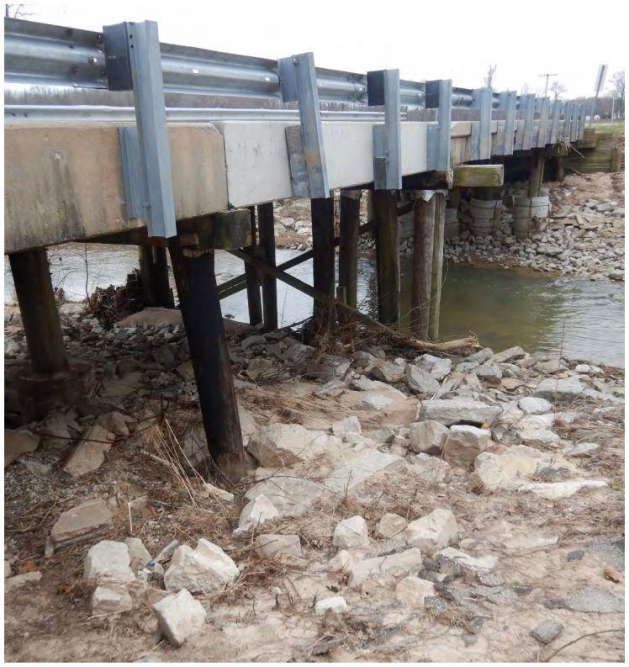


Subsurface Investigation Geotechnical Data Report

SR-436 over Reedy Creek (Bridge No. 1)

PIN No.: 128113.01
GES No.: 0933218

Carroll County, TN
June 20, 2019

APPROVED
07/03/2019

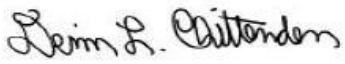
June 20, 2019

Mr. Travis Smith, P.E.
Civil Engineering Manager I
Materials & Tests Division
Tennessee Department of Transportation
6601 Centennial Boulevard
Nashville, Tennessee 37243

Dear Mr. Smith,

We have completed the *Subsurface Investigation Geotechnical Data Report* for the Bridge Replacement on SR-436 over Reedy Creek in Carroll County, Region 4 (Bridge No. 1). Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering and geological services to the Tennessee Department of Transportation.

Sincerely,
HDR



Devin L. Chittenden, P.E.
Senior Geotechnical Engineer



Bret O. Watkins, P.G.
Senior Geologist

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Appendix C: Laboratory Testing
Appendix D: Preliminary Soil Shear Strength Loss Analysis

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Executive Summary

The proposed project entails the replacement of an existing two-lane bridge along SR-436 near log mile 0.68 in Carroll County, TN. The new bridge will be offset immediately west of the existing four-span concrete channel beam-supported bridge, to be constructed with a 90-ft single span over Reedy Creek, beginning at Station 59+49.00 and ending at Station 60+39.00.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein. Bedrock was not encountered within the advanced borings.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design/build team for the proposed bridge along SR-436 near log mile 0.68 over Reedy Creek in Carroll County, TN. The proposed 90-ft single span bridge begins at Station 59+49.00 and ends at Station 60+39.00. Due to a roadway alignment change, the proposed bridge will be offset immediately west of the existing four span concrete channel beam bridge currently supported with timber piles. Borings were advanced and soil samples were collected and delivered to the HDR laboratory for further testing and analysis. Geotechnical parameters and foundation recommendations are provided in this report resulting from the evaluations of soil conditions at the proposed bridge site.

2 Subsurface Exploration

A subsurface investigation was conducted at this site by HDR and sub-consultants in May 2019. The exploration program included two Standard Penetration Test (SPT) borings advanced to a depth of 100-ft bgs. The borings were advanced with a CME-45C track-mounted rig on opposite ends of the existing bridge, offset to proposed roadway centerline. In addition, one piezoCone Penetrometer Test (CPT) boring was advanced by track-mounted box rig with 20-ton reaction mass near the north bridge abutment to cone refusal depth. Test boring locations are depicted on the Bridge Boring Plan and Profile Sheets provided in Appendix A, and tabulated below:

Table 2-1. Test Boring Locations

Test Hole Number	Location	Station	Offset	Depth
B-1	South Abutment	59+46	12-ft LT	100-ft
B-2	North Abutment	60+55	23-ft LT	100-ft
CPT-1	North Abutment	60+55	17-ft LT	69-ft

SPT's were obtained at two-foot intervals in the top ten feet and at five foot intervals until reaching termination depths. SPT borings were logged for blow counts, soil types, sample recoveries, and boring metrics. CPT piezoCone readings of depth, tip resistance, sleeve friction, friction ratio, and pore water pressure were collected on a continuous basis as the cone was advanced at a rate of 2cm/sec until refusal was met at 69.3-ft bgs. Seismic velocity measurements were also collected in the CPT boring at 5-ft intervals. Logs from borings B-1 and B-2, as well as CPT results are provided in Appendix B. All soil specimens were delivered to HDR for laboratory testing. Soil samples were subjected to laboratory analysis, including the following tests:

Atterberg Limits AASHTO T-89 and T-90

Sieve Analysis	ASTM D-1140
Natural Moisture Content	AASHTO T-265
Standard Proctor	AASHTO T-99
pH Testing	AASHTO T-288
Resistivity	ASTM G-187

Laboratory testing reports are provided in Appendix C.

3 Geology, Soils, and Site Conditions

The proposed bridge site is topographically depicted on the Trezevant East, Tennessee 7.5-minute topographic quadrangle map as situated in an area of low to moderate relief, within the local floodplain of Reedy Creek, which drains to the west and north. Approximate bridge deck elevations range from 390-ft to 395-ft, with nearby ridge line elevations over 500-ft to creek bottom elevations of 382 to 385-ft.

The project bridge site is located within the Gulf Coastal Plain Physiographic Province of Western Tennessee. The Mississippi Embayment – a large fluvial floodplain with relatively flat to gently sloping topography providing drainage over much of the central and eastern portions of North America – forms the northern portion of this province. The Embayment was initially formed as a topographic low during the Proterozoic, precipitated by crustal weaknesses that created many structural deformities including the Reelfoot Rift of the New Madrid Seismic Zone. By the end of the Paleozoic, much of the regional basin was infilled with shallow marine deposits, forming the base of the Embayment today as limestone, shale, and sandstones. Regional subsidence and deposition following the Paleozoic resulted in the thick accumulation of Mesozoic and younger unconsolidated strata that generally dip towards the Mississippi River, increasing in thickness to as much as 3000-ft thick, with strata becoming progressively younger towards the center of the basin.

Published mapping indicates the presence of Holocene alluvial sediments comprised of quartz-rich sands, silt, and clay that are poorly sorted and stratified. Generally finer-grained loess grades into coarser-grained sands and gravels with depth. Holocene alluvium is considered approximately 15 to 25-ft thick. The bridge approaches are supported atop this alluvium with roadway embankment fill, approximately 5 to 10-ft thick. The alluvium is supported with Eocene deltaic non-marine deposits of the Claiborne and Wilcox formations. Claiborne sediments are chiefly quartz sands crossbedded with lenses of clay, locally containing clay-ball conglomerates. Variations in lateral consistency are common in crossbedded sediments. Wilcox sediments are composed of interbedded/interlensing quartz sand, silt, and clay, with minor beds of lignite and siderite being common. Anticipated thickness of Eocene deposits is greater than 75-ft. It is believed Eocene deposits are further supported by Paleocene shallow marine deposits of glauconitic clay, with thin lenses of fine micaceous sands. Paleocene deposits are anticipated to be approximately 45 to 200-ft thick, and were not intercepted during this investigation. At this locality, Paleocene deposits are further supported by Upper Cretaceous sediments lying atop Paleozoic rocks at an approximate depth of 400 to 500-ft.

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1 and B-2. Fill was intercepted from the existing ground surface to approximately 7.5 to 9.0-ft deep. Field and laboratory classifications of recovered SPT samples indicate brown sandy gravels underlain with moderately plastic lean clays and silts (CL-ML, ML) with chert. Some wood fibers were noted in samples collected from 10-ft. SPT drives indicate very soft consistencies for the embankment fill.

Alluvium is interpreted as underlying the embankment fill in both of the advanced borings with an interpreted thickness range of 16-ft to 22.5-ft. Recovered samples indicate alluvium is dominantly reworked silt and clay (CL, ML, CL-ML) with traces to some fine grain sand and rare traces of coarser sand and gravel. Alluvial deposits exhibited slightly plastic to moderately plastic characteristics though a few samples exhibiting non-plastic characteristics were penetrated. SPT drives and laboratory testing of samples indicated very soft to stiff consistency for cohesive sediments that locally dominate the alluvial deposits. Natural moisture content of alluvial sediments ranges from 15.2 – 47.5 percent. The base of alluvium is believed to rest upon an angular unconformity surface eroded into the underlying Tertiary deposits (Claiborne Formation). This surface varied in elevation from 354.9 feet to 360.9 feet within advanced borings.

Claiborne Formation sediments underlying alluvial deposits were interpreted to a maximum of 85-ft below grade. Claiborne sediments were observed with thicknesses ranging from approximately 50-ft to 65-ft, and were predominantly composed of non-plastic to slightly plastic fine-grained sands, sandy silts with traces of clay (ML). SPT drives indicate stiff to very hard consistency for the partially cohesive sediments. Natural moisture contents generally ranged from 17 – 26 percent. These predominately cohesive sediments were penetrated to depths of 80-ft (elevation 281.8) to 85-ft (elevation 287.9) in borings B-1 and B-2, respectively, where Wilcox Formation sediments were identified by a sharp transition from the fine-grained sands and silts of the Claiborne to moderately plastic lean clays (CL) with relatively thick beds of black to dark brown lignite. Relative densities were observed as stiff to very stiff. The base of Wilcox deposits was not intercepted prior to boring termination depths.

No faulting was indicated on published mapping within the limits of the proposed alignment. Likewise recovered samples did not indicate the presence of faulting. The region surrounding the project area is located within an active seismic region (New Madrid Seismic Zone) and is considered one of the most active seismic regions in the country. Regional seismic events, both along the New Madrid Fault System and associated fault systems, have been and are continually documented throughout Western Tennessee, Western Kentucky, Southern Illinois, Southeastern Missouri and Northeastern Arkansas.

Groundwater was encountered within each of the bridge borings at the end of drilling operations. The immediate depth to groundwater was recorded as 5.4 to 11.8-ft (elev. 373.1-380.5) in borings B-2 and B-1, respectively. The generally interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed bridge foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A, with borehole test logs provided in Appendix B.

Table 3-1. Generalized Subsurface Conditions

Material Type/Formation	Elevation of Top Layer (ft)	Depth to Top Layer (ft)	USCS Soil Type	SPT-N values (bpf)
Embankment Fill	384.9-385.9	0	CL(A-6), ML(A-4)	0-3
Holocene Alluvium	376.9-377.4	7.5-9.0	ML(A-4)	2-17
Eocene-Claiborne	354.9-360.9	25.0-30.0	ML(A-4)	17-100
Eocene-Wilcox	304.9-300.9	80.0-85.0	CL(A-6)	14-29

In addition to lab classification testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils data for use by a structural engineer to provide any necessary protection to the piling, concrete, reinforcing steel, etc. Corrosion and deterioration protection requirements and guidelines for piling are set forth in LRFD Section 10.7.5. The corrosion and deterioration testing results are summarized in Table 3-2 below and are included in Appendix C.

Table 3-2. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth	pH	Resistivity (ohm·cm)
B-1	59+46	12-ft LT	0.0'-10.0'	6.5	1,720

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation:

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation:

- Resistivity less than 3,000 ohm-cm
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Results of the corrosion and deterioration testing indicated that the site has moderate potential for pile or steel reinforcement deterioration based on the resistivity value and the geographical location of the project site. Interpretation of the data and corrosion protection of the bridge structural components should be performed by the design build team.

4 Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Carroll County is considered vulnerable to severe ground shaking. The project site classifies as Site Class D based on the average CPT shear wave value (838.7 ft/s). The peak ground acceleration coefficient for this project site obtained from USGS (2009) is equal to 0.35g using Site Class D. S-wave response measurements (Vs) collected from the CPT boring observed values ranging from 393 – 660 ft/sec from 5-ft to 35-ft depths. From 40-ft to 65-ft depths, velocities increased to 1028 – 1396 ft/sec.

Preliminary analyses of the subsurface conditions in the SPT and CPT borings were performed to evaluate the likelihood of liquefaction during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger Soil Liquefaction during Earthquakes (2008) and using the Geologismiki software Cliq v.3.0.

Table 4-1. Soil Liquefaction Potential Results

Test Boring	Depth(ft)	Thickness(ft)	Average FS	Average LPI	Settlement (in)
B-1	6.25-8.75	2.5	0.99	N/A	0.0 (clay-like)
	8.75-17.5	8.75	0.71	N/A	3.23
	22.5-27.5	5.0	0.43	N/A	2.46
B-2	3.75-8.75	5.0	0.57	N/A	0.0 (clay-like)
CPT-1	8.69-18.54	9.85	0.55	0.18	4.17
	24.28-25.26	0.98	0.95	0.01	0.13
	42.98-44.13	1.15	0.74	0.04	0.33

Based on the results of the seismic hazard evaluation, it is believed the soils are susceptible to shear strength loss during the seismic event. The liquefiable layers present at the SPTs indicate layers ranging from 2.5’ to 8.75’ thick and settlement magnitudes of 5.48”. CPTs obtain continuous testing data at approximately 2-inch intervals and it is typically more appropriate to rely on CPT results more than SPT results during liquefaction analysis because they generate an improved soil model by localizing weaker zones susceptible to liquefaction. The liquefiable layers present at the CPTs indicate layers ranging from 0.98’ to 9.85’ thick and settlement magnitudes of 4.63”. Other seams of liquefiable material were present in the CPT results; however, it is common practice to eliminate layers of liquefaction less than 6” thick. The results of the preliminary soil shear strength loss analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered

preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. More detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment slopes, embankment settlements, retaining walls and bridge foundation types and capacities will be required to ensure a sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed bridge on SR-436 over Reedy Creek in Carroll County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

AASHTO, 2014; AASHTO LRFD Bridge Design Specifications Seventh Edition, 2014; Washington, DC, American Association of State Highway and Transportation Officials.

Boulanger, R.W., et al (2008); Soil Liquefaction during Earthquakes; Earthquake Engineering Research Institute.

USGS (1975). “Geologic Map showing upper Cretaceous, Paleocene, and lower and middle Eocene units and distributions of younger fluvial deposits in western Tennessee”; Parks, W.S. et al; US Geological Survey, Map I-916; scale 1:250,000.

USGS (2009). Earthquake Design Maps, AASHTO-2009. Online. URL: <https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=36.0144333&longitude=-88.539611&siteClass=D&title=Example> Accessed June 19, 2019.

USGS (2016). “Trezevant East, TN Topographic Quadrangle Map”, United States Geological Survey, 7.5 Minute Series; scale 1:24,000.

Hardeman, W.D., et al (1966). “Geologic Map of Tennessee – West Sheet”; Department of Environment and Conservation, Division of Geology; scale 1:250,000.

NRCS (2019). “Soil Map - Carroll County, Tennessee”, “Engineering Properties”, “Physical Soil Properties”; Web Soil Survey – National Cooperative Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

Appendix A: Plan and Boring Sheets

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
BR-STP-436(5)	2019	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION

PROP. R.O.W.

60

N

BEGIN PROP. BR.
STA. 59+49.00

END PROP. BR.
STA. 60+39.00

TOP OF CUT

SLOPE

TYPE 38 SLOPE

TYPE 38 SLOPE

TYPE 38 SLOPE

TYPE 38 SLOPE

BR1_B–2

BR1_CPT–1

BR1_B–1

SLOPE

TYPE 38 SLOPE

TYPE 38 SLOPE

TYPE 38 SLOPE

TYPE 38 SLOPE

N 9° 22′ 35″ E

EXISTING BRIDGE
TO BE REMOVED

TOE OF FILL

PROP. R.O.W.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 436 OVER REEDY CREEK
BRIDGE NO. 09-SR436-00.68
FED. ID NO. 09S82330001
CARROLL COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecraft DATE 05/19
SUPERVISED BY Bret Watkins DATE 05/19
CHECKED BY Kevin Walker DATE 05/31/19

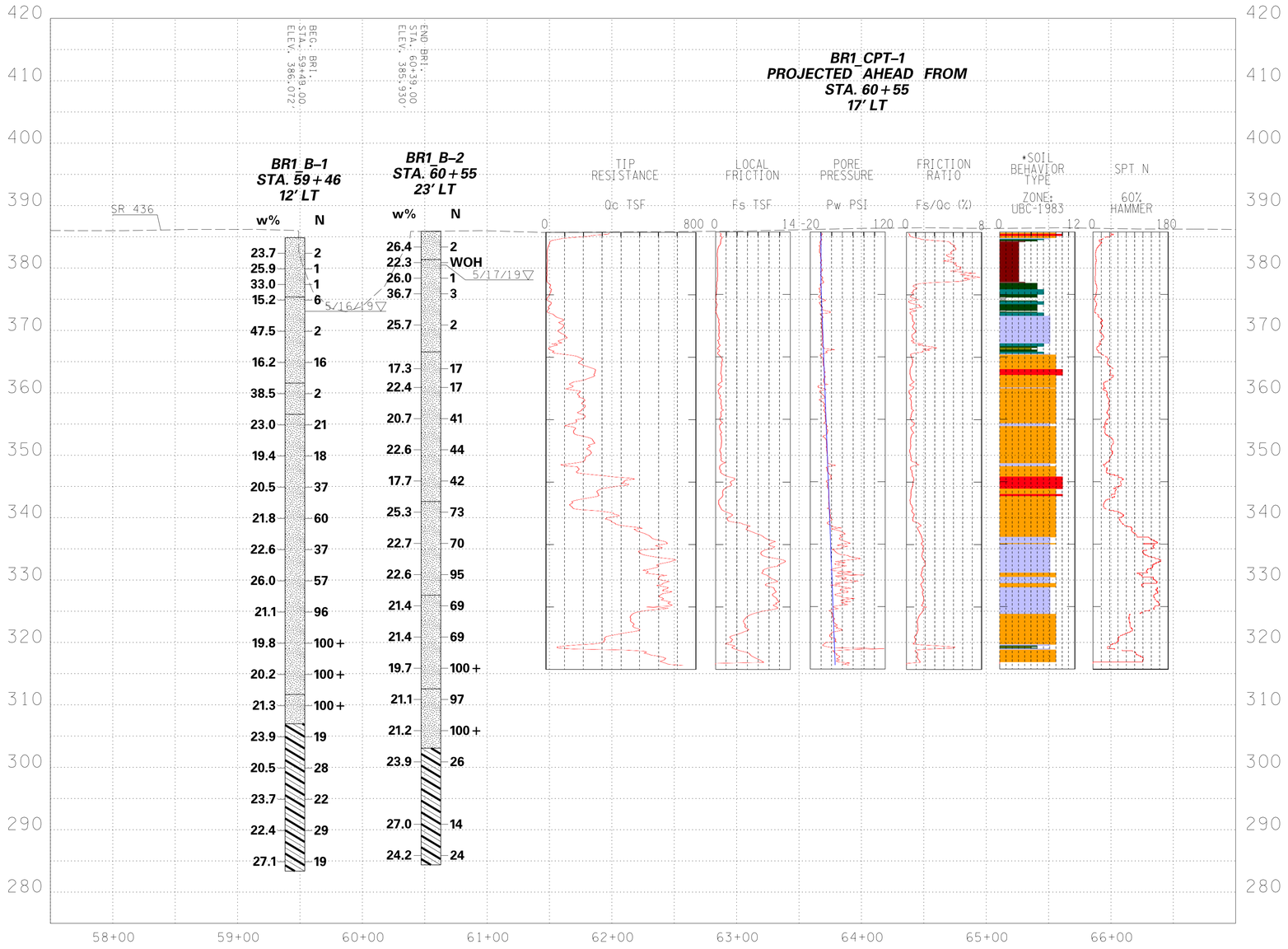
HDR

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
BR-STP-436(5)	2019	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



w%	N
23.7	2
25.9	1
33.0	1
15.2	6
47.5	2
16.2	16
38.5	2
23.0	21
19.4	18
20.5	37
21.8	60
22.6	37
26.0	57
21.1	96
19.8	100 +
20.2	100 +
21.3	100 +
23.9	19
20.5	28
23.7	22
22.4	29
27.1	19

w%	N
26.4	2
22.3	WOH
26.0	1
36.7	3
25.7	2
17.3	17
22.4	17
20.7	41
22.6	44
17.7	42
25.3	73
22.7	70
22.6	95
21.4	69
21.4	69
19.7	100 +
21.1	97
21.2	100 +
23.9	26
27.0	14
24.2	24

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS

ADDITIONAL ROCK SYMBOLS

SYMBOL	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	RANDOM BACKFILL	WEATHERED LIMESTONE	GRADED SOLID ROCK

SPT BORING LEGEND

○	ROCKLINE SOUNDINGS	RQD	ROCK QUALITY DESIGNATION
◕	DISTURBED SAMPLE BORING	REC	% CORE RECOVERED
◎	UNDISTURBED SAMPLE BORING	Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
⦿	UNDISTURBED SAMPLE BORING & ROCK CORE	Qu (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ROCK CORE)
●	ROCK CORE	UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
➡	APPROXIMATE PILE TIP ELEVATION	w%	MOISTURE CONTENT
▼(Date)	WATER ELEVATION	R	REFUSAL
✳	LIQUEFACTION OR SOIL STRENGTH LOSS IS PROBABLE AT THESE LOCATIONS	NR	REFUSAL NOT ENCOUNTERED
N	UNCORRECTED PENETRATION RESISTANCE		

CPT SOUNDINGS LEGEND

MAXIMUM DEPTH = 69.39 FEET

DEPTH INCREMENT = 0.164 FEET

1 SENSITIVE FINE GRAINED
2 ORGANIC MATERIAL
3 CLAY
4 SILTY CLAY TO CLAY
5 CLAYEY SILT TO SILTY CLAY
6 SANDY SILT TO CLAYEY SILT
7 SILTY SAND TO SANDY SILT
8 SAND TO SILTY SAND
9 SAND
10 GRAVELLY SAND TO SAND
11 VERY STIFF FINE GRAINED (•)
12 SAND TO CLAYEY SAND (•)

REFUSAL: REACTION

•SOIL BEHAVIOR TYPE AND SPT BASED ON DATA FROM UBC-1983

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 436 OVER REEDY CREEK
BRIDGE NO. 09-SR436-00.68
FED. ID NO. 09S82330001
CARROLL COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecroft DATE 05/19
SUPERVISED BY Bret Watkins DATE 05/19
CHECKED BY Kevin Walker DATE 05/31/19

HDR

Appendix B: Boring Logs & CPT Data

Sheet No. 1 of 2

State **Tennessee** Latitude **36.00024 °** Longitude **88.54389 °**

County **Carroll** Location **59+46 12' LT**

Project Name **SR-436 Over Reedy Creek** Surface Elevation **384.9 ft.**

Project Type **Subsurface Investigation** Dated Started **5/16/2019** Completed **5/16/2019**

Driller **D. Bowling** Logged by **B. Cayton** Depth to Water: Immediate **(After 30 min.) 11.8 ft.**

Hole Number **BR1_B-1** Total Depth **101.5 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
384.9 ft	0		*Ground Line*						
			Very soft, gray and brown, silt.		SS-1	2.5 4.0	0.3	1-1-1	SPT
380	5				SS-2	5.0 6.5	0.9	1-0-1	SPT
					SS-3	7.5 9.0	1.5	0-0-1	SPT
375	10		9.5						
			Very soft to very stiff, gray silt.		SS-4	10.0 11.5	0.8	2-3-3	SPT
370	15				SS-5	15.0 16.5	0.7	1-1-1	SPT
365	20				SS-6	20.0 21.5	0.7	1-8-8	SPT
			23.3						
360	25		Very soft, gray, sandy silt.		SS-7	25.0 26.5	1.3	0-0-2	SPT
			28.3						
355	30		Very stiff to hard, brown, white and gray, silt.		SS-8	30.0 31.5	1.2	8-10-11	SPT
350	35				SS-9	35.0 36.5	1.1	7-11-7	SPT
345	40				SS-10	40.0 41.5	1.0	6-18-19	SPT
340	45				SS-11	45.0 46.5	1.0	19-28-32	SPT
335	50				SS-12	50.0 51.5	1.0	5-13-24	SPT
330	55				SS-13	55.0 56.5	1.0	11-25-32	SPT
325	60								

State	**Tennessee**	Latitude	**36.00024 °** Longitude **88.54389 °**
County	**Carroll**	Location	**59+46 12' LT**
Project Name	**SR-436 Over Reedy Creek**	Surface Elevation	**384.9 ft.**
Project Type	**Subsurface Investigation**	Dated Started	**5/16/2019** Completed **5/16/2019**
Driller	**D. Bowling** Logged by **B. Cayton**	Depth to Water: Immediate	**(After 30 min.) 11.8 ft.**
Hole Number	**BR1_B-1** Total Depth **101.5 ft.**	Depth to Water	Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
324.9 ft	60		*Continued from previous page*						
					SS-14	60.0 61.5	1.0	32-46-50	SPT
320	65				SS-15	65.0 66.4	1.2	25-44-50/0.4	SPT
315	70				SS-16	70.0 71.3	1.2	16-42-50/0.3	SPT
				73.2'					
310	75		Hard, light brown, silt.		SS-17	75.0 75.8	0.7	28-50/0.3-	SPT
				77.9'					
305	80		Very stiff, gray, lean clay.		SS-18	80.0 81.5	1.5	4-8-11	SPT
300	85				SS-19	85.0 86.5	1.5	7-13-15	SPT
295	90				SS-20	90.0 91.5	1.5	7-9-13	SPT
290	95				SS-21	95.0 96.5	1.5	7-13-16	SPT
285	100				SS-22	100.0 101.5	1.5	6-8-11	SPT
				101.5'					
280	105		Boring Terminated @ 101.5' (Elev. 283.4). Bulk sample obtained from 0.0'-10.0'. Switched to smaller bit at 60.0'. Boring relocated due to ditch. Boring elevation estimated from field observation and roadway profile.						
275	110								
270	115								
265	120								

Sheet No. 1 of 2

State	**Tennessee**	Latitude	**36.00024 °**
County	**Carroll**	Location	**60+55 23' LT**
Project Name	**SR-436 Over Reedy Creek**	Surface Elevation	**385.9 ft.**
Project Type	**Subsurface Investigation**	Dated Started	**5/17/2019**
Driller	**D. Bowling**	Logged by	**B. Cayton**
Hole Number	**BR1_B-2**	Total Depth	**101.5 ft.**

Longitude **88.53344 °**

Completed **5/17/2019**

Depth to Water: Immediate **(After 30 min.) 5.4 ft.**

Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
385.9 ft	0		*Ground Line*						
385			Very soft, brown, silt.		SS-1	2.5 4.0	0.8	1-1-1	SPT
	5								
380			Very soft to soft, brown and gray, lean clay.		SS-2	5.0 6.5	0.6	0-0-0	SPT
					SS-3	7.5 9.0	1.0	0-0-1	SPT
	10								
375					SS-4	10.0 11.5	0.1	1-1-2	SPT
	15								
370					SS-5	15.0 16.5	1.2	1-0-2	SPT
			19.3'						
	20		Very stiff to hard, gray and brown silt.		ST-1	20.0 22.0	0.0		ST
365					SS-6	23.5	1.1	2-6-11	SPT
					SS-7	25.0 26.5	0.7	3-8-9	SPT
	25								
360									
	30				SS-8	30.0 31.5	1.1	8-17-24	SPT
355									
	35				SS-9	35.0 36.5	1.0	12-21-23	SPT
350									
	40				SS-10	40.0 41.5	1.1	11-21-21	SPT
345			43.3'						
			Hard, gray, silt.		SS-11	45.0 46.5	1.1	18-36-37	SPT
	45								
340									
	50				SS-12	50.0 51.5	1.2	22-34-36	SPT
335									
	55				SS-13	55.0 56.5	1.3	25-45-50/0.5	SPT
330			58.3'						
	60		Hard, gray and brown silt.						

State **Tennessee** Latitude **36.00024 °** Longitude **88.53344 °**

County **Carroll** Location **60+55 23' LT**

Project Name **SR-436 Over Reedy Creek** Surface Elevation **385.9 ft.**

Project Type **Subsurface Investigation** Dated Started **5/17/2019** Completed **5/17/2019**

Driller **D. Bowling** Logged by **B. Cayton** Depth to Water: Immediate **(After 30 min.) 5.4 ft.**

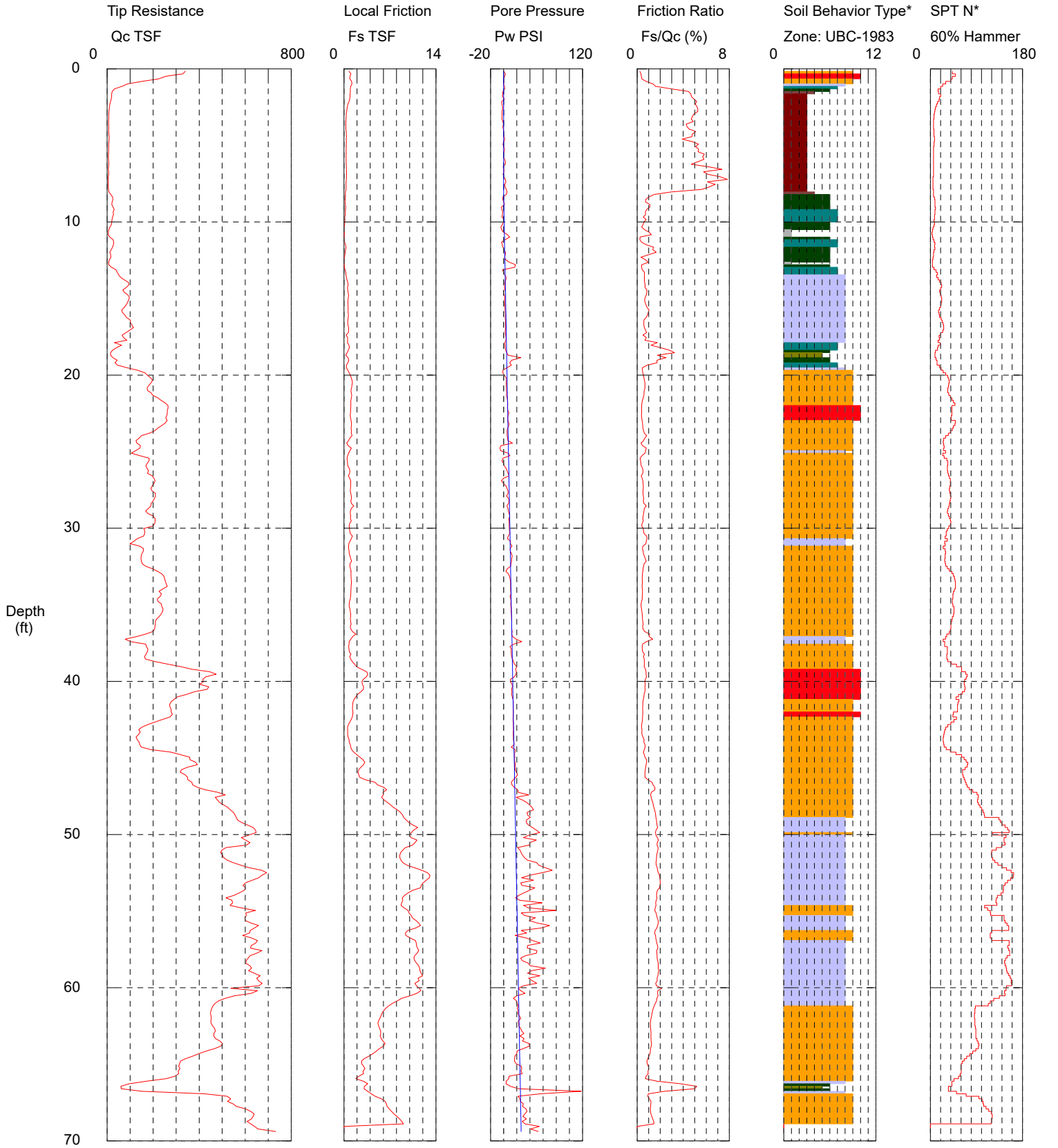
Hole Number **BR1_B-2** Total Depth **101.5 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
325.9 ft	60		*Continued from previous page*						
325					SS-14	60.0 61.5	1.3	13-31-38	SPT
320	65				SS-15	65.0 66.5	1.2	11-28-41	SPT
315	70				SS-16	70.0 71.0	1.0	28-50/0.5-	SPT
				73.3'					
310	75		Hard, red, brown and gray silt.		SS-17	75.0 76.5	1.5	20-47-50/0.5	SPT
305	80				SS-18	80.0 80.6	0.5	48-50/0.1-	SPT
				82.8'					
300	85		Stiff to very stiff, gray, sandy, lean clay.		SS-19	85.0 86.5	1.5	8-12-14	SPT
295	90				ST-2	90.0 91.3	1.0		ST
290	95				SS-20	95.0 96.5	1.2	3-7-7	SPT
285	100				SS-21	100.0 101.5	1.3	7-11-13	SPT
				101.5'					
280	105		Boring Terminated @ 101.5' (Elev. 284.4). Bulk sample obtained from 0.0'-10.0'. Boring relocated to minimize impact to traffic. Boring elevation estimated from field observation and roadway profile.						
275	110								
270	115								
	120								

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR1CPT-1
Cone Used: DDG1210
GPS Data: N36.01463 W88.53963

CPT Date/Time: 5/18/2019 8:40:38 AM
Location: REEDY CREEK-CARROLL CO
Job Number: M19-167
Groundwater: Sounding collapsed and wet at 8.2-ft.



Maximum Depth = 69.39 feet

Depth Increment = 0.164 feet

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

Refusal: Reaction.

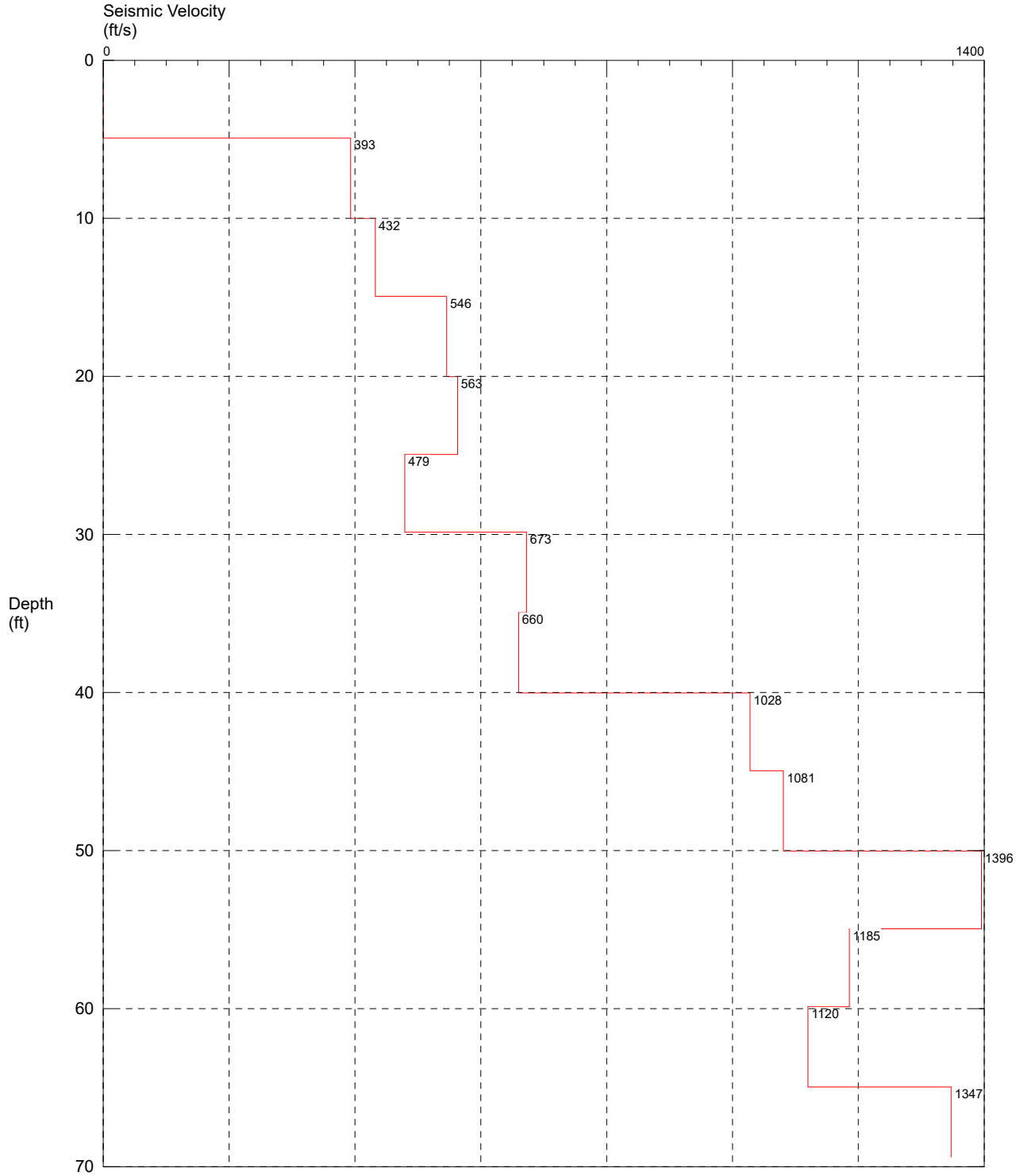
*Soil behavior type and SPT based on data from UBC-1983

SOUNDING

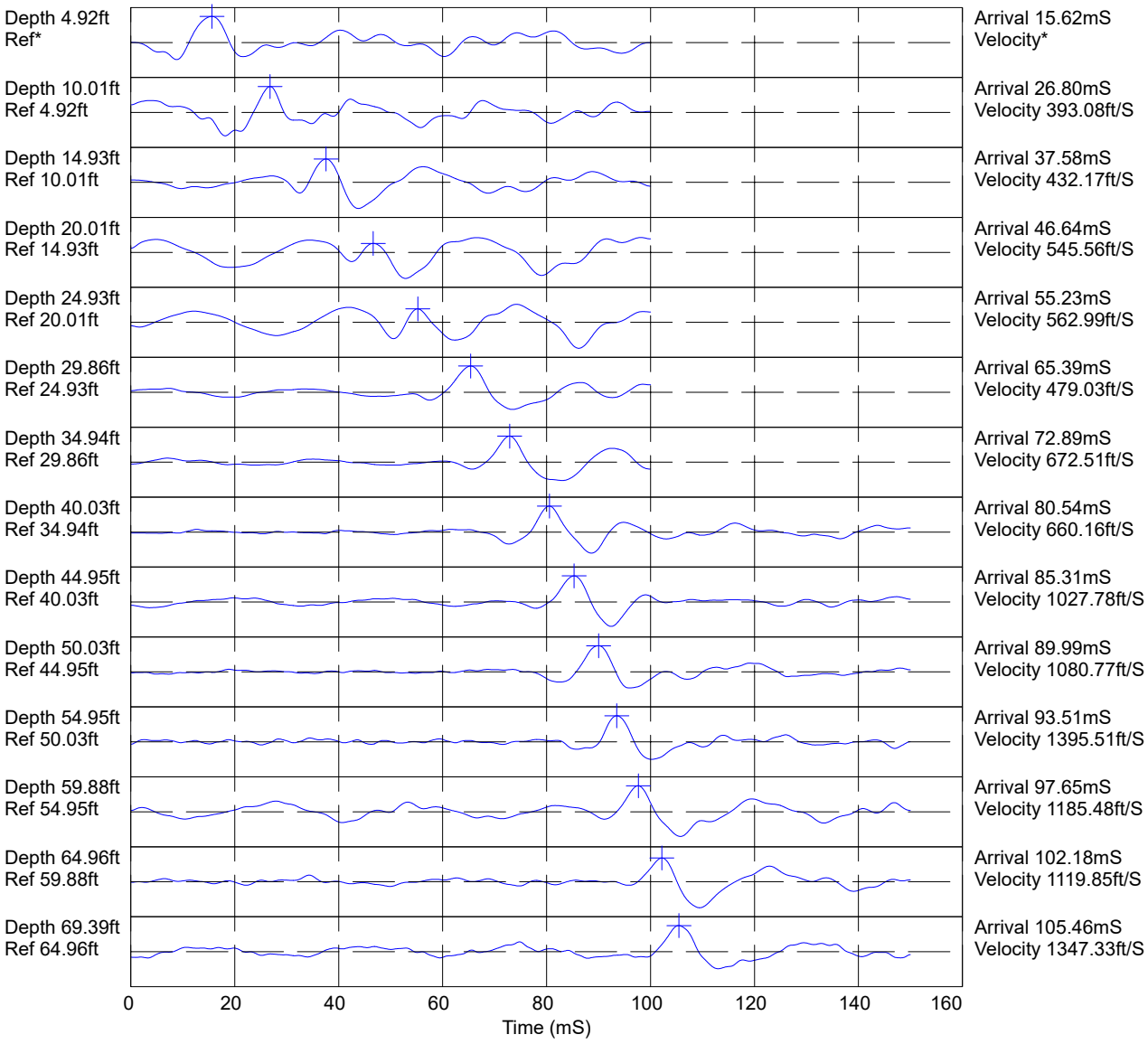
CUSTOMER: Southern Earth Science Inc
OPERATOR: Brandon Green
CONE ID: DDG1210
FILENAME: M19-167BR1CPT-1.cpt

JOB NUMBER: M19-167
HOLE NUMBER: BR1CPT-1
TEST DATE: 5/18/2019 8:40:38 AM

COMMENT:
GPS (LAT,LON,ALT): 0.00,0.00,0.0
LOCATION: REEDY CREEK-CARROLL CO



HOLE NUMBER: BR1CPT-1



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

Appendix C: Laboratory Testing

Project Name : State Rt 436 over South Fork Obion Rive
Location : Carroll County, TN
Job Number : 10168887

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1	B-1		SS-1	2.5	4.0	Gray & Brown Lean Clay		23.7
1			SS-2	5.0	6.5	Brown Lean Clay		25.9
1			SS-3	7.5	9.0	Gray Lean Clay		33.0
2			SS-4	10.0	11.5	Gray Silt		15.2
2			SS-5	15.0	16.5	Gray Silt		47.5
2			SS-6	20.0	21.5	Gray Silt		16.2
3			SS-7	25.0	26.5	Gray Sandy Silt		38.5
4			SS-8	30.0	31.5	Brown & White Silt		23.0
4			SS-9	35.0	36.5	Brown & White Silt		19.4
4			SS-10	40.0	41.5	Brown & Gray Silt		20.5
4			SS-11	45.0	46.5	Brown & Gray Silt		21.8
4			SS-12	50.0	51.5	Gray Silt		22.6
4			SS-13	55.0	56.5	Gray Silt		26.0
4			SS-14	60.0	61.5	Gray Silt		21.1
4			SS-15	65.0	66.4	Gray & Brown Silt		19.8
4			SS-16	70.0	71.3	Brown Silt		20.2
5			SS-17	75.0	75.8	Light Brown Silt		21.3
6			SS-18	80.0	81.5	Gray Lean Clay		23.9
6			SS-19	85.0	86.5	Gray Lean Clay		20.5
6			SS-20	90.0	91.5	Gray Lean Clay		23.7
6			SS-21	95.0	96.5	Gray Lean Clay		22.4
6			SS-22	100.0	101.5	Gray Lean Clay		27.1
			Bulk-1	0.0	10.0	Dark Brown & Dark Blueish Gray		22.1
7	B-2		SS-1	2.5	4.0	Brown Lean Clay		26.4
8			SS-2	5.0	6.5	Brown Lean Clay		22.3
8			SS-3	7.5	9.0	Brown & Gray Lean Clay		26.0
8			SS-4	10.0	11.5	Gray Lean Clay		36.7
8			SS-5	15.0	16.5	Gray Lean Clay		25.7
9			SS-6	22.0	23.5	Gray Silt		17.3
9			SS-7	25.0	26.5	Brown Silt		22.4
9			SS-8	30.0	31.5	Brown & Gray Silt		20.7
9			SS-9	35.0	36.5	Gray Silt		22.6
9			SS-10	40.0	41.5	Brown Silt		17.7
10			SS-11	45.0	46.5	Gray Silt		25.3
10			SS-12	50.0	51.5	Gray Silt		22.7
10			SS-13	55.0	56.5	Gray Silt		22.6
11			SS-14	60.0	61.5	Gray & Brown Silt		21.4
11			SS-15	65.0	66.5	Brown Silt		21.4
11			SS-16	70.0	71.5	Brown Silt		19.7
12			SS-17	75.0	76.5	Red & Brown Silt		21.1
12			SS-18	80.0	80.6	Gray Silt		21.2
13			SS-19	85.0	86.5	Gray Sandy Lean Clay		23.9
13			SS-20	95.0	96.5	Gray Sandy Lean Clay		27.0
13			SS-21	100.0	101.5	Gray Sandy Lean Clay		24.2

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-2
Project County	:	Carroll	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Brown Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	25.9
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	32
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	22
		Plasticity Index	:	10
AASHTO Composition of Total Sample: M145		Liquidity Index	:	0.40
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (10) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	CL *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 1

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-4
Project County	:	Carroll	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 10.0' to 11.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Gray Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	15.2
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	NP
		Plasticity Index	:	NP
AASHTO Composition of Total Sample: M145		Liquidity Index	:	NA
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	ML *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 2

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-7
Project County	:	Carroll	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 25.0' to 26.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Gray Sandy Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.8
1/4		6.3	mm	
No.4		4.75	mm	99.6
No.6		3.35	mm	
No.10		2	mm	99.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.0
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0328	mm	35.8
Hyd. Rd.	# 2	0.0217	mm	22.6
Hyd. Rd.	# 3	0.0129	mm	12.4
Hyd. Rd.	# 4	0.0093	mm	6.1
Hyd. Rd.	# 5	0.0067	mm	3.7
Hyd. Rd.	# 6	0.0033	mm	0.0
Hyd. Rd.	# 7	0.0014	mm	0.0

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.063 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 38.5
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 23
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 23
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Sp. Gr. (AASHTO T100)	: 2.645
			AASHTO Classification: M145	: A-4 (0)
			ASTM Classification: D2487	: ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	:	0.6
Coarse Sand (-No.10 + No.40)	:	4.0
Fine Sand (-No.40 + No.200)	:	41.4
Silt (-No.200 + 0.002mm)	:	54.0
Clay (-0.002mm + 0.001mm)	:	0.0
Colloids (-0.001mm)	:	0.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.4
Coarse Sand (-No.4 + No.10)	:	0.2
Medium Sand (-No.10 + No.40)	:	4.0
Fine Sand (-No.40 + No.200)	:	41.4
Silt (-No.200 + 0.005mm)	:	51.8
Clay (-0.005mm + 0.001mm)	:	2.2
Colloids (-0.001mm)	:	0.0

Approved By : Kevin E. Walker

Soil No. 3

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-8
Project County	:	Carroll	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 30.0' to 31.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Black & White Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	23.0
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	NP
		Plasticity Index	:	NP
AASHTO Composition of Total Sample: M145		Liquidity Index	:	NA
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	ML *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 4

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-17
Project County	:	Carroll	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 75.0' to 75.8'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Light Brown Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	21.3
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	19
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	17
		Plasticity Index	:	2
AASHTO Composition of Total Sample: M145		Liquidity Index	:	2.31
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	ML *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 5

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-18
Project County	:	Carroll	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 80.0' to 81.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Gray Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	89.9
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0294	mm	70.6
Hyd. Rd.	# 2	0.0192	mm	62.5
Hyd. Rd.	# 3	0.0115	mm	53.2
Hyd. Rd.	# 4	0.0083	mm	48.8
Hyd. Rd.	# 5	0.0060	mm	41.4
Hyd. Rd.	# 6	0.0031	mm	30.3
Hyd. Rd.	# 7	0.0013	mm	20.1

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.009 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	23.9
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	37
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	19
		Plasticity Index	:	18
AASHTO Composition of Total Sample: M145		Liquidity Index	:	0.26
Gravel (3in. + No.10)	: 0.0	Activity	:	0.72
Coarse Sand (-No.10 + No.40)	: 0.3	Sp. Gr. (AASHTO T100)	:	2.604
Fine Sand (-No.40 + No.200)	: 9.8	AASHTO Classification: M145	:	A-6 (16)
Silt (-No.200 + 0.002mm)	: 64.8	ASTM Classification: D2487	:	CL
Clay (-0.002mm + 0.001mm)	: 7.2			
Colloids (-0.001mm)	: 17.9			

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 0.3
Fine Sand (-No.40 + No.200)	: 9.8
Silt (-No.200 + 0.005mm)	: 51.6
Clay (-0.005mm + 0.001mm)	: 20.4
Colloids (-0.001mm)	: 17.9

Approved By : Kevin E. Walker

Soil No. 6

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-1
Project County	:	Carroll	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 2.5' to 4.0'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Brown Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	26.4
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	27
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	17
		Plasticity Index	:	10
AASHTO Composition of Total Sample: M145		Liquidity Index	:	0.96
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (8) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	CL *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 7

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-5
Project County	:	Carroll	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 15.0' to 16.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Gray Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	98.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	88.5
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0289	mm	72.1
Hyd. Rd.	# 2	0.0193	mm	58.8
Hyd. Rd.	# 3	0.0118	mm	43.3
Hyd. Rd.	# 4	0.0085	mm	37.9
Hyd. Rd.	# 5	0.0062	mm	30.4
Hyd. Rd.	# 6	0.0031	mm	24.4
Hyd. Rd.	# 7	0.0013	mm	20.2

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.015 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 25.7
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: 39
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: 22
		Plasticity Index	: 17
AASHTO Composition of Total Sample: M145		Liquidity Index	: 0.20
Gravel (3in. + No.10)	: 0.0	Activity	: 0.76
Coarse Sand (-No.10 + No.40)	: 1.9	Sp. Gr. (AASHTO T100)	: 2.650
Fine Sand (-No.40 + No.200)	: 9.6	AASHTO Classification: M145	: A-6 (16)
Silt (-No.200 + 0.002mm)	: 66.3	ASTM Classification: D2487	: CL
Clay (-0.002mm + 0.001mm)	: 4.1		
Colloids (-0.001mm)	: 18.1		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 1.9
Fine Sand (-No.40 + No.200)	: 9.6
Silt (-No.200 + 0.005mm)	: 60.0
Clay (-0.005mm + 0.001mm)	: 10.4
Colloids (-0.001mm)	: 18.1

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Soil No. 8

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-8
Project County	:	Carroll	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 30.0' to 31.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Brown & Gray Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	20.7
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	NP
		Plasticity Index	:	NP
AASHTO Composition of Total Sample: M145		Liquidity Index	:	NA
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	ML *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 9

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-13
Project County	:	Carroll	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Gray Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	22.6
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	NP
		Plasticity Index	:	NP
AASHTO Composition of Total Sample: M145		Liquidity Index	:	NA
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	ML *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

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Soil No. 10

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River			
Project No.	:	10168881	Sample No.	:	SS-15
Project County	:	Carroll	Sample Loc.	:	Boring No. B-2
Project State	:	Tennessee	Sample Depth	:	65.0' to 66.5'
Laboratory No.	:	10168881	Date Tested	:	05/22/19
Submitted By	:	HDR	Date Reported	:	05/28/19
Soil Type	:	Brown Silt			

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	:	21.4
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	:	NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	:	NP
			Plasticity Index	:	NP
AASHTO Composition of Total Sample: M145			Liquidity Index	:	NA
Gravel (3in. + No.10)	:		Activity	:	NA
Coarse Sand (-No.10 + No.40)	:		Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:		AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:		ASTM Classification: D2487	:	ML *
			* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	
Fine Gravel (-3/4in. + No.4)	:	
Coarse Sand (-No.4 + No.10)	:	
Medium Sand (-No.10 + No.40)	:	
Fine Sand (-No.40 + No.200)	:	
Silt + Clay (-No.200)	:	

Approved By : Kevin E. Walker

Soil No. 11

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-17
Project County	:	Carroll	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 75.0' to 76.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Red & Brown Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	21.1
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	19
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	17
		Plasticity Index	:	2
AASHTO Composition of Total Sample: M145		Liquidity Index	:	1.95
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (0) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	ML *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 12

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SOIL CLASSIFICATION

Project Name	:	State Rt 436 over South Fork Obion River		
Project No.	:	10168881	Sample No.	: SS-20
Project County	:	Carroll	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 95.0' to 96.5'
Laboratory No.	:	10168881	Date Tested	: 05/22/19
Submitted By	:	HDR	Date Reported	: 05/28/19
Soil Type	:	Gray Sandy Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	98.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	64.0
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0326	mm	40.9
Hyd. Rd.	# 2	0.0208	mm	37.8
Hyd. Rd.	# 3	0.0123	mm	32.7
Hyd. Rd.	# 4	0.0088	mm	28.3
Hyd. Rd.	# 5	0.0063	mm	24.0
Hyd. Rd.	# 6	0.0032	mm	15.0
Hyd. Rd.	# 7	0.0013	mm	12.9

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.045 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 27.0
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 29
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 18
			Plasticity Index	: 11
			Liquidity Index	: 0.78
			Activity	: 0.80
			Sp. Gr. (AASHTO T100)	: 2.611
			AASHTO Classification: M145	: A-6 (5)
			ASTM Classification: D2487	: CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	:	0.5
Coarse Sand (-No.10 + No.40)	:	0.6
Fine Sand (-No.40 + No.200)	:	34.9
Silt (-No.200 + 0.002mm)	:	50.2
Clay (-0.002mm + 0.001mm)	:	2.4
Colloids (-0.001mm)	:	11.4

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.5
Medium Sand (-No.10 + No.40)	:	0.6
Fine Sand (-No.40 + No.200)	:	34.9
Silt (-No.200 + 0.005mm)	:	43.2
Clay (-0.005mm + 0.001mm)	:	9.4
Colloids (-0.001mm)	:	11.4

Approved By : Kevin E. Walker

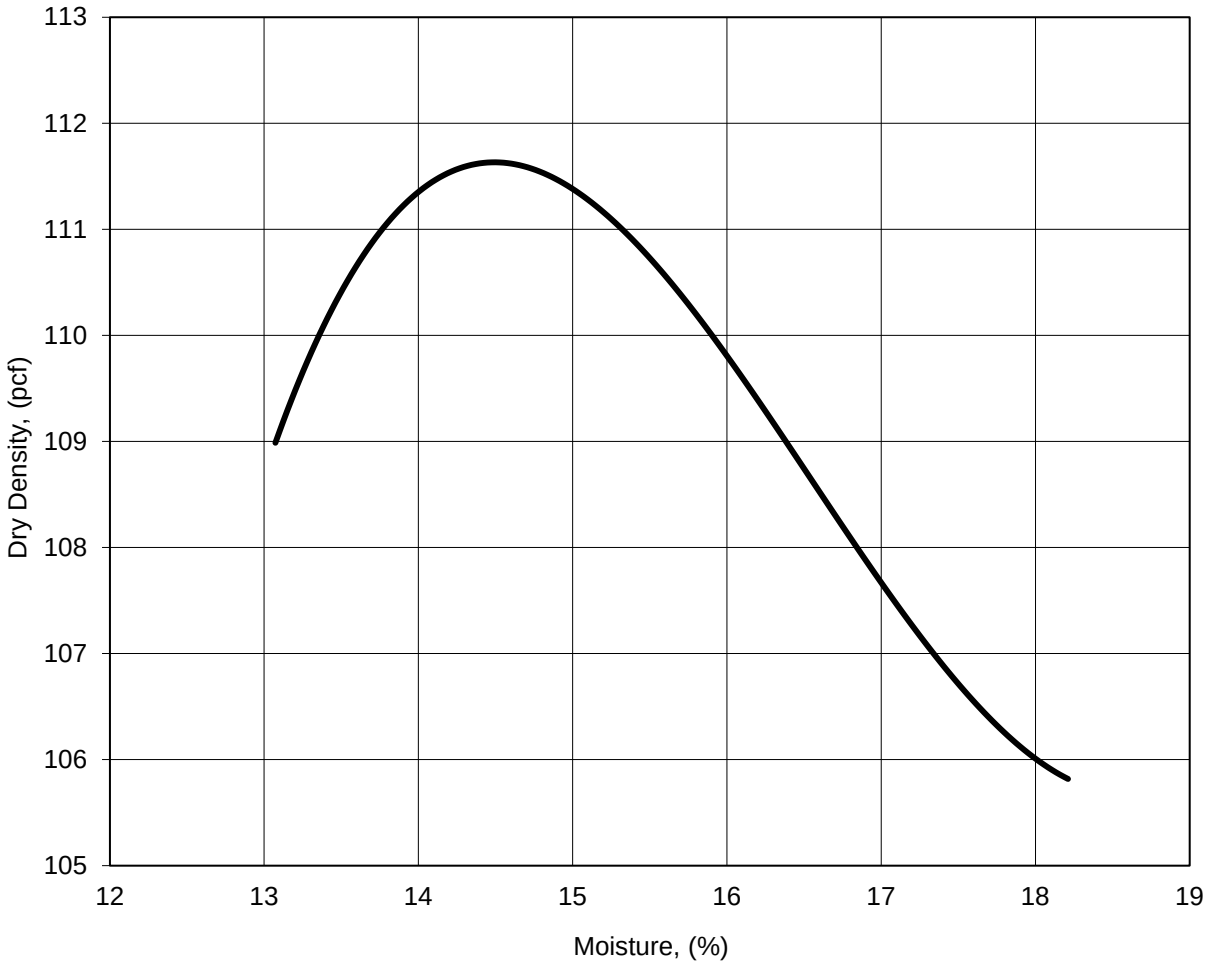
Soil No. 13

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MOISTURE-DENSITY RELATIONSHIP

Project Name	:	State Rt 436 over South Fork Obion River			
Project No.	:	10168881	Sample No.	:	Bulk 1
Project County	:	Carroll	Sample Loc.	:	Boring No. B-1
Project State	:	Tennessee	Sample Depth	:	0.0' to 10.0'
Laboratory No.	:	10168881	Date Tested	:	05/22/19
Submitted By	:	HDR	Date Reported	:	05/28/19
Soil Type	:				



MAXIMUM DENSITY: 111.6 pcf

OPTIMUM MOISTURE: 14.5 %

COMMENTS: AASHTO: T-99; Method (A)

APPROVED BY: KW

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Table 1 - Laboratory Tests on Soil Sample

HDR-ICA
TDOT Bridge 1
Your #10168881, HDR Lab #19-0314LAB
30-May-19

Sample ID			B-1 Bulk 1 @ 0-10'
Resistivity		**Units**	
as-received		ohm-cm	1,760
saturated		ohm-cm	1,720
pH			6.5
Electrical Conductivity		mS/cm	na
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	na
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

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

Appendix D: Preliminary Soil Shear Strength Loss Analysis Results

TABLE OF CONTENTS

BR1CPT-1 results

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HDR
4645 Village Square Drive, Suite F
Paducah, KY 42001

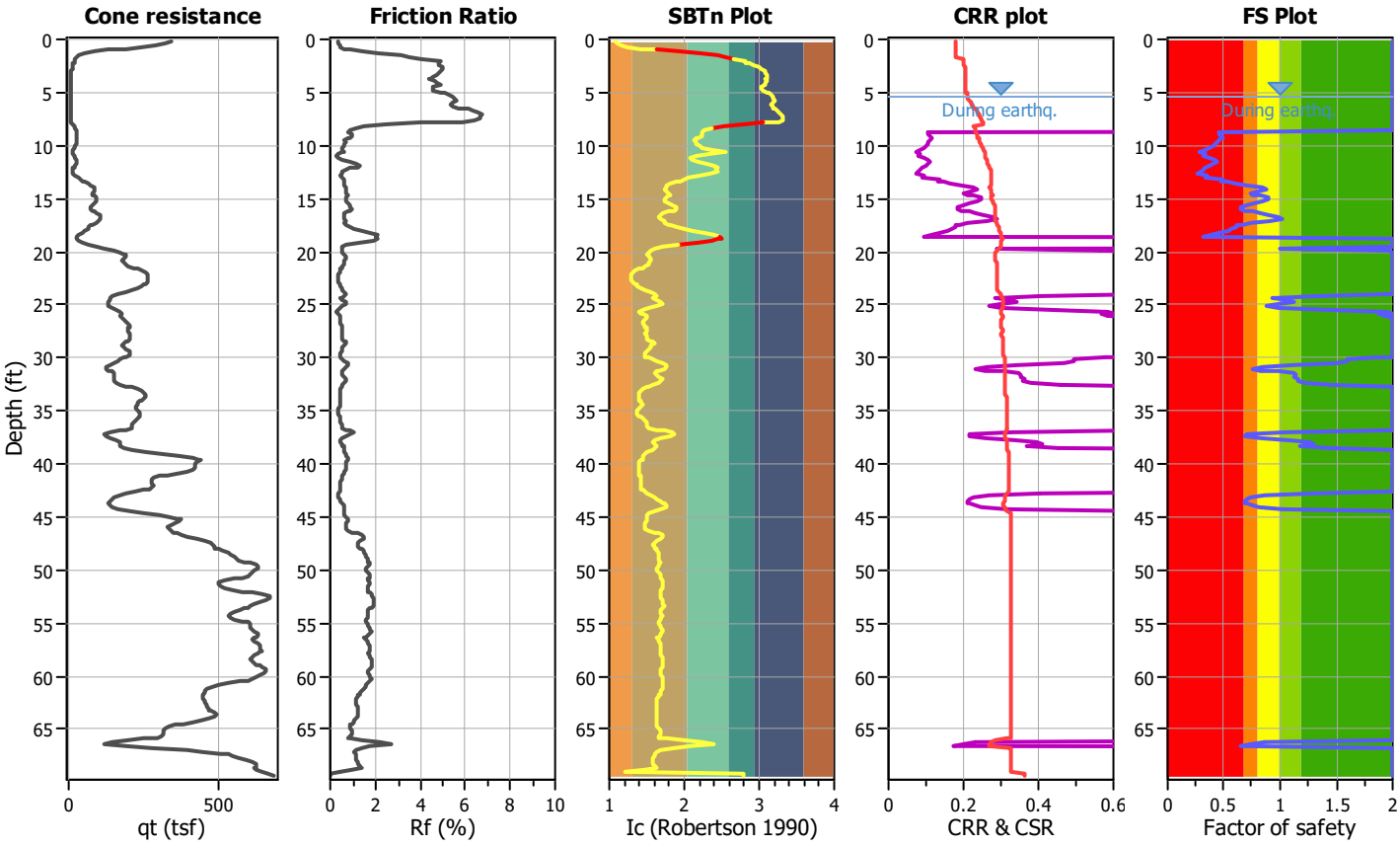
LIQUEFACTION ANALYSIS REPORT

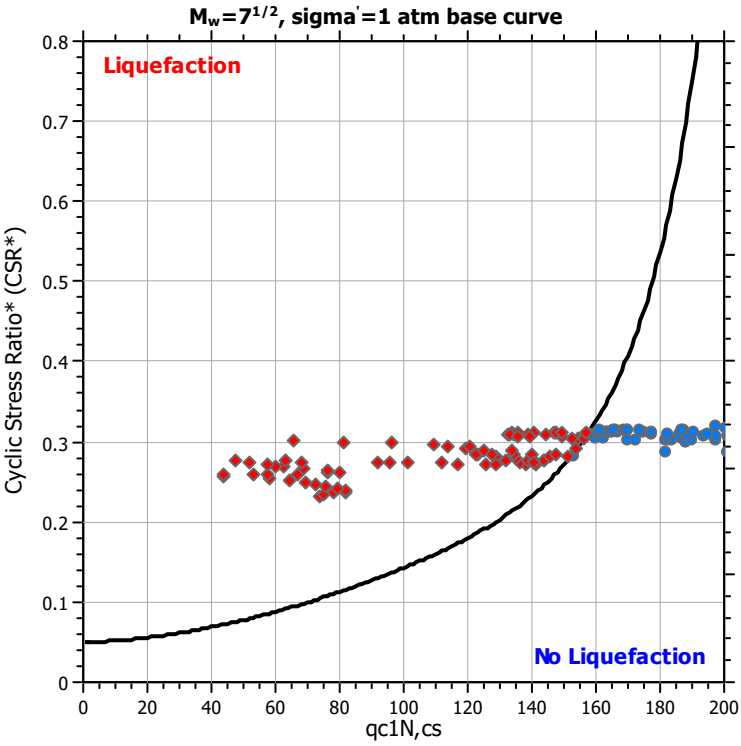
Project title : Bridge 1 - TDOT Region 4 Bridge Bundle **Location : Carroll County, TN**

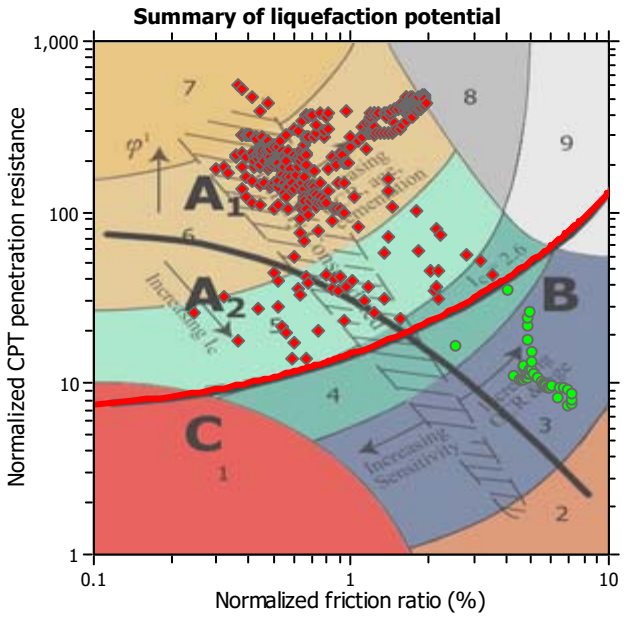
CPT file : BR1CPT-1

Input parameters and analysis data

Analysis method:	I&B (2008)	G.W.T. (in-situ):	5.40 ft	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	5.40 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

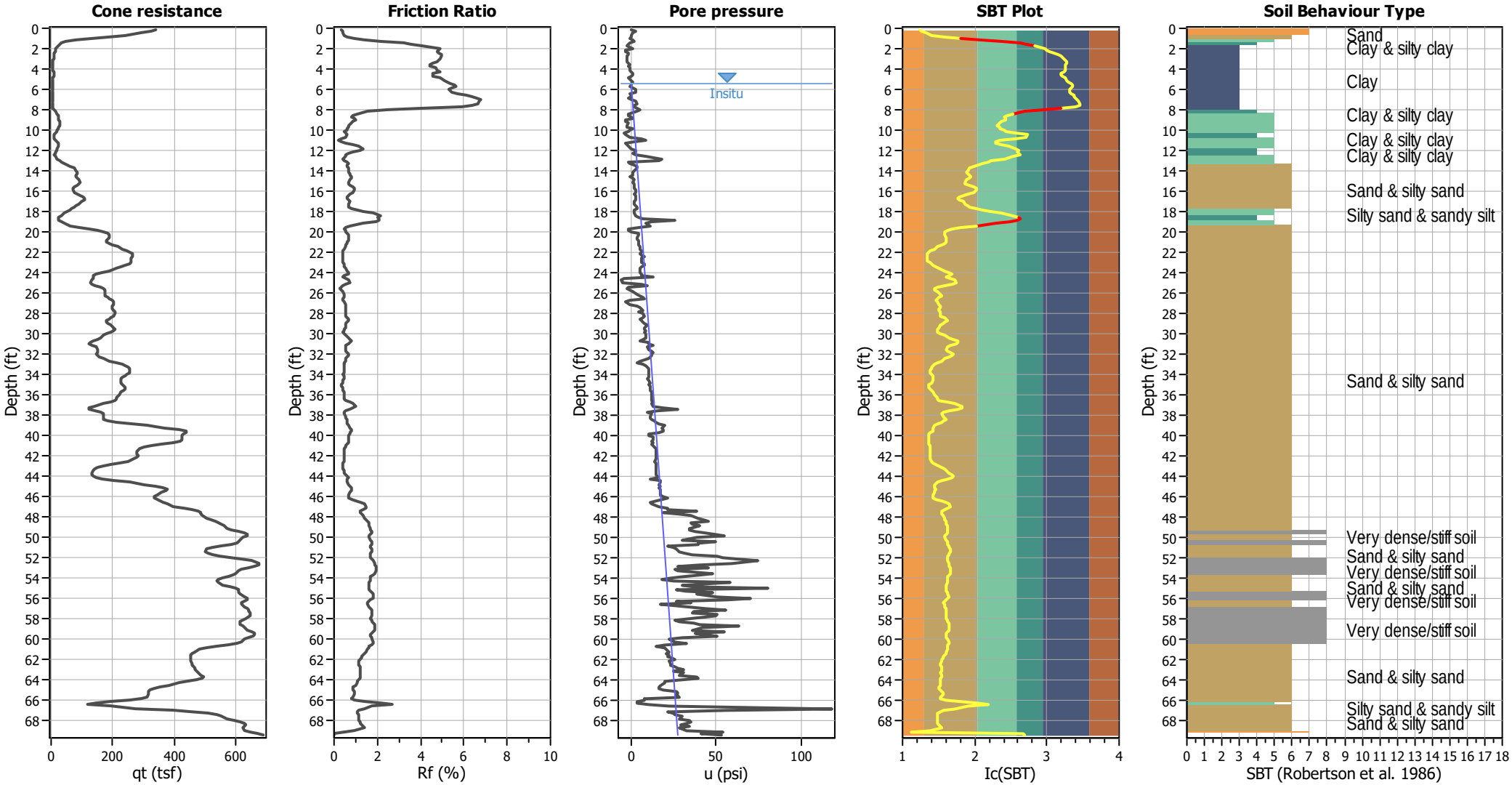






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



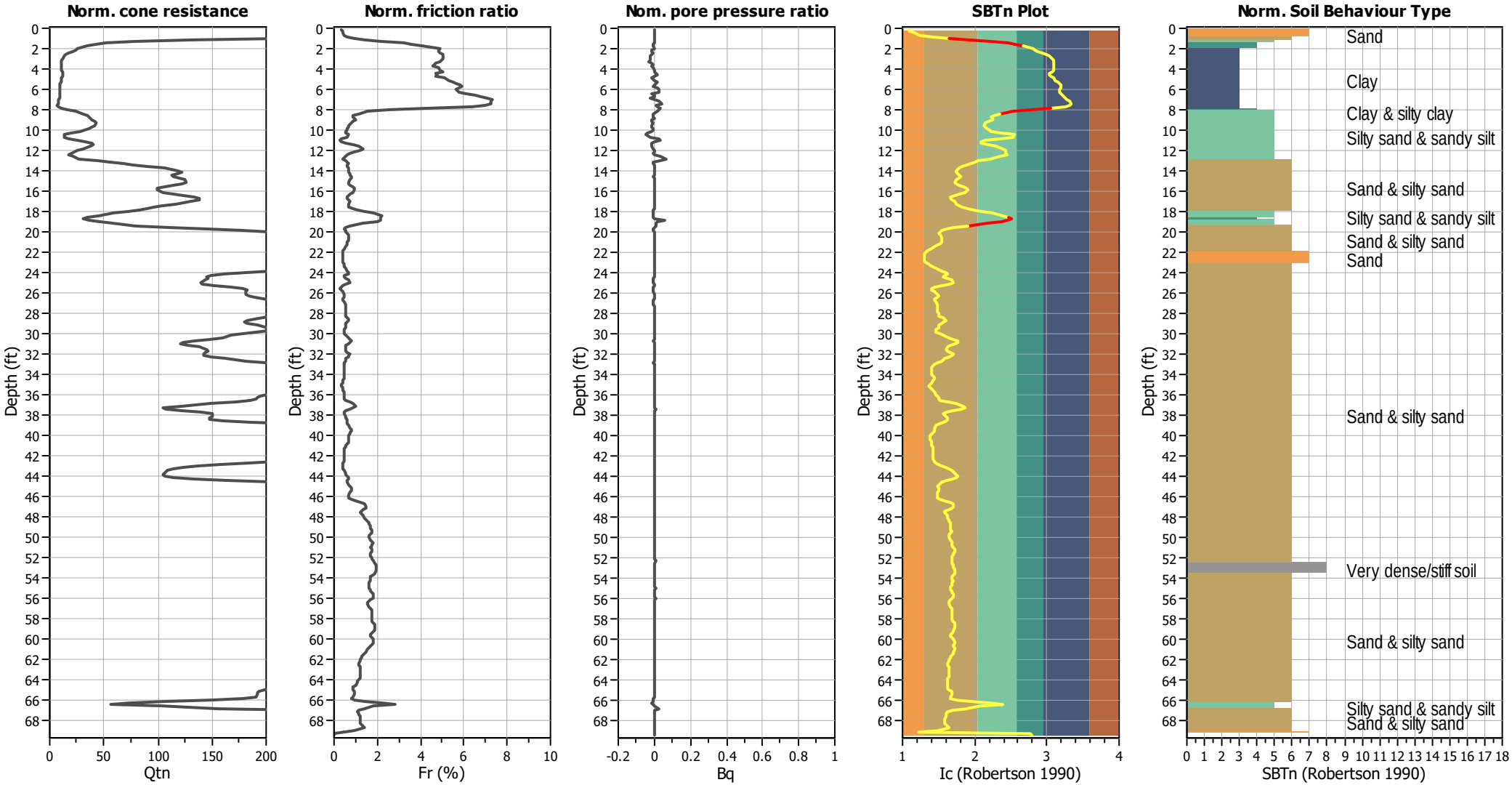
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	5.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.40 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

CPT basic interpretation plots (normalized)



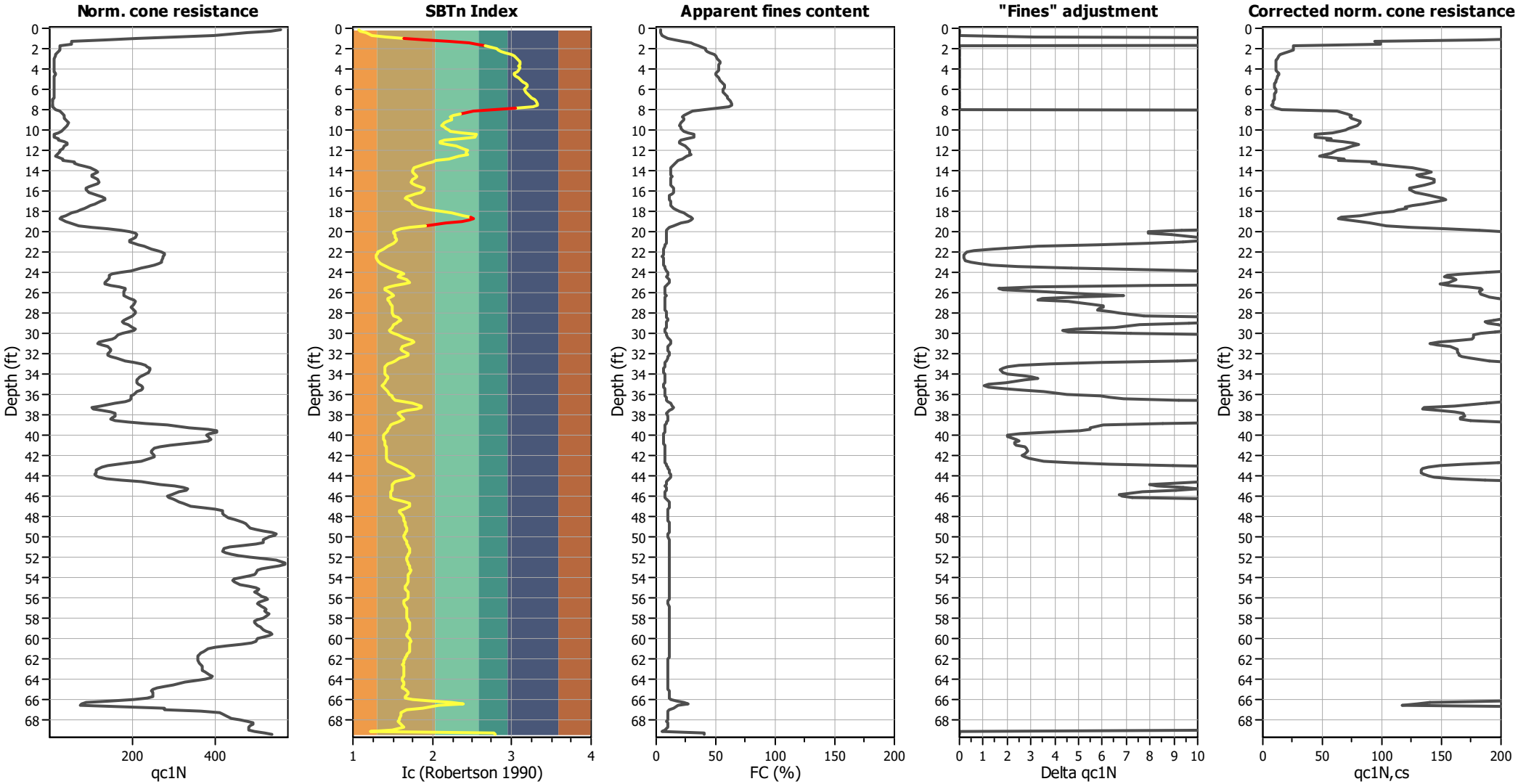
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	5.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.40 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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

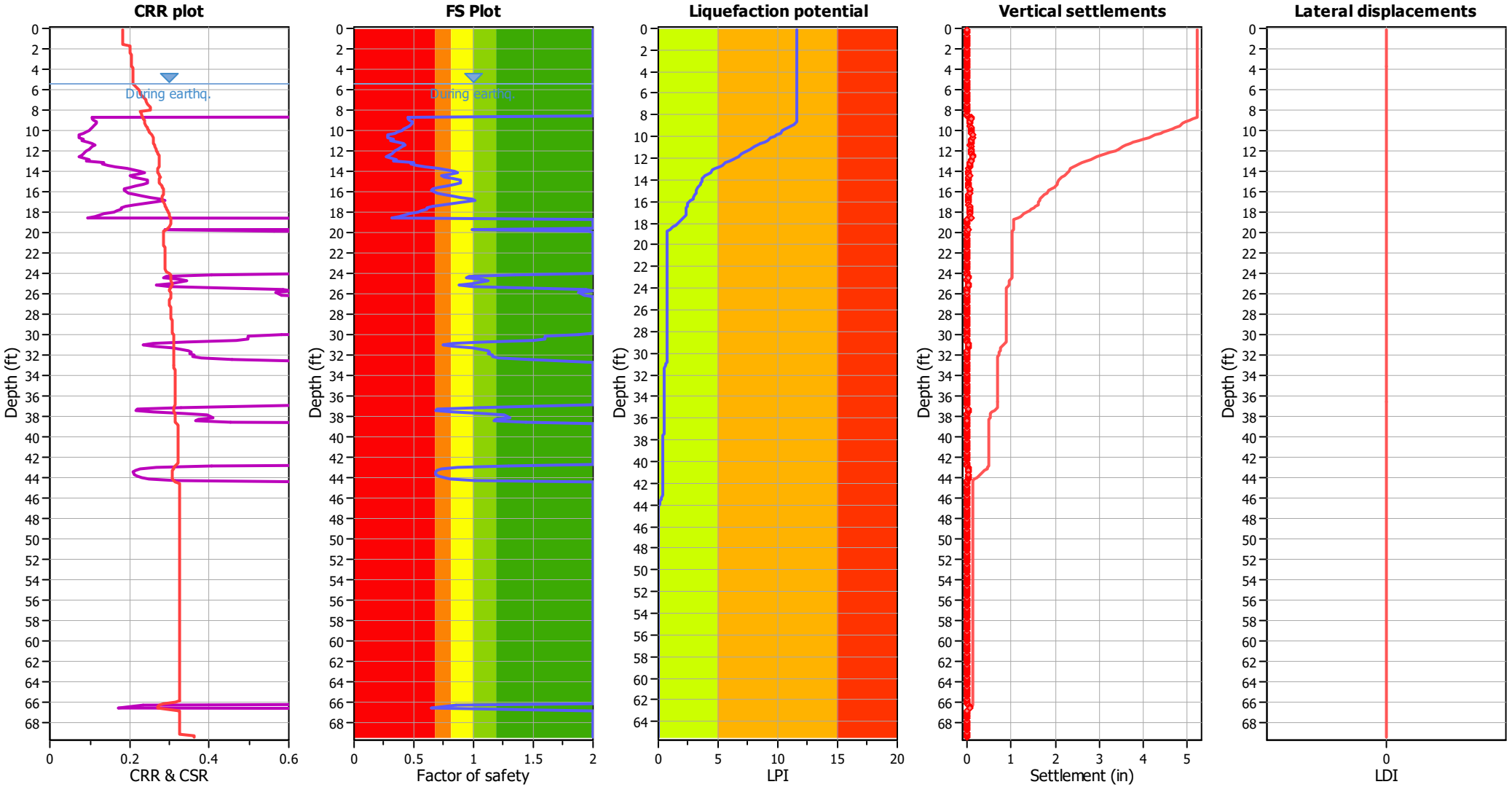
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	5.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.40 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	5.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.40 ft	Fill height:	N/A	Limit depth:	N/A

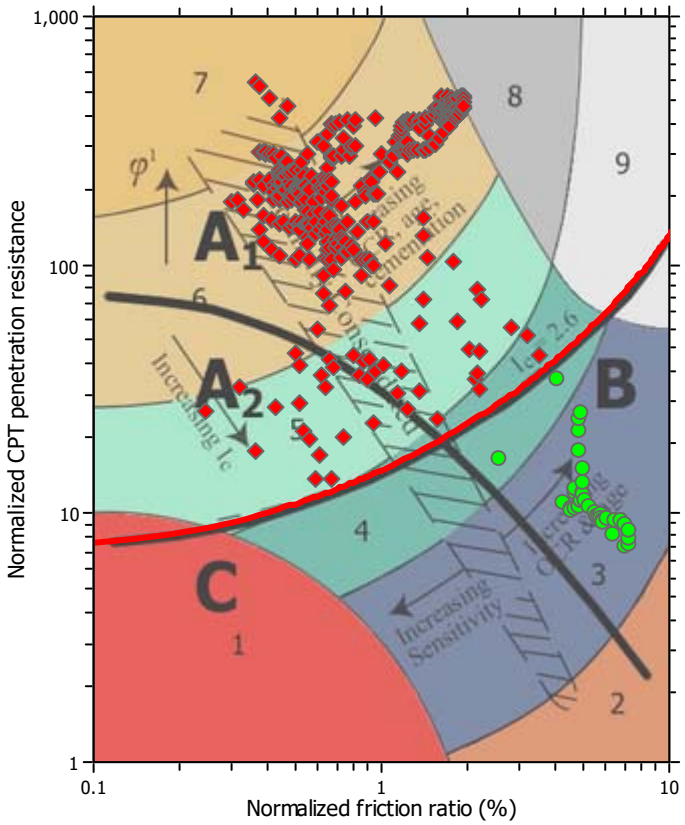
F.S. color scheme

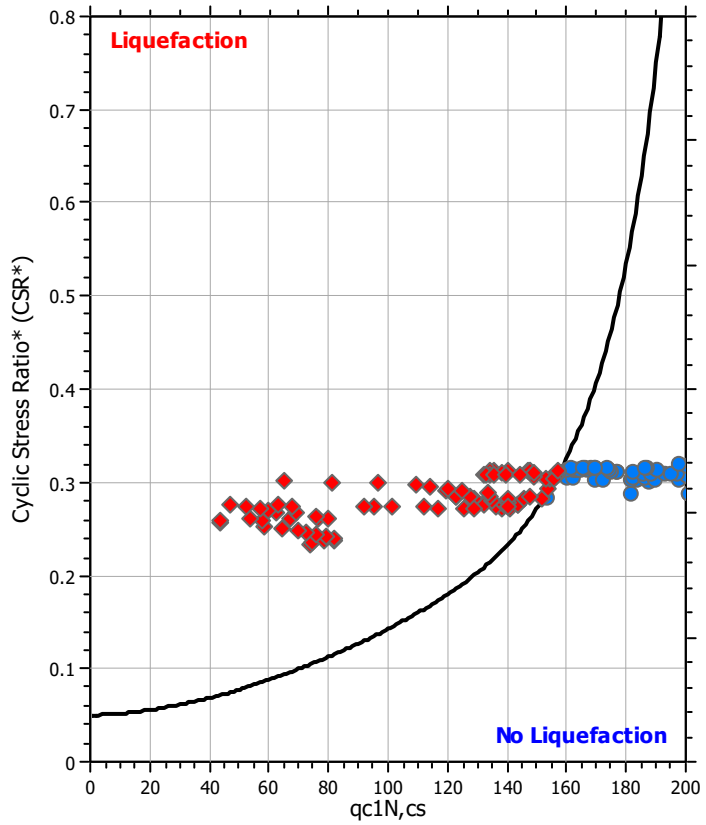
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

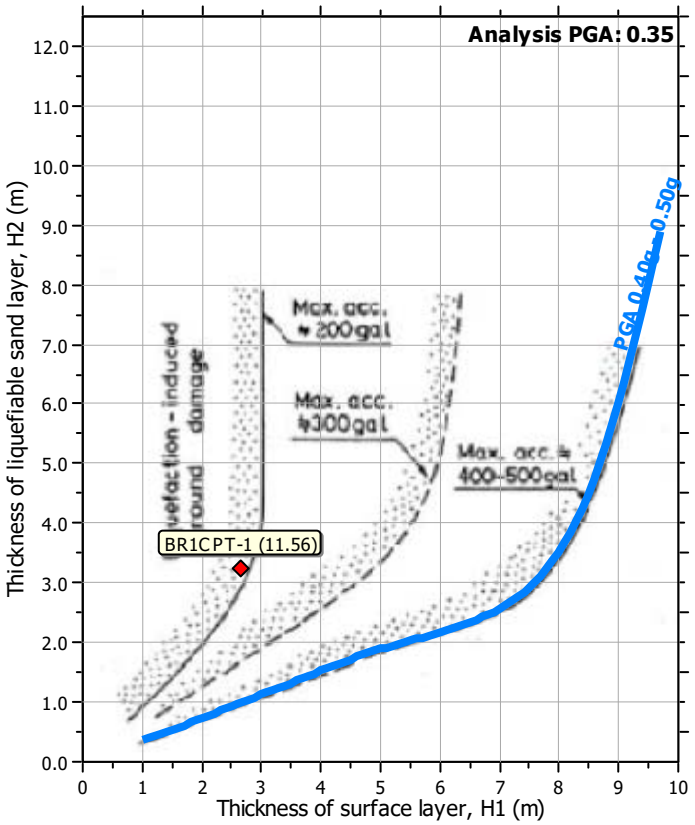
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



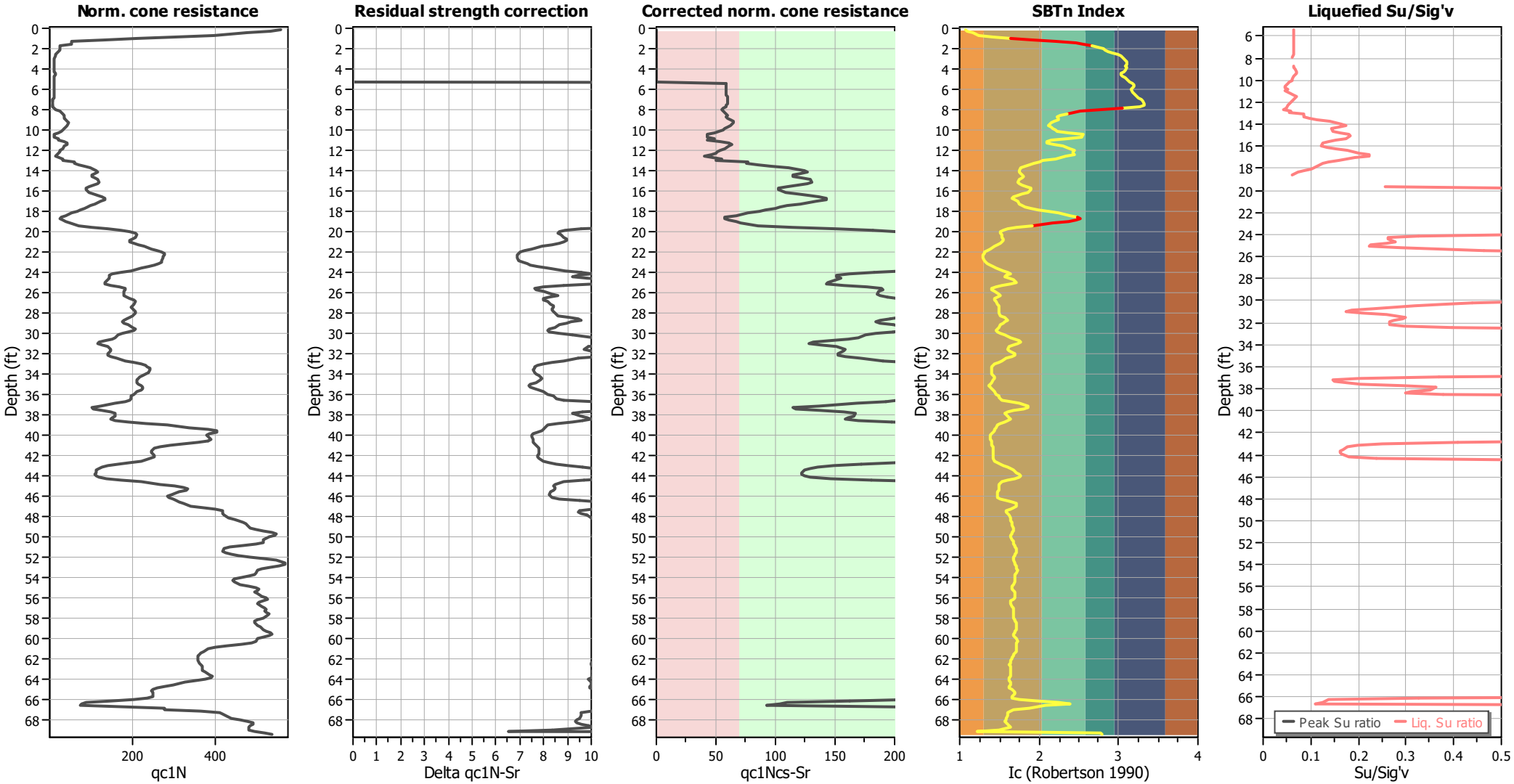




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	5.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.40 ft	Fill height:	N/A	Limit depth:	N/A

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



Input parameters and analysis data

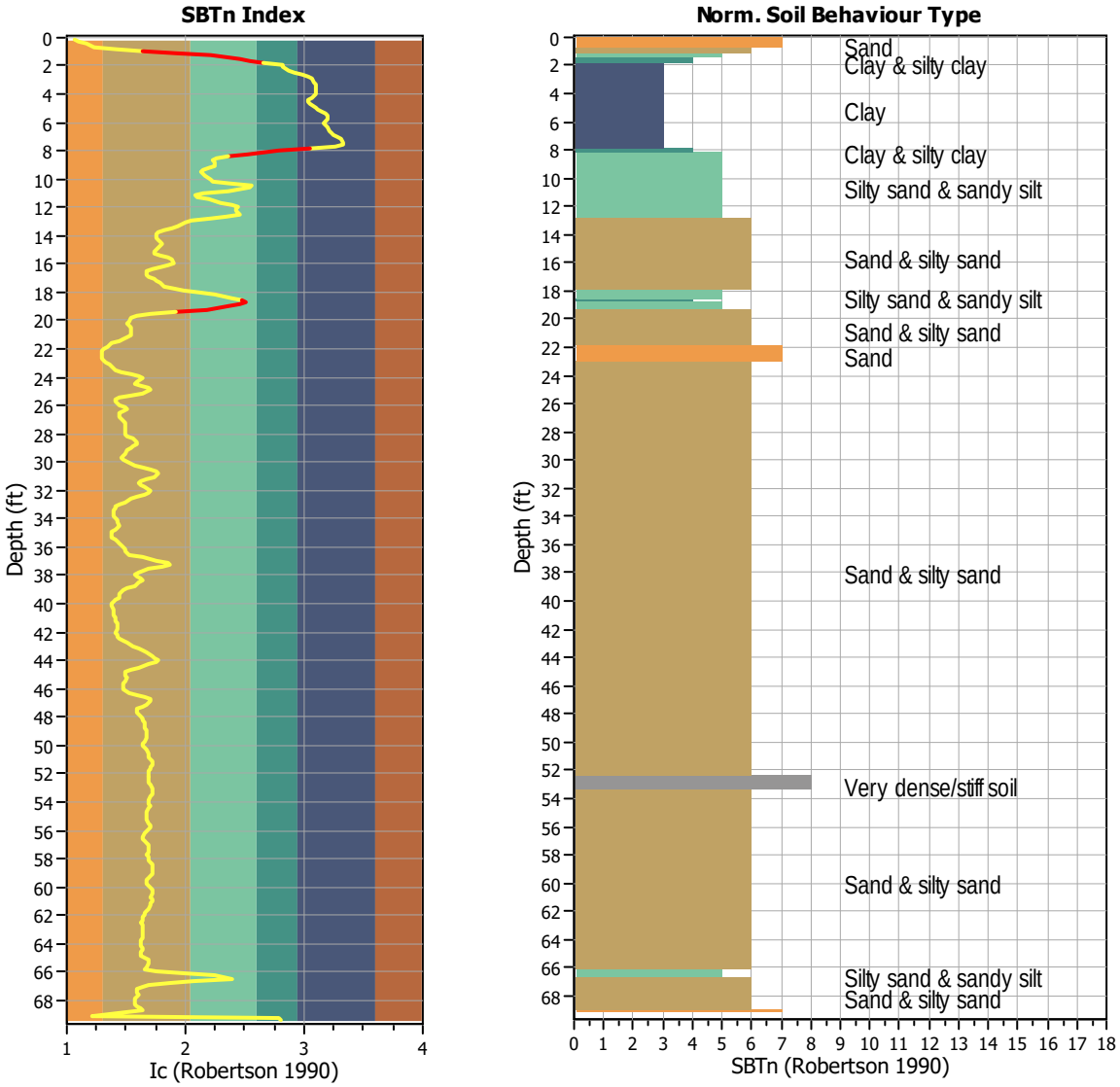
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	5.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.40 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	423
I_c maximum check value:	3.00	Total points excluded:	16
I_c change ratio value:	0.0250	Exclusion percentage:	3.78%
Minimum number of points in layer:	4	Number of layers detected:	3

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 1.15 (ft)	6	Sand & silty sand
		End depth: 1.97 (ft)	3	Clay
Transition layer 2	4	Start depth: 8.04 (ft)	4	Clay & silty clay
		End depth: 8.53 (ft)	5	Silty sand & sandy silt
Transition layer 3	6	Start depth: 18.70 (ft)	4	Clay & silty clay
		End depth: 19.52 (ft)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	346.32	1.06	0.08	0.00	126.14
2	0.33	331.50	1.64	2.56	0.00	125.86
3	0.49	295.33	0.98	1.45	0.00	125.41
4	0.66	245.25	0.96	0.38	0.00	124.14
5	0.82	186.57	1.26	0.61	1.78	124.22
6	0.98	130.55	1.31	-0.17	5.05	123.70
7	1.15	84.11	1.11	1.02	10.87	122.06
8	1.31	32.47	1.04	1.59	19.17	120.23
9	1.48	32.47	1.04	-0.95	28.94	119.02
10	1.64	32.47	1.04	-1.57	32.92	117.95
11	1.80	16.05	0.78	-1.88	38.42	116.72
12	1.97	16.05	0.78	1.10	46.75	115.26
13	2.13	16.05	0.78	-3.04	47.54	114.59
14	2.30	13.45	0.62	-3.00	49.74	113.45
15	2.46	11.19	0.54	-1.53	53.50	111.77
16	2.62	9.48	0.48	-1.77	57.74	110.41
17	2.79	8.32	0.42	-2.49	60.87	109.10
18	2.95	7.60	0.36	-2.47	63.06	108.05
19	3.12	7.12	0.34	-2.48	64.50	107.25
20	3.28	6.80	0.33	-2.67	65.58	106.71
21	3.44	6.59	0.30	-1.32	65.57	106.19
22	3.61	6.58	0.29	-0.37	65.24	105.92
23	3.77	6.67	0.29	-1.10	64.83	105.99
24	3.94	6.83	0.31	-0.54	65.21	106.66
25	4.10	7.14	0.36	-0.18	64.35	107.24
26	4.27	7.65	0.36	0.13	63.43	108.04
27	4.43	8.15	0.40	0.70	60.97	108.00
28	4.59	8.23	0.34	1.46	60.87	108.10
29	4.76	7.85	0.37	0.53	61.71	107.66
30	4.92	7.26	0.35	-1.15	64.92	107.68
31	5.09	6.88	0.36	-0.03	67.11	107.31
32	5.25	6.58	0.34	1.29	69.08	107.14
33	5.41	6.34	0.34	0.64	70.88	106.92
34	5.58	6.04	0.34	0.12	72.55	106.79
35	5.74	5.95	0.33	-0.22	73.09	106.77
36	5.91	6.17	0.34	1.39	71.84	106.84
37	6.07	6.50	0.34	2.57	70.44	106.97
38	6.23	6.54	0.34	2.48	70.87	107.20
39	6.40	6.30	0.37	-0.93	72.58	107.36
40	6.56	6.12	0.37	0.51	74.66	107.67
41	6.73	6.21	0.40	0.39	75.73	107.83
42	6.89	6.14	0.40	-1.05	77.18	107.90
43	7.05	5.77	0.39	0.53	79.63	107.61
44	7.22	5.23	0.37	2.51	81.55	106.85
45	7.38	4.95	0.31	3.54	83.36	106.23
46	7.55	4.86	0.33	1.72	82.84	105.89
47	7.71	5.13	0.32	2.27	77.86	106.25
48	7.87	6.51	0.33	3.98	62.27	106.18

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	10.07	0.23	5.19	44.78	106.30
50	8.20	15.43	0.23	4.06	31.74	106.25
51	8.37	20.45	0.23	-1.32	24.70	106.30
52	8.53	22.72	0.18	-1.23	21.05	105.75
53	8.69	22.78	0.16	-0.01	20.01	105.67
54	8.86	23.11	0.22	1.26	20.58	106.88
55	9.02	24.92	0.28	-3.35	20.31	107.94
56	9.19	27.25	0.25	-2.99	18.67	107.73
57	9.35	27.80	0.18	-1.22	17.40	107.01
58	9.51	26.84	0.20	-2.18	16.52	105.36
59	9.68	24.76	0.13	-2.51	17.50	104.99
60	9.84	23.02	0.17	0.75	17.83	103.44
61	10.01	21.05	0.12	-0.63	19.32	102.68
62	10.17	18.29	0.10	-1.82	20.11	99.63
63	10.33	14.15	0.05	-4.24	25.41	97.05
64	10.50	6.75	0.06	-3.32	33.16	94.83
65	10.66	6.75	0.06	-0.64	32.18	93.89
66	10.83	13.97	0.03	5.81	5.00	92.76
67	10.99	13.97	0.03	9.11	5.00	93.36
68	11.15	21.50	0.06	2.33	5.00	97.61
69	11.32	26.71	0.11	-3.32	15.60	103.07
70	11.48	27.50	0.22	-2.06	18.64	107.16
71	11.65	24.09	0.34	-1.01	22.36	108.39
72	11.81	19.55	0.25	0.27	26.22	107.75
73	11.98	16.22	0.19	2.62	27.93	105.46
74	12.14	14.94	0.16	2.46	27.38	102.19
75	12.30	13.59	0.05	1.20	27.45	99.17
76	12.47	10.93	0.07	2.91	28.55	96.12
77	12.63	9.23	0.07	8.88	24.12	97.39
78	12.80	21.30	0.07	17.91	5.00	98.03
79	12.96	21.30	0.07	16.73	14.14	104.03
80	13.12	41.99	0.27	-1.59	12.92	107.43
81	13.29	41.99	0.27	-0.20	11.29	110.45
82	13.45	50.31	0.32	1.78	10.08	111.50
83	13.62	60.71	0.36	3.55	8.66	113.32
84	13.78	74.00	0.47	3.37	7.62	115.25
85	13.94	85.49	0.58	1.93	7.18	116.88
86	14.11	88.54	0.65	1.22	7.04	117.36
87	14.27	83.59	0.56	1.18	7.43	117.29
88	14.44	77.69	0.58	1.46	7.87	117.11
89	14.60	78.69	0.63	-0.54	8.22	117.71
90	14.76	85.47	0.71	1.43	7.79	118.18
91	14.93	92.21	0.67	1.58	7.10	118.23
92	15.09	93.95	0.60	1.52	6.69	117.94
93	15.26	90.62	0.62	1.58	6.99	117.72
94	15.42	83.49	0.64	1.74	7.94	117.67
95	15.58	75.19	0.64	1.94	9.20	117.60
96	15.75	69.06	0.66	2.21	10.14	117.44

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	68.58	0.64	2.45	10.37	117.63
98	16.08	74.67	0.69	2.84	9.45	117.75
99	16.24	84.10	0.64	2.39	8.00	117.83
100	16.40	94.27	0.59	2.68	6.55	117.69
101	16.57	102.85	0.59	2.75	5.62	117.78
102	16.73	108.90	0.62	2.82	5.46	118.42
103	16.90	109.25	0.72	2.88	5.86	118.92
104	17.06	101.00	0.73	2.34	6.77	119.02
105	17.22	88.59	0.69	2.28	7.03	117.32
106	17.39	79.26	0.34	2.86	7.85	116.33
107	17.55	73.12	0.56	3.45	8.55	115.64
108	17.72	69.46	0.59	3.50	10.47	116.43
109	17.88	60.93	0.55	1.86	12.72	117.11
110	18.04	54.31	0.79	2.24	16.23	117.57
111	18.21	42.64	0.83	2.36	20.79	117.50
112	18.37	31.43	0.69	3.02	26.25	115.84
113	18.54	21.05	0.51	4.81	29.61	112.86
114	18.70	20.07	0.28	6.70	31.24	112.19
115	18.86	25.18	0.60	25.97	28.89	113.70
116	19.03	32.39	0.74	12.17	25.14	115.56
117	19.19	40.56	0.59	9.21	18.10	115.45
118	19.36	58.17	0.40	11.74	10.78	114.60
119	19.52	87.23	0.38	4.63	6.30	115.49
120	19.69	122.51	0.59	-1.36	4.31	118.13
121	19.85	153.19	0.80	-1.16	3.45	120.70
122	20.01	174.45	0.96	0.62	3.08	122.51
123	20.18	187.43	1.12	4.16	3.02	123.73
124	20.34	192.58	1.24	4.23	3.17	124.49
125	20.51	190.53	1.28	3.72	3.36	124.68
126	20.67	183.67	1.22	3.82	3.53	124.48
127	20.83	178.07	1.17	4.14	3.49	123.99
128	21.00	178.45	1.07	4.21	3.33	123.76
129	21.16	186.16	1.11	4.80	3.03	123.87
130	21.33	198.85	1.18	4.24	2.59	124.15
131	21.49	215.07	1.13	5.32	1.97	124.22
132	21.65	231.97	1.06	5.79	1.32	124.09
133	21.82	247.68	1.04	6.15	0.85	124.05
134	21.98	258.43	1.04	6.08	0.56	124.07
135	22.15	263.47	1.02	5.73	0.43	124.07
136	22.31	263.77	1.02	6.43	0.37	123.97
137	22.47	262.09	1.00	8.10	0.33	123.78
138	22.64	261.03	0.95	6.49	0.36	123.76
139	22.80	260.59	1.02	6.11	0.47	123.97
140	22.97	259.28	1.09	6.36	0.73	124.45
141	23.13	253.66	1.16	7.76	1.00	124.70
142	23.29	243.80	1.16	7.75	1.29	124.61
143	23.46	229.67	1.09	6.11	1.72	124.46
144	23.62	211.80	1.16	5.22	2.34	124.20

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	189.21	1.13	5.32	3.44	124.25
146	23.95	164.31	1.25	5.14	4.36	123.45
147	24.11	144.09	0.93	6.19	4.91	122.12
148	24.28	133.68	0.69	6.24	4.19	119.47
149	24.44	134.17	0.42	13.41	3.82	118.35
150	24.61	137.07	0.65	-4.12	4.68	119.92
151	24.77	133.39	1.12	-5.69	5.82	121.33
152	24.93	125.60	0.91	-4.59	6.28	121.43
153	25.10	125.62	0.71	6.55	5.07	119.90
154	25.26	141.12	0.58	9.44	3.36	118.45
155	25.43	162.62	0.46	-1.33	2.13	117.89
156	25.59	175.30	0.53	-2.61	1.56	117.89
157	25.75	176.61	0.55	-0.29	1.63	118.54
158	25.92	173.45	0.59	1.00	2.12	119.66
159	26.08	172.53	0.80	3.62	2.68	120.87
160	26.25	175.63	0.90	5.21	2.95	121.72
161	26.41	181.64	0.86	6.66	2.49	121.42
162	26.57	191.14	0.67	8.32	2.13	121.46
163	26.74	199.89	0.87	-0.47	2.06	122.05
164	26.90	204.70	1.02	-3.38	2.36	123.06
165	27.07	202.92	1.04	-0.44	2.58	123.42
166	27.23	197.96	1.02	3.48	2.70	123.35
167	27.40	195.34	1.01	5.12	2.71	123.19
168	27.56	198.03	0.98	6.57	2.66	123.26
169	27.72	204.05	1.04	6.86	2.62	123.55
170	27.89	207.71	1.11	4.31	2.73	124.00
171	28.05	206.66	1.16	7.42	2.80	124.04
172	28.22	201.96	1.07	7.90	3.01	124.05
173	28.38	195.64	1.13	7.45	3.70	124.67
174	28.54	187.95	1.50	5.05	4.14	124.67
175	28.71	179.73	1.12	6.49	4.32	124.29
176	28.87	175.97	0.98	7.31	3.78	123.11
177	29.04	180.74	0.98	8.24	3.46	122.95
178	29.20	192.54	1.03	9.30	3.03	123.09
179	29.36	204.17	0.99	7.79	2.79	123.56
180	29.53	210.23	1.12	8.25	2.42	123.22
181	29.69	206.15	0.87	8.38	2.33	122.69
182	29.86	194.44	0.80	8.32	2.42	121.84
183	30.02	178.96	0.86	8.51	3.04	121.78
184	30.18	169.42	0.90	8.78	3.87	122.15
185	30.35	162.69	0.98	9.09	5.03	123.09
186	30.51	154.22	1.29	7.03	6.14	123.42
187	30.68	136.95	1.12	5.69	7.19	123.10
188	30.84	122.64	0.94	10.35	7.34	121.60
189	31.00	119.23	0.75	10.37	6.69	120.41
190	31.17	131.70	0.71	12.63	5.53	119.79
191	31.33	145.95	0.70	9.66	4.76	120.18
192	31.50	154.10	0.81	10.13	4.47	120.62

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	153.06	0.81	11.79	4.82	121.35
194	31.82	149.57	0.93	13.01	5.38	121.93
195	31.99	147.10	1.03	12.00	6.12	122.79
196	32.15	147.78	1.17	12.06	5.98	122.77
197	32.32	154.42	0.91	10.98	5.28	122.60
198	32.48	169.15	0.91	10.63	4.13	122.38
199	32.64	190.36	1.00	5.38	3.36	123.05
200	32.81	212.72	1.08	3.43	2.67	123.69
201	32.97	230.72	1.07	6.91	2.13	124.08
202	33.14	242.66	1.09	8.86	1.74	124.26
203	33.30	249.66	1.10	9.82	1.57	124.48
204	33.46	254.76	1.14	10.32	1.49	124.66
205	33.63	257.05	1.15	10.56	1.45	124.66
206	33.79	254.33	1.09	10.64	1.49	124.52
207	33.96	246.54	1.09	10.68	1.59	124.23
208	34.12	238.09	1.04	10.70	1.80	124.10
209	34.28	232.29	1.07	10.90	1.94	123.86
210	34.45	227.57	1.01	9.60	2.02	123.63
211	34.61	224.51	0.97	10.72	1.87	123.06
212	34.78	224.76	0.85	11.08	1.61	122.52
213	34.94	230.25	0.81	10.78	1.28	122.06
214	35.10	236.83	0.79	10.92	1.20	122.31
215	35.27	241.19	0.91	11.50	1.28	122.81
216	35.43	240.95	0.98	11.35	1.55	123.43
217	35.60	236.40	1.03	11.71	1.82	123.66
218	35.76	228.71	1.02	11.84	2.09	123.64
219	35.93	220.33	1.00	12.00	2.35	123.53
220	36.09	214.29	1.02	12.30	2.68	123.66
221	36.25	211.77	1.11	12.22	2.78	123.58
222	36.42	211.87	0.98	12.20	2.88	123.64
223	36.58	210.28	1.05	12.17	3.30	124.01
224	36.75	199.14	1.29	12.90	5.02	125.51
225	36.91	171.07	1.82	12.29	7.03	125.68
226	37.07	135.06	1.35	13.43	9.29	124.84
227	37.24	111.42	1.07	19.02	9.57	122.49
228	37.40	115.63	0.81	27.64	8.20	121.09
229	37.57	140.45	0.77	15.28	5.84	120.37
230	37.73	163.50	0.71	9.67	4.38	120.60
231	37.89	174.76	0.78	11.79	3.82	120.91
232	38.06	173.09	0.82	11.44	4.33	121.96
233	38.22	167.25	1.07	11.65	4.67	122.15
234	38.39	165.22	0.87	12.12	4.93	122.70
235	38.55	177.21	1.02	13.56	4.44	123.40
236	38.71	208.43	1.28	14.76	3.87	125.32
237	38.88	255.20	1.62	16.45	3.00	127.33
238	39.04	311.81	1.95	19.98	2.40	129.63
239	39.21	371.49	2.66	18.06	2.17	131.94
240	39.37	421.12	3.48	19.24	2.08	133.61

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	446.12	3.65	18.72	1.97	134.30
242	39.70	443.36	3.42	16.17	1.71	133.93
243	39.86	427.77	2.94	10.40	1.48	133.18
244	40.03	419.04	2.74	10.22	1.33	132.63
245	40.19	422.73	2.80	12.86	1.34	132.67
246	40.35	430.09	2.98	13.35	1.42	132.86
247	40.52	423.52	2.96	12.07	1.47	132.61
248	40.68	397.47	2.57	12.61	1.46	131.64
249	40.85	359.71	2.07	12.27	1.50	130.22
250	41.01	323.70	1.80	13.21	1.59	128.72
251	41.17	298.48	1.55	14.07	1.73	127.53
252	41.34	282.80	1.38	14.63	1.79	126.64
253	41.50	275.94	1.34	14.59	1.82	126.16
254	41.67	274.71	1.32	14.53	1.81	126.01
255	41.83	278.16	1.30	14.61	1.77	126.07
256	41.99	282.62	1.37	14.71	1.74	126.18
257	42.16	283.02	1.36	14.35	1.76	126.11
258	42.32	273.61	1.27	14.43	1.85	125.55
259	42.49	251.86	1.12	14.22	2.06	124.45
260	42.65	221.48	0.92	14.50	2.43	122.81
261	42.81	189.64	0.71	14.83	2.92	120.87
262	42.98	164.26	0.58	14.80	3.60	119.30
263	43.14	148.57	0.58	14.93	4.38	118.54
264	43.31	140.27	0.58	14.49	5.00	118.31
265	43.47	135.04	0.57	14.55	5.00	118.43
266	43.64	131.61	0.63	14.83	6.41	119.14
267	43.80	131.01	0.78	14.82	7.00	119.89
268	43.96	132.87	0.79	15.40	7.46	120.95
269	44.13	139.82	0.95	15.97	7.10	121.82
270	44.29	159.77	1.03	11.59	6.01	123.12
271	44.46	199.64	1.17	17.51	4.45	124.77
272	44.62	254.71	1.49	17.41	3.33	126.91
273	44.78	305.38	1.95	16.14	2.78	129.10
274	44.95	343.84	2.43	17.03	2.71	130.98
275	45.11	366.95	2.91	16.10	2.80	132.28
276	45.28	379.80	3.17	17.39	2.85	132.82
277	45.44	376.63	2.99	17.69	2.74	132.52
278	45.60	358.50	2.57	17.22	2.59	131.63
279	45.77	338.00	2.26	17.69	2.49	130.67
280	45.93	328.03	2.14	19.35	2.53	130.29
281	46.10	332.19	2.27	21.20	2.59	130.45
282	46.26	342.32	2.40	18.43	3.10	131.62
283	46.42	351.47	3.27	14.84	4.25	133.67
284	46.59	360.11	4.75	11.58	5.37	135.46
285	46.75	371.07	5.16	12.59	6.21	136.97
286	46.92	393.64	6.09	16.52	6.27	137.28
287	47.08	428.33	6.58	21.53	5.73	137.28
288	47.24	463.42	6.01	21.94	4.95	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	484.39	6.02	38.23	4.25	137.28
290	47.57	485.49	5.74	19.09	4.14	137.28
291	47.74	483.78	6.06	27.97	4.33	137.28
292	47.90	488.23	6.65	34.95	4.67	137.28
293	48.06	502.30	7.14	39.55	4.90	137.28
294	48.23	518.33	7.57	43.03	5.05	137.28
295	48.39	532.69	8.20	45.37	5.19	137.28
296	48.56	544.33	8.64	35.52	5.35	137.28
297	48.72	552.28	8.97	36.32	5.43	137.28
298	48.88	558.95	9.13	40.56	5.50	137.28
299	49.05	568.10	9.50	34.55	5.55	137.28
300	49.21	583.64	9.94	34.45	5.60	137.28
301	49.38	605.26	10.55	37.35	5.65	137.28
302	49.54	627.76	11.27	43.65	5.47	137.28
303	49.70	640.94	10.65	49.50	5.23	137.28
304	49.87	637.61	10.25	54.73	4.97	137.28
305	50.03	621.94	9.88	38.98	5.03	137.28
306	50.20	609.16	10.08	30.17	5.36	137.28
307	50.36	609.39	10.96	49.66	5.67	137.28
308	50.52	607.86	10.84	39.69	5.85	137.28
309	50.69	588.81	10.31	39.12	5.84	137.28
310	50.85	550.17	9.21	21.19	5.96	137.28
311	51.02	515.76	8.76	24.75	6.19	137.28
312	51.18	497.72	8.65	26.66	6.43	137.28
313	51.35	497.17	8.55	28.59	6.48	137.28
314	51.51	504.97	8.58	31.60	6.34	137.28
315	51.67	519.87	8.76	36.27	6.15	137.28
316	51.84	543.12	9.09	50.30	5.95	137.28
317	52.00	576.13	9.73	53.56	5.83	137.28
318	52.17	616.65	10.89	63.33	5.80	137.28
319	52.33	654.73	11.99	74.03	5.84	137.28
320	52.49	677.97	12.75	58.85	5.92	137.28
321	52.66	679.12	13.01	39.90	6.04	137.28
322	52.82	662.67	12.79	27.20	6.21	137.28
323	52.99	637.54	12.37	45.56	6.37	137.28
324	53.15	615.85	11.86	26.05	6.51	137.28
325	53.31	603.47	11.65	27.62	6.61	137.28
326	53.48	599.23	11.61	47.59	6.45	137.28
327	53.64	593.25	10.44	39.56	6.20	137.28
328	53.81	576.68	9.72	30.74	5.90	137.28
329	53.97	555.77	9.11	23.06	5.88	137.28
330	54.13	538.90	8.84	18.07	6.00	137.28
331	54.30	533.11	8.98	24.64	6.08	137.28
332	54.46	536.48	8.85	58.38	5.94	137.28
333	54.63	553.66	8.69	30.21	5.69	137.28
334	54.79	579.78	9.26	37.27	5.50	137.28
335	54.95	604.96	9.85	80.16	5.46	137.28
336	55.12	611.89	10.00	26.92	5.52	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.28	607.05	10.15	31.65	5.69	137.28
338	55.45	601.06	10.43	47.98	5.93	137.28
339	55.61	608.74	10.94	38.83	6.13	137.28
340	55.77	624.20	11.44	50.79	6.18	137.28
341	55.94	638.35	11.71	69.83	5.98	137.28
342	56.10	639.84	10.89	56.78	5.59	137.28
343	56.27	628.13	9.70	26.71	5.19	137.28
344	56.43	615.52	9.26	35.02	5.02	137.28
345	56.59	612.43	9.43	17.19	5.15	137.28
346	56.76	624.20	10.13	35.15	5.44	137.28
347	56.92	636.09	11.01	43.96	5.65	137.28
348	57.09	639.44	11.07	55.55	5.75	137.28
349	57.25	638.16	10.92	36.46	5.77	137.28
350	57.41	641.24	11.19	36.05	5.80	137.28
351	57.58	649.03	11.41	50.53	5.81	137.28
352	57.74	646.98	11.18	49.92	5.75	137.28
353	57.91	634.07	10.67	33.47	5.76	137.28
354	58.07	617.39	10.57	25.84	5.92	137.28
355	58.23	608.33	10.75	28.22	6.17	137.28
356	58.40	608.72	11.05	37.26	6.41	137.28
357	58.56	613.45	11.44	40.12	6.52	137.28
358	58.73	619.42	11.56	63.66	6.53	137.28
359	58.89	626.78	11.59	42.09	6.46	137.28
360	59.06	637.42	11.78	36.38	6.39	137.28
361	59.22	649.13	12.03	55.16	6.12	137.28
362	59.38	659.40	11.25	37.89	5.86	137.28
363	59.55	666.57	11.33	43.55	5.59	137.28
364	59.71	657.14	10.95	50.45	5.59	137.28
365	59.88	640.95	10.70	30.39	5.88	137.28
366	60.04	621.85	11.39	22.14	6.22	137.28
367	60.20	620.20	11.39	26.01	6.55	137.28
368	60.37	607.28	11.17	32.55	6.48	137.28
369	60.53	578.52	9.80	19.79	6.39	137.28
370	60.70	534.08	8.53	14.83	6.36	137.28
371	60.86	498.11	7.99	19.61	6.45	137.28
372	61.02	476.18	7.32	20.80	6.49	137.28
373	61.19	463.62	6.78	22.15	6.31	137.28
374	61.35	456.50	6.34	20.76	6.06	137.28
375	61.52	452.42	6.00	22.10	5.81	137.28
376	61.68	450.80	5.77	21.65	5.60	137.28
377	61.84	450.74	5.64	23.79	5.42	137.28
378	62.01	450.86	5.47	25.95	5.22	137.28
379	62.17	451.30	5.25	22.07	5.02	137.28
380	62.34	453.65	5.17	22.84	4.90	137.28
381	62.50	458.68	5.29	23.07	4.88	137.28
382	62.66	463.85	5.44	25.89	4.95	137.28
383	62.83	466.20	5.61	27.63	5.02	137.28
384	62.99	465.58	5.59	30.67	5.03	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
385	63.16	467.24	5.52	24.97	4.99	137.28
386	63.32	475.20	5.68	31.15	4.95	137.28
387	63.48	488.05	5.93	28.77	4.99	137.28
388	63.65	497.14	6.25	38.54	4.97	137.28
389	63.81	493.82	5.98	39.38	4.85	137.28
390	63.98	475.10	5.31	29.62	4.75	137.28
391	64.14	445.90	4.87	20.23	4.77	136.71
392	64.30	413.07	4.38	19.94	4.93	135.71
393	64.47	380.77	3.77	17.01	4.93	134.42
394	64.63	352.65	3.07	16.67	4.82	133.04
395	64.80	331.07	2.68	16.50	4.82	132.01
396	64.96	319.55	2.69	18.88	5.22	131.85
397	65.12	315.23	2.98	26.78	5.77	132.25
398	65.29	316.21	3.19	27.52	5.95	132.41
399	65.45	317.94	2.90	26.46	5.90	132.38
400	65.62	317.14	2.94	28.12	5.46	131.56
401	65.78	301.34	2.27	8.09	5.37	130.35
402	65.94	262.03	1.81	7.74	7.27	129.94
403	66.11	196.46	2.90	3.72	12.76	130.50
404	66.27	126.05	3.51	3.65	20.50	130.75
405	66.44	111.18	2.98	10.32	26.38	130.29
406	66.60	111.18	2.98	22.55	14.97	132.03
407	66.77	355.35	4.19	117.77	9.68	133.71
408	66.93	355.35	4.19	55.44	5.78	135.72
409	67.09	467.86	4.88	21.88	4.90	136.85
410	67.26	525.82	5.73	24.93	4.31	137.28
411	67.42	537.84	6.26	25.40	4.31	137.28
412	67.59	547.21	6.45	29.93	4.35	137.28
413	67.75	565.52	6.61	28.49	4.21	137.28
414	67.91	592.83	6.92	34.23	4.05	137.28
415	68.08	616.88	7.29	35.41	3.96	137.28
416	68.24	631.75	7.62	32.55	4.06	137.28
417	68.41	633.01	8.08	29.20	4.32	137.28
418	68.57	626.60	8.44	34.65	4.71	137.28
419	68.73	619.68	8.81	28.14	5.04	137.28
420	68.90	622.35	9.08	32.65	2.65	137.28
421	69.06	641.85	0.00	54.02	0.00	134.16
422	69.23	673.68	0.00	41.05	44.90	87.36
423	69.39	693.90	0.00	52.71	45.90	87.36

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	0.228	1.14	0.199	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.228	1.14	0.199	1.10	1.00	2.000	Yes
8	1.31	0.08	0.00	0.08	1.00	0.228	1.14	0.199	1.10	1.00	2.000	Yes
9	1.48	0.09	0.00	0.09	1.00	0.228	1.14	0.199	1.10	1.00	2.000	Yes
10	1.64	0.10	0.00	0.10	1.00	0.228	1.14	0.199	1.10	1.00	2.000	Yes
11	1.80	0.11	0.00	0.11	1.00	0.228	1.14	0.199	1.10	1.00	2.000	Yes
12	1.97	0.12	0.00	0.12	1.00	0.228	1.14	0.199	1.10	1.00	2.000	Yes
13	2.13	0.13	0.00	0.13	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
14	2.30	0.14	0.00	0.14	1.00	0.228	1.14	0.199	1.10	1.00	2.000	No
15	2.46	0.15	0.00	0.15	1.00	0.227	1.14	0.199	1.10	1.00	2.000	No
16	2.62	0.16	0.00	0.16	1.00	0.227	1.14	0.199	1.09	1.00	2.000	No
17	2.79	0.17	0.00	0.17	1.00	0.227	1.14	0.199	1.09	1.00	2.000	No
18	2.95	0.17	0.00	0.17	1.00	0.227	1.14	0.199	1.08	1.00	2.000	No
19	3.12	0.18	0.00	0.18	1.00	0.227	1.14	0.199	1.08	1.00	2.000	No
20	3.28	0.19	0.00	0.19	1.00	0.227	1.14	0.199	1.08	1.00	2.000	No
21	3.44	0.20	0.00	0.20	1.00	0.227	1.14	0.199	1.08	1.00	2.000	No
22	3.61	0.21	0.00	0.21	1.00	0.227	1.14	0.199	1.07	1.00	2.000	No
23	3.77	0.22	0.00	0.22	1.00	0.227	1.14	0.199	1.07	1.00	2.000	No
24	3.94	0.23	0.00	0.23	1.00	0.226	1.14	0.198	1.07	1.00	2.000	No
25	4.10	0.24	0.00	0.24	0.99	0.226	1.14	0.198	1.07	1.00	2.000	No
26	4.27	0.24	0.00	0.24	0.99	0.226	1.14	0.198	1.07	1.00	2.000	No
27	4.43	0.25	0.00	0.25	0.99	0.226	1.14	0.198	1.07	1.00	2.000	No
28	4.59	0.26	0.00	0.26	0.99	0.226	1.14	0.198	1.07	1.00	2.000	No
29	4.76	0.27	0.00	0.27	0.99	0.226	1.14	0.198	1.06	1.00	2.000	No
30	4.92	0.28	0.00	0.28	0.99	0.226	1.14	0.198	1.06	1.00	2.000	No
31	5.09	0.29	0.00	0.29	0.99	0.226	1.14	0.198	1.06	1.00	2.000	No
32	5.25	0.30	0.00	0.30	0.99	0.225	1.14	0.198	1.06	1.00	2.000	No
33	5.41	0.31	0.00	0.31	0.99	0.226	1.14	0.198	1.06	1.00	0.209	No
34	5.58	0.32	0.01	0.31	0.99	0.229	1.14	0.201	1.06	1.00	0.212	No
35	5.74	0.32	0.01	0.31	0.99	0.233	1.14	0.204	1.05	1.00	0.216	No
36	5.91	0.33	0.02	0.32	0.99	0.236	1.14	0.207	1.05	1.00	0.219	No
37	6.07	0.34	0.02	0.32	0.99	0.239	1.14	0.210	1.05	1.00	0.222	No
38	6.23	0.35	0.03	0.32	0.99	0.243	1.14	0.213	1.05	1.00	0.225	No
39	6.40	0.36	0.03	0.33	0.99	0.246	1.14	0.216	1.05	1.00	0.228	No
40	6.56	0.37	0.04	0.33	0.99	0.249	1.14	0.218	1.05	1.00	0.231	No
41	6.73	0.38	0.04	0.34	0.99	0.252	1.14	0.221	1.05	1.00	0.234	No
42	6.89	0.39	0.05	0.34	0.99	0.255	1.14	0.223	1.05	1.00	0.237	No
43	7.05	0.39	0.05	0.34	0.98	0.258	1.14	0.226	1.05	1.00	0.240	No
44	7.22	0.40	0.06	0.35	0.98	0.261	1.14	0.228	1.05	1.00	0.243	No
45	7.38	0.41	0.06	0.35	0.98	0.263	1.14	0.231	1.05	1.00	0.246	No
46	7.55	0.42	0.07	0.35	0.98	0.266	1.14	0.233	1.05	1.00	0.248	No
47	7.71	0.43	0.07	0.36	0.98	0.269	1.14	0.235	1.05	1.00	0.251	No
48	7.87	0.44	0.08	0.36	0.98	0.271	1.14	0.238	1.05	1.00	0.253	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	0.45	0.08	0.36	0.98	0.274	1.14	0.240	1.05	1.00	2.000	Yes
50	8.20	0.46	0.09	0.37	0.98	0.276	1.14	0.242	1.06	1.00	2.000	Yes
51	8.37	0.46	0.09	0.37	0.98	0.279	1.14	0.244	1.06	1.00	2.000	Yes
52	8.53	0.47	0.10	0.38	0.98	0.281	1.14	0.246	1.07	1.00	2.000	Yes
53	8.69	0.48	0.10	0.38	0.98	0.283	1.14	0.248	1.06	1.00	0.233	No
54	8.86	0.49	0.11	0.38	0.98	0.285	1.14	0.250	1.06	1.00	0.235	No
55	9.02	0.50	0.11	0.39	0.98	0.287	1.14	0.252	1.07	1.00	0.236	No
56	9.19	0.51	0.12	0.39	0.98	0.290	1.14	0.254	1.07	1.00	0.238	No
57	9.35	0.52	0.12	0.39	0.98	0.292	1.14	0.256	1.07	1.00	0.240	No
58	9.51	0.53	0.13	0.40	0.98	0.294	1.14	0.257	1.07	1.00	0.242	No
59	9.68	0.53	0.13	0.40	0.97	0.296	1.14	0.259	1.06	1.00	0.244	No
60	9.84	0.54	0.14	0.40	0.97	0.298	1.14	0.261	1.06	1.00	0.246	No
61	10.01	0.55	0.14	0.41	0.97	0.300	1.14	0.263	1.06	1.00	0.248	No
62	10.17	0.56	0.15	0.41	0.97	0.302	1.14	0.264	1.06	1.00	0.251	No
63	10.33	0.57	0.15	0.41	0.97	0.304	1.14	0.266	1.05	1.00	0.253	No
64	10.50	0.57	0.16	0.42	0.97	0.306	1.14	0.268	1.04	1.00	0.257	No
65	10.66	0.58	0.16	0.42	0.97	0.308	1.14	0.270	1.04	1.00	0.259	No
66	10.83	0.59	0.17	0.42	0.97	0.310	1.14	0.271	1.05	1.00	0.259	No
67	10.99	0.60	0.17	0.42	0.97	0.312	1.14	0.273	1.05	1.00	0.260	No
68	11.15	0.61	0.18	0.43	0.97	0.313	1.14	0.275	1.06	1.00	0.260	No
69	11.32	0.61	0.18	0.43	0.97	0.315	1.14	0.276	1.06	1.00	0.261	No
70	11.48	0.62	0.19	0.43	0.97	0.317	1.14	0.277	1.06	1.00	0.262	No
71	11.65	0.63	0.20	0.44	0.97	0.318	1.14	0.279	1.06	1.00	0.264	No
72	11.81	0.64	0.20	0.44	0.97	0.320	1.14	0.280	1.05	1.00	0.266	No
73	11.98	0.65	0.21	0.44	0.97	0.321	1.14	0.282	1.05	1.00	0.268	No
74	12.14	0.66	0.21	0.45	0.97	0.323	1.14	0.283	1.05	1.00	0.270	No
75	12.30	0.67	0.22	0.45	0.96	0.324	1.14	0.284	1.05	1.00	0.272	No
76	12.47	0.67	0.22	0.45	0.96	0.326	1.14	0.286	1.04	1.00	0.274	No
77	12.63	0.68	0.23	0.46	0.96	0.327	1.14	0.287	1.04	1.00	0.276	No
78	12.80	0.69	0.23	0.46	0.96	0.329	1.14	0.288	1.05	1.00	0.275	No
79	12.96	0.70	0.24	0.46	0.96	0.330	1.14	0.290	1.05	1.00	0.276	No
80	13.12	0.71	0.24	0.47	0.96	0.332	1.14	0.291	1.06	1.00	0.273	No
81	13.29	0.72	0.25	0.47	0.96	0.333	1.14	0.292	1.06	1.00	0.274	No
82	13.45	0.73	0.25	0.47	0.96	0.334	1.14	0.293	1.07	1.00	0.274	No
83	13.62	0.73	0.26	0.48	0.96	0.335	1.14	0.294	1.07	1.00	0.273	No
84	13.78	0.74	0.26	0.48	0.96	0.336	1.14	0.295	1.08	1.00	0.272	No
85	13.94	0.75	0.27	0.49	0.96	0.337	1.14	0.295	1.09	1.00	0.271	No
86	14.11	0.76	0.27	0.49	0.96	0.338	1.14	0.296	1.09	1.00	0.271	No
87	14.27	0.77	0.28	0.50	0.96	0.339	1.14	0.297	1.09	1.00	0.273	No
88	14.44	0.78	0.28	0.50	0.96	0.340	1.14	0.298	1.08	1.00	0.276	No
89	14.60	0.79	0.29	0.51	0.95	0.341	1.14	0.298	1.08	1.00	0.276	No
90	14.76	0.80	0.29	0.51	0.95	0.341	1.14	0.299	1.08	1.00	0.276	No
91	14.93	0.81	0.30	0.51	0.95	0.342	1.14	0.300	1.09	1.00	0.276	No
92	15.09	0.82	0.30	0.52	0.95	0.343	1.14	0.301	1.09	1.00	0.276	No
93	15.26	0.83	0.31	0.52	0.95	0.344	1.14	0.301	1.08	1.00	0.278	No
94	15.42	0.84	0.31	0.53	0.95	0.344	1.14	0.302	1.08	1.00	0.280	No
95	15.58	0.85	0.32	0.53	0.95	0.345	1.14	0.302	1.07	1.00	0.282	No
96	15.75	0.86	0.32	0.54	0.95	0.346	1.14	0.303	1.07	1.00	0.284	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	0.87	0.33	0.54	0.95	0.347	1.14	0.304	1.06	1.00	0.285	No
98	16.08	0.88	0.33	0.55	0.95	0.347	1.14	0.304	1.07	1.00	0.285	No
99	16.24	0.89	0.34	0.55	0.95	0.348	1.14	0.305	1.07	1.00	0.284	No
100	16.40	0.90	0.34	0.55	0.95	0.348	1.14	0.305	1.08	1.00	0.283	No
101	16.57	0.91	0.35	0.56	0.95	0.349	1.14	0.306	1.08	1.00	0.282	No
102	16.73	0.92	0.35	0.56	0.94	0.350	1.14	0.306	1.09	1.00	0.282	No
103	16.90	0.93	0.36	0.57	0.94	0.350	1.14	0.307	1.09	1.00	0.283	No
104	17.06	0.94	0.36	0.57	0.94	0.351	1.14	0.307	1.08	1.00	0.285	No
105	17.22	0.95	0.37	0.58	0.94	0.351	1.14	0.308	1.07	1.00	0.288	No
106	17.39	0.96	0.37	0.58	0.94	0.352	1.14	0.308	1.06	1.00	0.290	No
107	17.55	0.97	0.38	0.59	0.94	0.352	1.14	0.309	1.06	1.00	0.292	No
108	17.72	0.98	0.38	0.59	0.94	0.353	1.14	0.309	1.06	1.00	0.293	No
109	17.88	0.99	0.39	0.60	0.94	0.353	1.14	0.310	1.05	1.00	0.295	No
110	18.04	0.99	0.39	0.60	0.94	0.354	1.14	0.310	1.05	1.00	0.296	No
111	18.21	1.00	0.40	0.60	0.94	0.354	1.14	0.311	1.04	1.00	0.298	No
112	18.37	1.01	0.40	0.61	0.94	0.355	1.14	0.311	1.04	1.00	0.300	No
113	18.54	1.02	0.41	0.61	0.94	0.355	1.14	0.312	1.03	1.00	0.302	No
114	18.70	1.03	0.41	0.62	0.94	0.356	1.14	0.312	1.03	1.00	2.000	Yes
115	18.86	1.04	0.42	0.62	0.94	0.356	1.14	0.312	1.03	1.00	2.000	Yes
116	19.03	1.05	0.43	0.63	0.93	0.357	1.14	0.313	1.03	1.00	2.000	Yes
117	19.19	1.06	0.43	0.63	0.93	0.357	1.14	0.313	1.04	1.00	2.000	Yes
118	19.36	1.07	0.44	0.63	0.93	0.358	1.14	0.314	1.04	1.00	2.000	Yes
119	19.52	1.08	0.44	0.64	0.93	0.358	1.14	0.314	1.06	1.00	2.000	Yes
120	19.69	1.09	0.45	0.64	0.93	0.359	1.14	0.314	1.07	1.00	0.293	No
121	19.85	1.10	0.45	0.65	0.93	0.359	1.14	0.314	1.10	1.00	0.287	No
122	20.01	1.11	0.46	0.65	0.93	0.359	1.14	0.315	1.10	1.00	0.286	No
123	20.18	1.12	0.46	0.66	0.93	0.359	1.14	0.315	1.10	1.00	0.286	No
124	20.34	1.13	0.47	0.66	0.93	0.359	1.14	0.315	1.10	1.00	0.286	No
125	20.51	1.14	0.47	0.67	0.93	0.360	1.14	0.315	1.10	1.00	0.287	No
126	20.67	1.15	0.48	0.67	0.93	0.360	1.14	0.315	1.10	1.00	0.287	No
127	20.83	1.16	0.48	0.68	0.93	0.360	1.14	0.315	1.10	1.00	0.287	No
128	21.00	1.17	0.49	0.68	0.92	0.360	1.14	0.316	1.10	1.00	0.287	No
129	21.16	1.18	0.49	0.69	0.92	0.360	1.14	0.316	1.10	1.00	0.287	No
130	21.33	1.19	0.50	0.69	0.92	0.360	1.14	0.316	1.10	1.00	0.287	No
131	21.49	1.20	0.50	0.70	0.92	0.361	1.14	0.316	1.10	1.00	0.287	No
132	21.65	1.21	0.51	0.70	0.92	0.361	1.14	0.316	1.10	1.00	0.287	No
133	21.82	1.22	0.51	0.71	0.92	0.361	1.14	0.316	1.10	1.00	0.287	No
134	21.98	1.23	0.52	0.71	0.92	0.361	1.14	0.316	1.10	1.00	0.288	No
135	22.15	1.24	0.52	0.72	0.92	0.361	1.14	0.316	1.10	1.00	0.288	No
136	22.31	1.25	0.53	0.72	0.92	0.361	1.14	0.316	1.10	1.00	0.288	No
137	22.47	1.26	0.53	0.73	0.92	0.361	1.14	0.317	1.10	1.00	0.288	No
138	22.64	1.27	0.54	0.73	0.92	0.361	1.14	0.317	1.10	1.00	0.288	No
139	22.80	1.28	0.54	0.74	0.92	0.361	1.14	0.317	1.10	1.00	0.288	No
140	22.97	1.29	0.55	0.74	0.91	0.361	1.14	0.317	1.10	1.00	0.288	No
141	23.13	1.30	0.55	0.75	0.91	0.361	1.14	0.317	1.10	1.00	0.288	No
142	23.29	1.31	0.56	0.75	0.91	0.361	1.14	0.317	1.10	1.00	0.288	No
143	23.46	1.32	0.56	0.76	0.91	0.362	1.14	0.317	1.10	1.00	0.288	No
144	23.62	1.33	0.57	0.76	0.91	0.362	1.14	0.317	1.10	1.00	0.289	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	1.34	0.57	0.77	0.91	0.362	1.14	0.317	1.08	1.00	0.293	No
146	23.95	1.35	0.58	0.77	0.91	0.362	1.14	0.317	1.06	1.00	0.299	No
147	24.11	1.36	0.58	0.78	0.91	0.362	1.14	0.317	1.05	1.00	0.302	No
148	24.28	1.37	0.59	0.78	0.91	0.362	1.14	0.317	1.04	1.00	0.303	No
149	24.44	1.38	0.59	0.79	0.91	0.362	1.14	0.317	1.04	1.00	0.304	No
150	24.61	1.39	0.60	0.79	0.91	0.362	1.14	0.317	1.04	1.00	0.304	No
151	24.77	1.40	0.60	0.80	0.91	0.362	1.14	0.317	1.04	1.00	0.305	No
152	24.93	1.41	0.61	0.80	0.90	0.362	1.14	0.317	1.04	1.00	0.306	No
153	25.10	1.42	0.61	0.81	0.90	0.362	1.14	0.317	1.04	1.00	0.306	No
154	25.26	1.43	0.62	0.81	0.90	0.362	1.14	0.317	1.04	1.00	0.305	No
155	25.43	1.44	0.62	0.82	0.90	0.362	1.14	0.317	1.05	1.00	0.303	No
156	25.59	1.45	0.63	0.82	0.90	0.362	1.14	0.317	1.05	1.00	0.301	No
157	25.75	1.46	0.63	0.83	0.90	0.362	1.14	0.318	1.05	1.00	0.301	No
158	25.92	1.47	0.64	0.83	0.90	0.362	1.14	0.318	1.05	1.00	0.302	No
159	26.08	1.48	0.65	0.84	0.90	0.362	1.14	0.318	1.05	1.00	0.303	No
160	26.25	1.49	0.65	0.84	0.90	0.362	1.14	0.318	1.05	1.00	0.303	No
161	26.41	1.50	0.66	0.85	0.90	0.362	1.14	0.318	1.05	1.00	0.302	No
162	26.57	1.51	0.66	0.85	0.90	0.362	1.14	0.318	1.05	1.00	0.301	No
163	26.74	1.52	0.67	0.86	0.90	0.362	1.14	0.317	1.06	1.00	0.300	No
164	26.90	1.53	0.67	0.86	0.89	0.362	1.14	0.317	1.06	1.00	0.300	No
165	27.07	1.54	0.68	0.87	0.89	0.362	1.14	0.317	1.06	1.00	0.301	No
166	27.23	1.55	0.68	0.87	0.89	0.362	1.14	0.317	1.05	1.00	0.302	No
167	27.40	1.56	0.69	0.88	0.89	0.362	1.14	0.317	1.05	1.00	0.303	No
168	27.56	1.57	0.69	0.88	0.89	0.362	1.14	0.317	1.05	1.00	0.303	No
169	27.72	1.58	0.70	0.89	0.89	0.362	1.14	0.317	1.05	1.00	0.302	No
170	27.89	1.59	0.70	0.89	0.89	0.362	1.14	0.317	1.05	1.00	0.302	No
171	28.05	1.60	0.71	0.90	0.89	0.362	1.14	0.317	1.05	1.00	0.303	No
172	28.22	1.61	0.71	0.90	0.89	0.362	1.14	0.317	1.04	1.00	0.304	No
173	28.38	1.62	0.72	0.91	0.89	0.361	1.14	0.317	1.04	1.00	0.305	No
174	28.54	1.63	0.72	0.91	0.89	0.361	1.14	0.317	1.03	1.00	0.306	No
175	28.71	1.64	0.73	0.92	0.88	0.361	1.14	0.317	1.03	1.00	0.307	No
176	28.87	1.65	0.73	0.92	0.88	0.361	1.14	0.316	1.03	1.00	0.308	No
177	29.04	1.66	0.74	0.93	0.88	0.361	1.14	0.316	1.03	1.00	0.308	No
178	29.20	1.67	0.74	0.93	0.88	0.361	1.14	0.316	1.03	1.00	0.307	No
179	29.36	1.68	0.75	0.94	0.88	0.361	1.14	0.316	1.03	1.00	0.306	No
180	29.53	1.69	0.75	0.94	0.88	0.361	1.14	0.316	1.03	1.00	0.306	No
181	29.69	1.70	0.76	0.95	0.88	0.360	1.14	0.316	1.03	1.00	0.307	No
182	29.86	1.71	0.76	0.95	0.88	0.360	1.14	0.316	1.03	1.00	0.308	No
183	30.02	1.72	0.77	0.96	0.88	0.360	1.14	0.316	1.02	1.00	0.309	No
184	30.18	1.73	0.77	0.96	0.88	0.360	1.14	0.316	1.02	1.00	0.310	No
185	30.35	1.74	0.78	0.97	0.88	0.360	1.14	0.316	1.02	1.00	0.311	No
186	30.51	1.75	0.78	0.97	0.88	0.360	1.14	0.315	1.01	1.00	0.311	No
187	30.68	1.76	0.79	0.98	0.87	0.360	1.14	0.315	1.01	1.00	0.312	No
188	30.84	1.77	0.79	0.98	0.87	0.360	1.14	0.315	1.01	1.00	0.312	No
189	31.00	1.78	0.80	0.98	0.87	0.359	1.14	0.315	1.01	1.00	0.312	No
190	31.17	1.79	0.80	0.99	0.87	0.359	1.14	0.315	1.01	1.00	0.312	No
191	31.33	1.80	0.81	0.99	0.87	0.359	1.14	0.315	1.01	1.00	0.312	No
192	31.50	1.81	0.81	1.00	0.87	0.359	1.14	0.315	1.01	1.00	0.312	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	1.82	0.82	1.00	0.87	0.359	1.14	0.315	1.01	1.00	0.312	No
194	31.82	1.83	0.82	1.01	0.87	0.359	1.14	0.315	1.01	1.00	0.312	No
195	31.99	1.84	0.83	1.01	0.87	0.359	1.14	0.314	1.01	1.00	0.312	No
196	32.15	1.85	0.83	1.02	0.87	0.359	1.14	0.314	1.01	1.00	0.312	No
197	32.32	1.86	0.84	1.02	0.87	0.358	1.14	0.314	1.01	1.00	0.312	No
198	32.48	1.87	0.84	1.03	0.86	0.358	1.14	0.314	1.01	1.00	0.312	No
199	32.64	1.88	0.85	1.03	0.86	0.358	1.14	0.314	1.01	1.00	0.312	No
200	32.81	1.89	0.86	1.04	0.86	0.358	1.14	0.314	1.01	1.00	0.312	No
201	32.97	1.90	0.86	1.04	0.86	0.358	1.14	0.313	1.00	1.00	0.312	No
202	33.14	1.91	0.87	1.05	0.86	0.357	1.14	0.313	1.00	1.00	0.312	No
203	33.30	1.92	0.87	1.05	0.86	0.357	1.14	0.313	1.00	1.00	0.313	No
204	33.46	1.93	0.88	1.06	0.86	0.357	1.14	0.313	1.00	1.00	0.313	No
205	33.63	1.94	0.88	1.06	0.86	0.357	1.14	0.313	1.00	1.00	0.313	No
206	33.79	1.95	0.89	1.07	0.86	0.357	1.14	0.313	1.00	1.00	0.313	No
207	33.96	1.97	0.89	1.07	0.86	0.356	1.14	0.312	1.00	1.00	0.314	No
208	34.12	1.98	0.90	1.08	0.86	0.356	1.14	0.312	0.99	1.00	0.314	No
209	34.28	1.99	0.90	1.08	0.85	0.356	1.14	0.312	0.99	1.00	0.314	No
210	34.45	2.00	0.91	1.09	0.85	0.356	1.14	0.312	0.99	1.00	0.315	No
211	34.61	2.01	0.91	1.09	0.85	0.356	1.14	0.312	0.99	1.00	0.315	No
212	34.78	2.02	0.92	1.10	0.85	0.355	1.14	0.311	0.99	1.00	0.315	No
213	34.94	2.03	0.92	1.10	0.85	0.355	1.14	0.311	0.99	1.00	0.315	No
214	35.10	2.04	0.93	1.11	0.85	0.355	1.14	0.311	0.99	1.00	0.316	No
215	35.27	2.05	0.93	1.11	0.85	0.355	1.14	0.311	0.98	1.00	0.316	No
216	35.43	2.06	0.94	1.12	0.85	0.355	1.14	0.311	0.98	1.00	0.316	No
217	35.60	2.07	0.94	1.12	0.85	0.354	1.14	0.310	0.98	1.00	0.316	No
218	35.76	2.08	0.95	1.13	0.85	0.354	1.14	0.310	0.98	1.00	0.316	No
219	35.93	2.09	0.95	1.13	0.85	0.354	1.14	0.310	0.98	1.00	0.316	No
220	36.09	2.10	0.96	1.14	0.84	0.354	1.14	0.310	0.98	1.00	0.316	No
221	36.25	2.11	0.96	1.14	0.84	0.353	1.14	0.310	0.98	1.00	0.316	No
222	36.42	2.12	0.97	1.15	0.84	0.353	1.14	0.309	0.98	1.00	0.316	No
223	36.58	2.13	0.97	1.15	0.84	0.353	1.14	0.309	0.98	1.00	0.316	No
224	36.75	2.14	0.98	1.16	0.84	0.353	1.14	0.309	0.98	1.00	0.315	No
225	36.91	2.15	0.98	1.16	0.84	0.352	1.14	0.309	0.98	1.00	0.314	No
226	37.07	2.16	0.99	1.17	0.84	0.352	1.14	0.309	0.99	1.00	0.313	No
227	37.24	2.17	0.99	1.17	0.84	0.352	1.14	0.308	0.99	1.00	0.312	No
228	37.40	2.18	1.00	1.18	0.84	0.352	1.14	0.308	0.99	1.00	0.312	No
229	37.57	2.19	1.00	1.18	0.84	0.351	1.14	0.308	0.99	1.00	0.313	No
230	37.73	2.20	1.01	1.19	0.84	0.351	1.14	0.308	0.98	1.00	0.314	No
231	37.89	2.21	1.01	1.19	0.83	0.351	1.14	0.308	0.98	1.00	0.314	No
232	38.06	2.22	1.02	1.20	0.83	0.351	1.14	0.307	0.98	1.00	0.314	No
233	38.22	2.23	1.02	1.20	0.83	0.351	1.14	0.307	0.98	1.00	0.314	No
234	38.39	2.24	1.03	1.21	0.83	0.350	1.14	0.307	0.98	1.00	0.314	No
235	38.55	2.25	1.03	1.21	0.83	0.350	1.14	0.307	0.98	1.00	0.314	No
236	38.71	2.26	1.04	1.22	0.83	0.350	1.14	0.307	0.97	1.00	0.317	No
237	38.88	2.27	1.04	1.22	0.83	0.350	1.14	0.306	0.96	1.00	0.320	No
238	39.04	2.28	1.05	1.23	0.83	0.349	1.14	0.306	0.96	1.00	0.320	No
239	39.21	2.29	1.05	1.24	0.83	0.349	1.14	0.306	0.95	1.00	0.321	No
240	39.37	2.30	1.06	1.24	0.83	0.348	1.14	0.305	0.95	1.00	0.321	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	2.31	1.06	1.25	0.83	0.348	1.14	0.305	0.95	1.00	0.321	No
242	39.70	2.32	1.07	1.25	0.82	0.348	1.14	0.305	0.95	1.00	0.321	No
243	39.86	2.33	1.08	1.26	0.82	0.347	1.14	0.304	0.95	1.00	0.321	No
244	40.03	2.34	1.08	1.26	0.82	0.347	1.14	0.304	0.95	1.00	0.321	No
245	40.19	2.36	1.09	1.27	0.82	0.347	1.14	0.304	0.95	1.00	0.321	No
246	40.35	2.37	1.09	1.28	0.82	0.346	1.14	0.303	0.94	1.00	0.322	No
247	40.52	2.38	1.10	1.28	0.82	0.346	1.14	0.303	0.94	1.00	0.322	No
248	40.68	2.39	1.10	1.29	0.82	0.346	1.14	0.303	0.94	1.00	0.322	No
249	40.85	2.40	1.11	1.29	0.82	0.345	1.14	0.303	0.94	1.00	0.322	No
250	41.01	2.41	1.11	1.30	0.82	0.345	1.14	0.302	0.94	1.00	0.322	No
251	41.17	2.42	1.12	1.30	0.82	0.345	1.14	0.302	0.94	1.00	0.322	No
252	41.34	2.43	1.12	1.31	0.82	0.344	1.14	0.302	0.94	1.00	0.322	No
253	41.50	2.44	1.13	1.31	0.81	0.344	1.14	0.301	0.94	1.00	0.322	No
254	41.67	2.45	1.13	1.32	0.81	0.344	1.14	0.301	0.93	1.00	0.323	No
255	41.83	2.46	1.14	1.32	0.81	0.343	1.14	0.301	0.93	1.00	0.323	No
256	41.99	2.47	1.14	1.33	0.81	0.343	1.14	0.301	0.93	1.00	0.323	No
257	42.16	2.48	1.15	1.33	0.81	0.343	1.14	0.300	0.93	1.00	0.323	No
258	42.32	2.49	1.15	1.34	0.81	0.343	1.14	0.300	0.93	1.00	0.323	No
259	42.49	2.50	1.16	1.35	0.81	0.342	1.14	0.300	0.93	1.00	0.323	No
260	42.65	2.51	1.16	1.35	0.81	0.342	1.14	0.300	0.94	1.00	0.319	No
261	42.81	2.52	1.17	1.35	0.81	0.342	1.14	0.299	0.96	1.00	0.313	No
262	42.98	2.53	1.17	1.36	0.81	0.341	1.14	0.299	0.96	1.00	0.311	No
263	43.14	2.54	1.18	1.36	0.81	0.341	1.14	0.299	0.97	1.00	0.309	No
264	43.31	2.55	1.18	1.37	0.80	0.341	1.14	0.299	0.97	1.00	0.309	No
265	43.47	2.56	1.19	1.37	0.80	0.341	1.14	0.299	0.97	1.00	0.308	No
266	43.64	2.57	1.19	1.38	0.80	0.341	1.14	0.298	0.97	1.00	0.308	No
267	43.80	2.58	1.20	1.38	0.80	0.340	1.14	0.298	0.97	1.00	0.308	No
268	43.96	2.59	1.20	1.39	0.80	0.340	1.14	0.298	0.97	1.00	0.308	No
269	44.13	2.60	1.21	1.39	0.80	0.340	1.14	0.298	0.97	1.00	0.308	No
270	44.29	2.61	1.21	1.40	0.80	0.339	1.14	0.297	0.96	1.00	0.310	No
271	44.46	2.62	1.22	1.40	0.80	0.339	1.14	0.297	0.95	1.00	0.314	No
272	44.62	2.63	1.22	1.41	0.80	0.339	1.14	0.297	0.91	1.00	0.325	No
273	44.78	2.64	1.23	1.41	0.80	0.338	1.14	0.297	0.91	1.00	0.325	No
274	44.95	2.65	1.23	1.42	0.79	0.338	1.14	0.296	0.91	1.00	0.325	No
275	45.11	2.66	1.24	1.42	0.79	0.338	1.14	0.296	0.91	1.00	0.325	No
276	45.28	2.67	1.24	1.43	0.79	0.337	1.14	0.296	0.91	1.00	0.325	No
277	45.44	2.69	1.25	1.44	0.79	0.337	1.14	0.295	0.91	1.00	0.325	No
278	45.60	2.70	1.25	1.44	0.79	0.337	1.14	0.295	0.91	1.00	0.325	No
279	45.77	2.71	1.26	1.45	0.79	0.336	1.14	0.295	0.91	1.00	0.325	No
280	45.93	2.72	1.26	1.45	0.79	0.336	1.14	0.294	0.90	1.00	0.325	No
281	46.10	2.73	1.27	1.46	0.79	0.336	1.14	0.294	0.90	1.00	0.325	No
282	46.26	2.74	1.27	1.46	0.79	0.335	1.14	0.294	0.90	1.00	0.325	No
283	46.42	2.75	1.28	1.47	0.79	0.335	1.14	0.293	0.90	1.00	0.326	No
284	46.59	2.76	1.29	1.48	0.79	0.334	1.14	0.293	0.90	1.00	0.326	No
285	46.75	2.77	1.29	1.48	0.78	0.334	1.14	0.293	0.90	1.00	0.326	No
286	46.92	2.78	1.30	1.49	0.78	0.334	1.14	0.292	0.90	1.00	0.326	No
287	47.08	2.79	1.30	1.49	0.78	0.333	1.14	0.292	0.90	1.00	0.326	No
288	47.24	2.81	1.31	1.50	0.78	0.333	1.14	0.292	0.90	1.00	0.326	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
289	47.41	2.82	1.31	1.51	0.78	0.332	1.14	0.291	0.89	1.00	0.326	No
290	47.57	2.83	1.32	1.51	0.78	0.332	1.14	0.291	0.89	1.00	0.326	No
291	47.74	2.84	1.32	1.52	0.78	0.332	1.14	0.291	0.89	1.00	0.326	No
292	47.90	2.85	1.33	1.53	0.78	0.331	1.14	0.290	0.89	1.00	0.326	No
293	48.06	2.86	1.33	1.53	0.78	0.331	1.14	0.290	0.89	1.00	0.326	No
294	48.23	2.87	1.34	1.54	0.78	0.330	1.14	0.289	0.89	1.00	0.326	No
295	48.39	2.88	1.34	1.54	0.78	0.330	1.14	0.289	0.89	1.00	0.326	No
296	48.56	2.90	1.35	1.55	0.77	0.329	1.14	0.289	0.89	1.00	0.326	No
297	48.72	2.91	1.35	1.56	0.77	0.329	1.14	0.288	0.88	1.00	0.326	No
298	48.88	2.92	1.36	1.56	0.77	0.329	1.14	0.288	0.88	1.00	0.326	No
299	49.05	2.93	1.36	1.57	0.77	0.328	1.14	0.288	0.88	1.00	0.326	No
300	49.21	2.94	1.37	1.57	0.77	0.328	1.14	0.287	0.88	1.00	0.326	No
301	49.38	2.95	1.37	1.58	0.77	0.327	1.14	0.287	0.88	1.00	0.326	No
302	49.54	2.96	1.38	1.59	0.77	0.327	1.14	0.287	0.88	1.00	0.326	No
303	49.70	2.97	1.38	1.59	0.77	0.327	1.14	0.286	0.88	1.00	0.326	No
304	49.87	2.99	1.39	1.60	0.77	0.326	1.14	0.286	0.88	1.00	0.326	No
305	50.03	3.00	1.39	1.60	0.77	0.326	1.14	0.286	0.88	1.00	0.326	No
306	50.20	3.01	1.40	1.61	0.77	0.325	1.14	0.285	0.87	1.00	0.326	No
307	50.36	3.02	1.40	1.62	0.77	0.325	1.14	0.285	0.87	1.00	0.326	No
308	50.52	3.03	1.41	1.62	0.76	0.325	1.14	0.285	0.87	1.00	0.326	No
309	50.69	3.04	1.41	1.63	0.76	0.324	1.14	0.284	0.87	1.00	0.326	No
310	50.85	3.05	1.42	1.64	0.76	0.324	1.14	0.284	0.87	1.00	0.326	No
311	51.02	3.07	1.42	1.64	0.76	0.323	1.14	0.283	0.87	1.00	0.327	No
312	51.18	3.08	1.43	1.65	0.76	0.323	1.14	0.283	0.87	1.00	0.327	No
313	51.35	3.09	1.43	1.65	0.76	0.323	1.14	0.283	0.87	1.00	0.327	No
314	51.51	3.10	1.44	1.66	0.76	0.322	1.14	0.282	0.86	1.00	0.327	No
315	51.67	3.11	1.44	1.67	0.76	0.322	1.14	0.282	0.86	1.00	0.327	No
316	51.84	3.12	1.45	1.67	0.76	0.321	1.14	0.282	0.86	1.00	0.327	No
317	52.00	3.13	1.45	1.68	0.76	0.321	1.14	0.281	0.86	1.00	0.327	No
318	52.17	3.14	1.46	1.69	0.76	0.321	1.14	0.281	0.86	1.00	0.327	No
319	52.33	3.16	1.46	1.69	0.75	0.320	1.14	0.281	0.86	1.00	0.327	No
320	52.49	3.17	1.47	1.70	0.75	0.320	1.14	0.280	0.86	1.00	0.327	No
321	52.66	3.18	1.47	1.70	0.75	0.319	1.14	0.280	0.86	1.00	0.327	No
322	52.82	3.19	1.48	1.71	0.75	0.319	1.14	0.280	0.86	1.00	0.327	No
323	52.99	3.20	1.48	1.72	0.75	0.319	1.14	0.279	0.85	1.00	0.327	No
324	53.15	3.21	1.49	1.72	0.75	0.318	1.14	0.279	0.85	1.00	0.327	No
325	53.31	3.22	1.49	1.73	0.75	0.318	1.14	0.279	0.85	1.00	0.327	No
326	53.48	3.23	1.50	1.73	0.75	0.318	1.14	0.278	0.85	1.00	0.327	No
327	53.64	3.25	1.51	1.74	0.75	0.317	1.14	0.278	0.85	1.00	0.327	No
328	53.81	3.26	1.51	1.75	0.75	0.317	1.14	0.278	0.85	1.00	0.327	No
329	53.97	3.27	1.52	1.75	0.75	0.316	1.14	0.277	0.85	1.00	0.327	No
330	54.13	3.28	1.52	1.76	0.74	0.316	1.14	0.277	0.85	1.00	0.327	No
331	54.30	3.29	1.53	1.76	0.74	0.316	1.14	0.277	0.85	1.00	0.327	No
332	54.46	3.30	1.53	1.77	0.74	0.315	1.14	0.276	0.85	1.00	0.327	No
333	54.63	3.31	1.54	1.78	0.74	0.315	1.14	0.276	0.84	1.00	0.327	No
334	54.79	3.32	1.54	1.78	0.74	0.314	1.14	0.276	0.84	1.00	0.327	No
335	54.95	3.34	1.55	1.79	0.74	0.314	1.14	0.275	0.84	1.00	0.327	No
336	55.12	3.35	1.55	1.80	0.74	0.314	1.14	0.275	0.84	1.00	0.327	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
337	55.28	3.36	1.56	1.80	0.74	0.313	1.14	0.275	0.84	1.00	0.327	No
338	55.45	3.37	1.56	1.81	0.74	0.313	1.14	0.274	0.84	1.00	0.327	No
339	55.61	3.38	1.57	1.81	0.74	0.313	1.14	0.274	0.84	1.00	0.327	No
340	55.77	3.39	1.57	1.82	0.74	0.312	1.14	0.274	0.84	1.00	0.327	No
341	55.94	3.40	1.58	1.83	0.74	0.312	1.14	0.273	0.84	1.00	0.327	No
342	56.10	3.41	1.58	1.83	0.73	0.311	1.14	0.273	0.84	1.00	0.327	No
343	56.27	3.43	1.59	1.84	0.73	0.311	1.14	0.273	0.83	1.00	0.327	No
344	56.43	3.44	1.59	1.84	0.73	0.311	1.14	0.272	0.83	1.00	0.327	No
345	56.59	3.45	1.60	1.85	0.73	0.310	1.14	0.272	0.83	1.00	0.327	No
346	56.76	3.46	1.60	1.86	0.73	0.310	1.14	0.272	0.83	1.00	0.327	No
347	56.92	3.47	1.61	1.86	0.73	0.309	1.14	0.271	0.83	1.00	0.327	No
348	57.09	3.48	1.61	1.87	0.73	0.309	1.14	0.271	0.83	1.00	0.327	No
349	57.25	3.49	1.62	1.88	0.73	0.309	1.14	0.271	0.83	1.00	0.327	No
350	57.41	3.50	1.62	1.88	0.73	0.308	1.14	0.270	0.83	1.00	0.327	No
351	57.58	3.52	1.63	1.89	0.73	0.308	1.14	0.270	0.83	1.00	0.327	No
352	57.74	3.53	1.63	1.89	0.73	0.308	1.14	0.270	0.83	1.00	0.327	No
353	57.91	3.54	1.64	1.90	0.73	0.307	1.14	0.269	0.82	1.00	0.327	No
354	58.07	3.55	1.64	1.91	0.72	0.307	1.14	0.269	0.82	1.00	0.327	No
355	58.23	3.56	1.65	1.91	0.72	0.306	1.14	0.269	0.82	1.00	0.327	No
356	58.40	3.57	1.65	1.92	0.72	0.306	1.14	0.268	0.82	1.00	0.327	No
357	58.56	3.58	1.66	1.92	0.72	0.306	1.14	0.268	0.82	1.00	0.327	No
358	58.73	3.59	1.66	1.93	0.72	0.305	1.14	0.268	0.82	1.00	0.327	No
359	58.89	3.61	1.67	1.94	0.72	0.305	1.14	0.267	0.82	1.00	0.327	No
360	59.06	3.62	1.67	1.94	0.72	0.305	1.14	0.267	0.82	1.00	0.326	No
361	59.22	3.63	1.68	1.95	0.72	0.304	1.14	0.267	0.82	1.00	0.326	No
362	59.38	3.64	1.68	1.96	0.72	0.304	1.14	0.266	0.82	1.00	0.326	No
363	59.55	3.65	1.69	1.96	0.72	0.304	1.14	0.266	0.81	1.00	0.326	No
364	59.71	3.66	1.69	1.97	0.72	0.303	1.14	0.266	0.81	1.00	0.326	No
365	59.88	3.67	1.70	1.97	0.72	0.303	1.14	0.265	0.81	1.00	0.326	No
366	60.04	3.68	1.70	1.98	0.71	0.302	1.14	0.265	0.81	1.00	0.326	No
367	60.20	3.70	1.71	1.99	0.71	0.302	1.14	0.265	0.81	1.00	0.326	No
368	60.37	3.71	1.72	1.99	0.71	0.302	1.14	0.264	0.81	1.00	0.326	No
369	60.53	3.72	1.72	2.00	0.71	0.301	1.14	0.264	0.81	1.00	0.326	No
370	60.70	3.73	1.73	2.00	0.71	0.301	1.14	0.264	0.81	1.00	0.326	No
371	60.86	3.74	1.73	2.01	0.71	0.301	1.14	0.263	0.81	1.00	0.326	No
372	61.02	3.75	1.74	2.02	0.71	0.300	1.14	0.263	0.81	1.00	0.326	No
373	61.19	3.76	1.74	2.02	0.71	0.300	1.14	0.263	0.81	1.00	0.326	No
374	61.35	3.77	1.75	2.03	0.71	0.300	1.14	0.263	0.80	1.00	0.326	No
375	61.52	3.79	1.75	2.04	0.71	0.299	1.14	0.262	0.80	1.00	0.326	No
376	61.68	3.80	1.76	2.04	0.71	0.299	1.14	0.262	0.80	1.00	0.326	No
377	61.84	3.81	1.76	2.05	0.71	0.298	1.14	0.262	0.80	1.00	0.326	No
378	62.01	3.82	1.77	2.05	0.70	0.298	1.14	0.261	0.80	1.00	0.326	No
379	62.17	3.83	1.77	2.06	0.70	0.298	1.14	0.261	0.80	1.00	0.326	No
380	62.34	3.84	1.78	2.07	0.70	0.297	1.14	0.261	0.80	1.00	0.326	No
381	62.50	3.85	1.78	2.07	0.70	0.297	1.14	0.260	0.80	1.00	0.326	No
382	62.66	3.86	1.79	2.08	0.70	0.297	1.14	0.260	0.80	1.00	0.326	No
383	62.83	3.88	1.79	2.08	0.70	0.296	1.14	0.260	0.80	1.00	0.326	No
384	62.99	3.89	1.80	2.09	0.70	0.296	1.14	0.259	0.80	1.00	0.326	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
385	63.16	3.90	1.80	2.10	0.70	0.296	1.14	0.259	0.79	1.00	0.326	No
386	63.32	3.91	1.81	2.10	0.70	0.295	1.14	0.259	0.79	1.00	0.326	No
387	63.48	3.92	1.81	2.11	0.70	0.295	1.14	0.259	0.79	1.00	0.326	No
388	63.65	3.93	1.82	2.11	0.70	0.295	1.14	0.258	0.79	1.00	0.326	No
389	63.81	3.94	1.82	2.12	0.70	0.294	1.14	0.258	0.79	1.00	0.326	No
390	63.98	3.95	1.83	2.13	0.69	0.294	1.14	0.258	0.79	1.00	0.326	No
391	64.14	3.97	1.83	2.13	0.69	0.294	1.14	0.257	0.79	1.00	0.326	No
392	64.30	3.98	1.84	2.14	0.69	0.293	1.14	0.257	0.79	1.00	0.326	No
393	64.47	3.99	1.84	2.15	0.69	0.293	1.14	0.257	0.79	1.00	0.326	No
394	64.63	4.00	1.85	2.15	0.69	0.293	1.14	0.256	0.79	1.00	0.326	No
395	64.80	4.01	1.85	2.16	0.69	0.292	1.14	0.256	0.79	1.00	0.326	No
396	64.96	4.02	1.86	2.16	0.69	0.292	1.14	0.256	0.79	1.00	0.326	No
397	65.12	4.03	1.86	2.17	0.69	0.292	1.14	0.256	0.78	1.00	0.326	No
398	65.29	4.04	1.87	2.17	0.69	0.291	1.14	0.255	0.78	1.00	0.326	No
399	65.45	4.05	1.87	2.18	0.69	0.291	1.14	0.255	0.78	1.00	0.326	No
400	65.62	4.06	1.88	2.19	0.69	0.291	1.14	0.255	0.78	1.00	0.326	No
401	65.78	4.07	1.88	2.19	0.69	0.290	1.14	0.255	0.78	1.00	0.326	No
402	65.94	4.09	1.89	2.20	0.69	0.290	1.14	0.254	0.80	1.00	0.316	No
403	66.11	4.10	1.89	2.20	0.68	0.290	1.14	0.254	0.89	1.00	0.286	No
404	66.27	4.11	1.90	2.21	0.68	0.289	1.14	0.254	0.93	1.00	0.273	No
405	66.44	4.12	1.90	2.21	0.68	0.289	1.14	0.253	0.94	1.00	0.271	No
406	66.60	4.13	1.91	2.22	0.68	0.289	1.14	0.253	0.94	1.00	0.271	No
407	66.77	4.14	1.91	2.22	0.68	0.289	1.14	0.253	0.78	1.00	0.325	No
408	66.93	4.15	1.92	2.23	0.68	0.288	1.14	0.253	0.78	1.00	0.325	No
409	67.09	4.16	1.92	2.24	0.68	0.288	1.14	0.252	0.78	1.00	0.325	No
410	67.26	4.17	1.93	2.24	0.68	0.288	1.14	0.252	0.77	1.00	0.325	No
411	67.42	4.18	1.94	2.25	0.68	0.287	1.14	0.252	0.77	1.00	0.325	No
412	67.59	4.20	1.94	2.26	0.68	0.287	1.14	0.251	0.77	1.00	0.325	No
413	67.75	4.21	1.95	2.26	0.68	0.287	1.14	0.251	0.77	1.00	0.325	No
414	67.91	4.22	1.95	2.27	0.68	0.286	1.14	0.251	0.77	1.00	0.325	No
415	68.08	4.23	1.96	2.27	0.68	0.286	1.14	0.251	0.77	1.00	0.325	No
416	68.24	4.24	1.96	2.28	0.67	0.286	1.14	0.250	0.77	1.00	0.325	No
417	68.41	4.25	1.97	2.29	0.67	0.285	1.14	0.250	0.77	1.00	0.325	No
418	68.57	4.26	1.97	2.29	0.67	0.285	1.14	0.250	0.77	1.00	0.325	No
419	68.73	4.27	1.98	2.30	0.67	0.285	1.14	0.249	0.77	1.00	0.325	No
420	68.90	4.29	1.98	2.30	0.67	0.284	1.14	0.249	0.77	1.00	0.325	No
421	69.06	4.30	1.99	2.31	0.67	0.284	1.14	0.249	0.77	1.00	0.325	No
422	69.23	4.30	1.99	2.31	0.67	0.284	1.14	0.249	0.77	1.00	0.363	No
423	69.39	4.31	2.00	2.31	0.67	0.284	1.14	0.249	0.77	1.00	0.363	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	341.39	3.35	1.07	0.26	1.70	556.41	0.00	556.41	4.000	No	No	2.00
2	0.33	324.41	3.56	1.10	0.26	1.70	532.61	0.00	532.61	4.000	No	No	2.00
3	0.49	290.72	4.08	1.16	0.26	1.70	474.50	0.00	474.50	4.000	No	No	2.00
4	0.66	242.40	4.83	1.23	0.26	1.70	394.03	0.03	394.06	4.000	No	No	2.00
5	0.82	187.46	6.98	1.42	0.26	1.70	299.75	3.16	302.91	4.000	No	No	2.00
6	0.98	133.75	10.14	1.64	0.29	1.70	209.75	22.49	232.24	4.000	No	No	2.00
7	1.15	82.39	15.25	1.92	0.36	1.70	135.14	46.32	181.45	4.000	Yes	No	2.00
8	1.31	49.69	21.88	2.21	0.51	1.70	52.17	41.16	93.33	4.000	Yes	No	2.00
9	1.48	32.47	29.09	2.46	0.50	1.70	52.17	46.11	98.28	4.000	Yes	No	2.00
10	1.64	26.97	31.90	2.55	0.50	1.70	52.17	47.02	99.19	4.000	Yes	No	2.00
11	1.80	21.51	35.67	2.66	0.59	1.70	25.78	0.00	25.78	4.000	Yes	Yes	2.00
12	1.97	16.03	41.21	2.81	0.59	1.70	25.78	0.00	25.78	4.000	Yes	Yes	2.00
13	2.13	15.16	41.73	2.83	0.59	1.70	25.78	0.00	25.78	4.000	No	Yes	2.00
14	2.30	13.52	43.15	2.86	0.61	1.70	21.61	0.00	21.61	4.000	No	Yes	2.00
15	2.46	11.34	45.56	2.92	0.62	1.70	17.97	0.00	17.97	4.000	No	Yes	2.00
16	2.62	9.63	48.25	2.99	0.64	1.70	15.22	0.00	15.22	4.000	No	Yes	2.00
17	2.79	8.43	50.20	3.03	0.64	1.70	13.37	0.00	13.37	4.000	No	Yes	2.00
18	2.95	7.65	51.56	3.07	0.65	1.70	12.21	0.00	12.21	4.000	No	Yes	2.00
19	3.12	7.14	52.45	3.09	0.65	1.70	11.45	0.00	11.45	4.000	No	Yes	2.00
20	3.28	6.81	53.11	3.10	0.66	1.70	10.93	0.00	10.93	4.000	No	Yes	2.00
21	3.44	6.64	53.11	3.10	0.66	1.70	10.60	0.00	10.60	4.000	No	Yes	2.00
22	3.61	6.60	52.91	3.10	0.66	1.70	10.57	0.00	10.57	4.000	No	Yes	2.00
23	3.77	6.69	52.65	3.09	0.66	1.70	10.71	0.00	10.71	4.000	No	Yes	2.00
24	3.94	6.87	52.89	3.10	0.66	1.70	10.98	0.00	10.98	4.000	No	Yes	2.00
25	4.10	7.20	52.36	3.08	0.65	1.70	11.47	0.00	11.47	4.000	No	Yes	2.00
26	4.27	7.65	51.79	3.07	0.65	1.70	12.29	0.00	12.29	4.000	No	Yes	2.00
27	4.43	8.02	50.27	3.04	0.65	1.70	13.09	0.00	13.09	4.000	No	Yes	2.00
28	4.59	8.09	50.21	3.04	0.65	1.70	13.22	0.00	13.22	4.000	No	Yes	2.00
29	4.76	7.78	50.73	3.05	0.65	1.70	12.61	0.00	12.61	4.000	No	Yes	2.00
30	4.92	7.32	52.71	3.09	0.65	1.70	11.67	0.00	11.67	4.000	No	Yes	2.00
31	5.09	6.91	54.05	3.12	0.66	1.70	11.05	0.00	11.05	4.000	No	Yes	2.00
32	5.25	6.61	55.25	3.15	0.66	1.70	10.58	0.00	10.58	4.000	No	Yes	2.00
33	5.41	6.33	56.34	3.17	0.66	1.70	10.19	0.00	10.19	1.126	No	Yes	2.00
34	5.58	6.12	57.35	3.19	0.66	1.70	9.70	0.00	9.70	1.070	No	Yes	2.00
35	5.74	6.06	57.67	3.20	0.67	1.70	9.57	0.00	9.57	1.047	No	Yes	2.00
36	5.91	6.22	56.92	3.19	0.66	1.70	9.91	0.00	9.91	1.062	No	Yes	2.00
37	6.07	6.43	56.07	3.17	0.66	1.70	10.44	0.00	10.44	1.086	No	Yes	2.00
38	6.23	6.46	56.34	3.17	0.66	1.70	10.51	0.00	10.51	1.078	No	Yes	2.00
39	6.40	6.33	57.36	3.19	0.66	1.70	10.12	0.00	10.12	1.041	No	Yes	2.00
40	6.56	6.21	58.62	3.22	0.66	1.70	9.84	0.00	9.84	1.007	No	Yes	2.00
41	6.73	6.16	59.26	3.23	0.66	1.70	9.98	0.00	9.98	0.985	No	Yes	2.00
42	6.89	6.04	60.12	3.25	0.66	1.70	9.86	0.00	9.86	0.953	No	Yes	2.00
43	7.05	5.72	61.57	3.28	0.67	1.70	9.27	0.00	9.27	0.889	No	Yes	2.00
44	7.22	5.35	62.70	3.31	0.67	1.70	8.41	0.00	8.41	0.816	No	Yes	2.00
45	7.38	5.05	63.76	3.33	0.67	1.70	7.95	0.00	7.95	0.758	No	Yes	2.00
46	7.55	5.02	63.46	3.32	0.68	1.70	7.81	0.00	7.81	0.742	No	Yes	2.00
47	7.71	5.54	60.52	3.26	0.67	1.70	8.24	0.00	8.24	0.817	No	Yes	2.00
48	7.87	7.29	51.07	3.05	0.66	1.70	10.46	0.00	10.46	1.086	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
49	8.04	10.73	39.92	2.78	0.63	1.70	16.18	0.00	16.18	4.000	Yes	Yes	2.00
50	8.20	15.36	31.07	2.52	0.60	1.70	24.79	37.55	62.34	4.000	Yes	No	2.00
51	8.37	19.54	26.02	2.36	0.57	1.70	32.86	38.38	71.24	4.000	Yes	No	2.00
52	8.53	21.97	23.31	2.26	0.56	1.70	36.50	37.77	74.27	4.000	Yes	No	2.00
53	8.69	22.87	22.53	2.23	0.56	1.70	36.59	37.14	73.73	0.104	No	No	0.45
54	8.86	23.59	22.96	2.25	0.56	1.70	37.13	37.67	74.80	0.106	No	No	0.45
55	9.02	25.07	22.75	2.24	0.55	1.70	40.04	38.38	78.42	0.110	No	No	0.47
56	9.19	26.62	21.50	2.19	0.54	1.70	43.79	38.27	82.06	0.115	No	No	0.49
57	9.35	27.27	20.52	2.15	0.54	1.70	44.67	37.37	82.04	0.115	No	No	0.48
58	9.51	26.44	19.83	2.12	0.55	1.70	43.12	36.02	79.15	0.111	No	No	0.46
59	9.68	24.85	20.60	2.15	0.56	1.70	39.78	36.06	75.84	0.107	No	No	0.44
60	9.84	22.93	20.85	2.16	0.57	1.70	36.98	35.56	72.54	0.103	No	No	0.42
61	10.01	20.78	22.00	2.21	0.57	1.70	33.82	35.83	69.64	0.099	No	No	0.40
62	10.17	17.80	22.60	2.23	0.59	1.70	29.39	35.02	64.42	0.093	No	No	0.37
63	10.33	13.02	26.54	2.38	0.61	1.70	22.73	35.36	58.10	0.086	No	No	0.34
64	10.50	9.18	32.06	2.55	0.66	1.70	10.85	33.03	43.89	0.072	No	No	0.28
65	10.66	9.17	31.38	2.53	0.66	1.70	10.85	32.90	43.76	0.072	No	No	0.28
66	10.83	11.63	25.95	2.35	0.61	1.70	22.45	35.00	57.45	0.085	No	No	0.33
67	10.99	16.56	20.44	2.15	0.63	1.70	22.45	30.95	53.40	0.081	No	No	0.31
68	11.15	20.76	19.02	2.09	0.58	1.70	34.51	32.51	67.01	0.096	No	No	0.37
69	11.32	25.22	19.10	2.09	0.56	1.65	41.64	34.56	76.20	0.108	No	No	0.41
70	11.48	26.07	21.48	2.19	0.55	1.63	42.30	37.81	80.10	0.113	No	No	0.43
71	11.65	23.70	24.30	2.30	0.56	1.64	37.23	38.73	75.96	0.107	No	No	0.41
72	11.81	19.96	27.14	2.40	0.58	1.66	30.61	38.19	68.80	0.098	No	No	0.37
73	11.98	16.93	28.36	2.44	0.59	1.68	25.68	37.05	62.73	0.091	No	No	0.34
74	12.14	14.95	27.97	2.42	0.60	1.68	23.74	36.27	60.01	0.088	No	No	0.33
75	12.30	13.19	28.02	2.43	0.61	1.69	21.67	35.61	57.28	0.085	No	No	0.31
76	12.47	11.31	28.81	2.45	0.63	1.70	17.56	34.51	52.07	0.080	No	No	0.29
77	12.63	13.96	25.60	2.34	0.65	1.70	14.83	32.39	47.21	0.075	No	No	0.27
78	12.80	17.48	22.03	2.21	0.58	1.62	32.62	35.49	68.11	0.097	No	No	0.35
79	12.96	28.35	17.94	2.04	0.59	1.63	32.90	30.41	63.31	0.092	No	No	0.33
80	13.12	35.16	16.95	2.00	0.51	1.52	60.27	35.19	95.46	0.135	No	No	0.50
81	13.29	44.76	15.61	1.94	0.52	1.52	60.31	31.70	92.01	0.130	No	No	0.47
82	13.45	51.02	14.60	1.89	0.49	1.49	70.70	30.66	101.37	0.145	No	No	0.53
83	13.62	61.71	13.37	1.82	0.47	1.46	83.57	28.27	111.84	0.163	No	No	0.60
84	13.78	73.44	12.47	1.78	0.45	1.42	99.22	26.46	125.68	0.192	No	No	0.71
85	13.94	82.71	12.08	1.75	0.42	1.39	112.16	26.15	138.31	0.227	No	No	0.84
86	14.11	85.89	11.96	1.75	0.42	1.38	115.25	25.87	141.12	0.236	No	No	0.87
87	14.27	83.29	12.30	1.77	0.43	1.38	109.14	26.95	136.09	0.220	No	No	0.80
88	14.44	80.00	12.69	1.79	0.44	1.39	101.89	27.95	129.84	0.203	No	No	0.74
89	14.60	80.63	12.99	1.80	0.43	1.38	102.50	29.57	132.08	0.209	No	No	0.75
90	14.76	85.47	12.62	1.78	0.42	1.36	109.95	28.79	138.74	0.228	No	No	0.83
91	14.93	90.56	12.01	1.75	0.41	1.35	117.41	26.43	143.84	0.246	No	No	0.89
92	15.09	92.28	11.64	1.73	0.41	1.34	119.20	24.55	143.75	0.246	No	No	0.89
93	15.26	89.37	11.91	1.75	0.42	1.34	115.00	25.57	140.56	0.234	No	No	0.84
94	15.42	83.12	12.75	1.79	0.43	1.35	106.28	28.93	135.20	0.217	No	No	0.78
95	15.58	75.94	13.84	1.85	0.44	1.35	96.25	32.49	128.74	0.200	No	No	0.71
96	15.75	70.98	14.64	1.89	0.45	1.36	88.69	34.35	123.03	0.186	No	No	0.65

:: 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	70.81	14.83	1.90	0.45	1.35	87.78	34.89	122.67	0.185	No	No	0.65
98	16.08	75.82	14.06	1.86	0.44	1.34	94.62	33.12	127.74	0.197	No	No	0.69
99	16.24	84.39	12.81	1.79	0.43	1.32	105.26	29.05	134.32	0.215	No	No	0.76
100	16.40	93.78	11.52	1.72	0.42	1.31	116.79	23.52	140.31	0.233	No	No	0.82
101	16.57	102.05	10.67	1.67	0.41	1.30	126.23	19.38	145.61	0.253	No	No	0.89
102	16.73	107.04	10.53	1.66	0.40	1.29	132.40	19.04	151.44	0.278	No	No	0.99
103	16.90	106.42	10.89	1.69	0.40	1.28	132.11	21.33	153.43	0.288	No	No	1.02
104	17.06	99.65	11.71	1.73	0.41	1.28	122.45	25.34	147.79	0.262	No	No	0.92
105	17.22	89.65	11.94	1.75	0.43	1.30	108.67	24.95	133.62	0.213	No	No	0.74
106	17.39	80.36	12.67	1.79	0.45	1.31	97.86	27.26	125.13	0.191	No	No	0.66
107	17.55	73.99	13.28	1.82	0.46	1.31	90.55	29.01	119.55	0.179	No	No	0.61
108	17.72	67.88	14.92	1.90	0.46	1.30	85.62	34.77	120.39	0.180	No	No	0.62
109	17.88	61.60	16.79	1.99	0.47	1.31	75.41	38.39	113.81	0.167	No	No	0.57
110	18.04	52.66	19.61	2.11	0.48	1.31	67.30	42.37	109.66	0.159	No	No	0.54
111	18.21	42.83	23.12	2.25	0.51	1.33	53.51	42.82	96.33	0.137	No	No	0.46
112	18.37	31.76	27.16	2.40	0.54	1.35	40.08	41.29	81.37	0.115	No	No	0.38
113	18.54	24.25	29.57	2.48	0.59	1.38	27.40	38.02	65.42	0.094	No	No	0.31
114	18.70	22.28	30.71	2.51	0.59	1.38	26.08	37.89	63.97	4.000	Yes	No	2.00
115	18.86	26.09	29.05	2.46	0.57	1.35	32.21	39.45	71.66	4.000	Yes	No	2.00
116	19.03	32.94	26.35	2.37	0.54	1.33	40.67	41.08	81.75	4.000	Yes	No	2.00
117	19.19	43.87	21.06	2.17	0.52	1.31	50.23	39.64	89.87	4.000	Yes	No	2.00
118	19.36	62.11	15.19	1.92	0.49	1.28	70.62	32.61	103.24	4.000	Yes	No	2.00
119	19.52	89.37	11.29	1.71	0.45	1.25	103.42	20.73	124.15	4.000	Yes	No	2.00
120	19.69	120.98	9.46	1.60	0.40	1.22	141.02	12.93	153.95	0.291	No	No	0.99
121	19.85	150.04	8.63	1.54	0.35	1.19	172.24	9.35	181.59	0.563	No	No	1.96
122	20.01	171.71	8.27	1.52	0.33	1.17	193.12	7.90	201.02	1.193	No	No	2.00
123	20.18	184.87	8.21	1.51	0.31	1.16	205.39	7.91	213.30	2.297	No	No	2.00
124	20.34	190.24	8.36	1.52	0.30	1.15	209.86	8.91	218.78	3.253	No	No	2.00
125	20.51	188.99	8.55	1.54	0.31	1.15	207.30	10.04	217.34	2.959	No	No	2.00
126	20.67	184.15	8.71	1.55	0.31	1.15	200.11	10.84	210.95	2.002	No	No	2.00
127	20.83	180.12	8.67	1.54	0.32	1.15	194.28	10.37	204.65	1.425	No	No	2.00
128	21.00	180.96	8.51	1.53	0.32	1.15	194.31	9.40	203.71	1.359	No	No	2.00
129	21.16	187.88	8.23	1.51	0.32	1.15	201.59	7.88	209.47	1.841	No	No	2.00
130	21.33	200.10	7.79	1.48	0.30	1.14	213.66	5.79	219.45	3.404	No	No	2.00
131	21.49	215.37	7.17	1.44	0.29	1.13	229.10	3.27	232.37	4.000	No	No	2.00
132	21.65	231.66	6.51	1.38	0.27	1.12	245.09	1.42	246.50	4.000	No	No	2.00
133	21.82	246.11	6.01	1.34	0.26	1.11	260.18	0.62	260.80	4.000	No	No	2.00
134	21.98	256.61	5.71	1.32	0.26	1.11	270.98	0.33	271.31	4.000	No	No	2.00
135	22.15	261.98	5.57	1.30	0.26	1.11	275.73	0.24	275.96	4.000	No	No	2.00
136	22.31	263.21	5.50	1.30	0.26	1.11	275.54	0.20	275.74	4.000	No	No	2.00
137	22.47	262.40	5.46	1.29	0.26	1.10	273.30	0.18	273.48	4.000	No	No	2.00
138	22.64	261.33	5.49	1.30	0.26	1.10	271.68	0.19	271.88	4.000	No	No	2.00
139	22.80	260.39	5.61	1.31	0.26	1.10	270.74	0.26	271.00	4.000	No	No	2.00
140	22.97	257.94	5.89	1.33	0.26	1.10	268.88	0.49	269.37	4.000	No	No	2.00
141	23.13	252.35	6.18	1.36	0.26	1.10	262.59	0.85	263.44	4.000	No	No	2.00
142	23.29	242.48	6.47	1.38	0.26	1.09	251.99	1.37	253.36	4.000	No	No	2.00
143	23.46	228.51	6.92	1.42	0.28	1.10	238.08	2.46	240.54	4.000	No	No	2.00
144	23.62	210.31	7.54	1.46	0.30	1.10	220.47	4.69	225.16	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
145	23.79	188.52	8.63	1.54	0.32	1.11	197.90	10.25	208.15	1.712	No	No	2.00
146	23.95	165.95	9.50	1.60	0.35	1.11	172.96	15.04	188.00	0.698	No	No	2.00
147	24.11	147.45	10.02	1.63	0.37	1.12	152.58	17.30	169.87	0.406	No	No	1.35
148	24.28	137.44	9.35	1.59	0.40	1.13	142.26	12.31	154.57	0.294	No	No	0.97
149	24.44	135.05	8.99	1.57	0.40	1.12	142.58	10.23	152.81	0.285	No	No	0.94
150	24.61	134.90	9.80	1.62	0.39	1.12	144.82	15.33	160.14	0.327	No	No	1.08
151	24.77	131.95	10.86	1.68	0.38	1.11	140.47	21.93	162.39	0.343	No	No	1.12
152	24.93	128.19	11.28	1.71	0.39	1.11	132.32	23.80	156.12	0.302	No	No	0.99
153	25.10	130.84	10.17	1.64	0.40	1.12	132.43	16.77	149.20	0.268	No	No	0.88
154	25.26	143.19	8.54	1.54	0.39	1.11	147.99	8.00	156.00	0.302	No	No	0.99
155	25.43	159.71	7.33	1.45	0.37	1.10	169.07	3.16	172.23	0.431	No	No	1.42
156	25.59	171.49	6.75	1.40	0.35	1.09	181.16	1.63	182.79	0.584	No	No	1.94
157	25.75	175.11	6.83	1.41	0.35	1.09	182.08	1.82	183.90	0.606	No	No	2.00
158	25.92	174.22	7.32	1.45	0.36	1.09	178.61	3.24	181.85	0.567	No	No	1.88
159	26.08	173.92	7.88	1.49	0.35	1.09	177.25	5.47	182.73	0.583	No	No	1.93
160	26.25	176.67	8.15	1.51	0.35	1.08	179.83	6.86	186.69	0.666	No	No	2.00
161	26.41	182.90	7.69	1.48	0.34	1.08	185.41	4.80	190.21	0.757	No	No	2.00
162	26.57	190.96	7.33	1.45	0.33	1.08	194.28	3.46	197.74	1.028	No	No	2.00
163	26.74	198.60	7.26	1.44	0.32	1.07	202.31	3.29	205.60	1.496	No	No	2.00
164	26.90	202.48	7.57	1.47	0.32	1.07	206.51	4.58	211.09	2.018	No	No	2.00
165	27.07	201.86	7.78	1.48	0.32	1.07	204.38	5.55	209.93	1.889	No	No	2.00
166	27.23	198.78	7.90	1.49	0.32	1.07	199.29	6.05	205.34	1.475	No	No	2.00
167	27.40	197.18	7.91	1.49	0.33	1.06	196.42	6.04	202.46	1.278	No	No	2.00
168	27.56	199.23	7.86	1.49	0.32	1.06	198.65	5.84	204.50	1.414	No	No	2.00
169	27.72	203.35	7.83	1.48	0.32	1.06	204.08	5.77	209.84	1.880	No	No	2.00
170	27.89	206.23	7.93	1.49	0.31	1.06	207.18	6.36	213.55	2.332	No	No	2.00
171	28.05	205.54	8.00	1.50	0.31	1.05	205.82	6.70	212.52	2.193	No	No	2.00
172	28.22	201.53	8.20	1.51	0.32	1.05	200.93	7.72	208.65	1.759	No	No	2.00
173	28.38	195.28	8.87	1.56	0.32	1.05	194.40	11.76	206.15	1.539	No	No	2.00
174	28.54	187.86	9.29	1.59	0.33	1.05	186.61	14.33	200.94	1.189	No	No	2.00
175	28.71	181.30	9.47	1.60	0.34	1.05	178.37	15.11	193.48	0.859	No	No	2.00
176	28.87	178.92	8.95	1.56	0.35	1.05	174.58	11.40	185.98	0.650	No	No	2.00
177	29.04	183.20	8.64	1.54	0.35	1.05	178.88	9.62	188.51	0.711	No	No	2.00
178	29.20	192.61	8.22	1.51	0.33	1.04	189.92	7.54	197.46	1.016	No	No	2.00
179	29.36	202.43	7.99	1.50	0.32	1.04	200.72	6.55	207.27	1.632	No	No	2.00
180	29.53	206.97	7.63	1.47	0.32	1.04	206.19	4.85	211.04	2.012	No	No	2.00
181	29.69	203.72	7.53	1.46	0.32	1.04	202.00	4.36	206.36	1.556	No	No	2.00
182	29.86	193.30	7.63	1.47	0.34	1.04	190.50	4.60	195.10	0.918	No	No	2.00
183	30.02	181.06	8.23	1.51	0.35	1.04	175.36	7.20	182.56	0.580	No	No	1.88
184	30.18	170.48	9.04	1.57	0.36	1.04	165.84	11.58	177.41	0.496	No	No	1.60
185	30.35	162.23	10.12	1.64	0.36	1.03	158.94	18.49	177.44	0.497	No	No	1.60
186	30.51	151.39	11.15	1.70	0.36	1.03	150.43	24.87	175.30	0.468	No	No	1.50
187	30.68	138.05	12.09	1.76	0.38	1.03	133.54	29.03	162.57	0.344	No	No	1.10
188	30.84	126.40	12.22	1.76	0.41	1.03	119.59	27.94	147.53	0.261	No	No	0.83
189	31.00	124.68	11.65	1.73	0.42	1.03	116.13	24.20	140.33	0.233	No	No	0.75
190	31.17	132.45	10.59	1.67	0.41	1.03	127.92	19.03	146.94	0.258	No	No	0.83
191	31.33	144.07	9.88	1.62	0.39	1.02	141.35	15.58	156.93	0.307	No	No	0.98
192	31.50	151.19	9.61	1.61	0.38	1.02	148.86	14.32	163.19	0.348	No	No	1.12

:: 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	152.41	9.93	1.63	0.38	1.02	147.59	16.33	163.92	0.354	No	No	1.13
194	31.82	150.08	10.45	1.66	0.38	1.02	143.96	19.50	163.47	0.351	No	No	1.12
195	31.99	148.33	11.13	1.70	0.38	1.02	141.30	23.80	165.10	0.363	No	No	1.16
196	32.15	149.93	11.00	1.69	0.38	1.01	141.70	23.01	164.71	0.360	No	No	1.15
197	32.32	157.28	10.36	1.65	0.38	1.01	147.77	19.21	166.98	0.379	No	No	1.21
198	32.48	171.44	9.29	1.59	0.37	1.01	161.53	12.96	174.49	0.458	No	No	1.46
199	32.64	190.84	8.54	1.54	0.34	1.01	181.38	9.14	190.51	0.765	No	No	2.00
200	32.81	211.35	7.87	1.49	0.32	1.01	202.24	5.96	208.20	1.717	No	No	2.00
201	32.97	228.79	7.33	1.45	0.30	1.00	218.97	3.76	222.73	4.000	No	No	2.00
202	33.14	241.14	6.94	1.42	0.29	1.00	229.93	2.48	232.41	4.000	No	No	2.00
203	33.30	249.17	6.76	1.40	0.28	1.00	236.23	2.00	238.23	4.000	No	No	2.00
204	33.46	253.97	6.69	1.40	0.28	1.00	240.74	1.82	242.55	4.000	No	No	2.00
205	33.63	255.53	6.64	1.39	0.27	1.00	242.57	1.71	244.29	4.000	No	No	2.00
206	33.79	252.80	6.68	1.40	0.28	1.00	239.69	1.80	241.49	4.000	No	No	2.00
207	33.96	246.47	6.78	1.41	0.29	1.00	232.00	2.02	234.02	4.000	No	No	2.00
208	34.12	239.13	7.00	1.42	0.30	0.99	223.71	2.62	226.32	4.000	No	No	2.00
209	34.28	232.80	7.14	1.43	0.30	0.99	217.93	3.04	220.97	3.778	No	No	2.00
210	34.45	228.27	7.22	1.44	0.31	0.99	213.16	3.28	216.44	2.792	No	No	2.00
211	34.61	225.77	7.07	1.43	0.31	0.99	209.97	2.72	212.69	2.216	No	No	2.00
212	34.78	226.66	6.80	1.41	0.31	0.99	209.89	1.94	211.83	2.106	No	No	2.00
213	34.94	230.77	6.47	1.38	0.31	0.99	214.77	1.20	215.98	2.711	No	No	2.00
214	35.10	236.25	6.38	1.37	0.30	0.99	220.69	1.06	221.75	3.992	No	No	2.00
215	35.27	239.82	6.47	1.38	0.30	0.98	224.49	1.25	225.74	4.000	No	No	2.00
216	35.43	239.68	6.75	1.40	0.30	0.98	223.98	1.88	225.86	4.000	No	No	2.00
217	35.60	235.52	7.02	1.42	0.30	0.98	219.39	2.64	222.02	4.000	No	No	2.00
218	35.76	228.65	7.29	1.44	0.31	0.98	211.86	3.52	215.38	2.611	No	No	2.00
219	35.93	221.28	7.56	1.46	0.32	0.98	203.67	4.49	208.17	1.713	No	No	2.00
220	36.09	215.64	7.88	1.49	0.32	0.98	197.74	5.90	203.64	1.354	No	No	2.00
221	36.25	212.82	7.98	1.50	0.33	0.97	195.09	6.34	201.44	1.217	No	No	2.00
222	36.42	211.48	8.08	1.50	0.33	0.97	194.91	6.88	201.79	1.237	No	No	2.00
223	36.58	207.28	8.49	1.53	0.33	0.97	193.19	9.19	202.38	1.273	No	No	2.00
224	36.75	193.68	10.12	1.64	0.33	0.97	182.68	20.25	202.93	1.308	No	No	2.00
225	36.91	168.61	11.95	1.75	0.35	0.97	156.40	31.11	187.51	0.686	No	No	2.00
226	37.07	139.40	13.92	1.85	0.39	0.96	122.80	37.58	160.38	0.329	No	No	1.05
227	37.24	120.99	14.16	1.87	0.43	0.96	100.70	34.68	135.38	0.218	No	No	0.70
228	37.40	122.80	12.97	1.80	0.43	0.95	104.30	29.76	134.06	0.214	No	No	0.69
229	37.57	140.11	10.87	1.68	0.41	0.96	126.79	20.68	147.46	0.260	No	No	0.83
230	37.73	159.75	9.52	1.60	0.39	0.96	147.75	13.68	161.43	0.336	No	No	1.07
231	37.89	170.61	8.98	1.57	0.37	0.96	157.89	10.89	168.78	0.396	No	No	1.26
232	38.06	171.87	9.47	1.60	0.37	0.95	156.18	13.88	170.06	0.408	No	No	1.30
233	38.22	168.69	9.80	1.62	0.38	0.95	150.57	15.66	166.23	0.373	No	No	1.19
234	38.39	170.07	10.03	1.63	0.38	0.95	148.48	17.08	165.56	0.367	No	No	1.17
235	38.55	183.81	9.57	1.60	0.37	0.95	159.29	14.74	174.03	0.452	No	No	1.44
236	38.71	213.83	9.04	1.57	0.33	0.95	188.05	12.59	200.65	1.173	No	No	2.00
237	38.88	258.73	8.20	1.51	0.28	0.96	231.55	8.52	240.08	4.000	No	No	2.00
238	39.04	313.09	7.60	1.47	0.26	0.96	283.25	6.01	289.26	4.000	No	No	2.00
239	39.21	368.42	7.37	1.45	0.26	0.96	337.03	5.47	342.51	4.000	No	No	2.00
240	39.37	413.18	7.28	1.44	0.26	0.96	381.60	5.49	387.10	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
241	39.53	437.13	7.17	1.44	0.26	0.96	403.76	5.08	408.84	4.000	No	No	2.00
242	39.70	439.30	6.91	1.42	0.26	0.96	400.74	3.67	404.42	4.000	No	No	2.00
243	39.86	430.23	6.67	1.40	0.26	0.96	386.20	2.58	388.77	4.000	No	No	2.00
244	40.03	423.34	6.51	1.38	0.26	0.95	377.84	1.99	379.83	4.000	No	No	2.00
245	40.19	424.13	6.52	1.38	0.26	0.95	380.72	2.04	382.76	4.000	No	No	2.00
246	40.35	425.63	6.61	1.39	0.26	0.95	386.90	2.35	389.25	4.000	No	No	2.00
247	40.52	417.21	6.66	1.40	0.26	0.95	380.52	2.50	383.01	4.000	No	No	2.00
248	40.68	393.74	6.65	1.39	0.26	0.95	356.71	2.34	359.05	4.000	No	No	2.00
249	40.85	360.48	6.69	1.40	0.26	0.95	322.44	2.29	324.73	4.000	No	No	2.00
250	41.01	327.48	6.79	1.41	0.26	0.95	289.85	2.41	292.25	4.000	No	No	2.00
251	41.17	301.86	6.93	1.42	0.26	0.95	266.98	2.73	269.71	4.000	No	No	2.00
252	41.34	285.95	6.99	1.42	0.26	0.95	252.68	2.83	255.51	4.000	No	No	2.00
253	41.50	278.03	7.02	1.42	0.27	0.94	245.99	2.89	248.88	4.000	No	No	2.00
254	41.67	276.48	7.01	1.42	0.27	0.94	244.53	2.82	247.35	4.000	No	No	2.00
255	41.83	278.71	6.97	1.42	0.27	0.94	247.52	2.72	250.25	4.000	No	No	2.00
256	41.99	281.47	6.94	1.42	0.26	0.94	251.47	2.64	254.12	4.000	No	No	2.00
257	42.16	279.96	6.96	1.42	0.26	0.94	251.56	2.72	254.28	4.000	No	No	2.00
258	42.32	269.70	7.05	1.43	0.27	0.94	242.40	2.94	245.34	4.000	No	No	2.00
259	42.49	249.19	7.27	1.44	0.30	0.93	221.61	3.54	225.15	4.000	No	No	2.00
260	42.65	221.20	7.63	1.47	0.33	0.92	193.01	4.64	197.65	1.024	No	No	2.00
261	42.81	192.01	8.12	1.51	0.37	0.91	163.45	6.30	169.75	0.405	No	No	1.29
262	42.98	167.71	8.77	1.55	0.40	0.90	140.26	8.94	149.20	0.268	No	No	0.86
263	43.14	151.25	9.52	1.60	0.42	0.90	126.11	12.43	138.54	0.228	No	No	0.74
264	43.31	141.51	10.16	1.64	0.43	0.90	118.66	15.66	134.32	0.215	No	No	0.70
265	43.47	135.85	10.71	1.68	0.43	0.89	113.97	18.49	132.46	0.210	No	No	0.68
266	43.64	132.76	11.39	1.72	0.43	0.89	110.94	22.12	133.06	0.211	No	No	0.69
267	43.80	132.05	11.92	1.75	0.43	0.89	110.40	25.04	135.44	0.218	No	No	0.71
268	43.96	134.79	12.33	1.77	0.42	0.89	112.03	27.51	139.53	0.231	No	No	0.75
269	44.13	144.36	12.01	1.75	0.41	0.89	117.98	26.53	144.50	0.248	No	No	0.81
270	44.29	166.63	11.03	1.69	0.39	0.90	135.44	22.56	158.00	0.313	No	No	1.01
271	44.46	204.93	9.59	1.61	0.35	0.91	171.06	15.55	186.61	0.664	No	No	2.00
272	44.62	253.49	8.51	1.53	0.29	0.92	221.63	10.31	231.94	4.000	No	No	2.00
273	44.78	301.55	7.98	1.50	0.26	0.93	267.38	8.01	275.39	4.000	No	No	2.00
274	44.95	338.96	7.91	1.49	0.26	0.93	300.73	8.29	309.02	4.000	No	No	2.00
275	45.11	363.77	8.00	1.50	0.26	0.92	320.61	9.38	329.99	4.000	No	No	2.00
276	45.28	374.71	8.05	1.50	0.26	0.92	331.47	9.99	341.46	4.000	No	No	2.00
277	45.44	371.90	7.94	1.49	0.26	0.92	328.37	9.11	337.48	4.000	No	No	2.00
278	45.60	357.97	7.79	1.48	0.26	0.92	312.24	7.65	319.90	4.000	No	No	2.00
279	45.77	341.77	7.69	1.47	0.26	0.92	294.08	6.70	300.77	4.000	No	No	2.00
280	45.93	333.02	7.73	1.48	0.26	0.92	285.11	6.81	291.92	4.000	No	No	2.00
281	46.10	334.46	7.79	1.48	0.26	0.92	288.43	7.24	295.67	4.000	No	No	2.00
282	46.26	342.25	8.29	1.52	0.26	0.92	296.93	10.99	307.92	4.000	No	No	2.00
283	46.42	351.51	9.40	1.59	0.26	0.92	304.55	21.59	326.14	4.000	No	No	2.00
284	46.59	361.07	10.44	1.66	0.26	0.92	311.69	33.62	345.32	4.000	No	No	2.00
285	46.75	375.14	11.21	1.70	0.26	0.91	320.84	43.51	364.34	4.000	No	No	2.00
286	46.92	397.92	11.26	1.71	0.26	0.91	339.97	46.21	386.18	4.000	No	No	2.00
287	47.08	428.75	10.77	1.68	0.26	0.91	369.54	42.90	412.43	4.000	No	No	2.00
288	47.24	459.11	10.06	1.64	0.26	0.91	399.39	35.69	435.08	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
289	47.41	478.15	9.40	1.59	0.26	0.91	416.99	27.83	444.82	4.000	No	No	2.00
290	47.57	484.96	9.29	1.59	0.26	0.91	417.50	26.38	443.88	4.000	No	No	2.00
291	47.74	486.23	9.47	1.60	0.26	0.91	415.58	28.69	444.27	4.000	No	No	2.00
292	47.90	491.93	9.79	1.62	0.26	0.91	418.96	33.32	452.28	4.000	No	No	2.00
293	48.06	503.52	10.00	1.63	0.26	0.91	430.59	37.19	467.77	4.000	No	No	2.00
294	48.23	518.39	10.15	1.64	0.26	0.91	443.84	40.31	484.15	4.000	No	No	2.00
295	48.39	532.38	10.28	1.65	0.26	0.91	455.67	43.26	498.93	4.000	No	No	2.00
296	48.56	543.67	10.43	1.66	0.26	0.90	465.12	46.35	511.48	4.000	No	No	2.00
297	48.72	552.40	10.50	1.66	0.26	0.90	471.44	48.05	519.49	4.000	No	No	2.00
298	48.88	560.31	10.56	1.67	0.26	0.90	476.64	49.59	526.23	4.000	No	No	2.00
299	49.05	570.75	10.61	1.67	0.26	0.90	483.92	50.92	534.85	4.000	No	No	2.00
300	49.21	586.18	10.66	1.67	0.26	0.90	496.66	52.91	549.57	4.000	No	No	2.00
301	49.38	606.11	10.70	1.67	0.26	0.90	514.51	55.25	569.76	4.000	No	No	2.00
302	49.54	625.28	10.54	1.66	0.26	0.90	533.11	54.03	587.14	4.000	No	No	2.00
303	49.70	636.15	10.31	1.65	0.26	0.90	543.76	50.87	594.63	4.000	No	No	2.00
304	49.87	634.18	10.07	1.64	0.26	0.90	540.36	46.25	586.61	4.000	No	No	2.00
305	50.03	623.50	10.13	1.64	0.26	0.90	526.56	46.21	572.77	4.000	No	No	2.00
306	50.20	614.07	10.43	1.66	0.26	0.89	515.21	50.69	565.90	4.000	No	No	2.00
307	50.36	609.38	10.72	1.68	0.26	0.89	514.89	55.61	570.50	4.000	No	No	2.00
308	50.52	602.63	10.89	1.69	0.26	0.89	513.10	58.41	571.51	4.000	No	No	2.00
309	50.69	582.76	10.87	1.68	0.26	0.89	496.51	56.56	553.07	4.000	No	No	2.00
310	50.85	551.99	10.98	1.69	0.26	0.89	463.48	55.12	518.60	4.000	No	No	2.00
311	51.02	521.56	11.19	1.70	0.26	0.89	434.04	55.39	489.43	4.000	No	No	2.00
312	51.18	503.93	11.41	1.72	0.26	0.89	418.46	56.87	475.33	4.000	No	No	2.00
313	51.35	500.37	11.45	1.72	0.26	0.89	417.57	57.36	474.93	4.000	No	No	2.00
314	51.51	507.80	11.33	1.71	0.26	0.89	423.72	56.29	480.01	4.000	No	No	2.00
315	51.67	523.22	11.15	1.70	0.26	0.89	435.80	54.95	490.75	4.000	No	No	2.00
316	51.84	547.04	10.97	1.69	0.26	0.89	454.84	54.06	508.90	4.000	No	No	2.00
317	52.00	579.43	10.86	1.68	0.26	0.89	482.03	54.97	537.01	4.000	No	No	2.00
318	52.17	616.75	10.83	1.68	0.26	0.88	515.41	57.73	573.14	4.000	No	No	2.00
319	52.33	650.72	10.88	1.69	0.26	0.88	546.73	61.49	608.22	4.000	No	No	2.00
320	52.49	671.43	10.95	1.69	0.26	0.88	565.61	64.68	630.29	4.000	No	No	2.00
321	52.66	673.86	11.06	1.70	0.26	0.88	566.01	66.86	632.86	4.000	No	No	2.00
322	52.82	660.32	11.21	1.71	0.26	0.88	551.79	68.25	620.04	4.000	No	No	2.00
323	52.99	639.16	11.36	1.71	0.26	0.88	530.34	68.53	598.87	4.000	No	No	2.00
324	53.15	619.43	11.48	1.72	0.26	0.88	511.83	68.67	580.50	4.000	No	No	2.00
325	53.31	606.67	11.57	1.73	0.26	0.88	501.08	68.85	569.93	4.000	No	No	2.00
326	53.48	599.20	11.43	1.72	0.26	0.88	497.08	66.02	563.10	4.000	No	No	2.00
327	53.64	590.29	11.20	1.70	0.26	0.88	491.67	61.58	553.25	4.000	No	No	2.00
328	53.81	575.68	10.93	1.69	0.26	0.88	477.47	55.66	533.14	4.000	No	No	2.00
329	53.97	557.46	10.91	1.69	0.26	0.88	459.74	53.58	513.32	4.000	No	No	2.00
330	54.13	542.91	11.02	1.69	0.26	0.87	445.39	53.90	499.29	4.000	No	No	2.00
331	54.30	536.65	11.09	1.70	0.26	0.87	440.19	54.43	494.62	4.000	No	No	2.00
332	54.46	541.63	10.96	1.69	0.26	0.87	442.57	52.73	495.30	4.000	No	No	2.00
333	54.63	557.24	10.74	1.68	0.26	0.87	456.31	50.55	506.87	4.000	No	No	2.00
334	54.79	580.18	10.56	1.67	0.26	0.87	477.41	49.64	527.05	4.000	No	No	2.00
335	54.95	599.57	10.53	1.66	0.26	0.87	497.71	50.82	548.52	4.000	No	No	2.00
336	55.12	608.63	10.58	1.67	0.26	0.87	502.93	52.10	555.04	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
337	55.28	607.18	10.73	1.68	0.26	0.87	498.52	54.39	552.91	4.000	No	No	2.00
338	55.45	606.19	10.96	1.69	0.26	0.87	493.14	57.69	550.83	4.000	No	No	2.00
339	55.61	612.00	11.13	1.70	0.26	0.87	499.01	61.25	560.26	4.000	No	No	2.00
340	55.77	624.53	11.18	1.70	0.26	0.87	511.24	63.39	574.62	4.000	No	No	2.00
341	55.94	634.98	11.00	1.69	0.26	0.87	522.34	61.42	583.76	4.000	No	No	2.00
342	56.10	636.18	10.65	1.67	0.26	0.87	523.10	55.14	578.24	4.000	No	No	2.00
343	56.27	628.40	10.27	1.65	0.26	0.86	513.06	47.74	560.80	4.000	No	No	2.00
344	56.43	619.07	10.12	1.64	0.26	0.86	502.34	44.22	546.56	4.000	No	No	2.00
345	56.59	617.80	10.24	1.65	0.26	0.86	499.38	46.06	545.44	4.000	No	No	2.00
346	56.76	624.70	10.51	1.66	0.26	0.86	508.52	51.43	559.94	4.000	No	No	2.00
347	56.92	633.89	10.70	1.67	0.26	0.86	517.77	55.67	573.44	4.000	No	No	2.00
348	57.09	638.55	10.79	1.68	0.26	0.86	520.02	57.48	577.50	4.000	No	No	2.00
349	57.25	640.23	10.81	1.68	0.26	0.86	518.55	57.63	576.18	4.000	No	No	2.00
350	57.41	643.40	10.84	1.68	0.26	0.86	520.61	58.27	578.87	4.000	No	No	2.00
351	57.58	646.41	10.85	1.68	0.26	0.86	526.47	59.02	585.49	4.000	No	No	2.00
352	57.74	644.00	10.79	1.68	0.26	0.86	524.36	57.83	582.20	4.000	No	No	2.00
353	57.91	633.34	10.80	1.68	0.26	0.86	513.44	57.02	570.46	4.000	No	No	2.00
354	58.07	620.35	10.94	1.69	0.26	0.86	499.52	58.06	557.58	4.000	No	No	2.00
355	58.23	611.92	11.18	1.70	0.26	0.86	491.78	61.21	552.99	4.000	No	No	2.00
356	58.40	610.67	11.39	1.72	0.26	0.85	491.67	64.74	556.41	4.000	No	No	2.00
357	58.56	614.54	11.49	1.72	0.26	0.85	495.08	66.90	561.98	4.000	No	No	2.00
358	58.73	620.58	11.50	1.72	0.26	0.85	499.47	67.58	567.05	4.000	No	No	2.00
359	58.89	628.56	11.44	1.72	0.26	0.85	504.98	67.12	572.10	4.000	No	No	2.00
360	59.06	638.42	11.37	1.71	0.26	0.85	513.11	66.83	579.94	4.000	No	No	2.00
361	59.22	649.27	11.13	1.70	0.26	0.85	522.11	63.62	585.73	4.000	No	No	2.00
362	59.38	659.02	10.89	1.69	0.26	0.85	529.94	60.18	590.12	4.000	No	No	2.00
363	59.55	661.67	10.65	1.67	0.26	0.85	535.24	56.28	591.53	4.000	No	No	2.00
364	59.71	655.48	10.65	1.67	0.26	0.85	527.25	55.49	582.74	4.000	No	No	2.00
365	59.88	640.48	10.91	1.69	0.26	0.85	513.82	58.88	572.70	4.000	No	No	2.00
366	60.04	628.04	11.21	1.71	0.26	0.85	498.11	62.55	560.67	4.000	No	No	2.00
367	60.20	616.83	11.51	1.72	0.26	0.85	496.39	67.41	563.80	4.000	No	No	2.00
368	60.37	602.38	11.45	1.72	0.26	0.85	485.65	65.20	550.84	4.000	No	No	2.00
369	60.53	573.62	11.37	1.71	0.26	0.85	462.28	61.25	523.53	4.000	No	No	2.00
370	60.70	537.17	11.34	1.71	0.26	0.84	426.41	56.79	483.20	4.000	No	No	2.00
371	60.86	503.06	11.42	1.72	0.26	0.84	397.38	54.70	452.08	4.000	No	No	2.00
372	61.02	479.61	11.47	1.72	0.26	0.84	379.58	53.25	432.83	4.000	No	No	2.00
373	61.19	465.74	11.30	1.71	0.26	0.84	369.27	49.88	419.14	4.000	No	No	2.00
374	61.35	457.83	11.07	1.70	0.26	0.84	363.31	46.26	409.57	4.000	No	No	2.00
375	61.52	453.55	10.84	1.68	0.26	0.84	359.77	42.94	402.70	4.000	No	No	2.00
376	61.68	451.65	10.66	1.67	0.26	0.84	358.20	40.37	398.57	4.000	No	No	2.00
377	61.84	451.14	10.49	1.66	0.26	0.84	357.87	38.18	396.06	4.000	No	No	2.00
378	62.01	451.31	10.31	1.65	0.26	0.84	357.68	35.80	393.48	4.000	No	No	2.00
379	62.17	452.28	10.12	1.64	0.26	0.84	357.75	33.41	391.16	4.000	No	No	2.00
380	62.34	454.87	10.00	1.63	0.26	0.84	359.32	32.05	391.37	4.000	No	No	2.00
381	62.50	459.07	9.99	1.63	0.26	0.84	363.03	32.09	395.12	4.000	No	No	2.00
382	62.66	463.28	10.06	1.64	0.26	0.84	366.84	33.30	400.14	4.000	No	No	2.00
383	62.83	465.62	10.12	1.64	0.26	0.84	368.40	34.21	402.62	4.000	No	No	2.00
384	62.99	466.74	10.13	1.64	0.26	0.84	367.63	34.28	401.91	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
385	63.16	469.76	10.09	1.64	0.26	0.83	368.65	33.89	402.54	4.000	No	No	2.00
386	63.32	477.24	10.06	1.64	0.26	0.83	374.64	33.85	408.49	4.000	No	No	2.00
387	63.48	487.27	10.09	1.64	0.26	0.83	384.49	35.08	419.57	4.000	No	No	2.00
388	63.65	493.52	10.07	1.64	0.26	0.83	391.34	35.28	426.62	4.000	No	No	2.00
389	63.81	489.20	9.97	1.63	0.26	0.83	388.43	33.63	422.06	4.000	No	No	2.00
390	63.98	472.03	9.87	1.62	0.26	0.83	373.41	31.33	404.74	4.000	No	No	2.00
391	64.14	445.03	9.89	1.62	0.26	0.83	350.20	29.99	380.19	4.000	No	No	2.00
392	64.30	413.52	10.03	1.63	0.26	0.83	324.19	29.89	354.08	4.000	No	No	2.00
393	64.47	382.42	10.04	1.63	0.26	0.83	298.61	28.05	326.66	4.000	No	No	2.00
394	64.63	355.07	9.94	1.63	0.26	0.83	276.36	25.40	301.76	4.000	No	No	2.00
395	64.80	334.67	9.93	1.63	0.26	0.83	259.26	24.18	283.45	4.000	No	No	2.00
396	64.96	322.25	10.30	1.65	0.26	0.83	250.07	27.06	277.13	4.000	No	No	2.00
397	65.12	317.35	10.81	1.68	0.26	0.83	246.52	31.72	278.24	4.000	No	No	2.00
398	65.29	316.85	10.97	1.69	0.26	0.83	247.11	33.33	280.44	4.000	No	No	2.00
399	65.45	317.49	10.93	1.69	0.26	0.83	248.29	33.06	281.35	4.000	No	No	2.00
400	65.62	312.44	10.52	1.66	0.26	0.83	247.49	29.02	276.51	4.000	No	No	2.00
401	65.78	293.71	10.45	1.66	0.26	0.83	235.01	27.21	262.22	4.000	No	No	2.00
402	65.94	253.37	12.16	1.76	0.28	0.81	201.75	38.59	240.34	4.000	No	No	2.00
403	66.11	194.92	16.82	1.99	0.33	0.79	145.92	55.25	201.17	1.202	No	No	2.00
404	66.27	144.65	22.89	2.24	0.42	0.73	87.42	52.93	140.35	0.234	No	No	0.86
405	66.44	116.31	27.25	2.40	0.44	0.72	75.89	53.03	128.93	0.200	No	No	0.74
406	66.60	193.29	18.60	2.07	0.46	0.71	74.56	42.45	117.01	0.173	No	No	0.64
407	66.77	274.90	14.25	1.87	0.26	0.82	276.00	67.93	343.93	4.000	No	No	2.00
408	66.93	393.79	10.82	1.68	0.26	0.82	275.81	34.56	310.36	4.000	No	No	2.00
409	67.09	450.17	10.01	1.63	0.26	0.82	362.88	32.36	395.25	4.000	No	No	2.00
410	67.26	510.85	9.45	1.60	0.26	0.82	407.54	28.01	435.54	4.000	No	No	2.00
411	67.42	537.34	9.46	1.60	0.26	0.82	416.56	28.56	445.12	4.000	No	No	2.00
412	67.59	550.59	9.49	1.60	0.26	0.82	423.50	29.40	452.90	4.000	No	No	2.00
413	67.75	568.97	9.36	1.59	0.26	0.82	437.36	28.38	465.75	4.000	No	No	2.00
414	67.91	592.21	9.20	1.58	0.26	0.82	458.16	27.30	485.47	4.000	No	No	2.00
415	68.08	614.31	9.12	1.58	0.26	0.82	476.40	27.05	503.45	4.000	No	No	2.00
416	68.24	627.68	9.22	1.58	0.26	0.82	487.54	29.02	516.56	4.000	No	No	2.00
417	68.41	630.92	9.47	1.60	0.26	0.82	488.15	32.78	520.93	4.000	No	No	2.00
418	68.57	626.87	9.83	1.62	0.26	0.82	482.88	38.17	521.04	4.000	No	No	2.00
419	68.73	623.33	10.14	1.64	0.26	0.81	477.22	42.67	519.89	4.000	No	No	2.00
420	68.90	628.51	7.85	1.49	0.26	0.81	478.92	11.44	490.36	4.000	No	No	2.00
421	69.06	646.57	4.70	1.22	0.26	0.81	493.60	0.02	493.62	4.000	No	No	2.00
422	69.23	670.52	40.00	2.78	0.26	0.81	517.96	0.00	517.96	4.000	No	Yes	2.00
423	69.39	687.87	40.65	2.80	0.26	0.81	533.39	0.00	533.39	4.000	No	Yes	2.00

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	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.05	0.00	0.33	2.00	0.00	0.00	0.05	0.00
0.49	2.00	0.00	0.00	0.05	0.00	0.66	2.00	0.00	0.00	0.05	0.00
0.82	2.00	0.00	0.00	0.05	0.00	0.98	2.00	0.00	0.00	0.05	0.00
1.15	2.00	0.00	0.00	0.05	0.00	1.31	2.00	0.00	0.00	0.05	0.00
1.48	2.00	0.00	0.00	0.05	0.00	1.64	2.00	0.00	0.00	0.05	0.00
1.80	2.00	0.00	0.00	0.05	0.00	1.97	2.00	0.00	0.00	0.05	0.00
2.13	2.00	0.00	0.00	0.05	0.00	2.30	2.00	0.00	0.00	0.05	0.00
2.46	2.00	0.00	0.00	0.05	0.00	2.62	2.00	0.00	0.00	0.05	0.00
2.79	2.00	0.00	0.00	0.05	0.00	2.95	2.00	0.00	0.00	0.05	0.00
3.12	2.00	0.00	0.00	0.05	0.00	3.28	2.00	0.00	0.00	0.05	0.00
3.44	2.00	0.00	0.00	0.05	0.00	3.61	2.00	0.00	0.00	0.05	0.00
3.77	2.00	0.00	0.00	0.05	0.00	3.94	2.00	0.00	0.00	0.05	0.00
4.10	2.00	0.00	0.00	0.05	0.00	4.27	2.00	0.00	0.00	0.05	0.00
4.43	2.00	0.00	0.00	0.05	0.00	4.59	2.00	0.00	0.00	0.05	0.00
4.76	2.00	0.00	0.00	0.05	0.00	4.92	2.00	0.00	0.00	0.05	0.00
5.09	2.00	0.00	0.00	0.05	0.00	5.25	2.00	0.00	0.00	0.05	0.00
5.41	2.00	0.00	0.00	0.05	0.00	5.58	2.00	0.00	0.00	0.05	0.00
5.74	2.00	0.00	0.00	0.05	0.00	5.91	2.00	0.00	0.00	0.05	0.00
6.07	2.00	0.00	0.00	0.05	0.00	6.23	2.00	0.00	0.00	0.05	0.00
6.40	2.00	0.00	0.00	0.05	0.00	6.56	2.00	0.00	0.00	0.05	0.00
6.73	2.00	0.00	0.00	0.05	0.00	6.89	2.00	0.00	0.00	0.05	0.00
7.05	2.00	0.00	0.00	0.05	0.00	7.22	2.00	0.00	0.00	0.05	0.00
7.38	2.00	0.00	0.00	0.05	0.00	7.55	2.00	0.00	0.00	0.05	0.00
7.71	2.00	0.00	0.00	0.05	0.00	7.87	2.00	0.00	0.00	0.05	0.00
8.04	2.00	0.00	0.00	0.05	0.00	8.20	2.00	0.00	0.00	0.05	0.00
8.37	2.00	0.00	0.00	0.05	0.00	8.53	2.00	0.00	0.00	0.05	0.00
8.69	0.45	0.00	0.00	0.05	0.23	8.86	0.45	0.00	0.00	0.05	0.25
9.02	0.47	0.00	0.00	0.05	0.22	9.19	0.49	0.00	0.00	0.05	0.23
9.35	0.48	0.00	0.00	0.05	0.22	9.51	0.46	0.00	0.00	0.05	0.22
9.68	0.44	0.00	0.00	0.05	0.25	9.84	0.42	0.00	0.00	0.05	0.24
10.01	0.40	0.00	0.00	0.05	0.26	10.17	0.37	0.00	0.00	0.05	0.26
10.33	0.34	0.66	0.34	0.16	0.27	10.50	0.28	0.72	0.31	0.17	0.31
10.66	0.28	0.72	0.31	0.16	0.30	10.83	0.33	0.67	0.34	0.17	0.29
10.99	0.31	0.69	0.33	0.16	0.28	11.15	0.37	0.00	0.00	0.05	0.26
11.32	0.41	0.00	0.00	0.05	0.25	11.48	0.43	0.00	0.00	0.05	0.23
11.65	0.41	0.00	0.00	0.05	0.25	11.81	0.37	0.00	0.00	0.05	0.25
11.98	0.34	0.66	0.34	0.17	0.28	12.14	0.33	0.67	0.34	0.16	0.27
12.30	0.31	0.69	0.33	0.16	0.27	12.47	0.29	0.71	0.32	0.17	0.30
12.63	0.27	0.73	0.31	0.16	0.29	12.80	0.35	0.00	0.00	0.05	0.27
12.96	0.33	0.67	0.34	0.16	0.26	13.12	0.50	0.00	0.00	0.05	0.20
13.29	0.47	0.00	0.00	0.05	0.22	13.45	0.53	0.00	0.00	0.05	0.18
13.62	0.60	0.00	0.00	0.05	0.17	13.78	0.71	0.00	0.00	0.05	0.11
13.94	0.84	0.00	0.00	0.05	0.06	14.11	0.87	0.00	0.00	0.05	0.05
14.27	0.80	0.00	0.00	0.05	0.07	14.44	0.74	0.00	0.00	0.05	0.11
14.60	0.75	0.00	0.00	0.05	0.09	14.76	0.83	0.00	0.00	0.05	0.07
14.93	0.89	0.00	0.00	0.05	0.04	15.09	0.89	0.00	0.00	0.05	0.04
15.26	0.84	0.00	0.00	0.05	0.06	15.42	0.78	0.00	0.00	0.05	0.08
15.58	0.71	0.00	0.00	0.05	0.11	15.75	0.65	0.00	0.00	0.05	0.14

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	0.65	0.00	0.00	0.05	0.13	16.08	0.69	0.00	0.00	0.05	0.12
16.24	0.76	0.00	0.00	0.05	0.09	16.40	0.82	0.00	0.00	0.05	0.06
16.57	0.89	0.00	0.00	0.05	0.04	16.73	0.99	0.00	0.00	0.05	0.01
16.90	1.02	0.00	0.00	0.05	0.00	17.06	0.92	0.00	0.00	0.05	0.03
17.22	0.74	0.00	0.00	0.05	0.09	17.39	0.66	0.00	0.00	0.05	0.13
17.55	0.61	0.00	0.00	0.05	0.14	17.72	0.62	0.00	0.00	0.05	0.15
17.88	0.57	0.00	0.00	0.05	0.15	18.04	0.54	0.00	0.00	0.05	0.16
18.21	0.46	0.00	0.00	0.05	0.20	18.37	0.38	0.00	0.00	0.05	0.22
18.54	0.31	0.69	0.33	0.17	0.26	18.70	2.00	0.00	0.00	0.05	0.00
18.86	2.00	0.00	0.00	0.05	0.00	19.03	2.00	0.00	0.00	0.05	0.00
19.19	2.00	0.00	0.00	0.05	0.00	19.36	2.00	0.00	0.00	0.05	0.00
19.52	2.00	0.00	0.00	0.05	0.00	19.69	0.99	0.00	0.00	0.05	0.00
19.85	1.96	0.00	0.00	0.05	0.00	20.01	2.00	0.00	0.00	0.05	0.00
20.18	2.00	0.00	0.00	0.05	0.00	20.34	2.00	0.00	0.00	0.05	0.00
20.51	2.00	0.00	0.00	0.05	0.00	20.67	2.00	0.00	0.00	0.05	0.00
20.83	2.00	0.00	0.00	0.05	0.00	21.00	2.00	0.00	0.00	0.05	0.00
21.16	2.00	0.00	0.00	0.05	0.00	21.33	2.00	0.00	0.00	0.05	0.00
21.49	2.00	0.00	0.00	0.05	0.00	21.65	2.00	0.00	0.00	0.05	0.00
21.82	2.00	0.00	0.00	0.05	0.00	21.98	2.00	0.00	0.00	0.05	0.00
22.15	2.00	0.00	0.00	0.05	0.00	22.31	2.00	0.00	0.00	0.05	0.00
22.47	2.00	0.00	0.00	0.05	0.00	22.64	2.00	0.00	0.00	0.05	0.00
22.80	2.00	0.00	0.00	0.05	0.00	22.97	2.00	0.00	0.00	0.05	0.00
23.13	2.00	0.00	0.00	0.05	0.00	23.29	2.00	0.00	0.00	0.05	0.00
23.46	2.00	0.00	0.00	0.05	0.00	23.62	2.00	0.00	0.00	0.05	0.00
23.79	2.00	0.00	0.00	0.05	0.00	23.95	2.00	0.00	0.00	0.05	0.00
24.11	1.35	0.00	0.00	0.05	0.00	24.28	0.97	0.00	0.00	0.05	0.01
24.44	0.94	0.00	0.00	0.05	0.02	24.61	1.08	0.00	0.00	0.05	0.00
24.77	1.12	0.00	0.00	0.05	0.00	24.93	0.99	0.00	0.00	0.05	0.00
25.10	0.88	0.00	0.00	0.05	0.04	25.26	0.99	0.00	0.00	0.05	0.00
25.43	1.42	0.00	0.00	0.05	0.00	25.59	1.94	0.00	0.00	0.05	0.00
25.75	2.00	0.00	0.00	0.05	0.00	25.92	1.88	0.00	0.00	0.05	0.00
26.08	1.93	0.00	0.00	0.05	0.00	26.25	2.00	0.00	0.00	0.05	0.00
26.41	2.00	0.00	0.00	0.05	0.00	26.57	2.00	0.00	0.00	0.05	0.00
26.74	2.00	0.00	0.00	0.05	0.00	26.90	2.00	0.00	0.00	0.05	0.00
27.07	2.00	0.00	0.00	0.05	0.00	27.23	2.00	0.00	0.00	0.05	0.00
27.40	2.00	0.00	0.00	0.05	0.00	27.56	2.00	0.00	0.00	0.05	0.00
27.72	2.00	0.00	0.00	0.05	0.00	27.89	2.00	0.00	0.00	0.05	0.00
28.05	2.00	0.00	0.00	0.05	0.00	28.22	2.00	0.00	0.00	0.05	0.00
28.38	2.00	0.00	0.00	0.05	0.00	28.54	2.00	0.00	0.00	0.05	0.00
28.71	2.00	0.00	0.00	0.05	0.00	28.87	2.00	0.00	0.00	0.05	0.00
29.04	2.00	0.00	0.00	0.05	0.00	29.20	2.00	0.00	0.00	0.05	0.00
29.36	2.00	0.00	0.00	0.05	0.00	29.53	2.00	0.00	0.00	0.05	0.00
29.69	2.00	0.00	0.00	0.05	0.00	29.86	2.00	0.00	0.00	0.05	0.00
30.02	1.88	0.00	0.00	0.05	0.00	30.18	1.60	0.00	0.00	0.05	0.00
30.35	1.60	0.00	0.00	0.05	0.00	30.51	1.50	0.00	0.00	0.05	0.00
30.68	1.10	0.00	0.00	0.05	0.00	30.84	0.83	0.00	0.00	0.05	0.04
31.00	0.75	0.00	0.00	0.05	0.06	31.17	0.83	0.00	0.00	0.05	0.05
31.33	0.98	0.00	0.00	0.05	0.00	31.50	1.12	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	1.13	0.00	0.00	0.05	0.00	31.82	1.12	0.00	0.00	0.05	0.00
31.99	1.16	0.00	0.00	0.05	0.00	32.15	1.15	0.00	0.00	0.05	0.00
32.32	1.21	0.00	0.00	0.05	0.00	32.48	1.46	0.00	0.00	0.05	0.00
32.64	2.00	0.00	0.00	0.05	0.00	32.81	2.00	0.00	0.00	0.05	0.00
32.97	2.00	0.00	0.00	0.05	0.00	33.14	2.00	0.00	0.00	0.05	0.00
33.30	2.00	0.00	0.00	0.05	0.00	33.46	2.00	0.00	0.00	0.05	0.00
33.63	2.00	0.00	0.00	0.05	0.00	33.79	2.00	0.00	0.00	0.05	0.00
33.96	2.00	0.00	0.00	0.05	0.00	34.12	2.00	0.00	0.00	0.05	0.00
34.28	2.00	0.00	0.00	0.05	0.00	34.45	2.00	0.00	0.00	0.05	0.00
34.61	2.00	0.00	0.00	0.05	0.00	34.78	2.00	0.00	0.00	0.05	0.00
34.94	2.00	0.00	0.00	0.05	0.00	35.10	2.00	0.00	0.00	0.05	0.00
35.27	2.00	0.00	0.00	0.05	0.00	35.43	2.00	0.00	0.00	0.05	0.00
35.60	2.00	0.00	0.00	0.05	0.00	35.76	2.00	0.00	0.00	0.05	0.00
35.93	2.00	0.00	0.00	0.05	0.00	36.09	2.00	0.00	0.00	0.05	0.00
36.25	2.00	0.00	0.00	0.05	0.00	36.42	2.00	0.00	0.00	0.05	0.00
36.58	2.00	0.00	0.00	0.05	0.00	36.75	2.00	0.00	0.00	0.05	0.00
36.91	2.00	0.00	0.00	0.05	0.00	37.07	1.05	0.00	0.00	0.05	0.00
37.24	0.70	0.00	0.00	0.05	0.07	37.40	0.69	0.00	0.00	0.05	0.07
37.57	0.83	0.00	0.00	0.05	0.04	37.73	1.07	0.00	0.00	0.05	0.00
37.89	1.26	0.00	0.00	0.05	0.00	38.06	1.30	0.00	0.00	0.05	0.00
38.22	1.19	0.00	0.00	0.05	0.00	38.39	1.17	0.00	0.00	0.05	0.00
38.55	1.44	0.00	0.00	0.05	0.00	38.71	2.00	0.00	0.00	0.05	0.00
38.88	2.00	0.00	0.00	0.05	0.00	39.04	2.00	0.00	0.00	0.05	0.00
39.21	2.00	0.00	0.00	0.05	0.00	39.37	2.00	0.00	0.00	0.05	0.00
39.53	2.00	0.00	0.00	0.05	0.00	39.70	2.00	0.00	0.00	0.05	0.00
39.86	2.00	0.00	0.00	0.05	0.00	40.03	2.00	0.00	0.00	0.05	0.00
40.19	2.00	0.00	0.00	0.05	0.00	40.35	2.00	0.00	0.00	0.05	0.00
40.52	2.00	0.00	0.00	0.05	0.00	40.68	2.00	0.00	0.00	0.05	0.00
40.85	2.00	0.00	0.00	0.05	0.00	41.01	2.00	0.00	0.00	0.05	0.00
41.17	2.00	0.00	0.00	0.05	0.00	41.34	2.00	0.00	0.00	0.05	0.00
41.50	2.00	0.00	0.00	0.05	0.00	41.67	2.00	0.00	0.00	0.05	0.00
41.83	2.00	0.00	0.00	0.05	0.00	41.99	2.00	0.00	0.00	0.05	0.00
42.16	2.00	0.00	0.00	0.05	0.00	42.32	2.00	0.00	0.00	0.05	0.00
42.49	2.00	0.00	0.00	0.05	0.00	42.65	2.00	0.00	0.00	0.05	0.00
42.81	1.29	0.00	0.00	0.05	0.00	42.98	0.86	0.00	0.00	0.05	0.02
43.14	0.74	0.00	0.00	0.05	0.04	43.31	0.70	0.00	0.00	0.05	0.05
43.47	0.68	0.00	0.00	0.05	0.05	43.64	0.69	0.00	0.00	0.05	0.05
43.80	0.71	0.00	0.00	0.05	0.05	43.96	0.75	0.00	0.00	0.05	0.04
44.13	0.81	0.00	0.00	0.05	0.03	44.29	1.01	0.00	0.00	0.05	0.00
44.46	2.00	0.00	0.00	0.05	0.00	44.62	2.00	0.00	0.00	0.05	0.00
44.78	2.00	0.00	0.00	0.05	0.00	44.95	2.00	0.00	0.00	0.05	0.00
45.11	2.00	0.00	0.00	0.05	0.00	45.28	2.00	0.00	0.00	0.05	0.00
45.44	2.00	0.00	0.00	0.05	0.00	45.60	2.00	0.00	0.00	0.05	0.00
45.77	2.00	0.00	0.00	0.05	0.00	45.93	2.00	0.00	0.00	0.05	0.00
46.10	2.00	0.00	0.00	0.05	0.00	46.26	2.00	0.00	0.00	0.05	0.00
46.42	2.00	0.00	0.00	0.05	0.00	46.59	2.00	0.00	0.00	0.05	0.00
46.75	2.00	0.00	0.00	0.05	0.00	46.92	2.00	0.00	0.00	0.05	0.00
47.08	2.00	0.00	0.00	0.05	0.00	47.24	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.05	0.00	47.57	2.00	0.00	0.00	0.05	0.00
47.74	2.00	0.00	0.00	0.05	0.00	47.90	2.00	0.00	0.00	0.05	0.00
48.06	2.00	0.00	0.00	0.05	0.00	48.23	2.00	0.00	0.00	0.05	0.00
48.39	2.00	0.00	0.00	0.05	0.00	48.56	2.00	0.00	0.00	0.05	0.00
48.72	2.00	0.00	0.00	0.05	0.00	48.88	2.00	0.00	0.00	0.05	0.00
49.05	2.00	0.00	0.00	0.05	0.00	49.21	2.00	0.00	0.00	0.05	0.00
49.38	2.00	0.00	0.00	0.05	0.00	49.54	2.00	0.00	0.00	0.05	0.00
49.70	2.00	0.00	0.00	0.05	0.00	49.87	2.00	0.00	0.00	0.05	0.00
50.03	2.00	0.00	0.00	0.05	0.00	50.20	2.00	0.00	0.00	0.05	0.00
50.36	2.00	0.00	0.00	0.05	0.00	50.52	2.00	0.00	0.00	0.05	0.00
50.69	2.00	0.00	0.00	0.05	0.00	50.85	2.00	0.00	0.00	0.05	0.00
51.02	2.00	0.00	0.00	0.05	0.00	51.18	2.00	0.00	0.00	0.05	0.00
51.35	2.00	0.00	0.00	0.05	0.00	51.51	2.00	0.00	0.00	0.05	0.00
51.67	2.00	0.00	0.00	0.05	0.00	51.84	2.00	0.00	0.00	0.05	0.00
52.00	2.00	0.00	0.00	0.05	0.00	52.17	2.00	0.00	0.00	0.05	0.00
52.33	2.00	0.00	0.00	0.05	0.00	52.49	2.00	0.00	0.00	0.05	0.00
52.66	2.00	0.00	0.00	0.05	0.00	52.82	2.00	0.00	0.00	0.05	0.00
52.99	2.00	0.00	0.00	0.05	0.00	53.15	2.00	0.00	0.00	0.05	0.00
53.31	2.00	0.00	0.00	0.05	0.00	53.48	2.00	0.00	0.00	0.05	0.00
53.64	2.00	0.00	0.00	0.05	0.00	53.81	2.00	0.00	0.00	0.05	0.00
53.97	2.00	0.00	0.00	0.05	0.00	54.13	2.00	0.00	0.00	0.05	0.00
54.30	2.00	0.00	0.00	0.05	0.00	54.46	2.00	0.00	0.00	0.05	0.00
54.63	2.00	0.00	0.00	0.05	0.00	54.79	2.00	0.00	0.00	0.05	0.00
54.95	2.00	0.00	0.00	0.05	0.00	55.12	2.00	0.00	0.00	0.05	0.00
55.28	2.00	0.00	0.00	0.05	0.00	55.45	2.00	0.00	0.00	0.05	0.00
55.61	2.00	0.00	0.00	0.05	0.00	55.77	2.00	0.00	0.00	0.05	0.00
55.94	2.00	0.00	0.00	0.05	0.00	56.10	2.00	0.00	0.00	0.05	0.00
56.27	2.00	0.00	0.00	0.05	0.00	56.43	2.00	0.00	0.00	0.05	0.00
56.59	2.00	0.00	0.00	0.05	0.00	56.76	2.00	0.00	0.00	0.05	0.00
56.92	2.00	0.00	0.00	0.05	0.00	57.09	2.00	0.00	0.00	0.05	0.00
57.25	2.00	0.00	0.00	0.05	0.00	57.41	2.00	0.00	0.00	0.05	0.00
57.58	2.00	0.00	0.00	0.05	0.00	57.74	2.00	0.00	0.00	0.05	0.00
57.91	2.00	0.00	0.00	0.05	0.00	58.07	2.00	0.00	0.00	0.05	0.00
58.23	2.00	0.00	0.00	0.05	0.00	58.40	2.00	0.00	0.00	0.05	0.00
58.56	2.00	0.00	0.00	0.05	0.00	58.73	2.00	0.00	0.00	0.05	0.00
58.89	2.00	0.00	0.00	0.05	0.00	59.06	2.00	0.00	0.00	0.05	0.00
59.22	2.00	0.00	0.00	0.05	0.00	59.38	2.00	0.00	0.00	0.05	0.00
59.55	2.00	0.00	0.00	0.05	0.00	59.71	2.00	0.00	0.00	0.05	0.00
59.88	2.00	0.00	0.00	0.05	0.00	60.04	2.00	0.00	0.00	0.05	0.00
60.20	2.00	0.00	0.00	0.05	0.00	60.37	2.00	0.00	0.00	0.05	0.00
60.53	2.00	0.00	0.00	0.05	0.00	60.70	2.00	0.00	0.00	0.05	0.00
60.86	2.00	0.00	0.00	0.05	0.00	61.02	2.00	0.00	0.00	0.05	0.00
61.19	2.00	0.00	0.00	0.05	0.00	61.35	2.00	0.00	0.00	0.05	0.00
61.52	2.00	0.00	0.00	0.05	0.00	61.68	2.00	0.00	0.00	0.05	0.00
61.84	2.00	0.00	0.00	0.05	0.00	62.01	2.00	0.00	0.00	0.05	0.00
62.17	2.00	0.00	0.00	0.05	0.00	62.34	2.00	0.00	0.00	0.05	0.00
62.50	2.00	0.00	0.00	0.05	0.00	62.66	2.00	0.00	0.00	0.05	0.00
62.83	2.00	0.00	0.00	0.05	0.00	62.99	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
63.16	2.00	0.00	0.00	0.05	0.00	63.32	2.00	0.00	0.00	0.05	0.00
63.48	2.00	0.00	0.00	0.05	0.00	63.65	2.00	0.00	0.00	0.05	0.00
63.81	2.00	0.00	0.00	0.05	0.00	63.98	2.00	0.00	0.00	0.05	0.00
64.14	2.00	0.00	0.00	0.05	0.00	64.30	2.00	0.00	0.00	0.05	0.00
64.47	2.00	0.00	0.00	0.05	0.00	64.63	2.00	0.00	0.00	0.05	0.00
64.80	2.00	0.00	0.00	0.05	0.00	64.96	2.00	0.00	0.00	0.05	0.00
65.12	2.00	0.00	0.00	0.05	0.00	65.29	2.00	0.00	0.00	0.05	0.00
65.45	2.00	0.00	0.00	0.05	0.00	65.62	2.00	0.00	0.00	0.05	0.00
65.78	2.00	0.00	0.00	0.05	0.00	65.94	2.00	0.00	0.00	0.05	0.00
66.11	2.00	0.00	0.00	0.05	0.00	66.27	0.86	0.00	0.00	0.05	0.00
66.44	0.74	0.00	0.00	0.05	0.00	66.60	0.64	0.00	0.00	0.05	0.00
66.77	2.00	0.00	0.00	0.05	0.00	66.93	2.00	0.00	0.00	0.05	0.00
67.09	2.00	0.00	0.00	0.05	0.00	67.26	2.00	0.00	0.00	0.05	0.00
67.42	2.00	0.00	0.00	0.05	0.00	67.59	2.00	0.00	0.00	0.05	0.00
67.75	2.00	0.00	0.00	0.05	0.00	67.91	2.00	0.00	0.00	0.05	0.00
68.08	2.00	0.00	0.00	0.05	0.00	68.24	2.00	0.00	0.00	0.05	0.00
68.41	2.00	0.00	0.00	0.05	0.00	68.57	2.00	0.00	0.00	0.05	0.00
68.73	2.00	0.00	0.00	0.05	0.00	68.90	2.00	0.00	0.00	0.05	0.00
69.06	2.00	0.00	0.00	0.05	0.00	69.23	2.00	0.00	0.00	0.05	0.00
69.39	2.00	0.00	0.00	0.05	0.00						

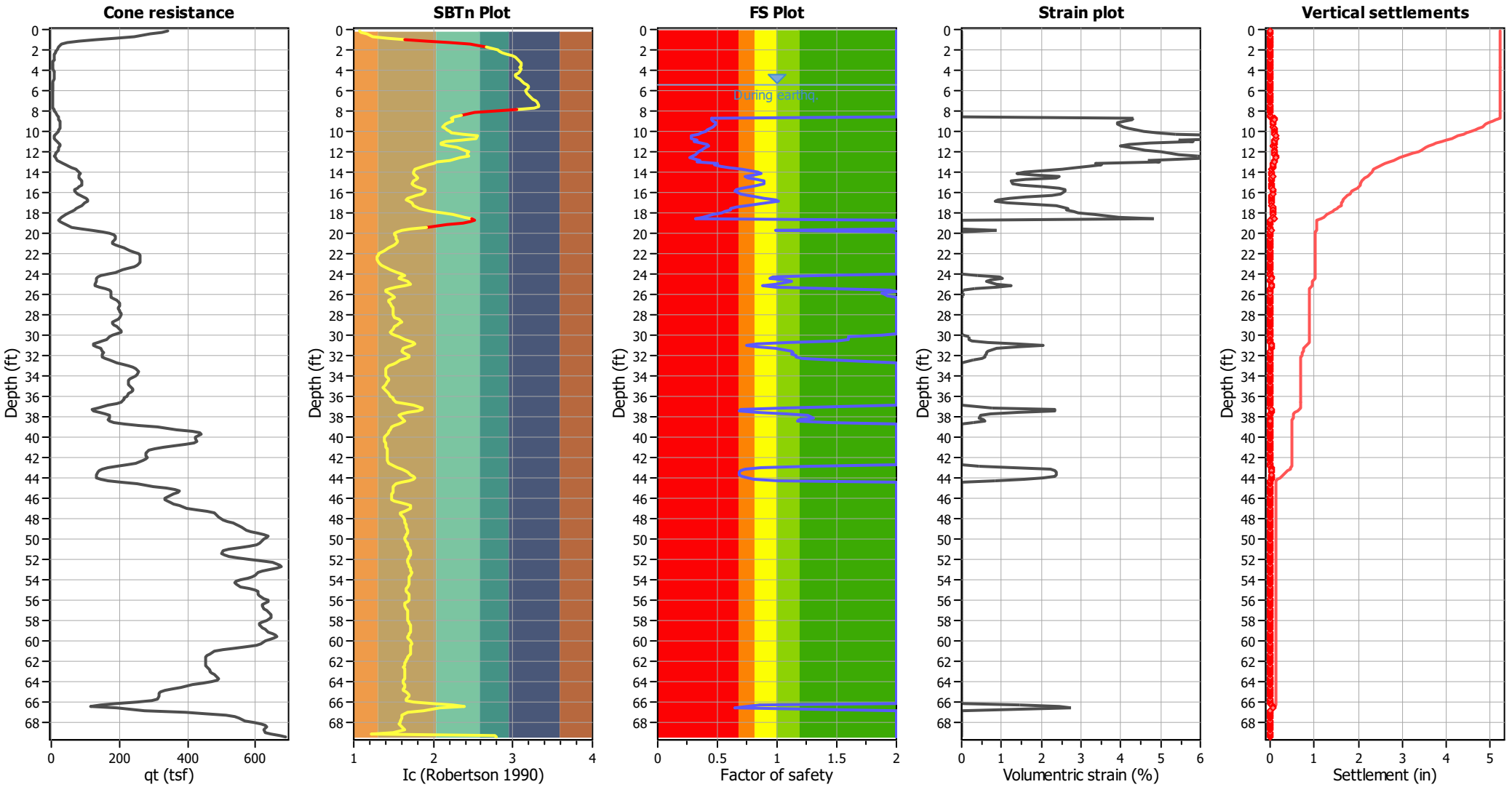
Overall liquefaction potential: 11.56

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
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)
5.41	10.19	2.00	0.00	1.00	0.00	5.58	9.70	2.00	0.00	1.00	0.00
5.74	9.57	2.00	0.00	1.00	0.00	5.91	9.91	2.00	0.00	1.00	0.00
6.07	10.44	2.00	0.00	1.00	0.00	6.23	10.51	2.00	0.00	1.00	0.00
6.40	10.12	2.00	0.00	1.00	0.00	6.56	9.84	2.00	0.00	1.00	0.00
6.73	9.98	2.00	0.00	1.00	0.00	6.89	9.86	2.00	0.00	1.00	0.00
7.05	9.27	2.00	0.00	1.00	0.00	7.22	8.41	2.00	0.00	1.00	0.00
7.38	7.95	2.00	0.00	1.00	0.00	7.55	7.81	2.00	0.00	1.00	0.00
7.71	8.24	2.00	0.00	1.00	0.00	7.87	10.46	2.00	0.00	1.00	0.00
8.04	16.18	2.00	0.00	1.00	0.00	8.20	62.34	2.00	0.00	1.00	0.00
8.37	71.24	2.00	0.00	1.00	0.00	8.53	74.27	2.00	0.00	1.00	0.00
8.69	73.73	0.45	4.33	1.00	0.08	8.86	74.80	0.45	4.27	1.00	0.09
9.02	78.42	0.47	4.09	1.00	0.08	9.19	82.06	0.49	3.91	1.00	0.08
9.35	82.04	0.48	3.91	1.00	0.08	9.51	79.15	0.46	4.05	1.00	0.08
9.68	75.84	0.44	4.22	1.00	0.09	9.84	72.54	0.42	4.40	1.00	0.08
10.01	69.64	0.40	4.57	1.00	0.09	10.17	64.42	0.37	4.91	1.00	0.09
10.33	58.10	0.34	5.39	1.00	0.10	10.50	43.89	0.28	6.84	1.00	0.14
10.66	43.76	0.28	6.86	1.00	0.13	10.83	57.45	0.33	5.44	1.00	0.11
10.99	53.40	0.31	5.80	1.00	0.11	11.15	67.01	0.37	4.74	1.00	0.09
11.32	76.20	0.41	4.20	1.00	0.09	11.48	80.10	0.43	4.00	1.00	0.08
11.65	75.96	0.41	4.21	1.00	0.09	11.81	68.80	0.37	4.62	1.00	0.09
11.98	62.73	0.34	5.03	1.00	0.10	12.14	60.01	0.33	5.23	1.00	0.10
12.30	57.28	0.31	5.45	1.00	0.10	12.47	52.07	0.29	5.93	1.00	0.12
12.63	47.21	0.27	6.44	1.00	0.12	12.80	68.11	0.35	4.67	1.00	0.10
12.96	63.31	0.33	4.99	1.00	0.10	13.12	95.46	0.50	3.37	1.00	0.06
13.29	92.01	0.47	3.50	1.00	0.07	13.45	101.37	0.53	3.17	1.00	0.06
13.62	111.84	0.60	2.86	1.00	0.06	13.78	125.68	0.71	2.53	1.00	0.05
13.94	138.31	0.84	1.58	1.00	0.03	14.11	141.12	0.87	1.38	1.00	0.03
14.27	136.09	0.80	1.83	1.00	0.04	14.44	129.84	0.74	2.44	1.00	0.05
14.60	132.08	0.75	2.39	1.00	0.05	14.76	138.74	0.83	1.62	1.00	0.03
14.93	143.84	0.89	1.26	1.00	0.03	15.09	143.75	0.89	1.27	1.00	0.02
15.26	140.56	0.84	1.50	1.00	0.03	15.42	135.20	0.78	2.06	1.00	0.04
15.58	128.74	0.71	2.46	1.00	0.05	15.75	123.03	0.65	2.58	1.00	0.05
15.91	122.67	0.65	2.59	1.00	0.05	16.08	127.74	0.69	2.48	1.00	0.05
16.24	134.32	0.76	2.28	1.00	0.04	16.40	140.31	0.82	1.60	1.00	0.03
16.57	145.61	0.89	1.22	1.00	0.02	16.73	151.44	0.99	0.93	1.00	0.02
16.90	153.43	1.02	0.85	1.00	0.02	17.06	147.79	0.92	1.13	1.00	0.02
17.22	133.62	0.74	2.36	1.00	0.05	17.39	125.13	0.66	2.54	1.00	0.05
17.55	119.55	0.61	2.67	1.00	0.05	17.72	120.39	0.62	2.65	1.00	0.05
17.88	113.81	0.57	2.81	1.00	0.05	18.04	109.66	0.54	2.92	1.00	0.06
18.21	96.33	0.46	3.34	1.00	0.07	18.37	81.37	0.38	3.94	1.00	0.08
18.54	65.42	0.31	4.84	1.00	0.10	18.70	63.97	2.00	0.00	1.00	0.00
18.86	71.66	2.00	0.00	1.00	0.00	19.03	81.75	2.00	0.00	1.00	0.00
19.19	89.87	2.00	0.00	1.00	0.00	19.36	103.24	2.00	0.00	1.00	0.00
19.52	124.15	2.00	0.00	1.00	0.00	19.69	153.95	0.99	0.90	1.00	0.02
19.85	181.59	1.96	0.02	1.00	0.00	20.01	201.02	2.00	0.00	1.00	0.00
20.18	213.30	2.00	0.00	1.00	0.00	20.34	218.78	2.00	0.00	1.00	0.00
20.51	217.34	2.00	0.00	1.00	0.00	20.67	210.95	2.00	0.00	1.00	0.00
20.83	204.65	2.00	0.00	1.00	0.00	21.00	203.71	2.00	0.00	1.00	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)
21.16	209.47	2.00	0.00	1.00	0.00	21.33	219.45	2.00	0.00	1.00	0.00
21.49	232.37	2.00	0.00	1.00	0.00	21.65	246.50	2.00	0.00	1.00	0.00
21.82	260.80	2.00	0.00	1.00	0.00	21.98	271.31	2.00	0.00	1.00	0.00
22.15	275.96	2.00	0.00	1.00	0.00	22.31	275.74	2.00	0.00	1.00	0.00
22.47	273.48	2.00	0.00	1.00	0.00	22.64	271.88	2.00	0.00	1.00	0.00
22.80	271.00	2.00	0.00	1.00	0.00	22.97	269.37	2.00	0.00	1.00	0.00
23.13	263.44	2.00	0.00	1.00	0.00	23.29	253.36	2.00	0.00	1.00	0.00
23.46	240.54	2.00	0.00	1.00	0.00	23.62	225.16	2.00	0.00	1.00	0.00
23.79	208.15	2.00	0.00	1.00	0.00	23.95	188.00	2.00	0.00	1.00	0.00
24.11	169.87	1.35	0.38	1.00	0.01	24.28	154.57	0.97	0.94	1.00	0.02
24.44	152.81	0.94	1.03	1.00	0.02	24.61	160.14	1.08	0.72	1.00	0.01
24.77	162.39	1.12	0.64	1.00	0.01	24.93	156.12	0.99	0.89	1.00	0.02
25.10	149.20	0.88	1.24	1.00	0.03	25.26	156.00	0.99	0.89	1.00	0.02
25.43	172.23	1.42	0.32	1.00	0.01	25.59	182.79	1.94	0.02	1.00	0.00
25.75	183.90	2.00	0.00	1.00	0.00	25.92	181.85	1.88	0.05	1.00	0.00
26.08	182.73	1.93	0.03	1.00	0.00	26.25	186.69	2.00	0.00	1.00	0.00
26.41	190.21	2.00	0.00	1.00	0.00	26.57	197.74	2.00	0.00	1.00	0.00
26.74	205.60	2.00	0.00	1.00	0.00	26.90	211.09	2.00	0.00	1.00	0.00
27.07	209.93	2.00	0.00	1.00	0.00	27.23	205.34	2.00	0.00	1.00	0.00
27.40	202.46	2.00	0.00	1.00	0.00	27.56	204.50	2.00	0.00	1.00	0.00
27.72	209.84	2.00	0.00	1.00	0.00	27.89	213.55	2.00	0.00	1.00	0.00
28.05	212.52	2.00	0.00	1.00	0.00	28.22	208.65	2.00	0.00	1.00	0.00
28.38	206.15	2.00	0.00	1.00	0.00	28.54	200.94	2.00	0.00	1.00	0.00
28.71	193.48	2.00	0.00	1.00	0.00	28.87	185.98	2.00	0.00	1.00	0.00
29.04	188.51	2.00	0.00	1.00	0.00	29.20	197.46	2.00	0.00	1.00	0.00
29.36	207.27	2.00	0.00	1.00	0.00	29.53	211.04	2.00	0.00	1.00	0.00
29.69	206.36	2.00	0.00	1.00	0.00	29.86	195.10	2.00	0.00	1.00	0.00
30.02	182.56	1.88	0.05	1.00	0.00	30.18	177.41	1.60	0.19	1.00	0.00
30.35	177.44	1.60	0.20	1.00	0.00	30.51	175.30	1.50	0.26	1.00	0.00
30.68	162.57	1.10	0.67	1.00	0.01	30.84	147.53	0.83	1.40	1.00	0.03
31.00	140.33	0.75	2.04	1.00	0.04	31.17	146.94	0.83	1.44	1.00	0.03
31.33	156.93	0.98	0.89	1.00	0.02	31.50	163.19	1.12	0.65	1.00	0.01
31.66	163.92	1.13	0.62	1.00	0.01	31.82	163.47	1.12	0.64	1.00	0.01
31.99	165.10	1.16	0.58	1.00	0.01	32.15	164.71	1.15	0.59	1.00	0.01
32.32	166.98	1.21	0.52	1.00	0.01	32.48	174.49	1.46	0.29	1.00	0.01
32.64	190.51	2.00	0.00	1.00	0.00	32.81	208.20	2.00	0.00	1.00	0.00
32.97	222.73	2.00	0.00	1.00	0.00	33.14	232.41	2.00	0.00	1.00	0.00
33.30	238.23	2.00	0.00	1.00	0.00	33.46	242.55	2.00	0.00	1.00	0.00
33.63	244.29	2.00	0.00	1.00	0.00	33.79	241.49	2.00	0.00	1.00	0.00
33.96	234.02	2.00	0.00	1.00	0.00	34.12	226.32	2.00	0.00	1.00	0.00
34.28	220.97	2.00	0.00	1.00	0.00	34.45	216.44	2.00	0.00	1.00	0.00
34.61	212.69	2.00	0.00	1.00	0.00	34.78	211.83	2.00	0.00	1.00	0.00
34.94	215.98	2.00	0.00	1.00	0.00	35.10	221.75	2.00	0.00	1.00	0.00
35.27	225.74	2.00	0.00	1.00	0.00	35.43	225.86	2.00	0.00	1.00	0.00
35.60	222.02	2.00	0.00	1.00	0.00	35.76	215.38	2.00	0.00	1.00	0.00
35.93	208.17	2.00	0.00	1.00	0.00	36.09	203.64	2.00	0.00	1.00	0.00
36.25	201.44	2.00	0.00	1.00	0.00	36.42	201.79	2.00	0.00	1.00	0.00
36.58	202.38	2.00	0.00	1.00	0.00	36.75	202.93	2.00	0.00	1.00	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)
36.91	187.51	2.00	0.00	1.00	0.00	37.07	160.38	1.05	0.75	1.00	0.01
37.24	135.38	0.70	2.33	1.00	0.05	37.40	134.06	0.69	2.35	1.00	0.05
37.57	147.46	0.83	1.41	1.00	0.03	37.73	161.43	1.07	0.72	1.00	0.01
37.89	168.78	1.26	0.47	1.00	0.01	38.06	170.06	1.30	0.43	1.00	0.01
38.22	166.23	1.19	0.55	1.00	0.01	38.39	165.56	1.17	0.57	1.00	0.01
38.55	174.03	1.44	0.31	1.00	0.01	38.71	200.65	2.00	0.00	1.00	0.00
38.88	240.08	2.00	0.00	1.00	0.00	39.04	289.26	2.00	0.00	1.00	0.00
39.21	342.51	2.00	0.00	1.00	0.00	39.37	387.10	2.00	0.00	1.00	0.00
39.53	408.84	2.00	0.00	1.00	0.00	39.70	404.42	2.00	0.00	1.00	0.00
39.86	388.77	2.00	0.00	1.00	0.00	40.03	379.83	2.00	0.00	1.00	0.00
40.19	382.76	2.00	0.00	1.00	0.00	40.35	389.25	2.00	0.00	1.00	0.00
40.52	383.01	2.00	0.00	1.00	0.00	40.68	359.05	2.00	0.00	1.00	0.00
40.85	324.73	2.00	0.00	1.00	0.00	41.01	292.25	2.00	0.00	1.00	0.00
41.17	269.71	2.00	0.00	1.00	0.00	41.34	255.51	2.00	0.00	1.00	0.00
41.50	248.88	2.00	0.00	1.00	0.00	41.67	247.35	2.00	0.00	1.00	0.00
41.83	250.25	2.00	0.00	1.00	0.00	41.99	254.12	2.00	0.00	1.00	0.00
42.16	254.28	2.00	0.00	1.00	0.00	42.32	245.34	2.00	0.00	1.00	0.00
42.49	225.15	2.00	0.00	1.00	0.00	42.65	197.65	2.00	0.00	1.00	0.00
42.81	169.75	1.29	0.43	1.00	0.01	42.98	149.20	0.86	1.28	1.00	0.03
43.14	138.54	0.74	2.22	1.00	0.04	43.31	134.32	0.70	2.35	1.00	0.05
43.47	132.46	0.68	2.38	1.00	0.05	43.64	133.06	0.69	2.37	1.00	0.05
43.80	135.44	0.71	2.33	1.00	0.04	43.96	139.53	0.75	2.06	1.00	0.04
44.13	144.50	0.81	1.58	1.00	0.03	44.29	158.00	1.01	0.83	1.00	0.02
44.46	186.61	2.00	0.00	1.00	0.00	44.62	231.94	2.00	0.00	1.00	0.00
44.78	275.39	2.00	0.00	1.00	0.00	44.95	309.02	2.00	0.00	1.00	0.00
45.11	329.99	2.00	0.00	1.00	0.00	45.28	341.46	2.00	0.00	1.00	0.00
45.44	337.48	2.00	0.00	1.00	0.00	45.60	319.90	2.00	0.00	1.00	0.00
45.77	300.77	2.00	0.00	1.00	0.00	45.93	291.92	2.00	0.00	1.00	0.00
46.10	295.67	2.00	0.00	1.00	0.00	46.26	307.92	2.00	0.00	1.00	0.00
46.42	326.14	2.00	0.00	1.00	0.00	46.59	345.32	2.00	0.00	1.00	0.00
46.75	364.34	2.00	0.00	1.00	0.00	46.92	386.18	2.00	0.00	1.00	0.00
47.08	412.43	2.00	0.00	1.00	0.00	47.24	435.08	2.00	0.00	1.00	0.00
47.41	444.82	2.00	0.00	1.00	0.00	47.57	443.88	2.00	0.00	1.00	0.00
47.74	444.27	2.00	0.00	1.00	0.00	47.90	452.28	2.00	0.00	1.00	0.00
48.06	467.77	2.00	0.00	1.00	0.00	48.23	484.15	2.00	0.00	1.00	0.00
48.39	498.93	2.00	0.00	1.00	0.00	48.56	511.48	2.00	0.00	1.00	0.00
48.72	519.49	2.00	0.00	1.00	0.00	48.88	526.23	2.00	0.00	1.00	0.00
49.05	534.85	2.00	0.00	1.00	0.00	49.21	549.57	2.00	0.00	1.00	0.00
49.38	569.76	2.00	0.00	1.00	0.00	49.54	587.14	2.00	0.00	1.00	0.00
49.70	594.63	2.00	0.00	1.00	0.00	49.87	586.61	2.00	0.00	1.00	0.00
50.03	572.77	2.00	0.00	1.00	0.00	50.20	565.90	2.00	0.00	1.00	0.00
50.36	570.50	2.00	0.00	1.00	0.00	50.52	571.51	2.00	0.00	1.00	0.00
50.69	553.07	2.00	0.00	1.00	0.00	50.85	518.60	2.00	0.00	1.00	0.00
51.02	489.43	2.00	0.00	1.00	0.00	51.18	475.33	2.00	0.00	1.00	0.00
51.35	474.93	2.00	0.00	1.00	0.00	51.51	480.01	2.00	0.00	1.00	0.00
51.67	490.75	2.00	0.00	1.00	0.00	51.84	508.90	2.00	0.00	1.00	0.00
52.00	537.01	2.00	0.00	1.00	0.00	52.17	573.14	2.00	0.00	1.00	0.00
52.33	608.22	2.00	0.00	1.00	0.00	52.49	630.29	2.00	0.00	1.00	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)
52.66	632.86	2.00	0.00	1.00	0.00	52.82	620.04	2.00	0.00	1.00	0.00
52.99	598.87	2.00	0.00	1.00	0.00	53.15	580.50	2.00	0.00	1.00	0.00
53.31	569.93	2.00	0.00	1.00	0.00	53.48	563.10	2.00	0.00	1.00	0.00
53.64	553.25	2.00	0.00	1.00	0.00	53.81	533.14	2.00	0.00	1.00	0.00
53.97	513.32	2.00	0.00	1.00	0.00	54.13	499.29	2.00	0.00	1.00	0.00
54.30	494.62	2.00	0.00	1.00	0.00	54.46	495.30	2.00	0.00	1.00	0.00
54.63	506.87	2.00	0.00	1.00	0.00	54.79	527.05	2.00	0.00	1.00	0.00
54.95	548.52	2.00	0.00	1.00	0.00	55.12	555.04	2.00	0.00	1.00	0.00
55.28	552.91	2.00	0.00	1.00	0.00	55.45	550.83	2.00	0.00	1.00	0.00
55.61	560.26	2.00	0.00	1.00	0.00	55.77	574.62	2.00	0.00	1.00	0.00
55.94	583.76	2.00	0.00	1.00	0.00	56.10	578.24	2.00	0.00	1.00	0.00
56.27	560.80	2.00	0.00	1.00	0.00	56.43	546.56	2.00	0.00	1.00	0.00
56.59	545.44	2.00	0.00	1.00	0.00	56.76	559.94	2.00	0.00	1.00	0.00
56.92	573.44	2.00	0.00	1.00	0.00	57.09	577.50	2.00	0.00	1.00	0.00
57.25	576.18	2.00	0.00	1.00	0.00	57.41	578.87	2.00	0.00	1.00	0.00
57.58	585.49	2.00	0.00	1.00	0.00	57.74	582.20	2.00	0.00	1.00	0.00
57.91	570.46	2.00	0.00	1.00	0.00	58.07	557.58	2.00	0.00	1.00	0.00
58.23	552.99	2.00	0.00	1.00	0.00	58.40	556.41	2.00	0.00	1.00	0.00
58.56	561.98	2.00	0.00	1.00	0.00	58.73	567.05	2.00	0.00	1.00	0.00
58.89	572.10	2.00	0.00	1.00	0.00	59.06	579.94	2.00	0.00	1.00	0.00
59.22	585.73	2.00	0.00	1.00	0.00	59.38	590.12	2.00	0.00	1.00	0.00
59.55	591.53	2.00	0.00	1.00	0.00	59.71	582.74	2.00	0.00	1.00	0.00
59.88	572.70	2.00	0.00	1.00	0.00	60.04	560.67	2.00	0.00	1.00	0.00
60.20	563.80	2.00	0.00	1.00	0.00	60.37	550.84	2.00	0.00	1.00	0.00
60.53	523.53	2.00	0.00	1.00	0.00	60.70	483.20	2.00	0.00	1.00	0.00
60.86	452.08	2.00	0.00	1.00	0.00	61.02	432.83	2.00	0.00	1.00	0.00
61.19	419.14	2.00	0.00	1.00	0.00	61.35	409.57	2.00	0.00	1.00	0.00
61.52	402.70	2.00	0.00	1.00	0.00	61.68	398.57	2.00	0.00	1.00	0.00
61.84	396.06	2.00	0.00	1.00	0.00	62.01	393.48	2.00	0.00	1.00	0.00
62.17	391.16	2.00	0.00	1.00	0.00	62.34	391.37	2.00	0.00	1.00	0.00
62.50	395.12	2.00	0.00	1.00	0.00	62.66	400.14	2.00	0.00	1.00	0.00
62.83	402.62	2.00	0.00	1.00	0.00	62.99	401.91	2.00	0.00	1.00	0.00
63.16	402.54	2.00	0.00	1.00	0.00	63.32	408.49	2.00	0.00	1.00	0.00
63.48	419.57	2.00	0.00	1.00	0.00	63.65	426.62	2.00	0.00	1.00	0.00
63.81	422.06	2.00	0.00	1.00	0.00	63.98	404.74	2.00	0.00	1.00	0.00
64.14	380.19	2.00	0.00	1.00	0.00	64.30	354.08	2.00	0.00	1.00	0.00
64.47	326.66	2.00	0.00	1.00	0.00	64.63	301.76	2.00	0.00	1.00	0.00
64.80	283.45	2.00	0.00	1.00	0.00	64.96	277.13	2.00	0.00	1.00	0.00
65.12	278.24	2.00	0.00	1.00	0.00	65.29	280.44	2.00	0.00	1.00	0.00
65.45	281.35	2.00	0.00	1.00	0.00	65.62	276.51	2.00	0.00	1.00	0.00
65.78	262.22	2.00	0.00	1.00	0.00	65.94	240.34	2.00	0.00	1.00	0.00
66.11	201.17	2.00	0.00	1.00	0.00	66.27	140.35	0.86	1.45	1.00	0.03
66.44	128.93	0.74	2.46	1.00	0.05	66.60	117.01	0.64	2.73	1.00	0.05
66.77	343.93	2.00	0.00	1.00	0.00	66.93	310.36	2.00	0.00	1.00	0.00
67.09	395.25	2.00	0.00	1.00	0.00	67.26	435.54	2.00	0.00	1.00	0.00
67.42	445.12	2.00	0.00	1.00	0.00	67.59	452.90	2.00	0.00	1.00	0.00
67.75	465.75	2.00	0.00	1.00	0.00	67.91	485.47	2.00	0.00	1.00	0.00
68.08	503.45	2.00	0.00	1.00	0.00	68.24	516.56	2.00	0.00	1.00	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)
68.41	520.93	2.00	0.00	1.00	0.00	68.57	521.04	2.00	0.00	1.00	0.00
68.73	519.89	2.00	0.00	1.00	0.00	68.90	490.36	2.00	0.00	1.00	0.00
69.06	493.62	2.00	0.00	1.00	0.00	69.23	517.96	2.00	0.00	1.00	0.00
69.39	533.39	2.00	0.00	1.00	0.00						

Total estimated settlement: 5.22

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	341.39	548.48	1.00	548.48	1.07	N/A	N/A
0.33	324.41	521.17	1.00	521.17	1.10	N/A	N/A
0.49	290.72	467.03	1.00	467.03	1.16	N/A	N/A
0.66	242.40	389.38	1.00	389.38	1.23	N/A	N/A
0.82	187.46	301.10	1.00	301.10	1.42	N/A	N/A
0.98	133.75	214.79	1.00	214.07	1.64	N/A	N/A
1.15	82.39	132.26	1.21	159.72	1.92	N/A	N/A
1.31	49.69	79.71	1.68	133.87	2.21	N/A	N/A
1.48	32.47	52.01	2.58	133.96	2.46	N/A	N/A
1.64	26.97	43.18	3.03	130.77	2.55	N/A	N/A
1.80	21.51	34.38	3.72	127.99	2.66	N/A	N/A
1.97	16.03	25.56	4.90	125.14	2.81	N/A	N/A
2.13	15.16	24.14	5.01	121.08	2.83	N/A	N/A
2.30	13.52	21.51	5.35	115.01	2.86	N/A	N/A
2.46	11.34	17.98	5.93	106.72	2.92	N/A	N/A
2.62	9.63	15.22	6.62	100.79	2.99	N/A	N/A
2.79	8.43	13.28	7.14	94.85	3.03	N/A	N/A
2.95	7.65	12.00	7.51	90.18	3.07	N/A	N/A
3.12	7.14	11.18	7.76	86.71	3.09	N/A	N/A
3.28	6.81	10.63	7.94	84.46	3.10	N/A	N/A
3.44	6.64	10.34	7.94	82.16	3.10	N/A	N/A
3.61	6.60	10.27	7.89	80.99	3.10	N/A	N/A
3.77	6.69	10.39	7.81	81.19	3.09	N/A	N/A
3.94	6.87	10.67	7.88	84.12	3.10	N/A	N/A
4.10	7.20	11.20	7.73	86.56	3.08	N/A	N/A
4.27	7.65	11.90	7.58	90.11	3.07	N/A	N/A
4.43	8.02	12.48	7.16	89.33	3.04	N/A	N/A
4.59	8.09	12.57	7.14	89.80	3.04	N/A	N/A
4.76	7.78	12.07	7.28	87.90	3.05	N/A	N/A
4.92	7.32	11.32	7.83	88.63	3.09	N/A	N/A
5.09	6.91	10.63	8.21	87.29	3.12	N/A	N/A
5.25	6.61	10.14	8.55	86.76	3.15	N/A	N/A
5.41	6.33	9.68	8.87	85.90	3.17	0.06	1.41
5.58	6.12	9.32	9.17	85.45	3.19	0.06	1.34
5.74	6.06	9.22	9.27	85.41	3.20	0.06	1.31
5.91	6.22	9.47	9.04	85.61	3.19	0.06	1.33
6.07	6.43	9.79	8.79	86.06	3.17	0.06	1.36
6.23	6.46	9.82	8.87	87.14	3.17	0.06	1.35
6.40	6.33	9.59	9.17	88.01	3.19	0.06	1.30
6.56	6.21	9.39	9.55	89.65	3.22	0.06	1.26
6.73	6.16	9.29	9.74	90.46	3.23	0.06	1.23
6.89	6.04	9.08	10.01	90.88	3.25	0.06	1.19
7.05	5.72	8.56	10.45	89.49	3.28	0.06	1.11
7.22	5.35	7.95	10.81	85.89	3.31	0.06	1.02
7.38	5.05	7.46	11.14	83.06	3.33	0.06	0.95
7.55	5.02	7.38	11.04	81.53	3.32	0.06	0.93
7.71	5.54	8.21	10.13	83.12	3.26	0.06	1.02
7.87	7.29	11.01	7.38	81.21	3.05	0.06	1.36

:: 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	10.73	16.53	4.61	76.14	2.78	0.06	2.02
8.20	15.36	23.94	2.89	69.18	2.52	0.06	0.64
8.37	19.54	30.65	2.15	65.76	2.36	0.06	0.67
8.53	21.97	34.54	1.83	63.05	2.26	0.06	0.69
8.69	22.87	35.97	1.74	62.70	2.23	0.06	0.69
8.86	23.59	37.12	1.79	66.34	2.25	0.06	0.70
9.02	25.07	39.48	1.77	69.72	2.24	0.07	0.70
9.19	26.62	41.96	1.64	68.95	2.19	0.07	0.71
9.35	27.27	42.98	1.56	66.87	2.15	0.07	0.72
9.51	26.44	41.64	1.50	62.39	2.12	0.07	0.71
9.68	24.85	39.07	1.56	61.03	2.15	0.07	0.70
9.84	22.93	35.97	1.58	56.99	2.16	0.06	0.69
10.01	20.78	32.50	1.69	54.96	2.21	0.06	0.68
10.17	17.80	27.70	1.75	48.49	2.23	0.06	0.66
10.33	13.02	20.01	2.21	44.29	2.38	0.05	0.62
10.50	9.18	13.83	3.06	42.27	2.55	0.05	0.58
10.66	9.17	13.80	2.94	40.58	2.53	0.04	0.58
10.83	11.63	17.74	1.00	17.74	2.35	0.05	0.61
10.99	16.56	25.65	1.00	25.65	2.15	0.05	0.65
11.15	20.76	32.39	1.00	32.39	2.09	0.06	0.68
11.32	25.22	39.54	1.44	57.02	2.09	0.07	0.70
11.48	26.07	40.89	1.64	67.10	2.19	0.07	0.71
11.65	23.70	37.07	1.94	71.72	2.30	0.07	0.70
11.81	19.96	31.04	2.29	71.20	2.40	0.06	0.67
11.98	16.93	26.16	2.47	64.55	2.44	0.06	0.65
12.14	14.95	22.96	2.41	55.35	2.42	0.06	0.64
12.30	13.19	20.12	2.42	48.66	2.43	0.05	0.62
12.47	11.31	17.09	2.53	43.31	2.45	0.05	0.60
12.63	13.96	21.34	2.09	44.64	2.34	0.04	0.63
12.80	17.48	26.98	1.00	26.98	2.21	0.06	0.66
12.96	28.35	44.43	1.36	60.45	2.04	0.05	0.72
13.12	35.16	54.76	1.30	71.11	2.00	0.09	0.75
13.29	44.76	68.31	1.23	83.68	1.94	0.08	0.78
13.45	51.02	76.49	1.18	90.02	1.89	0.10	0.79
13.62	61.71	90.44	1.13	101.75	1.82	0.11	0.81
13.78	73.44	105.75	1.09	115.24	1.78	0.14	0.84
13.94	82.71	117.89	1.07	126.69	1.75	0.17	0.85
14.11	85.89	121.60	1.07	130.12	1.75	0.17	0.86
14.27	83.29	117.98	1.08	127.78	1.77	0.16	0.85
14.44	80.00	113.39	1.10	124.51	1.79	0.14	0.85
14.60	80.63	114.27	1.11	126.84	1.80	0.15	0.85
14.76	85.47	119.93	1.10	131.38	1.78	0.16	0.85
14.93	90.56	125.33	1.07	134.34	1.75	0.18	0.86
15.09	92.28	126.43	1.06	133.77	1.73	0.18	0.86
15.26	89.37	122.32	1.07	130.66	1.75	0.17	0.86
15.42	83.12	114.58	1.10	126.09	1.79	0.15	0.85
15.58	75.94	105.68	1.14	120.94	1.85	0.14	0.84
15.75	70.98	99.22	1.18	116.98	1.89	0.12	0.83

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	70.81	98.74	1.19	117.28	1.90	0.12	0.83
16.08	75.82	104.25	1.15	120.24	1.86	0.13	0.83
16.24	84.39	113.74	1.10	125.42	1.79	0.15	0.85
16.40	93.78	123.77	1.05	130.36	1.72	0.18	0.86
16.57	102.05	132.58	1.02	135.15	1.67	0.20	0.87
16.73	107.04	138.27	1.01	140.13	1.66	0.22	0.87
16.90	106.42	137.59	1.03	141.50	1.69	0.22	0.87
17.06	99.65	129.66	1.06	137.53	1.73	0.19	0.86
17.22	89.65	116.41	1.07	124.50	1.75	0.16	0.85
17.39	80.36	104.73	1.10	114.92	1.79	0.14	0.83
17.55	73.99	96.64	1.12	108.36	1.82	0.13	0.82
17.72	67.88	89.80	1.19	107.01	1.90	0.12	0.81
17.88	61.60	82.60	1.29	106.48	1.99	0.11	0.80
18.04	52.66	71.95	1.48	106.53	2.11	0.10	0.78
18.21	42.83	59.68	1.80	107.68	2.25	0.09	0.76
18.37	31.76	44.99	2.30	103.32	2.40	0.07	0.72
18.54	24.25	34.37	2.65	91.07	2.48	0.06	0.69
18.70	22.28	31.51	2.83	89.22	2.51	0.06	0.68
18.86	26.09	36.56	2.57	93.95	2.46	0.07	0.69
19.03	32.94	45.43	2.19	99.41	2.37	0.07	0.72
19.19	43.87	58.37	1.60	93.58	2.17	0.08	0.75
19.36	62.11	78.79	1.20	94.89	1.92	0.10	0.79
19.52	89.37	109.10	1.04	113.94	1.71	0.15	0.84
19.69	120.98	144.48	1.00	144.48	1.60	0.26	0.88
19.85	150.04	177.04	1.00	177.04	1.54	0.52	0.91
20.01	171.71	201.16	1.00	201.16	1.52	0.93	0.93
20.18	184.87	215.75	1.00	215.75	1.51	0.94	0.94
20.34	190.24	221.71	1.00	221.71	1.52	0.95	0.95
20.51	188.99	219.95	1.00	219.95	1.54	0.94	0.94
20.67	184.15	213.96	1.00	213.96	1.55	0.94	0.94
20.83	180.12	208.46	1.00	208.46	1.54	0.94	0.94
21.00	180.96	208.32	1.00	208.32	1.53	0.94	0.94
21.16	187.88	214.92	1.00	214.92	1.51	0.94	0.94
21.33	200.10	227.05	1.00	227.05	1.48	0.95	0.95
21.49	215.37	241.95	1.00	241.95	1.44	0.96	0.96
21.65	231.66	257.45	1.00	257.45	1.38	0.97	0.97
21.82	246.11	271.07	1.00	271.07	1.34	0.98	0.98
21.98	256.61	280.81	1.00	280.81	1.32	0.98	0.98
22.15	261.98	285.38	1.00	285.38	1.30	0.99	0.99
22.31	263.21	285.76	1.00	285.76	1.30	0.99	0.99
22.47	262.40	284.01	1.00	284.01	1.29	0.99	0.99
22.64	261.33	282.22	1.00	282.22	1.30	0.98	0.98
22.80	260.39	280.91	1.00	280.91	1.31	0.98	0.98
22.97	257.94	278.42	1.00	278.42	1.33	0.98	0.98
23.13	252.35	272.55	1.00	272.55	1.36	0.98	0.98
23.29	242.48	261.98	1.00	261.98	1.38	0.97	0.97
23.46	228.51	247.21	1.00	247.21	1.42	0.96	0.96
23.62	210.31	228.13	1.00	228.13	1.46	0.95	0.95

:: 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	188.52	205.66	1.00	205.66	1.54	0.93	0.93
23.95	165.95	181.58	1.00	181.58	1.60	0.54	0.91
24.11	147.45	161.29	1.00	161.29	1.63	0.33	0.90
24.28	137.44	149.03	1.00	149.03	1.59	0.26	0.88
24.44	135.05	145.62	1.00	145.62	1.57	0.26	0.88
24.61	134.90	145.86	1.00	145.86	1.62	0.28	0.88
24.77	131.95	143.22	1.03	147.10	1.68	0.26	0.88
24.93	128.19	139.01	1.04	145.10	1.71	0.22	0.87
25.10	130.84	140.48	1.00	140.17	1.64	0.22	0.88
25.26	143.19	151.82	1.00	151.82	1.54	0.29	0.89
25.43	159.71	167.59	1.00	167.59	1.45	0.46	0.90
25.59	171.49	178.86	1.00	178.86	1.40	0.65	0.91
25.75	175.11	182.35	1.00	182.35	1.41	0.67	0.92
25.92	174.22	181.60	1.00	181.60	1.45	0.61	0.91
26.08	173.92	181.51	1.00	181.51	1.49	0.59	0.91
26.25	176.67	184.21	1.00	184.21	1.51	0.64	0.92
26.41	182.90	189.73	1.00	189.73	1.48	0.76	0.92
26.57	190.96	197.22	1.00	197.22	1.45	0.93	0.93
26.74	198.60	204.54	1.00	204.54	1.44	0.93	0.93
26.90	202.48	208.43	1.00	208.43	1.47	0.94	0.94
27.07	201.86	207.48	1.00	207.48	1.48	0.94	0.94
27.23	198.78	203.90	1.00	203.90	1.49	0.93	0.93
27.40	197.18	201.71	1.00	201.71	1.49	0.93	0.93
27.56	199.23	203.25	1.00	203.25	1.49	0.93	0.93
27.72	203.35	206.92	1.00	206.92	1.48	0.93	0.93
27.89	206.23	209.41	1.00	209.41	1.49	0.94	0.94
28.05	205.54	208.23	1.00	208.23	1.50	0.94	0.94
28.22	201.53	203.77	1.00	203.77	1.51	0.93	0.93
28.38	195.28	197.43	1.00	197.43	1.56	0.93	0.93
28.54	187.86	189.67	1.00	189.67	1.59	0.83	0.92
28.71	181.30	182.57	1.00	182.57	1.60	0.64	0.92
28.87	178.92	179.34	1.00	179.34	1.56	0.56	0.91
29.04	183.20	182.97	1.00	182.97	1.54	0.63	0.92
29.20	192.61	191.69	1.00	191.69	1.51	0.91	0.92
29.36	202.43	200.90	1.00	200.90	1.50	0.93	0.93
29.53	206.97	204.66	1.00	204.66	1.47	0.93	0.93
29.69	203.72	200.89	1.00	200.89	1.46	0.93	0.93
29.86	193.30	190.12	1.00	190.12	1.47	0.91	0.92
30.02	181.06	177.87	1.00	177.87	1.51	0.56	0.91
30.18	170.48	167.32	1.00	167.32	1.57	0.44	0.90
30.35	162.23	159.10	1.00	159.10	1.64	0.38	0.89
30.51	151.39	148.26	1.04	154.00	1.70	0.32	0.88
30.68	138.05	134.87	1.08	145.00	1.76	0.23	0.87
30.84	126.40	123.03	1.08	132.88	1.76	0.19	0.86
31.00	124.68	120.89	1.06	127.92	1.73	0.17	0.85
31.17	132.45	127.96	1.02	130.01	1.67	0.21	0.86
31.33	144.07	138.85	1.00	138.85	1.62	0.26	0.87
31.50	151.19	145.36	1.00	145.36	1.61	0.30	0.88

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	152.41	146.25	1.00	146.25	1.63	0.29	0.88
31.82	150.08	143.72	1.01	145.15	1.66	0.28	0.88
31.99	148.33	141.72	1.04	147.10	1.70	0.26	0.88
32.15	149.93	142.88	1.03	147.59	1.69	0.27	0.88
32.32	157.28	149.47	1.01	150.37	1.65	0.30	0.89
32.48	171.44	162.56	1.00	162.56	1.59	0.40	0.90
32.64	190.84	180.64	1.00	180.64	1.54	0.68	0.91
32.81	211.35	199.68	1.00	199.68	1.49	0.93	0.93
32.97	228.79	215.79	1.00	215.79	1.45	0.94	0.94
33.14	241.14	226.98	1.00	226.98	1.42	0.95	0.95
33.30	249.17	234.09	1.00	234.09	1.40	0.95	0.95
33.46	253.97	238.14	1.00	238.14	1.40	0.96	0.96
33.63	255.53	239.10	1.00	239.10	1.39	0.96	0.96
33.79	252.80	236.03	1.00	236.03	1.40	0.96	0.96
33.96	246.47	229.57	1.00	229.57	1.41	0.95	0.95
34.12	239.13	222.19	1.00	222.19	1.42	0.95	0.95
34.28	232.80	215.79	1.00	215.79	1.43	0.94	0.94
34.45	228.27	211.08	1.00	211.08	1.44	0.94	0.94
34.61	225.77	208.35	1.00	208.35	1.43	0.94	0.94
34.78	226.66	208.80	1.00	208.80	1.41	0.94	0.94
34.94	230.77	212.30	1.00	212.30	1.38	0.94	0.94
35.10	236.25	216.99	1.00	216.99	1.37	0.94	0.94
35.27	239.82	219.82	1.00	219.82	1.38	0.94	0.94
35.43	239.68	219.16	1.00	219.16	1.40	0.94	0.94
35.60	235.52	214.78	1.00	214.78	1.42	0.94	0.94
35.76	228.65	207.93	1.00	207.93	1.44	0.94	0.94
35.93	221.28	200.63	1.00	200.63	1.46	0.93	0.93
36.09	215.64	194.93	1.00	194.93	1.49	0.93	0.93
36.25	212.82	191.92	1.00	191.92	1.50	0.92	0.92
36.42	211.48	190.24	1.00	190.24	1.50	0.92	0.92
36.58	207.28	185.84	1.00	185.84	1.53	0.92	0.92
36.75	193.68	172.47	1.00	172.47	1.64	0.74	0.91
36.91	168.61	148.95	1.07	159.35	1.75	0.37	0.88
37.07	139.40	122.01	1.15	140.00	1.85	0.20	0.86
37.24	120.99	105.30	1.16	121.92	1.87	0.15	0.83
37.40	122.80	106.90	1.11	118.58	1.80	0.15	0.84
37.57	140.11	122.56	1.03	125.94	1.68	0.20	0.86
37.73	159.75	140.21	1.00	140.21	1.60	0.29	0.88
37.89	170.61	149.80	1.00	149.80	1.57	0.36	0.89
38.06	171.87	150.35	1.00	150.35	1.60	0.35	0.89
38.22	168.69	147.07	1.00	147.07	1.62	0.31	0.88
38.39	170.07	147.84	1.00	147.84	1.63	0.30	0.88
38.55	183.81	159.83	1.00	159.83	1.60	0.38	0.90
38.71	213.83	186.19	1.00	186.19	1.57	0.87	0.92
38.88	258.73	225.89	1.00	225.89	1.51	0.95	0.95
39.04	313.09	273.85	1.00	273.85	1.47	0.98	0.98
39.21	368.42	322.17	1.00	322.17	1.45	1.01	1.01
39.37	413.18	360.92	1.00	360.92	1.44	1.03	1.03

:: 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	437.13	381.32	1.00	381.32	1.44	1.04	1.04
39.70	439.30	382.85	1.00	382.85	1.42	1.04	1.04
39.86	430.23	374.61	1.00	374.61	1.40	1.03	1.03
40.03	423.34	368.10	1.00	368.10	1.38	1.03	1.03
40.19	424.13	368.03	1.00	368.03	1.38	1.03	1.03
40.35	425.63	368.41	1.00	368.41	1.39	1.03	1.03
40.52	417.21	360.20	1.00	360.20	1.40	1.03	1.03
40.68	393.74	339.17	1.00	339.17	1.39	1.02	1.02
40.85	360.48	309.62	1.00	309.62	1.40	1.00	1.00
41.01	327.48	280.39	1.00	280.39	1.41	0.98	0.98
41.17	301.86	257.58	1.00	257.58	1.42	0.97	0.97
41.34	285.95	243.31	1.00	243.31	1.42	0.96	0.96
41.50	278.03	236.03	1.00	236.03	1.42	0.96	0.96
41.67	276.48	234.26	1.00	234.26	1.42	0.95	0.95
41.83	278.71	235.79	1.00	235.79	1.42	0.96	0.96
41.99	281.47	237.77	1.00	237.77	1.42	0.96	0.96
42.16	279.96	235.98	1.00	235.98	1.42	0.96	0.96
42.32	269.70	226.71	1.00	226.71	1.43	0.95	0.95
42.49	249.19	208.59	1.00	208.59	1.44	0.94	0.94
42.65	221.20	184.13	1.00	184.13	1.47	0.92	0.92
42.81	192.01	158.74	1.00	158.74	1.51	0.41	0.89
42.98	167.71	137.52	1.00	137.52	1.55	0.25	0.87
43.14	151.25	123.01	1.00	123.01	1.60	0.20	0.86
43.31	141.51	114.27	1.00	114.27	1.64	0.18	0.85
43.47	135.85	109.05	1.00	109.05	1.68	0.17	0.84
43.64	132.76	105.87	1.05	110.98	1.72	0.16	0.84
43.80	132.05	104.75	1.07	111.94	1.75	0.16	0.83
43.96	134.79	106.50	1.08	115.46	1.77	0.17	0.84
44.13	144.36	114.16	1.07	122.38	1.75	0.18	0.85
44.29	166.63	132.59	1.03	137.12	1.69	0.24	0.87
44.46	204.93	164.76	1.00	164.76	1.61	0.51	0.90
44.62	253.49	205.48	1.00	205.48	1.53	0.93	0.93
44.78	301.55	245.38	1.00	245.38	1.50	0.96	0.96
44.95	338.96	275.65	1.00	275.65	1.49	0.98	0.98
45.11	363.77	295.18	1.00	295.18	1.50	0.99	0.99
45.28	374.71	303.34	1.00	303.34	1.50	1.00	1.00
45.44	371.90	300.71	1.00	300.71	1.49	1.00	1.00
45.60	357.97	289.18	1.00	289.18	1.48	0.99	0.99
45.77	341.77	275.66	1.00	275.66	1.47	0.98	0.98
45.93	333.02	267.93	1.00	267.93	1.48	0.98	0.98
46.10	334.46	268.41	1.00	268.41	1.48	0.98	0.98
46.26	342.25	272.97	1.00	272.97	1.52	0.98	0.98
46.42	351.51	277.22	1.00	277.22	1.59	0.98	0.98
46.59	361.07	281.79	1.01	284.51	1.66	0.98	0.98
46.75	375.14	290.45	1.04	302.40	1.70	0.99	0.99
46.92	397.92	307.31	1.04	320.59	1.71	1.00	1.00
47.08	428.75	331.75	1.02	339.56	1.68	1.01	1.01
47.24	459.11	356.61	1.00	356.61	1.64	1.02	1.02

