ASSOCIATED SOILS ENGINEERING, INC.
Consulting Geotechnical Engineers

2860 WALNUT AVE. - SIGNAL HILL, CALIF. 90755 - PHONE 562/426-7990 - FAX 562/426-1842

March 15, 2014
Project No. 6467.14

Attention: Kye Evans

Subject: Due Diligence Geotechnical Investigation, 1560 Placentia Avenue, Newport Beach, California

Gentlemen:

In accordance with your request and authorization, Associated Soils Engineering, Inc. (ASE) presents this letter of preliminary findings regarding geotechnical feasibility of residential development of the subject site. This report is based on a limited subsurface investigation and laboratory testing. The primary geotechnical issue is the existence of surficial soils unsuitable for structural support.

SITE DESCRIPTION

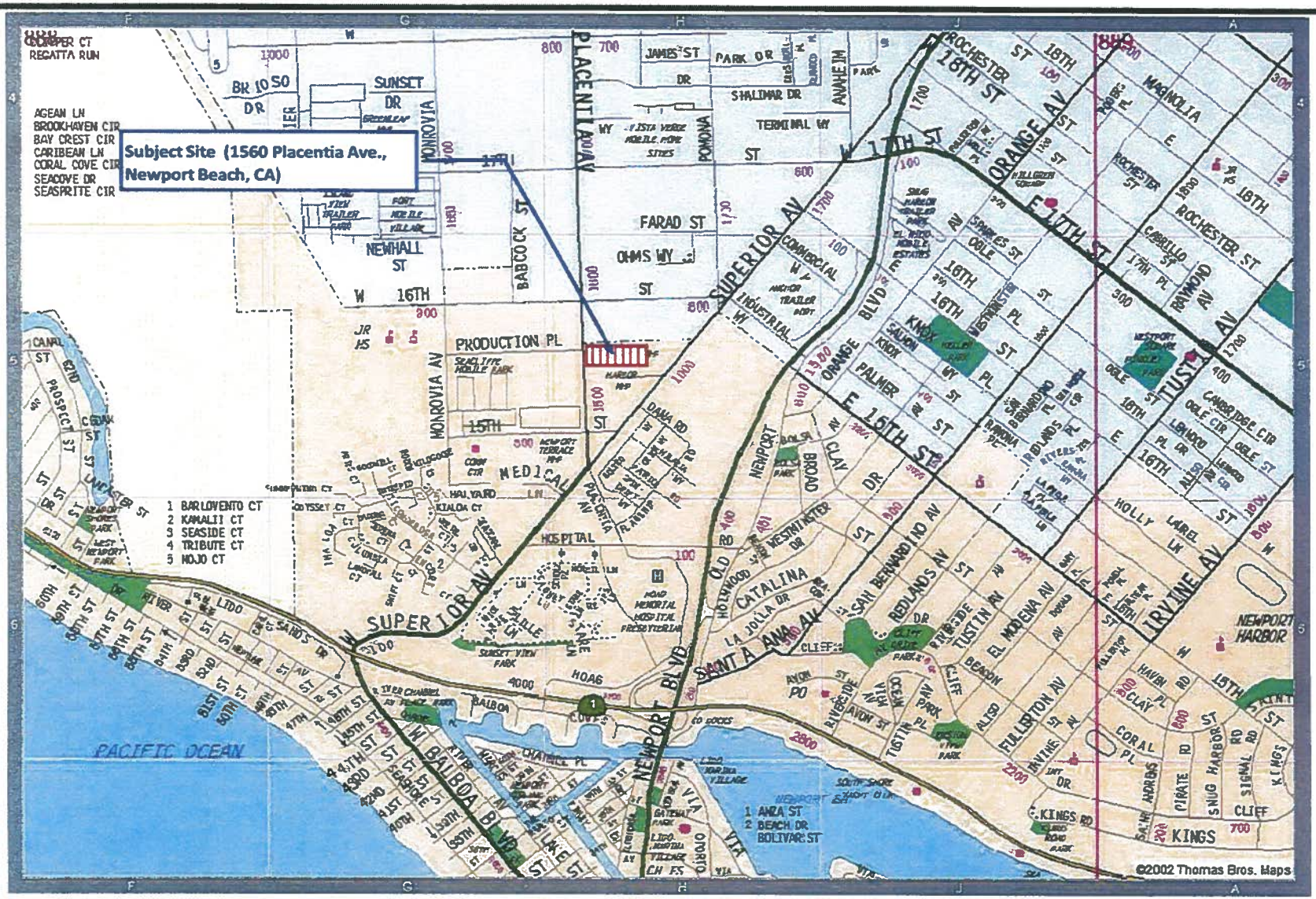
The subject site is located on the east side of Placentia Avenue where it intersects with Production Place in the City of Newport Beach (Figure 1). 4.65-acre rectangular and relatively flat parcel with a ground elevation of approximately 103 feet above mean sea level. The site surface is relatively uniform with The site is currently occupied by the Ebb Tide Mobile Home Park with 2 permanent buildings, swimming pool, concrete slabs for mobile home units, and asphalt paved access drives. The site is bounded by residential development to the south; Placentia Avenue with industrial buildings beyond to the west; industrial buildings to the north (in the City of Costa Mesa); and, an industrial building and a health care facility to the east.

PROPOSED DEVELOPMENT

The site is to be graded for 83 three-story single-family buildings with associated access drives. Cuts and fills to the existing grades are anticipated to be less than 10 feet.

SUBSURFACE INVESTIGATION

Our firm performed a limited subsurface investigation in February of 2014 as a part of this due diligence study. This fieldwork included site reconnaissance, four cone penetrometer test (CPT)



Associated Soils Engineering, Inc. 2860 Walnut Avenue Signal Hill, CA 90755 Tel (562) 426-7990 Fax (562) 426-1842	**Site Location Map**	Proj. Name:	1560 Placentia Avenue Newport Beach, CA
		Figure 1	Proj. No.: 6467.14
			Date: March, 2014

soundings to depths ranging from 35 to 50 feet below the existing surface elevations, five 3-inch diameter hand auger borings to depths ranging from 11 to 16 feet for soils identification, and one 8-inch diameter hand auger water infiltration test boring to a depth of 5 feet. Soils encountered in the hand auger borings were visually classified and logged. Samples were collected for laboratory testing. The approximate locations of our exploratory borings are shown on the attached Plate A. A descriptive log of the borings and the laboratory test results are also attached.

PRELIMINARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

General Project Feasibility

Based on our review of pertinent geotechnical literature and on the results of our limited data review, development of the site as currently planned is feasible from a geotechnical standpoint; however, there are several geotechnical conditions inherent to the property that should be considered during the design and construction phases of the project. These conditions are discussed in this section.

Subsurface Conditions

Surface Pavement. A large portion of the site is covered with asphalt pavement ranging in thickness from 3.5 to 6.5 inches. Each mobile home unit is situated on a concrete slab of undetermined thickness, but each slab estimated to be at least 4 inches thick.

Artificial Fill: While not identified in our exploratory borings, man-made fill deposits may be encountered during grading. Such soil deposits should not be relied upon for structural support.

Native Alluvial Soils. Terrace deposits consisting of silty-sandy clays and silt in the upper 5 to 10 from ground surface, with silty to clayey sands below. Below 3 feet from existing grades the soils are dense and considered suitable for foundation support.

Groundwater. During ASE's field exploration, groundwater was not encountered in any of our borings and cone penetrometer probes to the maximum explored depth of 50 feet (CPT-3). The historic depth to groundwater is considered to be more than 50 feet below the site surface and is not expected to adversely impact the proposed development.

Surface Water Infiltration Rate. Infiltration rates were determined by conducting percolation tests in three borings. The location of the tests are shown on Plate A. The test results are presented in the following table.

Test Location	Depth	Percolation Rate	Infiltration Rate*
P-1	5 feet 1 inch	48 minutes per inch	0.045 inches per hour

*Percolation rate converted to infiltration rate using the Porchet Method, aka Inverse Borehole Method

Seismic Hazards

Fault Rupture. The subject project is not located within an Alquist-Priolo Earthquake Fault Zone and no active faults are known to have been mapped on the site. The nearest known active faulting is the Newport-Inglewood (L.A. Basin) Fault located approximately 0.8 mile to the southwest.

Liquefaction and Seismically Induced Settlement. The site is not located within a Seismic Hazard Zone of required investigation for liquefaction, as mapped by the California Geological Survey. Liquefaction generally occurs within 50 feet of the surface during strong ground shaking within loose granular soils located below the groundwater table. Due to the depth to groundwater being more than 50 feet below the surface, the potential for liquefaction and seismically-induced settlement to be negligible.

Remedial Grading

Surficial Removals. The minimum recommended removal depth is the deepest of 3 feet below the existing ground surface, 3 feet below the bottom of foundations, and 5 feet from final grades.

Buried improvements related to the current site use, such as abandoned utilities, should be completely removed when encountered during grading and wasted off-site. It is possible that small amounts asphalt and concrete removed during site clearing and demolition and broken down to less than 6 inches in size may be mixed in with fill soils. All other debris should be wasted off site.

Excavatibility. The existing fill materials can be easily excavated with conventional earth moving equipment.

Volume Changes During Grading. Shrinkage that will occur when the existing soil is removed and replaced as compacted fill is estimated to be approximately 10% to 15%. Subsidence due to equipment vibration during grading is estimated to be 2 tenths of a foot.

Foundations

Foundation Type. Post-tensioned slabs are recommended for the proposed residential construction on the subject site. The recommended allowable bearing capacity is 1500 psf for three-story buildings with continuous footings having a minimum 24-inch embedment and 30-inch square planar dimension.

Soil Expansion. Preliminary testing indicates that the expansion potential of the site soils is expected to be "Medium".

