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April 19, 2022

Project No.: 305172-001
Report No.: 22-4-8

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Project: 101 Garden Street
Santa Barbara, California
Subject: Update of Geotechnical Engineering Report
Reference: Earth Systems Southern California, Geotechnical Engineering Report, for Proposed Residential and Commercial Development, Paseo De La Playa Site No. 1, Santa Barbara, California, Project No. VT-23842-01, Report No. 07-2-52, February 28, 2007.

Introduction

In 2007, Earth Systems Southern California, currently known as Earth Systems Pacific (Earth Systems), prepared a Geotechnical Engineering Report (referenced) for a proposed residential and commercial development near the intersection of the Garden and Yanonali Streets in Santa Barbara, California.

The 2007-proposed construction included two areas designated as Site No. 1 and Site No. 3. This report updates a Geotechnical Engineering Report prepared for Site No. 1 because the currently proposed project site at 101 Garden Street is the Site No. 1 of the 2007 study.

According to the plans prepared by Cearnal Collective, it is currently proposed to construct a three-story hotel building with a subterranean parking lot.

The project site does not lie within any special study zones for earthquake faults or landslides, but does lie in a zone of "High" liquefaction potential (City of Santa Barbara Hazard Maps prepared by URS in 2008). Therefore, this report includes additional field studies for liquefaction analyses.

Because the referenced report was prepared based on the 2001 California Building Code (CBC) that is outdated, this report also updates the referenced report to meet the current standards of the 2019 CBC, local codes, and standards of practice.

This report completes Phase 1 of the scope of services described within our Proposal No. SBA-22-01-010 dated January 25, 2022, and authorized by Shaun Gilbert on January 31, 2022.

Additional Field Studies

On February 22, 2022, five Cone Penetrometer Test (CPT) soundings, CPT-1 through CPT-5, were performed to obtain information pertaining to the soil profile. The CPT soundings were performed using equipment owned and operated by Kehoe Testing and Engineering. During advancement of the cone penetrometer, readings of sleeve friction (in tons per square foot), tip resistance (also in tons per square foot), and friction ratio (in percent) were recorded at 0.05-meter intervals as per ASTM D 5778 and ASTM D 3441.

The approximate locations of the test soundings were determined in the field by pacing and sighting, and is shown on the attached Site Plan. The final logs of the CPT soundings represent interpretations of field study, and data are attached to this report.

Updated Seismic Design Parameters

It is assumed that the 2019 CBC and ASCE 7-16 guidelines will apply for the seismic design parameters. The 2019 CBC includes several seismic design parameters that are influenced by the geographic site location with respect to active and potentially active faults, and with respect to subsurface soil or rock conditions.

The "general procedure" (i.e., probabilistic) seismic design parameters presented below were retrieved from the U.S. Seismic Design Maps web services using the SEAOC/OSHPD website which presents the data in a report format. The data were retrieved for the ASCE 7-16 design code, site coordinates 34.4161° North Latitude and 119.6879° West Longitude, Soil Site Class E, and Occupancy (Risk) Category II. A listing of the 2019 CBC and ASCE 7-16 Seismic Parameters is presented below and attached to this report.

Summary of Seismic Parameters – 2019 CBC "General Procedure"

Site Class (ASCE 7-16)	E
Occupancy (Risk) Category	II
Seismic Design Category	See ASCE 7-16 Section 11.4.8
Maximum Considered Earthquake (MCE) Ground Motion	
Spectral Response Acceleration, Short Period – S_s	2.195 g
Spectral Response Acceleration at 1 sec. – S_1	0.795 g
Site Coefficient – F_a	See ASCE 7-16 Section 11.4.8
Site Coefficient – F_v	See ASCE 7-16 Section 11.4.8
Site-Modified Spectral Response Acceleration, Short Period – S_{MS}	See ASCE 7-16 Section 11.4.8
Site-Modified Spectral Response Acceleration at 1 sec. – S_{M1}	See ASCE 7-16 Section 11.4.8

Design Earthquake Ground Motion	
Short Period Spectral Response – S_{DS}	See ASCE 7-16 Section 11.4.8
One Second Spectral Response – S_{D1}	See ASCE 7-16 Section 11.4.8
Site Modified Peak Ground Acceleration - PGA_M	1.060 g
Values appropriate for a 2% probability of exceedance in 50 years	

Because the seismic factors S_S is greater than 1.0 g and S_1 is greater than 0.2 g, and the Site Class is E, Exception Nos. 1 and/or 3 of ASCE 7-16 Section 11.4.8 may apply. If the Structural Engineer determines that the exceptions do not apply, a site-specific (i.e., deterministic) ground motion hazard analysis is required and can be performed by Earth Systems upon request.

Updated Earthquake-Induced Hazards

Earthquake-induced cyclic loading can be the cause of several significant phenomena, including liquefaction in fine sands and silty sands. Liquefaction results in a loss of soil strength and can cause structures to settle and, in extreme cases, to experience bearing failure. Cyclic softening in clays during earthquakes has resulted in buildings experiencing foundation failure and ground surface deformation similar to that resultant from liquefaction. If liquefaction or cyclic softening occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Liquefaction and cyclic softening typically are limited to the upper 50 feet of the subsurface soils. There are a number of conditions that need to be satisfied for liquefaction or cyclic softening to occur. Of primary importance is that groundwater, perched or otherwise, usually must be within the upper 50 feet of soils. In order for liquefaction to occur, a potentially liquefiable soil must be saturated and subjected to rapid cyclic loading that is sufficiently intense to overcome a soil's internal resistance to liquefaction.

Another type of ground damage caused by earthquakes is settlement in non-saturated (dry) sands. This occurs when ground motion causes the soil particles to reorient into a denser configuration. We have included analyses of this phenomenon within the same program that analyzes liquefaction.

Earth Systems performed liquefaction and dry sand seismic settlement analyses using the CPT-1 through CPT-5 sounding data and a proprietary program that implements standard accepted analytical methods. In the analyses, a 7.0 moment magnitude earthquake (identical to that used in the referenced report), a PGA_M of 1.060 g (the currently updated 2019 CBC value), and a groundwater depth of 6 feet (identical to that used in the referenced report) were used.

The table below summarizes the predicted earthquake-induced settlements for CPT-1 through CPT-5. The Updated CPT-Based Seismic Settlement Analyses Results are attached to this report.

	Dry Sand Settlement	Liquefaction Settlement	Combined Settlement
CPT-1	0.0	3.0	3.0
CPT-2	0.0	2.4	2.4
CPT-3	0.3	3.3	3.6
CPT-4	0.0	2.6	2.6
CPT-5	0.0	2.8	2.8

These updated settlements appeared to be on the average of about 3 inches, which is considered similar to the 2007 analyses results (see Page 7 of the referenced report).

Based on interpretation of a chart derived by Ishihara (National Academy Press, 1985) and the currently attached CPT-Based Seismic Settlement Analyses Results, the thicknesses of non-liquefiable soils at the surface are sufficiently thick to prevent the potentially liquefiable layers below from generating ground damage.

Lateral spreading can be experienced as two different phenomena: free face lateral spreading and ground oscillation. Free face lateral spreading does not appear to pose a potential hazard because there are no nearby sloped areas or canyons (Bartlett and Youd, 1995).

Ground oscillation, which is the other type of lateral spreading, occurs where sites are gently sloping, but not adjacent to sloped areas or canyons. It can pose a hazard when standard blow counts ($N1_{(60)}$) in the zones of potential liquefaction are less than 15. A ground-oscillation-type of lateral spreading of about 0.5 feet was calculated (Bartlett and Youd 2002). See attached Lateral Spreading Analyses Results. According to SP117A, when lateral spreading is predicted by screening procedures to be less than 0.5 meter (1.6 feet), it may be possible to design the foundation for the movement without complete failure.

Updated Minimum Foundation Requirements Table

The referenced report included a Table 18-1-D that is outdated. A Minimum Foundation Design Table, which is attached to this report, has superseded the previous table and should be used by the project design team.

Updated Grading Recommendations

Grading at a minimum should conform to the 2019 CBC. According to the 2019 CBC Section 1804.4, the ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than 5% for a minimum distance of 10 feet measured perpendicular to the face of the wall.

The proposed basement of the hotel building is expected to be bottomed near or below the groundwater level. Dewatering and sloping or shoring may be necessary during site construction operations to keep the excavation free of excess water and to mitigate caving. Excavation

bottoms at or below the groundwater level may not be firm and there may be a need to stabilize the excavation bottoms to provide a trafficable surface for construction.

Updated Foundation Recommendations

On Page 13 and 14 of the referenced report, post-tension or structural slab foundation recommendations were provided for the 2007-proposed buildings. It is Earth Systems' opinion that those recommendations remain applicable to the currently proposed hotel building. The following additional recommendations should be applied to appropriate conditions when designing.

Because the proposed basement area is anticipated to be submerged in groundwater, a buoyancy force acting upward at the bottom of the floor should be considered. Also, the floors and walls of the basement area should be designed to be water-tight. Based on Page 4 and 5 of the referenced report, although groundwater was encountered at a depth of about 6 feet below the ground surface during the geotechnical exploration in 2007, groundwater can be influenced by tide elevations. Therefore, groundwater should be considered to be at a depth of 6 feet or shallower.

Updated Retaining Wall Backfill Recommendations

Retaining wall backfill recommendations on Page 17 and 18 of the referenced report remain applicable. The following additional recommendations should be applied to appropriate conditions when designing.

For soils that are above groundwater, conventional cantilever retaining walls backfilled with compacted on-site soils may be designed for active pressures developed from 49 pcf of equivalent fluid weight for well-drained, level backfill. Active pressures developed from 58 pcf of equivalent fluid weight may be used for well-drained backfill sloping at 2-horizontal to 1-vertical.

For soils that are above groundwater, restrained retaining walls backfilled with compacted on-site soils may be designed for active pressures developed from 69 pcf of equivalent fluid weight for well-drained, level backfill.

For soils that are below groundwater, restrained retaining walls backfilled with compacted on-site soils may be designed for active pressures developed from 93 pcf of equivalent fluid weight for well-drained, level backfill.

Retaining walls that retain more than 6 feet of soil will need to be designed for a seismic loading force that is applied in addition to the static forces when seismic shaking occurs. Seismic increments of earth pressure can be determined using 34 and 49 pcf of additional equivalent fluid weight need to be considered for cantilever and restrained retaining walls, respectively. These equivalent fluid weights have been determined by a procedure presented by Al Atik and Sitar (2010). The seismic increment of pressure can be assumed to be distributed so that the centroid

of pressure acts at 0.33H above the base of a retaining wall, where H is the wall height in feet. Because this seismic force is transient, and in accordance with CBC Section 1807.2.3, a minimum safety factor of 1.1 may be used for sliding and overturning when seismic loads are included.

Geotechnical Conclusion

Based on review of the data provided in the referenced report and our observations of the current site conditions, it appears that the geotechnical data, conclusions, and recommendations previously provided will remain applicable for the proposed construction, except as modified in this report.

Respectfully submitted,

EARTH SYSTEMS PACIFIC

Meng Wei Lu
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4-19-2022

Reviewed and Approved

4-19-2022

Richard M. Beard
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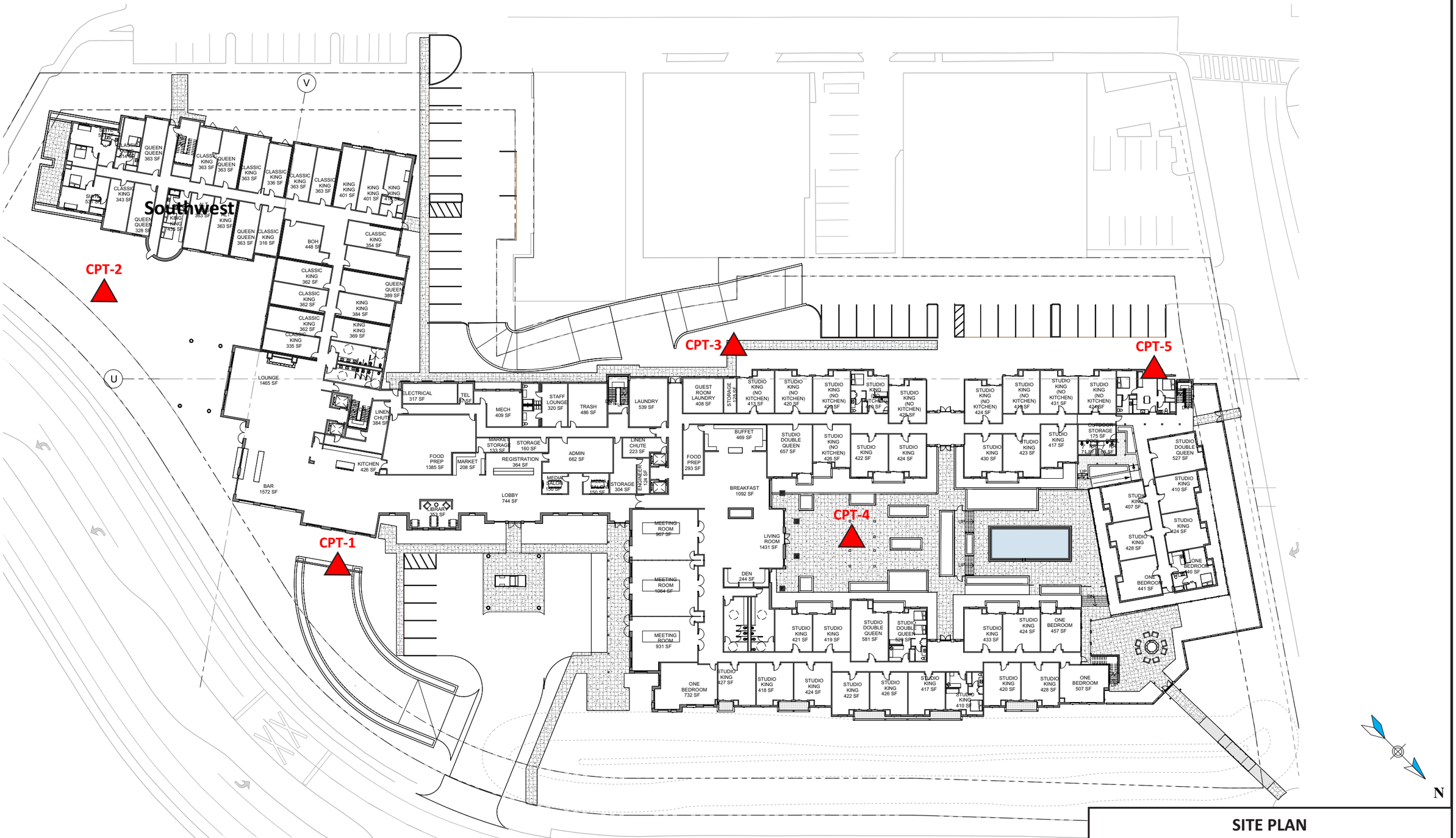
4-19-2022

Attached: Site Plan
Logs of CPT Interpretations and Soundings
Updated Seismic Design Parameters
Updated CPT-Based Seismic Settlement Analyses Results
Lateral Spreading Analyses Results
Minimum Foundation Design Table
Referenced Report

Copies: 1 - Client (email)
1 - Project File



CPT-5 : Approximate Cone Penetrometer Test (CPT) sounding location.

Approximate Scale: 1" = 50’

0 50’ 100’

SITE PLAN

101 Garden Street
Santa Barbara, California

Earth Systems

April 2022	305172-001

Earth Systems Pacific

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	162.51	0.97	Sand	SP	dense	100	5.9	28	0.013	0.013	0.97	0.50	1.70	261.1	1.60	261.1	47	52	100	40		
0.30	1.0	229.79	1.68	Sand to Silty Sand	SP/SM	very dense	100	5.7	41	0.038	0.038	1.68	0.52	1.70	369.2	1.70	384.2	69	77	100	44		
0.46	1.5	130.60	2.88	Silty Sand to Sandy Silt	SM/ML	dense	110	5.0	26	0.064	0.064	2.88	0.62	1.70	209.8	2.03	282.9	44	57	100	39		
0.61	2.0	48.23	4.38	Clayey Silt to Silty Clay	ML/CL	medium dense	110	4.2	11	0.091	0.091	4.39	0.74	1.70	77.5	2.44	193.5	19	39	66	33		
0.76	2.5	50.45	2.79	Sandy Silt to Clayey Silt	ML	medium dense	110	4.5	11	0.119	0.119	2.80	0.69	1.70	81.1	2.28	153.8	19	31	68	33		
0.91	3.0	29.61	3.41	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.1	7	0.148	0.148	3.42	0.76	1.70	47.6	2.51	133.7	12	27	46	31		
1.07	3.5	11.52	4.57	Clay	CL/CH	stiff	120	3.3	3	0.178	0.178	4.64	0.88	1.70	18.5	2.90		3				0.67	19.2
1.22	4.0	19.46	3.53	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.8	5	0.208	0.208	3.57	0.81	1.70	31.3	2.65		5				1.13	27.8
1.37	4.5	19.69	4.13	Silty Clay to Clay	CL	very stiff	120	3.7	5	0.238	0.238	4.18	0.82	1.70	31.6	2.70		5				1.14	24.6
1.52	5.0	7.17	2.63	Silty Clay to Clay	CL	firm	120	3.3	2	0.268	0.268	2.73	0.89	1.70	11.5	2.92		2				0.41	7.7
1.68	5.5	4.56	1.56	Sensitive fine grained	ML	firm	120	3.2	1	0.298	0.298	1.67	0.91	1.70	7.3	2.98		1				0.25	4.3
1.83	6.0	4.03	1.53	Sensitive fine grained	ML	soft	120	3.1	1	0.328	0.328	1.67	0.93	1.70	6.5	3.02		1				0.22	3.4
1.98	6.5	4.01	1.74	Sensitive fine grained	ML	soft	120	3.0	1	0.358	0.342	1.91	0.93	1.70	6.4	3.05		1				0.22	3.2
2.13	7.0	4.74	1.63	Sensitive fine grained	ML	firm	120	3.2	1	0.388	0.356	1.77	0.91	1.70	7.6	2.98		1				0.26	3.7
2.29	7.5	5.83	2.33	Silty Clay to Clay	CL	firm	120	3.2	2	0.418	0.371	2.51	0.91	1.70	9.4	2.98		2				0.32	4.4
2.44	8.0	11.91	1.79	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.8	3	0.448	0.385	1.86	0.81	1.70	19.1	2.65		3				0.68	8.9
2.59	8.5	17.47	1.47	Sandy Silt to Clayey Silt	ML	loose	120	4.2	4	0.478	0.400	1.51	0.75	1.70	28.1	2.46	72.0	7	14	24	29		
2.74	9.0	22.90	1.56	Sandy Silt to Clayey Silt	ML	loose	120	4.3	5	0.508	0.414	1.59	0.72	1.70	36.8	2.38	81.7	8	16	35	29		
2.90	9.5	15.28	1.75	Sandy Silt to Clayey Silt	ML	loose	120	4.0	4	0.538	0.428	1.82	0.78	1.70	24.5	2.55	74.8	6	15	19	28		
3.05	10.0	29.07	1.04	Silty Sand to Sandy Silt	SM/ML	loose	120	4.7	6	0.568	0.443	1.06	0.67	1.70	46.7	2.19	76.7	9	15	45	30		
3.20	10.5	9.08	2.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.5	3	0.598	0.457	2.30	0.85	1.70	14.6	2.80		3				0.51	5.6
3.35	11.0	4.94	2.16	Silty Clay to Clay	CL	firm	120	3.1	2	0.628	0.472	2.48	0.93	1.70	7.9	3.04		2				0.26	2.7
3.51	11.5	5.79	2.42	Silty Clay to Clay	CL	firm	120	3.1	2	0.658	0.486	2.73	0.92	1.70	9.3	3.00		2				0.31	3.2
3.66	12.0	45.10	0.58	Sand to Silty Sand	SP/SM	medium dense	120	5.2	9	0.688	0.500	0.59	0.59	1.55	66.2	1.92	80.3	12	16	60	31		
3.81	12.5	49.82	0.91	Silty Sand to Sandy Silt	SM/ML	medium dense	120	5.1	10	0.718	0.515	0.92	0.61	1.55	73.0	2.00	94.5	14	19	64	31		
3.96	13.0	22.98	1.59	Sandy Silt to Clayey Silt	ML	loose	120	4.3	5	0.748	0.529	1.65	0.73	1.66	36.0	2.39	82.2	7	16	34	29		
4.11	13.5	22.00	3.21	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	6	0.778	0.544	3.33	0.79	1.69	35.2	2.60	116.1	8	23	33	29		
4.27	14.0	20.17	2.44	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	5	0.808	0.558	2.54	0.78	1.65	31.4	2.56	96.3	7	19	29	29		
4.42	14.5	16.44	2.68	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.8	4	0.838	0.572	2.82	0.81	1.64	25.5	2.65		4				0.93	8.2
4.57	15.0	38.86	1.87	Sandy Silt to Clayey Silt	ML	medium dense	120	4.5	9	0.868	0.587	1.91	0.70	1.51	55.4	2.29	105.7	11	21	52	30		
4.72	15.5	32.00	1.61	Sandy Silt to Clayey Silt	ML	loose	120	4.5	7	0.898	0.601	1.66	0.71	1.49	45.1	2.32	90.4	9	18	44	30		
4.88	16.0	26.29	2.59	Sandy Silt to Clayey Silt	ML	loose	120	4.1	6	0.928	0.616	2.68	0.76	1.51	37.6	2.51	106.3	8	21	36	29		
5.03	16.5	8.98	3.21	Silty Clay to Clay	CL	firm	120	3.3	3	0.958	0.630	3.59	0.90	1.59	13.5	2.94		3				0.49	3.8
5.18	17.0	8.00	2.93	Silty Clay to Clay	CL	firm	120	3.2	3	0.988	0.644	3.34	0.91	1.57	11.8	2.96		3				0.43	3.3
5.33	17.5	8.16	2.91	Silty Clay to Clay	CL	firm	120	3.2	3	1.018	0.659	3.33	0.91	1.54	11.8	2.96		3				0.44	3.3
5.49	18.0	15.79	2.10	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.8	4	1.048	0.673	2.25	0.81	1.44	21.5	2.65		4				0.89	6.6
5.64	18.5	24.69	2.51	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	6	1.078	0.688	2.63	0.78	1.40	32.6	2.55	99.5	7	20	30	29		
5.79	19.0	13.16	2.90	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.5	4	1.108	0.702	3.17	0.86	1.42	17.7	2.81		4				0.73	5.1
5.94	19.5	9.59	2.29	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	3	1.138	0.716	2.60	0.88	1.41	12.8	2.87		3				0.52	3.5
6.10	20.0	7.26	1.82	Clayey Silt to Silty Clay	ML/CL	firm	120	3.3	2	1.168	0.731	2.17	0.90	1.40	9.6	2.93		2				0.38	2.5
6.25	20.5	6.96	2.04	Silty Clay to Clay	CL	firm	120	3.2	2	1.198	0.745	2.46	0.92	1.38	9.1	2.98		2				0.37	2.3
6.40	21.0	11.62	2.67	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	3	1.228	0.760	2.98	0.87	1.34	14.7	2.86		3				0.64	4.1
6.55	21.5	80.68	0.70	Sand to Silty Sand	SP/SM	medium dense	120	5.4	15	1.258	0.774	0.71	0.57	1.19	91.0	1.85	104.4	17	21	73	32		
6.71	22.0	67.96	1.15	Sand to Silty Sand	SP/SM	medium dense	120	5.0	14	1.288	0.788	1.18	0.62	1.20	77.1	2.04	104.9	15	21	66	32		
6.86	22.5	46.76	1.06	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	10	1.318	0.803	1.09	0.66	1.20	53.0	2.15	82.5	11	16	50	30		
7.01	23.0	22.14	2.18	Sandy Silt to Clayey Silt	ML	loose	120	3.9	6	1.348	0.817	2.32	0.79	1.23	25.7	2.60	85.4	6	17	20	29		
7.16	23.5	13.37	2.02	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	4	1.378	0.832	2.25	0.85	1.23	15.5	2.77		4				0.74	4.3
7.32	24.0	9.74	2.37	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.3	3	1.408	0.846	2.77	0.90	1.22	11.3	2.93		3				0.52	3.0
7.47	24.5	10.13	2.03	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.3	3	1.438	0.860	2.36	0.88	1.20	11.5	2.89		3				0.55	3.0
7.62	25.0	7.73	1.66	Clayey Silt to Silty Clay	ML/CL	firm	120	3.2	2	1.468	0.875	2.05	0.91	1.19	8.7	2.96		2				0.40	2.1
7.77	25.5	9.28	2.10	Clayey Silt to Silty Clay	ML/CL	firm	120	3.2	3	1.498	0.889	2.51	0.90	1.17	10.3	2.94		3				0.49	2.6
7.92	26.0	59.85	0.89	Sand to Silty Sand	SP/SM	medium dense	120	5.0	12	1.528	0.904	0.91	0.62	1.10	62.4	2.05	85.4	13	17	57	31		
8.08	26.5	54.40	1.51	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	12	1.558	0.918	1.56	0.68	1.10	56.6	2.22	97.7	12	20	53	31		
8.23	27.0	44.36	1.44	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	10	1.588	0.932	1.49	0.70	1.09	45.8	2.28	86.8	10	17	44	30		
8.38	27.5	34.51	1.39	Silty Sand to Sandy Silt	SM/ML	loose	120	4.4	8	1.618	0.947	1.46	0.72	1.08	35.3	2.37	77.4	8	15	34	29		
8.53	28.0	12.64	2.22	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	4	1.648	0.961	2.56	0.88	1.09	13.0	2.86		4				0.69	3.4
8.69	28.5	21.08	2.74	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.7	6	1.678	0.976	2.98	0.83	1.07	21.3	2.73		6				1.18	6.0
8.84	29.0	41.22	2.65	Sandy Silt to Clayey Silt	ML	medium dense	120	4.1	10	1.708	0.990	2.77	0.76	1.05	41.0	2.49	111.9	10	22	40	30		
8.99	29.5	85.39	1.96	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	18	1.738	1.004	2.00	0.66	1.03	83.5	2.17	133.5	18	27	69	33		
9.14	30.0	50.64	1.53	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	11	1.768	1.019	1.59	0.69	1.03	49.1	2.28	92.1	11	18	47	30		
9.30	30.5	24.75	1.96	Sandy Silt to Clayey Silt	ML	very stiff	120	3.9	6	1.798	1.033	2.11	0.79	1.02	23.8	2.60		6				1.39	6.7
9.45	31.0	23.27	1.76	Sandy Silt to Clayey Silt	ML	very stiff	120	3.9	6	1.828	1.048	1.91	0.79	1.01	22.2	2.60		6				1.31	6.1
9.60	31.5	33.30	2.28	Sandy Silt to Clayey Silt	ML	loose	120	4.0	8	1.858	1.062	2.42	0.77	1.00	31.4	2.54	93.9	8	19	29	29		
9.75	32.0	80.40	1.61	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	17	1.888	1.076	1.65	0.65	0.99	75.1	2.15	116.0	16	23	65	32		
9.91	32.5	97.45	1.03	Sand to Silty Sand	SP/SM	medium dense	120	5.2	19	1.918	1.091	1.05	0.60	0.98	90.5	1.96	112.8	18	23	73	33		
10.06	33.0	89.50	1.14	Sand to Silty Sand	SP/SM	medium dense	120	5.0	18	1.948	1.105	1.16	0.61	0.97	82.4	2.02	108.9	17	22	69	32		
10.21	33.5	61.73	1.97	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	14	1.978	1.120	2.03	0.70	0.96	56.1	2.30	109.5	13	22	53	31		
10.36	34.0	113.73	1.11	Sand to Silty Sand	SP/SM	medium dense	120	5.2	22	2.008	1.134	1.13	0.59	0.96	103.2	1.93	126.1	20	25	78	33		
10.52	34.5	128.19	0.97	Sand	SP	medium dense	120	5.4	24	2.038	1.148	0.99	0.57	0.95	115.7	1.86	133.3	22	27	83	34		
10.67	35.0	121.13	0.97	Sand to Silty Sand	SP/SM	medium dense	120	5.3	23	2.068	1.163	0.99	0.57	0.95	108.5	1.88	126.9	21	25	80	34		
10.82	35.5	61.65	2.78	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	14	2.098	1.177	2.87	0.73	0.92	53.9	2.42	128.3	13	26	51	31		
10.97	36.0	116.77	0.96	Sand to Silty Sand	SP/SM	medium dense	120	5.3	22	2.128	1.192	0.98	0.58	0.93	103.0	1.89	122.0	20	24	78	33		
11.13	36.5	130.89	0.84	Sand	SP	medium dense	120	5.4	24	2.158	1.206	0.85	0.55	0.93	115.0	1.82	129.0	22	26	83	34		
11.28	37.0	143.09	0.78	Sand	SP	medium dense	120	5.5	26	2.188	1.220	0.79	0.54	0.93	125.2	1.77	135.8	23	27	86	34		

Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

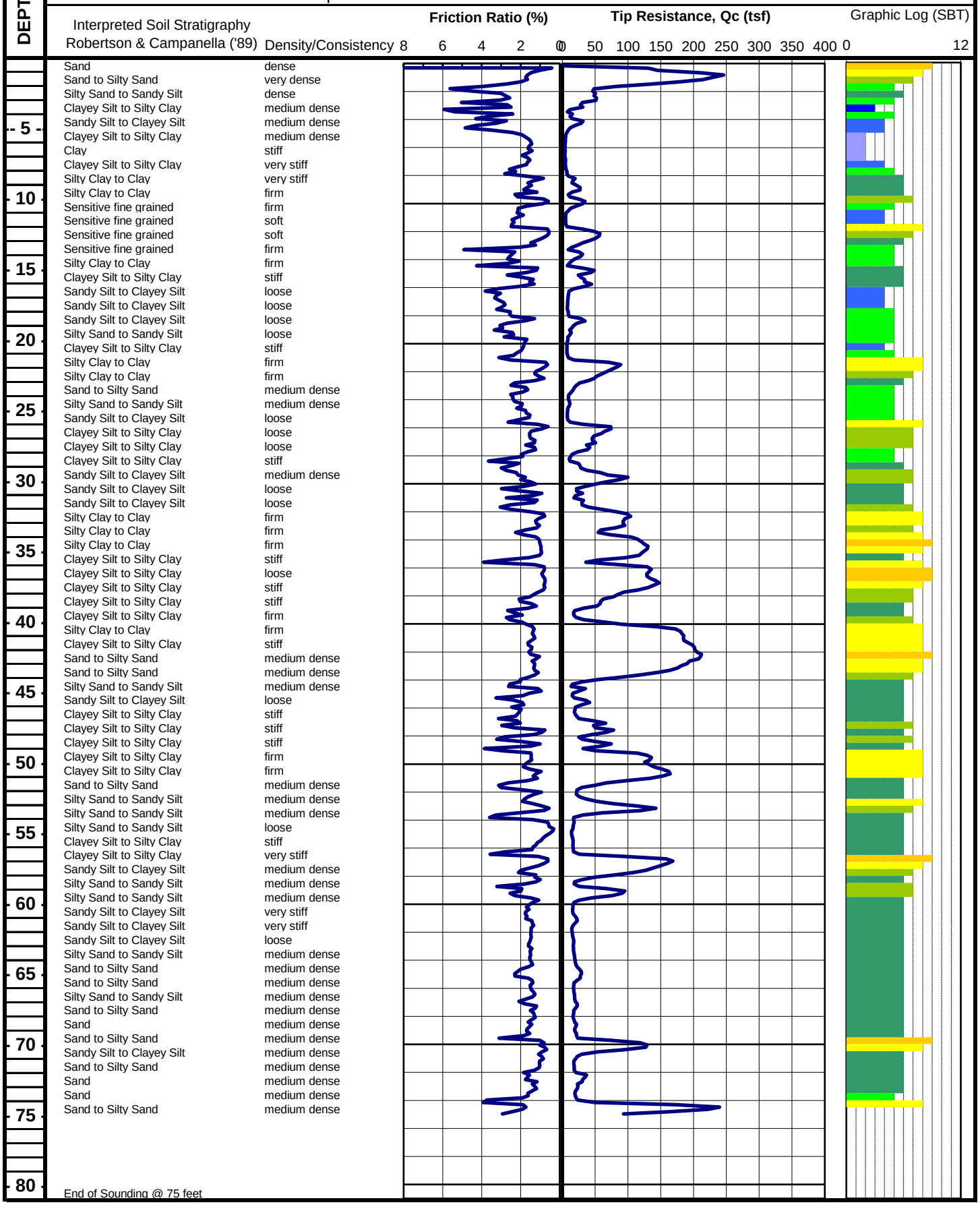
Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
11.43	37.5	113.31	0.89	Sand to Silty Sand	SP/SM	medium dense	120	5.3	21	2.218	1.235	0.91	0.58	0.91	98.0	1.89	115.6	19	23	76	33		
11.58	38.0	74.89	1.64	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	16	2.248	1.249	1.69	0.67	0.89	63.3	2.21	106.8	14	21	58	31		
11.73	38.5	56.16	1.56	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	12	2.278	1.264	1.62	0.70	0.88	46.9	2.30	91.1	11	18	45	30		
11.89	39.0	22.65	2.21	Sandy Silt to Clayey Silt	ML	very stiff	120	3.7	6	2.308	1.278	2.46	0.83	0.85	18.3	2.73		6				1.26	4.8
12.04	39.5	23.69	2.41	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	7	2.338	1.292	2.67	0.84	0.85	18.9	2.74		7				1.32	5.0
12.19	40.0	99.90	1.68	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	21	2.368	1.307	1.72	0.65	0.87	82.3	2.13	124.3	18	25	69	33		
12.34	40.5	178.04	1.35	Sand to Silty Sand	SP/SM	medium dense	120	5.3	33	2.398	1.321	1.37	0.57	0.88	148.2	1.88	173.4	29	35	93	36		
12.50	41.0	184.88	1.35	Sand to Silty Sand	SP/SM	medium dense	120	5.3	35	2.428	1.336	1.37	0.57	0.88	153.0	1.87	177.5	30	36	94	36		
12.65	41.5	197.20	1.55	Sand to Silty Sand	SP/SM	dense	120	5.3	37	2.458	1.350	1.57	0.58	0.87	161.9	1.90	191.9	32	38	97	37		
12.80	42.0	206.18	1.51	Sand to Silty Sand	SP/SM	dense	120	5.3	39	2.488	1.364	1.53	0.57	0.86	168.5	1.87	196.5	33	39	98	37		
12.95	42.5	203.89	1.22	Sand	SP	dense	120	5.5	37	2.518	1.379	1.23	0.55	0.86	166.5	1.81	185.5	32	37	98	37		
13.11	43.0	182.48	1.30	Sand to Silty Sand	SP/SM	medium dense	120	5.3	34	2.548	1.393	1.32	0.57	0.85	147.5	1.87	171.1	29	34	93	36		
13.26	43.5	142.20	1.22	Sand to Silty Sand	SP/SM	medium dense	120	5.2	27	2.578	1.408	1.24	0.59	0.85	113.6	1.93	138.5	23	28	82	34		
13.41	44.0	58.44	1.87	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.4	13	2.608	1.422	1.96	0.72	0.81	44.6	2.37	97.4	11	19	43	30		
13.56	44.5	21.35	2.10	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	6	2.638	1.436	2.39	0.85	0.77	15.6	2.78		6				1.17	3.9
13.72	45.0	18.86	1.47	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	5	2.668	1.451	1.71	0.84	0.77	13.7	2.75		5				1.02	3.3
13.87	45.5	31.77	2.52	Sandy Silt to Clayey Silt	ML	very stiff	120	3.7	8	2.698	1.465	2.76	0.82	0.77	23.0	2.68		8				1.78	6.0
14.02	46.0	23.14	2.09	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	6	2.728	1.480	2.37	0.84	0.75	16.5	2.76		6				1.27	4.1
14.17	46.5	19.90	2.16	Sandy Silt to Clayey Silt	ML	very stiff	120	3.5	6	2.758	1.494	2.50	0.87	0.74	13.9	2.83		6				1.08	3.4
14.33	47.0	46.98	2.58	Sandy Silt to Clayey Silt	ML	loose	120	4.0	12	2.788	1.508	2.74	0.78	0.76	33.7	2.55	102.9	10	21	32	30		
14.48	47.5	64.79	1.33	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	14	2.818	1.523	1.39	0.69	0.78	47.7	2.25	86.0	11	17	46	30		
14.63	48.0	33.31	2.47	Sandy Silt to Clayey Silt	ML	very stiff	120	3.8	9	2.848	1.537	2.70	0.82	0.74	23.2	2.67		9				1.87	5.9
14.78	48.5	61.63	1.50	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	14	2.878	1.552	1.57	0.70	0.76	44.5	2.31	87.8	11	18	43	30		
14.94	49.0	65.42	2.77	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	16	2.908	1.566	2.90	0.75	0.74	46.1	2.47	120.4	13	24	45	31		
15.09	49.5	132.78	1.45	Sand to Silty Sand	SP/SM	medium dense	120	5.0	26	2.938	1.580	1.48	0.62	0.78	97.9	2.03	131.4	21	26	76	34		
15.24	50.0	132.44	1.76	Sand to Silty Sand	SP/SM	medium dense	120	4.9	27	2.967	1.595	1.80	0.64	0.77	96.4	2.09	139.1	21	28	75	34		

Earth Systems
Pacific

CPT No : CPT-1
Project Name: 101 Garden Street
Project No.: 305172-001
Location: See Site Exploration Plan

Cone Penetrometer: **Kehoe Testing & Engineering**
Truck Mounted Electric Cone
with 23-ton reaction weight
Date: 2/22/2022



Earth Systems Pacific

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-2 Plot: 2 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	295.84	0.45	Gravelly Sand to Sand	SW	very dense	110	6.7	44	0.014	0.014	0.45	0.50	1.70	475.4	1.18	475.4	75	95	100	45		
0.30	1.0	371.42	1.27	Sand	SP	very dense	100	6.1	61	0.040	0.040	1.27	0.50	1.70	596.8	1.49	596.8	104	119	100	48		
0.46	1.5	362.45	1.15	Sand	SP	very dense	100	6.1	59	0.065	0.065	1.15	0.50	1.70	582.4	1.46	582.4	100	116	100	47		
0.61	2.0	263.49	1.85	Sand to Silty Sand	SP/SM	very dense	100	5.7	47	0.090	0.090	1.85	0.52	1.70	423.4	1.71	442.0	79	88	100	45		
0.76	2.5	96.44	2.95	Sandy Silt to Clayey Silt	ML	dense	110	4.8	20	0.116	0.116	2.95	0.64	1.70	155.0	2.12	231.3	34	46	95	37		
0.91	3.0	37.85	3.87	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.2	9	0.145	0.145	3.89	0.75	1.70	60.8	2.47	160.4	15	32	56	32		
1.07	3.5	32.44	2.15	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	7	0.175	0.175	2.16	0.71	1.70	52.1	2.34	109.3	13	22	50	31		
1.22	4.0	27.85	1.36	Sandy Silt to Clayey Silt	ML	medium dense	120	4.6	6	0.205	0.205	1.37	0.69	1.70	44.7	2.27	83.0	10	17	43	30		
1.37	4.5	19.39	2.59	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	5	0.235	0.235	2.62	0.78	1.70	31.2	2.57	97.5	8	20	28	29		
1.52	5.0	9.05	3.43	Clay	CL/CH	stiff	120	3.3	3	0.265	0.265	3.53	0.88	1.70	14.5	2.91		3				0.52	9.9
1.68	5.5	10.89	2.93	Silty Clay to Clay	CL	stiff	120	3.5	3	0.295	0.295	3.01	0.85	1.70	17.5	2.80		3				0.62	10.8
1.83	6.0	8.96	2.17	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.5	3	0.325	0.325	2.25	0.85	1.70	14.4	2.80		3				0.51	8.0
1.98	6.5	7.89	2.35	Silty Clay to Clay	CL	firm	120	3.4	2	0.355	0.339	2.46	0.87	1.70	12.7	2.86		2				0.44	6.7
2.13	7.0	9.81	3.01	Silty Clay to Clay	CL	stiff	120	3.4	3	0.385	0.354	3.13	0.87	1.70	15.8	2.85		3				0.56	8.0
2.29	7.5	5.78	1.99	Silty Clay to Clay	CL	firm	120	3.2	2	0.415	0.368	2.15	0.90	1.70	9.3	2.94		2				0.32	4.4
2.44	8.0	4.09	1.36	Sensitive fine grained	ML	soft	120	3.1	1	0.445	0.383	1.53	0.92	1.70	6.6	3.00		1				0.22	2.9
2.59	8.5	5.53	2.49	Silty Clay to Clay	CL	firm	120	3.1	2	0.475	0.397	2.72	0.92	1.70	8.9	3.02		2				0.30	3.8
2.74	9.0	19.89	1.71	Sandy Silt to Clayey Silt	ML	loose	120	4.2	5	0.505	0.411	1.75	0.75	1.70	32.0	2.45	80.9	7	16	30	29		
2.90	9.5	29.03	1.53	Sandy Silt to Clayey Silt	ML	loose	120	4.5	6	0.535	0.426	1.56	0.70	1.70	46.6	2.29	89.2	10	18	45	30		
3.05	10.0	48.36	1.21	Silty Sand to Sandy Silt	SM/ML	medium dense	120	5.0	10	0.565	0.440	1.22	0.62	1.70	77.7	2.05	106.5	15	21	66	32		
3.20	10.5	59.61	0.85	Sand to Silty Sand	SP/SM	medium dense	120	5.3	11	0.595	0.455	0.86	0.58	1.63	91.8	1.90	108.9	17	22	73	32		
3.35	11.0	55.59	0.99	Silty Sand to Sandy Silt	SM/ML	medium dense	120	5.2	11	0.625	0.469	1.00	0.60	1.63	85.5	1.96	107.3	16	21	70	32		
3.51	11.5	57.05	0.71	Sand to Silty Sand	SP/SM	medium dense	120	5.3	11	0.655	0.483	0.72	0.57	1.57	84.5	1.88	99.0	15	20	70	32		
3.66	12.0	50.56	0.54	Sand to Silty Sand	SP/SM	medium dense	120	5.3	9	0.685	0.498	0.55	0.57	1.54	73.5	1.87	85.2	13	17	64	31		
3.81	12.5	14.73	2.05	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.9	4	0.715	0.512	2.16	0.79	1.70	23.7	2.61		4				0.84	8.2
3.96	13.0	5.10	2.13	Silty Clay to Clay	CL	firm	120	3.1	2	0.745	0.527	2.50	0.93	1.70	8.2	3.03		2				0.27	2.5
4.11	13.5	5.96	3.85	Clay	CL/CH	firm	120	2.9	2	0.775	0.541	4.43	0.95	1.70	9.6	3.11		2				0.32	2.9
4.27	14.0	37.63	0.82	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.9	8	0.805	0.555	0.83	0.64	1.51	53.5	2.08	76.2	10	15	51	30		
4.42	14.5	28.28	2.23	Sandy Silt to Clayey Silt	ML	loose	120	4.2	7	0.835	0.570	2.30	0.74	1.58	42.2	2.43	102.9	9	21	41	30		
4.57	15.0	9.52	3.07	Silty Clay to Clay	CL	stiff	120	3.4	3	0.865	0.584	3.37	0.88	1.69	15.2	2.88		3				0.53	4.4
4.72	15.5	13.24	3.65	Silty Clay to Clay	CL	stiff	120	3.5	4	0.895	0.599	3.91	0.86	1.63	20.4	2.82		4				0.74	6.2
4.88	16.0	43.32	1.11	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	9	0.925	0.613	1.13	0.65	1.42	58.3	2.13	87.9	11	18	54	30		
5.03	16.5	36.46	1.45	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	8	0.955	0.627	1.49	0.69	1.43	49.4	2.26	89.8	10	18	48	30		
5.18	17.0	48.93	1.05	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.9	10	0.985	0.642	1.07	0.64	1.37	63.5	2.08	90.6	12	18	58	31		
5.33	17.5	52.99	0.68	Sand to Silty Sand	SP/SM	medium dense	120	5.2	10	1.015	0.656	0.70	0.60	1.33	66.7	1.96	83.4	13	17	60	31		
5.49	18.0	15.40	2.44	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	4	1.045	0.671	2.62	0.82	1.46	21.2	2.70		4				0.87	6.4
5.64	18.5	6.73	2.68	Silty Clay to Clay	CL	firm	120	3.1	2	1.075	0.685	3.18	0.93	1.50	9.5	3.03		2				0.36	2.5
5.79	19.0	6.18	2.18	Silty Clay to Clay	CL	firm	120	3.1	2	1.105	0.699	2.65	0.93	1.47	8.6	3.02		2				0.32	2.2
5.94	19.5	6.01	2.29	Silty Clay to Clay	CL	firm	120	3.0	2	1.135	0.714	2.82	0.94	1.45	8.2	3.05		2				0.31	2.0
6.10	20.0	7.76	2.06	Clayey Silt to Silty Clay	ML/CL	firm	120	3.3	2	1.165	0.728	2.42	0.90	1.40	10.3	2.94		2				0.41	2.7
6.25	20.5	13.90	2.27	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	4	1.195	0.743	2.48	0.84	1.35	17.7	2.75		4				0.77	5.1
6.40	21.0	9.57	2.20	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	3	1.225	0.757	2.52	0.88	1.34	12.1	2.88		3				0.52	3.3
6.55	21.5	7.85	1.80	Clayey Silt to Silty Clay	ML/CL	firm	120	3.3	2	1.255	0.771	2.14	0.90	1.33	9.9	2.92		2				0.42	2.6
6.71	22.0	6.78	1.81	Silty Clay to Clay	CL	firm	120	3.1	2	1.285	0.786	2.23	0.92	1.31	8.4	2.99		2				0.35	2.1
6.86	22.5	6.55	2.06	Silty Clay to Clay	CL	firm	120	3.0	2	1.315	0.800	2.58	0.93	1.30	8.0	3.04		2				0.34	2.0
7.01	23.0	6.81	2.33	Silty Clay to Clay	CL	firm	120	3.0	2	1.345	0.815	2.90	0.94	1.28	8.2	3.06		2				0.35	2.0
7.16	23.5	12.17	1.77	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	3	1.375	0.829	2.00	0.85	1.23	14.1	2.77		3				0.67	3.9
7.32	24.0	14.33	2.94	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	4	1.405	0.843	3.26	0.87	1.22	16.5	2.84		4				0.79	4.6
7.47	24.5	42.04	0.97	Silty Sand to Sandy Silt	SM/ML	loose	120	4.7	9	1.435	0.858	1.00	0.67	1.15	45.7	2.18	74.4	10	15	44	30		
7.62	25.0	13.82	2.75	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	4	1.465	0.872	3.08	0.87	1.18	15.5	2.85		4				0.76	4.3
7.77	25.5	9.97	2.65	Silty Clay to Clay	CL	stiff	120	3.2	3	1.495	0.887	3.12	0.91	1.17	11.1	2.97		3				0.53	2.9
7.92	26.0	9.25	2.19	Clayey Silt to Silty Clay	ML/CL	firm	120	3.2	3	1.525	0.901	2.63	0.91	1.16	10.1	2.96		3				0.49	2.6
8.08	26.5	8.15	2.28	Silty Clay to Clay	CL	firm	120	3.1	3	1.555	0.915	2.82	0.93	1.14	8.8	3.03		3				0.43	2.2
8.23	27.0	11.74	2.04	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	3	1.585	0.930	2.36	0.88	1.12	12.4	2.86		3				0.64	3.3
8.38	27.5	11.24	2.80	Silty Clay to Clay	CL	stiff	120	3.2	4	1.615	0.944	3.27	0.91	1.11	11.8	2.96		4				0.61	3.1
8.53	28.0	63.82	1.12	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.9	13	1.645	0.959	1.15	0.64	1.07	64.3	2.10	93.4	13	19	58	31		
8.69	28.5	76.46	1.11	Sand to Silty Sand	SP/SM	medium dense	120	5.0	15	1.675	0.973	1.14	0.62	1.05	76.1	2.04	102.9	15	21	66	32		
8.84	29.0	29.83	2.76	Sandy Silt to Clayey Silt	ML	very stiff	120	3.9	8	1.705	0.987	2.93	0.80	1.06	29.8	2.61		8				1.70	8.5
8.99	29.5	27.65	2.11	Sandy Silt to Clayey Silt	ML	loose	120	4.0	7	1.735	1.002	2.26	0.78	1.04	27.3	2.57	86.1	7	17	23	29		
9.14	30.0	12.60	1.44	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	4	1.765	1.016	1.67	0.85	1.03	12.3	2.78		4				0.68	3.2
9.30	30.5	9.30	1.97	Clayey Silt to Silty Clay	ML/CL	firm	120	3.2	3	1.795	1.031	2.45	0.92	1.02	9.0	2.99		3				0.49	2.2
9.45	31.0	11.24	3.45	Silty Clay to Clay	CL	stiff	120	3.0	4	1.825	1.045	4.12	0.93	1.01	10.7	3.05		4				0.60	2.7
9.60	31.5	51.07	1.61	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	11	1.855	1.059	1.67	0.70	1.00	48.2	2.30	93.5	11	19	47	30		
9.75	32.0	59.25	1.62	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	13	1.885	1.074	1.67	0.68	0.99	55.4	2.25	99.6	12	20	52	31		
9.91	32.5	49.84	2.95	Sandy Silt to Clayey Silt	ML	medium dense	120	4.1	12	1.915	1.088	3.07	0.76	0.98	46.1	2.49	124.3	12	25	45	31		
10.06	33.0	37.61	2.84	Sandy Silt to Clayey Silt	ML	loose	120	4.0	9	1.945	1.103	2.99	0.78	0.97	34.4	2.57	108.7	9	22	33	30		
10.21	33.5	34.18	1.99	Sandy Silt to Clayey Silt	ML	loose	120	4.1	8	1.975	1.117	2.12	0.76	0.96	31.0	2.51	87.5	8	18	28	29		
10.36	34.0	27.64	2.15	Sandy Silt to Clayey Silt	ML	very stiff	120	3.9	7	2.005	1.131	2.32	0.80	0.95	24.8	2.61		7				1.56	6.8
10.52	34.5	102.99	1.24	Sand to Silty Sand	SP/SM	medium dense	120	5.1	20	2.035	1.146	1.27	0.61	0.95	92.7	2.00	120.7	19	24	74	33		
10.67	35.0	102.44	1.08	Sand to Silty Sand	SP/SM	medium dense	120	5.2	20	2.065	1.160	1.10	0.60	0.95	91.6	1.97	115.2	18	23	73	33		
10.82	35.5	41.60	1.40	Silty Sand to Sandy Silt	SM/ML	loose	120	4.4	10	2.095	1.175	1.48	0.72	0.93	36.5	2.36	78.7	9	16	35	30		
10.97	36.0	31.94	1.72	Sandy Silt to Clayey Silt	ML	loose	120	4.1	8	2.125	1.189	1.84	0.77	0.91	27.6	2.51	78.4	7	16	23	29		
11.13	36.5	81.97	0.93	Sand to Silty Sand	SP/SM	medium dense	120	5.1	16	2.155	1.203	0.96	0.61	0.92	71.6	2.01	94.3	15	19	63	32		
11.28	37.0	111.81	0.84	Sand to Silty Sand	SP/SM	medium dense	120	5.3	21	2.185	1.218	0.86	0.57	0.92	97.5	1.88	113.9	19	23	76	33		

Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-2 Plot: 2 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

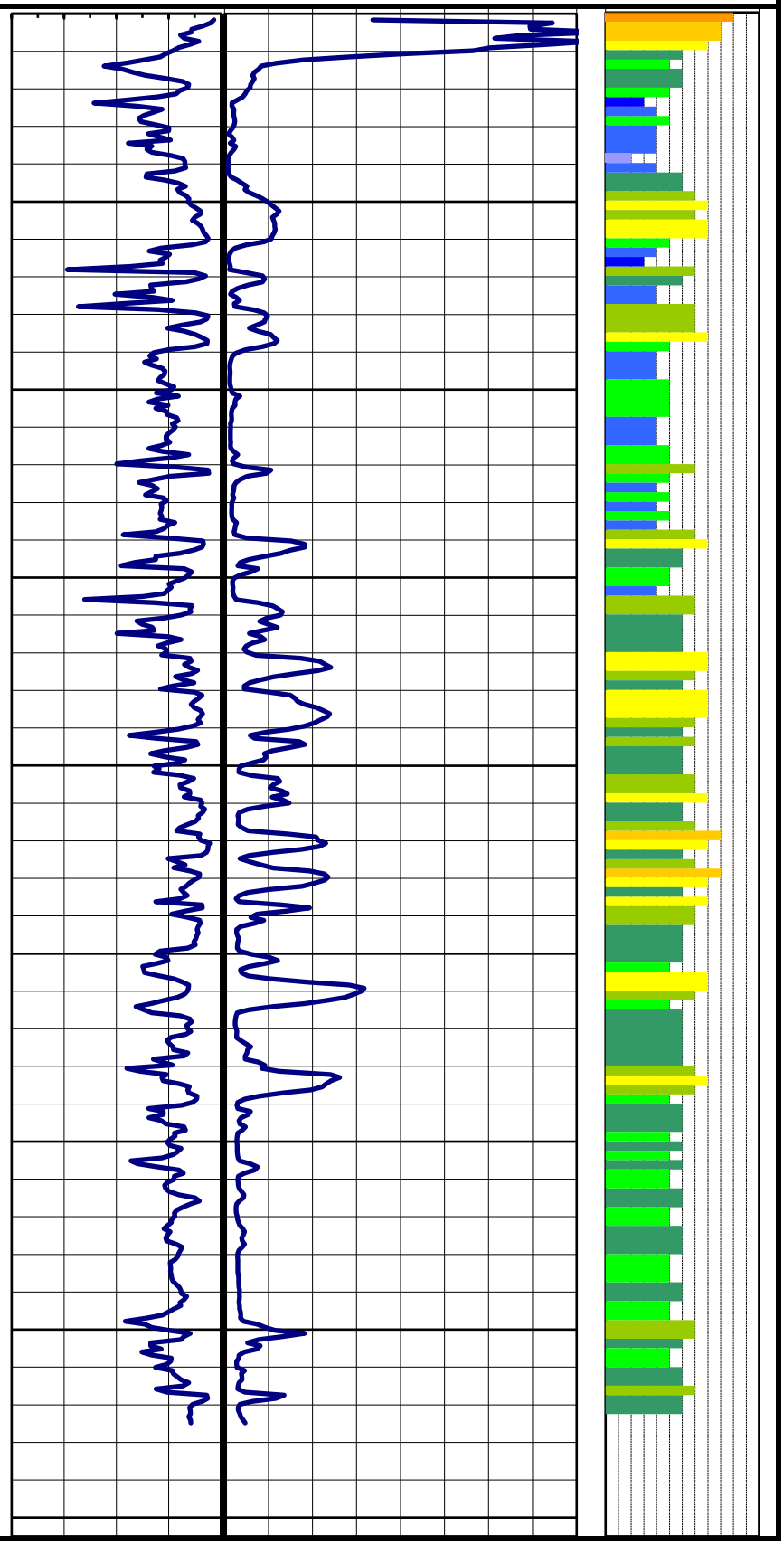
Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	Nk: 17 OCR
11.43	37.5	109.06	0.82	Sand to Silty Sand	SP/SM	medium dense	120	5.3	21	2.215	1.232	0.83	0.57	0.92	94.5	1.88	110.6	18	22	74	33		
11.58	38.0	70.76	1.72	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	15	2.245	1.247	1.77	0.68	0.89	59.8	2.24	106.1	14	21	55	31		
11.73	38.5	49.41	2.32	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	12	2.275	1.261	2.43	0.75	0.88	41.0	2.46	104.5	10	21	40	30		
11.89	39.0	72.80	1.46	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	15	2.305	1.275	1.51	0.67	0.88	60.7	2.19	99.8	14	20	56	31		
12.04	39.5	45.53	2.07	Sandy Silt to Clayey Silt	ML	loose	120	4.2	11	2.335	1.290	2.18	0.75	0.86	37.1	2.46	95.1	10	19	36	30		
12.19	40.0	21.53	2.18	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	6	2.365	1.304	2.45	0.84	0.84	17.1	2.76		6				1.19	4.4
12.34	40.5	35.76	1.73	Sandy Silt to Clayey Silt	ML	loose	120	4.1	9	2.395	1.319	1.85	0.76	0.85	28.6	2.50	79.7	8	16	25	29		
12.50	41.0	56.39	1.45	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	12	2.425	1.333	1.52	0.70	0.85	45.4	2.29	87.1	11	17	44	30		
12.65	41.5	63.41	1.26	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	14	2.455	1.347	1.31	0.67	0.85	50.9	2.21	86.6	12	17	49	31		
12.80	42.0	61.91	0.76	Sand to Silty Sand	SP/SM	medium dense	120	4.9	13	2.485	1.362	0.79	0.64	0.85	49.8	2.10	72.1	11	14	48	30		
12.95	42.5	19.51	0.73	Sandy Silt to Clayey Silt	ML	loose	120	4.0	5	2.515	1.376	0.84	0.79	0.81	15.0	2.56	46.6	4	9	-2	28		
13.11	43.0	15.59	1.05	Sandy Silt to Clayey Silt	ML	stiff	120	3.6	4	2.545	1.391	1.25	0.84	0.79	11.7	2.74		4				0.84	2.8
13.26	43.5	39.62	1.36	Silty Sand to Sandy Silt	SM/ML	loose	120	4.3	9	2.575	1.405	1.45	0.74	0.81	30.4	2.42	72.9	8	15	27	29		
13.41	44.0	108.44	0.69	Sand	SP	medium dense	120	5.3	20	2.605	1.419	0.71	0.57	0.85	86.7	1.87	100.6	17	20	71	32		
13.56	44.5	83.31	0.51	Sand to Silty Sand	SP/SM	medium dense	120	5.3	16	2.635	1.434	0.53	0.58	0.84	66.0	1.90	78.6	13	16	60	31		
13.72	45.0	24.48	1.48	Sandy Silt to Clayey Silt	ML	very stiff	120	3.8	6	2.665	1.448	1.66	0.81	0.78	18.0	2.64		6				1.35	4.5
13.87	45.5	64.15	1.45	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	14	2.695	1.463	1.52	0.69	0.80	48.5	2.27	89.8	12	18	47	31		
14.02	46.0	114.82	0.90	Sand	SP	medium dense	120	5.2	22	2.725	1.477	0.92	0.59	0.82	89.2	1.93	108.3	18	22	72	33		
14.17	46.5	79.68	1.36	Sand to Silty Sand	SP/SM	medium dense	120	4.7	17	2.755	1.491	1.41	0.66	0.80	60.0	2.18	96.7	14	19	56	31		
14.33	47.0	17.82	1.70	Sandy Silt to Clayey Silt	ML	stiff	120	3.5	5	2.785	1.506	2.01	0.86	0.74	12.4	2.82		5				0.96	3.0
14.48	47.5	77.22	0.94	Sand to Silty Sand	SP/SM	medium dense	120	4.9	16	2.815	1.520	0.97	0.64	0.79	57.9	2.09	83.4	13	17	54	31		
14.63	48.0	37.05	1.34	Silty Sand to Sandy Silt	SM/ML	loose	120	4.2	9	2.845	1.535	1.45	0.75	0.76	26.5	2.47	69.4	7	14	22	29		
14.78	48.5	22.08	0.86	Silty Sand to Sandy Silt	SM/ML	loose	120	3.9	6	2.875	1.549	0.99	0.79	0.74	15.4	2.59	50.0	5	10	-1	28		
14.94	49.0	14.90	0.92	Sandy Silt to Clayey Silt	ML	stiff	120	3.6	4	2.905	1.563	1.14	0.85	0.72	10.1	2.78		4				0.78	2.3
15.09	49.5	14.78	1.10	Sandy Silt to Clayey Silt	ML	stiff	120	3.5	4	2.935	1.578	1.37	0.87	0.71	9.9	2.82		4				0.78	2.3
15.24	50.0	32.67	2.31	Sandy Silt to Clayey Silt	ML	very stiff	120	3.8	9	2.965	1.592	2.54	0.82	0.72	22.1	2.68		9				1.83	5.6

Earth Systems
Pacific

CPT No : CPT-2
Project Name: 101 Garden Street
Project No.: 305172-001
Location: See Site Exploration Plan

Cone Penetrometer: **Kehoe Testing & Engineering**
Truck Mounted Electric Cone
with 23-ton reaction weight
Date: 2/22/2022

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Gravelly Sand to Sand	very dense
	Sand	very dense
	Sand	very dense
	Sand to Silty Sand	very dense
5	Sandy Silt to Clayey Silt	dense
	Clayey Silt to Silty Clay	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	loose
10	Clay	stiff
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Silty Clay to Clay	firm
	Silty Clay to Clay	stiff
15	Silty Clay to Clay	firm
	Sensitive fine grained	soft
	Silty Clay to Clay	firm
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
20	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
25	Clayey Silt to Silty Clay	stiff
	Silty Clay to Clay	firm
	Clay	firm
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	loose
30	Silty Clay to Clay	stiff
	Silty Clay to Clay	stiff
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
35	Sand to Silty Sand	medium dense
	Clayey Silt to Silty Clay	stiff
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
40	Clayey Silt to Silty Clay	firm
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	firm
	Silty Clay to Clay	firm
45	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Silty Sand to Sandy Silt	loose
50	Clayey Silt to Silty Clay	stiff
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	firm
	Silty Clay to Clay	firm
	Clayey Silt to Silty Clay	stiff
55	Silty Clay to Clay	stiff
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	very stiff
	Sandy Silt to Clayey Silt	loose
60	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	firm
	Silty Clay to Clay	stiff
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
65	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	very stiff
	Sand to Silty Sand	medium dense
70	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	loose
	Sandy Silt to Clayey Silt	loose
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
75	Sand to Silty Sand	medium dense
80	End of Sounding @ 75 feet	



Earth Systems Pacific

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: 101 Garden Street — Project No: 305172-001 — Date: 02/22/22

CPT SOUNDING: CPT-3 Plot: 3 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): 6.0 Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
0.15	0.5	259.09	0.62	Sand	SP	very dense	100	6.4	40	0.013	0.013	0.62	0.50	1.70	416.3	1.32	416.3	69	83	100	44		
0.30	1.0	148.79	2.11	Silty Sand to Sandy Silt	SM/ML	dense	110	5.3	28	0.039	0.039	2.11	0.58	1.70	239.1	1.89	282.3	48	56	100	40		
0.46	1.5	82.62	4.54	Overconsolidated Soil	??	dense	110	4.5	18	0.066	0.066	4.54	0.70	1.70	132.8	2.31	263.1	31	53	89	36		
0.61	2.0	68.38	2.46	Sandy Silt to Clayey Silt	ML	medium dense	110	4.8	14	0.094	0.094	2.46	0.65	1.70	109.9	2.15	171.4	24	34	81	34		
0.76	2.5	29.87	4.07	Silty Clay to Clay	CL	medium dense	110	4.0	7	0.121	0.121	4.09	0.78	1.70	48.0	2.56	148.3	13	30	46	31		
0.91	3.0	28.09	2.65	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	7	0.150	0.150	2.67	0.74	1.70	45.1	2.45	114.2	11	23	44	30		
1.07	3.5	18.42	2.88	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.9	5	0.180	0.180	2.91	0.79	1.70	29.6	2.61		5				1.07	30.4
1.22	4.0	14.12	2.21	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.8	4	0.210	0.210	2.25	0.80	1.70	22.7	2.63		4				0.82	19.9
1.37	4.5	19.00	2.30	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	5	0.240	0.240	2.33	0.77	1.70	30.5	2.54	91.3	8	18	28	29		
1.52	5.0	21.79	3.40	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.9	6	0.270	0.270	3.44	0.79	1.70	35.0	2.61		6				1.27	23.9
1.68	5.5	27.22	1.87	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	6	0.300	0.300	1.89	0.72	1.70	43.7	2.36	94.9	11	19	43	30		
1.83	6.0	12.74	2.53	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	3	0.330	0.330	2.60	0.82	1.70	20.5	2.71		3				0.73	11.3
1.98	6.5	22.87	1.67	Sandy Silt to Clayey Silt	ML	loose	120	4.3	5	0.360	0.344	1.70	0.73	1.70	36.7	2.39	84.0	9	17	35	30		
2.13	7.0	24.95	1.01	Silty Sand to Sandy Silt	SM/ML	loose	120	4.6	5	0.390	0.359	1.03	0.68	1.70	40.1	2.24	70.7	9	14	39	30		
2.29	7.5	17.44	1.01	Sandy Silt to Clayey Silt	ML	loose	120	4.4	4	0.420	0.373	1.04	0.72	1.70	28.0	2.37	61.5	7	12	24	29		
2.44	8.0	7.27	1.50	Clayey Silt to Silty Clay	ML/CL	firm	120	3.5	2	0.450	0.388	1.60	0.85	1.70	11.7	2.79		2				0.41	5.3
2.59	8.5	6.44	3.07	Clay	CL/CH	firm	120	3.1	2	0.480	0.402	3.31	0.92	1.70	10.3	3.01		2				0.35	4.4
2.74	9.0	7.95	3.69	Clay	CL/CH	firm	120	3.2	3	0.510	0.416	3.95	0.91	1.70	12.8	2.98		3				0.44	5.4
2.90	9.5	16.48	2.10	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	4	0.540	0.431	2.17	0.78	1.70	26.5	2.57	83.6	6	17	22	29		
3.05	10.0	29.05	2.75	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.2	7	0.570	0.445	2.81	0.75	1.70	46.7	2.45	119.1	10	24	45	30		
3.20	10.5	42.70	1.95	Sandy Silt to Clayey Silt	ML	medium dense	120	4.6	9	0.600	0.460	1.98	0.68	1.70	68.6	2.23	119.3	14	24	61	31		
3.35	11.0	53.48	1.07	Silty Sand to Sandy Silt	SM/ML	medium dense	120	5.1	11	0.630	0.474	1.09	0.61	1.63	82.4	2.00	106.9	15	21	69	32		
3.51	11.5	19.63	1.36	Sandy Silt to Clayey Silt	ML	loose	120	4.3	5	0.660	0.488	1.41	0.73	1.70	31.5	2.40	72.9	7	15	29	29		
3.66	12.0	5.43	2.36	Silty Clay to Clay	CL	firm	120	3.1	2	0.690	0.503	2.70	0.92	1.70	8.7	3.02		2				0.29	2.8
3.81	12.5	10.87	3.56	Silty Clay to Clay	CL	stiff	120	3.4	3	0.720	0.517	3.81	0.87	1.70	17.5	2.86		3				0.61	5.9
3.96	13.0	71.97	0.73	Sand to Silty Sand	SP/SM	medium dense	120	5.4	13	0.750	0.532	0.74	0.56	1.47	99.9	1.83	112.8	18	23	77	33		
4.11	13.5	71.06	1.67	Silty Sand to Sandy Silt	SM/ML	medium dense	120	5.0	14	0.780	0.546	1.69	0.63	1.51	101.7	2.06	140.6	19	28	78	33		
4.27	14.0	36.67	1.59	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	8	0.810	0.560	1.63	0.69	1.55	53.6	2.25	96.9	11	19	51	30		
4.42	14.5	8.22	2.58	Silty Clay to Clay	CL	firm	120	3.3	2	0.840	0.575	2.87	0.88	1.70	13.2	2.89		2				0.45	3.9
4.57	15.0	5.70	3.95	Clay	CL/CH	firm	120	2.9	2	0.870	0.589	4.67	0.96	1.70	9.2	3.14		2				0.30	2.5
4.72	15.5	6.08	2.68	Silty Clay to Clay	CL	firm	120	3.1	2	0.900	0.604	3.15	0.93	1.68	9.7	3.02		2				0.32	2.6
4.88	16.0	21.98	2.86	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	6	0.930	0.618	2.98	0.79	1.53	31.8	2.60	105.1	7	21	29	29		
5.03	16.5	58.76	0.66	Sand to Silty Sand	SP/SM	medium dense	120	5.3	11	0.960	0.632	0.67	0.58	1.35	74.9	1.91	89.6	14	18	65	31		
5.18	17.0	24.95	2.44	Sandy Silt to Clayey Silt	ML	loose	120	4.1	6	0.990	0.647	2.54	0.77	1.46	34.4	2.53	99.8	8	20	33	29		
5.33	17.5	18.07	2.28	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.9	5	1.020	0.661	2.42	0.80	1.46	24.9	2.62		5				1.02	7.7
5.49	18.0	9.25	2.79	Silty Clay to Clay	CL	stiff	120	3.3	3	1.050	0.676	3.15	0.89	1.49	13.0	2.92		3				0.50	3.6
5.64	18.5	8.16	2.42	Silty Clay to Clay	CL	firm	120	3.3	3	1.080	0.690	2.79	0.90	1.47	11.3	2.93		3				0.44	3.1
5.79	19.0	24.20	3.03	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.9	6	1.110	0.704	3.18	0.80	1.38	31.6	2.62		6				1.38	9.8
5.94	19.5	24.02	2.38	Sandy Silt to Clayey Silt	ML	loose	120	4.0	6	1.140	0.719	2.50	0.78	1.35	30.7	2.56	94.7	7	19	28	29		
6.10	20.0	37.41	1.31	Silty Sand to Sandy Silt	SM/ML	loose	120	4.6	8	1.170	0.733	1.35	0.69	1.29	45.5	2.26	83.1	10	17	44	30		
6.25	20.5	30.43	2.96	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	8	1.200	0.748	3.09	0.78	1.31	37.7	2.55	114.5	9	23	36	30		
6.40	21.0	39.29	2.27	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	9	1.230	0.762	2.34	0.73	1.27	47.2	2.40	108.8	10	22	46	30		
6.55	21.5	45.68	1.68	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	10	1.260	0.776	1.73	0.69	1.24	53.5	2.27	99.5	11	20	51	30		
6.71	22.0	23.36	2.46	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.9	6	1.290	0.791	2.61	0.79	1.26	27.8	2.60		6				1.33	8.4
6.86	22.5	24.84	3.59	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.7	7	1.320	0.805	3.79	0.82	1.25	29.4	2.69		7				1.41	8.8
7.01	23.0	65.13	2.34	Sandy Silt to Clayey Silt	ML	medium dense	120	4.6	14	1.350	0.820	2.39	0.69	1.19	73.4	2.27	135.2	16	27	64	32		
7.16	23.5	104.83	1.51	Sand to Silty Sand	SP/SM	medium dense	120	5.1	21	1.380	0.834	1.53	0.61	1.16	114.5	1.99	147.6	23	30	82	34		
7.32	24.0	89.55	1.13	Sand to Silty Sand	SP/SM	medium dense	120	5.2	17	1.410	0.848	1.14	0.60	1.14	96.6	1.96	120.8	19	24	75	33		
7.47	24.5	89.65	0.84	Sand to Silty Sand	SP/SM	medium dense	120	5.3	17	1.440	0.863	0.85	0.57	1.12	95.3	1.88	111.8	18	22	75	33		
7.62	25.0	78.20	1.43	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.9	16	1.470	0.877	1.46	0.63	1.13	83.2	2.08	117.8	17	24	69	32		
7.77	25.5	77.45	1.26	Sand to Silty Sand	SP/SM	medium dense	120	5.0	16	1.500	0.892	1.29	0.62	1.11	81.5	2.05	111.5	16	22	68	32		
7.92	26.0	35.44	2.59	Sandy Silt to Clayey Silt	ML	loose	120	4.1	9	1.530	0.906	2.71	0.76	1.13	37.7	2.51	106.9	9	21	36	30		
8.08	26.5	32.09	2.96	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	8	1.560	0.920	3.11	0.79	1.12	33.8	2.59	110.2	9	22	32	29		
8.23	27.0	28.31	2.66	Sandy Silt to Clayey Silt	ML	very stiff	120	3.9	7	1.590	0.935	2.81	0.79	1.10	29.5	2.60		7				1.61	8.6
8.38	27.5	27.74	2.23	Sandy Silt to Clayey Silt	ML	loose	120	4.0	7	1.620	0.949	2.37	0.78	1.09	28.5	2.57	89.8	7	18	25	29		
8.53	28.0	27.62	3.05	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.8	7	1.650	0.964	3.24	0.81	1.08	28.2	2.66		7				1.57	8.1
8.69	28.5	57.00	3.40	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.2	14	1.680	0.978	3.50	0.75	1.06	57.1	2.46	146.9	14	29	54	31		
8.84	29.0	99.61	0.88	Sand to Silty Sand	SP/SM	medium dense	120	5.3	19	1.710	0.992	0.90	0.58	1.04	97.7	1.89	115.1	19	23	76	33		
8.99	29.5	33.40	1.08	Silty Sand to Sandy Silt	SM/ML	loose	120	4.4	8	1.740	1.007	1.14	0.71	1.04	32.7	2.34	67.6	8	14	30	29		
9.14	30.0	13.51	2.47	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	4	1.770	1.021	2.84	0.88	1.03	13.2	2.88		4				0.73	3.4
9.30	30.5	28.07	3.79	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.6	8	1.800	1.036	4.05	0.83	1.02	27.0	2.74		8				1.59	7.6
9.45	31.0	93.62	1.17	Sand to Silty Sand	SP/SM	medium dense	120	5.1	18	1.830	1.050	1.19	0.61	1.00	88.9	2.00	115.4	18	23	72	33		
9.60	31.5	89.41	0.73	Sand to Silty Sand	SP/SM	medium dense	120	5.3	17	1.860	1.064	0.75	0.58	1.00	84.2	1.89	99.6	16	20	70	32		
9.75	32.0	40.43	2.19	Sandy Silt to Clayey Silt	ML	loose	120	4.2	10	1.890	1.079	2.30	0.75	0.99	37.7	2.47	98.3	9	20	36	30		
9.91	32.5	42.31	2.39	Sandy Silt to Clayey Silt	ML	loose	120	4.1	10	1.920	1.093	2.50	0.75	0.98	39.0	2.48	104.1	10	21	38	30		
10.06	33.0	114.85	1.50	Sand to Silty Sand	SP/SM	medium dense	120	5.1	23	1.950	1.108	1.53	0.61	0.97	105.5	2.02	139.5	22	28	79	34		
10.21	33.5	139.54	0.74	Sand	SP	medium dense	120	5.6	25	1.980	1.122	0.75	0.53	0.97	127.8	1.75	136.9	24	27	87	34		
10.36	34.0	138.81	0.56	Sand	SP	medium dense	120	5.7	24	2.010	1.136	0.57	0.51	0.96	126.5	1.68	129.6	23	26	87	34		
10.52	34.5	133.97	0.58	Sand	SP	medium dense	120	5.7	24	2.040	1.151	0.59	0.52	0.96	121.2	1.70	126.1	22	25	85	34		
10.67	35.0	126.98	0.63	Sand	SP	medium dense	120	5.6	23	2.070	1.165	0.64	0.53	0.95	114.0	1.75	121.8	21	24	82	34		
10.82	35.5	110.05	1.01	Sand to Silty Sand	SP/SM	medium dense	120	5.2	21	2.100	1.180	1.03	0.59	0.94	97.6	1.93	118.6	19	24	76	33		
10.97	36.0	55.38	2.54	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	13	2.130	1.194	2.65	0.74	0.91	47.9	2.43	116.6	12	23	46	31		
11.13	36.5	77.14	1.62	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	16	2.160	1.208	1.66	0.67	0.92	66.7	2.19	109.2	15	22	60	32		
11.28	37.0	59.34	2.09	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.4	14	2.190	1.223	2.17	0.72	0.90	50.6	2.35	108.0	12	22	49	31		
11.43	37.5	36.12	2.86	Sandy Silt to Clayey Silt	ML	hard	120	3.9	9	2.220	1.237	3.05	0.80	0.88	30.1	2.62		9				2.05	8.2
11.58	38.0	25.34	2.57	Sandy Silt to Clayey Silt	ML	very stiff	120	3.7	7	2.250	1.252	2.82	0.83	0.87	20.8	2.72		7				1.42	5.5
11.73	38.5	50.37	2.05	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	12	2.280	1.266	2.15	0.74	0.88	41.7	2.41	99.0	10	20	41	30		
11.89	39.0	123.36	0.97	Sand to Silty Sand	SP/SM	medium dense	120	5.3	23	2.310	1.280	0.99	0.58	0.90	104.4	1.89	123.5	21	25	79	33		
12.04	39.5	139.56	1.22	Sand to Silty Sand	SP/SM	medium dense	120	5.2	27	2.340	1.295	1.25	0.59	0.89	117.2	1.92	141.8	23	28	83	34		

Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-3 Plot: 3 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
12.19	40.0	114.02	1.24	Sand to Silty Sand	SP/SM	medium dense	120	5.1	22	2.370	1.309	1.26	0.61	0.88	94.7	1.99	122.4	20	24	75	33		
12.34	40.5	66.09	1.94	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	15	2.400	1.324	2.01	0.70	0.85	53.4	2.31	106.5	13	21	51	31		
12.50	41.0	37.85	3.19	Clayey Silt to Silty Clay	ML/CL	hard	120	3.8	10	2.430	1.338	3.41	0.81	0.83	29.6	2.66		10				2.15	7.9
12.65	41.5	36.09	1.89	Sandy Silt to Clayey Silt	ML	loose	120	4.0	9	2.460	1.352	2.03	0.77	0.83	28.2	2.53	82.9	8	17	24	29		
12.80	42.0	26.39	2.47	Sandy Silt to Clayey Silt	ML	very stiff	120	3.7	7	2.490	1.367	2.73	0.83	0.81	20.2	2.73		7				1.47	5.2
12.95	42.5	131.08	0.81	Sand	SP	medium dense	120	5.4	24	2.520	1.381	0.83	0.56	0.86	106.7	1.84	121.1	21	24	80	33		
13.11	43.0	147.90	0.95	Sand	SP	medium dense	120	5.4	27	2.550	1.396	0.97	0.56	0.86	119.7	1.84	136.2	23	27	84	34		
13.26	43.5	110.80	0.84	Sand to Silty Sand	SP/SM	medium dense	120	5.3	21	2.580	1.410	0.86	0.58	0.85	88.6	1.91	106.3	18	21	72	33		
13.41	44.0	29.51	1.98	Sandy Silt to Clayey Silt	ML	very stiff	120	3.8	8	2.610	1.424	2.18	0.80	0.79	22.0	2.64		8				1.65	5.7
13.56	44.5	13.55	1.84	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	4	2.640	1.439	2.29	0.90	0.76	9.7	2.94		4				0.71	2.3
13.72	45.0	15.84	2.03	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.3	5	2.670	1.453	2.44	0.89	0.75	11.3	2.90		5				0.85	2.7
13.87	45.5	19.16	1.96	Sandy Silt to Clayey Silt	ML	very stiff	120	3.5	6	2.700	1.468	2.29	0.86	0.75	13.7	2.82		6				1.04	3.4
14.02	46.0	15.57	1.74	Sandy Silt to Clayey Silt	ML	stiff	120	3.4	5	2.730	1.482	2.11	0.88	0.74	10.9	2.88		5				0.83	2.6
14.17	46.5	17.49	1.96	Sandy Silt to Clayey Silt	ML	stiff	120	3.4	5	2.760	1.496	2.33	0.88	0.74	12.2	2.86		5				0.94	3.0
14.33	47.0	39.99	2.93	Sandy Silt to Clayey Silt	ML	hard	120	3.8	10	2.790	1.511	3.15	0.81	0.75	28.3	2.65		10				2.26	7.4
14.48	47.5	74.66	2.21	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.4	17	2.820	1.525	2.29	0.71	0.77	54.3	2.35	114.6	14	23	52	31		
14.63	48.0	53.50	3.11	Sandy Silt to Clayey Silt	ML	medium dense	120	4.0	13	2.850	1.540	3.29	0.78	0.75	37.7	2.57	118.6	11	24	36	30		
14.78	48.5	56.21	2.81	Sandy Silt to Clayey Silt	ML	medium dense	120	4.1	14	2.880	1.554	2.96	0.77	0.74	39.5	2.52	114.4	11	23	38	30		
14.94	49.0	63.07	2.44	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	15	2.910	1.568	2.55	0.74	0.75	44.5	2.44	111.0	12	22	43	31		
15.09	49.5	99.45	1.45	Sand to Silty Sand	SP/SM	medium dense	120	4.8	21	2.940	1.583	1.49	0.65	0.77	72.4	2.13	109.4	16	22	63	32		
15.24	50.0	74.75	1.88	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	17	2.970	1.597	1.96	0.70	0.75	52.9	2.31	104.9	13	21	50	31		
15.39	50.5	28.82	3.37	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	8	3.000	1.612	3.76	0.86	0.70	18.9	2.83		8				1.60	4.8
15.54	51.0	19.09	2.61	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.3	6	3.030	1.626	3.10	0.90	0.68	12.3	2.93		6				1.03	3.0
15.70	51.5	21.33	3.04	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.3	7	3.060	1.640	3.55	0.90	0.68	13.6	2.93		7				1.16	3.3
15.85	52.0	26.98	3.21	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.4	8	3.090	1.655	3.63	0.87	0.68	17.3	2.86		8				1.49	4.3
16.00	52.5	39.28	4.35	Silty Clay to Clay	CL	hard	120	3.5	11	3.120	1.669	4.73	0.85	0.68	25.2	2.81		11				2.21	6.5
16.15	53.0	49.08	5.53	Clay	CL/CH	hard	120	3.5	14	3.150	1.684	5.91	0.85	0.67	31.2	2.81		14				2.79	8.2
16.31	53.5	83.08	4.62	Overconsolidated Soil	??	medium dense	120	4.0	21	3.180	1.698	4.81	0.78	0.69	54.2	2.57	172.2	16	34	51	32		
16.46	54.0	32.69	6.07	Clay	CL/CH	very stiff	120	3.2	10	3.210	1.712	6.73	0.91	0.65	19.9	2.98		10				1.82	5.2
16.61	54.5	23.55	3.85	Silty Clay to Clay	CL	very stiff	120	3.2	7	3.240	1.727	4.47	0.91	0.64	14.3	2.98		7				1.28	3.5
16.76	55.0	30.19	3.49	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.4	9	3.270	1.741	3.92	0.87	0.65	18.5	2.85		9				1.67	4.6
16.92	55.5	24.52	3.77	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	8	3.300	1.756	4.35	0.90	0.63	14.7	2.96		8				1.34	3.6
17.07	56.0	24.33	3.34	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.3	7	3.330	1.770	3.87	0.90	0.63	14.5	2.93		7				1.33	3.6
17.22	56.5	19.74	4.30	Silty Clay to Clay	CL	very stiff	120	2.9	7	3.360	1.784	5.18	0.95	0.61	11.4	3.09		7				1.06	2.8
17.37	57.0	72.43	2.68	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	17	3.390	1.799	2.81	0.75	0.67	46.0	2.46	118.3	13	24	45	31		
17.53	57.5	29.19	2.86	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	8	3.420	1.813	3.24	0.86	0.63	17.3	2.82		8				1.61	4.3
17.68	58.0	22.75	4.30	Silty Clay to Clay	CL	very stiff	120	3.0	7	3.450	1.828	5.07	0.93	0.60	12.9	3.04		7				1.23	3.2
17.83	58.5	47.07	3.04	Sandy Silt to Clayey Silt	ML	hard	120	3.8	12	3.480	1.842	3.28	0.81	0.64	28.4	2.66		12				2.66	7.1
17.98	59.0	18.23	3.60	Silty Clay to Clay	CL	stiff	120	2.9	6	3.510	1.856	4.46	0.95	0.59	10.1	3.09		6				0.96	2.4
18.14	59.5	22.32	3.21	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	7	3.540	1.871	3.82	0.91	0.60	12.6	2.98		7				1.20	3.0
18.29	60.0	22.77	2.37	Sandy Silt to Clayey Silt	ML	very stiff	120	3.3	7	3.570	1.885	2.81	0.88	0.60	12.9	2.89		7				1.23	3.1
18.44	60.5	18.73	2.15	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	6	3.600	1.900	2.66	0.91	0.59	10.4	2.95		6				0.99	2.4
18.59	61.0	22.98	2.10	Sandy Silt to Clayey Silt	ML	very stiff	120	3.4	7	3.630	1.914	2.50	0.88	0.60	12.9	2.86		7				1.24	3.0
18.75	61.5	16.19	2.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	5	3.660	1.928	2.77	0.93	0.57	8.8	3.03		5				0.84	1.9
18.90	62.0	17.11	2.39	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	6	3.690	1.943	3.04	0.93	0.57	9.2	3.03		6				0.89	2.1
19.05	62.5	16.68	2.16	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	5	3.720	1.957	2.78	0.93	0.57	8.9	3.02		5				0.87	2.0
19.20	63.0	16.27	2.33	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.750	1.972	3.03	0.94	0.56	8.6	3.05		5				0.84	1.9
19.35	63.5	16.83	2.16	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	5	3.780	1.986	2.78	0.93	0.56	8.9	3.02		5				0.87	2.0
19.51	64.0	18.61	2.28	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	6	3.810	2.000	2.86	0.92	0.56	9.8	2.99		6				0.98	2.2
19.66	64.5	19.27	2.70	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.1	6	3.840	2.015	3.37	0.93	0.55	10.0	3.03		6				1.02	2.3
19.81	65.0	29.60	3.73	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.3	9	3.870	2.029	4.29	0.90	0.56	15.6	2.94		9				1.62	3.8
19.96	65.5	20.71	4.02	Silty Clay to Clay	CL	very stiff	120	2.9	7	3.900	2.044	4.95	0.95	0.53	10.5	3.11		7				1.10	2.5
20.12	66.0	26.56	4.66	Silty Clay to Clay	CL	very stiff	120	3.0	9	3.930	2.058	5.47	0.93	0.54	13.5	3.05		9				1.44	3.3
20.27	66.5	20.31	5.75	Clay	CL/CH	very stiff	120	2.7	8	3.960	2.072	7.14	0.99	0.51	9.9	3.23		8				1.07	2.4
20.42	67.0	22.47	4.58	Clay	CL/CH	very stiff	120	2.9	8	3.990	2.087	5.57	0.95	0.52	11.1	3.12		8				1.20	2.7
20.57	67.5	81.94	3.52	Sandy Silt to Clayey Silt	ML	medium dense	120	4.0	20	4.020	2.101	3.70	0.78	0.59	45.5	2.55	137.0	14	27	44	31		
20.73	68.0	152.23	1.81	Sand to Silty Sand	SP/SM	medium dense	120	4.9	31	4.050	2.116	1.86	0.65	0.64	91.9	2.12	137.0	22	27	73	34		
20.88	68.5	102.51	1.53	Sand to Silty Sand	SP/SM	medium dense	120	4.7	22	4.080	2.130	1.59	0.67	0.62	60.5	2.21	101.9	15	20	56	32		
21.03	69.0	29.61	2.04	Sandy Silt to Clayey Silt	ML	very stiff	120	3.5	8	4.110	2.144	2.37	0.85	0.55	15.3	2.79		8				1.62	3.6
21.18	69.5	68.74	2.96	Sandy Silt to Clayey Silt	ML	medium dense	120	4.0	17	4.140	2.159	3.15	0.78	0.57	37.2	2.56	115.3	12	23	36	31		
21.34	70.0	46.06	3.97	Clayey Silt to Silty Clay	ML/CL	hard	120	3.5	13	4.170	2.173	4.36	0.85	0.54	23.5	2.80		13				2.58	5.8
21.49	70.5	21.30	2.41	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	7	4.200	2.188	3.00	0.92	0.51	10.4	2.98		7				1.12	2.3
21.64	71.0	22.33	2.01	Sandy Silt to Clayey Silt	ML	very stiff	120	3.3	7	4.230	2.202	2.48	0.90	0.52	11.0	2.92		7				1.18	2.5
21.79	71.5	28.38	2.72	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.3	9	4.260	2.216	3.20	0.89	0.52	13.9	2.90		9				1.54	3.3
21.95	72.0	208.58	1.32	Sand to Silty Sand	SP/SM	medium dense	120	5.2	40	4.290	2.231	1.35	0.59	0.65	127.3	1.92	153.7	27	31	87	35		
22.10	72.5	257.91	2.09	Sand to Silty Sand	SP/SM	dense	120	5.1	51	4.320	2.245	2.13	0.61	0.63	153.7	2.01	201.9	34	40	95	37		
22.25	73.0	112.96	3.21	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	27	4.350	2.260	3.34	0.74	0.57	61.0	2.42	147.4	18	29	56	33		
22.40	73.5	47.15	3.39	Clayey Silt to Silty Clay	ML/CL	hard	120	3.6	13	4.380	2.274	3.74	0.84	0.52	23.4	2.76		13				2.64	5.6
22.56	74.0	21.82	1.88	Sandy Silt to Clayey Silt	ML	very stiff	120	3.3	7	4.410	2.288	2.36	0.90	0.50	10.3	2.93		7				1.15	2.3
22.71	74.5	37.45	1.67	Silty Sand to Sandy Silt	SM/ML	hard	120	3.8	10	4.440	2.303	1.89	0.81	0.53	18.8	2.66		10				2.07	4.3

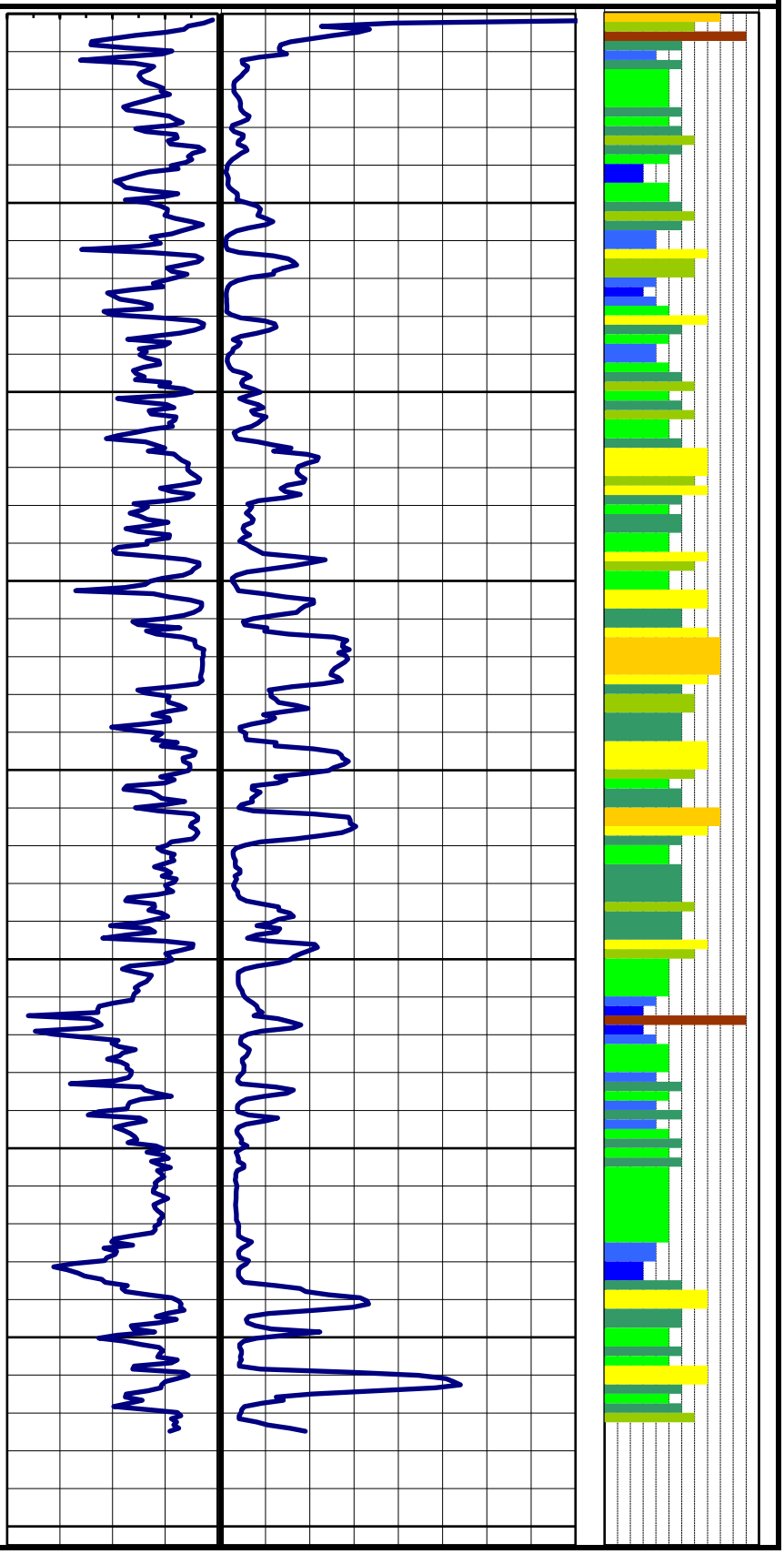
Earth Systems
Pacific

CPT No : CPT-3

Project Name: 101 Garden Street
Project No.: 305172-001
Location: See Site Exploration Plan