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	478.15	372.69	1.00	372.69	1.59	1.03	1.03
47.57	484.96	377.57	1.00	377.57	1.59	1.03	1.03
47.74	486.23	377.06	1.00	377.06	1.60	1.03	1.03
47.90	491.93	379.58	1.00	379.58	1.62	1.03	1.03
48.06	503.52	386.97	1.00	386.97	1.63	1.04	1.04
48.23	518.39	397.00	1.00	395.73	1.64	1.04	1.04
48.39	532.38	406.38	1.00	407.46	1.65	1.05	1.05
48.56	543.67	413.50	1.01	417.24	1.66	1.05	1.05
48.72	552.40	418.95	1.01	424.03	1.66	1.05	1.05
48.88	560.31	423.77	1.01	430.10	1.67	1.05	1.05
49.05	570.75	430.51	1.02	437.70	1.67	1.06	1.06
49.21	586.18	441.00	1.02	449.28	1.67	1.06	1.06
49.38	606.11	454.80	1.02	464.12	1.67	1.07	1.07
49.54	625.28	468.91	1.01	475.33	1.66	1.07	1.07
49.70	636.15	477.05	1.00	478.97	1.65	1.07	1.07
49.87	634.18	475.57	1.00	475.57	1.64	1.07	1.07
50.03	623.50	466.24	1.00	466.24	1.64	1.07	1.07
50.20	614.07	456.69	1.01	460.96	1.66	1.07	1.07
50.36	609.38	450.93	1.02	460.53	1.68	1.06	1.06
50.52	602.63	444.19	1.03	456.73	1.69	1.06	1.06
50.69	582.76	428.51	1.03	440.37	1.68	1.06	1.06
50.85	551.99	404.42	1.03	417.41	1.69	1.05	1.05
51.02	521.56	380.30	1.04	395.73	1.70	1.03	1.03
51.18	503.93	365.77	1.05	383.69	1.72	1.03	1.03
51.35	500.37	362.15	1.05	380.46	1.72	1.03	1.03
51.51	507.80	367.17	1.05	384.02	1.71	1.03	1.03
51.67	523.22	378.22	1.04	392.95	1.70	1.03	1.03
51.84	547.04	395.36	1.03	407.86	1.69	1.04	1.04
52.00	579.43	418.45	1.03	429.85	1.68	1.05	1.05
52.17	616.75	444.65	1.03	456.26	1.68	1.06	1.06
52.33	650.72	468.04	1.03	481.05	1.69	1.07	1.07
52.49	671.43	481.59	1.03	496.37	1.69	1.08	1.08
52.66	673.86	481.64	1.04	498.59	1.70	1.08	1.08
52.82	660.32	470.12	1.04	489.52	1.71	1.07	1.07
52.99	639.16	453.23	1.05	474.49	1.71	1.07	1.07
53.15	619.43	437.61	1.05	460.30	1.72	1.06	1.06
53.31	606.67	427.22	1.06	450.76	1.73	1.06	1.06
53.48	599.20	421.59	1.05	442.53	1.72	1.05	1.05
53.64	590.29	415.42	1.04	432.34	1.70	1.05	1.05
53.81	575.68	405.38	1.03	417.55	1.69	1.05	1.05
53.97	557.46	391.73	1.03	403.16	1.69	1.04	1.04
54.13	542.91	380.15	1.03	392.95	1.69	1.03	1.03
54.30	536.65	374.59	1.04	388.23	1.70	1.03	1.03
54.46	541.63	377.83	1.03	389.69	1.69	1.03	1.03
54.63	557.24	388.95	1.02	397.59	1.68	1.04	1.04
54.79	580.18	405.06	1.01	411.09	1.67	1.05	1.05
54.95	599.57	417.99	1.01	423.58	1.66	1.05	1.05
55.12	608.63	423.16	1.02	429.69	1.67	1.05	1.05

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.28	607.18	420.46	1.02	429.71	1.68	1.05	1.05
55.45	606.19	417.70	1.03	430.71	1.69	1.05	1.05
55.61	612.00	419.96	1.04	435.97	1.70	1.05	1.05
55.77	624.53	427.45	1.04	444.59	1.70	1.06	1.06
55.94	634.98	434.62	1.03	448.98	1.69	1.06	1.06
56.10	636.18	436.49	1.02	444.52	1.67	1.06	1.06
56.27	628.40	432.26	1.00	433.29	1.65	1.06	1.06
56.43	619.07	425.83	1.00	425.83	1.64	1.05	1.05
56.59	617.80	423.42	1.00	423.77	1.65	1.05	1.05
56.76	624.70	425.75	1.01	431.10	1.66	1.05	1.05
56.92	633.89	430.07	1.02	439.01	1.67	1.06	1.06
57.09	638.55	431.81	1.02	442.40	1.68	1.06	1.06
57.25	640.23	431.98	1.03	442.86	1.68	1.06	1.06
57.41	643.40	433.11	1.03	444.47	1.68	1.06	1.06
57.58	646.41	434.15	1.03	445.72	1.68	1.06	1.06
57.74	644.00	431.97	1.02	442.51	1.68	1.06	1.06
57.91	633.34	423.79	1.02	434.35	1.68	1.05	1.05
58.07	620.35	413.46	1.03	426.08	1.69	1.05	1.05
58.23	611.92	405.73	1.04	421.88	1.70	1.05	1.05
58.40	610.67	402.90	1.05	422.28	1.72	1.04	1.04
58.56	614.54	404.08	1.05	425.17	1.72	1.05	1.05
58.73	620.58	407.13	1.05	428.56	1.72	1.05	1.05
58.89	628.56	411.90	1.05	432.55	1.72	1.05	1.05
59.06	638.42	417.89	1.05	437.70	1.71	1.05	1.05
59.22	649.27	425.56	1.04	441.73	1.70	1.05	1.05
59.38	659.02	432.53	1.03	444.87	1.69	1.06	1.06
59.55	661.67	434.86	1.02	442.90	1.67	1.06	1.06
59.71	655.48	429.95	1.02	437.84	1.67	1.06	1.06
59.88	640.48	417.61	1.03	429.79	1.69	1.05	1.05
60.04	628.04	406.89	1.04	423.73	1.71	1.05	1.05
60.20	616.83	397.14	1.05	418.21	1.72	1.04	1.04
60.37	602.38	387.27	1.05	406.93	1.72	1.04	1.04
60.53	573.62	368.34	1.05	385.88	1.71	1.03	1.03
60.70	537.17	344.20	1.05	360.18	1.71	1.02	1.02
60.86	503.06	321.19	1.05	337.10	1.72	1.01	1.01
61.02	479.61	305.31	1.05	320.94	1.72	1.00	1.00
61.19	465.74	296.49	1.04	309.74	1.71	0.99	0.99
61.35	457.83	291.80	1.04	302.22	1.70	0.99	0.99
61.52	453.55	289.42	1.03	297.11	1.68	0.99	0.99
61.68	451.65	288.44	1.02	293.89	1.67	0.99	0.99
61.84	451.14	288.30	1.01	291.71	1.66	0.99	0.99
62.01	451.31	288.64	1.00	289.77	1.65	0.99	0.99
62.17	452.28	289.57	1.00	289.57	1.64	0.99	0.99
62.34	454.87	291.20	1.00	291.20	1.63	0.99	0.99
62.50	459.07	293.45	1.00	293.45	1.63	0.99	0.99
62.66	463.28	295.27	1.00	295.27	1.64	0.99	0.99
62.83	465.62	295.89	1.00	295.89	1.64	0.99	0.99
62.99	466.74	296.02	1.00	296.02	1.64	0.99	0.99

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

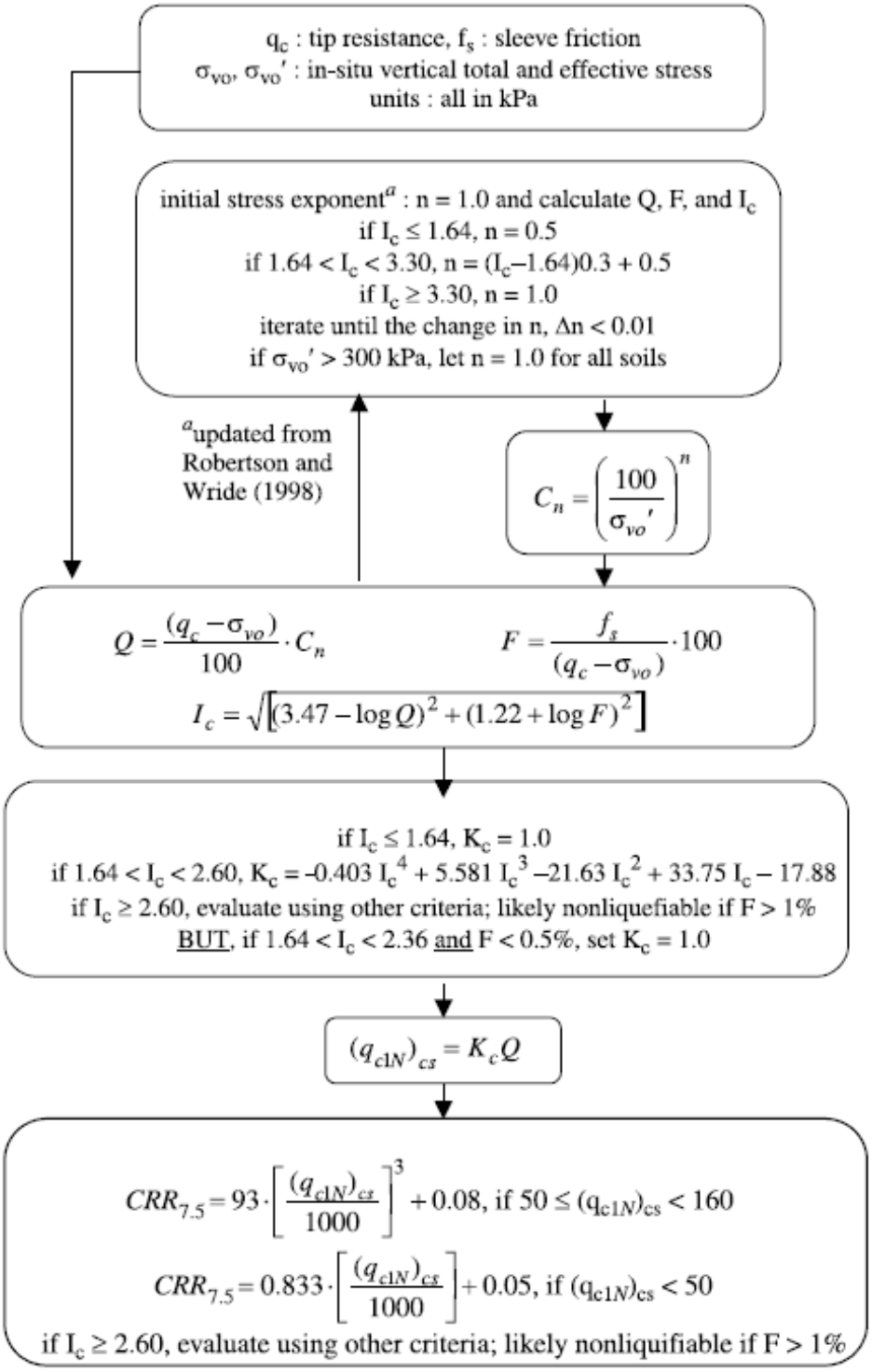
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
63.16	469.76	297.53	1.00	297.53	1.64	0.99	0.99
63.32	477.24	301.93	1.00	301.93	1.64	1.00	1.00
63.48	487.27	307.57	1.00	307.57	1.64	1.00	1.00
63.65	493.52	311.05	1.00	311.05	1.64	1.00	1.00
63.81	489.20	308.28	1.00	308.28	1.63	1.00	1.00
63.98	472.03	297.27	1.00	297.27	1.62	0.99	0.99
64.14	445.03	279.52	1.00	279.52	1.62	0.98	0.98
64.30	413.52	258.45	1.00	258.45	1.63	0.97	0.97
64.47	382.42	238.37	1.00	238.37	1.63	0.96	0.96
64.63	355.07	221.13	1.00	221.13	1.63	0.95	0.95
64.80	334.67	207.91	1.00	207.91	1.63	0.94	0.94
64.96	322.25	198.52	1.00	199.23	1.65	0.93	0.93
65.12	317.35	193.48	1.03	198.36	1.68	0.92	0.92
65.29	316.85	192.31	1.03	198.41	1.69	0.92	0.92
65.45	317.49	192.49	1.03	198.28	1.69	0.92	0.92
65.62	312.44	190.32	1.01	192.85	1.66	0.92	0.92
65.78	293.71	178.70	1.01	180.47	1.66	0.91	0.91
65.94	253.37	149.35	1.08	160.96	1.76	0.89	0.89
66.11	194.92	106.90	1.29	138.01	1.99	0.33	0.84
66.27	144.65	73.25	1.78	130.46	2.24	0.14	0.78
66.44	116.31	55.85	2.31	128.98	2.40	0.12	0.75
66.60	193.29	103.03	1.41	144.82	2.07	0.11	0.83
66.77	274.90	155.78	1.16	180.98	1.87	0.89	0.89
66.93	393.79	236.04	1.03	242.03	1.68	0.96	0.96
67.09	450.17	273.53	1.00	273.53	1.63	0.98	0.98
67.26	510.85	313.32	1.00	313.32	1.60	1.00	1.00
67.42	537.34	329.11	1.00	329.11	1.60	1.01	1.01
67.59	550.59	336.47	1.00	336.47	1.60	1.01	1.01
67.75	568.97	348.03	1.00	348.03	1.59	1.02	1.02
67.91	592.21	362.80	1.00	362.80	1.58	1.03	1.03
68.08	614.31	376.34	1.00	376.34	1.58	1.03	1.03
68.24	627.68	383.21	1.00	383.21	1.58	1.04	1.04
68.41	630.92	382.70	1.00	382.70	1.60	1.04	1.04
68.57	626.87	376.97	1.00	376.97	1.62	1.03	1.03
68.73	623.33	372.06	1.00	370.68	1.64	1.03	1.03
68.90	628.51	391.92	1.00	391.92	1.49	1.04	1.04
69.06	646.57	435.79	1.00	435.79	1.22	1.06	1.06
69.23	670.52	288.12	4.62	1332.47	2.78	0.99	20.58
69.39	687.87	295.37	4.77	1408.91	2.80	0.99	21.10

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)

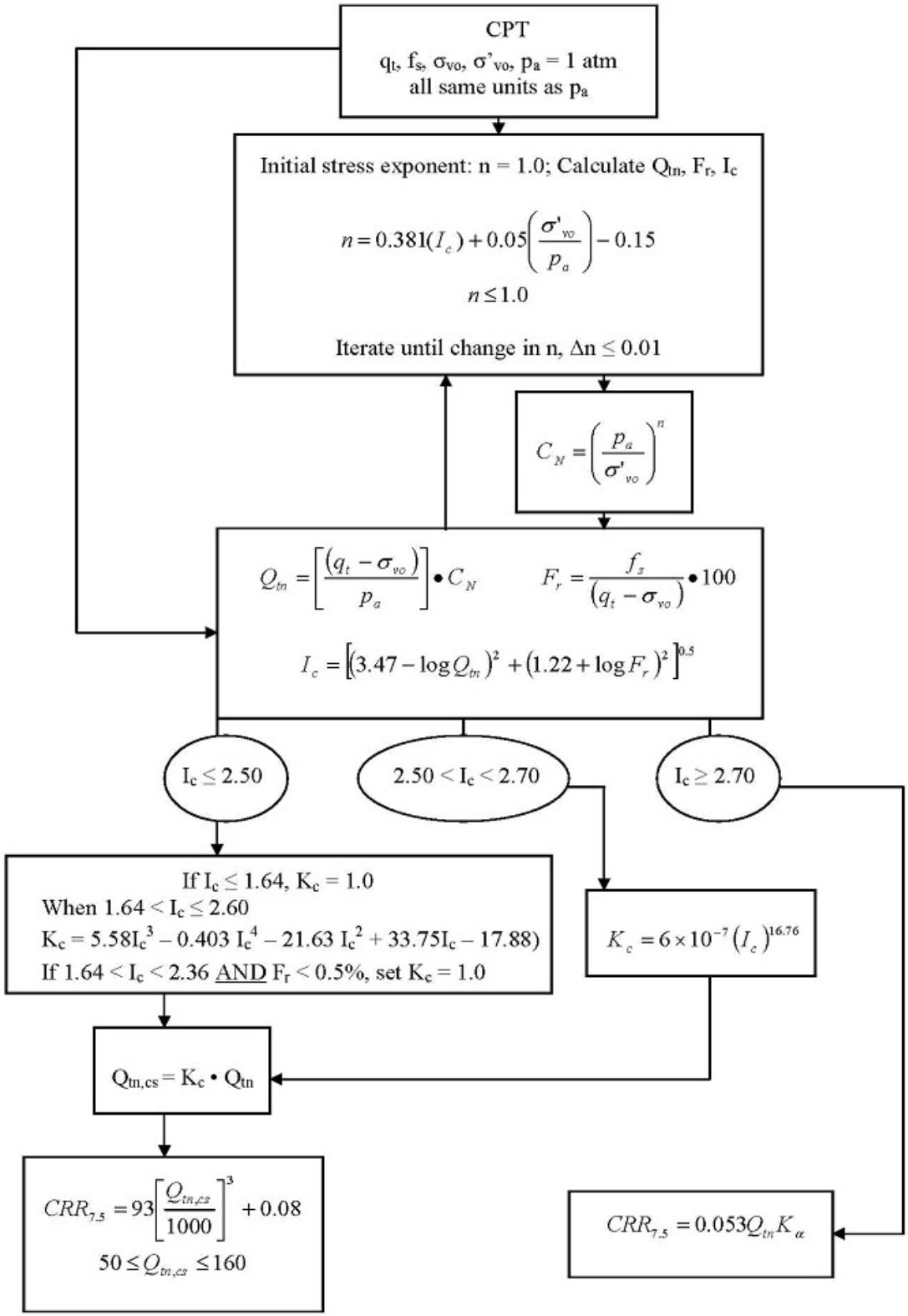
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

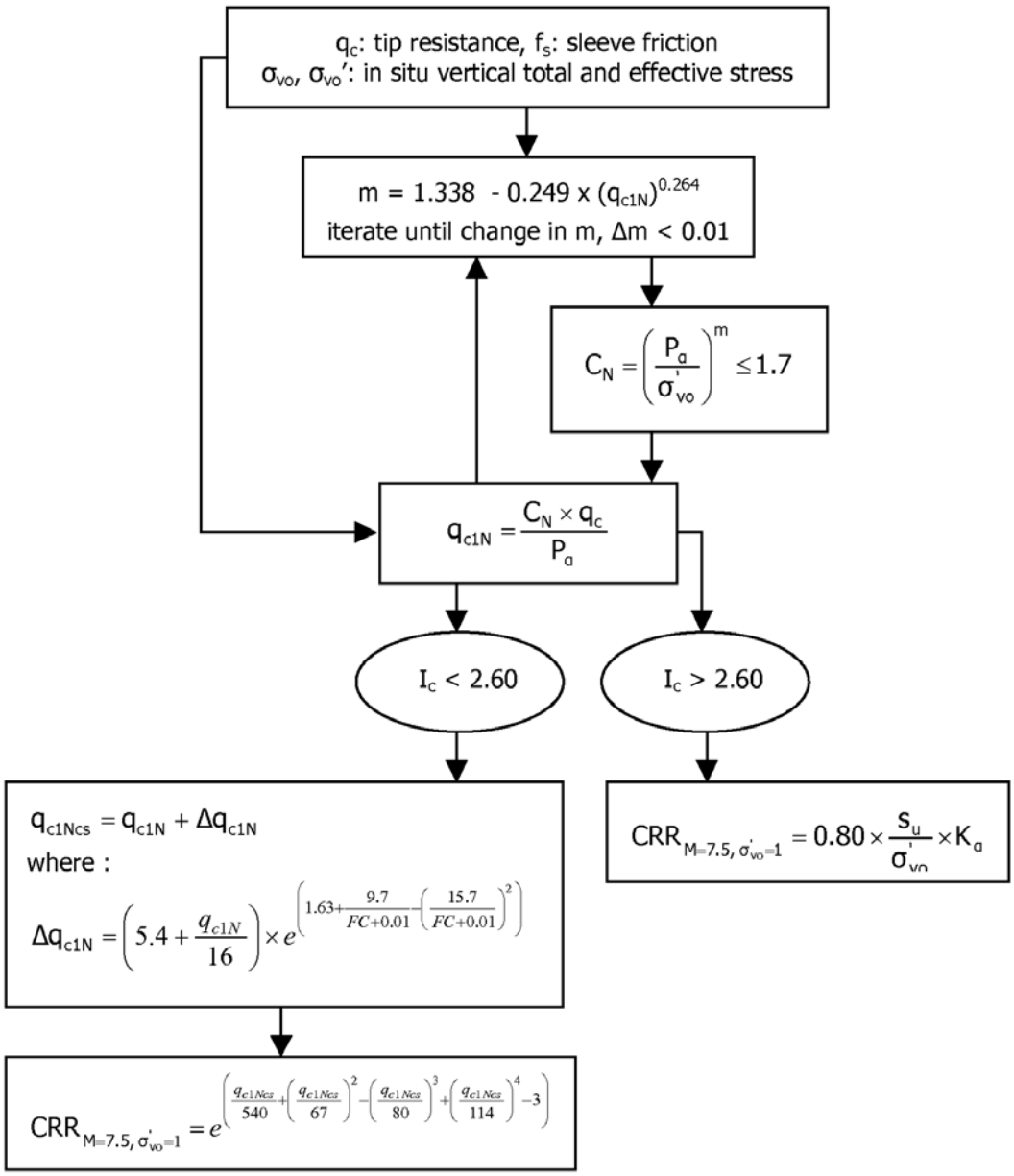
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

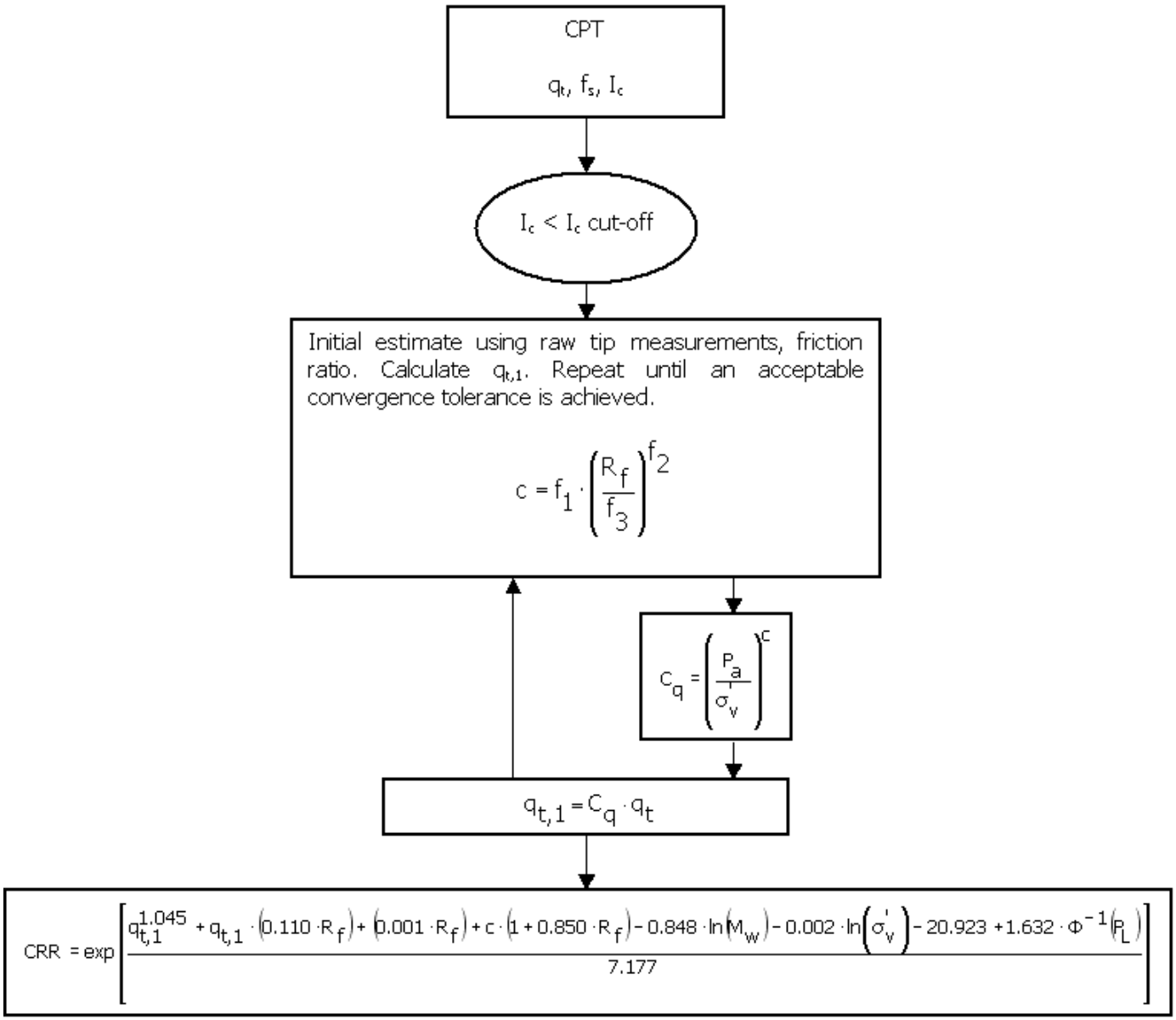


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{C1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

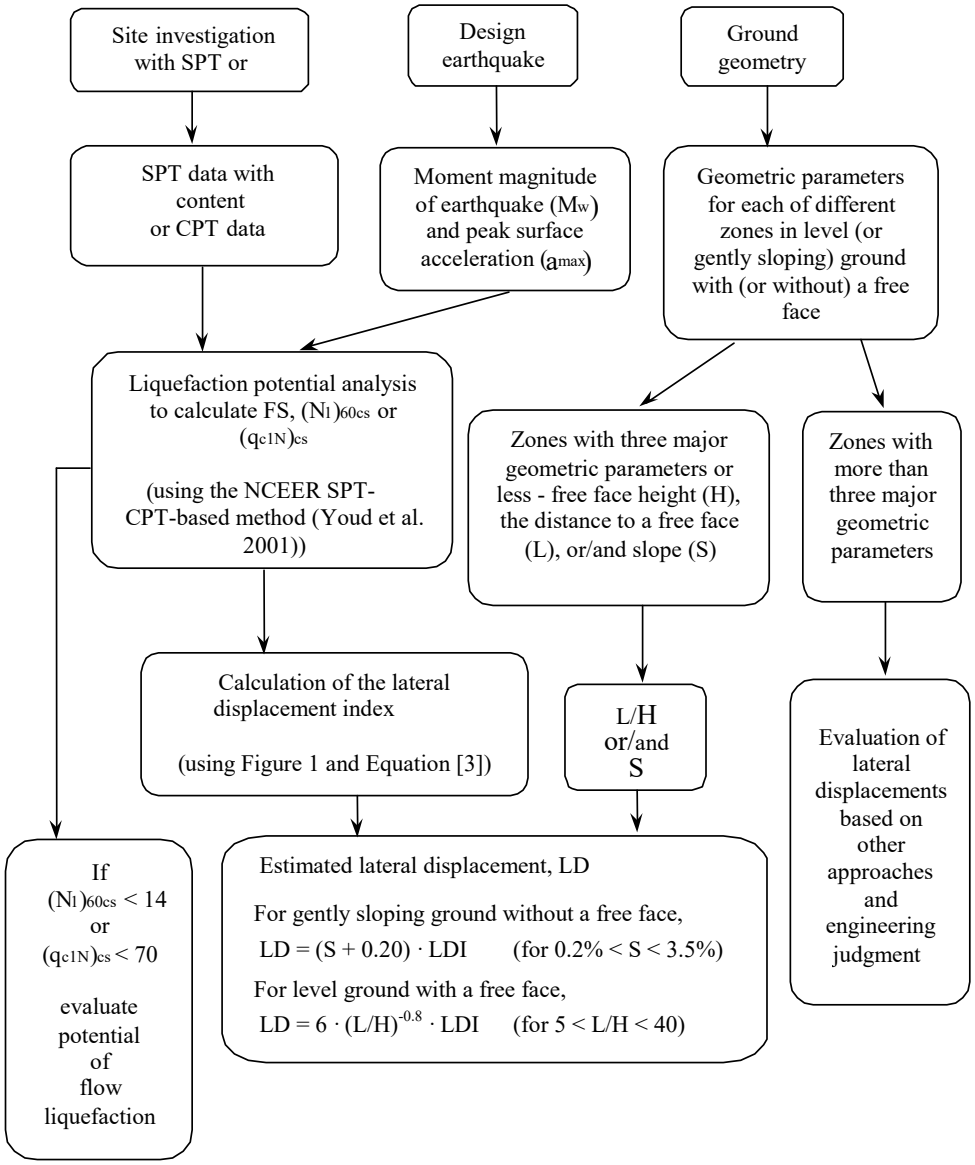
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

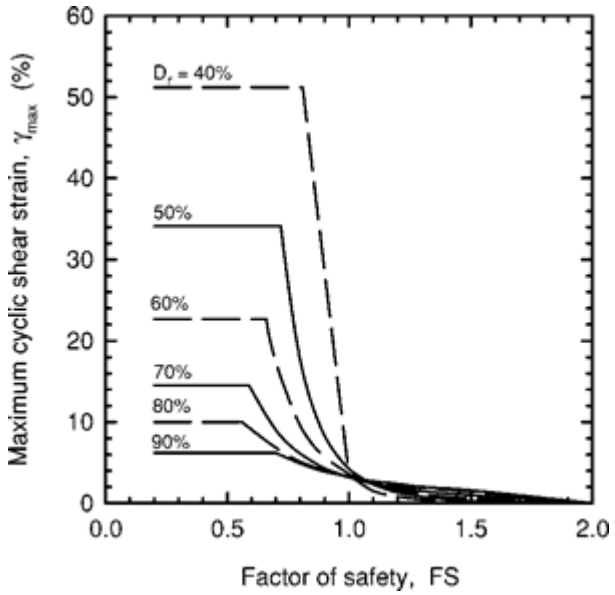
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

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



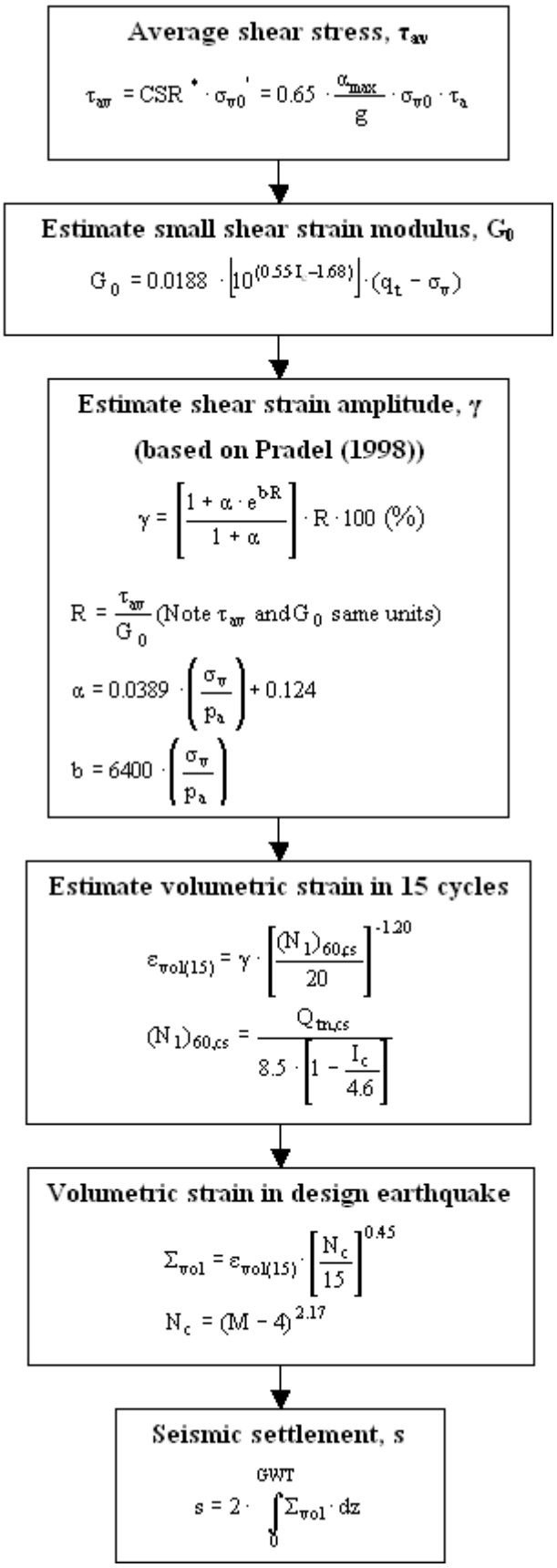
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

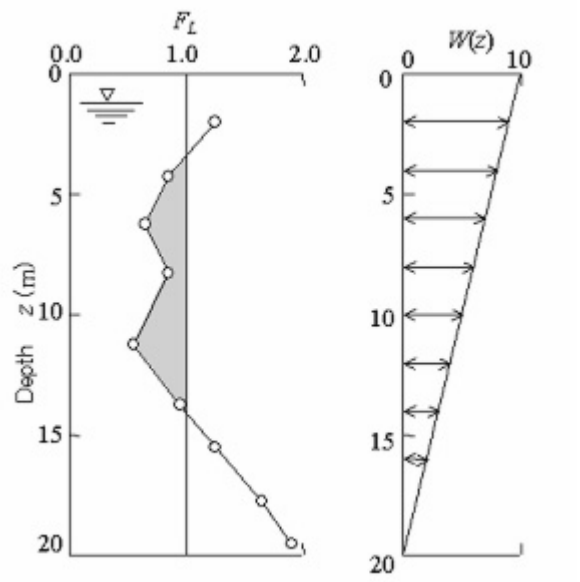
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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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Designed By: BDE
Checked By: 1/0/1900

Raw Data Input

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-1
Lattitude:	36.00024
Longitude:	88.54389
Ground Elevation, ft msl:	384.9
Groundwater Depth, ft:	11.8
Groundwater Elevation, ft msl:	373.1

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

													Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	2.5	2	95	32	22	10	25.9	CL	1			1	Clay-Like	-	230		
2	5.0	1	95	32	22	10	25.9	CL	1			1	Clay-Like	-	120		
3	7.5	1	95	32	22	10	25.9	CL	1			1	Clay-Like	-	120		
4	10.0	6	95	13	13	0	15.2	ML	1			1	Sand-Like	33	-		
5	15.0	2	95	13	13	0	15.2	ML	1			1	Sand-Like	27	-		
6	20.0	16	95	13	13	0	15.2	ML	1			1	Sand-Like	40	-		
7	25.0	2	54	23	23	0	38.5	ML	1			1	Sand-Like	27	-		
8	30.0	21	95	19	19	0	23	ML	1			1	Sand-Like	42	-		
9	35.0	18	95	19	19	0	23	ML	1			1	Sand-Like	39	-		
10	40.0	37	95	19	19	0	23	ML	1			1	Sand-Like	47	-		
11	45.0	60	95	19	19	0	23	ML	1			1	Sand-Like	48	-		
12	50.0	37	95	19	19	0	23	ML	1			1	Sand-Like	46	-		
13	55.0	57	95	19	19	0	23	ML	1			1	Sand-Like	48	-		
14	60.0	96	95	19	19	0	23	ML	1			1	Sand-Like	48	-		
15	65.0	100	95	19	19	0	23	ML	1			1	Sand-Like	48	-		
16	70.0	100	95	19	19	0	23	ML	1			1	Sand-Like	48	-		
17	75.0	100	95	19	17	2	21.3	ML	1			1	Sand-Like	48	-		
18	80.0	19	89.9	37	19	18	23.9	CL	1			1	Clay-Like	-	4460		
9	85.0	28	89.9	37	19	18	23.9	CL	1			1	Clay-Like	-	6570		
10	90.0	22	89.9	37	19	18	23.9	CL	1			1	Clay-Like	-	5160		
11	95.0	29	89.9	37	19	18	23.9	CL	1			1	Clay-Like	-	6810		
12	100.0	19	89.9	37	19	18	23.9	CL	1			1	Clay-Like	-	4460		

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Designed By: BDE
Checked By: 1/0/1900

Standard Penetration Test Correction

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-1
Lattitude:	36.00024
Longitude:	88.54389
Ground Elevation, ft msl:	384.9
Groundwater Depth, ft:	11.8
Groundwater Elevation, ft msl:	373.1

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		384.9																	
1	2.5	382.4	2	1.57	1.70	0.75	1.0	1.00	1.6	288	288	95.0	3.1	5.3	2.3	4.0	6.3	1	CL
2	5	379.9	1	1.57	1.70	0.77	1.0	1.00	2.0	575	575	95.0	1.6	2.7	1.2	2.0	4.1	1	CL
3	7.5	377.4	1	1.57	1.52	0.82	1.0	1.00	2.0	863	863	95.0	1.6	2.4	1.3	1.9	4.0	1	CL
4	10	374.9	6	1.57	1.32	0.86	1.0	1.00	1.3	1150	1150	95.0	9.4	12.4	8.0	10.6	13.9	1	ML
5	15	369.9	2	1.57	1.15	0.91	1.0	1.00	1.7	1725	1525	95.0	3.1	3.6	2.9	3.3	5.5	1	ML
6	20	364.9	16	1.57	1.06	0.95	1.0	1.00	1.2	2300	1788	95.0	25.0	26.5	23.8	25.2	30.4	1	ML
7	25	359.9	2	1.57	0.99	0.97	1.0	1.00	1.7	2875	2051	54.0	3.1	3.1	3.0	3.0	5.2	1	ML
8	30	354.9	21	1.57	0.93	0.98	1.0	1.00	1.2	3450	2314	95.0	32.9	30.6	32.3	30.0	36.0	1	ML
9	35	349.9	18	1.57	0.88	0.99	1.0	1.00	1.2	4025	2577	95.0	28.2	24.8	27.9	24.6	29.8	1	ML
10	40	344.9	37	1.57	0.84	0.99	1.0	1.00	1.2	4600	2840	95.0	50.0	42.0	57.6	48.3	56.8	1	ML
11	45	339.9	60	1.57	0.80	1.00	1.0	1.00	1.2	5175	3103	95.0	50.0	40.1	93.6	50.0	58.8	1	ML
12	50	334.9	37	1.57	0.77	1.00	1.0	1.00	1.2	5750	3366	95.0	50.0	38.5	57.8	44.5	52.5	1	ML
13	55	329.9	57	1.57	0.74	1.00	1.0	1.00	1.2	6325	3629	95.0	50.0	37.1	89.1	50.0	58.8	1	ML
14	60	324.9	96	1.57	0.72	1.00	1.0	1.00	1.2	6900	3892	95.0	50.0	35.8	150.1	50.0	58.8	1	ML
15	65	319.9	100	1.57	0.69	1.00	1.0	1.00	1.2	7475	4155	95.0	50.0	34.7	156.4	50.0	58.8	1	ML
16	70	314.9	100	1.57	0.67	1.00	1.0	1.00	1.2	8050	4418	95.0	50.0	33.6	156.5	50.0	58.8	1	ML
17	75	309.9	100	1.57	0.65	1.00	1.0	1.00	1.2	8625	4681	95.0	50.0	32.7	156.5	50.0	58.8	1	ML
18	80	304.9	19	1.57	0.64	1.00	1.0	1.00	1.2	9200	4944	89.9	29.7	18.9	29.7	18.9	23.3	1	CL
9	85	299.9	28	1.57	0.62	1.00	1.0	1.00	1.2	9775	5207	89.9	43.8	27.2	43.8	27.2	32.7	1	CL
10	90	294.9	22	1.57	0.60	1.00	1.0	1.00	1.2	10350	5470	89.9	34.4	20.8	34.4	20.8	25.5	1	CL
11	95	289.9	29	1.57	0.59	1.00	1.0	1.00	1.2	10925	5733	89.9	45.4	26.8	45.4	26.8	32.3	1	CL
12	100	284.9	19	1.57	0.58	1.00	1.0	1.00	1.2	11500	5996	89.9	29.7	17.2	29.7	17.2	21.3	1	CL

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Subsurface Soil Properties Summary

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-1
Lattitude:	36.00024
Longitude:	88.54389
Ground Elevation, ft msl:	384.9
Groundwater Depth, ft:	11.8
Groundwater Elevation, ft msl:	373.1

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	384.9															
1	2.5	382.4	2	3.1	4.0	CL	1	0	0	95.0	25.9	31.9	21.9	10.0	0.40	-	470
2	5	379.9	1	1.6	2.0	CL	1	0	0	95.0	25.9	31.9	21.9	10.0	0.40	-	235
3	7.5	377.4	1	1.6	1.9	CL	1	0	0	95.0	25.9	31.9	21.9	10.0	0.40	-	235
4	10	374.9	6	9.4	10.6	ML	1	0	0	95.0	15.2	13.1	13.1	0.0	NP	33	-
5	15	369.9	2	3.1	3.3	ML	1	0	0	95.0	15.2	13.1	13.1	0.0	NP	27	-
6	20	364.9	16	25.0	25.2	ML	1	0	0	95.0	15.2	13.1	13.1	0.0	NP	40	-
7	25	359.9	2	3.1	3.0	ML	1	0	0	54.0	38.5	23.0	23.0	0.0	NP	27	-
8	30	354.9	21	32.9	30.0	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	42	-
9	35	349.9	18	28.2	24.6	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	39	-
10	40	344.9	37	50.0	48.3	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	47	-
11	45	339.9	60	50.0	50.0	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	48	-
12	50	334.9	37	50.0	44.5	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	46	-
13	55	329.9	57	50.0	50.0	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	48	-
14	60	324.9	96	50.0	50.0	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	48	-
15	65	319.9	100	50.0	50.0	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	48	-
16	70	314.9	100	50.0	50.0	ML	1	0	0	95.0	23	18.6	18.6	0.0	NP	48	-
17	75	309.9	100	50.0	50.0	ML	1	0	0	95.0	21.3	18.5	16.5	2.0	2.40	48	-
18	80	304.9	19	29.7	18.9	CL	1	0	0	89.9	23.9	37.4	19.4	18.0	0.25	-	4460
9	85	299.9	28	43.8	27.2	CL	1	0	0	89.9	23.9	37.43	19.43	18	0.25	-	6573
10	90	294.9	22	34.4	20.8	CL	1	0	0	89.9	23.9	37.43	19.43	18	0.25	-	5165
11	95	289.9	29	45.4	26.8	CL	1	0	0	89.9	23.9	37.43	19.43	18	0.25	-	6808
12	100	284.9	19	29.7	17.2	CL	1	0	0	89.9	23.9	37.43	19.43	18	0.25	-	4460

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SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-1
Lattitude:	36.00024
Longitude:	88.54389
Ground Elevation, ft msl:	384.9
Groundwater Depth, ft:	11.8
Groundwater Elevation, ft msl:	373.1

PGA:	0.35
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7
R(km):	71.86

MSF_{sand}:	1.14
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	384.9																		
1	2.5	382.4	CL	1	1	4.0	5.5	9.5	PSL	NS Clay-Like	0.17	1	No Strength Loss	-	-	-	-	5.3	-	5.5
2	5	379.9	CL	1	1	2.0	5.5	7.5	PSL	NS Clay-Like	0.68	1	No Strength Loss	-	-	-	-	5.3	-	5.5
3	7.5	377.4	CL	1	1	1.9	5.5	7.4	PSL	NS Clay-Like	1.00	1	Strength Loss	-	-	187.8	-	5.3	-	5.5
4	10	374.9	ML	1	1	10.6	5.5	16.1	NSL-S	Sand-Like	1.11	1	Full Liquefaction	#VALUE!	-	-	0.14	5.3	0.60	5.5
5	15	369.9	ML	1	1	3.3	5.5	8.8	NSL-S	Sand-Like	1.92	1	Full Liquefaction	#VALUE!	-	-	2.56	5.1	2.41	4.9
6	20	364.9	ML	1	1	25.2	5.5	30.7	NSL-S	Sand-Like	0.44	1	No Liquefaction	-	-	-	-	2.6	-	2.5
7	25	359.9	ML	1	1	3.0	5.5	8.5	NSL-S	Sand-Like	2.35	1	Full Liquefaction	4.4	-	-	2.56	2.6	2.46	2.5
8	30	354.9	ML	1	1	30.0	5.5	35.5	NSL-S	Sand-Like	0.22	1	No Liquefaction	-	-	-	-	0.0	-	0.0
9	35	349.9	ML	1	1	24.6	5.5	30.1	NSL-S	Sand-Like	0.56	1	No Liquefaction	-	-	-	-	0.0	-	0.0
10	40	344.9	ML	1	1	48.3	5.5	53.8	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
11	45	339.9	ML	1	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
12	50	334.9	ML	1	1	44.5	5.5	50.0	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
13	55	329.9	ML	1	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
14	60	324.9	ML	1	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
15	65	319.9	ML	1	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
16	70	314.9	ML	1	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
17	75	309.9	ML	1	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
18	80	304.9	CL	1	1	18.9	5.5	24.4	PSL	NS Clay-Like	0.36	1	No Strength Loss	-	-	-	-	0.0	-	0.0
9	85	299.9	CL	1	1	27.2	5.5	32.7	PSL	NS Clay-Like	0.25	1	No Strength Loss	-	-	-	-	0.0	-	0.0
10	90	294.9	CL	1	1	20.8	5.5	26.3	PSL	NS Clay-Like	0.33	1	No Strength Loss	-	-	-	-	0.0	-	0.0
11	95	289.9	CL	1	1	26.8	5.5	32.3	PSL	NS Clay-Like	0.26	1	No Strength Loss	-	-	-	-	0.0	-	0.0
12	100	284.9	CL	1	1	17.2	5.5	22.7	PSL	NS Clay-Like	0.41	1	No Strength Loss	-	-	-	-	0.0	-	0.0

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Checked By: #######

SPT-Based Soil Shear Strength Summary

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-1
Lattitude:	36.00024
Longitude:	88.54389
Ground Elevation, ft msl:	384.9
Groundwater Depth, ft:	11.8
Groundwater Elevation, ft msl:	373.1

PGA: 0.35

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		384.9																		
1	2.5	382.4	2	9.5	CL	95.0	287.5	287.5	25.9	32	22	10	NS Clay-Like	No Strength Loss	-	470	-	470	-	470
2	5	379.9	1	7.5	CL	95.0	575.0	575.0	25.9	32	22	10	NS Clay-Like	No Strength Loss	-	235	-	230	-	230
3	7.5	377.4	1	7.4	CL	95.0	862.5	862.5	25.9	32	22	10	NS Clay-Like	Strength Loss	-	235	-	230	-	190
4	10	374.9	6	16.1	ML	95.0	1150.0	1150.0	15.2	13	13	0	Sand-Like	Full Liquefaction	33	-	33	-	-	-
5	15	369.9	2	8.8	ML	95.0	1725.0	1525.3	15.2	13	13	0	Sand-Like	Full Liquefaction	27	-	27	-	-	-
6	20	364.9	16	30.7	ML	95.0	2300.0	1788.3	15.2	13	13	0	Sand-Like	No Liquefaction	40	-	40	-	40	-
7	25	359.9	2	8.5	ML	54.0	2875.0	2051.3	38.5	23	23	0	Sand-Like	Full Liquefaction	27	-	27	-	4	-
8	30	354.9	21	35.5	ML	95.0	3450.0	2314.3	23.0	19	19	0	Sand-Like	No Liquefaction	42	-	42	-	42	-
9	35	349.9	18	30.1	ML	95.0	4025.0	2577.3	23.0	19	19	0	Sand-Like	No Liquefaction	39	-	39	-	39	-
10	40	344.9	37	53.8	ML	95.0	4600.0	2840.3	23.0	19	19	0	Sand-Like	No Liquefaction	47	-	47	-	47	-
11	45	339.9	60	55.5	ML	95.0	5175.0	3103.3	23.0	19	19	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
12	50	334.9	37	50.0	ML	95.0	5750.0	3366.3	23.0	19	19	0	Sand-Like	No Liquefaction	46	-	46	-	46	-
13	55	329.9	57	55.5	ML	95.0	6325.0	3629.3	23.0	19	19	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
14	60	324.9	96	55.5	ML	95.0	6900.0	3892.3	23.0	19	19	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
15	65	319.9	100	55.5	ML	95.0	7475.0	4155.3	23.0	19	19	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
16	70	314.9	100	55.5	ML	95.0	8050.0	4418.3	23.0	19	19	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
17	75	309.9	100	55.5	ML	95.0	8625.0	4681.3	21.3	19	17	2	Sand-Like	No Liquefaction	48	-	48	-	48	-
18	80	304.9	19	24.4	CL	89.9	9200.0	4944.3	23.9	37	19	18	NS Clay-Like	No Strength Loss	-	4460	-	4460	-	4460
9	85	299.9	28	32.7	CL	89.9	9775.0	5207.3	23.9	37.4	19.4	18.0	NS Clay-Like	No Strength Loss	-	6573.0	-	6570	-	6570
10	90	294.9	22	26.3	CL	89.9	10350.0	5470.3	23.9	37.4	19.4	18.0	NS Clay-Like	No Strength Loss	-	5164.5	-	5160	-	5160
11	95	289.9	29	32.3	CL	89.9	10925.0	5733.3	23.9	37.4	19.4	18.0	NS Clay-Like	No Strength Loss	-	6807.8	-	6810	-	6810
12	100	284.9	19	22.7	CL	89.9	11500.0	5996.3	23.9	37.4	19.4	18.0	NS Clay-Like	No Strength Loss	-	4460.3	-	4460	-	4460

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Raw Data Input

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-2
Lattitude:	36.00024
Longitude:	88.53344
Ground Elevation, ft msl:	385.9
Groundwater Depth, ft:	5.4
Groundwater Elevation, ft msl:	380.5

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

													Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	2.5	2	95	27	17	10	26.4	CL				1	Clay-Like	-	230		
2	5.0	0.1	88.5	39	22	17	25.7	CL				1	Clay-Like	-	20		
3	7.5	1	88.5	39	22	17	25.7	CL				1	Clay-Like	-	230		
4	10.0	3	88.5	39	22	17	25.7	CL				1	Clay-Like	-	700		
5	15.0	2	88.5	39	22	17	25.7	CL				1	Clay-Like	-	470		
6	22.0	17	95	0	0	0	20.7	ML				1	Sand-Like	41	-		
7	25.0	17	95	0	0	0	20.7	ML				1	Sand-Like	41	-		
8	30.0	41	95	0	0	0	20.7	ML				1	Sand-Like	48	-		
9	35.0	44	95	0	0	0	20.7	ML				1	Sand-Like	48	-		
10	40.0	42	95	0	0	0	20.7	ML				1	Sand-Like	48	-		
11	45.0	73	95	0	0	0	22.6	ML				1	Sand-Like	48	-		
12	50.0	70	95	0	0	0	22.6	ML				1	Sand-Like	48	-		
13	55.0	100	95	0	0	0	22.6	ML				1	Sand-Like	48	-		
14	60.0	69	95	0	0	0	21.4	ML				1	Sand-Like	48	-		
15	65.0	69	95	0	0	0	21.4	ML				1	Sand-Like	48	-		
16	70.0	100	95	0	0	0	21.4	ML				1	Sand-Like	48	-		
17	75.0	100	95	19	17	2	21.1	ML				1	Sand-Like	48	-		
18	80.0	100	95	19	17	2	21.1	ML				1	Sand-Like	48	-		
9	85.0	26	64	29	18	11	27	CL				1	Clay-Like	-	6100		
10	95.0	14	64	29	18	11	27	CL				1	Clay-Like	-	3290		
11	100.0	24	64	29	18	11	27	CL				1	Clay-Like	-	5630		

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Standard Penetration Test Correction

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-2
Lattitude:	36.00024
Longitude:	88.53344
Ground Elevation, ft msl:	385.9
Groundwater Depth, ft:	5.4
Groundwater Elevation, ft msl:	380.5

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		385.9																	
1	2.5	383.4	2	1.57	1.70	0.75	1.0	1.00	1.6	288	288	95.0	3.1	5.3	2.3	4.0	6.3	0	CL
2	5	380.9	0	1.57	1.70	0.77	1.0	1.00	1.4	575	575	88.5	0.2	0.3	0.1	0.2	0.3	0	CL
3	7.5	378.4	1	1.57	1.65	0.82	1.0	1.00	2.0	863	731	88.5	1.6	2.6	1.3	2.1	4.2	0	CL
4	10	375.9	3	1.57	1.52	0.86	1.0	1.00	1.4	1150	863	88.5	4.7	7.1	4.0	6.1	8.7	0	CL
5	15	370.9	2	1.57	1.33	0.91	1.0	1.00	1.6	1725	1126	88.5	3.1	4.2	2.9	3.8	6.1	0	CL
6	22	363.9	17	1.57	1.16	0.96	1.0	1.00	1.2	2530	1494	95.0	26.6	30.8	25.5	29.5	35.4	0	ML
7	25	360.9	17	1.57	1.10	0.97	1.0	1.00	1.2	2875	1652	95.0	26.6	29.3	25.8	28.4	34.1	0	ML
8	30	355.9	41	1.57	1.02	0.98	1.0	1.00	1.2	3450	1915	95.0	50.0	51.1	63.1	50.0	58.8	0	ML
9	35	350.9	44	1.57	0.96	0.99	1.0	1.00	1.2	4025	2178	95.0	50.0	47.9	68.2	50.0	58.8	0	ML
10	40	345.9	42	1.57	0.91	0.99	1.0	1.00	1.2	4600	2441	95.0	50.0	45.3	65.4	50.0	58.8	0	ML
11	45	340.9	73	1.57	0.86	1.00	1.0	1.00	1.2	5175	2704	95.0	50.0	43.0	113.9	50.0	58.8	0	ML
12	50	335.9	70	1.57	0.82	1.00	1.0	1.00	1.2	5750	2967	95.0	50.0	41.1	109.3	50.0	58.8	0	ML
13	55	330.9	100	1.57	0.79	1.00	1.0	1.00	1.2	6325	3230	95.0	50.0	39.3	156.3	50.0	58.8	0	ML
14	60	325.9	69	1.57	0.76	1.00	1.0	1.00	1.2	6900	3493	95.0	50.0	37.8	107.9	50.0	58.8	0	ML
15	65	320.9	69	1.57	0.73	1.00	1.0	1.00	1.2	7475	3756	95.0	50.0	36.5	107.9	50.0	58.8	0	ML
16	70	315.9	100	1.57	0.71	1.00	1.0	1.00	1.2	8050	4019	95.0	50.0	35.3	156.5	50.0	58.8	0	ML
17	75	310.9	100	1.57	0.68	1.00	1.0	1.00	1.2	8625	4282	95.0	50.0	34.2	156.5	50.0	58.8	0	ML
18	80	305.9	100	1.57	0.66	1.00	1.0	1.00	1.2	9200	4545	95.0	50.0	33.2	156.5	50.0	58.8	0	ML
9	85	300.9	26	1.57	0.64	1.00	1.0	1.00	1.2	9775	4808	64.0	40.7	26.2	40.7	26.2	31.7	0	CL
10	95	290.9	14	1.57	0.61	1.00	1.0	1.00	1.3	10925	5334	64.0	21.9	13.4	21.9	13.4	17.0	0	CL
11	100	285.9	24	1.57	0.60	1.00	1.0	1.00	1.2	11500	5597	64.0	37.6	22.5	37.6	22.5	27.3	0	CL

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Checked By: 1/0/1900

Subsurface Soil Properties Summary

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-2
Lattitude:	36.00024
Longitude:	88.53344
Ground Elevation, ft msl:	385.9
Groundwater Depth, ft:	5.4
Groundwater Elevation, ft msl:	380.5

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	385.9															
1	2.5	383.4	2	3.1	4.0	CL	0	0	0	95.0	26.4	26.7	16.7	10.0	0.97	-	470
2	5	380.9	0	0.2	0.2	CL	0	0	0	88.5	25.7	39.0	22.0	17.0	0.22	-	23
3	7.5	378.4	1	1.6	2.1	CL	0	0	0	88.5	25.7	39.0	22.0	17.0	0.22	-	235
4	10	375.9	3	4.7	6.1	CL	0	0	0	88.5	25.7	39.0	22.0	17.0	0.22	-	704
5	15	370.9	2	3.1	3.8	CL	0	0	0	88.5	25.7	39.0	22.0	17.0	0.22	-	470
6	22	363.9	17	26.6	29.5	ML	0	0	0	95.0	20.7	0.0	0.0	0.0	NP	41	-
7	25	360.9	17	26.6	28.4	ML	0	0	0	95.0	20.7	0.0	0.0	0.0	NP	41	-
8	30	355.9	41	50.0	50.0	ML	0	0	0	95.0	20.7	0.0	0.0	0.0	NP	48	-
9	35	350.9	44	50.0	50.0	ML	0	0	0	95.0	20.7	0.0	0.0	0.0	NP	48	-
10	40	345.9	42	50.0	50.0	ML	0	0	0	95.0	20.7	0.0	0.0	0.0	NP	48	-
11	45	340.9	73	50.0	50.0	ML	0	0	0	95.0	22.6	0.0	0.0	0.0	NP	48	-
12	50	335.9	70	50.0	50.0	ML	0	0	0	95.0	22.6	0.0	0.0	0.0	NP	48	-
13	55	330.9	100	50.0	50.0	ML	0	0	0	95.0	22.6	0.0	0.0	0.0	NP	48	-
14	60	325.9	69	50.0	50.0	ML	0	0	0	95.0	21.4	0.0	0.0	0.0	NP	48	-
15	65	320.9	69	50.0	50.0	ML	0	0	0	95.0	21.4	0.0	0.0	0.0	NP	48	-
16	70	315.9	100	50.0	50.0	ML	0	0	0	95.0	21.4	0.0	0.0	0.0	NP	48	-
17	75	310.9	100	50.0	50.0	ML	0	0	0	95.0	21.1	19.0	17.0	2.0	2.06	48	-
18	80	305.9	100	50.0	50.0	ML	0	0	0	95.0	21.1	19.0	17.0	2.0	2.06	48	-
9	85	300.9	26	40.7	26.2	CL	0	0	0	64.0	27	28.69	17.69	11	0.85	-	6104
10	95	290.9	14	21.9	13.4	CL	0	0	0	64.0	27	28.69	17.69	11	0.85	-	3287
11	100	285.9	24	37.6	22.5	CL	0	0	0	64.0	27	28.69	17.69	11	0.85	-	5634

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SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-2
Lattitude:	36.00024
Longitude:	88.53344
Ground Elevation, ft msl:	385.9
Groundwater Depth, ft:	5.4
Groundwater Elevation, ft msl:	380.5

PGA:	0.35
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7
R(km):	71.86

MSF_{sand}:	1.14
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	385.9																		
1	2.5	383.4	CL	0	1	4.0	5.5	9.5	PSL	NS Clay-Like	0.17	1	No Strength Loss	-	-	-	-	0.0	-	0.0
2	5	380.9	CL	0	1	0.2	5.5	5.7	PSL	NS Clay-Like	6.76	1	Strength Loss	-	-	18.8	-	0.0	-	0.0
3	7.5	378.4	CL	0	1	2.1	5.5	7.6	PSL	NS Clay-Like	1.00	1	Strength Loss	-	-	187.8	-	0.0	-	0.0
4	10	375.9	CL	0	1	6.1	5.5	11.6	PSL	NS Clay-Like	0.44	1	No Strength Loss	-	-	-	-	0.0	-	0.0
5	15	370.9	CL	0	1	3.8	5.5	9.3	PSL	NS Clay-Like	0.97	1	No Strength Loss	-	-	-	-	0.0	-	0.0
6	22	363.9	ML	0	1	29.5	5.5	35.0	NSL-S	Sand-Like	0.26	1	No Liquefaction	-	-	-	-	0.0	-	0.0
7	25	360.9	ML	0	1	28.4	5.5	33.9	NSL-S	Sand-Like	0.34	1	No Liquefaction	-	-	-	-	0.0	-	0.0
8	30	355.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
9	35	350.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
10	40	345.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
11	45	340.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
12	50	335.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
13	55	330.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
14	60	325.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
15	65	320.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
16	70	315.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
17	75	310.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
18	80	305.9	ML	0	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
9	85	300.9	CL	0	1	26.2	5.5	31.7	PSL	HS Clay-Like	0.27	1	No Strength Loss	-	-	-	-	0.0	-	0.0
10	95	290.9	CL	0	1	13.4	5.5	18.9	PSL	HS Clay-Like	0.54	1	No Strength Loss	-	-	-	-	0.0	-	0.0
11	100	285.9	CL	0	1	22.5	5.5	28.0	PSL	HS Clay-Like	0.32	1	No Strength Loss	-	-	-	-	0.0	-	0.0

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Checked By: #######

SPT-Based Soil Shear Strength Summary

Project Name: SR-436 over Reedy Creek
County: Carroll County

Boring Number:	B-2
Lattitude:	36.00024
Longitude:	88.53344
Ground Elevation, ft msl:	385.9
Groundwater Depth, ft:	5.4
Groundwater Elevation, ft msl:	380.5

PGA: 0.35

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		385.9																		
1	2.5	383.4	2	9.5	CL	95.0	287.5	287.5	26.4	27	17	10	NS Clay-Like	No Strength Loss	-	470	-	470	-	470
2	5	380.9	0	5.7	CL	88.5	575.0	575.0	25.7	39	22	17	NS Clay-Like	Strength Loss	-	23	-	20	-	20
3	7.5	378.4	1	7.6	CL	88.5	862.5	731.5	25.7	39	22	17	NS Clay-Like	Strength Loss	-	235	-	230	-	190
4	10	375.9	3	11.6	CL	88.5	1150.0	863.0	25.7	39	22	17	NS Clay-Like	No Strength Loss	-	704	-	700	-	700
5	15	370.9	2	9.3	CL	88.5	1725.0	1126.0	25.7	39	22	17	NS Clay-Like	No Strength Loss	-	470	-	470	-	470
6	22	363.9	17	35.0	ML	95.0	2530.0	1494.2	20.7	0	0	0	Sand-Like	No Liquefaction	41	-	41	-	41	-
7	25	360.9	17	33.9	ML	95.0	2875.0	1652.0	20.7	0	0	0	Sand-Like	No Liquefaction	41	-	41	-	41	-
8	30	355.9	41	55.5	ML	95.0	3450.0	1915.0	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
9	35	350.9	44	55.5	ML	95.0	4025.0	2178.0	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
10	40	345.9	42	55.5	ML	95.0	4600.0	2441.0	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
11	45	340.9	73	55.5	ML	95.0	5175.0	2704.0	22.6	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
12	50	335.9	70	55.5	ML	95.0	5750.0	2967.0	22.6	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
13	55	330.9	100	55.5	ML	95.0	6325.0	3230.0	22.6	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
14	60	325.9	69	55.5	ML	95.0	6900.0	3493.0	21.4	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
15	65	320.9	69	55.5	ML	95.0	7475.0	3756.0	21.4	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
16	70	315.9	100	55.5	ML	95.0	8050.0	4019.0	21.4	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
17	75	310.9	100	55.5	ML	95.0	8625.0	4282.0	21.1	19	17	2	Sand-Like	No Liquefaction	48	-	48	-	48	-
18	80	305.9	100	55.5	ML	95.0	9200.0	4545.0	21.1	19	17	2	Sand-Like	No Liquefaction	48	-	48	-	48	-
9	85	300.9	26	31.7	CL	64.0	9775.0	4808.0	27.0	28.7	17.7	11.0	HS Clay-Like	No Strength Loss	-	6103.5	-	6100	-	6100
10	95	290.9	14	18.9	CL	64.0	10925.0	5334.0	27.0	28.7	17.7	11.0	HS Clay-Like	No Strength Loss	-	3286.5	-	3290	-	3290
11	100	285.9	24	28.0	CL	64.0	11500.0	5597.0	27.0	28.7	17.7	11.0	HS Clay-Like	No Strength Loss	-	5634.0	-	5630	-	5630

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Subsurface Investigation Geotechnical Data Report

SR-193 over Branch (Bridge No. 2)

PIN No.: 128113.02
GES No.: 2432318

Fayette County, TN
June 25, 2019

APPROVED
07/03/2019

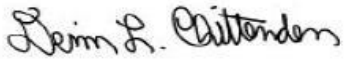
June 25, 2019

Mr. Travis Smith, P.E.
Civil Engineering Manager I
Materials & Tests Division
Tennessee Department of Transportation
6601 Centennial Boulevard
Nashville, Tennessee 37243

Dear Mr. Smith,

We have completed the *Subsurface Investigation Geotechnical Data Report* for the Bridge Replacement on SR-193 over unnamed Branch in Fayette County, Region 4 (Bridge No. 2). Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering and geological services to the Tennessee Department of Transportation.

Sincerely,
HDR



Devin L. Chittenden, P.E.
Senior Geotechnical Engineer



Bret O. Watkins, P.G.
Senior Geologist

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3 Geology, Soils, and Site Conditions 3
4 Seismic Considerations 5
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Appendices

Appendix A: Plan and Boring Sheets
Appendix B: Boring Logs & CPT Data
Appendix C: Laboratory Testing
Appendix D: Preliminary Soil Shear Strength Loss Analysis

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Executive Summary

The proposed project entails the replacement of an existing two-lane bridge along SR-193 near log mile 11.48 in Fayette County, TN. The new structure, described as “Bridge No. 2”, will be a direct replacement of the existing two-span bridge by construction of a double-reinforced concrete box bridge (RCBB) at an unnamed branch of Shaws Creek, centered at approximately Station 30+77.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein. Bedrock was not encountered within the advanced borings.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design/build team for the proposed structure along SR-193 (Macon Road) near log mile 11.48 over an unnamed branch of Shaws Creek in Fayette County, TN. The proposed double 18-ft by 6-ft reinforced concrete box bridge (RCBB) will replace the existing 38-ft two-span bridge situated between Stations 30+57.61 to 30+94.90. Borings were advanced and soil samples were collected and delivered to the HDR laboratory for further testing and analysis. Geotechnical parameters and foundation recommendations are provided in this report resulting from the evaluations of soil conditions at the proposed site.

2 Subsurface Exploration

A subsurface investigation was conducted at this site by HDR and sub-consultants in June 2019. The exploration program included two Standard Penetration Test (SPT) borings advanced to 100-ft bgs; with boring B-1 advanced with a CME-55C track-mounted rig and B-2 advanced with a CME-45C track-mounted rig. Both borings were drilled on opposite ends of the existing bridge, offset to roadway centerline. In addition, one piezoCone Penetrometer Test (CPT) boring was advanced by track-mounted box rig with 20-ton reaction mass near the existing west bridge abutment to cone refusal depth (see Bridge Replacement Boring Plan Sheet – Appendix A). Test boring locations are tabulated below:

Table 2-1. Test Boring Locations

Test Hole Number	Location	Station	Offset	Depth
B-1	Existing West Abutment	30+58	11-ft LT	101.5-ft
B-2	Existing East Abutment	30+94	11-ft RT	101.5-ft
CPT-1	Existing West Abutment	30+54	2-ft LT	47.6-ft

SPT's were obtained at 2.5-ft intervals in the top ten feet and at five foot intervals until reaching termination depths. SPT borings were logged for blow counts, soil types, sample recoveries, and boring metrics. CPT piezoCone readings of tip resistance, sleeve friction, friction ratio, and pore water pressure were collected on a continuous basis as the cone was advanced at a rate of 2cm/sec until refusal was met at 47.6-ft bgs. Seismic velocity measurements were also collected in the CPT boring at 5-ft intervals. Boring logs from borings B-1 and B-2, as well as CPT results are provided in Appendix B. All soil specimens were delivered to HDR for laboratory testing and analysis, including the following tests:

Atterberg Limits	AASHTO T-89 and T-90
Sieve Analysis	ASTM D-1140
Natural Moisture Content	AASHTO T-265

Unconsolidated Undrained (UU) Compression Test	AASHTO T-296
Standard Proctor	AASHTO T-99
pH Testing	AASHTO T-288
Resistivity	ASTM G-187

The full laboratory testing results are located in Appendix C.

3 Geology, Soils, and Site Conditions

The proposed site is topographically depicted on the Macon, Tennessee 7.5-minute topographic quadrangle map and is situated in an area of low to moderate relief, within the local floodplain of Shaws Creek, which drains to the west/southwest. Approximate proposed grade elevations range from 400-ft to 410-ft, with nearby ridge top elevations over 450-ft.

The project bridge site is located within the East Gulf Coastal Plain Physiographic Province of Western Tennessee. The Mississippi Embayment – a large fluvial floodplain with relatively flat to gently sloping topography providing drainage over much of the central and eastern portions of North America – forms the northern portion of this province. The Embayment was initially formed as a topographic low during the Proterozoic, precipitated by crustal weaknesses that created many structural deformities including the Reelfoot Rift of the New Madrid Seismic Zone. By the end of the Paleozoic, much of the regional basin was infilled with shallow marine deposits, forming the base of the Embayment today as limestone, shale, and sandstones. Regional subsidence and deposition following the Paleozoic resulted in the thick accumulation of Mesozoic and younger unconsolidated strata that generally dip towards the Mississippi River, increasing in thickness to as much as 3000-ft thick, with strata becoming progressively younger towards the center of the basin.

Published mapping indicates the presence of Pleistocene loess composed of clayey and sandy silts with minor very fine sand intermixed in massive beds. Pleistocene deposits are likely less than 20-ft in thickness at this locality. The existing bridge approaches are supported atop this loess with roadway embankment fill, approximately 0 to 10-ft thick. Loess deposits are further supported with Eocene deltaic non-marine deposits of the Claiborne and Wilcox formations, composed primarily of fine-grained micaceous quartz sands lenticularly crossbedded with clay and lenses of lignite or lignitic clay. Variations in lateral consistency are common due to crossbedding. Anticipated thickness of Eocene deposits is greater than 200 to 300-ft. It is believed Eocene deposits are further supported by Paleocene shallow marine deposits of glauconitic clay, with thin lenses of fine micaceous sands of the Midway Group. Paleocene deposits are anticipated to be approximately 100 to 200-ft thick. At this locality, Paleocene deposits are further supported by Upper Cretaceous unconsolidated sediments lying atop Paleozoic rocks at an approximate depth of greater than 1,000-ft deep.

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1. Fill was intercepted from the existing ground surface to approximately 9.5-ft maximum depth. Field and laboratory classifications of recovered SPT

samples indicate fill composed of loose to medium dense non-plastic poorly graded gravel with silt and sand (GP-GM).

Pleistocene loess deposits are interpreted as underlying the embankment fill in boring B-1, and near the surface in boring B-2, with thicknesses ranging from 6.3 to 15.8-ft. Recovered samples indicate loess is dominantly lean clays and silts with fine-grained sands (CL-ML) exhibiting low moderate plasticity. SPT drives and laboratory testing of samples indicated very soft to medium stiff consistencies. Natural moisture content of loess sediments ranges from 22.9 – 28.9 percent. The base of loess deposits is believed to rest upon an angular unconformity surface eroded into the underlying Tertiary Eocene deposits (Claiborne/Wilcox Formation, undivided). This surface was encountered at approximately 391.2 to 392.2-ft elevation within advanced borings.

The Claiborne/Wilcox Formation underlying loess deposits was intercepted approximately 15.8-ft below grade. The base of Claiborne/Wilcox sediments were not intercepted in the borings advanced, therefore thicknesses were interpreted to be greater than 84.2-ft. This formation is predominantly composed of non-plastic fine grained, poorly to well-graded silty sands and few interbeds of low plasticity lean clay and fine silts (CL-ML). SPT drives indicate medium stiff to very dense/hard consistencies for the cohesive/non-cohesive sediments. Natural moisture contents generally ranged from 17.0 – 37.9 percent.

No faulting was indicated on published mapping within the limits of the proposed alignment. Likewise recovered samples did not indicate the presence of faulting. The region surrounding the project area is located within an active seismic region (New Madrid Seismic Zone) and is considered one of the most active seismic regions in the country. Regional seismic events, both along the New Madrid Fault System and associated fault systems, have been and are continually documented throughout Western Tennessee, Western Kentucky, Southern Illinois, Southeastern Missouri and Northeastern Arkansas.

Groundwater was encountered within each of the RCBB borings at the end of drilling operations, measured near 10.3-ft bgs. Generally, the interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed RCBB foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A, with borehole test logs provided in Appendix B.

Table 3-1. Generalized Subsurface Conditions

Material Type/Formation	Elevation of Top Layer (ft)	Depth to Top Layer (ft)	USCS Soil Type	SPT-N values (bpf)	UU Total Shear Strength (psf)
Embankment Fill	407.0	0	GP-GM(A-1-a)	6-24	
Pleistocene Loess	397.5-408.0	0-9.5	CL-ML(A-4)	1-6	
Eocene-Claiborne/Wilcox Undivided	391.2-392.2	15.8	CL-ML(A-4), SM(A-2-4), SP-SM(A-3), SW-SM(A-2-4), SW(A-1-b)	10-100+	3,915-4,274

In addition to lab classification and triaxial shear testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils data for use by a structural engineer to provide any necessary protection to the piling, concrete,

reinforcing steel, etc. Corrosion and deterioration protection requirements and guidelines for piling are set forth in LRFD Section 10.7.5. The corrosion and deterioration testing results are summarized in Table 3-2 below and are included in Appendix C.

Table 3-2. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth	pH	Resistivity (ohm·cm)
B-2	30+94	11-ft RT	0.0'-5.0'	7.8	8,800

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation:

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation:

- Resistivity less than 3,000 ohm-cm
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Results of the corrosion and deterioration testing indicated that the site has low potential for pile or steel reinforcement deterioration based on the resistivity value and the geographical location of the project site. Interpretation of the data and corrosion protection of the foundation structural components will be discussed with the structural engineer for the project.

4 Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Fayette County is considered vulnerable to severe ground shaking. The project site classifies as Site Class D based on the average CPT shear wave value (1,157.3 ft/s). The peak ground acceleration coefficient for this project site is equal to 0.327g using Site Class D. S-wave response measurements (Vs) collected from the CPT boring saw gradually increasing shear wave velocities from 461 ft/sec to 1,000 ft/sec. From 25-ft to 45-ft, velocities ranged from 1,287 ft/sec to 1,661 ft/sec.

Preliminary analyses of the subsurface conditions in the SPT and CPT borings were performed to evaluate the likelihood of liquefaction during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger Soil Liquefaction during Earthquakes (2008) and using the Geologismiki software Cliq v.3.0.

Table 4-1. Soil Liquefaction Potential Results

Test Boring	Depth(ft)	Thickness(ft)	Average FS	Average LPI	Settlement (in)
B-1	0.0-7.75	7.75	0.89	N/A	1.63
	10.25-16.50	6.25	0.54	N/A	1.33
	39.00-44.00	5.00	0.72	N/A	1.47
	54.00-59.00	5.00	0.82	N/A	1.03
B-2	0.00-33.00	33.00	0.75	N/A	4.67
	59.00-64.00	5.00	0.86	N/A	0.85
	74.00-84.00	10.00	0.76	N/A	2.99
	89.00-99.00	10.00	0.61	N/A	3.70
CPT-1	17.06-19.69	2.63	0.76	0.09	0.74

Based on the results of the seismic hazard evaluation, it is believed the soils are susceptible to shear strength loss during the seismic event. The liquefiable layers present at the SPTs indicate layers ranging from 7.75’ to 33.0’ thick and settlement magnitudes of ranging from 5.46” to 12.21” in borings B-1 and B-2, respectively. CPTs obtain continuous testing data at approximately 2-inch intervals and it is typically more appropriate to rely on CPT results more than SPT results during liquefaction analysis because they generate an improved soil model by localizing weaker zones susceptible to liquefaction. However it should be noted that CPT data at this location is limited due to a shallow refusal depth of 47.6-ft. The liquefiable layers present at the CPTs indicate one layer approximately 2.63’ thick with a settlement magnitude of 0.74”. Other seams of liquefiable material were present in the CPT results; however, it is common practice to eliminate layers of liquefaction less than 6” thick. The results of the preliminary soil shear strength loss analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. More detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment slopes, embankment settlements, retaining walls and bridge foundation types and capacities will be required to ensure a sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed bridge on SR-193 over unnamed Branch of Shaws Creek in Fayette County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must

review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

AASHTO, 2014; AASHTO LRFD Bridge Design Specifications Seventh Edition, 2014; Washington, DC, American Association of State Highway and Transportation Officials.

Boulanger, R.W., et al (2008); Soil Liquefaction during Earthquakes; Earthquake Engineering Research Institute.

Hardeman, W.D., et al (1966). “Geologic Map of Tennessee – West Sheet”; Department of Environment and Conservation, Division of Geology; scale 1:250,000.

NRCS (2009). “Soil Map - Madison County, Tennessee”, “Engineering Properties”, “Physical Soil Properties”; Web Soil Survey – National Cooperative Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

USGS (2009). Earthquake Design Maps, AASHTO-2009. Online. URL: <https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=35.495293&longitude=-89.001293&siteClass=D&title=Example> Accessed June 19, 2019.

USGS (2019). “Macon, TN Topographic Quadrangle Map”, United States Geological Survey. Dept. of Interior. Reston, VA, 7.5 Minute Series; scale 1:24,000.

Appendix A: Plan and Boring Sheets

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
?	2018	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION

N

30

PROP. R.O.W.

PROPOSED DOUBLE
18'x9' RCBB

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

BR2_B-1

BR2_CPT-1

S68°29'02"E

BR2_B-2

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

PROP. R.O.W.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 193 (MACON DRIVE)
BRIDGE REPLACEMENT
OVER BRANCH AT L.M. 11.48
FAYETTE COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecraft DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/21/19

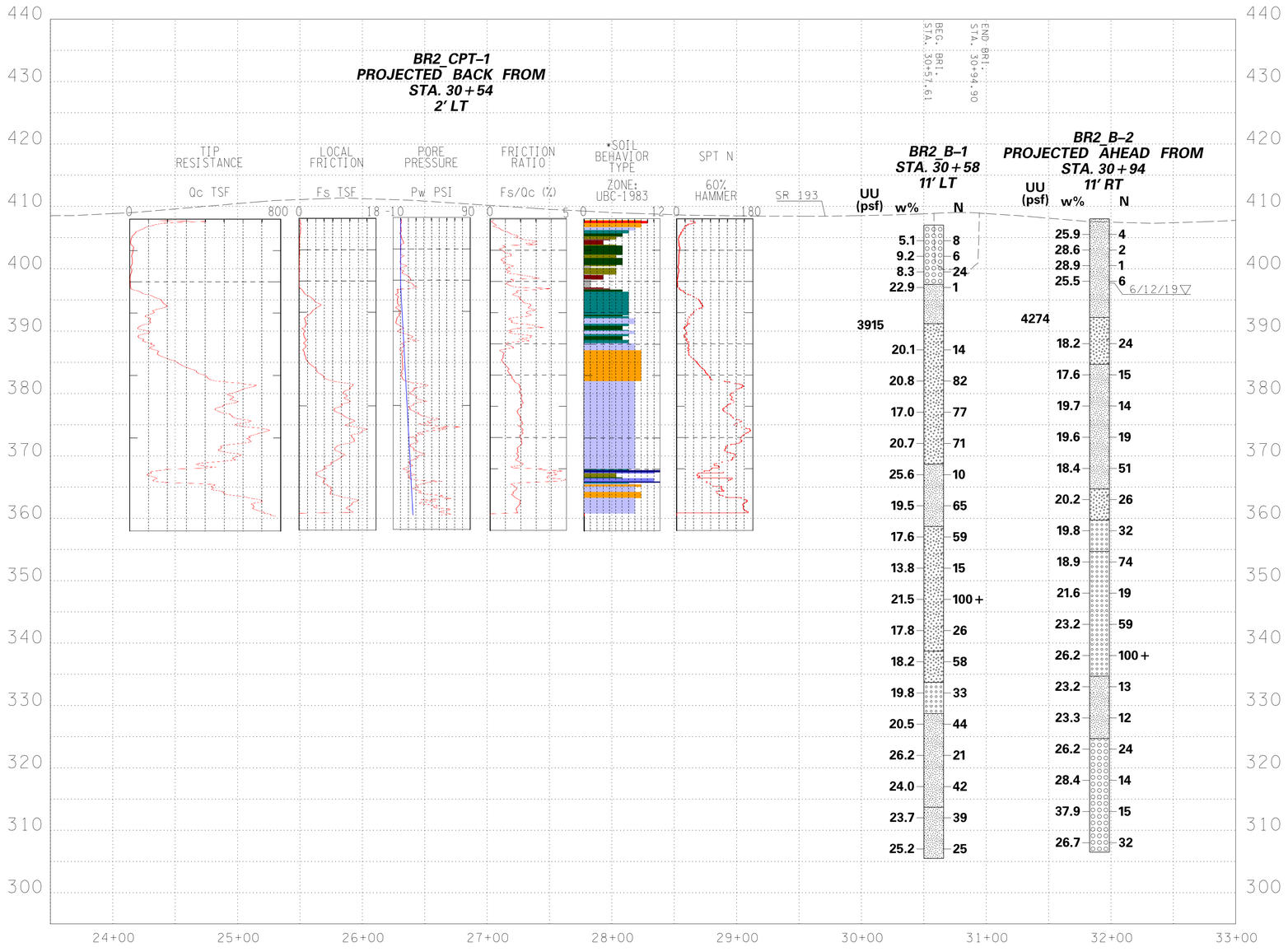
HDR

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
?	2018	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)						ORGANIC MATERIALS
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS

ADDITIONAL ROCK SYMBOLS

SYMBOL	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	RANDOM BACKFILL	WEATHERED LIMESTONE	GRADED SOLID ROCK

SPT BORING LEGEND

○	ROCKLINE SOUNDINGS	RQD	ROCK QUALITY DESIGNATION
◔	DISTURBED SAMPLE BORING	REC	% CORE RECOVERED
◎	UNDISTURBED SAMPLE BORING	Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
⊙	UNDISTURBED SAMPLE BORING & ROCK CORE	Qu (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ROCK CORE)
●	ROCK CORE	UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
➡	APPROXIMATE PILE TIP ELEVATION	w%	MOISTURE CONTENT
▼(Date)	WATER ELEVATION	R	REFUSAL
✳	LIQUEFACTION OR SOIL STRENGTH LOSS IS PROBABLE AT THESE LOCATIONS	NR	REFUSAL NOT ENCOUNTERED
N	UNCORRECTED PENETRATION RESISTANCE		

CPT SOUNDINGS LEGEND

MAXIMUM DEPTH = 47.57 FEET

DEPTH INCREMENT = 0.164 FEET

1 SENSITIVE FINE GRAINED	7 SILTY SAND TO SANDY SILT
2 ORGANIC MATERIAL	8 SAND TO SILTY SAND
3 CLAY	9 SAND
4 SILTY CLAY TO CLAY	10 GRAVELLY SAND TO SAND
5 CLAYEY SILT TO SILTY CLAY	11 VERY STIFF FINE GRAINED (•)
6 SANDY SILT TO CLAYEY SILT	12 SAND TO CLAYEY SAND (•)

REFUSAL: REACTION

•SOIL BEHAVIOR TYPE AND SPT BASED ON DATA FROM UBC-1983

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 193 (MACON DRIVE)
BRIDGE REPLACEMENT
OVER BRANCH AT L.M. 11.48
FAYETTE COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecroft DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/21/19

Appendix B: Boring Logs & CPT Data

Sheet No. 1 of 2

State	**Tennessee**	Latitude	**35.1556 °**
County	**Fayette**	Longitude	**89.4413 °**
Project Name	**SR-193 (Macon Road) over Branch**	Location	**30+58 11' Lt.**
Project Type	**Subsurface Investigation**	Surface Elevation	**407 ft.**
Driller	**F. Woodard**	Dated Started	**6/10/2019**
Logged by	**F. Woodard**	Completed	**6/11/2019**
Hole Number	**B-1**	Depth to Water: Immediate	
Total Depth	**101.5 ft.**	Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
407.0 ft	0		*Ground Line*						
			Loose to medium dense, brown, poorly graded gravel with silt and sand.		SS-1	2.5 4.0	1.0	4-4-4	SPT
405	5				SS-2	5.0 6.5	0.8	3-3-3	SPT
400					SS-3	7.5 9.0	0.6	7-13-11	SPT
	10			9.5	SS-4	10.0 11.5	1.0	0-0-1	SPT
395			Very soft, brown, silty clay.						
	15			15.8	ST-1	15.0 17.0	1.7		ST
390			Medium dense to very dense, brown and red, well graded sand with silt.						
	20				SS-5	20.0 21.5	1.0	3-7-7	SPT
385									
	25				SS-6	25.0 26.5	1.3	12-41-41	SPT
380									
	30				SS-7	30.0 31.5	1.1	14-29-48	SPT
375									
	35				SS-8	35.0 36.5	1.2	17-29-42	SPT
370				38.3					
	40		Stiff to hard, light gray, brown and red, sandy, silty clay.		SS-9	40.0 41.5	1.2	3-4-6	SPT
365									
	45				SS-10	45.0 46.5	1.4	19-23-42	SPT
360				48.3					
	50		Medium dense to very dense, brown, silty sand.		SS-11	50.0 51.5	1.1	20-27-32	SPT
355									
	55				SS-12	55.0 56.5	1.1	3-5-10	SPT
350									
	60								

State **Tennessee** Latitude **35.1556 °** Longitude **89.4413 °**

County **Fayette** Location **30+58 11' Lt.**

Project Name **SR-193 (Macon Road) over Branch** Surface Elevation **407 ft.**

Project Type **Subsurface Investigation** Dated Started **6/10/2019** Completed **6/11/2019**

Driller **F. Woodard** Logged by **F. Woodard** Depth to Water: Immediate

Hole Number **B-1** Total Depth **101.5 ft.** Depth to Water Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
347.0 ft	60		*Continued from previous page*						
345					SS-13	60.0 61.5	0.9	31-50/0.5-	SPT
	65								
340					SS-14	65.0 66.5	1.0	9-10-16	SPT
				68.3'					
	70		Very dense, brown, silty sand.		SS-15	70.0 71.5	1.2	16-23-35	SPT
335				73.3'					
	75		Dense, gray and brown, poorly graded sand with silt.		SS-16	75.0 76.5	1.5	10-9-24	SPT
330				78.3'					
			Medium dense to dense, gray, brown and red, silty sand.						
	80				SS-17	80.0 81.5	1.5	11-18-26	SPT
325									
	85				SS-18	85.0 86.5	1.4	5-7-14	SPT
320									
	90				SS-19	90.0 91.5	1.3	4-17-25	SPT
315				93.3'					
			Very stiff to hard, gray and brown, sandy, silty clay.						
	95				SS-20	95.0 96.5	1.3	9-18-21	SPT
310									
	100				SS-21	100.0 101.5	1.5	9-11-14	SPT
305				101.5'					
			Boring Terminated @ 101.5' (Elev. 305.5).						
	105		Boring elevation obtained using Google Earth imagery.						
300									
	110								
295									
	115								
290									
	120								

Sheet No. 1 of 2

State **Tennessee** Latitude **35.1555 °** Longitude **89.4412 °**

County **Fayette** Location **30+94 11' Rt.**

Project Name **SR-193 (Macon Road) over Branch** Surface Elevation **408 ft.**

Project Type **Subsurface Investigation** Dated Started **6/11/2019** Completed **6/12/2019**

Driller **D. Bowling** Logged by **D. Bowling** Depth to Water: Immediate **10.3 ft.**

Hole Number **B-2** Total Depth **101.5 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
408.0 ft	0		*Ground Line*					
			Very soft to medium stiff, brown and gray, silty clay.	SS-1	2.5 / 4.0	1.3	1-2-2	SPT
405	5			SS-2	5.0 / 6.5	1.5	1-1-1	SPT
400				SS-3	7.5 / 9.0	1.5	0-0-1	SPT
	10			SS-4	10.0 / 11.5	1.3	1-2-4	SPT
395	15		15.8'	ST-1	15.0 / 17.0	1.9		ST
			Medium dense, brown, well-graded sand with silt.					
390	20			SS-5	20.0 / 21.5	1.2	8-10-14	SPT
385			23.3'					
	25		Stiff to hard, brown and white, sandy, silty clay.	SS-6	25.0 / 26.5	1.4	7-9-6	SPT
380	30			SS-7	30.0 / 31.5	1.2	6-7-7	SPT
375	35			SS-8	35.0 / 36.5	1.4	4-8-11	SPT
370	40			SS-9	40.0 / 41.5	1.3	19-22-29	SPT
365			43.3'					
	45		Medium dense, brown and white, silty sand.	SS-10	45.0 / 46.5	1.3	9-11-15	SPT
360			48.3'					
	50		Dense, brown and white, poorly graded sand with silt.	SS-11	50.0 / 51.5	1.1	12-16-16	SPT
355			53.3'					
	55		Medium dense to very dense, white, poorly graded sand with silt.	SS-12	55.0 / 56.5	1.4	30-42-32	SPT
350	60							

State **Tennessee** Latitude **35.1555 °** Longitude **89.4412 °**

County **Fayette** Location **30+94 11' Rt.**

Project Name **SR-193 (Macon Road) over Branch** Surface Elevation **408 ft.**

Project Type **Subsurface Investigation** Dated Started **6/11/2019** Completed **6/12/2019**

Driller **D. Bowling** Logged by **D. Bowling** Depth to Water: Immediate **10.3 ft.**

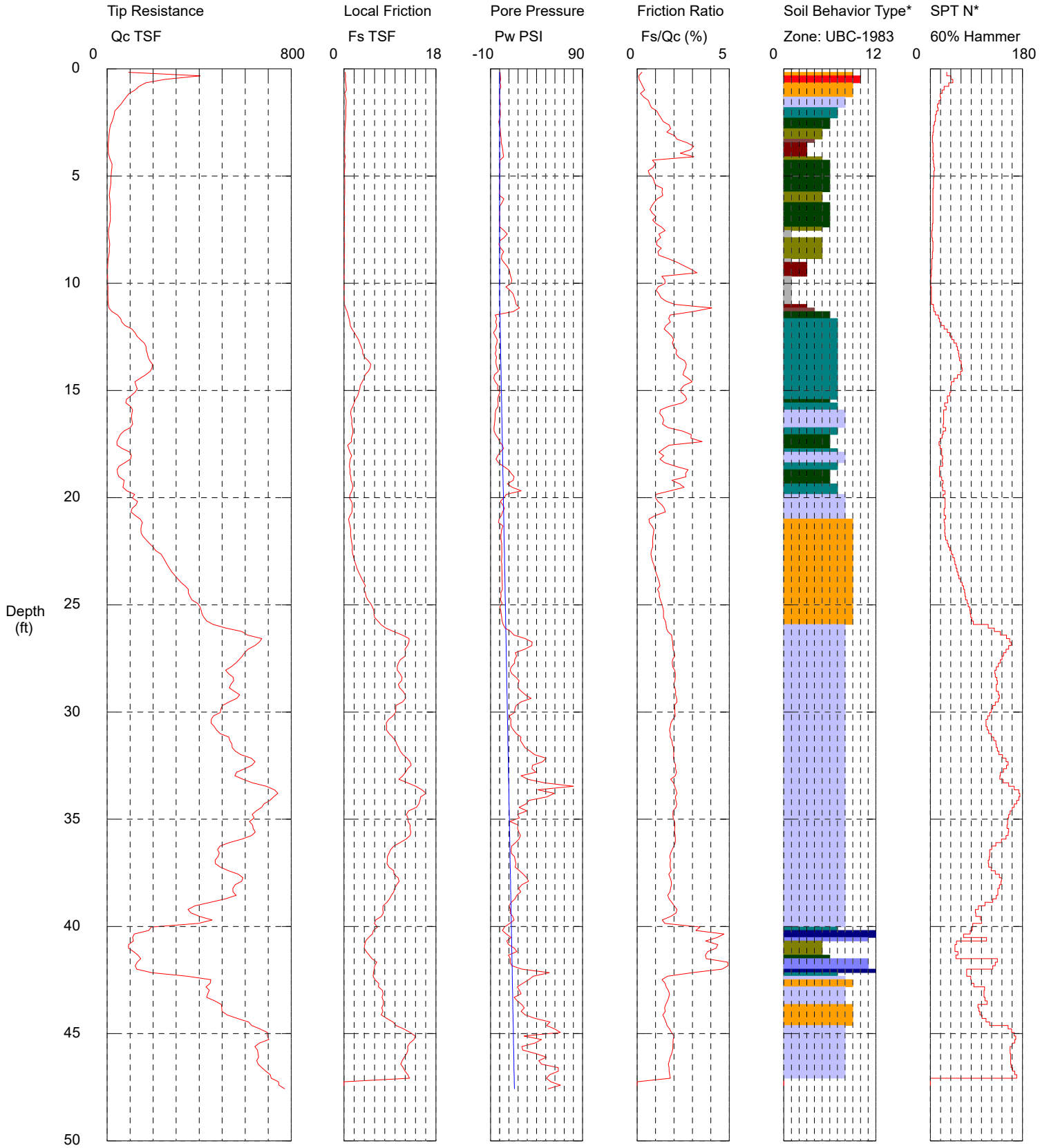
Hole Number **B-2** Total Depth **101.5 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
348.0 ft	60		*Continued from previous page*						
					SS-13	60.0 61.5	1.1	11-10-9	SPT
345	65				SS-14	65.0 66.5	1.3	18-29-30	SPT
340	70				SS-15	70.0 71.5	1.2	12-31-50/0.2	SPT
335				73.3'					
	75		Stiff, white, sandy, silty clay.		SS-16	75.0 76.5	1.5	4-5-8	SPT
330	80				SS-17	80.0 81.5	1.5	4-6-6	SPT
325				83.3'					
	85		Medium dense to dense, brown and white, well-graded sand.		SS-18	85.0 86.5	1.5	13-12-12	SPT
320	90				SS-19	90.0 91.5	1.5	6-6-8	SPT
315	95				SS-20	95.0 96.5	1.5	5-7-8	SPT
310	100				SS-21	100.0 101.5	1.4	8-15-17	SPT
				101.5'					
305	105		Boring Terminated @ 101.5' (Elev. 306.5). Boring elevation obtained using Google Earth imagery. Bulk sample obtained from 0.6'-10.0'.						
300	110								
295	115								
290	120								

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR2CPT-1
Cone Used: DDG1210
GPS Data: N35.15555 W89.44130

CPT Date/Time: 5/16/2019 11:25:14 AM
Location: BRANCH-FAYETTE CO.
Job Number: M19-166
Groundwater: Collapsed and dry at 10.8-ft.



Maximum Depth = 47.57 feet

Depth Increment = 0.164 feet

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

Refusal: Reaction.

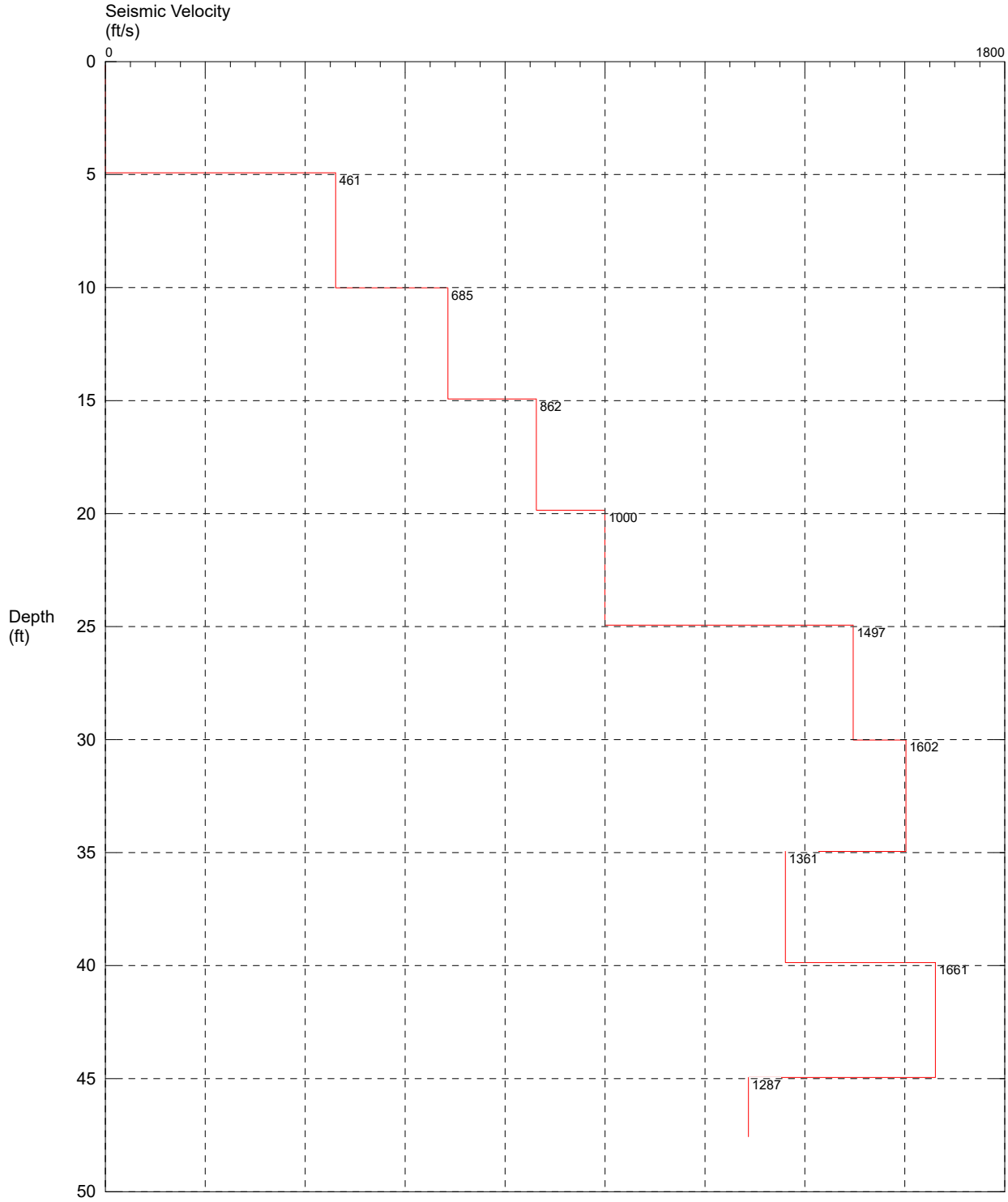
*Soil behavior type and SPT based on data from UBC-1983

SOUNDING

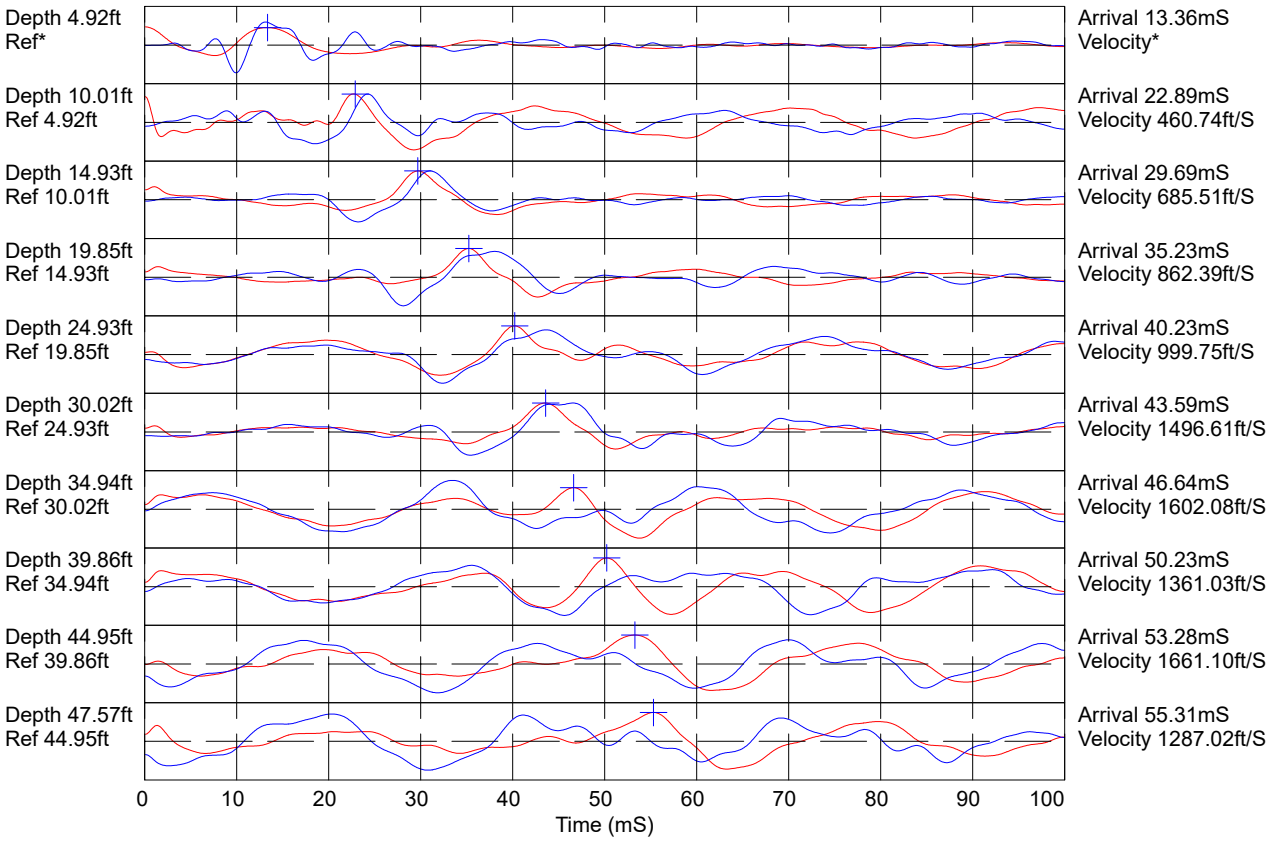
CUSTOMER: Southern Earth Science Inc
OPERATOR: Brandon Green
CONE ID: DDG1210
FILENAME: M19-166BR2CPT-1.cpt

JOB NUMBER: M19-166
HOLE NUMBER: BR2CPT-1
TEST DATE: 5/16/2019 11:25:14 AM

COMMENT:
GPS (LAT,LON,ALT): 0.00,0.00,0.0
LOCATION: BRANCH-FAYETTE CO.



HOLE NUMBER: BR2CPT-1



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

Appendix C: Laboratory Testing

Project Name : TDOT Region 4 Bridge
Location : Fayette County, Tennessee
Job Number : 10168884
Project Job No. : 10168884

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1	B-1		SS-1	2.5	4.0	Brown Poorly Graded Gravel with Silt and Sand		5.1
1			SS-2	5.0	6.5	Brown Poorly Graded Gravel with Silt and Sand		9.2
1			SS-3	7.5	9.0	Brown Poorly Graded Gravel with Silt and Sand		8.3
2			SS-4	10.0	11.5	Brown Silty Clay		22.9
			ST-1	15.0	17.0			
3			SS-5	20.0	21.5	Brown Well-Graded Sand with Silt		20.1
3			SS-6	25.0	26.5	Red Well-Graded Sand with Silt		20.8
3			SS-7	30.0	31.5	Red & Brown Well-Graded Sand with Silt		17.0
3			SS-8	35.0	36.5	Brown Well-Graded Sand with Silt		20.7
4			SS-9	40.0	41.5	Light Gray Sandy Silty Clay		25.6
4			SS-10	45.0	46.5	Brown & Red Sandy Silty Clay		19.5
5			SS-11	50.0	51.5	Brown Silty Sand		17.6
5			SS-12	55.0	56.5	Brown Silty Sand		13.8
5			SS-13	60.0	61.5	Brown Silty Sand		21.5
5			SS-14	65.0	66.5	Brown Silty Sand		17.8
6			SS-15	70.0	71.5	Brown Silty Sand		18.2
7			SS-16	75.0	76.5	Gray & Brown Poorly Graded Sand with Silt		19.8
8			SS-17	80.0	81.5	Gray Silty Sand		20.5
8			SS-18	85.0	86.5	Brown, Red & Gray Silty Sand		26.2
8			SS-19	90.0	91.5	Gray Silty Sand		24.0
10			SS-20	95.0	96.5	Gray Sandy Silty Clay		23.7
10			SS-21	100.0	101.5	Brown & Gray Sandy Silty Clay		25.2
2	B-2		SS-1	2.5	3.0	Brown Silty Clay		25.9
2			SS-2	5.0	6.5	Brown Silty Clay		28.6
2			SS-3	7.5	9.0	Brown Silty Clay		28.9
2			SS-4	10.0	11.5	Brown & Gray Silty Clay		25.5
			ST-1	15.0	17.0			
3			SS-5	20.0	21.5	Brown Well-Graded Sand with Silt		18.2
4			SS-6	25.0	26.5	Brown Sandy Silty Clay		17.6
4			SS-7	30.0	31.5	Brown Sandy Silty Clay		19.7
4			SS-8	35.0	36.5	Brown & White Sandy Silty Clay		19.6
4			SS-9	40.0	41.5	Brown & White Sandy Silty Clay		18.4
6			SS-10	45.0	46.5	Brown & White Silty Sand		20.2
7			SS-11	50.0	51.5	Brown & White Poorly Graded Sand with Silt		19.8
9			SS-12	55.0	56.5	White Poorly Graded Sand with Silt		18.9
9			SS-13	60.0	61.5	White Poorly Graded Sand with Silt		21.6
9			SS-14	65.0	66.5	White Poorly Graded Sand with Silt		23.2
9			SS-15	70.0	71.5	White Poorly Graded Sand with Silt		26.2
10			SS-16	75.0	76.5	White Sandy Silty Clay		23.2
10			SS-17	80.0	81.5	White Sandy Silty Clay		23.3
11			SS-18	85.0	86.5	Brown Well-Graded Sand		26.2
11			SS-19	90.0	91.5	White Well-Graded Sand		28.4
11			SS-20	95.0	96.5	White Well-Graded Sand		37.9
11			SS-21	100.0	101.5	White Well-Graded Sand		26.7

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-1
Project County	:	Fayette	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 2.5' to 4.0'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Brown Poorly Graded Gravel with Silt and Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	60.8
1/4		6.3	mm	
No.4		4.75	mm	30.3
No.6		3.35	mm	
No.10		2	mm	17.3

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	8.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	5.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 7.432 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 5.1
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 17
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 14
			Plasticity Index	: 3
AASHTO Composition of Total Sample: M145			Liquidity Index	: -2.92
Gravel (3in. + No.10)	:	82.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	8.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	3.0	AASHTO Classification: M145	: A-1-a (0)
Silt + Clay (-No.200)	:	5.8	ASTM Classification: D2487	: GP-GM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	69.7
Coarse Sand (-No.4 + No.10)	:	13.0
Medium Sand (-No.10 + No.40)	:	8.5
Fine Sand (-No.40 + No.200)	:	3.0
Silt + Clay (-No.200)	:	5.8

Approved By : Kevin E. Walker

Soil No. 1

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-3
Project County	:	Fayette	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 7.5' to 9.0'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Brown Silty Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	92.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.004 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 28.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 26
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 21
			Plasticity Index	: 5
AASHTO Composition of Total Sample: M145			Liquidity Index	: 1.60
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.3	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	7.5	AASHTO Classification: M145	: A-4 (4)
Silt + Clay (-No.200)	:	92.2	ASTM Classification: D2487	: CL-ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	0.3
Fine Sand (-No.40 + No.200)	:	7.5
Silt + Clay (-No.200)	:	92.2

Approved By : Kevin E. Walker

Soil No. 2

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-6
Project County	:	Fayette	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 25.0' to 26.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Red Well-Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.4
1/4		6.3	mm	
No.4		4.75	mm	99.1
No.6		3.35	mm	
No.10		2	mm	98.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	86.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	11.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.182 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 20.8
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	1.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	12.1	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	75.4	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	11.4	ASTM Classification: D2487	: SW-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.9
Coarse Sand (-No.4 + No.10)	:	0.2
Medium Sand (-No.10 + No.40)	:	12.1
Fine Sand (-No.40 + No.200)	:	75.4
Silt + Clay (-No.200)	:	11.4

Approved By : Kevin E. Walker

Soil No. 3

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-8
Project County	:	Fayette	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 35.0' to 36.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Brown & White Sandy Silty Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	97.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	53.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.049 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 19.6
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 19
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 14
			Plasticity Index	: 5
AASHTO Composition of Total Sample: M145			Liquidity Index	: 1.14
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	2.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	44.0	AASHTO Classification: M145	: A-4 (0)
Silt + Clay (-No.200)	:	53.5	ASTM Classification: D2487	: CL-ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	2.5
Fine Sand (-No.40 + No.200)	:	44.0
Silt + Clay (-No.200)	:	53.5

Approved By : Kevin E. Walker

Soil No. 4

SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-12
Project County	:	Fayette	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Brown Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.8
1/4		6.3	mm	
No.4		4.75	mm	95.2
No.6		3.35	mm	
No.10		2	mm	93.3

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	52.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.383 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 13.8
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	6.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	41.1	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	36.6	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	15.6	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	4.8
Coarse Sand (-No.4 + No.10)	:	1.9
Medium Sand (-No.10 + No.40)	:	41.1
Fine Sand (-No.40 + No.200)	:	36.6
Silt + Clay (-No.200)	:	15.6

Approved By : Kevin E. Walker

Soil No. 5

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-10
Project County	:	Fayette	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 45.0' to 46.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Brown & White Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.9
No.6		3.35	mm	
No.10		2	mm	99.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.16 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 20.2
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 15
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 15
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	22.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	48.6	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	28.7	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.1
Coarse Sand (-No.4 + No.10)	:	0.1
Medium Sand (-No.10 + No.40)	:	22.5
Fine Sand (-No.40 + No.200)	:	48.6
Silt + Clay (-No.200)	:	28.7

Approved By : Kevin E. Walker

Soil No. 6

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SOIL CLASSIFICATION

Project Name	: TDOT Region 4 Bridge		
Project No.	: 10168884	Sample No.	: SS-16
Project County	: Fayette	Sample Loc.	: Boring No. B-1
Project State	: Tennessee	Sample Depth	: 75.0' to 76.5'
Laboratory No.	: 10168884	Date Tested	: 06/18/19
Submitted By	: HDR	Date Reported	: 06/20/18
Soil Type	: Gray & Brown Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.8
No.6		3.35	mm	
No.10		2	mm	98.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	52.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	6.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.388 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 19.8
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: NP
		Plasticity Index	: NP
AASHTO Composition of Total Sample: M145		Liquidity Index	: NA
Gravel (3in. + No.10)	: 1.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 46.4	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	: 46.3	AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	: 6.1	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.2
Coarse Sand (-No.4 + No.10)	: 1.0
Medium Sand (-No.10 + No.40)	: 46.4
Fine Sand (-No.40 + No.200)	: 46.3
Silt + Clay (-No.200)	: 6.1

Approved By : Kevin E. Walker

Soil No. 7

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-19
Project County	:	Fayette	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 90.0' to 91.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	Gray Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	46.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.085 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 24.0
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 16
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 16
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.1	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	53.8	AASHTO Classification: M145	: A-4 (0)
Silt + Clay (-No.200)	:	46.1	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	0.1
Fine Sand (-No.40 + No.200)	:	53.8
Silt + Clay (-No.200)	:	46.1

Approved By : Kevin E. Walker

Soil No. 8

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-12
Project County	:	Fayette	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	White Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	87.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	7.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.187 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 18.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	12.4	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	79.7	AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	:	7.9	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	12.4
Fine Sand (-No.40 + No.200)	:	79.7
Silt + Clay (-No.200)	:	7.9

Approved By : Kevin E. Walker

Soil No. 9

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-17
Project County	:	Fayette	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 85.0' to 86.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	White Well-Graded Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.602 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 23.3
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	64.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	30.7	AASHTO Classification: M145	: A-1-b (0)
Silt + Clay (-No.200)	:	4.8	ASTM Classification: D2487	: SW

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	64.5
Fine Sand (-No.40 + No.200)	:	30.7
Silt + Clay (-No.200)	:	4.8

Approved By : Kevin E. Walker

Soil No. 10

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168884	Sample No.	: SS-20
Project County	:	Fayette	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 95.0' to 96.5'
Laboratory No.	:	10168884	Date Tested	: 06/18/19
Submitted By	:	HDR	Date Reported	: 06/20/18
Soil Type	:	White Well-Graded Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.602 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 37.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	64.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	30.7	AASHTO Classification: M145	: A-1-b (0)
Silt + Clay (-No.200)	:	4.8	ASTM Classification: D2487	: SW

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	64.5
Fine Sand (-No.40 + No.200)	:	30.7
Silt + Clay (-No.200)	:	4.8

Approved By : Kevin E. Walker

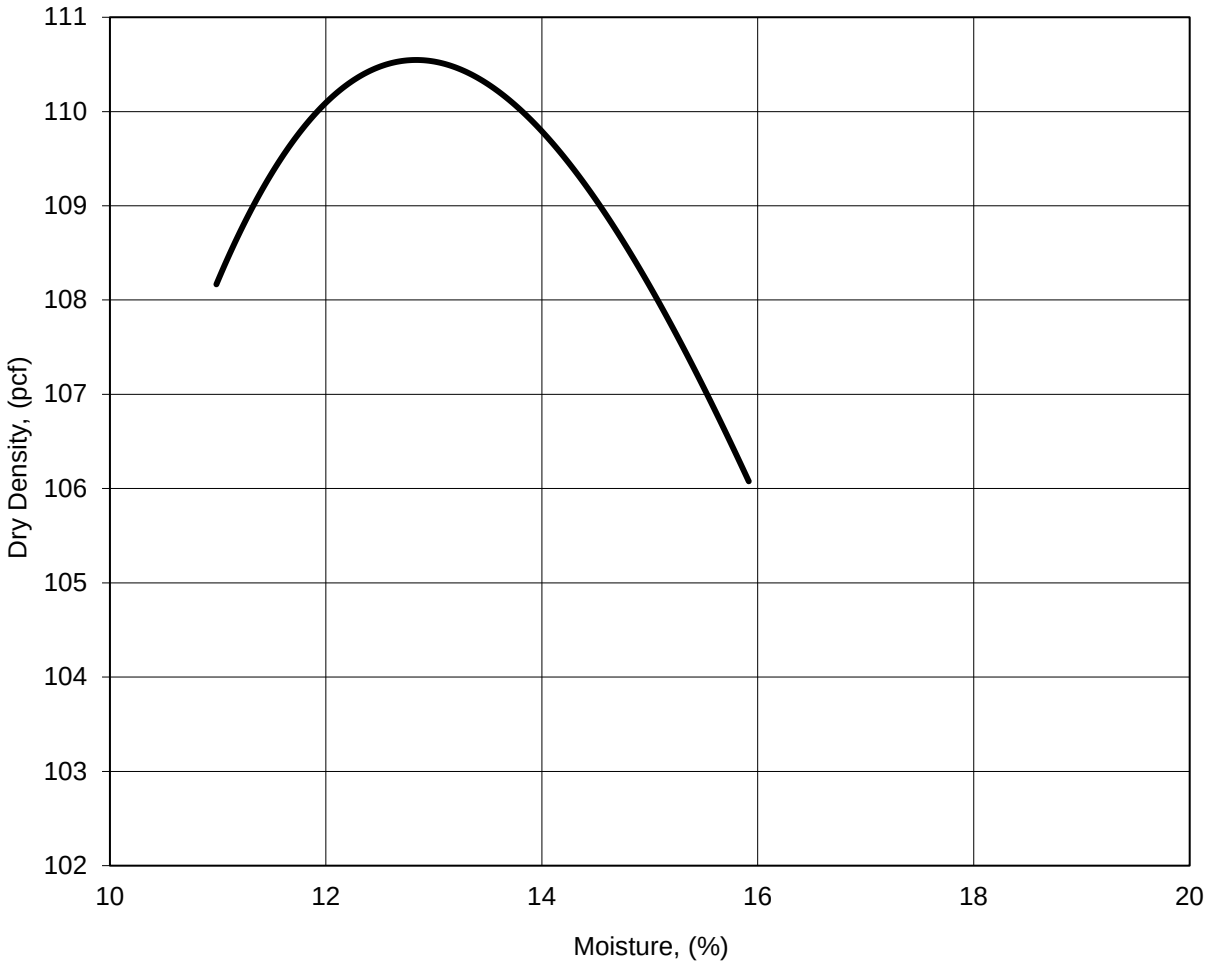
Soil No. 11

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MOISTURE-DENSITY RELATIONSHIP

Project Name	:	TDOT Region 4 Bridge			
Project No.	:	10168884	Sample No.	:	Bulk 1
Project County	:	Fayette	Sample Loc.	:	Boring No. B-2
Project State	:	Tennessee	Sample Depth	:	0.0' to 5.0'
Laboratory No.	:	10168884	Date Tested	:	06/18/19
Submitted By	:	HDR	Date Reported	:	06/20/18
Soil Type	:	Brown Silty Clay			



MAXIMUM DENSITY: 110.5 pcf

OPTIMUM MOISTURE: 12.8 %

COMMENTS: AASHTO: T-99; Method (A)

APPROVED BY: KW

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Table 1 - Laboratory Tests on Soil Samples

HDR-ICA
Region 4 Bridge
Your #10168884, HDR Lab #19-0390LAB
21-Jun-19

Sample ID			B-2 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	8,800
saturated		ohm-cm	8,800
pH			7.8
Electrical Conductivity		mS/cm	na
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	na
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

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Phone: 909.962.5485 · Fax: 909.626.3316

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TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168884	POINT #	: 1
PROJECT COUNTY	: Fayette	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168884	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

SOIL TYPE : Brown Silty Clay

WET DENSITY	: 132.62 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.34 cm
DRY DENSITY	: 112.77 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.17 cm
MOISTURE	: 17.6 %	CHAMBER PRES.	: 5.05 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	5.05	5.05	1.00
2	0.09	5.05	6.13	1.21
3	0.18	5.05	6.78	1.34
4	0.27	5.05	7.43	1.47
5	0.37	5.05	7.86	1.56
6	0.46	5.05	8.5	1.68
7	0.55	5.05	8.93	1.77
8	1.10	5.05	11.06	2.19
9	1.65	5.05	13.16	2.6
10	2.19	5.05	15.23	3.02
11	2.74	5.05	16.86	3.34
12	3.29	5.05	18.48	3.66
13	3.66	5.05	19.48	3.86
14	4.57	5.05	21.41	4.24
15	5.49	5.05	22.9	4.53
16	6.40	5.05	24.36	4.82
17	7.31	5.05	25.37	5.02
18	8.23	5.05	26.35	5.22
19	9.14	5.05	27.31	5.41
20	10.06	5.05	28.24	5.59
21	10.97	5.05	29.15	5.77
22	11.89	5.05	29.86	5.91
23	12.80	5.05	30.71	6.08
24	13.71	5.05	31.37	6.21
25	14.63	5.05	32.01	6.34
26	15.54	5.05	32.58	6.45
27	16.46	5.05	32.98	6.53
28	17.37	5.05	33.22	6.58
29	18.29	5.05	33.58	6.65
30	19.20	5.05	33.67	6.66
31	20.11	5.05	34	6.73
32	21.03	5.05	34.06	6.74

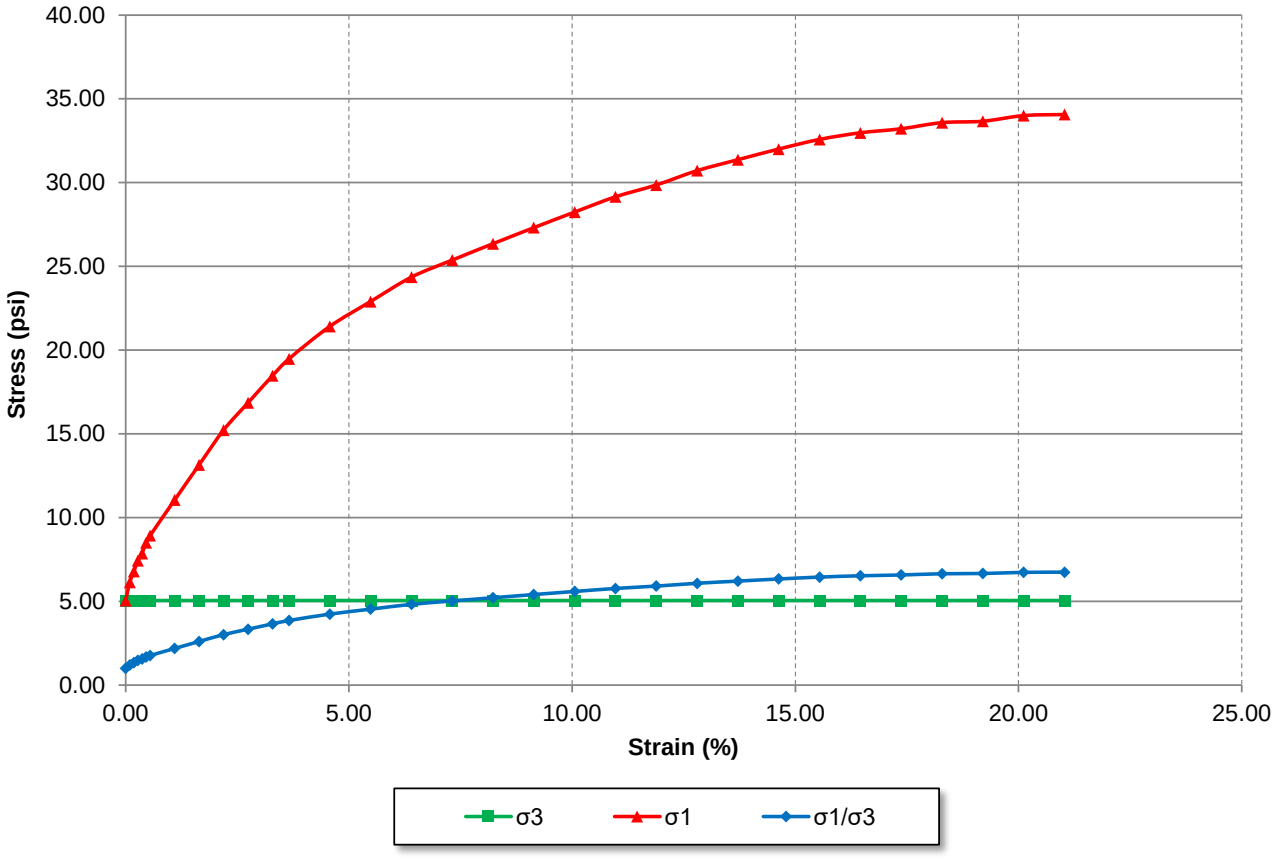
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168884	POINT #	: 1
PROJECT COUNTY	: Fayette	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168884	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

FINAL MOISTURE	: 17.6 %	EFF. CONS. STRESS	: 5.05 psi
FINAL HEIGHT	: 10.97 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.03 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168884	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Fayette	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168884	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

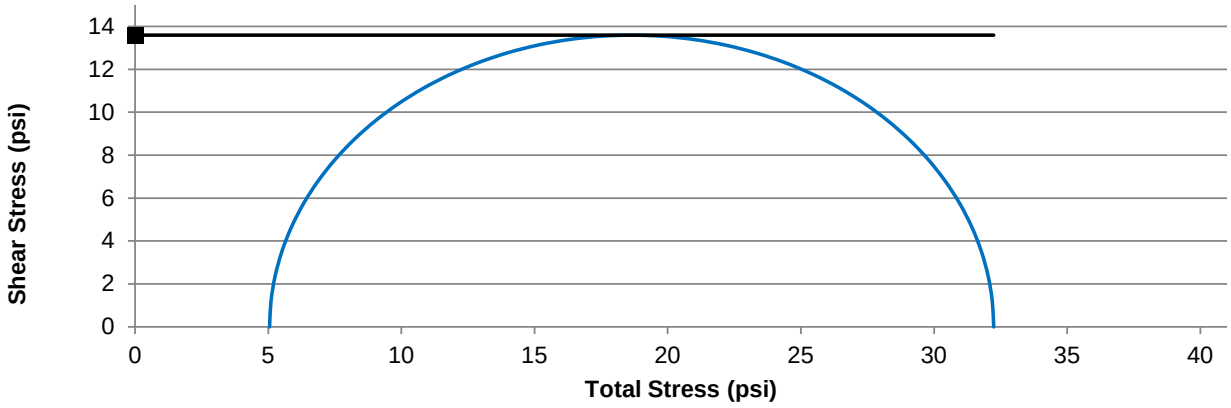
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	5.05 psi	32.24 psi

Compressive Strength =	3915	psf
Cohesion =	1958	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168884	POINT #	: 1
PROJECT COUNTY	: Fayette	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168884	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

SOIL TYPE	: Brown Silty Caly				
WET DENSITY	: 134.59 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.6 cm
DRY DENSITY	: 115.29 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.14 cm
MOISTURE	: 16.74 %	CHAMBER PRES.	: 5.05 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	5.05	5.05	1.00
2	0.09	5.05	7.02	1.39
3	0.18	5.05	8.1	1.6
4	0.27	5.05	9.19	1.82
5	0.36	5.05	10.06	1.99
6	0.45	5.05	10.71	2.12
7	0.54	5.05	11.35	2.25
8	1.08	5.05	15.64	3.1
9	1.62	5.05	19.03	3.77
10	2.15	5.05	21.74	4.3
11	2.69	5.05	24.22	4.79
12	3.23	5.05	26.01	5.15
13	3.59	5.05	27.4	5.42
14	4.49	5.05	29.04	5.75
15	5.39	5.05	30.45	6.03
16	6.28	5.05	31.83	6.3
17	7.18	5.05	32.98	6.53
18	8.08	5.05	33.7	6.67
19	8.98	5.05	34.01	6.73
20	9.88	5.05	34.11	6.75
21	10.77	5.05	34.66	6.86
22	11.67	5.05	34.65	6.86
23	12.57	5.05	34.5	6.83
24	13.47	5.05	34.63	6.86
25	14.37	5.05	34.75	6.88
26	15.26	5.05	34.72	6.87
27	16.16	5.05	34.83	6.89
28	17.06	5.05	34.93	6.91
29	17.96	5.05	34.88	6.9
30	18.85	5.05	35.09	6.95
31	19.75	5.05	35.03	6.93
32	20.65	5.05	34.83	6.89

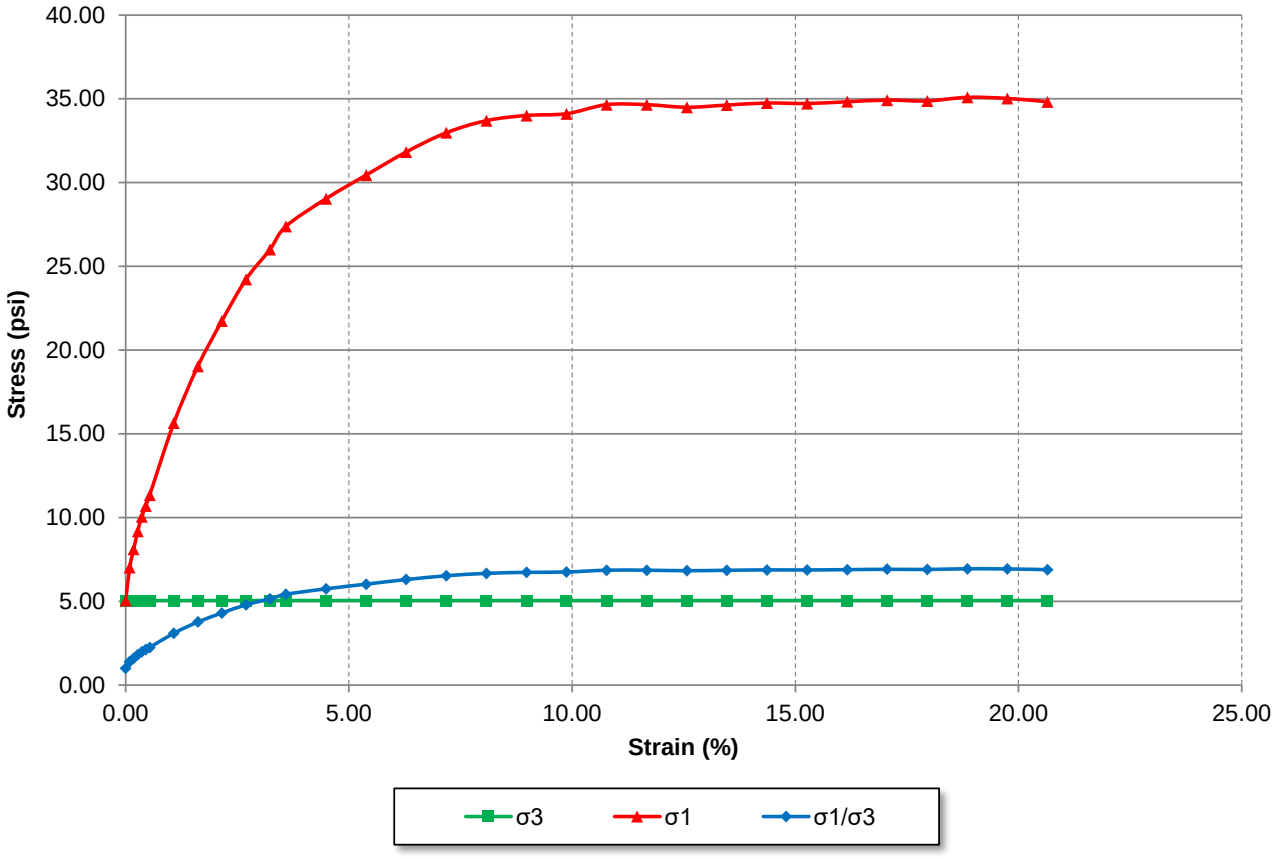
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168884	POINT #	: 1
PROJECT COUNTY	: Fayette	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168884	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

FINAL MOISTURE	: 16.74 %	EFF. CONS. STRESS	: 5.05 psi
FINAL HEIGHT	: 11.22 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 7.99 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168884	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Fayette	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168884	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

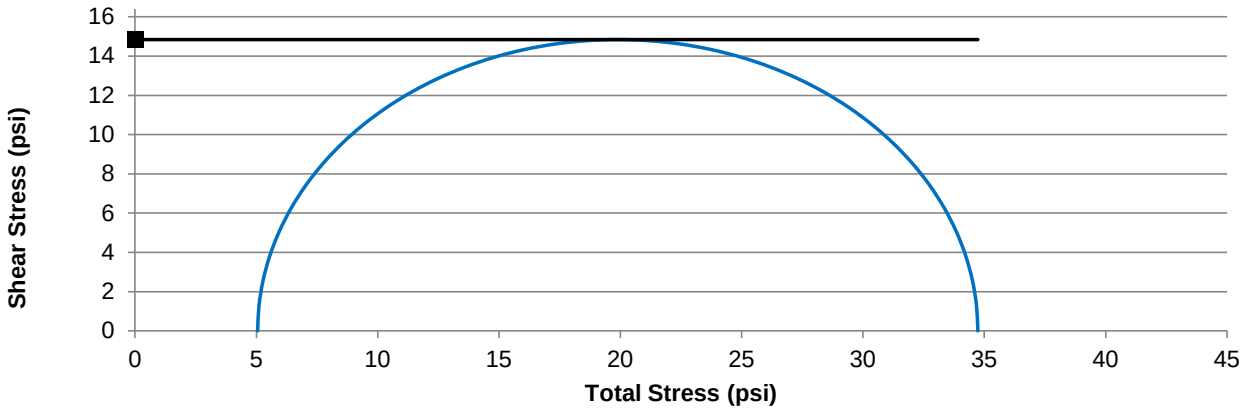
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	5.05 psi	34.73 psi

Compressive Strength =	4274	psf
Cohesion =	2137	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Appendix D: Preliminary Soil Shear Strength Loss Analysis

TABLE OF CONTENTS

M19-166BR2CPT-1 results

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HDR
4645 Village Square Drive, Suite F

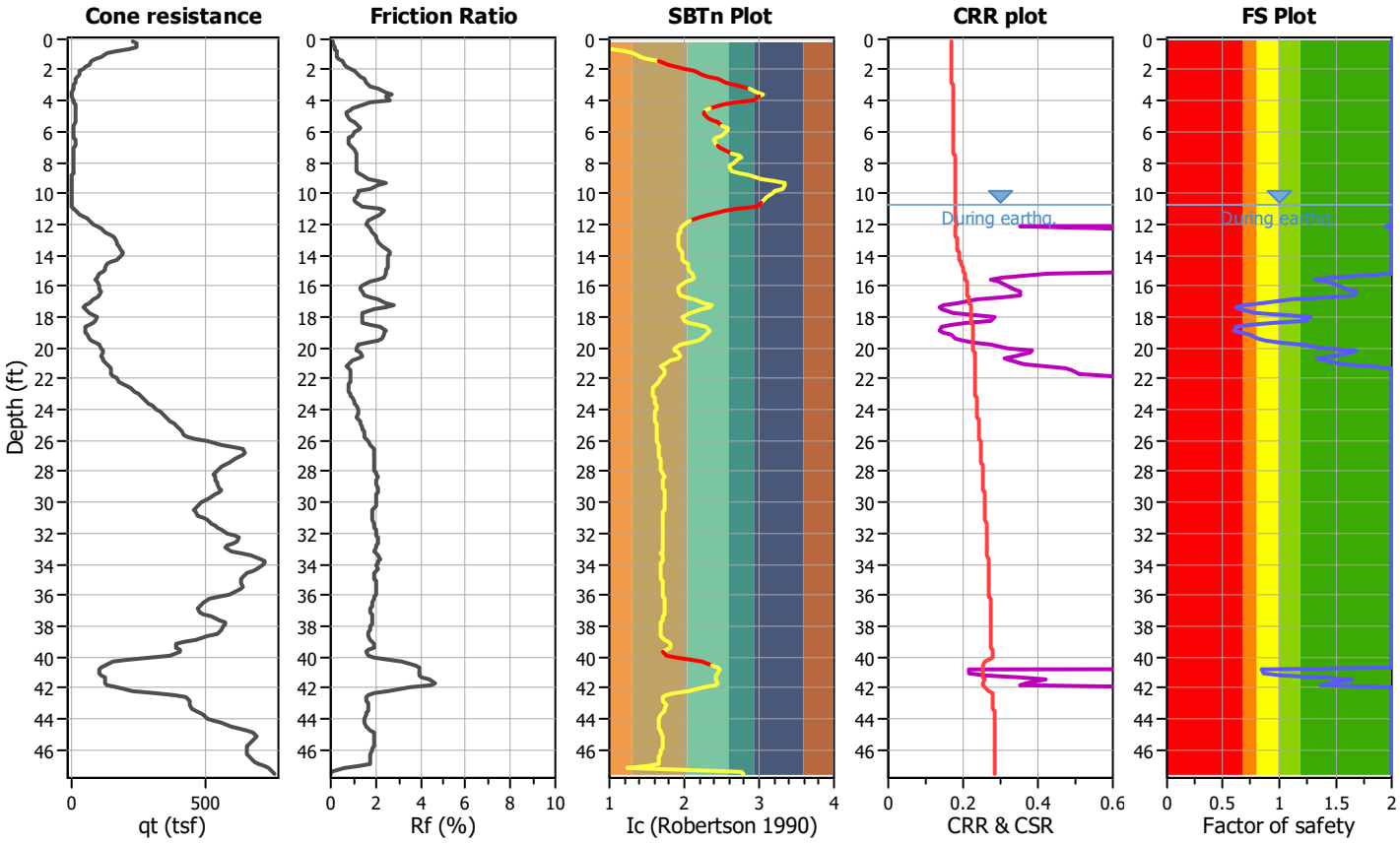
LIQUEFACTION ANALYSIS REPORT

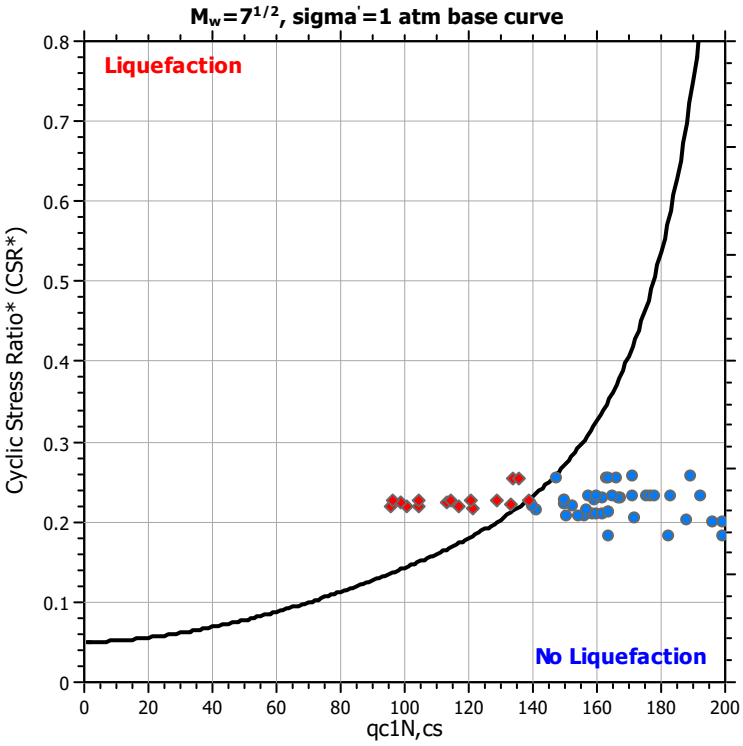
Project title : Bridge 2 - TDOT Region 4 Bridge Bundle **Location : Fayett County, TN**

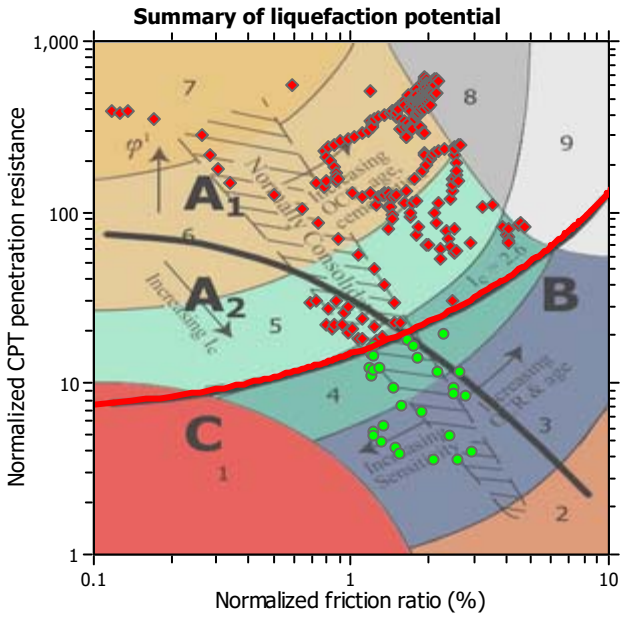
CPT file : M19-166BR2CPT-1

Input parameters and analysis data

Analysis method:	I&B (2008)	G.W.T. (in-situ):	10.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	10.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.33	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

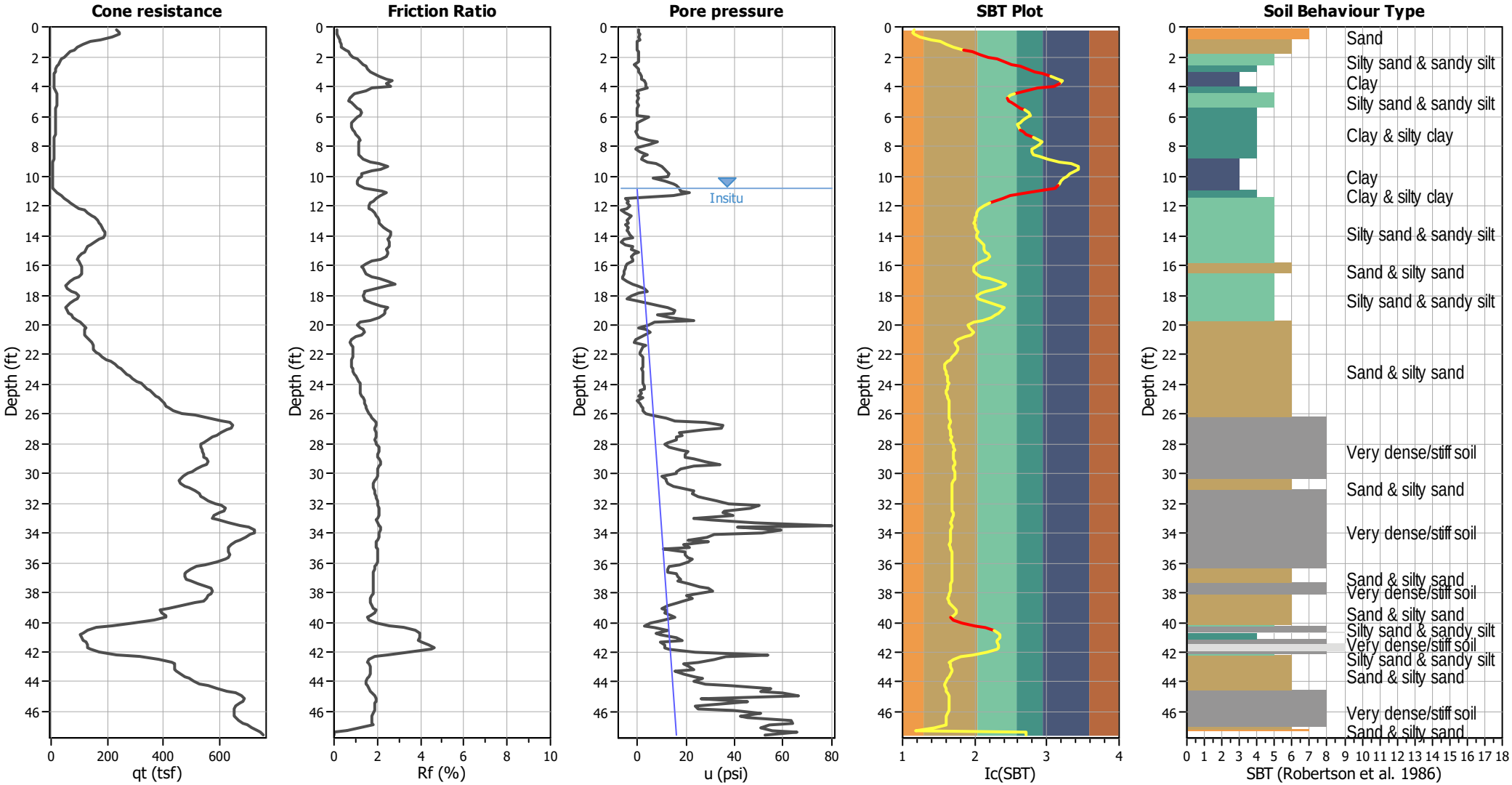






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



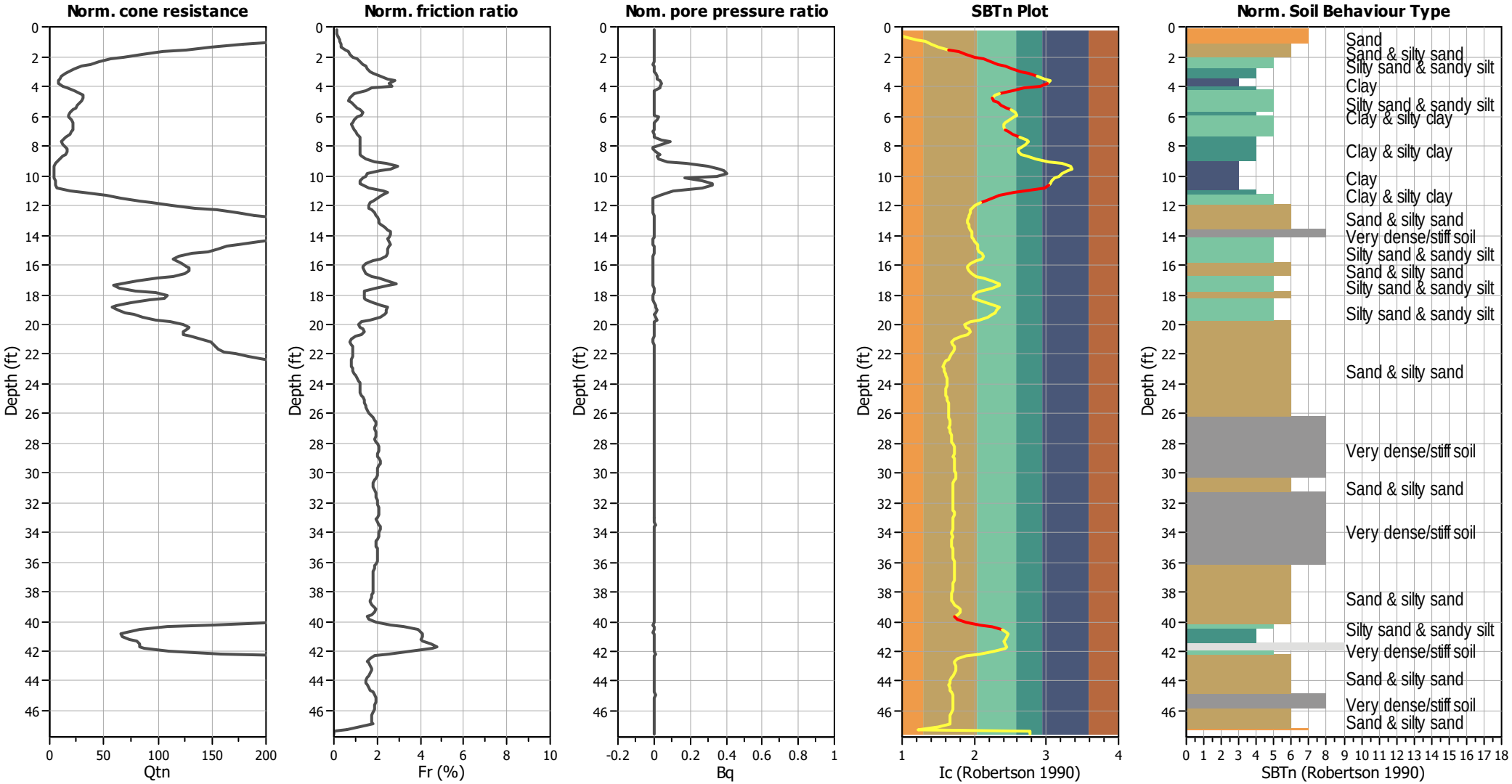
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

CPT basic interpretation plots (normalized)



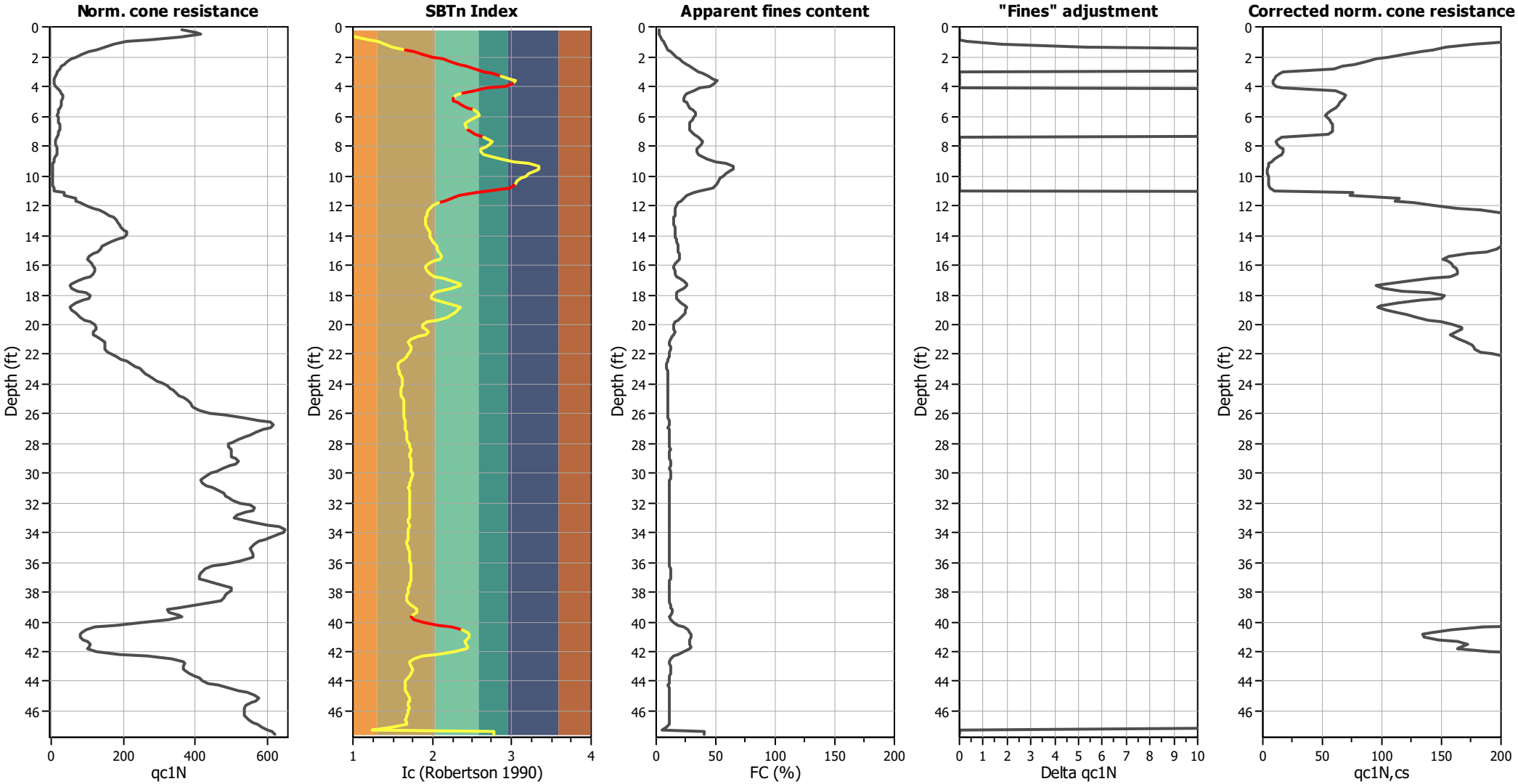
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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

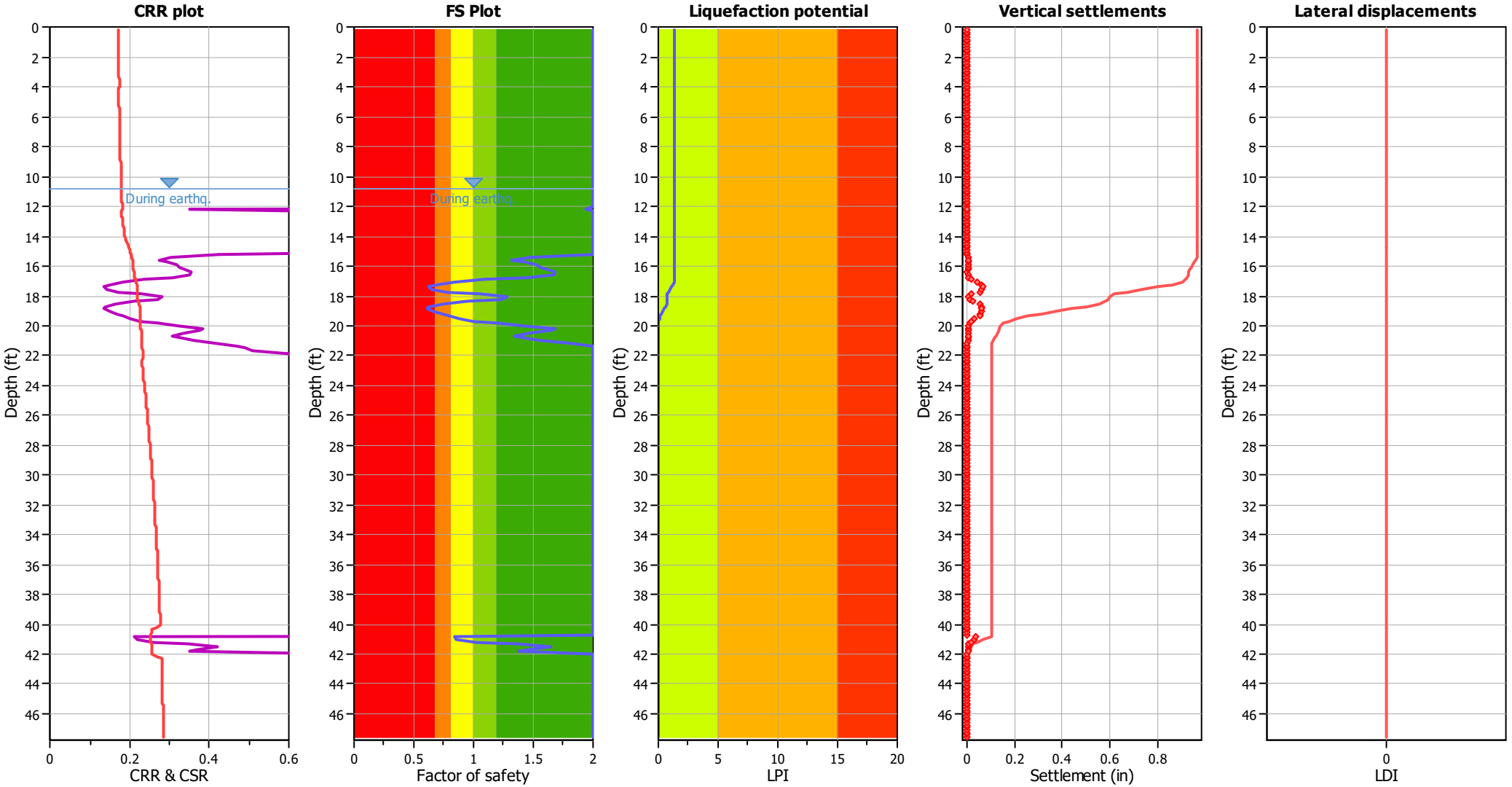
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

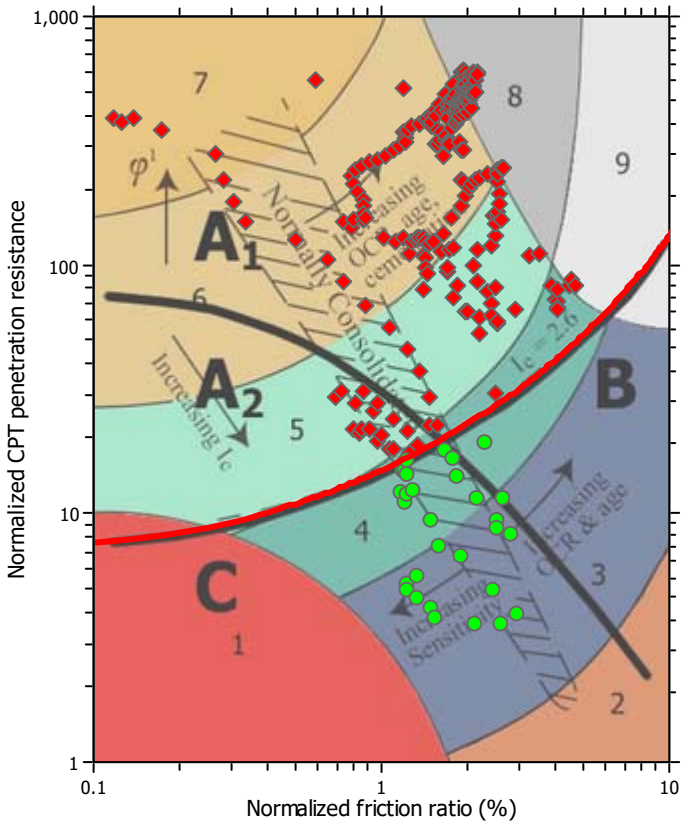
F.S. color scheme

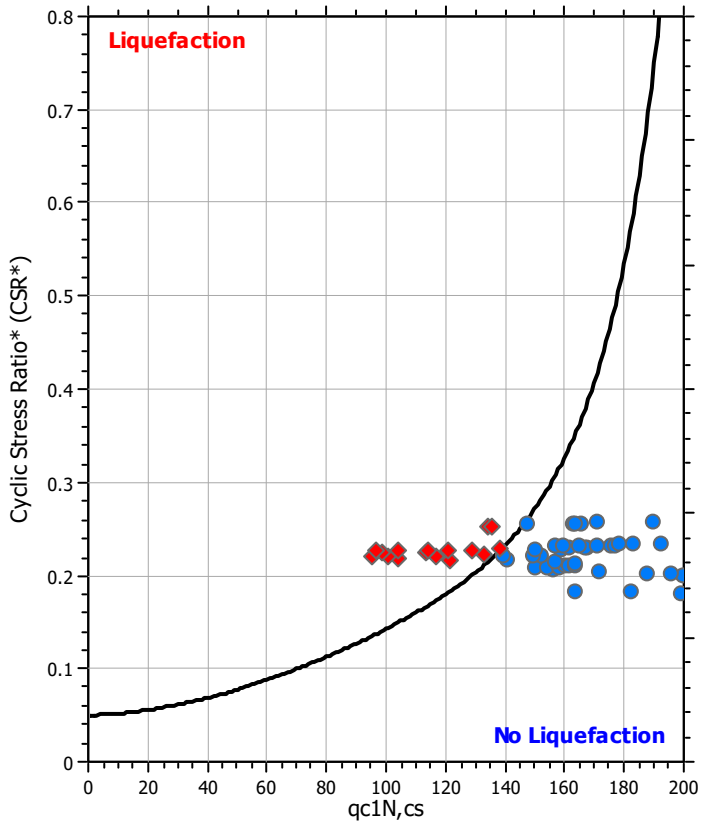
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

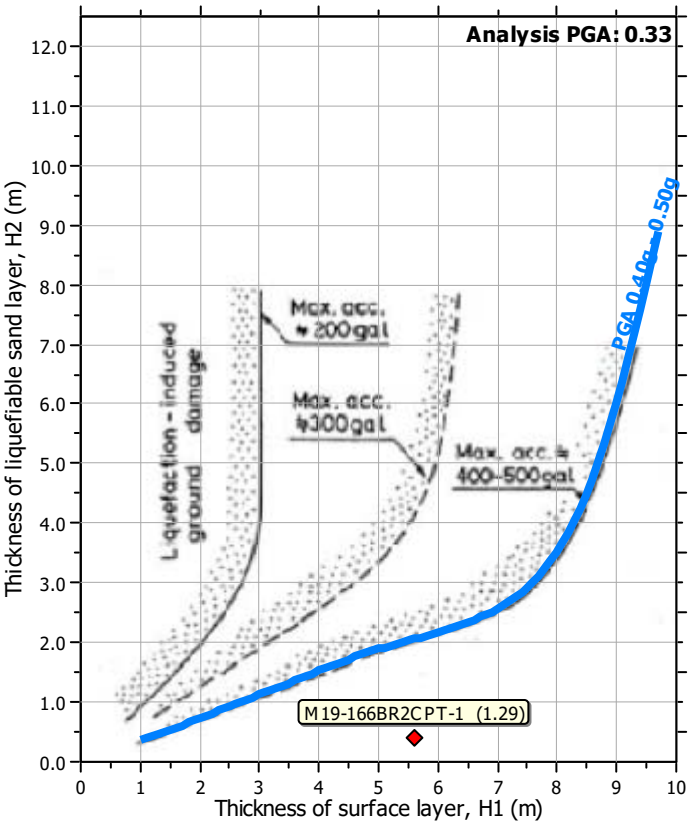
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



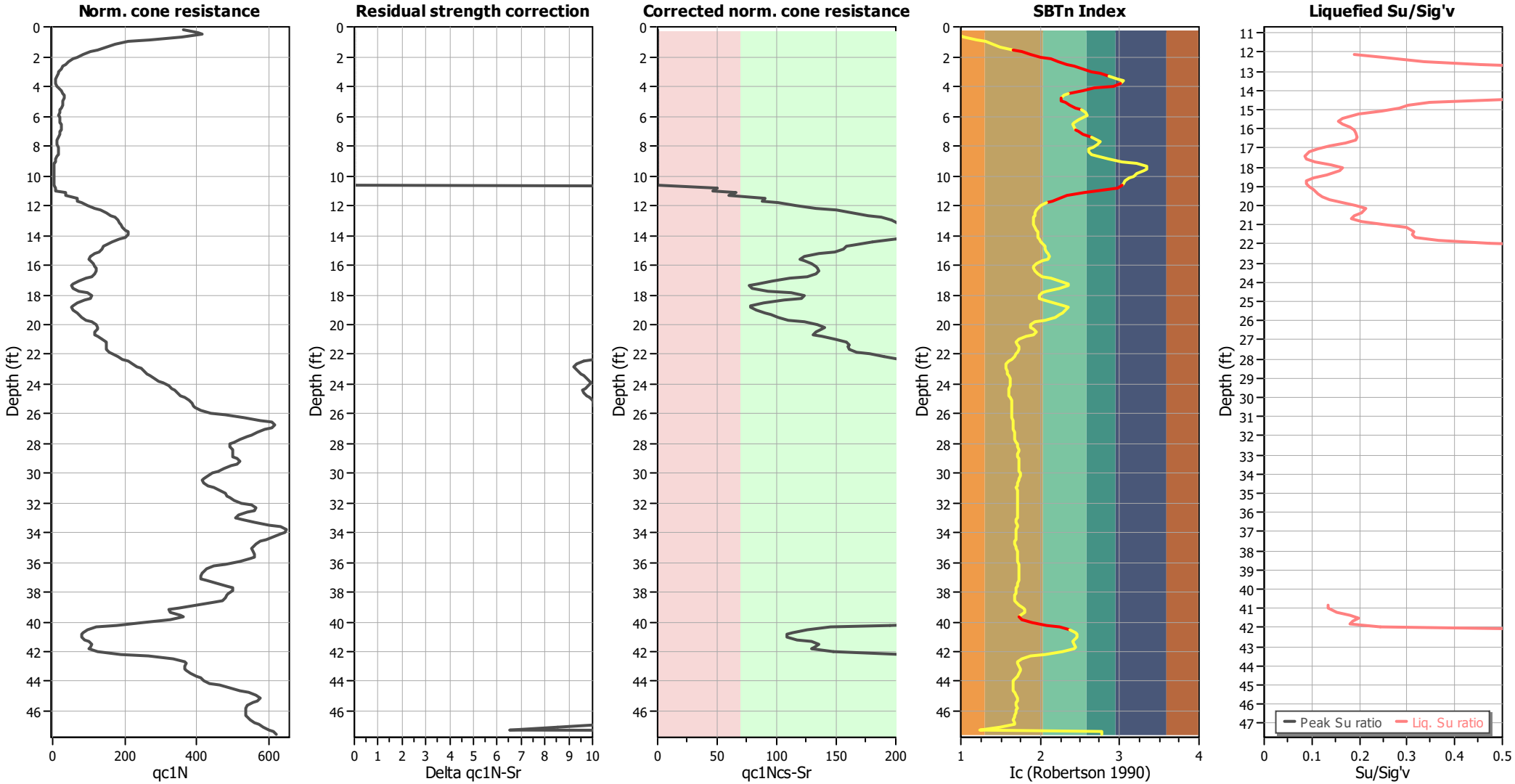




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

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



Input parameters and analysis data

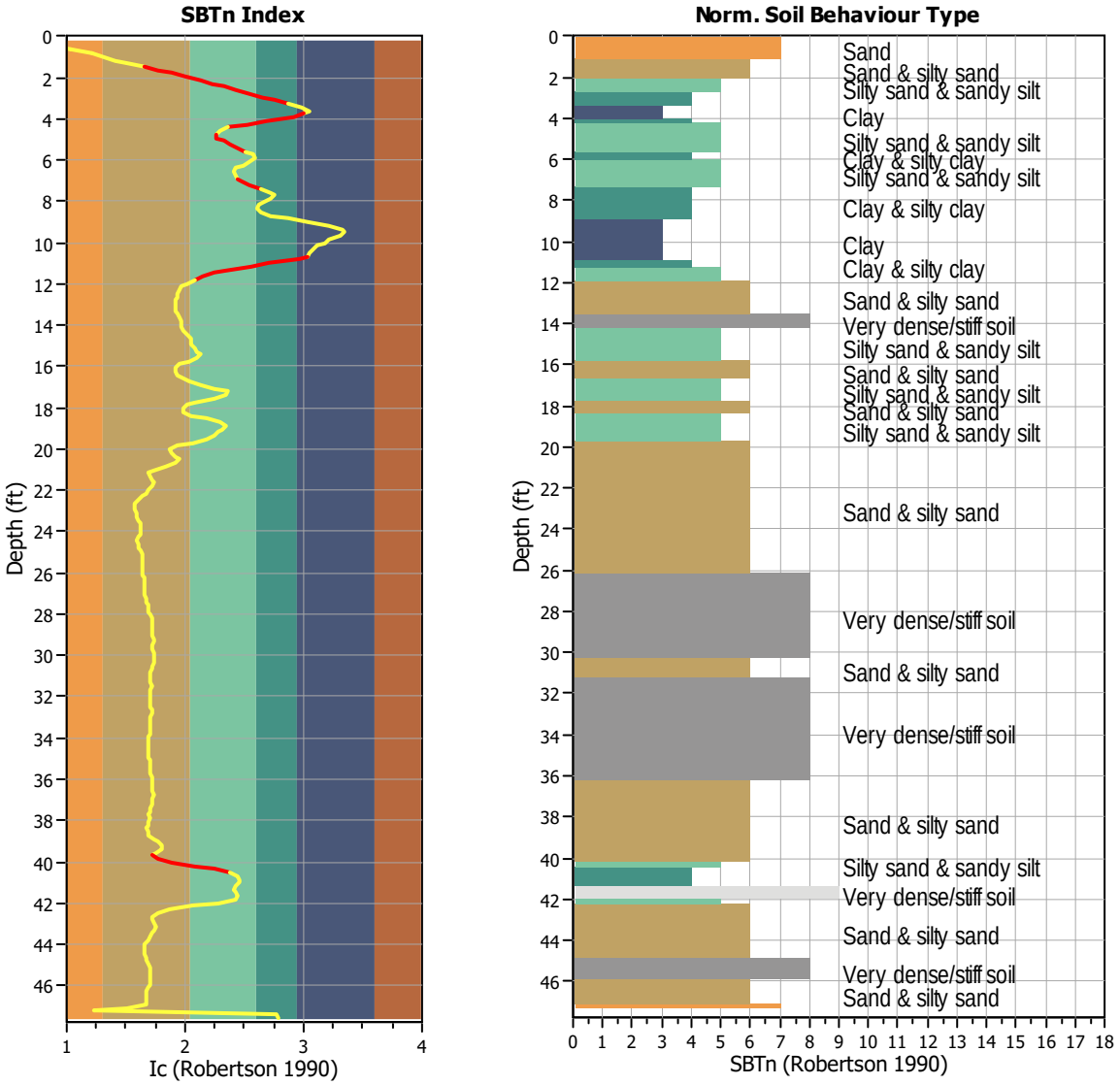
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics

Total points in CPT file:	290
Total points excluded:	41
Exclusion percentage:	14.14%
Number of layers detected:	6

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	12	Start depth: 1.64 (ft)	6	Sand & silty sand
		End depth: 3.44 (ft)	3	Clay
Transition layer 2	5	Start depth: 3.94 (ft)	3	Clay
		End depth: 4.59 (ft)	5	Silty sand & sandy silt
Transition layer 3	6	Start depth: 4.92 (ft)	5	Silty sand & sandy silt
		End depth: 5.74 (ft)	4	Clay & silty clay
Transition layer 4	4	Start depth: 7.05 (ft)	5	Silty sand & sandy silt
		End depth: 7.55 (ft)	4	Clay & silty clay
Transition layer 5	8	Start depth: 10.83 (ft)	3	Clay
		End depth: 11.98 (ft)	6	Sand & silty sand
Transition layer 6	6	Start depth: 39.86 (ft)	6	Sand & silty sand
		End depth: 40.68 (ft)	4	Clay & silty clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	225.21	0.27	0.36	0.00	114.60
2	0.33	250.10	0.34	0.76	0.00	114.60
3	0.49	257.75	0.26	1.03	0.00	115.65
4	0.66	224.61	0.40	0.42	0.00	116.14
5	0.82	167.39	0.46	1.27	0.00	117.18
6	0.98	131.46	0.52	0.22	0.58	115.29
7	1.15	108.61	0.18	-0.16	1.62	113.80
8	1.31	92.30	0.31	0.03	2.78	112.85
9	1.48	78.28	0.45	0.08	5.23	114.17
10	1.64	65.55	0.43	0.80	7.62	114.16
11	1.80	52.94	0.38	0.29	10.02	113.21
12	1.97	41.97	0.38	0.64	13.08	112.37
13	2.13	34.39	0.38	0.76	16.60	111.70
14	2.30	28.64	0.36	0.40	20.05	110.87
15	2.46	23.57	0.32	-1.01	23.58	109.54
16	2.62	18.28	0.27	-0.49	27.83	107.89
17	2.79	13.92	0.23	0.62	32.51	105.72
18	2.95	10.88	0.17	0.72	37.83	103.81
19	3.12	8.76	0.16	1.20	43.36	102.22
20	3.28	7.16	0.15	1.55	50.24	101.41
21	3.44	5.83	0.15	1.68	56.97	100.59
22	3.61	4.99	0.14	2.64	61.91	100.19
23	3.77	5.09	0.15	3.28	58.93	99.93
24	3.94	6.64	0.12	3.67	53.31	102.97
25	4.10	10.08	0.30	4.26	39.91	103.47
26	4.27	14.51	0.12	0.22	32.01	105.28
27	4.43	18.39	0.21	0.48	24.59	104.23
28	4.59	20.09	0.18	0.11	22.40	104.41
29	4.76	19.71	0.12	0.27	20.96	103.05
30	4.92	18.43	0.12	0.17	21.26	102.20
31	5.09	17.35	0.14	-0.09	23.31	102.79
32	5.25	16.57	0.15	0.24	25.40	103.24
33	5.41	15.40	0.16	-0.10	28.17	103.66
34	5.58	13.55	0.18	-0.12	31.15	103.35
35	5.74	11.72	0.15	-0.28	34.08	102.69
36	5.91	10.75	0.13	-0.10	34.60	101.61
37	6.07	11.29	0.12	4.45	32.89	100.97
38	6.23	12.54	0.11	2.63	30.20	100.80
39	6.40	13.66	0.11	0.20	27.79	100.45
40	6.56	14.03	0.10	-0.25	26.73	100.38
41	6.73	14.06	0.11	-0.14	27.21	101.01
42	6.89	14.06	0.14	-0.03	27.97	101.43
43	7.05	13.66	0.12	-0.61	29.61	101.58
44	7.22	12.07	0.12	-0.02	32.34	100.85
45	7.38	9.55	0.12	0.29	37.30	99.69
46	7.55	7.24	0.09	4.59	41.98	97.87
47	7.71	6.58	0.07	8.18	43.58	96.90
48	7.87	7.66	0.09	4.55	41.20	97.63

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	9.44	0.11	-0.34	38.38	99.48
50	8.20	10.73	0.13	-0.83	36.16	100.43
51	8.37	10.80	0.12	1.21	35.94	100.68
52	8.53	9.92	0.12	4.29	37.52	99.78
53	8.69	8.16	0.09	2.17	41.86	98.43
54	8.86	6.14	0.08	1.87	49.64	96.79
55	9.02	4.36	0.08	4.35	61.14	95.45
56	9.19	3.22	0.07	7.71	73.88	94.35
57	9.35	2.69	0.07	10.07	84.03	93.65
58	9.51	2.47	0.07	11.07	85.10	91.85
59	9.68	2.48	0.03	11.82	81.38	90.28
60	9.84	2.66	0.04	13.19	74.22	88.60
61	10.01	2.93	0.04	12.42	71.07	89.22
62	10.17	3.24	0.04	6.65	66.70	89.21
63	10.33	3.45	0.03	11.14	63.73	89.37
64	10.50	3.55	0.04	14.59	62.03	89.81
65	10.66	3.65	0.04	15.80	60.99	91.23
66	10.83	4.20	0.06	17.02	56.30	95.01
67	10.99	6.75	0.12	17.80	40.45	106.93
68	11.15	25.62	0.65	21.43	33.32	112.00
69	11.32	25.62	0.65	14.79	24.19	116.96
70	11.48	53.75	0.99	-4.81	20.69	118.57
71	11.65	53.75	0.99	-3.36	17.22	120.51
72	11.81	66.64	1.15	-4.36	15.23	121.40
73	11.98	81.74	1.23	-3.24	13.22	123.06
74	12.14	99.34	1.58	-4.15	12.04	124.97
75	12.30	115.79	2.04	-6.63	11.55	126.97
76	12.47	130.41	2.43	-4.78	11.36	128.69
77	12.63	143.52	2.87	-2.71	11.04	129.91
78	12.80	155.89	3.09	-3.06	10.82	130.87
79	12.96	165.04	3.37	-4.44	10.70	131.60
80	13.12	170.42	3.66	-3.72	10.68	132.11
81	13.29	174.33	3.69	-4.80	10.80	132.61
82	13.45	179.38	4.01	-3.47	11.19	133.37
83	13.62	186.56	4.78	-4.16	11.71	134.30
84	13.78	193.43	5.22	-3.92	12.01	134.93
85	13.94	195.34	5.12	-2.83	11.97	134.91
86	14.11	188.23	4.73	-1.56	11.91	134.27
87	14.27	171.44	4.13	-5.53	12.41	133.40
88	14.44	151.05	3.92	-6.47	13.29	132.44
89	14.60	135.44	3.57	-4.71	14.12	131.58
90	14.76	129.05	3.18	-1.79	14.44	130.86
91	14.93	126.38	3.11	-2.34	14.50	130.22
92	15.09	119.35	2.88	0.41	15.11	129.65
93	15.26	105.63	2.68	-1.47	15.89	128.64
94	15.42	93.29	2.24	-2.22	16.53	127.53
95	15.58	90.02	2.00	-1.77	15.80	126.39
96	15.75	96.11	1.75	-1.85	13.85	125.35

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	103.64	1.38	-4.22	11.78	124.43
98	16.08	107.72	1.31	-4.81	10.72	124.06
99	16.24	109.27	1.47	-5.05	10.73	124.41
100	16.40	110.52	1.56	-5.21	11.07	124.77
101	16.57	108.66	1.53	-5.70	11.90	125.04
102	16.73	99.70	1.68	-6.15	13.75	125.19
103	16.90	83.62	1.80	-6.02	16.88	125.04
104	17.06	66.04	1.69	-4.38	20.75	124.22
105	17.22	51.97	1.47	-1.69	24.71	123.26
106	17.39	46.01	1.50	-0.21	24.38	121.39
107	17.55	51.41	0.76	2.91	20.58	120.52
108	17.72	67.76	0.95	4.17	15.25	120.29
109	17.88	88.25	1.17	0.35	13.52	122.53
110	18.04	100.74	1.52	-2.19	12.38	123.41
111	18.21	98.39	1.26	-4.08	12.70	123.34
112	18.37	82.77	1.16	-1.42	14.17	122.16
113	18.54	63.48	1.09	4.18	18.11	121.53
114	18.70	50.16	1.22	9.53	22.31	121.13
115	18.86	48.00	1.19	12.37	24.49	121.52
116	19.03	54.22	1.35	15.71	23.21	122.03
117	19.19	62.56	1.39	14.59	21.81	123.10
118	19.36	68.51	1.64	8.20	20.37	124.01
119	19.52	76.23	1.75	13.47	18.36	124.50
120	19.69	87.73	1.53	23.41	14.90	124.19
121	19.85	104.04	1.21	7.24	11.37	123.35
122	20.01	116.54	1.09	4.43	9.75	123.55
123	20.18	123.30	1.49	0.71	9.92	124.51
124	20.34	120.14	1.68	3.48	10.84	125.33
125	20.51	114.40	1.60	5.29	11.47	125.42
126	20.67	113.08	1.60	3.04	10.67	124.68
127	20.83	121.89	1.21	1.85	8.74	123.60
128	21.00	135.70	0.92	-0.69	6.71	122.55
129	21.16	145.73	1.01	-1.26	5.97	122.68
130	21.33	148.49	1.19	3.62	6.31	123.65
131	21.49	147.91	1.33	2.07	6.68	124.26
132	21.65	149.40	1.31	1.63	6.70	124.58
133	21.82	156.25	1.34	1.21	6.38	124.88
134	21.98	167.33	1.44	1.42	5.99	125.48
135	22.15	180.83	1.56	2.26	5.57	126.20
136	22.31	195.83	1.67	2.28	4.95	126.67
137	22.47	211.27	1.62	2.22	4.38	127.12
138	22.64	226.95	1.74	2.35	3.97	127.64
139	22.80	239.68	1.92	2.19	3.87	128.41
140	22.97	250.18	2.10	1.87	3.95	129.23
141	23.13	258.79	2.34	2.38	4.08	130.03
142	23.29	268.01	2.56	2.41	4.26	130.85
143	23.46	278.53	2.84	2.48	4.44	131.68
144	23.62	290.15	3.16	2.54	4.61	132.54

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	303.64	3.50	2.49	4.75	133.41
146	23.95	318.63	3.87	2.63	4.84	134.21
147	24.11	333.15	4.21	2.77	4.63	134.57
148	24.28	344.67	3.92	2.96	4.48	134.86
149	24.44	351.74	4.22	1.30	4.31	135.00
150	24.61	359.50	4.34	1.48	4.42	135.49
151	24.77	370.40	4.67	0.83	4.55	136.09
152	24.93	384.87	5.22	2.63	4.74	136.79
153	25.10	397.19	5.60	0.03	4.91	137.28
154	25.26	405.30	5.88	1.22	4.96	137.28
155	25.43	410.20	5.92	1.71	4.97	137.28
156	25.59	417.07	6.06	2.29	5.04	137.28
157	25.75	432.31	6.69	2.51	5.08	137.28
158	25.92	463.74	7.30	3.77	5.10	137.28
159	26.08	508.40	8.35	6.01	5.07	137.28
160	26.25	563.25	9.87	12.06	5.19	137.28
161	26.41	611.75	11.65	15.43	5.33	137.28
162	26.57	647.49	12.77	27.80	5.39	137.28
163	26.74	657.23	12.78	35.31	5.32	137.28
164	26.90	647.69	12.26	34.89	5.25	137.28
165	27.07	626.35	11.76	27.14	5.36	137.28
166	27.23	607.23	11.89	17.01	5.61	137.28
167	27.40	591.78	11.85	18.25	5.74	137.28
168	27.56	577.48	10.95	16.28	5.77	137.28
169	27.72	559.99	10.60	16.16	5.76	137.28
170	27.89	541.90	10.34	12.64	5.96	137.28
171	28.05	530.57	10.41	11.24	6.25	137.28
172	28.22	531.43	10.96	13.31	6.54	137.28
173	28.38	538.48	11.45	17.65	6.68	137.28
174	28.54	542.13	11.35	21.11	6.55	137.28
175	28.71	540.89	10.64	19.97	6.40	137.28
176	28.87	543.35	10.87	19.87	6.38	137.28
177	29.04	553.91	11.56	23.51	6.55	137.28
178	29.20	563.07	12.04	27.95	6.70	137.28
179	29.36	558.60	12.03	33.98	6.75	137.28
180	29.53	539.85	11.29	23.10	6.63	137.28
181	29.69	518.35	10.00	18.00	6.60	137.28
182	29.86	500.69	10.07	16.37	6.71	137.28
183	30.02	486.13	10.02	16.25	6.99	137.28
184	30.18	470.50	9.53	10.23	6.99	137.28
185	30.35	458.81	8.69	12.18	6.80	137.28
186	30.51	454.62	8.31	11.96	6.59	137.28
187	30.68	460.13	8.45	12.50	6.39	137.28
188	30.84	473.78	8.39	14.93	6.27	137.28
189	31.00	492.69	8.94	18.01	6.16	137.28
190	31.17	513.64	9.57	23.10	6.23	137.28
191	31.33	528.31	10.19	22.50	6.28	137.28
192	31.50	537.44	10.40	25.12	6.37	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	544.13	10.79	27.25	6.37	137.28
194	31.82	559.02	11.06	32.98	6.34	137.28
195	31.99	584.23	11.65	37.80	6.25	137.28
196	32.15	613.17	12.45	50.42	6.22	137.28
197	32.32	630.50	13.01	46.67	6.27	137.28
198	32.48	625.46	13.13	35.68	6.33	137.28
199	32.64	601.92	12.34	34.97	6.47	137.28
200	32.81	576.81	11.96	39.17	6.52	137.28
201	32.97	568.53	11.56	23.27	6.31	137.28
202	33.14	587.41	10.88	30.53	6.16	137.28
203	33.30	627.61	12.72	48.63	6.07	137.28
204	33.46	675.63	14.29	80.04	6.22	137.28
205	33.63	713.16	15.49	41.25	6.25	137.28
206	33.79	731.37	16.06	59.29	6.09	137.28
207	33.96	728.49	14.91	51.21	5.95	137.28
208	34.12	713.47	14.61	31.81	5.89	137.28
209	34.28	693.10	14.46	28.48	6.03	137.28
210	34.45	673.15	14.00	21.07	5.98	137.28
211	34.61	655.73	12.50	29.45	5.85	137.28
212	34.78	641.42	12.19	19.33	5.78	137.28
213	34.94	633.19	12.42	21.25	5.96	137.28
214	35.10	629.00	12.58	10.97	6.15	137.28
215	35.27	632.75	12.87	19.87	6.22	137.28
216	35.43	638.71	12.89	19.41	6.24	137.28
217	35.60	640.95	12.96	20.74	6.26	137.28
218	35.76	626.95	12.76	22.47	6.35	137.28
219	35.93	593.57	11.91	20.97	6.47	137.28
220	36.09	549.73	10.71	17.21	6.55	137.28
221	36.25	512.18	9.60	13.01	6.62	137.28
222	36.42	490.90	9.07	12.39	6.67	137.28
223	36.58	482.62	8.85	12.62	6.68	137.28
224	36.75	477.11	8.55	15.97	6.69	137.28
225	36.91	472.53	8.54	16.78	6.66	137.28
226	37.07	475.18	8.45	17.65	6.63	137.28
227	37.24	493.25	8.91	16.73	6.59	137.28
228	37.40	524.19	9.86	21.63	6.36	137.28
229	37.57	557.58	9.92	25.68	6.20	137.28
230	37.73	577.63	10.66	29.40	6.05	137.28
231	37.89	579.34	10.76	31.32	6.06	137.28
232	38.06	568.47	10.23	24.07	5.96	137.28
233	38.22	560.77	9.73	20.56	5.85	137.28
234	38.39	558.18	9.65	22.90	5.71	137.28
235	38.55	550.37	9.14	18.57	5.75	137.28
236	38.71	519.58	8.75	16.72	6.03	137.28
237	38.88	466.33	8.15	12.65	6.69	137.28
238	39.04	409.72	7.46	9.97	7.65	137.28
239	39.21	376.45	7.45	11.71	8.36	137.28
240	39.37	383.67	7.56	11.28	8.23	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	415.24	7.23	14.23	7.24	137.28
242	39.70	424.85	6.16	15.66	6.56	137.28
243	39.86	383.71	5.66	10.95	7.45	137.28
244	40.03	293.74	6.12	5.16	10.11	136.84
245	40.19	208.87	5.23	2.96	15.23	135.97
246	40.35	148.75	5.38	7.29	20.64	134.58
247	40.52	122.10	4.72	12.52	25.65	133.52
248	40.68	107.04	4.24	7.64	28.09	132.49
249	40.85	99.85	4.09	9.69	29.10	131.89
250	41.01	101.24	3.96	15.87	28.84	132.03
251	41.17	112.34	4.41	18.61	27.63	132.75
252	41.34	126.52	5.01	9.49	26.82	133.78
253	41.50	133.27	5.54	11.56	27.62	134.85
254	41.67	128.56	6.51	11.34	28.48	135.28
255	41.83	127.04	6.03	13.17	27.40	135.53
256	41.99	153.05	5.85	24.06	21.58	135.75
257	42.16	223.34	5.79	53.92	14.71	136.45
258	42.32	318.22	5.84	36.25	9.83	137.28
259	42.49	398.99	6.22	31.72	7.43	137.28
260	42.65	438.66	6.85	25.16	6.47	137.28
261	42.81	445.13	6.72	19.18	6.54	137.28
262	42.98	439.75	7.48	21.41	6.85	137.28
263	43.14	437.64	7.68	23.27	7.10	137.28
264	43.31	445.24	7.45	15.67	7.00	137.28
265	43.47	461.52	7.75	18.96	6.67	137.28
266	43.64	479.35	7.80	23.88	6.29	137.28
267	43.80	491.97	7.49	26.66	5.92	137.28
268	43.96	503.45	7.65	23.27	5.44	137.28
269	44.13	525.02	7.33	27.77	5.29	137.28
270	44.29	557.01	8.54	38.62	5.25	137.28
271	44.46	594.44	9.74	54.74	5.36	137.28
272	44.62	628.75	10.33	51.04	5.49	137.28
273	44.78	659.73	11.79	59.77	5.68	137.28
274	44.95	684.73	13.01	66.05	6.04	137.28
275	45.11	696.16	14.02	26.50	6.22	137.28
276	45.28	691.33	13.60	45.34	6.25	137.28
277	45.44	673.75	12.77	38.33	6.14	137.28
278	45.60	658.35	12.33	24.10	6.16	137.28
279	45.77	652.28	12.48	24.96	6.21	137.28
280	45.93	652.92	12.38	39.23	6.15	137.28
281	46.10	654.04	11.84	50.76	5.92	137.28
282	46.26	654.12	11.40	42.54	5.64	137.28
283	46.42	658.63	11.16	45.42	5.53	137.28
284	46.59	669.85	11.68	63.59	5.51	137.28
285	46.75	684.76	12.09	63.77	5.57	137.28
286	46.92	701.70	12.59	54.40	5.57	137.28
287	47.08	717.51	12.97	50.84	2.87	137.28
288	47.24	735.82	0.00	55.52	0.00	137.08

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	751.77	0.00	65.94	44.43	87.36
290	47.57	760.84	0.00	52.62	44.81	87.36

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	0.215	1.14	0.188	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
9	1.48	0.09	0.00	0.09	1.00	0.215	1.14	0.188	1.10	1.00	2.000	No
10	1.64	0.09	0.00	0.09	1.00	0.215	1.14	0.188	1.10	1.00	2.000	Yes
11	1.80	0.10	0.00	0.10	1.00	0.215	1.14	0.188	1.10	1.00	2.000	Yes
12	1.97	0.11	0.00	0.11	1.00	0.215	1.14	0.188	1.10	1.00	2.000	Yes
13	2.13	0.12	0.00	0.12	1.00	0.215	1.14	0.188	1.10	1.00	2.000	Yes
14	2.30	0.13	0.00	0.13	1.00	0.215	1.14	0.188	1.10	1.00	2.000	Yes
15	2.46	0.14	0.00	0.14	1.00	0.214	1.14	0.188	1.10	1.00	2.000	Yes
16	2.62	0.15	0.00	0.15	1.00	0.214	1.14	0.188	1.10	1.00	2.000	Yes
17	2.79	0.16	0.00	0.16	1.00	0.214	1.14	0.188	1.10	1.00	2.000	Yes
18	2.95	0.17	0.00	0.17	1.00	0.214	1.14	0.188	1.09	1.00	2.000	Yes
19	3.12	0.17	0.00	0.17	1.00	0.214	1.14	0.188	1.09	1.00	2.000	Yes
20	3.28	0.18	0.00	0.18	1.00	0.214	1.14	0.188	1.08	1.00	2.000	Yes
21	3.44	0.19	0.00	0.19	1.00	0.214	1.14	0.187	1.08	1.00	2.000	Yes
22	3.61	0.20	0.00	0.20	1.00	0.214	1.14	0.187	1.07	1.00	2.000	No
23	3.77	0.21	0.00	0.21	1.00	0.214	1.14	0.187	1.07	1.00	2.000	No
24	3.94	0.22	0.00	0.22	1.00	0.214	1.14	0.187	1.07	1.00	2.000	Yes
25	4.10	0.22	0.00	0.22	0.99	0.213	1.14	0.187	1.08	1.00	2.000	Yes
26	4.27	0.23	0.00	0.23	0.99	0.213	1.14	0.187	1.08	1.00	2.000	Yes
27	4.43	0.24	0.00	0.24	0.99	0.213	1.14	0.187	1.09	1.00	2.000	Yes
28	4.59	0.25	0.00	0.25	0.99	0.213	1.14	0.187	1.09	1.00	2.000	Yes
29	4.76	0.26	0.00	0.26	0.99	0.213	1.14	0.187	1.08	1.00	2.000	No
30	4.92	0.27	0.00	0.27	0.99	0.213	1.14	0.187	1.08	1.00	2.000	Yes
31	5.09	0.28	0.00	0.28	0.99	0.213	1.14	0.186	1.08	1.00	2.000	Yes
32	5.25	0.28	0.00	0.28	0.99	0.213	1.14	0.186	1.07	1.00	2.000	Yes
33	5.41	0.29	0.00	0.29	0.99	0.212	1.14	0.186	1.07	1.00	2.000	Yes
34	5.58	0.30	0.00	0.30	0.99	0.212	1.14	0.186	1.07	1.00	2.000	Yes
35	5.74	0.31	0.00	0.31	0.99	0.212	1.14	0.186	1.06	1.00	2.000	Yes
36	5.91	0.32	0.00	0.32	0.99	0.212	1.14	0.186	1.06	1.00	2.000	No
37	6.07	0.33	0.00	0.33	0.99	0.212	1.14	0.186	1.06	1.00	2.000	No
38	6.23	0.33	0.00	0.33	0.99	0.212	1.14	0.186	1.06	1.00	2.000	No
39	6.40	0.34	0.00	0.34	0.99	0.212	1.14	0.186	1.06	1.00	2.000	No
40	6.56	0.35	0.00	0.35	0.99	0.212	1.14	0.185	1.06	1.00	2.000	No
41	6.73	0.36	0.00	0.36	0.99	0.211	1.14	0.185	1.06	1.00	2.000	No
42	6.89	0.37	0.00	0.37	0.99	0.211	1.14	0.185	1.06	1.00	2.000	No
43	7.05	0.38	0.00	0.38	0.98	0.211	1.14	0.185	1.06	1.00	2.000	Yes
44	7.22	0.38	0.00	0.38	0.98	0.211	1.14	0.185	1.05	1.00	2.000	Yes
45	7.38	0.39	0.00	0.39	0.98	0.211	1.14	0.185	1.05	1.00	2.000	Yes
46	7.55	0.40	0.00	0.40	0.98	0.211	1.14	0.185	1.05	1.00	2.000	Yes
47	7.71	0.41	0.00	0.41	0.98	0.211	1.14	0.185	1.04	1.00	2.000	No
48	7.87	0.42	0.00	0.42	0.98	0.211	1.14	0.185	1.04	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	0.42	0.00	0.42	0.98	0.210	1.14	0.184	1.04	1.00	2.000	No
50	8.20	0.43	0.00	0.43	0.98	0.210	1.14	0.184	1.05	1.00	2.000	No
51	8.37	0.44	0.00	0.44	0.98	0.210	1.14	0.184	1.04	1.00	2.000	No
52	8.53	0.45	0.00	0.45	0.98	0.210	1.14	0.184	1.04	1.00	2.000	No
53	8.69	0.46	0.00	0.46	0.98	0.210	1.14	0.184	1.04	1.00	2.000	No
54	8.86	0.46	0.00	0.46	0.98	0.210	1.14	0.184	1.04	1.00	2.000	No
55	9.02	0.47	0.00	0.47	0.98	0.210	1.14	0.184	1.03	1.00	2.000	No
56	9.19	0.48	0.00	0.48	0.98	0.210	1.14	0.184	1.03	1.00	2.000	No
57	9.35	0.49	0.00	0.49	0.98	0.209	1.14	0.184	1.03	1.00	2.000	No
58	9.51	0.50	0.00	0.50	0.98	0.209	1.14	0.183	1.03	1.00	2.000	No
59	9.68	0.50	0.00	0.50	0.97	0.209	1.14	0.183	1.03	1.00	2.000	No
60	9.84	0.51	0.00	0.51	0.97	0.209	1.14	0.183	1.03	1.00	2.000	No
61	10.01	0.52	0.00	0.52	0.97	0.209	1.14	0.183	1.03	1.00	2.000	No
62	10.17	0.52	0.00	0.52	0.97	0.209	1.14	0.183	1.03	1.00	2.000	No
63	10.33	0.53	0.00	0.53	0.97	0.209	1.14	0.183	1.03	1.00	2.000	No
64	10.50	0.54	0.00	0.54	0.97	0.208	1.14	0.183	1.03	1.00	2.000	No
65	10.66	0.55	0.00	0.55	0.97	0.208	1.14	0.183	1.03	1.00	2.000	No
66	10.83	0.55	0.00	0.55	0.97	0.209	1.14	0.183	1.03	1.00	2.000	Yes
67	10.99	0.56	0.01	0.56	0.97	0.210	1.14	0.184	1.03	1.00	2.000	Yes
68	11.15	0.57	0.01	0.56	0.97	0.212	1.14	0.186	1.04	1.00	2.000	Yes
69	11.32	0.58	0.02	0.57	0.97	0.214	1.14	0.187	1.04	1.00	2.000	Yes
70	11.48	0.59	0.02	0.57	0.97	0.215	1.14	0.189	1.05	1.00	2.000	Yes
71	11.65	0.60	0.03	0.58	0.97	0.217	1.14	0.190	1.05	1.00	2.000	Yes
72	11.81	0.61	0.03	0.58	0.97	0.219	1.14	0.192	1.06	1.00	2.000	Yes
73	11.98	0.62	0.04	0.59	0.97	0.220	1.14	0.193	1.06	1.00	2.000	Yes
74	12.14	0.63	0.04	0.59	0.97	0.222	1.14	0.194	1.07	1.00	0.181	No
75	12.30	0.64	0.05	0.60	0.96	0.223	1.14	0.196	1.08	1.00	0.181	No
76	12.47	0.65	0.05	0.60	0.96	0.225	1.14	0.197	1.09	1.00	0.181	No
77	12.63	0.66	0.06	0.61	0.96	0.226	1.14	0.198	1.10	1.00	0.180	No
78	12.80	0.67	0.06	0.61	0.96	0.227	1.14	0.199	1.10	1.00	0.181	No
79	12.96	0.69	0.07	0.62	0.96	0.229	1.14	0.200	1.10	1.00	0.182	No
80	13.12	0.70	0.07	0.62	0.96	0.230	1.14	0.202	1.10	1.00	0.183	No
81	13.29	0.71	0.08	0.63	0.96	0.231	1.14	0.203	1.10	1.00	0.184	No
82	13.45	0.72	0.08	0.64	0.96	0.233	1.14	0.204	1.10	1.00	0.185	No
83	13.62	0.73	0.09	0.64	0.96	0.234	1.14	0.205	1.10	1.00	0.186	No
84	13.78	0.74	0.09	0.65	0.96	0.235	1.14	0.206	1.10	1.00	0.187	No
85	13.94	0.75	0.10	0.65	0.96	0.236	1.14	0.207	1.10	1.00	0.188	No
86	14.11	0.76	0.10	0.66	0.96	0.237	1.14	0.208	1.10	1.00	0.189	No
87	14.27	0.77	0.11	0.66	0.96	0.238	1.14	0.209	1.10	1.00	0.190	No
88	14.44	0.78	0.11	0.67	0.96	0.240	1.14	0.210	1.08	1.00	0.194	No
89	14.60	0.79	0.12	0.68	0.95	0.241	1.14	0.211	1.07	1.00	0.197	No
90	14.76	0.81	0.12	0.68	0.95	0.242	1.14	0.212	1.07	1.00	0.199	No
91	14.93	0.82	0.13	0.69	0.95	0.243	1.14	0.213	1.06	1.00	0.200	No
92	15.09	0.83	0.13	0.69	0.95	0.244	1.14	0.214	1.06	1.00	0.202	No
93	15.26	0.84	0.14	0.70	0.95	0.245	1.14	0.215	1.05	1.00	0.204	No
94	15.42	0.85	0.14	0.70	0.95	0.246	1.14	0.215	1.04	1.00	0.206	No
95	15.58	0.86	0.15	0.71	0.95	0.247	1.14	0.216	1.04	1.00	0.207	No
96	15.75	0.87	0.15	0.71	0.95	0.248	1.14	0.217	1.04	1.00	0.208	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	0.88	0.16	0.72	0.95	0.249	1.14	0.218	1.05	1.00	0.208	No
98	16.08	0.89	0.16	0.72	0.95	0.250	1.14	0.219	1.05	1.00	0.209	No
99	16.24	0.90	0.17	0.73	0.95	0.250	1.14	0.219	1.05	1.00	0.210	No
100	16.40	0.91	0.17	0.73	0.95	0.251	1.14	0.220	1.05	1.00	0.211	No
101	16.57	0.92	0.18	0.74	0.95	0.252	1.14	0.221	1.04	1.00	0.212	No
102	16.73	0.93	0.19	0.74	0.94	0.253	1.14	0.222	1.04	1.00	0.213	No
103	16.90	0.94	0.19	0.75	0.94	0.254	1.14	0.223	1.03	1.00	0.215	No
104	17.06	0.95	0.20	0.75	0.94	0.255	1.14	0.223	1.03	1.00	0.217	No
105	17.22	0.96	0.20	0.76	0.94	0.256	1.14	0.224	1.03	1.00	0.218	No
106	17.39	0.97	0.21	0.76	0.94	0.256	1.14	0.225	1.02	1.00	0.220	No
107	17.55	0.98	0.21	0.77	0.94	0.257	1.14	0.225	1.02	1.00	0.220	No
108	17.72	0.99	0.22	0.77	0.94	0.258	1.14	0.226	1.03	1.00	0.220	No
109	17.88	1.00	0.22	0.78	0.94	0.259	1.14	0.227	1.03	1.00	0.220	No
110	18.04	1.01	0.23	0.78	0.94	0.259	1.14	0.227	1.03	1.00	0.220	No
111	18.21	1.02	0.23	0.79	0.94	0.260	1.14	0.228	1.03	1.00	0.221	No
112	18.37	1.03	0.24	0.79	0.94	0.261	1.14	0.229	1.03	1.00	0.222	No
113	18.54	1.04	0.24	0.80	0.94	0.262	1.14	0.229	1.02	1.00	0.224	No
114	18.70	1.05	0.25	0.80	0.94	0.262	1.14	0.230	1.02	1.00	0.225	No
115	18.86	1.06	0.25	0.81	0.94	0.263	1.14	0.230	1.02	1.00	0.226	No
116	19.03	1.07	0.26	0.81	0.93	0.264	1.14	0.231	1.02	1.00	0.227	No
117	19.19	1.08	0.26	0.82	0.93	0.264	1.14	0.232	1.02	1.00	0.227	No
118	19.36	1.09	0.27	0.82	0.93	0.265	1.14	0.232	1.02	1.00	0.227	No
119	19.52	1.10	0.27	0.83	0.93	0.266	1.14	0.233	1.02	1.00	0.228	No
120	19.69	1.11	0.28	0.83	0.93	0.266	1.14	0.233	1.02	1.00	0.228	No
121	19.85	1.12	0.28	0.84	0.93	0.267	1.14	0.234	1.03	1.00	0.228	No
122	20.01	1.13	0.29	0.84	0.93	0.267	1.14	0.234	1.03	1.00	0.228	No
123	20.18	1.14	0.29	0.85	0.93	0.268	1.14	0.235	1.03	1.00	0.228	No
124	20.34	1.15	0.30	0.85	0.93	0.268	1.14	0.235	1.03	1.00	0.229	No
125	20.51	1.16	0.30	0.86	0.93	0.269	1.14	0.236	1.03	1.00	0.230	No
126	20.67	1.17	0.31	0.86	0.93	0.269	1.14	0.236	1.02	1.00	0.231	No
127	20.83	1.18	0.31	0.87	0.93	0.270	1.14	0.237	1.03	1.00	0.231	No
128	21.00	1.19	0.32	0.87	0.92	0.271	1.14	0.237	1.03	1.00	0.231	No
129	21.16	1.20	0.32	0.88	0.92	0.271	1.14	0.238	1.03	1.00	0.231	No
130	21.33	1.21	0.33	0.88	0.92	0.272	1.14	0.238	1.03	1.00	0.231	No
131	21.49	1.22	0.33	0.89	0.92	0.272	1.14	0.238	1.03	1.00	0.232	No
132	21.65	1.23	0.34	0.89	0.92	0.272	1.14	0.239	1.03	1.00	0.233	No
133	21.82	1.24	0.34	0.90	0.92	0.273	1.14	0.239	1.03	1.00	0.233	No
134	21.98	1.25	0.35	0.90	0.92	0.273	1.14	0.240	1.03	1.00	0.233	No
135	22.15	1.26	0.35	0.91	0.92	0.274	1.14	0.240	1.03	1.00	0.233	No
136	22.31	1.27	0.36	0.92	0.92	0.274	1.14	0.240	1.04	1.00	0.232	No
137	22.47	1.28	0.36	0.92	0.92	0.275	1.14	0.241	1.04	1.00	0.231	No
138	22.64	1.30	0.37	0.93	0.92	0.275	1.14	0.241	1.04	1.00	0.232	No
139	22.80	1.31	0.37	0.93	0.92	0.275	1.14	0.241	1.04	1.00	0.232	No
140	22.97	1.32	0.38	0.94	0.91	0.276	1.14	0.242	1.04	1.00	0.233	No
141	23.13	1.33	0.38	0.94	0.91	0.276	1.14	0.242	1.03	1.00	0.234	No
142	23.29	1.34	0.39	0.95	0.91	0.276	1.14	0.242	1.03	1.00	0.234	No
143	23.46	1.35	0.39	0.95	0.91	0.277	1.14	0.243	1.03	1.00	0.235	No
144	23.62	1.36	0.40	0.96	0.91	0.277	1.14	0.243	1.03	1.00	0.236	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	1.37	0.41	0.97	0.91	0.277	1.14	0.243	1.03	1.00	0.237	No
146	23.95	1.38	0.41	0.97	0.91	0.278	1.14	0.243	1.03	1.00	0.237	No
147	24.11	1.39	0.42	0.98	0.91	0.278	1.14	0.244	1.02	1.00	0.238	No
148	24.28	1.40	0.42	0.98	0.91	0.278	1.14	0.244	1.02	1.00	0.238	No
149	24.44	1.41	0.43	0.99	0.91	0.278	1.14	0.244	1.02	1.00	0.239	No
150	24.61	1.43	0.43	1.00	0.91	0.279	1.14	0.244	1.02	1.00	0.240	No
151	24.77	1.44	0.44	1.00	0.91	0.279	1.14	0.244	1.02	1.00	0.240	No
152	24.93	1.45	0.44	1.01	0.90	0.279	1.14	0.245	1.01	1.00	0.241	No
153	25.10	1.46	0.45	1.01	0.90	0.279	1.14	0.245	1.01	1.00	0.242	No
154	25.26	1.47	0.45	1.02	0.90	0.279	1.14	0.245	1.01	1.00	0.242	No
155	25.43	1.48	0.46	1.03	0.90	0.280	1.14	0.245	1.01	1.00	0.243	No
156	25.59	1.49	0.46	1.03	0.90	0.280	1.14	0.245	1.01	1.00	0.243	No
157	25.75	1.50	0.47	1.04	0.90	0.280	1.14	0.245	1.01	1.00	0.244	No
158	25.92	1.52	0.47	1.04	0.90	0.280	1.14	0.246	1.00	1.00	0.245	No
159	26.08	1.53	0.48	1.05	0.90	0.280	1.14	0.246	1.00	1.00	0.245	No
160	26.25	1.54	0.48	1.06	0.90	0.280	1.14	0.246	1.00	1.00	0.246	No
161	26.41	1.55	0.49	1.06	0.90	0.281	1.14	0.246	1.00	1.00	0.246	No
162	26.57	1.56	0.49	1.07	0.90	0.281	1.14	0.246	1.00	1.00	0.247	No
163	26.74	1.57	0.50	1.07	0.90	0.281	1.14	0.246	1.00	1.00	0.247	No
164	26.90	1.58	0.50	1.08	0.89	0.281	1.14	0.246	0.99	1.00	0.248	No
165	27.07	1.59	0.51	1.09	0.89	0.281	1.14	0.246	0.99	1.00	0.248	No
166	27.23	1.61	0.51	1.09	0.89	0.281	1.14	0.247	0.99	1.00	0.249	No
167	27.40	1.62	0.52	1.10	0.89	0.281	1.14	0.247	0.99	1.00	0.249	No
168	27.56	1.63	0.52	1.11	0.89	0.282	1.14	0.247	0.99	1.00	0.250	No
169	27.72	1.64	0.53	1.11	0.89	0.282	1.14	0.247	0.99	1.00	0.251	No
170	27.89	1.65	0.53	1.12	0.89	0.282	1.14	0.247	0.98	1.00	0.251	No
171	28.05	1.66	0.54	1.12	0.89	0.282	1.14	0.247	0.98	1.00	0.252	No
172	28.22	1.67	0.54	1.13	0.89	0.282	1.14	0.247	0.98	1.00	0.252	No
173	28.38	1.68	0.55	1.14	0.89	0.282	1.14	0.247	0.98	1.00	0.253	No
174	28.54	1.70	0.55	1.14	0.89	0.282	1.14	0.247	0.98	1.00	0.253	No
175	28.71	1.71	0.56	1.15	0.88	0.282	1.14	0.247	0.98	1.00	0.254	No
176	28.87	1.72	0.56	1.15	0.88	0.282	1.14	0.247	0.97	1.00	0.254	No
177	29.04	1.73	0.57	1.16	0.88	0.282	1.14	0.247	0.97	1.00	0.254	No
178	29.20	1.74	0.57	1.17	0.88	0.282	1.14	0.247	0.97	1.00	0.255	No
179	29.36	1.75	0.58	1.17	0.88	0.282	1.14	0.247	0.97	1.00	0.255	No
180	29.53	1.76	0.58	1.18	0.88	0.282	1.14	0.248	0.97	1.00	0.256	No
181	29.69	1.77	0.59	1.19	0.88	0.282	1.14	0.248	0.97	1.00	0.256	No
182	29.86	1.79	0.59	1.19	0.88	0.283	1.14	0.248	0.96	1.00	0.257	No
183	30.02	1.80	0.60	1.20	0.88	0.283	1.14	0.248	0.96	1.00	0.257	No
184	30.18	1.81	0.60	1.20	0.88	0.283	1.14	0.248	0.96	1.00	0.258	No
185	30.35	1.82	0.61	1.21	0.88	0.283	1.14	0.248	0.96	1.00	0.258	No
186	30.51	1.83	0.61	1.22	0.88	0.283	1.14	0.248	0.96	1.00	0.258	No
187	30.68	1.84	0.62	1.22	0.87	0.283	1.14	0.248	0.96	1.00	0.259	No
188	30.84	1.85	0.63	1.23	0.87	0.283	1.14	0.248	0.96	1.00	0.259	No
189	31.00	1.86	0.63	1.23	0.87	0.283	1.14	0.248	0.95	1.00	0.260	No
190	31.17	1.88	0.64	1.24	0.87	0.283	1.14	0.248	0.95	1.00	0.260	No
191	31.33	1.89	0.64	1.25	0.87	0.283	1.14	0.248	0.95	1.00	0.261	No
192	31.50	1.90	0.65	1.25	0.87	0.283	1.14	0.248	0.95	1.00	0.261	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	1.91	0.65	1.26	0.87	0.283	1.14	0.248	0.95	1.00	0.261	No
194	31.82	1.92	0.66	1.26	0.87	0.283	1.14	0.248	0.95	1.00	0.262	No
195	31.99	1.93	0.66	1.27	0.87	0.283	1.14	0.248	0.94	1.00	0.262	No
196	32.15	1.94	0.67	1.28	0.87	0.283	1.14	0.248	0.94	1.00	0.263	No
197	32.32	1.95	0.67	1.28	0.87	0.283	1.14	0.248	0.94	1.00	0.263	No
198	32.48	1.97	0.68	1.29	0.86	0.283	1.14	0.248	0.94	1.00	0.263	No
199	32.64	1.98	0.68	1.30	0.86	0.283	1.14	0.248	0.94	1.00	0.264	No
200	32.81	1.99	0.69	1.30	0.86	0.283	1.14	0.248	0.94	1.00	0.264	No
201	32.97	2.00	0.69	1.31	0.86	0.283	1.14	0.248	0.94	1.00	0.264	No
202	33.14	2.01	0.70	1.31	0.86	0.283	1.14	0.248	0.93	1.00	0.265	No
203	33.30	2.02	0.70	1.32	0.86	0.283	1.14	0.248	0.93	1.00	0.265	No
204	33.46	2.03	0.71	1.33	0.86	0.282	1.14	0.248	0.93	1.00	0.266	No
205	33.63	2.04	0.71	1.33	0.86	0.282	1.14	0.248	0.93	1.00	0.266	No
206	33.79	2.06	0.72	1.34	0.86	0.282	1.14	0.247	0.93	1.00	0.266	No
207	33.96	2.07	0.72	1.34	0.86	0.282	1.14	0.247	0.93	1.00	0.267	No
208	34.12	2.08	0.73	1.35	0.86	0.282	1.14	0.247	0.93	1.00	0.267	No
209	34.28	2.09	0.73	1.36	0.85	0.282	1.14	0.247	0.93	1.00	0.267	No
210	34.45	2.10	0.74	1.36	0.85	0.282	1.14	0.247	0.92	1.00	0.268	No
211	34.61	2.11	0.74	1.37	0.85	0.282	1.14	0.247	0.92	1.00	0.268	No
212	34.78	2.12	0.75	1.38	0.85	0.282	1.14	0.247	0.92	1.00	0.268	No
213	34.94	2.13	0.75	1.38	0.85	0.282	1.14	0.247	0.92	1.00	0.269	No
214	35.10	2.15	0.76	1.39	0.85	0.282	1.14	0.247	0.92	1.00	0.269	No
215	35.27	2.16	0.76	1.39	0.85	0.282	1.14	0.247	0.92	1.00	0.269	No
216	35.43	2.17	0.77	1.40	0.85	0.282	1.14	0.247	0.92	1.00	0.270	No
217	35.60	2.18	0.77	1.41	0.85	0.282	1.14	0.247	0.91	1.00	0.270	No
218	35.76	2.19	0.78	1.41	0.85	0.282	1.14	0.247	0.91	1.00	0.270	No
219	35.93	2.20	0.78	1.42	0.85	0.282	1.14	0.247	0.91	1.00	0.271	No
220	36.09	2.21	0.79	1.42	0.84	0.281	1.14	0.247	0.91	1.00	0.271	No
221	36.25	2.22	0.79	1.43	0.84	0.281	1.14	0.247	0.91	1.00	0.271	No
222	36.42	2.24	0.80	1.44	0.84	0.281	1.14	0.246	0.91	1.00	0.271	No
223	36.58	2.25	0.80	1.44	0.84	0.281	1.14	0.246	0.91	1.00	0.272	No
224	36.75	2.26	0.81	1.45	0.84	0.281	1.14	0.246	0.91	1.00	0.272	No
225	36.91	2.27	0.81	1.46	0.84	0.281	1.14	0.246	0.90	1.00	0.272	No
226	37.07	2.28	0.82	1.46	0.84	0.281	1.14	0.246	0.90	1.00	0.273	No
227	37.24	2.29	0.82	1.47	0.84	0.281	1.14	0.246	0.90	1.00	0.273	No
228	37.40	2.30	0.83	1.47	0.84	0.281	1.14	0.246	0.90	1.00	0.273	No
229	37.57	2.32	0.84	1.48	0.84	0.281	1.14	0.246	0.90	1.00	0.273	No
230	37.73	2.33	0.84	1.49	0.84	0.280	1.14	0.246	0.90	1.00	0.274	No
231	37.89	2.34	0.85	1.49	0.83	0.280	1.14	0.246	0.90	1.00	0.274	No
232	38.06	2.35	0.85	1.50	0.83	0.280	1.14	0.246	0.90	1.00	0.274	No
233	38.22	2.36	0.86	1.50	0.83	0.280	1.14	0.246	0.89	1.00	0.274	No
234	38.39	2.37	0.86	1.51	0.83	0.280	1.14	0.245	0.89	1.00	0.275	No
235	38.55	2.38	0.87	1.52	0.83	0.280	1.14	0.245	0.89	1.00	0.275	No
236	38.71	2.39	0.87	1.52	0.83	0.280	1.14	0.245	0.89	1.00	0.275	No
237	38.88	2.41	0.88	1.53	0.83	0.280	1.14	0.245	0.89	1.00	0.276	No
238	39.04	2.42	0.88	1.54	0.83	0.280	1.14	0.245	0.89	1.00	0.276	No
239	39.21	2.43	0.89	1.54	0.83	0.279	1.14	0.245	0.89	1.00	0.276	No
240	39.37	2.44	0.89	1.55	0.83	0.279	1.14	0.245	0.89	1.00	0.276	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	2.45	0.90	1.55	0.83	0.279	1.14	0.245	0.88	1.00	0.276	No
242	39.70	2.46	0.90	1.56	0.82	0.279	1.14	0.245	0.88	1.00	0.277	No
243	39.86	2.47	0.91	1.57	0.82	0.279	1.14	0.244	0.88	1.00	2.000	Yes
244	40.03	2.48	0.91	1.57	0.82	0.279	1.14	0.244	0.88	1.00	2.000	Yes
245	40.19	2.50	0.92	1.58	0.82	0.279	1.14	0.244	0.92	1.00	2.000	Yes
246	40.35	2.51	0.92	1.58	0.82	0.278	1.14	0.244	0.95	1.00	2.000	Yes
247	40.52	2.52	0.93	1.59	0.82	0.278	1.14	0.244	0.96	1.00	2.000	Yes
248	40.68	2.53	0.93	1.60	0.82	0.278	1.14	0.244	0.96	1.00	2.000	Yes
249	40.85	2.54	0.94	1.60	0.82	0.278	1.14	0.244	0.96	1.00	0.253	No
250	41.01	2.55	0.94	1.61	0.82	0.278	1.14	0.244	0.96	1.00	0.253	No
251	41.17	2.56	0.95	1.61	0.82	0.278	1.14	0.244	0.96	1.00	0.254	No
252	41.34	2.57	0.95	1.62	0.82	0.278	1.14	0.243	0.95	1.00	0.255	No
253	41.50	2.58	0.96	1.62	0.81	0.278	1.14	0.243	0.95	1.00	0.256	No
254	41.67	2.59	0.96	1.63	0.81	0.277	1.14	0.243	0.95	1.00	0.255	No
255	41.83	2.60	0.97	1.64	0.81	0.277	1.14	0.243	0.95	1.00	0.255	No
256	41.99	2.62	0.97	1.64	0.81	0.277	1.14	0.243	0.94	1.00	0.258	No
257	42.16	2.63	0.98	1.65	0.81	0.277	1.14	0.243	0.90	1.00	0.270	No
258	42.32	2.64	0.98	1.65	0.81	0.277	1.14	0.243	0.87	1.00	0.280	No
259	42.49	2.65	0.99	1.66	0.81	0.277	1.14	0.243	0.86	1.00	0.280	No
260	42.65	2.66	0.99	1.67	0.81	0.277	1.14	0.242	0.86	1.00	0.281	No
261	42.81	2.67	1.00	1.67	0.81	0.276	1.14	0.242	0.86	1.00	0.281	No
262	42.98	2.68	1.00	1.68	0.81	0.276	1.14	0.242	0.86	1.00	0.281	No
263	43.14	2.69	1.01	1.69	0.81	0.276	1.14	0.242	0.86	1.00	0.281	No
264	43.31	2.71	1.01	1.69	0.80	0.276	1.14	0.242	0.86	1.00	0.281	No
265	43.47	2.72	1.02	1.70	0.80	0.276	1.14	0.242	0.86	1.00	0.282	No
266	43.64	2.73	1.02	1.70	0.80	0.276	1.14	0.241	0.86	1.00	0.282	No
267	43.80	2.74	1.03	1.71	0.80	0.275	1.14	0.241	0.86	1.00	0.282	No
268	43.96	2.75	1.03	1.72	0.80	0.275	1.14	0.241	0.85	1.00	0.282	No
269	44.13	2.76	1.04	1.72	0.80	0.275	1.14	0.241	0.85	1.00	0.282	No
270	44.29	2.77	1.04	1.73	0.80	0.275	1.14	0.241	0.85	1.00	0.282	No
271	44.46	2.78	1.05	1.73	0.80	0.275	1.14	0.241	0.85	1.00	0.283	No
272	44.62	2.80	1.06	1.74	0.80	0.275	1.14	0.241	0.85	1.00	0.283	No
273	44.78	2.81	1.06	1.75	0.80	0.274	1.14	0.240	0.85	1.00	0.283	No
274	44.95	2.82	1.07	1.75	0.79	0.274	1.14	0.240	0.85	1.00	0.283	No
275	45.11	2.83	1.07	1.76	0.79	0.274	1.14	0.240	0.85	1.00	0.283	No
276	45.28	2.84	1.08	1.77	0.79	0.274	1.14	0.240	0.85	1.00	0.283	No
277	45.44	2.85	1.08	1.77	0.79	0.274	1.14	0.240	0.85	1.00	0.284	No
278	45.60	2.86	1.09	1.78	0.79	0.273	1.14	0.240	0.84	1.00	0.284	No
279	45.77	2.87	1.09	1.78	0.79	0.273	1.14	0.239	0.84	1.00	0.284	No
280	45.93	2.89	1.10	1.79	0.79	0.273	1.14	0.239	0.84	1.00	0.284	No
281	46.10	2.90	1.10	1.80	0.79	0.273	1.14	0.239	0.84	1.00	0.284	No
282	46.26	2.91	1.11	1.80	0.79	0.273	1.14	0.239	0.84	1.00	0.284	No
283	46.42	2.92	1.11	1.81	0.79	0.272	1.14	0.239	0.84	1.00	0.285	No
284	46.59	2.93	1.12	1.81	0.79	0.272	1.14	0.239	0.84	1.00	0.285	No
285	46.75	2.94	1.12	1.82	0.78	0.272	1.14	0.238	0.84	1.00	0.285	No
286	46.92	2.95	1.13	1.83	0.78	0.272	1.14	0.238	0.84	1.00	0.285	No
287	47.08	2.96	1.13	1.83	0.78	0.272	1.14	0.238	0.84	1.00	0.285	No
288	47.24	2.98	1.14	1.84	0.78	0.272	1.14	0.238	0.83	1.00	0.285	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
289	47.41	2.98	1.14	1.84	0.78	0.272	1.14	0.238	0.83	1.00	0.285	No
290	47.57	2.99	1.15	1.84	0.78	0.272	1.14	0.238	0.83	1.00	0.286	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	233.52	2.46	0.95	0.26	1.70	361.84	0.00	361.84	4.000	No	No	2.00
2	0.33	244.37	2.28	0.92	0.26	1.70	401.83	0.00	401.83	4.000	No	No	2.00
3	0.49	244.17	2.42	0.95	0.26	1.70	414.12	0.00	414.12	4.000	No	No	2.00
4	0.66	216.60	3.05	1.03	0.26	1.70	360.87	0.00	360.87	4.000	No	No	2.00
5	0.82	174.50	4.57	1.21	0.26	1.70	268.94	0.01	268.95	4.000	No	No	2.00
6	0.98	135.83	5.73	1.32	0.31	1.70	211.20	0.29	211.49	4.000	No	No	2.00
7	1.15	110.79	6.82	1.41	0.36	1.70	174.50	1.74	176.24	4.000	No	No	2.00
8	1.31	93.06	7.98	1.50	0.40	1.70	148.29	5.32	153.61	4.000	No	No	2.00
9	1.48	78.71	10.31	1.65	0.42	1.70	125.77	17.15	142.92	4.000	No	No	2.00
10	1.64	65.60	12.47	1.78	0.43	1.70	105.32	27.34	132.66	4.000	Yes	No	2.00
11	1.80	53.49	14.54	1.88	0.46	1.70	85.06	33.25	118.31	4.000	Yes	No	2.00
12	1.97	43.11	17.08	2.00	0.49	1.70	67.42	37.23	104.65	4.000	Yes	No	2.00
13	2.13	35.01	19.90	2.13	0.51	1.70	55.26	39.49	94.75	4.000	Yes	No	2.00
14	2.30	28.87	22.55	2.23	0.53	1.70	46.02	40.01	86.03	4.000	Yes	No	2.00
15	2.46	23.49	25.20	2.33	0.55	1.70	37.87	39.52	77.39	4.000	Yes	No	2.00
16	2.62	18.59	28.29	2.43	0.58	1.70	29.37	38.25	67.62	4.000	Yes	No	2.00
17	2.79	14.36	31.61	2.54	0.61	1.70	22.37	36.85	59.21	4.000	Yes	No	2.00
18	2.95	11.20	35.27	2.65	0.63	1.70	17.47	0.00	17.47	4.000	Yes	Yes	2.00
19	3.12	8.95	38.98	2.75	0.64	1.70	14.08	0.00	14.08	4.000	Yes	Yes	2.00
20	3.28	7.27	43.48	2.87	0.65	1.70	11.50	0.00	11.50	4.000	Yes	Yes	2.00
21	3.44	6.02	47.77	2.98	0.67	1.70	9.37	0.00	9.37	4.000	Yes	Yes	2.00
22	3.61	5.34	50.85	3.05	0.67	1.70	8.01	0.00	8.01	4.000	No	Yes	2.00
23	3.77	5.62	48.99	3.01	0.67	1.70	8.17	0.00	8.17	4.000	No	Yes	2.00
24	3.94	7.32	45.45	2.92	0.66	1.70	10.67	0.00	10.67	4.000	Yes	Yes	2.00
25	4.10	10.45	36.68	2.69	0.63	1.70	16.20	0.00	16.20	4.000	Yes	Yes	2.00
26	4.27	14.35	31.26	2.53	0.60	1.70	23.31	37.09	60.40	4.000	Yes	No	2.00
27	4.43	17.67	25.94	2.35	0.58	1.70	29.54	37.27	66.82	4.000	Yes	No	2.00
28	4.59	19.40	24.33	2.30	0.58	1.70	32.29	37.20	69.48	4.000	Yes	No	2.00
29	4.76	19.41	23.24	2.26	0.58	1.70	31.66	36.23	67.89	4.000	No	No	2.00
30	4.92	18.50	23.47	2.27	0.59	1.70	29.61	35.77	65.39	4.000	Yes	No	2.00
31	5.09	17.45	25.00	2.32	0.59	1.70	27.87	36.23	64.09	4.000	Yes	No	2.00
32	5.25	16.44	26.53	2.37	0.59	1.70	26.62	36.62	63.24	4.000	Yes	No	2.00
33	5.41	15.17	28.54	2.44	0.60	1.70	24.73	36.80	61.53	4.000	Yes	No	2.00
34	5.58	13.55	30.65	2.51	0.61	1.70	21.77	36.43	58.20	4.000	Yes	No	2.00
35	5.74	12.01	32.70	2.57	0.62	1.70	18.83	35.87	54.70	4.000	Yes	No	2.00
36	5.91	11.27	33.06	2.58	0.63	1.70	17.27	35.40	52.67	4.000	No	No	2.00
37	6.07	11.56	31.88	2.55	0.63	1.70	18.14	35.47	53.61	4.000	No	No	2.00
38	6.23	12.53	29.98	2.49	0.62	1.70	20.15	35.71	55.86	4.000	No	No	2.00
39	6.40	13.42	28.27	2.43	0.61	1.70	21.95	35.78	57.73	4.000	No	No	2.00
40	6.56	13.91	27.50	2.41	0.61	1.70	22.53	35.70	58.23	4.000	No	No	2.00
41	6.73	14.05	27.85	2.42	0.61	1.70	22.59	35.85	58.44	4.000	No	No	2.00
42	6.89	13.92	28.40	2.44	0.61	1.70	22.59	36.04	58.63	4.000	No	No	2.00
43	7.05	13.26	29.57	2.48	0.61	1.70	21.94	36.19	58.13	4.000	Yes	No	2.00
44	7.22	11.76	31.49	2.54	0.62	1.70	19.39	35.81	55.20	4.000	Yes	No	2.00
45	7.38	9.64	34.91	2.64	0.64	1.70	15.35	0.00	15.35	4.000	Yes	Yes	2.00
46	7.55	7.85	38.06	2.73	0.66	1.70	11.63	0.00	11.63	4.000	Yes	Yes	2.00
47	7.71	7.25	39.13	2.76	0.66	1.70	10.58	0.00	10.58	4.000	No	Yes	2.00
48	7.87	7.96	37.54	2.71	0.65	1.70	12.31	0.00	12.31	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
49	8.04	9.29	35.64	2.66	0.64	1.70	15.16	0.00	15.16	4.000	No	Yes	2.00
50	8.20	10.32	34.13	2.62	0.63	1.70	17.24	0.00	17.24	4.000	No	Yes	2.00
51	8.37	10.51	33.98	2.61	0.63	1.70	17.36	0.00	17.36	4.000	No	Yes	2.00
52	8.53	9.67	35.06	2.64	0.63	1.70	15.94	0.00	15.94	4.000	No	Yes	2.00
53	8.69	8.11	37.99	2.73	0.65	1.70	13.12	0.00	13.12	4.000	No	Yes	2.00
54	8.86	6.26	43.09	2.86	0.66	1.70	9.86	0.00	9.86	4.000	No	Yes	2.00
55	9.02	4.64	50.38	3.04	0.68	1.70	7.01	0.00	7.01	4.000	No	Yes	2.00
56	9.19	3.53	58.15	3.21	0.69	1.70	5.18	0.00	5.18	4.000	No	Yes	2.00
57	9.35	2.93	64.16	3.34	0.70	1.70	4.32	0.00	4.32	4.000	No	Yes	2.00
58	9.51	2.71	64.78	3.35	0.70	1.70	3.97	0.00	3.97	4.000	No	Yes	2.00
59	9.68	2.71	62.60	3.30	0.70	1.68	3.94	0.00	3.94	4.000	No	Yes	2.00
60	9.84	2.87	58.35	3.22	0.70	1.66	4.18	0.00	4.18	4.000	No	Yes	2.00
61	10.01	3.10	56.46	3.18	0.69	1.64	4.56	0.00	4.56	4.000	No	Yes	2.00
62	10.17	3.35	53.80	3.12	0.69	1.62	4.98	0.00	4.98	4.000	No	Yes	2.00
63	10.33	3.57	51.98	3.08	0.69	1.61	5.24	0.00	5.24	4.000	No	Yes	2.00
64	10.50	3.75	50.93	3.05	0.69	1.59	5.34	0.00	5.34	4.000	No	Yes	2.00
65	10.66	4.03	50.28	3.04	0.69	1.58	5.44	0.00	5.44	4.000	No	Yes	2.00
66	10.83	5.11	47.34	2.97	0.68	1.56	6.18	0.00	6.18	4.000	Yes	Yes	2.00
67	10.99	12.46	37.04	2.70	0.67	1.53	9.77	0.00	9.77	4.000	Yes	Yes	2.00
68	11.15	19.59	32.17	2.56	0.56	1.42	34.47	41.08	75.55	4.000	Yes	No	2.00
69	11.32	35.15	25.65	2.34	0.56	1.42	34.46	38.69	73.15	4.000	Yes	No	2.00
70	11.48	44.41	23.04	2.25	0.47	1.33	67.79	47.11	114.89	4.000	Yes	No	2.00
71	11.65	57.99	20.38	2.15	0.47	1.33	67.79	43.74	111.53	4.000	Yes	No	2.00
72	11.81	67.33	18.82	2.08	0.44	1.31	82.23	44.92	127.15	4.000	Yes	No	2.00
73	11.98	82.52	17.20	2.01	0.41	1.28	98.67	45.13	143.80	4.000	Yes	No	2.00
74	12.14	98.89	16.23	1.97	0.38	1.25	117.26	46.38	163.64	0.352	No	No	1.94
75	12.30	115.10	15.83	1.95	0.35	1.22	134.04	48.55	182.59	0.581	No	No	2.00
76	12.47	129.84	15.67	1.94	0.33	1.20	148.49	51.02	199.51	1.113	No	No	2.00
77	12.63	143.22	15.40	1.93	0.31	1.19	161.26	52.50	213.76	2.362	No	No	2.00
78	12.80	154.77	15.21	1.92	0.29	1.17	173.06	54.03	227.09	4.000	No	No	2.00
79	12.96	163.73	15.11	1.91	0.28	1.16	181.61	55.27	236.88	4.000	No	No	2.00
80	13.12	169.87	15.10	1.91	0.28	1.16	186.41	56.19	242.60	4.000	No	No	2.00
81	13.29	174.66	15.20	1.92	0.27	1.15	189.81	57.45	247.25	4.000	No	No	2.00
82	13.45	180.03	15.52	1.93	0.26	1.14	193.98	60.12	254.09	4.000	No	No	2.00
83	13.62	186.40	15.96	1.95	0.26	1.14	201.23	64.07	265.30	4.000	No	No	2.00
84	13.78	191.72	16.20	1.96	0.26	1.14	208.14	66.92	275.05	4.000	No	No	2.00
85	13.94	192.29	16.17	1.96	0.26	1.14	209.70	67.10	276.80	4.000	No	No	2.00
86	14.11	184.95	16.13	1.96	0.26	1.13	201.57	65.02	266.59	4.000	No	No	2.00
87	14.27	170.17	16.53	1.98	0.27	1.14	183.93	62.97	246.90	4.000	No	No	2.00
88	14.44	152.56	17.26	2.01	0.30	1.15	163.50	61.16	224.66	4.000	No	No	2.00
89	14.60	138.45	17.93	2.04	0.32	1.15	147.69	59.61	207.30	1.635	No	No	2.00
90	14.76	130.24	18.18	2.05	0.33	1.16	140.99	58.69	199.68	1.121	No	No	2.00
91	14.93	124.91	18.23	2.06	0.33	1.16	137.97	58.08	196.05	0.956	No	No	2.00
92	15.09	117.10	18.72	2.08	0.35	1.16	130.57	57.54	188.11	0.700	No	No	2.00
93	15.26	106.07	19.34	2.10	0.37	1.17	116.37	55.28	171.65	0.425	No	No	2.00
94	15.42	96.29	19.84	2.12	0.39	1.17	103.49	52.82	156.31	0.304	No	No	1.47
95	15.58	93.11	19.27	2.10	0.40	1.18	99.98	50.66	150.64	0.274	No	No	1.32
96	15.75	96.55	17.71	2.03	0.40	1.17	106.16	48.42	154.58	0.294	No	No	1.41

:: 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
97	15.91	102.44	16.02	1.96	0.39	1.16	113.84	44.82	158.66	0.318	No	No	1.52
98	16.08	106.81	15.13	1.91	0.39	1.16	117.89	42.21	160.09	0.327	No	No	1.56
99	16.24	109.10	15.14	1.91	0.38	1.15	119.16	42.51	161.66	0.337	No	No	1.61
100	16.40	109.41	15.43	1.93	0.38	1.15	120.05	43.88	163.93	0.354	No	No	1.68
101	16.57	106.21	16.12	1.96	0.38	1.15	117.72	46.06	163.77	0.353	No	No	1.67
102	16.73	97.24	17.63	2.03	0.39	1.15	108.16	48.71	156.87	0.307	No	No	1.44
103	16.90	83.04	20.11	2.13	0.42	1.15	91.27	49.93	141.20	0.236	No	No	1.10
104	17.06	67.15	23.08	2.25	0.45	1.17	72.75	48.67	121.42	0.183	No	No	0.84
105	17.22	54.64	26.03	2.36	0.49	1.18	57.75	46.40	104.15	0.149	No	No	0.68
106	17.39	49.80	25.79	2.35	0.51	1.18	51.29	44.17	95.46	0.135	No	No	0.62
107	17.55	55.09	22.96	2.25	0.50	1.17	56.91	43.71	100.61	0.144	No	No	0.65
108	17.72	69.17	18.83	2.08	0.46	1.16	74.00	42.75	116.74	0.173	No	No	0.79
109	17.88	85.59	17.44	2.02	0.42	1.14	94.87	44.86	139.73	0.231	No	No	1.05
110	18.04	95.77	16.51	1.98	0.40	1.13	107.32	45.06	152.38	0.283	No	No	1.29
111	18.21	93.93	16.77	1.99	0.40	1.13	104.67	45.28	149.96	0.271	No	No	1.23
112	18.37	81.54	17.96	2.04	0.43	1.13	88.56	44.64	133.21	0.212	No	No	0.95
113	18.54	65.53	21.07	2.17	0.47	1.14	68.45	44.94	113.39	0.166	No	No	0.74
114	18.70	54.00	24.26	2.29	0.50	1.15	54.42	44.08	98.50	0.140	No	No	0.62
115	18.86	50.97	25.87	2.35	0.51	1.15	51.98	44.44	96.42	0.137	No	No	0.61
116	19.03	55.13	24.92	2.32	0.49	1.14	58.28	45.81	104.08	0.149	No	No	0.66
117	19.19	61.95	23.88	2.28	0.47	1.13	66.68	47.59	114.26	0.168	No	No	0.74
118	19.36	69.27	22.80	2.24	0.46	1.12	72.57	48.31	120.88	0.181	No	No	0.80
119	19.52	77.71	21.26	2.18	0.44	1.11	80.22	48.64	128.86	0.200	No	No	0.88
120	19.69	89.55	18.55	2.07	0.42	1.11	91.70	46.85	138.55	0.228	No	No	1.00
121	19.85	102.94	15.68	1.94	0.40	1.10	107.98	42.26	150.24	0.272	No	No	1.20
122	20.01	114.69	14.31	1.87	0.39	1.09	120.27	39.01	159.29	0.321	No	No	1.41
123	20.18	120.04	14.46	1.88	0.38	1.09	126.59	40.91	167.51	0.384	No	No	1.68
124	20.34	119.33	15.23	1.92	0.38	1.08	123.09	43.72	166.81	0.378	No	No	1.65
125	20.51	115.93	15.76	1.94	0.38	1.08	117.13	44.58	161.72	0.338	No	No	1.47
126	20.67	116.51	15.09	1.91	0.39	1.08	115.68	41.58	157.26	0.309	No	No	1.34
127	20.83	123.58	13.45	1.83	0.39	1.08	124.33	35.43	159.75	0.324	No	No	1.41
128	21.00	134.44	11.66	1.73	0.38	1.08	137.89	26.89	164.78	0.361	No	No	1.56
129	21.16	143.32	10.99	1.69	0.37	1.07	147.52	23.53	171.04	0.418	No	No	1.81
130	21.33	147.40	11.30	1.71	0.36	1.07	149.80	25.88	175.68	0.473	No	No	2.00
131	21.49	148.64	11.63	1.73	0.36	1.06	148.87	28.01	176.88	0.489	No	No	2.00
132	21.65	151.21	11.65	1.73	0.36	1.06	150.01	28.29	178.30	0.509	No	No	2.00
133	21.82	157.68	11.37	1.71	0.35	1.06	156.36	27.05	183.41	0.596	No	No	2.00
134	21.98	168.16	11.01	1.69	0.34	1.05	166.79	25.62	192.41	0.823	No	No	2.00
135	22.15	181.36	10.63	1.67	0.33	1.05	179.49	23.90	203.39	1.338	No	No	2.00
136	22.31	196.01	10.06	1.64	0.31	1.05	193.63	20.56	214.19	2.426	No	No	2.00
137	22.47	211.38	9.52	1.60	0.30	1.04	208.13	17.23	225.36	4.000	No	No	2.00
138	22.64	226.00	9.13	1.58	0.28	1.04	222.73	14.94	237.67	4.000	No	No	2.00
139	22.80	238.97	9.04	1.57	0.27	1.04	234.45	14.72	249.18	4.000	No	No	2.00
140	22.97	249.58	9.11	1.57	0.26	1.03	244.16	15.79	259.95	4.000	No	No	2.00
141	23.13	259.02	9.24	1.58	0.26	1.03	252.18	17.30	269.47	4.000	No	No	2.00
142	23.29	268.48	9.41	1.59	0.26	1.03	260.76	19.30	280.05	4.000	No	No	2.00
143	23.46	278.93	9.58	1.60	0.26	1.03	270.56	21.44	291.99	4.000	No	No	2.00
144	23.62	290.81	9.73	1.61	0.26	1.03	281.41	23.68	305.08	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
145	23.79	304.17	9.87	1.62	0.26	1.02	294.00	25.90	319.90	4.000	No	No	2.00
146	23.95	318.51	9.95	1.63	0.26	1.02	308.03	27.81	335.84	4.000	No	No	2.00
147	24.11	332.19	9.76	1.62	0.26	1.02	321.57	26.52	348.09	4.000	No	No	2.00
148	24.28	343.22	9.62	1.61	0.26	1.02	332.14	25.61	357.74	4.000	No	No	2.00
149	24.44	352.00	9.45	1.60	0.26	1.02	338.43	24.06	362.48	4.000	No	No	2.00
150	24.61	360.57	9.56	1.60	0.26	1.02	345.32	25.69	371.01	4.000	No	No	2.00
151	24.77	371.62	9.68	1.61	0.26	1.01	355.24	27.82	383.06	4.000	No	No	2.00
152	24.93	384.17	9.86	1.62	0.26	1.01	368.53	30.84	399.37	4.000	No	No	2.00
153	25.10	395.80	10.02	1.63	0.26	1.01	379.70	33.68	413.37	4.000	No	No	2.00
154	25.26	404.24	10.06	1.64	0.26	1.01	386.85	34.85	421.70	4.000	No	No	2.00
155	25.43	410.88	10.07	1.64	0.26	1.01	390.88	35.26	426.14	4.000	No	No	2.00
156	25.59	419.89	10.14	1.64	0.26	1.01	396.81	36.61	433.42	4.000	No	No	2.00
157	25.75	437.75	10.17	1.64	0.26	1.01	410.69	38.16	448.86	4.000	No	No	2.00
158	25.92	468.21	10.19	1.64	0.26	1.00	439.84	40.67	480.50	4.000	No	No	2.00
159	26.08	511.90	10.16	1.64	0.26	1.00	481.47	43.39	524.86	4.000	No	No	2.00
160	26.25	561.29	10.27	1.65	0.26	1.00	532.56	49.31	581.87	4.000	No	No	2.00
161	26.41	607.76	10.40	1.66	0.26	1.00	577.55	55.36	632.92	4.000	No	No	2.00
162	26.57	639.20	10.46	1.66	0.26	1.00	610.39	59.23	669.62	4.000	No	No	2.00
163	26.74	651.27	10.40	1.66	0.26	1.00	618.60	58.64	677.24	4.000	No	No	2.00
164	26.90	644.22	10.33	1.65	0.26	0.99	608.72	56.55	665.28	4.000	No	No	2.00
165	27.07	627.47	10.43	1.66	0.26	0.99	587.76	56.82	644.58	4.000	No	No	2.00
166	27.23	608.75	10.66	1.67	0.26	0.99	568.99	59.52	628.51	4.000	No	No	2.00
167	27.40	592.41	10.78	1.68	0.26	0.99	553.66	60.42	614.08	4.000	No	No	2.00
168	27.56	576.66	10.81	1.68	0.26	0.99	539.51	59.51	599.03	4.000	No	No	2.00
169	27.72	560.01	10.80	1.68	0.26	0.99	522.42	57.82	580.25	4.000	No	No	2.00
170	27.89	544.34	10.98	1.69	0.26	0.99	504.79	59.26	564.05	4.000	No	No	2.00
171	28.05	534.81	11.25	1.71	0.26	0.98	493.53	62.58	556.11	4.000	No	No	2.00
172	28.22	533.70	11.51	1.72	0.26	0.98	493.60	66.98	560.58	4.000	No	No	2.00
173	28.38	537.60	11.63	1.73	0.26	0.98	499.45	69.80	569.25	4.000	No	No	2.00
174	28.54	540.79	11.52	1.72	0.26	0.98	502.14	68.18	570.32	4.000	No	No	2.00
175	28.71	542.42	11.38	1.71	0.26	0.98	500.26	65.63	565.89	4.000	No	No	2.00
176	28.87	546.36	11.36	1.71	0.26	0.98	501.85	65.45	567.29	4.000	No	No	2.00
177	29.04	553.79	11.51	1.72	0.26	0.98	510.85	69.09	579.95	4.000	No	No	2.00
178	29.20	558.94	11.65	1.73	0.26	0.97	518.60	72.43	591.03	4.000	No	No	2.00
179	29.36	554.25	11.70	1.73	0.26	0.97	513.78	72.62	586.40	4.000	No	No	2.00
180	29.53	539.29	11.59	1.73	0.26	0.97	495.83	68.56	564.39	4.000	No	No	2.00
181	29.69	519.91	11.56	1.73	0.26	0.97	475.45	65.82	541.26	4.000	No	No	2.00
182	29.86	501.97	11.66	1.73	0.26	0.97	458.59	65.38	523.97	4.000	No	No	2.00
183	30.02	485.98	11.91	1.75	0.26	0.97	444.67	67.42	512.09	4.000	No	No	2.00
184	30.18	472.00	11.91	1.74	0.26	0.97	429.81	65.51	495.31	4.000	No	No	2.00
185	30.35	461.48	11.74	1.74	0.26	0.97	418.55	61.66	480.21	4.000	No	No	2.00
186	30.51	458.03	11.55	1.72	0.26	0.96	414.19	58.44	472.62	4.000	No	No	2.00
187	30.68	463.04	11.37	1.71	0.26	0.96	418.63	56.33	474.96	4.000	No	No	2.00
188	30.84	475.75	11.26	1.71	0.26	0.96	430.49	56.00	486.49	4.000	No	No	2.00
189	31.00	493.64	11.17	1.70	0.26	0.96	447.10	56.38	503.48	4.000	No	No	2.00
190	31.17	511.85	11.23	1.71	0.26	0.96	465.48	59.32	524.79	4.000	No	No	2.00
191	31.33	526.80	11.27	1.71	0.26	0.96	478.16	61.38	539.54	4.000	No	No	2.00
192	31.50	536.99	11.35	1.71	0.26	0.96	485.77	63.50	549.27	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
193	31.66	547.27	11.35	1.71	0.26	0.96	491.20	64.08	555.28	4.000	No	No	2.00
194	31.82	562.93	11.33	1.71	0.26	0.95	504.00	65.07	569.08	4.000	No	No	2.00
195	31.99	586.05	11.25	1.71	0.26	0.95	526.04	66.15	592.19	4.000	No	No	2.00
196	32.15	609.95	11.22	1.71	0.26	0.95	551.41	68.29	619.70	4.000	No	No	2.00
197	32.32	623.68	11.27	1.71	0.26	0.95	566.25	70.83	637.08	4.000	No	No	2.00
198	32.48	619.86	11.32	1.71	0.26	0.95	561.04	71.27	632.30	4.000	No	No	2.00
199	32.64	601.92	11.44	1.72	0.26	0.95	539.26	71.04	610.30	4.000	No	No	2.00
200	32.81	582.88	11.49	1.72	0.26	0.95	516.09	69.25	585.35	4.000	No	No	2.00
201	32.97	578.03	11.30	1.71	0.26	0.95	508.07	65.10	573.17	4.000	No	No	2.00
202	33.14	595.01	11.16	1.70	0.26	0.94	524.27	64.41	588.69	4.000	No	No	2.00
203	33.30	630.98	11.08	1.70	0.26	0.94	559.48	66.56	626.05	4.000	No	No	2.00
204	33.46	672.95	11.22	1.71	0.26	0.94	601.57	73.69	675.26	4.000	No	No	2.00
205	33.63	707.58	11.24	1.71	0.26	0.94	634.18	77.69	711.87	4.000	No	No	2.00
206	33.79	725.07	11.10	1.70	0.26	0.94	649.60	76.30	725.90	4.000	No	No	2.00
207	33.96	725.13	10.98	1.69	0.26	0.94	646.24	73.34	719.57	4.000	No	No	2.00
208	34.12	712.22	10.92	1.69	0.26	0.94	632.17	70.75	702.92	4.000	No	No	2.00
209	34.28	693.63	11.05	1.70	0.26	0.94	613.40	71.52	684.92	4.000	No	No	2.00
210	34.45	674.37	11.00	1.69	0.26	0.94	595.02	68.63	663.65	4.000	No	No	2.00
211	34.61	657.10	10.88	1.69	0.26	0.93	578.94	64.76	643.70	4.000	No	No	2.00
212	34.78	643.78	10.82	1.68	0.26	0.93	565.62	62.25	627.87	4.000	No	No	2.00
213	34.94	634.79	10.98	1.69	0.26	0.93	557.72	64.56	622.29	4.000	No	No	2.00
214	35.10	631.90	11.16	1.70	0.26	0.93	553.39	67.42	620.82	4.000	No	No	2.00
215	35.27	633.73	11.22	1.71	0.26	0.93	556.02	68.89	624.92	4.000	No	No	2.00
216	35.43	637.76	11.23	1.71	0.26	0.93	560.62	69.59	630.22	4.000	No	No	2.00
217	35.60	635.84	11.25	1.71	0.26	0.93	561.92	70.12	632.04	4.000	No	No	2.00
218	35.76	620.80	11.33	1.71	0.26	0.93	549.03	70.17	619.20	4.000	No	No	2.00
219	35.93	590.37	11.44	1.72	0.26	0.93	519.18	68.82	588.00	4.000	No	No	2.00
220	36.09	552.07	11.52	1.72	0.26	0.92	480.30	65.64	545.94	4.000	No	No	2.00
221	36.25	517.81	11.58	1.73	0.26	0.92	447.00	62.77	509.77	4.000	No	No	2.00
222	36.42	495.41	11.63	1.73	0.26	0.92	427.92	61.14	489.06	4.000	No	No	2.00
223	36.58	483.74	11.63	1.73	0.26	0.92	420.24	60.34	480.58	4.000	No	No	2.00
224	36.75	477.64	11.65	1.73	0.26	0.92	414.97	59.90	474.87	4.000	No	No	2.00
225	36.91	475.18	11.61	1.73	0.26	0.92	410.53	58.87	469.40	4.000	No	No	2.00
226	37.07	480.56	11.59	1.73	0.26	0.92	412.38	58.80	471.18	4.000	No	No	2.00
227	37.24	497.80	11.55	1.72	0.26	0.92	427.58	60.06	487.63	4.000	No	No	2.00
228	37.40	525.31	11.34	1.71	0.26	0.92	453.91	59.81	513.72	4.000	No	No	2.00
229	37.57	553.50	11.20	1.70	0.26	0.92	482.27	60.59	542.87	4.000	No	No	2.00
230	37.73	571.93	11.06	1.70	0.26	0.91	499.09	60.05	559.13	4.000	No	No	2.00
231	37.89	575.56	11.07	1.70	0.26	0.91	500.03	60.32	560.35	4.000	No	No	2.00
232	38.06	569.89	10.98	1.69	0.26	0.91	490.10	57.84	547.94	4.000	No	No	2.00
233	38.22	562.80	10.88	1.69	0.26	0.91	482.95	55.38	538.33	4.000	No	No	2.00
234	38.39	556.74	10.76	1.68	0.26	0.91	480.19	53.05	533.24	4.000	No	No	2.00
235	38.55	542.99	10.79	1.68	0.26	0.91	472.97	53.01	525.98	4.000	No	No	2.00
236	38.71	512.32	11.05	1.70	0.26	0.91	446.05	54.36	500.41	4.000	No	No	2.00
237	38.88	465.40	11.64	1.73	0.26	0.91	399.89	58.08	457.97	4.000	No	No	2.00
238	39.04	417.66	12.49	1.78	0.26	0.91	350.99	62.63	413.61	4.000	No	No	2.00
239	39.21	390.11	13.12	1.81	0.26	0.91	322.14	65.26	387.40	4.000	No	No	2.00
240	39.37	391.97	13.00	1.80	0.26	0.90	327.98	64.93	392.90	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
241	39.53	408.12	12.14	1.76	0.26	0.90	354.60	58.81	413.41	4.000	No	No	2.00
242	39.70	408.13	11.52	1.72	0.26	0.90	362.42	52.04	414.45	4.000	No	No	2.00
243	39.86	367.59	12.32	1.77	0.26	0.90	326.99	57.24	384.24	4.000	Yes	No	2.00
244	40.03	295.53	14.62	1.89	0.26	0.90	250.06	65.85	315.90	4.000	Yes	No	2.00
245	40.19	217.19	18.81	2.08	0.27	0.90	177.09	70.18	247.27	4.000	Yes	No	2.00
246	40.35	160.01	23.01	2.25	0.35	0.87	122.12	63.66	185.78	4.000	Yes	No	2.00
247	40.52	126.09	26.72	2.38	0.39	0.85	98.43	60.02	158.46	4.000	Yes	No	2.00
248	40.68	109.80	28.48	2.44	0.42	0.84	85.23	56.80	142.03	4.000	Yes	No	2.00
249	40.85	102.87	29.21	2.46	0.43	0.84	78.93	55.07	134.00	0.214	No	No	0.84
250	41.01	104.69	29.02	2.46	0.43	0.84	79.99	55.33	135.32	0.218	No	No	0.86
251	41.17	113.58	28.15	2.43	0.41	0.84	89.40	58.00	147.39	0.260	No	No	1.02
252	41.34	124.24	27.57	2.41	0.38	0.85	101.61	61.65	163.26	0.349	No	No	1.37
253	41.50	129.61	28.14	2.43	0.37	0.85	107.49	63.96	171.44	0.422	No	No	1.65
254	41.67	129.80	28.76	2.45	0.38	0.85	103.14	62.89	166.03	0.371	No	No	1.45
255	41.83	136.45	27.99	2.42	0.38	0.85	101.62	61.93	163.55	0.351	No	No	1.38
256	41.99	168.25	23.71	2.27	0.34	0.86	124.36	65.30	189.67	0.741	No	No	2.00
257	42.16	232.09	18.40	2.06	0.26	0.89	187.76	71.58	259.33	4.000	No	No	2.00
258	42.32	314.10	14.38	1.88	0.26	0.89	267.26	67.33	334.59	4.000	No	No	2.00
259	42.49	385.74	12.30	1.77	0.26	0.89	334.76	58.08	392.84	4.000	No	No	2.00
260	42.65	427.96	11.44	1.72	0.26	0.89	367.69	51.56	419.25	4.000	No	No	2.00
261	42.81	441.49	11.51	1.72	0.26	0.89	372.76	53.05	425.82	4.000	No	No	2.00
262	42.98	441.14	11.78	1.74	0.26	0.89	367.88	56.05	423.93	4.000	No	No	2.00
263	43.14	441.16	12.01	1.75	0.26	0.88	365.77	58.71	424.48	4.000	No	No	2.00
264	43.31	448.41	11.92	1.75	0.26	0.88	371.76	58.28	430.04	4.000	No	No	2.00
265	43.47	462.32	11.62	1.73	0.26	0.88	384.99	55.98	440.97	4.000	No	No	2.00
266	43.64	477.94	11.28	1.71	0.26	0.88	399.47	52.88	452.36	4.000	No	No	2.00
267	43.80	491.94	10.95	1.69	0.26	0.88	409.61	49.25	458.86	4.000	No	No	2.00
268	43.96	507.19	10.51	1.66	0.26	0.88	418.78	43.65	462.43	4.000	No	No	2.00
269	44.13	528.93	10.37	1.65	0.26	0.88	436.30	43.06	479.36	4.000	No	No	2.00
270	44.29	559.41	10.33	1.65	0.26	0.88	462.46	44.67	507.13	4.000	No	No	2.00
271	44.46	594.09	10.43	1.66	0.26	0.88	493.05	48.76	541.82	4.000	No	No	2.00
272	44.62	628.43	10.56	1.67	0.26	0.88	521.04	53.34	574.38	4.000	No	No	2.00
273	44.78	658.59	10.72	1.68	0.26	0.88	546.21	58.65	604.86	4.000	No	No	2.00
274	44.95	680.94	11.06	1.70	0.26	0.88	566.37	66.84	633.21	4.000	No	No	2.00
275	45.11	691.40	11.22	1.71	0.26	0.87	575.31	70.83	646.13	4.000	No	No	2.00
276	45.28	687.61	11.24	1.71	0.26	0.87	570.77	70.83	641.60	4.000	No	No	2.00
277	45.44	674.99	11.15	1.70	0.26	0.87	555.75	67.52	623.27	4.000	No	No	2.00
278	45.60	661.88	11.16	1.70	0.26	0.87	542.57	66.39	608.97	4.000	No	No	2.00
279	45.77	654.94	11.21	1.71	0.26	0.87	537.06	66.68	603.74	4.000	No	No	2.00
280	45.93	653.63	11.15	1.70	0.26	0.87	537.12	65.59	602.71	4.000	No	No	2.00
281	46.10	654.33	10.95	1.69	0.26	0.87	537.53	61.94	599.46	4.000	No	No	2.00
282	46.26	656.26	10.69	1.67	0.26	0.87	537.12	57.27	594.39	4.000	No	No	2.00
283	46.42	661.59	10.59	1.67	0.26	0.87	540.35	55.63	595.98	4.000	No	No	2.00
284	46.59	671.91	10.57	1.67	0.26	0.87	549.05	56.04	605.09	4.000	No	No	2.00
285	46.75	686.31	10.62	1.67	0.26	0.87	560.78	58.12	618.89	4.000	No	No	2.00
286	46.92	702.13	10.63	1.67	0.26	0.87	574.12	59.41	633.54	4.000	No	No	2.00
287	47.08	719.12	8.07	1.50	0.26	0.86	586.55	16.33	602.88	4.000	No	No	2.00
288	47.24	735.86	4.78	1.23	0.26	0.86	601.01	0.04	601.04	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
289	47.41	750.32	39.69	2.77	0.26	0.86	613.85	0.00	613.85	4.000	No	Yes	2.00
290	47.57	758.64	39.94	2.78	0.26	0.86	621.08	0.00	621.08	4.000	No	Yes	2.00

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	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.05	0.00	0.33	2.00	0.00	0.00	0.05	0.00
0.49	2.00	0.00	0.00	0.05	0.00	0.66	2.00	0.00	0.00	0.05	0.00
0.82	2.00	0.00	0.00	0.05	0.00	0.98	2.00	0.00	0.00	0.05	0.00
1.15	2.00	0.00	0.00	0.05	0.00	1.31	2.00	0.00	0.00	0.05	0.00
1.48	2.00	0.00	0.00	0.05	0.00	1.64	2.00	0.00	0.00	0.05	0.00
1.80	2.00	0.00	0.00	0.05	0.00	1.97	2.00	0.00	0.00	0.05	0.00
2.13	2.00	0.00	0.00	0.05	0.00	2.30	2.00	0.00	0.00	0.05	0.00
2.46	2.00	0.00	0.00	0.05	0.00	2.62	2.00	0.00	0.00	0.05	0.00
2.79	2.00	0.00	0.00	0.05	0.00	2.95	2.00	0.00	0.00	0.05	0.00
3.12	2.00	0.00	0.00	0.05	0.00	3.28	2.00	0.00	0.00	0.05	0.00
3.44	2.00	0.00	0.00	0.05	0.00	3.61	2.00	0.00	0.00	0.05	0.00
3.77	2.00	0.00	0.00	0.05	0.00	3.94	2.00	0.00	0.00	0.05	0.00
4.10	2.00	0.00	0.00	0.05	0.00	4.27	2.00	0.00	0.00	0.05	0.00
4.43	2.00	0.00	0.00	0.05	0.00	4.59	2.00	0.00	0.00	0.05	0.00
4.76	2.00	0.00	0.00	0.05	0.00	4.92	2.00	0.00	0.00	0.05	0.00
5.09	2.00	0.00	0.00	0.05	0.00	5.25	2.00	0.00	0.00	0.05	0.00
5.41	2.00	0.00	0.00	0.05	0.00	5.58	2.00	0.00	0.00	0.05	0.00
5.74	2.00	0.00	0.00	0.05	0.00	5.91	2.00	0.00	0.00	0.05	0.00
6.07	2.00	0.00	0.00	0.05	0.00	6.23	2.00	0.00	0.00	0.05	0.00
6.40	2.00	0.00	0.00	0.05	0.00	6.56	2.00	0.00	0.00	0.05	0.00
6.73	2.00	0.00	0.00	0.05	0.00	6.89	2.00	0.00	0.00	0.05	0.00
7.05	2.00	0.00	0.00	0.05	0.00	7.22	2.00	0.00	0.00	0.05	0.00
7.38	2.00	0.00	0.00	0.05	0.00	7.55	2.00	0.00	0.00	0.05	0.00
7.71	2.00	0.00	0.00	0.05	0.00	7.87	2.00	0.00	0.00	0.05	0.00
8.04	2.00	0.00	0.00	0.05	0.00	8.20	2.00	0.00	0.00	0.05	0.00
8.37	2.00	0.00	0.00	0.05	0.00	8.53	2.00	0.00	0.00	0.05	0.00
8.69	2.00	0.00	0.00	0.05	0.00	8.86	2.00	0.00	0.00	0.05	0.00
9.02	2.00	0.00	0.00	0.05	0.00	9.19	2.00	0.00	0.00	0.05	0.00
9.35	2.00	0.00	0.00	0.05	0.00	9.51	2.00	0.00	0.00	0.05	0.00
9.68	2.00	0.00	0.00	0.05	0.00	9.84	2.00	0.00	0.00	0.05	0.00
10.01	2.00	0.00	0.00	0.05	0.00	10.17	2.00	0.00	0.00	0.05	0.00
10.33	2.00	0.00	0.00	0.05	0.00	10.50	2.00	0.00	0.00	0.05	0.00
10.66	2.00	0.00	0.00	0.05	0.00	10.83	2.00	0.00	0.00	0.05	0.00
10.99	2.00	0.00	0.00	0.05	0.00	11.15	2.00	0.00	0.00	0.05	0.00
11.32	2.00	0.00	0.00	0.05	0.00	11.48	2.00	0.00	0.00	0.05	0.00
11.65	2.00	0.00	0.00	0.05	0.00	11.81	2.00	0.00	0.00	0.05	0.00
11.98	2.00	0.00	0.00	0.05	0.00	12.14	1.94	0.00	0.00	0.05	0.00
12.30	2.00	0.00	0.00	0.05	0.00	12.47	2.00	0.00	0.00	0.05	0.00
12.63	2.00	0.00	0.00	0.05	0.00	12.80	2.00	0.00	0.00	0.05	0.00
12.96	2.00	0.00	0.00	0.05	0.00	13.12	2.00	0.00	0.00	0.05	0.00
13.29	2.00	0.00	0.00	0.05	0.00	13.45	2.00	0.00	0.00	0.05	0.00
13.62	2.00	0.00	0.00	0.05	0.00	13.78	2.00	0.00	0.00	0.05	0.00
13.94	2.00	0.00	0.00	0.05	0.00	14.11	2.00	0.00	0.00	0.05	0.00
14.27	2.00	0.00	0.00	0.05	0.00	14.44	2.00	0.00	0.00	0.05	0.00
14.60	2.00	0.00	0.00	0.05	0.00	14.76	2.00	0.00	0.00	0.05	0.00
14.93	2.00	0.00	0.00	0.05	0.00	15.09	2.00	0.00	0.00	0.05	0.00
15.26	2.00	0.00	0.00	0.05	0.00	15.42	1.47	0.00	0.00	0.05	0.00
15.58	1.32	0.00	0.00	0.05	0.00	15.75	1.41	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	1.52	0.00	0.00	0.05	0.00	16.08	1.56	0.00	0.00	0.05	0.00
16.24	1.61	0.00	0.00	0.05	0.00	16.40	1.68	0.00	0.00	0.05	0.00
16.57	1.67	0.00	0.00	0.05	0.00	16.73	1.44	0.00	0.00	0.05	0.00
16.90	1.10	0.00	0.00	0.05	0.00	17.06	0.84	0.00	0.00	0.05	0.06
17.22	0.68	0.00	0.00	0.05	0.11	17.39	0.62	0.00	0.00	0.05	0.15
17.55	0.65	0.00	0.00	0.05	0.12	17.72	0.79	0.00	0.00	0.05	0.08
17.88	1.05	0.00	0.00	0.05	0.00	18.04	1.29	0.00	0.00	0.05	0.00
18.21	1.23	0.00	0.00	0.05	0.00	18.37	0.95	0.00	0.00	0.05	0.02
18.54	0.74	0.00	0.00	0.05	0.10	18.70	0.62	0.00	0.00	0.05	0.13
18.86	0.61	0.00	0.00	0.05	0.14	19.03	0.66	0.00	0.00	0.05	0.13
19.19	0.74	0.00	0.00	0.05	0.09	19.36	0.80	0.00	0.00	0.05	0.07
19.52	0.88	0.00	0.00	0.05	0.04	19.69	1.00	0.00	0.00	0.05	0.00
19.85	1.20	0.00	0.00	0.05	0.00	20.01	1.41	0.00	0.00	0.05	0.00
20.18	1.68	0.00	0.00	0.05	0.00	20.34	1.65	0.00	0.00	0.05	0.00
20.51	1.47	0.00	0.00	0.05	0.00	20.67	1.34	0.00	0.00	0.05	0.00
20.83	1.41	0.00	0.00	0.05	0.00	21.00	1.56	0.00	0.00	0.05	0.00
21.16	1.81	0.00	0.00	0.05	0.00	21.33	2.00	0.00	0.00	0.05	0.00
21.49	2.00	0.00	0.00	0.05	0.00	21.65	2.00	0.00	0.00	0.05	0.00
21.82	2.00	0.00	0.00	0.05	0.00	21.98	2.00	0.00	0.00	0.05	0.00
22.15	2.00	0.00	0.00	0.05	0.00	22.31	2.00	0.00	0.00	0.05	0.00
22.47	2.00	0.00	0.00	0.05	0.00	22.64	2.00	0.00	0.00	0.05	0.00
22.80	2.00	0.00	0.00	0.05	0.00	22.97	2.00	0.00	0.00	0.05	0.00
23.13	2.00	0.00	0.00	0.05	0.00	23.29	2.00	0.00	0.00	0.05	0.00
23.46	2.00	0.00	0.00	0.05	0.00	23.62	2.00	0.00	0.00	0.05	0.00
23.79	2.00	0.00	0.00	0.05	0.00	23.95	2.00	0.00	0.00	0.05	0.00
24.11	2.00	0.00	0.00	0.05	0.00	24.28	2.00	0.00	0.00	0.05	0.00
24.44	2.00	0.00	0.00	0.05	0.00	24.61	2.00	0.00	0.00	0.05	0.00
24.77	2.00	0.00	0.00	0.05	0.00	24.93	2.00	0.00	0.00	0.05	0.00
25.10	2.00	0.00	0.00	0.05	0.00	25.26	2.00	0.00	0.00	0.05	0.00
25.43	2.00	0.00	0.00	0.05	0.00	25.59	2.00	0.00	0.00	0.05	0.00
25.75	2.00	0.00	0.00	0.05	0.00	25.92	2.00	0.00	0.00	0.05	0.00
26.08	2.00	0.00	0.00	0.05	0.00	26.25	2.00	0.00	0.00	0.05	0.00
26.41	2.00	0.00	0.00	0.05	0.00	26.57	2.00	0.00	0.00	0.05	0.00
26.74	2.00	0.00	0.00	0.05	0.00	26.90	2.00	0.00	0.00	0.05	0.00
27.07	2.00	0.00	0.00	0.05	0.00	27.23	2.00	0.00	0.00	0.05	0.00
27.40	2.00	0.00	0.00	0.05	0.00	27.56	2.00	0.00	0.00	0.05	0.00
27.72	2.00	0.00	0.00	0.05	0.00	27.89	2.00	0.00	0.00	0.05	0.00
28.05	2.00	0.00	0.00	0.05	0.00	28.22	2.00	0.00	0.00	0.05	0.00
28.38	2.00	0.00	0.00	0.05	0.00	28.54	2.00	0.00	0.00	0.05	0.00
28.71	2.00	0.00	0.00	0.05	0.00	28.87	2.00	0.00	0.00	0.05	0.00
29.04	2.00	0.00	0.00	0.05	0.00	29.20	2.00	0.00	0.00	0.05	0.00
29.36	2.00	0.00	0.00	0.05	0.00	29.53	2.00	0.00	0.00	0.05	0.00
29.69	2.00	0.00	0.00	0.05	0.00	29.86	2.00	0.00	0.00	0.05	0.00
30.02	2.00	0.00	0.00	0.05	0.00	30.18	2.00	0.00	0.00	0.05	0.00
30.35	2.00	0.00	0.00	0.05	0.00	30.51	2.00	0.00	0.00	0.05	0.00
30.68	2.00	0.00	0.00	0.05	0.00	30.84	2.00	0.00	0.00	0.05	0.00
31.00	2.00	0.00	0.00	0.05	0.00	31.17	2.00	0.00	0.00	0.05	0.00
31.33	2.00	0.00	0.00	0.05	0.00	31.50	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.05	0.00	31.82	2.00	0.00	0.00	0.05	0.00
31.99	2.00	0.00	0.00	0.05	0.00	32.15	2.00	0.00	0.00	0.05	0.00
32.32	2.00	0.00	0.00	0.05	0.00	32.48	2.00	0.00	0.00	0.05	0.00
32.64	2.00	0.00	0.00	0.05	0.00	32.81	2.00	0.00	0.00	0.05	0.00
32.97	2.00	0.00	0.00	0.05	0.00	33.14	2.00	0.00	0.00	0.05	0.00
33.30	2.00	0.00	0.00	0.05	0.00	33.46	2.00	0.00	0.00	0.05	0.00
33.63	2.00	0.00	0.00	0.05	0.00	33.79	2.00	0.00	0.00	0.05	0.00
33.96	2.00	0.00	0.00	0.05	0.00	34.12	2.00	0.00	0.00	0.05	0.00
34.28	2.00	0.00	0.00	0.05	0.00	34.45	2.00	0.00	0.00	0.05	0.00
34.61	2.00	0.00	0.00	0.05	0.00	34.78	2.00	0.00	0.00	0.05	0.00
34.94	2.00	0.00	0.00	0.05	0.00	35.10	2.00	0.00	0.00	0.05	0.00
35.27	2.00	0.00	0.00	0.05	0.00	35.43	2.00	0.00	0.00	0.05	0.00
35.60	2.00	0.00	0.00	0.05	0.00	35.76	2.00	0.00	0.00	0.05	0.00
35.93	2.00	0.00	0.00	0.05	0.00	36.09	2.00	0.00	0.00	0.05	0.00
36.25	2.00	0.00	0.00	0.05	0.00	36.42	2.00	0.00	0.00	0.05	0.00
36.58	2.00	0.00	0.00	0.05	0.00	36.75	2.00	0.00	0.00	0.05	0.00
36.91	2.00	0.00	0.00	0.05	0.00	37.07	2.00	0.00	0.00	0.05	0.00
37.24	2.00	0.00	0.00	0.05	0.00	37.40	2.00	0.00	0.00	0.05	0.00
37.57	2.00	0.00	0.00	0.05	0.00	37.73	2.00	0.00	0.00	0.05	0.00
37.89	2.00	0.00	0.00	0.05	0.00	38.06	2.00	0.00	0.00	0.05	0.00
38.22	2.00	0.00	0.00	0.05	0.00	38.39	2.00	0.00	0.00	0.05	0.00
38.55	2.00	0.00	0.00	0.05	0.00	38.71	2.00	0.00	0.00	0.05	0.00
38.88	2.00	0.00	0.00	0.05	0.00	39.04	2.00	0.00	0.00	0.05	0.00
39.21	2.00	0.00	0.00	0.05	0.00	39.37	2.00	0.00	0.00	0.05	0.00
39.53	2.00	0.00	0.00	0.05	0.00	39.70	2.00	0.00	0.00	0.05	0.00
39.86	2.00	0.00	0.00	0.05	0.00	40.03	2.00	0.00	0.00	0.05	0.00
40.19	2.00	0.00	0.00	0.05	0.00	40.35	2.00	0.00	0.00	0.05	0.00
40.52	2.00	0.00	0.00	0.05	0.00	40.68	2.00	0.00	0.00	0.05	0.00
40.85	0.84	0.00	0.00	0.05	0.03	41.01	0.86	0.00	0.00	0.05	0.03
41.17	1.02	0.00	0.00	0.05	0.00	41.34	1.37	0.00	0.00	0.05	0.00
41.50	1.65	0.00	0.00	0.05	0.00	41.67	1.45	0.00	0.00	0.05	0.00
41.83	1.38	0.00	0.00	0.05	0.00	41.99	2.00	0.00	0.00	0.05	0.00
42.16	2.00	0.00	0.00	0.05	0.00	42.32	2.00	0.00	0.00	0.05	0.00
42.49	2.00	0.00	0.00	0.05	0.00	42.65	2.00	0.00	0.00	0.05	0.00
42.81	2.00	0.00	0.00	0.05	0.00	42.98	2.00	0.00	0.00	0.05	0.00
43.14	2.00	0.00	0.00	0.05	0.00	43.31	2.00	0.00	0.00	0.05	0.00
43.47	2.00	0.00	0.00	0.05	0.00	43.64	2.00	0.00	0.00	0.05	0.00
43.80	2.00	0.00	0.00	0.05	0.00	43.96	2.00	0.00	0.00	0.05	0.00
44.13	2.00	0.00	0.00	0.05	0.00	44.29	2.00	0.00	0.00	0.05	0.00
44.46	2.00	0.00	0.00	0.05	0.00	44.62	2.00	0.00	0.00	0.05	0.00
44.78	2.00	0.00	0.00	0.05	0.00	44.95	2.00	0.00	0.00	0.05	0.00
45.11	2.00	0.00	0.00	0.05	0.00	45.28	2.00	0.00	0.00	0.05	0.00
45.44	2.00	0.00	0.00	0.05	0.00	45.60	2.00	0.00	0.00	0.05	0.00
45.77	2.00	0.00	0.00	0.05	0.00	45.93	2.00	0.00	0.00	0.05	0.00
46.10	2.00	0.00	0.00	0.05	0.00	46.26	2.00	0.00	0.00	0.05	0.00
46.42	2.00	0.00	0.00	0.05	0.00	46.59	2.00	0.00	0.00	0.05	0.00
46.75	2.00	0.00	0.00	0.05	0.00	46.92	2.00	0.00	0.00	0.05	0.00
47.08	2.00	0.00	0.00	0.05	0.00	47.24	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.05	0.00	47.57	2.00	0.00	0.00	0.05	0.00

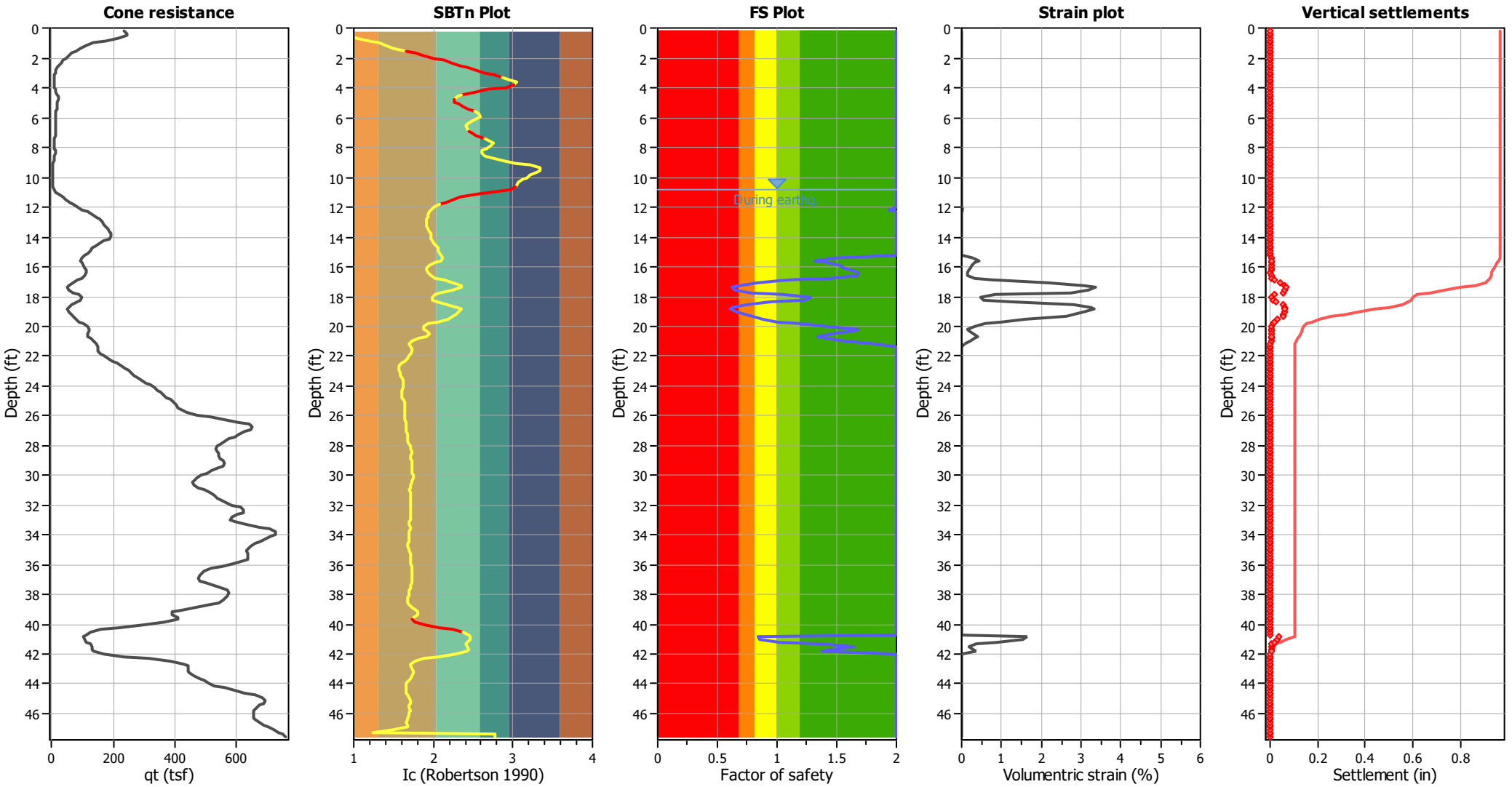
Overall liquefaction potential: 1.29

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
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)
10.83	6.18	2.00	0.00	1.00	0.00	10.99	9.77	2.00	0.00	1.00	0.00
11.15	75.55	2.00	0.00	1.00	0.00	11.32	73.15	2.00	0.00	1.00	0.00
11.48	114.89	2.00	0.00	1.00	0.00	11.65	111.53	2.00	0.00	1.00	0.00
11.81	127.15	2.00	0.00	1.00	0.00	11.98	143.80	2.00	0.00	1.00	0.00
12.14	163.64	1.94	0.02	1.00	0.00	12.30	182.59	2.00	0.00	1.00	0.00
12.47	199.51	2.00	0.00	1.00	0.00	12.63	213.76	2.00	0.00	1.00	0.00
12.80	227.09	2.00	0.00	1.00	0.00	12.96	236.88	2.00	0.00	1.00	0.00
13.12	242.60	2.00	0.00	1.00	0.00	13.29	247.25	2.00	0.00	1.00	0.00
13.45	254.09	2.00	0.00	1.00	0.00	13.62	265.30	2.00	0.00	1.00	0.00
13.78	275.05	2.00	0.00	1.00	0.00	13.94	276.80	2.00	0.00	1.00	0.00
14.11	266.59	2.00	0.00	1.00	0.00	14.27	246.90	2.00	0.00	1.00	0.00
14.44	224.66	2.00	0.00	1.00	0.00	14.60	207.30	2.00	0.00	1.00	0.00
14.76	199.68	2.00	0.00	1.00	0.00	14.93	196.05	2.00	0.00	1.00	0.00
15.09	188.11	2.00	0.00	1.00	0.00	15.26	171.65	2.00	0.00	1.00	0.00
15.42	156.31	1.47	0.29	1.00	0.01	15.58	150.64	1.32	0.43	1.00	0.01
15.75	154.58	1.41	0.34	1.00	0.01	15.91	158.66	1.52	0.25	1.00	0.00
16.08	160.09	1.56	0.23	1.00	0.00	16.24	161.66	1.61	0.20	1.00	0.00
16.40	163.93	1.68	0.15	1.00	0.00	16.57	163.77	1.67	0.16	1.00	0.00
16.73	156.87	1.44	0.32	1.00	0.01	16.90	141.20	1.10	0.76	1.00	0.02
17.06	121.42	0.84	2.16	1.00	0.04	17.22	104.15	0.68	3.08	1.00	0.06
17.39	95.46	0.62	3.37	1.00	0.07	17.55	100.61	0.65	3.19	1.00	0.06
17.72	116.74	0.79	2.73	1.00	0.06	17.88	139.73	1.05	0.86	1.00	0.02
18.04	152.38	1.29	0.47	1.00	0.01	18.21	149.96	1.23	0.54	1.00	0.01
18.37	133.21	0.95	1.19	1.00	0.02	18.54	113.39	0.74	2.82	1.00	0.06
18.70	98.50	0.62	3.26	1.00	0.06	18.86	96.42	0.61	3.33	1.00	0.06
19.03	104.08	0.66	3.08	1.00	0.06	19.19	114.26	0.74	2.80	1.00	0.05
19.36	120.88	0.80	2.63	1.00	0.05	19.52	128.86	0.88	1.60	1.00	0.03
19.69	138.55	1.00	1.00	1.00	0.02	19.85	150.24	1.20	0.58	1.00	0.01
20.01	159.29	1.41	0.34	1.00	0.01	20.18	167.51	1.68	0.15	1.00	0.00
20.34	166.81	1.65	0.17	1.00	0.00	20.51	161.72	1.47	0.29	1.00	0.01
20.67	157.26	1.34	0.40	1.00	0.01	20.83	159.75	1.41	0.34	1.00	0.01
21.00	164.78	1.56	0.22	1.00	0.00	21.16	171.04	1.81	0.08	1.00	0.00
21.33	175.68	2.00	0.00	1.00	0.00	21.49	176.88	2.00	0.00	1.00	0.00
21.65	178.30	2.00	0.00	1.00	0.00	21.82	183.41	2.00	0.00	1.00	0.00
21.98	192.41	2.00	0.00	1.00	0.00	22.15	203.39	2.00	0.00	1.00	0.00
22.31	214.19	2.00	0.00	1.00	0.00	22.47	225.36	2.00	0.00	1.00	0.00
22.64	237.67	2.00	0.00	1.00	0.00	22.80	249.18	2.00	0.00	1.00	0.00
22.97	259.95	2.00	0.00	1.00	0.00	23.13	269.47	2.00	0.00	1.00	0.00
23.29	280.05	2.00	0.00	1.00	0.00	23.46	291.99	2.00	0.00	1.00	0.00
23.62	305.08	2.00	0.00	1.00	0.00	23.79	319.90	2.00	0.00	1.00	0.00
23.95	335.84	2.00	0.00	1.00	0.00	24.11	348.09	2.00	0.00	1.00	0.00
24.28	357.74	2.00	0.00	1.00	0.00	24.44	362.48	2.00	0.00	1.00	0.00
24.61	371.01	2.00	0.00	1.00	0.00	24.77	383.06	2.00	0.00	1.00	0.00
24.93	399.37	2.00	0.00	1.00	0.00	25.10	413.37	2.00	0.00	1.00	0.00
25.26	421.70	2.00	0.00	1.00	0.00	25.43	426.14	2.00	0.00	1.00	0.00
25.59	433.42	2.00	0.00	1.00	0.00	25.75	448.86	2.00	0.00	1.00	0.00
25.92	480.50	2.00	0.00	1.00	0.00	26.08	524.86	2.00	0.00	1.00	0.00
26.25	581.87	2.00	0.00	1.00	0.00	26.41	632.92	2.00	0.00	1.00	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)
26.57	669.62	2.00	0.00	1.00	0.00	26.74	677.24	2.00	0.00	1.00	0.00
26.90	665.28	2.00	0.00	1.00	0.00	27.07	644.58	2.00	0.00	1.00	0.00
27.23	628.51	2.00	0.00	1.00	0.00	27.40	614.08	2.00	0.00	1.00	0.00
27.56	599.03	2.00	0.00	1.00	0.00	27.72	580.25	2.00	0.00	1.00	0.00
27.89	564.05	2.00	0.00	1.00	0.00	28.05	556.11	2.00	0.00	1.00	0.00
28.22	560.58	2.00	0.00	1.00	0.00	28.38	569.25	2.00	0.00	1.00	0.00
28.54	570.32	2.00	0.00	1.00	0.00	28.71	565.89	2.00	0.00	1.00	0.00
28.87	567.29	2.00	0.00	1.00	0.00	29.04	579.95	2.00	0.00	1.00	0.00
29.20	591.03	2.00	0.00	1.00	0.00	29.36	586.40	2.00	0.00	1.00	0.00
29.53	564.39	2.00	0.00	1.00	0.00	29.69	541.26	2.00	0.00	1.00	0.00
29.86	523.97	2.00	0.00	1.00	0.00	30.02	512.09	2.00	0.00	1.00	0.00
30.18	495.31	2.00	0.00	1.00	0.00	30.35	480.21	2.00	0.00	1.00	0.00
30.51	472.62	2.00	0.00	1.00	0.00	30.68	474.96	2.00	0.00	1.00	0.00
30.84	486.49	2.00	0.00	1.00	0.00	31.00	503.48	2.00	0.00	1.00	0.00
31.17	524.79	2.00	0.00	1.00	0.00	31.33	539.54	2.00	0.00	1.00	0.00
31.50	549.27	2.00	0.00	1.00	0.00	31.66	555.28	2.00	0.00	1.00	0.00
31.82	569.08	2.00	0.00	1.00	0.00	31.99	592.19	2.00	0.00	1.00	0.00
32.15	619.70	2.00	0.00	1.00	0.00	32.32	637.08	2.00	0.00	1.00	0.00
32.48	632.30	2.00	0.00	1.00	0.00	32.64	610.30	2.00	0.00	1.00	0.00
32.81	585.35	2.00	0.00	1.00	0.00	32.97	573.17	2.00	0.00	1.00	0.00
33.14	588.69	2.00	0.00	1.00	0.00	33.30	626.05	2.00	0.00	1.00	0.00
33.46	675.26	2.00	0.00	1.00	0.00	33.63	711.87	2.00	0.00	1.00	0.00
33.79	725.90	2.00	0.00	1.00	0.00	33.96	719.57	2.00	0.00	1.00	0.00
34.12	702.92	2.00	0.00	1.00	0.00	34.28	684.92	2.00	0.00	1.00	0.00
34.45	663.65	2.00	0.00	1.00	0.00	34.61	643.70	2.00	0.00	1.00	0.00
34.78	627.87	2.00	0.00	1.00	0.00	34.94	622.29	2.00	0.00	1.00	0.00
35.10	620.82	2.00	0.00	1.00	0.00	35.27	624.92	2.00	0.00	1.00	0.00
35.43	630.22	2.00	0.00	1.00	0.00	35.60	632.04	2.00	0.00	1.00	0.00
35.76	619.20	2.00	0.00	1.00	0.00	35.93	588.00	2.00	0.00	1.00	0.00
36.09	545.94	2.00	0.00	1.00	0.00	36.25	509.77	2.00	0.00	1.00	0.00
36.42	489.06	2.00	0.00	1.00	0.00	36.58	480.58	2.00	0.00	1.00	0.00
36.75	474.87	2.00	0.00	1.00	0.00	36.91	469.40	2.00	0.00	1.00	0.00
37.07	471.18	2.00	0.00	1.00	0.00	37.24	487.63	2.00	0.00	1.00	0.00
37.40	513.72	2.00	0.00	1.00	0.00	37.57	542.87	2.00	0.00	1.00	0.00
37.73	559.13	2.00	0.00	1.00	0.00	37.89	560.35	2.00	0.00	1.00	0.00
38.06	547.94	2.00	0.00	1.00	0.00	38.22	538.33	2.00	0.00	1.00	0.00
38.39	533.24	2.00	0.00	1.00	0.00	38.55	525.98	2.00	0.00	1.00	0.00
38.71	500.41	2.00	0.00	1.00	0.00	38.88	457.97	2.00	0.00	1.00	0.00
39.04	413.61	2.00	0.00	1.00	0.00	39.21	387.40	2.00	0.00	1.00	0.00
39.37	392.90	2.00	0.00	1.00	0.00	39.53	413.41	2.00	0.00	1.00	0.00
39.70	414.45	2.00	0.00	1.00	0.00	39.86	384.24	2.00	0.00	1.00	0.00
40.03	315.90	2.00	0.00	1.00	0.00	40.19	247.27	2.00	0.00	1.00	0.00
40.35	185.78	2.00	0.00	1.00	0.00	40.52	158.46	2.00	0.00	1.00	0.00
40.68	142.03	2.00	0.00	1.00	0.00	40.85	134.00	0.84	1.65	1.00	0.03
41.01	135.32	0.86	1.54	1.00	0.03	41.17	147.39	1.02	0.88	1.00	0.02
41.34	163.26	1.37	0.37	1.00	0.01	41.50	171.44	1.65	0.17	1.00	0.00
41.67	166.03	1.45	0.30	1.00	0.01	41.83	163.55	1.38	0.36	1.00	0.01
41.99	189.67	2.00	0.00	1.00	0.00	42.16	259.33	2.00	0.00	1.00	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)
42.32	334.59	2.00	0.00	1.00	0.00	42.49	392.84	2.00	0.00	1.00	0.00
42.65	419.25	2.00	0.00	1.00	0.00	42.81	425.82	2.00	0.00	1.00	0.00
42.98	423.93	2.00	0.00	1.00	0.00	43.14	424.48	2.00	0.00	1.00	0.00
43.31	430.04	2.00	0.00	1.00	0.00	43.47	440.97	2.00	0.00	1.00	0.00
43.64	452.36	2.00	0.00	1.00	0.00	43.80	458.86	2.00	0.00	1.00	0.00
43.96	462.43	2.00	0.00	1.00	0.00	44.13	479.36	2.00	0.00	1.00	0.00
44.29	507.13	2.00	0.00	1.00	0.00	44.46	541.82	2.00	0.00	1.00	0.00
44.62	574.38	2.00	0.00	1.00	0.00	44.78	604.86	2.00	0.00	1.00	0.00
44.95	633.21	2.00	0.00	1.00	0.00	45.11	646.13	2.00	0.00	1.00	0.00
45.28	641.60	2.00	0.00	1.00	0.00	45.44	623.27	2.00	0.00	1.00	0.00
45.60	608.97	2.00	0.00	1.00	0.00	45.77	603.74	2.00	0.00	1.00	0.00
45.93	602.71	2.00	0.00	1.00	0.00	46.10	599.46	2.00	0.00	1.00	0.00
46.26	594.39	2.00	0.00	1.00	0.00	46.42	595.98	2.00	0.00	1.00	0.00
46.59	605.09	2.00	0.00	1.00	0.00	46.75	618.89	2.00	0.00	1.00	0.00
46.92	633.54	2.00	0.00	1.00	0.00	47.08	602.88	2.00	0.00	1.00	0.00
47.24	601.04	2.00	0.00	1.00	0.00	47.41	613.85	2.00	0.00	1.00	0.00
47.57	621.08	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.97