Settlement Considerations. Anticipated post grading differential settlements is expected to be on the order of 1.0 inch with a maximum angular distortion of 1/360.

Site Seismicity. Although the probability of primary surface rupture is considered to be very low within the site, strong ground shaking caused by earthquakes must be taken into account in the design and construction of the dwelling structures proposed within the subject site. The Newport-

Inglewood (L.A. Basin) Fault located approximately 0.8 mile from the site, would probably generate the most severe site ground motions. A Maximum Probable Earthquake (MPE) of 7.1 Mw (moment magnitude as per USGS) has been assessed for the Puente Hills Blind Thrust Fault. An estimated Peak Ground Acceleration (PGA) resulting from a MPE event on the Newport-Inglewood (L.A. Basin) Fault is on the order of 0.353g should this event occur at the fault's closest approach to the site. An EqFault Search Summary for the subject site is attached.

2013 CBC Seismic Design Parameters. The seismic design of the proposed structures should be implemented in accordance with the applicable provisions stipulated in the 2013 CBC. A summary of the seismic coefficients for the site are presented in the following table, with printouts of detailed derivations of such parameters and pertinent MCE_R and Design Response Spectra from the USGS website, are presented in the appendix to this report.

2013 CBC SEISMIC DESIGN PARAMETERS		
Site Latitude: N 33.6311°	Site Longitude: W 117.9307°	
Seismic Parameter	**Recommended Value**	
Site Class [a]	D	
Soil Profile Name [b]	Stiff Soil Profile	
Site Coefficient, Fa [c]	1.0	
Site Coefficient, Fv [d]	1.5	
0.2-Second Spectral Response Acceleration, S_S [e]	1.688g	
1.0-Second Spectral Response Acceleration, S_1 [f]	0.623g	
Adjusted 0.2-Second Spectral Response Acceleration, SM_S [g]	1.688g	
Adjusted 1.0-Second Spectral Response Acceleration, SM_1 [h]	0.934g	
Design 0.2-Second Spectral Response Acceleration, SD_S [i]	1.125g	
Design 1.0-Second Spectral Response Acceleration, SD_1 [j]	0.623g	
Long-Period Transition Period, T_L [k]	8 sec	
Mapped MCE_g Geometric Mean Peak Ground Acceleration, PGA [l]	0.687g	
Site Coefficient, F_{PGA} [m]	1.0	
MCE_g Peak Ground Acceleration adjusted for Site Class Effect, PGA_M [n]	0.687g	
Occupancy Category	**I or II or III**	**IV**
Seismic Design Category based on SD_S [o]	D	D
Seismic Design Category based on SD_1 [m]	D	D

A Per 2013 CBC Table 1604.5
B Per 2013 CBC Table 1613.3.2
C Per 2013 CBC Table 1613.3.3(1)
D Per 2013 CBC Table 1613.3.3(2)
E Per 2013 CBC Figure 1613.3.1(1)
F Per 2013 CBC Figure 1613.3.1(2)
G Per 2013 CBC Equation 16-37
H Per 2013 CBC Equation 16-38
i Per 2013 CBC Equation 16-39
j Per 2013 CBC Equation 16-40
k Per ASCE 7-10 Figure 22-12
l Per ASCE 7-10 Figure 22-7
m Per ASCE 7-10 Table 11.8-1
n Per ASCE 7-10 Equation 11.8-1 = PGA times F_{PGA}
o Per 2013 CBC Table 1613.3.5(1)
p Per 2013 CBC Table 1613.3.5(2)

Soil Corrosivity. Preliminary laboratory testing of a soils sample considered to be representative of the site soils indicates that proposed concrete structures placed in contact with on-site soils are likely to experience a "moderate exposure" to water soluble sulfates and chlorides, and that the on-site soils will be corrosive to ferrous metals and copper.

CLOSING

It is the opinion of ASE that the project is feasible, provided appropriate remedial measures are addressed during the grading operation. The information provided herein was based on review of the available geotechnical data presented in the referenced report and plans.

This opportunity to be of service is sincerely appreciated. If you have any questions or comments regarding the geotechnical information provided herein, please feel free to call us at (562) 426-7990.

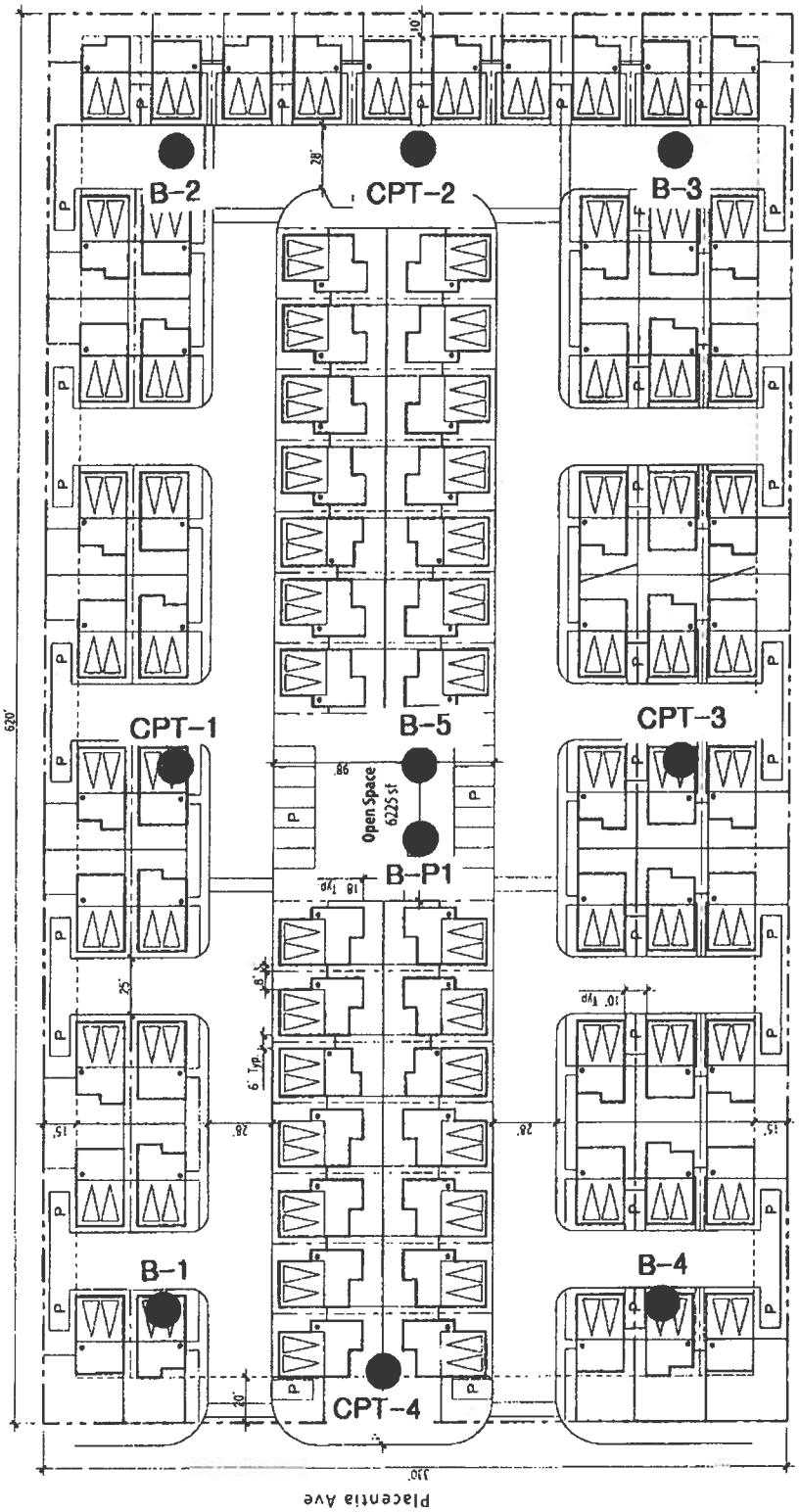
Respectfully Submitted,
ASSOCIATED SOILS ENGINEERING, INC.

John R. Whitney
Senior Project Geologist

JRW:jw

Attachments: Plate A- Boring Location Map
Log of Exploratory Borings
Results of Laboratory Testing
Cone Penetrometer Test Data
Site Faulting & Seismicity Data

Distribution: (1) Addressee via email



CONCEPTUAL LOT STUDY

NEWPORT BEACH, CA

EDIT # 20140961

EXPLANATION	
B-5	Approximate location of hand auger boring
CPT-4	Approximate location of cone penetrometer test
B-P1	Approximate location of percolation test

N

0 25 50 100

ASSOCIATED SOILS ENGINEERING, INC.		
BORING LOCATION MAP 1560 Placentia Avenue		PLATE A
JOB NO. 6467.14	DATE March, 2014	

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FIELD LOG OF BORING B-1

Sheet 1 of 1

Project: *83 Single Family Residences-Newport Beach*

Location: *1560 Placentia Avenue* | Project No. *6467.14*

Dates(s) Drilled:	**2/19/2014**	Logged By:	**Mike Doyle**
Drilled By:	**Associated Soils Engineering,Inc.**	Total Depth:	**16 Feet 2 Inches**
Rig Make/Model:	**N/A**	Hammer Type:	**N/A**
Drilling Method:	**Hand Auger**	Hammer Weight/Drop:	**N/A**
Hole Diameter:	**3 Inches**	Surface Elevation:	**Unknown**

Comments: Groundwater not encountered. No caving.