Cone Penetrometer: **Kehoe Testing & Engineering**
Truck Mounted Electric Cone
with 23-ton reaction weight
Date: 2/22/2022

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Sand	very dense
	Silty Sand to Sandy Silt	dense
	Overconsolidated Soil	dense
	Sandy Silt to Clayey Silt	medium dense
5	Silty Clay to Clay	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	loose
10	Clayey Silt to Silty Clay	very stiff
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	loose
	Silty Sand to Sandy Silt	loose
15	Sandy Silt to Clayey Silt	loose
	Clayey Silt to Silty Clay	firm
	Clay	firm
	Clay	firm
	Clayey Silt to Silty Clay	loose
20	Clayey Silt to Silty Clay	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	loose
	Silty Clay to Clay	firm
25	Silty Clay to Clay	stiff
	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Clay to Clay	firm
30	Clay	firm
	Silty Clay to Clay	firm
	Clayey Silt to Silty Clay	loose
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	loose
35	Clayey Silt to Silty Clay	very stiff
	Silty Clay to Clay	stiff
	Silty Clay to Clay	firm
	Clayey Silt to Silty Clay	very stiff
	Sandy Silt to Clayey Silt	loose
40	Silty Sand to Sandy Silt	loose
	Clayey Silt to Silty Clay	loose
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
45	Clayey Silt to Silty Clay	very stiff
	Sandy Silt to Clayey Silt	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
50	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	loose
	Clayey Silt to Silty Clay	loose
	Sandy Silt to Clayey Silt	very stiff
55	Sandy Silt to Clayey Silt	loose
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	medium dense
	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	loose
60	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	loose
65	Sandy Silt to Clayey Silt	loose
	Sand to Silty Sand	medium dense
	Sand	medium dense
	Sand	medium dense
	Sand	medium dense
70	Sand	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
75	Sandy Silt to Clayey Silt	hard
80	End of Sounding @ 75 feet	



Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-4 Plot: 4 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
0.15	0.5	272.75	1.11	Sand	SP	very dense	100	6.0	45	0.013	0.013	1.11	0.50	1.70	438.3	1.51	438.3	77	88	100	45		
0.30	1.0	104.61	3.61	Sandy Silt to Clayey Silt	ML	dense	110	4.8	22	0.039	0.039	3.61	0.66	1.70	168.1	2.17	268.2	37	54	98	38		
0.46	1.5	54.57	4.56	Silty Clay to Clay	CL	medium dense	110	4.3	13	0.066	0.066	4.57	0.73	1.70	87.7	2.42	210.8	22	42	71	34		
0.61	2.0	44.14	3.56	Clayey Silt to Silty Clay	ML/CL	medium dense	110	4.3	10	0.094	0.094	3.57	0.73	1.70	70.9	2.40	164.2	17	33	63	32		
0.76	2.5	49.89	3.02	Sandy Silt to Clayey Silt	ML	medium dense	110	4.5	11	0.121	0.121	3.03	0.70	1.70	80.2	2.31	159.5	19	32	68	33		
0.91	3.0	37.93	3.89	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.2	9	0.150	0.150	3.91	0.75	1.70	60.9	2.47	161.0	16	32	56	32		
1.07	3.5	47.97	2.61	Sandy Silt to Clayey Silt	ML	medium dense	120	4.5	11	0.180	0.180	2.62	0.69	1.70	77.1	2.28	144.9	18	29	66	33		
1.22	4.0	32.69	3.58	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.1	8	0.210	0.210	3.61	0.76	1.70	52.5	2.49	143.8	13	29	50	31		
1.37	4.5	14.47	3.05	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	4	0.240	0.240	3.11	0.82	1.70	23.3	2.71		4				0.84	17.8
1.52	5.0	14.66	2.53	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.8	4	0.270	0.270	2.58	0.81	1.70	23.6	2.66		4				0.85	16.0
1.68	5.5	16.06	2.45	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.9	4	0.300	0.300	2.50	0.80	1.70	25.8	2.62		4				0.93	15.8
1.83	6.0	17.35	1.97	Sandy Silt to Clayey Silt	ML	loose	120	4.0	4	0.330	0.330	2.00	0.77	1.70	27.9	2.53	82.0	7	16	24	29		
1.98	6.5	16.48	2.33	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	4	0.360	0.344	2.38	0.79	1.70	26.5	2.60	87.4	7	17	22	29		
2.13	7.0	12.15	1.63	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.9	3	0.390	0.359	1.69	0.80	1.70	19.5	2.62		3				0.69	9.8
2.29	7.5	9.85	2.73	Silty Clay to Clay	CL	stiff	120	3.5	3	0.420	0.373	2.85	0.86	1.70	15.8	2.82		3				0.56	7.6
2.44	8.0	19.27	2.31	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	5	0.450	0.388	2.36	0.77	1.70	31.0	2.54	92.4	8	18	28	29		
2.59	8.5	20.58	1.76	Sandy Silt to Clayey Silt	ML	loose	120	4.2	5	0.480	0.402	1.81	0.74	1.70	33.1	2.45	83.1	8	17	31	29		
2.74	9.0	20.45	2.32	Clayey Silt to Silty Clay	ML/CL	loose	120	4.1	5	0.510	0.416	2.38	0.77	1.70	32.9	2.52	94.9	8	19	31	29		
2.90	9.5	24.78	3.16	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	6	0.540	0.431	3.23	0.77	1.70	39.8	2.55	120.2	9	24	39	30		
3.05	10.0	35.55	2.30	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	8	0.570	0.445	2.34	0.71	1.70	57.1	2.34	118.4	12	24	54	31		
3.20	10.5	31.86	2.53	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	7	0.600	0.460	2.58	0.73	1.70	51.2	2.40	118.5	11	24	49	30		
3.35	11.0	21.53	1.50	Sandy Silt to Clayey Silt	ML	loose	120	4.3	5	0.630	0.474	1.54	0.73	1.70	34.6	2.39	78.6	7	16	33	29		
3.51	11.5	5.87	2.72	Clay	CL/CH	firm	120	3.1	2	0.660	0.488	3.06	0.92	1.70	9.4	3.02		2				0.32	3.2
3.66	12.0	6.91	3.39	Clay	CL/CH	firm	120	3.1	2	0.690	0.503	3.77	0.92	1.70	11.1	3.02		2				0.38	3.7
3.81	12.5	40.41	1.36	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	8	0.720	0.517	1.39	0.66	1.60	61.2	2.17	97.1	12	19	56	31		
3.96	13.0	68.40	0.85	Sand to Silty Sand	SP/SM	medium dense	120	5.3	13	0.750	0.532	0.85	0.57	1.48	96.0	1.88	112.5	18	22	75	33		
4.11	13.5	18.47	1.49	Sandy Silt to Clayey Silt	ML	loose	120	4.2	4	0.780	0.546	1.55	0.75	1.64	28.6	2.46	73.5	6	15	25	29		
4.27	14.0	8.04	4.20	Clay	CL/CH	firm	120	3.1	3	0.810	0.560	4.67	0.92	1.70	12.9	3.02		3				0.44	3.9
4.42	14.5	8.03	4.32	Clay	CL/CH	firm	120	3.1	3	0.840	0.575	4.82	0.92	1.70	12.9	3.03		3				0.44	3.8
4.57	15.0	33.52	2.11	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	8	0.870	0.589	2.17	0.72	1.53	48.3	2.37	105.8	10	21	47	30		
4.72	15.5	45.92	0.64	Sand to Silty Sand	SP/SM	medium dense	120	5.1	9	0.900	0.604	0.65	0.60	1.40	60.9	1.98	77.4	12	15	56	31		
4.88	16.0	21.64	2.38	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	5	0.930	0.618	2.49	0.78	1.52	31.1	2.55	95.0	7	19	28	29		
5.03	16.5	17.17	2.20	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.9	4	0.960	0.632	2.33	0.80	1.51	24.5	2.62		4				0.97	7.7
5.18	17.0	12.81	2.46	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	4	0.990	0.647	2.67	0.84	1.51	18.3	2.75		4				0.72	5.5
5.33	17.5	9.02	3.46	Clay	CL/CH	firm	120	3.2	3	1.020	0.661	3.90	0.91	1.53	13.1	2.97		3				0.49	3.6
5.49	18.0	33.33	1.22	Silty Sand to Sandy Silt	SM/ML	loose	120	4.6	7	1.050	0.676	1.26	0.69	1.36	42.9	2.26	78.8	9	16	42	30		
5.64	18.5	40.54	1.32	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	9	1.080	0.690	1.35	0.68	1.34	51.2	2.22	87.8	10	18	49	30		
5.79	19.0	17.96	3.68	Silty Clay to Clay	CL	very stiff	120	3.6	5	1.110	0.704	3.92	0.84	1.41	23.9	2.77		5				1.01	7.2
5.94	19.5	19.19	4.13	Silty Clay to Clay	CL	very stiff	120	3.6	5	1.140	0.719	4.39	0.85	1.39	25.2	2.78		5				1.09	7.5
6.10	20.0	29.77	2.03	Sandy Silt to Clayey Silt	ML	loose	120	4.2	7	1.170	0.733	2.11	0.75	1.31	37.0	2.45	93.5	8	19	36	29		
6.25	20.5	30.13	1.58	Sandy Silt to Clayey Silt	ML	loose	120	4.3	7	1.200	0.748	1.64	0.73	1.29	36.7	2.39	82.7	8	17	35	29		
6.40	21.0	25.44	2.16	Sandy Silt to Clayey Silt	ML	loose	120	4.0	6	1.230	0.762	2.27	0.77	1.29	31.0	2.53	90.6	7	18	28	29		
6.55	21.5	11.73	2.98	Silty Clay to Clay	CL	stiff	120	3.3	4	1.260	0.776	3.34	0.88	1.31	14.6	2.89		4				0.64	4.0
6.71	22.0	29.44	2.85	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	7	1.290	0.791	2.98	0.78	1.26	34.9	2.57	109.1	8	22	33	29		
6.86	22.5	29.58	2.91	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	7	1.320	0.805	3.05	0.78	1.24	34.6	2.57	110.0	8	22	33	29		
7.01	23.0	85.49	2.14	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	18	1.350	0.820	2.18	0.66	1.18	95.5	2.16	149.5	20	30	75	33		
7.16	23.5	84.91	0.80	Sand to Silty Sand	SP/SM	medium dense	120	5.3	16	1.380	0.834	0.81	0.57	1.15	92.0	1.88	107.8	17	22	73	32		
7.32	24.0	37.81	3.05	Sandy Silt to Clayey Silt	ML	medium dense	120	4.1	9	1.410	0.848	3.17	0.77	1.18	42.3	2.52	122.0	10	24	41	30		
7.47	24.5	27.89	2.53	Sandy Silt to Clayey Silt	ML	loose	120	4.0	7	1.440	0.863	2.67	0.78	1.17	30.9	2.57	98.2	8	20	28	29		
7.62	25.0	40.00	2.85	Sandy Silt to Clayey Silt	ML	medium dense	120	4.1	10	1.470	0.877	2.96	0.76	1.15	43.6	2.49	119.0	10	24	42	30		
7.77	25.5	28.41	2.85	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.9	7	1.500	0.892	3.01	0.79	1.15	30.8	2.61		7				1.62	9.1
7.92	26.0	38.39	4.43	Silty Clay to Clay	CL	hard	120	3.8	10	1.530	0.906	4.61	0.80	1.13	41.1	2.64		10				2.21	12.2
8.08	26.5	52.98	4.12	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.1	13	1.560	0.920	4.24	0.77	1.11	55.7	2.53	162.1	14	32	53	31		
8.23	27.0	40.64	3.65	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.0	10	1.590	0.935	3.80	0.78	1.10	42.3	2.58	134.8	11	27	41	30		
8.38	27.5	64.53	1.52	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	14	1.620	0.949	1.56	0.66	1.07	65.5	2.18	105.4	14	21	59	31		
8.53	28.0	64.65	2.93	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	15	1.650	0.964	3.01	0.72	1.07	65.4	2.37	143.6	15	29	59	32		
8.69	28.5	36.60	5.38	Clay	CL/CH	hard	120	3.6	10	1.680	0.978	5.64	0.83	1.07	36.9	2.74		10				2.10	10.7
8.84	29.0	25.51	5.30	Clay	CL/CH	very stiff	120	3.4	7	1.710	0.992	5.68	0.87	1.06	25.5	2.86		7				1.44	7.2
8.99	29.5	18.93	3.56	Silty Clay to Clay	CL	very stiff	120	3.4	6	1.740	1.007	3.92	0.87	1.04	18.7	2.85		6				1.05	5.1
9.14	30.0	51.11	2.59	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	12	1.770	1.021	2.68	0.74	1.03	49.6	2.42	119.2	12	24	48	31		
9.30	30.5	94.56	1.22	Sand to Silty Sand	SP/SM	medium dense	120	5.1	19	1.800	1.036	1.24	0.61	1.01	90.6	2.00	118.2	18	24	73	33		
9.45	31.0	46.80	1.84	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.4	11	1.830	1.050	1.92	0.72	1.01	44.5	2.36	96.2	10	19	43	30		
9.60	31.5	30.03	2.29	Sandy Silt to Clayey Silt	ML	loose	120	3.9	8	1.860	1.064	2.44	0.79	1.00	28.3	2.58	90.8	7	18	24	29		
9.75	32.0	45.78	2.50	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	11	1.890	1.079	2.61	0.75	0.99	42.6	2.46	110.3	11	22	41	30		
9.91	32.5	107.65	1.14	Sand to Silty Sand	SP/SM	medium dense	120	5.2	21	1.920	1.093	1.16	0.59	0.98	99.8	1.95	124.0	20	25	77	33		
10.06	33.0	76.79	1.69	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	16	1.950	1.108	1.74	0.66	0.97	70.4	2.18	114.4	15	23	62	32		
10.21	33.5	96.59	1.07	Sand to Silty Sand	SP/SM	medium dense	120	5.1	19	1.980	1.122	1.09	0.60	0.97	88.1	1.98	112.0	18	22	72	33		
10.36	34.0	112.17	0.68	Sand	SP	medium dense	120	5.5	21	2.010	1.136	0.69	0.55	0.96	101.9	1.80	113.2	19	23	78	33		
10.52	34.5	128.67	0.66	Sand	SP	medium dense	120	5.6	23	2.040	1.151	0.67	0.53	0.96	116.3	1.75	124.6	22	25	83	34		
10.67	35.0	121.24	0.71	Sand	SP	medium dense	120	5.5	22	2.070	1.165	0.72	0.55	0.95	108.7	1.79	119.7	20	24	80	33		
10.82	35.5	128.99	0.65	Sand	SP	medium dense	120	5.6	23	2.100	1.180	0.67	0.53	0.94	115.0	1.75	123.5	21	25	83	34		
10.97	36.0	101.69	1.15	Sand to Silty Sand	SP/SM	medium dense	120	5.1	20	2.130	1.194	1.18	0.61	0.93	89.3	1.99	115.3	18	23	72	33		
11.13	36.5	50.67	2.59	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	12	2.160	1.208	2.70	0.75	0.91	43.3	2.47	113.1	11	23	42	30		
11.28	37.0	25.23	3.16	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.6	7	2.190	1.223	3.46	0.85	0.88	21.1	2.77		7				1.41	5.7
11.43	37.5	25.92	3.36	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	7	2.220	1.237	3.67	0.85	0.88	21.5	2.79		7				1.45	5.7
11.58	38.0	104.18	1.78	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	22	2.250	1.252	1.82	0.65	0.90	88.3	2.12	132.5	19	27	72	33		
11.73	38.5	182.79	0.82	Sand	SP	medium dense	120	5.7	32	2.280	1.266	0.83	0.52	0.91	157.3	1.71	164.2	29	33	96	36		
11.89	39.0	97.56	2.21	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	21	2.310	1.280	2.26	0.67	0.88	81.1	2.22	138.7	19	28	68	33		
12.04	39.5	77.29	1.65	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	17	2.340	1.295	1.70	0.67	0.87	63.8	2.21	107.8	15	22	58	32		

Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-4 Plot: 4 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
12.19	40.0	53.66	2.42	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	13	2.370	1.309	2.54	0.75	0.85	43.3	2.45	109.3	11	22	42	30		
12.34	40.5	78.70	1.05	Sand to Silty Sand	SP/SM	medium dense	120	4.9	16	2.400	1.324	1.08	0.63	0.87	64.5	2.08	91.6	14	18	59	31		
12.50	41.0	35.76	2.00	Sandy Silt to Clayey Silt	ML	loose	120	4.0	9	2.430	1.338	2.15	0.78	0.83	28.2	2.55	85.1	8	17	24	29		
12.65	41.5	39.03	2.35	Sandy Silt to Clayey Silt	ML	loose	120	4.0	10	2.460	1.352	2.51	0.78	0.83	30.5	2.56	94.7	8	19	27	29		
12.80	42.0	69.92	1.36	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	15	2.490	1.367	1.41	0.67	0.84	55.7	2.20	93.1	13	19	53	31		
12.95	42.5	54.91	1.41	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	12	2.520	1.381	1.48	0.70	0.83	43.0	2.30	84.3	10	17	42	30		
13.11	43.0	47.36	0.89	Silty Sand to Sandy Silt	SM/ML	loose	120	4.6	10	2.550	1.396	0.94	0.69	0.83	37.0	2.25	66.1	9	13	36	30		
13.26	43.5	16.73	1.60	Sandy Silt to Clayey Silt	ML	stiff	120	3.5	5	2.580	1.410	1.90	0.86	0.78	12.3	2.81		5				0.90	3.0
13.41	44.0	15.43	1.68	Sandy Silt to Clayey Silt	ML	stiff	120	3.4	5	2.610	1.424	2.03	0.88	0.77	11.2	2.86		5				0.82	2.7
13.56	44.5	19.62	2.06	Sandy Silt to Clayey Silt	ML	very stiff	120	3.5	6	2.640	1.439	2.38	0.86	0.77	14.2	2.81		6				1.07	3.5
13.72	45.0	19.09	1.72	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	5	2.670	1.453	2.00	0.85	0.76	13.8	2.78		5				1.04	3.4
13.87	45.5	12.01	1.72	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	4	2.700	1.468	2.22	0.92	0.74	8.4	2.99		4				0.62	1.9
14.02	46.0	14.05	2.33	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	4	2.730	1.482	2.89	0.92	0.73	9.7	3.00		4				0.74	2.3
14.17	46.5	28.78	2.40	Sandy Silt to Clayey Silt	ML	very stiff	120	3.7	8	2.760	1.496	2.65	0.83	0.75	20.4	2.71		8				1.60	5.2
14.33	47.0	24.11	2.19	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	7	2.790	1.511	2.47	0.84	0.74	16.9	2.76		7				1.33	4.2
14.48	47.5	44.05	2.34	Sandy Silt to Clayey Silt	ML	loose	120	4.0	11	2.820	1.525	2.50	0.78	0.75	31.3	2.55	95.4	9	19	29	30		
14.63	48.0	128.77	1.46	Sand to Silty Sand	SP/SM	medium dense	120	5.0	26	2.850	1.540	1.49	0.62	0.79	96.4	2.04	130.3	21	26	75	33		
14.78	48.5	123.14	1.46	Sand to Silty Sand	SP/SM	medium dense	120	5.0	25	2.880	1.554	1.49	0.63	0.79	91.5	2.05	126.1	20	25	73	33		
14.94	49.0	34.38	2.51	Sandy Silt to Clayey Silt	ML	very stiff	120	3.8	9	2.910	1.568	2.74	0.82	0.73	23.6	2.67		9				1.93	6.0
15.09	49.5	16.04	1.74	Sandy Silt to Clayey Silt	ML	stiff	120	3.3	5	2.940	1.583	2.14	0.89	0.70	10.6	2.89		5				0.85	2.5
15.24	50.0	15.14	1.75	Sandy Silt to Clayey Silt	ML	stiff	120	3.3	5	2.970	1.597	2.17	0.90	0.69	9.9	2.92		5				0.80	2.3
15.39	50.5	18.85	2.04	Sandy Silt to Clayey Silt	ML	very stiff	120	3.4	6	3.000	1.612	2.42	0.88	0.69	12.3	2.87		6				1.01	2.9
15.54	51.0	24.90	2.56	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	7	3.030	1.626	2.91	0.86	0.69	16.3	2.82		7				1.37	4.0
15.70	51.5	44.02	3.51	Clayey Silt to Silty Clay	ML/CL	hard	120	3.7	12	3.060	1.640	3.77	0.82	0.70	29.0	2.69		12				2.49	7.5
15.85	52.0	45.29	3.43	Clayey Silt to Silty Clay	ML/CL	hard	120	3.8	12	3.090	1.655	3.68	0.82	0.69	29.7	2.68		12				2.57	7.7
16.00	52.5	69.08	2.58	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	16	3.120	1.669	2.70	0.74	0.71	46.5	2.45	116.5	13	23	45	31		
16.15	53.0	111.37	1.40	Sand to Silty Sand	SP/SM	medium dense	120	4.9	23	3.150	1.684	1.44	0.64	0.74	78.2	2.10	113.1	18	23	67	32		
16.31	53.5	95.18	2.30	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	21	3.180	1.698	2.38	0.70	0.72	64.6	2.30	126.4	16	25	59	32		
16.46	54.0	40.79	4.74	Silty Clay to Clay	CL	hard	120	3.5	12	3.210	1.712	5.15	0.86	0.66	25.5	2.83		12				2.30	6.6
16.61	54.5	20.26	3.23	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.1	6	3.240	1.727	3.85	0.91	0.64	12.2	2.99		6				1.09	3.0
16.76	55.0	18.59	3.43	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	6	3.270	1.741	4.16	0.93	0.63	11.0	3.05		6				0.99	2.6
16.92	55.5	16.17	2.72	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.300	1.756	3.42	0.93	0.62	9.5	3.05		5				0.85	2.2
17.07	56.0	15.66	2.86	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.330	1.770	3.63	0.94	0.62	9.1	3.08		5				0.82	2.1
17.22	56.5	15.39	2.72	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.360	1.784	3.48	0.94	0.61	8.9	3.08		5				0.80	2.0
17.37	57.0	17.56	3.15	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	6	3.390	1.799	3.91	0.94	0.61	10.1	3.06		6				0.93	2.4
17.53	57.5	29.08	2.46	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	8	3.420	1.813	2.79	0.85	0.63	17.4	2.78		8				1.60	4.2
17.68	58.0	15.57	2.68	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.450	1.828	3.45	0.94	0.60	8.8	3.08		5				0.81	2.0
17.83	58.5	16.78	1.78	Sandy Silt to Clayey Silt	ML	stiff	120	3.2	5	3.480	1.842	2.25	0.90	0.61	9.6	2.94		5				0.88	2.2
17.98	59.0	15.72	2.25	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	5	3.510	1.856	2.90	0.93	0.59	8.8	3.03		5				0.82	2.0
18.14	59.5	56.52	2.57	Sandy Silt to Clayey Silt	ML	medium dense	120	4.0	14	3.540	1.871	2.74	0.78	0.64	34.3	2.55	103.7	10	21	32	30		
18.29	60.0	154.08	1.72	Sand to Silty Sand	SP/SM	medium dense	120	4.9	31	3.570	1.885	1.77	0.63	0.69	101.1	2.07	142.4	23	28	77	34		
18.44	60.5	99.45	2.72	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	23	3.600	1.900	2.83	0.72	0.66	61.6	2.37	135.2	17	27	57	32		
18.59	61.0	21.83	2.30	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.3	7	3.630	1.914	2.76	0.89	0.59	12.2	2.91		7				1.17	2.9
18.75	61.5	14.26	2.26	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.9	5	3.660	1.928	3.04	0.95	0.56	7.6	3.10		5				0.73	1.6
18.90	62.0	14.30	1.86	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.690	1.943	2.50	0.94	0.56	7.6	3.05		5				0.73	1.6
19.05	62.5	18.75	2.09	Sandy Silt to Clayey Silt	ML	stiff	120	3.2	6	3.720	1.957	2.61	0.91	0.57	10.1	2.96		6				0.99	2.3
19.20	63.0	18.03	2.53	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	6	3.750	1.972	3.20	0.93	0.56	9.6	3.03		6				0.94	2.2
19.35	63.5	20.05	2.21	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	6	3.780	1.986	2.72	0.90	0.57	10.7	2.95		6				1.06	2.5
19.51	64.0	24.60	1.64	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	7	3.810	2.000	1.94	0.85	0.58	13.5	2.78		7				1.33	3.1
19.66	64.5	19.55	2.52	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.1	6	3.840	2.015	3.13	0.92	0.55	10.2	3.00		6				1.03	2.3
19.81	65.0	26.51	3.26	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	8	3.870	2.029	3.82	0.90	0.56	13.9	2.94		8				1.44	3.3
19.96	65.5	16.35	2.46	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	6	3.900	2.044	3.23	0.95	0.54	8.3	3.08		6				0.84	1.8
20.12	66.0	16.53	2.71	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.9	6	3.930	2.058	3.55	0.95	0.53	8.3	3.11		6				0.85	1.8
20.27	66.5	30.95	1.80	Sandy Silt to Clayey Silt	ML	very stiff	120	3.7	8	3.960	2.072	2.06	0.83	0.57	16.7	2.72		8				1.70	3.9
20.42	67.0	48.05	3.25	Sandy Silt to Clayey Silt	ML	hard	120	3.7	13	3.990	2.087	3.54	0.83	0.57	25.9	2.71		13				2.70	6.3
20.57	67.5	37.35	2.95	Sandy Silt to Clayey Silt	ML	hard	120	3.5	11	4.020	2.101	3.31	0.85	0.56	19.7	2.79		11				2.07	4.8
20.73	68.0	20.11	1.82	Sandy Silt to Clayey Silt	ML	very stiff	120	3.3	6	4.050	2.116	2.28	0.90	0.54	10.2	2.92		6				1.06	2.3
20.88	68.5	16.55	1.75	Sandy Silt to Clayey Silt	ML	stiff	120	3.1	5	4.080	2.130	2.32	0.93	0.52	8.2	3.01		5				0.85	1.8
21.03	69.0	40.38	3.44	Clayey Silt to Silty Clay	ML/CL	hard	120	3.5	12	4.110	2.144	3.83	0.86	0.55	20.8	2.81		12				2.25	5.1
21.18	69.5	162.87	1.76	Sand to Silty Sand	SP/SM	medium dense	120	4.9	33	4.140	2.159	1.80	0.64	0.63	97.7	2.09	140.5	23	28	76	34		
21.34	70.0	44.33	3.23	Clayey Silt to Silty Clay	ML/CL	hard	120	3.6	12	4.170	2.173	3.56	0.84	0.55	22.9	2.76		12				2.48	5.5
21.49	70.5	148.09	3.65	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	34	4.200	2.188	3.76	0.72	0.59	82.8	2.37	182.7	23	37	69	34		
21.64	71.0	356.74	2.43	Silty Sand to Sandy Silt	SM/ML	dense	120	5.1	69	4.230	2.202	2.46	0.60	0.64	217.1	1.97	274.2	47	55	100	40		
21.79	71.5	217.04	3.35	Sand to Clayey Sand	SP/SC	dense	120	4.6	47	4.260	2.216	3.42	0.68	0.61	124.2	2.23	216.2	31	43	86	36		
21.95	72.0	160.55	2.26	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	34	4.290	2.231	2.32	0.67	0.61	92.3	2.19	150.6	23	30	74	34		
22.10	72.5	81.73	1.46	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	18	4.320	2.245	1.54	0.70	0.59	45.6	2.29	88.0	12	18	44	31		
22.25	73.0	32.12	1.86	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	9	4.350	2.260	2.16	0.84	0.53	16.0	2.75		9				1.76	3.7
22.40	73.5	23.92	2.78	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	8	4.380	2.274	3.41	0.92	0.50	11.2	2.99		8				1.27	2.6
22.56	74.0	123.33	0.84	Sand	SP	medium dense	120	5.1	24	4.410	2.288	0.87	0.61	0.63	73.0	1.98	93.2	16	19	64	32		
22.71	74.5	98.98	1.54	Sand to Silty Sand	SP/SM	medium dense	120	4.6	21	4.440	2.303	1.61	0.69	0.59	54.9	2.24	97.7	14	20	52	31		

Earth Systems
Pacific

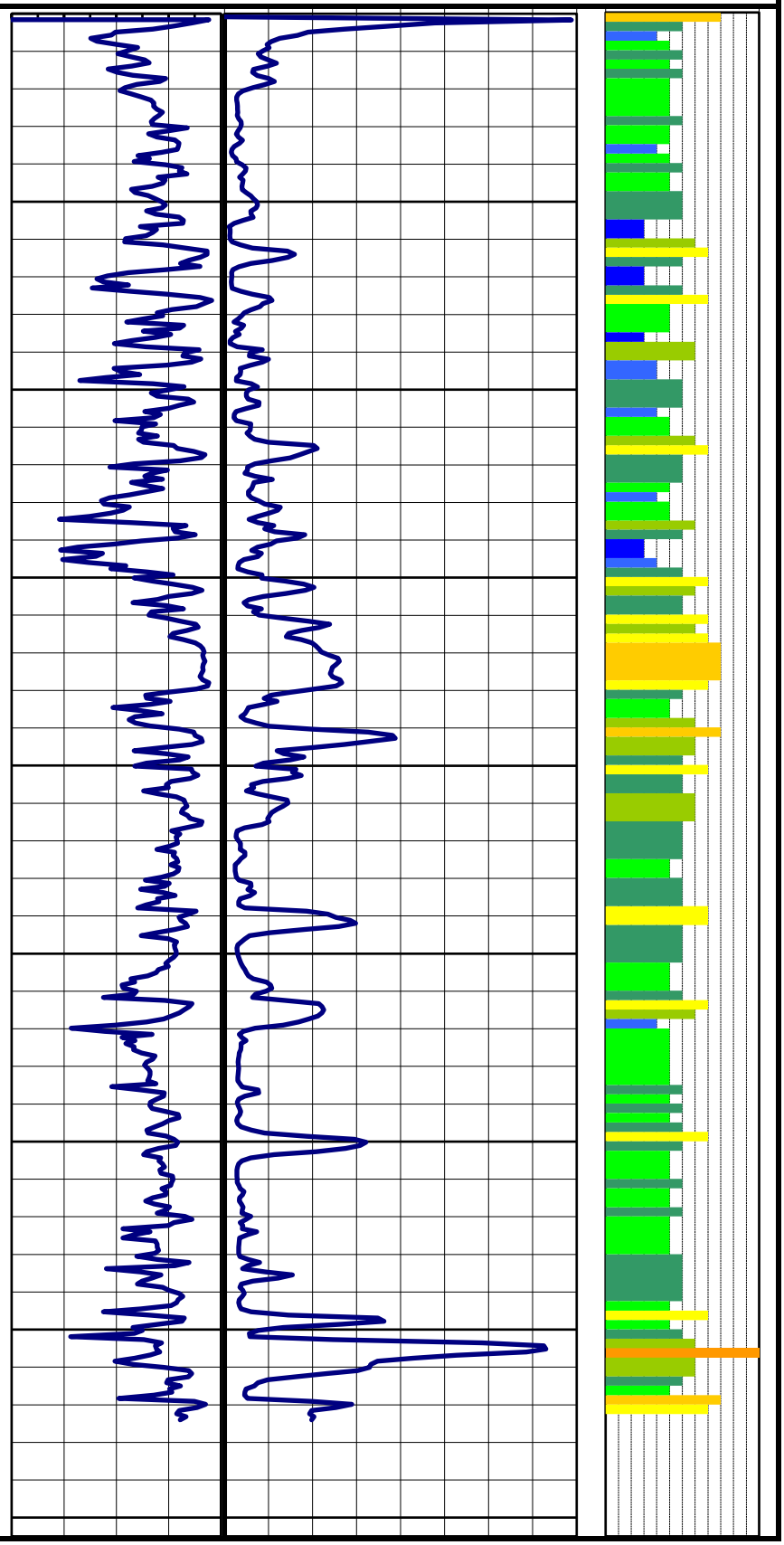
CPT No : CPT-4

Project Name: 101 Garden Street
Project No.: 305172-001
Location: See Site Exploration Plan

Cone Penetrometer: **Kehoe Testing & Engineering**
Truck Mounted Electric Cone
with 23-ton reaction weight
Date: 2/22/2022

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Sand	very dense
	Sandy Silt to Clayey Silt	dense
	Silty Clay to Clay	medium dense
	Clayey Silt to Silty Clay	medium dense
-- 5 -	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	medium dense
	Clayey Silt to Silty Clay	stiff
- 10 -	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	loose
	Clayey Silt to Silty Clay	loose
	Clayey Silt to Silty Clay	stiff
- 15 -	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	loose
	Sandy Silt to Clayey Silt	loose
	Clayey Silt to Silty Clay	loose
	Clayey Silt to Silty Clay	loose
- 20 -	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	loose
	Clay	firm
	Clay	firm
- 25 -	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	loose
	Clay	firm
	Clay	firm
- 30 -	Sandy Silt to Clayey Silt	medium dense
	Sand to Silty Sand	medium dense
	Clayey Silt to Silty Clay	loose
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
- 35 -	Clay	firm
	Silty Sand to Sandy Silt	loose
	Silty Sand to Sandy Silt	medium dense
	Silty Clay to Clay	very stiff
	Silty Clay to Clay	very stiff
- 40 -	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	loose
- 45 -	Clayey Silt to Silty Clay	loose
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	loose
- 50 -	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
	Silty Clay to Clay	hard
	Clayey Silt to Silty Clay	medium dense
	Clayey Silt to Silty Clay	medium dense
- 55 -	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clay	hard
	Clay	very stiff
	Silty Clay to Clay	very stiff
- 60 -	Sandy Silt to Clayey Silt	medium dense
	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	medium dense
- 65 -	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sand	medium dense
	Sand	medium dense
- 70 -	Sand	medium dense
	Sand	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
- 75 -	Clayey Silt to Silty Clay	very stiff
- 80 -		

End of Sounding @ 75 feet



Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-5 Plot: 5 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
0.15	0.5	187.92	0.59	Sand	SP	very dense	100	6.3	30	0.013	0.013	0.59	0.50	1.70	301.9	1.40	301.9	51	60	100	41		
0.30	1.0	386.96	0.44	Gravelly Sand to Sand	SW	very dense	110	6.8	57	0.039	0.039	0.44	0.50	1.70	621.8	1.10	621.8	96	124	100	47		
0.46	1.5	224.30	0.66	Sand	SP	very dense	100	6.3	36	0.065	0.065	0.66	0.50	1.70	360.4	1.38	360.4	61	72	100	42		
0.61	2.0	62.09	3.07	Sandy Silt to Clayey Silt	ML	medium dense	110	4.6	14	0.091	0.091	3.08	0.68	1.70	99.8	2.25	180.7	23	36	77	34		
0.76	2.5	23.42	3.50	Clayey Silt to Silty Clay	ML/CL	medium dense	110	3.9	6	0.119	0.119	3.52	0.79	1.70	37.6	2.59	123.0	10	25	36	30		
0.91	3.0	15.85	3.27	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	4	0.148	0.148	3.30	0.82	1.70	25.5	2.70		4				0.92	31.9
1.07	3.5	5.36	3.36	Clay	CL/CH	firm	120	3.0	2	0.178	0.178	3.47	0.94	1.70	8.6	3.09		2				0.30	8.8
1.22	4.0	5.44	4.13	Clay	CL/CH	firm	120	2.9	2	0.208	0.208	4.30	0.95	1.70	8.7	3.13		2				0.31	7.6
1.37	4.5	10.61	4.06	Clay	CL/CH	stiff	120	3.3	3	0.238	0.238	4.15	0.88	1.70	17.0	2.90		3				0.61	13.1
1.52	5.0	19.82	4.64	Clay	CL/CH	very stiff	120	3.7	5	0.268	0.268	4.70	0.83	1.70	31.8	2.73		5				1.15	21.9
1.68	5.5	18.02	4.85	Clay	CL/CH	very stiff	120	3.6	5	0.298	0.298	4.93	0.84	1.70	29.0	2.77		5				1.04	17.9
1.83	6.0	14.06	4.52	Clay	CL/CH	stiff	120	3.5	4	0.328	0.328	4.63	0.86	1.70	22.6	2.83		4				0.81	12.6
1.98	6.5	10.97	3.55	Silty Clay to Clay	CL	stiff	120	3.4	3	0.358	0.342	3.67	0.87	1.70	17.6	2.85		3				0.63	9.3
2.13	7.0	7.47	1.64	Clayey Silt to Silty Clay	ML/CL	firm	120	3.5	2	0.388	0.356	1.73	0.85	1.70	12.0	2.80		2				0.42	6.0
2.29	7.5	8.87	2.45	Silty Clay to Clay	CL	firm	120	3.5	3	0.418	0.371	2.57	0.86	1.70	14.3	2.83		3				0.50	6.8
2.44	8.0	18.10	1.65	Sandy Silt to Clayey Silt	ML	loose	120	4.2	4	0.448	0.385	1.70	0.75	1.70	29.1	2.48	76.9	7	15	26	29		
2.59	8.5	28.08	1.32	Sandy Silt to Clayey Silt	ML	loose	120	4.6	6	0.478	0.400	1.34	0.69	1.70	45.1	2.26	82.6	10	17	44	30		
2.74	9.0	26.58	1.21	Sandy Silt to Clayey Silt	ML	loose	120	4.6	6	0.508	0.414	1.24	0.69	1.70	42.7	2.26	77.9	9	16	42	30		
2.90	9.5	28.02	1.72	Sandy Silt to Clayey Silt	ML	loose	120	4.4	6	0.538	0.428	1.75	0.71	1.70	45.0	2.33	92.7	10	19	44	30		
3.05	10.0	10.75	4.25	Clay	CL/CH	stiff	120	3.3	3	0.568	0.443	4.49	0.89	1.70	17.3	2.91		3				0.61	6.9
3.20	10.5	21.64	3.10	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	5	0.598	0.457	3.19	0.79	1.70	34.8	2.59	112.9	8	23	33	29		
3.35	11.0	12.23	3.38	Silty Clay to Clay	CL	stiff	120	3.5	3	0.628	0.472	3.57	0.85	1.70	19.7	2.81		3				0.69	7.4
3.51	11.5	10.47	4.74	Clay	CL/CH	stiff	120	3.2	3	0.658	0.486	5.06	0.90	1.70	16.8	2.96		3				0.59	6.1
3.66	12.0	75.96	0.45	Sand to Silty Sand	SP/SM	medium dense	120	5.7	13	0.688	0.500	0.46	0.52	1.47	105.8	1.69	105.8	19	21	79	33		
3.81	12.5	34.52	2.71	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	8	0.718	0.515	2.77	0.73	1.69	55.2	2.40	127.1	11	25	52	30		
3.96	13.0	11.02	4.24	Clay	CL/CH	stiff	120	3.3	3	0.748	0.529	4.55	0.89	1.70	17.7	2.91		3				0.62	5.8
4.11	13.5	7.79	4.56	Clay	CL/CH	firm	120	3.0	3	0.778	0.544	5.07	0.93	1.70	12.5	3.06		3				0.43	3.9
4.27	14.0	18.84	1.92	Sandy Silt to Clayey Silt	ML	loose	120	4.1	5	0.808	0.558	2.00	0.77	1.63	29.1	2.52	83.2	6	17	26	29		
4.42	14.5	7.20	3.26	Clay	CL/CH	firm	120	3.1	2	0.838	0.572	3.69	0.92	1.70	11.6	3.00		2				0.39	3.3
4.57	15.0	6.06	4.03	Clay	CL/CH	firm	120	2.9	2	0.868	0.587	4.71	0.95	1.70	9.7	3.12		2				0.32	2.7
4.72	15.5	5.56	3.78	Clay	CL/CH	firm	120	2.9	2	0.898	0.601	4.50	0.96	1.70	8.9	3.14		2				0.29	2.3
4.88	16.0	5.21	2.51	Clay	CL/CH	firm	120	3.0	2	0.928	0.616	3.06	0.94	1.67	8.2	3.07		2				0.27	2.1
5.03	16.5	5.24	2.10	Silty Clay to Clay	CL	firm	120	3.1	2	0.958	0.630	2.57	0.93	1.62	8.0	3.04		2				0.27	2.0
5.18	17.0	5.52	2.38	Silty Clay to Clay	CL	firm	120	3.0	2	0.988	0.644	2.90	0.94	1.59	8.3	3.05		2				0.29	2.1
5.33	17.5	6.83	2.15	Silty Clay to Clay	CL	firm	120	3.2	2	1.018	0.659	2.53	0.91	1.54	9.9	2.96		2				0.36	2.6
5.49	18.0	11.07	3.01	Silty Clay to Clay	CL	stiff	120	3.4	3	1.048	0.673	3.32	0.88	1.49	15.5	2.87		3				0.61	4.5
5.64	18.5	13.12	2.50	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	4	1.078	0.688	2.72	0.84	1.44	17.8	2.77		4				0.73	5.3
5.79	19.0	22.09	2.32	Sandy Silt to Clayey Silt	ML	loose	120	4.0	6	1.108	0.702	2.45	0.78	1.38	28.8	2.57	91.5	7	18	25	29		
5.94	19.5	24.39	1.12	Sandy Silt to Clayey Silt	ML	loose	120	4.4	6	1.138	0.716	1.17	0.72	1.33	30.5	2.37	66.7	7	13	28	29		
6.10	20.0	10.54	1.39	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	3	1.168	0.731	1.56	0.84	1.36	13.6	2.73		3				0.58	3.8
6.25	20.5	13.20	2.97	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.5	4	1.198	0.745	3.26	0.86	1.35	16.9	2.83		4				0.73	4.8
6.40	21.0	41.93	2.12	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	10	1.228	0.760	2.18	0.72	1.27	50.3	2.36	108.0	11	22	48	30		
6.55	21.5	66.84	1.99	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	14	1.258	0.774	2.03	0.67	1.23	77.9	2.20	129.0	16	26	66	32		
6.71	22.0	30.78	3.85	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.8	8	1.288	0.788	4.02	0.80	1.27	36.8	2.64		8				1.76	11.2
6.86	22.5	14.64	2.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	4	1.318	0.803	2.35	0.84	1.26	17.4	2.74		4				0.81	5.0
7.01	23.0	26.18	2.64	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	7	1.348	0.817	2.79	0.79	1.23	30.3	2.59	99.7	7	20	27	29		
7.16	23.5	34.69	3.40	Clayey Silt to Silty Clay	ML/CL	loose	120	4.0	9	1.378	0.832	3.54	0.78	1.21	39.6	2.58	126.0	10	25	38	30		
7.32	24.0	33.04	3.23	Clayey Silt to Silty Clay	ML/CL	loose	120	3.9	8	1.408	0.846	3.38	0.79	1.19	37.2	2.58	119.7	9	24	36	30		
7.47	24.5	65.13	1.93	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	14	1.438	0.860	1.98	0.67	1.15	70.8	2.22	121.3	15	24	62	32		
7.62	25.0	80.81	2.45	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	17	1.468	0.875	2.50	0.68	1.14	86.9	2.23	150.9	19	30	71	33		
7.77	25.5	107.29	2.06	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.9	22	1.498	0.889	2.08	0.64	1.12	113.3	2.09	163.0	23	33	82	34		
7.92	26.0	127.23	1.76	Sand to Silty Sand	SP/SM	medium dense	120	5.1	25	1.528	0.904	1.79	0.61	1.10	132.4	2.00	171.4	26	34	88	35		
8.08	26.5	135.64	1.08	Sand to Silty Sand	SP/SM	medium dense	120	5.4	25	1.558	0.918	1.09	0.56	1.08	138.8	1.83	156.5	26	31	90	35		
8.23	27.0	122.62	0.84	Sand	SP	medium dense	120	5.5	22	1.588	0.932	0.85	0.55	1.07	124.2	1.79	136.7	23	27	86	34		
8.38	27.5	113.05	1.09	Sand to Silty Sand	SP/SM	medium dense	120	5.3	21	1.618	0.947	1.11	0.58	1.07	113.9	1.90	135.0	22	27	82	34		
8.53	28.0	119.21	1.37	Sand to Silty Sand	SP/SM	medium dense	120	5.2	23	1.648	0.961	1.39	0.59	1.06	119.3	1.95	147.8	23	30	84	34		
8.69	28.5	135.24	1.27	Sand to Silty Sand	SP/SM	medium dense	120	5.3	26	1.678	0.976	1.29	0.58	1.05	133.9	1.89	158.1	26	32	89	35		
8.84	29.0	122.76	1.41	Sand to Silty Sand	SP/SM	medium dense	120	5.2	24	1.708	0.990	1.43	0.60	1.04	120.7	1.96	150.4	24	30	85	34		
8.99	29.5	99.16	2.03	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	21	1.738	1.004	2.06	0.65	1.03	96.9	2.13	147.4	21	29	76	33		
9.14	30.0	29.78	3.04	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.8	8	1.768	1.019	3.23	0.81	1.03	29.0	2.65		8				1.69	8.2
9.30	30.5	26.73	1.91	Sandy Silt to Clayey Silt	ML	loose	120	4.0	7	1.798	1.033	2.05	0.78	1.02	25.7	2.57	80.5	7	16	21	29		
9.45	31.0	26.64	2.94	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.7	7	1.828	1.048	3.15	0.82	1.01	25.4	2.69		7				1.51	7.1
9.60	31.5	40.00	3.58	Clayey Silt to Silty Clay	ML/CL	hard	120	3.9	10	1.858	1.062	3.76	0.79	1.00	37.7	2.61		10				2.29	10.8
9.75	32.0	106.90	1.17	Sand to Silty Sand	SP/SM	medium dense	120	5.2	21	1.888	1.076	1.19	0.60	0.99	100.0	1.96	125.2	20	25	77	33		
9.91	32.5	98.14	1.05	Sand to Silty Sand	SP/SM	medium dense	120	5.2	19	1.918	1.091	1.07	0.60	0.98	91.1	1.96	114.0	18	23	73	33		
10.06	33.0	30.34	2.90	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.8	8	1.948	1.105	3.10	0.81	0.97	27.7	2.65		8				1.72	7.7
10.21	33.5	126.00	0.84	Sand	SP	medium dense	120	5.4	23	1.978	1.120	0.85	0.55	0.97	115.4	1.82	129.3	22	26	83	34		
10.36	34.0	129.84	1.06	Sand to Silty Sand	SP/SM	medium dense	120	5.3	24	2.008	1.134	1.08	0.57	0.96	118.0	1.88	137.7	23	28	84	34		
10.52	34.5	111.38	1.00	Sand to Silty Sand	SP/SM	medium dense	120	5.2	21	2.038	1.148	1.02	0.58	0.95	100.4	1.92	120.8	20	24	77	33		
10.67	35.0	71.48	1.62	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	15	2.068	1.163	1.67	0.67	0.94	63.4	2.21	106.6	14	21	58	31		
10.82	35.5	22.62	3.08	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	6	2.098	1.177	3.39	0.85	0.91	19.5	2.80		6				1.26	5.2
10.97	36.0	33.18	1.42	Silty Sand to Sandy Silt	SM/ML	loose	120	4.2	8	2.128	1.192	1.52	0.75	0.92	28.7	2.45	72.8	7	15	25	29		
11.13	36.5	23.87	3.01	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.6	7	2.158	1.206	3.31	0.85	0.90	20.2	2.78		7				1.33	5.4
11.28	37.0	40.42	3.26	Clayey Silt to Silty Clay	ML/CL	hard	120	3.9	10	2.188	1.220	3.45	0.80	0.89	34.1	2.62		10				2.31	9.4
11.43	37.5	53.30	2.65	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	13	2.218	1.235	2.76	0.75	0.89	44.9	2.46	116.0	11	23	44	30		
11.58	38.0	50.48	2.50	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	12	2.248	1.249	2.61	0.75	0.88	42.1	2.47	109.8	11	22	41	30		
11.73	38.5	72.60	1.30	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	15	2.278	1.264	1.34	0.66	0.89	61.1	2.16	95.8	14	19	56	31		
11.89	39.0	78.28	1.26	Sand to Silty Sand	SP/SM	medium dense	120	4.8	16	2.308	1.278	1.30	0.65	0.88	65.5	2.13	98.4	14	20	59	31		
12.04	39.5	76.11	1.67	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	16	2.338	1.292	1.72	0.67	0.87	62.9	2.22	107.5	14	21	58	31		

Earth Systems Pacific

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 101 Garden Street Project No: 305172-001 Date: 02/22/22

CPT SOUNDING: CPT-5 Plot: 5 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **6.0** Shift SBT: 0 Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
12.19	40.0	91.30	1.79	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	19	2.368	1.307	1.84	0.66	0.87	75.0	2.18	121.4	17	24	65	32		
12.34	40.5	112.39	1.09	Sand to Silty Sand	SP/SM	medium dense	120	5.2	22	2.398	1.321	1.11	0.60	0.88	93.0	1.96	116.9	19	23	74	33		
12.50	41.0	77.70	1.26	Sand to Silty Sand	SP/SM	medium dense	120	4.8	16	2.428	1.336	1.30	0.65	0.86	63.1	2.14	96.3	14	19	58	31		
12.65	41.5	45.02	1.51	Silty Sand to Sandy Silt	SM/ML	loose	120	4.3	10	2.458	1.350	1.60	0.73	0.84	35.6	2.39	80.8	9	16	34	30		
12.80	42.0	13.72	2.16	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	4	2.488	1.364	2.64	0.91	0.79	10.3	2.95		4				0.73	2.5
12.95	42.5	11.27	1.99	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	4	2.518	1.379	2.57	0.93	0.78	8.3	3.03		4				0.58	1.9
13.11	43.0	10.68	2.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	4	2.548	1.393	2.81	0.94	0.77	7.8	3.07		4				0.55	1.8
13.26	43.5	13.34	2.63	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	4	2.578	1.408	3.26	0.93	0.77	9.7	3.03		4				0.70	2.3
13.41	44.0	16.75	2.16	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.4	5	2.608	1.422	2.55	0.88	0.77	12.2	2.89		5				0.90	3.0
13.56	44.5	10.31	2.18	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.9	4	2.638	1.436	2.93	0.96	0.75	7.3	3.11		4				0.52	1.6
13.72	45.0	10.87	2.18	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	4	2.668	1.451	2.88	0.95	0.74	7.6	3.09		4				0.55	1.7
13.87	45.5	16.47	2.39	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.3	5	2.698	1.465	2.86	0.90	0.75	11.6	2.93		5				0.88	2.8
14.02	46.0	28.02	2.62	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	8	2.728	1.480	2.90	0.84	0.76	20.0	2.75		8				1.56	5.1
14.17	46.5	73.28	1.51	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	16	2.758	1.494	1.57	0.68	0.79	54.8	2.24	96.4	13	19	52	31		
14.33	47.0	85.01	1.90	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	19	2.788	1.508	1.97	0.69	0.78	63.0	2.25	114.1	15	23	58	32		
14.48	47.5	74.99	2.40	Sandy Silt to Clayey Silt	ML	medium dense	120	4.4	17	2.818	1.523	2.50	0.72	0.77	54.5	2.37	119.7	14	24	52	31		
14.63	48.0	53.62	1.94	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.2	13	2.848	1.537	2.04	0.74	0.76	38.4	2.43	93.5	10	19	37	30		
14.78	48.5	14.81	2.09	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	5	2.878	1.552	2.60	0.91	0.71	9.9	2.97		5				0.78	2.3
14.94	49.0	14.04	1.84	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	4	2.908	1.566	2.32	0.91	0.70	9.3	2.96		4				0.73	2.1
15.09	49.5	18.26	1.80	Sandy Silt to Clayey Silt	ML	stiff	120	3.4	5	2.938	1.580	2.14	0.87	0.70	12.2	2.84		5				0.98	2.9
15.24	50.0	31.57	4.06	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.4	9	2.967	1.595	4.48	0.87	0.70	20.9	2.85		9				1.76	5.4
15.39	50.5	75.63	4.54	Clayey Silt to Silty Clay	ML/CL	medium dense	120	3.9	19	2.997	1.609	4.72	0.79	0.72	51.4	2.58	166.4	15	33	49	32		
15.54	51.0	76.60	4.82	Overconsolidated Soil	??	hard	120	3.9	20	3.027	1.623	5.02	0.79	0.71	51.6	2.60		20				4.41	13.6
15.70	51.5	97.42	3.66	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	23	3.057	1.638	3.78	0.74	0.72	66.6	2.44	164.7	18	33	60	33		
15.85	52.0	26.68	4.74	Clay	CL/CH	very stiff	120	3.2	8	3.087	1.652	5.36	0.91	0.67	16.8	2.97		8				1.47	4.3
16.00	52.5	29.19	5.20	Clay	CL/CH	very stiff	120	3.2	9	3.117	1.667	5.82	0.90	0.66	18.3	2.97		9				1.62	4.7
16.15	53.0	89.35	3.10	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	21	3.147	1.681	3.21	0.74	0.71	60.1	2.42	143.2	16	29	56	32		
16.31	53.5	92.20	3.33	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	22	3.177	1.695	3.45	0.74	0.71	61.5	2.43	150.6	17	30	57	32		
16.46	54.0	73.50	3.61	Sandy Silt to Clayey Silt	ML	medium dense	120	4.0	18	3.207	1.710	3.77	0.77	0.69	48.0	2.54	141.8	14	28	46	31		
16.61	54.5	26.67	3.22	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.4	8	3.237	1.724	3.66	0.88	0.65	16.4	2.87		8				1.47	4.1
16.76	55.0	16.27	3.22	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.0	5	3.267	1.739	4.03	0.95	0.63	9.6	3.09		5				0.85	2.2
16.92	55.5	15.46	3.10	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.9	5	3.297	1.753	3.94	0.95	0.62	9.0	3.10		5				0.81	2.1
17.07	56.0	15.68	3.33	Silty Clay to Clay	CL	stiff	120	2.9	5	3.327	1.767	4.23	0.96	0.61	9.1	3.12		5				0.82	2.1
17.22	56.5	15.42	3.54	Silty Clay to Clay	CL	stiff	120	2.8	5	3.357	1.782	4.52	0.96	0.60	8.8	3.14		5				0.80	2.0
17.37	57.0	22.51	4.13	Silty Clay to Clay	CL	very stiff	120	3.1	7	3.387	1.796	4.86	0.93	0.61	13.0	3.03		7				1.22	3.2
17.53	57.5	67.33	1.93	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.3	16	3.417	1.811	2.03	0.73	0.68	43.0	2.39	97.5	12	20	42	31		
17.68	58.0	23.54	3.72	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	7	3.447	1.825	4.36	0.91	0.61	13.5	2.99		7				1.28	3.3
17.83	58.5	14.41	3.43	Silty Clay to Clay	CL	stiff	120	2.8	5	3.477	1.839	4.52	0.98	0.58	7.9	3.18		5				0.74	1.8
17.98	59.0	15.59	2.81	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.9	5	3.507	1.854	3.63	0.95	0.59	8.6	3.10		5				0.81	2.0
18.14	59.5	26.87	3.80	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	8	3.537	1.868	4.37	0.90	0.60	15.2	2.95		8				1.47	3.7
18.29	60.0	24.15	4.45	Silty Clay to Clay	CL	very stiff	120	3.0	8	3.567	1.883	5.22	0.93	0.59	13.4	3.04		8				1.31	3.3
18.44	60.5	15.34	3.74	Silty Clay to Clay	CL	stiff	120	2.8	6	3.597	1.897	4.88	0.98	0.56	8.2	3.19		6				0.79	1.9
18.59	61.0	17.61	4.66	Clay	CL/CH	stiff	120	2.7	6	3.627	1.911	5.87	0.98	0.56	9.3	3.19		6				0.92	2.2
18.75	61.5	17.02	4.15	Silty Clay to Clay	CL	stiff	120	2.8	6	3.657	1.926	5.29	0.97	0.56	9.0	3.18		6				0.89	2.1
18.90	62.0	16.17	3.77	Silty Clay to Clay	CL	stiff	120	2.8	6	3.687	1.940	4.88	0.98	0.55	8.5	3.18		6				0.84	1.9
19.05	62.5	15.75	3.52	Silty Clay to Clay	CL	stiff	120	2.8	6	3.717	1.955	4.61	0.97	0.55	8.2	3.18		6				0.81	1.8
19.20	63.0	14.35	3.14	Silty Clay to Clay	CL	stiff	120	2.8	5	3.747	1.969	4.25	0.98	0.54	7.4	3.19		5				0.73	1.6
19.35	63.5	18.04	2.16	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	6	3.777	1.983	2.73	0.92	0.56	9.6	2.99		6				0.94	2.2
19.51	64.0	33.84	2.47	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	9	3.807	1.998	2.79	0.84	0.59	18.7	2.76		9				1.87	4.5
19.66	64.5	127.51	2.01	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.7	27	3.837	2.012	2.07	0.67	0.65	78.3	2.20	130.6	19	26	67	33		
19.81	65.0	167.56	2.32	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	35	3.867	2.027	2.38	0.66	0.65	103.2	2.16	162.6	25	33	78	35		
19.96	65.5	195.82	2.58	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	41	3.897	2.041	2.63	0.65	0.65	120.4	2.15	186.8	29	37	85	36		
20.12	66.0	209.09	2.96	Silty Sand to Sandy Silt	SM/ML	dense	120	4.7	44	3.927	2.055	3.02	0.66	0.64	127.2	2.18	206.1	31	41	87	36		
20.27	66.5	230.69	2.87	Silty Sand to Sandy Silt	SM/ML	dense	120	4.8	48	3.957	2.070	2.92	0.65	0.65	140.8	2.14	216.0	33	43	91	37		
20.42	67.0	256.73	2.87	Silty Sand to Sandy Silt	SM/ML	dense	120	4.9	53	3.987	2.084	2.91	0.64	0.65	156.9	2.11	231.8	37	46	96	38		
20.57	67.5	220.41	2.66	Silty Sand to Sandy Silt	SM/ML	dense	120	4.8	46	4.017	2.099	2.71	0.65	0.64	133.5	2.13	202.1	32	40	89	36		
20.73	68.0	143.47	4.56	Overconsolidated Soil	??	medium dense	120	4.2	34	4.047	2.113	4.69	0.75	0.60	80.9	2.45	205.6	24	41	68	34		
20.88	68.5	131.33	4.07	Overconsolidated Soil	??	medium dense	120	4.2	31	4.077	2.127	4.20	0.74	0.60	73.9	2.44	184.0	21	37	64	34		
21.03	69.0	66.30	4.31	Clayey Silt to Silty Clay	ML/CL	hard	120	3.7	18	4.107	2.142	4.60	0.82	0.56	35.2	2.69		18				3.77	8.7
21.18	69.5	80.22	3.83	Clayey Silt to Silty Clay	ML/CL	medium dense	120	3.9	20	4.137	2.156	4.04	0.79	0.57	43.3	2.59	140.8	14	28	42	31		
21.34	70.0	97.80	3.23	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	23	4.167	2.171	3.37	0.75	0.58	53.9	2.47	140.1	16	28	51	32		
21.49	70.5	85.40	3.07	Sandy Silt to Clayey Silt	ML	medium dense	120	4.1	21	4.197	2.185	3.23	0.76	0.58	46.5	2.50	128.2	14	26	45	31		
21.64	71.0	93.40	2.90	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	22	4.227	2.199	3.04	0.75	0.58	51.1	2.45	129.3	15	26	49	32		
21.79	71.5	140.28	4.01	Overconsolidated Soil	??	medium dense	120	4.3	33	4.257	2.214	4.13	0.74	0.58	76.9	2.43	186.0	22	37	66	34		
21.95	72.0	246.69	4.17	Sand to Clayey Sand	SP/SC	dense	120	4.5	54	4.287	2.228	4.25	0.69	0.60	139.2	2.27	260.5	36	52	91	38		
22.10	72.5	364.08	1.98	Sand to Silty Sand	SP/SM	dense	120	5.3	69	4.317	2.243	2.00	0.58	0.65	223.1	1.89	263.2	46	53	100	40		
22.25	73.0	244.51	3.05	Sand to Clayey Sand	SP/SC	dense	120	4.8	51	4.347	2.257	3.11	0.66	0.61	140.2	2.16	222.1	34	44	91	37		
22.40	73.5	115.50	5.11	Overconsolidated Soil	??	medium dense	120	4.0	29	4.377	2.271	5.31	0.78	0.55	60.0	2.58	191.7	19	38	56	33		
22.56	74.0	186.99	4.69	Overconsolidated Soil	??	medium dense	120	4.3	44	4.407	2.286	4.81	0.73	0.57	100.7	2.40	233.6	29	47	77	36		
22.71	74.5	307.66	2.17	Sand to Silty Sand	SP/SM	dense	120	5.1	60	4.437	2.300	2.21	0.60	0.63	182.0	1.98	231.3	40	46	100	38		

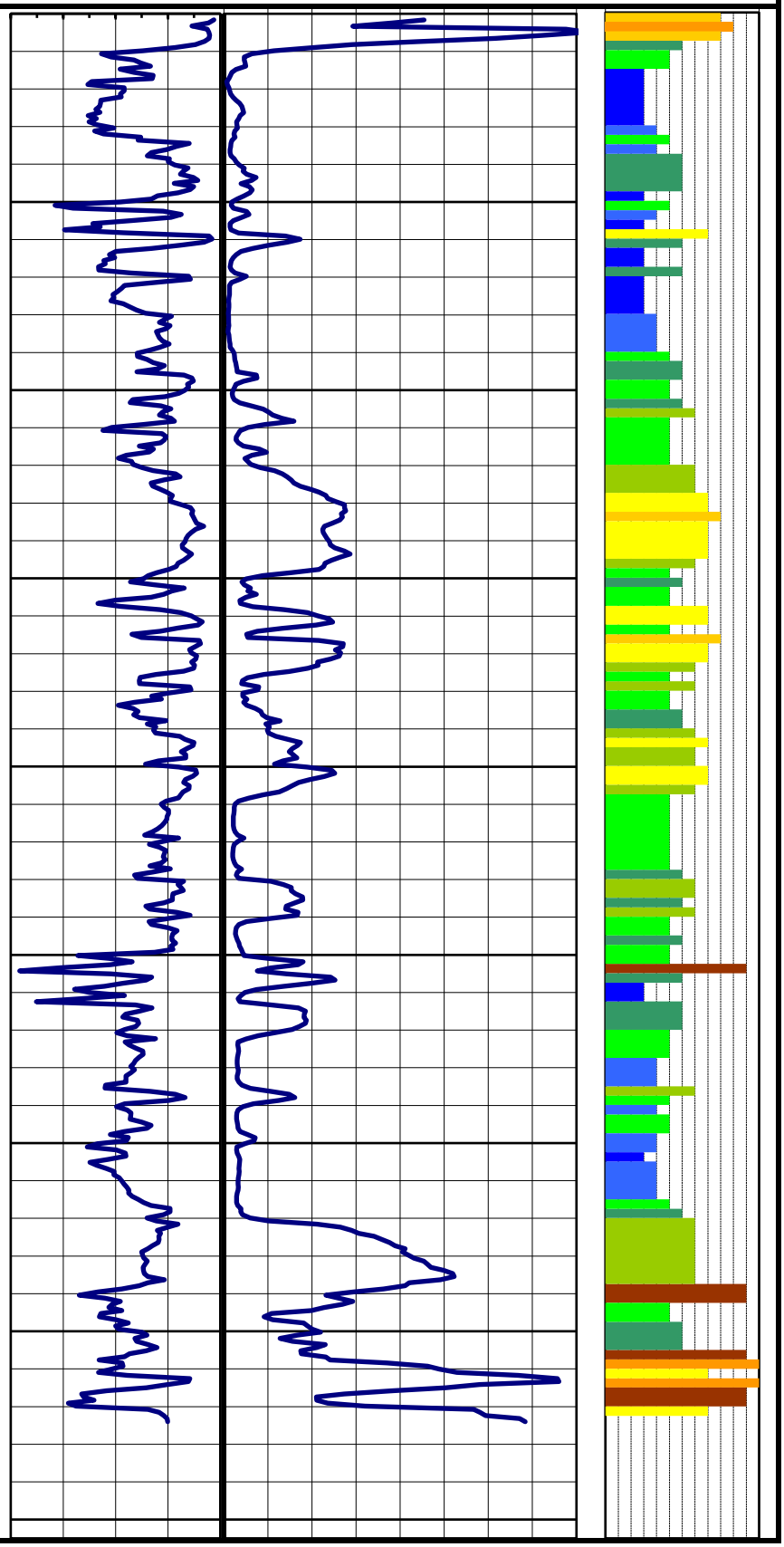
Earth Systems
Pacific

CPT No : CPT-5

Project Name: 101 Garden Street
Project No.: 305172-001
Location: See Site Exploration Plan

Cone Penetrometer: **Kehoe Testing & Engineering**
Truck Mounted Electric Cone
with 23-ton reaction weight
Date: 2/22/2022

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Sand	very dense
	Gravelly Sand to Sand	very dense
	Sand	very dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	medium dense
5	Clayey Silt to Silty Clay	stiff
	Clay	firm
	Clay	firm
	Clay	stiff
10	Clay	very stiff
	Clay	very stiff
	Clay	stiff
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	firm
15	Silty Clay to Clay	firm
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
20	Clay	stiff
	Clayey Silt to Silty Clay	loose
	Silty Clay to Clay	stiff
	Clay	stiff
	Sand to Silty Sand	medium dense
25	Sandy Silt to Clayey Silt	medium dense
	Clay	stiff
	Clay	firm
	Sandy Silt to Clayey Silt	loose
	Clay	firm
30	Clay	firm
	Clay	firm
	Clay	firm
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
35	Silty Clay to Clay	firm
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
40	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
45	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	loose
	Clayey Silt to Silty Clay	loose
	Clayey Silt to Silty Clay	loose
	Silty Sand to Sandy Silt	medium dense
50	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Sand	medium dense
55	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
60	Clayey Silt to Silty Clay	very stiff
	Sandy Silt to Clayey Silt	loose
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	hard
	Sand to Silty Sand	medium dense
65	Sand to Silty Sand	medium dense
	Clayey Silt to Silty Clay	very stiff
	Sand	medium dense
	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
70	Silty Sand to Sandy Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
	Silty Sand to Sandy Silt	loose
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	hard
75	Sandy Silt to Clayey Silt	medium dense
80	End of Sounding @ 75 feet	



305172-001 101 Garden Street

Latitude, Longitude: 34.4161, -119.6879

Date	2/25/2022, 9:33:35 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	E - Soft Clay Soil

Type	Value	Description
S_S	2.195	MCE_R ground motion. (for 0.2 second period)
S_1	0.795	MCE_R ground motion. (for 1.0s period)
S_{MS}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	null -See Section 11.4.8	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	null -See Section 11.4.8	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.964	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	1.06	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.195	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.508	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.967	Factored deterministic acceleration value. (0.2 second)
S1RT	0.795	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.907	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.947	Factored deterministic acceleration value. (1.0 second)
PGAd	1.185	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.875	Mapped value of the risk coefficient at short periods
C_{R1}	0.876	Mapped value of the risk coefficient at a period of 1 s

CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA

Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: 101 Garden Street
Job No: 305172-001
Date: 2/25/2022
Sounding: CPT-1

Liquefaction Analysis using 1998 NCEER (Robertson & Wride) method
Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Total Liquefied Thickness (feet)
16.7
Total Induced Subsidence (inches)
3.0

EARTHQUAKE INFORMATION:

Magnitude: 7 (7.5)
PGA, g: 1.060 (0.89)
MSF: 1.19
GWT, feet: 6.0
Calc GWT, feet: 6.0

Plot: 1
Method Used: 1 (1998 NCEER (Robertson & Wride))
Averaging Increment: 3 (0.15 m)
Induced CSR (M=7.5) = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR

Ignore 1st/last increment into sand/silt soils: 1 yes
Ignore/remediate upper: 0.0 m
Unit Weight of unsaturated soils: 115 pcf
Unit Weight of saturated soils: 130 pcf
Limiting Ic for liquefiable soils: 2.60
Limiting Ic for K_H: 2.6

Use Moss @ P_L: 15%
Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Required SF: 1.30
Max $\Delta N_{1(60)}$ - post liquefied: 5.5
Max $\Delta N_{1(60)}$ - non liquefied: 5.0
Min SF of Liquefiable Layers: 0.17
Avg SF of Liquefiable Layers: 0.25

Depth (feet)	(m)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio Rf %	qc MPa	Total Unit Wt. (pcf)	Total Stress po (tsf)	Eff. Stress p'o (tsf)	rd	F %	n	Max 1.70 Cq	Q	Moss qc1 MPa	Moss Δqc MPa	Moss qc_{1mod} MPa	Moss eff K_C	Qc1n	Ic	Override	Liquef. Suscept. (0 or 1)	Rel. Dens. Dr (%)	K_C	K_H	Clean Sand Qc1n	Clean Sand 1.0 Kσ	CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Qc1n $N_{1(60)}$ Ratio	Equiv. $N_{1(60)}$	FC Adj. $\Delta N_{1(60)}$	Equiv. $N_{1(60)cs}$	*Volumetric Strain (%)*
0.49	0.15	92.13	0.74	0.80	8.82	115	0.028	0.028	1.000	0.80	0.52	1.70	147.98	15.00	0.33	15.33	1.02	148.03	1.72		1	93	1.05	1.00	155.4	1.00	0.429	0.385	Non-Liq.	5.6	26.3	4.8	31.1	0.08
0.98	0.30	228.92	1.33	0.58	21.92	115	0.057	0.057	1.000	0.58	0.50	1.70	367.74	37.27	0.09	37.36	1.00	367.83	1.34		1	100	1.00	1.00	367.8	1.00	Infin.	0.385	Non-Liq.	6.4	57.7	5.0	62.7	0.01
1.48	0.45	202.10	3.62	1.79	19.35	115	0.085	0.085	0.999	1.79	0.54	1.70	324.59	32.90	1.42	34.32	1.04	324.73	1.76		1	100	1.08	1.00	349.7	1.00	Infin.	0.385	Non-Liq.	5.6	58.4	5.0	63.4	0.02
1.97	0.60	86.50	3.25	3.76	8.28	115	0.113	0.113	0.997	3.76	0.68	1.70	138.81	14.08	3.57	17.65	1.25	138.99	2.23		1	90	1.75	1.00	243.4	1.00	Infin.	0.384	Non-Liq.	4.6	30.0	5.0	35.0	0.07
2.46	0.75	50.09	2.18	4.35	4.80	115	0.141	0.141	0.996	4.36	0.74	1.70	80.26	8.15	4.22	12.37	1.52	80.49	2.43		1	68	2.44	1.00	196.6	1.00	Infin.	0.384	Non-Liq.	4.2	19.0	5.0	24.0	0.21
2.95	0.90	36.36	1.33	3.67	3.48	115	0.170	0.170	0.995	3.69	0.75	1.70	58.15	5.92	3.47	9.39		58.42	2.47		0			1.00		1.00		0.383	Non-Liq.	4.2	14.0			0.00
3.44	1.05	16.74	0.95	5.67	1.60	130	0.202	0.202	0.994	5.74	0.86	1.70	26.57	2.72	4.93	7.65		26.89	2.85		0			1.00		1.00		0.383	Non-Liq.	3.4	7.8			0.00
3.94	1.20	14.04	0.55	3.93	1.34	130	0.234	0.234	0.993	3.99	0.85	1.70	22.18	2.29	3.75	6.03		22.55	2.80		0			1.00		1.00		0.382	Non-Liq.	3.5	6.4			0.00
4.43	1.35	26.24	0.67	2.55	2.51	130	0.266	0.266	0.992	2.58	0.75	1.70	41.74	6.75	2.25	9.00		66.61	2.47		0			1.58		1.00		0.382	Non-Liq.	4.2	16.0			0.00
4.92	1.50	9.34	0.61	6.52	0.89	130	0.298	0.298	0.990	6.74	0.93	1.70	14.52	1.52	4.92	6.44		15.00	3.09		0			1.00		1.00		0.381	Non-Liq.	3.0	5.1			0.00
5.41	1.65	4.97	0.22	4.46	0.48	130	0.330	0.330	0.989	4.78	0.97	1.70	7.46	0.81	4.33	5.14		7.99	3.22		0			1.00		1.00		0.381	Non-Liq.	2.7	3.0			0.00
5.91	1.80	4.25	0.08	1.78	0.41	130	0.362	0.362	0.988	1.95	0.93	1.70	6.25	0.69	1.40	2.09		6.83	3.07		0			1.00		1.00		0.381	Non-Liq.	3.0	2.3			0.00
6.40	1.95	4.01	0.06	1.57	0.38	130	0.394	0.389	0.987	1.73	0.93	1.70	5.82	0.65	1.33	1.99		6.45	3.07		0			1.00		1.00		0.577	Non-Liq.	3.0	2.2			0.00
6.89	2.10	4.31	0.07	1.56	0.41	130	0.426	0.406	0.986	1.72	0.93	1.70	6.28	0.70	1.34	2.05		6.93	3.04		0			1.00		1.00		0.598	Non-Liq.	3.0	2.3			0.00
7.38	2.25	4.76	0.08	1.68	0.46	130	0.458	0.422	0.985	1.84	0.92	1.70	6.98	0.78	1.51	2.28		7.65	3.02		0			1.00		1.00		0.617	Non-Liq.	3.1	2.5			0.00
7.87	2.40	6.11	0.12	1.94	0.59	130	0.490	0.439	0.984	2.10	0.90	1.70	9.12	1.00	1.86	2.85		9.82	2.95		0			1.00		1.00		0.634	Non-Liq.	3.2	3.0			0.00
8.37	2.55	11.91	0.16	1.36	1.14	130	0.522	0.456	0.983	1.41	0.80	1.70	18.41	2.08	1.11	3.19		20.50	2.60		0			1.07		1.00		0.650	Non-Liq.	3.9	5.2			0.00
8.86	2.70	17.47	0.21	1.23	1.67	130	0.554	0.472	0.982	1.26	0.75	1.70	27.31	3.00	0.95	3.95	1.32	30.07	2.42		1	27	2.42	1.07	72.6	1.00	0.116	0.665	**0.17**	4.3	7.1	5.5	12.6	2.21
9.35	2.85	22.90	0.31	1.37	2.19	130	0.586	0.489	0.981	1.40	0.73	1.70	36.02	3.65	1.14	4.79	1.31	39.43	2.35		1	38	2.12	1.07	83.7	1.00	0.135	0.679	**0.20**	4.4	9.0	5.5	14.5	2.00
9.84	3.00	15.28	0.30	1.94	1.46	130	0.618	0.505	0.979	2.00	0.80	1.70	23.73	2.46	1.89	4.35	1.77	26.30	2.59		1	21	3.26	1.07	85.7	1.00	0.139	0.691	**0.20**	3.9	6.7	5.5	12.2	2.26
10.33	3.15	29.07	0.25	0.85	2.78	130	0.650	0.522	0.978	0.87	0.67	1.61	43.38	4.56	0.47	5.02		47.32	2.17		0			1.07		1.00		0.703	Non-Liq.	4.8	10.0			0.00
10.83	3.30	9.08	0.24	2.59	0.87	130	0.682	0.539	0.977	2.76	0.89	1.70	13.73	1.40	2.79	4.20		14.60	2.86		0			1.00		1.00		0.714	Non-Liq.	3.4	4.3			0.00
11.32	3.45	4.94	0.15	3.04	0.47	130	0.714	0.555	0.976	3.43	0.98	1.70	7.05	0.80	3.40	4.21		7.94	3.16		0			1.00		1.00		0.725	Non-Liq.	2.8	2.8			0.00
11.81	3.60	5.79	0.12	2.14	0.55	130	0.746	0.572	0.975	2.37	0.93	1.70	8.39	0.94	2.20	3.14		9.31	3.00		0			1.00		1.00		0.734	Non-Liq.	3.1	3.0			0.00
12.30	3.75	45.10	0.20	0.44	4.32	130	0.778	0.589	0.974	0.45	0.59	1.41	59.33	7.28	0.00	7.28		69.29	1.91		0			1.15		1.00		0.744	Non-Liq.	5.3	13.2			0.00
12.80	3.90	49.82	0.35	0.70	4.77	130	0.810	0.605	0.973	0.71	0.61	1.40	65.25	7.48	0.27	7.75	1.04	76.14	1.97		1	66	1.26	1.15	96.3	1.00	0.163	0.752	**0.22**	5.1	14.8	4.4	19.3	1.58
13.29	4.05	22.98	0.39	1.71	2.20	130	0.842	0.622	0.972	1.76	0.76	1.50	31.63	3.38	1.65	5.02	1.49	37.47	2.46		1	36	2.55	1.15	95.7	1.00	0.161	0.760	**0.21**	4.2	8.9	5.5	14.4	2.01
13.78	4.20	22.00	0.47	2.15	2.11	130	0.874	0.638	0.971	2.21	0.78	1.49	29.98	3.15	2.24	5.40		35.59	2.53		0			1.15		1.00		0.768	Non-Liq.	4.0	8.8			0.00
14.27	4.35	20.17	0.55	2.73	1.93	130	0.906	0.655	0.970	2.82	0.81	1.48	27.24	2.46	3.04	5.50		28.15	2.63		0			1.00		1.00		0.775	Non-Liq.	3.8	7.3			0.00
14.76	4.50	16.44	0.41	2.49	1.57	130	0.938	0.672	0.969	2.60	0.83	1.46	21.72	2.03	2.72	4.75		22.65	2.69		0			1.00		1.00		0.781	Non-Liq.	3.7	6.1			0.00
15.26	4.65	38.86	0.49	1.26	3.72	130	0.969	0.688	0.968	1.28	0.68	1.34	48.40	5.82	1.04	6.86		62.30	2.22		0			1.26		1.00		0.788	Non-Liq.	4.6	13.4			0.00
15.75	4.80	32.00	0.58	1.83	3.06	130	1.001	0.705	0.967	1.87	0.74	1.35	39.87	4.70	1.82	6.52	1.39	51.55	2.39		1	49	2.28	1.26	117.4	1.00	0.231	0.793	**0.29**	4.3	11.9	5.5	17.4	1.74
16.24	4.95	31.63	0.56	1.76	3.03	130	1.033	0.722	0.966	1.80	0.73	1.32	38.69	4.60	1.73	6.33		50.07	2.39		0			1.26		1.00		0.799	Non-Liq.	4.3	11.6			0.00
16.73	5.10	9.57	0.46	4.85	0.92	130	1.065	0.738	0.965	5.26	0.95	1.41	11.75	1.15	5.99	7.14		12.73	3.09		0			1.00		1.00		0.804	Non-Liq.	3.0	4.3			0.00
17.22	5.25	8.19	0.29	3.54	0.78	130	1.097	0.755	0.964	3.89	0.95	1.38	9.67	1.00	4.19	5.18		10.65	3.07		0			1.00		1.00		0.809	Non-Liq.	3.0	3.6			0.00
17.72	5.40	7.77	0.24	3.14	0.74	130	1.129	0.772	0.962	3.49	0.95	1.35	8.92	0.94	3.65	4.59		9.90	3.08		0			1.00		1.00		0.814	Non-Liq.	3.0	3.3			0.00
18.21	5.55	9.44	0.24	2.49	0.90	130	1.161	0.788	0.961	2.72	0.91	1.31	10.68	1.11	2.76	3.87		11.65	2.95		0			1.00		1.00		0.818	Non-Liq.	3.2	3.6			0.00
18.70	5.70	28.36	0.38	1.35	2.72	130	1.193	0.805	0.960	1.39	0.73	1.22	31.82	4.97	1.18	6.14		51.74	2.39		0			1.58		1.00		0.822	Non-Liq.	4.3	12.0			0.00
19.19	5.85	14.29	0.48	3.39	1.37	130	1.225	0.821	0.959	3.60	0.88	1.25	15.91	1.57	4.01	5.59		16.88	2.88		0			1.00		1.00		0.826	Non-Liq.	3.4	5.0			0.00
19.69	6.00	11.27	0.36	3.21	1.08	130	1.257	0.838	0.958	3.47	0.91	1.24	12.18	1.25	3.76	5.01		13.16	2.96		0			1.00		1.00		0.830	Non-Liq.	3.2	4.1			0.00
20.18	6.15	7.82	0.21	2.68	0.75	130	1.289	0.855	0.956	3.01	0.94	1.22	8.05	0.88	3.03	3.91		9.04	3.08		0			1.00		1.00		0.833	Non-Liq.	3.0	3.0			0.00
20.67	6.30	6.95	0.14	1.95	0.67	130	1.321	0.871	0.955	2.23	0.94	1.20	6.89	0.78	2.02	2.80		7.87	3.06		0			1.00		1.00		0.837	Non-Liq.	3.0	2.6			0.00
21.16	6.45	8.11	0.17	2.12	0.78	130	1.353	0.888	0.954	2.39	0.92	1.18	8.02	0.89	2.26	3.15		9.01	3.02		0			1.00		1.00		0.840	Non-Liq.	3.1	2.9			0.00
21.65	6.60	58.66	0.35	0.61	5.62	130	1.385	0.905	0.952	0.61	0.60	1.10	59.97	7.06	0.15	7.21		70.21	1.97		0			1.15		1.00		0.843	Non-Liq.	5.1	13.7			0.00
22.15	6.75	75.79	0.62	0.81	7.26	130	1.417	0.921	0.951	0.82	0.59	1.09	76.83	8.93	0.44	9.37	1.05	89.65	1.95		1	72	1.24	1.15	111.0	1.00	0.207	0.845	**0.25**	5.2	17.3	4.9	22.2	1.38
22.64	6.90	53.79	0.65	1.22	5.15	130	1.449	0.938	0.950	1.24	0.66	1.08	54.11	6.27	1.00	7.27	1.16	63.48	2.18		1	58	1.61	1.15	102.3	1.00	0.180	0.848	**0.21**	4.7	13.4	5.5	18.9	1.63
23.13	7.05	29.02	0.56	1.94	2.78	130	1.481	0.955	0.948	2.01	0.77	1.08	28.71	3.37	2.02	5.38		34.22	2.52		0			1.15		1.00		0.850	Non-Liq.	4.1	8.4			0.00