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	233.52	375.16	1.00	375.16	0.95	N/A	N/A
0.33	244.37	392.58	1.00	392.58	0.92	N/A	N/A
0.49	244.17	392.24	1.00	392.24	0.95	N/A	N/A
0.66	216.60	347.93	1.00	347.93	1.03	N/A	N/A
0.82	174.50	280.28	1.00	280.28	1.21	N/A	N/A
0.98	135.83	218.13	1.00	218.13	1.32	N/A	N/A
1.15	110.79	177.89	1.00	177.89	1.41	N/A	N/A
1.31	93.06	149.40	1.00	149.40	1.50	N/A	N/A
1.48	78.71	126.33	1.00	126.86	1.65	N/A	N/A
1.64	65.60	105.24	1.09	114.68	1.78	N/A	N/A
1.80	53.49	85.78	1.17	100.74	1.88	N/A	N/A
1.97	43.11	69.08	1.31	90.24	2.00	N/A	N/A
2.13	35.01	56.05	1.50	84.29	2.13	N/A	N/A
2.30	28.87	46.17	1.75	80.61	2.23	N/A	N/A
2.46	23.49	37.52	2.04	76.63	2.33	N/A	N/A
2.62	18.59	29.62	2.46	72.80	2.43	N/A	N/A
2.79	14.36	22.82	2.98	68.00	2.54	N/A	N/A
2.95	11.20	17.73	3.64	64.59	2.65	N/A	N/A
3.12	8.95	14.10	4.40	62.07	2.75	N/A	N/A
3.28	7.27	11.39	5.43	61.81	2.87	N/A	N/A
3.44	6.02	9.37	6.50	60.85	2.98	N/A	N/A
3.61	5.34	8.26	7.32	60.42	3.05	N/A	N/A
3.77	5.62	8.69	6.82	59.27	3.01	N/A	N/A
3.94	7.32	11.42	5.91	67.44	2.92	N/A	N/A
4.10	10.45	16.43	3.92	64.44	2.69	N/A	N/A
4.27	14.35	22.68	2.92	66.26	2.53	N/A	N/A
4.43	17.67	28.00	2.14	59.79	2.35	N/A	N/A
4.59	19.40	30.77	1.94	59.64	2.30	N/A	N/A
4.76	19.41	30.77	1.82	55.95	2.26	N/A	N/A
4.92	18.50	29.29	1.84	53.97	2.27	N/A	N/A
5.09	17.45	27.59	2.02	55.69	2.32	N/A	N/A
5.25	16.44	25.95	2.21	57.42	2.37	N/A	N/A
5.41	15.17	23.91	2.49	59.61	2.44	N/A	N/A
5.58	13.55	21.29	2.82	60.08	2.51	N/A	N/A
5.74	12.01	18.79	3.17	59.55	2.57	N/A	N/A
5.91	11.27	17.60	3.23	56.90	2.58	N/A	N/A
6.07	11.56	18.05	3.03	54.61	2.55	N/A	N/A
6.23	12.53	19.60	2.71	53.19	2.49	N/A	N/A
6.40	13.42	21.01	2.45	51.56	2.43	N/A	N/A
6.56	13.91	21.79	2.34	51.09	2.41	N/A	N/A
6.73	14.05	21.99	2.39	52.62	2.42	N/A	N/A
6.89	13.92	21.78	2.47	53.84	2.44	N/A	N/A
7.05	13.26	20.70	2.65	54.82	2.48	N/A	N/A
7.22	11.76	18.27	2.96	54.08	2.54	N/A	N/A
7.38	9.64	14.86	3.58	53.13	2.64	N/A	N/A
7.55	7.85	11.98	4.21	50.38	2.73	N/A	N/A
7.71	7.25	10.99	4.43	48.71	2.76	N/A	N/A
7.87	7.96	12.11	4.10	49.65	2.71	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	9.29	14.25	3.72	52.97	2.66	N/A	N/A
8.20	10.32	15.89	3.43	54.48	2.62	N/A	N/A
8.37	10.51	16.17	3.40	54.99	2.61	N/A	N/A
8.53	9.67	14.81	3.60	53.37	2.64	N/A	N/A
8.69	8.11	12.30	4.19	51.57	2.73	N/A	N/A
8.86	6.26	9.31	5.33	49.67	2.86	N/A	N/A
9.02	4.64	6.70	7.19	48.15	3.04	N/A	N/A
9.19	3.53	4.90	9.41	46.11	3.21	N/A	N/A
9.35	2.93	3.93	11.27	44.27	3.34	N/A	N/A
9.51	2.71	3.55	11.47	40.72	3.35	N/A	N/A
9.68	2.71	3.55	10.77	38.22	3.30	N/A	N/A
9.84	2.87	3.79	9.47	35.91	3.22	N/A	N/A
10.01	3.10	4.15	8.91	36.94	3.18	N/A	N/A
10.17	3.35	4.54	8.14	36.98	3.12	N/A	N/A
10.33	3.57	4.88	7.63	37.22	3.08	N/A	N/A
10.50	3.75	5.16	7.34	37.86	3.05	N/A	N/A
10.66	4.03	5.60	7.16	40.08	3.04	N/A	N/A
10.83	5.11	7.32	6.39	46.74	2.97	0.05	0.59
10.99	12.46	19.11	4.00	76.37	2.70	0.05	1.52
11.15	19.59	30.55	3.08	93.98	2.56	0.07	0.67
11.32	35.15	52.88	2.10	110.95	2.34	0.07	0.74
11.48	44.41	65.14	1.80	117.01	2.25	0.11	0.77
11.65	57.99	82.78	1.54	127.77	2.15	0.10	0.80
11.81	67.33	94.29	1.42	133.99	2.08	0.12	0.82
11.98	82.52	113.27	1.31	148.77	2.01	0.15	0.84
12.14	98.89	133.85	1.26	168.37	1.97	0.19	0.87
12.30	115.10	154.45	1.24	190.94	1.95	0.25	0.89
12.47	129.84	173.05	1.23	212.51	1.94	0.34	0.91
12.63	143.22	189.42	1.21	230.10	1.93	0.45	0.92
12.80	154.77	203.21	1.21	245.00	1.92	0.63	0.93
12.96	163.73	213.66	1.20	256.59	1.91	0.84	0.94
13.12	169.87	220.48	1.20	264.66	1.91	0.94	0.94
13.29	174.66	225.65	1.21	271.92	1.92	0.95	0.95
13.45	180.03	232.07	1.22	283.32	1.93	0.95	0.95
13.62	186.40	239.87	1.24	298.23	1.95	0.96	0.96
13.78	191.72	245.90	1.26	308.92	1.96	0.96	0.96
13.94	192.29	245.20	1.25	307.63	1.96	0.96	0.96
14.11	184.95	234.36	1.25	293.44	1.96	0.95	0.95
14.27	170.17	215.12	1.27	274.14	1.98	0.94	0.94
14.44	152.56	192.78	1.32	253.86	2.01	0.51	0.92
14.60	138.45	174.82	1.36	237.65	2.04	0.35	0.91
14.76	130.24	163.83	1.38	225.49	2.05	0.30	0.90
14.93	124.91	156.27	1.38	215.65	2.06	0.28	0.89
15.09	117.10	146.18	1.41	206.70	2.08	0.25	0.88
15.26	106.07	132.14	1.46	192.90	2.10	0.20	0.87
15.42	96.29	119.62	1.50	179.32	2.12	0.16	0.85
15.58	93.11	114.65	1.45	166.75	2.10	0.15	0.85
15.75	96.55	117.13	1.34	157.54	2.03	0.16	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	102.44	122.38	1.25	152.54	1.96	0.18	0.86
16.08	106.81	126.29	1.20	151.78	1.91	0.19	0.86
16.24	109.10	128.49	1.20	154.48	1.91	0.19	0.86
16.40	109.41	128.56	1.22	156.34	1.93	0.20	0.86
16.57	106.21	124.77	1.25	156.17	1.96	0.19	0.86
16.73	97.24	114.70	1.34	153.71	2.03	0.17	0.85
16.90	83.04	98.68	1.52	150.14	2.13	0.14	0.83
17.06	67.15	80.41	1.80	144.80	2.25	0.11	0.80
17.22	54.64	65.78	2.15	141.23	2.36	0.10	0.77
17.39	49.80	59.47	2.12	125.84	2.35	0.09	0.76
17.55	55.09	64.77	1.79	115.79	2.25	0.09	0.77
17.72	69.17	79.66	1.42	113.25	2.08	0.11	0.80
17.88	85.59	97.74	1.33	129.79	2.02	0.14	0.82
18.04	95.77	108.52	1.27	138.17	1.98	0.16	0.84
18.21	93.93	106.10	1.29	136.68	1.99	0.16	0.84
18.37	81.54	92.13	1.36	125.47	2.04	0.13	0.82
18.54	65.53	74.52	1.60	119.52	2.17	0.10	0.79
18.70	54.00	61.71	1.93	119.14	2.29	0.09	0.76
18.86	50.97	58.26	2.13	123.86	2.35	0.09	0.75
19.03	55.13	62.58	2.01	125.72	2.32	0.09	0.76
19.19	61.95	69.89	1.89	131.95	2.28	0.10	0.78
19.36	69.27	77.61	1.77	137.48	2.24	0.11	0.79
19.52	77.71	86.34	1.62	139.95	2.18	0.12	0.81
19.69	89.55	98.22	1.40	137.72	2.07	0.14	0.82
19.85	102.94	111.36	1.23	136.82	1.94	0.16	0.84
20.01	114.69	123.04	1.16	143.25	1.87	0.19	0.86
20.18	120.04	128.42	1.17	150.35	1.88	0.21	0.86
20.34	119.33	127.60	1.21	153.98	1.92	0.21	0.86
20.51	115.93	123.69	1.23	152.51	1.94	0.19	0.86
20.67	116.51	123.55	1.20	148.25	1.91	0.18	0.86
20.83	123.58	129.85	1.13	146.46	1.83	0.20	0.86
21.00	134.44	139.88	1.06	148.10	1.73	0.25	0.88
21.16	143.32	148.34	1.03	153.17	1.69	0.30	0.88
21.33	147.40	152.31	1.04	159.13	1.71	0.31	0.89
21.49	148.64	153.32	1.06	162.15	1.73	0.31	0.89
21.65	151.21	155.53	1.06	164.62	1.73	0.32	0.89
21.82	157.68	161.54	1.05	169.19	1.71	0.37	0.90
21.98	168.16	171.62	1.03	177.35	1.69	0.47	0.91
22.15	181.36	184.35	1.02	187.59	1.67	0.68	0.92
22.31	196.01	198.36	1.00	198.36	1.64	0.93	0.93
22.47	211.38	213.01	1.00	213.01	1.60	0.94	0.94
22.64	226.00	226.84	1.00	226.84	1.58	0.95	0.95
22.80	238.97	239.18	1.00	239.18	1.57	0.96	0.96
22.97	249.58	249.17	1.00	249.17	1.57	0.96	0.96
23.13	259.02	258.01	1.00	258.01	1.58	0.97	0.97
23.29	268.48	266.82	1.00	266.82	1.59	0.98	0.98
23.46	278.93	276.52	1.00	276.52	1.60	0.98	0.98
23.62	290.81	287.60	1.00	287.60	1.61	0.99	0.99

:: 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	304.17	300.00	1.00	300.00	1.62	0.99	0.99
23.95	318.51	313.30	1.00	313.30	1.63	1.00	1.00
24.11	332.19	325.69	1.00	325.69	1.62	1.01	1.01
24.28	343.22	335.38	1.00	335.38	1.61	1.01	1.01
24.44	352.00	342.87	1.00	342.87	1.60	1.02	1.02
24.61	360.57	350.19	1.00	350.19	1.60	1.02	1.02
24.77	371.62	359.93	1.00	359.93	1.61	1.03	1.03
24.93	384.17	371.09	1.00	371.09	1.62	1.03	1.03
25.10	395.80	381.18	1.00	381.18	1.63	1.04	1.04
25.26	404.24	388.16	1.00	388.16	1.64	1.04	1.04
25.43	410.88	393.27	1.00	393.27	1.64	1.04	1.04
25.59	419.89	400.72	1.00	399.26	1.64	1.04	1.04
25.75	437.75	416.55	1.00	415.70	1.64	1.05	1.05
25.92	468.21	444.20	1.00	443.65	1.64	1.06	1.06
26.08	511.90	484.32	1.00	483.06	1.64	1.08	1.08
26.25	561.29	529.50	1.00	530.78	1.65	1.09	1.09
26.41	607.76	571.73	1.01	576.33	1.66	1.11	1.11
26.57	639.20	599.56	1.01	605.83	1.66	1.12	1.12
26.74	651.27	608.98	1.01	613.70	1.66	1.12	1.12
26.90	644.22	600.60	1.01	603.61	1.65	1.12	1.12
27.07	627.47	583.07	1.01	588.54	1.66	1.11	1.11
27.23	608.75	563.87	1.02	574.52	1.67	1.11	1.11
27.40	592.41	546.90	1.02	560.02	1.68	1.10	1.10
27.56	576.66	530.73	1.02	543.96	1.68	1.09	1.09
27.72	560.01	513.83	1.02	526.58	1.68	1.09	1.09
27.89	544.34	497.74	1.03	513.73	1.69	1.08	1.08
28.05	534.81	487.38	1.04	508.13	1.71	1.08	1.08
28.22	533.70	484.64	1.05	510.22	1.72	1.08	1.08
28.38	537.60	486.64	1.06	514.72	1.73	1.08	1.08
28.54	540.79	488.15	1.05	514.17	1.72	1.08	1.08
28.71	542.42	488.21	1.05	511.61	1.71	1.08	1.08
28.87	546.36	490.34	1.05	513.44	1.71	1.08	1.08
29.04	553.79	495.33	1.05	521.62	1.72	1.08	1.08
29.20	558.94	498.33	1.06	527.48	1.73	1.08	1.08
29.36	554.25	492.64	1.06	522.30	1.73	1.08	1.08
29.53	539.29	477.94	1.06	504.64	1.73	1.08	1.08
29.69	519.91	459.39	1.06	484.67	1.73	1.07	1.07
29.86	501.97	442.01	1.06	468.00	1.73	1.06	1.06
30.02	485.98	426.36	1.07	455.45	1.75	1.05	1.05
30.18	472.00	412.85	1.07	440.99	1.74	1.05	1.05
30.35	461.48	402.56	1.06	427.40	1.74	1.04	1.04
30.51	458.03	398.63	1.05	420.34	1.72	1.04	1.04
30.68	463.04	402.01	1.05	421.11	1.71	1.04	1.04
30.84	475.75	412.09	1.04	429.88	1.71	1.05	1.05
31.00	493.64	426.59	1.04	443.47	1.70	1.05	1.05
31.17	511.85	440.99	1.04	459.52	1.71	1.06	1.06
31.33	526.80	452.60	1.04	472.38	1.71	1.07	1.07
31.50	536.99	459.90	1.05	481.39	1.71	1.07	1.07

:: 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	547.27	467.46	1.05	489.28	1.71	1.07	1.07
31.82	562.93	479.61	1.05	501.54	1.71	1.08	1.08
31.99	586.05	498.09	1.04	519.37	1.71	1.08	1.08
32.15	609.95	517.13	1.04	538.57	1.71	1.09	1.09
32.32	623.68	527.18	1.04	550.08	1.71	1.09	1.09
32.48	619.86	522.41	1.05	546.19	1.71	1.09	1.09
32.64	601.92	505.62	1.05	531.00	1.72	1.09	1.09
32.81	582.88	488.07	1.05	513.49	1.72	1.08	1.08
32.97	578.03	483.11	1.04	504.74	1.71	1.08	1.08
33.14	595.01	496.29	1.04	515.79	1.70	1.08	1.08
33.30	630.98	525.23	1.04	544.13	1.70	1.09	1.09
33.46	672.95	558.42	1.04	581.60	1.71	1.10	1.10
33.63	707.58	585.54	1.04	610.41	1.71	1.11	1.11
33.79	725.07	598.94	1.04	620.99	1.70	1.12	1.12
33.96	725.13	597.74	1.03	616.82	1.69	1.12	1.12
34.12	712.22	585.75	1.03	603.11	1.69	1.11	1.11
34.28	693.63	568.55	1.03	588.34	1.70	1.11	1.11
34.45	674.37	551.37	1.03	569.45	1.69	1.10	1.10
34.61	657.10	536.21	1.03	551.27	1.69	1.10	1.10
34.78	643.78	524.10	1.03	537.45	1.68	1.09	1.09
34.94	634.79	514.94	1.03	531.48	1.69	1.09	1.09
35.10	631.90	510.75	1.04	530.76	1.70	1.09	1.09
35.27	633.73	510.66	1.04	531.95	1.71	1.09	1.09
35.43	637.76	512.59	1.04	534.18	1.71	1.09	1.09
35.60	635.84	509.61	1.04	531.49	1.71	1.09	1.09
35.76	620.80	496.02	1.05	518.83	1.71	1.08	1.08
35.93	590.37	470.02	1.05	493.68	1.72	1.07	1.07
36.09	552.07	438.12	1.05	461.46	1.72	1.06	1.06
36.25	517.81	409.62	1.06	432.45	1.73	1.05	1.05
36.42	495.41	390.67	1.06	413.08	1.73	1.04	1.04
36.58	483.74	380.45	1.06	402.38	1.73	1.03	1.03
36.75	477.64	374.60	1.06	396.39	1.73	1.03	1.03
36.91	475.18	371.82	1.06	392.94	1.73	1.03	1.03
37.07	480.56	375.17	1.06	396.19	1.73	1.03	1.03
37.24	497.80	387.78	1.05	408.96	1.72	1.04	1.04
37.40	525.31	408.93	1.05	427.89	1.71	1.05	1.05
37.57	553.50	430.32	1.04	447.85	1.70	1.06	1.06
37.73	571.93	444.10	1.04	459.77	1.70	1.06	1.06
37.89	575.56	445.82	1.04	461.74	1.70	1.06	1.06
38.06	569.89	440.59	1.03	454.80	1.69	1.06	1.06
38.22	562.80	434.42	1.03	446.58	1.69	1.06	1.06
38.39	556.74	429.07	1.02	438.90	1.68	1.06	1.06
38.55	542.99	417.32	1.02	427.55	1.68	1.05	1.05
38.71	512.32	391.92	1.03	405.50	1.70	1.04	1.04
38.88	465.40	353.23	1.06	373.76	1.73	1.02	1.02
39.04	417.66	313.94	1.09	342.37	1.78	1.00	1.00
39.21	390.11	290.93	1.11	324.34	1.81	0.99	0.99
39.37	391.97	291.86	1.11	324.02	1.80	0.99	0.99

:: 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	408.12	305.29	1.08	328.78	1.76	1.00	1.00
39.70	408.13	306.09	1.05	322.44	1.72	1.00	1.00
39.86	367.59	273.01	1.08	295.94	1.77	0.98	0.98
40.03	295.53	214.64	1.18	252.85	1.89	0.94	0.94
40.19	217.19	152.33	1.42	216.42	2.08	0.82	0.89
40.35	160.01	108.60	1.79	194.68	2.25	0.23	0.84
40.52	126.09	83.21	2.24	186.11	2.38	0.17	0.80
40.68	109.80	71.35	2.48	177.29	2.44	0.14	0.78
40.85	102.87	66.26	2.59	171.84	2.46	0.13	0.77
41.01	104.69	67.31	2.56	172.65	2.46	0.13	0.77
41.17	113.58	73.27	2.44	178.55	2.43	0.15	0.78
41.34	124.24	80.28	2.35	188.94	2.41	0.18	0.80
41.50	129.61	83.30	2.44	202.85	2.43	0.20	0.80
41.67	129.80	82.85	2.53	209.35	2.45	0.19	0.80
41.83	136.45	87.27	2.41	210.61	2.42	0.18	0.81
41.99	168.25	110.39	1.87	206.31	2.27	0.24	0.84
42.16	232.09	158.01	1.39	219.86	2.06	0.89	0.89
42.32	314.10	220.80	1.17	257.76	1.88	0.95	0.95
42.49	385.74	276.01	1.08	298.97	1.77	0.98	0.98
42.65	427.96	308.30	1.05	323.78	1.72	1.00	1.00
42.81	441.49	317.18	1.05	333.95	1.72	1.00	1.00
42.98	441.14	315.30	1.06	335.30	1.74	1.00	1.00
43.14	441.16	313.89	1.07	336.53	1.75	1.00	1.00
43.31	448.41	318.60	1.07	340.45	1.75	1.00	1.00
43.47	462.32	328.80	1.06	347.61	1.73	1.01	1.01
43.64	477.94	340.40	1.04	355.32	1.71	1.02	1.02
43.80	491.94	350.89	1.03	361.70	1.69	1.02	1.02
43.96	507.19	362.81	1.01	367.35	1.66	1.03	1.03
44.13	528.93	378.19	1.01	380.67	1.65	1.03	1.03
44.29	559.41	399.41	1.01	401.43	1.65	1.04	1.04
44.46	594.09	422.89	1.01	426.78	1.66	1.05	1.05
44.62	628.43	445.86	1.01	452.36	1.67	1.06	1.06
44.78	658.59	465.46	1.02	475.51	1.68	1.07	1.07
44.95	680.94	478.42	1.04	495.21	1.70	1.08	1.08
45.11	691.40	483.89	1.04	503.93	1.71	1.08	1.08
45.28	687.61	479.99	1.04	500.35	1.71	1.08	1.08
45.44	674.99	470.63	1.04	488.91	1.70	1.07	1.07
45.60	661.88	460.39	1.04	478.53	1.70	1.07	1.07
45.77	654.94	454.26	1.04	473.02	1.71	1.07	1.07
45.93	653.63	452.71	1.04	470.32	1.70	1.07	1.07
46.10	654.33	453.27	1.03	467.22	1.69	1.07	1.07
46.26	656.26	455.07	1.02	464.34	1.67	1.07	1.07
46.42	661.59	458.43	1.02	465.74	1.67	1.07	1.07
46.59	671.91	464.71	1.02	471.73	1.67	1.07	1.07
46.75	686.31	473.41	1.02	481.67	1.67	1.07	1.07
46.92	702.13	483.29	1.02	491.82	1.67	1.08	1.08
47.08	719.12	511.69	1.00	511.69	1.50	1.09	1.09
47.24	735.86	553.70	1.00	553.70	1.23	1.10	1.10

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

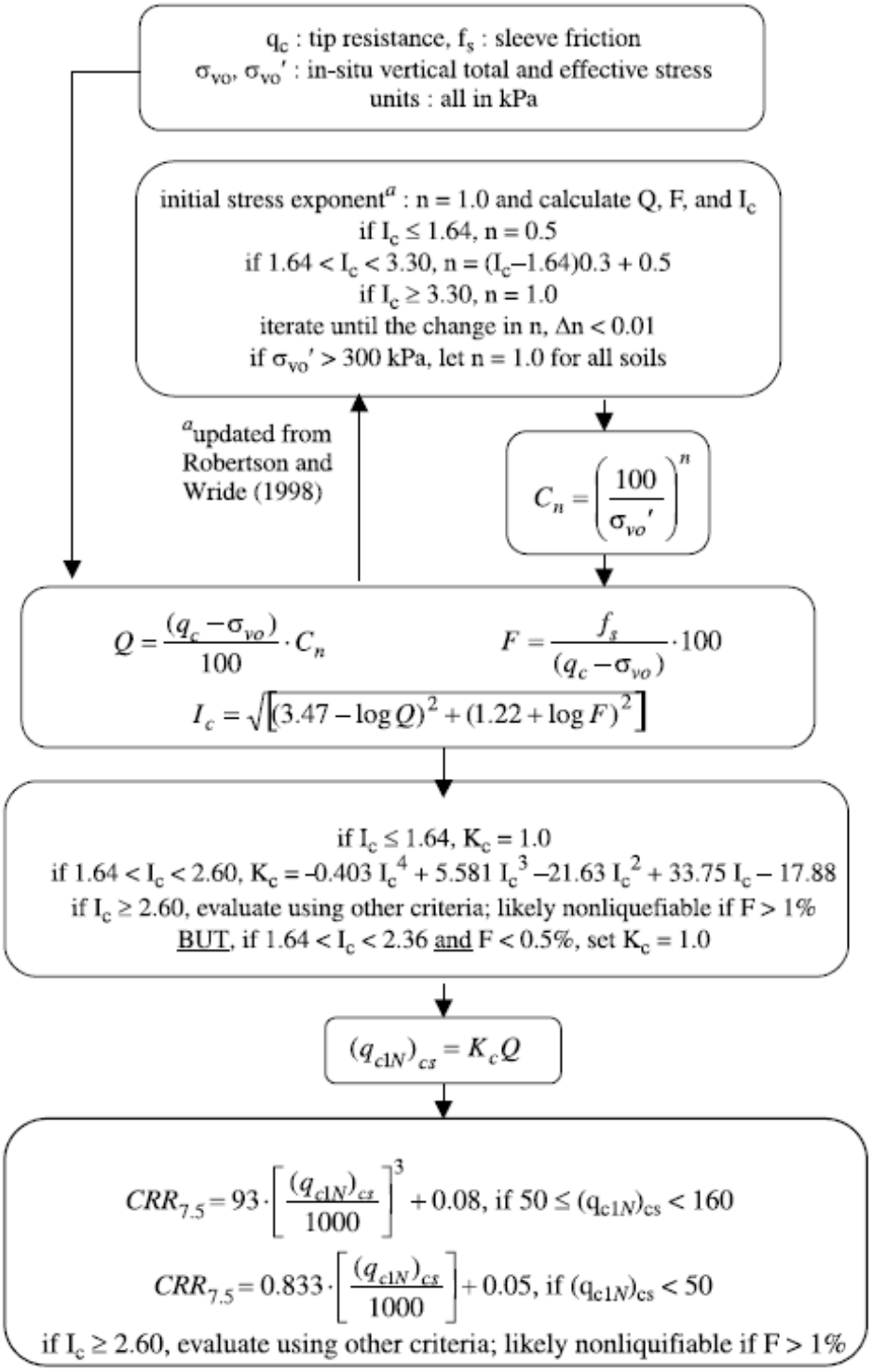
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	750.32	407.40	4.56	1856.20	2.77	1.05	29.00
47.57	758.64	410.91	4.61	1894.63	2.78	1.05	29.29

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)

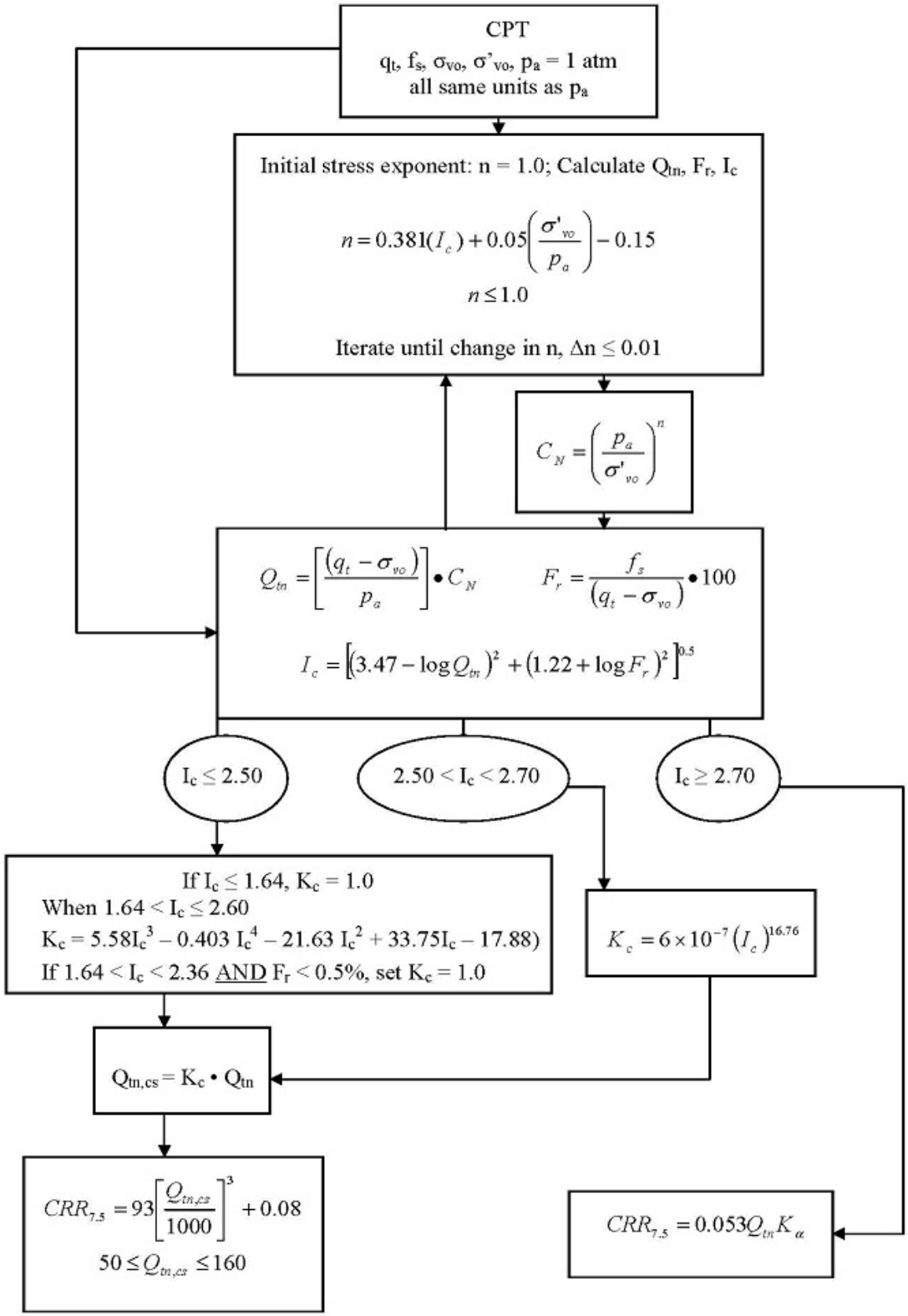
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

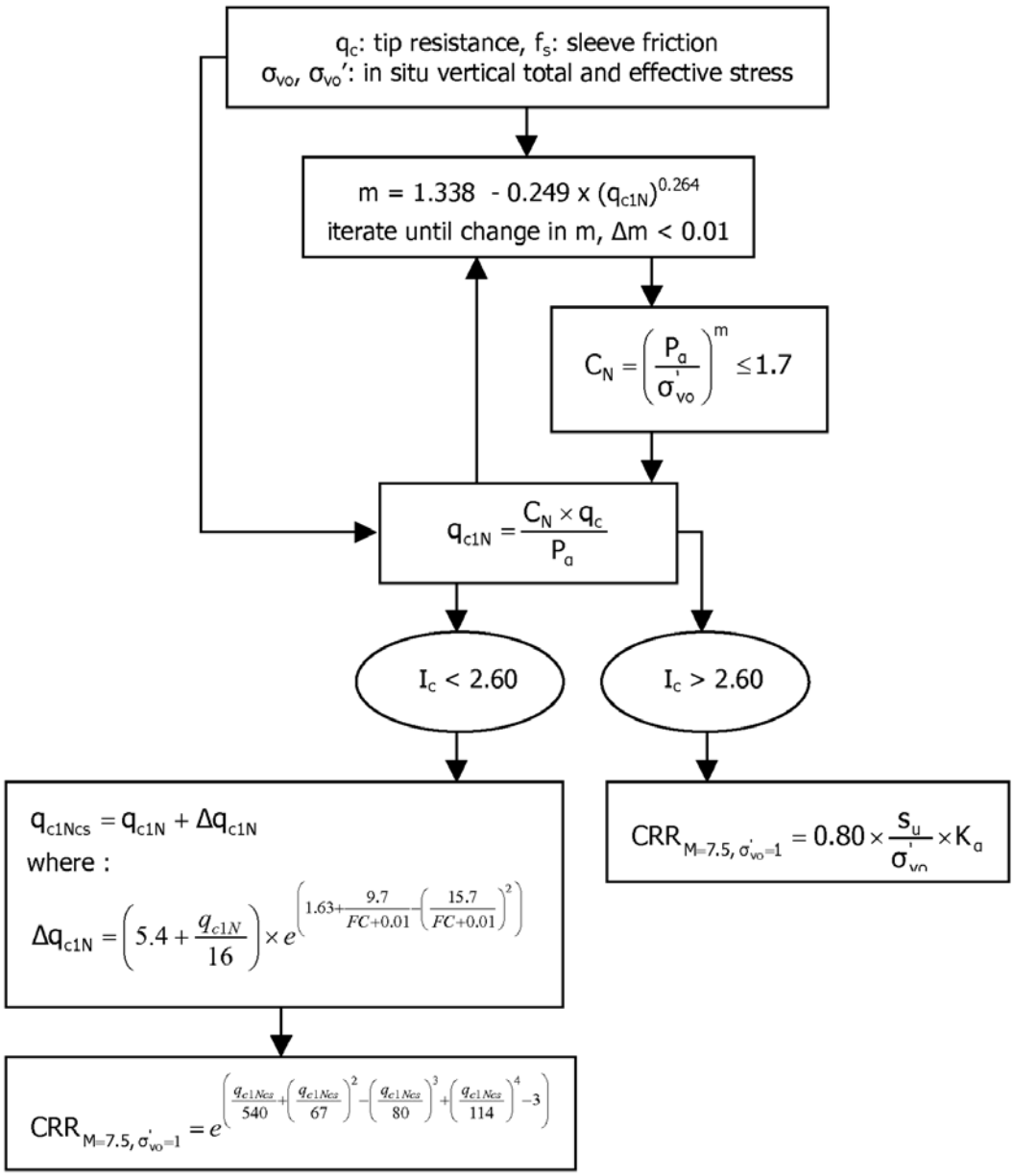
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

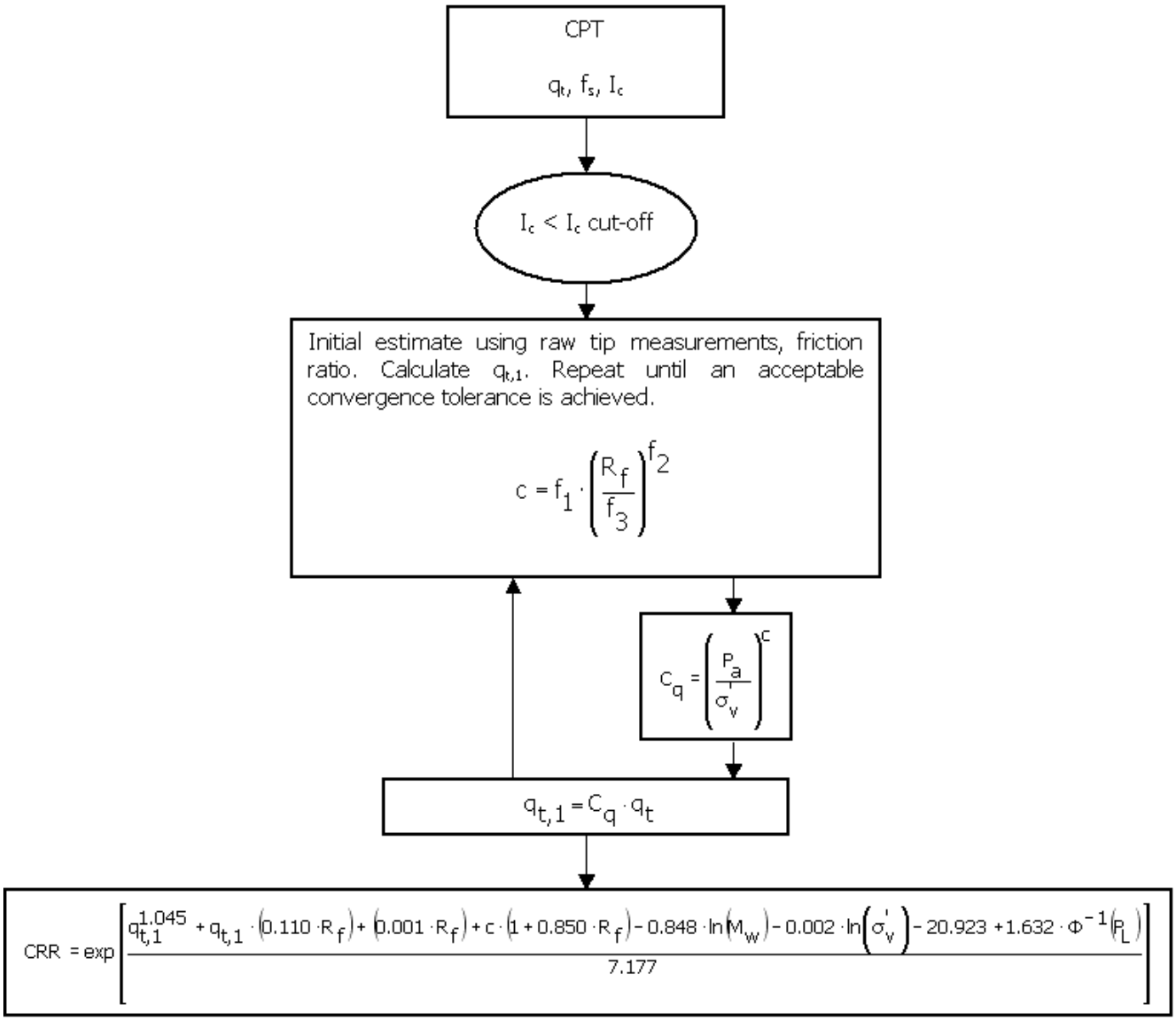


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

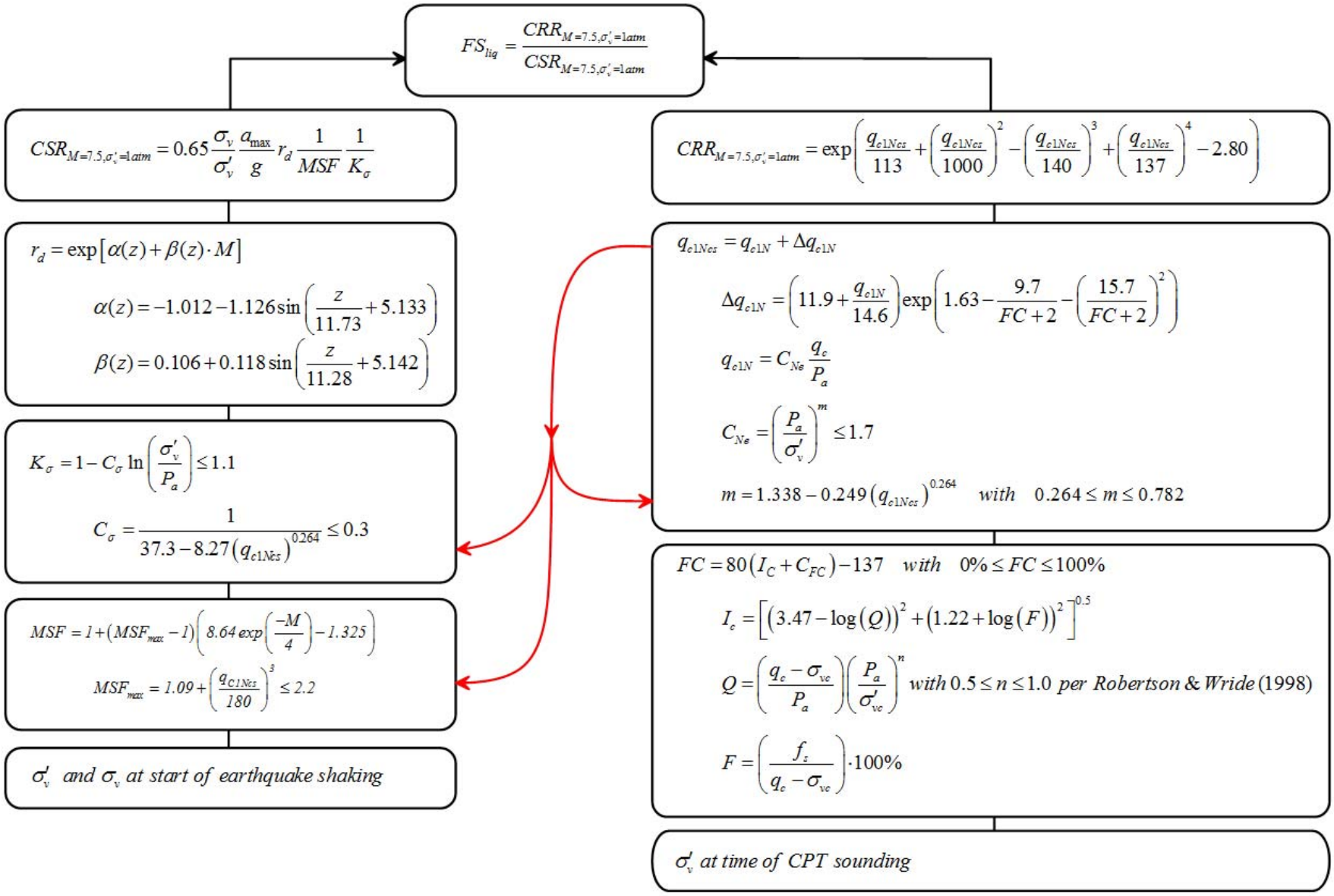
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



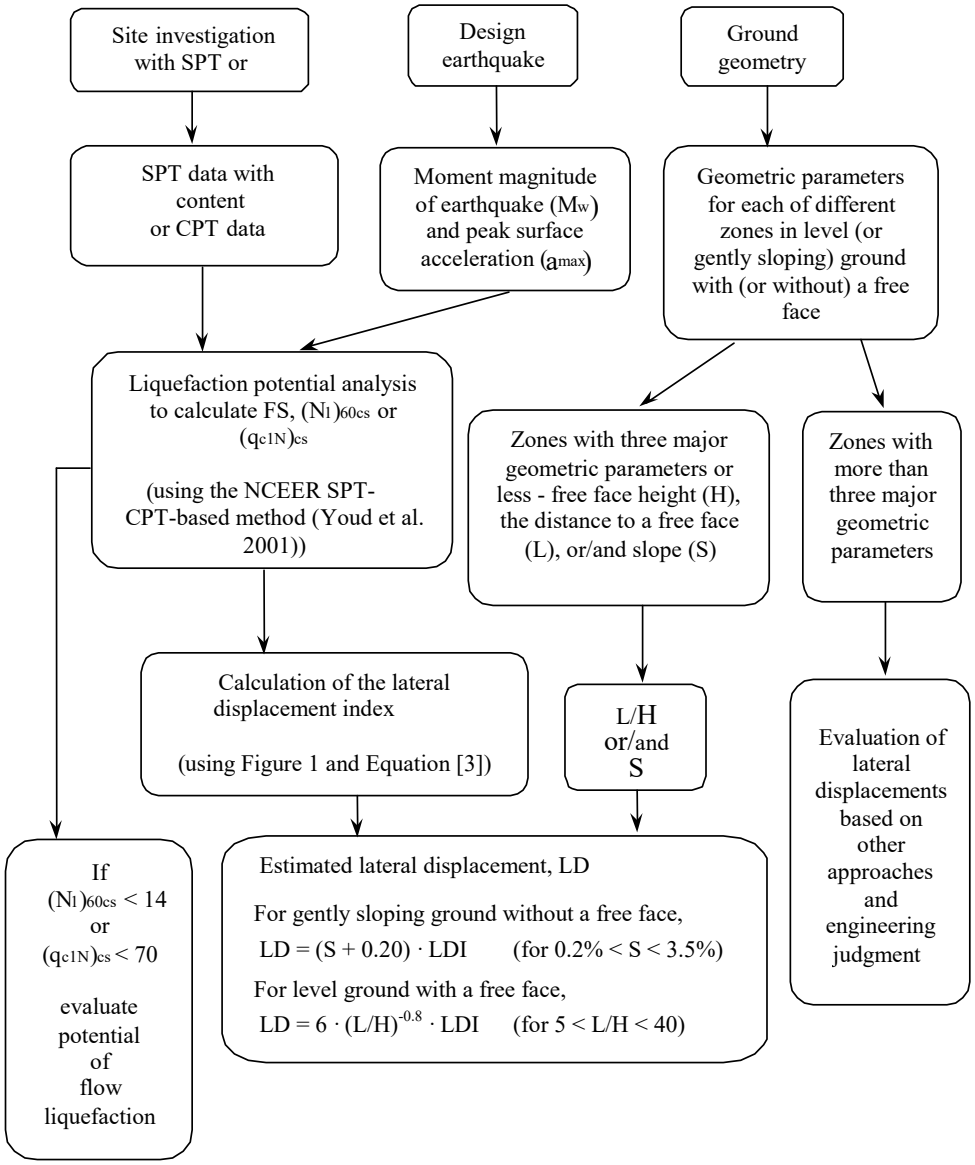
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



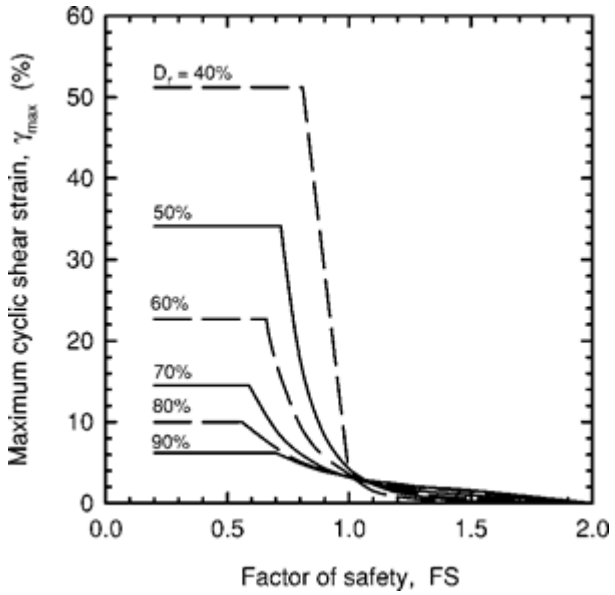
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



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



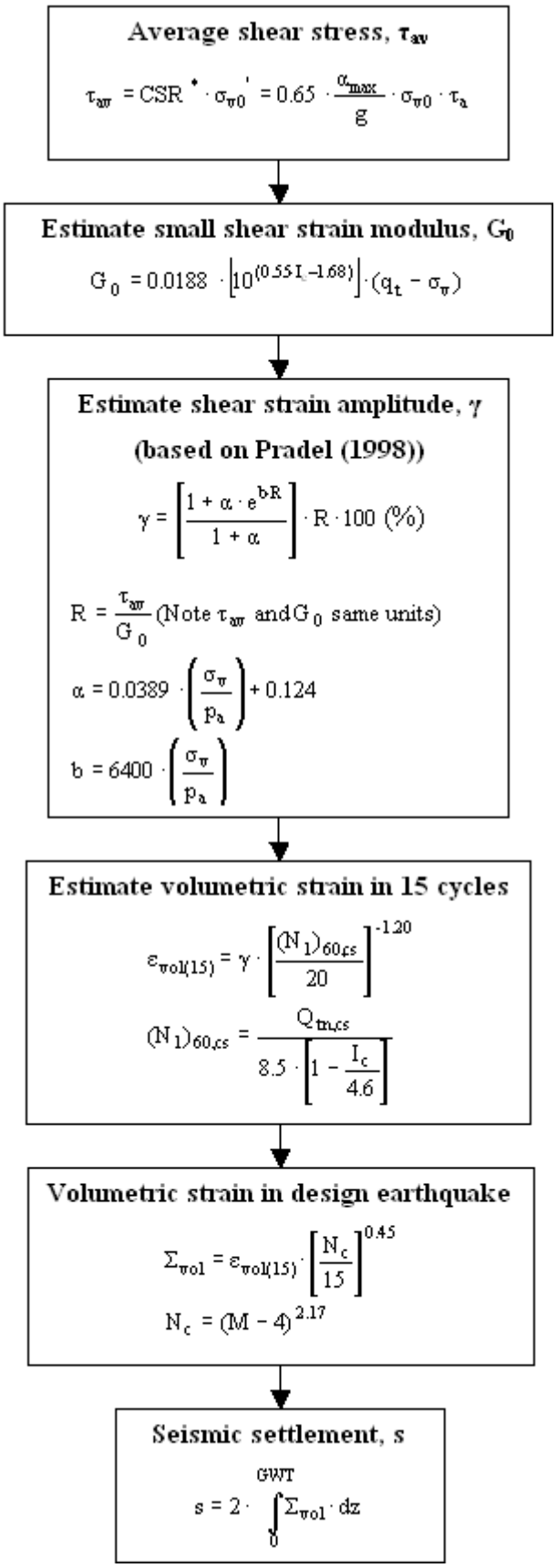
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

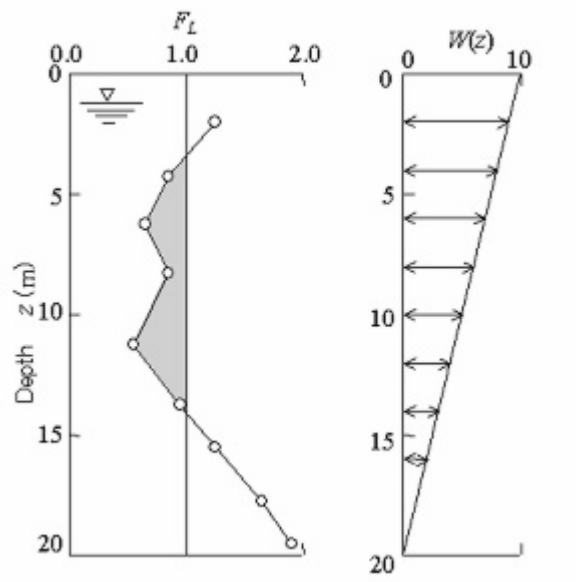
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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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Designed By: ZRB
Checked By: BW

Raw Data Input

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-1
Lattitude:	35.15560
Longitude:	89.44130
Ground Elevation, ft msl:	407.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	396.7

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

													Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	8	5.8	17	14	3	5.10	GP-GM	1			1	Sand-Like	36	-		
2	6.5	6	5.8	17	14	3	5.10	GP-GM	1			1	Sand-Like	34	-		
3	9.0	24	5.8	17	14	3	5.10	GP-GM	1			1	Sand-Like	46	-		
4	11.5	1	92.2	26	21	5	28.90	CL-ML	1			1	Sand-Like	25	-		
5	21.5	14	11.4	0	0	0	20.80	SW-SM	3			1	Sand-Like	39	-		
6	26.5	82	11.4	0	0	0	20.80	SW-SM	3			1	Sand-Like	48	-		
7	31.5	77	11.4	0	0	0	20.80	SW-SM	3			1	Sand-Like	48	-		
8	36.5	71	11.4	0	0	0	20.80	SW-SM	3			1	Sand-Like	48	-		
9	41.5	10	53.5	19	14	5	19.60	CL-ML	4			1	Sand-Like	34	-		
10	46.5	65	53.5	19	14	5	19.60	CL-ML	4			1	Sand-Like	48	-		
11	51.5	59	15.6	0	0	0	13.80	SM	5			1	Sand-Like	48	-		
12	56.5	15	15.6	0	0	0	13.80	SM	5			1	Sand-Like	36	-		
13	61.5	100	15.6	0	0	0	13.80	SM	5			1	Sand-Like	48	-		
14	66.5	26	15.6	0	0	0	13.80	SM	5			1	Sand-Like	41	-		
15	71.5	58	28.7	15	15	0	20.20	SM	6			1	Sand-Like	48	-		
16	76.5	33	6.1	0	0	0	19.80	SP-SM	7			1	Sand-Like	43	-		
17	81.5	44	46.1	16	16	0	24.00	SM	8			1	Sand-Like	46	-		
18	86.5	21	46.1	16	16	0	24.00	SM	8			1	Sand-Like	38	-		
19	91.5	42	46.1	16	16	0	24.00	SM	8			1	Sand-Like	45	-		
20	91.5	39	66.5	25	19	6	23.30	CL-ML	10			1	Sand-Like	44	-		
21	91.5	25	66.5	25	19	6	23.30	CL-ML	10			1	Sand-Like	39	-		

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Standard Penetration Test Correction

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-1
Lattitude:	35.15560
Longitude:	89.44130
Ground Elevation, ft msl:	407.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	396.7

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		407																	
1	4	403	8	1.57	1.70	0.75	1.0	1.00	1.0	460	460	5.8	12.5	21.3	9.4	16.0	16.6	1	GP-GM
2	6.5	400.5	6	1.57	1.64	0.80	1.0	1.00	1.0	748	748	5.8	9.4	15.4	7.5	12.2	12.8	1	GP-GM
3	9	398	24	1.57	1.39	0.84	1.0	1.00	1.0	1035	1035	5.8	37.6	52.2	31.6	44.0	45.3	1	GP-GM
4	11.5	395.5	1	1.57	1.27	0.88	1.0	1.00	2.1	1323	1248	92.2	1.6	2.0	1.4	1.7	3.7	1	CL-ML
5	21.52	385.48	14	1.57	1.06	0.96	1.0	1.00	1.1	2475	1775	11.4	21.9	23.3	21.0	22.3	23.9	3	SW-SM
6	26.5	380.5	82	1.57	0.99	0.98	1.0	1.00	1.1	3048	2037	11.4	50.0	49.5	125.1	50.0	52.9	3	SW-SM
7	31.5	375.5	77	1.57	0.93	0.99	1.0	1.00	1.1	3623	2300	11.4	50.0	46.6	118.8	50.0	52.9	3	SW-SM
8	36.5	370.5	71	1.57	0.88	0.99	1.0	1.00	1.1	4198	2563	11.4	50.0	44.2	110.2	50.0	52.9	3	SW-SM
9	41.5	365.5	10	1.57	0.84	1.00	1.0	1.00	1.3	4773	2826	53.5	15.7	13.2	15.6	13.1	16.7	4	CL-ML
10	46.5	360.5	65	1.57	0.80	1.00	1.0	1.00	1.2	5348	3089	53.5	50.0	40.2	101.4	50.0	58.8	4	CL-ML
11	51.5	355.5	59	1.57	0.77	1.00	1.0	1.00	1.1	5923	3352	15.6	50.0	38.6	92.2	50.0	53.9	5	SM
12	56.5	350.5	15	1.57	0.74	1.00	1.0	1.00	1.1	6498	3615	15.6	23.5	17.5	23.5	17.4	19.3	5	SM
13	61.5	345.5	100	1.57	0.72	1.00	1.0	1.00	1.1	7073	3878	15.6	50.0	35.9	156.4	50.0	53.9	5	SM
14	66.5	340.5	26	1.57	0.69	1.00	1.0	1.00	1.1	7648	4141	15.6	40.7	28.3	40.7	28.3	30.8	5	SM
15	71.5	335.5	58	1.57	0.67	1.00	1.0	1.00	1.1	8223	4404	28.7	50.0	33.7	90.8	50.0	57.2	6	SM
16	76.5	330.5	33	1.57	0.65	1.00	1.0	1.00	1.0	8798	4667	6.1	50.0	32.7	51.6	33.8	34.9	7	SP-SM
17	81.5	325.5	44	1.57	0.64	1.00	1.0	1.00	1.2	9373	4930	46.1	50.0	31.8	68.9	43.9	51.7	8	SM
18	86.5	320.5	21	1.57	0.62	1.00	1.0	1.00	1.2	9948	5193	46.1	32.9	20.4	32.9	20.4	25.0	8	SM
19	91.5	315.5	42	1.57	0.61	1.00	1.0	1.00	1.2	10523	5456	46.1	50.0	30.3	65.7	39.8	47.1	8	SM
20	91.5	315.5	39	1.57	0.61	1.00	1.0	1.00	1.2	10523	5456	66.5	50.0	30.3	61.0	37.0	43.9	10	CL-ML
21	91.5	315.5	25	1.57	0.61	1.00	1.0	1.00	1.2	10523	5456	66.5	39.1	23.7	39.1	23.7	28.8	10	CL-ML

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Checked By: BW

Subsurface Soil Properties Summary

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-1
Lattitude:	35.15560
Longitude:	89.44130
Ground Elevation, ft msl:	407.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	396.7

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	407															
1	4	403	8	12.5	16.0	GP-GM	1	0	0	5.8	5.1	17.0	14.0	3.0	-2.97	36	-
2	6.5	400.5	6	9.4	12.2	GP-GM	1	0	0	5.8	5.1	17.0	14.0	3.0	-2.97	34	-
3	9	398	24	37.6	44.0	GP-GM	1	0	0	5.8	5.1	17.0	14.0	3.0	-2.97	46	-
4	11.5	395.5	1	1.6	1.7	CL-ML	1	0	0	92.2	28.9	26.0	21.0	5.0	1.58	25	-
5	21.52	385.48	14	21.9	22.3	SW-SM	3	0	0	11.4	20.8	0.0	0.0	0.0	NP	39	-
6	26.5	380.5	82	50.0	50.0	SW-SM	3	0	0	11.4	20.8	0.0	0.0	0.0	NP	48	-
7	31.5	375.5	77	50.0	50.0	SW-SM	3	0	0	11.4	20.8	0.0	0.0	0.0	NP	48	-
8	36.5	370.5	71	50.0	50.0	SW-SM	3	0	0	11.4	20.8	0.0	0.0	0.0	NP	48	-
9	41.5	365.5	10	15.7	13.1	CL-ML	4	0	0	53.5	19.6	19.0	14.0	5.0	1.12	34	-
10	46.5	360.5	65	50.0	50.0	CL-ML	4	0	0	53.5	19.6	19.0	14.0	5.0	1.12	48	-
11	51.5	355.5	59	50.0	50.0	SM	5	0	0	15.6	13.8	0.0	0.0	0.0	NP	48	-
12	56.5	350.5	15	23.5	17.4	SM	5	0	0	15.6	13.8	0.0	0.0	0.0	NP	36	-
13	61.5	345.5	100	50.0	50.0	SM	5	0	0	15.6	13.8	0.0	0.0	0.0	NP	48	-
14	66.5	340.5	26	40.7	28.3	SM	5	0	0	15.6	13.8	0.0	0.0	0.0	NP	41	-
15	71.5	335.5	58	50.0	50.0	SM	6	0	0	28.7	20.2	15.0	15.0	0.0	NP	48	-
16	76.5	330.5	33	50.0	33.8	SP-SM	7	0	0	6.1	19.8	0.0	0.0	0.0	NP	43	-
17	81.5	325.5	44	50.0	43.9	SM	8	0	0	46.1	24	16.0	16.0	0.0	NP	46	-
18	86.5	320.5	21	32.9	20.4	SM	8	0	0	46.1	24	16.0	16.0	0.0	NP	38	-
19	91.5	315.5	42	50.0	39.8	SM	8	0	0	46.1	24	16	16	0	NP	44.8	-
20	91.5	315.5	39	50.0	37.0	CL-ML	10	0	0	66.5	23.3	25	19	6	0.72	43.9	-
21	91.5	315.5	25	39.1	23.7	CL-ML	10	0	0	66.5	23.3	25	19	6	0.72	39.1	-

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Designed By: ZRB
Checked By: BW

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-1
Lattitude:	35.15560
Longitude:	89.44130
Ground Elevation, ft msl:	407.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	396.7

PGA:	0.327
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7
R(km):	81.27

MSF_{sand}:	1.14
MSF_{clay}:	1.02

														Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	407																		
1	4	403	GP-GM	1	1	16.0	0.0	16.0	NSL-S	Sand-Like	1.02	1	Full Liquefaction	8.2	-	-	0.16	3.1	0.64	5.5
2	6.5	400.5	GP-GM	1	1	12.2	0.0	12.3	NSL-S	Sand-Like	1.24	1	Full Liquefaction	6.5	-	-	0.43	2.9	0.99	4.8
3	9	398	GP-GM	1	1	44.0	0.0	44.0	NSL-S	Sand-Like	0.01	1	No Liquefaction	-	-	-	-	2.5	-	3.8
4	11.5	395.5	CL-ML	1	1	1.7	5.5	7.2	NSL-S	Sand-Like	1.86	1	Full Liquefaction	#VALUE!	-	-	1.28	2.5	1.33	3.8
5	21.52	385.48	SW-SM	3	1	22.3	1.8	24.1	NSL-S	Sand-Like	0.87	1	No Liquefaction	-	-	-	-	1.2	-	2.5
6	26.5	380.5	SW-SM	3	1	50.0	1.8	51.8	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.2	-	2.5
7	31.5	375.5	SW-SM	3	1	50.0	1.8	51.8	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.2	-	2.5
8	36.5	370.5	SW-SM	3	1	50.0	1.8	51.8	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.2	-	2.5
9	41.5	365.5	CL-ML	4	1	13.1	5.5	18.6	NSL-S	Sand-Like	1.40	1	Full Liquefaction	8.8	-	-	0.79	1.2	1.47	2.5
10	46.5	360.5	CL-ML	4	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.4	-	1.0
11	51.5	355.5	SM	5	1	50.0	3.5	53.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.4	-	1.0
12	56.5	350.5	SM	5	1	17.4	3.5	20.9	NSL-S	Sand-Like	1.22	1	Full Liquefaction	9.6	-	-	0.42	0.4	1.03	1.0
13	61.5	345.5	SM	5	1	50.0	3.5	53.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
14	66.5	340.5	SM	5	1	28.3	3.5	31.7	NSL-S	Sand-Like	0.44	1	No Liquefaction	-	-	-	-	0.0	-	0.0
15	71.5	335.5	SM	6	1	50.0	5.3	55.3	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
16	76.5	330.5	SP-SM	7	1	33.8	0.0	33.8	NSL-S	Sand-Like	0.32	1	No Liquefaction	-	-	-	-	0.0	-	0.0
17	81.5	325.5	SM	8	1	43.9	5.5	49.4	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
18	86.5	320.5	SM	8	1	20.4	5.5	25.9	NSL-S	Sand-Like	0.79	1	No Liquefaction	-	-	-	-	0.0	-	0.0
19	91.5	315.5	SM	8	1	39.8	5.5	45.3	NSL-S	Sand-Like	0.01	1	No Liquefaction	-	-	-	-	0.0	-	0.0
20	91.5	315.5	CL-ML	10	1	37.0	5.5	42.5	NSL-S	Sand-Like	0.03	1	No Liquefaction	-	-	-	-	0.0	-	0.0
21	91.5	315.5	CL-ML	10	1	23.7	5.5	29.2	NSL-S	Sand-Like	0.57	1	No Liquefaction	-	-	-	-	0.0	-	0.0

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SPT-Based Soil Shear Strength Summary

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-1
Lattitude:	35.15560
Longitude:	89.44130
Ground Elevation, ft msl:	407.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	396.7

PGA: 0.327

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		407																		
1	4	403	8	16.0	GP-GM	5.8	460.0	460.0	5.1	17	14	3	Sand-Like	Full Liquefaction	36	-	36	-	8	-
2	6.5	400.5	6	12.3	GP-GM	5.8	747.5	747.5	5.1	17	14	3	Sand-Like	Full Liquefaction	34	-	34	-	6	-
3	9	398	24	44.0	GP-GM	5.8	1035.0	1035.0	5.1	17	14	3	Sand-Like	No Liquefaction	46	-	46	-	46	-
4	11.5	395.5	1	7.2	CL-ML	92.2	1322.5	1247.6	28.9	26	21	5	Sand-Like	Full Liquefaction	25	-	25	-	-	-
5	21.52	385.48	14	24.1	SW-SM	11.4	2474.8	1774.7	20.8	0	0	0	Sand-Like	No Liquefaction	39	-	39	-	39	-
6	26.5	380.5	82	51.8	SW-SM	11.4	3047.5	2036.6	20.8	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
7	31.5	375.5	77	51.8	SW-SM	11.4	3622.5	2299.6	20.8	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
8	36.5	370.5	71	51.8	SW-SM	11.4	4197.5	2562.6	20.8	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
9	41.5	365.5	10	18.6	CL-ML	53.5	4772.5	2825.6	19.6	19	14	5	Sand-Like	Full Liquefaction	34	-	34	-	9	-
10	46.5	360.5	65	55.5	CL-ML	53.5	5347.5	3088.6	19.6	19	14	5	Sand-Like	No Liquefaction	48	-	48	-	48	-
11	51.5	355.5	59	53.5	SM	15.6	5922.5	3351.6	13.8	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
12	56.5	350.5	15	20.9	SM	15.6	6497.5	3614.6	13.8	0	0	0	Sand-Like	Full Liquefaction	36	-	36	-	10	-
13	61.5	345.5	100	53.5	SM	15.6	7072.5	3877.6	13.8	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
14	66.5	340.5	26	31.7	SM	15.6	7647.5	4140.6	13.8	0	0	0	Sand-Like	No Liquefaction	41	-	41	-	41	-
15	71.5	335.5	58	55.3	SM	28.7	8222.5	4403.6	20.2	15	15	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
16	76.5	330.5	33	33.8	SP-SM	6.1	8797.5	4666.6	19.8	0	0	0	Sand-Like	No Liquefaction	43	-	43	-	43	-
17	81.5	325.5	44	49.4	SM	46.1	9372.5	4929.6	24.0	16	16	0	Sand-Like	No Liquefaction	46	-	46	-	46	-
18	86.5	320.5	21	25.9	SM	46.1	9947.5	5192.6	24.0	16	16	0	Sand-Like	No Liquefaction	38	-	38	-	38	-
19	91.5	315.5	42	45.3	SM	46.1	10522.5	5455.6	24.0	16.0	16.0	0.0	Sand-Like	No Liquefaction	44.8	-	45	-	45	-
20	91.5	315.5	39	42.5	CL-ML	66.5	10522.5	5455.6	23.3	25.0	19.0	6.0	Sand-Like	No Liquefaction	43.9	-	44	-	44	-
21	91.5	315.5	25	29.2	CL-ML	66.5	10522.5	5455.6	23.3	25.0	19.0	6.0	Sand-Like	No Liquefaction	39.1	-	39	-	39	-

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Designed By: ZRB
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Raw Data Input

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-2
Lattitude:	35.15550
Longitude:	89.44120
Ground Elevation, ft msl:	408.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	397.7

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

														Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	3.0	4	92.2	26	21	5	28.90	CL-ML	2			1	Sand-Like	31	-		
2	6.5	2	92.2	26	21	5	28.90	CL-ML	2			1	Sand-Like	28	-		
3	9.0	1	92.2	26	21	5	28.90	CL-ML	2			1	Sand-Like	25	-		
4	11.5	6	92.2	26	21	5	28.90	CL-ML	2			1	Sand-Like	33	-		
5	21.5	24	11.4	0	0	0	20.80	SW-SM	3			1	Sand-Like	44	-		
6	26.5	15	53.5	19	14	5	19.60	CL-ML	4			1	Sand-Like	39	-		
7	31.5	14	53.5	19	14	5	19.60	CL-ML	4			1	Sand-Like	38	-		
8	36.5	19	53.5	19	14	5	19.60	CL-ML	4			1	Sand-Like	40	-		
9	41.5	51	53.5	19	14	5	19.60	CL-ML	4			1	Sand-Like	48	-		
10	46.5	26	28.7	15	15	0	20.20	SM	6			1	Sand-Like	42	-		
11	51.5	32	6.1	0	0	0	19.80	SP-SM	7			1	Sand-Like	44	-		
12	56.5	74	7.9	0	0	0	18.90	SP-SM	9			1	Sand-Like	48	-		
13	61.5	19	7.9	0	0	0	18.90	SP-SM	9			1	Sand-Like	38	-		
14	66.5	59	7.9	0	0	0	18.90	SP-SM	9			1	Sand-Like	48	-		
15	71.5	100	7.9	0	0	0	18.90	SP-SM	9			1	Sand-Like	48	-		
16	76.5	13	66.5	25	19	6	23.30	CL-ML	10			1	Sand-Like	34	-		
17	81.5	12	66.5	25	19	6	23.30	CL-ML	10			1	Sand-Like	34	-		
18	86.5	24	4.8	0	0	0	37.90	SW	11			1	Sand-Like	39	-		
19	91.5	14	4.8	0	0	0	37.90	SW	11			1	Sand-Like	34	-		
20	96.5	15	4.8	0	0	0	37.90	SW	11			1	Sand-Like	35	-		
21	101.5	32	4.8	0	0	0	37.90	SW	11			1	Sand-Like	41	-		

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Designed By: ZRB
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Standard Penetration Test Correction

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-2
Lattitude:	35.15550
Longitude:	89.44120
Ground Elevation, ft msl:	408.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	397.7

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		408																	
1	3	405	4	1.57	1.70	0.75	1.0	1.00	1.4	345	345	92.2	6.3	10.6	4.7	8.0	10.8	2	CL-ML
2	6.5	401.5	2	1.57	1.64	0.80	1.0	1.00	1.6	748	748	92.2	3.1	5.1	2.5	4.1	6.4	2	CL-ML
3	9	399	1	1.57	1.39	0.84	1.0	1.00	2.1	1035	1035	92.2	1.6	2.2	1.3	1.8	3.8	2	CL-ML
4	11.5	396.5	6	1.57	1.27	0.88	1.0	1.00	1.3	1323	1248	92.2	9.4	11.9	8.2	10.4	13.6	2	CL-ML
5	21.5	386.5	24	1.57	1.06	0.96	1.0	1.00	1.1	2473	1774	11.4	37.6	39.9	36.0	38.2	40.5	3	SW-SM
6	26.5	381.5	15	1.57	0.99	0.98	1.0	1.00	1.2	3048	2037	53.5	23.5	23.3	22.9	22.7	27.6	4	CL-ML
7	31.5	376.5	14	1.57	0.93	0.99	1.0	1.00	1.2	3623	2300	53.5	21.9	20.4	21.6	20.1	24.7	4	CL-ML
8	36.5	371.5	19	1.57	0.88	0.99	1.0	1.00	1.2	4198	2563	53.5	29.7	26.3	29.5	26.1	31.4	4	CL-ML
9	41.5	366.5	51	1.57	0.84	1.00	1.0	1.00	1.2	4773	2826	53.5	50.0	42.1	79.4	50.0	58.8	4	CL-ML
10	46.5	361.5	26	1.57	0.80	1.00	1.0	1.00	1.2	5348	3089	28.7	40.7	32.7	40.6	32.7	37.8	6	SM
11	51.5	356.5	32	1.57	0.77	1.00	1.0	1.00	1.0	5923	3352	6.1	50.0	38.6	50.0	38.6	39.9	7	SP-SM
12	56.5	351.5	74	1.57	0.74	1.00	1.0	1.00	1.0	6498	3615	7.9	50.0	37.2	115.7	50.0	52.0	9	SP-SM
13	61.5	346.5	19	1.57	0.72	1.00	1.0	1.00	1.1	7073	3878	7.9	29.7	21.4	29.7	21.3	22.4	9	SP-SM
14	66.5	341.5	59	1.57	0.69	1.00	1.0	1.00	1.0	7648	4141	7.9	50.0	34.7	92.3	50.0	52.0	9	SP-SM
15	71.5	336.5	100	1.57	0.67	1.00	1.0	1.00	1.0	8223	4404	7.9	50.0	33.7	156.5	50.0	52.0	9	SP-SM
16	76.5	331.5	13	1.57	0.65	1.00	1.0	1.00	1.3	8798	4667	66.5	20.3	13.3	20.3	13.3	16.9	10	CL-ML
17	81.5	326.5	12	1.57	0.64	1.00	1.0	1.00	1.3	9373	4930	66.5	18.8	12.0	18.8	12.0	15.4	10	CL-ML
18	86.5	321.5	24	1.57	0.62	1.00	1.0	1.00	1.0	9948	5193	4.8	37.6	23.3	37.6	23.3	23.3	11	SW
19	91.5	316.5	14	1.57	0.61	1.00	1.0	1.00	1.0	10523	5456	4.8	21.9	13.3	21.9	13.3	13.3	11	SW
20	96.5	311.5	15	1.57	0.59	1.00	1.0	1.00	1.0	11098	5719	4.8	23.5	13.9	23.5	13.9	13.9	11	SW
21	101.5	306.5	32	1.57	0.58	1.00	1.0	1.00	1.0	11673	5982	4.8	50.0	28.9	50.1	29.0	29.0	11	SW

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Checked By: BW

Subsurface Soil Properties Summary

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-2
Lattitude:	35.15550
Longitude:	89.44120
Ground Elevation, ft msl:	408.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	397.7

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	408															
1	3	405	4	6.3	8.0	CL-ML	2	0	0	92.2	28.9	26.0	21.0	5.0	1.58	31	-
2	6.5	401.5	2	3.1	4.1	CL-ML	2	0	0	92.2	28.9	26.0	21.0	5.0	1.58	28	-
3	9	399	1	1.6	1.8	CL-ML	2	0	0	92.2	28.9	26.0	21.0	5.0	1.58	25	-
4	11.5	396.5	6	9.4	10.4	CL-ML	2	0	0	92.2	28.9	26.0	21.0	5.0	1.58	33	-
5	21.5	386.5	24	37.6	38.2	SW-SM	3	0	0	11.4	20.8	0.0	0.0	0.0	NP	44	-
6	26.5	381.5	15	23.5	22.7	CL-ML	4	0	0	53.5	19.6	19.0	14.0	5.0	1.12	39	-
7	31.5	376.5	14	21.9	20.1	CL-ML	4	0	0	53.5	19.6	19.0	14.0	5.0	1.12	38	-
8	36.5	371.5	19	29.7	26.1	CL-ML	4	0	0	53.5	19.6	19.0	14.0	5.0	1.12	40	-
9	41.5	366.5	51	50.0	50.0	CL-ML	4	0	0	53.5	19.6	19.0	14.0	5.0	1.12	48	-
10	46.5	361.5	26	40.7	32.7	SM	6	0	0	28.7	20.2	15.0	15.0	0.0	NP	42	-
11	51.5	356.5	32	50.0	38.6	SP-SM	7	0	0	6.1	19.8	0.0	0.0	0.0	NP	44	-
12	56.5	351.5	74	50.0	50.0	SP-SM	9	0	0	7.9	18.9	0.0	0.0	0.0	NP	48	-
13	61.5	346.5	19	29.7	21.3	SP-SM	9	0	0	7.9	18.9	0.0	0.0	0.0	NP	38	-
14	66.5	341.5	59	50.0	50.0	SP-SM	9	0	0	7.9	18.9	0.0	0.0	0.0	NP	48	-
15	71.5	336.5	100	50.0	50.0	SP-SM	9	0	0	7.9	18.9	0.0	0.0	0.0	NP	48	-
16	76.5	331.5	13	20.3	13.3	CL-ML	10	0	0	66.5	23.3	25.0	19.0	6.0	0.72	34	-
17	81.5	326.5	12	18.8	12.0	CL-ML	10	0	0	66.5	23.3	25.0	19.0	6.0	0.72	34	-
18	86.5	321.5	24	37.6	23.3	SW	11	0	0	4.8	37.9	0.0	0.0	0.0	NP	39	-
19	91.5	316.5	14	21.9	13.3	SW	11	0	0	4.8	37.9	0	0	0	NP	34.3	-
20	96.5	311.5	15	23.5	13.9	SW	11	0	0	4.8	37.9	0	0	0	NP	34.6	-
21	101.5	306.5	32	50.0	29.0	SW	11	0	0	4.8	37.9	0	0	0	NP	41.1	-

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SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-2
Lattitude:	35.15550
Longitude:	89.44120
Ground Elevation, ft msl:	408.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	397.7

PGA:	0.327
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7
R(km):	81.27

MSF_{sand}:	1.14
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	408																		
1	3	405	CL-ML	2	1	8.0	5.5	13.5	NSL-S	Sand-Like	1.18	0.9	Full Liquefaction	#VALUE!	-	-	0.36	5.0	1.11	12.2
2	6.5	401.5	CL-ML	2	1	4.1	5.5	9.6	NSL-S	Sand-Like	1.49	0.9	Full Liquefaction	#VALUE!	-	-	1.79	4.7	1.61	11.1
3	9	399	CL-ML	2	1	1.8	5.5	7.3	NSL-S	Sand-Like	1.74	0.9	Full Liquefaction	#VALUE!	-	-	1.28	2.9	1.33	9.5
4	11.5	396.5	CL-ML	2	1	10.4	5.5	15.9	NSL-S	Sand-Like	1.11	0.9	Full Liquefaction	#VALUE!	-	-	0.14	1.6	0.62	8.2
5	21.5	386.5	SW-SM	3	1	38.2	1.8	40.0	NSL-S	Sand-Like	0.06	1	No Liquefaction	-	-	-	-	1.5	-	7.5
6	26.5	381.5	CL-ML	4	1	22.7	5.5	28.2	NSL-S	Sand-Like	0.64	1	No Liquefaction	-	-	-	-	1.5	-	7.5
7	31.5	376.5	CL-ML	4	1	20.1	5.5	25.6	NSL-S	Sand-Like	0.85	1	No Liquefaction	-	-	-	-	1.5	-	7.5
8	36.5	371.5	CL-ML	4	1	26.1	5.5	31.6	NSL-S	Sand-Like	0.45	1	No Liquefaction	-	-	-	-	1.5	-	7.5
9	41.5	366.5	CL-ML	4	1	50.0	5.5	55.5	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.5	-	7.5
10	46.5	361.5	SM	6	1	32.7	5.3	38.0	NSL-S	Sand-Like	0.13	1	No Liquefaction	-	-	-	-	1.5	-	7.5
11	51.5	356.5	SP-SM	7	1	38.6	0.0	38.7	NSL-S	Sand-Like	0.11	1	No Liquefaction	-	-	-	-	1.5	-	7.5
12	56.5	351.5	SP-SM	9	1	50.0	0.3	50.3	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.5	-	7.5
13	61.5	346.5	SP-SM	9	1	21.3	0.3	21.7	NSL-S	Sand-Like	1.16	0.9	Full Liquefaction	11.7	-	-	0.25	1.5	0.85	7.5
14	66.5	341.5	SP-SM	9	1	50.0	0.3	50.3	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.2	-	6.7
15	71.5	336.5	SP-SM	9	1	50.0	0.3	50.3	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.2	-	6.7
16	76.5	331.5	CL-ML	10	1	13.3	5.5	18.8	NSL-S	Sand-Like	1.28	0.9	Full Liquefaction	8.9	-	-	0.54	1.2	1.45	6.7
17	81.5	326.5	CL-ML	10	1	12.0	5.5	17.5	NSL-S	Sand-Like	1.35	0.9	Full Liquefaction	8.2	-	-	0.68	0.7	1.54	5.2
18	86.5	321.5	SW	11	1	23.3	0.0	23.3	NSL-S	Sand-Like	0.99	1	No Liquefaction	-	-	-	-	0.0	-	3.7
19	91.5	316.5	SW	11	1	13.3	0.0	13.3	NSL-S	Sand-Like	1.67	0.9	Full Liquefaction	6.9	-	-	1.71	1.7	1.88	3.7
20	96.5	311.5	SW	11	1	13.9	0.0	13.9	NSL-S	Sand-Like	1.60	0.9	Full Liquefaction	7.2	-	-	1.71	3.4	1.82	1.8
21	101.5	306.5	SW	11	1	29.0	0.0	29.0	NSL-S	Sand-Like	0.61	1	No Liquefaction	-	-	-	-	3.4	-	0.0

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SPT-Based Soil Shear Strength Summary

Project Name: SR-93 over Branch
County: Fayette County

Boring Number:	BR2_B-2
Lattitude:	35.15550
Longitude:	89.44120
Ground Elevation, ft msl:	408.0
Groundwater Depth, ft:	10.3
Groundwater Elevation, ft msl:	397.7

PGA: 0.327

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		408																		
1	3	405	4	13.5	CL-ML	92.2	345.0	345.0	28.9	26	21	5	Sand-Like	Full Liquefaction	31	-	31	-	-	-
2	6.5	401.5	2	9.6	CL-ML	92.2	747.5	747.5	28.9	26	21	5	Sand-Like	Full Liquefaction	28	-	28	-	-	-
3	9	399	1	7.3	CL-ML	92.2	1035.0	1035.0	28.9	26	21	5	Sand-Like	Full Liquefaction	25	-	25	-	-	-
4	11.5	396.5	6	15.9	CL-ML	92.2	1322.5	1247.6	28.9	26	21	5	Sand-Like	Full Liquefaction	33	-	33	-	-	-
5	21.5	386.5	24	40.0	SW-SM	11.4	2472.5	1773.6	20.8	0	0	0	Sand-Like	No Liquefaction	44	-	44	-	44	-
6	26.5	381.5	15	28.2	CL-ML	53.5	3047.5	2036.6	19.6	19	14	5	Sand-Like	No Liquefaction	39	-	39	-	39	-
7	31.5	376.5	14	25.6	CL-ML	53.5	3622.5	2299.6	19.6	19	14	5	Sand-Like	No Liquefaction	38	-	38	-	38	-
8	36.5	371.5	19	31.6	CL-ML	53.5	4197.5	2562.6	19.6	19	14	5	Sand-Like	No Liquefaction	40	-	40	-	40	-
9	41.5	366.5	51	55.5	CL-ML	53.5	4772.5	2825.6	19.6	19	14	5	Sand-Like	No Liquefaction	48	-	48	-	48	-
10	46.5	361.5	26	38.0	SM	28.7	5347.5	3088.6	20.2	15	15	0	Sand-Like	No Liquefaction	42	-	42	-	42	-
11	51.5	356.5	32	38.7	SP-SM	6.1	5922.5	3351.6	19.8	0	0	0	Sand-Like	No Liquefaction	44	-	44	-	44	-
12	56.5	351.5	74	50.3	SP-SM	7.9	6497.5	3614.6	18.9	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
13	61.5	346.5	19	21.7	SP-SM	7.9	7072.5	3877.6	18.9	0	0	0	Sand-Like	Full Liquefaction	38	-	38	-	12	-
14	66.5	341.5	59	50.3	SP-SM	7.9	7647.5	4140.6	18.9	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
15	71.5	336.5	100	50.3	SP-SM	7.9	8222.5	4403.6	18.9	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
16	76.5	331.5	13	18.8	CL-ML	66.5	8797.5	4666.6	23.3	25	19	6	Sand-Like	Full Liquefaction	34	-	34	-	9	-
17	81.5	326.5	12	17.5	CL-ML	66.5	9372.5	4929.6	23.3	25	19	6	Sand-Like	Full Liquefaction	34	-	34	-	8	-
18	86.5	321.5	24	23.3	SW	4.8	9947.5	5192.6	37.9	0	0	0	Sand-Like	No Liquefaction	39	-	39	-	39	-
19	91.5	316.5	14	13.3	SW	4.8	10522.5	5455.6	37.9	0.0	0.0	0.0	Sand-Like	Full Liquefaction	34.3	-	34	-	7	-
20	96.5	311.5	15	13.9	SW	4.8	11097.5	5718.6	37.9	0.0	0.0	0.0	Sand-Like	Full Liquefaction	34.6	-	35	-	7	-
21	101.5	306.5	32	29.0	SW	4.8	11672.5	5981.6	37.9	0.0	0.0	0.0	Sand-Like	No Liquefaction	41.1	-	41	-	41	-

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Subsurface Investigation Geotechnical Data Report

SR-01 over Branch (Bridge No. 3)

PIN No.: 128113.03
GES No.: 3832418

Haywood County, TN
June 20, 2019

APPROVED
07/03/2019

June 20, 2019

Mr. Travis Smith, P.E.
Civil Engineering Manager I
Materials & Tests Division
Tennessee Department of Transportation
6601 Centennial Boulevard
Nashville, Tennessee 37243

Dear Mr. Smith,

We have completed the *Subsurface Investigation Geotechnical Data Report* for the Bridge Replacement on SR-01 over unnamed Branch in Haywood County, Region 4 (Bridge No. 3). Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering and geological services to the Tennessee Department of Transportation.

Sincerely,
HDR

Devin L. Chittenden, P.E.
Senior Geotechnical Engineer

Bret O. Watkins, P.G.
Senior Geologist

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Appendix B: Boring Logs & CPT Data
Appendix C: Laboratory Testing
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Executive Summary

The proposed project entails the replacement of an existing two-lane bridge along SR-01 near log mile 2.89 in Haywood County, TN. The new structure, described as “Bridge No. 3”, will be a direct replacement of the existing single-span bridge by constructing a reinforced concrete box culvert (RCBC) at an unnamed branch of Muddy Creek, centered at Station 99+57.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein. Bedrock was not encountered within the advanced borings.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design/build team for the proposed structure along SR-01 near log mile 2.89 over an unnamed branch of Muddy Creek in Haywood County, TN. The proposed 18-ft by 16-ft reinforced concrete box culvert (RCBC) will replace the existing 46-ft single span bridge situated between Stations 99+37.82 to 99+84.53. Borings were advanced and soil samples were collected and delivered to the HDR laboratory for further testing and analysis. Geotechnical parameters and foundation recommendations are provided in this report resulting from the evaluations of soil conditions at the proposed site.

2 Subsurface Exploration

A subsurface investigation was conducted at this site by HDR and sub-consultants in June 2019. The exploration program included two Standard Penetration Test (SPT) borings advanced to 100-ft bgs, with each boring advanced with a CME-45C track-mounted rig on opposite ends of the existing bridge, offset to roadway centerline. In addition, one piezoCone Penetrometer Test (CPT) boring was advanced by track-mounted box rig with 20-ton reaction mass near the existing west bridge abutment to cone refusal depth (see Bridge Replacement Boring Plan Sheet – Appendix A). Test boring locations are tabulated below:

Table 2-1. Test Boring Locations

Test Hole Number	Location	Station	Offset	Depth
B-1	Existing West Abutment	99+39	10-ft RT	101.5-ft
B-2	Existing East Abutment	99+84	18-ft LT	101.5-ft
CPT-1	Existing West Abutment	99+24	6-ft LT	87.6-ft

SPT's were obtained at 2.5-ft intervals in the top ten feet and at five foot intervals until reaching termination depths. SPT borings were logged for blow counts, soil types, sample recoveries, and boring metrics. CPT piezoCone readings of tip resistance, sleeve friction, friction ratio, and pore water pressure were collected on a continuous basis as the cone was advanced at a rate of 2cm/sec until refusal was met at 87.6-ft bgs. Seismic velocity measurements were also collected in the CPT boring at 5-ft intervals. Boring logs from borings B-1 and B-2, as well as CPT results are provided in Appendix B. All soil specimens were delivered to HDR for laboratory testing and analysis, including the following tests:

Atterberg Limits	AASHTO T-89 and T-90
Sieve Analysis	ASTM D-1140
Natural Moisture Content	AASHTO T-265

Unconsolidated Undrained (UU) Compression Test	AASHTO T-296
Standard Proctor	AASHTO T-99
pH Testing	AASHTO T-288
Resistivity	ASTM G-187

The full laboratory testing results are located in Appendix C.

3 Geology, Soils, and Site Conditions

The proposed bridge site is topographically depicted on the Stanton, Tennessee 7.5-minute topographic quadrangle map as situated in an area of low to moderate relief, within the local floodplain of Little Muddy Creek, which drains to the north/northwest. Approximate proposed grade elevations range from 310-ft to 314-ft, with nearby ridge line elevations over 350-ft.

The project site is located within the Gulf Coastal Plain Physiographic Province of Western Tennessee. The Mississippi Embayment – a large fluvial floodplain with relatively flat to gently sloping topography providing drainage over much of the central and eastern portions of North America – forms the northern portion of this province. The Embayment was initially formed as a topographic low during the Proterozoic, precipitated by crustal weaknesses that created many structural deformities including the Reelfoot Rift of the New Madrid Seismic Zone. By the end of the Paleozoic, much of the regional basin was infilled with shallow marine deposits, forming the base of the Embayment today as limestone, shale, and sandstones. Regional subsidence and deposition following the Paleozoic resulted in the thick accumulation of Mesozoic and younger unconsolidated strata that generally dip towards the Mississippi River, increasing in thickness to as much as 3000-ft thick, with strata becoming progressively younger towards the center of the basin.

Published mapping indicates the presence of Holocene alluvial sediments comprised of quartz-rich sands, silt, and clay that are poorly sorted and stratified. Generally finer-grained loess grades into coarser-grained sands and gravels with depth. Holocene alluvium is considered approximately 20 ft thick. The existing bridge approaches are supported atop this alluvium with roadway embankment fill, approximately 5 – 10 ft thick. The alluvium is supported with Eocene deltaic non-marine deposits of primarily fine-grained micaceous quartz sands crossbedded with clays and minor amounts of lignite and siderite. Variations is lateral consistency are common due to crossbedding. Anticipated thickness of Eocene deposits is greater than 100-ft. It is believed Eocene deposits are further supported by Paleocene shallow marine deposits of glauconitic clay, with thin lenses of fine micaceous sands. Paleocene deposits are anticipated to be approximately 100-200 ft thick. At this locality, Paleocene deposits are further supported by Upper Cretaceous sediments lying atop Paleozoic rocks at greater than 1000-ft depth.

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1 and B-2. Fill was intercepted from the existing ground surface to approximately 15.0 to 20.0-ft maximum depth. Field and laboratory classifications of recovered SPT samples indicate fill composed of very soft low plasticity lean clays and

silts (CL-ML, ML). Some concrete debris was noted while drilling boring B-1 at 19.0 to 19.8-ft near the fill / native soil interface.

Alluvium is interpreted as underlying the embankment fill in both of the advanced borings with an approximate thickness range of 10 to 22-ft. Recovered samples indicate alluvium is dominantly reworked silt, lean clay, and fine-grained clayey sands (CL, SC). Alluvial deposits exhibited low plasticity. SPT drives and laboratory testing of samples indicated medium stiff consistency for cohesive sediments that locally dominate the alluvial deposits. Natural moisture content of alluvial sediments ranges from 22.2 – 28.6 percent. The base of alluvium is believed to rest upon an angular unconformity surface eroded into the underlying Tertiary Eocene deposits (Claiborne/Wilcox Formations, undivided). This surface varied in elevation from 276.0 to 281.0-ft within advanced borings.

Claiborne/Wilcox Formation sediments underlying alluvial deposits were intercepted approximately 30 to 37-ft below grade. The base of Claiborne/Wilcox sediments were not intercepted in the borings advanced, therefore thicknesses were interpreted to be greater than 63 to 70-ft. This formation (considered undivided in this locality) is predominantly composed of non-plastic fine grain silty sands gradually transitioning to low plasticity poorly graded sandy silts and clayey sands (SM, SC, SP-SM). SPT drives indicate loose to very dense consistency for the partially cohesive sediments. Natural moisture contents generally ranged from 17.8 – 37.2 percent.

No faulting was indicated on published mapping within the limits of the proposed alignment. Likewise recovered samples did not indicate the presence of faulting. The region surrounding the project area is located within an active seismic region (New Madrid Seismic Zone) and is considered one of the most active seismic regions in the country. Regional seismic events, both along the New Madrid Fault System and associated fault systems, have been and are continually documented throughout Western Tennessee, Western Kentucky, Southern Illinois, Southeastern Missouri and Northeastern Arkansas.

Groundwater was encountered within each of the RCBC borings at the end of drilling operations at approximately 11.3-ft and 14.8-ft bgs. Generally, the interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed RCBC foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A, with borehole test logs provided in Appendix B.

Table 3-1. Generalized Subsurface Conditions

Material Type/Formation	Elevation of Top Layer (ft)	Depth to Top Layer (ft)	USCS Soil Type	SPT-N values (bpf)	UU Total Shear Strength (psf)
Embankment Fill	311.0-313.0	0	CL-ML(A-4), ML(A-4)	0-5	1,693
Holocene Alluvium	293.0-296.0	15.0-20.0	CL (A-6), SC(A-6)	6-9	1,209-2,310
Eocene-Claiborne/Wilcox	276.0-281.0	30.0-37.0	SM (A-2-4, A-4), SC (A-4), SP-SM (A-3, A-1-b)	12-81	3,521

In addition to lab classification and triaxial shear strength testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils

data for use by a structural engineer to provide any necessary protection to the piling, concrete, reinforcing steel, etc. Corrosion and deterioration protection requirements and guidelines for piling are set forth in LRFD Section 10.7.5. The corrosion and deterioration testing results are summarized in Table 3-2 below and are included in Appendix C.

Table 3-2. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth	pH	Resistivity (ohm·cm)
B-1	99+39	10-ft RT	0.0'-10.0'	7.4	1,120

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation:

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation:

- Resistivity less than 3,000 ohm-cm
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Results of the corrosion and deterioration testing indicated that the site has moderate potential for pile or steel reinforcement deterioration based on the resistivity value and the geographical location of the project site. Interpretation of the data and corrosion protection of the foundation structural components will be discussed with the structural engineer for the project.

4 Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Haywood County is considered vulnerable to severe ground shaking. The project site classifies as Site Class D based on the average CPT shear wave value (945.8 ft/s). The peak ground acceleration coefficient for this project site obtained from USGS (2009) is equal to 0.40g using Site Class D. S-wave response measurements (Vs) collected from the CPT boring observed values ranging from 480 – 972 ft/sec from 5-ft to 45-ft depths. From 50-ft to 80-ft depths, velocities increased to 722 – 1,910 ft/sec. Sharp increases in shear wave velocities were observed at 50-ft (1,427 ft/sec) and 60-ft (1,910 ft/sec).

Preliminary analyses of the subsurface conditions in the SPT and CPT borings were performed to evaluate the likelihood of liquefaction during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger Soil Liquefaction during Earthquakes (2008) and using the Geologismiki software Cliq v.3.0.

Table 4-1. Soil Liquefaction Potential Results

Test Boring	Depth(ft)	Thickness(ft)	Average FS	Average LPI	Settlement (in)
B-1	84.0-89.0	5.0	0.58	N/A	1.33
	94.0-99.0	5.0	0.58	N/A	1.36
B-2	5.25-7.75	2.50	0.10	N/A	0.0 (clay-like)
	10.25-14.00	3.75	0.06	N/A	0.0 (clay-like)
	89.0-94.0	5.00	0.70	N/A	1.23
CPT-1	15.42-20.83	5.41	0.39	N/A	2.94
	22.80-25.26	2.46	0.32	N/A	1.44
	27.40-28.38	0.98	0.45	N/A	0.48
	38.06-38.71	0.65	0.37	N/A	0.38
	43.31-45.60	2.29	0.38	N/A	1.03
	46.59-60.53	13.94	0.41	N/A	6.09
	61.68-72.83	11.15	0.40	N/A	5.35
	79.40-83.17	3.77	0.37	N/A	2.15

Based on the results of the seismic hazard evaluation, it is believed the soils are susceptible to shear strength loss during the seismic event. The liquefiable layers present at the SPTs indicate layers 2.5’ to 5.0’ thick and settlement magnitudes up to 2.69”. CPTs obtain continuous testing data at approximately 2-inch intervals and it is typically more appropriate to rely on CPT results more than SPT results during liquefaction analysis because they generate an improved soil model by localizing weaker zones susceptible to liquefaction. The liquefiable layers present at the CPTs indicate layers ranging from 0.65’ to 13.94’ thick and settlement magnitudes of 19.86”. Other seams of liquefiable material were present in the CPT results; however, it is common practice to eliminate layers of liquefaction less than 6” thick. The results of the preliminary soil shear strength loss analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. More detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment slopes, embankment settlements, retaining walls and bridge foundation types and capacities will be required to ensure a sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed structure on SR-

01 over unnamed Branch of Muddy Creek in Haywood County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

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USGS (2016). “Stanton, TN Topographic Quadrangle Map”, United States Geological Survey, 7.5 Minute Series; scale 1:24,000.

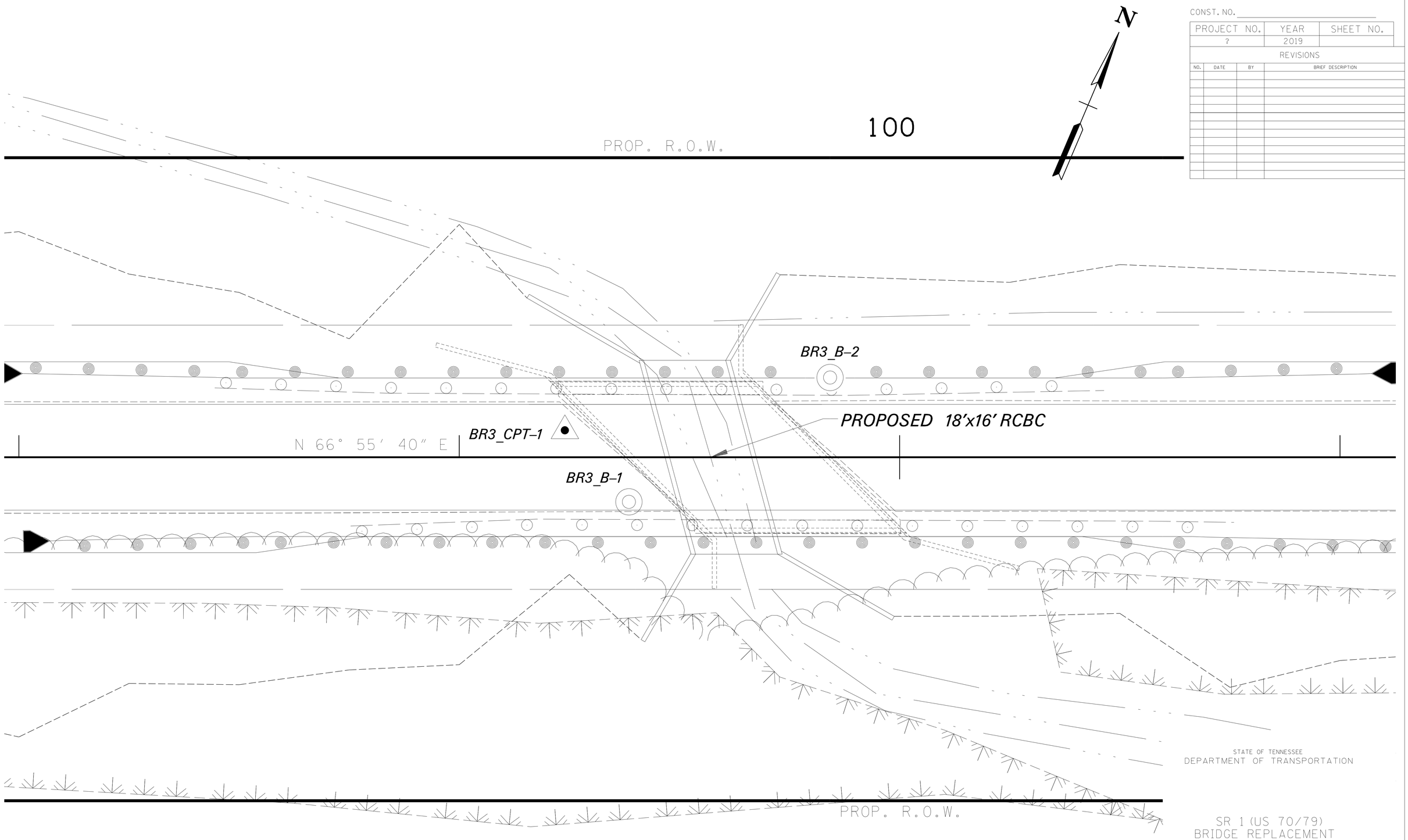
Appendix A: Plan and Boring Sheets

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
?	2019	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 1 (US 70/79)
BRIDGE REPLACEMENT
OVER BRANCH AT L.M. 2.89
HAYWOOD COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecraft DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/19/19

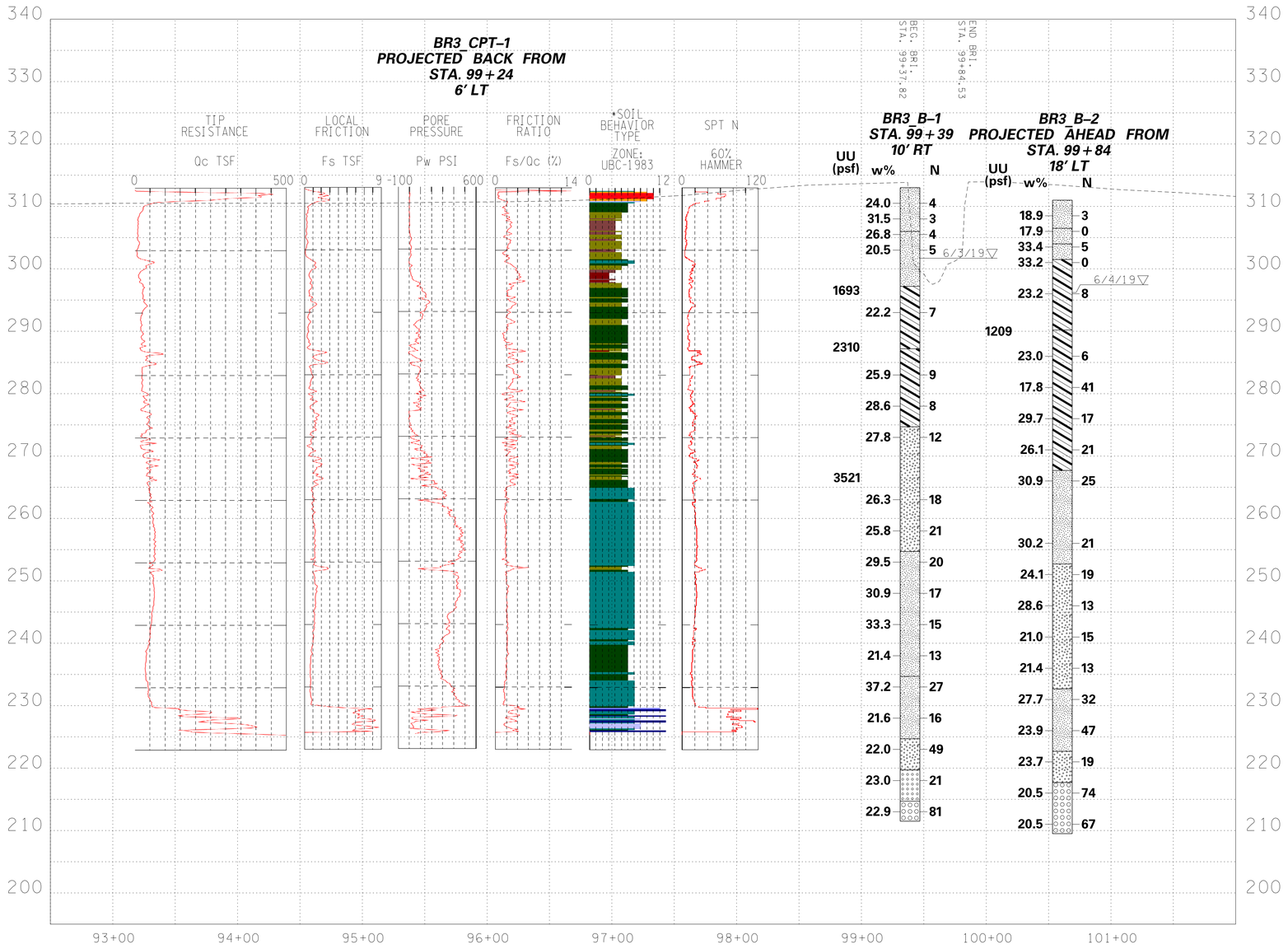
HDR

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
?	2019	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6		
SYMBOL													
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS

ADDITIONAL ROCK SYMBOLS

SYMBOL	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	RANDOM BACKFILL	WEATHERED LIMESTONE	GRADED SOLID ROCK

SPT BORING LEGEND

○	ROCKLINE SOUNDINGS	RQD	ROCK QUALITY DESIGNATION
◔	DISTURBED SAMPLE BORING	REC	% CORE RECOVERED
◎	UNDISTURBED SAMPLE BORING	Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
⊙	UNDISTURBED SAMPLE BORING & ROCK CORE	Qu (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ROCK CORE)
●	ROCK CORE	UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
➡	APPROXIMATE PILE TIP ELEVATION	w%	MOISTURE CONTENT
▼(Date)	WATER ELEVATION	R	REFUSAL
✳	LIQUEFACTION OR SOIL STRENGTH LOSS IS PROBABLE AT THESE LOCATIONS	NR	REFUSAL NOT ENCOUNTERED
N	UNCORRECTED PENETRATION RESISTANCE		

CPT SOUNDINGS LEGEND

MAXIMUM DEPTH = 87.60 FEET

DEPTH INCREMENT = 0.164 FEET

1 SENSITIVE FINE GRAINED
2 ORGANIC MATERIAL
3 CLAY
4 SILTY CLAY TO CLAY
5 CLAYEY SILT TO SILTY CLAY
6 SANDY SILT TO CLAYEY SILT
7 SILTY SAND TO SANDY SILT
8 SAND TO SILTY SAND
9 SAND
10 GRAVELLY SAND TO SAND
11 VERY STIFF FINE GRAINED (*)
12 SAND TO CLAYEY SAND (*)

REFUSAL: REACTION

*SOIL BEHAVIOR TYPE AND SPT BASED ON DATA FROM UBC-1983

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 1 (US 70/79)
BRIDGE REPLACEMENT
OVER BRANCH AT L.M. 2.89
HAYWOOD COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecraft DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/19/19

HDR

Appendix B: Boring Logs & CPT Data

State	**Tennessee**	Latitude	**35.4551 °** Longitude **89.4268 °**
County	**Haywood**	Location	**99+39 10' Rt.**
Project Name	**SR-1 Over Branch**	Surface Elevation	**313 ft.**
Project Type	**Subsurface Investigation**	Dated Started	**6/2/2019** Completed **6/3/2019**
Driller	**D. Bowling** Logged by **B. Cayton**	Depth to Water: Immediate	**(After 30 min.) 11.3 ft.**
Hole Number	**BR3_B-1** Total Depth **101.5 ft.**	Depth to Water	Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
313.0 ft	0		*Ground Line*						
			Asphalt pavement						
			1.3' Concrete pavement 1.9'						
310	5		Soft, brown, silty clay with sand.		SS-1	2.5 / 4.0	1.0	2-2-2	SPT
					SS-2	5.0 / 6.5	1.1	1-2-1	SPT
305	10		7.0' Soft to medium stiff, brown and gray silt.		SS-3	7.5 / 9.0	1.0	1-1-3	SPT
					SS-4	10.0 / 11.5	0.6	1-2-3	SPT
300	15		15.8' Medium stiff, brown, lean clay.		ST-1	15.0 / 17.0	0.9		ST
295	20				SS-5	20.0 / 21.5	1.4	2-3-4	SPT
290	25		25.8' Loose, brown, clayey sand.		ST-2	25.0 / 27.0	2.0		ST
285	30				SS-6	30.0 / 31.5	1.5	4-5-4	SPT
280	35				SS-7	35.0 / 36.5	1.5	2-4-4	SPT
275	40		38.3' Medium dense, gray, silty sand.		SS-8	40.0 / 41.5	1.5	3-5-7	SPT
270	45				ST-3	45.0 / 47.0	1.8		ST
265	50				SS-9	50.0 / 51.5	1.5	7-9-9	SPT
260	55				SS-10	55.0 / 56.5	1.5	7-10-11	SPT
255	60		58.3' Medium dense, gray, clayey sand.						

State	**Tennessee**	Latitude	**35.4551 °** Longitude **89.4268 °**
County	**Haywood**	Location	**99+39 10' Rt.**
Project Name	**SR-1 Over Branch**	Surface Elevation	**313 ft.**
Project Type	**Subsurface Investigation**	Dated Started	**6/2/2019** Completed **6/3/2019**
Driller	**D. Bowling** Logged by **B. Cayton**	Depth to Water: Immediate	**(After 30 min.) 11.3 ft.**
Hole Number	**BR3_B-1** Total Depth **101.5 ft.**	Depth to Water	Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
253.0 ft	60		*Continued from previous page*						
					SS-11	60.0 61.5	1.5	7-9-11	SPT
250	65				SS-12	65.0 66.5	1.5	5-8-9	SPT
245	70				SS-13	70.0 71.5	1.3	5-7-8	SPT
240	75				SS-14	75.0 76.5	1.4	3-5-8	SPT
235	80		Medium dense, gray, silty sand with lignite.	78.3'	SS-15	80.0 81.5	1.3	2-9-18	SPT
230	85				SS-16	85.0 86.5	1.5	3-7-9	SPT
225	90		Dense, gray, silty sand.	88.3'	SS-17	90.0 91.5	0.9	9-20-29	SPT
220	95		Medium dense, brown, poorly graded sand with silt.	93.3'	SS-18	95.0 96.5	0.9	5-9-12	SPT
215	100		Very dense, brown, poorly graded sand with silt.	98.3'	SS-19	100.0 101.5	1.0	13-36-45	SPT
210	105		Boring Terminated @ 101.5' (Elev. 211.5). Bulk sample obtained from 0.0'-10.0'. Encountered cement from 19.0 ft to 19.8 ft, possible foundation. Boring elevation estimated from Google Earth imagery.	101.5'					
205	110								
200	115								
195	120								

State	**Tennessee**	Latitude	**35.45522 °**
County	**Haywood**	Longitude	**89.4267 °**
Project Name	**SR-1 Over Branch**	Location	**99+84 18' Lt.**
Project Type	**Subsurface Investigation**	Surface Elevation	**311 ft.**
Driller	**D. Bowling**	Dated Started	**6/3/2019**
Logged by	**B. Cayton**	Completed	**6/4/2019**
Hole Number	**BR3_B-2**	Depth to Water: Immediate	**(After 30 min.) 14.8 ft.**
Total Depth	**101.5 ft.**	Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
311.0 ft	0		*Ground Line*						
310			Asphalt pavement	1.0'					
			Aggregate base course	1.4'					
			Soft, brown, silty clay with sand.		SS-1	2.5 4.0	0.7	1-1-2	SPT
	5			4.5'					
305			Very soft, brown, sandy, silty clay.		SS-2	5.0 6.5	0.6	0-0-0	SPT
				7.0'					
			Medium stiff, gray, silt.		SS-3	7.5 9.0	0.9	1-3-2	SPT
	10			9.5'					
300			Very soft to medium stiff, gray and brown, lean clay.		SS-4	10.0 11.5	1.3	0-0-0	SPT
295	15				SS-5	15.0 16.5	1.5	2-4-4	SPT
290	20			20.8'	ST-1	20.0 22.0	2.0		ST
			Loose to dense, brown and gray, clayey sand.						
285	25				SS-6	25.0 26.5	1.5	2-3-3	SPT
280	30				SS-7	30.0 31.5	1.2	9-22-19	SPT
275	35				SS-8	35.0 36.5	1.5	5-8-9	SPT
270	40				SS-9	40.0 41.5	1.5	6-9-12	SPT
				43.3'					
			Medium dense, gray, clayey sand.						
265	45				SS-10	45.0 46.5	1.0	7-11-14	SPT
260	50				ST-2	50.0 51.6	1.5		ST
255	55				SS-11	55.0 56.5	1.4	6-10-11	SPT
				58.3'					
	60		Medium dense, gray, silty sand.						

State **Tennessee** Latitude **35.45522** ° Longitude **89.4267** °

County **Haywood** Location **99+84 18' Lt.**

Project Name **SR-1 Over Branch** Surface Elevation **311 ft.**

Project Type **Subsurface Investigation** Dated Started **6/3/2019** Completed **6/4/2019**

Driller **D. Bowling** Logged by **B. Cayton** Depth to Water: Immediate **(After 30 min.) 14.8 ft.**

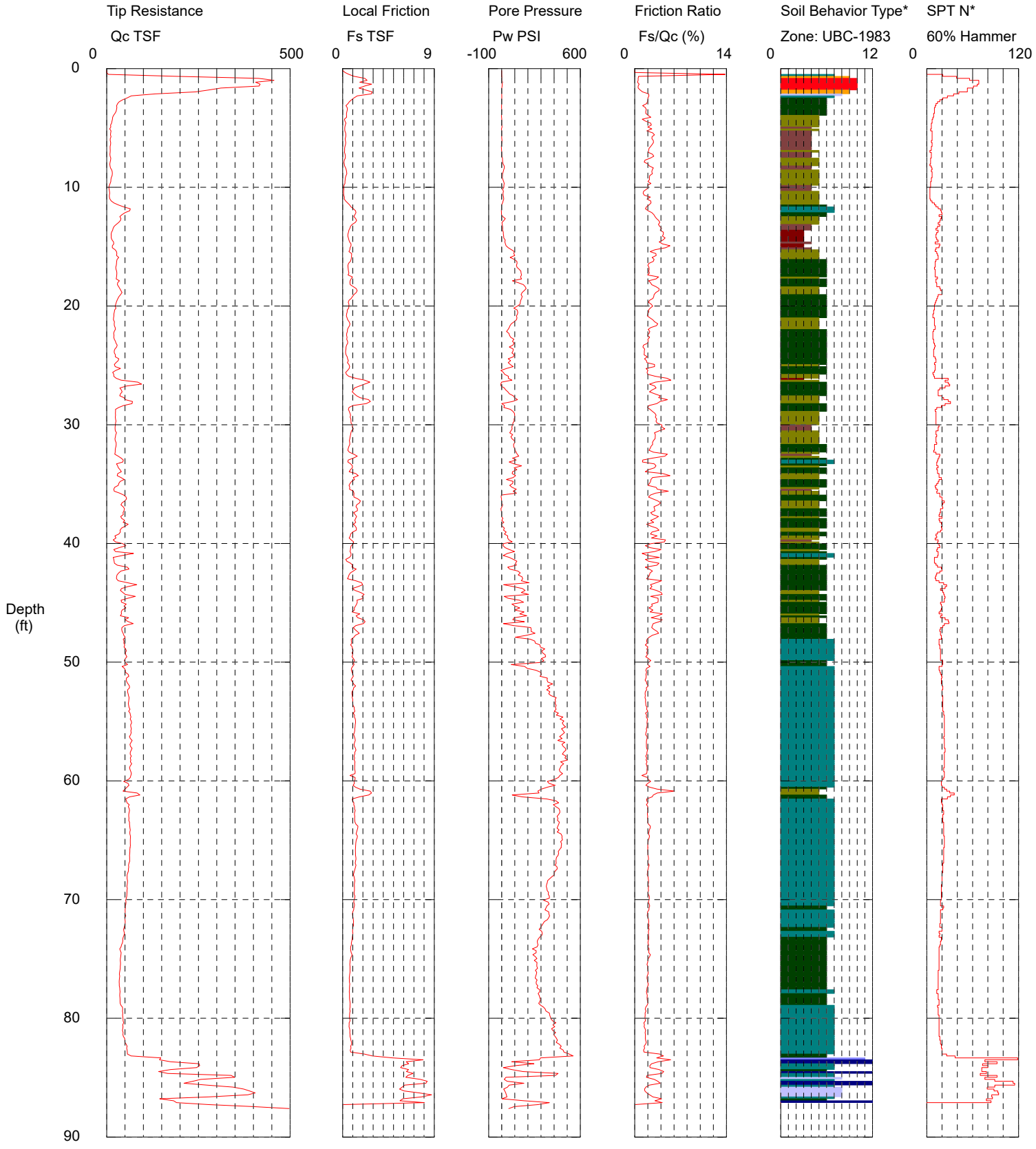
Hole Number **BR3_B-2** Total Depth **101.5 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
251.0 ft	60		*Continued from previous page*						
250					SS-12	60.0 61.5	1.5	6-9-10	SPT
	65								
245					SS-13	65.0 66.5	1.1	4-5-8	SPT
	70								
240					SS-14	70.0 71.5	1.4	4-7-8	SPT
	75								
235					SS-15	75.0 76.5	1.3	4-6-7	SPT
				78.3'					
	80		Dense, gray, silty sand.						
230					SS-16	80.0 81.5	1.3	4-11-21	SPT
	85								
225					SS-17	85.0 86.5	1.3	8-23-24	SPT
				88.3'					
	90		Medium dense, gray, silty sand.						
220					SS-18	90.0 91.5	0.8	3-8-11	SPT
				93.3'					
	95		Very dense, brown, poorly graded sand with silt.						
215					SS-19	95.0 96.5	1.1	21-37-37	SPT
	100								
210					SS-20	100.0 101.5	0.9	22-34-33	SPT
				101.5'					
	105		Boring Terminated @ 101.5' (Elev. 209.5).						
205			Bulk sample obtained from 0.0'-10.0'.						
	110		Boring relocated to avoid contact with concrete foundation and to minimize impact to traffic.						
200			Boring elevation estimated from Google Earth imagery.						
	115								
195									
	120								

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR3CPT-1
Cone Used: DDG1210
GPS Data: N35.45512 W89.42687

CPT Date/Time: 5/17/2019 10:07:46 AM
Location: BRANCH-HAYWOOD CO.
Job Number: M19-165
Groundwater: Collapsed and dry at 4.8-ft.



Maximum Depth = 87.60 feet

Depth Increment = 0.164 feet

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

Refusal: Reaction. Surface material removed: Asphalt (14-in) over Concrete (9-in).

Pulverized pavement placed back in hole prior to start of sounding.

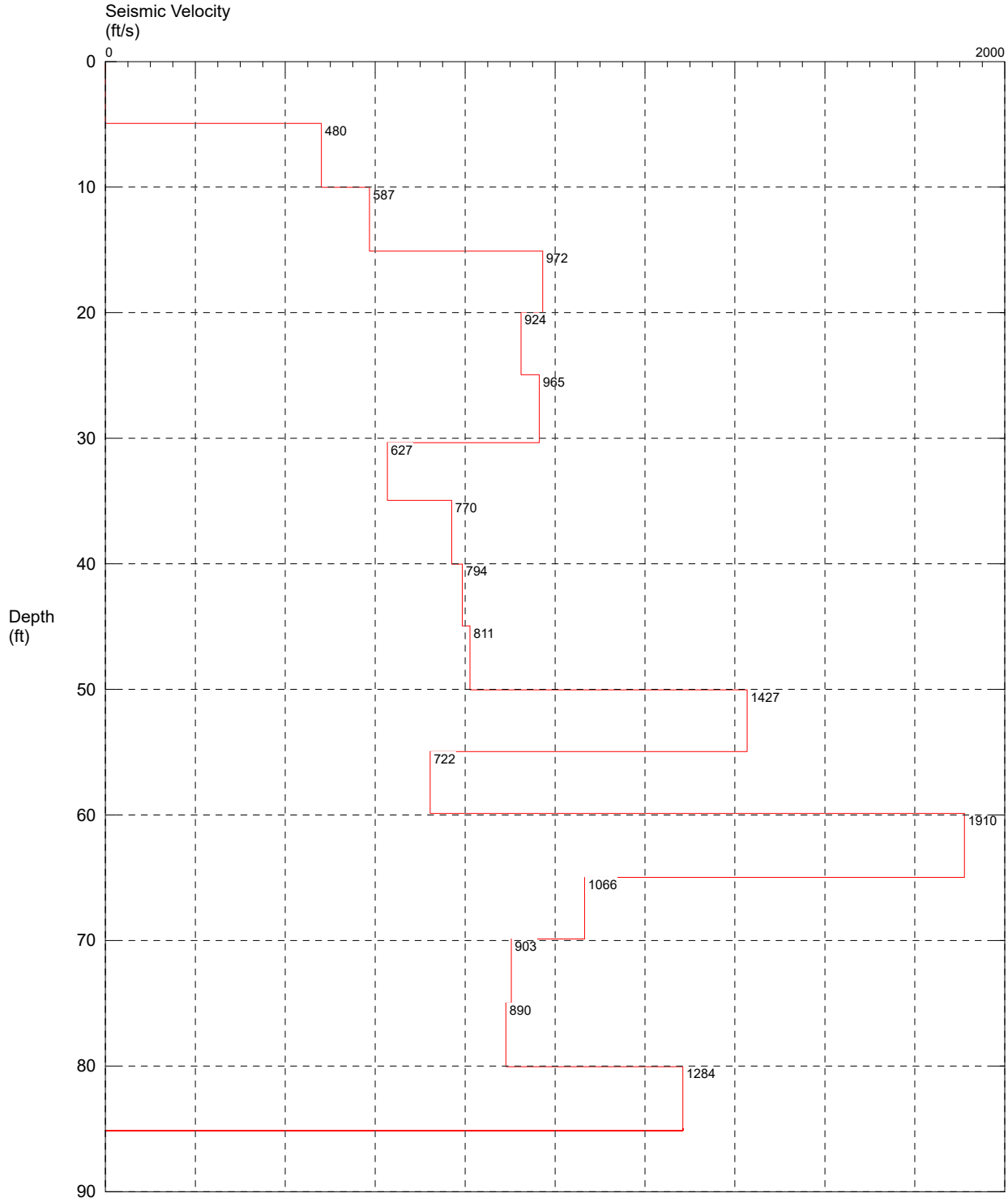
*Soil behavior type and SPT based on data from UBC-1983

SOUNDING

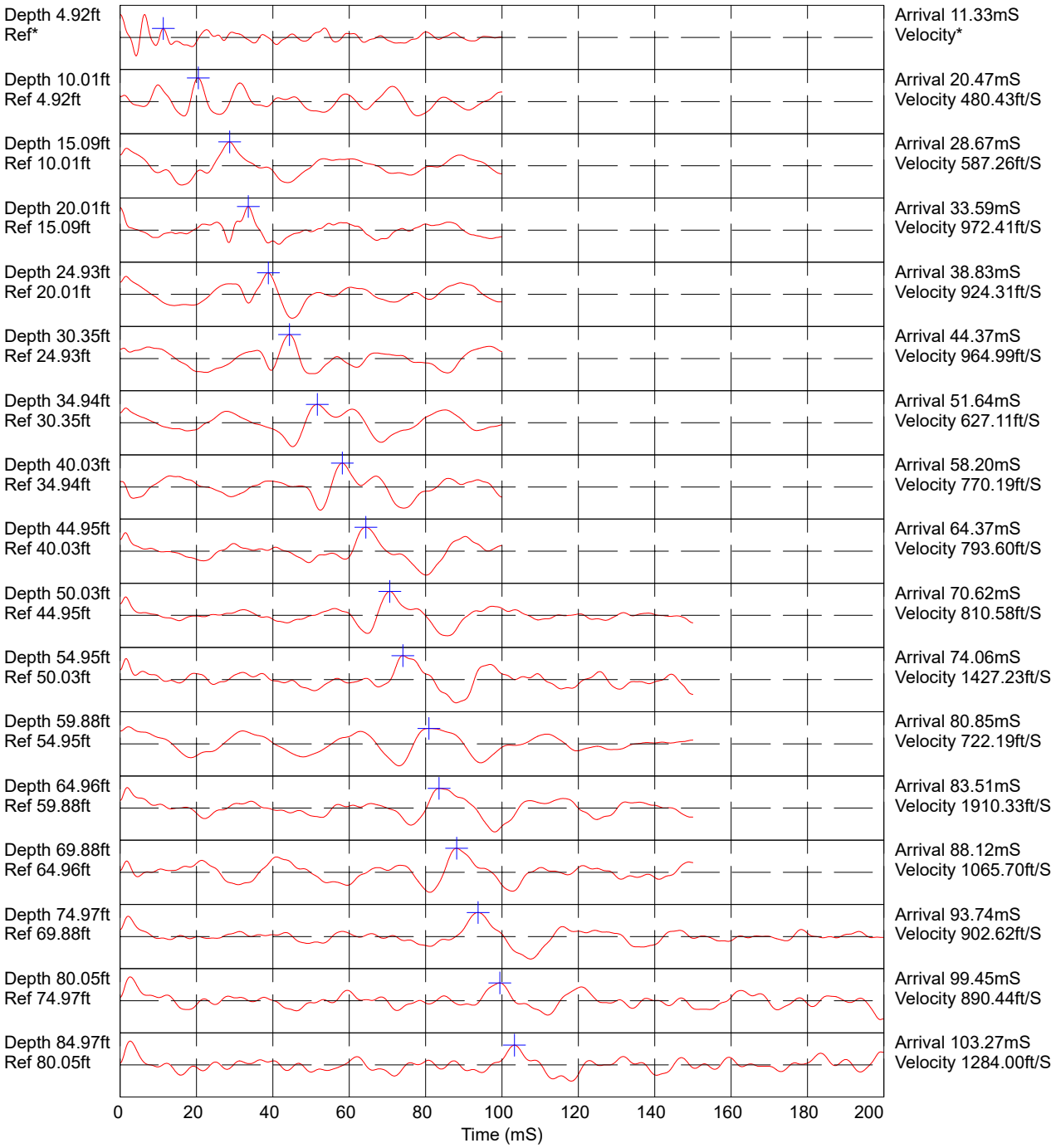
CUSTOMER: Southern Earth Science Inc
OPERATOR: Brandon Green
CONE ID: DDG1210
FILENAME: M19-165BR3CPT-1.cpt

JOB NUMBER: M19-165
HOLE NUMBER: BR3CPT-1
TEST DATE: 5/17/2019 10:07:46 AM

COMMENT: Pulverized pavement placed back in ho
GPS (LAT,LON,ALT): 0.00,0.00,0.0
LOCATION: BRANCH-HAYWOOD CO.



HOLE NUMBER: BR3CPT-1



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

Appendix C: Laboratory Testing

Project Name : SR-1 over Branch
Location : Haywood County, TN
Job Number : 10168886

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
3	B-1		SS-1	2.5	4.0	Brown Silty Clay with Sand		24.0
3			SS-2	5.0	6.5	Brown Silty Clay with Sand		31.5
4			SS-3	7.5	9.0	Brown Silt		26.8
4			SS-4	10.0	11.5	Gray Silt		20.5
			ST-1	15.0				
5			SS-5	20.0	21.5	Brown Lean Clay		22.2
			ST-2	25.0				
6			SS-6	30.0	31.5	Brown Clayey Sand		25.9
6			SS-7	35.0	36.5	Brown Clayey Sand		28.6
7			SS-8	40.0	41.5	Gray Silty Sand		27.8
			ST-3	45.0				
7			SS-9	50.0	51.5	Gray Silty Sand		26.3
7			SS-10	55.0	56.5	Gray Silty Sand		25.8
8			SS-11	60.0	61.5	Gray Clayey Sand		29.5
8			SS-12	65.0	66.5	Gray Clayey Sand		30.9
8			SS-13	70.0	71.5	Gray Clayey Sand		33.3
8			SS-14	75.0	76.5	Gray Clayey Sand		21.4
9			SS-15	80.0	81.5	Gray Silty Sand		37.2
9			SS-16	85.0	86.5	Gray Silty Sand		21.6
10			SS-17	90.0	91.5	Gray Silty Sand		22.0
11			SS-18	95.0	96.5	Brown Poorly Graded Sand with Silt		23.0
12			SS-19	100.0	101.5	Brown Poorly Graded Sand with Silt		22.9
13			Bulk-1	0.0	5.0			16.4
1	B-2		SS-1	2.5	4.0	Brown Silty Clay with Sand		18.9
2			SS-2	5.0	6.5	Brown Sandy Silty Clay		17.9
4			SS-3	7.5	9.0	Gray Silt		33.4
5			SS-4	10.0	11.5	Gray Lean Clay		33.2
5			SS-5	15.0	16.5	Brown Lean Clay		23.2
			ST-1	20.0				
6			SS-6	25.0	26.5	Brown & Gray Clayey Sand		23.0
6			SS-7	30.0	31.5	Brown Clayey Sand		17.8
6			SS-8	35.0	36.5	Brown Clayey Sand		29.7
6			SS-9	40.0	41.5	Brown Clayey Sand		26.1
7			SS-10	45.0	46.5	Gray Silty Sand		30.9
			ST-2	50.0				
7			SS-11	55.0	56.5	Gray Silty Sand		30.2
8			SS-12	60.0	61.5	Gray Clayey Sand		24.1
8			SS-13	65.0	66.5	Gray Clayey Sand		28.6
8			SS-14	70.0	71.5	Gray Clayey Sand		21.0
8			SS-15	75.0	76.5	Gray Clayey Sand		21.4
9			SS-16	80.0	81.5	Gray Silty Sand		27.7
9			SS-17	85.0	86.5	Gray Silty Sand		23.9
10			SS-18	90.0	91.5	Gray Silty Sand		23.7
12			SS-19	95.0	96.5	Brown Poorly Graded Sand with Silt		20.5
12			SS-20	100.0	101.5	Brown Poorly Graded Sand with Silt		20.5
			Bulk-1	0.0	5.0			

SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-1
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 2.5' to 4.0'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Silty Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.7
No.6		3.35	mm	
No.10		2	mm	99.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	81.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.006 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 18.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 28
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 21
			Plasticity Index	: 7
AASHTO Composition of Total Sample: M145			Liquidity Index	: -0.23
Gravel (3in. + No.10)	:	0.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	4.3	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	13.2	AASHTO Classification: M145	: A-4 (5)
Silt + Clay (-No.200)	:	81.9	ASTM Classification: D2487	: CL-ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.3
Coarse Sand (-No.4 + No.10)	:	0.3
Medium Sand (-No.10 + No.40)	:	4.3
Fine Sand (-No.40 + No.200)	:	13.2
Silt + Clay (-No.200)	:	81.9

Approved By : Kevin E. Walker

Soil No. 1

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-2
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Sandy Silty Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.6

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	61.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.021 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 17.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 24
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 17
			Plasticity Index	: 7
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.09
Gravel (3in. + No.10)	:	0.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	4.1	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	33.8	AASHTO Classification: M145	: A-4 (2)
Silt + Clay (-No.200)	:	61.7	ASTM Classification: D2487	: CL-ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.4
Medium Sand (-No.10 + No.40)	:	4.1
Fine Sand (-No.40 + No.200)	:	33.8
Silt + Clay (-No.200)	:	61.7

Approved By : Kevin E. Walker

Soil No. 2

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-1
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 2.5' to 4.0'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Silty Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.0
1/4		6.3	mm	
No.4		4.75	mm	93.6
No.6		3.35	mm	
No.10		2	mm	88.2

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	77.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.007 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 24.0
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 29
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 22
			Plasticity Index	: 7
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.29
Gravel (3in. + No.10)	:	11.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	5.2	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	5.8	AASHTO Classification: M145	: A-4 (4)
Silt + Clay (-No.200)	:	77.2	ASTM Classification: D2487	: CL-ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	6.4
Coarse Sand (-No.4 + No.10)	:	5.4
Medium Sand (-No.10 + No.40)	:	5.2
Fine Sand (-No.40 + No.200)	:	5.8
Silt + Clay (-No.200)	:	77.2

Approved By : Kevin E. Walker

Soil No. 3

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-3
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 7.5' to 9.0'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.0
1/4		6.3	mm	
No.4		4.75	mm	96.1
No.6		3.35	mm	
No.10		2	mm	95.7

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	94.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.003 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 31.5
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 32
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 24
			Plasticity Index	: 8
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.98
Gravel (3in. + No.10)	:	4.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.4	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	0.9	AASHTO Classification: M145	: A-4 (8)
Silt + Clay (-No.200)	:	94.4	ASTM Classification: D2487	: ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	3.9
Coarse Sand (-No.4 + No.10)	:	0.4
Medium Sand (-No.10 + No.40)	:	0.4
Fine Sand (-No.40 + No.200)	:	0.9
Silt + Clay (-No.200)	:	94.4

Approved By : Kevin E. Walker

Soil No. 4

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-5
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 15.0' to 16.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.8
No.6		3.35	mm	
No.10		2	mm	97.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	92.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	85.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.005 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 23.2
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 37
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 19
			Plasticity Index	: 18
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.23
Gravel (3in. + No.10)	:	2.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	5.7	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	6.8	AASHTO Classification: M145	: A-6 (15)
Silt + Clay (-No.200)	:	85.3	ASTM Classification: D2487	: CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.2
Coarse Sand (-No.4 + No.10)	:	2.0
Medium Sand (-No.10 + No.40)	:	5.7
Fine Sand (-No.40 + No.200)	:	6.8
Silt + Clay (-No.200)	:	85.3

Approved By : Kevin E. Walker

Soil No. 5

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-6
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 30.0' to 31.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Clayey Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	45.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.089 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 25.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 31
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 20
			Plasticity Index	: 11
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.51
Gravel (3in. + No.10)	:	0.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	4.4	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	50.2	AASHTO Classification: M145	: A-6 (2)
Silt + Clay (-No.200)	:	45.2	ASTM Classification: D2487	: SC

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.2
Medium Sand (-No.10 + No.40)	:	4.4
Fine Sand (-No.40 + No.200)	:	50.2
Silt + Clay (-No.200)	:	45.2

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Soil No. 6

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-10
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Gray Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	91.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	55.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	14.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.34 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 25.8
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 39
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 30
			Plasticity Index	: 9
AASHTO Composition of Total Sample: M145			Liquidity Index	: -0.45
Gravel (3in. + No.10)	:	8.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	36.3	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	40.3	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	14.9	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	8.5
Medium Sand (-No.10 + No.40)	:	36.3
Fine Sand (-No.40 + No.200)	:	40.3
Silt + Clay (-No.200)	:	14.9

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Soil No. 7

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-15
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 75.0' to 76.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Gray Clayey Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	93.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	45.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.089 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 21.4
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 27
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 17
			Plasticity Index	: 10
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.42
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	6.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	48.2	AASHTO Classification: M145	: A-4 (1)
Silt + Clay (-No.200)	:	45.2	ASTM Classification: D2487	: SC

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	6.6
Fine Sand (-No.40 + No.200)	:	48.2
Silt + Clay (-No.200)	:	45.2

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Soil No. 8

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-16
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 85.0' to 86.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Gray Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.1
No.6		3.35	mm	
No.10		2	mm	98.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	96.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.082 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 21.6
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 22
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 18
			Plasticity Index	: 4
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.86
Gravel (3in. + No.10)	:	1.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	2.3	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	48.7	AASHTO Classification: M145	: A-4 (0)
Silt + Clay (-No.200)	:	47.4	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.9
Coarse Sand (-No.4 + No.10)	:	0.7
Medium Sand (-No.10 + No.40)	:	2.3
Fine Sand (-No.40 + No.200)	:	48.7
Silt + Clay (-No.200)	:	47.4

Approved By : Kevin E. Walker

Soil No. 9

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SOIL CLASSIFICATION

Project Name : SR-1 Over Branch
Project No. : 10168886
Project County : Haywood
Project State : Tennessee
Laboratory No. : 10168886
Submitted By : HDR
Soil Type : Gray Silty Sand

Sample No. : SS-18
Sample Loc. : Boring No. B-2
Sample Depth : 90.0' to 91.5'
Date Tested : 06/10/19
Date Reported : 06/18/19

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.12 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 23.7
Liquid Limit (AASHTO T89) : NP
Plastic Limit (AASHTO T90) : NP
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-2-4 (0)
ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 0.0
Coarse Sand (-No.10 + No.40) : 0.2
Fine Sand (-No.40 + No.200) : 68.1
Silt + Clay (-No.200) : 31.7

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.0
Coarse Sand (-No.4 + No.10) : 0.0
Medium Sand (-No.10 + No.40) : 0.2
Fine Sand (-No.40 + No.200) : 68.1
Silt + Clay (-No.200) : 31.7

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Soil No. 10

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-18
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 95.0' to 96.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	10.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.163 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 23.0
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.3	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	89.7	AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	:	10.0	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	0.3
Fine Sand (-No.40 + No.200)	:	89.7
Silt + Clay (-No.200)	:	10.0

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Soil No. 11

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Branch		
Project No.	:	10168886	Sample No.	: SS-19
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 95.0' to 96.5'
Laboratory No.	:	10168886	Date Tested	: 06/10/19
Submitted By	:	HDR	Date Reported	: 06/18/19
Soil Type	:	Brown Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	6.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.509 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 20.5
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 20
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 16
			Plasticity Index	: 4
AASHTO Composition of Total Sample: M145			Liquidity Index	: 1.21
Gravel (3in. + No.10)	:	0.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	56.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	37.1	AASHTO Classification: M145	: A-1-b (0)
Silt + Clay (-No.200)	:	6.3	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.1
Medium Sand (-No.10 + No.40)	:	56.5
Fine Sand (-No.40 + No.200)	:	37.1
Silt + Clay (-No.200)	:	6.3

Approved By : Kevin E. Walker

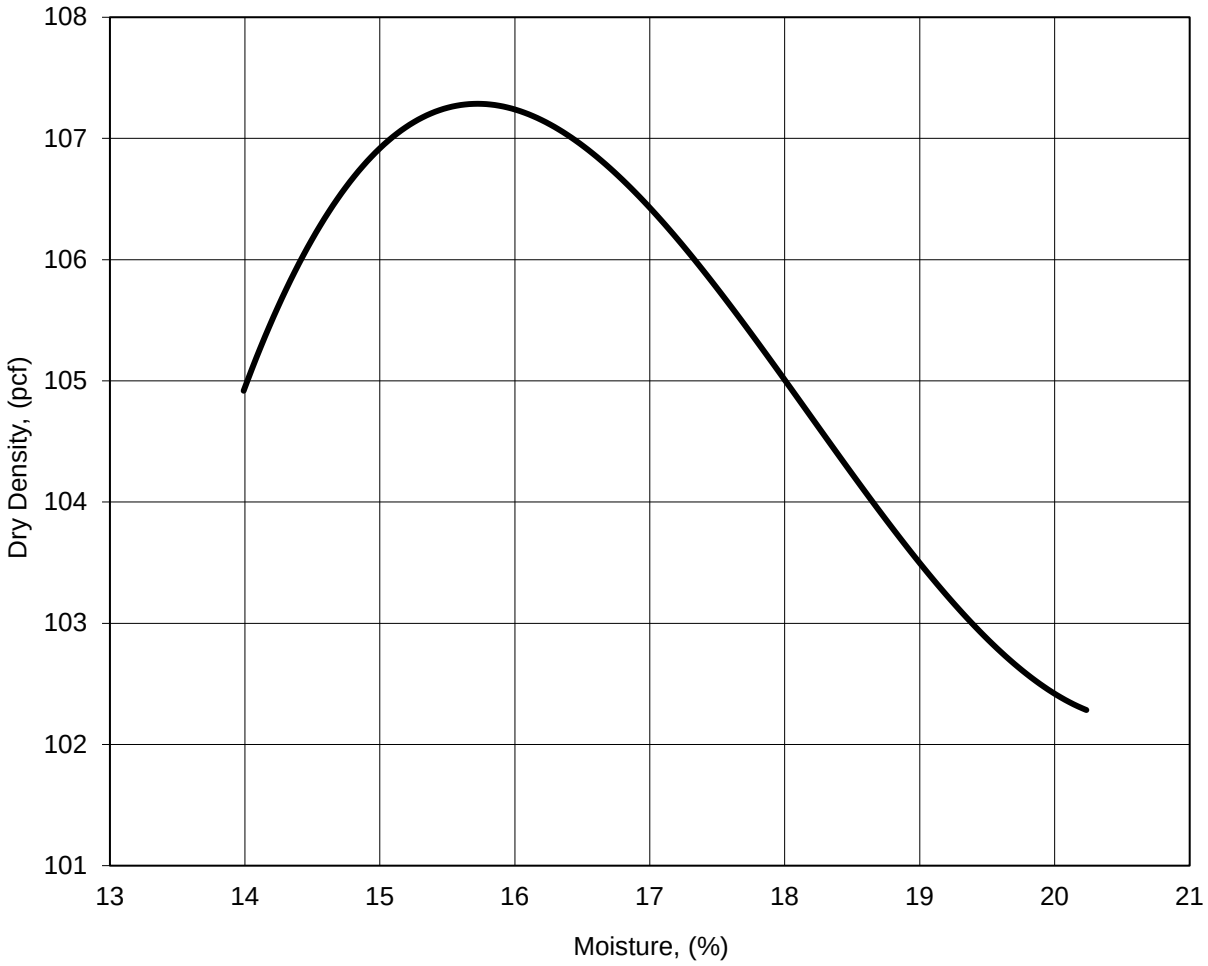
Soil No. 12

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MOISTURE-DENSITY RELATIONSHIP

Project Name	:	SR-1 Over Branch			
Project No.	:	10168886	Sample No.	:	Bulk 1
Project County	:	Haywood	Sample Loc.	:	Boring No. B-1
Project State	:	Tennessee	Sample Depth	:	0.0' to 5.0'
Laboratory No.	:	10168886	Date Tested	:	06/09/19
Submitted By	:	HDR	Date Reported	:	06/17/19
Soil Type	:	Brown Silty Clay with Sand			



MAXIMUM DENSITY: 107.3 pcf

OPTIMUM MOISTURE: 15.7 %

COMMENTS: AASHTO: T-99; Method (A)

APPROVED BY: KW

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Table 1 - Laboratory Tests on Soil Samples

HDR-ICA
SR-1 Over Branch
Your #10168886, HDR Lab #19-0367LAB
17-Jun-19

Sample ID			
			B-1 @ 0-10
Resistivity		**Units**	
as-received		ohm-cm	2,800
saturated		ohm-cm	1,120
pH			7.4
Electrical Conductivity		mS/cm	na
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	na
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.5' to 17.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE : Brown Silt

WET DENSITY	: 128.85 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.8 cm
DRY DENSITY	: 104.38 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.18 cm
MOISTURE	: 23.44 %	CHAMBER PRES.	: 4.06 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	4.06	4.06	1.00
2	0.09	4.06	4.27	1.05
3	0.18	4.06	4.49	1.11
4	0.27	4.06	4.92	1.21
5	0.35	4.06	5.13	1.27
6	0.44	4.06	5.13	1.27
7	0.53	4.06	5.35	1.32
8	1.06	4.06	5.98	1.47
9	1.59	4.06	6.82	1.68
10	2.12	4.06	7.44	1.84
11	2.65	4.06	8.27	2.04
12	3.19	4.06	8.87	2.19
13	3.54	4.06	9.06	2.23
14	4.42	4.06	10.05	2.48
15	5.31	4.06	10.81	2.67
16	6.19	4.06	11.56	2.85
17	7.08	4.06	12.09	2.98
18	7.96	4.06	12.81	3.16
19	8.85	4.06	13.32	3.28
20	9.73	4.06	13.62	3.36
21	10.62	4.06	14.11	3.48
22	11.50	4.06	14.58	3.6
23	12.39	4.06	14.86	3.66
24	13.27	4.06	15.32	3.78
25	14.16	4.06	15.57	3.84
26	15.04	4.06	15.82	3.9
27	15.93	4.06	16.25	4.01
28	16.81	4.06	16.48	4.06
29	17.70	4.06	16.7	4.12
30	18.58	4.06	16.92	4.17
31	19.47	4.06	17.31	4.27
32	20.35	4.06	17.51	4.32

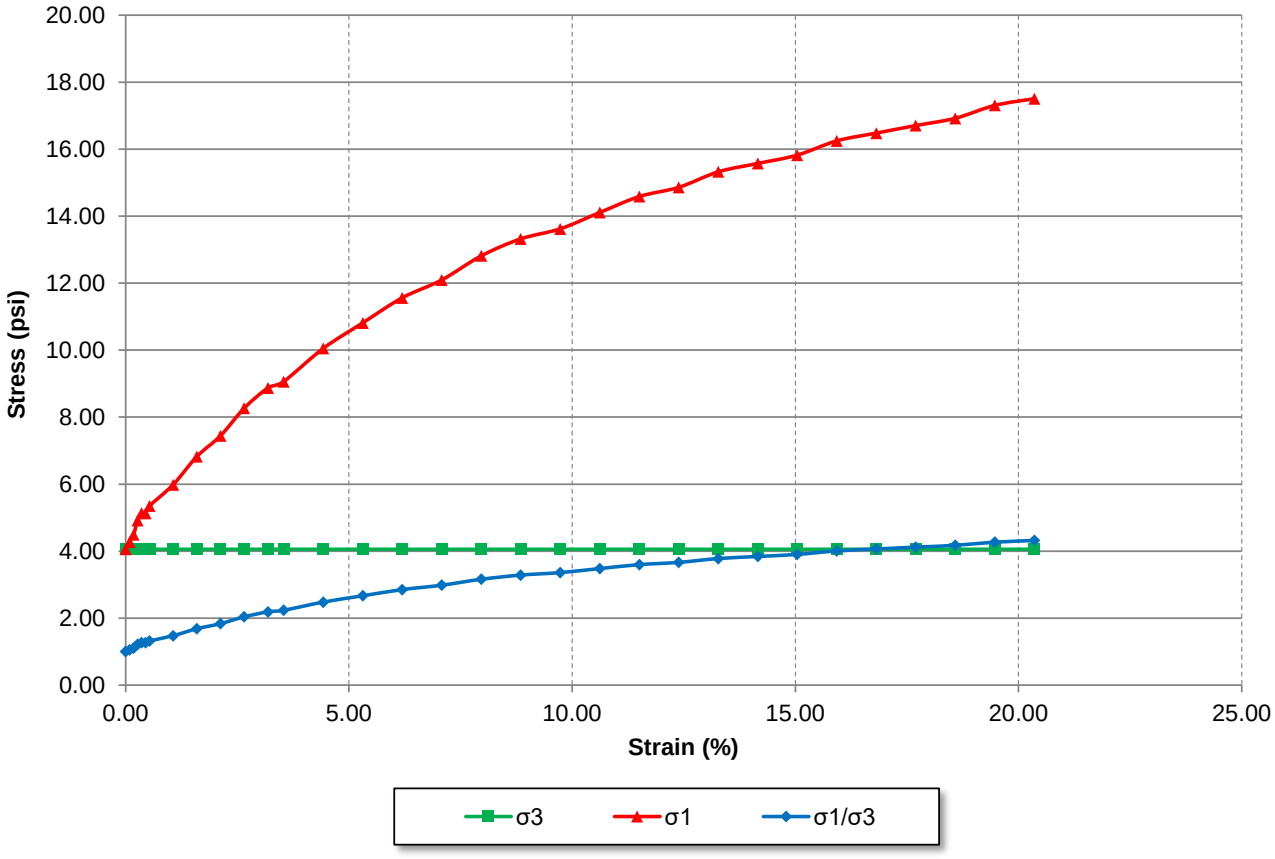
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.5' to 17.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 23.44 %	EFF. CONS. STRESS	: 4.06 psi
FINAL HEIGHT	: 11.43 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.01 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.5' to 17.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

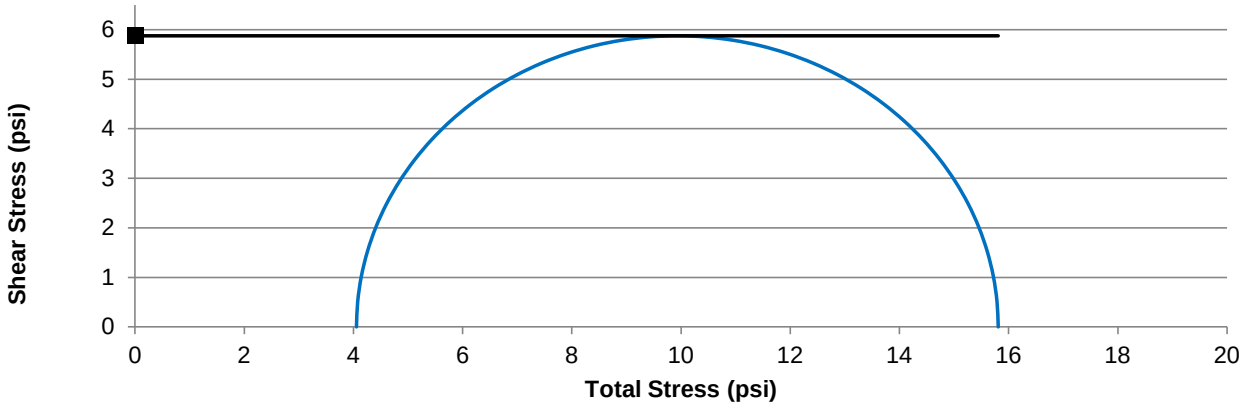
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	4.06 psi	15.81 psi

Compressive Strength =	1693	psf
Cohesion =	846	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 25.5' to 26.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE : Brown Lean Clay

WET DENSITY	: 134.85 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.86 cm
DRY DENSITY	: 112.57 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.22 cm
MOISTURE	: 19.79 %	CHAMBER PRES.	: 10.03 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	10.03	10.03	1.00
2	0.09	10.03	10.89	1.09
3	0.18	10.03	11.1	1.11
4	0.26	10.03	11.31	1.13
5	0.35	10.03	11.53	1.15
6	0.44	10.03	11.74	1.17
7	0.53	10.03	11.95	1.19
8	1.06	10.03	12.79	1.27
9	1.59	10.03	13.82	1.38
10	2.12	10.03	14.43	1.44
11	2.64	10.03	15.24	1.52
12	3.17	10.03	15.84	1.58
13	3.53	10.03	16.64	1.66
14	4.41	10.03	17.4	1.73
15	5.29	10.03	18.55	1.85
16	6.17	10.03	19.47	1.94
17	7.05	10.03	20.38	2.03
18	7.93	10.03	21.27	2.12
19	8.81	10.03	21.76	2.17
20	9.69	10.03	22.61	2.25
21	10.58	10.03	23.25	2.32
22	11.46	10.03	24.07	2.4
23	12.34	10.03	24.5	2.44
24	13.22	10.03	25.1	2.5
25	14.10	10.03	25.5	2.54
26	14.98	10.03	26.07	2.6
27	15.86	10.03	26.44	2.64
28	16.75	10.03	26.81	2.67
29	17.63	10.03	27.16	2.71
30	18.51	10.03	27.5	2.74
31	19.39	10.03	27.83	2.77
32	20.27	10.03	27.97	2.79

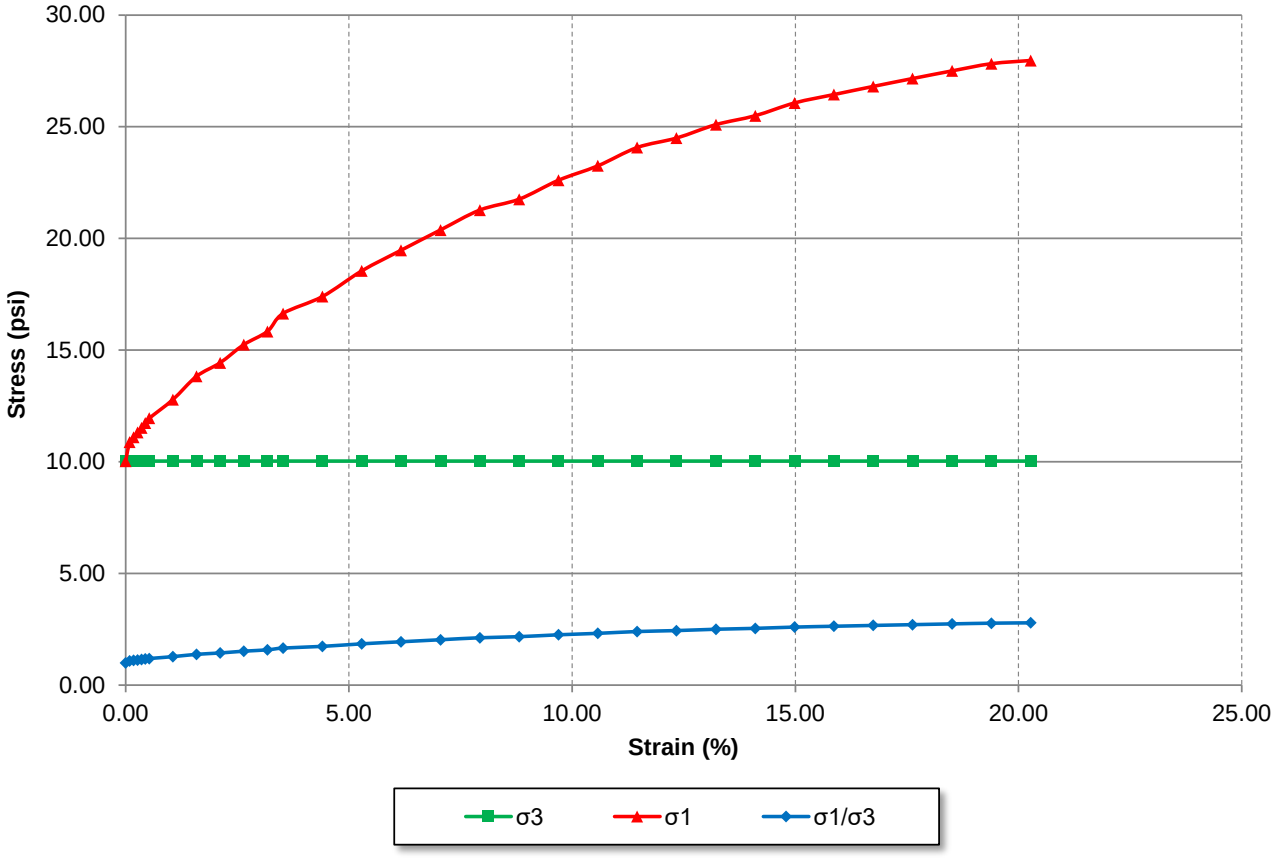
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 25.5' to 26.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 19.79 %	EFF. CONS. STRESS	: 10.03 psi
FINAL HEIGHT	: 11.49 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.05 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 25.5' to 26.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

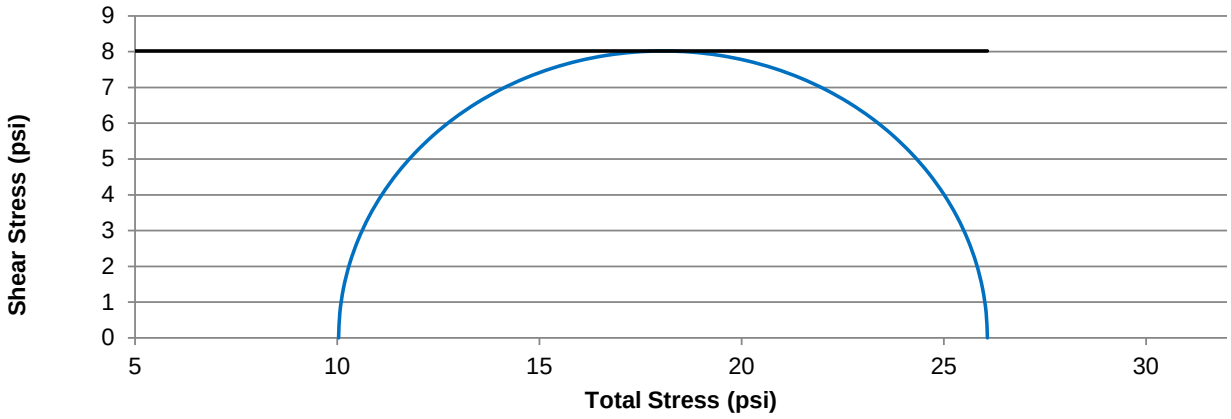
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	10.03 psi	26.08 psi

Compressive Strength =	2310	psf
Cohesion =	1155	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 46.5' to 47.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE	: Gray Silty Sand				
WET DENSITY	: 122.78 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.98 cm
DRY DENSITY	: 95.42 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.25 cm
MOISTURE	: 28.68 %	CHAMBER PRES.	: 13.02 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	13.02	13.02	1.00
2	0.09	13.02	14.5	1.11
3	0.17	13.02	14.93	1.15
4	0.26	13.02	15.56	1.19
5	0.35	13.02	15.98	1.23
6	0.44	13.02	16.19	1.24
7	0.52	13.02	16.4	1.26
8	1.05	13.02	19.1	1.47
9	1.57	13.02	21.37	1.64
10	2.10	13.02	22.98	1.77
11	2.62	13.02	22.93	1.76
12	3.15	13.02	23.08	1.77
13	3.50	13.02	23.45	1.8
14	4.37	13.02	24.78	1.9
15	5.24	13.02	26.09	2
16	6.12	13.02	26.97	2.07
17	6.99	13.02	28.02	2.15
18	7.87	13.02	29.05	2.23
19	8.74	13.02	30.07	2.31
20	9.61	13.02	31.25	2.4
21	10.49	13.02	32.4	2.49
22	11.36	13.02	32.58	2.5
23	12.24	13.02	34.23	2.63
24	13.11	13.02	35.11	2.7
25	13.98	13.02	36.33	2.79
26	14.86	13.02	37.34	2.87
27	15.73	13.02	38.15	2.93
28	16.61	13.02	38.94	2.99
29	17.48	13.02	39.85	3.06
30	18.35	13.02	40.89	3.14
31	19.23	13.02	40.99	3.15
32	20.10	13.02	40.94	3.14

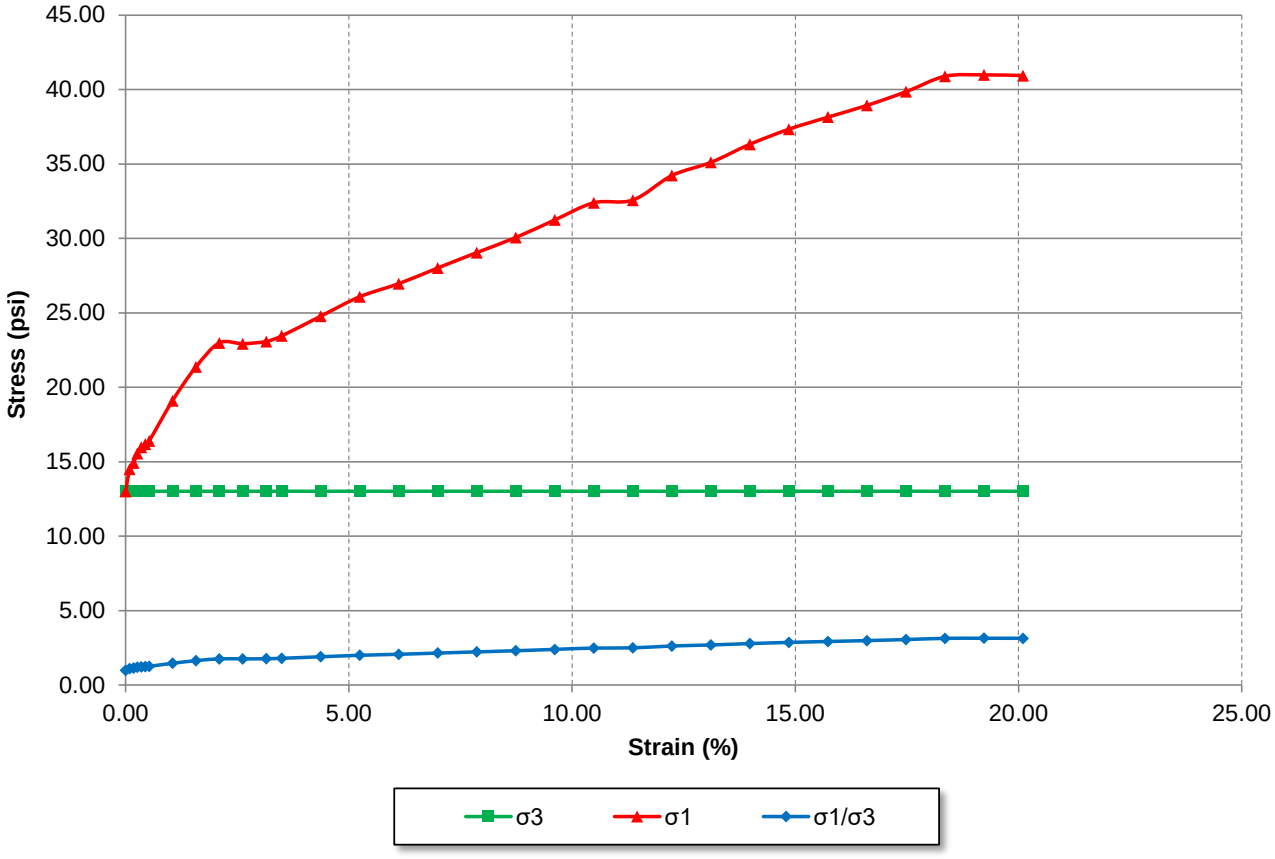
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 46.5' to 47.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 28.68 %	EFF. CONS. STRESS	: 13.02 psi
FINAL HEIGHT	: 11.61 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.08 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 46.5' to 47.0'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

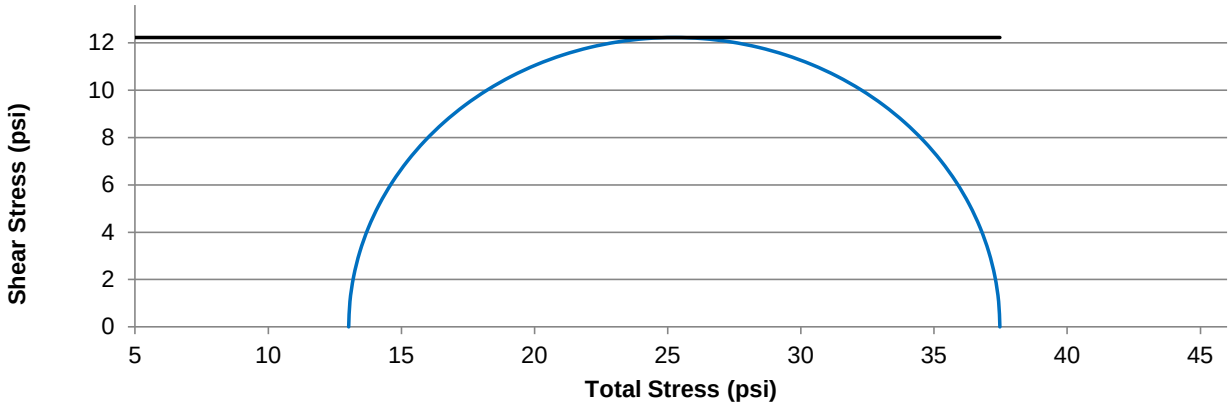
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	13.02 psi	37.47 psi

Compressive Strength =	3521	psf
Cohesion =	1760	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kristi E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 21.0' to 21.5'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE : Brown Claey Sand

WET DENSITY	: 130.46 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.27 cm
DRY DENSITY	: 104.91 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.23 cm
MOISTURE	: 24.35 %	CHAMBER PRES.	: 10.03 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	10.03	10.03	1.00
2	0.09	10.03	10.46	1.04
3	0.18	10.03	11.31	1.13
4	0.28	10.03	11.73	1.17
5	0.37	10.03	12.37	1.23
6	0.46	10.03	12.79	1.28
7	0.55	10.03	13	1.3
8	1.10	10.03	14.04	1.4
9	1.65	10.03	14.23	1.42
10	2.21	10.03	14.62	1.46
11	2.76	10.03	15.01	1.5
12	3.31	10.03	15.39	1.53
13	3.68	10.03	15.79	1.57
14	4.60	10.03	16.14	1.61
15	5.52	10.03	16.48	1.64
16	6.44	10.03	16.82	1.68
17	7.36	10.03	17.15	1.71
18	8.27	10.03	17.47	1.74
19	9.19	10.03	17.78	1.77
20	10.11	10.03	17.89	1.78
21	11.03	10.03	17.81	1.78
22	11.95	10.03	17.92	1.79
23	12.87	10.03	18.02	1.8
24	13.79	10.03	18.12	1.81
25	14.71	10.03	18.4	1.83
26	15.63	10.03	18.49	1.84
27	16.55	10.03	18.75	1.87
28	17.47	10.03	18.83	1.88
29	18.39	10.03	18.74	1.87
30	19.31	10.03	18.64	1.86

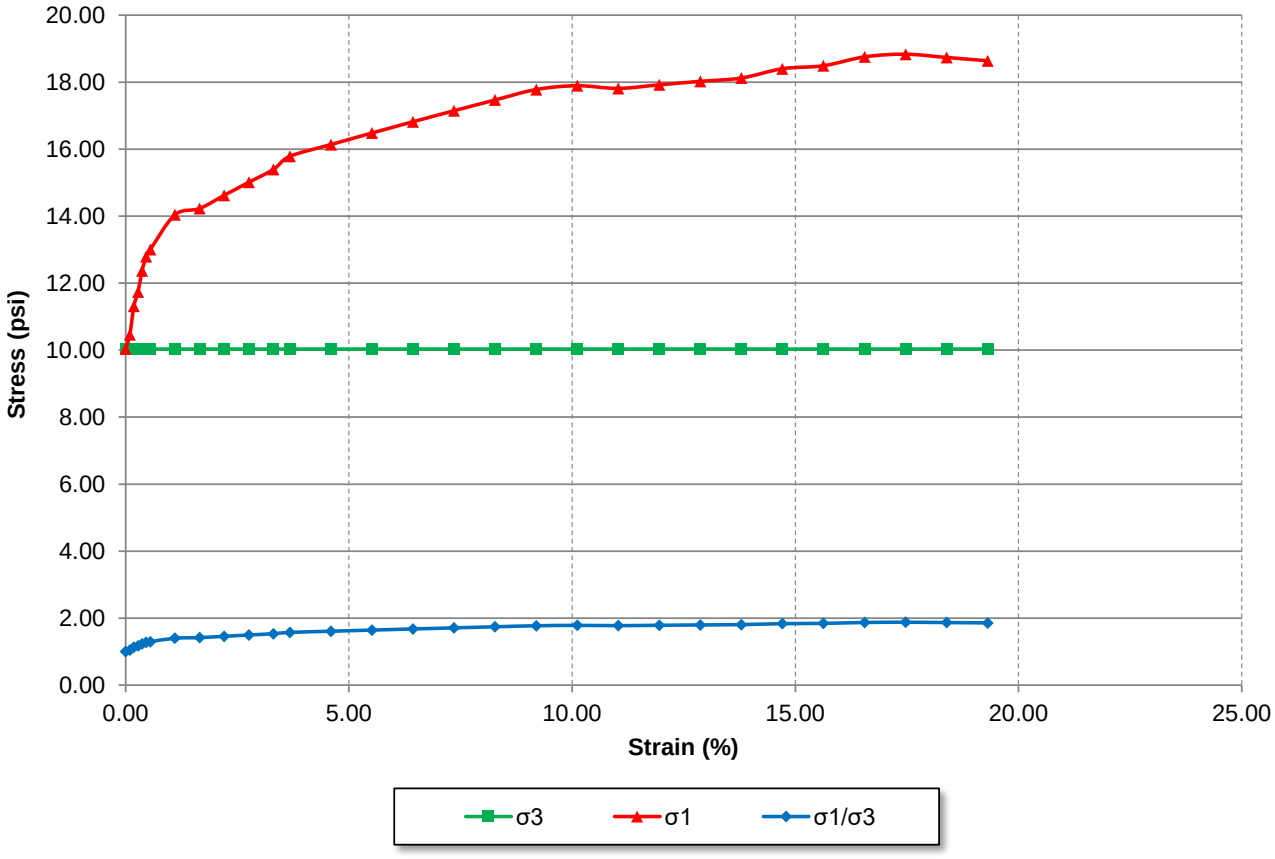
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 21.0' to 21.5'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 24.35 %	EFF. CONS. STRESS	: 10.03 psi
FINAL HEIGHT	: 10.89 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.1 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 over Branch		
PROJECT #	: 10168886	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 21.0' to 21.5'
LABORATORY #	: 10168886	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

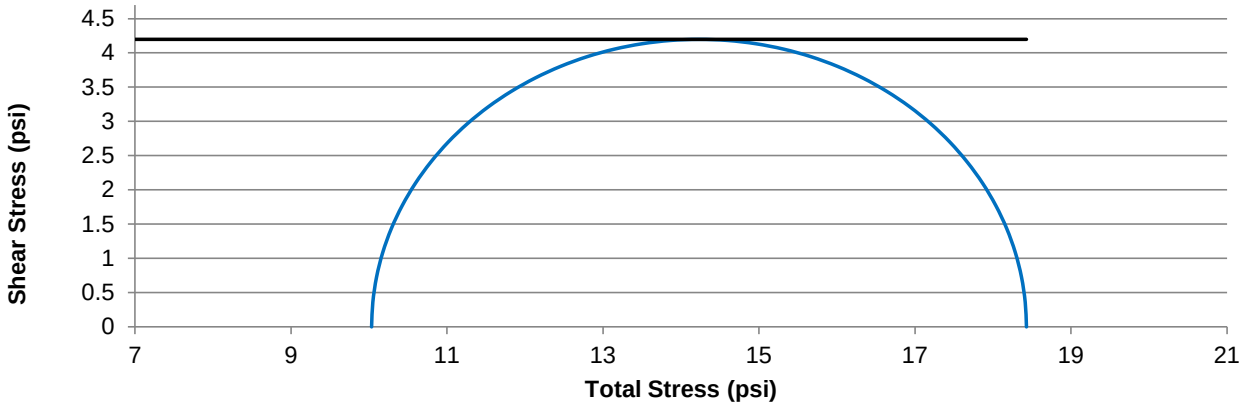
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	10.03 psi	18.43 psi

Compressive Strength =	1209	psf
Cohesion =	605	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Appendix D: Preliminary Soil Shear Strength Loss Analysis

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M19-165BR3CPT-1 results

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HDR
4645 Village Square Drive, Suite F
Paducah, KY 42001

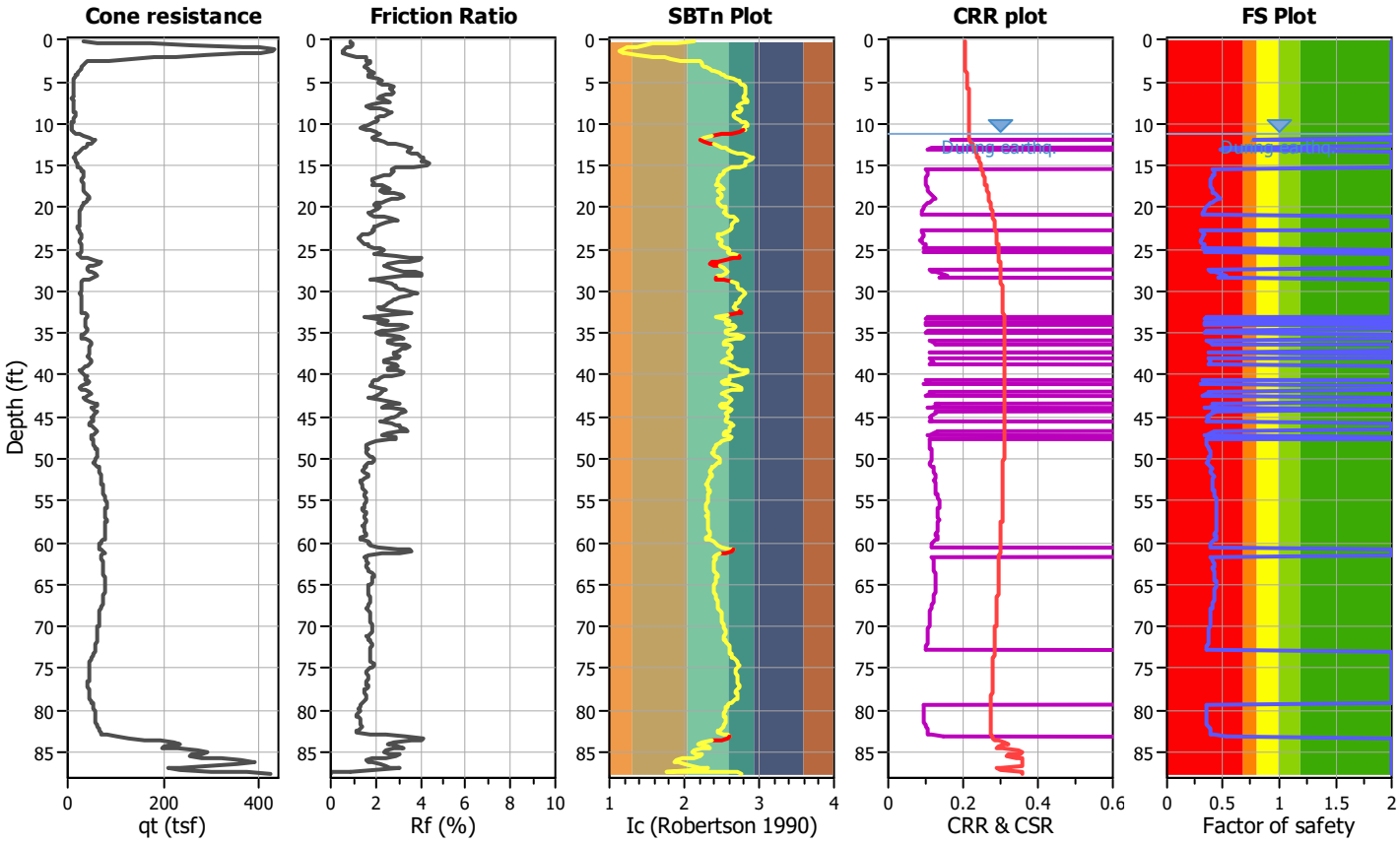
LIQUEFACTION ANALYSIS REPORT

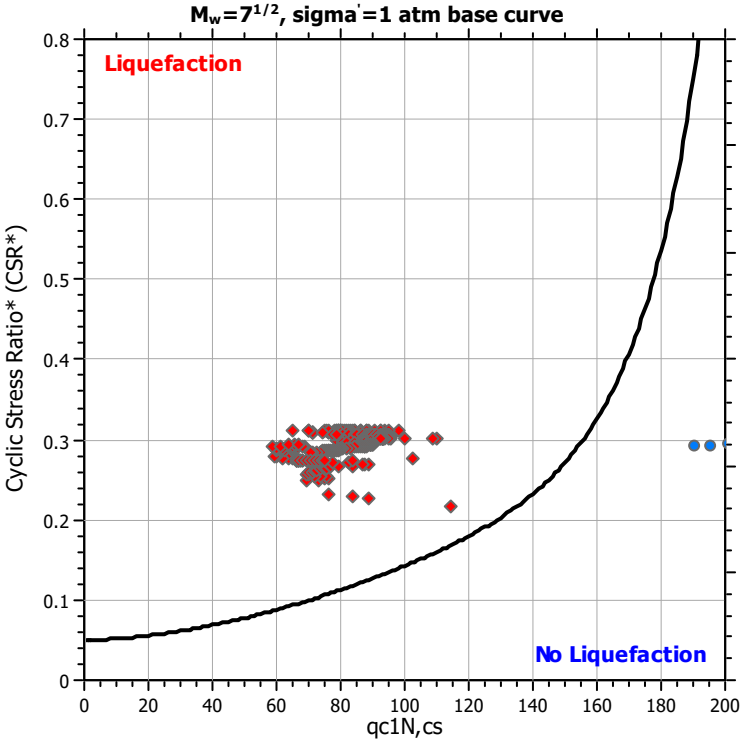
Project title : Bridge 3 - TDOT Region 4 Bridge Bundle **Location : Haywood County, TN**

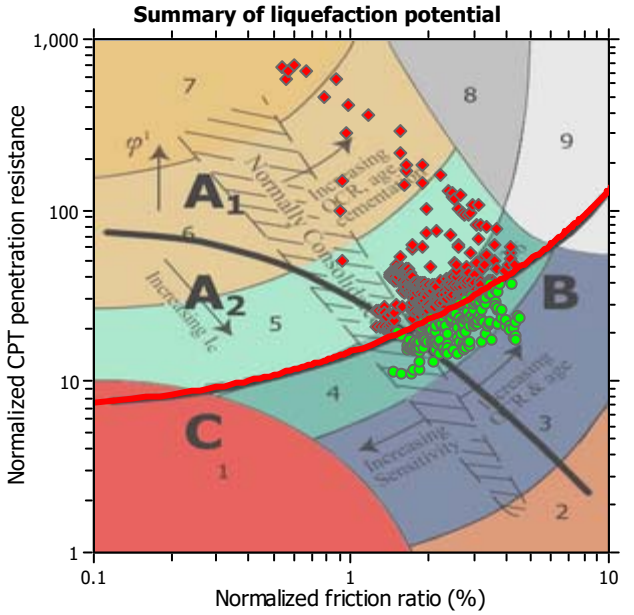
CPT file : M19-165BR3CPT-1

Input parameters and analysis data

Analysis method:	I&B (2008)	G.W.T. (in-situ):	11.30 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	11.30 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.40	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

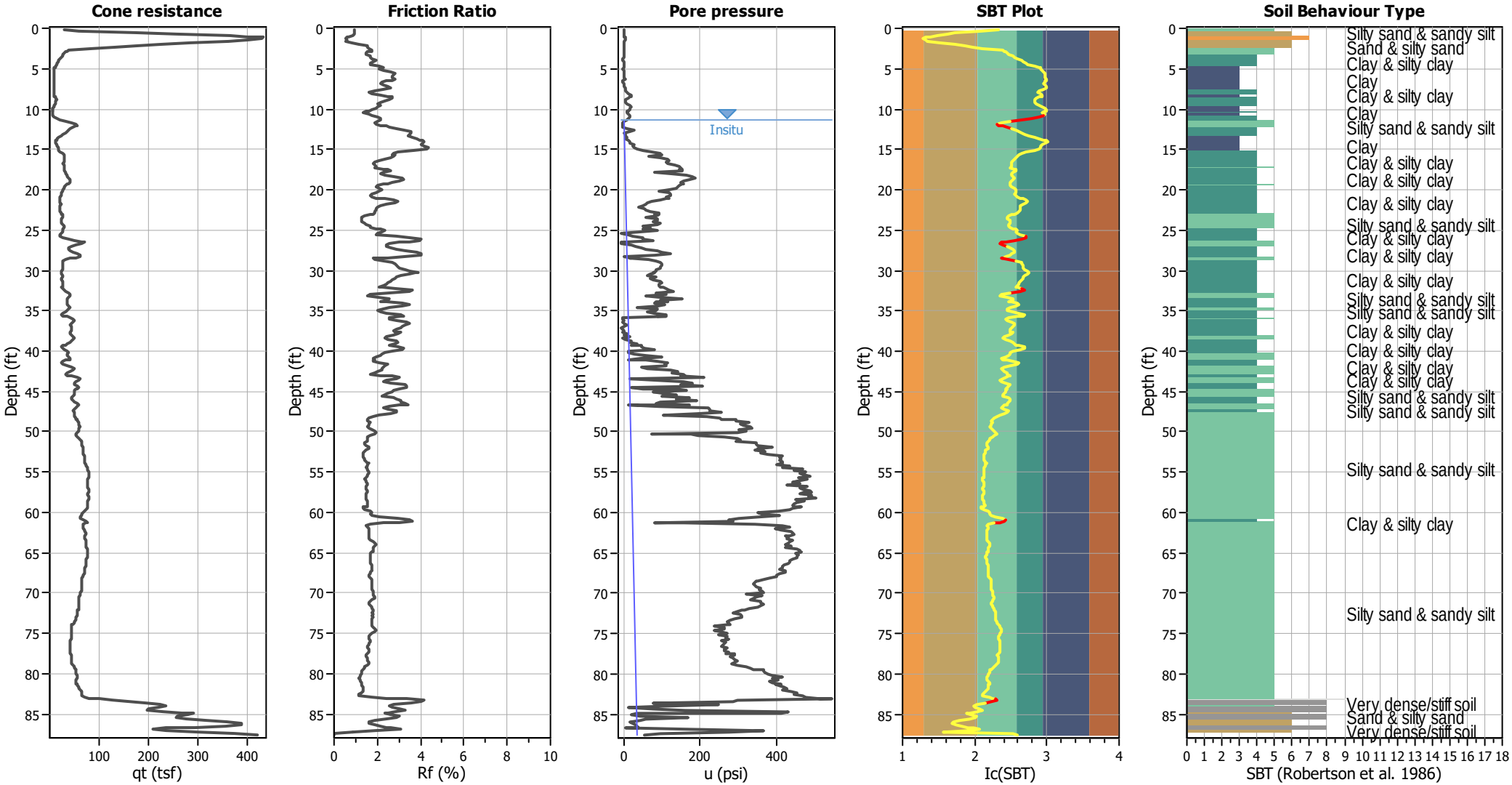






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



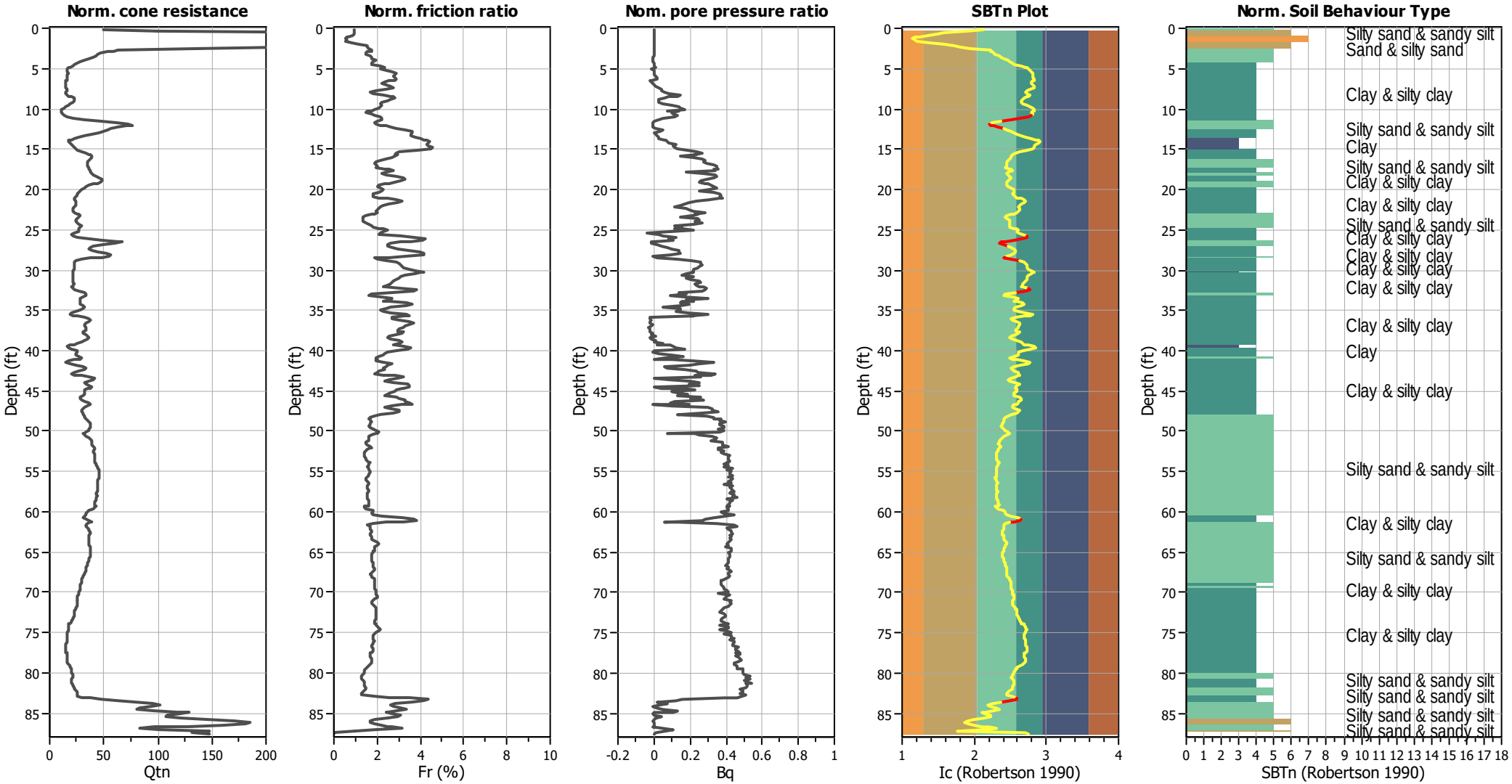
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	11.30 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	11.30 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

CPT basic interpretation plots (normalized)



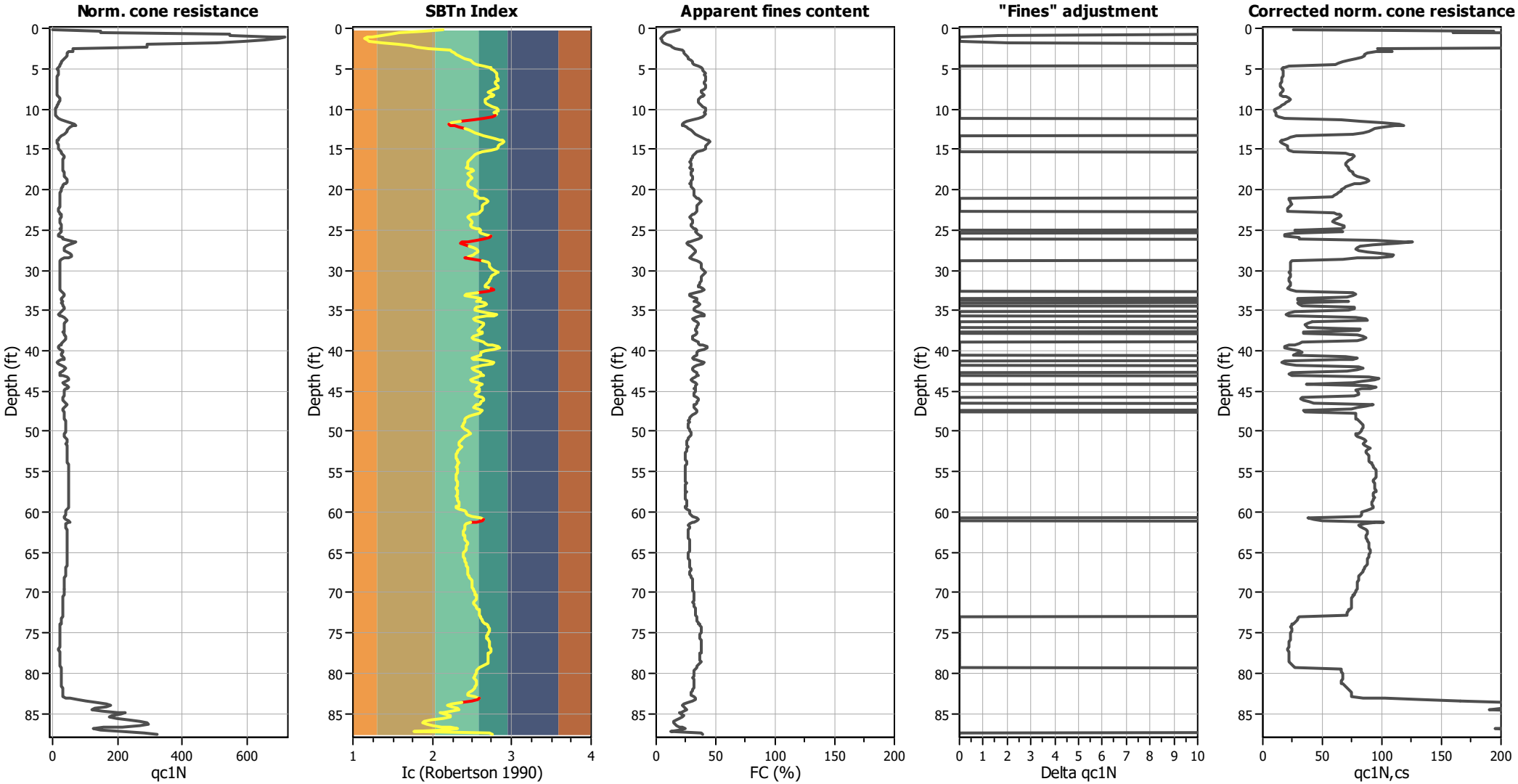
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	11.30 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	11.30 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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

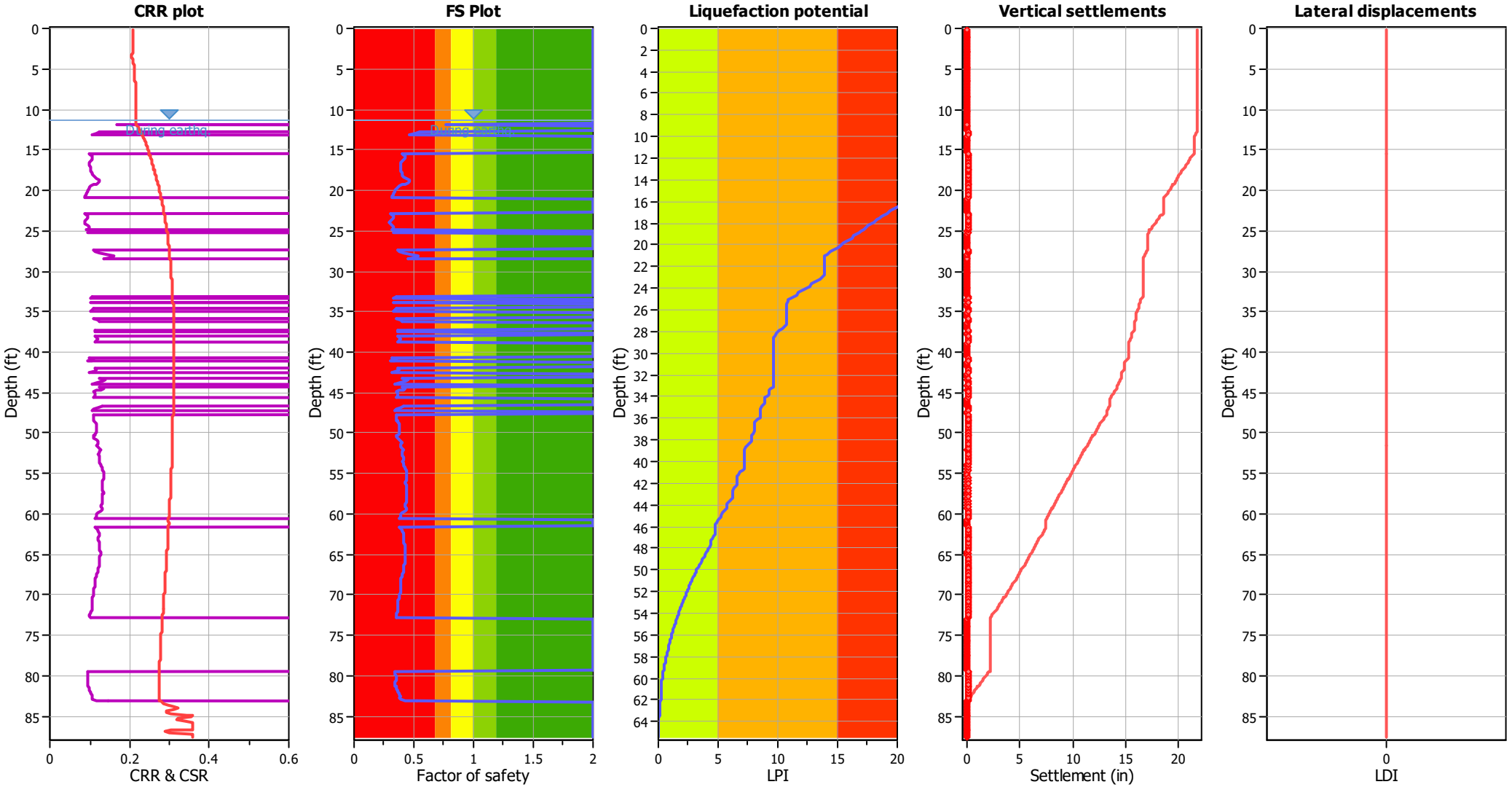
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	11.30 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	11.30 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	11.30 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	11.30 ft	Fill height:	N/A	Limit depth:	N/A

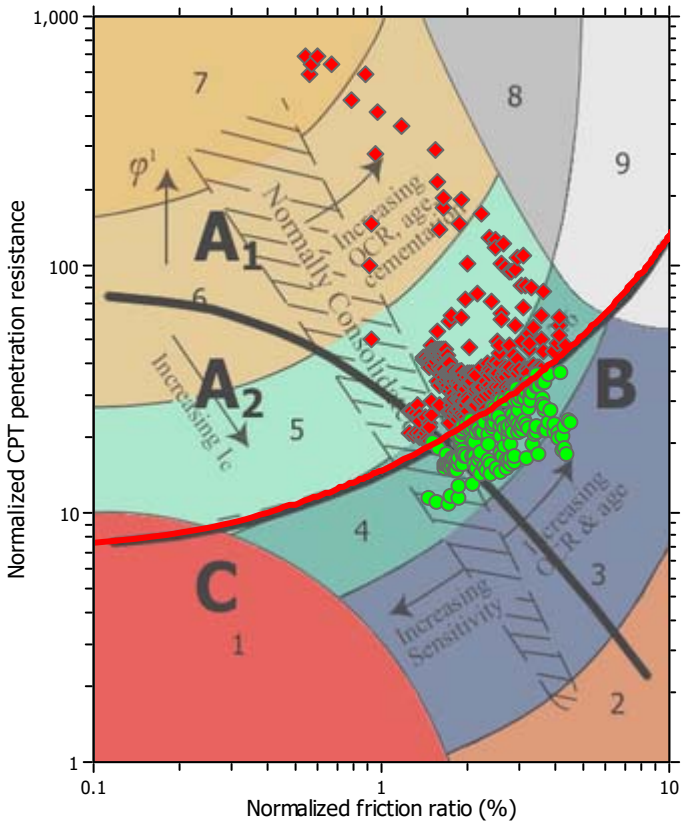
F.S. color scheme

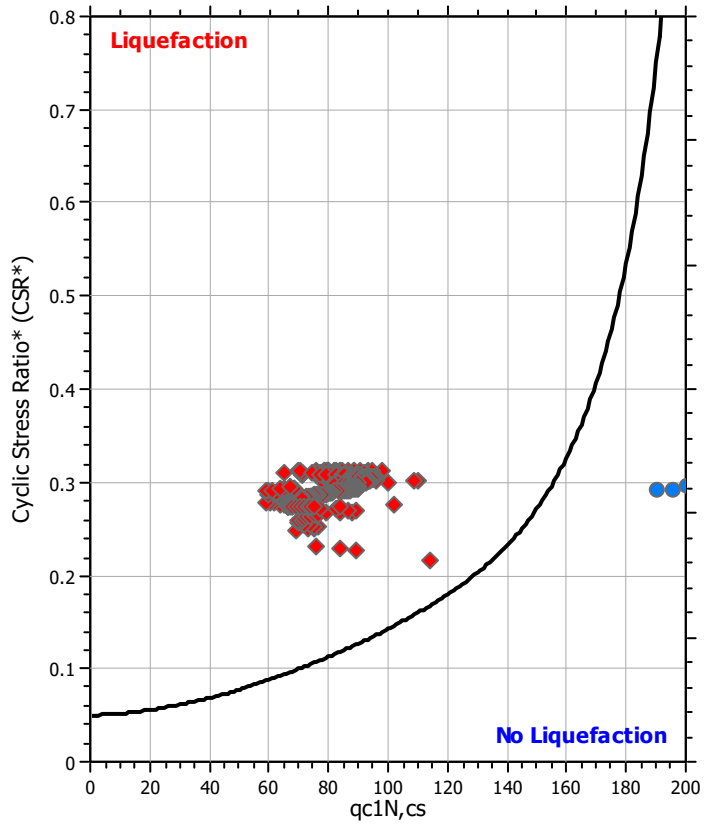
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

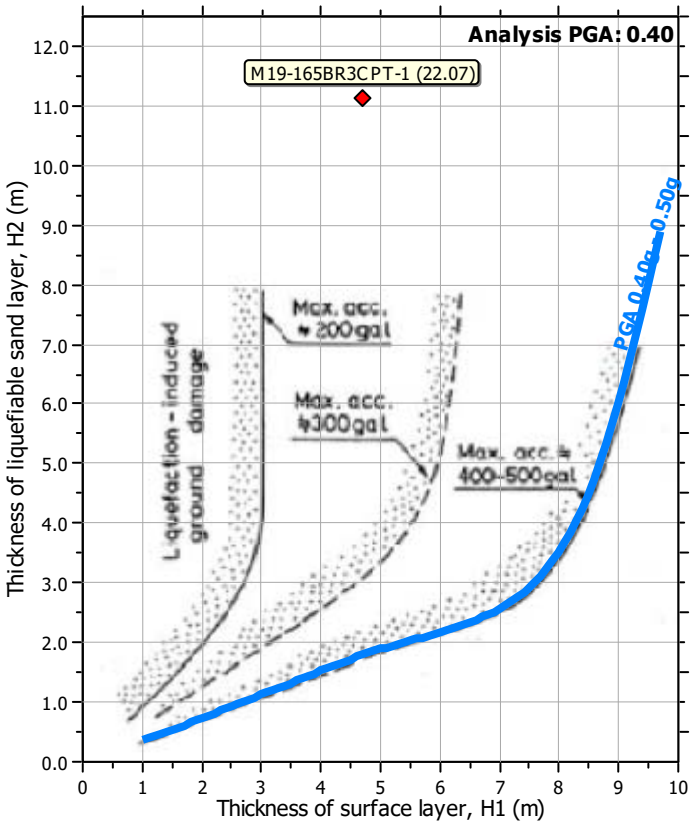
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



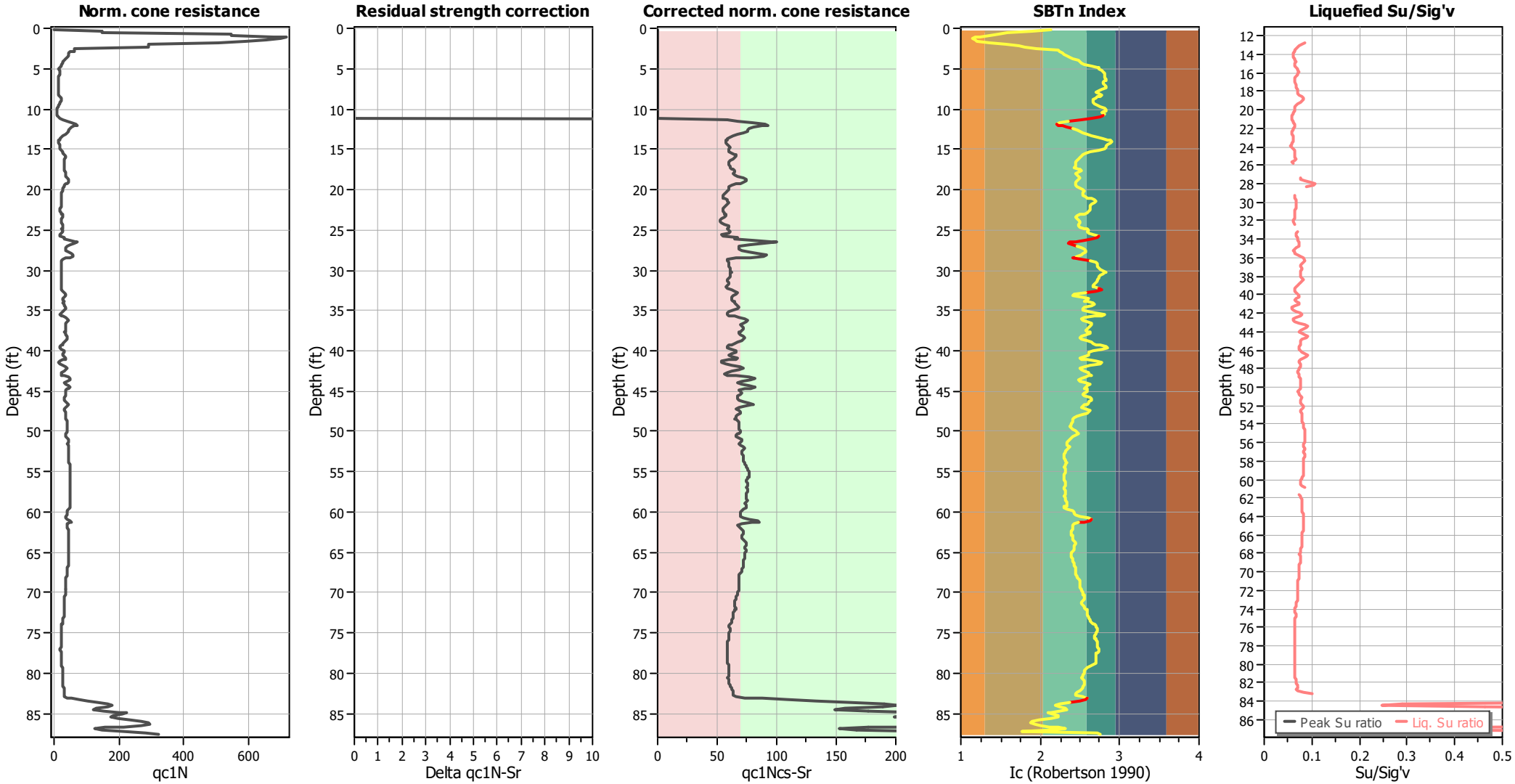




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	11.30 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	11.30 ft	Fill height:	N/A	Limit depth:	N/A

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



Input parameters and analysis data

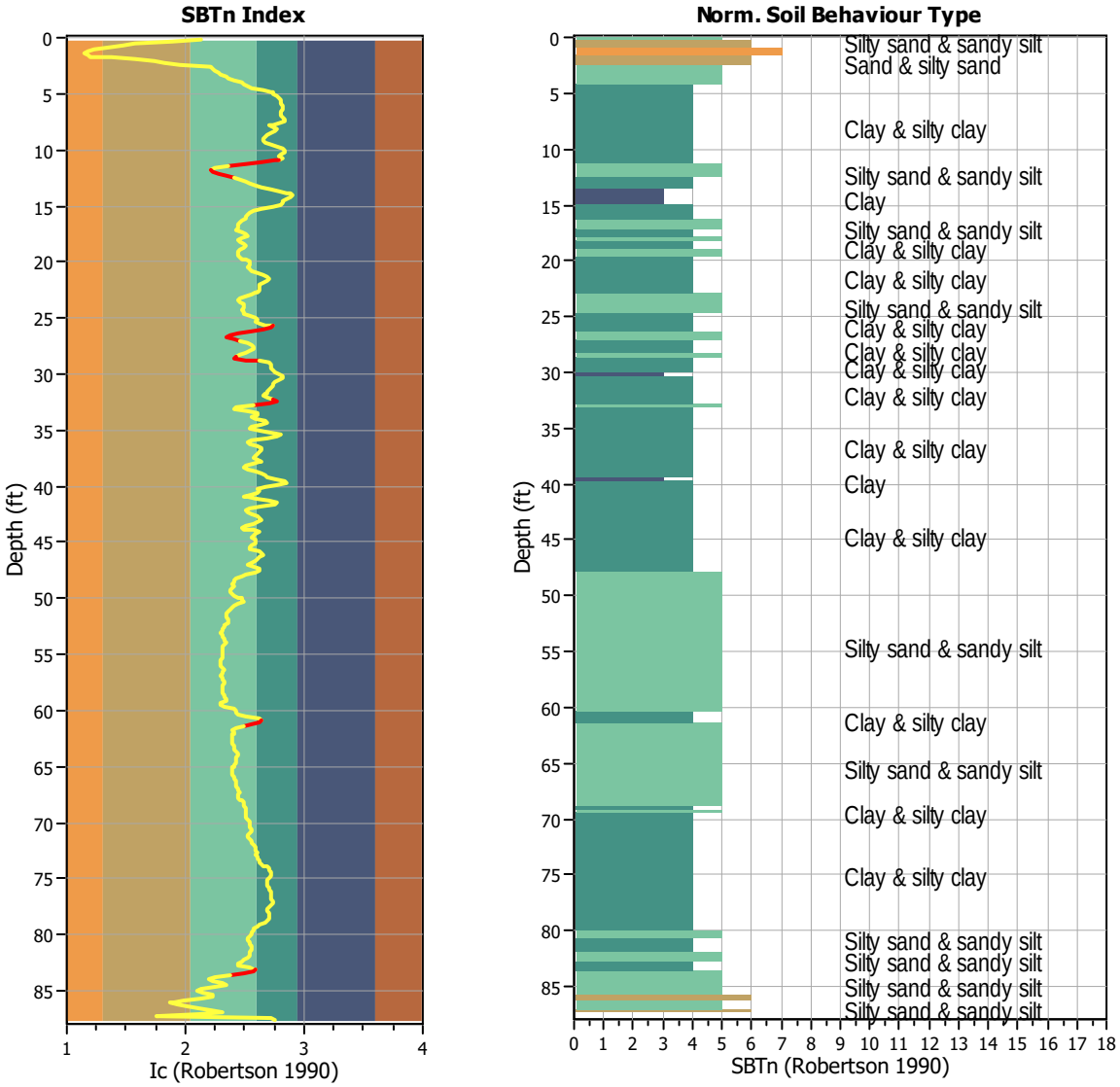
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	11.30 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	11.30 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics

Total points in CPT file:	534
Total points excluded:	35
Exclusion percentage:	6.55%
Number of layers detected:	8

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 10.99 (ft)	4	Clay & silty clay
		End depth: 11.65 (ft)	5	Silty sand & sandy silt
Transition layer 2	5	Start depth: 11.98 (ft)	5	Silty sand & sandy silt
		End depth: 12.63 (ft)	4	Clay & silty clay
Transition layer 3	5	Start depth: 25.92 (ft)	4	Clay & silty clay
		End depth: 26.57 (ft)	5	Silty sand & sandy silt
Transition layer 4	4	Start depth: 26.74 (ft)	5	Silty sand & sandy silt
		End depth: 27.23 (ft)	4	Clay & silty clay
Transition layer 5	4	Start depth: 28.54 (ft)	5	Silty sand & sandy silt
		End depth: 29.04 (ft)	4	Clay & silty clay
Transition layer 6	4	Start depth: 32.48 (ft)	4	Clay & silty clay
		End depth: 32.97 (ft)	5	Silty sand & sandy silt
Transition layer 7	4	Start depth: 61.02 (ft)	4	Clay & silty clay
		End depth: 61.52 (ft)	5	Silty sand & sandy silt
Transition layer 8	4	Start depth: 83.33 (ft)	4	Clay & silty clay
		End depth: 83.83 (ft)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	0.72	0.01	-0.01	16.70	109.49
2	0.33	92.06	0.84	0.00	10.12	116.11
3	0.49	92.06	0.84	0.02	3.98	126.57
4	0.66	338.36	3.30	0.32	2.54	130.45
5	0.82	338.36	3.30	1.10	1.05	133.22
6	0.98	420.13	3.05	1.23	0.00	132.12
7	1.15	445.11	1.70	6.27	0.00	132.12
8	1.31	434.27	3.09	3.24	0.00	131.23
9	1.48	407.34	2.17	3.19	0.00	131.01
10	1.64	366.28	1.64	0.59	0.00	129.84
11	1.80	314.80	2.29	-0.97	1.21	130.00
12	1.97	181.91	2.81	-0.02	3.96	130.57
13	2.13	181.91	2.81	0.05	6.69	130.51
14	2.30	181.91	2.81	0.52	8.42	127.64
15	2.46	39.24	0.68	0.25	11.54	123.55
16	2.62	39.24	0.68	-0.32	19.66	116.38
17	2.79	39.24	0.68	-0.93	20.27	115.77
18	2.95	32.60	0.55	-0.58	20.39	114.07
19	3.12	29.09	0.33	-0.95	21.49	112.63
20	3.28	27.87	0.45	-0.71	22.34	112.06
21	3.44	27.16	0.48	0.13	24.05	112.52
22	3.61	25.81	0.43	-1.01	24.97	112.05
23	3.77	23.35	0.39	-2.35	26.57	111.31
24	3.94	20.33	0.39	-2.36	29.49	110.82
25	4.10	17.77	0.40	-0.81	30.68	109.09
26	4.27	16.03	0.18	0.82	31.78	107.57
27	4.43	14.69	0.24	-0.18	33.43	106.66
28	4.59	13.39	0.33	-0.14	37.91	107.22
29	4.76	11.73	0.27	1.48	41.24	106.90
30	4.92	10.67	0.23	1.75	42.34	105.47
31	5.09	10.09	0.21	-2.14	42.84	104.89
32	5.25	10.47	0.22	-0.32	44.07	105.59
33	5.41	10.80	0.29	-0.36	45.10	106.69
34	5.58	10.98	0.32	-0.29	46.30	107.42
35	5.74	10.70	0.31	-0.04	46.15	107.05
36	5.91	10.33	0.25	0.83	46.26	106.62
37	6.07	10.22	0.27	1.96	46.78	106.59
38	6.23	10.25	0.31	2.56	47.53	106.80
39	6.40	10.17	0.28	-2.46	47.33	106.40
40	6.56	9.86	0.23	-2.76	46.33	105.36
41	6.73	9.53	0.21	-1.66	45.78	104.45
42	6.89	9.31	0.20	-0.84	45.73	103.93
43	7.05	9.17	0.19	0.37	46.87	104.35
44	7.22	9.29	0.24	1.32	47.74	105.14
45	7.38	9.75	0.27	2.92	47.70	105.96
46	7.55	10.29	0.26	5.20	44.91	105.26
47	7.71	10.26	0.16	6.06	42.08	103.73
48	7.87	9.69	0.14	7.57	40.96	102.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	9.14	0.17	10.40	42.56	102.78
50	8.20	9.52	0.20	19.29	44.46	104.85
51	8.37	10.97	0.29	19.95	43.78	107.02
52	8.53	13.00	0.36	14.28	41.95	108.84
53	8.69	14.67	0.39	11.44	40.20	109.89
54	8.86	15.25	0.42	5.90	38.83	109.86
55	9.02	14.70	0.34	5.14	38.33	109.03
56	9.19	13.54	0.28	4.45	38.34	107.68
57	9.35	12.39	0.26	8.72	39.32	106.48
58	9.51	11.26	0.23	15.22	41.84	105.80
59	9.68	9.83	0.23	18.71	43.97	104.26
60	9.84	8.26	0.15	16.75	46.84	102.55
61	10.01	7.13	0.13	16.60	48.06	100.39
62	10.17	6.98	0.12	6.90	48.07	99.36
63	10.33	7.35	0.10	13.01	46.54	98.89
64	10.50	7.62	0.10	9.42	45.04	98.66
65	10.66	7.57	0.11	10.49	46.73	100.18
66	10.83	7.90	0.17	14.21	45.62	101.55
67	10.99	9.66	0.17	16.05	43.16	104.77
68	11.15	13.81	0.31	10.43	37.33	108.57
69	11.32	21.48	0.49	6.83	31.09	112.76
70	11.48	33.04	0.69	-0.96	24.82	115.90
71	11.65	46.61	0.82	-2.30	20.79	118.45
72	11.81	57.14	1.05	-2.27	19.21	120.39
73	11.98	59.68	1.28	-2.90	19.76	121.57
74	12.14	54.28	1.32	-2.23	21.63	121.74
75	12.30	46.34	1.22	-1.64	23.94	121.11
76	12.47	40.86	1.11	8.15	26.51	120.77
77	12.63	38.98	1.29	27.17	28.89	120.93
78	12.80	37.41	1.38	16.36	31.04	121.05
79	12.96	34.00	1.26	1.72	32.66	120.15
80	13.12	28.76	0.95	3.08	34.57	118.46
81	13.29	23.47	0.79	6.05	37.41	116.59
82	13.45	19.43	0.72	7.82	41.37	115.12
83	13.62	16.54	0.63	6.28	45.48	114.00
84	13.78	14.41	0.59	12.48	48.83	112.90
85	13.94	12.91	0.53	12.55	51.44	112.17
86	14.11	12.39	0.52	14.26	52.55	112.04
87	14.27	13.22	0.57	16.30	51.20	112.59
88	14.44	15.21	0.62	26.55	48.77	113.53
89	14.60	17.01	0.69	24.63	47.49	114.65
90	14.76	17.52	0.82	28.81	47.46	115.42
91	14.93	17.43	0.82	33.70	46.48	115.62
92	15.09	18.68	0.72	50.61	42.70	115.47
93	15.26	22.02	0.70	74.72	36.95	115.13
94	15.42	25.67	0.62	96.30	33.92	116.04
95	15.58	28.52	0.89	92.43	32.20	116.86
96	15.75	30.01	0.88	99.84	32.09	117.72

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	30.88	0.87	64.62	31.30	117.62
98	16.08	30.54	0.84	96.81	30.86	117.30
99	16.24	29.72	0.77	115.35	29.91	116.37
100	16.40	28.51	0.59	117.74	28.98	115.18
101	16.57	27.63	0.52	112.57	28.31	114.14
102	16.73	27.18	0.54	116.64	28.38	113.97
103	16.90	27.50	0.55	132.76	28.46	114.26
104	17.06	28.44	0.58	146.09	28.36	114.66
105	17.22	29.10	0.61	147.42	27.81	114.63
106	17.39	29.05	0.54	151.15	29.94	116.13
107	17.55	29.30	0.97	143.84	30.89	116.88
108	17.72	30.11	0.84	151.12	31.59	117.53
109	17.88	31.49	0.74	81.60	29.64	116.81
110	18.04	32.06	0.71	127.18	28.48	116.62
111	18.21	32.99	0.75	165.03	28.97	117.73
112	18.37	34.81	1.06	179.75	30.08	119.51
113	18.54	38.07	1.34	186.52	30.79	121.11
114	18.70	40.99	1.44	172.39	30.26	121.77
115	18.86	42.19	1.35	156.32	29.20	121.43
116	19.03	40.78	1.13	147.97	28.44	120.45
117	19.19	37.75	0.98	155.88	28.32	119.16
118	19.36	34.25	0.85	151.63	28.44	117.65
119	19.52	31.33	0.64	145.42	28.57	116.06
120	19.69	28.94	0.55	142.19	29.25	115.02
121	19.85	27.30	0.63	139.02	30.90	114.81
122	20.01	26.11	0.63	118.78	32.71	114.88
123	20.18	25.34	0.60	92.42	32.85	114.09
124	20.34	24.21	0.46	117.26	32.69	113.19
125	20.51	23.07	0.45	122.44	32.15	111.98
126	20.67	21.87	0.39	121.13	32.69	111.36
127	20.83	21.05	0.37	112.80	33.67	111.18
128	21.00	20.67	0.43	116.88	35.39	111.80
129	21.16	20.72	0.50	112.42	37.90	113.16
130	21.33	21.17	0.64	95.18	40.01	114.38
131	21.49	21.74	0.72	74.40	40.94	115.13
132	21.65	22.54	0.69	63.33	39.80	114.90
133	21.82	23.11	0.56	56.73	37.75	113.98
134	21.98	22.92	0.48	48.40	36.53	112.96
135	22.15	21.88	0.47	37.29	36.37	112.09
136	22.31	20.68	0.41	55.16	36.82	111.49
137	22.47	20.20	0.39	59.23	36.87	111.23
138	22.64	20.68	0.43	68.67	36.00	111.30
139	22.80	22.08	0.41	93.13	35.01	112.04
140	22.97	24.37	0.49	82.07	33.02	112.58
141	23.13	26.71	0.49	93.77	30.82	112.65
142	23.29	28.05	0.39	85.10	28.79	111.87
143	23.46	27.22	0.34	58.01	28.01	110.80
144	23.62	24.99	0.34	87.98	28.87	110.02

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	22.98	0.30	86.43	30.18	109.62
146	23.95	22.43	0.30	77.52	30.54	109.61
147	24.11	24.16	0.34	96.68	30.51	110.77
148	24.28	27.14	0.45	88.28	29.86	112.17
149	24.44	29.98	0.49	49.47	29.99	113.46
150	24.61	29.77	0.55	68.09	30.41	113.60
151	24.77	27.30	0.48	49.59	32.77	114.18
152	24.93	26.10	0.64	64.85	34.61	114.70
153	25.10	27.28	0.69	87.69	35.40	115.40
154	25.26	28.70	0.65	37.06	34.82	114.79
155	25.43	26.11	0.49	-6.47	36.26	113.10
156	25.59	18.81	0.38	12.57	38.57	111.30
157	25.75	18.81	0.38	22.40	42.27	115.13
158	25.92	31.49	1.28	51.16	41.86	118.24
159	26.08	31.49	1.28	50.52	38.08	122.51
160	26.25	50.76	2.15	78.36	33.21	125.09
161	26.41	70.48	2.68	-0.72	28.02	126.69
162	26.57	76.98	2.16	-6.98	25.32	126.34
163	26.74	66.71	1.67	-5.26	24.49	124.21
164	26.90	51.41	1.19	20.24	26.54	121.94
165	27.07	41.79	1.07	29.65	28.96	120.00
166	27.23	39.19	0.94	46.48	31.48	119.69
167	27.40	39.01	1.15	58.82	32.93	120.38
168	27.56	40.47	1.38	88.06	33.76	122.01
169	27.72	46.82	1.72	98.23	33.88	124.41
170	27.89	56.55	2.54	120.73	32.56	126.34
171	28.05	64.84	2.73	81.06	31.24	127.16
172	28.22	64.34	2.32	0.14	28.76	125.49
173	28.38	54.39	1.03	21.43	27.35	122.10
174	28.54	41.01	0.66	15.78	26.78	117.39
175	28.71	30.77	0.58	66.17	31.35	115.48
176	28.87	26.35	0.66	85.26	36.78	115.37
177	29.04	25.09	0.73	97.51	40.33	115.94
178	29.20	25.11	0.79	98.39	41.31	116.19
179	29.36	25.32	0.74	99.68	41.66	116.46
180	29.53	25.67	0.81	94.97	41.66	116.60
181	29.69	25.91	0.82	94.19	42.23	116.86
182	29.86	25.63	0.82	85.47	43.72	117.31
183	30.02	24.95	0.98	83.48	45.43	117.60
184	30.18	24.29	0.95	77.23	47.44	118.14
185	30.35	24.42	1.05	79.98	46.94	117.88
186	30.51	25.16	0.87	70.30	45.48	117.56
187	30.68	25.99	0.81	61.29	43.21	116.83
188	30.84	25.83	0.77	84.23	42.48	116.42
189	31.00	25.09	0.74	70.33	42.39	116.05
190	31.17	24.59	0.71	78.36	41.97	115.65
191	31.33	25.10	0.66	94.98	41.04	115.54
192	31.50	26.18	0.70	100.30	40.12	115.62

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	26.76	0.71	90.71	39.42	115.55
194	31.82	26.50	0.63	91.56	38.79	115.00
195	31.99	25.49	0.55	97.11	38.27	114.10
196	32.15	24.30	0.50	103.24	39.43	114.18
197	32.32	24.29	0.66	110.19	42.72	116.20
198	32.48	26.71	1.09	117.95	44.47	119.00
199	32.64	32.52	1.45	130.16	40.85	120.22
200	32.81	39.30	1.06	83.06	33.82	119.39
201	32.97	42.79	0.55	109.95	27.69	116.92
202	33.14	41.05	0.53	56.56	27.06	115.94
203	33.30	35.92	0.81	95.10	31.61	117.24
204	33.46	33.17	0.98	151.26	35.71	118.34
205	33.63	33.99	0.95	94.32	35.37	118.24
206	33.79	36.27	0.76	116.28	33.09	117.33
207	33.96	36.23	0.64	83.55	34.80	118.31
208	34.12	34.58	1.29	80.06	38.84	120.13
209	34.28	35.17	1.54	105.48	39.90	120.99
210	34.45	38.45	1.05	88.08	37.60	120.91
211	34.61	41.65	1.17	35.42	33.53	119.65
212	34.78	41.05	0.90	87.15	32.61	118.86
213	34.94	36.96	0.75	83.56	32.58	117.11
214	35.10	31.25	0.64	60.86	36.24	116.11
215	35.27	25.57	0.70	79.17	40.99	115.52
216	35.43	23.22	0.68	110.96	46.13	116.71
217	35.60	25.94	1.05	87.19	44.52	118.11
218	35.76	34.11	1.12	112.81	39.74	119.60
219	35.93	43.45	1.11	-3.18	33.57	120.21
220	36.09	50.32	1.11	-4.01	31.46	121.30
221	36.25	52.11	1.50	-0.91	32.47	122.55
222	36.42	49.28	1.74	-1.70	35.38	123.35
223	36.58	44.95	1.67	-1.13	37.25	123.03
224	36.75	42.70	1.39	7.39	37.23	122.23
225	36.91	43.79	1.31	2.42	36.34	121.89
226	37.07	45.88	1.46	-5.52	35.67	122.08
227	37.24	46.85	1.46	-3.34	34.55	121.71
228	37.40	45.50	1.08	-0.58	34.39	121.25
229	37.57	43.34	1.24	-0.65	35.38	121.00
230	37.73	41.74	1.38	-2.56	37.03	121.33
231	37.89	42.19	1.29	8.66	36.36	121.30
232	38.06	45.58	1.20	0.65	34.15	121.28
233	38.22	49.48	1.29	16.47	31.29	121.01
234	38.39	52.14	1.07	-3.47	30.65	121.19
235	38.55	49.97	1.25	3.73	31.74	121.28
236	38.71	45.62	1.37	19.96	35.27	121.64
237	38.88	40.77	1.35	13.99	37.54	120.91
238	39.04	37.04	0.99	34.36	38.84	119.45
239	39.21	33.03	0.80	20.95	40.09	117.64
240	39.37	27.67	0.76	46.10	43.38	116.24

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	23.50	0.65	45.26	48.18	116.10
242	39.70	23.47	0.85	54.46	48.92	117.16
243	39.86	30.06	1.08	79.81	44.75	118.66
244	40.03	38.45	1.06	12.58	38.77	119.05
245	40.19	40.86	0.84	10.88	36.00	118.39
246	40.35	35.30	0.79	26.53	36.12	117.55
247	40.52	32.91	0.81	58.77	36.00	117.17
248	40.68	38.10	0.73	97.81	32.98	117.51
249	40.85	46.57	0.82	43.59	30.64	117.76
250	41.01	43.73	0.82	11.77	31.81	117.59
251	41.17	33.45	0.71	56.93	35.27	115.38
252	41.34	23.23	0.33	88.73	40.34	113.00
253	41.50	20.57	0.41	116.35	44.59	113.14
254	41.67	25.70	0.78	105.26	43.41	116.13
255	41.83	36.34	0.97	111.08	36.95	118.28
256	41.99	47.83	0.91	46.27	32.84	120.17
257	42.16	52.43	1.34	61.84	30.76	120.54
258	42.32	47.74	1.05	122.90	31.78	120.11
259	42.49	39.14	0.78	141.76	33.16	117.92
260	42.65	31.89	0.64	125.73	35.60	115.88
261	42.81	28.60	0.56	155.08	36.14	114.51
262	42.98	31.11	0.48	160.51	37.24	117.15
263	43.14	41.54	1.29	150.06	35.69	120.99
264	43.31	56.15	1.87	209.04	33.84	124.02
265	43.47	65.18	1.97	15.47	31.17	124.62
266	43.64	61.78	1.53	88.57	29.55	123.19
267	43.80	51.60	0.95	158.15	30.40	121.60
268	43.96	44.36	1.23	179.36	33.89	121.88
269	44.13	47.90	1.78	149.67	36.53	123.85
270	44.29	56.46	2.12	205.60	35.22	124.96
271	44.46	62.40	1.89	18.56	34.24	125.43
272	44.62	58.76	2.05	48.87	33.50	124.45
273	44.78	51.75	1.41	135.71	34.77	123.63
274	44.95	47.27	1.45	165.96	34.65	122.40
275	45.11	48.87	1.38	78.52	34.52	122.10
276	45.28	50.62	1.26	101.77	32.98	121.59
277	45.44	50.24	1.15	137.24	32.67	121.14
278	45.60	46.57	1.17	98.83	32.82	120.34
279	45.77	43.18	0.94	170.29	36.74	121.32
280	45.93	42.72	1.68	137.95	37.42	121.62
281	46.10	45.19	1.33	191.50	37.85	122.71
282	46.26	50.93	1.50	94.13	36.16	123.50
283	46.42	56.57	2.06	84.79	35.50	124.96
284	46.59	61.46	2.21	173.16	35.17	125.75
285	46.75	61.67	2.04	13.11	33.35	124.82
286	46.92	56.37	1.31	90.67	32.16	123.00
287	47.08	49.65	1.08	222.03	31.86	121.26
288	47.24	45.34	1.20	225.55	34.26	121.38

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	45.46	1.44	224.36	36.72	122.37
290	47.57	47.40	1.63	254.06	36.23	122.51
291	47.74	49.00	1.25	191.99	34.56	121.98
292	47.90	49.93	1.11	104.14	31.25	120.41
293	48.06	49.86	0.85	218.57	29.24	119.48
294	48.23	50.23	0.86	252.93	27.79	118.93
295	48.39	50.61	0.89	256.02	27.08	118.84
296	48.56	51.87	0.80	292.38	26.94	119.16
297	48.72	53.24	0.95	294.88	26.40	119.44
298	48.88	54.98	0.96	328.50	26.66	120.09
299	49.05	56.11	1.03	306.03	25.99	120.07
300	49.21	56.90	0.93	311.93	25.81	120.19
301	49.38	57.26	1.00	332.22	25.27	119.95
302	49.54	57.03	0.93	335.14	26.00	120.30
303	49.70	56.10	1.07	302.56	27.04	120.72
304	49.87	55.47	1.19	321.99	28.04	120.97
305	50.03	54.50	1.05	296.30	29.34	121.01
306	50.20	53.20	1.13	72.44	29.77	120.46
307	50.36	51.01	0.98	174.65	30.05	119.96
308	50.52	50.77	0.87	195.57	28.52	119.31
309	50.69	52.80	0.86	261.72	27.03	119.26
310	50.85	56.75	0.93	296.66	25.86	119.75
311	51.02	60.12	1.00	303.13	25.32	120.35
312	51.18	61.35	1.05	291.95	24.72	120.39
313	51.35	60.46	0.92	348.52	24.15	119.98
314	51.51	59.53	0.84	345.78	23.95	119.81
315	51.67	60.37	0.99	352.38	24.13	120.24
316	51.84	63.06	1.07	388.61	24.99	121.35
317	52.00	65.21	1.28	349.77	24.67	121.64
318	52.17	65.53	1.09	366.71	24.56	121.58
319	52.33	64.14	1.04	344.11	23.61	120.74
320	52.49	63.05	0.92	367.98	23.33	120.29
321	52.66	63.30	0.92	358.39	22.96	120.10
322	52.82	64.59	0.96	375.51	22.68	120.21
323	52.99	65.77	0.95	415.87	22.62	120.47
324	53.15	66.03	1.01	407.54	22.55	120.55
325	53.31	65.72	0.99	411.00	22.81	120.67
326	53.48	65.41	1.00	407.73	22.91	120.71
327	53.64	65.87	1.02	416.38	23.36	121.07
328	53.81	66.50	1.14	410.48	23.67	121.44
329	53.97	67.31	1.15	415.46	24.06	121.84
330	54.13	67.84	1.20	401.46	23.48	121.69
331	54.30	69.14	1.05	432.83	23.24	121.77
332	54.46	70.24	1.17	417.00	22.67	121.75
333	54.63	71.44	1.17	467.32	22.97	122.21
334	54.79	72.12	1.25	445.48	22.90	122.43
335	54.95	72.89	1.27	474.79	23.05	122.65
336	55.12	73.22	1.27	462.24	22.91	122.65

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.28	73.19	1.24	470.88	22.79	122.58
338	55.45	73.09	1.23	487.41	22.61	122.43
339	55.61	73.30	1.19	455.88	22.48	122.34
340	55.77	73.39	1.20	468.74	22.31	122.15
341	55.94	72.70	1.15	478.89	22.21	121.90
342	56.10	71.38	1.08	461.89	22.48	121.81
343	56.27	70.73	1.17	442.23	22.87	121.92
344	56.43	71.43	1.21	461.01	23.33	122.27
345	56.59	72.51	1.25	427.79	23.16	122.33
346	56.76	72.59	1.19	481.75	22.89	122.20
347	56.92	72.28	1.14	459.37	22.57	122.01
348	57.09	72.62	1.15	469.55	22.71	122.17
349	57.25	73.48	1.26	486.29	23.10	122.53
350	57.41	73.38	1.31	490.27	23.26	122.63
351	57.58	72.62	1.20	473.61	23.31	122.48
352	57.74	71.94	1.19	462.68	22.93	122.10
353	57.91	72.19	1.13	490.98	22.92	122.06
354	58.07	72.28	1.18	482.87	22.66	121.97
355	58.23	72.71	1.14	503.37	22.97	122.15
356	58.40	72.68	1.22	449.90	23.03	122.17
357	58.56	72.53	1.19	473.75	23.45	122.25
358	58.73	71.28	1.19	453.79	23.64	122.15
359	58.89	70.33	1.18	447.43	23.97	122.13
360	59.06	70.49	1.19	440.08	24.11	122.24
361	59.22	71.88	1.24	444.45	23.91	122.36
362	59.38	73.30	1.22	464.15	22.21	121.40
363	59.55	72.94	0.73	443.52	22.49	121.34
364	59.71	69.42	1.23	433.20	23.64	121.25
365	59.88	64.53	1.23	404.32	26.69	121.96
366	60.04	60.99	1.13	348.91	27.80	121.72
367	60.20	61.31	1.16	361.02	27.56	121.25
368	60.37	61.43	1.03	407.57	28.42	121.49
369	60.53	58.58	1.26	349.46	31.09	122.52
370	60.70	57.43	1.71	302.76	36.21	125.08
371	60.86	63.04	2.71	275.24	37.62	127.08
372	61.02	73.96	2.85	285.24	36.57	128.10
373	61.19	78.42	2.57	80.07	33.24	127.18
374	61.35	73.19	1.66	154.94	30.06	124.80
375	61.52	64.35	0.95	342.88	27.27	121.97
376	61.68	60.25	0.98	414.15	26.40	120.62
377	61.84	61.27	1.10	434.24	26.92	120.96
378	62.01	63.98	1.09	394.46	26.87	121.46
379	62.17	65.76	1.18	413.23	26.40	121.70
380	62.34	67.07	1.18	436.93	26.36	122.05
381	62.50	67.54	1.24	442.45	26.15	122.09
382	62.66	67.45	1.19	444.41	26.15	122.05
383	62.83	66.92	1.16	434.27	26.23	121.96
384	62.99	66.44	1.20	422.52	26.41	121.93

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
385	63.16	66.51	1.18	429.37	26.59	122.01
386	63.32	66.91	1.20	425.32	26.49	122.06
387	63.48	67.68	1.21	440.86	26.67	122.33
388	63.65	68.35	1.31	436.00	27.41	122.95
389	63.81	69.05	1.51	428.84	28.07	123.45
390	63.98	69.44	1.49	423.27	28.28	123.66
391	64.14	69.67	1.42	437.91	27.82	123.43
392	64.30	69.75	1.37	423.84	27.22	123.15
393	64.47	70.08	1.32	452.56	27.18	123.21
394	64.63	70.63	1.45	460.19	27.16	123.33
395	64.80	71.04	1.43	459.70	27.12	123.39
396	64.96	71.14	1.34	463.99	26.71	123.15
397	65.12	71.07	1.31	449.64	26.35	122.90
398	65.29	71.04	1.29	457.43	26.26	122.79
399	65.45	70.88	1.29	454.91	26.23	122.70
400	65.62	70.48	1.27	453.55	26.31	122.62
401	65.78	69.95	1.26	442.28	26.47	122.54
402	65.94	69.45	1.25	432.53	26.71	122.51
403	66.11	69.08	1.27	434.53	26.95	122.52
404	66.27	68.81	1.27	429.99	27.28	122.61
405	66.44	68.73	1.31	419.13	27.56	122.68
406	66.60	68.54	1.31	415.41	27.75	122.68
407	66.77	68.01	1.27	413.95	27.80	122.54
408	66.93	67.14	1.24	416.40	28.16	122.52
409	67.09	66.36	1.31	408.25	28.46	122.49
410	67.26	65.99	1.27	422.96	28.61	122.43
411	67.42	65.62	1.22	423.88	28.32	122.10
412	67.59	64.89	1.16	408.67	28.21	121.75
413	67.75	63.59	1.11	401.11	28.23	121.38
414	67.91	62.30	1.06	401.80	28.75	121.28
415	68.08	61.48	1.13	382.93	29.38	121.34
416	68.24	61.27	1.15	366.23	30.18	121.61
417	68.41	61.34	1.20	350.30	30.52	121.70
418	68.57	61.20	1.18	348.20	30.64	121.67
419	68.73	60.92	1.15	343.02	30.71	121.59
420	68.90	60.59	1.17	340.47	30.81	121.55
421	69.06	60.54	1.16	344.47	30.98	121.59
422	69.23	60.47	1.16	346.64	30.87	121.51
423	69.39	60.48	1.13	357.22	30.85	121.46
424	69.55	60.23	1.14	356.06	31.17	121.55
425	69.72	59.59	1.21	363.40	31.72	121.66
426	69.88	58.69	1.19	364.29	32.20	121.58
427	70.05	57.86	1.12	318.77	32.19	121.30
428	70.21	57.42	1.09	353.78	32.39	121.20
429	70.37	57.02	1.15	361.84	32.79	121.27
430	70.54	56.40	1.16	345.11	33.27	121.30
431	70.70	55.79	1.12	337.93	33.45	121.13
432	70.87	55.38	1.09	330.37	32.93	120.75

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
433	71.03	55.56	1.00	358.68	32.32	120.42
434	71.19	55.74	0.97	359.80	31.74	120.18
435	71.36	55.88	0.99	365.38	31.88	120.24
436	71.52	55.54	1.02	358.28	32.37	120.42
437	71.69	55.30	1.05	348.82	33.07	120.62
438	71.85	55.02	1.08	326.02	33.57	120.68
439	72.01	54.58	1.06	315.89	34.19	120.70
440	72.18	53.48	1.07	306.91	34.55	120.48
441	72.34	52.19	1.00	298.51	35.11	120.30
442	72.51	51.39	1.00	285.43	35.14	120.04
443	72.67	51.51	0.97	304.32	35.29	120.06
444	72.83	51.79	1.01	308.98	35.20	120.03
445	73.00	51.38	0.99	306.96	35.51	119.98
446	73.16	50.24	0.96	290.25	35.94	119.75
447	73.33	48.96	0.94	278.46	36.48	119.47
448	73.49	47.88	0.90	271.56	36.90	119.14
449	73.65	46.69	0.86	273.47	37.54	118.85
450	73.82	44.79	0.86	276.99	38.36	118.48
451	73.98	42.76	0.80	269.57	39.56	118.14
452	74.15	41.29	0.78	234.71	40.36	117.90
453	74.31	41.26	0.80	262.50	40.95	118.01
454	74.48	41.88	0.84	262.90	41.56	118.47
455	74.64	42.27	0.93	237.65	41.74	118.65
456	74.80	41.99	0.86	256.47	41.54	118.47
457	74.97	41.48	0.78	268.91	40.80	117.90
458	75.13	41.21	0.74	248.57	40.25	117.50
459	75.30	41.22	0.74	269.40	39.88	117.24
460	75.46	41.27	0.70	268.27	39.80	117.21
461	75.62	41.14	0.73	268.37	39.86	117.15
462	75.79	40.72	0.72	274.04	40.48	117.20
463	75.95	40.03	0.73	257.27	41.00	117.14
464	76.12	39.39	0.72	267.74	41.46	117.03
465	76.28	38.96	0.70	264.87	41.53	116.83
466	76.44	38.78	0.67	259.86	41.44	116.57
467	76.61	38.53	0.66	255.46	41.44	116.41
468	76.77	38.18	0.66	270.32	41.65	116.35
469	76.94	37.85	0.66	262.37	42.17	116.52
470	77.10	37.88	0.71	264.27	42.33	116.62
471	77.26	38.30	0.69	275.45	42.04	116.68
472	77.43	39.09	0.67	268.77	41.19	116.58
473	77.59	39.79	0.67	290.02	40.38	116.48
474	77.76	40.14	0.65	289.88	40.08	116.49
475	77.92	40.06	0.67	278.22	40.19	116.54
476	78.08	39.96	0.68	286.12	40.45	116.63
477	78.25	40.02	0.68	290.68	40.53	116.71
478	78.41	40.13	0.69	297.01	40.64	116.83
479	78.58	40.40	0.71	291.19	40.71	117.07
480	78.74	41.41	0.74	282.44	40.12	117.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
481	78.90	43.38	0.73	297.88	38.61	117.42
482	79.07	45.74	0.72	319.87	36.63	117.39
483	79.23	47.49	0.70	332.47	35.38	117.50
484	79.40	48.30	0.74	337.69	34.45	117.46
485	79.56	48.61	0.70	364.37	34.07	117.47
486	79.72	48.76	0.69	366.49	33.48	117.29
487	79.89	49.15	0.68	371.07	33.29	117.35
488	80.05	49.79	0.71	375.80	33.12	117.50
489	80.22	50.41	0.73	389.05	32.46	117.39
490	80.38	50.79	0.64	413.47	31.97	117.19
491	80.54	50.40	0.65	390.53	31.53	116.85
492	80.71	49.86	0.63	404.90	32.23	116.98
493	80.87	49.36	0.69	380.89	32.90	117.21
494	81.04	49.29	0.71	390.54	33.42	117.47
495	81.20	49.62	0.71	411.87	33.41	117.61
496	81.36	50.35	0.72	395.55	33.05	117.73
497	81.53	51.66	0.74	407.70	32.80	118.05
498	81.69	53.18	0.79	418.71	32.39	118.42
499	81.86	54.79	0.82	425.05	32.21	118.92
500	82.02	56.56	0.88	415.99	31.61	119.23
501	82.19	58.56	0.87	439.63	30.50	119.25
502	82.35	60.36	0.80	454.34	29.43	119.14
503	82.51	61.15	0.82	444.22	28.46	118.80
504	82.68	60.59	0.75	469.40	28.40	118.77
505	82.84	60.45	0.79	474.88	32.43	122.19
506	83.01	70.29	2.16	515.67	34.29	125.93
507	83.17	90.70	2.94	544.64	35.13	130.38
508	83.33	121.07	4.97	295.97	34.46	134.30
509	83.50	154.37	8.00	286.99	30.37	136.23
510	83.66	191.70	6.27	76.27	25.52	137.28
511	83.83	228.85	6.48	246.59	20.48	136.85
512	83.99	244.36	5.94	105.45	18.83	136.73
513	84.15	228.62	5.65	12.41	20.24	136.57
514	84.32	190.66	6.43	76.35	22.83	136.36
515	84.48	180.57	6.02	161.84	24.13	136.85
516	84.65	215.99	6.99	430.22	20.60	137.25
517	84.81	276.45	6.56	410.77	17.02	137.28
518	84.97	304.72	6.34	33.09	15.76	137.28
519	85.14	284.72	7.57	19.69	17.37	137.28
520	85.30	249.91	8.02	41.01	20.14	137.28
521	85.47	240.98	8.17	169.34	19.76	137.28
522	85.63	272.11	6.15	56.96	16.64	137.28
523	85.79	319.58	5.96	44.27	12.52	137.28
524	85.96	365.19	5.63	14.65	10.30	137.28
525	86.12	397.02	5.98	23.17	9.78	137.28
526	86.29	403.87	7.40	30.43	11.04	137.28
527	86.45	367.75	8.53	34.90	13.26	137.28
528	86.61	295.85	7.33	39.85	16.29	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
529	86.78	219.22	5.73	2.85	19.59	136.92
530	86.94	188.08	5.47	171.59	23.13	136.96
531	87.11	213.45	8.17	364.36	16.10	134.68
532	87.27	293.19	0.00	276.08	7.29	131.53
533	87.43	386.55	0.00	95.94	41.28	87.36
534	87.60	439.67	0.00	53.55	43.62	87.36

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	0.260	1.14	0.228	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
9	1.48	0.09	0.00	0.09	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
10	1.64	0.10	0.00	0.10	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
11	1.80	0.11	0.00	0.11	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
12	1.97	0.13	0.00	0.13	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
13	2.13	0.14	0.00	0.14	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
14	2.30	0.15	0.00	0.15	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
15	2.46	0.16	0.00	0.16	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
16	2.62	0.17	0.00	0.17	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
17	2.79	0.18	0.00	0.18	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
18	2.95	0.19	0.00	0.19	1.00	0.260	1.14	0.228	1.10	1.00	2.000	No
19	3.12	0.19	0.00	0.19	1.00	0.259	1.14	0.227	1.10	1.00	2.000	No
20	3.28	0.20	0.00	0.20	1.00	0.259	1.14	0.227	1.10	1.00	2.000	No
21	3.44	0.21	0.00	0.21	1.00	0.259	1.14	0.227	1.10	1.00	2.000	No
22	3.61	0.22	0.00	0.22	1.00	0.259	1.14	0.227	1.10	1.00	2.000	No
23	3.77	0.23	0.00	0.23	1.00	0.259	1.14	0.227	1.10	1.00	2.000	No
24	3.94	0.24	0.00	0.24	1.00	0.259	1.14	0.227	1.09	1.00	2.000	No
25	4.10	0.25	0.00	0.25	0.99	0.259	1.14	0.227	1.08	1.00	2.000	No
26	4.27	0.26	0.00	0.26	0.99	0.259	1.14	0.227	1.08	1.00	2.000	No
27	4.43	0.27	0.00	0.27	0.99	0.258	1.14	0.226	1.08	1.00	2.000	No
28	4.59	0.28	0.00	0.28	0.99	0.258	1.14	0.226	1.07	1.00	2.000	No
29	4.76	0.28	0.00	0.28	0.99	0.258	1.14	0.226	1.07	1.00	2.000	No
30	4.92	0.29	0.00	0.29	0.99	0.258	1.14	0.226	1.06	1.00	2.000	No
31	5.09	0.30	0.00	0.30	0.99	0.258	1.14	0.226	1.06	1.00	2.000	No
32	5.25	0.31	0.00	0.31	0.99	0.258	1.14	0.226	1.06	1.00	2.000	No
33	5.41	0.32	0.00	0.32	0.99	0.258	1.14	0.226	1.06	1.00	2.000	No
34	5.58	0.33	0.00	0.33	0.99	0.257	1.14	0.226	1.06	1.00	2.000	No
35	5.74	0.34	0.00	0.34	0.99	0.257	1.14	0.225	1.06	1.00	2.000	No
36	5.91	0.35	0.00	0.35	0.99	0.257	1.14	0.225	1.06	1.00	2.000	No
37	6.07	0.35	0.00	0.35	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
38	6.23	0.36	0.00	0.36	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
39	6.40	0.37	0.00	0.37	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
40	6.56	0.38	0.00	0.38	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
41	6.73	0.39	0.00	0.39	0.99	0.256	1.14	0.225	1.05	1.00	2.000	No
42	6.89	0.40	0.00	0.40	0.99	0.256	1.14	0.225	1.05	1.00	2.000	No
43	7.05	0.41	0.00	0.41	0.98	0.256	1.14	0.224	1.05	1.00	2.000	No
44	7.22	0.41	0.00	0.41	0.98	0.256	1.14	0.224	1.05	1.00	2.000	No
45	7.38	0.42	0.00	0.42	0.98	0.256	1.14	0.224	1.05	1.00	2.000	No
46	7.55	0.43	0.00	0.43	0.98	0.256	1.14	0.224	1.04	1.00	2.000	No
47	7.71	0.44	0.00	0.44	0.98	0.255	1.14	0.224	1.04	1.00	2.000	No
48	7.87	0.45	0.00	0.45	0.98	0.255	1.14	0.224	1.04	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	0.98	0.255	1.14	0.224	1.04	1.00	2.000	No
50	8.20	0.47	0.00	0.47	0.98	0.255	1.14	0.223	1.04	1.00	2.000	No
51	8.37	0.47	0.00	0.47	0.98	0.255	1.14	0.223	1.04	1.00	2.000	No
52	8.53	0.48	0.00	0.48	0.98	0.255	1.14	0.223	1.04	1.00	2.000	No
53	8.69	0.49	0.00	0.49	0.98	0.254	1.14	0.223	1.04	1.00	2.000	No
54	8.86	0.50	0.00	0.50	0.98	0.254	1.14	0.223	1.04	1.00	2.000	No
55	9.02	0.51	0.00	0.51	0.98	0.254	1.14	0.223	1.04	1.00	2.000	No
56	9.19	0.52	0.00	0.52	0.98	0.254	1.14	0.223	1.04	1.00	2.000	No
57	9.35	0.53	0.00	0.53	0.98	0.254	1.14	0.222	1.04	1.00	2.000	No
58	9.51	0.54	0.00	0.54	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
59	9.68	0.55	0.00	0.55	0.97	0.253	1.14	0.222	1.03	1.00	2.000	No
60	9.84	0.55	0.00	0.55	0.97	0.253	1.14	0.222	1.03	1.00	2.000	No
61	10.01	0.56	0.00	0.56	0.97	0.253	1.14	0.222	1.03	1.00	2.000	No
62	10.17	0.57	0.00	0.57	0.97	0.253	1.14	0.222	1.03	1.00	2.000	No
63	10.33	0.58	0.00	0.58	0.97	0.253	1.14	0.222	1.03	1.00	2.000	No
64	10.50	0.59	0.00	0.59	0.97	0.253	1.14	0.221	1.03	1.00	2.000	No
65	10.66	0.59	0.00	0.59	0.97	0.252	1.14	0.221	1.03	1.00	2.000	No
66	10.83	0.60	0.00	0.60	0.97	0.252	1.14	0.221	1.03	1.00	2.000	No
67	10.99	0.61	0.00	0.61	0.97	0.252	1.14	0.221	1.03	1.00	2.000	Yes
68	11.15	0.62	0.00	0.62	0.97	0.252	1.14	0.221	1.03	1.00	2.000	Yes
69	11.32	0.63	0.00	0.63	0.97	0.252	1.14	0.221	1.03	1.00	2.000	Yes
70	11.48	0.64	0.01	0.63	0.97	0.254	1.14	0.222	1.03	1.00	2.000	Yes
71	11.65	0.65	0.01	0.64	0.97	0.256	1.14	0.224	1.04	1.00	2.000	Yes
72	11.81	0.66	0.02	0.64	0.97	0.257	1.14	0.226	1.04	1.00	0.217	No
73	11.98	0.67	0.02	0.65	0.97	0.259	1.14	0.227	1.04	1.00	2.000	Yes
74	12.14	0.68	0.03	0.65	0.97	0.261	1.14	0.229	1.04	1.00	2.000	Yes
75	12.30	0.69	0.03	0.66	0.96	0.263	1.14	0.230	1.04	1.00	2.000	Yes
76	12.47	0.70	0.04	0.66	0.96	0.264	1.14	0.232	1.03	1.00	2.000	Yes
77	12.63	0.71	0.04	0.67	0.96	0.266	1.14	0.233	1.03	1.00	2.000	Yes
78	12.80	0.72	0.05	0.67	0.96	0.268	1.14	0.235	1.03	1.00	0.228	No
79	12.96	0.73	0.05	0.68	0.96	0.269	1.14	0.236	1.03	1.00	0.229	No
80	13.12	0.74	0.06	0.68	0.96	0.271	1.14	0.237	1.03	1.00	0.231	No
81	13.29	0.75	0.06	0.69	0.96	0.272	1.14	0.239	1.03	1.00	0.233	No
82	13.45	0.76	0.07	0.69	0.96	0.274	1.14	0.240	1.02	1.00	0.234	No
83	13.62	0.77	0.07	0.69	0.96	0.275	1.14	0.241	1.02	1.00	0.236	No
84	13.78	0.78	0.08	0.70	0.96	0.277	1.14	0.243	1.02	1.00	0.237	No
85	13.94	0.78	0.08	0.70	0.96	0.278	1.14	0.244	1.02	1.00	0.239	No
86	14.11	0.79	0.09	0.71	0.96	0.280	1.14	0.245	1.02	1.00	0.240	No
87	14.27	0.80	0.09	0.71	0.96	0.281	1.14	0.246	1.02	1.00	0.241	No
88	14.44	0.81	0.10	0.71	0.96	0.282	1.14	0.247	1.02	1.00	0.243	No
89	14.60	0.82	0.10	0.72	0.95	0.284	1.14	0.249	1.02	1.00	0.244	No
90	14.76	0.83	0.11	0.72	0.95	0.285	1.14	0.250	1.02	1.00	0.245	No
91	14.93	0.84	0.11	0.73	0.95	0.286	1.14	0.251	1.02	1.00	0.246	No
92	15.09	0.85	0.12	0.73	0.95	0.288	1.14	0.252	1.02	1.00	0.247	No
93	15.26	0.86	0.12	0.74	0.95	0.289	1.14	0.253	1.02	1.00	0.248	No
94	15.42	0.87	0.13	0.74	0.95	0.290	1.14	0.254	1.02	1.00	0.249	No
95	15.58	0.88	0.13	0.75	0.95	0.291	1.14	0.255	1.02	1.00	0.250	No
96	15.75	0.89	0.14	0.75	0.95	0.293	1.14	0.256	1.02	1.00	0.251	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	0.90	0.14	0.75	0.95	0.294	1.14	0.257	1.02	1.00	0.252	No
98	16.08	0.91	0.15	0.76	0.95	0.295	1.14	0.258	1.02	1.00	0.253	No
99	16.24	0.92	0.15	0.76	0.95	0.296	1.14	0.259	1.02	1.00	0.254	No
100	16.40	0.93	0.16	0.77	0.95	0.297	1.14	0.260	1.02	1.00	0.255	No
101	16.57	0.94	0.16	0.77	0.95	0.298	1.14	0.261	1.02	1.00	0.257	No
102	16.73	0.95	0.17	0.78	0.94	0.299	1.14	0.262	1.02	1.00	0.258	No
103	16.90	0.96	0.17	0.78	0.94	0.300	1.14	0.263	1.02	1.00	0.259	No
104	17.06	0.96	0.18	0.78	0.94	0.301	1.14	0.264	1.02	1.00	0.260	No
105	17.22	0.97	0.18	0.79	0.94	0.302	1.14	0.265	1.02	1.00	0.260	No
106	17.39	0.98	0.19	0.79	0.94	0.304	1.14	0.266	1.02	1.00	0.261	No
107	17.55	0.99	0.20	0.80	0.94	0.305	1.14	0.267	1.02	1.00	0.262	No
108	17.72	1.00	0.20	0.80	0.94	0.306	1.14	0.268	1.02	1.00	0.263	No
109	17.88	1.01	0.21	0.81	0.94	0.306	1.14	0.269	1.02	1.00	0.264	No
110	18.04	1.02	0.21	0.81	0.94	0.307	1.14	0.269	1.02	1.00	0.265	No
111	18.21	1.03	0.22	0.82	0.94	0.308	1.14	0.270	1.02	1.00	0.266	No
112	18.37	1.04	0.22	0.82	0.94	0.309	1.14	0.271	1.02	1.00	0.267	No
113	18.54	1.05	0.23	0.83	0.94	0.310	1.14	0.272	1.02	1.00	0.267	No
114	18.70	1.06	0.23	0.83	0.94	0.311	1.14	0.273	1.02	1.00	0.268	No
115	18.86	1.07	0.24	0.83	0.94	0.312	1.14	0.273	1.02	1.00	0.269	No
116	19.03	1.08	0.24	0.84	0.93	0.313	1.14	0.274	1.02	1.00	0.270	No
117	19.19	1.09	0.25	0.84	0.93	0.313	1.14	0.275	1.01	1.00	0.271	No
118	19.36	1.10	0.25	0.85	0.93	0.314	1.14	0.275	1.01	1.00	0.272	No
119	19.52	1.11	0.26	0.85	0.93	0.315	1.14	0.276	1.01	1.00	0.273	No
120	19.69	1.12	0.26	0.86	0.93	0.316	1.14	0.277	1.01	1.00	0.273	No
121	19.85	1.13	0.27	0.86	0.93	0.317	1.14	0.278	1.01	1.00	0.274	No
122	20.01	1.14	0.27	0.87	0.93	0.317	1.14	0.278	1.01	1.00	0.275	No
123	20.18	1.15	0.28	0.87	0.93	0.318	1.14	0.279	1.01	1.00	0.276	No
124	20.34	1.16	0.28	0.87	0.93	0.319	1.14	0.280	1.01	1.00	0.277	No
125	20.51	1.17	0.29	0.88	0.93	0.320	1.14	0.280	1.01	1.00	0.277	No
126	20.67	1.18	0.29	0.88	0.93	0.321	1.14	0.281	1.01	1.00	0.278	No
127	20.83	1.18	0.30	0.89	0.93	0.321	1.14	0.282	1.01	1.00	0.279	No
128	21.00	1.19	0.30	0.89	0.92	0.322	1.14	0.282	1.01	1.00	0.280	No
129	21.16	1.20	0.31	0.89	0.92	0.323	1.14	0.283	1.01	1.00	0.280	No
130	21.33	1.21	0.31	0.90	0.92	0.323	1.14	0.283	1.01	1.00	0.281	No
131	21.49	1.22	0.32	0.90	0.92	0.324	1.14	0.284	1.01	1.00	0.282	No
132	21.65	1.23	0.32	0.91	0.92	0.325	1.14	0.285	1.01	1.00	0.282	No
133	21.82	1.24	0.33	0.91	0.92	0.325	1.14	0.285	1.01	1.00	0.283	No
134	21.98	1.25	0.33	0.92	0.92	0.326	1.14	0.286	1.01	1.00	0.284	No
135	22.15	1.26	0.34	0.92	0.92	0.327	1.14	0.286	1.01	1.00	0.284	No
136	22.31	1.27	0.34	0.92	0.92	0.327	1.14	0.287	1.01	1.00	0.285	No
137	22.47	1.28	0.35	0.93	0.92	0.328	1.14	0.287	1.01	1.00	0.286	No
138	22.64	1.29	0.35	0.93	0.92	0.329	1.14	0.288	1.01	1.00	0.286	No
139	22.80	1.30	0.36	0.94	0.92	0.329	1.14	0.289	1.01	1.00	0.287	No
140	22.97	1.30	0.36	0.94	0.91	0.330	1.14	0.289	1.01	1.00	0.287	No
141	23.13	1.31	0.37	0.94	0.91	0.330	1.14	0.290	1.01	1.00	0.288	No
142	23.29	1.32	0.37	0.95	0.91	0.331	1.14	0.290	1.01	1.00	0.288	No
143	23.46	1.33	0.38	0.95	0.91	0.332	1.14	0.291	1.01	1.00	0.289	No
144	23.62	1.34	0.38	0.96	0.91	0.332	1.14	0.291	1.01	1.00	0.290	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	1.35	0.39	0.96	0.91	0.333	1.14	0.292	1.01	1.00	0.290	No
146	23.95	1.36	0.39	0.96	0.91	0.333	1.14	0.292	1.01	1.00	0.291	No
147	24.11	1.37	0.40	0.97	0.91	0.334	1.14	0.293	1.00	1.00	0.291	No
148	24.28	1.38	0.40	0.97	0.91	0.334	1.14	0.293	1.00	1.00	0.292	No
149	24.44	1.39	0.41	0.98	0.91	0.335	1.14	0.294	1.00	1.00	0.292	No
150	24.61	1.40	0.42	0.98	0.91	0.335	1.14	0.294	1.00	1.00	0.293	No
151	24.77	1.41	0.42	0.99	0.91	0.336	1.14	0.294	1.00	1.00	0.293	No
152	24.93	1.41	0.43	0.99	0.90	0.336	1.14	0.295	1.00	1.00	0.294	No
153	25.10	1.42	0.43	0.99	0.90	0.337	1.14	0.295	1.00	1.00	0.294	No
154	25.26	1.43	0.44	1.00	0.90	0.337	1.14	0.296	1.00	1.00	0.295	No
155	25.43	1.44	0.44	1.00	0.90	0.338	1.14	0.296	1.00	1.00	0.295	No
156	25.59	1.45	0.45	1.01	0.90	0.338	1.14	0.296	1.00	1.00	0.296	No
157	25.75	1.46	0.45	1.01	0.90	0.339	1.14	0.297	1.00	1.00	0.296	No
158	25.92	1.47	0.46	1.02	0.90	0.339	1.14	0.297	1.00	1.00	2.000	Yes
159	26.08	1.48	0.46	1.02	0.90	0.339	1.14	0.297	1.00	1.00	2.000	Yes
160	26.25	1.49	0.47	1.03	0.90	0.340	1.14	0.298	1.00	1.00	2.000	Yes
161	26.41	1.50	0.47	1.03	0.90	0.340	1.14	0.298	1.00	1.00	2.000	Yes
162	26.57	1.51	0.48	1.04	0.90	0.340	1.14	0.298	1.00	1.00	2.000	Yes
163	26.74	1.52	0.48	1.04	0.90	0.341	1.14	0.298	1.00	1.00	2.000	Yes
164	26.90	1.53	0.49	1.05	0.89	0.341	1.14	0.299	1.00	1.00	2.000	Yes
165	27.07	1.54	0.49	1.05	0.89	0.341	1.14	0.299	1.00	1.00	2.000	Yes
166	27.23	1.55	0.50	1.05	0.89	0.341	1.14	0.299	1.00	1.00	2.000	Yes
167	27.40	1.56	0.50	1.06	0.89	0.342	1.14	0.300	1.00	1.00	0.300	No
168	27.56	1.57	0.51	1.06	0.89	0.342	1.14	0.300	1.00	1.00	0.300	No
169	27.72	1.58	0.51	1.07	0.89	0.342	1.14	0.300	1.00	1.00	0.300	No
170	27.89	1.59	0.52	1.08	0.89	0.343	1.14	0.300	1.00	1.00	0.301	No
171	28.05	1.60	0.52	1.08	0.89	0.343	1.14	0.300	1.00	1.00	0.301	No
172	28.22	1.61	0.53	1.09	0.89	0.343	1.14	0.301	1.00	1.00	0.301	No
173	28.38	1.62	0.53	1.09	0.89	0.343	1.14	0.301	1.00	1.00	0.301	No
174	28.54	1.63	0.54	1.09	0.89	0.343	1.14	0.301	1.00	1.00	2.000	Yes
175	28.71	1.64	0.54	1.10	0.88	0.344	1.14	0.301	1.00	1.00	2.000	Yes
176	28.87	1.65	0.55	1.10	0.88	0.344	1.14	0.301	1.00	1.00	2.000	Yes
177	29.04	1.66	0.55	1.11	0.88	0.344	1.14	0.302	1.00	1.00	2.000	Yes
178	29.20	1.67	0.56	1.11	0.88	0.345	1.14	0.302	1.00	1.00	0.303	No
179	29.36	1.68	0.56	1.12	0.88	0.345	1.14	0.302	1.00	1.00	0.303	No
180	29.53	1.69	0.57	1.12	0.88	0.345	1.14	0.302	1.00	1.00	0.303	No
181	29.69	1.70	0.57	1.13	0.88	0.345	1.14	0.303	1.00	1.00	0.304	No
182	29.86	1.71	0.58	1.13	0.88	0.345	1.14	0.303	1.00	1.00	0.304	No
183	30.02	1.72	0.58	1.13	0.88	0.346	1.14	0.303	1.00	1.00	0.304	No
184	30.18	1.73	0.59	1.14	0.88	0.346	1.14	0.303	1.00	1.00	0.304	No
185	30.35	1.74	0.59	1.14	0.88	0.346	1.14	0.303	1.00	1.00	0.305	No
186	30.51	1.75	0.60	1.15	0.88	0.346	1.14	0.303	1.00	1.00	0.305	No
187	30.68	1.76	0.60	1.15	0.87	0.346	1.14	0.304	1.00	1.00	0.305	No
188	30.84	1.77	0.61	1.16	0.87	0.347	1.14	0.304	1.00	1.00	0.305	No
189	31.00	1.78	0.61	1.16	0.87	0.347	1.14	0.304	0.99	1.00	0.306	No
190	31.17	1.79	0.62	1.17	0.87	0.347	1.14	0.304	0.99	1.00	0.306	No
191	31.33	1.80	0.62	1.17	0.87	0.347	1.14	0.304	0.99	1.00	0.306	No
192	31.50	1.81	0.63	1.17	0.87	0.347	1.14	0.304	0.99	1.00	0.306	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	1.81	0.64	1.18	0.87	0.348	1.14	0.305	0.99	1.00	0.306	No
194	31.82	1.82	0.64	1.18	0.87	0.348	1.14	0.305	0.99	1.00	0.307	No
195	31.99	1.83	0.65	1.19	0.87	0.348	1.14	0.305	0.99	1.00	0.307	No
196	32.15	1.84	0.65	1.19	0.87	0.348	1.14	0.305	0.99	1.00	0.307	No
197	32.32	1.85	0.66	1.20	0.87	0.348	1.14	0.305	0.99	1.00	0.307	No
198	32.48	1.86	0.66	1.20	0.86	0.348	1.14	0.305	0.99	1.00	2.000	Yes
199	32.64	1.87	0.67	1.21	0.86	0.348	1.14	0.305	0.99	1.00	2.000	Yes
200	32.81	1.88	0.67	1.21	0.86	0.349	1.14	0.306	0.99	1.00	2.000	Yes
201	32.97	1.89	0.68	1.21	0.86	0.349	1.14	0.306	0.99	1.00	2.000	Yes
202	33.14	1.90	0.68	1.22	0.86	0.349	1.14	0.306	0.99	1.00	0.308	No
203	33.30	1.91	0.69	1.22	0.86	0.349	1.14	0.306	0.99	1.00	0.309	No
204	33.46	1.92	0.69	1.23	0.86	0.349	1.14	0.306	0.99	1.00	0.309	No
205	33.63	1.93	0.70	1.23	0.86	0.349	1.14	0.306	0.99	1.00	0.309	No
206	33.79	1.94	0.70	1.24	0.86	0.349	1.14	0.306	0.99	1.00	0.309	No
207	33.96	1.95	0.71	1.24	0.86	0.349	1.14	0.306	0.99	1.00	0.309	No
208	34.12	1.96	0.71	1.25	0.86	0.349	1.14	0.306	0.99	1.00	0.309	No
209	34.28	1.97	0.72	1.25	0.85	0.349	1.14	0.306	0.99	1.00	0.309	No
210	34.45	1.98	0.72	1.26	0.85	0.349	1.14	0.306	0.99	1.00	0.310	No
211	34.61	1.99	0.73	1.26	0.85	0.350	1.14	0.306	0.99	1.00	0.310	No
212	34.78	2.00	0.73	1.27	0.85	0.350	1.14	0.306	0.99	1.00	0.310	No
213	34.94	2.01	0.74	1.27	0.85	0.350	1.14	0.306	0.99	1.00	0.310	No
214	35.10	2.02	0.74	1.27	0.85	0.350	1.14	0.307	0.99	1.00	0.310	No
215	35.27	2.03	0.75	1.28	0.85	0.350	1.14	0.307	0.99	1.00	0.310	No
216	35.43	2.04	0.75	1.28	0.85	0.350	1.14	0.307	0.99	1.00	0.310	No
217	35.60	2.05	0.76	1.29	0.85	0.350	1.14	0.307	0.99	1.00	0.310	No
218	35.76	2.06	0.76	1.29	0.85	0.350	1.14	0.307	0.99	1.00	0.310	No
219	35.93	2.07	0.77	1.30	0.85	0.350	1.14	0.307	0.99	1.00	0.311	No
220	36.09	2.08	0.77	1.30	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
221	36.25	2.09	0.78	1.31	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
222	36.42	2.10	0.78	1.31	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
223	36.58	2.11	0.79	1.32	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
224	36.75	2.12	0.79	1.32	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
225	36.91	2.13	0.80	1.33	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
226	37.07	2.14	0.80	1.33	0.84	0.350	1.14	0.307	0.99	1.00	0.311	No
227	37.24	2.15	0.81	1.34	0.84	0.350	1.14	0.307	0.98	1.00	0.311	No
228	37.40	2.16	0.81	1.34	0.84	0.350	1.14	0.307	0.98	1.00	0.311	No
229	37.57	2.17	0.82	1.35	0.84	0.350	1.14	0.307	0.98	1.00	0.311	No
230	37.73	2.18	0.82	1.35	0.84	0.350	1.14	0.306	0.98	1.00	0.311	No
231	37.89	2.19	0.83	1.36	0.83	0.350	1.14	0.306	0.98	1.00	0.311	No
232	38.06	2.20	0.83	1.36	0.83	0.350	1.14	0.306	0.98	1.00	0.311	No
233	38.22	2.21	0.84	1.37	0.83	0.350	1.14	0.306	0.98	1.00	0.312	No
234	38.39	2.22	0.85	1.37	0.83	0.350	1.14	0.306	0.98	1.00	0.312	No
235	38.55	2.23	0.85	1.38	0.83	0.350	1.14	0.306	0.98	1.00	0.312	No
236	38.71	2.24	0.86	1.38	0.83	0.349	1.14	0.306	0.98	1.00	0.311	No
237	38.88	2.25	0.86	1.38	0.83	0.349	1.14	0.306	0.98	1.00	0.311	No
238	39.04	2.26	0.87	1.39	0.83	0.349	1.14	0.306	0.98	1.00	0.311	No
239	39.21	2.27	0.87	1.39	0.83	0.349	1.14	0.306	0.98	1.00	0.311	No
240	39.37	2.27	0.88	1.40	0.83	0.349	1.14	0.306	0.98	1.00	0.311	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	2.28	0.88	1.40	0.83	0.349	1.14	0.306	0.99	1.00	0.311	No
242	39.70	2.29	0.89	1.41	0.82	0.349	1.14	0.306	0.99	1.00	0.311	No
243	39.86	2.30	0.89	1.41	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
244	40.03	2.31	0.90	1.42	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
245	40.19	2.32	0.90	1.42	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
246	40.35	2.33	0.91	1.43	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
247	40.52	2.34	0.91	1.43	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
248	40.68	2.35	0.92	1.43	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
249	40.85	2.36	0.92	1.44	0.82	0.349	1.14	0.306	0.98	1.00	0.312	No
250	41.01	2.37	0.93	1.44	0.82	0.349	1.14	0.306	0.98	1.00	0.312	No
251	41.17	2.38	0.93	1.45	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
252	41.34	2.39	0.94	1.45	0.82	0.349	1.14	0.306	0.98	1.00	0.311	No
253	41.50	2.40	0.94	1.46	0.81	0.349	1.14	0.306	0.98	1.00	0.310	No
254	41.67	2.41	0.95	1.46	0.81	0.349	1.14	0.305	0.98	1.00	0.311	No
255	41.83	2.42	0.95	1.47	0.81	0.348	1.14	0.305	0.98	1.00	0.311	No
256	41.99	2.43	0.96	1.47	0.81	0.348	1.14	0.305	0.98	1.00	0.312	No
257	42.16	2.44	0.96	1.48	0.81	0.348	1.14	0.305	0.98	1.00	0.312	No
258	42.32	2.45	0.97	1.48	0.81	0.348	1.14	0.305	0.98	1.00	0.312	No
259	42.49	2.46	0.97	1.48	0.81	0.348	1.14	0.305	0.98	1.00	0.311	No
260	42.65	2.47	0.98	1.49	0.81	0.348	1.14	0.305	0.98	1.00	0.311	No
261	42.81	2.48	0.98	1.49	0.81	0.348	1.14	0.305	0.98	1.00	0.311	No
262	42.98	2.49	0.99	1.50	0.81	0.348	1.14	0.305	0.98	1.00	0.311	No
263	43.14	2.50	0.99	1.50	0.81	0.348	1.14	0.305	0.98	1.00	0.311	No
264	43.31	2.51	1.00	1.51	0.80	0.348	1.14	0.305	0.98	1.00	0.312	No
265	43.47	2.52	1.00	1.51	0.80	0.347	1.14	0.304	0.97	1.00	0.313	No
266	43.64	2.53	1.01	1.52	0.80	0.347	1.14	0.304	0.97	1.00	0.312	No
267	43.80	2.54	1.01	1.52	0.80	0.347	1.14	0.304	0.98	1.00	0.312	No
268	43.96	2.55	1.02	1.53	0.80	0.347	1.14	0.304	0.98	1.00	0.311	No
269	44.13	2.56	1.02	1.53	0.80	0.347	1.14	0.304	0.98	1.00	0.311	No
270	44.29	2.57	1.03	1.54	0.80	0.347	1.14	0.304	0.97	1.00	0.312	No
271	44.46	2.58	1.03	1.54	0.80	0.346	1.14	0.304	0.97	1.00	0.312	No
272	44.62	2.59	1.04	1.55	0.80	0.346	1.14	0.304	0.97	1.00	0.312	No
273	44.78	2.60	1.04	1.55	0.80	0.346	1.14	0.303	0.98	1.00	0.311	No
274	44.95	2.61	1.05	1.56	0.79	0.346	1.14	0.303	0.98	1.00	0.311	No
275	45.11	2.62	1.05	1.56	0.79	0.346	1.14	0.303	0.98	1.00	0.311	No
276	45.28	2.63	1.06	1.57	0.79	0.346	1.14	0.303	0.97	1.00	0.311	No
277	45.44	2.64	1.07	1.57	0.79	0.346	1.14	0.303	0.97	1.00	0.311	No
278	45.60	2.65	1.07	1.58	0.79	0.345	1.14	0.303	0.98	1.00	0.310	No
279	45.77	2.66	1.08	1.58	0.79	0.345	1.14	0.303	0.98	1.00	0.310	No
280	45.93	2.67	1.08	1.59	0.79	0.345	1.14	0.302	0.98	1.00	0.310	No
281	46.10	2.68	1.09	1.59	0.79	0.345	1.14	0.302	0.97	1.00	0.310	No
282	46.26	2.69	1.09	1.60	0.79	0.345	1.14	0.302	0.97	1.00	0.310	No
283	46.42	2.70	1.10	1.60	0.79	0.345	1.14	0.302	0.97	1.00	0.311	No
284	46.59	2.71	1.10	1.61	0.79	0.344	1.14	0.302	0.97	1.00	0.311	No
285	46.75	2.72	1.11	1.61	0.78	0.344	1.14	0.302	0.97	1.00	0.311	No
286	46.92	2.73	1.11	1.62	0.78	0.344	1.14	0.301	0.97	1.00	0.310	No
287	47.08	2.74	1.12	1.62	0.78	0.344	1.14	0.301	0.97	1.00	0.310	No
288	47.24	2.75	1.12	1.63	0.78	0.344	1.14	0.301	0.97	1.00	0.309	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
289	47.41	2.76	1.13	1.63	0.78	0.343	1.14	0.301	0.97	1.00	0.309	No
290	47.57	2.77	1.13	1.64	0.78	0.343	1.14	0.301	0.97	1.00	0.309	No
291	47.74	2.78	1.14	1.64	0.78	0.343	1.14	0.301	0.97	1.00	0.309	No
292	47.90	2.79	1.14	1.65	0.78	0.343	1.14	0.300	0.97	1.00	0.309	No
293	48.06	2.80	1.15	1.65	0.78	0.343	1.14	0.300	0.97	1.00	0.309	No
294	48.23	2.81	1.15	1.66	0.78	0.343	1.14	0.300	0.97	1.00	0.309	No
295	48.39	2.82	1.16	1.66	0.78	0.342	1.14	0.300	0.97	1.00	0.309	No
296	48.56	2.83	1.16	1.66	0.77	0.342	1.14	0.300	0.97	1.00	0.309	No
297	48.72	2.84	1.17	1.67	0.77	0.342	1.14	0.300	0.97	1.00	0.309	No
298	48.88	2.85	1.17	1.67	0.77	0.342	1.14	0.300	0.97	1.00	0.309	No
299	49.05	2.86	1.18	1.68	0.77	0.342	1.14	0.299	0.97	1.00	0.309	No
300	49.21	2.87	1.18	1.68	0.77	0.341	1.14	0.299	0.97	1.00	0.309	No
301	49.38	2.88	1.19	1.69	0.77	0.341	1.14	0.299	0.97	1.00	0.309	No
302	49.54	2.89	1.19	1.69	0.77	0.341	1.14	0.299	0.97	1.00	0.309	No
303	49.70	2.90	1.20	1.70	0.77	0.341	1.14	0.299	0.97	1.00	0.308	No
304	49.87	2.91	1.20	1.70	0.77	0.341	1.14	0.299	0.97	1.00	0.308	No
305	50.03	2.92	1.21	1.71	0.77	0.341	1.14	0.298	0.97	1.00	0.308	No
306	50.20	2.93	1.21	1.71	0.77	0.340	1.14	0.298	0.97	1.00	0.308	No
307	50.36	2.94	1.22	1.72	0.77	0.340	1.14	0.298	0.97	1.00	0.307	No
308	50.52	2.95	1.22	1.72	0.76	0.340	1.14	0.298	0.97	1.00	0.307	No
309	50.69	2.96	1.23	1.73	0.76	0.340	1.14	0.298	0.97	1.00	0.307	No
310	50.85	2.96	1.23	1.73	0.76	0.340	1.14	0.298	0.97	1.00	0.308	No
311	51.02	2.98	1.24	1.74	0.76	0.339	1.14	0.297	0.97	1.00	0.308	No
312	51.18	2.98	1.24	1.74	0.76	0.339	1.14	0.297	0.97	1.00	0.308	No
313	51.35	2.99	1.25	1.75	0.76	0.339	1.14	0.297	0.97	1.00	0.307	No
314	51.51	3.00	1.25	1.75	0.76	0.339	1.14	0.297	0.97	1.00	0.307	No
315	51.67	3.01	1.26	1.75	0.76	0.339	1.14	0.297	0.97	1.00	0.307	No
316	51.84	3.02	1.26	1.76	0.76	0.338	1.14	0.297	0.97	1.00	0.307	No
317	52.00	3.03	1.27	1.76	0.76	0.338	1.14	0.296	0.96	1.00	0.307	No
318	52.17	3.04	1.28	1.77	0.76	0.338	1.14	0.296	0.96	1.00	0.307	No
319	52.33	3.05	1.28	1.77	0.75	0.338	1.14	0.296	0.96	1.00	0.307	No
320	52.49	3.06	1.29	1.78	0.75	0.338	1.14	0.296	0.96	1.00	0.307	No
321	52.66	3.07	1.29	1.78	0.75	0.337	1.14	0.296	0.96	1.00	0.307	No
322	52.82	3.08	1.30	1.79	0.75	0.337	1.14	0.295	0.96	1.00	0.307	No
323	52.99	3.09	1.30	1.79	0.75	0.337	1.14	0.295	0.96	1.00	0.306	No
324	53.15	3.10	1.31	1.80	0.75	0.337	1.14	0.295	0.96	1.00	0.306	No
325	53.31	3.11	1.31	1.80	0.75	0.336	1.14	0.295	0.96	1.00	0.306	No
326	53.48	3.12	1.32	1.81	0.75	0.336	1.14	0.295	0.96	1.00	0.306	No
327	53.64	3.13	1.32	1.81	0.75	0.336	1.14	0.294	0.96	1.00	0.306	No
328	53.81	3.14	1.33	1.82	0.75	0.336	1.14	0.294	0.96	1.00	0.306	No
329	53.97	3.15	1.33	1.82	0.75	0.336	1.14	0.294	0.96	1.00	0.306	No
330	54.13	3.16	1.34	1.83	0.74	0.335	1.14	0.294	0.96	1.00	0.306	No
331	54.30	3.17	1.34	1.83	0.74	0.335	1.14	0.294	0.96	1.00	0.306	No
332	54.46	3.18	1.35	1.84	0.74	0.335	1.14	0.293	0.96	1.00	0.305	No
333	54.63	3.19	1.35	1.84	0.74	0.335	1.14	0.293	0.96	1.00	0.305	No
334	54.79	3.20	1.36	1.85	0.74	0.334	1.14	0.293	0.96	1.00	0.305	No
335	54.95	3.21	1.36	1.85	0.74	0.334	1.14	0.293	0.96	1.00	0.305	No
336	55.12	3.22	1.37	1.86	0.74	0.334	1.14	0.293	0.96	1.00	0.305	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
337	55.28	3.23	1.37	1.86	0.74	0.334	1.14	0.292	0.96	1.00	0.305	No
338	55.45	3.24	1.38	1.87	0.74	0.333	1.14	0.292	0.96	1.00	0.305	No
339	55.61	3.25	1.38	1.87	0.74	0.333	1.14	0.292	0.96	1.00	0.305	No
340	55.77	3.26	1.39	1.88	0.74	0.333	1.14	0.292	0.96	1.00	0.304	No
341	55.94	3.27	1.39	1.88	0.74	0.333	1.14	0.292	0.96	1.00	0.304	No
342	56.10	3.28	1.40	1.89	0.73	0.333	1.14	0.291	0.96	1.00	0.304	No
343	56.27	3.29	1.40	1.89	0.73	0.332	1.14	0.291	0.96	1.00	0.304	No
344	56.43	3.30	1.41	1.90	0.73	0.332	1.14	0.291	0.96	1.00	0.304	No
345	56.59	3.31	1.41	1.90	0.73	0.332	1.14	0.291	0.96	1.00	0.304	No
346	56.76	3.32	1.42	1.91	0.73	0.332	1.14	0.291	0.96	1.00	0.303	No
347	56.92	3.33	1.42	1.91	0.73	0.331	1.14	0.290	0.96	1.00	0.303	No
348	57.09	3.34	1.43	1.92	0.73	0.331	1.14	0.290	0.96	1.00	0.303	No
349	57.25	3.35	1.43	1.92	0.73	0.331	1.14	0.290	0.96	1.00	0.303	No
350	57.41	3.36	1.44	1.92	0.73	0.331	1.14	0.290	0.96	1.00	0.303	No
351	57.58	3.37	1.44	1.93	0.73	0.330	1.14	0.290	0.96	1.00	0.303	No
352	57.74	3.38	1.45	1.93	0.73	0.330	1.14	0.289	0.96	1.00	0.302	No
353	57.91	3.39	1.45	1.94	0.73	0.330	1.14	0.289	0.96	1.00	0.302	No
354	58.07	3.40	1.46	1.94	0.72	0.330	1.14	0.289	0.96	1.00	0.302	No
355	58.23	3.41	1.46	1.95	0.72	0.329	1.14	0.289	0.96	1.00	0.302	No
356	58.40	3.42	1.47	1.95	0.72	0.329	1.14	0.288	0.96	1.00	0.302	No
357	58.56	3.43	1.47	1.96	0.72	0.329	1.14	0.288	0.96	1.00	0.301	No
358	58.73	3.44	1.48	1.96	0.72	0.329	1.14	0.288	0.96	1.00	0.301	No
359	58.89	3.45	1.48	1.97	0.72	0.328	1.14	0.288	0.96	1.00	0.301	No
360	59.06	3.46	1.49	1.97	0.72	0.328	1.14	0.288	0.96	1.00	0.301	No
361	59.22	3.47	1.50	1.98	0.72	0.328	1.14	0.287	0.96	1.00	0.301	No
362	59.38	3.48	1.50	1.98	0.72	0.328	1.14	0.287	0.96	1.00	0.301	No
363	59.55	3.49	1.51	1.99	0.72	0.327	1.14	0.287	0.96	1.00	0.300	No
364	59.71	3.50	1.51	1.99	0.72	0.327	1.14	0.287	0.96	1.00	0.300	No
365	59.88	3.51	1.52	2.00	0.72	0.327	1.14	0.287	0.96	1.00	0.299	No
366	60.04	3.52	1.52	2.00	0.71	0.327	1.14	0.286	0.96	1.00	0.299	No
367	60.20	3.53	1.53	2.01	0.71	0.326	1.14	0.286	0.96	1.00	0.299	No
368	60.37	3.54	1.53	2.01	0.71	0.326	1.14	0.286	0.96	1.00	0.298	No
369	60.53	3.55	1.54	2.02	0.71	0.326	1.14	0.286	0.96	1.00	0.298	No
370	60.70	3.56	1.54	2.02	0.71	0.326	1.14	0.285	0.96	1.00	0.298	No
371	60.86	3.57	1.55	2.03	0.71	0.325	1.14	0.285	0.96	1.00	0.298	No
372	61.02	3.58	1.55	2.03	0.71	0.325	1.14	0.285	0.95	1.00	2.000	Yes
373	61.19	3.60	1.56	2.04	0.71	0.325	1.14	0.285	0.95	1.00	2.000	Yes
374	61.35	3.61	1.56	2.04	0.71	0.325	1.14	0.284	0.95	1.00	2.000	Yes
375	61.52	3.62	1.57	2.05	0.71	0.324	1.14	0.284	0.96	1.00	2.000	Yes
376	61.68	3.63	1.57	2.05	0.71	0.324	1.14	0.284	0.96	1.00	0.297	No
377	61.84	3.64	1.58	2.06	0.71	0.324	1.14	0.284	0.96	1.00	0.297	No
378	62.01	3.65	1.58	2.06	0.70	0.324	1.14	0.284	0.96	1.00	0.297	No
379	62.17	3.66	1.59	2.07	0.70	0.323	1.14	0.283	0.96	1.00	0.297	No
380	62.34	3.67	1.59	2.07	0.70	0.323	1.14	0.283	0.95	1.00	0.297	No
381	62.50	3.68	1.60	2.08	0.70	0.323	1.14	0.283	0.95	1.00	0.297	No
382	62.66	3.69	1.60	2.08	0.70	0.323	1.14	0.283	0.95	1.00	0.296	No
383	62.83	3.70	1.61	2.09	0.70	0.322	1.14	0.283	0.95	1.00	0.296	No
384	62.99	3.71	1.61	2.09	0.70	0.322	1.14	0.282	0.95	1.00	0.296	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
385	63.16	3.72	1.62	2.10	0.70	0.322	1.14	0.282	0.95	1.00	0.296	No
386	63.32	3.73	1.62	2.10	0.70	0.322	1.14	0.282	0.95	1.00	0.296	No
387	63.48	3.74	1.63	2.11	0.70	0.321	1.14	0.282	0.95	1.00	0.295	No
388	63.65	3.75	1.63	2.11	0.70	0.321	1.14	0.281	0.95	1.00	0.295	No
389	63.81	3.76	1.64	2.12	0.70	0.321	1.14	0.281	0.95	1.00	0.295	No
390	63.98	3.77	1.64	2.12	0.69	0.321	1.14	0.281	0.95	1.00	0.295	No
391	64.14	3.78	1.65	2.13	0.69	0.320	1.14	0.281	0.95	1.00	0.295	No
392	64.30	3.79	1.65	2.13	0.69	0.320	1.14	0.281	0.95	1.00	0.295	No
393	64.47	3.80	1.66	2.14	0.69	0.320	1.14	0.280	0.95	1.00	0.294	No
394	64.63	3.81	1.66	2.14	0.69	0.320	1.14	0.280	0.95	1.00	0.294	No
395	64.80	3.82	1.67	2.15	0.69	0.319	1.14	0.280	0.95	1.00	0.294	No
396	64.96	3.83	1.67	2.15	0.69	0.319	1.14	0.280	0.95	1.00	0.294	No
397	65.12	3.84	1.68	2.16	0.69	0.319	1.14	0.279	0.95	1.00	0.294	No
398	65.29	3.85	1.68	2.16	0.69	0.319	1.14	0.279	0.95	1.00	0.294	No
399	65.45	3.86	1.69	2.17	0.69	0.318	1.14	0.279	0.95	1.00	0.293	No
400	65.62	3.87	1.69	2.17	0.69	0.318	1.14	0.279	0.95	1.00	0.293	No
401	65.78	3.88	1.70	2.18	0.69	0.318	1.14	0.278	0.95	1.00	0.293	No
402	65.94	3.89	1.70	2.18	0.69	0.318	1.14	0.278	0.95	1.00	0.293	No
403	66.11	3.90	1.71	2.19	0.68	0.317	1.14	0.278	0.95	1.00	0.292	No
404	66.27	3.91	1.72	2.19	0.68	0.317	1.14	0.278	0.95	1.00	0.292	No
405	66.44	3.92	1.72	2.20	0.68	0.317	1.14	0.278	0.95	1.00	0.292	No
406	66.60	3.93	1.73	2.20	0.68	0.317	1.14	0.277	0.95	1.00	0.292	No
407	66.77	3.94	1.73	2.21	0.68	0.316	1.14	0.277	0.95	1.00	0.292	No
408	66.93	3.95	1.74	2.21	0.68	0.316	1.14	0.277	0.95	1.00	0.291	No
409	67.09	3.96	1.74	2.22	0.68	0.316	1.14	0.277	0.95	1.00	0.291	No
410	67.26	3.97	1.75	2.22	0.68	0.315	1.14	0.276	0.95	1.00	0.291	No
411	67.42	3.98	1.75	2.23	0.68	0.315	1.14	0.276	0.95	1.00	0.291	No
412	67.59	3.99	1.76	2.23	0.68	0.315	1.14	0.276	0.95	1.00	0.290	No
413	67.75	4.00	1.76	2.24	0.68	0.315	1.14	0.276	0.95	1.00	0.290	No
414	67.91	4.01	1.77	2.24	0.68	0.315	1.14	0.276	0.95	1.00	0.290	No
415	68.08	4.02	1.77	2.25	0.68	0.314	1.14	0.275	0.95	1.00	0.289	No
416	68.24	4.03	1.78	2.25	0.67	0.314	1.14	0.275	0.95	1.00	0.289	No
417	68.41	4.04	1.78	2.26	0.67	0.314	1.14	0.275	0.95	1.00	0.289	No
418	68.57	4.05	1.79	2.26	0.67	0.314	1.14	0.275	0.95	1.00	0.289	No
419	68.73	4.06	1.79	2.26	0.67	0.313	1.14	0.275	0.95	1.00	0.289	No
420	68.90	4.07	1.80	2.27	0.67	0.313	1.14	0.274	0.95	1.00	0.288	No
421	69.06	4.08	1.80	2.27	0.67	0.313	1.14	0.274	0.95	1.00	0.288	No
422	69.23	4.09	1.81	2.28	0.67	0.313	1.14	0.274	0.95	1.00	0.288	No
423	69.39	4.10	1.81	2.28	0.67	0.312	1.14	0.274	0.95	1.00	0.288	No
424	69.55	4.11	1.82	2.29	0.67	0.312	1.14	0.273	0.95	1.00	0.288	No
425	69.72	4.12	1.82	2.29	0.67	0.312	1.14	0.273	0.95	1.00	0.287	No
426	69.88	4.13	1.83	2.30	0.67	0.312	1.14	0.273	0.95	1.00	0.287	No
427	70.05	4.14	1.83	2.30	0.67	0.311	1.14	0.273	0.95	1.00	0.287	No
428	70.21	4.15	1.84	2.31	0.67	0.311	1.14	0.273	0.95	1.00	0.286	No
429	70.37	4.16	1.84	2.31	0.67	0.311	1.14	0.272	0.95	1.00	0.286	No
430	70.54	4.17	1.85	2.32	0.66	0.311	1.14	0.272	0.95	1.00	0.286	No
431	70.70	4.18	1.85	2.32	0.66	0.310	1.14	0.272	0.95	1.00	0.286	No
432	70.87	4.19	1.86	2.33	0.66	0.310	1.14	0.272	0.95	1.00	0.286	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
433	71.03	4.20	1.86	2.33	0.66	0.310	1.14	0.272	0.95	1.00	0.285	No
434	71.19	4.21	1.87	2.34	0.66	0.310	1.14	0.271	0.95	1.00	0.285	No
435	71.36	4.22	1.87	2.34	0.66	0.309	1.14	0.271	0.95	1.00	0.285	No
436	71.52	4.23	1.88	2.35	0.66	0.309	1.14	0.271	0.95	1.00	0.285	No
437	71.69	4.24	1.88	2.35	0.66	0.309	1.14	0.271	0.95	1.00	0.285	No
438	71.85	4.25	1.89	2.36	0.66	0.309	1.14	0.271	0.95	1.00	0.284	No
439	72.01	4.26	1.89	2.36	0.66	0.308	1.14	0.270	0.95	1.00	0.284	No
440	72.18	4.27	1.90	2.37	0.66	0.308	1.14	0.270	0.95	1.00	0.284	No
441	72.34	4.28	1.90	2.37	0.66	0.308	1.14	0.270	0.95	1.00	0.284	No
442	72.51	4.29	1.91	2.38	0.66	0.308	1.14	0.270	0.95	1.00	0.283	No
443	72.67	4.29	1.91	2.38	0.66	0.308	1.14	0.270	0.95	1.00	0.283	No
444	72.83	4.30	1.92	2.38	0.65	0.307	1.14	0.269	0.95	1.00	0.283	No
445	73.00	4.31	1.93	2.39	0.65	0.307	1.14	0.269	0.95	1.00	0.283	No
446	73.16	4.32	1.93	2.39	0.65	0.307	1.14	0.269	0.95	1.00	0.282	No
447	73.33	4.33	1.94	2.40	0.65	0.307	1.14	0.269	0.95	1.00	0.282	No
448	73.49	4.34	1.94	2.40	0.65	0.306	1.14	0.269	0.95	1.00	0.282	No
449	73.65	4.35	1.95	2.41	0.65	0.306	1.14	0.268	0.95	1.00	0.282	No
450	73.82	4.36	1.95	2.41	0.65	0.306	1.14	0.268	0.95	1.00	0.281	No
451	73.98	4.37	1.96	2.42	0.65	0.306	1.14	0.268	0.95	1.00	0.281	No
452	74.15	4.38	1.96	2.42	0.65	0.305	1.14	0.268	0.95	1.00	0.280	No
453	74.31	4.39	1.97	2.43	0.65	0.305	1.14	0.268	0.95	1.00	0.280	No
454	74.48	4.40	1.97	2.43	0.65	0.305	1.14	0.267	0.95	1.00	0.280	No
455	74.64	4.41	1.98	2.44	0.65	0.305	1.14	0.267	0.95	1.00	0.280	No
456	74.80	4.42	1.98	2.44	0.65	0.305	1.14	0.267	0.95	1.00	0.280	No
457	74.97	4.43	1.99	2.45	0.65	0.304	1.14	0.267	0.95	1.00	0.280	No
458	75.13	4.44	1.99	2.45	0.65	0.304	1.14	0.267	0.95	1.00	0.279	No
459	75.30	4.45	2.00	2.45	0.64	0.304	1.14	0.266	0.95	1.00	0.279	No
460	75.46	4.46	2.00	2.46	0.64	0.304	1.14	0.266	0.95	1.00	0.279	No
461	75.62	4.47	2.01	2.46	0.64	0.304	1.14	0.266	0.95	1.00	0.279	No
462	75.79	4.48	2.01	2.47	0.64	0.303	1.14	0.266	0.95	1.00	0.279	No
463	75.95	4.49	2.02	2.47	0.64	0.303	1.14	0.266	0.95	1.00	0.278	No
464	76.12	4.50	2.02	2.48	0.64	0.303	1.14	0.265	0.95	1.00	0.278	No
465	76.28	4.51	2.03	2.48	0.64	0.303	1.14	0.265	0.95	1.00	0.278	No
466	76.44	4.52	2.03	2.49	0.64	0.303	1.14	0.265	0.95	1.00	0.278	No
467	76.61	4.53	2.04	2.49	0.64	0.302	1.14	0.265	0.95	1.00	0.278	No
468	76.77	4.54	2.04	2.49	0.64	0.302	1.14	0.265	0.95	1.00	0.277	No
469	76.94	4.55	2.05	2.50	0.64	0.302	1.14	0.265	0.95	1.00	0.277	No
470	77.10	4.56	2.05	2.50	0.64	0.302	1.14	0.264	0.95	1.00	0.277	No
471	77.26	4.57	2.06	2.51	0.64	0.301	1.14	0.264	0.95	1.00	0.277	No
472	77.43	4.58	2.06	2.51	0.64	0.301	1.14	0.264	0.95	1.00	0.277	No
473	77.59	4.58	2.07	2.52	0.64	0.301	1.14	0.264	0.95	1.00	0.277	No
474	77.76	4.59	2.07	2.52	0.63	0.301	1.14	0.264	0.95	1.00	0.277	No
475	77.92	4.60	2.08	2.53	0.63	0.301	1.14	0.263	0.95	1.00	0.276	No
476	78.08	4.61	2.08	2.53	0.63	0.300	1.14	0.263	0.95	1.00	0.276	No
477	78.25	4.62	2.09	2.53	0.63	0.300	1.14	0.263	0.95	1.00	0.276	No
478	78.41	4.63	2.09	2.54	0.63	0.300	1.14	0.263	0.95	1.00	0.276	No
479	78.58	4.64	2.10	2.54	0.63	0.300	1.14	0.263	0.95	1.00	0.276	No
480	78.74	4.65	2.10	2.55	0.63	0.300	1.14	0.263	0.95	1.00	0.276	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
481	78.90	4.66	2.11	2.55	0.63	0.299	1.14	0.262	0.95	1.00	0.276	No
482	79.07	4.67	2.11	2.56	0.63	0.299	1.14	0.262	0.95	1.00	0.276	No
483	79.23	4.68	2.12	2.56	0.63	0.299	1.14	0.262	0.95	1.00	0.276	No
484	79.40	4.69	2.12	2.57	0.63	0.299	1.14	0.262	0.95	1.00	0.276	No
485	79.56	4.70	2.13	2.57	0.63	0.299	1.14	0.262	0.95	1.00	0.276	No
486	79.72	4.71	2.13	2.57	0.63	0.298	1.14	0.262	0.95	1.00	0.276	No
487	79.89	4.72	2.14	2.58	0.63	0.298	1.14	0.261	0.95	1.00	0.275	No
488	80.05	4.73	2.15	2.58	0.63	0.298	1.14	0.261	0.95	1.00	0.275	No
489	80.22	4.74	2.15	2.59	0.63	0.298	1.14	0.261	0.95	1.00	0.275	No
490	80.38	4.75	2.16	2.59	0.63	0.298	1.14	0.261	0.95	1.00	0.275	No
491	80.54	4.76	2.16	2.60	0.62	0.297	1.14	0.261	0.95	1.00	0.275	No
492	80.71	4.77	2.17	2.60	0.62	0.297	1.14	0.260	0.95	1.00	0.275	No
493	80.87	4.78	2.17	2.61	0.62	0.297	1.14	0.260	0.95	1.00	0.275	No
494	81.04	4.79	2.18	2.61	0.62	0.297	1.14	0.260	0.95	1.00	0.274	No
495	81.20	4.80	2.18	2.62	0.62	0.297	1.14	0.260	0.95	1.00	0.274	No
496	81.36	4.81	2.19	2.62	0.62	0.296	1.14	0.260	0.95	1.00	0.274	No
497	81.53	4.82	2.19	2.62	0.62	0.296	1.14	0.260	0.95	1.00	0.274	No
498	81.69	4.83	2.20	2.63	0.62	0.296	1.14	0.259	0.95	1.00	0.274	No
499	81.86	4.84	2.20	2.63	0.62	0.296	1.14	0.259	0.95	1.00	0.274	No
500	82.02	4.84	2.21	2.64	0.62	0.296	1.14	0.259	0.95	1.00	0.274	No
501	82.19	4.85	2.21	2.64	0.62	0.295	1.14	0.259	0.94	1.00	0.274	No
502	82.35	4.86	2.22	2.65	0.62	0.295	1.14	0.259	0.94	1.00	0.274	No
503	82.51	4.87	2.22	2.65	0.62	0.295	1.14	0.259	0.94	1.00	0.274	No
504	82.68	4.88	2.23	2.66	0.62	0.295	1.14	0.258	0.94	1.00	0.274	No
505	82.84	4.89	2.23	2.66	0.62	0.295	1.14	0.258	0.94	1.00	0.274	No
506	83.01	4.90	2.24	2.67	0.62	0.294	1.14	0.258	0.94	1.00	0.275	No
507	83.17	4.91	2.24	2.67	0.62	0.294	1.14	0.258	0.93	1.00	0.277	No
508	83.33	4.93	2.25	2.68	0.61	0.294	1.14	0.258	0.92	1.00	2.000	Yes
509	83.50	4.94	2.25	2.68	0.61	0.294	1.14	0.257	0.90	1.00	2.000	Yes
510	83.66	4.95	2.26	2.69	0.61	0.293	1.14	0.257	0.87	1.00	2.000	Yes
511	83.83	4.96	2.26	2.70	0.61	0.293	1.14	0.257	0.83	1.00	2.000	Yes
512	83.99	4.97	2.27	2.70	0.61	0.293	1.14	0.257	0.80	1.00	0.320	No
513	84.15	4.98	2.27	2.71	0.61	0.293	1.14	0.256	0.83	1.00	0.311	No
514	84.32	4.99	2.28	2.72	0.61	0.292	1.14	0.256	0.87	1.00	0.294	No
515	84.48	5.00	2.28	2.72	0.61	0.292	1.14	0.256	0.88	1.00	0.291	No
516	84.65	5.02	2.29	2.73	0.61	0.292	1.14	0.256	0.84	1.00	0.303	No
517	84.81	5.03	2.29	2.73	0.61	0.292	1.14	0.256	0.74	1.00	0.345	No
518	84.97	5.04	2.30	2.74	0.61	0.291	1.14	0.255	0.71	1.00	0.357	No
519	85.14	5.05	2.30	2.75	0.61	0.291	1.14	0.255	0.72	1.00	0.354	No
520	85.30	5.06	2.31	2.75	0.61	0.291	1.14	0.255	0.79	1.00	0.323	No
521	85.47	5.07	2.31	2.76	0.61	0.291	1.14	0.255	0.80	1.00	0.317	No
522	85.63	5.08	2.32	2.76	0.61	0.290	1.14	0.254	0.75	1.00	0.340	No
523	85.79	5.09	2.32	2.77	0.61	0.290	1.14	0.254	0.71	1.00	0.357	No
524	85.96	5.11	2.33	2.78	0.61	0.290	1.14	0.254	0.71	1.00	0.357	No
525	86.12	5.12	2.33	2.78	0.61	0.290	1.14	0.254	0.71	1.00	0.357	No
526	86.29	5.13	2.34	2.79	0.61	0.289	1.14	0.254	0.71	1.00	0.357	No
527	86.45	5.14	2.34	2.79	0.60	0.289	1.14	0.253	0.71	1.00	0.357	No
528	86.61	5.15	2.35	2.80	0.60	0.289	1.14	0.253	0.71	1.00	0.358	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
529	86.78	5.16	2.35	2.81	0.60	0.289	1.14	0.253	0.84	1.00	0.302	No
530	86.94	5.17	2.36	2.81	0.60	0.288	1.14	0.253	0.87	1.00	0.290	No
531	87.11	5.18	2.37	2.82	0.60	0.288	1.14	0.252	0.85	1.00	0.298	No
532	87.27	5.20	2.37	2.82	0.60	0.288	1.14	0.252	0.71	1.00	0.358	No
533	87.43	5.20	2.38	2.83	0.60	0.288	1.14	0.252	0.71	1.00	0.358	No
534	87.60	5.21	2.38	2.83	0.60	0.288	1.14	0.252	0.70	1.00	0.358	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	31.16	19.97	2.13	0.75	1.70	1.15	24.48	25.63	4.000	No	No	2.00
2	0.33	61.61	14.63	1.89	0.34	1.70	147.90	45.91	193.81	4.000	No	No	2.00
3	0.49	174.16	9.14	1.58	0.39	1.70	147.90	11.39	159.29	4.000	No	No	2.00
4	0.66	256.26	7.74	1.48	0.26	1.70	543.62	11.63	555.24	4.000	No	No	2.00
5	0.82	365.63	6.22	1.36	0.26	1.70	543.62	1.67	545.29	4.000	No	No	2.00
6	0.98	401.24	4.87	1.24	0.26	1.70	674.99	0.06	675.05	4.000	No	No	2.00
7	1.15	433.22	4.32	1.18	0.26	1.70	715.13	0.00	715.14	4.000	No	No	2.00
8	1.31	428.97	3.97	1.14	0.26	1.70	697.72	0.00	697.72	4.000	No	No	2.00
9	1.48	402.66	4.30	1.18	0.26	1.70	654.45	0.00	654.45	4.000	No	No	2.00
10	1.64	362.82	4.48	1.20	0.26	1.70	588.48	0.01	588.49	4.000	No	No	2.00
11	1.80	287.66	6.39	1.37	0.26	1.70	505.78	2.09	507.87	4.000	No	No	2.00
12	1.97	226.20	9.13	1.58	0.26	1.70	292.26	18.23	310.49	4.000	No	No	2.00
13	2.13	181.91	11.64	1.73	0.26	1.70	292.26	45.20	337.46	4.000	No	No	2.00
14	2.30	134.35	13.17	1.81	0.26	1.68	289.42	60.51	349.94	4.000	No	No	2.00
15	2.46	86.80	15.82	1.95	0.51	1.70	63.04	32.89	95.93	4.000	No	No	2.00
16	2.62	39.23	22.26	2.22	0.48	1.70	63.04	44.83	107.87	4.000	No	No	2.00
17	2.79	37.02	22.72	2.24	0.48	1.70	63.04	45.33	108.37	4.000	No	No	2.00
18	2.95	33.63	22.81	2.24	0.51	1.70	52.37	42.19	94.56	4.000	No	No	2.00
19	3.12	29.84	23.65	2.27	0.53	1.70	46.74	41.20	87.93	4.000	No	No	2.00
20	3.28	28.03	24.28	2.30	0.53	1.70	44.77	41.08	85.85	4.000	No	No	2.00
21	3.44	26.94	25.55	2.34	0.53	1.70	43.64	41.57	85.22	4.000	No	No	2.00
22	3.61	25.42	26.22	2.36	0.54	1.70	41.47	41.26	82.73	4.000	No	No	2.00
23	3.77	23.14	27.39	2.40	0.55	1.70	37.51	40.55	78.06	4.000	No	No	2.00
24	3.94	20.46	29.48	2.47	0.57	1.70	32.67	39.75	72.42	4.000	No	No	2.00
25	4.10	18.03	30.32	2.50	0.58	1.70	28.55	38.62	67.17	4.000	No	No	2.00
26	4.27	16.16	31.09	2.52	0.59	1.70	25.76	37.88	63.64	4.000	No	No	2.00
27	4.43	14.70	32.25	2.56	0.60	1.70	23.60	37.40	61.00	4.000	No	No	2.00
28	4.59	13.27	35.32	2.65	0.61	1.70	21.51	0.00	21.51	4.000	No	Yes	2.00
29	4.76	11.94	37.57	2.71	0.62	1.70	18.84	0.00	18.84	4.000	No	Yes	2.00
30	4.92	10.83	38.30	2.73	0.63	1.70	17.15	0.00	17.15	4.000	No	Yes	2.00
31	5.09	10.41	38.63	2.74	0.63	1.70	16.20	0.00	16.20	4.000	No	Yes	2.00
32	5.25	10.44	39.45	2.77	0.63	1.70	16.82	0.00	16.82	4.000	No	Yes	2.00
33	5.41	10.75	40.13	2.78	0.63	1.70	17.36	0.00	17.36	4.000	No	Yes	2.00
34	5.58	10.83	40.92	2.81	0.62	1.70	17.64	0.00	17.64	4.000	No	Yes	2.00
35	5.74	10.67	40.82	2.80	0.63	1.70	17.20	0.00	17.20	4.000	No	Yes	2.00
36	5.91	10.43	40.89	2.80	0.63	1.70	16.59	0.00	16.59	4.000	No	Yes	2.00
37	6.07	10.29	41.23	2.81	0.63	1.70	16.42	0.00	16.42	4.000	No	Yes	2.00
38	6.23	10.22	41.72	2.83	0.63	1.70	16.46	0.00	16.46	4.000	No	Yes	2.00
39	6.40	10.08	41.59	2.82	0.63	1.70	16.34	0.00	16.34	4.000	No	Yes	2.00
40	6.56	9.82	40.94	2.81	0.63	1.70	15.84	0.00	15.84	4.000	No	Yes	2.00
41	6.73	9.54	40.57	2.80	0.64	1.70	15.30	0.00	15.30	4.000	No	Yes	2.00
42	6.89	9.33	40.54	2.80	0.64	1.70	14.95	0.00	14.95	4.000	No	Yes	2.00
43	7.05	9.26	41.29	2.82	0.64	1.70	14.74	0.00	14.74	4.000	No	Yes	2.00
44	7.22	9.43	41.86	2.83	0.64	1.70	14.93	0.00	14.93	4.000	No	Yes	2.00
45	7.38	9.82	41.83	2.83	0.63	1.70	15.66	0.00	15.66	4.000	No	Yes	2.00
46	7.55	10.17	40.00	2.78	0.63	1.70	16.54	0.00	16.54	4.000	No	Yes	2.00
47	7.71	10.17	38.13	2.73	0.63	1.70	16.48	0.00	16.48	4.000	No	Yes	2.00
48	7.87	9.81	37.38	2.71	0.64	1.70	15.56	0.00	15.56	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
49	8.04	9.63	38.45	2.74	0.64	1.70	14.68	0.00	14.68	4.000	No	Yes	2.00
50	8.20	10.12	39.71	2.77	0.64	1.69	15.17	0.00	15.17	4.000	No	Yes	2.00
51	8.37	11.42	39.26	2.76	0.63	1.65	17.12	0.00	17.12	4.000	No	Yes	2.00
52	8.53	13.10	38.04	2.73	0.61	1.62	19.87	0.00	19.87	4.000	No	Yes	2.00
53	8.69	14.46	36.87	2.70	0.60	1.59	22.02	0.00	22.02	4.000	No	Yes	2.00
54	8.86	14.98	35.95	2.67	0.60	1.57	22.60	0.00	22.60	4.000	No	Yes	2.00
55	9.02	14.57	35.61	2.66	0.61	1.56	21.63	0.00	21.63	4.000	No	Yes	2.00
56	9.19	13.63	35.62	2.66	0.62	1.55	19.82	0.00	19.82	4.000	No	Yes	2.00
57	9.35	12.53	36.28	2.68	0.62	1.54	18.06	0.00	18.06	4.000	No	Yes	2.00
58	9.51	11.37	37.97	2.73	0.63	1.53	16.34	0.00	16.34	4.000	No	Yes	2.00
59	9.68	10.03	39.39	2.76	0.64	1.53	14.20	0.00	14.20	4.000	No	Yes	2.00
60	9.84	8.66	41.27	2.81	0.65	1.53	11.91	0.00	11.91	4.000	No	Yes	2.00
61	10.01	7.65	42.07	2.84	0.66	1.52	10.24	0.00	10.24	4.000	No	Yes	2.00
62	10.17	7.33	42.07	2.84	0.66	1.51	9.94	0.00	9.94	4.000	No	Yes	2.00
63	10.33	7.46	41.08	2.81	0.66	1.49	10.36	0.00	10.36	4.000	No	Yes	2.00
64	10.50	7.67	40.09	2.78	0.66	1.48	10.62	0.00	10.62	4.000	No	Yes	2.00
65	10.66	7.86	41.20	2.81	0.66	1.46	10.47	0.00	10.47	4.000	No	Yes	2.00
66	10.83	8.57	40.47	2.79	0.66	1.45	10.81	0.00	10.81	4.000	No	Yes	2.00
67	10.99	10.65	38.85	2.75	0.65	1.43	13.03	0.00	13.03	4.000	Yes	Yes	2.00
68	11.15	15.15	34.93	2.64	0.62	1.40	18.21	0.00	18.21	4.000	Yes	Yes	2.00
69	11.32	22.86	30.61	2.51	0.59	1.36	27.52	38.35	65.88	4.000	Yes	No	2.00
70	11.48	33.72	26.12	2.36	0.54	1.32	41.19	41.12	82.31	4.000	Yes	No	2.00
71	11.65	45.57	23.12	2.25	0.50	1.29	56.63	43.77	100.40	4.000	Yes	No	2.00
72	11.81	54.44	21.92	2.21	0.47	1.26	68.20	45.97	114.17	0.168	No	No	0.77
73	11.98	57.00	22.34	2.22	0.46	1.25	70.72	47.23	117.95	4.000	Yes	No	2.00
74	12.14	53.40	23.75	2.28	0.47	1.26	64.51	46.79	111.31	4.000	Yes	No	2.00
75	12.30	47.18	25.46	2.34	0.50	1.27	55.46	45.29	100.75	4.000	Yes	No	2.00
76	12.47	42.22	27.35	2.40	0.51	1.27	49.10	44.33	93.43	4.000	Yes	No	2.00
77	12.63	39.33	29.05	2.46	0.52	1.27	46.80	44.31	91.11	4.000	Yes	No	2.00
78	12.80	37.01	30.57	2.51	0.52	1.27	44.84	44.17	89.01	0.125	No	No	0.55
79	12.96	33.49	31.71	2.54	0.54	1.27	40.83	43.13	83.97	0.118	No	No	0.52
80	13.12	28.80	33.04	2.58	0.56	1.28	34.73	41.35	76.09	0.107	No	No	0.46
81	13.29	23.97	34.98	2.64	0.58	1.29	28.52	0.00	28.52	4.000	No	Yes	2.00
82	13.45	19.91	37.66	2.72	0.60	1.29	23.72	0.00	23.72	4.000	No	Yes	2.00
83	13.62	16.92	40.38	2.79	0.61	1.29	20.23	0.00	20.23	4.000	No	Yes	2.00
84	13.78	14.77	42.57	2.85	0.62	1.30	17.64	0.00	17.64	4.000	No	Yes	2.00
85	13.94	13.42	44.25	2.89	0.63	1.30	15.81	0.00	15.81	4.000	No	Yes	2.00
86	14.11	13.05	44.96	2.91	0.64	1.29	15.14	0.00	15.14	4.000	No	Yes	2.00
87	14.27	13.88	44.10	2.89	0.63	1.29	16.06	0.00	16.06	4.000	No	Yes	2.00
88	14.44	15.47	42.53	2.85	0.62	1.28	18.34	0.00	18.34	4.000	No	Yes	2.00
89	14.60	16.96	41.70	2.83	0.61	1.27	20.36	0.00	20.36	4.000	No	Yes	2.00
90	14.76	17.74	41.68	2.83	0.61	1.26	20.87	0.00	20.87	4.000	No	Yes	2.00
91	14.93	18.42	41.04	2.81	0.61	1.26	20.69	0.00	20.69	4.000	No	Yes	2.00
92	15.09	20.14	38.55	2.74	0.60	1.25	22.06	0.00	22.06	4.000	No	Yes	2.00
93	15.26	23.19	34.67	2.63	0.59	1.24	25.78	0.00	25.78	4.000	No	Yes	2.00
94	15.42	26.67	32.59	2.57	0.58	1.23	29.78	39.57	69.35	0.099	No	No	0.40
95	15.58	29.45	31.39	2.53	0.56	1.22	32.86	40.35	73.21	0.104	No	No	0.41
96	15.75	31.04	31.31	2.53	0.56	1.21	34.38	40.85	75.22	0.106	No	No	0.42