DEPTH (Ft.)	ELEVATION (MSL)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	LITHOLOGY	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (Pcf)	MOISTURE CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	0					CL	ASPHALTIC CONCRETE PAVEMENT: 4.0"				R-VALUE
							SILTY CLAY WITH SAND: Dark yellowish brown,moist,fine-grained sand	111.5	14.9		CONSOL,SHEAR
5	5					SC	CLAYEY SAND: Yellowish brown,moist,fine-grained sand	119.7	11.7		
						SM	SILTY SAND: Light olive brown,damp to moist,fine-grained sand	109.8	7.5		
10	10										
15	15					SM	same as above	112.1	9.5		
						SM	SILTY SAND: Light yellowish brown,moist,fine-grained sand,with lens Clayey Silt (ML)	102.9	19.3		

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FIELD LOG OF BORING B-2

Sheet 1 of 1

Project: *83 Single Family Residences-Newport Beach*

Location: *1560 Placentia Avenue* | Project No. *6467.14*

Dates(s) Drilled:	**2/19/2014**	Logged By:	**Mike Doyle**
Drilled By:	**Associated Soils Engineering,Inc.**	Total Depth:	**11 Feet 4 Inches**
Rig Make/Model:	**N/A**	Hammer Type:	**N/A**
Drilling Method:	**Hand Auger**	Hammer Weight/Drop:	**N/A**
Hole Diameter:	**3 Inches**	Surface Elevation:	**Unknown**

Comments: Groundwater not encountered. No caving.

DEPTH (Ft.)	ELEVATION (MSL)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	LITHOLOGY	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (Pcf)	MOISTURE CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	0					SC	ASPHALTIC CONCRETE PAVEMENT: 3.5"				
							CLAYEY SAND: Yellowish brown,moist,fine-grained sand	118.7	13.2		
5	5					SC	same as above,becoming light olive brown	114.9	15.9		SHEAR
						SM	SILTY SAND: Light olive brown,moist,fine-grained sand	119.1	11.8		
10	10					SM	same as above,becoming light yellowish brown	97.3	12.4		CONSOL

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FIELD LOG OF BORING B-3

Sheet 1 of 1

Project: *83 Single Family Residences-Newport Beach*

Location: *1560 Placentia Avenue* | Project No. *6467.14*

Dates(s) Drilled:	**2/19/2014**	Logged By:	**Mike Doyle**
Drilled By:	**Associated Soils Engineering,Inc.**	Total Depth:	**16 Feet 2 Inches**
Rig Make/Model:	**N/A**	Hammer Type:	**N/A**
Drilling Method:	**Hand Auger**	Hammer Weight/Drop:	**N/A**
Hole Diameter:	**3 Inches**	Surface Elevation:	**Unknown**

Comments: Groundwater not encountered. No caving.

DEPTH (Ft.)	ELEVATION (MSL)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	LITHOLOGY	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (Pcf)	MOISTURE CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	0					CL	ASPHALTIC CONCRETE PAVEMENT: 4.0"				
							SILTY CLAY: Dark yellowish brown,moist,trace fine sand	113.2	18.3		MAX DENSITY, EXPANSION, REMOLD SHEAR, SULFATE TEST ATTERBERG LIMITS
5	5					CL	SILTY CLAY: Light olive brown,moist,trace fine sand	110.8	18.9		ATTERBERG LIMITS
10	10					SM	SILTY SAND: Light olive brown,moist,fine-grained sand,trace clay	112.4	11.0		ATTERBERG LIMITS
						SM	SILTY SAND: Light olive brown,moist,fine-grained sand	109.8	13.6		
						ML	SANDY SILT: Light yellowish brown,moist,fine-grained sand,with lens Clayey Silt (ML)				
15	15							101.6	16.2		ATTERBERG LIMITS

ASSOCIATED SOILS ENGINEERING, INC.

FIELD LOG OF BORING B-4

Sheet 1 of 1

Project: *83 Single Family Residences-Newport Beach*

Location: *1560 Placentia Avenue* | Project No. *6467.14*

Dates(s) Drilled:	**2/19/2014**	Logged By:	**Mike Doyle**
Drilled By:	**Associated Soils Engineering,Inc.**	Total Depth:	**11 Feet 4 Inches**
Rig Make/Model:	**N/A**	Hammer Type:	**N/A**
Drilling Method:	**Hand Auger**	Hammer Weight/Drop:	**N/A**
Hole Diameter:	**3 Inches**	Surface Elevation:	**Unknown**

Comments: Groundwater not encountered. No caving.

DEPTH (Ft.)	ELEVATION (MSL)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	LITHOLOGY	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (Pcf)	MOISTURE CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	0					SM	ASPHALTIC CONCRETE PAVEMENT: 4.5"				
							SILTY SAND: Dark yellowish brown,moist,fine-grained sand,with some clay	121.6	11.7		
5	5					ML	CLAYEY SILT WITH SAND: Light olive brown,moist,fine-grained sand	120.7	13.6		
						SM	SILTY SAND: Light olive brown,damp to moist,fine-grained sand				
10	10							113.0	7.8		

ASSOCIATED SOILS ENGINEERING, INC.

FIELD LOG OF BORING B-5

Sheet 1 of 1

Project:	*83 Single Family Residences-Newport Beach*	
Location:	*1560 Placentia Avenue*	Project No. *6467.14*

Dates(s) Drilled:	**2/19/2014**	Logged By:	**Mike Doyle**
Drilled By:	**Associated Soils Engineering,Inc.**	Total Depth:	**11 Feet 1 Inch**
Rig Make/Model:	**N/A**	Hammer Type:	**N/A**
Drilling Method:	**Hand Auger**	Hammer Weight/Drop:	**N/A**
Hole Diameter:	**3 Inches**	Surface Elevation:	**Unknown**

Comments: Groundwater not encountered. No caving.

DEPTH (Ft.)	ELEVATION (MSL)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	LITHOLOGY	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (Pcf)	MOISTURE CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	0						ASPHALTIC CONCRETE PAVEMENT: 6.5"				EXPANSION
						CL	SANDY CLAY: Dark yellowish brown,moist,fine-grained sand	115.5	14.9		
5	5					CL	SANDY CLAY: Light olive brown,moist,fine-grained sand,borders Clayey Fine Sand (SC)	126.9	12.4		
						SM	SILTY SAND WITH CLAY: Light olive brown,moist,fine-grained sand	106.8	13.9		
10	10					ML	SANDY SILT: Light yellowish brown,very moist,fine-grained sand,trace clay	97.3	25.0		

ASSOCIATED SOILS ENGINEERING, INC

FIELD LOG OF BORING B-P1

Sheet 1 of 1

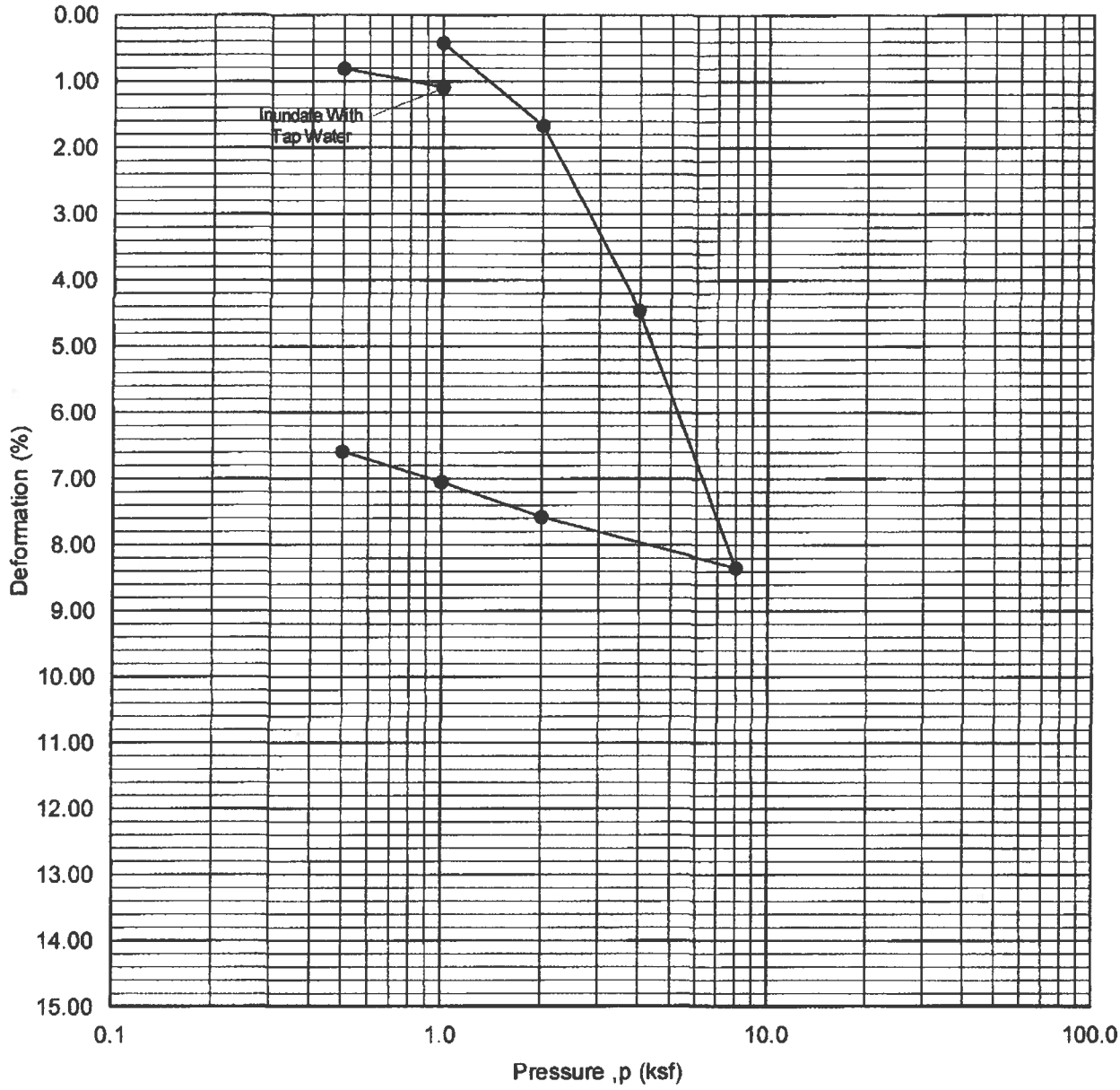
Project: *83 Single Family Residences-Newport Beach*

Location: *1560 Placentia Avenue* | Project No. *6467.14*

Dates(s) Drilled:	**2/18/2014**	Logged By:	**Grant Zike**
Drilled By:	**Associated Soils Engineering,Inc.**	Total Depth:	**5 Feet**
Rig Make/Model:	**Beaver**	Hammer Type:	**N/A**
Drilling Method:	**Solid-stem Auger**	Hammer Weight/Drop:	**N/A**
Hole Diameter:	**8 Inches**	Surface Elevation:	**Unknown**

Comments: Groundwater not encountered. No caving.