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress			F		Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	Liquefac. Safety	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	*Volumetric Strain*
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	Factor	Ratio	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	*(%)*
23.62	7.20	16.19	0.42	2.58	1.55	130	1.513	0.971	0.946	2.74	0.86	1.08	15.48	1.63	2.91	4.53		16.47	2.82		0			1.00		1.00		0.852	**Non-Liq.**	3.5	4.7			**0.00**
24.11	7.35	9.59	0.26	2.69	0.92	130	1.545	0.988	0.945	3.00	0.93	1.07	8.67	0.96	3.07	4.03		9.66	3.05		0			1.00		1.00		0.854	**Non-Liq.**	3.0	3.2			**0.00**
24.61	7.50	10.86	0.23	2.11	1.04	130	1.577	1.004	0.943	2.32	0.89	1.05	9.76	1.08	2.25	3.33		10.75	2.94		0			1.00		1.00		0.856	**Non-Liq.**	3.2	3.3			**0.00**
25.10	7.65	8.01	0.19	2.35	0.77	130	1.609	1.021	0.941	2.69	0.94	1.03	6.83	0.79	2.59	3.37		7.83	3.11		0			1.00		1.00		0.857	**Non-Liq.**	2.9	2.7			**0.00**
25.59	7.80	7.85	0.14	1.84	0.75	130	1.641	1.038	0.940	2.12	0.93	1.02	6.55	0.76	1.88	2.64		7.55	3.07		0			1.00		1.00		0.859	**Non-Liq.**	3.0	2.5			**0.00**
26.08	7.95	39.04	0.25	0.65	3.74	130	1.673	1.054	0.938	0.66	0.66	1.00	35.98	4.32	0.21	4.52		42.63	2.18		0			1.15		1.00		0.860	**Non-Liq.**	4.7	9.0			**0.00**
26.57	8.10	65.97	0.61	0.92	6.32	130	1.705	1.071	0.936	0.94	0.63	0.99	60.87	7.24	0.60	7.84	1.08	71.32	2.06		1	63	1.39	1.15	99.5	1.00	0.172	0.861	**0.20**	5.0	14.4	5.5	19.9	**1.55**
27.07	8.25	46.57	0.76	1.63	4.46	130	1.737	1.088	0.934	1.67	0.71	0.98	42.15	5.08	1.59	6.67	1.31	49.75	2.34		1	48	2.09	1.15	104.1	0.99	0.185	0.862	**0.21**	4.4	11.3	5.5	16.8	**1.81**
27.56	8.40	43.04	0.64	1.49	4.12	130	1.769	1.104	0.932	1.53	0.71	0.97	38.45	4.66	1.39	6.05		45.49	2.35		0			1.15		0.99		0.863	**Non-Liq.**	4.4	10.3			**0.00**
28.05	8.55	25.53	0.50	1.95	2.45	130	1.801	1.121	0.930	2.04	0.79	0.96	22.04	2.38	2.04	4.41		23.05	2.62		0			1.00		0.99		0.863	**Non-Liq.**	3.9	6.0			**0.00**
28.54	8.70	11.60	0.35	3.03	1.11	130	1.833	1.137	0.928	3.36	0.92	0.94	9.25	1.06	3.56	4.62		10.25	3.05		0			1.00		0.99		0.864	**Non-Liq.**	3.0	3.4			**0.00**
29.04	8.85	26.61	0.50	1.87	2.55	130	1.865	1.154	0.925	1.96	0.79	0.93	22.47	2.44	1.93	4.37		23.49	2.60		0			1.00		0.98		0.864	**Non-Liq.**	3.9	6.0			**0.00**
29.53	9.00	54.75	0.97	1.77	5.24	130	1.897	1.171	0.923	1.81	0.70	0.93	47.16	6.36	1.78	8.15		60.94	2.33		0			1.26		0.98		0.864	**Non-Liq.**	4.4	13.7			**0.00**
30.02	9.15	84.95	1.38	1.63	8.13	130	1.929	1.187	0.920	1.65	0.65	0.93	73.43	9.86	1.58	11.45		94.16	2.15		0			1.26		0.98		0.864	**Non-Liq.**	4.8	19.7			**0.00**
30.51	9.30	35.37	1.07	3.03	3.39	130	1.961	1.204	0.918	3.13	0.80	0.90	29.13	3.22	3.55	6.76		30.16	2.64		0			1.00		0.97		0.864	**Non-Liq.**	3.8	7.9			**0.00**
31.00	9.45	23.38	0.52	2.21	2.24	130	1.993	1.221	0.915	2.33	0.82	0.89	18.64	2.08	2.40	4.49		19.66	2.71		0			1.00		0.97		0.863	**Non-Liq.**	3.7	5.3			**0.00**
31.50	9.60	30.68	0.45	1.47	2.94	130	2.025	1.237	0.913	1.53	0.76	0.89	24.72	2.72	1.36	4.08		25.86	2.51		0			1.00		0.97		0.863	**Non-Liq.**	4.1	6.3			**0.00**
31.99	9.75	60.65	0.91	1.50	5.81	130	2.057	1.254	0.910	1.53	0.68	0.89	49.99	5.42	1.40	6.82	1.26	51.04	2.26		1	49	1.83	1.00	93.3	0.97	0.156	0.862	**0.17**	4.6	11.2	5.5	16.7	**1.82**
32.48	9.90	99.59	1.10	1.10	9.54	130	2.089	1.271	0.907	1.12	0.61	0.89	83.16	8.87	0.85	9.71	1.10	84.23	2.00		1	70	1.30	1.00	109.8	0.95	0.203	0.861	**0.22**	5.1	16.6	5.4	22.0	**1.40**
32.97	10.05	93.48	0.98	1.05	8.95	130	2.121	1.287	0.904	1.06	0.61	0.89	77.31	8.26	0.77	9.03	1.09	78.39	2.01		1	67	1.32	1.00	103.4	0.94	0.183	0.860	**0.20**	5.1	15.5	5.2	20.7	**1.49**
33.46	10.20	64.58	1.08	1.67	6.18	130	2.153	1.304	0.901	1.70	0.69	0.87	51.80	5.70	1.64	7.34	1.29	52.87	2.28		1	50	1.88	1.00	99.3	0.94	0.171	0.859	**0.19**	4.5	11.6	5.5	17.1	**1.77**
33.96	10.35	97.54	1.18	1.21	9.34	130	2.185	1.320	0.898	1.23	0.62	0.87	79.29	8.57	1.00	9.57	1.12	80.38	2.04		1	68	1.36	1.00	109.6	0.94	0.202	0.858	**0.22**	5.0	16.1	5.5	21.6	**1.43**
34.45	10.50	125.21	1.27	1.01	11.99	130	2.217	1.337	0.894	1.02	0.58	0.87	102.24	10.95	0.72	11.67	1.07	103.34	1.91		1	78	1.20	1.00	123.8	0.91	0.256	0.857	**0.27**	5.3	19.6	5.1	24.8	**1.22**
34.94	10.65	125.36	1.21	0.97	12.00	130	2.249	1.354	0.891	0.98	0.58	0.87	101.70	10.89	0.66	11.55	1.06	102.81	1.90		1	78	1.19	1.00	122.1	0.91	0.249	0.855	**0.26**	5.3	19.5	5.0	24.4	**1.24**
35.43	10.80	88.76	1.30	1.46	8.50	130	2.281	1.370	0.888	1.49	0.65	0.85	69.88	7.72	1.35	9.07	1.17	70.97	2.14		1	63	1.53	1.00	108.8	0.93	0.200	0.853	**0.22**	4.8	14.8	5.5	20.3	**1.52**
35.93	10.95	83.52	1.30	1.55	8.00	130	2.313	1.387	0.884	1.58	0.66	0.84	64.96	7.23	1.48	8.71	1.20	66.05	2.18		1	60	1.62	1.00	107.2	0.92	0.195	0.852	**0.21**	4.7	14.0	5.5	19.5	**1.58**
36.42	11.10	132.25	1.15	0.87	12.66	130	2.345	1.404	0.880	0.88	0.56	0.85	105.48	11.29	0.51	11.80	1.05	106.61	1.86		1	79	1.15	1.00	122.6	0.89	0.251	0.850	**0.26**	5.4	19.9	4.6	24.5	**1.24**
36.91	11.25	134.98	1.09	0.81	12.93	130	2.377	1.420	0.877	0.81	0.56	0.85	107.19	11.44	0.43	11.87	1.04	108.33	1.83		1	80	1.13	1.00	122.4	0.89	0.250	0.847	**0.26**	5.4	20.0	4.5	24.5	**1.24**
37.40	11.40	139.30	1.07	0.77	13.34	130	2.409	1.437	0.873	0.78	0.55	0.85	110.14	11.74	0.38	12.11	1.03	111.28	1.81		1	81	1.11	1.00	123.9	0.88	0.257	0.845	**0.27**	5.5	20.4	4.4	24.8	**1.22**
37.89	11.55	97.69	1.05	1.08	9.36	130	2.441	1.454	0.869	1.10	0.61	0.82	74.84	8.23	0.81	9.04	1.10	75.97	2.03		1	65	1.35	1.00	102.2	0.91	0.179	0.843	**0.19**	5.0	15.1	5.3	20.4	**1.51**
38.39	11.70	66.26	1.12	1.69	6.35	130	2.473	1.470	0.865	1.73	0.69	0.80	48.76	5.59	1.66	7.25	1.30	49.87	2.30		1	48	1.96	1.00	97.6	0.94	0.167	0.840	**0.19**	4.5	11.1	5.5	16.6	**1.82**
38.88	11.85	47.48	0.94	1.98	4.55	130	2.505	1.487	0.861	2.05	0.74	0.78	33.78	3.96	2.07	6.03		34.87	2.47		0			1.00		0.93		0.838	**Non-Liq.**	4.2	8.4			**0.00**
39.37	12.00	17.66	0.54	3.04	1.69	130	2.537	1.503	0.857	3.32	0.89	0.73	11.18	1.41	3.53	4.94		12.22	2.98		0			1.00		0.93		0.835	**Non-Liq.**	3.2	3.9			**0.00**
39.86	12.15	39.30	0.65	1.64	3.76	130	2.569	1.520	0.852	1.71	0.75	0.76	27.23	3.20	1.59	4.79		28.43	2.50		0			1.00		0.93		0.832	**Non-Liq.**	4.1	6.9			**0.00**
40.35	12.30	135.78	1.41	1.04	13.00	130	2.601	1.537	0.848	1.05	0.58	0.81	102.18	11.29	0.75	12.04	1.07	103.35	1.92		1	78	1.21	1.00	124.6	0.86	0.260	0.829	**0.27**	5.2	19.7	5.2	24.9	**1.21**
40.85	12.45	182.44	2.21	1.21	17.47	130	2.633	1.553	0.843	1.22	0.57	0.80	137.61	15.37	0.99	16.36	1.06	138.79	1.87		1	90	1.16	1.00	160.7	0.86	Infin.	0.826	**Non-Liq.**	5.3	26.0	5.0	31.0	**0.00**
41.34	12.60	187.07	2.60	1.39	17.91	130	2.665	1.570	0.839	1.40	0.58	0.80	139.66	15.82	1.23	17.05	1.08	140.85	1.90		1	91	1.19	1.00	167.9	0.85	Infin.	0.823	**Non-Liq.**	5.3	26.7	5.0	31.7	**0.00**
41.83	12.75	200.60	2.86	1.42	19.21	130	2.697	1.587	0.834	1.43	0.57	0.79	149.14	16.97	1.28	18.24	1.08	150.33	1.89		1	94	1.18	1.00	177.5	0.85	Infin.	0.819	**Non-Liq.**	5.3	28.4	5.0	33.4	**0.00**
42.32	12.90	209.06	2.93	1.40	20.02	130	2.729	1.603	0.830	1.41	0.57	0.79	154.85	17.63	1.25	18.88	1.07	156.05	1.87		1	95	1.17	1.00	181.9	0.85	Infin.	0.816	**Non-Liq.**	5.3	29.3	5.0	34.3	**0.00**
42.81	13.05	197.19	2.71	1.37	18.88	130	2.761	1.620	0.825	1.38	0.57	0.78	144.89	16.53	1.21	17.74	1.07	146.09	1.89		1	93	1.18	1.00	172.1	0.84	Infin.	0.812	**Non-Liq.**	5.3	27.6	5.0	32.6	**0.00**
43.31	13.20	173.71	2.41	1.39	16.63	130	2.793	1.637	0.820	1.40	0.58	0.77	126.02	14.47	1.22	15.69	1.08	127.22	1.93		1	87	1.22	1.00	155.6	0.84	0.430	0.809	**0.45**	5.2	24.4	5.5	29.9	**0.84**
43.80	13.35	117.54	1.88	1.60	11.26	130	2.825	1.653	0.816	1.62	0.64	0.75	82.48	9.69	1.52	11.21		83.65	2.11		0			1.00		0.91		0.805	**Non-Liq.**	4.9	17.2			**0.00**
44.29	13.50	33.52	1.11	3.30	3.21	130	2.857	1.670	0.811	3.47	0.83	0.69	20.64	2.68	3.85	6.53		21.72	2.78		0			1.00		0.91		0.801	**Non-Liq.**	3.6	6.1			**0.00**
44.78	13.65	24.71	0.52	2.09	2.37	130	2.889	1.686	0.806	2.25	0.83	0.68	14.80	1.87	2.19	4.06		15.88	2.79		0			1.00		0.91		0.797	**Non-Liq.**	3.5	4.5			**0.00**
45.28	13.80	16.40	0.35	2.15	1.57	130	2.921	1.703	0.801	2.39	0.88	0.66	9.13	1.19	2.26	3.45		10.19	2.98		0			1.00		0.91		0.793	**Non-Liq.**	3.2	3.2			**0.00**
45.77	13.95	35.79	0.55	1.55	3.43	130	2.953	1.720	0.796	1.63	0.76	0.69	22.24	3.82	1.44	5.26		32.86	2.56		0			1.41		0.91		0.789	**Non-Liq.**	4.0	8.2			**0.00**
46.26	14.10	19.15	0.57	3.00	1.83	130	2.985	1.736	0.791	3.30	0.89	0.64	10.61	1.43	3.42	4.85		11.66	3.00		0			1.00		0.91		0.785	**Non-Liq.**	3.1	3.7			**0.00**
46.75	14.25	22.16	0.49	2.22	2.12	130	3.017	1.753	0.786	2.41	0.85	0.65	12.57	1.64	2.34	3.98		13.65	2.86		0			1.00		0.90		0.781	**Non-Liq.**	3.4	4.0			**0.00**
47.24	14.40	54.30	0.92	1.70	5.20	130	3.049	1.770	0.781	1.75	0.72	0.69	34.21	4.86	1.63	6.49		40.76	2.43		0			1.15		0.90		0.777	**Non-Liq.**	4.2	9.6			**0.00**
47.74	14.55	64.79	1.03	1.59	6.20	130	3.081	1.786	0.776	1.64	0.70	0.69	41.26	5.81	1.49	7.30		48.91	2.34		0			1.15		0.90		0.773	**Non-Liq.**	4.4	11.1			**0.00**
48.23	14.70	33.31	0.78	2.33	3.19	130	3.113	1.803	0.771	2.46	0.80	0.65	19.39	2.53	2.49	5.01		20.50	2.71		0			1.00		0.90		0.769	**Non-Liq.**	3.7	5.6			**0.00**
48.72	14.85	61.63	0.82	1.34	5.90	130	3.145	1.819	0.766	1.38	0.69	0.69	38.82	4.78	1.14	5.92		40.83	2.32		0			1.02		0.90		0.765	**Non-Liq.**	4.5	9.2			**0.00**
49.21	15.00	65.42	1.17	1.80	6.26	130	3.177	1.836	0.761	1.85	0.71	0.68	40.61	5.19	1.76	6.94	1.34	42.65	2.38		1	41	2.24	1.02	95.6	0.90	0.161	0.760	**0.19**	4.3	9.8	5.5	15.3	**1.92**
49.70	15.15	132.78	1.70	1.28	12.72	130	3.209	1.853	0.756	1.30	0.61	0.71	87.94	10.65	1.05	11.70	1.10	91.02	2.03		1	73	1.34	1.02	121.5	0.80	0.247	0.756	**0.26**	5.0	18.1	5.5	23.6	**1.28**
50.20	15.30	132.44	2.13	1.61	12.68	130	3.241	1.869	0.751	1.63	0.63	0.70	86.18	10.76	1.50	12.26	1.14	89.22	2.10		1	72	1.45	1.02	129.7	0.80	0.283	0.752	**0.30**	4.9	18.3	5.5	23.8	**1.27**
50.69	15.45	159.69	2.14	1.34	15.29	130	3.273	1.886	0.746	1.36	0.60	0.71	105.64	12.89	1.13	14.02	1.09	109.10	1.98		1	80	1.27	1.02	139.1	0.79	0.330	0.747	**0.35**	5.1	21.3	5.5	26.8	**1.09**
51.18	15.60	127.87	1.84	1.44	12.24	130	3.305	1.903	0.741	1.46	0.63	0.69	82.49	10.23	1.27	11.50		85.46	2.08		0			1.02		0.89		0.743	**Non-Liq.**	4.9	17.4			**0.00**
51.67	15.75	48.66	1.57	3.23	4.66	130	3.337	1.919	0.736	3.36	0.79	0.62	27.53	3.79	3.67	7.46		28.66	2.68		0			1.00		0.89		0.739	**Non-Liq.**	3.8	7.6			**0.00**
52.17	15.90	21.84	0.85	3.91	2.09	130	3.369	1.936	0.731	4.29	0.90	0.58	10.92	1.59	4.58	6.18		11.98	3.06		0			1.00		0.89		0.735	**Non-Liq.**	3.0	4.0			**0.00**
52.66	16.05	38.07	0.50	1.31	3.65	130	3.401	1.953	0.726	1.38	0.75	0.63	21.55	3.41	1.08	4.49		28.72	2.53		0			1.26		0.88		0.730	**Non-Liq.**	4.0	7.1			**0.00**
53.15	16.20	111.06	0.82	0.74	10.63	130	3.433	1.969	0.721	0.75	0.59	0.69	71.57	10.19	0.32	10.51	1.03	92.13	1.95		1	73	1.24	1.26	114.4	0.78	0.219	0.726	**0.24**	5.2	17.8	5.1	22.9	**1.32**
53.64	16.35	70.31	1.01	1.44	6.73	130	3.465	1.986	0.716	1.48	0.69	0.65	41.83	6.62	1.26	7.88		54.43	2.31		0			1.26		0.88		0.722	**Non-Liq.**	4.5	12.2			**0.00**
54.13	16.50	17.50	0.70	3.99	1.68	130	3.497	2.002	0.712	4.51	0.93	0.55	8.08	1.22	4.66	5.88		9.13	3.17		0			1.00		0.88		0.718	**Non-Liq.**	2.8	3.3			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	**Liquefac. Safety**	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	***Volumetric Strain***
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	**Factor**	Ratio	$N_{1(60)}$	$ΔN_{1(60)}$	$N_{1(60)cs}$	***(%)***
54.63	16.65	16.48	0.20	1.22	1.58	130	3.529	2.019	0.707	1.39	0.86	0.58	7.87	1.03	0.95	1.99		8.96	2.91		0			1.00		0.88		0.714	**Non-Liq.**	3.3	2.7			**0.00**
55.12	16.80	14.21	0.08	0.54	1.36	130	3.561	2.036	0.702	0.63	0.83	0.58	6.68	0.80	0.05	0.85		7.79	2.83		0			1.00		0.88		0.709	**Non-Liq.**	3.5	2.3			**0.00**
55.61	16.95	16.17	0.12	0.73	1.55	130	3.593	2.052	0.698	0.83	0.83	0.58	7.70	0.95	0.30	1.25		8.82	2.82		0			1.00		0.88		0.705	**Non-Liq.**	3.5	2.5			**0.00**
56.10	17.10	16.33	0.19	1.16	1.56	130	3.625	2.069	0.693	1.33	0.86	0.56	7.60	1.00	0.87	1.87		8.70	2.92		0			1.00		0.87		0.701	**Non-Liq.**	3.3	2.6			**0.00**
56.59	17.25	46.09	0.52	1.12	4.41	130	3.656	2.086	0.689	1.17	0.72	0.61	25.49	3.65	0.82	4.47		30.77	2.43		0			1.15		0.87		0.697	**Non-Liq.**	4.2	7.3			**0.00**
57.09	17.40	162.16	0.95	0.58	15.53	130	3.688	2.102	0.684	0.59	0.53	0.69	104.97	13.16	0.11	13.27	1.01	122.58	1.76		1	85	1.08	1.15	131.8	0.76	0.293	0.693	**0.32**	5.6	22.0	4.3	26.4	**1.11**
57.58	17.55	138.56	1.58	1.14	13.27	130	3.720	2.119	0.680	1.16	0.60	0.66	84.86	11.88	0.84	12.72	1.07	99.33	2.01		1	77	1.31	1.15	129.8	0.76	0.284	0.689	**0.31**	5.1	19.6	5.5	25.1	**1.18**
58.07	17.70	79.37	1.69	2.13	7.60	130	3.752	2.136	0.675	2.19	0.71	0.61	44.23	6.90	2.15	9.05		52.39	2.40		0			1.15		0.87		0.686	**Non-Liq.**	4.3	12.2			**0.00**
58.56	17.85	22.41	0.79	3.54	2.15	130	3.784	2.152	0.671	3.91	0.90	0.53	10.13	1.55	3.99	5.54		11.21	3.06		0			1.00		0.87		0.682	**Non-Liq.**	3.0	3.7			**0.00**
59.06	18.00	62.66	0.81	1.30	6.00	130	3.816	2.169	0.667	1.34	0.70	0.61	34.62	6.21	1.04	7.26		50.44	2.35		0			1.41		0.87		0.678	**Non-Liq.**	4.4	11.5			**0.00**
59.55	18.15	70.62	1.46	2.06	6.76	130	3.848	2.185	0.663	2.13	0.72	0.59	38.26	7.35	2.05	9.40		55.54	2.44		0			1.41		0.86		0.674	**Non-Liq.**	4.2	13.2			**0.00**
60.04	18.30	19.69	0.91	4.65	1.89	130	3.880	2.202	0.659	5.23	0.94	0.50	8.32	1.35	5.42	6.78		9.37	3.20		0			1.00		0.86		0.671	**Non-Liq.**	2.7	3.4			**0.00**
60.53	18.45	15.85	0.26	1.64	1.52	130	3.912	2.219	0.655	1.91	0.89	0.52	6.67	0.96	1.49	2.45		7.76	3.04		0			1.00		0.86		0.667	**Non-Liq.**	3.0	2.5			**0.00**
61.02	18.60	19.51	0.30	1.54	1.87	130	3.944	2.235	0.651	1.74	0.86	0.53	8.61	1.21	1.36	2.56		9.72	2.93		0			1.00		0.86		0.664	**Non-Liq.**	3.3	3.0			**0.00**
61.52	18.75	19.39	0.30	1.56	1.86	130	3.976	2.252	0.647	1.77	0.86	0.52	8.47	1.19	1.38	2.58		9.58	2.94		0			1.00		0.86		0.660	**Non-Liq.**	3.3	2.9			**0.00**
62.01	18.90	14.67	0.24	1.65	1.40	130	4.008	2.269	0.643	1.95	0.90	0.50	5.89	0.86	1.49	2.36		6.97	3.09		0			1.00		0.86		0.657	**Non-Liq.**	2.9	2.4			**0.00**
62.50	19.05	16.11	0.23	1.40	1.54	130	4.040	2.285	0.640	1.63	0.88	0.51	6.65	0.94	1.17	2.11		7.75	3.01		0			1.00		0.86		0.653	**Non-Liq.**	3.1	2.5			**0.00**
62.99	19.20	16.99	0.25	1.48	1.63	130	4.072	2.302	0.636	1.72	0.87	0.51	7.04	1.01	1.27	2.28		8.14	3.00		0			1.00		0.86		0.650	**Non-Liq.**	3.1	2.6			**0.00**
63.48	19.35	17.23	0.26	1.51	1.65	130	4.104	2.318	0.633	1.75	0.87	0.50	7.10	1.02	1.31	2.33		8.20	3.00		0			1.00		0.85		0.647	**Non-Liq.**	3.1	2.6			**0.00**
63.98	19.50	18.74	0.27	1.44	1.79	130	4.136	2.335	0.629	1.64	0.86	0.51	7.85	1.11	1.21	2.33		8.96	2.95		0			1.00		0.85		0.644	**Non-Liq.**	3.2	2.8			**0.00**
64.47	19.65	21.01	0.30	1.41	2.01	130	4.168	2.352	0.626	1.59	0.84	0.51	8.99	1.26	1.18	2.44		10.12	2.89		0			1.00		0.85		0.641	**Non-Liq.**	3.3	3.0			**0.00**
64.96	19.80	27.96	0.46	1.63	2.68	130	4.200	2.368	0.622	1.79	0.82	0.52	12.52	1.77	1.46	3.24		13.68	2.79		0			1.00		0.85		0.638	**Non-Liq.**	3.5	3.9			**0.00**
65.45	19.95	25.47	0.53	2.08	2.44	130	4.232	2.385	0.619	2.29	0.85	0.50	10.96	1.63	2.03	3.66		12.09	2.90		0			1.00		0.85		0.635	**Non-Liq.**	3.3	3.6			**0.00**
65.94	20.10	17.37	0.35	2.04	1.66	130	4.264	2.402	0.616	2.37	0.90	0.48	6.78	1.04	1.98	3.02		7.87	3.08		0			1.00		0.85		0.632	**Non-Liq.**	3.0	2.7			**0.00**
66.44	20.25	17.81	0.25	1.39	1.71	130	4.296	2.418	0.613	1.60	0.87	0.49	7.10	1.02	1.14	2.16		8.21	2.98		0			1.00		0.85		0.629	**Non-Liq.**	3.2	2.6			**0.00**
66.93	20.40	19.06	0.28	1.49	1.83	130	4.328	2.435	0.610	1.71	0.86	0.49	7.65	1.11	1.28	2.39		8.77	2.97		0			1.00		0.85		0.626	**Non-Liq.**	3.2	2.7			**0.00**
67.42	20.55	21.75	0.32	1.47	2.08	130	4.360	2.452	0.607	1.66	0.85	0.49	8.96	1.29	1.24	2.53		10.10	2.90		0			1.00		0.85		0.623	**Non-Liq.**	3.3	3.0			**0.00**
67.91	20.70	17.17	0.27	1.59	1.64	130	4.392	2.468	0.604	1.86	0.88	0.47	6.57	0.98	1.40	2.38		7.67	3.04		0			1.00		0.84		0.621	**Non-Liq.**	3.0	2.5			**0.00**
68.41	20.85	17.67	0.25	1.39	1.69	130	4.424	2.485	0.601	1.62	0.87	0.48	6.82	1.00	1.14	2.14		7.93	3.00		0			1.00		0.84		0.618	**Non-Liq.**	3.1	2.5			**0.00**
68.90	21.00	20.21	0.28	1.40	1.94	130	4.456	2.501	0.598	1.60	0.85	0.48	8.03	1.16	1.15	2.31		9.16	2.93		0			1.00		0.84		0.615	**Non-Liq.**	3.3	2.8			**0.00**
69.39	21.15	20.79	0.33	1.60	1.99	130	4.488	2.518	0.595	1.82	0.86	0.47	8.20	1.22	1.40	2.62		9.33	2.95		0			1.00		0.84		0.613	**Non-Liq.**	3.2	2.9			**0.00**
69.88	21.30	72.33	0.58	0.81	6.93	130	4.520	2.535	0.593	0.84	0.66	0.56	37.13	6.41	0.39	6.80		54.13	2.22		0			1.41		0.84		0.610	**Non-Liq.**	4.7	11.6			**0.00**
70.37	21.45	117.30	0.90	0.77	11.23	130	4.552	2.551	0.590	0.78	0.60	0.59	64.01	10.77	0.34	11.11		92.05	2.00		0			1.41		0.84		0.608	**Non-Liq.**	5.1	18.1			**0.00**
70.87	21.60	35.56	0.66	1.86	3.41	130	4.584	2.568	0.587	2.00	0.80	0.49	15.31	2.27	1.72	4.00		16.50	2.75		0			1.00		0.84		0.606	**Non-Liq.**	3.6	4.5			**0.00**
71.36	21.75	18.44	0.26	1.40	1.77	130	4.616	2.585	0.585	1.63	0.87	0.46	6.89	1.02	1.14	2.17		8.02	3.00		0			1.00		0.84		0.603	**Non-Liq.**	3.1	2.6			**0.00**
71.85	21.90	18.04	0.19	1.05	1.73	130	4.648	2.601	0.582	1.23	0.86	0.46	6.76	0.96	0.70	1.66		7.90	2.95		0			1.00		0.84		0.601	**Non-Liq.**	3.2	2.4			**0.00**
72.34	22.05	30.84	0.36	1.16	2.95	130	4.680	2.618	0.580	1.26	0.79	0.49	13.06	1.81	0.83	2.64		14.27	2.70		0			1.00		0.83		0.599	**Non-Liq.**	3.7	3.8			**0.00**
72.83	22.20	27.99	0.46	1.63	2.68	130	4.712	2.635	0.578	1.80	0.82	0.47	11.29	1.68	1.43	3.11		12.47	2.83		0			1.00		0.83		0.597	**Non-Liq.**	3.5	3.6			**0.00**
73.33	22.35	22.11	0.34	1.56	2.12	130	4.744	2.651	0.575	1.77	0.85	0.46	8.40	1.27	1.34	2.60		9.54	2.94		0			1.00		0.83		0.595	**Non-Liq.**	3.2	2.9			**0.00**
73.82	22.50	20.03	0.31	1.57	1.92	130	4.776	2.668	0.573	1.81	0.87	0.45	7.36	1.12	1.35	2.48		8.48	2.99		0			1.00		0.83		0.592	**Non-Liq.**	3.1	2.7			**0.00**
74.31	22.65	81.97	1.18	1.44	7.85	130	4.808	2.684	0.571	1.49	0.69	0.53	39.40	5.52	1.19	6.71		40.89	2.34		0			1.00		0.83		0.590	**Non-Liq.**	4.4	9.2			**0.00**
74.80	22.80	208.28	3.08	1.48	19.95	130	4.840	2.701	0.569	1.50	0.60	0.57	110.97	15.06	1.23	16.29	1.08	112.43	1.99		1	82	1.29	1.00	145.3	0.69	0.365	0.588	**0.43**	5.1	22.1	5.5	27.6	**1.03**

EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

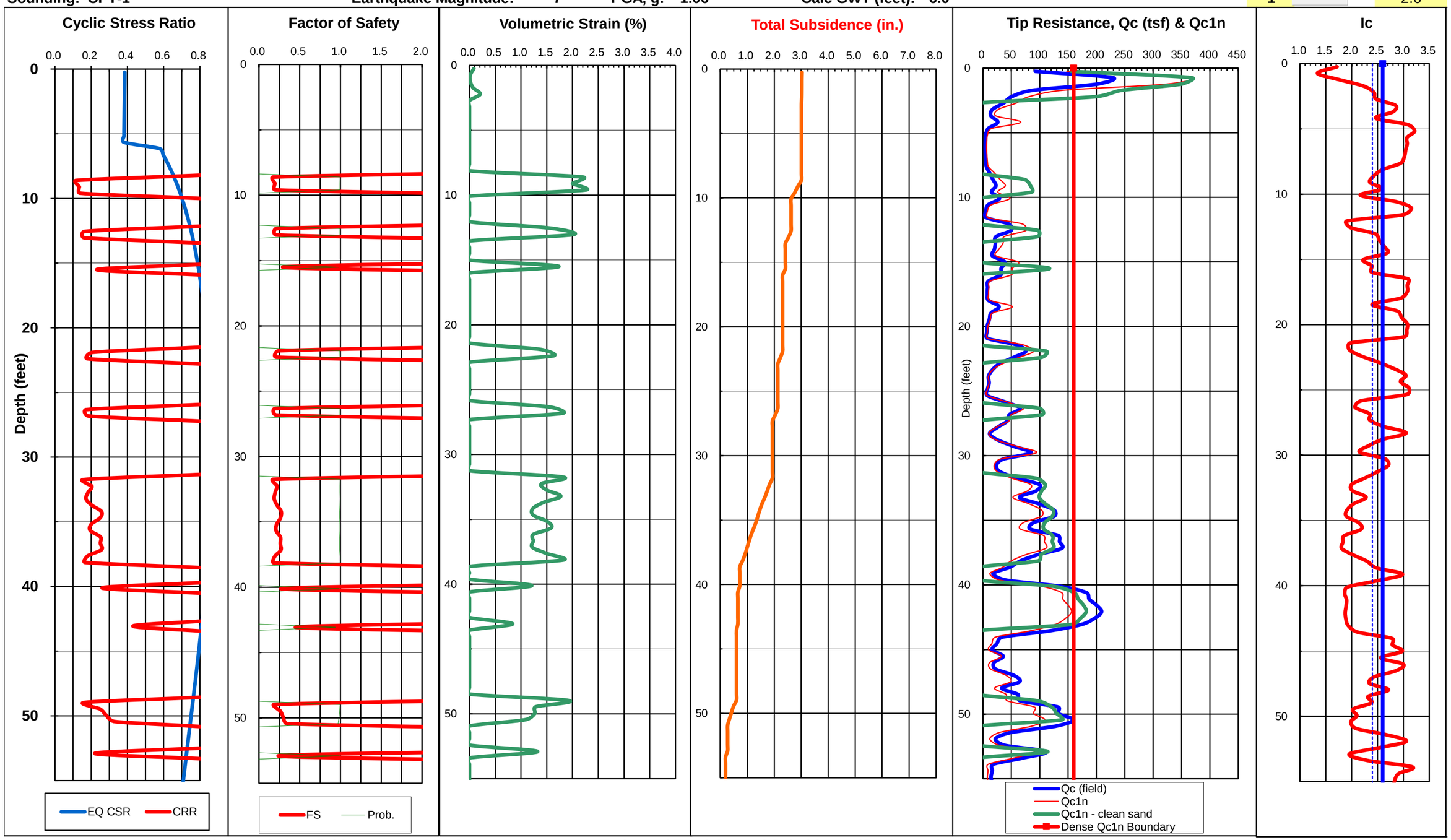
101 Garden Street **Project No: 305172-001**

Method Used: 1 1998 NCEER (Robertson & Wride)

Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Plot **1** Limiting Ic: 2.6

Sounding: CPT-1 **Earthquake Magnitude: 7** **PGA, g: 1.06** **Calc GWT (feet): 6.0**



Total Thickness of Liquefiable Layers: 16.7 feet

Estimated Total Ground Subsidence (Settlement): 3.0 inches

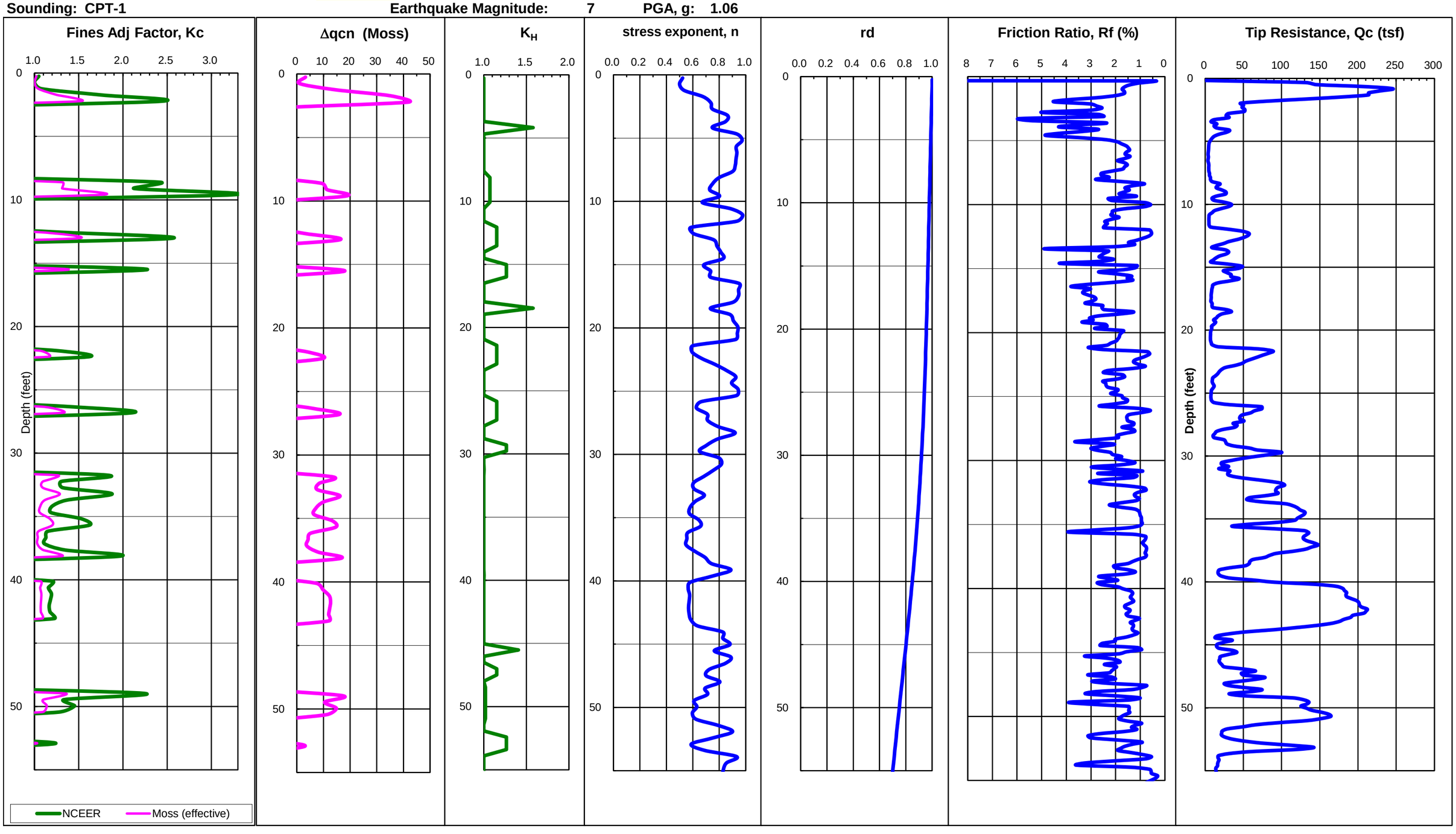
EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

3 avg increment =0.15m Qc1n/N1(60): 5

Ignore 1st/last increment into sand/silt soils: 0

Method Used: 1998 NCEER (Robertson & Wride)

Sounding: CPT-1 **Earthquake Magnitude: 7** **PGA, g: 1.06**



CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA

Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: 101 Garden Street
Job No: 305172-001
Date: 2/25/2022
Sounding: CPT-2

Liquefaction Analysis using 1998 NCEER (Robertson & Wride) method
Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Total Liquefied Thickness (feet)
12.3
Total Induced Subsidence (inches)
2.4

EARTHQUAKE INFORMATION:

Magnitude: 7 (7.5)
PGA, g: 1.060 (0.89)
MSF: 1.19
GWT, feet: 6.0
Calc GWT, feet: 6.0

Plot: 2
Method Used: 1 (1998 NCEER (Robertson & Wride))
Averaging Increment: 3 (0.15 m)
Induced CSR (M=7.5) = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR

Ignore 1st/last increment into sand/silt soils: 1 yes
Ignore/remediate upper: 0.0 m
Unit Weight of unsaturated soils: 115 pcf
Unit Weight of saturated soils: 130 pcf
Limiting Ic for liquefiable soils: 2.60
Limiting Ic for K_H: 2.6

Use Moss @ P_L: 15%
Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Required SF: 1.30
Max $\Delta N_{1(60)}$ - post liquefied: 5.5
Max $\Delta N_{1(60)}$ - non liquefied: 5.0
Min SF of Liquefiable Layers: 0.16
Avg SF of Liquefiable Layers: 0.23

Depth (feet)	(m)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio Rf %	qc MPa	Total Unit Wt. (pcf)	Total Stress po (tsf)	Eff. Stress p'o (tsf)	rd	F %	n	Max 1.70 Cq	Q	Moss qc1 MPa	Moss Δqc MPa	Moss qc_{1mod} MPa	Moss eff K_C	Qc1n	Ic	Override	Liquef. Suscept. (0 or 1)	Rel. Dens. Dr (%)	K_C	K_H	Clean Sand Qc1n	1.0 Kσ	CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Qc1n $N_{1(60)}$ Ratio	Equiv. $N_{1(60)}$	FC Adj. $\Delta N_{1(60)}$	Equiv. $N_{1(60)cs}$	*Volumetric Strain (%)*
0.49	0.15	180.26	0.69	0.39	17.26	115	0.028	0.028	1.000	0.39	0.50	1.70	289.60	29.35	0.00	29.35	1.00	289.65	1.29		1	100	1.00	1.00	289.6	1.00	Infin.	0.385	**Non-Liq.**	5.5	52.4	5.0	57.4	**0.02**
0.98	0.30	375.06	1.32	0.35	35.92	115	0.057	0.057	1.000	0.35	0.50	1.70	602.56	61.06	0.00	61.06	1.00	602.65	1.03		1	100	1.00	1.00	602.6	1.00	Infin.	0.385	**Non-Liq.**	5.5	108.9	5.0	113.9	**0.00**
1.48	0.45	326.25	4.31	1.32	31.24	115	0.085	0.085	0.999	1.32	0.50	1.70	524.08	53.11	0.90	54.01	1.02	524.22	1.54		1	100	1.00	1.00	524.2	1.00	Infin.	0.385	**Non-Liq.**	6.0	87.5	5.0	92.5	**0.01**
1.97	0.60	354.22	4.64	1.31	33.92	115	0.113	0.113	0.997	1.31	0.50	1.70	568.98	57.66	0.89	58.55	1.02	569.16	1.52		1	100	1.00	1.00	569.2	1.00	Infin.	0.384	**Non-Liq.**	6.0	94.4	5.0	99.4	**0.01**
2.46	0.75	145.79	3.89	2.67	13.96	115	0.141	0.141	0.996	2.67	0.60	1.70	234.03	23.73	2.38	26.10	1.10	234.26	1.98		1	100	1.28	1.00	298.9	1.00	Infin.	0.384	**Non-Liq.**	5.1	45.8	5.0	50.8	**0.03**
2.95	0.90	46.16	2.61	5.66	4.42	115	0.170	0.170	0.995	5.68	0.77	1.70	73.90	7.51	4.93	12.44	1.66	74.17	2.54		1	64	2.99	1.00	221.7	1.00	Infin.	0.383	**Non-Liq.**	4.0	18.4	5.0	23.4	**0.23**
3.44	1.05	33.06	1.36	4.12	3.17	130	0.202	0.202	0.994	4.14	0.77	1.70	52.80	5.38	3.96	9.34	1.74	53.12	2.54		1	51	2.95	1.00	156.9	1.00	0.439	0.383	**Non-Liq.**	4.0	13.2	5.0	18.2	**0.48**
3.94	1.20	30.11	0.66	2.19	2.88	130	0.234	0.234	0.993	2.21	0.72	1.70	48.01	4.90	1.85	6.75	1.38	48.39	2.38		1	47	2.22	1.00	107.3	1.00	0.195	0.382	**Non-Liq.**	4.3	11.1	5.0	16.1	**0.68**
4.43	1.35	22.94	0.41	1.80	2.20	130	0.266	0.266	0.992	1.83	0.73	1.70	36.43	3.73	1.43	5.16		36.86	2.42		0			1.00		1.00		0.382	**Non-Liq.**	4.3	8.6			**0.00**
4.92	1.50	10.34	0.41	4.00	0.99	130	0.298	0.298	0.990	4.11	0.88	1.70	16.13	1.68	3.82	5.51		16.61	2.91		0			1.00		1.00		0.381	**Non-Liq.**	3.3	5.0			**0.00**
5.41	1.65	10.37	0.33	3.21	0.99	130	0.330	0.330	0.989	3.31	0.86	1.70	16.14	1.69	2.96	4.65		16.67	2.85		0			1.00		1.00		0.381	**Non-Liq.**	3.4	4.9			**0.00**
5.91	1.80	11.29	0.30	2.65	1.08	130	0.362	0.362	0.988	2.73	0.84	1.70	17.55	1.84	2.34	4.18		18.14	2.77		0			1.00		1.00		0.381	**Non-Liq.**	3.6	5.1			**0.00**
6.40	1.95	6.91	0.24	3.47	0.66	130	0.394	0.389	0.987	3.68	0.92	1.70	10.48	1.12	3.71	4.84		11.10	3.03		0			1.00		1.00		0.577	**Non-Liq.**	3.1	3.6			**0.00**
6.89	2.10	8.41	0.18	2.13	0.81	130	0.426	0.406	0.986	2.24	0.86	1.70	12.86	1.37	2.06	3.43		13.51	2.83		0			1.00		1.00		0.598	**Non-Liq.**	3.5	3.9			**0.00**
7.38	2.25	10.22	0.24	2.37	0.98	130	0.458	0.422	0.985	2.47	0.85	1.70	15.74	1.66	2.39	4.05		16.42	2.79		0			1.00		1.00		0.617	**Non-Liq.**	3.5	4.6			**0.00**
7.87	2.40	5.02	0.18	3.64	0.48	130	0.490	0.439	0.984	3.98	0.97	1.70	7.36	0.82	4.04	4.85		8.06	3.18		0			1.00		1.00		0.634	**Non-Liq.**	2.8	2.9			**0.00**
8.37	2.55	4.09	0.07	1.76	0.39	130	0.522	0.456	0.983	1.98	0.95	1.70	5.84	0.67	1.64	2.30		6.57	3.10		0			1.00		1.00		0.650	**Non-Liq.**	2.9	2.2			**0.00**
8.86	2.70	5.53	0.10	1.79	0.53	130	0.554	0.472	0.982	1.96	0.91	1.70	8.13	0.90	1.68	2.59		8.89	2.97		0			1.00		1.00		0.665	**Non-Liq.**	3.2	2.8			**0.00**
9.35	2.85	19.89	0.23	1.18	1.90	130	0.586	0.489	0.981	1.21	0.73	1.70	31.18	3.09	0.89	3.97		32.08	2.37		0			1.00		1.00		0.679	**Non-Liq.**	4.4	7.3			**0.00**
9.84	3.00	29.03	0.38	1.31	2.78	130	0.618	0.505	0.979	1.34	0.70	1.68	45.26	4.13	1.07	5.20	1.26	46.06	2.26		1	45	1.82	1.00	84.0	1.00	0.135	0.691	**0.20**	4.6	10.1	5.5	15.6	**1.89**
10.33	3.15	48.36	0.51	1.05	4.63	130	0.650	0.522	0.978	1.06	0.63	1.56	70.62	6.55	0.73	7.28	1.11	71.39	2.05		1	63	1.36	1.00	97.4	1.00	0.166	0.703	**0.24**	5.0	14.3	5.2	19.5	**1.56**
10.83	3.30	59.61	0.54	0.91	5.71	130	0.682	0.539	0.977	0.92	0.60	1.50	83.67	7.92	0.55	8.46	1.07	84.44	1.95		1	70	1.24	1.00	104.5	1.00	0.186	0.714	**0.26**	5.2	16.3	4.6	20.9	**1.46**
11.32	3.45	55.59	0.53	0.95	5.32	130	0.714	0.555	0.976	0.96	0.61	1.48	77.15	7.29	0.60	7.89	1.08	77.93	1.99		1	66	1.28	1.00	100.0	1.00	0.173	0.725	**0.24**	5.1	15.3	4.7	20.0	**1.52**
11.81	3.60	57.05	0.48	0.84	5.46	130	0.746	0.572	0.975	0.84	0.60	1.45	77.24	7.45	0.45	7.90	1.06	78.02	1.95		1	67	1.24	1.00	97.1	1.00	0.165	0.734	**0.22**	5.2	15.1	4.3	19.4	**1.57**
12.30	3.75	50.56	0.34	0.67	4.84	130	0.778	0.589	0.974	0.67	0.60	1.42	67.13	6.71	0.23	6.93		67.92	1.95		0			1.00		1.00		0.744	**Non-Liq.**	5.2	13.1			**0.00**
12.80	3.90	14.73	0.26	1.78	1.41	130	0.810	0.605	0.973	1.85	0.81	1.57	21.00	2.00	1.73	3.73		21.90	2.61		0			1.00		1.00		0.752	**Non-Liq.**	3.9	5.6			**0.00**
13.29	4.05	5.10	0.18	3.54	0.49	130	0.842	0.622	0.972	4.03	0.99	1.69	7.17	0.79	4.12	4.90		8.16	3.19		0			1.00		1.00		0.760	**Non-Liq.**	2.8	3.0			**0.00**
13.78	4.20	5.96	0.17	2.83	0.57	130	0.874	0.638	0.971	3.17	0.96	1.62	8.17	0.88	3.17	4.05		9.14	3.08		0			1.00		1.00		0.768	**Non-Liq.**	3.0	3.1			**0.00**
14.27	4.35	37.63	0.26	0.70	3.60	130	0.906	0.655	0.970	0.71	0.64	1.36	47.54	6.05	0.27	6.32		61.17	2.09		0			1.26		1.00		0.775	**Non-Liq.**	4.9	12.5			**0.00**
14.76	4.50	28.28	0.43	1.52	2.71	130	0.938	0.672	0.969	1.56	0.73	1.39	36.38	4.33	1.39	5.73		47.12	2.37		0			1.26		1.00		0.781	**Non-Liq.**	4.4	10.8			**0.00**
15.26	4.65	9.52	0.42	4.43	0.91	130	0.969	0.688	0.968	4.78	0.94	1.50	12.50	1.20	5.38	6.58		13.47	3.04		0			1.00		1.00		0.788	**Non-Liq.**	3.1	4.4			**0.00**
15.75	4.80	13.24	0.36	2.75	1.27	130	1.001	0.705	0.967	2.91	0.87	1.42	16.83	1.62	3.09	4.70		17.77	2.81		0			1.00		1.00		0.793	**Non-Liq.**	3.5	5.1			**0.00**
16.24	4.95	42.38	0.47	1.11	4.06	130	1.033	0.722	0.966	1.13	0.67	1.29	50.83	5.26	0.84	6.11		55.40	2.18		0			1.07		1.00		0.799	**Non-Liq.**	4.7	11.7			**0.00**
16.73	5.10	42.42	0.44	1.03	4.06	130	1.065	0.738	0.965	1.05	0.66	1.27	50.02	5.23	0.74	5.97	1.14	54.53	2.16		1	52	1.58	1.07	86.2	1.00	0.140	0.804	**0.17**	4.8	11.4	5.5	16.9	**1.78**
17.22	5.25	39.73	0.47	1.17	3.80	130	1.097	0.755	0.964	1.20	0.68	1.26	46.36	4.83	0.93	5.76	1.19	50.63	2.22		1	49	1.72	1.07	87.2	1.00	0.142	0.809	**0.18**	4.6	10.9	5.5	16.4	**1.83**
17.72	5.40	57.43	0.45	0.78	5.50	130	1.129	0.772	0.962	0.79	0.61	1.21	64.95	6.93	0.38	7.31	1.05	70.54	2.00		1	62	1.30	1.07	91.5	1.00	0.151	0.814	**0.19**	5.1	13.9	4.4	18.3	**1.67**
18.21	5.55	26.56	0.38	1.43	2.54	130	1.161	0.788	0.961	1.47	0.74	1.24	30.32	3.19	1.29	4.48		33.48	2.42		0			1.07		1.00		0.818	**Non-Liq.**	4.3	7.9			**0.00**
18.70	5.70	7.75	0.31	4.04	0.74	130	1.193	0.805	0.960	4.50	0.97	1.30	8.55	0.90	4.90	5.80		9.55	3.15		0			1.00		1.00		0.822	**Non-Liq.**	2.8	3.4			**0.00**
19.19	5.85	6.07	0.18	2.89	0.58	130	1.225	0.821	0.959	3.34	0.98	1.28	6.35	0.72	3.31	4.03		7.34	3.19		0			1.00		1.00		0.826	**Non-Liq.**	2.8	2.7			**0.00**
19.69	6.00	6.11	0.14	2.31	0.58	130	1.257	0.838	0.958	2.68	0.96	1.25	6.23	0.71	2.51	3.23		7.22	3.14		0			1.00		1.00		0.830	**Non-Liq.**	2.9	2.5			**0.00**
20.18	6.15	6.85	0.14	1.99	0.66	130	1.289	0.855	0.956	2.27	0.94	1.22	6.92	0.78	2.07	2.85		7.91	3.07		0			1.00		1.00		0.833	**Non-Liq.**	3.0	2.6			**0.00**
20.67	6.30	12.92	0.20	1.55	1.24	130	1.321	0.871	0.955	1.66	0.84	1.18	13.40	1.41	1.46	2.87		14.37	2.75		0			1.00		1.00		0.837	**Non-Liq.**	3.6	4.0			**0.00**
21.16	6.45	10.76	0.26	2.45	1.03	130	1.353	0.888	0.954	2.67	0.90	1.17	10.92	1.16	2.72	3.88		11.90	2.94		0			1.00		1.00		0.840	**Non-Liq.**	3.3	3.7			**0.00**
21.65	6.60	7.89	0.21	2.62	0.76	130	1.385	0.905	0.952	2.96	0.94	1.16	7.65	0.85	2.96	3.81		8.64	3.09		0			1.00		1.00		0.843	**Non-Liq.**	3.0	2.9			**0.00**
22.15	6.75	7.20	0.14	1.94	0.69	130	1.417	0.921	0.951	2.22	0.94	1.14	6.76	0.77	2.01	2.78		7.75	3.07		0			1.00		1.00		0.845	**Non-Liq.**	3.0	2.6			**0.00**
22.64	6.90	6.58	0.13	1.94	0.63	130	1.449	0.938	0.950	2.26	0.95	1.12	5.98	0.70	2.01	2.71		6.97	3.12		0			1.00		1.00		0.848	**Non-Liq.**	2.9	2.4			**0.00**
23.13	7.05	6.75	0.14	2.01	0.65	130	1.481	0.955	0.948	2.34	0.95	1.10	6.04	0.70	2.12	2.82		7.03	3.12		0			1.00		1.00		0.850	**Non-Liq.**	2.9	2.4			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Override	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	Liquefac. Safety	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	Volumetric Strain
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	Factor	Ratio	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	(%)
23.62	7.20	10.85	0.17	1.59	1.04	130	1.513	0.971	0.946	1.75	0.87	1.08	10.06	1.11	1.53	2.64		11.05	2.87		0			1.00		1.00		0.852	**Non-Liq.**	3.4	3.3			**0.00**
24.11	7.35	9.92	0.25	2.50	0.95	130	1.545	0.988	0.945	2.78	0.92	1.06	8.99	1.00	2.80	3.80		9.99	3.02		0			1.00		1.00		0.854	**Non-Liq.**	3.1	3.2			**0.00**
24.61	7.50	41.46	0.30	0.72	3.97	130	1.577	1.004	0.943	0.74	0.66	1.03	39.57	6.46	0.30	6.77		64.07	2.16		0			1.58		1.00		0.856	**Non-Liq.**	4.8	13.5			**0.00**
25.10	7.65	18.81	0.38	2.00	1.80	130	1.609	1.021	0.941	2.11	0.82	1.03	17.32	1.84	2.10	3.94		18.31	2.71		0			1.00		1.00		0.857	**Non-Liq.**	3.7	5.0			**0.00**
25.59	7.80	10.51	0.36	3.42	1.01	130	1.641	1.038	0.940	3.80	0.94	1.02	9.11	1.02	4.10	5.11		10.11	3.09		0			1.00		1.00		0.859	**Non-Liq.**	3.0	3.4			**0.00**
26.08	7.95	9.66	0.25	2.59	0.93	130	1.673	1.054	0.938	2.90	0.93	1.00	8.16	0.93	2.93	3.85		9.16	3.06		0			1.00		1.00		0.860	**Non-Liq.**	3.0	3.0			**0.00**
26.57	8.10	8.10	0.21	2.56	0.78	130	1.705	1.071	0.936	2.95	0.95	0.99	6.57	0.77	2.89	3.66		7.57	3.15		0			1.00		1.00		0.861	**Non-Liq.**	2.8	2.7			**0.00**
27.07	8.25	8.49	0.19	2.24	0.81	130	1.737	1.088	0.934	2.57	0.94	0.97	6.82	0.80	2.44	3.24		7.82	3.10		0			1.00		0.99		0.862	**Non-Liq.**	2.9	2.7			**0.00**
27.56	8.40	12.50	0.22	1.77	1.20	130	1.769	1.104	0.932	1.94	0.87	0.96	10.38	1.16	1.79	2.95		11.38	2.88		0			1.00		0.99		0.863	**Non-Liq.**	3.4	3.4			**0.00**
28.05	8.55	15.73	0.32	2.06	1.51	130	1.801	1.121	0.930	2.22	0.85	0.95	13.14	1.46	2.19	3.65		14.15	2.83		0			1.00		0.99		0.863	**Non-Liq.**	3.5	4.1			**0.00**
28.54	8.70	85.91	0.50	0.58	8.23	130	1.833	1.137	0.928	0.59	0.57	0.96	76.89	11.15	0.11	11.26		109.63	1.87		0			1.41		0.99		0.864	**Non-Liq.**	5.3	20.5			**0.00**
29.04	8.85	60.84	0.78	1.28	5.83	130	1.865	1.154	0.925	1.30	0.67	0.94	53.25	7.89	1.09	8.99		76.36	2.20		0			1.41		0.98		0.864	**Non-Liq.**	4.7	16.2			**0.00**
29.53	9.00	20.08	0.79	3.92	1.92	130	1.897	1.171	0.923	4.17	0.88	0.91	16.36	1.83	4.81	6.64		17.37	2.91		0			1.00		0.98		0.864	**Non-Liq.**	3.3	5.3			**0.00**
30.02	9.15	28.66	0.49	1.71	2.74	130	1.929	1.187	0.920	1.78	0.77	0.91	23.75	2.99	1.69	4.68		28.56	2.56		0			1.15		0.98		0.864	**Non-Liq.**	4.0	7.2			**0.00**
30.51	9.30	9.49	0.26	2.75	0.91	130	1.961	1.204	0.918	3.15	0.94	0.89	6.93	0.83	3.15	3.99		7.94	3.14		0			1.00		0.97		0.864	**Non-Liq.**	2.9	2.8			**0.00**
31.00	9.45	9.99	0.20	1.96	0.96	130	1.993	1.221	0.915	2.23	0.91	0.88	7.27	0.86	2.05	2.92		8.28	3.04		0			1.00		0.97		0.863	**Non-Liq.**	3.0	2.7			**0.00**
31.50	9.60	35.32	0.49	1.40	3.38	130	2.025	1.237	0.913	1.45	0.74	0.89	28.71	3.35	1.26	4.61		31.87	2.44		0			1.07		0.97		0.863	**Non-Liq.**	4.2	7.5			**0.00**
31.99	9.75	63.31	0.78	1.24	6.06	130	2.057	1.254	0.910	1.26	0.66	0.89	52.41	6.04	1.04	7.07	1.17	57.28	2.19		1	54	1.65	1.07	94.6	0.95	0.159	0.862	**0.17**	4.7	12.2	5.5	17.7	**1.73**
32.48	9.90	45.92	1.05	2.28	4.40	130	2.089	1.271	0.907	2.34	0.75	0.87	36.81	4.38	2.49	6.88	1.57	40.55	2.48		1	39	2.67	1.07	108.3	0.96	0.198	0.861	**0.22**	4.1	9.8	5.5	15.3	**1.95**
32.97	10.05	43.96	1.27	2.89	4.21	130	2.121	1.287	0.904	2.98	0.77	0.86	34.66	4.19	3.36	7.55	1.80	38.25	2.57		1	37	3.14	1.07	120.1	0.96	0.241	0.860	**0.27**	4.0	9.6	5.5	15.1	**1.96**
33.46	10.20	39.65	1.00	2.52	3.80	130	2.153	1.304	0.901	2.60	0.77	0.85	30.84	3.74	2.83	6.57		34.16	2.57		0			1.07		0.96		0.859	**Non-Liq.**	4.0	8.6			**0.00**
33.96	10.35	23.89	0.63	2.62	2.29	130	2.185	1.320	0.898	2.77	0.83	0.83	17.74	2.06	2.97	5.03		18.78	2.77		0			1.00		0.96		0.858	**Non-Liq.**	3.6	5.3			**0.00**
34.45	10.50	76.86	0.77	1.01	7.36	130	2.217	1.337	0.894	1.03	0.63	0.86	61.59	8.40	0.71	9.11		79.26	2.08		0			1.26		0.95		0.857	**Non-Liq.**	4.9	16.1			**0.00**
34.94	10.65	113.70	1.18	1.04	10.89	130	2.249	1.354	0.891	1.05	0.59	0.86	91.78	12.49	0.75	13.25	1.06	117.45	1.95		1	84	1.24	1.26	146.0	0.91	0.369	0.855	**0.39**	5.2	22.7	5.5	28.2	**1.03**
35.43	10.80	59.01	1.08	1.83	5.65	130	2.281	1.370	0.888	1.87	0.71	0.83	45.37	6.46	1.86	8.32		58.74	2.35		0			1.26		0.95		0.853	**Non-Liq.**	4.4	13.3			**0.00**
35.93	10.95	24.35	0.61	2.51	2.33	130	2.313	1.387	0.884	2.67	0.83	0.80	17.33	2.05	2.82	4.87		18.38	2.77		0			1.00		0.95		0.852	**Non-Liq.**	3.6	5.1			**0.00**
36.42	11.10	68.60	0.49	0.71	6.57	130	2.345	1.404	0.880	0.73	0.62	0.84	53.31	5.72	0.30	6.02		54.62	2.05		0			1.00		0.95		0.850	**Non-Liq.**	5.0	11.0			**0.00**
36.91	11.25	92.46	0.78	0.84	8.85	130	2.377	1.420	0.877	0.86	0.60	0.84	72.13	7.77	0.48	8.25	1.06	73.25	1.98		1	64	1.28	1.00	93.5	0.92	0.156	0.847	**0.17**	5.1	14.3	4.4	18.7	**1.64**
37.40	11.40	115.94	0.93	0.81	11.10	130	2.409	1.437	0.873	0.82	0.57	0.84	90.84	9.74	0.43	10.16	1.04	91.98	1.89		1	73	1.18	1.00	108.4	0.88	0.198	0.845	**0.21**	5.3	17.4	4.3	21.7	**1.42**
37.89	11.55	100.40	0.89	0.89	9.61	130	2.441	1.454	0.869	0.90	0.60	0.83	77.40	8.39	0.54	8.93	1.06	78.53	1.97		1	67	1.26	1.00	99.2	0.91	0.171	0.843	**0.18**	5.1	15.3	4.6	19.8	**1.55**
38.39	11.70	50.25	1.02	2.02	4.81	130	2.473	1.470	0.865	2.09	0.74	0.78	36.19	4.22	2.12	6.35	1.50	37.28	2.45		1	36	2.55	1.00	94.9	0.94	0.160	0.840	**0.18**	4.2	8.9	5.5	14.4	**2.03**
38.88	11.85	70.08	0.98	1.39	6.71	130	2.505	1.487	0.861	1.42	0.67	0.80	51.60	5.85	1.24	7.09	1.21	52.72	2.23		1	50	1.74	1.00	92.0	0.90	0.152	0.838	**0.16**	4.6	11.4	5.5	16.9	**1.79**
39.37	12.00	57.43	0.97	1.69	5.50	130	2.537	1.503	0.857	1.73	0.71	0.78	41.21	4.77	1.65	6.43	1.35	42.32	2.36		1	41	2.16	1.00	91.2	0.93	0.151	0.835	**0.17**	4.4	9.7	5.5	15.2	**1.95**
39.86	12.15	40.62	0.91	2.24	3.89	130	2.569	1.520	0.852	2.33	0.77	0.76	27.96	3.35	2.43	5.77		29.05	2.57		0			1.00		0.93		0.832	**Non-Liq.**	4.0	7.3			**0.00**
40.35	12.30	16.89	0.56	3.33	1.62	130	2.601	1.537	0.848	3.67	0.90	0.71	10.36	1.33	3.94	5.27		11.40	3.03		0			1.00		0.93		0.829	**Non-Liq.**	3.1	3.7			**0.00**
40.85	12.45	51.13	0.52	1.03	4.90	130	2.633	1.553	0.843	1.06	0.68	0.77	36.02	4.68	0.73	5.41		42.82	2.28		0			1.15		0.93		0.826	**Non-Liq.**	4.5	9.5			**0.00**
41.34	12.60	57.21	0.72	1.26	5.48	130	2.665	1.570	0.839	1.29	0.69	0.76	40.08	5.30	1.05	6.35	1.20	47.51	2.29		1	46	1.93	1.15	91.6	0.92	0.151	0.823	**0.17**	4.5	10.5	5.5	16.0	**1.87**
41.83	12.75	63.87	0.76	1.19	6.12	130	2.697	1.587	0.834	1.22	0.67	0.76	44.83	5.91	0.96	6.86	1.16	52.99	2.24		1	50	1.77	1.15	93.7	0.89	0.156	0.819	**0.17**	4.6	11.5	5.5	17.0	**1.78**
42.32	12.90	48.65	0.53	1.09	4.66	130	2.729	1.603	0.830	1.13	0.70	0.75	33.28	4.39	0.82	5.21		39.67	2.33		0			1.15		0.92		0.816	**Non-Liq.**	4.4	8.9			**0.00**
42.81	13.05	15.94	0.24	1.51	1.53	130	2.761	1.620	0.825	1.68	0.86	0.69	9.40	1.17	1.39	2.56		10.46	2.89		0			1.00		0.92		0.812	**Non-Liq.**	3.4	3.1			**0.00**
43.31	13.20	16.88	0.18	1.04	1.62	130	2.793	1.637	0.820	1.15	0.83	0.70	10.05	1.21	0.74	1.95		11.13	2.78		0			1.00		0.92		0.809	**Non-Liq.**	3.6	3.1			**0.00**
43.80	13.35	67.70	0.43	0.64	6.48	130	2.825	1.653	0.816	0.65	0.62	0.76	47.26	6.48	0.19	6.67		61.26	2.07		0			1.26		0.91		0.805	**Non-Liq.**	4.9	12.4			**0.00**
44.29	13.50	109.70	0.63	0.58	10.51	130	2.857	1.670	0.811	0.58	0.56	0.77	79.02	10.63	0.10	10.73	1.01	101.47	1.86		1	77	1.15	1.26	116.7	0.83	0.228	0.801	**0.24**	5.4	18.9	4.4	23.3	**1.30**
44.78	13.65	56.56	0.47	0.83	5.42	130	2.889	1.686	0.806	0.85	0.66	0.73	38.07	5.41	0.45	5.86		49.62	2.21		0			1.26		0.91		0.797	**Non-Liq.**	4.7	10.6			**0.00**
45.28	13.80	28.88	0.39	1.34	2.77	130	2.921	1.703	0.801	1.43	0.78	0.69	17.74	2.15	1.16	3.30		18.86	2.61		0			1.00		0.91		0.793	**Non-Liq.**	3.9	4.9			**0.00**
45.77	13.95	88.36	0.74	0.84	8.46	130	2.953	1.720	0.796	0.86	0.61	0.74	60.75	8.60	0.47	9.06		78.34	2.04		0			1.26		0.91		0.789	**Non-Liq.**	5.0	15.7			**0.00**
46.26	14.10	110.78	1.08	0.97	10.61	130	2.985	1.736	0.791	0.99	0.60	0.74	76.48	10.97	0.65	11.62	1.06	98.25	2.00		1	76	1.30	1.26	127.5	0.82	0.273	0.785	**0.28**	5.1	19.3	5.5	24.8	**1.21**
46.75	14.25	54.58	0.95	1.74	5.23	130	3.017	1.753	0.786	1.80	0.73	0.69	34.62	5.39	1.70	7.08		45.23	2.43		0			1.26		0.90		0.781	**Non-Liq.**	4.2	10.7			**0.00**
47.24	14.40	15.11	0.52	3.45	1.45	130	3.049	1.770	0.781	3.91	0.93	0.62	7.82	1.10	4.02	5.12		8.86	3.15		0			1.00		0.90		0.777	**Non-Liq.**	2.8	3.1			**0.00**
47.74	14.55	77.22	0.49	0.63	7.39	130	3.081	1.786	0.776	0.65	0.61	0.73	51.73	7.96	0.18	8.14		74.50	2.04		0			1.41		0.90		0.773	**Non-Liq.**	5.0	14.9			**0.00**
48.23	14.70	37.05	0.60	1.61	3.55	130	3.113	1.803	0.771	1.69	0.76	0.67	22.17	3.89	1.50	5.39		32.79	2.57		0			1.41		0.90		0.769	**Non-Liq.**	4.0	8.3			**0.00**
48.72	14.85	22.08	0.33	1.52	2.11	130	3.145	1.819	0.766	1.65	0.82	0.64	12.25	1.56	1.38	2.94		13.35	2.78		0			1.00		0.90		0.765	**Non-Liq.**	3.6	3.8			**0.00**
49.21	15.00	14.90	0.16	1.08	1.43	130	3.177	1.836	0.761	1.24	0.85	0.62	7.71	0.97	0.79	1.77		8.79	2.90		0			1.00		0.90		0.760	**Non-Liq.**	3.3	2.6			**0.00**
49.70	15.15	14.78	0.15	1.01	1.42	130	3.209	1.853	0.756	1.16	0.85	0.62	7.58	0.95	0.69	1.65		8.67	2.89		0			1.00		0.89		0.756	**Non-Liq.**	3.3	2.6			**0.00**
50.20	15.30	32.67	0.45	1.38	3.13	130	3.241	1.869	0.751	1.46	0.77	0.65	18.78	2.96	1.19	4.15		25.19	2.60		0			1.26		0.89		0.752	**Non-Liq.**	3.9	6.4			**0.00**
50.69	15.45	44.61	0.90	2.01	4.27	130	3.273	1.886	0.746	2.10	0.76	0.64	25.98	4.25	2.04	6.29		34.30	2.57		0			1.26		0.89		0.747	**Non-Liq.**	4.0	8.6			**0.00**
51.18	15.60	21.19	0.81	3.83	2.03	130	3.305	1.903	0.741	4.21	0.90	0.59	10.74	1.55	4.49	6.04		11.80	3.06		0			1.00		0.89		0.743	**Non-Liq.**	3.0	3.9			**0.00**
51.67	15.75	95.76	0.96	1.00	9.17	130	3.337	1.919	0.736	1.02	0.63	0.69	61.10	9.05	0.68	9.73		78.83	2.09		0			1.26		0.89		0.739	**Non-Liq.**	4.9	16.0			**0.00**
52.17	15.90	153.66	1.68	1.09	14.71	130	3.369	1.936	0.731	1.10	0.58	0.70	100.79	14.97	0.79	15.76	1.05	129.07	1.94		1	87	1.22	1.26	158.0	0.79	0.447	0.735	**0.48**	5.2	24.8	5.5	30.3	**0.78**
52.66	16.05	114.66	2.21	1.93	10.98	130	3.401	1.953	0.726	1.96	0.66	0.67	70.96	11.44	1.91	13.35		91.28	2.22		0			1.26		0.88		0.730	**Non-Liq.**	4.7	19.6			**0.00**
53.15	16.20	32.07	1.70	5.31	3.07	130	3.433	1.969	0.721	5.65	0.88	0.58	16.43	2.47	6.02	8.49		17.51	3.00		0			1.00		0.88		0.726	**Non-Liq.**	3.1	5.6			**0.00**
53.64	16.35	12.42	0.57	4.62	1.19	130	3.465	1.986	0.716	5.49	0.99	0.54	5.29	0.84	5.50	6.34		6.30	3.37		0			1.00		0.88		0.722	**Non-Liq.**	2.4	2.6			**0.00**
54.13	16.50	13.00	0.16	1.24	1.24	130	3.497	2.002	0.712	1.47	0.89	0.57	5.89	0.79	0.99	1.79		6.96	3.04		0			1.00		0.88		0.718	**Non-Liq.**	3.1	2.3			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	**Liquefac. Safety**	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	***Volumetric Strain***
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	**Factor**	Ratio	$N_{1(60)}$	$ΔN_{1(60)}$	$N_{1(60)cs}$	***(%)***
54.63	16.65	15.20	0.22	1.43	1.46	130	3.529	2.019	0.707	1.65	0.88	0.57	7.07	0.96	1.24	2.20		8.15	2.99		0			1.00		0.88		0.714	**Non-Liq.**	3.1	2.6			**0.00**
55.12	16.80	26.55	0.39	1.45	2.54	130	3.561	2.036	0.702	1.57	0.80	0.59	13.68	1.79	1.27	3.06		14.82	2.73		0			1.00		0.88		0.709	**Non-Liq.**	3.7	4.1			**0.00**
55.61	16.95	24.11	0.46	1.90	2.31	130	3.593	2.052	0.698	2.08	0.84	0.57	11.98	1.64	1.86	3.50		13.09	2.84		0			1.00		0.88		0.705	**Non-Liq.**	3.4	3.8			**0.00**
56.10	17.10	42.13	0.75	1.77	4.03	130	3.625	2.069	0.693	1.86	0.77	0.60	22.66	3.47	1.69	5.16		27.47	2.59		0			1.15		0.87		0.701	**Non-Liq.**	3.9	7.0			**0.00**
56.59	17.25	104.34	1.77	1.69	9.99	130	3.656	2.086	0.689	1.73	0.66	0.64	61.57	9.15	1.58	10.72	1.17	72.41	2.22		1	63	1.73	1.15	125.2	0.82	0.262	0.697	**0.31**	4.6	15.6	5.5	21.1	**1.44**
57.09	17.40	115.89	2.21	1.90	11.10	130	3.688	2.102	0.684	1.94	0.66	0.63	68.13	10.29	1.86	12.15	1.18	79.98	2.23		1	68	1.73	1.15	138.5	0.81	0.327	0.693	**0.38**	4.6	17.2	5.5	22.7	**1.33**
57.58	17.55	67.97	1.38	2.04	6.51	130	3.720	2.119	0.680	2.10	0.73	0.60	37.61	5.84	2.03	7.87		44.75	2.44		0			1.15		0.87		0.689	**Non-Liq.**	4.2	10.6			**0.00**
58.07	17.70	17.32	0.50	2.90	1.66	130	3.752	2.136	0.675	3.31	0.91	0.53	7.56	1.14	3.16	4.30		8.62	3.12		0			1.00		0.87		0.686	**Non-Liq.**	2.9	3.0			**0.00**
58.56	17.85	23.84	0.37	1.57	2.28	130	3.784	2.152	0.671	1.73	0.83	0.56	11.39	1.55	1.41	2.96		12.52	2.82		0			1.00		0.87		0.682	**Non-Liq.**	3.5	3.6			**0.00**
59.06	18.00	17.46	0.49	2.78	1.67	130	3.816	2.169	0.667	3.17	0.91	0.52	7.52	1.14	2.99	4.13		8.59	3.11		0			1.00		0.87		0.678	**Non-Liq.**	2.9	3.0			**0.00**
59.55	18.15	19.57	0.35	1.81	1.87	130	3.848	2.185	0.663	2.04	0.86	0.53	8.77	1.25	1.72	2.96		9.88	2.95		0			1.00		0.86		0.674	**Non-Liq.**	3.2	3.1			**0.00**
60.04	18.30	14.15	0.28	1.99	1.36	130	3.880	2.202	0.659	2.35	0.92	0.51	5.77	0.86	1.94	2.80		6.83	3.14		0			1.00		0.86		0.671	**Non-Liq.**	2.9	2.4			**0.00**
60.53	18.45	14.44	0.26	1.79	1.38	130	3.912	2.219	0.655	2.12	0.91	0.51	5.90	0.87	1.69	2.56		6.97	3.11		0			1.00		0.86		0.667	**Non-Liq.**	2.9	2.4			**0.00**
61.02	18.60	15.62	0.32	2.07	1.50	130	3.944	2.235	0.651	2.41	0.91	0.51	6.42	0.96	2.05	3.00		7.49	3.11		0			1.00		0.86		0.664	**Non-Liq.**	2.9	2.6			**0.00**
61.52	18.75	33.64	0.60	1.77	3.22	130	3.976	2.252	0.647	1.90	0.80	0.55	16.25	2.26	1.65	3.91		17.41	2.71		0			1.00		0.86		0.660	**Non-Liq.**	3.7	4.7			**0.00**
62.01	18.90	17.68	0.54	3.06	1.69	130	4.008	2.269	0.643	3.51	0.92	0.50	7.22	1.14	3.33	4.47		8.29	3.15		0			1.00		0.86		0.657	**Non-Liq.**	2.8	2.9			**0.00**
62.50	19.05	15.90	0.31	1.96	1.52	130	4.040	2.285	0.640	2.29	0.90	0.50	6.42	0.96	1.90	2.86		7.50	3.10		0			1.00		0.86		0.653	**Non-Liq.**	2.9	2.6			**0.00**
62.99	19.20	20.95	0.33	1.55	2.01	130	4.072	2.302	0.636	1.75	0.85	0.52	9.11	1.29	1.37	2.66		10.23	2.91		0			1.00		0.86		0.650	**Non-Liq.**	3.3	3.1			**0.00**
63.48	19.35	14.55	0.24	1.65	1.39	130	4.104	2.318	0.633	1.96	0.90	0.49	5.69	0.84	1.48	2.33		6.77	3.11		0			1.00		0.85		0.647	**Non-Liq.**	2.9	2.3			**0.00**
63.98	19.50	13.49	0.20	1.48	1.29	130	4.136	2.335	0.629	1.78	0.91	0.49	5.13	0.76	1.26	2.02		6.21	3.13		0			1.00		0.85		0.644	**Non-Liq.**	2.9	2.2			**0.00**
64.47	19.65	16.14	0.27	1.70	1.55	130	4.168	2.352	0.626	1.99	0.89	0.49	6.39	0.95	1.55	2.50		7.48	3.07		0			1.00		0.85		0.641	**Non-Liq.**	3.0	2.5			**0.00**
64.96	19.80	21.62	0.38	1.75	2.07	130	4.200	2.368	0.622	1.97	0.86	0.50	9.13	1.33	1.61	2.94		10.26	2.93		0			1.00		0.85		0.638	**Non-Liq.**	3.3	3.1			**0.00**
65.45	19.95	20.70	0.42	2.05	1.98	130	4.232	2.385	0.619	2.31	0.87	0.49	8.52	1.28	1.99	3.27		9.63	2.99		0			1.00		0.85		0.635	**Non-Liq.**	3.1	3.1			**0.00**
65.94	20.10	17.12	0.33	1.96	1.64	130	4.264	2.402	0.616	2.27	0.90	0.48	6.67	1.02	1.87	2.89		7.76	3.08		0			1.00		0.85		0.632	**Non-Liq.**	3.0	2.6			**0.00**
66.44	20.25	14.91	0.26	1.78	1.43	130	4.296	2.418	0.613	2.12	0.91	0.47	5.57	0.85	1.64	2.49		6.64	3.13		0			1.00		0.85		0.629	**Non-Liq.**	2.9	2.3			**0.00**
66.93	20.40	15.07	0.28	1.84	1.44	130	4.328	2.435	0.610	2.20	0.91	0.47	5.59	0.86	1.72	2.59		6.66	3.14		0			1.00		0.85		0.626	**Non-Liq.**	2.9	2.3			**0.00**
67.42	20.55	15.83	0.29	1.85	1.52	130	4.360	2.452	0.607	2.19	0.91	0.47	5.91	0.91	1.73	2.64		6.99	3.12		0			1.00		0.85		0.623	**Non-Liq.**	2.9	2.4			**0.00**
67.91	20.70	16.48	0.28	1.71	1.58	130	4.392	2.468	0.604	2.01	0.89	0.47	6.21	0.94	1.55	2.49		7.30	3.08		0			1.00		0.84		0.621	**Non-Liq.**	3.0	2.5			**0.00**
68.41	20.85	16.80	0.25	1.50	1.61	130	4.424	2.485	0.601	1.76	0.88	0.47	6.36	0.95	1.27	2.22		7.47	3.04		0			1.00		0.84		0.618	**Non-Liq.**	3.0	2.5			**0.00**
68.90	21.00	16.72	0.25	1.52	1.60	130	4.456	2.501	0.598	1.79	0.89	0.47	6.27	0.94	1.31	2.25		7.37	3.05		0			1.00		0.84		0.615	**Non-Liq.**	3.0	2.4			**0.00**
69.39	21.15	18.24	0.35	1.92	1.75	130	4.488	2.518	0.595	2.23	0.89	0.46	6.87	1.07	1.82	2.88		7.97	3.06		0			1.00		0.84		0.613	**Non-Liq.**	3.0	2.7			**0.00**
69.88	21.30	35.03	0.73	2.08	3.35	130	4.520	2.535	0.593	2.25	0.81	0.49	15.10	2.28	2.01	4.29		16.28	2.78		0			1.00		0.84		0.610	**Non-Liq.**	3.6	4.6			**0.00**
70.37	21.45	71.38	1.04	1.45	6.84	130	4.552	2.551	0.590	1.51	0.70	0.54	35.03	7.62	1.21	8.83		57.39	2.38		0			1.58		0.84		0.608	**Non-Liq.**	4.3	13.2			**0.00**
70.87	21.60	35.15	0.92	2.62	3.37	130	4.584	2.568	0.587	2.83	0.83	0.48	14.74	2.33	2.69	5.02		15.91	2.84		0			1.00		0.84		0.606	**Non-Liq.**	3.4	4.6			**0.00**
71.36	21.75	25.15	0.72	2.87	2.41	130	4.616	2.585	0.585	3.20	0.88	0.46	9.73	1.60	3.01	4.61		10.84	3.02		0			1.00		0.84		0.603	**Non-Liq.**	3.1	3.5			**0.00**
71.85	21.90	14.51	0.47	3.22	1.39	130	4.648	2.601	0.582	3.92	0.96	0.42	4.74	0.84	3.44	4.28		5.77	3.33		0			1.00		0.84		0.601	**Non-Liq.**	2.5	2.3			**0.00**
72.34	22.05	18.54	0.33	1.77	1.78	130	4.680	2.618	0.580	2.06	0.89	0.45	6.75	1.05	1.61	2.66		7.86	3.05		0			1.00		0.83		0.599	**Non-Liq.**	3.0	2.6			**0.00**
72.83	22.20	18.55	0.32	1.75	1.78	130	4.712	2.635	0.578	2.04	0.88	0.45	6.71	1.05	1.58	2.62		7.82	3.05		0			1.00		0.83		0.597	**Non-Liq.**	3.0	2.6			**0.00**
73.33	22.35	17.80	0.32	1.78	1.70	130	4.744	2.651	0.575	2.09	0.89	0.44	6.31	1.00	1.61	2.61		7.41	3.08		0			1.00		0.83		0.595	**Non-Liq.**	3.0	2.5			**0.00**
73.82	22.50	52.59	0.33	0.62	5.04	130	4.776	2.668	0.573	0.66	0.68	0.53	25.09	3.00	0.16	3.16		26.53	2.32		0			1.00		0.83		0.592	**Non-Liq.**	4.5	5.9			**0.00**
74.31	22.65	16.15	0.24	1.50	1.55	130	4.808	2.684	0.571	1.80	0.90	0.43	5.53	0.86	1.26	2.12		6.63	3.10		0			1.00		0.83		0.590	**Non-Liq.**	2.9	2.3			**0.00**
74.80	22.80	18.88	0.20	1.08	1.81	130	4.840	2.701	0.569	1.27	0.85	0.45	6.87	0.99	0.74	1.73		8.02	2.95		0			1.00		0.83		0.588	**Non-Liq.**	3.2	2.5			**0.00**

EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

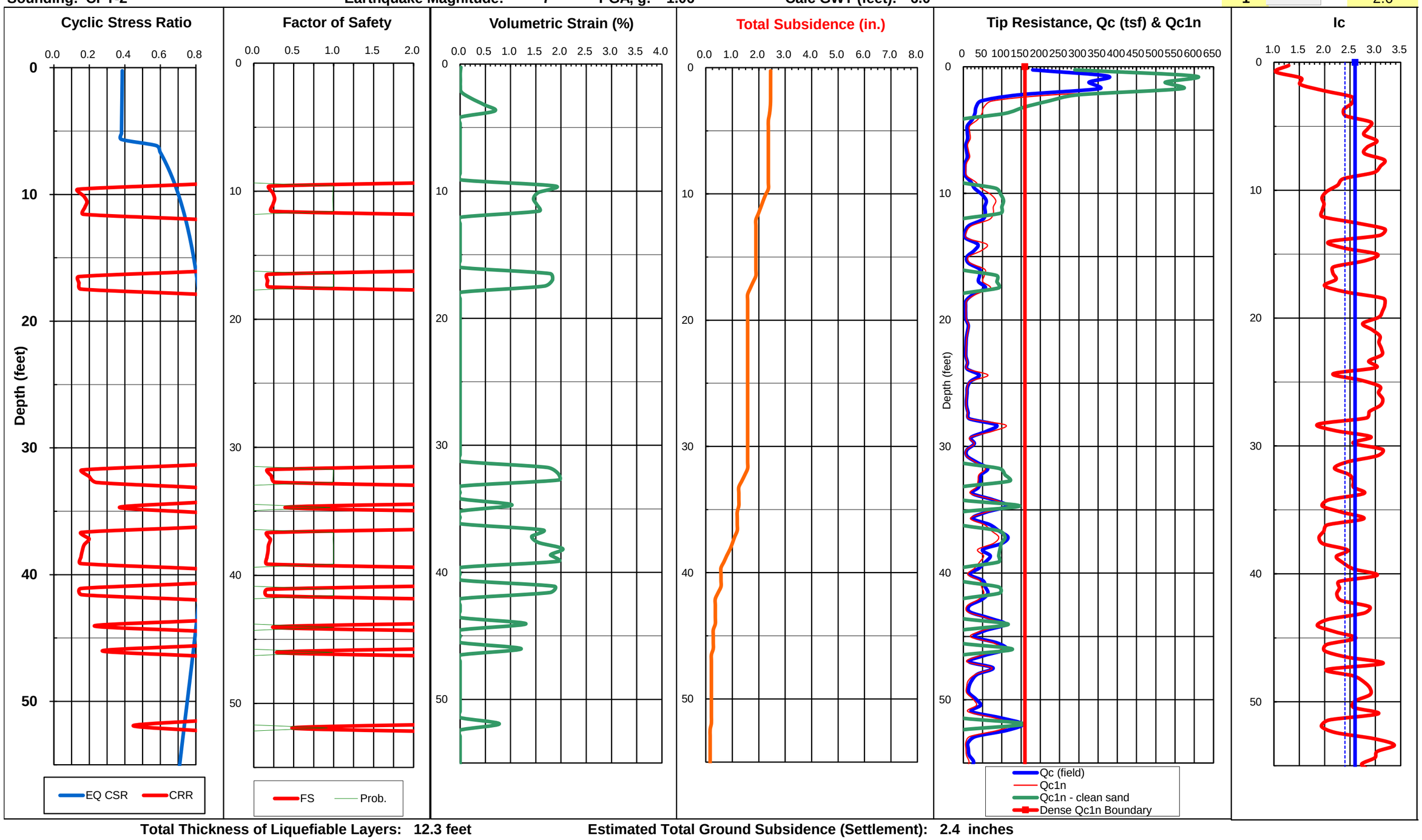
101 Garden Street **Project No: 305172-001**

Method Used: 1 1998 NCEER (Robertson & Wride)

Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Sounding: CPT-2 **Earthquake Magnitude: 7** **PGA, g: 1.06** **Calc GWT (feet): 6.0**

Plot: 1 Limiting Ic: 2.6



Total Thickness of Liquefiable Layers: 12.3 feet

Estimated Total Ground Subsidence (Settlement): 2.4 inches

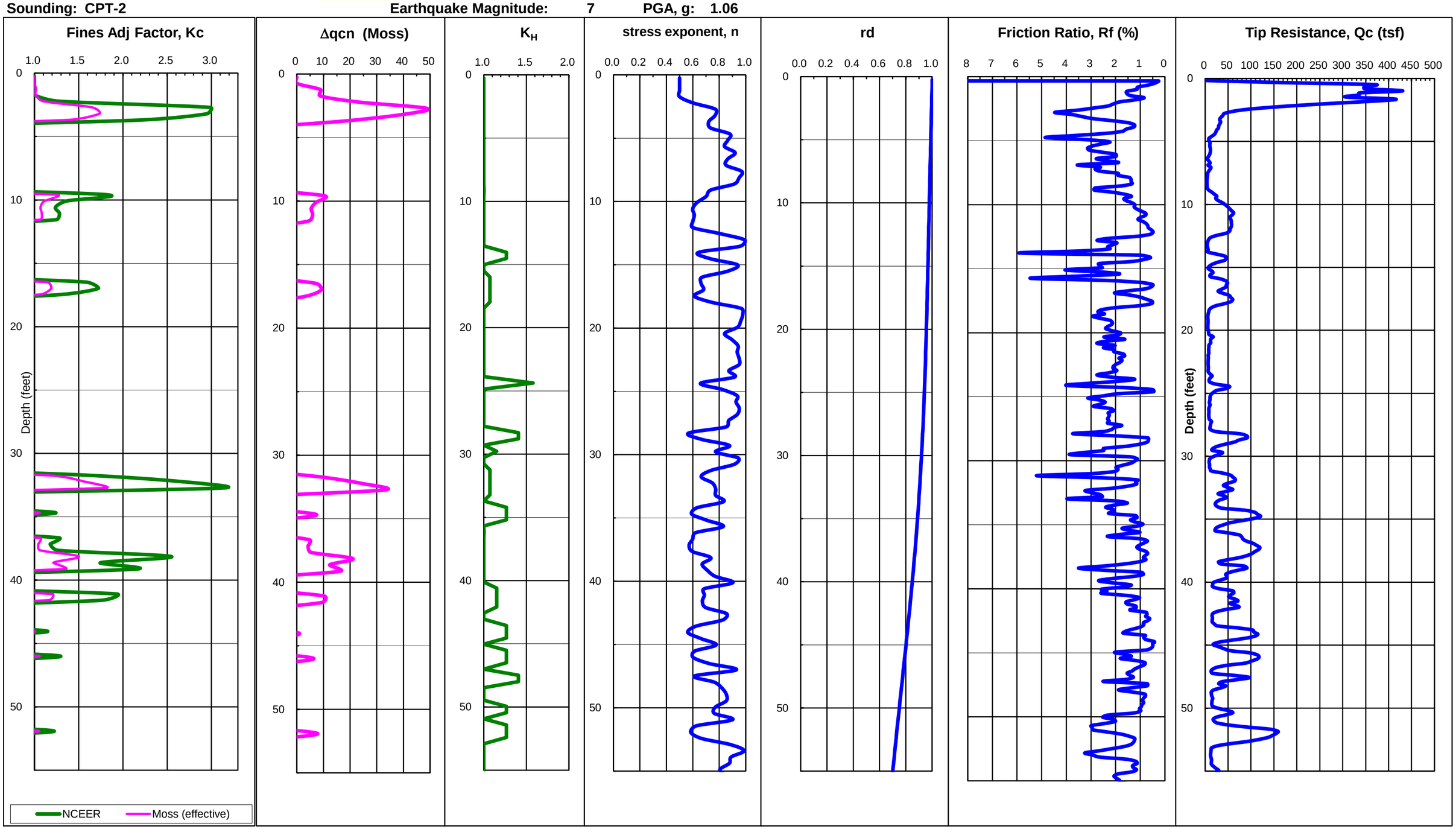
EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

3 avg increment =0.15m Qc1n/N1(60): 5

Ignore 1st/last increment into sand/silt soils: 0

Method Used: 1998 NCEER (Robertson & Wride)

Sounding: CPT-2 **Earthquake Magnitude: 7** **PGA, g: 1.06**



CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA

Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: 101 Garden Street
Job No: 305172-001
Date: 2/25/2022
Sounding: CPT-3

Liquefaction Analysis using 1998 NCEER (Robertson & Wride) method
Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Total Liquefied Thickness (feet)
18.2
Total Induced Subsidence (inches)
3.6

EARTHQUAKE INFORMATION:

Magnitude:	7	7.5
PGA, g:	1.060	0.89
MSF:	1.19	
GWT, feet:	6.0	
Calc GWT, feet:	6.0	

Plot: 3
Method Used: 1 1998 NCEER (Robertson & Wride)
Averaging Increment: 3 0.15 m
Induced CSR (M=7.5) = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR

Ignore 1st/last increment into sand/silt soils: 1 yes
Ignore/remediate upper: 0.0 m
Unit Weight of unsaturated soils: 115 pcf
Unit Weight of saturated soils: 130 pcf
Limiting Ic for liquefiable soils: 2.60 Limiting Ic for K_H: 2.6

Use Moss @ P_L: 15%
Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Required SF: 1.30 Max $\Delta N_{1(60)}$ - post liquefied: 5.5
Min SF of Liquefiable Layers: 0.15 Max $\Delta N_{1(60)}$ - non liquefied: 5.0
Avg SF of Liquefiable Layers: 0.27