:: 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	31.73	30.76	2.51	0.56	1.21	35.23	40.99	76.22	0.108	No	No	0.43
98	16.08	31.71	30.45	2.50	0.56	1.20	34.74	40.74	75.48	0.107	No	No	0.42
99	16.24	31.17	29.78	2.48	0.56	1.20	33.75	40.20	73.95	0.105	No	No	0.41
100	16.40	30.28	29.12	2.46	0.57	1.20	32.34	39.52	71.86	0.102	No	No	0.40
101	16.57	29.44	28.64	2.45	0.57	1.20	31.29	39.00	70.29	0.100	No	No	0.39
102	16.73	29.18	28.69	2.45	0.57	1.20	30.69	38.83	69.52	0.099	No	No	0.38
103	16.90	29.61	28.75	2.45	0.57	1.19	30.95	38.93	69.89	0.099	No	No	0.38
104	17.06	30.39	28.67	2.45	0.57	1.19	31.88	39.21	71.09	0.101	No	No	0.39
105	17.22	31.00	28.28	2.43	0.57	1.18	32.50	39.27	71.77	0.102	No	No	0.39
106	17.39	31.27	29.80	2.48	0.57	1.18	32.33	39.74	72.06	0.102	No	No	0.39
107	17.55	31.63	30.47	2.50	0.57	1.17	32.49	39.99	72.48	0.103	No	No	0.39
108	17.72	32.11	30.96	2.52	0.56	1.17	33.26	40.38	73.64	0.104	No	No	0.40
109	17.88	32.95	29.59	2.48	0.56	1.16	34.64	40.44	75.08	0.106	No	No	0.40
110	18.04	33.98	28.76	2.45	0.56	1.16	35.15	40.33	75.48	0.107	No	No	0.40
111	18.21	35.55	29.11	2.46	0.55	1.16	36.01	40.74	76.75	0.108	No	No	0.41
112	18.37	37.84	29.90	2.49	0.55	1.15	37.82	41.61	79.43	0.112	No	No	0.42
113	18.54	40.55	30.40	2.50	0.54	1.14	41.11	42.86	83.97	0.118	No	No	0.44
114	18.70	42.89	30.03	2.49	0.53	1.14	44.02	43.72	87.75	0.124	No	No	0.46
115	18.86	43.61	29.28	2.47	0.52	1.13	45.14	43.84	88.98	0.125	No	No	0.47
116	19.03	42.45	28.73	2.45	0.53	1.13	43.56	43.11	86.67	0.122	No	No	0.45
117	19.19	39.78	28.65	2.45	0.54	1.13	40.31	42.00	82.31	0.116	No	No	0.43
118	19.36	36.62	28.73	2.45	0.55	1.13	36.56	40.79	77.35	0.109	No	No	0.40
119	19.52	33.62	28.82	2.45	0.56	1.13	33.44	39.78	73.22	0.104	No	No	0.38
120	19.69	31.24	29.31	2.47	0.57	1.13	30.85	39.09	69.94	0.100	No	No	0.36
121	19.85	29.37	30.48	2.50	0.58	1.13	29.06	38.83	67.89	0.097	No	No	0.35
122	20.01	27.93	31.75	2.54	0.58	1.12	27.73	38.70	66.43	0.095	No	No	0.35
123	20.18	26.80	31.84	2.55	0.59	1.12	26.85	38.42	65.27	0.094	No	No	0.34
124	20.34	25.80	31.73	2.54	0.59	1.12	25.62	37.98	63.60	0.092	No	No	0.33
125	20.51	24.78	31.35	2.53	0.60	1.12	24.36	37.47	61.83	0.090	No	No	0.32
126	20.67	23.71	31.73	2.54	0.60	1.12	23.05	37.11	60.16	0.088	No	No	0.32
127	20.83	22.88	32.41	2.56	0.61	1.11	22.14	36.94	59.08	0.087	No	No	0.31
128	21.00	22.45	33.60	2.60	0.61	1.11	21.69	0.00	21.69	4.000	No	Yes	2.00
129	21.16	22.41	35.32	2.65	0.61	1.11	21.68	0.00	21.68	4.000	No	Yes	2.00
130	21.33	22.56	36.74	2.69	0.61	1.10	22.07	0.00	22.07	4.000	No	Yes	2.00
131	21.49	22.93	37.37	2.71	0.60	1.10	22.59	0.00	22.59	4.000	No	Yes	2.00
132	21.65	23.40	36.61	2.69	0.60	1.10	23.35	0.00	23.35	4.000	No	Yes	2.00
133	21.82	23.66	35.22	2.65	0.60	1.09	23.87	0.00	23.87	4.000	No	Yes	2.00
134	21.98	23.32	34.38	2.62	0.60	1.09	23.61	0.00	23.61	4.000	No	Yes	2.00
135	22.15	22.50	34.28	2.62	0.60	1.09	22.49	0.00	22.49	4.000	No	Yes	2.00
136	22.31	21.65	34.58	2.63	0.61	1.09	21.22	0.00	21.22	4.000	No	Yes	2.00
137	22.47	21.40	34.62	2.63	0.61	1.08	20.69	0.00	20.69	4.000	No	Yes	2.00
138	22.64	22.05	34.03	2.61	0.61	1.08	21.12	0.00	21.12	4.000	No	Yes	2.00
139	22.80	23.55	33.34	2.59	0.61	1.08	22.47	37.22	59.69	0.088	No	No	0.31
140	22.97	25.68	31.96	2.55	0.60	1.07	24.70	37.72	62.42	0.091	No	No	0.32
141	23.13	27.63	30.42	2.50	0.59	1.07	26.98	38.12	65.10	0.094	No	No	0.33
142	23.29	28.46	28.98	2.46	0.58	1.07	28.25	38.12	66.37	0.095	No	No	0.33
143	23.46	27.86	28.42	2.44	0.59	1.06	27.36	37.63	64.99	0.094	No	No	0.32
144	23.62	26.18	29.04	2.46	0.60	1.06	25.08	37.08	62.16	0.090	No	No	0.31

:: 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	24.67	29.97	2.49	0.61	1.06	23.02	36.67	59.70	0.088	No	No	0.30
146	23.95	24.44	30.22	2.50	0.61	1.06	22.42	36.54	58.96	0.087	No	No	0.30
147	24.11	25.84	30.21	2.50	0.60	1.05	24.08	37.09	61.17	0.089	No	No	0.31
148	24.28	28.22	29.74	2.48	0.59	1.05	26.96	37.92	64.88	0.093	No	No	0.32
149	24.44	29.96	29.83	2.48	0.58	1.05	29.68	38.86	68.54	0.098	No	No	0.33
150	24.61	29.82	30.13	2.49	0.58	1.04	29.40	38.85	68.25	0.097	No	No	0.33
151	24.77	28.60	31.79	2.55	0.59	1.04	26.91	38.43	65.34	0.094	No	No	0.32
152	24.93	27.86	33.07	2.58	0.59	1.04	25.67	38.26	63.93	0.092	No	No	0.31
153	25.10	28.27	33.61	2.60	0.59	1.04	26.75	0.00	26.75	4.000	No	Yes	2.00
154	25.26	27.93	33.21	2.59	0.58	1.03	28.06	39.11	67.17	0.096	No	No	0.33
155	25.43	24.75	34.20	2.62	0.59	1.03	25.48	0.00	25.48	4.000	No	Yes	2.00
156	25.59	21.38	35.77	2.66	0.62	1.03	18.35	0.00	18.35	4.000	No	Yes	2.00
157	25.75	23.45	38.26	2.73	0.62	1.03	18.30	0.00	18.30	4.000	No	Yes	2.00
158	25.92	27.86	37.99	2.73	0.57	1.02	30.47	0.00	30.47	4.000	Yes	Yes	2.00
159	26.08	38.78	35.44	2.65	0.57	1.02	30.39	0.00	30.39	4.000	Yes	Yes	2.00
160	26.25	51.53	32.09	2.56	0.51	1.02	48.76	45.92	94.67	4.000	Yes	No	2.00
161	26.41	66.42	28.43	2.44	0.46	1.01	67.43	50.89	118.32	4.000	Yes	No	2.00
162	26.57	71.33	26.48	2.37	0.45	1.01	73.46	51.76	125.22	4.000	Yes	No	2.00
163	26.74	65.07	25.87	2.35	0.47	1.01	63.54	48.16	111.70	4.000	Yes	No	2.00
164	26.90	53.51	27.36	2.40	0.51	1.01	48.88	44.26	93.15	4.000	Yes	No	2.00
165	27.07	44.59	29.10	2.46	0.54	1.00	39.65	41.95	81.60	4.000	Yes	No	2.00
166	27.23	40.64	30.89	2.52	0.55	1.00	37.10	41.65	78.75	4.000	Yes	No	2.00
167	27.40	40.48	31.90	2.55	0.55	1.00	36.83	41.82	78.65	0.111	No	No	0.37
168	27.56	43.28	32.48	2.57	0.54	1.00	38.12	42.39	80.51	0.113	No	No	0.38
169	27.72	49.42	32.56	2.57	0.53	0.99	44.00	44.41	88.41	0.125	No	No	0.41
170	27.89	57.51	31.64	2.54	0.50	0.99	53.03	47.25	100.27	0.143	No	No	0.48
171	28.05	62.88	30.71	2.51	0.48	0.99	60.68	49.55	110.23	0.160	No	No	0.53
172	28.22	61.68	28.96	2.46	0.48	0.99	60.06	48.68	108.74	0.158	No	No	0.52
173	28.38	53.42	27.95	2.42	0.51	0.98	50.62	45.11	95.74	0.136	No	No	0.45
174	28.54	42.55	27.54	2.41	0.55	0.98	38.04	40.79	78.83	4.000	Yes	No	2.00
175	28.71	33.51	30.80	2.51	0.58	0.98	28.44	38.71	67.15	4.000	Yes	No	2.00
176	28.87	28.60	34.55	2.63	0.60	0.98	24.29	0.00	24.29	4.000	Yes	Yes	2.00
177	29.04	26.87	36.96	2.70	0.60	0.97	23.06	0.00	23.06	4.000	Yes	Yes	2.00
178	29.20	26.59	37.61	2.72	0.60	0.97	23.03	0.00	23.03	4.000	No	Yes	2.00
179	29.36	26.77	37.85	2.72	0.60	0.97	23.17	0.00	23.17	4.000	No	Yes	2.00
180	29.53	27.02	37.85	2.72	0.60	0.97	23.43	0.00	23.43	4.000	No	Yes	2.00
181	29.69	27.05	38.23	2.73	0.60	0.96	23.60	0.00	23.60	4.000	No	Yes	2.00
182	29.86	26.76	39.22	2.76	0.60	0.96	23.28	0.00	23.28	4.000	No	Yes	2.00
183	30.02	26.14	40.35	2.79	0.60	0.96	22.61	0.00	22.61	4.000	No	Yes	2.00
184	30.18	25.71	41.66	2.82	0.60	0.96	21.95	0.00	21.95	4.000	No	Yes	2.00
185	30.35	25.71	41.34	2.82	0.60	0.95	22.02	0.00	22.02	4.000	No	Yes	2.00
186	30.51	26.21	40.38	2.79	0.60	0.95	22.64	0.00	22.64	4.000	No	Yes	2.00
187	30.68	26.70	38.88	2.75	0.60	0.95	23.33	0.00	23.33	4.000	No	Yes	2.00
188	30.84	26.67	38.40	2.74	0.60	0.95	23.13	0.00	23.13	4.000	No	Yes	2.00
189	31.00	26.29	38.34	2.74	0.60	0.95	22.41	0.00	22.41	4.000	No	Yes	2.00
190	31.17	26.10	38.06	2.73	0.61	0.94	21.91	0.00	21.91	4.000	No	Yes	2.00
191	31.33	26.60	37.44	2.71	0.60	0.94	22.32	0.00	22.32	4.000	No	Yes	2.00
192	31.50	27.39	36.82	2.69	0.60	0.94	23.24	0.00	23.24	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
193	31.66	27.84	36.35	2.68	0.60	0.94	23.70	0.00	23.70	4.000	No	Yes	2.00
194	31.82	27.59	35.92	2.67	0.60	0.94	23.42	0.00	23.42	4.000	No	Yes	2.00
195	31.99	26.83	35.57	2.66	0.60	0.93	22.46	0.00	22.46	4.000	No	Yes	2.00
196	32.15	26.18	36.35	2.68	0.61	0.93	21.36	0.00	21.36	4.000	No	Yes	2.00
197	32.32	26.69	38.56	2.74	0.61	0.93	21.30	0.00	21.30	4.000	No	Yes	2.00
198	32.48	29.56	39.71	2.77	0.60	0.93	23.40	0.00	23.40	4.000	Yes	Yes	2.00
199	32.64	34.43	37.31	2.71	0.58	0.93	28.50	0.00	28.50	4.000	Yes	Yes	2.00
200	32.81	39.75	32.52	2.57	0.56	0.93	34.46	41.15	75.61	4.000	Yes	No	2.00
201	32.97	42.24	28.20	2.43	0.55	0.93	37.48	40.89	78.36	4.000	Yes	No	2.00
202	33.14	41.18	27.74	2.42	0.56	0.92	35.85	40.16	76.02	0.107	No	No	0.35
203	33.30	38.17	30.97	2.52	0.57	0.92	31.24	39.70	70.95	0.101	No	No	0.33
204	33.46	36.00	33.82	2.61	0.58	0.92	28.76	0.00	28.76	4.000	No	Yes	2.00
205	33.63	36.21	33.59	2.60	0.58	0.92	29.41	0.00	29.41	4.000	No	Yes	2.00
206	33.79	36.91	32.01	2.55	0.57	0.91	31.36	39.99	71.34	0.101	No	No	0.33
207	33.96	37.04	33.20	2.59	0.57	0.91	31.25	40.19	71.45	0.101	No	No	0.33
208	34.12	36.62	35.95	2.67	0.57	0.91	29.75	0.00	29.75	4.000	No	Yes	2.00
209	34.28	37.38	36.67	2.69	0.57	0.91	30.20	0.00	30.20	4.000	No	Yes	2.00
210	34.45	39.52	35.12	2.65	0.56	0.91	33.00	0.00	33.00	4.000	No	Yes	2.00
211	34.61	41.39	32.32	2.56	0.55	0.91	35.73	41.54	77.27	0.109	No	No	0.35
212	34.78	40.88	31.68	2.54	0.56	0.91	35.11	41.18	76.30	0.108	No	No	0.35
213	34.94	37.53	31.66	2.54	0.57	0.90	31.48	39.95	71.43	0.101	No	No	0.33
214	35.10	32.33	34.18	2.62	0.59	0.90	26.48	0.00	26.48	4.000	No	Yes	2.00
215	35.27	27.88	37.40	2.71	0.61	0.89	21.53	0.00	21.53	4.000	No	Yes	2.00
216	35.43	26.24	40.81	2.80	0.62	0.89	19.48	0.00	19.48	4.000	No	Yes	2.00
217	35.60	29.25	39.75	2.77	0.61	0.89	21.76	0.00	21.76	4.000	No	Yes	2.00
218	35.76	35.44	36.56	2.69	0.58	0.89	28.71	0.00	28.71	4.000	No	Yes	2.00
219	35.93	43.13	32.35	2.56	0.55	0.89	36.71	41.88	78.59	0.111	No	No	0.36
220	36.09	48.59	30.87	2.52	0.53	0.90	42.60	43.50	86.10	0.121	No	No	0.39
221	36.25	50.54	31.58	2.54	0.53	0.89	44.08	44.20	88.27	0.124	No	No	0.40
222	36.42	48.76	33.59	2.60	0.53	0.89	41.52	0.00	41.52	4.000	No	Yes	2.00
223	36.58	45.66	34.88	2.64	0.55	0.89	37.70	0.00	37.70	4.000	No	Yes	2.00
224	36.75	43.85	34.86	2.64	0.55	0.88	35.68	0.00	35.68	4.000	No	Yes	2.00
225	36.91	44.14	34.26	2.62	0.55	0.88	36.54	0.00	36.54	4.000	No	Yes	2.00
226	37.07	45.48	33.79	2.61	0.54	0.88	38.27	0.00	38.27	4.000	No	Yes	2.00
227	37.24	46.03	33.03	2.58	0.54	0.88	39.01	42.81	81.83	0.115	No	No	0.37
228	37.40	45.21	32.91	2.58	0.55	0.88	37.78	42.37	80.14	0.113	No	No	0.36
229	37.57	43.51	33.60	2.60	0.55	0.88	35.86	0.00	35.86	4.000	No	Yes	2.00
230	37.73	42.45	34.73	2.63	0.56	0.87	34.43	0.00	34.43	4.000	No	Yes	2.00
231	37.89	43.20	34.27	2.62	0.56	0.87	34.74	0.00	34.74	4.000	No	Yes	2.00
232	38.06	45.87	32.75	2.58	0.55	0.87	37.54	42.25	79.79	0.112	No	No	0.36
233	38.22	49.13	30.75	2.51	0.54	0.87	40.78	42.86	83.63	0.118	No	No	0.38
234	38.39	50.61	30.30	2.50	0.53	0.87	42.96	43.46	86.42	0.122	No	No	0.39
235	38.55	49.34	31.07	2.52	0.54	0.87	41.04	43.03	84.07	0.118	No	No	0.38
236	38.71	45.64	33.52	2.60	0.55	0.86	37.28	42.32	79.60	0.112	No	No	0.36
237	38.88	41.47	35.07	2.64	0.56	0.86	33.13	0.00	33.13	4.000	No	Yes	2.00
238	39.04	37.28	35.96	2.67	0.57	0.86	29.95	0.00	29.95	4.000	No	Yes	2.00
239	39.21	33.07	36.80	2.69	0.59	0.85	26.55	0.00	26.55	4.000	No	Yes	2.00
240	39.37	28.60	38.99	2.75	0.60	0.84	22.09	0.00	22.09	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
241	39.53	25.58	42.15	2.84	0.62	0.84	18.65	0.00	18.65	4.000	No	Yes	2.00
242	39.70	26.54	42.63	2.85	0.62	0.84	18.59	0.00	18.59	4.000	No	Yes	2.00
243	39.86	31.37	39.90	2.78	0.60	0.84	23.92	0.00	23.92	4.000	No	Yes	2.00
244	40.03	36.95	35.91	2.67	0.57	0.85	30.77	0.00	30.77	4.000	No	Yes	2.00
245	40.19	38.45	34.02	2.61	0.56	0.85	32.70	0.00	32.70	4.000	No	Yes	2.00
246	40.35	36.82	34.11	2.62	0.58	0.84	28.05	0.00	28.05	4.000	No	Yes	2.00
247	40.52	36.32	34.02	2.61	0.59	0.84	26.04	0.00	26.04	4.000	No	Yes	2.00
248	40.68	40.16	31.94	2.55	0.57	0.84	30.24	39.59	69.83	0.099	No	No	0.32
249	40.85	43.54	30.29	2.50	0.55	0.84	37.17	41.51	78.67	0.111	No	No	0.36
250	41.01	41.79	31.12	2.52	0.56	0.84	34.75	40.92	75.68	0.107	No	No	0.34
251	41.17	34.23	33.52	2.60	0.59	0.83	26.28	38.55	64.83	0.093	No	No	0.30
252	41.34	27.01	36.97	2.70	0.62	0.82	18.02	0.00	18.02	4.000	No	Yes	2.00
253	41.50	24.66	39.79	2.78	0.63	0.82	15.88	0.00	15.88	4.000	No	Yes	2.00
254	41.67	29.13	39.01	2.75	0.61	0.82	19.92	0.00	19.92	4.000	No	Yes	2.00
255	41.83	37.89	34.67	2.63	0.58	0.83	28.43	0.00	28.43	4.000	No	Yes	2.00
256	41.99	46.59	31.83	2.55	0.55	0.84	37.77	42.12	79.90	0.112	No	No	0.36
257	42.16	50.44	30.38	2.50	0.53	0.84	41.49	42.98	84.47	0.119	No	No	0.38
258	42.32	48.00	31.10	2.52	0.55	0.83	37.55	41.86	79.41	0.112	No	No	0.36
259	42.49	41.46	32.06	2.55	0.57	0.82	30.47	39.70	70.16	0.100	No	No	0.32
260	42.65	35.24	33.75	2.60	0.60	0.82	24.59	0.00	24.59	4.000	No	Yes	2.00
261	42.81	32.65	34.12	2.62	0.61	0.81	21.93	0.00	21.93	4.000	No	Yes	2.00
262	42.98	35.98	34.87	2.64	0.60	0.81	23.89	0.00	23.89	4.000	No	Yes	2.00
263	43.14	45.43	33.81	2.61	0.57	0.82	32.20	0.00	32.20	4.000	No	Yes	2.00
264	43.31	56.09	32.53	2.57	0.52	0.83	44.07	44.43	88.50	0.125	No	No	0.40
265	43.47	62.54	30.67	2.51	0.50	0.84	51.47	46.43	97.91	0.139	No	No	0.45
266	43.64	60.78	29.53	2.47	0.51	0.83	48.53	45.06	93.59	0.132	No	No	0.42
267	43.80	54.63	30.12	2.49	0.54	0.82	40.08	42.43	82.51	0.116	No	No	0.37
268	43.96	50.30	32.57	2.57	0.56	0.81	34.15	41.06	75.21	0.106	No	No	0.34
269	44.13	52.14	34.38	2.62	0.55	0.82	36.96	0.00	36.96	4.000	No	Yes	2.00
270	44.29	57.38	33.49	2.60	0.52	0.82	43.86	44.56	88.41	0.125	No	No	0.40
271	44.46	60.52	32.81	2.58	0.51	0.83	48.66	46.06	94.72	0.134	No	No	0.43
272	44.62	58.61	32.30	2.56	0.52	0.82	45.57	44.88	90.46	0.128	No	No	0.41
273	44.78	54.28	33.18	2.59	0.54	0.81	39.78	43.10	82.88	0.117	No	No	0.37
274	44.95	51.12	33.09	2.59	0.55	0.81	36.09	41.83	77.92	0.110	No	No	0.35
275	45.11	50.58	33.00	2.58	0.55	0.81	37.32	42.23	79.54	0.112	No	No	0.36
276	45.28	51.43	31.94	2.55	0.54	0.81	38.64	42.44	81.08	0.114	No	No	0.37
277	45.44	50.76	31.72	2.54	0.54	0.81	38.27	42.26	80.53	0.113	No	No	0.36
278	45.60	48.61	31.82	2.55	0.56	0.80	35.27	41.27	76.54	0.108	No	No	0.35
279	45.77	46.11	34.53	2.63	0.56	0.80	32.53	0.00	32.53	4.000	No	Yes	2.00
280	45.93	46.10	34.99	2.64	0.57	0.80	32.11	0.00	32.11	4.000	No	Yes	2.00
281	46.10	48.32	35.29	2.65	0.56	0.80	34.01	0.00	34.01	4.000	No	Yes	2.00
282	46.26	52.68	34.13	2.62	0.54	0.80	38.51	0.00	38.51	4.000	No	Yes	2.00
283	46.42	58.01	33.68	2.60	0.53	0.80	42.96	0.00	42.96	4.000	No	Yes	2.00
284	46.59	61.20	33.45	2.60	0.52	0.81	46.83	45.57	92.40	0.131	No	No	0.42
285	46.75	61.16	32.19	2.56	0.52	0.80	46.91	45.31	92.22	0.130	No	No	0.42
286	46.92	57.46	31.36	2.53	0.53	0.80	42.54	43.62	86.16	0.121	No	No	0.39
287	47.08	53.04	31.15	2.53	0.55	0.79	37.11	41.73	78.84	0.111	No	No	0.36
288	47.24	50.04	32.82	2.58	0.56	0.79	33.67	40.95	74.62	0.105	No	No	0.34

:: 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
289	47.41	49.44	34.51	2.63	0.56	0.78	33.72	0.00	33.72	4.000	No	Yes	2.00
290	47.57	50.50	34.18	2.62	0.55	0.79	35.18	0.00	35.18	4.000	No	Yes	2.00
291	47.74	51.42	33.03	2.58	0.55	0.79	36.36	41.91	78.27	0.110	No	No	0.36
292	47.90	52.07	30.72	2.51	0.55	0.78	37.01	41.58	78.59	0.111	No	No	0.36
293	48.06	52.77	29.30	2.47	0.55	0.78	36.88	41.10	77.97	0.110	No	No	0.36
294	48.23	53.73	28.27	2.43	0.55	0.78	37.08	40.78	77.87	0.110	No	No	0.36
295	48.39	54.75	27.76	2.42	0.55	0.78	37.31	40.65	77.96	0.110	No	No	0.36
296	48.56	55.96	27.65	2.41	0.55	0.78	38.24	40.91	79.15	0.111	No	No	0.36
297	48.72	57.76	27.26	2.40	0.55	0.78	39.24	41.06	80.31	0.113	No	No	0.37
298	48.88	59.24	27.45	2.41	0.54	0.78	40.55	41.58	82.12	0.116	No	No	0.37
299	49.05	60.54	26.96	2.39	0.54	0.78	41.36	41.61	82.97	0.117	No	No	0.38
300	49.21	61.32	26.84	2.39	0.54	0.78	41.91	41.73	83.64	0.118	No	No	0.38
301	49.38	61.77	26.44	2.37	0.54	0.78	42.12	41.59	83.71	0.118	No	No	0.38
302	49.54	61.45	26.97	2.39	0.54	0.78	41.88	41.79	83.67	0.118	No	No	0.38
303	49.70	60.81	27.73	2.42	0.54	0.78	41.11	41.88	82.99	0.117	No	No	0.38
304	49.87	59.78	28.45	2.44	0.54	0.77	40.56	42.00	82.56	0.116	No	No	0.38
305	50.03	57.71	29.37	2.47	0.54	0.77	39.76	42.08	81.83	0.115	No	No	0.37
306	50.20	55.51	29.68	2.48	0.54	0.77	38.68	41.82	80.50	0.113	No	No	0.37
307	50.36	53.78	29.88	2.49	0.55	0.77	36.93	41.30	78.23	0.110	No	No	0.36
308	50.52	54.56	28.79	2.45	0.55	0.76	36.67	40.84	77.51	0.109	No	No	0.36
309	50.69	57.06	27.72	2.42	0.55	0.76	38.15	40.91	79.06	0.111	No	No	0.36
310	50.85	60.69	26.87	2.39	0.54	0.77	41.13	41.49	82.62	0.116	No	No	0.38
311	51.02	63.69	26.48	2.37	0.53	0.77	43.68	42.12	85.80	0.121	No	No	0.39
312	51.18	65.17	26.04	2.36	0.53	0.77	44.56	42.16	86.72	0.122	No	No	0.40
313	51.35	65.18	25.62	2.34	0.53	0.77	43.78	41.66	85.44	0.120	No	No	0.39
314	51.51	65.15	25.48	2.34	0.54	0.76	42.98	41.32	84.30	0.119	No	No	0.39
315	51.67	66.20	25.61	2.34	0.53	0.76	43.58	41.59	85.17	0.120	No	No	0.39
316	51.84	68.12	26.23	2.36	0.53	0.77	45.62	42.61	88.23	0.124	No	No	0.40
317	52.00	69.90	26.00	2.36	0.52	0.77	47.23	43.00	90.23	0.127	No	No	0.41
318	52.17	70.05	25.92	2.35	0.52	0.77	47.40	43.00	90.40	0.128	No	No	0.42
319	52.33	69.42	25.22	2.33	0.52	0.76	46.22	42.19	88.41	0.125	No	No	0.41
320	52.49	68.64	25.01	2.32	0.53	0.76	45.29	41.76	87.05	0.123	No	No	0.40
321	52.66	68.94	24.74	2.31	0.53	0.76	45.40	41.60	87.00	0.122	No	No	0.40
322	52.82	70.07	24.53	2.30	0.53	0.76	46.33	41.75	88.08	0.124	No	No	0.40
323	52.99	71.22	24.49	2.30	0.52	0.76	47.17	41.98	89.15	0.126	No	No	0.41
324	53.15	71.77	24.43	2.30	0.52	0.76	47.30	41.98	89.29	0.126	No	No	0.41
325	53.31	71.61	24.63	2.31	0.52	0.76	47.00	42.03	89.03	0.125	No	No	0.41
326	53.48	71.60	24.70	2.31	0.52	0.76	46.69	41.99	88.68	0.125	No	No	0.41
327	53.64	71.85	25.04	2.32	0.52	0.75	46.99	42.31	89.30	0.126	No	No	0.41
328	53.81	72.52	25.27	2.33	0.52	0.75	47.41	42.60	90.01	0.127	No	No	0.42
329	53.97	73.11	25.56	2.34	0.52	0.75	47.98	42.97	90.95	0.128	No	No	0.42
330	54.13	74.09	25.13	2.33	0.52	0.75	48.31	42.79	91.10	0.129	No	No	0.42
331	54.30	75.08	24.95	2.32	0.52	0.75	49.23	42.96	92.19	0.130	No	No	0.43
332	54.46	76.59	24.52	2.30	0.51	0.75	49.99	42.90	92.89	0.131	No	No	0.43
333	54.63	77.65	24.75	2.31	0.51	0.75	50.86	43.33	94.20	0.133	No	No	0.44
334	54.79	78.81	24.70	2.31	0.51	0.75	51.34	43.45	94.79	0.134	No	No	0.44
335	54.95	79.38	24.81	2.31	0.51	0.75	51.86	43.69	95.55	0.135	No	No	0.44
336	55.12	79.86	24.70	2.31	0.51	0.75	52.04	43.67	95.71	0.136	No	No	0.44

:: 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
337	55.28	79.99	24.62	2.31	0.51	0.75	51.93	43.58	95.51	0.135	No	No	0.44
338	55.45	79.98	24.48	2.30	0.51	0.75	51.77	43.42	95.19	0.135	No	No	0.44
339	55.61	80.04	24.39	2.30	0.51	0.75	51.85	43.38	95.23	0.135	No	No	0.44
340	55.77	79.87	24.26	2.29	0.51	0.75	51.84	43.28	95.12	0.135	No	No	0.44
341	55.94	79.26	24.18	2.29	0.51	0.75	51.21	43.02	94.23	0.133	No	No	0.44
342	56.10	78.24	24.38	2.30	0.51	0.74	50.13	42.83	92.96	0.131	No	No	0.43
343	56.27	77.73	24.67	2.31	0.52	0.74	49.57	42.87	92.44	0.131	No	No	0.43
344	56.43	77.95	25.02	2.32	0.51	0.74	50.05	43.27	93.32	0.132	No	No	0.43
345	56.59	78.76	24.89	2.32	0.51	0.74	50.80	43.42	94.22	0.133	No	No	0.44
346	56.76	79.03	24.69	2.31	0.51	0.74	50.78	43.27	94.05	0.133	No	No	0.44
347	56.92	79.27	24.45	2.30	0.51	0.74	50.45	42.99	93.44	0.132	No	No	0.44
348	57.09	79.58	24.56	2.31	0.51	0.74	50.64	43.13	93.77	0.133	No	No	0.44
349	57.25	80.10	24.84	2.32	0.51	0.74	51.28	43.53	94.81	0.134	No	No	0.44
350	57.41	80.12	24.97	2.32	0.51	0.74	51.14	43.58	94.71	0.134	No	No	0.44
351	57.58	79.50	25.00	2.32	0.51	0.74	50.45	43.39	93.84	0.133	No	No	0.44
352	57.74	79.10	24.72	2.31	0.51	0.73	49.85	43.00	92.85	0.131	No	No	0.43
353	57.91	79.03	24.71	2.31	0.51	0.73	49.96	43.03	92.99	0.131	No	No	0.44
354	58.07	79.48	24.52	2.30	0.51	0.73	49.95	42.88	92.83	0.131	No	No	0.43
355	58.23	79.45	24.75	2.31	0.51	0.73	50.22	43.13	93.36	0.132	No	No	0.44
356	58.40	79.49	24.79	2.31	0.51	0.73	50.13	43.13	93.26	0.132	No	No	0.44
357	58.56	78.78	25.10	2.32	0.51	0.73	49.96	43.30	93.26	0.132	No	No	0.44
358	58.73	77.98	25.25	2.33	0.52	0.73	48.95	43.07	92.03	0.130	No	No	0.43
359	58.89	77.14	25.49	2.34	0.52	0.72	48.17	42.98	91.16	0.129	No	No	0.43
360	59.06	77.29	25.59	2.34	0.52	0.72	48.23	43.07	91.30	0.129	No	No	0.43
361	59.22	78.36	25.44	2.34	0.52	0.72	49.20	43.28	92.49	0.131	No	No	0.43
362	59.38	79.19	24.19	2.29	0.51	0.72	50.14	42.69	92.83	0.131	No	No	0.44
363	59.55	78.32	24.39	2.30	0.52	0.72	49.81	42.74	92.55	0.131	No	No	0.44
364	59.71	75.11	25.24	2.33	0.52	0.72	47.14	42.50	89.64	0.126	No	No	0.42
365	59.88	70.67	27.47	2.41	0.53	0.71	43.52	42.56	86.09	0.121	No	No	0.40
366	60.04	67.62	28.27	2.43	0.54	0.71	40.88	42.04	82.92	0.117	No	No	0.39
367	60.20	66.61	28.10	2.43	0.54	0.71	41.05	42.02	83.08	0.117	No	No	0.39
368	60.37	65.81	28.72	2.45	0.54	0.71	41.10	42.29	83.38	0.117	No	No	0.39
369	60.53	64.23	30.61	2.51	0.54	0.70	39.00	42.22	81.22	0.114	No	No	0.38
370	60.70	64.14	34.17	2.62	0.54	0.70	38.16	0.00	38.16	4.000	No	Yes	2.00
371	60.86	68.96	35.13	2.65	0.53	0.71	42.22	0.00	42.22	4.000	No	Yes	2.00
372	61.02	74.88	34.41	2.62	0.50	0.72	50.30	0.00	50.30	4.000	Yes	Yes	2.00
373	61.19	77.69	32.12	2.56	0.50	0.72	53.52	47.54	101.06	4.000	Yes	No	2.00
374	61.35	74.76	29.88	2.49	0.51	0.72	49.48	45.51	94.99	4.000	Yes	No	2.00
375	61.52	70.31	27.89	2.42	0.53	0.70	42.78	42.51	85.28	4.000	Yes	No	2.00
376	61.68	67.68	27.26	2.40	0.54	0.70	39.71	41.22	80.93	0.114	No	No	0.38
377	61.84	67.80	27.64	2.41	0.54	0.70	40.41	41.62	82.03	0.115	No	No	0.39
378	62.01	69.63	27.61	2.41	0.53	0.70	42.32	42.23	84.55	0.119	No	No	0.40
379	62.17	71.58	27.26	2.40	0.53	0.70	43.55	42.47	86.02	0.121	No	No	0.41
380	62.34	72.99	27.23	2.40	0.53	0.70	44.45	42.75	87.20	0.123	No	No	0.41
381	62.50	73.71	27.08	2.39	0.53	0.70	44.72	42.77	87.49	0.123	No	No	0.42
382	62.66	73.64	27.08	2.39	0.53	0.70	44.60	42.73	87.33	0.123	No	No	0.41
383	62.83	73.18	27.14	2.40	0.53	0.70	44.15	42.61	86.76	0.122	No	No	0.41
384	62.99	72.80	27.27	2.40	0.53	0.70	43.75	42.54	86.29	0.121	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
385	63.16	72.75	27.40	2.40	0.53	0.70	43.74	42.60	86.34	0.122	No	No	0.41
386	63.32	73.25	27.33	2.40	0.53	0.70	43.97	42.64	86.61	0.122	No	No	0.41
387	63.48	73.90	27.46	2.41	0.53	0.70	44.48	42.87	87.35	0.123	No	No	0.42
388	63.65	74.63	27.99	2.42	0.53	0.70	44.93	43.26	88.18	0.124	No	No	0.42
389	63.81	75.13	28.47	2.44	0.52	0.70	45.39	43.61	89.00	0.125	No	No	0.42
390	63.98	75.58	28.62	2.44	0.52	0.70	45.62	43.75	89.36	0.126	No	No	0.43
391	64.14	75.79	28.29	2.43	0.52	0.69	45.71	43.64	89.35	0.126	No	No	0.43
392	64.30	76.14	27.86	2.42	0.52	0.69	45.69	43.45	89.14	0.126	No	No	0.43
393	64.47	76.57	27.83	2.42	0.52	0.69	45.87	43.49	89.36	0.126	No	No	0.43
394	64.63	77.17	27.81	2.42	0.52	0.69	46.21	43.60	89.81	0.127	No	No	0.43
395	64.80	77.58	27.78	2.42	0.52	0.69	46.44	43.66	90.11	0.127	No	No	0.43
396	64.96	77.68	27.49	2.41	0.52	0.69	46.45	43.53	89.97	0.127	No	No	0.43
397	65.12	77.67	27.23	2.40	0.52	0.69	46.32	43.36	89.68	0.126	No	No	0.43
398	65.29	77.53	27.16	2.40	0.52	0.69	46.23	43.30	89.53	0.126	No	No	0.43
399	65.45	77.36	27.14	2.40	0.52	0.69	46.05	43.23	89.28	0.126	No	No	0.43
400	65.62	76.92	27.20	2.40	0.52	0.69	45.70	43.14	88.85	0.125	No	No	0.43
401	65.78	76.33	27.31	2.40	0.52	0.68	45.26	43.06	88.32	0.124	No	No	0.42
402	65.94	75.78	27.49	2.41	0.53	0.68	44.85	43.01	87.86	0.124	No	No	0.42
403	66.11	75.34	27.66	2.41	0.53	0.68	44.53	42.98	87.51	0.123	No	No	0.42
404	66.27	75.03	27.90	2.42	0.53	0.68	44.29	43.01	87.30	0.123	No	No	0.42
405	66.44	74.76	28.10	2.43	0.53	0.68	44.18	43.06	87.23	0.123	No	No	0.42
406	66.60	74.42	28.24	2.43	0.53	0.68	43.99	43.05	87.04	0.123	No	No	0.42
407	66.77	73.88	28.27	2.43	0.53	0.68	43.56	42.92	86.48	0.122	No	No	0.42
408	66.93	73.12	28.53	2.44	0.53	0.68	42.89	42.81	85.70	0.121	No	No	0.41
409	67.09	72.49	28.74	2.45	0.53	0.67	42.28	42.69	84.97	0.120	No	No	0.41
410	67.26	72.02	28.86	2.45	0.53	0.67	41.97	42.63	84.60	0.119	No	No	0.41
411	67.42	71.53	28.65	2.45	0.54	0.67	41.65	42.44	84.09	0.118	No	No	0.41
412	67.59	70.62	28.57	2.44	0.54	0.67	41.07	42.22	83.29	0.117	No	No	0.40
413	67.75	69.41	28.58	2.44	0.54	0.67	40.11	41.91	82.01	0.115	No	No	0.40
414	67.91	68.15	28.95	2.46	0.54	0.67	39.16	41.73	80.90	0.114	No	No	0.39
415	68.08	67.21	29.40	2.47	0.55	0.66	38.55	41.69	80.24	0.113	No	No	0.39
416	68.24	66.64	29.97	2.49	0.55	0.66	38.37	41.81	80.18	0.113	No	No	0.39
417	68.41	66.38	30.21	2.50	0.55	0.66	38.38	41.89	80.26	0.113	No	No	0.39
418	68.57	66.15	30.29	2.50	0.55	0.66	38.23	41.86	80.09	0.113	No	No	0.39
419	68.73	65.86	30.34	2.50	0.55	0.66	37.99	41.80	79.79	0.112	No	No	0.39
420	68.90	65.62	30.41	2.50	0.55	0.66	37.71	41.73	79.44	0.112	No	No	0.39
421	69.06	65.49	30.54	2.51	0.55	0.66	37.63	41.73	79.36	0.112	No	No	0.39
422	69.23	65.53	30.45	2.50	0.55	0.66	37.53	41.68	79.21	0.112	No	No	0.39
423	69.39	65.48	30.44	2.50	0.55	0.66	37.49	41.66	79.15	0.111	No	No	0.39
424	69.55	65.27	30.67	2.51	0.55	0.65	37.27	41.65	78.93	0.111	No	No	0.39
425	69.72	64.71	31.06	2.52	0.55	0.65	36.80	41.60	78.39	0.110	No	No	0.38
426	69.88	63.74	31.39	2.53	0.55	0.65	36.14	41.46	77.60	0.109	No	No	0.38
427	70.05	62.97	31.38	2.53	0.55	0.65	35.52	41.25	76.78	0.108	No	No	0.38
428	70.21	62.40	31.53	2.54	0.56	0.65	35.19	41.17	76.36	0.108	No	No	0.38
429	70.37	62.04	31.80	2.55	0.56	0.65	34.87	41.13	76.01	0.107	No	No	0.37
430	70.54	61.42	32.14	2.56	0.56	0.65	34.42	41.05	75.47	0.107	No	No	0.37
431	70.70	60.72	32.26	2.56	0.56	0.64	33.96	40.93	74.89	0.106	No	No	0.37
432	70.87	60.51	31.90	2.55	0.56	0.64	33.63	40.73	74.36	0.105	No	No	0.37

:: 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
433	71.03	60.59	31.47	2.54	0.56	0.64	33.71	40.66	74.37	0.105	No	No	0.37
434	71.19	60.93	31.07	2.52	0.56	0.64	33.77	40.58	74.35	0.105	No	No	0.37
435	71.36	60.92	31.17	2.53	0.56	0.64	33.83	40.62	74.45	0.105	No	No	0.37
436	71.52	60.72	31.51	2.54	0.56	0.64	33.56	40.62	74.18	0.105	No	No	0.37
437	71.69	60.24	32.00	2.55	0.56	0.64	33.37	40.67	74.04	0.105	No	No	0.37
438	71.85	59.72	32.35	2.56	0.56	0.64	33.15	40.67	73.81	0.104	No	No	0.37
439	72.01	58.91	32.77	2.58	0.56	0.64	32.82	40.65	73.47	0.104	No	No	0.37
440	72.18	57.84	33.02	2.58	0.57	0.63	32.05	40.43	72.49	0.103	No	No	0.36
441	72.34	56.63	33.41	2.59	0.57	0.63	31.17	40.20	71.37	0.101	No	No	0.36
442	72.51	55.96	33.43	2.60	0.57	0.63	30.60	40.01	70.61	0.100	No	No	0.35
443	72.67	55.88	33.53	2.60	0.57	0.63	30.64	40.05	70.69	0.100	No	No	0.35
444	72.83	55.98	33.47	2.60	0.57	0.63	30.79	40.09	70.87	0.101	No	No	0.36
445	73.00	55.49	33.69	2.60	0.57	0.63	30.48	0.00	30.48	4.000	No	Yes	2.00
446	73.16	54.40	33.98	2.61	0.57	0.63	29.70	0.00	29.70	4.000	No	Yes	2.00
447	73.33	53.06	34.35	2.62	0.58	0.62	28.83	0.00	28.83	4.000	No	Yes	2.00
448	73.49	51.79	34.64	2.63	0.58	0.62	28.10	0.00	28.10	4.000	No	Yes	2.00
449	73.65	50.40	35.07	2.64	0.58	0.62	27.31	0.00	27.31	4.000	No	Yes	2.00
450	73.82	48.68	35.63	2.66	0.59	0.62	26.06	0.00	26.06	4.000	No	Yes	2.00
451	73.98	46.70	36.44	2.68	0.59	0.61	24.75	0.00	24.75	4.000	No	Yes	2.00
452	74.15	45.45	36.98	2.70	0.60	0.61	23.80	0.00	23.80	4.000	No	Yes	2.00
453	74.31	45.12	37.38	2.71	0.60	0.61	23.75	0.00	23.75	4.000	No	Yes	2.00
454	74.48	45.47	37.79	2.72	0.60	0.61	24.11	0.00	24.11	4.000	No	Yes	2.00
455	74.64	45.68	37.90	2.72	0.59	0.61	24.33	0.00	24.33	4.000	No	Yes	2.00
456	74.80	45.58	37.77	2.72	0.60	0.61	24.13	0.00	24.13	4.000	No	Yes	2.00
457	74.97	45.28	37.27	2.71	0.60	0.61	23.77	0.00	23.77	4.000	No	Yes	2.00
458	75.13	45.08	36.91	2.70	0.60	0.61	23.57	0.00	23.57	4.000	No	Yes	2.00
459	75.30	45.00	36.66	2.69	0.60	0.60	23.55	0.00	23.55	4.000	No	Yes	2.00
460	75.46	45.08	36.60	2.69	0.60	0.60	23.55	0.00	23.55	4.000	No	Yes	2.00
461	75.62	44.93	36.65	2.69	0.60	0.60	23.44	0.00	23.44	4.000	No	Yes	2.00
462	75.79	44.47	37.06	2.70	0.60	0.60	23.15	0.00	23.15	4.000	No	Yes	2.00
463	75.95	43.88	37.41	2.71	0.60	0.60	22.70	0.00	22.70	4.000	No	Yes	2.00
464	76.12	43.25	37.72	2.72	0.60	0.60	22.28	0.00	22.28	4.000	No	Yes	2.00
465	76.28	42.84	37.76	2.72	0.60	0.60	21.99	0.00	21.99	4.000	No	Yes	2.00
466	76.44	42.50	37.71	2.72	0.61	0.60	21.85	0.00	21.85	4.000	No	Yes	2.00
467	76.61	42.27	37.70	2.72	0.61	0.60	21.68	0.00	21.68	4.000	No	Yes	2.00
468	76.77	41.97	37.84	2.72	0.61	0.59	21.44	0.00	21.44	4.000	No	Yes	2.00
469	76.94	41.80	38.19	2.73	0.61	0.59	21.22	0.00	21.22	4.000	No	Yes	2.00
470	77.10	41.86	38.30	2.73	0.61	0.59	21.21	0.00	21.21	4.000	No	Yes	2.00
471	77.26	42.30	38.11	2.73	0.61	0.59	21.44	0.00	21.44	4.000	No	Yes	2.00
472	77.43	43.07	37.54	2.71	0.61	0.59	21.89	0.00	21.89	4.000	No	Yes	2.00
473	77.59	43.75	36.99	2.70	0.60	0.59	22.29	0.00	22.29	4.000	No	Yes	2.00
474	77.76	44.11	36.79	2.69	0.60	0.59	22.47	0.00	22.47	4.000	No	Yes	2.00
475	77.92	44.15	36.86	2.69	0.60	0.59	22.40	0.00	22.40	4.000	No	Yes	2.00
476	78.08	44.12	37.04	2.70	0.60	0.59	22.32	0.00	22.32	4.000	No	Yes	2.00
477	78.25	44.23	37.09	2.70	0.60	0.59	22.33	0.00	22.33	4.000	No	Yes	2.00
478	78.41	44.40	37.17	2.70	0.60	0.59	22.37	0.00	22.37	4.000	No	Yes	2.00
479	78.58	44.83	37.22	2.70	0.60	0.59	22.51	0.00	22.51	4.000	No	Yes	2.00
480	78.74	45.91	36.82	2.69	0.60	0.59	23.09	0.00	23.09	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
481	78.90	47.83	35.80	2.66	0.60	0.59	24.27	0.00	24.27	4.000	No	Yes	2.00
482	79.07	50.10	34.46	2.63	0.59	0.59	25.68	0.00	25.68	4.000	No	Yes	2.00
483	79.23	51.93	33.60	2.60	0.59	0.60	26.73	0.00	26.73	4.000	No	Yes	2.00
484	79.40	53.09	32.96	2.58	0.58	0.60	27.19	38.76	65.95	0.095	No	No	0.34
485	79.56	53.68	32.69	2.57	0.58	0.60	27.35	38.76	66.11	0.095	No	No	0.34
486	79.72	54.13	32.29	2.56	0.58	0.59	27.41	38.71	66.12	0.095	No	No	0.34
487	79.89	54.58	32.15	2.56	0.58	0.59	27.62	38.75	66.36	0.095	No	No	0.35
488	80.05	55.24	32.03	2.55	0.58	0.59	27.99	38.85	66.83	0.096	No	No	0.35
489	80.22	55.99	31.57	2.54	0.58	0.59	28.33	38.86	67.19	0.096	No	No	0.35
490	80.38	56.26	31.23	2.53	0.58	0.59	28.53	38.85	67.38	0.096	No	No	0.35
491	80.54	56.15	30.92	2.52	0.58	0.59	28.25	38.68	66.93	0.096	No	No	0.35
492	80.71	55.52	31.41	2.53	0.58	0.59	27.89	38.67	66.56	0.095	No	No	0.35
493	80.87	55.15	31.88	2.55	0.58	0.59	27.56	38.67	66.23	0.095	No	No	0.35
494	81.04	55.10	32.24	2.56	0.58	0.59	27.49	38.72	66.21	0.095	No	No	0.35
495	81.20	55.50	32.24	2.56	0.58	0.59	27.66	38.78	66.44	0.095	No	No	0.35
496	81.36	56.37	31.99	2.55	0.58	0.59	28.08	38.87	66.95	0.096	No	No	0.35
497	81.53	57.60	31.81	2.55	0.58	0.59	28.86	39.09	67.95	0.097	No	No	0.35
498	81.69	59.22	31.52	2.54	0.58	0.59	29.77	39.34	69.11	0.099	No	No	0.36
499	81.86	60.89	31.40	2.53	0.57	0.59	30.74	39.64	70.38	0.100	No	No	0.37
500	82.02	62.79	30.98	2.52	0.57	0.60	31.81	39.90	71.71	0.102	No	No	0.37
501	82.19	64.78	30.20	2.50	0.56	0.60	33.03	40.09	73.11	0.104	No	No	0.38
502	82.35	66.45	29.44	2.47	0.56	0.60	34.11	40.22	74.32	0.105	No	No	0.38
503	82.51	67.27	28.75	2.45	0.56	0.60	34.55	40.13	74.68	0.106	No	No	0.39
504	82.68	67.40	28.70	2.45	0.56	0.60	34.16	39.98	74.14	0.105	No	No	0.38
505	82.84	70.79	31.55	2.54	0.56	0.60	34.11	40.82	74.93	0.106	No	No	0.39
506	83.01	81.18	32.85	2.58	0.54	0.61	40.47	43.27	83.74	0.118	No	No	0.43
507	83.17	100.53	33.43	2.60	0.49	0.63	54.24	48.10	102.34	0.146	No	No	0.53
508	83.33	127.46	32.96	2.58	0.44	0.67	76.31	55.53	131.84	4.000	Yes	No	2.00
509	83.50	158.88	30.10	2.49	0.38	0.70	102.53	63.38	165.91	4.000	Yes	No	2.00
510	83.66	194.57	26.63	2.38	0.32	0.74	133.93	71.47	205.40	4.000	Yes	No	2.00
511	83.83	223.69	22.88	2.24	0.28	0.77	166.85	77.10	243.95	4.000	Yes	No	2.00
512	83.99	235.69	21.63	2.20	0.26	0.78	180.29	78.67	258.96	4.000	No	No	2.00
513	84.15	222.15	22.70	2.24	0.28	0.77	166.29	76.61	242.90	4.000	No	No	2.00
514	84.32	201.15	24.65	2.31	0.33	0.73	132.08	68.86	200.94	1.189	No	No	2.00
515	84.48	198.95	25.61	2.34	0.34	0.72	123.36	67.12	190.48	0.764	No	No	2.00
516	84.65	229.15	22.97	2.25	0.30	0.76	154.17	73.39	227.56	4.000	No	No	2.00
517	84.81	269.91	20.22	2.14	0.26	0.78	203.36	81.75	285.11	4.000	No	No	2.00
518	84.97	290.85	19.23	2.10	0.26	0.78	224.03	84.25	308.28	4.000	No	No	2.00
519	85.14	280.23	20.50	2.15	0.26	0.78	209.20	84.21	293.41	4.000	No	No	2.00
520	85.30	259.64	22.62	2.23	0.26	0.78	183.51	81.69	265.20	4.000	No	No	2.00
521	85.47	255.62	22.33	2.22	0.26	0.78	176.85	79.12	255.97	4.000	No	No	2.00
522	85.63	278.86	19.92	2.13	0.26	0.78	199.58	79.81	279.40	4.000	No	No	2.00
523	85.79	319.52	16.62	1.98	0.26	0.78	234.26	75.20	309.46	4.000	No	No	2.00
524	85.96	360.99	14.78	1.90	0.26	0.78	267.54	70.49	338.03	4.000	No	No	2.00
525	86.12	389.02	14.34	1.87	0.26	0.77	290.69	71.43	362.13	4.000	No	No	2.00
526	86.29	389.97	15.40	1.93	0.26	0.77	295.52	80.95	376.48	4.000	No	No	2.00
527	86.45	356.33	17.23	2.01	0.26	0.77	268.94	86.83	355.77	4.000	No	No	2.00
528	86.61	294.65	19.65	2.12	0.26	0.77	216.24	83.58	299.82	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
529	86.78	235.41	22.20	2.22	0.30	0.75	155.11	72.34	227.45	4.000	No	No	2.00
530	86.94	209.50	24.87	2.32	0.34	0.72	127.89	67.79	195.68	0.941	No	No	2.00
531	87.11	235.47	19.50	2.11	0.32	0.73	148.15	64.38	212.52	2.194	No	No	2.00
532	87.27	301.27	12.18	1.76	0.26	0.77	213.69	40.37	254.06	4.000	No	No	2.00
533	87.43	375.18	37.60	2.72	0.26	0.77	281.85	0.00	281.85	4.000	No	Yes	2.00
534	87.60	422.94	39.15	2.76	0.26	0.77	320.51	0.00	320.51	4.000	No	Yes	2.00

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	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.05	0.00	0.33	2.00	0.00	0.00	0.05	0.00
0.49	2.00	0.00	0.00	0.05	0.00	0.66	2.00	0.00	0.00	0.05	0.00
0.82	2.00	0.00	0.00	0.05	0.00	0.98	2.00	0.00	0.00	0.05	0.00
1.15	2.00	0.00	0.00	0.05	0.00	1.31	2.00	0.00	0.00	0.05	0.00
1.48	2.00	0.00	0.00	0.05	0.00	1.64	2.00	0.00	0.00	0.05	0.00
1.80	2.00	0.00	0.00	0.05	0.00	1.97	2.00	0.00	0.00	0.05	0.00
2.13	2.00	0.00	0.00	0.05	0.00	2.30	2.00	0.00	0.00	0.05	0.00
2.46	2.00	0.00	0.00	0.05	0.00	2.62	2.00	0.00	0.00	0.05	0.00
2.79	2.00	0.00	0.00	0.05	0.00	2.95	2.00	0.00	0.00	0.05	0.00
3.12	2.00	0.00	0.00	0.05	0.00	3.28	2.00	0.00	0.00	0.05	0.00
3.44	2.00	0.00	0.00	0.05	0.00	3.61	2.00	0.00	0.00	0.05	0.00
3.77	2.00	0.00	0.00	0.05	0.00	3.94	2.00	0.00	0.00	0.05	0.00
4.10	2.00	0.00	0.00	0.05	0.00	4.27	2.00	0.00	0.00	0.05	0.00
4.43	2.00	0.00	0.00	0.05	0.00	4.59	2.00	0.00	0.00	0.05	0.00
4.76	2.00	0.00	0.00	0.05	0.00	4.92	2.00	0.00	0.00	0.05	0.00
5.09	2.00	0.00	0.00	0.05	0.00	5.25	2.00	0.00	0.00	0.05	0.00
5.41	2.00	0.00	0.00	0.05	0.00	5.58	2.00	0.00	0.00	0.05	0.00
5.74	2.00	0.00	0.00	0.05	0.00	5.91	2.00	0.00	0.00	0.05	0.00
6.07	2.00	0.00	0.00	0.05	0.00	6.23	2.00	0.00	0.00	0.05	0.00
6.40	2.00	0.00	0.00	0.05	0.00	6.56	2.00	0.00	0.00	0.05	0.00
6.73	2.00	0.00	0.00	0.05	0.00	6.89	2.00	0.00	0.00	0.05	0.00
7.05	2.00	0.00	0.00	0.05	0.00	7.22	2.00	0.00	0.00	0.05	0.00
7.38	2.00	0.00	0.00	0.05	0.00	7.55	2.00	0.00	0.00	0.05	0.00
7.71	2.00	0.00	0.00	0.05	0.00	7.87	2.00	0.00	0.00	0.05	0.00
8.04	2.00	0.00	0.00	0.05	0.00	8.20	2.00	0.00	0.00	0.05	0.00
8.37	2.00	0.00	0.00	0.05	0.00	8.53	2.00	0.00	0.00	0.05	0.00
8.69	2.00	0.00	0.00	0.05	0.00	8.86	2.00	0.00	0.00	0.05	0.00
9.02	2.00	0.00	0.00	0.05	0.00	9.19	2.00	0.00	0.00	0.05	0.00
9.35	2.00	0.00	0.00	0.05	0.00	9.51	2.00	0.00	0.00	0.05	0.00
9.68	2.00	0.00	0.00	0.05	0.00	9.84	2.00	0.00	0.00	0.05	0.00
10.01	2.00	0.00	0.00	0.05	0.00	10.17	2.00	0.00	0.00	0.05	0.00
10.33	2.00	0.00	0.00	0.05	0.00	10.50	2.00	0.00	0.00	0.05	0.00
10.66	2.00	0.00	0.00	0.05	0.00	10.83	2.00	0.00	0.00	0.05	0.00
10.99	2.00	0.00	0.00	0.05	0.00	11.15	2.00	0.00	0.00	0.05	0.00
11.32	2.00	0.00	0.00	0.05	0.00	11.48	2.00	0.00	0.00	0.05	0.00
11.65	2.00	0.00	0.00	0.05	0.00	11.81	0.77	0.00	0.00	0.05	0.09
11.98	2.00	0.00	0.00	0.05	0.00	12.14	2.00	0.00	0.00	0.05	0.00
12.30	2.00	0.00	0.00	0.05	0.00	12.47	2.00	0.00	0.00	0.05	0.00
12.63	2.00	0.00	0.00	0.05	0.00	12.80	0.55	0.00	0.00	0.05	0.19
12.96	0.52	0.00	0.00	0.05	0.19	13.12	0.46	0.00	0.00	0.05	0.21
13.29	2.00	0.00	0.00	0.05	0.00	13.45	2.00	0.00	0.00	0.05	0.00
13.62	2.00	0.00	0.00	0.05	0.00	13.78	2.00	0.00	0.00	0.05	0.00
13.94	2.00	0.00	0.00	0.05	0.00	14.11	2.00	0.00	0.00	0.05	0.00
14.27	2.00	0.00	0.00	0.05	0.00	14.44	2.00	0.00	0.00	0.05	0.00
14.60	2.00	0.00	0.00	0.05	0.00	14.76	2.00	0.00	0.00	0.05	0.00
14.93	2.00	0.00	0.00	0.05	0.00	15.09	2.00	0.00	0.00	0.05	0.00
15.26	2.00	0.00	0.00	0.05	0.00	15.42	0.40	0.00	0.00	0.05	0.23
15.58	0.41	0.00	0.00	0.05	0.22	15.75	0.42	0.00	0.00	0.05	0.23

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	0.43	0.00	0.00	0.05	0.21	16.08	0.42	0.00	0.00	0.05	0.23
16.24	0.41	0.00	0.00	0.05	0.22	16.40	0.40	0.00	0.00	0.05	0.22
16.57	0.39	0.00	0.00	0.05	0.24	16.73	0.38	0.00	0.00	0.05	0.22
16.90	0.38	0.00	0.00	0.05	0.24	17.06	0.39	0.00	0.00	0.05	0.22
17.22	0.39	0.00	0.00	0.05	0.22	17.39	0.39	0.00	0.00	0.05	0.23
17.55	0.39	0.00	0.00	0.05	0.22	17.72	0.40	0.00	0.00	0.05	0.23
17.88	0.40	0.00	0.00	0.05	0.21	18.04	0.40	0.00	0.00	0.05	0.21
18.21	0.41	0.00	0.00	0.05	0.22	18.37	0.42	0.00	0.00	0.05	0.20
18.54	0.44	0.00	0.00	0.05	0.21	18.70	0.46	0.00	0.00	0.05	0.19
18.86	0.47	0.00	0.00	0.05	0.19	19.03	0.45	0.00	0.00	0.05	0.20
19.19	0.43	0.00	0.00	0.05	0.20	19.36	0.40	0.00	0.00	0.05	0.22
19.52	0.38	0.00	0.00	0.05	0.21	19.69	0.36	0.00	0.00	0.05	0.23
19.85	0.35	0.00	0.00	0.05	0.22	20.01	0.35	0.00	0.00	0.05	0.22
20.18	0.34	0.00	0.00	0.05	0.24	20.34	0.33	0.00	0.00	0.05	0.22
20.51	0.32	0.00	0.00	0.05	0.24	20.67	0.32	0.00	0.00	0.05	0.23
20.83	0.31	0.00	0.00	0.05	0.23	21.00	2.00	0.00	0.00	0.05	0.00
21.16	2.00	0.00	0.00	0.05	0.00	21.33	2.00	0.00	0.00	0.05	0.00
21.49	2.00	0.00	0.00	0.05	0.00	21.65	2.00	0.00	0.00	0.05	0.00
21.82	2.00	0.00	0.00	0.05	0.00	21.98	2.00	0.00	0.00	0.05	0.00
22.15	2.00	0.00	0.00	0.05	0.00	22.31	2.00	0.00	0.00	0.05	0.00
22.47	2.00	0.00	0.00	0.05	0.00	22.64	2.00	0.00	0.00	0.05	0.00
22.80	0.31	0.00	0.00	0.05	0.22	22.97	0.32	0.00	0.00	0.05	0.23
23.13	0.33	0.00	0.00	0.05	0.21	23.29	0.33	0.00	0.00	0.05	0.21
23.46	0.32	0.00	0.00	0.05	0.23	23.62	0.31	0.00	0.00	0.05	0.21
23.79	0.30	0.00	0.00	0.05	0.23	23.95	0.30	0.00	0.00	0.05	0.22
24.11	0.31	0.00	0.00	0.05	0.21	24.28	0.32	0.00	0.00	0.05	0.22
24.44	0.33	0.00	0.00	0.05	0.20	24.61	0.33	0.00	0.00	0.05	0.22
24.77	0.32	0.00	0.00	0.05	0.21	24.93	0.31	0.00	0.00	0.05	0.21
25.10	2.00	0.00	0.00	0.05	0.00	25.26	0.33	0.00	0.00	0.05	0.20
25.43	2.00	0.00	0.00	0.05	0.00	25.59	2.00	0.00	0.00	0.05	0.00
25.75	2.00	0.00	0.00	0.05	0.00	25.92	2.00	0.00	0.00	0.05	0.00
26.08	2.00	0.00	0.00	0.05	0.00	26.25	2.00	0.00	0.00	0.05	0.00
26.41	2.00	0.00	0.00	0.05	0.00	26.57	2.00	0.00	0.00	0.05	0.00
26.74	2.00	0.00	0.00	0.05	0.00	26.90	2.00	0.00	0.00	0.05	0.00
27.07	2.00	0.00	0.00	0.05	0.00	27.23	2.00	0.00	0.00	0.05	0.00
27.40	0.37	0.00	0.00	0.05	0.19	27.56	0.38	0.00	0.00	0.05	0.18
27.72	0.41	0.00	0.00	0.05	0.16	27.89	0.48	0.00	0.00	0.05	0.16
28.05	0.53	0.00	0.00	0.05	0.13	28.22	0.52	0.00	0.00	0.05	0.14
28.38	0.45	0.00	0.00	0.05	0.15	28.54	2.00	0.00	0.00	0.05	0.00
28.71	2.00	0.00	0.00	0.05	0.00	28.87	2.00	0.00	0.00	0.05	0.00
29.04	2.00	0.00	0.00	0.05	0.00	29.20	2.00	0.00	0.00	0.05	0.00
29.36	2.00	0.00	0.00	0.05	0.00	29.53	2.00	0.00	0.00	0.05	0.00
29.69	2.00	0.00	0.00	0.05	0.00	29.86	2.00	0.00	0.00	0.05	0.00
30.02	2.00	0.00	0.00	0.05	0.00	30.18	2.00	0.00	0.00	0.05	0.00
30.35	2.00	0.00	0.00	0.05	0.00	30.51	2.00	0.00	0.00	0.05	0.00
30.68	2.00	0.00	0.00	0.05	0.00	30.84	2.00	0.00	0.00	0.05	0.00
31.00	2.00	0.00	0.00	0.05	0.00	31.17	2.00	0.00	0.00	0.05	0.00
31.33	2.00	0.00	0.00	0.05	0.00	31.50	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.05	0.00	31.82	2.00	0.00	0.00	0.05	0.00
31.99	2.00	0.00	0.00	0.05	0.00	32.15	2.00	0.00	0.00	0.05	0.00
32.32	2.00	0.00	0.00	0.05	0.00	32.48	2.00	0.00	0.00	0.05	0.00
32.64	2.00	0.00	0.00	0.05	0.00	32.81	2.00	0.00	0.00	0.05	0.00
32.97	2.00	0.00	0.00	0.05	0.00	33.14	0.35	0.00	0.00	0.05	0.17
33.30	0.33	0.00	0.00	0.05	0.16	33.46	2.00	0.00	0.00	0.05	0.00
33.63	2.00	0.00	0.00	0.05	0.00	33.79	0.33	0.00	0.00	0.05	0.16
33.96	0.33	0.00	0.00	0.05	0.17	34.12	2.00	0.00	0.00	0.05	0.00
34.28	2.00	0.00	0.00	0.05	0.00	34.45	2.00	0.00	0.00	0.05	0.00
34.61	0.35	0.00	0.00	0.05	0.15	34.78	0.35	0.00	0.00	0.05	0.16
34.94	0.33	0.00	0.00	0.05	0.15	35.10	2.00	0.00	0.00	0.05	0.00
35.27	2.00	0.00	0.00	0.05	0.00	35.43	2.00	0.00	0.00	0.05	0.00
35.60	2.00	0.00	0.00	0.05	0.00	35.76	2.00	0.00	0.00	0.05	0.00
35.93	0.36	0.00	0.00	0.05	0.15	36.09	0.39	0.00	0.00	0.05	0.13
36.25	0.40	0.00	0.00	0.05	0.13	36.42	2.00	0.00	0.00	0.05	0.00
36.58	2.00	0.00	0.00	0.05	0.00	36.75	2.00	0.00	0.00	0.05	0.00
36.91	2.00	0.00	0.00	0.05	0.00	37.07	2.00	0.00	0.00	0.05	0.00
37.24	0.37	0.00	0.00	0.05	0.14	37.40	0.36	0.00	0.00	0.05	0.13
37.57	2.00	0.00	0.00	0.05	0.00	37.73	2.00	0.00	0.00	0.05	0.00
37.89	2.00	0.00	0.00	0.05	0.00	38.06	0.36	0.00	0.00	0.05	0.14
38.22	0.38	0.00	0.00	0.05	0.13	38.39	0.39	0.00	0.00	0.05	0.13
38.55	0.38	0.00	0.00	0.05	0.12	38.71	0.36	0.00	0.00	0.05	0.13
38.88	2.00	0.00	0.00	0.05	0.00	39.04	2.00	0.00	0.00	0.05	0.00
39.21	2.00	0.00	0.00	0.05	0.00	39.37	2.00	0.00	0.00	0.05	0.00
39.53	2.00	0.00	0.00	0.05	0.00	39.70	2.00	0.00	0.00	0.05	0.00
39.86	2.00	0.00	0.00	0.05	0.00	40.03	2.00	0.00	0.00	0.05	0.00
40.19	2.00	0.00	0.00	0.05	0.00	40.35	2.00	0.00	0.00	0.05	0.00
40.52	2.00	0.00	0.00	0.05	0.00	40.68	0.32	0.00	0.00	0.05	0.13
40.85	0.36	0.00	0.00	0.05	0.13	41.01	0.34	0.00	0.00	0.05	0.12
41.17	0.30	0.00	0.00	0.05	0.13	41.34	2.00	0.00	0.00	0.05	0.00
41.50	2.00	0.00	0.00	0.05	0.00	41.67	2.00	0.00	0.00	0.05	0.00
41.83	2.00	0.00	0.00	0.05	0.00	41.99	0.36	0.00	0.00	0.05	0.11
42.16	0.38	0.00	0.00	0.05	0.11	42.32	0.36	0.00	0.00	0.05	0.11
42.49	0.32	0.00	0.00	0.05	0.12	42.65	2.00	0.00	0.00	0.05	0.00
42.81	2.00	0.00	0.00	0.05	0.00	42.98	2.00	0.00	0.00	0.05	0.00
43.14	2.00	0.00	0.00	0.05	0.00	43.31	0.40	0.00	0.00	0.05	0.11
43.47	0.45	0.00	0.00	0.05	0.09	43.64	0.42	0.00	0.00	0.05	0.10
43.80	0.37	0.00	0.00	0.05	0.10	43.96	0.34	0.00	0.00	0.05	0.11
44.13	2.00	0.00	0.00	0.05	0.00	44.29	0.40	0.00	0.00	0.05	0.10
44.46	0.43	0.00	0.00	0.05	0.10	44.62	0.41	0.00	0.00	0.05	0.09
44.78	0.37	0.00	0.00	0.05	0.10	44.95	0.35	0.00	0.00	0.05	0.11
45.11	0.36	0.00	0.00	0.05	0.10	45.28	0.37	0.00	0.00	0.05	0.10
45.44	0.36	0.00	0.00	0.05	0.10	45.60	0.35	0.00	0.00	0.05	0.10
45.77	2.00	0.00	0.00	0.05	0.00	45.93	2.00	0.00	0.00	0.05	0.00
46.10	2.00	0.00	0.00	0.05	0.00	46.26	2.00	0.00	0.00	0.05	0.00
46.42	2.00	0.00	0.00	0.05	0.00	46.59	0.42	0.00	0.00	0.05	0.09
46.75	0.42	0.00	0.00	0.05	0.08	46.92	0.39	0.00	0.00	0.05	0.09
47.08	0.36	0.00	0.00	0.05	0.09	47.24	0.34	0.00	0.00	0.05	0.09

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.05	0.00	47.57	2.00	0.00	0.00	0.05	0.00
47.74	0.36	0.00	0.00	0.05	0.09	47.90	0.36	0.00	0.00	0.05	0.08
48.06	0.36	0.00	0.00	0.05	0.08	48.23	0.36	0.00	0.00	0.05	0.09
48.39	0.36	0.00	0.00	0.05	0.08	48.56	0.36	0.00	0.00	0.05	0.09
48.72	0.37	0.00	0.00	0.05	0.08	48.88	0.37	0.00	0.00	0.05	0.08
49.05	0.38	0.00	0.00	0.05	0.08	49.21	0.38	0.00	0.00	0.05	0.08
49.38	0.38	0.00	0.00	0.05	0.08	49.54	0.38	0.00	0.00	0.05	0.07
49.70	0.38	0.00	0.00	0.05	0.07	49.87	0.38	0.00	0.00	0.05	0.08
50.03	0.37	0.00	0.00	0.05	0.07	50.20	0.37	0.00	0.00	0.05	0.08
50.36	0.36	0.00	0.00	0.05	0.07	50.52	0.36	0.00	0.00	0.05	0.07
50.69	0.36	0.00	0.00	0.05	0.08	50.85	0.38	0.00	0.00	0.05	0.07
51.02	0.39	0.00	0.00	0.05	0.07	51.18	0.40	0.00	0.00	0.05	0.06
51.35	0.39	0.00	0.00	0.05	0.07	51.51	0.39	0.00	0.00	0.05	0.06
51.67	0.39	0.00	0.00	0.05	0.06	51.84	0.40	0.00	0.00	0.05	0.06
52.00	0.41	0.00	0.00	0.05	0.06	52.17	0.42	0.00	0.00	0.05	0.06
52.33	0.41	0.00	0.00	0.05	0.06	52.49	0.40	0.00	0.00	0.05	0.06
52.66	0.40	0.00	0.00	0.05	0.06	52.82	0.40	0.00	0.00	0.05	0.06
52.99	0.41	0.00	0.00	0.05	0.06	53.15	0.41	0.00	0.00	0.05	0.05
53.31	0.41	0.00	0.00	0.05	0.05	53.48	0.41	0.00	0.00	0.05	0.06
53.64	0.41	0.00	0.00	0.05	0.05	53.81	0.42	0.00	0.00	0.05	0.05
53.97	0.42	0.00	0.00	0.05	0.05	54.13	0.42	0.00	0.00	0.05	0.05
54.30	0.43	0.00	0.00	0.05	0.05	54.46	0.43	0.00	0.00	0.05	0.05
54.63	0.44	0.00	0.00	0.05	0.05	54.79	0.44	0.00	0.00	0.05	0.05
54.95	0.44	0.00	0.00	0.05	0.04	55.12	0.44	0.00	0.00	0.05	0.05
55.28	0.44	0.00	0.00	0.05	0.04	55.45	0.44	0.00	0.00	0.05	0.04
55.61	0.44	0.00	0.00	0.05	0.04	55.77	0.44	0.00	0.00	0.05	0.04
55.94	0.44	0.00	0.00	0.05	0.04	56.10	0.43	0.00	0.00	0.05	0.04
56.27	0.43	0.00	0.00	0.05	0.04	56.43	0.43	0.00	0.00	0.05	0.04
56.59	0.44	0.00	0.00	0.05	0.04	56.76	0.44	0.00	0.00	0.05	0.04
56.92	0.44	0.00	0.00	0.05	0.04	57.09	0.44	0.00	0.00	0.05	0.04
57.25	0.44	0.00	0.00	0.05	0.03	57.41	0.44	0.00	0.00	0.05	0.03
57.58	0.44	0.00	0.00	0.05	0.04	57.74	0.43	0.00	0.00	0.05	0.03
57.91	0.44	0.00	0.00	0.05	0.03	58.07	0.43	0.00	0.00	0.05	0.03
58.23	0.44	0.00	0.00	0.05	0.03	58.40	0.44	0.00	0.00	0.05	0.03
58.56	0.44	0.00	0.00	0.05	0.03	58.73	0.43	0.00	0.00	0.05	0.03
58.89	0.43	0.00	0.00	0.05	0.03	59.06	0.43	0.00	0.00	0.05	0.03
59.22	0.43	0.00	0.00	0.05	0.03	59.38	0.44	0.00	0.00	0.05	0.03
59.55	0.44	0.00	0.00	0.05	0.03	59.71	0.42	0.00	0.00	0.05	0.03
59.88	0.40	0.00	0.00	0.05	0.03	60.04	0.39	0.00	0.00	0.05	0.03
60.20	0.39	0.00	0.00	0.05	0.02	60.37	0.39	0.00	0.00	0.05	0.03
60.53	0.38	0.00	0.00	0.05	0.02	60.70	2.00	0.00	0.00	0.05	0.00
60.86	2.00	0.00	0.00	0.05	0.00	61.02	2.00	0.00	0.00	0.05	0.00
61.19	2.00	0.00	0.00	0.05	0.00	61.35	2.00	0.00	0.00	0.05	0.00
61.52	2.00	0.00	0.00	0.05	0.00	61.68	0.38	0.00	0.00	0.05	0.02
61.84	0.39	0.00	0.00	0.05	0.02	62.01	0.40	0.00	0.00	0.05	0.02
62.17	0.41	0.00	0.00	0.05	0.02	62.34	0.41	0.00	0.00	0.05	0.02
62.50	0.42	0.00	0.00	0.05	0.01	62.66	0.41	0.00	0.00	0.05	0.01
62.83	0.41	0.00	0.00	0.05	0.01	62.99	0.41	0.00	0.00	0.05	0.01

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
63.16	0.41	0.00	0.00	0.05	0.01	63.32	0.41	0.00	0.00	0.05	0.01
63.48	0.42	0.00	0.00	0.05	0.01	63.65	0.42	0.00	0.00	0.05	0.01
63.81	0.42	0.00	0.00	0.05	0.01	63.98	0.43	0.00	0.00	0.05	0.01
64.14	0.43	0.00	0.00	0.05	0.01	64.30	0.43	0.00	0.00	0.05	0.01
64.47	0.43	0.00	0.00	0.05	0.01	64.63	0.43	0.00	0.00	0.05	0.00
64.80	0.43	0.00	0.00	0.05	0.00	64.96	0.43	0.00	0.00	0.05	0.00
65.12	0.43	0.00	0.00	0.05	0.00	65.29	0.43	0.00	0.00	0.05	0.00
65.45	0.43	0.00	0.00	0.05	0.00	65.62	0.43	0.00	0.00	0.05	0.00
65.78	0.42	0.00	0.00	0.05	0.00	65.94	0.42	0.00	0.00	0.05	0.00
66.11	0.42	0.00	0.00	0.05	0.00	66.27	0.42	0.00	0.00	0.05	0.00
66.44	0.42	0.00	0.00	0.05	0.00	66.60	0.42	0.00	0.00	0.05	0.00
66.77	0.42	0.00	0.00	0.05	0.00	66.93	0.41	0.00	0.00	0.05	0.00
67.09	0.41	0.00	0.00	0.05	0.00	67.26	0.41	0.00	0.00	0.05	0.00
67.42	0.41	0.00	0.00	0.05	0.00	67.59	0.40	0.00	0.00	0.05	0.00
67.75	0.40	0.00	0.00	0.05	0.00	67.91	0.39	0.00	0.00	0.05	0.00
68.08	0.39	0.00	0.00	0.05	0.00	68.24	0.39	0.00	0.00	0.05	0.00
68.41	0.39	0.00	0.00	0.05	0.00	68.57	0.39	0.00	0.00	0.05	0.00
68.73	0.39	0.00	0.00	0.05	0.00	68.90	0.39	0.00	0.00	0.05	0.00
69.06	0.39	0.00	0.00	0.05	0.00	69.23	0.39	0.00	0.00	0.05	0.00
69.39	0.39	0.00	0.00	0.05	0.00	69.55	0.39	0.00	0.00	0.05	0.00
69.72	0.38	0.00	0.00	0.05	0.00	69.88	0.38	0.00	0.00	0.05	0.00
70.05	0.38	0.00	0.00	0.05	0.00	70.21	0.38	0.00	0.00	0.05	0.00
70.37	0.37	0.00	0.00	0.05	0.00	70.54	0.37	0.00	0.00	0.05	0.00
70.70	0.37	0.00	0.00	0.05	0.00	70.87	0.37	0.00	0.00	0.05	0.00
71.03	0.37	0.00	0.00	0.05	0.00	71.19	0.37	0.00	0.00	0.05	0.00
71.36	0.37	0.00	0.00	0.05	0.00	71.52	0.37	0.00	0.00	0.05	0.00
71.69	0.37	0.00	0.00	0.05	0.00	71.85	0.37	0.00	0.00	0.05	0.00
72.01	0.37	0.00	0.00	0.05	0.00	72.18	0.36	0.00	0.00	0.05	0.00
72.34	0.36	0.00	0.00	0.05	0.00	72.51	0.35	0.00	0.00	0.05	0.00
72.67	0.35	0.00	0.00	0.05	0.00	72.83	0.36	0.00	0.00	0.05	0.00
73.00	2.00	0.00	0.00	0.05	0.00	73.16	2.00	0.00	0.00	0.05	0.00
73.33	2.00	0.00	0.00	0.05	0.00	73.49	2.00	0.00	0.00	0.05	0.00
73.65	2.00	0.00	0.00	0.05	0.00	73.82	2.00	0.00	0.00	0.05	0.00
73.98	2.00	0.00	0.00	0.05	0.00	74.15	2.00	0.00	0.00	0.05	0.00
74.31	2.00	0.00	0.00	0.05	0.00	74.48	2.00	0.00	0.00	0.05	0.00
74.64	2.00	0.00	0.00	0.05	0.00	74.80	2.00	0.00	0.00	0.05	0.00
74.97	2.00	0.00	0.00	0.05	0.00	75.13	2.00	0.00	0.00	0.05	0.00
75.30	2.00	0.00	0.00	0.05	0.00	75.46	2.00	0.00	0.00	0.05	0.00
75.62	2.00	0.00	0.00	0.05	0.00	75.79	2.00	0.00	0.00	0.05	0.00
75.95	2.00	0.00	0.00	0.05	0.00	76.12	2.00	0.00	0.00	0.05	0.00
76.28	2.00	0.00	0.00	0.05	0.00	76.44	2.00	0.00	0.00	0.05	0.00
76.61	2.00	0.00	0.00	0.05	0.00	76.77	2.00	0.00	0.00	0.05	0.00
76.94	2.00	0.00	0.00	0.05	0.00	77.10	2.00	0.00	0.00	0.05	0.00
77.26	2.00	0.00	0.00	0.05	0.00	77.43	2.00	0.00	0.00	0.05	0.00
77.59	2.00	0.00	0.00	0.05	0.00	77.76	2.00	0.00	0.00	0.05	0.00
77.92	2.00	0.00	0.00	0.05	0.00	78.08	2.00	0.00	0.00	0.05	0.00
78.25	2.00	0.00	0.00	0.05	0.00	78.41	2.00	0.00	0.00	0.05	0.00
78.58	2.00	0.00	0.00	0.05	0.00	78.74	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
78.90	2.00	0.00	0.00	0.05	0.00	79.07	2.00	0.00	0.00	0.05	0.00
79.23	2.00	0.00	0.00	0.05	0.00	79.40	0.34	0.00	0.00	0.05	0.00
79.56	0.34	0.00	0.00	0.05	0.00	79.72	0.34	0.00	0.00	0.05	0.00
79.89	0.35	0.00	0.00	0.05	0.00	80.05	0.35	0.00	0.00	0.05	0.00
80.22	0.35	0.00	0.00	0.05	0.00	80.38	0.35	0.00	0.00	0.05	0.00
80.54	0.35	0.00	0.00	0.05	0.00	80.71	0.35	0.00	0.00	0.05	0.00
80.87	0.35	0.00	0.00	0.05	0.00	81.04	0.35	0.00	0.00	0.05	0.00
81.20	0.35	0.00	0.00	0.05	0.00	81.36	0.35	0.00	0.00	0.05	0.00
81.53	0.35	0.00	0.00	0.05	0.00	81.69	0.36	0.00	0.00	0.05	0.00
81.86	0.37	0.00	0.00	0.05	0.00	82.02	0.37	0.00	0.00	0.05	0.00
82.19	0.38	0.00	0.00	0.05	0.00	82.35	0.38	0.00	0.00	0.05	0.00
82.51	0.39	0.00	0.00	0.05	0.00	82.68	0.38	0.00	0.00	0.05	0.00
82.84	0.39	0.00	0.00	0.05	0.00	83.01	0.43	0.00	0.00	0.05	0.00
83.17	0.53	0.00	0.00	0.05	0.00	83.33	2.00	0.00	0.00	0.05	0.00
83.50	2.00	0.00	0.00	0.05	0.00	83.66	2.00	0.00	0.00	0.05	0.00
83.83	2.00	0.00	0.00	0.05	0.00	83.99	2.00	0.00	0.00	0.05	0.00
84.15	2.00	0.00	0.00	0.05	0.00	84.32	2.00	0.00	0.00	0.05	0.00
84.48	2.00	0.00	0.00	0.05	0.00	84.65	2.00	0.00	0.00	0.05	0.00
84.81	2.00	0.00	0.00	0.05	0.00	84.97	2.00	0.00	0.00	0.05	0.00
85.14	2.00	0.00	0.00	0.05	0.00	85.30	2.00	0.00	0.00	0.05	0.00
85.47	2.00	0.00	0.00	0.05	0.00	85.63	2.00	0.00	0.00	0.05	0.00
85.79	2.00	0.00	0.00	0.05	0.00	85.96	2.00	0.00	0.00	0.05	0.00
86.12	2.00	0.00	0.00	0.05	0.00	86.29	2.00	0.00	0.00	0.05	0.00
86.45	2.00	0.00	0.00	0.05	0.00	86.61	2.00	0.00	0.00	0.05	0.00
86.78	2.00	0.00	0.00	0.05	0.00	86.94	2.00	0.00	0.00	0.05	0.00
87.11	2.00	0.00	0.00	0.05	0.00	87.27	2.00	0.00	0.00	0.05	0.00
87.43	2.00	0.00	0.00	0.05	0.00	87.60	2.00	0.00	0.00	0.05	0.00

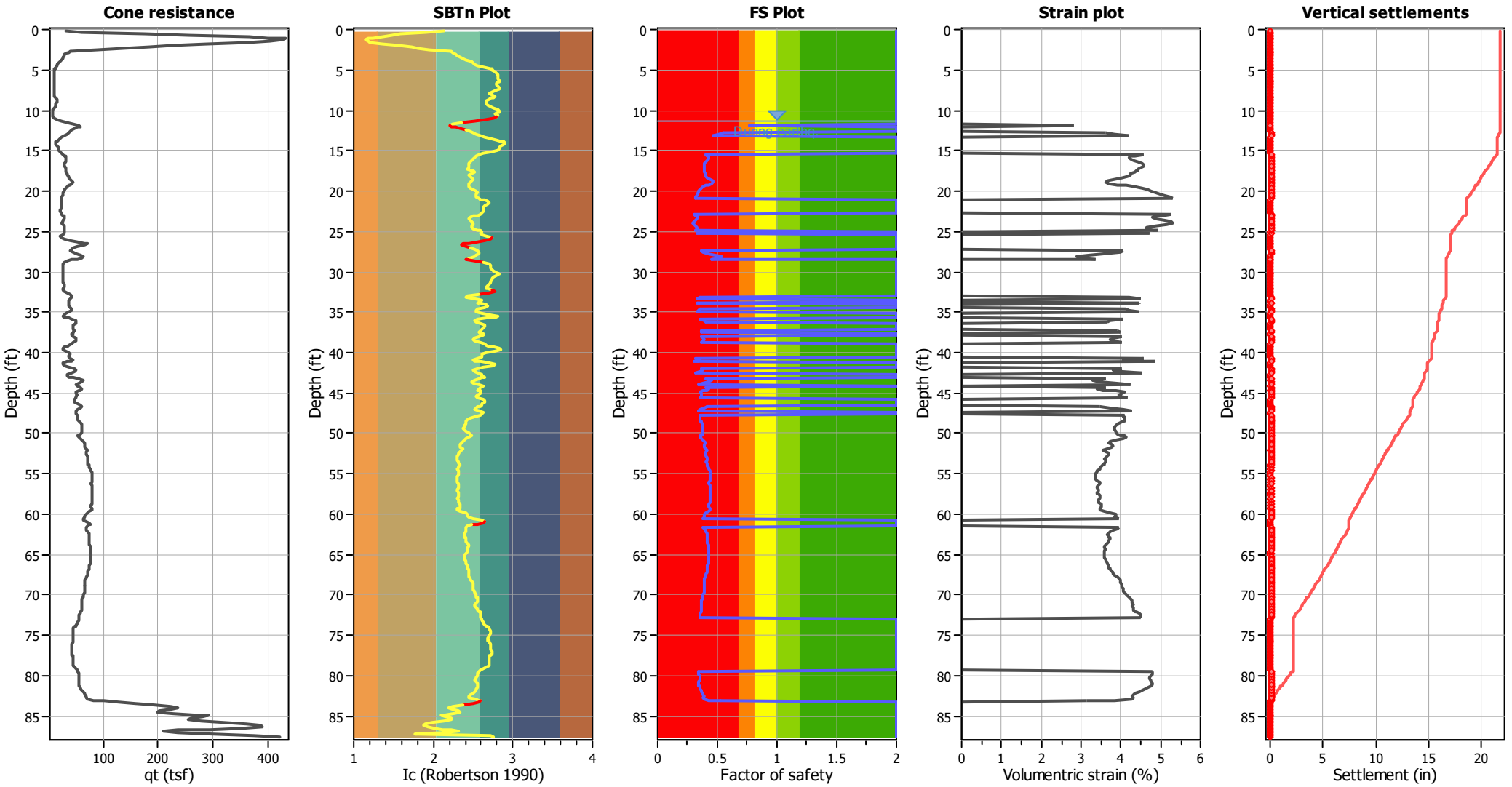
Overall liquefaction potential: 22.07

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
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)
11.32	65.88	2.00	0.00	1.00	0.00	11.48	82.31	2.00	0.00	1.00	0.00
11.65	100.40	2.00	0.00	1.00	0.00	11.81	114.17	0.77	2.80	1.00	0.05
11.98	117.95	2.00	0.00	1.00	0.00	12.14	111.31	2.00	0.00	1.00	0.00
12.30	100.75	2.00	0.00	1.00	0.00	12.47	93.43	2.00	0.00	1.00	0.00
12.63	91.11	2.00	0.00	1.00	0.00	12.80	89.01	0.55	3.61	1.00	0.07
12.96	83.97	0.52	3.83	1.00	0.07	13.12	76.09	0.46	4.21	1.00	0.08
13.29	28.52	2.00	0.00	1.00	0.00	13.45	23.72	2.00	0.00	1.00	0.00
13.62	20.23	2.00	0.00	1.00	0.00	13.78	17.64	2.00	0.00	1.00	0.00
13.94	15.81	2.00	0.00	1.00	0.00	14.11	15.14	2.00	0.00	1.00	0.00
14.27	16.06	2.00	0.00	1.00	0.00	14.44	18.34	2.00	0.00	1.00	0.00
14.60	20.36	2.00	0.00	1.00	0.00	14.76	20.87	2.00	0.00	1.00	0.00
14.93	20.69	2.00	0.00	1.00	0.00	15.09	22.06	2.00	0.00	1.00	0.00
15.26	25.78	2.00	0.00	1.00	0.00	15.42	69.35	0.40	4.59	1.00	0.09
15.58	73.21	0.41	4.36	1.00	0.08	15.75	75.22	0.42	4.25	1.00	0.09
15.91	76.22	0.43	4.20	1.00	0.08	16.08	75.48	0.42	4.24	1.00	0.09
16.24	73.95	0.41	4.32	1.00	0.08	16.40	71.86	0.40	4.44	1.00	0.09
16.57	70.29	0.39	4.53	1.00	0.09	16.73	69.52	0.38	4.58	1.00	0.09
16.90	69.89	0.38	4.56	1.00	0.09	17.06	71.09	0.39	4.48	1.00	0.09
17.22	71.77	0.39	4.44	1.00	0.09	17.39	72.06	0.39	4.43	1.00	0.09
17.55	72.48	0.39	4.40	1.00	0.08	17.72	73.64	0.40	4.34	1.00	0.09
17.88	75.08	0.40	4.26	1.00	0.08	18.04	75.48	0.40	4.24	1.00	0.08
18.21	76.75	0.41	4.17	1.00	0.09	18.37	79.43	0.42	4.04	1.00	0.08
18.54	83.97	0.44	3.83	1.00	0.08	18.70	87.75	0.46	3.66	1.00	0.07
18.86	88.98	0.47	3.61	1.00	0.07	19.03	86.67	0.45	3.71	1.00	0.08
19.19	82.31	0.43	3.90	1.00	0.07	19.36	77.35	0.40	4.14	1.00	0.08
19.52	73.22	0.38	4.36	1.00	0.08	19.69	69.94	0.36	4.55	1.00	0.09
19.85	67.89	0.35	4.68	1.00	0.09	20.01	66.43	0.35	4.77	1.00	0.09
20.18	65.27	0.34	4.85	1.00	0.10	20.34	63.60	0.33	4.97	1.00	0.10
20.51	61.83	0.32	5.10	1.00	0.10	20.67	60.16	0.32	5.22	1.00	0.10
20.83	59.08	0.31	5.31	1.00	0.10	21.00	21.69	2.00	0.00	1.00	0.00
21.16	21.68	2.00	0.00	1.00	0.00	21.33	22.07	2.00	0.00	1.00	0.00
21.49	22.59	2.00	0.00	1.00	0.00	21.65	23.35	2.00	0.00	1.00	0.00
21.82	23.87	2.00	0.00	1.00	0.00	21.98	23.61	2.00	0.00	1.00	0.00
22.15	22.49	2.00	0.00	1.00	0.00	22.31	21.22	2.00	0.00	1.00	0.00
22.47	20.69	2.00	0.00	1.00	0.00	22.64	21.12	2.00	0.00	1.00	0.00
22.80	59.69	0.31	5.26	1.00	0.10	22.97	62.42	0.32	5.05	1.00	0.10
23.13	65.10	0.33	4.86	1.00	0.09	23.29	66.37	0.33	4.78	1.00	0.09
23.46	64.99	0.32	4.87	1.00	0.10	23.62	62.16	0.31	5.07	1.00	0.10
23.79	59.70	0.30	5.26	1.00	0.11	23.95	58.96	0.30	5.32	1.00	0.10
24.11	61.17	0.31	5.14	1.00	0.10	24.28	64.88	0.32	4.88	1.00	0.10
24.44	68.54	0.33	4.64	1.00	0.09	24.61	68.25	0.33	4.66	1.00	0.09
24.77	65.34	0.32	4.85	1.00	0.09	24.93	63.93	0.31	4.94	1.00	0.09
25.10	26.75	2.00	0.00	1.00	0.00	25.26	67.17	0.33	4.73	1.00	0.09
25.43	25.48	2.00	0.00	1.00	0.00	25.59	18.35	2.00	0.00	1.00	0.00
25.75	18.30	2.00	0.00	1.00	0.00	25.92	30.47	2.00	0.00	1.00	0.00
26.08	30.39	2.00	0.00	1.00	0.00	26.25	94.67	2.00	0.00	1.00	0.00
26.41	118.32	2.00	0.00	1.00	0.00	26.57	125.22	2.00	0.00	1.00	0.00
26.74	111.70	2.00	0.00	1.00	0.00	26.90	93.15	2.00	0.00	1.00	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)
27.07	81.60	2.00	0.00	1.00	0.00	27.23	78.75	2.00	0.00	1.00	0.00
27.40	78.65	0.37	4.08	1.00	0.08	27.56	80.51	0.38	3.98	1.00	0.08
27.72	88.41	0.41	3.64	1.00	0.07	27.89	100.27	0.48	3.20	1.00	0.07
28.05	110.23	0.53	2.91	1.00	0.06	28.22	108.74	0.52	2.95	1.00	0.06
28.38	95.74	0.45	3.36	1.00	0.06	28.54	78.83	2.00	0.00	1.00	0.00
28.71	67.15	2.00	0.00	1.00	0.00	28.87	24.29	2.00	0.00	1.00	0.00
29.04	23.06	2.00	0.00	1.00	0.00	29.20	23.03	2.00	0.00	1.00	0.00
29.36	23.17	2.00	0.00	1.00	0.00	29.53	23.43	2.00	0.00	1.00	0.00
29.69	23.60	2.00	0.00	1.00	0.00	29.86	23.28	2.00	0.00	1.00	0.00
30.02	22.61	2.00	0.00	1.00	0.00	30.18	21.95	2.00	0.00	1.00	0.00
30.35	22.02	2.00	0.00	1.00	0.00	30.51	22.64	2.00	0.00	1.00	0.00
30.68	23.33	2.00	0.00	1.00	0.00	30.84	23.13	2.00	0.00	1.00	0.00
31.00	22.41	2.00	0.00	1.00	0.00	31.17	21.91	2.00	0.00	1.00	0.00
31.33	22.32	2.00	0.00	1.00	0.00	31.50	23.24	2.00	0.00	1.00	0.00
31.66	23.70	2.00	0.00	1.00	0.00	31.82	23.42	2.00	0.00	1.00	0.00
31.99	22.46	2.00	0.00	1.00	0.00	32.15	21.36	2.00	0.00	1.00	0.00
32.32	21.30	2.00	0.00	1.00	0.00	32.48	23.40	2.00	0.00	1.00	0.00
32.64	28.50	2.00	0.00	1.00	0.00	32.81	75.61	2.00	0.00	1.00	0.00
32.97	78.36	2.00	0.00	1.00	0.00	33.14	76.02	0.35	4.21	1.00	0.09
33.30	70.95	0.33	4.49	1.00	0.09	33.46	28.76	2.00	0.00	1.00	0.00
33.63	29.41	2.00	0.00	1.00	0.00	33.79	71.34	0.33	4.47	1.00	0.09
33.96	71.45	0.33	4.46	1.00	0.09	34.12	29.75	2.00	0.00	1.00	0.00
34.28	30.20	2.00	0.00	1.00	0.00	34.45	33.00	2.00	0.00	1.00	0.00
34.61	77.27	0.35	4.14	1.00	0.08	34.78	76.30	0.35	4.20	1.00	0.09
34.94	71.43	0.33	4.46	1.00	0.09	35.10	26.48	2.00	0.00	1.00	0.00
35.27	21.53	2.00	0.00	1.00	0.00	35.43	19.48	2.00	0.00	1.00	0.00
35.60	21.76	2.00	0.00	1.00	0.00	35.76	28.71	2.00	0.00	1.00	0.00
35.93	78.59	0.36	4.08	1.00	0.08	36.09	86.10	0.39	3.73	1.00	0.07
36.25	88.27	0.40	3.64	1.00	0.07	36.42	41.52	2.00	0.00	1.00	0.00
36.58	37.70	2.00	0.00	1.00	0.00	36.75	35.68	2.00	0.00	1.00	0.00
36.91	36.54	2.00	0.00	1.00	0.00	37.07	38.27	2.00	0.00	1.00	0.00
37.24	81.83	0.37	3.92	1.00	0.08	37.40	80.14	0.36	4.00	1.00	0.08
37.57	35.86	2.00	0.00	1.00	0.00	37.73	34.43	2.00	0.00	1.00	0.00
37.89	34.74	2.00	0.00	1.00	0.00	38.06	79.79	0.36	4.02	1.00	0.08
38.22	83.63	0.38	3.84	1.00	0.07	38.39	86.42	0.39	3.72	1.00	0.08
38.55	84.07	0.38	3.82	1.00	0.07	38.71	79.60	0.36	4.03	1.00	0.08
38.88	33.13	2.00	0.00	1.00	0.00	39.04	29.95	2.00	0.00	1.00	0.00
39.21	26.55	2.00	0.00	1.00	0.00	39.37	22.09	2.00	0.00	1.00	0.00
39.53	18.65	2.00	0.00	1.00	0.00	39.70	18.59	2.00	0.00	1.00	0.00
39.86	23.92	2.00	0.00	1.00	0.00	40.03	30.77	2.00	0.00	1.00	0.00
40.19	32.70	2.00	0.00	1.00	0.00	40.35	28.05	2.00	0.00	1.00	0.00
40.52	26.04	2.00	0.00	1.00	0.00	40.68	69.83	0.32	4.56	1.00	0.09
40.85	78.67	0.36	4.07	1.00	0.08	41.01	75.68	0.34	4.23	1.00	0.08
41.17	64.83	0.30	4.88	1.00	0.09	41.34	18.02	2.00	0.00	1.00	0.00
41.50	15.88	2.00	0.00	1.00	0.00	41.67	19.92	2.00	0.00	1.00	0.00
41.83	28.43	2.00	0.00	1.00	0.00	41.99	79.90	0.36	4.01	1.00	0.08
42.16	84.47	0.38	3.80	1.00	0.08	42.32	79.41	0.36	4.04	1.00	0.08
42.49	70.16	0.32	4.54	1.00	0.09	42.65	24.59	2.00	0.00	1.00	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)
42.81	21.93	2.00	0.00	1.00	0.00	42.98	23.89	2.00	0.00	1.00	0.00
43.14	32.20	2.00	0.00	1.00	0.00	43.31	88.50	0.40	3.63	1.00	0.07
43.47	97.91	0.45	3.28	1.00	0.06	43.64	93.59	0.42	3.44	1.00	0.07
43.80	82.51	0.37	3.89	1.00	0.07	43.96	75.21	0.34	4.25	1.00	0.08
44.13	36.96	2.00	0.00	1.00	0.00	44.29	88.41	0.40	3.64	1.00	0.07
44.46	94.72	0.43	3.39	1.00	0.07	44.62	90.46	0.41	3.55	1.00	0.07
44.78	82.88	0.37	3.87	1.00	0.07	44.95	77.92	0.35	4.11	1.00	0.08
45.11	79.54	0.36	4.03	1.00	0.08	45.28	81.08	0.37	3.96	1.00	0.08
45.44	80.53	0.36	3.98	1.00	0.08	45.60	76.54	0.35	4.18	1.00	0.08
45.77	32.53	2.00	0.00	1.00	0.00	45.93	32.11	2.00	0.00	1.00	0.00
46.10	34.01	2.00	0.00	1.00	0.00	46.26	38.51	2.00	0.00	1.00	0.00
46.42	42.96	2.00	0.00	1.00	0.00	46.59	92.40	0.42	3.48	1.00	0.07
46.75	92.22	0.42	3.49	1.00	0.07	46.92	86.16	0.39	3.73	1.00	0.08
47.08	78.84	0.36	4.07	1.00	0.08	47.24	74.62	0.34	4.28	1.00	0.08
47.41	33.72	2.00	0.00	1.00	0.00	47.57	35.18	2.00	0.00	1.00	0.00
47.74	78.27	0.36	4.09	1.00	0.08	47.90	78.59	0.36	4.08	1.00	0.08
48.06	77.97	0.36	4.11	1.00	0.08	48.23	77.87	0.36	4.11	1.00	0.08
48.39	77.96	0.36	4.11	1.00	0.08	48.56	79.15	0.36	4.05	1.00	0.08
48.72	80.31	0.37	3.99	1.00	0.08	48.88	82.12	0.37	3.91	1.00	0.08
49.05	82.97	0.38	3.87	1.00	0.08	49.21	83.64	0.38	3.84	1.00	0.07
49.38	83.71	0.38	3.84	1.00	0.08	49.54	83.67	0.38	3.84	1.00	0.07
49.70	82.99	0.38	3.87	1.00	0.07	49.87	82.56	0.38	3.89	1.00	0.08
50.03	81.83	0.37	3.92	1.00	0.08	50.20	80.50	0.37	3.98	1.00	0.08
50.36	78.23	0.36	4.10	1.00	0.08	50.52	77.51	0.36	4.13	1.00	0.08
50.69	79.06	0.36	4.05	1.00	0.08	50.85	82.62	0.38	3.89	1.00	0.07
51.02	85.80	0.39	3.75	1.00	0.08	51.18	86.72	0.40	3.71	1.00	0.07
51.35	85.44	0.39	3.76	1.00	0.08	51.51	84.30	0.39	3.81	1.00	0.07
51.67	85.17	0.39	3.77	1.00	0.07	51.84	88.23	0.40	3.64	1.00	0.07
52.00	90.23	0.41	3.56	1.00	0.07	52.17	90.40	0.42	3.56	1.00	0.07
52.33	88.41	0.41	3.64	1.00	0.07	52.49	87.05	0.40	3.69	1.00	0.07
52.66	87.00	0.40	3.69	1.00	0.08	52.82	88.08	0.40	3.65	1.00	0.07
52.99	89.15	0.41	3.61	1.00	0.07	53.15	89.29	0.41	3.60	1.00	0.07
53.31	89.03	0.41	3.61	1.00	0.07	53.48	88.68	0.41	3.63	1.00	0.07
53.64	89.30	0.41	3.60	1.00	0.07	53.81	90.01	0.42	3.57	1.00	0.07
53.97	90.95	0.42	3.54	1.00	0.07	54.13	91.10	0.42	3.53	1.00	0.07
54.30	92.19	0.43	3.49	1.00	0.07	54.46	92.89	0.43	3.46	1.00	0.07
54.63	94.20	0.44	3.41	1.00	0.07	54.79	94.79	0.44	3.39	1.00	0.07
54.95	95.55	0.44	3.36	1.00	0.06	55.12	95.71	0.44	3.36	1.00	0.07
55.28	95.51	0.44	3.37	1.00	0.06	55.45	95.19	0.44	3.38	1.00	0.07
55.61	95.23	0.44	3.38	1.00	0.06	55.77	95.12	0.44	3.38	1.00	0.06
55.94	94.23	0.44	3.41	1.00	0.07	56.10	92.96	0.43	3.46	1.00	0.07
56.27	92.44	0.43	3.48	1.00	0.07	56.43	93.32	0.43	3.45	1.00	0.07
56.59	94.22	0.44	3.41	1.00	0.07	56.76	94.05	0.44	3.42	1.00	0.07
56.92	93.44	0.44	3.44	1.00	0.07	57.09	93.77	0.44	3.43	1.00	0.07
57.25	94.81	0.44	3.39	1.00	0.07	57.41	94.71	0.44	3.39	1.00	0.07
57.58	93.84	0.44	3.43	1.00	0.07	57.74	92.85	0.43	3.46	1.00	0.07
57.91	92.99	0.44	3.46	1.00	0.07	58.07	92.83	0.43	3.46	1.00	0.07
58.23	93.36	0.44	3.44	1.00	0.07	58.40	93.26	0.44	3.45	1.00	0.07

:: 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)
58.56	93.26	0.44	3.45	1.00	0.07	58.73	92.03	0.43	3.49	1.00	0.07
58.89	91.16	0.43	3.53	1.00	0.07	59.06	91.30	0.43	3.52	1.00	0.07
59.22	92.49	0.43	3.48	1.00	0.07	59.38	92.83	0.44	3.46	1.00	0.07
59.55	92.55	0.44	3.47	1.00	0.07	59.71	89.64	0.42	3.59	1.00	0.07
59.88	86.09	0.40	3.73	1.00	0.08	60.04	82.92	0.39	3.87	1.00	0.07
60.20	83.08	0.39	3.87	1.00	0.07	60.37	83.38	0.39	3.85	1.00	0.08
60.53	81.22	0.38	3.95	1.00	0.08	60.70	38.16	2.00	0.00	1.00	0.00
60.86	42.22	2.00	0.00	1.00	0.00	61.02	50.30	2.00	0.00	1.00	0.00
61.19	101.06	2.00	0.00	1.00	0.00	61.35	94.99	2.00	0.00	1.00	0.00
61.52	85.28	2.00	0.00	1.00	0.00	61.68	80.93	0.38	3.96	1.00	0.08
61.84	82.03	0.39	3.91	1.00	0.08	62.01	84.55	0.40	3.80	1.00	0.08
62.17	86.02	0.41	3.74	1.00	0.07	62.34	87.20	0.41	3.69	1.00	0.08
62.50	87.49	0.42	3.67	1.00	0.07	62.66	87.33	0.41	3.68	1.00	0.07
62.83	86.76	0.41	3.70	1.00	0.08	62.99	86.29	0.41	3.72	1.00	0.07
63.16	86.34	0.41	3.72	1.00	0.08	63.32	86.61	0.41	3.71	1.00	0.07
63.48	87.35	0.42	3.68	1.00	0.07	63.65	88.18	0.42	3.65	1.00	0.07
63.81	89.00	0.42	3.61	1.00	0.07	63.98	89.36	0.43	3.60	1.00	0.07
64.14	89.35	0.43	3.60	1.00	0.07	64.30	89.14	0.43	3.61	1.00	0.07
64.47	89.36	0.43	3.60	1.00	0.07	64.63	89.81	0.43	3.58	1.00	0.07
64.80	90.11	0.43	3.57	1.00	0.07	64.96	89.97	0.43	3.57	1.00	0.07
65.12	89.68	0.43	3.59	1.00	0.07	65.29	89.53	0.43	3.59	1.00	0.07
65.45	89.28	0.43	3.60	1.00	0.07	65.62	88.85	0.43	3.62	1.00	0.07
65.78	88.32	0.42	3.64	1.00	0.07	65.94	87.86	0.42	3.66	1.00	0.07
66.11	87.51	0.42	3.67	1.00	0.07	66.27	87.30	0.42	3.68	1.00	0.07
66.44	87.23	0.42	3.68	1.00	0.08	66.60	87.04	0.42	3.69	1.00	0.07
66.77	86.48	0.42	3.72	1.00	0.08	66.93	85.70	0.41	3.75	1.00	0.07
67.09	84.97	0.41	3.78	1.00	0.07	67.26	84.60	0.41	3.80	1.00	0.08
67.42	84.09	0.41	3.82	1.00	0.07	67.59	83.29	0.40	3.86	1.00	0.08
67.75	82.01	0.40	3.91	1.00	0.08	67.91	80.90	0.39	3.97	1.00	0.08
68.08	80.24	0.39	4.00	1.00	0.08	68.24	80.18	0.39	4.00	1.00	0.08
68.41	80.26	0.39	4.00	1.00	0.08	68.57	80.09	0.39	4.00	1.00	0.08
68.73	79.79	0.39	4.02	1.00	0.08	68.90	79.44	0.39	4.04	1.00	0.08
69.06	79.36	0.39	4.04	1.00	0.08	69.23	79.21	0.39	4.05	1.00	0.08
69.39	79.15	0.39	4.05	1.00	0.08	69.55	78.93	0.39	4.06	1.00	0.08
69.72	78.39	0.38	4.09	1.00	0.08	69.88	77.60	0.38	4.13	1.00	0.08
70.05	76.78	0.38	4.17	1.00	0.09	70.21	76.36	0.38	4.19	1.00	0.08
70.37	76.01	0.37	4.21	1.00	0.08	70.54	75.47	0.37	4.24	1.00	0.09
70.70	74.89	0.37	4.27	1.00	0.08	70.87	74.36	0.37	4.30	1.00	0.09
71.03	74.37	0.37	4.30	1.00	0.08	71.19	74.35	0.37	4.30	1.00	0.08
71.36	74.45	0.37	4.29	1.00	0.09	71.52	74.18	0.37	4.31	1.00	0.08
71.69	74.04	0.37	4.32	1.00	0.09	71.85	73.81	0.37	4.33	1.00	0.08
72.01	73.47	0.37	4.35	1.00	0.08	72.18	72.49	0.36	4.40	1.00	0.09
72.34	71.37	0.36	4.47	1.00	0.09	72.51	70.61	0.35	4.51	1.00	0.09
72.67	70.69	0.35	4.51	1.00	0.09	72.83	70.87	0.36	4.50	1.00	0.09
73.00	30.48	2.00	0.00	1.00	0.00	73.16	29.70	2.00	0.00	1.00	0.00
73.33	28.83	2.00	0.00	1.00	0.00	73.49	28.10	2.00	0.00	1.00	0.00
73.65	27.31	2.00	0.00	1.00	0.00	73.82	26.06	2.00	0.00	1.00	0.00
73.98	24.75	2.00	0.00	1.00	0.00	74.15	23.80	2.00	0.00	1.00	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)
74.31	23.75	2.00	0.00	1.00	0.00	74.48	24.11	2.00	0.00	1.00	0.00
74.64	24.33	2.00	0.00	1.00	0.00	74.80	24.13	2.00	0.00	1.00	0.00
74.97	23.77	2.00	0.00	1.00	0.00	75.13	23.57	2.00	0.00	1.00	0.00
75.30	23.55	2.00	0.00	1.00	0.00	75.46	23.55	2.00	0.00	1.00	0.00
75.62	23.44	2.00	0.00	1.00	0.00	75.79	23.15	2.00	0.00	1.00	0.00
75.95	22.70	2.00	0.00	1.00	0.00	76.12	22.28	2.00	0.00	1.00	0.00
76.28	21.99	2.00	0.00	1.00	0.00	76.44	21.85	2.00	0.00	1.00	0.00
76.61	21.68	2.00	0.00	1.00	0.00	76.77	21.44	2.00	0.00	1.00	0.00
76.94	21.22	2.00	0.00	1.00	0.00	77.10	21.21	2.00	0.00	1.00	0.00
77.26	21.44	2.00	0.00	1.00	0.00	77.43	21.89	2.00	0.00	1.00	0.00
77.59	22.29	2.00	0.00	1.00	0.00	77.76	22.47	2.00	0.00	1.00	0.00
77.92	22.40	2.00	0.00	1.00	0.00	78.08	22.32	2.00	0.00	1.00	0.00
78.25	22.33	2.00	0.00	1.00	0.00	78.41	22.37	2.00	0.00	1.00	0.00
78.58	22.51	2.00	0.00	1.00	0.00	78.74	23.09	2.00	0.00	1.00	0.00
78.90	24.27	2.00	0.00	1.00	0.00	79.07	25.68	2.00	0.00	1.00	0.00
79.23	26.73	2.00	0.00	1.00	0.00	79.40	65.95	0.34	4.81	1.00	0.10
79.56	66.11	0.34	4.80	1.00	0.09	79.72	66.12	0.34	4.79	1.00	0.09
79.89	66.36	0.35	4.78	1.00	0.10	80.05	66.83	0.35	4.75	1.00	0.09
80.22	67.19	0.35	4.72	1.00	0.10	80.38	67.38	0.35	4.71	1.00	0.09
80.54	66.93	0.35	4.74	1.00	0.09	80.71	66.56	0.35	4.77	1.00	0.10
80.87	66.23	0.35	4.79	1.00	0.09	81.04	66.21	0.35	4.79	1.00	0.10
81.20	66.44	0.35	4.77	1.00	0.09	81.36	66.95	0.35	4.74	1.00	0.09
81.53	67.95	0.35	4.68	1.00	0.10	81.69	69.11	0.36	4.60	1.00	0.09
81.86	70.38	0.37	4.53	1.00	0.09	82.02	71.71	0.37	4.45	1.00	0.09
82.19	73.11	0.38	4.37	1.00	0.09	82.35	74.32	0.38	4.30	1.00	0.08
82.51	74.68	0.39	4.28	1.00	0.08	82.68	74.14	0.38	4.31	1.00	0.09
82.84	74.93	0.39	4.27	1.00	0.08	83.01	83.74	0.43	3.84	1.00	0.08
83.17	102.34	0.53	3.14	1.00	0.06	83.33	131.84	2.00	0.00	1.00	0.00
83.50	165.91	2.00	0.00	1.00	0.00	83.66	205.40	2.00	0.00	1.00	0.00
83.83	243.95	2.00	0.00	1.00	0.00	83.99	258.96	2.00	0.00	1.00	0.00
84.15	242.90	2.00	0.00	1.00	0.00	84.32	200.94	2.00	0.00	1.00	0.00
84.48	190.48	2.00	0.00	1.00	0.00	84.65	227.56	2.00	0.00	1.00	0.00
84.81	285.11	2.00	0.00	1.00	0.00	84.97	308.28	2.00	0.00	1.00	0.00
85.14	293.41	2.00	0.00	1.00	0.00	85.30	265.20	2.00	0.00	1.00	0.00
85.47	255.97	2.00	0.00	1.00	0.00	85.63	279.40	2.00	0.00	1.00	0.00
85.79	309.46	2.00	0.00	1.00	0.00	85.96	338.03	2.00	0.00	1.00	0.00
86.12	362.13	2.00	0.00	1.00	0.00	86.29	376.48	2.00	0.00	1.00	0.00
86.45	355.77	2.00	0.00	1.00	0.00	86.61	299.82	2.00	0.00	1.00	0.00
86.78	227.45	2.00	0.00	1.00	0.00	86.94	195.68	2.00	0.00	1.00	0.00
87.11	212.52	2.00	0.00	1.00	0.00	87.27	254.06	2.00	0.00	1.00	0.00
87.43	281.85	2.00	0.00	1.00	0.00	87.60	320.51	2.00	0.00	1.00	0.00

Total estimated settlement: 21.76

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	31.16	50.05	1.51	75.57	2.13	N/A	N/A
0.33	61.61	98.96	1.18	116.62	1.89	N/A	N/A
0.49	174.16	279.77	1.00	279.77	1.58	N/A	N/A
0.66	256.26	411.66	1.00	411.66	1.48	N/A	N/A
0.82	365.63	587.35	1.00	587.35	1.36	N/A	N/A
0.98	401.24	644.55	1.00	644.55	1.24	N/A	N/A
1.15	433.22	695.91	1.00	695.91	1.18	N/A	N/A
1.31	428.97	689.06	1.00	689.06	1.14	N/A	N/A
1.48	402.66	646.78	1.00	646.78	1.18	N/A	N/A
1.64	362.82	582.75	1.00	582.75	1.20	N/A	N/A
1.80	287.66	461.98	1.00	461.98	1.37	N/A	N/A
1.97	226.20	363.22	1.00	363.22	1.58	N/A	N/A
2.13	181.91	292.04	1.06	308.99	1.73	N/A	N/A
2.30	134.35	215.62	1.12	240.80	1.81	N/A	N/A
2.46	86.80	139.20	1.24	172.03	1.95	N/A	N/A
2.62	39.23	62.77	1.72	107.73	2.22	N/A	N/A
2.79	37.02	59.19	1.76	104.34	2.24	N/A	N/A
2.95	33.63	53.73	1.77	95.25	2.24	N/A	N/A
3.12	29.84	47.63	1.86	88.67	2.27	N/A	N/A
3.28	28.03	44.71	1.93	86.44	2.30	N/A	N/A
3.44	26.94	42.94	2.09	89.54	2.34	N/A	N/A
3.61	25.42	40.49	2.17	87.92	2.36	N/A	N/A
3.77	23.14	36.80	2.33	85.68	2.40	N/A	N/A
3.94	20.46	32.48	2.64	85.59	2.47	N/A	N/A
4.10	18.03	28.57	2.77	79.10	2.50	N/A	N/A
4.27	16.16	25.55	2.89	73.94	2.52	N/A	N/A
4.43	14.70	23.20	3.09	71.66	2.56	N/A	N/A
4.59	13.27	20.88	3.65	76.30	2.65	N/A	N/A
4.76	11.94	18.73	4.10	76.88	2.71	N/A	N/A
4.92	10.83	16.93	4.26	72.10	2.73	N/A	N/A
5.09	10.41	16.23	4.33	70.26	2.74	N/A	N/A
5.25	10.44	16.27	4.50	73.30	2.77	N/A	N/A
5.41	10.75	16.75	4.65	77.94	2.78	N/A	N/A
5.58	10.83	16.87	4.83	81.46	2.81	N/A	N/A
5.74	10.67	16.61	4.81	79.83	2.80	N/A	N/A
5.91	10.43	16.20	4.82	78.15	2.80	N/A	N/A
6.07	10.29	15.96	4.90	78.24	2.81	N/A	N/A
6.23	10.22	15.84	5.01	79.40	2.83	N/A	N/A
6.40	10.08	15.60	4.98	77.71	2.82	N/A	N/A
6.56	9.82	15.17	4.83	73.32	2.81	N/A	N/A
6.73	9.54	14.70	4.75	69.86	2.80	N/A	N/A
6.89	9.33	14.34	4.75	68.08	2.80	N/A	N/A
7.05	9.26	14.23	4.91	69.92	2.82	N/A	N/A
7.22	9.43	14.48	5.04	73.03	2.83	N/A	N/A
7.38	9.82	15.10	5.04	76.07	2.83	N/A	N/A
7.55	10.17	15.64	4.63	72.34	2.78	N/A	N/A
7.71	10.17	15.63	4.22	65.97	2.73	N/A	N/A
7.87	9.81	15.04	4.07	61.14	2.71	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	9.63	14.73	4.29	63.20	2.74	N/A	N/A
8.20	10.12	15.50	4.56	70.69	2.77	N/A	N/A
8.37	11.42	17.59	4.46	78.48	2.76	N/A	N/A
8.53	13.10	20.27	4.20	85.18	2.73	N/A	N/A
8.69	14.46	22.44	3.96	88.90	2.70	N/A	N/A
8.86	14.98	23.26	3.78	87.85	2.67	N/A	N/A
9.02	14.57	22.59	3.71	83.82	2.66	N/A	N/A
9.19	13.63	21.07	3.71	78.18	2.66	N/A	N/A
9.35	12.53	19.29	3.84	74.10	2.68	N/A	N/A
9.51	11.37	17.40	4.19	72.85	2.73	N/A	N/A
9.68	10.03	15.23	4.49	68.39	2.76	N/A	N/A
9.84	8.66	13.02	4.91	63.91	2.81	N/A	N/A
10.01	7.65	11.39	5.09	58.00	2.84	N/A	N/A
10.17	7.33	10.86	5.09	55.33	2.84	N/A	N/A
10.33	7.46	11.05	4.87	53.78	2.81	N/A	N/A
10.50	7.67	11.38	4.64	52.86	2.78	N/A	N/A
10.66	7.86	11.67	4.89	57.09	2.81	N/A	N/A
10.83	8.57	12.79	4.73	60.50	2.79	N/A	N/A
10.99	10.65	15.78	4.37	69.00	2.75	N/A	N/A
11.15	15.15	22.03	3.58	78.84	2.64	N/A	N/A
11.32	22.86	32.43	2.82	91.30	2.51	0.06	0.68
11.48	33.72	46.64	2.16	100.63	2.36	0.07	0.73
11.65	45.57	61.66	1.80	111.26	2.25	0.09	0.76
11.81	54.44	72.80	1.68	122.50	2.21	0.10	0.78
11.98	57.00	76.06	1.72	131.15	2.22	0.11	0.79
12.14	53.40	71.51	1.87	133.96	2.28	0.10	0.78
12.30	47.18	63.44	2.07	131.63	2.34	0.09	0.77
12.47	42.22	56.99	2.32	132.37	2.40	0.09	0.75
12.63	39.33	53.25	2.57	136.85	2.46	0.08	0.74
12.80	37.01	50.18	2.81	140.92	2.51	0.08	0.73
12.96	33.49	45.31	3.00	135.80	2.54	0.08	0.72
13.12	28.80	38.85	3.23	125.43	2.58	0.07	0.70
13.29	23.97	32.28	3.59	115.85	2.64	0.07	2.42
13.45	19.91	26.81	4.12	110.51	2.72	0.07	1.98
13.62	16.92	22.75	4.71	107.11	2.79	0.06	1.66
13.78	14.77	19.77	5.21	103.01	2.85	0.06	1.43
13.94	13.42	17.89	5.61	100.36	2.89	0.06	1.29
14.11	13.05	17.28	5.79	99.98	2.91	0.06	1.24
14.27	13.88	18.28	5.57	101.92	2.89	0.06	1.31
14.44	15.47	20.25	5.20	105.32	2.85	0.06	1.46
14.60	16.96	22.11	5.01	110.70	2.83	0.06	1.60
14.76	17.74	23.02	5.00	115.18	2.83	0.07	1.67
14.93	18.42	23.74	4.86	115.30	2.81	0.06	1.72
15.09	20.14	25.67	4.31	110.62	2.74	0.06	1.88
15.26	23.19	29.11	3.53	102.73	2.63	0.06	2.17
15.42	26.67	33.18	3.15	104.50	2.57	0.07	0.68
15.58	29.45	36.39	2.94	107.08	2.53	0.07	0.69
15.75	31.04	38.18	2.93	111.87	2.53	0.07	0.70

:: 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	31.73	38.77	2.84	110.05	2.51	0.07	0.70
16.08	31.71	38.48	2.79	107.30	2.50	0.07	0.70
16.24	31.17	37.52	2.68	100.65	2.48	0.07	0.70
16.40	30.28	36.15	2.58	93.25	2.46	0.07	0.69
16.57	29.44	34.87	2.51	87.46	2.45	0.06	0.69
16.73	29.18	34.40	2.52	86.54	2.45	0.06	0.69
16.90	29.61	34.76	2.52	87.73	2.45	0.06	0.69
17.06	30.39	35.54	2.51	89.32	2.45	0.07	0.69
17.22	31.00	36.05	2.46	88.50	2.43	0.07	0.69
17.39	31.27	36.39	2.69	97.72	2.48	0.07	0.69
17.55	31.63	36.73	2.79	102.56	2.50	0.07	0.70
17.72	32.11	37.17	2.87	106.77	2.52	0.07	0.70
17.88	32.95	37.82	2.65	100.33	2.48	0.07	0.70
18.04	33.98	38.75	2.53	97.90	2.45	0.07	0.70
18.21	35.55	40.45	2.58	104.30	2.46	0.07	0.71
18.37	37.84	43.03	2.70	116.19	2.49	0.07	0.72
18.54	40.55	46.01	2.78	127.92	2.50	0.08	0.72
18.70	42.89	48.45	2.72	131.83	2.49	0.08	0.73
18.86	43.61	48.93	2.60	127.42	2.47	0.08	0.73
19.03	42.45	47.28	2.52	119.24	2.45	0.08	0.73
19.19	39.78	44.02	2.51	110.46	2.45	0.08	0.72
19.36	36.62	40.24	2.52	101.50	2.45	0.07	0.71
19.52	33.62	36.68	2.54	93.02	2.45	0.07	0.70
19.69	31.24	33.89	2.61	88.41	2.47	0.07	0.69
19.85	29.37	31.74	2.79	88.64	2.50	0.06	0.68
20.01	27.93	30.08	3.00	90.33	2.54	0.06	0.67
20.18	26.80	28.68	3.02	86.60	2.55	0.06	0.67
20.34	25.80	27.44	3.00	82.35	2.54	0.06	0.66
20.51	24.78	26.16	2.94	76.85	2.53	0.06	0.65
20.67	23.71	24.89	3.00	74.69	2.54	0.06	0.65
20.83	22.88	23.91	3.12	74.55	2.56	0.06	0.64
21.00	22.45	23.39	3.33	77.89	2.60	0.06	1.70
21.16	22.41	23.31	3.65	85.17	2.65	0.06	1.69
21.33	22.56	23.42	3.94	92.18	2.69	0.06	1.70
21.49	22.93	23.74	4.06	96.48	2.71	0.06	1.72
21.65	23.40	24.11	3.91	94.20	2.69	0.06	1.74
21.82	23.66	24.23	3.63	88.05	2.65	0.06	1.76
21.98	23.32	23.72	3.48	82.44	2.62	0.06	1.72
22.15	22.50	22.73	3.46	78.56	2.62	0.06	1.65
22.31	21.65	21.74	3.51	76.36	2.63	0.06	1.57
22.47	21.40	21.39	3.52	75.26	2.63	0.06	1.55
22.64	22.05	21.96	3.41	74.85	2.61	0.06	1.59
22.80	23.55	23.42	3.28	76.91	2.59	0.06	0.64
22.97	25.68	25.51	3.04	77.55	2.55	0.06	0.65
23.13	27.63	27.38	2.78	76.23	2.50	0.06	0.66
23.29	28.46	28.08	2.56	71.89	2.46	0.06	0.66
23.46	27.86	27.33	2.48	67.68	2.44	0.06	0.66
23.62	26.18	25.53	2.57	65.56	2.46	0.06	0.65

:: 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	24.67	23.92	2.71	64.87	2.49	0.06	0.64
23.95	24.44	23.60	2.75	64.94	2.50	0.06	0.64
24.11	25.84	24.93	2.75	68.54	2.50	0.06	0.65
24.28	28.22	27.24	2.68	72.89	2.48	0.06	0.66
24.44	29.96	28.89	2.69	77.72	2.48	0.06	0.67
24.61	29.82	28.64	2.74	78.41	2.49	0.06	0.67
24.77	28.60	27.35	3.01	82.33	2.55	0.06	0.66
24.93	27.86	26.52	3.23	85.79	2.58	0.06	0.66
25.10	28.27	26.83	3.33	89.40	2.60	0.06	1.93
25.26	27.93	26.37	3.26	85.98	2.59	0.07	0.66
25.43	24.75	23.12	3.44	79.56	2.62	0.06	1.66
25.59	21.38	19.72	3.74	73.80	2.66	0.06	1.41
25.75	23.45	21.70	4.25	92.21	2.73	0.06	1.55
25.92	27.86	25.93	4.19	108.66	2.73	0.07	1.86
26.08	38.78	36.45	3.68	134.00	2.65	0.07	2.61
26.25	51.53	48.61	3.06	148.87	2.56	0.09	0.73
26.41	66.42	62.71	2.48	155.39	2.44	0.11	0.76
26.57	71.33	67.14	2.20	148.03	2.37	0.12	0.77
26.74	65.07	60.85	2.13	129.38	2.35	0.10	0.76
26.90	53.51	49.61	2.33	115.36	2.40	0.09	0.73
27.07	44.59	40.93	2.58	105.53	2.46	0.08	0.71
27.23	40.64	37.04	2.86	105.92	2.52	0.07	0.70
27.40	40.48	36.73	3.03	111.29	2.55	0.08	0.70
27.56	43.28	39.20	3.13	122.70	2.57	0.08	0.70
27.72	49.42	44.78	3.14	140.82	2.57	0.09	0.72
27.89	57.51	52.12	2.99	155.62	2.54	0.10	0.74
28.05	62.88	56.89	2.83	161.08	2.51	0.11	0.75
28.22	61.68	55.56	2.56	142.04	2.46	0.10	0.75
28.38	53.42	47.76	2.41	115.00	2.42	0.09	0.73
28.54	42.55	37.61	2.35	88.36	2.41	0.07	0.70
28.71	33.51	29.15	2.84	82.92	2.51	0.06	0.67
28.87	28.60	24.52	3.51	85.99	2.63	0.06	1.74
29.04	26.87	22.82	3.98	90.81	2.70	0.06	1.62
29.20	26.59	22.47	4.11	92.44	2.72	0.06	1.60
29.36	26.77	22.54	4.16	93.84	2.72	0.06	1.61
29.53	27.02	22.67	4.16	94.37	2.72	0.07	1.61
29.69	27.05	22.60	4.24	95.87	2.73	0.07	1.61
29.86	26.76	22.23	4.45	98.99	2.76	0.07	1.58
30.02	26.14	21.57	4.70	101.40	2.79	0.07	1.54
30.18	25.71	21.08	5.00	105.40	2.82	0.07	1.50
30.35	25.71	21.00	4.92	103.41	2.82	0.07	1.50
30.51	26.21	21.36	4.71	100.57	2.79	0.07	1.52
30.68	26.70	21.72	4.38	95.15	2.75	0.07	1.55
30.84	26.67	21.62	4.28	92.49	2.74	0.07	1.54
31.00	26.29	21.21	4.27	90.45	2.74	0.06	1.51
31.17	26.10	20.96	4.21	88.17	2.73	0.06	1.49
31.33	26.60	21.33	4.08	86.95	2.71	0.06	1.51
31.50	27.39	21.93	3.95	86.64	2.69	0.06	1.56

:: 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	27.84	22.25	3.86	85.76	2.68	0.06	1.58
31.82	27.59	21.97	3.77	82.83	2.67	0.06	1.56
31.99	26.83	21.25	3.70	78.65	2.66	0.06	1.50
32.15	26.18	20.60	3.86	79.46	2.68	0.06	1.46
32.32	26.69	20.89	4.31	90.05	2.74	0.06	1.48
32.48	29.56	23.17	4.56	105.70	2.77	0.07	1.65
32.64	34.43	27.23	4.05	110.28	2.71	0.07	1.93
32.81	39.75	31.77	3.14	99.66	2.57	0.07	0.68
32.97	42.24	33.99	2.44	83.05	2.43	0.07	0.69
33.14	41.18	33.01	2.38	78.48	2.42	0.07	0.68
33.30	38.17	30.20	2.87	86.81	2.52	0.07	0.67
33.46	36.00	28.15	3.37	94.91	2.61	0.07	1.98
33.63	36.21	28.24	3.33	94.00	2.60	0.07	1.99
33.79	36.91	28.79	3.05	87.79	2.55	0.07	0.67
33.96	37.04	28.73	3.26	93.58	2.59	0.07	0.67
34.12	36.62	28.14	3.78	106.30	2.67	0.07	1.99
34.28	37.38	28.61	3.92	112.16	2.69	0.07	2.02
34.45	39.52	30.31	3.61	109.56	2.65	0.07	2.13
34.61	41.39	31.88	3.10	98.90	2.56	0.07	0.68
34.78	40.88	31.39	2.99	93.90	2.54	0.07	0.68
34.94	37.53	28.59	2.99	85.45	2.54	0.07	0.66
35.10	32.33	24.20	3.44	83.19	2.62	0.07	1.70
35.27	27.88	20.44	4.07	83.17	2.71	0.06	1.44
35.43	26.24	18.94	4.80	90.98	2.80	0.06	1.35
35.60	29.25	21.25	4.57	97.10	2.77	0.06	1.51
35.76	35.44	26.17	3.90	102.02	2.69	0.07	1.84
35.93	43.13	32.38	3.11	100.61	2.56	0.08	0.68
36.09	48.59	36.69	2.86	104.82	2.52	0.08	0.70
36.25	50.54	38.03	2.97	113.12	2.54	0.08	0.70
36.42	48.76	36.31	3.33	120.89	2.60	0.08	2.54
36.58	45.66	33.67	3.57	120.17	2.64	0.08	2.36
36.75	43.85	32.15	3.57	114.65	2.64	0.08	2.25
36.91	44.14	32.31	3.45	111.51	2.62	0.08	2.26
37.07	45.48	33.26	3.37	111.92	2.61	0.08	2.32
37.24	46.03	33.63	3.23	108.50	2.58	0.08	0.68
37.40	45.21	32.89	3.21	105.46	2.58	0.08	0.68
37.57	43.51	31.42	3.33	104.63	2.60	0.08	2.19
37.73	42.45	30.42	3.54	107.67	2.63	0.08	2.13
37.89	43.20	30.91	3.45	106.77	2.62	0.08	2.16
38.06	45.87	32.95	3.18	104.69	2.58	0.08	0.68
38.22	49.13	35.50	2.84	100.73	2.51	0.08	0.69
38.39	50.61	36.54	2.77	101.05	2.50	0.08	0.69
38.55	49.34	35.39	2.89	102.25	2.52	0.08	0.69
38.71	45.64	32.25	3.32	106.94	2.60	0.08	0.68
38.88	41.47	28.92	3.61	104.28	2.64	0.07	2.02
39.04	37.28	25.67	3.78	96.98	2.67	0.07	1.80
39.21	33.07	22.45	3.95	88.58	2.69	0.07	1.58
39.37	28.60	19.01	4.40	83.73	2.75	0.06	1.34

:: 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	25.58	16.62	5.11	84.94	2.84	0.06	1.19
39.70	26.54	17.23	5.22	89.98	2.85	0.06	1.23
39.86	31.37	20.73	4.60	95.42	2.78	0.07	1.47
40.03	36.95	24.93	3.77	93.95	2.67	0.07	1.75
40.19	38.45	26.08	3.41	88.87	2.61	0.07	1.82
40.35	36.82	24.82	3.42	84.97	2.62	0.07	1.73
40.52	36.32	24.38	3.41	83.10	2.61	0.06	1.70
40.68	40.16	27.25	3.04	82.73	2.55	0.07	0.66
40.85	43.54	29.77	2.76	82.26	2.50	0.07	0.67
41.01	41.79	28.34	2.90	82.11	2.52	0.07	0.66
41.17	34.23	22.63	3.32	75.05	2.60	0.06	0.64
41.34	27.01	17.24	3.98	68.62	2.70	0.06	1.21
41.50	24.66	15.40	4.58	70.52	2.78	0.06	1.09
41.67	29.13	18.48	4.41	81.48	2.75	0.06	1.31
41.83	37.89	24.82	3.53	87.60	2.63	0.07	1.73
41.99	46.59	31.14	3.02	94.00	2.55	0.08	0.68
42.16	50.44	33.95	2.78	94.28	2.50	0.08	0.69
42.32	48.00	32.03	2.89	92.71	2.52	0.08	0.68
42.49	41.46	27.24	3.06	83.27	2.55	0.07	0.66
42.65	35.24	22.68	3.36	76.13	2.60	0.06	1.57
42.81	32.65	20.80	3.43	71.23	2.62	0.06	1.44
42.98	35.98	22.95	3.57	81.87	2.64	0.06	1.60
43.14	45.43	29.45	3.37	99.21	2.61	0.07	2.04
43.31	56.09	36.82	3.14	115.58	2.57	0.09	0.70
43.47	62.54	41.45	2.82	117.03	2.51	0.09	0.71
43.64	60.78	40.30	2.64	106.50	2.47	0.09	0.71
43.80	54.63	35.84	2.74	98.08	2.49	0.08	0.69
43.96	50.30	32.42	3.15	101.98	2.57	0.07	0.68
44.13	52.14	33.31	3.47	115.73	2.62	0.08	2.31
44.29	57.38	36.84	3.31	121.95	2.60	0.09	0.70
44.46	60.52	38.93	3.19	124.10	2.58	0.09	0.70
44.62	58.61	37.61	3.10	116.53	2.56	0.09	0.70
44.78	54.28	34.46	3.25	112.13	2.59	0.08	0.69
44.95	51.12	32.26	3.24	104.48	2.59	0.08	0.68
45.11	50.58	31.82	3.22	102.54	2.58	0.08	0.68
45.28	51.43	32.44	3.04	98.47	2.55	0.08	0.68
45.44	50.76	31.93	3.00	95.75	2.54	0.08	0.68
45.60	48.61	30.40	3.02	91.70	2.55	0.07	0.67
45.77	46.11	28.30	3.50	99.11	2.63	0.07	1.96
45.93	46.10	28.14	3.59	101.05	2.64	0.07	1.96
46.10	48.32	29.44	3.65	107.39	2.65	0.08	2.05
46.26	52.68	32.33	3.43	110.82	2.62	0.08	2.24
46.42	58.01	35.74	3.34	119.53	2.60	0.09	2.47
46.59	61.20	37.71	3.30	124.56	2.60	0.09	0.70
46.75	61.16	37.80	3.08	116.43	2.56	0.09	0.70
46.92	57.46	35.44	2.94	104.13	2.53	0.08	0.69
47.08	53.04	32.51	2.90	94.40	2.53	0.07	0.68
47.24	50.04	30.24	3.19	96.46	2.58	0.07	0.67

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	49.44	29.51	3.50	103.30	2.63	0.07	2.04
47.57	50.50	30.14	3.44	103.62	2.62	0.08	2.08
47.74	51.42	30.80	3.23	99.39	2.58	0.08	0.67
47.90	52.07	31.49	2.83	89.20	2.51	0.07	0.68
48.06	52.77	32.10	2.61	83.72	2.47	0.07	0.68
48.23	53.73	32.81	2.45	80.50	2.43	0.07	0.68
48.39	54.75	33.48	2.38	79.69	2.42	0.07	0.68
48.56	55.96	34.18	2.37	80.85	2.41	0.07	0.69
48.72	57.76	35.33	2.31	81.65	2.40	0.07	0.69
48.88	59.24	36.15	2.34	84.47	2.41	0.07	0.69
49.05	60.54	36.99	2.27	83.96	2.39	0.08	0.70
49.21	61.32	37.42	2.25	84.30	2.39	0.08	0.70
49.38	61.77	37.69	2.20	82.93	2.37	0.08	0.70
49.54	61.45	37.28	2.27	84.66	2.39	0.08	0.70
49.70	60.81	36.60	2.38	86.96	2.42	0.08	0.69
49.87	59.78	35.70	2.48	88.52	2.44	0.08	0.69
50.03	57.71	34.12	2.62	89.34	2.47	0.08	0.69
50.20	55.51	32.60	2.67	86.92	2.48	0.08	0.68
50.36	53.78	31.41	2.70	84.71	2.49	0.07	0.68
50.52	54.56	32.01	2.53	81.00	2.45	0.07	0.68
50.69	57.06	33.69	2.38	80.02	2.42	0.07	0.68
50.85	60.69	36.05	2.26	81.40	2.39	0.07	0.69
51.02	63.69	37.93	2.21	83.65	2.37	0.08	0.70
51.18	65.17	38.87	2.15	83.49	2.36	0.08	0.70
51.35	65.18	38.89	2.09	81.45	2.34	0.08	0.70
51.51	65.15	38.81	2.08	80.59	2.34	0.08	0.70
51.67	66.20	39.34	2.09	82.32	2.34	0.08	0.70
51.84	68.12	40.25	2.17	87.47	2.36	0.08	0.71
52.00	69.90	41.32	2.14	88.56	2.36	0.08	0.71
52.17	70.05	41.32	2.13	88.12	2.35	0.08	0.71
52.33	69.42	41.03	2.05	83.92	2.33	0.08	0.71
52.49	68.64	40.51	2.02	81.81	2.32	0.08	0.71
52.66	68.94	40.67	1.99	80.80	2.31	0.08	0.71
52.82	70.07	41.33	1.96	81.11	2.30	0.08	0.71
52.99	71.22	41.95	1.96	82.10	2.30	0.08	0.71
53.15	71.77	42.20	1.95	82.34	2.30	0.08	0.71
53.31	71.61	41.95	1.97	82.79	2.31	0.08	0.71
53.48	71.60	41.81	1.98	82.89	2.31	0.08	0.71
53.64	71.85	41.77	2.02	84.48	2.32	0.08	0.71
53.81	72.52	42.00	2.05	86.12	2.33	0.08	0.71
53.97	73.11	42.16	2.09	87.97	2.34	0.08	0.71
54.13	74.09	42.79	2.03	87.00	2.33	0.08	0.71
54.30	75.08	43.32	2.01	87.18	2.32	0.08	0.72
54.46	76.59	44.28	1.96	86.84	2.30	0.08	0.72
54.63	77.65	44.72	1.99	88.90	2.31	0.08	0.72
54.79	78.81	45.33	1.98	89.85	2.31	0.08	0.72
54.95	79.38	45.52	1.99	90.82	2.31	0.09	0.72
55.12	79.86	45.73	1.98	90.65	2.31	0.09	0.72

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.28	79.99	45.73	1.97	90.20	2.31	0.09	0.72
55.45	79.98	45.66	1.96	89.32	2.30	0.09	0.72
55.61	80.04	45.62	1.95	88.75	2.30	0.09	0.72
55.77	79.87	45.46	1.93	87.77	2.29	0.08	0.72
55.94	79.26	45.01	1.92	86.51	2.29	0.08	0.72
56.10	78.24	44.24	1.94	86.04	2.30	0.08	0.72
56.27	77.73	43.73	1.98	86.55	2.31	0.08	0.72
56.43	77.95	43.63	2.02	88.15	2.32	0.08	0.72
56.59	78.76	44.05	2.00	88.30	2.32	0.08	0.72
56.76	79.03	44.17	1.98	87.50	2.31	0.08	0.72
56.92	79.27	44.29	1.95	86.48	2.30	0.08	0.72
57.09	79.58	44.33	1.97	87.12	2.31	0.08	0.72
57.25	80.10	44.42	2.00	88.80	2.32	0.09	0.72
57.41	80.12	44.28	2.01	89.19	2.32	0.09	0.72
57.58	79.50	43.80	2.02	88.41	2.32	0.08	0.72
57.74	79.10	43.58	1.98	86.48	2.31	0.08	0.72
57.91	79.03	43.43	1.98	86.17	2.31	0.08	0.72
58.07	79.48	43.66	1.96	85.60	2.30	0.08	0.72
58.23	79.45	43.46	1.99	86.41	2.31	0.08	0.72
58.40	79.49	43.36	1.99	86.42	2.31	0.08	0.72
58.56	78.78	42.75	2.03	86.79	2.32	0.08	0.71
58.73	77.98	42.14	2.05	86.31	2.33	0.08	0.71
58.89	77.14	41.49	2.08	86.20	2.34	0.08	0.71
59.06	77.29	41.43	2.09	86.64	2.34	0.08	0.71
59.22	78.36	41.99	2.07	87.01	2.34	0.08	0.71
59.38	79.19	42.82	1.92	82.32	2.29	0.08	0.71
59.55	78.32	42.15	1.95	82.02	2.30	0.08	0.71
59.71	75.11	39.96	2.05	81.82	2.33	0.08	0.71
59.88	70.67	36.70	2.34	85.89	2.41	0.08	0.70
60.04	67.62	34.71	2.45	85.19	2.43	0.08	0.69
60.20	66.61	34.14	2.43	82.94	2.43	0.08	0.69
60.37	65.81	33.44	2.52	84.27	2.45	0.08	0.68
60.53	64.23	32.04	2.81	90.19	2.51	0.08	0.68
60.70	64.14	31.07	3.44	106.71	2.62	0.08	2.14
60.86	68.96	33.22	3.62	120.13	2.65	0.09	2.30
61.02	74.88	36.31	3.48	126.40	2.62	0.10	2.50
61.19	77.69	38.28	3.07	117.39	2.56	0.10	0.70
61.35	74.76	37.32	2.70	100.69	2.49	0.09	0.70
61.52	70.31	35.49	2.40	85.15	2.42	0.08	0.69
61.68	67.68	34.19	2.31	79.01	2.40	0.07	0.69
61.84	67.80	34.07	2.36	80.52	2.41	0.07	0.69
62.01	69.63	34.97	2.36	82.49	2.41	0.08	0.69
62.17	71.58	36.02	2.31	83.25	2.40	0.08	0.69
62.34	72.99	36.70	2.31	84.66	2.40	0.08	0.70
62.50	73.71	37.04	2.29	84.68	2.39	0.08	0.70
62.66	73.64	36.92	2.29	84.40	2.39	0.08	0.70
62.83	73.18	36.57	2.29	83.91	2.40	0.08	0.69
62.99	72.80	36.24	2.31	83.80	2.40	0.08	0.69

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
63.16	72.75	36.09	2.33	84.11	2.40	0.08	0.69
63.32	73.25	36.29	2.32	84.20	2.40	0.08	0.69
63.48	73.90	36.50	2.34	85.38	2.41	0.08	0.69
63.65	74.63	36.62	2.41	88.40	2.42	0.08	0.70
63.81	75.13	36.62	2.48	90.95	2.44	0.08	0.70
63.98	75.58	36.71	2.50	91.97	2.44	0.08	0.70
64.14	75.79	36.86	2.46	90.56	2.43	0.08	0.70
64.30	76.14	37.10	2.39	88.84	2.42	0.08	0.70
64.47	76.57	37.24	2.39	89.02	2.42	0.08	0.70
64.63	77.17	37.47	2.39	89.48	2.42	0.08	0.70
64.80	77.58	37.59	2.38	89.63	2.42	0.08	0.70
64.96	77.68	37.66	2.34	88.22	2.41	0.08	0.70
65.12	77.67	37.66	2.31	86.86	2.40	0.08	0.70
65.29	77.53	37.52	2.30	86.21	2.40	0.08	0.70
65.45	77.36	37.36	2.29	85.70	2.40	0.08	0.70
65.62	76.92	37.03	2.30	85.26	2.40	0.08	0.70
65.78	76.33	36.61	2.32	84.87	2.40	0.08	0.70
65.94	75.78	36.19	2.34	84.78	2.41	0.08	0.69
66.11	75.34	35.83	2.37	84.81	2.41	0.08	0.69
66.27	75.03	35.52	2.40	85.25	2.42	0.08	0.69
66.44	74.76	35.23	2.43	85.59	2.43	0.08	0.69
66.60	74.42	34.94	2.45	85.58	2.43	0.08	0.69
66.77	73.88	34.58	2.45	84.87	2.43	0.08	0.69
66.93	73.12	34.04	2.49	84.84	2.44	0.08	0.69
67.09	72.49	33.57	2.52	84.72	2.45	0.08	0.68
67.26	72.02	33.23	2.54	84.41	2.45	0.08	0.68
67.42	71.53	33.00	2.51	82.81	2.45	0.08	0.68
67.59	70.62	32.51	2.50	81.18	2.44	0.08	0.68
67.75	69.41	31.84	2.50	79.59	2.44	0.08	0.68
67.91	68.15	31.03	2.56	79.29	2.46	0.07	0.67
68.08	67.21	30.38	2.62	79.69	2.47	0.07	0.67
68.24	66.64	29.88	2.71	81.04	2.49	0.08	0.67
68.41	66.38	29.62	2.75	81.47	2.50	0.08	0.67
68.57	66.15	29.43	2.76	81.32	2.50	0.08	0.67
68.73	65.86	29.21	2.77	80.93	2.50	0.07	0.67
68.90	65.62	29.01	2.78	80.72	2.50	0.07	0.67
69.06	65.49	28.85	2.80	80.84	2.51	0.07	0.67
69.23	65.53	28.82	2.79	80.39	2.50	0.07	0.67
69.39	65.48	28.74	2.79	80.10	2.50	0.07	0.67
69.55	65.27	28.51	2.82	80.53	2.51	0.07	0.66
69.72	64.71	28.09	2.89	81.10	2.52	0.07	0.66
69.88	63.74	27.49	2.94	80.91	2.53	0.07	0.66
70.05	62.97	27.07	2.94	79.65	2.53	0.07	0.66
70.21	62.40	26.72	2.97	79.25	2.54	0.07	0.66
70.37	62.04	26.43	3.01	79.62	2.55	0.07	0.66
70.54	61.42	26.00	3.07	79.84	2.56	0.07	0.65
70.70	60.72	25.60	3.09	79.14	2.56	0.07	0.65
70.87	60.51	25.53	3.03	77.33	2.55	0.07	0.65

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
71.03	60.59	25.61	2.96	75.73	2.54	0.07	0.65
71.19	60.93	25.80	2.89	74.54	2.52	0.07	0.65
71.36	60.92	25.71	2.91	74.73	2.53	0.07	0.65
71.52	60.72	25.49	2.96	75.51	2.54	0.07	0.65
71.69	60.24	25.10	3.05	76.47	2.55	0.07	0.65
71.85	59.72	24.73	3.11	76.83	2.56	0.07	0.65
72.01	58.91	24.22	3.18	77.07	2.58	0.07	0.65
72.18	57.84	23.64	3.23	76.25	2.58	0.07	0.64
72.34	56.63	22.97	3.30	75.70	2.59	0.07	0.64
72.51	55.96	22.62	3.30	74.62	2.60	0.07	0.64
72.67	55.88	22.51	3.32	74.69	2.60	0.07	0.64
72.83	55.98	22.52	3.31	74.48	2.60	0.07	0.64
73.00	55.49	22.21	3.35	74.32	2.60	0.07	1.53
73.16	54.40	21.63	3.40	73.55	2.61	0.07	1.49
73.33	53.06	20.93	3.47	72.61	2.62	0.07	1.45
73.49	51.79	20.29	3.52	71.48	2.63	0.07	1.41
73.65	50.40	19.57	3.61	70.59	2.64	0.07	1.37
73.82	48.68	18.71	3.71	69.48	2.66	0.07	1.31
73.98	46.70	17.70	3.87	68.58	2.68	0.07	1.25
74.15	45.45	17.05	3.98	67.92	2.70	0.06	1.21
74.31	45.12	16.82	4.06	68.38	2.71	0.07	1.20
74.48	45.47	16.89	4.15	70.08	2.72	0.07	1.21
74.64	45.68	16.94	4.17	70.71	2.72	0.07	1.21
74.80	45.58	16.86	4.15	69.92	2.72	0.07	1.20
74.97	45.28	16.75	4.04	67.71	2.71	0.07	1.19
75.13	45.08	16.68	3.97	66.18	2.70	0.06	1.19
75.30	45.00	16.64	3.92	65.20	2.69	0.06	1.18
75.46	45.08	16.64	3.91	65.02	2.69	0.06	1.18
75.62	44.93	16.54	3.92	64.78	2.69	0.06	1.17
75.79	44.47	16.26	4.00	65.04	2.70	0.06	1.16
75.95	43.88	15.94	4.07	64.90	2.71	0.06	1.14
76.12	43.25	15.65	4.13	64.70	2.72	0.06	1.12
76.28	42.84	15.45	4.14	64.03	2.72	0.06	1.10
76.44	42.50	15.28	4.13	63.15	2.72	0.06	1.09
76.61	42.27	15.16	4.13	62.62	2.72	0.06	1.08
76.77	41.97	15.01	4.16	62.45	2.72	0.06	1.07
76.94	41.80	14.91	4.23	63.12	2.73	0.06	1.06
77.10	41.86	14.90	4.26	63.43	2.73	0.06	1.06
77.26	42.30	15.05	4.22	63.46	2.73	0.06	1.08
77.43	43.07	15.32	4.10	62.78	2.71	0.06	1.09
77.59	43.75	15.60	3.99	62.18	2.70	0.06	1.11
77.76	44.11	15.74	3.94	62.07	2.69	0.06	1.12
77.92	44.15	15.71	3.96	62.20	2.69	0.06	1.12
78.08	44.12	15.64	3.99	62.47	2.70	0.06	1.12
78.25	44.23	15.64	4.01	62.67	2.70	0.06	1.12
78.41	44.40	15.67	4.02	63.01	2.70	0.06	1.12
78.58	44.83	15.80	4.03	63.70	2.70	0.06	1.13
78.74	45.91	16.24	3.95	64.14	2.69	0.06	1.16

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
78.90	47.83	17.12	3.75	64.17	2.66	0.06	1.21
79.07	50.10	18.22	3.49	63.55	2.63	0.06	1.27
79.23	51.93	19.07	3.33	63.51	2.60	0.06	1.32
79.40	53.09	19.63	3.21	63.08	2.58	0.06	0.62
79.56	53.68	19.88	3.17	62.95	2.57	0.06	0.62
79.72	54.13	20.10	3.10	62.24	2.56	0.06	0.62
79.89	54.58	20.27	3.07	62.29	2.56	0.06	0.62
80.05	55.24	20.52	3.05	62.64	2.55	0.06	0.63
80.22	55.99	20.88	2.97	62.10	2.54	0.06	0.63
80.38	56.26	21.03	2.92	61.33	2.53	0.06	0.63
80.54	56.15	21.01	2.87	60.20	2.52	0.06	0.63
80.71	55.52	20.60	2.95	60.70	2.53	0.06	0.63
80.87	55.15	20.31	3.03	61.46	2.55	0.06	0.62
81.04	55.10	20.17	3.09	62.31	2.56	0.06	0.62
81.20	55.50	20.30	3.09	62.66	2.56	0.06	0.62
81.36	56.37	20.66	3.04	62.89	2.55	0.06	0.63
81.53	57.60	21.14	3.01	63.72	2.55	0.07	0.63
81.69	59.22	21.82	2.97	64.69	2.54	0.07	0.63
81.86	60.89	22.47	2.94	66.16	2.53	0.07	0.64
82.02	62.79	23.29	2.87	66.94	2.52	0.07	0.64
82.19	64.78	24.24	2.75	66.62	2.50	0.07	0.65
82.35	66.45	25.08	2.63	65.93	2.47	0.07	0.65
82.51	67.27	25.59	2.52	64.59	2.45	0.07	0.65
82.68	67.40	25.60	2.52	64.45	2.45	0.07	0.65
82.84	70.79	26.08	2.97	77.45	2.54	0.07	0.65
83.01	81.18	29.71	3.19	94.92	2.58	0.08	0.67
83.17	100.53	36.94	3.30	121.85	2.60	0.10	0.70
83.33	127.46	47.46	3.21	152.56	2.58	0.13	0.73
83.50	158.88	61.35	2.73	167.67	2.49	0.19	0.76
83.66	194.57	78.59	2.22	174.84	2.38	0.31	0.79
83.83	223.69	94.89	1.78	168.84	2.24	0.67	0.82
83.99	235.69	101.60	1.66	168.17	2.20	0.83	0.83
84.15	222.15	94.04	1.76	165.58	2.24	0.65	0.82
84.32	201.15	82.60	1.98	163.21	2.31	0.29	0.80
84.48	198.95	80.49	2.09	168.48	2.34	0.25	0.80
84.65	229.15	96.07	1.79	171.87	2.25	0.46	0.82
84.81	269.91	117.79	1.53	180.24	2.14	0.85	0.85
84.97	290.85	128.73	1.45	186.90	2.10	0.86	0.86
85.14	280.23	121.37	1.55	188.55	2.15	0.85	0.85
85.30	259.64	108.71	1.75	190.59	2.23	0.84	0.84
85.47	255.62	107.19	1.72	184.77	2.22	0.84	0.84
85.63	278.86	121.03	1.51	182.27	2.13	0.85	0.85
85.79	319.52	146.19	1.28	187.07	1.98	0.88	0.88
85.96	360.99	170.55	1.19	202.15	1.90	0.91	0.91
86.12	389.02	185.14	1.17	215.79	1.87	0.92	0.92
86.29	389.97	181.72	1.21	220.73	1.93	0.91	0.91
86.45	356.33	160.40	1.32	210.98	2.01	0.90	0.90
86.61	294.65	126.96	1.48	188.45	2.12	0.86	0.86

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

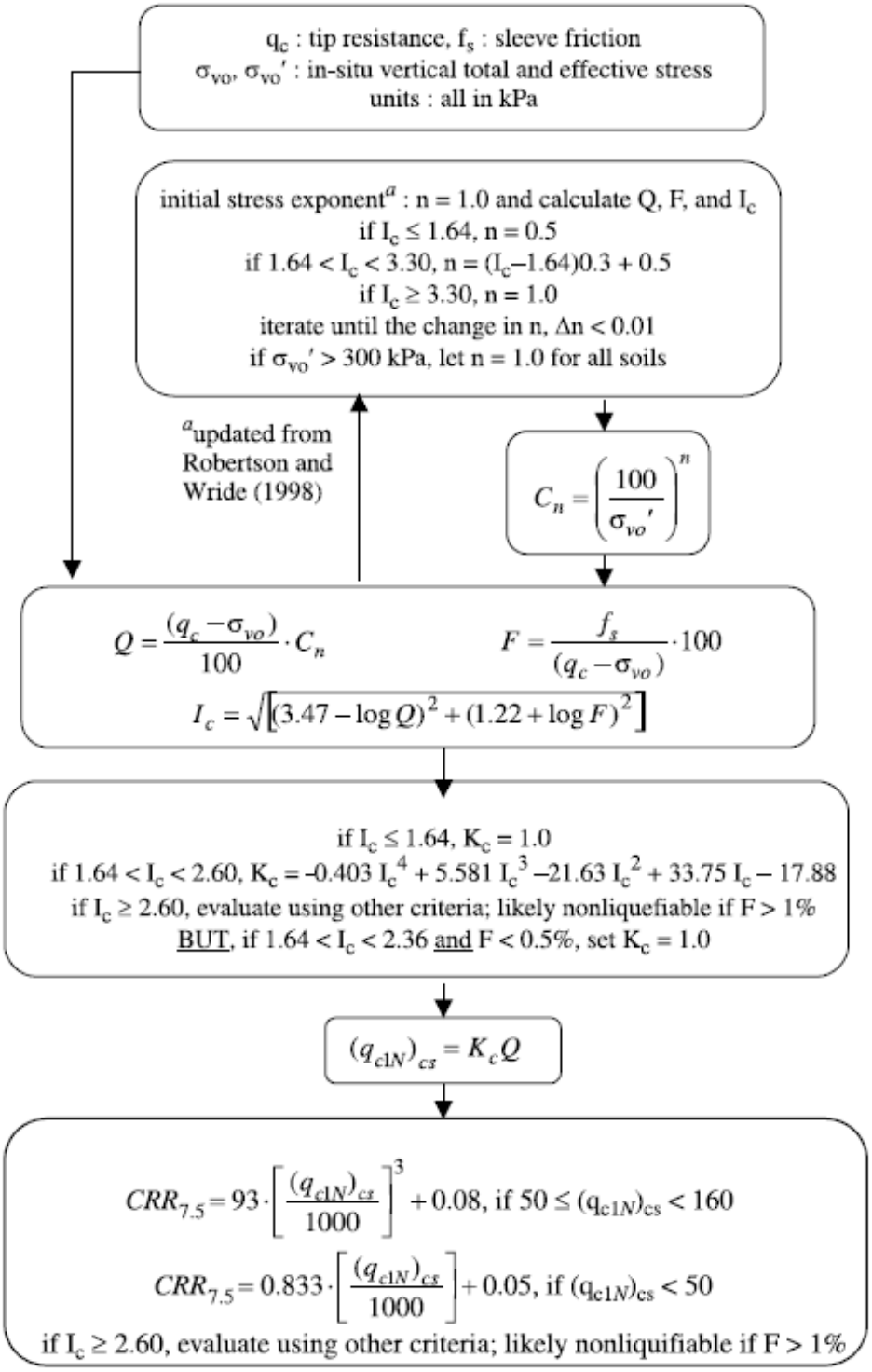
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
86.78	235.41	97.04	1.71	166.01	2.22	0.47	0.82
86.94	209.50	82.83	2.00	165.88	2.32	0.27	0.80
87.11	235.47	100.62	1.47	148.15	2.11	0.36	0.83
87.27	301.27	147.13	1.08	158.68	1.76	0.88	0.88
87.43	375.18	130.89	4.11	537.89	2.72	0.87	9.35
87.60	422.94	147.67	4.44	655.49	2.76	0.88	10.55

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)

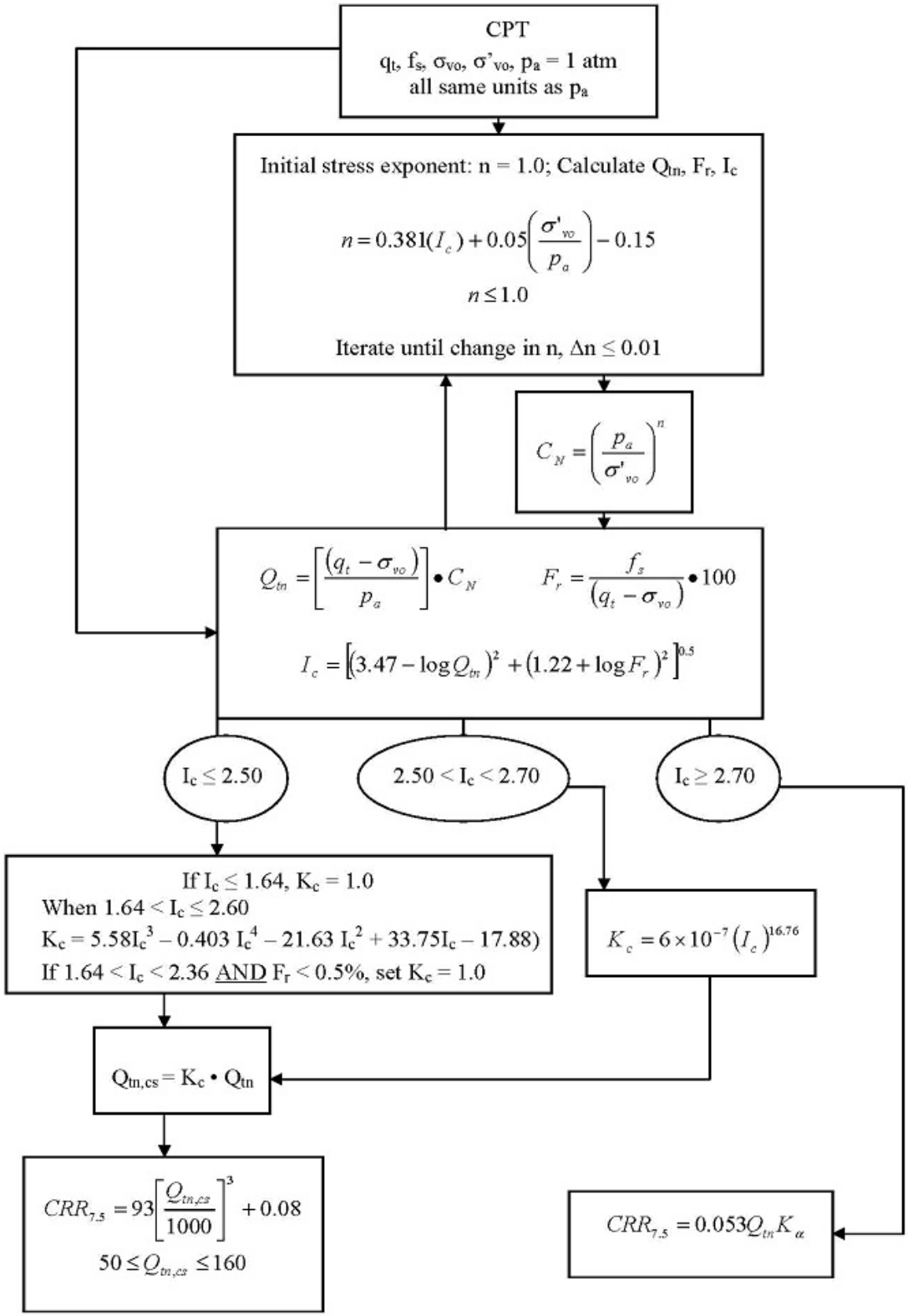
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

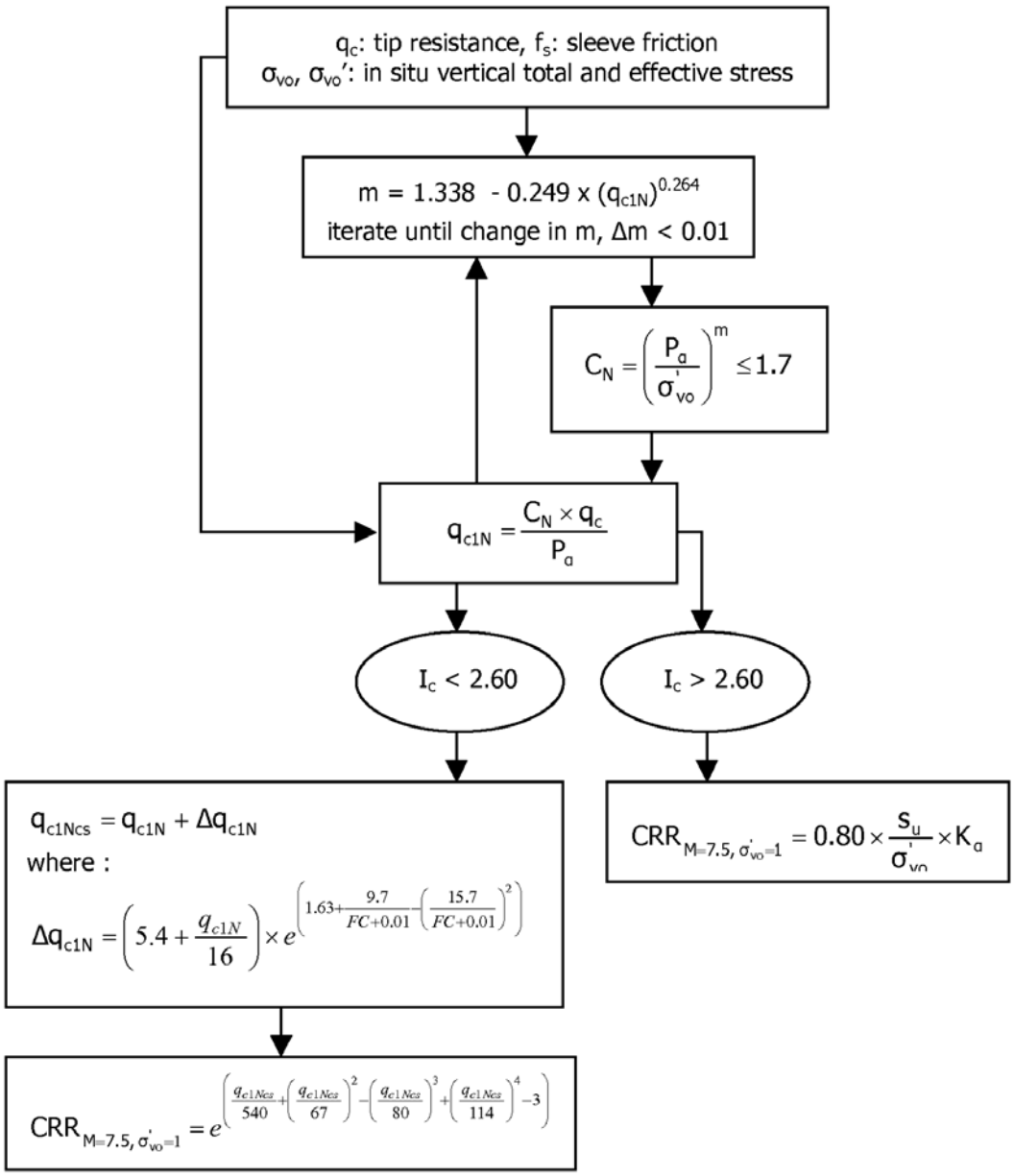
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

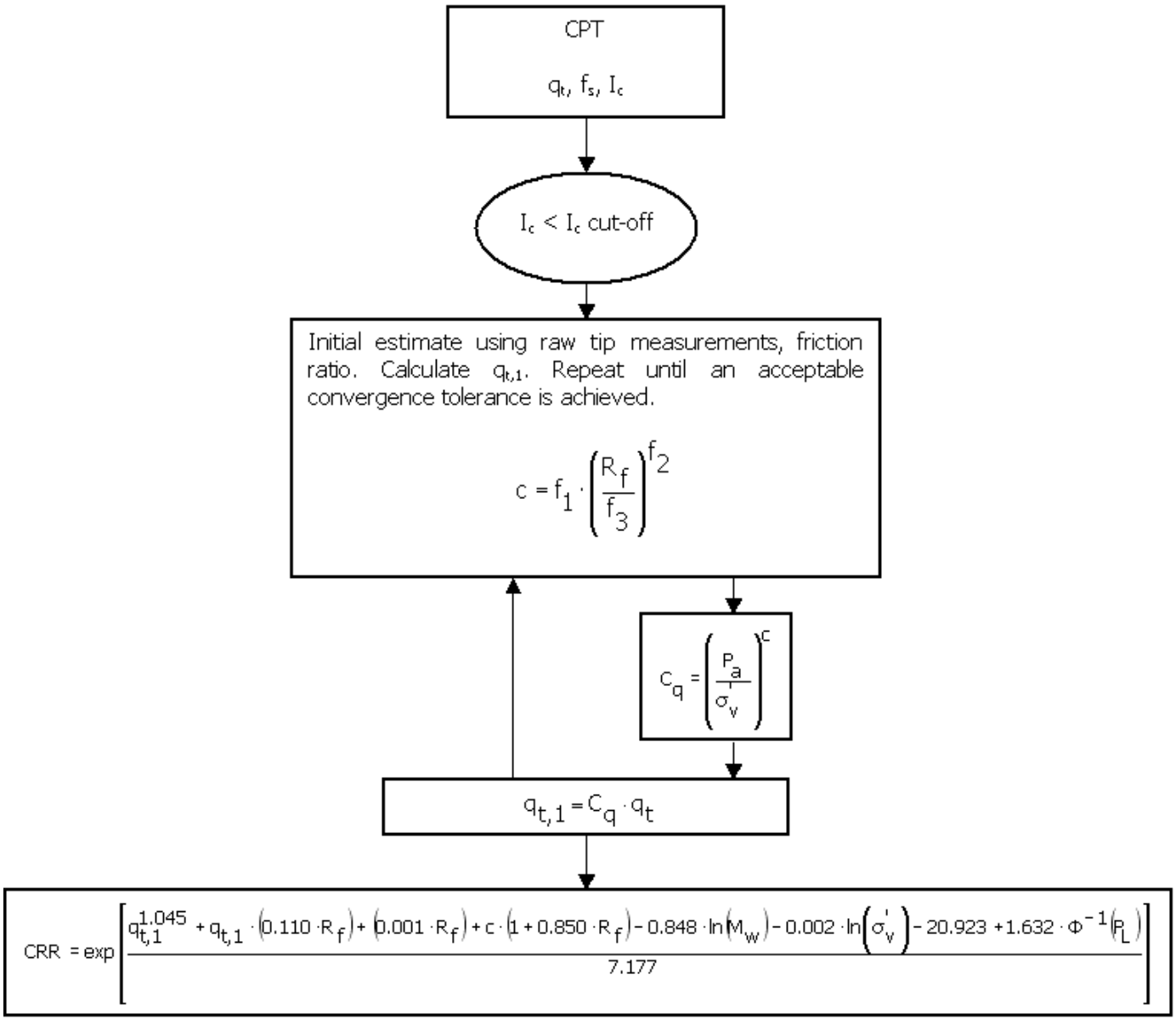


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{C1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

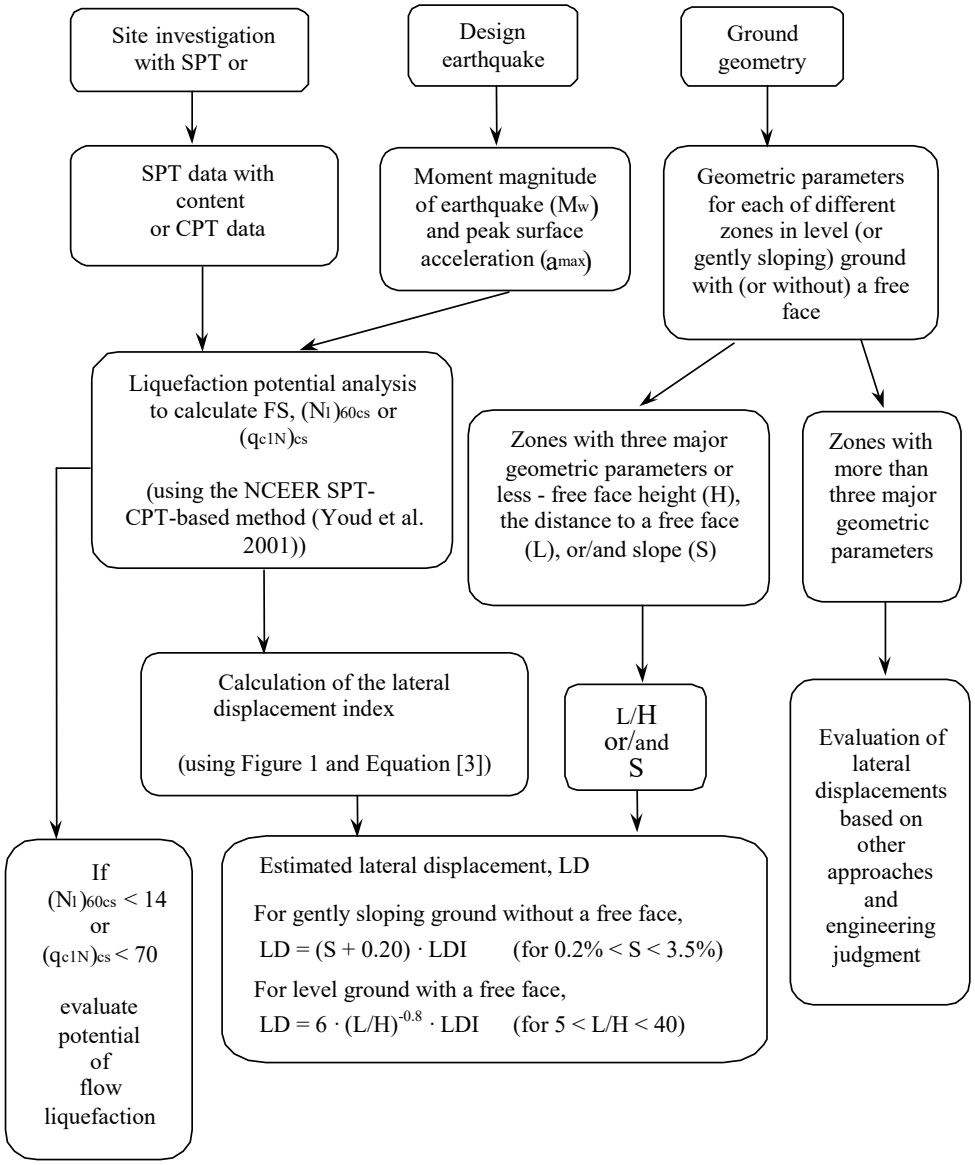
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

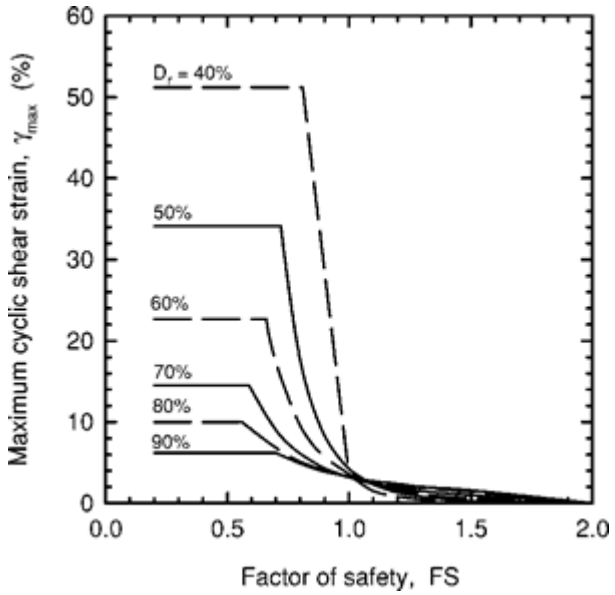
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

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



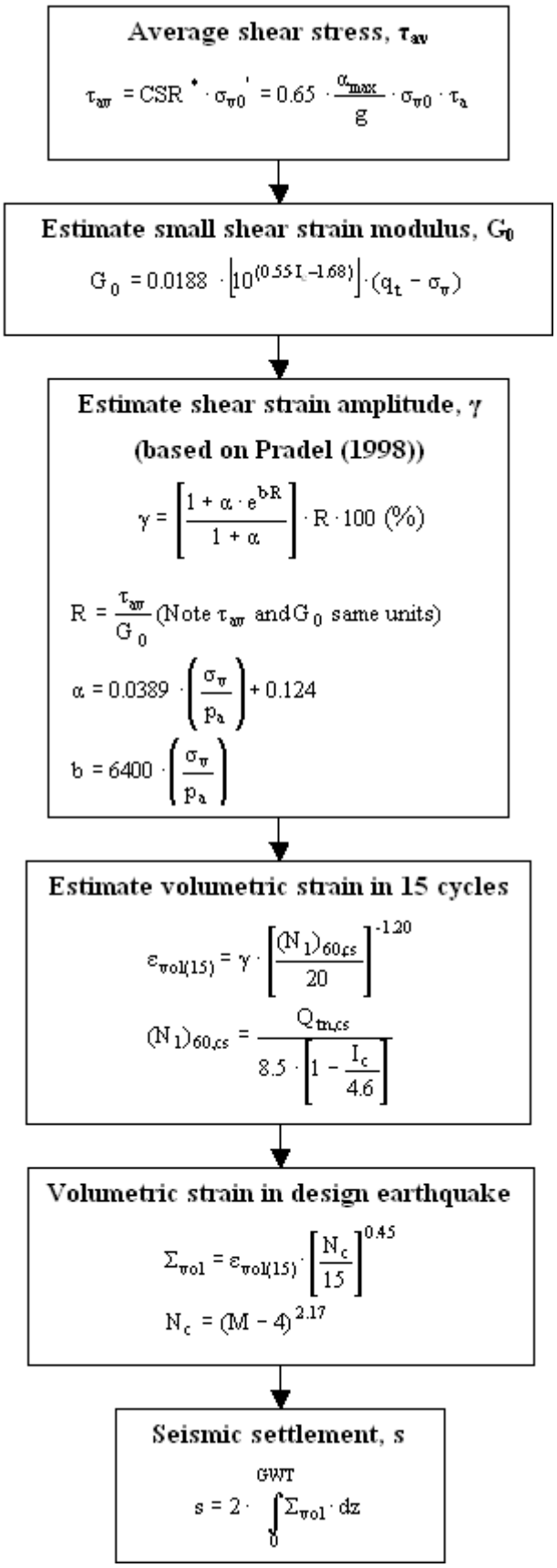
[1] Figure 1

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

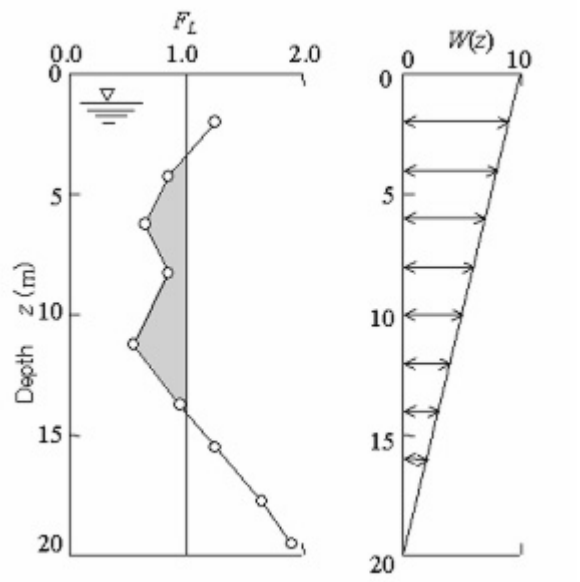
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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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Designed By: JH
Checked By: NRM

Raw Data Input

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	313.0
Groundwater Depth, ft:	11.3
Groundwater Elevation, ft msl:	301.7

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

													Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	4	77.2	29	22	7	23.96	CL-ML	1			1	Clay-Like	-	470		
2	6.5	3	77.2	29	22	7	31.55	CL-ML	1			1	Clay-Like	-	350		
3	9.0	4	94.4	32	24	8	26.80	ML	1			1	Clay-Like	-	470		
4	11.5	5	94.4	32	24	8	20.46	ML	1			1	Clay-Like	-	590		
5	21.5	7	85.3	37	19	18	22.18	CL	1			1	Clay-Like	-	1640		
6	31.5	9	45.2	31	20	11	25.86	SC	1			1	Clay-Like	-	2110		
7	36.5	8	45.2	31	20	11	28.58	SC	1			1	Clay-Like	-	1880		
8	41.5	12	14.9	39	30	9	27.80	SM	1			1	Clay-Like	-	1410		
9	51.5	18	14.9	39	30	9	26.26	SM	1			1	Clay-Like	-	2110		
10	56.5	21	14.9	39	30	9	25.83	SM	1			1	Clay-Like	-	2460		
11	61.5	20	45.2	27	17	10	29.45	SC	1			1	Clay-Like	-	2350		
12	66.5	17	45.2	27	17	10	30.87	SC	1			1	Clay-Like	-	2000		
13	71.5	15	45.2	27	17	10	33.28	SC	1			1	Clay-Like	-	1760		
14	76.5	13	45.2	27	17	10	21.43	SC	1			1	Clay-Like	-	1530		
15	81.5	27	47.4	22	18	4	37.21	SM	1			1	Sand-Like	40	-		
16	86.5	16	47.4	22	18	4	21.65	SM	1			1	Sand-Like	35	-		
17	91.5	49	31.7	0	0	0	21.95	SM	1			1	Sand-Like	47	-		
18	96.5	21	10	0	0	0	22.98	SP-SM	1			1	Sand-Like	37	-		
19	101.5	81	6.3	20	16	4	22.87	SP-SM	1			1	Sand-Like	48	-		
10													#DIV/0!	#DIV/0!	#DIV/0!		

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Standard Penetration Test Correction

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	313.0
Groundwater Depth, ft:	11.3
Groundwater Elevation, ft msl:	301.7

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	$N_{meas,}$ bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		313																	
1	4	309	4	1.57	1.70	0.75	1.0	1.00	1.4	460	460	77.2	6.3	10.6	4.7	8.0	10.8	1	CL-ML
2	6.5	306.5	3	1.57	1.64	0.80	1.0	1.00	1.4	748	748	77.2	4.7	7.7	3.7	6.1	8.7	1	CL-ML
3	9	304	4	1.57	1.39	0.84	1.0	1.00	1.4	1035	1035	94.4	6.3	8.7	5.3	7.3	10.1	1	ML
4	11.5	301.5	5	1.57	1.24	0.88	1.0	1.00	1.3	1323	1310	94.4	7.8	9.7	6.9	8.5	11.4	1	ML
5	21.5	291.5	7	1.57	1.04	0.96	1.0	1.00	1.3	2473	1836	85.3	11.0	11.4	10.5	10.9	14.2	1	CL
6	31.5	281.5	9	1.57	0.92	0.99	1.0	1.00	1.3	3623	2362	45.2	14.1	13.0	13.9	12.8	16.3	1	SC
7	36.5	276.5	8	1.57	0.87	0.99	1.0	1.00	1.3	4198	2625	45.2	12.5	10.9	12.4	10.8	14.1	1	SC
8	41.5	271.5	12	1.57	0.83	1.00	1.0	1.00	1.1	4773	2888	14.9	18.8	15.6	18.7	15.6	17.2	1	SM
9	51.5	261.5	18	1.57	0.77	1.00	1.0	1.00	1.1	5923	3414	14.9	28.2	21.6	28.1	21.5	23.6	1	SM
10	56.5	256.5	21	1.57	0.74	1.00	1.0	1.00	1.1	6498	3677	14.9	32.9	24.2	32.8	24.2	26.4	1	SM
11	61.5	251.5	20	1.57	0.71	1.00	1.0	1.00	1.2	7073	3940	45.2	31.3	22.3	31.3	22.3	27.2	1	SC
12	66.5	246.5	17	1.57	0.69	1.00	1.0	1.00	1.2	7648	4203	45.2	26.6	18.4	26.6	18.3	22.7	1	SC
13	71.5	241.5	15	1.57	0.67	1.00	1.0	1.00	1.3	8223	4466	45.2	23.5	15.7	23.5	15.7	19.7	1	SC
14	76.5	236.5	13	1.57	0.65	1.00	1.0	1.00	1.3	8798	4729	45.2	20.3	13.2	20.3	13.2	16.8	1	SC
15	81.5	231.5	27	1.57	0.63	1.00	1.0	1.00	1.2	9373	4992	47.4	42.3	26.7	42.3	26.7	32.2	1	SM
16	86.5	226.5	16	1.57	0.62	1.00	1.0	1.00	1.3	9948	5255	47.4	25.0	15.4	25.0	15.4	19.4	1	SM
17	91.5	221.5	49	1.57	0.60	1.00	1.0	1.00	1.2	10523	5518	31.7	50.0	30.1	76.7	46.2	53.6	1	SM
18	96.5	216.5	21	1.57	0.59	1.00	1.0	1.00	1.1	11098	5781	10.0	32.9	19.3	32.9	19.3	20.6	1	SP-SM
19	101.5	211.5	81	1.57	0.58	1.00	1.0	1.00	1.0	11673	6044	6.3	50.0	28.8	126.8	50.0	51.6	1	SP-SM
10	0	313		1.57	#DIV/0!	0.75	1.0	1.00	1.0	0	0	0.0	0.0	#DIV/0!	0.0	#DIV/0!	#DIV/0!	0	0.0

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Subsurface Soil Properties Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	313.0
Groundwater Depth, ft:	11.3
Groundwater Elevation, ft msl:	301.7

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	313															
1	4	309	4	6.3	8.0	CL-ML	1	0	0	77.2	23.9562402	29.0	22.0	7.0	0.28	-	939
2	6.5	306.5	3	4.7	6.1	CL-ML	1	0	0	77.2	31.5490161	29.0	22.0	7.0	1.36	-	704
3	9	304	4	6.3	7.3	ML	1	0	0	94.4	26.7956903	32.0	24.0	8.0	0.35	-	939
4	11.5	301.5	5	7.8	8.5	ML	1	0	0	94.4	20.4610205	32.0	24.0	8.0	-0.44	-	1174
5	21.5	291.5	7	11.0	10.9	CL	1	0	0	85.3	22.1788618	37.0	19.0	18.0	0.18	-	1643
6	31.5	281.5	9	14.1	12.8	SC	1	0	0	45.2	25.8627301	31.0	20.0	11.0	0.53	-	2113
7	36.5	276.5	8	12.5	10.8	SC	1	0	0	45.2	28.5751566	31.0	20.0	11.0	0.78	-	1878
8	41.5	271.5	12	18.8	15.6	SM	1	0	0	14.9	27.8000205	39.0	30.0	9.0	-0.24	-	2817
9	51.5	261.5	18	28.2	21.5	SM	1	0	0	14.9	26.2556287	39.0	30.0	9.0	-0.42	-	4226
10	56.5	256.5	21	32.9	24.2	SM	1	0	0	14.9	25.8253239	39.0	30.0	9.0	-0.46	-	4930
11	61.5	251.5	20	31.3	22.3	SC	1	0	0	45.2	29.451639	27.0	17.0	10.0	1.25	-	4695
12	66.5	246.5	17	26.6	18.3	SC	1	0	0	45.2	30.8731466	27.0	17.0	10.0	1.39	-	3991
13	71.5	241.5	15	23.5	15.7	SC	1	0	0	45.2	33.282559	27.0	17.0	10.0	1.63	-	3521
14	76.5	236.5	13	20.3	13.2	SC	1	0	0	45.2	21.4257851	27.0	17.0	10.0	0.44	-	3052
15	81.5	231.5	27	42.3	26.7	SM	1	0	0	47.4	37.212568	22.0	18.0	4.0	4.80	40	-
16	86.5	226.5	16	25.0	15.4	SM	1	0	0	47.4	21.6458602	22.0	18.0	4.0	0.91	35	-
17	91.5	221.5	49	50.0	46.2	SM	1	0	0	31.7	21.9520587	0.0	0.0	0.0	NP	47	-
18	96.5	216.5	21	32.9	19.3	SP-SM	1	0	0	10.0	22.9756098	0.0	0.0	0.0	NP	37	-
19	101.5	211.5	81	50.0	50.0	SP-SM	1	0	0	6.3	22.8655927	20	16	4	1.72	47.7	-
10	0	313		0.0	#DIV/0!	0	0	0	0	0.0	0	0	0	0	NP	#DIV/0!	#DIV/0!

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Designed By: JH
Checked By: NRM

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	313.0
Groundwater Depth, ft:	11.3
Groundwater Elevation, ft msl:	301.7

PGA:	0.402
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7.5
R(km):	165.7

MSF_{sand}:	1.00
MSF_{clay}:	1.00

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	313																		
1	4	309	CL-ML	1	1	8.0	5.5	13.5	PSL	NS Clay-Like	0.16	1	No Strength Loss	-	-	-	-	2.3	-	2.7
2	6.5	306.5	CL-ML	1	1	6.1	5.5	11.6	PSL	HS Clay-Like	0.34	1	No Strength Loss	-	-	-	-	2.3	-	2.7
3	9	304	ML	1	1	7.3	5.5	12.8	PSL	NS Clay-Like	0.35	1	No Strength Loss	-	-	-	-	2.3	-	2.7
4	11.5	301.5	ML	1	1	8.5	5.5	14.0	PSL	NS Clay-Like	0.36	1	No Strength Loss	-	-	-	-	2.3	-	2.7
5	21.5	291.5	CL	1	1	10.9	5.5	16.4	PSL	NS Clay-Like	0.46	1	No Strength Loss	-	-	-	-	2.3	-	2.7
6	31.5	281.5	SC	1	1	12.8	5.5	18.3	PSL	NS Clay-Like	0.51	1	No Strength Loss	-	-	-	-	2.3	-	2.7
7	36.5	276.5	SC	1	1	10.8	5.5	16.3	PSL	HS Clay-Like	0.64	1	No Strength Loss	-	-	-	-	2.3	-	2.7
8	41.5	271.5	SM	1	1	15.6	3.2	18.8	PSL	NS Clay-Like	0.47	1	No Strength Loss	-	-	-	-	2.3	-	2.7
9	51.5	261.5	SM	1	1	21.5	3.2	24.8	PSL	NS Clay-Like	0.37	1	No Strength Loss	-	-	-	-	2.3	-	2.7
10	56.5	256.5	SM	1	1	24.2	3.2	27.4	PSL	NS Clay-Like	0.34	1	No Strength Loss	-	-	-	-	2.3	-	2.7
11	61.5	251.5	SC	1	1	22.3	5.5	27.8	PSL	HS Clay-Like	0.38	1	No Strength Loss	-	-	-	-	2.3	-	2.7
12	66.5	246.5	SC	1	1	18.3	5.5	23.8	PSL	HS Clay-Like	0.47	1	No Strength Loss	-	-	-	-	2.3	-	2.7
13	71.5	241.5	SC	1	1	15.7	5.5	21.2	PSL	HS Clay-Like	0.55	1	No Strength Loss	-	-	-	-	2.3	-	2.7
14	76.5	236.5	SC	1	1	13.2	5.5	18.7	PSL	NS Clay-Like	0.67	1	No Strength Loss	-	-	-	-	2.3	-	2.7
15	81.5	231.5	SM	1	1	26.7	5.5	32.2	NSL-S	Sand-Like	0.60	1	No Liquefaction	-	-	-	-	2.3	-	2.7
16	86.5	226.5	SM	1	1	15.4	5.5	20.9	NSL-S	Sand-Like	1.71	1	Full Liquefaction	9.6	-	-	1.14	2.3	1.33	2.7
17	91.5	221.5	SM	1	1	46.2	5.4	51.6	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.1	-	1.4
18	96.5	216.5	SP-SM	1	1	19.3	1.1	20.5	NSL-S	Sand-Like	1.77	1	Full Liquefaction	10.1	-	-	1.14	1.1	1.36	1.4
19	101.5	211.5	SP-SM	1	1	50.0	0.0	50.0	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	1.1	-	0.0
10	0	313	0	0	0	#DIV/0!	0.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	1.1	-	0.0

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Designed By: JH
Checked By: NRM

SPT-Based Soil Shear Strength Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	313.0
Groundwater Depth, ft:	11.3
Groundwater Elevation, ft msl:	301.7

PGA: 0.402

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		313																		
1	4	309	4	13.5	CL-ML	77.2	460.0	460.0	24.0	29	22	7	NS Clay-Like	No Strength Loss	-	939	-	940	-	940
2	6.5	306.5	3	11.6	CL-ML	77.2	747.5	747.5	31.5	29	22	7	HS Clay-Like	No Strength Loss	-	704	-	700	-	700
3	9	304	4	12.8	ML	94.4	1035.0	1035.0	26.8	32	24	8	NS Clay-Like	No Strength Loss	-	939	-	940	-	940
4	11.5	301.5	5	14.0	ML	94.4	1322.5	1310.0	20.5	32	24	8	NS Clay-Like	No Strength Loss	-	1174	-	1170	-	1170
5	21.5	291.5	7	16.4	CL	85.3	2472.5	1836.0	22.2	37	19	18	NS Clay-Like	No Strength Loss	-	1643	-	1640	-	1640
6	31.5	281.5	9	18.3	SC	45.2	3622.5	2362.0	25.9	31	20	11	NS Clay-Like	No Strength Loss	-	2113	-	2110	-	2110
7	36.5	276.5	8	16.3	SC	45.2	4197.5	2625.0	28.6	31	20	11	HS Clay-Like	No Strength Loss	-	1878	-	1880	-	1880
8	41.5	271.5	12	18.8	SM	14.9	4772.5	2888.0	27.8	39	30	9	NS Clay-Like	No Strength Loss	-	2817	-	2820	-	2820
9	51.5	261.5	18	24.8	SM	14.9	5922.5	3414.0	26.3	39	30	9	NS Clay-Like	No Strength Loss	-	4226	-	4230	-	4230
10	56.5	256.5	21	27.4	SM	14.9	6497.5	3677.0	25.8	39	30	9	NS Clay-Like	No Strength Loss	-	4930	-	4930	-	4930
11	61.5	251.5	20	27.8	SC	45.2	7072.5	3940.0	29.5	27	17	10	HS Clay-Like	No Strength Loss	-	4695	-	4700	-	4700
12	66.5	246.5	17	23.8	SC	45.2	7647.5	4203.0	30.9	27	17	10	HS Clay-Like	No Strength Loss	-	3991	-	3990	-	3990
13	71.5	241.5	15	21.2	SC	45.2	8222.5	4466.0	33.3	27	17	10	HS Clay-Like	No Strength Loss	-	3521	-	3520	-	3520
14	76.5	236.5	13	18.7	SC	45.2	8797.5	4729.0	21.4	27	17	10	NS Clay-Like	No Strength Loss	-	3052	-	3050	-	3050
15	81.5	231.5	27	32.2	SM	47.4	9372.5	4992.0	37.2	22	18	4	Sand-Like	No Liquefaction	40	-	40	-	40	-
16	86.5	226.5	16	20.9	SM	47.4	9947.5	5255.0	21.6	22	18	4	Sand-Like	Full Liquefaction	35	-	35	-	10	-
17	91.5	221.5	49	51.6	SM	31.7	10522.5	5518.0	22.0	0	0	0	Sand-Like	No Liquefaction	47	-	47	-	47	-
18	96.5	216.5	21	20.5	SP-SM	10.0	11097.5	5781.0	23.0	0	0	0	Sand-Like	Full Liquefaction	37	-	37	-	10	-
19	101.5	211.5	81	50.0	SP-SM	6.3	11672.5	6044.0	22.9	20.0	16.0	4.0	Sand-Like	No Liquefaction	47.7	-	48	-	48	-
10	0	313	0	#DIV/0!	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	-	-	-

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Raw Data Input

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	311.0
Groundwater Depth, ft:	14.8
Groundwater Elevation, ft msl:	296.2

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

														Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	3	81.9	28	21	7	18.86	CL-ML				1	Clay-Like	-	350		
2	6.5	0	61.7	24	17	7	17.92	CL-ML				1	Clay-Like	-	10		
3	9.0	5	94.4	32	24	8	33.42	ML				1	Clay-Like	-	590		
4	11.5	0.1	85.3	37	19	18	33.23	CL				1	Clay-Like	-	20		
5	16.5	8	85.3	37	19	18	23.16	CL				1	Clay-Like	-	1880		
6	26.5	6	45.2	31	20	11	22.97	SC				1	Clay-Like	-	1410		
7	31.5	41	45.2	31	20	11	17.78	SC				1	Clay-Like	-	7500		
8	36.5	17	45.2	31	20	11	29.75	SC				1	Clay-Like	-	3990		
9	41.5	21	45.2	31	20	11	26.13	SC				1	Clay-Like	-	4930		
10	46.5	25	14.9	39	30	9	30.95	SM				1	Clay-Like	-	2930		
11	56.5	21	14.9	39	30	9	30.19	SM				1	Clay-Like	-	2460		
12	61.5	19	45.2	27	17	10	24.06	SC				1	Clay-Like	-	2230		
13	66.5	13	45.2	27	17	10	28.55	SC				1	Clay-Like	-	1530		
14	71.5	15	45.2	27	17	10	20.97	SC				1	Clay-Like	-	1760		
15	76.5	13	45.2	27	17	10	21.40	SC				1	Clay-Like	-	1530		
16	81.5	32	47.4	22	18	4	27.73	SM				1	Sand-Like	42	-		
17	86.5	47	47.4	22	18	4	23.89	SM				1	Sand-Like	46	-		
18	91.5	19	31.7	0	0	0	23.70	SM				1	Sand-Like	36	-		
19	96.5	74	6.3	20	16	4	20.47	SP-SM				1	Sand-Like	48	-		
20	101.5	67	6.3	20	16	4	20.52	SP-SM				1	Sand-Like	48	-		
11													#DIV/0!	#DIV/0!	#DIV/0!		

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Standard Penetration Test Correction

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	311.0
Groundwater Depth, ft:	14.8
Groundwater Elevation, ft msl:	296.2

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		311																	
1	4	307	3	1.57	1.70	0.75	1.0	1.00	1.4	460	460	81.9	4.7	8.0	3.5	6.0	8.6	0	CL-ML
2	6.5	304.5	0	1.57	1.64	0.80	1.0	1.00	1.2	748	748	61.7	0.2	0.3	0.1	0.2	0.3	0	CL-ML
3	9	302	5	1.57	1.39	0.84	1.0	1.00	1.3	1035	1035	94.4	7.8	10.9	6.6	9.2	12.2	0	ML
4	11.5	299.5	0	1.57	1.23	0.88	1.0	1.00	1.3	1323	1323	85.3	0.2	0.2	0.1	0.2	0.2	0	CL
5	16.5	294.5	8	1.57	1.06	0.93	1.0	1.00	1.3	1898	1791	85.3	12.5	13.2	11.6	12.3	15.7	0	CL
6	26.5	284.5	6	1.57	0.93	0.98	1.0	1.00	1.3	3048	2317	45.2	9.4	8.7	9.2	8.5	11.4	0	SC
7	31.5	279.5	41	1.57	0.88	0.99	1.0	1.00	1.2	3623	2580	45.2	50.0	44.0	63.2	50.0	58.8	0	SC
8	36.5	274.5	17	1.57	0.84	0.99	1.0	1.00	1.2	4198	2843	45.2	26.6	22.3	26.4	22.1	27.0	0	SC
9	41.5	269.5	21	1.57	0.80	1.00	1.0	1.00	1.2	4773	3106	45.2	32.9	26.4	32.7	26.2	31.7	0	SC
10	46.5	264.5	25	1.57	0.77	1.00	1.0	1.00	1.1	5348	3369	14.9	39.1	30.1	39.0	30.1	32.6	0	SM
11	56.5	254.5	21	1.57	0.72	1.00	1.0	1.00	1.1	6498	3895	14.9	32.9	23.5	32.8	23.5	25.7	0	SM
12	61.5	249.5	19	1.57	0.69	1.00	1.0	1.00	1.2	7073	4158	45.2	29.7	20.6	29.7	20.6	25.2	0	SC
13	66.5	244.5	13	1.57	0.67	1.00	1.0	1.00	1.3	7648	4421	45.2	20.3	13.7	20.3	13.7	17.3	0	SC
14	71.5	239.5	15	1.57	0.65	1.00	1.0	1.00	1.3	8223	4684	45.2	23.5	15.3	23.5	15.3	19.2	0	SC
15	76.5	234.5	13	1.57	0.64	1.00	1.0	1.00	1.3	8798	4947	45.2	20.3	12.9	20.3	12.9	16.5	0	SC
16	81.5	229.5	32	1.57	0.62	1.00	1.0	1.00	1.2	9373	5210	47.4	50.0	31.0	50.1	31.0	37.1	0	SM
17	86.5	224.5	47	1.57	0.60	1.00	1.0	1.00	1.2	9948	5473	47.4	50.0	30.2	73.6	44.5	52.4	0	SM
18	91.5	219.5	19	1.57	0.59	1.00	1.0	1.00	1.2	10523	5736	31.7	29.7	17.6	29.7	17.6	21.4	0	SM
19	96.5	214.5	74	1.57	0.58	1.00	1.0	1.00	1.0	11098	5999	6.3	50.0	28.9	115.8	50.0	51.6	0	SP-SM
20	101.5	209.5	67	1.57	0.57	1.00	1.0	1.00	1.0	11673	6262	6.3	50.0	28.3	104.9	50.0	51.6	0	SP-SM
11	0	311		1.57	#DIV/0!	0.75	1.0	1.00	1.0	0	0	0.0	0.0	#DIV/0!	0.0	#DIV/0!	#DIV/0!	0	0.0

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Subsurface Soil Properties Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	311.0
Groundwater Depth, ft:	14.8
Groundwater Elevation, ft msl:	296.2

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	311															
1	4	307	3	4.7	6.0	CL-ML	0	0	0	81.9	18.8627201	28.0	21.0	7.0	-0.31	-	704
2	6.5	304.5	0	0.2	0.2	CL-ML	0	0	0	61.7	17.9228636	24.0	17.0	7.0	0.13	-	23
3	9	302	5	7.8	9.2	ML	0	0	0	94.4	33.4194074	32.0	24.0	8.0	1.18	-	1174
4	11.5	299.5	0	0.2	0.2	CL	0	0	0	85.3	33.2304186	37.0	19.0	18.0	0.79	-	23
5	16.5	294.5	8	12.5	12.3	CL	0	0	0	85.3	23.1642556	37.0	19.0	18.0	0.23	-	1878
6	26.5	284.5	6	9.4	8.5	SC	0	0	0	45.2	22.9717813	31.0	20.0	11.0	0.27	-	1409
7	31.5	279.5	41	50.0	50.0	SC	0	0	0	45.2	17.7797259	31.0	20.0	11.0	-0.20	-	7500
8	36.5	274.5	17	26.6	22.1	SC	0	0	0	45.2	29.7489479	31.0	20.0	11.0	0.89	-	3991
9	41.5	269.5	21	32.9	26.2	SC	0	0	0	45.2	26.1343013	31.0	20.0	11.0	0.56	-	4930
10	46.5	264.5	25	39.1	30.1	SM	0	0	0	14.9	30.9484193	39.0	30.0	9.0	0.11	-	5869
11	56.5	254.5	21	32.9	23.5	SM	0	0	0	14.9	30.1913043	39.0	30.0	9.0	0.02	-	4930
12	61.5	249.5	19	29.7	20.6	SC	0	0	0	45.2	24.0627657	27.0	17.0	10.0	0.71	-	4460
13	66.5	244.5	13	20.3	13.7	SC	0	0	0	45.2	28.5548462	27.0	17.0	10.0	1.16	-	3052
14	71.5	239.5	15	23.5	15.3	SC	0	0	0	45.2	20.9693982	27.0	17.0	10.0	0.40	-	3521
15	76.5	234.5	13	20.3	12.9	SC	0	0	0	45.2	21.4017913	27.0	17.0	10.0	0.44	-	3052
16	81.5	229.5	32	50.0	31.0	SM	0	0	0	47.4	27.7265851	22.0	18.0	4.0	2.43	42	-
17	86.5	224.5	47	50.0	44.5	SM	0	0	0	47.4	23.88772	22.0	18.0	4.0	1.47	46	-
18	91.5	219.5	19	29.7	17.6	SM	0	0	0	31.7	23.6988848	0.0	0.0	0.0	NP	36	-
19	96.5	214.5	74	50.0	50.0	SP-SM	0	0	0	6.3	20.465587	20	16	4	1.12	47.7	-
20	101.5	209.5	67	50.0	50.0	SP-SM	0	0	0	6.3	20.5213533	20	16	4	1.13	47.7	-
11	0	311		0.0	#DIV/0!	0	0	0	0	0.0	0	0	0	0	NP	#DIV/0!	#DIV/0!

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Checked By: NRM

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	311.0
Groundwater Depth, ft:	14.8
Groundwater Elevation, ft msl:	296.2

PGA:	0.402
$\varphi_{SL\text{-}Sand}$	0.90
$\varphi_{NSL\text{-}Sand}$	0.75
$\varphi_{SL\text{-}Clay}$	0.90

M_w:	7.5
R(km):	165.7

MSF_{sand}:	1.00
MSF_{clay}:	1.00

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	311																		
1	4	307	CL-ML	0	1	6.0	5.5	11.5	PSL	NS Clay-Like	0.21	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
2	6.5	304.5	CL-ML	0	1	0.2	5.5	5.7	PSL	NS Clay-Like	10.31	0.9	Strength Loss	-	-	18.8	-	0.5	-	1.2
3	9	302	ML	0	1	9.2	5.5	14.7	PSL	HS Clay-Like	0.28	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
4	11.5	299.5	CL	0	1	0.2	5.5	5.7	PSL	HS Clay-Like	17.98	0.9	Strength Loss	-	-	62.0	-	0.5	-	1.2
5	16.5	294.5	CL	0	1	12.3	5.5	17.8	PSL	NS Clay-Like	0.32	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
6	26.5	284.5	SC	0	1	8.5	5.5	14.0	PSL	NS Clay-Like	0.65	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
7	31.5	279.5	SC	0	1	50.0	5.5	55.5	PSL	NS Clay-Like	0.14	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
8	36.5	274.5	SC	0	1	22.1	5.5	27.6	PSL	HS Clay-Like	0.30	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
9	41.5	269.5	SC	0	1	26.2	5.5	31.7	PSL	NS Clay-Like	0.27	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
10	46.5	264.5	SM	0	1	30.1	3.2	33.3	PSL	NS Clay-Like	0.25	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
11	56.5	254.5	SM	0	1	23.5	3.2	26.8	PSL	NS Clay-Like	0.34	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
12	61.5	249.5	SC	0	1	20.6	5.5	26.1	PSL	HS Clay-Like	0.40	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
13	66.5	244.5	SC	0	1	13.7	5.5	19.2	PSL	HS Clay-Like	0.61	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
14	71.5	239.5	SC	0	1	15.3	5.5	20.8	PSL	NS Clay-Like	0.55	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
15	76.5	234.5	SC	0	1	12.9	5.5	18.4	PSL	NS Clay-Like	0.67	0.9	No Strength Loss	-	-	-	-	0.5	-	1.2
16	81.5	229.5	SM	0	1	31.0	5.5	36.5	NSL-S	Sand-Like	0.26	0.75	No Liquefaction	-	-	-	-	0.5	-	1.2
17	86.5	224.5	SM	0	1	44.5	5.5	50.0	NSL-S	Sand-Like	0.00	0.75	No Liquefaction	-	-	-	-	0.5	-	1.2
18	91.5	219.5	SM	0	1	17.6	5.4	23.0	NSL-S	Sand-Like	1.45	0.9	Full Liquefaction	11.0	-	-	0.47	0.5	1.23	1.2
19	96.5	214.5	SP-SM	0	1	50.0	0.0	50.0	NSL-S	Sand-Like	0.00	0.75	No Liquefaction	-	-	-	-	0.5	-	0.0
20	101.5	209.5	SP-SM	0	1	50.0	0.0	50.0	NSL-S	Sand-Like	0.00	0.75	No Liquefaction	-	-	-	-	0.5	-	0.0
11	0	311	0	0	0	#DIV/0!	0.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.5	-	0.0

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Designed By: JH
Checked By: NRM

SPT-Based Soil Shear Strength Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	BR3_B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	311.0
Groundwater Depth, ft:	14.8
Groundwater Elevation, ft msl:	296.2

PGA: 0.402

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		311																		
1	4	307	3	11.5	CL-ML	81.9	460.0	460.0	18.9	28	21	7	NS Clay-Like	No Strength Loss	-	704	-	700	-	700
2	6.5	304.5	0	5.7	CL-ML	61.7	747.5	747.5	17.9	24	17	7	NS Clay-Like	Strength Loss	-	23	-	20	-	20
3	9	302	5	14.7	ML	94.4	1035.0	1035.0	33.4	32	24	8	HS Clay-Like	No Strength Loss	-	1174	-	1170	-	1170
4	11.5	299.5	0	5.7	CL	85.3	1322.5	1322.5	33.2	37	19	18	HS Clay-Like	Strength Loss	-	23	-	20	-	60
5	16.5	294.5	8	17.8	CL	85.3	1897.5	1791.4	23.2	37	19	18	NS Clay-Like	No Strength Loss	-	1878	-	1880	-	1880
6	26.5	284.5	6	14.0	SC	45.2	3047.5	2317.4	23.0	31	20	11	NS Clay-Like	No Strength Loss	-	1409	-	1410	-	1410
7	31.5	279.5	41	55.5	SC	45.2	3622.5	2580.4	17.8	31	20	11	NS Clay-Like	No Strength Loss	-	7500	-	7500	-	7500
8	36.5	274.5	17	27.6	SC	45.2	4197.5	2843.4	29.7	31	20	11	HS Clay-Like	No Strength Loss	-	3991	-	3990	-	3990
9	41.5	269.5	21	31.7	SC	45.2	4772.5	3106.4	26.1	31	20	11	NS Clay-Like	No Strength Loss	-	4930	-	4930	-	4930
10	46.5	264.5	25	33.3	SM	14.9	5347.5	3369.4	30.9	39	30	9	NS Clay-Like	No Strength Loss	-	5869	-	5870	-	5870
11	56.5	254.5	21	26.8	SM	14.9	6497.5	3895.4	30.2	39	30	9	NS Clay-Like	No Strength Loss	-	4930	-	4930	-	4930
12	61.5	249.5	19	26.1	SC	45.2	7072.5	4158.4	24.1	27	17	10	HS Clay-Like	No Strength Loss	-	4460	-	4460	-	4460
13	66.5	244.5	13	19.2	SC	45.2	7647.5	4421.4	28.6	27	17	10	HS Clay-Like	No Strength Loss	-	3052	-	3050	-	3050
14	71.5	239.5	15	20.8	SC	45.2	8222.5	4684.4	21.0	27	17	10	NS Clay-Like	No Strength Loss	-	3521	-	3520	-	3520
15	76.5	234.5	13	18.4	SC	45.2	8797.5	4947.4	21.4	27	17	10	NS Clay-Like	No Strength Loss	-	3052	-	3050	-	3050
16	81.5	229.5	32	36.5	SM	47.4	9372.5	5210.4	27.7	22	18	4	Sand-Like	No Liquefaction	42	-	42	-	42	-
17	86.5	224.5	47	50.0	SM	47.4	9947.5	5473.4	23.9	22	18	4	Sand-Like	No Liquefaction	46	-	46	-	46	-
18	91.5	219.5	19	23.0	SM	31.7	10522.5	5736.4	23.7	0	0	0	Sand-Like	Full Liquefaction	36	-	36	-	11	-
19	96.5	214.5	74	50.0	SP-SM	6.3	11097.5	5999.4	20.5	20.0	16.0	4.0	Sand-Like	No Liquefaction	47.7	-	48	-	48	-
20	101.5	209.5	67	50.0	SP-SM	6.3	11672.5	6262.4	20.5	20.0	16.0	4.0	Sand-Like	No Liquefaction	47.7	-	48	-	48	-
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Subsurface Investigation Geotechnical Data Report

SR-01 over Muddy Creek (Bridge No. 4)

PIN No.: 128113.04
GES No.: 3832518

Haywood County, TN
June 20, 2019

APPROVED
07/03/2019

June 20, 2019

Mr. Travis Smith, P.E.
Civil Engineering Manager I
Materials & Tests Division
Tennessee Department of Transportation
6601 Centennial Boulevard
Nashville, Tennessee 37243

Dear Mr. Smith,

We have completed the *Subsurface Investigation Geotechnical Data Report* for the Bridge Replacement on SR-01 over Muddy Creek in Haywood County, Region 4 (Bridge No. 4). Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering and geological services to the Tennessee Department of Transportation.

Sincerely,
HDR

Devin L. Chittenden, P.E.
Senior Geotechnical Engineer

Bret O. Watkins, P.G.
Senior Geologist

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Appendix A: Plan and Boring Sheets
Appendix B: Boring Logs & CPT Data
Appendix C: Laboratory Testing
Appendix D: Preliminary Soil Shear Strength Loss Analysis

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Executive Summary

The proposed project entails the replacement of an existing two-lane bridge along SR-01 near log mile 2.13 in Haywood County, TN. The new bridge will be a direct replacement of the existing two-span bridge with a single span 70-ft bridge over Muddy Creek, beginning at Station 59+79.78 and ending at Station 60+49.78.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein. Bedrock was not encountered within the advanced borings.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design/build team for the proposed bridge along SR-01 near log mile 2.13 over Muddy Creek in Haywood County, TN. The proposed 70-ft single span bridge begins at 59+79.78 and ends at Station 60+49.78. Borings were advanced and soil samples were collected and delivered to the HDR laboratory for further testing and analysis. Geotechnical parameters and foundation recommendations are provided in this report resulting from the evaluations of soil conditions at the proposed bridge site.

2 Subsurface Exploration

A subsurface investigation was conducted at this site by HDR and sub-consultants in May 2019. The exploration program included two Standard Penetration Test (SPT) borings advanced to 100-ft bgs, with each boring advanced with a CME-45C track-mounted rig on opposite ends of the existing bridge, offset to roadway centerline. In addition, one piezoCone Penetrometer Test (CPT) boring was advanced by track-mounted box rig with 20-ton reaction mass near the west bridge abutment to cone refusal depth (see Bridge Boring Plan Sheet – Appendix A). Test boring locations are tabulated below:

Table 2-1. Test Boring Locations

Test Hole Number	Location	Station	Offset	Depth
B-1	West Abutment	59+72	13-ft RT	101.5-ft
B-2	East Abutment	60+58	14-ft LT	101.5-ft
CPT-1(A)[1]	West Abutment	59+50	9-ft LT	73-ft

SPT's were obtained at 2.5-ft intervals in the top ten feet and at five foot intervals until reaching termination depths. SPT borings were logged for blow counts, soil types, sample recoveries, and boring metrics. CPT piezoCone readings of tip resistance, sleeve friction, friction ratio, and pore water pressure were collected on a continuous basis as the cone was advanced at a rate of 2cm/sec until refusal was met at 73-ft bgs. Seismic velocity measurements were also collected in the CPT boring at 5-ft intervals. Boring logs from borings B-1 and B-2, as well as CPT results are provided in Appendix B. All soil specimens were delivered to HDR for laboratory testing and analysis, including the following tests:

Atterberg Limits	AASHTO T-89 and T-90
Sieve Analysis	ASTM D-1140
Natural Moisture Content	AASHTO T-265
Unconsolidated Undrained (UU)	AASHTO T-296

[1] CPT-1 was offset approx. 4-ft due to initial cone refusal at 17.55-ft

Compression Test	
Standard Proctor	AASHTO T-99
pH Testing	AASHTO T-288
Resistivity	ASTM G-187

The full laboratory testing results are located in Appendix C.

3 Geology, Soils, and Site Conditions

The proposed bridge site is topographically depicted on the Stanton, Tennessee 7.5-minute topographic quadrangle map as situated in an area of low to moderate relief, within the local floodplain of Little Muddy Creek, which drains to the north/northwest. Approximate bridge deck elevations range from 300-ft to 310-ft, with nearby ridge line elevations over 350-ft.

The project bridge site is located within the Gulf Coastal Plain Physiographic Province of Western Tennessee. The Mississippi Embayment – a large fluvial floodplain with relatively flat to gently sloping topography providing drainage over much of the central and eastern portions of North America – forms the northern portion of this province. The Embayment was initially formed as a topographic low during the Proterozoic, precipitated by crustal weaknesses that created many structural deformities including the Reelfoot Rift of the New Madrid Seismic Zone. By the end of the Paleozoic, much of the regional basin was infilled with shallow marine deposits, forming the base of the Embayment today as limestone, shale, and sandstones. Regional subsidence and deposition following the Paleozoic resulted in the thick accumulation of Mesozoic and younger unconsolidated strata that generally dip towards the Mississippi River, increasing in thickness to as much as 3000-ft thick, with strata becoming progressively younger towards the center of the basin.

Published mapping indicates the presence of Holocene alluvial sediments comprised of quartz-rich sands, silt, and clay that are poorly sorted and stratified. Generally finer-grained loess grades into coarser-grained sands and gravels with depth. Holocene alluvium is considered approximately 20 ft thick. The bridge approaches are supported atop this alluvium with roadway embankment fill, approximately 5 – 10 ft thick. The alluvium is supported with Eocene deltaic non-marine deposits of primarily fine-grained micaceous quartz sands crossbedded with clays and minor amounts of lignite and siderite. Variations is lateral consistency are common due to crossbedding. Anticipated thickness of Eocene deposits is greater than 100-ft. It is believed Eocene deposits are further supported by Paleocene shallow marine deposits of glauconitic clay, with thin lenses of fine micaceous sands. Paleocene deposits are anticipated to be approximately 100-200 ft thick. At this locality, Paleocene deposits are further supported by Upper Cretaceous sediments lying atop Paleozoic rocks at greater than 1000-ft depth.

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1 and B-2. Fill was intercepted from the existing ground surface to approximately 9.0 to 11.5-ft maximum depth. Field and laboratory classifications of recovered SPT samples indicate very loose sandy gravels underlain with very soft low plasticity lean clays and silts (CL-ML, ML). Some organic detritus was noted in samples collected from 10-ft near the fill / native soil interface.

Alluvium is interpreted as underlying the embankment fill in both of the advanced borings with an approximate thickness range of 18-ft to 28-ft. Recovered samples indicate alluvium is dominantly reworked silt and clay (CL, CL-ML) with traces to some fine grain sand. Alluvial deposits exhibited low to moderately plastic characteristics though a few samples exhibiting non-plastic characteristics were penetrated. SPT drives and laboratory testing of samples indicated very soft to stiff consistency for cohesive sediments that locally dominate the alluvial deposits. Natural moisture content of alluvial sediments ranges from 18.2 – 33.7 percent. The base of alluvium is believed to rest upon an angular unconformity surface eroded into the underlying Tertiary Eocene deposits (Claiborne/Wilcox Formations, undivided). This surface varied in elevation from 264.0 to 270.0-ft within advanced borings.

Claiborne/Wilcox Formation sediments underlying alluvial deposits were intercepted approximately 30 to 37-ft below grade. The base of Claiborne/Wilcox sediments were not intercepted in the borings advanced, therefore thicknesses were interpreted to be greater than 63 to 70-ft. This formation (considered undivided in this locality) is predominantly composed of non-plastic fine grain silty sands gradually transitioning to moderately plastic sandy silts, and lean clays (CL, ML, SM). SPT drives indicate firm to very hard consistency for the partially cohesive sediments. Natural moisture contents generally ranged from 21.1 – 34.4 percent.

No faulting was indicated on published mapping within the limits of the proposed alignment. Likewise recovered samples did not indicate the presence of faulting. The region surrounding the project area is located within an active seismic region (New Madrid Seismic Zone) and is considered one of the most active seismic regions in the country. Regional seismic events, both along the New Madrid Fault System and associated fault systems, have been and are continually documented throughout Western Tennessee, Western Kentucky, Southern Illinois, Southeastern Missouri and Northeastern Arkansas.

Groundwater was encountered within each of the bridge borings at the end of drilling operations; however accurate measurements could not be obtained due to the influence of mud rotary drilling methods on the local potentiometric surface. Generally, the interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed bridge foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A, with borehole test logs provided in Appendix B.

Table 3-1. Generalized Subsurface Conditions

Material Type/Formation	Elevation of Top Layer (ft)	Depth to Top Layer (ft)	USCS Soil Type	SPT-N values (bpf)	UU Total Shear Strength (psf)
Embankment Fill	300.0-301.0	0	CL(A-6), ML(A-4)	0-2	
Holocene Alluvium	289.5-291.0	9.0-11.5	CL (A-6, CL-ML(A-4)	3-17	2,660
Eocene-Claiborne/Wilcox	264.0-270.0	30.0-37.0	CL(A-4),ML(A-4),SM(A-4, A-2-7)	9-46	6,584-7,998

In addition to lab classification testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils data for use by a structural engineer to provide any necessary protection to the piling, concrete, reinforcing steel, etc.

Corrosion and deterioration protection requirements and guidelines for piling are set forth in LRFD Section 10.7.5. The corrosion and deterioration testing results are summarized in Table 3-2 below and are included in Appendix C.

Table 3-2. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth	pH	Resistivity (ohm·cm)
B-2	60+58	14-ft LT	2.0'-10.0'	7.4	4,400

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation:

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation:

- Resistivity less than 3,000 ohm-cm
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Results of the corrosion and deterioration testing indicated that the site has low potential for pile or steel reinforcement deterioration based on the resistivity value and the geographical location of the project site. Interpretation of the data and corrosion protection of the bridge structural components will be discussed with the structural engineer for the project.

4 Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Haywood County is considered vulnerable to severe ground shaking. The project site classifies as Site Class D based on the average CPT shear wave value (945.8 ft/s). The peak ground acceleration coefficient for this project site, obtained from USGS (2009) is equal to 0.40g using Site Class D. S-wave response measurements (Vs) collected from the CPT boring observed values ranging from 426 – 727 ft/sec from 5-ft to 35-ft depths. From 40-ft to 65-ft depths, velocities increased to 731 – 950 ft/sec. A sharp increase in Vs was then observed at 70-ft depth at 3,621 ft/sec just before cone refusal was encountered at 73-ft depth.

Preliminary analyses of the subsurface conditions in the SPT and CPT borings were performed to evaluate the likelihood of liquefaction during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger Soil Liquefaction during Earthquakes (2008) and using the Geologismiki software Cliq v.3.0.

Table 4-1. Soil Liquefaction Potential Results

Test Boring	Depth(ft)	Thickness(ft)	Average FS	Average LPI	Settlement (in)
B-1	6.25-8.75	2.5	0.10	N/A	0.0 (clay-like)
	15.0-27.5	12.5	0.54	N/A	6.91
	33.5-62.5	29.0	0.83	N/A	8.38
B-2	3.75-8.75	5.0	0.10	N/A	0.0 (clay-like)
CPT-1(A)	19.03-20.67	1.64	0.31	0.24	1.17
	31.50-32.48	0.98	0.40	0.16	0.38
	38.39-39.21	0.82	0.31	0.14	0.53
	46.92-50.52	3.60	0.34	0.09	1.18
	51.51-60.04	8.53	0.34	0.05	4.42
	61.52-62.34	0.82	0.36	0.02	0.49
	67.75-73.0	5.25	0.50	0.00	1.93

Based on the results of the seismic hazard evaluation, it is believed the soils are susceptible to shear strength loss during the seismic event. The liquefiable layers present at the SPTs indicate layers ranging from 2.5’ to 29.0’ thick and settlement magnitudes of 15.29”. CPTs obtain continuous testing data at approximately 2-inch intervals and it is typically more appropriate to rely on CPT results more than SPT results during liquefaction analysis because they generate an improved soil model by localizing weaker zones susceptible to liquefaction. The liquefiable layers present at the CPTs indicate layers ranging from 0.82’ to 8.53’ thick and settlement magnitudes of 10.10”. Other seams of liquefiable material were present in the CPT results; however, it is common practice to eliminate layers of liquefaction less than 6” thick. The results of the preliminary soil shear strength loss analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. More detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment slopes, embankment settlements, retaining walls and bridge foundation types and capacities will be required to ensure a sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed bridge on SR-01 over Muddy Creek in Haywood County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data

submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

AASHTO, 2014; AASHTO LRFD Bridge Design Specifications Seventh Edition, 2014; Washington, DC, American Association of State Highway and Transportation Officials.

Boulanger, R.W., et al (2008); Soil Liquefaction during Earthquakes; Earthquake Engineering Research Institute.

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NRCS (2009). “Soil Map - Haywood County, Tennessee”, “Engineering Properties”, “Physical Soil Properties”; Web Soil Survey – National Cooperative Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

USGS (2009). Earthquake Design Maps, AASHTO-2009. Online. URL: <https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=35.450561&longitude=-89.4387666&siteClass=D&title=Example> Accessed June 19, 2019.

USGS (2016). “Stanton, TN Topographic Quadrangle Map”, United States Geological Survey, 7.5 Minute Series; scale 1:24,000.

Appendix A: Plan and Boring Sheets

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
BR-NH-1(383)	2019	1

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION

N

60

PROP. R.O.W.

BEGIN PROP. BR.
STA. 59+79.78

END PROP. BR.
STA. 60+49.78

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

BR4_CPT-1

BR4_B-2

N 66° 56' 27" E

BR4_B-1

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

PROP. R.O.W.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 1 OVER MUDDY CREEK
BRIDGE NO. 38-SR001-02.13
FED. ID NO. 38SR0010001
HAYWOOD COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Tamara Lynn DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/19

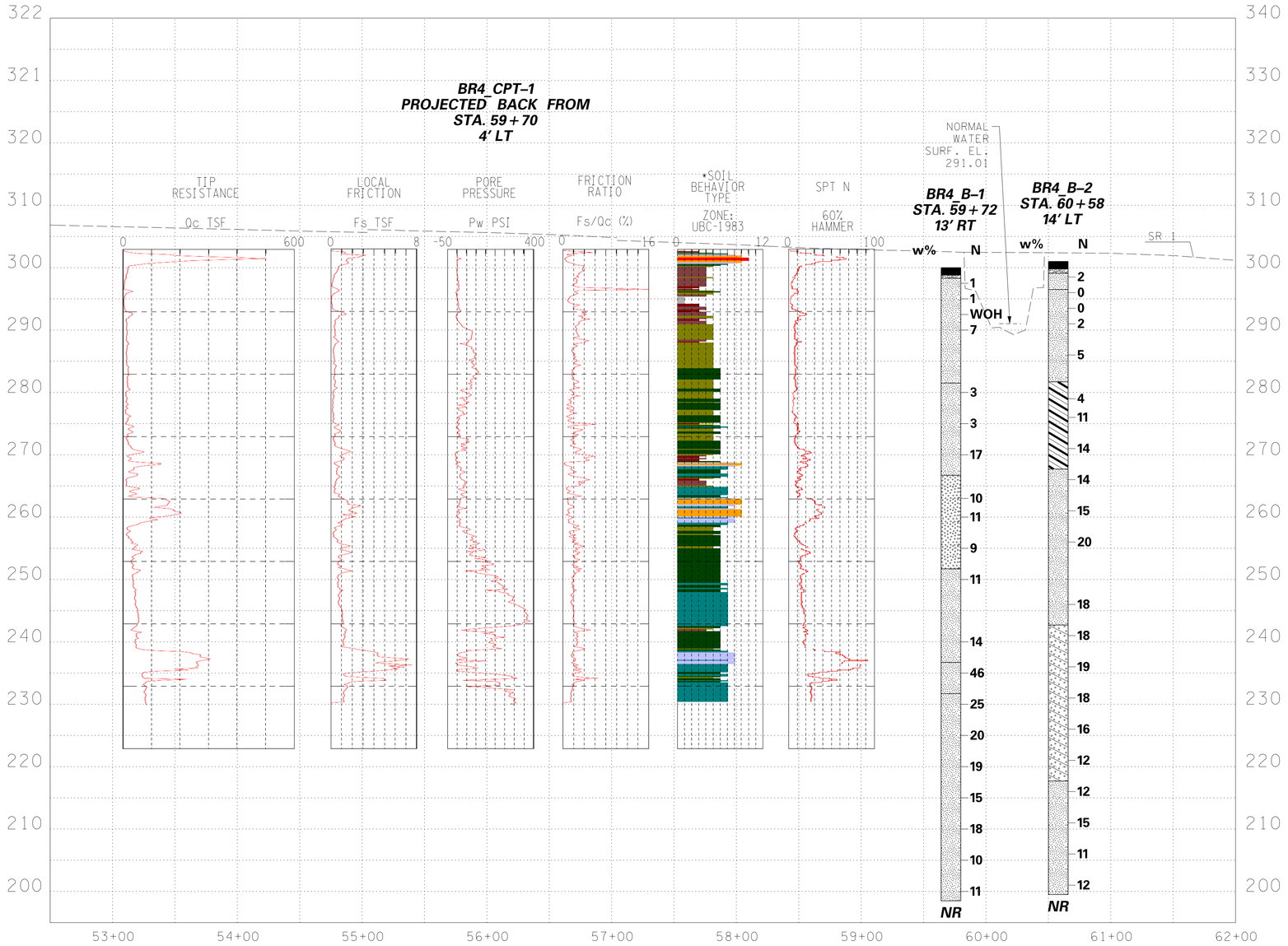
HDR

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
BR-NH-1(383)	2019	2

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS

ADDITIONAL ROCK SYMBOLS

SYMBOL								
	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	RANDOM BACKFILL	WEATHERED LIMESTONE	GRADED SOLID ROCK

SPT BORING LEGEND

○	ROCKLINE SOUNDINGS	RQD	ROCK QUALITY DESIGNATION
◔	DISTURBED SAMPLE BORING	REC	% CORE RECOVERED
◎	UNDISTURBED SAMPLE BORING	Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
⊙	UNDISTURBED SAMPLE BORING & ROCK CORE	Qu (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ROCK CORE)
●	ROCK CORE	UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
➡	APPROXIMATE PILE TIP ELEVATION	w%	MOISTURE CONTENT
▼ (Date)	WATER ELEVATION	R	REFUSAL
✳	LIQUEFACTION OR SOIL STRENGTH LOSS IS PROBABLE AT THESE LOCATIONS	NR	REFUSAL NOT ENCOUNTERED
N	UNCORRECTED PENETRATION RESISTANCE		

CPT SOUNDINGS LEGEND

MAXIMUM DEPTH = 73.00 FEET

DEPTH INCREMENT = 0.164 FEET

1 SENSITIVE FINE GRAINED
2 ORGANIC MATERIAL
3 CLAY
4 SILTY CLAY TO CLAY
5 CLAYEY SILT TO SILTY CLAY
6 SANDY SILT TO CLAYEY SILT
7 SILTY SAND TO SANDY SILT
8 SAND TO SILTY SAND
9 SAND
10 GRAVELLY SAND TO SAND
11 VERY STIFF FINE GRAINED (*)
12 SAND TO CLAYEY SAND (*)

REFUSAL: EXCESSIVE INCLINATION
SURFACE MATERIAL REMOVED: ASPHALT (14-IN) OVER CONCRETE (9-IN)

*SOIL BEHAVIOR TYPE AND SPT BASED ON DATA FROM UBC-1983

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 1 OVER MUDDY CREEK
BRIDGE NO. 38-SR001-02.13
FED. ID NO. 38SR0010001
HAYWOOD COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Tamara Lynn DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/19

HDR

Appendix B: Boring Logs & CPT Data

Sheet No. 1 of 2

State	Tennessee	Latitude	35.45047 °
County	Haywood	Location	59+72 13' RT
Project Name	SR-1 Over Muddy Creek	Surface Elevation	300 ft.
Project Type	Subsurface Investigation	Dated Started	5/7/2019
Driller	D. Bowling	Logged by	D. Bowling
Hole Number	BR4_B-1	Total Depth	101.5 ft.

Longitude 89.43886 °
Completed 5/14/2019
Depth to Water: Immediate N/A ft.
Depth to Water N/A ft. Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
300.0 ft	0		*Ground Line*						
			Asphalt pavement						
			Aggregate base coarse						
			Very soft to medium stiff, gray and brown, silty clay.		SS-1	2.5 / 4.0	0.3	0-1-0	SPT
295	5				SS-2	5.0 / 6.5	0.3	0-0-1	SPT
					SS-3	7.5 / 9.0	1.5	0-0-0	SPT
290	10				SS-4	10.0 / 11.5	1.2	2-4-3	SPT
285	15				ST-1	15.0 / 17.0	2.0		ST
			Soft to very stiff, brown and gray, silty clay with sand.						
280	20				SS-5	20.0 / 21.5	1.5	2-1-2	SPT
275	25				SS-6	25.0 / 26.5	1.5	0-2-1	SPT
270	30				SS-7	30.0 / 31.5	1.2	3-8-9	SPT
			Loose to medium dense, white, brown, orange and gray, silty sand.						
265	35				ST-2	35.0	0.0		ST
					SS-8	37.0 / 38.5	1.5	7-5-5	SPT
260	40				SS-9	40.0 / 41.5	1.5	4-4-7	SPT
255	45				SS-10	45.0 / 46.5	1.5	4-4-5	SPT
			Stiff, gray, sandy silt.						
250	50				SS-11	50.0 / 51.5	1.5	4-5-6	SPT
245	55				ST-3	55.0 / 57.0	2.0		ST
240	60								

State **Tennessee** Latitude **35.45047** ° Longitude **89.43886** °

County **Haywood** Location **59+72 13' RT**

Project Name **SR-1 Over Muddy Creek** Surface Elevation **300 ft.**

Project Type **Subsurface Investigation** Dated Started **5/7/2019** Completed **5/14/2019**

Driller **D. Bowling** Logged by **D. Bowling** Depth to Water: Immediate **N/A ft.**

Hole Number **BR4_B-1** Total Depth **101.5 ft.** Depth to Water **N/A ft.** Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
240.0 ft	60		*Continued from previous page*						
					SS-12	60.0 61.5	1.5	5-6-8	SPT
			63.3'						
235	65		Hard, gray, silt.		SS-13	65.0 66.5	1.2	15-20-26	SPT
			68.3'						
230	70		Stiff to very stiff, gray, silt with sand.		SS-14	70.0 71.5	1.5	10-11-14	SPT
225	75				SS-15	75.0 76.5	1.5	6-9-11	SPT
220	80				SS-16	80.0 81.5	1.5	7-9-10	SPT
215	85				SS-17	85.0 86.5	1.5	5-7-8	SPT
210	90				SS-18	90.0 91.5	1.4	7-8-10	SPT
205	95				SS-19	95.0 96.5	1.5	3-5-5	SPT
200	100				SS-20	100.0 101.5	1.2	4-5-6	SPT
			101.5' Boring Terminated @ 101.5' (Elev. 198.5).						
195	105		Bulk sample obtained from 0.0'-10.0'						
			Shelby tube at 35.0' resulted in no recovery						
190	110		Boring elevation obtained using Google Earth satellite imagery						
185	115								
180	120								

State **Tennessee** Latitude **35.45064 °** Longitude **89.43864 °**

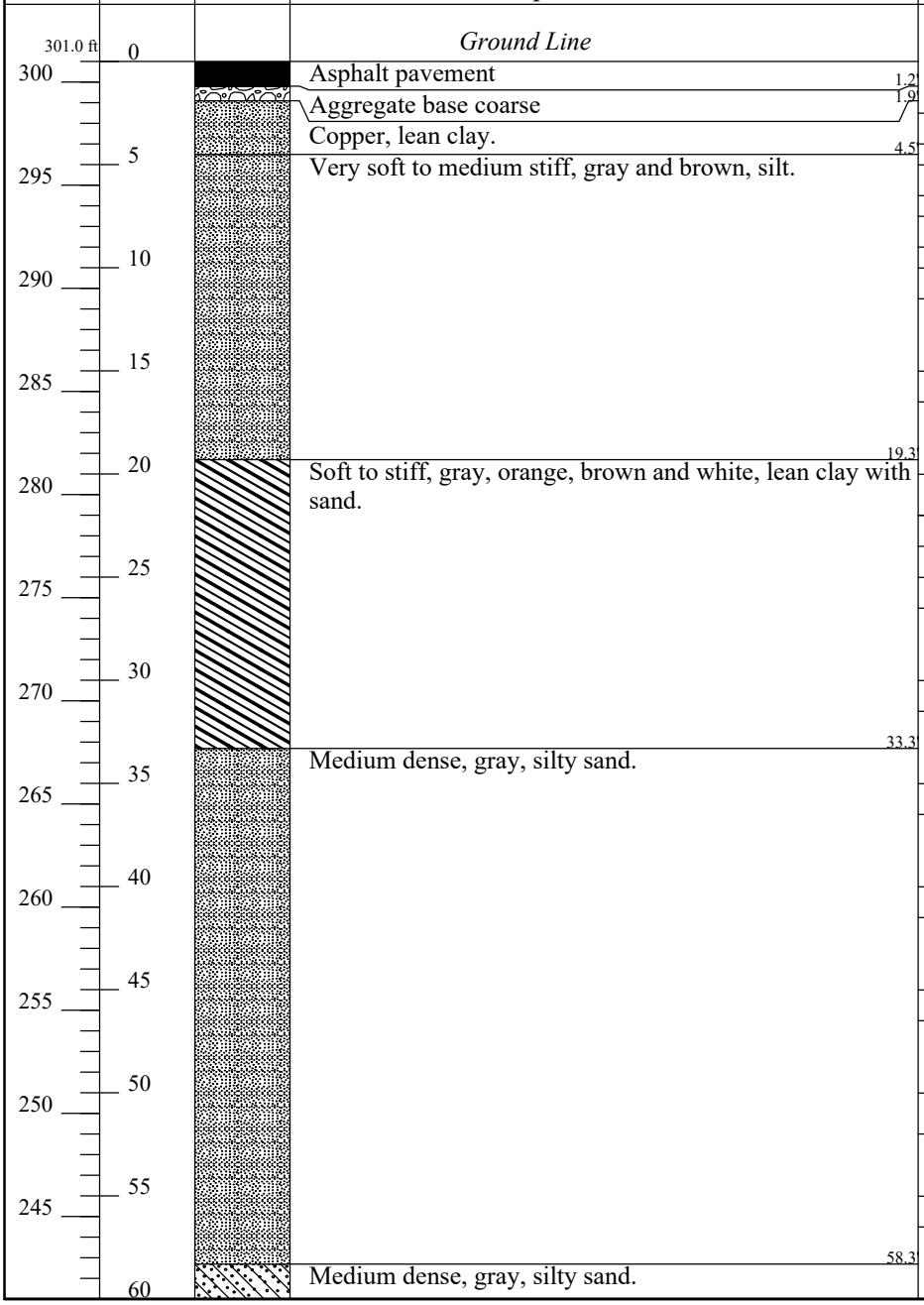
County **Haywood** Location **60+58 14' LT**

Project Name **SR-1 Over Muddy Creek** Surface Elevation **301 ft.**

Project Type **Subsurface Investigation** Dated Started **5/5/2019** Completed **5/6/2019**

Driller **D. Bowling** Logged by **D. Bowling** Depth to Water: Immediate **N/A ft.**

Hole Number **BR4_B-2** Total Depth **101.5 ft.** Depth to Water **N/A ft.** Date Measured



Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
SS-1	2.5 – 4.0	0.8	1-1-1	SPT
SS-2	5.0 – 6.5	1.5	0-0-0	SPT
SS-3	7.5 – 9.0	1.5	0-0-0	SPT
SS-4	10.0 – 11.5	1.5	0-1-1	SPT
SS-5	15.0 – 16.5	1.5	1-2-3	SPT
ST-1	20.0 – 22.0	0.0		ST
SS-6	23.5	1.5	1-2-2	SPT
SS-7	25.0 – 26.5	1.5	3-5-6	SPT
SS-8	30.0 – 31.5	1.3	7-6-8	SPT
SS-9	35.0 – 36.5	1.5	4-7-7	SPT
SS-10	40.0 – 41.5	1.5	4-7-8	SPT
SS-11	45.0 – 46.5	1.5	6-10-10	SPT
ST-2	50.0 – 52.0	2.0		ST
SS-12	55.0 – 56.5	1.5	6-8-10	SPT

State	**Tennessee**	Latitude	**35.45064 °**
County	**Haywood**	Location	**60+58 14' LT**
Project Name	**SR-1 Over Muddy Creek**	Surface Elevation	**301 ft.**
Project Type	**Subsurface Investigation**	Dated Started	**5/5/2019**
Driller	**D. Bowling**	Logged by	**D. Bowling**
Hole Number	**BR4_B-2**	Total Depth	**101.5 ft.**

Longitude **89.43864 °**
Completed **5/6/2019**
Depth to Water: Immediate **N/A ft.**
Depth to Water **N/A ft.** Date Measured

Lithology: Elev. | Depth | Symbol | Description | Overburden / Rock Core

Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
	60.0			
SS-13	61.5	1.5	6-8-10	SPT
	65.0			
SS-14	66.5	1.5	6-8-11	SPT
	70.0			
SS-15	71.5	1.5	5-8-10	SPT
	75.0			
SS-16	76.5	1.5	6-8-8	SPT
	80.0			
SS-17	81.5	1.5	5-6-6	SPT
	85.0			
SS-18	86.5	1.5	4-6-6	SPT
	90.0			
SS-19	91.5	1.5	4-7-8	SPT
	95.0			
SS-20	96.5	1.5	4-5-6	SPT
	100.0			
SS-21	101.5	1.5	5-5-7	SPT

241.0 ft

60 65 70 75 80 85 90 95 100 105 110 115 120

240 235 230 225 220 215 210 205 200 195 190 185

Continued from previous page

83.3'

Stiff, gray, lean clay with sand.

101.5'

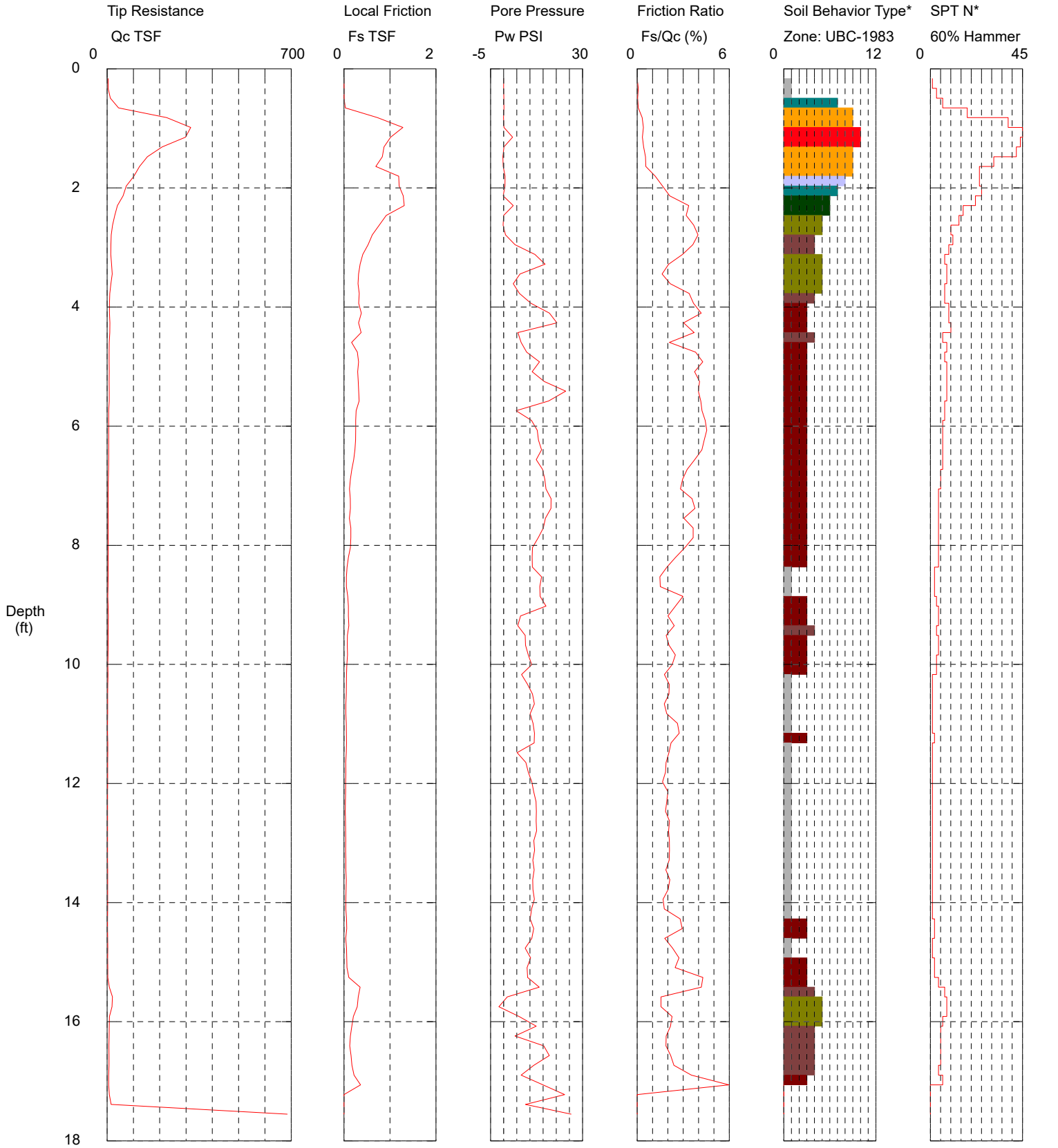
Boring Terminated @ 101.5' (Elev. 199.5).

Shelby tube at 20.0' resulted in no recovery
Boring elevation obtained using Google Earth satellite imagery

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR4CPT-1
Cone Used: DDG1210
GPS Data: N35.45051 W89.43889

CPT Date/Time: 5/17/2019 1:17:10 PM
Location: MUDDY CREEK-HAYWOOD CO.
Job Number: M19-164
Groundwater not measured.



Maximum Depth = 17.55 feet

Depth Increment = 0.164 feet

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

Refusal: Reaction. Surface material removed: Asphalt (14-in) over Concrete (9-in).

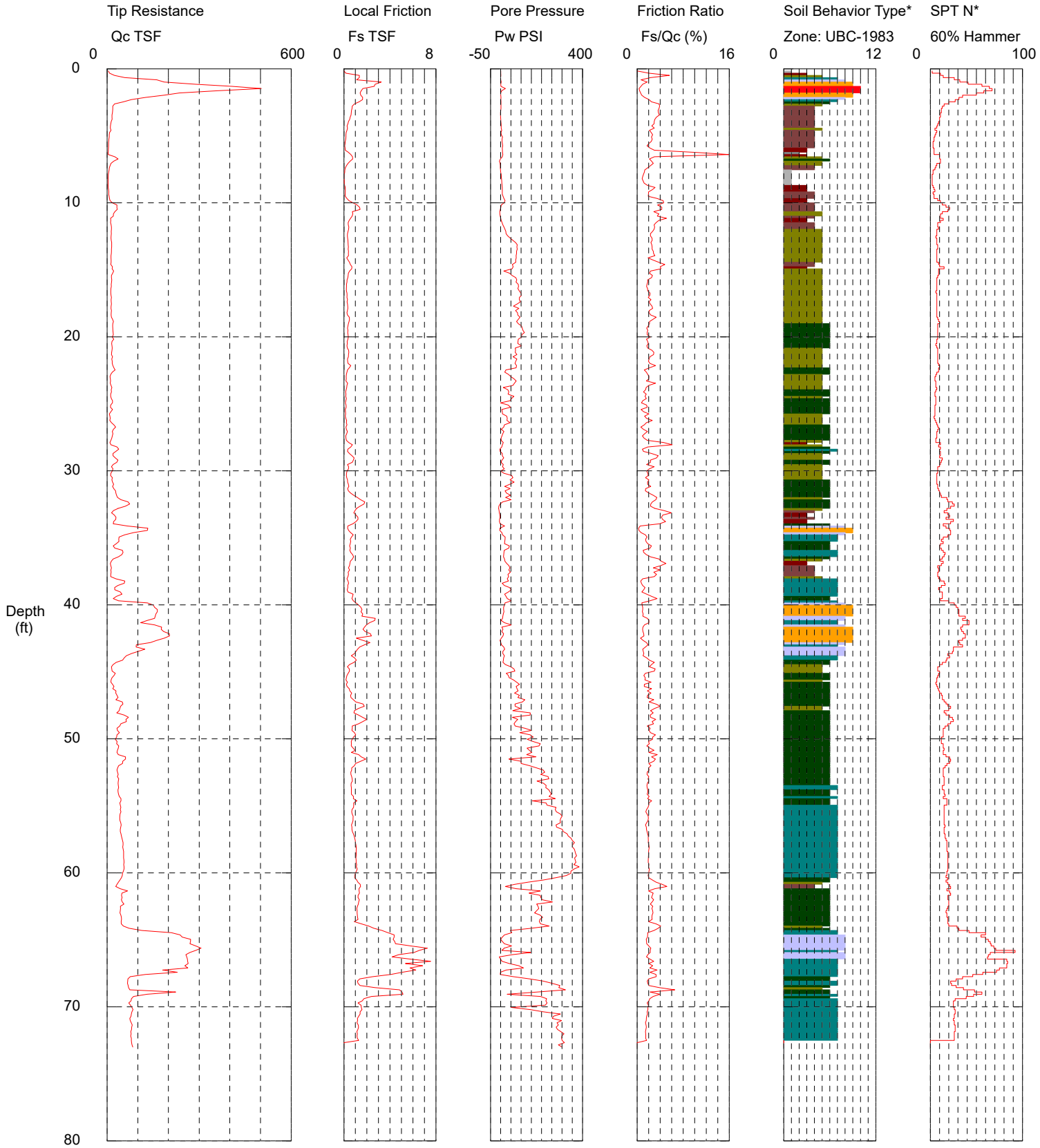
Pulverized pavement placed back in hole prior to start of sounding.

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

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR4CPT-1A
Cone Used: DDG1210
GPS Data: N35.45050 W89.43896

CPT Date/Time: 5/17/2019 2:58:36 PM
Location: MUDDY CREEK-HAYWOOD CO.
Job Number: M19-164
Groundwater: Collapsed and dry at 10.8-ft.



Maximum Depth = 73.00 feet

Depth Increment = 0.164 feet

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

Refusal: Excessive inclination.

Surface material removed: Asphalt (14-in) over Concrete (9-in).
Pulverized pavement placed back in hole prior to start of sounding.

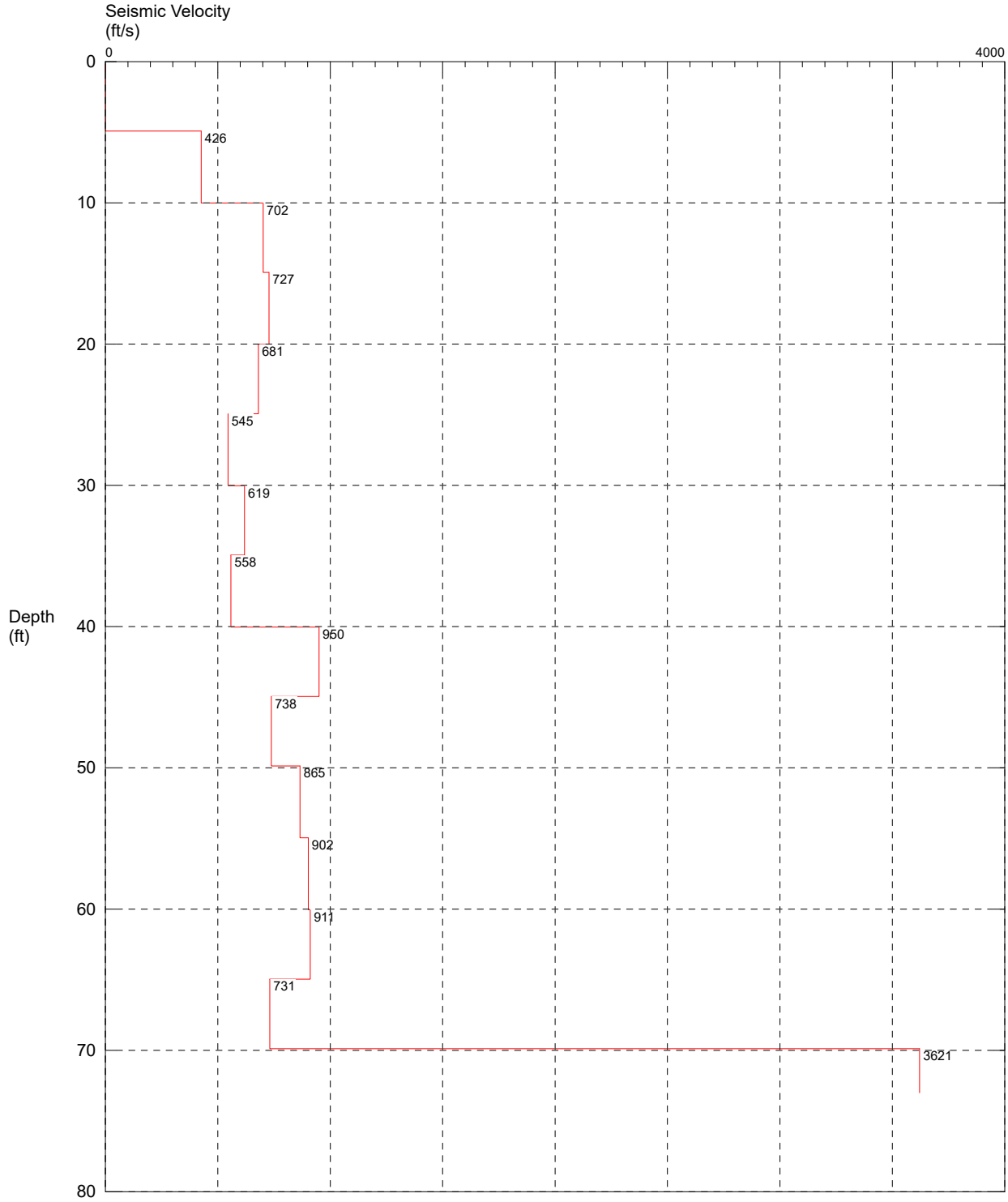
*Soil behavior type and SPT based on data from UBC-1983

SOUNDING

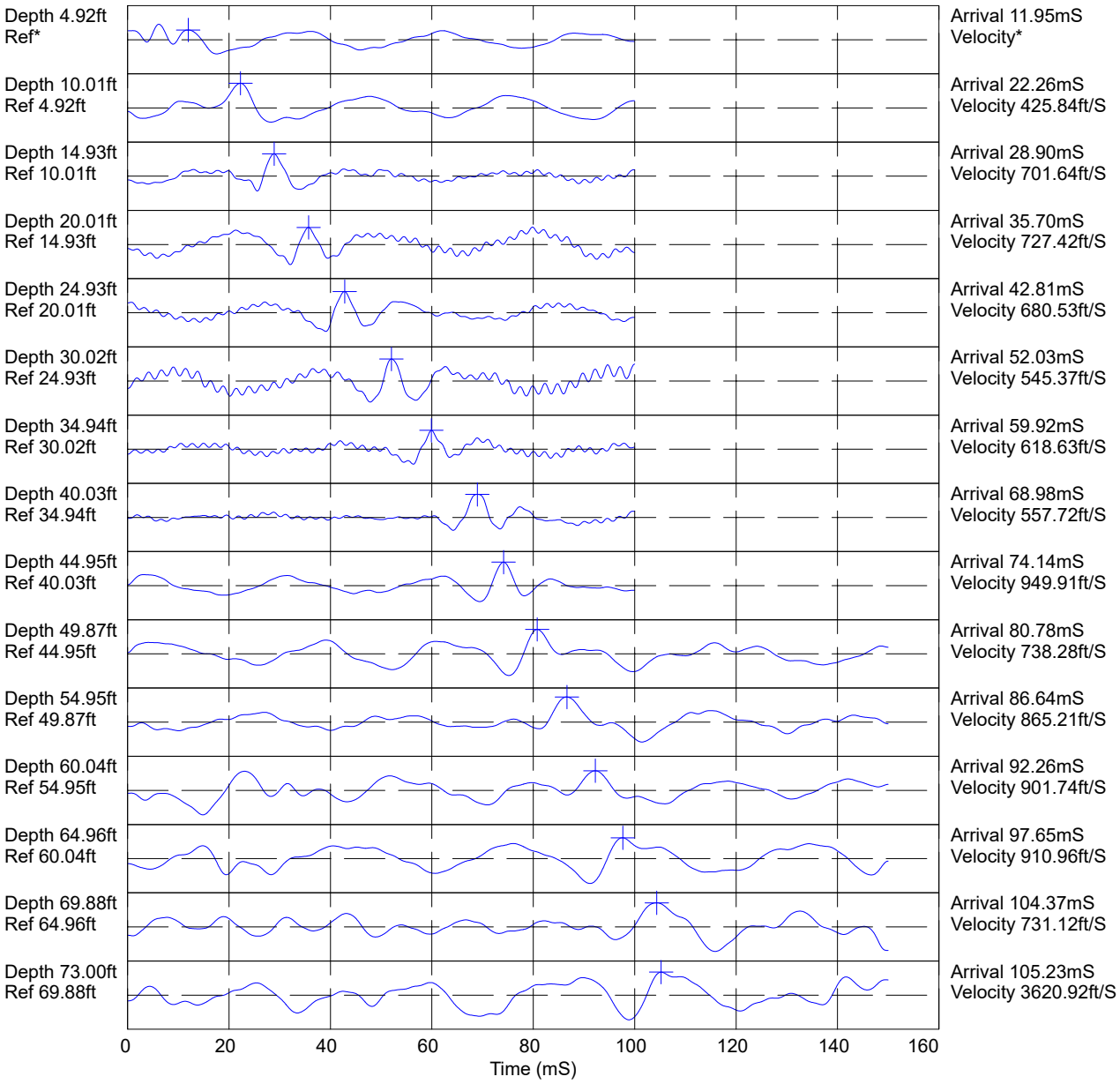
CUSTOMER: Southern Earth Science Inc
OPERATOR: Brandon Green
CONE ID: DDG1210
FILENAME: M19-164BR4CPT-1A.cpt

JOB NUMBER: M19-164
HOLE NUMBER: BR4CPT-1A
TEST DATE: 5/17/2019 2:58:36 PM

COMMENT: Pulverized pavement placed back in ho
GPS (LAT,LON,ALT): 0.00,0.00,0.0
LOCATION: MUDDY CREEK-HAYWOOD CO.