DEPTH (Ft.)	ELEVATION (MSL)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	LITHOLOGY	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (Pcf)	MOISTURE CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	0					CL	ASPHALTIC CONCRETE PAVEMENT: 5.5" SANDY CLAY: Dark yellowish brown,moist,fine-grained sand				
5	5						NOTE:Five (5) feet length of 6-inch I.D. slotted PVC pipe (Two pieces: lower piece placed in boring with annular area backfilled with pea gravel to grade. Pea gravel (2.0") placed at bottom of pipe and percolation test performed after overnight presoak.				

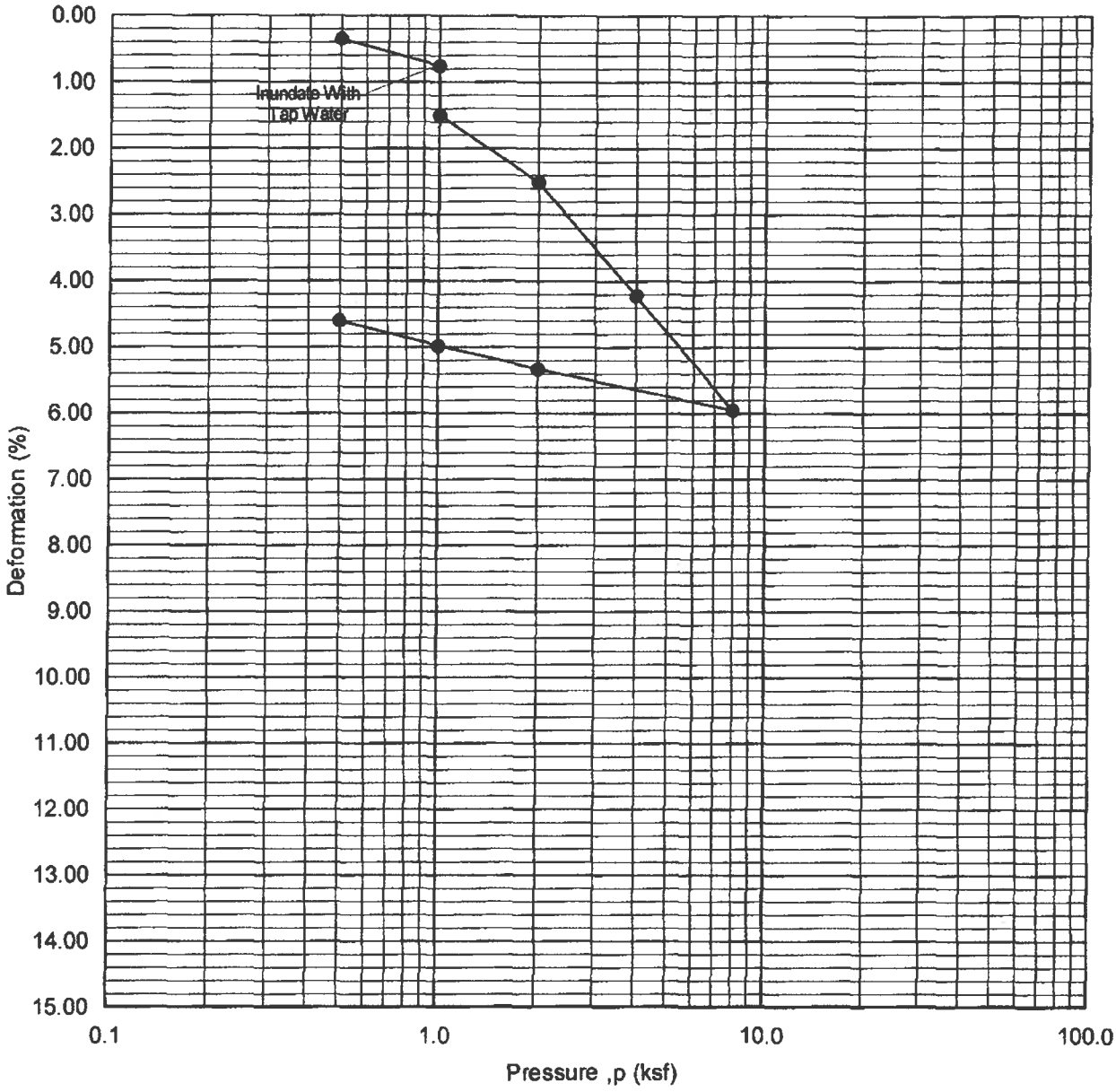


Boring No. : B-1
Depth (ft.) : 2.0
Sample Type: Silty Clay with Fine Sand

Dry Density (pcf) = 111.5
Moisture (%) = 14.9

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D 2435)

PLATE C-1

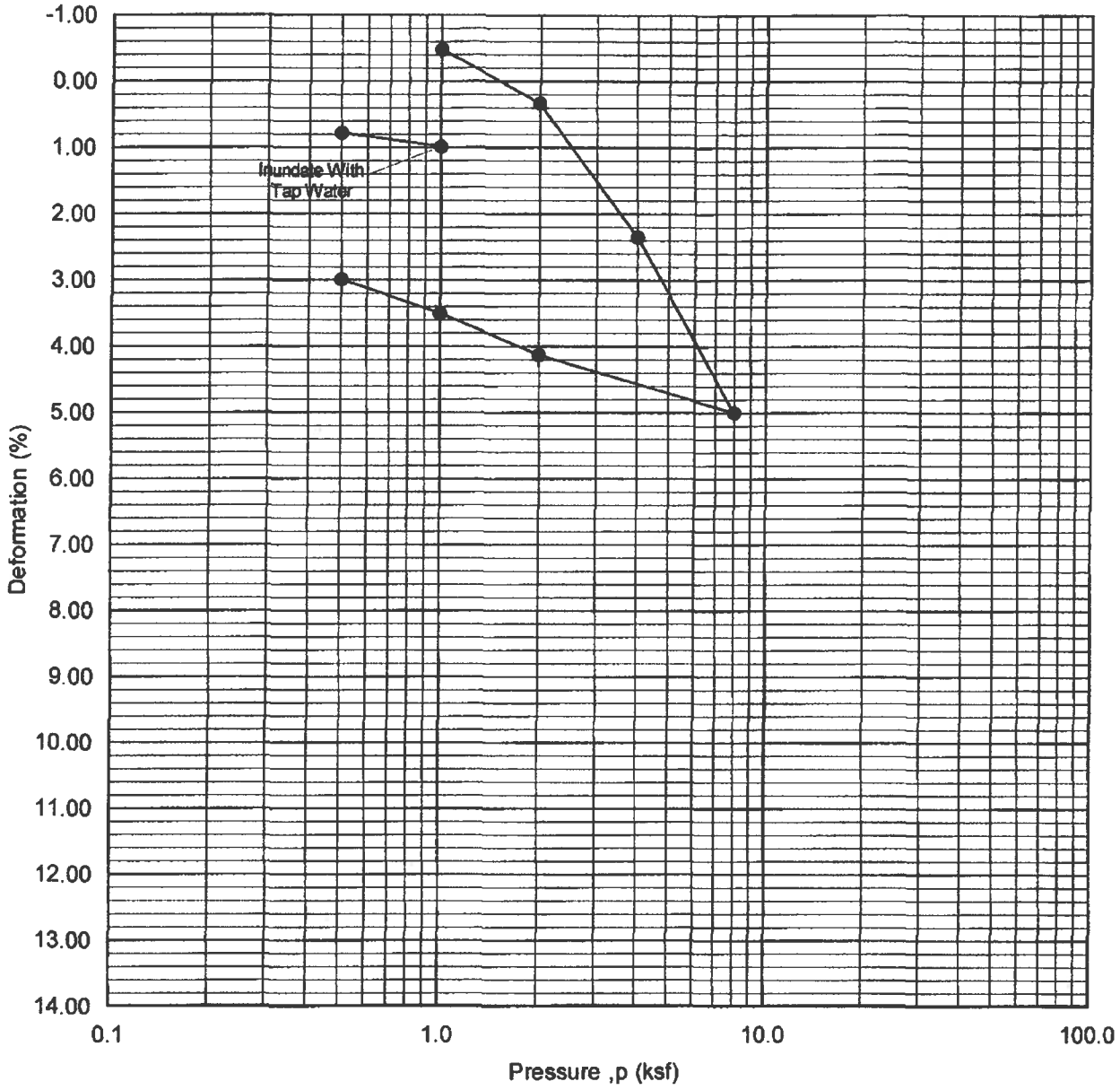


Boring No. : B-2
Depth (ft.) : 10.0
Sample Type: Silty Fine Sand

Dry Density (pcf) = 97.3
Moisture (%) = 12.4

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D 2435)