Depth (feet)	(m)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio Rf %	qc MPa	Total Unit Wt. (pcf)	Total Stress po (tsf)	Eff. Stress p'o (tsf)	rd	F %	n	Max 1.70 Cq	Q	Moss qc1 MPa	Moss Δqc MPa	Moss qc_{1mod} MPa	Moss eff K_C	Qc1n	Ic	Override	Liquef. Suscept. (0 or 1)	Rel. Dens. Dr (%)	K_C	K_H	Clean Sand Qc1n	1.0 Kσ	CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Qc1n $N_{1(60)}$ Ratio	Equiv. $N_{1(60)}$	FC Adj. $\Delta N_{1(60)}$	Equiv. $N_{1(60)cs}$	*Volumetric Strain (%)*
0.49	0.15	221.43	0.80	0.36	21.20	115	0.028	0.028	1.000	0.36	0.50	1.70	355.75	36.05	0.00	36.05	1.00	355.79	1.20		1	100	1.00	1.00	355.8	1.00	Infin.	0.385	**Non-Liq.**	5.5	64.3	5.0	69.3	**0.01**
0.98	0.30	144.70	0.88	0.61	13.86	115	0.057	0.057	1.000	0.61	0.50	1.70	232.42	23.56	0.12	23.68	1.01	232.51	1.49		1	100	1.00	1.00	232.5	1.00	Infin.	0.385	**Non-Liq.**	6.1	38.3	5.0	43.3	**0.04**
1.48	0.45	117.76	3.05	2.59	11.28	115	0.085	0.085	0.999	2.59	0.61	1.70	189.08	19.17	2.29	21.46	1.12	189.22	2.02		1	100	1.33	1.00	251.8	1.00	Infin.	0.385	**Non-Liq.**	5.0	37.6	5.0	42.6	**0.04**
1.97	0.60	70.32	3.33	4.73	6.73	115	0.113	0.113	0.997	4.74	0.72	1.70	112.81	11.45	4.64	16.09	1.41	112.99	2.37		1	82	2.18	1.00	246.7	1.00	Infin.	0.384	**Non-Liq.**	4.4	25.9	5.0	30.9	**0.10**
2.46	0.75	46.50	2.09	4.49	4.45	115	0.141	0.141	0.996	4.50	0.75	1.70	74.48	7.57	4.37	11.94	1.58	74.71	2.46		1	65	2.58	1.00	193.1	1.00	Infin.	0.384	**Non-Liq.**	4.2	17.9	5.0	22.9	**0.24**
2.95	0.90	27.61	1.11	4.00	2.64	115	0.170	0.170	0.995	4.03	0.78	1.70	44.10	4.50	3.84	8.33	1.85	44.37	2.58		1	43	3.22	1.00	142.7	1.00	0.350	0.383	**Non-Liq.**	3.9	11.2	5.0	16.2	**0.66**
3.44	1.05	22.01	0.70	3.16	2.11	130	0.202	0.202	0.994	3.19	0.78	1.70	35.04	3.58	2.92	6.50		35.36	2.58		0			1.00		1.00		0.383	**Non-Liq.**	3.9	9.0			**0.00**
3.94	1.20	14.36	0.50	3.46	1.38	130	0.234	0.234	0.993	3.52	0.83	1.70	22.70	2.34	3.24	5.58		23.07	2.75		0			1.00		1.00		0.382	**Non-Liq.**	3.6	6.4			**0.00**
4.43	1.35	16.59	0.35	2.10	1.59	130	0.266	0.266	0.992	2.14	0.78	1.70	26.23	2.71	1.75	4.46		26.76	2.57		0			1.00		1.00		0.382	**Non-Liq.**	4.0	6.7			**0.00**
4.92	1.50	21.35	0.51	2.41	2.04	130	0.298	0.298	0.990	2.44	0.76	1.70	33.83	3.48	2.08	5.56	1.60	34.31	2.52		1	32	2.87	1.00	98.5	1.00	0.169	0.381	**Non-Liq.**	4.1	8.4	5.0	13.4	**1.20**
5.41	1.65	26.57	0.68	2.55	2.54	130	0.330	0.330	0.989	2.58	0.75	1.70	42.17	4.33	2.24	6.57	1.52	42.70	2.46		1	42	2.59	1.00	110.6	1.00	0.206	0.381	**Non-Liq.**	4.2	10.2	5.0	15.2	**0.83**
5.91	1.80	21.43	0.51	2.37	2.05	130	0.362	0.362	0.988	2.41	0.76	1.70	33.85	3.49	2.04	5.53	1.58	34.43	2.52		1	33	2.85	1.00	98.2	1.00	0.168	0.381	**Non-Liq.**	4.1	8.5	5.0	13.5	**1.21**
6.40	1.95	16.83	0.36	2.12	1.61	130	0.394	0.389	0.987	2.17	0.78	1.70	26.42	2.74	2.02	4.76	1.74	27.05	2.57		1	23	3.16	1.00	85.4	1.00	0.138	0.577	**0.24**	4.0	6.8	5.5	12.3	**2.22**
6.89	2.10	20.84	0.37	1.77	2.00	130	0.426	0.406	0.986	1.80	0.75	1.70	32.83	3.39	1.61	5.00	1.47	33.48	2.45		1	31	2.52	1.00	84.5	1.00	0.136	0.598	**0.23**	4.2	8.0	5.5	13.5	**2.09**
7.38	2.25	26.17	0.27	1.04	2.51	130	0.458	0.422	0.985	1.06	0.69	1.70	41.37	4.26	0.69	4.95	1.16	42.04	2.23		1	41	1.75	1.00	73.6	1.00	0.117	0.617	**0.19**	4.6	9.1	5.5	14.6	**2.00**
7.87	2.40	15.78	0.18	1.13	1.51	130	0.490	0.439	0.984	1.16	0.75	1.70	24.65	2.57	0.81	3.38		25.36	2.44		0			1.00		1.00		0.634	**Non-Liq.**	4.2	6.0			**0.00**
8.37	2.55	7.27	0.14	1.90	0.70	130	0.522	0.456	0.983	2.03	0.88	1.70	10.95	1.18	1.82	3.00		11.69	2.87		0			1.00		1.00		0.650	**Non-Liq.**	3.4	3.5			**0.00**
8.86	2.70	6.44	0.15	2.40	0.62	130	0.554	0.472	0.982	2.59	0.91	1.70	9.58	1.05	2.48	3.52		10.34	2.98		0			1.00		1.00		0.665	**Non-Liq.**	3.2	3.3			**0.00**
9.35	2.85	7.95	0.25	3.11	0.76	130	0.586	0.489	0.981	3.31	0.91	1.70	11.99	1.29	3.43	4.72		12.78	2.96		0			1.00		1.00		0.679	**Non-Liq.**	3.2	4.0			**0.00**
9.84	3.00	16.48	0.31	1.91	1.58	130	0.618	0.505	0.979	1.97	0.79	1.70	25.66	2.62	1.86	4.48		28.36	2.56		0			1.07		1.00		0.691	**Non-Liq.**	4.0	7.1			**0.00**
10.33	3.15	29.05	0.54	1.86	2.78	130	0.650	0.522	0.978	1.90	0.73	1.68	45.17	4.20	1.81	6.01	1.43	49.28	2.35		1	47	2.13	1.07	105.1	1.00	0.188	0.703	**0.27**	4.4	11.2	5.5	16.7	**1.78**
10.83	3.30	42.70	0.79	1.85	4.09	130	0.682	0.539	0.977	1.87	0.69	1.60	63.57	5.86	1.80	7.65	1.31	68.97	2.24		1	61	1.76	1.07	121.6	1.00	0.247	0.714	**0.35**	4.6	14.9	5.5	20.4	**1.49**
11.32	3.45	53.48	0.70	1.31	5.12	130	0.714	0.555	0.976	1.33	0.64	1.51	75.65	7.31	1.09	8.40	1.15	81.90	2.08		1	69	1.42	1.07	116.5	1.00	0.227	0.725	**0.31**	4.9	16.6	5.5	22.1	**1.37**
11.81	3.60	19.63	0.41	2.07	1.88	130	0.746	0.572	0.975	2.13	0.79	1.62	29.22	2.82	2.11	4.93		32.24	2.53		0			1.07		1.00		0.734	**Non-Liq.**	4.0	8.0			**0.00**
12.30	3.75	5.43	0.18	3.40	0.52	130	0.778	0.589	0.974	3.81	0.98	1.70	7.78	0.87	3.90	4.77		8.73	3.15		0			1.00		1.00		0.744	**Non-Liq.**	2.8	3.1			**0.00**
12.80	3.90	10.87	0.24	2.17	1.04	130	0.810	0.605	0.973	2.30	0.86	1.62	15.69	1.52	2.26	3.78		16.62	2.77		0			1.00		1.00		0.752	**Non-Liq.**	3.6	4.6			**0.00**
13.29	4.05	71.97	0.43	0.60	6.89	130	0.842	0.622	0.972	0.60	0.56	1.34	90.60	11.54	0.13	11.68		115.56	1.81		0			1.26		1.00		0.760	**Non-Liq.**	5.4	21.2			**0.00**
13.78	4.20	71.06	0.84	1.19	6.80	130	0.874	0.638	0.971	1.20	0.61	1.36	90.65	10.66	0.93	11.59	1.09	115.66	1.99		1	83	1.29	1.26	149.4	1.00	0.390	0.768	**0.51**	5.1	22.7	5.5	28.2	**1.02**
14.27	4.35	36.67	0.85	2.31	3.51	130	0.906	0.655	0.970	2.35	0.74	1.42	48.45	5.44	2.46	7.90		62.38	2.39		0			1.26		1.00		0.775	**Non-Liq.**	4.3	14.4			**0.00**
14.76	4.50	8.22	0.37	4.46	0.79	130	0.938	0.672	0.969	4.85	0.96	1.54	11.02	1.08	5.40	6.48		12.00	3.09		0			1.00		1.00		0.781	**Non-Liq.**	3.0	4.1			**0.00**
15.26	4.65	5.70	0.22	3.80	0.55	130	0.969	0.688	0.968	4.32	0.99	1.53	7.26	0.78	4.51	5.30		8.25	3.20		0			1.00		1.00		0.788	**Non-Liq.**	2.7	3.0			**0.00**
15.75	4.80	6.08	0.19	3.19	0.58	130	1.001	0.705	0.967	3.61	0.97	1.48	7.54	0.82	3.69	4.51		8.53	3.14		0			1.00		1.00		0.793	**Non-Liq.**	2.8	3.0			**0.00**
16.24	4.95	13.03	0.28	2.17	1.25	130	1.033	0.722	0.966	2.29	0.85	1.38	16.11	1.59	2.29	3.88		17.06	2.76		0			1.00		1.00		0.799	**Non-Liq.**	3.6	4.7			**0.00**
16.73	5.10	56.98	0.38	0.66	5.46	130	1.065	0.738	0.965	0.67	0.60	1.24	65.93	9.33	0.22	9.55		93.97	1.95		0			1.41		1.00		0.804	**Non-Liq.**	5.2	18.2			**0.00**
17.22	5.25	38.58	0.44	1.14	3.69	130	1.097	0.755	0.964	1.16	0.68	1.26	45.01	6.17	0.88	7.06		64.58	2.23		0			1.41		1.00		0.809	**Non-Liq.**	4.6	13.9			**0.00**
17.72	5.40	18.00	0.47	2.61	1.72	130	1.129	0.772	0.962	2.73	0.83	1.30	21.17	2.04	2.92	4.96		22.12	2.71		0			1.00		1.00		0.814	**Non-Liq.**	3.7	6.0			**0.00**
18.21	5.55	11.39	0.37	3.25	1.09	130	1.161	0.788	0.961	3.49	0.90	1.30	13.07	1.31	3.81	5.12		14.04	2.94		0			1.00		1.00		0.818	**Non-Liq.**	3.2	4.3			**0.00**
18.70	5.70	7.28	0.25	3.44	0.70	130	1.193	0.805	0.960	3.86	0.96	1.30	7.97	0.86	4.07	4.93		8.96	3.14		0			1.00		1.00		0.822	**Non-Liq.**	2.9	3.1			**0.00**
19.19	5.85	16.48	0.34	2.06	1.58	130	1.225	0.821	0.959	2.17	0.83	1.23	18.24	1.83	2.17	4.00		19.20	2.70		0			1.00		1.00		0.826	**Non-Liq.**	3.7	5.2			**0.00**
19.69	6.00	26.85	0.60	2.25	2.57	130	1.257	0.838	0.958	2.33	0.78	1.20	29.49	2.93	2.44	5.37		31.07	2.55		0			1.02		1.00		0.830	**Non-Liq.**	4.0	7.8			**0.00**
20.18	6.15	34.81	0.59	1.70	3.33	130	1.289	0.855	0.956	1.74	0.73	1.17	37.52	3.76	1.67	5.43	1.44	39.25	2.39		1	38	2.28	1.02	89.7	1.00	0.147	0.833	**0.18**	4.3	9.1	5.5	14.6	**2.01**
20.67	6.30	27.18	0.61	2.24	2.60	130	1.321	0.871	0.955	2.31	0.78	1.16	28.94	2.91	2.42	5.34	1.83	30.51	2.56		1	28	3.08	1.02	94.0	1.00	0.157	0.837	**0.19**	4.0	7.6	5.5	13.1	**2.18**
21.16	6.45	40.99	0.78	1.91	3.93	130	1.353	0.888	0.954	1.96	0.73	1.14	43.04	4.32	1.97	6.29	1.46	44.90	2.38		1	44	2.23	1.02	99.9	1.00	0.173	0.840	**0.21**	4.3	10.3	5.5	15.8	**1.89**
21.65	6.60	44.16	0.83	1.87	4.23	130	1.385	0.905	0.952	1.91	0.72	1.12	45.74	4.61	1.91	6.52	1.41	47.66	2.35		1	46	2.12	1.02	101.2	1.00	0.176	0.843	**0.21**	4.4	10.8	5.5	16.3	**1.84**
22.15	6.75	32.35	0.73	2.25	3.10	130	1.417	0.921	0.951	2.31	0.77	1.11	33.02	3.36	2.44	5.80		34.69	2.51		0			1.02		1.00		0.845	**Non-Liq.**	4.1	8.5			**0.00**
22.64	6.90	15.93	0.62	3.86	1.53	130	1.449	0.938	0.950	4.11	0.89	1.11	15.77	1.62	4.70	6.32		16.76	2.92		0			1.00		1.00		0.848	**Non-Liq.**	3.3	5.1			**0.00**
23.13	7.05	59.13	0.98	1.66	5.66	130	1.481	0.955	0.948	1.68	0.68	1.07	58.97	5.92	1.62	7.54		60.16	2.23		0			1.00		1.00		0.850	**Non-Liq.**	4.6	13.0			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	Liquefac. Safety	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	Volumetric Strain
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	Factor	Ratio	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	(%)
23.62	7.20	88.49	1.48	1.68	8.47	130	1.513	0.971	0.946	1.70	0.64	1.06	87.39	8.74	1.65	10.38	1.19	88.36	2.11		1	72	1.47	1.00	129.6	1.00	0.282	0.852	**0.33**	4.9	18.1	5.5	23.6	**1.29**
24.11	7.35	97.03	1.39	1.43	9.29	130	1.545	0.988	0.945	1.45	0.62	1.04	94.72	9.53	1.31	10.84	1.14	95.69	2.03		1	75	1.35	1.00	128.9	1.00	0.279	0.854	**0.33**	5.0	19.1	5.5	24.6	**1.23**
24.61	7.50	86.67	1.02	1.17	8.30	130	1.577	1.004	0.943	1.19	0.61	1.03	83.59	8.48	0.94	9.42	1.11	84.57	2.02		1	70	1.32	1.00	112.0	1.00	0.211	0.856	**0.25**	5.0	16.8	5.5	22.3	**1.38**
25.10	7.65	87.28	0.82	0.94	8.36	130	1.609	1.021	0.941	0.95	0.60	1.02	83.28	8.49	0.62	9.11	1.07	84.26	1.96		1	70	1.25	1.00	105.3	1.00	0.189	0.857	**0.22**	5.2	16.3	4.7	21.1	**1.46**
25.59	7.80	76.16	0.98	1.29	7.29	130	1.641	1.038	0.940	1.31	0.64	1.01	71.88	7.35	1.11	8.46	1.15	72.88	2.10		1	64	1.45	1.00	105.4	1.00	0.189	0.859	**0.22**	4.9	14.9	5.5	20.4	**1.51**
26.08	7.95	47.67	1.01	2.13	4.56	130	1.673	1.054	0.938	2.18	0.73	1.00	44.17	4.57	2.28	6.86		45.17	2.40		0			1.00		1.00		0.860	**Non-Liq.**	4.3	10.5			**0.00**
26.57	8.10	31.38	0.88	2.82	3.01	130	1.705	1.071	0.936	2.91	0.80	0.99	28.37	2.99	3.25	6.24		29.38	2.63		0			1.00		1.00		0.861	**Non-Liq.**	3.9	7.6			**0.00**
27.07	8.25	34.50	0.89	2.58	3.30	130	1.737	1.088	0.934	2.67	0.78	0.98	30.91	4.13	2.93	7.05		40.36	2.57		0			1.26		0.99		0.862	**Non-Liq.**	4.0	10.2			**0.00**
27.56	8.40	25.53	0.82	3.20	2.44	130	1.769	1.104	0.932	3.34	0.83	0.97	22.28	2.40	3.79	6.19		23.29	2.75		0			1.00		0.99		0.863	**Non-Liq.**	3.6	6.4			**0.00**
28.05	8.55	25.83	0.65	2.53	2.47	130	1.801	1.121	0.930	2.64	0.81	0.95	22.29	2.41	2.85	5.26		23.30	2.68		0			1.00		0.99		0.863	**Non-Liq.**	3.7	6.2			**0.00**
28.54	8.70	34.11	0.87	2.55	3.27	130	1.833	1.137	0.928	2.64	0.78	0.94	29.45	4.01	2.88	6.89		38.52	2.59		0			1.26		0.99		0.864	**Non-Liq.**	3.9	9.8			**0.00**
29.04	8.85	82.74	1.48	1.79	7.92	130	1.865	1.154	0.925	1.81	0.66	0.94	72.80	9.71	1.81	11.52	1.19	93.35	2.18		1	74	1.63	1.26	152.1	0.97	0.407	0.864	**0.46**	4.7	19.8	5.5	25.3	**1.19**
29.53	9.00	78.47	1.17	1.49	7.51	130	1.897	1.171	0.923	1.52	0.65	0.94	68.39	9.14	1.40	10.54		87.79	2.15		0			1.26		0.98		0.864	**Non-Liq.**	4.8	18.4			**0.00**
30.02	9.15	19.53	0.43	2.19	1.87	130	1.929	1.187	0.920	2.33	0.84	0.91	15.74	1.76	2.37	4.12		16.76	2.77		0			1.00		0.98		0.864	**Non-Liq.**	3.6	4.7			**0.00**
30.51	9.30	15.17	0.36	2.35	1.45	130	1.961	1.204	0.918	2.55	0.87	0.89	11.79	1.35	2.59	3.94		12.81	2.90		0			1.00		0.97		0.864	**Non-Liq.**	3.3	3.8			**0.00**
31.00	9.45	56.91	0.78	1.37	5.45	130	1.993	1.221	0.915	1.40	0.68	0.91	47.76	5.14	1.22	6.36		48.98	2.25		0			1.00		0.97		0.863	**Non-Liq.**	4.6	10.7			**0.00**
31.50	9.60	95.72	0.85	0.89	9.17	130	2.025	1.237	0.913	0.90	0.59	0.91	81.40	8.57	0.55	9.12	1.06	82.46	1.95		1	69	1.24	1.00	102.5	0.95	0.180	0.863	**0.20**	5.2	15.9	4.6	20.5	**1.51**
31.99	9.75	60.56	0.69	1.13	5.80	130	2.057	1.254	0.910	1.16	0.66	0.89	50.10	5.37	0.89	6.26	1.17	51.16	2.19		1	49	1.63	1.00	83.6	0.97	0.134	0.862	**0.15**	4.7	10.8	5.5	16.3	**1.85**
32.48	9.90	34.25	0.77	2.25	3.28	130	2.089	1.271	0.907	2.34	0.78	0.87	27.04	3.03	2.46	5.49	1.81	28.08	2.58		1	24	3.23	1.00	90.8	0.96	0.150	0.861	**0.17**	3.9	7.1	5.5	12.6	**2.24**
32.97	10.05	83.90	1.18	1.41	8.03	130	2.121	1.287	0.904	1.43	0.65	0.88	68.80	7.45	1.28	8.73	1.17	69.87	2.14		1	62	1.52	1.00	106.4	0.94	0.192	0.860	**0.21**	4.8	14.5	5.5	20.0	**1.54**
33.46	10.20	138.64	1.39	1.00	13.28	130	2.153	1.304	0.901	1.01	0.57	0.89	115.32	12.26	0.70	12.96	1.06	116.41	1.87		1	83	1.16	1.00	134.9	0.92	0.308	0.859	**0.33**	5.3	21.8	5.2	27.0	**1.09**
33.96	10.35	139.33	0.97	0.70	13.34	130	2.185	1.320	0.898	0.70	0.54	0.89	115.82	12.12	0.27	12.39	1.02	116.93	1.76		1	83	1.08	1.00	126.5	0.92	0.268	0.858	**0.29**	5.5	21.1	4.2	25.3	**1.19**
34.45	10.50	138.90	0.78	0.56	13.30	130	2.217	1.337	0.894	0.57	0.52	0.89	115.09	11.92	0.08	12.00	1.01	116.21	1.71		1	83	1.05	1.00	121.5	0.91	0.247	0.857	**0.26**	5.6	20.6	3.7	24.3	**1.25**
34.94	10.65	125.72	0.78	0.62	12.04	130	2.249	1.354	0.891	0.63	0.54	0.88	102.88	10.75	0.17	10.92	1.02	104.00	1.78		1	78	1.09	1.00	113.5	0.91	0.216	0.855	**0.23**	5.5	18.9	3.8	22.7	**1.35**
35.43	10.80	127.42	0.80	0.63	12.20	130	2.281	1.370	0.888	0.64	0.54	0.87	103.59	10.84	0.18	11.02	1.02	104.71	1.78		1	79	1.09	1.00	114.3	0.90	0.219	0.853	**0.23**	5.5	19.0	3.9	22.9	**1.34**
35.93	10.95	63.39	1.18	1.86	6.07	130	2.313	1.387	0.884	1.90	0.70	0.83	48.47	5.48	1.90	7.38	1.35	49.55	2.33		1	48	2.05	1.00	101.6	0.95	0.177	0.852	**0.20**	4.4	11.2	5.5	16.7	**1.81**
36.42	11.10	60.58	1.32	2.19	5.80	130	2.345	1.404	0.880	2.24	0.72	0.82	45.62	5.23	2.36	7.59	1.45	46.70	2.40		1	45	2.30	1.00	107.3	0.95	0.195	0.850	**0.22**	4.3	10.8	5.5	16.3	**1.84**
36.91	11.25	84.35	1.20	1.43	8.08	130	2.377	1.420	0.877	1.45	0.65	0.83	64.70	7.22	1.30	8.52	1.18	65.81	2.16		1	59	1.57	1.00	103.5	0.92	0.183	0.847	**0.20**	4.8	13.8	5.5	19.3	**1.59**
37.40	11.40	53.73	1.18	2.20	5.15	130	2.409	1.437	0.873	2.26	0.73	0.80	39.47	4.58	2.37	6.95		40.56	2.45		0			1.00		0.94		0.845	**Non-Liq.**	4.2	9.6			**0.00**
37.89	11.55	25.35	0.95	3.76	2.43	130	2.441	1.454	0.869	3.99	0.86	0.76	17.18	2.12	4.55	6.67		18.23	2.88		0			1.00		0.94		0.843	**Non-Liq.**	3.4	5.4			**0.00**
38.39	11.70	27.73	0.73	2.63	2.66	130	2.473	1.470	0.865	2.78	0.82	0.76	18.93	2.29	2.97	5.26		19.99	2.75		0			1.00		0.94		0.840	**Non-Liq.**	3.6	5.5			**0.00**
38.88	11.85	75.53	0.90	1.19	7.23	130	2.505	1.487	0.861	1.21	0.65	0.80	56.09	6.72	0.96	7.68		61.30	2.16		0			1.07		0.93		0.838	**Non-Liq.**	4.8	12.8			**0.00**
39.37	12.00	134.28	1.27	0.94	12.86	130	2.537	1.503	0.857	0.95	0.57	0.82	102.65	12.00	0.62	12.62	1.05	111.22	1.89		1	81	1.18	1.07	131.0	0.87	0.289	0.835	**0.30**	5.3	21.0	5.2	26.2	**1.14**
39.86	12.15	136.40	1.46	1.07	13.06	130	2.569	1.520	0.852	1.09	0.58	0.81	103.25	12.23	0.80	13.02	1.07	111.87	1.92		1	81	1.21	1.07	135.5	0.87	0.311	0.832	**0.32**	5.2	21.4	5.5	26.9	**1.10**
40.35	12.30	92.10	1.46	1.59	8.82	130	2.601	1.537	0.848	1.62	0.66	0.78	67.01	8.26	1.51	9.78	1.18	73.01	2.18		1	64	1.61	1.07	117.9	0.89	0.232	0.829	**0.25**	4.7	15.4	5.5	20.9	**1.47**
40.85	12.45	57.31	1.30	2.27	5.49	130	2.633	1.553	0.843	2.34	0.74	0.75	39.74	5.11	2.46	7.57		43.76	2.45		0			1.07		0.93		0.826	**Non-Liq.**	4.2	10.4			**0.00**
41.34	12.60	39.16	1.16	2.95	3.75	130	2.665	1.570	0.839	3.08	0.80	0.73	25.93	3.22	3.40	6.62		27.01	2.67		0			1.00		0.92		0.823	**Non-Liq.**	3.8	7.2			**0.00**
41.83	12.75	30.68	0.81	2.65	2.94	130	2.697	1.587	0.834	2.79	0.82	0.72	19.75	2.46	2.98	5.44		20.83	2.74		0			1.00		0.92		0.819	**Non-Liq.**	3.6	5.7			**0.00**
42.32	12.90	53.48	0.67	1.26	5.12	130	2.729	1.603	0.830	1.30	0.70	0.75	36.70	4.89	1.05	5.94		43.61	2.32		0			1.15		0.92		0.816	**Non-Liq.**	4.4	9.8			**0.00**
42.81	13.05	144.95	1.00	0.69	13.88	130	2.761	1.620	0.825	0.70	0.54	0.79	107.49	13.32	0.27	13.58	1.02	125.29	1.79		1	86	1.10	1.15	137.8	0.84	0.323	0.812	**0.34**	5.5	22.8	4.7	27.6	**1.06**
43.31	13.20	144.70	1.24	0.86	13.86	130	2.793	1.637	0.820	0.87	0.56	0.78	105.88	13.42	0.49	13.91	1.04	123.44	1.85		1	86	1.15	1.15	141.5	0.84	0.343	0.809	**0.36**	5.4	23.0	5.3	28.3	**1.02**
43.80	13.35	80.35	1.05	1.31	7.69	130	2.825	1.653	0.816	1.34	0.66	0.75	55.47	7.43	1.12	8.54		65.28	2.19		0			1.15		0.91		0.805	**Non-Liq.**	4.7	13.8			**0.00**
44.29	13.50	19.10	0.62	3.23	1.83	130	2.857	1.670	0.811	3.54	0.89	0.67	10.97	1.46	3.75	5.21		12.02	3.01		0			1.00		0.91		0.801	**Non-Liq.**	3.1	3.9			**0.00**
44.78	13.65	14.41	0.32	2.21	1.38	130	2.889	1.686	0.806	2.51	0.90	0.66	7.91	1.04	2.36	3.40		8.96	3.04		0			1.00		0.91		0.797	**Non-Liq.**	3.1	2.9			**0.00**
45.28	13.80	17.48	0.31	1.76	1.67	130	2.921	1.703	0.801	1.95	0.86	0.66	9.91	1.26	1.73	2.99		10.98	2.90		0			1.00		0.91		0.793	**Non-Liq.**	3.3	3.3			**0.00**
45.77	13.95	18.01	0.35	1.94	1.72	130	2.953	1.720	0.796	2.14	0.86	0.66	10.13	1.31	1.97	3.27		11.20	2.91		0			1.00		0.91		0.789	**Non-Liq.**	3.3	3.4			**0.00**
46.26	14.10	14.78	0.30	2.03	1.42	130	2.985	1.736	0.791	2.30	0.89	0.64	7.93	1.05	2.09	3.14		8.98	3.02		0			1.00		0.91		0.785	**Non-Liq.**	3.1	2.9			**0.00**
46.75	14.25	19.37	0.38	1.95	1.85	130	3.017	1.753	0.786	2.15	0.85	0.65	10.81	1.40	1.99	3.39		11.89	2.89		0			1.00		0.90		0.781	**Non-Liq.**	3.3	3.6			**0.00**
47.24	14.40	46.37	0.85	1.84	4.44	130	3.049	1.770	0.781	1.91	0.75	0.68	28.70	4.13	1.82	5.95		34.39	2.51		0			1.15		0.90		0.777	**Non-Liq.**	4.1	8.4			**0.00**
47.74	14.55	74.66	1.42	1.91	7.15	130	3.081	1.786	0.776	1.95	0.70	0.69	47.73	6.83	1.92	8.75		56.36	2.34		0			1.15		0.90		0.773	**Non-Liq.**	4.4	12.8			**0.00**
48.23	14.70	53.50	1.61	3.01	5.12	130	3.113	1.803	0.771	3.12	0.77	0.66	32.33	4.26	3.42	7.68		33.46	2.60		0			1.00		0.90		0.769	**Non-Liq.**	3.9	8.6			**0.00**
48.72	14.85	56.21	1.56	2.78	5.38	130	3.145	1.819	0.766	2.87	0.76	0.66	33.99	5.14	3.10	8.24		40.48	2.56		0			1.15		0.90		0.765	**Non-Liq.**	4.0	10.2			**0.00**
49.21	15.00	63.07	1.33	2.10	6.04	130	3.177	1.836	0.761	2.16	0.73	0.67	38.75	5.69	2.17	7.86	1.38	46.00	2.44		1	45	2.49	1.15	114.5	0.90	0.220	0.760	**0.26**	4.2	10.9	5.5	16.4	**1.82**
49.70	15.15	99.45	1.26	1.27	9.52	130	3.209	1.853	0.756	1.30	0.64	0.70	64.49	8.87	1.04	9.92	1.12	75.75	2.13		1	65	1.51	1.15	114.4	0.85	0.219	0.756	**0.24**	4.8	15.7	5.5	21.2	**1.44**
50.20	15.30	74.75	1.40	1.88	7.16	130	3.241	1.869	0.751	1.93	0.70	0.67	46.20	6.72	1.86	8.58		54.62	2.35		0			1.15		0.89		0.752	**Non-Liq.**	4.4	12.4			**0.00**
50.69	15.45	28.82	1.19	4.12	2.76	130	3.273	1.886	0.746	4.41	0.87	0.60	15.39	2.20	4.88	7.08		16.47	2.95		0			1.00		0.89		0.747	**Non-Liq.**	3.2	5.1			**0.00**
51.18	15.60	19.09	0.74	3.86	1.83	130	3.305	1.903	0.741	4.29	0.91	0.58	9.50	1.38	4.53	5.91		10.55	3.11		0			1.00		0.89		0.743	**Non-Liq.**	2.9	3.6			**0.00**
51.67	15.75	21.33	0.57	2.69	2.04	130	3.337	1.919	0.736	2.95	0.87	0.59	10.91	1.52	2.94	4.46		11.99	2.96		0			1.00		0.89		0.739	**Non-Liq.**	3.2	3.7			**0.00**
52.17	15.90	26.98	0.76	2.81	2.58	130	3.369	1.936	0.731	3.03	0.85	0.60	14.17	1.97	3.10	5.07		15.27	2.88		0			1.00		0.89		0.735	**Non-Liq.**	3.4	4.5			**0.00**
52.66	16.05	39.28	1.29	3.29	3.76	130	3.401	1.953	0.726	3.46	0.82	0.61	21.35	2.99	3.74	6.73		22.47	2.77		0			1.00		0.88		0.730	**Non-Liq.**	3.6	6.3			**0.00**
53.15	16.20	49.08	2.17	4.42	4.70	130	3.433	1.969	0.721	4.60	0.82	0.60	26.71	3.86	5.24	9.11		27.83	2.78		0			1.00		0.88		0.726	**Non-Liq.**	3.6	7.8			**0.00**
53.64	16.35	83.08	3.23	3.89	7.96	130	3.465	1.986	0.716	3.98	0.76	0.62	47.51	10.58	4.52	15.10		76.89	2.55		0			1.58		0.88		0.722	**Non-Liq.**	4.0	19.2			**0.00**
54.13	16.50	32.69	2.94	9.00	3.13	130	3.497	2.002	0.712	9.59	0.93	0.55	16.02	2.58	6.00	8.58		17.06	3.16		0			1.00		0.88		0.718	**Non-Liq.**	2.8	6.1			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	**Liquefac. Safety**	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	***Volumetric Strain***
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	**Factor**	Ratio	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	***(%)***
54.63	16.65	23.55	1.48	6.28	2.26	130	3.529	2.019	0.707	6.87	0.93	0.55	11.13	1.76	5.99	7.75		12.17	3.18		0			1.00		0.88		0.714	**Non-Liq.**	2.8	4.4			**0.00**
55.12	16.80	30.19	0.98	3.24	2.89	130	3.561	2.036	0.702	3.47	0.85	0.57	15.25	2.20	3.64	5.85		16.36	2.89		0			1.00		0.88		0.709	**Non-Liq.**	3.4	4.9			**0.00**
55.61	16.95	24.52	0.99	4.02	2.35	130	3.593	2.052	0.698	4.39	0.89	0.55	11.76	1.77	4.67	6.44		12.83	3.04		0			1.00		0.88		0.705	**Non-Liq.**	3.1	4.2			**0.00**
56.10	17.10	24.33	0.87	3.57	2.33	130	3.625	2.069	0.693	3.90	0.88	0.55	11.63	1.73	4.06	5.80		12.71	3.01		0			1.00		0.87		0.701	**Non-Liq.**	3.1	4.1			**0.00**
56.59	17.25	19.74	0.84	4.24	1.89	130	3.656	2.086	0.689	4.74	0.92	0.53	8.91	1.38	4.95	6.33		9.96	3.15		0			1.00		0.87		0.697	**Non-Liq.**	2.8	3.5			**0.00**
57.09	17.40	72.43	1.40	1.93	6.94	130	3.688	2.102	0.684	1.99	0.71	0.61	40.72	8.56	1.89	10.44		66.26	2.40		0			1.58		0.87		0.693	**Non-Liq.**	4.3	15.4			**0.00**
57.58	17.55	32.76	1.37	4.17	3.14	130	3.720	2.119	0.680	4.46	0.86	0.55	15.88	2.42	4.84	7.26		16.98	2.94		0			1.00		0.87		0.689	**Non-Liq.**	3.2	5.2			**0.00**
58.07	17.70	18.60	0.75	4.05	1.78	130	3.752	2.136	0.675	4.58	0.93	0.52	8.10	1.27	4.67	5.95		9.15	3.18		0			1.00		0.87		0.686	**Non-Liq.**	2.8	3.3			**0.00**
58.56	17.85	48.10	1.15	2.39	4.61	130	3.784	2.152	0.671	2.50	0.78	0.58	25.02	3.51	2.48	5.99		26.19	2.63		0			1.00		0.87		0.682	**Non-Liq.**	3.9	6.8			**0.00**
59.06	18.00	21.55	1.18	5.49	2.06	130	3.816	2.169	0.667	6.10	0.94	0.51	9.34	1.53	5.91	7.44		10.39	3.20		0			1.00		0.87		0.678	**Non-Liq.**	2.7	3.8			**0.00**
59.55	18.15	20.76	0.72	3.46	1.99	130	3.848	2.185	0.663	3.86	0.91	0.52	9.11	1.41	3.88	5.29		10.18	3.09		0			1.00		0.86		0.674	**Non-Liq.**	2.9	3.5			**0.00**
60.04	18.30	24.71	0.65	2.63	2.37	130	3.880	2.202	0.659	2.88	0.86	0.53	11.30	1.67	2.78	4.46		12.41	2.94		0			1.00		0.86		0.671	**Non-Liq.**	3.2	3.8			**0.00**
60.53	18.45	17.98	0.52	2.87	1.72	130	3.912	2.219	0.655	3.28	0.91	0.51	7.59	1.17	3.10	4.27		8.66	3.12		0			1.00		0.86		0.667	**Non-Liq.**	2.9	3.0			**0.00**
61.02	18.60	23.35	0.45	1.91	2.24	130	3.944	2.235	0.651	2.12	0.85	0.53	10.59	1.51	1.84	3.36		11.71	2.89		0			1.00		0.86		0.664	**Non-Liq.**	3.3	3.5			**0.00**
61.52	18.75	16.89	0.43	2.56	1.62	130	3.976	2.252	0.647	2.96	0.91	0.50	6.95	1.07	2.69	3.75		8.02	3.13		0			1.00		0.86		0.660	**Non-Liq.**	2.9	2.8			**0.00**
62.01	18.90	16.71	0.38	2.25	1.60	130	4.008	2.269	0.643	2.61	0.90	0.50	6.85	1.04	2.28	3.32		7.92	3.10		0			1.00		0.86		0.657	**Non-Liq.**	2.9	2.7			**0.00**
62.50	19.05	16.82	0.39	2.33	1.61	130	4.040	2.285	0.640	2.69	0.91	0.50	6.83	1.04	2.37	3.42		7.91	3.11		0			1.00		0.86		0.653	**Non-Liq.**	2.9	2.7			**0.00**
62.99	19.20	16.32	0.37	2.29	1.56	130	4.072	2.302	0.636	2.67	0.91	0.49	6.53	1.00	2.32	3.32		7.60	3.12		0			1.00		0.86		0.650	**Non-Liq.**	2.9	2.6			**0.00**
63.48	19.35	16.66	0.36	2.19	1.60	130	4.104	2.318	0.633	2.54	0.90	0.49	6.66	1.02	2.19	3.20		7.74	3.11		0			1.00		0.85		0.647	**Non-Liq.**	2.9	2.6			**0.00**
63.98	19.50	17.72	0.38	2.15	1.70	130	4.136	2.335	0.629	2.47	0.90	0.49	7.16	1.09	2.13	3.22		8.24	3.07		0			1.00		0.85		0.644	**Non-Liq.**	3.0	2.8			**0.00**
64.47	19.65	19.42	0.43	2.20	1.86	130	4.168	2.352	0.626	2.50	0.89	0.49	7.95	1.21	2.19	3.40		9.05	3.04		0			1.00		0.85		0.641	**Non-Liq.**	3.1	3.0			**0.00**
64.96	19.80	26.14	0.73	2.80	2.50	130	4.200	2.368	0.622	3.08	0.87	0.50	11.18	1.73	2.97	4.70		12.29	2.96		0			1.00		0.85		0.638	**Non-Liq.**	3.2	3.8			**0.00**
65.45	19.95	24.15	0.95	3.94	2.31	130	4.232	2.385	0.619	4.37	0.90	0.48	9.87	1.63	4.42	6.05		10.95	3.10		0			1.00		0.85		0.635	**Non-Liq.**	2.9	3.7			**0.00**
65.94	20.10	23.61	0.94	4.00	2.26	130	4.264	2.402	0.616	4.45	0.91	0.48	9.52	1.59	4.50	6.08		10.60	3.11		0			1.00		0.85		0.632	**Non-Liq.**	2.9	3.6			**0.00**
66.44	20.25	23.29	1.16	5.00	2.23	130	4.296	2.418	0.613	5.58	0.93	0.46	9.16	1.59	5.78	7.36		10.22	3.19		0			1.00		0.85		0.629	**Non-Liq.**	2.8	3.7			**0.00**
66.93	20.40	20.39	1.17	5.75	1.95	130	4.328	2.435	0.610	6.53	0.96	0.45	7.64	1.37	5.77	7.14		8.68	3.29		0			1.00		0.85		0.626	**Non-Liq.**	2.6	3.4			**0.00**
67.42	20.55	58.64	1.57	2.68	5.62	130	4.360	2.452	0.607	2.79	0.77	0.52	27.75	4.20	2.79	6.99		28.96	2.62		0			1.00		0.85		0.623	**Non-Liq.**	3.9	7.5			**0.00**
67.91	20.70	124.51	2.62	2.10	11.92	130	4.392	2.468	0.604	2.14	0.67	0.56	65.13	11.69	2.05	13.74		84.02	2.27		0			1.26		0.84		0.621	**Non-Liq.**	4.6	18.4			**0.00**
68.41	20.85	159.61	2.69	1.68	15.28	130	4.424	2.485	0.601	1.71	0.63	0.58	86.65	14.90	1.51	16.41	1.10	111.30	2.11		1	81	1.48	1.26	164.3	0.71	Infin.	0.618	**Non-Liq.**	4.9	22.9	5.0	27.9	**0.00**
68.90	21.00	63.52	1.66	2.61	6.08	130	4.456	2.501	0.598	2.72	0.76	0.52	29.91	5.74	2.69	8.43		39.38	2.59		0			1.26		0.84		0.615	**Non-Liq.**	3.9	10.0			**0.00**
69.39	21.15	32.02	0.91	2.84	3.07	130	4.488	2.518	0.595	3.08	0.85	0.48	13.38	2.13	2.98	5.11		14.52	2.90		0			1.00		0.84		0.613	**Non-Liq.**	3.3	4.4			**0.00**
69.88	21.30	80.17	1.60	2.00	7.68	130	4.520	2.535	0.593	2.06	0.72	0.53	39.25	7.18	1.90	9.08		51.25	2.42		0			1.26		0.84		0.610	**Non-Liq.**	4.3	12.0			**0.00**
70.37	21.45	28.74	1.76	6.13	2.75	130	4.552	2.551	0.590	6.73	0.92	0.44	10.97	2.01	5.72	7.73		12.04	3.18		0			1.00		0.84		0.608	**Non-Liq.**	2.8	4.3			**0.00**
70.87	21.60	22.00	0.79	3.60	2.11	130	4.584	2.568	0.587	4.08	0.91	0.44	8.17	1.40	3.94	5.35		9.25	3.15		0			1.00		0.84		0.606	**Non-Liq.**	2.8	3.3			**0.00**
71.36	21.75	21.52	0.44	2.03	2.06	130	4.616	2.585	0.585	2.31	0.87	0.46	8.20	1.28	1.95	3.23		9.32	3.01		0			1.00		0.84		0.603	**Non-Liq.**	3.1	3.0			**0.00**
71.85	21.90	71.44	0.87	1.21	6.84	130	4.648	2.601	0.582	1.26	0.69	0.54	34.97	5.92	0.90	6.83		45.88	2.34		0			1.26		0.84		0.601	**Non-Liq.**	4.4	10.4			**0.00**
72.34	22.05	246.10	2.60	1.06	23.57	130	4.680	2.618	0.580	1.07	0.55	0.61	139.84	17.52	0.71	18.22	1.04	141.34	1.82		1	91	1.12	1.00	158.6	0.70	0.451	0.599	**0.52**	5.4	26.0	5.5	31.5	**0.60**
72.83	22.20	228.91	4.54	1.98	21.92	130	4.712	2.635	0.578	2.00	0.62	0.57	121.93	17.26	1.87	19.13		123.35	2.06		0			1.00		0.83		0.597	**Non-Liq.**	5.0	24.8			**0.00**
73.33	22.35	77.97	3.89	4.99	7.47	130	4.744	2.651	0.575	5.16	0.80	0.48	34.02	5.89	5.66	11.56		35.21	2.74		0			1.00		0.83		0.595	**Non-Liq.**	3.6	9.7			**0.00**
73.82	22.50	31.43	1.82	5.78	3.01	130	4.776	2.668	0.573	6.31	0.91	0.43	11.69	2.18	5.67	7.86		12.78	3.14		0			1.00		0.83		0.592	**Non-Liq.**	2.9	4.5			**0.00**
74.31	22.65	20.85	0.69	3.32	2.00	130	4.808	2.684	0.571	3.81	0.92	0.43	7.31	1.28	3.55	4.83		8.39	3.17		0			1.00		0.83		0.590	**Non-Liq.**	2.8	3.0			**0.00**
74.80	22.80	56.57	0.60	1.07	5.42	130	4.840	2.701	0.569	1.12	0.71	0.51	26.17	3.51	0.71	4.22		27.58	2.41		0			1.00		0.83		0.588	**Non-Liq.**	4.3	6.5			**0.00**

EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

101 Garden Street **Project No: 305172-001**

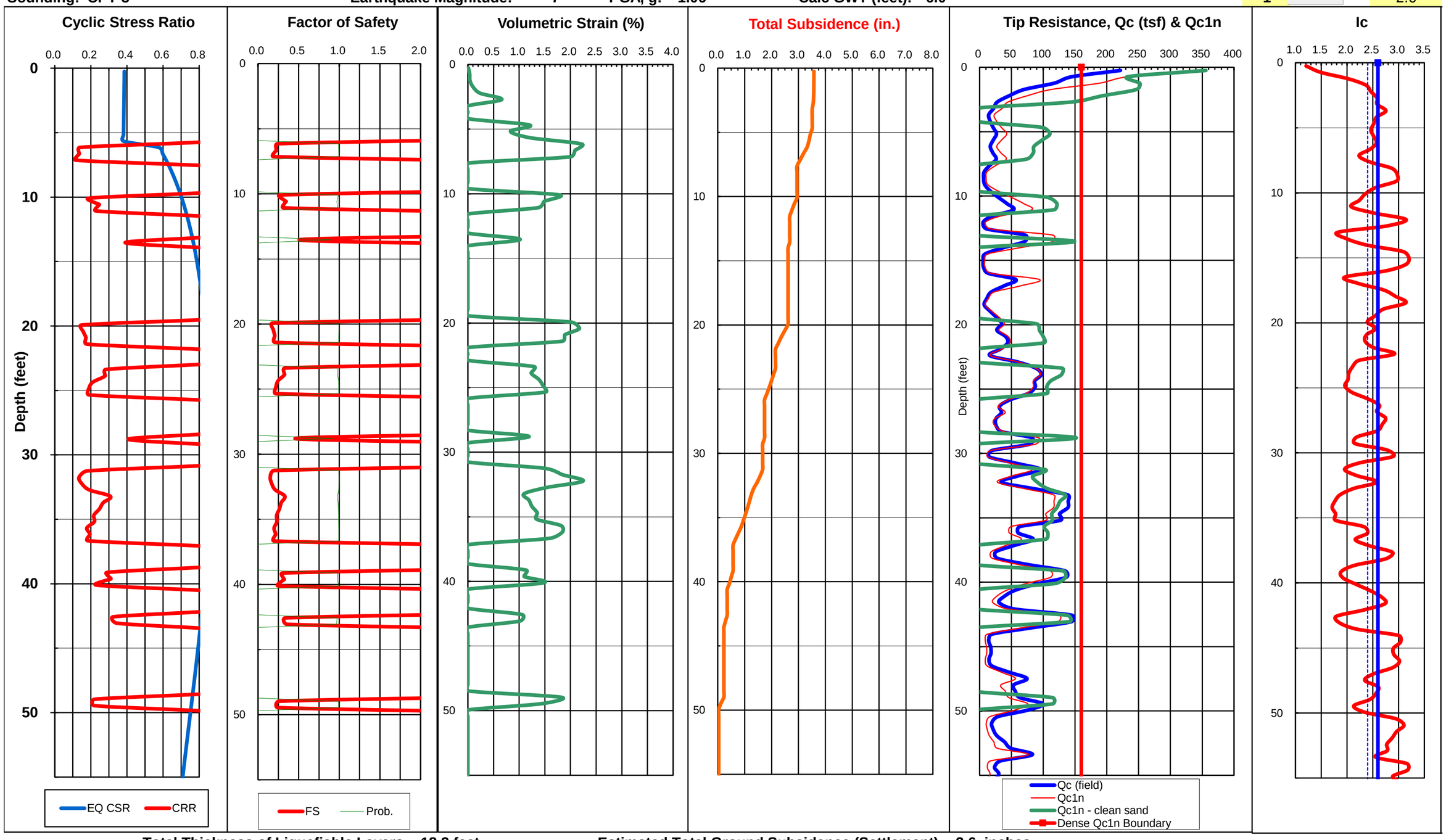
Method Used: 1 1998 NCEER (Robertson & Wride)

Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Plot 1

Limiting Ic: 2.6

Sounding: CPT-3 **Earthquake Magnitude: 7** **PGA, g: 1.06** **Calc GWT (feet): 6.0**



Total Thickness of Liquefiable Layers: 18.2 feet

Estimated Total Ground Subsidence (Settlement): 3.6 inches

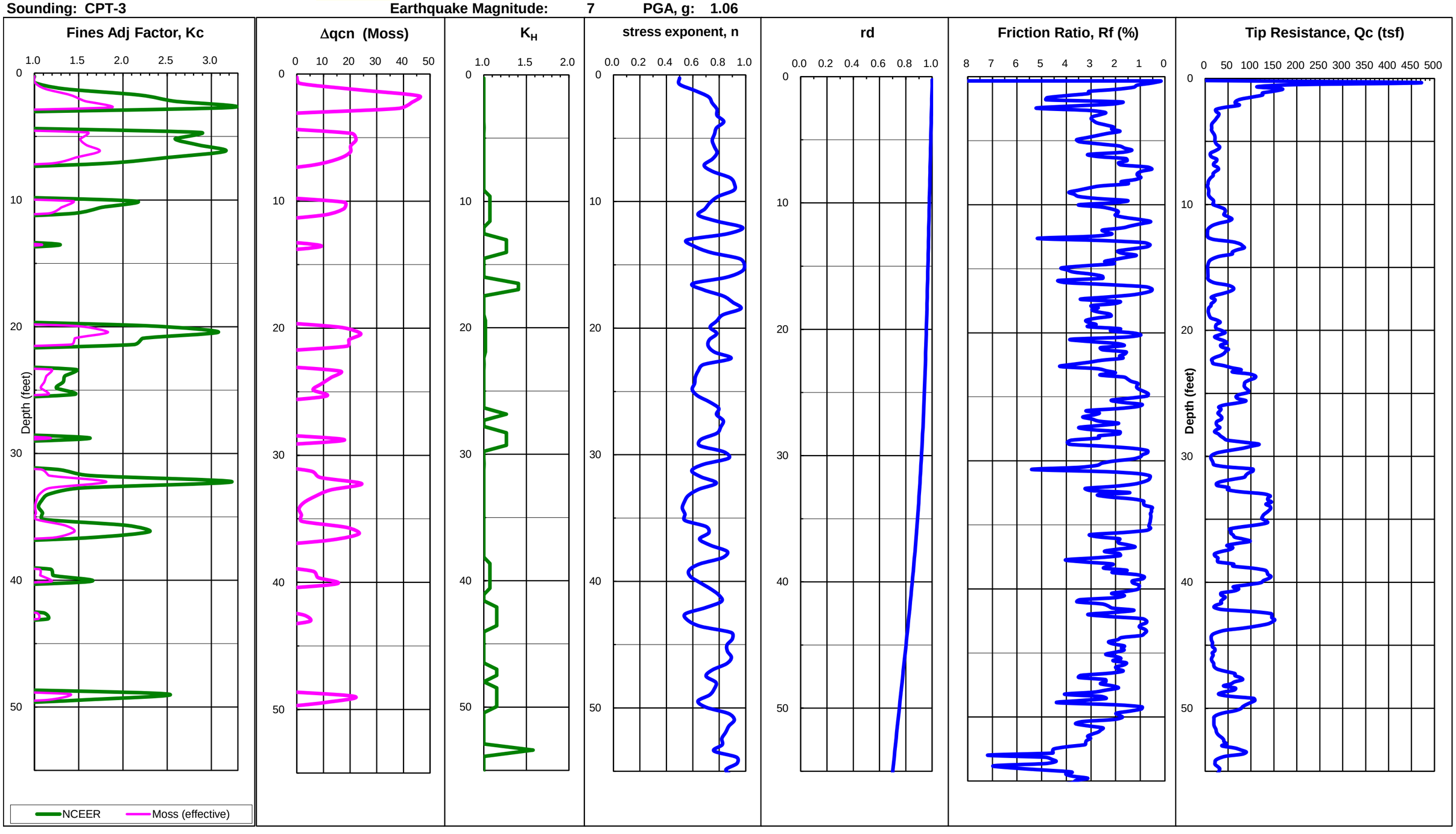
EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

3 avg increment =0.15m Qc1n/N1(60): 5

Ignore 1st/last increment into sand/silt soils: 0

Method Used: 1998 NCEER (Robertson & Wride)

Sounding: CPT-3 **Earthquake Magnitude: 7** **PGA, g: 1.06**



CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA

Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: 101 Garden Street
Job No: 305172-001
Date: 2/25/2022
Sounding: CPT-4

Liquefaction Analysis using 1998 NCEER (Robertson & Wride) method
Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Total Liquefied Thickness (feet)
13.8
Total Induced Subsidence (inches)
2.6

EARTHQUAKE INFORMATION:

Magnitude: 7 (7.5)
PGA, g: 1.060 (0.89)
MSF: 1.19
GWT, feet: 6.0
Calc GWT, feet: 6.0

Plot: 4
Method Used: 1 (1998 NCEER (Robertson & Wride))
Averaging Increment: 3 (0.15 m)
Induced CSR (M=7.5) = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR

Ignore 1st/last increment into sand/silt soils: 1 (yes)
Ignore/remediate upper: 0.0 m
Unit Weight of unsaturated soils: 115 pcf
Unit Weight of saturated soils: 130 pcf
Limiting Ic for liquefiable soils: 2.60 (Limiting Ic for K_H: 2.6)

Use Moss @ P_L: 15%
Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Required SF: 1.30 (Max $\Delta N_{1(60)}$ - post liquefied: 5.5; Max $\Delta N_{1(60)}$ - non liquefied: 5.0)
Min SF of Liquefiable Layers: 0.18
Avg SF of Liquefiable Layers: 0.26

Depth (feet)	(m)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio Rf %	qc MPa	Total Unit Wt. (pcf)	Total Stress po (tsf)	Eff. Stress p'o (tsf)	rd	F %	n	Max 1.70 Cq	Q	Moss qc1 MPa	Moss Δqc MPa	Moss qc_{1mod} MPa	Moss eff K_C	Qc1n	Ic	Override	Liquef. Suscept. (0 or 1)	Rel. Dens. Dr (%)	K_C	K_H	Clean Sand Qc1n	Clean Sand 1.0 Kσ	CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Qc1n $N_{1(60)}$ Ratio	Equiv. $N_{1(60)}$	FC Adj. $\Delta N_{1(60)}$	Equiv. $N_{1(60)cs}$	*Volumetric Strain (%)*
0.49	0.15	210.95	1.82	0.86	20.20	115	0.028	0.028	1.000	0.87	0.50	1.70	338.90	34.34	0.40	34.74	1.01	338.95	1.49		1	100	1.00	1.00	339.0	1.00	Infin.	0.385	**Non-Liq.**	6.1	55.8	5.0	60.8	**0.01**
0.98	0.30	138.87	1.61	1.16	13.30	115	0.057	0.057	1.000	1.16	0.52	1.70	223.05	22.61	0.73	23.33	1.03	223.14	1.71		1	100	1.04	1.00	232.5	1.00	Infin.	0.385	**Non-Liq.**	5.7	39.4	5.0	44.4	**0.03**
1.48	0.45	76.01	3.45	4.54	7.28	115	0.085	0.085	0.999	4.55	0.71	1.70	122.00	12.37	4.43	16.81	1.36	122.14	2.33		1	85	2.06	1.00	251.2	1.00	Infin.	0.385	**Non-Liq.**	4.4	27.6	5.0	32.6	**0.08**
1.97	0.60	48.27	2.67	5.53	4.62	115	0.113	0.113	0.997	5.54	0.76	1.70	77.38	7.86	4.93	12.79	1.63	77.57	2.52		1	66	2.88	1.00	223.3	1.00	Infin.	0.384	**Non-Liq.**	4.1	19.1	5.0	24.1	**0.20**
2.46	0.75	42.91	1.72	4.01	4.11	115	0.141	0.141	0.996	4.02	0.74	1.70	68.73	6.99	3.85	10.83	1.55	68.95	2.45		1	61	2.52	1.00	173.9	1.00	Infin.	0.384	**Non-Liq.**	4.2	16.4	5.0	21.4	**0.29**
2.95	0.90	46.99	1.51	3.21	4.50	115	0.170	0.170	0.995	3.22	0.71	1.70	75.23	7.65	2.97	10.62	1.39	75.50	2.35		1	65	2.12	1.00	160.3	1.00	Infin.	0.383	**Non-Liq.**	4.4	17.2	5.0	22.2	**0.26**
3.44	1.05	39.79	1.38	3.47	3.81	130	0.202	0.202	0.994	3.49	0.74	1.70	63.61	6.48	3.25	9.73	1.50	63.93	2.43		1	58	2.42	1.00	154.7	1.00	0.425	0.383	**Non-Liq.**	4.3	15.0	5.0	20.0	**0.36**
3.94	1.20	44.59	1.26	2.82	4.27	130	0.234	0.234	0.993	2.83	0.71	1.70	71.27	7.26	2.53	9.79		71.64	2.33		0			1.00		1.00		0.382	**Non-Liq.**	4.4	16.1			**0.00**
4.43	1.35	16.78	0.95	5.68	1.61	130	0.266	0.266	0.992	5.77	0.86	1.70	26.54	2.73	4.92	7.66		26.97	2.85		0			1.00		1.00		0.382	**Non-Liq.**	3.4	7.9			**0.00**
4.92	1.50	14.33	0.48	3.35	1.37	130	0.298	0.298	0.990	3.43	0.83	1.70	22.54	2.33	3.12	5.45		23.02	2.75		0			1.00		1.00		0.381	**Non-Liq.**	3.6	6.4			**0.00**
5.41	1.65	14.76	0.36	2.44	1.41	130	0.330	0.330	0.989	2.49	0.80	1.70	23.19	2.40	2.12	4.52		23.72	2.65		0			1.00		1.00		0.381	**Non-Liq.**	3.8	6.2			**0.00**
5.91	1.80	17.94	0.41	2.27	1.72	130	0.362	0.362	0.988	2.32	0.78	1.70	28.24	4.11	1.94	6.05		40.55	2.57		0			1.41		1.00		0.381	**Non-Liq.**	4.0	10.2			**0.00**
6.40	1.95	15.46	0.38	2.49	1.48	130	0.394	0.389	0.987	2.55	0.80	1.70	24.22	2.52	2.49	5.00		24.85	2.65		0			1.00		1.00		0.577	**Non-Liq.**	3.8	6.5			**0.00**
6.89	2.10	17.75	0.32	1.80	1.70	130	0.426	0.406	0.986	1.85	0.77	1.70	27.87	3.33	1.65	4.98		32.88	2.51		0			1.15		1.00		0.598	**Non-Liq.**	4.1	8.1			**0.00**
7.38	2.25	8.92	0.25	2.81	0.85	130	0.458	0.422	0.985	2.95	0.88	1.70	13.66	1.45	2.95	4.40		14.34	2.88		0			1.00		1.00		0.617	**Non-Liq.**	3.4	4.3			**0.00**
7.87	2.40	10.38	0.24	2.28	0.99	130	0.490	0.439	0.984	2.38	0.85	1.70	15.98	1.69	2.29	3.98		16.68	2.77		0			1.00		1.00		0.634	**Non-Liq.**	3.6	4.7			**0.00**
8.37	2.55	19.27	0.36	1.87	1.84	130	0.522	0.456	0.983	1.92	0.77	1.70	30.23	2.97	1.78	4.75		31.07	2.49		0			1.00		1.00		0.650	**Non-Liq.**	4.1	7.5			**0.00**
8.86	2.70	20.58	0.38	1.86	1.97	130	0.554	0.472	0.982	1.90	0.76	1.70	32.30	3.07	1.77	4.84	1.58	33.06	2.47		1	31	2.61	1.00	86.4	1.00	0.140	0.665	**0.21**	4.2	7.9	5.5	13.4	**2.10**
9.35	2.85	20.45	0.41	2.02	1.96	130	0.586	0.489	0.981	2.07	0.77	1.70	32.07	2.97	2.00	4.97	1.67	32.85	2.49		1	31	2.74	1.00	89.9	1.00	0.148	0.679	**0.22**	4.1	8.0	5.5	13.5	**2.10**
9.84	3.00	24.78	0.62	2.52	2.37	130	0.618	0.505	0.979	2.57	0.77	1.70	39.01	3.38	2.66	6.04	1.79	39.82	2.49		1	39	2.70	1.00	107.7	1.00	0.196	0.691	**0.28**	4.1	9.6	5.5	15.1	**1.93**
10.33	3.15	35.55	0.79	2.23	3.40	130	0.650	0.522	0.978	2.27	0.72	1.67	55.24	4.62	2.30	6.92	1.50	56.07	2.34		1	53	2.08	1.00	116.5	1.00	0.227	0.703	**0.32**	4.4	12.7	5.5	18.2	**1.66**
10.83	3.30	31.86	0.81	2.54	3.05	130	0.682	0.539	0.977	2.58	0.75	1.66	49.07	4.09	2.71	6.80	1.66	49.91	2.41		1	48	2.37	1.00	118.3	1.00	0.234	0.714	**0.33**	4.3	11.7	5.5	17.2	**1.75**
11.32	3.45	21.53	0.56	2.62	2.06	130	0.714	0.555	0.976	2.69	0.79	1.67	33.07	2.84	2.84	5.68		33.94	2.55		0			1.00		1.00		0.725	**Non-Liq.**	4.0	8.5			**0.00**
11.81	3.60	5.87	0.24	4.14	0.56	130	0.746	0.572	0.975	4.59	0.98	1.70	8.51	0.93	4.89	5.82		9.43	3.16		0			1.00		1.00		0.734	**Non-Liq.**	2.8	3.4			**0.00**
12.30	3.75	6.91	0.20	2.86	0.66	130	0.778	0.589	0.974	3.13	0.93	1.70	10.16	1.05	3.18	4.23		11.11	3.00		0			1.00		1.00		0.744	**Non-Liq.**	3.1	3.6			**0.00**
12.80	3.90	40.41	0.32	0.79	3.87	130	0.810	0.605	0.973	0.80	0.64	1.43	53.73	6.69	0.39	7.08		68.97	2.07		0			1.26		1.00		0.752	**Non-Liq.**	4.9	14.0			**0.00**
13.29	4.05	68.40	0.48	0.69	6.55	130	0.842	0.622	0.972	0.70	0.57	1.36	86.81	10.86	0.26	11.13	1.02	110.77	1.87		1	81	1.16	1.26	128.3	1.00	0.276	0.760	**0.36**	5.3	20.7	4.9	25.7	**1.16**
13.78	4.20	18.47	0.41	2.19	1.77	130	0.874	0.638	0.971	2.27	0.80	1.50	25.29	2.95	2.30	5.26		33.12	2.60		0			1.26		1.00		0.768	**Non-Liq.**	3.9	8.5			**0.00**
14.27	4.35	8.04	0.30	3.73	0.77	130	0.906	0.655	0.970	4.07	0.94	1.57	10.97	1.08	4.41	5.49		11.94	3.04		0			1.00		1.00		0.775	**Non-Liq.**	3.0	3.9			**0.00**
14.76	4.50	8.03	0.34	4.28	0.77	130	0.938	0.672	0.969	4.67	0.95	1.54	10.73	1.06	5.16	6.21		11.71	3.09		0			1.00		1.00		0.781	**Non-Liq.**	3.0	4.0			**0.00**
15.26	4.65	33.52	0.46	1.36	3.21	130	0.969	0.688	0.968	1.39	0.71	1.35	42.03	5.05	1.18	6.22		54.26	2.29		0			1.26		1.00		0.788	**Non-Liq.**	4.5	12.0			**0.00**
15.75	4.80	45.92	0.42	0.92	4.40	130	1.001	0.705	0.967	0.93	0.64	1.30	55.48	6.86	0.57	7.43	1.08	71.25	2.10		1	63	1.45	1.26	103.1	1.00	0.182	0.793	**0.23**	4.9	14.6	5.5	20.1	**1.53**
16.24	4.95	23.77	0.39	1.66	2.28	130	1.033	0.722	0.966	1.71	0.76	1.34	29.16	3.54	1.59	5.13		38.02	2.48		0			1.26		1.00		0.799	**Non-Liq.**	4.2	9.2			**0.00**
16.73	5.10	15.91	0.45	2.81	1.52	130	1.065	0.738	0.965	2.95	0.85	1.36	19.46	1.86	3.18	5.04		20.41	2.76		0			1.00		1.00		0.804	**Non-Liq.**	3.6	5.7			**0.00**
17.22	5.25	16.01	0.36	2.23	1.53	130	1.097	0.755	0.964	2.34	0.83	1.32	19.09	1.86	2.38	4.25		20.03	2.71		0			1.00		1.00		0.809	**Non-Liq.**	3.7	5.4			**0.00**
17.72	5.40	7.39	0.28	3.83	0.71	130	1.129	0.772	0.962	4.28	0.97	1.36	8.48	0.89	4.61	5.50		9.47	3.14		0			1.00		1.00		0.814	**Non-Liq.**	2.8	3.3			**0.00**
18.21	5.55	28.74	0.31	1.09	2.75	130	1.161	0.788	0.961	1.12	0.71	1.23	32.60	4.11	0.82	4.93		42.39	2.33		0			1.26		1.00		0.818	**Non-Liq.**	4.4	9.6			**0.00**
18.70	5.70	40.30	0.41	1.01	3.86	130	1.193	0.805	0.960	1.03	0.67	1.20	44.86	5.63	0.70	6.33		57.88	2.20		0			1.26		1.00		0.822	**Non-Liq.**	4.7	12.3			**0.00**
19.19	5.85	21.69	0.55	2.54	2.08	130	1.225	0.821	0.959	2.64	0.81	1.23	24.23	2.36	2.83	5.19		25.18	2.65		0			1.00		1.00		0.826	**Non-Liq.**	3.8	6.6			**0.00**
19.69	6.00	14.96	0.65	4.36	1.43	130	1.257	0.838	0.958	4.62	0.90	1.23	16.45	1.62	5.37	6.98		17.43	2.94		0			1.00		1.00		0.830	**Non-Liq.**	3.2	5.4			**0.00**
20.18	6.15	31.62	0.62	1.97	3.03	130	1.289	0.855	0.956	2.02	0.75	1.17	34.15	4.23	2.04	6.27		44.38	2.47		0			1.26		1.00		0.833	**Non-Liq.**	4.2	10.6			**0.00**
20.67	6.30	25.34	0.58	2.27	2.43	130	1.321	0.871	0.955	2.35	0.79	1.17	26.96	3.37	2.47	5.84	1.73	35.31	2.59		1	34	3.25	1.26	114.6	1.00	0.220	0.837	**0.26**	3.9	9.0	5.5	14.5	**2.02**
21.16	6.45	34.14	0.52	1.52	3.27	130	1.353	0.888	0.954	1.56	0.73	1.14	35.70	4.50	1.42	5.92		46.35	2.38		0			1.26		1.00		0.840	**Non-Liq.**	4.3	10.7			**0.00**
21.65	6.60	11.62	0.40	3.47	1.11	130	1.385	0.905	0.952	3.77	0.91	1.15	11.69	1.22	4.15	5.37		12.68	3.00		0			1.00		1.00		0.843	**Non-Liq.**	3.1	4.1			**0.00**
22.15	6.75	24.20	0.51	2.12	2.32	130	1.417	0.921	0.951	2.21	0.79	1.12	24.56	2.48	2.27	4.75		25.53	2.60		0			1.00		1.00		0.845	**Non-Liq.**	3.9	6.5			**0.00**
22.64	6.90	27.85	0.76	2.73	2.67	130	1.449	0.938	0.950	2.83	0.80	1.10	28.00	2.81	3.12	5.93		28.98	2.62		0			1.00		1.00		0.848	**Non-Liq.**	3.9	7.5			**0.00**
23.13	7.05	61.84	1.13	1.82	5.92	130	1.481	0.955	0.948	1.85	0.68	1.07	61.74	7.79	1.85	9.64		79.29	2.24		0			1.26		1.00		0.850	**Non-Liq.**	4.6	17.2			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	Liquefac. Safety	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	*Volumetric Strain*
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	**Factor**	Ratio	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	*(%)*
23.62	7.20	95.19	1.27	1.34	9.12	130	1.513	0.971	0.946	1.35	0.61	1.05	93.86	11.90	1.17	13.08	1.10	119.91	2.02		1	84	1.32	1.26	158.5	1.00	0.451	0.852	**0.53**	5.1	23.7	5.5	29.2	**0.93**
24.11	7.35	53.94	0.97	1.79	5.17	130	1.545	0.988	0.945	1.82	0.70	1.05	52.50	6.71	1.81	8.52		67.63	2.29		0			1.26		1.00		0.854	**Non-Liq.**	4.5	15.0			**0.00**
24.61	7.50	25.08	0.80	3.18	2.40	130	1.577	1.004	0.943	3.31	0.83	1.04	23.75	2.46	3.75	6.21		24.75	2.72		0			1.00		1.00		0.856	**Non-Liq.**	3.7	6.7			**0.00**
25.10	7.65	40.82	0.94	2.29	3.91	130	1.609	1.021	0.941	2.35	0.75	1.03	38.63	5.58	2.52	8.10		55.74	2.47		0			1.41		1.00		0.857	**Non-Liq.**	4.2	13.4			**0.00**
25.59	7.80	29.99	0.96	3.20	2.87	130	1.641	1.038	0.940	3.31	0.81	1.02	27.79	2.89	3.78	6.67		28.79	2.67		0			1.00		1.00		0.859	**Non-Liq.**	3.8	7.6			**0.00**
26.08	7.95	32.27	1.07	3.31	3.09	130	1.673	1.054	0.938	3.42	0.81	1.00	29.59	3.09	3.94	7.04		30.59	2.66		0			1.00		1.00		0.860	**Non-Liq.**	3.8	8.1			**0.00**
26.57	8.10	56.41	1.76	3.11	5.40	130	1.705	1.071	0.936	3.17	0.75	0.99	51.84	6.80	3.67	10.47		66.81	2.46		0			1.26		1.00		0.861	**Non-Liq.**	4.2	16.0			**0.00**
27.07	8.25	38.75	2.04	5.27	3.71	130	1.737	1.088	0.934	5.42	0.83	0.98	34.79	3.68	6.32	9.99		35.79	2.75		0			1.00		0.99		0.862	**Non-Liq.**	3.6	9.9			**0.00**
27.56	8.40	46.48	1.44	3.10	4.45	130	1.769	1.104	0.932	3.17	0.77	0.97	41.51	5.54	3.64	9.19		53.77	2.53		0			1.26		0.99		0.863	**Non-Liq.**	4.1	13.3			**0.00**
28.05	8.55	76.96	1.02	1.33	7.37	130	1.801	1.121	0.930	1.35	0.64	0.96	69.07	9.11	1.16	10.27	1.13	88.63	2.12		1	72	1.49	1.26	131.7	0.98	0.293	0.863	**0.33**	4.9	18.3	5.5	23.8	**1.29**
28.54	8.70	49.54	1.54	3.11	4.74	130	1.833	1.137	0.928	3.18	0.76	0.95	43.29	5.85	3.66	9.51		56.03	2.52		0			1.26		0.99		0.864	**Non-Liq.**	4.1	13.8			**0.00**
29.04	8.85	36.74	1.93	5.25	3.52	130	1.865	1.154	0.925	5.42	0.84	0.93	31.27	3.42	6.32	9.74		32.28	2.78		0			1.00		0.98		0.864	**Non-Liq.**	3.6	9.1			**0.00**
29.53	9.00	18.05	1.39	7.68	1.73	130	1.897	1.171	0.923	8.21	0.95	0.91	14.49	1.66	6.32	7.98		15.50	3.14		0			1.00		0.98		0.864	**Non-Liq.**	2.8	5.4			**0.00**
30.02	9.15	27.92	0.82	2.92	2.67	130	1.929	1.187	0.920	3.05	0.82	0.91	23.00	2.54	3.40	5.94		24.02	2.71		0			1.00		0.98		0.864	**Non-Liq.**	3.7	6.5			**0.00**
30.51	9.30	66.97	1.17	1.75	6.41	130	1.961	1.204	0.918	1.78	0.68	0.92	56.90	7.04	1.75	8.79		66.79	2.26		0			1.15		0.97		0.864	**Non-Liq.**	4.6	14.6			**0.00**
31.00	9.45	79.14	1.25	1.58	7.58	130	1.993	1.221	0.915	1.61	0.66	0.91	67.03	8.28	1.52	9.80		78.47	2.18		0			1.15		0.97		0.863	**Non-Liq.**	4.7	16.6			**0.00**
31.50	9.60	25.18	0.76	3.03	2.41	130	2.025	1.237	0.913	3.19	0.83	0.88	19.86	2.25	3.55	5.80		20.89	2.77		0			1.00		0.97		0.863	**Non-Liq.**	3.6	5.8			**0.00**
31.99	9.75	37.96	0.75	1.97	3.63	130	2.057	1.254	0.910	2.04	0.76	0.88	30.51	3.39	2.07	5.45		31.67	2.51		0			1.00		0.97		0.862	**Non-Liq.**	4.1	7.7			**0.00**
32.48	9.90	93.62	1.10	1.17	8.97	130	2.089	1.271	0.907	1.19	0.62	0.89	77.95	8.34	0.95	9.28	1.11	79.02	2.04		1	67	1.36	1.00	107.4	0.95	0.195	0.861	**0.21**	5.0	15.8	5.5	21.3	**1.45**
32.97	10.05	89.25	1.24	1.39	8.55	130	2.121	1.287	0.904	1.41	0.64	0.88	73.36	7.93	1.25	9.19	1.16	74.43	2.11		1	65	1.47	1.00	109.6	0.94	0.202	0.860	**0.22**	4.9	15.3	5.5	20.8	**1.48**
33.46	10.20	85.42	1.17	1.37	8.18	130	2.153	1.304	0.901	1.39	0.64	0.87	69.53	7.55	1.21	8.76	1.16	70.60	2.12		1	62	1.50	1.00	105.7	0.94	0.190	0.859	**0.21**	4.8	14.6	5.5	20.1	**1.54**
33.96	10.35	107.02	0.98	0.91	10.25	130	2.185	1.320	0.898	0.92	0.59	0.88	87.74	9.34	0.58	9.92	1.06	88.83	1.93		1	72	1.22	1.00	108.5	0.92	0.199	0.858	**0.21**	5.2	17.0	4.7	21.7	**1.42**
34.45	10.50	126.12	0.79	0.63	12.08	130	2.217	1.337	0.894	0.64	0.54	0.88	103.92	10.85	0.18	11.03	1.02	105.04	1.78		1	79	1.09	1.00	114.6	0.91	0.220	0.857	**0.23**	5.5	19.0	3.9	22.9	**1.34**
34.94	10.65	123.45	0.84	0.68	11.82	130	2.249	1.354	0.891	0.69	0.55	0.87	100.79	10.58	0.25	10.84	1.02	101.91	1.81		1	78	1.11	1.00	113.4	0.91	0.216	0.855	**0.23**	5.5	18.7	4.0	22.7	**1.35**
35.43	10.80	124.63	0.89	0.71	11.93	130	2.281	1.370	0.888	0.72	0.55	0.87	100.99	10.65	0.30	10.95	1.03	102.11	1.82		1	78	1.12	1.00	114.4	0.90	0.219	0.853	**0.23**	5.4	18.8	4.1	22.9	**1.34**
35.93	10.95	120.84	0.83	0.69	11.57	130	2.313	1.387	0.884	0.70	0.55	0.86	97.18	10.25	0.27	10.52	1.03	98.30	1.82		1	76	1.13	1.00	110.6	0.90	0.206	0.852	**0.22**	5.4	18.1	4.0	22.1	**1.39**
36.42	11.10	57.87	1.09	1.89	5.54	130	2.345	1.404	0.880	1.93	0.71	0.82	43.63	4.97	1.94	6.90		44.71	2.37		0			1.00		0.95		0.850	**Non-Liq.**	4.4	10.3			**0.00**
36.91	11.25	43.96	1.30	2.96	4.21	130	2.377	1.420	0.877	3.06	0.78	0.79	31.95	3.77	3.44	7.22		33.02	2.60		0			1.00		0.94		0.847	**Non-Liq.**	3.9	8.5			**0.00**
37.40	11.40	22.33	0.90	4.03	2.14	130	2.409	1.437	0.873	4.31	0.88	0.76	15.08	1.87	4.93	6.80		16.12	2.95		0			1.00		0.94		0.845	**Non-Liq.**	3.2	5.0			**0.00**
37.89	11.55	36.56	0.88	2.41	3.50	130	2.441	1.454	0.869	2.51	0.78	0.78	25.86	3.06	2.66	5.72		26.93	2.62		0			1.00		0.94		0.843	**Non-Liq.**	3.9	7.0			**0.00**
38.39	11.70	151.06	1.42	0.94	14.47	130	2.473	1.470	0.865	0.95	0.56	0.83	117.65	13.02	0.61	13.64		121.25	1.84		0			1.02		0.94		0.840	**Non-Liq.**	5.4	22.5			**0.00**
38.88	11.85	164.38	1.55	0.94	15.74	130	2.505	1.487	0.861	0.95	0.55	0.83	127.64	14.15	0.62	14.76	1.04	131.46	1.82		1	88	1.12	1.02	147.0	0.87	0.375	0.838	**0.39**	5.4	24.2	5.3	29.4	**0.91**
39.37	12.00	74.64	1.61	2.16	7.15	130	2.537	1.503	0.857	2.21	0.70	0.78	54.01	6.46	2.31	8.78	1.36	56.25	2.34		1	53	2.08	1.02	116.7	0.90	0.228	0.835	**0.25**	4.4	12.7	5.5	18.2	**1.68**
39.86	12.15	69.72	1.52	2.18	6.68	130	2.569	1.520	0.852	2.23	0.71	0.77	49.83	6.00	2.33	8.34	1.39	51.99	2.37		1	50	2.18	1.02	113.3	0.93	0.215	0.832	**0.24**	4.4	11.9	5.5	17.4	**1.75**
40.35	12.30	64.67	1.08	1.67	6.19	130	2.601	1.537	0.848	1.72	0.70	0.77	46.01	5.46	1.63	7.10	1.30	48.10	2.32		1	46	2.01	1.02	96.9	0.93	0.164	0.829	**0.18**	4.5	10.8	5.5	16.3	**1.84**
40.85	12.45	67.47	0.89	1.33	6.46	130	2.633	1.553	0.843	1.36	0.67	0.77	48.10	5.62	1.15	6.77		50.25	2.24		0			1.02		0.93		0.826	**Non-Liq.**	4.6	10.9			**0.00**
41.34	12.60	29.49	0.75	2.53	2.82	130	2.665	1.570	0.839	2.67	0.82	0.72	19.12	2.37	2.82	5.18		20.19	2.74		0			1.00		0.92		0.823	**Non-Liq.**	3.6	5.6			**0.00**
41.83	12.75	54.48	0.81	1.49	5.22	130	2.697	1.587	0.834	1.54	0.71	0.75	37.54	5.06	1.37	6.43		44.56	2.36		0			1.15		0.92		0.819	**Non-Liq.**	4.4	10.2			**0.00**
42.32	12.90	66.10	0.93	1.40	6.33	130	2.729	1.603	0.830	1.44	0.68	0.75	45.91	6.15	1.25	7.40	1.20	54.24	2.27		1	51	1.86	1.15	101.1	0.88	0.176	0.816	**0.19**	4.5	11.9	5.5	17.4	**1.74**
42.81	13.05	51.35	0.79	1.55	4.92	130	2.761	1.620	0.825	1.60	0.72	0.74	34.62	4.72	1.45	6.17	1.31	41.20	2.40		1	40	2.31	1.15	95.1	0.92	0.160	0.812	**0.18**	4.3	9.6	5.5	15.1	**1.96**
43.31	13.20	38.57	0.51	1.32	3.69	130	2.793	1.637	0.820	1.37	0.74	0.72	25.29	3.44	1.13	4.56		30.44	2.47		0			1.15		0.92		0.809	**Non-Liq.**	4.2	7.3			**0.00**
43.80	13.35	13.48	0.28	2.10	1.29	130	2.825	1.653	0.816	2.39	0.90	0.67	7.47	0.98	2.20	3.18		8.52	3.05		0			1.00		0.91		0.805	**Non-Liq.**	3.0	2.8			**0.00**
44.29	13.50	17.19	0.27	1.56	1.65	130	2.857	1.670	0.811	1.73	0.85	0.68	9.95	1.25	1.46	2.71		11.02	2.87		0			1.00		0.91		0.801	**Non-Liq.**	3.4	3.3			**0.00**
44.78	13.65	21.23	0.36	1.71	2.03	130	2.889	1.686	0.806	1.85	0.83	0.68	12.54	1.57	1.66	3.23		13.62	2.80		0			1.00		0.91		0.797	**Non-Liq.**	3.5	3.9			**0.00**
45.28	13.80	15.41	0.34	2.23	1.48	130	2.921	1.703	0.801	2.51	0.89	0.65	8.47	1.12	2.38	3.49		9.52	3.01		0			1.00		0.91		0.793	**Non-Liq.**	3.1	3.1			**0.00**
45.77	13.95	12.23	0.24	1.94	1.17	130	2.953	1.720	0.796	2.25	0.91	0.64	6.37	0.85	1.97	2.82		7.41	3.10		0			1.00		0.91		0.789	**Non-Liq.**	2.9	2.5			**0.00**
46.26	14.10	19.79	0.33	1.67	1.90	130	2.985	1.736	0.791	1.83	0.84	0.66	11.26	1.43	1.60	3.02		12.34	2.84		0			1.00		0.91		0.785	**Non-Liq.**	3.4	3.6			**0.00**
46.75	14.25	30.24	0.60	1.97	2.90	130	3.017	1.753	0.786	2.09	0.80	0.67	17.96	2.28	2.01	4.29		19.07	2.70		0			1.00		0.90		0.781	**Non-Liq.**	3.7	5.1			**0.00**
47.24	14.40	20.77	0.59	2.83	1.99	130	3.049	1.770	0.781	3.09	0.87	0.64	11.45	1.54	3.17	4.72		12.52	2.96		0			1.00		0.90		0.777	**Non-Liq.**	3.2	3.9			**0.00**
47.74	14.55	44.05	0.56	1.28	4.22	130	3.081	1.786	0.776	1.33	0.73	0.68	27.30	4.16	1.06	5.22		35.98	2.44		0			1.26		0.90		0.773	**Non-Liq.**	4.2	8.5			**0.00**
48.23	14.70	128.77	1.29	1.00	12.33	130	3.113	1.803	0.771	1.02	0.59	0.73	87.59	12.68	0.68	13.36	1.05	112.32	1.96		1	82	1.25	1.26	140.4	0.81	0.337	0.769	**0.35**	5.2	21.8	5.5	27.3	**1.07**
48.72	14.85	123.14	1.82	1.48	11.79	130	3.145	1.819	0.766	1.50	0.63	0.71	81.53	12.39	1.33	13.72		104.64	2.09		0			1.26		0.90		0.765	**Non-Liq.**	4.9	21.3			**0.00**
49.21	15.00	34.38	1.31	3.81	3.29	130	3.177	1.836	0.761	4.03	0.84	0.63	19.32	2.67	4.49	7.16		20.41	2.85		0			1.00		0.90		0.760	**Non-Liq.**	3.4	6.0			**0.00**
49.70	15.15	16.04	0.57	3.57	1.54	130	3.209	1.853	0.756	4.04	0.93	0.59	7.97	1.15	4.16	5.31		9.01	3.15		0			1.00		0.89		0.756	**Non-Liq.**	2.8	3.2			**0.00**
50.20	15.30	15.14	0.27	1.79	1.45	130	3.241	1.869	0.751	2.05	0.89	0.60	7.58	1.02	1.75	2.77		8.64	3.01		0			1.00		0.89		0.752	**Non-Liq.**	3.1	2.8			**0.00**
50.69	15.45	18.85	0.32	1.72	1.80	130	3.273	1.886	0.746	1.91	0.85	0.61	9.78	1.29	1.65	2.94		10.87	2.90		0			1.00		0.89		0.747	**Non-Liq.**	3.3	3.3			**0.00**
51.18	15.60	24.90	0.51	2.05	2.38	130	3.305	1.903	0.741	2.22	0.83	0.61	13.33	1.78	2.09	3.87		14.44	2.82		0			1.00		0.89		0.743	**Non-Liq.**	3.5	4.1			**0.00**
51.67	15.75	44.02	1.10	2.49	4.22	130	3.337	1.919	0.736	2.60	0.78	0.63	24.96	3.34	2.68	6.02		26.10	2.64		0			1.00		0.89		0.739	**Non-Liq.**	3.8	6.8			**0.00**
52.17	15.90	45.29	1.56	3.44	4.34	130	3.369	1.936	0.731	3.60	0.81	0.61	25.15	3.51	3.95	7.46		26.28	2.73		0			1.00		0.89		0.735	**Non-Liq.**	3.7	7.2			**0.00**
52.66	16.05	69.08	1.46	2.12	6.61	130	3.401	1.953	0.726	2.18	0.72	0.64	40.75	6.73	2.17	8.90		53.03	2.43		0			1.26		0.88		0.730	**Non-Liq.**	4.2	12.5			**0.00**
53.15	16.20	111.37	1.46	1.31	10.67	130	3.433	1.969	0.721	1.34	0.63	0.67	69.79	10.75	1.09	11.84	1.10	89.83	2.11		1	72	1.47	1.26	132.5	0.78	0.296	0.726	**0.32**	4.9	18.5	5.5	24.0	**1.26**
53.64	16.35	95.18	1.86	1.95	9.11	130	3.465	1.986	0.716	1.99	0.68	0.65	57.28	9.35	1.94	11.29		73.97	2.29		0			1.26		0.88		0.722	**Non-Liq.**	4.5	16.4			**0.00**
54.13	16.50	40.79	2.01	4.94	3.91	130	3.497	2.002	0.712	5.19	0.85	0.58	21.28	3.17	5.92	9.09		22.38	2.89		0			1.00		0.88		0.718	**Non-Liq.**	3.3	6.7			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	**Liquefac. Safety**	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	***Volumetric Strain***
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	**Factor**	Ratio	$N_{1(60)}$	$ΔN_{1(60)}$	$N_{1(60)cs}$	***(%)***
54.63	16.65	20.26	1.27	6.26	1.94	130	3.529	2.019	0.707	6.96	0.95	0.54	9.32	1.48	5.99	7.48		10.36	3.24		0			1.00		0.88		0.714	**Non-Liq.**	2.7	3.9			**0.00**
55.12	16.80	18.59	0.65	3.50	1.78	130	3.561	2.036	0.702	3.93	0.91	0.55	8.60	1.29	3.98	5.27		9.65	3.12		0			1.00		0.88		0.709	**Non-Liq.**	2.9	3.3			**0.00**
55.61	16.95	16.17	0.54	3.33	1.55	130	3.593	2.052	0.698	3.82	0.93	0.54	7.20	1.09	3.76	4.85		8.25	3.17		0			1.00		0.88		0.705	**Non-Liq.**	2.8	3.0			**0.00**
56.10	17.10	15.66	0.44	2.83	1.50	130	3.625	2.069	0.693	3.26	0.92	0.54	6.92	1.03	3.09	4.13		7.97	3.15		0			1.00		0.87		0.701	**Non-Liq.**	2.8	2.8			**0.00**
56.59	17.25	15.39	0.43	2.81	1.47	130	3.656	2.086	0.689	3.25	0.92	0.53	6.71	1.01	3.06	4.07		7.77	3.16		0			1.00		0.87		0.697	**Non-Liq.**	2.8	2.8			**0.00**
57.09	17.40	17.56	0.49	2.81	1.68	130	3.688	2.102	0.684	3.19	0.91	0.54	7.83	1.17	3.05	4.21		8.90	3.10		0			1.00		0.87		0.693	**Non-Liq.**	2.9	3.0			**0.00**
57.58	17.55	33.39	0.70	2.10	3.20	130	3.720	2.119	0.680	2.24	0.81	0.57	16.87	2.34	2.11	4.45		18.02	2.74		0			1.00		0.87		0.689	**Non-Liq.**	3.6	5.0			**0.00**
58.07	17.70	15.29	0.62	4.05	1.46	130	3.752	2.136	0.675	4.71	0.96	0.51	6.35	1.02	4.67	5.69		7.39	3.27		0			1.00		0.87		0.686	**Non-Liq.**	2.6	2.8			**0.00**
58.56	17.85	17.55	0.39	2.20	1.68	130	3.784	2.152	0.671	2.51	0.89	0.53	7.73	1.13	2.24	3.36		8.81	3.05		0			1.00		0.87		0.682	**Non-Liq.**	3.0	2.9			**0.00**
59.06	18.00	14.41	0.33	2.26	1.38	130	3.816	2.169	0.667	2.66	0.92	0.52	5.97	0.90	2.31	3.21		7.03	3.16		0			1.00		0.87		0.678	**Non-Liq.**	2.8	2.5			**0.00**
59.55	18.15	31.57	0.57	1.82	3.02	130	3.848	2.185	0.663	1.95	0.80	0.56	15.49	2.14	1.73	3.87		16.64	2.74		0			1.00		0.86		0.674	**Non-Liq.**	3.6	4.6			**0.00**
60.04	18.30	133.91	1.64	1.23	12.82	130	3.880	2.202	0.659	1.25	0.61	0.64	79.35	13.89	0.95	14.84		113.49	2.05		0			1.41		0.86		0.671	**Non-Liq.**	5.0	22.8			**0.00**
60.53	18.45	131.99	2.69	2.04	12.64	130	3.912	2.219	0.655	2.08	0.66	0.61	75.17	14.26	2.01	16.27		107.56	2.21		0			1.41		0.86		0.667	**Non-Liq.**	4.7	23.1			**0.00**
61.02	18.60	35.32	1.95	5.53	3.38	130	3.944	2.235	0.651	5.90	0.88	0.52	16.14	2.63	5.87	8.50		17.23	3.01		0			1.00		0.86		0.664	**Non-Liq.**	3.1	5.6			**0.00**
61.52	18.75	14.91	0.64	4.27	1.43	130	3.976	2.252	0.647	5.03	0.97	0.48	5.76	0.96	4.91	5.88		6.79	3.32		0			1.00		0.86		0.660	**Non-Liq.**	2.5	2.7			**0.00**
62.01	18.90	14.16	0.31	2.17	1.36	130	4.008	2.269	0.643	2.59	0.93	0.49	5.55	0.85	2.18	3.03		6.61	3.18		0			1.00		0.86		0.657	**Non-Liq.**	2.8	2.4			**0.00**
62.50	19.05	16.14	0.30	1.89	1.55	130	4.040	2.285	0.640	2.20	0.90	0.50	6.56	0.97	1.80	2.78		7.64	3.08		0			1.00		0.86		0.653	**Non-Liq.**	3.0	2.6			**0.00**
62.99	19.20	19.91	0.39	1.95	1.91	130	4.072	2.302	0.636	2.20	0.87	0.51	8.45	1.24	1.88	3.12		9.56	2.99		0			1.00		0.86		0.650	**Non-Liq.**	3.2	3.0			**0.00**
63.48	19.35	18.89	0.45	2.40	1.81	130	4.104	2.318	0.633	2.74	0.89	0.50	7.77	1.19	2.46	3.65		8.85	3.07		0			1.00		0.85		0.647	**Non-Liq.**	3.0	3.0			**0.00**
63.98	19.50	23.19	0.45	1.93	2.22	130	4.136	2.335	0.629	2.15	0.85	0.51	10.04	1.47	1.85	3.32		11.16	2.92		0			1.00		0.85		0.644	**Non-Liq.**	3.3	3.4			**0.00**
64.47	19.65	20.92	0.39	1.85	2.00	130	4.168	2.352	0.626	2.08	0.86	0.50	8.81	1.29	1.74	3.03		9.92	2.96		0			1.00		0.85		0.641	**Non-Liq.**	3.2	3.1			**0.00**
64.96	19.80	27.55	0.60	2.18	2.64	130	4.200	2.368	0.622	2.39	0.84	0.51	12.09	1.80	2.17	3.97		13.23	2.87		0			1.00		0.85		0.638	**Non-Liq.**	3.4	3.9			**0.00**
65.45	19.95	16.70	0.68	4.06	1.60	130	4.232	2.385	0.619	4.73	0.95	0.46	6.24	1.06	4.58	5.64		7.27	3.28		0			1.00		0.85		0.635	**Non-Liq.**	2.6	2.8			**0.00**
65.94	20.10	16.04	0.44	2.74	1.54	130	4.264	2.402	0.616	3.22	0.93	0.47	6.02	0.98	2.87	3.85		7.08	3.20		0			1.00		0.85		0.632	**Non-Liq.**	2.7	2.6			**0.00**
66.44	20.25	28.11	0.48	1.71	2.69	130	4.296	2.418	0.613	1.87	0.82	0.51	12.31	1.77	1.55	3.32		13.47	2.81		0			1.00		0.85		0.629	**Non-Liq.**	3.5	3.8			**0.00**
66.93	20.40	31.03	0.75	2.41	2.97	130	4.328	2.435	0.610	2.62	0.84	0.50	13.47	2.05	2.45	4.50		14.62	2.86		0			1.00		0.85		0.626	**Non-Liq.**	3.4	4.3			**0.00**
67.42	20.55	56.66	1.19	2.10	5.43	130	4.360	2.452	0.607	2.19	0.76	0.53	27.15	5.56	2.04	7.60		39.93	2.57		0			1.41		0.85		0.623	**Non-Liq.**	4.0	10.0			**0.00**
67.91	20.70	18.98	0.96	5.05	1.82	130	4.392	2.468	0.604	5.80	0.96	0.44	6.94	1.24	5.75	7.00		7.98	3.29		0			1.00		0.84		0.621	**Non-Liq.**	2.6	3.1			**0.00**
68.41	20.85	19.74	0.39	1.97	1.89	130	4.424	2.485	0.601	2.25	0.88	0.47	7.70	1.18	1.87	3.06		8.80	3.02		0			1.00		0.84		0.618	**Non-Liq.**	3.1	2.9			**0.00**
68.90	21.00	17.20	0.35	2.02	1.65	130	4.456	2.501	0.598	2.37	0.90	0.46	6.40	1.00	1.94	2.95		7.49	3.10		0			1.00		0.84		0.615	**Non-Liq.**	2.9	2.6			**0.00**
69.39	21.15	92.24	1.16	1.26	8.83	130	4.488	2.518	0.595	1.29	0.66	0.56	47.74	7.27	0.96	8.23		56.57	2.23		0			1.15		0.84		0.613	**Non-Liq.**	4.6	12.2			**0.00**
69.88	21.30	127.04	2.32	1.83	12.17	130	4.520	2.535	0.593	1.86	0.66	0.56	66.02	10.66	1.69	12.35		77.65	2.22		0			1.15		0.84		0.610	**Non-Liq.**	4.6	16.7			**0.00**
70.37	21.45	31.66	1.98	6.24	3.03	130	4.552	2.551	0.590	6.79	0.92	0.45	12.29	2.25	5.72	7.97		13.37	3.14		0			1.00		0.84		0.608	**Non-Liq.**	2.8	4.7			**0.00**
70.87	21.60	259.37	3.85	1.48	24.84	130	4.584	2.568	0.587	1.50	0.58	0.60	145.69	22.25	1.25	23.50		169.61	1.91		0			1.15		0.84		0.606	**Non-Liq.**	5.3	32.3			**0.00**
71.36	21.75	323.68	7.24	2.24	31.00	130	4.616	2.585	0.585	2.26	0.60	0.59	177.86	29.10	2.20	31.30	1.08	206.65	1.99		1	100	1.29	1.15	266.2	0.70	Infin.	0.603	**Non-Liq.**	5.1	40.5	5.0	45.5	**0.00**
71.85	21.90	184.66	7.29	3.95	17.68	130	4.648	2.601	0.582	4.00	0.70	0.53	91.43	16.82	4.37	21.19	1.26	106.89	2.37		1	80	2.18	1.15	233.0	0.70	Infin.	0.601	**Non-Liq.**	4.4	24.5	5.0	29.5	**0.00**
72.34	22.05	143.88	4.40	3.06	13.78	130	4.680	2.618	0.580	3.12	0.70	0.53	70.85	10.97	3.24	14.21		72.16	2.36		0			1.00		0.83		0.599	**Non-Liq.**	4.4	16.5			**0.00**
72.83	22.20	55.67	1.59	2.85	5.33	130	4.712	2.635	0.578	2.99	0.79	0.49	24.44	3.89	2.97	6.86		25.65	2.69		0			1.00		0.83		0.597	**Non-Liq.**	3.7	6.9			**0.00**
73.33	22.35	27.21	0.70	2.58	2.61	130	4.744	2.651	0.575	2.86	0.86	0.45	10.51	1.71	2.63	4.34		11.64	2.97		0			1.00		0.83		0.595	**Non-Liq.**	3.2	3.6			**0.00**
73.82	22.50	49.18	0.67	1.37	4.71	130	4.776	2.668	0.573	1.45	0.74	0.50	22.09	3.12	1.10	4.22		23.45	2.53		0			1.00		0.83		0.592	**Non-Liq.**	4.0	5.8			**0.00**
74.31	22.65	123.30	1.03	0.83	11.81	130	4.808	2.684	0.571	0.85	0.60	0.57	65.03	8.00	0.42	8.42	1.05	66.47	2.02		1	60	1.32	1.00	88.0	0.76	0.143	0.590	**0.18**	5.0	13.2	4.4	17.6	**1.69**
74.80	22.80	98.99	1.35	1.36	9.48	130	4.840	2.701	0.569	1.40	0.67	0.54	48.76	6.69	1.09	7.78	1.16	50.13	2.25		1	48	1.79	1.00	89.5	0.83	0.147	0.588	**0.21**	4.6	10.9	5.5	16.4	**1.79**

EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

101 Garden Street **Project No: 305172-001**

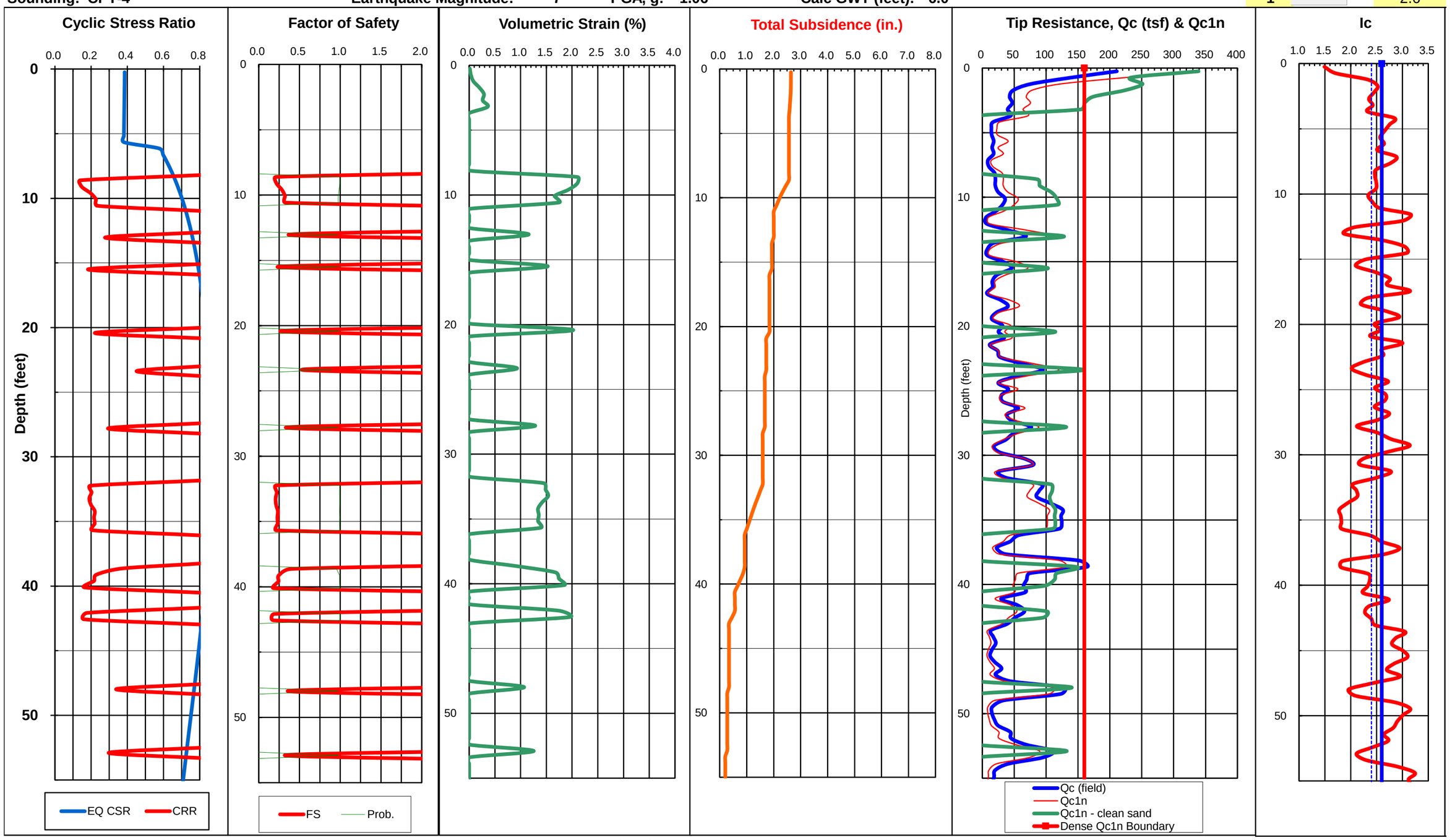
Method Used: 1 1998 NCEER (Robertson & Wride)

Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Plot **1**

Limiting Ic: 2.6

Sounding: CPT-4 **Earthquake Magnitude: 7** **PGA, g: 1.06** **Calc GWT (feet): 6.0**



Total Thickness of Liquefiable Layers: 13.8 feet

Estimated Total Ground Subsidence (Settlement): 2.6 inches

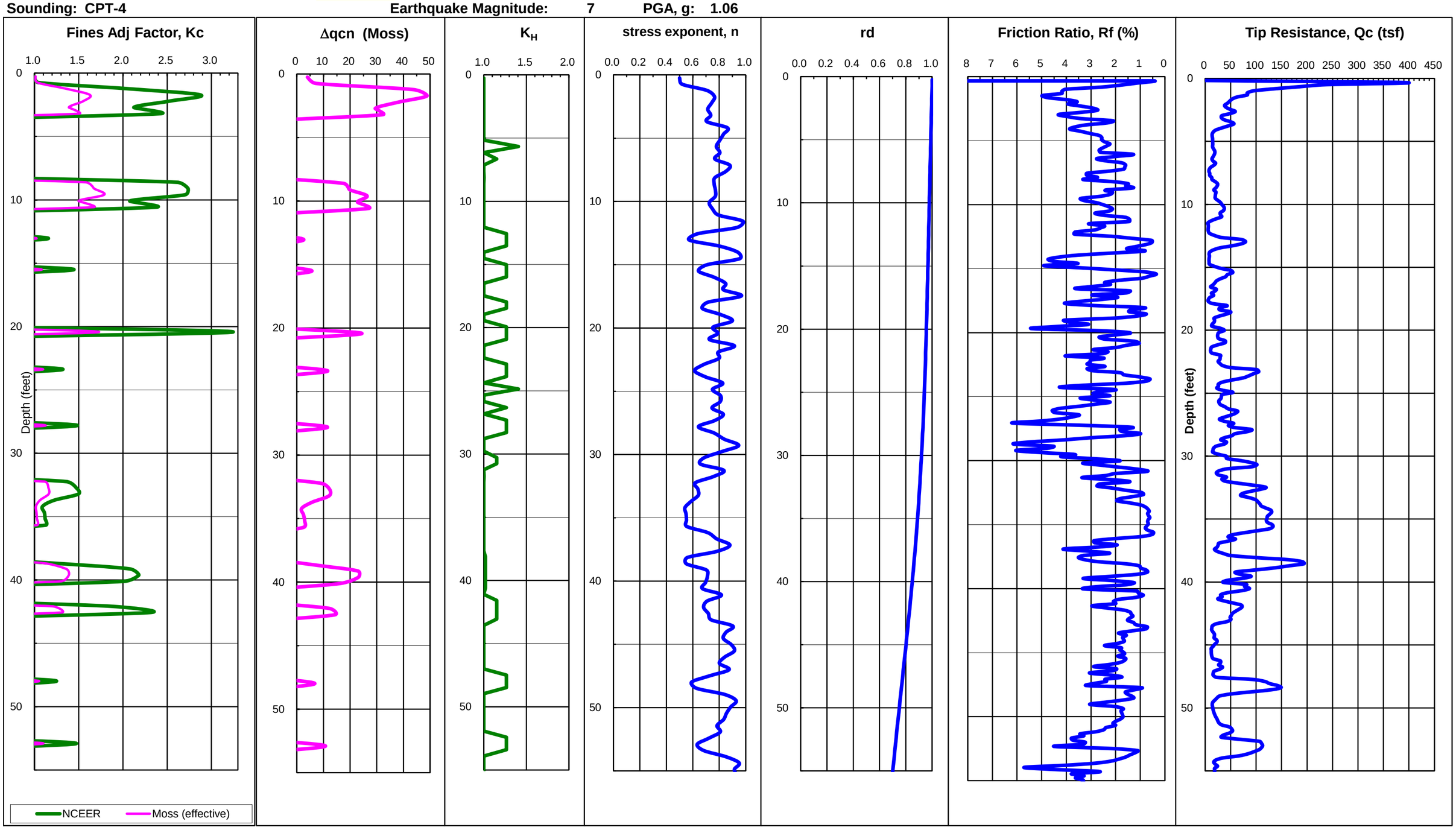
EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

3 avg increment =0.15m Qc1n/N1(60): 5

Ignore 1st/last increment into sand/silt soils: 0

Method Used: 1998 NCEER (Robertson & Wride)

Sounding: CPT-4 **Earthquake Magnitude: 7** **PGA, g: 1.06**



CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA

Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: 101 Garden Street
Job No: 305172-001
Date: 2/25/2022
Sounding: CPT-5

Liquefaction Analysis using 1998 NCEER (Robertson & Wride) method
Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Total Liquefied Thickness (feet)
15.7
Total Induced Subsidence (inches)
2.8

EARTHQUAKE INFORMATION:

Magnitude: 7 (7.5)
PGA, g: 1.060 (0.89)
MSF: 1.19
GWT, feet: 6.0
Calc GWT, feet: 6.0

Plot: 5
Method Used: 1 (1998 NCEER (Robertson & Wride))
Averaging Increment: 3 (0.15 m)
Induced CSR (M=7.5) = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR

Ignore 1st/last increment into sand/silt soils: 1 yes
Ignore/remediate upper: 0.0 m
Unit Weight of unsaturated soils: 115 pcf
Unit Weight of saturated soils: 130 pcf
Limiting Ic for liquefiable soils: 2.60
Limiting Ic for K_H: 2.6

Use Moss @ P_L: 15%
Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Required SF: 1.30
Max $\Delta N_{1(60)}$ - post liquefied: 5.5
Max $\Delta N_{1(60)}$ - non liquefied: 5.0
Min SF of Liquefiable Layers: 0.17
Avg SF of Liquefiable Layers: 0.30

Depth (feet)	(m)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio Rf %	qc MPa	Total Unit Wt. (pcf)	Total Stress po (tsf)	Eff. Stress p'o (tsf)	rd	F %	n	Max 1.70 Cq	Q	Moss qc1 MPa	Moss Δqc MPa	Moss qc_{1mod} MPa	Moss eff K_C	Qc1n	Ic	Override	Liquef. Suscept. (0 or 1)	Rel. Dens. Dr (%)	K_C	K_H	Clean Sand Qc1n	Clean Sand 1.0 Kσ	CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Qc1n $N_{1(60)}$ Ratio	Equiv. $N_{1(60)}$	FC Adj. $\Delta N_{1(60)}$	Equiv. $N_{1(60)cs}$	*Volumetric Strain (%)*
0.49	0.15	139.18	0.57	0.41	13.33	115	0.028	0.028	1.000	0.41	0.50	1.70	223.59	22.66	0.00	22.66	1.00	223.64	1.39		1	100	1.00	1.00	223.6	1.00	Infin.	0.385	Non-Liq.	6.3	35.7	5.0	40.7	0.04
0.98	0.30	315.54	0.70	0.22	30.22	115	0.057	0.057	1.000	0.22	0.50	1.70	506.93	51.37	0.00	51.37	1.00	507.02	0.95		1	100	1.00	1.00	507.0	1.00	Infin.	0.385	Non-Liq.	5.5	91.6	5.0	96.6	0.01
1.48	0.45	343.00	1.59	0.46	32.85	115	0.085	0.085	0.999	0.46	0.50	1.70	551.00	55.84	0.00	55.84	1.00	551.14	1.15		1	100	1.00	1.00	551.1	1.00	Infin.	0.385	Non-Liq.	5.5	99.6	5.0	104.6	0.00
1.97	0.60	140.49	1.43	1.02	13.45	115	0.113	0.113	0.997	1.02	0.51	1.70	225.56	22.87	0.57	23.44		225.75	1.66		0			1.00		1.00		0.384	Non-Liq.	5.7	39.3			0.00
2.46	0.75	26.00	1.26	4.83	2.49	115	0.141	0.141	0.996	4.86	0.81	1.70	41.55	4.23	4.75	8.98		41.78	2.66		0			1.00		1.00		0.384	Non-Liq.	3.8	11.0			0.00
2.95	0.90	20.79	0.85	4.07	1.99	115	0.170	0.170	0.995	4.11	0.81	1.70	33.13	3.38	3.91	7.30		33.41	2.68		0			1.00		1.00		0.383	Non-Liq.	3.8	8.9			0.00
3.44	1.05	7.34	0.42	5.78	0.70	130	0.202	0.202	0.994	5.94	0.95	1.70	11.48	1.20	4.93	6.12		11.80	3.13		0			1.00		1.00		0.383	Non-Liq.	2.9	4.1			0.00
3.94	1.20	4.25	0.20	4.69	0.41	130	0.234	0.234	0.993	4.96	0.99	1.70	6.46	0.69	4.58	5.28		6.83	3.28		0			1.00		1.00		0.382	Non-Liq.	2.6	2.6			0.00
4.43	1.35	8.32	0.25	3.01	0.80	130	0.266	0.266	0.992	3.11	0.88	1.70	12.95	1.35	2.74	4.10		13.37	2.91		0			1.00		1.00		0.382	Non-Liq.	3.3	4.1			0.00
4.92	1.50	17.21	0.55	3.20	1.65	130	0.298	0.298	0.990	3.26	0.81	1.70	27.18	2.80	2.95	5.76		27.66	2.67		0			1.00		1.00		0.381	Non-Liq.	3.8	7.3			0.00
5.41	1.65	20.80	0.89	4.29	1.99	130	0.330	0.330	0.989	4.36	0.82	1.70	32.90	3.36	4.14	7.50		33.43	2.70		0			1.00		1.00		0.381	Non-Liq.	3.7	9.0			0.00
5.91	1.80	15.22	0.86	5.68	1.46	130	0.362	0.362	0.988	5.81	0.87	1.70	23.87	2.45	4.92	7.37		24.45	2.88		0			1.00		1.00		0.381	Non-Liq.	3.4	7.3			0.00
6.40	1.95	12.96	0.65	5.03	1.24	130	0.394	0.389	0.987	5.19	0.88	1.70	20.19	2.11	5.63	7.74		20.82	2.90		0			1.00		1.00		0.577	Non-Liq.	3.3	6.3			0.00
6.89	2.10	9.91	0.41	4.17	0.95	130	0.426	0.406	0.986	4.34	0.90	1.70	15.28	1.61	4.64	6.25		15.93	2.95		0			1.00		1.00		0.598	Non-Liq.	3.2	4.9			0.00
7.38	2.25	7.07	0.20	2.85	0.68	130	0.458	0.422	0.985	3.04	0.91	1.70	10.68	1.15	3.00	4.16		11.35	2.98		0			1.00		1.00		0.617	Non-Liq.	3.2	3.6			0.00
7.87	2.40	9.29	0.19	2.02	0.89	130	0.490	0.439	0.984	2.12	0.85	1.70	14.22	1.51	1.95	3.47		14.93	2.79		0			1.00		1.00		0.634	Non-Liq.	3.5	4.2			0.00
8.37	2.55	18.10	0.26	1.42	1.73	130	0.522	0.456	0.983	1.45	0.75	1.70	28.36	3.35	1.19	4.54		33.53	2.45		0			1.15		1.00		0.650	Non-Liq.	4.2	8.0			0.00
8.86	2.70	28.08	0.32	1.15	2.69	130	0.554	0.472	0.982	1.17	0.69	1.70	44.36	4.87	0.85	5.72	1.17	52.00	2.23		1	50	1.75	1.15	91.0	1.00	0.150	0.665	**0.23**	4.6	11.2	5.5	16.7	**1.78**
9.35	2.85	26.58	0.33	1.24	2.55	130	0.586	0.489	0.981	1.27	0.71	1.70	41.92	4.51	0.98	5.49	1.22	49.23	2.27		1	47	1.86	1.15	91.7	1.00	0.152	0.679	**0.22**	4.6	10.8	5.5	16.3	**1.81**
9.84	3.00	28.02	0.38	1.36	2.68	130	0.618	0.505	0.979	1.39	0.71	1.69	43.88	4.59	1.14	5.73		51.51	2.28		0			1.15		1.00		0.691	Non-Liq.	4.5	11.4			0.00
10.33	3.15	10.75	0.44	4.10	1.03	130	0.650	0.522	0.978	4.31	0.90	1.70	16.43	1.58	4.77	6.36		17.27	2.92		0			1.00		1.00		0.703	Non-Liq.	3.3	5.3			0.00
10.83	3.30	21.64	0.48	2.20	2.07	130	0.682	0.539	0.977	2.25	0.78	1.69	33.69	4.14	2.26	6.40		48.61	2.50		0			1.41		1.00		0.714	Non-Liq.	4.1	11.8			0.00
11.32	3.45	12.23	0.44	3.61	1.17	130	0.714	0.555	0.976	3.78	0.88	1.70	18.76	1.71	4.16	5.87		19.65	2.84		0			1.00		1.00		0.725	Non-Liq.	3.4	5.7			0.00
11.81	3.60	10.47	0.41	3.92	1.00	130	0.746	0.572	0.975	4.14	0.91	1.70	15.90	1.47	4.59	6.06		16.82	2.92		0			1.00		1.00		0.734	Non-Liq.	3.3	5.1			0.00
12.30	3.75	75.96	0.40	0.53	7.27	130	0.778	0.589	0.974	0.53	0.54	1.37	97.65	14.08	0.04	14.12		138.45	1.76		0			1.41		1.00		0.744	Non-Liq.	5.6	24.9			0.00
12.80	3.90	34.52	0.57	1.66	3.31	130	0.810	0.605	0.973	1.69	0.71	1.49	47.68	6.06	1.56	7.63		68.27	2.30		0			1.41		1.00		0.752	Non-Liq.	4.5	15.2			0.00
13.29	4.05	11.02	0.64	5.77	1.06	130	0.842	0.622	0.972	6.11	0.94	1.65	16.18	1.43	6.10	7.53		17.15	3.02		0			1.00		1.00		0.760	Non-Liq.	3.1	5.6			0.00
13.78	4.20	7.79	0.41	5.27	0.75	130	0.874	0.638	0.971	5.74	0.97	1.63	11.04	1.06	6.12	7.17		12.03	3.13		0			1.00		1.00		0.768	Non-Liq.	2.9	4.2			0.00
14.27	4.35	18.84	0.34	1.78	1.80	130	0.906	0.655	0.970	1.85	0.79	1.46	25.06	3.75	1.75	5.50		41.02	2.55		0			1.58		1.00		0.775	Non-Liq.	4.0	10.2			0.00
14.76	4.50	7.20	0.27	3.78	0.69	130	0.938	0.672	0.969	4.17	0.96	1.55	9.53	0.97	4.48	5.45		10.52	3.10		0			1.00		1.00		0.781	Non-Liq.	2.9	3.6			0.00
15.26	4.65	6.06	0.24	3.89	0.58	130	0.969	0.688	0.968	4.39	0.98	1.53	7.75	0.82	4.64	5.47		8.74	3.18		0			1.00		1.00		0.788	Non-Liq.	2.8	3.2			0.00
15.75	4.80	5.56	0.23	4.08	0.53	130	1.001	0.705	0.967	4.67	1.00	1.50	6.88	0.75	4.91	5.66		7.88	3.24		0			1.00		1.00		0.793	Non-Liq.	2.7	3.0			0.00
16.24	4.95	5.20	0.17	3.34	0.50	130	1.033	0.722	0.966	3.88	1.00	1.47	6.20	0.70	3.90	4.60		7.20	3.23		0			1.00		1.00		0.799	Non-Liq.	2.7	2.7			0.00
16.73	5.10	5.39	0.13	2.34	0.52	130	1.065	0.738	0.965	2.71	0.97	1.42	6.24	0.71	2.53	3.24		7.23	3.14		0			1.00		1.00		0.804	Non-Liq.	2.8	2.5			0.00
17.22	5.25	5.09	0.12	2.27	0.49	130	1.097	0.755	0.964	2.67	0.98	1.39	5.70	0.67	2.44	3.11		6.69	3.17		0			1.00		1.00		0.809	Non-Liq.	2.8	2.4			0.00
17.72	5.40	6.54	0.13	1.96	0.63	130	1.129	0.772	0.962	2.23	0.94	1.34	7.33	0.82	2.02	2.84		8.31	3.04		0			1.00		1.00		0.814	Non-Liq.	3.0	2.7			0.00
18.21	5.55	9.37	0.20	2.15	0.90	130	1.161	0.788	0.961	2.34	0.90	1.30	10.56	1.11	2.28	3.39		11.53	2.92		0			1.00		1.00		0.818	Non-Liq.	3.3	3.5			0.00
18.70	5.70	12.50	0.31	2.46	1.20	130	1.193	0.805	0.960	2.63	0.87	1.27	14.03	1.42	2.72	4.14		15.00	2.84		0			1.00		1.00		0.822	Non-Liq.	3.4	4.4			0.00
19.19	5.85	14.49	0.36	2.51	1.39	130	1.225	0.821	0.959	2.66	0.86	1.24	16.05	1.61	2.79	4.40		17.01	2.80		0			1.00		1.00		0.826	Non-Liq.	3.5	4.8			0.00
19.69	6.00	32.07	0.38	1.18	3.07	130	1.257	0.838	0.958	1.21	0.71	1.18	34.84	4.40	0.94	5.34		45.24	2.33		0			1.26		1.00		0.830	Non-Liq.	4.4	10.2			0.00
20.18	6.15	11.94	0.27	2.23	1.14	130	1.289	0.855	0.956	2.40	0.87	1.21	12.63	1.31	2.40	3.72		13.60	2.86		0			1.00		1.00		0.833	Non-Liq.	3.4	4.0			0.00
20.67	6.30	10.37	0.20	1.94	0.99	130	1.321	0.871	0.955	2.11	0.88	1.19	10.66	1.14	2.00	3.14		11.64	2.89		0			1.00		1.00		0.837	Non-Liq.	3.3	3.5			0.00
21.16	6.45	31.09	0.49	1.56	2.98	130	1.353	0.888	0.954	1.61	0.74	1.14	32.50	4.11	1.48	5.59		42.30	2.42		0			1.26		1.00		0.840	Non-Liq.	4.3	9.9			0.00
21.65	6.60	57.19	0.97	1.69	5.48	130	1.385	0.905	0.952	1.72	0.68	1.11	59.19	7.38	1.66	9.03	1.22	76.04	2.24		1	65	1.76	1.26	133.7	1.00	0.302	0.843	**0.36**	4.6	16.5	5.5	22.0	**1.40**
22.15	6.75	51.09	1.25	2.46	4.89	130	1.417	0.921	0.951	2.50	0.73	1.11	52.43	6.51	2.73	9.24		67.51	2.38		0			1.26		1.00		0.845	Non-Liq.	4.3	15.6			0.00
22.64	6.90	16.22	0.89	5.51	1.55	130	1.449	0.938	0.950	5.85	0.92	1.12	16.13	1.64	6.29	7.93		17.12	3.01		0			1.00		1.00		0.848	Non-Liq.	3.1	5.5			0.00
23.13	7.05	17.36	0.47	2.71	1.66	130	1.481	0.955	0.948	2.87	0.85	1.09	16.92	1.76	3.09	4.85		17.91	2.80		0			1.00		1.00		0.850	Non-Liq.	3.5	5.1			0.00

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Override	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	Liquefac. Safety	Qc1n $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	Volumetric Strain
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	%	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	Factor	Ratio	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	(%)
23.62	7.20	40.13	0.80	2.00	3.84	130	1.513	0.971	0.946	2.05	0.74	1.07	39.43	4.27	2.11	6.38		43.29	2.42		0			1.07		1.00		0.852	**Non-Liq.**	4.3	10.2			**0.00**
24.11	7.35	27.17	1.06	3.89	2.60	130	1.545	0.988	0.945	4.04	0.83	1.06	26.21	2.68	4.75	7.43		27.19	2.75		0			1.00		1.00		0.854	**Non-Liq.**	3.6	7.5			**0.00**
24.61	7.50	55.05	1.12	2.03	5.27	130	1.577	1.004	0.943	2.07	0.71	1.04	53.00	5.40	2.14	7.54		54.18	2.32		0			1.00		1.00		0.856	**Non-Liq.**	4.4	12.2			**0.00**
25.10	7.65	75.79	1.44	1.90	7.26	130	1.609	1.021	0.941	1.93	0.67	1.02	72.37	7.35	1.97	9.32	1.27	73.36	2.20		1	64	1.68	1.00	123.1	1.00	0.253	0.857	**0.30**	4.7	15.7	5.5	21.2	**1.46**
25.59	7.80	97.64	1.92	1.97	9.35	130	1.641	1.038	0.940	1.99	0.65	1.01	92.46	9.41	2.06	11.47	1.22	93.46	2.14		1	74	1.53	1.00	142.7	1.00	0.350	0.859	**0.41**	4.8	19.4	5.5	24.9	**1.21**
26.08	7.95	120.20	2.25	1.87	11.51	130	1.673	1.054	0.938	1.88	0.63	1.00	112.86	11.52	1.92	13.44	1.17	113.86	2.06		1	82	1.39	1.00	158.0	1.00	0.446	0.860	**0.52**	5.0	22.9	5.5	28.4	**1.02**
26.57	8.10	137.25	1.97	1.43	13.14	130	1.705	1.071	0.936	1.45	0.59	0.99	127.80	13.09	1.31	14.40	1.10	128.80	1.94		1	87	1.23	1.00	158.3	1.00	0.449	0.861	**0.52**	5.2	24.8	5.5	30.3	**0.80**
27.07	8.25	133.01	1.53	1.15	12.74	130	1.737	1.088	0.934	1.16	0.57	0.98	122.73	12.61	0.91	13.52	1.07	123.75	1.89		1	86	1.18	1.00	145.4	0.99	0.366	0.862	**0.42**	5.3	23.3	5.5	28.8	**1.00**
27.56	8.40	116.15	1.17	1.00	11.12	130	1.769	1.104	0.932	1.01	0.58	0.98	106.09	10.94	0.71	11.64	1.06	107.11	1.89		1	80	1.18	1.00	126.8	0.98	0.269	0.863	**0.31**	5.3	20.2	5.1	25.4	**1.19**
28.05	8.55	114.72	1.18	1.03	10.99	130	1.801	1.121	0.930	1.04	0.58	0.97	103.83	10.74	0.74	11.48	1.07	104.86	1.91		1	79	1.20	1.00	125.5	0.98	0.264	0.863	**0.30**	5.3	19.9	5.2	25.1	**1.20**
28.54	8.70	122.11	1.56	1.28	11.69	130	1.833	1.137	0.928	1.29	0.59	0.96	109.53	11.39	1.09	12.49	1.10	110.56	1.95		1	81	1.24	1.00	137.6	0.97	0.322	0.864	**0.36**	5.2	21.4	5.5	26.9	**1.10**
29.04	8.85	137.12	1.69	1.23	13.13	130	1.865	1.154	0.925	1.24	0.58	0.95	122.19	12.73	1.03	13.76	1.08	123.23	1.91		1	85	1.20	1.00	147.4	0.97	0.378	0.864	**0.42**	5.3	23.4	5.5	28.9	**1.00**
29.53	9.00	116.73	1.74	1.49	11.18	130	1.897	1.171	0.923	1.50	0.61	0.94	102.65	10.79	1.39	12.18	1.13	103.69	2.02		1	78	1.33	1.00	137.5	0.96	0.322	0.864	**0.36**	5.0	20.6	5.5	26.1	**1.15**
30.02	9.15	76.02	1.77	2.33	7.28	130	1.929	1.187	0.920	2.37	0.70	0.92	65.27	7.00	2.58	9.58		66.31	2.30		0			1.00		0.98		0.864	**Non-Liq.**	4.5	14.7			**0.00**
30.51	9.30	22.82	1.20	5.26	2.19	130	1.961	1.204	0.918	5.55	0.89	0.89	18.21	2.07	6.32	8.39		19.22	2.96		0			1.00		0.97		0.864	**Non-Liq.**	3.2	6.0			**0.00**
31.00	9.45	27.44	0.60	2.18	2.63	130	1.993	1.221	0.915	2.28	0.80	0.89	22.11	2.45	2.36	4.81		23.14	2.65		0			1.00		0.97		0.863	**Non-Liq.**	3.8	6.1			**0.00**
31.50	9.60	23.23	0.74	3.18	2.22	130	2.025	1.237	0.913	3.35	0.85	0.88	18.21	2.07	3.76	5.83		19.23	2.82		0			1.00		0.97		0.863	**Non-Liq.**	3.5	5.5			**0.00**
31.99	9.75	89.93	1.17	1.30	8.61	130	2.057	1.254	0.910	1.32	0.63	0.90	75.30	8.09	1.12	9.22		76.65	2.08		0			1.00		0.97		0.862	**Non-Liq.**	4.9	15.6			**0.00**
32.48	9.90	115.78	1.17	1.01	11.09	130	2.089	1.271	0.907	1.02	0.58	0.90	97.26	10.31	0.71	11.02	1.07	98.34	1.92		1	76	1.21	1.00	119.3	0.93	0.238	0.861	**0.26**	5.2	18.8	5.1	23.9	**1.28**
32.97	10.05	43.36	0.94	2.17	4.15	130	2.121	1.287	0.904	2.23	0.75	0.86	34.33	3.83	2.34	6.17	1.61	35.38	2.49		1	34	2.72	1.00	96.3	0.96	0.163	0.860	**0.18**	4.1	8.6	5.5	14.1	**2.07**
33.46	10.20	90.16	0.92	1.02	8.63	130	2.153	1.304	0.901	1.04	0.61	0.88	73.90	7.91	0.73	8.64	1.09	74.98	2.02		1	65	1.33	1.00	99.8	0.94	0.172	0.859	**0.19**	5.0	14.9	5.1	20.0	**1.55**
33.96	10.35	131.15	1.16	0.88	12.56	130	2.185	1.320	0.898	0.89	0.56	0.88	108.34	11.49	0.54	12.02	1.05	109.44	1.85		1	81	1.15	1.00	125.5	0.92	0.264	0.858	**0.28**	5.4	20.4	4.7	25.1	**1.20**
34.45	10.50	119.30	1.29	1.08	11.42	130	2.217	1.337	0.894	1.09	0.59	0.87	97.13	10.44	0.81	11.25	1.08	98.23	1.94		1	76	1.23	1.00	121.2	0.91	0.245	0.857	**0.26**	5.2	18.9	5.3	24.2	**1.25**
34.94	10.65	92.08	1.09	1.18	8.82	130	2.249	1.354	0.891	1.20	0.62	0.86	73.53	8.00	0.95	8.95		74.62	2.06		0			1.00		0.95		0.855	**Non-Liq.**	5.0	15.0			**0.00**
35.43	10.80	31.03	0.94	3.02	2.97	130	2.281	1.370	0.888	3.16	0.82	0.81	22.69	2.67	3.53	6.20		23.74	2.73		0			1.00		0.95		0.853	**Non-Liq.**	3.7	6.5			**0.00**
35.93	10.95	32.70	0.68	2.08	3.13	130	2.313	1.387	0.884	2.18	0.78	0.81	23.95	2.77	2.22	4.99		25.01	2.61		0			1.00		0.95		0.852	**Non-Liq.**	3.9	6.4			**0.00**
36.42	11.10	23.05	0.51	2.23	2.21	130	2.345	1.404	0.880	2.38	0.83	0.79	16.19	1.91	2.42	4.33		17.24	2.77		0			1.00		0.95		0.850	**Non-Liq.**	3.6	4.8			**0.00**
36.91	11.25	27.94	0.75	2.69	2.68	130	2.377	1.420	0.877	2.83	0.82	0.79	19.68	2.34	3.05	5.40		20.73	2.74		0			1.00		0.94		0.847	**Non-Liq.**	3.6	5.7			**0.00**
37.40	11.40	44.68	1.20	2.68	4.28	130	2.409	1.437	0.873	2.77	0.77	0.79	32.28	3.82	3.04	6.87		33.47	2.57		0			1.00		0.94		0.845	**Non-Liq.**	4.0	8.4			**0.00**
37.89	11.55	54.25	1.36	2.51	5.20	130	2.441	1.454	0.869	2.58	0.75	0.79	39.38	4.63	2.80	7.43	1.61	40.46	2.49		1	39	2.69	1.00	109.0	0.94	0.200	0.843	**0.22**	4.1	9.8	5.5	15.3	**1.94**
38.39	11.70	52.92	1.22	2.31	5.07	130	2.473	1.470	0.865	2.37	0.74	0.78	38.09	4.48	2.52	7.00	1.56	39.18	2.47		1	38	2.63	1.00	103.2	0.94	0.182	0.840	**0.20**	4.2	9.4	5.5	14.9	**2.00**
38.88	11.85	80.76	1.02	1.27	7.73	130	2.505	1.487	0.861	1.29	0.65	0.80	60.09	6.75	1.07	7.81	1.16	61.22	2.15		1	56	1.56	1.00	95.3	0.90	0.160	0.838	**0.17**	4.8	12.8	5.5	18.3	**1.67**
39.37	12.00	76.66	0.97	1.27	7.34	130	2.537	1.503	0.857	1.29	0.65	0.79	56.44	6.36	1.07	7.43	1.17	57.57	2.17		1	54	1.61	1.00	92.4	0.90	0.153	0.835	**0.17**	4.7	12.1	5.5	17.6	**1.73**
39.86	12.15	69.00	1.24	1.80	6.61	130	2.569	1.520	0.852	1.84	0.69	0.78	49.58	5.77	1.80	7.57	1.31	50.70	2.31		1	49	1.99	1.00	101.0	0.93	0.176	0.832	**0.20**	4.5	11.3	5.5	16.8	**1.80**
40.35	12.30	114.14	1.35	1.18	10.93	130	2.601	1.537	0.848	1.20	0.61	0.80	84.80	9.50	0.95	10.45	1.10	85.96	2.02		1	71	1.32	1.00	113.5	0.86	0.216	0.829	**0.22**	5.1	17.0	5.5	22.5	**1.36**
40.85	12.45	98.73	1.24	1.26	9.45	130	2.633	1.553	0.843	1.28	0.63	0.79	72.13	8.17	1.05	9.22	1.13	73.29	2.09		1	64	1.43	1.00	105.0	0.89	0.188	0.826	**0.20**	4.9	14.9	5.5	20.4	**1.51**
41.34	12.60	70.38	1.06	1.50	6.74	130	2.665	1.570	0.839	1.53	0.68	0.76	49.74	5.77	1.38	7.15		50.87	2.26		0			1.00		0.92		0.823	**Non-Liq.**	4.6	11.1			**0.00**
41.83	12.75	29.64	0.69	2.31	2.84	130	2.697	1.587	0.834	2.44	0.81	0.72	19.10	2.36	2.51	4.87		20.18	2.72		0			1.00		0.92		0.819	**Non-Liq.**	3.7	5.5			**0.00**
42.32	12.90	12.11	0.37	3.08	1.16	130	2.729	1.603	0.830	3.55	0.94	0.68	6.71	0.90	3.56	4.46		7.74	3.18		0			1.00		0.92		0.816	**Non-Liq.**	2.8	2.8			**0.00**
42.81	13.05	10.88	0.24	2.19	1.04	130	2.761	1.620	0.825	2.58	0.93	0.67	5.88	0.78	2.34	3.12		6.91	3.15		0			1.00		0.92		0.812	**Non-Liq.**	2.8	2.4			**0.00**
43.31	13.20	10.94	0.23	2.13	1.05	130	2.793	1.637	0.820	2.51	0.93	0.67	5.86	0.78	2.25	3.03		6.89	3.15		0			1.00		0.92		0.809	**Non-Liq.**	2.8	2.4			**0.00**
43.80	13.35	17.15	0.32	1.84	1.64	130	2.825	1.653	0.816	2.04	0.86	0.68	9.97	1.26	1.85	3.11		11.04	2.91		0			1.00		0.91		0.805	**Non-Liq.**	3.3	3.3			**0.00**
44.29	13.50	12.69	0.34	2.70	1.21	130	2.857	1.670	0.811	3.11	0.93	0.65	6.81	0.92	3.03	3.95		7.84	3.14		0			1.00		0.91		0.801	**Non-Liq.**	2.8	2.8			**0.00**
44.78	13.65	10.05	0.26	2.56	0.96	130	2.889	1.686	0.806	3.08	0.96	0.64	5.05	0.70	2.83	3.53		6.07	3.25		0			1.00		0.91		0.797	**Non-Liq.**	2.6	2.3			**0.00**
45.28	13.80	12.24	0.25	2.06	1.17	130	2.921	1.703	0.801	2.39	0.92	0.65	6.44	0.86	2.14	3.00		7.48	3.10		0			1.00		0.91		0.793	**Non-Liq.**	2.9	2.6			**0.00**
45.77	13.95	16.49	0.35	2.14	1.58	130	2.953	1.720	0.796	2.38	0.88	0.65	9.10	1.19	2.24	3.43		10.16	2.98		0			1.00		0.91		0.789	**Non-Liq.**	3.2	3.2			**0.00**
46.26	14.10	45.78	0.60	1.31	4.38	130	2.985	1.736	0.791	1.37	0.72	0.70	29.11	3.73	1.11	4.84		32.41	2.42		0			1.07		0.91		0.785	**Non-Liq.**	4.3	7.6			**0.00**
46.75	14.25	77.82	1.01	1.30	7.45	130	3.017	1.753	0.786	1.33	0.66	0.72	51.44	6.52	1.09	7.60	1.17	56.38	2.21		1	53	1.70	1.07	95.7	0.86	0.162	0.781	**0.18**	4.7	12.1	5.5	17.6	**1.72**
47.24	14.40	86.36	1.45	1.68	8.27	130	3.049	1.770	0.781	1.71	0.67	0.71	56.53	7.37	1.60	8.97	1.22	61.83	2.25		1	57	1.80	1.07	111.2	0.86	0.208	0.777	**0.23**	4.6	13.5	5.5	19.0	**1.61**
47.74	14.55	74.99	1.72	2.29	7.18	130	3.081	1.786	0.776	2.35	0.72	0.69	47.56	6.45	2.44	8.89	1.38	52.19	2.40		1	50	2.30	1.07	119.9	0.90	0.240	0.773	**0.28**	4.3	12.1	5.5	17.6	**1.72**
48.23	14.70	53.62	1.33	2.48	5.13	130	3.113	1.803	0.771	2.56	0.76	0.67	32.70	4.53	2.69	7.22		36.25	2.54		0			1.07		0.90		0.769	**Non-Liq.**	4.0	9.0			**0.00**
48.72	14.85	14.81	0.60	4.07	1.42	130	3.145	1.819	0.766	4.64	0.95	0.60	7.35	1.07	4.85	5.91		8.38	3.22		0			1.00		0.90		0.765	**Non-Liq.**	2.7	3.1			**0.00**
49.21	15.00	14.04	0.29	2.05	1.34	130	3.177	1.836	0.761	2.36	0.90	0.61	7.01	0.96	2.10	3.06		8.06	3.07		0			1.00		0.90		0.760	**Non-Liq.**	3.0	2.7			**0.00**
49.70	15.15	18.26	0.29	1.61	1.75	130	3.209	1.853	0.756	1.79	0.85	0.62	9.62	1.25	1.50	2.75		10.70	2.89		0			1.00		0.89		0.756	**Non-Liq.**	3.3	3.2			**0.00**
50.20	15.30	31.57	0.82	2.59	3.02	130	3.241	1.869	0.751	2.75	0.82	0.63	17.58	2.36	2.82	5.18		18.69	2.78		0			1.00		0.89		0.752	**Non-Liq.**	3.6	5.2			**0.00**
50.69	15.45	75.63	2.28	3.01	7.24	130	3.273	1.886	0.746	3.09	0.74	0.65	45.38	7.67	3.39	11.06		58.85	2.49		0			1.26		0.89		0.747	**Non-Liq.**	4.1	14.3			**0.00**
51.18	15.60	76.60	3.13	4.09	7.34	130	3.305	1.903	0.741	4.19	0.77	0.64	44.93	7.89	4.83	12.72	1.61	58.26	2.59		1	54	3.25	1.26	189.5	0.84	Infin.	0.743	**Non-Liq.**	3.9	14.8	5.0	19.8	**0.00**
51.67	15.75	97.42	3.21	3.30	9.33	130	3.337	1.919	0.736	3.36	0.73	0.65	58.52	10.01	3.76	13.78		75.49	2.44		0			1.26		0.89		0.739	**Non-Liq.**	4.2	17.9			**0.00**
52.17	15.90	26.68	2.37	8.87	2.55	130	3.369	1.936	0.731	9.56	0.95	0.56	13.18	2.09	6.04	8.13		14.22	3.22		0			1.00		0.89		0.735	**Non-Liq.**	2.7	5.3			**0.00**
52.66	16.05	29.19	1.30	4.45	2.80	130	3.401	1.953	0.726	4.77	0.88	0.58	15.03	2.21	5.29	7.50		16.11	2.98		0			1.00		0.88		0.730	**Non-Liq.**	3.2	5.1			**0.00**
53.15	16.20	89.35	2.03	2.27	8.56	130	3.433	1.969	0.721	2.32	0.70	0.65	53.37	8.87	2.37	11.24		69.00	2.36		0			1.26		0.88		0.726	**Non-Liq.**	4.4	15.7			**0.00**
53.64	16.35	92.20	2.92	3.17	8.83	130	3.465	1.986	0.716	3.24	0.73	0.63	53.82	9.34	3.57	12.91	1.38	69.55	2.45		1	62	2.54	1.26	177.0	0.83	Infin.	0.722	**Non-Liq.**	4.2	16.6	5.0	21.6	**0.00**
54.13	16.50	73.50	2.84	3.87	7.04	130	3.497	2.002	0.712	3.98	0.77	0.61	41.31	7.42	4.49	11.91		53.70	2.60		0			1.26		0.88		0.718	**Non-Liq.**	3.9	13.7			**0.00**

Depth		Tip Qc	Friction Fs	Friction Ratio	qc	Total Unit Wt.	Total Stress	Eff. Stress				Max 1.70		Moss qc1	Moss Δqc	Moss qc_{1mod}	Moss eff			Overide	Liquef. Suscept.	Rel. Dens.			Clean Sand	1.0		Induced M=7.5	**Liquefac. Safety**	$Qc1n$ $N_{1(60)}$	Equiv.	FC Adj.	Equiv.	***Volumetric Strain***
(feet)	(m)	(tsf)	(tsf)	Rf %	MPa	(pcf)	po (tsf)	p'o (tsf)	rd	F %	n	Cq	Q	MPa	MPa	MPa	K_C	Qc1n	Ic		(0 or 1)	Dr (%)	K_C	K_H	Qc1n	Kσ	CRR	CSR	**Factor**	Ratio	$N_{1(60)}$	$ΔN_{1(60)}$	$N_{1(60)cs}$	***(%)***
54.63	16.65	26.67	1.74	6.53	2.55	130	3.529	2.019	0.707	7.06	0.92	0.55	12.83	2.02	5.99	8.01		13.88	3.14		0			1.00		0.88		0.714	**Non-Liq.**	2.9	4.9			**0.00**
55.12	16.80	16.27	0.69	4.26	1.56	130	3.561	2.036	0.702	4.86	0.95	0.54	7.24	1.12	4.99	6.12		8.27	3.23		0			1.00		0.88		0.709	**Non-Liq.**	2.7	3.1			**0.00**
55.61	16.95	15.46	0.50	3.24	1.48	130	3.593	2.052	0.698	3.73	0.93	0.54	6.83	1.03	3.64	4.67		7.87	3.19		0			1.00		0.88		0.705	**Non-Liq.**	2.8	2.9			**0.00**
56.10	17.10	15.68	0.50	3.19	1.50	130	3.625	2.069	0.693	3.68	0.93	0.54	6.89	1.04	3.57	4.61		7.94	3.18		0			1.00		0.87		0.701	**Non-Liq.**	2.8	2.9			**0.00**
56.59	17.25	15.42	0.53	3.46	1.48	130	3.656	2.086	0.689	4.00	0.94	0.53	6.66	1.03	3.92	4.94		7.70	3.21		0			1.00		0.87		0.697	**Non-Liq.**	2.7	2.8			**0.00**
57.09	17.40	22.51	0.74	3.31	2.16	130	3.688	2.102	0.684	3.65	0.89	0.54	10.48	1.57	3.71	5.27		11.56	3.03		0			1.00		0.87		0.693	**Non-Liq.**	3.1	3.8			**0.00**
57.58	17.55	69.12	1.10	1.59	6.62	130	3.720	2.119	0.680	1.64	0.70	0.61	38.86	7.98	1.44	9.42		63.33	2.37		0			1.58		0.87		0.689	**Non-Liq.**	4.4	14.5			**0.00**
58.07	17.70	38.90	1.18	3.02	3.72	130	3.752	2.136	0.675	3.20	0.82	0.56	19.55	2.84	3.32	6.16		20.68	2.78		0			1.00		0.87		0.686	**Non-Liq.**	3.6	5.8			**0.00**
58.56	17.85	14.92	0.81	5.40	1.43	130	3.784	2.152	0.671	6.31	0.98	0.50	6.01	1.00	5.92	6.92		7.02	3.37		0			1.00		0.87		0.682	**Non-Liq.**	2.4	2.9			**0.00**
59.06	18.00	15.06	0.49	3.23	1.44	130	3.816	2.169	0.667	3.77	0.94	0.51	6.20	0.97	3.58	4.55		7.24	3.22		0			1.00		0.87		0.678	**Non-Liq.**	2.7	2.7			**0.00**
59.55	18.15	20.35	0.60	2.96	1.95	130	3.848	2.185	0.663	3.31	0.90	0.52	8.96	1.36	3.22	4.58		10.04	3.06		0			1.00		0.86		0.674	**Non-Liq.**	3.0	3.3			**0.00**
60.04	18.30	31.06	0.97	3.12	2.97	130	3.880	2.202	0.659	3.36	0.85	0.54	14.64	2.20	3.43	5.63		15.76	2.89		0			1.00		0.86		0.671	**Non-Liq.**	3.3	4.7			**0.00**
60.53	18.45	14.65	0.91	6.18	1.40	130	3.912	2.219	0.655	7.28	1.00	0.48	5.60	0.98	5.88	6.86		6.60	3.43		0			1.00		0.86		0.667	**Non-Liq.**	2.3	2.9			**0.00**
61.02	18.60	17.48	0.69	3.92	1.67	130	3.944	2.235	0.651	4.50	0.94	0.50	7.14	1.16	4.46	5.62		8.19	3.22		0			1.00		0.86		0.664	**Non-Liq.**	2.7	3.0			**0.00**
61.52	18.75	17.14	0.75	4.38	1.64	130	3.976	2.252	0.647	5.04	0.95	0.49	6.86	1.14	5.05	6.19		7.90	3.26		0			1.00		0.86		0.660	**Non-Liq.**	2.6	3.0			**0.00**
62.01	18.90	16.46	0.70	4.22	1.58	130	4.008	2.269	0.643	4.90	0.95	0.48	6.48	1.08	4.84	5.92		7.52	3.27		0			1.00		0.86		0.657	**Non-Liq.**	2.6	2.9			**0.00**
62.50	19.05	16.08	0.61	3.79	1.54	130	4.040	2.285	0.640	4.41	0.95	0.48	6.28	1.03	4.27	5.30		7.32	3.26		0			1.00		0.86		0.653	**Non-Liq.**	2.6	2.8			**0.00**
62.99	19.20	14.54	0.53	3.65	1.39	130	4.072	2.302	0.636	4.34	0.96	0.47	5.48	0.91	4.08	5.00		6.51	3.30		0			1.00		0.86		0.650	**Non-Liq.**	2.5	2.6			**0.00**
63.48	19.35	16.53	0.44	2.69	1.58	130	4.104	2.318	0.633	3.13	0.92	0.49	6.53	1.03	2.83	3.86		7.59	3.16		0			1.00		0.85		0.647	**Non-Liq.**	2.8	2.7			**0.00**
63.98	19.50	23.26	0.48	2.05	2.23	130	4.136	2.335	0.629	2.28	0.86	0.51	10.04	1.48	2.01	3.49		11.16	2.93		0			1.00		0.85		0.644	**Non-Liq.**	3.3	3.4			**0.00**
64.47	19.65	96.16	1.21	1.26	9.21	130	4.168	2.352	0.626	1.29	0.65	0.59	52.56	6.80	0.98	7.78		54.08	2.20		0			1.00		0.85		0.641	**Non-Liq.**	4.7	11.5			**0.00**
64.96	19.80	155.98	2.76	1.77	14.94	130	4.200	2.368	0.622	1.80	0.64	0.60	87.01	11.72	1.64	13.36	1.14	88.35	2.13		1	72	1.50	1.00	132.7	0.72	0.297	0.638	**0.34**	4.8	18.3	5.5	23.8	**1.26**
65.45	19.95	187.10	4.11	2.20	17.92	130	4.232	2.385	0.619	2.23	0.64	0.59	103.83	14.44	2.18	16.63	1.15	105.17	2.14		1	79	1.53	1.00	160.6	0.72	Infin.	0.635	**Non-Liq.**	4.8	21.8	5.0	26.8	**0.00**
65.94	20.10	205.75	5.28	2.57	19.70	130	4.264	2.402	0.616	2.60	0.65	0.59	113.12	16.13	2.66	18.79	1.16	114.45	2.16		1	82	1.58	1.00	180.9	0.72	Infin.	0.632	**Non-Liq.**	4.8	24.0	5.0	29.0	**0.00**
66.44	20.25	224.35	6.20	2.76	21.48	130	4.296	2.418	0.613	2.79	0.65	0.59	122.85	17.74	2.91	20.64	1.16	124.19	2.16		1	86	1.58	1.00	196.6	0.72	Infin.	0.629	**Non-Liq.**	4.8	26.1	5.0	31.1	**0.00**
66.93	20.40	247.87	6.83	2.76	23.74	130	4.328	2.435	0.610	2.78	0.64	0.59	136.19	19.66	2.89	22.55	1.15	137.54	2.13		1	90	1.52	1.00	209.1	0.72	Infin.	0.626	**Non-Liq.**	4.8	28.5	5.0	33.5	**0.00**
67.42	20.55	239.02	6.67	2.79	22.89	130	4.360	2.452	0.607	2.82	0.64	0.58	130.20	18.91	2.93	21.84	1.16	131.55	2.15		1	88	1.56	1.00	204.6	0.71	Infin.	0.623	**Non-Liq.**	4.8	27.5	5.0	32.5	**0.00**
67.91	20.70	177.86	6.39	3.59	17.03	130	4.392	2.468	0.604	3.64	0.69	0.56	92.08	14.09	3.95	18.04	1.28	93.38	2.33		1	74	2.06	1.00	192.1	0.71	Infin.	0.621	**Non-Liq.**	4.4	21.1	5.0	26.1	**0.00**
68.41	20.85	130.62	6.26	4.79	12.51	130	4.424	2.485	0.601	4.89	0.75	0.53	63.84	10.36	5.48	15.84	1.53	65.08	2.53		1	59	2.94	1.00	191.4	0.77	Infin.	0.618	**Non-Liq.**	4.0	16.1	5.0	21.1	**0.00**
68.90	21.00	115.77	5.28	4.56	11.09	130	4.456	2.501	0.598	4.66	0.76	0.52	55.87	9.07	5.17	14.25		57.10	2.56		0			1.00		0.84		0.615	**Non-Liq.**	4.0	14.3			**0.00**
69.39	21.15	51.61	3.48	6.74	4.94	130	4.488	2.518	0.595	7.09	0.87	0.47	21.82	3.90	5.73	9.64		22.94	2.97		0			1.00		0.84		0.613	**Non-Liq.**	3.2	7.2			**0.00**
69.88	21.30	95.19	2.94	3.09	9.12	130	4.520	2.535	0.593	3.17	0.74	0.53	45.98	7.14	3.29	10.43		47.42	2.50		0			1.00		0.84		0.610	**Non-Liq.**	4.1	11.5			**0.00**
70.37	21.45	85.56	3.09	3.62	8.19	130	4.552	2.551	0.590	3.73	0.76	0.51	40.09	6.42	3.96	10.38	1.62	41.32	2.59		1	40	3.25	1.00	134.3	0.84	0.305	0.608	**0.42**	3.9	10.5	5.5	16.0	**1.83**
70.87	21.60	99.27	2.65	2.67	9.51	130	4.584	2.568	0.587	2.74	0.72	0.53	48.24	7.32	2.75	10.08	1.38	49.52	2.44		1	48	2.47	1.00	122.3	0.84	0.250	0.606	**0.35**	4.2	11.7	5.5	17.2	**1.72**
71.36	21.75	96.85	2.99	3.08	9.27	130	4.616	2.585	0.585	3.17	0.74	0.52	46.14	7.21	3.28	10.49	1.45	47.41	2.49		1	46	2.74	1.00	130.0	0.84	0.284	0.603	**0.39**	4.1	11.5	5.5	17.0	**1.74**
71.85	21.90	178.82	5.14	2.87	17.12	130	4.648	2.601	0.582	2.91	0.67	0.55	90.87	13.77	3.00	16.77	1.22	92.21	2.26		1	73	1.84	1.00	169.3	0.70	Infin.	0.601	**Non-Liq.**	4.6	20.2	5.0	25.2	**0.00**
72.34	22.05	280.90	9.24	3.29	26.90	130	4.680	2.618	0.580	3.32	0.65	0.55	145.91	22.35	3.53	25.88	1.16	147.28	2.18		1	93	1.61	1.00	237.3	0.70	Infin.	0.599	**Non-Liq.**	4.7	31.1	5.0	36.1	**0.00**
72.83	22.20	349.55	8.20	2.35	33.47	130	4.712	2.635	0.578	2.36	0.60	0.58	190.02	27.35	2.33	29.69	1.09	191.46	1.99		1	100	1.29	1.00	246.4	0.69	Infin.	0.597	**Non-Liq.**	5.1	37.5	5.0	42.5	**0.00**
73.33	22.35	193.27	6.25	3.23	18.51	130	4.744	2.651	0.575	3.28	0.68	0.54	96.51	15.02	3.45	18.47		97.85	2.28		0			1.00		0.83		0.595	**Non-Liq.**	4.5	21.6			**0.00**
73.82	22.50	109.23	6.67	6.10	10.46	130	4.776	2.668	0.573	6.26	0.79	0.48	48.37	8.58	5.67	14.25		49.58	2.69		0			1.00		0.83		0.592	**Non-Liq.**	3.7	13.3			**0.00**
74.31	22.65	244.65	6.80	2.78	23.43	130	4.808	2.684	0.571	2.81	0.64	0.55	125.45	19.05	2.87	21.92		127.31	2.16		0			1.00		0.83		0.590	**Non-Liq.**	4.8	26.7			**0.00**
74.80	22.80	324.75	7.25	2.23	31.10	130	4.840	2.701	0.569	2.25	0.60	0.57	173.53	25.07	2.18	27.25	1.09	174.99	2.00		1	100	1.30	1.00	226.7	0.69	Infin.	0.588	**Non-Liq.**	5.1	34.4	5.0	39.4	**0.00**

EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

101 Garden Street **Project No: 305172-001**

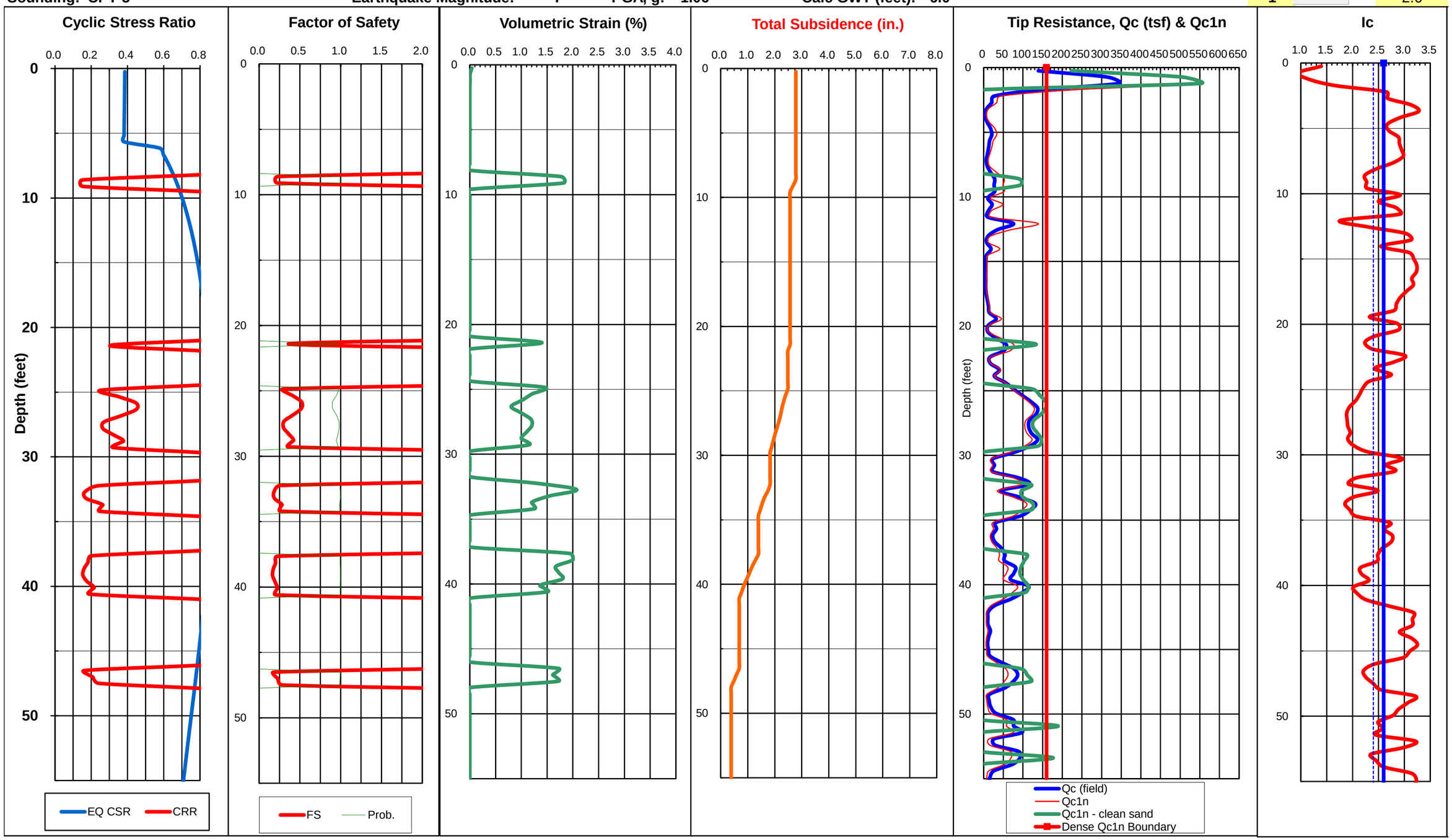
Method Used: 1 1998 NCEER (Robertson & Wride)

Settlement Analysis using Tokimatsu & Seed (1987), clean sand Qc1n/N1(60) ratio =5

Plot **1**

Limiting Ic: 2.6

Sounding: CPT-5 **Earthquake Magnitude: 7** **PGA, g: 1.06** **Calc GWT (feet): 6.0**



Total Thickness of Liquefiable Layers: 15.7 feet

Estimated Total Ground Subsidence (Settlement): 2.8 inches

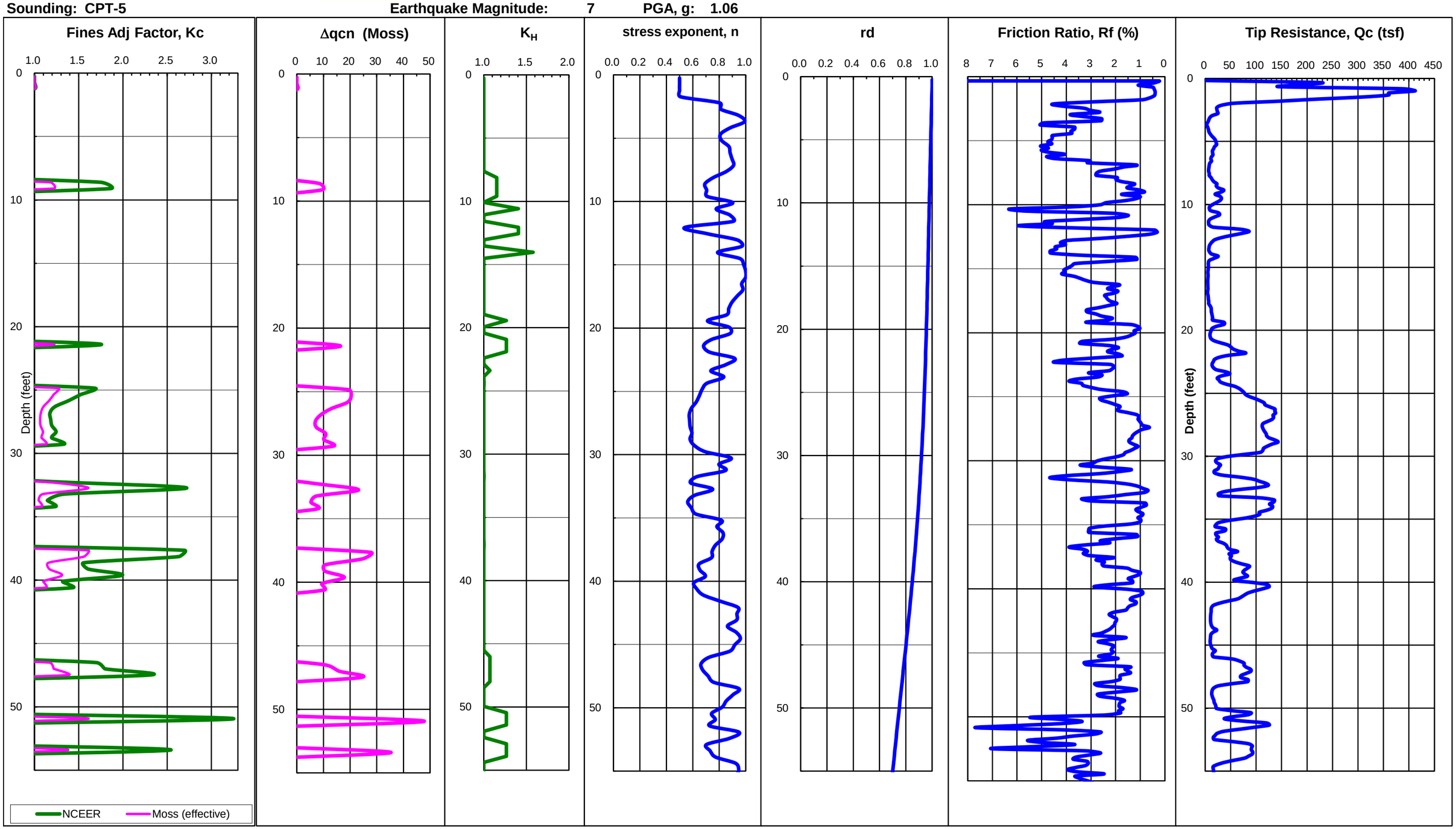
EARTH SYSTEMS - EVALUATION OF LIQUEFACTION POTENTIAL AND INDUCED GROUND SUBSIDENCE

3 avg increment =0.15m Qc1n/N1(60): 5

Ignore 1st/last increment into sand/silt soils: 0

Method Used: 1998 NCEER (Robertson & Wride)

Sounding: CPT-5 **Earthquake Magnitude: 7** **PGA, g: 1.06**



Job Number: 305172-001
Job Name: 101 Garden Street
CPT Number: CPT-1
Date: April 13, 2022
Calculated By: ML

Prediction of Liquefaction Induced Lateral Spreading with Ground Slope Conditions

Based on Data Published in the ASCE Journal of Geotechnicial and Geoenvironmental Engineering December 2002
(Bartlett and Youd 2002)

Variables Used in Calculation Defined

Earthquake Magnitude (M)
Horizontal Distance to Nearest Seismic Energy Source, km (R)
Percent Slope (S)
Cumulative Thickness in Meters of Saturated Cohesionless Sediments with SPT $(N1)_{60}$ Values <= 15 (T_{15})
Average Fines Content in Percent (F_{15})
Mean Grain size in milimeters ($D50_{15}$)

$$\text{Log } D_H = -16.213 + 1.532M - 1.406\text{Log}(R + 10^{(0.89M - 5.64)}) - 0.012R + 0.338\text{Log}S + 0.540\text{Log}T_{15} + 3.413\text{Log}(100 - F_{15}) - 0.795\text{Log}(D50_{15} + 0.1\text{mm})$$

Requirements and Limitations Used to Develop this Model

Soils must be Liquefiable
Saturated Cohesionless Sediments with SPT $(N1)_{60}$ less than 15
Earthquake Magnitude (M) must be between 6 and 8
Percent Slope (S) must be between 0.1% and 6%
Cumulative Thickness (T15) must be between 1 and 15 meters
Depth to top of Liquefied layer must be between 1 and 10 meters
Distance to Fault Rupture (R_{eq}) must be determined using Figure 10 if soft soils are present.
F_{15} and $D50_{15}$ must be within bounds shown in Fig. 5.
If R or R_{eq} < 0.5 km use 0.5; otherwise use R or R_{eq}.

Input Values	
M = 7	
R = 3.7	km
S = 0.1	%
T_{15} = 2.25	m
F_{15} = 30	%
$D50_{15}$ = 1.5	mm

Horizontal Ground Displacement in meters (D_H) = 0.16
Horizontal Ground Displacement in feet (D_H) = 0.5

Displacements should be between 0.1 and 6 meters and should be multiplied by a FOS of 2 for a conservative estimate. Any displacement greater than 6 meters is outside of the data set used in the analysis and may not be an accurate estimate.

Job Number: 305172-001
Job Name: 101 Garden Street
CPT Number: CPT-2
Date: April 13, 2022
Calculated By: ML

Prediction of Liquefaction Induced Lateral Spreading with Ground Slope Conditions

Based on Data Published in the ASCE Journal of Geotechnicial and Geoenvironmental Engineering December 2002
(Bartlett and Youd 2002)

Variables Used in Calculation Defined

Earthquake Magnitude (M)
Horizontal Distance to Nearest Seismic Energy Source, km (R)
Percent Slope (S)
Cumulative Thickness in Meters of Saturated Cohesionless Sediments with SPT $(N1)_{60}$ Values <= 15 (T_{15})
Average Fines Content in Percent (F_{15})
Mean Grain size in milimeters ($D50_{15}$)

$$\text{Log } D_H = -16.213 + 1.532M - 1.406\text{Log}(R + 10^{(0.89M - 5.64)}) - 0.012R + 0.338\text{Log}S + 0.540\text{Log}T_{15} + 3.413\text{Log}(100 - F_{15}) - 0.795\text{Log}(D50_{15} + 0.1\text{mm})$$

Requirements and Limitations Used to Develop this Model

Soils must be Liquefiable
Saturated Cohesionless Sediments with SPT $(N1)_{60}$ less than 15
Earthquake Magnitude (M) must be between 6 and 8
Percent Slope (S) must be between 0.1% and 6%
Cumulative Thickness (T15) must be between 1 and 15 meters
Depth to top of Liquefied layer must be between 1 and 10 meters
Distance to Fault Rupture (R_{eq}) must be determined using Figure 10 if soft soils are present.
F_{15} and $D50_{15}$ must be within bounds shown in Fig. 5.
If R or R_{eq} < 0.5 km use 0.5; otherwise use R or R_{eq}.

Input Values	
M = 7	
R = 3.7	km
S = 0.1	%
T_{15} = 2.1	m
F_{15} = 30	%
$D50_{15}$ = 1.5	mm

Horizontal Ground Displacement in meters (D_H) = 0.16
Horizontal Ground Displacement in feet (D_H) = 0.5

Displacements should be between 0.1 and 6 meters and should be multiplied by a FOS of 2 for a conservative estimate. Any displacement greater than 6 meters is outside of the data set used in the analysis and may not be an accurate estimate.

Job Number: 305172-001
Job Name: 101 Garden Street
CPT Number: CPT-3
Date: April 13, 2022
Calculated By: ML

Prediction of Liquefaction Induced Lateral Spreading with Ground Slope Conditions

Based on Data Published in the ASCE Journal of Geotechnicial and Geoenvironmental Engineering December 2002
(Bartlett and Youd 2002)

Variables Used in Calculation Defined

Earthquake Magnitude (M)
Horizontal Distance to Nearest Seismic Energy Source, km (R)
Percent Slope (S)
Cumulative Thickness in Meters of Saturated Cohesionless Sediments with SPT $(N1)_{60}$ Values <= 15 (T_{15})
Average Fines Content in Percent (F_{15})
Mean Grain size in milimeters ($D50_{15}$)

$$\text{Log } D_H = -16.213 + 1.532M - 1.406\text{Log}(R + 10^{(0.89M - 5.64)}) - 0.012R + 0.338\text{Log}S + 0.540\text{Log}T_{15} + 3.413\text{Log}(100 - F_{15}) - 0.795\text{Log}(D50_{15} + 0.1\text{mm})$$

Requirements and Limitations Used to Develop this Model

Soils must be Liquefiable
Saturated Cohesionless Sediments with SPT $(N1)_{60}$ less than 15
Earthquake Magnitude (M) must be between 6 and 8
Percent Slope (S) must be between 0.1% and 6%
Cumulative Thickness (T15) must be between 1 and 15 meters
Depth to top of Liquefied layer must be between 1 and 10 meters
Distance to Fault Rupture (R_{eq}) must be determined using Figure 10 if soft soils are present.
F_{15} and $D50_{15}$ must be within bounds shown in Fig. 5.
If R or R_{eq} < 0.5 km use 0.5; otherwise use R or R_{eq}.

Input Values	
M = 7	
R = 3.7	km
S = 0.1	%
T_{15} = 2.55	m
F_{15} = 30	%
$D50_{15}$ = 1.5	mm

Horizontal Ground Displacement in meters (D_H) = 0.18
Horizontal Ground Displacement in feet (D_H) = 0.6

Displacements should be between 0.1 and 6 meters and should be multiplied by a FOS of 2 for a conservative estimate. Any displacement greater than 6 meters is outside of the data set used in the analysis and may not be an accurate estimate.

Job Number: 305172-001
Job Name: 101 Garden Street
CPT Number: CPT-4
Date: April 13, 2022
Calculated By: ML

Prediction of Liquefaction Induced Lateral Spreading with Ground Slope Conditions

Based on Data Published in the ASCE Journal of Geotechnicial and Geoenvironmental Engineering December 2002
(Bartlett and Youd 2002)

Variables Used in Calculation Defined

Earthquake Magnitude (M)
Horizontal Distance to Nearest Seismic Energy Source, km (R)
Percent Slope (S)
Cumulative Thickness in Meters of Saturated Cohesionless Sediments with SPT $(N1)_{60}$ Values <= 15 (T_{15})
Average Fines Content in Percent (F_{15})
Mean Grain size in milimeters ($D50_{15}$)

$$\text{Log } D_H = -16.213 + 1.532M - 1.406\text{Log}(R + 10^{(0.89M - 5.64)}) - 0.012R + 0.338\text{Log}S + 0.540\text{Log}T_{15} + 3.413\text{Log}(100 - F_{15}) - 0.795\text{Log}(D50_{15} + 0.1\text{mm})$$

Requirements and Limitations Used to Develop this Model

Soils must be Liquefiable
Saturated Cohesionless Sediments with SPT $(N1)_{60}$ less than 15
Earthquake Magnitude (M) must be between 6 and 8
Percent Slope (S) must be between 0.1% and 6%
Cumulative Thickness (T15) must be between 1 and 15 meters
Depth to top of Liquefied layer must be between 1 and 10 meters
Distance to Fault Rupture (R_{eq}) must be determined using Figure 10 if soft soils are present.
F_{15} and $D50_{15}$ must be within bounds shown in Fig. 5.
If R or R_{eq} < 0.5 km use 0.5; otherwise use R or R_{eq}.

Input Values	
M = 7	
R = 3.7	km
S = 0.1	%
T_{15} = 2.25	m
F_{15} = 30	%
$D50_{15}$ = 1.5	mm

Horizontal Ground Displacement in meters (D_H) = 0.16
Horizontal Ground Displacement in feet (D_H) = 0.5

Displacements should be between 0.1 and 6 meters and should be multiplied by a FOS of 2 for a conservative estimate. Any displacement greater than 6 meters is outside of the data set used in the analysis and may not be an accurate estimate.

Job Number: 305172-001
Job Name: 101 Garden Street
CPT Number: CPT-5
Date: April 13, 2022
Calculated By: ML

Prediction of Liquefaction Induced Lateral Spreading with Ground Slope Conditions

Based on Data Published in the ASCE Journal of Geotechnicial and Geoenvironmental Engineering December 2002
(Bartlett and Youd 2002)

Variables Used in Calculation Defined

Earthquake Magnitude (M)
Horizontal Distance to Nearest Seismic Energy Source, km (R)
Percent Slope (S)
Cumulative Thickness in Meters of Saturated Cohesionless Sediments with SPT $(N1)_{60}$ Values <= 15 (T_{15})
Average Fines Content in Percent (F_{15})
Mean Grain size in milimeters ($D50_{15}$)

$$\text{Log } D_H = -16.213 + 1.532M - 1.406\text{Log}(R + 10^{(0.89M - 5.64)}) - 0.012R + 0.338\text{Log}S + 0.540\text{Log}T_{15} + 3.413\text{Log}(100 - F_{15}) - 0.795\text{Log}(D50_{15} + 0.1\text{mm})$$

Requirements and Limitations Used to Develop this Model

Soils must be Liquefiable
Saturated Cohesionless Sediments with SPT $(N1)_{60}$ less than 15
Earthquake Magnitude (M) must be between 6 and 8
Percent Slope (S) must be between 0.1% and 6%
Cumulative Thickness (T15) must be between 1 and 15 meters
Depth to top of Liquefied layer must be between 1 and 10 meters
Distance to Fault Rupture (R_{eq}) must be determined using Figure 10 if soft soils are present.
F_{15} and $D50_{15}$ must be within bounds shown in Fig. 5.
If R or R_{eq} < 0.5 km use 0.5; otherwise use R or R_{eq}.

Input Values	
M = 7	
R = 3.7	km
S = 0.1	%
T_{15} = 2.4	m
F_{15} = 30	%
$D50_{15}$ = 1.5	mm

Horizontal Ground Displacement in meters (D_H) = 0.17
Horizontal Ground Displacement in feet (D_H) = 0.6

Displacements should be between 0.1 and 6 meters and should be multiplied by a FOS of 2 for a conservative estimate. Any displacement greater than 6 meters is outside of the data set used in the analysis and may not be an accurate estimate.

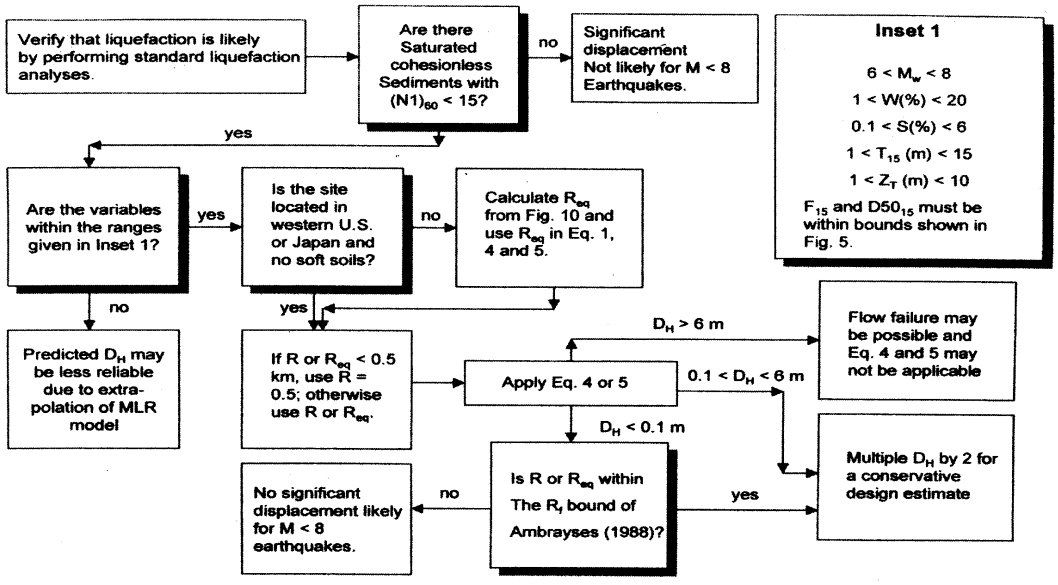


Fig. 9. Flow chart [for application of Eq. (6)]

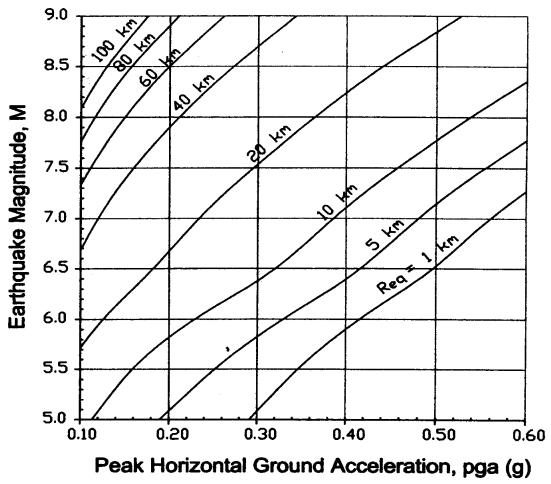


Fig. 10. Graph for determining equivalent source distance, R_{eq}, from magnitude, M, and peak acceleration, a_{max} (revised from Bartlett and Youd 1992, 1995). The above curves are the averages of pga from three different attenuation relations: Abrahamson and Silva (1997); Boore et al. (1997); and Campbell (1997). For the Abrahamson and Silva (1997) relation, the following parameters were used in the regression equation: a) R equals the distance to the fault rupture, b) fault type was set to "otherwise", c) HW=hanging wall factor was set to 1, which implies that sites are found on the hanging wall, d) site classification was set to 1 for deep soil sites. For the Boore, Joyner and Fumal (1997) relation, the following parameters were used in the regression equation: a) R is the closest horizontal distance (km) to a vertical projection of fault rupture surface (km), b) Vs in the upper 30 meters was set to 270 m/s, which is the mid range for a medium stiff soil (site class D), c) fault type was set to "fault mechanism not specified." For the Campbell (1997) relation, the following parameters were used in the regression equation: a) R is the closest distance to the seismogenic rupture surface (km), b) fault style factor was set to "otherwise", c) soft rock and hard rock site factors were set to "otherwise", which implies a stiff soil site.

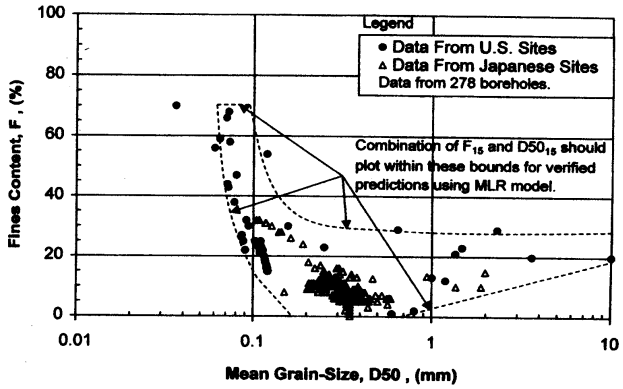


Fig. 5. Compiled grain-size data with ranges of F_{15} and $D50_{15}$ [for which Eq. (6) is applicable]

MINIMUM FOUNDATION DESIGN

FOUNDATIONS FOR STUD BEARING WALLS – MINIMUM REQUIREMENTS

EXPANSION INDEX (E. I.)	FOUNDATIONS FOR SLAB AND RAISED FLOOR SYSTEM						REINFORCEMENT FOR FOUNDATIONS	CONCRETE SLAB 3-1/2" MINIMUM THICKNESS (4" WHEN OVER 51, E. I.)		PREMOISTENING CONTROLS FOR SOILS UNDER FOOTINGS, PEIRS AND SLABS	PIERS UNDER RAISED FLOORS
	NUMBER OF STORIES	STEM THICKNESS	FOOTING WIDTH	FOOTING THICKNESS	ALL PERIMETER FOOTINGS	INTERIOR FOOTINGS FOR SLAB AND RAISED FLOORS		REINFORCEMENT	TOTAL THICKNESS OF SAND		
					DEPTH BELOW NATURAL SURFACE OF GROUND & FINISH GRADE						
		INCHES									
0 -20 VERY LOW (NON-EXPANSIVE)	1 2 3	6 8 10	12 15 18	6 7 8	12 18 24	12 18 24	1 - #4 @ TOP AND BOTTOM	#3 @ 24" O.C. EACH WAY	2"	MOISTENING OF GROUND PRIOR TO PLACING CONCRETE IS RECOMMENDED	PIERS ALLOWED FOR SINGLE FLOOR LOADS ONLY
21-50 LOW	1 2 3	6 8 10	12 15 18	6 7 8	15 18 24	12 18 24	1 - #4 @ TOP AND BOTTOM	#3 @ 24" O.C. EACH WAY	4"	3% OVER OPTIMUM MOISTURE CONTENT TO A DEPTH OF 18" BELOW LOWEST ADJACENT GRADE TESTING REQ'D	PIERS ALLOWED FO SINGLE FLOOR LOADS ONLY
51-90 MEDIUM	1 2 3	6 8 10	12 15 18	6 8 8	21 21 24	12 18 24	1 - #4 @ TOP AND BOTTOM #3 BARS @ 24" O.C. 12" INTO FOOTING AND BENT 3' INTO SLAB	#3 @ 24" O.C. EACH WAY	4"	3% OVER OPTIMUM MOISTURE CONTENT TO A DEPTH OF 18" BELOW LOWEST ADJ ACENT GRADE TESTING REQ'D	PIERS NOT ALLOWED
91-130 HIGH	1 2 3	6 8 10	12 15 18	8 8 8	27 27 27	12 18 24	2 - #4 @ TOP AND BOTTOM #3 BARS @ 24" O.C. 12" INTO FOOTING AND BENT 3' INTO SLAB	#3 @ 24" O.C. EACH WAY	4"	3% OVER OPTIMUM MOISTURE CONTENT TO A DEPTH OF 24" BELOW LOWEST ADJACENT GRADE TESTING REQ'D	PIERS NOT ALLOWED
ABOVE 130 VERY HIGH	REQUIRES SPECIAL DESIGN BY A STATE LICENSED SOILS PROFESSIONAL										

GEOTECHNICAL ENGINEERING REPORT
FOR
PROPOSED RESIDENTIAL AND
COMMERCIAL DEVELOPMENT
PASEO DE LA PLAYA
SITE NO. 1
SANTA BARBARA, CALIFORNIA

VT-23842-01
February 28, 2007

PREPARED FOR
Wright and Company
Attention: Bill Wright
130 Garden Street
Santa Barbara, California 93101

BY
EARTH SYSTEMS
SOUTHERN CALIFORNIA
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February 28, 2007

VT-23842-01
07-2-52

Wright and Company
Attention: Bill Wright
130 Garden Street
Santa Barbara, California 93101

Project: Proposed Residential and Commercial Development, Site No. 1
Near the Intersection of Garden and Yanonali Streets
Santa Barbara, California

As authorized, we have performed a geotechnical study for a residential and commercial development to be located near the intersection of the Garden Street and Yanonali Street in Santa Barbara, California. The accompanying Geotechnical Engineering Report presents the results of our subsurface exploration and laboratory testing programs, as well as our conclusions and recommendations pertaining to geotechnical aspects of project design.

We have appreciated the opportunity to be of service to you on this project. Please call if you have any questions, or when we can be of further service.

Respectfully submitted,

EARTH SYSTEMS
SOUTHERN CALIFORNIA

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Project Engineer

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JT/TT/RMB/bt
Copies: 6 - Wright and Company
1 - Project File

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INTRODUCTION

A. Project Description

This report presents findings and recommendations from a Geotechnical Engineering study performed for a proposed residential and commercial development to be located near the intersection of the Garden and Yanonali Streets in Santa Barbara, California. The project consists of two separate sites. Site No. 1 will consist of about 91 residential condominium/townhome units. The structures will be three-story units with attached garages at the lower level. Site No. 2 is not a part of the project. Site No. 3 is a part of the project and will include retail/commercial and self-storage units. The structures will be one- to three-story. This report presents our findings and recommendations for Site No. 1. The findings for Site No. 3 are included in a separate report. The site development will also include related utility, roadways, and parking areas. This firm has performed several geotechnical reports for similar buildings in the immediate vicinity of this site and some of those data were referenced in preparing this report.

The project site does not lie in a zone of required investigation for fault rupture on a State of California Special Studies Zone Map (CDMG, Official Map, 1978). The site however does lie in zone of required investigation for liquefaction (City of Santa Barbara Geological Map, Hoover, 1978). Therefore, liquefaction potential was evaluated.

Site grading is expected to consist of excavation and backfill for the structures, related new utilities, and the associated parking areas. The traffic on the site is expected to include light trucks and automobiles and occasional heavy trucks.

Earth Systems Southern California (ESSC) has not received building or foundation plans for the proposed structures. However, it is anticipated that buildings will be supported by post-tensioned and/or structural slabs. Structural loads are assumed to be 50 kips for the column footings and about 3 kips per linear foot at the perimeter walls. If these loads are not correct, ESSC should be notified so that the recommendations of this report can be reviewed and modified if necessary.

B. Purpose and Scope of Services

The purpose of the geotechnical study was to evaluate seismicity and soil conditions of the site with respect to the proposed construction. The soil conditions include surface and subsurface soil types, expansion potential, settlement potential, bearing capacity, and the presence or absence of subsurface water. In particular, the scope of work included:

1. Reconnaissance of the site and marking locations for borings and CPT soundings.
2. Drilling, sampling, and logging ten continuous flight auger borings to a maximum depth of 51-1/2 feet below existing ground surface to study soil and groundwater conditions.
3. Performing two cone penetrometer tests (CPT's).
4. Testing soil samples obtained from the subsurface exploration to determine their physical and engineering properties.
5. Analyzing the geotechnical data obtained.
6. Preparing this report.

Contained in the report are:

1. Discussions on local soil and groundwater conditions.
2. Conclusions and recommendations pertaining to structural design.

C. Site Setting

The subject site is located at the southeast corner of the intersection of Garden Street and Yanonali Street in Santa Barbara, California (see Vicinity Map, Appendix A). The subject site is bounded by Yanonali Street to the west, Garden Street to the north and northeast, Santa Barbara Street to the south. The Union Pacific Railroad tracks run on the east side of the property. The site is relatively flat. The area surrounding the site is also relatively flat with slight surface drainage to the south. The elevation of the site is approximately 11 feet above sea level on its north side and approximately 14 feet above mean sea level on its south side (based on the City of Santa Barbara Topographic Maps, 1999). The site is currently occupied by trailers, storage containers, and piles of stone.

REGIONAL GEOLOGY

The parcel lies within the Santa Barbara coastal plain in the western portion of the Transverse Ranges geologic province. Numerous east-west trending folds and reverse faults indicative of active north-south transpressional tectonics characterize the region. The site does not lie within a State of California Fault Rupture Hazard Zone or a City of Santa Barbara fault hazard zone (Hoover, 1978). No faults or landslides are mapped on or trending into the parcel during site reconnaissance by a representative of this office or in attached review of regional geology maps prepared by others [Dibblee (1986), and Gurrola (2002)].

STRATIGRAPHY

The subsurface stratigraphy below the subject site is mapped by Dibblee, Gurrola, and Hoover as alluvium (see Regional Geology Maps, Appendix A). The CPT's and borings performed as part of this study encountered artificial fills and interbedded alluvium consisting of silty clays, clayey sandy silts, and silty sands.

GEOLOGIC HAZARDS

Geologic hazards that are common to the Southern California area include fault rupture, seismic shaking, landslides, rockfalls, tsunami, seiche, and flooding (seismic related and non-seismic related). Below, we will address each of these hazards as they relate to the subject site.

Fault Rupture

The parcel does not lie within a State of California designated fault hazard zone or City of Santa Barbara designated fault hazard zone. There are no other mapped faults trending towards the site on the referenced regional geology map. Therefore, the potential for fault rupture hazard on the subject site is considered low.

Landslides and Rockfall

There are no identified landslides or rockfalls either on or trending into the site, therefore, hazards associated with this phenomena should be considered low.

Seismically Induced Flooding (Tsunamis, Seiches, and Reservoir Failure)

The potential for earthquake induced tsunamis must be considered a hazard because of the site's relative elevation (El. 11 to 14 feet above mean sea level) and close positioning to the Pacific Ocean (approximately 2,000 feet). The County of Santa Barbara Seismic Safety and Safety Element (1980) has the subject site located in an area with a moderate potential for tsunami inundation (the County does not have any tsunami designation greater than moderate). The County indicates that sites below elevation of 40 feet could be susceptible to tsunami inundation. Project designers should consider the effects of tsunami inundation.

Because of the subject sites relative position away from any reservoirs, the potential for seiche and reservoir failure should be considered low.

SOIL CONDITIONS

The site is capped with about 2 to 4 inches of asphalt or gravel. Below that, uncertified fill material was encountered in all borings. The fill material consists of silty fine to coarse sand with gravel, pieces of brick, asphalt, glass, and debris. The depth of fill ranges from about 3-1/2 feet to 8 feet below existing ground surface. Below the fill material, the soils encountered were alluvium to the maximum depth explored. Generally, the alluvium consists of silty clays, clayey silts, and silty sands. Soils within the anticipated influence of the building foundations and the parking areas have less than 90% relative compaction and include significant quantities of uncertified fill. Consolidation testing indicated that the clays within the influence of anticipated foundations are generally compressible. The in-place densities in the upper 5 feet of the site soils range from about 72 pcf to 118.5 pcf. Moisture contents range from about 11% to 29%.

Groundwater was encountered at a depth of about 6 feet below the ground surface. Based on experience with similar coastal sites, it may be assumed that the

groundwater beneath the site is hydraulically connected to the ocean and the groundwater surface elevation is influenced by tide elevations. Soil moisture content above the groundwater, at the time the site was explored was above the optimum moisture content for compaction. Soil moisture may change with variations in weather patterns, the time of year, irrigation, and other factors.

Expansion determination indicates that bearing soils lie in the "Low" range (51-90) in accordance with Table 18-I-B of the CBC. Table 18-I-D, a locally adopted variation of CBC Table 18-I-B, provides recommended minimum foundation and slab requirements as a function of expansion index, and is included in Appendix B of this report. Because there are several buildings that will be graded, it is recommended that the expansion index of individual pads be determined after the completion of grading.

Corrosion characteristics of shallow soils were determined by testing for resistivity, pH, soluble sulfates, and soluble chlorides. The results are presented in Appendix B and should be brought to the attention of the project Structural or Mechanical Engineer or anyone designing facilities in contact with soil. Soluble sulfate content is in the "Negligible" range of Table 19-A-4 of the CBC. Therefore, it appears that special designs for concrete in contact with the ground will be necessary. Soil resistivity is in the "Moderately Corrosive" range for ferrous metal according to a table in the Los Angeles County Guidelines of Preparing Geotechnical Reports (2001). Designers of metals in contact with soil should be made aware of this potential. Please note that ESSC does not provide corrosion-engineering services.

SEISMICITY

The project site, like any other site in the region, is subject to relatively severe ground shaking in the event of a maximum earthquake on a nearby fault. It is the standard of practice, when evaluating the seismicity of a residential type development, to consider the design basis (10% probability of exceedance in 50 years) accelerations. The California Division of Mines and Geology, in concert with the U.S. Geological Survey and the scientific community, has presented results of a statewide probabilistic seismic hazard assessment (CDMG 1996). The

focus of the assessment was to generate a seismic hazard map showing zones of estimated peak ground accelerations at a hazard level of 10% probability of exceedance in 50 years. At this site, based on the soil type encountered, a uniform ground condition of "Alluvium" is used. More recently, the data from the 1996 evaluation has been refined and modified to include effects of local surface conditions (The Revised 2002 California Probabilistic seismic Hazard Zone Maps, June, 2003). The data from that effort is now available at the CGS internet web site. Searches can be done using the site geographic coordinates. This latest probabilistic analysis indicates the site area to have an estimated 0.50-g of predicted peak horizontal surface acceleration at the design level. The 1996 evaluation also included a statewide mapping of the magnitude of earthquake responsible for the design level acceleration. The subject site is located within a zone indicated as having predicted earthquake magnitudes of 6.5 to 7.0.

The 2001 CBC seismic design values are different from earlier versions by having more site-specific input. The following CBC geotechnical related values could be used in the buildings' earthquake design:

Seismic Zone - Figure 16-2	4
Seismic Zone Factor Z - Table 16A-I	0.40
Soil Profile Type - Table 16A-J	S_D
Seismic Coefficient C_a - Table 16A-Q	$0.44N_a$
Seismic Coefficient C_v - Table 16A-R	$0.64N_v$
Near Source Factor N_a -Table 16A-S	1.3
Near Source Factor N_v -Table 16A-T	1.6
Seismic Source Type - Table 16A-U	B
Distance to Seismic Source	≈2 km

LIQUEFACTION

Earthquake-induced vibrations can be the cause of several significant phenomena, including liquefaction in fine sands and silty sands. Liquefaction can result in a complete loss of strength and can cause structures to settle or even overturn if it occurs in the bearing zone. If liquefaction occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Liquefaction is typically limited to the upper 50 feet of the subsurface soils.

There are a number of conditions that need to be satisfied for liquefaction to be a potential hazard. Of primary importance is that groundwater, perched or otherwise, usually must be within the upper 50 feet of soils. Groundwater was encountered during our site exploration at a depth of about 6 feet. In addition, the site is in a required liquefaction hazard study zone (City of Santa Barbara Geological Map, Hoover).

There are several layers of sandy silts and silty sands that have less than 15% clay sized particles throughout the depth of the borings advanced. Consequently, a liquefaction analysis was performed using the CPT data at each location that the CPT was advanced, a magnitude 7.0 earthquake, and a 0.50-g peak ground acceleration. The analyses were done with a proprietary spreadsheet developed by this firm. This spreadsheet is based on the CPT data and methods developed by Robertson and Wride (1998). The analyses were done at every data point, which were taken at 0.05m intervals (about every 2 inches). No data averaging was performed. The analysis is presented in Appendix C. It indicates that at the location of the CPT Nos. 1 and 2, liquefaction is a potential in several soil layers and in thin soil lenses between the depths of about 5 to 50 feet. These layers have a cumulative total thickness of about 17.4 feet and 17.1 feet, respectively.

Liquefaction induced settlement has been estimated using the procedure developed by Tokimatsu and Seed (1987) to be on the average about 3 inches at this site. It can be assumed that this amount of strain would be experienced at the ground surface as areal settlement. Differential settlement is estimated to be half that amount or about 1-1/2- inches.

SEISMIC INDUCED SETTLEMENT OF DRY SANDS

Dry sands tend to settle and densify when subjected to earthquake shaking. The amount of settlement is a function of relative density, cyclic shear strain magnitude, and the number of strain cycles. Procedures to evaluate this type of settlement were developed by Seed and Silver (1972) and later modified by Pyke, et al. (1975). Tokimatsu and Seed (1987) presented a simplified procedure that has been reduced to a series of equations by Pradel (1998).

al. (1975). Tokimatsu and Seed (1987) presented a simplified procedure that has been reduced to a series of equations by Pradel (1998).

Because the soils above the groundwater contain more than 15% clay sized particles (Boring No. 7), and that the soils in the upper 5 feet of the site will be graded, the potential for seismic induced settlement of dry sands is considered to be low.

HYDROCONSOLIDATION

Hydroconsolidation is a phenomenon in which naturally occurring soil deposits, or non-engineered fill soils, collapse when wetted. Natural soils that are susceptible to this phenomenon are typically aeolian, debris flow, alluvial, or colluvial deposits with high apparent strength when dry. The dry strength is attributed to salts, clays, silts, and in some cases capillary tension, "bonding" larger soil grains together. So long as these soils remain dry, their strength and resistance to compression are retained. However, when wetted, the salt, clay, or silt-bonding agent is weakened or dissolved, or capillary tension reduced, eventually leading to collapse. Soils susceptible to this phenomenon are found throughout the southwestern United States.