HOLE NUMBER: BR4CPT-1A



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

Appendix C: Laboratory Testing

Project Name : SR-1 over Muddy Creek Bridge
Location : Haywood County, TN
Job Number : 10168887

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
12	B-1		SS-1	2.5	4.0	Gray Silty Clay		18.5
12			SS-2	5.0	6.5	Gray Silty Clay		16.1
12			SS-3	7.5	9.0	Gray Silty Clay		26.0
12			SS-4	10.0	11.5	Gray Silty Clay		24.7
			ST-1	15.0	17.0			27.8
11			SS-5	20.0	21.5	Brown Silty Clay with Sand		21.7
11			SS-6	25.0	26.5	Gray Silty Clay with Sand		23.1
11			SS-7	30.0	31.5	Gray Silty Clay with Sand		18.2
			ST-2	35.0	37.0	No recovery		
9			SS-8	37.0	38.5	White & Brown Silty Sand		27.0
9			SS-9	40.0	41.5	Orange Silty Sand		30.1
9			SS-10	45.0	46.5	Gray Silty Sand		29.3
13			SS-11	50.0	51.5	Gray Sandy Silt		25.6
13			SS-12	55.0	57.0	Gray Sandy Silt		23.3
			ST-3	60.0	61.5			21.1
10			SS-13	65.0	66.5	Gray Silt		23.8
8			SS-14	70.0	71.5	Gray Silt with Sand		22.6
8			SS-15	75.0	76.5	Gray Silt with Sand		25.6
8			SS-16	80.0	81.5	Gray Silt with Sand		27.6
8			SS-17	85.0	86.5	Gray Silt with Sand		30.1
8			SS-18	90.0	91.5	Gray Silt with Sand		29.3
8			SS-19	95.0	96.5	Gray Silt with Sand		26.1
8			SS-20	100.0	101.5	Gray Silt with Sand		34.4
7			Bulk-1	2.0	10.0			24.4
1	B-2		SS-1	2.5	4.0	Copper Lean Clay		23.4
2			SS-2	5.0	6.5	Gray Silt		33.5
2			SS-3	7.5	9.0	Gray Silt		34.4
2			SS-4	10.0	11.5	Gray Silt		44.2
2			SS-5	15.0	16.5	Gray & Brown Silt		33.7
3			SS-6	22.0	23.5	Gray & Orange Lean Clay with Sand		26.7
3			SS-7	25.0	26.5	Brown & Gray Lean Clay with Sand		22.6
3			SS-8	30.0	31.5	White Lean Clay with Sand		22.4
4			SS-9	35.0	36.5	Gray Silty Sand		25.5
4			SS-10	40.0	41.5	Gray Silty Sand		25.2
4			SS-11	45.0	46.5	Gray Silty Sand		24.3
			ST-2	50.0	52.0			24.5
4			SS-12	55.0	56.5	Gray Silty Sand		25.6
5			SS-13	60.0	61.5	Gray Silty Sand		24.8
5			SS-14	65.0	66.5	Gray Silty Sand		26.6
5			SS-15	70.0	71.5	Gray Silty Sand		26.3
5			SS-16	75.0	76.5	Gray Silty Sand		29.8
5			SS-17	80.0	81.5	Gray Silty Sand		31.8
6			SS-18	85.0	86.5	Gray Lean Clay with Sand		27.4
6			SS-19	90.0	91.5	Gray Lean Clay with Sand		29.8
6			SS-20	95.0	96.5	Gray Lean Clay with Sand		24.6
6			SS-21	100.0	101.5	Gray Lean Clay with Sand		24.2

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Mudy Creek Bridge		
Project No.	:	10168887	Sample No.	: SS-1
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 2.5' to 4.0'
Laboratory No.	:	10168887	Date Tested	: 05/20/19
Submitted By	:	HDR	Date Reported	: 5/33/2019
Soil Type	:	Copper Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.043 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	23.4
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	27
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	19
		Plasticity Index	:	8
AASHTO Composition of Total Sample: M145		Liquidity Index	:	0.59
Gravel (3in. + No.10)	:	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	Sp. Gr. (AASHTO T100)	:	2.637
Fine Sand (-No.40 + No.200)	:	AASHTO Classification: M145	:	A-4 (6) *
Silt + Clay (-No.200)	:	ASTM Classification: D2487	:	CL *
		* Visual Classification		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:
Fine Gravel (-3/4in. + No.4)	:
Coarse Sand (-No.4 + No.10)	:
Medium Sand (-No.10 + No.40)	:
Fine Sand (-No.40 + No.200)	:
Silt + Clay (-No.200)	:

Approved By : Kevin E. Walker

Soil No. 1

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Mudy Creek Bridge		
Project No.	:	10168887	Sample No.	: SS-2
Project County	:	Haywood	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	10168887	Date Tested	: 05/20/19
Submitted By	:	HDR	Date Reported	: 5/33/2019
Soil Type	:	Gray Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	98.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.003 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	:	33.5
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	:	30
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	:	23
			Plasticity Index	:	7
AASHTO Composition of Total Sample: M145			Liquidity Index	:	1.46
Gravel (3in. + No.10)	:	0.1	Activity	:	NA
Coarse Sand (-No.10 + No.40)	:	0.3	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	:	0.7	AASHTO Classification: M145	:	A-4 (7)
Silt + Clay (-No.200)	:	98.9	ASTM Classification: D2487	:	ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.1
Medium Sand (-No.10 + No.40)	:	0.3
Fine Sand (-No.40 + No.200)	:	0.7
Silt + Clay (-No.200)	:	98.9

Approved By : Kevin E. Walker

Soil No. 2

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SOIL CLASSIFICATION

Project Name	: SR-1 Over Mudy Creek Bridge		
Project No.	: 10168887	Sample No.	: SS-6
Project County	: Haywood	Sample Loc.	: Boring No. B-2
Project State	: Tennessee	Sample Depth	: 22.0' to 23.5'
Laboratory No.	: 10168887	Date Tested	: 05/20/19
Submitted By	: HDR	Date Reported	: 5/33/2019
Soil Type	: Gray & Orange Lean Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	84.9
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0295	mm	62.3
Hyd. Rd.	# 2	0.0198	mm	46.3
Hyd. Rd.	# 3	0.0120	mm	32.3
Hyd. Rd.	# 4	0.0087	mm	23.1
Hyd. Rd.	# 5	0.0062	mm	20.9
Hyd. Rd.	# 6	0.0031	mm	16.3
Hyd. Rd.	# 7	0.0013	mm	13.6

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.022 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 26.7
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: 32
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: 19
		Plasticity Index	: 13
AASHTO Composition of Total Sample: M145		Liquidity Index	: 0.57
Gravel (3in. + No.10)	: 0.0	Activity	: 0.87
Coarse Sand (-No.10 + No.40)	: 0.1	Sp. Gr. (AASHTO T100)	: 2.663
Fine Sand (-No.40 + No.200)	: 15.0	AASHTO Classification: M145	: A-6 (10)
Silt (-No.200 + 0.002mm)	: 69.9	ASTM Classification: D2487	: CL
Clay (-0.002mm + 0.001mm)	: 2.7		
Colloids (-0.001mm)	: 12.3		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 0.1
Fine Sand (-No.40 + No.200)	: 15.0
Silt (-No.200 + 0.005mm)	: 65.5
Clay (-0.005mm + 0.001mm)	: 7.2
Colloids (-0.001mm)	: 12.3

Approved By : Kevin E. Walker

Soil No. 3

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SOIL CLASSIFICATION

Project Name : SR-1 Over Mudy Creek Bridge
Project No. : 10168887
Project County : Haywood
Project State : Tennessee
Laboratory No. : 10168887
Submitted By : HDR
Soil Type : Gray Silty Sand

Sample No. : SS-9
Sample Loc. : Boring No. B-2
Sample Depth : 35.0' to 36.5'
Date Tested : 05/20/19
Date Reported : 5/33/2019

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	67.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.6
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0350	mm	14.0
Hyd. Rd.	# 2	0.0223	mm	11.0
Hyd. Rd.	# 3	0.0130	mm	7.1
Hyd. Rd.	# 4	0.0093	mm	3.0
Hyd. Rd.	# 5	0.0066	mm	0.7
Hyd. Rd.	# 6	0.0032	mm	0.1
Hyd. Rd.	# 7	0.0013	mm	0.0

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.159 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.5
Liquid Limit (AASHTO T89) : 40
Plastic Limit (AASHTO T90) : 31
Plasticity Index : 9
Liquidity Index : -0.56
Activity : 146.45
Sp. Gr. (AASHTO T100) : 2.665
AASHTO Classification: M145 : A-4 (0)
ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 0.0
Coarse Sand (-No.10 + No.40) : 32.4
Fine Sand (-No.40 + No.200) : 31.0
Silt (-No.200 + 0.002mm) : 36.5
Clay (-0.002mm + 0.001mm) : 0.1
Colloids (-0.001mm) : 0.0

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.0
Coarse Sand (-No.4 + No.10) : 0.0
Medium Sand (-No.10 + No.40) : 32.4
Fine Sand (-No.40 + No.200) : 31.0
Silt (-No.200 + 0.005mm) : 36.1
Clay (-0.005mm + 0.001mm) : 0.5
Colloids (-0.001mm) : 0.0

Approved By : Kevin E. Walker

Soil No. 4

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SOIL CLASSIFICATION

Project Name : SR-1 Over Mudy Creek Bridge
Project No. : 10168887
Project County : Haywood
Project State : Tennessee
Laboratory No. : 10168887
Submitted By : HDR
Soil Type : Gray Silty Sand

Sample No. : SS-13
Sample Loc. : Boring No. B-2
Sample Depth : 60.0' to 61.5'
Date Tested : 05/20/19
Date Reported : 5/33/2019

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.8
No.6		3.35	mm	
No.10		2	mm	89.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.257 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 24.8
Liquid Limit (AASHTO T89) : 43
Plastic Limit (AASHTO T90) : 30
Plasticity Index : 13
Liquidity Index : -0.38
Activity : NA
Sp. Gr. (AASHTO T100) : 2.626
AASHTO Classification: M145 : A-2-7 (1)
ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 10.1
Coarse Sand (-No.10 + No.40) : 30.4
Fine Sand (-No.40 + No.200) : 32.8
Silt + Clay (-No.200) : 26.7

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.2
Coarse Sand (-No.4 + No.10) : 9.9
Medium Sand (-No.10 + No.40) : 30.4
Fine Sand (-No.40 + No.200) : 32.8
Silt + Clay (-No.200) : 26.7

Approved By : Kevin E. Walker

Soil No. 5

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SOIL CLASSIFICATION

Project Name	: SR-1 Over Mudy Creek Bridge		
Project No.	: 10168887	Sample No.	: SS-18
Project County	: Haywood	Sample Loc.	: Boring No. B-2
Project State	: Tennessee	Sample Depth	: 85.0' to 86.5'
Laboratory No.	: 10168887	Date Tested	: 05/20/19
Submitted By	: HDR	Date Reported	: 5/33/2019
Soil Type	: Gray Lean Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	75.9
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0334	mm	32.1
Hyd. Rd.	# 2	0.0217	mm	23.1
Hyd. Rd.	# 3	0.0127	mm	18.2
Hyd. Rd.	# 4	0.0091	mm	14.0
Hyd. Rd.	# 5	0.0065	mm	10.8
Hyd. Rd.	# 6	0.0032	mm	6.2
Hyd. Rd.	# 7	0.0014	mm	2.6

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.046 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 27.4
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: 31
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: 21
		Plasticity Index	: 10
AASHTO Composition of Total Sample: M145		Liquidity Index	: 0.63
Gravel (3in. + No.10)	: 0.0	Activity	: 2.38
Coarse Sand (-No.10 + No.40)	: 0.1	Sp. Gr. (AASHTO T100)	: 2.638
Fine Sand (-No.40 + No.200)	: 24.0	AASHTO Classification: M145	: A-4 (6)
Silt (-No.200 + 0.002mm)	: 71.7	ASTM Classification: D2487	: CL
Clay (-0.002mm + 0.001mm)	: 1.9		
Colloids (-0.001mm)	: 2.3		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 0.1
Fine Sand (-No.40 + No.200)	: 24.0
Silt (-No.200 + 0.005mm)	: 66.8
Clay (-0.005mm + 0.001mm)	: 6.8
Colloids (-0.001mm)	: 2.3

Approved By : Kevin E. Walker

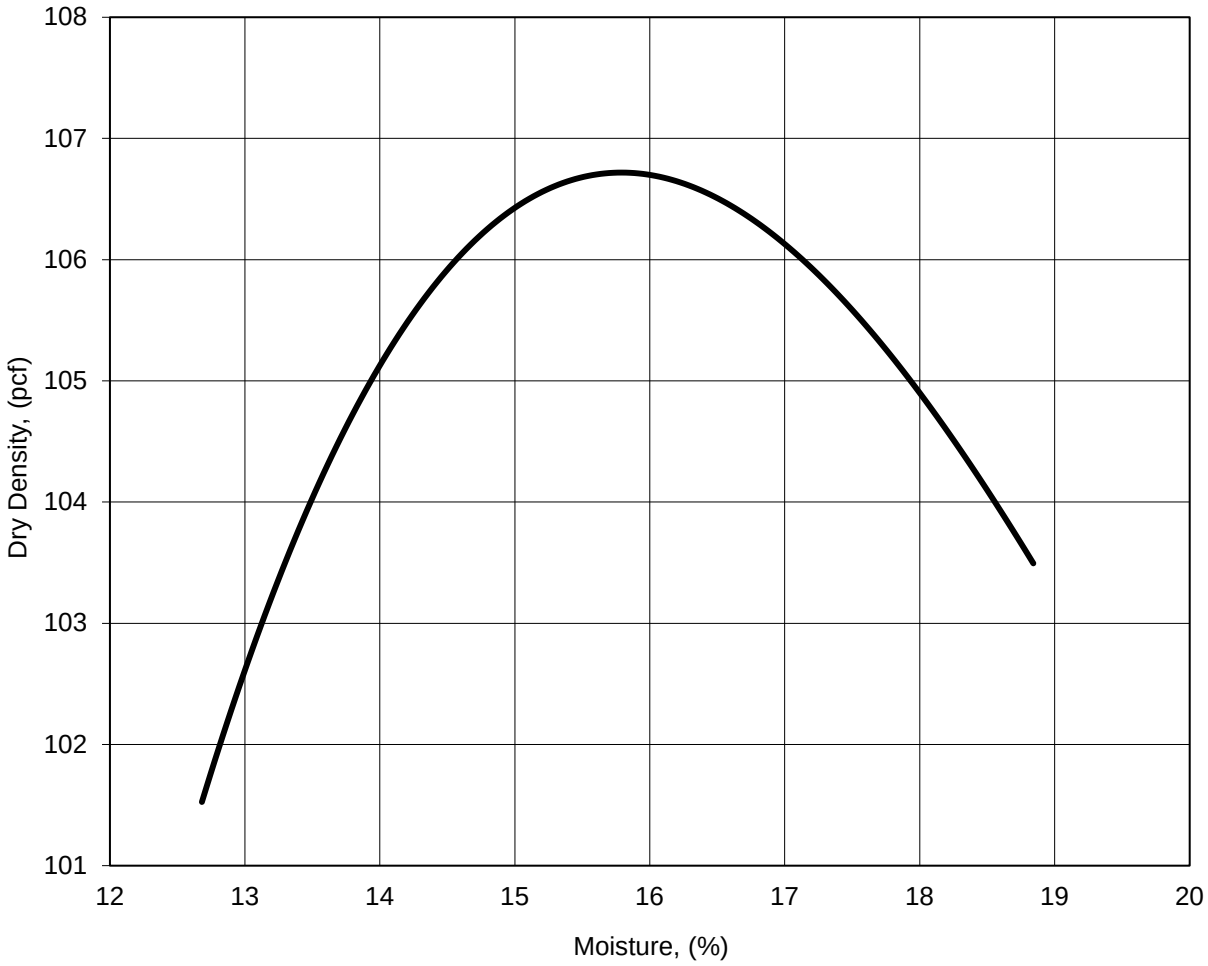
Soil No. 6

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MOISTURE-DENSITY RELATIONSHIP

Project Name	:	SR-1 Over Mudy Creek Bridge			
Project No.	:	10168887	Sample No.	:	Bulk-1
Project County	:	Haywood	Sample Loc.	:	Boring No. B-2
Project State	:	Tennessee	Sample Depth	:	2.0' to 10.0'
Laboratory No.	:	10168887	Date Tested	:	05/23/19
Submitted By	:	HDR	Date Reported	:	5/30/2019
Soil Type	:				



MAXIMUM DENSITY: 106.7 pcf

OPTIMUM MOISTURE: 15.8 %

COMMENTS: AASHTO: T-99; Method (A)

APPROVED BY: KW

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SOIL CLASSIFICATION

Project Name	: SR-1 Over Mudy Creek Bridge		
Project No.	: 10168887	Sample No.	: SS-14
Project County	: Haywood	Sample Loc.	: Boring No. B-1
Project State	: Tennessee	Sample Depth	: 70.0' to 71.5'
Laboratory No.	: 10168887	Date Tested	: 05/20/19
Submitted By	: HDR	Date Reported	: 5/33/2019
Soil Type	: Gray Silt with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	96.0
No.6		3.35	mm	
No.10		2	mm	84.2

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.01 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 22.6
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: 38
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: 28
		Plasticity Index	: 10
AASHTO Composition of Total Sample: M145		Liquidity Index	: -0.52
Gravel (3in. + No.10)	: 15.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.8	Sp. Gr. (AASHTO T100)	: 2.716
Fine Sand (-No.40 + No.200)	: 5.7	AASHTO Classification: M145	: A-4 (7)
Silt + Clay (-No.200)	: 71.7	ASTM Classification: D2487	: ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 4.0
Coarse Sand (-No.4 + No.10)	: 11.8
Medium Sand (-No.10 + No.40)	: 6.8
Fine Sand (-No.40 + No.200)	: 5.7
Silt + Clay (-No.200)	: 71.7

Approved By : Kevin E. Walker

Soil No. 8

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SOIL CLASSIFICATION

Project Name	: SR-1 Over Mudy Creek Bridge		
Project No.	: 10168887	Sample No.	: SS-8
Project County	: Haywood	Sample Loc.	: Boring No. B-1
Project State	: Tennessee	Sample Depth	: 37.0' to 38.5'
Laboratory No.	: 10168887	Date Tested	: 05/20/19
Submitted By	: HDR	Date Reported	: 5/33/2019
Soil Type	: White & Brown Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.118 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 27.0
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: NP
		Plasticity Index	: NP
AASHTO Composition of Total Sample: M145		Liquidity Index	: NA
Gravel (3in. + No.10)	: 0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 0.1	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	: 67.4	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	: 32.5	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 0.1
Fine Sand (-No.40 + No.200)	: 67.4
Silt + Clay (-No.200)	: 32.5

Approved By : Kevin E. Walker

Soil No. 9

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SOIL CLASSIFICATION

Project Name : SR-1 Over Mudy Creek Bridge
Project No. : 10168887
Project County : Haywood
Project State : Tennessee
Laboratory No. : 10168887
Submitted By : HDR
Soil Type : Gray Silt

Sample No. : SS-13
Sample Loc. : Boring No. B-1
Sample Depth : 65.0' to 66.5'
Date Tested : 05/24/19
Date Reported : 6/3/2019

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	
No.6		3.35	mm	
No.10		2	mm	

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.257 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 23.8
Liquid Limit (AASHTO T89) : NP
Plastic Limit (AASHTO T90) : NP
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-4 (0) *
ASTM Classification: D2487 : ML *
* Visual Classification

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) :
Coarse Sand (-No.10 + No.40) :
Fine Sand (-No.40 + No.200) :
Silt + Clay (-No.200) :

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) :
Fine Gravel (-3/4in. + No.4) :
Coarse Sand (-No.4 + No.10) :
Medium Sand (-No.10 + No.40) :
Fine Sand (-No.40 + No.200) :
Silt + Clay (-No.200) :

Approved By : Kevin E. Walker

Soil No. 10

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Mudy Creek Bridge		
Project No.	:	10168887	Sample No.	: SS-5
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 20.0' to 21.5'
Laboratory No.	:	10168887	Date Tested	: 05/24/19
Submitted By	:	HDR	Date Reported	: 6/3/2019
Soil Type	:	Gray Silty Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	75.2
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0314	mm	51.6
Hyd. Rd.	# 2	0.0207	mm	40.5
Hyd. Rd.	# 3	0.0126	mm	25.5
Hyd. Rd.	# 4	0.0091	mm	19.3
Hyd. Rd.	# 5	0.0064	mm	16.8
Hyd. Rd.	# 6	0.0032	mm	11.7
Hyd. Rd.	# 7	0.0013	mm	8.7

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.03 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 21.7
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 24
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 18
			Plasticity Index	: 6
			Liquidity Index	: 0.57
			Activity	: 0.59
			Sp. Gr. (AASHTO T100)	: 2.680
			AASHTO Classification: M145	: A-4 (2)
			ASTM Classification: D2487	: CL-ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	:	0.0
Coarse Sand (-No.10 + No.40)	:	0.2
Fine Sand (-No.40 + No.200)	:	24.6
Silt (-No.200 + 0.002mm)	:	65.1
Clay (-0.002mm + 0.001mm)	:	2.4
Colloids (-0.001mm)	:	7.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	0.2
Fine Sand (-No.40 + No.200)	:	24.6
Silt (-No.200 + 0.005mm)	:	60.2
Clay (-0.005mm + 0.001mm)	:	7.3
Colloids (-0.001mm)	:	7.7

Approved By : Kevin E. Walker

Soil No. 11

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SOIL CLASSIFICATION

Project Name : SR-1 Over Mudy Creek Bridge
Project No. : 10168887
Project County : Haywood
Project State : Tennessee
Laboratory No. : 10168887
Submitted By : HDR
Soil Type : Gray Silty Clay

Sample No. : SS-3
Sample Loc. : Boring No. B-1
Sample Depth : 7.5' to 9.0'
Date Tested : 05/24/19
Date Reported : 6/3/2019

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.1
1/4		6.3	mm	
No.4		4.75	mm	98.8
No.6		3.35	mm	
No.10		2	mm	97.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	93.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	92.1
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0291	mm	67.6
Hyd. Rd.	# 2	0.0199	mm	49.8
Hyd. Rd.	# 3	0.0124	mm	30.0
Hyd. Rd.	# 4	0.0090	mm	22.0
Hyd. Rd.	# 5	0.0064	mm	15.6
Hyd. Rd.	# 6	0.0032	mm	9.6
Hyd. Rd.	# 7	0.0014	mm	6.6

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.02 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 26.0
Liquid Limit (AASHTO T89) : 28
Plastic Limit (AASHTO T90) : 21
Plasticity Index : 7
Liquidity Index : 0.77
Activity : 0.88
Sp. Gr. (AASHTO T100) : 2.661
AASHTO Classification: M145 : A-4 (6)
ASTM Classification: D2487 : CL-ML

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 2.6
Coarse Sand (-No.10 + No.40) : 4.0
Fine Sand (-No.40 + No.200) : 1.3
Silt (-No.200 + 0.002mm) : 84.1
Clay (-0.002mm + 0.001mm) : 2.1
Colloids (-0.001mm) : 5.8

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 1.2
Coarse Sand (-No.4 + No.10) : 1.4
Medium Sand (-No.10 + No.40) : 4.0
Fine Sand (-No.40 + No.200) : 1.3
Silt (-No.200 + 0.005mm) : 78.7
Clay (-0.005mm + 0.001mm) : 7.6
Colloids (-0.001mm) : 5.8

Approved By : Kevin E. Walker

Soil No. 12

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SOIL CLASSIFICATION

Project Name	:	SR-1 Over Mudy Creek Bridge		
Project No.	:	10168887	Sample No.	: SS-11
Project County	:	Haywood	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 50.0' to 51.5'
Laboratory No.	:	10168887	Date Tested	: 05/24/19
Submitted By	:	HDR	Date Reported	: 6/3/2019
Soil Type	:	Gray Sandy Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	91.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.6
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0360	mm	14.9
Hyd. Rd.	# 2	0.0232	mm	8.6
Hyd. Rd.	# 3	0.0134	mm	7.6
Hyd. Rd.	# 4	0.0096	mm	4.4
Hyd. Rd.	# 5	0.0068	mm	2.9
Hyd. Rd.	# 6	0.0033	mm	0.7
Hyd. Rd.	# 7	0.0014	mm	0.0

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.069 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 25.6
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 33
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 29
			Plasticity Index	: 4
AASHTO Composition of Total Sample: M145			Liquidity Index	: -0.83
Gravel (3in. + No.10)	:	0.2	Activity	: 13.86
Coarse Sand (-No.10 + No.40)	:	8.7	Sp. Gr. (AASHTO T100)	: 2.633
Fine Sand (-No.40 + No.200)	:	36.5	AASHTO Classification: M145	: A-4 (1)
Silt (-No.200 + 0.002mm)	:	54.3	ASTM Classification: D2487	: ML
Clay (-0.002mm + 0.001mm)	:	0.3		
Colloids (-0.001mm)	:	0.0		

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.2
Medium Sand (-No.10 + No.40)	:	8.7
Fine Sand (-No.40 + No.200)	:	36.5
Silt (-No.200 + 0.005mm)	:	52.7
Clay (-0.005mm + 0.001mm)	:	1.9
Colloids (-0.001mm)	:	0.0

Approved By : Kevin E. Walker

Soil No. 13

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Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/31/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/3/2019
SOIL TYPE	: Gray Silty Clay with Sand		

WET DENSITY	: 121.8 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.76 cm
DRY DENSITY	: 94.99 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.23 cm
MOISTURE	: 28.22 %	CHAMBER PRES.	: 4.06 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	4.06	4.06	1.00
2	0.09	4.06	5.33	1.32
3	0.18	4.06	5.55	1.37
4	0.27	4.06	6.18	1.52
5	0.36	4.06	6.61	1.63
6	0.44	4.06	7.03	1.73
7	0.53	4.06	7.24	1.79
8	1.07	4.06	9.76	2.41
9	1.60	4.06	11.83	2.92
10	2.13	4.06	13.66	3.37
11	2.66	4.06	15.07	3.72
12	3.20	4.06	16.25	4.01
13	3.55	4.06	16.82	4.15
14	4.44	4.06	17.93	4.42
15	5.33	4.06	18.41	4.54
16	6.21	4.06	18.88	4.66
17	7.10	4.06	19.34	4.77
18	7.99	4.06	19.79	4.88
19	8.88	4.06	20.41	5.03
20	9.76	4.06	20.83	5.14
21	10.65	4.06	21.05	5.19
22	11.54	4.06	21.64	5.34
23	12.43	4.06	21.83	5.38
24	13.32	4.06	22.03	5.43
25	14.20	4.06	22.21	5.48
26	15.09	4.06	22.56	5.56
27	15.98	4.06	22.54	5.56
28	16.87	4.06	22.52	5.55
29	17.75	4.06	22.85	5.63
30	18.64	4.06	22.82	5.63
31	19.53	4.06	22.96	5.66
32	20.42	4.06	22.91	5.65

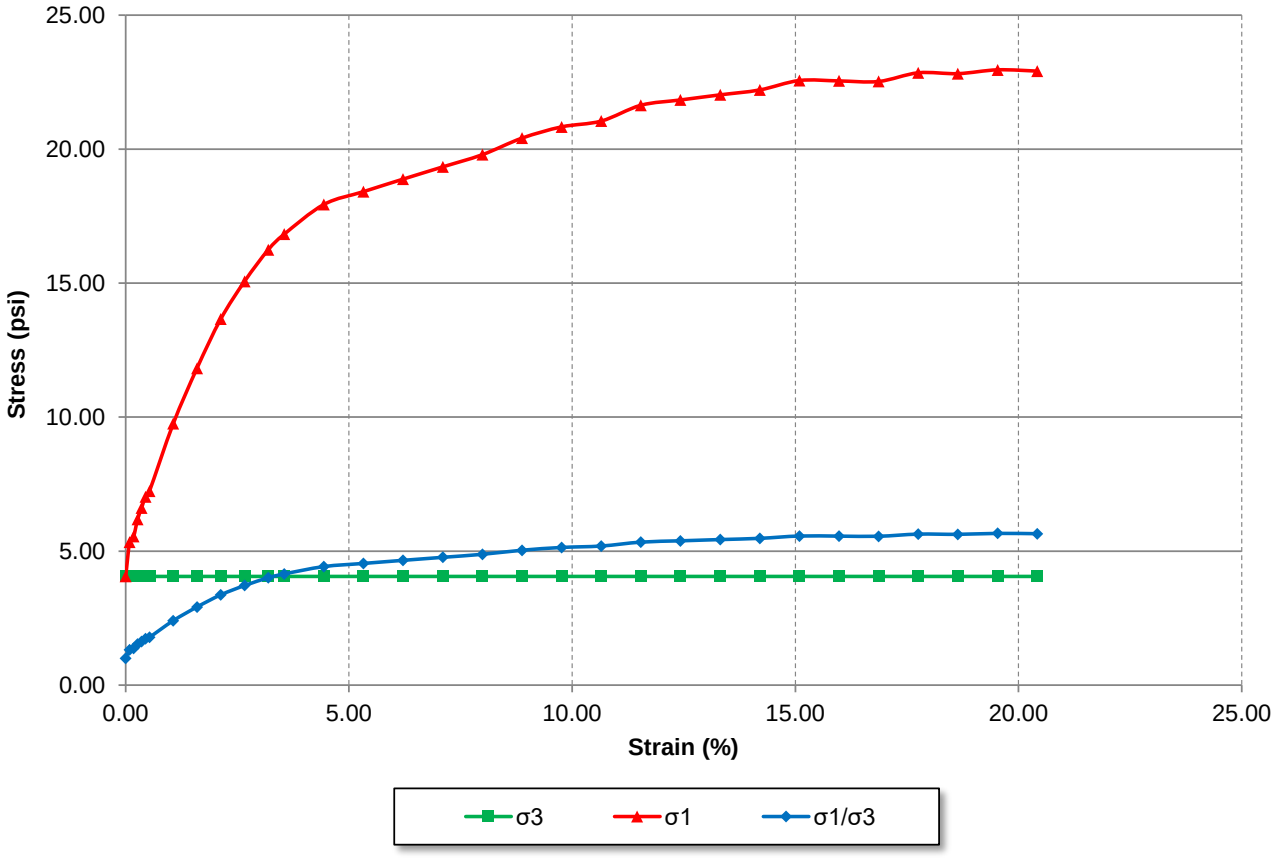
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/31/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/3/2019

FINAL MOISTURE	: 28.22 %	EFF. CONS. STRESS	: 4.06 psi
FINAL HEIGHT	: 11.39 cm	SPECIFIC GRAVITY	: 2.68
FINAL DIAMETER	: 8.07 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 16.0' to 16.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/31/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/3/2019

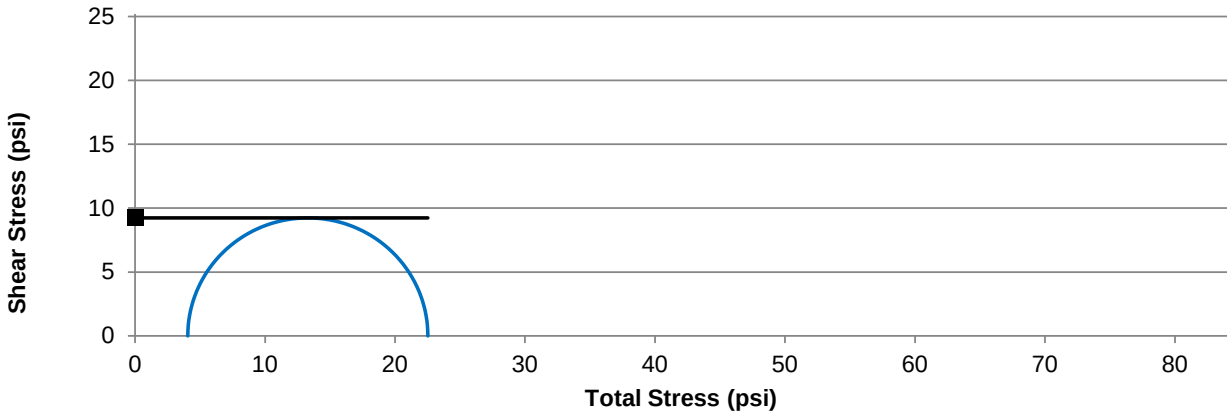
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	4.06 psi	22.52 psi

Compressive Strength =	2660	psf
Cohesion =	1330	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 56.0' to 56.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/31/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/3/2019

SOIL TYPE	: Gray Silt				
WET DENSITY	: 121.84 pcf	DELTA HEIGHT	: 0.28 cm	INITIAL HEIGHT	: 14.95 cm
DRY DENSITY	: 98.56 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.4 cm
MOISTURE	: 23.62 %	CHAMBER PRES.	: 10.03 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	10.03	10.03	1.00
2	0.09	10.03	18.06	1.8
3	0.17	10.03	21.96	2.19
4	0.26	10.03	25.04	2.5
5	0.35	10.03	28.11	2.8
6	0.43	10.03	30.77	3.07
7	0.52	10.03	33.18	3.31
8	1.04	10.03	46.27	4.61
9	1.56	10.03	48.1	4.79
10	2.08	10.03	48.54	4.84
11	2.60	10.03	48.65	4.85
12	3.12	10.03	49.87	4.97
13	3.46	10.03	51.23	5.11
14	4.33	10.03	51.21	5.1
15	5.19	10.03	52.16	5.2
16	6.06	10.03	54.42	5.42
17	6.92	10.03	56.4	5.62
18	7.79	10.03	63.28	6.31
19	8.65	10.03	65.41	6.52
20	9.52	10.03	65.58	6.54
21	10.39	10.03	64.88	6.47
22	11.25	10.03	56.71	5.65
23	12.12	10.03	50.08	4.99

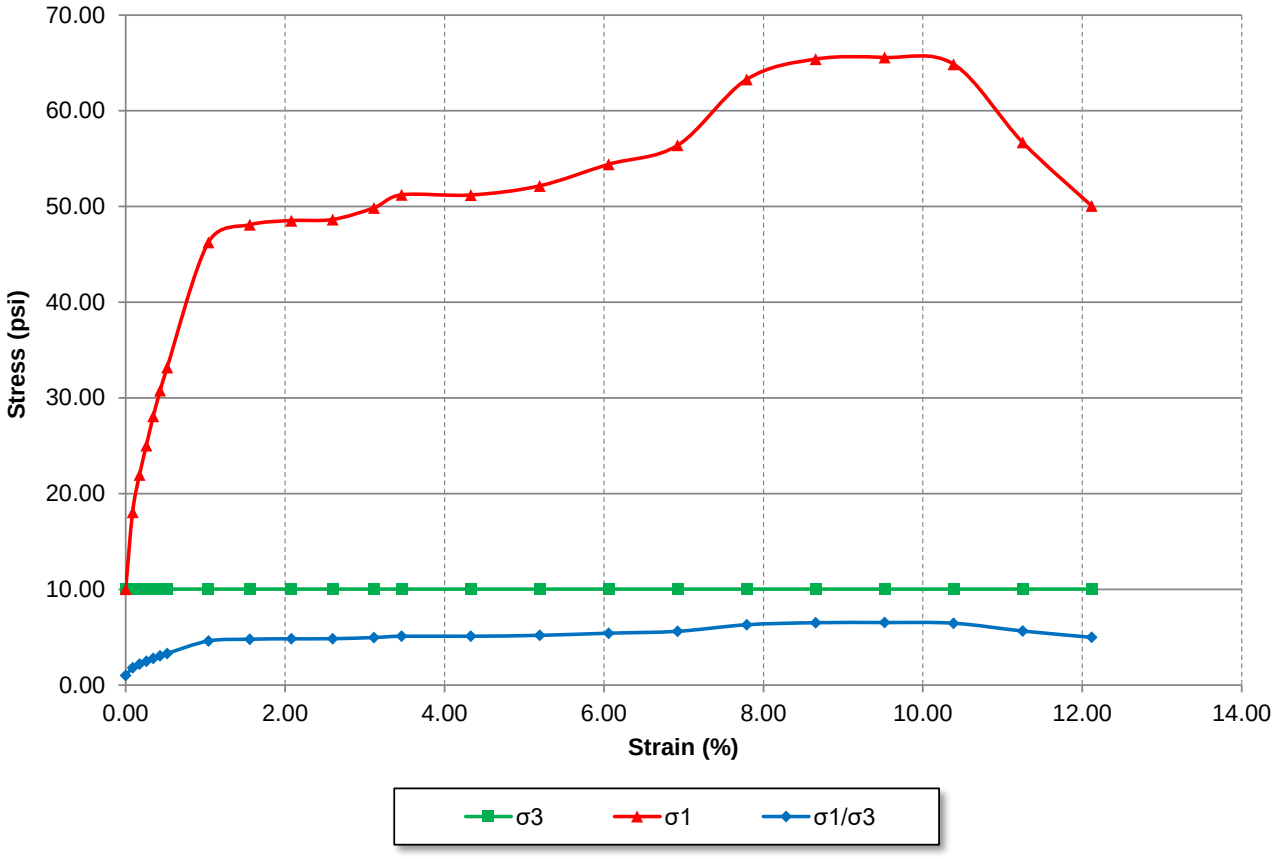
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 56.0' to 56.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/31/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/3/2019

FINAL MOISTURE	: 23.62 %	EFF. CONS. STRESS	: 10.03 psi
FINAL HEIGHT	: 12.9 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 7.89 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 56.0' to 56.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/31/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/3/2019

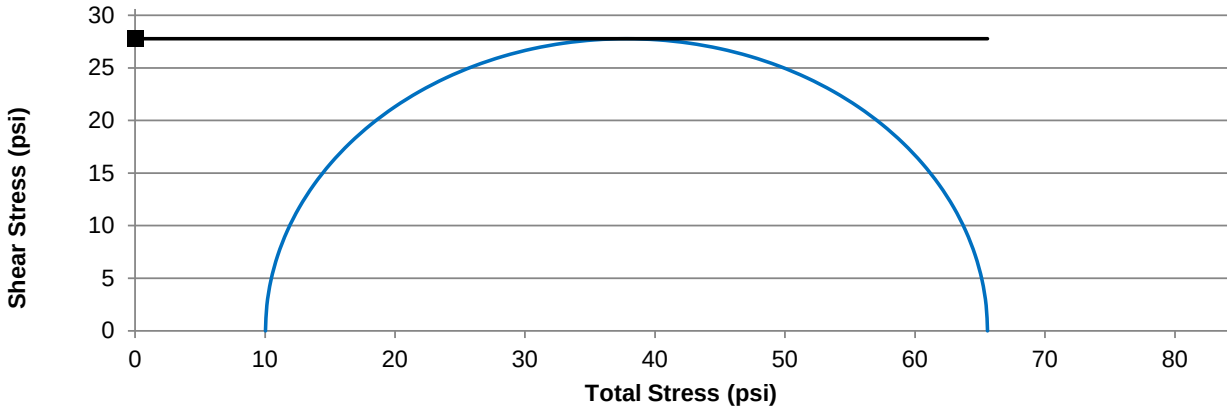
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	10.03 psi	65.58 psi

Compressive Strength =	7998	psf
Cohesion =	3999	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 51.0' to 51.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/19/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 5/22/2019

SOIL TYPE	: Gray Silty Sand				
WET DENSITY	: 124.55 pcf	DELTA HEIGHT	: 0.1 cm	INITIAL HEIGHT	: 15.05 cm
DRY DENSITY	: 99.63 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.27 cm
MOISTURE	: 25.02 %	CHAMBER PRES.	: 22.88 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	22.88	22.88	1.00
2	0.08	22.88	28.07	1.23
3	0.17	22.88	30.87	1.35
4	0.25	22.88	33.24	1.45
5	0.34	22.88	35.17	1.54
6	0.42	22.88	36.89	1.61
7	0.51	22.88	39.04	1.71
8	1.02	22.88	49.19	2.15
9	1.53	22.88	57.66	2.52
10	2.04	22.88	64.01	2.8
11	2.55	22.88	68.46	2.99
12	3.06	22.88	68.6	3
13	3.40	22.88	66.09	2.89
14	4.25	22.88	65.47	2.86

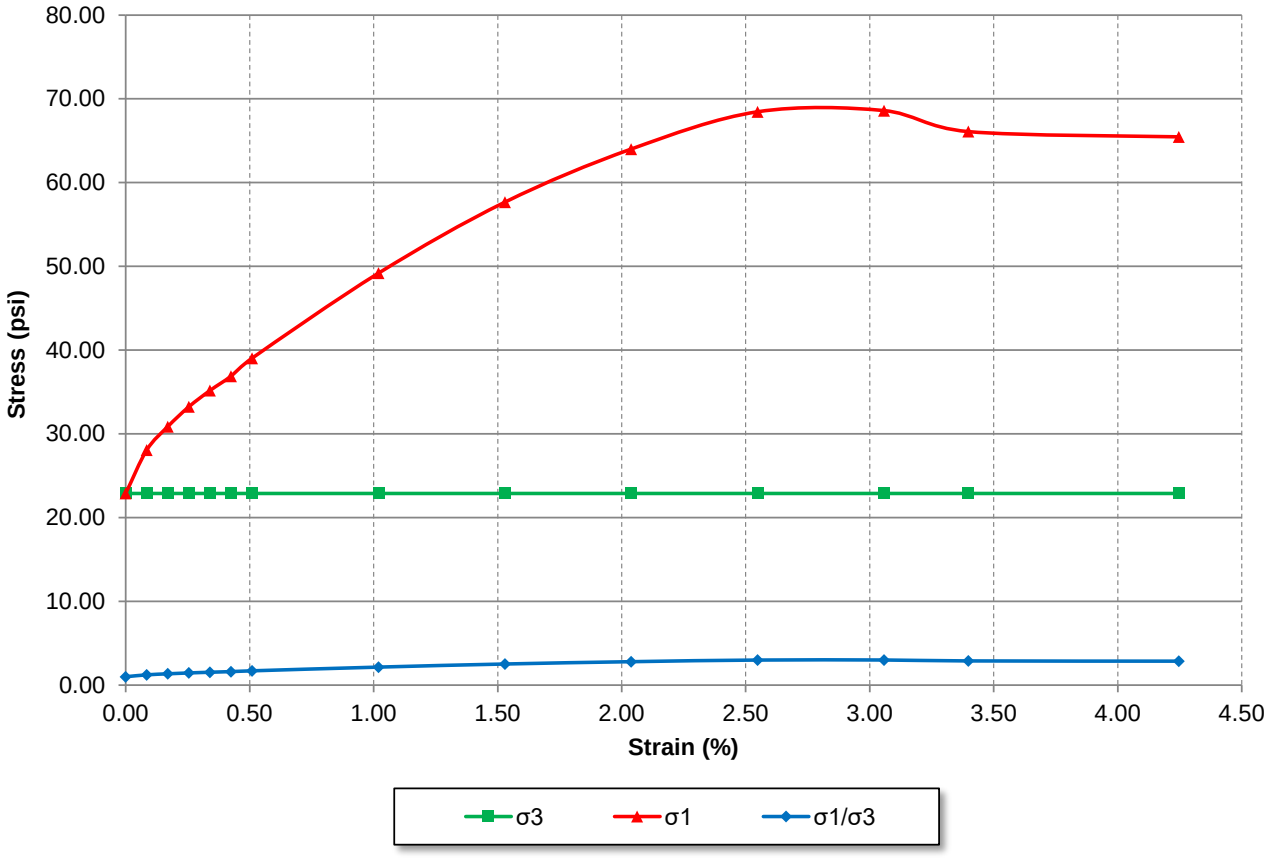
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	POINT #	: 1
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 51.0' to 51.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/19/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 5/22/2019

FINAL MOISTURE	: 25.02 %	EFF. CONS. STRESS	: 22.88 psi
FINAL HEIGHT	: 14.32 cm	SPECIFIC GRAVITY	: 2.67
FINAL DIAMETER	: 7.43 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR-1 Over Muddy Creek		
PROJECT #	: 10168887	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Haywood	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 51.0' to 51.5'
LABORATORY #	: 10168887	DATE TESTED	: 5/19/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 5/22/2019

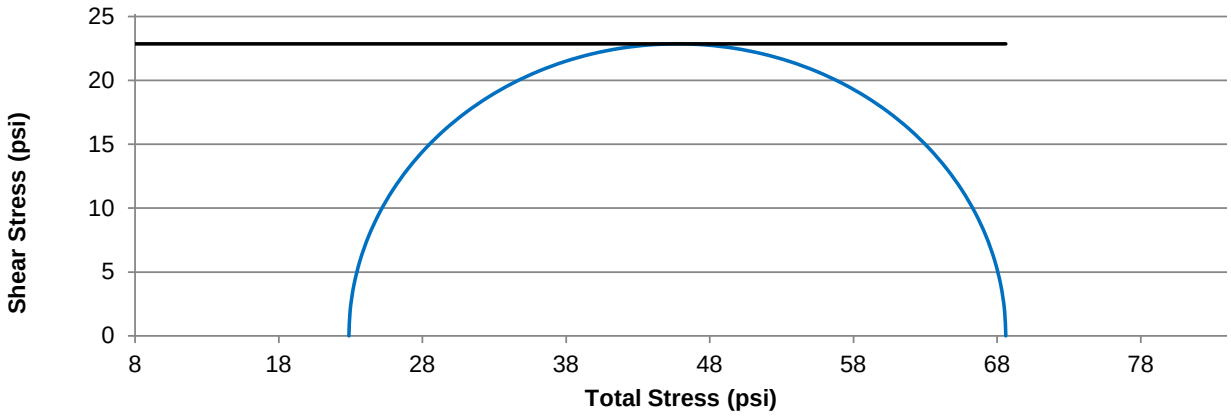
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	22.88 psi	68.6 psi

Compressive Strength =	6584	psf
Cohesion =	3292	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Table 1 - Laboratory Tests on Soil Samples

HDR-ICA
SR 1 Over Muddy Creek Bridge
Your #10168887, HDR Lab #19-0361LAB
12-Jun-19

Sample ID			B-2 @ 32.0-10.0'
Resistivity		**Units**	
as-received		ohm-cm	2,560,000
saturated		ohm-cm	4,400
pH			7.4
Electrical Conductivity		mS/cm	na
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	na
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

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Appendix D: Preliminary Soil Shear Strength Loss Analysis

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HDR
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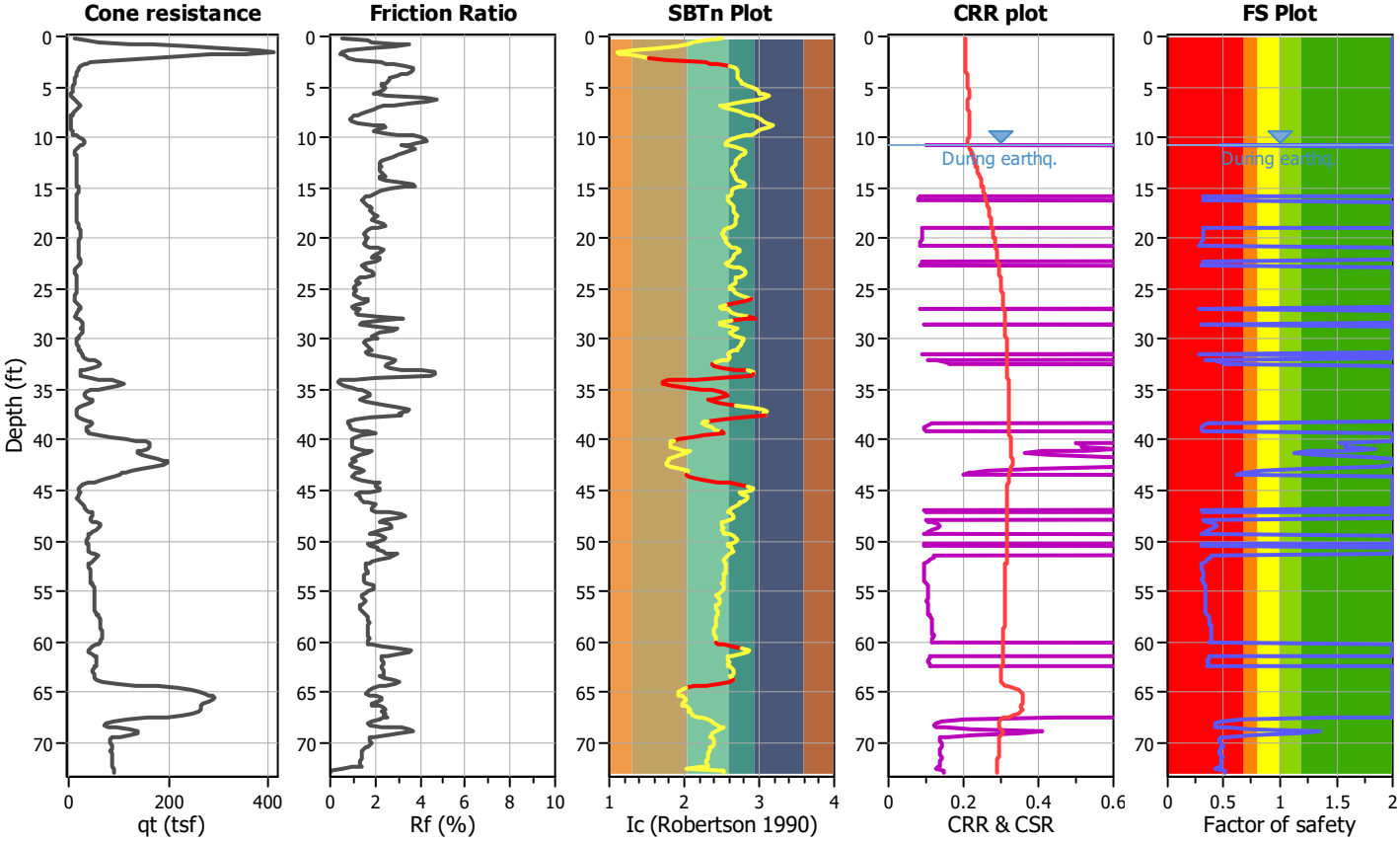
LIQUEFACTION ANALYSIS REPORT

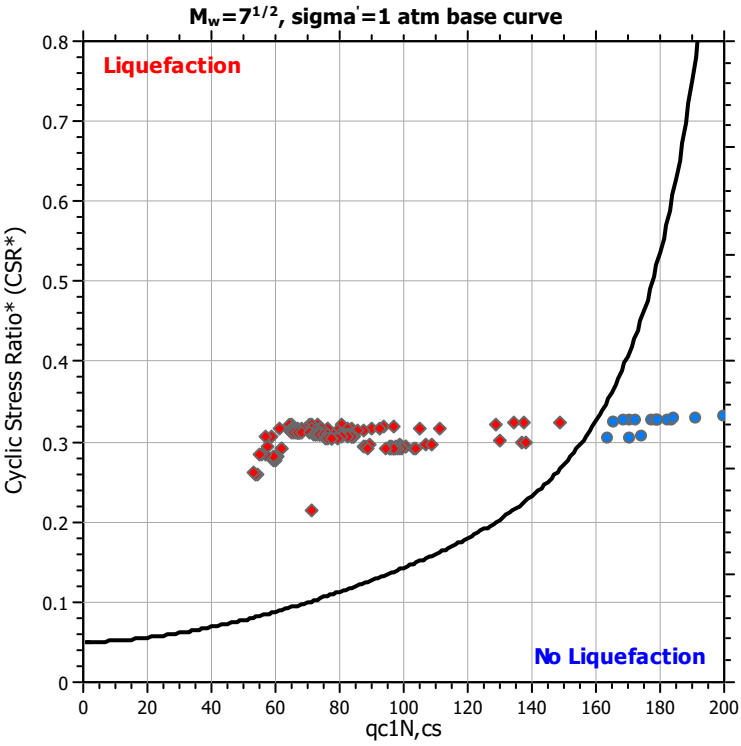
Project title : Bridge 4 - TDOT Region 4 Bridge Bundle **Location : Haywood County, TN**

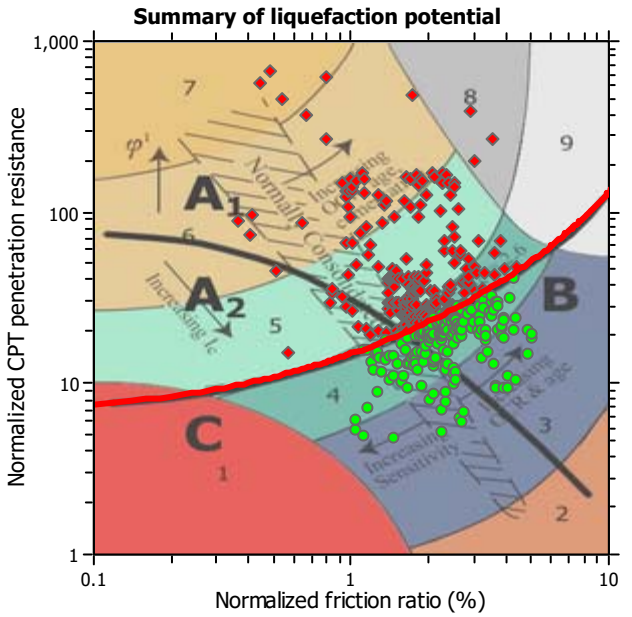
CPT file : M19-164BR4CPT-1A

Input parameters and analysis data

Analysis method:	I&B (2008)	G.W.T. (in-situ):	10.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	10.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.99	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.40	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

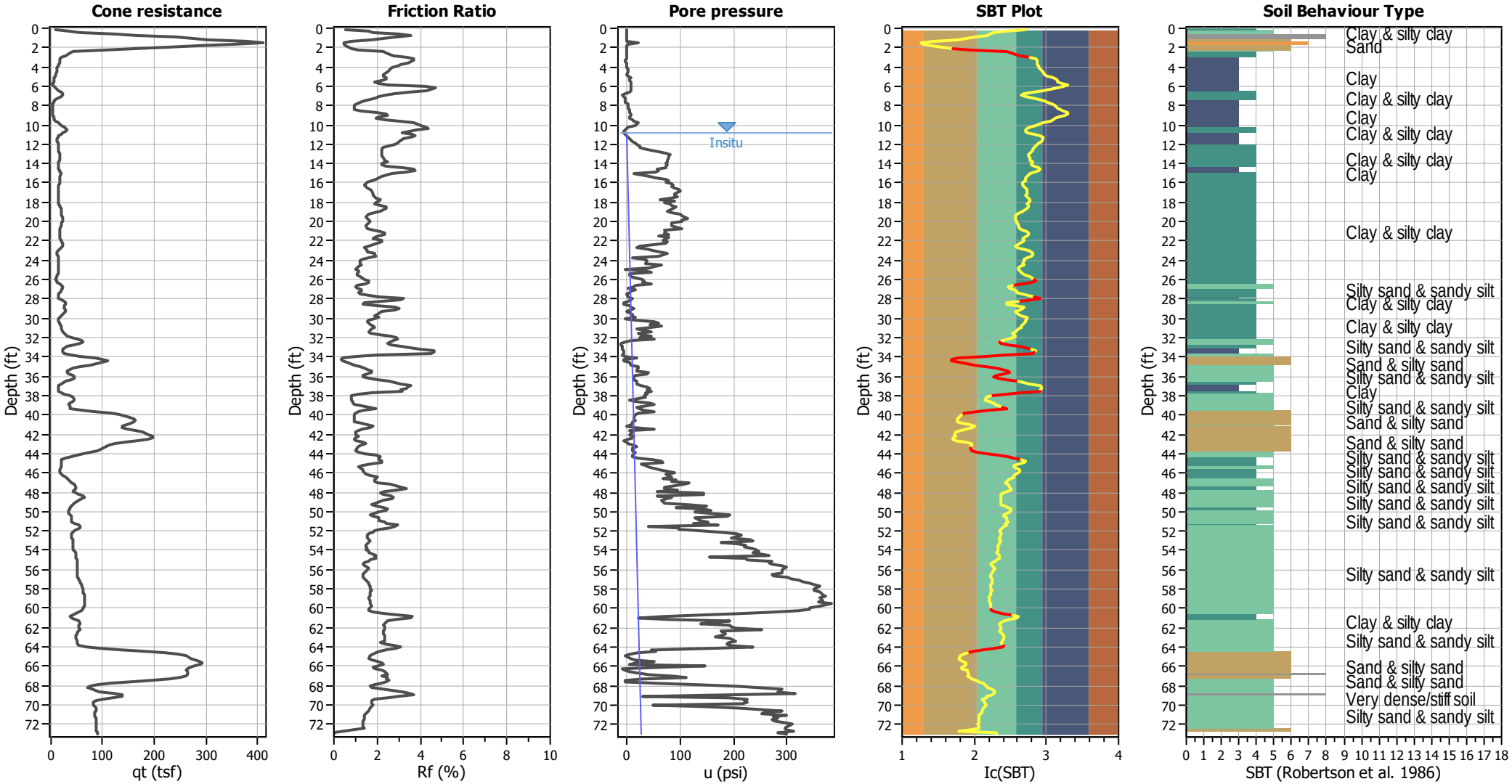






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



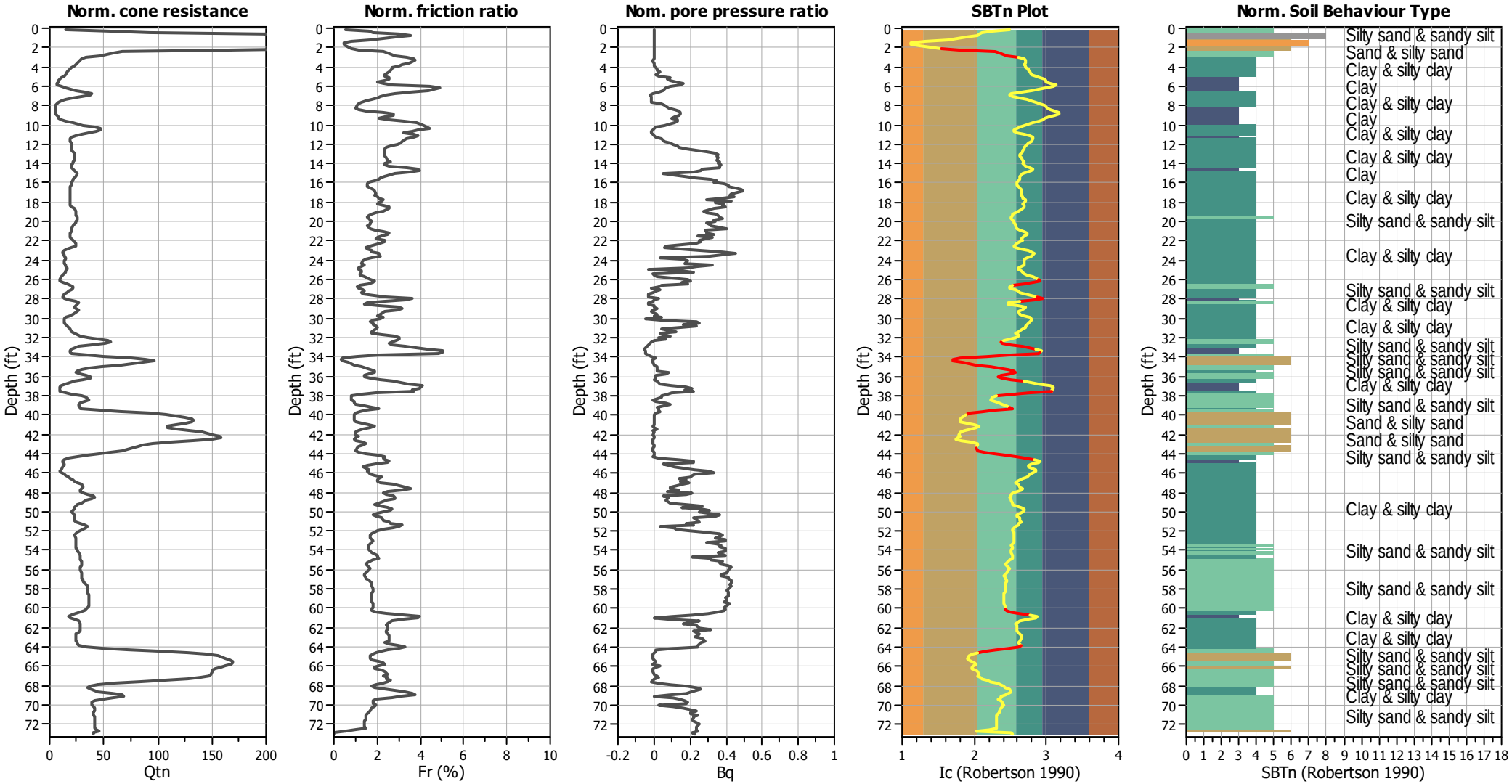
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.99	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

CPT basic interpretation plots (normalized)



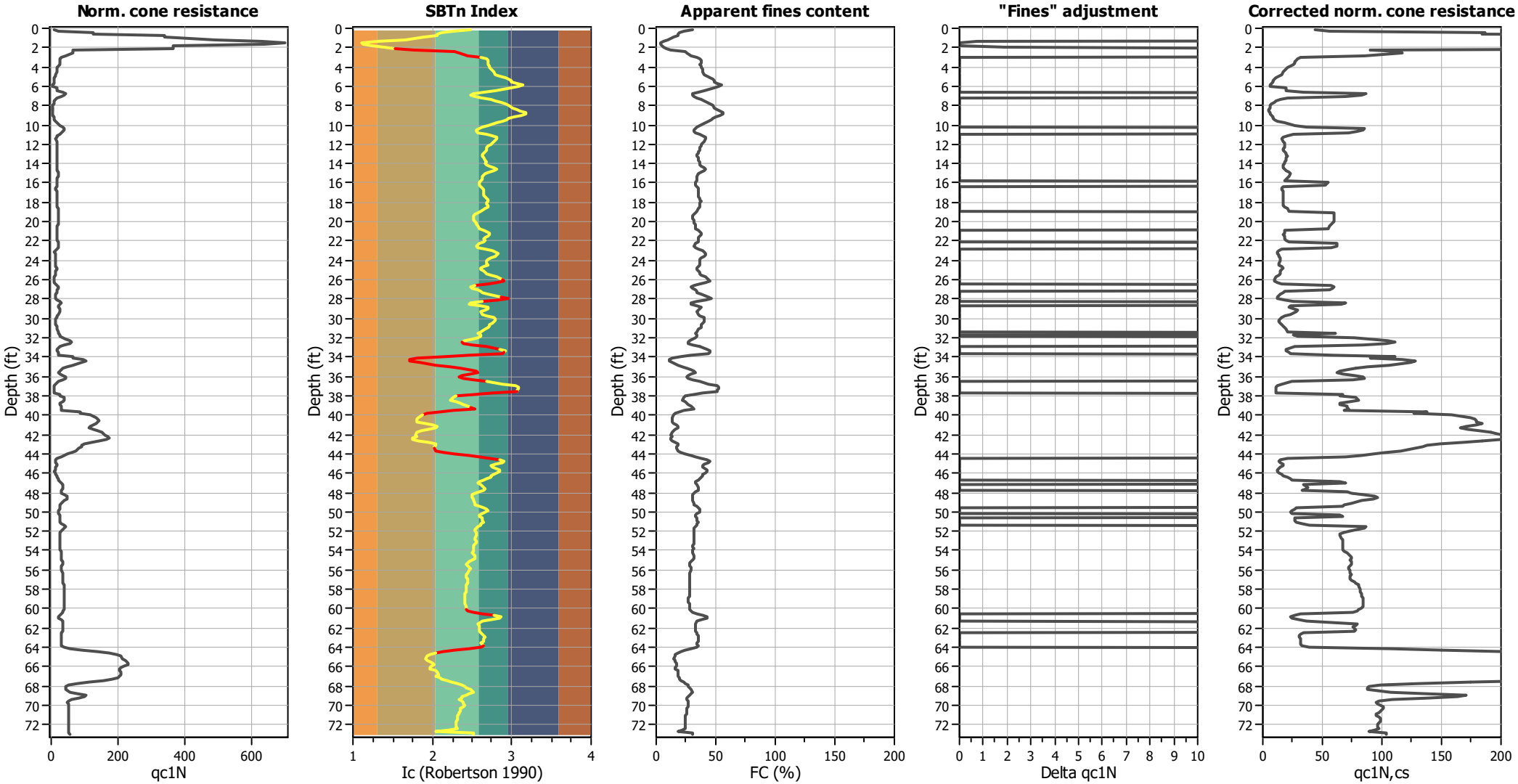
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.99	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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

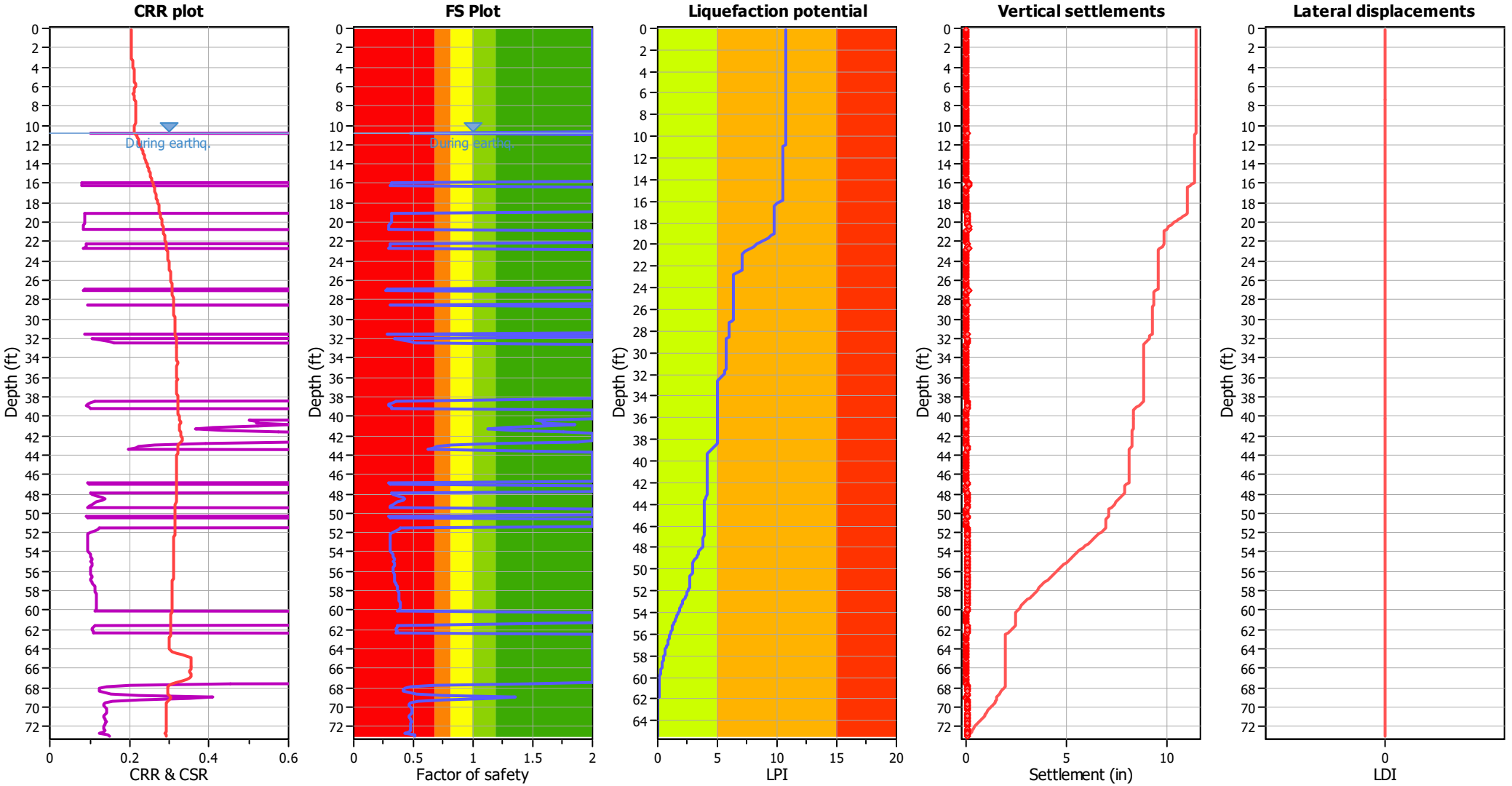
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.99	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.99	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

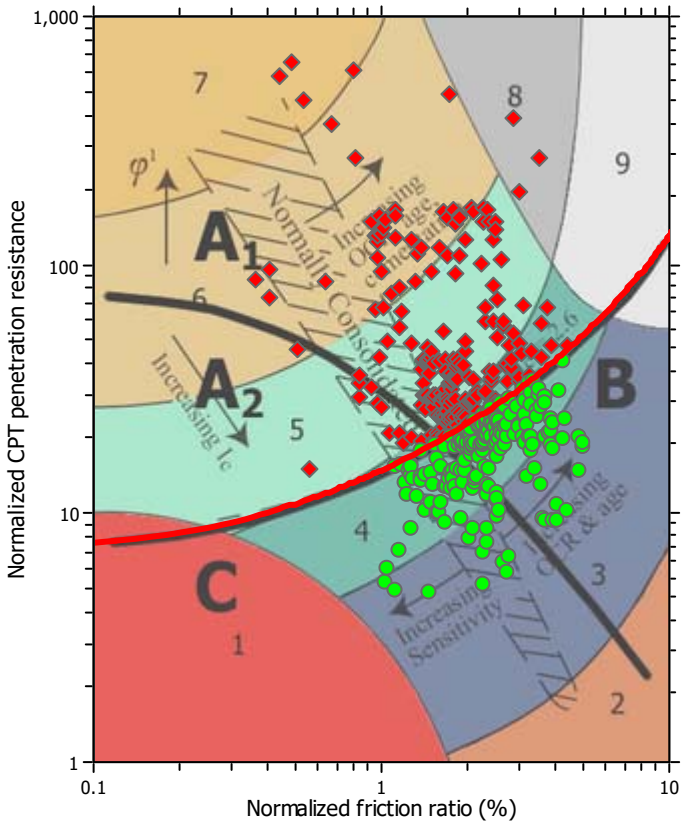
F.S. color scheme

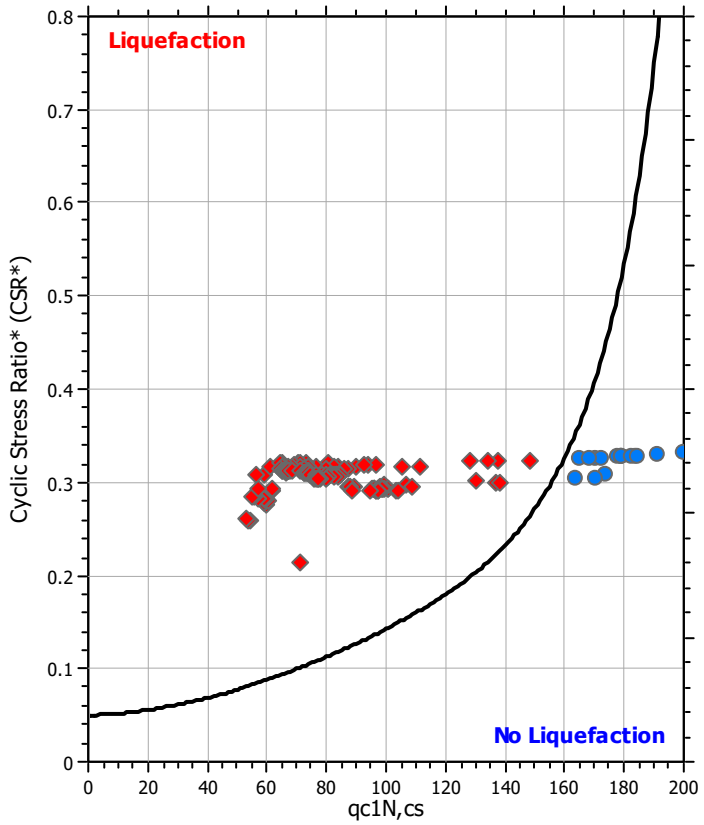
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

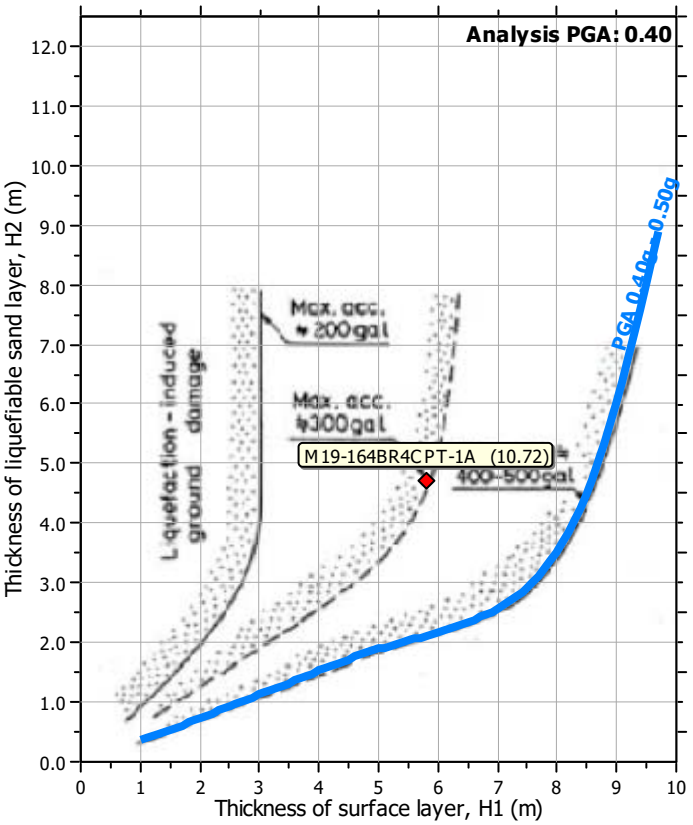
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



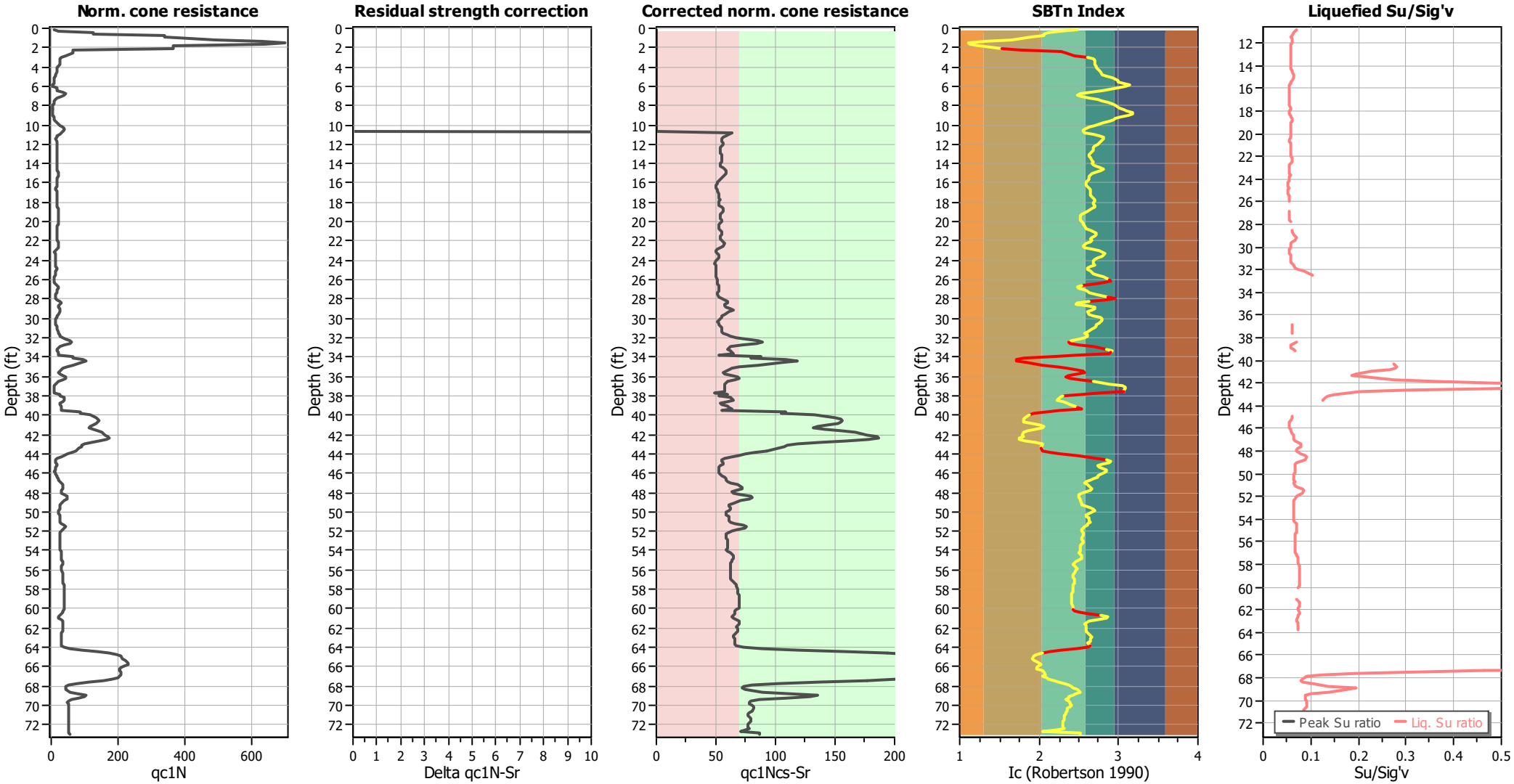




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.99	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

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



Input parameters and analysis data

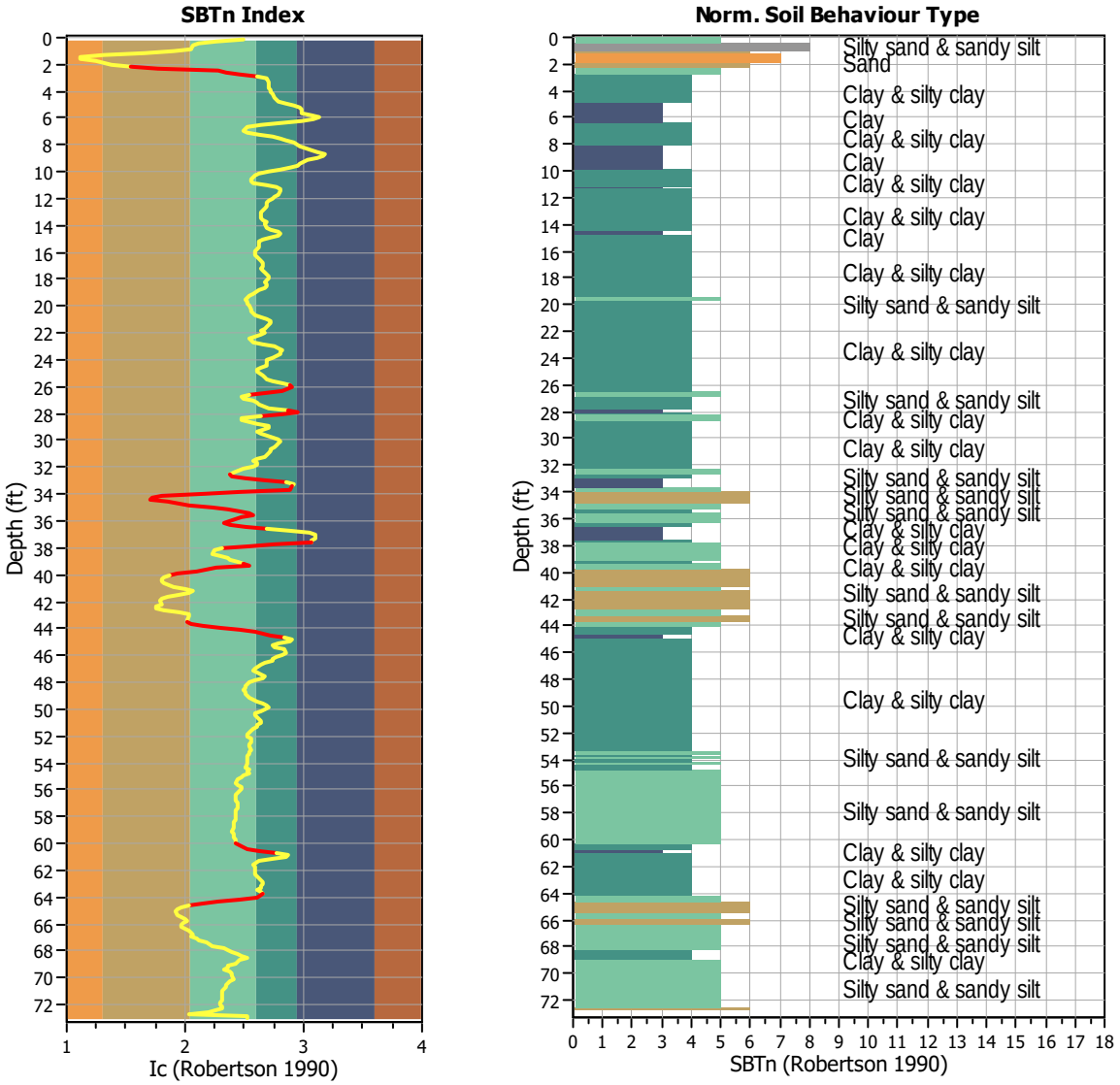
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.99	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics

Total points in CPT file:	445
Total points excluded:	70
Exclusion percentage:	15.73%
Number of layers detected:	13

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 2.30 (ft)	6	Sand & silty sand
		End depth: 3.12 (ft)	4	Clay & silty clay
Transition layer 2	5	Start depth: 26.08 (ft)	4	Clay & silty clay
		End depth: 26.74 (ft)	5	Silty sand & sandy silt
Transition layer 3	4	Start depth: 27.89 (ft)	3	Clay
		End depth: 28.38 (ft)	5	Silty sand & sandy silt
Transition layer 4	5	Start depth: 32.64 (ft)	5	Silty sand & sandy silt
		End depth: 33.30 (ft)	3	Clay
Transition layer 5	5	Start depth: 33.63 (ft)	3	Clay
		End depth: 34.28 (ft)	6	Sand & silty sand
Transition layer 6	7	Start depth: 34.45 (ft)	6	Sand & silty sand
		End depth: 35.43 (ft)	4	Clay & silty clay
Transition layer 7	4	Start depth: 35.60 (ft)	4	Clay & silty clay
		End depth: 36.09 (ft)	5	Silty sand & sandy silt
Transition layer 8	5	Start depth: 36.09 (ft)	5	Silty sand & sandy silt
		End depth: 36.75 (ft)	3	Clay
Transition layer 9	4	Start depth: 37.73 (ft)	4	Clay & silty clay
		End depth: 38.22 (ft)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 39.37 (ft)	4	Clay & silty clay
		End depth: 40.19 (ft)	6	Sand & silty sand
Transition layer 11	8	Start depth: 43.64 (ft)	6	Sand & silty sand
		End depth: 44.78 (ft)	3	Clay
Transition layer 12	5	Start depth: 60.20 (ft)	5	Silty sand & sandy silt
		End depth: 60.86 (ft)	3	Clay
Transition layer 13	6	Start depth: 63.98 (ft)	4	Clay & silty clay
		End depth: 64.80 (ft)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	6.93	0.00	0.01	30.20	94.28
2	0.33	14.35	0.16	0.10	20.86	114.49
3	0.49	79.52	1.50	0.64	16.07	120.52
4	0.66	79.52	1.50	-0.06	14.76	131.62
5	0.82	211.05	8.15	0.11	14.44	135.79
6	0.98	211.05	8.15	1.89	10.28	137.28
7	1.15	307.42	4.70	0.11	5.22	136.31
8	1.31	394.69	2.81	0.91	0.59	132.93
9	1.48	437.14	1.66	22.89	0.00	130.02
10	1.64	399.98	1.53	4.27	0.00	127.92
11	1.80	229.04	1.53	0.16	0.00	127.18
12	1.97	229.04	1.53	0.12	1.31	126.63
13	2.13	229.04	1.53	1.03	3.34	124.91
14	2.30	42.20	0.97	0.64	7.61	122.68
15	2.46	42.20	0.97	1.29	21.79	119.20
16	2.62	42.20	0.97	1.14	24.04	118.33
17	2.79	26.41	0.77	1.23	28.54	117.06
18	2.95	19.74	0.72	0.91	35.80	115.29
19	3.12	18.03	0.66	0.26	39.69	114.48
20	3.28	17.44	0.64	-1.18	40.73	114.02
21	3.44	16.94	0.63	-1.03	40.80	113.48
22	3.61	16.44	0.54	-0.05	40.81	112.81
23	3.77	15.63	0.50	0.39	40.52	111.59
24	3.94	14.17	0.40	0.60	41.28	110.35
25	4.10	12.68	0.35	1.54	41.60	108.72
26	4.27	11.85	0.28	2.63	42.93	107.98
27	4.43	11.49	0.32	2.40	43.34	107.22
28	4.59	10.95	0.27	4.53	44.34	106.32
29	4.76	9.58	0.20	1.25	45.65	104.74
30	4.92	8.17	0.19	2.94	48.77	103.28
31	5.09	7.03	0.18	8.98	53.07	102.39
32	5.25	6.25	0.16	6.56	56.09	101.10
33	5.41	5.58	0.12	6.54	57.63	99.41
34	5.58	5.08	0.10	8.19	57.89	97.50
35	5.74	4.76	0.08	9.69	62.77	97.07
36	5.91	3.83	0.12	7.82	68.22	97.29
37	6.07	3.83	0.12	8.14	64.55	105.66
38	6.23	12.17	0.61	8.77	57.85	109.88
39	6.40	12.17	0.61	10.13	45.89	113.85
40	6.56	21.28	0.74	7.41	37.66	115.05
41	6.73	26.98	0.76	-1.46	31.50	115.32
42	6.89	25.34	0.56	-6.72	30.08	113.88
43	7.05	19.00	0.39	-3.60	32.02	110.76
44	7.22	12.72	0.25	-2.22	36.85	106.87
45	7.38	9.09	0.14	-2.23	42.08	102.52
46	7.55	7.09	0.09	-1.18	45.89	98.37
47	7.71	5.73	0.07	-0.83	49.38	95.06
48	7.87	4.74	0.05	2.41	53.09	92.39

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	4.04	0.04	3.01	56.12	89.99
50	8.20	3.61	0.03	3.72	59.50	88.72
51	8.37	3.37	0.03	4.83	62.51	88.56
52	8.53	3.31	0.04	5.78	66.38	90.40
53	8.69	3.49	0.06	6.60	71.12	94.21
54	8.86	3.97	0.12	7.50	70.79	96.76
55	9.02	4.56	0.12	8.03	67.07	98.26
56	9.19	5.19	0.11	7.41	60.82	98.21
57	9.35	5.71	0.10	7.36	56.11	98.66
58	9.51	6.44	0.12	11.52	54.91	101.80
59	9.68	8.22	0.27	15.57	51.51	106.44
60	9.84	12.57	0.45	21.09	46.24	111.63
61	10.01	19.39	0.79	16.52	40.39	115.90
62	10.17	27.05	1.15	2.30	36.56	118.90
63	10.33	31.43	1.35	0.64	34.80	120.51
64	10.50	31.69	1.41	-2.01	33.07	119.76
65	10.66	28.38	0.75	-4.87	33.31	118.26
66	10.83	23.87	0.79	-4.28	34.47	115.94
67	10.99	19.37	0.73	-2.56	39.58	114.90
68	11.15	15.17	0.58	0.41	43.98	113.16
69	11.32	12.77	0.46	2.48	46.38	111.09
70	11.48	11.99	0.37	6.65	46.24	109.82
71	11.65	12.78	0.38	10.30	44.96	109.65
72	11.81	13.61	0.42	16.15	43.67	110.05
73	11.98	14.07	0.41	20.54	42.37	109.98
74	12.14	14.00	0.36	24.98	40.98	109.29
75	12.30	13.73	0.31	26.06	39.95	108.47
76	12.47	13.50	0.30	34.02	39.70	108.24
77	12.63	13.67	0.33	46.20	39.46	108.54
78	12.80	14.29	0.34	59.09	38.70	109.06
79	12.96	15.19	0.35	72.70	37.64	109.52
80	13.12	15.80	0.37	80.74	37.05	109.92
81	13.29	15.97	0.39	79.19	36.96	110.06
82	13.45	15.71	0.37	80.50	37.63	110.17
83	13.62	15.28	0.40	77.08	38.52	110.13
84	13.78	14.78	0.39	77.29	39.82	110.20
85	13.94	14.34	0.39	74.78	38.99	109.13
86	14.11	14.05	0.24	75.85	39.47	108.84
87	14.27	13.70	0.36	73.36	41.17	109.47
88	14.44	13.79	0.49	73.61	44.79	111.34
89	14.60	14.40	0.56	56.83	46.25	113.02
90	14.76	16.31	0.69	60.42	44.98	113.96
91	14.93	18.14	0.67	55.84	41.91	113.90
92	15.09	19.24	0.50	14.44	38.46	112.66
93	15.26	18.38	0.39	43.49	36.54	111.07
94	15.42	16.88	0.38	55.27	36.51	110.03
95	15.58	15.76	0.35	73.76	36.66	109.13
96	15.75	15.52	0.27	78.38	36.05	108.25

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	15.55	0.27	74.39	34.77	107.19
98	16.08	15.17	0.23	85.20	34.68	106.69
99	16.24	14.55	0.23	87.03	34.92	106.07
100	16.40	13.85	0.22	83.92	35.89	105.90
101	16.57	13.48	0.22	90.24	37.20	106.28
102	16.73	13.56	0.27	98.00	37.92	106.88
103	16.90	14.02	0.28	101.37	37.98	107.36
104	17.06	14.52	0.27	91.52	37.99	107.82
105	17.22	14.78	0.31	90.73	37.65	107.87
106	17.39	14.79	0.28	96.30	38.45	108.26
107	17.55	14.58	0.31	80.79	39.35	108.39
108	17.72	14.41	0.33	62.56	40.66	108.85
109	17.88	14.38	0.34	88.88	40.78	108.72
110	18.04	14.40	0.30	72.19	39.85	108.24
111	18.21	14.36	0.27	82.34	39.23	107.95
112	18.37	14.75	0.31	83.63	40.19	109.37
113	18.54	16.14	0.47	93.78	40.26	110.91
114	18.70	18.14	0.48	86.31	38.84	111.87
115	18.86	19.72	0.44	77.10	36.15	111.61
116	19.03	20.15	0.39	85.60	33.93	110.91
117	19.19	20.04	0.35	101.65	32.35	110.07
118	19.36	20.04	0.31	104.85	31.68	109.78
119	19.52	20.43	0.35	108.85	31.19	109.66
120	19.69	20.67	0.33	115.70	31.42	110.06
121	19.85	20.98	0.36	102.56	31.79	110.31
122	20.01	20.66	0.38	103.08	32.55	110.45
123	20.18	20.12	0.36	85.75	32.98	109.83
124	20.34	18.67	0.28	84.27	33.57	109.04
125	20.51	17.69	0.29	84.20	33.91	108.23
126	20.67	17.23	0.27	102.69	35.04	108.28
127	20.83	17.19	0.30	71.04	37.21	109.16
128	21.00	16.79	0.41	72.61	40.02	110.21
129	21.16	16.32	0.43	71.13	41.74	110.76
130	21.33	16.19	0.39	79.23	41.82	110.61
131	21.49	16.63	0.39	60.18	40.13	109.88
132	21.65	16.84	0.31	79.07	38.80	109.46
133	21.82	17.24	0.33	73.68	37.64	109.38
134	21.98	18.17	0.37	69.69	38.81	111.38
135	22.15	20.58	0.60	77.05	37.36	112.35
136	22.31	22.75	0.47	75.06	35.14	112.27
137	22.47	22.91	0.32	25.38	32.90	110.27
138	22.64	19.61	0.28	19.70	33.90	108.10
139	22.80	15.27	0.23	37.66	38.27	106.46
140	22.97	12.09	0.20	49.16	43.08	105.26
141	23.13	11.14	0.21	64.29	45.32	104.51
142	23.29	11.42	0.18	75.96	47.46	105.88
143	23.46	12.21	0.32	67.14	46.44	106.52
144	23.62	13.32	0.26	59.49	45.79	107.20

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	14.30	0.24	12.48	42.25	106.08
146	23.95	14.41	0.19	34.32	40.23	104.90
147	24.11	13.80	0.15	39.59	39.85	104.08
148	24.28	13.03	0.18	35.80	39.62	103.59
149	24.44	13.47	0.16	64.77	40.07	104.57
150	24.61	14.92	0.22	52.59	37.46	104.52
151	24.77	16.12	0.17	44.83	35.98	104.14
152	24.93	15.77	0.13	-0.83	35.84	103.78
153	25.10	14.75	0.20	36.71	37.83	104.13
154	25.26	14.22	0.20	47.52	38.89	103.88
155	25.43	13.99	0.12	5.55	39.66	102.87
156	25.59	12.64	0.14	7.23	42.26	101.90
157	25.75	10.68	0.16	8.98	46.92	101.60
158	25.92	9.30	0.12	29.46	51.30	101.77
159	26.08	9.45	0.16	32.19	52.24	103.11
160	26.25	11.46	0.24	30.61	47.13	104.97
161	26.41	15.72	0.22	45.52	40.08	106.70
162	26.57	20.45	0.26	17.75	32.50	106.56
163	26.74	23.17	0.17	14.60	29.82	106.78
164	26.90	22.42	0.22	2.77	30.62	107.29
165	27.07	20.34	0.31	15.88	33.82	107.87
166	27.23	18.69	0.25	9.90	35.56	107.00
167	27.40	17.27	0.16	6.15	36.75	105.27
168	27.56	14.93	0.18	1.79	40.72	104.43
169	27.72	12.15	0.21	2.41	50.28	107.16
170	27.89	12.59	0.43	12.39	55.24	111.11
171	28.05	18.01	0.74	8.25	47.42	113.56
172	28.22	26.40	0.59	4.69	37.00	113.79
173	28.38	30.83	0.33	-4.17	29.58	111.96
174	28.54	28.93	0.31	-3.56	29.45	111.28
175	28.71	24.19	0.49	7.36	35.57	113.14
176	28.87	23.11	0.71	7.57	40.89	115.46
177	29.04	26.75	0.89	14.56	40.38	116.71
178	29.20	30.30	0.81	6.09	38.17	116.95
179	29.36	29.19	0.73	1.63	35.63	114.96
180	29.53	24.29	0.33	12.47	37.09	112.95
181	29.69	19.60	0.43	8.91	39.79	110.70
182	29.86	17.19	0.40	17.45	44.78	109.96
183	30.02	15.65	0.27	-0.84	45.96	108.27
184	30.18	14.45	0.23	16.16	45.21	106.45
185	30.35	13.98	0.22	53.18	44.36	106.14
186	30.51	15.20	0.24	59.50	43.59	107.13
187	30.68	16.95	0.31	45.09	41.96	108.27
188	30.84	18.41	0.32	65.67	41.42	109.56
189	31.00	19.38	0.39	44.00	40.86	110.42
190	31.17	20.53	0.42	19.79	38.78	110.61
191	31.33	22.67	0.32	46.13	35.99	110.80
192	31.50	25.45	0.38	21.19	34.31	111.99

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	28.02	0.58	28.31	35.45	114.77
194	31.82	31.00	0.85	47.44	36.04	117.72
195	31.99	37.69	1.17	24.08	33.84	120.32
196	32.15	49.33	1.44	51.03	30.44	122.67
197	32.32	62.43	1.81	9.70	27.12	124.00
198	32.48	67.86	1.74	-2.83	25.53	124.08
199	32.64	61.29	1.40	-9.05	26.25	122.75
200	32.81	45.07	1.12	-10.14	30.70	120.73
201	32.97	29.60	0.99	-7.79	39.35	118.71
202	33.14	21.69	0.88	-6.82	49.11	117.87
203	33.30	22.15	1.05	-4.16	53.52	118.19
204	33.46	24.25	1.20	-3.56	52.54	118.74
205	33.63	25.22	1.07	-5.80	51.02	118.88
206	33.79	25.22	1.07	-6.33	29.24	117.95
207	33.96	73.76	0.35	-2.75	17.86	116.25
208	34.12	73.76	0.35	18.97	5.00	113.13
209	34.28	106.90	0.32	-4.34	5.00	113.92
210	34.45	118.11	0.40	-4.55	5.00	115.73
211	34.61	102.53	0.60	5.73	9.13	117.96
212	34.78	75.12	0.85	8.65	13.97	118.41
213	34.94	53.31	0.69	21.70	19.81	117.55
214	35.10	42.17	0.57	21.29	24.71	115.95
215	35.27	35.76	0.59	19.62	29.11	114.92
216	35.43	30.09	0.55	18.54	32.83	114.30
217	35.60	27.69	0.51	42.18	33.84	114.09
218	35.76	32.00	0.56	39.35	29.93	114.20
219	35.93	41.99	0.51	17.47	25.44	115.02
220	36.09	49.18	0.59	15.41	23.53	116.16
221	36.25	48.66	0.76	14.48	25.75	117.40
222	36.42	39.92	0.87	13.58	31.25	117.55
223	36.58	28.17	0.76	18.52	39.92	116.33
224	36.75	18.57	0.60	20.60	51.26	114.29
225	36.91	13.58	0.54	29.06	61.58	112.43
226	37.07	12.59	0.48	39.74	65.01	111.12
227	37.24	13.12	0.39	44.99	64.83	110.83
228	37.40	13.13	0.48	39.27	63.00	110.42
229	37.57	13.14	0.40	47.13	63.40	110.47
230	37.73	13.14	0.40	35.54	43.37	110.08
231	37.89	32.95	0.27	38.47	32.31	109.80
232	38.06	32.95	0.27	32.03	22.64	110.24
233	38.22	45.74	0.35	37.19	20.83	111.56
234	38.39	48.78	0.40	7.17	20.01	112.19
235	38.55	41.34	0.34	17.51	22.27	111.98
236	38.71	33.16	0.36	42.98	24.66	110.87
237	38.88	32.57	0.29	52.14	25.67	110.79
238	39.04	37.16	0.34	37.08	28.34	113.52
239	39.21	37.23	0.79	18.98	30.20	115.62
240	39.37	37.60	0.73	25.84	32.45	117.02

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	37.60	0.73	32.22	21.32	118.96
242	39.70	103.53	1.05	51.86	15.81	120.60
243	39.86	103.53	1.05	21.61	11.18	122.72
244	40.03	137.31	1.28	17.74	9.84	123.93
245	40.19	156.31	1.48	14.25	8.72	125.21
246	40.35	162.32	1.58	14.17	8.26	125.69
247	40.52	163.72	1.49	15.70	8.30	125.98
248	40.68	163.18	1.64	12.39	8.40	125.93
249	40.85	158.35	1.56	10.53	10.60	127.57
250	41.01	147.09	2.73	8.64	12.93	128.59
251	41.17	135.26	2.67	1.85	14.86	129.13
252	41.34	132.87	2.23	17.63	13.97	128.34
253	41.50	145.22	1.96	51.85	11.72	127.49
254	41.67	162.69	1.79	5.61	9.47	126.99
255	41.83	177.92	1.65	10.95	8.12	127.03
256	41.99	189.19	1.84	5.72	7.85	127.87
257	42.16	198.33	2.30	14.38	8.11	128.84
258	42.32	201.03	2.39	10.86	7.26	127.96
259	42.49	192.58	1.09	2.88	7.16	126.97
260	42.65	170.78	1.65	-4.05	8.48	126.51
261	42.81	143.00	2.25	0.66	11.83	127.09
262	42.98	119.82	1.79	3.22	14.07	126.36
263	43.14	110.05	1.38	14.75	14.01	124.55
264	43.31	108.59	1.20	19.56	13.45	123.08
265	43.47	103.17	1.06	10.32	13.61	121.99
266	43.64	90.33	0.94	10.62	14.38	120.36
267	43.80	74.88	0.66	17.59	17.30	119.65
268	43.96	62.37	0.95	14.20	22.13	119.61
269	44.13	50.89	1.09	12.77	28.86	119.70
270	44.29	38.08	0.90	11.02	35.24	117.88
271	44.46	26.26	0.52	22.74	41.44	114.37
272	44.62	18.53	0.31	49.45	48.46	111.67
273	44.78	17.04	0.48	64.77	52.49	111.20
274	44.95	19.27	0.48	69.20	50.96	111.68
275	45.11	22.08	0.37	27.19	45.55	110.52
276	45.28	21.74	0.26	37.23	42.75	108.59
277	45.44	18.71	0.23	41.02	43.45	106.54
278	45.60	15.72	0.18	62.59	48.57	106.73
279	45.77	15.46	0.30	77.31	48.84	106.52
280	45.93	17.36	0.21	91.30	46.78	107.64
281	46.10	20.39	0.27	74.79	44.03	109.24
282	46.26	23.08	0.45	79.42	42.72	111.65
283	46.42	26.61	0.52	84.92	42.10	113.93
284	46.59	29.60	0.67	67.97	39.38	114.72
285	46.75	31.81	0.58	91.80	37.31	115.33
286	46.92	34.37	0.62	84.13	35.26	116.12
287	47.08	38.44	0.82	117.94	34.24	117.87
288	47.24	44.53	1.03	106.15	35.70	120.72

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	48.00	1.67	70.18	37.29	122.62
290	47.57	47.36	1.77	70.49	38.60	122.97
291	47.74	42.78	1.26	95.65	38.01	121.57
292	47.90	40.39	0.92	58.65	35.01	119.62
293	48.06	43.63	0.87	144.35	32.48	119.82
294	48.23	53.02	1.26	144.07	30.79	121.66
295	48.39	62.26	1.62	57.40	30.69	123.85
296	48.56	65.28	1.98	83.71	30.58	124.49
297	48.72	61.34	1.64	72.70	31.29	123.87
298	48.88	52.37	1.28	65.05	31.19	121.42
299	49.05	44.25	0.74	70.80	32.08	118.98
300	49.21	38.83	0.73	117.14	32.41	116.98
301	49.38	37.33	0.69	151.04	35.33	117.44
302	49.54	37.15	0.92	93.01	37.81	118.21
303	49.70	35.54	1.02	144.29	39.86	118.53
304	49.87	33.45	0.84	158.23	40.43	117.86
305	50.03	31.77	0.72	129.00	39.01	116.66
306	50.20	33.05	0.64	157.88	37.05	116.04
307	50.36	35.23	0.65	193.04	34.57	115.90
308	50.52	37.44	0.64	187.36	34.59	116.54
309	50.69	37.05	0.80	128.75	36.67	117.60
310	50.85	35.69	0.98	140.23	36.97	117.64
311	51.02	37.40	0.65	151.96	37.62	119.09
312	51.18	43.76	1.28	126.72	35.48	120.63
313	51.35	52.62	1.50	171.90	35.89	123.21
314	51.51	57.37	1.90	40.21	34.05	123.65
315	51.67	56.24	1.45	99.33	33.19	122.85
316	51.84	50.75	1.02	99.49	32.07	120.80
317	52.00	44.11	0.91	141.27	32.17	118.66
318	52.17	39.29	0.68	175.62	33.37	117.39
319	52.33	36.86	0.67	206.87	33.18	116.17
320	52.49	36.75	0.60	214.95	33.13	115.87
321	52.66	37.67	0.61	195.72	32.66	115.91
322	52.82	38.47	0.67	231.45	32.76	116.42
323	52.99	39.20	0.72	235.35	33.16	116.86
324	53.15	39.28	0.73	177.23	32.78	116.72
325	53.31	39.44	0.63	209.29	32.21	116.36
326	53.48	39.47	0.62	222.29	31.52	116.05
327	53.64	39.46	0.64	220.23	31.66	116.12
328	53.81	39.18	0.65	234.97	31.89	116.26
329	53.97	39.36	0.66	241.36	31.49	116.30
330	54.13	40.93	0.64	247.13	31.53	117.02
331	54.30	43.60	0.83	236.19	30.91	117.70
332	54.46	45.94	0.82	266.56	32.46	119.21
333	54.63	46.68	1.14	154.54	32.05	119.32
334	54.79	46.48	0.85	221.68	32.27	119.41
335	54.95	46.42	0.86	226.85	30.45	118.63
336	55.12	47.21	0.84	270.54	29.41	118.24

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.28	47.83	0.71	266.45	28.14	117.71
338	55.45	47.92	0.68	271.65	27.52	117.30
339	55.61	47.04	0.72	291.66	28.29	117.60
340	55.77	46.15	0.80	300.10	29.32	117.97
341	55.94	45.76	0.80	293.18	29.82	118.17
342	56.10	46.49	0.79	290.48	29.21	117.97
343	56.27	47.72	0.73	291.91	28.10	117.56
344	56.43	48.47	0.66	270.65	27.41	117.30
345	56.59	48.29	0.70	273.22	27.19	117.16
346	56.76	47.86	0.69	301.11	27.61	117.42
347	56.92	48.00	0.74	305.73	27.94	117.82
348	57.09	49.15	0.82	324.46	28.31	118.49
349	57.25	50.89	0.89	329.89	28.28	119.14
350	57.41	52.92	0.93	343.32	27.99	119.66
351	57.58	54.74	0.98	349.97	27.60	120.03
352	57.74	55.95	1.00	360.44	27.50	120.36
353	57.91	56.48	1.05	351.75	27.57	120.61
354	58.07	56.82	1.07	351.16	27.63	120.78
355	58.23	57.45	1.07	360.10	27.41	120.83
356	58.40	58.26	1.06	363.37	27.12	120.87
357	58.56	58.84	1.07	366.08	26.84	120.87
358	58.73	59.19	1.06	371.01	26.67	120.86
359	58.89	59.49	1.05	360.98	26.52	120.84
360	59.06	59.80	1.06	364.59	26.45	120.86
361	59.22	60.07	1.06	367.77	26.60	121.00
362	59.38	60.27	1.11	357.84	26.59	121.06
363	59.55	60.38	1.08	382.99	27.01	121.26
364	59.71	59.88	1.15	359.55	27.28	121.22
365	59.88	58.67	1.10	343.43	27.64	120.97
366	60.04	56.82	0.99	341.94	27.77	120.39
367	60.20	54.56	0.94	320.30	28.60	119.89
368	60.37	51.16	0.94	268.74	31.44	120.01
369	60.53	46.10	1.11	209.60	36.60	120.37
370	60.70	39.29	1.21	133.50	44.20	121.01
371	60.86	34.58	1.42	67.46	49.73	121.40
372	61.02	36.52	1.46	22.88	48.63	121.64
373	61.19	44.44	1.30	75.71	42.09	121.84
374	61.35	52.83	1.31	194.31	36.72	121.97
375	61.52	54.80	1.35	138.53	34.38	122.01
376	61.68	52.98	1.24	192.78	34.50	121.81
377	61.84	50.83	1.22	195.97	34.97	121.77
378	62.01	51.71	1.34	202.86	35.03	121.87
379	62.17	52.89	1.29	252.40	34.87	121.95
380	62.34	52.71	1.25	175.85	34.71	121.61
381	62.50	50.09	1.18	182.26	35.54	121.18
382	62.66	47.22	1.12	186.25	36.85	120.85
383	62.83	45.32	1.15	176.02	37.96	120.71
384	62.99	45.53	1.15	165.68	38.25	120.79

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
385	63.16	46.86	1.16	192.49	37.66	120.92
386	63.32	48.11	1.18	205.24	37.21	121.11
387	63.48	48.44	1.22	191.74	35.87	120.57
388	63.65	48.12	0.90	188.39	36.99	121.27
389	63.81	49.48	1.51	195.03	38.10	123.13
390	63.98	58.49	2.16	236.25	35.89	125.92
391	64.14	85.24	2.59	149.71	29.20	128.57
392	64.30	129.06	3.33	46.87	21.90	130.84
393	64.47	181.55	3.85	54.19	17.14	132.81
394	64.63	223.05	4.42	18.37	13.99	133.94
395	64.80	249.39	4.38	7.40	12.23	134.47
396	64.96	262.33	4.28	-0.66	11.18	134.62
397	65.12	270.16	4.42	8.36	10.64	134.76
398	65.29	279.00	4.47	17.82	11.08	135.65
399	65.45	288.57	5.82	52.93	12.22	137.00
400	65.62	294.67	7.25	17.00	13.11	137.28
401	65.78	290.18	6.55	6.10	13.42	137.28
402	65.94	278.42	6.04	146.41	12.68	136.84
403	66.11	266.75	4.73	57.15	11.91	135.67
404	66.27	261.89	4.17	-7.02	12.15	135.48
405	66.44	262.25	5.76	-1.08	13.92	136.74
406	66.60	264.79	7.51	6.63	14.42	137.21
407	66.77	267.45	5.28	41.64	15.01	137.28
408	66.93	261.97	6.83	88.06	14.14	136.82
409	67.09	254.08	5.53	110.89	15.60	137.06
410	67.26	231.45	6.17	26.49	16.09	136.02
411	67.42	202.67	4.84	-1.21	18.39	134.93
412	67.59	155.00	3.99	-2.64	20.28	132.29
413	67.75	111.98	2.45	61.64	23.26	128.91
414	67.91	80.85	1.39	141.11	25.05	125.00
415	68.08	70.20	1.18	207.38	26.45	122.53
416	68.24	67.75	1.22	251.10	27.90	122.40
417	68.41	67.95	1.39	289.56	29.82	125.01
418	68.57	86.64	2.65	283.88	31.42	129.41
419	68.73	116.58	4.96	316.34	29.05	132.48
420	68.90	147.20	5.03	177.60	27.81	134.16
421	69.06	142.86	5.21	31.51	25.10	132.80
422	69.23	119.80	2.36	193.97	24.94	130.25
423	69.39	92.31	1.75	224.64	23.72	126.21
424	69.55	80.68	1.59	220.71	25.16	124.21
425	69.72	77.65	1.22	226.65	26.03	123.65
426	69.88	78.68	1.49	217.99	26.10	123.51
427	70.05	81.12	1.52	49.97	26.55	124.14
428	70.21	83.69	1.57	144.80	25.74	124.06
429	70.37	84.29	1.41	208.28	24.87	123.93
430	70.54	83.18	1.41	291.12	24.23	123.44
431	70.70	81.20	1.29	257.89	24.03	122.99
432	70.87	79.76	1.18	252.02	23.72	122.53

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
433	71.03	80.20	1.19	297.62	23.19	122.23
434	71.19	81.92	1.14	274.88	22.97	122.41
435	71.36	83.82	1.25	281.69	22.88	122.62
436	71.52	84.24	1.27	271.12	22.94	122.78
437	71.69	83.73	1.21	277.09	22.71	122.53
438	71.85	82.64	1.12	293.67	22.58	122.30
439	72.01	82.10	1.16	309.20	22.55	122.13
440	72.18	81.91	1.14	298.34	22.74	122.22
441	72.34	82.39	1.17	297.31	23.05	122.48
442	72.51	83.08	1.29	300.14	19.06	119.71
443	72.67	84.26	0.00	311.54	13.94	115.02
444	72.83	85.60	0.00	281.89	31.59	87.36
445	73.00	86.43	0.00	300.24	31.66	87.36

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	0.260	1.14	0.227	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
9	1.48	0.09	0.00	0.09	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
10	1.64	0.10	0.00	0.10	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
11	1.80	0.11	0.00	0.11	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
12	1.97	0.12	0.00	0.12	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
13	2.13	0.13	0.00	0.13	1.00	0.260	1.14	0.227	1.10	1.00	2.000	No
14	2.30	0.14	0.00	0.14	1.00	0.260	1.14	0.227	1.10	1.00	2.000	Yes
15	2.46	0.15	0.00	0.15	1.00	0.260	1.14	0.227	1.10	1.00	2.000	Yes
16	2.62	0.16	0.00	0.16	1.00	0.260	1.14	0.227	1.10	1.00	2.000	Yes
17	2.79	0.17	0.00	0.17	1.00	0.260	1.14	0.227	1.10	1.00	2.000	Yes
18	2.95	0.18	0.00	0.18	1.00	0.260	1.14	0.227	1.10	1.00	2.000	Yes
19	3.12	0.19	0.00	0.19	1.00	0.259	1.14	0.227	1.10	1.00	2.000	Yes
20	3.28	0.20	0.00	0.20	1.00	0.259	1.14	0.227	1.10	1.00	2.000	No
21	3.44	0.21	0.00	0.21	1.00	0.259	1.14	0.227	1.09	1.00	2.000	No
22	3.61	0.22	0.00	0.22	1.00	0.259	1.14	0.226	1.09	1.00	2.000	No
23	3.77	0.23	0.00	0.23	1.00	0.259	1.14	0.226	1.09	1.00	2.000	No
24	3.94	0.24	0.00	0.24	1.00	0.259	1.14	0.226	1.08	1.00	2.000	No
25	4.10	0.25	0.00	0.25	0.99	0.259	1.14	0.226	1.08	1.00	2.000	No
26	4.27	0.26	0.00	0.26	0.99	0.259	1.14	0.226	1.07	1.00	2.000	No
27	4.43	0.27	0.00	0.27	0.99	0.258	1.14	0.226	1.07	1.00	2.000	No
28	4.59	0.27	0.00	0.27	0.99	0.258	1.14	0.226	1.07	1.00	2.000	No
29	4.76	0.28	0.00	0.28	0.99	0.258	1.14	0.226	1.07	1.00	2.000	No
30	4.92	0.29	0.00	0.29	0.99	0.258	1.14	0.225	1.06	1.00	2.000	No
31	5.09	0.30	0.00	0.30	0.99	0.258	1.14	0.225	1.06	1.00	2.000	No
32	5.25	0.31	0.00	0.31	0.99	0.258	1.14	0.225	1.06	1.00	2.000	No
33	5.41	0.32	0.00	0.32	0.99	0.258	1.14	0.225	1.05	1.00	2.000	No
34	5.58	0.32	0.00	0.32	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
35	5.74	0.33	0.00	0.33	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
36	5.91	0.34	0.00	0.34	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
37	6.07	0.35	0.00	0.35	0.99	0.257	1.14	0.225	1.05	1.00	2.000	No
38	6.23	0.36	0.00	0.36	0.99	0.257	1.14	0.224	1.06	1.00	2.000	No
39	6.40	0.37	0.00	0.37	0.99	0.257	1.14	0.224	1.06	1.00	2.000	No
40	6.56	0.38	0.00	0.38	0.99	0.256	1.14	0.224	1.06	1.00	2.000	No
41	6.73	0.39	0.00	0.39	0.99	0.256	1.14	0.224	1.07	1.00	2.000	No
42	6.89	0.40	0.00	0.40	0.99	0.256	1.14	0.224	1.06	1.00	2.000	No
43	7.05	0.40	0.00	0.40	0.98	0.256	1.14	0.224	1.06	1.00	2.000	No
44	7.22	0.41	0.00	0.41	0.98	0.256	1.14	0.224	1.05	1.00	2.000	No
45	7.38	0.42	0.00	0.42	0.98	0.256	1.14	0.224	1.04	1.00	2.000	No
46	7.55	0.43	0.00	0.43	0.98	0.256	1.14	0.223	1.04	1.00	2.000	No
47	7.71	0.44	0.00	0.44	0.98	0.255	1.14	0.223	1.04	1.00	2.000	No
48	7.87	0.44	0.00	0.44	0.98	0.255	1.14	0.223	1.04	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	0.45	0.00	0.45	0.98	0.255	1.14	0.223	1.04	1.00	2.000	No
50	8.20	0.46	0.00	0.46	0.98	0.255	1.14	0.223	1.03	1.00	2.000	No
51	8.37	0.47	0.00	0.47	0.98	0.255	1.14	0.223	1.03	1.00	2.000	No
52	8.53	0.47	0.00	0.47	0.98	0.255	1.14	0.223	1.03	1.00	2.000	No
53	8.69	0.48	0.00	0.48	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
54	8.86	0.49	0.00	0.49	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
55	9.02	0.50	0.00	0.50	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
56	9.19	0.51	0.00	0.51	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
57	9.35	0.51	0.00	0.51	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
58	9.51	0.52	0.00	0.52	0.98	0.254	1.14	0.222	1.03	1.00	2.000	No
59	9.68	0.53	0.00	0.53	0.97	0.253	1.14	0.222	1.03	1.00	2.000	No
60	9.84	0.54	0.00	0.54	0.97	0.253	1.14	0.221	1.03	1.00	2.000	No
61	10.01	0.55	0.00	0.55	0.97	0.253	1.14	0.221	1.04	1.00	2.000	No
62	10.17	0.56	0.00	0.56	0.97	0.253	1.14	0.221	1.04	1.00	2.000	No
63	10.33	0.57	0.00	0.57	0.97	0.253	1.14	0.221	1.04	1.00	2.000	No
64	10.50	0.58	0.00	0.58	0.97	0.253	1.14	0.221	1.04	1.00	2.000	No
65	10.66	0.59	0.00	0.59	0.97	0.252	1.14	0.221	1.04	1.00	2.000	No
66	10.83	0.60	0.00	0.60	0.97	0.253	1.14	0.221	1.03	1.00	0.214	No
67	10.99	0.61	0.01	0.60	0.97	0.255	1.14	0.223	1.03	1.00	0.216	No
68	11.15	0.62	0.01	0.61	0.97	0.256	1.14	0.224	1.03	1.00	0.218	No
69	11.32	0.63	0.02	0.61	0.97	0.258	1.14	0.226	1.03	1.00	0.220	No
70	11.48	0.64	0.02	0.61	0.97	0.260	1.14	0.228	1.03	1.00	0.222	No
71	11.65	0.64	0.03	0.62	0.97	0.262	1.14	0.229	1.03	1.00	0.223	No
72	11.81	0.65	0.03	0.62	0.97	0.264	1.14	0.231	1.03	1.00	0.225	No
73	11.98	0.66	0.04	0.63	0.97	0.266	1.14	0.232	1.03	1.00	0.226	No
74	12.14	0.67	0.04	0.63	0.96	0.268	1.14	0.234	1.03	1.00	0.228	No
75	12.30	0.68	0.05	0.63	0.96	0.269	1.14	0.235	1.03	1.00	0.229	No
76	12.47	0.69	0.05	0.64	0.96	0.271	1.14	0.237	1.03	1.00	0.231	No
77	12.63	0.70	0.06	0.64	0.96	0.273	1.14	0.238	1.03	1.00	0.232	No
78	12.80	0.71	0.06	0.64	0.96	0.274	1.14	0.240	1.03	1.00	0.234	No
79	12.96	0.72	0.07	0.65	0.96	0.276	1.14	0.241	1.03	1.00	0.235	No
80	13.12	0.72	0.07	0.65	0.96	0.278	1.14	0.243	1.03	1.00	0.237	No
81	13.29	0.73	0.08	0.66	0.96	0.279	1.14	0.244	1.03	1.00	0.238	No
82	13.45	0.74	0.08	0.66	0.96	0.281	1.14	0.245	1.02	1.00	0.239	No
83	13.62	0.75	0.09	0.66	0.96	0.282	1.14	0.247	1.02	1.00	0.241	No
84	13.78	0.76	0.09	0.67	0.96	0.284	1.14	0.248	1.02	1.00	0.242	No
85	13.94	0.77	0.10	0.67	0.96	0.285	1.14	0.249	1.02	1.00	0.244	No
86	14.11	0.78	0.10	0.68	0.96	0.287	1.14	0.251	1.02	1.00	0.245	No
87	14.27	0.79	0.11	0.68	0.96	0.288	1.14	0.252	1.02	1.00	0.246	No
88	14.44	0.80	0.11	0.68	0.96	0.290	1.14	0.253	1.02	1.00	0.248	No
89	14.60	0.81	0.12	0.69	0.95	0.291	1.14	0.254	1.02	1.00	0.249	No
90	14.76	0.82	0.12	0.69	0.95	0.292	1.14	0.255	1.02	1.00	0.250	No
91	14.93	0.83	0.13	0.70	0.95	0.294	1.14	0.257	1.02	1.00	0.251	No
92	15.09	0.83	0.13	0.70	0.95	0.295	1.14	0.258	1.02	1.00	0.252	No
93	15.26	0.84	0.14	0.70	0.95	0.296	1.14	0.259	1.02	1.00	0.253	No
94	15.42	0.85	0.14	0.71	0.95	0.297	1.14	0.260	1.02	1.00	0.255	No
95	15.58	0.86	0.15	0.71	0.95	0.299	1.14	0.261	1.02	1.00	0.256	No
96	15.75	0.87	0.15	0.72	0.95	0.300	1.14	0.262	1.02	1.00	0.257	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	0.88	0.16	0.72	0.95	0.301	1.14	0.263	1.02	1.00	0.258	No
98	16.08	0.89	0.16	0.72	0.95	0.303	1.14	0.264	1.02	1.00	0.259	No
99	16.24	0.90	0.17	0.73	0.95	0.304	1.14	0.265	1.02	1.00	0.261	No
100	16.40	0.90	0.17	0.73	0.95	0.305	1.14	0.266	1.02	1.00	0.262	No
101	16.57	0.91	0.18	0.73	0.95	0.306	1.14	0.268	1.02	1.00	0.263	No
102	16.73	0.92	0.19	0.74	0.94	0.307	1.14	0.269	1.02	1.00	0.264	No
103	16.90	0.93	0.19	0.74	0.94	0.308	1.14	0.270	1.02	1.00	0.265	No
104	17.06	0.94	0.20	0.74	0.94	0.310	1.14	0.271	1.02	1.00	0.266	No
105	17.22	0.95	0.20	0.75	0.94	0.311	1.14	0.271	1.02	1.00	0.267	No
106	17.39	0.96	0.21	0.75	0.94	0.312	1.14	0.272	1.02	1.00	0.268	No
107	17.55	0.97	0.21	0.76	0.94	0.313	1.14	0.273	1.02	1.00	0.269	No
108	17.72	0.98	0.22	0.76	0.94	0.314	1.14	0.274	1.02	1.00	0.270	No
109	17.88	0.98	0.22	0.76	0.94	0.315	1.14	0.275	1.02	1.00	0.271	No
110	18.04	0.99	0.23	0.77	0.94	0.316	1.14	0.276	1.02	1.00	0.272	No
111	18.21	1.00	0.23	0.77	0.94	0.317	1.14	0.277	1.02	1.00	0.273	No
112	18.37	1.01	0.24	0.77	0.94	0.318	1.14	0.278	1.02	1.00	0.274	No
113	18.54	1.02	0.24	0.78	0.94	0.319	1.14	0.279	1.02	1.00	0.274	No
114	18.70	1.03	0.25	0.78	0.94	0.320	1.14	0.280	1.02	1.00	0.275	No
115	18.86	1.04	0.25	0.79	0.93	0.321	1.14	0.280	1.02	1.00	0.276	No
116	19.03	1.05	0.26	0.79	0.93	0.322	1.14	0.281	1.02	1.00	0.277	No
117	19.19	1.06	0.26	0.79	0.93	0.322	1.14	0.282	1.02	1.00	0.278	No
118	19.36	1.07	0.27	0.80	0.93	0.323	1.14	0.283	1.02	1.00	0.278	No
119	19.52	1.07	0.27	0.80	0.93	0.324	1.14	0.283	1.01	1.00	0.279	No
120	19.69	1.08	0.28	0.81	0.93	0.325	1.14	0.284	1.01	1.00	0.280	No
121	19.85	1.09	0.28	0.81	0.93	0.326	1.14	0.285	1.01	1.00	0.281	No
122	20.01	1.10	0.29	0.81	0.93	0.327	1.14	0.286	1.01	1.00	0.282	No
123	20.18	1.11	0.29	0.82	0.93	0.328	1.14	0.286	1.01	1.00	0.282	No
124	20.34	1.12	0.30	0.82	0.93	0.328	1.14	0.287	1.01	1.00	0.283	No
125	20.51	1.13	0.30	0.83	0.93	0.329	1.14	0.288	1.01	1.00	0.284	No
126	20.67	1.14	0.31	0.83	0.93	0.330	1.14	0.289	1.01	1.00	0.285	No
127	20.83	1.15	0.31	0.83	0.93	0.331	1.14	0.289	1.01	1.00	0.286	No
128	21.00	1.16	0.32	0.84	0.92	0.332	1.14	0.290	1.01	1.00	0.286	No
129	21.16	1.16	0.32	0.84	0.92	0.332	1.14	0.290	1.01	1.00	0.287	No
130	21.33	1.17	0.33	0.85	0.92	0.333	1.14	0.291	1.01	1.00	0.288	No
131	21.49	1.18	0.33	0.85	0.92	0.334	1.14	0.292	1.01	1.00	0.289	No
132	21.65	1.19	0.34	0.85	0.92	0.334	1.14	0.292	1.01	1.00	0.289	No
133	21.82	1.20	0.34	0.86	0.92	0.335	1.14	0.293	1.01	1.00	0.290	No
134	21.98	1.21	0.35	0.86	0.92	0.336	1.14	0.294	1.01	1.00	0.290	No
135	22.15	1.22	0.35	0.87	0.92	0.337	1.14	0.294	1.01	1.00	0.291	No
136	22.31	1.23	0.36	0.87	0.92	0.337	1.14	0.295	1.01	1.00	0.292	No
137	22.47	1.24	0.36	0.87	0.92	0.338	1.14	0.295	1.01	1.00	0.292	No
138	22.64	1.25	0.37	0.88	0.92	0.338	1.14	0.296	1.01	1.00	0.293	No
139	22.80	1.25	0.37	0.88	0.92	0.339	1.14	0.296	1.01	1.00	0.294	No
140	22.97	1.26	0.38	0.88	0.91	0.340	1.14	0.297	1.01	1.00	0.295	No
141	23.13	1.27	0.38	0.89	0.91	0.340	1.14	0.298	1.01	1.00	0.295	No
142	23.29	1.28	0.39	0.89	0.91	0.341	1.14	0.298	1.01	1.00	0.296	No
143	23.46	1.29	0.39	0.89	0.91	0.342	1.14	0.299	1.01	1.00	0.296	No
144	23.62	1.30	0.40	0.90	0.91	0.342	1.14	0.299	1.01	1.00	0.297	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	1.31	0.41	0.90	0.91	0.343	1.14	0.300	1.01	1.00	0.297	No
146	23.95	1.32	0.41	0.91	0.91	0.344	1.14	0.300	1.01	1.00	0.298	No
147	24.11	1.32	0.42	0.91	0.91	0.344	1.14	0.301	1.01	1.00	0.299	No
148	24.28	1.33	0.42	0.91	0.91	0.345	1.14	0.301	1.01	1.00	0.299	No
149	24.44	1.34	0.43	0.92	0.91	0.345	1.14	0.302	1.01	1.00	0.300	No
150	24.61	1.35	0.43	0.92	0.91	0.346	1.14	0.302	1.01	1.00	0.300	No
151	24.77	1.36	0.44	0.92	0.91	0.347	1.14	0.303	1.01	1.00	0.301	No
152	24.93	1.37	0.44	0.93	0.90	0.347	1.14	0.303	1.01	1.00	0.301	No
153	25.10	1.38	0.45	0.93	0.90	0.348	1.14	0.304	1.01	1.00	0.302	No
154	25.26	1.38	0.45	0.93	0.90	0.348	1.14	0.304	1.01	1.00	0.302	No
155	25.43	1.39	0.46	0.94	0.90	0.349	1.14	0.305	1.01	1.00	0.303	No
156	25.59	1.40	0.46	0.94	0.90	0.349	1.14	0.305	1.01	1.00	0.304	No
157	25.75	1.41	0.47	0.94	0.90	0.350	1.14	0.306	1.01	1.00	0.304	No
158	25.92	1.42	0.47	0.95	0.90	0.350	1.14	0.306	1.01	1.00	0.305	No
159	26.08	1.43	0.48	0.95	0.90	0.351	1.14	0.307	1.00	1.00	2.000	Yes
160	26.25	1.43	0.48	0.95	0.90	0.351	1.14	0.307	1.00	1.00	2.000	Yes
161	26.41	1.44	0.49	0.96	0.90	0.352	1.14	0.308	1.01	1.00	2.000	Yes
162	26.57	1.45	0.49	0.96	0.90	0.352	1.14	0.308	1.01	1.00	2.000	Yes
163	26.74	1.46	0.50	0.96	0.89	0.353	1.14	0.308	1.01	1.00	2.000	Yes
164	26.90	1.47	0.50	0.97	0.89	0.353	1.14	0.309	1.00	1.00	0.307	No
165	27.07	1.48	0.51	0.97	0.89	0.354	1.14	0.309	1.00	1.00	0.308	No
166	27.23	1.49	0.51	0.97	0.89	0.354	1.14	0.309	1.00	1.00	0.308	No
167	27.40	1.50	0.52	0.98	0.89	0.354	1.14	0.310	1.00	1.00	0.309	No
168	27.56	1.50	0.52	0.98	0.89	0.355	1.14	0.310	1.00	1.00	0.309	No
169	27.72	1.51	0.53	0.99	0.89	0.355	1.14	0.311	1.00	1.00	0.309	No
170	27.89	1.52	0.53	0.99	0.89	0.356	1.14	0.311	1.00	1.00	2.000	Yes
171	28.05	1.53	0.54	0.99	0.89	0.356	1.14	0.311	1.00	1.00	2.000	Yes
172	28.22	1.54	0.54	1.00	0.89	0.356	1.14	0.311	1.00	1.00	2.000	Yes
173	28.38	1.55	0.55	1.00	0.89	0.357	1.14	0.312	1.00	1.00	2.000	Yes
174	28.54	1.56	0.55	1.01	0.89	0.357	1.14	0.312	1.00	1.00	0.311	No
175	28.71	1.57	0.56	1.01	0.88	0.357	1.14	0.312	1.00	1.00	0.311	No
176	28.87	1.58	0.56	1.01	0.88	0.357	1.14	0.312	1.00	1.00	0.312	No
177	29.04	1.59	0.57	1.02	0.88	0.358	1.14	0.313	1.00	1.00	0.312	No
178	29.20	1.60	0.57	1.02	0.88	0.358	1.14	0.313	1.00	1.00	0.312	No
179	29.36	1.61	0.58	1.03	0.88	0.358	1.14	0.313	1.00	1.00	0.312	No
180	29.53	1.62	0.58	1.03	0.88	0.358	1.14	0.313	1.00	1.00	0.313	No
181	29.69	1.62	0.59	1.04	0.88	0.359	1.14	0.313	1.00	1.00	0.313	No
182	29.86	1.63	0.59	1.04	0.88	0.359	1.14	0.314	1.00	1.00	0.313	No
183	30.02	1.64	0.60	1.04	0.88	0.359	1.14	0.314	1.00	1.00	0.314	No
184	30.18	1.65	0.60	1.05	0.88	0.359	1.14	0.314	1.00	1.00	0.314	No
185	30.35	1.66	0.61	1.05	0.88	0.360	1.14	0.314	1.00	1.00	0.314	No
186	30.51	1.67	0.61	1.05	0.87	0.360	1.14	0.315	1.00	1.00	0.315	No
187	30.68	1.68	0.62	1.06	0.87	0.360	1.14	0.315	1.00	1.00	0.315	No
188	30.84	1.69	0.63	1.06	0.87	0.361	1.14	0.315	1.00	1.00	0.315	No
189	31.00	1.70	0.63	1.07	0.87	0.361	1.14	0.315	1.00	1.00	0.315	No
190	31.17	1.71	0.64	1.07	0.87	0.361	1.14	0.316	1.00	1.00	0.316	No
191	31.33	1.71	0.64	1.07	0.87	0.361	1.14	0.316	1.00	1.00	0.316	No
192	31.50	1.72	0.65	1.08	0.87	0.361	1.14	0.316	1.00	1.00	0.316	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	1.73	0.65	1.08	0.87	0.362	1.14	0.316	1.00	1.00	0.316	No
194	31.82	1.74	0.66	1.09	0.87	0.362	1.14	0.316	1.00	1.00	0.317	No
195	31.99	1.75	0.66	1.09	0.87	0.362	1.14	0.316	1.00	1.00	0.317	No
196	32.15	1.76	0.67	1.10	0.87	0.362	1.14	0.316	1.00	1.00	0.317	No
197	32.32	1.77	0.67	1.10	0.86	0.362	1.14	0.316	1.00	1.00	0.317	No
198	32.48	1.78	0.68	1.11	0.86	0.362	1.14	0.316	1.00	1.00	0.317	No
199	32.64	1.79	0.68	1.11	0.86	0.362	1.14	0.316	1.00	1.00	2.000	Yes
200	32.81	1.80	0.69	1.12	0.86	0.362	1.14	0.316	1.00	1.00	2.000	Yes
201	32.97	1.81	0.69	1.12	0.86	0.362	1.14	0.316	1.00	1.00	2.000	Yes
202	33.14	1.82	0.70	1.13	0.86	0.362	1.14	0.317	1.00	1.00	2.000	Yes
203	33.30	1.83	0.70	1.13	0.86	0.362	1.14	0.317	1.00	1.00	2.000	Yes
204	33.46	1.84	0.71	1.13	0.86	0.362	1.14	0.317	1.00	1.00	0.318	No
205	33.63	1.85	0.71	1.14	0.86	0.362	1.14	0.317	1.00	1.00	2.000	Yes
206	33.79	1.86	0.72	1.14	0.86	0.362	1.14	0.317	1.00	1.00	2.000	Yes
207	33.96	1.87	0.72	1.15	0.86	0.362	1.14	0.317	0.99	1.00	2.000	Yes
208	34.12	1.88	0.73	1.15	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
209	34.28	1.89	0.73	1.16	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
210	34.45	1.90	0.74	1.16	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
211	34.61	1.91	0.74	1.17	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
212	34.78	1.92	0.75	1.17	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
213	34.94	1.93	0.75	1.17	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
214	35.10	1.94	0.76	1.18	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
215	35.27	1.95	0.76	1.18	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
216	35.43	1.96	0.77	1.19	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
217	35.60	1.97	0.77	1.19	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
218	35.76	1.97	0.78	1.20	0.85	0.363	1.14	0.317	0.99	1.00	2.000	Yes
219	35.93	1.98	0.78	1.20	0.84	0.363	1.14	0.317	0.99	1.00	2.000	Yes
220	36.09	1.99	0.79	1.20	0.84	0.363	1.14	0.317	0.99	1.00	2.000	Yes
221	36.25	2.00	0.79	1.21	0.84	0.363	1.14	0.317	0.99	1.00	2.000	Yes
222	36.42	2.01	0.80	1.21	0.84	0.363	1.14	0.317	0.99	1.00	2.000	Yes
223	36.58	2.02	0.80	1.22	0.84	0.363	1.14	0.317	0.99	1.00	2.000	Yes
224	36.75	2.03	0.81	1.22	0.84	0.363	1.14	0.317	0.99	1.00	2.000	Yes
225	36.91	2.04	0.81	1.23	0.84	0.363	1.14	0.317	0.99	1.00	0.320	No
226	37.07	2.05	0.82	1.23	0.84	0.363	1.14	0.317	0.99	1.00	0.320	No
227	37.24	2.06	0.82	1.23	0.84	0.363	1.14	0.317	0.99	1.00	0.320	No
228	37.40	2.07	0.83	1.24	0.84	0.363	1.14	0.317	0.99	1.00	0.320	No
229	37.57	2.08	0.84	1.24	0.84	0.363	1.14	0.317	0.99	1.00	0.320	No
230	37.73	2.09	0.84	1.25	0.83	0.363	1.14	0.318	0.99	1.00	2.000	Yes
231	37.89	2.10	0.85	1.25	0.83	0.363	1.14	0.318	0.99	1.00	2.000	Yes
232	38.06	2.10	0.85	1.25	0.83	0.363	1.14	0.318	0.99	1.00	2.000	Yes
233	38.22	2.11	0.86	1.26	0.83	0.363	1.14	0.318	0.99	1.00	2.000	Yes
234	38.39	2.12	0.86	1.26	0.83	0.363	1.14	0.318	0.99	1.00	0.321	No
235	38.55	2.13	0.87	1.27	0.83	0.363	1.14	0.318	0.99	1.00	0.321	No
236	38.71	2.14	0.87	1.27	0.83	0.363	1.14	0.318	0.99	1.00	0.321	No
237	38.88	2.15	0.88	1.27	0.83	0.363	1.14	0.318	0.99	1.00	0.321	No
238	39.04	2.16	0.88	1.28	0.83	0.363	1.14	0.318	0.99	1.00	0.321	No
239	39.21	2.17	0.89	1.28	0.83	0.363	1.14	0.318	0.99	1.00	0.321	No
240	39.37	2.18	0.89	1.29	0.83	0.363	1.14	0.317	0.99	1.00	2.000	Yes

:: 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	2.19	0.90	1.29	0.82	0.363	1.14	0.317	0.99	1.00	2.000	Yes
242	39.70	2.20	0.90	1.30	0.82	0.363	1.14	0.317	0.98	1.00	2.000	Yes
243	39.86	2.21	0.91	1.30	0.82	0.363	1.14	0.317	0.98	1.00	2.000	Yes
244	40.03	2.22	0.91	1.31	0.82	0.363	1.14	0.317	0.97	1.00	2.000	Yes
245	40.19	2.23	0.92	1.31	0.82	0.363	1.14	0.317	0.97	1.00	2.000	Yes
246	40.35	2.24	0.92	1.32	0.82	0.362	1.14	0.317	0.97	1.00	0.327	No
247	40.52	2.25	0.93	1.32	0.82	0.362	1.14	0.317	0.97	1.00	0.328	No
248	40.68	2.26	0.93	1.33	0.82	0.362	1.14	0.316	0.97	1.00	0.328	No
249	40.85	2.27	0.94	1.33	0.82	0.362	1.14	0.316	0.97	1.00	0.327	No
250	41.01	2.28	0.94	1.34	0.82	0.362	1.14	0.316	0.97	1.00	0.326	No
251	41.17	2.29	0.95	1.34	0.82	0.361	1.14	0.316	0.97	1.00	0.325	No
252	41.34	2.30	0.95	1.35	0.81	0.361	1.14	0.316	0.97	1.00	0.325	No
253	41.50	2.31	0.96	1.35	0.81	0.361	1.14	0.316	0.97	1.00	0.326	No
254	41.67	2.32	0.96	1.36	0.81	0.361	1.14	0.315	0.96	1.00	0.328	No
255	41.83	2.33	0.97	1.36	0.81	0.361	1.14	0.315	0.96	1.00	0.329	No
256	41.99	2.34	0.97	1.37	0.81	0.360	1.14	0.315	0.95	1.00	0.331	No
257	42.16	2.35	0.98	1.38	0.81	0.360	1.14	0.315	0.95	1.00	0.332	No
258	42.32	2.36	0.98	1.38	0.81	0.360	1.14	0.315	0.95	1.00	0.332	No
259	42.49	2.38	0.99	1.39	0.81	0.360	1.14	0.314	0.95	1.00	0.331	No
260	42.65	2.39	0.99	1.39	0.81	0.360	1.14	0.314	0.96	1.00	0.328	No
261	42.81	2.40	1.00	1.40	0.81	0.359	1.14	0.314	0.96	1.00	0.326	No
262	42.98	2.41	1.00	1.40	0.81	0.359	1.14	0.314	0.97	1.00	0.324	No
263	43.14	2.42	1.01	1.41	0.80	0.359	1.14	0.314	0.97	1.00	0.323	No
264	43.31	2.43	1.01	1.41	0.80	0.359	1.14	0.314	0.97	1.00	0.323	No
265	43.47	2.44	1.02	1.42	0.80	0.359	1.14	0.313	0.97	1.00	0.322	No
266	43.64	2.45	1.02	1.42	0.80	0.358	1.14	0.313	0.97	1.00	2.000	Yes
267	43.80	2.46	1.03	1.43	0.80	0.358	1.14	0.313	0.98	1.00	2.000	Yes
268	43.96	2.47	1.03	1.43	0.80	0.358	1.14	0.313	0.98	1.00	2.000	Yes
269	44.13	2.48	1.04	1.44	0.80	0.358	1.14	0.313	0.98	1.00	2.000	Yes
270	44.29	2.49	1.04	1.44	0.80	0.358	1.14	0.313	0.98	1.00	2.000	Yes
271	44.46	2.50	1.05	1.45	0.80	0.358	1.14	0.313	0.98	1.00	2.000	Yes
272	44.62	2.50	1.06	1.45	0.80	0.358	1.14	0.313	0.98	1.00	2.000	Yes
273	44.78	2.51	1.06	1.45	0.79	0.358	1.14	0.313	0.98	1.00	2.000	Yes
274	44.95	2.52	1.07	1.46	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
275	45.11	2.53	1.07	1.46	0.79	0.357	1.14	0.312	0.98	1.00	0.318	No
276	45.28	2.54	1.08	1.46	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
277	45.44	2.55	1.08	1.47	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
278	45.60	2.56	1.09	1.47	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
279	45.77	2.57	1.09	1.48	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
280	45.93	2.58	1.10	1.48	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
281	46.10	2.58	1.10	1.48	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
282	46.26	2.59	1.11	1.49	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
283	46.42	2.60	1.11	1.49	0.79	0.357	1.14	0.312	0.98	1.00	0.317	No
284	46.59	2.61	1.12	1.50	0.78	0.356	1.14	0.312	0.98	1.00	0.318	No
285	46.75	2.62	1.12	1.50	0.78	0.356	1.14	0.311	0.98	1.00	0.318	No
286	46.92	2.63	1.13	1.50	0.78	0.356	1.14	0.311	0.98	1.00	0.318	No
287	47.08	2.64	1.13	1.51	0.78	0.356	1.14	0.311	0.98	1.00	0.318	No
288	47.24	2.65	1.14	1.51	0.78	0.356	1.14	0.311	0.98	1.00	0.318	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
289	47.41	2.66	1.14	1.52	0.78	0.355	1.14	0.311	0.98	1.00	0.318	No
290	47.57	2.67	1.15	1.52	0.78	0.355	1.14	0.311	0.98	1.00	0.318	No
291	47.74	2.68	1.15	1.53	0.78	0.355	1.14	0.310	0.98	1.00	0.317	No
292	47.90	2.69	1.16	1.53	0.78	0.355	1.14	0.310	0.98	1.00	0.317	No
293	48.06	2.70	1.16	1.54	0.78	0.355	1.14	0.310	0.98	1.00	0.317	No
294	48.23	2.71	1.17	1.54	0.78	0.354	1.14	0.310	0.98	1.00	0.318	No
295	48.39	2.72	1.17	1.55	0.77	0.354	1.14	0.310	0.97	1.00	0.318	No
296	48.56	2.73	1.18	1.55	0.77	0.354	1.14	0.309	0.97	1.00	0.318	No
297	48.72	2.74	1.18	1.56	0.77	0.354	1.14	0.309	0.97	1.00	0.318	No
298	48.88	2.75	1.19	1.56	0.77	0.353	1.14	0.309	0.97	1.00	0.317	No
299	49.05	2.76	1.19	1.57	0.77	0.353	1.14	0.309	0.98	1.00	0.316	No
300	49.21	2.77	1.20	1.57	0.77	0.353	1.14	0.309	0.98	1.00	0.316	No
301	49.38	2.78	1.20	1.58	0.77	0.353	1.14	0.308	0.98	1.00	0.316	No
302	49.54	2.79	1.21	1.58	0.77	0.353	1.14	0.308	0.98	1.00	0.316	No
303	49.70	2.80	1.21	1.59	0.77	0.352	1.14	0.308	0.98	1.00	0.315	No
304	49.87	2.81	1.22	1.59	0.77	0.352	1.14	0.308	0.98	1.00	0.315	No
305	50.03	2.82	1.22	1.59	0.77	0.352	1.14	0.308	0.98	1.00	0.315	No
306	50.20	2.83	1.23	1.60	0.77	0.352	1.14	0.308	0.98	1.00	0.315	No
307	50.36	2.84	1.23	1.60	0.76	0.352	1.14	0.307	0.98	1.00	0.315	No
308	50.52	2.85	1.24	1.61	0.76	0.351	1.14	0.307	0.98	1.00	0.315	No
309	50.69	2.86	1.24	1.61	0.76	0.351	1.14	0.307	0.98	1.00	0.315	No
310	50.85	2.87	1.25	1.62	0.76	0.351	1.14	0.307	0.98	1.00	0.314	No
311	51.02	2.88	1.25	1.62	0.76	0.351	1.14	0.307	0.98	1.00	0.314	No
312	51.18	2.89	1.26	1.63	0.76	0.351	1.14	0.306	0.97	1.00	0.315	No
313	51.35	2.90	1.27	1.63	0.76	0.350	1.14	0.306	0.97	1.00	0.315	No
314	51.51	2.91	1.27	1.64	0.76	0.350	1.14	0.306	0.97	1.00	0.315	No
315	51.67	2.92	1.28	1.64	0.76	0.350	1.14	0.306	0.97	1.00	0.315	No
316	51.84	2.93	1.28	1.65	0.76	0.349	1.14	0.305	0.97	1.00	0.314	No
317	52.00	2.94	1.29	1.65	0.76	0.349	1.14	0.305	0.97	1.00	0.314	No
318	52.17	2.95	1.29	1.66	0.75	0.349	1.14	0.305	0.97	1.00	0.313	No
319	52.33	2.96	1.30	1.66	0.75	0.349	1.14	0.305	0.97	1.00	0.313	No
320	52.49	2.96	1.30	1.66	0.75	0.349	1.14	0.305	0.97	1.00	0.313	No
321	52.66	2.97	1.31	1.67	0.75	0.348	1.14	0.305	0.97	1.00	0.313	No
322	52.82	2.98	1.31	1.67	0.75	0.348	1.14	0.304	0.97	1.00	0.313	No
323	52.99	2.99	1.32	1.68	0.75	0.348	1.14	0.304	0.97	1.00	0.312	No
324	53.15	3.00	1.32	1.68	0.75	0.348	1.14	0.304	0.97	1.00	0.312	No
325	53.31	3.01	1.33	1.69	0.75	0.348	1.14	0.304	0.97	1.00	0.312	No
326	53.48	3.02	1.33	1.69	0.75	0.347	1.14	0.304	0.97	1.00	0.312	No
327	53.64	3.03	1.34	1.69	0.75	0.347	1.14	0.303	0.97	1.00	0.312	No
328	53.81	3.04	1.34	1.70	0.75	0.347	1.14	0.303	0.97	1.00	0.312	No
329	53.97	3.05	1.35	1.70	0.74	0.347	1.14	0.303	0.97	1.00	0.312	No
330	54.13	3.06	1.35	1.71	0.74	0.346	1.14	0.303	0.97	1.00	0.312	No
331	54.30	3.07	1.36	1.71	0.74	0.346	1.14	0.303	0.97	1.00	0.312	No
332	54.46	3.08	1.36	1.72	0.74	0.346	1.14	0.302	0.97	1.00	0.312	No
333	54.63	3.09	1.37	1.72	0.74	0.346	1.14	0.302	0.97	1.00	0.311	No
334	54.79	3.10	1.37	1.73	0.74	0.345	1.14	0.302	0.97	1.00	0.311	No
335	54.95	3.11	1.38	1.73	0.74	0.345	1.14	0.302	0.97	1.00	0.311	No
336	55.12	3.12	1.38	1.74	0.74	0.345	1.14	0.302	0.97	1.00	0.311	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
337	55.28	3.13	1.39	1.74	0.74	0.345	1.14	0.301	0.97	1.00	0.311	No
338	55.45	3.14	1.39	1.75	0.74	0.344	1.14	0.301	0.97	1.00	0.311	No
339	55.61	3.15	1.40	1.75	0.74	0.344	1.14	0.301	0.97	1.00	0.310	No
340	55.77	3.16	1.40	1.75	0.74	0.344	1.14	0.301	0.97	1.00	0.310	No
341	55.94	3.17	1.41	1.76	0.73	0.344	1.14	0.300	0.97	1.00	0.310	No
342	56.10	3.18	1.41	1.76	0.73	0.344	1.14	0.300	0.97	1.00	0.310	No
343	56.27	3.19	1.42	1.77	0.73	0.343	1.14	0.300	0.97	1.00	0.310	No
344	56.43	3.20	1.42	1.77	0.73	0.343	1.14	0.300	0.97	1.00	0.310	No
345	56.59	3.21	1.43	1.78	0.73	0.343	1.14	0.300	0.97	1.00	0.309	No
346	56.76	3.22	1.43	1.78	0.73	0.343	1.14	0.299	0.97	1.00	0.309	No
347	56.92	3.22	1.44	1.79	0.73	0.342	1.14	0.299	0.97	1.00	0.309	No
348	57.09	3.23	1.44	1.79	0.73	0.342	1.14	0.299	0.97	1.00	0.309	No
349	57.25	3.24	1.45	1.80	0.73	0.342	1.14	0.299	0.97	1.00	0.309	No
350	57.41	3.25	1.45	1.80	0.73	0.342	1.14	0.299	0.97	1.00	0.309	No
351	57.58	3.26	1.46	1.80	0.73	0.341	1.14	0.298	0.97	1.00	0.309	No
352	57.74	3.27	1.46	1.81	0.72	0.341	1.14	0.298	0.97	1.00	0.309	No
353	57.91	3.28	1.47	1.81	0.72	0.341	1.14	0.298	0.97	1.00	0.309	No
354	58.07	3.29	1.47	1.82	0.72	0.340	1.14	0.298	0.96	1.00	0.308	No
355	58.23	3.30	1.48	1.82	0.72	0.340	1.14	0.297	0.96	1.00	0.308	No
356	58.40	3.31	1.49	1.83	0.72	0.340	1.14	0.297	0.96	1.00	0.308	No
357	58.56	3.32	1.49	1.83	0.72	0.340	1.14	0.297	0.96	1.00	0.308	No
358	58.73	3.33	1.50	1.84	0.72	0.339	1.14	0.297	0.96	1.00	0.308	No
359	58.89	3.34	1.50	1.84	0.72	0.339	1.14	0.296	0.96	1.00	0.308	No
360	59.06	3.35	1.51	1.85	0.72	0.339	1.14	0.296	0.96	1.00	0.308	No
361	59.22	3.36	1.51	1.85	0.72	0.339	1.14	0.296	0.96	1.00	0.307	No
362	59.38	3.37	1.52	1.86	0.72	0.338	1.14	0.296	0.96	1.00	0.307	No
363	59.55	3.38	1.52	1.86	0.72	0.338	1.14	0.295	0.96	1.00	0.307	No
364	59.71	3.39	1.53	1.87	0.71	0.338	1.14	0.295	0.96	1.00	0.307	No
365	59.88	3.40	1.53	1.87	0.71	0.337	1.14	0.295	0.96	1.00	0.306	No
366	60.04	3.41	1.54	1.88	0.71	0.337	1.14	0.295	0.96	1.00	0.306	No
367	60.20	3.42	1.54	1.88	0.71	0.337	1.14	0.295	0.96	1.00	2.000	Yes
368	60.37	3.43	1.55	1.89	0.71	0.337	1.14	0.294	0.96	1.00	2.000	Yes
369	60.53	3.44	1.55	1.89	0.71	0.336	1.14	0.294	0.97	1.00	2.000	Yes
370	60.70	3.45	1.56	1.90	0.71	0.336	1.14	0.294	0.97	1.00	2.000	Yes
371	60.86	3.46	1.56	1.90	0.71	0.336	1.14	0.294	0.97	1.00	2.000	Yes
372	61.02	3.47	1.57	1.91	0.71	0.336	1.14	0.293	0.97	1.00	0.303	No
373	61.19	3.48	1.57	1.91	0.71	0.335	1.14	0.293	0.97	1.00	0.304	No
374	61.35	3.49	1.58	1.91	0.71	0.335	1.14	0.293	0.96	1.00	0.304	No
375	61.52	3.50	1.58	1.92	0.71	0.335	1.14	0.293	0.96	1.00	0.304	No
376	61.68	3.51	1.59	1.92	0.70	0.334	1.14	0.292	0.96	1.00	0.304	No
377	61.84	3.52	1.59	1.93	0.70	0.334	1.14	0.292	0.96	1.00	0.303	No
378	62.01	3.53	1.60	1.93	0.70	0.334	1.14	0.292	0.96	1.00	0.303	No
379	62.17	3.54	1.60	1.94	0.70	0.334	1.14	0.292	0.96	1.00	0.303	No
380	62.34	3.55	1.61	1.94	0.70	0.333	1.14	0.291	0.96	1.00	0.303	No
381	62.50	3.56	1.61	1.95	0.70	0.333	1.14	0.291	0.96	1.00	0.302	No
382	62.66	3.57	1.62	1.95	0.70	0.333	1.14	0.291	0.96	1.00	0.302	No
383	62.83	3.58	1.62	1.96	0.70	0.332	1.14	0.291	0.96	1.00	0.302	No
384	62.99	3.59	1.63	1.96	0.70	0.332	1.14	0.290	0.96	1.00	0.301	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
385	63.16	3.60	1.63	1.97	0.70	0.332	1.14	0.290	0.96	1.00	0.301	No
386	63.32	3.61	1.64	1.97	0.70	0.332	1.14	0.290	0.96	1.00	0.301	No
387	63.48	3.62	1.64	1.98	0.70	0.331	1.14	0.290	0.96	1.00	0.301	No
388	63.65	3.63	1.65	1.98	0.70	0.331	1.14	0.289	0.96	1.00	0.301	No
389	63.81	3.64	1.65	1.99	0.69	0.331	1.14	0.289	0.96	1.00	0.301	No
390	63.98	3.65	1.66	1.99	0.69	0.331	1.14	0.289	0.96	1.00	2.000	Yes
391	64.14	3.66	1.66	2.00	0.69	0.330	1.14	0.289	0.95	1.00	2.000	Yes
392	64.30	3.67	1.67	2.00	0.69	0.330	1.14	0.288	0.94	1.00	2.000	Yes
393	64.47	3.68	1.67	2.01	0.69	0.330	1.14	0.288	0.91	1.00	2.000	Yes
394	64.63	3.69	1.68	2.02	0.69	0.329	1.14	0.288	0.87	1.00	2.000	Yes
395	64.80	3.71	1.68	2.02	0.69	0.329	1.14	0.287	0.83	1.00	2.000	Yes
396	64.96	3.72	1.69	2.03	0.69	0.328	1.14	0.287	0.81	1.00	0.354	No
397	65.12	3.73	1.69	2.03	0.69	0.328	1.14	0.287	0.80	1.00	0.357	No
398	65.29	3.74	1.70	2.04	0.69	0.328	1.14	0.286	0.80	1.00	0.357	No
399	65.45	3.75	1.71	2.05	0.69	0.327	1.14	0.286	0.80	1.00	0.357	No
400	65.62	3.76	1.71	2.05	0.69	0.327	1.14	0.286	0.80	1.00	0.357	No
401	65.78	3.77	1.72	2.06	0.69	0.327	1.14	0.285	0.80	1.00	0.357	No
402	65.94	3.78	1.72	2.06	0.68	0.326	1.14	0.285	0.80	1.00	0.357	No
403	66.11	3.80	1.73	2.07	0.68	0.326	1.14	0.285	0.80	1.00	0.357	No
404	66.27	3.81	1.73	2.08	0.68	0.326	1.14	0.285	0.81	1.00	0.353	No
405	66.44	3.82	1.74	2.08	0.68	0.325	1.14	0.284	0.81	1.00	0.353	No
406	66.60	3.83	1.74	2.09	0.68	0.325	1.14	0.284	0.80	1.00	0.355	No
407	66.77	3.84	1.75	2.09	0.68	0.324	1.14	0.284	0.80	1.00	0.357	No
408	66.93	3.85	1.75	2.10	0.68	0.324	1.14	0.283	0.81	1.00	0.352	No
409	67.09	3.86	1.76	2.11	0.68	0.324	1.14	0.283	0.82	1.00	0.346	No
410	67.26	3.87	1.76	2.11	0.68	0.323	1.14	0.283	0.85	1.00	0.332	No
411	67.42	3.88	1.77	2.12	0.68	0.323	1.14	0.282	0.88	1.00	0.320	No
412	67.59	3.90	1.77	2.12	0.68	0.323	1.14	0.282	0.92	1.00	0.307	No
413	67.75	3.91	1.78	2.13	0.68	0.322	1.14	0.282	0.94	1.00	0.301	No
414	67.91	3.92	1.78	2.13	0.68	0.322	1.14	0.282	0.95	1.00	0.297	No
415	68.08	3.93	1.79	2.14	0.67	0.322	1.14	0.281	0.95	1.00	0.296	No
416	68.24	3.94	1.79	2.14	0.67	0.322	1.14	0.281	0.95	1.00	0.295	No
417	68.41	3.95	1.80	2.15	0.67	0.321	1.14	0.281	0.95	1.00	0.295	No
418	68.57	3.96	1.80	2.16	0.67	0.321	1.14	0.281	0.95	1.00	0.297	No
419	68.73	3.97	1.81	2.16	0.67	0.321	1.14	0.280	0.93	1.00	0.300	No
420	68.90	3.98	1.81	2.17	0.67	0.320	1.14	0.280	0.92	1.00	0.304	No
421	69.06	3.99	1.82	2.17	0.67	0.320	1.14	0.280	0.92	1.00	0.303	No
422	69.23	4.00	1.82	2.18	0.67	0.320	1.14	0.279	0.93	1.00	0.300	No
423	69.39	4.01	1.83	2.18	0.67	0.319	1.14	0.279	0.94	1.00	0.296	No
424	69.55	4.02	1.83	2.19	0.67	0.319	1.14	0.279	0.95	1.00	0.294	No
425	69.72	4.03	1.84	2.19	0.67	0.319	1.14	0.279	0.95	1.00	0.294	No
426	69.88	4.04	1.84	2.20	0.67	0.319	1.14	0.278	0.95	1.00	0.294	No
427	70.05	4.05	1.85	2.20	0.67	0.318	1.14	0.278	0.95	1.00	0.294	No
428	70.21	4.06	1.85	2.21	0.66	0.318	1.14	0.278	0.95	1.00	0.294	No
429	70.37	4.07	1.86	2.21	0.66	0.318	1.14	0.278	0.95	1.00	0.294	No
430	70.54	4.08	1.86	2.22	0.66	0.317	1.14	0.277	0.95	1.00	0.293	No
431	70.70	4.09	1.87	2.22	0.66	0.317	1.14	0.277	0.95	1.00	0.293	No
432	70.87	4.10	1.87	2.23	0.66	0.317	1.14	0.277	0.95	1.00	0.293	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
433	71.03	4.11	1.88	2.23	0.66	0.317	1.14	0.277	0.95	1.00	0.293	No
434	71.19	4.12	1.88	2.24	0.66	0.316	1.14	0.277	0.95	1.00	0.292	No
435	71.36	4.13	1.89	2.24	0.66	0.316	1.14	0.276	0.94	1.00	0.292	No
436	71.52	4.14	1.89	2.25	0.66	0.316	1.14	0.276	0.94	1.00	0.292	No
437	71.69	4.15	1.90	2.25	0.66	0.316	1.14	0.276	0.94	1.00	0.292	No
438	71.85	4.16	1.90	2.26	0.66	0.315	1.14	0.276	0.94	1.00	0.292	No
439	72.01	4.17	1.91	2.26	0.66	0.315	1.14	0.275	0.94	1.00	0.291	No
440	72.18	4.18	1.92	2.27	0.66	0.315	1.14	0.275	0.94	1.00	0.291	No
441	72.34	4.19	1.92	2.27	0.66	0.314	1.14	0.275	0.94	1.00	0.291	No
442	72.51	4.20	1.93	2.28	0.65	0.314	1.14	0.275	0.94	1.00	0.291	No
443	72.67	4.21	1.93	2.28	0.65	0.314	1.14	0.274	0.94	1.00	0.291	No
444	72.83	4.22	1.94	2.28	0.65	0.314	1.14	0.274	0.94	1.00	0.291	No
445	73.00	4.23	1.94	2.29	0.65	0.314	1.14	0.274	0.94	1.00	0.291	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	9.41	29.99	2.49	0.66	1.70	11.14	32.69	43.83	4.000	No	No	2.00
2	0.33	33.60	23.17	2.25	0.62	1.70	23.06	33.54	56.60	4.000	No	No	2.00
3	0.49	57.80	19.48	2.11	0.35	1.70	127.76	58.72	186.48	4.000	No	No	2.00
4	0.66	123.36	18.44	2.06	0.35	1.70	127.76	56.02	183.77	4.000	No	No	2.00
5	0.82	167.21	18.18	2.05	0.26	1.70	339.08	109.86	448.94	4.000	No	No	2.00
6	0.98	243.18	14.76	1.90	0.26	1.70	339.08	84.56	423.64	4.000	No	No	2.00
7	1.15	304.40	10.30	1.65	0.26	1.70	493.91	46.74	540.65	4.000	No	No	2.00
8	1.31	379.87	5.73	1.32	0.26	1.70	634.13	0.71	634.84	4.000	No	No	2.00
9	1.48	410.74	3.73	1.12	0.26	1.70	702.33	0.00	702.33	4.000	No	No	2.00
10	1.64	355.52	3.78	1.12	0.26	1.70	642.62	0.00	642.62	4.000	No	No	2.00
11	1.80	286.04	4.96	1.25	0.26	1.70	367.98	0.05	368.03	4.000	No	No	2.00
12	1.97	229.05	6.49	1.38	0.26	1.70	367.98	1.89	369.87	4.000	No	No	2.00
13	2.13	166.77	8.53	1.53	0.26	1.70	367.98	15.34	383.33	4.000	No	No	2.00
14	2.30	104.49	12.46	1.78	0.52	1.70	67.80	21.92	89.73	4.000	Yes	No	2.00
15	2.46	42.22	23.87	2.28	0.47	1.70	67.80	47.93	115.73	4.000	Yes	No	2.00
16	2.62	36.96	25.54	2.34	0.46	1.70	67.80	49.29	117.10	4.000	Yes	No	2.00
17	2.79	29.47	28.80	2.45	0.53	1.70	42.44	42.76	85.20	4.000	Yes	No	2.00
18	2.95	21.41	33.89	2.61	0.57	1.70	31.72	0.00	31.72	4.000	Yes	Yes	2.00
19	3.12	18.40	36.53	2.69	0.58	1.70	28.96	0.00	28.96	4.000	Yes	Yes	2.00
20	3.28	17.46	37.23	2.71	0.58	1.70	28.02	0.00	28.02	4.000	No	Yes	2.00
21	3.44	16.93	37.27	2.71	0.58	1.70	27.22	0.00	27.22	4.000	No	Yes	2.00
22	3.61	16.33	37.28	2.71	0.59	1.70	26.41	0.00	26.41	4.000	No	Yes	2.00
23	3.77	15.42	37.09	2.70	0.59	1.70	25.11	0.00	25.11	4.000	No	Yes	2.00
24	3.94	14.18	37.60	2.72	0.60	1.70	22.77	0.00	22.77	4.000	No	Yes	2.00
25	4.10	12.93	37.81	2.72	0.61	1.70	20.38	0.00	20.38	4.000	No	Yes	2.00
26	4.27	12.04	38.70	2.75	0.62	1.70	19.04	0.00	19.04	4.000	No	Yes	2.00
27	4.43	11.48	38.97	2.75	0.62	1.70	18.46	0.00	18.46	4.000	No	Yes	2.00
28	4.59	10.71	39.63	2.77	0.62	1.70	17.59	0.00	17.59	4.000	No	Yes	2.00
29	4.76	9.61	40.49	2.79	0.64	1.70	15.39	0.00	15.39	4.000	No	Yes	2.00
30	4.92	8.32	42.52	2.85	0.65	1.70	13.13	0.00	13.13	4.000	No	Yes	2.00
31	5.09	7.24	45.29	2.92	0.66	1.70	11.29	0.00	11.29	4.000	No	Yes	2.00
32	5.25	6.39	47.21	2.96	0.66	1.70	10.04	0.00	10.04	4.000	No	Yes	2.00
33	5.41	5.74	48.18	2.99	0.67	1.70	8.96	0.00	8.96	4.000	No	Yes	2.00
34	5.58	5.26	48.34	2.99	0.67	1.70	8.16	0.00	8.16	4.000	No	Yes	2.00
35	5.74	4.68	51.39	3.06	0.68	1.70	7.65	0.00	7.65	4.000	No	Yes	2.00
36	5.91	4.26	54.73	3.14	0.68	1.70	6.15	0.00	6.15	4.000	No	Yes	2.00
37	6.07	6.73	52.48	3.09	0.68	1.70	6.15	0.00	6.15	4.000	No	Yes	2.00
38	6.23	9.52	48.32	2.99	0.61	1.70	19.55	0.00	19.55	4.000	No	Yes	2.00
39	6.40	15.33	40.65	2.80	0.62	1.70	19.55	0.00	19.55	4.000	No	Yes	2.00
40	6.56	20.22	35.15	2.65	0.56	1.70	34.19	0.00	34.19	4.000	No	Yes	2.00
41	6.73	24.53	30.90	2.52	0.53	1.70	43.34	43.76	87.11	4.000	No	No	2.00
42	6.89	23.72	29.90	2.49	0.54	1.70	40.68	42.56	83.24	4.000	No	No	2.00
43	7.05	18.96	31.27	2.53	0.57	1.70	30.53	39.53	70.06	4.000	No	No	2.00
44	7.22	13.56	34.60	2.63	0.61	1.70	20.43	0.00	20.43	4.000	No	Yes	2.00
45	7.38	9.60	38.13	2.73	0.64	1.70	14.60	0.00	14.60	4.000	No	Yes	2.00
46	7.55	7.28	40.65	2.80	0.66	1.70	11.39	0.00	11.39	4.000	No	Yes	2.00
47	7.71	5.86	42.92	2.86	0.67	1.70	9.21	0.00	9.21	4.000	No	Yes	2.00
48	7.87	4.86	45.31	2.92	0.68	1.70	7.62	0.00	7.62	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
49	8.04	4.17	47.23	2.96	0.68	1.70	6.49	0.00	6.49	4.000	No	Yes	2.00
50	8.20	3.73	49.35	3.02	0.69	1.70	5.80	0.00	5.80	4.000	No	Yes	2.00
51	8.37	3.50	51.22	3.06	0.69	1.70	5.41	0.00	5.41	4.000	No	Yes	2.00
52	8.53	3.47	53.60	3.11	0.69	1.70	5.31	0.00	5.31	4.000	No	Yes	2.00
53	8.69	3.68	56.49	3.18	0.69	1.70	5.60	0.00	5.60	4.000	No	Yes	2.00
54	8.86	4.11	56.28	3.17	0.68	1.69	6.34	0.00	6.34	4.000	No	Yes	2.00
55	9.02	4.68	54.02	3.12	0.68	1.67	7.18	0.00	7.18	4.000	No	Yes	2.00
56	9.19	5.26	50.17	3.03	0.67	1.64	8.06	0.00	8.06	4.000	No	Yes	2.00
57	9.35	5.91	47.22	2.96	0.67	1.62	8.76	0.00	8.76	4.000	No	Yes	2.00
58	9.51	6.96	46.46	2.95	0.66	1.60	9.73	0.00	9.73	4.000	No	Yes	2.00
59	9.68	9.31	44.29	2.89	0.65	1.57	12.17	0.00	12.17	4.000	No	Yes	2.00
60	9.84	13.65	40.88	2.80	0.62	1.52	18.06	0.00	18.06	4.000	No	Yes	2.00
61	10.01	19.86	37.00	2.70	0.58	1.47	26.87	0.00	26.87	4.000	No	Yes	2.00
62	10.17	26.05	34.40	2.62	0.55	1.42	36.30	0.00	36.30	4.000	No	Yes	2.00
63	10.33	30.06	33.20	2.59	0.53	1.39	41.35	43.64	84.99	4.000	No	No	2.00
64	10.50	30.47	32.00	2.55	0.53	1.38	41.31	43.37	84.68	4.000	No	No	2.00
65	10.66	27.93	32.17	2.56	0.55	1.38	37.00	41.94	78.95	4.000	No	No	2.00
66	10.83	23.82	32.97	2.58	0.57	1.38	31.23	40.14	71.37	0.101	No	No	0.47
67	10.99	19.44	36.45	2.68	0.59	1.40	25.54	0.00	25.54	4.000	No	Yes	2.00
68	11.15	15.77	39.39	2.76	0.61	1.41	20.17	0.00	20.17	4.000	No	Yes	2.00
69	11.32	13.35	40.97	2.81	0.63	1.41	17.04	0.00	17.04	4.000	No	Yes	2.00
70	11.48	12.60	40.88	2.80	0.63	1.41	15.98	0.00	15.98	4.000	No	Yes	2.00
71	11.65	12.95	40.04	2.78	0.63	1.40	16.93	0.00	16.93	4.000	No	Yes	2.00
72	11.81	13.71	39.18	2.76	0.62	1.39	17.92	0.00	17.92	4.000	No	Yes	2.00
73	11.98	14.19	38.32	2.74	0.62	1.39	18.43	0.00	18.43	4.000	No	Yes	2.00
74	12.14	14.28	37.40	2.71	0.62	1.38	18.28	0.00	18.28	4.000	No	Yes	2.00
75	12.30	14.16	36.70	2.69	0.62	1.38	17.89	0.00	17.89	4.000	No	Yes	2.00
76	12.47	14.15	36.53	2.69	0.63	1.37	17.53	0.00	17.53	4.000	No	Yes	2.00
77	12.63	14.49	36.37	2.68	0.63	1.37	17.68	0.00	17.68	4.000	No	Yes	2.00
78	12.80	15.24	35.86	2.67	0.62	1.36	18.38	0.00	18.38	4.000	No	Yes	2.00
79	12.96	16.11	35.14	2.65	0.62	1.35	19.43	0.00	19.43	4.000	No	Yes	2.00
80	13.12	16.77	34.74	2.63	0.61	1.35	20.10	0.00	20.10	4.000	No	Yes	2.00
81	13.29	16.98	34.68	2.63	0.61	1.34	20.23	0.00	20.23	4.000	No	Yes	2.00
82	13.45	16.79	35.13	2.65	0.62	1.34	19.85	0.00	19.85	4.000	No	Yes	2.00
83	13.62	16.39	35.74	2.66	0.62	1.33	19.26	0.00	19.26	4.000	No	Yes	2.00
84	13.78	15.90	36.62	2.69	0.62	1.33	18.59	0.00	18.59	4.000	No	Yes	2.00
85	13.94	15.48	36.06	2.67	0.62	1.33	18.00	0.00	18.00	4.000	No	Yes	2.00
86	14.11	15.10	36.38	2.68	0.63	1.32	17.58	0.00	17.58	4.000	No	Yes	2.00
87	14.27	14.91	37.52	2.71	0.63	1.32	17.10	0.00	17.10	4.000	No	Yes	2.00
88	14.44	14.94	39.92	2.78	0.63	1.32	17.13	0.00	17.13	4.000	No	Yes	2.00
89	14.60	15.75	40.88	2.80	0.62	1.31	17.80	0.00	17.80	4.000	No	Yes	2.00
90	14.76	17.11	40.05	2.78	0.61	1.30	20.00	0.00	20.00	4.000	No	Yes	2.00
91	14.93	18.52	38.02	2.73	0.60	1.29	22.09	0.00	22.09	4.000	No	Yes	2.00
92	15.09	19.13	35.70	2.66	0.60	1.28	23.29	0.00	23.29	4.000	No	Yes	2.00
93	15.26	18.71	34.39	2.62	0.61	1.28	22.23	0.00	22.23	4.000	No	Yes	2.00
94	15.42	17.84	34.37	2.62	0.61	1.28	20.41	0.00	20.41	4.000	No	Yes	2.00
95	15.58	17.05	34.48	2.63	0.62	1.28	19.04	0.00	19.04	4.000	No	Yes	2.00
96	15.75	16.70	34.05	2.61	0.62	1.28	18.70	0.00	18.70	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	16.55	33.18	2.59	0.62	1.27	18.68	35.90	54.58	0.082	No	No	0.32
98	16.08	16.27	33.12	2.59	0.62	1.27	18.18	35.72	53.90	0.081	No	No	0.31
99	16.24	15.75	33.28	2.59	0.63	1.27	17.42	35.48	52.90	0.080	No	No	0.31
100	16.40	15.22	33.95	2.61	0.63	1.26	16.55	0.00	16.55	4.000	No	Yes	2.00
101	16.57	14.94	34.84	2.64	0.63	1.26	16.07	0.00	16.07	4.000	No	Yes	2.00
102	16.73	15.08	35.33	2.65	0.63	1.26	16.11	0.00	16.11	4.000	No	Yes	2.00
103	16.90	15.43	35.37	2.65	0.63	1.25	16.59	0.00	16.59	4.000	No	Yes	2.00
104	17.06	15.80	35.38	2.65	0.63	1.25	17.12	0.00	17.12	4.000	No	Yes	2.00
105	17.22	16.04	35.15	2.65	0.63	1.24	17.36	0.00	17.36	4.000	No	Yes	2.00
106	17.39	16.00	35.69	2.66	0.63	1.24	17.31	0.00	17.31	4.000	No	Yes	2.00
107	17.55	15.75	36.30	2.68	0.63	1.24	17.02	0.00	17.02	4.000	No	Yes	2.00
108	17.72	15.57	37.18	2.70	0.63	1.23	16.77	0.00	16.77	4.000	No	Yes	2.00
109	17.88	15.47	37.26	2.71	0.63	1.23	16.68	0.00	16.68	4.000	No	Yes	2.00
110	18.04	15.55	36.63	2.69	0.63	1.22	16.66	0.00	16.66	4.000	No	Yes	2.00
111	18.21	15.65	36.22	2.68	0.63	1.22	16.57	0.00	16.57	4.000	No	Yes	2.00
112	18.37	16.33	36.87	2.70	0.63	1.22	16.96	0.00	16.96	4.000	No	Yes	2.00
113	18.54	17.61	36.91	2.70	0.62	1.21	18.45	0.00	18.45	4.000	No	Yes	2.00
114	18.70	19.23	35.96	2.67	0.61	1.20	20.61	0.00	20.61	4.000	No	Yes	2.00
115	18.86	20.53	34.12	2.62	0.61	1.20	22.29	0.00	22.29	4.000	No	Yes	2.00
116	19.03	21.24	32.60	2.57	0.60	1.19	22.70	37.16	59.86	0.088	No	No	0.32
117	19.19	21.48	31.49	2.54	0.61	1.19	22.52	36.88	59.39	0.087	No	No	0.31
118	19.36	21.68	31.03	2.52	0.61	1.19	22.46	36.75	59.20	0.087	No	No	0.31
119	19.52	21.96	30.68	2.51	0.61	1.18	22.83	36.79	59.61	0.087	No	No	0.31
120	19.69	22.26	30.85	2.52	0.60	1.18	23.01	36.89	59.90	0.088	No	No	0.31
121	19.85	22.31	31.10	2.52	0.60	1.17	23.28	37.04	60.32	0.088	No	No	0.31
122	20.01	21.98	31.64	2.54	0.60	1.17	22.87	37.03	59.90	0.088	No	No	0.31
123	20.18	21.13	31.93	2.55	0.61	1.17	22.22	36.87	59.09	0.087	No	No	0.31
124	20.34	20.05	32.35	2.56	0.61	1.17	20.60	36.40	57.00	0.085	No	No	0.30
125	20.51	19.16	32.58	2.57	0.62	1.17	19.49	36.07	55.55	0.083	No	No	0.29
126	20.67	18.61	33.36	2.59	0.62	1.16	18.93	36.01	54.95	0.082	No	No	0.29
127	20.83	18.25	34.85	2.64	0.62	1.16	18.84	0.00	18.84	4.000	No	Yes	2.00
128	21.00	17.80	36.75	2.69	0.62	1.16	18.35	0.00	18.35	4.000	No	Yes	2.00
129	21.16	17.50	37.91	2.72	0.62	1.15	17.80	0.00	17.80	4.000	No	Yes	2.00
130	21.33	17.39	37.96	2.73	0.63	1.15	17.60	0.00	17.60	4.000	No	Yes	2.00
131	21.49	17.60	36.82	2.69	0.62	1.15	18.03	0.00	18.03	4.000	No	Yes	2.00
132	21.65	17.93	35.93	2.67	0.62	1.14	18.20	0.00	18.20	4.000	No	Yes	2.00
133	21.82	18.49	35.14	2.65	0.62	1.14	18.58	0.00	18.58	4.000	No	Yes	2.00
134	21.98	19.72	35.93	2.67	0.62	1.14	19.50	0.00	19.50	4.000	No	Yes	2.00
135	22.15	21.56	34.95	2.64	0.61	1.13	21.97	0.00	21.97	4.000	No	Yes	2.00
136	22.31	22.93	33.43	2.60	0.60	1.12	24.18	37.82	62.00	0.090	No	No	0.31
137	22.47	22.33	31.88	2.55	0.60	1.12	24.29	37.56	61.85	0.090	No	No	0.31
138	22.64	19.66	32.57	2.57	0.61	1.12	20.79	36.51	57.30	0.085	No	No	0.29
139	22.80	16.17	35.57	2.66	0.63	1.12	16.21	0.00	16.21	4.000	No	Yes	2.00
140	22.97	13.56	38.80	2.75	0.65	1.12	12.83	0.00	12.83	4.000	No	Yes	2.00
141	23.13	12.46	40.27	2.79	0.65	1.12	11.81	0.00	11.81	4.000	No	Yes	2.00
142	23.29	12.59	41.67	2.83	0.65	1.12	12.07	0.00	12.07	4.000	No	Yes	2.00
143	23.46	13.29	41.01	2.81	0.65	1.11	12.87	0.00	12.87	4.000	No	Yes	2.00
144	23.62	13.94	40.58	2.80	0.64	1.11	13.98	0.00	13.98	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	14.52	38.25	2.73	0.64	1.11	14.96	0.00	14.96	4.000	No	Yes	2.00
146	23.95	14.58	36.90	2.70	0.64	1.10	15.04	0.00	15.04	4.000	No	Yes	2.00
147	24.11	14.27	36.64	2.69	0.64	1.10	14.38	0.00	14.38	4.000	No	Yes	2.00
148	24.28	14.11	36.48	2.68	0.65	1.10	13.55	0.00	13.55	4.000	No	Yes	2.00
149	24.44	14.54	36.79	2.69	0.64	1.10	13.97	0.00	13.97	4.000	No	Yes	2.00
150	24.61	15.62	35.02	2.64	0.64	1.09	15.43	0.00	15.43	4.000	No	Yes	2.00
151	24.77	16.07	34.01	2.61	0.63	1.09	16.62	0.00	16.62	4.000	No	Yes	2.00
152	24.93	15.94	33.91	2.61	0.63	1.09	16.22	0.00	16.22	4.000	No	Yes	2.00
153	25.10	15.31	35.27	2.65	0.64	1.09	15.14	0.00	15.14	4.000	No	Yes	2.00
154	25.26	14.75	35.99	2.67	0.64	1.08	14.57	0.00	14.57	4.000	No	Yes	2.00
155	25.43	13.91	36.51	2.69	0.64	1.08	14.31	0.00	14.31	4.000	No	Yes	2.00
156	25.59	12.54	38.25	2.73	0.65	1.08	12.91	0.00	12.91	4.000	No	Yes	2.00
157	25.75	11.09	41.32	2.82	0.66	1.08	10.89	0.00	10.89	4.000	No	Yes	2.00
158	25.92	10.15	44.16	2.89	0.67	1.08	9.47	0.00	9.47	4.000	No	Yes	2.00
159	26.08	10.51	44.76	2.90	0.66	1.07	9.60	0.00	9.60	4.000	Yes	Yes	2.00
160	26.25	12.73	41.46	2.82	0.65	1.07	11.60	0.00	11.60	4.000	Yes	Yes	2.00
161	26.41	16.33	36.79	2.69	0.63	1.07	15.85	0.00	15.85	4.000	Yes	Yes	2.00
162	26.57	20.16	31.60	2.54	0.61	1.06	20.53	36.22	56.75	4.000	Yes	No	2.00
163	26.74	22.18	29.72	2.48	0.60	1.06	23.17	36.65	59.82	4.000	Yes	No	2.00
164	26.90	22.14	30.28	2.50	0.61	1.06	22.38	36.54	58.92	0.087	No	No	0.28
165	27.07	20.62	32.52	2.57	0.62	1.05	20.27	36.32	56.59	0.084	No	No	0.27
166	27.23	18.92	33.72	2.60	0.62	1.05	18.59	0.00	18.59	4.000	No	Yes	2.00
167	27.40	17.05	34.53	2.63	0.63	1.05	17.15	0.00	17.15	4.000	No	Yes	2.00
168	27.56	14.83	37.22	2.71	0.64	1.05	14.81	0.00	14.81	4.000	No	Yes	2.00
169	27.72	13.30	43.50	2.87	0.65	1.05	12.03	0.00	12.03	4.000	No	Yes	2.00
170	27.89	14.36	46.67	2.95	0.65	1.04	12.43	0.00	12.43	4.000	Yes	Yes	2.00
171	28.05	19.12	41.65	2.82	0.62	1.04	17.71	0.00	17.71	4.000	Yes	Yes	2.00
172	28.22	25.12	34.70	2.63	0.59	1.04	25.83	0.00	25.83	4.000	Yes	Yes	2.00
173	28.38	28.71	29.54	2.48	0.58	1.03	30.08	38.90	68.98	4.000	Yes	No	2.00
174	28.54	27.99	29.45	2.47	0.58	1.03	28.17	38.24	66.41	0.095	No	No	0.31
175	28.71	25.47	33.73	2.60	0.60	1.03	23.51	0.00	23.51	4.000	No	Yes	2.00
176	28.87	24.83	37.33	2.71	0.60	1.03	22.41	0.00	22.41	4.000	No	Yes	2.00
177	29.04	26.86	36.99	2.70	0.59	1.02	25.85	0.00	25.85	4.000	No	Yes	2.00
178	29.20	28.85	35.50	2.66	0.58	1.02	29.19	0.00	29.19	4.000	No	Yes	2.00
179	29.36	28.02	33.77	2.61	0.58	1.02	28.06	0.00	28.06	4.000	No	Yes	2.00
180	29.53	24.47	34.77	2.63	0.60	1.02	23.31	0.00	23.31	4.000	No	Yes	2.00
181	29.69	20.55	36.60	2.69	0.62	1.01	18.78	0.00	18.78	4.000	No	Yes	2.00
182	29.86	17.60	39.92	2.78	0.63	1.01	16.43	0.00	16.43	4.000	No	Yes	2.00
183	30.02	15.92	40.69	2.80	0.64	1.01	14.92	0.00	14.92	4.000	No	Yes	2.00
184	30.18	15.02	40.20	2.79	0.64	1.01	13.75	0.00	13.75	4.000	No	Yes	2.00
185	30.35	15.16	39.64	2.77	0.65	1.00	13.27	0.00	13.27	4.000	No	Yes	2.00
186	30.51	16.13	39.13	2.76	0.64	1.00	14.40	0.00	14.40	4.000	No	Yes	2.00
187	30.68	17.67	38.05	2.73	0.63	1.00	16.02	0.00	16.02	4.000	No	Yes	2.00
188	30.84	18.99	37.69	2.72	0.63	1.00	17.36	0.00	17.36	4.000	No	Yes	2.00
189	31.00	20.06	37.32	2.71	0.62	1.00	18.24	0.00	18.24	4.000	No	Yes	2.00
190	31.17	21.39	35.91	2.67	0.62	0.99	19.27	0.00	19.27	4.000	No	Yes	2.00
191	31.33	23.30	34.02	2.61	0.61	0.99	21.24	0.00	21.24	4.000	No	Yes	2.00
192	31.50	25.84	32.86	2.58	0.60	0.99	23.79	37.58	61.37	0.089	No	No	0.28

:: 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	28.62	33.64	2.60	0.59	0.99	26.14	0.00	26.14	4.000	No	Yes	2.00
194	31.82	32.72	34.05	2.61	0.58	0.98	28.85	0.00	28.85	4.000	No	Yes	2.00
195	31.99	39.93	32.53	2.57	0.56	0.98	35.01	41.34	76.36	0.108	No	No	0.34
196	32.15	50.22	30.15	2.49	0.52	0.98	45.77	44.35	90.12	0.127	No	No	0.40
197	32.32	60.15	27.79	2.42	0.49	0.98	57.86	47.42	105.27	0.151	No	No	0.48
198	32.48	63.85	26.63	2.38	0.47	0.98	62.79	48.40	111.19	0.162	No	No	0.51
199	32.64	57.97	27.15	2.40	0.49	0.98	56.55	46.66	103.21	4.000	Yes	No	2.00
200	32.81	45.19	30.34	2.50	0.54	0.97	41.39	42.94	84.33	4.000	Yes	No	2.00
201	32.97	32.00	36.30	2.68	0.58	0.97	27.05	0.00	27.05	4.000	Yes	Yes	2.00
202	33.14	24.39	42.75	2.85	0.61	0.96	19.74	0.00	19.74	4.000	Yes	Yes	2.00
203	33.30	22.63	45.58	2.92	0.61	0.96	20.11	0.00	20.11	4.000	Yes	Yes	2.00
204	33.46	23.81	44.95	2.91	0.60	0.96	21.97	0.00	21.97	4.000	No	Yes	2.00
205	33.63	24.82	43.98	2.88	0.60	0.96	22.80	0.00	22.80	4.000	Yes	Yes	2.00
206	33.79	41.33	29.30	2.47	0.61	0.95	22.74	36.38	59.12	4.000	Yes	No	2.00
207	33.96	57.63	20.88	2.17	0.47	0.96	67.07	44.27	111.33	4.000	Yes	No	2.00
208	34.12	84.87	12.89	1.80	0.52	0.96	66.69	23.56	90.25	4.000	Yes	No	2.00
209	34.28	99.64	11.36	1.71	0.46	0.96	96.97	20.42	117.39	4.000	Yes	No	2.00
210	34.45	109.16	11.20	1.70	0.44	0.96	107.15	20.65	127.80	4.000	Yes	No	2.00
211	34.61	98.63	13.78	1.85	0.45	0.96	92.79	31.60	124.40	4.000	Yes	No	2.00
212	34.78	77.16	17.80	2.04	0.48	0.95	67.63	38.95	106.57	4.000	Yes	No	2.00
213	34.94	57.12	22.37	2.22	0.53	0.95	47.70	40.34	88.04	4.000	Yes	No	2.00
214	35.10	44.05	26.03	2.36	0.55	0.94	37.54	39.90	77.44	4.000	Yes	No	2.00
215	35.27	36.29	29.21	2.46	0.57	0.94	31.71	39.34	71.05	4.000	Yes	No	2.00
216	35.43	31.57	31.83	2.55	0.59	0.93	26.58	38.32	64.90	4.000	Yes	No	2.00
217	35.60	30.41	32.54	2.57	0.60	0.93	24.37	37.72	62.09	4.000	Yes	No	2.00
218	35.76	34.37	29.79	2.48	0.58	0.93	28.16	38.34	66.50	4.000	Yes	No	2.00
219	35.93	41.41	26.57	2.38	0.55	0.93	37.01	40.00	77.01	4.000	Yes	No	2.00
220	36.09	46.84	25.16	2.33	0.53	0.93	43.37	41.24	84.61	4.000	Yes	No	2.00
221	36.25	46.13	26.79	2.38	0.53	0.93	42.83	42.01	84.84	4.000	Yes	No	2.00
222	36.42	39.14	30.73	2.51	0.56	0.93	34.95	40.89	75.84	4.000	Yes	No	2.00
223	36.58	29.14	36.68	2.69	0.60	0.92	24.49	0.00	24.49	4.000	Yes	Yes	2.00
224	36.75	20.43	44.14	2.89	0.63	0.91	16.02	0.00	16.02	4.000	Yes	Yes	2.00
225	36.91	15.34	50.65	3.05	0.65	0.91	11.66	0.00	11.66	4.000	No	Yes	2.00
226	37.07	13.64	52.77	3.09	0.66	0.91	10.77	0.00	10.77	4.000	No	Yes	2.00
227	37.24	13.54	52.66	3.09	0.66	0.90	11.20	0.00	11.20	4.000	No	Yes	2.00
228	37.40	13.76	51.53	3.07	0.66	0.90	11.19	0.00	11.19	4.000	No	Yes	2.00
229	37.57	13.72	51.77	3.07	0.66	0.90	11.18	0.00	11.18	4.000	No	Yes	2.00
230	37.73	20.33	38.99	2.75	0.66	0.90	11.15	0.00	11.15	4.000	Yes	Yes	2.00
231	37.89	26.86	31.47	2.54	0.58	0.91	28.26	38.81	67.08	4.000	Yes	No	2.00
232	38.06	37.73	24.51	2.30	0.59	0.90	28.17	36.02	64.19	4.000	Yes	No	2.00
233	38.22	42.86	23.14	2.25	0.55	0.91	39.29	38.49	77.77	4.000	Yes	No	2.00
234	38.39	45.58	22.52	2.23	0.54	0.91	41.88	38.73	80.61	0.113	No	No	0.35
235	38.55	41.42	24.23	2.29	0.56	0.90	35.31	38.08	73.39	0.104	No	No	0.32
236	38.71	36.23	26.00	2.36	0.59	0.90	28.14	36.85	65.00	0.094	No	No	0.29
237	38.88	34.93	26.73	2.38	0.59	0.90	27.58	37.02	64.60	0.093	No	No	0.29
238	39.04	36.17	28.66	2.45	0.57	0.90	31.52	39.09	70.61	0.100	No	No	0.31
239	39.21	37.72	29.99	2.49	0.57	0.90	31.52	39.52	71.04	0.101	No	No	0.31
240	39.37	37.85	31.57	2.54	0.57	0.89	31.79	40.03	71.82	4.000	Yes	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
241	39.53	60.11	23.52	2.27	0.58	0.89	31.66	36.44	68.09	4.000	Yes	No	2.00
242	39.70	82.06	19.27	2.10	0.42	0.92	89.76	47.88	137.64	4.000	Yes	No	2.00
243	39.86	115.23	15.52	1.93	0.44	0.91	89.26	37.66	126.92	4.000	Yes	No	2.00
244	40.03	132.64	14.39	1.88	0.39	0.92	119.53	39.25	158.78	4.000	Yes	No	2.00
245	40.19	152.20	13.43	1.83	0.37	0.92	136.54	37.37	173.91	4.000	Yes	No	2.00
246	40.35	160.99	13.02	1.81	0.36	0.92	141.76	35.91	177.66	0.500	No	No	1.53
247	40.52	163.27	13.07	1.81	0.36	0.92	142.84	36.32	179.16	0.522	No	No	1.59
248	40.68	161.94	13.15	1.81	0.36	0.92	142.16	36.73	178.89	0.518	No	No	1.58
249	40.85	156.36	15.03	1.91	0.35	0.92	137.98	45.87	183.84	0.605	No	No	1.85
250	41.01	147.00	16.96	2.00	0.36	0.92	127.78	51.42	179.20	0.523	No	No	1.60
251	41.17	138.54	18.52	2.07	0.37	0.92	116.98	53.41	170.38	0.411	No	No	1.26
252	41.34	138.12	17.80	2.04	0.38	0.91	114.52	50.80	165.32	0.365	No	No	1.12
253	41.50	147.28	15.97	1.95	0.37	0.91	125.31	47.18	172.49	0.434	No	No	1.33
254	41.67	162.27	14.07	1.86	0.35	0.91	140.68	41.60	182.28	0.575	No	No	1.76
255	41.83	176.71	12.91	1.80	0.34	0.92	154.13	37.11	191.23	0.787	No	No	2.00
256	41.99	188.63	12.67	1.79	0.33	0.92	164.28	37.11	201.39	1.214	No	No	2.00
257	42.16	196.33	12.90	1.80	0.31	0.92	172.64	39.93	212.57	2.200	No	No	2.00
258	42.32	197.45	12.15	1.76	0.32	0.92	174.60	34.92	209.52	1.845	No	No	2.00
259	42.49	188.18	12.07	1.75	0.33	0.91	166.48	33.22	199.70	1.122	No	No	2.00
260	42.65	168.79	13.22	1.82	0.35	0.91	146.58	37.82	184.40	0.616	No	No	1.88
261	42.81	144.53	16.05	1.96	0.37	0.90	121.80	46.74	168.53	0.393	No	No	1.21
262	42.98	124.38	17.88	2.04	0.41	0.89	101.01	47.60	148.62	0.265	No	No	0.82
263	43.14	113.00	17.84	2.04	0.42	0.89	92.14	45.24	137.37	0.224	No	No	0.69
264	43.31	107.48	17.38	2.02	0.43	0.88	90.63	43.66	134.29	0.215	No	No	0.67
265	43.47	100.89	17.51	2.02	0.44	0.88	85.72	42.79	128.51	0.199	No	No	0.62
266	43.64	89.65	18.13	2.05	0.47	0.87	74.41	41.41	115.81	4.000	Yes	No	2.00
267	43.80	76.06	20.44	2.15	0.49	0.86	61.09	41.93	103.02	4.000	Yes	No	2.00
268	43.96	62.92	24.12	2.29	0.51	0.86	50.47	42.74	93.21	4.000	Yes	No	2.00
269	44.13	50.63	29.03	2.46	0.54	0.85	40.80	42.31	83.11	4.000	Yes	No	2.00
270	44.29	38.63	33.50	2.60	0.57	0.84	30.15	39.87	70.03	4.000	Yes	No	2.00
271	44.46	28.02	37.70	2.72	0.61	0.83	20.51	0.00	20.51	4.000	Yes	Yes	2.00
272	44.62	21.27	42.32	2.84	0.64	0.82	14.32	0.00	14.32	4.000	Yes	Yes	2.00
273	44.78	19.16	44.92	2.91	0.65	0.81	13.12	0.00	13.12	4.000	Yes	Yes	2.00
274	44.95	20.24	43.94	2.88	0.64	0.82	14.86	0.00	14.86	4.000	No	Yes	2.00
275	45.11	21.67	40.43	2.79	0.63	0.82	17.04	0.00	17.04	4.000	No	Yes	2.00
276	45.28	21.35	38.57	2.74	0.63	0.81	16.74	0.00	16.74	4.000	No	Yes	2.00
277	45.44	19.40	39.04	2.76	0.64	0.81	14.33	0.00	14.33	4.000	No	Yes	2.00
278	45.60	17.50	42.40	2.84	0.65	0.81	11.98	0.00	11.98	4.000	No	Yes	2.00
279	45.77	17.29	42.57	2.85	0.65	0.80	11.76	0.00	11.76	4.000	No	Yes	2.00
280	45.93	18.91	41.23	2.81	0.65	0.81	13.22	0.00	13.22	4.000	No	Yes	2.00
281	46.10	21.46	39.43	2.77	0.63	0.81	15.55	0.00	15.55	4.000	No	Yes	2.00
282	46.26	24.51	38.55	2.74	0.62	0.81	17.63	0.00	17.63	4.000	No	Yes	2.00
283	46.42	27.55	38.14	2.73	0.61	0.81	20.38	0.00	20.38	4.000	No	Yes	2.00
284	46.59	30.52	36.32	2.68	0.60	0.81	22.71	0.00	22.71	4.000	No	Yes	2.00
285	46.75	33.10	34.92	2.64	0.60	0.81	24.42	0.00	24.42	4.000	No	Yes	2.00
286	46.92	36.28	33.51	2.60	0.59	0.81	26.40	38.59	65.00	0.094	No	No	0.29
287	47.08	40.59	32.81	2.58	0.58	0.82	29.61	39.56	69.17	0.099	No	No	0.31
288	47.24	45.07	33.82	2.61	0.56	0.82	34.48	0.00	34.48	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
289	47.41	47.82	34.90	2.64	0.55	0.82	37.23	0.00	37.23	4.000	No	Yes	2.00
290	47.57	47.18	35.80	2.66	0.55	0.82	36.64	0.00	36.64	4.000	No	Yes	2.00
291	47.74	44.59	35.39	2.65	0.56	0.81	32.88	0.00	32.88	4.000	No	Yes	2.00
292	47.90	43.70	33.34	2.59	0.57	0.81	30.89	40.10	70.99	0.101	No	No	0.32
293	48.06	47.35	31.59	2.54	0.56	0.81	33.42	40.59	74.01	0.105	No	No	0.33
294	48.23	54.63	30.40	2.50	0.54	0.82	40.93	42.80	83.73	0.118	No	No	0.37
295	48.39	61.56	30.33	2.50	0.51	0.82	48.43	45.30	93.73	0.133	No	No	0.42
296	48.56	63.99	30.25	2.50	0.50	0.82	50.83	46.09	96.92	0.138	No	No	0.43
297	48.72	60.73	30.75	2.51	0.51	0.82	47.50	45.12	92.62	0.131	No	No	0.41
298	48.88	53.66	30.69	2.51	0.54	0.81	40.11	42.61	82.73	0.116	No	No	0.37
299	49.05	46.37	31.31	2.53	0.56	0.80	33.54	40.56	74.10	0.105	No	No	0.33
300	49.21	41.77	31.54	2.54	0.58	0.80	29.19	39.15	68.34	0.098	No	No	0.31
301	49.38	39.50	33.56	2.60	0.58	0.79	27.98	39.14	67.12	0.096	No	No	0.30
302	49.54	38.54	35.26	2.65	0.58	0.79	27.79	0.00	27.79	4.000	No	Yes	2.00
303	49.70	37.28	36.64	2.69	0.59	0.79	26.49	0.00	26.49	4.000	No	Yes	2.00
304	49.87	35.66	37.03	2.70	0.59	0.79	24.83	0.00	24.83	4.000	No	Yes	2.00
305	50.03	34.89	36.07	2.67	0.60	0.78	23.48	0.00	23.48	4.000	No	Yes	2.00
306	50.20	35.65	34.74	2.63	0.60	0.78	24.42	0.00	24.42	4.000	No	Yes	2.00
307	50.36	37.82	33.04	2.58	0.59	0.78	26.06	38.39	64.45	0.093	No	No	0.30
308	50.52	39.02	33.05	2.58	0.58	0.78	27.72	38.96	66.68	0.096	No	No	0.30
309	50.69	38.92	34.48	2.63	0.58	0.78	27.38	0.00	27.38	4.000	No	Yes	2.00
310	50.85	38.73	34.69	2.63	0.59	0.78	26.29	0.00	26.29	4.000	No	Yes	2.00
311	51.02	40.96	35.13	2.65	0.58	0.78	27.56	0.00	27.56	4.000	No	Yes	2.00
312	51.18	46.76	33.66	2.60	0.56	0.78	32.44	0.00	32.44	4.000	No	Yes	2.00
313	51.35	52.88	33.95	2.61	0.54	0.79	39.37	0.00	39.37	4.000	No	Yes	2.00
314	51.51	56.91	32.68	2.57	0.53	0.79	43.07	44.12	87.19	0.123	No	No	0.39
315	51.67	55.93	32.08	2.55	0.53	0.79	42.09	43.65	85.74	0.121	No	No	0.38
316	51.84	52.00	31.30	2.53	0.55	0.79	37.66	41.95	79.61	0.112	No	No	0.36
317	52.00	46.72	31.37	2.53	0.57	0.78	32.41	40.19	72.60	0.103	No	No	0.33
318	52.17	42.60	32.21	2.56	0.58	0.77	28.65	39.11	67.75	0.097	No	No	0.31
319	52.33	40.50	32.08	2.55	0.59	0.77	26.74	38.43	65.17	0.094	No	No	0.30
320	52.49	40.05	32.04	2.55	0.59	0.77	26.61	38.38	64.99	0.094	No	No	0.30
321	52.66	40.71	31.71	2.54	0.59	0.77	27.26	38.53	65.79	0.094	No	No	0.30
322	52.82	41.63	31.78	2.55	0.58	0.77	27.83	38.74	66.57	0.095	No	No	0.31
323	52.99	42.07	32.06	2.55	0.58	0.77	28.34	38.98	67.32	0.096	No	No	0.31
324	53.15	42.29	31.80	2.55	0.58	0.76	28.35	38.92	67.27	0.096	No	No	0.31
325	53.31	42.32	31.40	2.53	0.58	0.76	28.43	38.85	67.28	0.096	No	No	0.31
326	53.48	42.58	30.92	2.52	0.58	0.76	28.40	38.73	67.12	0.096	No	No	0.31
327	53.64	42.62	31.01	2.52	0.58	0.76	28.35	38.74	67.09	0.096	No	No	0.31
328	53.81	42.68	31.17	2.53	0.58	0.76	28.09	38.69	66.78	0.096	No	No	0.31
329	53.97	43.30	30.89	2.52	0.58	0.76	28.18	38.65	66.83	0.096	No	No	0.31
330	54.13	44.78	30.92	2.52	0.58	0.76	29.33	39.04	68.37	0.098	No	No	0.31
331	54.30	47.09	30.49	2.51	0.57	0.76	31.30	39.59	70.88	0.101	No	No	0.32
332	54.46	48.56	31.57	2.54	0.56	0.76	33.05	40.46	73.51	0.104	No	No	0.33
333	54.63	49.45	31.28	2.53	0.56	0.76	33.55	40.56	74.11	0.105	No	No	0.34
334	54.79	49.42	31.44	2.53	0.56	0.76	33.35	40.53	73.88	0.105	No	No	0.34
335	54.95	50.16	30.16	2.49	0.56	0.76	33.24	40.15	73.39	0.104	No	No	0.33
336	55.12	50.82	29.42	2.47	0.56	0.76	33.77	40.10	73.87	0.104	No	No	0.34

:: 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
337	55.28	51.54	28.52	2.44	0.56	0.76	34.18	39.92	74.10	0.105	No	No	0.34
338	55.45	51.58	28.07	2.43	0.56	0.75	34.18	39.75	73.93	0.105	No	No	0.34
339	55.61	51.18	28.62	2.45	0.56	0.75	33.47	39.72	73.19	0.104	No	No	0.33
340	55.77	50.56	29.36	2.47	0.57	0.75	32.76	39.74	72.50	0.103	No	No	0.33
341	55.94	50.37	29.72	2.48	0.57	0.75	32.42	39.74	72.15	0.102	No	No	0.33
342	56.10	50.86	29.28	2.47	0.57	0.75	32.91	39.77	72.68	0.103	No	No	0.33
343	56.27	51.65	28.49	2.44	0.56	0.75	33.77	39.77	73.54	0.104	No	No	0.34
344	56.43	52.17	27.99	2.42	0.56	0.75	34.28	39.75	74.03	0.105	No	No	0.34
345	56.59	52.26	27.83	2.42	0.56	0.75	34.09	39.62	73.71	0.104	No	No	0.34
346	56.76	52.27	28.14	2.43	0.56	0.75	33.72	39.62	73.34	0.104	No	No	0.34
347	56.92	52.81	28.38	2.44	0.56	0.74	33.78	39.73	73.51	0.104	No	No	0.34
348	57.09	53.95	28.64	2.45	0.56	0.74	34.59	40.10	74.69	0.106	No	No	0.34
349	57.25	55.77	28.62	2.44	0.56	0.75	35.85	40.51	76.37	0.108	No	No	0.35
350	57.41	57.76	28.41	2.44	0.55	0.75	37.33	40.92	78.26	0.110	No	No	0.36
351	57.58	59.60	28.13	2.43	0.55	0.75	38.65	41.25	79.90	0.112	No	No	0.36
352	57.74	60.82	28.06	2.43	0.54	0.75	39.51	41.50	81.01	0.114	No	No	0.37
353	57.91	61.52	28.11	2.43	0.54	0.75	39.85	41.63	81.48	0.115	No	No	0.37
354	58.07	62.02	28.15	2.43	0.54	0.75	40.05	41.72	81.77	0.115	No	No	0.37
355	58.23	62.67	27.99	2.42	0.54	0.75	40.46	41.79	82.25	0.116	No	No	0.38
356	58.40	63.41	27.79	2.42	0.54	0.74	41.01	41.88	82.89	0.117	No	No	0.38
357	58.56	64.04	27.58	2.41	0.54	0.74	41.38	41.91	83.29	0.117	No	No	0.38
358	58.73	64.44	27.46	2.41	0.54	0.74	41.58	41.92	83.50	0.117	No	No	0.38
359	58.89	64.76	27.35	2.40	0.54	0.74	41.75	41.92	83.67	0.118	No	No	0.38
360	59.06	65.04	27.30	2.40	0.54	0.74	41.92	41.96	83.87	0.118	No	No	0.38
361	59.22	65.28	27.41	2.40	0.54	0.74	42.06	42.05	84.12	0.118	No	No	0.39
362	59.38	65.56	27.40	2.40	0.54	0.74	42.15	42.08	84.23	0.119	No	No	0.39
363	59.55	65.46	27.70	2.41	0.53	0.74	42.18	42.22	84.40	0.119	No	No	0.39
364	59.71	64.86	27.90	2.42	0.54	0.74	41.74	42.17	83.91	0.118	No	No	0.38
365	59.88	63.47	28.16	2.43	0.54	0.74	40.77	41.96	82.73	0.116	No	No	0.38
366	60.04	61.51	28.26	2.43	0.54	0.73	39.32	41.52	80.84	0.114	No	No	0.37
367	60.20	58.65	28.85	2.45	0.55	0.73	37.60	41.17	78.77	4.000	Yes	No	2.00
368	60.37	54.44	30.86	2.52	0.56	0.72	35.05	40.96	76.01	4.000	Yes	No	2.00
369	60.53	48.46	34.43	2.63	0.57	0.72	31.33	0.00	31.33	4.000	Yes	Yes	2.00
370	60.70	41.96	39.54	2.77	0.59	0.71	26.39	0.00	26.39	4.000	Yes	Yes	2.00
371	60.86	37.87	43.15	2.86	0.60	0.70	23.00	0.00	23.00	4.000	Yes	Yes	2.00
372	61.02	39.31	42.44	2.84	0.59	0.71	24.33	0.00	24.33	4.000	No	Yes	2.00
373	61.19	46.00	38.14	2.73	0.57	0.71	29.95	0.00	29.95	4.000	No	Yes	2.00
374	61.35	52.65	34.51	2.63	0.55	0.72	36.01	0.00	36.01	4.000	No	Yes	2.00
375	61.52	56.06	32.91	2.58	0.55	0.72	37.39	42.23	79.62	0.112	No	No	0.37
376	61.68	55.40	32.99	2.58	0.55	0.72	35.99	41.77	77.76	0.110	No	No	0.36
377	61.84	54.68	33.31	2.59	0.56	0.72	34.37	41.28	75.65	0.107	No	No	0.35
378	62.01	54.94	33.36	2.59	0.56	0.72	34.96	41.49	76.45	0.108	No	No	0.36
379	62.17	55.47	33.24	2.59	0.55	0.72	35.77	41.75	77.51	0.109	No	No	0.36
380	62.34	54.83	33.14	2.59	0.55	0.71	35.58	41.66	77.24	0.109	No	No	0.36
381	62.50	52.62	33.71	2.60	0.56	0.71	33.62	0.00	33.62	4.000	No	Yes	2.00
382	62.66	50.16	34.61	2.63	0.57	0.71	31.51	0.00	31.51	4.000	No	Yes	2.00
383	62.83	48.56	35.36	2.65	0.57	0.70	30.11	0.00	30.11	4.000	No	Yes	2.00
384	62.99	48.47	35.56	2.66	0.57	0.70	30.21	0.00	30.21	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
385	63.16	49.54	35.16	2.65	0.57	0.70	31.11	0.00	31.11	4.000	No	Yes	2.00
386	63.32	50.63	34.85	2.64	0.57	0.70	31.97	0.00	31.97	4.000	No	Yes	2.00
387	63.48	51.03	33.93	2.61	0.57	0.70	32.14	0.00	32.14	4.000	No	Yes	2.00
388	63.65	51.44	34.70	2.63	0.57	0.70	31.87	0.00	31.87	4.000	No	Yes	2.00
389	63.81	55.00	35.45	2.65	0.56	0.70	32.81	0.00	32.81	4.000	No	Yes	2.00
390	63.98	67.19	33.95	2.61	0.54	0.71	39.27	0.00	39.27	4.000	Yes	Yes	2.00
391	64.14	93.01	29.28	2.47	0.48	0.74	59.32	48.57	107.89	4.000	Yes	No	2.00
392	64.30	133.16	23.95	2.28	0.40	0.77	94.33	56.25	150.58	4.000	Yes	No	2.00
393	64.47	178.46	20.32	2.14	0.33	0.81	139.21	63.87	203.08	4.000	Yes	No	2.00
394	64.63	218.38	17.82	2.04	0.28	0.84	176.31	66.51	242.81	4.000	Yes	No	2.00
395	64.80	245.04	16.38	1.97	0.26	0.84	198.66	65.68	264.34	4.000	Yes	No	2.00
396	64.96	260.70	15.52	1.93	0.26	0.84	208.82	63.28	272.09	4.000	No	No	2.00
397	65.12	270.62	15.06	1.91	0.26	0.84	214.89	61.82	276.71	4.000	No	No	2.00
398	65.29	279.63	15.44	1.93	0.26	0.84	221.74	65.55	287.29	4.000	No	No	2.00
399	65.45	287.84	16.38	1.97	0.26	0.84	229.17	72.69	301.86	4.000	No	No	2.00
400	65.62	291.51	17.11	2.01	0.26	0.84	233.82	77.62	311.45	4.000	No	No	2.00
401	65.78	288.57	17.36	2.02	0.26	0.84	230.08	77.96	308.05	4.000	No	No	2.00
402	65.94	279.45	16.76	1.99	0.26	0.84	220.59	72.66	293.25	4.000	No	No	2.00
403	66.11	269.96	16.12	1.96	0.26	0.84	211.17	67.17	278.34	4.000	No	No	2.00
404	66.27	263.86	16.32	1.97	0.26	0.84	207.17	67.31	274.48	4.000	No	No	2.00
405	66.44	262.97	17.76	2.04	0.26	0.84	207.30	74.09	281.39	4.000	No	No	2.00
406	66.60	265.06	18.17	2.05	0.26	0.84	209.14	76.24	285.38	4.000	No	No	2.00
407	66.77	265.39	18.64	2.07	0.26	0.84	211.07	78.57	289.65	4.000	No	No	2.00
408	66.93	262.32	17.94	2.04	0.26	0.83	206.59	74.66	281.25	4.000	No	No	2.00
409	67.09	250.25	19.10	2.09	0.26	0.83	200.22	77.35	277.58	4.000	No	No	2.00
410	67.26	230.05	19.49	2.11	0.26	0.83	182.24	73.71	255.95	4.000	No	No	2.00
411	67.42	196.48	21.28	2.18	0.30	0.81	155.92	70.78	226.71	4.000	No	No	2.00
412	67.59	156.83	22.73	2.24	0.37	0.77	113.50	60.65	174.14	0.453	No	No	1.47
413	67.75	116.90	24.97	2.32	0.44	0.74	77.85	52.04	129.89	0.203	No	No	0.67
414	67.91	89.64	26.28	2.37	0.50	0.70	53.79	45.27	99.06	0.141	No	No	0.47
415	68.08	75.81	27.30	2.40	0.52	0.69	45.90	43.26	89.16	0.126	No	No	0.43
416	68.24	72.22	28.35	2.44	0.53	0.69	44.10	43.13	87.24	0.123	No	No	0.42
417	68.41	78.07	29.72	2.48	0.53	0.69	44.23	43.69	87.93	0.124	No	No	0.42
418	68.57	94.66	30.85	2.52	0.48	0.71	58.04	48.70	106.74	0.154	No	No	0.52
419	68.73	120.54	29.17	2.46	0.43	0.74	81.26	55.83	137.09	0.223	No	No	0.74
420	68.90	138.07	28.28	2.43	0.37	0.77	106.57	63.74	170.32	0.411	No	No	1.35
421	69.06	138.56	26.32	2.37	0.38	0.76	102.58	61.06	163.64	0.352	No	No	1.16
422	69.23	120.49	26.20	2.36	0.42	0.74	83.32	54.75	138.07	0.226	No	No	0.75
423	69.39	100.67	25.30	2.33	0.48	0.71	61.64	47.15	108.79	0.158	No	No	0.53
424	69.55	86.77	26.36	2.37	0.50	0.69	52.93	45.04	97.97	0.139	No	No	0.47
425	69.72	82.20	27.00	2.39	0.51	0.69	50.68	44.67	95.35	0.135	No	No	0.46
426	69.88	81.52	27.05	2.39	0.51	0.69	51.37	44.92	96.28	0.137	No	No	0.46
427	70.05	83.14	27.37	2.40	0.50	0.69	53.09	45.64	98.73	0.140	No	No	0.48
428	70.21	84.97	26.78	2.38	0.50	0.69	54.87	45.91	100.79	0.144	No	No	0.49
429	70.37	86.81	26.15	2.36	0.50	0.69	55.21	45.66	100.87	0.144	No	No	0.49
430	70.54	86.53	25.68	2.35	0.50	0.69	54.31	45.07	99.37	0.142	No	No	0.48
431	70.70	85.23	25.53	2.34	0.50	0.69	52.79	44.49	97.27	0.138	No	No	0.47
432	70.87	84.26	25.31	2.33	0.51	0.69	51.66	43.98	95.64	0.136	No	No	0.46

:: 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
433	71.03	84.58	24.91	2.32	0.51	0.68	51.89	43.78	95.67	0.136	No	No	0.46
434	71.19	86.08	24.75	2.31	0.50	0.69	53.06	44.03	97.09	0.138	No	No	0.47
435	71.36	87.30	24.68	2.31	0.50	0.69	54.37	44.39	98.76	0.141	No	No	0.48
436	71.52	87.91	24.72	2.31	0.50	0.69	54.62	44.50	99.12	0.141	No	No	0.48
437	71.69	87.58	24.55	2.31	0.50	0.68	54.16	44.23	98.40	0.140	No	No	0.48
438	71.85	87.05	24.46	2.30	0.50	0.68	53.30	43.89	97.19	0.138	No	No	0.47
439	72.01	86.54	24.44	2.30	0.51	0.68	52.84	43.73	96.57	0.137	No	No	0.47
440	72.18	86.48	24.58	2.31	0.51	0.68	52.65	43.77	96.42	0.137	No	No	0.47
441	72.34	86.76	24.81	2.31	0.50	0.68	52.95	44.04	96.99	0.138	No	No	0.47
442	72.51	87.61	21.80	2.20	0.51	0.68	53.13	41.36	94.49	0.134	No	No	0.46
443	72.67	88.60	17.78	2.04	0.52	0.67	53.21	35.27	88.48	0.125	No	No	0.43
444	72.83	89.72	30.96	2.52	0.49	0.68	55.41	47.85	103.26	0.148	No	No	0.51
445	73.00	90.39	31.01	2.52	0.49	0.69	55.98	48.06	104.04	0.149	No	No	0.51

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	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.05	0.00	0.33	2.00	0.00	0.00	0.05	0.00
0.49	2.00	0.00	0.00	0.05	0.00	0.66	2.00	0.00	0.00	0.05	0.00
0.82	2.00	0.00	0.00	0.05	0.00	0.98	2.00	0.00	0.00	0.05	0.00
1.15	2.00	0.00	0.00	0.05	0.00	1.31	2.00	0.00	0.00	0.05	0.00
1.48	2.00	0.00	0.00	0.05	0.00	1.64	2.00	0.00	0.00	0.05	0.00
1.80	2.00	0.00	0.00	0.05	0.00	1.97	2.00	0.00	0.00	0.05	0.00
2.13	2.00	0.00	0.00	0.05	0.00	2.30	2.00	0.00	0.00	0.05	0.00
2.46	2.00	0.00	0.00	0.05	0.00	2.62	2.00	0.00	0.00	0.05	0.00
2.79	2.00	0.00	0.00	0.05	0.00	2.95	2.00	0.00	0.00	0.05	0.00
3.12	2.00	0.00	0.00	0.05	0.00	3.28	2.00	0.00	0.00	0.05	0.00
3.44	2.00	0.00	0.00	0.05	0.00	3.61	2.00	0.00	0.00	0.05	0.00
3.77	2.00	0.00	0.00	0.05	0.00	3.94	2.00	0.00	0.00	0.05	0.00
4.10	2.00	0.00	0.00	0.05	0.00	4.27	2.00	0.00	0.00	0.05	0.00
4.43	2.00	0.00	0.00	0.05	0.00	4.59	2.00	0.00	0.00	0.05	0.00
4.76	2.00	0.00	0.00	0.05	0.00	4.92	2.00	0.00	0.00	0.05	0.00
5.09	2.00	0.00	0.00	0.05	0.00	5.25	2.00	0.00	0.00	0.05	0.00
5.41	2.00	0.00	0.00	0.05	0.00	5.58	2.00	0.00	0.00	0.05	0.00
5.74	2.00	0.00	0.00	0.05	0.00	5.91	2.00	0.00	0.00	0.05	0.00
6.07	2.00	0.00	0.00	0.05	0.00	6.23	2.00	0.00	0.00	0.05	0.00
6.40	2.00	0.00	0.00	0.05	0.00	6.56	2.00	0.00	0.00	0.05	0.00
6.73	2.00	0.00	0.00	0.05	0.00	6.89	2.00	0.00	0.00	0.05	0.00
7.05	2.00	0.00	0.00	0.05	0.00	7.22	2.00	0.00	0.00	0.05	0.00
7.38	2.00	0.00	0.00	0.05	0.00	7.55	2.00	0.00	0.00	0.05	0.00
7.71	2.00	0.00	0.00	0.05	0.00	7.87	2.00	0.00	0.00	0.05	0.00
8.04	2.00	0.00	0.00	0.05	0.00	8.20	2.00	0.00	0.00	0.05	0.00
8.37	2.00	0.00	0.00	0.05	0.00	8.53	2.00	0.00	0.00	0.05	0.00
8.69	2.00	0.00	0.00	0.05	0.00	8.86	2.00	0.00	0.00	0.05	0.00
9.02	2.00	0.00	0.00	0.05	0.00	9.19	2.00	0.00	0.00	0.05	0.00
9.35	2.00	0.00	0.00	0.05	0.00	9.51	2.00	0.00	0.00	0.05	0.00
9.68	2.00	0.00	0.00	0.05	0.00	9.84	2.00	0.00	0.00	0.05	0.00
10.01	2.00	0.00	0.00	0.05	0.00	10.17	2.00	0.00	0.00	0.05	0.00
10.33	2.00	0.00	0.00	0.05	0.00	10.50	2.00	0.00	0.00	0.05	0.00
10.66	2.00	0.00	0.00	0.05	0.00	10.83	0.47	0.00	0.00	0.05	0.23
10.99	2.00	0.00	0.00	0.05	0.00	11.15	2.00	0.00	0.00	0.05	0.00
11.32	2.00	0.00	0.00	0.05	0.00	11.48	2.00	0.00	0.00	0.05	0.00
11.65	2.00	0.00	0.00	0.05	0.00	11.81	2.00	0.00	0.00	0.05	0.00
11.98	2.00	0.00	0.00	0.05	0.00	12.14	2.00	0.00	0.00	0.05	0.00
12.30	2.00	0.00	0.00	0.05	0.00	12.47	2.00	0.00	0.00	0.05	0.00
12.63	2.00	0.00	0.00	0.05	0.00	12.80	2.00	0.00	0.00	0.05	0.00
12.96	2.00	0.00	0.00	0.05	0.00	13.12	2.00	0.00	0.00	0.05	0.00
13.29	2.00	0.00	0.00	0.05	0.00	13.45	2.00	0.00	0.00	0.05	0.00
13.62	2.00	0.00	0.00	0.05	0.00	13.78	2.00	0.00	0.00	0.05	0.00
13.94	2.00	0.00	0.00	0.05	0.00	14.11	2.00	0.00	0.00	0.05	0.00
14.27	2.00	0.00	0.00	0.05	0.00	14.44	2.00	0.00	0.00	0.05	0.00
14.60	2.00	0.00	0.00	0.05	0.00	14.76	2.00	0.00	0.00	0.05	0.00
14.93	2.00	0.00	0.00	0.05	0.00	15.09	2.00	0.00	0.00	0.05	0.00
15.26	2.00	0.00	0.00	0.05	0.00	15.42	2.00	0.00	0.00	0.05	0.00
15.58	2.00	0.00	0.00	0.05	0.00	15.75	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	0.32	0.00	0.00	0.05	0.25	16.08	0.31	0.00	0.00	0.05	0.27
16.24	0.31	0.00	0.00	0.05	0.25	16.40	2.00	0.00	0.00	0.05	0.00
16.57	2.00	0.00	0.00	0.05	0.00	16.73	2.00	0.00	0.00	0.05	0.00
16.90	2.00	0.00	0.00	0.05	0.00	17.06	2.00	0.00	0.00	0.05	0.00
17.22	2.00	0.00	0.00	0.05	0.00	17.39	2.00	0.00	0.00	0.05	0.00
17.55	2.00	0.00	0.00	0.05	0.00	17.72	2.00	0.00	0.00	0.05	0.00
17.88	2.00	0.00	0.00	0.05	0.00	18.04	2.00	0.00	0.00	0.05	0.00
18.21	2.00	0.00	0.00	0.05	0.00	18.37	2.00	0.00	0.00	0.05	0.00
18.54	2.00	0.00	0.00	0.05	0.00	18.70	2.00	0.00	0.00	0.05	0.00
18.86	2.00	0.00	0.00	0.05	0.00	19.03	0.32	0.00	0.00	0.05	0.25
19.19	0.31	0.00	0.00	0.05	0.24	19.36	0.31	0.00	0.00	0.05	0.25
19.52	0.31	0.00	0.00	0.05	0.24	19.69	0.31	0.00	0.00	0.05	0.25
19.85	0.31	0.00	0.00	0.05	0.23	20.01	0.31	0.00	0.00	0.05	0.23
20.18	0.31	0.00	0.00	0.05	0.25	20.34	0.30	0.00	0.00	0.05	0.24
20.51	0.29	0.00	0.00	0.05	0.25	20.67	0.29	0.00	0.00	0.05	0.24
20.83	2.00	0.00	0.00	0.05	0.00	21.00	2.00	0.00	0.00	0.05	0.00
21.16	2.00	0.00	0.00	0.05	0.00	21.33	2.00	0.00	0.00	0.05	0.00
21.49	2.00	0.00	0.00	0.05	0.00	21.65	2.00	0.00	0.00	0.05	0.00
21.82	2.00	0.00	0.00	0.05	0.00	21.98	2.00	0.00	0.00	0.05	0.00
22.15	2.00	0.00	0.00	0.05	0.00	22.31	0.31	0.00	0.00	0.05	0.22
22.47	0.31	0.00	0.00	0.05	0.22	22.64	0.29	0.00	0.00	0.05	0.24
22.80	2.00	0.00	0.00	0.05	0.00	22.97	2.00	0.00	0.00	0.05	0.00
23.13	2.00	0.00	0.00	0.05	0.00	23.29	2.00	0.00	0.00	0.05	0.00
23.46	2.00	0.00	0.00	0.05	0.00	23.62	2.00	0.00	0.00	0.05	0.00
23.79	2.00	0.00	0.00	0.05	0.00	23.95	2.00	0.00	0.00	0.05	0.00
24.11	2.00	0.00	0.00	0.05	0.00	24.28	2.00	0.00	0.00	0.05	0.00
24.44	2.00	0.00	0.00	0.05	0.00	24.61	2.00	0.00	0.00	0.05	0.00
24.77	2.00	0.00	0.00	0.05	0.00	24.93	2.00	0.00	0.00	0.05	0.00
25.10	2.00	0.00	0.00	0.05	0.00	25.26	2.00	0.00	0.00	0.05	0.00
25.43	2.00	0.00	0.00	0.05	0.00	25.59	2.00	0.00	0.00	0.05	0.00
25.75	2.00	0.00	0.00	0.05	0.00	25.92	2.00	0.00	0.00	0.05	0.00
26.08	2.00	0.00	0.00	0.05	0.00	26.25	2.00	0.00	0.00	0.05	0.00
26.41	2.00	0.00	0.00	0.05	0.00	26.57	2.00	0.00	0.00	0.05	0.00
26.74	2.00	0.00	0.00	0.05	0.00	26.90	0.28	0.00	0.00	0.05	0.21
27.07	0.27	0.00	0.00	0.05	0.22	27.23	2.00	0.00	0.00	0.05	0.00
27.40	2.00	0.00	0.00	0.05	0.00	27.56	2.00	0.00	0.00	0.05	0.00
27.72	2.00	0.00	0.00	0.05	0.00	27.89	2.00	0.00	0.00	0.05	0.00
28.05	2.00	0.00	0.00	0.05	0.00	28.22	2.00	0.00	0.00	0.05	0.00
28.38	2.00	0.00	0.00	0.05	0.00	28.54	0.31	0.00	0.00	0.05	0.19
28.71	2.00	0.00	0.00	0.05	0.00	28.87	2.00	0.00	0.00	0.05	0.00
29.04	2.00	0.00	0.00	0.05	0.00	29.20	2.00	0.00	0.00	0.05	0.00
29.36	2.00	0.00	0.00	0.05	0.00	29.53	2.00	0.00	0.00	0.05	0.00
29.69	2.00	0.00	0.00	0.05	0.00	29.86	2.00	0.00	0.00	0.05	0.00
30.02	2.00	0.00	0.00	0.05	0.00	30.18	2.00	0.00	0.00	0.05	0.00
30.35	2.00	0.00	0.00	0.05	0.00	30.51	2.00	0.00	0.00	0.05	0.00
30.68	2.00	0.00	0.00	0.05	0.00	30.84	2.00	0.00	0.00	0.05	0.00
31.00	2.00	0.00	0.00	0.05	0.00	31.17	2.00	0.00	0.00	0.05	0.00
31.33	2.00	0.00	0.00	0.05	0.00	31.50	0.28	0.00	0.00	0.05	0.19

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.05	0.00	31.82	2.00	0.00	0.00	0.05	0.00
31.99	0.34	0.00	0.00	0.05	0.18	32.15	0.40	0.00	0.00	0.05	0.15
32.32	0.48	0.00	0.00	0.05	0.14	32.48	0.51	0.00	0.00	0.05	0.12
32.64	2.00	0.00	0.00	0.05	0.00	32.81	2.00	0.00	0.00	0.05	0.00
32.97	2.00	0.00	0.00	0.05	0.00	33.14	2.00	0.00	0.00	0.05	0.00
33.30	2.00	0.00	0.00	0.05	0.00	33.46	2.00	0.00	0.00	0.05	0.00
33.63	2.00	0.00	0.00	0.05	0.00	33.79	2.00	0.00	0.00	0.05	0.00
33.96	2.00	0.00	0.00	0.05	0.00	34.12	2.00	0.00	0.00	0.05	0.00
34.28	2.00	0.00	0.00	0.05	0.00	34.45	2.00	0.00	0.00	0.05	0.00
34.61	2.00	0.00	0.00	0.05	0.00	34.78	2.00	0.00	0.00	0.05	0.00
34.94	2.00	0.00	0.00	0.05	0.00	35.10	2.00	0.00	0.00	0.05	0.00
35.27	2.00	0.00	0.00	0.05	0.00	35.43	2.00	0.00	0.00	0.05	0.00
35.60	2.00	0.00	0.00	0.05	0.00	35.76	2.00	0.00	0.00	0.05	0.00
35.93	2.00	0.00	0.00	0.05	0.00	36.09	2.00	0.00	0.00	0.05	0.00
36.25	2.00	0.00	0.00	0.05	0.00	36.42	2.00	0.00	0.00	0.05	0.00
36.58	2.00	0.00	0.00	0.05	0.00	36.75	2.00	0.00	0.00	0.05	0.00
36.91	2.00	0.00	0.00	0.05	0.00	37.07	2.00	0.00	0.00	0.05	0.00
37.24	2.00	0.00	0.00	0.05	0.00	37.40	2.00	0.00	0.00	0.05	0.00
37.57	2.00	0.00	0.00	0.05	0.00	37.73	2.00	0.00	0.00	0.05	0.00
37.89	2.00	0.00	0.00	0.05	0.00	38.06	2.00	0.00	0.00	0.05	0.00
38.22	2.00	0.00	0.00	0.05	0.00	38.39	0.35	0.00	0.00	0.05	0.14
38.55	0.32	0.00	0.00	0.05	0.14	38.71	0.29	0.00	0.00	0.05	0.14
38.88	0.29	0.00	0.00	0.05	0.15	39.04	0.31	0.00	0.00	0.05	0.14
39.21	0.31	0.00	0.00	0.05	0.14	39.37	2.00	0.00	0.00	0.05	0.00
39.53	2.00	0.00	0.00	0.05	0.00	39.70	2.00	0.00	0.00	0.05	0.00
39.86	2.00	0.00	0.00	0.05	0.00	40.03	2.00	0.00	0.00	0.05	0.00
40.19	2.00	0.00	0.00	0.05	0.00	40.35	1.53	0.00	0.00	0.05	0.00
40.52	1.59	0.00	0.00	0.05	0.00	40.68	1.58	0.00	0.00	0.05	0.00
40.85	1.85	0.00	0.00	0.05	0.00	41.01	1.60	0.00	0.00	0.05	0.00
41.17	1.26	0.00	0.00	0.05	0.00	41.34	1.12	0.00	0.00	0.05	0.00
41.50	1.33	0.00	0.00	0.05	0.00	41.67	1.76	0.00	0.00	0.05	0.00
41.83	2.00	0.00	0.00	0.05	0.00	41.99	2.00	0.00	0.00	0.05	0.00
42.16	2.00	0.00	0.00	0.05	0.00	42.32	2.00	0.00	0.00	0.05	0.00
42.49	2.00	0.00	0.00	0.05	0.00	42.65	1.88	0.00	0.00	0.05	0.00
42.81	1.21	0.00	0.00	0.05	0.00	42.98	0.82	0.00	0.00	0.05	0.03
43.14	0.69	0.00	0.00	0.05	0.05	43.31	0.67	0.00	0.00	0.05	0.06
43.47	0.62	0.00	0.00	0.05	0.06	43.64	2.00	0.00	0.00	0.05	0.00
43.80	2.00	0.00	0.00	0.05	0.00	43.96	2.00	0.00	0.00	0.05	0.00
44.13	2.00	0.00	0.00	0.05	0.00	44.29	2.00	0.00	0.00	0.05	0.00
44.46	2.00	0.00	0.00	0.05	0.00	44.62	2.00	0.00	0.00	0.05	0.00
44.78	2.00	0.00	0.00	0.05	0.00	44.95	2.00	0.00	0.00	0.05	0.00
45.11	2.00	0.00	0.00	0.05	0.00	45.28	2.00	0.00	0.00	0.05	0.00
45.44	2.00	0.00	0.00	0.05	0.00	45.60	2.00	0.00	0.00	0.05	0.00
45.77	2.00	0.00	0.00	0.05	0.00	45.93	2.00	0.00	0.00	0.05	0.00
46.10	2.00	0.00	0.00	0.05	0.00	46.26	2.00	0.00	0.00	0.05	0.00
46.42	2.00	0.00	0.00	0.05	0.00	46.59	2.00	0.00	0.00	0.05	0.00
46.75	2.00	0.00	0.00	0.05	0.00	46.92	0.29	0.00	0.00	0.05	0.10
47.08	0.31	0.00	0.00	0.05	0.10	47.24	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.05	0.00	47.57	2.00	0.00	0.00	0.05	0.00
47.74	2.00	0.00	0.00	0.05	0.00	47.90	0.32	0.00	0.00	0.05	0.09
48.06	0.33	0.00	0.00	0.05	0.09	48.23	0.37	0.00	0.00	0.05	0.09
48.39	0.42	0.00	0.00	0.05	0.07	48.56	0.43	0.00	0.00	0.05	0.08
48.72	0.41	0.00	0.00	0.05	0.07	48.88	0.37	0.00	0.00	0.05	0.08
49.05	0.33	0.00	0.00	0.05	0.09	49.21	0.31	0.00	0.00	0.05	0.08
49.38	0.30	0.00	0.00	0.05	0.09	49.54	2.00	0.00	0.00	0.05	0.00
49.70	2.00	0.00	0.00	0.05	0.00	49.87	2.00	0.00	0.00	0.05	0.00
50.03	2.00	0.00	0.00	0.05	0.00	50.20	2.00	0.00	0.00	0.05	0.00
50.36	0.30	0.00	0.00	0.05	0.08	50.52	0.30	0.00	0.00	0.05	0.08
50.69	2.00	0.00	0.00	0.05	0.00	50.85	2.00	0.00	0.00	0.05	0.00
51.02	2.00	0.00	0.00	0.05	0.00	51.18	2.00	0.00	0.00	0.05	0.00
51.35	2.00	0.00	0.00	0.05	0.00	51.51	0.39	0.00	0.00	0.05	0.06
51.67	0.38	0.00	0.00	0.05	0.06	51.84	0.36	0.00	0.00	0.05	0.07
52.00	0.33	0.00	0.00	0.05	0.07	52.17	0.31	0.00	0.00	0.05	0.07
52.33	0.30	0.00	0.00	0.05	0.07	52.49	0.30	0.00	0.00	0.05	0.07
52.66	0.30	0.00	0.00	0.05	0.07	52.82	0.31	0.00	0.00	0.05	0.07
52.99	0.31	0.00	0.00	0.05	0.07	53.15	0.31	0.00	0.00	0.05	0.06
53.31	0.31	0.00	0.00	0.05	0.06	53.48	0.31	0.00	0.00	0.05	0.07
53.64	0.31	0.00	0.00	0.05	0.06	53.81	0.31	0.00	0.00	0.05	0.06
53.97	0.31	0.00	0.00	0.05	0.06	54.13	0.31	0.00	0.00	0.05	0.06
54.30	0.32	0.00	0.00	0.05	0.06	54.46	0.33	0.00	0.00	0.05	0.06
54.63	0.34	0.00	0.00	0.05	0.06	54.79	0.34	0.00	0.00	0.05	0.05
54.95	0.33	0.00	0.00	0.05	0.05	55.12	0.34	0.00	0.00	0.05	0.06
55.28	0.34	0.00	0.00	0.05	0.05	55.45	0.34	0.00	0.00	0.05	0.05
55.61	0.33	0.00	0.00	0.05	0.05	55.77	0.33	0.00	0.00	0.05	0.05
55.94	0.33	0.00	0.00	0.05	0.05	56.10	0.33	0.00	0.00	0.05	0.05
56.27	0.34	0.00	0.00	0.05	0.05	56.43	0.34	0.00	0.00	0.05	0.05
56.59	0.34	0.00	0.00	0.05	0.04	56.76	0.34	0.00	0.00	0.05	0.05
56.92	0.34	0.00	0.00	0.05	0.04	57.09	0.34	0.00	0.00	0.05	0.04
57.25	0.35	0.00	0.00	0.05	0.04	57.41	0.36	0.00	0.00	0.05	0.04
57.58	0.36	0.00	0.00	0.05	0.04	57.74	0.37	0.00	0.00	0.05	0.04
57.91	0.37	0.00	0.00	0.05	0.04	58.07	0.37	0.00	0.00	0.05	0.04
58.23	0.38	0.00	0.00	0.05	0.03	58.40	0.38	0.00	0.00	0.05	0.04
58.56	0.38	0.00	0.00	0.05	0.03	58.73	0.38	0.00	0.00	0.05	0.03
58.89	0.38	0.00	0.00	0.05	0.03	59.06	0.38	0.00	0.00	0.05	0.03
59.22	0.39	0.00	0.00	0.05	0.03	59.38	0.39	0.00	0.00	0.05	0.03
59.55	0.39	0.00	0.00	0.05	0.03	59.71	0.38	0.00	0.00	0.05	0.03
59.88	0.38	0.00	0.00	0.05	0.03	60.04	0.37	0.00	0.00	0.05	0.03
60.20	2.00	0.00	0.00	0.05	0.00	60.37	2.00	0.00	0.00	0.05	0.00
60.53	2.00	0.00	0.00	0.05	0.00	60.70	2.00	0.00	0.00	0.05	0.00
60.86	2.00	0.00	0.00	0.05	0.00	61.02	2.00	0.00	0.00	0.05	0.00
61.19	2.00	0.00	0.00	0.05	0.00	61.35	2.00	0.00	0.00	0.05	0.00
61.52	0.37	0.00	0.00	0.05	0.02	61.68	0.36	0.00	0.00	0.05	0.02
61.84	0.35	0.00	0.00	0.05	0.02	62.01	0.36	0.00	0.00	0.05	0.02
62.17	0.36	0.00	0.00	0.05	0.02	62.34	0.36	0.00	0.00	0.05	0.02
62.50	2.00	0.00	0.00	0.05	0.00	62.66	2.00	0.00	0.00	0.05	0.00
62.83	2.00	0.00	0.00	0.05	0.00	62.99	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
63.16	2.00	0.00	0.00	0.05	0.00	63.32	2.00	0.00	0.00	0.05	0.00
63.48	2.00	0.00	0.00	0.05	0.00	63.65	2.00	0.00	0.00	0.05	0.00
63.81	2.00	0.00	0.00	0.05	0.00	63.98	2.00	0.00	0.00	0.05	0.00
64.14	2.00	0.00	0.00	0.05	0.00	64.30	2.00	0.00	0.00	0.05	0.00
64.47	2.00	0.00	0.00	0.05	0.00	64.63	2.00	0.00	0.00	0.05	0.00
64.80	2.00	0.00	0.00	0.05	0.00	64.96	2.00	0.00	0.00	0.05	0.00
65.12	2.00	0.00	0.00	0.05	0.00	65.29	2.00	0.00	0.00	0.05	0.00
65.45	2.00	0.00	0.00	0.05	0.00	65.62	2.00	0.00	0.00	0.05	0.00
65.78	2.00	0.00	0.00	0.05	0.00	65.94	2.00	0.00	0.00	0.05	0.00
66.11	2.00	0.00	0.00	0.05	0.00	66.27	2.00	0.00	0.00	0.05	0.00
66.44	2.00	0.00	0.00	0.05	0.00	66.60	2.00	0.00	0.00	0.05	0.00
66.77	2.00	0.00	0.00	0.05	0.00	66.93	2.00	0.00	0.00	0.05	0.00
67.09	2.00	0.00	0.00	0.05	0.00	67.26	2.00	0.00	0.00	0.05	0.00
67.42	2.00	0.00	0.00	0.05	0.00	67.59	1.47	0.00	0.00	0.05	0.00
67.75	0.67	0.00	0.00	0.05	0.00	67.91	0.47	0.00	0.00	0.05	0.00
68.08	0.43	0.00	0.00	0.05	0.00	68.24	0.42	0.00	0.00	0.05	0.00
68.41	0.42	0.00	0.00	0.05	0.00	68.57	0.52	0.00	0.00	0.05	0.00
68.73	0.74	0.00	0.00	0.05	0.00	68.90	1.35	0.00	0.00	0.05	0.00
69.06	1.16	0.00	0.00	0.05	0.00	69.23	0.75	0.00	0.00	0.05	0.00
69.39	0.53	0.00	0.00	0.05	0.00	69.55	0.47	0.00	0.00	0.05	0.00
69.72	0.46	0.00	0.00	0.05	0.00	69.88	0.46	0.00	0.00	0.05	0.00
70.05	0.48	0.00	0.00	0.05	0.00	70.21	0.49	0.00	0.00	0.05	0.00
70.37	0.49	0.00	0.00	0.05	0.00	70.54	0.48	0.00	0.00	0.05	0.00
70.70	0.47	0.00	0.00	0.05	0.00	70.87	0.46	0.00	0.00	0.05	0.00
71.03	0.46	0.00	0.00	0.05	0.00	71.19	0.47	0.00	0.00	0.05	0.00
71.36	0.48	0.00	0.00	0.05	0.00	71.52	0.48	0.00	0.00	0.05	0.00
71.69	0.48	0.00	0.00	0.05	0.00	71.85	0.47	0.00	0.00	0.05	0.00
72.01	0.47	0.00	0.00	0.05	0.00	72.18	0.47	0.00	0.00	0.05	0.00
72.34	0.47	0.00	0.00	0.05	0.00	72.51	0.46	0.00	0.00	0.05	0.00
72.67	0.43	0.00	0.00	0.05	0.00	72.83	0.51	0.00	0.00	0.05	0.00
73.00	0.51	0.00	0.00	0.05	0.00						

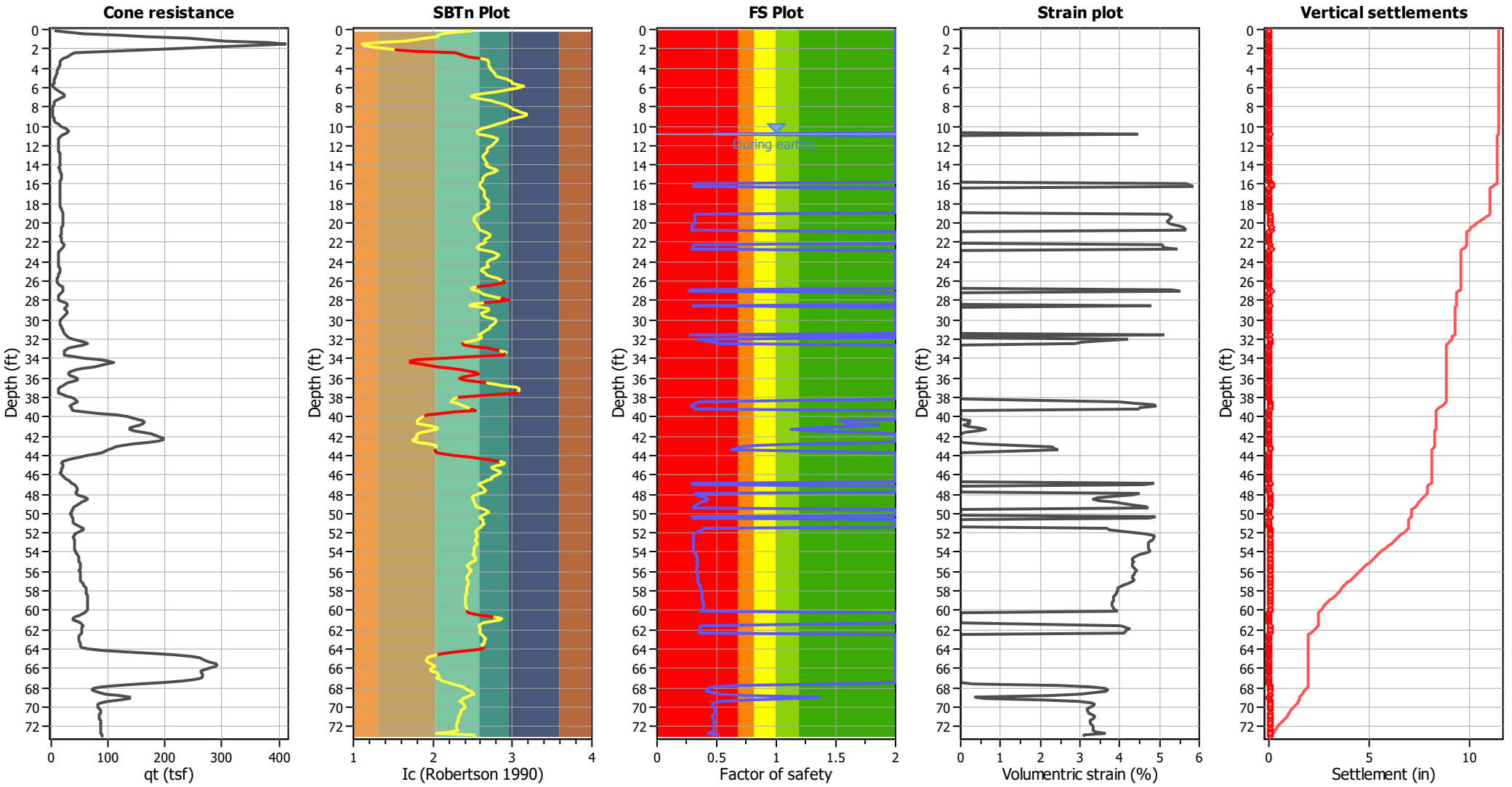
Overall liquefaction potential: 10.72

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
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)
10.83	71.37	0.47	4.47	1.00	0.09	10.99	25.54	2.00	0.00	1.00	0.00
11.15	20.17	2.00	0.00	1.00	0.00	11.32	17.04	2.00	0.00	1.00	0.00
11.48	15.98	2.00	0.00	1.00	0.00	11.65	16.93	2.00	0.00	1.00	0.00
11.81	17.92	2.00	0.00	1.00	0.00	11.98	18.43	2.00	0.00	1.00	0.00
12.14	18.28	2.00	0.00	1.00	0.00	12.30	17.89	2.00	0.00	1.00	0.00
12.47	17.53	2.00	0.00	1.00	0.00	12.63	17.68	2.00	0.00	1.00	0.00
12.80	18.38	2.00	0.00	1.00	0.00	12.96	19.43	2.00	0.00	1.00	0.00
13.12	20.10	2.00	0.00	1.00	0.00	13.29	20.23	2.00	0.00	1.00	0.00
13.45	19.85	2.00	0.00	1.00	0.00	13.62	19.26	2.00	0.00	1.00	0.00
13.78	18.59	2.00	0.00	1.00	0.00	13.94	18.00	2.00	0.00	1.00	0.00
14.11	17.58	2.00	0.00	1.00	0.00	14.27	17.10	2.00	0.00	1.00	0.00
14.44	17.13	2.00	0.00	1.00	0.00	14.60	17.80	2.00	0.00	1.00	0.00
14.76	20.00	2.00	0.00	1.00	0.00	14.93	22.09	2.00	0.00	1.00	0.00
15.09	23.29	2.00	0.00	1.00	0.00	15.26	22.23	2.00	0.00	1.00	0.00
15.42	20.41	2.00	0.00	1.00	0.00	15.58	19.04	2.00	0.00	1.00	0.00
15.75	18.70	2.00	0.00	1.00	0.00	15.91	54.58	0.32	5.69	1.00	0.11
16.08	53.90	0.31	5.75	1.00	0.12	16.24	52.90	0.31	5.85	1.00	0.11
16.40	16.55	2.00	0.00	1.00	0.00	16.57	16.07	2.00	0.00	1.00	0.00
16.73	16.11	2.00	0.00	1.00	0.00	16.90	16.59	2.00	0.00	1.00	0.00
17.06	17.12	2.00	0.00	1.00	0.00	17.22	17.36	2.00	0.00	1.00	0.00
17.39	17.31	2.00	0.00	1.00	0.00	17.55	17.02	2.00	0.00	1.00	0.00
17.72	16.77	2.00	0.00	1.00	0.00	17.88	16.68	2.00	0.00	1.00	0.00
18.04	16.66	2.00	0.00	1.00	0.00	18.21	16.57	2.00	0.00	1.00	0.00
18.37	16.96	2.00	0.00	1.00	0.00	18.54	18.45	2.00	0.00	1.00	0.00
18.70	20.61	2.00	0.00	1.00	0.00	18.86	22.29	2.00	0.00	1.00	0.00
19.03	59.86	0.32	5.25	1.00	0.11	19.19	59.39	0.31	5.28	1.00	0.10
19.36	59.20	0.31	5.30	1.00	0.11	19.52	59.61	0.31	5.26	1.00	0.10
19.69	59.90	0.31	5.24	1.00	0.11	19.85	60.32	0.31	5.21	1.00	0.10
20.01	59.90	0.31	5.24	1.00	0.10	20.18	59.09	0.31	5.31	1.00	0.11
20.34	57.00	0.30	5.48	1.00	0.11	20.51	55.55	0.29	5.60	1.00	0.11
20.67	54.95	0.29	5.66	1.00	0.11	20.83	18.84	2.00	0.00	1.00	0.00
21.00	18.35	2.00	0.00	1.00	0.00	21.16	17.80	2.00	0.00	1.00	0.00
21.33	17.60	2.00	0.00	1.00	0.00	21.49	18.03	2.00	0.00	1.00	0.00
21.65	18.20	2.00	0.00	1.00	0.00	21.82	18.58	2.00	0.00	1.00	0.00
21.98	19.50	2.00	0.00	1.00	0.00	22.15	21.97	2.00	0.00	1.00	0.00
22.31	62.00	0.31	5.08	1.00	0.10	22.47	61.85	0.31	5.09	1.00	0.10
22.64	57.30	0.29	5.45	1.00	0.11	22.80	16.21	2.00	0.00	1.00	0.00
22.97	12.83	2.00	0.00	1.00	0.00	23.13	11.81	2.00	0.00	1.00	0.00
23.29	12.07	2.00	0.00	1.00	0.00	23.46	12.87	2.00	0.00	1.00	0.00
23.62	13.98	2.00	0.00	1.00	0.00	23.79	14.96	2.00	0.00	1.00	0.00
23.95	15.04	2.00	0.00	1.00	0.00	24.11	14.38	2.00	0.00	1.00	0.00
24.28	13.55	2.00	0.00	1.00	0.00	24.44	13.97	2.00	0.00	1.00	0.00
24.61	15.43	2.00	0.00	1.00	0.00	24.77	16.62	2.00	0.00	1.00	0.00
24.93	16.22	2.00	0.00	1.00	0.00	25.10	15.14	2.00	0.00	1.00	0.00
25.26	14.57	2.00	0.00	1.00	0.00	25.43	14.31	2.00	0.00	1.00	0.00
25.59	12.91	2.00	0.00	1.00	0.00	25.75	10.89	2.00	0.00	1.00	0.00
25.92	9.47	2.00	0.00	1.00	0.00	26.08	9.60	2.00	0.00	1.00	0.00
26.25	11.60	2.00	0.00	1.00	0.00	26.41	15.85	2.00	0.00	1.00	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)
26.57	56.75	2.00	0.00	1.00	0.00	26.74	59.82	2.00	0.00	1.00	0.00
26.90	58.92	0.28	5.32	1.00	0.10	27.07	56.59	0.27	5.51	1.00	0.11
27.23	18.59	2.00	0.00	1.00	0.00	27.40	17.15	2.00	0.00	1.00	0.00
27.56	14.81	2.00	0.00	1.00	0.00	27.72	12.03	2.00	0.00	1.00	0.00
27.89	12.43	2.00	0.00	1.00	0.00	28.05	17.71	2.00	0.00	1.00	0.00
28.22	25.83	2.00	0.00	1.00	0.00	28.38	68.98	2.00	0.00	1.00	0.00
28.54	66.41	0.31	4.78	1.00	0.09	28.71	23.51	2.00	0.00	1.00	0.00
28.87	22.41	2.00	0.00	1.00	0.00	29.04	25.85	2.00	0.00	1.00	0.00
29.20	29.19	2.00	0.00	1.00	0.00	29.36	28.06	2.00	0.00	1.00	0.00
29.53	23.31	2.00	0.00	1.00	0.00	29.69	18.78	2.00	0.00	1.00	0.00
29.86	16.43	2.00	0.00	1.00	0.00	30.02	14.92	2.00	0.00	1.00	0.00
30.18	13.75	2.00	0.00	1.00	0.00	30.35	13.27	2.00	0.00	1.00	0.00
30.51	14.40	2.00	0.00	1.00	0.00	30.68	16.02	2.00	0.00	1.00	0.00
30.84	17.36	2.00	0.00	1.00	0.00	31.00	18.24	2.00	0.00	1.00	0.00
31.17	19.27	2.00	0.00	1.00	0.00	31.33	21.24	2.00	0.00	1.00	0.00
31.50	61.37	0.28	5.13	1.00	0.10	31.66	26.14	2.00	0.00	1.00	0.00
31.82	28.85	2.00	0.00	1.00	0.00	31.99	76.36	0.34	4.19	1.00	0.09
32.15	90.12	0.40	3.57	1.00	0.07	32.32	105.27	0.48	3.05	1.00	0.06
32.48	111.19	0.51	2.88	1.00	0.06	32.64	103.21	2.00	0.00	1.00	0.00
32.81	84.33	2.00	0.00	1.00	0.00	32.97	27.05	2.00	0.00	1.00	0.00
33.14	19.74	2.00	0.00	1.00	0.00	33.30	20.11	2.00	0.00	1.00	0.00
33.46	21.97	2.00	0.00	1.00	0.00	33.63	22.80	2.00	0.00	1.00	0.00
33.79	59.12	2.00	0.00	1.00	0.00	33.96	111.33	2.00	0.00	1.00	0.00
34.12	90.25	2.00	0.00	1.00	0.00	34.28	117.39	2.00	0.00	1.00	0.00
34.45	127.80	2.00	0.00	1.00	0.00	34.61	124.40	2.00	0.00	1.00	0.00
34.78	106.57	2.00	0.00	1.00	0.00	34.94	88.04	2.00	0.00	1.00	0.00
35.10	77.44	2.00	0.00	1.00	0.00	35.27	71.05	2.00	0.00	1.00	0.00
35.43	64.90	2.00	0.00	1.00	0.00	35.60	62.09	2.00	0.00	1.00	0.00
35.76	66.50	2.00	0.00	1.00	0.00	35.93	77.01	2.00	0.00	1.00	0.00
36.09	84.61	2.00	0.00	1.00	0.00	36.25	84.84	2.00	0.00	1.00	0.00
36.42	75.84	2.00	0.00	1.00	0.00	36.58	24.49	2.00	0.00	1.00	0.00
36.75	16.02	2.00	0.00	1.00	0.00	36.91	11.66	2.00	0.00	1.00	0.00
37.07	10.77	2.00	0.00	1.00	0.00	37.24	11.20	2.00	0.00	1.00	0.00
37.40	11.19	2.00	0.00	1.00	0.00	37.57	11.18	2.00	0.00	1.00	0.00
37.73	11.15	2.00	0.00	1.00	0.00	37.89	67.08	2.00	0.00	1.00	0.00
38.06	64.19	2.00	0.00	1.00	0.00	38.22	77.77	2.00	0.00	1.00	0.00
38.39	80.61	0.35	3.98	1.00	0.08	38.55	73.39	0.32	4.35	1.00	0.08
38.71	65.00	0.29	4.87	1.00	0.09	38.88	64.60	0.29	4.90	1.00	0.10
39.04	70.61	0.31	4.51	1.00	0.09	39.21	71.04	0.31	4.49	1.00	0.09
39.37	71.82	2.00	0.00	1.00	0.00	39.53	68.09	2.00	0.00	1.00	0.00
39.70	137.64	2.00	0.00	1.00	0.00	39.86	126.92	2.00	0.00	1.00	0.00
40.03	158.78	2.00	0.00	1.00	0.00	40.19	173.91	2.00	0.00	1.00	0.00
40.35	177.66	1.53	0.24	1.00	0.00	40.52	179.16	1.59	0.20	1.00	0.00
40.68	178.89	1.58	0.20	1.00	0.00	40.85	183.84	1.85	0.06	1.00	0.00
41.01	179.20	1.60	0.19	1.00	0.00	41.17	170.38	1.26	0.46	1.00	0.01
41.34	165.32	1.12	0.63	1.00	0.01	41.50	172.49	1.33	0.39	1.00	0.01
41.67	182.28	1.76	0.11	1.00	0.00	41.83	191.23	2.00	0.00	1.00	0.00
41.99	201.39	2.00	0.00	1.00	0.00	42.16	212.57	2.00	0.00	1.00	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)
42.32	209.52	2.00	0.00	1.00	0.00	42.49	199.70	2.00	0.00	1.00	0.00
42.65	184.40	1.88	0.05	1.00	0.00	42.81	168.53	1.21	0.52	1.00	0.01
42.98	148.62	0.82	1.44	1.00	0.03	43.14	137.37	0.69	2.29	1.00	0.04
43.31	134.29	0.67	2.35	1.00	0.05	43.47	128.51	0.62	2.47	1.00	0.05
43.64	115.81	2.00	0.00	1.00	0.00	43.80	103.02	2.00	0.00	1.00	0.00
43.96	93.21	2.00	0.00	1.00	0.00	44.13	83.11	2.00	0.00	1.00	0.00
44.29	70.03	2.00	0.00	1.00	0.00	44.46	20.51	2.00	0.00	1.00	0.00
44.62	14.32	2.00	0.00	1.00	0.00	44.78	13.12	2.00	0.00	1.00	0.00
44.95	14.86	2.00	0.00	1.00	0.00	45.11	17.04	2.00	0.00	1.00	0.00
45.28	16.74	2.00	0.00	1.00	0.00	45.44	14.33	2.00	0.00	1.00	0.00
45.60	11.98	2.00	0.00	1.00	0.00	45.77	11.76	2.00	0.00	1.00	0.00
45.93	13.22	2.00	0.00	1.00	0.00	46.10	15.55	2.00	0.00	1.00	0.00
46.26	17.63	2.00	0.00	1.00	0.00	46.42	20.38	2.00	0.00	1.00	0.00
46.59	22.71	2.00	0.00	1.00	0.00	46.75	24.42	2.00	0.00	1.00	0.00
46.92	65.00	0.29	4.87	1.00	0.10	47.08	69.17	0.31	4.60	1.00	0.09
47.24	34.48	2.00	0.00	1.00	0.00	47.41	37.23	2.00	0.00	1.00	0.00
47.57	36.64	2.00	0.00	1.00	0.00	47.74	32.88	2.00	0.00	1.00	0.00
47.90	70.99	0.32	4.49	1.00	0.09	48.06	74.01	0.33	4.32	1.00	0.08
48.23	83.73	0.37	3.84	1.00	0.08	48.39	93.73	0.42	3.43	1.00	0.07
48.56	96.92	0.43	3.32	1.00	0.07	48.72	92.62	0.41	3.47	1.00	0.07
48.88	82.73	0.37	3.88	1.00	0.07	49.05	74.10	0.33	4.31	1.00	0.09
49.21	68.34	0.31	4.65	1.00	0.09	49.38	67.12	0.30	4.73	1.00	0.10
49.54	27.79	2.00	0.00	1.00	0.00	49.70	26.49	2.00	0.00	1.00	0.00
49.87	24.83	2.00	0.00	1.00	0.00	50.03	23.48	2.00	0.00	1.00	0.00
50.20	24.42	2.00	0.00	1.00	0.00	50.36	64.45	0.30	4.91	1.00	0.09
50.52	66.68	0.30	4.76	1.00	0.09	50.69	27.38	2.00	0.00	1.00	0.00
50.85	26.29	2.00	0.00	1.00	0.00	51.02	27.56	2.00	0.00	1.00	0.00
51.18	32.44	2.00	0.00	1.00	0.00	51.35	39.37	2.00	0.00	1.00	0.00
51.51	87.19	0.39	3.69	1.00	0.07	51.67	85.74	0.38	3.75	1.00	0.07
51.84	79.61	0.36	4.03	1.00	0.08	52.00	72.60	0.33	4.40	1.00	0.08
52.17	67.75	0.31	4.69	1.00	0.10	52.33	65.17	0.30	4.86	1.00	0.09
52.49	64.99	0.30	4.87	1.00	0.09	52.66	65.79	0.30	4.82	1.00	0.10
52.82	66.57	0.31	4.76	1.00	0.09	52.99	67.32	0.31	4.72	1.00	0.10
53.15	67.27	0.31	4.72	1.00	0.09	53.31	67.28	0.31	4.72	1.00	0.09
53.48	67.12	0.31	4.73	1.00	0.10	53.64	67.09	0.31	4.73	1.00	0.09
53.81	66.78	0.31	4.75	1.00	0.10	53.97	66.83	0.31	4.75	1.00	0.09
54.13	68.37	0.31	4.65	1.00	0.09	54.30	70.88	0.32	4.50	1.00	0.09
54.46	73.51	0.33	4.35	1.00	0.08	54.63	74.11	0.34	4.31	1.00	0.09
54.79	73.88	0.34	4.33	1.00	0.08	54.95	73.39	0.33	4.35	1.00	0.08
55.12	73.87	0.34	4.33	1.00	0.09	55.28	74.10	0.34	4.31	1.00	0.08
55.45	73.93	0.34	4.32	1.00	0.09	55.61	73.19	0.33	4.36	1.00	0.08
55.77	72.50	0.33	4.40	1.00	0.08	55.94	72.15	0.33	4.42	1.00	0.09
56.10	72.68	0.33	4.39	1.00	0.08	56.27	73.54	0.34	4.34	1.00	0.09
56.43	74.03	0.34	4.32	1.00	0.08	56.59	73.71	0.34	4.33	1.00	0.08
56.76	73.34	0.34	4.35	1.00	0.09	56.92	73.51	0.34	4.35	1.00	0.08
57.09	74.69	0.34	4.28	1.00	0.09	57.25	76.37	0.35	4.19	1.00	0.08
57.41	78.26	0.36	4.09	1.00	0.08	57.58	79.90	0.36	4.01	1.00	0.08
57.74	81.01	0.37	3.96	1.00	0.08	57.91	81.48	0.37	3.94	1.00	0.08

:: 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)
58.07	81.77	0.37	3.93	1.00	0.08	58.23	82.25	0.38	3.90	1.00	0.07
58.40	82.89	0.38	3.87	1.00	0.08	58.56	83.29	0.38	3.86	1.00	0.07
58.73	83.50	0.38	3.85	1.00	0.08	58.89	83.67	0.38	3.84	1.00	0.07
59.06	83.87	0.38	3.83	1.00	0.08	59.22	84.12	0.39	3.82	1.00	0.07
59.38	84.23	0.39	3.81	1.00	0.07	59.55	84.40	0.39	3.81	1.00	0.08
59.71	83.91	0.38	3.83	1.00	0.07	59.88	82.73	0.38	3.88	1.00	0.08
60.04	80.84	0.37	3.97	1.00	0.08	60.20	78.77	2.00	0.00	1.00	0.00
60.37	76.01	2.00	0.00	1.00	0.00	60.53	31.33	2.00	0.00	1.00	0.00
60.70	26.39	2.00	0.00	1.00	0.00	60.86	23.00	2.00	0.00	1.00	0.00
61.02	24.33	2.00	0.00	1.00	0.00	61.19	29.95	2.00	0.00	1.00	0.00
61.35	36.01	2.00	0.00	1.00	0.00	61.52	79.62	0.37	4.03	1.00	0.08
61.68	77.76	0.36	4.12	1.00	0.08	61.84	75.65	0.35	4.23	1.00	0.08
62.01	76.45	0.36	4.19	1.00	0.09	62.17	77.51	0.36	4.13	1.00	0.08
62.34	77.24	0.36	4.15	1.00	0.08	62.50	33.62	2.00	0.00	1.00	0.00
62.66	31.51	2.00	0.00	1.00	0.00	62.83	30.11	2.00	0.00	1.00	0.00
62.99	30.21	2.00	0.00	1.00	0.00	63.16	31.11	2.00	0.00	1.00	0.00
63.32	31.97	2.00	0.00	1.00	0.00	63.48	32.14	2.00	0.00	1.00	0.00
63.65	31.87	2.00	0.00	1.00	0.00	63.81	32.81	2.00	0.00	1.00	0.00
63.98	39.27	2.00	0.00	1.00	0.00	64.14	107.89	2.00	0.00	1.00	0.00
64.30	150.58	2.00	0.00	1.00	0.00	64.47	203.08	2.00	0.00	1.00	0.00
64.63	242.81	2.00	0.00	1.00	0.00	64.80	264.34	2.00	0.00	1.00	0.00
64.96	272.09	2.00	0.00	1.00	0.00	65.12	276.71	2.00	0.00	1.00	0.00
65.29	287.29	2.00	0.00	1.00	0.00	65.45	301.86	2.00	0.00	1.00	0.00
65.62	311.45	2.00	0.00	1.00	0.00	65.78	308.05	2.00	0.00	1.00	0.00
65.94	293.25	2.00	0.00	1.00	0.00	66.11	278.34	2.00	0.00	1.00	0.00
66.27	274.48	2.00	0.00	1.00	0.00	66.44	281.39	2.00	0.00	1.00	0.00
66.60	285.38	2.00	0.00	1.00	0.00	66.77	289.65	2.00	0.00	1.00	0.00
66.93	281.25	2.00	0.00	1.00	0.00	67.09	277.58	2.00	0.00	1.00	0.00
67.26	255.95	2.00	0.00	1.00	0.00	67.42	226.71	2.00	0.00	1.00	0.00
67.59	174.14	1.47	0.28	1.00	0.01	67.75	129.89	0.67	2.44	1.00	0.05
67.91	99.06	0.47	3.24	1.00	0.06	68.08	89.16	0.43	3.61	1.00	0.07
68.24	87.24	0.42	3.68	1.00	0.07	68.41	87.93	0.42	3.66	1.00	0.07
68.57	106.74	0.52	3.00	1.00	0.06	68.73	137.09	0.74	2.23	1.00	0.04
68.90	170.32	1.35	0.38	1.00	0.01	69.06	163.64	1.16	0.59	1.00	0.01
69.23	138.07	0.75	2.09	1.00	0.04	69.39	108.79	0.53	2.95	1.00	0.06
69.55	97.97	0.47	3.28	1.00	0.06	69.72	95.35	0.46	3.37	1.00	0.07
69.88	96.28	0.46	3.34	1.00	0.06	70.05	98.73	0.48	3.26	1.00	0.07
70.21	100.79	0.49	3.19	1.00	0.06	70.37	100.87	0.49	3.18	1.00	0.06
70.54	99.37	0.48	3.23	1.00	0.07	70.70	97.27	0.47	3.30	1.00	0.06
70.87	95.64	0.46	3.36	1.00	0.07	71.03	95.67	0.46	3.36	1.00	0.06
71.19	97.09	0.47	3.31	1.00	0.06	71.36	98.76	0.48	3.25	1.00	0.07
71.52	99.12	0.48	3.24	1.00	0.06	71.69	98.40	0.48	3.27	1.00	0.07
71.85	97.19	0.47	3.31	1.00	0.06	72.01	96.57	0.47	3.33	1.00	0.06
72.18	96.42	0.47	3.33	1.00	0.07	72.34	96.99	0.47	3.31	1.00	0.06
72.51	94.49	0.46	3.40	1.00	0.07	72.67	88.48	0.43	3.63	1.00	0.07
72.83	103.26	0.51	3.11	1.00	0.06	73.00	104.04	0.51	3.09	1.00	0.06

:: 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: 11.44

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	9.41	15.10	2.71	40.99	2.49	N/A	N/A
0.33	33.60	53.96	1.81	97.67	2.25	N/A	N/A
0.49	57.80	92.82	1.47	136.49	2.11	N/A	N/A
0.66	123.36	198.14	1.39	276.23	2.06	N/A	N/A
0.82	167.21	268.58	1.38	369.74	2.05	N/A	N/A
0.98	243.18	390.61	1.18	462.63	1.90	N/A	N/A
1.15	304.40	488.95	1.00	490.80	1.65	N/A	N/A
1.31	379.87	610.18	1.00	610.18	1.32	N/A	N/A
1.48	410.74	659.76	1.00	659.76	1.12	N/A	N/A
1.64	355.52	571.02	1.00	571.02	1.12	N/A	N/A
1.80	286.04	459.38	1.00	459.38	1.25	N/A	N/A
1.97	229.05	367.79	1.00	367.79	1.38	N/A	N/A
2.13	166.77	267.72	1.00	267.72	1.53	N/A	N/A
2.30	104.49	167.65	1.09	182.60	1.78	N/A	N/A
2.46	42.22	67.58	1.89	127.51	2.28	N/A	N/A
2.62	36.96	59.11	2.08	123.24	2.34	N/A	N/A
2.79	29.47	47.07	2.53	119.18	2.45	N/A	N/A
2.95	21.41	34.10	3.38	115.34	2.61	N/A	N/A
3.12	18.40	29.26	3.89	113.86	2.69	N/A	N/A
3.28	17.46	27.73	4.03	111.86	2.71	N/A	N/A
3.44	16.93	26.86	4.04	108.61	2.71	N/A	N/A
3.61	16.33	25.89	4.04	104.72	2.71	N/A	N/A
3.77	15.42	24.40	4.01	97.75	2.70	N/A	N/A
3.94	14.18	22.39	4.11	92.03	2.72	N/A	N/A
4.10	12.93	20.37	4.15	84.64	2.72	N/A	N/A
4.27	12.04	18.93	4.34	82.20	2.75	N/A	N/A
4.43	11.48	18.01	4.40	79.25	2.75	N/A	N/A
4.59	10.71	16.77	4.54	76.19	2.77	N/A	N/A
4.76	9.61	14.98	4.73	70.92	2.79	N/A	N/A
4.92	8.32	12.90	5.20	67.09	2.85	N/A	N/A
5.09	7.24	11.15	5.87	65.41	2.92	N/A	N/A
5.25	6.39	9.77	6.35	62.08	2.96	N/A	N/A
5.41	5.74	8.71	6.60	57.52	2.99	N/A	N/A
5.58	5.26	7.92	6.65	52.67	2.99	N/A	N/A
5.74	4.68	6.98	7.46	52.11	3.06	N/A	N/A
5.91	4.26	6.30	8.40	52.94	3.14	N/A	N/A
6.07	6.73	10.25	7.77	79.58	3.09	N/A	N/A
6.23	9.52	14.72	6.64	97.72	2.99	N/A	N/A
6.40	15.33	24.05	4.77	114.68	2.80	N/A	N/A
6.56	20.22	31.88	3.62	115.47	2.65	N/A	N/A
6.73	24.53	38.79	2.86	111.00	2.52	N/A	N/A
6.89	23.72	37.47	2.70	101.18	2.49	N/A	N/A
7.05	18.96	29.81	2.92	87.13	2.53	N/A	N/A
7.22	13.56	21.13	3.52	74.30	2.63	N/A	N/A
7.38	9.60	14.75	4.22	62.29	2.73	N/A	N/A
7.55	7.28	11.01	4.77	52.50	2.80	N/A	N/A
7.71	5.86	8.71	5.29	46.07	2.86	N/A	N/A
7.87	4.86	7.09	5.87	41.64	2.92	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	4.17	5.98	6.36	38.01	2.96	N/A	N/A
8.20	3.73	5.25	6.91	36.29	3.02	N/A	N/A
8.37	3.50	4.87	7.42	36.10	3.06	N/A	N/A
8.53	3.47	4.81	8.08	38.89	3.11	N/A	N/A
8.69	3.68	5.14	8.92	45.85	3.18	N/A	N/A
8.86	4.11	5.82	8.86	51.50	3.17	N/A	N/A
9.02	4.68	6.72	8.20	55.14	3.12	N/A	N/A
9.19	5.26	7.65	7.13	54.53	3.03	N/A	N/A
9.35	5.91	8.67	6.36	55.10	2.96	N/A	N/A
9.51	6.96	10.34	6.16	63.71	2.95	N/A	N/A
9.68	9.31	14.11	5.62	79.30	2.89	N/A	N/A
9.84	13.65	21.07	4.82	101.54	2.80	N/A	N/A
10.01	19.86	31.03	3.99	123.72	2.70	N/A	N/A
10.17	26.05	40.96	3.48	142.50	2.62	N/A	N/A
10.33	30.06	47.38	3.26	154.32	2.59	N/A	N/A
10.50	30.47	47.14	3.05	143.64	2.55	N/A	N/A
10.66	27.93	42.59	3.08	130.98	2.56	N/A	N/A
10.83	23.82	35.91	3.22	115.51	2.58	0.07	0.69
10.99	19.44	29.59	3.88	114.71	2.68	0.07	2.23
11.15	15.77	24.08	4.49	108.15	2.76	0.06	1.79
11.32	13.35	20.28	4.84	98.15	2.81	0.06	1.49
11.48	12.60	18.95	4.82	91.35	2.80	0.06	1.39
11.65	12.95	19.28	4.63	89.33	2.78	0.06	1.42
11.81	13.71	20.25	4.45	90.03	2.76	0.06	1.50
11.98	14.19	20.76	4.26	88.47	2.74	0.06	1.54
12.14	14.28	20.66	4.07	84.06	2.71	0.06	1.54
12.30	14.16	20.28	3.93	79.62	2.69	0.06	1.52
12.47	14.15	20.12	3.89	78.32	2.69	0.06	1.51
12.63	14.49	20.49	3.86	79.12	2.68	0.06	1.54
12.80	15.24	21.42	3.76	80.50	2.67	0.06	1.61
12.96	16.11	22.49	3.62	81.41	2.65	0.06	1.70
13.12	16.77	23.27	3.54	82.41	2.63	0.06	1.76
13.29	16.98	23.42	3.53	82.70	2.63	0.06	1.77
13.45	16.79	23.08	3.62	83.49	2.65	0.06	1.74
13.62	16.39	22.43	3.74	83.79	2.66	0.06	1.68
13.78	15.90	21.71	3.91	84.88	2.69	0.06	1.62
13.94	15.48	20.93	3.80	79.51	2.67	0.06	1.56
14.11	15.10	20.31	3.86	78.44	2.68	0.06	1.51
14.27	14.91	20.03	4.09	82.01	2.71	0.06	1.48
14.44	14.94	20.16	4.61	92.91	2.78	0.06	1.48
14.60	15.75	21.27	4.82	102.57	2.80	0.06	1.55
14.76	17.11	23.00	4.64	106.61	2.78	0.06	1.68
14.93	18.52	24.61	4.20	103.28	2.73	0.06	1.82
15.09	19.13	25.05	3.73	93.39	2.66	0.06	1.87
15.26	18.71	24.19	3.48	84.09	2.62	0.06	1.81
15.42	17.84	22.89	3.47	79.49	2.62	0.06	1.71
15.58	17.05	21.72	3.49	75.88	2.63	0.06	1.62
15.75	16.70	21.10	3.41	72.03	2.61	0.06	1.58

:: 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	16.55	20.73	3.25	67.45	2.59	0.06	0.63
16.08	16.27	20.25	3.24	65.66	2.59	0.05	0.62
16.24	15.75	19.49	3.27	63.76	2.59	0.05	0.62
16.40	15.22	18.75	3.39	63.63	2.61	0.05	1.40
16.57	14.94	18.36	3.56	65.39	2.64	0.05	1.37
16.73	15.08	18.49	3.66	67.59	2.65	0.05	1.37
16.90	15.43	18.85	3.66	69.08	2.65	0.05	1.40
17.06	15.80	19.24	3.67	70.52	2.65	0.06	1.43
17.22	16.04	19.43	3.62	70.34	2.65	0.06	1.44
17.39	16.00	19.33	3.73	72.02	2.66	0.06	1.43
17.55	15.75	18.94	3.85	72.85	2.68	0.06	1.40
17.72	15.57	18.68	4.02	75.19	2.70	0.06	1.37
17.88	15.47	18.46	4.04	74.60	2.71	0.06	1.35
18.04	15.55	18.43	3.91	72.12	2.69	0.06	1.35
18.21	15.65	18.44	3.83	70.61	2.68	0.06	1.36
18.37	16.33	19.24	3.96	76.21	2.70	0.06	1.41
18.54	17.61	20.74	3.97	82.33	2.70	0.06	1.52
18.70	19.23	22.58	3.78	85.32	2.67	0.06	1.66
18.86	20.53	23.93	3.43	82.00	2.62	0.06	1.77
19.03	21.24	24.55	3.15	77.35	2.57	0.06	0.65
19.19	21.48	24.64	2.96	72.94	2.54	0.06	0.65
19.36	21.68	24.73	2.88	71.31	2.52	0.06	0.65
19.52	21.96	24.93	2.83	70.44	2.51	0.06	0.65
19.69	22.26	25.18	2.85	71.84	2.52	0.06	0.65
19.85	22.31	25.15	2.90	72.82	2.52	0.06	0.65
20.01	21.98	24.69	2.98	73.70	2.54	0.06	0.65
20.18	21.13	23.59	3.04	71.61	2.55	0.06	0.64
20.34	20.05	22.25	3.11	69.12	2.56	0.06	0.64
20.51	19.16	21.13	3.15	66.51	2.57	0.06	0.63
20.67	18.61	20.44	3.29	67.18	2.59	0.06	0.63
20.83	18.25	20.01	3.56	71.30	2.64	0.06	1.47
21.00	17.80	19.48	3.94	76.70	2.69	0.06	1.42
21.16	17.50	19.10	4.17	79.72	2.72	0.06	1.39
21.33	17.39	18.87	4.18	78.97	2.73	0.06	1.37
21.49	17.60	18.98	3.95	75.00	2.69	0.06	1.38
21.65	17.93	19.23	3.77	72.55	2.67	0.06	1.40
21.82	18.49	19.74	3.62	71.45	2.65	0.06	1.44
21.98	19.72	21.09	3.77	79.59	2.67	0.06	1.54
22.15	21.56	23.03	3.58	82.51	2.64	0.06	1.68
22.31	22.93	24.38	3.30	80.44	2.60	0.06	0.65
22.47	22.33	23.53	3.03	71.20	2.55	0.06	0.64
22.64	19.66	20.49	3.15	64.47	2.57	0.06	0.63
22.80	16.17	16.64	3.70	61.60	2.66	0.05	1.21
22.97	13.56	13.75	4.36	60.01	2.75	0.05	0.99
23.13	12.46	12.50	4.68	58.58	2.79	0.05	0.90
23.29	12.59	12.62	5.00	63.13	2.83	0.06	0.91
23.46	13.29	13.33	4.85	64.63	2.81	0.06	0.96
23.62	13.94	13.98	4.75	66.46	2.80	0.06	1.01

:: 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	14.52	14.49	4.25	61.52	2.73	0.06	1.05
23.95	14.58	14.47	3.97	57.39	2.70	0.05	1.05
24.11	14.27	14.07	3.91	55.06	2.69	0.05	1.02
24.28	14.11	13.83	3.88	53.68	2.68	0.05	1.00
24.44	14.54	14.25	3.94	56.20	2.69	0.05	1.03
24.61	15.62	15.30	3.60	55.02	2.64	0.05	1.11
24.77	16.07	15.70	3.41	53.48	2.61	0.05	1.14
24.93	15.94	15.50	3.39	52.51	2.61	0.05	1.12
25.10	15.31	14.81	3.64	53.96	2.65	0.05	1.07
25.26	14.75	14.18	3.78	53.65	2.67	0.05	1.02
25.43	13.91	13.24	3.89	51.47	2.69	0.05	0.96
25.59	12.54	11.77	4.25	49.99	2.73	0.05	0.85
25.75	11.09	10.24	4.92	50.39	2.82	0.05	0.73
25.92	10.15	9.23	5.59	51.57	2.89	0.05	0.66
26.08	10.51	9.58	5.74	54.93	2.90	0.05	0.68
26.25	12.73	11.82	4.95	58.54	2.82	0.05	0.85
26.41	16.33	15.44	3.94	60.92	2.69	0.06	1.11
26.57	20.16	19.23	2.98	57.28	2.54	0.06	0.62
26.74	22.18	21.19	2.67	56.62	2.48	0.06	0.63
26.90	22.14	21.08	2.76	58.20	2.50	0.06	0.63
27.07	20.62	19.50	3.14	61.17	2.57	0.06	0.62
27.23	18.92	17.72	3.35	59.42	2.60	0.06	1.28
27.40	17.05	15.77	3.50	55.26	2.63	0.05	1.14
27.56	14.83	13.50	4.03	54.46	2.71	0.05	0.97
27.72	13.30	11.96	5.43	64.95	2.87	0.06	0.85
27.89	14.36	12.98	6.21	80.64	2.95	0.06	0.93
28.05	19.12	17.68	5.00	88.32	2.82	0.06	1.26
28.22	25.12	23.50	3.54	83.08	2.63	0.06	1.69
28.38	28.71	26.87	2.65	71.09	2.48	0.06	0.66
28.54	27.99	26.06	2.63	68.58	2.47	0.06	0.65
28.71	25.47	23.54	3.35	78.96	2.60	0.06	1.69
28.87	24.83	22.85	4.06	92.69	2.71	0.06	1.64
29.04	26.86	24.73	3.99	98.56	2.70	0.07	1.77
29.20	28.85	26.56	3.69	97.98	2.66	0.07	1.90
29.36	28.02	25.63	3.36	86.14	2.61	0.07	1.84
29.53	24.47	22.10	3.55	78.39	2.63	0.06	1.58
29.69	20.55	18.24	3.91	71.26	2.69	0.06	1.31
29.86	17.60	15.35	4.61	70.71	2.78	0.06	1.10
30.02	15.92	13.68	4.78	65.37	2.80	0.06	0.98
30.18	15.02	12.77	4.67	59.60	2.79	0.06	0.91
30.35	15.16	12.85	4.55	58.39	2.77	0.05	0.92
30.51	16.13	13.72	4.44	60.84	2.76	0.06	0.98
30.68	17.67	15.11	4.20	63.54	2.73	0.06	1.08
30.84	18.99	16.30	4.13	67.30	2.72	0.06	1.16
31.00	20.06	17.24	4.05	69.88	2.71	0.06	1.23
31.17	21.39	18.42	3.77	69.42	2.67	0.06	1.31
31.33	23.30	20.14	3.41	68.61	2.61	0.06	1.44
31.50	25.84	22.43	3.20	71.70	2.58	0.06	0.64

:: 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	28.62	24.91	3.34	83.16	2.60	0.06	1.78
31.82	32.72	28.59	3.41	97.57	2.61	0.07	2.04
31.99	39.93	35.11	3.14	110.21	2.57	0.07	0.69
32.15	50.22	44.44	2.74	121.80	2.49	0.08	0.72
32.32	60.15	53.38	2.38	127.29	2.42	0.10	0.74
32.48	63.85	56.58	2.23	125.93	2.38	0.10	0.75
32.64	57.97	51.01	2.30	117.12	2.40	0.10	0.74
32.81	45.19	39.17	2.77	108.53	2.50	0.08	0.70
32.97	32.00	27.06	3.85	104.08	2.68	0.07	1.92
33.14	24.39	20.07	5.25	105.39	2.85	0.07	1.43
33.30	22.63	18.41	5.94	109.32	2.92	0.07	1.31
33.46	23.81	19.37	5.78	112.01	2.91	0.07	1.38
33.63	24.82	20.16	5.55	111.82	2.88	0.07	1.44
33.79	41.33	34.94	2.61	91.11	2.47	0.06	0.69
33.96	57.63	49.65	1.59	78.77	2.17	0.10	0.73
34.12	84.87	74.58	1.00	74.58	1.80	0.09	0.79
34.28	99.64	87.92	1.00	87.92	1.71	0.13	0.81
34.45	109.16	96.30	1.00	96.30	1.70	0.15	0.82
34.61	98.63	86.20	1.14	98.42	1.85	0.13	0.81
34.78	77.16	66.40	1.35	89.72	2.04	0.10	0.77
34.94	57.12	48.22	1.73	83.31	2.22	0.08	0.73
35.10	44.05	36.49	2.15	78.34	2.36	0.07	0.69
35.27	36.29	29.54	2.59	76.60	2.46	0.07	0.67
35.43	31.57	25.30	3.02	76.33	2.55	0.06	0.65
35.60	30.41	24.20	3.14	75.97	2.57	0.06	0.64
35.76	34.37	27.58	2.68	74.03	2.48	0.06	0.66
35.93	41.41	33.63	2.22	74.55	2.38	0.07	0.68
36.09	46.84	38.24	2.04	77.93	2.33	0.08	0.70
36.25	46.13	37.41	2.25	84.07	2.38	0.08	0.70
36.42	39.14	31.16	2.83	88.30	2.51	0.07	0.68
36.58	29.14	22.48	3.92	88.18	2.69	0.07	1.59
36.75	20.43	15.05	5.58	84.05	2.89	0.06	1.08
36.91	15.34	10.85	7.26	78.75	3.05	0.06	0.77
37.07	13.64	9.42	7.85	73.93	3.09	0.06	0.67
37.24	13.54	9.30	7.82	72.70	3.09	0.06	0.66
37.40	13.76	9.44	7.50	70.84	3.07	0.06	0.67
37.57	13.72	9.37	7.57	70.95	3.07	0.06	0.67
37.73	20.33	14.74	4.40	64.89	2.75	0.05	1.05
37.89	26.86	20.23	2.96	59.79	2.54	0.06	0.62
38.06	37.73	29.46	1.96	57.71	2.30	0.06	0.67
38.22	42.86	33.71	1.81	60.93	2.25	0.07	0.68
38.39	45.58	35.92	1.74	62.61	2.23	0.07	0.69
38.55	41.42	32.25	1.93	62.17	2.29	0.06	0.68
38.71	36.23	27.80	2.14	59.56	2.36	0.06	0.66
38.88	34.93	26.61	2.24	59.58	2.38	0.06	0.66
39.04	36.17	27.41	2.51	68.84	2.45	0.07	0.66
39.21	37.72	28.48	2.71	77.30	2.49	0.07	0.66
39.37	37.85	28.38	2.97	84.37	2.54	0.07	0.66

:: 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	60.11	46.90	1.85	86.64	2.27	0.06	0.73
39.70	82.06	65.31	1.45	95.00	2.10	0.13	0.77
39.86	115.23	93.41	1.22	114.03	1.93	0.13	0.82
40.03	132.64	107.98	1.17	126.10	1.88	0.19	0.84
40.19	152.20	124.37	1.13	140.19	1.83	0.25	0.86
40.35	160.99	131.57	1.11	146.20	1.81	0.28	0.87
40.52	163.27	133.09	1.11	148.11	1.81	0.28	0.87
40.68	161.94	131.61	1.12	146.92	1.81	0.28	0.87
40.85	156.36	125.62	1.20	150.34	1.91	0.27	0.86
41.01	147.00	116.72	1.30	151.63	2.00	0.23	0.85
41.17	138.54	108.90	1.40	152.42	2.07	0.20	0.84
41.34	138.12	108.55	1.35	146.67	2.04	0.19	0.84
41.50	147.28	116.46	1.24	144.83	1.95	0.22	0.85
41.67	162.27	129.29	1.15	149.18	1.86	0.28	0.86
41.83	176.71	141.44	1.11	156.52	1.80	0.36	0.88
41.99	188.63	150.93	1.10	165.64	1.79	0.46	0.89
42.16	196.33	156.58	1.11	173.24	1.80	0.58	0.89
42.32	197.45	157.75	1.08	169.98	1.76	0.61	0.89
42.49	188.18	149.96	1.07	161.09	1.75	0.48	0.89
42.65	168.79	133.13	1.12	148.95	1.82	0.31	0.87
42.81	144.53	111.78	1.25	139.53	1.96	0.20	0.84
42.98	124.38	94.82	1.36	128.63	2.04	0.15	0.82
43.14	113.00	85.77	1.35	116.09	2.04	0.14	0.81
43.31	107.48	81.45	1.32	107.88	2.02	0.13	0.80
43.47	100.89	76.10	1.33	101.41	2.02	0.12	0.79
43.64	89.65	67.03	1.37	92.05	2.05	0.11	0.77
43.80	76.06	55.83	1.55	86.45	2.15	0.09	0.75
43.96	62.92	45.00	1.92	86.19	2.29	0.08	0.72
44.13	50.63	35.05	2.57	89.97	2.46	0.08	0.69
44.29	38.63	25.82	3.31	85.49	2.60	0.07	0.65
44.46	28.02	17.92	4.13	74.05	2.72	0.06	1.26
44.62	21.27	12.95	5.15	66.73	2.84	0.06	0.93
44.78	19.16	11.46	5.78	66.20	2.91	0.06	0.82
44.95	20.24	12.16	5.54	67.31	2.88	0.06	0.87
45.11	21.67	13.17	4.72	62.17	2.79	0.06	0.94
45.28	21.35	12.99	4.32	56.06	2.74	0.06	0.92
45.44	19.40	11.59	4.42	51.18	2.76	0.06	0.82
45.60	17.50	10.15	5.17	52.48	2.84	0.06	0.73
45.77	17.29	9.98	5.21	51.99	2.85	0.06	0.71
45.93	18.91	11.07	4.90	54.26	2.81	0.06	0.79
46.10	21.46	12.84	4.50	57.75	2.77	0.06	0.91
46.26	24.51	14.91	4.31	64.29	2.74	0.06	1.05
46.42	27.55	16.95	4.22	71.61	2.73	0.06	1.19
46.59	30.52	19.04	3.85	73.30	2.68	0.06	1.33
46.75	33.10	20.84	3.58	74.54	2.64	0.06	1.45
46.92	36.28	23.08	3.31	76.49	2.60	0.06	0.64
47.08	40.59	26.03	3.19	82.98	2.58	0.07	0.65
47.24	45.07	28.89	3.37	97.37	2.61	0.07	2.00

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	47.82	30.52	3.57	109.08	2.64	0.08	2.12
47.57	47.18	29.89	3.75	111.97	2.66	0.08	2.09
47.74	44.59	28.10	3.67	103.03	2.65	0.07	1.96
47.90	43.70	27.65	3.28	90.77	2.59	0.07	0.66
48.06	47.35	30.25	2.98	90.01	2.54	0.07	0.67
48.23	54.63	35.26	2.78	98.04	2.50	0.08	0.69
48.39	61.56	39.85	2.77	110.36	2.50	0.09	0.71
48.56	63.99	41.38	2.76	114.08	2.50	0.09	0.71
48.72	60.73	38.96	2.84	110.58	2.51	0.09	0.70
48.88	53.66	34.12	2.83	96.45	2.51	0.08	0.69
49.05	46.37	29.06	2.93	85.13	2.53	0.07	0.67
49.21	41.77	25.90	2.97	76.86	2.54	0.07	0.65
49.38	39.50	24.10	3.32	80.08	2.60	0.07	0.64
49.54	38.54	23.21	3.64	84.54	2.65	0.07	1.61
49.70	37.28	22.20	3.91	86.89	2.69	0.07	1.55
49.87	35.66	21.05	3.99	84.04	2.70	0.07	1.48
50.03	34.89	20.58	3.80	78.24	2.67	0.06	1.44
50.20	35.65	21.13	3.54	74.87	2.63	0.06	1.47
50.36	37.82	22.65	3.23	73.12	2.58	0.06	0.64
50.52	39.02	23.35	3.23	75.45	2.58	0.07	0.64
50.69	38.92	23.06	3.49	80.56	2.63	0.07	1.60
50.85	38.73	22.85	3.53	80.74	2.63	0.07	1.58
51.02	40.96	24.15	3.62	87.32	2.65	0.07	1.68
51.18	46.76	27.93	3.34	93.35	2.60	0.07	1.93
51.35	52.88	31.69	3.39	107.55	2.61	0.08	2.19
51.51	56.91	34.35	3.16	108.72	2.57	0.08	0.69
51.67	55.93	33.74	3.06	103.24	2.55	0.08	0.68
51.84	52.00	31.26	2.93	91.54	2.53	0.08	0.68
52.00	46.72	27.81	2.94	81.74	2.53	0.07	0.66
52.17	42.60	25.01	3.08	77.10	2.56	0.07	0.65
52.33	40.50	23.64	3.06	72.33	2.55	0.06	0.64
52.49	40.05	23.30	3.05	71.17	2.55	0.06	0.64
52.66	40.71	23.69	3.00	71.00	2.54	0.06	0.64
52.82	41.63	24.19	3.01	72.79	2.55	0.06	0.64
52.99	42.07	24.36	3.06	74.50	2.55	0.07	0.65
53.15	42.29	24.47	3.01	73.70	2.55	0.06	0.65
53.31	42.32	24.47	2.94	72.07	2.53	0.06	0.65
53.48	42.58	24.64	2.86	70.58	2.52	0.06	0.65
53.64	42.62	24.59	2.88	70.81	2.52	0.06	0.65
53.81	42.68	24.53	2.91	71.31	2.53	0.06	0.65
53.97	43.30	24.89	2.86	71.20	2.52	0.06	0.65
54.13	44.78	25.73	2.86	73.72	2.52	0.07	0.65
54.30	47.09	27.15	2.79	75.88	2.51	0.07	0.66
54.46	48.56	27.81	2.97	82.70	2.54	0.07	0.66
54.63	49.45	28.32	2.93	82.84	2.53	0.07	0.66
54.79	49.42	28.20	2.95	83.23	2.53	0.07	0.66
54.95	50.16	28.79	2.74	78.93	2.49	0.07	0.67
55.12	50.82	29.25	2.63	76.81	2.47	0.07	0.67

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.28	51.54	29.77	2.49	74.14	2.44	0.07	0.67
55.45	51.58	29.81	2.43	72.30	2.43	0.07	0.67
55.61	51.18	29.38	2.51	73.63	2.45	0.07	0.67
55.77	50.56	28.80	2.62	75.36	2.47	0.07	0.67
55.94	50.37	28.55	2.67	76.28	2.48	0.07	0.66
56.10	50.86	28.84	2.61	75.15	2.47	0.07	0.67
56.27	51.65	29.40	2.49	73.07	2.44	0.07	0.67
56.43	52.17	29.73	2.41	71.76	2.42	0.07	0.67
56.59	52.26	29.75	2.39	71.13	2.42	0.07	0.67
56.76	52.27	29.62	2.43	72.11	2.43	0.07	0.67
56.92	52.81	29.82	2.47	73.64	2.44	0.07	0.67
57.09	53.95	30.38	2.51	76.19	2.45	0.07	0.67
57.25	55.77	31.39	2.51	78.65	2.44	0.07	0.68
57.41	57.76	32.55	2.47	80.53	2.44	0.07	0.68
57.58	59.60	33.61	2.43	81.81	2.43	0.07	0.68
57.74	60.82	34.28	2.42	83.08	2.43	0.07	0.69
57.91	61.52	34.59	2.43	84.08	2.43	0.07	0.69
58.07	62.02	34.79	2.44	84.77	2.43	0.07	0.69
58.23	62.67	35.12	2.41	84.79	2.42	0.08	0.69
58.40	63.41	35.52	2.38	84.70	2.42	0.08	0.69
58.56	64.04	35.86	2.36	84.48	2.41	0.08	0.69
58.73	64.44	36.03	2.34	84.24	2.41	0.08	0.69
58.89	64.76	36.17	2.32	84.03	2.40	0.08	0.69
59.06	65.04	36.25	2.32	83.98	2.40	0.08	0.69
59.22	65.28	36.28	2.33	84.57	2.40	0.08	0.69
59.38	65.56	36.35	2.33	84.72	2.40	0.08	0.69
59.55	65.46	36.11	2.37	85.66	2.41	0.08	0.69
59.71	64.86	35.62	2.40	85.51	2.42	0.08	0.69
59.88	63.47	34.66	2.44	84.49	2.43	0.08	0.69
60.04	61.51	33.43	2.45	81.96	2.43	0.07	0.68
60.20	58.65	31.57	2.54	80.16	2.45	0.07	0.68
60.37	54.44	28.68	2.86	81.88	2.52	0.07	0.67
60.53	48.46	24.65	3.48	85.90	2.63	0.07	1.70
60.70	41.96	20.38	4.52	92.16	2.77	0.07	1.45
60.86	37.87	18.11	5.35	96.81	2.86	0.07	1.29
61.02	39.31	18.81	5.18	97.42	2.84	0.07	1.34
61.19	46.00	22.52	4.22	95.08	2.73	0.07	1.59
61.35	52.65	26.57	3.50	92.99	2.63	0.08	1.83
61.52	56.06	28.64	3.21	91.81	2.58	0.08	0.67
61.68	55.40	28.19	3.22	90.78	2.58	0.08	0.66
61.84	54.68	27.67	3.28	90.69	2.59	0.07	0.66
62.01	54.94	27.72	3.29	91.09	2.59	0.07	0.66
62.17	55.47	27.96	3.27	91.29	2.59	0.08	0.66
62.34	54.83	27.55	3.25	89.46	2.59	0.08	0.66
62.50	52.62	26.20	3.35	87.76	2.60	0.07	1.80
62.66	50.16	24.67	3.52	86.75	2.63	0.07	1.70
62.83	48.56	23.63	3.66	86.52	2.65	0.07	1.64
62.99	48.47	23.49	3.70	86.91	2.66	0.07	1.63

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
63.16	49.54	24.05	3.62	87.11	2.65	0.07	1.67
63.32	50.63	24.61	3.56	87.71	2.64	0.07	1.70
63.48	51.03	24.91	3.39	84.50	2.61	0.07	1.71
63.65	51.44	24.93	3.54	88.12	2.63	0.07	1.72
63.81	55.00	26.57	3.68	97.77	2.65	0.07	1.85
63.98	67.19	33.13	3.39	112.46	2.61	0.08	2.28
64.14	93.01	48.11	2.60	125.29	2.47	0.10	0.73
64.30	133.16	72.74	1.90	137.87	2.28	0.15	0.78
64.47	178.46	101.34	1.54	155.90	2.14	0.30	0.83
64.63	218.38	127.44	1.35	172.38	2.04	0.77	0.86
64.80	245.04	145.23	1.27	183.88	1.97	0.88	0.88
64.96	260.70	155.87	1.22	190.27	1.93	0.89	0.89
65.12	270.62	162.43	1.20	194.67	1.91	0.90	0.90
65.29	279.63	166.77	1.22	202.89	1.93	0.90	0.90
65.45	287.84	169.45	1.27	214.52	1.97	0.90	0.90
65.62	291.51	169.80	1.31	222.07	2.01	0.90	0.90
65.78	288.57	167.19	1.32	221.25	2.02	0.90	0.90
65.94	279.45	162.60	1.29	209.28	1.99	0.90	0.90
66.11	269.96	157.80	1.25	197.55	1.96	0.89	0.89
66.27	263.86	153.48	1.26	193.80	1.97	0.89	0.89
66.44	262.97	150.06	1.35	202.37	2.04	0.89	0.89
66.60	265.06	150.22	1.38	206.63	2.05	0.89	0.89
66.77	265.39	149.25	1.41	210.16	2.07	0.89	0.89
66.93	262.32	148.32	1.36	201.77	2.04	0.88	0.88
67.09	250.25	139.23	1.44	200.78	2.09	0.87	0.87
67.26	230.05	126.96	1.47	186.84	2.11	0.86	0.86
67.42	196.48	105.81	1.62	171.77	2.18	0.46	0.84
67.59	156.83	82.59	1.76	145.67	2.24	0.20	0.80
67.75	116.90	59.57	2.01	119.98	2.32	0.12	0.76
67.91	89.64	44.54	2.18	97.07	2.37	0.09	0.72
68.08	75.81	36.92	2.32	85.50	2.40	0.08	0.70
68.24	72.22	34.67	2.47	85.47	2.44	0.08	0.69
68.41	78.07	37.08	2.67	99.08	2.48	0.08	0.70
68.57	94.66	44.83	2.85	127.91	2.52	0.10	0.72
68.73	120.54	58.31	2.59	150.89	2.46	0.14	0.75
68.90	138.07	67.42	2.46	165.56	2.43	0.20	0.77
69.06	138.56	68.77	2.18	150.17	2.37	0.18	0.78
69.23	120.49	59.44	2.17	128.92	2.36	0.14	0.76
69.39	100.67	49.65	2.06	102.03	2.33	0.10	0.73
69.55	86.77	41.98	2.19	91.94	2.37	0.09	0.71
69.72	82.20	39.33	2.27	89.46	2.39	0.09	0.70
69.88	81.52	38.89	2.28	88.72	2.39	0.09	0.70
70.05	83.14	39.48	2.33	91.84	2.40	0.09	0.70
70.21	84.97	40.53	2.25	91.03	2.38	0.09	0.71
70.37	86.81	41.62	2.16	89.99	2.36	0.09	0.71
70.54	86.53	41.57	2.10	87.38	2.35	0.09	0.71
70.70	85.23	40.89	2.08	85.20	2.34	0.09	0.71
70.87	84.26	40.40	2.06	83.05	2.33	0.09	0.71

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

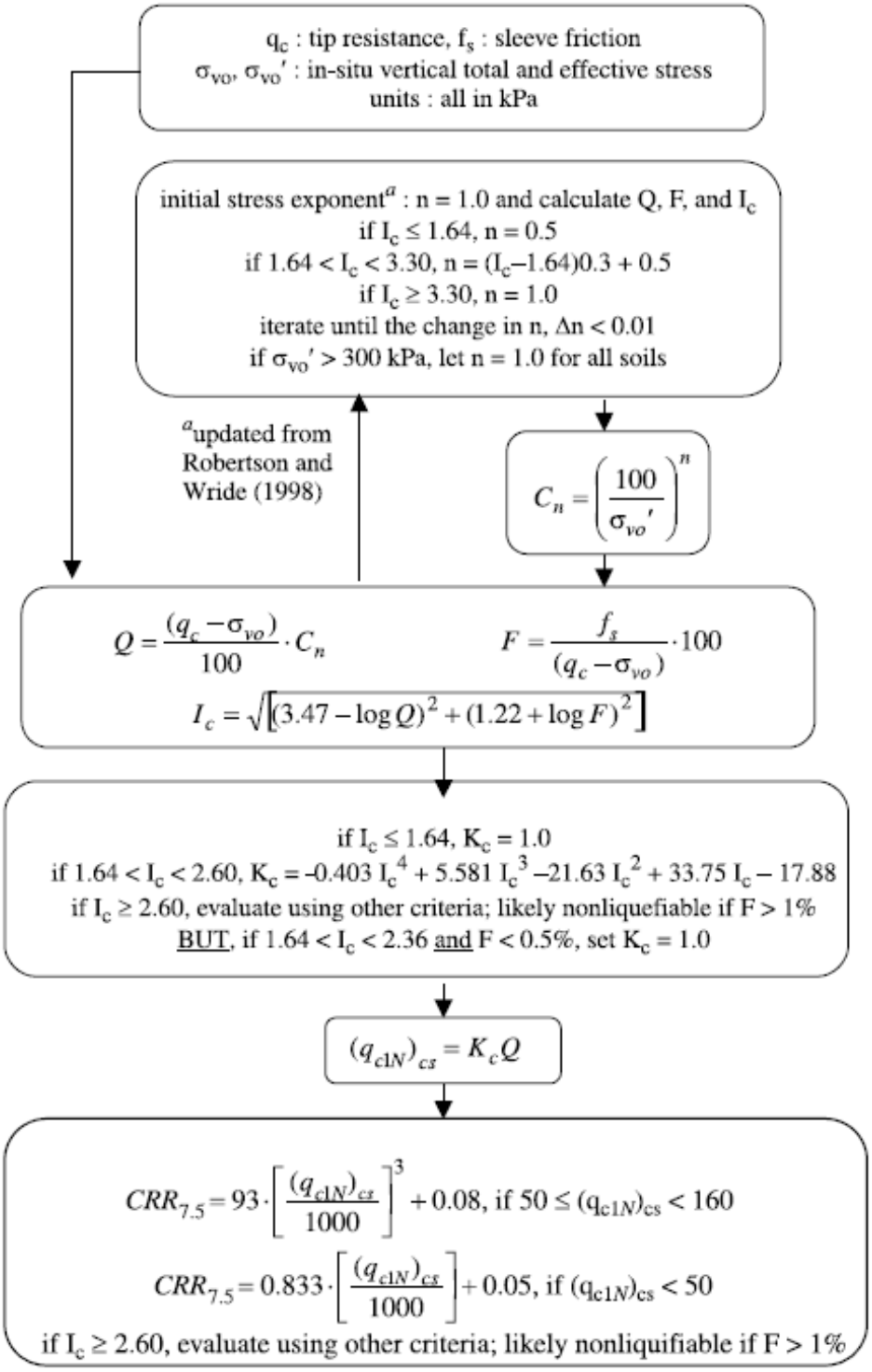
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
71.03	84.58	40.64	2.01	81.59	2.32	0.09	0.71
71.19	86.08	41.38	1.99	82.24	2.31	0.09	0.71
71.36	87.30	41.93	1.98	83.01	2.31	0.09	0.71
71.52	87.91	42.13	1.99	83.64	2.31	0.09	0.71
71.69	87.58	41.95	1.97	82.42	2.31	0.09	0.71
71.85	87.05	41.63	1.95	81.36	2.30	0.09	0.71
72.01	86.54	41.30	1.95	80.61	2.30	0.09	0.71
72.18	86.48	41.12	1.97	80.92	2.31	0.09	0.71
72.34	86.76	41.08	2.00	81.96	2.31	0.09	0.71
72.51	87.61	42.79	1.67	71.53	2.20	0.08	0.71
72.67	88.60	45.37	1.35	61.26	2.04	0.08	0.72
72.83	89.72	39.85	2.87	114.45	2.52	0.10	0.71
73.00	90.39	40.11	2.88	115.50	2.52	0.10	0.71

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)

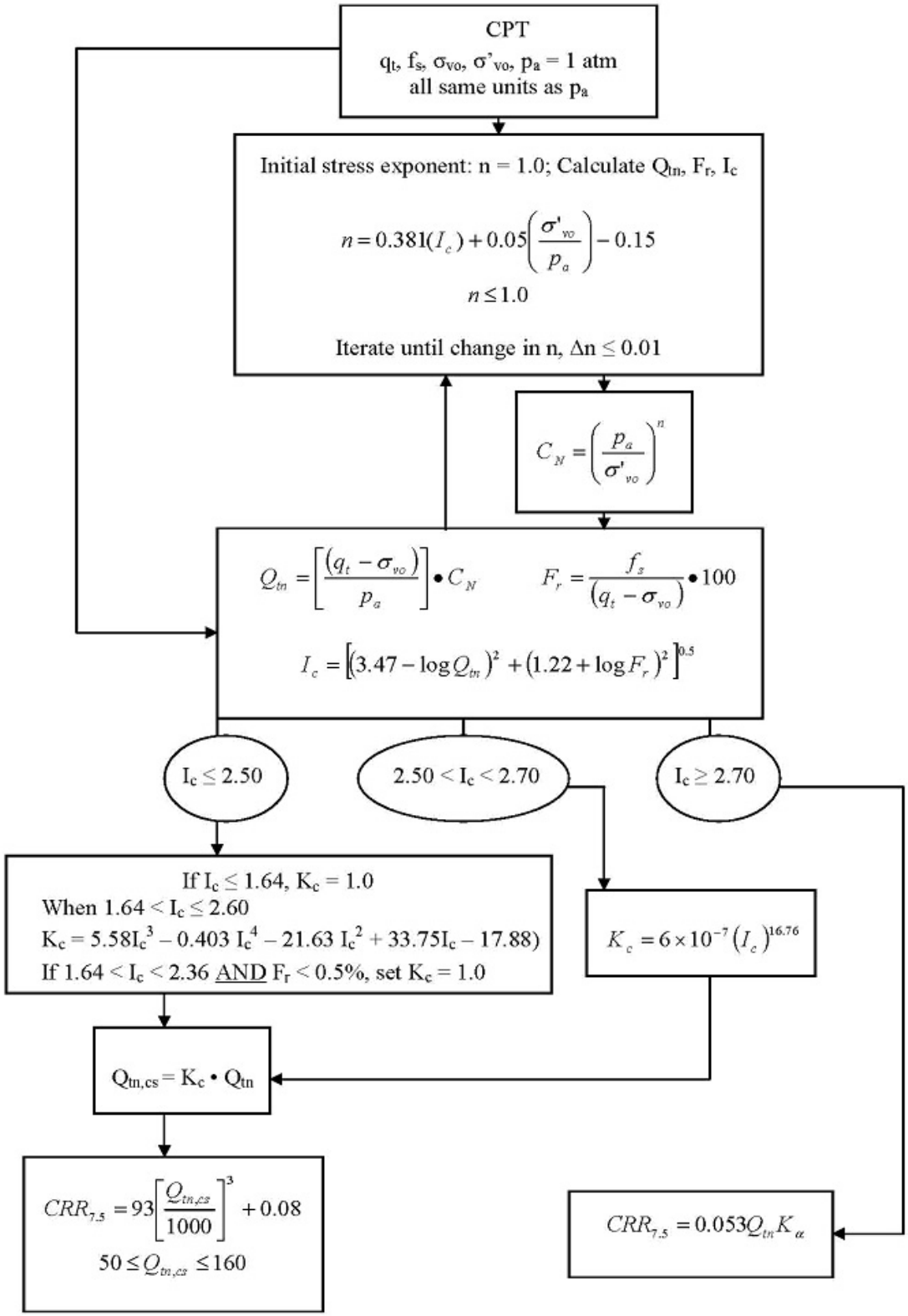
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

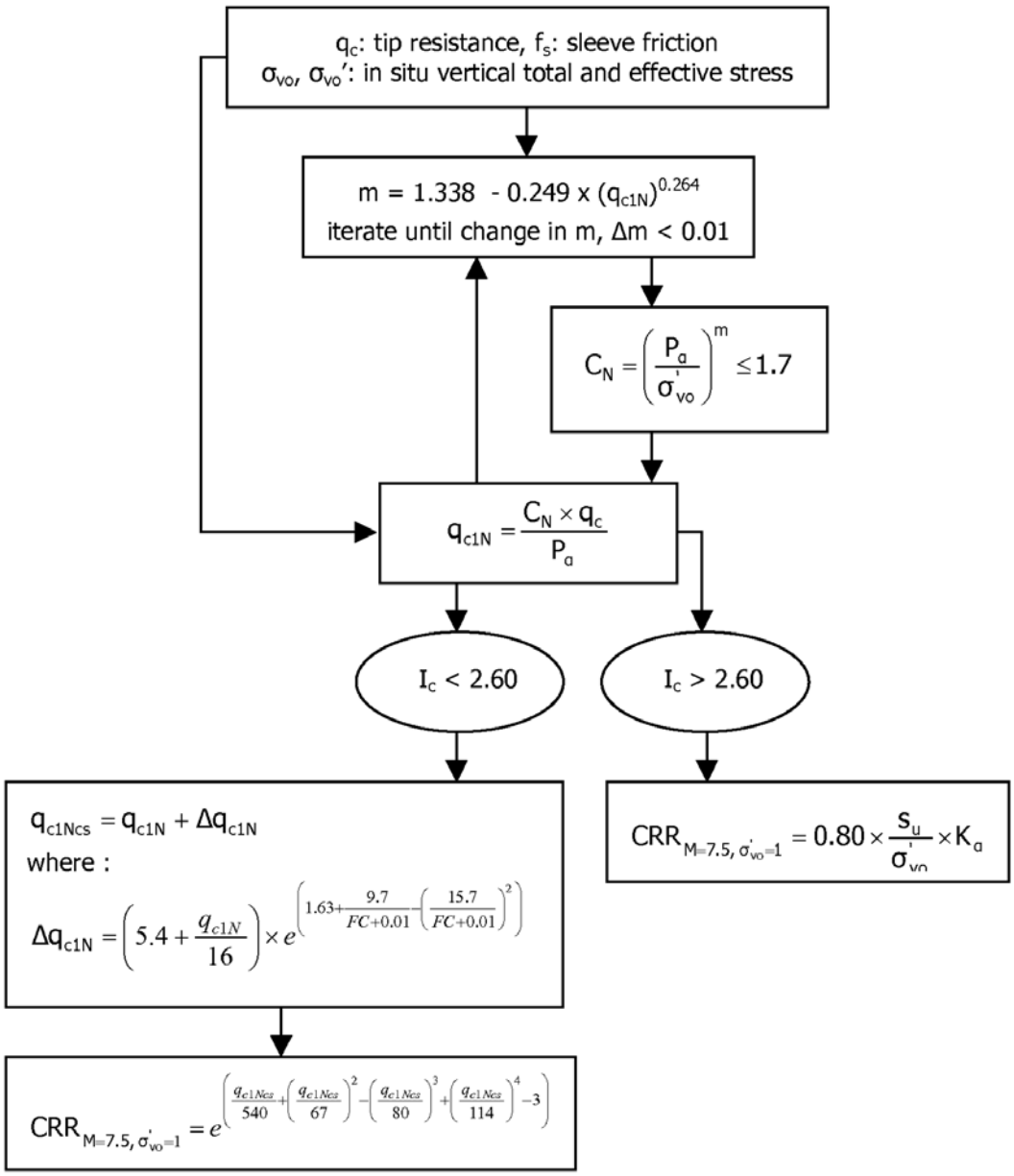
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

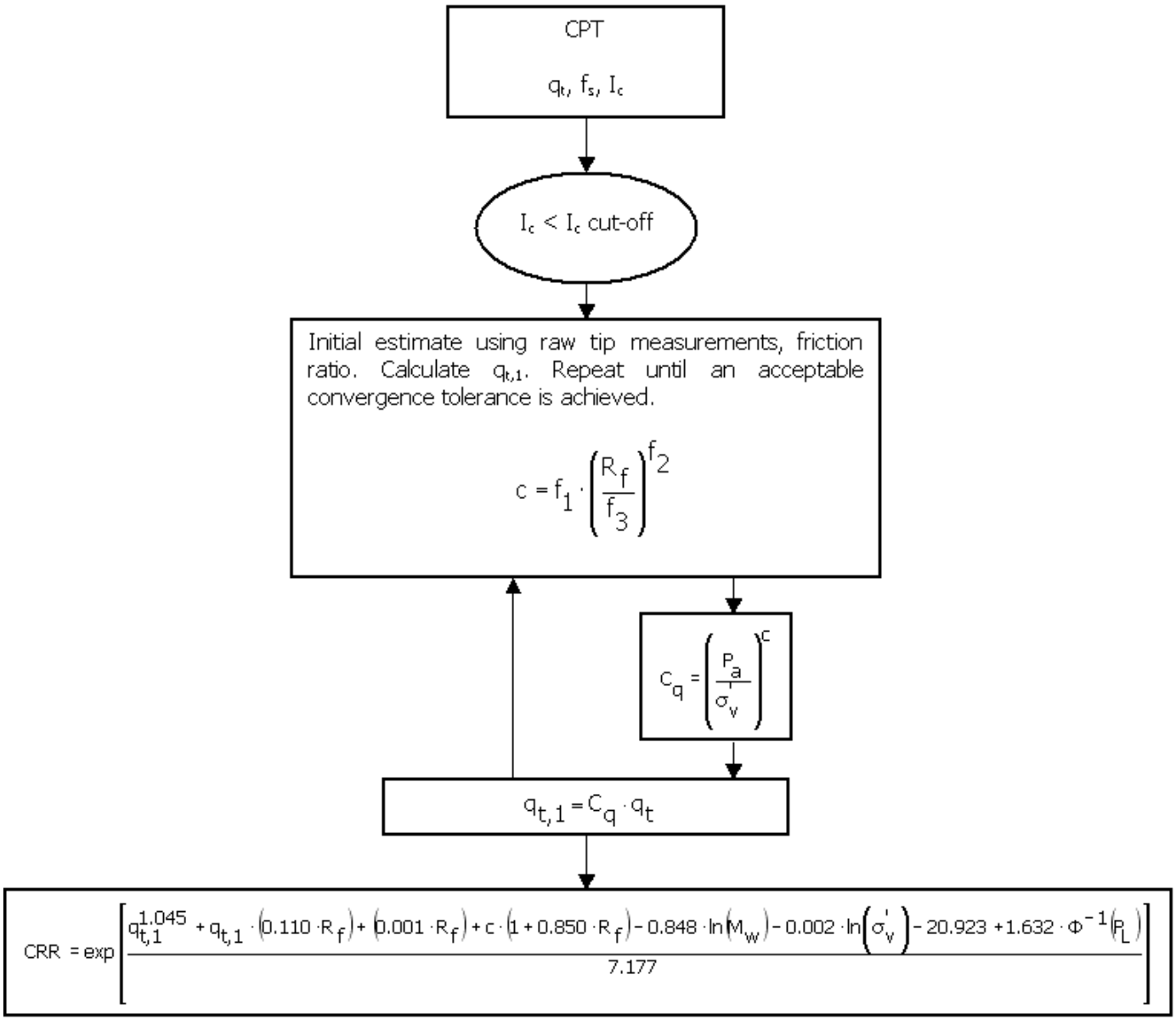


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{C1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

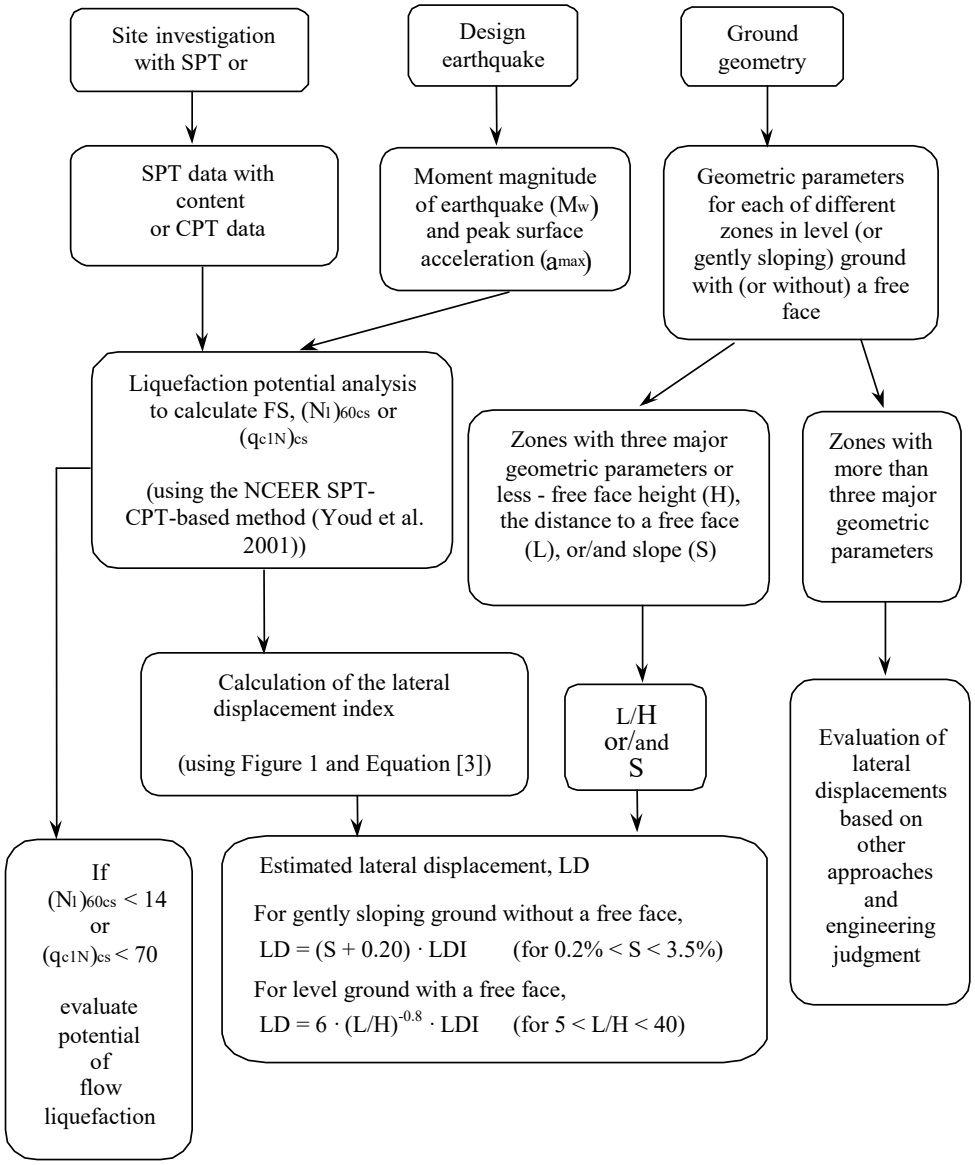
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

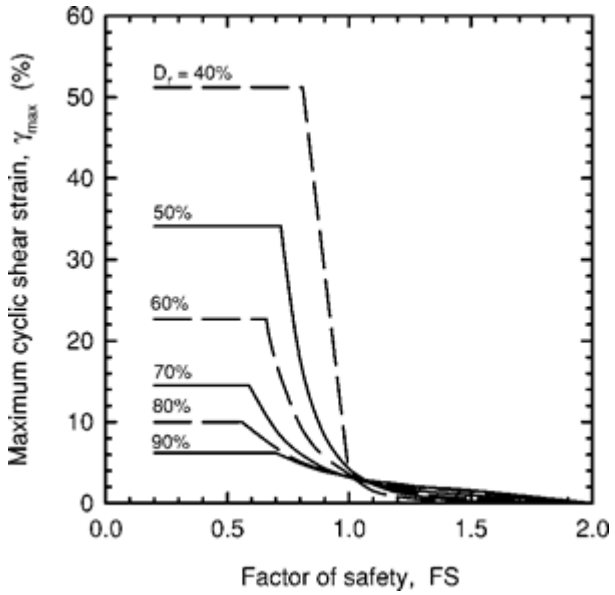
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

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



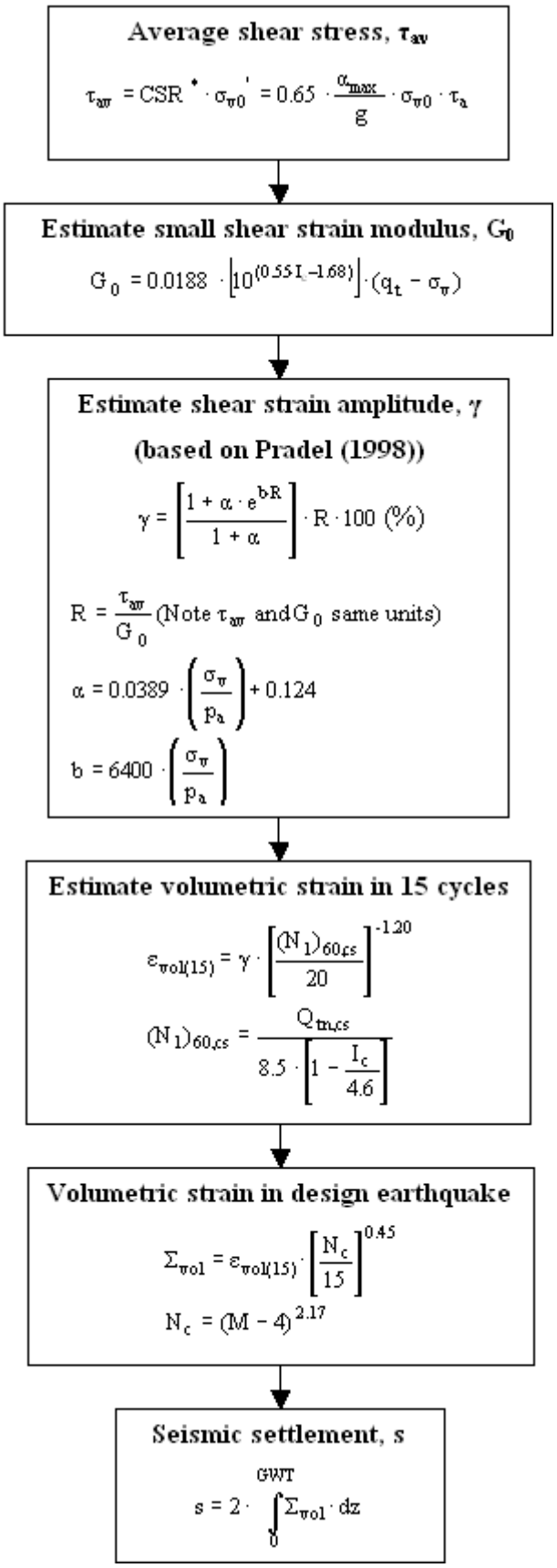
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

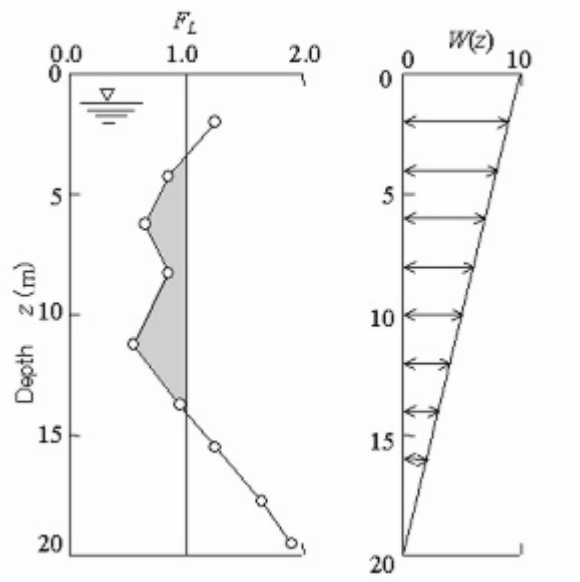
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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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Designed By: SKB
Checked By: 1/0/1900

Raw Data Input

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	300.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	198.5

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

														Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	2.5	1	92	28	21	7	26	CL-ML	1			1	Clay-Like	-	120		
2	5.0	1	92	28	21	7	26	CL-ML	1			1	Clay-Like	-	120		
3	7.5	0	92	28	21	7	26	CL-ML	1			1	Clay-Like	-	10		
4	10.0	7	92	28	21	7	26	CL-ML	1			1	Clay-Like	-	820		
5	20.0	3	75	24	18	6	21.7	CL-ML	1			1	Sand-Like	28	-		
6	25.0	3	75	24	18	6	21.7	CL-ML	1			1	Sand-Like	28	-		
7	30.0	17	75	24	18	6	21.7	CL-ML	1			1	Sand-Like	38	-		
8	37.0	10	33	0	0	0	27	SM	1			1	Sand-Like	33	-		
9	40.0	11	33	0	0	0	27	SM	1			1	Sand-Like	33	-		
10	45.0	9	33	0	0	0	27	SM	1			1	Sand-Like	32	-		
11	50.0	11	55	33	29	4	25.6	ML	1			1	Sand-Like	32	-		
12	60.0	14	55	33	29	4	25.6	ML	1			1	Sand-Like	33	-		
13	65.0	46	50	0	0	0	23.8	ML	1			1	Sand-Like	44	-		
14	70.0	25	72	38	28	10	22.6	ML	1			1	Clay-Like	-	2930		
15	75.0	20	72	38	28	10	22.6	ML	1			1	Clay-Like	-	2350		
16	80.0	19	72	38	28	10	22.6	ML	1			1	Clay-Like	-	2230		
17	85.0	15	72	38	28	10	22.6	ML	1			1	Clay-Like	-	1760		
18	90.0	18	72	38	28	10	22.6	ML	1			1	Clay-Like	-	2110		
9	95.0	10	72	38	28	10	22.6	ML	1			1	Clay-Like	-	1170		
10	100.0	11	72	38	28	10	22.6	ML	1			1	Clay-Like	-	1290		

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Checked By: 1/0/1900

Standard Penetration Test Correction

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	300.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	198.5

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		300																	
1	2.5	297.5	1	1.57	1.70	0.75	1.0	1.00	2.0	288	288	92.0	1.6	2.7	1.2	2.0	4.0	1	CL-ML
2	5	295	1	1.57	1.70	0.77	1.0	1.00	2.0	575	575	92.0	1.6	2.7	1.2	2.0	4.1	1	CL-ML
3	7.5	292.5	0	1.57	1.52	0.82	1.0	1.00	1.4	863	863	92.0	0.2	0.2	0.1	0.2	0.3	1	CL-ML
4	10	290	7	1.57	1.32	0.86	1.0	1.00	1.3	1150	1150	92.0	11.0	14.4	9.4	12.4	15.9	1	CL-ML
5	20	280	3	1.57	0.93	0.95	1.0	1.00	1.6	2300	2300	75.0	4.7	4.4	4.5	4.2	6.5	1	CL-ML
6	25	275	3	1.57	0.83	0.97	1.0	1.00	1.6	2875	2875	75.0	4.7	3.9	4.6	3.8	6.1	1	CL-ML
7	30	270	17	1.57	0.76	0.98	1.0	1.00	1.2	3450	3450	75.0	26.6	20.3	26.2	19.9	24.5	1	CL-ML
8	37	263	10	1.57	0.69	0.99	1.0	1.00	1.3	4255	4255	33.0	15.7	10.7	15.5	10.6	13.7	1	SM
9	40	260	11	1.57	0.66	0.99	1.0	1.00	1.3	4600	4600	33.0	17.2	11.4	17.1	11.3	14.4	1	SM
10	45	255	9	1.57	0.62	1.00	1.0	1.00	1.3	5175	5175	33.0	14.1	8.8	14.0	8.7	11.5	1	SM
11	50	250	11	1.57	0.59	1.00	1.0	1.00	1.3	5750	5750	55.0	17.2	10.2	17.2	10.1	13.3	1	ML
12	60	240	14	1.57	0.54	1.00	1.0	1.00	1.3	6900	6900	55.0	21.9	11.8	21.9	11.8	15.2	1	ML
13	65	235	46	1.57	0.52	1.00	1.0	1.00	1.2	7475	7475	50.0	50.0	25.9	72.0	37.2	44.2	1	ML
14	70	230	25	1.57	0.50	1.00	1.0	1.00	1.2	8050	8050	72.0	39.1	19.5	39.1	19.5	24.0	1	ML
15	75	225	20	1.57	0.48	1.00	1.0	1.00	1.3	8625	8625	72.0	31.3	15.1	31.3	15.1	18.9	1	ML
16	80	220	19	1.57	0.47	1.00	1.0	1.00	1.3	9200	9200	72.0	29.7	13.9	29.7	13.9	17.6	1	ML
17	85	215	15	1.57	0.45	1.00	1.0	1.00	1.3	9775	9775	72.0	23.5	10.6	23.5	10.6	13.9	1	ML
18	90	210	18	1.57	0.44	1.00	1.0	1.00	1.3	10350	10350	72.0	28.2	12.4	28.2	12.4	15.9	1	ML
9	95	205	10	1.57	0.43	1.00	1.0	1.00	1.4	10925	10925	72.0	15.7	6.7	15.6	6.7	9.4	1	ML
10	100	200	11	1.57	0.42	1.00	1.0	1.00	1.4	11500	11500	72.0	17.2	7.2	17.2	7.2	9.9	1	ML

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Subsurface Soil Properties Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	300.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	198.5

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	300															
1	2.5	297.5	1	1.6	2.0	CL-ML	1	0	0	92.0	26	28.0	21.0	7.0	0.71	-	235
2	5	295	1	1.6	2.0	CL-ML	1	0	0	92.0	26	28.0	21.0	7.0	0.71	-	235
3	7.5	292.5	0	0.2	0.2	CL-ML	1	0	0	92.0	26	28.0	21.0	7.0	0.71	-	23
4	10	290	7	11.0	12.4	CL-ML	1	0	0	92.0	26	28.0	21.0	7.0	0.71	-	1643
5	20	280	3	4.7	4.2	CL-ML	1	0	0	75.0	21.7	24.0	18.0	6.0	0.62	28	-
6	25	275	3	4.7	3.8	CL-ML	1	0	0	75.0	21.7	24.0	18.0	6.0	0.62	28	-
7	30	270	17	26.6	19.9	CL-ML	1	0	0	75.0	21.7	24.0	18.0	6.0	0.62	38	-
8	37	263	10	15.7	10.6	SM	1	0	0	33.0	27	0.0	0.0	0.0	NP	33	-
9	40	260	11	17.2	11.3	SM	1	0	0	33.0	27	0.0	0.0	0.0	NP	33	-
10	45	255	9	14.1	8.7	SM	1	0	0	33.0	27	0.0	0.0	0.0	NP	32	-
11	50	250	11	17.2	10.1	ML	1	0	0	55.0	25.6	33.0	29.0	4.0	-0.85	32	-
12	60	240	14	21.9	11.8	ML	1	0	0	55.0	25.6	33.0	29.0	4.0	-0.85	33	-
13	65	235	46	50.0	37.2	ML	1	0	0	50.0	23.8	0.0	0.0	0.0	NP	44	-
14	70	230	25	39.1	19.5	ML	1	0	0	72.0	22.6	38.0	28.0	10.0	-0.54	-	5869
15	75	225	20	31.3	15.1	ML	1	0	0	72.0	22.6	38.0	28.0	10.0	-0.54	-	4695
16	80	220	19	29.7	13.9	ML	1	0	0	72.0	22.6	38.0	28.0	10.0	-0.54	-	4460
17	85	215	15	23.5	10.6	ML	1	0	0	72.0	22.6	38.0	28.0	10.0	-0.54	-	3521
18	90	210	18	28.2	12.4	ML	1	0	0	72.0	22.6	38.0	28.0	10.0	-0.54	-	4226
9	95	205	10	15.7	6.7	ML	1	0	0	72.0	22.6	38	28	10	-0.54	-	2348
10	100	200	11	17.2	7.2	ML	1	0	0	72.0	22.6	38	28	10	-0.54	-	2582

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SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	300.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	198.5

PGA:	0.40
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	6.99
R(km):	60.56

MSF_{sand}:	1.14
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	300																		
1	2.5	297.5	CL-ML	1	1	2.0	5.5	7.5	PSL	NS Clay-Like	0.39	1	No Strength Loss	-	-	-	-	10.7	-	15.3
2	5	295	CL-ML	1	1	2.0	5.5	7.5	PSL	NS Clay-Like	0.78	1	No Strength Loss	-	-	-	-	10.7	-	15.3
3	7.5	292.5	CL-ML	1	1	0.2	5.5	5.7	PSL	NS Clay-Like	11.56	1	Strength Loss	-	-	18.8	-	10.7	-	15.3
4	10	290	CL-ML	1	1	12.4	5.5	17.9	PSL	NS Clay-Like	0.22	1	No Strength Loss	-	-	-	-	10.7	-	15.3
5	20	280	CL-ML	1	1	4.2	5.5	9.7	NSL-S	Sand-Like	1.86	1	Full Liquefaction	4.9	-	-	5.12	10.7	4.57	15.3
6	25	275	CL-ML	1	1	3.8	5.5	9.3	NSL-S	Sand-Like	1.88	1	Full Liquefaction	4.7	-	-	2.56	5.6	2.34	10.7
7	30	270	CL-ML	1	1	19.9	5.5	25.4	NSL-S	Sand-Like	0.72	1	No Liquefaction	-	-	-	-	3.0	-	8.4
8	37	263	SM	1	1	10.6	5.5	16.1	NSL-S	Sand-Like	1.25	1	Full Liquefaction	7.1	-	-	0.67	3.0	2.29	8.4
9	40	260	SM	1	1	11.3	5.5	16.7	NSL-S	Sand-Like	1.19	1	Full Liquefaction	7.4	-	-	0.23	2.4	0.95	6.1
10	45	255	SM	1	1	8.7	5.5	14.2	NSL-S	Sand-Like	1.33	1	Full Liquefaction	6.3	-	-	1.29	2.1	1.79	5.1
11	50	250	ML	1	1	10.1	5.5	15.6	NSL-S	Sand-Like	1.20	1	Full Liquefaction	7.3	-	-	0.41	0.9	1.67	3.3
12	60	240	ML	1	1	11.8	5.5	17.3	NSL-S	Sand-Like	1.05	1	Full Liquefaction	8.1	-	-	0.45	0.4	1.67	1.7
13	65	235	ML	1	1	37.2	5.5	42.7	NSL-S	Sand-Like	0.02	1	No Liquefaction	-	-	-	-	0.0	-	0.0
14	70	230	ML	1	1	19.5	5.5	25.0	PSL	NS Clay-Like	0.29	1	No Strength Loss	-	-	-	-	0.0	-	0.0
15	75	225	ML	1	1	15.1	5.5	20.6	PSL	NS Clay-Like	0.38	1	No Strength Loss	-	-	-	-	0.0	-	0.0
16	80	220	ML	1	1	13.9	5.5	19.4	PSL	NS Clay-Like	0.41	1	No Strength Loss	-	-	-	-	0.0	-	0.0
17	85	215	ML	1	1	10.6	5.5	16.1	PSL	NS Clay-Like	0.54	1	No Strength Loss	-	-	-	-	0.0	-	0.0
18	90	210	ML	1	1	12.4	5.5	17.9	PSL	NS Clay-Like	0.46	1	No Strength Loss	-	-	-	-	0.0	-	0.0
9	95	205	ML	1	1	6.7	5.5	12.2	PSL	NS Clay-Like	0.86	1	No Strength Loss	-	-	-	-	0.0	-	0.0
10	100	200	ML	1	1	7.2	5.5	12.7	PSL	NS Clay-Like	0.81	1	No Strength Loss	-	-	-	-	0.0	-	0.0

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Checked By: #######

SPT-Based Soil Shear Strength Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	300.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	198.5

PGA: 0.403

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		300																		
1	2.5	297.5	1	7.5	CL-ML	92.0	287.5	287.5	26.0	28	21	7	NS Clay-Like	No Strength Loss	-	235	-	230	-	230
2	5	295	1	7.5	CL-ML	92.0	575.0	575.0	26.0	28	21	7	NS Clay-Like	No Strength Loss	-	235	-	230	-	230
3	7.5	292.5	0	5.7	CL-ML	92.0	862.5	862.5	26.0	28	21	7	NS Clay-Like	Strength Loss	-	23	-	20	-	20
4	10	290	7	17.9	CL-ML	92.0	1150.0	1150.0	26.0	28	21	7	NS Clay-Like	No Strength Loss	-	1643	-	1640	-	1640
5	20	280	3	9.7	CL-ML	75.0	2300.0	2300.0	21.7	24	18	6	Sand-Like	Full Liquefaction	28	-	28	-	5	-
6	25	275	3	9.3	CL-ML	75.0	2875.0	2875.0	21.7	24	18	6	Sand-Like	Full Liquefaction	28	-	28	-	5	-
7	30	270	17	25.4	CL-ML	75.0	3450.0	3450.0	21.7	24	18	6	Sand-Like	No Liquefaction	38	-	38	-	38	-
8	37	263	10	16.1	SM	33.0	4255.0	4255.0	27.0	0	0	0	Sand-Like	Full Liquefaction	33	-	33	-	7	-
9	40	260	11	16.7	SM	33.0	4600.0	4600.0	27.0	0	0	0	Sand-Like	Full Liquefaction	33	-	33	-	7	-
10	45	255	9	14.2	SM	33.0	5175.0	5175.0	27.0	0	0	0	Sand-Like	Full Liquefaction	32	-	32	-	6	-
11	50	250	11	15.6	ML	55.0	5750.0	5750.0	25.6	33	29	4	Sand-Like	Full Liquefaction	32	-	32	-	7	-
12	60	240	14	17.3	ML	55.0	6900.0	6900.0	25.6	33	29	4	Sand-Like	Full Liquefaction	33	-	33	-	8	-
13	65	235	46	42.7	ML	50.0	7475.0	7475.0	23.8	0	0	0	Sand-Like	No Liquefaction	44	-	44	-	44	-
14	70	230	25	25.0	ML	72.0	8050.0	8050.0	22.6	38	28	10	NS Clay-Like	No Strength Loss	-	5869	-	5870	-	5870
15	75	225	20	20.6	ML	72.0	8625.0	8625.0	22.6	38	28	10	NS Clay-Like	No Strength Loss	-	4695	-	4700	-	4700
16	80	220	19	19.4	ML	72.0	9200.0	9200.0	22.6	38	28	10	NS Clay-Like	No Strength Loss	-	4460	-	4460	-	4460
17	85	215	15	16.1	ML	72.0	9775.0	9775.0	22.6	38	28	10	NS Clay-Like	No Strength Loss	-	3521	-	3520	-	3520
18	90	210	18	17.9	ML	72.0	10350.0	10350.0	22.6	38	28	10	NS Clay-Like	No Strength Loss	-	4226	-	4230	-	4230
9	95	205	10	12.2	ML	72.0	10925.0	10925.0	22.6	38.0	28.0	10.0	NS Clay-Like	No Strength Loss	-	2347.5	-	2350	-	2350
10	100	200	11	12.7	ML	72.0	11500.0	11500.0	22.6	38.0	28.0	10.0	NS Clay-Like	No Strength Loss	-	2582.3	-	2580	-	2580

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Designed By: SKB
Checked By: 1/0/1900

Raw Data Input

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	301.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	199.5

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

														Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	2.5	2	99	27	19	8	23.4	CL				1	Clay-Like	-	230		
2	5.0	0	99	30	23	7	33.5	ML				1	Clay-Like	-	10		
3	7.5	0	99	30	23	7	33.5	ML				1	Clay-Like	-	10		
4	10.0	2	99	30	23	7	33.5	ML				1	Clay-Like	-	230		
5	15.0	5	99	30	23	7	33.5	ML				1	Clay-Like	-	590		
6	22.0	4	85	32	19	13	26.7	CL				1	Clay-Like	-	940		
7	25.0	11	85	32	19	13	26.7	CL				1	Clay-Like	-	2580		
8	30.0	14	85	32	19	13	26.7	CL				1	Clay-Like	-	3290		
9	35.0	14	37	40	31	9	25.5	SM				1	Clay-Like	-	1640		
10	40.0	15	37	40	31	9	25.5	SM				1	Clay-Like	-	1760		
11	45.0	20	37	40	31	9	25.5	SM				1	Clay-Like	-	2350		
12	55.0	18	37	40	31	9	25.5	SM				1	Clay-Like	-	2110		
13	60.0	18	27	43	30	13	24.8	SM				1	Clay-Like	-	4230		
14	65.0	19	27	43	30	13	24.8	SM				1	Clay-Like	-	4460		
15	70.0	18	27	43	30	13	24.8	SM				1	Clay-Like	-	4230		
16	75.0	16	27	43	30	13	24.8	SM				1	Clay-Like	-	3760		
17	80.0	12	27	43	30	13	24.8	SM				1	Clay-Like	-	2820		
18	85.0	12	76	31	21	10	27.4	CL				1	Clay-Like	-	1410		
9	90.0	15	76	31	21	10	27.4	CL				1	Clay-Like	-	1760		
10	95.0	11	76	31	21	10	27.4	CL				1	Clay-Like	-	1290		
11	100.0	13	76	31	21	10	27.4	CL				1	Clay-Like	-	1530		

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Designed By: SKB
Checked By: 1/0/1900

Standard Penetration Test Correction

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	301.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	199.5

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		301																	
1	2.5	298.5	2	1.57	1.70	0.75	1.0	1.00	1.6	288	288	99.0	3.1	5.3	2.3	4.0	6.3	0	CL
2	5	296	0	1.57	1.70	0.77	1.0	1.00	1.4	575	575	99.0	0.2	0.3	0.1	0.2	0.3	0	ML
3	7.5	293.5	0	1.57	1.52	0.82	1.0	1.00	1.4	863	863	99.0	0.2	0.2	0.1	0.2	0.3	0	ML
4	10	291	2	1.57	1.32	0.86	1.0	1.00	1.6	1150	1150	99.0	3.1	4.1	2.7	3.5	5.8	0	ML
5	15	286	5	1.57	1.08	0.91	1.0	1.00	1.4	1725	1725	99.0	7.8	8.4	7.2	7.7	10.5	0	ML
6	22	279	4	1.57	0.89	0.96	1.0	1.00	1.5	2530	2530	85.0	6.3	5.6	6.0	5.3	7.8	0	CL
7	25	276	11	1.57	0.83	0.97	1.0	1.00	1.3	2875	2875	85.0	17.2	14.4	16.7	13.9	17.6	0	CL
8	30	271	14	1.57	0.76	0.98	1.0	1.00	1.2	3450	3450	85.0	21.9	16.7	21.5	16.4	20.4	0	CL
9	35	266	14	1.57	0.70	0.99	1.0	1.00	1.3	4025	4025	37.0	21.9	15.4	21.7	15.3	19.2	0	SM
10	40	261	15	1.57	0.66	0.99	1.0	1.00	1.3	4600	4600	37.0	23.5	15.5	23.3	15.4	19.3	0	SM
11	45	256	20	1.57	0.62	1.00	1.0	1.00	1.2	5175	5175	37.0	31.3	19.5	31.2	19.4	23.9	0	SM
12	55	246	18	1.57	0.56	1.00	1.0	1.00	1.3	6325	6325	37.0	28.2	15.8	28.1	15.8	19.8	0	SM
13	60	241	18	1.57	0.54	1.00	1.0	1.00	1.2	6900	6900	27.0	28.2	15.2	28.2	15.2	18.1	0	SM
14	65	236	19	1.57	0.52	1.00	1.0	1.00	1.2	7475	7475	27.0	29.7	15.4	29.7	15.4	18.4	0	SM
15	70	231	18	1.57	0.50	1.00	1.0	1.00	1.2	8050	8050	27.0	28.2	14.0	28.2	14.0	16.9	0	SM
16	75	226	16	1.57	0.48	1.00	1.0	1.00	1.2	8625	8625	27.0	25.0	12.1	25.0	12.1	14.7	0	SM
17	80	221	12	1.57	0.47	1.00	1.0	1.00	1.3	9200	9200	27.0	18.8	8.8	18.8	8.8	11.1	0	SM
18	85	216	12	1.57	0.45	1.00	1.0	1.00	1.3	9775	9775	76.0	18.8	8.5	18.8	8.5	11.4	0	CL
9	90	211	15	1.57	0.44	1.00	1.0	1.00	1.3	10350	10350	76.0	23.5	10.3	23.5	10.3	13.5	0	CL
10	95	206	11	1.57	0.43	1.00	1.0	1.00	1.4	10925	10925	76.0	17.2	7.4	17.2	7.4	10.1	0	CL
11	100	201	13	1.57	0.42	1.00	1.0	1.00	1.3	11500	11500	76.0	20.3	8.5	20.3	8.5	11.4	0	CL

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Checked By: 1/0/1900

Subsurface Soil Properties Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	301.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	199.5

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	301															
1	2.5	298.5	2	3.1	4.0	CL	0	0	0	99.0	23.4	27.0	19.0	8.0	0.55	-	470
2	5	296	0	0.2	0.2	ML	0	0	0	99.0	33.5	30.0	23.0	7.0	1.50	-	23
3	7.5	293.5	0	0.2	0.2	ML	0	0	0	99.0	33.5	30.0	23.0	7.0	1.50	-	23
4	10	291	2	3.1	3.5	ML	0	0	0	99.0	33.5	30.0	23.0	7.0	1.50	-	470
5	15	286	5	7.8	7.7	ML	0	0	0	99.0	33.5	30.0	23.0	7.0	1.50	-	1174
6	22	279	4	6.3	5.3	CL	0	0	0	85.0	26.7	32.0	19.0	13.0	0.59	-	939
7	25	276	11	17.2	13.9	CL	0	0	0	85.0	26.7	32.0	19.0	13.0	0.59	-	2582
8	30	271	14	21.9	16.4	CL	0	0	0	85.0	26.7	32.0	19.0	13.0	0.59	-	3287
9	35	266	14	21.9	15.3	SM	0	0	0	37.0	25.5	40.0	31.0	9.0	-0.61	-	3287
10	40	261	15	23.5	15.4	SM	0	0	0	37.0	25.5	40.0	31.0	9.0	-0.61	-	3521
11	45	256	20	31.3	19.4	SM	0	0	0	37.0	25.5	40.0	31.0	9.0	-0.61	-	4695
12	55	246	18	28.2	15.8	SM	0	0	0	37.0	25.5	40.0	31.0	9.0	-0.61	-	4226
13	60	241	18	28.2	15.2	SM	0	0	0	27.0	24.8	43.0	30.0	13.0	-0.40	-	4226
14	65	236	19	29.7	15.4	SM	0	0	0	27.0	24.8	43.0	30.0	13.0	-0.40	-	4460
15	70	231	18	28.2	14.0	SM	0	0	0	27.0	24.8	43.0	30.0	13.0	-0.40	-	4226
16	75	226	16	25.0	12.1	SM	0	0	0	27.0	24.8	43.0	30.0	13.0	-0.40	-	3756
17	80	221	12	18.8	8.8	SM	0	0	0	27.0	24.8	43.0	30.0	13.0	-0.40	-	2817
18	85	216	12	18.8	8.5	CL	0	0	0	76.0	27.4	31.0	21.0	10.0	0.64	-	2817
9	90	211	15	23.5	10.3	CL	0	0	0	76.0	27.4	31	21	10	0.64	-	3521
10	95	206	11	17.2	7.4	CL	0	0	0	76.0	27.4	31	21	10	0.64	-	2582
11	100	201	13	20.3	8.5	CL	0	0	0	76.0	27.4	31	21	10	0.64	-	3052

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Checked By: #######

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	301.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	199.5

PGA:	0.403
$\varphi_{SL\text{-}Sand}$	0.90
$\varphi_{NSL\text{-}Sand}$	0.75
$\varphi_{SL\text{-}Clay}$	0.90

M_w:	6.99
R(km):	60.56

MSF_{sand}:	1.14
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	301																		
1	2.5	298.5	CL	0	1	4.0	5.5	9.5	PSL	NS Clay-Like	0.20	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
2	5	296	ML	0	1	0.2	5.5	5.7	PSL	HS Clay-Like	7.78	0.9	Strength Loss	-	-	12.6	-	0.0	-	0.0
3	7.5	293.5	ML	0	1	0.2	5.5	5.7	PSL	HS Clay-Like	11.56	0.9	Strength Loss	-	-	12.6	-	0.0	-	0.0
4	10	291	ML	0	1	3.5	5.5	9.0	PSL	HS Clay-Like	0.76	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
5	15	286	ML	0	1	7.7	5.5	13.2	PSL	HS Clay-Like	0.45	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
6	22	279	CL	0	1	5.3	5.5	10.8	PSL	NS Clay-Like	0.79	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
7	25	276	CL	0	1	13.9	5.5	19.4	PSL	NS Clay-Like	0.32	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
8	30	271	CL	0	1	16.4	5.5	21.9	PSL	NS Clay-Like	0.29	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
9	35	266	SM	0	1	15.3	5.5	20.8	PSL	NS Clay-Like	0.33	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
10	40	261	SM	0	1	15.4	5.5	20.9	PSL	NS Clay-Like	0.34	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
11	45	256	SM	0	1	19.4	5.5	24.9	PSL	NS Clay-Like	0.28	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
12	55	246	SM	0	1	15.8	5.5	21.3	PSL	NS Clay-Like	0.35	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
13	60	241	SM	0	1	15.2	5.2	20.4	PSL	NS Clay-Like	0.37	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
14	65	236	SM	0	1	15.4	5.2	20.6	PSL	NS Clay-Like	0.37	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
15	70	231	SM	0	1	14.0	5.2	19.3	PSL	NS Clay-Like	0.41	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
16	75	226	SM	0	1	12.1	5.2	17.3	PSL	NS Clay-Like	0.47	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
17	80	221	SM	0	1	8.8	5.2	14.0	PSL	NS Clay-Like	0.65	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
18	85	216	CL	0	1	8.5	5.5	14.0	PSL	HS Clay-Like	0.68	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
9	90	211	CL	0	1	10.3	5.5	15.8	PSL	HS Clay-Like	0.56	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
10	95	206	CL	0	1	7.4	5.5	12.9	PSL	HS Clay-Like	0.78	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0
11	100	201	CL	0	1	8.5	5.5	14.0	PSL	HS Clay-Like	0.69	0.9	No Strength Loss	-	-	-	-	0.0	-	0.0

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Designed By: SKB
Checked By: #######

SPT-Based Soil Shear Strength Summary

Project Name: SR-1 over Muddy Creek
County: Haywood County

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	301.0
Groundwater Depth, ft:	101.5
Groundwater Elevation, ft msl:	199.5

PGA: 0.403

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		301																		
1	2.5	298.5	2	9.5	CL	99.0	287.5	287.5	23.4	27	19	8	NS Clay-Like	No Strength Loss	-	470	-	470	-	470
2	5	296	0	5.7	ML	99.0	575.0	575.0	33.5	30	23	7	HS Clay-Like	Strength Loss	-	23	-	20	-	10
3	7.5	293.5	0	5.7	ML	99.0	862.5	862.5	33.5	30	23	7	HS Clay-Like	Strength Loss	-	23	-	20	-	10
4	10	291	2	9.0	ML	99.0	1150.0	1150.0	33.5	30	23	7	HS Clay-Like	No Strength Loss	-	470	-	470	-	470
5	15	286	5	13.2	ML	99.0	1725.0	1725.0	33.5	30	23	7	HS Clay-Like	No Strength Loss	-	1174	-	1170	-	1170
6	22	279	4	10.8	CL	85.0	2530.0	2530.0	26.7	32	19	13	NS Clay-Like	No Strength Loss	-	939	-	940	-	940
7	25	276	11	19.4	CL	85.0	2875.0	2875.0	26.7	32	19	13	NS Clay-Like	No Strength Loss	-	2582	-	2580	-	2580
8	30	271	14	21.9	CL	85.0	3450.0	3450.0	26.7	32	19	13	NS Clay-Like	No Strength Loss	-	3287	-	3290	-	3290
9	35	266	14	20.8	SM	37.0	4025.0	4025.0	25.5	40	31	9	NS Clay-Like	No Strength Loss	-	3287	-	3290	-	3290
10	40	261	15	20.9	SM	37.0	4600.0	4600.0	25.5	40	31	9	NS Clay-Like	No Strength Loss	-	3521	-	3520	-	3520
11	45	256	20	24.9	SM	37.0	5175.0	5175.0	25.5	40	31	9	NS Clay-Like	No Strength Loss	-	4695	-	4700	-	4700
12	55	246	18	21.3	SM	37.0	6325.0	6325.0	25.5	40	31	9	NS Clay-Like	No Strength Loss	-	4226	-	4230	-	4230
13	60	241	18	20.4	SM	27.0	6900.0	6900.0	24.8	43	30	13	NS Clay-Like	No Strength Loss	-	4226	-	4230	-	4230
14	65	236	19	20.6	SM	27.0	7475.0	7475.0	24.8	43	30	13	NS Clay-Like	No Strength Loss	-	4460	-	4460	-	4460
15	70	231	18	19.3	SM	27.0	8050.0	8050.0	24.8	43	30	13	NS Clay-Like	No Strength Loss	-	4226	-	4230	-	4230
16	75	226	16	17.3	SM	27.0	8625.0	8625.0	24.8	43	30	13	NS Clay-Like	No Strength Loss	-	3756	-	3760	-	3760
17	80	221	12	14.0	SM	27.0	9200.0	9200.0	24.8	43	30	13	NS Clay-Like	No Strength Loss	-	2817	-	2820	-	2820
18	85	216	12	14.0	CL	76.0	9775.0	9775.0	27.4	31	21	10	HS Clay-Like	No Strength Loss	-	2817	-	2820	-	2820
9	90	211	15	15.8	CL	76.0	10350.0	10350.0	27.4	31.0	21.0	10.0	HS Clay-Like	No Strength Loss	-	3521.3	-	3520	-	3520
10	95	206	11	12.9	CL	76.0	10925.0	10925.0	27.4	31.0	21.0	10.0	HS Clay-Like	No Strength Loss	-	2582.3	-	2580	-	2580
11	100	201	13	14.0	CL	76.0	11500.0	11500.0	27.4	31.0	21.0	10.0	HS Clay-Like	No Strength Loss	-	3051.8	-	3050	-	3050

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Subsurface Investigation Geotechnical Data Report

SR-87 over Overflow (Bridge No. 5)

PIN No.: 128113.05
GES No.: 4932618

Lauderdale County, TN
June 20, 2019

APPROVED
07/03/2019

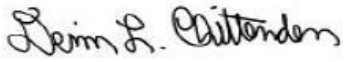
June 20, 2019

Mr. Travis Smith, P.E.
Civil Engineering Manager I
Materials & Tests Division
Tennessee Department of Transportation
6601 Centennial Boulevard
Nashville, Tennessee 37243

Dear Mr. Smith,

We have completed the *Subsurface Investigation Geotechnical Data Report* for the Bridge Replacement on SR-87 over Overflow channel in Lauderdale County, Region 4 (Bridge No. 5). Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering and geological services to the Tennessee Department of Transportation.