PLATE C-2

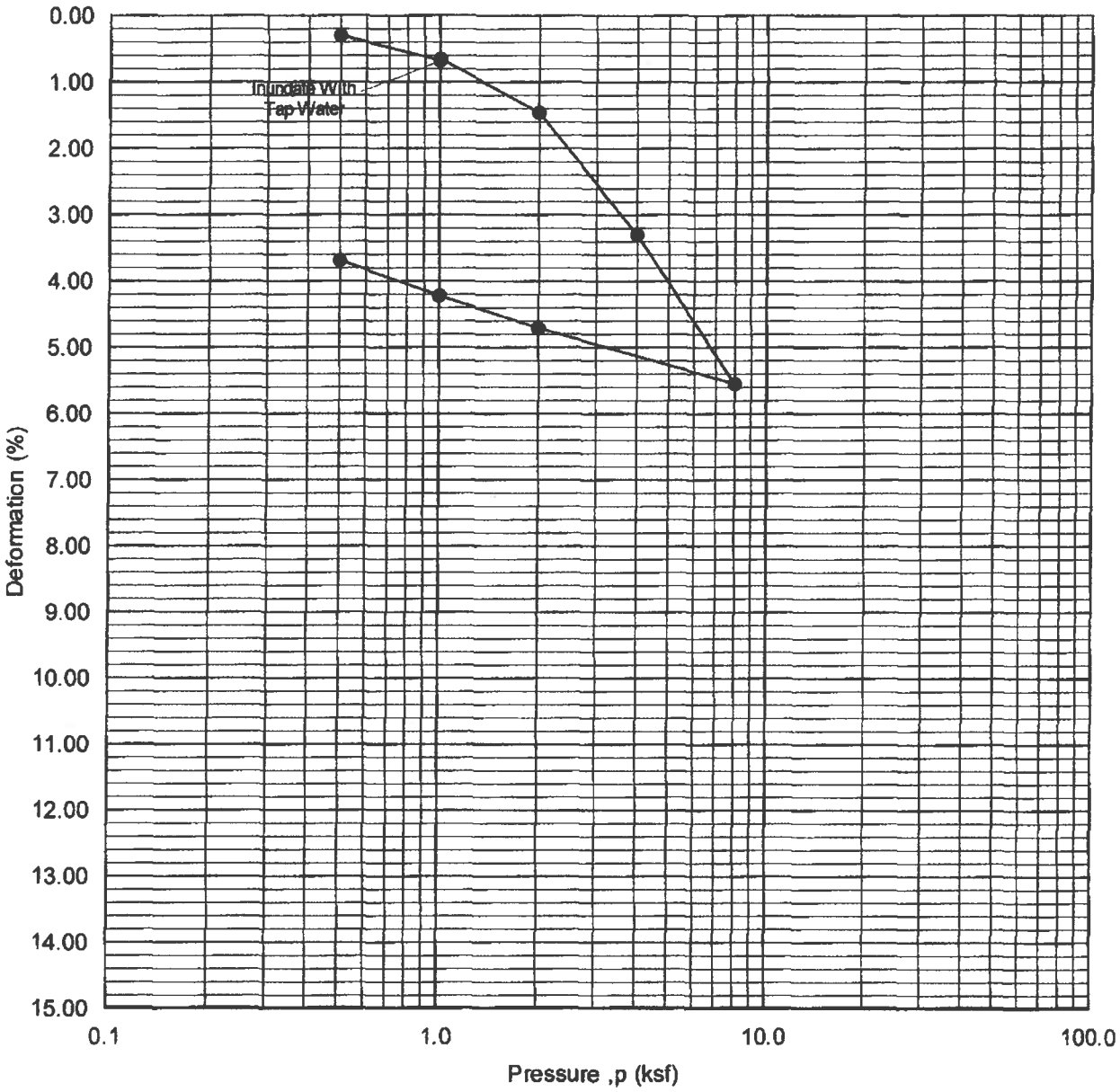


Boring No. : B-3
Depth (ft.) : 5.0
Sample Type: Silty Clay with trace Fine Sand

Dry Density (pcf) = 110.8
Moisture (%) = 18.9

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D 2435)

PLATE C-3

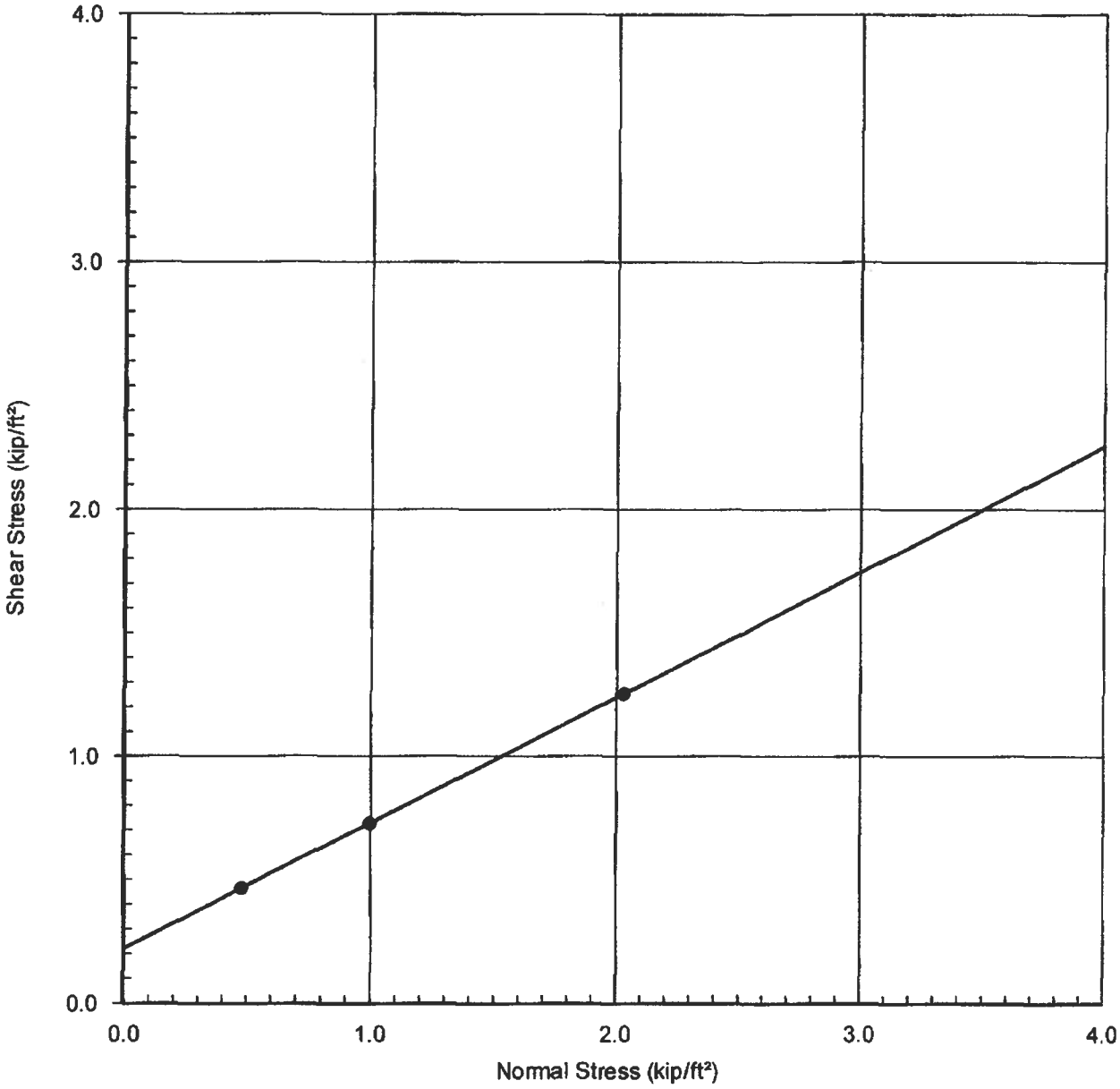


Boring No. : B-3
Depth (ft.) : 15.0
Sample Type: Fine Sandy Silt with lens Clayey Silt

Dry Density (pcf) = 101.6
Moisture (%) = 16.2

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D 2435)