Methods to analyze hydroconsolidation include double oedometer tests proposed by Jennings and Knight (1956), and a modified version of the Jennings and Knight procedure presented by Houston, et al. (1988) involving a single oedometer test on a soil sample. We have performed hydroconsolidation testing according to the later procedure.

The consolidation tests on soils from above groundwater showed no tendency for the soils to hydroconsolidate. Soils below groundwater are not susceptible to hydroconsolidation.

CONCLUSIONS AND RECOMMENDATIONS

The site is suitable for the proposed development from a Geotechnical Engineering standpoint provided that the recommendations contained in this report are successfully implemented into the project.

The main geotechnical concerns at the site are the presence of uncertified fill material, shallow groundwater, potential large liquefaction induced settlement, and that the existing soils within the anticipated influence of the foundations are compressible and have less than 90% relative compaction and in their present condition are not suitable for the support of the buildings. In addition, some areas of the site appear to be underlain in the top 20 feet by some soft, normally consolidated clays that are compressible. Therefore, to help mitigate these conditions, the upper soils within the building areas require removal and recompaction. Additionally, because of liquefaction induced settlement, use of structural slabs and/or stiff post-tensioned slabs capable of tolerating the estimated differential settlement is recommended to support the structures. Auxiliary structures (signs, garden walls, retaining walls) can be supported on conventional footings with slab-on-grade floors.

Settlement from the maximum anticipated foundation loads (50 kips at column and 3 klf at continuous footings) is estimated to be about 1-3/4 inches without recompaction and about 3/4-inch when the recommended recompaction is completed. However, in the areas underlain by soft clays between the depths of 14 feet to 19 feet, total settlement could be about 2 inches before recompaction and about 1 inch after recompaction. The following sections will provide more detailed recommendations for grading and foundation design.

The site is in a seismically active area. Seismic induced settlement of dry soils and hydroconsolidation are not potentials at this site.

Calculations indicate that liquefaction is a potential in soil layers and in thin soil lenses from about 5 to 50 feet up to 5 feet in thickness. The result of liquefaction is

estimated to be approximately 3 inches of settlement, on an average, at the ground surface and differential settlement of about 1-1/2 inches.

Groundwater was encountered at a depth of about 6 to 10 feet during drilling. Therefore, dewatering of the excavation during overexcavation and recompaction may be needed, depending on its depth.

A. Grading

1. General Grading

a. Grading at a minimum should conform to Chapter 33 of the CBC.

b. The existing ground surface should be initially prepared for grading by removing all vegetation, noncomplying fill (from a few feet to about 8 feet thick at the boring locations), and all buried obstacles, buried irrigation lines, and debris. Voids created by removal of such material should be properly backfilled and compacted.

c. The bottom of all excavations should be observed by a representative of this firm prior to processing or placing fill.

d. Fill and backfill material should be placed at about optimum moisture content, in layers with loose thickness not greater than 8 inches and should be compacted to a minimum of 90% of the maximum dry density obtainable by the ASTM D 1557 test method, unless otherwise recommended or specified. Random compaction tests by ESSC can assist the Grading Contractor in evaluating whether the Grading Contractor is meeting compaction requirements. However, compaction tests pertain only to specific locations, and do not guaranty that all fill has been compacted to the prescribed percentage of maximum density. It is the ultimate responsibility of the Grading Contractor to achieve uniform compaction in accordance with the requirements of this report and the grading ordinance.

e. Shrinkage of soils affected by compaction is estimated to be about 15%. Shrinkage from clearing and grubbing the site is not included in this figure.

f. Import soils used to raise site grade should be equal to, or better than, on-site soils in strength, expansion, and compressibility characteristics. Import soil can be evaluated, but will not be prequalified by the

Geotechnical Engineer. Final comments on the characteristics of the import will be given after the material is at the project site.

g. Roof draining systems and exterior decking should be designed so that water is not discharged into bearing soils or near the structures. Final site grade should be designed so that all water is diverted away from the structures, and is not allowed to pond. A minimum gradient of 2% is recommended for landscaped areas.

h. It is recommended that ESSC be retained to provide Geotechnical Engineering services during site development and grading, and foundation construction phases of the work to observe compliance with the design concepts, specifications and recommendations, and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

i. Plans and specifications should be provided to ESSC prior to grading. Plans should include the grading plans, foundation plans, and foundation details. ESSC will review these plans only for conformity with geotechnical parameters not including drainage. It is the responsibility of the Client and other Engineers to review and approve designs and plans for conformity with all engineering and design requirements necessary to the proper function and performance of the structures.

2. Site Grading/Development - Main Buildings

a. Recompaction in the building areas will be necessary to decrease the potential for differential settlement and provide more uniform bearing conditions. In the foundation areas, soils should be overexcavated to the deeper depth of 2 feet below the bottom of footings or 3 feet below existing grade and through any uncertified fill material. As mentioned earlier, the depths of fill at the location of the borings appear to be between about 3-1/2 to 8 feet below existing ground surface. Therefore, the depth of overexcavation should increase as necessary to remove the uncertified fill. The actual depth of fill should be determined in the field during construction by the Geotechnical Engineer. The overexcavation should extend laterally to 5 feet beyond the foundation edges. The resulting surface should then be scarified an additional 1 foot, moisture conditioned to about optimum moisture content and recompacted to at least 90% of

maximum dry density as determined by ASTM 1557 test method. The intent of these recommendations is to provide a minimum of 3 feet of compacted fill below bottom of footings and to remove all uncertified fill.

b. On-site soils may be used for fill once they are cleaned of organic material, rock, debris and irreducible material larger than 8 inches. Alternatively, a granular import soil may be used for fill.

c. As mentioned earlier, expansion determination indicates that bearing soils lie in the "Low" range (21 to 50) in accordance with Table 18-I-B of the CBC. However, because there are several pads that will be constructed, the expansion index of the soils should be determined after the completion of the grading.

d. Based on soil moisture content of the soils in the upper 5 feet during drilling, pumping soils or otherwise unstable soils will most likely be encountered at overexcavation bottoms. Alternate ways to stabilize excavation bottoms include working thin lifts of 1-1/2-inch (minimum size) float rock into the excavation bottoms until stabilization is achieved, or lime or cement treatment of the soils. Use of geotextiles in combination with crushed rock is another possibility. In this method, an extra 1 foot of soil should be removed and the bottom of the excavations covered with a woven geotextile fabric equivalent to Mirafi 500X, and then the fabric covered with a 12-inch thick layer of crushed rock. After the rock has been wheel rolled or track-walked, it should be smoothed, rolled, and then covered with a non-woven filter fabric equivalent to Mirafi 140N. Fill can then be placed in thin moisture conditioned compacted lifts until finished grade is reached.

3. Grading Recommendations - Site Walls and Miscellaneous Foundations

a. Foundation areas should be overexcavated to a depth of 12 inches below the bottom of footings and through any uncertified fill, and to a distance of 3 feet beyond the footing perimeters. The resulting surfaces should then be scarified an additional 1 foot, moisture conditioned, and recompacted to at least 90% of maximum density. On-site soils may be used for fill once they are cleaned of organic material, rock, debris, and irreducible material larger than 8 inches. Alternatively, a granular import soil may be used for fill.

4. Grading Recommendations - Exterior Slabs and Pavements
   a. Areas to receive exterior slabs-on-grade or pavements should be overexcavated to the deeper depth of 24 inches below existing grade or 24 inches below finishes subgrade, whichever is deeper and through any uncertified fill, and to a distance of 2 feet beyond the perimeter of the slab or pavement. The resulting surface should then be scarified an additional 1 foot, moisture conditioned, and recompacted to at least 90% of maximum density. On-site soils may be used for fill once they are cleaned of organic material, rock, debris, and irreducible material larger than 8 inches.

5. Utility Trenches
   a. Utility trench backfill should be governed by the provisions of this report relating to minimum compaction standards. In general, on-site service lines may be backfilled with native soils compacted to 90% of maximum density. Backfill of off site service lines will be subject to the specifications of the jurisdictional agency or this report whichever are greater.
   b. If water is present in trenches, backfill should be gravel to 6 inches above the water. If the elevation of a utility does not allow this, water should be pumped from its trench.
   c. Backfill operations should be observed and tested by the Geotechnical Engineer to monitor compliance with these recommendations.
   d. Jetting should not be utilized for compaction in utility trenches.

B. Structural Design

1. Post-Tension or Structural Slab Designs
   a. Post-tensioned or structural slab foundations are recommended for the proposed residential and commercial complex because of the potential for liquefaction at relatively shallow depths below the ground surface and estimated differential settlement. Either slab type should be designed to accommodate a differential ground movement of 2 inches in 15 feet in all directions.
   b. Post-tensioned or structural slabs and their footings should bear on firm recompacted soils as recommended elsewhere in this report. Foundation

excavations should be observed by a member of this firm after excavation and before reinforcing steel or concrete are placed.

c. Footing and thickened slab edges should have a minimum depth of 24 inches for the proposed three-story construction.

d. Slabs can be designed for a bearing capacity of 1,000 psf at the ground surface. At a depth of 24 inches, a bearing value of 1,500 psf can be used. These are net bearing values (weight of footing and soil surcharge can be ignored) and are applicable for dead plus live loads. These values can be increased by one-third when transient loads from wind or seismicity are included.

e. For slabs designed by the PTI method, edge lift and center lift conditions will not be factors because the soils are non-expansive. Rather differential settlement will be a factor and slabs should be designed for a differential settlement of 2 inches in 15 feet.

f. Slabs can be designed using a modulus of subgrade reaction of 60 pci.

g. Lateral loads can be resisted by friction on the base of the post-tensioned slab and foundations, and by passive resistance on the edge of the foundations. Lateral capacity is based on the assumption that backfill adjacent to foundations will be properly compacted.

h. Bearing soils under footings should be premoistened to 3% over the optimum moisture content to a depth of 18 inches below lowest adjacent grade. Premoistening should be confirmed by testing.

i. Slabs should be underlain by a minimum of 4 inches of clean sand (less than 5% fines). The sand found at the site will meet this criterion. A vapor retarder should be placed on the subgrade and covered with the 2 inches of clean sand. The sand above the vapor retarder should be lightly moistened just prior to placing concrete.

2. Conventional Foundations - Miscellaneous Structures

a. Conventional continuous footings and/or isolated pad footings may be used for support of miscellaneous structures (not buildings).

b. Footings with a minimum embedment depth of 15 inches should bear into firm recompacted soils. Foundation excavations should be observed by a representative of ESSC after excavation, but prior to placing of reinforcing steel or concrete, to verify bearing conditions.

c. Conventional continuous and isolated pad footings may be designed based on an allowable bearing value of 1,500 psf. This value includes a factor of safety greater than three, and should not be increased because of settlement potential.

d. The allowable bearing value is net (weight of footing and soil surcharge may be neglected) and is applicable for dead plus live loads.

e. The bearing value may be increased by one-third when transient loads such as wind and/or seismicity are included.

f. Lateral loads may be resisted by soil friction on floor slabs and foundations and by passive resistance of the soils acting on foundation stem walls. Lateral capacity is based on the assumption that any required backfill adjacent to foundations and grade beams is properly compacted.

g. The data that follow regarding depths, widths, reinforcement and premoistening for footings are generally the same as those given in Table 18-I-D for the "Low" expansion range. It should be noted, however, that these values are minima and that other more stringent structural considerations may govern. Actual footing designs, depths, widths and reinforcement should be provided by the Structural Engineer but should not be less than values given herein.

h. Continuous footings bottomed in soils in the "Low" expansion range should, at a minimum, be reinforced with one No. 4 bar along the bottom and one No. 4 bar along the top.

i. Bearing soils under footings should be premoistened to 3% over the optimum moisture content to a depth of 18 inches below lowest adjacent grade. Premoistening should be confirmed by testing.

j. ESSC's representative should observe foundation excavations prior to placing reinforcing steel or concrete.

3. Slabs-on-Grade (miscellaneous slabs)

a. Concrete slabs should be supported by compacted structural fill as recommended earlier in this report.

b. It is recommended that perimeter slabs (walks, patios, etc.) be designed relatively independent of footing stems (i.e., free floating) so foundation adjustment will be less likely to cause cracking.

c. Slabs should be underlain with a minimum of 4 inches of clean sand. Areas where floor wetness would be undesirable should also be underlain with a vapor retarder to reduce moisture transmission from the subgrade soils to slabs. In these areas, the vapor retarder should be centered in the 4 inches of sand. The sand should be lightly moistened just prior to placing concrete.

d. Reinforcement and premoistening data given herein for slabs are the same as those given in Table 18-I-D for the "Low" expansion range. It should be noted, however, that these values are minima and that other more stringent structural consideration; such as large construction loads may govern. Actual reinforcement and slab thickness should be determined by the Structural Engineer, but should not be less than values given herein.

e. Slabs bottomed on soils in the "Low" expansion range should be reinforced with No. 3 bars placed 24 inches on center in each direction. Reinforcing should be located at mid-slab.

f. Slab subgrade soils should be premoistened to 3% above the optimum moisture content to a depth of 18 inches below lowest adjacent grade. Premoistening should be confirmed by testing.

4. Frictional and Lateral Coefficients

a. Resistance to lateral loading may be provided by friction acting on the base of foundations, grade-beams, and slabs-on-grade. A coefficient of friction of 0.30 may be applied to dead load forces. This value includes factor-of-safety of 1.5.

b. Passive resistance acting on the sides of foundation stems equal to 190 pcf of equivalent fluid weight may be included for resistance to lateral load. This value includes a factor-of-safety of 1.5. When passive resistance is used in conjunction with friction, the coefficient of friction should be reduced by one-third in determining the total lateral resistance.

5. Settlement Considerations

a. Maximum expected settlement of less than 1 inch is anticipated from static loads for foundations and slabs designed as recommended when recompaction is completed. Differential settlement between adjacent load

bearing members from static loads could be about one-half the total estimated settlement, or 1/2-inch.

b. The potential for seismic induced settlement of dry sands is estimated to be non-existence. The potential for hydroconsolidation settlement is estimated to be non-existence.

c. Liquefaction induced settlement is estimated to be about 3 inches. Differential settlement from this phenomenon could be about 1-1/2 inches.

d. Total potential settlement from all sources could be about 4 inches and total differential settlement from all sources could be about 2 inches.

6. Retaining Walls

a. Conventional cantilever retaining walls backfilled with compacted on-site soils may be designed for active pressures of 49 pcf of equivalent fluid weight for well-drained, level backfill.

b. The pressures listed above were based on the assumption that the on-site soils will be compacted to approximately 90% of maximum dry density as determined by ASTM D 1557 test procedures. The use of select granular fill may lower the recommended driving earth pressures.

c. The lateral earth pressure to be resisted by the retaining walls or similar structures should be increased to allow for surcharge loads. The surcharge considered should include the loads from any structures or temporary loads that would influence wall design.

d. A backdrain or an equivalent system of backfill drainage should be incorporated into retaining wall design. Backfill immediately behind retaining structures should be a free-draining granular material a minimum of 1 foot thick and extending to within 12 inches of the top of the backfill. The granular backfill should be capped with about 12 inches of on-site soils. Efflorescence on the face of walls can be mitigated by water proofing which, if done, should be according to the Architect or Civil Engineer's recommendations.

e. Compaction on the uphill side of walls within a horizontal distance equal to one wall height should be performed by hand-operated or other lightweight compaction equipment. This is intended to reduce potential "locked-in" lateral pressures caused by compaction with heavy grading equipment.

f. Water should not be allowed to pond near the top of walls. To accomplish this, the final backfill site grade should be such that all water is diverted away from retaining walls.

7. Paving Design

a. The R-Value measured on a sample of anticipated subgrade soil was 11 and this value is used in the designs that follow. Note that this value was measured on a sample from the adjacent site, but is similar to the values measured on a sample from this site (R=14).

b. If a Traffic Index of 4.5 is assumed (automobiles and infrequent light trucks), and using the R-Value of 11, paving sections should have a minimum gravel equivalent of 1.28 feet. This can be achieved by using 3 inches of asphalt concrete over 7 inches of aggregate base.

c. If a traffic Index of 5.0 (truck traffic area with two three- to five-axle trucks per day or nine three-axle trucks per day) is assumed, and using the measured R-Value of 11, paving sections should have a minimum gravel equivalent of 1.42 feet. This can be achieved by using 3 inches of asphalt concrete over 8.5 inches of aggregate base.

d. In the truck traffic areas described above, a PCC paving design would be 6 inches of PCC over 4 inches of aggregate base. For the lighter traffic areas the concrete thickness can be reduced to 5 inches. The concrete should have a minimum compressive strength of 3,700 psi. Cracks can be controlled by placing contraction joints spaced about 15 feet apart in each direction. Slabs should have aspect ratios of about 1:1. Reinforcing would provide additional crack control.

e. The above paving sections have been designed for the type of traffic indicated. If the pavement is placed before construction on the project is complete, construction loads should be taken into account.

f. Subgrade should be prepared in accordance with the recommendations in the grading section of this report. The subgrade should be firm and unyielding when proof rolled with a loaded water truck or similar load. Aggregate base should be compacted to a minimum of 95% maximum density and should be firm and unyielding prior to placing concrete.

g. Paving sections probably can be reduced significantly if the subgrade soils are lime-treated. This option can be explored during rough grading.

ADDITIONAL SERVICES

This report is based on the assumption that an adequate program of monitoring and testing will be performed by ESSC during construction to check compliance with the recommendations given in this report. The recommended tests and observations include, but are not necessarily limited to the following:

1. Review of the structural and grading plans during the design phase of the project.
2. Observation and testing during site preparation, grading, placing of engineered fill, backfilling, and foundation construction.
3. Consultation as required during construction.
4. Special Inspection and material testing.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The analysis and recommendations submitted in this report are based in part upon the data obtained from the borings drilled and CPT's performed on the site and other existing data. The nature and extent of variations between or beyond the borings may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater or air, on, below, or around this site. Any statements in this report or on the soil boring logs regarding odors noted, unusual or suspicious items or conditions observed are strictly for the information of our Client.

Findings of this report are valid as of this date; however, changes in conditions of a property can occur with passage of time whether they are due to natural processes or works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

In the event that any changes in the nature, design, or location of the structures, and other improvements are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

This report is issued with the understanding that it is the responsibility of the Owner, or of his representative to insure that the information and recommendations contained herein are called to the attention of the Architect and Engineers for the project and incorporated into the plan and that the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

As the Geotechnical Engineers for this project, Earth System Southern California has strived to provide our services in accordance with generally accepted geotechnical engineering practices in this community at this time. No warranty or guarantee is expressed or implied. This report was prepared for the exclusive use of Client and their authorized agents.

It is recommended that Earth Systems Southern California be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. If ESSC is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

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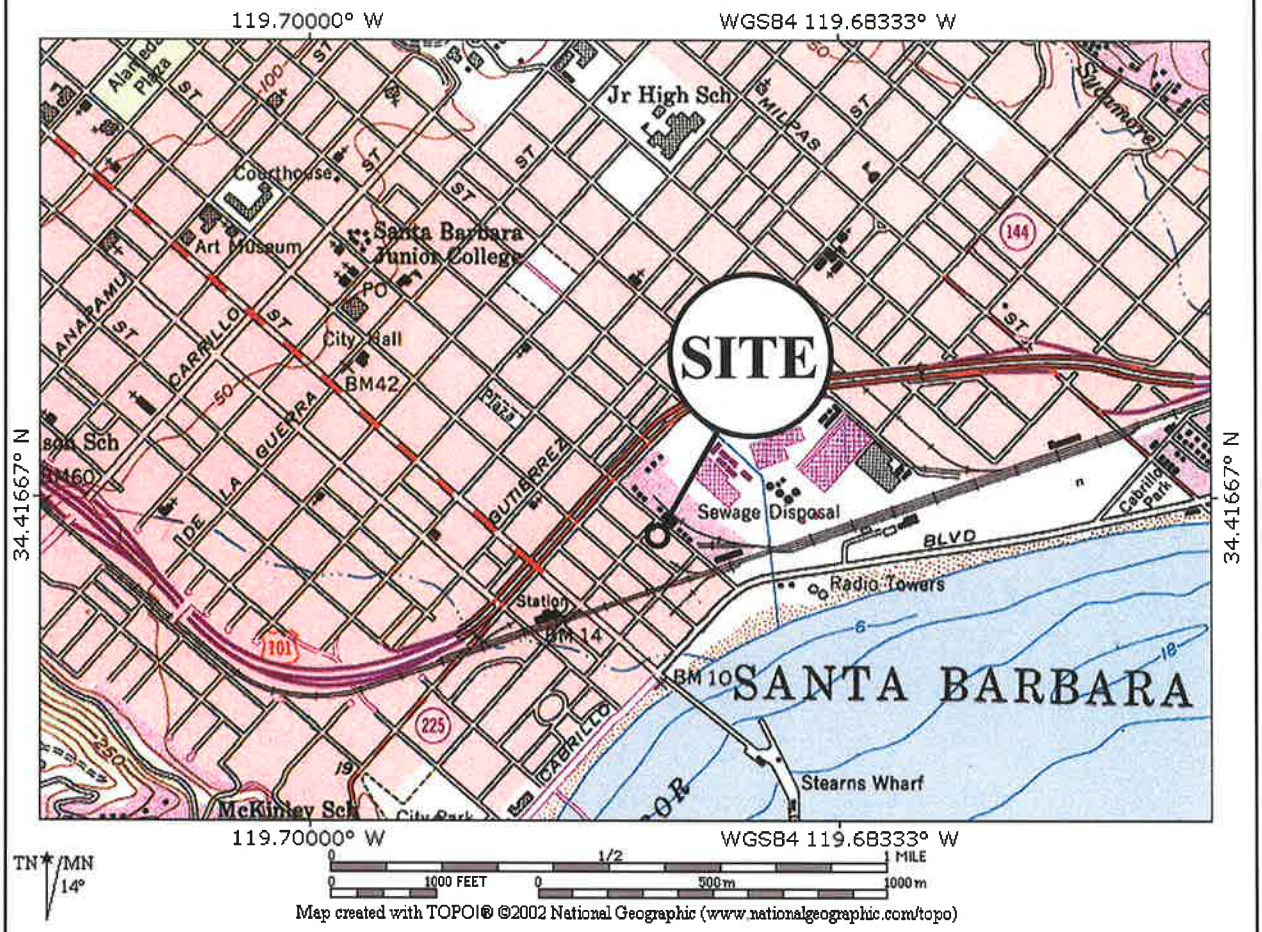
END OF TEXT

Appendices

APPENDIX A

Vicinity Map
Borings & CPT Loctions
Satellite Site Image Plan
Field Investigation
Boring Logs
CPT Logs and Interpretations
Symbols Commonly Used on Boring Logs
Unified Soil Classification



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VICINITY MAP

PASEO DE LA PLAYA
SANTA BARBARA, CALIFORNIA

Earth Systems
Southern California

February, 2007	VT-23842-01

CPT-1 - CONE PENETRATION TEST LOCATION

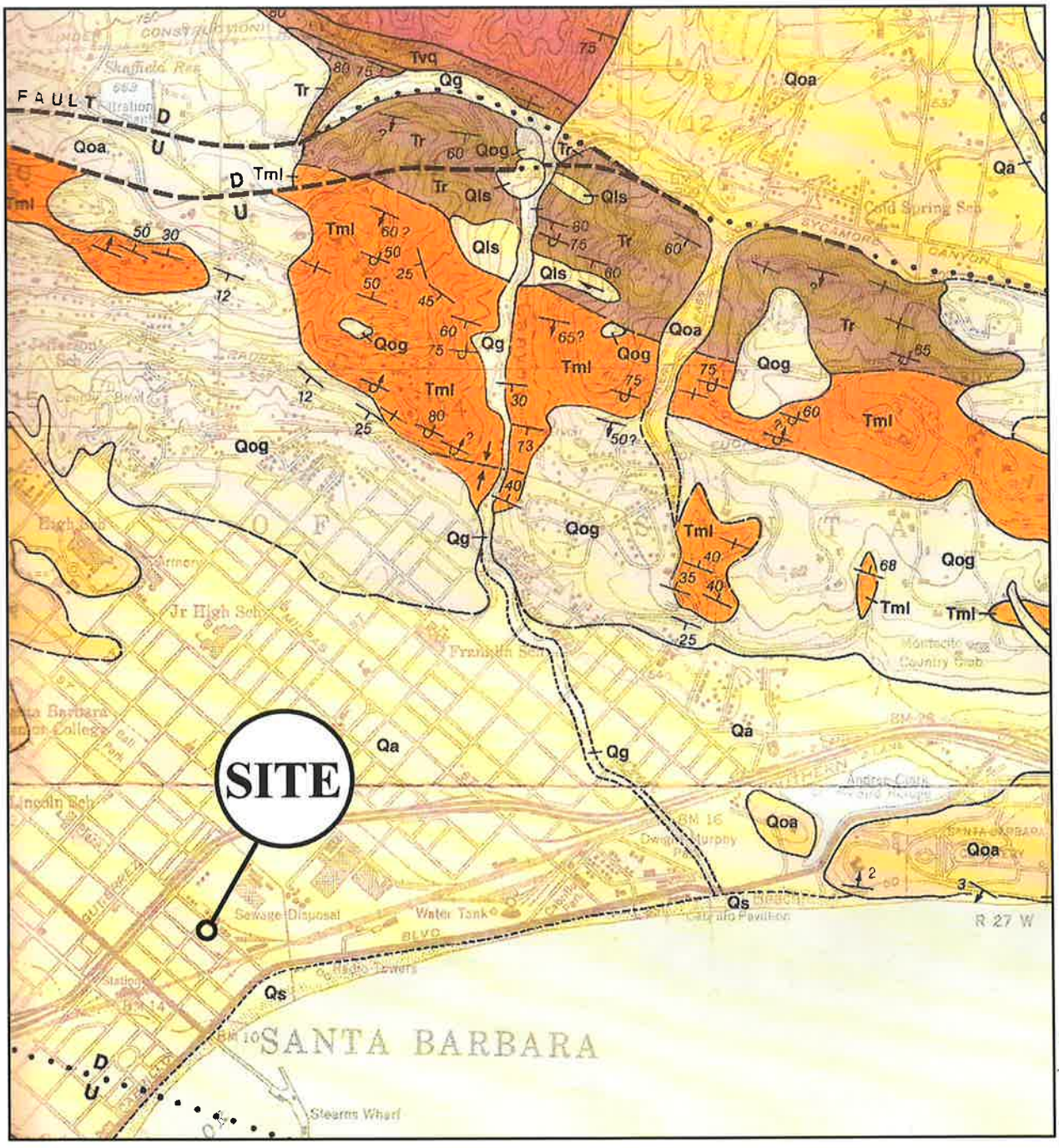
B1 - BORING LOCATION

BORING AND CPT LOCATIONS

PASEO DE LA PLAYA
SANTA BARBARA, CALIFORNIA

Earth Systems
Southern California

February, 2007	VT-23842-01



*Taken from T.W. Dibblee, Jr., Geologic Map of the Santa Barbara Quadrangle, 1986

REGIONAL GEOLOGY MAP

PASEO DE LA PLAYA
SANTA BARBARA, CALIFORNIA

Earth Systems
Southern California

February, 2007	VT-23842-01

SATELLITE SITE IMAGE

PASEO DE LA PLAYA
SANTA BARBARA, CALIFORNIA

Earth Systems
Southern California

February, 2007	VT-23842-01

FIELD INVESTIGATION

A. Ten borings were drilled to a maximum depth of 51-1/2 feet below the existing ground surface to observe the soil profile and to obtain samples for laboratory analysis. The borings were drilled on December 11 and 12, 2006, using a 6-inch outside diameter hollow stem auger powered by a Mobil B-80 truck mounted drilling rig. The approximate locations of the borings were determined in the field by pacing and sighting and are shown on the Site Plan in this Appendix.

B. Two cone penetration tests sounding (CPT's) were made to a depth to 50 feet below the existing ground surface on December 20, 2006. The CPT's were conducted in general accordance with the current ASTM specifications (D 5778 and D 3441) using an electrical cone penetrometer. The CPT's consisted of pushing the instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve. The cone penetrometer assembly consisted of a conical tip and a friction sleeve. The conical tip had a 60 degree apex angle and a diameter of 1.4 inches. The friction sleeve was 5.25 inches long and 1.4 inches in diameter. The approximate locations of the CPT's were determined in the field by pacing and sighting and are shown on the Site Plan in this Appendix. The CPT logs and their interpretations are presented in this Appendix.

C. Samples were obtained within the test borings with a Modified California (MC) ring sampler (ASTM D 3550 with shoe similar to ASTM D 1586). The MC sampler has a 3-inch outside diameter and a 2.37-inch inside diameter. Samples were also taken with a Standard Penetration Test split spoon sampler with a 2-inch outside diameter and a 1-3/8-inch inside diameter when used with liners and 1-5/8-inch when used without liners. This sampler was used without liners. The samples were obtained by driving the sampler with a 140-pound down hole hammer operated by a power reversing winch.

D. Bulk samples of shallow soils were gathered from the excavated materials.

E. The final logs of the borings represent our interpretation of the contents of the field logs and the results of laboratory testing performed on the samples obtained during the subsurface investigation. The final logs are included in this Appendix.

Earth Systems Southern California
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BORING NO: 1
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									**SURFACE:** About 2" of asphalt.
	X		■	27/20/17		SM	118.5	11.1	**ARTIFICIAL FILL:** Silty fine to coarse sand with fine to medium gravel, some small pieces of brick and asphalt, slightly moist, medium dense, moderate brown to black.
	X		■	6/6/17		SM	102.0	22.1	Same as above.
5			■	3/3/4		ML	103.8	21.8	**ALLUVIUM:** Clayey sandy silt, moist, medium stiff, dark reddish brown.
		▼							
10	X		▨	5/6/7		SM	--	--	**ALLUVIUM:** Clayey very silty fine to medium sand, trace fine gravel, wet, loose, moderate to dark reddish brown. HYDRO: 2.7% gravel, 61.9% sand, 23.2% silt, 12.2% clay.
15		◧		3/3/4		ML	--	--	**ALLUVIUM:** Clayey sandy silt, wet, medium stiff, grayish brown to dark reddish brown. HYDRO: 0.4% gravel, 44.2% sand, 40.3% silt, 15.1% clay.
20		◧		2/2/3		CL	--	--	**ALLUVIUM:** Silty clay with sand, low to medium plasticity, wet, medium stiff, dark gray to dark olive. HYDRO: 0.0% gravel, 15.1% sand, 26.1% silt, 58.8% clay.
25		◧		3/4/8		CL SM	--	--	Same as above transitioning at 26.0' into a silty fine to medium sand with clay, wet, stiff to medium dense, dark gray to dark olive gray.
						CL			**ALLUVIUM:** Silty clay, low plasticity.
30		◧		6/4/5		SM	--	--	**ALLUVIUM:** Silty fine to medium sand, wet, loose, dark olive gray. HYDRO: 0.4% gravel, 83.9% sand, 15.5% silt, 0.1% clay.
35	X			--		SM			**ALLUVIUM:** Silty fine to coarse sand, trace fine gravel, wet, dark olive gray. No SPT due to heaving sands.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 1
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
40				7/14/16		SM ML	--	--	**ALLUVIUM:** Silty fine sand to fine sandy silt, wet, medium dense to very stiff, dark grayish olive to dark olive gray. HYDRO: 0.0% gravel, 51.7% sand, 45.2% silt, 3.1% clay.
45				4/13/18		ML SM	--	--	**ALLUVIUM:** Very silty fine sand, wet, medium dense, moderate olive to moderate olive gray.
						ML			**ALLUVIUM:** Clayey fine sandy silt, wet, moderate to dark gray. No SPT due to heaving sands. HYDRO: 0.0% gravel, 23.9% sand, 60.3% silt, 15.7% clay.
50									Final Depth: 50.0 feet Groundwater was encountered at about 10.0 feet.
55									
60									
65									
70									
75									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

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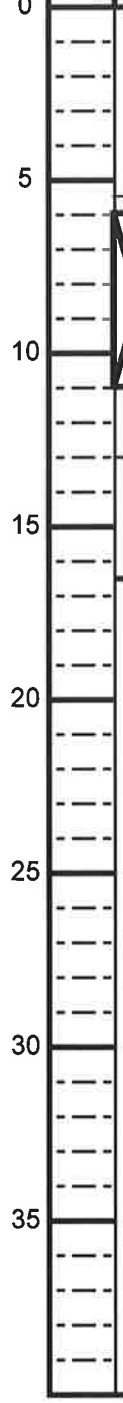
BORING NO: 2
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith



PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
		GM			**SURFACE:** Debris- gravel, tile, brick, and asphalt.
14/13/15		GM	75.9	24.7	**ARTIFICIAL FILL:** Silty sand and gravel, some debris including pieces of brick and asphalt, moist, medium dense, moderate brown to moderate reddish brown.
5/6/6		GM	72.3	29.4	**ARTIFICIAL FILL:** Sandy silty fine to coarse gravel (angular clasts of shale), moist, loose, dark reddish brown.
2/1/2		SM	112.0	17.0	**ALLUVIUM:** Silty fine to coarse sand, trace fine gravel, wet, very loose, dark reddish brown.
5/6/7		SM	--	--	**ALLUVIUM:** Silty fine to coarse sand, wet, medium dense, moderate to dark reddish brown.
2/5/5		SM ML	--	--	**ALLUVIUM:** Silty fine to medium sand to sandy silt, wet, loose to medium stiff, grayish brown.
					Final Depth: 16.5 feet
					Groundwater was encountered at about 6.0 feet.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
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BORING NO: 3
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0			■	6/15 for 3"		GM	116.5	13.0	**SURFACE:** About 2" of asphalt. **ARTIFICIAL FILL:** Silty sand and gravel with cobbles, trace clay, moist, medium dense, dark brown to black to reddish brown.
			▨	10/8/11		GC			**ARTIFICIAL FILL:** Clayey sand with gravel and cobbles, moist, medium dense, black to dark brown.
5	▼		▨	7/9/13		SC	--	--	**ALLUVIUM:** Silty clayey sand, moist to very moist, medium dense, reddish brown.
		■		2/1/2		SC CL	--	--	**ALLUVIUM:** Layered clayey sand to sandy clay, low to medium plasticity, wet, very loose to soft, moderate reddish brown.
10		■		7/6/5		SC	--	--	**ALLUVIUM:** Clayey silty fine to coarse sand to silty fine sand, wet, medium dense, moderate reddish brown.
15		■		2/2/2		CL	--	--	**ALLUVIUM:** Silty clay, trace sand, low to medium plasticity, wet, soft, olive to dark olive.
20									Final Depth: 16.5 feet Groundwater was encountered at about 6.5 feet.
25									
30									
35									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 4
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									**SURFACE:** About 4" of asphalt.
	X		■	16/14/14		SM	84.1	23.7	**ARTIFICIAL FILL:** Silty fine to coarse sand with gravel and fine cobbles, moist, medium dense, moderate to dark reddish brown.
5	X		■	4/4/6		SM	--	--	**ARTIFICIAL FILL:** Clayey silty fine to coarse sand with fine gravel, very moist, loose, dark brown to dark reddish brown.
		▼	■	4/5/8		SC	111.6	18.2	**ALLUVIUM:** Clayey fine to coarse sand, wet, loose, moderate reddish brown.
10		■		2/2/3		CL	--	--	**ALLUVIUM:** Sandy clay with gravel sized calcium carbonate nodules, wet, medium stiff, dark olive to dark olive gray.
15		■		2/2/3		CL	--	--	Same as above.
20									Final Depth: 16.5 feet Groundwater was encountered at about 6.5 to 7.0 feet.
25									
30									
35									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 5
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

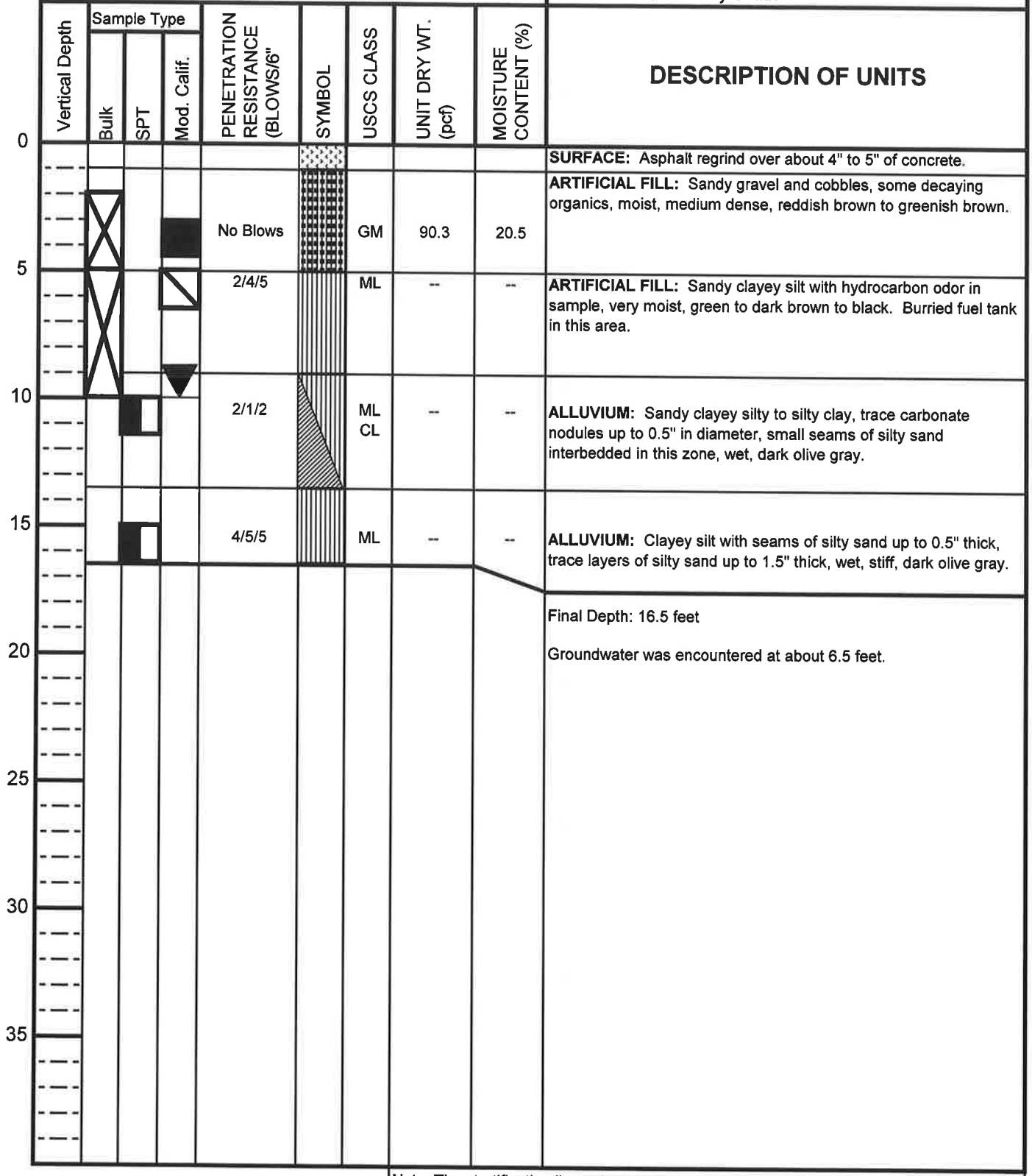
Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0			■	14/13/14		GM	92.6	17.2	**SURFACE:** Grass and weeds. **ARTIFICIAL FILL:** Silty sandy gravel and fine cobbles, subrounded to subangular, moist, medium dense, reddish brown to dark reddish brown.
			■	9/11/13		GM	100.4	13.4	**ARTIFICIAL FILL:** Silty sand to silty sandy gravel, some pieces of brick up to 0.75" in diameter, moist, medium dense, moderate reddish brown.
5	▼		■	5/4/4		CL SC	103.3	24.0	**ALLUVIUM:** Sandy clay, low to medium plasticity, very moist to wet, medium stiff, dark brown to dark reddish brown.
10		■		2/2/3		CL	--	--	**ALLUVIUM:** Sandy clay with seams of clayey sand throughout zone, wet, medium stiff, olive brown.
15		■		4/5/6		ML	--	--	**ALLUVIUM:** Fine sandy silt with small layers of very silty fine sand, wet, stiff, dark olive.
20									Final Depth: 16.5 feet Groundwater was encountered at about 6.5 feet.
25									
30									
35									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 6
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 11, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith



DESCRIPTION OF UNITS

SURFACE: Asphalt regrind over about 4" to 5" of concrete.

ARTIFICIAL FILL: Sandy gravel and cobbles, some decaying organics, moist, medium dense, reddish brown to greenish brown.

ARTIFICIAL FILL: Sandy clayey silt with hydrocarbon odor in sample, very moist, green to dark brown to black. Burried fuel tank in this area.

ALLUVIUM: Sandy clayey silty to silty clay, trace carbonate nodules up to 0.5" in diameter, small seams of silty sand interbedded in this zone, wet, dark olive gray.

ALLUVIUM: Clayey silt with seams of silty sand up to 0.5" thick, trace layers of silty sand up to 1.5" thick, wet, stiff, dark olive gray.

Final Depth: 16.5 feet

Groundwater was encountered at about 6.5 feet.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 7
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 12, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									**SURFACE:** Gravel over about 4" to 5" of concrete.
	X		■	6/7/9		ML	93.0	23.7	**ARTIFICIAL FILL:** Sandy clayey silt, trace fine gravel, moist, stiff, light green to black at 3.0 feet.
5			■	9/12/14		ML CL	111.8	16.9	**ALLUVIUM:** Very sandy silt with clay, very moist, very stiff, dark gray to black.
	▼		■	3/5/8		CL SC	103.6	23.9	**ALLUVIUM:** Silty clay, low to medium plasticity to silty clayey sand, trace charcoal up to 1/8" in diameter, wet, olive gray to light greenish gray.
10		■		2/3/2		SM	--	--	**ALLUVIUM:** Silty fine to medium sand with seams of sandy clay, wet, loose, olive to olive green. HYDRO: 2.3% gravel, 62.8% sand, 23.8% silt, 11.1% clay.
15		■		5/4/4		SM	--	--	**ALLUVIUM:** Silty fine to medium sand with interbedded sandy silt layers about 1.5" thick, wet, loose, dark olive green.
20		■		3/6/6		ML SM	--	--	**ALLUVIUM:** Silty fine sand to fine sandy silt, wet, stiff to medium dense, dark grayish olive. HYDRO: 0.0% gravel, 50.1% sand, 33.8% silt, 16.1% clay.
25		■		6/8/8		SM	--	--	**ALLUVIUM:** Very silty fine to medium sand, wet, medium dense, dark olive gray. HYDRO: 0.8% gravel, 70.5% sand, 28.1% silt, 0.6% clay.
30		■		3/8/9		ML	--	--	**ALLUVIUM:** Sandy clayey silt, wet, very stiff, dark to moderate olive. HYDRO: 0.4% gravel, 38.9% sand, 43.7% silt, 17.0% clay.
35		■		15/30		SM SW	--	--	**ALLUVIUM:** Slightly silty fine to coarse sand, trace fine gravel, medium dense to dense, olive gray.
						SM			

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

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PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 7
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 12, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
40				8/18/21		SM	--	--	**ALLUVIUM:** Silty fine to medium sand with clay, some seams of fine sandy silt up to 0.5" thick, wet, dense, olive. HYDRO: 0.8% gravel, 58.7% sand, 31.4% silt, 9.0% clay.
45				3/5/5		ML CL	--	--	**ALLUVIUM:** Clayey sandy silt to silty clay at 46.25', low to medium plasticity, wet, stiff, dark olive green. HYDRO: 0.1% gravel, 30.8% sand, 49.9% silt, 19.2% clay.
50				3/4/6		CL	--	--	**ALLUVIUM:** Silty clay with sand, medium plasticity, wet, stiff, dark olive gray. HYDRO: 0.0% gravel, 16.5% sand, 52.7% silt, 30.8% clay.
55									Final Depth: 51.5 feet Groundwater was encountered at about 7.0 feet.
60									
65									
70									
75									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 8
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 12, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

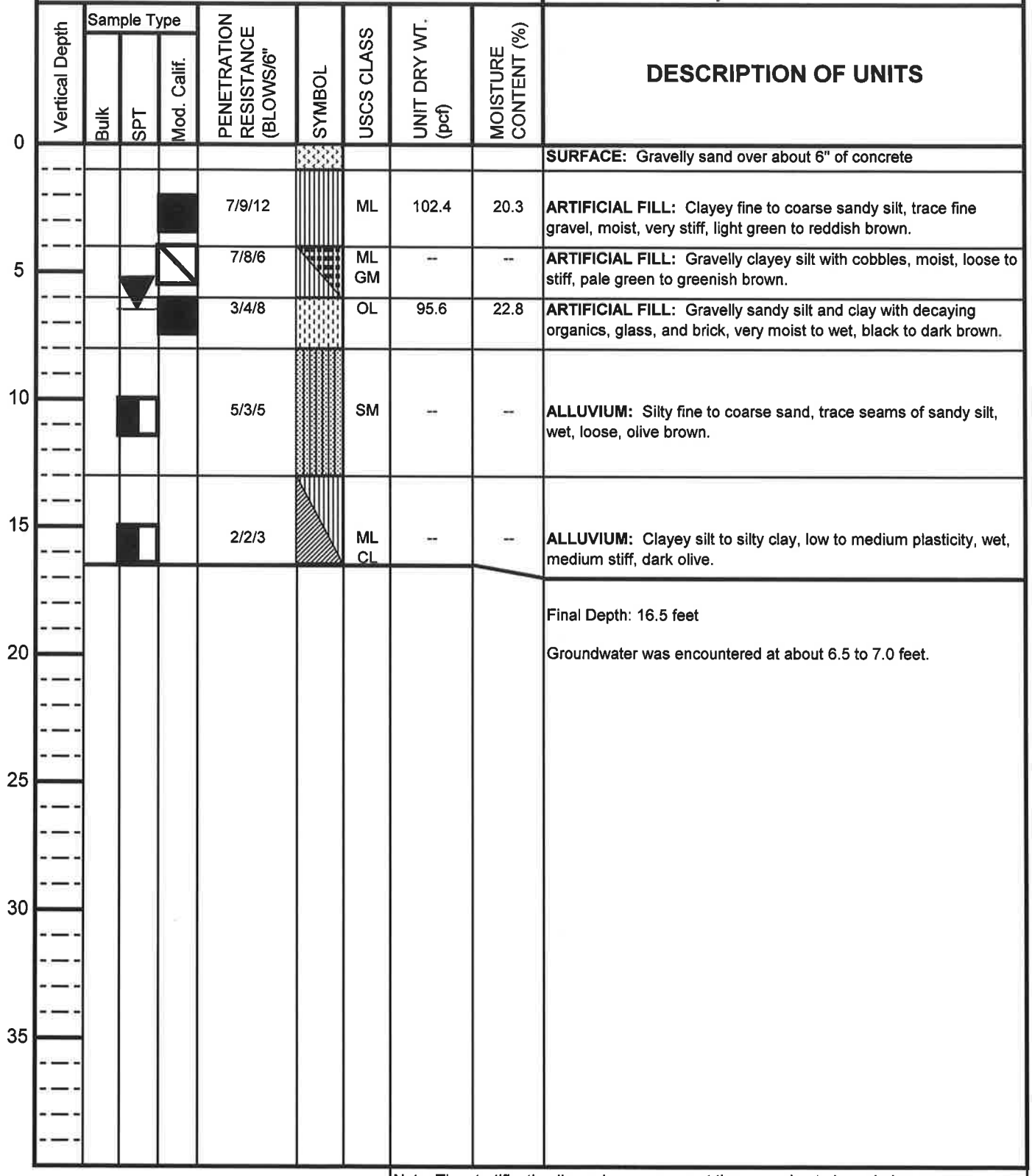
Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									**SURFACE:** Broken concrete slab.
			■	23/37 for 5"		GM	110.4	11.4	**ARTIFICIAL FILL:** Silty sand and gravel, trace cobbles, slightly moist, dense, orangish brown to black.
5			■	7/5/6		ML	--	--	**ALLUVIUM:** Sandy clayey silt, moist, stiff, dark brown to black.
		▼	■	7/7/6		ML	100.3	25.7	**Same as above.**
10		■		2/3/5		ML	--	--	**ALLUVIUM:** Sandy silt, some clay, wet, medium stiff, olive green.
15		■		3/3/5		CL	--	--	**ALLUVIUM:** Sandy silty clay, low to medium plasticity, wet, medium stiff, dark olive gray.
20									Final Depth: 16.5 feet Groundwater was encountered at about 6.5 feet.
25									
30									
35									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 9
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 12, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith



PENETRATION RESISTANCE (BLOWS/6")	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
				SURFACE: Gravelly sand over about 6" of concrete
7/9/12	ML	102.4	20.3	**ARTIFICIAL FILL:** Clayey fine to coarse sandy silt, trace fine gravel, moist, very stiff, light green to reddish brown.
7/8/6	ML GM	--	--	**ARTIFICIAL FILL:** Gravelly clayey silt with cobbles, moist, loose to stiff, pale green to greenish brown.
3/4/8	OL	95.6	22.8	**ARTIFICIAL FILL:** Gravelly sandy silt and clay with decaying organics, glass, and brick, very moist to wet, black to dark brown.
5/3/5	SM	--	--	**ALLUVIUM:** Silty fine to coarse sand, trace seams of sandy silt, wet, loose, olive brown.
2/2/3	ML CL	--	--	**ALLUVIUM:** Clayey silt to silty clay, low to medium plasticity, wet, medium stiff, dark olive.
				Final Depth: 16.5 feet Groundwater was encountered at about 6.5 to 7.0 feet.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 10
PROJECT NAME: Paseo De La Playa
PROJECT NUMBER: VT-23842-01
BORING LOCATION: Per Plan

DRILLING DATE: December 12, 2006
DRILL RIG: Mobile B-80
DRILLING METHOD: 6" Hollow Stem Auger
LOGGED BY: Wesley Smith

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									**SURFACE:** Broken tile and gravel over about 6" of conrete.
			■	17/16/17		GM	115.4	15.5	**ARTIFICIAL FILL:** Silty fine to coarse sand and gravel with pieces of brick, glass, and nails, moist, medium dense, dark brown to black.
5			■	5/6/5		SM	111.2	17.2	**ALLUVIUM:** Very silty fine to coarse sand with fine gravel, very moist, loose, dark brown.
		▼	■	4/5/5		CL ML	102.5	24.6	**ALLUVIUM:** Sandy silty clay, very moist to wet, medium stiff, grayish brown to dark brown.
10		■		4/3/3		SM ML	--	--	**ALLUVIUM:** Silty fine to medium sand with layers of sandy silt about 2" tthick, wet, loose, olive brown.
15		■		3/5/7		CL SC	--	--	**ALLUVIUM:** Silty clay with sand, some layers of silty sand, wet, stiff, dark olive.
20									Final Depth: 16.5 feet Groundwater was encountered at about 6.5 to 7.0 feet.
25									
30									
35									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

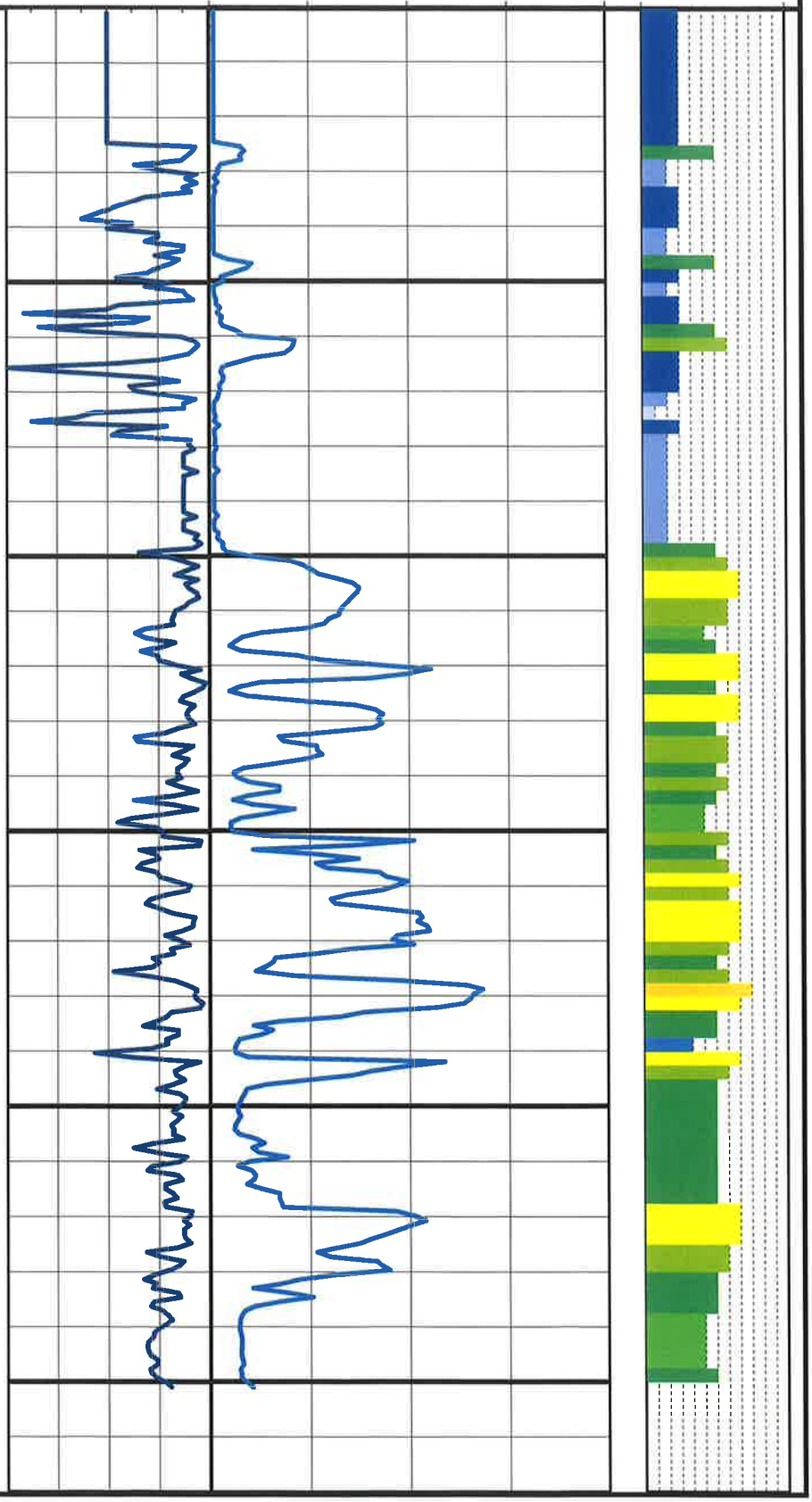
Earth Systems
Southwest

CPT No: CPT-1
Project Name: Paseo De La Playa
Project No.: VT-23842-01
Location: See Site Exploration Plan

CPT Vendor: Gregg
Truck Mounted Electric
Cone with 23-ton reaction
Date: 2/20/2007

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Clay	very soft
	Clay	very soft
	Clay	very soft
	Clay	very soft
	Clay	soft
5	Clayey Silt to Silty Clay	stiff
	Sensitive fine grained	soft
	Clay	very soft
	Sensitive fine grained	soft
	Clayey Silt to Silty Clay	stiff
10	Clay	soft
	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	medium dense
	Clay	firm
	Clay	very soft
15	Sensitive fine grained	soft
	Sensitive fine grained	very soft
	Sensitive fine grained	very soft
	Sensitive fine grained	very soft
	Sandy Silt to Clayey Silt	loose
20	Sand to Silty Sand	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
25	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	stiff
30	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
35	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Clayey Silt to Silty Clay	stiff
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	stiff
40	Sandy Silt to Clayey Silt	stiff
	Sandy Silt to Clayey Silt	very stiff
	Sandy Silt to Clayey Silt	very stiff
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
45	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
50		

End of Sounding @ 50.4 feet



Earth Systems Southwest

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: Paseo De La Playa — Project No: VT-23842-01 — Date: 02/20/07

CPT SOUNDING: CPT-1 — Plot: 1 — Density: 1 — SPT N — Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): 6.0 — Dr correlation: 0 — Baldi — Qc/N: 1 — Robertson — Phi Correlation: 4 — SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
0.15	0.5	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.014	0.014	4.03	1.00	1.70	3.2	3.48		2			0.12	43.3
0.30	1.0	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.041	0.041	4.08	1.00	1.70	3.2	3.48		2			0.12	14.2
0.46	1.5	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.069	0.069	4.14	1.00	1.70	3.2	3.49		2			0.11	8.4
0.61	2.0	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.096	0.096	4.20	1.00	1.70	3.2	3.49		2			0.11	5.9
0.76	2.5	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.124	0.124	4.26	1.00	1.70	3.2	3.49		2			0.11	4.5
0.91	3.0	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.153	0.153	4.33	1.00	1.70	3.2	3.50		2			0.11	3.6
1.07	3.5	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.183	0.183	4.40	1.00	1.70	3.2	3.50		2			0.11	3.0
1.22	4.0	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.213	0.213	4.48	1.00	1.70	3.2	3.50		2			0.11	2.5
1.37	4.5	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.243	0.243	4.55	1.00	1.70	3.2	3.51		2			0.10	2.2
1.52	5.0	6.52	2.84	Clay	CL/CH	firm	120	1.0	7	0.273	0.273	2.96	0.91	1.70	10.5	2.98		7			0.37	6.9
1.68	5.5	13.75	1.36	Sandy Silt to Clayey Silt	ML	loose	120	2.5	5	0.303	0.303	1.39	0.77	1.70	22.1	2.52	64.0	9	13	14	30		
1.83	6.0	3.61	1.08	Sensitive fine grained	ML	soft	120	2.0	2	0.333	0.333	1.19	0.92	1.70	5.8	3.00		2			0.19	3.0
1.98	6.5	3.11	0.71	Sensitive fine grained	ML	soft	120	2.0	2	0.363	0.347	0.80	0.92	1.70	5.0	2.99		2			0.16	2.4
2.13	7.0	2.00	3.00	Clay	CL/CH	very soft	120	1.0	2	0.393	0.361	3.73	1.00	1.70	3.2	3.46		2			0.10	1.3
2.29	7.5	2.00	4.50	Clay	CL/CH	very soft	120	1.0	2	0.423	0.376	5.71	1.00	1.70	3.2	3.56		2			0.10	1.3
2.44	8.0	2.00	3.00	Clay	CL/CH	very soft	120	1.0	2	0.453	0.390	3.88	1.00	1.70	3.2	3.47		2			0.09	1.2
2.59	8.5	2.01	1.83	Sensitive fine grained	ML	very soft	120	2.0	1	0.483	0.405	2.40	1.00	1.70	3.2	3.37		1			0.09	1.1
2.74	9.0	4.32	1.43	Sensitive fine grained	ML	soft	120	2.0	2	0.513	0.419	1.62	0.92	1.70	6.9	2.99		2			0.23	2.7
2.90	9.5	17.57	1.99	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	7	0.543	0.433	2.05	0.77	1.70	28.2	2.53	83.3	11	17	24	30		
3.05	10.0	5.06	2.54	Clay	CL/CH	firm	120	1.0	5	0.573	0.448	2.86	0.94	1.70	8.1	3.06		5			0.27	3.0
3.20	10.5	2.56	0.82	Sensitive fine grained	ML	very soft	120	2.0	1	0.603	0.462	1.07	0.97	1.70	4.1	3.12		1			0.12	1.3
3.35	11.0	4.08	4.96	Clay	CL/CH	soft	120	1.0	4	0.633	0.477	5.87	1.00	1.70	6.6	3.32		4			0.21	2.2
3.51	11.5	6.14	3.99	Clay	CL/CH	firm	120	1.0	6	0.663	0.491	4.48	0.95	1.70	9.9	3.10		6			0.33	3.3
3.66	12.0	24.45	2.07	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	10	0.693	0.505	2.13	0.74	1.70	39.3	2.43	96.1	14	19	38	31		
3.81	12.5	40.45	0.59	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	13	0.723	0.520	0.60	0.60	1.53	58.7	1.97	74.4	19	15	55	33		
3.96	13.0	14.76	4.43	Clay	CL/CH	stiff	120	1.0	15	0.753	0.534	4.67	0.86	1.70	23.7	2.82		15			0.84	7.9
4.11	13.5	6.41	2.91	Clay	CL/CH	firm	120	1.0	6	0.783	0.549	3.32	0.92	1.70	10.3	3.01		6			0.34	3.1
4.27	14.0	4.84	2.59	Clay	CL/CH	firm	120	1.0	5	0.813	0.563	3.11	0.95	1.70	7.8	3.10		5			0.25	2.1
4.42	14.5	2.62	0.83	Sensitive fine grained	ML	very soft	120	2.0	1	0.843	0.577	1.23	0.98	1.70	4.2	3.13		1			0.12	0.9
4.57	15.0	2.35	5.58	Organic Material	OL/OH	very soft	120	1.0	2	0.873	0.592	8.86	1.00	1.70	3.8	3.61		2			0.10	0.8
4.72	15.5	3.07	2.99	Clay	CL/CH	soft	120	1.0	3	0.903	0.606	4.24	1.00	1.70	4.9	3.34		3			0.14	1.1
4.88	16.0	2.68	0.77	Sensitive fine grained	ML	very soft	120	2.0	1	0.933	0.621	1.19	0.98	1.68	4.3	3.12		1			0.12	0.8
5.03	16.5	2.00	1.00	Sensitive fine grained	ML	very soft	120	2.0	1	0.963	0.635	1.93	1.00	1.67	3.2	3.33		1			0.08	0.5
5.18	17.0	2.81	0.81	Sensitive fine grained	ML	soft	120	2.0	1	0.993	0.649	1.25	0.98	1.61	4.3	3.13		1			0.13	0.8
5.33	17.5	2.00	1.00	Sensitive fine grained	ML	very soft	120	2.0	1	1.023	0.664	2.05	1.00	1.59	3.0	3.36		1			0.08	0.4
5.49	18.0	2.00	1.00	Sensitive fine grained	ML	very soft	120	2.0	1	1.053	0.678	2.11	1.00	1.56	2.9	3.37		1			0.08	0.4
5.64	18.5	2.67	0.83	Sensitive fine grained	ML	very soft	120	2.0	1	1.083	0.693	1.40	1.00	1.53	3.9	3.19		1			0.12	0.7
5.79	19.0	2.86	0.81	Sensitive fine grained	ML	soft	120	2.0	1	1.113	0.707	1.33	0.99	1.49	4.0	3.16		1			0.13	0.7
5.94	19.5	5.59	0.49	Sensitive fine grained	ML	firm	120	2.0	3	1.143	0.721	0.62	0.86	1.39	7.3	2.79		3			0.29	1.8
6.10	20.0	23.28	1.78	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	9	1.173	0.736	1.87	0.76	1.32	29.0	2.50	80.5	11	16	26	30		
6.25	20.5	51.02	0.88	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	17	1.203	0.750	0.91	0.63	1.24	59.9	2.06	83.2	20	17	56	33		
6.40	21.0	70.12	0.72	Sand to Silty Sand	SP/SM	medium dense	120	4.0	18	1.233	0.765	0.73	0.58	1.21	80.0	1.90	95.5	20	19	68	33		
6.55	21.5	71.71	0.55	Sand to Silty Sand	SP/SM	medium dense	120	4.0	18	1.263	0.779	0.56	0.56	1.19	80.5	1.84	91.5	20	18	68	33		
6.71	22.0	65.87	1.24	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	22	1.293	0.793	1.26	0.63	1.20	74.7	2.07	105.1	25	21	65	35		
6.86	22.5	54.78	1.79	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	18	1.323	0.808	1.84	0.68	1.20	62.2	2.24	110.0	20	22	57	33		
7.01	23.0	18.33	2.26	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	9	1.353	0.822	2.44	0.82	1.23	21.3	2.68		9			1.03	6.2
7.16	23.5	22.83	2.18	Sandy Silt to Clayey Silt	ML	loose	120	2.5	9	1.383	0.837	2.32	0.79	1.20	26.0	2.60	85.8	10	17	21	30		
7.32	24.0	83.08	1.22	Sand to Silty Sand	SP/SM	medium dense	120	4.0	21	1.413	0.851	1.24	0.61	1.14	89.7	2.01	117.3	23	23	72	34		
7.47	24.5	68.46	0.66	Sand to Silty Sand	SP/SM	medium dense	120	4.0	17	1.443	0.865	0.67	0.59	1.12	72.8	1.92	87.8	18	18	64	33		
7.62	25.0	14.42	0.64	Sandy Silt to Clayey Silt	ML	loose	120	2.5	6	1.473	0.880	0.71	0.77	1.15	15.7	2.51	44.6	6	9	0	29		
7.77	25.5	65.98	0.86	Sand to Silty Sand	SP/SM	medium dense	120	4.0	16	1.503	0.894	0.88	0.61	1.11	69.1	2.00	90.2	17	18	61	32		
7.92	26.0	85.86	0.75	Sand to Silty Sand	SP/SM	medium dense	120	4.0	21	1.533	0.909	0.76	0.57	1.09	88.6	1.88	103.7	23	21	72	34		
8.08	26.5	53.45	2.16	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	21	1.563	0.923	2.22	0.71	1.10	55.7	2.33	114.1	22	23	53	34		
8.23	27.0	54.57	1.04	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	18	1.593	0.937	1.07	0.65	1.08	55.8	2.13	84.2	19	17	53	33		
8.38	27.5	32.12	1.04	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	11	1.623	0.952	1.10	0.71	1.08	32.7	2.33	66.7	11	13	30	30		
8.53	28.0	14.91	1.34	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	1.653	0.966	1.51	0.82	1.08	15.2	2.68		6			0.82	4.1
8.69	28.5	29.78	1.00	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	10	1.683	0.981	1.06	0.72	1.06	29.7	2.35	63.4	10	13	26	30		
8.84	29.0	24.85	1.64	Sandy Silt to Clayey Silt	ML	loose	120	2.5	10	1.713	0.995	1.77	0.78	1.05	24.6	2.54	73.9	10	15	19	30		
8.99	29.5	18.59	2.78	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	9	1.743	1.009	3.07	0.85	1.04	18.3	2.79		9			1.03	5.0
9.14	30.0	16.35	1.92	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	1.773	1.024	2.16	0.84	1.03	15.9	2.75		8			0.90	4.3
9.30	30.5	65.81	1.17	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	22	1.803	1.038	1.21	0.65	1.01	63.0	2.12	93.7	22	19	58	34		
9.45	31.0	59.93	2.25	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	24	1.833	1.053	2.32	0.71	1.00	56.9	2.34	117.7	23	24	53	34		
9.60	31.5	77.03	2.28	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	26	1.863	1.067	2.34	0.69	0.99	72.4	2.26	132.8	25	27	63	35		
9.75	32.0	93.00	0.99	Sand to Silty Sand	SP/SM	medium dense	120	4.0	23	1.893	1.081	1.01	0.60	0.99	86.8	1.96	108.6	22	22	71	34		
9.91	32.5	64.09	2.19	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	21	1.923	1.096	2.25	0.70	0.98	59.1	2.31	118.1	20	24	55	33		
10.06	33.0	98.27	1.35	Sand to Silty Sand	SP/SM	medium dense	120	4.0	25	1.953	1.110	1.38	0.62	0.97	90.2	2.04	121.6	23	24	73	34		
10.21	33.5	107.61	0.81	Sand to Silty Sand	SP/SM	medium dense	120	4.0	27	1.983	1.125	0.83	0.57	0.97	98.2	1.87	113.8	25	23	76	35		
10.36	34.0	95.78	1.26	Sand to Silty Sand	SP/SM	medium dense	120	4.0	24	2.013	1.139	1.28	0.62	0.96	86.5	2.03	115.8	22	23	71	34		
10.52	34.5	52.30	1.73	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	17	2.043	1.153	1.80	0.71	0.94	46.5	2.33	95.1	16	19	45	32		
10.67	35.0	27.23	2.67	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	11	2.073	1.168	2.89	0.82	0.92	23.7	2.69		11			1.53	6.5
10.82	35.5	88.39	1.58	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	29	2.103	1.182	1.61	0.65	0.93	77.8	2.13	117.4	27	23	66	35		

Earth Systems Southwest

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: Paseo De La Playa Project No: VT-23842-01 Date: 02/20/07

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): 6.0 Dr correlation: 0 Baldi Qc/N: 1 Robertson Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
10.97	36.0	133.21	0.55	Sand	SP	medium dense	120	5.0	27	2.133	1.197	0.56	0.52	0.94	118.1	1.70	122.6	24	25	84	35		
11.13	36.5	95.91	0.97	Sand to Silty Sand	SP/SM	medium dense	120	4.0	24	2.163	1.211	0.99	0.60	0.92	83.6	1.97	105.4	22	21	69	34		
11.28	37.0	29.32	1.99	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	12	2.193	1.225	2.15	0.79	0.89	24.7	2.59	81.1	11	16	19	30		
11.43	37.5	17.74	1.54	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.223	1.240	1.77	0.84	0.88	14.7	2.73		7				0.97	3.8
11.58	38.0	14.49	3.26	Silty Clay to Clay	CL	stiff	120	1.5	10	2.253	1.254	3.86	0.92	0.86	11.7	3.00		10				0.78	2.9
11.73	38.5	98.63	0.95	Sand to Silty Sand	SP/SM	medium dense	120	4.0	25	2.283	1.269	0.97	0.60	0.90	83.6	1.96	104.9	22	21	69	34		
11.89	39.0	49.56	1.27	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	17	2.313	1.283	1.33	0.70	0.87	40.9	2.29	78.8	15	16	40	32		
12.04	39.5	16.99	1.42	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.343	1.297	1.65	0.84	0.84	13.5	2.75		7				0.92	3.4
12.19	40.0	13.95	1.22	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.373	1.312	1.47	0.86	0.83	11.0	2.80		6				0.74	2.6
12.34	40.5	13.72	1.32	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	5	2.403	1.326	1.61	0.87	0.82	10.7	2.83		5				0.73	2.6
12.50	41.0	16.29	1.32	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.433	1.341	1.55	0.84	0.82	12.6	2.76		7				0.88	3.1
12.65	41.5	23.94	2.43	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	10	2.463	1.355	2.71	0.84	0.81	18.4	2.76		10				1.33	4.8
12.80	42.0	23.98	1.46	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	10	2.493	1.369	1.63	0.80	0.81	18.4	2.63		10				1.33	4.7
12.95	42.5	21.73	1.61	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	9	2.523	1.384	1.82	0.82	0.80	16.5	2.70		9				1.20	4.2
13.11	43.0	26.11	1.67	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	10	2.553	1.398	1.85	0.80	0.80	19.7	2.63		10				1.45	5.1
13.26	43.5	35.35	1.62	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	14	2.583	1.413	1.75	0.77	0.80	26.8	2.51	75.7	12	15	22	31		
13.41	44.0	100.78	0.84	Sand to Silty Sand	SP/SM	medium dense	120	4.0	25	2.613	1.427	0.86	0.59	0.84	79.7	1.95	98.7	21	20	67	34		
13.56	44.5	94.57	0.97	Sand to Silty Sand	SP/SM	medium dense	120	4.0	24	2.643	1.441	0.99	0.61	0.83	73.9	2.01	97.3	20	19	64	33		
13.72	45.0	73.05	1.01	Sand to Silty Sand	SP/SM	medium dense	120	4.0	18	2.673	1.456	1.05	0.65	0.81	56.2	2.12	84.0	15	17	53	32		
13.87	45.5	65.45	1.84	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	22	2.703	1.470	1.92	0.71	0.79	49.0	2.33	100.4	18	20	47	33		
14.02	46.0	78.96	1.65	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	26	2.733	1.485	1.71	0.68	0.79	59.3	2.23	103.9	22	21	55	34		
14.17	46.5	34.03	2.32	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	14	2.763	1.499	2.52	0.81	0.76	24.3	2.64		14				1.91	6.3
14.33	47.0	36.77	1.74	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	15	2.793	1.513	1.88	0.77	0.76	26.3	2.54	78.0	12	16	21	31		
14.48	47.5	15.83	1.68	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.823	1.528	2.04	0.88	0.72	10.8	2.88		6				0.84	2.6
14.63	48.0	14.63	1.98	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	2.853	1.542	2.46	0.91	0.71	9.8	2.96		7				0.77	2.3
14.78	48.5	15.49	2.39	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.883	1.557	2.94	0.91	0.70	10.3	2.98		8				0.82	2.4
14.94	49.0	15.55	2.28	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.913	1.571	2.80	0.91	0.70	10.3	2.97		8				0.82	2.4
15.09	49.5	15.53	2.24	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.943	1.585	2.76	0.91	0.69	10.2	2.97		8				0.82	2.4
15.24	50.0	18.27	1.78	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.973	1.600	2.13	0.87	0.70	12.0	2.85		7				0.98	2.9

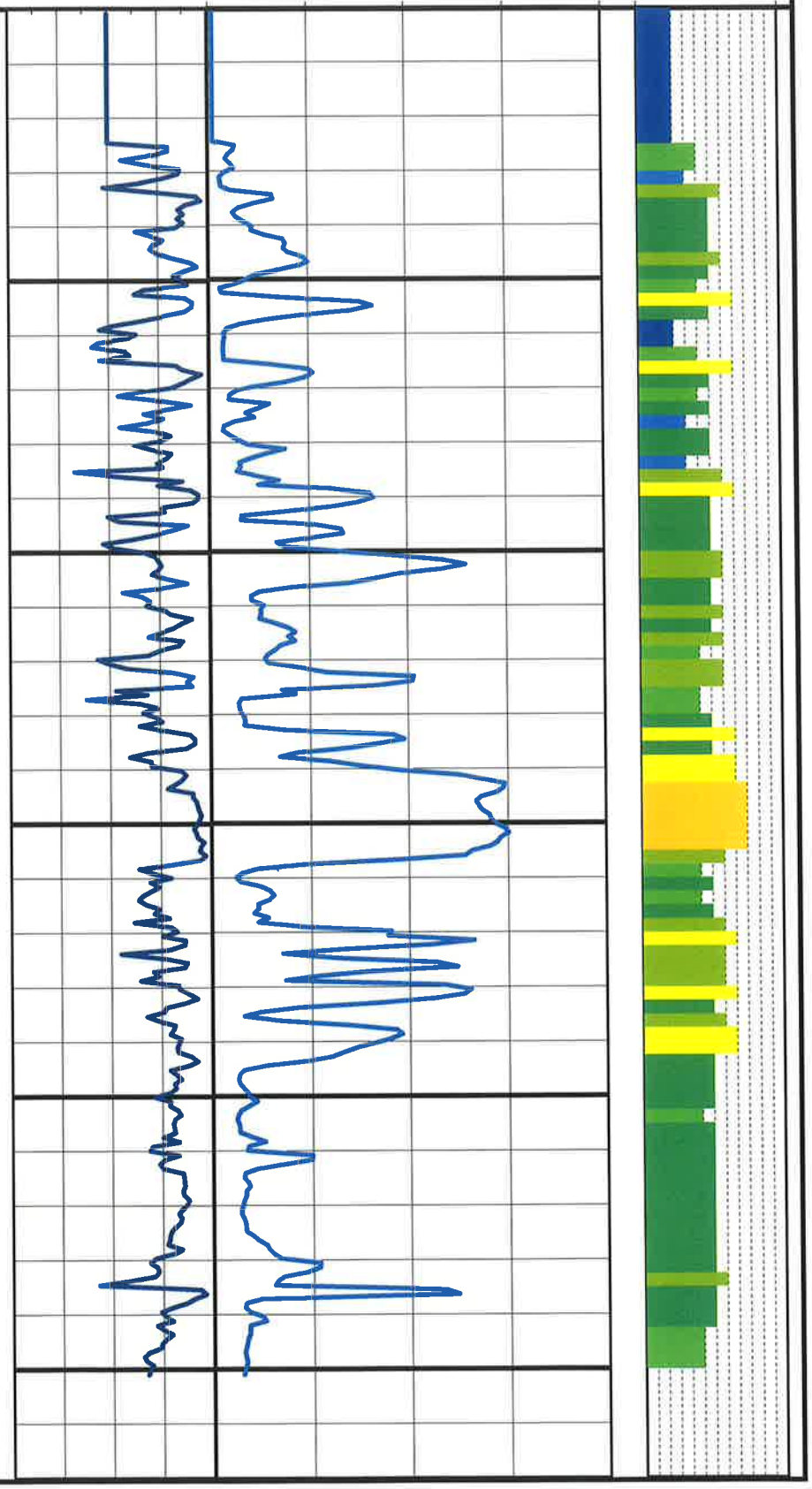
Earth Systems
Southwest

CPT No: CPT-2
Project Name: Paseo De La Playa
Project No.: VT-23842-01
Location: See Site Exploration Plan

CPT Vendor: Gregg
Truck Mounted Electric
Cone with 23-ton reaction
Date: 2/20/2007

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Clay	very soft
	Clay	very soft
	Clay	very soft
	Clay	very soft
	Clay	soft
5	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
10	Silty Sand to Sandy Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
	Silty Clay to Clay	stiff
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
15	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
20	Silty Sand to Sandy Silt	dense
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
25	Clayey Silt to Silty Clay	very stiff
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sand	medium dense
	Sand	medium dense
30	Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Sandy Silt to Clayey Silt	very stiff
	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
35	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	stiff
40	Sandy Silt to Clayey Silt	stiff
	Sandy Silt to Clayey Silt	very stiff
	Sandy Silt to Clayey Silt	very stiff
	Sandy Silt to Clayey Silt	stiff
	Sandy Silt to Clayey Silt	stiff
45	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	very stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
50		

End of Sounding @ 50.4 feet



Earth Systems Southwest

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: Paseo De La Playa — Project No: VT-23842-01 — Date: 02/20/07

CPT SOUNDING: CPT-2 — Plot: 2 — Density: 1 SPT N — Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): 6.0 — Dr correlation: 0 Baldi — Qc/N: 1 Robertson — Phi Correlation: 4 SPT N — Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.014	0.014	4.03	1.00	1.70	3.2	3.48		2				0.12	43.3
0.30	1.0	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.041	0.041	4.08	1.00	1.70	3.2	3.48		2				0.12	14.2
0.46	1.5	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.069	0.069	4.14	1.00	1.70	3.2	3.49		2				0.11	8.4
0.61	2.0	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.096	0.096	4.20	1.00	1.70	3.2	3.49		2				0.11	5.9
0.76	2.5	2.00	4.00	Clay	CL/CH	very soft	110	1.0	2	0.124	0.124	4.26	1.00	1.70	3.2	3.49		2				0.11	4.5
0.91	3.0	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.153	0.153	4.33	1.00	1.70	3.2	3.50		2				0.11	3.6
1.07	3.5	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.183	0.183	4.40	1.00	1.70	3.2	3.50		2				0.11	3.0
1.22	4.0	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.213	0.213	4.48	1.00	1.70	3.2	3.50		2				0.11	2.5
1.37	4.5	2.00	4.00	Clay	CL/CH	very soft	120	1.0	2	0.243	0.243	4.55	1.00	1.70	3.2	3.51		2				0.10	2.2
1.52	5.0	5.77	3.19	Clay	CL/CH	firm	120	1.0	6	0.273	0.273	3.35	0.93	1.70	9.3	3.05		6				0.32	6.1
1.68	5.5	10.64	2.48	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	5	0.303	0.303	2.56	0.84	1.70	17.1	2.77		5				0.61	10.3
1.83	6.0	8.56	1.37	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	0.333	0.333	1.43	0.82	1.70	13.8	2.71		4				0.48	7.4
1.98	6.5	7.50	3.05	Silty Clay to Clay	CL	firm	120	1.5	5	0.363	0.347	3.21	0.90	1.70	12.0	2.95		5				0.42	6.2
2.13	7.0	29.25	0.55	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	10	0.393	0.361	0.56	0.62	1.70	47.0	2.04	63.8	16	13	45	32		
2.29	7.5	13.83	1.12	Sandy Silt to Clayey Silt	ML	loose	120	2.5	6	0.423	0.376	1.16	0.76	1.70	22.2	2.48	59.5	9	12	14	30		
2.44	8.0	20.20	1.72	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	8	0.453	0.390	1.76	0.74	1.70	32.5	2.45	81.4	13	16	30	31		
2.59	8.5	34.75	2.09	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	14	0.483	0.405	2.12	0.70	1.70	55.8	2.32	111.6	22	22	53	34		
2.74	9.0	41.95	1.91	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	17	0.513	0.419	1.94	0.68	1.70	67.4	2.23	117.2	26	23	60	35		
2.90	9.5	43.12	0.69	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	14	0.543	0.433	0.70	0.59	1.70	69.2	1.95	85.6	22	17	62	34		
3.05	10.0	18.25	1.06	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	7	0.573	0.448	1.10	0.72	1.70	29.3	2.37	64.0	11	13	26	30		
3.20	10.5	15.49	2.15	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	0.603	0.462	2.24	0.79	1.70	24.9	2.60		8				0.88	9.7
3.35	11.0	77.17	0.74	Sand to Silty Sand	SP/SM	medium dense	120	4.0	19	0.633	0.477	0.74	0.55	1.55	112.8	1.79	123.8	28	25	82	35		
3.51	11.5	30.76	2.76	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	12	0.663	0.491	2.82	0.74	1.70	49.4	2.44	122.3	18	24	48	32		
3.66	12.0	8.01	3.47	Clay	CL/CH	firm	120	1.0	8	0.693	0.505	3.80	0.91	1.70	12.9	2.97		8				0.44	4.3
3.81	12.5	6.94	4.13	Clay	CL/CH	firm	120	1.0	7	0.723	0.520	4.61	0.94	1.70	11.2	3.07		7				0.38	3.6
3.96	13.0	15.21	2.94	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	0.753	0.534	3.09	0.82	1.70	24.4	2.69		8				0.86	8.1
4.11	13.5	50.13	0.66	Sand to Silty Sand	SP/SM	medium dense	120	4.0	13	0.783	0.549	0.67	0.59	1.47	69.8	1.93	85.3	17	17	62	32		
4.27	14.0	24.71	1.74	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	10	0.813	0.563	1.80	0.73	1.59	37.1	2.41	86.6	13	17	36	31		
4.42	14.5	16.84	2.07	Clayey Silt to Silty Clay	ML/CL	medium dense	120	2.0	8	0.843	0.577	2.18	0.79	1.61	25.6	2.58	82.8	11	17	20	30		
4.57	15.0	21.92	2.01	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	9	0.873	0.592	2.09	0.76	1.56	32.2	2.49	88.4	11	18	30	30		
4.72	15.5	8.90	2.66	Silty Clay to Clay	CL	firm	120	1.5	6	0.903	0.606	2.96	0.88	1.63	13.7	2.88		6				0.49	4.0
4.88	16.0	20.38	2.20	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	8	0.933	0.621	2.30	0.78	1.51	29.2	2.55	89.2	10	18	26	30		
5.03	16.5	21.65	1.75	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	9	0.963	0.635	1.83	0.76	1.47	30.1	2.48	80.8	11	16	27	30		
5.18	17.0	17.38	3.57	Silty Clay to Clay	CL	stiff	120	1.5	12	0.993	0.649	3.78	0.84	1.50	24.7	2.75		12				0.98	7.6
5.33	17.5	40.19	1.29	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	13	1.023	0.664	1.32	0.67	1.37	52.0	2.21	87.6	16	18	50	32		
5.49	18.0	79.72	0.52	Sand to Silty Sand	SP/SM	medium dense	120	4.0	20	1.053	0.678	0.52	0.54	1.27	95.7	1.76	103.3	24	21	75	34		
5.64	18.5	39.36	2.58	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	16	1.083	0.693	2.65	0.73	1.36	50.8	2.41	119.7	19	24	49	33		
5.79	19.0	44.82	1.96	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	18	1.113	0.707	2.01	0.70	1.33	56.2	2.30	109.2	21	22	53	34		
5.94	19.5	50.34	3.13	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	20	1.143	0.721	3.21	0.73	1.32	62.9	2.40	146.2	24	29	58	34		
6.10	20.0	67.49	2.86	Sandy Silt to Clayey Silt	ML	dense	120	2.5	27	1.173	0.736	2.91	0.70	1.29	82.2	2.29	158.2	31	32	69	36		
6.25	20.5	121.48	2.00	Silty Sand to Sandy Silt	SM/ML	dense	120	3.0	40	1.203	0.750	2.02	0.61	1.23	141.8	2.02	187.3	47	37	91	40		
6.40	21.0	83.86	1.63	Silty Sand to Sandy Silt	SM/ML	dense	120	3.0	28	1.233	0.765	1.65	0.63	1.23	97.2	2.06	135.6	32	27	76	37		
6.55	21.5	29.00	2.67	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	12	1.263	0.779	2.79	0.78	1.27	34.8	2.55	105.2	13	21	33	31		
6.71	22.0	24.26	2.24	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	10	1.293	0.793	2.37	0.78	1.25	28.7	2.57	89.9	11	18	25	30		
6.86	22.5	27.32	1.15	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	9	1.323	0.808	1.21	0.72	1.21	31.4	2.37	68.3	10	14	29	30		
7.01	23.0	40.13	1.94	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	16	1.353	0.822	2.00	0.72	1.20	45.5	2.37	99.2	18	20	44	33		
7.16	23.5	36.62	1.46	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	12	1.383	0.837	1.51	0.71	1.18	40.9	2.33	83.3	13	17	40	31		
7.32	24.0	28.23	3.65	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	14	1.413	0.851	3.84	0.81	1.19	31.8	2.67		14				1.61	9.5
7.47	24.5	68.91	1.80	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	23	1.443	0.865	1.84	0.66	1.14	74.4	2.18	120.9	25	24	65	35		
7.62	25.0	73.84	1.79	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	25	1.473	0.880	1.83	0.66	1.13	78.8	2.16	124.3	26	25	67	35		
7.77	25.5	23.98	3.43	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	12	1.503	0.894	3.66	0.83	1.15	26.1	2.72		12				1.36	7.5
7.92	26.0	15.23	2.32	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	1.533	0.909	2.58	0.85	1.14	16.4	2.78		8				0.84	4.5
8.08	26.5	40.55	1.85	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	16	1.563	0.923	1.93	0.72	1.10	42.3	2.38	94.4	17	19	41	32		
8.23	27.0	84.63	0.77	Sand to Silty Sand	SP/SM	medium dense	120	4.0	21	1.593	0.937	0.78	0.58	1.07	85.8	1.90	101.8	22	20	70	34		
8.38	27.5	46.52	2.68	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	19	1.623	0.952	2.78	0.74	1.08	47.6	2.45	119.4	19	24	46	33		
8.53	28.0	98.90	1.49	Sand to Silty Sand	SP/SM	medium dense	120	4.0	25	1.653	0.966	1.52	0.62	1.06	98.9	2.03	133.2	25	27	76	35		
8.69	28.5	144.17	1.41	Sand to Silty Sand	SP/SM	dense	120	4.0	36	1.683	0.981	1.43	0.58	1.05	142.4	1.90	169.8	36	34	91	38		
8.84	29.0	138.26	0.66	Sand	SP	medium dense	120	5.0	28	1.713	0.995	0.66	0.52	1.03	134.9	1.70	139.8	28	28	89	35		
8.99	29.5	137.76	0.45	Sand	SP	medium dense	120	5.0	28	1.743	1.009	0.45	0.50	1.02	133.3	1.61	133.3	27	27	89	35		
9.14	30.0	144.77	0.55	Sand	SP	medium dense	120	5.0	29	1.773	1.024	0.56	0.50	1.02	139.1	1.64	138.8	29	28	91	36		
9.30	30.5	147.29	0.46	Sand	SP	medium dense	120	5.0	29	1.803	1.038	0.46	0.50	1.01	140.5	1.59	140.5	29	28	91	36		
9.45	31.0	133.91	0.35	Sand	SP	medium dense	120	5.0	27	1.833	1.053	0.35	0.50	1.00	126.9	1.57	126.9	26	25	87	35		
9.60	31.5	55.06	1.60	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	18	1.863	1.067	1.66	0.69	0.99	51.7	2.27	96.2	18	19	49	33		
9.75	32.0	13.83	2.11	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	1.893	1.081	2.45	0.87	0.98	12.8	2.86		7				0.75	3.3
9.91	32.5	28.36	2.40	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	11	1.923	1.096	2.57	0.80	0.97	26.1	2.62		11				1.60	7.2
10.06	33.0	25.00	2.52	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	13	1.953	1.110	2.73	0.82	0.96	22.7	2.69		13				1.41	6.2
10.21	33.5	24.15	2.35	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	10	1.983	1.125	2.56	0.82	0.95	21.7	2.68		10				1.35	5.9
10.36	34.0	75.31	1.65	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	25	2.013	1.139	1.70	0.67	0.95	67.8	2.19	111.0	24	22	61	34		
10.52	34.5	103.47	1.27	Sand to Silty Sand	SP/SM	medium dense	120	4.0	26	2.043	1.153	1.30	0.61	0.95	92.8	2.01	121.7	24	24	74	34		
10.67	35.0	71.16	2.17	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	24	2.073	1.168	2.24	0.70	0.93	62.8	2.29	121.0	22	24	58	34		
10.82	35.5	85.16	1.84	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	28	2.103	1.182	1.88	0.67	0.93	74.8	2.19	122.2	26	24	65	35		

Earth Systems Southwest

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: Paseo De La Playa Project No: VT-23842-01 Date: 02/20/07

CPT SOUNDING: CPT-2 Plot: 2 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): 6.0 Dr correlation: 0 Baldi Qc/N: 1 Robertson Phi Correlation: 4 SPT N

Nk: 17

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
10.97	36.0	95.21	1.81	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	32	2.133	1.197	1.85	0.65	0.92	83.0	2.15	128.8	29	26	69	36		
11.13	36.5	92.38	1.10	Sand to Silty Sand	SP/SM	medium dense	120	4.0	23	2.163	1.211	1.13	0.61	0.92	80.4	2.02	106.3	21	21	68	34		
11.28	37.0	24.79	2.22	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	10	2.193	1.225	2.43	0.82	0.89	20.8	2.69		10				1.39	5.5
11.43	37.5	86.35	1.58	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	29	2.223	1.240	1.62	0.65	0.90	73.6	2.15	113.9	26	23	64	35		
11.58	38.0	81.72	1.32	Sand to Silty Sand	SP/SM	medium dense	120	4.0	20	2.253	1.254	1.36	0.64	0.90	69.2	2.12	103.0	18	21	62	33		
11.73	38.5	57.99	0.93	Sand to Silty Sand	SP/SM	medium dense	120	4.0	14	2.283	1.269	0.97	0.66	0.89	48.7	2.15	75.8	13	15	47	31		
11.89	39.0	18.78	1.35	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	8	2.313	1.283	1.54	0.82	0.85	15.1	2.69		8				1.03	3.9
12.04	39.5	13.81	1.40	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.343	1.297	1.68	0.87	0.84	10.9	2.83		6				0.74	2.7
12.19	40.0	19.18	1.89	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	8	2.373	1.312	2.15	0.85	0.83	15.1	2.77		8				1.05	3.8
12.34	40.5	14.76	1.46	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.403	1.326	1.74	0.86	0.82	11.5	2.82		6				0.79	2.8
12.50	41.0	12.47	1.55	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	6	2.433	1.341	1.93	0.89	0.81	9.5	2.91		6				0.65	2.2
12.65	41.5	19.46	1.61	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	8	2.463	1.355	1.85	0.84	0.81	15.0	2.73		8				1.07	3.8
12.80	42.0	28.04	2.09	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	11	2.493	1.369	2.29	0.81	0.81	21.5	2.66		11				1.57	5.6
12.95	42.5	35.58	2.00	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	14	2.523	1.384	2.16	0.78	0.81	27.3	2.56	84.3	12	17	23	31		
13.11	43.0	16.10	1.18	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.553	1.398	1.40	0.84	0.79	12.0	2.75		6				0.86	2.9
13.26	43.5	16.93	1.18	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.583	1.413	1.40	0.84	0.78	12.6	2.74		7				0.91	3.0
13.41	44.0	14.61	1.08	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.613	1.427	1.31	0.85	0.77	10.7	2.78		6				0.78	2.5
13.56	44.5	14.85	1.33	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	6	2.643	1.441	1.61	0.87	0.76	10.7	2.83		6				0.79	2.5
13.72	45.0	17.29	1.63	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.673	1.456	1.93	0.86	0.76	12.4	2.81		7				0.93	3.0
13.87	45.5	25.60	1.60	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	10	2.703	1.470	1.79	0.81	0.77	18.5	2.65		10				1.42	4.7
14.02	46.0	38.94	2.12	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	16	2.733	1.485	2.28	0.78	0.77	28.3	2.56	87.6	13	18	24	31		
14.17	46.5	45.29	2.25	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	18	2.763	1.499	2.39	0.77	0.76	32.7	2.53	94.9	15	19	31	32		
14.33	47.0	75.92	2.17	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	25	2.793	1.513	2.26	0.71	0.78	55.6	2.33	114.8	21	23	52	33		
14.48	47.5	18.42	1.15	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.823	1.528	1.35	0.83	0.74	12.8	2.72		7				0.99	3.1
14.63	48.0	22.58	1.87	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	9	2.853	1.542	2.14	0.84	0.73	15.5	2.76		9				1.24	3.8
14.78	48.5	17.61	1.97	Sandy Silt to Clayey Silt	ML	stiff	120	2.5	7	2.883	1.557	2.35	0.88	0.71	11.8	2.88		7				0.94	2.8
14.94	49.0	16.12	2.01	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.913	1.571	2.45	0.90	0.70	10.7	2.92		8				0.86	2.5
15.09	49.5	15.57	2.68	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.943	1.585	3.30	0.92	0.69	10.1	3.02		8				0.82	2.4
15.24	50.0	15.08	2.52	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.973	1.600	3.14	0.93	0.68	9.7	3.02		8				0.79	2.3

Modified California Split Barrel Sampler

Modified California Split Barrel Sampler - No Recovery

Standard Penetration Test (SPT) Sampler

Standard Penetration Test (SPT) Sampler - No Recovery

Perched Water Level

Water Level First Encountered

Water Level After Drilling

Pocket Penetrometer (tsf)

Vane Shear (ksf)

1. The approximate locations of borings were determined by sighting and pacing from nearby prominent topographic or cultural features. Borehole elevations were estimated by interpolating between available plan contour intervals. The location and elevation of each boring should be considered accurate only to the degree implied by this method.