Sincerely,
HDR



Devin L. Chittenden, P.E.
Senior Geotechnical Engineer



Bret O. Watkins, P.G.
Senior Geologist

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T 270.538.1500

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Executive Summary

The proposed project entails the replacement of an existing two-lane bridge along SR-87 near log mile 3.88 in Lauderdale County, TN. The new structure will be a direct replacement of the existing 29-ft single-span bridge with a 32-ft single span bridge or reinforced concrete box culvert (RCBC) over the Overflow Channel, beginning at Station 108+07.79 and ending at Station 108+39.79.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein. Bedrock was not encountered within the advanced borings.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design/build team for the proposed bridge along SR-87 near log mile 3.88 over an overflow channel in Lauderdale County, TN. The proposed 32-ft single span bridge or box culvert begins at 108+07.79 and ends at Station 108+39.79. Borings were advanced and soil samples were collected and delivered to the HDR laboratory for further testing and analysis. Geotechnical parameters and foundation recommendations are provided in this report resulting from the evaluations of soil conditions at the proposed bridge site.

2 Subsurface Exploration

A subsurface investigation was conducted at this site by HDR and sub-consultants in May 2019. The exploration program included two Standard Penetration Test (SPT) borings advanced to 100-ft bgs, with each boring advanced with a CME-45C track-mounted rig on opposite ends of the existing bridge, offset to roadway centerline. In addition, one piezoCone Penetrometer Test (CPT) boring was advanced by track-mounted box rig with 20-ton reaction mass near the west bridge abutment to cone refusal depth (see Bridge Boring Plan Sheet – Appendix A). Test boring locations are tabulated below:

Table 2-1. Test Boring Locations

Test Hole Number	Location	Station	Offset	Depth
B-1	West Abutment	107+98	25-ft RT	101.5-ft
B-2	East Abutment	108+49	9-ft LT	101.5-ft
CPT-1	West Abutment	108+00	18-ft RT	88-ft

SPT's were obtained at 2.5-ft intervals in the top ten feet and at five foot intervals until reaching termination depths. SPT borings were logged for blow counts, soil types, sample recoveries, and boring metrics. CPT piezoCone readings of tip resistance, sleeve friction, friction ratio, and pore water pressure were collected on a continuous basis as the cone was advanced at a rate of 2cm/sec until refusal was met at 88-ft bgs. Seismic velocity measurements were also collected in the CPT boring at 3-ft intervals. Boring logs from borings B-1 and B-2, as well as CPT results are provided in Appendix B. All soil specimens were delivered to HDR for laboratory testing and analysis, including the following tests:

Atterberg Limits	AASHTO T-89 and T-90
Sieve Analysis	ASTM D-1140
Natural Moisture Content	AASHTO T-265

Unconsolidated Undrained (UU) Compression Test	AASHTO T-296
Standard Proctor	AASHTO T-99
pH Testing	AASHTO T-288
Resistivity	ASTM G-187

The full laboratory testing results are located in Appendix C.

3 Geology, Soils, and Site Conditions

The proposed bridge site is topographically depicted on the Golddust, Tennessee 7.5-minute topographic quadrangle map as situated in an area of low to moderate relief, specifically on the northwest edge of the Hatchie River floodplain, which regionally drains to the southwest into the nearby Mississippi River. The bridge straddles an overflow branch of the Hatchie River that provides relief of the main river channel during high water conditions. Approximate bridge deck elevations range from 250-ft to 260-ft, with nearby loessal bluff elevations over 350-ft.

The project bridge site is located within the Gulf Coastal Plain Physiographic Province of Western Tennessee. The Mississippi Embayment – a large fluvial floodplain with relatively flat to gently sloping topography providing drainage over much of the central and eastern portions of North America – forms the northern portion of this province. The Embayment was initially formed as a topographic low during the Proterozoic, precipitated by crustal weaknesses that created many structural deformities including the Reelfoot Rift of the New Madrid Seismic Zone. By the end of the Paleozoic, much of the regional basin was infilled with shallow marine deposits, forming the base of the Embayment today as limestone, shale, and sandstones. Regional subsidence and deposition following the Paleozoic resulted in the thick accumulation of Mesozoic and younger unconsolidated strata that generally dip towards the Mississippi River, increasing in thickness to as much as 3000-ft thick, with strata becoming progressively younger towards the center of the basin.

Published mapping indicates the presence of Pleistocene to Recent loess deposits as part of a large loessal bluff situated immediately north that trends east/northeast to west/southwest. Loess deposits in this area are largely composed of massively bedded clayey sands and fine sandy silts, with an approximate thickness of 20 to 30-ft. The bridge approaches are supported atop this loess with roadway embankment fill, approximately 5 – 10 ft thick. The loess deposits are supported by Eocene deltaic non-marine deposits of primarily fine-grained micaceous quartz sands that are crossbedded and interlaminated with clay, including minor beds of lignite and lignitic clays. Eocene deposits (Claiborne/Wilcox Formations, undivided) are often laterally inconsistent due to crossbedding. Anticipated thickness of Eocene sediments is greater than 1,000-ft thick, which are further supported by Paleocene shallow marine deposits of dark gray to greenish gray glauconitic clay with thin lenses of fine-grained light to medium gray sands. Anticipated thickness ranges from 200 to 400 ft. Paleocene sediments are further supported by Upper Cretaceous unconsolidated sediments lying atop Paleozoic rocks anticipated to be greater than 2,000 ft deep.

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1 and B-2. Fill was intercepted from the existing ground surface to approximately 7.0-ft depth. Field and laboratory classifications of recovered SPT samples indicate very soft clayey silts, fine sands, and trace gravels (CL, ML).

Loess and re-worked loess are interpreted as underlying the embankment fill in both of the advanced borings with an approximate thickness of 28-ft. Recovered samples indicate loess and re-worked loess are dominantly silts, clays, and fine-grained sands (CL, ML, SM). Loess deposits exhibited low plastic characteristics though a few samples exhibiting non-plastic characteristics were penetrated. SPT drives and laboratory testing of samples indicated very soft to firm consistency for cohesive sediments that locally dominate the loess deposits. Natural moisture content of loess samples ranges from 25 – 32 percent. The base of loess is believed to rest upon an angular unconformity surface eroded into the underlying Tertiary Eocene deposits (Claiborne/Wilcox Formations, undivided). This surface varied in elevation from 247.0 to 249.0-ft within advanced borings.

Claiborne/Wilcox Formation sediments underlying loess deposits were intercepted approximately 35 to 40-ft below grade. The base of Claiborne/Wilcox sediments were not intercepted in the borings advanced, therefore thicknesses were interpreted to be greater than 66-ft. This formation (considered undivided in this locality) is predominantly composed of non-plastic fine to medium-grained silty sands (SP-SM, SW-SM) interbedded with low plasticity sandy to clayey silts (ML, SM). SPT drives indicate firm to very dense relative densities. Natural moisture contents generally ranged from 20 – 38 percent.

No faulting was indicated on published mapping within the limits of the proposed alignment. Likewise recovered samples did not indicate the presence of faulting. The region surrounding the project area is located within an active seismic region (New Madrid Seismic Zone) and is considered one of the most active seismic regions in the country. Regional seismic events, both along the New Madrid Fault System and associated fault systems, have been and are continually documented throughout Western Tennessee, Western Kentucky, Southern Illinois, Southeastern Missouri and Northeastern Arkansas.

Groundwater was encountered within each of the bridge borings at the end of drilling operations at depths ranging from approximately 10.4-ft to 12.3-ft. Generally, the interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed bridge foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A, with borehole test logs provided in Appendix B.

Table 3-1. Generalized Subsurface Conditions

Material Type/Formation	Elevation of Top Layer (ft)	Depth to Top Layer (ft)	USCS Soil Type	SPT-N values (bpf)	UU Total Shear Strength (psf)
Embankment Fill	254.0-256.0	0	CL, ML(A-4)	1-2	
Pleistocene Loess	247.0-249.0	7.0	CL, ML, SM (A-4)	0-4	1,441-1,464
Eocene-Claiborne/Wilcox	218.0-219.0	35.0-38.0	ML (A-4), SM (A-2-4), SW-SM, SP-SM (A-1-b)	9-68	5,495

In addition to lab classification and triaxial shear testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils data for use by a structural engineer to provide any necessary protection to the piling, concrete, reinforcing steel, etc. Corrosion and deterioration protection requirements and guidelines for piling are set forth in LRFD Section 10.7.5. The corrosion and deterioration testing results are summarized in Table 3-2 below and are included in Appendix C.

Table 3-2. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth	pH	Resistivity (ohm·cm)
B-2	108+49	9-ft LT	0.0'-10.0'	7.4	4,400

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation:

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation:

- Resistivity less than 3,000 ohm-cm
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Results of the corrosion and deterioration testing indicated that the site has low potential for pile or steel reinforcement deterioration based on the resistivity value and the geographical location of the project site. Interpretation of the data and corrosion protection of the bridge structural components will be discussed with the structural engineer for the project.

4 Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Lauderdale County is considered vulnerable to severe ground shaking. The project site classifies as Site Class D based on the average CPT shear wave value (785.2 ft/s). The peak ground acceleration coefficient for this project site, obtained from USGS (2009), is equal to 0.72g using Site Class D. S-wave response measurements (Vs) collected from the CPT boring observed values ranging from 163 – 848 ft/sec from 5-ft to 48-ft depths. From 52-ft to 88-ft depths, velocities increased to 698 – 1,796 ft/sec.

Preliminary analyses of the subsurface conditions in the SPT and CPT borings were performed to evaluate the likelihood of liquefaction during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger

Soil Liquefaction during Earthquakes (2008) and using the Geologismiki software Cliq v.3.0.

Table 4-1. Soil Liquefaction Potential Results

Test Boring	Depth(ft)	Thickness(ft)	Average FS	Average LPI	Settlement (in)
B-1	2.0-7.75	5.5	0.27	N/A	3.15
	12.5-31.0	18.5	0.32	N/A	0.0 (clay-like)
	43.5-53.5	10.0	0.46	N/A	2.28
	58.5-68.5	10.0	0.50	N/A	5.52
B-2	10.25-39.0	28.75	0.33	N/A	0.0 (clay-like)
	39.0-44.0	5.0	0.99	N/A	0.40
	49.0-54.0	5.0	0.98	N/A	0.0 (clay-like)
	54.0-89.0	35.0	0.54	N/A	7.73
	99.0-101.5	2.50	0.53	N/A	1.13
CPT-1	43.14-43.80	0.66	0.70	0.05	0.11
	46.26-49.26	3.00	0.39	0.08	0.97
	55.28-58.40	3.12	0.49	0.03	0.77
	61.02-62.99	1.97	0.38	0.02	0.64
	66.93-68.08	1.15	0.43	0.00	0.35
	69.06-87.43	18.37	0.26	0.00	7.33

Based on the results of the seismic hazard evaluation, it is believed the soils are susceptible to shear strength loss during the seismic event. The liquefiable layers present at the SPTs indicate layers ranging from 2.5’ to 35.0’ thick and settlement magnitudes ranging from 9.26” to 10.95”. CPTs obtain continuous testing data at approximately 2-inch intervals and it is typically more appropriate to rely on CPT results more than SPT results during liquefaction analysis because they generate an improved soil model by localizing weaker zones susceptible to liquefaction. The liquefiable layers present at the CPTs indicate layers ranging from 0.66’ to 18.37’ thick and settlement magnitudes of 10.17”. Other seams of liquefiable material were present in the CPT results; however, it is common practice to eliminate layers of liquefaction less than 6” thick. The results of the preliminary soil shear strength loss analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. More detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment

slopes, embankment settlements, retaining walls and bridge foundation types and capacities will be required to ensure a sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed bridge on SR-87 over Overflow branch in Lauderdale County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

AASHTO, 2014; AASHTO LRFD Bridge Design Specifications Seventh Edition, 2014; Washington, DC, American Association of State Highway and Transportation Officials.

Boulanger, R.W., et al (2008); Soil Liquefaction during Earthquakes; Earthquake Engineering Research Institute.

Hardeman, W.D., et al (1966). “Geologic Map of Tennessee – West Sheet”; Department of Environment and Conservation, Division of Geology; scale 1:250,000.

NRCS (2009). “Soil Map - Lauderdale County, Tennessee”, “Engineering Properties”, “Physical Soil Properties”; Web Soil Survey – National Cooperative Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

USGS (2009). Earthquake Design Maps, AASHTO-2009. Online. URL: <https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=35.626924&longitude=-89.826157&siteClass=D&title=Example> Accessed June 19, 2019.

USGS (2019). “Golddust, TN Topographic Quadrangle Map”, United States Geological Survey, 7.5 Minute Series; scale 1:24,000.

Appendix A: Plan and Boring Sheets

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
BR-STP-87(9)	2019	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION

108

CULTIVATED FIELD

WOODS

PROP. R.O.W.

N

BEGIN PROP. BR.
STA. 108+07.79

END PROP. BR.
STA. 108+39.79

TYPE 3E

TYPE 3S SLOPE

TYPE 3E

TYPE 3S SLOPE

N 74° 57' 23" E

BR5_B-2

TYPE 3E

TYPE 3S SLOPE

BR5_CPT-1

BR5_B-1

TYPE 3E

TYPE 3S SLOPE

SR87 STA. 108+22.27 =
OVERFLOW STA. 33+39.09
N 493119.2412
E 831755.3775

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROP. R.O.W.

SR 87 OVER OVERFLOW
BRIDGE NO. 49-SR087-03.88
FED. ID NO. 49SR0870011
LAUDERDALE COUNTY
2018

DESIGNED BY _____ DATE _____
DRAWN BY Tamara Lynn DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/19

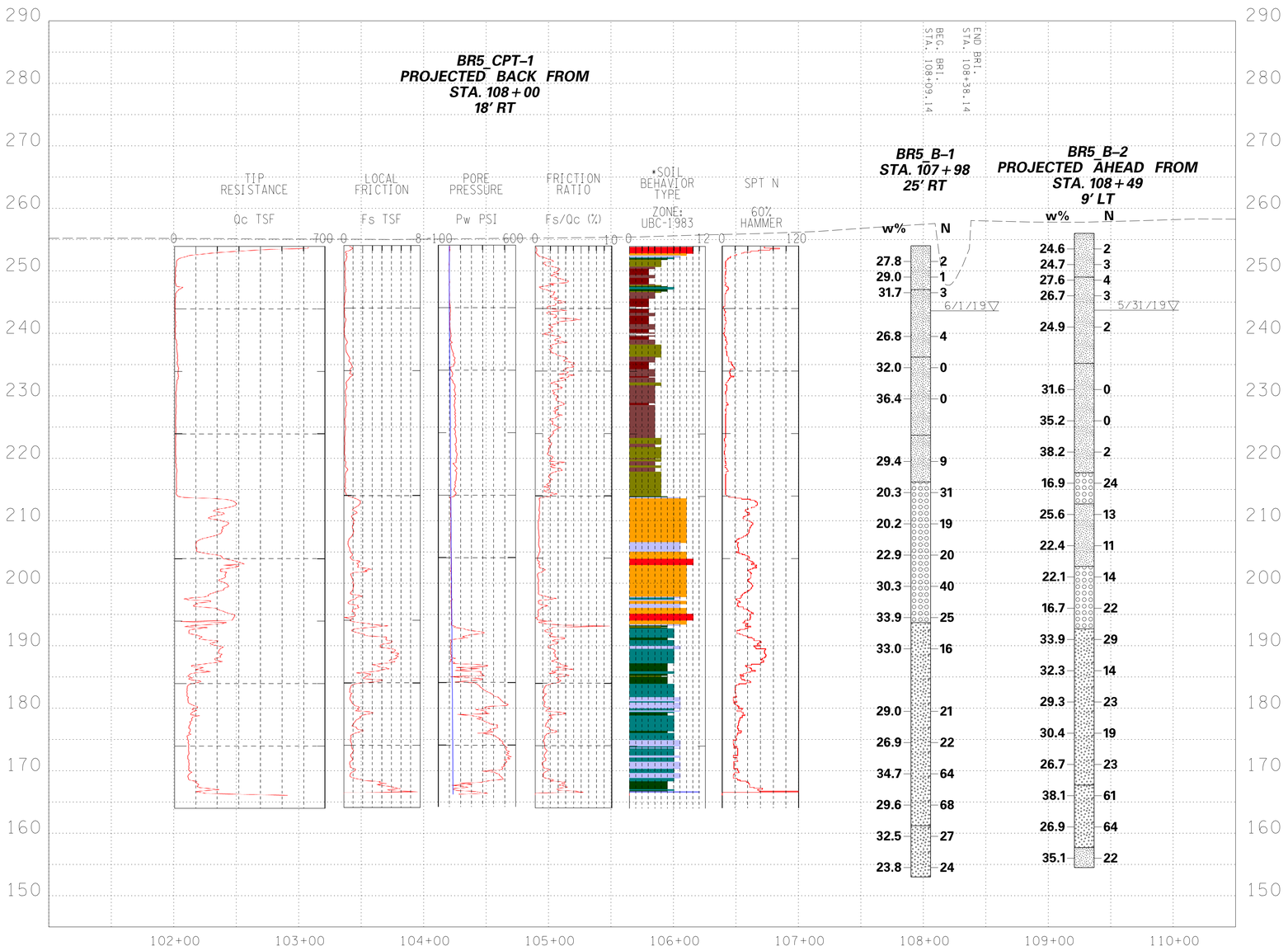
HDR

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
BR-STP-87(9)	2019	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS

ADDITIONAL ROCK SYMBOLS

SYMBOL	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	RANDOM BACKFILL	WEATHERED LIMESTONE	GRADED SOLID ROCK

SPT BORING LEGEND

○	ROCKLINE SOUNDINGS	RQD	ROCK QUALITY DESIGNATION
◕	DISTURBED SAMPLE BORING	REC	% CORE RECOVERED
◎	UNDISTURBED SAMPLE BORING	Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
⦿	UNDISTURBED SAMPLE BORING & ROCK CORE	Qu (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ROCK CORE)
●	ROCK CORE	UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
➡	APPROXIMATE PILE TIP ELEVATION	w%	MOISTURE CONTENT
▼(Date)	WATER ELEVATION	R	REFUSAL
✳	LIQUEFACTION OR SOIL STRENGTH LOSS IS PROBABLE AT THESE LOCATIONS	NR	REFUSAL NOT ENCOUNTERED
N	UNCORRECTED PENETRATION RESISTANCE		

CPT SOUNDINGS LEGEND

MAXIMUM DEPTH = 87.93 FEET

DEPTH INCREMENT = 0.164 FEET

1 SENSITIVE FINE GRAINED
2 ORGANIC MATERIAL
3 CLAY
4 SILTY CLAY TO CLAY
5 CLAYEY SILT TO SILTY CLAY
6 SANDY SILT TO CLAYEY SILT
7 SILTY SAND TO SANDY SILT
8 SAND TO SILTY SAND
9 SAND
10 GRAVELLY SAND TO SAND
11 VERY STIFF FINE GRAINED (•)
12 SAND TO CLAYEY SAND (•)

REFUSAL: REACTION

•SOIL BEHAVIOR TYPE AND SPT BASED ON DATA FROM UBC-1983

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 87 OVER OVERFLOW
BRIDGE NO. 49-SR087-03.88
FED. ID NO. 49SR0870011
LAUDERDALE COUNTY
2018

DESIGNED BY _____ DATE _____
DRAWN BY Tamara Lynn DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/19

Appendix B: Boring Logs & CPT Data

State **Tennessee** Latitude **35.62683 °** Longitude **89.8262 °**

County **Lauderdale** Location **107+98 25' RT**

Project Name **SR-87 Over Overflow** Surface Elevation **254 ft.**

Project Type **Subsurface Investigation** Dated Started **5/31/2019** Completed **6/1/2019**

Driller **D. Bowling** Logged by **B. Cayton** Depth to Water: Immediate **(After 20 min.) 10.4 ft.**

Hole Number **BR5_B-1** Total Depth **101 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
254.0 ft	0		*Ground Line*						
			Very soft to soft, brown, silt with sand.		SS-1	2.5 4.0	1.0	1-1-1	SPT
250	5				SS-2	5.0 6.5	1.2	0-0-1	SPT
			7.0' Very loose, brown, silty sand with gravel.		SS-3	7.5 9.0	1.1	1-2-1	SPT
245	10				ST-1	9.5 11.5	1.8		ST
240	15				SS-4	14.5 16.0	1.2	1-2-2	SPT
			17.8' Very soft, brown and gray, lean clay.		SS-5	19.5 21.0	1.5	0-0-0	SPT
235	20								
230	25				SS-6	24.5 26.0	1.5	0-0-0	SPT
			30.3' Stiff, brown and gray, silt.		ST-2	29.5 31.5	2.0		ST
225	30								
220	35				SS-7	34.5 36.0	1.3	0-2-7	SPT
			37.8' Medium dense to dense, gray and brown, well-graded sand with silt and gravel.		SS-8	39.5 41.0	0.9	7-12-19	SPT
215	40								
210	45				SS-9	44.5 46.0	0.9	4-9-10	SPT
205	50				SS-10	49.5 51.0	1.2	14-12-8	SPT
200	55				SS-11	54.5 56.0	1.5	13-25-15	SPT
195	60					59.5			

State **Tennessee** Latitude **35.62683** ° Longitude **89.8262** °

County **Lauderdale** Location **107+98 25' RT**

Project Name **SR-87 Over Overflow** Surface Elevation **254 ft.**

Project Type **Subsurface Investigation** Dated Started **5/31/2019** Completed **6/1/2019**

Driller **D. Bowling** Logged by **B. Cayton** Depth to Water: Immediate **(After 20 min.) 10.4 ft.**

Hole Number **BR5_B-1** Total Depth **101 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
194.0 ft	60		*Continued from previous page*					
			Medium dense to very dense, gray, well-graded sand with silt. (92.3')	SS-12	61.0	1.5	7-11-14	SPT
190	65			SS-13	64.5 66.0	1.5	6-7-9	SPT
185	70			ST-3	69.5 71.5	1.5		ST
180	75			SS-14	74.5 76.0	1.5	8-9-12	SPT
175	80			SS-15	79.5 81.0	1.5	6-9-13	SPT
170	85			SS-16	84.5 86.0	1.5	15-25-39	SPT
165	90			SS-17	89.5 91.0	1.5	15-40-28	SPT
			(92.8') Medium dense, dark brown and brown, silty sand.					
160	95			SS-18	94.5 96.0	1.3	8-12-15	SPT
155	100		(101.0')	SS-19	99.5 101.0	1.4	11-11-13	SPT
			Boring Terminated @ 101.0' (Elev. 153.0).					
150	105		Bulk sample obtained from 0.0'-10.0'. Boring relocated to avoid overhead utilities and minimize impact to traffic.					
145	110							
140	115							
135	120							

State	**Tennessee**	Latitude	**35.62696 °**
County	**Lauderdale**	Location	**108+49 9' LT**
Project Name	**SR-87 Over Overflow**	Surface Elevation	**256 ft.**
Project Type	**Subsurface Investigation**	Dated Started	**5/30/2019**
Driller	**D. Bowling**	Logged by	**B. Cayton**
Hole Number	**BR5_B-2**	Total Depth	**101.5 ft.**

Longitude **89.82607 °**
Completed **5/31/2019**
Depth to Water: Immediate **12.3 ft.**
Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
256.0 ft	0		*Ground Line*						
255			Asphalt pavement						
			1.0' Aggregate base course 1.4'						
			Very soft to soft, brown, lean clay with sand.		SS-1	2.5 / 4.0	1.0	1-1-1	SPT
	5				SS-2	5.0 / 6.5	1.2	2-1-2	SPT
250			7.0' Very soft to soft, brown, lean clay.		SS-3	7.5 / 9.0	1.4	2-1-3	SPT
	10				SS-4	10.0 / 11.5	1.3	0-1-2	SPT
245 ▽									
	15				SS-5	15.0 / 16.5	1.4	0-1-1	SPT
240									
	20		20.8' Very soft, brown and gray silt.		ST-1	20.0 / 22.0	1.9		ST
235									
	25				SS-6	25.0 / 26.5	1.5	0-0-0	SPT
230									
	30				SS-7	30.0 / 31.5	1.5	0-0-0	SPT
225									
	35				SS-8	35.0 / 36.5	1.5	1-1-1	SPT
220			38.3' Medium dense, gray, well-graded sand with silt and gravel.						
	40				SS-9	40.0 / 41.5	1.2	4-10-14	SPT
215			43.3' Stiff, gray, sandy silt.						
	45				SS-10	45.0 / 46.5	1.0	5-6-7	SPT
210									
	50				SS-11	50.0 / 51.5	1.4	3-4-7	SPT
205			53.3' Medium dense, gray, poorly graded sand with silt.						
	55				SS-12	55.0 / 56.5	0.9	5-5-9	SPT
200									
	60								

State **Tennessee** Latitude **35.62696 °** Longitude **89.82607 °**

County **Lauderdale** Location **108+49 9' LT**

Project Name **SR-87 Over Overflow** Surface Elevation **256 ft.**

Project Type **Subsurface Investigation** Dated Started **5/30/2019** Completed **5/31/2019**

Driller **D. Bowling** Logged by **B. Cayton** Depth to Water: Immediate **12.3 ft.**

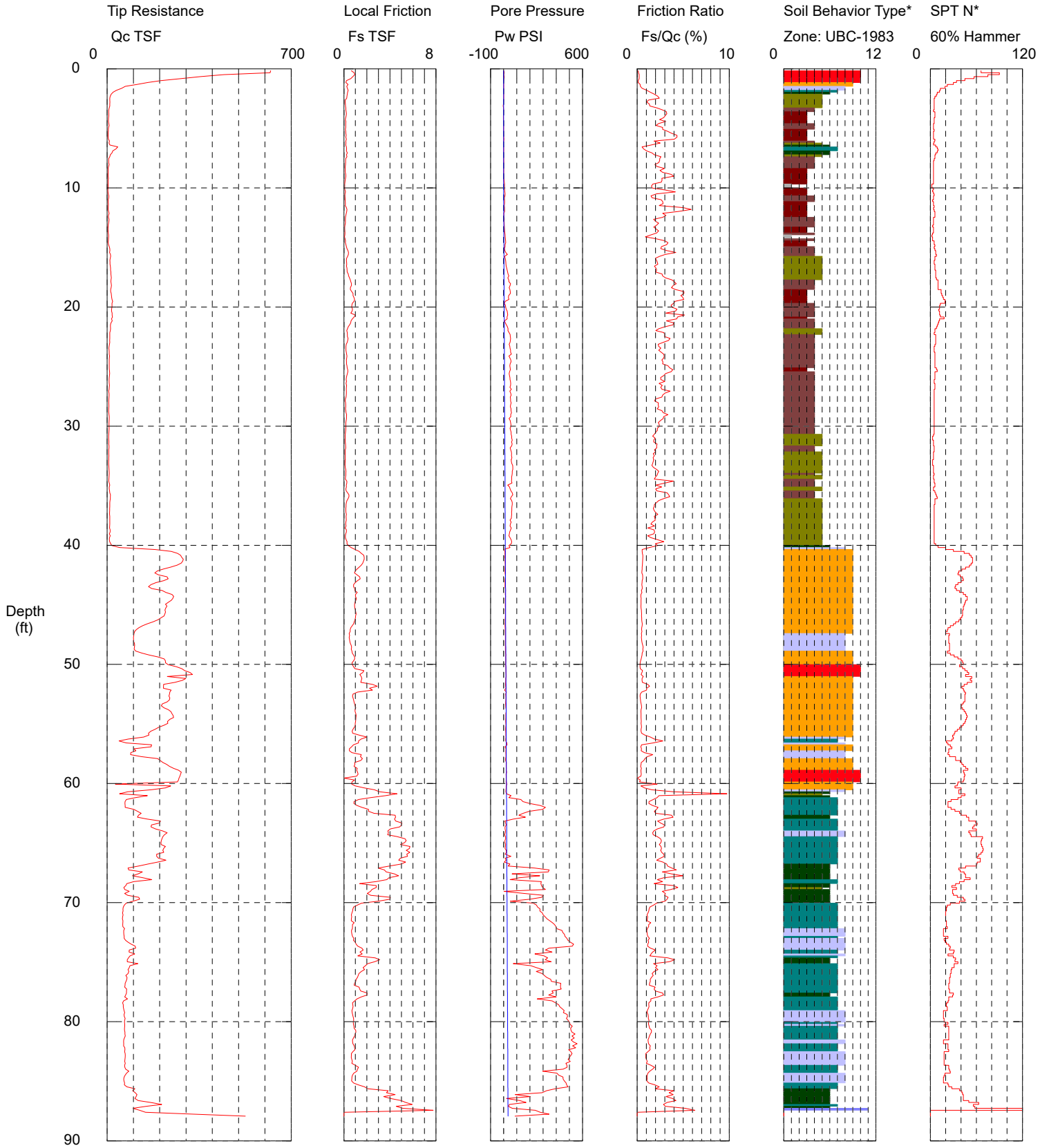
Hole Number **BR5_B-2** Total Depth **101.5 ft.** Depth to Water _____ Date Measured _____

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
196.0 ft	60		*Continued from previous page*						
195					SS-13	60.0 61.5	0.8	9-14-8	SPT
			63.3'						
	65		Medium dense, gray, well-graded sand with silt.						
190					SS-14	65.0 66.5	1.5	9-11-18	SPT
	70								
185					SS-15	70.0 71.5	1.5	6-6-8	SPT
	75								
180					SS-16	75.0 76.5	1.5	6-9-14	SPT
	80								
175					SS-17	80.0 81.5	1.5	7-8-11	SPT
	85								
170					SS-18	85.0 86.5	1.5	6-8-15	SPT
			88.3'						
	90		Very dense, gray, silty sand.						
165					SS-19	90.0 91.5	1.5	16-31-30	SPT
	95								
160					SS-20	95.0 96.5	1.5	10-23-41	SPT
			98.3'						
	100		Very dense, brown, silty sand.						
155					SS-21	100.0 101.5	1.5	6-9-13	SPT
			101.5'						
			Boring Terminated @ 101.5' (Elev. 154.5).						
			Bulk sample obtained from 0.0'-10.0'.						
150	105								
145	110								
140	115								
	120								

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR5CPT-1
Cone Used: DDG1210
GPS Data: N35.62685 W89.82620

CPT Date/Time: 5/15/2019 9:54:03 AM
Location: LAUDERDALE CO.
Job Number: M19-169
Groundwater: Collapsed and dry at 10.9-ft.



Maximum Depth = 87.93 feet

Depth Increment = 0.164 feet

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

Refusal: Rod Buckling.

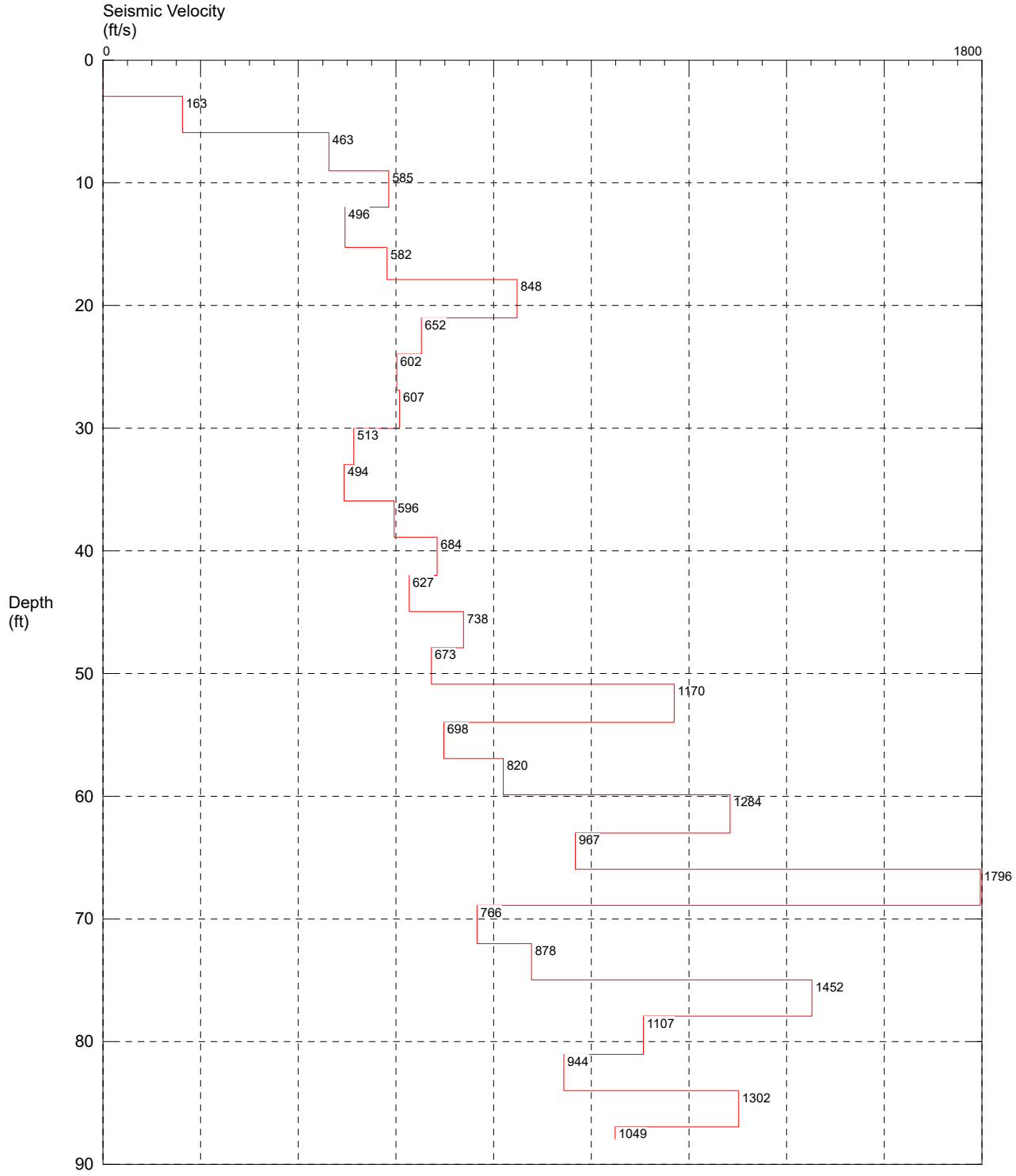
*Soil behavior type and SPT based on data from UBC-1983

SOUNDING

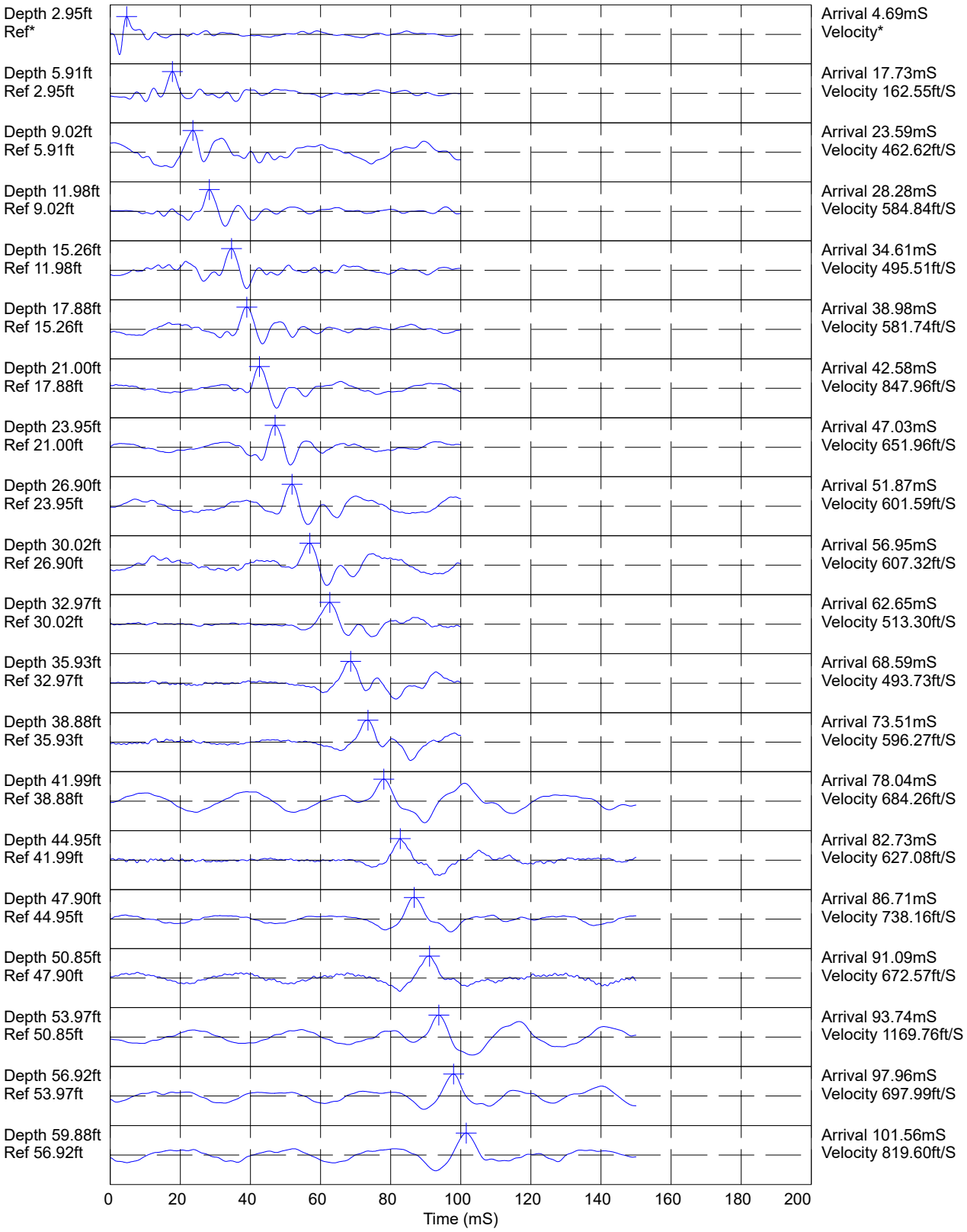
CUSTOMER: Southern Earth Science Inc
OPERATOR: Brandon Green
CONE ID: DDG1210
FILENAME: M19-169BR5CPT-1.cpt

JOB NUMBER: M19-169
HOLE NUMBER: BR5CPT-1
TEST DATE: 5/15/2019 9:54:03 AM

COMMENT:
GPS (LAT,LON,ALT): 0.00,0.00,0.0
LOCATION: LAUDERDALE CO.



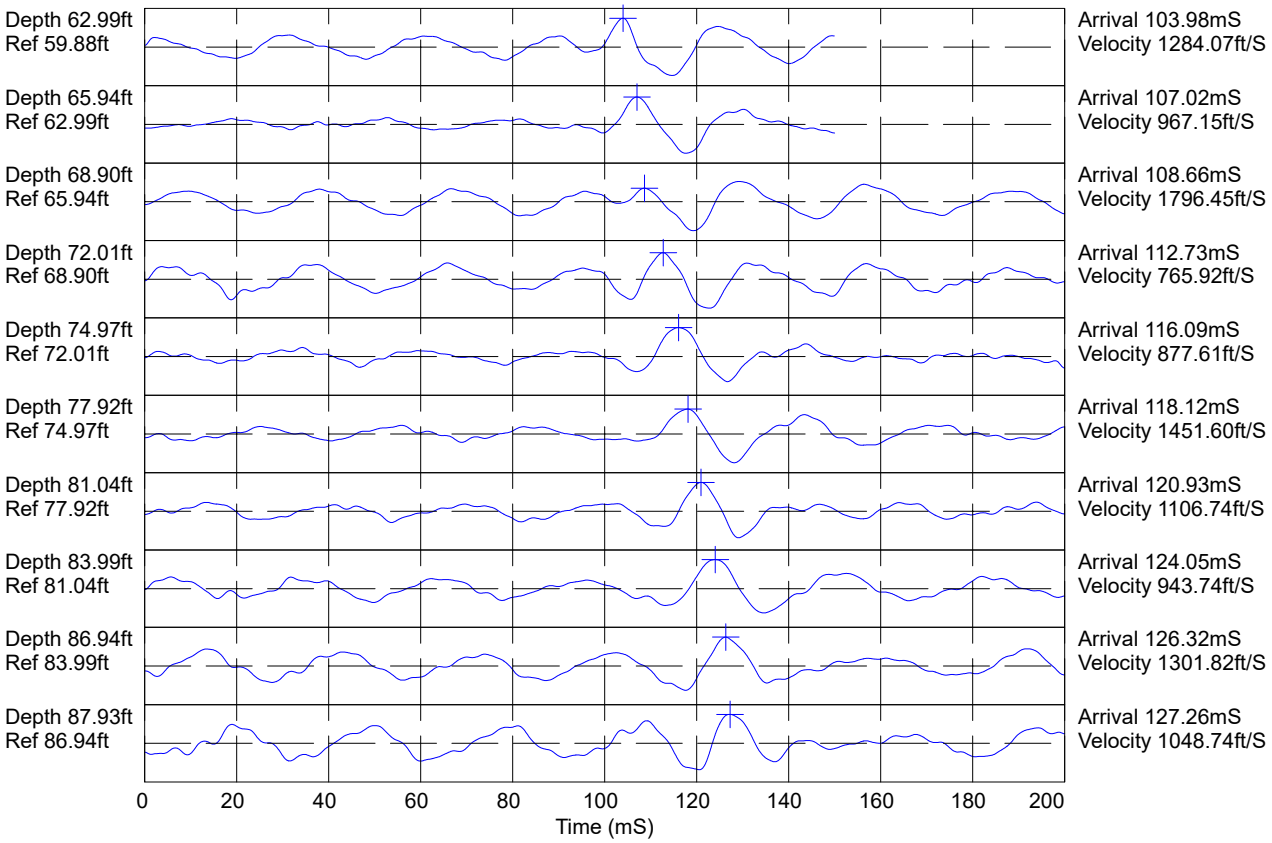
HOLE NUMBER: BR5CPT-1



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

HOLE NUMBER: BR5CPT-1



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

Appendix C: Laboratory Testing

Project Name : SR 87 Overflow
Location : Lauderdale County, TN
Job Number : 10168889

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
2	B-1		SS-1	2.5	4.0	Brown Silt with Sand		27.8
2			SS-2	5.0	6.5	Brown Silt with Sand		29.0
4			SS-3	7.5	9.0	Brown Silty Sand with Gravel		31.7
			ST-1	9.5				
4			SS-4	14.5	16.0	Brown Silty Sand with Gravel		26.8
3			SS-5	19.5	21.0	Brown Lean Clay		32.0
3			SS-6	24.5	26.0	Brown & Gray Lean Clay		36.4
			ST-2	29.5				
5			SS-7	34.5	36.0	Brown & Gray Silt		29.4
6			SS-8	39.5	41.0	Gray Well-Graded Sand with Silt and Gravel		20.3
6			SS-9	44.5	46.0	Gray Well-Graded Sand with Silt and Gravel		20.2
6			SS-10	49.5	51.0	Gray Well-Graded Sand with Silt and Gravel		22.9
6			SS-11	54.5	56.0	Brown & Gray Well-Graded Sand with Silt and Gravel		30.3
			SS-12	59.5	61.0	Gray		33.9
9			SS-13	64.5	66.0	Gray Well-Graded Sand with Silt		33.0
			ST-3	69.5				
9			SS-14	74.5	76.0	Gray Well-Graded Sand with Silt		29.0
9			SS-15	79.5	81.0	Gray Well-Graded Sand with Silt		26.9
9			SS-16	84.5	86.0	Gray Well-Graded Sand with Silt		34.7
9			SS-17	89.5	91.0	Gray & Brown Well-Graded Sand with Silt		29.6
10			SS-18	94.5	96.0	Dark Brown Silty Sand		32.5
10			SS-19	99.5	101.0	Brown Silty Sand		23.8
1	B-2		SS-1	2.5	4.0	Brown Lean Clay with Sand		24.6
1			SS-2	5.0	6.5	Brown Lean Clay with Sand		24.7
3			SS-3	7.5	9.0	Brown Lean Clay		27.6
3			SS-4	10.0	11.5	Brown Lean Clay		26.7
3			SS-5	15.0	16.5	Brown Lean Clay		24.9
			ST-1	20.0				
5			SS-6	25.0	26.5	Brown & Gray Silt		31.6
5			SS-7	30.0	31.5	Brown & Gray Silt		35.2
5			SS-8	35.0	36.5	Gray Silt		38.2
6			SS-9	40.0	41.5	Gray Well-Graded Sand with Silt and Gravel		16.9
7			SS-10	45.0	46.5	Gray Sandy Silt		25.6
7			SS-11	50.0	51.5	Gray Sandy Silt		22.4
8			SS-12	55.0	56.5	Gray Poorly Graded Sand with Silt		22.1
8			SS-13	60.0	61.5	Gray Poorly Graded Sand with Silt		16.7
9			SS-14	65.0	66.5	Gray Well-Graded Sand with Silt		33.9
9			SS-15	70.0	71.5	Gray Well-Graded Sand with Silt		32.3
9			SS-16	75.0	76.5	Gray Well-Graded Sand with Silt		29.3
9			SS-17	80.0	81.5	Gray Well-Graded Sand with Silt		30.4
9			SS-18	85.0	86.5	Gray Well-Graded Sand with Silt		26.7
11			SS-19	90.0	91.5	Gray Silty Sand		38.1
11			SS-20	95.0	96.5	Gray Silty Sand		26.9
12			SS-21	100.0	101.5	Brown Silty Sand		35.1
13			Bulk-1	0.0	10.0			20.5

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-2
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Brown Lean Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	98.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	84.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.005 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 24.7
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 32
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 22
			Plasticity Index	: 10
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.25
Gravel (3in. + No.10)	:	0.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	1.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	14.3	AASHTO Classification: M145	: A-4 (8)
Silt + Clay (-No.200)	:	84.0	ASTM Classification: D2487	: CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.1
Medium Sand (-No.10 + No.40)	:	1.6
Fine Sand (-No.40 + No.200)	:	14.3
Silt + Clay (-No.200)	:	84.0

Approved By : Kevin E. Walker

Soil No. 1

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-2
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Brown Silt with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.3
1/4		6.3	mm	
No.4		4.75	mm	94.3
No.6		3.35	mm	
No.10		2	mm	94.1

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	92.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	72.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.01 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 29.0
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 25
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 21
			Plasticity Index	: 4
AASHTO Composition of Total Sample: M145			Liquidity Index	: 2.11
Gravel (3in. + No.10)	:	5.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	2.0	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	19.9	AASHTO Classification: M145	: A-4 (1)
Silt + Clay (-No.200)	:	72.2	ASTM Classification: D2487	: ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	5.7
Coarse Sand (-No.4 + No.10)	:	0.2
Medium Sand (-No.10 + No.40)	:	2.0
Fine Sand (-No.40 + No.200)	:	19.9
Silt + Clay (-No.200)	:	72.2

Approved By : Kevin E. Walker

Soil No. 2

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-5
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 15.0' to 16.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Brown Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.3
No.6		3.35	mm	
No.10		2	mm	99.2

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	97.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	87.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.004 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 24.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 29
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 21
			Plasticity Index	: 8
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.52
Gravel (3in. + No.10)	:	0.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	1.7	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	10.5	AASHTO Classification: M145	: A-4 (6)
Silt + Clay (-No.200)	:	87.0	ASTM Classification: D2487	: CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.7
Coarse Sand (-No.4 + No.10)	:	0.1
Medium Sand (-No.10 + No.40)	:	1.7
Fine Sand (-No.40 + No.200)	:	10.5
Silt + Clay (-No.200)	:	87.0

Approved By : Kevin E. Walker

Soil No. 3

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SOIL CLASSIFICATION

Project Name : SR-87 Overflow
Project No. : 10168889
Project County : Lauderdale
Project State : Tennessee
Laboratory No. : 10168889
Submitted By : HDR
Soil Type : Brown Silty Sand with Gravel

Sample No. : SS-3
Sample Loc. : Boring No. B-1
Sample Depth : 7.5' to 9.0'
Date Tested : 06/11/19
Date Reported : 06/14/19

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.6
1/4		6.3	mm	
No.4		4.75	mm	73.0
No.6		3.35	mm	
No.10		2	mm	64.1

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.41 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 31.7
Liquid Limit (AASHTO T89) : 30
Plastic Limit (AASHTO T90) : 23
Plasticity Index : 7
Liquidity Index : 1.18
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-4 (0)
ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 35.9
Coarse Sand (-No.10 + No.40) : 13.8
Fine Sand (-No.40 + No.200) : 14.2
Silt + Clay (-No.200) : 36.1

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 27.0
Coarse Sand (-No.4 + No.10) : 8.9
Medium Sand (-No.10 + No.40) : 13.8
Fine Sand (-No.40 + No.200) : 14.2
Silt + Clay (-No.200) : 36.1

Approved By : Kevin E. Walker

Soil No. 4

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-6
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 25.0' to 26.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Brown & Gray Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.9
No.6		3.35	mm	
No.10		2	mm	99.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	96.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.003 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 31.6
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 33
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 25
			Plasticity Index	: 8
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.79
Gravel (3in. + No.10)	:	0.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	2.9	AASHTO Classification: M145	: A-4 (9)
Silt + Clay (-No.200)	:	96.3	ASTM Classification: D2487	: ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.1
Coarse Sand (-No.4 + No.10)	:	0.1
Medium Sand (-No.10 + No.40)	:	0.6
Fine Sand (-No.40 + No.200)	:	2.9
Silt + Clay (-No.200)	:	96.3

Approved By : Kevin E. Walker

Soil No. 5

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-9
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 44.5' to 46.0'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Gray Well-Graded Sand with Silt and Gravel		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.4
1/4		6.3	mm	
No.4		4.75	mm	83.6
No.6		3.35	mm	
No.10		2	mm	69.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	9.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.936 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 20.2
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 18
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 17
			Plasticity Index	: 1
AASHTO Composition of Total Sample: M145			Liquidity Index	: 3.26
Gravel (3in. + No.10)	:	30.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	39.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	20.4	AASHTO Classification: M145	: A-1-b (0)
Silt + Clay (-No.200)	:	9.4	ASTM Classification: D2487	: SW-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	6.7
Fine Gravel (-3/4in. + No.4)	:	9.7
Coarse Sand (-No.4 + No.10)	:	14.2
Medium Sand (-No.10 + No.40)	:	39.6
Fine Sand (-No.40 + No.200)	:	20.4
Silt + Clay (-No.200)	:	9.4

Approved By : Kevin E. Walker

Soil No. 6

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-11
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 50.0' to 51.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Gray Sandy Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.7
No.6		3.35	mm	
No.10		2	mm	94.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	67.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.014 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 22.4
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 33
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 24
			Plasticity Index	: 9
AASHTO Composition of Total Sample: M145			Liquidity Index	: -0.20
Gravel (3in. + No.10)	:	5.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	12.0	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	15.9	AASHTO Classification: M145	: A-4 (5)
Silt + Clay (-No.200)	:	67.0	ASTM Classification: D2487	: ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	1.3
Coarse Sand (-No.4 + No.10)	:	3.8
Medium Sand (-No.10 + No.40)	:	12.0
Fine Sand (-No.40 + No.200)	:	15.9
Silt + Clay (-No.200)	:	67.0

Approved By : Kevin E. Walker

Soil No. 7

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-12
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Gray Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.3
1/4		6.3	mm	
No.4		4.75	mm	98.0
No.6		3.35	mm	
No.10		2	mm	92.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	21.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	12.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.791 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 22.1
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 24
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 24
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	7.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	70.8	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	9.6	AASHTO Classification: M145	: A-1-b (0)
Silt + Clay (-No.200)	:	12.0	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	2.0
Coarse Sand (-No.4 + No.10)	:	5.6
Medium Sand (-No.10 + No.40)	:	70.8
Fine Sand (-No.40 + No.200)	:	9.6
Silt + Clay (-No.200)	:	12.0

Approved By : Kevin E. Walker

Soil No. 8

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-15
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 79.5' to 81.0'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Gray Well-Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.7

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	86.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	12.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.182 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 26.9
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	13.2	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	74.5	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	12.0	ASTM Classification: D2487	: SW-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.3
Medium Sand (-No.10 + No.40)	:	13.2
Fine Sand (-No.40 + No.200)	:	74.5
Silt + Clay (-No.200)	:	12.0

Approved By : Kevin E. Walker

Soil No. 9

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-19
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 99.5' to 101.0'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Brown Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	69.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.176 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 23.8
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 33
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 25
			Plasticity Index	: 8
AASHTO Composition of Total Sample: M145			Liquidity Index	: -0.20
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	30.3	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	38.8	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	30.9	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	30.3
Fine Sand (-No.40 + No.200)	:	38.8
Silt + Clay (-No.200)	:	30.9

Approved By : Kevin E. Walker

Soil No. 10

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SOIL CLASSIFICATION

Project Name	: SR-87 Overflow		
Project No.	: 10168889	Sample No.	: SS-19
Project County	: Lauderdale	Sample Loc.	: Boring No. B-2
Project State	: Tennessee	Sample Depth	: 90.0' to 91.5'
Laboratory No.	: 10168889	Date Tested	: 06/11/19
Submitted By	: HDR	Date Reported	: 06/14/19
Soil Type	: Gray Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	13.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.189 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 38.1
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: NP
		Plasticity Index	: NP
AASHTO Composition of Total Sample: M145		Liquidity Index	: NA
Gravel (3in. + No.10)	: 0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 17.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	: 69.2	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	: 13.2	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 17.6
Fine Sand (-No.40 + No.200)	: 69.2
Silt + Clay (-No.200)	: 13.2

Approved By : Kevin E. Walker

Soil No. 11

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SOIL CLASSIFICATION

Project Name	:	SR-87 Overflow		
Project No.	:	10168889	Sample No.	: SS-21
Project County	:	Lauderdale	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 100.0' to 101.5'
Laboratory No.	:	10168889	Date Tested	: 06/11/19
Submitted By	:	HDR	Date Reported	: 06/14/19
Soil Type	:	Brown Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.7

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	90.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.101 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 35.1
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 37
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 34
			Plasticity Index	: 3
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.30
Gravel (3in. + No.10)	:	0.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	48.4	AASHTO Classification: M145	: A-4 (0)
Silt + Clay (-No.200)	:	41.7	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.3
Medium Sand (-No.10 + No.40)	:	9.6
Fine Sand (-No.40 + No.200)	:	48.4
Silt + Clay (-No.200)	:	41.7

Approved By : Kevin E. Walker

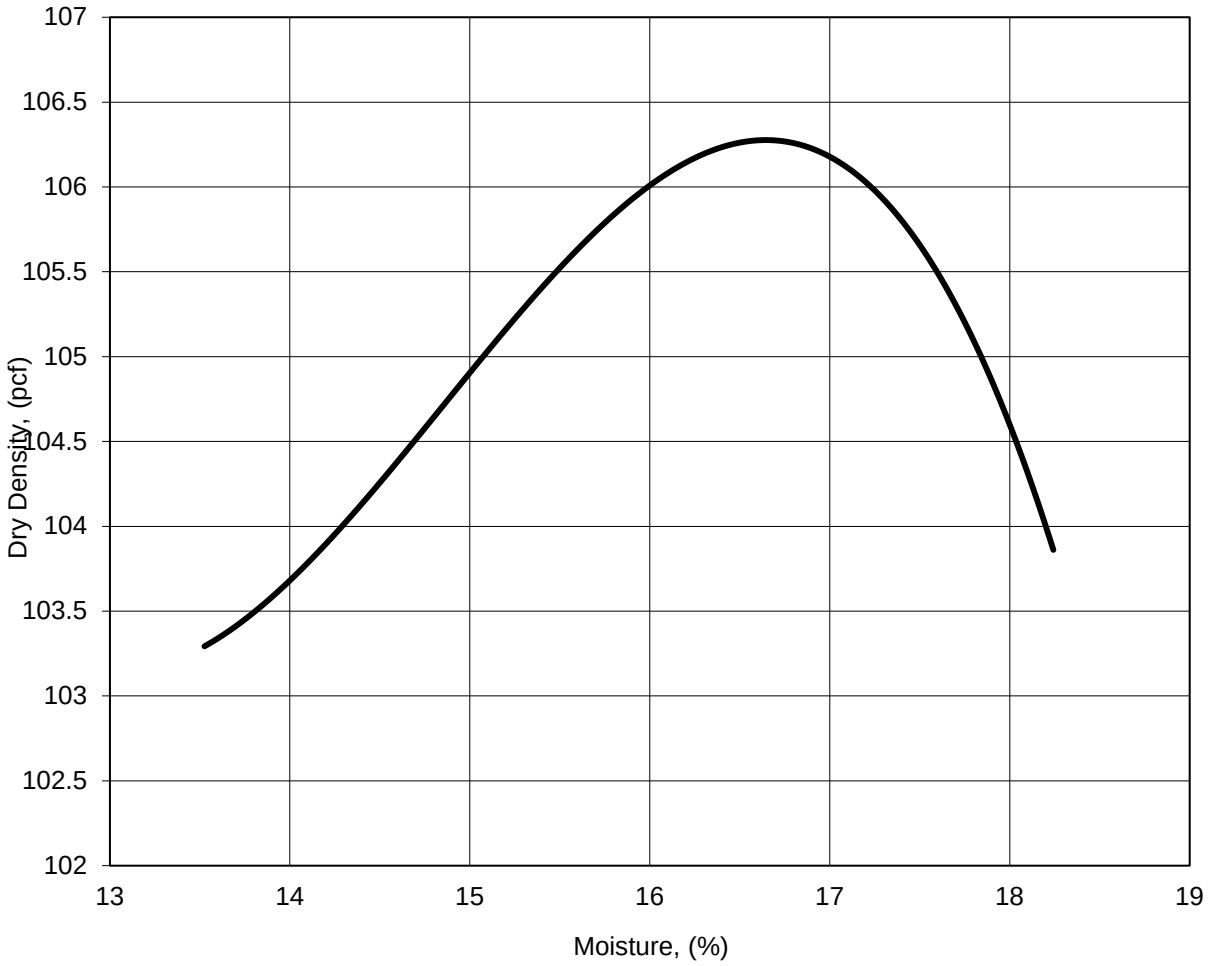
Soil No. 12

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MOISTURE-DENSITY RELATIONSHIP

Project Name	:	SR-87 Overflow			
Project No.	:	10168889	Sample No.	:	Bulk 1
Project County	:	Lauderdale	Sample Loc.	:	Boring No. B-2
Project State	:	Tennessee	Sample Depth	:	0.0' to 10.0'
Laboratory No.	:	10168889	Date Tested	:	06/11/19
Submitted By	:	HDR	Date Reported	:	06/14/19
Soil Type	:				



MAXIMUM DENSITY: 106.3 pcf

OPTIMUM MOISTURE: 16.6 %

COMMENTS: AASHTO: T-99; Method (A)

APPROVED BY: KW

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Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 30.0' to 30.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE : Brown Silty Sand with Gravel

WET DENSITY	: 114.38 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.85 cm
DRY DENSITY	: 82.2 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.28 cm
MOISTURE	: 39.15 %	CHAMBER PRES.	: 5.05 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	5.05	5.05	1.00
2	0.09	5.05	5.47	1.08
3	0.18	5.05	5.89	1.17
4	0.26	5.05	6.1	1.21
5	0.35	5.05	6.52	1.29
6	0.44	5.05	6.94	1.37
7	0.53	5.05	7.36	1.46
8	1.06	5.05	9.43	1.87
9	1.59	5.05	11.27	2.23
10	2.12	5.05	12.88	2.55
11	2.65	5.05	14.07	2.79
12	3.18	5.05	14.63	2.9
13	3.53	5.05	15	2.97
14	4.41	5.05	15.11	2.99
15	5.29	5.05	15.22	3.01
16	6.17	5.05	15.13	2.99
17	7.06	5.05	14.84	2.94

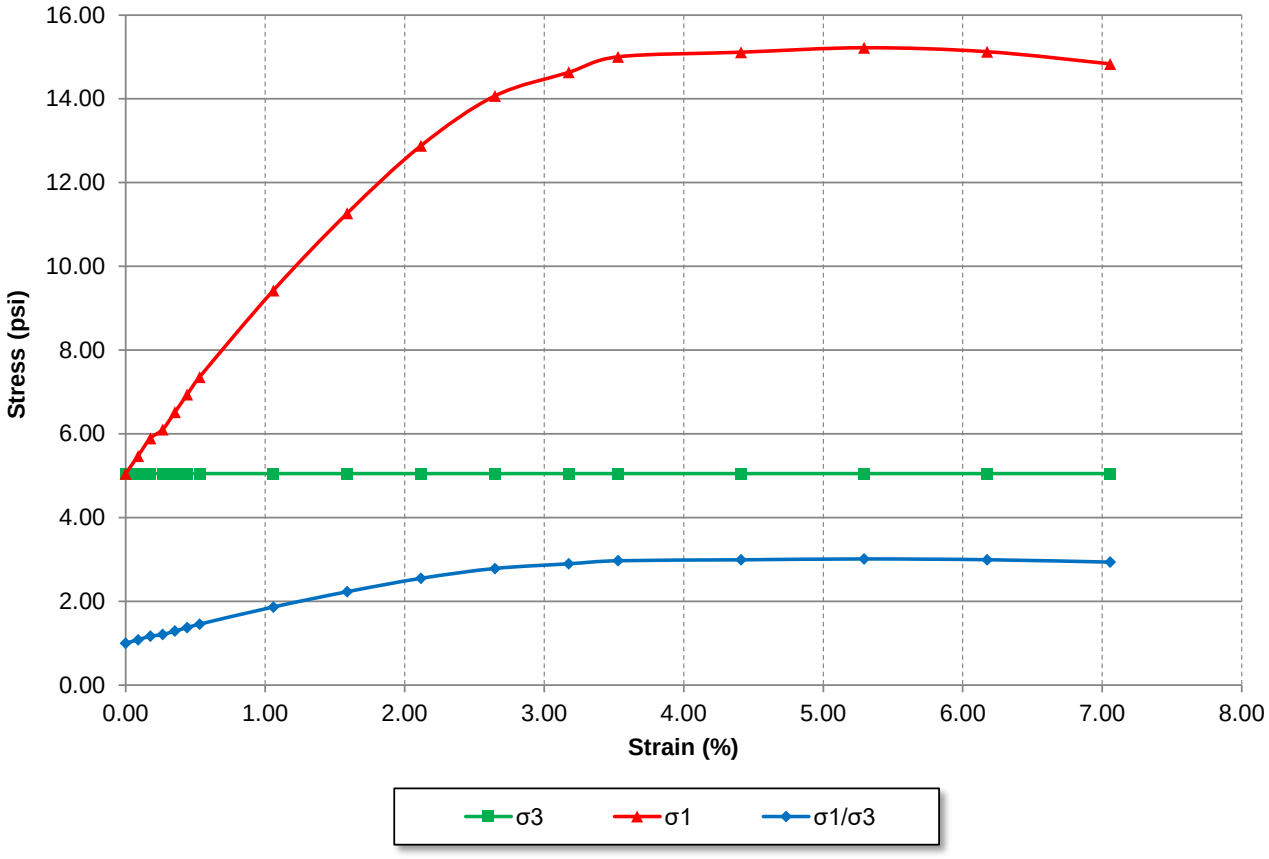
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 30.0' to 30.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 39.15 %	EFF. CONS. STRESS	: 5.05 psi
FINAL HEIGHT	: 11.48 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.12 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 30.0' to 30.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

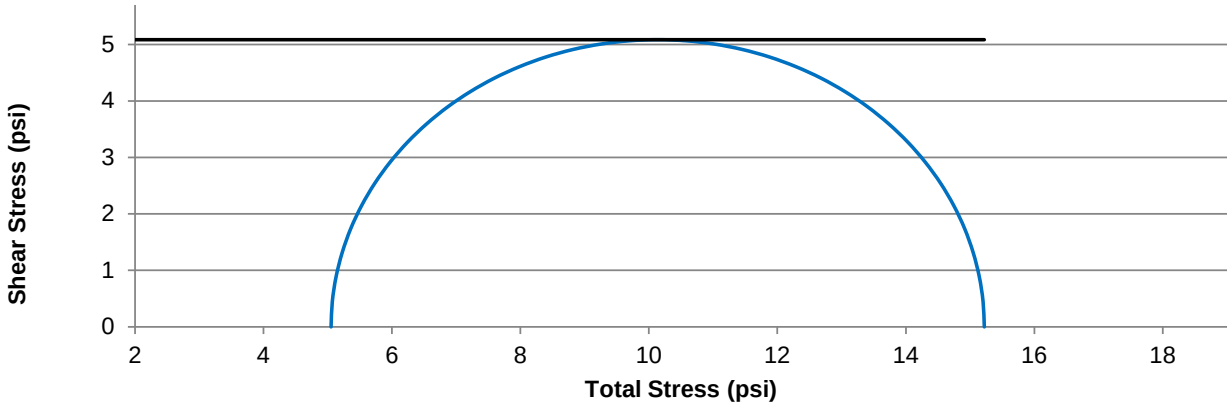
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	5.05 psi	15.22 psi

Compressive Strength =	1464	psf
Cohesion =	732	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 30.5' to 31.0'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE	: Brown & Gray Silt				
WET DENSITY	: 114.93 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.94 cm
DRY DENSITY	: 82.4 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.23 cm
MOISTURE	: 39.47 %	CHAMBER PRES.	: 10.03 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	10.03	10.03	1.00
2	0.09	10.03	10.46	1.04
3	0.18	10.03	11.1	1.11
4	0.26	10.03	11.31	1.13
5	0.35	10.03	11.73	1.17
6	0.44	10.03	12.15	1.21
7	0.53	10.03	12.58	1.25
8	1.05	10.03	14.46	1.44
9	1.58	10.03	16.33	1.63
10	2.10	10.03	17.75	1.77
11	2.63	10.03	18.96	1.89
12	3.16	10.03	19.32	1.93
13	3.51	10.03	19.49	1.94
14	4.38	10.03	19.82	1.98
15	5.26	10.03	19.93	1.99
16	6.13	10.03	20.04	2
17	7.01	10.03	19.94	1.99
18	7.89	10.03	19.85	1.98
19	8.76	10.03	19.95	1.99
20	9.64	10.03	19.86	1.98
21	10.52	10.03	19.19	1.91

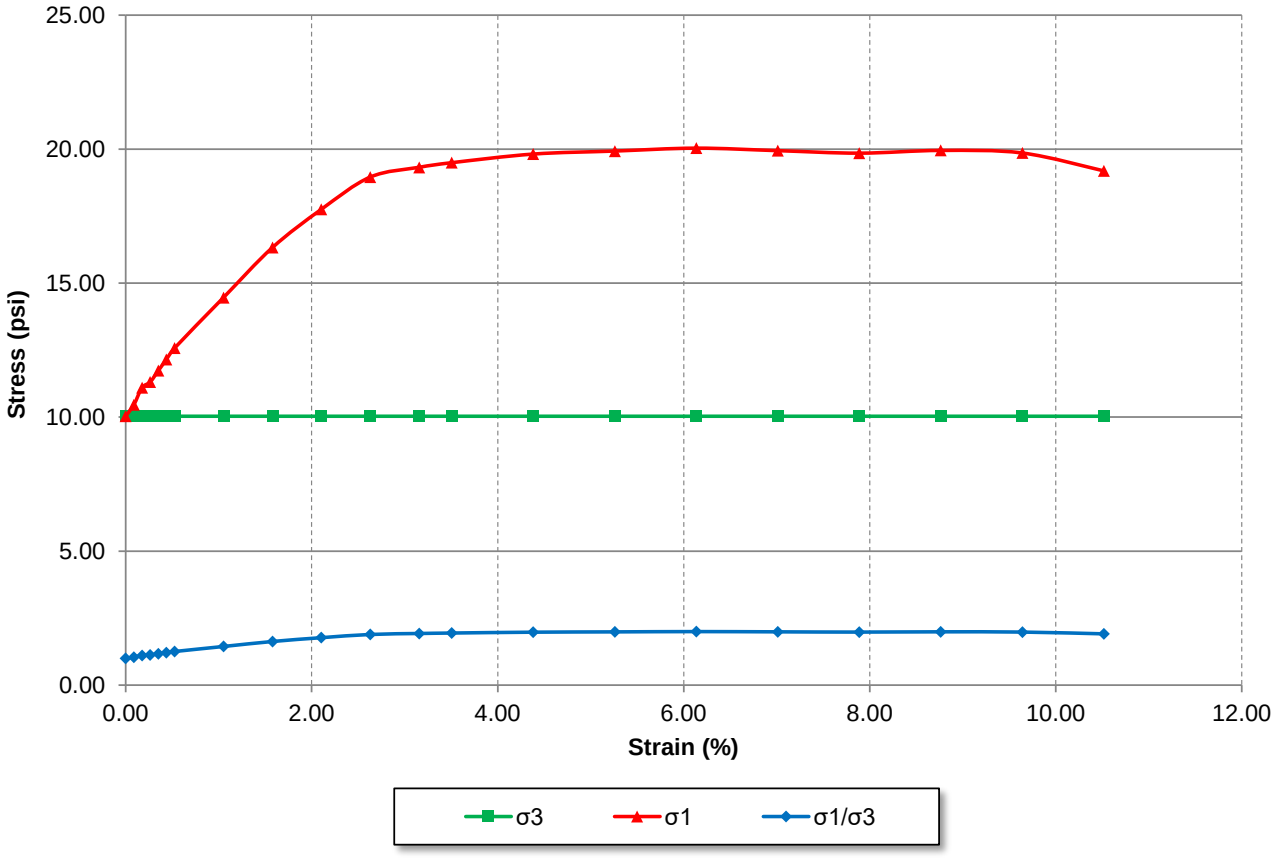
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 30.5' to 31.0'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 39.47 %	EFF. CONS. STRESS	: 10.03 psi
FINAL HEIGHT	: 11.57 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.06 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 30.5' to 31.0'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

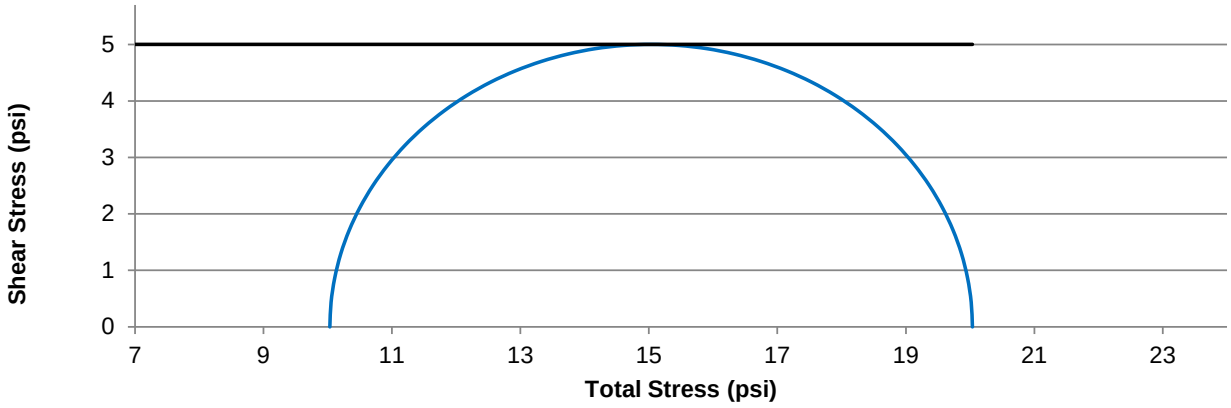
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	10.03 psi	20.04 psi

Compressive Strength =	1441	psf
Cohesion =	720	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 70.0' to 70.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE : Gray Well- Graded Sand with Silt

WET DENSITY	: 121.42 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 15.07 cm
DRY DENSITY	: 96.28 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.29 cm
MOISTURE	: 26.12 %	CHAMBER PRES.	: 19.99 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	19.99	19.99	1.00
2	0.09	19.99	21.04	1.05
3	0.17	19.99	21.67	1.08
4	0.26	19.99	22.09	1.1
5	0.35	19.99	22.5	1.13
6	0.43	19.99	22.92	1.15
7	0.52	19.99	23.34	1.17
8	1.04	19.99	25.81	1.29
9	1.56	19.99	28.47	1.42
10	2.08	19.99	31.71	1.59
11	2.61	19.99	35.75	1.79
12	3.13	19.99	40.36	2.02
13	3.47	19.99	43.69	2.19
14	4.34	19.99	52.18	2.61
15	5.21	19.99	58.15	2.91
16	6.08	19.99	56.56	2.83
17	6.95	19.99	53.99	2.7

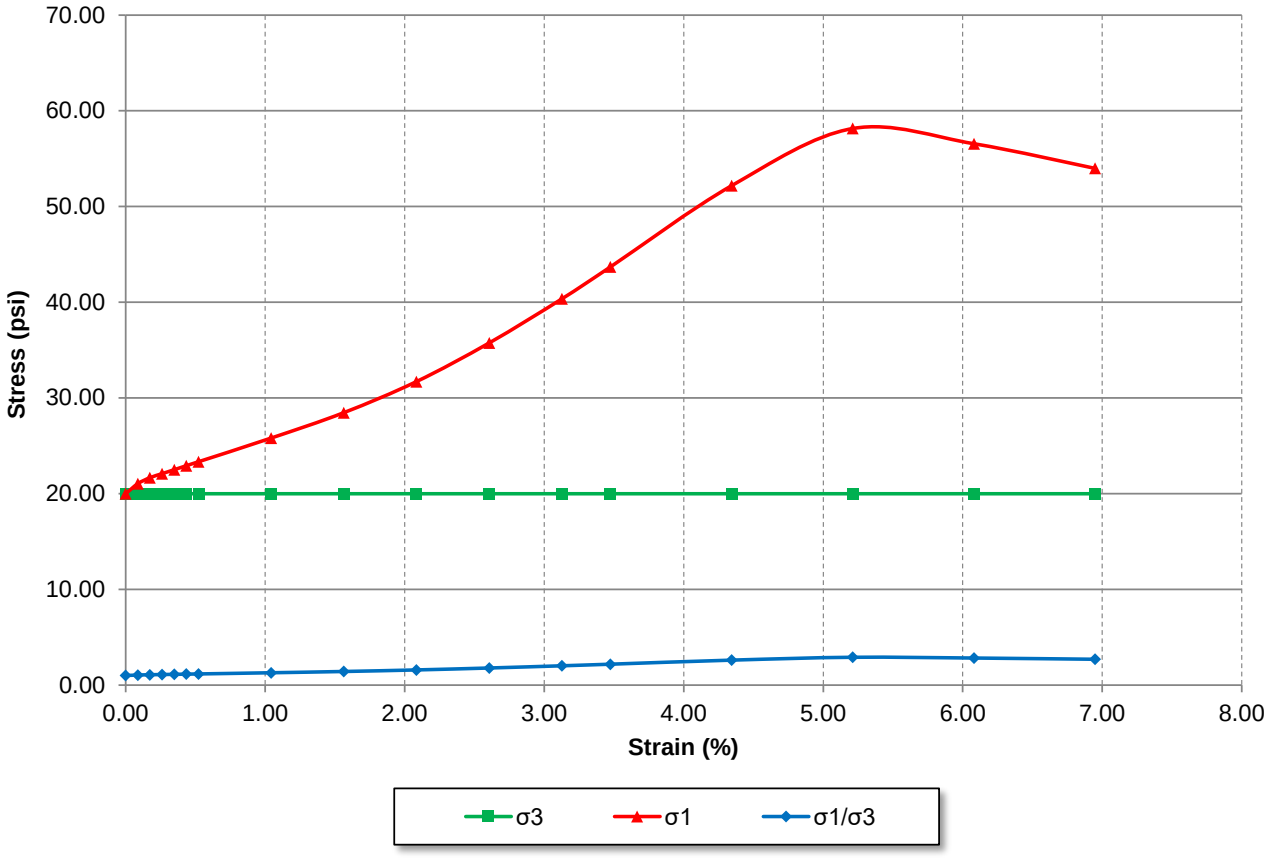
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 70.0' to 70.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 26.12 %	EFF. CONS. STRESS	: 19.99 psi
FINAL HEIGHT	: 11.7 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.12 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 70.0' to 70.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

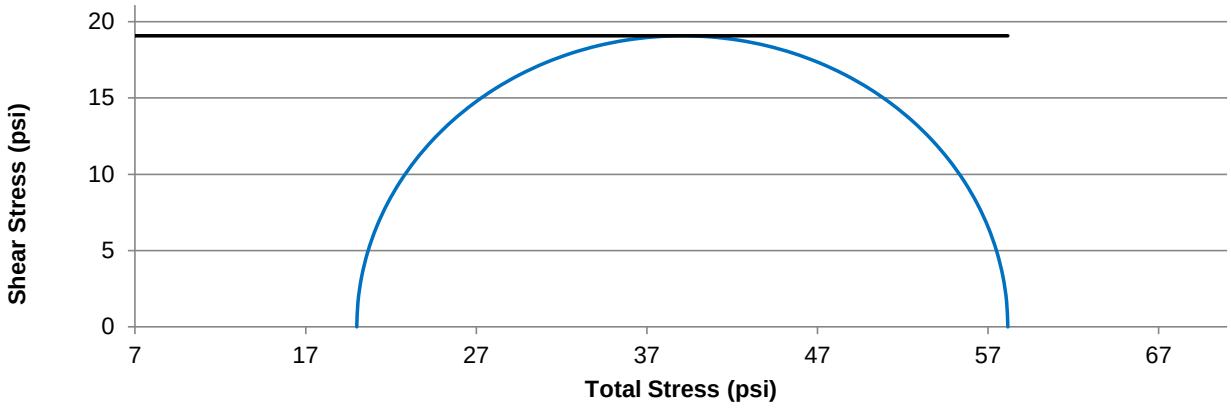
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	19.99 psi	58.15 psi

Compressive Strength =	5495	psf
Cohesion =	2747	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 21.0' to 21.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

SOIL TYPE : Brown & Gray Silt

WET DENSITY	: 124.7 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.63 cm
DRY DENSITY	: 95.08 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.23 cm
MOISTURE	: 31.15 %	CHAMBER PRES.	: 6.05 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	6.05	6.05	1.00
2	0.09	6.05	6.26	1.04
3	0.18	6.05	6.26	1.04
4	0.27	6.05	6.26	1.04
5	0.36	6.05	6.47	1.07
6	0.45	6.05	6.47	1.07
7	0.54	6.05	6.68	1.11
8	1.08	6.05	6.89	1.14
9	1.61	6.05	7.3	1.21
10	2.15	6.05	7.51	1.24
11	2.69	6.05	7.71	1.27
12	3.23	6.05	8.31	1.37
13	3.58	6.05	8.51	1.41
14	4.48	6.05	9.1	1.5
15	5.38	6.05	9.67	1.6
16	6.27	6.05	10.44	1.73
17	7.17	6.05	10.99	1.82
18	8.06	6.05	11.72	1.94
19	8.96	6.05	12.25	2.03
20	9.85	6.05	12.96	2.14
21	10.75	6.05	13.46	2.23
22	11.65	6.05	13.95	2.31
23	12.54	6.05	14.61	2.42
24	13.44	6.05	14.89	2.46
25	14.33	6.05	15.53	2.57
26	15.23	6.05	15.98	2.64
27	16.13	6.05	16.05	2.65
28	17.02	6.05	16.66	2.75
29	17.92	6.05	16.89	2.79
30	18.81	6.05	17.12	2.83
31	19.71	6.05	17.34	2.87
32	20.61	6.05	17.55	2.9

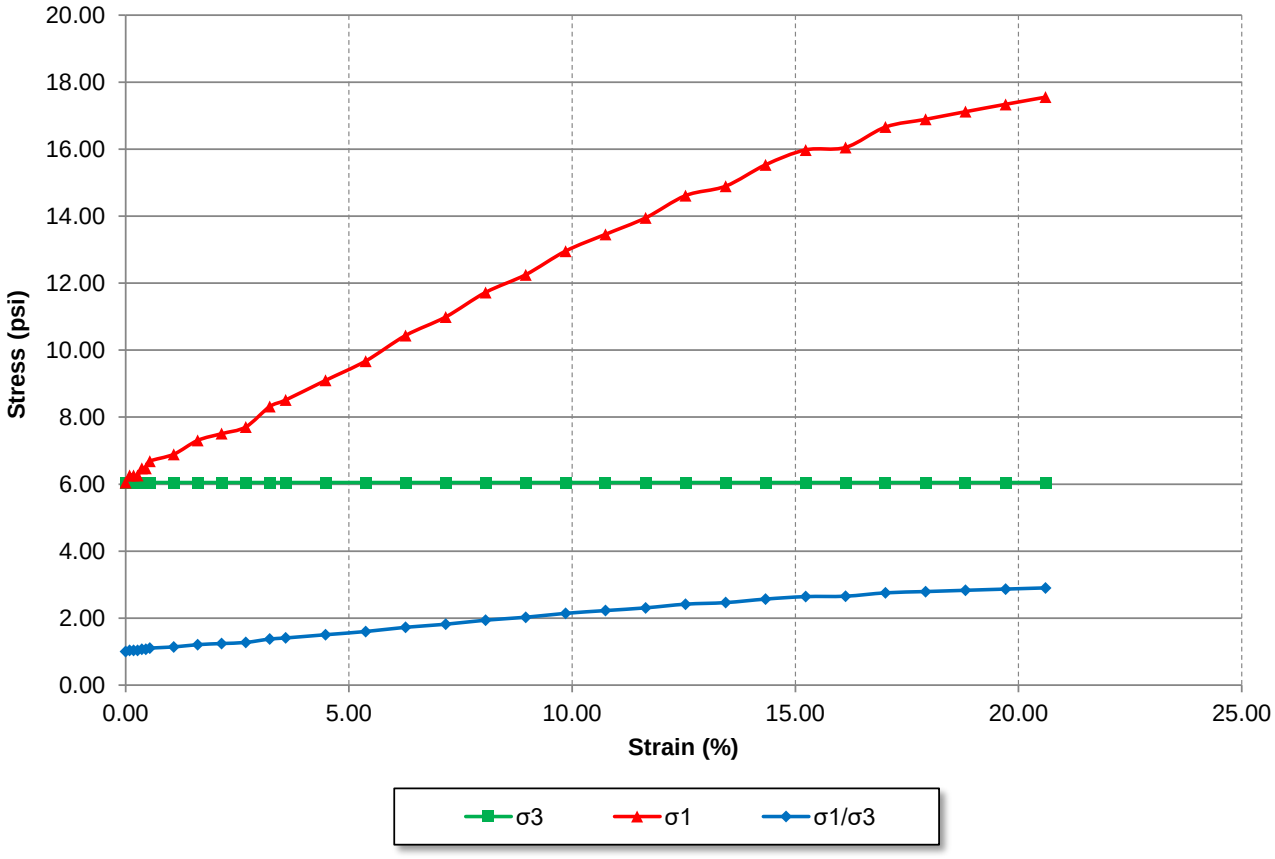
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	POINT #	: 1
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 21.0' to 21.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

FINAL MOISTURE	: 31.15 %	EFF. CONS. STRESS	: 6.05 psi
FINAL HEIGHT	: 11.25 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.09 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: SR 87 Overflow		
PROJECT #	: 10168889	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Lauderdale	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 21.0' to 21.5'
LABORATORY #	: 10168889	DATE TESTED	: 6/12/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/14/2019

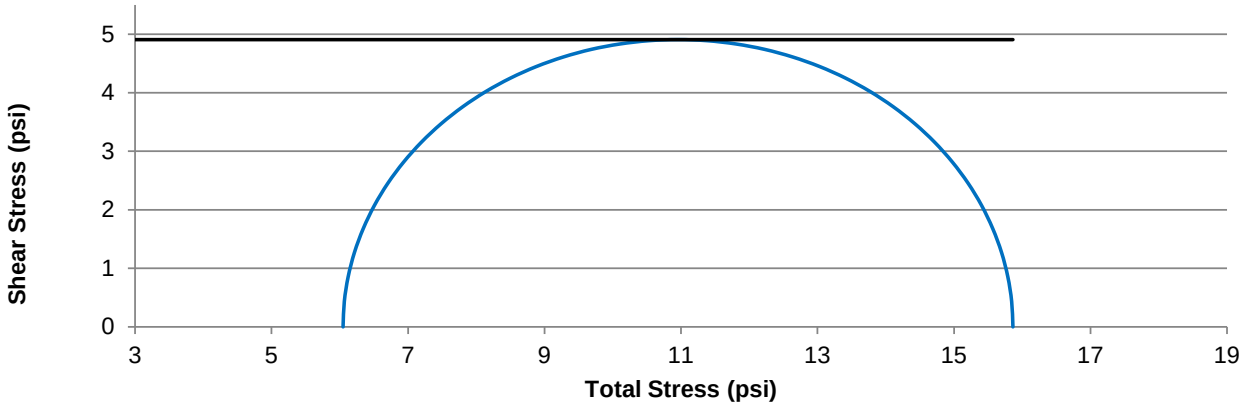
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	6.05 psi	15.86 psi

Compressive Strength =	1413	psf
Cohesion =	707	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Table 1 - Laboratory Tests on Soil Samples

HDR-ICA
SR-1 Overflow
Your #10168889, HDR Lab #19-0368LAB
17-Jun-19

Sample ID			
			B-2 @ 0-10
Resistivity		**Units**	
as-received		ohm-cm	7,200
saturated		ohm-cm	4,400
pH			7.4
Electrical Conductivity		mS/cm	na
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	na
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Appendix D: Preliminary Soil Shear Strength Loss Analysis

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M19-169BR5CPT-1 results

Summary data report	1
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Strength loss data report	59

HDR
4645 Village Square Drive, Suite F
Paducah, KY 42001

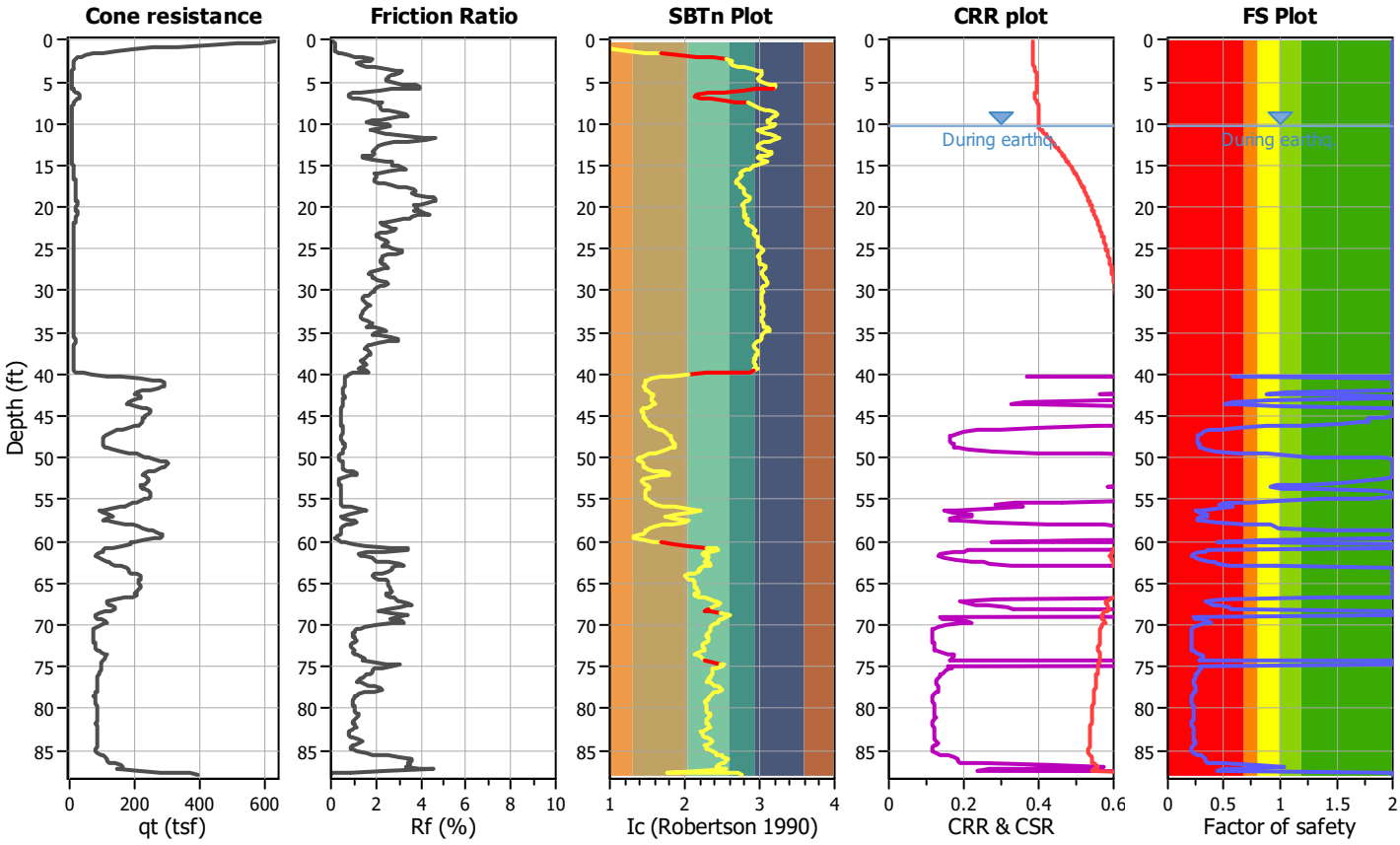
LIQUEFACTION ANALYSIS REPORT

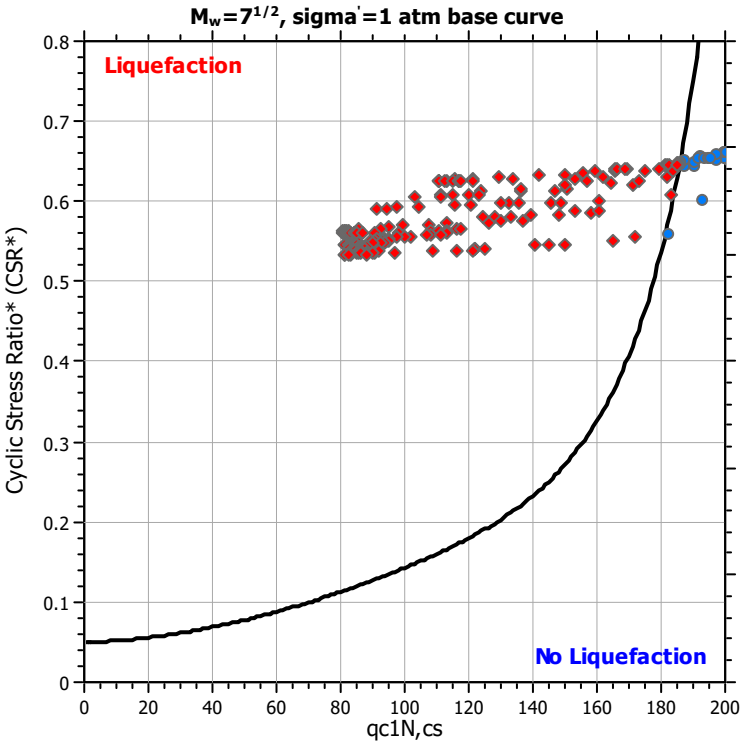
Project title : Bridge 5 - TDOT Region 4 Bridge Bundle **Location : Lauderdale County, TN**

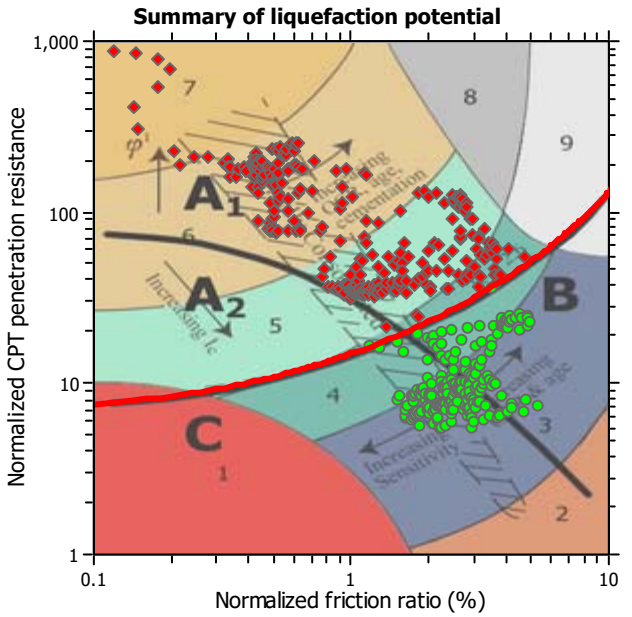
CPT file : M19-169BR5CPT-1

Input parameters and analysis data

Analysis method:	I&B (2008)	G.W.T. (in-situ):	10.40 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	10.40 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.11	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.72	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

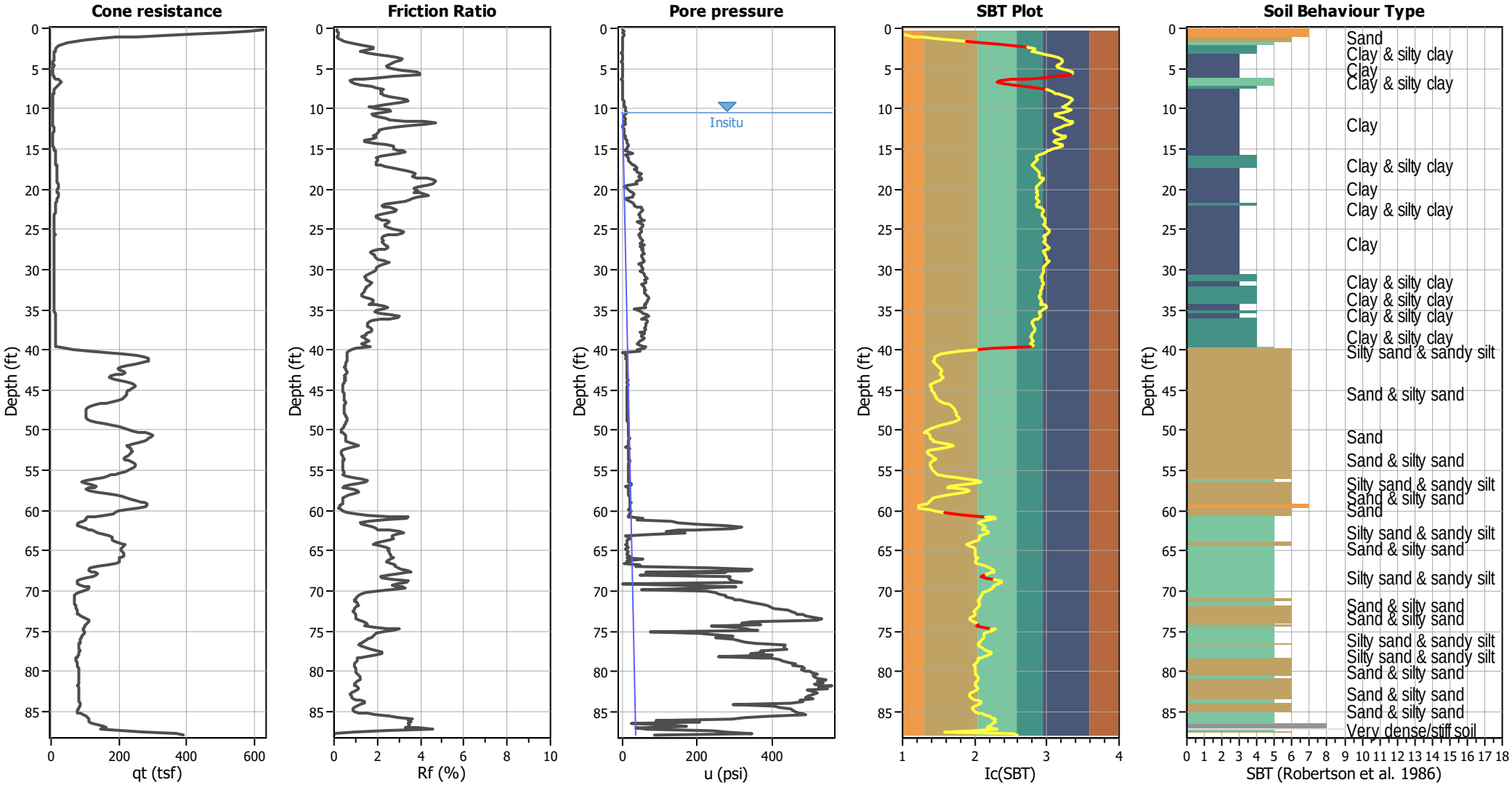






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



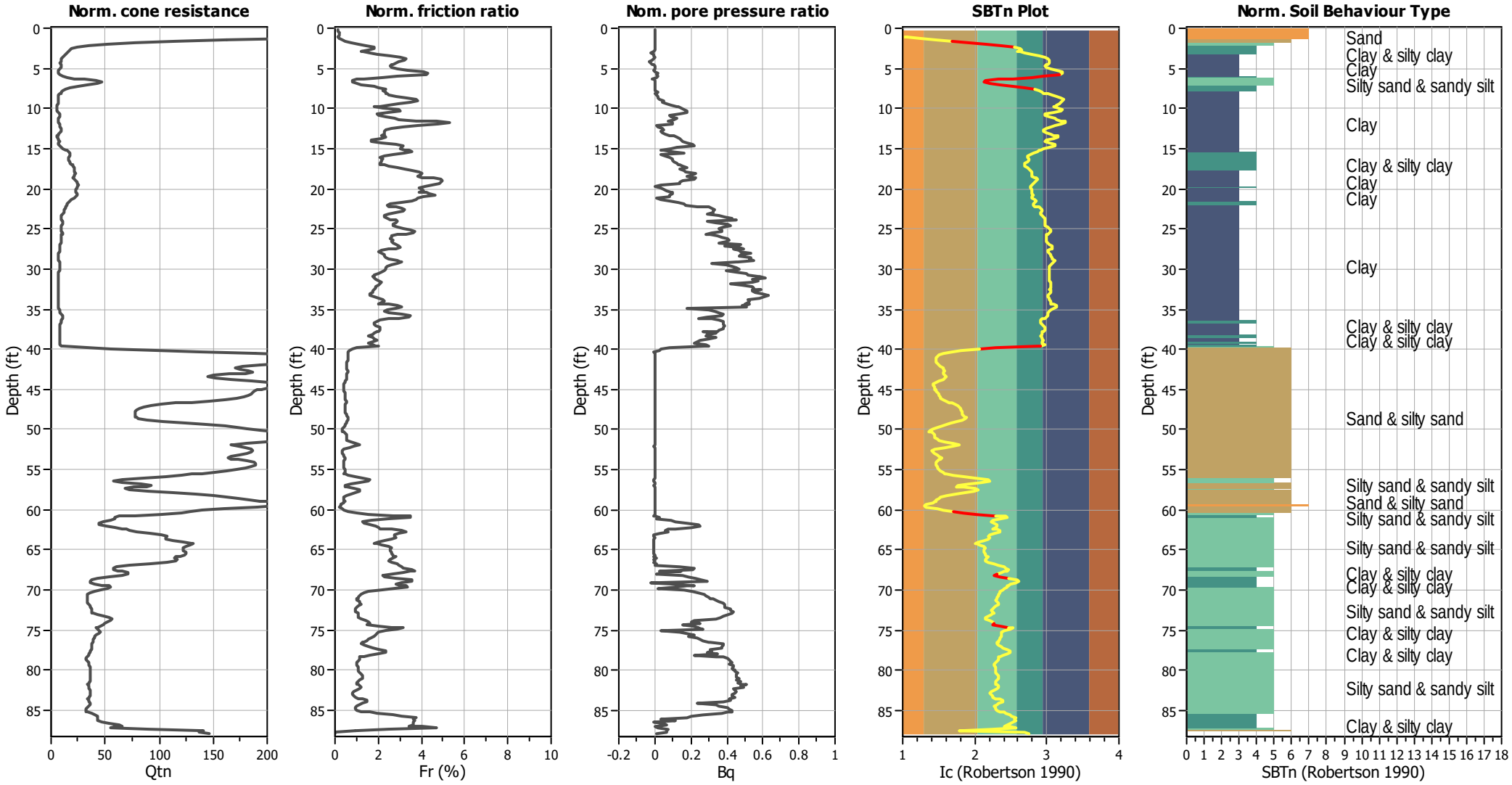
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.72	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.40 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

CPT basic interpretation plots (normalized)



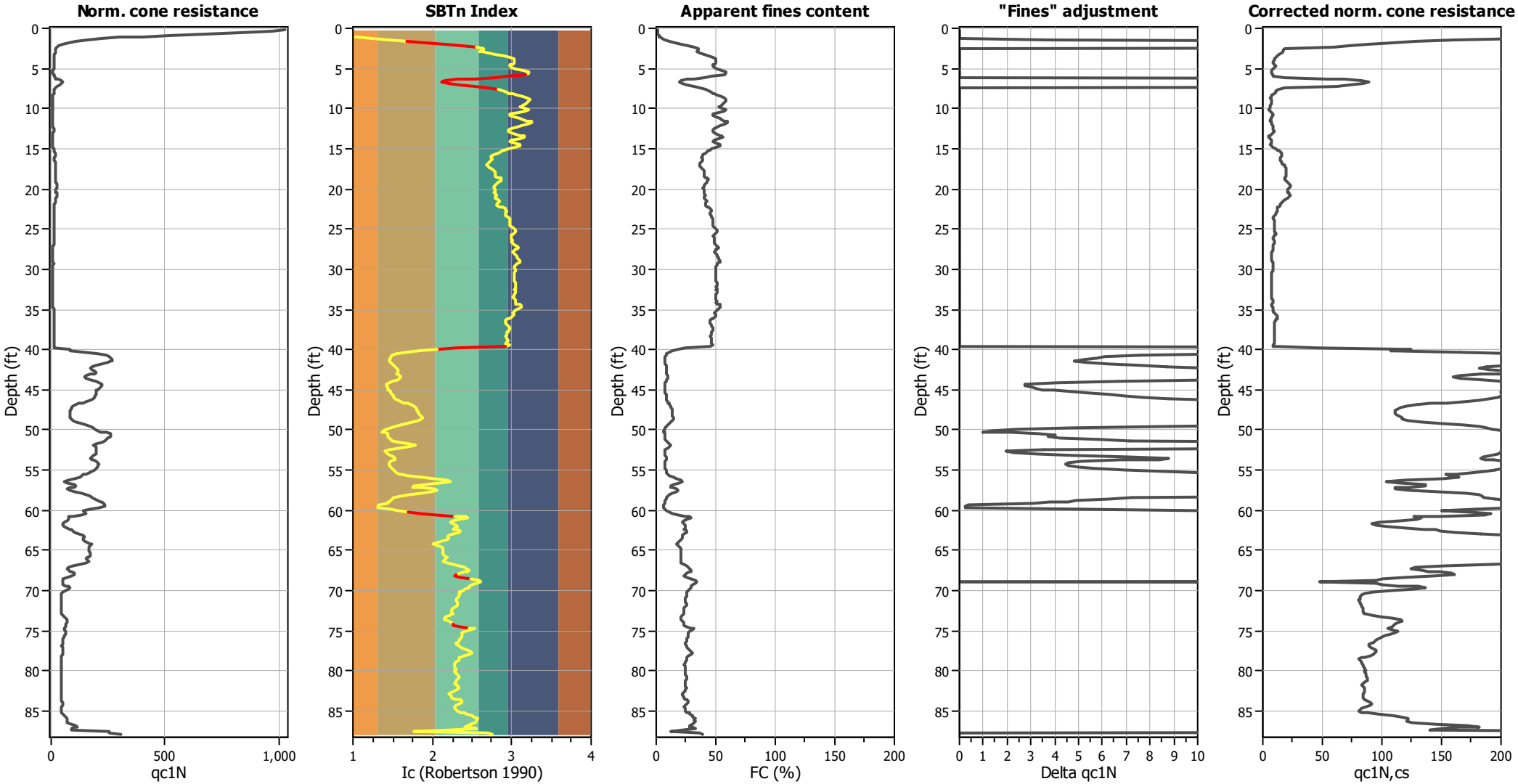
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.72	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.40 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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

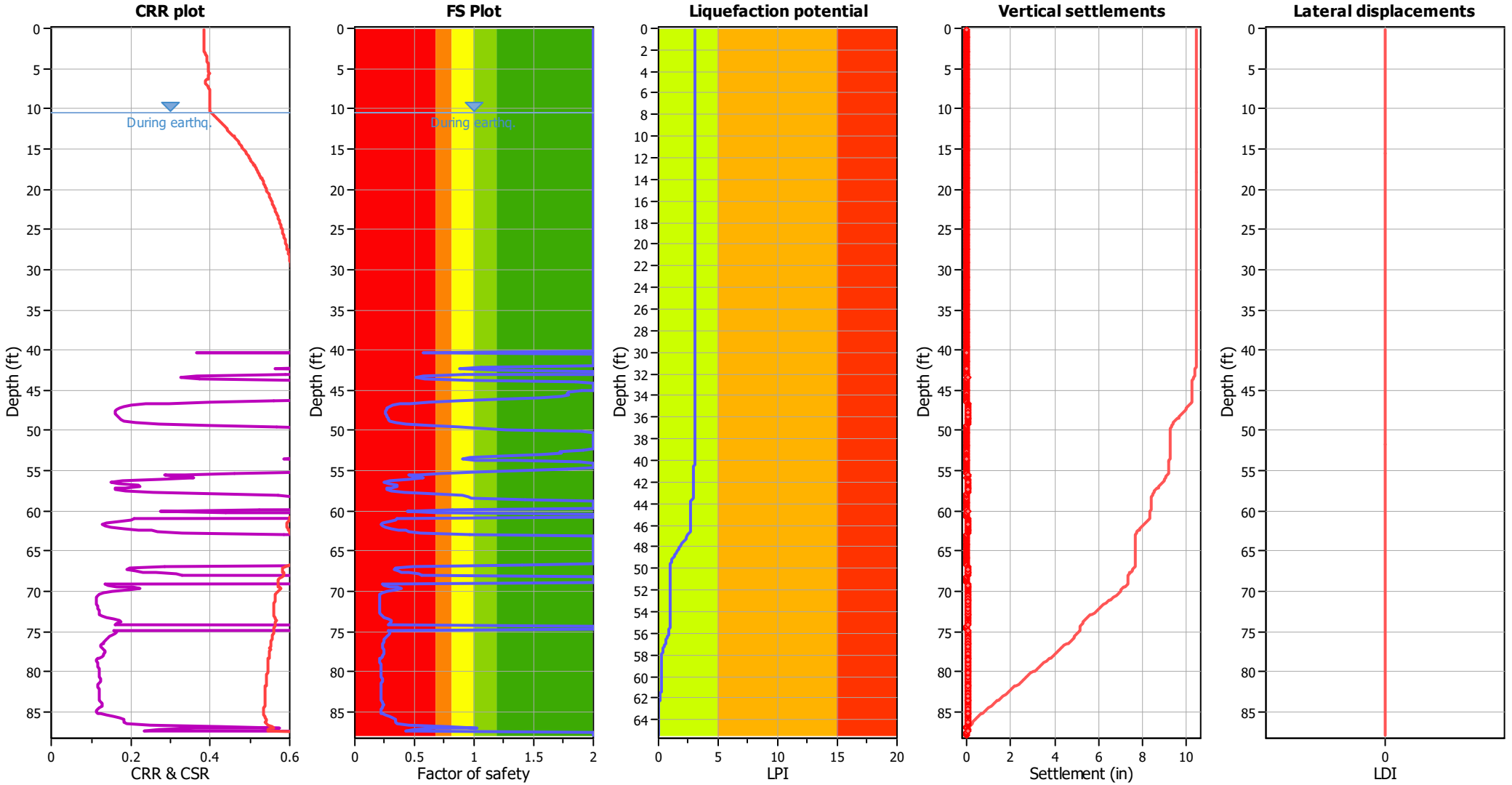
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.72	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.40 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.72	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.40 ft	Fill height:	N/A	Limit depth:	N/A

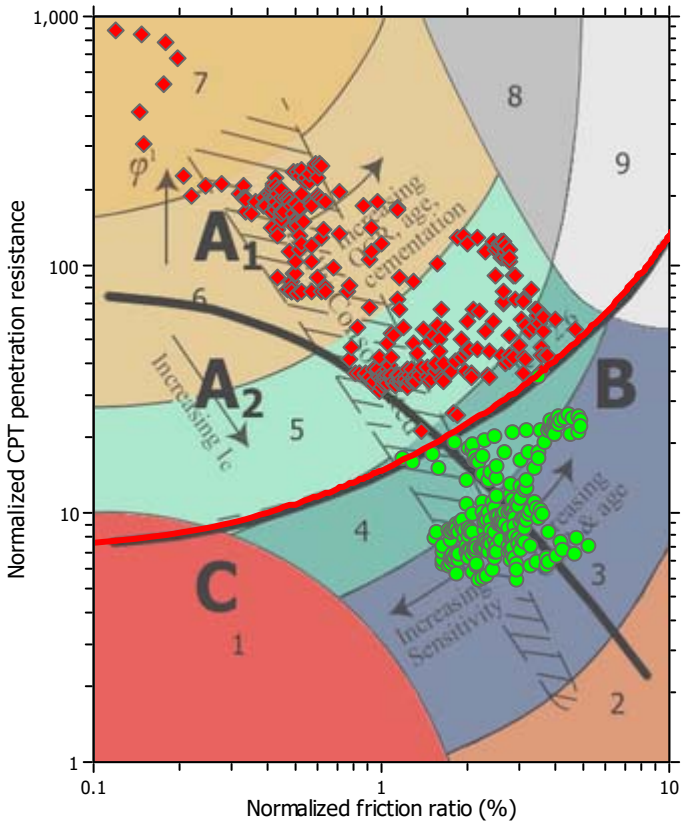
F.S. color scheme

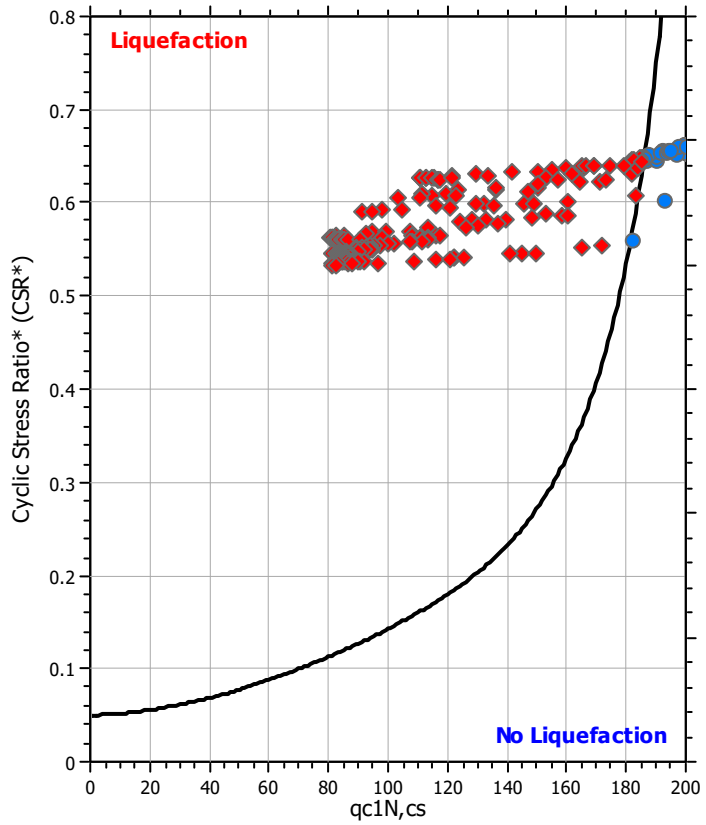
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

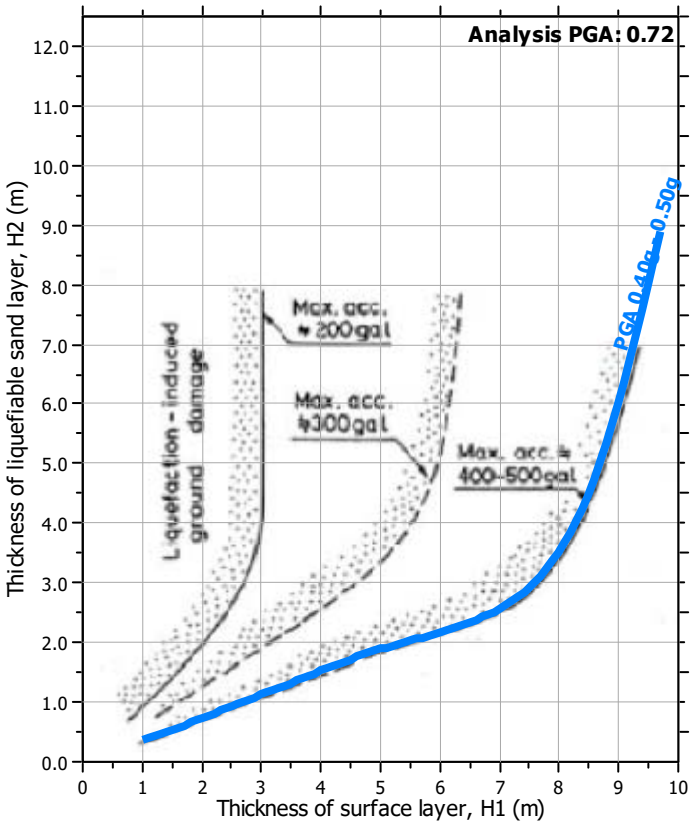
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



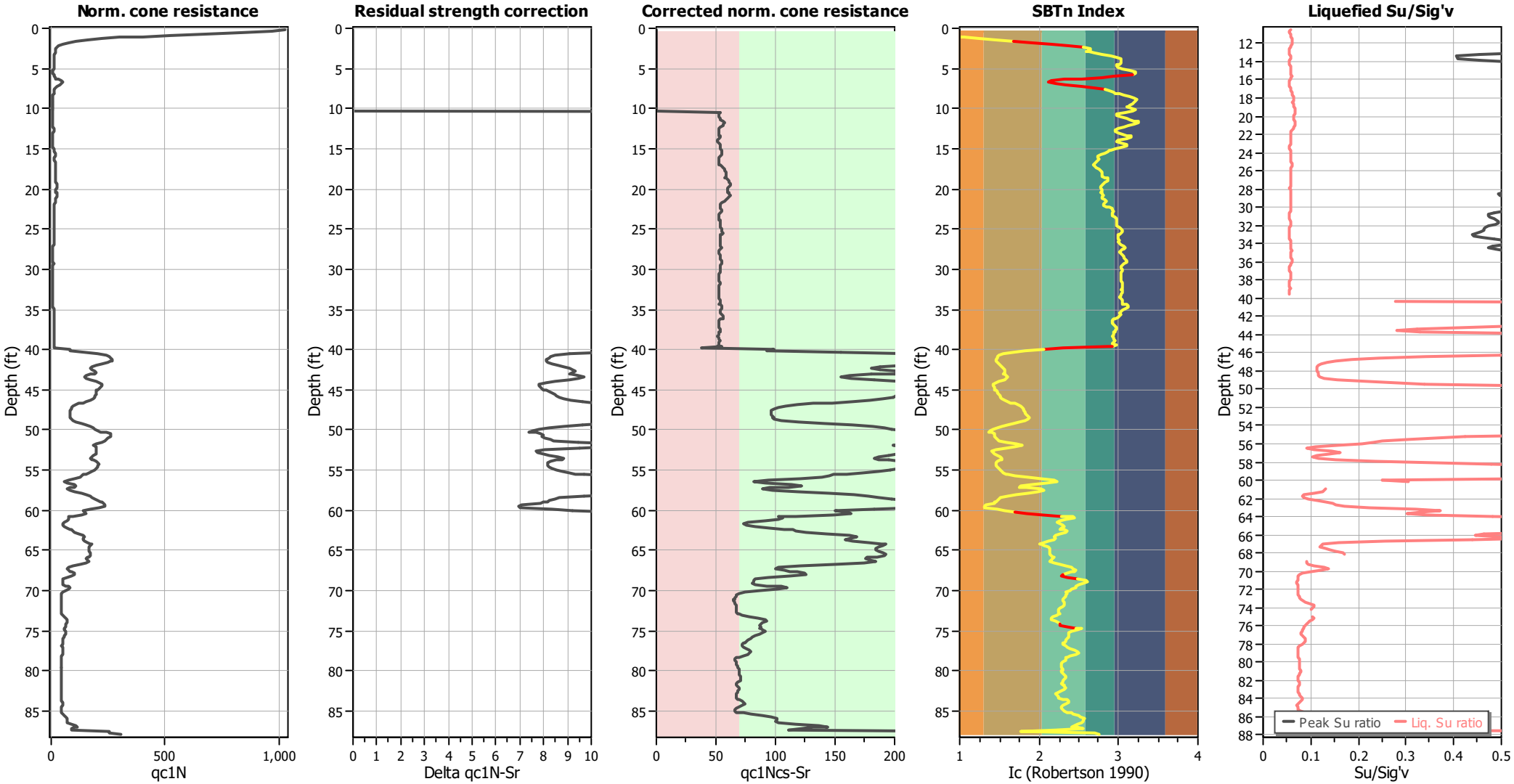




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.72	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.40 ft	Fill height:	N/A	Limit depth:	N/A

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



Input parameters and analysis data

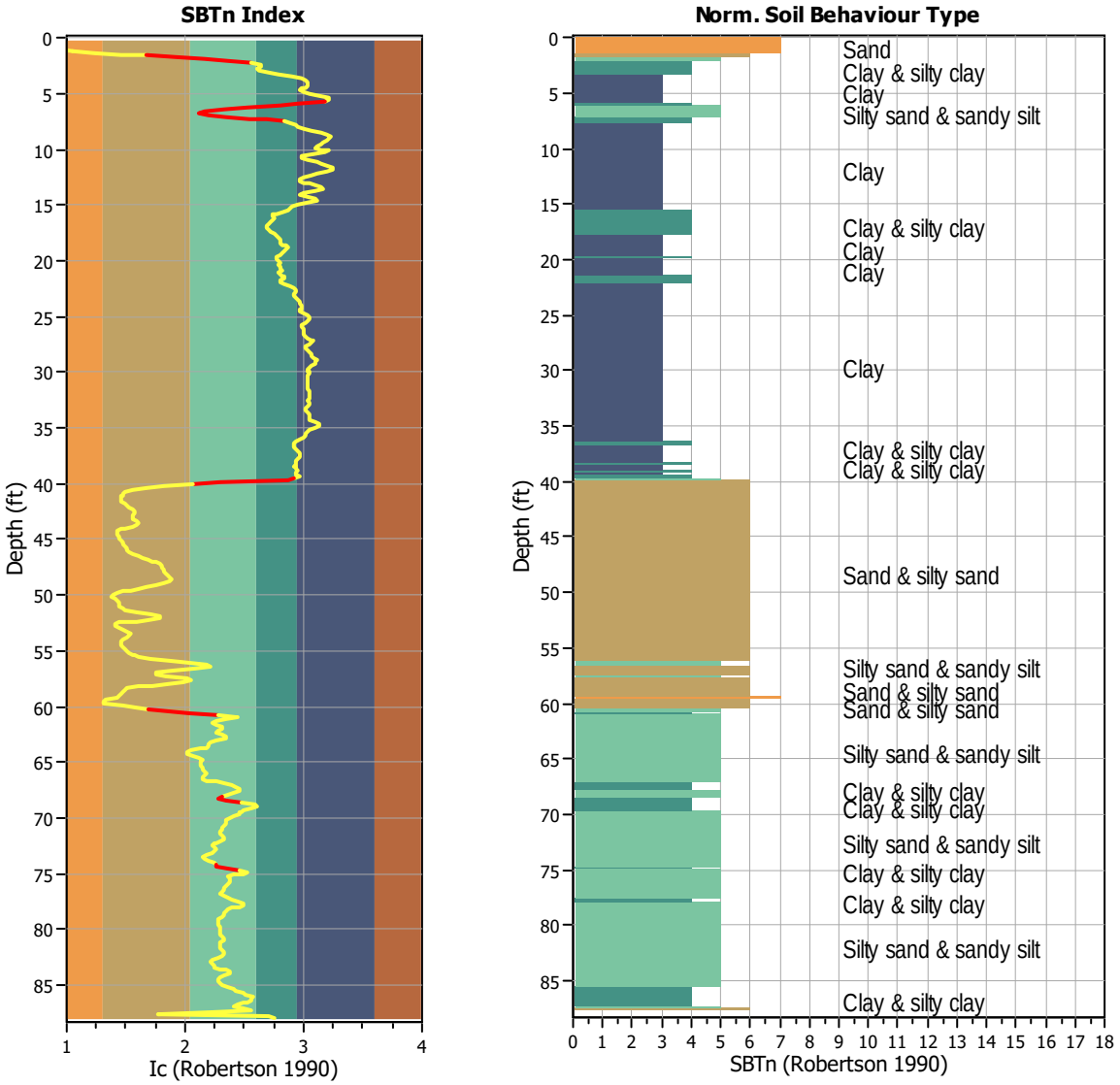
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	10.40 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.72	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.40 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	536
I_c maximum check value:	3.00	Total points excluded:	33
I_c change ratio value:	0.0250	Exclusion percentage:	6.16%
Minimum number of points in layer:	4	Number of layers detected:	7

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 1.80 (ft)	6	Sand & silty sand
		End depth: 2.46 (ft)	4	Clay & silty clay
Transition layer 2	5	Start depth: 5.91 (ft)	3	Clay
		End depth: 6.56 (ft)	5	Silty sand & sandy silt
Transition layer 3	7	Start depth: 6.73 (ft)	5	Silty sand & sandy silt
		End depth: 7.71 (ft)	4	Clay & silty clay
Transition layer 4	4	Start depth: 39.70 (ft)	4	Clay & silty clay
		End depth: 40.19 (ft)	6	Sand & silty sand
Transition layer 5	4	Start depth: 60.37 (ft)	6	Sand & silty sand
		End depth: 60.86 (ft)	4	Clay & silty clay
Transition layer 6	4	Start depth: 68.24 (ft)	5	Silty sand & sandy silt
		End depth: 68.73 (ft)	4	Clay & silty clay
Transition layer 7	4	Start depth: 74.31 (ft)	5	Silty sand & sandy silt
		End depth: 74.80 (ft)	4	Clay & silty clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	640.32	0.66	0.21	0.00	123.88
2	0.33	603.05	0.92	3.96	0.00	124.73
3	0.49	520.27	1.00	0.70	0.00	124.89
4	0.66	420.85	0.84	4.04	0.00	123.67
5	0.82	326.48	0.66	3.77	0.00	120.52
6	0.98	250.81	0.26	1.10	0.00	116.47
7	1.15	188.16	0.19	0.09	0.00	113.91
8	1.31	137.97	0.41	0.66	0.00	113.27
9	1.48	97.54	0.27	0.50	2.34	113.66
10	1.64	68.20	0.34	0.44	5.00	112.75
11	1.80	46.35	0.40	0.52	10.97	112.42
12	1.97	31.22	0.36	0.43	17.59	111.28
13	2.13	20.69	0.31	0.57	24.99	109.40
14	2.30	14.41	0.28	0.60	33.02	107.66
15	2.46	11.44	0.25	0.41	37.34	105.17
16	2.62	10.42	0.12	0.11	37.41	102.73
17	2.79	10.43	0.11	-0.66	35.36	100.61
18	2.95	10.39	0.13	-1.42	36.66	100.99
19	3.12	9.80	0.15	-3.48	40.34	101.87
20	3.28	8.54	0.17	-1.03	45.43	102.33
21	3.44	7.34	0.18	-0.34	51.79	102.79
22	3.61	6.62	0.20	0.14	56.96	103.06
23	3.77	6.38	0.21	-0.52	60.01	103.07
24	3.94	6.12	0.19	-1.24	61.09	102.42
25	4.10	5.69	0.16	-2.17	60.86	101.15
26	4.27	5.44	0.13	-1.49	60.83	100.59
27	4.43	5.71	0.16	-1.01	59.06	100.55
28	4.59	6.28	0.15	-0.88	57.39	101.11
29	4.76	6.54	0.16	-0.18	56.34	101.08
30	4.92	6.12	0.16	-0.15	57.95	100.79
31	5.09	5.40	0.14	0.12	62.43	100.52
32	5.25	4.78	0.15	-0.28	67.90	100.37
33	5.41	4.40	0.16	-0.05	73.97	101.02
34	5.58	4.29	0.20	0.84	73.59	101.80
35	5.74	5.39	0.20	0.85	71.54	102.47
36	5.91	5.39	0.20	2.04	54.85	103.41
37	6.07	11.12	0.20	0.75	45.88	103.89
38	6.23	11.12	0.20	-2.35	32.04	104.29
39	6.40	19.16	0.16	-2.16	23.42	105.34
40	6.56	28.34	0.21	-0.28	17.56	106.51
41	6.73	31.53	0.23	0.28	16.38	107.67
42	6.89	28.17	0.24	0.29	19.06	108.52
43	7.05	21.42	0.32	-0.15	24.02	108.04
44	7.22	15.40	0.24	0.06	32.44	107.70
45	7.38	11.31	0.28	0.09	39.72	105.39
46	7.55	8.25	0.16	0.23	47.69	103.79
47	7.71	6.96	0.16	0.47	51.50	101.41
48	7.87	6.56	0.14	1.22	54.49	100.94

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	6.44	0.14	1.01	55.73	100.13
50	8.20	5.77	0.12	0.34	58.72	99.40
51	8.37	4.90	0.12	0.52	63.15	98.33
52	8.53	4.32	0.11	0.90	68.62	98.01
53	8.69	4.15	0.12	0.72	72.93	98.65
54	8.86	4.28	0.15	1.21	75.06	99.65
55	9.02	4.41	0.16	2.67	74.60	100.06
56	9.19	4.48	0.14	2.45	72.65	99.33
57	9.35	4.28	0.11	3.35	70.67	97.97
58	9.51	4.09	0.09	4.68	68.40	96.21
59	9.68	4.02	0.07	6.20	66.49	94.82
60	9.84	4.00	0.07	6.47	65.29	93.64
61	10.01	3.79	0.06	6.66	69.24	94.56
62	10.17	3.60	0.10	7.64	74.60	96.70
63	10.33	3.91	0.14	9.22	71.87	97.66
64	10.50	4.79	0.09	11.06	64.35	97.96
65	10.66	5.59	0.09	9.79	57.23	97.27
66	10.83	5.70	0.10	5.74	57.35	97.77
67	10.99	5.18	0.11	6.09	61.15	98.21
68	11.15	4.71	0.12	7.57	66.11	98.64
69	11.32	4.57	0.13	6.58	68.42	98.60
70	11.48	4.60	0.11	4.69	73.31	100.40
71	11.65	4.66	0.22	6.02	76.69	102.36
72	11.81	5.03	0.27	6.90	77.06	103.90
73	11.98	5.54	0.24	7.51	72.58	103.90
74	12.14	5.93	0.20	1.35	66.97	102.88
75	12.30	5.98	0.16	2.33	62.48	101.74
76	12.47	6.17	0.15	4.22	58.47	100.71
77	12.63	6.51	0.13	4.87	56.02	100.27
78	12.80	6.56	0.13	3.96	55.88	100.00
79	12.96	6.02	0.13	4.33	58.00	99.17
80	13.12	5.09	0.10	4.74	61.68	97.62
81	13.29	4.30	0.08	5.56	65.64	95.64
82	13.45	3.83	0.07	6.33	69.43	94.95
83	13.62	3.89	0.08	7.31	69.69	95.32
84	13.78	4.39	0.09	8.66	65.30	95.82
85	13.94	5.04	0.08	10.27	58.06	94.95
86	14.11	5.33	0.05	11.44	56.59	95.52
87	14.27	5.14	0.10	13.20	60.62	97.24
88	14.44	4.80	0.14	14.83	65.85	99.12
89	14.60	4.98	0.14	16.30	66.10	100.59
90	14.76	6.10	0.18	11.34	60.74	102.16
91	14.93	7.87	0.22	11.21	55.48	104.12
92	15.09	9.32	0.25	6.03	52.59	106.25
93	15.26	10.38	0.35	9.24	51.27	107.94
94	15.42	11.18	0.39	15.91	49.73	109.13
95	15.58	12.19	0.39	28.57	47.27	109.12
96	15.75	12.60	0.33	7.78	44.22	108.05

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	12.28	0.23	12.01	42.55	106.56
98	16.08	11.49	0.22	14.41	42.39	105.62
99	16.24	11.17	0.24	16.68	43.41	105.69
100	16.40	11.47	0.25	17.69	42.90	105.82
101	16.57	12.20	0.23	19.79	41.70	106.19
102	16.73	12.97	0.26	23.44	40.39	106.64
103	16.90	13.64	0.28	26.44	39.65	107.28
104	17.06	14.26	0.29	29.71	39.88	108.36
105	17.22	14.87	0.38	33.58	40.32	109.46
106	17.39	15.41	0.41	39.37	41.74	110.78
107	17.55	15.64	0.49	31.63	43.07	111.77
108	17.72	15.64	0.56	38.45	44.60	112.65
109	17.88	15.82	0.60	40.10	45.59	113.41
110	18.04	16.19	0.66	52.45	45.87	113.81
111	18.21	16.32	0.65	48.82	45.77	113.67
112	18.37	15.73	0.56	42.03	46.07	113.27
113	18.54	15.00	0.57	47.57	47.54	113.31
114	18.70	14.85	0.68	50.37	49.57	114.17
115	18.86	15.59	0.79	51.28	50.11	114.98
116	19.03	16.71	0.78	38.15	49.40	115.72
117	19.19	18.01	0.87	36.48	48.15	116.26
118	19.36	19.04	0.92	39.78	47.16	116.63
119	19.52	19.72	0.88	12.31	45.77	116.30
120	19.69	19.56	0.73	4.97	44.59	115.58
121	19.85	19.03	0.69	13.26	44.23	114.89
122	20.01	18.27	0.69	15.69	45.28	114.86
123	20.18	17.93	0.74	19.82	46.06	114.91
124	20.34	18.09	0.71	26.17	44.97	114.62
125	20.51	18.88	0.60	29.17	45.73	115.50
126	20.67	19.49	0.98	30.92	45.94	116.12
127	20.83	19.87	0.89	25.91	46.74	116.54
128	21.00	19.25	0.74	26.32	45.57	115.42
129	21.16	18.17	0.63	6.85	45.90	114.20
130	21.33	16.20	0.59	12.55	47.40	113.05
131	21.49	14.60	0.50	20.94	48.54	111.71
132	21.65	13.57	0.39	28.37	47.92	110.05
133	21.82	13.11	0.31	33.25	46.26	108.14
134	21.98	12.47	0.24	32.92	46.59	107.29
135	22.15	11.63	0.30	40.86	48.36	107.08
136	22.31	11.04	0.30	49.76	50.99	107.48
137	22.47	10.82	0.30	50.42	52.85	107.92
138	22.64	10.81	0.36	53.14	53.85	108.12
139	22.80	10.72	0.33	50.93	54.22	107.94
140	22.97	10.38	0.28	48.58	53.36	106.60
141	23.13	9.65	0.20	41.88	53.02	104.96
142	23.29	8.81	0.18	46.94	53.84	103.58
143	23.46	8.23	0.18	48.03	55.31	103.13
144	23.62	8.22	0.18	52.08	56.26	103.40

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	8.60	0.20	52.28	56.31	104.20
146	23.95	9.06	0.24	58.60	57.12	105.27
147	24.11	9.32	0.27	40.60	57.18	105.75
148	24.28	9.31	0.24	47.31	56.86	105.58
149	24.44	9.18	0.22	54.57	56.33	105.19
150	24.61	8.99	0.23	55.94	56.75	104.95
151	24.77	8.81	0.23	49.58	58.79	105.34
152	24.93	8.71	0.26	46.49	60.43	105.81
153	25.10	8.86	0.28	49.37	62.05	106.83
154	25.26	9.28	0.33	50.71	61.99	107.51
155	25.43	9.72	0.34	45.67	60.98	107.70
156	25.59	9.88	0.30	41.97	59.28	107.09
157	25.75	9.59	0.25	44.18	57.83	105.92
158	25.92	9.07	0.21	47.35	57.57	104.80
159	26.08	8.60	0.20	48.14	58.59	104.39
160	26.25	8.51	0.23	51.64	58.46	104.11
161	26.41	8.79	0.19	54.00	58.70	104.63
162	26.57	9.09	0.24	52.20	57.98	104.53
163	26.74	8.92	0.21	47.31	59.04	104.71
164	26.90	8.43	0.21	58.62	60.98	104.45
165	27.07	7.93	0.23	46.74	63.07	104.43
166	27.23	7.87	0.22	54.06	64.18	104.37
167	27.40	7.94	0.21	56.64	63.34	103.97
168	27.56	7.91	0.19	50.54	61.48	102.88
169	27.72	7.68	0.14	52.85	60.02	101.65
170	27.89	7.50	0.13	53.14	59.40	100.91
171	28.05	7.45	0.15	57.57	60.78	101.27
172	28.22	7.46	0.16	52.19	62.31	101.74
173	28.38	7.36	0.16	50.98	62.63	101.54
174	28.54	7.21	0.14	56.11	63.57	101.65
175	28.71	7.17	0.17	56.03	64.27	102.11
176	28.87	7.44	0.19	59.65	66.05	103.52
177	29.04	7.91	0.24	53.86	65.53	104.37
178	29.20	8.35	0.23	54.53	65.11	104.88
179	29.36	8.50	0.22	41.31	63.32	104.44
180	29.53	8.40	0.19	49.61	62.13	103.71
181	29.69	8.22	0.17	52.76	61.15	103.06
182	29.86	8.14	0.18	54.86	61.05	102.77
183	30.02	8.12	0.17	56.10	61.45	102.71
184	30.18	8.10	0.17	48.19	61.39	102.41
185	30.35	7.95	0.16	53.24	61.12	101.83
186	30.51	7.72	0.14	57.24	60.81	101.07
187	30.68	7.44	0.12	56.79	60.21	100.07
188	30.84	7.26	0.11	61.12	60.50	99.66
189	31.00	7.21	0.12	61.51	60.38	99.52
190	31.17	7.31	0.12	65.17	60.65	99.84
191	31.33	7.49	0.12	59.83	60.62	100.36
192	31.50	7.71	0.14	64.06	61.09	101.03

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	7.84	0.15	61.46	62.14	101.62
194	31.82	7.79	0.15	49.64	62.16	101.29
195	31.99	7.59	0.12	54.04	62.41	100.84
196	32.15	7.41	0.13	58.67	61.49	100.06
197	32.32	7.39	0.11	59.81	61.72	100.03
198	32.48	7.45	0.12	59.21	61.11	99.75
199	32.64	7.42	0.11	62.75	61.62	99.77
200	32.81	7.27	0.12	57.87	61.79	99.38
201	32.97	7.11	0.11	58.70	62.09	99.12
202	33.14	7.13	0.10	62.44	61.01	98.82
203	33.30	7.39	0.10	68.30	60.07	99.23
204	33.46	7.78	0.12	69.29	59.93	100.36
205	33.63	8.18	0.15	69.63	60.85	101.80
206	33.79	8.46	0.18	64.84	61.31	102.65
207	33.96	8.54	0.17	66.01	61.60	102.82
208	34.12	8.36	0.16	63.72	61.52	102.18
209	34.28	7.96	0.14	60.15	61.88	101.43
210	34.45	7.75	0.13	60.85	65.69	102.71
211	34.61	8.02	0.25	59.35	67.40	104.17
212	34.78	8.69	0.25	63.88	67.39	105.03
213	34.94	9.19	0.20	30.43	64.80	104.75
214	35.10	9.21	0.21	44.02	62.14	103.80
215	35.27	9.23	0.16	49.36	60.28	103.80
216	35.43	9.90	0.19	55.50	59.54	105.24
217	35.60	11.19	0.32	65.35	60.05	107.97
218	35.76	12.57	0.44	69.43	59.74	109.84
219	35.93	13.21	0.44	58.70	58.37	110.17
220	36.09	13.11	0.36	51.00	56.24	109.05
221	36.25	12.44	0.26	61.74	54.28	107.32
222	36.42	11.78	0.22	64.71	52.95	105.59
223	36.58	11.27	0.19	65.38	53.09	104.61
224	36.75	10.92	0.19	63.20	53.39	103.83
225	36.91	10.60	0.17	62.44	54.33	103.54
226	37.07	10.34	0.17	62.08	55.27	103.43
227	37.24	10.26	0.18	60.35	56.80	104.01
228	37.40	10.44	0.21	61.14	56.72	104.23
229	37.57	10.78	0.19	59.63	56.16	104.45
230	37.73	11.02	0.20	58.73	55.44	104.40
231	37.89	11.11	0.21	48.75	54.69	104.10
232	38.06	10.99	0.16	57.49	54.15	103.50
233	38.22	10.77	0.15	50.87	54.28	103.19
234	38.39	10.69	0.19	49.18	52.83	102.28
235	38.55	10.90	0.11	57.85	53.94	103.16
236	38.71	11.16	0.21	53.03	54.11	103.60
237	38.88	11.28	0.21	46.02	55.54	104.19
238	39.04	10.99	0.15	43.32	54.62	103.20
239	39.21	10.72	0.14	40.60	53.79	101.83
240	39.37	10.15	0.13	48.19	56.36	102.53

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	10.03	0.20	56.88	53.27	104.79
242	39.70	15.68	0.28	61.28	50.31	106.69
243	39.86	15.68	0.28	58.89	22.44	112.61
244	40.03	89.11	0.64	40.74	14.79	115.70
245	40.19	89.11	0.64	48.06	8.45	119.73
246	40.35	158.95	0.97	-0.37	5.72	122.45
247	40.52	221.73	1.32	11.23	3.65	125.11
248	40.68	261.81	1.51	9.80	2.82	126.84
249	40.85	279.77	1.72	10.76	2.50	127.72
250	41.01	287.03	1.76	9.52	2.42	128.17
251	41.17	290.78	1.77	12.17	2.31	128.16
252	41.34	290.51	1.70	11.19	2.24	127.98
253	41.50	284.88	1.64	11.41	2.24	127.55
254	41.67	270.81	1.52	12.15	2.38	126.87
255	41.83	248.50	1.34	11.53	2.63	125.82
256	41.99	221.83	1.15	10.52	2.99	124.56
257	42.16	199.74	1.00	11.09	3.30	123.41
258	42.32	191.98	0.92	10.97	3.65	123.32
259	42.49	200.30	1.14	12.54	3.87	124.21
260	42.65	216.05	1.37	13.72	3.97	125.31
261	42.81	223.53	1.41	11.81	3.79	125.42
262	42.98	214.92	1.17	10.67	3.69	124.58
263	43.14	194.02	0.98	10.15	3.77	123.11
264	43.31	173.68	0.84	10.57	4.15	122.01
265	43.47	166.03	0.84	11.00	4.46	121.79
266	43.64	174.84	0.93	12.93	4.18	122.18
267	43.80	196.75	0.94	14.23	3.69	123.21
268	43.96	220.29	1.15	13.49	2.83	123.64
269	44.13	239.45	1.00	12.20	2.25	123.96
270	44.29	249.05	1.00	15.21	1.85	123.92
271	44.46	250.54	1.09	12.77	1.85	124.05
272	44.62	244.77	1.05	12.64	1.95	123.92
273	44.78	236.62	0.96	13.01	2.01	123.45
274	44.95	229.61	0.93	12.78	2.10	123.09
275	45.11	225.96	0.93	12.78	2.25	123.00
276	45.28	223.99	0.95	12.99	2.42	123.16
277	45.44	223.16	1.00	12.55	2.60	123.40
278	45.60	222.66	1.03	13.39	2.78	123.66
279	45.77	221.40	1.06	13.22	2.89	123.70
280	45.93	217.97	1.02	12.91	3.06	123.62
281	46.10	210.04	1.01	12.55	3.29	123.29
282	46.26	197.59	0.97	12.08	3.74	122.88
283	46.42	180.85	0.91	12.13	4.39	122.25
284	46.59	161.63	0.85	11.98	5.16	121.36
285	46.75	143.18	0.74	11.37	5.93	120.13
286	46.92	127.27	0.61	11.89	6.61	118.77
287	47.08	115.67	0.55	12.32	5.00	117.73
288	47.24	107.99	0.54	12.37	5.00	116.90

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	103.65	0.46	12.82	5.00	116.54
290	47.57	101.55	0.50	12.97	5.00	116.03
291	47.74	100.50	0.45	12.98	5.00	116.12
292	47.90	100.52	0.48	13.26	5.00	116.20
293	48.06	101.37	0.51	13.14	8.89	116.74
294	48.23	102.65	0.56	13.23	9.26	117.41
295	48.39	102.91	0.63	13.24	9.71	118.04
296	48.56	102.35	0.66	13.31	9.89	118.34
297	48.72	104.06	0.63	13.43	9.63	118.62
298	48.88	112.26	0.68	13.74	8.56	119.03
299	49.05	130.85	0.72	14.13	7.14	120.02
300	49.21	156.77	0.82	16.39	5.60	121.15
301	49.38	184.55	0.92	15.36	4.37	122.13
302	49.54	205.25	0.94	15.62	3.35	122.41
303	49.70	216.81	0.83	15.71	2.49	121.99
304	49.87	225.01	0.71	14.57	1.83	121.48
305	50.03	236.87	0.73	15.01	1.40	121.62
306	50.20	255.92	0.83	16.36	1.16	122.54
307	50.36	278.23	0.96	16.44	1.62	125.18
308	50.52	299.05	1.73	17.18	1.90	126.82
309	50.69	304.65	1.64	17.58	2.06	127.57
310	50.85	299.61	1.39	17.85	2.00	127.17
311	51.02	285.98	1.50	19.60	2.15	127.00
312	51.18	283.82	1.57	16.06	2.51	127.13
313	51.35	275.51	1.51	15.75	2.76	126.99
314	51.51	260.30	1.46	14.84	4.20	128.17
315	51.67	234.68	2.48	14.02	6.28	129.64
316	51.84	221.00	2.88	14.73	7.71	130.27
317	52.00	221.00	2.22	17.20	7.81	130.26
318	52.17	230.36	2.48	7.76	5.95	128.46
319	52.33	236.12	1.19	20.55	4.22	126.49
320	52.49	238.42	0.79	15.23	2.14	122.91
321	52.66	238.08	0.75	16.97	1.64	121.79
322	52.82	238.14	0.80	17.06	1.74	121.92
323	52.99	234.76	0.84	16.34	2.06	122.28
324	53.15	226.53	0.88	16.00	2.49	122.55
325	53.31	216.55	0.92	15.50	2.99	122.83
326	53.48	212.31	0.97	16.25	3.34	123.19
327	53.64	216.83	1.03	16.75	3.25	123.34
328	53.81	227.47	0.97	19.11	2.89	123.44
329	53.97	238.50	0.97	18.59	2.52	123.55
330	54.13	246.82	1.04	16.84	2.36	123.86
331	54.30	250.55	1.06	16.52	2.33	124.07
332	54.46	249.35	1.04	16.38	2.36	124.06
333	54.63	244.21	1.04	16.26	2.47	123.91
334	54.79	237.57	1.02	16.31	2.65	123.70
335	54.95	229.92	0.98	16.89	2.93	123.49
336	55.12	218.92	0.99	17.04	3.28	123.12

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.28	204.21	0.92	16.12	3.67	122.45
338	55.45	188.08	0.79	15.04	4.01	121.52
339	55.61	176.09	0.72	15.66	4.46	120.94
340	55.77	168.83	0.78	16.41	6.10	122.31
341	55.94	157.10	1.32	16.51	9.57	124.79
342	56.10	130.97	1.99	17.09	13.79	125.56
343	56.27	95.40	1.50	16.09	18.37	124.97
344	56.43	79.13	1.29	15.73	19.56	123.45
345	56.59	94.94	1.26	24.37	15.48	122.37
346	56.76	127.18	0.81	25.47	10.55	121.31
347	56.92	142.29	0.66	10.03	5.00	119.07
348	57.09	130.39	0.48	17.65	5.00	117.65
349	57.25	108.81	0.50	16.58	9.02	117.52
350	57.41	95.52	0.70	16.90	13.39	120.85
351	57.58	105.09	1.52	17.12	14.39	123.20
352	57.74	131.86	1.43	17.69	12.61	125.30
353	57.91	167.31	1.61	15.58	9.26	125.70
354	58.07	194.64	1.46	15.55	6.47	125.21
355	58.23	211.87	0.94	20.32	4.47	124.12
356	58.40	223.57	0.95	18.51	3.04	122.88
357	58.56	236.58	0.88	19.38	2.79	123.59
358	58.73	252.24	1.16	19.94	2.44	124.10
359	58.89	266.89	1.11	19.48	2.33	124.91
360	59.06	277.04	1.19	21.95	2.10	125.16
361	59.22	281.59	1.24	18.07	1.93	125.22
362	59.38	285.05	1.11	18.84	0.63	122.26
363	59.55	286.81	0.00	19.64	0.45	121.10
364	59.71	259.95	0.91	18.43	0.53	119.43
365	59.88	222.07	0.74	17.84	2.60	121.59
366	60.04	183.08	0.68	25.12	3.82	121.64
367	60.20	190.83	1.01	18.58	6.05	124.08
368	60.37	189.92	1.76	18.89	9.16	127.29
369	60.53	167.79	2.63	17.49	13.90	129.23
370	60.70	122.59	2.98	16.96	21.78	131.06
371	60.86	99.48	4.54	21.89	27.66	131.31
372	61.02	104.17	3.61	56.03	28.50	130.73
373	61.19	104.04	2.33	38.97	24.01	127.98
374	61.35	93.34	1.28	130.79	20.89	124.30
375	61.52	76.81	0.89	147.12	19.84	121.11
376	61.68	69.70	0.86	197.89	21.37	120.56
377	61.84	71.87	1.14	278.04	22.78	122.14
378	62.01	81.32	1.55	317.03	23.15	124.67
379	62.17	97.80	2.13	296.58	21.82	126.41
380	62.34	112.57	2.16	194.29	20.99	127.92
381	62.50	120.17	2.62	147.40	22.92	130.20
382	62.66	122.32	4.47	115.45	24.43	131.96
383	62.83	132.69	4.47	165.48	24.18	133.23
384	62.99	154.87	4.43	73.47	21.23	133.58

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
385	63.16	178.09	4.56	8.77	19.40	134.16
386	63.32	186.06	5.09	14.43	18.85	134.56
387	63.48	180.32	4.99	18.94	19.13	134.68
388	63.65	176.56	4.81	11.40	18.33	134.14
389	63.81	185.62	4.05	10.91	16.54	133.61
390	63.98	202.89	3.85	13.85	14.43	133.22
391	64.14	216.12	3.88	12.13	13.23	133.20
392	64.30	219.31	3.81	8.35	13.50	133.72
393	64.47	215.69	4.61	13.52	14.77	134.49
394	64.63	210.34	5.29	14.84	16.35	135.26
395	64.80	206.75	5.42	9.50	17.14	135.53
396	64.96	206.74	5.27	11.16	16.93	135.36
397	65.12	209.51	4.92	14.47	16.92	135.53
398	65.29	214.29	5.74	13.39	16.90	135.76
399	65.45	217.01	5.69	10.27	17.08	136.01
400	65.62	214.97	5.42	19.55	17.28	135.96
401	65.78	207.88	5.69	20.92	17.77	135.79
402	65.94	198.63	5.46	11.88	18.42	135.73
403	66.11	197.56	5.45	55.09	18.06	135.36
404	66.27	203.10	4.90	11.88	17.19	135.05
405	66.44	208.43	4.72	17.88	17.13	134.96
406	66.60	197.19	5.29	4.55	18.40	134.80
407	66.77	167.59	4.86	47.58	21.09	134.01
408	66.93	130.40	3.87	33.90	23.65	132.19
409	67.09	106.36	2.93	234.67	26.42	130.90
410	67.26	102.28	3.52	345.76	27.61	130.68
411	67.42	109.84	3.72	339.54	28.96	131.73
412	67.59	116.09	4.42	63.56	28.56	132.58
413	67.75	124.95	4.68	274.72	27.10	132.84
414	67.91	135.31	3.92	118.24	24.79	132.57
415	68.08	138.90	3.72	47.90	22.74	131.33
416	68.24	123.18	2.76	286.70	21.64	129.07
417	68.41	98.45	1.39	282.90	24.46	127.74
418	68.57	78.92	2.79	287.87	29.69	127.36
419	68.73	72.41	2.81	296.01	35.23	128.14
420	68.90	71.77	2.45	317.32	35.80	127.59
421	69.06	73.19	2.31	2.17	33.55	126.84
422	69.23	78.65	2.03	155.80	30.58	126.92
423	69.39	92.50	2.33	303.48	29.35	128.98
424	69.55	109.04	4.06	289.10	28.76	130.82
425	69.72	115.33	4.01	201.41	28.75	131.32
426	69.88	106.25	2.96	51.16	27.05	129.26
427	70.05	88.75	1.53	225.14	25.66	125.97
428	70.21	74.70	1.18	249.19	24.05	122.22
429	70.37	67.29	0.85	258.02	24.27	120.23
430	70.54	64.62	0.78	276.57	23.92	118.92
431	70.70	63.96	0.76	276.07	23.65	118.39
432	70.87	63.86	0.69	294.07	23.14	117.96

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
433	71.03	63.89	0.65	300.19	22.75	117.67
434	71.19	63.70	0.68	314.94	22.49	117.49
435	71.36	63.73	0.64	330.58	22.35	117.45
436	71.52	64.02	0.64	350.51	23.17	118.21
437	71.69	64.38	0.88	371.23	23.34	118.56
438	71.85	65.33	0.74	387.45	23.39	118.93
439	72.01	66.77	0.74	398.03	22.18	118.50
440	72.18	68.72	0.73	402.98	21.27	118.29
441	72.34	69.68	0.66	443.37	20.55	118.10
442	72.51	70.01	0.67	449.48	20.20	117.98
443	72.67	69.78	0.69	462.50	20.51	118.29
444	72.83	70.25	0.75	466.86	21.03	118.93
445	73.00	72.21	0.86	480.64	20.76	119.43
446	73.16	77.28	0.83	489.01	19.97	120.27
447	73.33	86.78	0.98	507.74	18.28	121.04
448	73.49	98.59	1.06	532.09	17.19	122.18
449	73.65	106.22	1.20	522.07	17.55	123.50
450	73.82	105.62	1.56	345.57	19.13	124.60
451	73.98	100.40	1.68	317.22	20.46	124.83
452	74.15	96.92	1.40	368.37	21.43	124.80
453	74.31	96.57	1.59	238.25	20.91	123.96
454	74.48	93.35	1.21	307.62	24.86	125.87
455	74.64	87.90	2.71	334.63	28.95	127.55
456	74.80	86.37	3.09	315.70	31.94	128.92
457	74.97	90.50	2.67	362.08	30.24	128.40
458	75.13	96.98	2.07	72.66	27.12	127.23
459	75.30	95.81	1.87	207.07	25.11	126.02
460	75.46	91.83	1.67	248.29	25.19	125.58
461	75.62	86.66	1.79	296.79	25.46	124.98
462	75.79	84.58	1.52	248.17	25.47	124.34
463	75.95	82.60	1.30	293.56	24.68	123.38
464	76.12	80.57	1.25	309.32	24.12	122.70
465	76.28	79.60	1.17	327.91	23.73	122.19
466	76.44	78.76	1.06	358.14	23.30	121.68
467	76.61	77.50	1.03	361.81	22.76	121.07
468	76.77	75.50	0.92	433.96	22.53	120.63
469	76.94	74.74	0.90	432.75	23.67	121.32
470	77.10	75.60	1.31	432.38	24.90	122.31
471	77.26	77.79	1.36	437.95	26.30	123.42
472	77.43	78.77	1.47	367.15	28.10	124.61
473	77.59	78.28	2.03	377.60	30.04	125.51
474	77.76	77.31	2.01	342.03	30.47	125.56
475	77.92	76.26	1.52	399.65	28.85	124.23
476	78.08	74.84	1.14	255.32	26.32	122.25
477	78.25	71.35	0.93	367.67	24.64	120.41
478	78.41	68.27	0.75	394.73	23.90	119.32
479	78.58	66.71	0.77	418.26	23.70	118.84
480	78.74	67.36	0.79	426.74	23.58	118.87

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
481	78.90	68.93	0.75	443.71	22.78	118.68
482	79.07	70.32	0.70	460.43	21.97	118.48
483	79.23	71.44	0.71	454.08	21.59	118.54
484	79.40	72.18	0.76	483.04	21.70	118.88
485	79.56	72.91	0.80	485.52	21.95	119.28
486	79.72	73.52	0.83	476.82	22.18	119.58
487	79.89	73.74	0.85	491.27	22.14	119.63
488	80.05	73.83	0.81	501.83	22.08	119.63
489	80.22	73.91	0.83	504.92	22.10	119.69
490	80.38	73.98	0.87	521.67	22.44	119.94
491	80.54	73.90	0.89	509.18	23.18	120.47
492	80.71	74.10	1.02	512.07	23.77	120.93
493	80.87	74.93	1.05	518.91	23.81	121.13
494	81.04	75.66	0.97	542.84	23.33	120.91
495	81.20	75.47	0.93	519.14	22.62	120.33
496	81.36	73.99	0.83	537.24	22.22	119.67
497	81.53	72.18	0.75	513.46	22.04	119.10
498	81.69	70.88	0.75	529.78	22.20	118.94
499	81.86	70.89	0.78	559.17	22.89	119.40
500	82.02	71.80	0.90	524.51	23.30	119.92
501	82.19	73.21	0.92	548.03	23.72	120.41
502	82.35	74.19	0.96	494.68	22.99	120.13
503	82.51	74.89	0.78	510.56	21.71	119.34
504	82.68	75.46	0.64	520.62	20.24	118.32
505	82.84	75.82	0.64	510.10	19.55	117.78
506	83.01	75.71	0.63	497.74	19.83	117.94
507	83.17	75.29	0.69	490.05	20.35	118.25
508	83.33	74.73	0.73	507.04	20.79	118.40
509	83.50	74.24	0.68	472.94	22.29	119.41
510	83.66	73.94	1.00	481.35	24.36	120.89
511	83.83	75.57	1.27	482.57	25.64	122.05
512	83.99	78.44	1.17	452.40	25.57	122.35
513	84.15	81.01	1.12	296.87	23.86	121.49
514	84.32	80.05	0.86	404.96	22.59	120.39
515	84.48	76.70	0.74	417.86	21.58	119.09
516	84.65	72.87	0.70	451.29	21.78	118.43
517	84.81	70.80	0.69	452.67	22.16	118.10
518	84.97	69.95	0.67	461.84	22.98	118.54
519	85.14	70.86	0.83	474.93	24.74	120.30
520	85.30	76.04	1.26	479.44	26.85	123.00
521	85.47	85.21	1.81	489.70	27.49	125.24
522	85.63	96.72	2.07	393.58	30.28	128.48
523	85.79	104.71	3.88	326.23	31.27	130.25
524	85.96	109.91	3.70	292.73	33.88	131.95
525	86.12	110.10	4.48	87.90	33.11	131.72
526	86.29	109.12	3.47	204.72	33.61	131.93
527	86.45	113.81	4.04	21.77	31.98	132.37
528	86.61	133.34	4.95	122.32	30.17	133.76

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
529	86.78	159.05	5.45	169.90	28.23	135.01
530	86.94	169.47	6.01	44.02	26.75	134.92
531	87.11	152.73	4.54	34.57	30.12	135.70
532	87.27	137.50	7.54	64.84	33.59	136.14
533	87.43	137.50	7.54	240.45	19.44	135.10
534	87.60	339.68	0.00	278.25	7.62	130.73
535	87.76	339.68	0.00	345.45	40.45	87.36
536	87.93	415.72	0.00	86.89	43.44	87.36

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	0.468	1.11	0.422	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
9	1.48	0.09	0.00	0.09	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
10	1.64	0.10	0.00	0.10	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
11	1.80	0.11	0.00	0.11	1.00	0.468	1.11	0.422	1.10	1.00	2.000	Yes
12	1.97	0.12	0.00	0.12	1.00	0.468	1.11	0.422	1.10	1.00	2.000	Yes
13	2.13	0.12	0.00	0.12	1.00	0.468	1.11	0.422	1.10	1.00	2.000	Yes
14	2.30	0.13	0.00	0.13	1.00	0.468	1.11	0.422	1.10	1.00	2.000	Yes
15	2.46	0.14	0.00	0.14	1.00	0.468	1.11	0.422	1.10	1.00	2.000	Yes
16	2.62	0.15	0.00	0.15	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
17	2.79	0.16	0.00	0.16	1.00	0.468	1.11	0.422	1.10	1.00	2.000	No
18	2.95	0.17	0.00	0.17	1.00	0.467	1.11	0.422	1.09	1.00	2.000	No
19	3.12	0.18	0.00	0.18	1.00	0.467	1.11	0.421	1.09	1.00	2.000	No
20	3.28	0.18	0.00	0.18	1.00	0.467	1.11	0.421	1.08	1.00	2.000	No
21	3.44	0.19	0.00	0.19	1.00	0.467	1.11	0.421	1.08	1.00	2.000	No
22	3.61	0.20	0.00	0.20	1.00	0.467	1.11	0.421	1.08	1.00	2.000	No
23	3.77	0.21	0.00	0.21	1.00	0.466	1.11	0.421	1.07	1.00	2.000	No
24	3.94	0.22	0.00	0.22	1.00	0.466	1.11	0.420	1.07	1.00	2.000	No
25	4.10	0.23	0.00	0.23	1.00	0.466	1.11	0.420	1.07	1.00	2.000	No
26	4.27	0.23	0.00	0.23	0.99	0.466	1.11	0.420	1.07	1.00	2.000	No
27	4.43	0.24	0.00	0.24	0.99	0.465	1.11	0.420	1.07	1.00	2.000	No
28	4.59	0.25	0.00	0.25	0.99	0.465	1.11	0.420	1.07	1.00	2.000	No
29	4.76	0.26	0.00	0.26	0.99	0.465	1.11	0.419	1.06	1.00	2.000	No
30	4.92	0.27	0.00	0.27	0.99	0.465	1.11	0.419	1.06	1.00	2.000	No
31	5.09	0.28	0.00	0.28	0.99	0.464	1.11	0.419	1.06	1.00	2.000	No
32	5.25	0.28	0.00	0.28	0.99	0.464	1.11	0.419	1.06	1.00	2.000	No
33	5.41	0.29	0.00	0.29	0.99	0.464	1.11	0.419	1.05	1.00	2.000	No
34	5.58	0.30	0.00	0.30	0.99	0.464	1.11	0.418	1.05	1.00	2.000	No
35	5.74	0.31	0.00	0.31	0.99	0.463	1.11	0.418	1.05	1.00	2.000	No
36	5.91	0.32	0.00	0.32	0.99	0.463	1.11	0.418	1.05	1.00	2.000	Yes
37	6.07	0.33	0.00	0.33	0.99	0.463	1.11	0.418	1.06	1.00	2.000	Yes
38	6.23	0.33	0.00	0.33	0.99	0.463	1.11	0.417	1.06	1.00	2.000	Yes
39	6.40	0.34	0.00	0.34	0.99	0.462	1.11	0.417	1.07	1.00	2.000	Yes
40	6.56	0.35	0.00	0.35	0.99	0.462	1.11	0.417	1.08	1.00	2.000	Yes
41	6.73	0.36	0.00	0.36	0.99	0.462	1.11	0.417	1.08	1.00	2.000	Yes
42	6.89	0.37	0.00	0.37	0.99	0.462	1.11	0.416	1.07	1.00	2.000	Yes
43	7.05	0.38	0.00	0.38	0.99	0.461	1.11	0.416	1.06	1.00	2.000	Yes
44	7.22	0.39	0.00	0.39	0.99	0.461	1.11	0.416	1.06	1.00	2.000	Yes
45	7.38	0.40	0.00	0.40	0.98	0.461	1.11	0.416	1.05	1.00	2.000	Yes
46	7.55	0.40	0.00	0.40	0.98	0.461	1.11	0.416	1.05	1.00	2.000	Yes
47	7.71	0.41	0.00	0.41	0.98	0.460	1.11	0.415	1.04	1.00	2.000	Yes
48	7.87	0.42	0.00	0.42	0.98	0.460	1.11	0.415	1.04	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	0.43	0.00	0.43	0.98	0.460	1.11	0.415	1.04	1.00	2.000	No
50	8.20	0.44	0.00	0.44	0.98	0.460	1.11	0.415	1.04	1.00	2.000	No
51	8.37	0.45	0.00	0.45	0.98	0.459	1.11	0.414	1.04	1.00	2.000	No
52	8.53	0.45	0.00	0.45	0.98	0.459	1.11	0.414	1.04	1.00	2.000	No
53	8.69	0.46	0.00	0.46	0.98	0.459	1.11	0.414	1.04	1.00	2.000	No
54	8.86	0.47	0.00	0.47	0.98	0.458	1.11	0.414	1.03	1.00	2.000	No
55	9.02	0.48	0.00	0.48	0.98	0.458	1.11	0.413	1.03	1.00	2.000	No
56	9.19	0.49	0.00	0.49	0.98	0.458	1.11	0.413	1.03	1.00	2.000	No
57	9.35	0.49	0.00	0.49	0.98	0.458	1.11	0.413	1.03	1.00	2.000	No
58	9.51	0.50	0.00	0.50	0.98	0.457	1.11	0.413	1.03	1.00	2.000	No
59	9.68	0.51	0.00	0.51	0.98	0.457	1.11	0.412	1.03	1.00	2.000	No
60	9.84	0.52	0.00	0.52	0.98	0.457	1.11	0.412	1.03	1.00	2.000	No
61	10.01	0.53	0.00	0.53	0.98	0.456	1.11	0.412	1.03	1.00	2.000	No
62	10.17	0.53	0.00	0.53	0.97	0.456	1.11	0.412	1.03	1.00	2.000	No
63	10.33	0.54	0.00	0.54	0.97	0.456	1.11	0.411	1.03	1.00	2.000	No
64	10.50	0.55	0.00	0.55	0.97	0.458	1.11	0.413	1.03	1.00	0.402	No
65	10.66	0.56	0.01	0.55	0.97	0.462	1.11	0.417	1.03	1.00	0.405	No
66	10.83	0.57	0.01	0.55	0.97	0.466	1.11	0.420	1.03	1.00	0.409	No
67	10.99	0.57	0.02	0.55	0.97	0.470	1.11	0.424	1.03	1.00	0.412	No
68	11.15	0.58	0.02	0.56	0.97	0.474	1.11	0.427	1.03	1.00	0.416	No
69	11.32	0.59	0.03	0.56	0.97	0.477	1.11	0.431	1.03	1.00	0.419	No
70	11.48	0.60	0.03	0.56	0.97	0.481	1.11	0.434	1.03	1.00	0.423	No
71	11.65	0.61	0.04	0.57	0.97	0.485	1.11	0.437	1.03	1.00	0.426	No
72	11.81	0.61	0.04	0.57	0.97	0.488	1.11	0.440	1.03	1.00	0.429	No
73	11.98	0.62	0.05	0.57	0.97	0.492	1.11	0.444	1.03	1.00	0.432	No
74	12.14	0.63	0.05	0.58	0.97	0.495	1.11	0.447	1.03	1.00	0.435	No
75	12.30	0.64	0.06	0.58	0.97	0.499	1.11	0.450	1.03	1.00	0.438	No
76	12.47	0.65	0.06	0.58	0.97	0.502	1.11	0.453	1.03	1.00	0.441	No
77	12.63	0.66	0.07	0.59	0.97	0.505	1.11	0.456	1.03	1.00	0.444	No
78	12.80	0.66	0.07	0.59	0.96	0.509	1.11	0.459	1.03	1.00	0.447	No
79	12.96	0.67	0.08	0.59	0.96	0.512	1.11	0.462	1.03	1.00	0.450	No
80	13.12	0.68	0.08	0.60	0.96	0.515	1.11	0.465	1.02	1.00	0.454	No
81	13.29	0.69	0.09	0.60	0.96	0.518	1.11	0.468	1.02	1.00	0.457	No
82	13.45	0.70	0.10	0.60	0.96	0.521	1.11	0.470	1.02	1.00	0.460	No
83	13.62	0.70	0.10	0.60	0.96	0.525	1.11	0.473	1.02	1.00	0.463	No
84	13.78	0.71	0.11	0.61	0.96	0.528	1.11	0.476	1.02	1.00	0.465	No
85	13.94	0.72	0.11	0.61	0.96	0.531	1.11	0.479	1.02	1.00	0.468	No
86	14.11	0.73	0.12	0.61	0.96	0.534	1.11	0.482	1.02	1.00	0.471	No
87	14.27	0.74	0.12	0.61	0.96	0.537	1.11	0.484	1.02	1.00	0.473	No
88	14.44	0.74	0.13	0.62	0.96	0.540	1.11	0.487	1.02	1.00	0.476	No
89	14.60	0.75	0.13	0.62	0.96	0.543	1.11	0.489	1.02	1.00	0.479	No
90	14.76	0.76	0.14	0.62	0.96	0.545	1.11	0.492	1.02	1.00	0.481	No
91	14.93	0.77	0.14	0.63	0.96	0.548	1.11	0.494	1.02	1.00	0.483	No
92	15.09	0.78	0.15	0.63	0.96	0.551	1.11	0.497	1.02	1.00	0.485	No
93	15.26	0.79	0.15	0.64	0.95	0.553	1.11	0.499	1.02	1.00	0.487	No
94	15.42	0.80	0.16	0.64	0.95	0.556	1.11	0.501	1.02	1.00	0.489	No
95	15.58	0.80	0.16	0.64	0.95	0.558	1.11	0.504	1.02	1.00	0.491	No
96	15.75	0.81	0.17	0.65	0.95	0.561	1.11	0.506	1.02	1.00	0.494	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	0.82	0.17	0.65	0.95	0.563	1.11	0.508	1.02	1.00	0.496	No
98	16.08	0.83	0.18	0.65	0.95	0.566	1.11	0.510	1.02	1.00	0.499	No
99	16.24	0.84	0.18	0.66	0.95	0.568	1.11	0.512	1.02	1.00	0.501	No
100	16.40	0.85	0.19	0.66	0.95	0.570	1.11	0.515	1.02	1.00	0.503	No
101	16.57	0.86	0.19	0.66	0.95	0.573	1.11	0.517	1.02	1.00	0.505	No
102	16.73	0.87	0.20	0.67	0.95	0.575	1.11	0.519	1.02	1.00	0.507	No
103	16.90	0.87	0.20	0.67	0.95	0.577	1.11	0.521	1.02	1.00	0.509	No
104	17.06	0.88	0.21	0.68	0.95	0.579	1.11	0.523	1.02	1.00	0.511	No
105	17.22	0.89	0.21	0.68	0.95	0.581	1.11	0.525	1.02	1.00	0.513	No
106	17.39	0.90	0.22	0.68	0.95	0.584	1.11	0.527	1.02	1.00	0.515	No
107	17.55	0.91	0.22	0.69	0.94	0.586	1.11	0.528	1.02	1.00	0.517	No
108	17.72	0.92	0.23	0.69	0.94	0.588	1.11	0.530	1.02	1.00	0.519	No
109	17.88	0.93	0.23	0.70	0.94	0.590	1.11	0.532	1.02	1.00	0.520	No
110	18.04	0.94	0.24	0.70	0.94	0.591	1.11	0.533	1.02	1.00	0.522	No
111	18.21	0.95	0.24	0.70	0.94	0.593	1.11	0.535	1.02	1.00	0.524	No
112	18.37	0.96	0.25	0.71	0.94	0.595	1.11	0.537	1.02	1.00	0.526	No
113	18.54	0.97	0.25	0.71	0.94	0.597	1.11	0.538	1.02	1.00	0.528	No
114	18.70	0.98	0.26	0.72	0.94	0.599	1.11	0.540	1.02	1.00	0.529	No
115	18.86	0.98	0.26	0.72	0.94	0.600	1.11	0.541	1.02	1.00	0.531	No
116	19.03	0.99	0.27	0.73	0.94	0.602	1.11	0.543	1.02	1.00	0.532	No
117	19.19	1.00	0.27	0.73	0.94	0.604	1.11	0.544	1.02	1.00	0.534	No
118	19.36	1.01	0.28	0.73	0.94	0.605	1.11	0.546	1.02	1.00	0.535	No
119	19.52	1.02	0.28	0.74	0.94	0.607	1.11	0.547	1.02	1.00	0.537	No
120	19.69	1.03	0.29	0.74	0.93	0.608	1.11	0.549	1.02	1.00	0.538	No
121	19.85	1.04	0.29	0.75	0.93	0.610	1.11	0.550	1.02	1.00	0.540	No
122	20.01	1.05	0.30	0.75	0.93	0.611	1.11	0.551	1.02	1.00	0.542	No
123	20.18	1.06	0.31	0.76	0.93	0.613	1.11	0.553	1.02	1.00	0.543	No
124	20.34	1.07	0.31	0.76	0.93	0.614	1.11	0.554	1.02	1.00	0.544	No
125	20.51	1.08	0.32	0.76	0.93	0.616	1.11	0.555	1.02	1.00	0.546	No
126	20.67	1.09	0.32	0.77	0.93	0.617	1.11	0.557	1.02	1.00	0.547	No
127	20.83	1.10	0.33	0.77	0.93	0.618	1.11	0.558	1.02	1.00	0.548	No
128	21.00	1.11	0.33	0.78	0.93	0.620	1.11	0.559	1.02	1.00	0.550	No
129	21.16	1.12	0.34	0.78	0.93	0.621	1.11	0.560	1.02	1.00	0.551	No
130	21.33	1.13	0.34	0.79	0.93	0.622	1.11	0.561	1.02	1.00	0.553	No
131	21.49	1.14	0.35	0.79	0.93	0.624	1.11	0.563	1.01	1.00	0.554	No
132	21.65	1.14	0.35	0.79	0.93	0.625	1.11	0.564	1.01	1.00	0.556	No
133	21.82	1.15	0.36	0.80	0.93	0.626	1.11	0.565	1.01	1.00	0.557	No
134	21.98	1.16	0.36	0.80	0.92	0.628	1.11	0.566	1.01	1.00	0.559	No
135	22.15	1.17	0.37	0.81	0.92	0.629	1.11	0.567	1.01	1.00	0.560	No
136	22.31	1.18	0.37	0.81	0.92	0.630	1.11	0.569	1.01	1.00	0.561	No
137	22.47	1.19	0.38	0.81	0.92	0.631	1.11	0.570	1.01	1.00	0.563	No
138	22.64	1.20	0.38	0.82	0.92	0.633	1.11	0.571	1.01	1.00	0.564	No
139	22.80	1.21	0.39	0.82	0.92	0.634	1.11	0.572	1.01	1.00	0.565	No
140	22.97	1.22	0.39	0.82	0.92	0.635	1.11	0.573	1.01	1.00	0.566	No
141	23.13	1.22	0.40	0.83	0.92	0.636	1.11	0.574	1.01	1.00	0.568	No
142	23.29	1.23	0.40	0.83	0.92	0.638	1.11	0.575	1.01	1.00	0.569	No
143	23.46	1.24	0.41	0.83	0.92	0.639	1.11	0.576	1.01	1.00	0.570	No
144	23.62	1.25	0.41	0.84	0.92	0.640	1.11	0.578	1.01	1.00	0.572	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	1.26	0.42	0.84	0.92	0.641	1.11	0.579	1.01	1.00	0.573	No
146	23.95	1.27	0.42	0.84	0.91	0.643	1.11	0.580	1.01	1.00	0.574	No
147	24.11	1.28	0.43	0.85	0.91	0.644	1.11	0.581	1.01	1.00	0.575	No
148	24.28	1.28	0.43	0.85	0.91	0.645	1.11	0.582	1.01	1.00	0.576	No
149	24.44	1.29	0.44	0.85	0.91	0.646	1.11	0.583	1.01	1.00	0.577	No
150	24.61	1.30	0.44	0.86	0.91	0.647	1.11	0.584	1.01	1.00	0.578	No
151	24.77	1.31	0.45	0.86	0.91	0.648	1.11	0.585	1.01	1.00	0.579	No
152	24.93	1.32	0.45	0.87	0.91	0.649	1.11	0.586	1.01	1.00	0.580	No
153	25.10	1.33	0.46	0.87	0.91	0.650	1.11	0.586	1.01	1.00	0.581	No
154	25.26	1.34	0.46	0.87	0.91	0.651	1.11	0.587	1.01	1.00	0.582	No
155	25.43	1.35	0.47	0.88	0.91	0.652	1.11	0.588	1.01	1.00	0.583	No
156	25.59	1.35	0.47	0.88	0.91	0.653	1.11	0.589	1.01	1.00	0.584	No
157	25.75	1.36	0.48	0.88	0.91	0.654	1.11	0.590	1.01	1.00	0.585	No
158	25.92	1.37	0.48	0.89	0.91	0.655	1.11	0.591	1.01	1.00	0.586	No
159	26.08	1.38	0.49	0.89	0.90	0.656	1.11	0.592	1.01	1.00	0.587	No
160	26.25	1.39	0.49	0.89	0.90	0.657	1.11	0.592	1.01	1.00	0.588	No
161	26.41	1.40	0.50	0.90	0.90	0.658	1.11	0.593	1.01	1.00	0.589	No
162	26.57	1.41	0.50	0.90	0.90	0.659	1.11	0.594	1.01	1.00	0.590	No
163	26.74	1.41	0.51	0.90	0.90	0.659	1.11	0.595	1.01	1.00	0.591	No
164	26.90	1.42	0.51	0.91	0.90	0.660	1.11	0.596	1.01	1.00	0.592	No
165	27.07	1.43	0.52	0.91	0.90	0.661	1.11	0.596	1.01	1.00	0.593	No
166	27.23	1.44	0.53	0.91	0.90	0.662	1.11	0.597	1.01	1.00	0.593	No
167	27.40	1.45	0.53	0.92	0.90	0.663	1.11	0.598	1.01	1.00	0.594	No
168	27.56	1.46	0.54	0.92	0.90	0.664	1.11	0.599	1.01	1.00	0.595	No
169	27.72	1.46	0.54	0.92	0.90	0.665	1.11	0.599	1.01	1.00	0.596	No
170	27.89	1.47	0.55	0.93	0.90	0.665	1.11	0.600	1.01	1.00	0.597	No
171	28.05	1.48	0.55	0.93	0.89	0.666	1.11	0.601	1.01	1.00	0.598	No
172	28.22	1.49	0.56	0.93	0.89	0.667	1.11	0.602	1.01	1.00	0.599	No
173	28.38	1.50	0.56	0.94	0.89	0.668	1.11	0.602	1.01	1.00	0.599	No
174	28.54	1.51	0.57	0.94	0.89	0.669	1.11	0.603	1.01	1.00	0.600	No
175	28.71	1.52	0.57	0.94	0.89	0.669	1.11	0.604	1.00	1.00	0.601	No
176	28.87	1.52	0.58	0.95	0.89	0.670	1.11	0.605	1.00	1.00	0.602	No
177	29.04	1.53	0.58	0.95	0.89	0.671	1.11	0.605	1.00	1.00	0.602	No
178	29.20	1.54	0.59	0.95	0.89	0.671	1.11	0.606	1.00	1.00	0.603	No
179	29.36	1.55	0.59	0.96	0.89	0.672	1.11	0.606	1.00	1.00	0.604	No
180	29.53	1.56	0.60	0.96	0.89	0.673	1.11	0.607	1.00	1.00	0.604	No
181	29.69	1.57	0.60	0.96	0.89	0.673	1.11	0.608	1.00	1.00	0.605	No
182	29.86	1.57	0.61	0.97	0.89	0.674	1.11	0.608	1.00	1.00	0.606	No
183	30.02	1.58	0.61	0.97	0.88	0.675	1.11	0.609	1.00	1.00	0.606	No
184	30.18	1.59	0.62	0.97	0.88	0.675	1.11	0.609	1.00	1.00	0.607	No
185	30.35	1.60	0.62	0.98	0.88	0.676	1.11	0.610	1.00	1.00	0.608	No
186	30.51	1.61	0.63	0.98	0.88	0.677	1.11	0.611	1.00	1.00	0.609	No
187	30.68	1.62	0.63	0.98	0.88	0.677	1.11	0.611	1.00	1.00	0.609	No
188	30.84	1.62	0.64	0.99	0.88	0.678	1.11	0.612	1.00	1.00	0.610	No
189	31.00	1.63	0.64	0.99	0.88	0.679	1.11	0.612	1.00	1.00	0.611	No
190	31.17	1.64	0.65	0.99	0.88	0.679	1.11	0.613	1.00	1.00	0.611	No
191	31.33	1.65	0.65	1.00	0.88	0.680	1.11	0.613	1.00	1.00	0.612	No
192	31.50	1.66	0.66	1.00	0.88	0.681	1.11	0.614	1.00	1.00	0.612	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	1.67	0.66	1.00	0.88	0.681	1.11	0.614	1.00	1.00	0.613	No
194	31.82	1.67	0.67	1.01	0.88	0.682	1.11	0.615	1.00	1.00	0.614	No
195	31.99	1.68	0.67	1.01	0.87	0.682	1.11	0.615	1.00	1.00	0.614	No
196	32.15	1.69	0.68	1.01	0.87	0.683	1.11	0.616	1.00	1.00	0.615	No
197	32.32	1.70	0.68	1.01	0.87	0.683	1.11	0.616	1.00	1.00	0.615	No
198	32.48	1.71	0.69	1.02	0.87	0.684	1.11	0.617	1.00	1.00	0.616	No
199	32.64	1.71	0.69	1.02	0.87	0.684	1.11	0.617	1.00	1.00	0.617	No
200	32.81	1.72	0.70	1.02	0.87	0.685	1.11	0.618	1.00	1.00	0.617	No
201	32.97	1.73	0.70	1.03	0.87	0.686	1.11	0.618	1.00	1.00	0.618	No
202	33.14	1.74	0.71	1.03	0.87	0.686	1.11	0.619	1.00	1.00	0.618	No
203	33.30	1.75	0.71	1.03	0.87	0.687	1.11	0.619	1.00	1.00	0.619	No
204	33.46	1.76	0.72	1.04	0.87	0.687	1.11	0.620	1.00	1.00	0.619	No
205	33.63	1.76	0.72	1.04	0.87	0.688	1.11	0.620	1.00	1.00	0.620	No
206	33.79	1.77	0.73	1.04	0.86	0.688	1.11	0.621	1.00	1.00	0.620	No
207	33.96	1.78	0.74	1.05	0.86	0.688	1.11	0.621	1.00	1.00	0.621	No
208	34.12	1.79	0.74	1.05	0.86	0.689	1.11	0.621	1.00	1.00	0.621	No
209	34.28	1.80	0.75	1.05	0.86	0.689	1.11	0.622	1.00	1.00	0.621	No
210	34.45	1.81	0.75	1.06	0.86	0.689	1.11	0.622	1.00	1.00	0.622	No
211	34.61	1.81	0.76	1.06	0.86	0.690	1.11	0.622	1.00	1.00	0.622	No
212	34.78	1.82	0.76	1.06	0.86	0.690	1.11	0.623	1.00	1.00	0.623	No
213	34.94	1.83	0.77	1.07	0.86	0.690	1.11	0.623	1.00	1.00	0.623	No
214	35.10	1.84	0.77	1.07	0.86	0.691	1.11	0.623	1.00	1.00	0.623	No
215	35.27	1.85	0.78	1.07	0.86	0.691	1.11	0.623	1.00	1.00	0.624	No
216	35.43	1.86	0.78	1.08	0.86	0.691	1.11	0.624	1.00	1.00	0.624	No
217	35.60	1.87	0.79	1.08	0.86	0.691	1.11	0.624	1.00	1.00	0.624	No
218	35.76	1.88	0.79	1.08	0.85	0.692	1.11	0.624	1.00	1.00	0.625	No
219	35.93	1.88	0.80	1.09	0.85	0.692	1.11	0.624	1.00	1.00	0.625	No
220	36.09	1.89	0.80	1.09	0.85	0.692	1.11	0.624	1.00	1.00	0.625	No
221	36.25	1.90	0.81	1.10	0.85	0.692	1.11	0.624	1.00	1.00	0.625	No
222	36.42	1.91	0.81	1.10	0.85	0.692	1.11	0.624	1.00	1.00	0.626	No
223	36.58	1.92	0.82	1.10	0.85	0.692	1.11	0.625	1.00	1.00	0.626	No
224	36.75	1.93	0.82	1.11	0.85	0.693	1.11	0.625	1.00	1.00	0.626	No
225	36.91	1.94	0.83	1.11	0.85	0.693	1.11	0.625	1.00	1.00	0.626	No
226	37.07	1.94	0.83	1.11	0.85	0.693	1.11	0.625	1.00	1.00	0.627	No
227	37.24	1.95	0.84	1.12	0.85	0.693	1.11	0.625	1.00	1.00	0.627	No
228	37.40	1.96	0.84	1.12	0.85	0.693	1.11	0.626	1.00	1.00	0.627	No
229	37.57	1.97	0.85	1.12	0.84	0.694	1.11	0.626	1.00	1.00	0.627	No
230	37.73	1.98	0.85	1.13	0.84	0.694	1.11	0.626	1.00	1.00	0.628	No
231	37.89	1.99	0.86	1.13	0.84	0.694	1.11	0.626	1.00	1.00	0.628	No
232	38.06	2.00	0.86	1.13	0.84	0.694	1.11	0.626	1.00	1.00	0.628	No
233	38.22	2.00	0.87	1.14	0.84	0.694	1.11	0.626	1.00	1.00	0.628	No
234	38.39	2.01	0.87	1.14	0.84	0.694	1.11	0.626	1.00	1.00	0.629	No
235	38.55	2.02	0.88	1.14	0.84	0.695	1.11	0.627	1.00	1.00	0.629	No
236	38.71	2.03	0.88	1.15	0.84	0.695	1.11	0.627	1.00	1.00	0.629	No
237	38.88	2.04	0.89	1.15	0.84	0.695	1.11	0.627	1.00	1.00	0.629	No
238	39.04	2.05	0.89	1.15	0.84	0.695	1.11	0.627	1.00	1.00	0.629	No
239	39.21	2.06	0.90	1.16	0.84	0.695	1.11	0.627	1.00	1.00	0.630	No
240	39.37	2.06	0.90	1.16	0.83	0.695	1.11	0.627	1.00	1.00	0.630	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	2.07	0.91	1.16	0.83	0.695	1.11	0.627	1.00	1.00	0.630	No
242	39.70	2.08	0.91	1.17	0.83	0.695	1.11	0.627	1.00	1.00	2.000	Yes
243	39.86	2.09	0.92	1.17	0.83	0.695	1.11	0.627	1.00	1.00	2.000	Yes
244	40.03	2.10	0.92	1.18	0.83	0.695	1.11	0.627	0.99	1.00	2.000	Yes
245	40.19	2.11	0.93	1.18	0.83	0.695	1.11	0.627	0.99	1.00	2.000	Yes
246	40.35	2.12	0.93	1.18	0.83	0.695	1.11	0.627	0.98	1.00	0.637	No
247	40.52	2.13	0.94	1.19	0.83	0.694	1.11	0.626	0.97	1.00	0.647	No
248	40.68	2.14	0.94	1.20	0.83	0.694	1.11	0.626	0.96	1.00	0.650	No
249	40.85	2.15	0.95	1.20	0.83	0.693	1.11	0.625	0.96	1.00	0.650	No
250	41.01	2.16	0.96	1.21	0.83	0.693	1.11	0.625	0.96	1.00	0.651	No
251	41.17	2.17	0.96	1.21	0.83	0.692	1.11	0.625	0.96	1.00	0.651	No
252	41.34	2.18	0.97	1.22	0.82	0.692	1.11	0.624	0.96	1.00	0.651	No
253	41.50	2.19	0.97	1.22	0.82	0.691	1.11	0.624	0.96	1.00	0.652	No
254	41.67	2.20	0.98	1.23	0.82	0.691	1.11	0.623	0.96	1.00	0.652	No
255	41.83	2.21	0.98	1.23	0.82	0.690	1.11	0.623	0.95	1.00	0.653	No
256	41.99	2.22	0.99	1.24	0.82	0.690	1.11	0.623	0.96	1.00	0.649	No
257	42.16	2.23	0.99	1.24	0.82	0.690	1.11	0.622	0.97	1.00	0.644	No
258	42.32	2.24	1.00	1.25	0.82	0.689	1.11	0.622	0.97	1.00	0.642	No
259	42.49	2.25	1.00	1.25	0.82	0.689	1.11	0.621	0.96	1.00	0.644	No
260	42.65	2.26	1.01	1.26	0.82	0.688	1.11	0.621	0.96	1.00	0.648	No
261	42.81	2.27	1.01	1.26	0.82	0.688	1.11	0.621	0.95	1.00	0.651	No
262	42.98	2.29	1.02	1.27	0.82	0.688	1.11	0.620	0.96	1.00	0.648	No
263	43.14	2.29	1.02	1.27	0.81	0.687	1.11	0.620	0.96	1.00	0.643	No
264	43.31	2.31	1.03	1.28	0.81	0.687	1.11	0.620	0.97	1.00	0.639	No
265	43.47	2.31	1.03	1.28	0.81	0.686	1.11	0.619	0.97	1.00	0.638	No
266	43.64	2.33	1.04	1.29	0.81	0.686	1.11	0.619	0.97	1.00	0.640	No
267	43.80	2.34	1.04	1.29	0.81	0.686	1.11	0.618	0.96	1.00	0.644	No
268	43.96	2.35	1.05	1.30	0.81	0.685	1.11	0.618	0.95	1.00	0.651	No
269	44.13	2.36	1.05	1.30	0.81	0.685	1.11	0.618	0.94	1.00	0.659	No
270	44.29	2.37	1.06	1.31	0.81	0.684	1.11	0.617	0.94	1.00	0.659	No
271	44.46	2.38	1.06	1.31	0.81	0.684	1.11	0.617	0.94	1.00	0.660	No
272	44.62	2.39	1.07	1.32	0.81	0.683	1.11	0.616	0.93	1.00	0.660	No
273	44.78	2.40	1.07	1.32	0.81	0.683	1.11	0.616	0.93	1.00	0.659	No
274	44.95	2.41	1.08	1.33	0.81	0.682	1.11	0.616	0.94	1.00	0.656	No
275	45.11	2.42	1.08	1.33	0.80	0.682	1.11	0.615	0.94	1.00	0.654	No
276	45.28	2.43	1.09	1.34	0.80	0.682	1.11	0.615	0.94	1.00	0.653	No
277	45.44	2.44	1.09	1.34	0.80	0.681	1.11	0.614	0.94	1.00	0.653	No
278	45.60	2.45	1.10	1.35	0.80	0.681	1.11	0.614	0.94	1.00	0.653	No
279	45.77	2.46	1.10	1.35	0.80	0.680	1.11	0.614	0.94	1.00	0.653	No
280	45.93	2.47	1.11	1.36	0.80	0.680	1.11	0.613	0.94	1.00	0.651	No
281	46.10	2.48	1.11	1.36	0.80	0.679	1.11	0.613	0.95	1.00	0.648	No
282	46.26	2.49	1.12	1.37	0.80	0.679	1.11	0.612	0.95	1.00	0.644	No
283	46.42	2.50	1.12	1.37	0.80	0.678	1.11	0.612	0.96	1.00	0.640	No
284	46.59	2.51	1.13	1.38	0.80	0.678	1.11	0.612	0.96	1.00	0.636	No
285	46.75	2.52	1.13	1.38	0.80	0.678	1.11	0.611	0.97	1.00	0.633	No
286	46.92	2.53	1.14	1.39	0.79	0.677	1.11	0.611	0.97	1.00	0.630	No
287	47.08	2.54	1.14	1.39	0.79	0.677	1.11	0.611	0.97	1.00	0.628	No
288	47.24	2.55	1.15	1.40	0.79	0.676	1.11	0.610	0.97	1.00	0.627	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
289	47.41	2.56	1.15	1.40	0.79	0.676	1.11	0.610	0.97	1.00	0.627	No
290	47.57	2.56	1.16	1.41	0.79	0.676	1.11	0.610	0.97	1.00	0.626	No
291	47.74	2.57	1.17	1.41	0.79	0.675	1.11	0.609	0.97	1.00	0.626	No
292	47.90	2.58	1.17	1.41	0.79	0.675	1.11	0.609	0.97	1.00	0.626	No
293	48.06	2.59	1.17	1.42	0.79	0.675	1.11	0.609	0.97	1.00	0.626	No
294	48.23	2.60	1.18	1.42	0.79	0.674	1.11	0.608	0.97	1.00	0.626	No
295	48.39	2.61	1.19	1.43	0.79	0.674	1.11	0.608	0.97	1.00	0.626	No
296	48.56	2.62	1.19	1.43	0.79	0.673	1.11	0.608	0.97	1.00	0.625	No
297	48.72	2.63	1.20	1.44	0.78	0.673	1.11	0.607	0.97	1.00	0.625	No
298	48.88	2.64	1.20	1.44	0.78	0.673	1.11	0.607	0.97	1.00	0.626	No
299	49.05	2.65	1.21	1.45	0.78	0.672	1.11	0.606	0.96	1.00	0.629	No
300	49.21	2.66	1.21	1.45	0.78	0.672	1.11	0.606	0.96	1.00	0.633	No
301	49.38	2.67	1.22	1.46	0.78	0.671	1.11	0.606	0.95	1.00	0.640	No
302	49.54	2.68	1.22	1.46	0.78	0.671	1.11	0.605	0.94	1.00	0.646	No
303	49.70	2.69	1.23	1.47	0.78	0.670	1.11	0.605	0.93	1.00	0.651	No
304	49.87	2.70	1.23	1.47	0.78	0.670	1.11	0.604	0.92	1.00	0.655	No
305	50.03	2.71	1.24	1.48	0.78	0.669	1.11	0.604	0.91	1.00	0.662	No
306	50.20	2.72	1.24	1.48	0.78	0.669	1.11	0.603	0.90	1.00	0.671	No
307	50.36	2.73	1.25	1.49	0.78	0.668	1.11	0.603	0.90	1.00	0.671	No
308	50.52	2.74	1.25	1.49	0.78	0.668	1.11	0.602	0.90	1.00	0.671	No
309	50.69	2.75	1.26	1.50	0.77	0.667	1.11	0.602	0.90	1.00	0.672	No
310	50.85	2.76	1.26	1.50	0.77	0.667	1.11	0.601	0.90	1.00	0.672	No
311	51.02	2.77	1.27	1.51	0.77	0.666	1.11	0.601	0.89	1.00	0.672	No
312	51.18	2.78	1.27	1.51	0.77	0.665	1.11	0.600	0.89	1.00	0.672	No
313	51.35	2.80	1.28	1.52	0.77	0.665	1.11	0.600	0.89	1.00	0.672	No
314	51.51	2.81	1.28	1.52	0.77	0.664	1.11	0.599	0.89	1.00	0.673	No
315	51.67	2.82	1.29	1.53	0.77	0.664	1.11	0.599	0.90	1.00	0.662	No
316	51.84	2.83	1.29	1.53	0.77	0.663	1.11	0.598	0.92	1.00	0.653	No
317	52.00	2.84	1.30	1.54	0.77	0.662	1.11	0.597	0.91	1.00	0.653	No
318	52.17	2.85	1.30	1.54	0.77	0.662	1.11	0.597	0.91	1.00	0.658	No
319	52.33	2.86	1.31	1.55	0.77	0.661	1.11	0.596	0.90	1.00	0.661	No
320	52.49	2.87	1.31	1.55	0.77	0.661	1.11	0.596	0.90	1.00	0.662	No
321	52.66	2.88	1.32	1.56	0.76	0.660	1.11	0.595	0.90	1.00	0.661	No
322	52.82	2.89	1.32	1.56	0.76	0.660	1.11	0.595	0.90	1.00	0.661	No
323	52.99	2.90	1.33	1.57	0.76	0.659	1.11	0.594	0.90	1.00	0.659	No
324	53.15	2.91	1.33	1.57	0.76	0.658	1.11	0.594	0.91	1.00	0.653	No
325	53.31	2.92	1.34	1.58	0.76	0.658	1.11	0.594	0.92	1.00	0.647	No
326	53.48	2.93	1.34	1.58	0.76	0.657	1.11	0.593	0.92	1.00	0.645	No
327	53.64	2.94	1.35	1.59	0.76	0.657	1.11	0.593	0.92	1.00	0.647	No
328	53.81	2.95	1.35	1.59	0.76	0.656	1.11	0.592	0.91	1.00	0.653	No
329	53.97	2.96	1.36	1.60	0.76	0.656	1.11	0.592	0.90	1.00	0.661	No
330	54.13	2.97	1.36	1.60	0.76	0.655	1.11	0.591	0.88	1.00	0.668	No
331	54.30	2.98	1.37	1.61	0.76	0.655	1.11	0.591	0.88	1.00	0.672	No
332	54.46	2.99	1.37	1.61	0.76	0.654	1.11	0.590	0.88	1.00	0.670	No
333	54.63	3.00	1.38	1.62	0.75	0.654	1.11	0.590	0.89	1.00	0.665	No
334	54.79	3.01	1.38	1.62	0.75	0.653	1.11	0.589	0.89	1.00	0.659	No
335	54.95	3.02	1.39	1.63	0.75	0.653	1.11	0.589	0.90	1.00	0.654	No
336	55.12	3.03	1.40	1.63	0.75	0.652	1.11	0.588	0.91	1.00	0.646	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
337	55.28	3.04	1.40	1.64	0.75	0.651	1.11	0.588	0.92	1.00	0.639	No
338	55.45	3.05	1.41	1.64	0.75	0.651	1.11	0.587	0.93	1.00	0.632	No
339	55.61	3.06	1.41	1.65	0.75	0.650	1.11	0.587	0.94	1.00	0.627	No
340	55.77	3.07	1.42	1.65	0.75	0.650	1.11	0.586	0.94	1.00	0.625	No
341	55.94	3.08	1.42	1.66	0.75	0.649	1.11	0.586	0.94	1.00	0.622	No
342	56.10	3.09	1.43	1.66	0.75	0.649	1.11	0.585	0.95	1.00	0.616	No
343	56.27	3.10	1.43	1.67	0.75	0.648	1.11	0.585	0.96	1.00	0.609	No
344	56.43	3.11	1.44	1.67	0.74	0.648	1.11	0.584	0.96	1.00	0.606	No
345	56.59	3.12	1.44	1.68	0.74	0.647	1.11	0.584	0.96	1.00	0.608	No
346	56.76	3.13	1.45	1.68	0.74	0.647	1.11	0.583	0.95	1.00	0.613	No
347	56.92	3.14	1.45	1.69	0.74	0.646	1.11	0.583	0.95	1.00	0.616	No
348	57.09	3.15	1.46	1.69	0.74	0.646	1.11	0.582	0.95	1.00	0.613	No
349	57.25	3.16	1.46	1.70	0.74	0.645	1.11	0.582	0.96	1.00	0.609	No
350	57.41	3.17	1.47	1.70	0.74	0.645	1.11	0.582	0.96	1.00	0.606	No
351	57.58	3.18	1.47	1.71	0.74	0.644	1.11	0.581	0.96	1.00	0.607	No
352	57.74	3.19	1.48	1.71	0.74	0.644	1.11	0.581	0.95	1.00	0.612	No
353	57.91	3.20	1.48	1.72	0.74	0.643	1.11	0.580	0.93	1.00	0.621	No
354	58.07	3.21	1.49	1.72	0.74	0.642	1.11	0.579	0.92	1.00	0.631	No
355	58.23	3.22	1.49	1.73	0.74	0.642	1.11	0.579	0.91	1.00	0.638	No
356	58.40	3.23	1.50	1.73	0.74	0.641	1.11	0.578	0.90	1.00	0.644	No
357	58.56	3.24	1.50	1.74	0.73	0.641	1.11	0.578	0.88	1.00	0.654	No
358	58.73	3.25	1.51	1.74	0.73	0.640	1.11	0.577	0.86	1.00	0.669	No
359	58.89	3.26	1.51	1.75	0.73	0.640	1.11	0.577	0.85	1.00	0.679	No
360	59.06	3.27	1.52	1.75	0.73	0.639	1.11	0.576	0.85	1.00	0.679	No
361	59.22	3.28	1.52	1.76	0.73	0.638	1.11	0.576	0.85	1.00	0.680	No
362	59.38	3.29	1.53	1.76	0.73	0.638	1.11	0.575	0.85	1.00	0.680	No
363	59.55	3.30	1.53	1.77	0.73	0.637	1.11	0.575	0.85	1.00	0.680	No
364	59.71	3.31	1.54	1.77	0.73	0.637	1.11	0.574	0.85	1.00	0.676	No
365	59.88	3.32	1.54	1.78	0.73	0.636	1.11	0.574	0.90	1.00	0.640	No
366	60.04	3.33	1.55	1.78	0.73	0.636	1.11	0.574	0.92	1.00	0.621	No
367	60.20	3.34	1.55	1.79	0.73	0.635	1.11	0.573	0.92	1.00	0.625	No
368	60.37	3.35	1.56	1.79	0.73	0.635	1.11	0.572	0.92	1.00	2.000	Yes
369	60.53	3.36	1.56	1.80	0.72	0.634	1.11	0.572	0.93	1.00	2.000	Yes
370	60.70	3.37	1.57	1.80	0.72	0.633	1.11	0.571	0.95	1.00	2.000	Yes
371	60.86	3.38	1.57	1.81	0.72	0.633	1.11	0.571	0.95	1.00	2.000	Yes
372	61.02	3.40	1.58	1.82	0.72	0.632	1.11	0.570	0.95	1.00	0.599	No
373	61.19	3.41	1.58	1.82	0.72	0.631	1.11	0.570	0.95	1.00	0.599	No
374	61.35	3.42	1.59	1.83	0.72	0.631	1.11	0.569	0.95	1.00	0.596	No
375	61.52	3.43	1.59	1.83	0.72	0.630	1.11	0.569	0.96	1.00	0.593	No
376	61.68	3.44	1.60	1.84	0.72	0.630	1.11	0.568	0.96	1.00	0.591	No
377	61.84	3.45	1.60	1.84	0.72	0.629	1.11	0.568	0.96	1.00	0.591	No
378	62.01	3.46	1.61	1.85	0.72	0.629	1.11	0.567	0.96	1.00	0.592	No
379	62.17	3.47	1.62	1.85	0.72	0.628	1.11	0.567	0.95	1.00	0.595	No
380	62.34	3.48	1.62	1.86	0.72	0.627	1.11	0.566	0.95	1.00	0.597	No
381	62.50	3.49	1.63	1.86	0.72	0.627	1.11	0.565	0.94	1.00	0.599	No
382	62.66	3.50	1.63	1.87	0.71	0.626	1.11	0.565	0.94	1.00	0.599	No
383	62.83	3.51	1.64	1.87	0.71	0.625	1.11	0.564	0.94	1.00	0.601	No
384	62.99	3.52	1.64	1.88	0.71	0.625	1.11	0.564	0.93	1.00	0.607	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
385	63.16	3.53	1.65	1.89	0.71	0.624	1.11	0.563	0.92	1.00	0.615	No
386	63.32	3.54	1.65	1.89	0.71	0.623	1.11	0.562	0.91	1.00	0.618	No
387	63.48	3.55	1.66	1.90	0.71	0.623	1.11	0.562	0.91	1.00	0.615	No
388	63.65	3.56	1.66	1.90	0.71	0.622	1.11	0.561	0.92	1.00	0.613	No
389	63.81	3.58	1.67	1.91	0.71	0.621	1.11	0.561	0.91	1.00	0.616	No
390	63.98	3.59	1.67	1.91	0.71	0.621	1.11	0.560	0.90	1.00	0.625	No
391	64.14	3.60	1.68	1.92	0.71	0.620	1.11	0.559	0.88	1.00	0.633	No
392	64.30	3.61	1.68	1.93	0.71	0.619	1.11	0.559	0.88	1.00	0.636	No
393	64.47	3.62	1.69	1.93	0.71	0.619	1.11	0.558	0.88	1.00	0.633	No
394	64.63	3.63	1.69	1.94	0.71	0.618	1.11	0.558	0.89	1.00	0.629	No
395	64.80	3.64	1.70	1.94	0.70	0.617	1.11	0.557	0.89	1.00	0.626	No
396	64.96	3.65	1.70	1.95	0.70	0.617	1.11	0.556	0.89	1.00	0.626	No
397	65.12	3.66	1.71	1.96	0.70	0.616	1.11	0.556	0.89	1.00	0.627	No
398	65.29	3.67	1.71	1.96	0.70	0.615	1.11	0.555	0.88	1.00	0.630	No
399	65.45	3.69	1.72	1.97	0.70	0.615	1.11	0.554	0.88	1.00	0.632	No
400	65.62	3.70	1.72	1.97	0.70	0.614	1.11	0.554	0.88	1.00	0.630	No
401	65.78	3.71	1.73	1.98	0.70	0.613	1.11	0.553	0.89	1.00	0.624	No
402	65.94	3.72	1.73	1.99	0.70	0.613	1.11	0.553	0.89	1.00	0.618	No
403	66.11	3.73	1.74	1.99	0.70	0.612	1.11	0.552	0.89	1.00	0.617	No
404	66.27	3.74	1.74	2.00	0.70	0.611	1.11	0.551	0.89	1.00	0.620	No
405	66.44	3.75	1.75	2.00	0.70	0.610	1.11	0.551	0.88	1.00	0.623	No
406	66.60	3.76	1.75	2.01	0.70	0.610	1.11	0.550	0.89	1.00	0.615	No
407	66.77	3.77	1.76	2.02	0.70	0.609	1.11	0.550	0.91	1.00	0.601	No
408	66.93	3.79	1.76	2.02	0.69	0.609	1.11	0.549	0.93	1.00	0.588	No
409	67.09	3.80	1.77	2.03	0.69	0.608	1.11	0.548	0.94	1.00	0.582	No
410	67.26	3.81	1.77	2.03	0.69	0.607	1.11	0.548	0.94	1.00	0.580	No
411	67.42	3.82	1.78	2.04	0.69	0.607	1.11	0.547	0.94	1.00	0.581	No
412	67.59	3.83	1.78	2.04	0.69	0.606	1.11	0.547	0.94	1.00	0.582	No
413	67.75	3.84	1.79	2.05	0.69	0.605	1.11	0.546	0.93	1.00	0.584	No
414	67.91	3.85	1.79	2.06	0.69	0.605	1.11	0.546	0.93	1.00	0.587	No
415	68.08	3.86	1.80	2.06	0.69	0.604	1.11	0.545	0.93	1.00	0.587	No
416	68.24	3.87	1.80	2.07	0.69	0.604	1.11	0.545	0.94	1.00	2.000	Yes
417	68.41	3.88	1.81	2.07	0.69	0.603	1.11	0.544	0.94	1.00	2.000	Yes
418	68.57	3.89	1.81	2.08	0.69	0.602	1.11	0.543	0.95	1.00	2.000	Yes
419	68.73	3.90	1.82	2.08	0.69	0.602	1.11	0.543	0.95	1.00	2.000	Yes
420	68.90	3.91	1.83	2.09	0.69	0.601	1.11	0.542	0.95	1.00	0.569	No
421	69.06	3.92	1.83	2.09	0.68	0.601	1.11	0.542	0.95	1.00	0.569	No
422	69.23	3.93	1.84	2.10	0.68	0.600	1.11	0.541	0.95	1.00	0.570	No
423	69.39	3.95	1.84	2.10	0.68	0.600	1.11	0.541	0.95	1.00	0.572	No
424	69.55	3.96	1.85	2.11	0.68	0.599	1.11	0.540	0.94	1.00	0.575	No
425	69.72	3.97	1.85	2.12	0.68	0.598	1.11	0.540	0.94	1.00	0.576	No
426	69.88	3.98	1.86	2.12	0.68	0.598	1.11	0.539	0.94	1.00	0.574	No
427	70.05	3.99	1.86	2.13	0.68	0.597	1.11	0.539	0.95	1.00	0.570	No
428	70.21	4.00	1.87	2.13	0.68	0.597	1.11	0.538	0.95	1.00	0.566	No
429	70.37	4.01	1.87	2.14	0.68	0.596	1.11	0.538	0.95	1.00	0.565	No
430	70.54	4.02	1.88	2.14	0.68	0.596	1.11	0.538	0.95	1.00	0.564	No
431	70.70	4.03	1.88	2.15	0.68	0.595	1.11	0.537	0.95	1.00	0.563	No
432	70.87	4.04	1.89	2.15	0.68	0.595	1.11	0.537	0.95	1.00	0.563	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
433	71.03	4.05	1.89	2.15	0.68	0.595	1.11	0.536	0.95	1.00	0.563	No
434	71.19	4.06	1.90	2.16	0.68	0.594	1.11	0.536	0.95	1.00	0.562	No
435	71.36	4.07	1.90	2.16	0.68	0.594	1.11	0.536	0.95	1.00	0.562	No
436	71.52	4.08	1.91	2.17	0.67	0.593	1.11	0.535	0.95	1.00	0.562	No
437	71.69	4.09	1.91	2.17	0.67	0.593	1.11	0.535	0.95	1.00	0.561	No
438	71.85	4.09	1.92	2.18	0.67	0.592	1.11	0.534	0.95	1.00	0.561	No
439	72.01	4.10	1.92	2.18	0.67	0.592	1.11	0.534	0.95	1.00	0.561	No
440	72.18	4.11	1.93	2.19	0.67	0.591	1.11	0.533	0.95	1.00	0.561	No
441	72.34	4.12	1.93	2.19	0.67	0.591	1.11	0.533	0.95	1.00	0.561	No
442	72.51	4.13	1.94	2.20	0.67	0.590	1.11	0.533	0.95	1.00	0.560	No
443	72.67	4.14	1.94	2.20	0.67	0.590	1.11	0.532	0.95	1.00	0.560	No
444	72.83	4.15	1.95	2.20	0.67	0.590	1.11	0.532	0.95	1.00	0.560	No
445	73.00	4.16	1.95	2.21	0.67	0.589	1.11	0.531	0.95	1.00	0.560	No
446	73.16	4.17	1.96	2.21	0.67	0.589	1.11	0.531	0.95	1.00	0.560	No
447	73.33	4.18	1.96	2.22	0.67	0.588	1.11	0.531	0.94	1.00	0.562	No
448	73.49	4.19	1.97	2.22	0.67	0.588	1.11	0.530	0.94	1.00	0.564	No
449	73.65	4.20	1.97	2.23	0.67	0.587	1.11	0.530	0.94	1.00	0.565	No
450	73.82	4.21	1.98	2.23	0.66	0.587	1.11	0.529	0.94	1.00	0.565	No
451	73.98	4.22	1.98	2.24	0.66	0.586	1.11	0.529	0.94	1.00	0.563	No
452	74.15	4.23	1.99	2.24	0.66	0.586	1.11	0.528	0.94	1.00	0.562	No
453	74.31	4.24	1.99	2.25	0.66	0.585	1.11	0.528	0.94	1.00	2.000	Yes
454	74.48	4.25	2.00	2.25	0.66	0.585	1.11	0.527	0.94	1.00	2.000	Yes
455	74.64	4.26	2.00	2.26	0.66	0.584	1.11	0.527	0.94	1.00	2.000	Yes
456	74.80	4.27	2.01	2.27	0.66	0.584	1.11	0.526	0.94	1.00	2.000	Yes
457	74.97	4.29	2.01	2.27	0.66	0.583	1.11	0.526	0.94	1.00	0.559	No
458	75.13	4.30	2.02	2.28	0.66	0.582	1.11	0.525	0.94	1.00	0.560	No
459	75.30	4.31	2.02	2.28	0.66	0.582	1.11	0.525	0.94	1.00	0.559	No
460	75.46	4.32	2.03	2.29	0.66	0.581	1.11	0.525	0.94	1.00	0.558	No
461	75.62	4.33	2.03	2.29	0.66	0.581	1.11	0.524	0.94	1.00	0.556	No
462	75.79	4.34	2.04	2.30	0.66	0.580	1.11	0.524	0.94	1.00	0.555	No
463	75.95	4.35	2.05	2.30	0.66	0.580	1.11	0.523	0.94	1.00	0.555	No
464	76.12	4.36	2.05	2.31	0.66	0.580	1.11	0.523	0.94	1.00	0.554	No
465	76.28	4.37	2.06	2.31	0.65	0.579	1.11	0.522	0.94	1.00	0.553	No
466	76.44	4.38	2.06	2.32	0.65	0.579	1.11	0.522	0.94	1.00	0.553	No
467	76.61	4.39	2.07	2.32	0.65	0.578	1.11	0.522	0.94	1.00	0.552	No
468	76.77	4.40	2.07	2.33	0.65	0.578	1.11	0.521	0.95	1.00	0.551	No
469	76.94	4.41	2.08	2.33	0.65	0.577	1.11	0.521	0.95	1.00	0.551	No
470	77.10	4.42	2.08	2.34	0.65	0.577	1.11	0.520	0.95	1.00	0.551	No
471	77.26	4.43	2.09	2.34	0.65	0.576	1.11	0.520	0.94	1.00	0.551	No
472	77.43	4.44	2.09	2.35	0.65	0.576	1.11	0.519	0.94	1.00	0.550	No
473	77.59	4.45	2.10	2.35	0.65	0.575	1.11	0.519	0.94	1.00	0.550	No
474	77.76	4.46	2.10	2.36	0.65	0.575	1.11	0.519	0.94	1.00	0.549	No
475	77.92	4.47	2.11	2.36	0.65	0.574	1.11	0.518	0.94	1.00	0.549	No
476	78.08	4.48	2.11	2.37	0.65	0.574	1.11	0.518	0.94	1.00	0.548	No
477	78.25	4.49	2.12	2.37	0.65	0.573	1.11	0.517	0.95	1.00	0.547	No
478	78.41	4.50	2.12	2.38	0.65	0.573	1.11	0.517	0.95	1.00	0.546	No
479	78.58	4.51	2.13	2.38	0.65	0.573	1.11	0.517	0.95	1.00	0.545	No
480	78.74	4.52	2.13	2.38	0.65	0.572	1.11	0.516	0.95	1.00	0.545	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
481	78.90	4.53	2.14	2.39	0.64	0.572	1.11	0.516	0.95	1.00	0.545	No
482	79.07	4.54	2.14	2.39	0.64	0.571	1.11	0.515	0.95	1.00	0.545	No
483	79.23	4.55	2.15	2.40	0.64	0.571	1.11	0.515	0.95	1.00	0.545	No
484	79.40	4.56	2.15	2.40	0.64	0.571	1.11	0.515	0.94	1.00	0.545	No
485	79.56	4.57	2.16	2.41	0.64	0.570	1.11	0.514	0.94	1.00	0.545	No
486	79.72	4.58	2.16	2.41	0.64	0.570	1.11	0.514	0.94	1.00	0.544	No
487	79.89	4.59	2.17	2.42	0.64	0.569	1.11	0.514	0.94	1.00	0.544	No
488	80.05	4.60	2.17	2.42	0.64	0.569	1.11	0.513	0.94	1.00	0.544	No
489	80.22	4.61	2.18	2.43	0.64	0.568	1.11	0.513	0.94	1.00	0.543	No
490	80.38	4.61	2.18	2.43	0.64	0.568	1.11	0.512	0.94	1.00	0.543	No
491	80.54	4.62	2.19	2.44	0.64	0.568	1.11	0.512	0.94	1.00	0.543	No
492	80.71	4.63	2.19	2.44	0.64	0.567	1.11	0.512	0.94	1.00	0.543	No
493	80.87	4.64	2.20	2.45	0.64	0.567	1.11	0.511	0.94	1.00	0.542	No
494	81.04	4.65	2.20	2.45	0.64	0.566	1.11	0.511	0.94	1.00	0.542	No
495	81.20	4.66	2.21	2.46	0.64	0.566	1.11	0.511	0.94	1.00	0.542	No
496	81.36	4.67	2.21	2.46	0.64	0.566	1.11	0.510	0.94	1.00	0.541	No
497	81.53	4.68	2.22	2.46	0.64	0.565	1.11	0.510	0.94	1.00	0.540	No
498	81.69	4.69	2.22	2.47	0.63	0.565	1.11	0.509	0.94	1.00	0.540	No
499	81.86	4.70	2.23	2.47	0.63	0.564	1.11	0.509	0.94	1.00	0.540	No
500	82.02	4.71	2.23	2.48	0.63	0.564	1.11	0.509	0.94	1.00	0.539	No
501	82.19	4.72	2.24	2.48	0.63	0.564	1.11	0.508	0.94	1.00	0.539	No
502	82.35	4.73	2.24	2.49	0.63	0.563	1.11	0.508	0.94	1.00	0.539	No
503	82.51	4.74	2.25	2.49	0.63	0.563	1.11	0.508	0.94	1.00	0.539	No
504	82.68	4.75	2.26	2.50	0.63	0.562	1.11	0.507	0.94	1.00	0.539	No
505	82.84	4.76	2.26	2.50	0.63	0.562	1.11	0.507	0.94	1.00	0.539	No
506	83.01	4.77	2.27	2.51	0.63	0.562	1.11	0.507	0.94	1.00	0.538	No
507	83.17	4.78	2.27	2.51	0.63	0.561	1.11	0.506	0.94	1.00	0.538	No
508	83.33	4.79	2.28	2.52	0.63	0.561	1.11	0.506	0.94	1.00	0.537	No
509	83.50	4.80	2.28	2.52	0.63	0.560	1.11	0.506	0.94	1.00	0.537	No
510	83.66	4.81	2.29	2.53	0.63	0.560	1.11	0.505	0.94	1.00	0.537	No
511	83.83	4.82	2.29	2.53	0.63	0.560	1.11	0.505	0.94	1.00	0.537	No
512	83.99	4.83	2.30	2.54	0.63	0.559	1.11	0.504	0.94	1.00	0.537	No
513	84.15	4.84	2.30	2.54	0.63	0.559	1.11	0.504	0.94	1.00	0.537	No
514	84.32	4.85	2.31	2.54	0.63	0.558	1.11	0.504	0.94	1.00	0.537	No
515	84.48	4.86	2.31	2.55	0.63	0.558	1.11	0.503	0.94	1.00	0.536	No
516	84.65	4.87	2.32	2.55	0.62	0.558	1.11	0.503	0.94	1.00	0.534	No
517	84.81	4.88	2.32	2.56	0.62	0.557	1.11	0.503	0.94	1.00	0.534	No
518	84.97	4.89	2.33	2.56	0.62	0.557	1.11	0.502	0.94	1.00	0.533	No
519	85.14	4.90	2.33	2.57	0.62	0.557	1.11	0.502	0.94	1.00	0.533	No
520	85.30	4.91	2.34	2.57	0.62	0.556	1.11	0.502	0.94	1.00	0.534	No
521	85.47	4.92	2.34	2.58	0.62	0.556	1.11	0.501	0.94	1.00	0.536	No
522	85.63	4.93	2.35	2.58	0.62	0.555	1.11	0.501	0.93	1.00	0.538	No
523	85.79	4.94	2.35	2.59	0.62	0.555	1.11	0.501	0.93	1.00	0.540	No
524	85.96	4.95	2.36	2.59	0.62	0.554	1.11	0.500	0.93	1.00	0.540	No
525	86.12	4.96	2.36	2.60	0.62	0.554	1.11	0.500	0.93	1.00	0.540	No
526	86.29	4.97	2.37	2.61	0.62	0.553	1.11	0.499	0.93	1.00	0.540	No
527	86.45	4.98	2.37	2.61	0.62	0.553	1.11	0.499	0.92	1.00	0.540	No
528	86.61	5.00	2.38	2.62	0.62	0.552	1.11	0.498	0.91	1.00	0.546	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
529	86.78	5.01	2.38	2.62	0.62	0.552	1.11	0.498	0.90	1.00	0.555	No
530	86.94	5.02	2.39	2.63	0.62	0.551	1.11	0.498	0.89	1.00	0.559	No
531	87.11	5.03	2.39	2.64	0.62	0.551	1.11	0.497	0.90	1.00	0.551	No
532	87.27	5.04	2.40	2.64	0.62	0.551	1.11	0.497	0.91	1.00	0.546	No
533	87.43	5.05	2.40	2.65	0.62	0.550	1.11	0.496	0.91	1.00	0.545	No
534	87.60	5.06	2.41	2.65	0.62	0.550	1.11	0.496	0.72	1.00	0.685	No
535	87.76	5.07	2.41	2.66	0.62	0.549	1.11	0.496	0.72	1.00	0.685	No
536	87.93	5.08	2.42	2.66	0.61	0.549	1.11	0.496	0.72	1.00	0.685	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	627.92	0.75	0.60	0.26	1.70	1028.77	0.00	1028.77	4.000	No	No	2.00
2	0.33	587.90	0.97	0.66	0.26	1.70	968.88	0.00	968.88	4.000	No	No	2.00
3	0.49	514.76	1.28	0.74	0.26	1.70	835.89	0.00	835.89	4.000	No	No	2.00
4	0.66	422.57	1.67	0.82	0.26	1.70	676.15	0.00	676.15	4.000	No	No	2.00
5	0.82	332.76	1.98	0.88	0.26	1.70	524.54	0.00	524.54	4.000	No	No	2.00
6	0.98	255.18	2.37	0.94	0.26	1.70	402.97	0.00	402.97	4.000	No	No	2.00
7	1.15	192.32	3.22	1.06	0.26	1.70	302.31	0.00	302.31	4.000	No	No	2.00
8	1.31	141.23	4.85	1.23	0.30	1.70	221.67	0.02	221.69	4.000	No	No	2.00
9	1.48	101.24	7.55	1.46	0.39	1.70	156.71	3.74	160.45	4.000	No	No	2.00
10	1.64	70.70	10.76	1.68	0.44	1.70	109.57	18.37	127.94	4.000	No	No	2.00
11	1.80	48.60	15.34	1.92	0.48	1.70	74.47	33.92	108.39	4.000	Yes	No	2.00
12	1.97	32.76	20.66	2.16	0.52	1.70	50.16	39.12	89.28	4.000	Yes	No	2.00
13	2.13	22.11	26.24	2.36	0.57	1.70	33.24	38.62	71.86	4.000	Yes	No	2.00
14	2.30	15.52	31.96	2.55	0.60	1.70	23.15	37.19	60.34	4.000	Yes	No	2.00
15	2.46	12.09	34.94	2.64	0.62	1.70	18.38	0.00	18.38	4.000	Yes	Yes	2.00
16	2.62	10.76	34.99	2.64	0.63	1.70	16.74	0.00	16.74	4.000	No	Yes	2.00
17	2.79	10.41	33.58	2.60	0.63	1.70	16.76	0.00	16.76	4.000	No	Yes	2.00
18	2.95	10.18	34.48	2.63	0.63	1.70	16.70	0.00	16.70	4.000	No	Yes	2.00
19	3.12	9.55	36.97	2.70	0.63	1.70	15.75	0.00	15.75	4.000	No	Yes	2.00
20	3.28	8.54	40.35	2.79	0.64	1.70	13.72	0.00	13.72	4.000	No	Yes	2.00
21	3.44	7.49	44.47	2.90	0.65	1.70	11.79	0.00	11.79	4.000	No	Yes	2.00
22	3.61	6.78	47.76	2.98	0.66	1.70	10.64	0.00	10.64	4.000	No	Yes	2.00
23	3.77	6.37	49.67	3.02	0.66	1.70	10.25	0.00	10.25	4.000	No	Yes	2.00
24	3.94	6.04	50.34	3.04	0.66	1.70	9.84	0.00	9.84	4.000	No	Yes	2.00
25	4.10	5.73	50.20	3.03	0.67	1.70	9.13	0.00	9.13	4.000	No	Yes	2.00
26	4.27	5.59	50.18	3.03	0.67	1.70	8.74	0.00	8.74	4.000	No	Yes	2.00
27	4.43	5.80	49.08	3.01	0.67	1.70	9.18	0.00	9.18	4.000	No	Yes	2.00
28	4.59	6.17	48.03	2.98	0.66	1.70	10.09	0.00	10.09	4.000	No	Yes	2.00
29	4.76	6.31	47.37	2.97	0.66	1.70	10.51	0.00	10.51	4.000	No	Yes	2.00
30	4.92	6.02	48.38	2.99	0.66	1.70	9.83	0.00	9.83	4.000	No	Yes	2.00
31	5.09	5.43	51.17	3.06	0.67	1.70	8.68	0.00	8.68	4.000	No	Yes	2.00
32	5.25	4.86	54.53	3.13	0.68	1.70	7.69	0.00	7.69	4.000	No	Yes	2.00
33	5.41	4.49	58.20	3.21	0.68	1.70	7.08	0.00	7.08	4.000	No	Yes	2.00
34	5.58	4.70	57.97	3.21	0.68	1.70	6.89	0.00	6.89	4.000	No	Yes	2.00
35	5.74	5.04	56.74	3.18	0.67	1.70	8.65	0.00	8.65	4.000	No	Yes	2.00
36	5.91	7.32	46.43	2.94	0.67	1.70	8.65	0.00	8.65	4.000	Yes	Yes	2.00
37	6.07	9.21	40.65	2.80	0.62	1.70	17.87	0.00	17.87	4.000	Yes	Yes	2.00
38	6.23	13.78	31.28	2.53	0.63	1.70	17.87	35.26	53.13	4.000	Yes	No	2.00
39	6.40	19.52	25.09	2.32	0.58	1.70	30.78	37.20	67.98	4.000	Yes	No	2.00
40	6.56	26.33	20.64	2.16	0.54	1.70	45.53	37.77	83.29	4.000	Yes	No	2.00
41	6.73	29.35	19.72	2.12	0.52	1.70	50.66	37.95	88.61	4.000	Yes	No	2.00
42	6.89	27.04	21.80	2.20	0.54	1.70	45.26	39.02	84.28	4.000	Yes	No	2.00
43	7.05	21.67	25.53	2.34	0.57	1.70	34.42	38.61	73.03	4.000	Yes	No	2.00
44	7.22	16.05	31.56	2.54	0.60	1.70	24.75	37.65	62.40	4.000	Yes	No	2.00
45	7.38	11.66	36.55	2.69	0.62	1.70	18.17	0.00	18.17	4.000	Yes	Yes	2.00
46	7.55	8.84	41.82	2.83	0.65	1.70	13.26	0.00	13.26	4.000	Yes	Yes	2.00
47	7.71	7.27	44.29	2.89	0.66	1.70	11.18	0.00	11.18	4.000	Yes	Yes	2.00
48	7.87	6.67	46.19	2.94	0.66	1.70	10.54	0.00	10.54	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
49	8.04	6.27	46.98	2.96	0.66	1.70	10.35	0.00	10.35	4.000	No	Yes	2.00
50	8.20	5.71	48.87	3.00	0.67	1.70	9.27	0.00	9.27	4.000	No	Yes	2.00
51	8.37	5.00	51.62	3.07	0.67	1.70	7.87	0.00	7.87	4.000	No	Yes	2.00
52	8.53	4.47	54.97	3.14	0.68	1.70	6.94	0.00	6.94	4.000	No	Yes	2.00
53	8.69	4.26	57.58	3.20	0.68	1.70	6.66	0.00	6.66	4.000	No	Yes	2.00
54	8.86	4.30	58.85	3.23	0.68	1.70	6.87	0.00	6.87	4.000	No	Yes	2.00
55	9.02	4.42	58.58	3.22	0.68	1.70	7.09	0.00	7.09	4.000	No	Yes	2.00
56	9.19	4.43	57.41	3.20	0.68	1.70	7.18	0.00	7.18	4.000	No	Yes	2.00
57	9.35	4.33	56.21	3.17	0.68	1.68	6.80	0.00	6.80	4.000	No	Yes	2.00
58	9.51	4.20	54.84	3.14	0.68	1.66	6.44	0.00	6.44	4.000	No	Yes	2.00
59	9.68	4.12	53.67	3.11	0.68	1.65	6.27	0.00	6.27	4.000	No	Yes	2.00
60	9.84	4.03	52.94	3.10	0.68	1.63	6.17	0.00	6.17	4.000	No	Yes	2.00
61	10.01	3.90	55.35	3.15	0.69	1.62	5.80	0.00	5.80	4.000	No	Yes	2.00
62	10.17	3.88	58.58	3.22	0.69	1.60	5.46	0.00	5.46	4.000	No	Yes	2.00
63	10.33	4.23	56.94	3.19	0.69	1.59	5.86	0.00	5.86	4.000	No	Yes	2.00
64	10.50	4.91	52.36	3.08	0.68	1.57	7.09	0.00	7.09	4.000	No	Yes	2.00
65	10.66	5.49	47.93	2.98	0.67	1.55	8.22	0.00	8.22	4.000	No	Yes	2.00
66	10.83	5.60	48.00	2.98	0.67	1.55	8.35	0.00	8.35	4.000	No	Yes	2.00
67	10.99	5.29	50.38	3.04	0.68	1.55	7.57	0.00	7.57	4.000	No	Yes	2.00
68	11.15	4.92	53.44	3.11	0.68	1.55	6.89	0.00	6.89	4.000	No	Yes	2.00
69	11.32	4.72	54.85	3.14	0.68	1.54	6.65	0.00	6.65	4.000	No	Yes	2.00
70	11.48	4.69	57.81	3.20	0.68	1.54	6.68	0.00	6.68	4.000	No	Yes	2.00
71	11.65	4.85	59.83	3.25	0.68	1.53	6.73	0.00	6.73	4.000	No	Yes	2.00
72	11.81	5.17	60.05	3.25	0.68	1.52	7.22	0.00	7.22	4.000	No	Yes	2.00
73	11.98	5.57	57.37	3.19	0.67	1.51	7.91	0.00	7.91	4.000	No	Yes	2.00
74	12.14	5.87	53.96	3.12	0.67	1.50	8.42	0.00	8.42	4.000	No	Yes	2.00
75	12.30	6.06	51.20	3.06	0.67	1.50	8.46	0.00	8.46	4.000	No	Yes	2.00
76	12.47	6.27	48.71	3.00	0.67	1.49	8.68	0.00	8.68	4.000	No	Yes	2.00
77	12.63	6.47	47.17	2.96	0.67	1.48	9.12	0.00	9.12	4.000	No	Yes	2.00
78	12.80	6.43	47.08	2.96	0.67	1.48	9.15	0.00	9.15	4.000	No	Yes	2.00
79	12.96	5.95	48.41	2.99	0.67	1.48	8.40	0.00	8.40	4.000	No	Yes	2.00
80	13.12	5.21	50.71	3.05	0.68	1.48	7.11	0.00	7.11	4.000	No	Yes	2.00
81	13.29	4.49	53.15	3.10	0.69	1.48	6.00	0.00	6.00	4.000	No	Yes	2.00
82	13.45	4.10	55.46	3.15	0.69	1.48	5.35	0.00	5.35	4.000	No	Yes	2.00
83	13.62	4.15	55.62	3.16	0.69	1.47	5.42	0.00	5.42	4.000	No	Yes	2.00
84	13.78	4.57	52.94	3.10	0.69	1.46	6.08	0.00	6.08	4.000	No	Yes	2.00
85	13.94	5.07	48.45	2.99	0.68	1.46	6.93	0.00	6.93	4.000	No	Yes	2.00
86	14.11	5.34	47.53	2.97	0.68	1.45	7.31	0.00	7.31	4.000	No	Yes	2.00
87	14.27	5.28	50.05	3.03	0.68	1.45	7.02	0.00	7.02	4.000	No	Yes	2.00
88	14.44	5.19	53.28	3.11	0.68	1.44	6.55	0.00	6.55	4.000	No	Yes	2.00
89	14.60	5.50	53.44	3.11	0.68	1.44	6.77	0.00	6.77	4.000	No	Yes	2.00
90	14.76	6.50	50.13	3.03	0.67	1.43	8.22	0.00	8.22	4.000	No	Yes	2.00
91	14.93	7.90	46.82	2.95	0.66	1.41	10.49	0.00	10.49	4.000	No	Yes	2.00
92	15.09	9.32	44.98	2.91	0.65	1.40	12.32	0.00	12.32	4.000	No	Yes	2.00
93	15.26	10.44	44.14	2.89	0.64	1.39	13.63	0.00	13.63	4.000	No	Yes	2.00
94	15.42	11.51	43.15	2.86	0.64	1.38	14.58	0.00	14.58	4.000	No	Yes	2.00
95	15.58	12.24	41.55	2.82	0.63	1.37	15.80	0.00	15.80	4.000	No	Yes	2.00
96	15.75	12.59	39.55	2.77	0.63	1.36	16.25	0.00	16.25	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	12.29	38.45	2.74	0.63	1.36	15.81	0.00	15.81	4.000	No	Yes	2.00
98	16.08	11.86	38.33	2.74	0.64	1.36	14.77	0.00	14.77	4.000	No	Yes	2.00
99	16.24	11.61	39.02	2.75	0.64	1.36	14.33	0.00	14.33	4.000	No	Yes	2.00
100	16.40	11.88	38.67	2.75	0.64	1.35	14.65	0.00	14.65	4.000	No	Yes	2.00
101	16.57	12.51	37.88	2.72	0.64	1.34	15.50	0.00	15.50	4.000	No	Yes	2.00
102	16.73	13.27	37.00	2.70	0.63	1.34	16.39	0.00	16.39	4.000	No	Yes	2.00
103	16.90	14.01	36.50	2.68	0.63	1.33	17.14	0.00	17.14	4.000	No	Yes	2.00
104	17.06	14.69	36.66	2.69	0.62	1.32	17.84	0.00	17.84	4.000	No	Yes	2.00
105	17.22	15.34	36.96	2.70	0.62	1.32	18.51	0.00	18.51	4.000	No	Yes	2.00
106	17.39	15.81	37.90	2.72	0.62	1.31	19.09	0.00	19.09	4.000	No	Yes	2.00
107	17.55	16.09	38.79	2.75	0.62	1.31	19.29	0.00	19.29	4.000	No	Yes	2.00
108	17.72	16.23	39.80	2.78	0.62	1.30	19.23	0.00	19.23	4.000	No	Yes	2.00
109	17.88	16.52	40.45	2.79	0.62	1.30	19.37	0.00	19.37	4.000	No	Yes	2.00
110	18.04	16.79	40.64	2.80	0.61	1.29	19.73	0.00	19.73	4.000	No	Yes	2.00
111	18.21	16.77	40.57	2.80	0.61	1.28	19.81	0.00	19.81	4.000	No	Yes	2.00
112	18.37	16.35	40.77	2.80	0.62	1.28	19.05	0.00	19.05	4.000	No	Yes	2.00
113	18.54	15.86	41.72	2.83	0.62	1.28	18.13	0.00	18.13	4.000	No	Yes	2.00
114	18.70	15.86	43.04	2.86	0.62	1.27	17.89	0.00	17.89	4.000	No	Yes	2.00
115	18.86	16.38	43.40	2.87	0.62	1.27	18.69	0.00	18.69	4.000	No	Yes	2.00
116	19.03	17.37	42.93	2.86	0.61	1.26	19.91	0.00	19.91	4.000	No	Yes	2.00
117	19.19	18.47	42.13	2.84	0.61	1.25	21.34	0.00	21.34	4.000	No	Yes	2.00
118	19.36	19.35	41.48	2.82	0.60	1.25	22.43	0.00	22.43	4.000	No	Yes	2.00
119	19.52	19.71	40.57	2.80	0.60	1.24	23.13	0.00	23.13	4.000	No	Yes	2.00
120	19.69	19.58	39.79	2.78	0.60	1.24	22.86	0.00	22.86	4.000	No	Yes	2.00
121	19.85	19.12	39.55	2.77	0.60	1.23	22.19	0.00	22.19	4.000	No	Yes	2.00
122	20.01	18.64	40.25	2.79	0.61	1.23	21.26	0.00	21.26	4.000	No	Yes	2.00
123	20.18	18.39	40.76	2.80	0.61	1.23	20.81	0.00	20.81	4.000	No	Yes	2.00
124	20.34	18.66	40.04	2.78	0.61	1.22	20.92	0.00	20.92	4.000	No	Yes	2.00
125	20.51	19.23	40.54	2.80	0.61	1.22	21.73	0.00	21.73	4.000	No	Yes	2.00
126	20.67	19.83	40.68	2.80	0.60	1.21	22.33	0.00	22.33	4.000	No	Yes	2.00
127	20.83	19.93	41.21	2.81	0.60	1.21	22.67	0.00	22.67	4.000	No	Yes	2.00
128	21.00	19.38	40.44	2.79	0.60	1.20	21.92	0.00	21.92	4.000	No	Yes	2.00
129	21.16	18.09	40.66	2.80	0.61	1.20	20.66	0.00	20.66	4.000	No	Yes	2.00
130	21.33	16.52	41.64	2.82	0.62	1.20	18.41	0.00	18.41	4.000	No	Yes	2.00
131	21.49	15.09	42.37	2.84	0.63	1.20	16.59	0.00	16.59	4.000	No	Yes	2.00
132	21.65	14.16	41.97	2.83	0.64	1.20	15.39	0.00	15.39	4.000	No	Yes	2.00
133	21.82	13.50	40.89	2.80	0.64	1.20	14.84	0.00	14.84	4.000	No	Yes	2.00
134	21.98	12.92	41.11	2.81	0.64	1.20	14.09	0.00	14.09	4.000	No	Yes	2.00
135	22.15	12.31	42.26	2.84	0.65	1.19	13.12	0.00	13.12	4.000	No	Yes	2.00
136	22.31	11.84	43.96	2.88	0.65	1.19	12.42	0.00	12.42	4.000	No	Yes	2.00
137	22.47	11.62	45.15	2.91	0.65	1.19	12.14	0.00	12.14	4.000	No	Yes	2.00
138	22.64	11.52	45.79	2.93	0.65	1.18	12.10	0.00	12.10	4.000	No	Yes	2.00
139	22.80	11.37	46.03	2.94	0.65	1.18	11.97	0.00	11.97	4.000	No	Yes	2.00
140	22.97	10.93	45.48	2.92	0.65	1.18	11.56	0.00	11.56	4.000	No	Yes	2.00
141	23.13	10.27	45.26	2.92	0.66	1.18	10.73	0.00	10.73	4.000	No	Yes	2.00
142	23.29	9.55	45.78	2.93	0.66	1.17	9.78	0.00	9.78	4.000	No	Yes	2.00
143	23.46	9.13	46.71	2.95	0.67	1.17	9.12	0.00	9.12	4.000	No	Yes	2.00
144	23.62	9.08	47.32	2.97	0.67	1.17	9.09	0.00	9.09	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	9.41	47.35	2.97	0.67	1.17	9.47	0.00	9.47	4.000	No	Yes	2.00
146	23.95	9.72	47.86	2.98	0.66	1.16	9.94	0.00	9.94	4.000	No	Yes	2.00
147	24.11	9.93	47.90	2.98	0.66	1.16	10.20	0.00	10.20	4.000	No	Yes	2.00
148	24.28	9.95	47.69	2.98	0.66	1.15	10.16	0.00	10.16	4.000	No	Yes	2.00
149	24.44	9.92	47.36	2.97	0.66	1.15	9.99	0.00	9.99	4.000	No	Yes	2.00
150	24.61	9.76	47.63	2.97	0.66	1.15	9.76	0.00	9.76	4.000	No	Yes	2.00
151	24.77	9.57	48.91	3.00	0.67	1.15	9.54	0.00	9.54	4.000	No	Yes	2.00
152	24.93	9.49	49.93	3.03	0.67	1.14	9.41	0.00	9.41	4.000	No	Yes	2.00
153	25.10	9.66	50.94	3.05	0.66	1.14	9.54	0.00	9.54	4.000	No	Yes	2.00
154	25.26	9.99	50.90	3.05	0.66	1.14	9.97	0.00	9.97	4.000	No	Yes	2.00
155	25.43	10.29	50.27	3.04	0.66	1.13	10.40	0.00	10.40	4.000	No	Yes	2.00
156	25.59	10.36	49.22	3.01	0.66	1.13	10.54	0.00	10.54	4.000	No	Yes	2.00
157	25.75	10.15	48.31	2.99	0.66	1.13	10.22	0.00	10.22	4.000	No	Yes	2.00
158	25.92	9.76	48.14	2.99	0.66	1.12	9.63	0.00	9.63	4.000	No	Yes	2.00
159	26.08	9.43	48.78	3.00	0.67	1.12	9.11	0.00	9.11	4.000	No	Yes	2.00
160	26.25	9.37	48.70	3.00	0.67	1.12	9.01	0.00	9.01	4.000	No	Yes	2.00
161	26.41	9.55	48.85	3.00	0.67	1.12	9.27	0.00	9.27	4.000	No	Yes	2.00
162	26.57	9.67	48.40	2.99	0.66	1.11	9.56	0.00	9.56	4.000	No	Yes	2.00
163	26.74	9.57	49.07	3.01	0.67	1.11	9.36	0.00	9.36	4.000	No	Yes	2.00
164	26.90	9.16	50.28	3.04	0.67	1.11	8.83	0.00	8.83	4.000	No	Yes	2.00
165	27.07	8.84	51.57	3.07	0.67	1.11	8.28	0.00	8.28	4.000	No	Yes	2.00
166	27.23	8.67	52.26	3.08	0.67	1.10	8.20	0.00	8.20	4.000	No	Yes	2.00
167	27.40	8.68	51.74	3.07	0.67	1.10	8.25	0.00	8.25	4.000	No	Yes	2.00
168	27.56	8.61	50.59	3.04	0.67	1.10	8.20	0.00	8.20	4.000	No	Yes	2.00
169	27.72	8.45	49.68	3.02	0.67	1.10	7.95	0.00	7.95	4.000	No	Yes	2.00
170	27.89	8.33	49.29	3.01	0.68	1.09	7.75	0.00	7.75	4.000	No	Yes	2.00
171	28.05	8.25	50.15	3.03	0.68	1.09	7.68	0.00	7.68	4.000	No	Yes	2.00
172	28.22	8.20	51.10	3.06	0.68	1.09	7.67	0.00	7.67	4.000	No	Yes	2.00
173	28.38	8.11	51.30	3.06	0.68	1.09	7.55	0.00	7.55	4.000	No	Yes	2.00
174	28.54	8.03	51.88	3.07	0.68	1.08	7.38	0.00	7.38	4.000	No	Yes	2.00
175	28.71	8.10	52.31	3.08	0.68	1.08	7.32	0.00	7.32	4.000	No	Yes	2.00
176	28.87	8.32	53.40	3.11	0.68	1.08	7.58	0.00	7.58	4.000	No	Yes	2.00
177	29.04	8.70	53.08	3.10	0.67	1.07	8.03	0.00	8.03	4.000	No	Yes	2.00
178	29.20	8.97	52.83	3.09	0.67	1.07	8.46	0.00	8.46	4.000	No	Yes	2.00
179	29.36	9.11	51.72	3.07	0.67	1.07	8.59	0.00	8.59	4.000	No	Yes	2.00
180	29.53	9.06	50.99	3.05	0.67	1.07	8.47	0.00	8.47	4.000	No	Yes	2.00
181	29.69	9.01	50.38	3.04	0.67	1.06	8.27	0.00	8.27	4.000	No	Yes	2.00
182	29.86	8.95	50.32	3.04	0.67	1.06	8.17	0.00	8.17	4.000	No	Yes	2.00
183	30.02	8.88	50.57	3.04	0.67	1.06	8.13	0.00	8.13	4.000	No	Yes	2.00
184	30.18	8.81	50.53	3.04	0.67	1.06	8.09	0.00	8.09	4.000	No	Yes	2.00
185	30.35	8.68	50.36	3.04	0.67	1.05	7.93	0.00	7.93	4.000	No	Yes	2.00
186	30.51	8.50	50.17	3.03	0.68	1.05	7.68	0.00	7.68	4.000	No	Yes	2.00
187	30.68	8.31	49.79	3.03	0.68	1.05	7.38	0.00	7.38	4.000	No	Yes	2.00
188	30.84	8.16	49.98	3.03	0.68	1.05	7.19	0.00	7.19	4.000	No	Yes	2.00
189	31.00	8.16	49.90	3.03	0.68	1.05	7.13	0.00	7.13	4.000	No	Yes	2.00
190	31.17	8.23	50.07	3.03	0.68	1.04	7.21	0.00	7.21	4.000	No	Yes	2.00
191	31.33	8.41	50.05	3.03	0.68	1.04	7.38	0.00	7.38	4.000	No	Yes	2.00
192	31.50	8.57	50.34	3.04	0.68	1.04	7.57	0.00	7.57	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
193	31.66	8.62	50.99	3.05	0.68	1.04	7.68	0.00	7.68	4.000	No	Yes	2.00
194	31.82	8.53	51.00	3.05	0.68	1.04	7.62	0.00	7.62	4.000	No	Yes	2.00
195	31.99	8.37	51.16	3.06	0.68	1.03	7.41	0.00	7.41	4.000	No	Yes	2.00
196	32.15	8.29	50.59	3.04	0.68	1.03	7.22	0.00	7.22	4.000	No	Yes	2.00
197	32.32	8.27	50.73	3.05	0.68	1.03	7.19	0.00	7.19	4.000	No	Yes	2.00
198	32.48	8.30	50.36	3.04	0.68	1.03	7.23	0.00	7.23	4.000	No	Yes	2.00
199	32.64	8.24	50.67	3.05	0.68	1.02	7.19	0.00	7.19	4.000	No	Yes	2.00
200	32.81	8.13	50.78	3.05	0.68	1.02	7.02	0.00	7.02	4.000	No	Yes	2.00
201	32.97	8.03	50.96	3.05	0.68	1.02	6.86	0.00	6.86	4.000	No	Yes	2.00
202	33.14	8.12	50.29	3.04	0.68	1.02	6.87	0.00	6.87	4.000	No	Yes	2.00
203	33.30	8.39	49.71	3.02	0.68	1.02	7.09	0.00	7.09	4.000	No	Yes	2.00
204	33.46	8.78	49.62	3.02	0.68	1.01	7.46	0.00	7.46	4.000	No	Yes	2.00
205	33.63	9.12	50.19	3.03	0.67	1.01	7.83	0.00	7.83	4.000	No	Yes	2.00
206	33.79	9.36	50.48	3.04	0.67	1.01	8.08	0.00	8.08	4.000	No	Yes	2.00
207	33.96	9.39	50.66	3.05	0.67	1.01	8.13	0.00	8.13	4.000	No	Yes	2.00
208	34.12	9.20	50.61	3.04	0.67	1.01	7.95	0.00	7.95	4.000	No	Yes	2.00
209	34.28	8.91	50.83	3.05	0.68	1.00	7.55	0.00	7.55	4.000	No	Yes	2.00
210	34.45	8.78	53.18	3.10	0.68	1.00	7.34	0.00	7.34	4.000	No	Yes	2.00
211	34.61	9.04	54.23	3.13	0.68	1.00	7.57	0.00	7.57	4.000	No	Yes	2.00
212	34.78	9.37	54.22	3.13	0.67	1.00	8.19	0.00	8.19	4.000	No	Yes	2.00
213	34.94	9.70	52.64	3.09	0.67	0.99	8.64	0.00	8.64	4.000	No	Yes	2.00
214	35.10	9.81	50.99	3.05	0.67	0.99	8.64	0.00	8.64	4.000	No	Yes	2.00
215	35.27	10.16	49.84	3.03	0.67	0.99	8.64	0.00	8.64	4.000	No	Yes	2.00
216	35.43	10.92	49.38	3.02	0.67	0.99	9.25	0.00	9.25	4.000	No	Yes	2.00
217	35.60	12.13	49.69	3.02	0.66	0.99	10.43	0.00	10.43	4.000	No	Yes	2.00
218	35.76	13.25	49.50	3.02	0.65	0.98	11.69	0.00	11.69	4.000	No	Yes	2.00
219	35.93	13.82	48.64	3.00	0.65	0.98	12.26	0.00	12.26	4.000	No	Yes	2.00
220	36.09	13.74	47.30	2.97	0.65	0.98	12.14	0.00	12.14	4.000	No	Yes	2.00
221	36.25	13.30	46.06	2.94	0.65	0.98	11.49	0.00	11.49	4.000	No	Yes	2.00
222	36.42	12.75	45.21	2.92	0.66	0.98	10.86	0.00	10.86	4.000	No	Yes	2.00
223	36.58	12.25	45.31	2.92	0.66	0.97	10.36	0.00	10.36	4.000	No	Yes	2.00
224	36.75	11.85	45.49	2.92	0.66	0.97	10.02	0.00	10.02	4.000	No	Yes	2.00
225	36.91	11.52	46.09	2.94	0.66	0.97	9.71	0.00	9.71	4.000	No	Yes	2.00
226	37.07	11.29	46.69	2.95	0.67	0.97	9.45	0.00	9.45	4.000	No	Yes	2.00
227	37.24	11.23	47.66	2.97	0.67	0.97	9.35	0.00	9.35	4.000	No	Yes	2.00
228	37.40	11.36	47.61	2.97	0.67	0.96	9.51	0.00	9.51	4.000	No	Yes	2.00
229	37.57	11.61	47.26	2.97	0.66	0.96	9.79	0.00	9.79	4.000	No	Yes	2.00
230	37.73	11.77	46.80	2.95	0.66	0.96	9.99	0.00	9.99	4.000	No	Yes	2.00
231	37.89	11.83	46.32	2.94	0.66	0.96	10.06	0.00	10.06	4.000	No	Yes	2.00
232	38.06	11.71	45.98	2.93	0.66	0.96	9.93	0.00	9.93	4.000	No	Yes	2.00
233	38.22	11.57	46.06	2.94	0.66	0.95	9.70	0.00	9.70	4.000	No	Yes	2.00
234	38.39	11.54	45.14	2.91	0.66	0.95	9.61	0.00	9.61	4.000	No	Yes	2.00
235	38.55	11.68	45.85	2.93	0.66	0.95	9.78	0.00	9.78	4.000	No	Yes	2.00
236	38.71	11.87	45.95	2.93	0.66	0.95	10.00	0.00	10.00	4.000	No	Yes	2.00
237	38.88	11.82	46.86	2.96	0.66	0.95	10.09	0.00	10.09	4.000	No	Yes	2.00
238	39.04	11.62	46.28	2.94	0.66	0.94	9.80	0.00	9.80	4.000	No	Yes	2.00
239	39.21	11.26	45.75	2.93	0.67	0.94	9.55	0.00	9.55	4.000	No	Yes	2.00
240	39.37	11.00	47.38	2.97	0.67	0.94	9.02	0.00	9.02	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
241	39.53	12.76	45.42	2.92	0.67	0.94	8.90	0.00	8.90	4.000	No	Yes	2.00
242	39.70	14.65	43.52	2.87	0.64	0.94	13.92	0.00	13.92	4.000	Yes	Yes	2.00
243	39.86	40.93	24.36	2.30	0.66	0.94	13.87	31.44	45.31	4.000	Yes	No	2.00
244	40.03	65.34	18.46	2.07	0.45	0.95	80.33	43.67	123.99	4.000	Yes	No	2.00
245	40.19	112.81	13.20	1.82	0.48	0.95	79.89	26.91	106.80	4.000	Yes	No	2.00
246	40.35	156.88	10.76	1.68	0.38	0.96	143.92	21.60	165.52	0.367	No	No	0.58
247	40.52	214.26	8.82	1.55	0.31	0.96	202.00	11.72	213.72	2.357	No	No	2.00
248	40.68	254.59	8.02	1.50	0.27	0.97	239.35	7.63	246.98	4.000	No	No	2.00
249	40.85	276.35	7.70	1.48	0.26	0.97	255.71	6.10	261.81	4.000	No	No	2.00
250	41.01	286.01	7.63	1.47	0.26	0.97	262.04	5.78	267.82	4.000	No	No	2.00
251	41.17	289.60	7.51	1.46	0.26	0.96	265.16	5.22	270.37	4.000	No	No	2.00
252	41.34	288.89	7.44	1.46	0.26	0.96	264.60	4.87	269.46	4.000	No	No	2.00
253	41.50	282.24	7.45	1.46	0.26	0.96	259.18	4.81	263.99	4.000	No	No	2.00
254	41.67	268.24	7.58	1.47	0.27	0.96	245.97	5.27	251.24	4.000	No	No	2.00
255	41.83	247.21	7.83	1.49	0.29	0.96	224.64	6.22	230.86	4.000	No	No	2.00
256	41.99	223.52	8.18	1.51	0.32	0.95	199.36	7.57	206.93	1.603	No	No	2.00
257	42.16	204.67	8.49	1.53	0.35	0.95	178.51	8.74	187.24	0.679	No	No	1.05
258	42.32	197.51	8.82	1.55	0.36	0.94	171.11	10.46	181.57	0.562	No	No	0.88
259	42.49	202.96	9.04	1.57	0.34	0.94	178.65	12.18	190.83	0.775	No	No	1.20
260	42.65	213.48	9.13	1.58	0.32	0.95	193.14	13.50	206.64	1.579	No	No	2.00
261	42.81	218.34	8.96	1.56	0.31	0.95	199.83	12.61	212.44	2.183	No	No	2.00
262	42.98	210.98	8.86	1.56	0.33	0.94	191.46	11.55	203.01	1.313	No	No	2.00
263	43.14	194.36	8.94	1.56	0.35	0.94	171.76	11.20	182.96	0.588	No	No	0.91
264	43.31	178.06	9.31	1.59	0.38	0.93	152.78	12.62	165.41	0.366	No	No	0.57
265	43.47	171.68	9.60	1.61	0.39	0.93	145.60	14.06	159.66	0.324	No	No	0.51
266	43.64	179.39	9.34	1.59	0.38	0.93	153.40	12.84	166.24	0.373	No	No	0.58
267	43.80	197.49	8.87	1.56	0.35	0.93	173.28	10.82	184.10	0.610	No	No	0.95
268	43.96	219.02	8.03	1.50	0.33	0.94	194.68	6.62	201.31	1.210	No	No	1.86
269	44.13	236.46	7.45	1.46	0.31	0.94	212.21	4.17	216.38	2.781	No	No	2.00
270	44.29	246.54	7.05	1.43	0.30	0.94	220.89	2.75	223.64	4.000	No	No	2.00
271	44.46	248.32	7.05	1.43	0.30	0.94	222.01	2.76	224.77	4.000	No	No	2.00
272	44.62	244.16	7.15	1.43	0.30	0.94	216.34	3.07	219.41	3.394	No	No	2.00
273	44.78	237.19	7.22	1.44	0.31	0.93	208.45	3.21	211.66	2.085	No	No	2.00
274	44.95	230.92	7.31	1.45	0.32	0.93	201.63	3.46	205.09	1.457	No	No	2.00
275	45.11	226.70	7.45	1.46	0.33	0.93	197.98	3.98	201.96	1.248	No	No	1.91
276	45.28	224.55	7.63	1.47	0.33	0.93	195.92	4.68	200.60	1.170	No	No	1.79
277	45.44	223.46	7.80	1.48	0.33	0.92	194.98	5.46	200.44	1.162	No	No	1.78
278	45.60	222.60	7.98	1.50	0.33	0.92	194.33	6.34	200.67	1.174	No	No	1.80
279	45.77	220.87	8.09	1.50	0.33	0.92	192.92	6.87	199.79	1.127	No	No	1.73
280	45.93	216.65	8.25	1.52	0.33	0.92	189.54	7.68	197.23	1.005	No	No	1.54
281	46.10	208.71	8.48	1.53	0.34	0.92	181.98	8.78	190.76	0.773	No	No	1.19
282	46.26	196.33	8.92	1.56	0.36	0.91	170.42	11.01	181.43	0.560	No	No	0.87
283	46.42	180.20	9.53	1.60	0.37	0.91	155.06	14.18	169.25	0.400	No	No	0.63
284	46.59	162.06	10.25	1.65	0.40	0.90	137.62	17.71	155.32	0.298	No	No	0.47
285	46.75	144.20	10.95	1.69	0.42	0.89	121.01	20.63	141.64	0.238	No	No	0.38
286	46.92	128.88	11.57	1.73	0.44	0.89	106.78	22.64	129.43	0.202	No	No	0.32
287	47.08	117.15	12.19	1.76	0.45	0.88	96.50	24.67	121.17	0.182	No	No	0.29
288	47.24	109.28	12.63	1.78	0.47	0.88	89.70	25.86	115.56	0.170	No	No	0.27