PLATE C-4

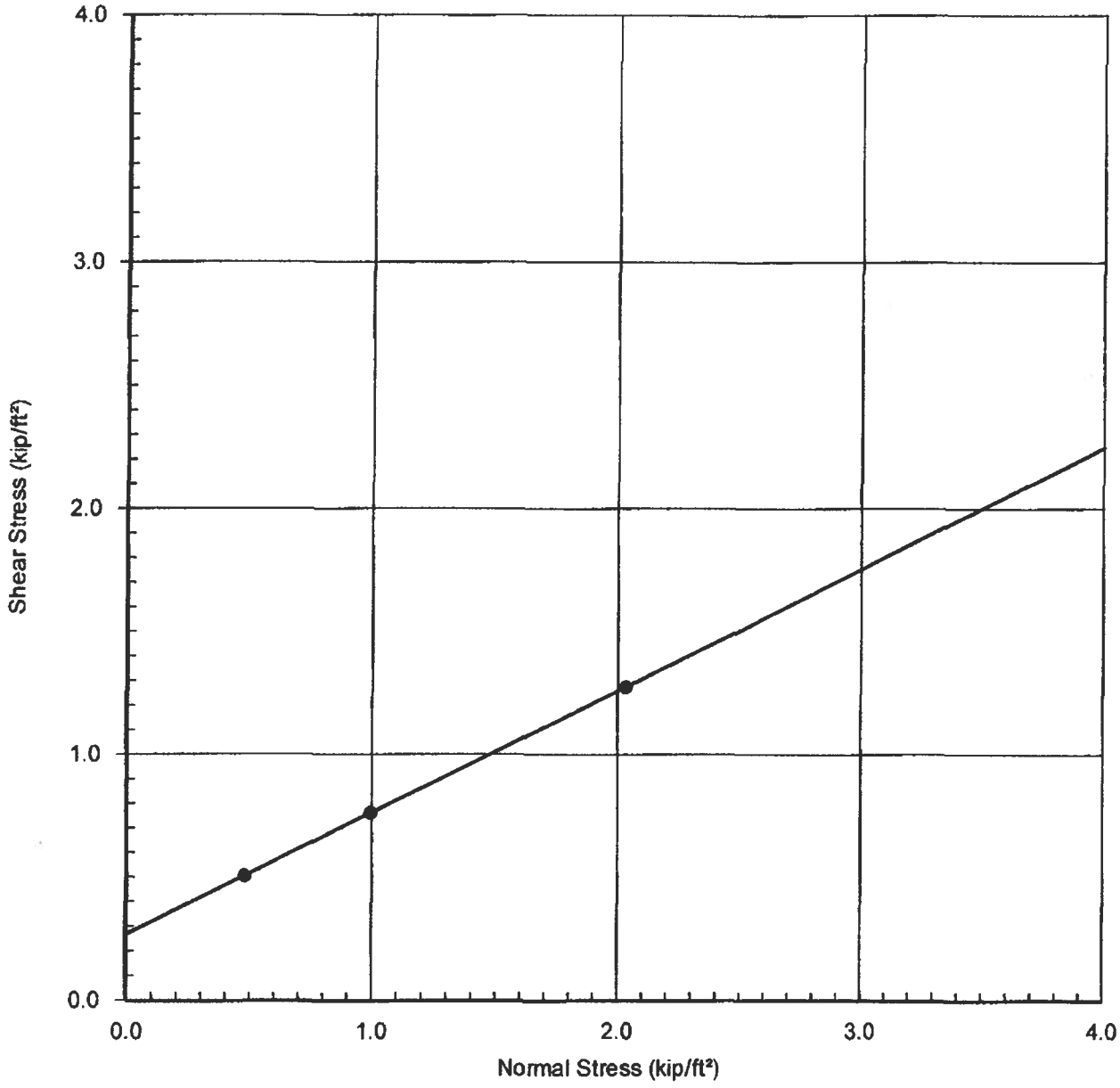


Boring No. : B-1
Depth (ft.) : 2.0
Sample Type : Relatively Undisturbed
Soil Type : Silty Clay with Fine Sand

Cohesion(C) = 220 psf
Friction (ϕ) = 27°
Dry Density (pcf) = 111.5
Moisture (%) = 14.9

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	DIRECT SHEAR TEST RESULTS (ASTM D 3080)

PLATE D-1

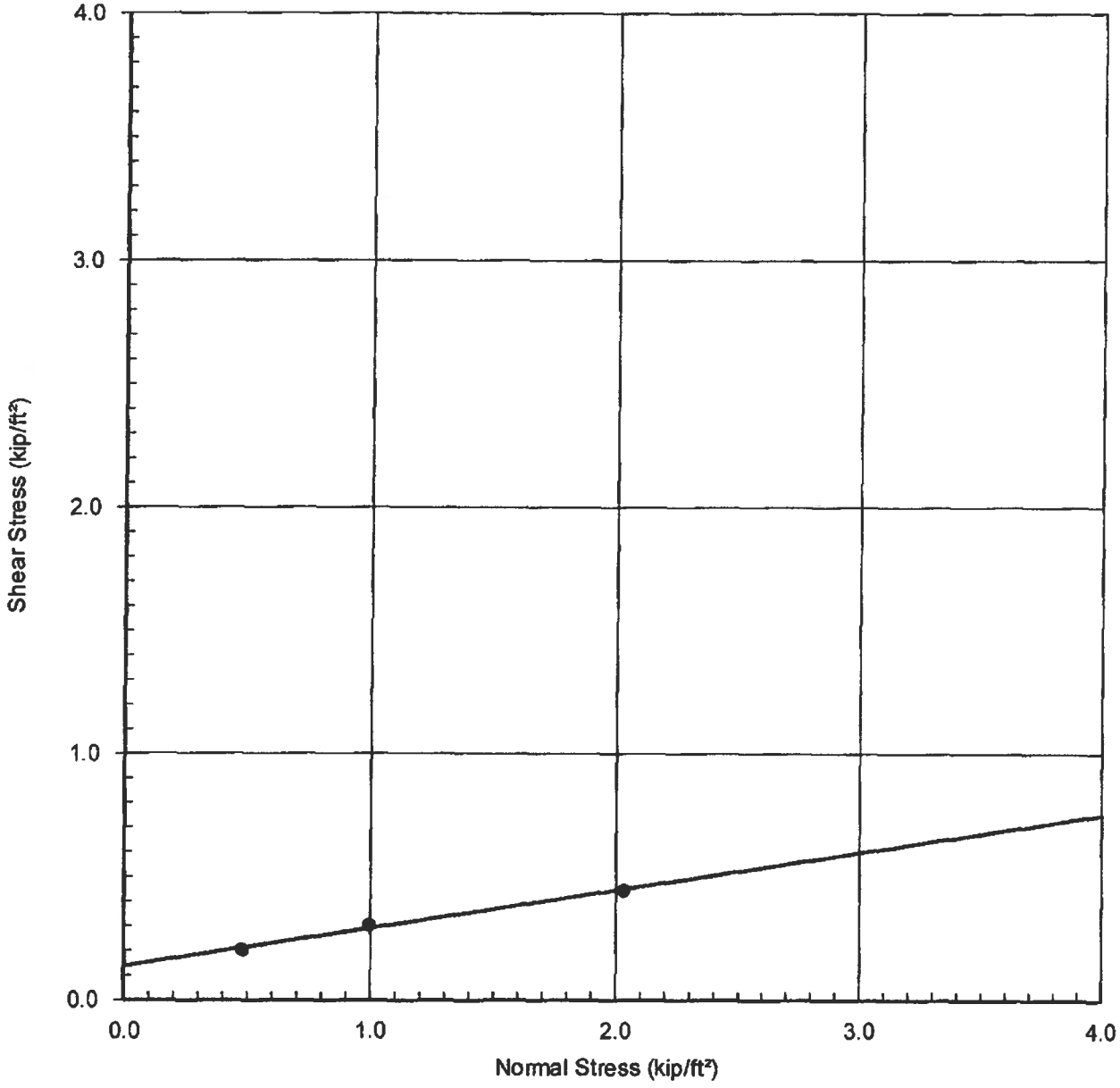


Boring No. : B-2
Depth (ft.) : 5.0
Sample Type : Relatively Undisturbed
Soil Type : Clayey Fine Sand

Cohesion(C) = 270 psf
Friction (ϕ) = 26°
Dry Density (pcf) = 114.9
Moisture (%) = 15.9

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	DIRECT SHEAR TEST RESULTS (ASTM D 3080)

PLATE D-2



Boring No. : B-1
Depth (ft.) : 0.33-5.0
Sample Type : Remolded (90% of Maximum Density)
Soil Type : Silty Clay with Fine Sand

Cohesion(C) = 135 psf
Friction (ϕ) = 8.5°
Dry Density (pcf) = 116.1
Moisture (%) = 10.0

Project Name: 1560 Placentia Avenue,Newport Beach	Project No.: 6467.14
ASSOCIATED SOILS ENGINEERING, INC.	DIRECT SHEAR TEST RESULTS (ASTM D 3080)

PLATE D-3

ATTERBERG LIMIT

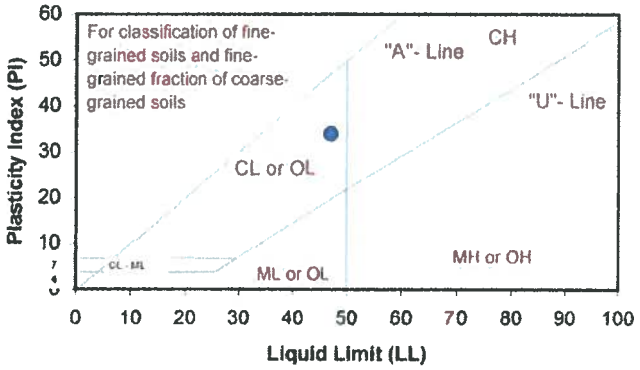
ASTM D 4318-93

Project Name: -83 Single Family Residences-1560 Placentia Avenue,Newport Beach
Project No. : 6467.14
Boring No. : B-3
Depth (feet): 2.0
Visual Sample Description: Silty Clay (CL)

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			37	28	18	
Container No.	b1	c1	A1	B1	C1	
Wet Wt. of Soil + Cont. (gm)	13.19	13.24	16.84	16.44	15.14	
Dry Wt. of Soil + Cont. (gm)	12.14	12.20	15.07	14.81	13.66	
Wt. of Container (gm)	4.28	4.29	11.07	11.26	10.62	
Moisture Content (%) [Wn]	13.36	13.15	44.25	45.92	48.68	

Liquid Limit	**47**
Plastic Limit	**13**
Plasticity Index	**34**
USCS Classification	**CL**

PI at "A" - Line = 0.73(LL-20) = 19.71
One - Point Liquid Limit Calculation
LL =Wn(N/25)$^{0.121}$



PROCEDURES USED

- ☐ Wet Preparation
  Multipoint - Wet
- ☒ Dry Preparation
  Multipoint - Dry
- ☒ Procedure A
  Multipoint Test
- ☐ Procedure B
  One-point Test