2. Stratification lines represent the approximate boundary between soil and/or rock types. The transition between statigraphic units may be gradual.

3. Water level readings taken in boreholes are approximate and apply only to the time and date of drilling. Fluctuations in the level of groundwater from the time of initial measurement may occur due to variations in rainfall, tides, barometric pressure, temperature, or other factors.

Earth Systems So. Calif.

1731-A Walter Street, Ventura, California 93003
PH: (805) 642-6727 FAX: (805) 642-1325

Symbols Commonly Used on Boring Logs

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		G W	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				G P	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		G M	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				G C	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		S W	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				S P	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SAND WITH FINES (APPRECIABLE AMOUNT OF FINES)		S M	SILTY SANDS, SAND-SILT MIXTURES
				S C	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		M L	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				C L	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				O L	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		M H	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				C H	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				O H	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				P T	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

Earth Systems So. Calif.

1731-A Walter Street, Ventura, California 93003
PH: (805) 642-6727 FAX: (805) 642-1325

Unified Soil Classification System (USCS)

APPENDIX B

Laboratory Testing
Test Results
Individual Test Results
Table 18-I-D

LABORATORY TESTING

A. Samples were reviewed along with field logs to determine which would be analyzed further. Those chosen for laboratory analysis were considered representative of soils that would be exposed and/or used during grading, and those deemed to be within the influence of the proposed construction. Test results are presented in graphic and tabular form in this Appendix.

B. In-situ Moisture Content and Unit Dry Weight for the ring samples were determined in general accordance with ASTM D 2937.

C. Relative strength characteristics of the soils were determined from the results of Direct Shear tests on remolded and "undisturbed" ring samples. Specimens were placed in contact with water at least 24 hours before testing, and were then sheared under normal loads ranging from 1.0 to 3.0 kips per square foot in general accordance with ASTM D 3080.

D. Settlement characteristics were developed from the results of one-dimensional Consolidation tests performed in general accordance with ASTM D 2435. The samples were loaded incrementally to 0.5 ksf and then flooded with water, and then incrementally loaded to 1.0, 2.0, 4.0, and 8.0 ksf. The samples were allowed to consolidate under each load increment. Rebound was measured under reverse alternate loading. Compression was measured by dial gauges accurate to 0.0001 inch. The results of the consolidation tests in the form of a percent consolidation versus log of pressure curve are presented in this Appendix. Additionally, collapse potential of the soils was determined in general accordance with ASTM D 5333. The samples were incrementally loaded to their approximate in-situ overburden pressure and then flooded with water and the deformation measured.

E. Two expansion index tests were performed on bulk soil samples in accordance with ASTM D 4829. The samples were surcharged under 144-pounds per square foot at moisture content of near 50% saturation. The samples were then submerged in water for 24 hours and the amount of expansion was recorded with a dial indicator.

F. Two maximum density tests were performed to estimate the moisture-density relationship of a typical soil material. The tests were performed in accordance with ASTM designation.

G. The gradation characteristics of selected samples were made by hydrometer and sieve analysis procedures. Selected samples were soaked in water until individual soil particles were separated, and then washed on the No. 200 mesh sieve, oven dried, weighed to calculate the percent passing the No. 200 sieve, and then mechanically sieved. Additionally, hydrometer analyses were performed to assess the distribution of the minus No. 200 mesh material of selected samples. The hydrometer test was run using sodium hexametaphosphate as a dispersing agent.

H. Three soil corrosion potentials were evaluated by measuring pH, resistivity, soluble sulfate content, and soluble chloride content. These tests were subcontracted to Capco Analytical Services.

I. Two Resistance ("R") Value tests were conducted on a bulk sample secured during the field study (one on this site and one on an adjacent site). The tests were performed in accordance with California Method 301. Three specimens at different moisture contents were tested, and the R-Value at 300 psi exudation pressure was determined from the plotted results.

TEST RESULTS

BORING/DEPTH	B-6 @ 5-10'	B-7 @ 1-4'	B-4 @ 4'
USCS	ML	ML	SM/ML
MAXIMUM DENSITY (pcf)	126	124*	--
OPTIMUM MOISTURE (%)	10	11*	--
COHESION (psf) P/U**	180/0	320/100	440/40
ANGLE OF INT. FRICTION (°) P/U**	28/31	26/29	26/30
EXPANSION INDEX	27	42	--
pH	7.8	9.8	--
RESISTIVITY (ohm-cm)	4290	2800	--
SOLUBLE CHLORIDES (mg/kg)	15	33	--
SOLUBLE SULFATES (mg/kg)	60	230	--
GRAVEL	3	7	--
SAND	41	35	--
SILT	33	35	--
CLAY	23	23	--

BORING/DEPTH	B-8 @ 4'
USCS	ML
COHESION (psf) P/U	150/20
ANGLE OF INT. FRICTION (°) P/U	28/30

* : Gravel Corrected

** : Peak/Ultimate

TEST RESULTS

GRAIN SIZE DISTRIBUTION (%)

BORING AND DEPTH	1 @ 10'	1 @ 15'	1 @ 20'	1 @ 30'	1 @ 50'
GRAVEL	3	0	0	0	0
SAND	62	45	15	84	24
SILT	23	40	26	15	60
CLAY	12	15	59	1	16

BORING AND DEPTH	7 @ 10'	7 @ 20'	7 @ 25'	7 @ 30'	7 @ 40'
GRAVEL	2	0	1	0	1
SAND	63	50	71	39	59
SILT	24	34	28	44	31
CLAY	11	16	0	17	9

BORING AND DEPTH	7 @ 45'	7 @ 50'
GRAVEL	0	0
SAND	31	17
SILT	50	53
CLAY	19	31

VT-23842-01

MAXIMUM DENSITY / OPTIMUM MOISTURE

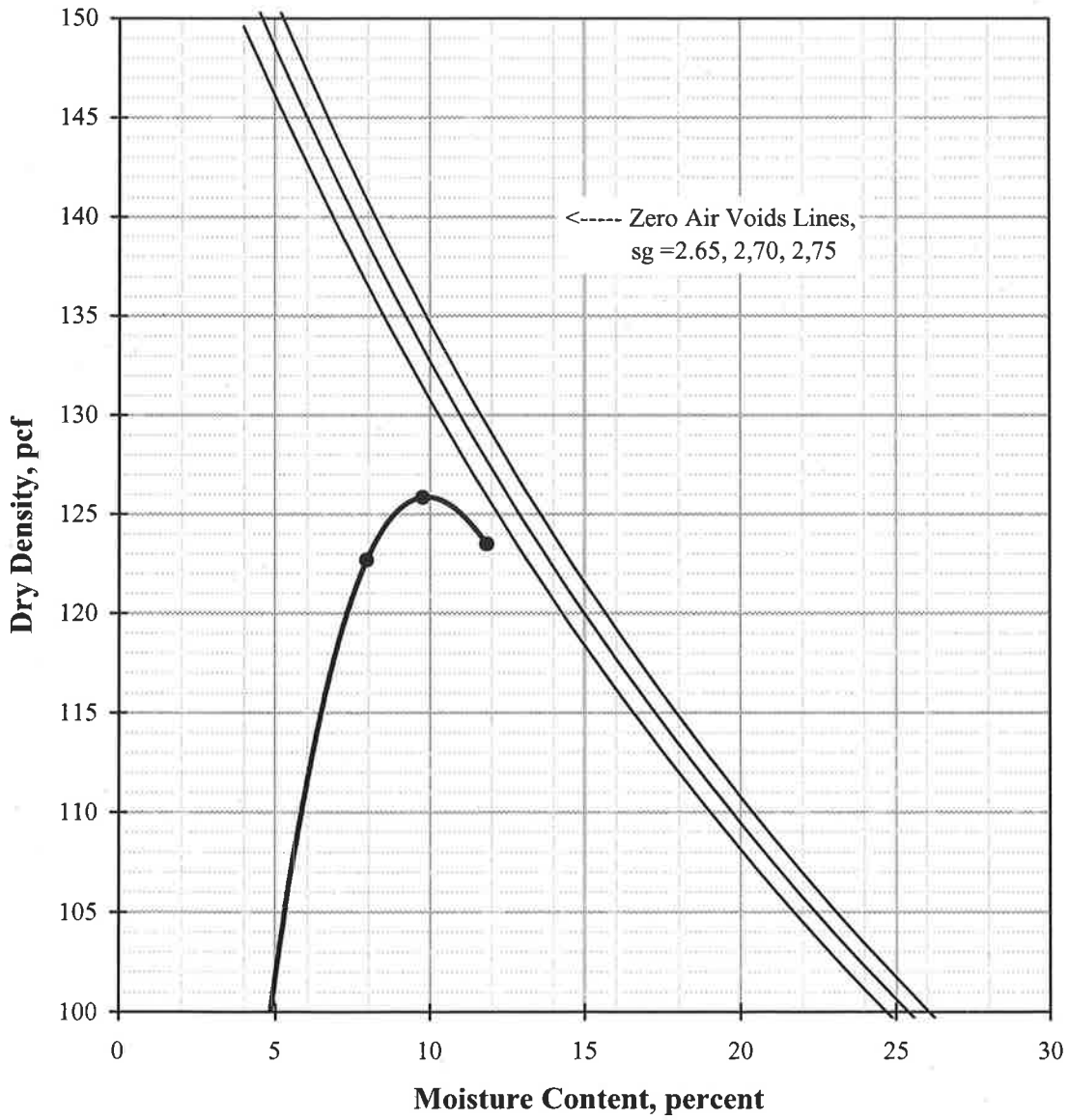
ASTM D 1557-91 (Modified)

Job Name: Paseo De La Playa
Sample ID: B 6 @ 5-10
Location: 5ft-10ft
Description: Black Fine Sandy Silt

Procedure Used: A
Prep. Method: Moist
Rammer Type: Automatic

Maximum Density: **126 pcf**
Optimum Moisture: **10%**

Sieve Size	% Retained
3/4"	0.0
3/8"	0.0
#4	3.2



VT-23842-01

MAXIMUM DENSITY / OPTIMUM MOISTURE

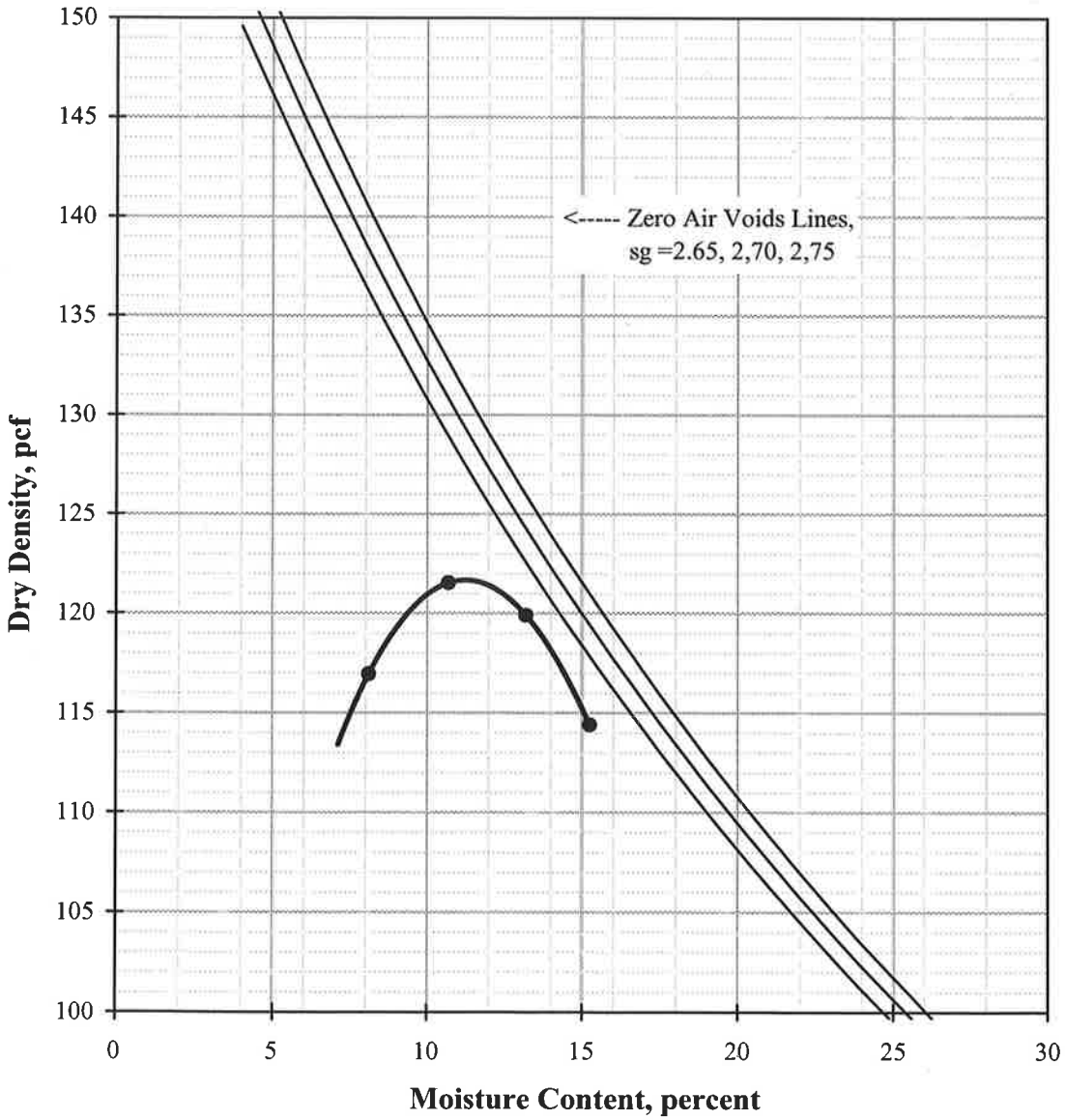
ASTM D 1557-91 (Modified)

Job Name: Paseo De La Playa
Sample ID: B 7 @ 1-4
Location: 1ft-4ft
Description: Black Spotted Olive Brown Sandy Silt (Organic)

Procedure Used: A
Prep. Method: Moist
Rammer Type: Automatic

Maximum Density: **122 pcf**
Optimum Moisture: **11%**

Sieve Size	% Retained
3/4"	0.0
3/8"	0.0
#4	6.7



VT-23842-01

MAXIMUM DENSITY / OPTIMUM MOISTURE

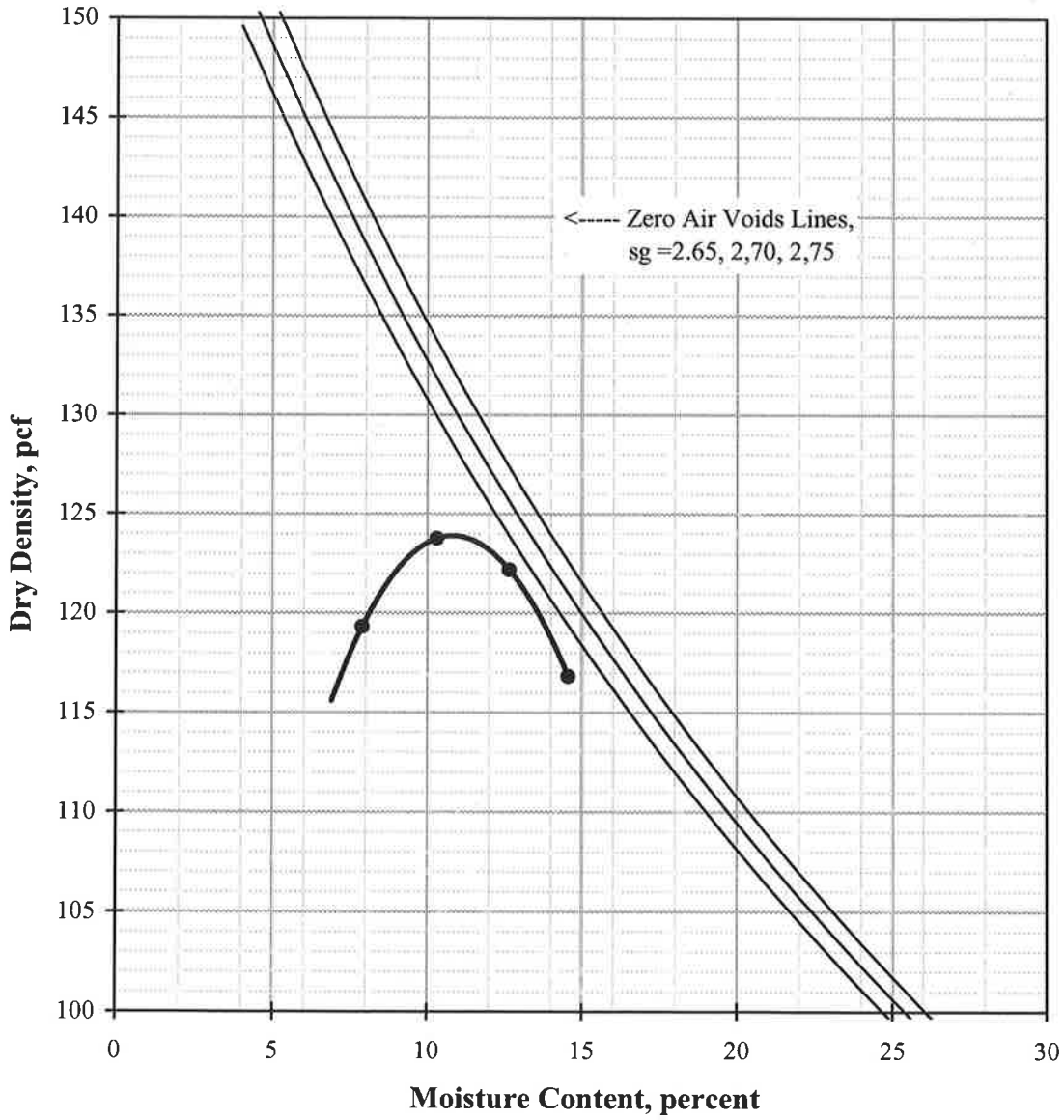
ASTM D 1557-91 (Modified)

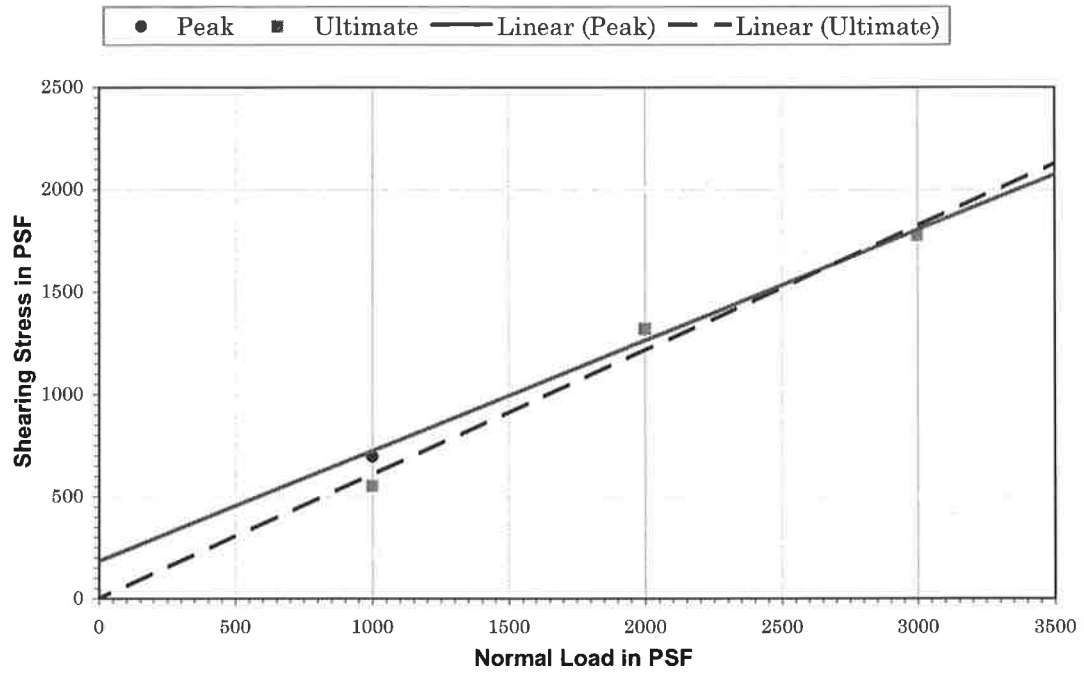
Job Name: Paseo De La Playa
Sample ID: B 7 @ 1-4
Location: 1ft-4ft
Description: Black Spotted Olive Brown Sandy Silt (Organic)

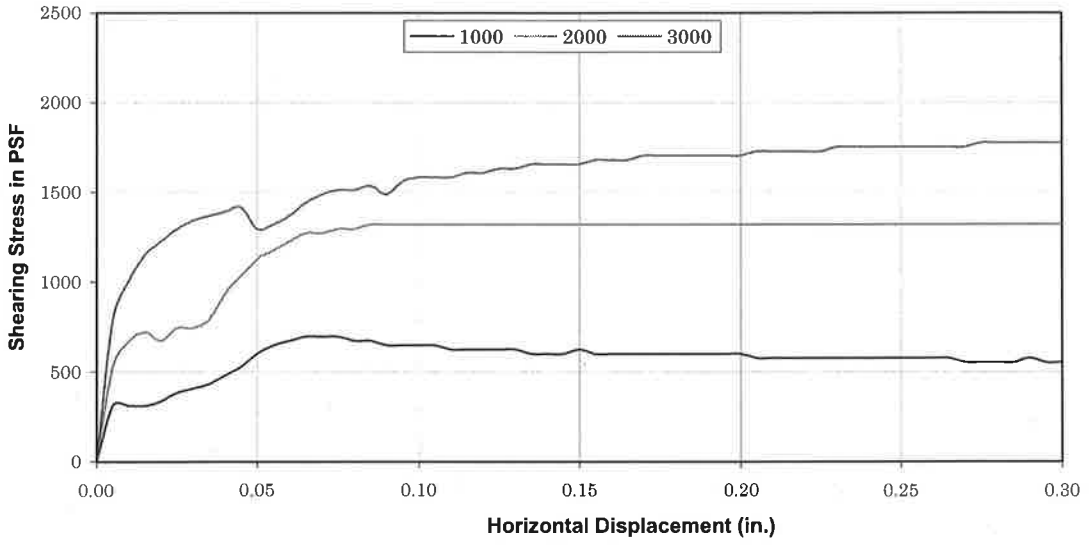
Procedure Used: A
Prep. Method: Moist
Rammer Type: Automatic

Maximum Density: **124 pcf**
Optimum Moisture: **11%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	0.0
3/8"	0.0
#4	6.7







DIRECT SHEAR DATA*

Sample Location: B6 @ 5-10'
Sample Description: Silty fine sand
Dry Density (pcf): 112.6
Intial % Moisture: 9.8
Average Degree of Saturation: 100.0
Shear Rate (in/min): 0.024

Normal stress (psf)	1000	2000	3000
Peak stress (psf)	696	1320	1776
Ultimate stress (psf)	552	1320	1776

	Peak	Ultimate
ϕ Angle of Friction (degrees):	28	31
c Cohesive Strength (psf):	180	0

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

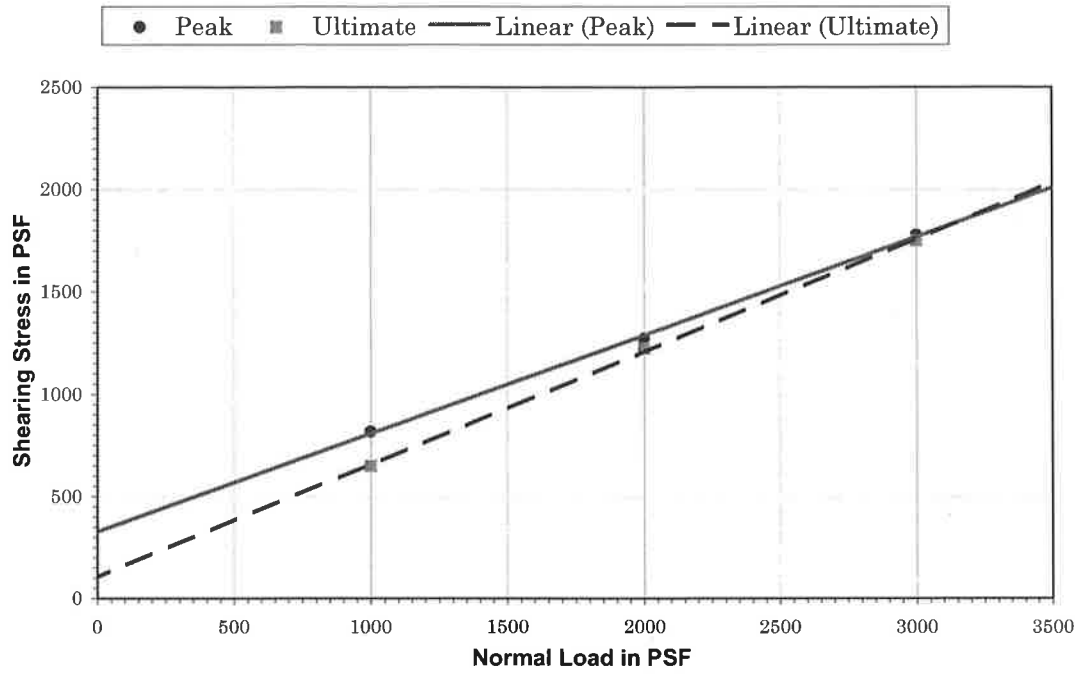
DIRECT SHEAR TEST

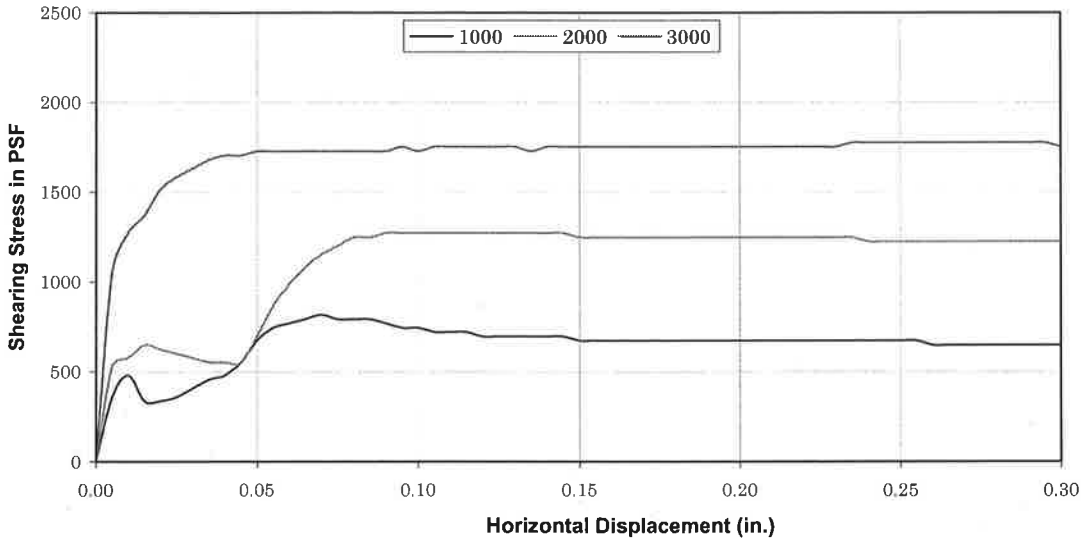
Paseo de la Playa

Santa Barbara, CA

Earth Systems
Southern California

1/26/2007 | VT-23842-01





DIRECT SHEAR DATA*

Sample Location: B7 @ 1-4'
Sample Description: Silty fine sand
Dry Density (pcf): 109.1
Intial % Moisture: 11.2
Average Degree of Saturation: 100.0
Shear Rate (in/min): 0.024

Normal stress (psf)	1000	2000	3000
Peak stress (psf)	816	1272	1776
Ultimate stress (psf)	648	1224	1752

	Peak	Ultimate
ϕ Angle of Friction (degrees):	26	29
c Cohesive Strength (psf):	320	100

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

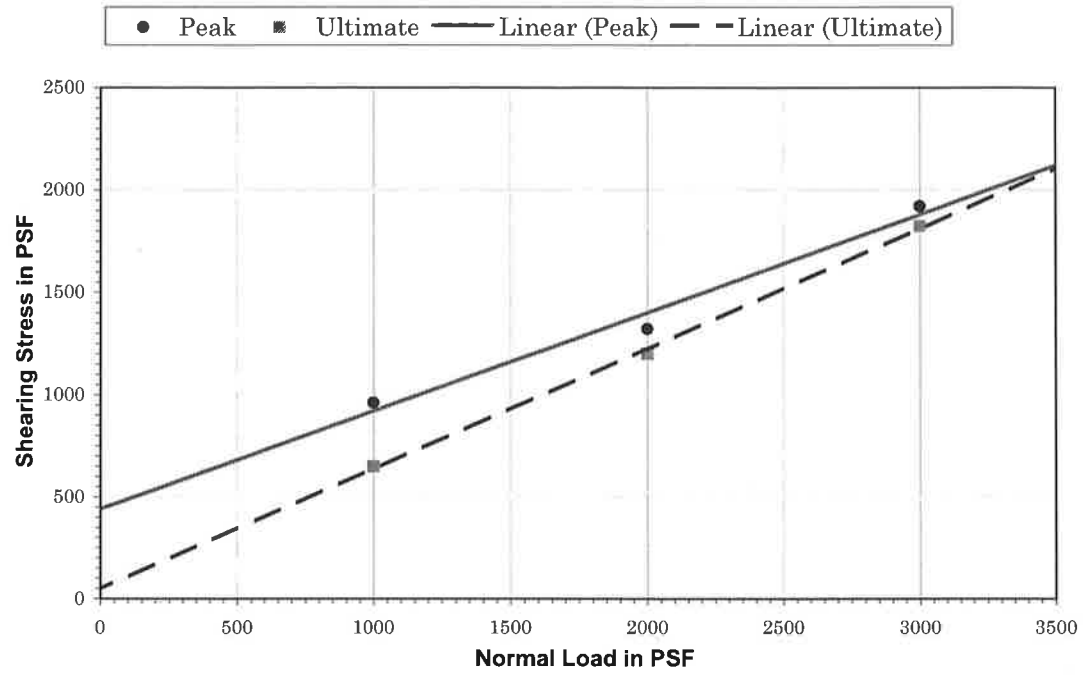
DIRECT SHEAR TEST

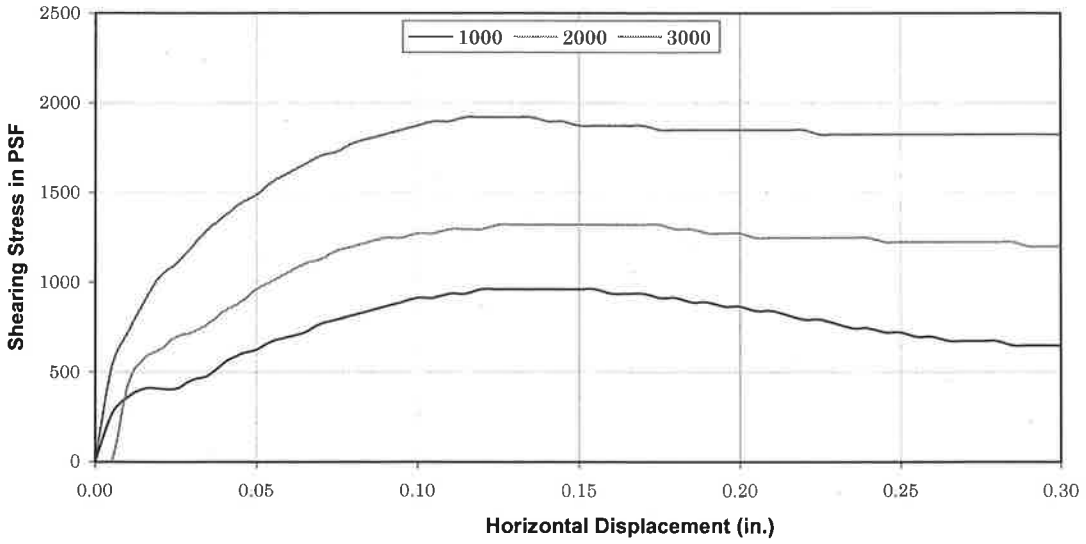
Paseo de la Playa

Santa Barbara, CA

Earth Systems
Southern California

1/26/2007 | VT-23842-01





DIRECT SHEAR DATA*

Sample Location: B4 @ 4'
Sample Description: Clayey silty sand / Sandy silt
Dry Density (pcf): 110.1
Intial % Moisture: 17.9
Average Degree of Saturation: 95.7
Shear Rate (in/min): 0.01

Normal stress (psf)	1000	2000	3000
Peak stress (psf)	960	1320	1920
Ultimate stress (psf)	648	1200	1824

	Peak	Ultimate
ϕ Angle of Friction (degrees):	26	30
c Cohesive Strength (psf):	440	40

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

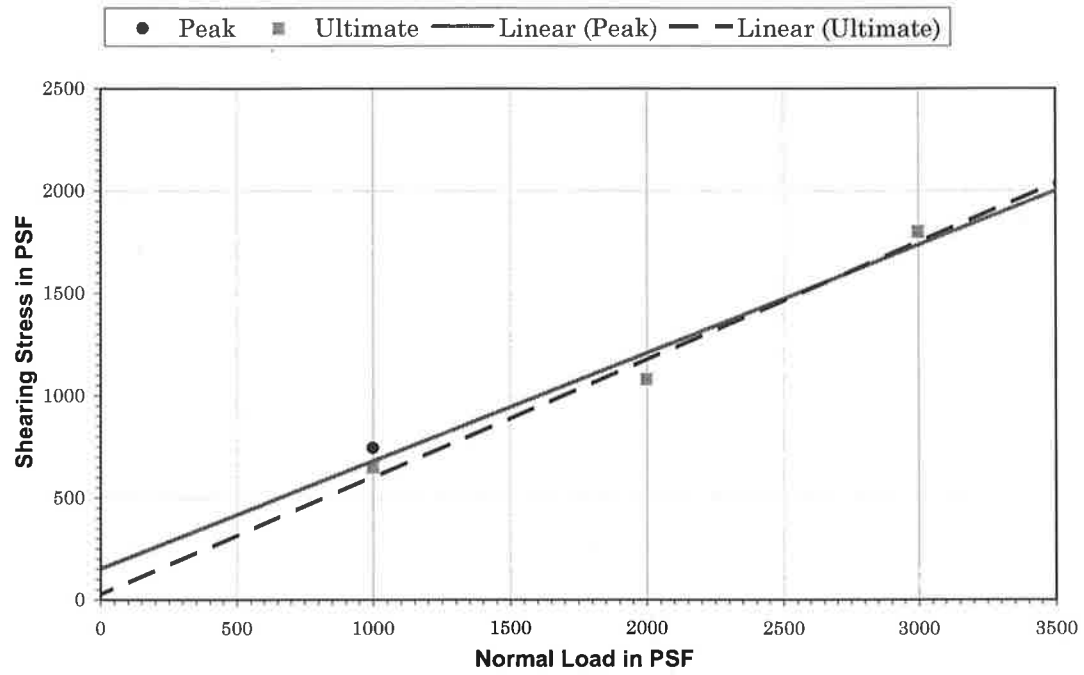
DIRECT SHEAR TEST

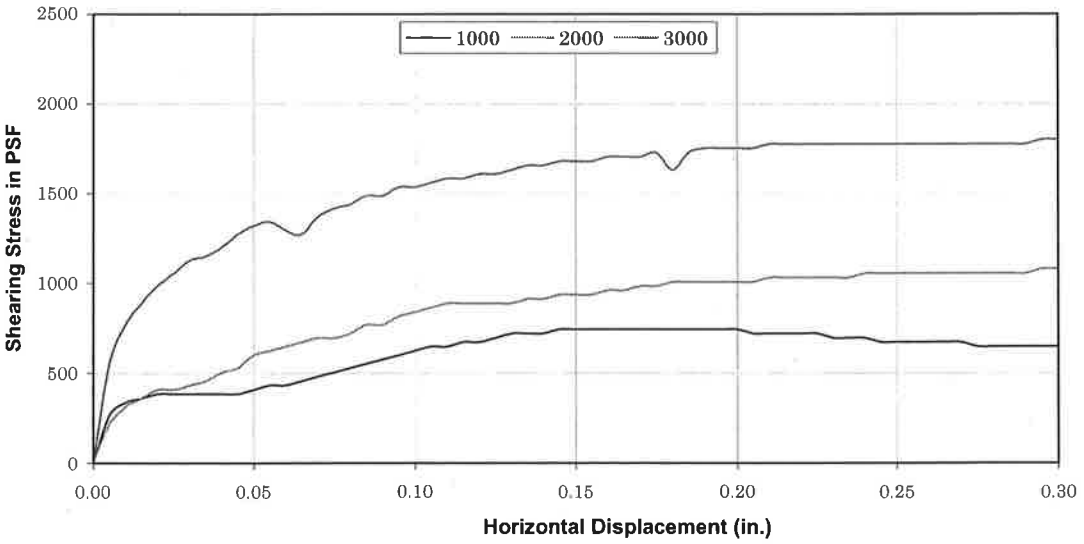
Paseo de la Playa

Santa Barbara, CA

Earth Systems
Southern California

1/26/2007 | VT-23842-01





DIRECT SHEAR DATA*

Sample Location: B8 @ 4'
Sample Description: Clayey silty sand / Sandy silt
Dry Density (pcf): 106.3
Intial % Moisture: 21.3
Average Degree of Saturation: 100.0
Shear Rate (in/min): 0.01

Normal stress (psf)	1000	2000	3000
Peak stress (psf)	744	1080	1800
Ultimate stress (psf)	648	1080	1800

	Peak	Ultimate
ϕ Angle of Friction (degrees):	28	30
c Cohesive Strength (psf):	150	20

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

DIRECT SHEAR TEST

Paseo de la Playa

Santa Barbara, CA

Earth Systems
Southern California

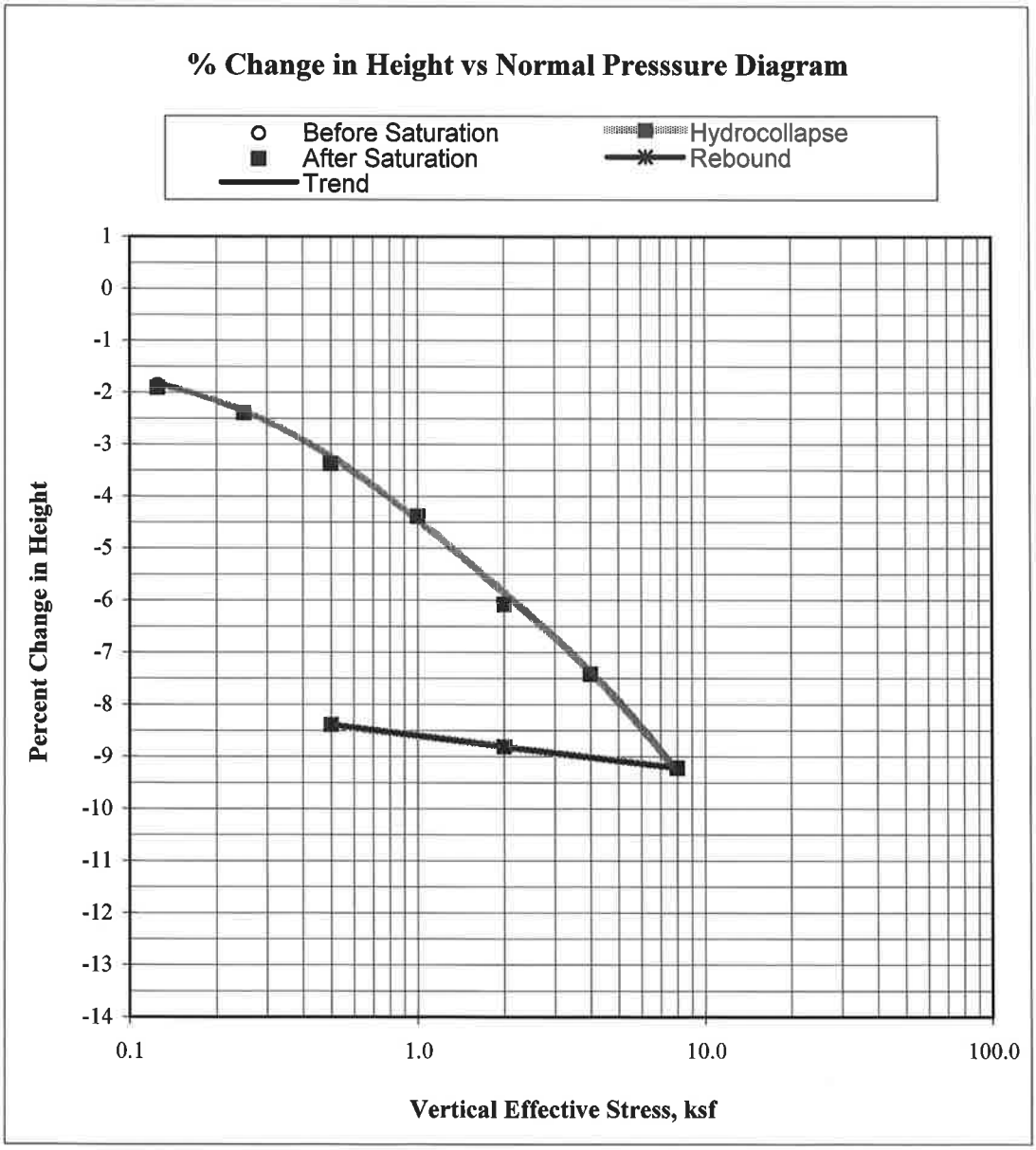
1/26/2007 | VT-23842-01

CONSOLIDATION TEST

ASTM D 2435-90

Paseo de la Playa
B1 @ 5'
SM
Ring Sample

Initial Dry Density: 109.1 pcf
Initial Moisture, %: 21.8%
Specific Gravity: 2.67 (assumed
Initial Void Ratio: 0.527



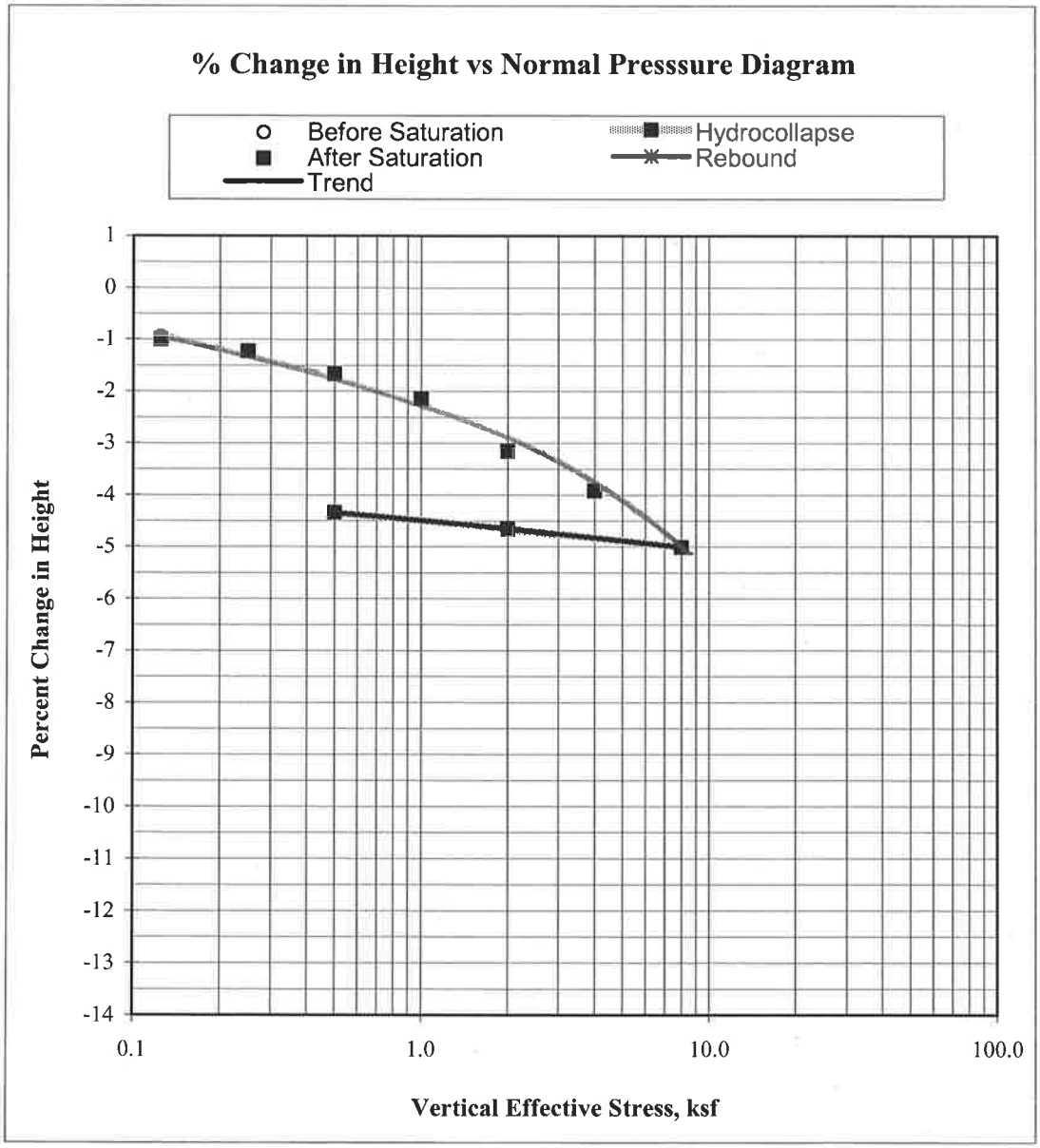
VT-23842-01 Jan 25, 2007

CONSOLIDATION TEST

ASTM D 2435-90

Paseo de la Playa
B7 @ 6'
SM
Ring Sample

Initial Dry Density: 107.6 pcf
Initial Moisture, %: 23.9%
Specific Gravity: 2.67 (assumed
Initial Void Ratio: 0.549



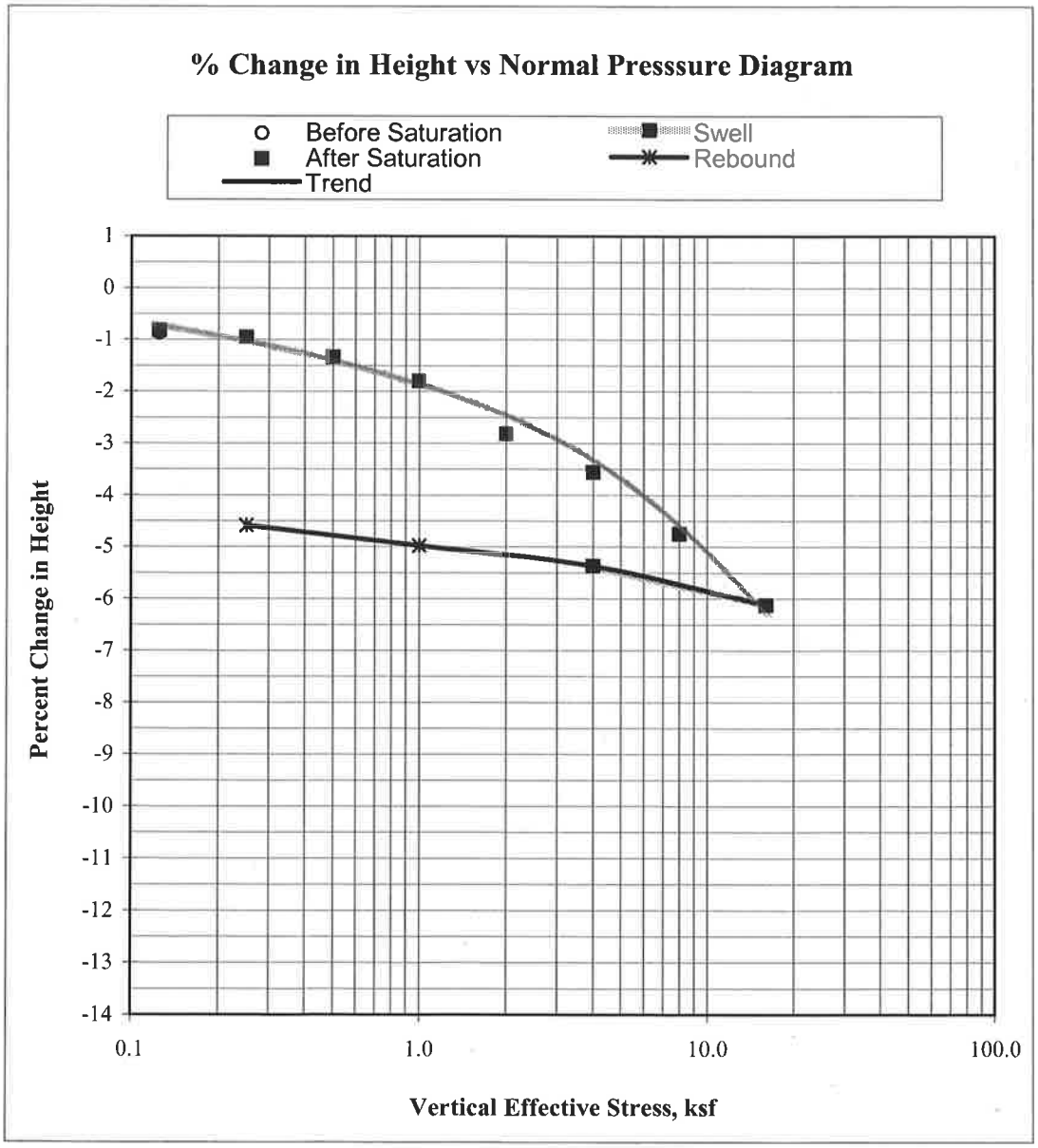
VT-23842-01 Jan 25, 2007

CONSOLIDATION TEST

ASTM D 2435-90

Paseo de la Playa
B9 @ 6'
SM
Ring Sample

Initial Dry Density: 111.6 pcf
Initial Moisture, %: 22.8%
Specific Gravity: 2.67 (assumed
Initial Void Ratio: 0.494



Capco Analytical Services, INC. (CAS)
1536 Eastman Avenue, Suite B
Ventura CA 93003
(805) 644-1095

Client: Earth Systems Southern CA
Sample ID: B6 @ 5-10'
Date Received: 01/03/07

Sample Matrix: Soil
CAS LAB NO: 07001601
Date Sampled: 12/29/06

WET CHEMISTRY ANALYSIS SUMMARY

COMPOUND	RESULT	UNITS	DF	PQL	METHOD	ANALYZED
*Chloride	15	mg/Kg	1	10	300.0M	01/08/07
pH	7.8	S.U.	1	--	9045	01/05/07
*Resistivity	4290	ohms-cm	1	3	CA Test 424	01/08/07
*Sulfate	60	mg/Kg	1	10	300.0M	01/08/07

*Sample was extracted using a 1:3 ratio of soil and DI water.
Results were based on the original sample weight.
PQL: Practical Quantitation Limit
BQL: Below Practical Quantitation Limit

Principal Analyst

CAPCO Analytical Services, Inc.

Capco Analytical Services, INC. (CAS)
1536 Eastman Avenue, Suite B
Ventura CA 93003
(805) 644-1095

Client: Earth Systems Southern CA
Sample ID: B7 @ 1-4'
Date Received: 01/03/07

Sample Matrix: Soil
CAS LAB NO: 07001602
Date Sampled: 12/29/06

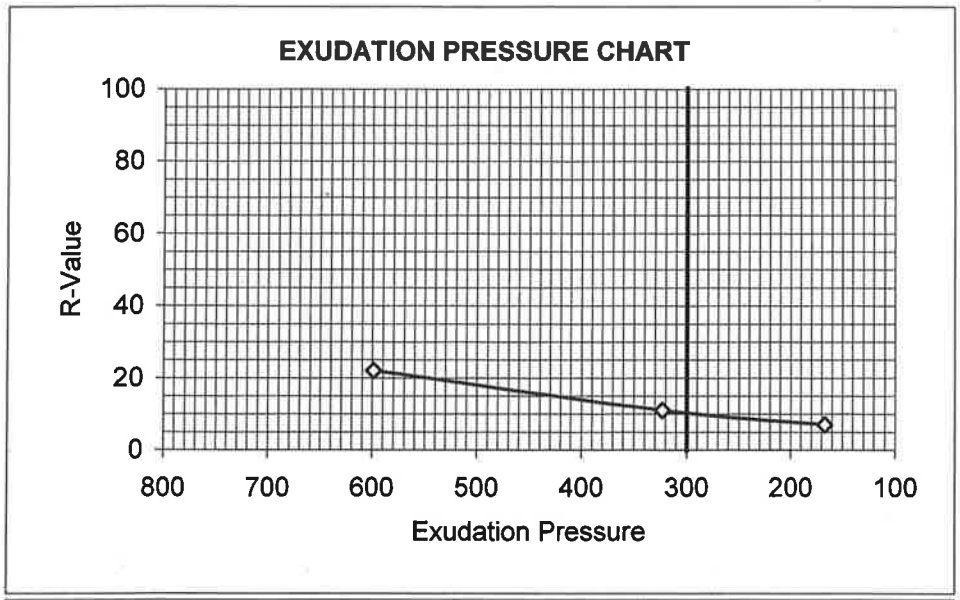
WET CHEMISTRY ANALYSIS SUMMARY

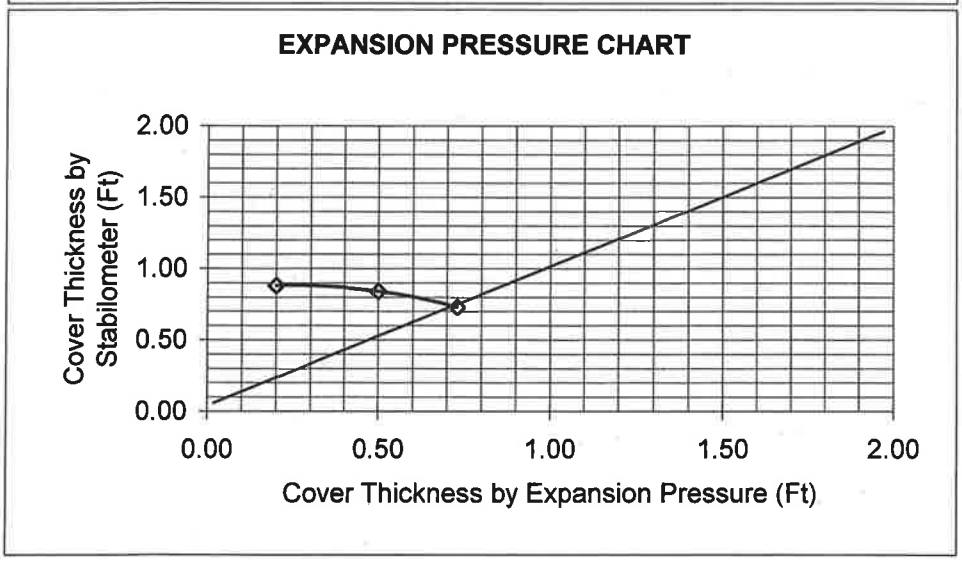
COMPOUND	RESULT	UNITS	DF	PQL	METHOD	ANALYZED
*Chloride	33	mg/Kg	1	10	300.0M	01/08/07
pH	9.8	S.U.	1	--	9045	01/05/07
*Resistivity	2800	ohms-cm	1	3	CA Test 424	01/08/07
*Sulfate	230	mg/Kg	1	10	300.0M	01/08/07

*Sample was extracted using a 1:3 ratio of soil and DI water.
Results were based on the original sample weight.
PQL: Practical Quantitation Limit
BQL: Below Practical Quantitation Limit

Principal Analyst

CAPCO Analytical Services, Inc.



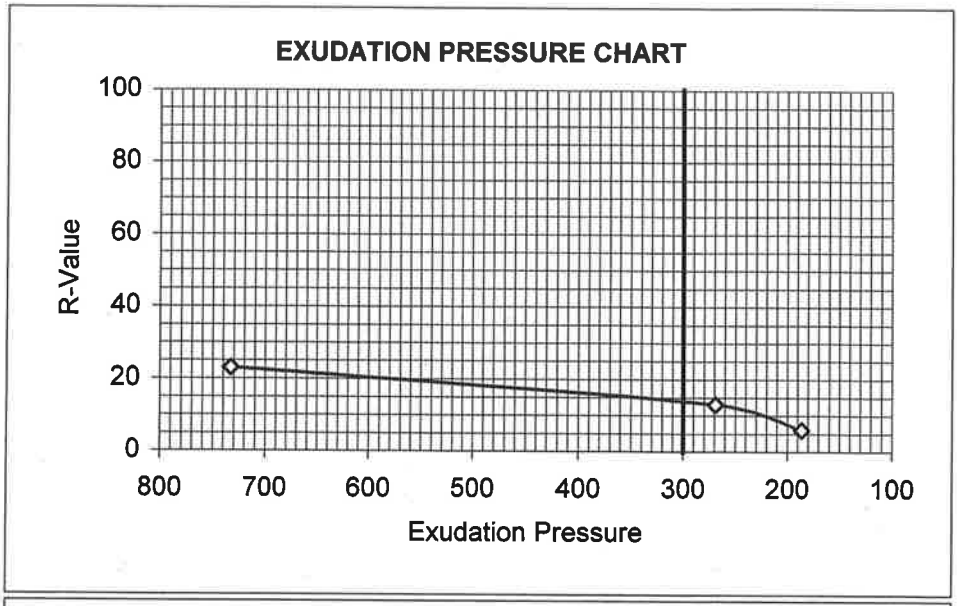


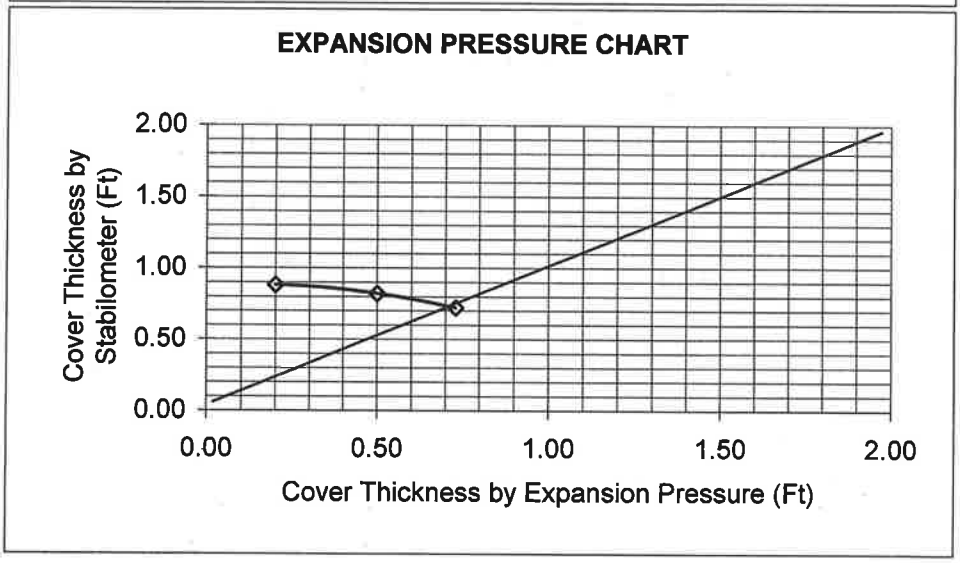
JOB NAME: Paseo de la Playa
SAMPLE I. D.: Boring 12 @ 0'-5'
SOIL DESCRIPTION: Clayey Fine to Medium Sand with Silt (SC)

SPECIMEN NUMBER	A	B	C
EXUDATION PRESSURE	599	323	167
RESISTANCE VALUE	22	11	7
EXPANSION DIAL(0.0001")	22	15	6
EXPANSION PRESSURE (PSF)	95.3	65.0	26.0
% MOISTURE AT TEST	14.2	15.4	16.7
DRY DENSITY AT TEST	117.3	113.9	110.0

R-VALUE @ 300 PSI EXUDATION	11
R-VALUE by Expansion Pressure*	25

**Based on a Traffic Index of 5.0 and a Gravel Factor of 1.70*





JOB NAME: Paseo de la Playa
SAMPLE I. D.: Boring 7 @ 1'-4'
SOIL DESCRIPTION: Fine to Medium Sandy Clay with Silt (CL)

SPECIMEN NUMBER	A	B	C
EXUDATION PRESSURE	733	269	186
RESISTANCE VALUE	23	13	6
EXPANSION DIAL(0.0001")	22	15	6
EXPANSION PRESSURE (PSF)	95.3	65.0	26.0
% MOISTURE AT TEST	14.4	17.8	20.3
DRY DENSITY AT TEST	113.8	109.8	105.5

R-VALUE @ 300 PSI EXUDATION	**14**
R-VALUE by Expansion Pressure*	**25**

**Based on a Traffic Index of 5.0 and a Gravel Factor of 1.70*

TABLE UBC 18-1-D

FOUNDATIONS FOR STUD BEARING WALLS – MINIMUM REQUIREMENTS

EXPANSION INDEX (E. I.)	FOUNDATIONS FOR SLAB AND RAISED FLOOR SYSTEM						REINFORCEMENT FOR FOUNDATIONS	CONCRETE SLAB 3-1/2" MINIMUM THICKNESS (4" WHEN OVER 51, E. I.)		PREMOISTENING CONTROLS FOR SOILS UNDER FOOTINGS, PEIRS AND SLABS	PIERS UNDER RAISED FLOORS
	NUMBER OF STORIES	STEM THICKNESS	FOOTING WIDTH	FOOTING THICKNESS	ALL PERIMETER FOOTINGS	INTERIOR FOOTINGS FOR SLAB AND RAISED FLOORS		REINFORCEMENT	TOTAL THICKNESS OF SAND		
					DEPTH BELOW NATURAL SURFACE OF GROUND & FINISH GRADE						
		INCHES									
0 -20 VERY LOW (NON-EXPANSIVE)	1 2 3	6 8 10	12 15 18	6 7 8	12 18 24	12 18 24	1 - #4 @ TOP AND BOTTOM	#3 @ 24" O.C. EACH WAY	2"	MOISTENING OF GROUND PRIOR TO PLACING CONCRETE IS RECOMMENDED	PIERS ALLOWED FOR SINGLE FLOOR LOADS ONLY
21-50 LOW	1 2 3	6 8 10	12 15 18	6 7 8	15 21 24	12 18 24	1 - #4 @ TOP AND BOTTOM	#3 @ 24" O.C. EACH WAY	4"	3% OVER OPTIMUM MOISTURE CONTENT TO A DEPTH OF 18" BELOW LOWEST ADJACENT GRADE TESTING REQ'D	PIERS ALLOWED FO SINGLE FLOOR LOADS ONLY
51-90 MEDIUM	1 2 3	6 8 10	12 15 18	6 8 8	21 21 24	12 18 24	1 - #4 @ TOP AND BOTTOM #3 BARS @ 24" O.C. 12" INTO FOOTING AND BENT 3' INTO SLAB	#3 @ 24" O.C. EACH WAY	4"	3% OVER OPTIMUM MOISTURE CONTENT TO A DEPTH OF 18" BELOW LOWEST ADJ ACENT GRADE TESTING REQ'D	PIERS NOT ALLOWED
91-130 HIGH	1 2 3	6 8 10	12 15 18	8 8 8	27 27 27	12 18 24	2 - #4 @ TOP AND BOTTOM #3 BARS @ 24" O.C. 12" INTO FOOTING AND BENT 3' INTO SLAB	#3 @ 24" O.C. EACH WAY	4"	3% OVER OPTIMUM MOISTURE CONTENT TO A DEPTH OF 24" BELOW LOWEST ADJACENT GRADE TESTING REQ'D	PIERS NOT ALLOWED
ABOVE 130 VERY HIGH	REQUIRES SPECIAL DESIGN BY A STATE LICENSED SOILS PROFESSIONAL										

APPENDIX C
Liquefaction Analysis

CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA
Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: Paseo De La Playa
Job No: VT-23842-01
Date: 2/27/2007
Sounding: CPT-1
Plot: 1

Methods: Liquefaction Analysis using 1998 NCEER workshop methods (Robertson & Wride)
Post-liquefaction Settlement Analysis from Tokimatsu & Seed (1987)
Dry Sand Settlement by Pradel, ASCE Journal of G&GE, Vol 124, No. 4

Total Liquefied Thickness (feet)
17.4

EARTHQUAKE INFORMATION:
Magnitude: 7 (7.5)
PGA, g: 0.50 (0.42)
MSF: 1.19
GWT, feet: 6.0
Design GWT, feet: 6.0

Induced CSR (M=7.5): = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR

Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Unit Weight of unsaturated soils: 100 pcf
Unit Weight of saturated soils: 120 pcf
Limiting Ic for liquefiable soils: 2.60
Limiting Ic for K_H: 2.0
Required SF: 1.50
Min SF of Liquefiable Layers: 0.15
Avg SF of Liquefiable Layers: 0.07

Probab.	Total Induced Subsidence (inches)
Avg 12%	
Max 100%	3.2

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_C	H (m)	K_H	Clean Sand Qc1n	Kσ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	*Volumetric Strain (%)*
0.16	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.33	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.49	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.66	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.82	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.98	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.15	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.31	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.48	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.64	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.80	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.97	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.13	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.30	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.46	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.62	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.79	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.95	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.12	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.28	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.44	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.61	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.77	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.94	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.10	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.27	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.43	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.59	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.76	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.92	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
5.09	15.55	0.08	0.51	120	0.276	0.990	0.52	0.69	1.70	24.54	2.28		1	19	1.89		1.00	46.5	1.00	0.089	0.089	0.268	Non-Liq.	Non-Liq.	0.00
5.25	17.65	0.11	0.62	120	0.285	0.990	0.63	0.69	1.70	27.90	2.27		1	24	1.85		1.00	51.6	1.00	0.093	0.093	0.268	Non-Liq.	Non-Liq.	0.00
5.41	15.42	0.13	0.84	120	0.295	0.989	0.86	0.72	1.70	24.30	2.38		1	18	2.24		1.00	54.5	1.00	0.095	0.095	0.267	Non-Liq.	Non-Liq.	0.00
5.58	16.06	0.17	1.06	120	0.305	0.989	1.08	0.73	1.70	25.32	2.42		1	20	2.38		1.00	60.3	1.00	0.100	0.100	0.267	Non-Liq.	Non-Liq.	0.00
5.74	5.86	0.17	2.90	120	0.315	0.989	3.07	0.92	1.70	8.91	3.04		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
5.91	4.27	0.08	1.87	120	0.325	0.988	2.03	0.93	1.70	6.34	3.07		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
6.07	4.33	0.02	0.46	120	0.335	0.988	0.50	0.85	1.70	6.42	2.82		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
6.23	2.23	0.02	0.90	120	0.340	0.988	1.06	0.98	1.70	3.04	3.24		0						1.00			0.271	Non-Liq.	Non-Liq.	0.00
6.40	4.33	0.02	0.46	120	0.344	0.987	0.50	0.85	1.70	6.40	2.82		0						1.00			0.274	Non-Liq.	Non-Liq.	0.00
6.56	2.00	0.02	1.00	120	0.349	0.987	1.21	1.00	1.70	2.65	3.31		0						1.00			0.278	Non-Liq.	Non-Liq.	0.00
6.73	3.00	0.02	0.67	120	0.354	0.986	0.76	0.92	1.70	4.25	3.05		0						1.00			0.282	Non-Liq.	Non-Liq.	0.00
6.89	2.00	0.05	2.50	120	0.359	0.986	3.05	1.00	1.70	2.64	3.49		0						1.00			0.285	Non-Liq.	Non-Liq.	0.00
7.05	2.00	0.06	3.00	120	0.363	0.986	3.67	1.00	1.70	2.63	3.53		0						1.00			0.289	Non-Liq.	Non-Liq.	0.00
7.22	2.00	0.07	3.50	120	0.368	0.985	4.29	1.00	1.70	2.62	3.57		0						1.00			0.292	Non-Liq.	Non-Liq.	0.00
7.38	2.00	0.08	4.00	120	0.373	0.985	4.92	1.00	1.70	2.61	3.60		0						1.00			0.295	Non-Liq.	Non-Liq.	0.00
7.55	2.00	0.09	4.50	120	0.378	0.985	5.55	1.00	1.70	2.61	3.63		0						1.00			0.298	Non-Liq.	Non-Liq.	0.00
7.71	2.00	0.09	4.50	120	0.382	0.984	5.56	1.00	1.70	2.60	3.63		0						1.00			0.301	Non-Liq.	Non-Liq.	0.00
7.87	2.00	0.10	5.00	120	0.387	0.984	6.20	1.00	1.70	2.59	3.66		0						1.00			0.304	Non-Liq.	Non-Liq.	0.00
8.04	2.00	0.06	3.00	120	0.392	0.984	3.73	1.00	1.70	2.58	3.54		0						1.00			0.307	Non-Liq.	Non-Liq.	0.00
8.20	2.00	0.08	4.00	120	0.396	0.983	4.99	1.00	1.70	2.58	3.61		0						1.00			0.310	Non-Liq.	Non-Liq.	0.00
8.37	2.00	0.04	2.00	120	0.401	0.983	2.50	1.00	1.70	2.57	3.46		0						1.00			0.313	Non-Liq.	Non-Liq.	0.00
8.53	2.00	0.04	2.00	120	0.406	0.982	2.51	1.00	1.70	2.56	3.46		0						1.00			0.316	Non-Liq.	Non-Liq.	0.00
8.69	2.00	0.05	2.50	120	0.411	0.982	3.15	1.00	1.70	2.55	3.51		0						1.00			0.318	Non-Liq.	Non-Liq.	0.00
8.86	2.04	0.02	0.98	120	0.415	0.982	1.23	1.00	1.70	2.61	3.32		0						1.00			0.321	Non-Liq.	Non-Liq.	0.00
9.02	2.00	0.02	1.00	120	0.420	0.981	1.27	1.00	1.70	2.54	3.34		0						1.00			0.323	Non-Liq.	Non-Liq.	0.00
9.19	2.36	0.05	2.12	120	0.425	0.981	2.58	1.00	1.70	3.11	3.40		0						1.00			0.326	Non-Liq.	Non-Liq.	0.00
9.35	8.60	0.10	1.16	120	0.430	0.981	1.22	0.82	1.70	13.13	2.69		0						1.00			0.328	Non-Liq.	Non-Liq.	0.00
9.51	21.35	0.32	1.50	120	0.434	0.980	1.53	0.73	1.70	33.61	2.40		1	32	2.30		1.00	77.4	1.00	0.123	0.123	0.330	**0.37**	96%	**1.83**
9.68	18.86	0.39	2.07	120	0.439	0.980	2.12	0.77	1.70	29.60	2.53		1	26	2.91		1.00	86.0	1.00	0.139	0.139	0.333	**0.42**	95%	**1.66**
9.84	12.49	0.30	2.40	120	0.444	0.980	2.49	0.82	1.70	19.36	2.72		0						1.00			0.335	Non-Liq.	Non-Liq.	0.00
10.01	5.80	0.21	3.62	120	0.448	0.979	3.92	0.94	1.70	8.60	3.12		0						1.00			0.337	Non-Liq.	Non-Liq.	0.00
10.17	7.39	0.11	1.49	120	0.453	0.979	1.59	0.85	1.70	11.15	2.81		0						1.00			0.339	Non-Liq.	Non-Liq.	0.00
10.33	2.00	0.05	2.50	120	0.458	0.979	3.24	1.00	1.70	2.48	3.53		0						1.00			0.341	Non-Liq.	Non-Liq.	0.00
10.50	2.00	0.02	1.00	120	0.463	0.978	1.30	1.00	1.70	2.47	3.35		0						1.00			0.343	Non-Liq.	Non-Liq.	0.00
10.66	2.36	0.02	0.85	120	0.467	0.978	1.06	0.98	1.70	3.04	3.24		0						1.00			0.345	Non-Liq.	Non-Liq.	0.00
10.83	3.31	0.02	0.60	120	0.472	0.978	0.70	0.91	1.70	4.56	3.01		0						1.00			0.347	Non-Liq.	Non-Liq.	0.00
10.99	3.12	0.11	3.53	120	0.477	0.977	4.16	1.00	1.70	4.25	3.39		0						1.00			0.349	Non-Liq.	Non-Liq.	0.00
11.15	5.42	0.22	4.06	120	0.481	0.977	4.45	0.96	1.70	7.94	3.18		0						1.00			0.351	Non-Liq.	Non-Liq.	0.00
11.32	3.70	0.27	7.30	120	0.486	0.977	8.40	1.00	1.70	5.16	3.49		0						1.00			0.353	Non-Liq.	Non-Liq.	0.00
11.48	6.37	0.15	2.35	120	0.491	0.976	2.55	0.90	1.70	9.45	2.98		0						1.00			0.354	Non-Liq.	Non-Liq.	0.00
11.65	5.48	0.16	2.92	120	0.496	0.976	3.21	0.94	1.70	8.01	3.09		0						1.00			0.356	Non-Liq.	Non-Liq.	0.00
11.81	6.56	0.44	6.71	120	0.500	0.975	7.26	0.98	1.70	9.74	3.24		0						1.00			0.358	Non-Liq.	Non-Liq.	0.00
11.98	13.26	0.60	4.52	120	0.505	0.975	4.70	0.87	1.70	20.49	2.87		0						1.00			0.360	Non-Liq.	Non-Liq.	0.00

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_σ	H (m)	K_H	Clean Sand Qc1n	K_σ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	Volumetric Strain (%)
12.14	17.08	0.19	1.11	120	0.510	0.975	1.15	0.73	1.70	26.63	2.41		1	22	2.36		1.00	62.9	1.00	0.103	0.103	0.361	**0.29**	98%	**2.17**
12.30	43.02	0.24	0.56	120	0.515	0.974	0.56	0.59	1.53	61.49	1.94		1	57	1.23	0.15	1.58	119.6	1.00	0.239	0.239	0.363	**0.66**	80%	**1.17**
12.47	42.38	0.17	0.40	120	0.519	0.974	0.41	0.57	1.50	59.53	1.89		1	55	1.00	0.15	1.58	94.0	1.00	0.157	0.157	0.364	**0.43**	94%	**1.55**
12.63	41.17	0.24	0.58	120	0.524	0.974	0.59	0.60	1.52	58.52	1.97		1	55	1.26	0.15	1.58	116.8	1.00	0.228	0.228	0.366	**0.62**	83%	**1.22**
12.80	37.79	0.30	0.79	120	0.529	0.973	0.81	0.63	1.55	54.45	2.07		1	52	1.40		1.00	76.2	1.00	0.121	0.121	0.367	**0.33**	97%	**1.87**
12.96	22.94	0.38	1.66	120	0.533	0.973	1.70	0.73	1.65	34.94	2.41		1	33	2.36		1.00	82.4	1.00	0.132	0.132	0.369	**0.36**	97%	**1.75**
13.12	14.78	0.55	3.72	120	0.538	0.973	3.86	0.84	1.70	22.88	2.78		0						1.00			0.370	**Non-Liq.**	Non-Liq.	**0.00**
13.29	6.56	0.52	7.93	120	0.543	0.972	8.64	1.00	1.70	9.67	3.29		0						1.00			0.372	**Non-Liq.**	Non-Liq.	**0.00**
13.45	5.54	0.29	5.23	120	0.548	0.972	5.81	0.98	1.70	8.02	3.24		0						1.00			0.373	**Non-Liq.**	Non-Liq.	**0.00**
13.62	6.88	0.16	2.33	120	0.552	0.972	2.53	0.89	1.70	10.17	2.95		0						1.00			0.374	**Non-Liq.**	Non-Liq.	**0.00**
13.78	6.82	0.08	1.17	120	0.557	0.971	1.28	0.85	1.70	10.06	2.80		0						1.00			0.376	**Non-Liq.**	Non-Liq.	**0.00**
13.94	4.84	0.15	3.10	120	0.562	0.971	3.51	0.96	1.70	6.87	3.17		0						1.00			0.377	**Non-Liq.**	Non-Liq.	**0.00**
14.11	5.16	0.15	2.91	120	0.567	0.971	3.27	0.95	1.70	7.38	3.13		0						1.00			0.378	**Non-Liq.**	Non-Liq.	**0.00**
14.27	4.52	0.08	1.77	120	0.571	0.970	2.03	0.93	1.70	6.34	3.07		0						1.00			0.380	**Non-Liq.**	Non-Liq.	**0.00**
14.44	3.82	0.02	0.52	120	0.576	0.970	0.62	0.89	1.70	5.21	2.93		0						1.00			0.381	**Non-Liq.**	Non-Liq.	**0.00**
14.60	2.00	0.02	1.00	120	0.581	0.970	1.41	1.00	1.70	2.28	3.40		0						1.00			0.382	**Non-Liq.**	Non-Liq.	**0.00**
14.76	2.04	0.02	0.98	120	0.585	0.969	1.37	1.00	1.70	2.34	3.39		0						1.00			0.383	**Non-Liq.**	Non-Liq.	**0.00**
14.93	2.00	0.09	4.50	120	0.590	0.969	6.38	1.00	1.70	2.27	3.72		0						1.00			0.384	**Non-Liq.**	Non-Liq.	**0.00**
15.09	3.06	0.16	5.23	120	0.595	0.969	6.49	1.00	1.70	3.96	3.52		0						1.00			0.386	**Non-Liq.**	Non-Liq.	**0.00**
15.26	2.00	0.14	7.00	120	0.600	0.968	10.00	1.00	1.70	2.25	3.83		0						1.00			0.387	**Non-Liq.**	Non-Liq.	**0.00**
15.42	4.84	0.08	1.65	120	0.604	0.968	1.89	0.92	1.67	6.70	3.04		0						1.00			0.388	**Non-Liq.**	Non-Liq.	**0.00**
15.58	2.00	0.07	3.50	120	0.609	0.967	5.03	1.00	1.70	2.23	3.66		0						1.00			0.389	**Non-Liq.**	Non-Liq.	**0.00**
15.75	2.36	0.09	3.81	120	0.614	0.967	5.15	1.00	1.70	2.81	3.59		0						1.00			0.390	**Non-Liq.**	Non-Liq.	**0.00**
15.91	2.80	0.02	0.71	120	0.618	0.967	0.92	0.96	1.67	3.45	3.16		0						1.00			0.391	**Non-Liq.**	Non-Liq.	**0.00**
16.08	2.49	0.02	0.80	120	0.623	0.966	1.07	0.98	1.68	2.97	3.25		0						1.00			0.392	**Non-Liq.**	Non-Liq.	**0.00**
16.24	3.44	0.02	0.58	120	0.628	0.966	0.71	0.92	1.61	4.29	3.03		0						1.00			0.393	**Non-Liq.**	Non-Liq.	**0.00**
16.40	2.00	0.02	1.00	120	0.633	0.966	1.46	1.00	1.67	2.16	3.43		0						1.00			0.394	**Non-Liq.**	Non-Liq.	**0.00**
16.57	2.00	0.02	1.00	120	0.637	0.965	1.47	1.00	1.66	2.14	3.43		0						1.00			0.395	**Non-Liq.**	Non-Liq.	**0.00**
16.73	2.00	0.02	1.00	120	0.642	0.965	1.47	1.00	1.65	2.11	3.44		0						1.00			0.396	**Non-Liq.**	Non-Liq.	**0.00**
16.90	2.00	0.02	1.00	120	0.647	0.965	1.48	1.00	1.64	2.09	3.44		0						1.00			0.397	**Non-Liq.**	Non-Liq.	**0.00**
17.06	4.40	0.02	0.45	120	0.652	0.964	0.53	0.88	1.53	5.42	2.90		0						1.00			0.398	**Non-Liq.**	Non-Liq.	**0.00**
17.22	2.00	0.02	1.00	120	0.656	0.964	1.49	1.00	1.61	2.05	3.45		0						1.00			0.399	**Non-Liq.**	Non-Liq.	**0.00**
17.39	2.04	0.02	0.98	120	0.661	0.963	1.45	1.00	1.60	2.09	3.44		0						1.00			0.399	**Non-Liq.**	Non-Liq.	**0.00**
17.55	2.00	0.02	1.00	120	0.666	0.963	1.50	1.00	1.59	2.00	3.46		0						1.00			0.400	**Non-Liq.**	Non-Liq.	**0.00**
17.72	2.00	0.02	1.00	120	0.670	0.963	1.50	1.00	1.58	1.98	3.47		0						1.00			0.401	**Non-Liq.**	Non-Liq.	**0.00**
17.88	2.00	0.02	1.00	120	0.675	0.962	1.51	1.00	1.57	1.96	3.47		0						1.00			0.402	**Non-Liq.**	Non-Liq.	**0.00**
18.04	2.00	0.02	1.00	120	0.680	0.962	1.52	1.00	1.56	1.94	3.48		0						1.00			0.403	**Non-Liq.**	Non-Liq.	**0.00**
18.21	2.00	0.02	1.00	120	0.685	0.962	1.52	1.00	1.55	1.92	3.48		0						1.00			0.404	**Non-Liq.**	Non-Liq.	**0.00**
18.37	2.00	0.02	1.00	120	0.689	0.961	1.53	1.00	1.53	1.90	3.49		0						1.00			0.404	**Non-Liq.**	Non-Liq.	**0.00**
18.54	2.00	0.02	1.00	120	0.694	0.961	1.53	1.00	1.52	1.88	3.49		0						1.00			0.405	**Non-Liq.**	Non-Liq.	**0.00**
18.70	4.01	0.02	0.50	120	0.699	0.960	0.60	0.90	1.45	4.55	2.98		0						1.00			0.406	**Non-Liq.**	Non-Liq.	**0.00**
18.86	2.00	0.02	1.00	120	0.704	0.960	1.54	1.00	1.50	1.84	3.50		0						1.00			0.407	**Non-Liq.**	Non-Liq.	**0.00**
19.03	2.00	0.02	1.00	120	0.708	0.960	1.55	1.00	1.49	1.82	3.51		0						1.00			0.407	**Non-Liq.**	Non-Liq.	**0.00**
19.19	2.00	0.02	1.00	120	0.713	0.959	1.55	1.00	1.48	1.81	3.51		0						1.00			0.408	**Non-Liq.**	Non-Liq.	**0.00**
19.36	4.59	0.02	0.44	120	0.718	0.959	0.52	0.88	1.41	5.15	2.91		0						1.00			0.409	**Non-Liq.**	Non-Liq.	**0.00**
19.52	3.57	0.02	0.56	120	0.722	0.958	0.70	0.93	1.43	3.84	3.08		0						1.00			0.409	**Non-Liq.**	Non-Liq.	**0.00**
19.69	6.63	0.02	0.30	120	0.727	0.958	0.34	0.82	1.36	7.58	2.70		0		1.00				1.00			0.410	**Non-Liq.**	Non-Liq.	**0.00**
19.85	6.56	0.04	0.61	120	0.732	0.957	0.69	0.85	1.37	7.53	2.80		0						1.00			0.411	**Non-Liq.**	Non-Liq.	**0.00**
20.01	8.35	0.23	2.75	120	0.737	0.957	3.02	0.91	1.39	10.00	3.00		0						1.00			0.411	**Non-Liq.**	Non-Liq.	**0.00**
20.18	21.03	0.34	1.62	120	0.741	0.957	1.68	0.76	1.31	25.17	2.52	1	0		2.89		1.00		1.00			0.412	**Non-Liq.**	Non-Liq.	**0.00**
20.34	40.47	0.39	0.96	120	0.746	0.956	0.98	0.66	1.26	47.25	2.17		1	46	1.59		1.00	75.0	1.00	0.119	0.119	0.413	**0.29**	98%	**1.90**
20.51	46.78	0.20	0.43	120	0.751	0.956	0.43	0.59	1.22	53.28	1.94		1	51	1.00	0.30	1.41	75.0	1.00	0.119	0.119	0.413	**0.29**	98%	**1.90**
20.67	51.55	0.45	0.87	120	0.756	0.955	0.89	0.63	1.23	59.28	2.06		1	55	1.39		1.00	82.2	1.00	0.132	0.132	0.414	**0.32**	98%	**1.77**
20.83	54.74	0.74	1.35	120	0.760	0.955	1.37	0.65	1.24	63.31	2.15		1	58	1.55		1.00	98.4	1.00	0.169	0.169	0.414	**0.41**	95%	**1.50**
21.00	63.66	0.28	0.44	120	0.765	0.954	0.45	0.56	1.20	71.26	1.84		1	63	1.00	0.30	1.41	100.2	1.00	0.174	0.174	0.415	**0.42**	95%	**1.47**
21.16	71.82	0.66	0.92	120	0.770	0.954	0.93	0.60	1.21	81.19	1.96		1	68	1.25	0.30	1.41	143.1	1.00	0.352	0.352	0.416	**0.85**	63%	**0.86**
21.33	74.88	0.59	0.79	120	0.774	0.954	0.80	0.58	1.20	83.96	1.91		1	70	1.20	0.30	1.41	141.5	1.00	0.344	0.344	0.416	**0.83**	65%	**0.90**
21.49	73.99	0.35	0.47	120	0.779	0.953	0.48	0.55	1.18	81.82	1.80		1	68	1.00	0.30	1.41	115.1	1.00	0.222	0.222	0.417	**0.53**	89%	**1.27**
21.65	71.56	0.29	0.41	120	0.784	0.953	0.41	0.54	1.18	78.71	1.78		1	67	1.00	0.30	1.41	110.7	1.00	0.206	0.206	0.417	**0.49**	91%	**1.33**
21.82	69.59	0.54	0.78	120	0.789	0.952	0.78	0.59	1.19	77.31	1.94		1	66	1.22	0.30	1.41	133.1	1.00	0.299	0.299	0.418	**0.72**	75%	**1.06**
21.98	67.23	0.65	0.97	120	0.793	0.952	0.98	0.61	1.19	74.83	2.00		1	65	1.30		1.00	97.6	1.00	0.166	0.166	0.418	**0.40**	95%	**1.51**
22.15	65.45	0.88	1.34	120	0.798	0.951	1.36	0.64	1.20	73.15	2.10		1	64	1.46		1.00	106.5	1.00	0.192	0.192	0.419	**0.46**	93%	**1.39**
22.31	64.94	0.91	1.40	120	0.803	0.951	1.42	0.64	1.19	72.39	2.12		1	63	1.48		1.00	107.4	1.00	0.195	0.195	0.419	**0.47**	93%	**1.37**
22.47	59.58	0.88	1.48	120	0.807	0.950	1.50	0.66	1.19	66.32	2.16		1	60	1.57		1.00	104.4	1.00	0.186	0.186	0.420	**0.44**	94%	**1.42**
22.64	57.42	0.80	1.39	120	0.812	0.950	1.41	0.66	1.19	63.62	2.16		1	58	1.57		1.00	99.8	1.00	0.172	0.172	0.420	**0.41**	95%	**1.48**
22.80	47.35	1.19	2.51	120	0.817	0.949	2.56	0.72	1.21	53.04	2.39		1	51	2.26		1.00	119.8	1.00	0.240	0.240	0.420	**0.57**	86%	**1.21**
22.97	26.13	0.76	2.91	120	0.822	0.949	3.00	0.80	1.22	29.25	2.63	1	0						1.00			0.421	**Non-Liq.**	Non-Liq.	**0.00**
23.13	16.25	0.41	2.52	120	0.826	0.948	2.66	0.84	1.23	17.92	2.76		0						1.00			0.421	**Non-Liq.**	Non-Liq.	**0.00**
23.29	12.62	0.17	1.35	120	0.831	0.948	1.44	0.82	1.22	13.59	2.71		0						1.00			0.422	**Non-Liq.**	Non-Liq.	**0.00**
23.46	9.81	0.18	1.83	120	0.836	0.947	2.01	0.87	1.23	10.42	2.89		0						1.00			0.422	**Non-Liq.**	Non-Liq.	**0.00**
23.62	15.29	0.41	2.68	120	0.841	0.947	2.84	0.85	1.22	16.60	2.80		0						1.00			0.423	**Non-Liq.**	Non-Liq.	**0.00**
23.79	43.40	0.88	2.03	120	0.845	0.946	2.07	0.72	1.17	47.24	2.36		1	46	2.17		1.00	102.3	1.00	0.180	0.180	0.423	**0.42**	94%	**1.45**
23.95	56.27	1.11	1.97	120	0.850	0.946	2.00	0.69	1.16	60.91	2.27		1	56	1.86		1.00	113.2	1.00	0.215	0.215	0.423	**0.51**	90%	**1.30**
24.11	81.82	1.09	1.33	120	0.855	0.945	1.35	0.62	1.14	87.34	2.04		1	71	1.35		1.00	118.3	1.00	0.234	0.234	0.424	**0.55**	88%	**1.23**
24.28	111.14	0.38	0.34	120	0.859	0.945	0.34	0.50	1.11	115.65	1.60		1	83	1.00	0.25	1.46	169.0	1.00	Infin.	0.000	0.424	**Non-Liq.**	Non-Liq.	**0.00**
24.44	99.60	1.11	1.11	120	0.864	0.944	1.12	0.59	1.13	105.07	1.93		1	79	1.22	0.25	1.46	186.6	1.00	Infin.	0.000	0.424	**Non-Liq.**	Non-Liq.	**0.00**
24.61	79.79	0.59	0.74	120	0.869	0.943	0.75	0.58	1.12	83.56	1.90		1	69	1.18	0.25	1.46	144.6	1.00	0.361	0.361	0.425	**0.85**	63%	**0.83**
24.77	26.00	0.03	0.12	120	0.874	0.943	0.12	0.63	1.13	26.78	2.06		1	22	1.00		1.00	26.8	1.00	0.072	0.072	0.425	**0.17**	100%	**3.84**
24.93	15.10	0.04	0.26	120	0.878	0.942	0.28	0.72	1.14	15.37	2.38		1	0	1.00		1.00	15.4	1.00	0.063	0.063	0.425	**0.15**	100%	**5.23**
25.10	9.69	0.06	0.62	120	0.883	0.942	0.68	0.82	1.16	9.65	2.70		0						1.00			0.426	**Non-Liq.**	Non-Liq.	**0.00**
25.26	18.48	0.19	1.03	120	0.888	0.941	1.08	0.77	1.14	19.02	2.52		1	8	2.89		1.00	55.0	1.00	0.095	0.095	0.426	**0.22**	99%	**2.38**
25.43	43.02	0.50	1.16	120	0.893	0.941	1.19	0.68	1.12	44.68	2.23		1	43	1.75		1.00	78.3	1.00	0.125	0.125	0.426	**0.29**	98%	**1.84**
25.59	72.20	0.42	0.58	120	0.897	0.940	0.59	0.57	1.10	74.06	1.88		1	64	1.17	0.25	1.46	126.9	1.00	0.270	0.270	0.426	**0.63**	82%	**1.13**
25.75	82.72	0.69	0.83	120	0.902	0.939	0.84	0.58	1.10	84.89	1.92		1	70	1.21	0.25	1.46	149.9	1.00	0.393	0.393	0.427	**0.92**	57%	**0.69**
25.92	86.73	0.80	0.92	120	0.907	0.939	0.93	0.59	1.09	88.82	1.93		1	72	1.22	0.25	1.46	158.3	1.00	0.449	0.449	0.427	**1.05**	46%	**0.50**
26.08	84.37	0.65	0.77	120	0.911	0.938	0.78	0.58	1.09	85.97	1.90		1	71	1.18	0.25	1.46	148.8	1.00	0.387	0.387	0.427	**0.90**	58%	**0.72**
26.25	86.48	0.48	0.56	120	0.916	0.938	0.56	0.55	1.08	87.55	1.81		1	71	1.11	0.25	1.46	142.4	1.00	0.349	0.349	0.427	**0.82**	66%	**0.90**
26.41	82.21	0.99	1.20	120	0.921	0.937	1.22	0.62	1.09	83.69	2.02		1	69	1.33		1.00	111.6	1.00	0.209	0.209	0.428	**0.49**	91%	**1.32**