:: 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
289	47.41	104.58	13.01	1.81	0.47	0.88	85.83	27.06	112.89	0.165	No	No	0.26
290	47.57	102.09	13.06	1.81	0.48	0.87	83.87	26.93	110.80	0.161	No	No	0.26
291	47.74	101.05	13.26	1.82	0.48	0.87	82.86	27.66	110.52	0.161	No	No	0.26
292	47.90	100.99	13.33	1.82	0.48	0.87	82.77	27.96	110.73	0.161	No	No	0.26
293	48.06	101.70	13.57	1.84	0.47	0.87	83.43	29.09	112.52	0.165	No	No	0.26
294	48.23	102.50	13.90	1.85	0.47	0.87	84.49	30.61	115.10	0.170	No	No	0.27
295	48.39	102.83	14.28	1.87	0.46	0.87	84.67	32.16	116.83	0.173	No	No	0.28
296	48.56	103.30	14.43	1.88	0.46	0.87	84.07	32.64	116.71	0.173	No	No	0.28
297	48.72	106.42	14.21	1.87	0.46	0.87	85.39	32.02	117.41	0.174	No	No	0.28
298	48.88	115.92	13.29	1.82	0.45	0.87	92.21	29.33	121.53	0.183	No	No	0.29
299	49.05	133.51	12.04	1.75	0.43	0.87	108.05	25.41	133.47	0.212	No	No	0.34
300	49.21	157.61	10.65	1.67	0.40	0.88	130.44	19.65	150.09	0.272	No	No	0.43
301	49.38	182.42	9.51	1.60	0.37	0.89	154.77	14.07	168.84	0.396	No	No	0.62
302	49.54	202.43	8.54	1.54	0.35	0.89	173.01	8.84	181.85	0.567	No	No	0.88
303	49.70	215.91	7.69	1.48	0.35	0.89	183.05	4.76	187.81	0.693	No	No	1.06
304	49.87	226.45	7.02	1.42	0.34	0.89	190.16	2.41	192.57	0.829	No	No	1.27
305	50.03	239.49	6.59	1.39	0.33	0.90	200.83	1.39	202.21	1.263	No	No	1.91
306	50.20	257.24	6.34	1.37	0.30	0.90	218.33	1.00	219.33	3.377	No	No	2.00
307	50.36	277.97	6.81	1.41	0.28	0.91	239.26	2.16	241.43	4.000	No	No	2.00
308	50.52	294.22	7.10	1.43	0.26	0.91	258.18	3.27	261.44	4.000	No	No	2.00
309	50.69	301.35	7.27	1.44	0.26	0.91	262.75	4.01	266.77	4.000	No	No	2.00
310	50.85	297.01	7.20	1.44	0.26	0.91	258.18	3.69	261.87	4.000	No	No	2.00
311	51.02	290.06	7.35	1.45	0.27	0.91	245.80	4.20	250.00	4.000	No	No	2.00
312	51.18	282.02	7.71	1.48	0.27	0.91	243.67	5.93	249.60	4.000	No	No	2.00
313	51.35	273.43	7.96	1.49	0.28	0.91	235.65	7.16	242.81	4.000	No	No	2.00
314	51.51	257.04	9.35	1.59	0.28	0.90	222.04	16.64	238.68	4.000	No	No	2.00
315	51.67	238.87	11.28	1.71	0.29	0.90	199.27	31.09	230.36	4.000	No	No	2.00
316	51.84	225.78	12.54	1.78	0.30	0.90	187.14	39.55	226.68	4.000	No	No	2.00
317	52.00	224.31	12.64	1.79	0.30	0.90	186.99	40.22	227.21	4.000	No	No	2.00
318	52.17	229.38	10.98	1.69	0.30	0.89	194.26	28.08	222.34	4.000	No	No	2.00
319	52.33	235.18	9.37	1.59	0.31	0.89	198.09	15.48	213.57	2.335	No	No	2.00
320	52.49	237.79	7.34	1.45	0.33	0.88	198.70	3.56	202.26	1.266	No	No	1.91
321	52.66	238.45	6.83	1.41	0.33	0.88	197.96	1.94	199.91	1.133	No	No	1.71
322	52.82	237.23	6.94	1.42	0.33	0.88	197.83	2.23	200.07	1.142	No	No	1.73
323	52.99	233.38	7.26	1.44	0.33	0.88	194.59	3.21	197.80	1.031	No	No	1.56
324	53.15	226.18	7.70	1.48	0.34	0.87	186.97	4.84	191.81	0.804	No	No	1.23
325	53.31	218.69	8.18	1.51	0.35	0.87	177.85	7.00	184.85	0.625	No	No	0.97
326	53.48	215.46	8.53	1.53	0.35	0.87	173.97	8.81	182.78	0.584	No	No	0.91
327	53.64	219.12	8.44	1.53	0.35	0.87	177.83	8.40	186.23	0.655	No	No	1.01
328	53.81	227.86	8.09	1.50	0.34	0.87	187.15	6.74	193.90	0.874	No	No	1.34
329	53.97	237.86	7.72	1.48	0.33	0.87	196.91	5.12	202.03	1.252	No	No	1.89
330	54.13	245.54	7.56	1.47	0.32	0.88	204.33	4.54	208.88	1.781	No	No	2.00
331	54.30	249.15	7.53	1.46	0.31	0.88	207.55	4.44	211.99	2.126	No	No	2.00
332	54.46	248.27	7.57	1.47	0.32	0.88	206.23	4.59	210.82	1.987	No	No	2.00
333	54.63	243.95	7.68	1.47	0.32	0.87	201.27	5.00	206.27	1.548	No	No	2.00
334	54.79	237.47	7.85	1.49	0.33	0.87	194.99	5.71	200.71	1.176	No	No	1.78
335	54.95	229.04	8.13	1.51	0.34	0.86	187.89	6.97	194.86	0.909	No	No	1.39
336	55.12	217.92	8.47	1.53	0.35	0.86	177.80	8.58	186.38	0.659	No	No	1.02

:: 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
337	55.28	203.97	8.84	1.56	0.36	0.85	164.49	10.32	174.81	0.461	No	No	0.72
338	55.45	189.68	9.17	1.58	0.38	0.84	150.01	11.64	161.65	0.337	No	No	0.53
339	55.61	177.89	9.60	1.61	0.40	0.84	139.39	13.69	153.08	0.286	No	No	0.46
340	55.77	167.57	11.11	1.70	0.39	0.84	133.90	22.88	156.78	0.306	No	No	0.49
341	55.94	152.54	14.16	1.87	0.38	0.84	125.10	39.21	164.31	0.357	No	No	0.57
342	56.10	128.06	17.66	2.03	0.40	0.83	103.12	47.53	150.65	0.274	No	No	0.45
343	56.27	102.07	21.27	2.18	0.46	0.81	73.18	46.60	119.77	0.179	No	No	0.29
344	56.43	90.09	22.18	2.22	0.49	0.80	59.68	43.74	103.42	0.148	No	No	0.24
345	56.59	100.73	19.01	2.09	0.47	0.81	72.31	42.66	114.98	0.169	No	No	0.28
346	56.76	121.76	14.99	1.91	0.43	0.82	98.53	37.64	136.17	0.220	No	No	0.36
347	56.92	133.54	12.17	1.76	0.43	0.82	110.14	26.40	136.54	0.221	No	No	0.36
348	57.09	127.38	11.98	1.75	0.45	0.81	99.71	24.02	123.73	0.188	No	No	0.31
349	57.25	111.82	13.69	1.84	0.47	0.80	82.19	29.36	111.55	0.163	No	No	0.27
350	57.41	103.38	17.33	2.02	0.47	0.80	72.02	38.95	110.97	0.162	No	No	0.27
351	57.58	111.07	18.15	2.05	0.45	0.81	80.00	42.88	122.88	0.186	No	No	0.31
352	57.74	134.99	16.70	1.99	0.41	0.82	102.31	44.50	146.80	0.258	No	No	0.42
353	57.91	164.83	13.89	1.85	0.37	0.84	132.14	39.13	171.27	0.421	No	No	0.68
354	58.07	191.52	11.44	1.72	0.35	0.84	154.75	27.39	182.14	0.572	No	No	0.91
355	58.23	210.29	9.61	1.61	0.35	0.84	168.49	15.51	184.00	0.608	No	No	0.95
356	58.40	224.29	8.23	1.51	0.35	0.84	177.73	7.25	184.98	0.628	No	No	0.98
357	58.56	237.74	7.99	1.50	0.34	0.85	189.25	6.26	195.52	0.934	No	No	1.43
358	58.73	252.18	7.64	1.47	0.32	0.85	203.25	4.88	208.13	1.710	No	No	2.00
359	58.89	265.68	7.53	1.46	0.30	0.86	216.65	4.59	221.24	3.849	No	No	2.00
360	59.06	275.46	7.31	1.45	0.29	0.86	225.83	3.76	229.59	4.000	No	No	2.00
361	59.22	281.51	7.13	1.43	0.29	0.86	229.82	3.12	232.94	4.000	No	No	2.00
362	59.38	284.75	5.77	1.32	0.29	0.86	232.43	0.34	232.78	4.000	No	No	2.00
363	59.55	277.55	5.59	1.30	0.29	0.86	233.87	0.22	234.09	4.000	No	No	2.00
364	59.71	256.55	5.68	1.31	0.32	0.85	208.41	0.25	208.66	1.761	No	No	2.00
365	59.88	222.00	7.80	1.48	0.36	0.83	174.23	5.05	179.28	0.524	No	No	0.82
366	60.04	198.96	8.98	1.57	0.40	0.81	140.21	10.10	150.31	0.273	No	No	0.44
367	60.20	188.25	11.07	1.70	0.37	0.82	148.70	24.14	172.84	0.438	No	No	0.70
368	60.37	183.11	13.81	1.85	0.34	0.84	149.94	41.83	191.77	4.000	Yes	No	2.00
369	60.53	160.36	17.75	2.03	0.35	0.83	131.86	55.02	186.88	4.000	Yes	No	2.00
370	60.70	130.23	23.86	2.28	0.41	0.81	93.30	55.84	149.14	4.000	Yes	No	2.00
371	60.86	109.20	28.18	2.43	0.44	0.79	74.08	52.95	127.03	4.000	Yes	No	2.00
372	61.02	103.13	28.77	2.45	0.43	0.79	77.87	54.51	132.39	0.209	No	No	0.35
373	61.19	101.60	25.52	2.34	0.44	0.79	77.48	52.37	129.85	0.203	No	No	0.34
374	61.35	92.92	23.19	2.25	0.47	0.78	68.44	47.46	115.90	0.171	No	No	0.29
375	61.52	82.24	22.39	2.22	0.50	0.76	55.09	42.58	97.67	0.139	No	No	0.23
376	61.68	75.78	23.55	2.27	0.52	0.75	49.53	41.98	91.51	0.129	No	No	0.22
377	61.84	78.10	24.61	2.31	0.51	0.75	51.22	43.35	94.57	0.134	No	No	0.23
378	62.01	87.94	24.88	2.32	0.49	0.76	58.56	45.87	104.42	0.150	No	No	0.25
379	62.17	101.11	23.89	2.28	0.46	0.78	71.64	49.14	120.77	0.181	No	No	0.30
380	62.34	113.25	23.26	2.26	0.43	0.79	83.63	52.20	135.83	0.219	No	No	0.37
381	62.50	120.55	24.71	2.31	0.41	0.79	90.00	55.66	145.66	0.253	No	No	0.42
382	62.66	127.12	25.82	2.35	0.41	0.79	91.78	57.19	148.97	0.267	No	No	0.45
383	62.83	138.33	25.64	2.34	0.39	0.80	100.54	59.84	160.38	0.329	No	No	0.55
384	62.99	156.41	23.45	2.26	0.35	0.82	119.48	63.45	182.93	0.587	No	No	0.97

:: 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
385	63.16	173.47	22.06	2.21	0.32	0.83	139.90	67.54	207.43	1.647	No	No	2.00
386	63.32	181.69	21.64	2.20	0.31	0.84	146.91	68.84	215.75	2.673	No	No	2.00
387	63.48	181.19	21.85	2.20	0.32	0.83	141.55	67.67	209.22	1.815	No	No	2.00
388	63.65	181.03	21.24	2.18	0.33	0.83	137.83	65.42	203.24	1.328	No	No	2.00
389	63.81	188.53	19.84	2.12	0.32	0.83	145.51	64.53	210.04	1.900	No	No	2.00
390	63.98	201.72	18.17	2.05	0.30	0.84	160.59	63.73	224.32	4.000	No	No	2.00
391	64.14	212.94	17.21	2.01	0.29	0.84	172.25	63.11	235.36	4.000	No	No	2.00
392	64.30	217.20	17.43	2.02	0.28	0.85	175.20	64.70	239.90	4.000	No	No	2.00
393	64.47	215.29	18.44	2.06	0.28	0.84	172.14	67.64	239.79	4.000	No	No	2.00
394	64.63	211.11	19.70	2.12	0.28	0.84	167.49	70.24	237.73	4.000	No	No	2.00
395	64.80	208.11	20.31	2.14	0.29	0.84	164.18	70.93	235.11	4.000	No	No	2.00
396	64.96	207.84	20.15	2.14	0.29	0.84	163.94	70.45	234.39	4.000	No	No	2.00
397	65.12	210.37	20.15	2.14	0.28	0.84	166.37	71.12	237.49	4.000	No	No	2.00
398	65.29	213.79	20.13	2.14	0.28	0.84	170.67	72.29	242.96	4.000	No	No	2.00
399	65.45	215.63	20.27	2.14	0.27	0.84	173.12	73.36	246.48	4.000	No	No	2.00
400	65.62	213.53	20.43	2.15	0.28	0.84	171.07	73.18	244.25	4.000	No	No	2.00
401	65.78	207.41	20.80	2.16	0.28	0.84	164.38	72.17	236.55	4.000	No	No	2.00
402	65.94	201.78	21.30	2.18	0.30	0.83	155.76	70.78	226.53	4.000	No	No	2.00
403	66.11	200.14	21.03	2.17	0.30	0.83	154.52	69.83	224.35	4.000	No	No	2.00
404	66.27	203.44	20.36	2.14	0.29	0.83	159.27	69.64	228.91	4.000	No	No	2.00
405	66.44	203.07	20.31	2.14	0.29	0.83	164.04	70.88	234.92	4.000	No	No	2.00
406	66.60	191.40	21.30	2.18	0.30	0.83	153.76	70.17	223.94	4.000	No	No	2.00
407	66.77	165.47	23.34	2.26	0.34	0.80	127.25	65.70	192.96	0.841	No	No	1.40
408	66.93	136.30	25.25	2.33	0.40	0.77	95.21	57.80	153.01	0.286	No	No	0.49
409	67.09	115.96	27.28	2.40	0.44	0.75	75.42	52.90	128.32	0.199	No	No	0.34
410	67.26	110.58	28.14	2.43	0.45	0.75	72.10	52.28	124.38	0.189	No	No	0.33
411	67.42	113.00	29.10	2.46	0.43	0.75	78.11	54.75	132.86	0.211	No	No	0.36
412	67.59	120.22	28.82	2.45	0.42	0.76	83.07	56.26	139.33	0.230	No	No	0.40
413	67.75	127.64	27.77	2.42	0.41	0.76	90.26	58.06	148.32	0.264	No	No	0.45
414	67.91	135.17	26.09	2.36	0.39	0.77	98.69	59.62	158.31	0.315	No	No	0.54
415	68.08	134.64	24.57	2.31	0.39	0.77	101.43	59.13	160.56	0.330	No	No	0.56
416	68.24	123.14	23.75	2.28	0.42	0.76	88.00	54.08	142.09	4.000	Yes	No	2.00
417	68.41	104.30	25.85	2.35	0.46	0.73	68.23	49.65	117.87	4.000	Yes	No	2.00
418	68.57	87.42	29.62	2.48	0.50	0.71	53.28	46.68	99.97	4.000	Yes	No	2.00
419	68.73	78.69	33.49	2.60	0.51	0.71	48.46	46.14	94.60	4.000	Yes	No	2.00
420	68.90	75.41	33.88	2.61	0.51	0.71	47.89	0.00	47.89	4.000	No	Yes	2.00
421	69.06	76.82	32.33	2.56	0.51	0.71	48.88	46.02	94.90	0.134	No	No	0.24
422	69.23	83.66	30.25	2.50	0.50	0.71	52.80	46.74	99.54	0.142	No	No	0.25
423	69.39	96.99	29.38	2.47	0.47	0.72	63.25	49.92	113.17	0.166	No	No	0.29
424	69.55	109.44	28.96	2.46	0.44	0.74	76.14	54.03	130.16	0.203	No	No	0.35
425	69.72	112.81	28.96	2.46	0.43	0.74	81.09	55.67	136.75	0.222	No	No	0.39
426	69.88	105.74	27.73	2.42	0.45	0.73	73.65	52.58	126.23	0.194	No	No	0.34
427	70.05	92.42	26.73	2.38	0.48	0.71	59.90	47.52	107.41	0.155	No	No	0.27
428	70.21	80.43	25.55	2.34	0.51	0.70	49.23	43.36	92.58	0.131	No	No	0.23
429	70.37	72.63	25.71	2.35	0.53	0.69	43.76	41.71	85.47	0.120	No	No	0.21
430	70.54	69.18	25.45	2.34	0.54	0.68	41.77	40.92	82.69	0.116	No	No	0.21
431	70.70	68.21	25.25	2.33	0.54	0.68	41.24	40.62	81.86	0.115	No	No	0.20
432	70.87	68.08	24.88	2.32	0.54	0.68	41.09	40.34	81.43	0.115	No	No	0.20

:: 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
433	71.03	68.18	24.58	2.31	0.54	0.68	41.05	40.13	81.18	0.114	No	No	0.20
434	71.19	68.31	24.39	2.30	0.54	0.68	40.85	39.93	80.78	0.114	No	No	0.20
435	71.36	68.59	24.29	2.30	0.54	0.68	40.81	39.84	80.66	0.114	No	No	0.20
436	71.52	69.09	24.90	2.32	0.54	0.68	41.00	40.32	81.32	0.114	No	No	0.20
437	71.69	69.90	25.02	2.32	0.54	0.68	41.21	40.47	81.68	0.115	No	No	0.20
438	71.85	71.05	25.06	2.32	0.54	0.68	41.84	40.69	82.53	0.116	No	No	0.21
439	72.01	72.64	24.16	2.29	0.54	0.68	42.76	40.36	83.11	0.117	No	No	0.21
440	72.18	74.36	23.47	2.27	0.53	0.68	44.05	40.23	84.27	0.119	No	No	0.21
441	72.34	75.69	22.94	2.25	0.53	0.68	44.64	39.95	84.59	0.119	No	No	0.21
442	72.51	76.33	22.67	2.24	0.53	0.68	44.80	39.75	84.55	0.119	No	No	0.21
443	72.67	76.63	22.90	2.24	0.53	0.68	44.60	39.90	84.50	0.119	No	No	0.21
444	72.83	77.52	23.30	2.26	0.53	0.68	44.91	40.34	85.26	0.120	No	No	0.21
445	73.00	80.14	23.09	2.25	0.53	0.68	46.24	40.57	86.81	0.122	No	No	0.22
446	73.16	85.85	22.49	2.23	0.52	0.68	49.79	41.09	90.87	0.128	No	No	0.23
447	73.33	94.89	21.20	2.18	0.50	0.69	56.55	41.66	98.21	0.140	No	No	0.25
448	73.49	104.69	20.36	2.14	0.48	0.70	65.18	42.97	108.16	0.156	No	No	0.28
449	73.65	110.19	20.63	2.16	0.47	0.71	70.99	45.05	116.04	0.171	No	No	0.30
450	73.82	109.77	21.86	2.20	0.46	0.71	70.64	46.62	117.25	0.174	No	No	0.31
451	73.98	105.93	22.87	2.24	0.47	0.70	66.69	46.59	113.28	0.166	No	No	0.29
452	74.15	102.40	23.60	2.27	0.48	0.70	64.04	46.50	110.54	0.161	No	No	0.29
453	74.31	100.00	23.21	2.26	0.48	0.70	63.65	46.01	109.67	4.000	Yes	No	2.00
454	74.48	96.83	26.14	2.36	0.48	0.70	61.40	47.65	109.05	4.000	Yes	No	2.00
455	74.64	93.80	29.10	2.46	0.49	0.69	57.41	47.86	105.27	4.000	Yes	No	2.00
456	74.80	93.11	31.21	2.53	0.49	0.69	56.28	48.22	104.50	4.000	Yes	No	2.00
457	74.97	94.88	30.01	2.49	0.48	0.69	59.23	48.82	108.05	0.156	No	No	0.28
458	75.13	97.51	27.78	2.42	0.47	0.70	63.92	49.41	113.33	0.166	No	No	0.30
459	75.30	97.40	26.32	2.37	0.47	0.69	62.86	48.23	111.10	0.162	No	No	0.29
460	75.46	95.04	26.39	2.37	0.48	0.69	59.81	47.28	107.09	0.155	No	No	0.28
461	75.62	91.50	26.58	2.38	0.49	0.68	55.90	46.13	102.03	0.146	No	No	0.26
462	75.79	88.64	26.59	2.38	0.50	0.68	54.32	45.62	99.94	0.142	No	No	0.26
463	75.95	86.67	26.01	2.36	0.50	0.68	52.80	44.79	97.59	0.139	No	No	0.25
464	76.12	85.39	25.60	2.34	0.51	0.67	51.25	44.04	95.30	0.135	No	No	0.24
465	76.28	84.42	25.31	2.33	0.51	0.67	50.44	43.59	94.03	0.133	No	No	0.24
466	76.44	83.65	24.99	2.32	0.51	0.67	49.76	43.16	92.91	0.131	No	No	0.24
467	76.61	82.79	24.59	2.31	0.52	0.67	48.77	42.56	91.33	0.129	No	No	0.23
468	76.77	81.81	24.42	2.30	0.52	0.66	47.27	41.97	89.24	0.126	No	No	0.23
469	76.94	81.51	25.27	2.33	0.52	0.66	46.73	42.38	89.11	0.126	No	No	0.23
470	77.10	82.29	26.17	2.36	0.52	0.66	47.34	43.13	90.46	0.128	No	No	0.23
471	77.26	83.32	27.19	2.40	0.51	0.67	48.89	44.18	93.07	0.132	No	No	0.24
472	77.43	83.95	28.49	2.44	0.51	0.67	49.63	45.02	94.65	0.134	No	No	0.24
473	77.59	83.34	29.87	2.49	0.51	0.67	49.27	45.43	94.71	0.134	No	No	0.24
474	77.76	82.66	30.17	2.50	0.51	0.66	48.49	45.27	93.76	0.133	No	No	0.24
475	77.92	80.92	29.03	2.46	0.52	0.66	47.64	44.58	92.22	0.130	No	No	0.24
476	78.08	79.06	27.21	2.40	0.52	0.66	46.50	43.41	89.91	0.127	No	No	0.23
477	78.25	76.37	25.98	2.36	0.53	0.65	43.94	41.92	85.86	0.121	No	No	0.22
478	78.41	74.44	25.43	2.34	0.54	0.65	41.72	40.89	82.61	0.116	No	No	0.21
479	78.58	73.40	25.29	2.33	0.54	0.64	40.59	40.44	81.03	0.114	No	No	0.21
480	78.74	73.85	25.20	2.33	0.54	0.64	40.99	40.51	81.50	0.115	No	No	0.21

:: 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
481	78.90	75.26	24.61	2.31	0.54	0.64	41.98	40.44	82.42	0.116	No	No	0.21
482	79.07	76.75	24.00	2.28	0.54	0.64	42.84	40.27	83.10	0.117	No	No	0.21
483	79.23	78.02	23.72	2.27	0.54	0.64	43.54	40.27	83.81	0.118	No	No	0.22
484	79.40	79.01	23.80	2.28	0.53	0.65	44.01	40.47	84.48	0.119	No	No	0.22
485	79.56	79.81	23.99	2.28	0.53	0.65	44.47	40.77	85.24	0.120	No	No	0.22
486	79.72	80.37	24.16	2.29	0.53	0.65	44.86	41.02	85.88	0.121	No	No	0.22
487	79.89	80.75	24.13	2.29	0.53	0.65	44.95	41.02	85.98	0.121	No	No	0.22
488	80.05	81.02	24.08	2.29	0.53	0.64	44.96	40.99	85.95	0.121	No	No	0.22
489	80.22	81.24	24.10	2.29	0.53	0.64	44.96	41.00	85.97	0.121	No	No	0.22
490	80.38	81.30	24.36	2.30	0.53	0.64	44.98	41.20	86.18	0.121	No	No	0.22
491	80.54	81.40	24.90	2.32	0.53	0.64	44.92	41.56	86.48	0.122	No	No	0.22
492	80.71	81.70	25.34	2.33	0.53	0.64	45.03	41.88	86.91	0.122	No	No	0.23
493	80.87	82.45	25.37	2.33	0.53	0.64	45.55	42.07	87.62	0.123	No	No	0.23
494	81.04	82.94	25.01	2.32	0.53	0.64	45.98	41.98	87.95	0.124	No	No	0.23
495	81.20	82.72	24.49	2.30	0.53	0.64	45.75	41.54	87.29	0.123	No	No	0.23
496	81.36	81.42	24.19	2.29	0.53	0.64	44.66	40.98	85.64	0.121	No	No	0.22
497	81.53	79.94	24.06	2.29	0.54	0.64	43.36	40.47	83.83	0.118	No	No	0.22
498	81.69	79.01	24.18	2.29	0.54	0.63	42.43	40.27	82.70	0.116	No	No	0.22
499	81.86	78.93	24.69	2.31	0.54	0.63	42.43	40.63	83.06	0.117	No	No	0.22
500	82.02	79.80	24.99	2.32	0.54	0.63	43.02	41.02	84.04	0.118	No	No	0.22
501	82.19	80.59	25.31	2.33	0.53	0.64	43.95	41.52	85.47	0.120	No	No	0.22
502	82.35	81.56	24.76	2.31	0.53	0.64	44.54	41.35	85.88	0.121	No	No	0.22
503	82.51	82.17	23.81	2.28	0.53	0.63	44.89	40.76	85.65	0.121	No	No	0.22
504	82.68	82.79	22.70	2.24	0.53	0.63	45.12	39.87	85.00	0.120	No	No	0.22
505	82.84	83.00	22.17	2.22	0.53	0.63	45.26	39.41	84.67	0.119	No	No	0.22
506	83.01	82.79	22.39	2.22	0.53	0.63	45.16	39.59	84.75	0.119	No	No	0.22
507	83.17	82.42	22.79	2.24	0.53	0.63	44.86	39.88	84.74	0.119	No	No	0.22
508	83.33	81.81	23.11	2.25	0.53	0.63	44.47	40.05	84.52	0.119	No	No	0.22
509	83.50	81.32	24.25	2.29	0.53	0.63	44.18	40.87	85.05	0.120	No	No	0.22
510	83.66	81.48	25.77	2.35	0.53	0.63	44.03	41.83	85.87	0.121	No	No	0.23
511	83.83	82.78	26.71	2.38	0.53	0.63	45.15	42.72	87.87	0.124	No	No	0.23
512	83.99	84.25	26.66	2.38	0.52	0.63	47.06	43.31	90.37	0.127	No	No	0.24
513	84.15	85.37	25.41	2.34	0.52	0.64	48.70	43.10	91.80	0.130	No	No	0.24
514	84.32	84.63	24.47	2.30	0.52	0.63	47.91	42.20	90.11	0.127	No	No	0.24
515	84.48	82.66	23.71	2.27	0.53	0.63	45.50	40.86	86.36	0.122	No	No	0.23
516	84.65	79.80	23.86	2.28	0.54	0.62	42.87	40.17	83.05	0.117	No	No	0.22
517	84.81	77.76	24.14	2.29	0.54	0.62	41.46	39.94	81.40	0.115	No	No	0.21
518	84.97	77.20	24.76	2.31	0.54	0.62	40.90	40.19	81.09	0.114	No	No	0.21
519	85.14	79.08	26.05	2.36	0.54	0.62	41.54	41.19	82.73	0.116	No	No	0.22
520	85.30	84.30	27.59	2.41	0.53	0.63	45.06	43.12	88.19	0.124	No	No	0.23
521	85.47	92.53	28.05	2.43	0.50	0.64	51.37	45.41	96.78	0.137	No	No	0.26
522	85.63	101.35	30.04	2.49	0.48	0.65	59.54	48.93	108.47	0.157	No	No	0.29
523	85.79	108.64	30.74	2.51	0.46	0.66	65.31	51.12	116.43	0.172	No	No	0.32
524	85.96	111.63	32.56	2.57	0.45	0.67	69.14	52.97	122.12	0.184	No	No	0.34
525	86.12	112.52	32.03	2.55	0.45	0.66	69.18	52.84	122.02	0.184	No	No	0.34
526	86.29	112.52	32.37	2.56	0.46	0.66	68.39	52.67	121.06	0.182	No	No	0.34
527	86.45	120.43	31.24	2.53	0.45	0.67	71.75	53.46	125.21	0.191	No	No	0.35
528	86.61	136.91	29.97	2.49	0.41	0.69	86.74	58.02	144.76	0.249	No	No	0.46

:: 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
529	86.78	155.57	28.58	2.44	0.37	0.71	107.39	64.19	171.59	0.424	No	No	0.76
530	86.94	161.61	27.52	2.41	0.35	0.72	115.95	66.32	182.27	0.575	No	No	1.03
531	87.11	153.92	29.93	2.49	0.38	0.71	102.06	63.14	165.19	0.364	No	No	0.66
532	87.27	144.21	32.36	2.56	0.40	0.69	89.78	59.94	149.72	0.270	No	No	0.49
533	87.43	207.70	22.09	2.21	0.42	0.68	88.46	52.23	140.70	0.235	No	No	0.43
534	87.60	276.44	12.47	1.78	0.26	0.78	251.84	48.22	300.07	4.000	No	No	2.00
535	87.76	368.44	37.04	2.70	0.26	0.78	251.79	0.00	251.79	4.000	No	Yes	2.00
536	87.93	392.86	39.04	2.75	0.26	0.78	308.09	0.00	308.09	4.000	No	Yes	2.00

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	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.05	0.00	0.33	2.00	0.00	0.00	0.05	0.00
0.49	2.00	0.00	0.00	0.05	0.00	0.66	2.00	0.00	0.00	0.05	0.00
0.82	2.00	0.00	0.00	0.05	0.00	0.98	2.00	0.00	0.00	0.05	0.00
1.15	2.00	0.00	0.00	0.05	0.00	1.31	2.00	0.00	0.00	0.05	0.00
1.48	2.00	0.00	0.00	0.05	0.00	1.64	2.00	0.00	0.00	0.05	0.00
1.80	2.00	0.00	0.00	0.05	0.00	1.97	2.00	0.00	0.00	0.05	0.00
2.13	2.00	0.00	0.00	0.05	0.00	2.30	2.00	0.00	0.00	0.05	0.00
2.46	2.00	0.00	0.00	0.05	0.00	2.62	2.00	0.00	0.00	0.05	0.00
2.79	2.00	0.00	0.00	0.05	0.00	2.95	2.00	0.00	0.00	0.05	0.00
3.12	2.00	0.00	0.00	0.05	0.00	3.28	2.00	0.00	0.00	0.05	0.00
3.44	2.00	0.00	0.00	0.05	0.00	3.61	2.00	0.00	0.00	0.05	0.00
3.77	2.00	0.00	0.00	0.05	0.00	3.94	2.00	0.00	0.00	0.05	0.00
4.10	2.00	0.00	0.00	0.05	0.00	4.27	2.00	0.00	0.00	0.05	0.00
4.43	2.00	0.00	0.00	0.05	0.00	4.59	2.00	0.00	0.00	0.05	0.00
4.76	2.00	0.00	0.00	0.05	0.00	4.92	2.00	0.00	0.00	0.05	0.00
5.09	2.00	0.00	0.00	0.05	0.00	5.25	2.00	0.00	0.00	0.05	0.00
5.41	2.00	0.00	0.00	0.05	0.00	5.58	2.00	0.00	0.00	0.05	0.00
5.74	2.00	0.00	0.00	0.05	0.00	5.91	2.00	0.00	0.00	0.05	0.00
6.07	2.00	0.00	0.00	0.05	0.00	6.23	2.00	0.00	0.00	0.05	0.00
6.40	2.00	0.00	0.00	0.05	0.00	6.56	2.00	0.00	0.00	0.05	0.00
6.73	2.00	0.00	0.00	0.05	0.00	6.89	2.00	0.00	0.00	0.05	0.00
7.05	2.00	0.00	0.00	0.05	0.00	7.22	2.00	0.00	0.00	0.05	0.00
7.38	2.00	0.00	0.00	0.05	0.00	7.55	2.00	0.00	0.00	0.05	0.00
7.71	2.00	0.00	0.00	0.05	0.00	7.87	2.00	0.00	0.00	0.05	0.00
8.04	2.00	0.00	0.00	0.05	0.00	8.20	2.00	0.00	0.00	0.05	0.00
8.37	2.00	0.00	0.00	0.05	0.00	8.53	2.00	0.00	0.00	0.05	0.00
8.69	2.00	0.00	0.00	0.05	0.00	8.86	2.00	0.00	0.00	0.05	0.00
9.02	2.00	0.00	0.00	0.05	0.00	9.19	2.00	0.00	0.00	0.05	0.00
9.35	2.00	0.00	0.00	0.05	0.00	9.51	2.00	0.00	0.00	0.05	0.00
9.68	2.00	0.00	0.00	0.05	0.00	9.84	2.00	0.00	0.00	0.05	0.00
10.01	2.00	0.00	0.00	0.05	0.00	10.17	2.00	0.00	0.00	0.05	0.00
10.33	2.00	0.00	0.00	0.05	0.00	10.50	2.00	0.00	0.00	0.05	0.00
10.66	2.00	0.00	0.00	0.05	0.00	10.83	2.00	0.00	0.00	0.05	0.00
10.99	2.00	0.00	0.00	0.05	0.00	11.15	2.00	0.00	0.00	0.05	0.00
11.32	2.00	0.00	0.00	0.05	0.00	11.48	2.00	0.00	0.00	0.05	0.00
11.65	2.00	0.00	0.00	0.05	0.00	11.81	2.00	0.00	0.00	0.05	0.00
11.98	2.00	0.00	0.00	0.05	0.00	12.14	2.00	0.00	0.00	0.05	0.00
12.30	2.00	0.00	0.00	0.05	0.00	12.47	2.00	0.00	0.00	0.05	0.00
12.63	2.00	0.00	0.00	0.05	0.00	12.80	2.00	0.00	0.00	0.05	0.00
12.96	2.00	0.00	0.00	0.05	0.00	13.12	2.00	0.00	0.00	0.05	0.00
13.29	2.00	0.00	0.00	0.05	0.00	13.45	2.00	0.00	0.00	0.05	0.00
13.62	2.00	0.00	0.00	0.05	0.00	13.78	2.00	0.00	0.00	0.05	0.00
13.94	2.00	0.00	0.00	0.05	0.00	14.11	2.00	0.00	0.00	0.05	0.00
14.27	2.00	0.00	0.00	0.05	0.00	14.44	2.00	0.00	0.00	0.05	0.00
14.60	2.00	0.00	0.00	0.05	0.00	14.76	2.00	0.00	0.00	0.05	0.00
14.93	2.00	0.00	0.00	0.05	0.00	15.09	2.00	0.00	0.00	0.05	0.00
15.26	2.00	0.00	0.00	0.05	0.00	15.42	2.00	0.00	0.00	0.05	0.00
15.58	2.00	0.00	0.00	0.05	0.00	15.75	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	2.00	0.00	0.00	0.05	0.00	16.08	2.00	0.00	0.00	0.05	0.00
16.24	2.00	0.00	0.00	0.05	0.00	16.40	2.00	0.00	0.00	0.05	0.00
16.57	2.00	0.00	0.00	0.05	0.00	16.73	2.00	0.00	0.00	0.05	0.00
16.90	2.00	0.00	0.00	0.05	0.00	17.06	2.00	0.00	0.00	0.05	0.00
17.22	2.00	0.00	0.00	0.05	0.00	17.39	2.00	0.00	0.00	0.05	0.00
17.55	2.00	0.00	0.00	0.05	0.00	17.72	2.00	0.00	0.00	0.05	0.00
17.88	2.00	0.00	0.00	0.05	0.00	18.04	2.00	0.00	0.00	0.05	0.00
18.21	2.00	0.00	0.00	0.05	0.00	18.37	2.00	0.00	0.00	0.05	0.00
18.54	2.00	0.00	0.00	0.05	0.00	18.70	2.00	0.00	0.00	0.05	0.00
18.86	2.00	0.00	0.00	0.05	0.00	19.03	2.00	0.00	0.00	0.05	0.00
19.19	2.00	0.00	0.00	0.05	0.00	19.36	2.00	0.00	0.00	0.05	0.00
19.52	2.00	0.00	0.00	0.05	0.00	19.69	2.00	0.00	0.00	0.05	0.00
19.85	2.00	0.00	0.00	0.05	0.00	20.01	2.00	0.00	0.00	0.05	0.00
20.18	2.00	0.00	0.00	0.05	0.00	20.34	2.00	0.00	0.00	0.05	0.00
20.51	2.00	0.00	0.00	0.05	0.00	20.67	2.00	0.00	0.00	0.05	0.00
20.83	2.00	0.00	0.00	0.05	0.00	21.00	2.00	0.00	0.00	0.05	0.00
21.16	2.00	0.00	0.00	0.05	0.00	21.33	2.00	0.00	0.00	0.05	0.00
21.49	2.00	0.00	0.00	0.05	0.00	21.65	2.00	0.00	0.00	0.05	0.00
21.82	2.00	0.00	0.00	0.05	0.00	21.98	2.00	0.00	0.00	0.05	0.00
22.15	2.00	0.00	0.00	0.05	0.00	22.31	2.00	0.00	0.00	0.05	0.00
22.47	2.00	0.00	0.00	0.05	0.00	22.64	2.00	0.00	0.00	0.05	0.00
22.80	2.00	0.00	0.00	0.05	0.00	22.97	2.00	0.00	0.00	0.05	0.00
23.13	2.00	0.00	0.00	0.05	0.00	23.29	2.00	0.00	0.00	0.05	0.00
23.46	2.00	0.00	0.00	0.05	0.00	23.62	2.00	0.00	0.00	0.05	0.00
23.79	2.00	0.00	0.00	0.05	0.00	23.95	2.00	0.00	0.00	0.05	0.00
24.11	2.00	0.00	0.00	0.05	0.00	24.28	2.00	0.00	0.00	0.05	0.00
24.44	2.00	0.00	0.00	0.05	0.00	24.61	2.00	0.00	0.00	0.05	0.00
24.77	2.00	0.00	0.00	0.05	0.00	24.93	2.00	0.00	0.00	0.05	0.00
25.10	2.00	0.00	0.00	0.05	0.00	25.26	2.00	0.00	0.00	0.05	0.00
25.43	2.00	0.00	0.00	0.05	0.00	25.59	2.00	0.00	0.00	0.05	0.00
25.75	2.00	0.00	0.00	0.05	0.00	25.92	2.00	0.00	0.00	0.05	0.00
26.08	2.00	0.00	0.00	0.05	0.00	26.25	2.00	0.00	0.00	0.05	0.00
26.41	2.00	0.00	0.00	0.05	0.00	26.57	2.00	0.00	0.00	0.05	0.00
26.74	2.00	0.00	0.00	0.05	0.00	26.90	2.00	0.00	0.00	0.05	0.00
27.07	2.00	0.00	0.00	0.05	0.00	27.23	2.00	0.00	0.00	0.05	0.00
27.40	2.00	0.00	0.00	0.05	0.00	27.56	2.00	0.00	0.00	0.05	0.00
27.72	2.00	0.00	0.00	0.05	0.00	27.89	2.00	0.00	0.00	0.05	0.00
28.05	2.00	0.00	0.00	0.05	0.00	28.22	2.00	0.00	0.00	0.05	0.00
28.38	2.00	0.00	0.00	0.05	0.00	28.54	2.00	0.00	0.00	0.05	0.00
28.71	2.00	0.00	0.00	0.05	0.00	28.87	2.00	0.00	0.00	0.05	0.00
29.04	2.00	0.00	0.00	0.05	0.00	29.20	2.00	0.00	0.00	0.05	0.00
29.36	2.00	0.00	0.00	0.05	0.00	29.53	2.00	0.00	0.00	0.05	0.00
29.69	2.00	0.00	0.00	0.05	0.00	29.86	2.00	0.00	0.00	0.05	0.00
30.02	2.00	0.00	0.00	0.05	0.00	30.18	2.00	0.00	0.00	0.05	0.00
30.35	2.00	0.00	0.00	0.05	0.00	30.51	2.00	0.00	0.00	0.05	0.00
30.68	2.00	0.00	0.00	0.05	0.00	30.84	2.00	0.00	0.00	0.05	0.00
31.00	2.00	0.00	0.00	0.05	0.00	31.17	2.00	0.00	0.00	0.05	0.00
31.33	2.00	0.00	0.00	0.05	0.00	31.50	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.05	0.00	31.82	2.00	0.00	0.00	0.05	0.00
31.99	2.00	0.00	0.00	0.05	0.00	32.15	2.00	0.00	0.00	0.05	0.00
32.32	2.00	0.00	0.00	0.05	0.00	32.48	2.00	0.00	0.00	0.05	0.00
32.64	2.00	0.00	0.00	0.05	0.00	32.81	2.00	0.00	0.00	0.05	0.00
32.97	2.00	0.00	0.00	0.05	0.00	33.14	2.00	0.00	0.00	0.05	0.00
33.30	2.00	0.00	0.00	0.05	0.00	33.46	2.00	0.00	0.00	0.05	0.00
33.63	2.00	0.00	0.00	0.05	0.00	33.79	2.00	0.00	0.00	0.05	0.00
33.96	2.00	0.00	0.00	0.05	0.00	34.12	2.00	0.00	0.00	0.05	0.00
34.28	2.00	0.00	0.00	0.05	0.00	34.45	2.00	0.00	0.00	0.05	0.00
34.61	2.00	0.00	0.00	0.05	0.00	34.78	2.00	0.00	0.00	0.05	0.00
34.94	2.00	0.00	0.00	0.05	0.00	35.10	2.00	0.00	0.00	0.05	0.00
35.27	2.00	0.00	0.00	0.05	0.00	35.43	2.00	0.00	0.00	0.05	0.00
35.60	2.00	0.00	0.00	0.05	0.00	35.76	2.00	0.00	0.00	0.05	0.00
35.93	2.00	0.00	0.00	0.05	0.00	36.09	2.00	0.00	0.00	0.05	0.00
36.25	2.00	0.00	0.00	0.05	0.00	36.42	2.00	0.00	0.00	0.05	0.00
36.58	2.00	0.00	0.00	0.05	0.00	36.75	2.00	0.00	0.00	0.05	0.00
36.91	2.00	0.00	0.00	0.05	0.00	37.07	2.00	0.00	0.00	0.05	0.00
37.24	2.00	0.00	0.00	0.05	0.00	37.40	2.00	0.00	0.00	0.05	0.00
37.57	2.00	0.00	0.00	0.05	0.00	37.73	2.00	0.00	0.00	0.05	0.00
37.89	2.00	0.00	0.00	0.05	0.00	38.06	2.00	0.00	0.00	0.05	0.00
38.22	2.00	0.00	0.00	0.05	0.00	38.39	2.00	0.00	0.00	0.05	0.00
38.55	2.00	0.00	0.00	0.05	0.00	38.71	2.00	0.00	0.00	0.05	0.00
38.88	2.00	0.00	0.00	0.05	0.00	39.04	2.00	0.00	0.00	0.05	0.00
39.21	2.00	0.00	0.00	0.05	0.00	39.37	2.00	0.00	0.00	0.05	0.00
39.53	2.00	0.00	0.00	0.05	0.00	39.70	2.00	0.00	0.00	0.05	0.00
39.86	2.00	0.00	0.00	0.05	0.00	40.03	2.00	0.00	0.00	0.05	0.00
40.19	2.00	0.00	0.00	0.05	0.00	40.35	0.58	0.00	0.00	0.05	0.08
40.52	2.00	0.00	0.00	0.05	0.00	40.68	2.00	0.00	0.00	0.05	0.00
40.85	2.00	0.00	0.00	0.05	0.00	41.01	2.00	0.00	0.00	0.05	0.00
41.17	2.00	0.00	0.00	0.05	0.00	41.34	2.00	0.00	0.00	0.05	0.00
41.50	2.00	0.00	0.00	0.05	0.00	41.67	2.00	0.00	0.00	0.05	0.00
41.83	2.00	0.00	0.00	0.05	0.00	41.99	2.00	0.00	0.00	0.05	0.00
42.16	1.05	0.00	0.00	0.05	0.00	42.32	0.88	0.00	0.00	0.05	0.02
42.49	1.20	0.00	0.00	0.05	0.00	42.65	2.00	0.00	0.00	0.05	0.00
42.81	2.00	0.00	0.00	0.05	0.00	42.98	2.00	0.00	0.00	0.05	0.00
43.14	0.91	0.00	0.00	0.05	0.01	43.31	0.57	0.00	0.00	0.05	0.08
43.47	0.51	0.00	0.00	0.05	0.08	43.64	0.58	0.00	0.00	0.05	0.07
43.80	0.95	0.00	0.00	0.05	0.01	43.96	1.86	0.00	0.00	0.05	0.00
44.13	2.00	0.00	0.00	0.05	0.00	44.29	2.00	0.00	0.00	0.05	0.00
44.46	2.00	0.00	0.00	0.05	0.00	44.62	2.00	0.00	0.00	0.05	0.00
44.78	2.00	0.00	0.00	0.05	0.00	44.95	2.00	0.00	0.00	0.05	0.00
45.11	1.91	0.00	0.00	0.05	0.00	45.28	1.79	0.00	0.00	0.05	0.00
45.44	1.78	0.00	0.00	0.05	0.00	45.60	1.80	0.00	0.00	0.05	0.00
45.77	1.73	0.00	0.00	0.05	0.00	45.93	1.54	0.00	0.00	0.05	0.00
46.10	1.19	0.00	0.00	0.05	0.00	46.26	0.87	0.00	0.00	0.05	0.02
46.42	0.63	0.00	0.00	0.05	0.05	46.59	0.47	0.00	0.00	0.05	0.08
46.75	0.38	0.00	0.00	0.05	0.09	46.92	0.32	0.00	0.00	0.05	0.10
47.08	0.29	0.00	0.00	0.05	0.10	47.24	0.27	0.00	0.00	0.05	0.10

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	0.26	0.00	0.00	0.05	0.11	47.57	0.26	0.00	0.00	0.05	0.10
47.74	0.26	0.00	0.00	0.05	0.10	47.90	0.26	0.00	0.00	0.05	0.10
48.06	0.26	0.00	0.00	0.05	0.10	48.23	0.27	0.00	0.00	0.05	0.10
48.39	0.28	0.00	0.00	0.05	0.09	48.56	0.28	0.00	0.00	0.05	0.10
48.72	0.28	0.00	0.00	0.05	0.09	48.88	0.29	0.00	0.00	0.05	0.09
49.05	0.34	0.00	0.00	0.05	0.09	49.21	0.43	0.00	0.00	0.05	0.07
49.38	0.62	0.00	0.00	0.05	0.05	49.54	0.88	0.00	0.00	0.05	0.01
49.70	1.06	0.00	0.00	0.05	0.00	49.87	1.27	0.00	0.00	0.05	0.00
50.03	1.91	0.00	0.00	0.05	0.00	50.20	2.00	0.00	0.00	0.05	0.00
50.36	2.00	0.00	0.00	0.05	0.00	50.52	2.00	0.00	0.00	0.05	0.00
50.69	2.00	0.00	0.00	0.05	0.00	50.85	2.00	0.00	0.00	0.05	0.00
51.02	2.00	0.00	0.00	0.05	0.00	51.18	2.00	0.00	0.00	0.05	0.00
51.35	2.00	0.00	0.00	0.05	0.00	51.51	2.00	0.00	0.00	0.05	0.00
51.67	2.00	0.00	0.00	0.05	0.00	51.84	2.00	0.00	0.00	0.05	0.00
52.00	2.00	0.00	0.00	0.05	0.00	52.17	2.00	0.00	0.00	0.05	0.00
52.33	2.00	0.00	0.00	0.05	0.00	52.49	1.91	0.00	0.00	0.05	0.00
52.66	1.71	0.00	0.00	0.05	0.00	52.82	1.73	0.00	0.00	0.05	0.00
52.99	1.56	0.00	0.00	0.05	0.00	53.15	1.23	0.00	0.00	0.05	0.00
53.31	0.97	0.00	0.00	0.05	0.00	53.48	0.91	0.00	0.00	0.05	0.01
53.64	1.01	0.00	0.00	0.05	0.00	53.81	1.34	0.00	0.00	0.05	0.00
53.97	1.89	0.00	0.00	0.05	0.00	54.13	2.00	0.00	0.00	0.05	0.00
54.30	2.00	0.00	0.00	0.05	0.00	54.46	2.00	0.00	0.00	0.05	0.00
54.63	2.00	0.00	0.00	0.05	0.00	54.79	1.78	0.00	0.00	0.05	0.00
54.95	1.39	0.00	0.00	0.05	0.00	55.12	1.02	0.00	0.00	0.05	0.00
55.28	0.72	0.00	0.00	0.05	0.02	55.45	0.53	0.00	0.00	0.05	0.04
55.61	0.46	0.00	0.00	0.05	0.04	55.77	0.49	0.00	0.00	0.05	0.04
55.94	0.57	0.00	0.00	0.05	0.03	56.10	0.45	0.00	0.00	0.05	0.04
56.27	0.29	0.00	0.00	0.05	0.05	56.43	0.24	0.00	0.00	0.05	0.05
56.59	0.28	0.00	0.00	0.05	0.05	56.76	0.36	0.00	0.00	0.05	0.04
56.92	0.36	0.00	0.00	0.05	0.04	57.09	0.31	0.00	0.00	0.05	0.05
57.25	0.27	0.00	0.00	0.05	0.05	57.41	0.27	0.00	0.00	0.05	0.04
57.58	0.31	0.00	0.00	0.05	0.04	57.74	0.42	0.00	0.00	0.05	0.03
57.91	0.68	0.00	0.00	0.05	0.02	58.07	0.91	0.00	0.00	0.05	0.01
58.23	0.95	0.00	0.00	0.05	0.00	58.40	0.98	0.00	0.00	0.05	0.00
58.56	1.43	0.00	0.00	0.05	0.00	58.73	2.00	0.00	0.00	0.05	0.00
58.89	2.00	0.00	0.00	0.05	0.00	59.06	2.00	0.00	0.00	0.05	0.00
59.22	2.00	0.00	0.00	0.05	0.00	59.38	2.00	0.00	0.00	0.05	0.00
59.55	2.00	0.00	0.00	0.05	0.00	59.71	2.00	0.00	0.00	0.05	0.00
59.88	0.82	0.00	0.00	0.05	0.01	60.04	0.44	0.00	0.00	0.05	0.02
60.20	0.70	0.00	0.00	0.05	0.01	60.37	2.00	0.00	0.00	0.05	0.00
60.53	2.00	0.00	0.00	0.05	0.00	60.70	2.00	0.00	0.00	0.05	0.00
60.86	2.00	0.00	0.00	0.05	0.00	61.02	0.35	0.00	0.00	0.05	0.02
61.19	0.34	0.00	0.00	0.05	0.02	61.35	0.29	0.00	0.00	0.05	0.02
61.52	0.23	0.00	0.00	0.05	0.02	61.68	0.22	0.00	0.00	0.05	0.02
61.84	0.23	0.00	0.00	0.05	0.02	62.01	0.25	0.00	0.00	0.05	0.02
62.17	0.30	0.00	0.00	0.05	0.02	62.34	0.37	0.00	0.00	0.05	0.02
62.50	0.42	0.00	0.00	0.05	0.01	62.66	0.45	0.00	0.00	0.05	0.01
62.83	0.55	0.00	0.00	0.05	0.01	62.99	0.97	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
63.16	2.00	0.00	0.00	0.05	0.00	63.32	2.00	0.00	0.00	0.05	0.00
63.48	2.00	0.00	0.00	0.05	0.00	63.65	2.00	0.00	0.00	0.05	0.00
63.81	2.00	0.00	0.00	0.05	0.00	63.98	2.00	0.00	0.00	0.05	0.00
64.14	2.00	0.00	0.00	0.05	0.00	64.30	2.00	0.00	0.00	0.05	0.00
64.47	2.00	0.00	0.00	0.05	0.00	64.63	2.00	0.00	0.00	0.05	0.00
64.80	2.00	0.00	0.00	0.05	0.00	64.96	2.00	0.00	0.00	0.05	0.00
65.12	2.00	0.00	0.00	0.05	0.00	65.29	2.00	0.00	0.00	0.05	0.00
65.45	2.00	0.00	0.00	0.05	0.00	65.62	2.00	0.00	0.00	0.05	0.00
65.78	2.00	0.00	0.00	0.05	0.00	65.94	2.00	0.00	0.00	0.05	0.00
66.11	2.00	0.00	0.00	0.05	0.00	66.27	2.00	0.00	0.00	0.05	0.00
66.44	2.00	0.00	0.00	0.05	0.00	66.60	2.00	0.00	0.00	0.05	0.00
66.77	1.40	0.00	0.00	0.05	0.00	66.93	0.49	0.00	0.00	0.05	0.00
67.09	0.34	0.00	0.00	0.05	0.00	67.26	0.33	0.00	0.00	0.05	0.00
67.42	0.36	0.00	0.00	0.05	0.00	67.59	0.40	0.00	0.00	0.05	0.00
67.75	0.45	0.00	0.00	0.05	0.00	67.91	0.54	0.00	0.00	0.05	0.00
68.08	0.56	0.00	0.00	0.05	0.00	68.24	2.00	0.00	0.00	0.05	0.00
68.41	2.00	0.00	0.00	0.05	0.00	68.57	2.00	0.00	0.00	0.05	0.00
68.73	2.00	0.00	0.00	0.05	0.00	68.90	2.00	0.00	0.00	0.05	0.00
69.06	0.24	0.00	0.00	0.05	0.00	69.23	0.25	0.00	0.00	0.05	0.00
69.39	0.29	0.00	0.00	0.05	0.00	69.55	0.35	0.00	0.00	0.05	0.00
69.72	0.39	0.00	0.00	0.05	0.00	69.88	0.34	0.00	0.00	0.05	0.00
70.05	0.27	0.00	0.00	0.05	0.00	70.21	0.23	0.00	0.00	0.05	0.00
70.37	0.21	0.00	0.00	0.05	0.00	70.54	0.21	0.00	0.00	0.05	0.00
70.70	0.20	0.00	0.00	0.05	0.00	70.87	0.20	0.00	0.00	0.05	0.00
71.03	0.20	0.00	0.00	0.05	0.00	71.19	0.20	0.00	0.00	0.05	0.00
71.36	0.20	0.00	0.00	0.05	0.00	71.52	0.20	0.00	0.00	0.05	0.00
71.69	0.20	0.00	0.00	0.05	0.00	71.85	0.21	0.00	0.00	0.05	0.00
72.01	0.21	0.00	0.00	0.05	0.00	72.18	0.21	0.00	0.00	0.05	0.00
72.34	0.21	0.00	0.00	0.05	0.00	72.51	0.21	0.00	0.00	0.05	0.00
72.67	0.21	0.00	0.00	0.05	0.00	72.83	0.21	0.00	0.00	0.05	0.00
73.00	0.22	0.00	0.00	0.05	0.00	73.16	0.23	0.00	0.00	0.05	0.00
73.33	0.25	0.00	0.00	0.05	0.00	73.49	0.28	0.00	0.00	0.05	0.00
73.65	0.30	0.00	0.00	0.05	0.00	73.82	0.31	0.00	0.00	0.05	0.00
73.98	0.29	0.00	0.00	0.05	0.00	74.15	0.29	0.00	0.00	0.05	0.00
74.31	2.00	0.00	0.00	0.05	0.00	74.48	2.00	0.00	0.00	0.05	0.00
74.64	2.00	0.00	0.00	0.05	0.00	74.80	2.00	0.00	0.00	0.05	0.00
74.97	0.28	0.00	0.00	0.05	0.00	75.13	0.30	0.00	0.00	0.05	0.00
75.30	0.29	0.00	0.00	0.05	0.00	75.46	0.28	0.00	0.00	0.05	0.00
75.62	0.26	0.00	0.00	0.05	0.00	75.79	0.26	0.00	0.00	0.05	0.00
75.95	0.25	0.00	0.00	0.05	0.00	76.12	0.24	0.00	0.00	0.05	0.00
76.28	0.24	0.00	0.00	0.05	0.00	76.44	0.24	0.00	0.00	0.05	0.00
76.61	0.23	0.00	0.00	0.05	0.00	76.77	0.23	0.00	0.00	0.05	0.00
76.94	0.23	0.00	0.00	0.05	0.00	77.10	0.23	0.00	0.00	0.05	0.00
77.26	0.24	0.00	0.00	0.05	0.00	77.43	0.24	0.00	0.00	0.05	0.00
77.59	0.24	0.00	0.00	0.05	0.00	77.76	0.24	0.00	0.00	0.05	0.00
77.92	0.24	0.00	0.00	0.05	0.00	78.08	0.23	0.00	0.00	0.05	0.00
78.25	0.22	0.00	0.00	0.05	0.00	78.41	0.21	0.00	0.00	0.05	0.00
78.58	0.21	0.00	0.00	0.05	0.00	78.74	0.21	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
78.90	0.21	0.00	0.00	0.05	0.00	79.07	0.21	0.00	0.00	0.05	0.00
79.23	0.22	0.00	0.00	0.05	0.00	79.40	0.22	0.00	0.00	0.05	0.00
79.56	0.22	0.00	0.00	0.05	0.00	79.72	0.22	0.00	0.00	0.05	0.00
79.89	0.22	0.00	0.00	0.05	0.00	80.05	0.22	0.00	0.00	0.05	0.00
80.22	0.22	0.00	0.00	0.05	0.00	80.38	0.22	0.00	0.00	0.05	0.00
80.54	0.22	0.00	0.00	0.05	0.00	80.71	0.23	0.00	0.00	0.05	0.00
80.87	0.23	0.00	0.00	0.05	0.00	81.04	0.23	0.00	0.00	0.05	0.00
81.20	0.23	0.00	0.00	0.05	0.00	81.36	0.22	0.00	0.00	0.05	0.00
81.53	0.22	0.00	0.00	0.05	0.00	81.69	0.22	0.00	0.00	0.05	0.00
81.86	0.22	0.00	0.00	0.05	0.00	82.02	0.22	0.00	0.00	0.05	0.00
82.19	0.22	0.00	0.00	0.05	0.00	82.35	0.22	0.00	0.00	0.05	0.00
82.51	0.22	0.00	0.00	0.05	0.00	82.68	0.22	0.00	0.00	0.05	0.00
82.84	0.22	0.00	0.00	0.05	0.00	83.01	0.22	0.00	0.00	0.05	0.00
83.17	0.22	0.00	0.00	0.05	0.00	83.33	0.22	0.00	0.00	0.05	0.00
83.50	0.22	0.00	0.00	0.05	0.00	83.66	0.23	0.00	0.00	0.05	0.00
83.83	0.23	0.00	0.00	0.05	0.00	83.99	0.24	0.00	0.00	0.05	0.00
84.15	0.24	0.00	0.00	0.05	0.00	84.32	0.24	0.00	0.00	0.05	0.00
84.48	0.23	0.00	0.00	0.05	0.00	84.65	0.22	0.00	0.00	0.05	0.00
84.81	0.21	0.00	0.00	0.05	0.00	84.97	0.21	0.00	0.00	0.05	0.00
85.14	0.22	0.00	0.00	0.05	0.00	85.30	0.23	0.00	0.00	0.05	0.00
85.47	0.26	0.00	0.00	0.05	0.00	85.63	0.29	0.00	0.00	0.05	0.00
85.79	0.32	0.00	0.00	0.05	0.00	85.96	0.34	0.00	0.00	0.05	0.00
86.12	0.34	0.00	0.00	0.05	0.00	86.29	0.34	0.00	0.00	0.05	0.00
86.45	0.35	0.00	0.00	0.05	0.00	86.61	0.46	0.00	0.00	0.05	0.00
86.78	0.76	0.00	0.00	0.05	0.00	86.94	1.03	0.00	0.00	0.05	0.00
87.11	0.66	0.00	0.00	0.05	0.00	87.27	0.49	0.00	0.00	0.05	0.00
87.43	0.43	0.00	0.00	0.05	0.00	87.60	2.00	0.00	0.00	0.05	0.00
87.76	2.00	0.00	0.00	0.05	0.00	87.93	2.00	0.00	0.00	0.05	0.00

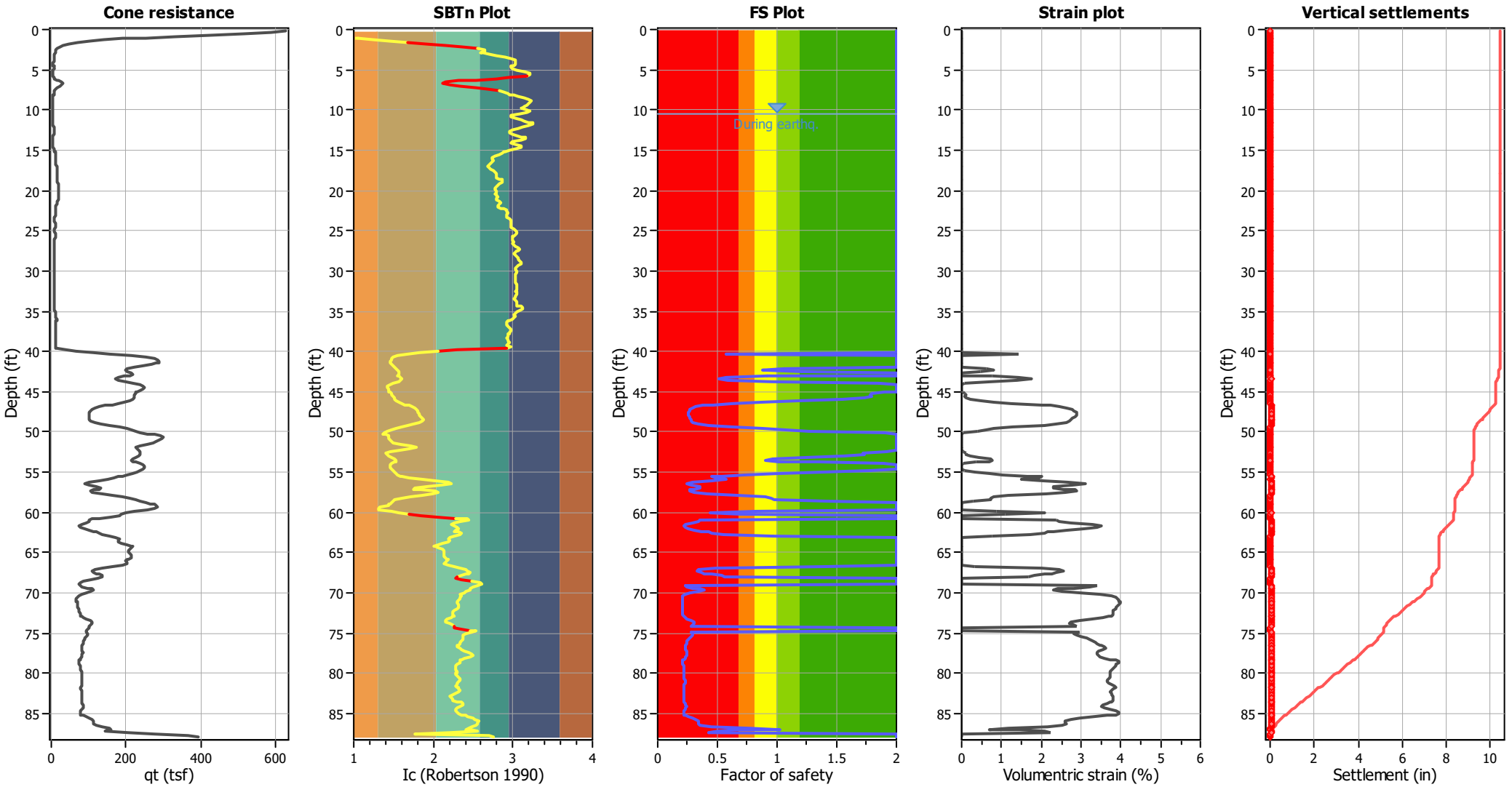
Overall liquefaction potential: 3.06

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
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)
10.50	7.09	2.00	0.00	1.00	0.00	10.66	8.22	2.00	0.00	1.00	0.00
10.83	8.35	2.00	0.00	1.00	0.00	10.99	7.57	2.00	0.00	1.00	0.00
11.15	6.89	2.00	0.00	1.00	0.00	11.32	6.65	2.00	0.00	1.00	0.00
11.48	6.68	2.00	0.00	1.00	0.00	11.65	6.73	2.00	0.00	1.00	0.00
11.81	7.22	2.00	0.00	1.00	0.00	11.98	7.91	2.00	0.00	1.00	0.00
12.14	8.42	2.00	0.00	1.00	0.00	12.30	8.46	2.00	0.00	1.00	0.00
12.47	8.68	2.00	0.00	1.00	0.00	12.63	9.12	2.00	0.00	1.00	0.00
12.80	9.15	2.00	0.00	1.00	0.00	12.96	8.40	2.00	0.00	1.00	0.00
13.12	7.11	2.00	0.00	1.00	0.00	13.29	6.00	2.00	0.00	1.00	0.00
13.45	5.35	2.00	0.00	1.00	0.00	13.62	5.42	2.00	0.00	1.00	0.00
13.78	6.08	2.00	0.00	1.00	0.00	13.94	6.93	2.00	0.00	1.00	0.00
14.11	7.31	2.00	0.00	1.00	0.00	14.27	7.02	2.00	0.00	1.00	0.00
14.44	6.55	2.00	0.00	1.00	0.00	14.60	6.77	2.00	0.00	1.00	0.00
14.76	8.22	2.00	0.00	1.00	0.00	14.93	10.49	2.00	0.00	1.00	0.00
15.09	12.32	2.00	0.00	1.00	0.00	15.26	13.63	2.00	0.00	1.00	0.00
15.42	14.58	2.00	0.00	1.00	0.00	15.58	15.80	2.00	0.00	1.00	0.00
15.75	16.25	2.00	0.00	1.00	0.00	15.91	15.81	2.00	0.00	1.00	0.00
16.08	14.77	2.00	0.00	1.00	0.00	16.24	14.33	2.00	0.00	1.00	0.00
16.40	14.65	2.00	0.00	1.00	0.00	16.57	15.50	2.00	0.00	1.00	0.00
16.73	16.39	2.00	0.00	1.00	0.00	16.90	17.14	2.00	0.00	1.00	0.00
17.06	17.84	2.00	0.00	1.00	0.00	17.22	18.51	2.00	0.00	1.00	0.00
17.39	19.09	2.00	0.00	1.00	0.00	17.55	19.29	2.00	0.00	1.00	0.00
17.72	19.23	2.00	0.00	1.00	0.00	17.88	19.37	2.00	0.00	1.00	0.00
18.04	19.73	2.00	0.00	1.00	0.00	18.21	19.81	2.00	0.00	1.00	0.00
18.37	19.05	2.00	0.00	1.00	0.00	18.54	18.13	2.00	0.00	1.00	0.00
18.70	17.89	2.00	0.00	1.00	0.00	18.86	18.69	2.00	0.00	1.00	0.00
19.03	19.91	2.00	0.00	1.00	0.00	19.19	21.34	2.00	0.00	1.00	0.00
19.36	22.43	2.00	0.00	1.00	0.00	19.52	23.13	2.00	0.00	1.00	0.00
19.69	22.86	2.00	0.00	1.00	0.00	19.85	22.19	2.00	0.00	1.00	0.00
20.01	21.26	2.00	0.00	1.00	0.00	20.18	20.81	2.00	0.00	1.00	0.00
20.34	20.92	2.00	0.00	1.00	0.00	20.51	21.73	2.00	0.00	1.00	0.00
20.67	22.33	2.00	0.00	1.00	0.00	20.83	22.67	2.00	0.00	1.00	0.00
21.00	21.92	2.00	0.00	1.00	0.00	21.16	20.66	2.00	0.00	1.00	0.00
21.33	18.41	2.00	0.00	1.00	0.00	21.49	16.59	2.00	0.00	1.00	0.00
21.65	15.39	2.00	0.00	1.00	0.00	21.82	14.84	2.00	0.00	1.00	0.00
21.98	14.09	2.00	0.00	1.00	0.00	22.15	13.12	2.00	0.00	1.00	0.00
22.31	12.42	2.00	0.00	1.00	0.00	22.47	12.14	2.00	0.00	1.00	0.00
22.64	12.10	2.00	0.00	1.00	0.00	22.80	11.97	2.00	0.00	1.00	0.00
22.97	11.56	2.00	0.00	1.00	0.00	23.13	10.73	2.00	0.00	1.00	0.00
23.29	9.78	2.00	0.00	1.00	0.00	23.46	9.12	2.00	0.00	1.00	0.00
23.62	9.09	2.00	0.00	1.00	0.00	23.79	9.47	2.00	0.00	1.00	0.00
23.95	9.94	2.00	0.00	1.00	0.00	24.11	10.20	2.00	0.00	1.00	0.00
24.28	10.16	2.00	0.00	1.00	0.00	24.44	9.99	2.00	0.00	1.00	0.00
24.61	9.76	2.00	0.00	1.00	0.00	24.77	9.54	2.00	0.00	1.00	0.00
24.93	9.41	2.00	0.00	1.00	0.00	25.10	9.54	2.00	0.00	1.00	0.00
25.26	9.97	2.00	0.00	1.00	0.00	25.43	10.40	2.00	0.00	1.00	0.00
25.59	10.54	2.00	0.00	1.00	0.00	25.75	10.22	2.00	0.00	1.00	0.00
25.92	9.63	2.00	0.00	1.00	0.00	26.08	9.11	2.00	0.00	1.00	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)
26.25	9.01	2.00	0.00	1.00	0.00	26.41	9.27	2.00	0.00	1.00	0.00
26.57	9.56	2.00	0.00	1.00	0.00	26.74	9.36	2.00	0.00	1.00	0.00
26.90	8.83	2.00	0.00	1.00	0.00	27.07	8.28	2.00	0.00	1.00	0.00
27.23	8.20	2.00	0.00	1.00	0.00	27.40	8.25	2.00	0.00	1.00	0.00
27.56	8.20	2.00	0.00	1.00	0.00	27.72	7.95	2.00	0.00	1.00	0.00
27.89	7.75	2.00	0.00	1.00	0.00	28.05	7.68	2.00	0.00	1.00	0.00
28.22	7.67	2.00	0.00	1.00	0.00	28.38	7.55	2.00	0.00	1.00	0.00
28.54	7.38	2.00	0.00	1.00	0.00	28.71	7.32	2.00	0.00	1.00	0.00
28.87	7.58	2.00	0.00	1.00	0.00	29.04	8.03	2.00	0.00	1.00	0.00
29.20	8.46	2.00	0.00	1.00	0.00	29.36	8.59	2.00	0.00	1.00	0.00
29.53	8.47	2.00	0.00	1.00	0.00	29.69	8.27	2.00	0.00	1.00	0.00
29.86	8.17	2.00	0.00	1.00	0.00	30.02	8.13	2.00	0.00	1.00	0.00
30.18	8.09	2.00	0.00	1.00	0.00	30.35	7.93	2.00	0.00	1.00	0.00
30.51	7.68	2.00	0.00	1.00	0.00	30.68	7.38	2.00	0.00	1.00	0.00
30.84	7.19	2.00	0.00	1.00	0.00	31.00	7.13	2.00	0.00	1.00	0.00
31.17	7.21	2.00	0.00	1.00	0.00	31.33	7.38	2.00	0.00	1.00	0.00
31.50	7.57	2.00	0.00	1.00	0.00	31.66	7.68	2.00	0.00	1.00	0.00
31.82	7.62	2.00	0.00	1.00	0.00	31.99	7.41	2.00	0.00	1.00	0.00
32.15	7.22	2.00	0.00	1.00	0.00	32.32	7.19	2.00	0.00	1.00	0.00
32.48	7.23	2.00	0.00	1.00	0.00	32.64	7.19	2.00	0.00	1.00	0.00
32.81	7.02	2.00	0.00	1.00	0.00	32.97	6.86	2.00	0.00	1.00	0.00
33.14	6.87	2.00	0.00	1.00	0.00	33.30	7.09	2.00	0.00	1.00	0.00
33.46	7.46	2.00	0.00	1.00	0.00	33.63	7.83	2.00	0.00	1.00	0.00
33.79	8.08	2.00	0.00	1.00	0.00	33.96	8.13	2.00	0.00	1.00	0.00
34.12	7.95	2.00	0.00	1.00	0.00	34.28	7.55	2.00	0.00	1.00	0.00
34.45	7.34	2.00	0.00	1.00	0.00	34.61	7.57	2.00	0.00	1.00	0.00
34.78	8.19	2.00	0.00	1.00	0.00	34.94	8.64	2.00	0.00	1.00	0.00
35.10	8.64	2.00	0.00	1.00	0.00	35.27	8.64	2.00	0.00	1.00	0.00
35.43	9.25	2.00	0.00	1.00	0.00	35.60	10.43	2.00	0.00	1.00	0.00
35.76	11.69	2.00	0.00	1.00	0.00	35.93	12.26	2.00	0.00	1.00	0.00
36.09	12.14	2.00	0.00	1.00	0.00	36.25	11.49	2.00	0.00	1.00	0.00
36.42	10.86	2.00	0.00	1.00	0.00	36.58	10.36	2.00	0.00	1.00	0.00
36.75	10.02	2.00	0.00	1.00	0.00	36.91	9.71	2.00	0.00	1.00	0.00
37.07	9.45	2.00	0.00	1.00	0.00	37.24	9.35	2.00	0.00	1.00	0.00
37.40	9.51	2.00	0.00	1.00	0.00	37.57	9.79	2.00	0.00	1.00	0.00
37.73	9.99	2.00	0.00	1.00	0.00	37.89	10.06	2.00	0.00	1.00	0.00
38.06	9.93	2.00	0.00	1.00	0.00	38.22	9.70	2.00	0.00	1.00	0.00
38.39	9.61	2.00	0.00	1.00	0.00	38.55	9.78	2.00	0.00	1.00	0.00
38.71	10.00	2.00	0.00	1.00	0.00	38.88	10.09	2.00	0.00	1.00	0.00
39.04	9.80	2.00	0.00	1.00	0.00	39.21	9.55	2.00	0.00	1.00	0.00
39.37	9.02	2.00	0.00	1.00	0.00	39.53	8.90	2.00	0.00	1.00	0.00
39.70	13.92	2.00	0.00	1.00	0.00	39.86	45.31	2.00	0.00	1.00	0.00
40.03	123.99	2.00	0.00	1.00	0.00	40.19	106.80	2.00	0.00	1.00	0.00
40.35	165.52	0.58	1.43	1.00	0.03	40.52	213.72	2.00	0.00	1.00	0.00
40.68	246.98	2.00	0.00	1.00	0.00	40.85	261.81	2.00	0.00	1.00	0.00
41.01	267.82	2.00	0.00	1.00	0.00	41.17	270.37	2.00	0.00	1.00	0.00
41.34	269.46	2.00	0.00	1.00	0.00	41.50	263.99	2.00	0.00	1.00	0.00
41.67	251.24	2.00	0.00	1.00	0.00	41.83	230.86	2.00	0.00	1.00	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)
41.99	206.93	2.00	0.00	1.00	0.00	42.16	187.24	1.05	0.63	1.00	0.01
42.32	181.57	0.88	0.81	1.00	0.02	42.49	190.83	1.20	0.47	1.00	0.01
42.65	206.64	2.00	0.00	1.00	0.00	42.81	212.44	2.00	0.00	1.00	0.00
42.98	203.01	2.00	0.00	1.00	0.00	43.14	182.96	0.91	0.77	1.00	0.01
43.31	165.41	0.57	1.43	1.00	0.03	43.47	159.66	0.51	1.75	1.00	0.03
43.64	166.24	0.58	1.39	1.00	0.03	43.80	184.10	0.95	0.74	1.00	0.01
43.96	201.31	1.86	0.06	1.00	0.00	44.13	216.38	2.00	0.00	1.00	0.00
44.29	223.64	2.00	0.00	1.00	0.00	44.46	224.77	2.00	0.00	1.00	0.00
44.62	219.41	2.00	0.00	1.00	0.00	44.78	211.66	2.00	0.00	1.00	0.00
44.95	205.09	2.00	0.00	1.00	0.00	45.11	201.96	1.91	0.04	1.00	0.00
45.28	200.60	1.79	0.09	1.00	0.00	45.44	200.44	1.78	0.09	1.00	0.00
45.60	200.67	1.80	0.08	1.00	0.00	45.77	199.79	1.73	0.12	1.00	0.00
45.93	197.23	1.54	0.22	1.00	0.00	46.10	190.76	1.19	0.48	1.00	0.01
46.26	181.43	0.87	0.81	1.00	0.02	46.42	169.25	0.63	1.26	1.00	0.02
46.59	155.32	0.47	1.99	1.00	0.04	46.75	141.64	0.38	2.21	1.00	0.04
46.92	129.43	0.32	2.45	1.00	0.05	47.08	121.17	0.29	2.63	1.00	0.05
47.24	115.56	0.27	2.76	1.00	0.05	47.41	112.89	0.26	2.83	1.00	0.06
47.57	110.80	0.26	2.89	1.00	0.06	47.74	110.52	0.26	2.90	1.00	0.06
47.90	110.73	0.26	2.89	1.00	0.06	48.06	112.52	0.26	2.84	1.00	0.05
48.23	115.10	0.27	2.78	1.00	0.06	48.39	116.83	0.28	2.73	1.00	0.05
48.56	116.71	0.28	2.73	1.00	0.06	48.72	117.41	0.28	2.72	1.00	0.05
48.88	121.53	0.29	2.62	1.00	0.05	49.05	133.47	0.34	2.37	1.00	0.05
49.21	150.09	0.43	2.07	1.00	0.04	49.38	168.84	0.62	1.27	1.00	0.03
49.54	181.85	0.88	0.80	1.00	0.02	49.70	187.81	1.06	0.62	1.00	0.01
49.87	192.57	1.27	0.42	1.00	0.01	50.03	202.21	1.91	0.04	1.00	0.00
50.20	219.33	2.00	0.00	1.00	0.00	50.36	241.43	2.00	0.00	1.00	0.00
50.52	261.44	2.00	0.00	1.00	0.00	50.69	266.77	2.00	0.00	1.00	0.00
50.85	261.87	2.00	0.00	1.00	0.00	51.02	250.00	2.00	0.00	1.00	0.00
51.18	249.60	2.00	0.00	1.00	0.00	51.35	242.81	2.00	0.00	1.00	0.00
51.51	238.68	2.00	0.00	1.00	0.00	51.67	230.36	2.00	0.00	1.00	0.00
51.84	226.68	2.00	0.00	1.00	0.00	52.00	227.21	2.00	0.00	1.00	0.00
52.17	222.34	2.00	0.00	1.00	0.00	52.33	213.57	2.00	0.00	1.00	0.00
52.49	202.26	1.91	0.03	1.00	0.00	52.66	199.91	1.71	0.12	1.00	0.00
52.82	200.07	1.73	0.12	1.00	0.00	52.99	197.80	1.56	0.20	1.00	0.00
53.15	191.81	1.23	0.45	1.00	0.01	53.31	184.85	0.97	0.72	1.00	0.01
53.48	182.78	0.91	0.77	1.00	0.02	53.64	186.23	1.01	0.68	1.00	0.01
53.81	193.90	1.34	0.36	1.00	0.01	53.97	202.03	1.89	0.04	1.00	0.00
54.13	208.88	2.00	0.00	1.00	0.00	54.30	211.99	2.00	0.00	1.00	0.00
54.46	210.82	2.00	0.00	1.00	0.00	54.63	206.27	2.00	0.00	1.00	0.00
54.79	200.71	1.78	0.09	1.00	0.00	54.95	194.86	1.39	0.32	1.00	0.01
55.12	186.38	1.02	0.68	1.00	0.01	55.28	174.81	0.72	1.03	1.00	0.02
55.45	161.65	0.53	1.63	1.00	0.03	55.61	153.08	0.46	2.03	1.00	0.04
55.77	156.78	0.49	1.92	1.00	0.04	55.94	164.31	0.57	1.49	1.00	0.03
56.10	150.65	0.45	2.07	1.00	0.04	56.27	119.77	0.29	2.66	1.00	0.05
56.43	103.42	0.24	3.10	1.00	0.06	56.59	114.98	0.28	2.78	1.00	0.05
56.76	136.17	0.36	2.31	1.00	0.05	56.92	136.54	0.36	2.31	1.00	0.04
57.09	123.73	0.31	2.57	1.00	0.05	57.25	111.55	0.27	2.87	1.00	0.06
57.41	110.97	0.27	2.88	1.00	0.06	57.58	122.88	0.31	2.59	1.00	0.05

:: 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)
57.74	146.80	0.42	2.13	1.00	0.04	57.91	171.27	0.68	1.17	1.00	0.02
58.07	182.14	0.91	0.79	1.00	0.02	58.23	184.00	0.95	0.74	1.00	0.01
58.40	184.98	0.98	0.71	1.00	0.01	58.56	195.52	1.43	0.29	1.00	0.01
58.73	208.13	2.00	0.00	1.00	0.00	58.89	221.24	2.00	0.00	1.00	0.00
59.06	229.59	2.00	0.00	1.00	0.00	59.22	232.94	2.00	0.00	1.00	0.00
59.38	232.78	2.00	0.00	1.00	0.00	59.55	234.09	2.00	0.00	1.00	0.00
59.71	208.66	2.00	0.00	1.00	0.00	59.88	179.28	0.82	0.88	1.00	0.02
60.04	150.31	0.44	2.07	1.00	0.04	60.20	172.84	0.70	1.11	1.00	0.02
60.37	191.77	2.00	0.00	1.00	0.00	60.53	186.88	2.00	0.00	1.00	0.00
60.70	149.14	2.00	0.00	1.00	0.00	60.86	127.03	2.00	0.00	1.00	0.00
61.02	132.39	0.35	2.39	1.00	0.05	61.19	129.85	0.34	2.44	1.00	0.05
61.35	115.90	0.29	2.76	1.00	0.05	61.52	97.67	0.23	3.29	1.00	0.07
61.68	91.51	0.22	3.51	1.00	0.07	61.84	94.57	0.23	3.40	1.00	0.07
62.01	104.42	0.25	3.07	1.00	0.06	62.17	120.77	0.30	2.64	1.00	0.05
62.34	135.83	0.37	2.32	1.00	0.05	62.50	145.66	0.42	2.15	1.00	0.04
62.66	148.97	0.45	2.09	1.00	0.04	62.83	160.38	0.55	1.70	1.00	0.03
62.99	182.93	0.97	0.76	1.00	0.01	63.16	207.43	2.00	0.00	1.00	0.00
63.32	215.75	2.00	0.00	1.00	0.00	63.48	209.22	2.00	0.00	1.00	0.00
63.65	203.24	2.00	0.00	1.00	0.00	63.81	210.04	2.00	0.00	1.00	0.00
63.98	224.32	2.00	0.00	1.00	0.00	64.14	235.36	2.00	0.00	1.00	0.00
64.30	239.90	2.00	0.00	1.00	0.00	64.47	239.79	2.00	0.00	1.00	0.00
64.63	237.73	2.00	0.00	1.00	0.00	64.80	235.11	2.00	0.00	1.00	0.00
64.96	234.39	2.00	0.00	1.00	0.00	65.12	237.49	2.00	0.00	1.00	0.00
65.29	242.96	2.00	0.00	1.00	0.00	65.45	246.48	2.00	0.00	1.00	0.00
65.62	244.25	2.00	0.00	1.00	0.00	65.78	236.55	2.00	0.00	1.00	0.00
65.94	226.53	2.00	0.00	1.00	0.00	66.11	224.35	2.00	0.00	1.00	0.00
66.27	228.91	2.00	0.00	1.00	0.00	66.44	234.92	2.00	0.00	1.00	0.00
66.60	223.94	2.00	0.00	1.00	0.00	66.77	192.96	1.40	0.31	1.00	0.01
66.93	153.01	0.49	2.03	1.00	0.04	67.09	128.32	0.34	2.47	1.00	0.05
67.26	124.38	0.33	2.55	1.00	0.05	67.42	132.86	0.36	2.38	1.00	0.05
67.59	139.33	0.40	2.26	1.00	0.05	67.75	148.32	0.45	2.10	1.00	0.04
67.91	158.31	0.54	1.83	1.00	0.04	68.08	160.56	0.56	1.69	1.00	0.03
68.24	142.09	2.00	0.00	1.00	0.00	68.41	117.87	2.00	0.00	1.00	0.00
68.57	99.97	2.00	0.00	1.00	0.00	68.73	94.60	2.00	0.00	1.00	0.00
68.90	47.89	2.00	0.00	1.00	0.00	69.06	94.90	0.24	3.39	1.00	0.07
69.23	99.54	0.25	3.23	1.00	0.07	69.39	113.17	0.29	2.83	1.00	0.05
69.55	130.16	0.35	2.43	1.00	0.05	69.72	136.75	0.39	2.30	1.00	0.05
69.88	126.23	0.34	2.51	1.00	0.05	70.05	107.41	0.27	2.98	1.00	0.06
70.21	92.58	0.23	3.47	1.00	0.07	70.37	85.47	0.21	3.76	1.00	0.07
70.54	82.69	0.21	3.88	1.00	0.08	70.70	81.86	0.20	3.92	1.00	0.08
70.87	81.43	0.20	3.94	1.00	0.08	71.03	81.18	0.20	3.95	1.00	0.08
71.19	80.78	0.20	3.97	1.00	0.08	71.36	80.66	0.20	3.98	1.00	0.08
71.52	81.32	0.20	3.95	1.00	0.08	71.69	81.68	0.20	3.93	1.00	0.08
71.85	82.53	0.21	3.89	1.00	0.07	72.01	83.11	0.21	3.86	1.00	0.07
72.18	84.27	0.21	3.81	1.00	0.08	72.34	84.59	0.21	3.80	1.00	0.07
72.51	84.55	0.21	3.80	1.00	0.08	72.67	84.50	0.21	3.80	1.00	0.07
72.83	85.26	0.21	3.77	1.00	0.07	73.00	86.81	0.22	3.70	1.00	0.08
73.16	90.87	0.23	3.54	1.00	0.07	73.33	98.21	0.25	3.27	1.00	0.07

:: 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)
73.49	108.16	0.28	2.96	1.00	0.06	73.65	116.04	0.30	2.75	1.00	0.05
73.82	117.25	0.31	2.72	1.00	0.06	73.98	113.28	0.29	2.82	1.00	0.05
74.15	110.54	0.29	2.90	1.00	0.06	74.31	109.67	2.00	0.00	1.00	0.00
74.48	109.05	2.00	0.00	1.00	0.00	74.64	105.27	2.00	0.00	1.00	0.00
74.80	104.50	2.00	0.00	1.00	0.00	74.97	108.05	0.28	2.97	1.00	0.06
75.13	113.33	0.30	2.82	1.00	0.05	75.30	111.10	0.29	2.88	1.00	0.06
75.46	107.09	0.28	2.99	1.00	0.06	75.62	102.03	0.26	3.15	1.00	0.06
75.79	99.94	0.26	3.22	1.00	0.07	75.95	97.59	0.25	3.29	1.00	0.06
76.12	95.30	0.24	3.37	1.00	0.07	76.28	94.03	0.24	3.42	1.00	0.07
76.44	92.91	0.24	3.46	1.00	0.07	76.61	91.33	0.23	3.52	1.00	0.07
76.77	89.24	0.23	3.60	1.00	0.07	76.94	89.11	0.23	3.61	1.00	0.07
77.10	90.46	0.23	3.55	1.00	0.07	77.26	93.07	0.24	3.46	1.00	0.07
77.43	94.65	0.24	3.40	1.00	0.07	77.59	94.71	0.24	3.40	1.00	0.07
77.76	93.76	0.24	3.43	1.00	0.07	77.92	92.22	0.24	3.49	1.00	0.07
78.08	89.91	0.23	3.58	1.00	0.07	78.25	85.86	0.22	3.74	1.00	0.08
78.41	82.61	0.21	3.89	1.00	0.07	78.58	81.03	0.21	3.96	1.00	0.08
78.74	81.50	0.21	3.94	1.00	0.08	78.90	82.42	0.21	3.90	1.00	0.07
79.07	83.10	0.21	3.86	1.00	0.08	79.23	83.81	0.22	3.83	1.00	0.07
79.40	84.48	0.22	3.80	1.00	0.08	79.56	85.24	0.22	3.77	1.00	0.07
79.72	85.88	0.22	3.74	1.00	0.07	79.89	85.98	0.22	3.74	1.00	0.08
80.05	85.95	0.22	3.74	1.00	0.07	80.22	85.97	0.22	3.74	1.00	0.08
80.38	86.18	0.22	3.73	1.00	0.07	80.54	86.48	0.22	3.72	1.00	0.07
80.71	86.91	0.23	3.70	1.00	0.08	80.87	87.62	0.23	3.67	1.00	0.07
81.04	87.95	0.23	3.66	1.00	0.07	81.20	87.29	0.23	3.68	1.00	0.07
81.36	85.64	0.22	3.75	1.00	0.07	81.53	83.83	0.22	3.83	1.00	0.08
81.69	82.70	0.22	3.88	1.00	0.07	81.86	83.06	0.22	3.87	1.00	0.08
82.02	84.04	0.22	3.82	1.00	0.07	82.19	85.47	0.22	3.76	1.00	0.08
82.35	85.88	0.22	3.74	1.00	0.07	82.51	85.65	0.22	3.75	1.00	0.07
82.68	85.00	0.22	3.78	1.00	0.08	82.84	84.67	0.22	3.79	1.00	0.07
83.01	84.75	0.22	3.79	1.00	0.08	83.17	84.74	0.22	3.79	1.00	0.07
83.33	84.52	0.22	3.80	1.00	0.07	83.50	85.05	0.22	3.78	1.00	0.08
83.66	85.87	0.23	3.74	1.00	0.07	83.83	87.87	0.23	3.66	1.00	0.07
83.99	90.37	0.24	3.56	1.00	0.07	84.15	91.80	0.24	3.50	1.00	0.07
84.32	90.11	0.24	3.57	1.00	0.07	84.48	86.36	0.23	3.72	1.00	0.07
84.65	83.05	0.22	3.87	1.00	0.08	84.81	81.40	0.21	3.94	1.00	0.08
84.97	81.09	0.21	3.96	1.00	0.08	85.14	82.73	0.22	3.88	1.00	0.08
85.30	88.19	0.23	3.65	1.00	0.07	85.47	96.78	0.26	3.32	1.00	0.07
85.63	108.47	0.29	2.95	1.00	0.06	85.79	116.43	0.32	2.74	1.00	0.05
85.96	122.12	0.34	2.61	1.00	0.05	86.12	122.02	0.34	2.61	1.00	0.05
86.29	121.06	0.34	2.63	1.00	0.05	86.45	125.21	0.35	2.54	1.00	0.05
86.61	144.76	0.46	2.16	1.00	0.04	86.78	171.59	0.76	1.16	1.00	0.02
86.94	182.27	1.03	0.69	1.00	0.01	87.11	165.19	0.66	1.45	1.00	0.03
87.27	149.72	0.49	2.08	1.00	0.04	87.43	140.70	0.43	2.23	1.00	0.04
87.60	300.07	2.00	0.00	1.00	0.00	87.76	251.79	2.00	0.00	1.00	0.00
87.93	308.09	2.00	0.00	1.00	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: 10.44

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	627.92	882.59	1.00	882.59	0.60	N/A	N/A
0.33	587.90	849.44	1.00	849.44	0.66	N/A	N/A
0.49	514.76	793.48	1.00	793.48	0.74	N/A	N/A
0.66	422.57	678.86	1.00	678.86	0.82	N/A	N/A
0.82	332.76	534.54	1.00	534.54	0.88	N/A	N/A
0.98	255.18	409.88	1.00	409.88	0.94	N/A	N/A
1.15	192.32	308.88	1.00	308.88	1.06	N/A	N/A
1.31	141.23	226.78	1.00	226.78	1.23	N/A	N/A
1.48	101.24	162.52	1.00	162.52	1.46	N/A	N/A
1.64	70.70	113.44	1.00	113.44	1.68	N/A	N/A
1.80	48.60	77.91	1.21	94.42	1.92	N/A	N/A
1.97	32.76	52.45	1.57	82.23	2.16	N/A	N/A
2.13	22.11	35.33	2.17	76.79	2.36	N/A	N/A
2.30	15.52	24.72	3.04	75.15	2.55	N/A	N/A
2.46	12.09	19.20	3.58	68.74	2.64	N/A	N/A
2.62	10.76	17.05	3.59	61.20	2.64	N/A	N/A
2.79	10.41	16.46	3.33	54.78	2.60	N/A	N/A
2.95	10.18	16.09	3.49	56.21	2.63	N/A	N/A
3.12	9.55	15.06	3.98	59.95	2.70	N/A	N/A
3.28	8.54	13.42	4.70	63.10	2.79	N/A	N/A
3.44	7.49	11.73	5.67	66.47	2.90	N/A	N/A
3.61	6.78	10.57	6.49	68.60	2.98	N/A	N/A
3.77	6.37	9.89	7.00	69.23	3.02	N/A	N/A
3.94	6.04	9.36	7.18	67.19	3.04	N/A	N/A
4.10	5.73	8.84	7.14	63.11	3.03	N/A	N/A
4.27	5.59	8.61	7.13	61.39	3.03	N/A	N/A
4.43	5.80	8.92	6.84	61.02	3.01	N/A	N/A
4.59	6.17	9.51	6.56	62.41	2.98	N/A	N/A
4.76	6.31	9.72	6.39	62.12	2.97	N/A	N/A
4.92	6.02	9.24	6.66	61.52	2.99	N/A	N/A
5.09	5.43	8.29	7.40	61.35	3.06	N/A	N/A
5.25	4.86	7.35	8.35	61.39	3.13	N/A	N/A
5.41	4.49	6.75	9.42	63.63	3.21	N/A	N/A
5.58	4.70	7.07	9.36	66.14	3.21	N/A	N/A
5.74	5.04	7.60	8.99	68.30	3.18	N/A	N/A
5.91	7.32	11.24	6.15	69.17	2.94	N/A	N/A
6.07	9.21	14.28	4.77	68.08	2.80	N/A	N/A
6.23	13.78	21.61	2.92	63.19	2.53	N/A	N/A
6.40	19.52	30.81	2.03	62.49	2.32	N/A	N/A
6.56	26.33	41.74	1.57	65.37	2.16	N/A	N/A
6.73	29.35	46.57	1.49	69.37	2.12	N/A	N/A
6.89	27.04	42.85	1.67	71.63	2.20	N/A	N/A
7.05	21.67	34.20	2.08	71.24	2.34	N/A	N/A
7.22	16.05	25.16	2.97	74.76	2.54	N/A	N/A
7.38	11.66	18.09	3.90	70.48	2.69	N/A	N/A
7.55	8.84	13.56	5.04	68.29	2.83	N/A	N/A
7.71	7.27	11.01	5.62	61.91	2.89	N/A	N/A
7.87	6.67	10.04	6.09	61.16	2.94	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	6.27	9.38	6.29	59.05	2.96	N/A	N/A
8.20	5.71	8.48	6.78	57.49	3.00	N/A	N/A
8.37	5.00	7.32	7.53	55.13	3.07	N/A	N/A
8.53	4.47	6.45	8.47	54.62	3.14	N/A	N/A
8.69	4.26	6.11	9.24	56.41	3.20	N/A	N/A
8.86	4.30	6.16	9.62	59.22	3.23	N/A	N/A
9.02	4.42	6.33	9.54	60.41	3.22	N/A	N/A
9.19	4.43	6.34	9.19	58.24	3.20	N/A	N/A
9.35	4.33	6.17	8.83	54.52	3.17	N/A	N/A
9.51	4.20	5.94	8.43	50.13	3.14	N/A	N/A
9.68	4.12	5.80	8.10	47.02	3.11	N/A	N/A
9.84	4.03	5.65	7.89	44.57	3.10	N/A	N/A
10.01	3.90	5.42	8.58	46.50	3.15	N/A	N/A
10.17	3.88	5.38	9.54	51.30	3.22	N/A	N/A
10.33	4.23	5.93	9.05	53.67	3.19	N/A	N/A
10.50	4.91	7.00	7.73	54.13	3.08	0.06	0.57
10.66	5.49	7.92	6.54	51.79	2.98	0.06	0.64
10.83	5.60	8.08	6.56	52.99	2.98	0.06	0.65
10.99	5.29	7.58	7.19	54.49	3.04	0.06	0.61
11.15	4.92	6.97	8.04	55.98	3.11	0.06	0.56
11.32	4.72	6.63	8.44	55.97	3.14	0.06	0.53
11.48	4.69	6.58	9.31	61.23	3.20	0.06	0.52
11.65	4.85	6.81	9.92	67.57	3.25	0.06	0.53
11.81	5.17	7.32	9.98	73.11	3.25	0.06	0.57
11.98	5.57	7.96	9.18	72.99	3.19	0.06	0.62
12.14	5.87	8.42	8.18	68.91	3.12	0.06	0.65
12.30	6.06	8.71	7.41	64.60	3.06	0.06	0.67
12.47	6.27	9.04	6.74	60.93	3.00	0.06	0.69
12.63	6.47	9.35	6.34	59.26	2.96	0.06	0.71
12.80	6.43	9.26	6.32	58.47	2.96	0.06	0.70
12.96	5.95	8.48	6.66	56.53	2.99	0.06	0.64
13.12	5.21	7.27	7.28	52.94	3.05	0.06	0.54
13.29	4.49	6.10	7.95	48.55	3.10	0.06	0.45
13.45	4.10	5.47	8.62	47.11	3.15	0.06	0.40
13.62	4.15	5.53	8.66	47.90	3.16	0.06	0.41
13.78	4.57	6.19	7.90	48.89	3.10	0.06	0.45
13.94	5.07	6.98	6.67	46.61	2.99	0.05	0.51
14.11	5.34	7.41	6.43	47.64	2.97	0.05	0.54
14.27	5.28	7.30	7.10	51.85	3.03	0.06	0.53
14.44	5.19	7.14	7.99	57.05	3.11	0.06	0.51
14.60	5.50	7.62	8.03	61.26	3.11	0.06	0.55
14.76	6.50	9.20	7.12	65.51	3.03	0.06	0.66
14.93	7.90	11.36	6.25	71.03	2.95	0.06	0.81
15.09	9.32	13.45	5.79	77.88	2.91	0.06	0.97
15.26	10.44	15.06	5.58	84.09	2.89	0.06	1.09
15.42	11.51	16.53	5.35	88.37	2.86	0.06	1.20
15.58	12.24	17.41	4.97	86.61	2.82	0.06	1.27
15.75	12.59	17.65	4.53	79.90	2.77	0.06	1.30

:: 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	12.29	17.01	4.29	72.93	2.74	0.06	1.26
16.08	11.86	16.26	4.26	69.34	2.74	0.06	1.20
16.24	11.61	15.87	4.41	69.97	2.75	0.06	1.17
16.40	11.88	16.14	4.34	69.97	2.75	0.06	1.19
16.57	12.51	16.90	4.17	70.42	2.72	0.06	1.25
16.73	13.27	17.83	3.99	71.09	2.70	0.06	1.33
16.90	14.01	18.73	3.89	72.77	2.68	0.06	1.40
17.06	14.69	19.60	3.92	76.80	2.69	0.06	1.46
17.22	15.34	20.45	3.98	81.34	2.70	0.06	1.52
17.39	15.81	21.07	4.17	87.94	2.72	0.06	1.56
17.55	16.09	21.43	4.36	93.46	2.75	0.06	1.58
17.72	16.23	21.59	4.58	98.89	2.78	0.06	1.58
17.88	16.52	21.92	4.72	103.57	2.79	0.06	1.60
18.04	16.79	22.19	4.77	105.77	2.80	0.06	1.62
18.21	16.77	22.01	4.75	104.59	2.80	0.06	1.61
18.37	16.35	21.31	4.80	102.22	2.80	0.06	1.55
18.54	15.86	20.59	5.01	103.22	2.83	0.06	1.49
18.70	15.86	20.56	5.32	109.43	2.86	0.06	1.48
18.86	16.38	21.18	5.41	114.52	2.87	0.06	1.53
19.03	17.37	22.36	5.30	118.40	2.86	0.07	1.61
19.19	18.47	23.63	5.11	120.69	2.84	0.07	1.71
19.36	19.35	24.61	4.96	121.99	2.82	0.07	1.78
19.52	19.71	24.86	4.75	118.13	2.80	0.07	1.81
19.69	19.58	24.47	4.58	112.04	2.78	0.07	1.78
19.85	19.12	23.69	4.53	107.25	2.77	0.07	1.73
20.01	18.64	23.00	4.68	107.64	2.79	0.06	1.67
20.18	18.39	22.57	4.79	108.20	2.80	0.06	1.64
20.34	18.66	22.74	4.63	105.36	2.78	0.06	1.65
20.51	19.23	23.37	4.74	110.91	2.80	0.07	1.70
20.67	19.83	24.01	4.78	114.65	2.80	0.07	1.74
20.83	19.93	24.05	4.89	117.71	2.81	0.07	1.74
21.00	19.38	23.14	4.72	109.27	2.79	0.07	1.68
21.16	18.09	21.41	4.77	102.14	2.80	0.06	1.55
21.33	16.52	19.37	4.99	96.70	2.82	0.06	1.40
21.49	15.09	17.51	5.16	90.42	2.84	0.06	1.26
21.65	14.16	16.24	5.07	82.33	2.83	0.06	1.17
21.82	13.50	15.29	4.82	73.75	2.80	0.06	1.11
21.98	12.92	14.50	4.87	70.66	2.81	0.06	1.05
22.15	12.31	13.72	5.14	70.48	2.84	0.06	0.99
22.31	11.84	13.13	5.54	72.77	2.88	0.06	0.94
22.47	11.62	12.84	5.83	74.89	2.91	0.06	0.92
22.64	11.52	12.65	5.99	75.80	2.93	0.06	0.90
22.80	11.37	12.40	6.05	75.01	2.94	0.06	0.89
22.97	10.93	11.79	5.91	69.74	2.92	0.06	0.84
23.13	10.27	10.94	5.86	64.11	2.92	0.06	0.78
23.29	9.55	10.02	5.99	60.03	2.93	0.06	0.72
23.46	9.13	9.46	6.22	58.88	2.95	0.06	0.68
23.62	9.08	9.36	6.38	59.70	2.97	0.06	0.67

:: 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	9.41	9.70	6.39	61.93	2.97	0.06	0.69
23.95	9.72	10.01	6.52	65.28	2.98	0.06	0.72
24.11	9.93	10.21	6.53	66.69	2.98	0.06	0.73
24.28	9.95	10.18	6.48	65.95	2.98	0.06	0.73
24.44	9.92	10.09	6.39	64.49	2.97	0.06	0.72
24.61	9.76	9.86	6.46	63.65	2.97	0.06	0.70
24.77	9.57	9.58	6.79	65.09	3.00	0.06	0.68
24.93	9.49	9.45	7.07	66.77	3.03	0.06	0.67
25.10	9.66	9.58	7.34	70.34	3.05	0.06	0.68
25.26	9.99	9.91	7.33	72.67	3.05	0.06	0.71
25.43	10.29	10.21	7.16	73.07	3.04	0.06	0.73
25.59	10.36	10.24	6.88	70.39	3.01	0.06	0.73
25.75	10.15	9.95	6.64	66.03	2.99	0.06	0.71
25.92	9.76	9.45	6.59	62.32	2.99	0.06	0.68
26.08	9.43	9.04	6.76	61.14	3.00	0.06	0.65
26.25	9.37	8.93	6.74	60.18	3.00	0.06	0.64
26.41	9.55	9.09	6.78	61.64	3.00	0.06	0.65
26.57	9.67	9.18	6.66	61.12	2.99	0.06	0.66
26.74	9.57	9.02	6.84	61.69	3.01	0.06	0.64
26.90	9.16	8.52	7.16	61.04	3.04	0.06	0.61
27.07	8.84	8.13	7.51	61.10	3.07	0.06	0.58
27.23	8.67	7.90	7.70	60.88	3.08	0.06	0.56
27.40	8.68	7.88	7.56	59.53	3.07	0.06	0.56
27.56	8.61	7.76	7.24	56.25	3.04	0.06	0.55
27.72	8.45	7.55	7.00	52.87	3.02	0.06	0.54
27.89	8.33	7.39	6.90	50.96	3.01	0.06	0.53
28.05	8.25	7.28	7.13	51.84	3.03	0.06	0.52
28.22	8.20	7.18	7.38	53.01	3.06	0.06	0.51
28.38	8.11	7.05	7.44	52.46	3.06	0.06	0.50
28.54	8.03	6.93	7.60	52.70	3.07	0.06	0.50
28.71	8.10	6.97	7.72	53.82	3.08	0.06	0.50
28.87	8.32	7.17	8.02	57.56	3.11	0.06	0.51
29.04	8.70	7.54	7.93	59.85	3.10	0.06	0.54
29.20	8.97	7.79	7.86	61.21	3.09	0.06	0.56
29.36	9.11	7.90	7.56	59.69	3.07	0.06	0.56
29.53	9.06	7.81	7.35	57.42	3.05	0.06	0.56
29.69	9.01	7.72	7.19	55.48	3.04	0.06	0.55
29.86	8.95	7.62	7.17	54.63	3.04	0.06	0.54
30.02	8.88	7.52	7.24	54.44	3.04	0.06	0.54
30.18	8.81	7.41	7.23	53.59	3.04	0.06	0.53
30.35	8.68	7.25	7.18	52.05	3.04	0.06	0.52
30.51	8.50	7.03	7.13	50.15	3.03	0.06	0.50
30.68	8.31	6.80	7.03	47.84	3.03	0.06	0.49
30.84	8.16	6.63	7.08	46.91	3.03	0.06	0.47
31.00	8.16	6.60	7.06	46.56	3.03	0.06	0.47
31.17	8.23	6.64	7.10	47.18	3.03	0.06	0.47
31.33	8.41	6.79	7.10	48.20	3.03	0.06	0.48
31.50	8.57	6.92	7.18	49.65	3.04	0.06	0.49

:: 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	8.62	6.94	7.36	51.02	3.05	0.06	0.50
31.82	8.53	6.82	7.36	50.18	3.05	0.06	0.49
31.99	8.37	6.63	7.40	49.10	3.06	0.06	0.47
32.15	8.29	6.52	7.25	47.28	3.04	0.06	0.47
32.32	8.27	6.48	7.28	47.17	3.05	0.06	0.46
32.48	8.30	6.47	7.18	46.48	3.04	0.06	0.46
32.64	8.24	6.40	7.27	46.48	3.05	0.06	0.46
32.81	8.13	6.25	7.30	45.63	3.05	0.06	0.45
32.97	8.03	6.13	7.35	45.06	3.05	0.06	0.44
33.14	8.12	6.19	7.16	44.38	3.04	0.06	0.44
33.30	8.39	6.43	7.01	45.08	3.02	0.06	0.46
33.46	8.78	6.78	6.98	47.33	3.02	0.06	0.48
33.63	9.12	7.08	7.14	50.51	3.03	0.06	0.51
33.79	9.36	7.27	7.22	52.49	3.04	0.06	0.52
33.96	9.39	7.27	7.26	52.83	3.05	0.06	0.52
34.12	9.20	7.06	7.25	51.21	3.04	0.06	0.50
34.28	8.91	6.76	7.31	49.43	3.05	0.06	0.48
34.45	8.78	6.60	7.96	52.57	3.10	0.06	0.47
34.61	9.04	6.82	8.26	56.33	3.13	0.06	0.49
34.78	9.37	7.10	8.26	58.65	3.13	0.06	0.51
34.94	9.70	7.38	7.81	57.61	3.09	0.06	0.53
35.10	9.81	7.45	7.36	54.79	3.05	0.06	0.53
35.27	10.16	7.75	7.04	54.55	3.03	0.06	0.55
35.43	10.92	8.42	6.92	58.27	3.02	0.06	0.60
35.60	12.13	9.50	7.00	66.54	3.02	0.06	0.68
35.76	13.25	10.49	6.95	72.95	3.02	0.06	0.75
35.93	13.82	10.97	6.72	73.78	3.00	0.06	0.78
36.09	13.74	10.85	6.38	69.19	2.97	0.06	0.78
36.25	13.30	10.40	6.06	63.04	2.94	0.06	0.74
36.42	12.75	9.86	5.85	57.67	2.92	0.06	0.70
36.58	12.25	9.37	5.87	55.02	2.92	0.06	0.67
36.75	11.85	8.97	5.92	53.06	2.92	0.06	0.64
36.91	11.52	8.64	6.07	52.42	2.94	0.06	0.62
37.07	11.29	8.39	6.22	52.21	2.95	0.06	0.60
37.24	11.23	8.31	6.47	53.73	2.97	0.06	0.59
37.40	11.36	8.40	6.45	54.19	2.97	0.06	0.60
37.57	11.61	8.58	6.36	54.61	2.97	0.06	0.61
37.73	11.77	8.69	6.25	54.31	2.95	0.06	0.62
37.89	11.83	8.72	6.13	53.39	2.94	0.06	0.62
38.06	11.71	8.57	6.04	51.78	2.93	0.06	0.61
38.22	11.57	8.42	6.06	51.01	2.94	0.06	0.60
38.39	11.54	8.36	5.83	48.73	2.91	0.06	0.60
38.55	11.68	8.45	6.01	50.76	2.93	0.06	0.60
38.71	11.87	8.58	6.03	51.75	2.93	0.06	0.61
38.88	11.82	8.51	6.26	53.29	2.96	0.06	0.61
39.04	11.62	8.30	6.11	50.75	2.94	0.06	0.59
39.21	11.26	7.95	5.98	47.57	2.93	0.06	0.57
39.37	11.00	7.71	6.40	49.29	2.97	0.06	0.55

:: 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	12.76	9.18	5.90	54.17	2.92	0.05	0.66
39.70	14.65	10.77	5.44	58.54	2.87	0.06	0.77
39.86	40.93	33.91	1.94	65.85	2.30	0.04	0.69
40.03	65.34	55.57	1.40	77.57	2.07	0.12	0.75
40.19	112.81	98.02	1.12	109.59	1.82	0.11	0.82
40.35	156.88	137.50	1.02	140.68	1.68	0.28	0.87
40.52	214.26	189.05	1.00	189.05	1.55	0.92	0.92
40.68	254.59	225.07	1.00	225.07	1.50	0.95	0.95
40.85	276.35	244.18	1.00	244.18	1.48	0.96	0.96
41.01	286.01	252.33	1.00	252.33	1.47	0.97	0.97
41.17	289.60	255.09	1.00	255.09	1.46	0.97	0.97
41.34	288.89	253.97	1.00	253.97	1.46	0.97	0.97
41.50	282.24	247.57	1.00	247.57	1.46	0.96	0.96
41.67	268.24	234.55	1.00	234.55	1.47	0.95	0.95
41.83	247.21	215.35	1.00	215.35	1.49	0.94	0.94
41.99	223.52	193.85	1.00	193.85	1.51	0.92	0.92
42.16	204.67	176.73	1.00	176.73	1.53	0.62	0.91
42.32	197.51	169.89	1.00	169.89	1.55	0.51	0.90
42.49	202.96	174.08	1.00	174.08	1.57	0.63	0.91
42.65	213.48	182.74	1.00	182.74	1.58	0.92	0.92
42.81	218.34	186.70	1.00	186.70	1.56	0.92	0.92
42.98	210.98	180.03	1.00	180.03	1.56	0.91	0.91
43.14	194.36	165.29	1.00	165.29	1.56	0.52	0.90
43.31	178.06	150.68	1.00	150.68	1.59	0.32	0.89
43.47	171.68	144.72	1.00	144.72	1.61	0.28	0.88
43.64	179.39	151.17	1.00	151.17	1.59	0.33	0.89
43.80	197.49	166.68	1.00	166.68	1.56	0.54	0.90
43.96	219.02	185.54	1.00	185.54	1.50	0.92	0.92
44.13	236.46	200.74	1.00	200.74	1.46	0.93	0.93
44.29	246.54	209.52	1.00	209.52	1.43	0.94	0.94
44.46	248.32	210.64	1.00	210.64	1.43	0.94	0.94
44.62	244.16	206.57	1.00	206.57	1.43	0.93	0.93
44.78	237.19	200.17	1.00	200.17	1.44	0.93	0.93
44.95	230.92	194.34	1.00	194.34	1.45	0.93	0.93
45.11	226.70	190.23	1.00	190.23	1.46	0.92	0.92
45.28	224.55	187.83	1.00	187.83	1.47	0.92	0.92
45.44	223.46	186.35	1.00	186.35	1.48	0.92	0.92
45.60	222.60	185.05	1.00	185.05	1.50	0.92	0.92
45.77	220.87	183.10	1.00	183.10	1.50	0.92	0.92
45.93	216.65	179.04	1.00	179.04	1.52	0.89	0.91
46.10	208.71	171.79	1.00	171.79	1.53	0.70	0.91
46.26	196.33	160.71	1.00	160.71	1.56	0.50	0.90
46.42	180.20	146.46	1.00	146.46	1.60	0.34	0.88
46.59	162.06	130.64	1.00	130.83	1.65	0.24	0.87
46.75	144.20	115.29	1.03	118.87	1.69	0.19	0.85
46.92	128.88	102.23	1.06	107.87	1.73	0.15	0.83
47.08	117.15	92.22	1.00	92.22	1.76	0.13	0.82
47.24	109.28	85.51	1.00	85.51	1.78	0.12	0.81

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	104.58	81.38	1.00	81.38	1.81	0.12	0.80
47.57	102.09	79.22	1.00	79.22	1.81	0.11	0.80
47.74	101.05	78.13	1.00	78.13	1.82	0.11	0.79
47.90	100.99	77.89	1.00	77.89	1.82	0.11	0.79
48.06	101.70	78.19	1.13	88.61	1.84	0.11	0.79
48.23	102.50	78.50	1.15	90.00	1.85	0.12	0.79
48.39	102.83	78.42	1.16	91.19	1.87	0.12	0.79
48.56	103.30	78.54	1.17	91.86	1.88	0.12	0.79
48.72	106.42	80.91	1.16	93.83	1.87	0.12	0.80
48.88	115.92	88.62	1.12	99.41	1.82	0.13	0.81
49.05	133.51	102.97	1.07	110.52	1.75	0.16	0.83
49.21	157.61	122.88	1.02	125.17	1.67	0.22	0.86
49.38	182.42	143.49	1.00	143.49	1.60	0.34	0.88
49.54	202.43	160.45	1.00	160.45	1.54	0.53	0.90
49.70	215.91	172.27	1.00	172.27	1.48	0.71	0.91
49.87	226.45	181.61	1.00	181.61	1.42	0.89	0.91
50.03	239.49	192.73	1.00	192.73	1.39	0.92	0.92
50.20	257.24	207.36	1.00	207.36	1.37	0.94	0.94
50.36	277.97	222.79	1.00	222.79	1.41	0.95	0.95
50.52	294.22	234.87	1.00	234.87	1.43	0.95	0.95
50.69	301.35	239.76	1.00	239.76	1.44	0.96	0.96
50.85	297.01	236.01	1.00	236.01	1.44	0.96	0.96
51.02	290.06	229.65	1.00	229.65	1.45	0.95	0.95
51.18	282.02	222.02	1.00	222.02	1.48	0.95	0.95
51.35	273.43	214.26	1.00	214.26	1.49	0.94	0.94
51.51	257.04	198.27	1.00	198.27	1.59	0.93	0.93
51.67	238.87	180.70	1.04	188.62	1.71	0.91	0.91
51.84	225.78	168.58	1.09	184.18	1.78	0.90	0.90
52.00	224.31	166.96	1.10	183.02	1.79	0.90	0.90
52.17	229.38	172.72	1.03	178.22	1.69	0.91	0.91
52.33	235.18	179.37	1.00	179.37	1.59	0.91	0.91
52.49	237.79	184.88	1.00	184.88	1.45	0.92	0.92
52.66	238.45	186.17	1.00	186.17	1.41	0.92	0.92
52.82	237.23	184.69	1.00	184.69	1.42	0.92	0.92
52.99	233.38	180.68	1.00	180.68	1.44	0.91	0.91
53.15	226.18	173.89	1.00	173.89	1.48	0.81	0.91
53.31	218.69	166.89	1.00	166.89	1.51	0.61	0.90
53.48	215.46	163.49	1.00	163.49	1.53	0.54	0.90
53.64	219.12	166.19	1.00	166.19	1.53	0.61	0.90
53.81	227.86	173.26	1.00	173.26	1.50	0.82	0.91
53.97	237.86	181.43	1.00	181.43	1.48	0.91	0.91
54.13	245.54	187.39	1.00	187.39	1.47	0.92	0.92
54.30	249.15	189.93	1.00	189.93	1.46	0.92	0.92
54.46	248.27	188.86	1.00	188.86	1.47	0.92	0.92
54.63	243.95	184.97	1.00	184.97	1.47	0.92	0.92
54.79	237.47	179.33	1.00	179.33	1.49	0.91	0.91
54.95	229.04	172.04	1.00	172.04	1.51	0.84	0.91
55.12	217.92	162.64	1.00	162.64	1.53	0.61	0.90

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.28	203.97	151.18	1.00	151.18	1.56	0.42	0.89
55.45	189.68	139.67	1.00	139.67	1.58	0.30	0.88
55.61	177.89	130.01	1.00	130.01	1.61	0.25	0.86
55.77	167.57	120.22	1.04	124.68	1.70	0.23	0.85
55.94	152.54	105.94	1.16	122.67	1.87	0.21	0.84
56.10	128.06	85.92	1.34	115.30	2.03	0.16	0.81
56.27	102.07	66.13	1.62	107.27	2.18	0.11	0.77
56.43	90.09	57.62	1.71	98.48	2.22	0.09	0.75
56.59	100.73	65.98	1.44	94.71	2.09	0.11	0.77
56.76	121.76	82.64	1.19	98.74	1.91	0.14	0.80
56.92	133.54	93.07	1.00	93.07	1.76	0.16	0.82
57.09	127.38	88.67	1.00	88.67	1.75	0.14	0.81
57.25	111.82	76.16	1.14	86.67	1.84	0.11	0.79
57.41	103.38	67.92	1.32	89.76	2.02	0.10	0.77
57.58	111.07	72.49	1.37	99.60	2.05	0.12	0.78
57.74	134.99	89.41	1.28	114.80	1.99	0.15	0.81
57.91	164.83	112.18	1.15	128.60	1.85	0.23	0.84
58.07	191.52	133.70	1.05	140.42	1.72	0.35	0.87
58.23	210.29	149.85	1.00	149.85	1.61	0.48	0.89
58.40	224.29	162.51	1.00	162.51	1.51	0.61	0.90
58.56	237.74	172.69	1.00	172.69	1.50	0.88	0.91
58.73	252.18	183.89	1.00	183.89	1.47	0.92	0.92
58.89	265.68	193.87	1.00	193.87	1.46	0.92	0.92
59.06	275.46	201.41	1.00	201.41	1.45	0.93	0.93
59.22	281.51	206.11	1.00	206.11	1.43	0.93	0.93
59.38	284.75	212.78	1.00	212.78	1.32	0.94	0.94
59.55	277.55	207.73	1.00	207.73	1.30	0.94	0.94
59.71	256.55	191.27	1.00	191.27	1.31	0.92	0.92
59.88	222.00	159.48	1.00	159.48	1.48	0.54	0.90
60.04	198.96	140.13	1.00	140.13	1.57	0.25	0.88
60.20	188.25	128.84	1.04	133.41	1.70	0.31	0.86
60.37	183.11	121.28	1.14	138.60	1.85	0.33	0.85
60.53	160.36	101.78	1.35	137.17	2.03	0.25	0.83
60.70	130.23	78.04	1.89	147.16	2.28	0.15	0.79
60.86	109.20	62.95	2.44	153.63	2.43	0.12	0.76
61.02	103.13	58.93	2.53	148.98	2.45	0.13	0.76
61.19	101.60	59.21	2.08	123.29	2.34	0.12	0.76
61.35	92.92	54.80	1.81	99.31	2.25	0.11	0.75
61.52	82.24	48.44	1.73	83.79	2.22	0.09	0.73
61.68	75.78	43.97	1.85	81.42	2.27	0.08	0.72
61.84	78.10	44.91	1.97	88.54	2.31	0.08	0.72
62.01	87.94	50.59	2.00	101.39	2.32	0.09	0.74
62.17	101.11	58.77	1.89	111.03	2.28	0.11	0.76
62.34	113.25	66.23	1.82	120.56	2.26	0.13	0.77
62.50	120.55	69.66	1.98	138.16	2.31	0.15	0.78
62.66	127.12	72.75	2.12	154.24	2.35	0.15	0.78
62.83	138.33	79.22	2.10	166.14	2.34	0.17	0.80
62.99	156.41	91.17	1.84	167.74	2.26	0.22	0.81

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
63.16	173.47	102.23	1.70	173.45	2.21	0.32	0.83
63.32	181.69	107.29	1.66	177.67	2.20	0.37	0.84
63.48	181.19	106.51	1.68	178.59	2.20	0.33	0.84
63.65	181.03	106.69	1.62	172.77	2.18	0.30	0.84
63.81	188.53	112.33	1.50	168.44	2.12	0.35	0.84
63.98	201.72	121.96	1.38	167.81	2.05	0.48	0.86
64.14	212.94	129.82	1.31	170.57	2.01	0.66	0.86
64.30	217.20	131.86	1.33	175.02	2.02	0.73	0.87
64.47	215.29	129.03	1.39	179.92	2.06	0.68	0.86
64.63	211.11	124.65	1.49	185.46	2.12	0.62	0.86
64.80	208.11	121.81	1.54	187.35	2.14	0.57	0.86
64.96	207.84	121.53	1.52	185.27	2.14	0.56	0.86
65.12	210.37	122.74	1.52	187.06	2.14	0.60	0.86
65.29	213.79	124.46	1.52	189.52	2.14	0.69	0.86
65.45	215.63	125.07	1.53	191.93	2.14	0.75	0.86
65.62	213.53	123.31	1.55	190.86	2.15	0.71	0.86
65.78	207.41	118.99	1.58	188.03	2.16	0.58	0.85
65.94	201.78	114.86	1.63	186.67	2.18	0.46	0.85
66.11	200.14	113.91	1.60	182.27	2.17	0.44	0.85
66.27	203.44	116.29	1.54	179.28	2.14	0.49	0.85
66.44	203.07	115.83	1.54	178.11	2.14	0.57	0.85
66.60	191.40	107.74	1.62	175.01	2.18	0.44	0.84
66.77	165.47	90.85	1.83	166.10	2.26	0.26	0.81
66.93	136.30	73.01	2.05	149.56	2.33	0.16	0.78
67.09	115.96	60.56	2.31	140.11	2.40	0.12	0.76
67.26	110.58	57.08	2.43	138.99	2.43	0.12	0.75
67.42	113.00	57.77	2.58	148.93	2.46	0.13	0.75
67.59	120.22	61.55	2.54	156.05	2.45	0.14	0.76
67.75	127.64	65.88	2.38	156.95	2.42	0.15	0.77
67.91	135.17	70.75	2.15	152.41	2.36	0.17	0.78
68.08	134.64	71.24	1.97	140.15	2.31	0.17	0.78
68.24	123.14	65.31	1.87	122.37	2.28	0.14	0.77
68.41	104.30	53.81	2.12	114.29	2.35	0.11	0.74
68.57	87.42	43.22	2.66	114.84	2.48	0.09	0.72
68.73	78.69	37.43	3.31	123.94	2.60	0.09	0.70
68.90	75.41	35.58	3.38	120.35	2.61	0.09	2.45
69.06	76.82	36.63	3.10	113.69	2.56	0.09	0.70
69.23	83.66	40.63	2.76	112.01	2.50	0.09	0.71
69.39	96.99	47.65	2.62	124.82	2.47	0.11	0.73
69.55	109.44	54.07	2.56	138.24	2.46	0.13	0.74
69.72	112.81	55.65	2.56	142.22	2.46	0.14	0.75
69.88	105.74	52.46	2.38	124.68	2.42	0.12	0.74
70.05	92.42	45.92	2.24	102.79	2.38	0.10	0.72
70.21	80.43	40.04	2.09	83.50	2.34	0.08	0.71
70.37	72.63	35.82	2.11	75.44	2.35	0.08	0.69
70.54	69.18	34.03	2.07	70.56	2.34	0.07	0.69
70.70	68.21	33.52	2.05	68.66	2.33	0.07	0.68
70.87	68.08	33.50	2.00	67.11	2.32	0.07	0.68

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
71.03	68.18	33.58	1.97	66.10	2.31	0.07	0.68
71.19	68.31	33.64	1.95	65.47	2.30	0.07	0.68
71.36	68.59	33.75	1.93	65.29	2.30	0.07	0.69
71.52	69.09	33.74	2.01	67.69	2.32	0.07	0.68
71.69	69.90	34.05	2.02	68.81	2.32	0.07	0.69
71.85	71.05	34.56	2.03	70.00	2.32	0.07	0.69
72.01	72.64	35.63	1.92	68.38	2.29	0.07	0.69
72.18	74.36	36.70	1.84	67.63	2.27	0.07	0.70
72.34	75.69	37.53	1.79	67.00	2.25	0.07	0.70
72.51	76.33	37.89	1.76	66.61	2.24	0.07	0.70
72.67	76.63	37.89	1.78	67.51	2.24	0.07	0.70
72.83	77.52	38.12	1.82	69.51	2.26	0.07	0.70
73.00	80.14	39.48	1.80	71.13	2.25	0.08	0.70
73.16	85.85	42.63	1.74	74.17	2.23	0.08	0.71
73.33	94.89	47.92	1.62	77.44	2.18	0.09	0.73
73.49	104.69	53.51	1.54	82.49	2.14	0.10	0.74
73.65	110.19	56.15	1.57	87.90	2.16	0.11	0.75
73.82	109.77	55.05	1.68	92.31	2.20	0.11	0.75
73.98	105.93	52.36	1.78	93.10	2.24	0.10	0.74
74.15	102.40	50.03	1.86	92.87	2.27	0.10	0.73
74.31	100.00	48.91	1.81	88.73	2.26	0.10	0.73
74.48	96.83	45.77	2.16	98.93	2.36	0.10	0.72
74.64	93.80	42.90	2.58	110.55	2.46	0.10	0.71
74.80	93.11	41.66	2.91	121.33	2.53	0.10	0.71
74.97	94.88	42.84	2.72	116.47	2.49	0.10	0.71
75.13	97.51	44.94	2.38	107.15	2.42	0.11	0.72
75.30	97.40	45.44	2.18	99.28	2.37	0.10	0.72
75.46	95.04	44.16	2.19	96.85	2.37	0.10	0.72
75.62	91.50	42.26	2.22	93.77	2.38	0.09	0.71
75.79	88.64	40.78	2.22	90.51	2.38	0.09	0.71
75.95	86.67	39.97	2.14	85.70	2.36	0.09	0.71
76.12	85.39	39.43	2.09	82.51	2.34	0.09	0.70
76.28	84.42	39.00	2.06	80.20	2.33	0.08	0.70
76.44	83.65	38.68	2.02	78.02	2.32	0.08	0.70
76.61	82.79	38.34	1.97	75.51	2.31	0.08	0.70
76.77	81.81	37.85	1.95	73.81	2.30	0.08	0.70
76.94	81.51	37.29	2.05	76.47	2.33	0.08	0.70
77.10	82.29	37.23	2.16	80.60	2.36	0.08	0.70
77.26	83.32	37.25	2.30	85.72	2.40	0.09	0.70
77.43	83.95	36.97	2.49	91.91	2.44	0.09	0.70
77.59	83.34	36.09	2.70	97.29	2.49	0.09	0.69
77.76	82.66	35.58	2.74	97.64	2.50	0.09	0.69
77.92	80.92	35.11	2.57	90.09	2.46	0.09	0.69
78.08	79.06	34.84	2.30	80.26	2.40	0.08	0.69
78.25	76.37	33.95	2.14	72.65	2.36	0.08	0.69
78.41	74.44	33.17	2.07	68.70	2.34	0.07	0.68
78.58	73.40	32.66	2.05	67.05	2.33	0.07	0.68
78.74	73.85	32.84	2.04	67.08	2.33	0.07	0.68

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
78.90	75.26	33.67	1.97	66.36	2.31	0.07	0.68
79.07	76.75	34.54	1.90	65.68	2.28	0.07	0.69
79.23	78.02	35.20	1.87	65.81	2.27	0.07	0.69
79.40	79.01	35.57	1.88	66.82	2.28	0.07	0.69
79.56	79.81	35.80	1.90	68.03	2.28	0.08	0.69
79.72	80.37	35.93	1.92	68.96	2.29	0.08	0.69
79.89	80.75	36.05	1.92	69.08	2.29	0.08	0.69
80.05	81.02	36.13	1.91	69.03	2.29	0.08	0.69
80.22	81.24	36.16	1.91	69.15	2.29	0.08	0.69
80.38	81.30	36.01	1.94	69.93	2.30	0.08	0.69
80.54	81.40	35.76	2.01	71.75	2.32	0.08	0.69
80.71	81.70	35.65	2.06	73.42	2.33	0.08	0.69
80.87	82.45	35.92	2.06	74.11	2.33	0.08	0.69
81.04	82.94	36.22	2.02	73.15	2.32	0.08	0.69
81.20	82.72	36.26	1.96	70.98	2.30	0.08	0.69
81.36	81.42	35.71	1.92	68.67	2.29	0.08	0.69
81.53	79.94	35.01	1.91	66.78	2.29	0.07	0.69
81.69	79.01	34.47	1.92	66.22	2.29	0.07	0.69
81.86	78.93	34.16	1.98	67.66	2.31	0.07	0.69
82.02	79.80	34.37	2.02	69.32	2.32	0.07	0.69
82.19	80.59	34.54	2.06	70.99	2.33	0.08	0.69
82.35	81.56	35.13	1.99	69.90	2.31	0.08	0.69
82.51	82.17	35.75	1.88	67.21	2.28	0.08	0.69
82.68	82.79	36.45	1.76	64.19	2.24	0.07	0.69
82.84	83.00	36.73	1.71	62.72	2.22	0.07	0.70
83.01	82.79	36.47	1.73	63.05	2.22	0.07	0.69
83.17	82.42	36.05	1.77	63.79	2.24	0.07	0.69
83.33	81.81	35.56	1.80	64.15	2.25	0.07	0.69
83.50	81.32	34.78	1.93	67.09	2.29	0.08	0.69
83.66	81.48	34.17	2.11	72.22	2.35	0.08	0.69
83.83	82.78	34.30	2.24	76.71	2.38	0.08	0.69
83.99	84.25	34.90	2.23	77.80	2.38	0.08	0.69
84.15	85.37	35.84	2.07	74.11	2.34	0.08	0.69
84.32	84.63	35.84	1.95	70.06	2.30	0.08	0.69
84.48	82.66	35.21	1.87	65.80	2.27	0.08	0.69
84.65	79.80	33.79	1.89	63.72	2.28	0.07	0.69
84.81	77.76	32.70	1.92	62.70	2.29	0.07	0.68
84.97	77.20	32.15	1.99	63.94	2.31	0.07	0.68
85.14	79.08	32.41	2.15	69.67	2.36	0.07	0.68
85.30	84.30	34.02	2.36	80.18	2.41	0.08	0.69
85.47	92.53	37.27	2.42	90.28	2.43	0.09	0.70
85.63	101.35	40.01	2.72	108.96	2.49	0.10	0.71
85.79	108.64	42.62	2.83	120.83	2.51	0.11	0.71
85.96	111.63	42.92	3.14	134.95	2.57	0.12	0.71
86.12	112.52	43.41	3.05	132.46	2.55	0.12	0.72
86.29	112.52	43.15	3.11	134.25	2.56	0.12	0.72
86.45	120.43	46.77	2.92	136.45	2.53	0.12	0.73
86.61	136.91	54.05	2.71	146.55	2.49	0.15	0.74

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

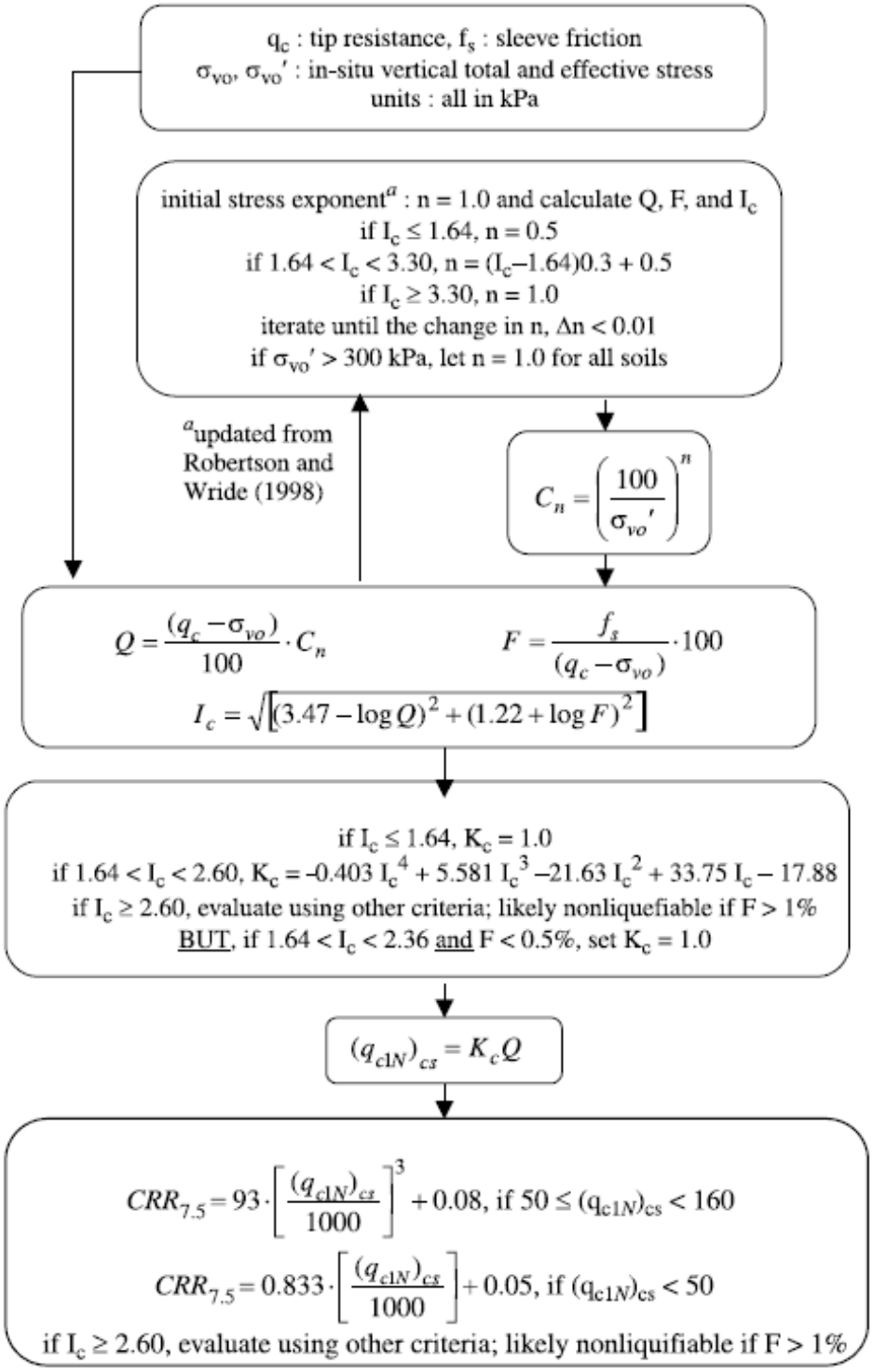
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
86.78	155.57	62.50	2.50	156.21	2.44	0.20	0.76
86.94	161.61	65.70	2.35	154.20	2.41	0.23	0.77
87.11	153.92	60.60	2.71	163.97	2.49	0.19	0.76
87.27	144.21	55.05	3.11	171.17	2.56	0.16	0.75
87.43	207.70	90.40	1.70	153.68	2.21	0.14	0.81
87.60	276.44	140.76	1.09	153.39	1.78	0.88	0.88
87.76	368.44	136.84	4.00	546.72	2.70	0.87	9.77
87.93	392.86	145.92	4.41	644.13	2.75	0.88	10.42

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)

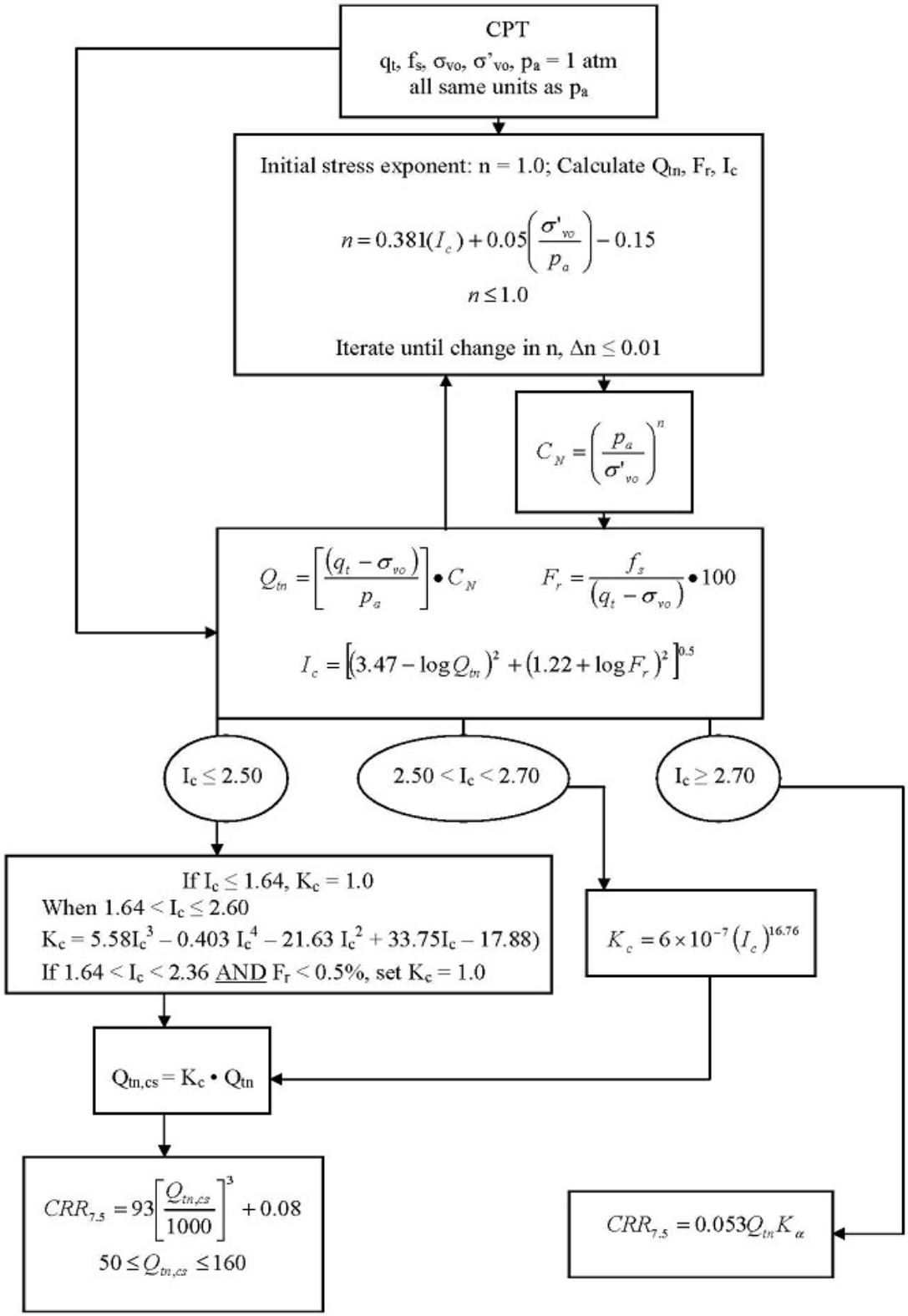
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

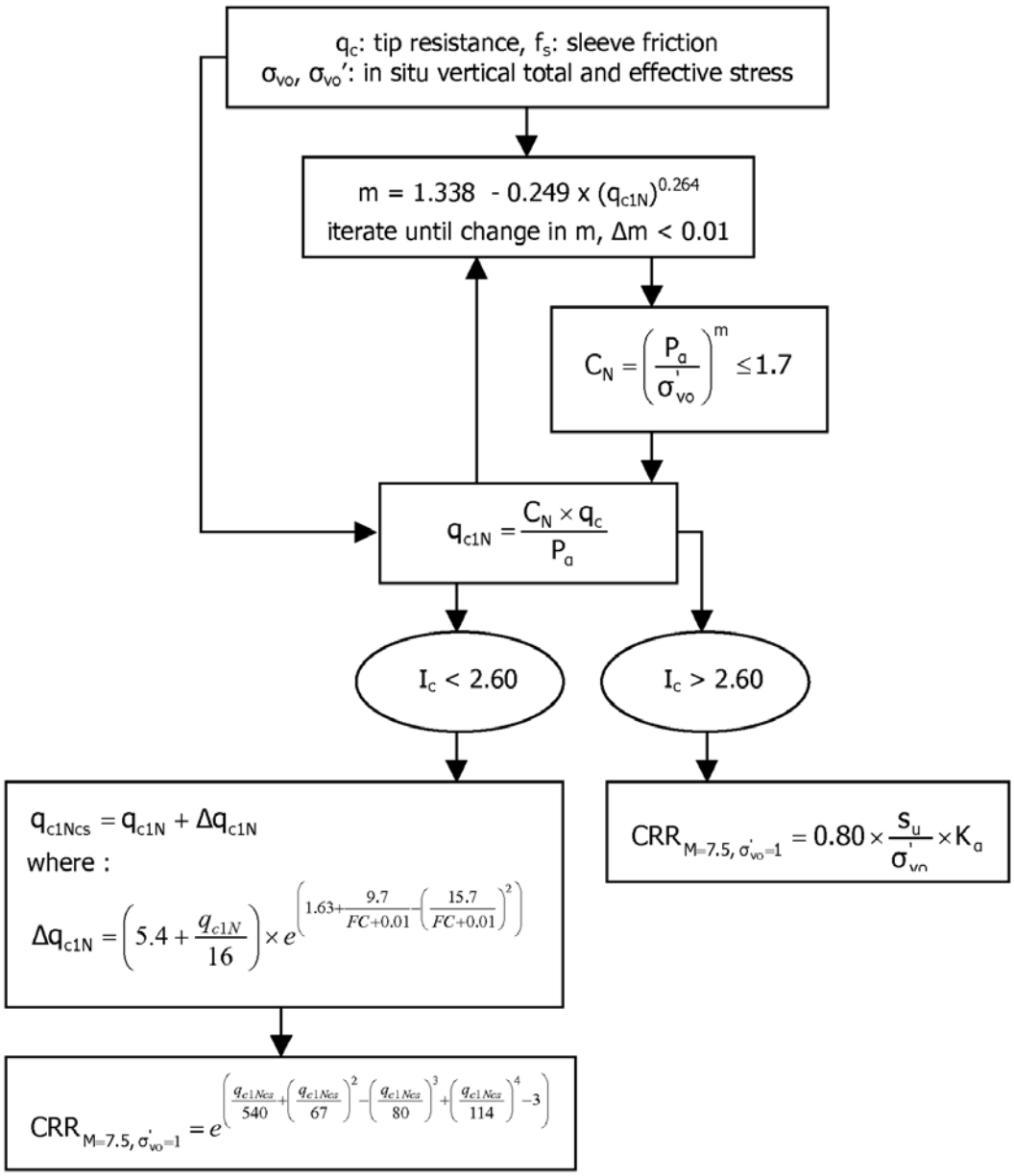
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

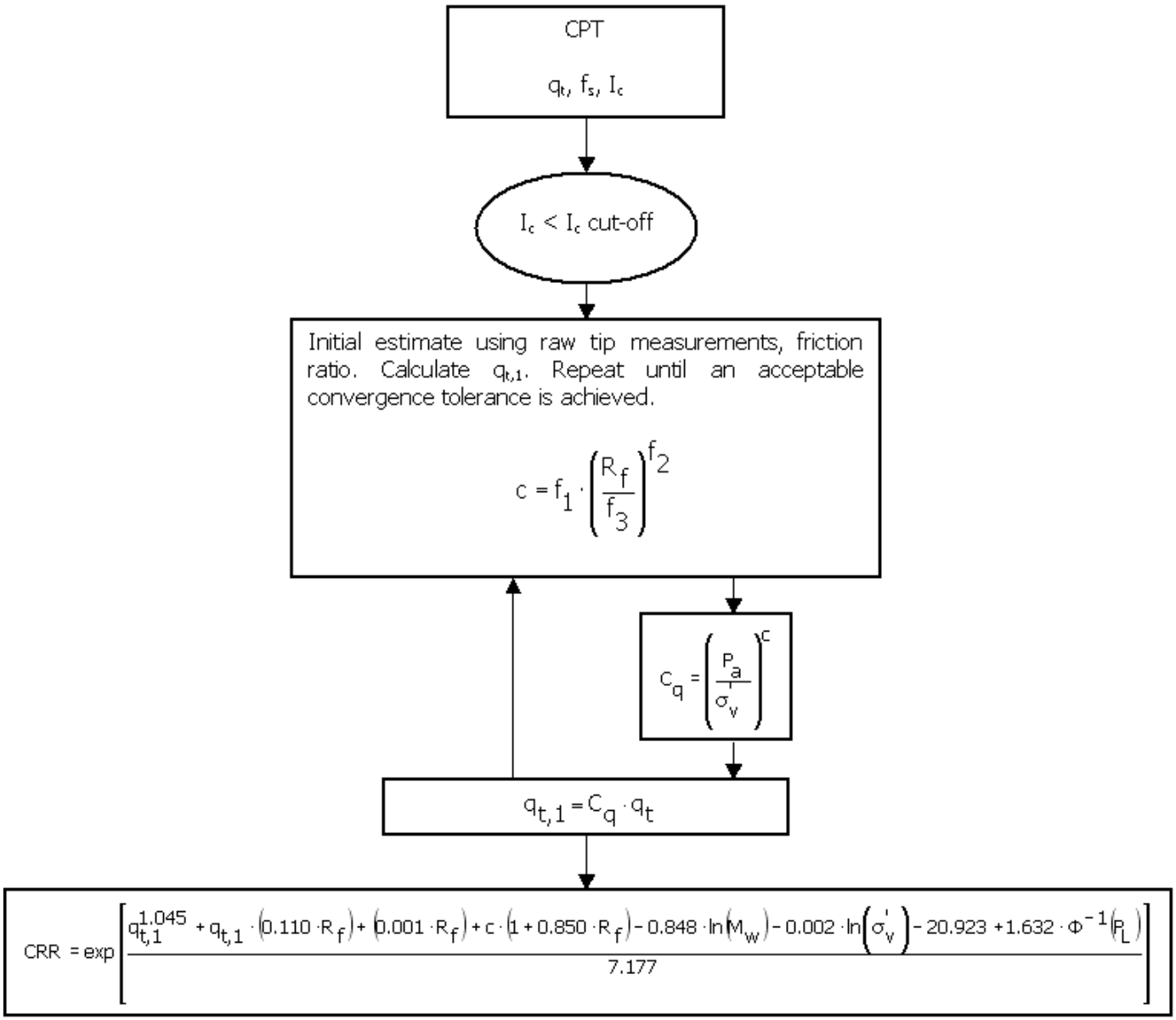


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{C1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

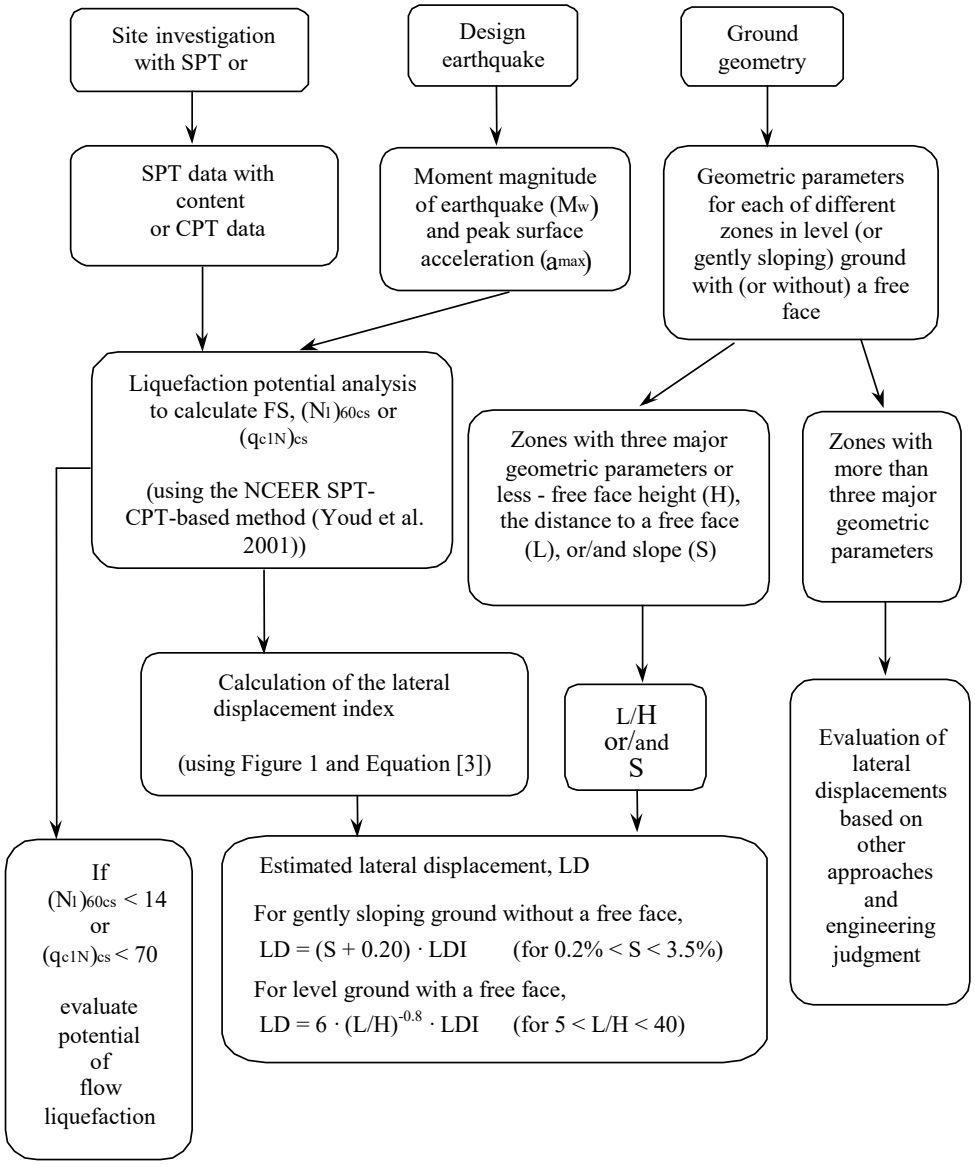
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

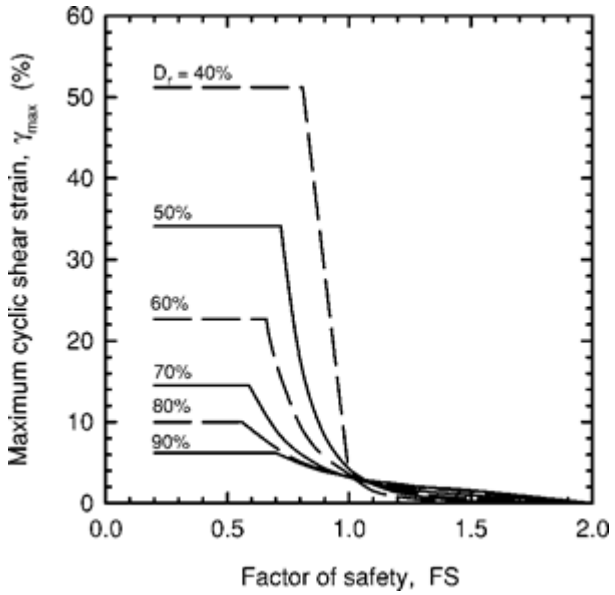
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

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



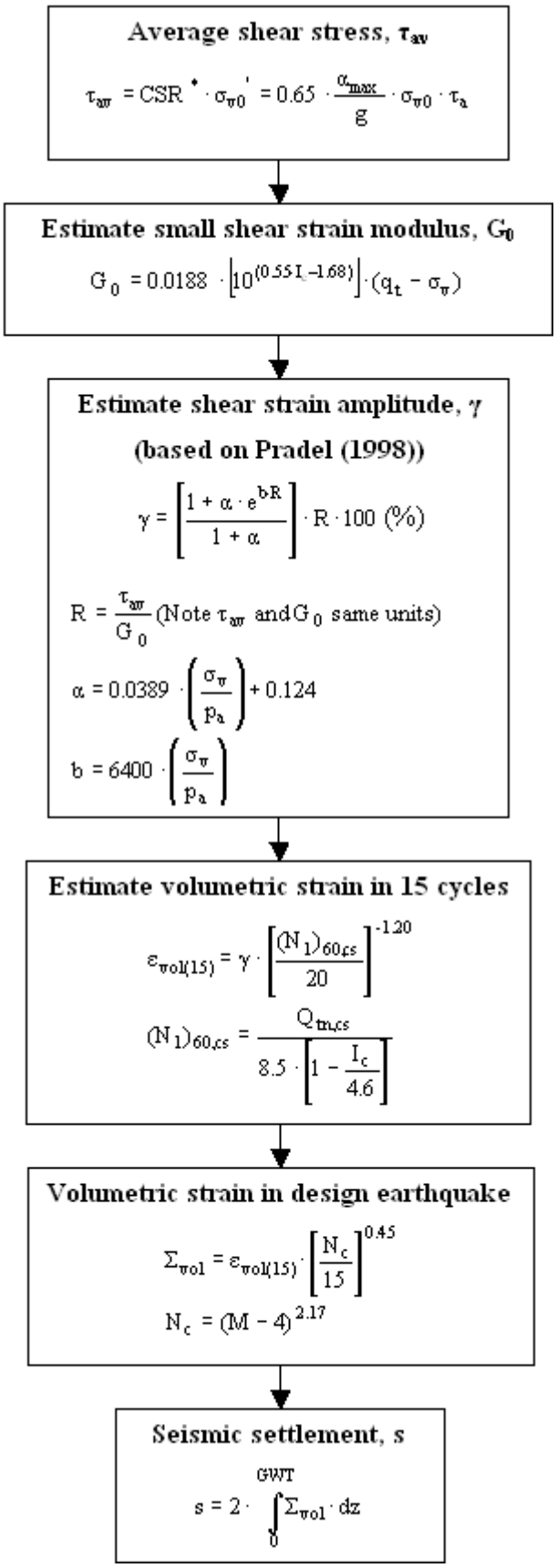
[1] Figure 1

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

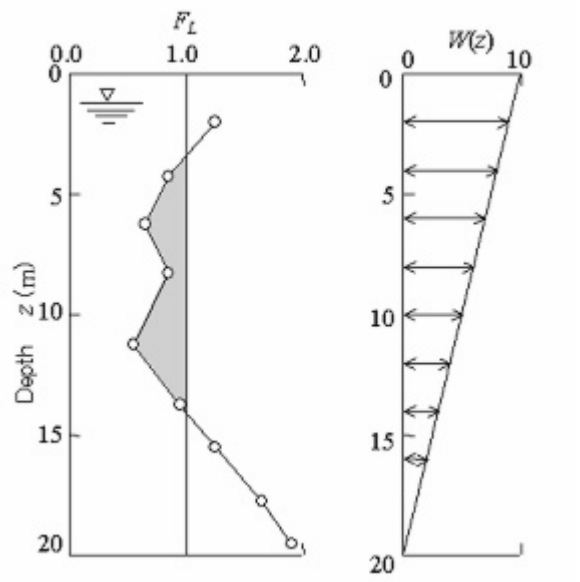
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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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Designed By: JH
Checked By: NRM

Raw Data Input

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	254.0
Groundwater Depth, ft:	10.4
Groundwater Elevation, ft msl:	243.6

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

														Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	2	72.2	25	21	4	27.82	ML	1			1	Sand-Like	28	-		
2	6.5	1	72.2	25	21	4	29.05	ML	1			1	Sand-Like	26	-		
3	9.0	3	36.1	30	23	7	31.70	SM	1			1	Clay-Like	-	350		
4	16.0	4	36.1	30	23	7	26.79	SM	1			1	Clay-Like	-	470		
5	21.0	0	87	29	21	8	31.97	CL	1			1	Clay-Like	-	10		
6	26.0	0	87	29	21	8	36.40	CL	1			1	Clay-Like	-	0		
7	36.0	9	96.3	33	25	8	29.36	ML	1			1	Clay-Like	-	1060		
8	41.0	31	9.4	18	17	1	20.33	SW-SM	1			1	Sand-Like	45	-		
9	46.0	19	9.4	18	17	1	20.21	SW-SM	1			1	Sand-Like	39	-		
10	51.0	20	9.4	18	17	1	22.89	SW-SM	1			1	Sand-Like	39	-		
11	56.0	40	9.4	18	17	1	30.25	SW-SM	1			1	Sand-Like	47	-		
12	61.0	25	12	0	0	0	33.94	SW-SM	0			1	Sand-Like	41	-		
13	66.0	16	12	0	0	0	33.04	SW-SM	1			1	Sand-Like	36	-		
14	76.0	21	12	0	0	0	28.96	SW-SM	1			1	Sand-Like	38	-		
15	81.0	22	12	0	0	0	26.86	SW-SM	1			1	Sand-Like	38	-		
16	86.0	64	12	0	0	0	34.75	SW-SM	1			1	Sand-Like	48	-		
17	91.0	68	12	0	0	0	29.64	SW-SM	1			1	Sand-Like	48	-		
18	96.0	27	30.9	33	25	8	32.46	SM	1			1	Clay-Like	-	3170		
19	101.0	24	30.9	33	25	8	23.76	SM	1			1	Clay-Like	-	2820		
10													#DIV/0!	#DIV/0!	#DIV/0!		

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Standard Penetration Test Correction

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	254.0
Groundwater Depth, ft:	10.4
Groundwater Elevation, ft msl:	243.6

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	$N_{meas,}$ bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		254																	
1	4	250	2	1.57	1.70	0.75	1.0	1.00	1.6	460	460	72.2	3.1	5.3	2.3	4.0	6.3	1	ML
2	6.5	247.5	1	1.57	1.64	0.80	1.0	1.00	2.0	748	748	72.2	1.6	2.6	1.2	2.0	4.1	1	ML
3	9	245	3	1.57	1.39	0.84	1.0	1.00	1.5	1035	1035	36.1	4.7	6.5	4.0	5.5	8.0	1	SM
4	16	238	4	1.57	1.16	0.92	1.0	1.00	1.4	1840	1491	36.1	6.3	7.3	5.8	6.7	9.4	1	SM
5	21	233	0	1.57	1.07	0.96	1.0	1.00	1.3	2415	1754	87.0	0.2	0.2	0.1	0.2	0.2	1	CL
6	26	228	0	1.57	1.00	0.97	1.0	1.00	116.4	2990	2017	87.0	0.0	0.0	0.0	0.0	1.8	1	CL
7	36	218	9	1.57	0.89	0.99	1.0	1.00	1.3	4140	2543	96.3	14.1	12.5	14.0	12.4	15.9	1	ML
8	41	213	31	1.57	0.84	0.99	1.0	1.00	1.0	4715	2806	9.4	48.5	41.0	48.3	40.8	42.8	1	SW-SM
9	46	208	19	1.57	0.81	1.00	1.0	1.00	1.1	5290	3069	9.4	29.7	24.0	29.6	23.9	25.3	1	SW-SM
10	51	203	20	1.57	0.77	1.00	1.0	1.00	1.1	5865	3332	9.4	31.3	24.3	31.2	24.2	25.6	1	SW-SM
11	56	198	40	1.57	0.75	1.00	1.0	1.00	1.0	6440	3595	9.4	50.0	37.3	62.5	46.6	48.9	1	SW-SM
12	61	193	25	1.57	0.72	1.00	1.0	1.00	1.1	7015	3858	12.0	39.1	28.2	39.1	28.2	30.1	0	SW-SM
13	66	188	16	1.57	0.70	1.00	1.0	1.00	1.1	7590	4121	12.0	25.0	17.4	25.0	17.4	18.9	1	SW-SM
14	76	178	21	1.57	0.66	1.00	1.0	1.00	1.1	8740	4647	12.0	32.9	21.6	32.9	21.6	23.2	1	SW-SM
15	81	173	22	1.57	0.64	1.00	1.0	1.00	1.1	9315	4910	12.0	34.4	22.0	34.4	22.0	23.6	1	SW-SM
16	86	168	64	1.57	0.62	1.00	1.0	1.00	1.1	9890	5173	12.0	50.0	31.1	100.2	50.0	53.0	1	SW-SM
17	91	163	68	1.57	0.61	1.00	1.0	1.00	1.1	10465	5436	12.0	50.0	30.3	106.4	50.0	53.0	1	SW-SM
18	96	158	27	1.57	0.59	1.00	1.0	1.00	1.2	11040	5699	30.9	42.3	25.0	42.3	25.0	29.7	1	SM
19	101	153	24	1.57	0.58	1.00	1.0	1.00	1.2	11615	5962	30.9	37.6	21.8	37.6	21.8	26.0	1	SM
10	0	254		1.57	#DIV/0!	0.75	1.0	1.00	1.0	0	0	0.0	0.0	#DIV/0!	0.0	#DIV/0!	#DIV/0!	0	0.0

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Subsurface Soil Properties Summary

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	254.0
Groundwater Depth, ft:	10.4
Groundwater Elevation, ft msl:	243.6

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	254															
1	4	250	2	3.1	4.0	ML	1	0	0	72.2	27.8180993	25.0	21.0	4.0	1.70	28	-
2	6.5	247.5	1	1.6	2.0	ML	1	0	0	72.2	29.0458176	25.0	21.0	4.0	2.01	26	-
3	9	245	3	4.7	5.5	SM	1	0	0	36.1	31.7041382	30.0	23.0	7.0	1.24	-	704
4	16	238	4	6.3	6.7	SM	1	0	0	36.1	26.7878922	30.0	23.0	7.0	0.54	-	939
5	21	233	0	0.2	0.2	CL	1	0	0	87.0	31.9722483	29.0	21.0	8.0	1.37	-	23
6	26	228	0	0.0	0.0	CL	1	0	0	87.0	36.4045516	29.0	21.0	8.0	1.93	-	2
7	36	218	9	14.1	12.4	ML	1	0	0	96.3	29.3608565	33.0	25.0	8.0	0.55	-	2113
8	41	213	31	48.5	40.8	SW-SM	1	0	0	9.4	20.3323639	18.0	17.0	1.0	3.33	45	-
9	46	208	19	29.7	23.9	SW-SM	1	0	0	9.4	20.2144502	18.0	17.0	1.0	3.21	39	-
10	51	203	20	31.3	24.2	SW-SM	1	0	0	9.4	22.8941685	18.0	17.0	1.0	5.89	39	-
11	56	198	40	50.0	46.6	SW-SM	1	0	0	9.4	30.2542646	18.0	17.0	1.0	13.25	47	-
12	61	193	25	39.1	28.2	SW-SM	0	0	0	12.0	33.9424774	0.0	0.0	0.0	NP	41	-
13	66	188	16	25.0	17.4	SW-SM	1	0	0	12.0	33.0365974	0.0	0.0	0.0	NP	36	-
14	76	178	21	32.9	21.6	SW-SM	1	0	0	12.0	28.9640592	0.0	0.0	0.0	NP	38	-
15	81	173	22	34.4	22.0	SW-SM	1	0	0	12.0	26.8637714	0.0	0.0	0.0	NP	38	-
16	86	168	64	50.0	50.0	SW-SM	1	0	0	12.0	34.7468354	0.0	0.0	0.0	NP	48	-
17	91	163	68	50.0	50.0	SW-SM	1	0	0	12.0	29.642283	0.0	0.0	0.0	NP	48	-
18	96	158	27	42.3	25.0	SM	1	0	0	30.9	32.464455	33.0	25.0	8.0	0.93	-	6338
19	101	153	24	37.6	21.8	SM	1	0	0	30.9	23.7639553	33	25	8	-0.15	-	5634
10	0	254		0.0	#DIV/0!	0	0	0	0	0.0	0	0	0	0	NP	#DIV/0!	#DIV/0!

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SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	254.0
Groundwater Depth, ft:	10.4
Groundwater Elevation, ft msl:	243.6

PGA:	0.723
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7.11
R(km):	30.6

MSF_{sand}:	1.11
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	254																		
1	4	250	ML	1	1	4.0	5.5	9.5	NSL-S	Sand-Like	3.35	1	Full Liquefaction	4.8	-	-	2.05	8.4	1.85	11.0
2	6.5	247.5	ML	1	1	2.0	5.5	7.5	NSL-S	Sand-Like	3.87	1	Full Liquefaction	4.1	-	-	1.28	6.3	1.31	9.1
3	9	245	SM	1	1	5.5	5.5	11.0	PSL	HS Clay-Like	0.83	1	No Strength Loss	-	-	-	-	5.0	-	7.8
4	16	238	SM	1	1	6.7	5.5	12.2	PSL	NS Clay-Like	1.08	1	Strength Loss	-	-	751.2	-	5.0	-	7.8
5	21	233	CL	1	1	0.2	5.5	5.7	PSL	HS Clay-Like	55.18	1	Strength Loss	-	-	15.5	-	5.0	-	7.8
6	26	228	CL	1	1	0.0	5.5	5.5	PSL	HS Clay-Like	665.37	1	Strength Loss	-	-	7.1	-	5.0	-	7.8
7	36	218	ML	1	1	12.4	5.5	17.9	PSL	NS Clay-Like	0.97	1	No Strength Loss	-	-	-	-	5.0	-	7.8
8	41	213	SW-SM	1	1	40.8	0.9	41.6	NSL-S	Sand-Like	0.09	1	No Liquefaction	-	-	-	-	5.0	-	7.8
9	46	208	SW-SM	1	1	23.9	0.9	24.8	NSL-S	Sand-Like	2.19	1	Full Liquefaction	14.3	-	-	0.73	5.0	1.15	7.8
10	51	203	SW-SM	1	1	24.2	0.9	25.1	NSL-S	Sand-Like	2.15	1	Full Liquefaction	14.6	-	-	0.73	4.3	1.13	6.7
11	56	198	SW-SM	1	1	46.6	0.9	47.5	NSL-S	Sand-Like	0.01	1	No Liquefaction	-	-	-	-	3.6	-	5.5
12	61	193	SW-SM	0	1	28.2	2.1	30.2	NSL-S	Sand-Like	1.27	1	Full Liquefaction	23.8	-	-	0.26	3.6	0.53	5.5
13	66	188	SW-SM	1	1	17.4	2.1	19.5	NSL-S	Sand-Like	2.99	1	Full Liquefaction	9.6	-	-	1.14	3.3	1.41	5.0
14	76	178	SW-SM	1	1	21.6	2.1	23.6	NSL-S	Sand-Like	2.28	1	Full Liquefaction	12.8	-	-	1.45	2.2	2.40	3.6
15	81	173	SW-SM	1	1	22.0	2.1	24.0	NSL-S	Sand-Like	2.19	1	Full Liquefaction	13.2	-	-	0.73	0.7	1.18	1.2
16	86	168	SW-SM	1	1	50.0	2.1	52.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
17	91	163	SW-SM	1	1	50.0	2.1	52.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
18	96	158	SM	1	1	25.0	5.4	30.4	PSL	HS Clay-Like	0.60	1	No Strength Loss	-	-	-	-	0.0	-	0.0
19	101	153	SM	1	1	21.8	5.4	27.2	PSL	NS Clay-Like	0.69	1	No Strength Loss	-	-	-	-	0.0	-	0.0
10	0	254	0	0	0	#DIV/0!	0.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.0	-	0.0

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SPT-Based Soil Shear Strength Summary

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-1
Lattitude:	35.45047
Longitude:	89.43886
Ground Elevation, ft msl:	254.0
Groundwater Depth, ft:	10.4
Groundwater Elevation, ft msl:	243.6

PGA: 0.723

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		254																		
1	4	250	2	9.5	ML	72.2	460.0	460.0	27.8	25	21	4	Sand-Like	Full Liquefaction	28	-	28	-	5	-
2	6.5	247.5	1	7.5	ML	72.2	747.5	747.5	29.0	25	21	4	Sand-Like	Full Liquefaction	26	-	26	-	4	-
3	9	245	3	11.0	SM	36.1	1035.0	1035.0	31.7	30	23	7	HS Clay-Like	No Strength Loss	-	704	-	700	-	700
4	16	238	4	12.2	SM	36.1	1840.0	1490.6	26.8	30	23	7	NS Clay-Like	Strength Loss	-	939	-	940	-	750
5	21	233	0	5.7	CL	87.0	2415.0	1753.6	32.0	29	21	8	HS Clay-Like	Strength Loss	-	23	-	20	-	20
6	26	228	0	5.5	CL	87.0	2990.0	2016.6	36.4	29	21	8	HS Clay-Like	Strength Loss	-	2	-	0	-	10
7	36	218	9	17.9	ML	96.3	4140.0	2542.6	29.4	33	25	8	NS Clay-Like	No Strength Loss	-	2113	-	2110	-	2110
8	41	213	31	41.6	SW-SM	9.4	4715.0	2805.6	20.3	18	17	1	Sand-Like	No Liquefaction	45	-	45	-	45	-
9	46	208	19	24.8	SW-SM	9.4	5290.0	3068.6	20.2	18	17	1	Sand-Like	Full Liquefaction	39	-	39	-	14	-
10	51	203	20	25.1	SW-SM	9.4	5865.0	3331.6	22.9	18	17	1	Sand-Like	Full Liquefaction	39	-	39	-	15	-
11	56	198	40	47.5	SW-SM	9.4	6440.0	3594.6	30.3	18	17	1	Sand-Like	No Liquefaction	47	-	47	-	47	-
12	61	193	25	30.2	SW-SM	12.0	7015.0	3857.6	33.9	0	0	0	Sand-Like	Full Liquefaction	41	-	41	-	24	-
13	66	188	16	19.5	SW-SM	12.0	7590.0	4120.6	33.0	0	0	0	Sand-Like	Full Liquefaction	36	-	36	-	10	-
14	76	178	21	23.6	SW-SM	12.0	8740.0	4646.6	29.0	0	0	0	Sand-Like	Full Liquefaction	38	-	38	-	13	-
15	81	173	22	24.0	SW-SM	12.0	9315.0	4909.6	26.9	0	0	0	Sand-Like	Full Liquefaction	38	-	38	-	13	-
16	86	168	64	52.1	SW-SM	12.0	9890.0	5172.6	34.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
17	91	163	68	52.1	SW-SM	12.0	10465.0	5435.6	29.6	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
18	96	158	27	30.4	SM	30.9	11040.0	5698.6	32.5	33	25	8	HS Clay-Like	No Strength Loss	-	6338	-	6340	-	6340
19	101	153	24	27.2	SM	30.9	11615.0	5961.6	23.8	33.0	25.0	8.0	NS Clay-Like	No Strength Loss	-	5634.0	-	5630	-	5630
10	0	254	0	#DIV/0!	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	-	-	-

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Raw Data Input

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	256.0
Groundwater Depth, ft:	12.3
Groundwater Elevation, ft msl:	243.7

Hammer Energy Ratio (ER), %:	93.9
C_E:	1.57
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

													Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	2	84	32	22	10	24.61	CL	1			1	Clay-Like	-	230		
2	6.5	3	84	32	22	10	24.73	CL	1			1	Clay-Like	-	350		
3	9.0	5	87	29	21	8	27.63	CL	1			1	Clay-Like	-	590		
4	11.5	3	87	29	21	8	26.72	CL	1			1	Clay-Like	-	350		
5	16.5	2	87	29	21	8	24.93	CL	1			1	Clay-Like	-	230		
6	26.5	0	96.3	33	25	8	31.61	ML	1			1	Clay-Like	-	10		
7	31.5	0	96.3	33	25	8	35.20	ML	1			1	Clay-Like	-	10		
8	36.5	2	96.3	33	25	8	38.20	ML	1			1	Clay-Like	-	230		
9	41.5	24	9.4	18	17	1	16.94	SW-SM	1			1	Sand-Like	42	-		
10	46.5	13	67	33	24	9	25.64	ML	1			1	Clay-Like	-	1530		
11	51.5	11	67	33	24	9	22.38	ML	1			1	Clay-Like	-	1290		
12	56.5	14	12	0	0	0	22.15	SP-SM	1			1	Sand-Like	36	-		
13	61.5	22	12	0	0	0	16.70	SP-SM	1			1	Sand-Like	39	-		
14	66.5	29	12	0	0	0	33.91	SW-SM	1			1	Sand-Like	42	-		
15	71.5	14	12	0	0	0	32.26	SW-SM	1			1	Sand-Like	35	-		
16	76.5	25	12	0	0	0	29.30	SW-SM	1			1	Sand-Like	40	-		
17	81.5	19	12	0	0	0	30.45	SW-SM	1			1	Sand-Like	37	-		
18	86.5	23	12	0	0	0	26.71	SW-SM	1			1	Sand-Like	38	-		
19	91.5	61	13.2	0	0	0	38.15	SM	1			1	Sand-Like	48	-		
20	96.5	64	13.2	0	0	0	26.91	SM	1			1	Sand-Like	48	-		
21	101.5	22	41.7	37	34	3	35.07	SM	1			1	Sand-Like	37	-		

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Standard Penetration Test Correction

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	256.0
Groundwater Depth, ft:	12.3
Groundwater Elevation, ft msl:	243.7

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		256																	
1	4	252	2	1.57	1.70	0.75	1.0	1.00	1.6	460	460	84.0	3.1	5.3	2.3	4.0	6.3	1	CL
2	6.5	249.5	3	1.57	1.64	0.80	1.0	1.00	1.4	748	748	84.0	4.7	7.7	3.7	6.1	8.7	1	CL
3	9	247	5	1.57	1.39	0.84	1.0	1.00	1.3	1035	1035	87.0	7.8	10.9	6.6	9.2	12.2	1	CL
4	11.5	244.5	3	1.57	1.23	0.88	1.0	1.00	1.5	1323	1323	87.0	4.7	5.8	4.1	5.1	7.5	1	CL
5	16.5	239.5	2	1.57	1.11	0.93	1.0	1.00	1.7	1898	1635	87.0	3.1	3.5	2.9	3.2	5.4	1	CL
6	26.5	229.5	0	1.57	0.96	0.98	1.0	1.00	1.4	3048	2161	96.3	0.2	0.2	0.2	0.1	0.2	1	ML
7	31.5	224.5	0	1.57	0.91	0.99	1.0	1.00	1.4	3623	2424	96.3	0.2	0.1	0.2	0.1	0.2	1	ML
8	36.5	219.5	2	1.57	0.86	0.99	1.0	1.00	1.8	4198	2687	96.3	3.1	2.7	3.1	2.7	4.8	1	ML
9	41.5	214.5	24	1.57	0.82	1.00	1.0	1.00	1.1	4773	2950	9.4	37.6	30.9	37.4	30.8	32.4	1	SW-SM
10	46.5	209.5	13	1.57	0.79	1.00	1.0	1.00	1.2	5348	3213	67.0	20.3	16.1	20.3	16.0	20.0	1	ML
11	51.5	204.5	11	1.57	0.76	1.00	1.0	1.00	1.3	5923	3476	67.0	17.2	13.1	17.2	13.0	16.6	1	ML
12	56.5	199.5	14	1.57	0.73	1.00	1.0	1.00	1.1	6498	3739	12.0	21.9	16.0	21.9	16.0	17.4	1	SP-SM
13	61.5	194.5	22	1.57	0.71	1.00	1.0	1.00	1.1	7073	4002	12.0	34.4	24.3	34.4	24.3	26.1	1	SP-SM
14	66.5	189.5	29	1.57	0.68	1.00	1.0	1.00	1.1	7648	4265	12.0	45.4	31.1	45.4	31.1	33.2	1	SW-SM
15	71.5	184.5	14	1.57	0.66	1.00	1.0	1.00	1.1	8223	4528	12.0	21.9	14.6	21.9	14.6	15.9	1	SW-SM
16	76.5	179.5	25	1.57	0.65	1.00	1.0	1.00	1.1	8798	4791	12.0	39.1	25.3	39.1	25.3	27.1	1	SW-SM
17	81.5	174.5	19	1.57	0.63	1.00	1.0	1.00	1.1	9373	5054	12.0	29.7	18.7	29.7	18.7	20.2	1	SW-SM
18	86.5	169.5	23	1.57	0.61	1.00	1.0	1.00	1.1	9948	5317	12.0	36.0	22.1	36.0	22.1	23.7	1	SW-SM
19	91.5	164.5	61	1.57	0.60	1.00	1.0	1.00	1.1	10523	5580	13.2	50.0	29.9	95.5	50.0	53.3	1	SM
20	96.5	159.5	64	1.57	0.59	1.00	1.0	1.00	1.1	11098	5843	13.2	50.0	29.3	100.2	50.0	53.3	1	SM
21	101.5	154.5	22	1.57	0.57	1.00	1.0	1.00	1.2	11673	6106	41.7	34.4	19.7	34.4	19.7	24.2	1	SM

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Subsurface Soil Properties Summary

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	256.0
Groundwater Depth, ft:	12.3
Groundwater Elevation, ft msl:	243.7

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	256															
1	4	252	2	3.1	4.0	CL	1	0	0	84.0	24.6083436	32.0	22.0	10.0	0.26	-	470
2	6.5	249.5	3	4.7	6.1	CL	1	0	0	84.0	24.7305564	32.0	22.0	10.0	0.27	-	704
3	9	247	5	7.8	9.2	CL	1	0	0	87.0	27.6281396	29.0	21.0	8.0	0.83	-	1174
4	11.5	244.5	3	4.7	5.1	CL	1	0	0	87.0	26.7195279	29.0	21.0	8.0	0.71	-	704
5	16.5	239.5	2	3.1	3.2	CL	1	0	0	87.0	24.9286054	29.0	21.0	8.0	0.49	-	470
6	26.5	229.5	0	0.2	0.1	ML	1	0	0	96.3	31.6058564	33.0	25.0	8.0	0.83	-	23
7	31.5	224.5	0	0.2	0.1	ML	1	0	0	96.3	35.2014888	33.0	25.0	8.0	1.28	-	23
8	36.5	219.5	2	3.1	2.7	ML	1	0	0	96.3	38.203295	33.0	25.0	8.0	1.65	-	470
9	41.5	214.5	24	37.6	30.8	SW-SM	1	0	0	9.4	16.9387489	18.0	17.0	1.0	-0.06	42	-
10	46.5	209.5	13	20.3	16.0	ML	1	0	0	67.0	25.6372017	33.0	24.0	9.0	0.18	-	3052
11	51.5	204.5	11	17.2	13.0	ML	1	0	0	67.0	22.3765432	33.0	24.0	9.0	-0.18	-	2582
12	56.5	199.5	14	21.9	16.0	SP-SM	1	0	0	12.0	22.1453287	0.0	0.0	0.0	NP	36	-
13	61.5	194.5	22	34.4	24.3	SP-SM	1	0	0	12.0	16.6982077	0.0	0.0	0.0	NP	39	-
14	66.5	189.5	29	45.4	31.1	SW-SM	1	0	0	12.0	33.9106901	0.0	0.0	0.0	NP	42	-
15	71.5	184.5	14	21.9	14.6	SW-SM	1	0	0	12.0	32.2584469	0.0	0.0	0.0	NP	35	-
16	76.5	179.5	25	39.1	25.3	SW-SM	1	0	0	12.0	29.2989019	0.0	0.0	0.0	NP	40	-
17	81.5	174.5	19	29.7	18.7	SW-SM	1	0	0	12.0	30.44505	0.0	0.0	0.0	NP	37	-
18	86.5	169.5	23	36.0	22.1	SW-SM	1	0	0	12.0	26.7135896	0.0	0.0	0.0	NP	38	-
19	91.5	164.5	61	50.0	50.0	SM	1	0	0	13.2	38.1465517	0	0	0	NP	47.7	-
20	96.5	159.5	64	50.0	50.0	SM	1	0	0	13.2	26.9116775	0	0	0	NP	47.7	-
21	101.5	154.5	22	34.4	19.7	SM	1	0	0	41.7	35.0671937	37	34	3	0.36	37.4	-

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Checked By: NRM

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	256.0
Groundwater Depth, ft:	12.3
Groundwater Elevation, ft msl:	243.7

PGA:	0.723
$\varphi_{SL\text{-}Sand}$	0.90
$\varphi_{NSL\text{-}Sand}$	0.75
$\varphi_{SL\text{-}Clay}$	0.90

M_w:	7.11
R(km):	30.6

MSF_{sand}:	1.11
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	256																		
1	4	252	CL	1	1	4.0	5.5	9.5	PSL	NS Clay-Like	0.56	0.9	No Strength Loss	-	-	-	-	5.8	-	9.3
2	6.5	249.5	CL	1	1	6.1	5.5	11.6	PSL	NS Clay-Like	0.61	0.9	No Strength Loss	-	-	-	-	5.8	-	9.3
3	9	247	CL	1	1	9.2	5.5	14.7	PSL	HS Clay-Like	0.50	0.9	No Strength Loss	-	-	-	-	5.8	-	9.3
4	11.5	244.5	CL	1	1	5.1	5.5	10.6	PSL	NS Clay-Like	1.05	0.9	Strength Loss	-	-	563.4	-	5.8	-	9.3
5	16.5	239.5	CL	1	1	3.2	5.5	8.7	PSL	NS Clay-Like	2.22	0.9	Strength Loss	-	-	375.6	-	5.8	-	9.3
6	26.5	229.5	ML	1	1	0.1	5.5	5.6	PSL	HS Clay-Like	67.63	0.9	Strength Loss	-	-	55.1	-	5.8	-	9.3
7	31.5	224.5	ML	1	1	0.1	5.5	5.6	PSL	HS Clay-Like	78.11	0.9	Strength Loss	-	-	18.4	-	5.8	-	9.3
8	36.5	219.5	ML	1	1	2.7	5.5	8.2	PSL	HS Clay-Like	4.39	0.9	Strength Loss	-	-	10.1	-	5.8	-	9.3
9	41.5	214.5	SW-SM	1	1	30.8	0.9	31.7	NSL-S	Sand-Like	1.01	0.9	Full Liquefaction	28.7	-	-	0.16	5.8	0.40	9.3
10	46.5	209.5	ML	1	1	16.0	5.5	21.5	PSL	NS Clay-Like	0.81	0.9	No Strength Loss	-	-	-	-	5.6	-	8.9
11	51.5	204.5	ML	1	1	13.0	5.5	18.5	PSL	NS Clay-Like	1.02	0.9	Strength Loss	-	-	2065.8	-	5.6	-	8.9
12	56.5	199.5	SP-SM	1	1	16.0	2.1	18.1	NSL-S	Sand-Like	3.20	0.9	Full Liquefaction	8.7	-	-	1.14	5.6	1.50	8.9
13	61.5	194.5	SP-SM	1	1	24.3	2.1	26.4	NSL-S	Sand-Like	1.85	0.9	Full Liquefaction	16.2	-	-	0.73	4.5	1.01	7.4
14	66.5	189.5	SW-SM	1	1	31.1	2.1	33.1	NSL-S	Sand-Like	0.81	0.9	Lim. Liquefaction	-	28.3	-	0.10	3.8	0.25	6.4
15	71.5	184.5	SW-SM	1	1	14.6	2.1	16.6	NSL-S	Sand-Like	3.34	0.9	Full Liquefaction	8.0	-	-	1.14	3.7	1.60	6.1
16	76.5	179.5	SW-SM	1	1	25.3	2.1	27.3	NSL-S	Sand-Like	1.66	0.9	Full Liquefaction	17.7	-	-	0.69	2.5	0.86	4.5
17	81.5	174.5	SW-SM	1	1	18.7	2.1	20.8	NSL-S	Sand-Like	2.63	0.9	Full Liquefaction	10.4	-	-	1.14	1.9	1.34	3.6
18	86.5	169.5	SW-SM	1	1	22.1	2.1	24.1	NSL-S	Sand-Like	2.11	0.9	Full Liquefaction	13.3	-	-	0.73	0.7	1.17	2.3
19	91.5	164.5	SM	1	1	50.0	2.6	52.6	NSL-S	Sand-Like	0.00	0.75	No Liquefaction	-	-	-	-	0.7	-	1.1
20	96.5	159.5	SM	1	1	50.0	2.6	52.6	NSL-S	Sand-Like	0.00	0.75	No Liquefaction	-	-	-	-	0.7	-	1.1
21	101.5	154.5	SM	1	1	19.7	5.5	25.2	NSL-S	Sand-Like	1.87	0.9	Full Liquefaction	12.9	-	-	0.73	1.5	1.13	1.1

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Checked By: NRM

SPT-Based Soil Shear Strength Summary

Project Name: SR-87 Over Overflow
County: Lauderdale

Boring Number:	B-2
Lattitude:	35.45064
Longitude:	89.43864
Ground Elevation, ft msl:	256.0
Groundwater Depth, ft:	12.3
Groundwater Elevation, ft msl:	243.7

PGA: 0.723

Hammer Energy Ratio (ER), %:	93.9
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		256																		
1	4	252	2	9.5	CL	84.0	460.0	460.0	24.6	32	22	10	NS Clay-Like	No Strength Loss	-	470	-	470	-	470
2	6.5	249.5	3	11.6	CL	84.0	747.5	747.5	24.7	32	22	10	NS Clay-Like	No Strength Loss	-	704	-	700	-	700
3	9	247	5	14.7	CL	87.0	1035.0	1035.0	27.6	29	21	8	HS Clay-Like	No Strength Loss	-	1174	-	1170	-	1170
4	11.5	244.5	3	10.6	CL	87.0	1322.5	1322.5	26.7	29	21	8	NS Clay-Like	Strength Loss	-	704	-	700	-	560
5	16.5	239.5	2	8.7	CL	87.0	1897.5	1635.4	24.9	29	21	8	NS Clay-Like	Strength Loss	-	470	-	470	-	380
6	26.5	229.5	0	5.6	ML	96.3	3047.5	2161.4	31.6	33	25	8	HS Clay-Like	Strength Loss	-	23	-	20	-	60
7	31.5	224.5	0	5.6	ML	96.3	3622.5	2424.4	35.2	33	25	8	HS Clay-Like	Strength Loss	-	23	-	20	-	20
8	36.5	219.5	2	8.2	ML	96.3	4197.5	2687.4	38.2	33	25	8	HS Clay-Like	Strength Loss	-	470	-	470	-	10
9	41.5	214.5	24	31.7	SW-SM	9.4	4772.5	2950.4	16.9	18	17	1	Sand-Like	Full Liquefaction	42	-	42	-	29	-
10	46.5	209.5	13	21.5	ML	67.0	5347.5	3213.4	25.6	33	24	9	NS Clay-Like	No Strength Loss	-	3052	-	3050	-	3050
11	51.5	204.5	11	18.5	ML	67.0	5922.5	3476.4	22.4	33	24	9	NS Clay-Like	Strength Loss	-	2582	-	2580	-	2070
12	56.5	199.5	14	18.1	SP-SM	12.0	6497.5	3739.4	22.1	0	0	0	Sand-Like	Full Liquefaction	36	-	36	-	9	-
13	61.5	194.5	22	26.4	SP-SM	12.0	7072.5	4002.4	16.7	0	0	0	Sand-Like	Full Liquefaction	39	-	39	-	16	-
14	66.5	189.5	29	33.1	SW-SM	12.0	7647.5	4265.4	33.9	0	0	0	Sand-Like	Lim. Liquefaction	42	-	42	-	28	-
15	71.5	184.5	14	16.6	SW-SM	12.0	8222.5	4528.4	32.3	0	0	0	Sand-Like	Full Liquefaction	35	-	35	-	8	-
16	76.5	179.5	25	27.3	SW-SM	12.0	8797.5	4791.4	29.3	0	0	0	Sand-Like	Full Liquefaction	40	-	40	-	18	-
17	81.5	174.5	19	20.8	SW-SM	12.0	9372.5	5054.4	30.4	0	0	0	Sand-Like	Full Liquefaction	37	-	37	-	10	-
18	86.5	169.5	23	24.1	SW-SM	12.0	9947.5	5317.4	26.7	0	0	0	Sand-Like	Full Liquefaction	38	-	38	-	13	-
19	91.5	164.5	61	52.6	SM	13.2	10522.5	5580.4	38.1	0.0	0.0	0.0	Sand-Like	No Liquefaction	47.7	-	48	-	48	-
20	96.5	159.5	64	52.6	SM	13.2	11097.5	5843.4	26.9	0.0	0.0	0.0	Sand-Like	No Liquefaction	47.7	-	48	-	48	-
21	101.5	154.5	22	25.2	SM	41.7	11672.5	6106.4	35.1	37.0	34.0	3.0	Sand-Like	Full Liquefaction	37.4	-	37	-	13	-

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```
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Subsurface Investigation Geotechnical Data Report

SR-223 over Branch (Bridge No. 6)

PIN No.: 128113.06
GES No.: 5732718

Madison County, TN
June 25, 2019

APPROVED
07/03/2019

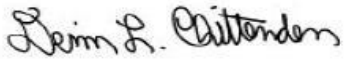
June 25, 2019

Mr. Travis Smith, P.E.
Civil Engineering Manager I
Materials & Tests Division
Tennessee Department of Transportation
6601 Centennial Boulevard
Nashville, Tennessee 37243

Dear Mr. Smith,

We have completed the *Subsurface Investigation Geotechnical Data Report* for the Bridge Replacement on SR-223 over unnamed Branch in Madison County, Region 4 (Bridge No. 6). Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering and geological services to the Tennessee Department of Transportation.

Sincerely,
HDR



Devin L. Chittenden, P.E.
Senior Geotechnical Engineer



Bret O. Watkins, P.G.
Senior Geologist

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Appendix B: Boring Logs & CPT Data
Appendix C: Laboratory Testing
Appendix D: Preliminary Soil Shear Strength Loss Analysis

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Executive Summary

The proposed project entails the replacement of an existing two-lane bridge along SR-223 near log mile 2.28 in Madison County, TN. The new structure, described as “Bridge No. 6”, will be a direct replacement of the existing single-span bridge by construction of a double-reinforced concrete box bridge (RCBB) at an unnamed branch of Big Black Creek, centered at approximately Station 35+02.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein. Bedrock was not encountered within the advanced borings.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design/build team for the proposed structure along SR-223 (Shady Grove Road) near log mile 2.28 over an unnamed branch of Big Black Creek in Madison County, TN. The proposed double 12-ft by 5-ft reinforced concrete box bridge (RCBB) will replace the existing 28-ft single span bridge situated between Stations 34+87.58 to 35+15.36. Borings were advanced and soil samples were collected and delivered to the HDR laboratory for further testing and analysis. Geotechnical parameters and foundation recommendations are provided in this report resulting from the evaluations of soil conditions at the proposed site.

2 Subsurface Exploration

A subsurface investigation was conducted at this site by HDR and sub-consultants in June 2019. The exploration program included two Standard Penetration Test (SPT) borings advanced to 100-ft bgs, with each boring advanced with a CME-55C track-mounted rig on opposite ends of the existing bridge, offset to roadway centerline. In addition, one piezoCone Penetrometer Test (CPT) boring was advanced by track-mounted box rig with 20-ton reaction mass near the existing west bridge abutment to cone refusal depth (see Bridge Replacement Boring Plan Sheet – Appendix A). Test boring locations are tabulated below:

Table 2-1. Test Boring Locations

Test Hole Number	Location	Station	Offset	Depth
B-1	Existing West Abutment	34+71	11-ft LT	101.5-ft
B-2	Existing East Abutment	35+32	11-ft RT	101.5-ft
CPT-1	Existing West Abutment	34+63	25-ft LT	74.2-ft

SPT's were obtained at 2.5-ft intervals in the top ten feet and at five foot intervals until reaching termination depths. SPT borings were logged for blow counts, soil types, sample recoveries, and boring metrics. CPT piezoCone readings of tip resistance, sleeve friction, friction ratio, and pore water pressure were collected on a continuous basis as the cone was advanced at a rate of 2cm/sec until refusal was met at 74.2-ft bgs. Seismic velocity measurements were also collected in the CPT boring at 5-ft intervals. Boring logs from borings B-1 and B-2, as well as CPT results are provided in Appendix B. All soil specimens were delivered to HDR for laboratory testing and analysis, including the following tests:

Atterberg Limits	AASHTO T-89 and T-90
Sieve Analysis	ASTM D-1140
Natural Moisture Content	AASHTO T-265

Unconsolidated Undrained (UU) Compression Test	AASHTO T-296
Standard Proctor	AASHTO T-99
pH Testing	AASHTO T-288
Resistivity	ASTM G-187

The full laboratory testing results are located in Appendix C.

3 Geology, Soils, and Site Conditions

The proposed site is topographically depicted on the Mercer, Tennessee 7.5-minute topographic quadrangle map and is situated in an area of low to moderate relief, within the local floodplain of Big Black Creek, which drains to the west/southwest into the Hatchie River. Approximate proposed grade elevations range from 375-ft to 380-ft, with nearby ridge top elevations over 480-ft.

The project bridge site is located within the East Gulf Coastal Plain Physiographic Province of Western Tennessee. The Mississippi Embayment – a large fluvial floodplain with relatively flat to gently sloping topography providing drainage over much of the central and eastern portions of North America – forms the northern portion of this province. The Embayment was initially formed as a topographic low during the Proterozoic, precipitated by crustal weaknesses that created many structural deformities including the Reelfoot Rift of the New Madrid Seismic Zone. By the end of the Paleozoic, much of the regional basin was infilled with shallow marine deposits, forming the base of the Embayment today as limestone, shale, and sandstones. Regional subsidence and deposition following the Paleozoic resulted in the thick accumulation of Mesozoic and younger unconsolidated strata that generally dip towards the Mississippi River, increasing in thickness to as much as 3000-ft thick, with strata becoming progressively younger towards the center of the basin.

Published mapping indicates the presence of Holocene alluvial sediments comprised of quartz-rich sands, silt, and clay that are poorly sorted and stratified. Generally finer-grained alluvium grades into coarser-grained sands and gravels with depth. Holocene alluvium is considered approximately 20 ft thick. The existing bridge approaches are supported atop this alluvium with roadway embankment fill, approximately 5 – 10 ft thick. The alluvium is supported with Eocene deltaic non-marine deposits of the Claiborne and Wilcox formations, composed primarily of fine-grained micaceous quartz sands lenticularly crossbedded with clay and lenses of lignite or lignitic clay. Variations in lateral consistency are common due to crossbedding. Anticipated thickness of Eocene deposits is greater than 160 to 180-ft. It is believed Eocene deposits are further supported by Paleocene shallow marine deposits of glauconitic clay, with thin lenses of fine micaceous sands of the Midway Group. Paleocene deposits are anticipated to be approximately 45 to 200-ft thick. At this locality, Paleocene deposits are further supported by Upper Cretaceous unconsolidated sediments lying atop Paleozoic rocks at an approximate depth of 400 to 500-ft deep.

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1 and B-2. Fill was intercepted from the existing ground surface to

approximately 4.0 to 6.5-ft maximum depth. Field and laboratory classifications of recovered SPT samples indicate fill composed of very soft to medium stiff low to moderate plasticity lean clays and sandy silts (CL, ML).

Alluvium is interpreted as underlying the embankment fill in both of the advanced borings with an approximate thickness range of 18.5 to 21-ft. Recovered samples indicate alluvium is dominantly reworked silt, lean clay, and fine-grained silty sands (CL, SM). Alluvial deposits exhibited non to moderate plasticity. SPT drives and laboratory testing of samples indicated very loose to stiff consistencies for the alluvial deposits. Natural moisture content of alluvial sediments ranges from 16.3 – 31.0 percent. The base of alluvium is believed to rest upon an angular unconformity surface eroded into the underlying Tertiary Eocene deposits (Claiborne Formation). This surface was encountered at approximately 355-ft elevation within advanced borings.

Claiborne Formation sediments underlying alluvial deposits were intercepted approximately 25-ft below grade. The base of Claiborne sediments were not intercepted in the borings advanced, therefore thicknesses were interpreted to be greater than 76.5-ft. This formation is predominantly composed of non-plastic fine grained, poorly graded silty sands and interbeds of lean clay (CL, SM, SP-SM). SPT drives indicate medium stiff to very dense consistencies for the partially cohesive sediments. Natural moisture contents generally ranged from 17.1 – 25.7 percent.

No faulting was indicated on published mapping within the limits of the proposed alignment. Likewise recovered samples did not indicate the presence of faulting. The region surrounding the project area is located within an active seismic region (New Madrid Seismic Zone) and is considered one of the most active seismic regions in the country. Regional seismic events, both along the New Madrid Fault System and associated fault systems, have been and are continually documented throughout Western Tennessee, Western Kentucky, Southern Illinois, Southeastern Missouri and Northeastern Arkansas.

Groundwater was encountered within each of the RCBB borings at the end of drilling operations; however readings of the local potentiometric surface could not be collected due to variations caused by rotary wash drilling methods. Generally, the interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed RCBB foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A, with borehole test logs provided in Appendix B.

Table 3-1. Generalized Subsurface Conditions

Material Type/Formation	Elevation of Top Layer (ft)	Depth to Top Layer (ft)	USCS Soil Type	SPT-N values (bpf)	UU Total Shear Strength (psf)
Embankment Fill	380.0	0	CL (A-6)	WOH-6	
Holocene Alluvium	373.5-376.0	4-6.5	CL(A-4), ML(A-4), SM(A-1-b)	1-17	574
Eocene-Claiborne	355.0	25.0	CL(A-4), SM(A-2-4), SP-SM(A-3)	16-100+	7,773-7,943

In addition to lab classification and triaxial shear testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils data for use by a structural engineer to provide any necessary protection to the piling, concrete, reinforcing steel, etc. Corrosion and deterioration protection requirements and guidelines for piling are set forth in LRFD Section 10.7.5. The corrosion and deterioration testing results are summarized in Table 3-2 below and are included in Appendix C.

Table 3-2. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth	pH	Resistivity (ohm·cm)
B-2	35+32	11-ft RT	0.6'-10.0'	7.4	8,000

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation:

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation:

- Resistivity less than 3,000 ohm-cm
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Results of the corrosion and deterioration testing indicated that the site has low potential for pile or steel reinforcement deterioration based on the resistivity value and the geographical location of the project site. Interpretation of the data and corrosion protection of the foundation structural components will be discussed with the structural engineer for the project.

4 Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Madison County is considered vulnerable to severe ground shaking. The project site classifies as Site Class D based on the average CPT shear wave value (996.9 ft/s). The peak ground acceleration coefficient for this project site is equal to 0.33g using Site Class D. S-wave response measurements (Vs) collected from the CPT boring observed values ranging from 429 – 736 ft/sec from 5-ft to 25-ft depths. From 30-ft to 70-ft depths, velocities increased to 889 – 1,963 ft/sec. A notably sharp increase in shear wave velocities was observed at 55-ft (1,963 ft/sec).

Preliminary analyses of the subsurface conditions in the SPT and CPT borings were performed to evaluate the likelihood of liquefaction during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger

Soil Liquefaction during Earthquakes (2008) and using the Geologismiki software Cliq v.3.0.

Table 4-1. Soil Liquefaction Potential Results

Test Boring	Depth(ft)	Thickness(ft)	Average FS	Average LPI	Settlement (in)
B-1	19.00-26.50	7.50	0.37	N/A	0.0 (clay-like)
	54.00-65.50	11.50	0.66	N/A	3.65
	89.00-94.00	5.00	0.96	N/A	0.57
B-2	5.25-9.25	4.00	0.43	N/A	1.49
	14.25-53.00	38.75	0.40	N/A	4.56
CPT-1	8.69-10.99	2.30	0.71	0.12	0.80
	14.76-16.08	1.32	0.46	0.21	0.66
	24.61-26.90	2.29	0.62	0.12	0.75
	37.40-38.88	1.48	0.62	0.08	0.51
	64.80-67.09	2.29	0.54	0.00	0.98

Based on the results of the seismic hazard evaluation, it is believed the soils are susceptible to shear strength loss during the seismic event. The liquefiable layers present at the SPTs indicate layers 4.0’ to 38.75’ thick and settlement magnitudes of ranging from 4.22” to 6.05”. CPTs obtain continuous testing data at approximately 2-inch intervals and it is typically more appropriate to rely on CPT results more than SPT results during liquefaction analysis because they generate an improved soil model by localizing weaker zones susceptible to liquefaction. The liquefiable layers present at the CPTs indicate layers ranging from 1.32’ to 2.30’ thick and settlement magnitudes of 3.70”. Other seams of liquefiable material were present in the CPT results; however, it is common practice to eliminate layers of liquefaction less than 6” thick. The results of the preliminary soil shear strength loss analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. More detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment slopes, embankment settlements, retaining walls and bridge foundation types and capacities will be required to ensure a sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed bridge on SR-223 over unnamed Branch of Big Black Creek in Madison County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project

must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

AASHTO, 2014; AASHTO LRFD Bridge Design Specifications Seventh Edition, 2014; Washington, DC, American Association of State Highway and Transportation Officials.

Boulanger, R.W., et al (2008); Soil Liquefaction during Earthquakes; Earthquake Engineering Research Institute.

Hardeman, W.D., et al (1966). “Geologic Map of Tennessee – West Sheet”; Department of Environment and Conservation, Division of Geology; scale 1:250,000.

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NRCS (2009). “Soil Map - Madison County, Tennessee”, “Engineering Properties”, “Physical Soil Properties”; Web Soil Survey – National Cooperative Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

USGS (2009). Earthquake Design Maps, AASHTO-2009. Online. URL: <https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=35.495293&longitude=-89.001293&siteClass=D&title=Example> Accessed June 19, 2019.

USGS (2019). “Mercer, TN Topographic Quadrangle Map”, United States Geological Survey. Dept. of Interior. Reston, VA, 7.5 Minute Series; scale 1:24,000.

Appendix A: Plan and Boring Sheets

35

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
?	2018	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION

N

WOODS

PROP. R.O.W.

SR223 STA. 35+05.24 =
STR1CL STA. 81+26.84
N 436679.2112
E 1075284.7841

WOODS

BR6_CPT-1

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

BR6_B-1

S 87° 42' 17" E

S 88° 25' 05" E

PROPOSED DOUBLE
12'x5' RCBB

BR6_B-2

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

TYPE-38-SLOPE

BRUSH

BRUSH

PROP. R.O.W.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 223 (SHADY GROVE ROAD)
BRIDGE REPLACEMENT
OVER BRANCH AT L.M. 2.28
MADISON COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecraft DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/20/19

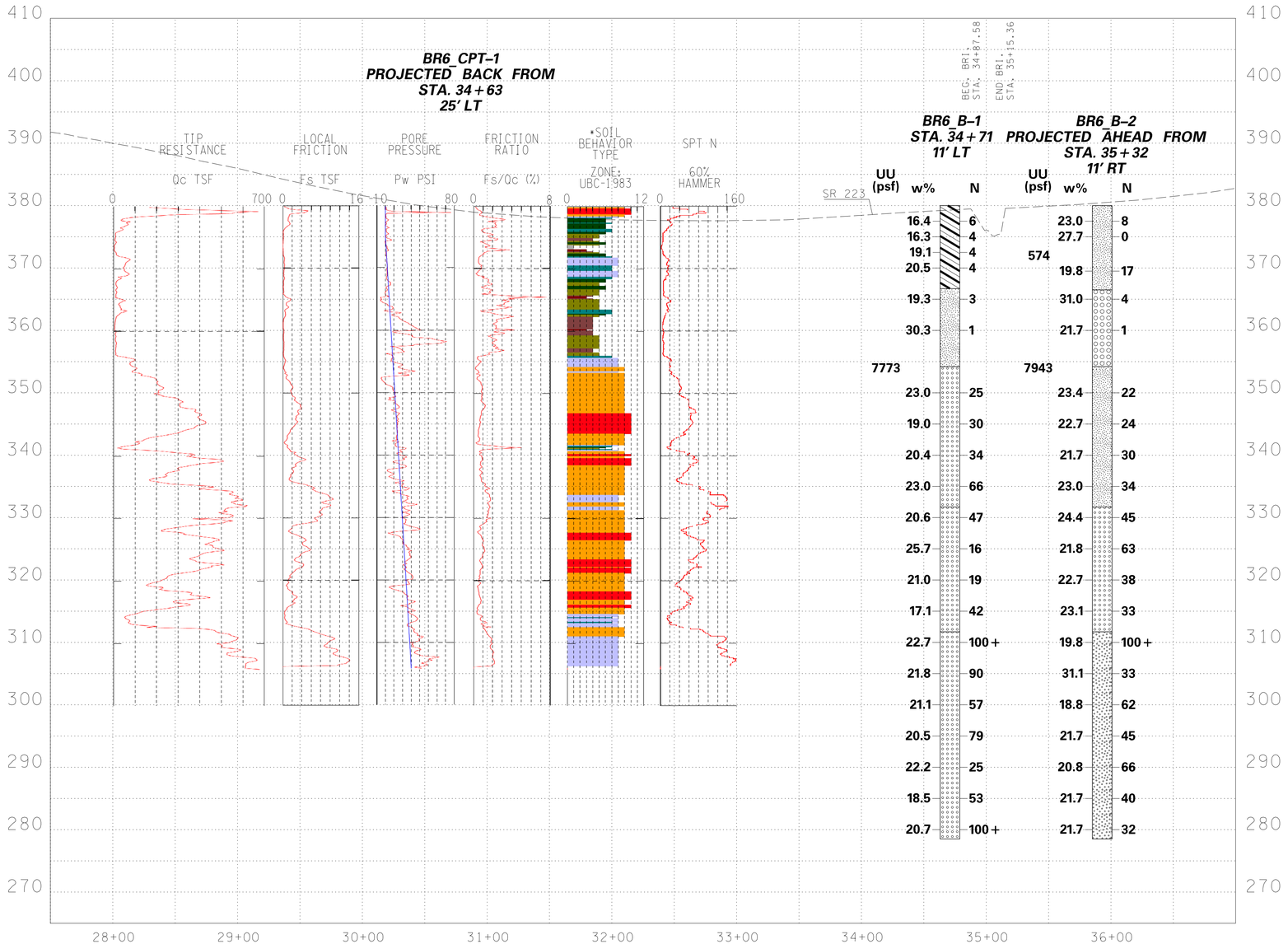
HDR

CONST. NO. _____

PROJECT NO.	YEAR	SHEET NO.
?	2018	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6		
SYMBOL													
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS

ADDITIONAL ROCK SYMBOLS

SYMBOL	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	RANDOM BACKFILL	WEATHERED LIMESTONE	GRADED SOLID ROCK

SPT BORING LEGEND

○	ROCKLINE SOUNDINGS	RQD	ROCK QUALITY DESIGNATION
◔	DISTURBED SAMPLE BORING	REC	% CORE RECOVERED
◎	UNDISTURBED SAMPLE BORING	Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
⊙	UNDISTURBED SAMPLE BORING & ROCK CORE	Qu (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ROCK CORE)
●	ROCK CORE	UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
➡	APPROXIMATE PILE TIP ELEVATION	w%	MOISTURE CONTENT
▼ (Date)	WATER ELEVATION	R	REFUSAL
✳	LIQUEFACTION OR SOIL STRENGTH LOSS IS PROBABLE AT THESE LOCATIONS	NR	REFUSAL NOT ENCOUNTERED
N	UNCORRECTED PENETRATION RESISTANCE		

CPT SOUNDINGS LEGEND

MAXIMUM DEPTH = 74.15 FEET

DEPTH INCREMENT = 0.164 FEET

1 SENSITIVE FINE GRAINED
2 ORGANIC MATERIAL
3 CLAY
4 SILTY CLAY TO CLAY
5 CLAYEY SILT TO SILTY CLAY
6 SANDY SILT TO CLAYEY SILT
7 SILTY SAND TO SANDY SILT
8 SAND TO SILTY SAND
9 SAND
10 GRAVELLY SAND TO SAND
11 VERY STIFF FINE GRAINED (*)
12 SAND TO CLAYEY SAND (*)

REFUSAL: REACTION

*SOIL BEHAVIOR TYPE AND SPT BASED ON DATA FROM UBC-1983

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SR 223 (SHADY GROVE ROAD)
BRIDGE REPLACEMENT
OVER BRANCH AT L.M. 2.28
MADISON COUNTY
2019

DESIGNED BY _____ DATE _____
DRAWN BY Wesley Shuecraft DATE 06/19
SUPERVISED BY Bret Watkins DATE 06/19
CHECKED BY Kevin Walker DATE 06/20/19

Appendix B: Boring Logs & CPT Data

Sheet No. 1 of 2

State **Tennessee** Latitude **35.49532** ° Longitude **89.0014** °

County **Madison** Location **34+71 11' Lt.**

Project Name **SR-223 over Branch** Surface Elevation **380 ft.**

Project Type **Subsurface Investigation** Dated Started **6/9/2019** Completed **6/9/2019**

Driller **F. Woodard** Logged by **F. Woodard** Depth to Water: Immediate

Hole Number **B-1** Total Depth **101.5 ft.** Depth to Water Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
380.0 ft	0		*Ground Line*						
			Soft to medium stiff, brown, sandy lean clay.		SS-1	2.5 4.0	1.1	2-3-3	SPT
375	5				SS-2	5.0 6.5	1.1	2-2-2	SPT
					SS-3	7.5 9.0	1.0	2-2-2	SPT
370	10				SS-4	10.0 11.5	1.0	1-2-2	SPT
			13.3'						
365	15		Very soft to soft, brown, sandy lean clay.		SS-5	15.0 16.5	1.5	0-1-2	SPT
360	20				SS-6	20.0 21.5	1.5	0-0-1	SPT
355	25		25.8'		ST-1	25.0 27.0	2.0		ST
			Medium dense to very dense, reddish brown, brown, tan and gray, poorly graded sand with silt.						
350	30				SS-7	30.0 31.5	1.3	5-10-15	SPT
345	35				SS-8	35.0 36.5	1.0	10-15-15	SPT
340	40				SS-9	40.0 41.5	1.3	13-16-18	SPT
335	45				SS-10	45.0 46.5	1.4	26-31-35	SPT
			48.3'						
330	50		Medium dense to dense, brown, gray and reddish brown, poorly graded sand with silt.		SS-11	50.0 51.5	1.4	22-23-24	SPT
325	55				SS-12	55.0 56.5	1.5	6-7-9	SPT
320	60								

State **Tennessee** Latitude **35.49532** ° Longitude **89.0014** °

County **Madison** Location **34+71 11' Lt.**

Project Name **SR-223 over Branch** Surface Elevation **380 ft.**

Project Type **Subsurface Investigation** Dated Started **6/9/2019** Completed **6/9/2019**

Driller **F. Woodard** Logged by **F. Woodard** Depth to Water: Immediate

Hole Number **B-1** Total Depth **101.5 ft.** Depth to Water Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
320.0 ft	60		*Continued from previous page*						
					SS-13	60.0 61.5	1.2	7-9-10	SPT
315	65				SS-14	65.0 66.5	1.5	12-18-24	SPT
			68.3'						
310	70		Medium dense to very dense, brown, gray and reddish brown, poorly graded sand with silt.		SS-15	70.0 71.5	1.5	22-40-50/0.5	SPT
305	75				SS-16	75.0 76.5	1.5	31-44-46	SPT
300	80				SS-17	80.0 81.5	1.2	16-25-32	SPT
295	85				SS-18	85.0 86.5	1.2	23-33-46	SPT
290	90				SS-19	90.0 91.5	1.2	15-14-11	SPT
285	95				SS-20	95.0 96.5	1.3	22-23-30	SPT
280	100				SS-21	100.0 101.5	1.3	26-47-50/0.4	SPT
			101.5' Boring Terminated @ 101.5' (Elev. 278.5).						
275	105		Boring elevation obtained using Google Earth imagery.						
270	110								
265	115								
260	120								

Sheet No. 1 of 2

State **Tennessee** Latitude **35.49526** ° Longitude **89.0012** °

County **Madison** Location **35+32 11' Rt.**

Project Name **SR-223 over Branch** Surface Elevation **380 ft.**

Project Type **Subsurface Investigation** Dated Started **6/8/2019** Completed **6/8/2019**

Driller **F. Woodard** Logged by **F. Woodard** Depth to Water: Immediate

Hole Number **B-2** Total Depth **101.5 ft.** Depth to Water Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
380.0 ft	0		*Ground Line*						
			Very soft to very stiff, brown and gray, sandy silt.		SS-1	2.5 4.0	1.2	1-2-6	SPT
375	5				SS-2	5.0 6.5	1.5	0-0-0	SPT
					ST-1	7.5 9.5	2.0		ST
370	10				SS-2	10.5 12.0	1.1	2-5-12	SPT
			13.5'						
365	15		Very loose, brown and gray, silty sand.		SS-4	15.0 16.5	1.5	2-2-2	SPT
360	20				SS-5	20.0 21.5	1.5	0-0-1	SPT
355	25		25.8'		ST-2	25.0 27.0	1.6		ST
			Very stiff to hard, reddish brown, lean clay.						
350	30				SS-6	30.0 31.5	1.4	9-10-12	SPT
345	35				SS-7	35.0 36.5	1.5	6-11-13	SPT
340	40				SS-8	40.0 41.5	1.3	8-11-19	SPT
335	45				SS-9	45.0 46.5	1.5	12-15-19	SPT
			48.3'						
330	50		Dense to very dense, brown and gray, poorly graded sand with silt.		SS-10	50.0 51.5	1.5	15-18-27	SPT
325	55				SS-11	55.0 56.5	1.5	16-25-38	SPT
320	60								

State **Tennessee** Latitude **35.49526** ° Longitude **89.0012** °

County **Madison** Location **35+32 11' Rt.**

Project Name **SR-223 over Branch** Surface Elevation **380 ft.**

Project Type **Subsurface Investigation** Dated Started **6/8/2019** Completed **6/8/2019**

Driller **F. Woodard** Logged by **F. Woodard** Depth to Water: Immediate

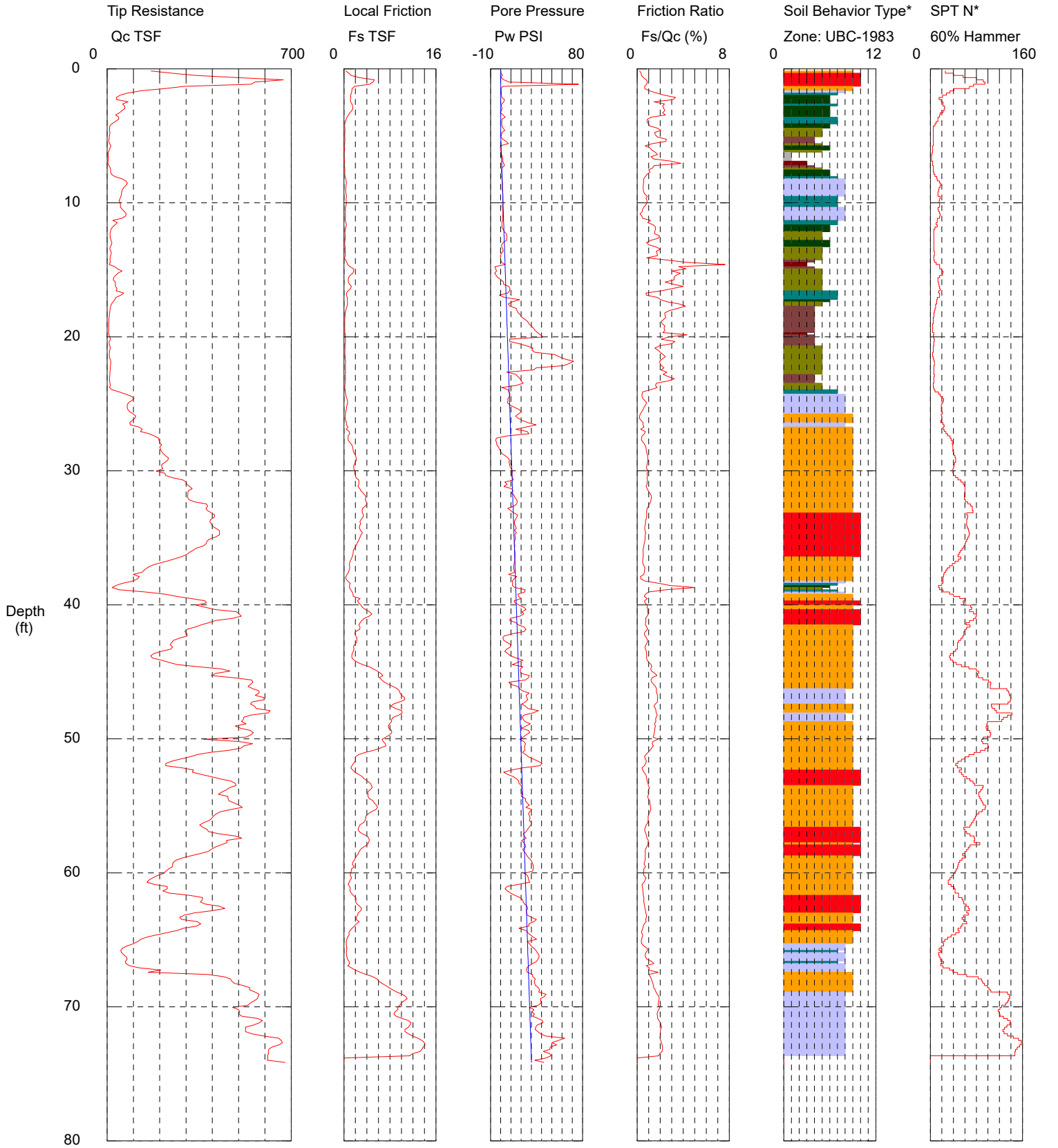
Hole Number **B-2** Total Depth **101.5 ft.** Depth to Water Date Measured

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
320.0 ft	60		*Continued from previous page*						
					SS-12	60.0 61.5	1.4	12-16-22	SPT
315	65				SS-13	65.0 66.5	1.1	9-20-13	SPT
			68.3'						
310	70		Dense to very dense, brown, gray and reddish brown, silty sand.		SS-14	70.0 71.5	1.4	30-45-50/0.4	SPT
305	75				SS-15	75.0 76.5	1.3	12-13-20	SPT
300	80				SS-16	80.0 81.5	1.2	12-24-38	SPT
295	85				SS-17	85.0 86.5	1.2	15-20-25	SPT
290	90				SS-18	90.0 91.5	1.5	14-28-38	SPT
285	95				SS-19	95.0 96.5	1.3	12-18-22	SPT
280	100				SS-20	100.0 101.5	1.5	10-14-18	SPT
			101.5' Boring Terminated @ 101.5' (Elev. 278.5).						
275	105		Boring elevation obtained using Google Earth imagery. Bulk sample obtained from 0.6'-10'.						
270	110								
265	115								
260	120								

Southern Earth Science Inc

Operator: Brandon Green
Sounding: BR6CPT-1
Cone Used: DDG1210
GPS Data: N35.49536 W89.00143

CPT Date/Time: 5/16/2019 3:28:00 PM
Location: BRANCH-MADISON CO.
Job Number: M19-168
Groundwater: Collpased and wet at 4.8-ft.



Maximum Depth = 74.15 feet

Depth Increment = 0.164 feet

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

Refusal: Rod Buckling.

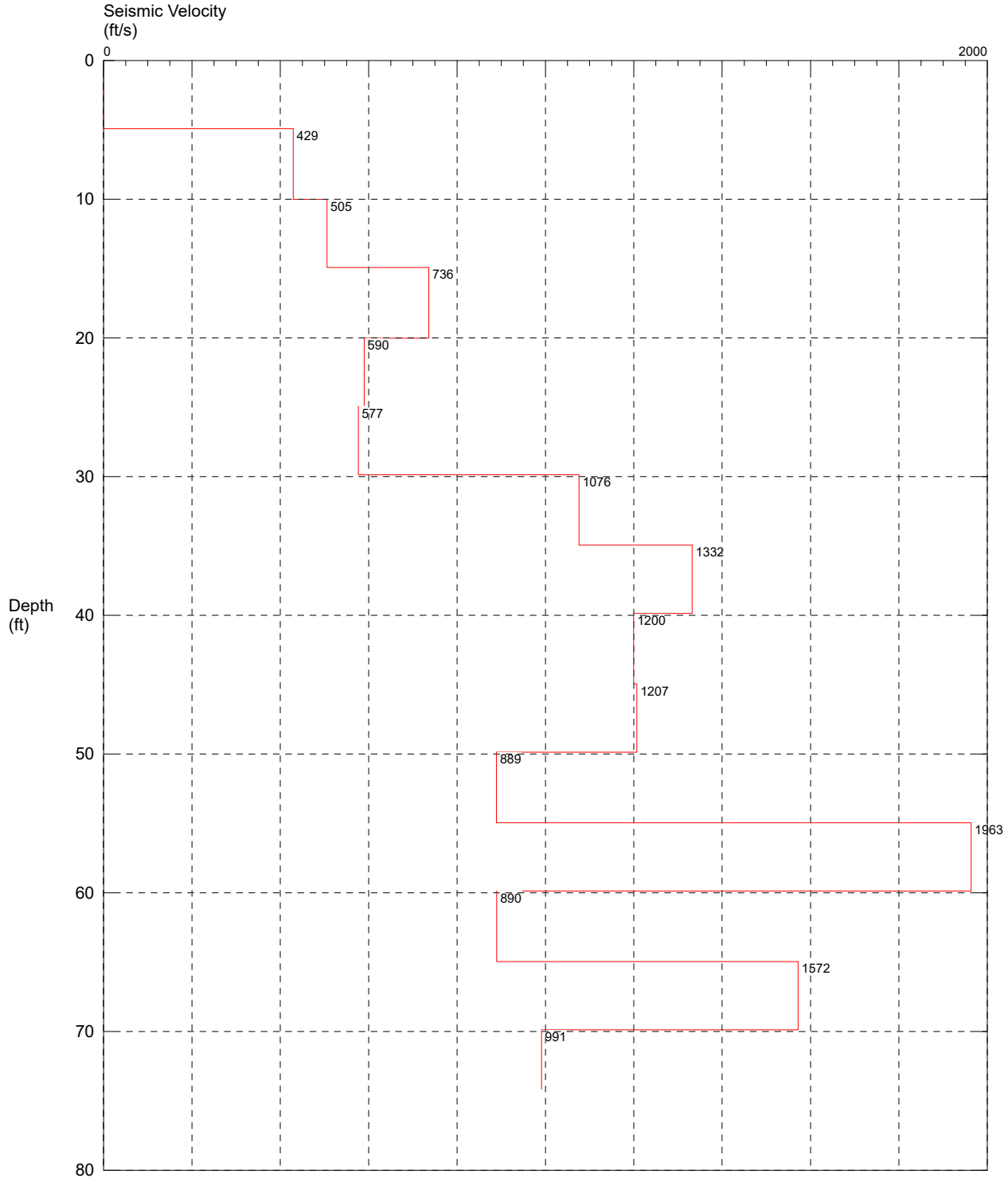
*Soil behavior type and SPT based on data from UBC-1983

SOUNDING

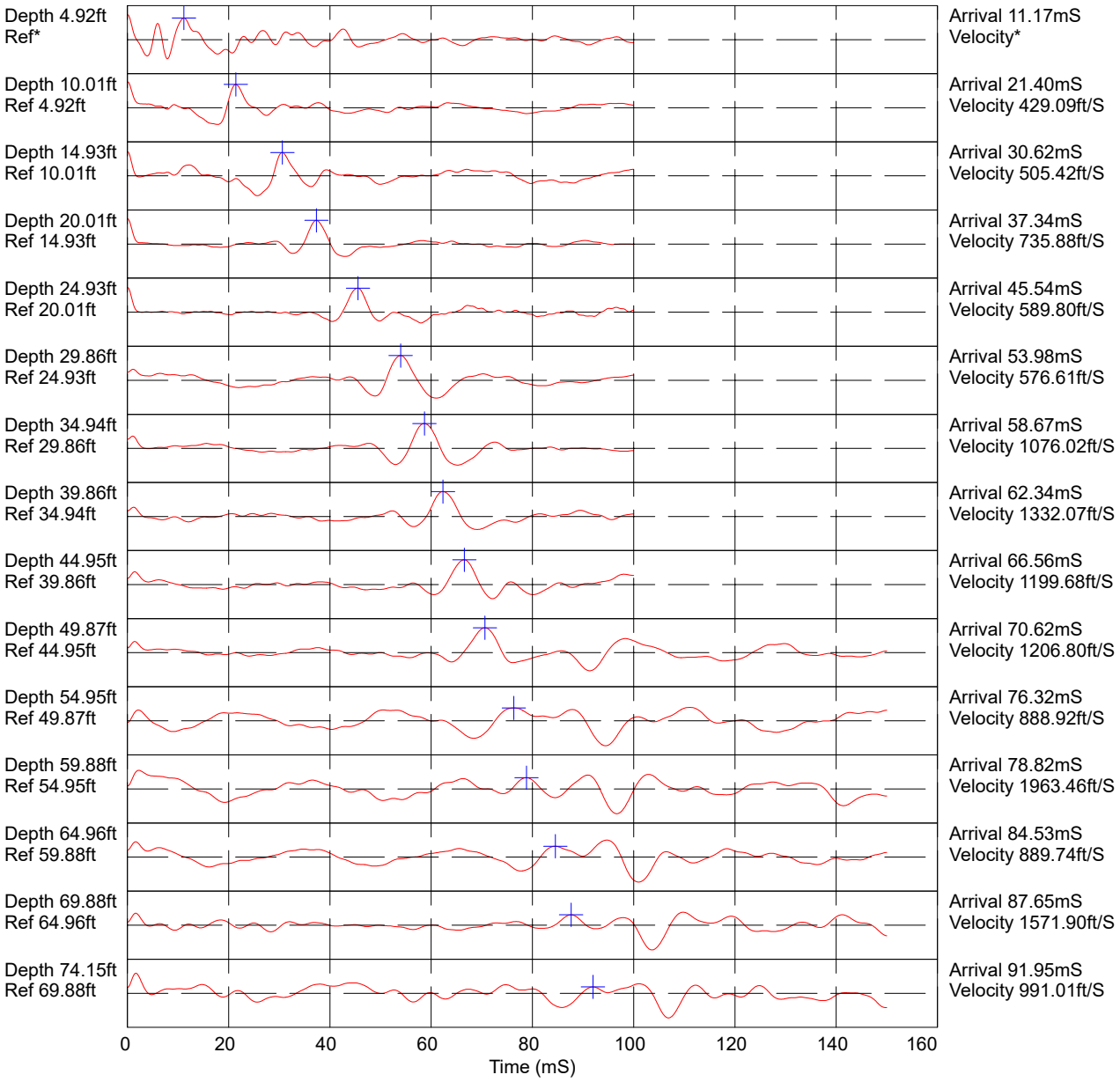
CUSTOMER: Southern Earth Science Inc
OPERATOR: Brandon Green
CONE ID: DDG1210
FILENAME: M19-168BR6CPT-1.cpt

JOB NUMBER: M19-168
HOLE NUMBER: BR6CPT-1
TEST DATE: 5/16/2019 3:28:00 PM

COMMENT:
GPS (LAT,LON,ALT): 0.00,0.00,0.0
LOCATION: BRANCH-MADISON CO.



HOLE NUMBER: BR6CPT-1



Hammer to Rod String Distance (ft): 4.17
* = Not Determined

SEISMIC TEST

Appendix C: Laboratory Testing

Project Name : Region 4 Bridge
Location : Madison County, Tennessee
Job Number : 10168891
Project Job No. : 10168891

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1	B-1		SS-1	2.5	4.0	Brown Sandy Lean Clay		16.4
1			SS-2	5.0	6.5	Brown Sandy Lean Clay		16.3
1			SS-3	7.5	9.0	Brown Sandy Lean Clay		19.1
1			SS-4	10.0	11.5	Brown Sandy Lean Clay		20.5
2			SS-5	15.0	16.5	Brown Sandy Lean Clay		19.3
2			SS-6	20.0	21.5	Brown Sandy Lean Clay		30.3
			ST-1	25.0	27.0			
3			SS-7	30.0	31.5	Reddish Brown Poorly Graded Sand with Silt		23.0
3			SS-8	35.0	36.5	Brown Poorly Graded Sand with Silt		19.0
3			SS-9	40.0	41.5	Brown & Tan Poorly Graded Sand with Silt		20.4
3			SS-10	45.0	46.5	Brown & Gray Poorly Graded Sand with Silt		23.0
4			SS-11	50.0	51.5	Brown & Gray Poorly Graded Sand with Silt		20.6
4			SS-12	55.0	56.5	Reddish Brown Poorly Graded Sand with Silt		25.7
4			SS-13	60.0	61.5	Brown & Grayish Poorly Graded Sand with Silt		21.0
4			SS-14	65.0	66.5	Brown & Gray Poorly Graded Sand with Silt		17.1
5			SS-15	70.0	71.5	Brown & Gray Poorly Graded Sand with Silt		22.7
5			SS-16	75.0	76.5	Brown Poorly Graded Sand with Silt		21.8
5			SS-17	80.0	81.5	Reddish Brown Poorly Graded Sand with Silt		21.1
5			SS-18	85.0	86.5	Brown Poorly Graded Sand with Silt		20.5
5			SS-19	90.0	91.5	Brown Poorly Graded Sand with Silt		22.2
5			SS-20	95.0	96.5	Brown & Gray Poorly Graded Sand with Silt		18.5
5			SS-21	100.0	101.5	Brown & Gray Poorly Graded Sand with Silt		20.7
6	B-2		SS-1	2.5	4.0	Brown Sandy Silt		23.0
6			SS-2	5.0	6.5	Brown Sandy Silt		27.7
			ST-1	7.5	10.5			
6			SS-3	10.5	12.0	Brown & Gray Sandy Silt		19.8
7			SS-4	15.0	16.5	Brown Silty Sand		31.0
7			SS-5	20.0	21.5	Brown & Gray Silty Sand		21.7
			ST-2	25.0	27.0			
8			SS-6	30.0	31.5	Reddish Brown Lean Clay		23.4
8			SS-7	35.0	36.5	Reddish Brown Lean Clay		22.7
8			SS-8	40.0	41.5	Reddish Brown Lean Clay		21.7
8			SS-9	45.0	46.5	Reddish Brown Lean Clay		23.0
9			SS-10	50.0	51.5	Brown & Gray Poorly Graded Sand with Silt		24.4
9			SS-11	55.0	56.5	Brown & Gray Poorly Graded Sand with Silt		21.8
9			SS-12	60.0	61.5	Brown & Gray Poorly Graded Sand with Silt		22.7
9			SS-13	65.0	66.5	Brown & Gray Poorly Graded Sand with Silt		23.1
10			SS-14	70.0	71.5	Brown & Gray Silty Sand		19.8
10			SS-15	75.0	76.5	Brown & Gray Silty Sand		31.1
10			SS-16	80.0	81.5	Gray Silty Sand		18.8
10			SS-17	85.0	86.5	Reddish Brown Silty Sand		21.7
10			SS-18	90.0	91.5	Brown Silty Sand		20.8
10			SS-19	95.0	96.5	Brown & Gray Silty Sand		21.7
10			SS-20	100.0	101.5	Brown Silty Sand		21.7
	B-3		Bulk	0.6	10.0			

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-1
Project County	:	Madison	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 2.5' to 4.0'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown Sandy Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	96.2
No.6		3.35	mm	
No.10		2	mm	94.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	75.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	53.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.051 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 16.4
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 26
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 15
			Plasticity Index	: 11
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.11
Gravel (3in. + No.10)	:	5.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	18.8	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	22.6	AASHTO Classification: M145	: A-6 (3)
Silt + Clay (-No.200)	:	53.1	ASTM Classification: D2487	: CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	3.8
Coarse Sand (-No.4 + No.10)	:	1.7
Medium Sand (-No.10 + No.40)	:	18.8
Fine Sand (-No.40 + No.200)	:	22.6
Silt + Clay (-No.200)	:	53.1

Approved By : Kevin E. Walker

Soil No. 1

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-6
Project County	:	Madison	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 20.0' to 21.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown Sandy Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.7

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	92.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.011 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 30.3
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 31
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 21
			Plasticity Index	: 10
AASHTO Composition of Total Sample: M145			Liquidity Index	: 0.94
Gravel (3in. + No.10)	:	0.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	7.1	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	22.1	AASHTO Classification: M145	: A-4 (5)
Silt + Clay (-No.200)	:	70.5	ASTM Classification: D2487	: CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.3
Medium Sand (-No.10 + No.40)	:	7.1
Fine Sand (-No.40 + No.200)	:	22.1
Silt + Clay (-No.200)	:	70.5

Approved By : Kevin E. Walker

Soil No. 2

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-8
Project County	:	Madison	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 35.0' to 36.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.6
No.6		3.35	mm	
No.10		2	mm	96.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	7.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.212 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	: 19.0
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	: NP
		Plasticity Index	: NP
AASHTO Composition of Total Sample: M145		Liquidity Index	: NA
Gravel (3in. + No.10)	: 3.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 18.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	: 70.9	AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	: 7.5	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 1.4
Coarse Sand (-No.4 + No.10)	: 1.7
Medium Sand (-No.10 + No.40)	: 18.5
Fine Sand (-No.40 + No.200)	: 70.9
Silt + Clay (-No.200)	: 7.5

Approved By : Kevin E. Walker

Soil No. 3

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-12
Project County	:	Madison	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Reddish Brown Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	54.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	5.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.362 mm

CBR	: NA		Natural Moisture (%) (AASHTO T265)	: 25.7
Dry Dens.	: NA		Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	: NA		Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	: 0.0		Activity	: NA
Coarse Sand (-No.10 + No.40)	: 45.4		Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	: 49.5		AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	: 5.1		ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.0
Coarse Sand (-No.4 + No.10)	: 0.0
Medium Sand (-No.10 + No.40)	: 45.4
Fine Sand (-No.40 + No.200)	: 49.5
Silt + Clay (-No.200)	: 5.1

Approved By : Kevin E. Walker

Soil No. 4

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-21
Project County	:	Madison	Sample Loc.	: Boring No. B-1
Project State	:	Tennessee	Sample Depth	: 100.0' to 101.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown & Gray Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	55.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	6.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.348 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 20.7
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	44.4	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	48.7	AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	:	6.9	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	44.4
Fine Sand (-No.40 + No.200)	:	48.7
Silt + Clay (-No.200)	:	6.9

Approved By : Kevin E. Walker

Soil No. 5

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-3
Project County	:	Madison	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 10.5' to 12.0'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown & Gray Sandy Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.8
1/4		6.3	mm	
No.4		4.75	mm	97.1
No.6		3.35	mm	
No.10		2	mm	94.3

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	84.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	61.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.021 mm

CBR	: NA	Natural Moisture (%) (AASHTO T265)	:	19.8
Dry Dens.	: NA	Liquid Limit (AASHTO T89)	:	21
Opt. Moist.	: NA	Plastic Limit (AASHTO T90)	:	18
		Plasticity Index	:	3
AASHTO Composition of Total Sample: M145		Liquidity Index	:	0.47
Gravel (3in. + No.10)	: 5.7	Activity	:	NA
Coarse Sand (-No.10 + No.40)	: 9.7	Sp. Gr. (AASHTO T100)	:	NA
Fine Sand (-No.40 + No.200)	: 22.8	AASHTO Classification: M145	:	A-4 (0)
Silt + Clay (-No.200)	: 61.8	ASTM Classification: D2487	:	ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 2.9
Coarse Sand (-No.4 + No.10)	: 2.8
Medium Sand (-No.10 + No.40)	: 9.7
Fine Sand (-No.40 + No.200)	: 22.8
Silt + Clay (-No.200)	: 61.8

Approved By : Kevin E. Walker

Soil No. 6

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-4
Project County	:	Madison	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 15.0' to 16.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.9
No.6		3.35	mm	
No.10		2	mm	99.6

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	37.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.579 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 31.0
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	62.0	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	14.1	AASHTO Classification: M145	: A-1-b (0)
Silt + Clay (-No.200)	:	23.5	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.1
Coarse Sand (-No.4 + No.10)	:	0.3
Medium Sand (-No.10 + No.40)	:	62.0
Fine Sand (-No.40 + No.200)	:	14.1
Silt + Clay (-No.200)	:	23.5

Approved By : Kevin E. Walker

Soil No. 7

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-7
Project County	:	Madison	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 35.0' to 36.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Reddish Brown Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	99.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	91.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.004 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 22.7
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: 33
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: 23
			Plasticity Index	: 10
AASHTO Composition of Total Sample: M145			Liquidity Index	: -0.02
Gravel (3in. + No.10)	:	0.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	3.9	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	4.6	AASHTO Classification: M145	: A-4 (9)
Silt + Clay (-No.200)	:	91.0	ASTM Classification: D2487	: CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.5
Medium Sand (-No.10 + No.40)	:	3.9
Fine Sand (-No.40 + No.200)	:	4.6
Silt + Clay (-No.200)	:	91.0

Approved By : Kevin E. Walker

Soil No. 8

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-11
Project County	:	Madison	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 55.0' to 56.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Brown & Gray Poorly Graded Sand with Silt		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	6.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.253 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 21.5
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	31.5	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	61.9	AASHTO Classification: M145	: A-3 (0)
Silt + Clay (-No.200)	:	6.6	ASTM Classification: D2487	: SP-SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	31.5
Fine Sand (-No.40 + No.200)	:	61.9
Silt + Clay (-No.200)	:	6.6

Approved By : Kevin E. Walker

Soil No. 9

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SOIL CLASSIFICATION

Project Name	:	TDOT Region 4 Bridge		
Project No.	:	10168891	Sample No.	: SS-19
Project County	:	Madison	Sample Loc.	: Boring No. B-2
Project State	:	Tennessee	Sample Depth	: 95.0' to 96.5'
Laboratory No.	:	10168891	Date Tested	: 06/17/19
Submitted By	:	HDR	Date Reported	: 06/19/19
Soil Type	:	Reddish Brown Silty Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	100.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	99.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

**Method B used for #200 Wash with a soaking time of 1440 minutes*

D50 = 0.143 mm

CBR	:	NA	Natural Moisture (%) (AASHTO T265)	: 21.7
Dry Dens.	:	NA	Liquid Limit (AASHTO T89)	: NP
Opt. Moist.	:	NA	Plastic Limit (AASHTO T90)	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample: M145			Liquidity Index	: NA
Gravel (3in. + No.10)	:	0.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.6	Sp. Gr. (AASHTO T100)	: NA
Fine Sand (-No.40 + No.200)	:	78.9	AASHTO Classification: M145	: A-2-4 (0)
Silt + Clay (-No.200)	:	20.5	ASTM Classification: D2487	: SM

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.0
Coarse Sand (-No.4 + No.10)	:	0.0
Medium Sand (-No.10 + No.40)	:	0.6
Fine Sand (-No.40 + No.200)	:	78.9
Silt + Clay (-No.200)	:	20.5

Approved By : Kevin E. Walker

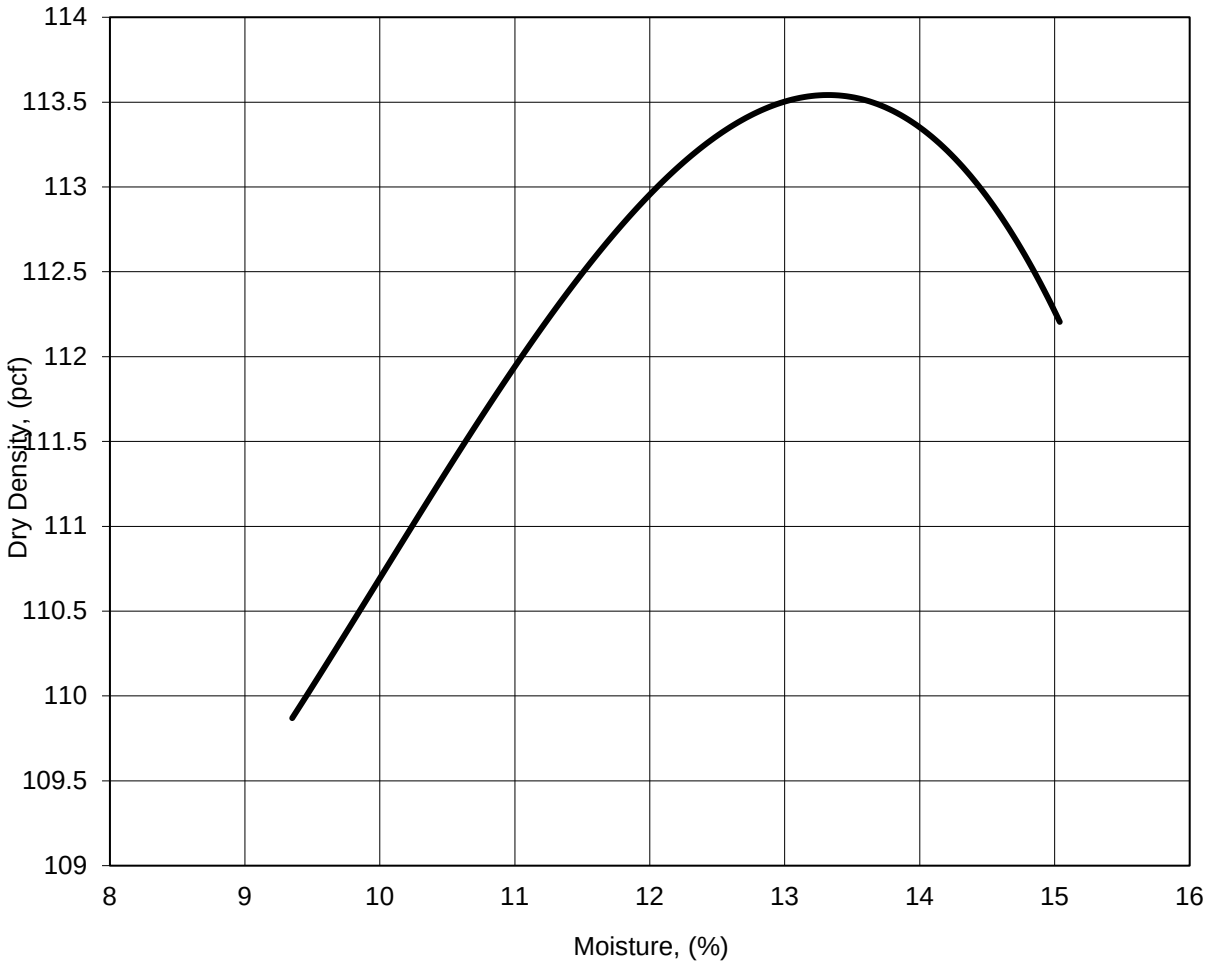
Soil No. 10

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MOISTURE-DENSITY RELATIONSHIP

Project Name	:	TDOT Region 4 Bridge			
Project No.	:	10168891	Sample No.	:	SS-1
Project County	:	Madison	Sample Loc.	:	Boring No. B-1
Project State	:	Tennessee	Sample Depth	:	2.5' to 4.0'
Laboratory No.	:	10168891	Date Tested	:	06/17/19
Submitted By	:	HDR	Date Reported	:	06/19/19
Soil Type	:	Brown Silty Lean Clay			



MAXIMUM DENSITY: 113.5 pcf

OPTIMUM MOISTURE: 13.3 %

COMMENTS: AASHTO: T-99; Method (C)

APPROVED BY: KW

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Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	POINT #	: 1
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 26.0' to 26.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

SOIL TYPE : Brown Sandy Lean Clay

WET DENSITY	: 128.83 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 13.95 cm
DRY DENSITY	: 106.53 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.29 cm
MOISTURE	: 20.93 %	CHAMBER PRES.	: 6.05 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	6.05	6.05	1.00
2	0.09	6.05	9.82	1.62
3	0.19	6.05	11.9	1.97
4	0.28	6.05	12.94	2.14
5	0.38	6.05	14.4	2.38
6	0.47	6.05	14.81	2.45
7	0.56	6.05	16.05	2.65
8	1.13	6.05	23.26	3.85
9	1.69	6.05	30.75	5.08
10	2.26	6.05	37.62	6.22
11	2.82	6.05	42.42	7.01
12	3.39	6.05	47.84	7.91
13	3.76	6.05	50.58	8.36
14	4.70	6.05	55.7	9.21
15	5.64	6.05	58.45	9.67
16	6.58	6.05	59.44	9.83
17	7.52	6.05	60.03	9.93
18	8.47	6.05	59.83	9.89
19	9.41	6.05	59.28	9.8
20	10.35	6.05	58.38	9.65
21	11.29	6.05	57.65	9.53

Table 1 - Laboratory Tests on Soil Samples

HDR-ICA
Region 4 Bridge
Your #10168891, HDR Lab #19-0391LAB
21-Jun-19

Sample ID			B-3 @ 0.6-10
Resistivity		**Units**	
as-received		ohm-cm	8,000
saturated		ohm-cm	8,000
pH			7.4
Electrical Conductivity		mS/cm	na
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	na
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

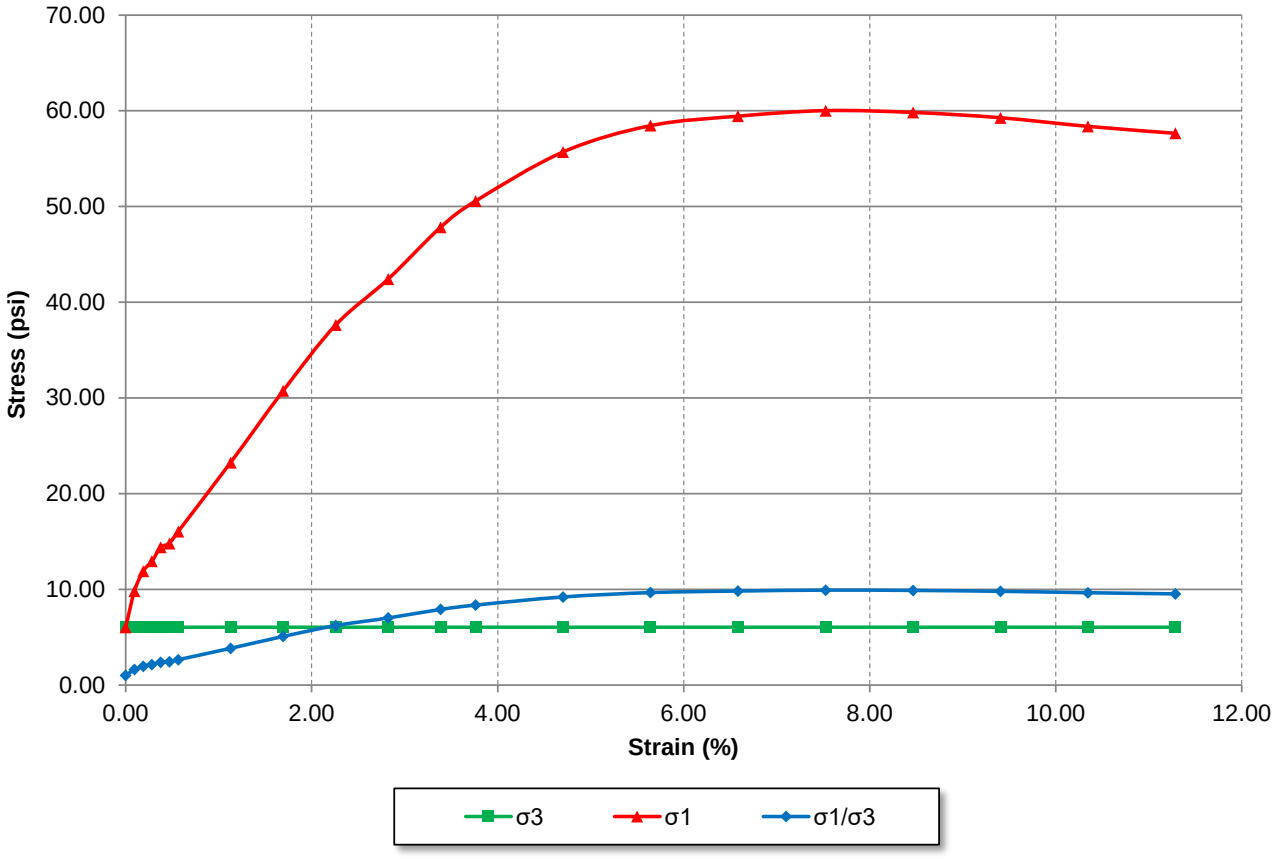
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	POINT #	: 1
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 26.0' to 26.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

FINAL MOISTURE	: 20.93 %	EFF. CONS. STRESS	: 6.05 psi
FINAL HEIGHT	: 10.58 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.2 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-1
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 26.0' to 26.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

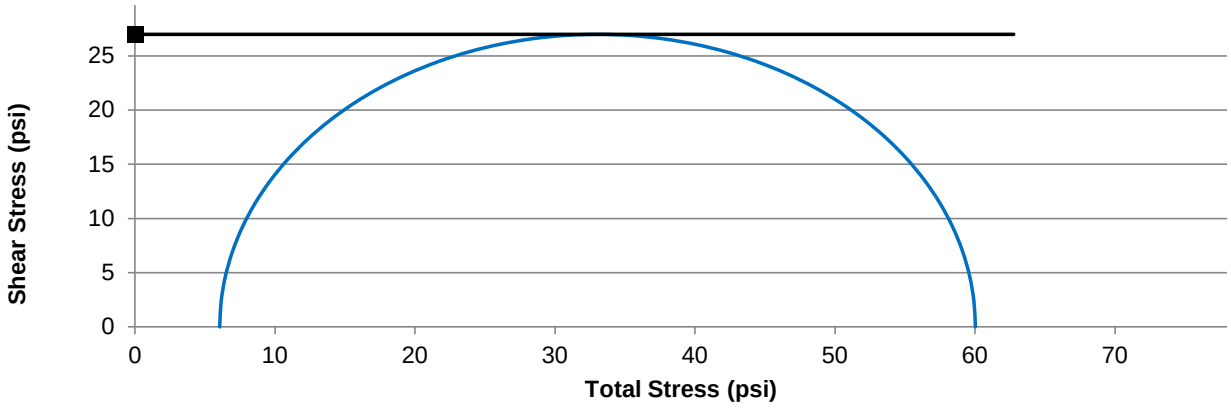
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	6.05 psi	60.03 psi

Compressive Strength =	7773	psf
Cohesion =	3886	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

hdrinc.com

4645 Village Square Drive, Suite F, Paducah, KY 42001
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Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	POINT #	: 1
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 8.0' to 8.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

SOIL TYPE : Brown & Gray Sandy Silt

WET DENSITY	: 121.78 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.17 cm
DRY DENSITY	: 94.49 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.23 cm
MOISTURE	: 28.89 %	CHAMBER PRES.	: 5.05 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	5.05	5.05	1.00
2	0.09	5.05	5.48	1.08
3	0.19	5.05	5.9	1.17
4	0.28	5.05	6.11	1.21
5	0.37	5.05	6.11	1.21
6	0.46	5.05	6.32	1.25
7	0.56	5.05	6.32	1.25
8	1.11	5.05	6.74	1.33
9	1.67	5.05	6.94	1.37
10	2.22	5.05	7.13	1.41
11	2.78	5.05	7.54	1.49
12	3.33	5.05	7.73	1.53
13	3.70	5.05	7.72	1.53
14	4.63	5.05	8.1	1.6
15	5.56	5.05	8.07	1.6
16	6.48	5.05	8.24	1.63
17	7.41	5.05	8.41	1.66
18	8.33	5.05	8.37	1.66
19	9.26	5.05	8.53	1.69
20	10.18	5.05	8.69	1.72
21	11.11	5.05	8.84	1.75
22	12.04	5.05	8.8	1.74
23	12.96	5.05	8.95	1.77
24	13.89	5.05	8.9	1.76
25	14.81	5.05	9.04	1.79
26	15.74	5.05	9	1.78
27	16.67	5.05	9.13	1.81
28	17.59	5.05	9.09	1.8
29	18.52	5.05	9.04	1.79
30	19.44	5.05	9.17	1.82
31	20.37	5.05	9.12	1.81
32	21.29	5.05	9.08	1.8

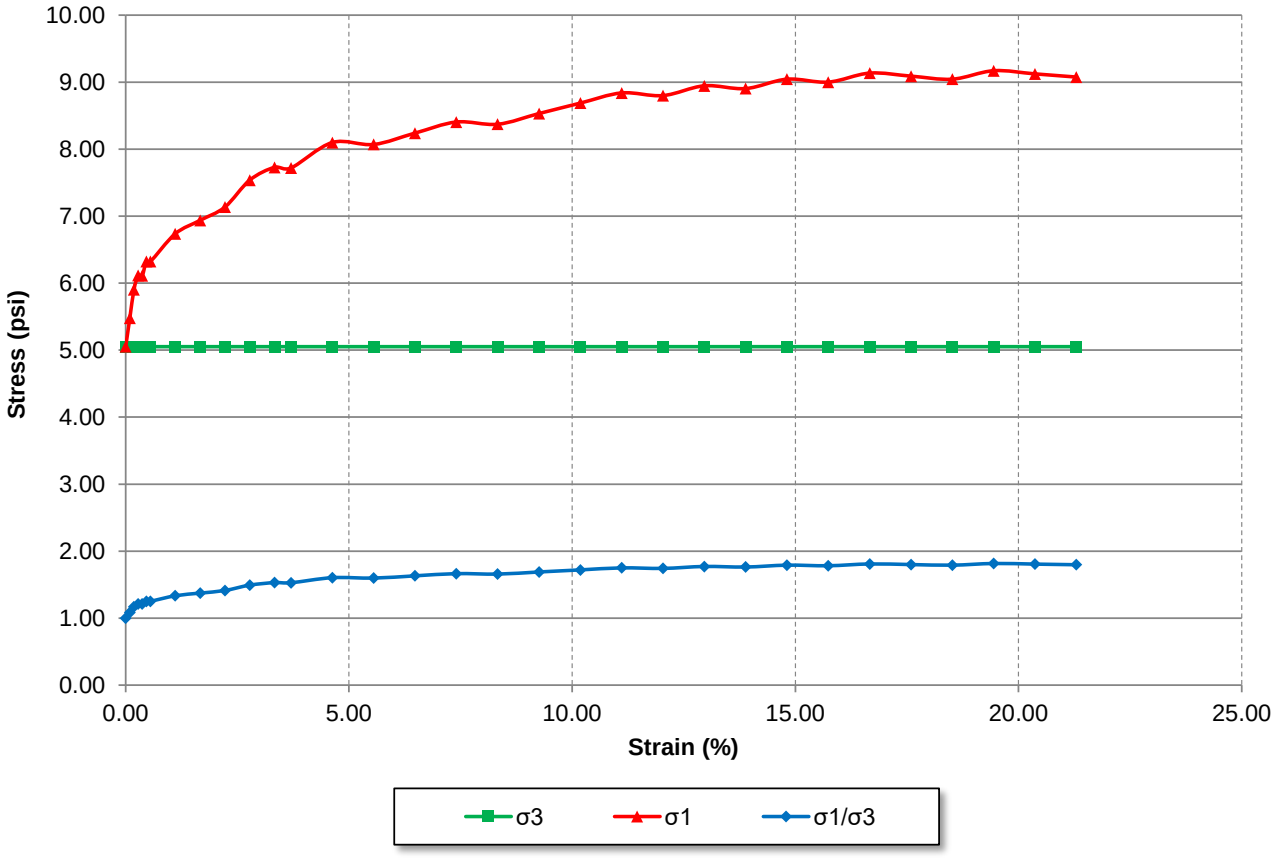
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	POINT #	: 1
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 8.0' to 8.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

FINAL MOISTURE	: 28.89 %	EFF. CONS. STRESS	: 5.05 psi
FINAL HEIGHT	: 10.8 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.11 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 8.0' to 8.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

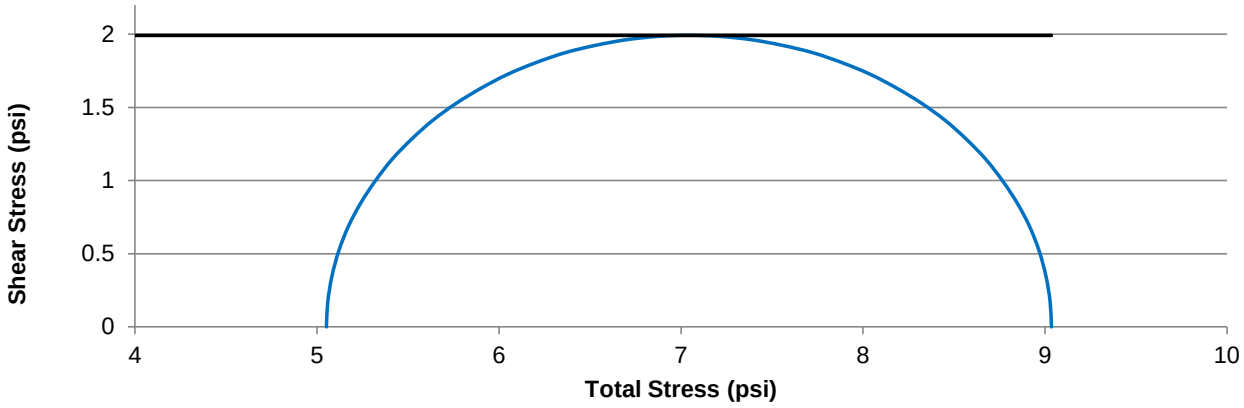
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	5.05 psi	9.04 psi

Compressive Strength =	574	psf
Cohesion =	287	psf
Phi =	0	deg
Tan (Phi) =	0	

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	POINT #	: 1
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 26.0' to 26.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

SOIL TYPE	: Brown Silty Sand				
WET DENSITY	: 127.78 pcf	DELTA HEIGHT	: 0.45 cm	INITIAL HEIGHT	: 14.58 cm
DRY DENSITY	: 102.69 pcf	DELTA VOLUME	: NA	INITIAL DIAMETER	: 7.14 cm
MOISTURE	: 24.43 %	CHAMBER PRES.	: 8.04 psi	COMMENTS	: AASHTO T-296

RESULTS:

	ε a	σ 3 (psi)	σ 1 (psi)	σ1/σ3
1	0.00	8.04	8.04	1.00
2	0.09	8.04	9.57	1.19
3	0.18	8.04	10.44	1.3
4	0.27	8.04	11.09	1.38
5	0.36	8.04	11.52	1.43
6	0.45	8.04	12.17	1.51
7	0.54	8.04	12.82	1.59
8	1.08	8.04	16.25	2.02
9	1.62	8.04	19.86	2.47
10	2.16	8.04	23.87	2.97
11	2.70	8.04	26.76	3.33
12	3.24	8.04	30.87	3.84
13	3.60	8.04	34.32	4.27
14	4.50	8.04	40.67	5.06
15	5.40	8.04	46.2	5.75
16	6.29	8.04	51.74	6.43
17	7.19	8.04	56.48	7.03
18	8.09	8.04	59.3	7.38
19	8.99	8.04	60.72	7.55
20	9.89	8.04	62.1	7.72
21	10.79	8.04	62.67	7.79
22	11.69	8.04	63.2	7.86
23	12.59	8.04	62.81	7.81
24	13.49	8.04	62.07	7.72
25	14.39	8.04	61.34	7.63

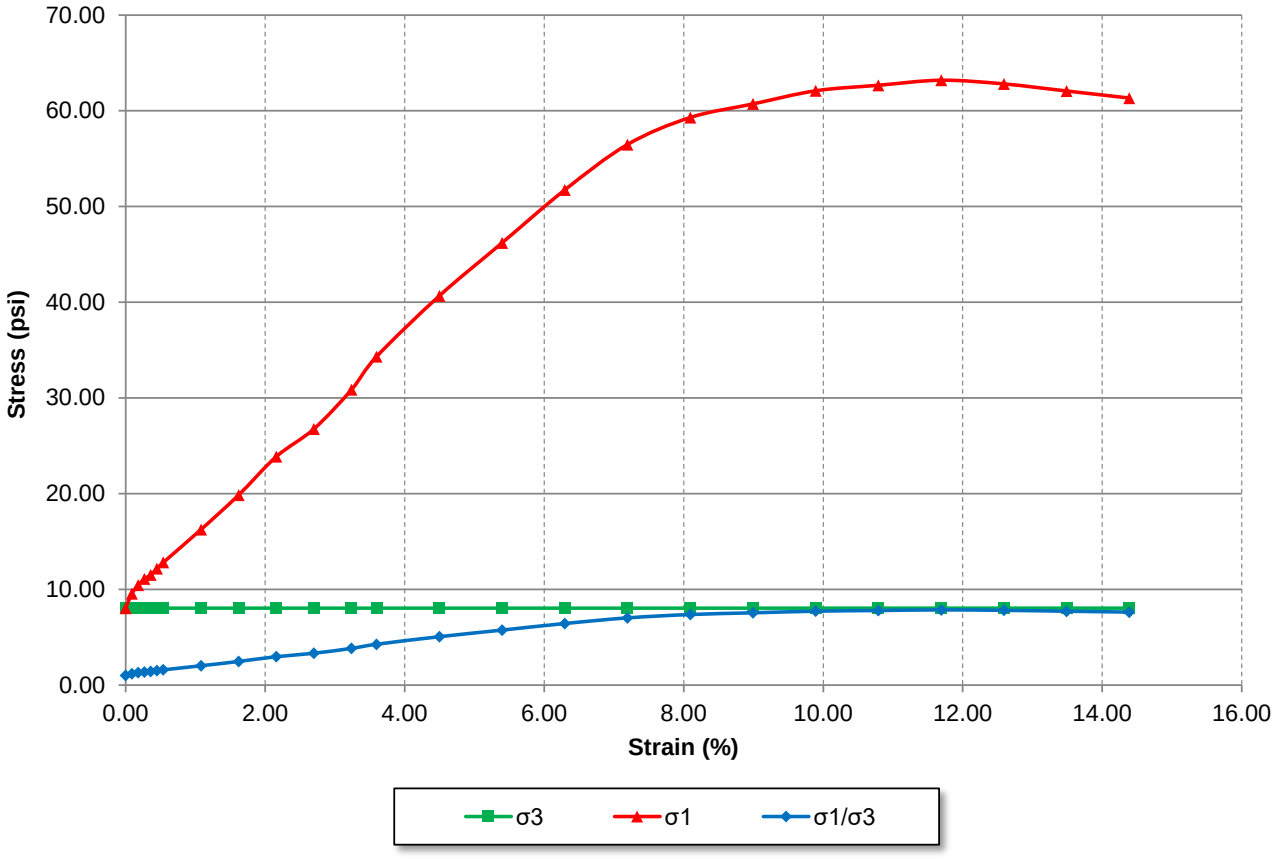
Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	POINT #	: 1
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 26.0' to 26.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

FINAL MOISTURE	: 24.43 %	EFF. CONS. STRESS	: 8.04 psi
FINAL HEIGHT	: 11.2 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 7.99 cm	COMMENTS	: AASHTO T-296

RESULTS:



Unconsolidated Undrained

TRIAXIAL COMPRESSION TEST

PROJECT NAME	: TDOT Region 4 Bridge		
PROJECT #	: 10168891	COMMENTS	: AASHTO T-296
PROJECT COUNTY	: Madison	SAMPLE LOC.	: B-2
PROJECT STATE	: Tennessee	SAMPLE DEPTH	: 26.0' to 26.5'
LABORATORY #	: 10168891	DATE TESTED	: 6/17/2019
SUBMITTED BY	: HDR	DATE REPORTED	: 6/19/2019

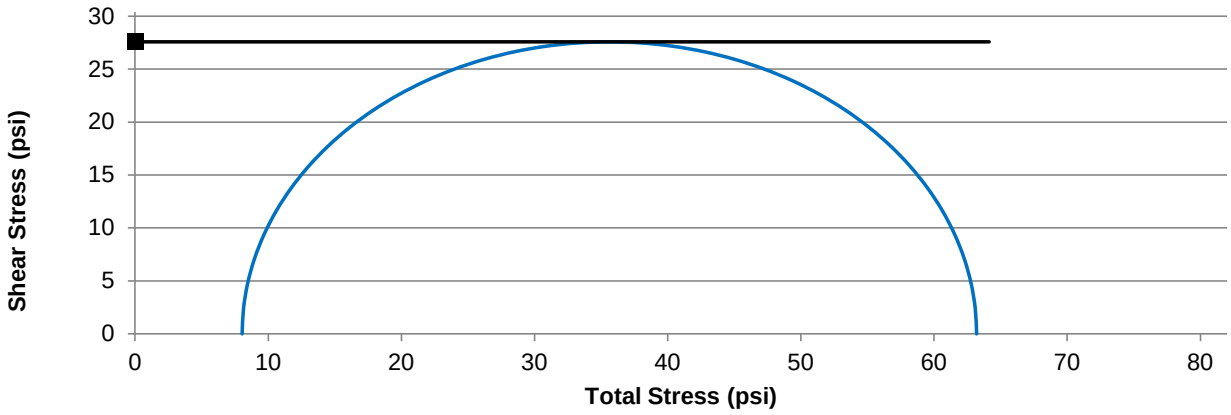
COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total
1	8.04 psi	63.2 psi

Compressive Strength =	7943	psf
Cohesion =	3971	psf
Phi =	0	deg
Tan (Phi) =	0	

Maximum Deviator Stress

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Kevin E. Walker

Appendix D: Preliminary Soil Shear Strength Loss Analysis

TABLE OF CONTENTS

M19-168BR6CPT-1 results

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HDR
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Paducah, KY 42001

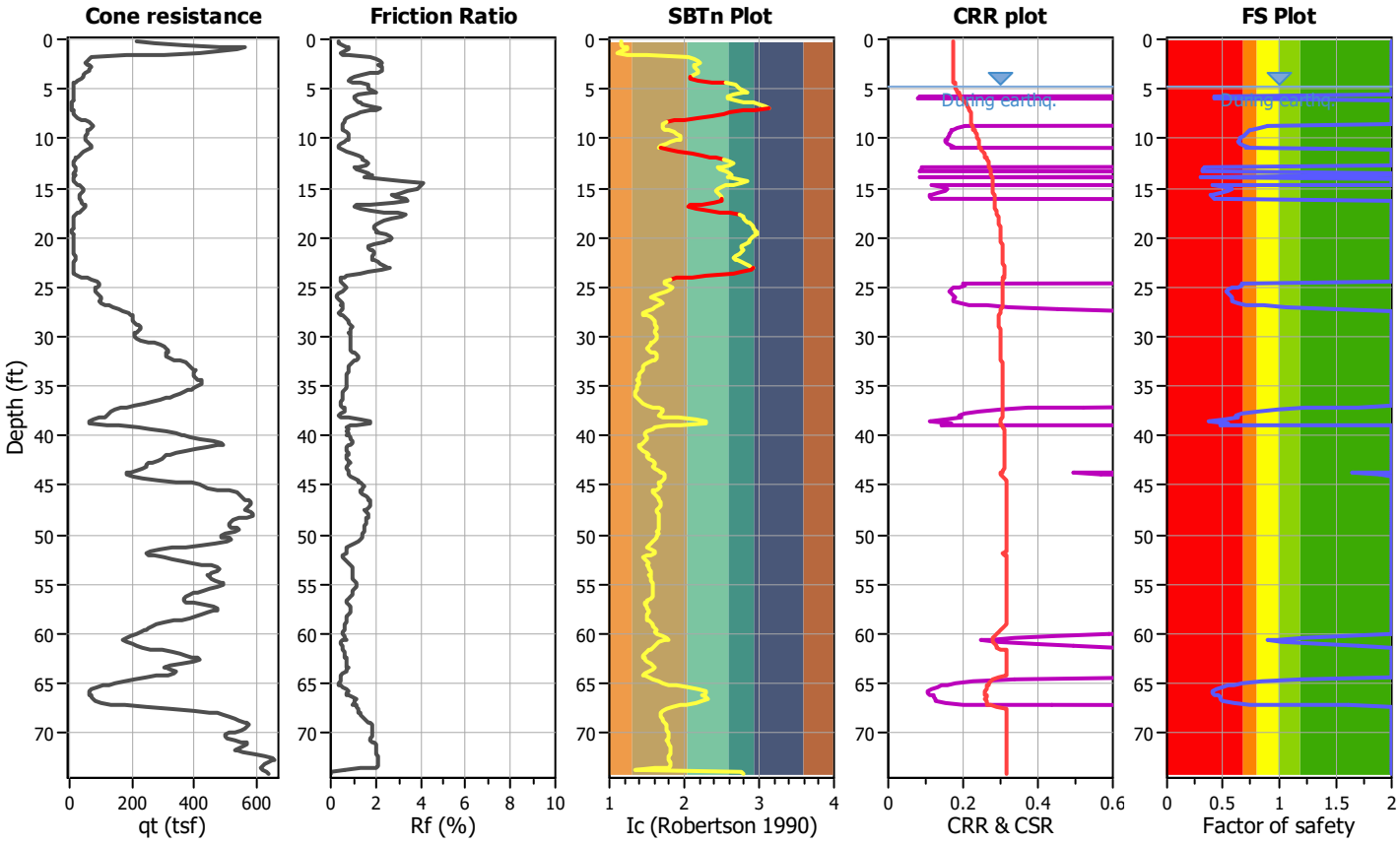
LIQUEFACTION ANALYSIS REPORT

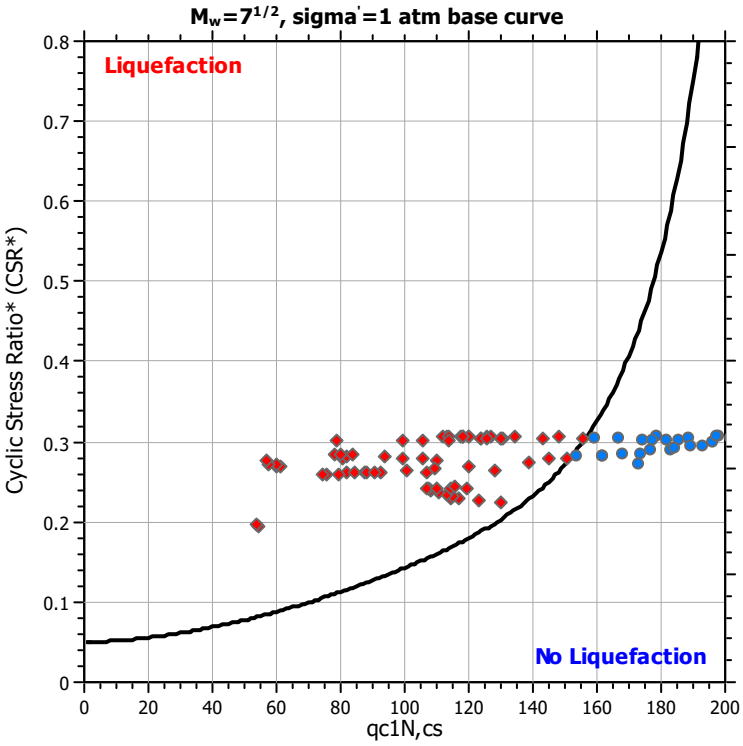
Project title : Bridge 6 - TDOT Region 4 Bridge Bundle **Location : Madison County, TN**

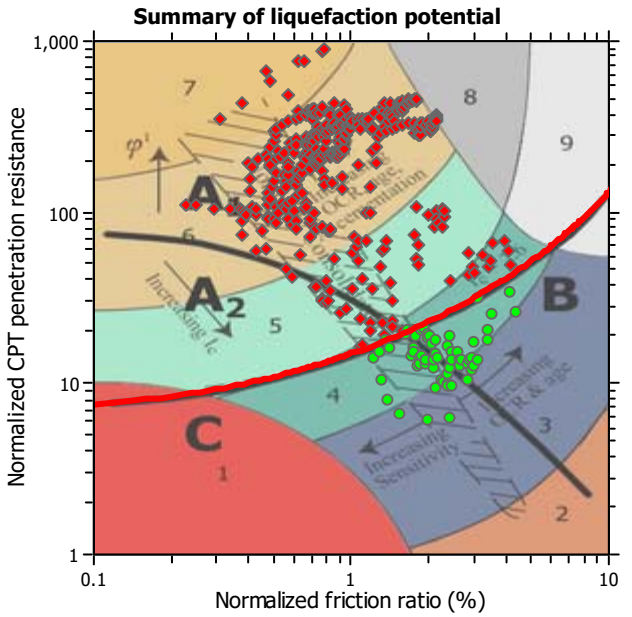
CPT file : M19-168BR6CPT-1

Input parameters and analysis data

Analysis method:	I&B (2008)	G.W.T. (in-situ):	4.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	4.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.04	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.33	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

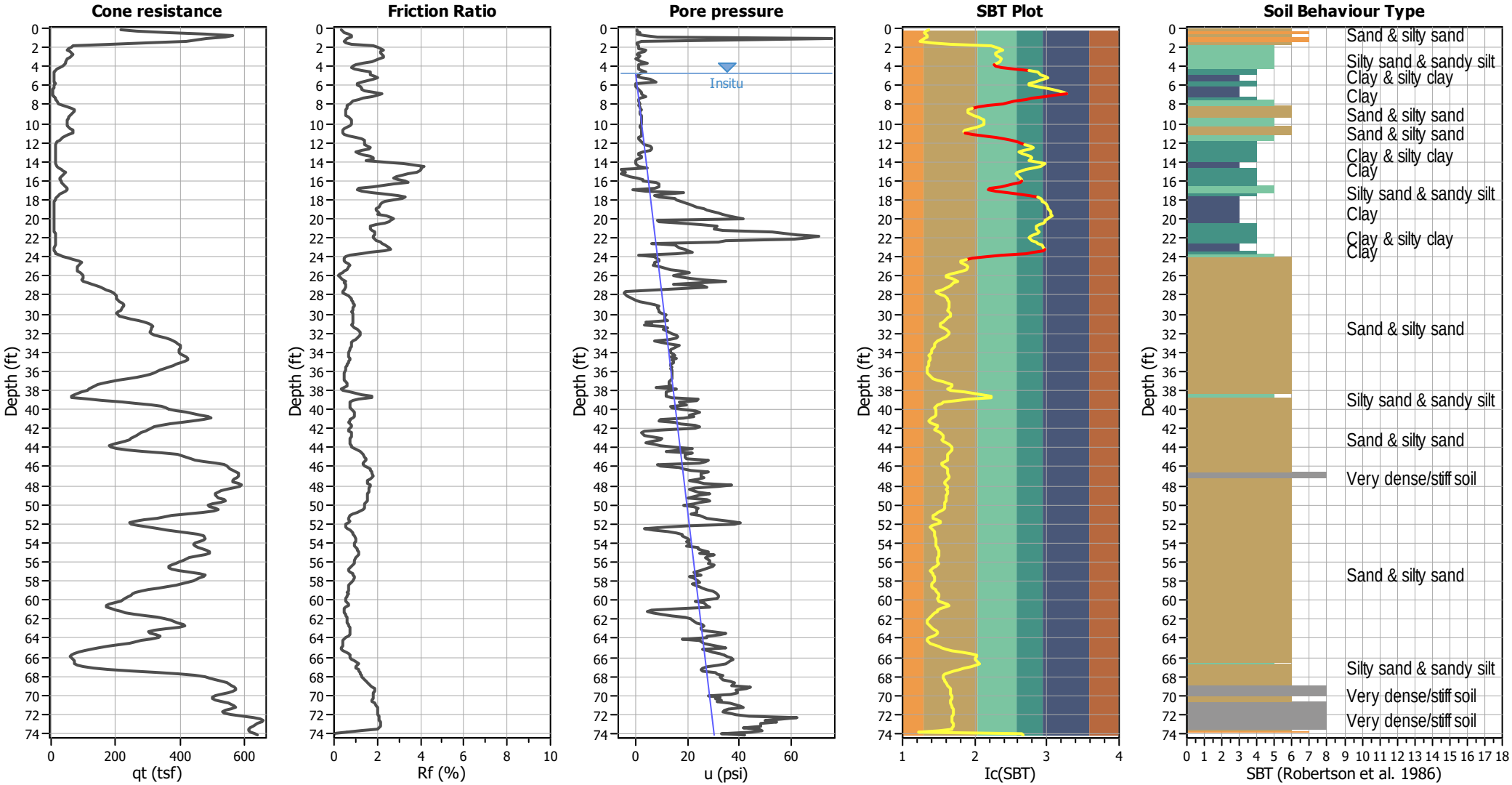






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



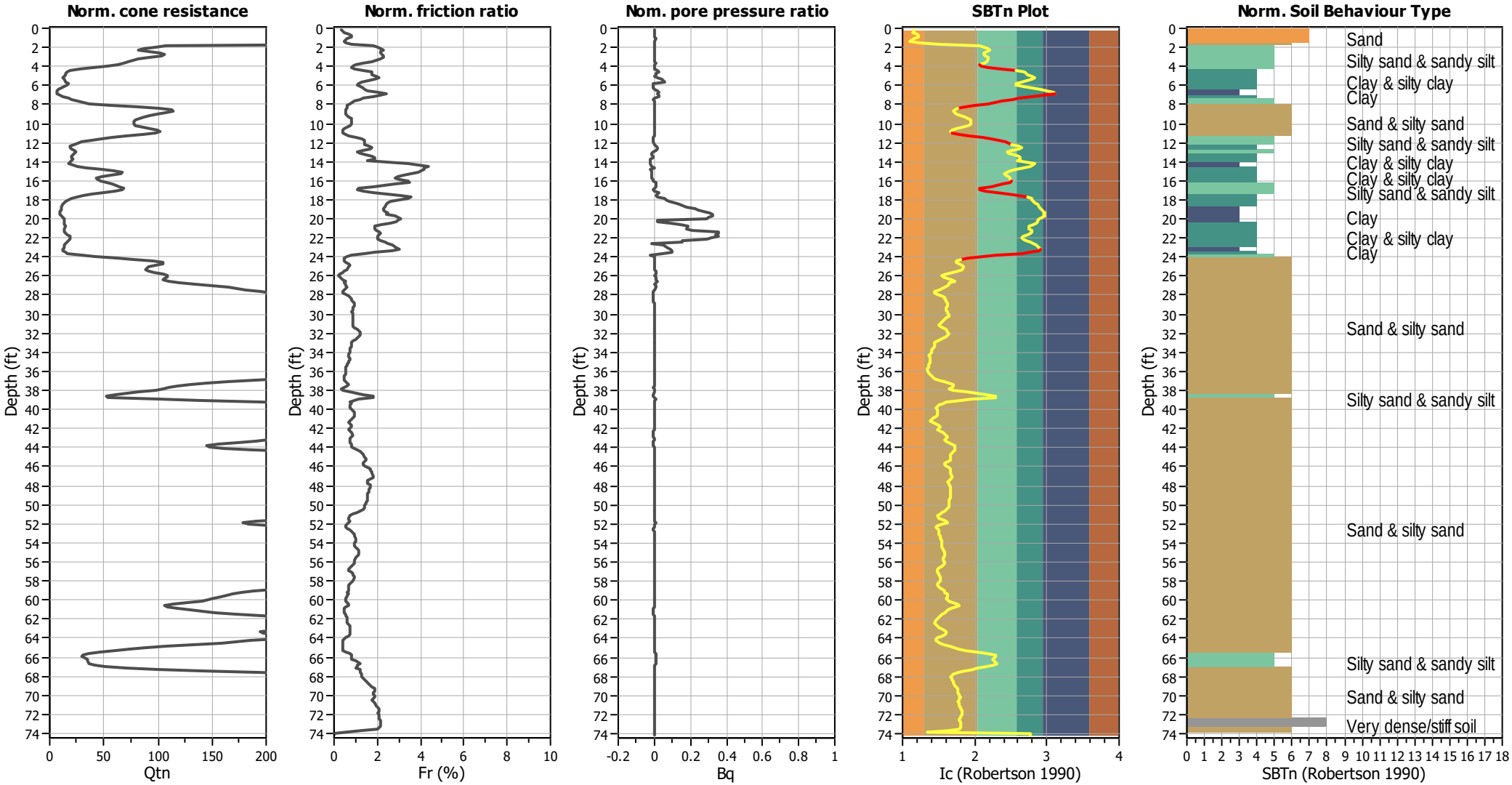
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	4.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.04	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

CPT basic interpretation plots (normalized)



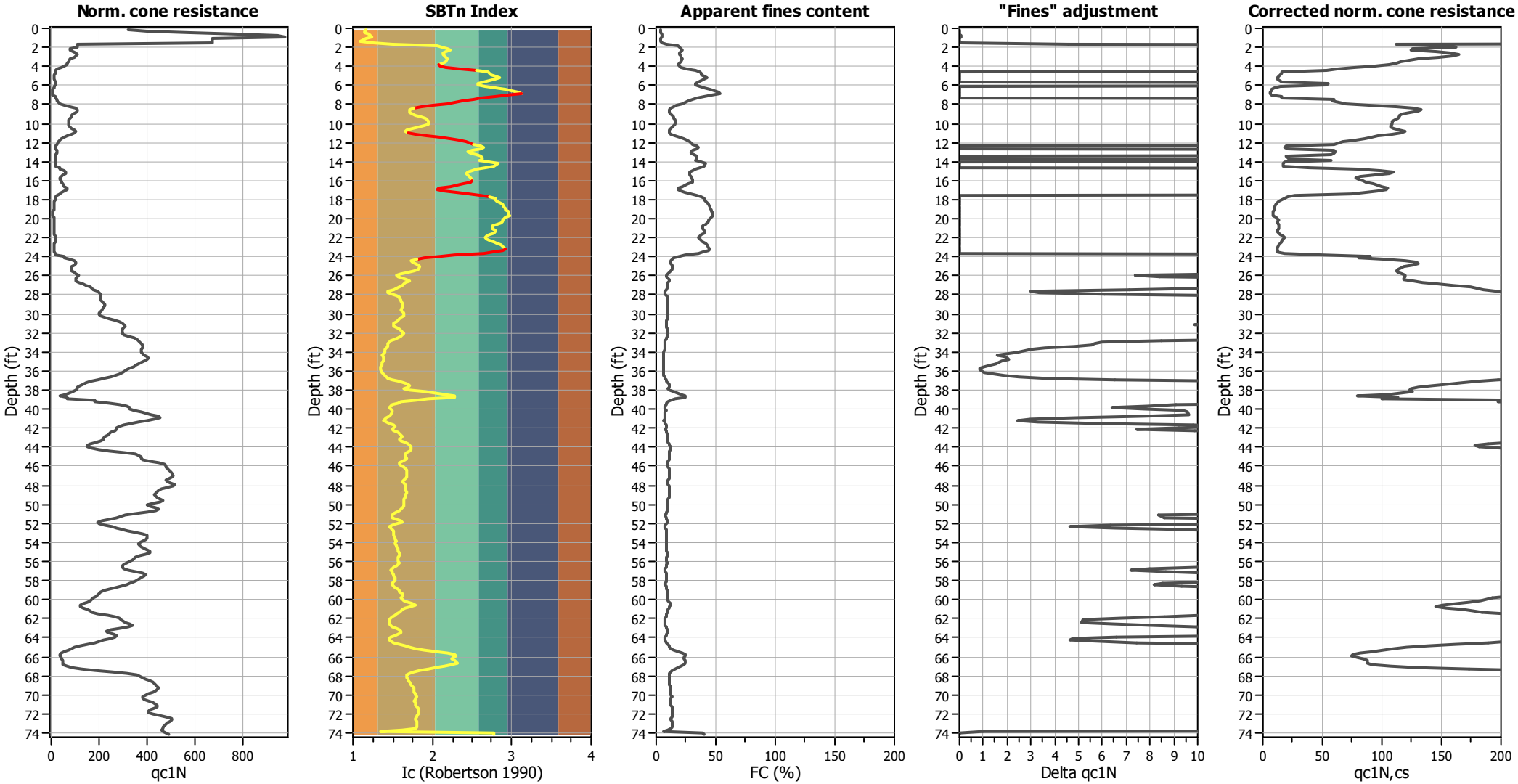
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	4.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.04	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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

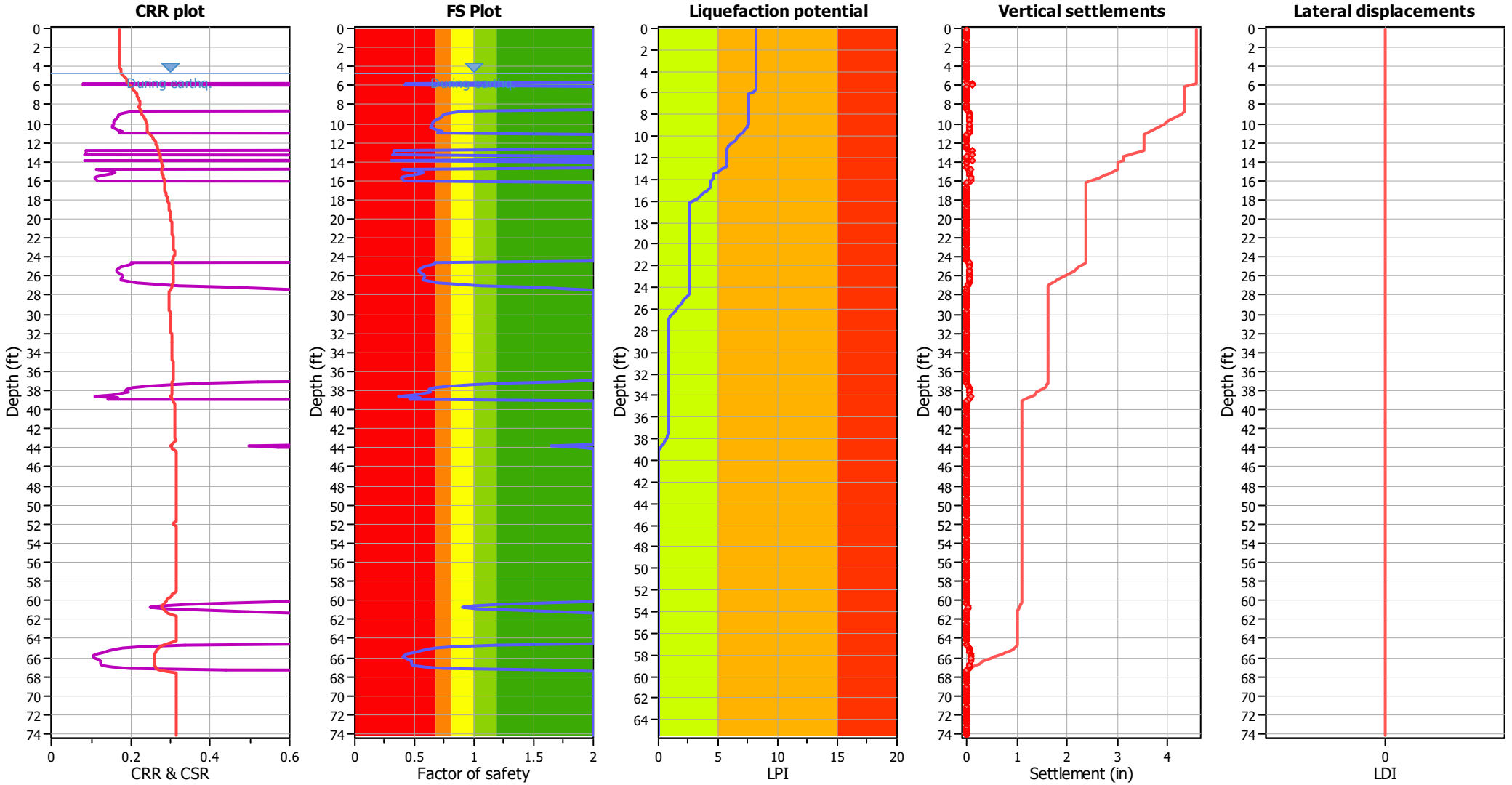
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	4.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.04	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	4.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.04	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.80 ft	Fill height:	N/A	Limit depth:	N/A