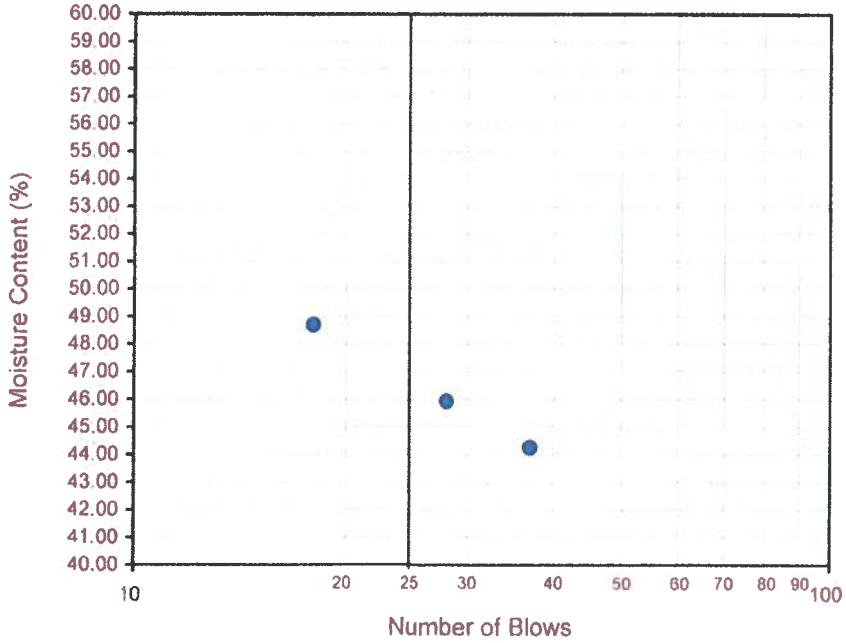


PLATE E-1

ATTERBERG LIMITS

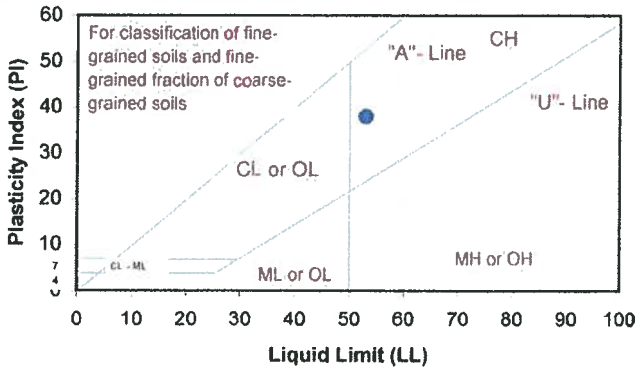
ASTM D 4318-93

Project Name: 83 Single Family Residences-1560 Placentia Avenue,Newport Beach
Project No. : 6467.14
Boring No. : B-3
Depth (feet): 5.0
Visual Sample Description: Silty Clay (CL)

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			34	27	18	
Container No.	b2	c2	A2	B2	C2	
Wet Wt. of Soil + Cont. (gm)	12.28	11.50	16.45	16.61	15.77	
Dry Wt. of Soil + Cont. (gm)	11.20	10.56	14.55	14.79	14.02	
Wt. of Container (gm)	4.25	4.30	10.78	11.33	10.80	
Moisture Content (%) [Wn]	15.54	15.02	50.40	52.75	54.35	

Liquid Limit	**53**
Plastic Limit	**15**
Plasticity Index	**38**
USCS Classification	**CH**

PI at "A" - Line = 0.73(LL-20) = 24.09
One - Point Liquid Limit Calculation
LL =Wn(N/25)$^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test

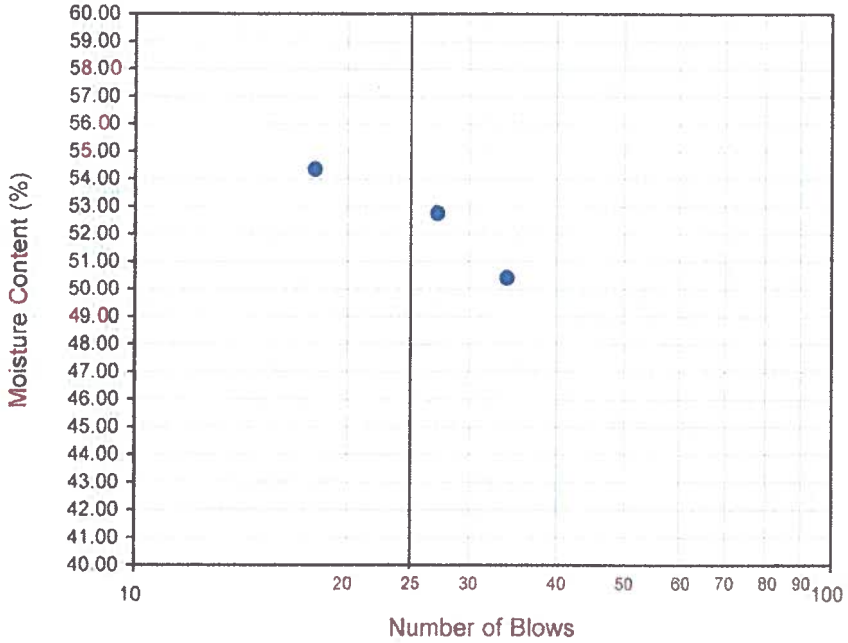


PLATE E-2

ATTERBERG LIMIT

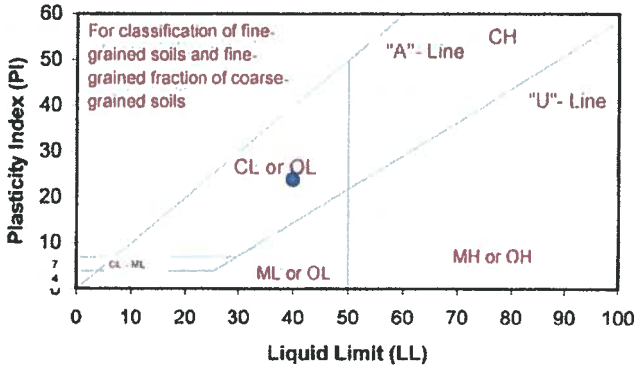
ASTM D 4318-93

Project Name: 83 Single Family Residences-1560 Placentia Avenue,Newport Beach
Project No. : 6467.14
Boring No. : B-3
Depth (feet): 10.0
Visual Sample Description: Silty Fine Sand with trace Clay (SM)

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			32	24	18	
Container No.	b3	c3	A3	B3	C3	
Wet Wt. of Soil + Cont. (gm)	13.71	16.24	16.39	16.47	15.49	
Dry Wt. of Soil + Cont. (gm)	12.39	15.54	14.83	14.96	14.11	
Wt. of Container (gm)	4.26	4.30	10.79	11.21	10.85	
Moisture Content (%) [Wn]	16.24	16.60	38.61	40.27	42.33	

Liquid Limit	**40**
Plastic Limit	**16**
Plasticity Index	**24**
USCS Classification	**CL**

PI at "A" - Line = 0.73(LL-20) = 14.6
One - Point Liquid Limit Calculation
LL =Wn(N/25)$^{0.121}$



PROCEDURES USED

- ☐ Wet Preparation
  Multipoint - Wet
- ☒ Dry Preparation
  Multipoint - Dry
- ☒ Procedure A
  Multipoint Test
- ☐ Procedure B
  One-point Test

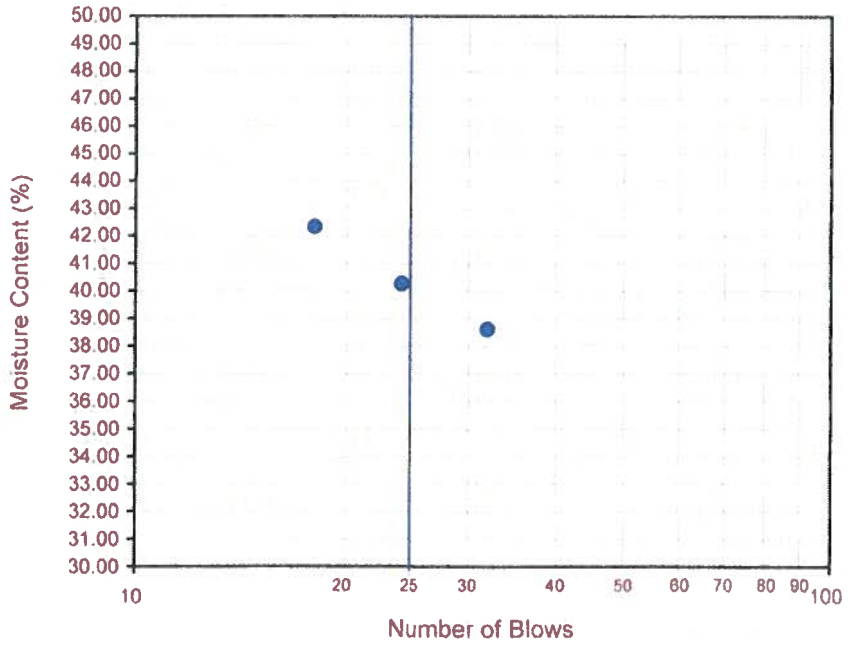


PLATE E-3

ATTERBERG LIMIT

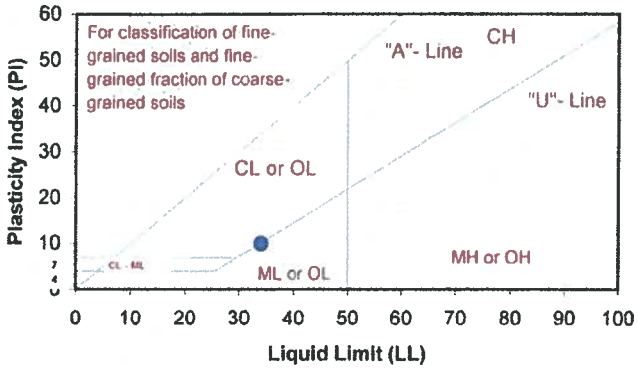
ASTM D 4318-93

Project Name: 83 Single Family Residences-1560 Placentia Avenue,Newport Beach
Project No. : 6467.14
Boring No. : B-3
Depth (feet): 15.0
Visual Sample Description: Fine Sandy Silt with lens Clayey Silt (ML)