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_c	H (m)	K_H	Clean Sand Qc1n	K_σ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	Volumetric Strain (%)
26.57	60.09	1.02	1.70	120	0.926	0.936	1.72	0.68	1.09	61.21	2.23		1	56	1.73		1.00	106.1	1.00	0.191	0.191	0.428	**0.45**	93%	**1.40**
26.74	34.60	1.01	2.92	120	0.930	0.936	3.00	0.78	1.11	35.17	2.57		1	33	3.12		1.00	109.8	1.00	0.203	0.203	0.428	**0.47**	92%	**1.35**
26.90	36.90	1.04	2.82	120	0.935	0.935	2.89	0.77	1.10	37.38	2.54		1	36	2.95		1.00	110.3	1.00	0.205	0.205	0.428	**0.48**	92%	**1.34**
27.07	53.53	0.35	0.65	120	0.940	0.934	0.67	0.62	1.08	53.48	2.03		1	51	1.34		1.00	71.7	1.00	0.114	0.114	0.428	**0.27**	99%	**1.97**
27.23	53.85	0.54	1.00	120	0.944	0.934	1.02	0.65	1.08	53.81	2.13		1	51	1.51		1.00	81.3	1.00	0.130	0.130	0.429	**0.30**	98%	**1.79**
27.40	56.33	0.82	1.46	120	0.949	0.933	1.48	0.67	1.08	56.30	2.21		1	53	1.69		1.00	95.4	1.00	0.161	0.161	0.429	**0.38**	96%	**1.55**
27.56	47.09	0.40	0.85	120	0.954	0.932	0.87	0.65	1.07	46.64	2.14		1	45	1.53		1.00	71.6	1.00	0.114	0.114	0.429	**0.27**	99%	**1.97**
27.72	32.18	0.32	0.99	120	0.959	0.932	1.02	0.70	1.07	31.63	2.32		1	29	2.02		1.00	64.0	1.00	0.104	0.104	0.429	**0.24**	99%	**2.14**
27.89	17.08	0.22	1.29	120	0.963	0.931	1.37	0.80	1.08	16.41	2.63		0						1.00			0.429	**Non-Liq.**	Non-Liq.	**0.00**
28.05	11.85	0.15	1.27	120	0.968	0.930	1.38	0.84	1.08	11.08	2.78		0						1.00			0.429	**Non-Liq.**	Non-Liq.	**0.00**
28.22	13.57	0.15	1.11	120	0.973	0.929	1.19	0.82	1.07	12.75	2.70		0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
28.38	19.31	0.32	1.66	120	0.978	0.929	1.75	0.80	1.07	18.46	2.64		0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
28.54	34.73	0.40	1.15	120	0.982	0.928	1.19	0.71	1.05	33.62	2.33		1	32	2.07		1.00	69.4	1.00	0.111	0.111	0.430	**0.26**	99%	**2.02**
28.71	34.73	0.17	0.49	120	0.987	0.927	0.50	0.65	1.05	33.38	2.15		1	31	1.56		1.00	52.1	1.00	0.093	0.093	0.430	**0.22**	99%	**2.46**
28.87	19.88	0.27	1.36	120	0.992	0.926	1.43	0.79	1.05	18.78	2.59		1	7	3.27		1.00	61.5	1.00	0.102	0.102	0.430	**0.24**	99%	**2.20**
29.04	11.47	0.34	2.96	120	0.996	0.926	3.25	0.91	1.06	10.45	3.00		0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
29.20	20.71	0.30	1.45	120	1.001	0.925	1.52	0.79	1.04	19.45	2.59	1	0		3.28		1.00		1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
29.36	42.38	0.22	0.52	120	1.006	0.924	0.53	0.64	1.03	40.38	2.09		1	39	1.44		1.00	58.0	1.00	0.098	0.098	0.430	**0.23**	99%	**2.29**
29.53	29.44	0.50	1.70	120	1.011	0.923	1.76	0.76	1.04	27.82	2.50	1	0		2.77		1.00		1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
29.69	16.00	0.49	3.06	120	1.015	0.923	3.27	0.87	1.04	14.68	2.88	1	0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
29.86	10.32	0.37	3.59	120	1.020	0.922	3.98	0.94	1.03	9.10	3.10	1	0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
30.02	10.32	0.22	2.13	120	1.025	0.921	2.37	0.90	1.03	9.04	2.98		0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
30.18	11.15	0.20	1.79	120	1.030	0.920	1.98	0.88	1.02	9.80	2.91		0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
30.35	27.59	0.51	1.85	120	1.034	0.919	1.92	0.77	1.02	25.54	2.55	1	0		3.05		1.00		1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
30.51	102.34	0.37	0.36	120	1.039	0.918	0.37	0.51	1.01	96.64	1.68		1	75	1.00	0.20	1.52	146.8	1.00	0.374	0.374	0.430	**0.87**	61%	**0.78**
30.68	73.54	0.31	0.42	120	1.044	0.918	0.43	0.56	1.01	69.05	1.84		1	61	1.00	0.20	1.52	104.9	1.00	0.187	0.187	0.430	**0.44**	94%	**1.41**
30.84	21.54	0.59	2.74	120	1.048	0.917	2.88	0.83	1.01	19.52	2.75	1	0						1.00			0.430	**Non-Liq.**	Non-Liq.	**0.00**
31.00	74.37	1.47	1.98	120	1.053	0.916	2.00	0.68	1.00	69.51	2.23		1	62	1.74		1.00	120.9	1.00	0.245	0.245	0.430	**0.57**	87%	**1.21**
31.17	53.15	1.41	2.65	120	1.058	0.915	2.71	0.74	1.00	49.24	2.43		1	47	2.43		1.00	119.5	1.00	0.239	0.239	0.430	**0.55**	87%	**1.22**
31.33	57.93	1.64	2.83	120	1.063	0.914	2.88	0.73	1.00	53.58	2.42		1	51	2.39		1.00	128.2	1.00	0.276	0.276	0.430	**0.64**	81%	**1.12**
31.50	84.76	1.75	2.06	120	1.067	0.913	2.09	0.67	0.99	78.64	2.20		1	67	1.67		1.00	131.6	1.00	0.292	0.291	0.430	**0.68**	78%	**1.08**
31.66	88.39	1.73	1.96	120	1.072	0.912	1.98	0.66	0.99	81.82	2.17		1	68	1.61		1.00	131.3	1.00	0.291	0.290	0.430	**0.67**	79%	**1.09**
31.82	98.97	1.34	1.35	120	1.077	0.911	1.37	0.62	0.99	91.53	2.03		1	73	1.34		1.00	122.6	0.99	0.251	0.249	0.430	**0.58**	86%	**1.19**
31.99	93.74	0.69	0.74	120	1.081	0.910	0.74	0.57	0.99	86.48	1.88		1	71	1.17	0.20	1.52	154.0	0.99	0.420	0.416	0.430	**0.97**	53%	**0.59**
32.15	86.29	0.75	0.87	120	1.086	0.909	0.88	0.59	0.98	79.28	1.96		1	67	1.25	0.20	1.52	150.0	0.99	0.394	0.391	0.430	**0.91**	58%	**0.69**
32.32	69.40	1.20	1.73	120	1.091	0.908	1.76	0.67	0.98	63.24	2.22		1	58	1.72		1.00	108.7	0.99	0.199	0.198	0.430	**0.46**	93%	**1.36**
32.48	60.41	1.40	2.32	120	1.096	0.907	2.36	0.71	0.98	54.68	2.35		1	52	2.13		1.00	116.6	0.99	0.227	0.225	0.430	**0.52**	89%	**1.26**
32.64	62.45	1.57	2.51	120	1.100	0.906	2.56	0.72	0.97	56.37	2.37		1	53	2.18		1.00	123.2	0.99	0.254	0.251	0.430	**0.58**	86%	**1.18**
32.81	83.93	1.66	1.98	120	1.105	0.905	2.00	0.67	0.97	76.04	2.20		1	65	1.67		1.00	126.8	0.99	0.270	0.266	0.429	**0.62**	83%	**1.14**
32.97	104.51	1.55	1.48	120	1.110	0.904	1.50	0.62	0.97	94.87	2.04		1	75	1.36		1.00	129.2	0.98	0.280	0.275	0.429	**0.64**	81%	**1.11**
33.14	106.36	0.63	0.59	120	1.115	0.903	0.60	0.54	0.97	96.69	1.79		1	75	1.10	0.25	1.46	155.2	0.98	0.427	0.419	0.429	**0.98**	52%	**0.55**
33.30	103.81	0.70	0.67	120	1.119	0.902	0.68	0.56	0.97	94.06	1.83		1	74	1.13	0.30	1.46	155.2	0.98	0.428	0.418	0.429	**0.97**	52%	**0.55**
33.46	108.97	0.74	0.68	120	1.124	0.901	0.69	0.55	0.97	98.58	1.82		1	76	1.12	0.30	1.46	161.0	0.98	Infin.	0.000	0.429	**Non-Liq.**	Non-Liq.	**0.00**
33.63	110.06	1.20	1.09	120	1.129	0.900	1.10	0.59	0.96	99.10	1.94		1	76	1.23	0.30	1.46	178.0	0.97	Infin.	0.000	0.429	**Non-Liq.**	Non-Liq.	**0.00**
33.79	93.93	1.65	1.76	120	1.133	0.899	1.78	0.65	0.96	83.88	2.13		1	70	1.52		1.00	127.4	0.98	0.272	0.267	0.428	**0.62**	83%	**1.13**
33.96	91.32	1.11	1.22	120	1.138	0.898	1.23	0.62	0.96	81.47	2.04		1	68	1.35		1.00	110.0	0.98	0.204	0.199	0.428	**0.47**	93%	**1.34**
34.12	102.09	0.81	0.79	120	1.143	0.897	0.80	0.57	0.96	91.29	1.88		1	73	1.17	0.30	1.41	150.6	0.97	0.398	0.386	0.428	**0.90**	59%	**0.67**
34.28	70.48	1.08	1.53	120	1.148	0.896	1.56	0.67	0.95	62.08	2.19		1	57	1.65		1.00	102.4	0.98	0.180	0.175	0.428	**0.41**	95%	**1.45**
34.45	53.72	0.76	1.41	120	1.152	0.895	1.45	0.69	0.94	46.85	2.27		1	45	1.85		1.00	86.6	0.98	0.140	0.138	0.428	**0.32**	98%	**1.69**
34.61	32.69	0.73	2.23	120	1.157	0.894	2.32	0.78	0.93	27.80	2.57		1	24	3.16		1.00	87.8	0.98	0.143	0.140	0.427	**0.33**	98%	**1.67**
34.78	31.42	0.62	1.97	120	1.162	0.893	2.05	0.77	0.93	26.60	2.56		1	22	3.06		1.00	81.5	0.98	0.130	0.128	0.427	**0.30**	98%	**1.78**
34.94	27.53	0.62	2.25	120	1.167	0.892	2.35	0.80	0.92	23.05	2.64		0						0.98			0.427	**Non-Liq.**	Non-Liq.	**0.00**
35.10	22.75	0.86	3.78	120	1.171	0.890	3.99	0.86	0.92	18.68	2.85		0						0.98			0.427	**Non-Liq.**	Non-Liq.	**0.00**
35.27	42.44	1.02	2.40	120	1.176	0.889	2.47	0.76	0.92	36.00	2.50		1	34	2.78		1.00	100.2	0.98	0.173	0.170	0.427	**0.40**	95%	**1.48**
35.43	94.51	1.34	1.42	120	1.181	0.888	1.44	0.63	0.93	82.31	2.08		1	69	1.41		1.00	116.4	0.97	0.227	0.219	0.426	**0.51**	90%	**1.26**
35.60	128.22	1.16	0.90	120	1.185	0.887	0.91	0.56	0.94	112.64	1.85		1	82	1.14	0.30	1.41	180.9	0.96	Infin.	0.000	0.426	**Non-Liq.**	Non-Liq.	**0.00**
35.76	136.76	0.71	0.52	120	1.190	0.886	0.52	0.51	0.94	120.66	1.68		1	85	1.02	0.30	1.41	173.4	0.95	Infin.	0.000	0.426	**Non-Liq.**	Non-Liq.	**0.00**
35.93	132.17	0.78	0.59	120	1.195	0.885	0.60	0.52	0.94	116.14	1.72		1	83	1.05	0.30	1.41	172.0	0.95	Infin.	0.000	0.425	**Non-Liq.**	Non-Liq.	**0.00**
36.09	130.70	0.71	0.54	120	1.200	0.883	0.55	0.52	0.94	114.67	1.71		1	83	1.04	0.30	1.41	168.0	0.95	Infin.	0.000	0.425	**Non-Liq.**	Non-Liq.	**0.00**
36.25	127.39	0.33	0.26	120	1.204	0.882	0.26	0.50	0.94	111.79	1.56		1	81	1.00	0.30	1.41	157.3	0.95	0.442	0.419	0.425	**0.99**	51%	**0.50**
36.42	113.37	0.44	0.39	120	1.209	0.881	0.39	0.51	0.93	98.99	1.68		1	76	1.00	0.30	1.41	139.3	0.95	0.331	0.314	0.425	**0.74**	73%	**1.00**
36.58	77.17	1.17	1.52	120	1.214	0.880	1.54	0.66	0.91	65.58	2.17		1	59	1.60		1.00	104.9	0.96	0.187	0.180	0.424	**0.42**	94%	**1.41**
36.75	65.70	1.12	1.70	120	1.218	0.878	1.74	0.69	0.91	55.32	2.26		1	52	1.83		1.00	101.3	0.96	0.177	0.169	0.424	**0.40**	95%	**1.46**
36.91	34.99	0.73	2.09	120	1.223	0.877	2.16	0.77	0.89	28.54	2.54		1	25	3.01		1.00	85.8	0.97	0.139	0.135	0.424	**0.32**	98%	**1.71**
37.07	21.67	0.57	2.63	120	1.228	0.876	2.79	0.85	0.88	17.04	2.79		0						0.97			0.423	**Non-Liq.**	Non-Liq.	**0.00**
37.24	31.29	0.39	1.25	120	1.233	0.875	1.30	0.75	0.89	25.35	2.46		1	20	2.57		1.00	65.1	0.97	0.106	0.102	0.423	**0.24**	99%	**2.12**
37.40	25.36	0.32	1.26	120	1.237	0.873	1.33	0.77	0.89	20.20	2.55		1	10	3.02		1.00	61.0	0.97	0.101	0.098	0.423	**0.23**	99%	**2.22**
37.57	14.47	0.25	1.73	120	1.242	0.872	1.89	0.86	0.87	10.88	2.86		0						0.97			0.422	**Non-Liq.**	Non-Liq.	**0.00**
37.73	13.38	0.22	1.64	120	1.247	0.871	1.81	0.87	0.87	9.94	2.88		0						0.97			0.422	**Non-Liq.**	Non-Liq.	**0.00**
37.89	12.24	0.28	2.29	120	1.252	0.869	2.55	0.91	0.86	8.92	3.00		0						0.97			0.421	**Non-Liq.**	Non-Liq.	**0.00**
38.06	12.55	0.57	4.54	120	1.256	0.868	5.05	0.96	0.85	9.06	3.16		0						0.97			0.421	**Non-Liq.**	Non-Liq.	**0.00**
38.22	18.67	0.55	2.95	120	1.261	0.867	3.16	0.87	0.86	14.11	2.89		0						0.97			0.421	**Non-Liq.**	Non-Liq.	**0.00**
38.39	117.58	0.50	0.43	120	1.266	0.865	0.43	0.52	0.91	100.19	1.70		1	77	1.00	0.10	1.64	164.7	0.93	Infin.	0.000	0.420	**Non-Liq.**	Non-Liq.	**0.00**
38.55	97.37	1.01	1.04	120	1.270	0.864	1.05	0.61	0.90	81.29	1.99		1	68	1.29	0.10	1.64	172.7	0.95	Infin.	0.000	0.420	**Non-Liq.**	Non-Liq.	**0.00**
38.71	80.93	1.12	1.38	120	1.275	0.863	1.41	0.65	0.89	66.68	2.14		1	60	1.53		1.00	102.2	0.95	0.179	0.169	0.419	**0.40**	95%	**1.45**
38.88	71.50	0.94	1.31	120	1.280	0.861	1.34	0.66	0.88	58.54	2.17		1	55	1.60		1.00	93.6	0.94	0.156	0.147	0.419	**0.35**	97%	**1.58**
39.04	48.81	0.49	1.00	120	1.285	0.860	1.03	0.68	0.88	39.36	2.24		1	38	1.78		1.00	70.1	0.96	0.112	0.108	0.419	**0.26**	99%	**2.00**
39.21	28.36	0.42	1.48	120	1.289	0.859	1.55	0.77	0.86	21.95	2.55		1	14	3.05		1.00	67.1	0.96	0.108	0.104	0.418	**0.25**	99%	**2.07**
39.37	18.16	0.38	2.09	120	1.294	0.857	2.25	0.85	0.84	13.42	2.82		0						0.96			0.418	**Non-Liq.**	Non-Liq.	**0.00**
39.53	17.14	0.21	1.23	120	1.299	0.856	1.33	0.82	0.84	12.64	2.72		0						0.96			0.417	**Non-Liq.**	Non-Liq.	**0.00**
39.70	15.68	0.15	0.96	120	1.304	0.854	1.04	0.82	0.84	11.45	2.71		0						0.96			0.417	**Non-Liq.**	Non-Liq.	**0.00**
39.86	14.72	0.15	1.02	120	1.308	0.853	1.12	0.83	0.84	10.62	2.75		0						0.96			0.416	**Non-Liq.**	Non-Liq.	**0.00**
40.03	13.38	0.16	1.20	120	1.313	0.852	1.33	0.86	0.83	9.48	2.83		0						0.96			0.416	**Non-Liq.**	Non-Liq.	**0.00**
40.19	13.76	0.20	1.45	120	1.318	0.850	1.61	0.87	0.83	9.72	2.86		0						0.96			0.415	**Non-Liq.**	Non-Liq.	**0.00**
40.35	15.10	0.17	1.13	120	1.322	0.849	1.23	0.84	0.83	10.80	2.77		0						0.96			0.415	**Non-Liq.**	Non-Liq.	**0.00**
40.52	13.64	0.18	1.32	120	1.327	0.847	1.46	0.86	0.82	9.57	2.85		0						0.96			0.414	**Non-Liq.**	Non-Liq.	**0.00**
40.68	12.43	0.19	1.53	120	1.332	0.846	1.71	0.89	0.82	8.56	2.92		0						0.96			0.414	**Non-Liq.**	Non-Liq.	**0.00**
40.85	11.98	0.17	1.42	120	1.337	0.844	1.60	0.89	0.81	8.18	2.93		0						0.95			0.413	**Non-Liq.**	Non-Liq.	**0.00**

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_C	H (m)	K_H	Clean Sand Qc1n	K_σ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	Volumetric Strain (%)
41.01	14.34	0.21	1.46	120	1.341	0.843	1.62	0.86	0.81	10.01	2.85		0						0.95			0.413	Non-Liq.	Non-Liq.	0.00
41.17	22.56	0.24	1.06	120	1.346	0.841	1.13	0.78	0.83	16.60	2.59		1	2	3.24		1.00	53.8	0.95	0.094	0.090	0.412	0.22	99%	2.41
41.34	26.89	0.60	2.23	120	1.351	0.840	2.35	0.82	0.82	19.78	2.69		0						0.95			0.412	Non-Liq.	Non-Liq.	0.00
41.50	20.84	0.62	2.98	120	1.356	0.838	3.18	0.87	0.81	14.85	2.87		0						0.95			0.411	Non-Liq.	Non-Liq.	0.00
41.67	24.09	0.50	2.08	120	1.360	0.837	2.20	0.82	0.81	17.46	2.72		0						0.95			0.411	Non-Liq.	Non-Liq.	0.00
41.83	38.62	0.36	0.93	120	1.365	0.835	0.97	0.71	0.83	29.39	2.34		1	26	2.07		1.00	60.9	0.95	0.101	0.096	0.410	0.23	99%	2.22
41.99	19.76	0.23	1.16	120	1.370	0.834	1.25	0.81	0.81	14.11	2.67		0						0.95			0.410	Non-Liq.	Non-Liq.	0.00
42.16	13.57	0.31	2.28	120	1.374	0.832	2.54	0.91	0.79	9.10	2.99		0						0.95			0.409	Non-Liq.	Non-Liq.	0.00
42.32	20.77	0.51	2.46	120	1.379	0.831	2.63	0.86	0.80	14.60	2.83		0						0.95			0.409	Non-Liq.	Non-Liq.	0.00
42.49	22.62	0.29	1.28	120	1.384	0.829	1.37	0.80	0.81	16.20	2.64		0						0.95			0.408	Non-Liq.	Non-Liq.	0.00
42.65	21.79	0.24	1.10	120	1.389	0.827	1.18	0.79	0.81	15.54	2.62		0						0.95			0.407	Non-Liq.	Non-Liq.	0.00
42.81	18.16	0.32	1.76	120	1.393	0.826	1.91	0.85	0.79	12.54	2.81		0						0.95			0.407	Non-Liq.	Non-Liq.	0.00
42.98	25.43	0.45	1.77	120	1.398	0.824	1.87	0.81	0.80	18.13	2.67		0						0.95			0.406	Non-Liq.	Non-Liq.	0.00
43.14	34.73	0.51	1.47	120	1.403	0.823	1.53	0.76	0.81	25.44	2.50		1	20	2.75		1.00	70.1	0.95	0.112	0.106	0.406	0.26	99%	2.00
43.31	34.35	0.45	1.31	120	1.407	0.821	1.37	0.75	0.81	25.13	2.47		1	20	2.64		1.00	66.4	0.94	0.107	0.101	0.405	0.25	99%	2.09
43.47	35.50	0.64	1.80	120	1.412	0.820	1.88	0.77	0.80	25.79	2.54		1	21	3.00		1.00	77.3	0.94	0.123	0.116	0.405	0.29	98%	1.86
43.64	36.20	0.63	1.74	120	1.417	0.818	1.81	0.77	0.80	26.28	2.53		1	21	2.91		1.00	76.5	0.94	0.122	0.115	0.404	0.28	98%	1.87
43.80	92.79	0.67	0.72	120	1.422	0.816	0.73	0.59	0.84	72.54	1.94		1	64	1.23	0.20	1.52	135.5	0.92	0.312	0.285	0.403	0.71	76%	1.02
43.96	101.84	0.76	0.75	120	1.426	0.815	0.76	0.58	0.84	79.75	1.92		1	67	1.20	0.20	1.52	145.7	0.91	0.368	0.336	0.403	0.84	64%	0.74
44.13	107.70	1.13	1.05	120	1.431	0.813	1.06	0.60	0.83	83.69	1.99		1	69	1.28	0.20	1.52	163.1	0.91	Infin.	0.000	0.402	Non-Liq.	Non-Liq.	0.00
44.29	100.94	0.83	0.82	120	1.436	0.811	0.83	0.59	0.83	78.51	1.95		1	67	1.23	0.20	1.52	147.2	0.91	0.377	0.344	0.401	0.86	63%	0.69
44.46	94.57	0.99	1.05	120	1.441	0.810	1.06	0.62	0.83	72.73	2.03		1	64	1.35		1.00	98.1	0.91	0.168	0.153	0.401	0.38	96%	1.50
44.62	88.20	0.91	1.03	120	1.445	0.808	1.05	0.63	0.82	67.47	2.06		1	60	1.38		1.00	93.3	0.91	0.155	0.142	0.400	0.35	97%	1.58
44.78	80.74	0.79	0.98	120	1.450	0.807	1.00	0.63	0.82	61.43	2.08		1	57	1.41		1.00	86.9	0.91	0.141	0.128	0.400	0.32	98%	1.68
44.95	74.69	0.58	0.78	120	1.455	0.805	0.79	0.62	0.82	56.77	2.05		1	53	1.37		1.00	77.7	0.91	0.124	0.112	0.399	0.28	98%	1.85
45.11	63.73	0.82	1.29	120	1.459	0.803	1.32	0.68	0.80	47.29	2.24		1	46	1.77		1.00	83.7	0.94	0.135	0.126	0.398	0.32	98%	1.74
45.28	53.40	1.33	2.49	120	1.464	0.802	2.56	0.76	0.78	38.40	2.49	1	0		2.73		1.00		0.94			0.398	Non-Liq.	Non-Liq.	0.00
45.44	59.78	1.19	1.99	120	1.469	0.800	2.04	0.72	0.79	43.46	2.39		1	42	2.26		1.00	98.2	0.94	0.168	0.157	0.397	0.40	96%	1.50
45.60	83.16	0.87	1.05	120	1.474	0.798	1.07	0.63	0.81	62.58	2.09		1	57	1.43		1.00	89.6	0.91	0.147	0.133	0.396	0.34	97%	1.63
45.77	85.71	1.03	1.20	120	1.478	0.797	1.22	0.64	0.81	64.22	2.11		1	58	1.48		1.00	95.2	0.90	0.160	0.145	0.396	0.37	96%	1.54
45.93	89.79	1.40	1.56	120	1.483	0.795	1.59	0.66	0.80	66.79	2.17		1	60	1.60		1.00	107.1	0.90	0.194	0.176	0.395	0.44	94%	1.37
46.10	61.37	1.34	2.18	120	1.488	0.793	2.24	0.73	0.78	44.13	2.41	1	0		2.34		1.00		0.93			0.394	Non-Liq.	Non-Liq.	0.00
46.26	44.86	1.16	2.59	120	1.493	0.792	2.67	0.78	0.76	31.35	2.57	1	0		3.15		1.00		0.93			0.394	Non-Liq.	Non-Liq.	0.00
46.42	36.01	0.76	2.11	120	1.497	0.790	2.20	0.79	0.76	24.82	2.60	1	0		3.31		1.00		0.93			0.393	Non-Liq.	Non-Liq.	0.00
46.59	21.22	0.48	2.26	120	1.502	0.788	2.43	0.86	0.74	13.80	2.83	1	0						0.93			0.392	Non-Liq.	Non-Liq.	0.00
46.75	39.00	0.49	1.26	120	1.507	0.787	1.31	0.74	0.77	27.30	2.43	1	0		2.45		1.00		0.93			0.392	Non-Liq.	Non-Liq.	0.00
46.92	51.30	0.60	1.17	120	1.511	0.785	1.21	0.70	0.78	36.66	2.31		1	35	1.97		1.00	72.3	0.93	0.115	0.107	0.391	0.27	99%	1.95
47.08	34.41	0.76	2.21	120	1.516	0.783	2.31	0.80	0.75	23.34	2.63		0						0.93			0.390	Non-Liq.	Non-Liq.	0.00
47.24	22.37	0.52	2.32	120	1.521	0.782	2.49	0.85	0.73	14.46	2.82		0						0.93			0.390	Non-Liq.	Non-Liq.	0.00
47.41	17.08	0.32	1.87	120	1.526	0.780	2.06	0.87	0.73	10.68	2.88		0						0.93			0.389	Non-Liq.	Non-Liq.	0.00
47.57	15.68	0.26	1.66	120	1.530	0.778	1.84	0.88	0.72	9.68	2.89		0						0.93			0.388	Non-Liq.	Non-Liq.	0.00
47.74	14.72	0.22	1.49	120	1.535	0.777	1.67	0.88	0.72	8.99	2.90		0						0.93			0.388	Non-Liq.	Non-Liq.	0.00
47.90	14.59	0.25	1.71	120	1.540	0.775	1.92	0.89	0.72	8.84	2.94		0						0.93			0.387	Non-Liq.	Non-Liq.	0.00
48.06	14.40	0.29	2.01	120	1.544	0.773	2.26	0.90	0.71	8.64	2.98		0						0.93			0.386	Non-Liq.	Non-Liq.	0.00
48.23	14.91	0.33	2.21	120	1.549	0.772	2.47	0.91	0.71	8.94	2.99		0						0.93			0.386	Non-Liq.	Non-Liq.	0.00
48.39	15.55	0.35	2.25	120	1.554	0.770	2.50	0.90	0.71	9.36	2.98		0						0.93			0.385	Non-Liq.	Non-Liq.	0.00
48.56	15.49	0.38	2.45	120	1.559	0.768	2.73	0.91	0.70	9.26	3.00		0						0.93			0.384	Non-Liq.	Non-Liq.	0.00
48.72	15.42	0.38	2.46	120	1.563	0.767	2.74	0.91	0.70	9.18	3.01		0						0.92			0.384	Non-Liq.	Non-Liq.	0.00
48.88	15.29	0.37	2.42	120	1.568	0.765	2.70	0.91	0.70	9.07	3.01		0						0.92			0.383	Non-Liq.	Non-Liq.	0.00
49.05	15.42	0.36	2.33	120	1.573	0.763	2.60	0.91	0.70	9.14	2.99		0						0.92			0.382	Non-Liq.	Non-Liq.	0.00
49.21	15.93	0.33	2.07	120	1.578	0.762	2.30	0.89	0.70	9.49	2.95		0						0.92			0.381	Non-Liq.	Non-Liq.	0.00
49.38	16.44	0.34	2.07	120	1.582	0.760	2.29	0.89	0.70	9.82	2.94	1	0						0.92			0.381	Non-Liq.	Non-Liq.	0.00
49.54	14.78	0.35	2.37	120	1.587	0.758	2.65	0.91	0.69	8.61	3.02	1	0						0.92			0.380	Non-Liq.	Non-Liq.	0.00
49.70	15.36	0.35	2.28	120	1.592	0.757	2.54	0.91	0.69	8.99	3.00	1	0						0.92			0.379	Non-Liq.	Non-Liq.	0.00
49.87	15.23	0.32	2.10	120	1.596	0.755	2.35	0.90	0.69	8.89	2.98	1	0						0.92			0.379	Non-Liq.	Non-Liq.	0.00
50.03	18.48	0.32	1.73	120	1.601	0.753	1.90	0.86	0.70	11.16	2.85	1	0						0.92			0.378	Non-Liq.	Non-Liq.	0.00
50.20	21.09	0.32	1.52	120	1.606	0.752	1.64	0.84	0.71	12.99	2.76	1	0						0.92			0.377	Non-Liq.	Non-Liq.	0.00
50.36	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
50.52	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
50.69	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
50.85	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.02	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.18	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.35	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.51	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.67	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.84	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.00	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.17	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.33	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.49	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.66	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.82	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.99	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.15	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.31	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.48	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.64	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.81	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.97	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.13	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.30	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.46	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.63	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.79	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.95	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
55.12	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
55.28	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A

CPT-LIQUEFY.XLS - A SPREADSHEET FOR EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL USING CPT DATA
Developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Project: Paseo De La Playa
Job No: VT-23842-01
Date: 2/27/2007
Sounding: CPT-2
Plot: 2

Methods: Liquefaction Analysis using 1998 NCEER workshop methods (Robertson & Wride)
Post-liquefaction Settlement Analysis from Tokimatsu & Seed (1987)
Dry Sand Settlement by Pradel, ASCE Journal of G&GE, Vol 124, No. 4

Total Liquefied Thickness (feet)
17.1

EARTHQUAKE INFORMATION:

Magnitude:	7	7.5
PGA, g:	0.50	0.42
MSF:	1.19	
GWT, feet:	6.0	
Design GWT, feet:	6.0	

Induced CSR (M=7.5): = 0.65*PGA*(po/p'o)*rd/MSF
Clean Sand Qc1n = C_Q*K_C*K_H*Qc
SF = $CRR_{7.5}$*Kσ/CSR
Use Tokimatsu & Seed (0) or Ishihara &Yoshmine (1): 0
Unit Weight of unsaturated soils: 100 pcf
Unit Weight of saturated soils: 120 pcf
Limiting Ic for liquefiable soils: 2.60
Limiting Ic for K_H: 2.0
Required SF: 1.50
Min SF of Liquefiable Layers: 0.22
Avg SF of Liquefiable Layers: 0.07

Probab	Total
Avg	Induced
12%	Subsidence
Max	(inches)
99%	2.9

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Overide	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_C	H (m)	K_H	Clean Sand Qc1n	Kσ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	*Volumetric Strain (%)*
0.16	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.33	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.49	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.66	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.82	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
0.98	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.15	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.31	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.48	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.64	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.80	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
1.97	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.13	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.30	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.46	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.62	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.79	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
2.95	#N/A	#N/A	#N/A	100	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.12	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.28	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.44	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.61	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.77	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
3.94	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.10	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.27	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.43	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.59	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.76	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
4.92	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
5.09	13.32	0.21	1.58	120	0.276	0.990	1.61	0.78	1.70	20.96	2.58		1	12	3.20		1.00	67.1	1.00	0.108	0.108	0.268	Non-Liq.	Non-Liq.	0.00
5.25	12.68	0.20	1.58	120	0.285	0.990	1.61	0.79	1.70	19.92	2.60		1	10	3.32		1.00	66.0	1.00	0.107	0.107	0.268	Non-Liq.	Non-Liq.	0.00
5.41	10.07	0.24	2.38	120	0.295	0.989	2.46	0.84	1.70	15.71	2.79		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
5.58	8.67	0.30	3.46	120	0.305	0.989	3.59	0.89	1.70	13.44	2.94		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
5.74	11.15	0.28	2.51	120	0.315	0.989	2.58	0.84	1.70	17.41	2.76		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
5.91	12.62	0.14	1.11	120	0.325	0.988	1.14	0.76	1.70	19.76	2.52		1	10	2.88		1.00	56.9	1.00	0.097	0.097	0.267	Non-Liq.	Non-Liq.	0.00
6.07	7.58	0.09	1.19	120	0.335	0.988	1.24	0.83	1.70	11.64	2.74		0						1.00			0.267	Non-Liq.	Non-Liq.	0.00
6.23	5.48	0.10	1.82	120	0.340	0.988	1.95	0.90	1.70	8.26	2.97		0						1.00			0.271	Non-Liq.	Non-Liq.	0.00
6.40	5.86	0.16	2.73	120	0.344	0.987	2.90	0.92	1.70	8.86	3.03		0						1.00			0.274	Non-Liq.	Non-Liq.	0.00
6.56	5.99	0.25	4.17	120	0.349	0.987	4.43	0.95	1.70	9.06	3.13		0						1.00			0.278	Non-Liq.	Non-Liq.	0.00
6.73	10.64	0.24	2.26	120	0.354	0.986	2.33	0.83	1.70	16.53	2.76		0						1.00			0.282	Non-Liq.	Non-Liq.	0.00
6.89	31.99	0.15	0.47	120	0.359	0.986	0.47	0.60	1.70	50.83	1.98		1	49	1.00	0.10	1.64	83.6	1.00	0.134	0.134	0.285	0.47	92%	1.67
7.05	32.69	0.09	0.28	120	0.363	0.986	0.28	0.57	1.70	51.94	1.88		1	50	1.00	0.10	1.64	85.4	1.00	0.138	0.138	0.289	0.48	92%	1.63
7.22	23.07	0.21	0.91	120	0.368	0.985	0.93	0.68	1.70	36.48	2.25		1	35	1.79		1.00	65.3	1.00	0.106	0.106	0.292	0.36	97%	2.11
7.38	15.23	0.18	1.18	120	0.373	0.985	1.21	0.75	1.70	23.87	2.46		1	17	2.60		1.00	62.0	1.00	0.102	0.102	0.295	0.35	97%	2.19
7.55	12.24	0.12	0.98	120	0.378	0.985	1.01	0.76	1.70	19.06	2.51		1	8	2.82		1.00	53.7	1.00	0.094	0.094	0.298	0.32	98%	2.41
7.71	12.24	0.12	0.98	120	0.382	0.984	1.01	0.76	1.70	19.05	2.51		1	8	2.82		1.00	53.7	1.00	0.094	0.094	0.301	0.31	98%	2.41
7.87	14.02	0.17	1.21	120	0.387	0.984	1.25	0.76	1.70	21.91	2.50		1	14	2.78		1.00	61.0	1.00	0.101	0.101	0.304	0.33	97%	2.21
8.04	17.40	0.17	0.98	120	0.392	0.984	1.00	0.72	1.70	27.33	2.37		1	23	2.20		1.00	60.1	1.00	0.100	0.100	0.307	0.33	98%	2.24
8.20	21.73	0.28	1.29	120	0.396	0.983	1.31	0.71	1.70	34.28	2.35		1	32	2.13		1.00	73.0	1.00	0.116	0.116	0.310	0.37	96%	1.93
8.37	21.48	0.62	2.89	120	0.401	0.983	2.94	0.78	1.70	33.87	2.57		1	32	3.16		1.00	107.0	1.00	0.194	0.194	0.313	0.62	83%	1.27
8.53	27.85	0.64	2.30	120	0.406	0.982	2.33	0.73	1.70	44.10	2.42		1	43	2.39		1.00	105.5	1.00	0.189	0.189	0.316	0.60	84%	1.30
8.69	37.53	0.67	1.79	120	0.411	0.982	1.80	0.68	1.70	59.64	2.25		1	55	1.79		1.00	106.8	1.00	0.193	0.193	0.318	0.61	84%	1.28
8.86	38.87	0.85	2.19	120	0.415	0.982	2.21	0.70	1.70	61.79	2.29		1	57	1.93		1.00	119.4	1.00	0.238	0.238	0.321	0.74	73%	1.10
9.02	37.66	0.87	2.31	120	0.420	0.981	2.34	0.70	1.70	59.84	2.32		1	56	2.02		1.00	120.9	1.00	0.244	0.244	0.323	0.76	72%	1.08
9.19	40.08	0.80	2.00	120	0.425	0.981	2.02	0.69	1.70	63.72	2.26		1	58	1.82		1.00	116.1	1.00	0.225	0.225	0.326	0.69	77%	1.16
9.35	48.11	0.69	1.43	120	0.430	0.981	1.45	0.64	1.70	76.61	2.10		1	66	1.46		1.00	111.8	1.00	0.210	0.210	0.328	0.64	81%	1.22
9.51	50.22	0.35	0.70	120	0.434	0.980	0.70	0.58	1.67	78.76	1.90		1	67	1.19	0.15	1.58	148.1	1.00	0.382	0.382	0.330	1.16	38%	0.20
9.68	44.67	0.19	0.43	120	0.439	0.980	0.43	0.56	1.64	68.48	1.84		1	61	1.00	0.15	1.58	108.2	1.00	0.198	0.198	0.333	0.59	85%	1.29
9.84	34.48	0.33	0.96	120	0.444	0.980	0.97	0.64	1.70	54.69	2.11		1	52	1.47		1.00	80.7	1.00	0.129	0.129	0.335	0.38	96%	1.77
10.01	23.13	0.32	1.38	120	0.448	0.979	1.41	0.71	1.70	36.44	2.35		1	35	2.12		1.00	77.1	1.00	0.123	0.123	0.337	0.36	97%	1.84
10.17	18.29	0.18	0.98	120	0.453	0.979	1.01	0.71	1.70	28.66	2.36		1	25	2.14		1.00	61.3	1.00	0.101	0.101	0.339	0.30	98%	2.21
10.33	13.32	0.11	0.83	120	0.458	0.979	0.86	0.74	1.70	20.67	2.44		1	11	2.50		1.00	51.6	1.00	0.093	0.093	0.341	0.27	99%	2.47
10.50	5.42	0.14	2.58	120	0.463	0.978	2.82	0.93	1.70	7.97	3.06		0						1.00			0.343	Non-Liq.	Non-Liq.	0.00
10.66	6.44	0.19	2.95	120	0.467	0.978	3.18	0.92	1.70	9.60	3.03		0						1.00			0.345	Non-Liq.	Non-Liq.	0.00
10.83	34.60	0.32	0.92	120	0.472	0.978	0.94	0.64	1.68	54.07	2.11		1	51	1.47		1.00	79.3	1.00	0.126	0.126	0.347	0.36	97%	1.80
10.99	75.90	0.47	0.62	120	0.477	0.977	0.62	0.53	1.53	109.15	1.75		1	80	1.07	0.15	1.58	185.4	1.00	Infin.	0.000	0.349	Non-Liq.	Non-Liq.	0.00
11.15	82.91	0.54	0.65	120	0.481	0.977	0.66	0.53	1.52	118.23	1.74		1	84	1.06	0.15	1.58	198.8	1.00	Infin.	0.000	0.351	Non-Liq.	Non-Liq.	0.00
11.32	72.71	0.68	0.94	120	0.486	0.977	0.94	0.57	1.56	106.32	1.87		1	79	1.16	0.15	1.58	195.6	1.00	Infin.	0.000	0.353	Non-Liq.	Non-Liq.	0.00
11.48	47.22	0.84	1.78	120	0.491	0.976	1.80	0.66	1.66	73.41	2.18		1	64	1.62		1.00	118.7	1.00	0.236	0.236	0.354	0.66	79%	1.17
11.65	28.68	0.78	2.72	120	0.496	0.976	2.77	0.75	1.70	45.29	2.46		1	44	2.58		1.00	116.7	1.00	0.228	0.228	0.356	0.64	81%	1.20
11.81	16.38	0.62	3.79	120	0.500	0.975	3.90	0.83	1.70	25.52	2.75		0						1.00			0.358	Non-Liq.	Non-Liq.	0.00
11.98	9.18	0.40	4.36	120	0.505	0.975	4.61	0.91	1.70	13.94	2.99		0						1.00			0.360	Non-Liq.	Non-Liq.	0.00

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_c	H (m)	K_H	Clean Sand Qc1n	K_σ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	Volumetric Strain (%)
12.14	7.26	0.21	2.89	120	0.510	0.975	3.11	0.90	1.70	10.85	2.98		0						1.00			0.361	**Non-Liq.**	Non-Liq.	**0.00**
12.30	7.58	0.24	3.17	120	0.515	0.974	3.40	0.90	1.70	11.35	2.98		0						1.00			0.363	**Non-Liq.**	Non-Liq.	**0.00**
12.47	7.07	0.31	4.38	120	0.519	0.974	4.73	0.94	1.70	10.53	3.10		0						1.00			0.364	**Non-Liq.**	Non-Liq.	**0.00**
12.63	6.88	0.32	4.65	120	0.524	0.974	5.03	0.94	1.70	10.21	3.12		0						1.00			0.366	**Non-Liq.**	Non-Liq.	**0.00**
12.80	6.88	0.23	3.34	120	0.529	0.973	3.62	0.92	1.70	10.21	3.04		0						1.00			0.367	**Non-Liq.**	Non-Liq.	**0.00**
12.96	7.01	0.22	3.14	120	0.533	0.973	3.40	0.91	1.70	10.41	3.01		0						1.00			0.369	**Non-Liq.**	Non-Liq.	**0.00**
13.12	7.14	0.31	4.34	120	0.538	0.973	4.70	0.94	1.70	10.61	3.09		0						1.00			0.370	**Non-Liq.**	Non-Liq.	**0.00**
13.29	31.48	0.42	1.33	120	0.543	0.972	1.36	0.68	1.58	46.18	2.26		1	45	1.82		1.00	83.8	1.00	0.135	0.135	0.372	**0.36**	97%	**1.73**
13.45	49.90	0.51	1.02	120	0.548	0.972	1.03	0.62	1.50	70.16	2.04		1	62	1.36		1.00	95.1	1.00	0.160	0.160	0.373	**0.43**	94%	**1.54**
13.62	52.57	0.15	0.29	120	0.552	0.972	0.29	0.54	1.42	69.69	1.76		1	62	1.00	0.10	1.64	114.6	1.00	0.220	0.220	0.374	**0.59**	85%	**1.25**
13.78	47.92	0.32	0.67	120	0.557	0.971	0.68	0.60	1.47	65.59	1.96		1	59	1.25	0.10	1.64	134.7	1.00	0.307	0.307	0.376	**0.82**	66%	**1.01**
13.94	38.11	0.39	1.02	120	0.562	0.971	1.04	0.65	1.51	53.51	2.14		1	51	1.52		1.00	81.5	1.00	0.130	0.130	0.377	**0.35**	97%	**1.77**
14.11	22.37	0.33	1.48	120	0.567	0.971	1.51	0.73	1.58	32.51	2.41	1	0		2.34		1.00		1.00			0.378	**Non-Liq.**	Non-Liq.	**0.00**
14.27	13.64	0.37	2.71	120	0.571	0.970	2.83	0.83	1.66	20.56	2.73	1	0						1.00			0.380	**Non-Liq.**	Non-Liq.	**0.00**
14.44	10.26	0.37	3.61	120	0.576	0.970	3.82	0.88	1.70	15.56	2.90		0						1.00			0.381	**Non-Liq.**	Non-Liq.	**0.00**
14.60	9.94	0.19	1.91	120	0.581	0.970	2.03	0.84	1.65	14.62	2.77		0						1.00			0.382	**Non-Liq.**	Non-Liq.	**0.00**
14.76	30.33	0.21	0.69	120	0.585	0.969	0.71	0.65	1.47	41.30	2.14		1	40	1.53		1.00	63.3	1.00	0.104	0.104	0.383	**0.27**	99%	**2.16**
14.93	24.79	0.41	1.65	120	0.590	0.969	1.69	0.73	1.53	35.04	2.41	1	0		2.35		1.00		1.00			0.384	**Non-Liq.**	Non-Liq.	**0.00**
15.09	18.23	0.47	2.58	120	0.595	0.969	2.67	0.80	1.58	26.37	2.63		0						1.00			0.386	**Non-Liq.**	Non-Liq.	**0.00**
15.26	22.75	0.41	1.80	120	0.600	0.968	1.85	0.75	1.53	32.00	2.46	1	0		2.59		1.00		1.00			0.387	**Non-Liq.**	Non-Liq.	**0.00**
15.42	12.49	0.30	2.40	120	0.604	0.968	2.52	0.83	1.59	17.90	2.75		0						1.00			0.388	**Non-Liq.**	Non-Liq.	**0.00**
15.58	7.33	0.26	3.55	120	0.609	0.967	3.87	0.92	1.66	10.56	3.04		0						1.00			0.389	**Non-Liq.**	Non-Liq.	**0.00**
15.75	6.88	0.14	2.03	120	0.614	0.967	2.23	0.89	1.62	9.62	2.94		0						1.00			0.390	**Non-Liq.**	Non-Liq.	**0.00**
15.91	10.39	0.16	1.54	120	0.618	0.967	1.64	0.82	1.56	14.38	2.72		0						1.00			0.391	**Non-Liq.**	Non-Liq.	**0.00**
16.08	13.96	0.27	1.93	120	0.623	0.966	2.02	0.81	1.53	19.32	2.66		0						1.00			0.392	**Non-Liq.**	Non-Liq.	**0.00**
16.24	19.12	0.57	2.98	120	0.628	0.966	3.08	0.81	1.52	26.63	2.66		0						1.00			0.393	**Non-Liq.**	Non-Liq.	**0.00**
16.40	38.04	0.89	2.34	120	0.633	0.966	2.38	0.72	1.45	51.22	2.38	1	0		2.22		1.00		1.00			0.394	**Non-Liq.**	Non-Liq.	**0.00**
16.57	28.55	0.43	1.51	120	0.637	0.965	1.54	0.72	1.44	37.91	2.36	1	0		2.15		1.00		1.00			0.395	**Non-Liq.**	Non-Liq.	**0.00**
16.73	21.41	0.36	1.68	120	0.642	0.965	1.73	0.75	1.46	28.60	2.49	1	0		2.70		1.00		1.00			0.396	**Non-Liq.**	Non-Liq.	**0.00**
16.90	14.98	0.31	2.07	120	0.647	0.965	2.16	0.81	1.49	20.16	2.67	1	0						1.00			0.397	**Non-Liq.**	Non-Liq.	**0.00**
17.06	15.61	0.29	1.86	120	0.652	0.964	1.94	0.80	1.47	20.80	2.63		0						1.00			0.398	**Non-Liq.**	Non-Liq.	**0.00**
17.22	13.64	0.73	5.35	120	0.656	0.964	5.62	0.89	1.53	18.80	2.95		0						1.00			0.399	**Non-Liq.**	Non-Liq.	**0.00**
17.39	22.88	0.80	3.50	120	0.661	0.963	3.60	0.81	1.46	30.69	2.66		0						1.00			0.399	**Non-Liq.**	Non-Liq.	**0.00**
17.55	34.73	0.37	1.07	120	0.666	0.963	1.09	0.67	1.37	43.98	2.22	1	0		1.71		1.00		1.00			0.400	**Non-Liq.**	Non-Liq.	**0.00**
17.72	24.47	0.50	2.04	120	0.670	0.963	2.10	0.76	1.41	31.79	2.50	1	0		2.77		1.00		1.00			0.401	**Non-Liq.**	Non-Liq.	**0.00**
17.88	61.37	0.46	0.75	120	0.675	0.962	0.76	0.59	1.30	74.76	1.94		1	65	1.23	0.20	1.52	139.3	1.00	0.332	0.332	0.402	**0.83**	65%	**1.00**
18.04	80.87	0.35	0.43	120	0.680	0.962	0.44	0.52	1.26	95.56	1.72		1	75	1.00	0.20	1.52	145.1	1.00	0.364	0.364	0.403	**0.90**	58%	**0.76**
18.21	82.84	0.38	0.46	120	0.685	0.962	0.46	0.53	1.26	97.60	1.72		1	76	1.00	0.20	1.52	148.2	1.00	0.383	0.383	0.404	**0.95**	54%	**0.67**
18.37	75.45	0.50	0.66	120	0.689	0.961	0.67	0.56	1.27	89.84	1.84		1	72	1.14	0.20	1.52	155.3	1.00	0.429	0.429	0.404	**1.06**	45%	**0.43**
18.54	62.39	1.17	1.88	120	0.694	0.961	1.90	0.66	1.32	77.08	2.18		1	66	1.62		1.00	124.7	1.00	0.260	0.260	0.405	**0.64**	81%	**1.15**
18.70	39.70	0.71	1.79	120	0.699	0.960	1.82	0.70	1.34	49.32	2.31		1	47	1.99		1.00	98.2	1.00	0.168	0.168	0.406	**0.41**	95%	**1.50**
18.86	16.00	0.65	4.06	120	0.704	0.960	4.25	0.86	1.42	20.54	2.84	1	0						1.00			0.407	**Non-Liq.**	Non-Liq.	**0.00**
19.03	15.68	0.57	3.64	120	0.708	0.960	3.81	0.85	1.41	19.94	2.82	1	0						1.00			0.407	**Non-Liq.**	Non-Liq.	**0.00**
19.19	52.38	0.44	0.84	120	0.713	0.959	0.85	0.62	1.28	62.32	2.03		1	57	1.34		1.00	83.8	1.00	0.135	0.135	0.408	**0.33**	97%	**1.74**
19.36	66.40	0.94	1.42	120	0.718	0.959	1.43	0.63	1.28	79.41	2.09		1	67	1.43		1.00	113.8	1.00	0.217	0.217	0.409	**0.53**	89%	**1.28**
19.52	67.55	1.42	2.10	120	0.722	0.958	2.12	0.67	1.29	81.47	2.20		1	68	1.66		1.00	135.1	1.00	0.309	0.309	0.409	**0.76**	72%	**1.03**
19.69	49.96	1.53	3.06	120	0.727	0.958	3.11	0.73	1.31	61.15	2.40		1	56	2.32		1.00	141.8	1.00	0.345	0.345	0.410	**0.84**	64%	**0.88**
19.85	33.52	1.42	4.24	120	0.732	0.957	4.33	0.79	1.34	41.53	2.62	1	0						1.00			0.411	**Non-Liq.**	Non-Liq.	**0.00**
20.01	38.30	1.47	3.84	120	0.737	0.957	3.91	0.77	1.32	46.99	2.55	1	0		3.05		1.00		1.00			0.411	**Non-Liq.**	Non-Liq.	**0.00**
20.18	67.81	1.74	2.57	120	0.741	0.957	2.59	0.69	1.28	80.91	2.26		1	68	1.83		1.00	147.9	1.00	0.381	0.381	0.412	**0.92**	56%	**0.70**
20.34	96.35	2.10	2.18	120	0.746	0.956	2.20	0.64	1.25	113.03	2.11		1	82	1.47		1.00	166.2	1.00	Infin.	0.000	0.413	**Non-Liq.**	Non-Liq.	**0.00**
20.51	118.02	2.38	2.02	120	0.751	0.956	2.03	0.62	1.24	136.93	2.03		1	90	1.34		1.00	183.2	1.00	Infin.	0.000	0.413	**Non-Liq.**	Non-Liq.	**0.00**
20.67	129.49	2.48	1.92	120	0.756	0.955	1.93	0.60	1.23	149.12	1.99		1	93	1.28	0.05	1.71	327.4	1.00	Infin.	0.000	0.414	**Non-Liq.**	Non-Liq.	**0.00**
20.83	116.94	2.41	2.06	120	0.760	0.955	2.07	0.62	1.23	134.77	2.04		1	89	1.35		1.00	182.6	1.00	Infin.	0.000	0.414	**Non-Liq.**	Non-Liq.	**0.00**
21.00	96.23	2.22	2.31	120	0.765	0.954	2.33	0.65	1.23	111.31	2.13		1	81	1.51		1.00	168.6	1.00	Infin.	0.000	0.415	**Non-Liq.**	Non-Liq.	**0.00**
21.16	84.18	1.43	1.70	120	0.770	0.954	1.71	0.63	1.22	96.39	2.08		1	75	1.42		1.00	136.7	1.00	0.317	0.317	0.416	**0.76**	71%	**1.02**
21.33	71.18	0.62	0.87	120	0.774	0.954	0.88	0.59	1.20	80.09	1.95		1	68	1.24	0.05	1.71	170.3	1.00	Infin.	0.000	0.416	**Non-Liq.**	Non-Liq.	**0.00**
21.49	41.61	0.78	1.87	120	0.779	0.953	1.91	0.71	1.24	47.94	2.34	1	0		2.07		1.00		1.00			0.417	**Non-Liq.**	Non-Liq.	**0.00**
21.65	24.92	0.86	3.45	120	0.784	0.953	3.56	0.81	1.28	29.09	2.68	1	0						1.00			0.417	**Non-Liq.**	Non-Liq.	**0.00**
21.82	20.46	0.55	2.69	120	0.789	0.952	2.80	0.81	1.27	23.60	2.66	1	0						1.00			0.418	**Non-Liq.**	Non-Liq.	**0.00**
21.98	20.77	0.49	2.36	120	0.793	0.952	2.45	0.80	1.26	23.77	2.64	1	0						1.00			0.418	**Non-Liq.**	Non-Liq.	**0.00**
22.15	26.83	0.68	2.53	120	0.798	0.951	2.61	0.78	1.25	30.65	2.57	1	0		3.16		1.00		1.00			0.419	**Non-Liq.**	Non-Liq.	**0.00**
22.31	25.17	0.46	1.83	120	0.803	0.951	1.89	0.76	1.23	28.42	2.51	1	0		2.82		1.00		1.00			0.419	**Non-Liq.**	Non-Liq.	**0.00**
22.47	25.36	0.40	1.58	120	0.807	0.950	1.63	0.75	1.22	28.42	2.47	1	0		2.64		1.00		1.00			0.420	**Non-Liq.**	Non-Liq.	**0.00**
22.64	24.41	0.18	0.74	120	0.812	0.950	0.76	0.70	1.20	26.87	2.32		1	22	2.01		1.00	54.1	1.00	0.095	0.095	0.420	**0.23**	99%	**2.40**
22.80	32.18	0.37	1.15	120	0.817	0.949	1.18	0.70	1.20	35.54	2.31		1	34	1.99		1.00	70.8	1.00	0.113	0.113	0.420	**0.27**	99%	**1.99**
22.97	38.87	0.56	1.44	120	0.822	0.949	1.47	0.70	1.19	42.91	2.30		1	42	1.96		1.00	84.0	1.00	0.135	0.135	0.421	**0.32**	98%	**1.74**
23.13	42.57	0.82	1.93	120	0.826	0.948	1.96	0.71	1.19	47.05	2.35		1	46	2.12		1.00	99.7	1.00	0.172	0.172	0.421	**0.41**	95%	**1.48**
23.29	38.94	0.95	2.44	120	0.831	0.948	2.49	0.74	1.20	43.08	2.45	1	0		2.51		1.00		1.00			0.422	**Non-Liq.**	Non-Liq.	**0.00**
23.46	42.44	0.47	1.11	120	0.836	0.947	1.13	0.67	1.17	46.06	2.21		1	45	1.69		1.00	77.9	1.00	0.124	0.124	0.422	**0.29**	98%	**1.85**
23.62	35.05	0.44	1.26	120	0.841	0.947	1.29	0.70	1.18	38.00	2.31		1	37	1.98		1.00	75.4	1.00	0.120	0.120	0.423	**0.28**	98%	**1.89**
23.79	32.37	0.65	2.01	120	0.845	0.946	2.06	0.75	1.18	35.23	2.46	1	0		2.57		1.00		1.00			0.423	**Non-Liq.**	Non-Liq.	**0.00**
23.95	28.61	0.70	2.45	120	0.850	0.946	2.52	0.78	1.18	31.09	2.56	1	0		3.08		1.00		1.00			0.423	**Non-Liq.**	Non-Liq.	**0.00**
24.11	27.15	1.22	4.49	120	0.855	0.945	4.64	0.83	1.19	29.68	2.75		0						1.00			0.424	**Non-Liq.**	Non-Liq.	**0.00**
24.28	28.93	1.16	4.01	120	0.859	0.945	4.13	0.82	1.18	31.44	2.69		0						1.00			0.424	**Non-Liq.**	Non-Liq.	**0.00**
24.44	45.12	1.49	3.30	120	0.864	0.944	3.37	0.76	1.17	48.75	2.50	1	0		2.75		1.00		1.00			0.424	**Non-Liq.**	Non-Liq.	**0.00**
24.61	58.63	0.85	1.45	120	0.869	0.943	1.47	0.66	1.14	62.18	2.18		1	57	1.61		1.00	100.1	1.00	0.173	0.173	0.425	**0.41**	95%	**1.48**
24.77	102.98	0.68	0.66	120	0.874	0.943	0.67	0.54	1.11	107.06	1.78		1	80	1.09	0.15	1.58	184.6	1.00	Infin.	0.000	0.425	**Non-Liq.**	Non-Liq.	**0.00**
24.93	102.41	0.93	0.91	120	0.878	0.942	0.92	0.57	1.11	106.65	1.86		1	79	1.16	0.15	1.58	195.0	1.00	Infin.	0.000	0.425	**Non-Liq.**	Non-Liq.	**0.00**
25.10	83.48	0.59	0.71	120	0.883	0.942	0.71	0.57	1.11	86.53	1.87	1	0		1.16	0.15	1.58		1.00			0.426	**Non-Liq.**	Non-Liq.	**0.00**
25.26	35.62	1.34	3.76	120	0.888	0.941	3.86	0.79	1.15	37.73	2.62		0						1.00			0.426	**Non-Liq.**	Non-Liq.	**0.00**
25.43	42.70	1.07	2.51	120	0.893	0.941	2.56	0.74	1.13	44.82	2.44		1	44	2.49		1.00	111.5	1.00	0.209	0.209	0.426	**0.49**	91%	**1.32**
25.59	15.23	0.75	4.92	120	0.897	0.940	5.23	0.90	1.16	15.72	2.99		0						1.00			0.426	**Non-Liq.**	Non-Liq.	**0.00**
25.75	14.02	0.40	2.85	120	0.902	0.939	3.05	0.87	1.15	14.25	2.88		0						1.00			0.427	**Non-Liq.**	Non-Liq.	**0.00**
25.92	14.27	0.30	2.10	120	0.907	0.939	2.24	0.85	1.14	14.39	2.80		0						1.00			0.427	**Non-Liq.**	Non-Liq.	**0.00**
26.08	14.91	0.40	2.68	120	0.911	0.938	2.86	0.86	1.14	15.04	2.84		0						1.00			0.427	**Non-Liq.**	Non-Liq.	**0.00**
26.25	16.51	0.36	2.18	120	0.916	0.938	2.31	0.83	1.13	16.62	2.75		0						1.00			0.427	**Non-Liq.**	Non-Liq.	**0.00**
26.41	17.21	0.33	1.92	120	0.921	0.937	2.03	0.82	1.12	17.25	2.71		0						1.00			0.428	**Non-Liq.**	Non-Liq.	**0.00**

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff.Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_C	H (m)	K_H	Clean Sand Qc1n	Kσ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	Volumetric Strain (%)
26.57	16.63	0.47	2.83	120	0.926	0.936	2.99	0.85	1.12	16.64	2.82		0						1.00			0.428	Non-Liq.	Non-Liq.	0.00
26.74	36.58	0.67	1.83	120	0.930	0.936	1.88	0.73	1.10	37.03	2.42		1	36	2.39		1.00	88.4	1.00	0.144	0.144	0.428	0.34	97%	1.66
26.90	91.77	0.77	0.84	120	0.935	0.935	0.85	0.58	1.07	92.19	1.89		1	73	1.18	0.60	1.15	125.7	1.00	0.265	0.265	0.428	0.62	83%	1.15
27.07	97.95	0.64	0.65	120	0.940	0.934	0.66	0.55	1.07	97.87	1.81		1	76	1.11	0.65	1.15	125.5	1.00	0.264	0.264	0.428	0.62	83%	1.15
27.23	85.78	0.57	0.66	120	0.944	0.934	0.67	0.57	1.07	85.51	1.86		1	70	1.15	0.70	1.15	113.7	1.00	0.217	0.217	0.429	0.51	90%	1.30
27.40	70.16	0.69	0.98	120	0.949	0.933	1.00	0.62	1.07	69.95	2.03		1	62	1.34		1.00	94.0	1.00	0.157	0.157	0.429	0.37	96%	1.57
27.56	44.61	1.09	2.44	120	0.954	0.932	2.50	0.74	1.08	44.54	2.44		1	43	2.46		1.00	109.8	1.00	0.203	0.203	0.429	0.47	92%	1.35
27.72	34.48	1.11	3.22	120	0.959	0.932	3.31	0.79	1.08	34.25	2.60		0						1.00			0.429	Non-Liq.	Non-Liq.	0.00
27.89	60.48	1.44	2.38	120	0.963	0.931	2.42	0.71	1.07	60.11	2.33		1	56	2.05		1.00	123.3	1.00	0.254	0.254	0.429	0.59	85%	1.18
28.05	75.71	1.78	2.35	120	0.968	0.930	2.38	0.68	1.06	75.07	2.26		1	65	1.82		1.00	136.4	1.00	0.316	0.316	0.429	0.74	73%	1.03
28.22	95.84	1.10	1.15	120	0.973	0.929	1.16	0.60	1.05	94.29	1.97		1	74	1.26	1.00	1.00	119.7	1.00	0.239	0.239	0.430	0.56	87%	1.22
28.38	125.16	1.22	0.97	120	0.978	0.929	0.98	0.56	1.05	122.68	1.84		1	85	1.14	1.00	1.00	139.6	1.00	0.334	0.334	0.430	0.78	70%	1.00
28.54	136.06	1.54	1.13	120	0.982	0.928	1.14	0.56	1.04	133.14	1.86		1	89	1.15	1.00	1.00	153.6	1.00	0.417	0.417	0.430	0.97	53%	0.60
28.71	148.67	2.07	1.39	120	0.987	0.927	1.40	0.58	1.04	145.28	1.89		1	92	1.18	1.00	1.00	172.2	1.00	Infin.	0.000	0.430	Non-Liq.	Non-Liq.	0.00
28.87	147.78	2.53	1.71	120	0.992	0.926	1.72	0.60	1.04	144.19	1.96		1	92	1.25	1.00	1.00	181.0	1.00	Infin.	0.000	0.430	Non-Liq.	Non-Liq.	0.00
29.04	144.34	1.02	0.71	120	0.996	0.926	0.71	0.52	1.03	139.77	1.70		1	91	1.04	1.00	1.00	146.0	1.00	0.369	0.369	0.430	0.86	62%	0.81
29.20	136.50	0.96	0.70	120	1.001	0.925	0.71	0.52	1.03	131.84	1.72		1	88	1.05	1.00	1.00	139.4	1.00	0.332	0.332	0.430	0.77	70%	1.00
29.36	133.95	0.75	0.56	120	1.006	0.924	0.56	0.51	1.03	128.93	1.67		1	87	1.02	1.00	1.00	131.7	1.00	0.293	0.293	0.430	0.68	78%	1.08
29.53	135.55	0.69	0.51	120	1.011	0.923	0.51	0.50	1.02	130.12	1.64		1	86	1.00	1.00	1.00	130.5	1.00	0.287	0.287	0.430	0.67	79%	1.10
29.69	137.01	0.63	0.46	120	1.015	0.923	0.46	0.50	1.02	131.21	1.62		1	88	1.00	1.00	1.00	131.7	1.00	0.292	0.292	0.430	0.68	78%	1.08
29.86	140.71	0.53	0.38	120	1.020	0.922	0.38	0.50	1.02	134.46	1.56		1	89	1.00	1.00	1.00	135.0	1.00	0.309	0.309	0.430	0.72	75%	1.05
30.02	141.54	0.64	0.45	120	1.025	0.921	0.46	0.50	1.02	134.95	1.60		1	89	1.00	1.00	1.00	135.5	1.00	0.311	0.311	0.430	0.72	74%	1.04
30.18	144.21	0.78	0.54	120	1.030	0.920	0.54	0.50	1.01	137.19	1.64		1	90	1.00	1.00	1.00	137.2	1.00	0.320	0.320	0.430	0.74	73%	1.02
30.35	148.55	0.99	0.67	120	1.034	0.919	0.67	0.51	1.01	141.06	1.69		1	91	1.03	1.00	1.00	145.5	1.00	0.367	0.367	0.430	0.85	63%	0.82
30.51	150.52	0.86	0.57	120	1.039	0.918	0.58	0.50	1.01	142.57	1.64		1	92	1.00	1.00	1.00	142.6	1.00	0.350	0.350	0.430	0.81	66%	0.90
30.68	146.44	0.76	0.52	120	1.044	0.918	0.52	0.50	1.01	138.36	1.63		1	90	1.00	1.00	1.00	138.9	1.00	0.329	0.329	0.430	0.76	71%	1.00
30.84	144.91	0.40	0.28	120	1.048	0.917	0.28	0.50	1.00	136.59	1.49		1	90	1.00	1.00	1.00	137.1	1.00	0.320	0.320	0.430	0.74	73%	1.02
31.00	131.98	0.58	0.44	120	1.053	0.916	0.44	0.50	1.00	124.03	1.63		1	86	1.00	1.00	1.00	124.5	1.00	0.259	0.259	0.430	0.60	84%	1.16
31.17	128.66	0.26	0.20	120	1.058	0.915	0.20	0.50	1.00	120.61	1.49		1	85	1.00	1.00	1.00	121.1	1.00	0.245	0.245	0.430	0.57	87%	1.20
31.33	93.23	0.38	0.41	120	1.063	0.914	0.41	0.53	1.00	86.91	1.74		1	71	1.00	1.00	1.00	87.2	1.00	0.142	0.142	0.430	0.33	98%	1.68
31.50	48.69	0.74	1.52	120	1.067	0.913	1.55	0.70	0.99	44.74	2.30		1	43	1.96		1.00	87.6	1.00	0.142	0.142	0.430	0.33	97%	1.68
31.66	23.26	0.67	2.88	120	1.072	0.912	3.02	0.83	0.99	20.74	2.74		0						1.00			0.430	Non-Liq.	Non-Liq.	0.00
31.82	15.17	0.35	2.31	120	1.077	0.911	2.48	0.86	0.98	13.12	2.85		0						1.00			0.430	Non-Liq.	Non-Liq.	0.00
31.99	11.92	0.19	1.59	120	1.081	0.910	1.75	0.87	0.98	10.05	2.87		0						1.00			0.430	Non-Liq.	Non-Liq.	0.00
32.15	14.40	0.35	2.43	120	1.086	0.909	2.63	0.88	0.98	12.30	2.89		0						0.99			0.430	Non-Liq.	Non-Liq.	0.00
32.32	24.53	0.51	2.08	120	1.091	0.908	2.18	0.80	0.98	21.62	2.64		0						0.99			0.430	Non-Liq.	Non-Liq.	0.00
32.48	29.38	0.70	2.38	120	1.096	0.907	2.47	0.79	0.97	26.00	2.61		0						0.99			0.430	Non-Liq.	Non-Liq.	0.00
32.64	31.16	0.85	2.73	120	1.100	0.906	2.83	0.80	0.97	27.54	2.63		0						0.99			0.430	Non-Liq.	Non-Liq.	0.00
32.81	28.68	0.83	2.89	120	1.105	0.905	3.01	0.81	0.97	25.16	2.68		0						0.99			0.429	Non-Liq.	Non-Liq.	0.00
32.97	23.01	0.60	2.61	120	1.110	0.904	2.74	0.83	0.96	19.90	2.73		0						0.99			0.429	Non-Liq.	Non-Liq.	0.00
33.14	23.32	0.48	2.06	120	1.115	0.903	2.16	0.81	0.96	20.12	2.67		0						0.99			0.429	Non-Liq.	Non-Liq.	0.00
33.30	21.03	0.48	2.28	120	1.119	0.902	2.41	0.83	0.95	17.96	2.73		0						0.99			0.429	Non-Liq.	Non-Liq.	0.00
33.46	28.29	0.48	1.70	120	1.124	0.901	1.77	0.77	0.95	24.50	2.55		1	18	3.01		1.00	73.8	0.99	0.117	0.116	0.429	0.27	99%	1.93
33.63	23.13	0.71	3.07	120	1.129	0.900	3.23	0.84	0.95	19.69	2.78		0						0.99			0.429	Non-Liq.	Non-Liq.	0.00
33.79	46.27	0.76	1.64	120	1.133	0.899	1.68	0.72	0.95	40.61	2.36		1	39	2.15		1.00	87.2	0.99	0.142	0.140	0.428	0.33	98%	1.68
33.96	90.75	1.24	1.37	120	1.138	0.898	1.38	0.63	0.96	80.89	2.07		1	66	1.41		1.00	113.7	0.98	0.217	0.212	0.428	0.50	91%	1.29
34.12	88.90	1.73	1.95	120	1.143	0.897	1.97	0.66	0.95	78.81	2.18		1	67	1.63		1.00	128.3	0.98	0.277	0.270	0.428	0.63	82%	1.12
34.28	132.61	1.42	1.07	120	1.148	0.896	1.08	0.57	0.95	118.62	1.88		1	84	1.17	0.20	1.52	210.3	0.97	Infin.	0.000	0.428	Non-Liq.	Non-Liq.	0.00
34.45	110.18	1.20	1.09	120	1.152	0.895	1.10	0.59	0.95	97.98	1.94		1	76	1.23	0.20	1.52	183.5	0.97	Infin.	0.000	0.428	Non-Liq.	Non-Liq.	0.00
34.61	67.61	1.12	1.66	120	1.157	0.894	1.69	0.68	0.94	59.11	2.23		1	55	1.75		1.00	103.2	0.97	0.182	0.177	0.427	0.42	95%	1.44
34.78	35.37	1.28	3.62	120	1.162	0.893	3.74	0.81	0.93	29.97	2.68		0						0.98			0.427	Non-Liq.	Non-Liq.	0.00
34.94	64.56	1.23	1.91	120	1.167	0.892	1.94	0.69	0.93	55.99	2.29		1	53	1.91		1.00	107.1	0.97	0.194	0.189	0.427	0.44	94%	1.38
35.10	113.56	1.12	0.99	120	1.171	0.890	1.00	0.58	0.94	100.14	1.91		1	77	1.20	0.20	1.52	182.1	0.96	Infin.	0.000	0.427	Non-Liq.	Non-Liq.	0.00
35.27	124.33	1.36	1.09	120	1.176	0.889	1.10	0.58	0.94	109.47	1.91		1	81	1.20	0.20	1.52	199.0	0.96	Infin.	0.000	0.427	Non-Liq.	Non-Liq.	0.00
35.43	78.26	1.81	2.31	120	1.181	0.888	2.35	0.69	0.93	67.52	2.29		1	61	1.90		1.00	128.4	0.97	0.277	0.268	0.426	0.63	82%	1.12
35.60	52.89	1.11	2.10	120	1.185	0.887	2.15	0.72	0.92	45.00	2.39		1	44	2.27		1.00	102.1	0.98	0.179	0.175	0.426	0.41	95%	1.45
35.76	36.77	1.04	2.83	120	1.190	0.886	2.92	0.79	0.91	30.65	2.60		0						0.98			0.426	Non-Liq.	Non-Liq.	0.00
35.93	117.70	1.58	1.34	120	1.195	0.885	1.36	0.61	0.93	102.30	1.99		1	78	1.29	0.20	1.52	200.0	0.95	Infin.	0.000	0.425	Non-Liq.	Non-Liq.	0.00
36.09	131.15	1.66	1.27	120	1.200	0.883	1.28	0.59	0.93	114.06	1.94		1	82	1.23	0.20	1.52	212.5	0.95	Infin.	0.000	0.425	Non-Liq.	Non-Liq.	0.00
36.25	127.84	1.17	0.92	120	1.204	0.882	0.92	0.56	0.93	111.26	1.85		1	81	1.15	0.20	1.52	193.9	0.95	Infin.	0.000	0.425	Non-Liq.	Non-Liq.	0.00
36.42	112.99	0.67	0.59	120	1.209	0.881	0.60	0.54	0.93	98.27	1.78		1	76	1.09	0.20	1.52	163.3	0.95	Infin.	0.000	0.425	Non-Liq.	Non-Liq.	0.00
36.58	84.76	0.91	1.07	120	1.214	0.880	1.09	0.62	0.92	72.51	2.04		1	63	1.36		1.00	98.6	0.96	0.169	0.162	0.424	0.38	96%	1.50
36.75	43.91	0.80	1.82	120	1.218	0.878	1.87	0.74	0.90	36.37	2.42		1	35	2.41		1.00	87.7	0.97	0.143	0.139	0.424	0.33	98%	1.67
36.91	24.41	0.47	1.93	120	1.223	0.877	2.03	0.81	0.89	19.50	2.66		0						0.97			0.424	Non-Liq.	Non-Liq.	0.00
37.07	15.80	0.41	2.59	120	1.228	0.876	2.81	0.88	0.88	12.08	2.91		0						0.97			0.423	Non-Liq.	Non-Liq.	0.00
37.24	34.16	0.73	2.14	120	1.233	0.875	2.22	0.78	0.89	27.64	2.56		1	23	3.10		1.00	85.8	0.97	0.139	0.135	0.423	0.32	98%	1.71
37.40	69.72	1.04	1.49	120	1.237	0.873	1.52	0.67	0.90	58.28	2.21		1	54	1.68		1.00	98.1	0.95	0.168	0.160	0.423	0.38	96%	1.51
37.57	93.23	1.45	1.56	120	1.242	0.872	1.58	0.64	0.90	78.41	2.12		1	67	1.49		1.00	116.9	0.95	0.229	0.218	0.422	0.52	90%	1.25
37.73	96.10	1.62	1.69	120	1.247	0.871	1.71	0.65	0.90	80.60	2.13		1	68	1.52		1.00	122.5	0.95	0.251	0.239	0.422	0.57	87%	1.18
37.89	90.43	1.13	1.25	120	1.252	0.869	1.27	0.63	0.90	75.84	2.07		1	65	1.40		1.00	106.2	0.95	0.191	0.182	0.421	0.43	94%	1.39
38.06	81.70	1.08	1.32	120	1.256	0.868	1.34	0.64	0.90	68.07	2.12		1	61	1.49		1.00	101.6	0.95	0.178	0.169	0.421	0.40	95%	1.46
38.22	73.03	1.01	1.38	120	1.261	0.867	1.41	0.66	0.89	60.41	2.17		1	56	1.60		1.00	96.9	0.95	0.165	0.156	0.421	0.37	96%	1.53
38.39	66.59	0.90	1.35	120	1.266	0.865	1.38	0.67	0.89	54.77	2.20		1	52	1.67		1.00	91.5	0.95	0.151	0.143	0.420	0.34	97%	1.61
38.55	60.48	0.51	0.84	120	1.270	0.864	0.86	0.64	0.89	49.75	2.12		1	48	1.49		1.00	73.9	0.96	0.118	0.113	0.420	0.27	99%	1.92
38.71	46.90	0.28	0.60	120	1.275	0.863	0.61	0.65	0.89	38.19	2.14		1	37	1.53		1.00	58.5	0.96	0.099	0.095	0.419	0.23	99%	2.28
38.88	27.40	0.26	0.95	120	1.280	0.861	1.00	0.75	0.87	21.42	2.46		1	13	2.58		1.00	55.3	0.96	0.096	0.092	0.419	0.22	99%	2.37
39.04	15.55	0.26	1.67	120	1.285	0.860	1.82	0.86	0.85	11.42	2.83		0						0.96			0.419	Non-Liq.	Non-Liq.	0.00
39.21	13.38	0.19	1.42	120	1.289	0.859	1.57	0.87	0.84	9.63	2.86		0						0.96			0.418	Non-Liq.	Non-Liq.	0.00
39.37	12.81	0.16	1.25	120	1.294	0.857	1.39	0.86	0.84	9.15	2.86		0						0.96			0.418	Non-Liq.	Non-Liq.	0.00
39.53	13.32	0.20	1.50	120	1.299	0.856	1.66	0.87	0.84	9.50	2.88		0						0.96			0.417	Non-Liq.	Non-Liq.	0.00
39.70	15.29	0.22	1.44	120	1.304	0.854	1.57	0.85	0.84	11.07	2.81		0						0.96			0.417	Non-Liq.	Non-Liq.	0.00
39.86	17.40	0.29	1.67	120	1.308	0.853	1.80	0.84	0.84	12.71	2.79		0						0.96			0.416	Non-Liq.	Non-Liq.	0.00
40.03	18.10	0.42	2.32	120	1.313	0.852	2.50	0.86	0.83	13.17	2.85		0						0.96			0.416	Non-Liq.	Non-Liq.	0.00
40.19	22.05	0.37	1.68	120	1.318	0.850	1.78	0.82	0.84	16.38	2.69		0						0.96			0.415	Non-Liq.	Non-Liq.	0.00
40.35	18.03	0.31	1.72	120	1.322	0.849	1.86	0.84	0.83	13.08	2.78		0						0.96			0.415	Non-Liq.	Non-Liq.	0.00
40.52	13.76	0.19	1.38	120	1.327	0.847	1.53	0.86	0.82	9.66	2.85		0						0.96			0.414	Non-Liq.	Non-Liq.	0.00
40.68	12.49	0.16	1.28	120	1.332	0.846	1.43	0.87	0.82	8.63	2.88		0						0.96			0.414	Non-Liq.	Non-Liq.	0.00
40.85	11.85	0.18	1.52	120	1.337	0.844	1.71	0.89	0.81	8.07	2.95		0						0.95			0.413	Non-Liq.	Non-Liq.	0.00

Layer Depth (feet)	Tip Qc (tsf)	Friction Fs (tsf)	Friction Ratio %	Total Unit Wt. (pcf)	Eff. Stress at Midpt. p'o (tsf)	rd	F	n	C_Q	Corrected Qc1n	Ic	Override	Liquef. Suscept (0 or 1)	Rel. Dens. Dr (%)	K_c	H (m)	K_H	Clean Sand Qc1n	K_σ	$CRR_{7.5}$	EQ CRR	Induced M=7.5 CSR	Liquefac. Safety Factor	Probab. P_L	Volumetric Strain (%)
41.01	12.62	0.20	1.58	120	1.341	0.843	1.77	0.89	0.81	8.64	2.93		0						0.95			0.413	Non-Liq.	Non-Liq.	0.00
41.17	12.94	0.20	1.55	120	1.346	0.841	1.73	0.88	0.81	8.86	2.91		0						0.95			0.412	Non-Liq.	Non-Liq.	0.00
41.34	13.19	0.20	1.52	120	1.351	0.840	1.69	0.88	0.81	9.03	2.90		0						0.95			0.412	Non-Liq.	Non-Liq.	0.00
41.50	19.25	0.38	1.97	120	1.356	0.838	2.12	0.85	0.81	13.71	2.80		0						0.95			0.411	Non-Liq.	Non-Liq.	0.00
41.67	25.94	0.35	1.35	120	1.360	0.837	1.42	0.78	0.82	19.08	2.58		1	8	3.23		1.00	61.7	0.95	0.102	0.097	0.411	0.24	99%	2.20
41.83	17.52	0.42	2.40	120	1.365	0.835	2.60	0.87	0.80	12.22	2.89		0						0.95			0.410	Non-Liq.	Non-Liq.	0.00
41.99	16.82	0.42	2.50	120	1.370	0.834	2.72	0.88	0.80	11.62	2.92		0						0.95			0.410	Non-Liq.	Non-Liq.	0.00
42.16	49.77	0.68	1.37	120	1.374	0.832	1.41	0.71	0.83	38.01	2.33		1	37	2.06		1.00	78.3	0.95	0.125	0.118	0.409	0.29	98%	1.84
42.32	49.45	0.95	1.92	120	1.379	0.831	1.98	0.74	0.82	37.38	2.43		1	36	2.43		1.00	90.9	0.95	0.150	0.142	0.409	0.35	97%	1.62
42.49	35.05	0.74	2.11	120	1.384	0.829	2.20	0.78	0.81	25.79	2.58		1	21	3.23		1.00	83.3	0.95	0.134	0.127	0.408	0.31	98%	1.75
42.65	22.24	0.44	1.98	120	1.389	0.827	2.11	0.83	0.80	15.72	2.75		0						0.95			0.407	Non-Liq.	Non-Liq.	0.00
42.81	15.80	0.19	1.20	120	1.393	0.826	1.32	0.84	0.79	10.80	2.78		0						0.95			0.407	Non-Liq.	Non-Liq.	0.00
42.98	15.29	0.18	1.18	120	1.398	0.824	1.30	0.85	0.79	10.37	2.79		0						0.95			0.406	Non-Liq.	Non-Liq.	0.00
43.14	17.21	0.20	1.16	120	1.403	0.823	1.27	0.83	0.79	11.82	2.74		0						0.95			0.406	Non-Liq.	Non-Liq.	0.00
43.31	18.23	0.21	1.15	120	1.407	0.821	1.25	0.82	0.79	12.58	2.71		0						0.94			0.405	Non-Liq.	Non-Liq.	0.00
43.47	16.31	0.20	1.23	120	1.412	0.820	1.34	0.84	0.78	11.05	2.78		0						0.94			0.405	Non-Liq.	Non-Liq.	0.00
43.64	16.25	0.19	1.17	120	1.417	0.818	1.28	0.84	0.78	10.97	2.77		0						0.94			0.404	Non-Liq.	Non-Liq.	0.00
43.80	15.29	0.15	0.98	120	1.422	0.816	1.08	0.84	0.78	10.24	2.76		0						0.94			0.403	Non-Liq.	Non-Liq.	0.00
43.96	14.72	0.15	1.02	120	1.426	0.815	1.13	0.84	0.78	9.76	2.79		0						0.94			0.403	Non-Liq.	Non-Liq.	0.00
44.13	13.83	0.17	1.23	120	1.431	0.813	1.37	0.87	0.77	9.02	2.86		0						0.94			0.402	Non-Liq.	Non-Liq.	0.00
44.29	13.76	0.19	1.38	120	1.436	0.811	1.54	0.87	0.77	8.92	2.89		0						0.94			0.401	Non-Liq.	Non-Liq.	0.00
44.46	14.98	0.19	1.27	120	1.441	0.810	1.40	0.86	0.77	9.82	2.83		0						0.94			0.401	Non-Liq.	Non-Liq.	0.00
44.62	15.80	0.21	1.33	120	1.445	0.808	1.46	0.85	0.77	10.40	2.82		0						0.94			0.400	Non-Liq.	Non-Liq.	0.00
44.78	15.93	0.24	1.51	120	1.450	0.807	1.66	0.86	0.76	10.43	2.84		0						0.94			0.400	Non-Liq.	Non-Liq.	0.00
44.95	16.25	0.27	1.66	120	1.455	0.805	1.82	0.87	0.76	10.62	2.86		0						0.94			0.399	Non-Liq.	Non-Liq.	0.00
45.11	19.69	0.34	1.73	120	1.459	0.803	1.87	0.84	0.76	13.14	2.78		0						0.94			0.398	Non-Liq.	Non-Liq.	0.00
45.28	22.43	0.39	1.74	120	1.464	0.802	1.86	0.83	0.76	15.14	2.73		0						0.94			0.398	Non-Liq.	Non-Liq.	0.00
45.44	26.51	0.48	1.81	120	1.469	0.800	1.92	0.81	0.77	18.14	2.67		0						0.94			0.397	Non-Liq.	Non-Liq.	0.00
45.60	27.85	0.35	1.26	120	1.474	0.798	1.33	0.78	0.77	19.27	2.56	1	0		3.12		1.00		0.94			0.396	Non-Liq.	Non-Liq.	0.00
45.77	29.89	0.47	1.57	120	1.478	0.797	1.65	0.79	0.77	20.65	2.59	1	0		3.27		1.00		0.94			0.396	Non-Liq.	Non-Liq.	0.00
45.93	33.46	0.76	2.27	120	1.483	0.795	2.38	0.80	0.76	23.06	2.64	1	0						0.93			0.395	Non-Liq.	Non-Liq.	0.00
46.10	53.47	1.34	2.51	120	1.488	0.793	2.58	0.76	0.77	37.95	2.50	1	0		2.75		1.00		0.93			0.394	Non-Liq.	Non-Liq.	0.00
46.26	53.21	1.19	2.24	120	1.493	0.792	2.30	0.75	0.77	37.79	2.47	1	0		2.61		1.00		0.93			0.394	Non-Liq.	Non-Liq.	0.00
46.42	47.48	1.03	2.17	120	1.497	0.790	2.24	0.76	0.77	33.40	2.50	1	0		2.77		1.00		0.93			0.393	Non-Liq.	Non-Liq.	0.00
46.59	35.18	0.82	2.33	120	1.502	0.788	2.43	0.80	0.76	24.06	2.63		0						0.93			0.392	Non-Liq.	Non-Liq.	0.00
46.75	31.93	1.07	3.35	120	1.507	0.787	3.52	0.84	0.74	21.36	2.77		0						0.93			0.392	Non-Liq.	Non-Liq.	0.00
46.92	30.65	1.39	4.54	120	1.511	0.785	4.77	0.87	0.73	20.18	2.88	1	0						0.93			0.391	Non-Liq.	Non-Liq.	0.00
47.08	117.00	0.59	0.50	120	1.516	0.783	0.51	0.54	0.82	89.83	1.78		1	72	1.09	0.10	1.64	161.1	0.87	Infin.	0.000	0.390	Non-Liq.	Non-Liq.	0.00
47.24	124.08	0.37	0.30	120	1.521	0.782	0.30	0.50	0.83	96.60	1.64		1	75	1.00	0.10	1.64	158.8	0.86	0.453	0.391	0.390	1.00	50%	0.20
47.41	23.83	0.18	0.76	120	1.526	0.780	0.81	0.77	0.76	15.92	2.53	1	0		2.94		1.00		0.93			0.389	Non-Liq.	Non-Liq.	0.00
47.57	16.00	0.17	1.06	120	1.530	0.778	1.17	0.84	0.73	10.02	2.79		0						0.93			0.388	Non-Liq.	Non-Liq.	0.00
47.74	15.42	0.25	1.62	120	1.535	0.777	1.80	0.88	0.72	9.47	2.90		0						0.93			0.388	Non-Liq.	Non-Liq.	0.00
47.90	17.78	0.37	2.08	120	1.540	0.775	2.28	0.88	0.72	11.05	2.89		0						0.93			0.387	Non-Liq.	Non-Liq.	0.00
48.06	24.22	0.46	1.90	120	1.544	0.773	2.03	0.83	0.73	15.66	2.74		0						0.93			0.386	Non-Liq.	Non-Liq.	0.00
48.23	25.75	0.42	1.63	120	1.549	0.772	1.74	0.81	0.73	16.79	2.68		0						0.93			0.386	Non-Liq.	Non-Liq.	0.00
48.39	17.65	0.40	2.27	120	1.554	0.770	2.49	0.88	0.71	10.83	2.92		0						0.93			0.385	Non-Liq.	Non-Liq.	0.00
48.56	17.59	0.35	1.99	120	1.559	0.768	2.18	0.88	0.71	10.79	2.89		0						0.93			0.384	Non-Liq.	Non-Liq.	0.00
48.72	17.59	0.29	1.65	120	1.563	0.767	1.81	0.86	0.71	10.82	2.85		0						0.92			0.384	Non-Liq.	Non-Liq.	0.00
48.88	16.57	0.31	1.87	120	1.568	0.765	2.07	0.88	0.71	10.03	2.91		0						0.92			0.383	Non-Liq.	Non-Liq.	0.00
49.05	16.06	0.33	2.05	120	1.573	0.763	2.28	0.89	0.70	9.62	2.95		0						0.92			0.382	Non-Liq.	Non-Liq.	0.00
49.21	15.74	0.33	2.10	120	1.578	0.762	2.33	0.90	0.70	9.36	2.96		0						0.92			0.381	Non-Liq.	Non-Liq.	0.00
49.38	15.10	0.39	2.58	120	1.582	0.760	2.89	0.92	0.69	8.83	3.03	1	0						0.92			0.381	Non-Liq.	Non-Liq.	0.00
49.54	15.49	0.43	2.78	120	1.587	0.758	3.09	0.92	0.69	9.05	3.04	1	0						0.92			0.380	Non-Liq.	Non-Liq.	0.00
49.70	16.12	0.43	2.67	120	1.592	0.757	2.96	0.91	0.69	9.46	3.01	1	0						0.92			0.379	Non-Liq.	Non-Liq.	0.00
49.87	15.68	0.38	2.42	120	1.596	0.755	2.70	0.91	0.69	9.16	3.00	1	0						0.92			0.379	Non-Liq.	Non-Liq.	0.00
50.03	14.98	0.38	2.54	120	1.601	0.753	2.84	0.92	0.68	8.64	3.04	1	0						0.92			0.378	Non-Liq.	Non-Liq.	0.00
50.20	14.59	0.38	2.60	120	1.606	0.752	2.93	0.92	0.68	8.34	3.06	1	0						0.92			0.377	Non-Liq.	Non-Liq.	0.00
50.36	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
50.52	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
50.69	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
50.85	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.02	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.18	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.35	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.51	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.67	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
51.84	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.00	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.17	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.33	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.49	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.66	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.82	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
52.99	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.15	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.31	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.48	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.64	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.81	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
53.97	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.13	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.30	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.46	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.63	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.79	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
54.95	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
55.12	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A
55.28	#N/A	#N/A	#N/A	120	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Non-Liq.	#N/A	#N/A