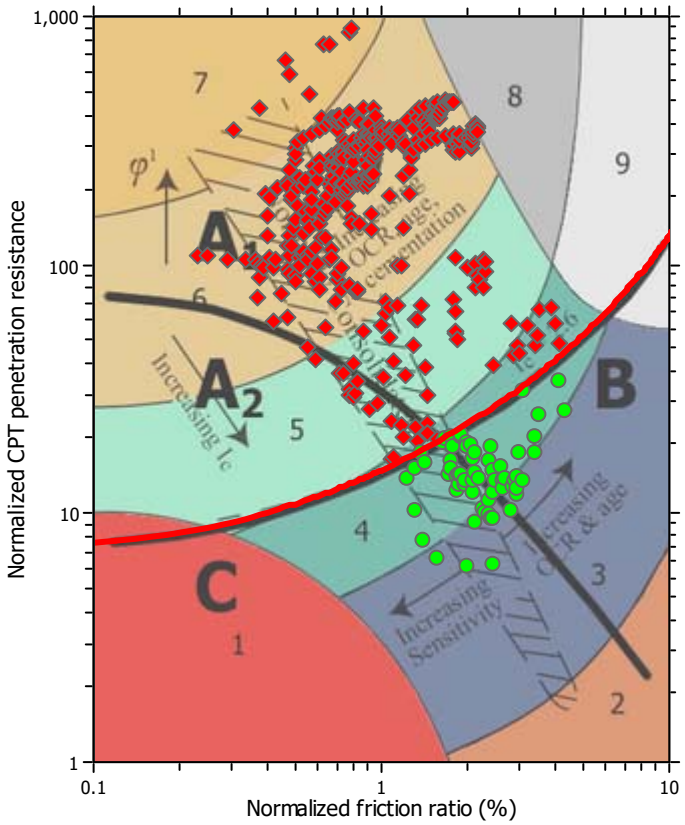
F.S. color scheme

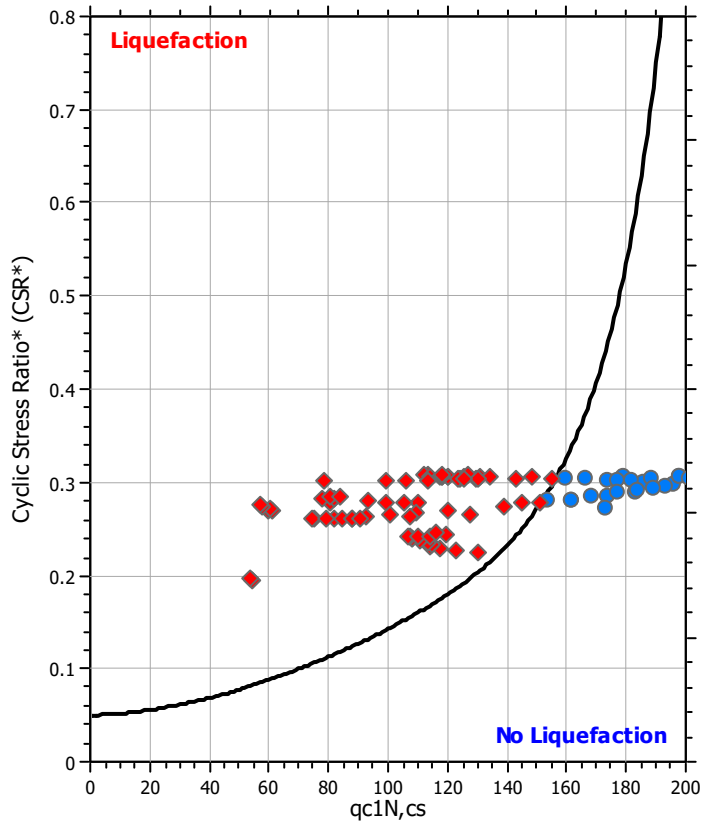
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

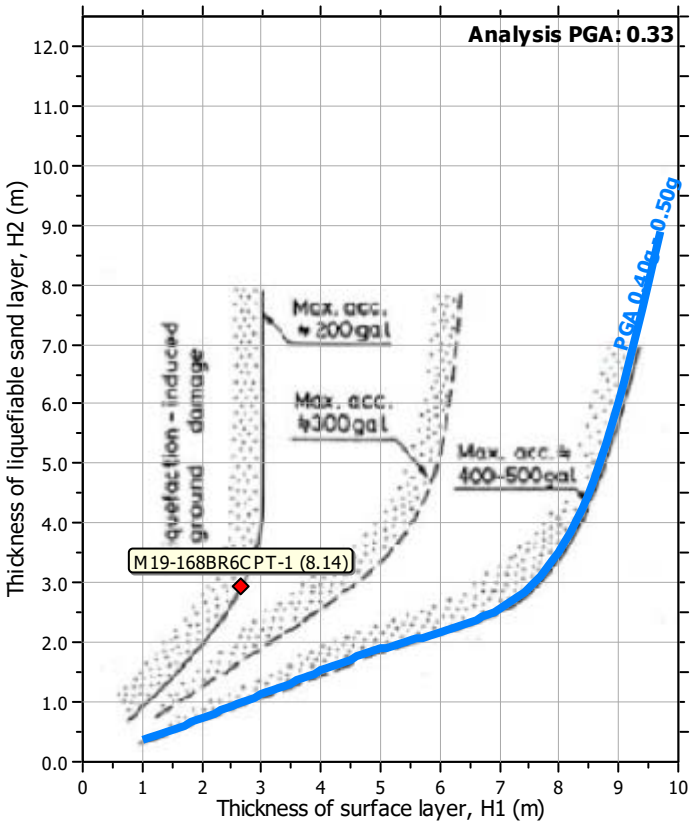
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



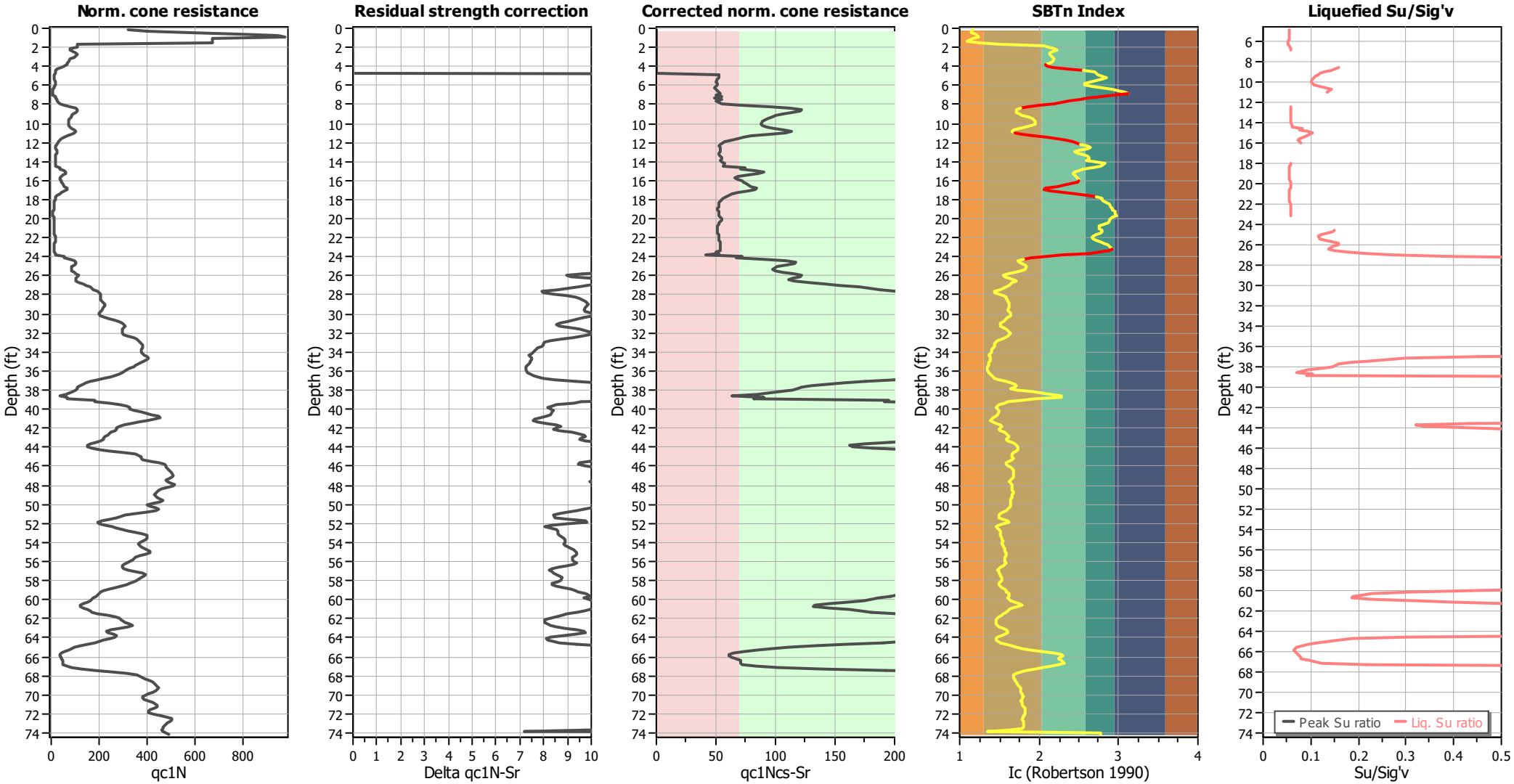




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	4.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.04	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.80 ft	Fill height:	N/A	Limit depth:	N/A

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



Input parameters and analysis data

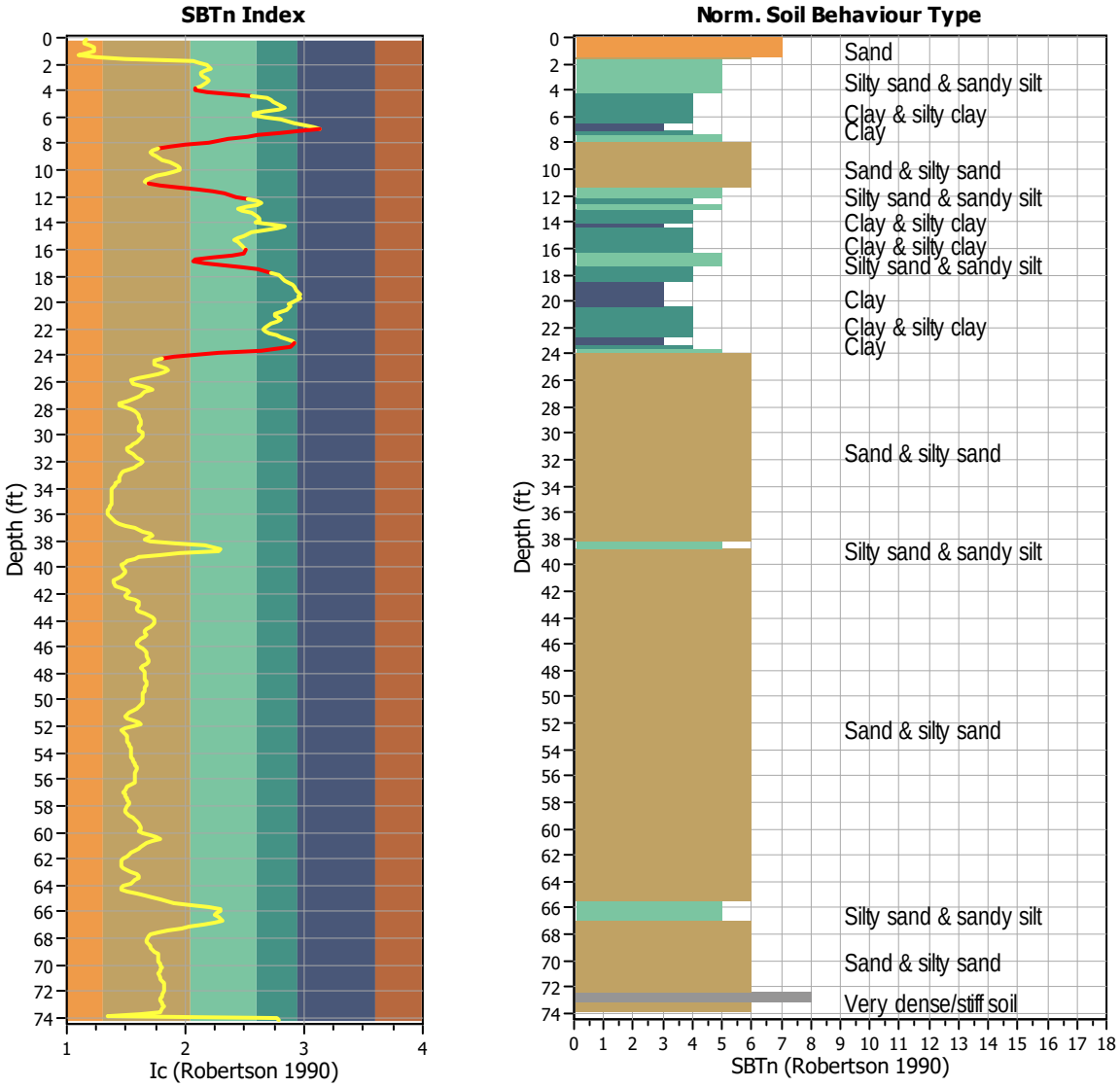
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	4.80 ft	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.04	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.33	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between 1.80 < I_c < 3.0) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	452
I_c maximum check value:	3.00	Total points excluded:	42
I_c change ratio value:	0.0250	Exclusion percentage:	9.29%
Minimum number of points in layer:	4	Number of layers detected:	6

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 3.94 (ft)	5	Silty sand & sandy silt
		End depth: 4.59 (ft)	4	Clay & silty clay
Transition layer 2	10	Start depth: 7.05 (ft)	3	Clay
		End depth: 8.53 (ft)	6	Sand & silty sand
Transition layer 3	8	Start depth: 11.15 (ft)	6	Sand & silty sand
		End depth: 12.30 (ft)	4	Clay & silty clay
Transition layer 4	4	Start depth: 16.24 (ft)	4	Clay & silty clay
		End depth: 16.73 (ft)	5	Silty sand & sandy silt
Transition layer 5	7	Start depth: 16.90 (ft)	5	Silty sand & sandy silt
		End depth: 17.88 (ft)	4	Clay & silty clay
Transition layer 6	8	Start depth: 23.29 (ft)	3	Clay
		End depth: 24.44 (ft)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	199.25	0.38	0.12	0.00	120.39
2	0.33	248.03	1.24	0.22	0.00	123.99
3	0.49	356.70	1.42	1.53	0.00	128.77
4	0.66	486.16	2.61	0.18	0.00	133.72
5	0.82	590.44	5.43	3.06	0.00	136.55
6	0.98	607.63	5.15	8.22	0.00	136.06
7	1.15	417.14	1.94	76.02	0.00	133.39
8	1.31	417.14	1.94	1.96	0.00	129.83
9	1.48	417.14	1.94	0.27	0.00	128.04
10	1.64	67.15	1.20	0.41	2.82	125.70
11	1.80	67.15	1.20	0.67	14.61	121.89
12	1.97	67.15	1.20	0.71	16.45	121.66
13	2.13	48.09	1.21	1.17	18.45	121.19
14	2.30	47.29	1.11	3.71	19.55	120.95
15	2.46	57.75	1.16	2.95	17.96	121.57
16	2.62	64.74	1.39	1.06	16.70	122.59
17	2.79	68.19	1.50	0.58	16.88	123.38
18	2.95	65.45	1.56	1.27	17.43	123.27
19	3.12	58.82	1.37	0.65	18.31	122.27
20	3.28	50.29	1.06	-0.40	18.80	120.39
21	3.44	44.00	0.80	2.28	18.17	118.00
22	3.61	42.81	0.56	4.42	16.61	115.46
23	3.77	41.02	0.39	1.00	15.12	112.70
24	3.94	34.89	0.28	0.95	15.51	109.77
25	4.10	24.97	0.20	0.92	18.27	106.41
26	4.27	15.98	0.13	1.14	24.81	104.07
27	4.43	11.24	0.17	2.31	33.60	103.08
28	4.59	9.78	0.19	3.89	40.12	103.20
29	4.76	9.80	0.17	1.25	41.48	102.59
30	4.92	9.34	0.14	0.77	42.35	101.87
31	5.09	8.27	0.15	0.15	46.02	101.87
32	5.25	7.37	0.18	1.93	48.30	101.79
33	5.41	7.87	0.15	5.18	45.35	101.66
34	5.58	9.79	0.13	7.44	37.77	100.53
35	5.74	11.58	0.10	-0.29	33.99	100.43
36	5.91	11.32	0.13	-0.27	34.24	99.99
37	6.07	9.06	0.11	-0.15	39.07	99.14
38	6.23	6.39	0.08	0.36	45.89	96.87
39	6.40	4.88	0.07	0.80	52.92	94.62
40	6.56	4.42	0.06	1.66	58.68	93.81
41	6.73	4.09	0.07	1.98	64.46	94.77
42	6.89	3.88	0.10	1.93	67.16	96.48
43	7.05	4.67	0.12	2.87	54.79	99.36
44	7.22	9.80	0.15	3.77	46.02	101.05
45	7.38	9.80	0.15	1.26	35.63	102.37
46	7.55	14.50	0.15	0.70	31.78	102.58
47	7.71	14.50	0.15	0.72	25.06	103.16
48	7.87	21.13	0.15	1.27	18.79	104.85

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	34.00	0.20	0.77	13.02	107.98
50	8.20	51.01	0.31	1.27	9.47	111.10
51	8.37	65.79	0.39	1.33	7.53	113.24
52	8.53	73.33	0.42	1.79	6.52	113.94
53	8.69	72.66	0.38	1.61	6.22	113.61
54	8.86	67.29	0.34	1.59	6.41	112.71
55	9.02	61.45	0.31	1.55	7.03	112.01
56	9.19	57.36	0.31	1.89	8.02	112.03
57	9.35	54.78	0.36	2.05	9.52	112.95
58	9.51	52.25	0.46	2.01	10.54	113.25
59	9.68	49.84	0.38	2.07	11.32	113.31
60	9.84	48.28	0.39	2.19	11.51	112.99
61	10.01	48.30	0.42	2.31	11.50	112.94
62	10.17	49.64	0.37	1.54	10.50	112.36
63	10.33	52.71	0.29	1.53	8.74	111.44
64	10.50	58.58	0.27	1.81	5.00	110.91
65	10.66	66.14	0.28	2.05	5.00	110.24
66	10.83	71.34	0.19	2.04	5.00	110.51
67	10.99	67.37	0.29	1.95	5.00	110.38
68	11.15	56.57	0.28	1.85	7.95	110.75
69	11.32	43.27	0.27	2.10	11.19	111.00
70	11.48	35.85	0.38	1.16	15.85	111.53
71	11.65	30.10	0.43	1.17	20.11	111.62
72	11.81	25.11	0.35	1.24	23.74	110.25
73	11.98	18.67	0.25	2.32	27.30	107.88
74	12.14	14.26	0.20	3.33	31.52	105.36
75	12.30	11.99	0.17	5.46	36.02	104.60
76	12.47	11.68	0.22	5.95	37.69	104.80
77	12.63	12.85	0.23	5.86	35.56	105.09
78	12.80	14.79	0.18	5.68	31.09	104.38
79	12.96	15.95	0.14	2.46	28.35	103.52
80	13.12	15.24	0.16	0.83	29.56	103.82
81	13.29	13.65	0.20	0.91	32.94	104.59
82	13.45	12.88	0.21	2.11	35.87	105.53
83	13.62	13.52	0.25	2.27	36.69	106.22
84	13.78	14.05	0.26	0.36	36.50	106.43
85	13.94	13.55	0.23	-0.06	34.86	104.69
86	14.11	12.20	0.10	-0.20	41.56	107.11
87	14.27	11.47	0.51	0.06	48.00	109.09
88	14.44	11.47	0.51	0.70	44.62	114.50
89	14.60	27.28	1.06	4.33	38.92	116.87
90	14.76	27.28	1.06	-5.74	33.54	120.36
91	14.93	38.81	1.66	-5.05	30.54	121.96
92	15.09	46.19	1.71	-4.07	28.26	123.06
93	15.26	43.70	1.55	-5.87	27.14	122.10
94	15.42	36.19	1.09	-4.35	27.92	120.02
95	15.58	29.02	0.80	-2.70	29.09	117.71
96	15.75	26.78	0.76	0.51	29.85	116.52

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	28.25	0.76	2.83	30.32	117.12
98	16.08	30.53	0.98	2.73	31.02	118.65
99	16.24	32.34	1.28	7.72	30.11	119.77
100	16.40	36.94	1.15	9.07	26.05	119.48
101	16.57	43.83	0.72	8.66	19.83	117.72
102	16.73	50.88	0.48	6.94	15.09	115.25
103	16.90	50.34	0.42	-1.44	14.66	114.68
104	17.06	43.30	0.60	3.77	17.57	115.00
105	17.22	33.64	0.62	18.26	22.90	115.29
106	17.39	25.68	0.62	11.15	29.27	114.84
107	17.55	20.09	0.64	7.22	36.07	114.01
108	17.72	15.76	0.57	9.02	41.83	112.68
109	17.88	13.09	0.43	15.15	45.19	110.54
110	18.04	11.46	0.31	15.87	46.08	108.06
111	18.21	10.26	0.24	17.02	46.68	105.86
112	18.37	9.15	0.21	19.21	48.42	104.36
113	18.54	8.22	0.19	20.62	50.54	103.20
114	18.70	7.57	0.16	23.59	52.00	102.13
115	18.86	7.16	0.14	26.47	52.78	101.24
116	19.03	6.90	0.14	27.51	53.79	100.90
117	19.19	6.73	0.15	29.80	55.06	100.94
118	19.36	6.59	0.15	32.04	56.18	100.97
119	19.52	6.45	0.15	33.41	55.70	100.87
120	19.69	6.82	0.14	35.96	56.55	102.89
121	19.85	8.06	0.27	38.63	53.86	104.67
122	20.01	9.63	0.27	41.44	51.98	106.18
123	20.18	10.32	0.26	8.50	50.47	106.32
124	20.34	9.80	0.27	8.79	50.66	105.98
125	20.51	9.47	0.24	17.61	49.52	105.22
126	20.67	9.94	0.19	25.24	46.22	104.26
127	20.83	10.65	0.18	31.50	43.77	103.61
128	21.00	10.42	0.18	30.50	43.69	103.35
129	21.16	9.62	0.17	33.63	45.19	103.37
130	21.33	9.27	0.19	52.82	46.10	103.91
131	21.49	10.17	0.22	57.15	44.60	104.93
132	21.65	11.94	0.24	62.36	41.77	106.12
133	21.82	13.64	0.27	71.15	39.32	106.94
134	21.98	14.30	0.28	67.22	38.37	107.33
135	22.15	14.00	0.27	61.54	39.30	107.34
136	22.31	13.17	0.28	34.85	41.01	107.06
137	22.47	12.43	0.26	32.05	44.06	106.96
138	22.64	11.61	0.28	5.98	46.21	106.46
139	22.80	10.79	0.24	14.75	49.34	106.27
140	22.97	9.96	0.26	16.76	51.74	106.18
141	23.13	9.67	0.28	18.90	53.04	106.18
142	23.29	9.93	0.25	19.97	51.26	105.38
143	23.46	10.08	0.18	21.92	43.25	104.43
144	23.62	14.70	0.17	15.40	37.67	103.67

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	14.70	0.17	1.10	21.79	105.78
146	23.95	45.69	0.22	7.25	15.76	107.27
147	24.11	45.69	0.22	7.79	5.00	109.67
148	24.28	68.48	0.29	9.01	5.00	111.64
149	24.44	86.96	0.38	8.59	5.00	114.21
150	24.61	95.60	0.50	6.93	6.94	116.28
151	24.77	93.49	0.63	7.05	7.83	117.54
152	24.93	86.05	0.66	6.54	8.77	117.59
153	25.10	79.32	0.55	9.27	9.12	116.69
154	25.26	76.94	0.45	13.20	8.61	115.41
155	25.43	79.74	0.41	17.94	5.00	114.31
156	25.59	87.21	0.34	20.40	5.00	113.28
157	25.75	96.69	0.27	17.31	4.43	111.99
158	25.92	103.23	0.22	14.57	3.49	110.72
159	26.08	102.58	0.20	17.03	3.73	111.34
160	26.25	96.26	0.33	21.04	4.83	113.20
161	26.41	92.70	0.44	26.59	5.00	114.81
162	26.57	97.67	0.44	34.56	6.44	116.90
163	26.74	110.02	0.71	24.51	5.00	116.90
164	26.90	123.68	0.39	14.71	5.15	119.00
165	27.07	137.43	0.88	25.74	4.64	120.34
166	27.23	154.49	1.02	27.57	4.16	121.63
167	27.40	172.56	0.74	6.13	3.01	121.41
168	27.56	187.75	0.72	-4.26	2.00	120.72
169	27.72	196.30	0.74	-4.99	2.08	121.87
170	27.89	200.42	1.07	-4.10	2.68	123.58
171	28.05	202.15	1.36	-3.80	3.49	125.22
172	28.22	202.38	1.52	-2.30	4.00	126.12
173	28.38	203.35	1.58	-1.33	4.25	126.60
174	28.54	206.23	1.65	-0.05	4.40	127.09
175	28.71	212.90	1.82	1.24	4.55	127.77
176	28.87	221.19	2.02	4.24	4.65	128.46
177	29.04	227.66	2.12	7.17	4.73	128.91
178	29.20	227.72	2.15	8.56	4.68	128.85
179	29.36	222.18	1.97	8.17	4.59	128.38
180	29.53	214.86	1.77	8.65	4.50	127.72
181	29.69	207.70	1.69	9.03	4.60	127.34
182	29.86	203.71	1.74	10.21	4.92	127.42
183	30.02	202.03	1.87	11.57	5.05	127.63
184	30.18	209.33	1.85	11.16	4.96	128.06
185	30.35	224.69	2.01	10.99	4.46	128.51
186	30.51	248.36	2.09	11.35	4.18	129.58
187	30.68	272.87	2.58	12.39	3.81	130.44
188	30.84	292.41	2.63	4.01	3.52	131.08
189	31.00	305.43	2.58	6.19	3.04	131.05
190	31.17	312.35	2.43	3.20	2.92	131.25
191	31.33	315.04	2.77	10.43	3.08	131.61
192	31.50	312.87	2.95	11.98	3.65	132.37

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	308.85	3.33	10.52	4.27	133.04
194	31.82	305.07	3.68	13.01	4.84	133.64
195	31.99	305.97	3.83	13.76	4.97	133.91
196	32.15	315.88	3.70	15.58	4.76	134.13
197	32.32	335.65	3.91	16.10	4.33	134.38
198	32.48	358.42	4.01	15.67	3.82	134.53
199	32.64	373.13	3.73	12.66	3.15	134.19
200	32.81	379.94	3.24	6.89	2.56	133.66
201	32.97	385.21	3.16	9.85	2.19	133.33
202	33.14	394.23	3.23	12.64	2.12	133.50
203	33.30	401.94	3.41	16.53	2.08	133.66
204	33.46	403.24	3.32	15.66	1.96	133.50
205	33.63	398.75	3.01	14.50	1.73	133.00
206	33.79	394.26	2.78	13.37	1.61	132.64
207	33.96	394.69	2.90	13.42	1.46	132.39
208	34.12	401.03	2.71	14.31	1.33	132.36
209	34.28	411.31	2.70	15.24	1.17	132.40
210	34.45	421.88	2.89	13.58	1.26	132.90
211	34.61	427.76	3.22	15.32	1.30	133.14
212	34.78	425.13	2.97	13.70	1.32	133.05
213	34.94	413.89	2.80	14.21	1.23	132.51
214	35.10	399.58	2.65	14.28	1.22	131.99
215	35.27	387.76	2.47	13.49	1.18	131.40
216	35.43	378.08	2.26	13.59	1.10	130.76
217	35.60	366.49	2.09	13.80	1.00	129.99
218	35.76	351.11	1.85	13.50	0.92	129.13
219	35.93	335.44	1.65	13.69	0.93	128.36
220	36.09	321.10	1.61	13.92	1.05	127.83
221	36.25	307.15	1.56	13.97	1.26	127.38
222	36.42	288.93	1.44	14.08	1.47	126.68
223	36.58	265.68	1.28	13.65	1.70	125.59
224	36.75	237.07	1.07	13.66	2.09	124.33
225	36.91	207.43	0.96	13.12	2.83	123.35
226	37.07	181.31	0.99	12.66	3.98	122.92
227	37.24	161.46	1.02	12.62	5.16	122.49
228	37.40	144.85	0.91	12.90	6.13	121.83
229	37.57	131.59	0.84	14.01	6.39	120.29
230	37.73	121.89	0.57	7.59	5.00	118.12
231	37.89	119.83	0.35	15.56	5.00	115.74
232	38.06	114.31	0.37	13.06	5.00	116.12
233	38.22	99.20	0.67	11.42	10.64	118.91
234	38.39	70.30	1.10	11.60	17.65	120.11
235	38.55	44.45	1.00	11.40	22.05	121.04
236	38.71	73.94	1.18	13.62	21.86	121.25
237	38.88	73.94	1.18	23.95	11.59	123.85
238	39.04	201.21	1.57	23.48	7.71	125.31
239	39.21	201.21	1.57	16.90	4.35	126.84
240	39.37	263.64	1.62	17.30	3.90	128.91

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	315.44	2.81	19.79	2.88	130.25
242	39.70	348.36	2.38	13.09	2.62	131.46
243	39.86	360.23	2.58	13.99	2.35	131.73
244	40.03	361.41	2.98	17.89	2.56	132.51
245	40.19	378.72	3.19	22.81	2.74	133.56
246	40.35	415.58	3.77	24.86	2.67	134.79
247	40.52	464.83	4.46	20.75	2.57	136.00
248	40.68	497.39	4.86	22.49	2.28	136.48
249	40.85	503.57	4.37	18.68	1.87	135.97
250	41.01	480.24	3.50	9.45	1.52	134.80
251	41.17	441.88	3.11	8.81	1.43	133.48
252	41.34	402.60	2.78	14.91	1.69	132.52
253	41.50	368.31	2.59	17.23	2.24	132.02
254	41.67	339.67	2.79	22.97	2.91	131.78
255	41.83	317.65	2.73	24.67	3.17	131.14
256	41.99	306.68	2.07	22.96	2.93	130.09
257	42.16	302.58	1.86	11.92	2.68	129.26
258	42.32	296.58	2.06	3.19	3.07	129.40
259	42.49	281.88	2.24	2.13	3.82	129.77
260	42.65	263.89	2.28	2.94	4.47	129.74
261	42.81	251.61	2.16	6.34	4.60	129.16
262	42.98	247.79	1.82	9.85	4.33	128.34
263	43.14	245.74	1.66	9.41	4.20	127.73
264	43.31	234.81	1.75	5.71	4.54	127.33
265	43.47	212.87	1.62	3.95	5.27	126.79
266	43.64	188.15	1.44	6.93	6.02	125.96
267	43.80	174.24	1.38	9.26	6.50	125.41
268	43.96	177.44	1.39	15.01	6.73	125.98
269	44.13	196.47	1.75	21.69	6.76	127.69
270	44.29	228.41	2.39	16.87	6.63	130.19
271	44.46	277.95	3.25	11.37	6.31	132.93
272	44.62	342.97	4.46	21.55	5.72	135.17
273	44.78	400.92	5.20	19.19	5.38	136.87
274	44.95	427.93	5.90	19.13	5.36	137.28
275	45.11	427.77	6.35	19.32	5.62	137.28
276	45.28	435.25	6.72	27.88	5.39	137.28
277	45.44	469.94	6.23	27.03	4.83	137.28
278	45.60	514.56	6.69	24.41	4.21	137.28
279	45.77	541.77	7.08	8.03	4.17	137.28
280	45.93	547.06	7.72	9.42	4.46	137.28
281	46.10	547.48	8.46	16.59	4.97	137.28
282	46.26	554.91	9.27	18.22	5.38	137.28
283	46.42	564.84	9.72	21.22	5.53	137.28
284	46.59	573.57	9.76	27.80	5.55	137.28
285	46.75	580.38	10.00	24.93	5.63	137.28
286	46.92	585.13	10.55	25.42	5.79	137.28
287	47.08	580.81	10.59	26.44	5.80	137.28
288	47.24	567.28	9.64	23.90	5.52	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	555.63	8.55	20.71	5.05	137.28
290	47.57	560.31	8.13	24.22	4.82	137.28
291	47.74	579.79	8.99	26.24	4.95	137.28
292	47.90	597.56	10.10	36.82	5.24	137.28
293	48.06	593.93	10.13	31.70	5.42	137.28
294	48.23	568.71	9.42	22.79	5.39	137.28
295	48.39	539.46	8.41	20.78	5.38	137.28
296	48.56	522.73	8.21	22.16	5.47	137.28
297	48.72	515.05	8.34	23.82	5.55	137.28
298	48.88	510.38	7.92	28.84	5.53	137.28
299	49.05	506.61	7.71	24.71	5.37	137.28
300	49.21	515.93	7.76	20.26	5.31	137.28
301	49.38	535.17	8.28	27.19	5.17	137.28
302	49.54	551.35	8.29	28.35	5.13	137.28
303	49.70	535.05	8.03	24.61	5.04	137.28
304	49.87	500.48	7.11	22.14	5.12	137.28
305	50.03	470.34	6.58	18.56	5.11	137.28
306	50.20	483.78	6.74	22.47	5.09	137.28
307	50.36	512.78	7.32	24.22	4.87	137.28
308	50.52	531.04	7.26	23.44	4.51	137.28
309	50.69	514.22	6.18	23.29	4.08	137.28
310	50.85	472.77	5.06	23.45	3.57	136.98
311	51.02	420.50	3.62	21.21	3.10	134.64
312	51.18	369.89	2.51	24.49	2.69	131.99
313	51.35	325.81	1.99	27.24	2.85	130.07
314	51.51	287.30	2.01	31.82	3.66	129.11
315	51.67	253.33	1.96	36.72	4.54	128.43
316	51.84	235.33	1.65	40.43	4.62	127.44
317	52.00	242.15	1.40	38.39	3.60	126.26
318	52.17	269.95	1.18	20.82	2.66	126.24
319	52.33	302.13	1.52	10.93	2.23	127.32
320	52.49	328.96	1.90	2.95	2.52	129.48
321	52.66	355.66	2.57	6.76	2.87	131.48
322	52.82	387.23	3.19	12.17	3.03	133.12
323	52.99	424.39	3.57	15.66	3.00	134.44
324	53.15	457.78	4.10	17.64	2.98	135.50
325	53.31	478.76	4.61	17.73	3.07	136.29
326	53.48	483.76	4.76	19.92	3.29	136.74
327	53.64	473.48	4.91	20.63	3.41	136.66
328	53.81	456.41	4.52	19.82	3.45	136.25
329	53.97	442.94	4.11	20.75	3.41	135.78
330	54.13	438.92	4.19	20.86	3.36	135.58
331	54.30	445.70	4.20	19.82	3.43	135.80
332	54.46	455.33	4.45	24.35	3.59	136.34
333	54.63	468.08	5.08	24.31	3.74	136.95
334	54.79	483.91	5.26	25.61	3.90	137.28
335	54.95	497.65	5.68	27.94	3.97	137.28
336	55.12	497.84	5.84	24.55	4.11	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.28	478.39	5.51	30.37	4.10	137.28
338	55.45	449.74	4.67	28.24	3.99	136.62
339	55.61	425.10	4.14	27.11	3.82	135.57
340	55.77	409.91	3.82	28.34	3.83	134.93
341	55.94	398.95	3.76	28.67	3.94	134.56
342	56.10	386.10	3.68	27.90	4.07	134.19
343	56.27	371.83	3.38	30.19	3.88	133.40
344	56.43	362.40	2.76	29.52	3.50	132.49
345	56.59	361.51	2.60	27.82	2.97	131.68
346	56.76	371.06	2.46	26.28	2.66	131.65
347	56.92	393.06	2.66	24.89	2.49	132.35
348	57.09	429.35	3.21	22.17	2.62	133.81
349	57.25	465.09	4.04	22.90	2.76	135.12
350	57.41	484.89	4.34	24.95	2.94	135.91
351	57.58	478.65	4.40	20.41	3.05	136.02
352	57.74	461.21	4.23	22.48	3.23	135.76
353	57.91	440.24	4.02	24.01	3.18	135.03
354	58.07	423.49	3.36	24.37	2.97	134.03
355	58.23	406.66	2.89	21.58	2.66	132.86
356	58.40	387.78	2.62	22.67	2.66	131.98
357	58.56	362.69	2.49	24.57	2.89	131.17
358	58.73	331.03	2.21	25.64	3.30	130.30
359	58.89	299.48	2.00	27.35	3.74	129.30
360	59.06	274.39	1.82	29.73	4.03	128.23
361	59.22	259.49	1.53	30.57	4.20	127.38
362	59.38	251.67	1.50	31.60	4.60	127.27
363	59.55	246.28	1.81	31.98	4.69	126.89
364	59.71	239.52	1.32	31.72	4.81	126.46
365	59.88	229.53	1.28	31.16	4.53	125.17
366	60.04	215.83	1.15	22.93	4.98	124.60
367	60.20	197.80	1.12	26.05	6.07	124.50
368	60.37	177.90	1.33	26.87	7.23	124.17
369	60.53	163.43	1.10	27.23	7.77	123.57
370	60.70	164.58	0.91	28.36	6.62	122.16
371	60.86	181.86	0.74	17.33	5.00	121.99
372	61.02	202.90	0.97	6.21	4.79	122.73
373	61.19	215.16	1.10	4.28	4.46	123.66
374	61.35	226.03	1.04	6.66	4.06	124.49
375	61.52	252.47	1.27	9.70	3.53	125.78
376	61.68	295.44	1.61	14.01	3.25	127.82
377	61.84	334.31	2.08	18.70	2.88	129.23
378	62.01	354.64	2.10	21.39	2.53	129.89
379	62.17	366.28	2.02	21.87	2.23	130.24
380	62.34	387.25	2.28	23.33	2.18	131.08
381	62.50	414.98	2.75	25.75	2.35	132.23
382	62.66	426.17	3.08	26.42	2.59	132.82
383	62.83	403.95	2.93	25.04	2.88	132.45
384	62.99	357.56	2.46	25.23	3.45	131.57

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
385	63.16	312.00	2.38	25.93	4.09	130.55
386	63.32	291.80	2.17	30.02	4.50	130.02
387	63.48	300.36	2.11	34.82	4.56	130.38
388	63.65	326.89	2.67	32.53	3.96	130.52
389	63.81	344.39	2.17	27.40	3.35	130.32
390	63.98	340.84	1.83	27.50	2.54	128.78
391	64.14	314.89	1.42	17.92	2.27	127.03
392	64.30	281.12	1.11	24.63	2.34	124.95
393	64.47	243.13	0.87	26.44	3.05	123.43
394	64.63	205.94	0.92	28.98	4.08	121.81
395	64.80	171.06	0.66	31.84	5.00	120.24
396	64.96	144.03	0.52	34.96	5.00	117.87
397	65.12	123.43	0.43	25.73	5.00	116.19
398	65.29	104.30	0.41	28.12	5.00	115.38
399	65.45	84.83	0.45	29.82	14.14	115.39
400	65.62	67.44	0.52	32.38	18.74	115.25
401	65.78	57.60	0.47	34.33	22.04	114.72
402	65.94	56.78	0.41	35.64	22.28	114.24
403	66.11	62.45	0.44	37.21	21.08	114.66
404	66.27	68.74	0.52	37.56	20.55	115.94
405	66.44	71.31	0.63	36.44	21.71	117.76
406	66.60	70.78	0.86	34.99	23.08	119.45
407	66.77	75.61	1.02	31.34	20.58	119.83
408	66.93	95.69	0.67	27.67	17.54	121.48
409	67.09	122.92	1.31	25.56	13.93	124.14
410	67.26	172.41	1.95	25.39	11.89	128.13
411	67.42	235.41	2.87	25.82	9.18	131.46
412	67.59	328.67	3.84	30.93	7.51	134.45
413	67.75	405.64	5.18	31.31	6.32	136.55
414	67.91	457.60	5.78	33.70	5.81	137.28
415	68.08	477.08	6.03	32.81	5.61	137.28
416	68.24	491.62	6.61	33.24	5.73	137.28
417	68.41	510.30	7.30	33.94	5.93	137.28
418	68.57	529.84	7.88	36.59	6.10	137.28
419	68.73	546.45	8.51	37.99	6.28	137.28
420	68.90	560.70	9.17	37.07	6.61	137.28
421	69.06	571.23	10.14	44.27	6.99	137.28
422	69.23	575.84	10.74	42.78	7.35	137.28
423	69.39	573.14	10.92	38.92	7.45	137.28
424	69.55	564.96	10.30	39.11	7.49	137.28
425	69.72	548.34	9.99	39.55	7.50	137.28
426	69.88	528.10	9.56	36.60	7.73	137.28
427	70.05	507.00	9.34	27.93	8.00	137.28
428	70.21	497.41	9.30	32.50	8.15	137.28
429	70.37	495.03	9.02	30.59	7.98	137.28
430	70.54	505.07	8.68	32.92	7.69	137.28
431	70.70	525.09	9.13	31.29	7.54	137.28
432	70.87	554.23	10.23	36.42	7.69	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
433	71.03	575.03	11.33	40.70	7.93	137.28
434	71.19	576.66	11.63	41.35	8.17	137.28
435	71.36	560.49	11.35	35.75	8.43	137.28
436	71.52	539.42	11.17	34.15	8.60	137.28
437	71.69	527.01	10.58	33.67	8.71	137.28
438	71.85	530.15	10.70	36.24	8.63	137.28
439	72.01	553.38	11.28	39.01	8.49	137.28
440	72.18	590.72	12.16	43.92	8.26	137.28
441	72.34	630.01	13.06	62.48	8.04	137.28
442	72.51	655.98	13.70	56.37	7.92	137.28
443	72.67	662.77	13.95	50.06	7.96	137.28
444	72.83	653.49	14.00	54.64	8.09	137.28
445	73.00	637.38	13.65	48.36	8.26	137.28
446	73.16	623.61	13.40	48.11	8.39	137.28
447	73.33	615.53	13.22	41.71	8.22	137.28
448	73.49	611.83	11.98	47.91	7.91	137.28
449	73.65	609.02	11.49	49.06	4.61	137.28
450	73.82	615.59	0.00	44.37	0.83	135.78
451	73.98	631.57	0.00	33.34	44.11	87.36
452	74.15	644.36	0.00	41.99	44.94	87.36

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	0.215	1.13	0.190	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
8	1.31	0.09	0.00	0.09	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
9	1.48	0.10	0.00	0.10	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
10	1.64	0.11	0.00	0.11	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
11	1.80	0.12	0.00	0.12	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
12	1.97	0.13	0.00	0.13	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
13	2.13	0.14	0.00	0.14	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
14	2.30	0.15	0.00	0.15	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
15	2.46	0.16	0.00	0.16	1.00	0.215	1.13	0.190	1.10	1.00	2.000	No
16	2.62	0.17	0.00	0.17	1.00	0.214	1.13	0.190	1.10	1.00	2.000	No
17	2.79	0.18	0.00	0.18	1.00	0.214	1.13	0.190	1.10	1.00	2.000	No
18	2.95	0.19	0.00	0.19	1.00	0.214	1.13	0.190	1.10	1.00	2.000	No
19	3.12	0.20	0.00	0.20	1.00	0.214	1.13	0.190	1.10	1.00	2.000	No
20	3.28	0.21	0.00	0.21	1.00	0.214	1.13	0.190	1.10	1.00	2.000	No
21	3.44	0.22	0.00	0.22	1.00	0.214	1.13	0.189	1.10	1.00	2.000	No
22	3.61	0.23	0.00	0.23	1.00	0.214	1.13	0.189	1.10	1.00	2.000	No
23	3.77	0.23	0.00	0.23	1.00	0.214	1.13	0.189	1.10	1.00	2.000	No
24	3.94	0.24	0.00	0.24	1.00	0.214	1.13	0.189	1.10	1.00	2.000	Yes
25	4.10	0.25	0.00	0.25	1.00	0.213	1.13	0.189	1.09	1.00	2.000	Yes
26	4.27	0.26	0.00	0.26	0.99	0.213	1.13	0.189	1.08	1.00	2.000	Yes
27	4.43	0.27	0.00	0.27	0.99	0.213	1.13	0.189	1.07	1.00	2.000	Yes
28	4.59	0.28	0.00	0.28	0.99	0.213	1.13	0.189	1.07	1.00	2.000	Yes
29	4.76	0.29	0.00	0.29	0.99	0.213	1.13	0.189	1.06	1.00	2.000	No
30	4.92	0.29	0.00	0.29	0.99	0.216	1.13	0.191	1.06	1.00	0.180	No
31	5.09	0.30	0.01	0.29	0.99	0.219	1.13	0.194	1.06	1.00	0.183	No
32	5.25	0.31	0.01	0.30	0.99	0.223	1.13	0.197	1.06	1.00	0.186	No
33	5.41	0.32	0.02	0.30	0.99	0.226	1.13	0.200	1.06	1.00	0.189	No
34	5.58	0.33	0.02	0.30	0.99	0.229	1.13	0.203	1.06	1.00	0.191	No
35	5.74	0.34	0.03	0.31	0.99	0.233	1.13	0.206	1.06	1.00	0.194	No
36	5.91	0.34	0.03	0.31	0.99	0.236	1.13	0.209	1.06	1.00	0.197	No
37	6.07	0.35	0.04	0.31	0.99	0.239	1.13	0.212	1.06	1.00	0.200	No
38	6.23	0.36	0.04	0.32	0.99	0.242	1.13	0.214	1.05	1.00	0.203	No
39	6.40	0.37	0.05	0.32	0.99	0.245	1.13	0.217	1.05	1.00	0.206	No
40	6.56	0.38	0.05	0.32	0.99	0.248	1.13	0.220	1.05	1.00	0.209	No
41	6.73	0.38	0.06	0.32	0.99	0.251	1.13	0.222	1.05	1.00	0.212	No
42	6.89	0.39	0.07	0.33	0.99	0.254	1.13	0.225	1.05	1.00	0.214	No
43	7.05	0.40	0.07	0.33	0.99	0.256	1.13	0.227	1.05	1.00	2.000	Yes
44	7.22	0.41	0.08	0.33	0.98	0.259	1.13	0.230	1.06	1.00	2.000	Yes
45	7.38	0.42	0.08	0.34	0.98	0.262	1.13	0.232	1.06	1.00	2.000	Yes
46	7.55	0.43	0.09	0.34	0.98	0.264	1.13	0.234	1.06	1.00	2.000	Yes
47	7.71	0.43	0.09	0.34	0.98	0.267	1.13	0.236	1.06	1.00	2.000	Yes
48	7.87	0.44	0.10	0.35	0.98	0.269	1.13	0.238	1.07	1.00	2.000	Yes

:: 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	0.45	0.10	0.35	0.98	0.271	1.13	0.240	1.08	1.00	2.000	Yes
50	8.20	0.46	0.11	0.35	0.98	0.274	1.13	0.242	1.10	1.00	2.000	Yes
51	8.37	0.47	0.11	0.36	0.98	0.276	1.13	0.244	1.10	1.00	2.000	Yes
52	8.53	0.48	0.12	0.36	0.98	0.278	1.13	0.246	1.10	1.00	2.000	Yes
53	8.69	0.49	0.12	0.37	0.98	0.280	1.13	0.248	1.10	1.00	0.225	No
54	8.86	0.50	0.13	0.37	0.98	0.282	1.13	0.249	1.10	1.00	0.227	No
55	9.02	0.51	0.13	0.37	0.98	0.284	1.13	0.251	1.10	1.00	0.228	No
56	9.19	0.52	0.14	0.38	0.98	0.285	1.13	0.253	1.10	1.00	0.230	No
57	9.35	0.52	0.14	0.38	0.98	0.287	1.13	0.254	1.09	1.00	0.232	No
58	9.51	0.53	0.15	0.39	0.98	0.289	1.13	0.256	1.09	1.00	0.235	No
59	9.68	0.54	0.15	0.39	0.98	0.291	1.13	0.257	1.09	1.00	0.237	No
60	9.84	0.55	0.16	0.40	0.97	0.292	1.13	0.259	1.08	1.00	0.239	No
61	10.01	0.56	0.16	0.40	0.97	0.294	1.13	0.260	1.08	1.00	0.240	No
62	10.17	0.57	0.17	0.40	0.97	0.296	1.13	0.262	1.08	1.00	0.241	No
63	10.33	0.58	0.17	0.41	0.97	0.297	1.13	0.263	1.09	1.00	0.242	No
64	10.50	0.59	0.18	0.41	0.97	0.299	1.13	0.265	1.09	1.00	0.243	No
65	10.66	0.60	0.18	0.42	0.97	0.300	1.13	0.266	1.10	1.00	0.242	No
66	10.83	0.61	0.19	0.42	0.97	0.302	1.13	0.267	1.10	1.00	0.243	No
67	10.99	0.62	0.19	0.42	0.97	0.303	1.13	0.268	1.10	1.00	0.245	No
68	11.15	0.63	0.20	0.43	0.97	0.305	1.13	0.270	1.08	1.00	2.000	Yes
69	11.32	0.63	0.20	0.43	0.97	0.306	1.13	0.271	1.07	1.00	2.000	Yes
70	11.48	0.64	0.21	0.44	0.97	0.307	1.13	0.272	1.07	1.00	2.000	Yes
71	11.65	0.65	0.21	0.44	0.97	0.309	1.13	0.273	1.06	1.00	2.000	Yes
72	11.81	0.66	0.22	0.44	0.97	0.310	1.13	0.274	1.06	1.00	2.000	Yes
73	11.98	0.67	0.22	0.45	0.97	0.311	1.13	0.276	1.05	1.00	2.000	Yes
74	12.14	0.68	0.23	0.45	0.97	0.312	1.13	0.277	1.05	1.00	2.000	Yes
75	12.30	0.69	0.23	0.45	0.97	0.314	1.13	0.278	1.04	1.00	2.000	Yes
76	12.47	0.70	0.24	0.46	0.96	0.315	1.13	0.279	1.04	1.00	0.268	No
77	12.63	0.71	0.24	0.46	0.96	0.316	1.13	0.280	1.04	1.00	0.268	No
78	12.80	0.71	0.25	0.46	0.96	0.318	1.13	0.281	1.04	1.00	0.269	No
79	12.96	0.72	0.25	0.47	0.96	0.319	1.13	0.282	1.05	1.00	0.270	No
80	13.12	0.73	0.26	0.47	0.96	0.320	1.13	0.283	1.04	1.00	0.271	No
81	13.29	0.74	0.26	0.47	0.96	0.321	1.13	0.284	1.04	1.00	0.273	No
82	13.45	0.75	0.27	0.48	0.96	0.322	1.13	0.285	1.04	1.00	0.274	No
83	13.62	0.76	0.28	0.48	0.96	0.323	1.13	0.286	1.04	1.00	0.275	No
84	13.78	0.77	0.28	0.49	0.96	0.324	1.13	0.287	1.04	1.00	0.276	No
85	13.94	0.77	0.29	0.49	0.96	0.326	1.13	0.288	1.04	1.00	0.277	No
86	14.11	0.78	0.29	0.49	0.96	0.327	1.13	0.289	1.04	1.00	0.278	No
87	14.27	0.79	0.30	0.50	0.96	0.327	1.13	0.290	1.04	1.00	0.279	No
88	14.44	0.80	0.30	0.50	0.96	0.328	1.13	0.291	1.04	1.00	0.280	No
89	14.60	0.81	0.31	0.51	0.96	0.329	1.13	0.291	1.05	1.00	0.278	No
90	14.76	0.82	0.31	0.51	0.95	0.330	1.13	0.292	1.05	1.00	0.279	No
91	14.93	0.83	0.32	0.51	0.95	0.330	1.13	0.293	1.05	1.00	0.278	No
92	15.09	0.84	0.32	0.52	0.95	0.331	1.13	0.293	1.06	1.00	0.278	No
93	15.26	0.85	0.33	0.52	0.95	0.331	1.13	0.294	1.05	1.00	0.279	No
94	15.42	0.86	0.33	0.53	0.95	0.332	1.13	0.294	1.05	1.00	0.280	No
95	15.58	0.87	0.34	0.53	0.95	0.333	1.13	0.295	1.04	1.00	0.282	No
96	15.75	0.88	0.34	0.54	0.95	0.333	1.13	0.295	1.04	1.00	0.283	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	0.89	0.35	0.54	0.95	0.334	1.13	0.296	1.04	1.00	0.284	No
98	16.08	0.90	0.35	0.55	0.95	0.334	1.13	0.296	1.04	1.00	0.284	No
99	16.24	0.91	0.36	0.55	0.95	0.335	1.13	0.297	1.04	1.00	2.000	Yes
100	16.40	0.92	0.36	0.56	0.95	0.335	1.13	0.297	1.05	1.00	2.000	Yes
101	16.57	0.93	0.37	0.56	0.95	0.336	1.13	0.298	1.05	1.00	2.000	Yes
102	16.73	0.94	0.37	0.57	0.95	0.337	1.13	0.298	1.05	1.00	2.000	Yes
103	16.90	0.95	0.38	0.57	0.95	0.337	1.13	0.299	1.05	1.00	2.000	Yes
104	17.06	0.96	0.38	0.57	0.94	0.338	1.13	0.299	1.05	1.00	2.000	Yes
105	17.22	0.97	0.39	0.58	0.94	0.338	1.13	0.299	1.04	1.00	2.000	Yes
106	17.39	0.98	0.39	0.58	0.94	0.339	1.13	0.300	1.04	1.00	2.000	Yes
107	17.55	0.98	0.40	0.59	0.94	0.339	1.13	0.300	1.03	1.00	2.000	Yes
108	17.72	0.99	0.40	0.59	0.94	0.340	1.13	0.301	1.03	1.00	2.000	Yes
109	17.88	1.00	0.41	0.60	0.94	0.340	1.13	0.301	1.03	1.00	2.000	Yes
110	18.04	1.01	0.41	0.60	0.94	0.341	1.13	0.302	1.03	1.00	0.294	No
111	18.21	1.02	0.42	0.60	0.94	0.341	1.13	0.302	1.03	1.00	0.294	No
112	18.37	1.03	0.42	0.61	0.94	0.342	1.13	0.303	1.03	1.00	0.295	No
113	18.54	1.04	0.43	0.61	0.94	0.343	1.13	0.304	1.03	1.00	0.296	No
114	18.70	1.05	0.43	0.61	0.94	0.343	1.13	0.304	1.02	1.00	0.297	No
115	18.86	1.05	0.44	0.62	0.94	0.344	1.13	0.305	1.02	1.00	0.297	No
116	19.03	1.06	0.44	0.62	0.94	0.345	1.13	0.305	1.02	1.00	0.298	No
117	19.19	1.07	0.45	0.62	0.93	0.345	1.13	0.306	1.02	1.00	0.299	No
118	19.36	1.08	0.45	0.63	0.93	0.346	1.13	0.306	1.02	1.00	0.299	No
119	19.52	1.09	0.46	0.63	0.93	0.346	1.13	0.307	1.02	1.00	0.300	No
120	19.69	1.10	0.46	0.63	0.93	0.347	1.13	0.307	1.02	1.00	0.301	No
121	19.85	1.10	0.47	0.64	0.93	0.348	1.13	0.308	1.02	1.00	0.301	No
122	20.01	1.11	0.47	0.64	0.93	0.348	1.13	0.308	1.02	1.00	0.301	No
123	20.18	1.12	0.48	0.64	0.93	0.349	1.13	0.309	1.02	1.00	0.301	No
124	20.34	1.13	0.48	0.65	0.93	0.349	1.13	0.309	1.02	1.00	0.302	No
125	20.51	1.14	0.49	0.65	0.93	0.349	1.13	0.310	1.02	1.00	0.303	No
126	20.67	1.15	0.50	0.65	0.93	0.350	1.13	0.310	1.02	1.00	0.303	No
127	20.83	1.16	0.50	0.66	0.93	0.350	1.13	0.310	1.02	1.00	0.303	No
128	21.00	1.17	0.51	0.66	0.93	0.351	1.13	0.311	1.02	1.00	0.304	No
129	21.16	1.17	0.51	0.66	0.93	0.351	1.13	0.311	1.02	1.00	0.304	No
130	21.33	1.18	0.52	0.67	0.92	0.352	1.13	0.312	1.02	1.00	0.305	No
131	21.49	1.19	0.52	0.67	0.92	0.352	1.13	0.312	1.02	1.00	0.305	No
132	21.65	1.20	0.53	0.67	0.92	0.353	1.13	0.312	1.02	1.00	0.305	No
133	21.82	1.21	0.53	0.68	0.92	0.353	1.13	0.313	1.02	1.00	0.306	No
134	21.98	1.22	0.54	0.68	0.92	0.353	1.13	0.313	1.02	1.00	0.306	No
135	22.15	1.23	0.54	0.68	0.92	0.354	1.13	0.313	1.02	1.00	0.306	No
136	22.31	1.23	0.55	0.69	0.92	0.354	1.13	0.313	1.02	1.00	0.307	No
137	22.47	1.24	0.55	0.69	0.92	0.354	1.13	0.314	1.02	1.00	0.307	No
138	22.64	1.25	0.56	0.70	0.92	0.355	1.13	0.314	1.02	1.00	0.308	No
139	22.80	1.26	0.56	0.70	0.92	0.355	1.13	0.314	1.02	1.00	0.308	No
140	22.97	1.27	0.57	0.70	0.92	0.355	1.13	0.315	1.02	1.00	0.309	No
141	23.13	1.28	0.57	0.71	0.92	0.355	1.13	0.315	1.02	1.00	0.309	No
142	23.29	1.29	0.58	0.71	0.91	0.356	1.13	0.315	1.02	1.00	2.000	Yes
143	23.46	1.30	0.58	0.71	0.91	0.356	1.13	0.315	1.02	1.00	2.000	Yes
144	23.62	1.30	0.59	0.72	0.91	0.356	1.13	0.316	1.02	1.00	2.000	Yes

:: 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	1.31	0.59	0.72	0.91	0.357	1.13	0.316	1.02	1.00	2.000	Yes
146	23.95	1.32	0.60	0.72	0.91	0.357	1.13	0.316	1.03	1.00	2.000	Yes
147	24.11	1.33	0.60	0.73	0.91	0.357	1.13	0.316	1.03	1.00	2.000	Yes
148	24.28	1.34	0.61	0.73	0.91	0.357	1.13	0.316	1.03	1.00	2.000	Yes
149	24.44	1.35	0.61	0.74	0.91	0.357	1.13	0.317	1.04	1.00	2.000	Yes
150	24.61	1.36	0.62	0.74	0.91	0.357	1.13	0.317	1.04	1.00	0.305	No
151	24.77	1.37	0.62	0.74	0.91	0.357	1.13	0.317	1.04	1.00	0.305	No
152	24.93	1.38	0.63	0.75	0.91	0.357	1.13	0.317	1.04	1.00	0.306	No
153	25.10	1.39	0.63	0.75	0.91	0.358	1.13	0.317	1.03	1.00	0.307	No
154	25.26	1.40	0.64	0.76	0.90	0.358	1.13	0.317	1.03	1.00	0.307	No
155	25.43	1.41	0.64	0.76	0.90	0.358	1.13	0.317	1.03	1.00	0.307	No
156	25.59	1.42	0.65	0.77	0.90	0.358	1.13	0.317	1.03	1.00	0.307	No
157	25.75	1.42	0.65	0.77	0.90	0.358	1.13	0.317	1.04	1.00	0.306	No
158	25.92	1.43	0.66	0.77	0.90	0.358	1.13	0.317	1.04	1.00	0.306	No
159	26.08	1.44	0.66	0.78	0.90	0.358	1.13	0.317	1.04	1.00	0.306	No
160	26.25	1.45	0.67	0.78	0.90	0.358	1.13	0.317	1.03	1.00	0.307	No
161	26.41	1.46	0.67	0.79	0.90	0.358	1.13	0.317	1.03	1.00	0.307	No
162	26.57	1.47	0.68	0.79	0.90	0.358	1.13	0.317	1.03	1.00	0.307	No
163	26.74	1.48	0.68	0.80	0.90	0.358	1.13	0.317	1.03	1.00	0.306	No
164	26.90	1.49	0.69	0.80	0.90	0.358	1.13	0.317	1.04	1.00	0.305	No
165	27.07	1.50	0.69	0.81	0.90	0.358	1.13	0.317	1.04	1.00	0.304	No
166	27.23	1.51	0.70	0.81	0.89	0.358	1.13	0.317	1.05	1.00	0.303	No
167	27.40	1.52	0.71	0.82	0.89	0.358	1.13	0.317	1.05	1.00	0.300	No
168	27.56	1.53	0.71	0.82	0.89	0.357	1.13	0.317	1.06	1.00	0.298	No
169	27.72	1.54	0.72	0.82	0.89	0.357	1.13	0.316	1.07	1.00	0.297	No
170	27.89	1.55	0.72	0.83	0.89	0.357	1.13	0.316	1.07	1.00	0.296	No
171	28.05	1.56	0.73	0.83	0.89	0.357	1.13	0.316	1.07	1.00	0.296	No
172	28.22	1.57	0.73	0.84	0.89	0.357	1.13	0.316	1.06	1.00	0.297	No
173	28.38	1.58	0.74	0.85	0.89	0.357	1.13	0.316	1.06	1.00	0.297	No
174	28.54	1.59	0.74	0.85	0.89	0.356	1.13	0.316	1.06	1.00	0.297	No
175	28.71	1.60	0.75	0.86	0.89	0.356	1.13	0.315	1.06	1.00	0.297	No
176	28.87	1.61	0.75	0.86	0.89	0.356	1.13	0.315	1.06	1.00	0.297	No
177	29.04	1.62	0.76	0.87	0.89	0.356	1.13	0.315	1.06	1.00	0.297	No
178	29.20	1.63	0.76	0.87	0.88	0.355	1.13	0.315	1.06	1.00	0.297	No
179	29.36	1.64	0.77	0.88	0.88	0.355	1.13	0.314	1.06	1.00	0.298	No
180	29.53	1.65	0.77	0.88	0.88	0.355	1.13	0.314	1.05	1.00	0.298	No
181	29.69	1.67	0.78	0.89	0.88	0.355	1.13	0.314	1.05	1.00	0.299	No
182	29.86	1.68	0.78	0.89	0.88	0.354	1.13	0.314	1.05	1.00	0.300	No
183	30.02	1.69	0.79	0.90	0.88	0.354	1.13	0.314	1.04	1.00	0.301	No
184	30.18	1.70	0.79	0.90	0.88	0.354	1.13	0.313	1.04	1.00	0.300	No
185	30.35	1.71	0.80	0.91	0.88	0.353	1.13	0.313	1.05	1.00	0.299	No
186	30.51	1.72	0.80	0.92	0.88	0.353	1.13	0.313	1.04	1.00	0.300	No
187	30.68	1.73	0.81	0.92	0.88	0.353	1.13	0.312	1.04	1.00	0.300	No
188	30.84	1.74	0.81	0.93	0.88	0.353	1.13	0.312	1.04	1.00	0.300	No
189	31.00	1.75	0.82	0.93	0.87	0.352	1.13	0.312	1.04	1.00	0.301	No
190	31.17	1.76	0.82	0.94	0.87	0.352	1.13	0.312	1.04	1.00	0.301	No
191	31.33	1.77	0.83	0.94	0.87	0.352	1.13	0.311	1.03	1.00	0.301	No
192	31.50	1.78	0.83	0.95	0.87	0.351	1.13	0.311	1.03	1.00	0.301	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	1.79	0.84	0.96	0.87	0.351	1.13	0.311	1.03	1.00	0.302	No
194	31.82	1.80	0.84	0.96	0.87	0.351	1.13	0.310	1.03	1.00	0.302	No
195	31.99	1.82	0.85	0.97	0.87	0.350	1.13	0.310	1.03	1.00	0.302	No
196	32.15	1.83	0.85	0.97	0.87	0.350	1.13	0.310	1.03	1.00	0.302	No
197	32.32	1.84	0.86	0.98	0.87	0.349	1.13	0.309	1.02	1.00	0.302	No
198	32.48	1.85	0.86	0.98	0.87	0.349	1.13	0.309	1.02	1.00	0.303	No
199	32.64	1.86	0.87	0.99	0.87	0.349	1.13	0.309	1.02	1.00	0.303	No
200	32.81	1.87	0.87	1.00	0.87	0.348	1.13	0.309	1.02	1.00	0.303	No
201	32.97	1.88	0.88	1.00	0.86	0.348	1.13	0.308	1.02	1.00	0.303	No
202	33.14	1.89	0.88	1.01	0.86	0.348	1.13	0.308	1.01	1.00	0.303	No
203	33.30	1.90	0.89	1.01	0.86	0.347	1.13	0.308	1.01	1.00	0.304	No
204	33.46	1.91	0.89	1.02	0.86	0.347	1.13	0.307	1.01	1.00	0.304	No
205	33.63	1.93	0.90	1.03	0.86	0.347	1.13	0.307	1.01	1.00	0.304	No
206	33.79	1.94	0.90	1.03	0.86	0.346	1.13	0.307	1.01	1.00	0.304	No
207	33.96	1.95	0.91	1.04	0.86	0.346	1.13	0.306	1.01	1.00	0.304	No
208	34.12	1.96	0.91	1.04	0.86	0.346	1.13	0.306	1.00	1.00	0.305	No
209	34.28	1.97	0.92	1.05	0.86	0.345	1.13	0.306	1.00	1.00	0.305	No
210	34.45	1.98	0.93	1.05	0.86	0.345	1.13	0.305	1.00	1.00	0.305	No
211	34.61	1.99	0.93	1.06	0.86	0.344	1.13	0.305	1.00	1.00	0.305	No
212	34.78	2.00	0.94	1.07	0.85	0.344	1.13	0.305	1.00	1.00	0.305	No
213	34.94	2.01	0.94	1.07	0.85	0.344	1.13	0.304	1.00	1.00	0.306	No
214	35.10	2.02	0.95	1.08	0.85	0.343	1.13	0.304	0.99	1.00	0.306	No
215	35.27	2.03	0.95	1.08	0.85	0.343	1.13	0.304	0.99	1.00	0.306	No
216	35.43	2.04	0.96	1.09	0.85	0.343	1.13	0.304	0.99	1.00	0.306	No
217	35.60	2.06	0.96	1.09	0.85	0.342	1.13	0.303	0.99	1.00	0.306	No
218	35.76	2.07	0.97	1.10	0.85	0.342	1.13	0.303	0.99	1.00	0.307	No
219	35.93	2.08	0.97	1.11	0.85	0.342	1.13	0.303	0.99	1.00	0.307	No
220	36.09	2.09	0.98	1.11	0.85	0.342	1.13	0.302	0.99	1.00	0.307	No
221	36.25	2.10	0.98	1.12	0.85	0.341	1.13	0.302	0.98	1.00	0.307	No
222	36.42	2.11	0.99	1.12	0.85	0.341	1.13	0.302	0.98	1.00	0.307	No
223	36.58	2.12	0.99	1.13	0.84	0.341	1.13	0.302	0.98	1.00	0.307	No
224	36.75	2.13	1.00	1.13	0.84	0.340	1.13	0.302	0.98	1.00	0.308	No
225	36.91	2.14	1.00	1.14	0.84	0.340	1.13	0.301	0.98	1.00	0.307	No
226	37.07	2.15	1.01	1.14	0.84	0.340	1.13	0.301	0.99	1.00	0.305	No
227	37.24	2.16	1.01	1.15	0.84	0.340	1.13	0.301	0.99	1.00	0.305	No
228	37.40	2.17	1.02	1.15	0.84	0.339	1.13	0.301	0.99	1.00	0.304	No
229	37.57	2.18	1.02	1.16	0.84	0.339	1.13	0.300	0.99	1.00	0.304	No
230	37.73	2.19	1.03	1.16	0.84	0.339	1.13	0.300	0.99	1.00	0.304	No
231	37.89	2.20	1.03	1.16	0.84	0.339	1.13	0.300	0.99	1.00	0.303	No
232	38.06	2.21	1.04	1.17	0.84	0.339	1.13	0.300	0.99	1.00	0.303	No
233	38.22	2.22	1.04	1.17	0.84	0.338	1.13	0.300	0.99	1.00	0.303	No
234	38.39	2.23	1.05	1.18	0.83	0.338	1.13	0.300	0.99	1.00	0.302	No
235	38.55	2.24	1.05	1.18	0.83	0.338	1.13	0.299	0.99	1.00	0.302	No
236	38.71	2.25	1.06	1.19	0.83	0.338	1.13	0.299	0.99	1.00	0.302	No
237	38.88	2.26	1.06	1.19	0.83	0.337	1.13	0.299	0.99	1.00	0.302	No
238	39.04	2.27	1.07	1.20	0.83	0.337	1.13	0.299	0.97	1.00	0.307	No
239	39.21	2.28	1.07	1.20	0.83	0.337	1.13	0.298	0.97	1.00	0.307	No
240	39.37	2.29	1.08	1.21	0.83	0.337	1.13	0.298	0.96	1.00	0.311	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	2.30	1.08	1.21	0.83	0.336	1.13	0.298	0.96	1.00	0.311	No
242	39.70	2.31	1.09	1.22	0.83	0.336	1.13	0.297	0.96	1.00	0.311	No
243	39.86	2.32	1.09	1.23	0.83	0.336	1.13	0.297	0.96	1.00	0.311	No
244	40.03	2.33	1.10	1.23	0.83	0.335	1.13	0.297	0.95	1.00	0.311	No
245	40.19	2.34	1.10	1.24	0.82	0.335	1.13	0.296	0.95	1.00	0.311	No
246	40.35	2.35	1.11	1.24	0.82	0.334	1.13	0.296	0.95	1.00	0.311	No
247	40.52	2.36	1.11	1.25	0.82	0.334	1.13	0.296	0.95	1.00	0.311	No
248	40.68	2.38	1.12	1.26	0.82	0.334	1.13	0.295	0.95	1.00	0.311	No
249	40.85	2.39	1.12	1.26	0.82	0.333	1.13	0.295	0.95	1.00	0.312	No
250	41.01	2.40	1.13	1.27	0.82	0.333	1.13	0.295	0.95	1.00	0.312	No
251	41.17	2.41	1.13	1.27	0.82	0.332	1.13	0.294	0.94	1.00	0.312	No
252	41.34	2.42	1.14	1.28	0.82	0.332	1.13	0.294	0.94	1.00	0.312	No
253	41.50	2.43	1.15	1.28	0.82	0.332	1.13	0.294	0.94	1.00	0.312	No
254	41.67	2.44	1.15	1.29	0.82	0.331	1.13	0.293	0.94	1.00	0.312	No
255	41.83	2.45	1.16	1.30	0.82	0.331	1.13	0.293	0.94	1.00	0.312	No
256	41.99	2.46	1.16	1.30	0.81	0.331	1.13	0.293	0.94	1.00	0.312	No
257	42.16	2.47	1.17	1.31	0.81	0.330	1.13	0.292	0.94	1.00	0.312	No
258	42.32	2.48	1.17	1.31	0.81	0.330	1.13	0.292	0.94	1.00	0.312	No
259	42.49	2.49	1.18	1.32	0.81	0.330	1.13	0.292	0.93	1.00	0.313	No
260	42.65	2.50	1.18	1.32	0.81	0.329	1.13	0.292	0.93	1.00	0.313	No
261	42.81	2.52	1.19	1.33	0.81	0.329	1.13	0.291	0.93	1.00	0.313	No
262	42.98	2.53	1.19	1.33	0.81	0.329	1.13	0.291	0.93	1.00	0.313	No
263	43.14	2.54	1.20	1.34	0.81	0.328	1.13	0.291	0.93	1.00	0.313	No
264	43.31	2.55	1.20	1.35	0.81	0.328	1.13	0.290	0.93	1.00	0.312	No
265	43.47	2.56	1.21	1.35	0.81	0.328	1.13	0.290	0.94	1.00	0.307	No
266	43.64	2.57	1.21	1.36	0.81	0.327	1.13	0.290	0.96	1.00	0.303	No
267	43.80	2.58	1.22	1.36	0.80	0.327	1.13	0.290	0.96	1.00	0.302	No
268	43.96	2.59	1.22	1.37	0.80	0.327	1.13	0.289	0.96	1.00	0.302	No
269	44.13	2.60	1.23	1.37	0.80	0.326	1.13	0.289	0.95	1.00	0.304	No
270	44.29	2.61	1.23	1.38	0.80	0.326	1.13	0.289	0.93	1.00	0.310	No
271	44.46	2.62	1.24	1.38	0.80	0.326	1.13	0.288	0.92	1.00	0.314	No
272	44.62	2.63	1.24	1.39	0.80	0.325	1.13	0.288	0.92	1.00	0.314	No
273	44.78	2.64	1.25	1.39	0.80	0.325	1.13	0.288	0.92	1.00	0.314	No
274	44.95	2.65	1.25	1.40	0.80	0.324	1.13	0.287	0.92	1.00	0.314	No
275	45.11	2.66	1.26	1.41	0.80	0.324	1.13	0.287	0.91	1.00	0.314	No
276	45.28	2.68	1.26	1.41	0.80	0.324	1.13	0.287	0.91	1.00	0.314	No
277	45.44	2.69	1.27	1.42	0.80	0.323	1.13	0.286	0.91	1.00	0.314	No
278	45.60	2.70	1.27	1.43	0.80	0.323	1.13	0.286	0.91	1.00	0.314	No
279	45.77	2.71	1.28	1.43	0.79	0.322	1.13	0.286	0.91	1.00	0.314	No
280	45.93	2.72	1.28	1.44	0.79	0.322	1.13	0.285	0.91	1.00	0.314	No
281	46.10	2.73	1.29	1.44	0.79	0.322	1.13	0.285	0.91	1.00	0.314	No
282	46.26	2.74	1.29	1.45	0.79	0.321	1.13	0.284	0.91	1.00	0.314	No
283	46.42	2.75	1.30	1.46	0.79	0.321	1.13	0.284	0.90	1.00	0.314	No
284	46.59	2.77	1.30	1.46	0.79	0.320	1.13	0.284	0.90	1.00	0.314	No
285	46.75	2.78	1.31	1.47	0.79	0.320	1.13	0.283	0.90	1.00	0.314	No
286	46.92	2.79	1.31	1.48	0.79	0.320	1.13	0.283	0.90	1.00	0.314	No
287	47.08	2.80	1.32	1.48	0.79	0.319	1.13	0.283	0.90	1.00	0.314	No
288	47.24	2.81	1.32	1.49	0.79	0.319	1.13	0.282	0.90	1.00	0.314	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
289	47.41	2.82	1.33	1.49	0.79	0.318	1.13	0.282	0.90	1.00	0.314	No
290	47.57	2.83	1.33	1.50	0.78	0.318	1.13	0.282	0.90	1.00	0.314	No
291	47.74	2.85	1.34	1.51	0.78	0.318	1.13	0.281	0.89	1.00	0.315	No
292	47.90	2.86	1.34	1.51	0.78	0.317	1.13	0.281	0.89	1.00	0.315	No
293	48.06	2.87	1.35	1.52	0.78	0.317	1.13	0.281	0.89	1.00	0.315	No
294	48.23	2.88	1.36	1.52	0.78	0.316	1.13	0.280	0.89	1.00	0.315	No
295	48.39	2.89	1.36	1.53	0.78	0.316	1.13	0.280	0.89	1.00	0.315	No
296	48.56	2.90	1.37	1.54	0.78	0.316	1.13	0.279	0.89	1.00	0.315	No
297	48.72	2.91	1.37	1.54	0.78	0.315	1.13	0.279	0.89	1.00	0.315	No
298	48.88	2.92	1.38	1.55	0.78	0.315	1.13	0.279	0.89	1.00	0.315	No
299	49.05	2.94	1.38	1.55	0.78	0.314	1.13	0.278	0.88	1.00	0.315	No
300	49.21	2.95	1.39	1.56	0.78	0.314	1.13	0.278	0.88	1.00	0.315	No
301	49.38	2.96	1.39	1.57	0.77	0.314	1.13	0.278	0.88	1.00	0.315	No
302	49.54	2.97	1.40	1.57	0.77	0.313	1.13	0.277	0.88	1.00	0.315	No
303	49.70	2.98	1.40	1.58	0.77	0.313	1.13	0.277	0.88	1.00	0.315	No
304	49.87	2.99	1.41	1.59	0.77	0.312	1.13	0.277	0.88	1.00	0.315	No
305	50.03	3.00	1.41	1.59	0.77	0.312	1.13	0.276	0.88	1.00	0.315	No
306	50.20	3.01	1.42	1.60	0.77	0.312	1.13	0.276	0.88	1.00	0.315	No
307	50.36	3.03	1.42	1.60	0.77	0.311	1.13	0.276	0.88	1.00	0.315	No
308	50.52	3.04	1.43	1.61	0.77	0.311	1.13	0.275	0.87	1.00	0.315	No
309	50.69	3.05	1.43	1.62	0.77	0.310	1.13	0.275	0.87	1.00	0.315	No
310	50.85	3.06	1.44	1.62	0.77	0.310	1.13	0.275	0.87	1.00	0.315	No
311	51.02	3.07	1.44	1.63	0.77	0.310	1.13	0.274	0.87	1.00	0.315	No
312	51.18	3.08	1.45	1.63	0.76	0.309	1.13	0.274	0.87	1.00	0.315	No
313	51.35	3.09	1.45	1.64	0.76	0.309	1.13	0.274	0.87	1.00	0.315	No
314	51.51	3.10	1.46	1.64	0.76	0.309	1.13	0.273	0.87	1.00	0.315	No
315	51.67	3.11	1.46	1.65	0.76	0.308	1.13	0.273	0.87	1.00	0.315	No
316	51.84	3.12	1.47	1.66	0.76	0.308	1.13	0.273	0.89	1.00	0.306	No
317	52.00	3.13	1.47	1.66	0.76	0.308	1.13	0.273	0.88	1.00	0.308	No
318	52.17	3.14	1.48	1.67	0.76	0.307	1.13	0.272	0.86	1.00	0.315	No
319	52.33	3.15	1.48	1.67	0.76	0.307	1.13	0.272	0.86	1.00	0.315	No
320	52.49	3.16	1.49	1.68	0.76	0.307	1.13	0.272	0.86	1.00	0.315	No
321	52.66	3.18	1.49	1.68	0.76	0.306	1.13	0.271	0.86	1.00	0.315	No
322	52.82	3.19	1.50	1.69	0.76	0.306	1.13	0.271	0.86	1.00	0.315	No
323	52.99	3.20	1.50	1.69	0.76	0.306	1.13	0.271	0.86	1.00	0.315	No
324	53.15	3.21	1.51	1.70	0.75	0.305	1.13	0.270	0.86	1.00	0.315	No
325	53.31	3.22	1.51	1.71	0.75	0.305	1.13	0.270	0.86	1.00	0.315	No
326	53.48	3.23	1.52	1.71	0.75	0.305	1.13	0.270	0.86	1.00	0.315	No
327	53.64	3.24	1.52	1.72	0.75	0.304	1.13	0.269	0.85	1.00	0.315	No
328	53.81	3.25	1.53	1.72	0.75	0.304	1.13	0.269	0.85	1.00	0.315	No
329	53.97	3.26	1.53	1.73	0.75	0.303	1.13	0.269	0.85	1.00	0.315	No
330	54.13	3.28	1.54	1.74	0.75	0.303	1.13	0.268	0.85	1.00	0.315	No
331	54.30	3.29	1.54	1.74	0.75	0.303	1.13	0.268	0.85	1.00	0.315	No
332	54.46	3.30	1.55	1.75	0.75	0.302	1.13	0.268	0.85	1.00	0.315	No
333	54.63	3.31	1.55	1.76	0.75	0.302	1.13	0.267	0.85	1.00	0.315	No
334	54.79	3.32	1.56	1.76	0.75	0.302	1.13	0.267	0.85	1.00	0.315	No
335	54.95	3.33	1.56	1.77	0.74	0.301	1.13	0.267	0.85	1.00	0.315	No
336	55.12	3.34	1.57	1.77	0.74	0.301	1.13	0.266	0.85	1.00	0.315	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
337	55.28	3.35	1.57	1.78	0.74	0.301	1.13	0.266	0.84	1.00	0.315	No
338	55.45	3.37	1.58	1.79	0.74	0.300	1.13	0.266	0.84	1.00	0.315	No
339	55.61	3.38	1.59	1.79	0.74	0.300	1.13	0.265	0.84	1.00	0.315	No
340	55.77	3.39	1.59	1.80	0.74	0.299	1.13	0.265	0.84	1.00	0.315	No
341	55.94	3.40	1.60	1.80	0.74	0.299	1.13	0.265	0.84	1.00	0.315	No
342	56.10	3.41	1.60	1.81	0.74	0.299	1.13	0.265	0.84	1.00	0.315	No
343	56.27	3.42	1.61	1.82	0.74	0.298	1.13	0.264	0.84	1.00	0.315	No
344	56.43	3.43	1.61	1.82	0.74	0.298	1.13	0.264	0.84	1.00	0.315	No
345	56.59	3.44	1.62	1.83	0.74	0.298	1.13	0.264	0.84	1.00	0.315	No
346	56.76	3.45	1.62	1.83	0.74	0.297	1.13	0.263	0.84	1.00	0.315	No
347	56.92	3.46	1.63	1.84	0.73	0.297	1.13	0.263	0.83	1.00	0.315	No
348	57.09	3.48	1.63	1.84	0.73	0.297	1.13	0.263	0.83	1.00	0.315	No
349	57.25	3.49	1.64	1.85	0.73	0.296	1.13	0.262	0.83	1.00	0.315	No
350	57.41	3.50	1.64	1.86	0.73	0.296	1.13	0.262	0.83	1.00	0.315	No
351	57.58	3.51	1.65	1.86	0.73	0.296	1.13	0.262	0.83	1.00	0.315	No
352	57.74	3.52	1.65	1.87	0.73	0.295	1.13	0.261	0.83	1.00	0.315	No
353	57.91	3.53	1.66	1.87	0.73	0.295	1.13	0.261	0.83	1.00	0.315	No
354	58.07	3.54	1.66	1.88	0.73	0.295	1.13	0.261	0.83	1.00	0.315	No
355	58.23	3.55	1.67	1.89	0.73	0.294	1.13	0.261	0.83	1.00	0.315	No
356	58.40	3.56	1.67	1.89	0.73	0.294	1.13	0.260	0.83	1.00	0.315	No
357	58.56	3.57	1.68	1.90	0.73	0.294	1.13	0.260	0.82	1.00	0.315	No
358	58.73	3.59	1.68	1.90	0.73	0.293	1.13	0.260	0.82	1.00	0.315	No
359	58.89	3.60	1.69	1.91	0.72	0.293	1.13	0.259	0.82	1.00	0.315	No
360	59.06	3.61	1.69	1.91	0.72	0.293	1.13	0.259	0.82	1.00	0.315	No
361	59.22	3.62	1.70	1.92	0.72	0.292	1.13	0.259	0.83	1.00	0.310	No
362	59.38	3.63	1.70	1.92	0.72	0.292	1.13	0.259	0.85	1.00	0.305	No
363	59.55	3.64	1.71	1.93	0.72	0.292	1.13	0.258	0.85	1.00	0.302	No
364	59.71	3.65	1.71	1.93	0.72	0.291	1.13	0.258	0.86	1.00	0.299	No
365	59.88	3.66	1.72	1.94	0.72	0.291	1.13	0.258	0.88	1.00	0.294	No
366	60.04	3.67	1.72	1.94	0.72	0.291	1.13	0.258	0.89	1.00	0.290	No
367	60.20	3.68	1.73	1.95	0.72	0.291	1.13	0.257	0.90	1.00	0.285	No
368	60.37	3.69	1.73	1.95	0.72	0.290	1.13	0.257	0.92	1.00	0.281	No
369	60.53	3.70	1.74	1.96	0.72	0.290	1.13	0.257	0.92	1.00	0.278	No
370	60.70	3.71	1.74	1.96	0.72	0.290	1.13	0.257	0.92	1.00	0.278	No
371	60.86	3.72	1.75	1.97	0.71	0.289	1.13	0.256	0.91	1.00	0.281	No
372	61.02	3.73	1.75	1.97	0.71	0.289	1.13	0.256	0.90	1.00	0.285	No
373	61.19	3.74	1.76	1.98	0.71	0.289	1.13	0.256	0.89	1.00	0.288	No
374	61.35	3.75	1.76	1.98	0.71	0.289	1.13	0.256	0.88	1.00	0.291	No
375	61.52	3.76	1.77	1.99	0.71	0.288	1.13	0.255	0.84	1.00	0.303	No
376	61.68	3.77	1.77	2.00	0.71	0.288	1.13	0.255	0.81	1.00	0.315	No
377	61.84	3.78	1.78	2.00	0.71	0.288	1.13	0.255	0.81	1.00	0.315	No
378	62.01	3.79	1.78	2.01	0.71	0.287	1.13	0.255	0.81	1.00	0.315	No
379	62.17	3.80	1.79	2.01	0.71	0.287	1.13	0.254	0.81	1.00	0.315	No
380	62.34	3.81	1.80	2.02	0.71	0.287	1.13	0.254	0.81	1.00	0.315	No
381	62.50	3.82	1.80	2.02	0.71	0.286	1.13	0.254	0.81	1.00	0.315	No
382	62.66	3.83	1.81	2.03	0.71	0.286	1.13	0.253	0.80	1.00	0.315	No
383	62.83	3.85	1.81	2.03	0.71	0.286	1.13	0.253	0.80	1.00	0.315	No
384	62.99	3.86	1.82	2.04	0.70	0.286	1.13	0.253	0.80	1.00	0.315	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
385	63.16	3.87	1.82	2.05	0.70	0.285	1.13	0.253	0.80	1.00	0.315	No
386	63.32	3.88	1.83	2.05	0.70	0.285	1.13	0.252	0.80	1.00	0.315	No
387	63.48	3.89	1.83	2.06	0.70	0.285	1.13	0.252	0.80	1.00	0.315	No
388	63.65	3.90	1.84	2.06	0.70	0.284	1.13	0.252	0.80	1.00	0.315	No
389	63.81	3.91	1.84	2.07	0.70	0.284	1.13	0.252	0.80	1.00	0.315	No
390	63.98	3.92	1.85	2.07	0.70	0.284	1.13	0.251	0.80	1.00	0.315	No
391	64.14	3.93	1.85	2.08	0.70	0.283	1.13	0.251	0.80	1.00	0.315	No
392	64.30	3.94	1.86	2.08	0.70	0.283	1.13	0.251	0.80	1.00	0.315	No
393	64.47	3.95	1.86	2.09	0.70	0.283	1.13	0.251	0.85	1.00	0.294	No
394	64.63	3.96	1.87	2.09	0.70	0.283	1.13	0.250	0.89	1.00	0.281	No
395	64.80	3.97	1.87	2.10	0.70	0.282	1.13	0.250	0.91	1.00	0.274	No
396	64.96	3.98	1.88	2.10	0.70	0.282	1.13	0.250	0.93	1.00	0.269	No
397	65.12	3.99	1.88	2.11	0.69	0.282	1.13	0.250	0.94	1.00	0.267	No
398	65.29	4.00	1.89	2.11	0.69	0.282	1.13	0.249	0.94	1.00	0.265	No
399	65.45	4.01	1.89	2.12	0.69	0.281	1.13	0.249	0.95	1.00	0.263	No
400	65.62	4.02	1.90	2.12	0.69	0.281	1.13	0.249	0.95	1.00	0.261	No
401	65.78	4.03	1.90	2.13	0.69	0.281	1.13	0.249	0.96	1.00	0.260	No
402	65.94	4.04	1.91	2.13	0.69	0.281	1.13	0.249	0.96	1.00	0.260	No
403	66.11	4.05	1.91	2.13	0.69	0.281	1.13	0.248	0.95	1.00	0.260	No
404	66.27	4.06	1.92	2.14	0.69	0.280	1.13	0.248	0.95	1.00	0.261	No
405	66.44	4.07	1.92	2.14	0.69	0.280	1.13	0.248	0.95	1.00	0.261	No
406	66.60	4.08	1.93	2.15	0.69	0.280	1.13	0.248	0.95	1.00	0.260	No
407	66.77	4.09	1.93	2.15	0.69	0.280	1.13	0.248	0.95	1.00	0.261	No
408	66.93	4.10	1.94	2.16	0.69	0.279	1.13	0.247	0.94	1.00	0.262	No
409	67.09	4.11	1.94	2.16	0.69	0.279	1.13	0.247	0.93	1.00	0.265	No
410	67.26	4.12	1.95	2.17	0.68	0.279	1.13	0.247	0.91	1.00	0.272	No
411	67.42	4.13	1.95	2.17	0.68	0.278	1.13	0.247	0.85	1.00	0.291	No
412	67.59	4.14	1.96	2.18	0.68	0.278	1.13	0.246	0.78	1.00	0.314	No
413	67.75	4.15	1.96	2.18	0.68	0.278	1.13	0.246	0.78	1.00	0.314	No
414	67.91	4.16	1.97	2.19	0.68	0.278	1.13	0.246	0.78	1.00	0.314	No
415	68.08	4.17	1.97	2.20	0.68	0.277	1.13	0.245	0.78	1.00	0.314	No
416	68.24	4.18	1.98	2.20	0.68	0.277	1.13	0.245	0.78	1.00	0.314	No
417	68.41	4.19	1.98	2.21	0.68	0.277	1.13	0.245	0.78	1.00	0.314	No
418	68.57	4.21	1.99	2.22	0.68	0.276	1.13	0.245	0.78	1.00	0.314	No
419	68.73	4.22	1.99	2.22	0.68	0.276	1.13	0.244	0.78	1.00	0.314	No
420	68.90	4.23	2.00	2.23	0.68	0.276	1.13	0.244	0.78	1.00	0.314	No
421	69.06	4.24	2.00	2.23	0.68	0.275	1.13	0.244	0.78	1.00	0.314	No
422	69.23	4.25	2.01	2.24	0.68	0.275	1.13	0.243	0.77	1.00	0.314	No
423	69.39	4.26	2.02	2.25	0.67	0.275	1.13	0.243	0.77	1.00	0.314	No
424	69.55	4.27	2.02	2.25	0.67	0.274	1.13	0.243	0.77	1.00	0.314	No
425	69.72	4.28	2.03	2.26	0.67	0.274	1.13	0.243	0.77	1.00	0.314	No
426	69.88	4.30	2.03	2.26	0.67	0.274	1.13	0.242	0.77	1.00	0.314	No
427	70.05	4.31	2.04	2.27	0.67	0.273	1.13	0.242	0.77	1.00	0.314	No
428	70.21	4.32	2.04	2.28	0.67	0.273	1.13	0.242	0.77	1.00	0.314	No
429	70.37	4.33	2.05	2.28	0.67	0.273	1.13	0.241	0.77	1.00	0.314	No
430	70.54	4.34	2.05	2.29	0.67	0.272	1.13	0.241	0.77	1.00	0.314	No
431	70.70	4.35	2.06	2.30	0.67	0.272	1.13	0.241	0.77	1.00	0.314	No
432	70.87	4.36	2.06	2.30	0.67	0.272	1.13	0.241	0.77	1.00	0.314	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
433	71.03	4.37	2.07	2.31	0.67	0.271	1.13	0.240	0.77	1.00	0.314	No
434	71.19	4.39	2.07	2.31	0.67	0.271	1.13	0.240	0.77	1.00	0.314	No
435	71.36	4.40	2.08	2.32	0.67	0.271	1.13	0.240	0.76	1.00	0.314	No
436	71.52	4.41	2.08	2.33	0.67	0.270	1.13	0.240	0.76	1.00	0.314	No
437	71.69	4.42	2.09	2.33	0.66	0.270	1.13	0.239	0.76	1.00	0.314	No
438	71.85	4.43	2.09	2.34	0.66	0.270	1.13	0.239	0.76	1.00	0.314	No
439	72.01	4.44	2.10	2.34	0.66	0.270	1.13	0.239	0.76	1.00	0.314	No
440	72.18	4.45	2.10	2.35	0.66	0.269	1.13	0.238	0.76	1.00	0.314	No
441	72.34	4.46	2.11	2.36	0.66	0.269	1.13	0.238	0.76	1.00	0.314	No
442	72.51	4.48	2.11	2.36	0.66	0.269	1.13	0.238	0.76	1.00	0.313	No
443	72.67	4.49	2.12	2.37	0.66	0.268	1.13	0.238	0.76	1.00	0.313	No
444	72.83	4.50	2.12	2.38	0.66	0.268	1.13	0.237	0.76	1.00	0.313	No
445	73.00	4.51	2.13	2.38	0.66	0.268	1.13	0.237	0.76	1.00	0.313	No
446	73.16	4.52	2.13	2.39	0.66	0.267	1.13	0.237	0.76	1.00	0.313	No
447	73.33	4.53	2.14	2.39	0.66	0.267	1.13	0.237	0.76	1.00	0.313	No
448	73.49	4.54	2.14	2.40	0.66	0.267	1.13	0.236	0.75	1.00	0.313	No
449	73.65	4.55	2.15	2.41	0.66	0.267	1.13	0.236	0.75	1.00	0.313	No
450	73.82	4.57	2.15	2.41	0.66	0.266	1.13	0.236	0.75	1.00	0.313	No
451	73.98	4.57	2.16	2.41	0.66	0.266	1.13	0.236	0.75	1.00	0.313	No
452	74.15	4.58	2.16	2.42	0.65	0.266	1.13	0.236	0.75	1.00	0.313	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	215.51	4.21	1.17	0.26	1.70	320.13	0.00	320.13	4.000	No	No	2.00
2	0.33	268.01	4.07	1.15	0.26	1.70	398.50	0.00	398.50	4.000	No	No	2.00
3	0.49	363.64	3.98	1.15	0.26	1.70	573.09	0.00	573.10	4.000	No	No	2.00
4	0.66	477.79	4.43	1.19	0.26	1.70	781.08	0.01	781.09	4.000	No	No	2.00
5	0.82	561.46	4.77	1.23	0.26	1.70	948.62	0.05	948.67	4.000	No	No	2.00
6	0.98	538.82	4.80	1.23	0.26	1.70	976.24	0.06	976.30	4.000	No	No	2.00
7	1.15	481.05	4.22	1.17	0.26	1.70	670.19	0.00	670.19	4.000	No	No	2.00
8	1.31	417.51	3.55	1.10	0.26	1.70	670.19	0.00	670.19	4.000	No	No	2.00
9	1.48	300.49	5.00	1.25	0.26	1.70	670.19	0.09	670.28	4.000	No	No	2.00
10	1.64	183.82	8.02	1.50	0.47	1.70	107.89	4.54	112.44	4.000	No	No	2.00
11	1.80	67.16	18.32	2.06	0.39	1.70	107.89	50.51	158.40	4.000	No	No	2.00
12	1.97	60.81	19.77	2.12	0.38	1.70	107.89	53.91	161.80	4.000	No	No	2.00
13	2.13	54.20	21.33	2.18	0.45	1.70	77.27	47.87	125.14	4.000	No	No	2.00
14	2.30	51.08	22.18	2.22	0.45	1.70	75.97	48.61	124.58	4.000	No	No	2.00
15	2.46	56.63	20.95	2.17	0.41	1.70	92.78	51.81	144.60	4.000	No	No	2.00
16	2.62	63.58	19.97	2.13	0.39	1.70	104.02	53.23	157.25	4.000	No	No	2.00
17	2.79	66.14	20.12	2.13	0.38	1.70	109.56	55.08	164.63	4.000	No	No	2.00
18	2.95	64.17	20.54	2.15	0.39	1.70	105.16	54.66	159.82	4.000	No	No	2.00
19	3.12	58.20	21.22	2.18	0.41	1.70	94.50	52.75	147.25	4.000	No	No	2.00
20	3.28	51.05	21.60	2.19	0.44	1.70	80.80	49.29	130.08	4.000	No	No	2.00
21	3.44	45.73	21.12	2.18	0.46	1.70	70.68	45.66	116.34	4.000	No	No	2.00
22	3.61	42.65	19.90	2.13	0.47	1.70	68.79	43.27	112.05	4.000	No	No	2.00
23	3.77	39.61	18.73	2.08	0.48	1.70	65.91	40.41	106.32	4.000	No	No	2.00
24	3.94	33.64	19.04	2.09	0.51	1.70	56.06	38.33	94.40	4.000	Yes	No	2.00
25	4.10	25.29	21.19	2.18	0.55	1.70	40.11	36.85	76.96	4.000	Yes	No	2.00
26	4.27	17.41	26.10	2.36	0.60	1.70	25.67	36.11	61.78	4.000	Yes	No	2.00
27	4.43	12.37	32.37	2.56	0.63	1.70	18.05	35.54	53.59	4.000	Yes	No	2.00
28	4.59	10.31	36.82	2.69	0.63	1.70	15.71	0.00	15.71	4.000	Yes	Yes	2.00
29	4.76	9.67	37.73	2.72	0.63	1.70	15.75	0.00	15.75	4.000	No	Yes	2.00
30	4.92	9.15	38.31	2.74	0.64	1.70	15.01	0.00	15.01	4.000	No	Yes	2.00
31	5.09	8.34	40.73	2.80	0.65	1.70	13.29	0.00	13.29	4.000	No	Yes	2.00
32	5.25	7.87	42.22	2.84	0.65	1.70	11.83	0.00	11.83	4.000	No	Yes	2.00
33	5.41	8.41	40.29	2.79	0.65	1.70	12.64	0.00	12.64	4.000	No	Yes	2.00
34	5.58	9.81	35.23	2.65	0.64	1.70	15.74	0.00	15.74	4.000	No	Yes	2.00
35	5.74	10.93	32.64	2.57	0.62	1.70	18.60	35.77	54.37	0.082	No	No	0.42
36	5.91	10.65	32.81	2.58	0.62	1.70	18.18	35.66	53.84	0.081	No	No	0.41
37	6.07	8.92	36.11	2.67	0.64	1.70	14.56	0.00	14.56	4.000	No	Yes	2.00
38	6.23	6.78	40.65	2.80	0.66	1.70	10.26	0.00	10.26	4.000	No	Yes	2.00
39	6.40	5.24	45.19	2.91	0.67	1.70	7.84	0.00	7.84	4.000	No	Yes	2.00
40	6.56	4.49	48.84	3.00	0.68	1.70	7.11	0.00	7.11	4.000	No	Yes	2.00
41	6.73	4.16	52.43	3.09	0.68	1.70	6.57	0.00	6.57	4.000	No	Yes	2.00
42	6.89	4.25	54.08	3.12	0.68	1.70	6.23	0.00	6.23	4.000	No	Yes	2.00
43	7.05	6.16	46.39	2.94	0.68	1.70	7.51	0.00	7.51	4.000	Yes	Yes	2.00
44	7.22	8.13	40.73	2.80	0.63	1.70	15.75	0.00	15.75	4.000	Yes	Yes	2.00
45	7.38	11.39	33.77	2.61	0.64	1.70	15.75	0.00	15.75	4.000	Yes	Yes	2.00
46	7.55	12.94	31.10	2.52	0.60	1.70	23.29	37.05	60.34	4.000	Yes	No	2.00
47	7.71	16.72	26.29	2.37	0.61	1.70	23.29	35.43	58.72	4.000	Yes	No	2.00
48	7.87	23.22	21.59	2.19	0.58	1.70	33.95	35.47	69.42	4.000	Yes	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	35.40	17.03	2.00	0.52	1.70	54.63	34.01	88.64	4.000	Yes	No	2.00
50	8.20	50.28	14.08	1.86	0.47	1.68	81.02	30.70	111.72	4.000	Yes	No	2.00
51	8.37	63.40	12.39	1.77	0.44	1.62	100.50	26.25	126.75	4.000	Yes	No	2.00
52	8.53	70.62	11.49	1.72	0.43	1.59	110.13	22.60	132.73	4.000	Yes	No	2.00
53	8.69	71.12	11.22	1.71	0.44	1.59	109.14	20.95	130.09	0.203	No	No	0.90
54	8.86	67.15	11.39	1.72	0.45	1.60	101.98	21.12	123.11	0.186	No	No	0.82
55	9.02	62.06	11.94	1.75	0.46	1.62	94.08	23.10	117.17	0.174	No	No	0.76
56	9.19	57.89	12.82	1.80	0.47	1.62	87.83	26.49	114.32	0.168	No	No	0.73
57	9.35	54.82	14.12	1.86	0.47	1.61	83.39	31.31	114.70	0.169	No	No	0.73
58	9.51	52.32	14.98	1.91	0.47	1.61	79.37	33.74	113.11	0.166	No	No	0.71
59	9.68	50.15	15.63	1.94	0.48	1.61	75.66	35.11	110.77	0.161	No	No	0.68
60	9.84	48.84	15.80	1.95	0.48	1.61	73.28	35.08	108.36	0.157	No	No	0.66
61	10.01	48.77	15.79	1.94	0.48	1.60	72.98	34.98	107.96	0.156	No	No	0.65
62	10.17	50.24	14.95	1.90	0.48	1.59	74.73	32.67	107.40	0.155	No	No	0.64
63	10.33	53.67	13.45	1.83	0.48	1.59	79.06	27.83	106.89	0.154	No	No	0.64
64	10.50	59.17	12.07	1.75	0.48	1.57	86.96	22.81	109.78	0.159	No	No	0.66
65	10.66	65.38	10.78	1.68	0.47	1.55	96.97	17.28	114.25	0.168	No	No	0.69
66	10.83	68.31	10.50	1.66	0.46	1.53	102.97	16.33	119.30	0.178	No	No	0.73
67	10.99	65.12	10.93	1.69	0.47	1.53	97.63	18.17	115.80	0.171	No	No	0.70
68	11.15	55.76	12.76	1.79	0.48	1.55	82.73	25.44	108.17	4.000	Yes	No	2.00
69	11.32	45.26	15.52	1.93	0.51	1.58	64.43	32.34	96.77	4.000	Yes	No	2.00
70	11.48	36.43	19.30	2.10	0.52	1.58	53.62	38.11	91.73	4.000	Yes	No	2.00
71	11.65	30.37	22.60	2.23	0.53	1.60	45.41	39.87	85.28	4.000	Yes	No	2.00
72	11.81	24.65	25.32	2.33	0.55	1.61	38.32	39.73	78.06	4.000	Yes	No	2.00
73	11.98	19.38	27.92	2.42	0.58	1.65	29.12	38.02	67.14	4.000	Yes	No	2.00
74	12.14	15.03	30.91	2.52	0.61	1.68	22.59	36.77	59.36	4.000	Yes	No	2.00
75	12.30	12.71	34.03	2.61	0.62	1.69	19.13	0.00	19.13	4.000	Yes	Yes	2.00
76	12.47	12.25	35.17	2.65	0.62	1.68	18.57	0.00	18.57	4.000	No	Yes	2.00
77	12.63	13.19	33.72	2.60	0.61	1.67	20.22	0.00	20.22	4.000	No	Yes	2.00
78	12.80	14.60	30.61	2.51	0.60	1.64	22.99	36.83	59.82	0.088	No	No	0.33
79	12.96	15.37	28.67	2.45	0.60	1.63	24.58	36.79	61.37	0.089	No	No	0.33
80	13.12	14.97	29.53	2.47	0.60	1.63	23.46	36.69	60.15	0.088	No	No	0.32
81	13.29	13.94	31.91	2.55	0.61	1.63	21.07	36.47	57.54	0.085	No	No	0.31
82	13.45	13.38	33.93	2.61	0.62	1.63	19.86	0.00	19.86	4.000	No	Yes	2.00
83	13.62	13.51	34.50	2.63	0.61	1.62	20.67	0.00	20.67	4.000	No	Yes	2.00
84	13.78	13.72	34.36	2.62	0.61	1.61	21.34	0.00	21.34	4.000	No	Yes	2.00
85	13.94	13.27	33.24	2.59	0.61	1.61	20.56	36.55	57.10	0.085	No	No	0.31
86	14.11	12.41	37.78	2.72	0.62	1.61	18.53	0.00	18.53	4.000	No	Yes	2.00
87	14.27	11.72	42.03	2.83	0.62	1.60	17.40	0.00	17.40	4.000	No	Yes	2.00
88	14.44	16.77	39.81	2.78	0.63	1.60	17.32	0.00	17.32	4.000	No	Yes	2.00
89	14.60	22.01	36.01	2.67	0.54	1.49	38.48	0.00	38.48	4.000	No	Yes	2.00
90	14.76	31.09	32.33	2.56	0.54	1.49	38.35	42.44	80.79	0.114	No	No	0.41
91	14.93	37.36	30.22	2.50	0.50	1.43	52.58	46.66	99.24	0.141	No	No	0.51
92	15.09	42.83	28.60	2.44	0.48	1.40	61.27	48.93	110.20	0.160	No	No	0.58
93	15.26	41.96	27.80	2.42	0.49	1.41	58.09	47.50	105.59	0.152	No	No	0.55
94	15.42	36.24	28.36	2.44	0.51	1.43	48.79	44.69	93.48	0.132	No	No	0.47
95	15.58	30.63	29.19	2.46	0.54	1.45	39.72	42.00	81.72	0.115	No	No	0.41
96	15.75	28.02	29.74	2.48	0.55	1.45	36.73	41.19	77.92	0.110	No	No	0.39

:: 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	28.55	30.07	2.49	0.55	1.44	38.42	41.86	80.27	0.113	No	No	0.40
98	16.08	30.44	30.56	2.51	0.54	1.42	41.07	42.90	83.97	0.118	No	No	0.42
99	16.24	33.37	29.92	2.49	0.53	1.41	43.13	43.39	86.53	4.000	Yes	No	2.00
100	16.40	37.83	27.01	2.39	0.51	1.39	48.59	43.99	92.59	4.000	Yes	No	2.00
101	16.57	44.00	22.39	2.22	0.50	1.37	56.81	43.10	99.90	4.000	Yes	No	2.00
102	16.73	48.42	18.70	2.08	0.49	1.36	65.22	40.17	105.39	4.000	Yes	No	2.00
103	16.90	48.22	18.36	2.06	0.49	1.35	64.43	39.30	103.73	4.000	Yes	No	2.00
104	17.06	42.53	20.65	2.16	0.51	1.36	55.78	40.71	96.49	4.000	Yes	No	2.00
105	17.22	34.36	24.69	2.31	0.53	1.38	43.87	41.09	84.95	4.000	Yes	No	2.00
106	17.39	26.64	29.32	2.47	0.56	1.40	33.92	40.12	74.04	4.000	Yes	No	2.00
107	17.55	20.64	34.07	2.61	0.59	1.41	26.81	0.00	26.81	4.000	Yes	Yes	2.00
108	17.72	16.46	37.96	2.73	0.61	1.42	21.22	0.00	21.22	4.000	Yes	Yes	2.00
109	17.88	13.63	40.19	2.79	0.62	1.43	17.72	0.00	17.72	4.000	Yes	Yes	2.00
110	18.04	11.84	40.78	2.80	0.63	1.43	15.55	0.00	15.55	4.000	No	Yes	2.00
111	18.21	10.54	41.17	2.81	0.64	1.44	13.92	0.00	13.92	4.000	No	Yes	2.00
112	18.37	9.48	42.30	2.84	0.65	1.44	12.43	0.00	12.43	4.000	No	Yes	2.00
113	18.54	8.62	43.67	2.88	0.66	1.44	11.16	0.00	11.16	4.000	No	Yes	2.00
114	18.70	7.99	44.61	2.90	0.66	1.44	10.27	0.00	10.27	4.000	No	Yes	2.00
115	18.86	7.58	45.10	2.91	0.66	1.43	9.70	0.00	9.70	4.000	No	Yes	2.00
116	19.03	7.33	45.75	2.93	0.67	1.43	9.33	0.00	9.33	4.000	No	Yes	2.00
117	19.19	7.17	46.56	2.95	0.67	1.43	9.06	0.00	9.06	4.000	No	Yes	2.00
118	19.36	7.05	47.27	2.97	0.67	1.42	8.86	0.00	8.86	4.000	No	Yes	2.00
119	19.52	7.11	46.96	2.96	0.67	1.42	8.64	0.00	8.64	4.000	No	Yes	2.00
120	19.69	7.63	47.50	2.97	0.67	1.41	9.09	0.00	9.09	4.000	No	Yes	2.00
121	19.85	8.73	45.80	2.93	0.66	1.40	10.67	0.00	10.67	4.000	No	Yes	2.00
122	20.01	9.76	44.60	2.90	0.65	1.39	12.63	0.00	12.63	4.000	No	Yes	2.00
123	20.18	10.20	43.63	2.88	0.64	1.38	13.45	0.00	13.45	4.000	No	Yes	2.00
124	20.34	10.03	43.75	2.88	0.65	1.38	12.75	0.00	12.75	4.000	No	Yes	2.00
125	20.51	9.98	43.01	2.86	0.65	1.37	12.30	0.00	12.30	4.000	No	Yes	2.00
126	20.67	10.38	40.86	2.80	0.65	1.37	12.84	0.00	12.84	4.000	No	Yes	2.00
127	20.83	10.76	39.25	2.76	0.64	1.36	13.69	0.00	13.69	4.000	No	Yes	2.00
128	21.00	10.69	39.20	2.76	0.65	1.36	13.36	0.00	13.36	4.000	No	Yes	2.00
129	21.16	10.33	40.19	2.79	0.65	1.36	12.33	0.00	12.33	4.000	No	Yes	2.00
130	21.33	10.38	40.78	2.80	0.65	1.35	11.85	0.00	11.85	4.000	No	Yes	2.00
131	21.49	11.29	39.80	2.78	0.65	1.34	12.92	0.00	12.92	4.000	No	Yes	2.00
132	21.65	12.83	37.92	2.72	0.64	1.33	15.05	0.00	15.05	4.000	No	Yes	2.00
133	21.82	14.26	36.28	2.68	0.63	1.32	17.06	0.00	17.06	4.000	No	Yes	2.00
134	21.98	14.94	35.64	2.66	0.62	1.32	17.81	0.00	17.81	4.000	No	Yes	2.00
135	22.15	14.61	36.26	2.68	0.63	1.31	17.39	0.00	17.39	4.000	No	Yes	2.00
136	22.31	13.82	37.41	2.71	0.63	1.31	16.33	0.00	16.33	4.000	No	Yes	2.00
137	22.47	12.75	39.45	2.77	0.64	1.31	15.39	0.00	15.39	4.000	No	Yes	2.00
138	22.64	11.86	40.86	2.80	0.64	1.31	14.35	0.00	14.35	4.000	No	Yes	2.00
139	22.80	10.96	42.90	2.86	0.65	1.31	13.32	0.00	13.32	4.000	No	Yes	2.00
140	22.97	10.38	44.44	2.90	0.65	1.31	12.28	0.00	12.28	4.000	No	Yes	2.00
141	23.13	10.12	45.27	2.92	0.65	1.30	11.90	0.00	11.90	4.000	No	Yes	2.00
142	23.29	10.19	44.13	2.89	0.65	1.30	12.17	0.00	12.17	4.000	Yes	Yes	2.00
143	23.46	11.84	38.91	2.75	0.65	1.29	12.32	0.00	12.32	4.000	Yes	Yes	2.00
144	23.62	13.34	35.16	2.65	0.63	1.28	17.72	0.00	17.72	4.000	Yes	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	25.14	23.87	2.28	0.64	1.28	17.75	32.37	50.12	4.000	Yes	No	2.00
146	23.95	35.44	19.23	2.10	0.52	1.22	52.61	37.73	90.34	4.000	Yes	No	2.00
147	24.11	53.40	14.88	1.90	0.54	1.23	52.93	28.04	80.97	4.000	Yes	No	2.00
148	24.28	67.17	13.08	1.81	0.49	1.20	77.55	26.04	103.59	4.000	Yes	No	2.00
149	24.44	83.80	11.83	1.74	0.46	1.18	97.03	22.87	119.90	4.000	Yes	No	2.00
150	24.61	92.13	11.86	1.74	0.44	1.17	105.67	24.13	129.80	0.203	No	No	0.67
151	24.77	91.81	12.65	1.79	0.44	1.17	102.99	27.94	130.93	0.205	No	No	0.67
152	24.93	86.40	13.47	1.83	0.45	1.17	94.88	30.59	125.47	0.192	No	No	0.63
153	25.10	80.91	13.77	1.85	0.46	1.17	87.62	30.64	118.27	0.176	No	No	0.57
154	25.26	78.86	13.34	1.82	0.47	1.17	85.04	28.35	113.39	0.166	No	No	0.54
155	25.43	81.54	12.33	1.77	0.47	1.17	87.97	24.18	112.15	0.164	No	No	0.53
156	25.59	88.15	10.96	1.69	0.47	1.16	95.86	18.13	113.99	0.167	No	No	0.55
157	25.75	95.96	9.57	1.60	0.46	1.16	105.81	11.50	117.31	0.174	No	No	0.57
158	25.92	101.07	8.67	1.54	0.46	1.15	112.50	7.38	119.88	0.179	No	No	0.59
159	26.08	100.94	8.90	1.56	0.46	1.15	111.53	8.40	119.93	0.179	No	No	0.59
160	26.25	97.49	9.94	1.63	0.46	1.15	104.52	13.41	117.93	0.175	No	No	0.57
161	26.41	95.94	10.85	1.68	0.46	1.15	100.38	18.00	118.38	0.176	No	No	0.57
162	26.57	100.54	11.42	1.72	0.44	1.14	105.02	21.61	126.63	0.195	No	No	0.63
163	26.74	110.81	10.36	1.65	0.43	1.13	117.53	16.74	134.27	0.215	No	No	0.70
164	26.90	124.02	10.24	1.65	0.41	1.12	130.93	17.12	148.06	0.263	No	No	0.86
165	27.07	138.86	9.77	1.62	0.39	1.11	144.40	15.06	159.46	0.323	No	No	1.06
166	27.23	155.11	9.31	1.59	0.37	1.10	161.00	13.12	174.12	0.453	No	No	1.50
167	27.40	171.74	8.20	1.51	0.35	1.10	178.61	7.12	185.74	0.644	No	No	2.00
168	27.56	185.52	7.20	1.44	0.33	1.09	193.23	2.98	196.21	0.962	No	No	2.00
169	27.72	194.76	7.28	1.44	0.32	1.08	201.10	3.37	204.47	1.411	No	No	2.00
170	27.89	199.56	7.89	1.49	0.32	1.08	204.50	6.08	210.59	1.960	No	No	2.00
171	28.05	201.60	8.67	1.54	0.31	1.08	205.52	10.83	216.35	2.777	No	No	2.00
172	28.22	202.59	9.16	1.58	0.30	1.07	205.16	14.31	219.47	3.408	No	No	2.00
173	28.38	203.97	9.40	1.59	0.30	1.07	205.63	16.13	221.76	3.994	No	No	2.00
174	28.54	207.49	9.53	1.60	0.30	1.07	207.96	17.34	225.30	4.000	No	No	2.00
175	28.71	213.46	9.68	1.61	0.29	1.06	213.87	18.85	232.72	4.000	No	No	2.00
176	28.87	220.64	9.78	1.62	0.28	1.06	221.33	20.18	241.51	4.000	No	No	2.00
177	29.04	225.62	9.85	1.62	0.27	1.06	227.06	21.15	248.21	4.000	No	No	2.00
178	29.20	225.97	9.80	1.62	0.27	1.05	226.78	20.77	247.56	4.000	No	No	2.00
179	29.36	221.71	9.72	1.61	0.28	1.05	221.20	19.66	240.86	4.000	No	No	2.00
180	29.53	215.04	9.64	1.61	0.29	1.05	213.93	18.51	232.44	4.000	No	No	2.00
181	29.69	208.89	9.72	1.61	0.30	1.05	206.76	18.79	225.55	4.000	No	No	2.00
182	29.86	204.63	10.02	1.63	0.30	1.05	202.50	20.93	223.43	4.000	No	No	2.00
183	30.02	205.18	10.15	1.64	0.30	1.05	200.53	21.82	222.35	4.000	No	No	2.00
184	30.18	212.18	10.07	1.64	0.29	1.05	207.15	21.64	228.79	4.000	No	No	2.00
185	30.35	227.62	9.59	1.61	0.28	1.04	221.50	18.64	240.13	4.000	No	No	2.00
186	30.51	248.81	9.34	1.59	0.26	1.04	243.86	17.69	261.55	4.000	No	No	2.00
187	30.68	271.35	8.98	1.57	0.26	1.04	267.49	15.73	283.22	4.000	No	No	2.00
188	30.84	290.35	8.70	1.55	0.26	1.04	286.19	14.02	300.21	4.000	No	No	2.00
189	31.00	303.46	8.23	1.51	0.26	1.03	298.47	10.58	309.05	4.000	No	No	2.00
190	31.17	311.03	8.12	1.51	0.26	1.03	304.72	9.87	314.59	4.000	No	No	2.00
191	31.33	313.54	8.28	1.52	0.26	1.03	306.87	11.16	318.03	4.000	No	No	2.00
192	31.50	312.41	8.82	1.55	0.26	1.03	304.25	15.85	320.11	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
193	31.66	309.10	9.42	1.59	0.26	1.03	299.87	21.53	321.40	4.000	No	No	2.00
194	31.82	306.81	9.95	1.63	0.26	1.03	295.74	26.89	322.63	4.000	No	No	2.00
195	31.99	309.18	10.07	1.64	0.26	1.02	296.11	28.24	324.36	4.000	No	No	2.00
196	32.15	319.38	9.88	1.62	0.26	1.02	305.23	26.81	332.04	4.000	No	No	2.00
197	32.32	336.88	9.47	1.60	0.26	1.02	323.80	23.47	347.27	4.000	No	No	2.00
198	32.48	355.95	8.99	1.57	0.26	1.02	345.23	19.31	364.54	4.000	No	No	2.00
199	32.64	370.67	8.34	1.52	0.26	1.02	358.85	13.25	372.10	4.000	No	No	2.00
200	32.81	379.57	7.77	1.48	0.26	1.02	364.80	8.49	373.30	4.000	No	No	2.00
201	32.97	386.60	7.39	1.45	0.26	1.01	369.31	5.98	375.29	4.000	No	No	2.00
202	33.14	393.98	7.33	1.45	0.26	1.01	377.36	5.70	383.06	4.000	No	No	2.00
203	33.30	400.02	7.29	1.44	0.26	1.01	384.17	5.53	389.70	4.000	No	No	2.00
204	33.46	401.53	7.16	1.44	0.26	1.01	384.84	4.84	389.67	4.000	No	No	2.00
205	33.63	398.96	6.93	1.42	0.26	1.01	379.97	3.62	383.58	4.000	No	No	2.00
206	33.79	396.10	6.80	1.41	0.26	1.01	375.15	3.01	378.15	4.000	No	No	2.00
207	33.96	396.86	6.65	1.39	0.26	1.01	374.99	2.43	377.42	4.000	No	No	2.00
208	34.12	402.55	6.51	1.38	0.26	1.00	380.47	2.01	382.48	4.000	No	No	2.00
209	34.28	411.61	6.35	1.37	0.26	1.00	389.67	1.57	391.24	4.000	No	No	2.00
210	34.45	420.53	6.44	1.38	0.26	1.00	399.08	1.87	400.95	4.000	No	No	2.00
211	34.61	425.13	6.49	1.38	0.26	1.00	404.08	2.03	406.11	4.000	No	No	2.00
212	34.78	422.47	6.50	1.38	0.26	1.00	400.99	2.07	403.06	4.000	No	No	2.00
213	34.94	413.07	6.41	1.38	0.26	1.00	389.85	1.74	391.59	4.000	No	No	2.00
214	35.10	400.61	6.40	1.37	0.26	1.00	375.86	1.66	377.52	4.000	No	No	2.00
215	35.27	388.67	6.36	1.37	0.26	0.99	364.22	1.50	365.72	4.000	No	No	2.00
216	35.43	377.64	6.27	1.36	0.26	0.99	354.65	1.28	355.93	4.000	No	No	2.00
217	35.60	365.43	6.17	1.35	0.26	0.99	343.31	1.03	344.34	4.000	No	No	2.00
218	35.76	351.21	6.08	1.35	0.26	0.99	328.48	0.85	329.33	4.000	No	No	2.00
219	35.93	336.08	6.09	1.35	0.26	0.99	313.40	0.84	314.23	4.000	No	No	2.00
220	36.09	321.43	6.22	1.36	0.26	0.99	299.62	1.02	300.64	4.000	No	No	2.00
221	36.25	305.93	6.44	1.38	0.26	0.99	286.25	1.44	287.69	4.000	No	No	2.00
222	36.42	287.45	6.66	1.40	0.26	0.98	268.92	1.91	270.83	4.000	No	No	2.00
223	36.58	264.09	6.90	1.41	0.27	0.98	246.91	2.48	249.38	4.000	No	No	2.00
224	36.75	236.92	7.30	1.45	0.30	0.98	219.60	3.63	223.23	4.000	No	No	2.00
225	36.91	208.80	8.03	1.50	0.33	0.98	191.45	6.55	198.00	1.040	No	No	2.00
226	37.07	183.59	9.14	1.58	0.36	0.97	166.77	12.28	179.06	0.521	No	No	1.71
227	37.24	162.72	10.25	1.65	0.38	0.97	148.06	18.53	166.59	0.376	No	No	1.23
228	37.40	146.16	11.14	1.70	0.39	0.97	132.42	22.95	155.37	0.298	No	No	0.98
229	37.57	132.94	11.37	1.71	0.42	0.96	119.88	23.03	142.92	0.243	No	No	0.80
230	37.73	124.62	10.92	1.69	0.44	0.96	110.64	19.41	130.05	0.203	No	No	0.67
231	37.89	118.85	10.28	1.65	0.45	0.96	108.47	15.56	124.03	0.188	No	No	0.62
232	38.06	111.31	11.23	1.71	0.45	0.96	103.29	20.38	123.67	0.188	No	No	0.62
233	38.22	94.78	15.07	1.91	0.45	0.95	89.51	36.11	125.62	0.192	No	No	0.63
234	38.39	71.48	20.71	2.16	0.49	0.95	63.05	42.88	105.93	0.153	No	No	0.50
235	38.55	63.07	24.06	2.29	0.55	0.94	39.50	39.27	78.78	0.111	No	No	0.37
236	38.71	64.34	23.92	2.28	0.47	0.95	66.18	47.47	113.65	0.167	No	No	0.55
237	38.88	116.66	15.86	1.95	0.50	0.94	65.81	33.62	99.43	0.142	No	No	0.47
238	39.04	159.10	12.55	1.78	0.30	0.96	183.17	39.03	222.20	4.000	No	No	2.00
239	39.21	222.30	9.49	1.60	0.33	0.96	182.17	15.51	197.68	1.025	No	No	2.00
240	39.37	260.36	9.06	1.57	0.26	0.97	240.54	15.19	255.73	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
241	39.53	309.39	8.07	1.50	0.26	0.96	287.46	9.11	296.57	4.000	No	No	2.00
242	39.70	341.57	7.82	1.48	0.26	0.96	317.05	7.95	325.00	4.000	No	No	2.00
243	39.86	356.88	7.55	1.46	0.26	0.96	327.46	6.37	333.84	4.000	No	No	2.00
244	40.03	367.05	7.76	1.48	0.26	0.96	328.12	7.76	335.88	4.000	No	No	2.00
245	40.19	385.55	7.94	1.49	0.26	0.96	343.42	9.39	352.81	4.000	No	No	2.00
246	40.35	420.04	7.87	1.49	0.26	0.96	376.37	9.56	385.93	4.000	No	No	2.00
247	40.52	459.59	7.78	1.48	0.26	0.96	420.42	9.63	430.05	4.000	No	No	2.00
248	40.68	488.89	7.48	1.46	0.26	0.96	449.31	7.73	457.04	4.000	No	No	2.00
249	40.85	493.98	7.07	1.43	0.26	0.95	454.30	4.94	459.24	4.000	No	No	2.00
250	41.01	475.41	6.71	1.40	0.26	0.95	432.73	2.99	435.72	4.000	No	No	2.00
251	41.17	441.73	6.62	1.39	0.26	0.95	397.69	2.44	400.13	4.000	No	No	2.00
252	41.34	404.46	6.89	1.41	0.26	0.95	361.89	3.28	365.17	4.000	No	No	2.00
253	41.50	370.46	7.45	1.46	0.26	0.95	330.69	5.80	336.49	4.000	No	No	2.00
254	41.67	342.19	8.11	1.51	0.26	0.95	304.61	9.80	314.41	4.000	No	No	2.00
255	41.83	321.67	8.36	1.52	0.26	0.95	284.54	11.18	295.73	4.000	No	No	2.00
256	41.99	309.25	8.13	1.51	0.26	0.95	274.41	9.18	283.59	4.000	No	No	2.00
257	42.16	302.13	7.88	1.49	0.26	0.95	270.43	7.43	277.86	4.000	No	No	2.00
258	42.32	293.76	8.27	1.52	0.26	0.94	264.79	9.89	274.68	4.000	No	No	2.00
259	42.49	280.82	8.99	1.57	0.26	0.94	251.37	15.12	266.49	4.000	No	No	2.00
260	42.65	265.85	9.61	1.61	0.26	0.94	235.07	19.56	254.63	4.000	No	No	2.00
261	42.81	254.52	9.73	1.61	0.28	0.94	223.28	19.88	243.16	4.000	No	No	2.00
262	42.98	248.50	9.48	1.60	0.28	0.94	219.25	17.51	236.76	4.000	No	No	2.00
263	43.14	242.90	9.35	1.59	0.29	0.93	216.99	16.40	233.39	4.000	No	No	2.00
264	43.31	231.23	9.67	1.61	0.30	0.93	206.59	18.36	224.95	4.000	No	No	2.00
265	43.47	212.02	10.35	1.65	0.32	0.93	186.13	22.30	208.43	1.738	No	No	2.00
266	43.64	191.85	11.03	1.69	0.35	0.92	163.21	25.39	188.60	0.713	No	No	2.00
267	43.80	180.09	11.47	1.72	0.36	0.91	150.35	27.10	177.45	0.497	No	No	1.65
268	43.96	182.94	11.68	1.73	0.35	0.91	153.16	28.86	182.02	0.570	No	No	1.89
269	44.13	201.03	11.70	1.73	0.33	0.92	170.55	31.12	201.67	1.231	No	No	2.00
270	44.29	234.51	11.59	1.73	0.29	0.93	200.14	33.74	233.88	4.000	No	No	2.00
271	44.46	283.35	11.30	1.71	0.26	0.93	244.75	36.26	281.00	4.000	No	No	2.00
272	44.62	340.86	10.76	1.68	0.26	0.93	301.67	36.44	338.11	4.000	No	No	2.00
273	44.78	390.90	10.45	1.66	0.26	0.93	352.24	37.18	389.42	4.000	No	No	2.00
274	44.95	419.15	10.43	1.66	0.26	0.93	375.52	38.90	414.42	4.000	No	No	2.00
275	45.11	430.64	10.67	1.67	0.26	0.93	374.96	42.06	417.02	4.000	No	No	2.00
276	45.28	444.68	10.46	1.66	0.26	0.93	381.06	39.74	420.80	4.000	No	No	2.00
277	45.44	473.63	9.94	1.63	0.26	0.93	410.97	34.87	445.84	4.000	No	No	2.00
278	45.60	509.04	9.36	1.59	0.26	0.92	449.49	29.03	478.52	4.000	No	No	2.00
279	45.77	534.66	9.32	1.59	0.26	0.92	472.70	29.70	502.40	4.000	No	No	2.00
280	45.93	545.60	9.60	1.61	0.26	0.92	476.80	34.17	510.97	4.000	No	No	2.00
281	46.10	550.03	10.07	1.64	0.26	0.92	476.61	41.62	518.23	4.000	No	No	2.00
282	46.26	556.01	10.45	1.66	0.26	0.92	482.55	48.18	530.73	4.000	No	No	2.00
283	46.42	564.76	10.59	1.67	0.26	0.92	490.65	51.30	541.94	4.000	No	No	2.00
284	46.59	573.28	10.61	1.67	0.26	0.92	497.66	52.24	549.90	4.000	No	No	2.00
285	46.75	580.07	10.68	1.67	0.26	0.92	503.02	53.89	556.91	4.000	No	No	2.00
286	46.92	582.48	10.82	1.68	0.26	0.92	506.56	56.71	563.27	4.000	No	No	2.00
287	47.08	578.10	10.83	1.68	0.26	0.92	502.28	56.46	558.74	4.000	No	No	2.00
288	47.24	568.25	10.58	1.67	0.26	0.91	490.06	51.08	541.14	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
289	47.41	561.40	10.15	1.64	0.26	0.91	479.46	43.04	522.50	4.000	No	No	2.00
290	47.57	565.58	9.93	1.63	0.26	0.91	482.98	39.77	522.75	4.000	No	No	2.00
291	47.74	579.64	10.06	1.64	0.26	0.91	499.22	43.03	542.25	4.000	No	No	2.00
292	47.90	590.88	10.32	1.65	0.26	0.91	513.98	48.66	562.64	4.000	No	No	2.00
293	48.06	587.17	10.49	1.66	0.26	0.91	510.32	51.19	561.52	4.000	No	No	2.00
294	48.23	567.73	10.46	1.66	0.26	0.91	488.11	48.85	536.96	4.000	No	No	2.00
295	48.39	543.95	10.45	1.66	0.26	0.91	462.53	46.50	509.03	4.000	No	No	2.00
296	48.56	526.07	10.53	1.66	0.26	0.91	447.69	46.52	494.22	4.000	No	No	2.00
297	48.72	516.41	10.61	1.67	0.26	0.91	440.66	47.05	487.71	4.000	No	No	2.00
298	48.88	511.05	10.59	1.67	0.26	0.90	436.22	46.44	482.66	4.000	No	No	2.00
299	49.05	511.33	10.44	1.66	0.26	0.90	432.53	43.85	476.39	4.000	No	No	2.00
300	49.21	519.58	10.38	1.66	0.26	0.90	440.04	43.60	483.63	4.000	No	No	2.00
301	49.38	534.51	10.26	1.65	0.26	0.90	455.96	42.96	498.92	4.000	No	No	2.00
302	49.54	540.91	10.22	1.65	0.26	0.90	469.28	43.36	512.63	4.000	No	No	2.00
303	49.70	529.33	10.14	1.64	0.26	0.90	454.95	41.07	496.02	4.000	No	No	2.00
304	49.87	502.27	10.21	1.65	0.26	0.90	425.10	39.87	464.97	4.000	No	No	2.00
305	50.03	485.17	10.20	1.64	0.26	0.90	399.10	37.63	436.73	4.000	No	No	2.00
306	50.20	489.28	10.19	1.64	0.26	0.90	410.07	38.28	448.36	4.000	No	No	2.00
307	50.36	509.54	9.98	1.63	0.26	0.90	434.22	37.13	471.35	4.000	No	No	2.00
308	50.52	519.69	9.64	1.61	0.26	0.90	449.24	33.07	482.31	4.000	No	No	2.00
309	50.69	506.35	9.23	1.58	0.26	0.89	434.56	26.50	461.06	4.000	No	No	2.00
310	50.85	469.49	8.75	1.55	0.26	0.89	399.14	18.86	418.01	4.000	No	No	2.00
311	51.02	421.39	8.29	1.52	0.26	0.89	354.66	12.69	367.35	4.000	No	No	2.00
312	51.18	372.42	7.89	1.49	0.26	0.89	311.70	8.33	320.03	4.000	No	No	2.00
313	51.35	328.07	8.05	1.50	0.26	0.89	274.29	8.62	282.91	4.000	No	No	2.00
314	51.51	289.27	8.84	1.56	0.26	0.89	241.67	13.43	255.10	4.000	No	No	2.00
315	51.67	259.18	9.67	1.61	0.29	0.88	210.14	18.56	228.71	4.000	No	No	2.00
316	51.84	244.16	9.75	1.62	0.32	0.87	193.14	18.08	211.22	2.032	No	No	2.00
317	52.00	249.62	8.78	1.55	0.32	0.87	198.35	11.24	209.60	1.854	No	No	2.00
318	52.17	271.75	7.86	1.49	0.29	0.88	223.42	6.36	229.78	4.000	No	No	2.00
319	52.33	300.51	7.43	1.46	0.26	0.89	253.07	4.65	257.71	4.000	No	No	2.00
320	52.49	329.01	7.72	1.48	0.26	0.89	275.31	6.54	281.85	4.000	No	No	2.00
321	52.66	357.39	8.07	1.50	0.26	0.88	297.38	9.33	306.71	4.000	No	No	2.00
322	52.82	389.26	8.22	1.51	0.26	0.88	323.49	11.17	334.66	4.000	No	No	2.00
323	52.99	423.36	8.20	1.51	0.26	0.88	354.20	11.80	366.00	4.000	No	No	2.00
324	53.15	453.89	8.18	1.51	0.26	0.88	381.72	12.35	394.07	4.000	No	No	2.00
325	53.31	473.70	8.27	1.52	0.26	0.88	398.85	13.67	412.51	4.000	No	No	2.00
326	53.48	478.95	8.48	1.53	0.26	0.88	402.62	15.95	418.57	4.000	No	No	2.00
327	53.64	471.51	8.60	1.54	0.26	0.88	393.70	16.98	410.68	4.000	No	No	2.00
328	53.81	457.90	8.64	1.54	0.26	0.88	379.14	16.86	395.99	4.000	No	No	2.00
329	53.97	446.38	8.60	1.54	0.26	0.88	367.62	16.04	383.66	4.000	No	No	2.00
330	54.13	442.81	8.55	1.54	0.26	0.88	363.96	15.42	379.38	4.000	No	No	2.00
331	54.30	446.96	8.61	1.54	0.26	0.88	369.23	16.23	385.46	4.000	No	No	2.00
332	54.46	456.70	8.77	1.55	0.26	0.88	376.88	18.19	395.06	4.000	No	No	2.00
333	54.63	469.47	8.91	1.56	0.26	0.87	387.06	20.21	407.26	4.000	No	No	2.00
334	54.79	483.59	9.07	1.57	0.26	0.87	399.79	22.67	422.46	4.000	No	No	2.00
335	54.95	493.51	9.14	1.58	0.26	0.87	410.77	24.04	434.81	4.000	No	No	2.00
336	55.12	491.69	9.27	1.58	0.26	0.87	410.54	25.70	436.23	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
337	55.28	475.72	9.25	1.58	0.26	0.87	394.14	24.71	418.85	4.000	No	No	2.00
338	55.45	451.49	9.15	1.58	0.26	0.87	370.20	22.30	392.50	4.000	No	No	2.00
339	55.61	428.65	8.99	1.57	0.26	0.87	349.61	19.48	369.09	4.000	No	No	2.00
340	55.77	411.72	8.99	1.57	0.26	0.87	336.83	18.96	355.79	4.000	No	No	2.00
341	55.94	398.73	9.11	1.57	0.26	0.87	327.53	19.73	347.25	4.000	No	No	2.00
342	56.10	386.04	9.23	1.58	0.26	0.87	316.71	20.45	337.16	4.000	No	No	2.00
343	56.27	373.87	9.05	1.57	0.26	0.87	304.74	18.06	322.80	4.000	No	No	2.00
344	56.43	365.67	8.69	1.55	0.26	0.87	296.77	14.32	311.09	4.000	No	No	2.00
345	56.59	365.39	8.17	1.51	0.26	0.87	295.81	10.03	305.83	4.000	No	No	2.00
346	56.76	375.59	7.86	1.49	0.26	0.87	303.36	8.00	311.37	4.000	No	No	2.00
347	56.92	398.18	7.69	1.48	0.26	0.86	321.09	7.19	328.28	4.000	No	No	2.00
348	57.09	429.50	7.82	1.48	0.26	0.86	350.43	8.67	359.10	4.000	No	No	2.00
349	57.25	460.11	7.96	1.49	0.26	0.86	379.28	10.39	389.67	4.000	No	No	2.00
350	57.41	476.54	8.13	1.51	0.26	0.86	395.10	12.30	407.40	4.000	No	No	2.00
351	57.58	475.24	8.24	1.51	0.26	0.86	389.66	13.20	402.86	4.000	No	No	2.00
352	57.74	460.35	8.42	1.53	0.26	0.86	375.16	14.51	389.67	4.000	No	No	2.00
353	57.91	441.99	8.38	1.52	0.26	0.86	357.79	13.54	371.32	4.000	No	No	2.00
354	58.07	423.80	8.16	1.51	0.26	0.86	343.90	11.25	355.14	4.000	No	No	2.00
355	58.23	406.31	7.86	1.49	0.26	0.86	329.97	8.52	338.49	4.000	No	No	2.00
356	58.40	386.04	7.86	1.49	0.26	0.86	314.39	8.19	322.58	4.000	No	No	2.00
357	58.56	360.85	8.08	1.50	0.26	0.86	293.82	9.34	303.16	4.000	No	No	2.00
358	58.73	331.44	8.49	1.53	0.26	0.86	267.96	11.64	279.60	4.000	No	No	2.00
359	58.89	302.03	8.91	1.56	0.26	0.86	242.24	14.05	256.29	4.000	No	No	2.00
360	59.06	278.21	9.19	1.58	0.29	0.84	218.68	15.18	233.86	4.000	No	No	2.00
361	59.22	262.29	9.35	1.59	0.30	0.83	204.65	15.73	220.38	3.626	No	No	2.00
362	59.38	252.93	9.73	1.61	0.31	0.83	197.67	18.26	215.93	2.703	No	No	2.00
363	59.55	246.28	9.81	1.62	0.32	0.83	192.56	18.58	211.14	2.024	No	No	2.00
364	59.71	238.90	9.92	1.63	0.32	0.82	186.26	18.98	205.25	1.469	No	No	2.00
365	59.88	228.70	9.66	1.61	0.34	0.81	176.58	16.39	192.96	0.842	No	No	2.00
366	60.04	214.77	10.08	1.64	0.35	0.81	164.53	18.61	183.14	0.591	No	No	2.00
367	60.20	197.54	11.09	1.70	0.37	0.80	149.41	24.35	173.77	0.449	No	No	1.57
368	60.37	180.10	12.12	1.76	0.38	0.79	132.78	29.15	161.93	0.339	No	No	1.21
369	60.53	169.03	12.60	1.78	0.40	0.78	120.55	30.26	150.80	0.275	No	No	0.99
370	60.70	170.31	11.58	1.73	0.41	0.77	120.52	24.31	144.83	0.250	No	No	0.90
371	60.86	183.36	10.53	1.66	0.40	0.78	134.22	19.23	153.45	0.288	No	No	1.03
372	61.02	200.11	9.90	1.63	0.37	0.79	151.76	16.45	168.21	0.390	No	No	1.37
373	61.19	214.78	9.60	1.61	0.36	0.80	162.11	15.05	177.15	0.493	No	No	1.71
374	61.35	231.32	9.21	1.58	0.35	0.80	171.23	12.98	184.21	0.612	No	No	2.00
375	61.52	258.13	8.71	1.55	0.32	0.82	194.52	10.63	205.15	1.461	No	No	2.00
376	61.68	294.28	8.44	1.53	0.28	0.84	234.46	10.19	244.65	4.000	No	No	2.00
377	61.84	328.39	8.07	1.50	0.26	0.85	267.04	8.62	275.66	4.000	No	No	2.00
378	62.01	352.04	7.73	1.48	0.26	0.84	283.07	6.74	289.81	4.000	No	No	2.00
379	62.17	369.71	7.43	1.46	0.26	0.84	292.15	5.18	297.33	4.000	No	No	2.00
380	62.34	389.84	7.38	1.45	0.26	0.84	308.65	5.12	313.77	4.000	No	No	2.00
381	62.50	409.83	7.56	1.46	0.26	0.84	330.50	6.47	336.97	4.000	No	No	2.00
382	62.66	415.40	7.79	1.48	0.26	0.84	339.16	8.19	347.35	4.000	No	No	2.00
383	62.83	396.26	8.07	1.50	0.26	0.84	321.23	9.93	331.17	4.000	No	No	2.00
384	62.99	358.20	8.64	1.54	0.26	0.84	284.14	13.42	297.56	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
385	63.16	320.84	9.25	1.58	0.26	0.84	247.75	17.15	264.89	4.000	No	No	2.00
386	63.32	301.82	9.64	1.61	0.27	0.84	230.77	19.57	250.33	4.000	No	No	2.00
387	63.48	306.82	9.69	1.61	0.26	0.84	238.17	20.49	258.66	4.000	No	No	2.00
388	63.65	324.34	9.12	1.58	0.26	0.84	259.02	16.60	275.62	4.000	No	No	2.00
389	63.81	337.79	8.53	1.54	0.26	0.84	272.70	12.18	284.88	4.000	No	No	2.00
390	63.98	333.72	7.75	1.48	0.26	0.84	269.69	6.59	276.28	4.000	No	No	2.00
391	64.14	312.62	7.47	1.46	0.27	0.84	248.71	4.78	253.49	4.000	No	No	2.00
392	64.30	280.04	7.54	1.46	0.30	0.81	216.24	4.61	220.86	3.749	No	No	2.00
393	64.47	243.78	8.24	1.51	0.34	0.79	181.72	7.43	189.15	0.727	No	No	2.00
394	64.63	207.13	9.23	1.58	0.39	0.77	149.64	12.00	161.64	0.337	No	No	1.20
395	64.80	174.14	10.48	1.66	0.42	0.75	121.04	17.77	138.81	0.228	No	No	0.84
396	64.96	146.62	11.39	1.72	0.46	0.73	99.44	20.85	120.30	0.180	No	No	0.67
397	65.12	124.35	12.69	1.79	0.48	0.72	83.87	25.29	109.16	0.158	No	No	0.59
398	65.29	104.59	14.73	1.89	0.50	0.71	69.93	30.98	100.90	0.144	No	No	0.54
399	65.45	85.95	17.94	2.04	0.52	0.70	56.09	36.30	92.39	0.131	No	No	0.50
400	65.62	70.42	21.56	2.19	0.54	0.69	43.77	38.33	82.10	0.116	No	No	0.44
401	65.78	61.10	24.06	2.29	0.56	0.68	36.89	38.45	75.34	0.106	No	No	0.41
402	65.94	59.46	24.23	2.29	0.56	0.68	36.27	38.39	74.66	0.106	No	No	0.41
403	66.11	63.19	23.34	2.26	0.55	0.68	40.19	38.92	79.11	0.111	No	No	0.43
404	66.27	68.04	22.94	2.25	0.53	0.69	44.62	39.94	84.55	0.119	No	No	0.46
405	66.44	70.80	23.81	2.28	0.53	0.69	46.49	41.25	87.74	0.124	No	No	0.47
406	66.60	73.06	24.83	2.31	0.53	0.69	46.11	41.89	87.99	0.124	No	No	0.48
407	66.77	81.14	22.95	2.25	0.52	0.69	49.44	41.42	90.86	0.128	No	No	0.49
408	66.93	98.48	20.63	2.16	0.48	0.71	64.12	43.06	107.18	0.155	No	No	0.59
409	67.09	130.71	17.77	2.04	0.44	0.73	84.66	43.18	127.84	0.198	No	No	0.75
410	67.26	177.28	16.11	1.96	0.37	0.77	125.14	47.69	172.83	0.438	No	No	1.61
411	67.42	245.89	13.83	1.85	0.30	0.81	179.76	47.23	226.99	4.000	No	No	2.00
412	67.59	323.66	12.37	1.77	0.26	0.83	256.69	47.96	304.65	4.000	No	No	2.00
413	67.75	397.76	11.31	1.71	0.26	0.83	316.57	44.19	360.76	4.000	No	No	2.00
414	67.91	447.24	10.84	1.68	0.26	0.83	356.86	42.64	399.50	4.000	No	No	2.00
415	68.08	475.91	10.66	1.67	0.26	0.82	371.77	41.67	413.44	4.000	No	No	2.00
416	68.24	493.48	10.77	1.68	0.26	0.82	382.83	44.11	426.94	4.000	No	No	2.00
417	68.41	511.09	10.96	1.69	0.26	0.82	397.07	48.08	445.15	4.000	No	No	2.00
418	68.57	529.39	11.11	1.70	0.26	0.82	411.98	51.87	463.86	4.000	No	No	2.00
419	68.73	546.20	11.28	1.71	0.26	0.82	424.60	55.58	480.18	4.000	No	No	2.00
420	68.90	560.03	11.57	1.73	0.26	0.82	435.34	61.21	496.54	4.000	No	No	2.00
421	69.06	569.85	11.91	1.75	0.26	0.82	443.20	67.29	510.49	4.000	No	No	2.00
422	69.23	574.01	12.23	1.76	0.26	0.82	446.44	72.51	518.95	4.000	No	No	2.00
423	69.39	571.89	12.32	1.77	0.26	0.82	444.03	73.46	517.49	4.000	No	No	2.00
424	69.55	562.71	12.35	1.77	0.26	0.82	437.39	72.96	510.35	4.000	No	No	2.00
425	69.72	547.68	12.36	1.77	0.26	0.82	424.20	71.30	495.51	4.000	No	No	2.00
426	69.88	528.31	12.57	1.78	0.26	0.82	408.26	71.84	480.10	4.000	No	No	2.00
427	70.05	511.30	12.80	1.79	0.26	0.82	391.66	72.39	464.05	4.000	No	No	2.00
428	70.21	500.25	12.93	1.80	0.26	0.82	383.98	72.90	456.88	4.000	No	No	2.00
429	70.37	499.63	12.79	1.79	0.26	0.82	381.88	70.75	452.63	4.000	No	No	2.00
430	70.54	508.85	12.53	1.78	0.26	0.82	389.34	68.62	457.96	4.000	No	No	2.00
431	70.70	528.61	12.40	1.77	0.26	0.82	404.50	69.00	473.50	4.000	No	No	2.00
432	70.87	551.97	12.53	1.78	0.26	0.81	426.63	74.01	500.64	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
433	71.03	569.21	12.74	1.79	0.26	0.81	442.33	79.22	521.56	4.000	No	No	2.00
434	71.19	571.29	12.95	1.80	0.26	0.81	443.29	82.31	525.59	4.000	No	No	2.00
435	71.36	559.39	13.18	1.81	0.26	0.81	430.55	83.43	513.98	4.000	No	No	2.00
436	71.52	542.81	13.33	1.82	0.26	0.81	414.08	82.65	496.73	4.000	No	No	2.00
437	71.69	532.70	13.42	1.83	0.26	0.81	404.26	82.18	486.44	4.000	No	No	2.00
438	71.85	537.37	13.35	1.82	0.26	0.81	406.40	81.64	488.03	4.000	No	No	2.00
439	72.01	558.66	13.23	1.82	0.26	0.81	423.92	83.00	506.92	4.000	No	No	2.00
440	72.18	592.07	13.03	1.81	0.26	0.81	452.19	84.81	537.00	4.000	No	No	2.00
441	72.34	626.35	12.84	1.80	0.26	0.81	481.95	86.61	568.57	4.000	No	No	2.00
442	72.51	650.40	12.73	1.79	0.26	0.81	501.46	87.92	589.38	4.000	No	No	2.00
443	72.67	658.18	12.77	1.79	0.26	0.81	506.31	89.23	595.54	4.000	No	No	2.00
444	72.83	651.94	12.88	1.80	0.26	0.81	498.88	89.86	588.74	4.000	No	No	2.00
445	73.00	638.88	13.03	1.81	0.26	0.81	486.24	90.23	576.47	4.000	No	No	2.00
446	73.16	626.17	13.14	1.81	0.26	0.81	475.42	90.07	565.49	4.000	No	No	2.00
447	73.33	617.65	13.00	1.80	0.26	0.81	468.93	86.98	555.91	4.000	No	No	2.00
448	73.49	612.79	12.72	1.79	0.26	0.81	465.81	82.50	548.31	4.000	No	No	2.00
449	73.65	612.83	9.74	1.61	0.26	0.81	463.36	35.41	498.77	4.000	No	No	2.00
450	73.82	619.33	6.00	1.34	0.26	0.80	468.04	0.96	469.00	4.000	No	No	2.00
451	73.98	631.08	39.48	2.77	0.26	0.80	480.09	0.00	480.09	4.000	No	Yes	2.00
452	74.15	640.66	40.02	2.78	0.26	0.80	489.69	0.00	489.69	4.000	No	Yes	2.00

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	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.05	0.00	0.33	2.00	0.00	0.00	0.05	0.00
0.49	2.00	0.00	0.00	0.05	0.00	0.66	2.00	0.00	0.00	0.05	0.00
0.82	2.00	0.00	0.00	0.05	0.00	0.98	2.00	0.00	0.00	0.05	0.00
1.15	2.00	0.00	0.00	0.05	0.00	1.31	2.00	0.00	0.00	0.05	0.00
1.48	2.00	0.00	0.00	0.05	0.00	1.64	2.00	0.00	0.00	0.05	0.00
1.80	2.00	0.00	0.00	0.05	0.00	1.97	2.00	0.00	0.00	0.05	0.00
2.13	2.00	0.00	0.00	0.05	0.00	2.30	2.00	0.00	0.00	0.05	0.00
2.46	2.00	0.00	0.00	0.05	0.00	2.62	2.00	0.00	0.00	0.05	0.00
2.79	2.00	0.00	0.00	0.05	0.00	2.95	2.00	0.00	0.00	0.05	0.00
3.12	2.00	0.00	0.00	0.05	0.00	3.28	2.00	0.00	0.00	0.05	0.00
3.44	2.00	0.00	0.00	0.05	0.00	3.61	2.00	0.00	0.00	0.05	0.00
3.77	2.00	0.00	0.00	0.05	0.00	3.94	2.00	0.00	0.00	0.05	0.00
4.10	2.00	0.00	0.00	0.05	0.00	4.27	2.00	0.00	0.00	0.05	0.00
4.43	2.00	0.00	0.00	0.05	0.00	4.59	2.00	0.00	0.00	0.05	0.00
4.76	2.00	0.00	0.00	0.05	0.00	4.92	2.00	0.00	0.00	0.05	0.00
5.09	2.00	0.00	0.00	0.05	0.00	5.25	2.00	0.00	0.00	0.05	0.00
5.41	2.00	0.00	0.00	0.05	0.00	5.58	2.00	0.00	0.00	0.05	0.00
5.74	0.42	0.00	0.00	0.05	0.26	5.91	0.41	0.00	0.00	0.05	0.28
6.07	2.00	0.00	0.00	0.05	0.00	6.23	2.00	0.00	0.00	0.05	0.00
6.40	2.00	0.00	0.00	0.05	0.00	6.56	2.00	0.00	0.00	0.05	0.00
6.73	2.00	0.00	0.00	0.05	0.00	6.89	2.00	0.00	0.00	0.05	0.00
7.05	2.00	0.00	0.00	0.05	0.00	7.22	2.00	0.00	0.00	0.05	0.00
7.38	2.00	0.00	0.00	0.05	0.00	7.55	2.00	0.00	0.00	0.05	0.00
7.71	2.00	0.00	0.00	0.05	0.00	7.87	2.00	0.00	0.00	0.05	0.00
8.04	2.00	0.00	0.00	0.05	0.00	8.20	2.00	0.00	0.00	0.05	0.00
8.37	2.00	0.00	0.00	0.05	0.00	8.53	2.00	0.00	0.00	0.05	0.00
8.69	0.90	0.00	0.00	0.05	0.04	8.86	0.82	0.00	0.00	0.05	0.08
9.02	0.76	0.00	0.00	0.05	0.10	9.19	0.73	0.00	0.00	0.05	0.12
9.35	0.73	0.00	0.00	0.05	0.11	9.51	0.71	0.00	0.00	0.05	0.12
9.68	0.68	0.00	0.00	0.05	0.14	9.84	0.66	0.00	0.00	0.05	0.14
10.01	0.65	0.00	0.00	0.05	0.15	10.17	0.64	0.00	0.00	0.05	0.15
10.33	0.64	0.00	0.00	0.05	0.15	10.50	0.66	0.00	0.00	0.05	0.15
10.66	0.69	0.00	0.00	0.05	0.13	10.83	0.73	0.00	0.00	0.05	0.12
10.99	0.70	0.00	0.00	0.05	0.12	11.15	2.00	0.00	0.00	0.05	0.00
11.32	2.00	0.00	0.00	0.05	0.00	11.48	2.00	0.00	0.00	0.05	0.00
11.65	2.00	0.00	0.00	0.05	0.00	11.81	2.00	0.00	0.00	0.05	0.00
11.98	2.00	0.00	0.00	0.05	0.00	12.14	2.00	0.00	0.00	0.05	0.00
12.30	2.00	0.00	0.00	0.05	0.00	12.47	2.00	0.00	0.00	0.05	0.00
12.63	2.00	0.00	0.00	0.05	0.00	12.80	0.33	0.67	0.34	0.17	0.28
12.96	0.33	0.67	0.34	0.16	0.26	13.12	0.32	0.68	0.34	0.16	0.26
13.29	0.31	0.69	0.33	0.17	0.28	13.45	2.00	0.00	0.00	0.05	0.00
13.62	2.00	0.00	0.00	0.05	0.00	13.78	2.00	0.00	0.00	0.05	0.00
13.94	0.31	0.69	0.33	0.16	0.27	14.11	2.00	0.00	0.00	0.05	0.00
14.27	2.00	0.00	0.00	0.05	0.00	14.44	2.00	0.00	0.00	0.05	0.00
14.60	2.00	0.00	0.00	0.05	0.00	14.76	0.41	0.00	0.00	0.05	0.22
14.93	0.51	0.00	0.00	0.05	0.20	15.09	0.58	0.00	0.00	0.05	0.16
15.26	0.55	0.00	0.00	0.05	0.18	15.42	0.47	0.00	0.00	0.05	0.20
15.58	0.41	0.00	0.00	0.05	0.22	15.75	0.39	0.00	0.00	0.05	0.24

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	0.40	0.00	0.00	0.05	0.22	16.08	0.42	0.00	0.00	0.05	0.23
16.24	2.00	0.00	0.00	0.05	0.00	16.40	2.00	0.00	0.00	0.05	0.00
16.57	2.00	0.00	0.00	0.05	0.00	16.73	2.00	0.00	0.00	0.05	0.00
16.90	2.00	0.00	0.00	0.05	0.00	17.06	2.00	0.00	0.00	0.05	0.00
17.22	2.00	0.00	0.00	0.05	0.00	17.39	2.00	0.00	0.00	0.05	0.00
17.55	2.00	0.00	0.00	0.05	0.00	17.72	2.00	0.00	0.00	0.05	0.00
17.88	2.00	0.00	0.00	0.05	0.00	18.04	2.00	0.00	0.00	0.05	0.00
18.21	2.00	0.00	0.00	0.05	0.00	18.37	2.00	0.00	0.00	0.05	0.00
18.54	2.00	0.00	0.00	0.05	0.00	18.70	2.00	0.00	0.00	0.05	0.00
18.86	2.00	0.00	0.00	0.05	0.00	19.03	2.00	0.00	0.00	0.05	0.00
19.19	2.00	0.00	0.00	0.05	0.00	19.36	2.00	0.00	0.00	0.05	0.00
19.52	2.00	0.00	0.00	0.05	0.00	19.69	2.00	0.00	0.00	0.05	0.00
19.85	2.00	0.00	0.00	0.05	0.00	20.01	2.00	0.00	0.00	0.05	0.00
20.18	2.00	0.00	0.00	0.05	0.00	20.34	2.00	0.00	0.00	0.05	0.00
20.51	2.00	0.00	0.00	0.05	0.00	20.67	2.00	0.00	0.00	0.05	0.00
20.83	2.00	0.00	0.00	0.05	0.00	21.00	2.00	0.00	0.00	0.05	0.00
21.16	2.00	0.00	0.00	0.05	0.00	21.33	2.00	0.00	0.00	0.05	0.00
21.49	2.00	0.00	0.00	0.05	0.00	21.65	2.00	0.00	0.00	0.05	0.00
21.82	2.00	0.00	0.00	0.05	0.00	21.98	2.00	0.00	0.00	0.05	0.00
22.15	2.00	0.00	0.00	0.05	0.00	22.31	2.00	0.00	0.00	0.05	0.00
22.47	2.00	0.00	0.00	0.05	0.00	22.64	2.00	0.00	0.00	0.05	0.00
22.80	2.00	0.00	0.00	0.05	0.00	22.97	2.00	0.00	0.00	0.05	0.00
23.13	2.00	0.00	0.00	0.05	0.00	23.29	2.00	0.00	0.00	0.05	0.00
23.46	2.00	0.00	0.00	0.05	0.00	23.62	2.00	0.00	0.00	0.05	0.00
23.79	2.00	0.00	0.00	0.05	0.00	23.95	2.00	0.00	0.00	0.05	0.00
24.11	2.00	0.00	0.00	0.05	0.00	24.28	2.00	0.00	0.00	0.05	0.00
24.44	2.00	0.00	0.00	0.05	0.00	24.61	0.67	0.00	0.00	0.05	0.11
24.77	0.67	0.00	0.00	0.05	0.10	24.93	0.63	0.00	0.00	0.05	0.11
25.10	0.57	0.00	0.00	0.05	0.14	25.26	0.54	0.00	0.00	0.05	0.14
25.43	0.53	0.00	0.00	0.05	0.15	25.59	0.55	0.00	0.00	0.05	0.14
25.75	0.57	0.00	0.00	0.05	0.13	25.92	0.59	0.00	0.00	0.05	0.13
26.08	0.59	0.00	0.00	0.05	0.12	26.25	0.57	0.00	0.00	0.05	0.13
26.41	0.57	0.00	0.00	0.05	0.12	26.57	0.63	0.00	0.00	0.05	0.11
26.74	0.70	0.00	0.00	0.05	0.09	26.90	0.86	0.00	0.00	0.05	0.04
27.07	1.06	0.00	0.00	0.05	0.00	27.23	1.50	0.00	0.00	0.05	0.00
27.40	2.00	0.00	0.00	0.05	0.00	27.56	2.00	0.00	0.00	0.05	0.00
27.72	2.00	0.00	0.00	0.05	0.00	27.89	2.00	0.00	0.00	0.05	0.00
28.05	2.00	0.00	0.00	0.05	0.00	28.22	2.00	0.00	0.00	0.05	0.00
28.38	2.00	0.00	0.00	0.05	0.00	28.54	2.00	0.00	0.00	0.05	0.00
28.71	2.00	0.00	0.00	0.05	0.00	28.87	2.00	0.00	0.00	0.05	0.00
29.04	2.00	0.00	0.00	0.05	0.00	29.20	2.00	0.00	0.00	0.05	0.00
29.36	2.00	0.00	0.00	0.05	0.00	29.53	2.00	0.00	0.00	0.05	0.00
29.69	2.00	0.00	0.00	0.05	0.00	29.86	2.00	0.00	0.00	0.05	0.00
30.02	2.00	0.00	0.00	0.05	0.00	30.18	2.00	0.00	0.00	0.05	0.00
30.35	2.00	0.00	0.00	0.05	0.00	30.51	2.00	0.00	0.00	0.05	0.00
30.68	2.00	0.00	0.00	0.05	0.00	30.84	2.00	0.00	0.00	0.05	0.00
31.00	2.00	0.00	0.00	0.05	0.00	31.17	2.00	0.00	0.00	0.05	0.00
31.33	2.00	0.00	0.00	0.05	0.00	31.50	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.05	0.00	31.82	2.00	0.00	0.00	0.05	0.00
31.99	2.00	0.00	0.00	0.05	0.00	32.15	2.00	0.00	0.00	0.05	0.00
32.32	2.00	0.00	0.00	0.05	0.00	32.48	2.00	0.00	0.00	0.05	0.00
32.64	2.00	0.00	0.00	0.05	0.00	32.81	2.00	0.00	0.00	0.05	0.00
32.97	2.00	0.00	0.00	0.05	0.00	33.14	2.00	0.00	0.00	0.05	0.00
33.30	2.00	0.00	0.00	0.05	0.00	33.46	2.00	0.00	0.00	0.05	0.00
33.63	2.00	0.00	0.00	0.05	0.00	33.79	2.00	0.00	0.00	0.05	0.00
33.96	2.00	0.00	0.00	0.05	0.00	34.12	2.00	0.00	0.00	0.05	0.00
34.28	2.00	0.00	0.00	0.05	0.00	34.45	2.00	0.00	0.00	0.05	0.00
34.61	2.00	0.00	0.00	0.05	0.00	34.78	2.00	0.00	0.00	0.05	0.00
34.94	2.00	0.00	0.00	0.05	0.00	35.10	2.00	0.00	0.00	0.05	0.00
35.27	2.00	0.00	0.00	0.05	0.00	35.43	2.00	0.00	0.00	0.05	0.00
35.60	2.00	0.00	0.00	0.05	0.00	35.76	2.00	0.00	0.00	0.05	0.00
35.93	2.00	0.00	0.00	0.05	0.00	36.09	2.00	0.00	0.00	0.05	0.00
36.25	2.00	0.00	0.00	0.05	0.00	36.42	2.00	0.00	0.00	0.05	0.00
36.58	2.00	0.00	0.00	0.05	0.00	36.75	2.00	0.00	0.00	0.05	0.00
36.91	2.00	0.00	0.00	0.05	0.00	37.07	1.71	0.00	0.00	0.05	0.00
37.24	1.23	0.00	0.00	0.05	0.00	37.40	0.98	0.00	0.00	0.05	0.00
37.57	0.80	0.00	0.00	0.05	0.04	37.73	0.67	0.00	0.00	0.05	0.07
37.89	0.62	0.00	0.00	0.05	0.08	38.06	0.62	0.00	0.00	0.05	0.08
38.22	0.63	0.00	0.00	0.05	0.07	38.39	0.50	0.00	0.00	0.05	0.11
38.55	0.37	0.00	0.00	0.05	0.13	38.71	0.55	0.00	0.00	0.05	0.09
38.88	0.47	0.00	0.00	0.05	0.11	39.04	2.00	0.00	0.00	0.05	0.00
39.21	2.00	0.00	0.00	0.05	0.00	39.37	2.00	0.00	0.00	0.05	0.00
39.53	2.00	0.00	0.00	0.05	0.00	39.70	2.00	0.00	0.00	0.05	0.00
39.86	2.00	0.00	0.00	0.05	0.00	40.03	2.00	0.00	0.00	0.05	0.00
40.19	2.00	0.00	0.00	0.05	0.00	40.35	2.00	0.00	0.00	0.05	0.00
40.52	2.00	0.00	0.00	0.05	0.00	40.68	2.00	0.00	0.00	0.05	0.00
40.85	2.00	0.00	0.00	0.05	0.00	41.01	2.00	0.00	0.00	0.05	0.00
41.17	2.00	0.00	0.00	0.05	0.00	41.34	2.00	0.00	0.00	0.05	0.00
41.50	2.00	0.00	0.00	0.05	0.00	41.67	2.00	0.00	0.00	0.05	0.00
41.83	2.00	0.00	0.00	0.05	0.00	41.99	2.00	0.00	0.00	0.05	0.00
42.16	2.00	0.00	0.00	0.05	0.00	42.32	2.00	0.00	0.00	0.05	0.00
42.49	2.00	0.00	0.00	0.05	0.00	42.65	2.00	0.00	0.00	0.05	0.00
42.81	2.00	0.00	0.00	0.05	0.00	42.98	2.00	0.00	0.00	0.05	0.00
43.14	2.00	0.00	0.00	0.05	0.00	43.31	2.00	0.00	0.00	0.05	0.00
43.47	2.00	0.00	0.00	0.05	0.00	43.64	2.00	0.00	0.00	0.05	0.00
43.80	1.65	0.00	0.00	0.05	0.00	43.96	1.89	0.00	0.00	0.05	0.00
44.13	2.00	0.00	0.00	0.05	0.00	44.29	2.00	0.00	0.00	0.05	0.00
44.46	2.00	0.00	0.00	0.05	0.00	44.62	2.00	0.00	0.00	0.05	0.00
44.78	2.00	0.00	0.00	0.05	0.00	44.95	2.00	0.00	0.00	0.05	0.00
45.11	2.00	0.00	0.00	0.05	0.00	45.28	2.00	0.00	0.00	0.05	0.00
45.44	2.00	0.00	0.00	0.05	0.00	45.60	2.00	0.00	0.00	0.05	0.00
45.77	2.00	0.00	0.00	0.05	0.00	45.93	2.00	0.00	0.00	0.05	0.00
46.10	2.00	0.00	0.00	0.05	0.00	46.26	2.00	0.00	0.00	0.05	0.00
46.42	2.00	0.00	0.00	0.05	0.00	46.59	2.00	0.00	0.00	0.05	0.00
46.75	2.00	0.00	0.00	0.05	0.00	46.92	2.00	0.00	0.00	0.05	0.00
47.08	2.00	0.00	0.00	0.05	0.00	47.24	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.05	0.00	47.57	2.00	0.00	0.00	0.05	0.00
47.74	2.00	0.00	0.00	0.05	0.00	47.90	2.00	0.00	0.00	0.05	0.00
48.06	2.00	0.00	0.00	0.05	0.00	48.23	2.00	0.00	0.00	0.05	0.00
48.39	2.00	0.00	0.00	0.05	0.00	48.56	2.00	0.00	0.00	0.05	0.00
48.72	2.00	0.00	0.00	0.05	0.00	48.88	2.00	0.00	0.00	0.05	0.00
49.05	2.00	0.00	0.00	0.05	0.00	49.21	2.00	0.00	0.00	0.05	0.00
49.38	2.00	0.00	0.00	0.05	0.00	49.54	2.00	0.00	0.00	0.05	0.00
49.70	2.00	0.00	0.00	0.05	0.00	49.87	2.00	0.00	0.00	0.05	0.00
50.03	2.00	0.00	0.00	0.05	0.00	50.20	2.00	0.00	0.00	0.05	0.00
50.36	2.00	0.00	0.00	0.05	0.00	50.52	2.00	0.00	0.00	0.05	0.00
50.69	2.00	0.00	0.00	0.05	0.00	50.85	2.00	0.00	0.00	0.05	0.00
51.02	2.00	0.00	0.00	0.05	0.00	51.18	2.00	0.00	0.00	0.05	0.00
51.35	2.00	0.00	0.00	0.05	0.00	51.51	2.00	0.00	0.00	0.05	0.00
51.67	2.00	0.00	0.00	0.05	0.00	51.84	2.00	0.00	0.00	0.05	0.00
52.00	2.00	0.00	0.00	0.05	0.00	52.17	2.00	0.00	0.00	0.05	0.00
52.33	2.00	0.00	0.00	0.05	0.00	52.49	2.00	0.00	0.00	0.05	0.00
52.66	2.00	0.00	0.00	0.05	0.00	52.82	2.00	0.00	0.00	0.05	0.00
52.99	2.00	0.00	0.00	0.05	0.00	53.15	2.00	0.00	0.00	0.05	0.00
53.31	2.00	0.00	0.00	0.05	0.00	53.48	2.00	0.00	0.00	0.05	0.00
53.64	2.00	0.00	0.00	0.05	0.00	53.81	2.00	0.00	0.00	0.05	0.00
53.97	2.00	0.00	0.00	0.05	0.00	54.13	2.00	0.00	0.00	0.05	0.00
54.30	2.00	0.00	0.00	0.05	0.00	54.46	2.00	0.00	0.00	0.05	0.00
54.63	2.00	0.00	0.00	0.05	0.00	54.79	2.00	0.00	0.00	0.05	0.00
54.95	2.00	0.00	0.00	0.05	0.00	55.12	2.00	0.00	0.00	0.05	0.00
55.28	2.00	0.00	0.00	0.05	0.00	55.45	2.00	0.00	0.00	0.05	0.00
55.61	2.00	0.00	0.00	0.05	0.00	55.77	2.00	0.00	0.00	0.05	0.00
55.94	2.00	0.00	0.00	0.05	0.00	56.10	2.00	0.00	0.00	0.05	0.00
56.27	2.00	0.00	0.00	0.05	0.00	56.43	2.00	0.00	0.00	0.05	0.00
56.59	2.00	0.00	0.00	0.05	0.00	56.76	2.00	0.00	0.00	0.05	0.00
56.92	2.00	0.00	0.00	0.05	0.00	57.09	2.00	0.00	0.00	0.05	0.00
57.25	2.00	0.00	0.00	0.05	0.00	57.41	2.00	0.00	0.00	0.05	0.00
57.58	2.00	0.00	0.00	0.05	0.00	57.74	2.00	0.00	0.00	0.05	0.00
57.91	2.00	0.00	0.00	0.05	0.00	58.07	2.00	0.00	0.00	0.05	0.00
58.23	2.00	0.00	0.00	0.05	0.00	58.40	2.00	0.00	0.00	0.05	0.00
58.56	2.00	0.00	0.00	0.05	0.00	58.73	2.00	0.00	0.00	0.05	0.00
58.89	2.00	0.00	0.00	0.05	0.00	59.06	2.00	0.00	0.00	0.05	0.00
59.22	2.00	0.00	0.00	0.05	0.00	59.38	2.00	0.00	0.00	0.05	0.00
59.55	2.00	0.00	0.00	0.05	0.00	59.71	2.00	0.00	0.00	0.05	0.00
59.88	2.00	0.00	0.00	0.05	0.00	60.04	2.00	0.00	0.00	0.05	0.00
60.20	1.57	0.00	0.00	0.05	0.00	60.37	1.21	0.00	0.00	0.05	0.00
60.53	0.99	0.00	0.00	0.05	0.00	60.70	0.90	0.00	0.00	0.05	0.00
60.86	1.03	0.00	0.00	0.05	0.00	61.02	1.37	0.00	0.00	0.05	0.00
61.19	1.71	0.00	0.00	0.05	0.00	61.35	2.00	0.00	0.00	0.05	0.00
61.52	2.00	0.00	0.00	0.05	0.00	61.68	2.00	0.00	0.00	0.05	0.00
61.84	2.00	0.00	0.00	0.05	0.00	62.01	2.00	0.00	0.00	0.05	0.00
62.17	2.00	0.00	0.00	0.05	0.00	62.34	2.00	0.00	0.00	0.05	0.00
62.50	2.00	0.00	0.00	0.05	0.00	62.66	2.00	0.00	0.00	0.05	0.00
62.83	2.00	0.00	0.00	0.05	0.00	62.99	2.00	0.00	0.00	0.05	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
63.16	2.00	0.00	0.00	0.05	0.00	63.32	2.00	0.00	0.00	0.05	0.00
63.48	2.00	0.00	0.00	0.05	0.00	63.65	2.00	0.00	0.00	0.05	0.00
63.81	2.00	0.00	0.00	0.05	0.00	63.98	2.00	0.00	0.00	0.05	0.00
64.14	2.00	0.00	0.00	0.05	0.00	64.30	2.00	0.00	0.00	0.05	0.00
64.47	2.00	0.00	0.00	0.05	0.00	64.63	1.20	0.00	0.00	0.05	0.00
64.80	0.84	0.00	0.00	0.05	0.00	64.96	0.67	0.00	0.00	0.05	0.00
65.12	0.59	0.00	0.00	0.05	0.00	65.29	0.54	0.00	0.00	0.05	0.00
65.45	0.50	0.00	0.00	0.05	0.00	65.62	0.44	0.00	0.00	0.05	0.00
65.78	0.41	0.00	0.00	0.05	0.00	65.94	0.41	0.00	0.00	0.05	0.00
66.11	0.43	0.00	0.00	0.05	0.00	66.27	0.46	0.00	0.00	0.05	0.00
66.44	0.47	0.00	0.00	0.05	0.00	66.60	0.48	0.00	0.00	0.05	0.00
66.77	0.49	0.00	0.00	0.05	0.00	66.93	0.59	0.00	0.00	0.05	0.00
67.09	0.75	0.00	0.00	0.05	0.00	67.26	1.61	0.00	0.00	0.05	0.00
67.42	2.00	0.00	0.00	0.05	0.00	67.59	2.00	0.00	0.00	0.05	0.00
67.75	2.00	0.00	0.00	0.05	0.00	67.91	2.00	0.00	0.00	0.05	0.00
68.08	2.00	0.00	0.00	0.05	0.00	68.24	2.00	0.00	0.00	0.05	0.00
68.41	2.00	0.00	0.00	0.05	0.00	68.57	2.00	0.00	0.00	0.05	0.00
68.73	2.00	0.00	0.00	0.05	0.00	68.90	2.00	0.00	0.00	0.05	0.00
69.06	2.00	0.00	0.00	0.05	0.00	69.23	2.00	0.00	0.00	0.05	0.00
69.39	2.00	0.00	0.00	0.05	0.00	69.55	2.00	0.00	0.00	0.05	0.00
69.72	2.00	0.00	0.00	0.05	0.00	69.88	2.00	0.00	0.00	0.05	0.00
70.05	2.00	0.00	0.00	0.05	0.00	70.21	2.00	0.00	0.00	0.05	0.00
70.37	2.00	0.00	0.00	0.05	0.00	70.54	2.00	0.00	0.00	0.05	0.00
70.70	2.00	0.00	0.00	0.05	0.00	70.87	2.00	0.00	0.00	0.05	0.00
71.03	2.00	0.00	0.00	0.05	0.00	71.19	2.00	0.00	0.00	0.05	0.00
71.36	2.00	0.00	0.00	0.05	0.00	71.52	2.00	0.00	0.00	0.05	0.00
71.69	2.00	0.00	0.00	0.05	0.00	71.85	2.00	0.00	0.00	0.05	0.00
72.01	2.00	0.00	0.00	0.05	0.00	72.18	2.00	0.00	0.00	0.05	0.00
72.34	2.00	0.00	0.00	0.05	0.00	72.51	2.00	0.00	0.00	0.05	0.00
72.67	2.00	0.00	0.00	0.05	0.00	72.83	2.00	0.00	0.00	0.05	0.00
73.00	2.00	0.00	0.00	0.05	0.00	73.16	2.00	0.00	0.00	0.05	0.00
73.33	2.00	0.00	0.00	0.05	0.00	73.49	2.00	0.00	0.00	0.05	0.00
73.65	2.00	0.00	0.00	0.05	0.00	73.82	2.00	0.00	0.00	0.05	0.00
73.98	2.00	0.00	0.00	0.05	0.00	74.15	2.00	0.00	0.00	0.05	0.00

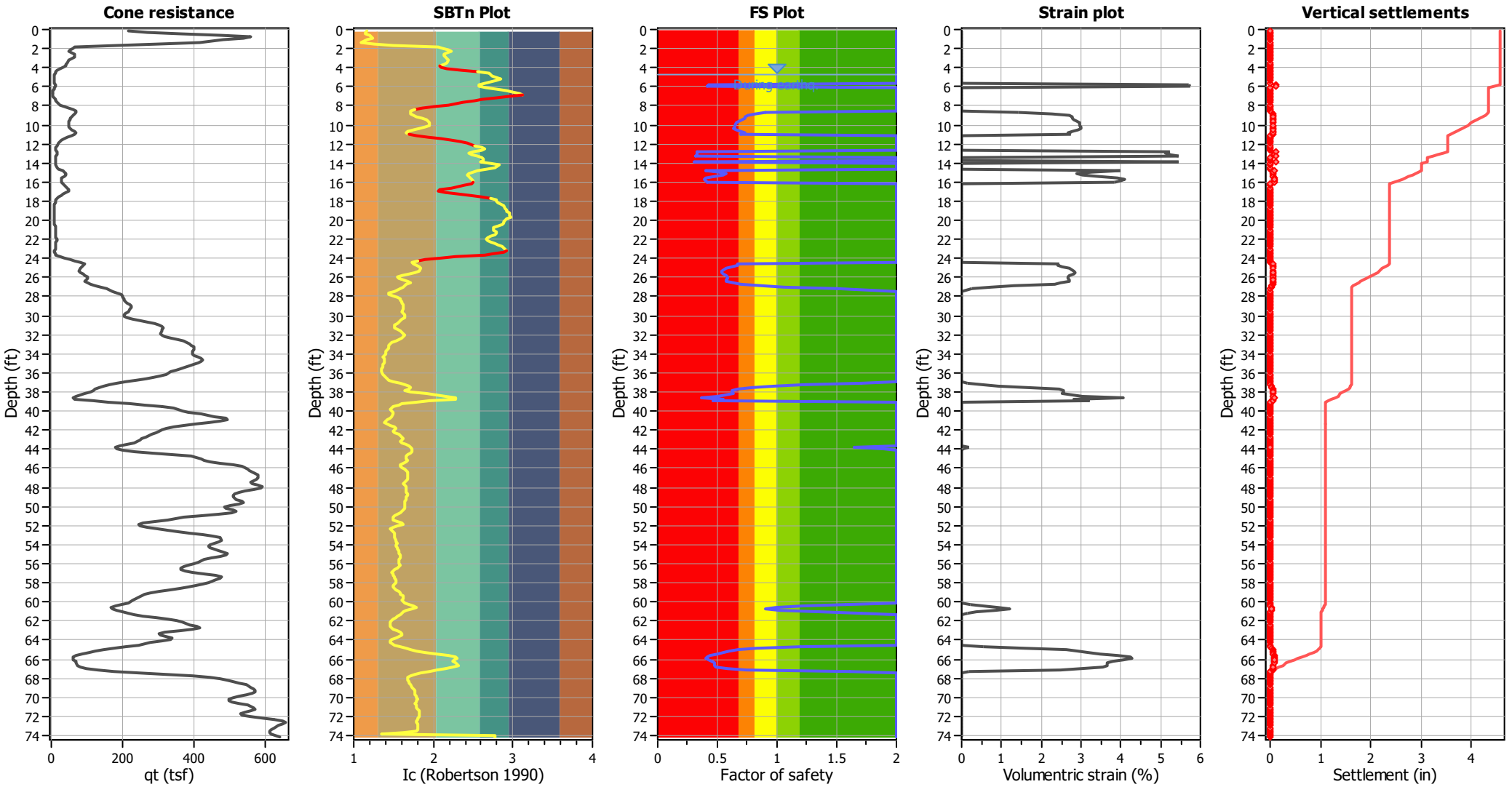
Overall liquefaction potential: 8.14

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
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)
4.92	15.01	2.00	0.00	1.00	0.00	5.09	13.29	2.00	0.00	1.00	0.00
5.25	11.83	2.00	0.00	1.00	0.00	5.41	12.64	2.00	0.00	1.00	0.00
5.58	15.74	2.00	0.00	1.00	0.00	5.74	54.37	0.42	5.71	1.00	0.11
5.91	53.84	0.41	5.76	1.00	0.12	6.07	14.56	2.00	0.00	1.00	0.00
6.23	10.26	2.00	0.00	1.00	0.00	6.40	7.84	2.00	0.00	1.00	0.00
6.56	7.11	2.00	0.00	1.00	0.00	6.73	6.57	2.00	0.00	1.00	0.00
6.89	6.23	2.00	0.00	1.00	0.00	7.05	7.51	2.00	0.00	1.00	0.00
7.22	15.75	2.00	0.00	1.00	0.00	7.38	15.75	2.00	0.00	1.00	0.00
7.55	60.34	2.00	0.00	1.00	0.00	7.71	58.72	2.00	0.00	1.00	0.00
7.87	69.42	2.00	0.00	1.00	0.00	8.04	88.64	2.00	0.00	1.00	0.00
8.20	111.72	2.00	0.00	1.00	0.00	8.37	126.75	2.00	0.00	1.00	0.00
8.53	132.73	2.00	0.00	1.00	0.00	8.69	130.09	0.90	1.44	1.00	0.03
8.86	123.11	0.82	2.28	1.00	0.05	9.02	117.17	0.76	2.72	1.00	0.05
9.19	114.32	0.73	2.80	1.00	0.06	9.35	114.70	0.73	2.79	1.00	0.05
9.51	113.11	0.71	2.83	1.00	0.05	9.68	110.77	0.68	2.89	1.00	0.06
9.84	108.36	0.66	2.96	1.00	0.06	10.01	107.96	0.65	2.97	1.00	0.06
10.17	107.40	0.64	2.99	1.00	0.06	10.33	106.89	0.64	3.00	1.00	0.06
10.50	109.78	0.66	2.92	1.00	0.06	10.66	114.25	0.69	2.80	1.00	0.05
10.83	119.30	0.73	2.67	1.00	0.05	10.99	115.80	0.70	2.76	1.00	0.05
11.15	108.17	2.00	0.00	1.00	0.00	11.32	96.77	2.00	0.00	1.00	0.00
11.48	91.73	2.00	0.00	1.00	0.00	11.65	85.28	2.00	0.00	1.00	0.00
11.81	78.06	2.00	0.00	1.00	0.00	11.98	67.14	2.00	0.00	1.00	0.00
12.14	59.36	2.00	0.00	1.00	0.00	12.30	19.13	2.00	0.00	1.00	0.00
12.47	18.57	2.00	0.00	1.00	0.00	12.63	20.22	2.00	0.00	1.00	0.00
12.80	59.82	0.33	5.25	1.00	0.11	12.96	61.37	0.33	5.13	1.00	0.10
13.12	60.15	0.32	5.22	1.00	0.10	13.29	57.54	0.31	5.43	1.00	0.11
13.45	19.86	2.00	0.00	1.00	0.00	13.62	20.67	2.00	0.00	1.00	0.00
13.78	21.34	2.00	0.00	1.00	0.00	13.94	57.10	0.31	5.47	1.00	0.11
14.11	18.53	2.00	0.00	1.00	0.00	14.27	17.40	2.00	0.00	1.00	0.00
14.44	17.32	2.00	0.00	1.00	0.00	14.60	38.48	2.00	0.00	1.00	0.00
14.76	80.79	0.41	3.97	1.00	0.08	14.93	99.24	0.51	3.24	1.00	0.07
15.09	110.20	0.58	2.91	1.00	0.06	15.26	105.59	0.55	3.04	1.00	0.06
15.42	93.48	0.47	3.44	1.00	0.07	15.58	81.72	0.41	3.93	1.00	0.08
15.75	77.92	0.39	4.11	1.00	0.08	15.91	80.27	0.40	4.00	1.00	0.08
16.08	83.97	0.42	3.83	1.00	0.08	16.24	86.53	2.00	0.00	1.00	0.00
16.40	92.59	2.00	0.00	1.00	0.00	16.57	99.90	2.00	0.00	1.00	0.00
16.73	105.39	2.00	0.00	1.00	0.00	16.90	103.73	2.00	0.00	1.00	0.00
17.06	96.49	2.00	0.00	1.00	0.00	17.22	84.95	2.00	0.00	1.00	0.00
17.39	74.04	2.00	0.00	1.00	0.00	17.55	26.81	2.00	0.00	1.00	0.00
17.72	21.22	2.00	0.00	1.00	0.00	17.88	17.72	2.00	0.00	1.00	0.00
18.04	15.55	2.00	0.00	1.00	0.00	18.21	13.92	2.00	0.00	1.00	0.00
18.37	12.43	2.00	0.00	1.00	0.00	18.54	11.16	2.00	0.00	1.00	0.00
18.70	10.27	2.00	0.00	1.00	0.00	18.86	9.70	2.00	0.00	1.00	0.00
19.03	9.33	2.00	0.00	1.00	0.00	19.19	9.06	2.00	0.00	1.00	0.00
19.36	8.86	2.00	0.00	1.00	0.00	19.52	8.64	2.00	0.00	1.00	0.00
19.69	9.09	2.00	0.00	1.00	0.00	19.85	10.67	2.00	0.00	1.00	0.00
20.01	12.63	2.00	0.00	1.00	0.00	20.18	13.45	2.00	0.00	1.00	0.00
20.34	12.75	2.00	0.00	1.00	0.00	20.51	12.30	2.00	0.00	1.00	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)
20.67	12.84	2.00	0.00	1.00	0.00	20.83	13.69	2.00	0.00	1.00	0.00
21.00	13.36	2.00	0.00	1.00	0.00	21.16	12.33	2.00	0.00	1.00	0.00
21.33	11.85	2.00	0.00	1.00	0.00	21.49	12.92	2.00	0.00	1.00	0.00
21.65	15.05	2.00	0.00	1.00	0.00	21.82	17.06	2.00	0.00	1.00	0.00
21.98	17.81	2.00	0.00	1.00	0.00	22.15	17.39	2.00	0.00	1.00	0.00
22.31	16.33	2.00	0.00	1.00	0.00	22.47	15.39	2.00	0.00	1.00	0.00
22.64	14.35	2.00	0.00	1.00	0.00	22.80	13.32	2.00	0.00	1.00	0.00
22.97	12.28	2.00	0.00	1.00	0.00	23.13	11.90	2.00	0.00	1.00	0.00
23.29	12.17	2.00	0.00	1.00	0.00	23.46	12.32	2.00	0.00	1.00	0.00
23.62	17.72	2.00	0.00	1.00	0.00	23.79	50.12	2.00	0.00	1.00	0.00
23.95	90.34	2.00	0.00	1.00	0.00	24.11	80.97	2.00	0.00	1.00	0.00
24.28	103.59	2.00	0.00	1.00	0.00	24.44	119.90	2.00	0.00	1.00	0.00
24.61	129.80	0.67	2.44	1.00	0.05	24.77	130.93	0.67	2.42	1.00	0.05
24.93	125.47	0.63	2.53	1.00	0.05	25.10	118.27	0.57	2.70	1.00	0.06
25.26	113.39	0.54	2.82	1.00	0.05	25.43	112.15	0.53	2.85	1.00	0.06
25.59	113.99	0.55	2.80	1.00	0.05	25.75	117.31	0.57	2.72	1.00	0.05
25.92	119.88	0.59	2.66	1.00	0.05	26.08	119.93	0.59	2.66	1.00	0.05
26.25	117.93	0.57	2.70	1.00	0.06	26.41	118.38	0.57	2.69	1.00	0.05
26.57	126.63	0.63	2.51	1.00	0.05	26.74	134.27	0.70	2.35	1.00	0.05
26.90	148.06	0.86	1.30	1.00	0.02	27.07	159.46	1.06	0.74	1.00	0.02
27.23	174.12	1.50	0.26	1.00	0.01	27.40	185.74	2.00	0.00	1.00	0.00
27.56	196.21	2.00	0.00	1.00	0.00	27.72	204.47	2.00	0.00	1.00	0.00
27.89	210.59	2.00	0.00	1.00	0.00	28.05	216.35	2.00	0.00	1.00	0.00
28.22	219.47	2.00	0.00	1.00	0.00	28.38	221.76	2.00	0.00	1.00	0.00
28.54	225.30	2.00	0.00	1.00	0.00	28.71	232.72	2.00	0.00	1.00	0.00
28.87	241.51	2.00	0.00	1.00	0.00	29.04	248.21	2.00	0.00	1.00	0.00
29.20	247.56	2.00	0.00	1.00	0.00	29.36	240.86	2.00	0.00	1.00	0.00
29.53	232.44	2.00	0.00	1.00	0.00	29.69	225.55	2.00	0.00	1.00	0.00
29.86	223.43	2.00	0.00	1.00	0.00	30.02	222.35	2.00	0.00	1.00	0.00
30.18	228.79	2.00	0.00	1.00	0.00	30.35	240.13	2.00	0.00	1.00	0.00
30.51	261.55	2.00	0.00	1.00	0.00	30.68	283.22	2.00	0.00	1.00	0.00
30.84	300.21	2.00	0.00	1.00	0.00	31.00	309.05	2.00	0.00	1.00	0.00
31.17	314.59	2.00	0.00	1.00	0.00	31.33	318.03	2.00	0.00	1.00	0.00
31.50	320.11	2.00	0.00	1.00	0.00	31.66	321.40	2.00	0.00	1.00	0.00
31.82	322.63	2.00	0.00	1.00	0.00	31.99	324.36	2.00	0.00	1.00	0.00
32.15	332.04	2.00	0.00	1.00	0.00	32.32	347.27	2.00	0.00	1.00	0.00
32.48	364.54	2.00	0.00	1.00	0.00	32.64	372.10	2.00	0.00	1.00	0.00
32.81	373.30	2.00	0.00	1.00	0.00	32.97	375.29	2.00	0.00	1.00	0.00
33.14	383.06	2.00	0.00	1.00	0.00	33.30	389.70	2.00	0.00	1.00	0.00
33.46	389.67	2.00	0.00	1.00	0.00	33.63	383.58	2.00	0.00	1.00	0.00
33.79	378.15	2.00	0.00	1.00	0.00	33.96	377.42	2.00	0.00	1.00	0.00
34.12	382.48	2.00	0.00	1.00	0.00	34.28	391.24	2.00	0.00	1.00	0.00
34.45	400.95	2.00	0.00	1.00	0.00	34.61	406.11	2.00	0.00	1.00	0.00
34.78	403.06	2.00	0.00	1.00	0.00	34.94	391.59	2.00	0.00	1.00	0.00
35.10	377.52	2.00	0.00	1.00	0.00	35.27	365.72	2.00	0.00	1.00	0.00
35.43	355.93	2.00	0.00	1.00	0.00	35.60	344.34	2.00	0.00	1.00	0.00
35.76	329.33	2.00	0.00	1.00	0.00	35.93	314.23	2.00	0.00	1.00	0.00
36.09	300.64	2.00	0.00	1.00	0.00	36.25	287.69	2.00	0.00	1.00	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)
36.42	270.83	2.00	0.00	1.00	0.00	36.58	249.38	2.00	0.00	1.00	0.00
36.75	223.23	2.00	0.00	1.00	0.00	36.91	198.00	2.00	0.00	1.00	0.00
37.07	179.06	1.71	0.13	1.00	0.00	37.24	166.59	1.23	0.50	1.00	0.01
37.40	155.37	0.98	0.91	1.00	0.02	37.57	142.92	0.80	1.66	1.00	0.03
37.73	130.05	0.67	2.43	1.00	0.05	37.89	124.03	0.62	2.56	1.00	0.05
38.06	123.67	0.62	2.57	1.00	0.05	38.22	125.62	0.63	2.53	1.00	0.05
38.39	105.93	0.50	3.03	1.00	0.06	38.55	78.78	0.37	4.07	1.00	0.08
38.71	113.65	0.55	2.81	1.00	0.05	38.88	99.43	0.47	3.23	1.00	0.07
39.04	222.20	2.00	0.00	1.00	0.00	39.21	197.68	2.00	0.00	1.00	0.00
39.37	255.73	2.00	0.00	1.00	0.00	39.53	296.57	2.00	0.00	1.00	0.00
39.70	325.00	2.00	0.00	1.00	0.00	39.86	333.84	2.00	0.00	1.00	0.00
40.03	335.88	2.00	0.00	1.00	0.00	40.19	352.81	2.00	0.00	1.00	0.00
40.35	385.93	2.00	0.00	1.00	0.00	40.52	430.05	2.00	0.00	1.00	0.00
40.68	457.04	2.00	0.00	1.00	0.00	40.85	459.24	2.00	0.00	1.00	0.00
41.01	435.72	2.00	0.00	1.00	0.00	41.17	400.13	2.00	0.00	1.00	0.00
41.34	365.17	2.00	0.00	1.00	0.00	41.50	336.49	2.00	0.00	1.00	0.00
41.67	314.41	2.00	0.00	1.00	0.00	41.83	295.73	2.00	0.00	1.00	0.00
41.99	283.59	2.00	0.00	1.00	0.00	42.16	277.86	2.00	0.00	1.00	0.00
42.32	274.68	2.00	0.00	1.00	0.00	42.49	266.49	2.00	0.00	1.00	0.00
42.65	254.63	2.00	0.00	1.00	0.00	42.81	243.16	2.00	0.00	1.00	0.00
42.98	236.76	2.00	0.00	1.00	0.00	43.14	233.39	2.00	0.00	1.00	0.00
43.31	224.95	2.00	0.00	1.00	0.00	43.47	208.43	2.00	0.00	1.00	0.00
43.64	188.60	2.00	0.00	1.00	0.00	43.80	177.45	1.65	0.17	1.00	0.00
43.96	182.02	1.89	0.05	1.00	0.00	44.13	201.67	2.00	0.00	1.00	0.00
44.29	233.88	2.00	0.00	1.00	0.00	44.46	281.00	2.00	0.00	1.00	0.00
44.62	338.11	2.00	0.00	1.00	0.00	44.78	389.42	2.00	0.00	1.00	0.00
44.95	414.42	2.00	0.00	1.00	0.00	45.11	417.02	2.00	0.00	1.00	0.00
45.28	420.80	2.00	0.00	1.00	0.00	45.44	445.84	2.00	0.00	1.00	0.00
45.60	478.52	2.00	0.00	1.00	0.00	45.77	502.40	2.00	0.00	1.00	0.00
45.93	510.97	2.00	0.00	1.00	0.00	46.10	518.23	2.00	0.00	1.00	0.00
46.26	530.73	2.00	0.00	1.00	0.00	46.42	541.94	2.00	0.00	1.00	0.00
46.59	549.90	2.00	0.00	1.00	0.00	46.75	556.91	2.00	0.00	1.00	0.00
46.92	563.27	2.00	0.00	1.00	0.00	47.08	558.74	2.00	0.00	1.00	0.00
47.24	541.14	2.00	0.00	1.00	0.00	47.41	522.50	2.00	0.00	1.00	0.00
47.57	522.75	2.00	0.00	1.00	0.00	47.74	542.25	2.00	0.00	1.00	0.00
47.90	562.64	2.00	0.00	1.00	0.00	48.06	561.52	2.00	0.00	1.00	0.00
48.23	536.96	2.00	0.00	1.00	0.00	48.39	509.03	2.00	0.00	1.00	0.00
48.56	494.22	2.00	0.00	1.00	0.00	48.72	487.71	2.00	0.00	1.00	0.00
48.88	482.66	2.00	0.00	1.00	0.00	49.05	476.39	2.00	0.00	1.00	0.00
49.21	483.63	2.00	0.00	1.00	0.00	49.38	498.92	2.00	0.00	1.00	0.00
49.54	512.63	2.00	0.00	1.00	0.00	49.70	496.02	2.00	0.00	1.00	0.00
49.87	464.97	2.00	0.00	1.00	0.00	50.03	436.73	2.00	0.00	1.00	0.00
50.20	448.36	2.00	0.00	1.00	0.00	50.36	471.35	2.00	0.00	1.00	0.00
50.52	482.31	2.00	0.00	1.00	0.00	50.69	461.06	2.00	0.00	1.00	0.00
50.85	418.01	2.00	0.00	1.00	0.00	51.02	367.35	2.00	0.00	1.00	0.00
51.18	320.03	2.00	0.00	1.00	0.00	51.35	282.91	2.00	0.00	1.00	0.00
51.51	255.10	2.00	0.00	1.00	0.00	51.67	228.71	2.00	0.00	1.00	0.00
51.84	211.22	2.00	0.00	1.00	0.00	52.00	209.60	2.00	0.00	1.00	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)
52.17	229.78	2.00	0.00	1.00	0.00	52.33	257.71	2.00	0.00	1.00	0.00
52.49	281.85	2.00	0.00	1.00	0.00	52.66	306.71	2.00	0.00	1.00	0.00
52.82	334.66	2.00	0.00	1.00	0.00	52.99	366.00	2.00	0.00	1.00	0.00
53.15	394.07	2.00	0.00	1.00	0.00	53.31	412.51	2.00	0.00	1.00	0.00
53.48	418.57	2.00	0.00	1.00	0.00	53.64	410.68	2.00	0.00	1.00	0.00
53.81	395.99	2.00	0.00	1.00	0.00	53.97	383.66	2.00	0.00	1.00	0.00
54.13	379.38	2.00	0.00	1.00	0.00	54.30	385.46	2.00	0.00	1.00	0.00
54.46	395.06	2.00	0.00	1.00	0.00	54.63	407.26	2.00	0.00	1.00	0.00
54.79	422.46	2.00	0.00	1.00	0.00	54.95	434.81	2.00	0.00	1.00	0.00
55.12	436.23	2.00	0.00	1.00	0.00	55.28	418.85	2.00	0.00	1.00	0.00
55.45	392.50	2.00	0.00	1.00	0.00	55.61	369.09	2.00	0.00	1.00	0.00
55.77	355.79	2.00	0.00	1.00	0.00	55.94	347.25	2.00	0.00	1.00	0.00
56.10	337.16	2.00	0.00	1.00	0.00	56.27	322.80	2.00	0.00	1.00	0.00
56.43	311.09	2.00	0.00	1.00	0.00	56.59	305.83	2.00	0.00	1.00	0.00
56.76	311.37	2.00	0.00	1.00	0.00	56.92	328.28	2.00	0.00	1.00	0.00
57.09	359.10	2.00	0.00	1.00	0.00	57.25	389.67	2.00	0.00	1.00	0.00
57.41	407.40	2.00	0.00	1.00	0.00	57.58	402.86	2.00	0.00	1.00	0.00
57.74	389.67	2.00	0.00	1.00	0.00	57.91	371.32	2.00	0.00	1.00	0.00
58.07	355.14	2.00	0.00	1.00	0.00	58.23	338.49	2.00	0.00	1.00	0.00
58.40	322.58	2.00	0.00	1.00	0.00	58.56	303.16	2.00	0.00	1.00	0.00
58.73	279.60	2.00	0.00	1.00	0.00	58.89	256.29	2.00	0.00	1.00	0.00
59.06	233.86	2.00	0.00	1.00	0.00	59.22	220.38	2.00	0.00	1.00	0.00
59.38	215.93	2.00	0.00	1.00	0.00	59.55	211.14	2.00	0.00	1.00	0.00
59.71	205.25	2.00	0.00	1.00	0.00	59.88	192.96	2.00	0.00	1.00	0.00
60.04	183.14	2.00	0.00	1.00	0.00	60.20	173.77	1.57	0.21	1.00	0.00
60.37	161.93	1.21	0.54	1.00	0.01	60.53	150.80	0.99	0.93	1.00	0.02
60.70	144.83	0.90	1.22	1.00	0.02	60.86	153.45	1.03	0.83	1.00	0.02
61.02	168.21	1.37	0.37	1.00	0.01	61.19	177.15	1.71	0.13	1.00	0.00
61.35	184.21	2.00	0.00	1.00	0.00	61.52	205.15	2.00	0.00	1.00	0.00
61.68	244.65	2.00	0.00	1.00	0.00	61.84	275.66	2.00	0.00	1.00	0.00
62.01	289.81	2.00	0.00	1.00	0.00	62.17	297.33	2.00	0.00	1.00	0.00
62.34	313.77	2.00	0.00	1.00	0.00	62.50	336.97	2.00	0.00	1.00	0.00
62.66	347.35	2.00	0.00	1.00	0.00	62.83	331.17	2.00	0.00	1.00	0.00
62.99	297.56	2.00	0.00	1.00	0.00	63.16	264.89	2.00	0.00	1.00	0.00
63.32	250.33	2.00	0.00	1.00	0.00	63.48	258.66	2.00	0.00	1.00	0.00
63.65	275.62	2.00	0.00	1.00	0.00	63.81	284.88	2.00	0.00	1.00	0.00
63.98	276.28	2.00	0.00	1.00	0.00	64.14	253.49	2.00	0.00	1.00	0.00
64.30	220.86	2.00	0.00	1.00	0.00	64.47	189.15	2.00	0.00	1.00	0.00
64.63	161.64	1.20	0.55	1.00	0.01	64.80	138.81	0.84	1.58	1.00	0.03
64.96	120.30	0.67	2.65	1.00	0.05	65.12	109.16	0.59	2.94	1.00	0.06
65.29	100.90	0.54	3.18	1.00	0.06	65.45	92.39	0.50	3.48	1.00	0.07
65.62	82.10	0.44	3.91	1.00	0.08	65.78	75.34	0.41	4.25	1.00	0.08
65.94	74.66	0.41	4.28	1.00	0.08	66.11	79.11	0.43	4.05	1.00	0.08
66.27	84.55	0.46	3.80	1.00	0.07	66.44	87.74	0.47	3.66	1.00	0.07
66.60	87.99	0.48	3.65	1.00	0.07	66.77	90.86	0.49	3.54	1.00	0.07
66.93	107.18	0.59	2.99	1.00	0.06	67.09	127.84	0.75	2.48	1.00	0.05
67.26	172.83	1.61	0.19	1.00	0.00	67.42	226.99	2.00	0.00	1.00	0.00
67.59	304.65	2.00	0.00	1.00	0.00	67.75	360.76	2.00	0.00	1.00	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)
67.91	399.50	2.00	0.00	1.00	0.00	68.08	413.44	2.00	0.00	1.00	0.00
68.24	426.94	2.00	0.00	1.00	0.00	68.41	445.15	2.00	0.00	1.00	0.00
68.57	463.86	2.00	0.00	1.00	0.00	68.73	480.18	2.00	0.00	1.00	0.00
68.90	496.54	2.00	0.00	1.00	0.00	69.06	510.49	2.00	0.00	1.00	0.00
69.23	518.95	2.00	0.00	1.00	0.00	69.39	517.49	2.00	0.00	1.00	0.00
69.55	510.35	2.00	0.00	1.00	0.00	69.72	495.51	2.00	0.00	1.00	0.00
69.88	480.10	2.00	0.00	1.00	0.00	70.05	464.05	2.00	0.00	1.00	0.00
70.21	456.88	2.00	0.00	1.00	0.00	70.37	452.63	2.00	0.00	1.00	0.00
70.54	457.96	2.00	0.00	1.00	0.00	70.70	473.50	2.00	0.00	1.00	0.00
70.87	500.64	2.00	0.00	1.00	0.00	71.03	521.56	2.00	0.00	1.00	0.00
71.19	525.59	2.00	0.00	1.00	0.00	71.36	513.98	2.00	0.00	1.00	0.00
71.52	496.73	2.00	0.00	1.00	0.00	71.69	486.44	2.00	0.00	1.00	0.00
71.85	488.03	2.00	0.00	1.00	0.00	72.01	506.92	2.00	0.00	1.00	0.00
72.18	537.00	2.00	0.00	1.00	0.00	72.34	568.57	2.00	0.00	1.00	0.00
72.51	589.38	2.00	0.00	1.00	0.00	72.67	595.54	2.00	0.00	1.00	0.00
72.83	588.74	2.00	0.00	1.00	0.00	73.00	576.47	2.00	0.00	1.00	0.00
73.16	565.49	2.00	0.00	1.00	0.00	73.33	555.91	2.00	0.00	1.00	0.00
73.49	548.31	2.00	0.00	1.00	0.00	73.65	498.77	2.00	0.00	1.00	0.00
73.82	469.00	2.00	0.00	1.00	0.00	73.98	480.09	2.00	0.00	1.00	0.00
74.15	489.69	2.00	0.00	1.00	0.00						

Total estimated settlement: 4.58

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	215.51	346.24	1.00	346.24	1.17	N/A	N/A
0.33	268.01	430.56	1.00	430.56	1.15	N/A	N/A
0.49	363.64	584.19	1.00	584.19	1.15	N/A	N/A
0.66	477.79	767.57	1.00	767.57	1.19	N/A	N/A
0.82	561.46	901.99	1.00	901.99	1.23	N/A	N/A
0.98	538.82	865.59	1.00	865.59	1.23	N/A	N/A
1.15	481.05	772.75	1.00	772.75	1.17	N/A	N/A
1.31	417.51	670.66	1.00	670.66	1.10	N/A	N/A
1.48	300.49	482.62	1.00	482.62	1.25	N/A	N/A
1.64	183.82	295.17	1.00	295.17	1.50	N/A	N/A
1.80	67.16	107.72	1.39	149.25	2.06	N/A	N/A
1.97	60.81	97.50	1.49	145.64	2.12	N/A	N/A
2.13	54.20	86.87	1.63	141.38	2.18	N/A	N/A
2.30	51.08	81.83	1.71	139.78	2.22	N/A	N/A
2.46	56.63	90.73	1.59	144.57	2.17	N/A	N/A
2.62	63.58	101.89	1.51	153.81	2.13	N/A	N/A
2.79	66.14	105.99	1.52	161.26	2.13	N/A	N/A
2.95	64.17	102.79	1.56	160.11	2.15	N/A	N/A
3.12	58.20	93.18	1.62	150.75	2.18	N/A	N/A
3.28	51.05	81.68	1.65	134.99	2.19	N/A	N/A
3.44	45.73	73.12	1.61	117.59	2.18	N/A	N/A
3.61	42.65	68.16	1.50	102.50	2.13	N/A	N/A
3.77	39.61	63.26	1.41	89.49	2.08	N/A	N/A
3.94	33.64	53.66	1.44	77.11	2.09	N/A	N/A
4.10	25.29	40.23	1.62	64.98	2.18	N/A	N/A
4.27	17.41	27.56	2.16	59.42	2.36	N/A	N/A
4.43	12.37	19.43	3.11	60.45	2.56	N/A	N/A
4.59	10.31	16.12	3.95	63.66	2.69	N/A	N/A
4.76	9.67	15.08	4.14	62.37	2.72	N/A	N/A
4.92	9.15	14.23	4.26	60.58	2.74	0.06	2.17
5.09	8.34	12.91	4.79	61.82	2.80	0.06	1.95
5.25	7.87	12.14	5.13	62.27	2.84	0.06	1.82
5.41	8.41	13.00	4.69	60.98	2.79	0.05	1.92
5.58	9.81	15.23	3.64	55.37	2.65	0.05	2.23
5.74	10.93	17.02	3.16	53.73	2.57	0.05	0.60
5.91	10.65	16.55	3.19	52.78	2.58	0.05	0.60
6.07	8.92	13.77	3.81	52.44	2.67	0.05	1.96
6.23	6.78	10.32	4.77	49.19	2.80	0.05	1.45
6.40	5.24	7.83	5.84	45.76	2.91	0.05	1.09
6.56	4.49	6.60	6.78	44.74	3.00	0.05	0.91
6.73	4.16	6.06	7.75	46.99	3.09	0.06	0.83
6.89	4.25	6.19	8.22	50.88	3.12	0.06	0.84
7.05	6.16	9.25	6.14	56.83	2.94	0.05	1.25
7.22	8.13	12.41	4.79	59.40	2.80	0.06	1.66
7.38	11.39	17.64	3.36	59.27	2.61	0.05	2.33
7.55	12.94	20.11	2.89	58.21	2.52	0.06	0.62
7.71	16.72	26.17	2.18	57.05	2.37	0.05	0.65
7.87	23.22	36.60	1.65	60.46	2.19	0.06	0.69

:: 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	35.40	56.15	1.30	73.17	2.00	0.08	0.75
8.20	50.28	80.05	1.15	92.39	1.86	0.11	0.80
8.37	63.40	101.10	1.09	109.87	1.77	0.14	0.83
8.53	70.62	112.68	1.05	118.56	1.72	0.16	0.84
8.69	71.12	113.48	1.04	118.19	1.71	0.16	0.85
8.86	67.15	107.09	1.05	112.27	1.72	0.14	0.84
9.02	62.06	98.89	1.07	105.78	1.75	0.13	0.83
9.19	57.89	92.18	1.10	101.70	1.80	0.12	0.82
9.35	54.82	87.24	1.16	100.85	1.86	0.11	0.81
9.51	52.32	83.20	1.19	99.41	1.91	0.11	0.80
9.68	50.15	79.71	1.23	97.76	1.94	0.11	0.80
9.84	48.84	77.58	1.23	95.79	1.95	0.10	0.79
10.01	48.77	77.45	1.23	95.60	1.94	0.10	0.79
10.17	50.24	79.80	1.19	95.21	1.90	0.10	0.80
10.33	53.67	85.29	1.13	96.22	1.83	0.11	0.81
10.50	59.17	92.04	1.00	92.04	1.75	0.12	0.82
10.66	65.38	98.69	1.00	98.69	1.68	0.13	0.83
10.83	68.31	101.91	1.00	101.91	1.66	0.14	0.83
10.99	65.12	97.68	1.00	97.68	1.69	0.13	0.82
11.15	55.76	86.10	1.10	94.79	1.79	0.11	0.81
11.32	45.26	71.69	1.22	87.53	1.93	0.09	0.78
11.48	36.43	57.50	1.46	83.77	2.10	0.08	0.75
11.65	30.37	47.75	1.75	83.60	2.23	0.07	0.73
11.81	24.65	38.55	2.06	79.28	2.33	0.07	0.70
11.98	19.38	30.06	2.40	72.23	2.42	0.06	0.67
12.14	15.03	23.05	2.86	66.01	2.52	0.06	0.64
12.30	12.71	19.32	3.41	65.87	2.61	0.06	1.89
12.47	12.25	18.57	3.63	67.31	2.65	0.06	1.80
12.63	13.19	20.06	3.35	67.23	2.60	0.06	1.93
12.80	14.60	22.31	2.81	62.78	2.51	0.06	0.64
12.96	15.37	23.54	2.51	59.13	2.45	0.06	0.64
13.12	14.97	22.87	2.64	60.47	2.47	0.06	0.64
13.29	13.94	21.21	3.03	64.30	2.55	0.06	0.63
13.45	13.38	20.29	3.39	68.80	2.61	0.06	1.89
13.62	13.51	20.48	3.50	71.62	2.63	0.06	1.89
13.78	13.72	20.81	3.47	72.25	2.62	0.06	1.91
13.94	13.27	20.07	3.27	65.53	2.59	0.06	0.62
14.11	12.41	18.67	4.15	77.47	2.72	0.06	1.69
14.27	11.72	17.55	5.08	89.24	2.83	0.06	1.57
14.44	16.77	25.65	4.58	117.57	2.78	0.06	2.28
14.60	22.01	34.06	3.79	129.03	2.67	0.08	3.00
14.76	31.09	48.64	3.10	150.93	2.56	0.08	0.73
14.93	37.36	58.68	2.75	161.49	2.50	0.09	0.76
15.09	42.83	67.46	2.50	168.87	2.44	0.10	0.77
15.26	41.96	66.05	2.39	157.61	2.42	0.10	0.77
15.42	36.24	56.85	2.47	140.22	2.44	0.09	0.75
15.58	30.63	47.81	2.59	123.91	2.46	0.08	0.73
15.75	28.02	43.60	2.68	116.65	2.48	0.07	0.72

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	28.55	44.44	2.73	121.21	2.49	0.08	0.72
16.08	30.44	47.46	2.81	133.22	2.51	0.08	0.73
16.24	33.37	52.15	2.70	141.02	2.49	0.08	0.74
16.40	37.83	57.85	2.28	131.70	2.39	0.08	0.75
16.57	44.00	64.45	1.73	111.45	2.22	0.09	0.77
16.73	48.42	68.17	1.41	96.30	2.08	0.10	0.77
16.90	48.22	67.29	1.39	93.45	2.06	0.09	0.77
17.06	42.53	60.21	1.57	94.33	2.16	0.09	0.76
17.22	34.36	49.89	1.98	98.86	2.31	0.08	0.73
17.39	26.64	39.51	2.61	103.15	2.47	0.07	0.70
17.55	20.64	31.08	3.42	106.22	2.61	0.07	2.39
17.72	16.46	24.85	4.19	104.04	2.73	0.06	1.87
17.88	13.63	20.29	4.67	94.68	2.79	0.06	1.52
18.04	11.84	17.39	4.80	83.44	2.80	0.06	1.29
18.21	10.54	15.30	4.89	74.75	2.81	0.06	1.13
18.37	9.48	13.58	5.15	69.91	2.84	0.06	1.00
18.54	8.62	12.18	5.47	66.64	2.88	0.06	0.89
18.70	7.99	11.15	5.70	63.58	2.90	0.06	0.81
18.86	7.58	10.49	5.82	61.06	2.91	0.06	0.76
19.03	7.33	10.07	5.98	60.26	2.93	0.06	0.72
19.19	7.17	9.80	6.19	60.61	2.95	0.06	0.70
19.36	7.05	9.54	6.37	60.75	2.97	0.06	0.68
19.52	7.11	9.58	6.29	60.23	2.96	0.06	0.68
19.69	7.63	10.34	6.43	66.44	2.97	0.06	0.74
19.85	8.73	11.98	5.99	71.79	2.93	0.06	0.86
20.01	9.76	13.44	5.70	76.57	2.90	0.06	0.97
20.18	10.20	13.96	5.46	76.23	2.88	0.06	1.01
20.34	10.03	13.63	5.49	74.80	2.88	0.06	0.98
20.51	9.98	13.42	5.31	71.31	2.86	0.06	0.97
20.67	10.38	13.79	4.82	66.45	2.80	0.06	1.01
20.83	10.76	14.17	4.46	63.21	2.76	0.06	1.04
21.00	10.69	13.99	4.45	62.24	2.76	0.05	1.03
21.16	10.33	13.45	4.67	62.79	2.79	0.05	0.99
21.33	10.38	13.48	4.80	64.67	2.80	0.05	0.99
21.49	11.29	14.66	4.58	67.14	2.78	0.05	1.08
21.65	12.83	16.66	4.18	69.59	2.72	0.06	1.23
21.82	14.26	18.45	3.84	70.88	2.68	0.06	1.38
21.98	14.94	19.26	3.72	71.55	2.66	0.06	1.44
22.15	14.61	18.74	3.84	71.95	2.68	0.06	1.40
22.31	13.82	17.63	4.07	71.80	2.71	0.06	1.31
22.47	12.75	16.20	4.50	72.93	2.77	0.06	1.19
22.64	11.86	14.95	4.82	71.99	2.80	0.06	1.09
22.80	10.96	13.72	5.29	72.54	2.86	0.06	0.99
22.97	10.38	12.90	5.66	72.97	2.90	0.06	0.93
23.13	10.12	12.49	5.86	73.24	2.92	0.06	0.89
23.29	10.19	12.46	5.58	69.57	2.89	0.06	0.90
23.46	11.84	14.40	4.39	63.18	2.75	0.05	1.06
23.62	13.34	16.11	3.62	58.38	2.65	0.06	1.20

:: 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	25.14	30.08	1.89	56.74	2.28	0.04	0.67
23.95	35.44	41.80	1.45	60.69	2.10	0.08	0.71
24.11	53.40	61.81	1.00	61.81	1.90	0.07	0.76
24.28	67.17	76.87	1.00	76.87	1.81	0.10	0.79
24.44	83.80	95.08	1.00	95.08	1.74	0.13	0.82
24.61	92.13	104.35	1.07	111.28	1.74	0.15	0.83
24.77	91.81	104.25	1.10	114.34	1.79	0.15	0.83
24.93	86.40	98.24	1.13	110.92	1.83	0.13	0.82
25.10	80.91	91.75	1.14	104.71	1.85	0.12	0.82
25.26	78.86	88.83	1.12	99.80	1.82	0.12	0.81
25.43	81.54	90.97	1.00	90.97	1.77	0.12	0.81
25.59	88.15	97.23	1.00	97.23	1.69	0.13	0.82
25.75	95.96	104.61	1.00	104.61	1.60	0.15	0.83
25.92	101.07	109.19	1.00	109.19	1.54	0.16	0.84
26.08	100.94	108.98	1.00	108.98	1.56	0.16	0.84
26.25	97.49	105.74	1.00	105.74	1.63	0.15	0.84
26.41	95.94	104.40	1.00	104.40	1.68	0.14	0.83
26.57	100.54	109.57	1.05	114.98	1.72	0.15	0.84
26.74	110.81	119.72	1.00	119.72	1.65	0.18	0.85
26.90	124.02	133.69	1.00	133.84	1.65	0.22	0.87
27.07	138.86	148.94	1.00	148.94	1.62	0.27	0.88
27.23	155.11	165.58	1.00	165.58	1.59	0.39	0.90
27.40	171.74	181.58	1.00	181.58	1.51	0.62	0.91
27.56	185.52	194.36	1.00	194.36	1.44	0.93	0.93
27.72	194.76	203.73	1.00	203.73	1.44	0.93	0.93
27.89	199.56	209.09	1.00	209.09	1.49	0.94	0.94
28.05	201.60	211.72	1.00	211.72	1.54	0.94	0.94
28.22	202.59	212.72	1.00	212.72	1.58	0.94	0.94
28.38	203.97	213.82	1.00	213.82	1.59	0.94	0.94
28.54	207.49	217.05	1.00	217.05	1.60	0.94	0.94
28.71	213.46	222.78	1.00	222.78	1.61	0.95	0.95
28.87	220.64	229.73	1.00	229.73	1.62	0.95	0.95
29.04	225.62	234.25	1.00	234.25	1.62	0.95	0.95
29.20	225.97	233.84	1.00	233.84	1.62	0.95	0.95
29.36	221.71	228.61	1.00	228.61	1.61	0.95	0.95
29.53	215.04	220.89	1.00	220.89	1.61	0.95	0.95
29.69	208.89	213.98	1.00	213.98	1.61	0.94	0.94
29.86	204.63	209.18	1.00	209.18	1.63	0.94	0.94
30.02	205.18	209.22	1.00	208.56	1.64	0.94	0.94
30.18	212.18	215.69	1.00	215.69	1.64	0.94	0.94
30.35	227.62	230.38	1.00	230.38	1.61	0.95	0.95
30.51	248.81	251.00	1.00	251.00	1.59	0.97	0.97
30.68	271.35	272.70	1.00	272.70	1.57	0.98	0.98
30.84	290.35	290.78	1.00	290.78	1.55	0.99	0.99
31.00	303.46	302.66	1.00	302.66	1.51	1.00	1.00
31.17	311.03	309.23	1.00	309.23	1.51	1.00	1.00
31.33	313.54	311.03	1.00	311.03	1.52	1.00	1.00
31.50	312.41	309.46	1.00	309.46	1.55	1.00	1.00

:: 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	309.10	305.74	1.00	305.74	1.59	1.00	1.00
31.82	306.81	302.93	1.00	302.93	1.63	1.00	1.00
31.99	309.18	304.37	1.00	304.37	1.64	1.00	1.00
32.15	319.38	313.39	1.00	313.39	1.62	1.00	1.00
32.32	336.88	329.33	1.00	329.33	1.60	1.01	1.01
32.48	355.95	346.74	1.00	346.74	1.57	1.02	1.02
32.64	370.67	359.71	1.00	359.71	1.52	1.03	1.03
32.81	379.57	366.97	1.00	366.97	1.48	1.03	1.03
32.97	386.60	372.60	1.00	372.60	1.45	1.03	1.03
33.14	393.98	378.68	1.00	378.68	1.45	1.03	1.03
33.30	400.02	383.52	1.00	383.52	1.44	1.04	1.04
33.46	401.53	383.95	1.00	383.95	1.44	1.04	1.04
33.63	398.96	380.39	1.00	380.39	1.42	1.03	1.03
33.79	396.10	376.71	1.00	376.71	1.41	1.03	1.03
33.96	396.86	376.45	1.00	376.45	1.39	1.03	1.03
34.12	402.55	380.96	1.00	380.96	1.38	1.04	1.04
34.28	411.61	388.66	1.00	388.66	1.37	1.04	1.04
34.45	420.53	396.16	1.00	396.16	1.38	1.04	1.04
34.61	425.13	399.59	1.00	399.59	1.38	1.04	1.04
34.78	422.47	396.11	1.00	396.11	1.38	1.04	1.04
34.94	413.07	386.39	1.00	386.39	1.38	1.04	1.04
35.10	400.61	373.85	1.00	373.85	1.37	1.03	1.03
35.27	388.67	361.82	1.00	361.82	1.37	1.03	1.03
35.43	377.64	350.76	1.00	350.76	1.36	1.02	1.02
35.60	365.43	338.62	1.00	338.62	1.35	1.02	1.02
35.76	351.21	324.74	1.00	324.74	1.35	1.01	1.01
35.93	336.08	309.99	1.00	309.99	1.35	1.00	1.00
36.09	321.43	295.74	1.00	295.74	1.36	0.99	0.99
36.25	305.93	280.71	1.00	280.71	1.38	0.98	0.98
36.42	287.45	262.98	1.00	262.98	1.40	0.97	0.97
36.58	264.09	240.85	1.00	240.85	1.41	0.96	0.96
36.75	236.92	215.25	1.00	215.25	1.45	0.94	0.94
36.91	208.80	188.80	1.00	188.80	1.50	0.92	0.92
37.07	183.59	165.06	1.00	165.06	1.58	0.45	0.90
37.24	162.72	145.42	1.00	145.64	1.65	0.30	0.88
37.40	146.16	129.90	1.04	134.89	1.70	0.22	0.86
37.57	132.94	117.63	1.05	123.24	1.71	0.18	0.85
37.73	124.62	110.00	1.00	110.00	1.69	0.16	0.84
37.89	118.85	104.75	1.00	104.75	1.65	0.15	0.83
38.06	111.31	97.55	1.00	97.55	1.71	0.14	0.82
38.22	94.78	81.91	1.20	98.19	1.91	0.13	0.80
38.39	71.48	60.50	1.57	95.11	2.16	0.10	0.76
38.55	63.07	52.71	1.91	100.57	2.29	0.07	0.74
38.71	64.34	53.64	1.89	101.50	2.28	0.10	0.74
38.88	116.66	100.00	1.24	123.81	1.95	0.09	0.83
39.04	159.10	137.81	1.09	150.60	1.78	0.81	0.87
39.21	222.30	194.54	1.00	194.54	1.60	0.72	0.93
39.37	260.36	227.98	1.00	227.98	1.57	0.95	0.95

:: 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	309.39	271.63	1.00	271.63	1.50	0.98	0.98
39.70	341.57	299.69	1.00	299.69	1.48	0.99	0.99
39.86	356.88	312.87	1.00	312.87	1.46	1.00	1.00
40.03	367.05	320.80	1.00	320.80	1.48	1.01	1.01
40.19	385.55	336.06	1.00	336.06	1.49	1.01	1.01
40.35	420.04	365.57	1.00	365.57	1.49	1.03	1.03
40.52	459.59	399.38	1.00	399.38	1.48	1.04	1.04
40.68	488.89	424.59	1.00	424.59	1.46	1.05	1.05
40.85	493.98	428.92	1.00	428.92	1.43	1.06	1.06
41.01	475.41	412.64	1.00	412.64	1.40	1.05	1.05
41.17	441.73	382.67	1.00	382.67	1.39	1.04	1.04
41.34	404.46	348.91	1.00	348.91	1.41	1.02	1.02
41.50	370.46	317.74	1.00	317.74	1.46	1.00	1.00
41.67	342.19	291.61	1.00	291.61	1.51	0.99	0.99
41.83	321.67	273.04	1.00	273.04	1.52	0.98	0.98
41.99	309.25	262.20	1.00	262.20	1.51	0.97	0.97
42.16	302.13	255.91	1.00	255.91	1.49	0.97	0.97
42.32	293.76	247.69	1.00	247.69	1.52	0.96	0.96
42.49	280.82	235.18	1.00	235.18	1.57	0.96	0.96
42.65	265.85	221.28	1.00	221.28	1.61	0.95	0.95
42.81	254.52	211.15	1.00	211.15	1.61	0.94	0.94
42.98	248.50	205.93	1.00	205.93	1.60	0.93	0.93
43.14	242.90	200.94	1.00	200.94	1.59	0.93	0.93
43.31	231.23	190.40	1.00	190.40	1.61	0.92	0.92
43.47	212.02	173.35	1.01	174.34	1.65	0.84	0.91
43.64	191.85	155.70	1.03	161.01	1.69	0.43	0.89
43.80	180.09	145.34	1.05	152.82	1.72	0.32	0.88
43.96	182.94	147.17	1.06	155.93	1.73	0.34	0.88
44.13	201.03	161.52	1.06	171.27	1.73	0.53	0.90
44.29	234.51	188.45	1.06	198.98	1.73	0.92	0.92
44.46	283.35	227.93	1.04	238.12	1.71	0.95	0.95
44.62	340.86	274.84	1.02	281.23	1.68	0.98	0.98
44.78	390.90	315.34	1.01	318.53	1.66	1.00	1.00
44.95	419.15	337.45	1.01	340.58	1.66	1.01	1.01
45.11	430.64	345.37	1.02	352.07	1.67	1.02	1.02
45.28	444.68	356.27	1.01	360.00	1.66	1.02	1.02
45.44	473.63	380.06	1.00	380.06	1.63	1.03	1.03
45.60	509.04	409.40	1.00	409.40	1.59	1.05	1.05
45.77	534.66	429.19	1.00	429.19	1.59	1.06	1.06
45.93	545.60	436.09	1.00	436.09	1.61	1.06	1.06
46.10	550.03	437.01	1.00	437.01	1.64	1.06	1.06
46.26	556.01	439.52	1.01	443.91	1.66	1.06	1.06
46.42	564.76	444.93	1.02	452.12	1.67	1.06	1.06
46.59	573.28	450.47	1.02	458.10	1.67	1.06	1.06
46.75	580.07	454.51	1.02	463.50	1.67	1.07	1.07
46.92	582.48	454.76	1.03	466.46	1.68	1.07	1.07
47.08	578.10	450.22	1.03	461.97	1.68	1.06	1.06
47.24	568.25	442.32	1.02	449.27	1.67	1.06	1.06

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	561.40	437.40	1.00	436.02	1.64	1.06	1.06
47.57	565.58	440.46	1.00	440.46	1.63	1.06	1.06
47.74	579.64	449.88	1.00	449.88	1.64	1.06	1.06
47.90	590.88	456.59	1.00	458.66	1.65	1.07	1.07
48.06	587.17	452.04	1.01	457.30	1.66	1.07	1.07
48.23	567.73	436.03	1.01	440.60	1.66	1.06	1.06
48.39	543.95	416.75	1.01	420.92	1.66	1.05	1.05
48.56	526.07	401.71	1.01	407.15	1.66	1.04	1.04
48.72	516.41	393.14	1.02	399.70	1.67	1.04	1.04
48.88	511.05	388.19	1.02	394.43	1.67	1.04	1.04
49.05	511.33	387.98	1.01	391.75	1.66	1.04	1.04
49.21	519.58	393.59	1.01	396.43	1.66	1.04	1.04
49.38	534.51	404.46	1.00	405.17	1.65	1.05	1.05
49.54	540.91	408.57	1.00	408.54	1.65	1.05	1.05
49.70	529.33	399.17	1.00	397.79	1.64	1.04	1.04
49.87	502.27	377.50	1.00	377.42	1.65	1.03	1.03
50.03	485.17	363.81	1.00	363.49	1.64	1.03	1.03
50.20	489.28	366.10	1.00	365.55	1.64	1.03	1.03
50.36	509.54	381.28	1.00	381.28	1.63	1.04	1.04
50.52	519.69	389.43	1.00	389.43	1.61	1.04	1.04
50.69	506.35	380.12	1.00	380.12	1.58	1.03	1.03
50.85	469.49	353.41	1.00	353.41	1.55	1.02	1.02
51.02	421.39	317.93	1.00	317.93	1.52	1.00	1.00
51.18	372.42	281.54	1.00	281.54	1.49	0.98	0.98
51.35	328.07	246.78	1.00	246.78	1.50	0.96	0.96
51.51	289.27	214.95	1.00	214.95	1.56	0.94	0.94
51.67	259.18	190.22	1.00	190.22	1.61	0.92	0.92
51.84	244.16	178.56	1.00	178.56	1.62	0.91	0.91
52.00	249.62	184.29	1.00	184.29	1.55	0.92	0.92
52.17	271.75	202.69	1.00	202.69	1.49	0.93	0.93
52.33	300.51	225.27	1.00	225.27	1.46	0.95	0.95
52.49	329.01	245.51	1.00	245.51	1.48	0.96	0.96
52.66	357.39	265.20	1.00	265.20	1.50	0.97	0.97
52.82	389.26	287.99	1.00	287.99	1.51	0.99	0.99
52.99	423.36	312.89	1.00	312.89	1.51	1.00	1.00
53.15	453.89	335.08	1.00	335.08	1.51	1.01	1.01
53.31	473.70	348.74	1.00	348.74	1.52	1.02	1.02
53.48	478.95	350.96	1.00	350.96	1.53	1.02	1.02
53.64	471.51	344.26	1.00	344.26	1.54	1.02	1.02
53.81	457.90	333.41	1.00	333.41	1.54	1.01	1.01
53.97	446.38	324.50	1.00	324.50	1.54	1.01	1.01
54.13	442.81	321.47	1.00	321.47	1.54	1.01	1.01
54.30	446.96	323.59	1.00	323.59	1.54	1.01	1.01
54.46	456.70	329.38	1.00	329.38	1.55	1.01	1.01
54.63	469.47	337.33	1.00	337.33	1.56	1.01	1.01
54.79	483.59	346.15	1.00	346.15	1.57	1.02	1.02
54.95	493.51	352.29	1.00	352.29	1.58	1.02	1.02
55.12	491.69	349.66	1.00	349.66	1.58	1.02	1.02

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

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.28	475.72	337.60	1.00	337.60	1.58	1.01	1.01
55.45	451.49	320.03	1.00	320.03	1.58	1.01	1.01
55.61	428.65	303.81	1.00	303.81	1.57	1.00	1.00
55.77	411.72	291.15	1.00	291.15	1.57	0.99	0.99
55.94	398.73	280.88	1.00	280.88	1.57	0.98	0.98
56.10	386.04	270.92	1.00	270.92	1.58	0.98	0.98
56.27	373.87	262.42	1.00	262.42	1.57	0.97	0.97
56.43	365.67	257.45	1.00	257.45	1.55	0.97	0.97
56.59	365.39	258.73	1.00	258.73	1.51	0.97	0.97
56.76	375.59	266.75	1.00	266.75	1.49	0.98	0.98
56.92	398.18	283.21	1.00	283.21	1.48	0.99	0.99
57.09	429.50	304.50	1.00	304.50	1.48	1.00	1.00
57.25	460.11	325.10	1.00	325.10	1.49	1.01	1.01
57.41	476.54	335.32	1.00	335.32	1.51	1.01	1.01
57.58	475.24	333.20	1.00	333.20	1.51	1.01	1.01
57.74	460.35	321.24	1.00	321.24	1.53	1.01	1.01
57.91	441.99	307.95	1.00	307.95	1.52	1.00	1.00
58.07	423.80	295.61	1.00	295.61	1.51	0.99	0.99
58.23	406.31	284.18	1.00	284.18	1.49	0.99	0.99
58.40	386.04	269.41	1.00	269.41	1.49	0.98	0.98
58.56	360.85	250.34	1.00	250.34	1.50	0.97	0.97
58.73	331.44	227.88	1.00	227.88	1.53	0.95	0.95
58.89	302.03	205.75	1.00	205.75	1.56	0.93	0.93
59.06	278.21	188.20	1.00	188.20	1.58	0.92	0.92
59.22	262.29	176.57	1.00	176.57	1.59	0.91	0.91
59.38	252.93	168.95	1.00	168.95	1.61	0.90	0.90
59.55	246.28	163.95	1.00	163.95	1.62	0.90	0.90
59.71	238.90	158.45	1.00	158.45	1.63	0.83	0.89
59.88	228.70	151.90	1.00	151.90	1.61	0.60	0.89
60.04	214.77	141.39	1.00	141.39	1.64	0.43	0.88
60.20	197.54	127.81	1.04	132.45	1.70	0.31	0.86
60.37	180.10	114.50	1.08	123.25	1.76	0.23	0.85
60.53	169.03	106.47	1.09	116.57	1.78	0.19	0.84
60.70	170.31	108.55	1.06	114.58	1.73	0.19	0.84
60.86	183.36	118.58	1.00	118.58	1.66	0.23	0.85
61.02	200.11	130.63	1.00	130.63	1.63	0.32	0.87
61.19	214.78	140.81	1.00	140.81	1.61	0.40	0.88
61.35	231.32	152.52	1.00	152.52	1.58	0.51	0.89
61.52	258.13	171.60	1.00	171.60	1.55	0.91	0.91
61.68	294.28	196.56	1.00	196.56	1.53	0.93	0.93
61.84	328.39	220.65	1.00	220.65	1.50	0.95	0.95
62.01	352.04	237.77	1.00	237.77	1.48	0.96	0.96
62.17	369.71	250.82	1.00	250.82	1.46	0.97	0.97
62.34	389.84	264.43	1.00	264.43	1.45	0.97	0.97
62.50	409.83	276.77	1.00	276.77	1.46	0.98	0.98
62.66	415.40	278.93	1.00	278.93	1.48	0.98	0.98
62.83	396.26	264.14	1.00	264.14	1.50	0.97	0.97
62.99	358.20	235.80	1.00	235.80	1.54	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
63.16	320.84	208.40	1.00	208.40	1.58	0.94	0.94
63.32	301.82	194.34	1.00	194.34	1.61	0.93	0.93
63.48	306.82	197.09	1.00	197.09	1.61	0.93	0.93
63.65	324.34	210.08	1.00	210.08	1.58	0.94	0.94
63.81	337.79	220.78	1.00	220.78	1.54	0.95	0.95
63.98	333.72	220.88	1.00	220.88	1.48	0.95	0.95
64.14	312.62	207.51	1.00	207.51	1.46	0.94	0.94
64.30	280.04	185.11	1.00	185.11	1.46	0.92	0.92
64.47	243.78	158.45	1.00	158.45	1.51	0.69	0.89
64.63	207.13	131.71	1.00	131.71	1.58	0.30	0.87
64.80	174.14	107.91	1.00	107.91	1.66	0.19	0.84
64.96	146.62	89.05	1.00	89.05	1.72	0.14	0.81
65.12	124.35	73.62	1.00	73.62	1.79	0.11	0.79
65.29	104.59	59.75	1.00	59.75	1.89	0.10	0.76
65.45	85.95	46.73	1.36	63.57	2.04	0.08	0.73
65.62	70.42	36.34	1.65	59.91	2.19	0.07	0.69
65.78	61.10	30.41	1.91	58.01	2.29	0.07	0.67
65.94	59.46	29.43	1.93	56.73	2.29	0.07	0.67
66.11	63.19	31.62	1.83	57.80	2.26	0.07	0.68
66.27	68.04	34.28	1.79	61.21	2.25	0.07	0.69
66.44	70.80	35.38	1.88	66.50	2.28	0.08	0.69
66.60	73.06	36.14	2.00	72.19	2.31	0.08	0.69
66.77	81.14	41.04	1.79	73.36	2.25	0.08	0.71
66.93	98.48	51.42	1.56	80.46	2.16	0.10	0.74
67.09	130.71	71.13	1.35	95.98	2.04	0.12	0.78
67.26	177.28	99.12	1.25	124.00	1.96	0.22	0.83
67.42	245.89	142.41	1.14	162.85	1.85	0.75	0.88
67.59	323.66	191.87	1.09	208.34	1.77	0.92	0.92
67.75	397.76	239.87	1.04	250.66	1.71	0.96	0.96
67.91	447.24	271.56	1.03	278.76	1.68	0.98	0.98
68.08	475.91	289.43	1.02	294.96	1.67	0.99	0.99
68.24	493.48	299.13	1.02	306.14	1.68	0.99	0.99
68.41	511.09	308.33	1.03	317.90	1.69	1.00	1.00
68.57	529.39	318.03	1.04	329.92	1.70	1.00	1.00
68.73	546.20	326.73	1.04	341.03	1.71	1.01	1.01
68.90	560.03	332.79	1.06	351.18	1.73	1.01	1.01
69.06	569.85	336.17	1.07	359.16	1.75	1.01	1.01
69.23	574.01	336.23	1.08	363.36	1.76	1.01	1.01
69.39	571.89	333.88	1.08	361.93	1.77	1.01	1.01
69.55	562.71	327.70	1.09	355.60	1.77	1.01	1.01
69.72	547.68	318.17	1.09	345.41	1.77	1.00	1.00
69.88	528.31	305.25	1.09	333.78	1.78	1.00	1.00
70.05	511.30	293.67	1.10	323.74	1.79	0.99	0.99
70.21	500.25	286.10	1.11	316.90	1.80	0.99	0.99
70.37	499.63	285.86	1.10	314.99	1.79	0.99	0.99
70.54	508.85	291.77	1.09	318.63	1.78	0.99	0.99
70.70	528.61	303.28	1.09	329.64	1.77	1.00	1.00
70.87	551.97	315.46	1.09	344.52	1.78	1.00	1.00

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

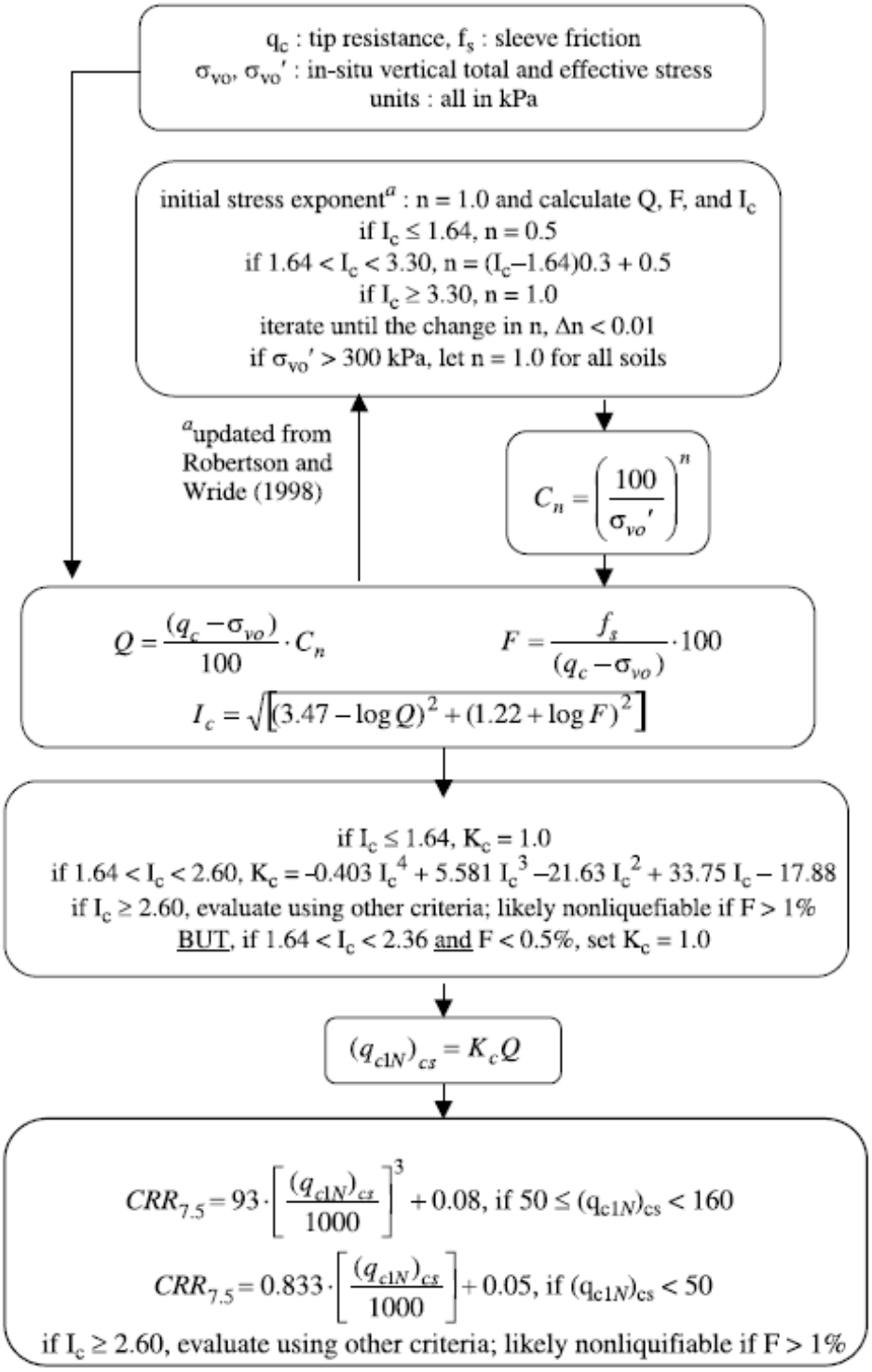
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
71.03	569.21	323.70	1.10	356.09	1.79	1.01	1.01
71.19	571.29	323.18	1.11	358.17	1.80	1.01	1.01
71.36	559.39	314.60	1.12	351.52	1.81	1.00	1.00
71.52	542.81	303.90	1.12	341.35	1.82	1.00	1.00
71.69	532.70	297.14	1.13	334.88	1.83	0.99	0.99
71.85	537.37	299.54	1.12	336.70	1.82	0.99	0.99
72.01	558.66	311.50	1.12	348.66	1.82	1.00	1.00
72.18	592.07	330.68	1.11	367.50	1.81	1.01	1.01
72.34	626.35	350.41	1.10	386.79	1.80	1.02	1.02
72.51	650.40	363.87	1.10	400.15	1.79	1.03	1.03
72.67	658.18	367.35	1.10	404.49	1.79	1.03	1.03
72.83	651.94	362.48	1.11	400.72	1.80	1.03	1.03
73.00	638.88	353.56	1.11	392.99	1.81	1.02	1.02
73.16	626.17	345.21	1.12	385.16	1.81	1.02	1.02
73.33	617.65	340.60	1.11	378.10	1.80	1.02	1.02
73.49	612.79	338.82	1.10	372.51	1.79	1.02	1.02
73.65	612.83	357.24	1.00	357.24	1.61	1.02	1.02
73.82	619.33	392.83	1.00	392.83	1.34	1.04	1.04
73.98	631.08	259.52	4.51	1170.39	2.77	0.97	18.54
74.15	640.66	263.25	4.63	1218.86	2.78	0.97	18.80

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

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

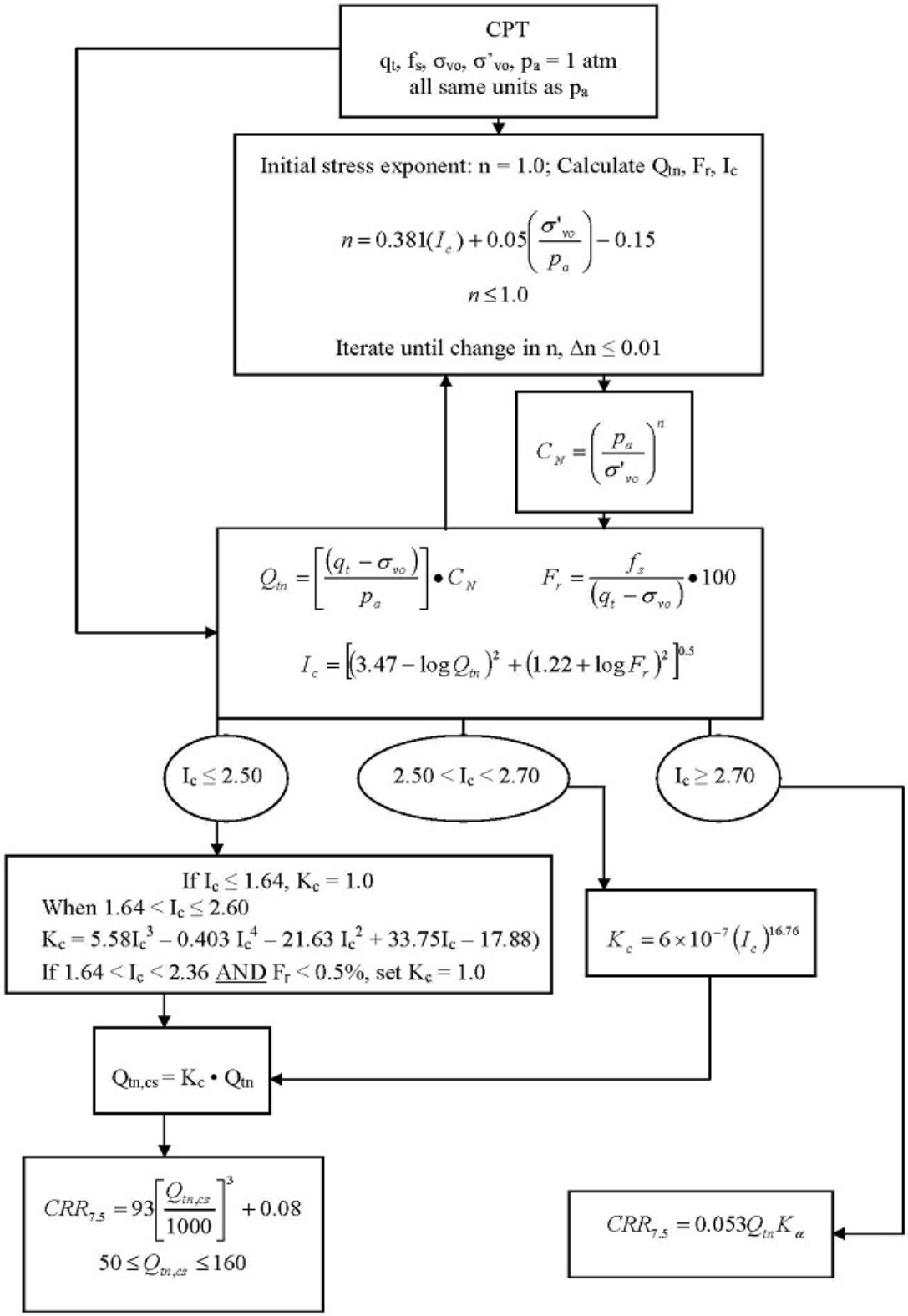
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

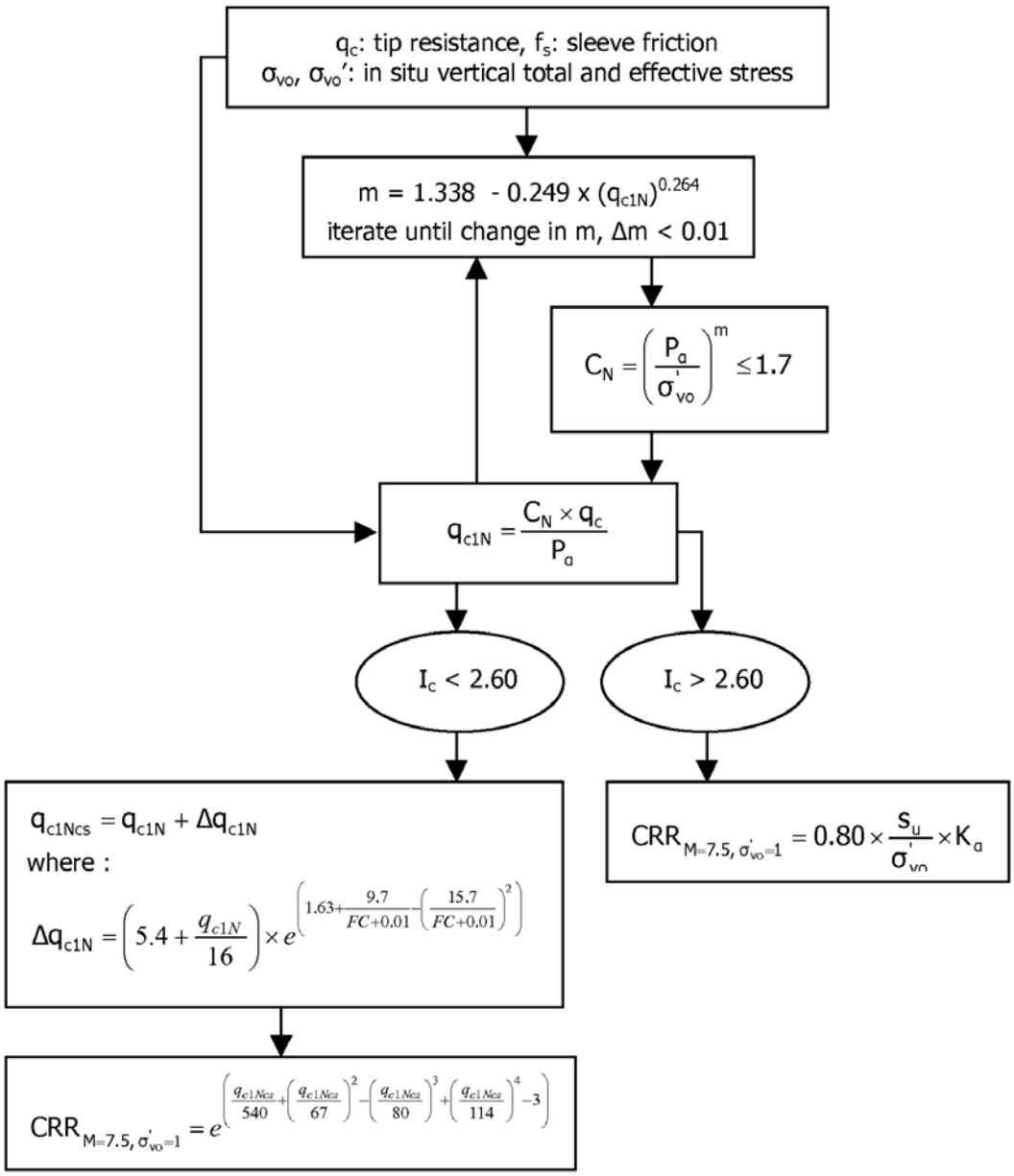
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

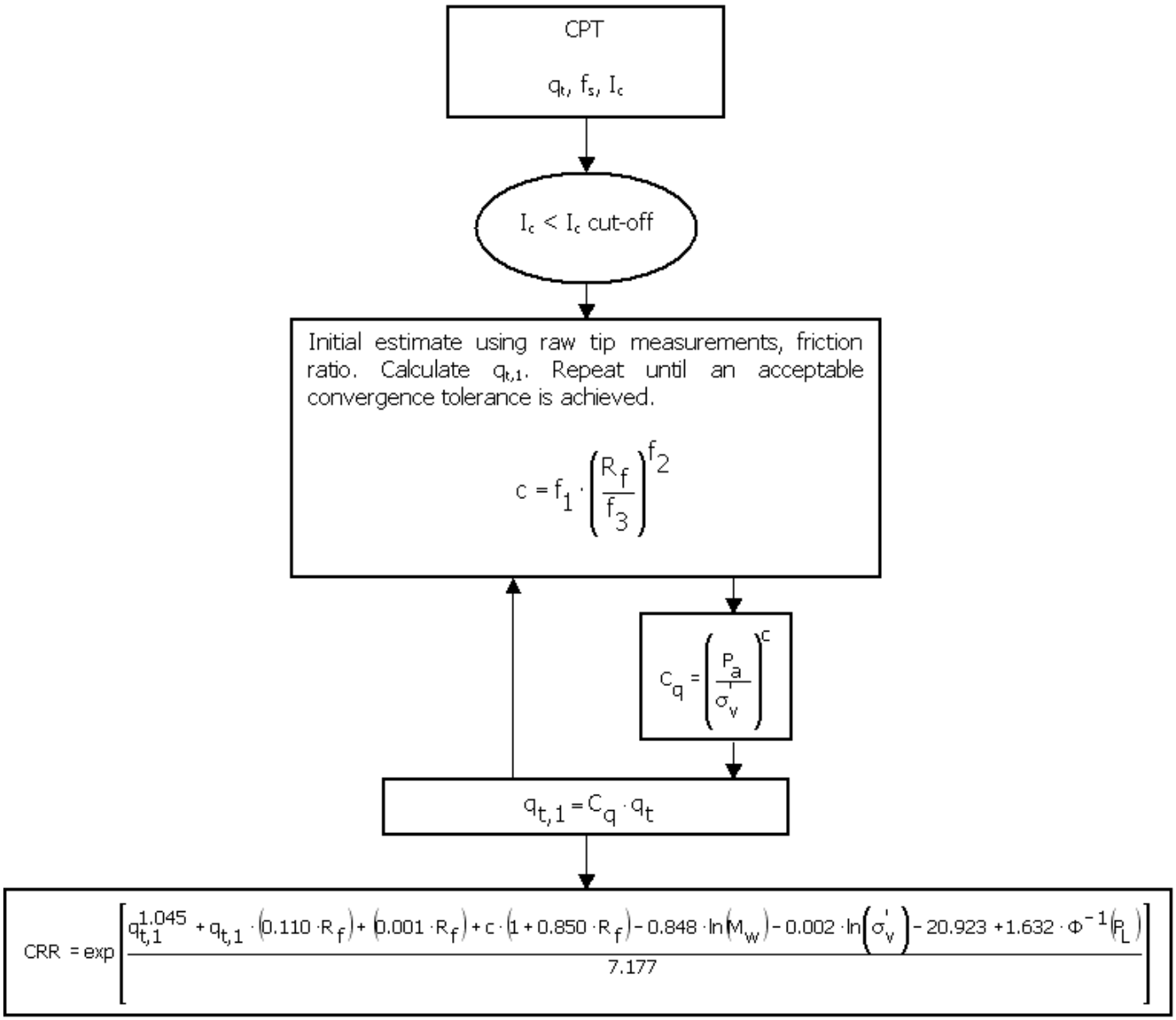


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{C1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

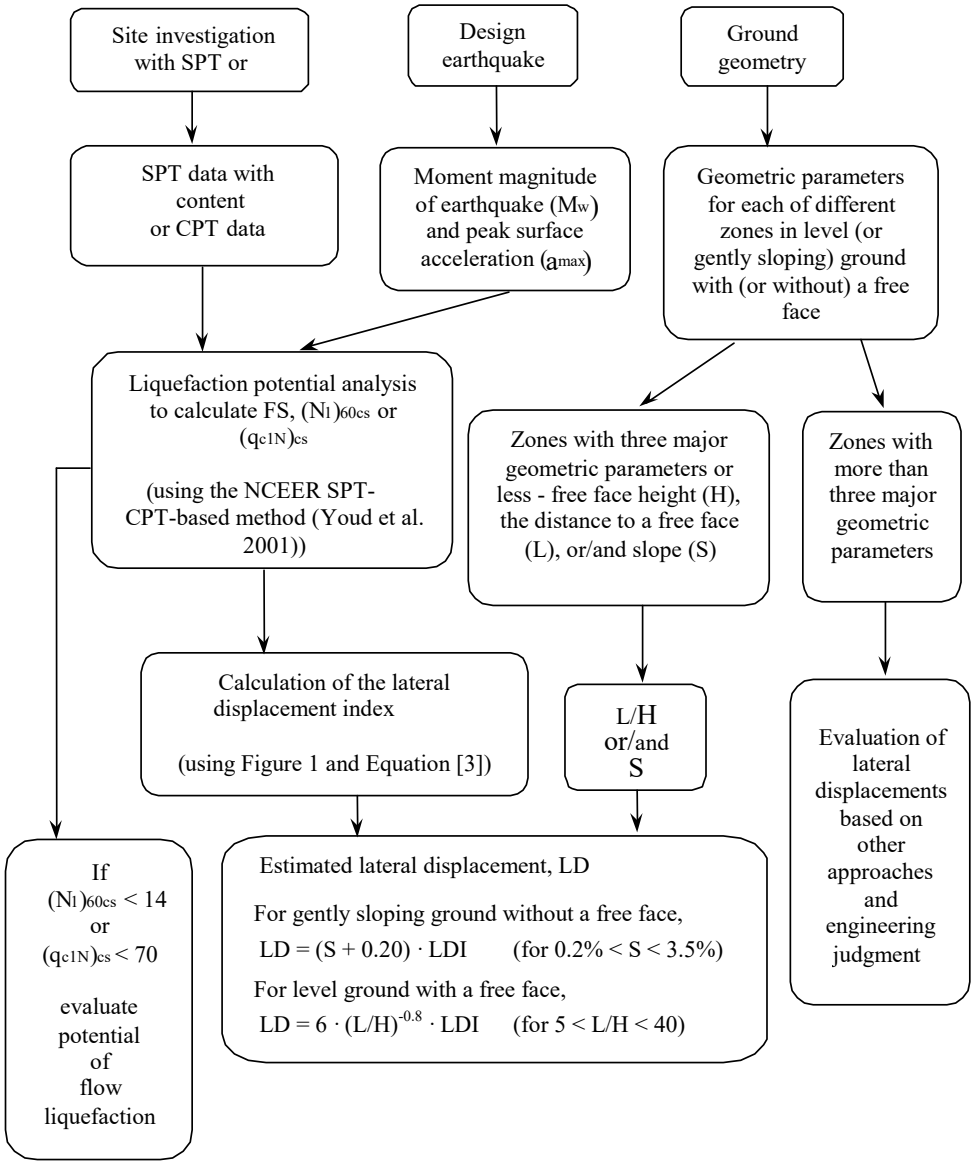
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

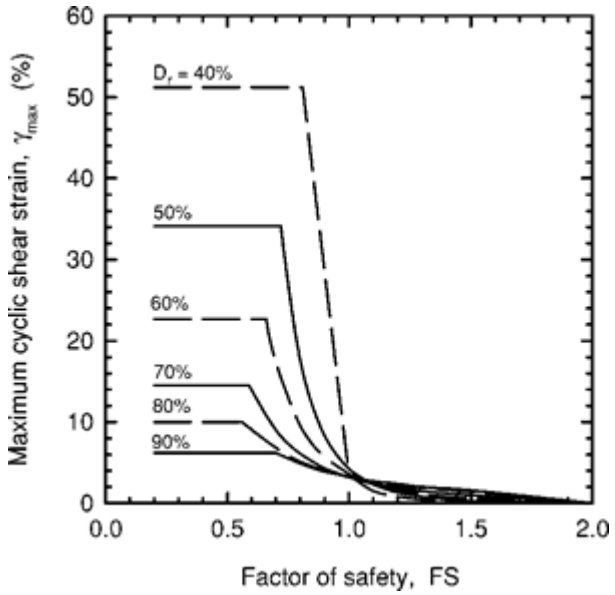
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

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



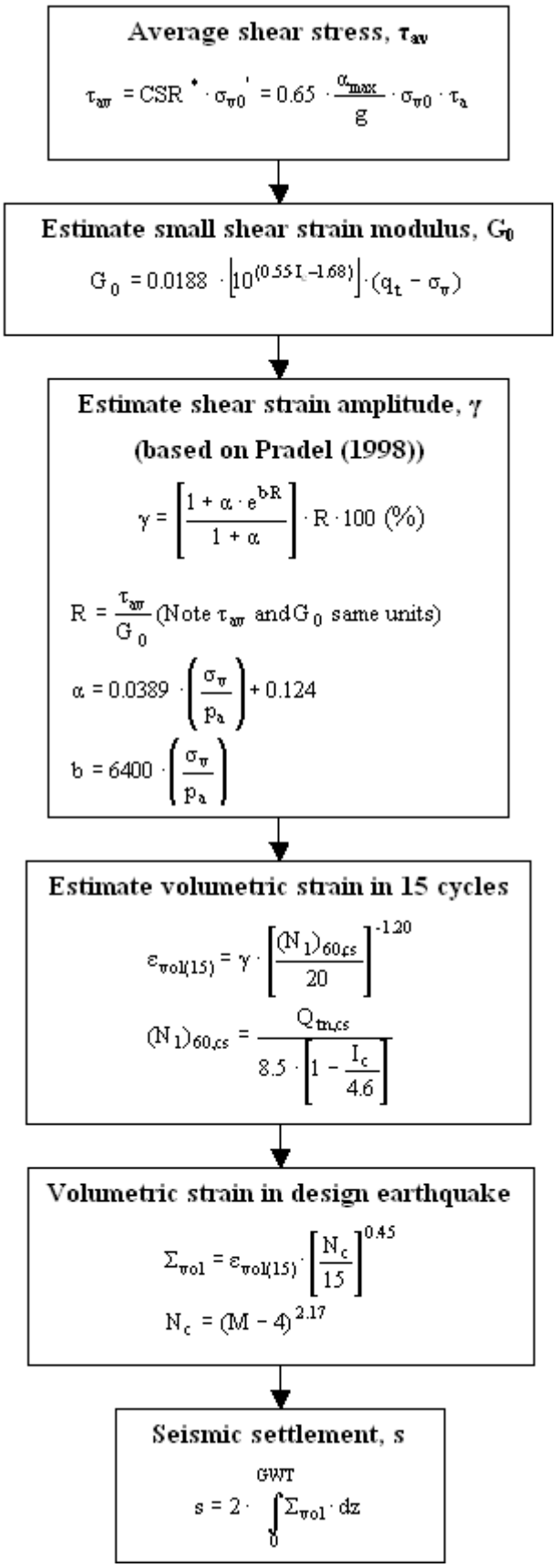
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

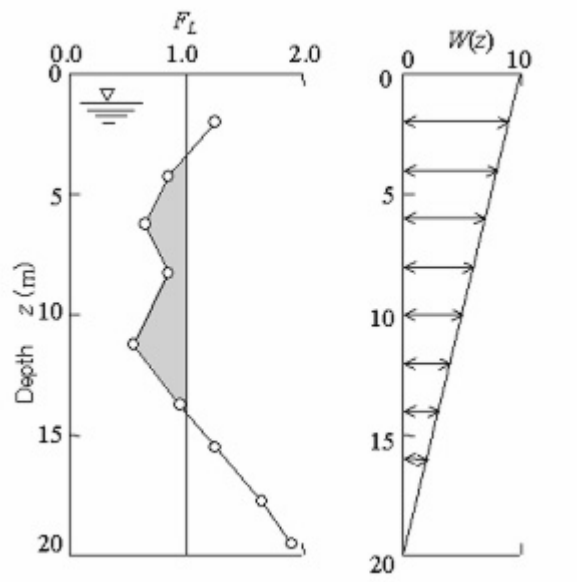
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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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Designed By: ZRB
Checked By: BW

Raw Data Input

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-1
Lattitude:	35.49532
Longitude:	89.00140
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

Hammer Energy Ratio (ER), %:	91
C_E:	1.52
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

													Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	6	53.1	26	15	11	16.40	CL	1			1	Clay-Like	-	1370		
2	6.5	4	53.1	26	15	11	16.40	CL	1			1	Clay-Like	-	910		
3	9.0	4	53.1	26	15	11	16.40	CL	1			1	Clay-Like	-	910		
4	11.5	4	53.1	26	15	11	16.40	CL	1			1	Clay-Like	-	910		
5	16.5	3	70.5	31	21	10	30.30	CL	2			1	Clay-Like	-	340		
6	21.5	1	70.5	31	21	10	30.30	CL	2			1	Clay-Like	-	110		
7	31.5	25	7.5	0	0	0	19.00	SP-SM	3			1	Sand-Like	44	-		
8	36.5	30	7.5	0	0	0	19.00	SP-SM	3			1	Sand-Like	46	-		
9	41.5	34	7.5	0	0	0	19.00	SP-SM	3			1	Sand-Like	47	-		
10	46.5	66	7.5	0	0	0	19.00	SP-SM	3			1	Sand-Like	48	-		
11	51.5	47	5.1	0	0	0	25.70	SP-SM	4			1	Sand-Like	48	-		
12	56.5	16	5.1	0	0	0	25.70	SP-SM	4			1	Sand-Like	37	-		
13	64.5	18	5.1	0	0	0	25.70	SP-SM	4			1	Sand-Like	38	-		
14	66.5	42	5.1	0	0	0	25.70	SP-SM	4			1	Sand-Like	47	-		
15	71.5	100	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	48	-		
16	76.5	90	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	48	-		
17	81.5	57	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	48	-		
18	86.5	79	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	48	-		
19	91.5	25	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	39	-		
20	96.5	53	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	47	-		
21	101.5	100	6.9	0	0	0	20.70	SP-SM	5			1	Sand-Like	48	-		

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T 270.444.9691 F 270.443.3943

Designed By: ZRB
Checked By: BW

Standard Penetration Test Correction

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-1
Lattitude:	35.49532
Longitude:	89.00140
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

Hammer Energy Ratio (ER), %:	91
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	$N_{meas,}$ bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		380																	
1	4	376	6	1.52	1.70	0.75	1.0	1.00	1.3	460	460	53.1	9.1	15.5	6.8	11.6	15.0	1	CL
2	6.5	373.5	4	1.52	1.70	0.80	1.0	1.00	1.4	748	641	53.1	6.1	10.3	4.8	8.2	11.1	1	CL
3	9	371	4	1.52	1.61	0.84	1.0	1.00	1.4	1035	773	53.1	6.1	9.8	5.1	8.2	11.1	1	CL
4	11.5	368.5	4	1.52	1.49	0.88	1.0	1.00	1.4	1323	904	53.1	6.1	9.0	5.3	7.9	10.8	1	CL
5	16.5	363.5	3	1.52	1.31	0.93	1.0	1.00	1.5	1898	1167	70.5	4.6	6.0	4.2	5.5	8.0	2	CL
6	21.5	358.5	1	1.52	1.18	0.96	1.0	1.00	2.2	2473	1430	70.5	1.5	1.8	1.5	1.7	3.7	2	CL
7	31.5	348.5	25	1.52	1.01	0.99	1.0	1.00	1.0	3623	1956	7.5	37.9	38.3	37.4	37.8	39.3	3	SP-SM
8	36.5	343.5	30	1.52	0.95	0.99	1.0	1.00	1.0	4198	2219	7.5	45.5	43.2	45.1	42.8	44.5	3	SP-SM
9	41.5	338.5	34	1.52	0.90	1.00	1.0	1.00	1.0	4773	2482	7.5	50.0	44.9	51.3	46.1	47.8	3	SP-SM
10	46.5	333.5	66	1.52	0.85	1.00	1.0	1.00	1.0	5348	2745	7.5	50.0	42.7	99.8	50.0	51.9	3	SP-SM
11	51.5	328.5	47	1.52	0.82	1.00	1.0	1.00	1.0	5923	3008	5.1	50.0	40.8	71.2	50.0	51.3	4	SP-SM
12	56.5	323.5	16	1.52	0.78	1.00	1.0	1.00	1.0	6498	3271	5.1	24.3	19.0	24.2	19.0	19.6	4	SP-SM
13	64.5	315.5	18	1.52	0.74	1.00	1.0	1.00	1.0	7418	3692	5.1	27.3	20.1	27.3	20.1	20.7	4	SP-SM
14	66.5	313.5	42	1.52	0.73	1.00	1.0	1.00	1.0	7648	3797	5.1	50.0	36.3	63.7	46.2	47.4	4	SP-SM
15	71.5	308.5	100	1.52	0.70	1.00	1.0	1.00	1.0	8223	4060	6.9	50.0	35.1	151.6	50.0	51.7	5	SP-SM
16	76.5	303.5	90	1.52	0.68	1.00	1.0	1.00	1.0	8798	4323	6.9	50.0	34.0	136.5	50.0	51.7	5	SP-SM
17	81.5	298.5	57	1.52	0.66	1.00	1.0	1.00	1.0	9373	4586	6.9	50.0	33.0	86.4	50.0	51.7	5	SP-SM
18	86.5	293.5	79	1.52	0.64	1.00	1.0	1.00	1.0	9948	4849	6.9	50.0	32.1	119.8	50.0	51.7	5	SP-SM
19	91.5	288.5	25	1.52	0.63	1.00	1.0	1.00	1.0	10523	5112	6.9	37.9	23.7	37.9	23.7	24.7	5	SP-SM
20	96.5	283.5	53	1.52	0.61	1.00	1.0	1.00	1.0	11098	5375	6.9	50.0	30.5	80.4	49.0	50.7	5	SP-SM
21	101.5	278.5	100	1.52	0.60	1.00	1.0	1.00	1.0	11673	5638	6.9	50.0	29.8	151.7	50.0	51.7	5	SP-SM

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Designed By: ZRB
Checked By: BW

Subsurface Soil Properties Summary

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-1
Lattitude:	35.49532
Longitude:	89.00140
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	380															
1	4	376	6	9.1	11.6	CL	1	0	0	53.1	16.4	26.0	15.0	11.0	0.13	-	1365
2	6.5	373.5	4	6.1	8.2	CL	1	0	0	53.1	16.4	26.0	15.0	11.0	0.13	-	910
3	9	371	4	6.1	8.2	CL	1	0	0	53.1	16.4	26.0	15.0	11.0	0.13	-	910
4	11.5	368.5	4	6.1	7.9	CL	1	0	0	53.1	16.4	26.0	15.0	11.0	0.13	-	910
5	16.5	363.5	3	4.6	5.5	CL	2	0	0	70.5	30.3	31.0	21.0	10.0	0.93	-	683
6	21.5	358.5	1	1.5	1.7	CL	2	0	0	70.5	30.3	31.0	21.0	10.0	0.93	-	228
7	31.5	348.5	25	37.9	37.8	SP-SM	3	0	0	7.5	19	0.0	0.0	0.0	NP	44	-
8	36.5	343.5	30	45.5	42.8	SP-SM	3	0	0	7.5	19	0.0	0.0	0.0	NP	46	-
9	41.5	338.5	34	50.0	46.1	SP-SM	3	0	0	7.5	19	0.0	0.0	0.0	NP	47	-
10	46.5	333.5	66	50.0	50.0	SP-SM	3	0	0	7.5	19	0.0	0.0	0.0	NP	48	-
11	51.5	328.5	47	50.0	50.0	SP-SM	4	0	0	5.1	25.7	0.0	0.0	0.0	NP	48	-
12	56.5	323.5	16	24.3	19.0	SP-SM	4	0	0	5.1	25.7	0.0	0.0	0.0	NP	37	-
13	64.5	315.5	18	27.3	20.1	SP-SM	4	0	0	5.1	25.7	0.0	0.0	0.0	NP	38	-
14	66.5	313.5	42	50.0	46.2	SP-SM	4	0	0	5.1	25.7	0.0	0.0	0.0	NP	47	-
15	71.5	308.5	100	50.0	50.0	SP-SM	5	0	0	6.9	20.7	0.0	0.0	0.0	NP	48	-
16	76.5	303.5	90	50.0	50.0	SP-SM	5	0	0	6.9	20.7	0.0	0.0	0.0	NP	48	-
17	81.5	298.5	57	50.0	50.0	SP-SM	5	0	0	6.9	20.7	0.0	0.0	0.0	NP	48	-
18	86.5	293.5	79	50.0	50.0	SP-SM	5	0	0	6.9	20.7	0.0	0.0	0.0	NP	48	-
19	91.5	288.5	25	37.9	23.7	SP-SM	5	0	0	6.9	20.7	0	0	0	NP	39.1	-
20	96.5	283.5	53	50.0	49.0	SP-SM	5	0	0	6.9	20.7	0	0	0	NP	47.5	-
21	101.5	278.5	100	50.0	50.0	SP-SM	5	0	0	6.9	20.7	0	0	0	NP	47.7	-

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Checked By: BW

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-1
Lattitude:	35.49532
Longitude:	89.00140
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

PGA:	0.334
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7.04
R(km):	77.17

MSF_{sand}:	1.13
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	380																		
1	4	376	CL	1	1	11.6	5.5	17.1	PSL	NS Clay-Like	0.09	1	No Strength Loss	-	-	-	-	2.5	-	4.2
2	6.5	373.5	CL	1	1	8.2	5.5	13.7	PSL	NS Clay-Like	0.22	1	No Strength Loss	-	-	-	-	2.5	-	4.2
3	9	371	CL	1	1	8.2	5.5	13.7	PSL	NS Clay-Like	0.30	1	No Strength Loss	-	-	-	-	2.5	-	4.2
4	11.5	368.5	CL	1	1	7.9	5.5	13.4	PSL	NS Clay-Like	0.37	1	No Strength Loss	-	-	-	-	2.5	-	4.2
5	16.5	363.5	CL	2	1	5.5	5.5	11.0	PSL	HS Clay-Like	0.70	1	No Strength Loss	-	-	-	-	2.5	-	4.2
6	21.5	358.5	CL	2	1	1.7	5.5	7.2	PSL	HS Clay-Like	2.67	1	Strength Loss	-	-	40.3	-	2.5	-	4.2
7	31.5	348.5	SP-SM	3	1	37.8	0.2	38.0	NSL-S	Sand-Like	0.13	1	No Liquefaction	-	-	-	-	2.5	-	4.2
8	36.5	343.5	SP-SM	3	1	42.8	0.2	43.1	NSL-S	Sand-Like	0.02	1	No Liquefaction	-	-	-	-	2.5	-	4.2
9	41.5	338.5	SP-SM	3	1	46.1	0.2	46.3	NSL-S	Sand-Like	0.01	1	No Liquefaction	-	-	-	-	2.5	-	4.2
10	46.5	333.5	SP-SM	3	1	50.0	0.2	50.2	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	2.5	-	4.2
11	51.5	328.5	SP-SM	4	1	50.0	0.0	50.0	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	2.5	-	4.2
12	56.5	323.5	SP-SM	4	1	19.0	0.0	19.0	NSL-S	Sand-Like	1.55	1	Full Liquefaction	9.9	-	-	1.14	2.5	1.44	4.2
13	64.5	315.5	SP-SM	4	1	20.1	0.0	20.1	NSL-S	Sand-Like	1.42	1	Full Liquefaction	10.7	-	-	1.34	1.3	2.20	2.8
14	66.5	313.5	SP-SM	4	1	46.2	0.0	46.2	NSL-S	Sand-Like	0.01	1	No Liquefaction	-	-	-	-	0.0	-	0.6
15	71.5	308.5	SP-SM	5	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.6
16	76.5	303.5	SP-SM	5	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.6
17	81.5	298.5	SP-SM	5	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.6
18	86.5	293.5	SP-SM	5	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.6
19	91.5	288.5	SP-SM	5	1	23.7	0.1	23.8	NSL-S	Sand-Like	1.04	1	Full Liquefaction	14.0	-	-	0.18	0.2	0.57	0.6
20	96.5	283.5	SP-SM	5	1	49.0	0.1	49.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.2	-	0.0
21	101.5	278.5	SP-SM	5	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.2	-	0.0

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Checked By: BW

SPT-Based Soil Shear Strength Summary

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-1
Lattitude:	35.49532
Longitude:	89.00140
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

PGA: 0.334

Hammer Energy Ratio (ER), %:	91
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		380																		
1	4	376	6	17.1	CL	53.1	460.0	460.0	16.4	26	15	11	NS Clay-Like	No Strength Loss	-	1365	-	1370	-	1370
2	6.5	373.5	4	13.7	CL	53.1	747.5	641.4	16.4	26	15	11	NS Clay-Like	No Strength Loss	-	910	-	910	-	910
3	9	371	4	13.7	CL	53.1	1035.0	772.9	16.4	26	15	11	NS Clay-Like	No Strength Loss	-	910	-	910	-	910
4	11.5	368.5	4	13.4	CL	53.1	1322.5	904.4	16.4	26	15	11	NS Clay-Like	No Strength Loss	-	910	-	910	-	910
5	16.5	363.5	3	11.0	CL	70.5	1897.5	1167.4	30.3	31	21	10	HS Clay-Like	No Strength Loss	-	683	-	680	-	680
6	21.5	358.5	1	7.2	CL	70.5	2472.5	1430.4	30.3	31	21	10	HS Clay-Like	Strength Loss	-	228	-	230	-	40
7	31.5	348.5	25	38.0	SP-SM	7.5	3622.5	1956.4	19.0	0	0	0	Sand-Like	No Liquefaction	44	-	44	-	44	-
8	36.5	343.5	30	43.1	SP-SM	7.5	4197.5	2219.4	19.0	0	0	0	Sand-Like	No Liquefaction	46	-	46	-	46	-
9	41.5	338.5	34	46.3	SP-SM	7.5	4772.5	2482.4	19.0	0	0	0	Sand-Like	No Liquefaction	47	-	47	-	47	-
10	46.5	333.5	66	50.2	SP-SM	7.5	5347.5	2745.4	19.0	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
11	51.5	328.5	47	50.0	SP-SM	5.1	5922.5	3008.4	25.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
12	56.5	323.5	16	19.0	SP-SM	5.1	6497.5	3271.4	25.7	0	0	0	Sand-Like	Full Liquefaction	37	-	37	-	10	-
13	64.5	315.5	18	20.1	SP-SM	5.1	7417.5	3692.2	25.7	0	0	0	Sand-Like	Full Liquefaction	38	-	38	-	11	-
14	66.5	313.5	42	46.2	SP-SM	5.1	7647.5	3797.4	25.7	0	0	0	Sand-Like	No Liquefaction	47	-	47	-	47	-
15	71.5	308.5	100	50.1	SP-SM	6.9	8222.5	4060.4	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
16	76.5	303.5	90	50.1	SP-SM	6.9	8797.5	4323.4	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
17	81.5	298.5	57	50.1	SP-SM	6.9	9372.5	4586.4	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
18	86.5	293.5	79	50.1	SP-SM	6.9	9947.5	4849.4	20.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
19	91.5	288.5	25	23.8	SP-SM	6.9	10522.5	5112.4	20.7	0.0	0.0	0.0	Sand-Like	Full Liquefaction	39.1	-	39	-	14	-
20	96.5	283.5	53	49.1	SP-SM	6.9	11097.5	5375.4	20.7	0.0	0.0	0.0	Sand-Like	No Liquefaction	47.5	-	47	-	47	-
21	101.5	278.5	100	50.1	SP-SM	6.9	11672.5	5638.4	20.7	0.0	0.0	0.0	Sand-Like	No Liquefaction	47.7	-	48	-	48	-

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Designed By: ZRB
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Raw Data Input

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-2
Lattitude:	35.49526
Longitude:	89.00120
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

Hammer Energy Ratio (ER), %:	91
C_E:	1.52
Bore Hold Diameter, in.:	4
C_B:	1.00
Liner Required:	N
Liner Used:	N
C_S:	1.00

Strength Loss
Limited Liquefcation
Full Liquefaction

														Calculated Strengths		Strength Override	
SPT Sample	Depth, ft	$N_{meas,}$ bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K_{DR}	SSL Soil Type	ϕ', deg	c, psf	ϕ', deg	c, psf
	0																
1	4.0	8	61.8	21	18	3	19.80	ML	6			1	Sand-Like	35	-		
2	6.5	0	61.8	21	18	3	19.80	ML	6			1	Sand-Like	22	-		
3	12.0	17	61.8	21	18	3	19.80	ML	6			1	Sand-Like	43	-		
4	16.5	4	23.5	0	0	0	31.00	SM	7			1	Sand-Like	31	-		
5	21.5	1	23.5	0	0	0	31.00	SM	7			1	Sand-Like	25	-		
6	31.5	22	91	33	23	10	22.70	CL	8			1	Clay-Like	-	2500		
7	36.5	24	91	33	23	10	22.70	CL	8			1	Clay-Like	-	2730		
8	41.5	30	91	33	23	10	22.70	CL	8			1	Clay-Like	-	3410		
9	46.5	34	91	33	23	10	22.70	CL	8			1	Clay-Like	-	3750		
10	51.5	45	6.6	0	0	0	21.50	SP-SM	9			1	Sand-Like	48	-		
11	56.5	63	6.6	0	0	0	21.50	SP-SM	9			1	Sand-Like	48	-		
12	61.5	38	6.6	0	0	0	21.50	SP-SM	9			1	Sand-Like	46	-		
13	66.5	23	6.6	0	0	0	21.50	SP-SM	9			1	Sand-Like	40	-		
14	71.5	100	20.5	0	0	0	21.70	SM	10			1	Sand-Like	48	-		
15	76.5	33	20.5	0	0	0	21.70	SM	10			1	Sand-Like	43	-		
16	81.5	62	20.5	0	0	0	21.70	SM	10			1	Sand-Like	48	-		
17	86.5	45	20.5	0	0	0	21.70	SM	10			1	Sand-Like	46	-		
18	91.5	68	20.5	0	0	0	21.70	SM	10			1	Sand-Like	48	-		
19	96.5	40	20.5	0	0	0	21.70	SM	10			1	Sand-Like	44	-		
20	101.5	32	20.5	0	0	0	21.70	SM	10			1	Sand-Like	41	-		

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Standard Penetration Test Correction

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-2
Lattitude:	35.49526
Longitude:	89.00120
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

Hammer Energy Ratio (ER), %:	91
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	C_E	C_N	C_R	C_S	C_B	C_F	σ, psf	$\bar{\sigma}$, psf	FC, %	N_{60}	$N_{1,60}$	N^*_{60}	$N^*_{1,60}$	$N^*_{1,60,cs}$	Soil Layer	USCS Soil Type
		380																	
1	4	376	8	1.52	1.70	0.75	1.0	1.00	1.3	460	460	61.8	12.1	20.6	9.1	15.5	19.4	6	ML
2	6.5	373.5	0	1.52	1.70	0.80	1.0	1.00	1.2	748	641	61.8	0.2	0.3	0.1	0.2	0.3	6	ML
3	12	368	17	1.52	1.47	0.88	1.0	1.00	1.2	1380	931	61.8	25.8	37.8	22.8	33.4	39.8	6	ML
4	16.5	363.5	4	1.52	1.31	0.93	1.0	1.00	1.3	1898	1167	23.5	6.1	7.9	5.6	7.4	9.2	7	SM
5	21.5	358.5	1	1.52	1.18	0.96	1.0	1.00	1.8	2473	1430	23.5	1.5	1.8	1.5	1.7	3.1	7	SM
6	31.5	348.5	22	1.52	1.01	0.99	1.0	1.00	1.2	3623	1956	91.0	33.4	33.7	32.9	33.3	39.7	8	CL
7	36.5	343.5	24	1.52	0.95	0.99	1.0	1.00	1.2	4198	2219	91.0	36.4	34.6	36.1	34.3	40.8	8	CL
8	41.5	338.5	30	1.52	0.90	1.00	1.0	1.00	1.2	4773	2482	91.0	45.5	40.8	45.3	40.6	48.1	8	CL
9	46.5	333.5	34	1.52	0.85	1.00	1.0	1.00	1.2	5348	2745	91.0	50.0	42.7	51.4	43.9	51.8	8	CL
10	51.5	328.5	45	1.52	0.82	1.00	1.0	1.00	1.0	5923	3008	6.6	50.0	40.8	68.1	50.0	51.7	9	SP-SM
11	56.5	323.5	63	1.52	0.78	1.00	1.0	1.00	1.0	6498	3271	6.6	50.0	39.1	95.5	50.0	51.7	9	SP-SM
12	61.5	318.5	38	1.52	0.75	1.00	1.0	1.00	1.0	7073	3534	6.6	50.0	37.6	57.6	43.3	44.8	9	SP-SM
13	66.5	313.5	23	1.52	0.73	1.00	1.0	1.00	1.0	7648	3797	6.6	34.9	25.3	34.9	25.3	26.3	9	SP-SM
14	71.5	308.5	100	1.52	0.70	1.00	1.0	1.00	1.1	8223	4060	20.5	50.0	35.1	151.6	50.0	55.1	10	SM
15	76.5	303.5	33	1.52	0.68	1.00	1.0	1.00	1.1	8798	4323	20.5	50.0	34.0	50.0	34.0	37.9	10	SM
16	81.5	298.5	62	1.52	0.66	1.00	1.0	1.00	1.1	9373	4586	20.5	50.0	33.0	94.0	50.0	55.1	10	SM
17	86.5	293.5	45	1.52	0.64	1.00	1.0	1.00	1.1	9948	4849	20.5	50.0	32.1	68.2	43.8	48.4	10	SM
18	91.5	288.5	68	1.52	0.63	1.00	1.0	1.00	1.1	10523	5112	20.5	50.0	31.3	103.1	50.0	55.1	10	SM
19	96.5	283.5	40	1.52	0.61	1.00	1.0	1.00	1.1	11098	5375	20.5	50.0	30.5	60.7	37.0	41.1	10	SM
20	101.5	278.5	32	1.52	0.60	1.00	1.0	1.00	1.1	11673	5638	20.5	48.5	28.9	48.5	28.9	32.3	10	SM

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Subsurface Soil Properties Summary

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-2
Lattitude:	35.49526
Longitude:	89.00120
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

																Correlated Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	N_{60}	$N^{*}_{1,60}$	USCS Soil Type	Soil Layer	General Geology	Epoch	FC, %	w, %	LL	PL	PI	LI	ϕ', deg	c, psf
	0	380															
1	4	376	8	12.1	15.5	ML	6	0	0	61.8	19.8	21.0	18.0	3.0	0.60	35	-
2	6.5	373.5	0	0.2	0.2	ML	6	0	0	61.8	19.8	21.0	18.0	3.0	0.60	22	-
3	12	368	17	25.8	33.4	ML	6	0	0	61.8	19.8	21.0	18.0	3.0	0.60	43	-
4	16.5	363.5	4	6.1	7.4	SM	7	0	0	23.5	31	0.0	0.0	0.0	NP	31	-
5	21.5	358.5	1	1.5	1.7	SM	7	0	0	23.5	31	0.0	0.0	0.0	NP	25	-
6	31.5	348.5	22	33.4	33.3	CL	8	0	0	91.0	22.7	33.0	23.0	10.0	-0.03	-	5005
7	36.5	343.5	24	36.4	34.3	CL	8	0	0	91.0	22.7	33.0	23.0	10.0	-0.03	-	5460
8	41.5	338.5	30	45.5	40.6	CL	8	0	0	91.0	22.7	33.0	23.0	10.0	-0.03	-	6825
9	46.5	333.5	34	50.0	43.9	CL	8	0	0	91.0	22.7	33.0	23.0	10.0	-0.03	-	7500
10	51.5	328.5	45	50.0	50.0	SP-SM	9	0	0	6.6	21.5	0.0	0.0	0.0	NP	48	-
11	56.5	323.5	63	50.0	50.0	SP-SM	9	0	0	6.6	21.5	0.0	0.0	0.0	NP	48	-
12	61.5	318.5	38	50.0	43.3	SP-SM	9	0	0	6.6	21.5	0.0	0.0	0.0	NP	46	-
13	66.5	313.5	23	34.9	25.3	SP-SM	9	0	0	6.6	21.5	0.0	0.0	0.0	NP	40	-
14	71.5	308.5	100	50.0	50.0	SM	10	0	0	20.5	21.7	0.0	0.0	0.0	NP	48	-
15	76.5	303.5	33	50.0	34.0	SM	10	0	0	20.5	21.7	0.0	0.0	0.0	NP	43	-
16	81.5	298.5	62	50.0	50.0	SM	10	0	0	20.5	21.7	0.0	0.0	0.0	NP	48	-
17	86.5	293.5	45	50.0	43.8	SM	10	0	0	20.5	21.7	0.0	0.0	0.0	NP	46	-
18	91.5	288.5	68	50.0	50.0	SM	10	0	0	20.5	21.7	0.0	0.0	0.0	NP	48	-
19	96.5	283.5	40	50.0	37.0	SM	10	0	0	20.5	21.7	0	0	0	NP	43.9	-
20	101.5	278.5	32	48.5	28.9	SM	10	0	0	20.5	21.7	0	0	0	NP	41.1	-

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Checked By: BW

SPT-Based Soil Shear Strength Loss Evaluation

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-2
Lattitude:	35.49526
Longitude:	89.00120
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

PGA:	0.334
$\varphi_{SL\text{-}Sand}$	1.00
$\varphi_{NSL\text{-}Sand}$	1.00
$\varphi_{SL\text{-}Clay}$	1.00

M_w:	7.04
R(km):	77.17

MSF_{sand}:	1.13
MSF_{clay}:	1.02

											Soil Strength Loss Triggering Summary			Reduced Seismic Shear			Geotechnical Seismic Hazards Summary			
SPT Sample	Depth, ft	Elev, ft msl	USCS Soil Type	Soil Layer	K_{DR}	$N^*_{1,60}$	$\Delta N^*_{1,60}$	$N^*_{1,60,cs}$	SSL Potential	SSL Susceptibility Screening	$(D/C)_{SL}$	φ_{SL}	$(D/C)_{SL} \le \varphi_{SL}$	ϕ_{rl}, deg	$\phi_{rl\text{-}lim}$, deg	τ_{rs}, psf	LDI, ft	$\sum$LDI, ft	$S_{v\text{-}1D}$, in	$\sum S_{v\text{-}1D}$, in
	0	380																		
1	4	376	ML	6	1	15.5	5.5	21.0	NSL-S	Sand-Like	0.80	1	No Liquefaction	-	-	-	-	5.4	-	6.0
2	6.5	373.5	ML	6	1	0.2	5.5	5.7	NSL-S	Sand-Like	2.30	0.9	Full Liquefaction	3.5	-	-	1.28	5.4	1.49	6.0
3	12	368	ML	6	1	33.4	5.5	38.9	NSL-S	Sand-Like	0.09	1	No Liquefaction	-	-	-	-	4.1	-	4.6
4	16.5	363.5	SM	7	1	7.4	4.9	12.3	NSL-S	Sand-Like	2.10	0.9	Full Liquefaction	5.0	-	-	1.53	4.1	1.78	4.6
5	21.5	358.5	SM	7	1	1.7	4.9	6.7	NSL-S	Sand-Like	3.13	0.9	Full Liquefaction	3.0	-	-	2.56	2.6	2.78	2.8
6	31.5	348.5	CL	8	1	33.3	5.5	38.8	PSL	NS Clay-Like	0.17	1	No Strength Loss	-	-	-	-	0.0	-	0.0
7	36.5	343.5	CL	8	1	34.3	5.5	39.8	PSL	NS Clay-Like	0.17	1	No Strength Loss	-	-	-	-	0.0	-	0.0
8	41.5	338.5	CL	8	1	40.6	5.5	46.1	PSL	NS Clay-Like	0.15	1	No Strength Loss	-	-	-	-	0.0	-	0.0
9	46.5	333.5	CL	8	1	43.9	5.5	49.4	PSL	NS Clay-Like	0.15	1	No Strength Loss	-	-	-	-	0.0	-	0.0
10	51.5	328.5	SP-SM	9	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
11	56.5	323.5	SP-SM	9	1	50.0	0.1	50.1	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
12	61.5	318.5	SP-SM	9	1	43.3	0.1	43.4	NSL-S	Sand-Like	0.02	1	No Liquefaction	-	-	-	-	0.0	-	0.0
13	66.5	313.5	SP-SM	9	1	25.3	0.1	25.4	NSL-S	Sand-Like	0.99	1	No Liquefaction	-	-	-	-	0.0	-	0.0
14	71.5	308.5	SM	10	1	50.0	4.6	54.6	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
15	76.5	303.5	SM	10	1	34.0	4.6	38.6	NSL-S	Sand-Like	0.12	1	No Liquefaction	-	-	-	-	0.0	-	0.0
16	81.5	298.5	SM	10	1	50.0	4.6	54.6	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
17	86.5	293.5	SM	10	1	43.8	4.6	48.4	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
18	91.5	288.5	SM	10	1	50.0	4.6	54.6	NSL-S	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0
19	96.5	283.5	SM	10	1	37.0	4.6	41.6	NSL-S	Sand-Like	0.05	1	No Liquefaction	-	-	-	-	0.0	-	0.0
20	101.5	278.5	SM	10	1	28.9	4.6	33.5	NSL-S	Sand-Like	0.35	1	No Liquefaction	-	-	-	-	0.0	-	0.0

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SPT-Based Soil Shear Strength Summary

Project Name: SR-93 over Branch
County: Madison County

Boring Number:	BR6_B-2
Lattitude:	35.49526
Longitude:	89.00120
Ground Elevation, ft msl:	380.0
Groundwater Depth, ft:	4.8
Groundwater Elevation, ft msl:	375.2

PGA: 0.334

Hammer Energy Ratio (ER), %:	91
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

															Correlated Shear Strengths		Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev, ft msl	N_{meas}, bpf	$N^{*}_{1,60,cs}$	USCS Soil Type	FC, %	σ, psf	$\bar{\sigma}$, psf	w, %	LL	PL	PI	SSL Susceptibility Screening	$(D/C)_{SL} \leq \varphi_{SL}$	ϕ', deg	c, psf	ϕ', deg	c, psf	ϕ', deg	c, psf
0		380																		
1	4	376	8	21.0	ML	61.8	460.0	460.0	19.8	21	18	3	Sand-Like	No Liquefaction	35	-	35	-	35	-
2	6.5	373.5	0	5.7	ML	61.8	747.5	641.4	19.8	21	18	3	Sand-Like	Full Liquefaction	22	-	22	-	3	-
3	12	368	17	38.9	ML	61.8	1380.0	930.7	19.8	21	18	3	Sand-Like	No Liquefaction	43	-	43	-	43	-
4	16.5	363.5	4	12.3	SM	23.5	1897.5	1167.4	31.0	0	0	0	Sand-Like	Full Liquefaction	31	-	31	-	5	-
5	21.5	358.5	1	6.7	SM	23.5	2472.5	1430.4	31.0	0	0	0	Sand-Like	Full Liquefaction	25	-	25	-	3	-
6	31.5	348.5	22	38.8	CL	91.0	3622.5	1956.4	22.7	33	23	10	NS Clay-Like	No Strength Loss	-	5005	-	5010	-	5010
7	36.5	343.5	24	39.8	CL	91.0	4197.5	2219.4	22.7	33	23	10	NS Clay-Like	No Strength Loss	-	5460	-	5460	-	5460
8	41.5	338.5	30	46.1	CL	91.0	4772.5	2482.4	22.7	33	23	10	NS Clay-Like	No Strength Loss	-	6825	-	6830	-	6830
9	46.5	333.5	34	49.4	CL	91.0	5347.5	2745.4	22.7	33	23	10	NS Clay-Like	No Strength Loss	-	7500	-	7500	-	7500
10	51.5	328.5	45	50.1	SP-SM	6.6	5922.5	3008.4	21.5	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
11	56.5	323.5	63	50.1	SP-SM	6.6	6497.5	3271.4	21.5	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
12	61.5	318.5	38	43.4	SP-SM	6.6	7072.5	3534.4	21.5	0	0	0	Sand-Like	No Liquefaction	46	-	46	-	46	-
13	66.5	313.5	23	25.4	SP-SM	6.6	7647.5	3797.4	21.5	0	0	0	Sand-Like	No Liquefaction	40	-	40	-	40	-
14	71.5	308.5	100	54.6	SM	20.5	8222.5	4060.4	21.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
15	76.5	303.5	33	38.6	SM	20.5	8797.5	4323.4	21.7	0	0	0	Sand-Like	No Liquefaction	43	-	43	-	43	-
16	81.5	298.5	62	54.6	SM	20.5	9372.5	4586.4	21.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
17	86.5	293.5	45	48.4	SM	20.5	9947.5	4849.4	21.7	0	0	0	Sand-Like	No Liquefaction	46	-	46	-	46	-
18	91.5	288.5	68	54.6	SM	20.5	10522.5	5112.4	21.7	0	0	0	Sand-Like	No Liquefaction	48	-	48	-	48	-
19	96.5	283.5	40	41.6	SM	20.5	11097.5	5375.4	21.7	0.0	0.0	0.0	Sand-Like	No Liquefaction	43.9	-	44	-	44	-
20	101.5	278.5	32	33.5	SM	20.5	11672.5	5638.4	21.7	0.0	0.0	0.0	Sand-Like	No Liquefaction	41.1	-	41	-	41	-

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