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			32	22	17	
Container No.	b4	c4	A4	B4	C4	
Wet Wt. of Soil + Cont. (gm)	13.98	13.70	16.61	16.83	15.81	
Dry Wt. of Soil + Cont. (gm)	12.09	11.88	15.28	15.40	14.58	
Wt. of Container (gm)	4.26	4.29	11.20	11.31	11.20	
Moisture Content (%) [Wn]	24.14	23.98	32.60	34.96	36.39	

Liquid Limit	**34**
Plastic Limit	**24**
Plasticity Index	**10**
USCS Classification	**ML**

PI at "A" - Line = 0.73(LL-20) = 10.22
One - Point Liquid Limit Calculation
LL =Wn(N/25)^0.121



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test

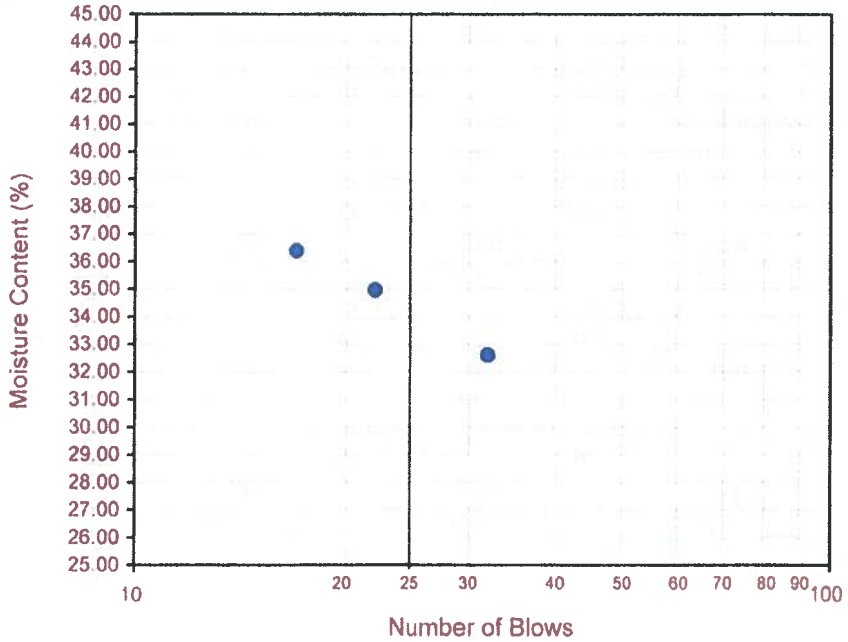


PLATE E-4

SUMMARY

OF

CONE PENETRATION TEST DATA

Project:

1560 Placentia Avenue
Newport Beach, CA
February 17, 2014

Prepared for:

Mr. John Whitney
Associated Soils Engineering, Inc.
2860 Walnut Avenue
Signal Hill, CA 90755
Office (562) 426-7990 / Fax (562) 426-1842

Prepared by:

KEHOE TESTING & ENGINEERING
5415 Industrial Drive
Huntington Beach, CA 92649-1518
Office (714) 901-7270 / Fax (714) 901-7289
www.kehoetesting.com

TABLE OF CONTENTS

SUMMARY

OF

CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the project located at 1560 Placentia Avenue in Newport Beach, California. The work was performed by Kehoe Testing & Engineering (KTE) on February 17, 2014. The scope of work was performed as directed by Associated Soils Engineering, Inc. personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at four locations to determine the soil lithology. Groundwater measurements and hole collapse depths provided in **TABLE 2.1** are for information only. The readings indicate the apparent depth to which the hole is open and the apparent water level (if encountered) in the CPT probe hole at the time of measurement upon completion of the CPT. KTE does not warranty the accuracy of the measurements and the reported water levels may not represent the true or stabilized groundwater levels.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
CPT-1	50	Hole open to 49 ft (dry)
CPT-2	35	Hole open to 35 ft (dry)
CPT-3	50	Hole open to 50 ft (dry)
CPT-4	35	Hole open to 35 ft (dry)

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm^2 cone and recorded the following parameters at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed
- Pore Pressure Dissipation (at selected depths)

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

The Cone Penetration Test data is presented in graphical form in the attached Appendix. These plots were generated using the CPeT-IT program. Penetration depths are referenced to ground surface. The soil classification on the CPT plots is derived from the attached CPT Classification Chart (Robertson) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance (qc), sleeve friction (fs), and penetration pore pressure (u). The friction ratio (Rf), which is sleeve friction divided by cone resistance, is a calculated parameter that is used along with cone resistance to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

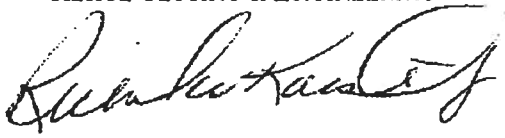
Tables of basic CPT output from the interpretation program CPeT-IT are provided for CPT data averaged over one foot intervals in the Appendix. Spreadsheet files of the averaged basic CPT output and averaged estimated geotechnical parameters are also included for use in further geotechnical analysis. We recommend a geotechnical engineer review the assumed input parameters and the calculated output from the CPeT-IT program. A summary of the equations used for the tabulated parameters is provided in the Appendix.

It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and u. In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

Sincerely,

KEHOE TESTING & ENGINEERING



Richard W. Koester, Jr.
General Manager

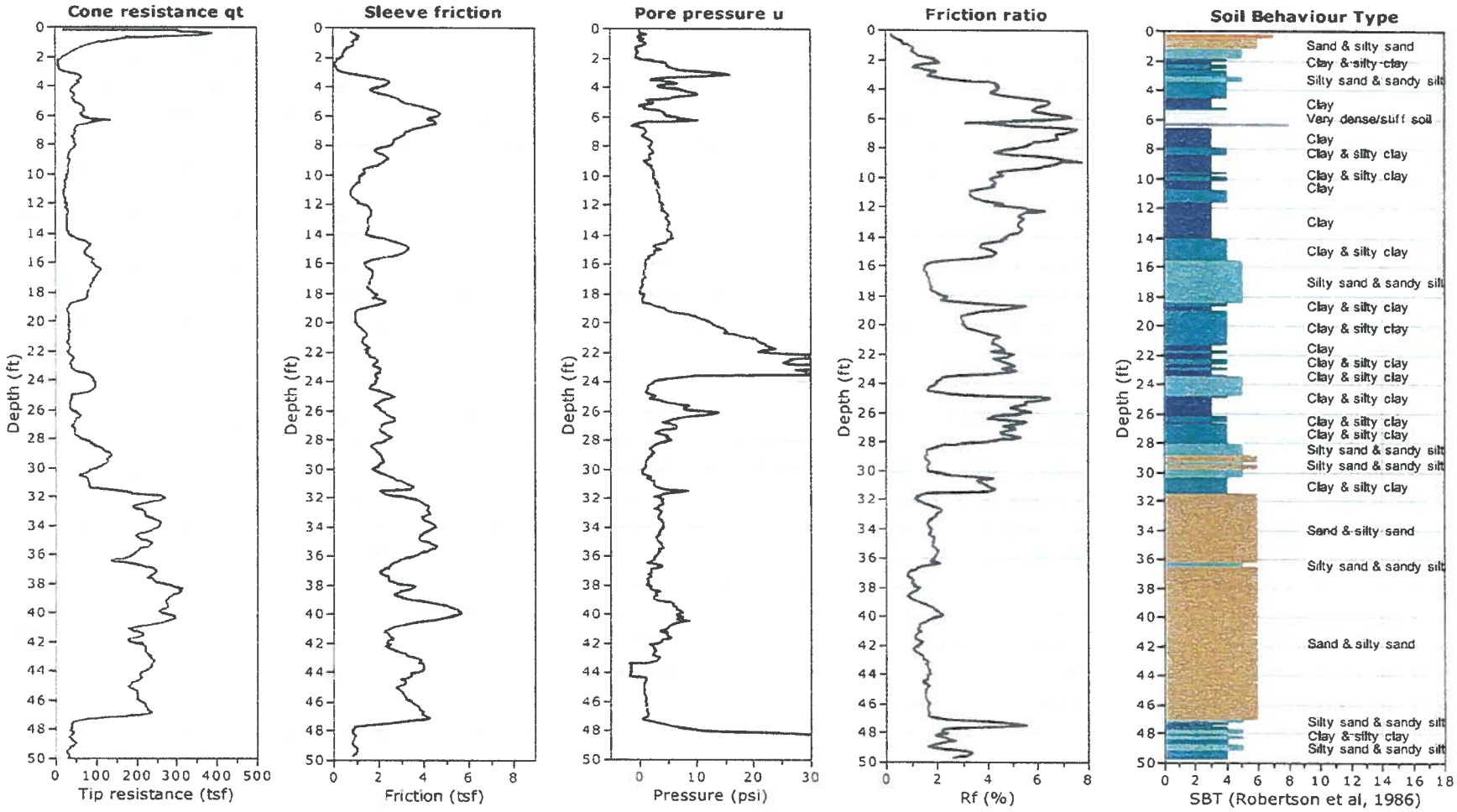
02/20/14-cb-4609

APPENDIX

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

Project: **Associated Soils Engineering, Inc.**
Location: **1560 Placentia Ave. Newport Beach, CA**

CPT: CPT-1
Total depth: 50.15 ft, Date: 2/17/2014
Cone Type: Vertek



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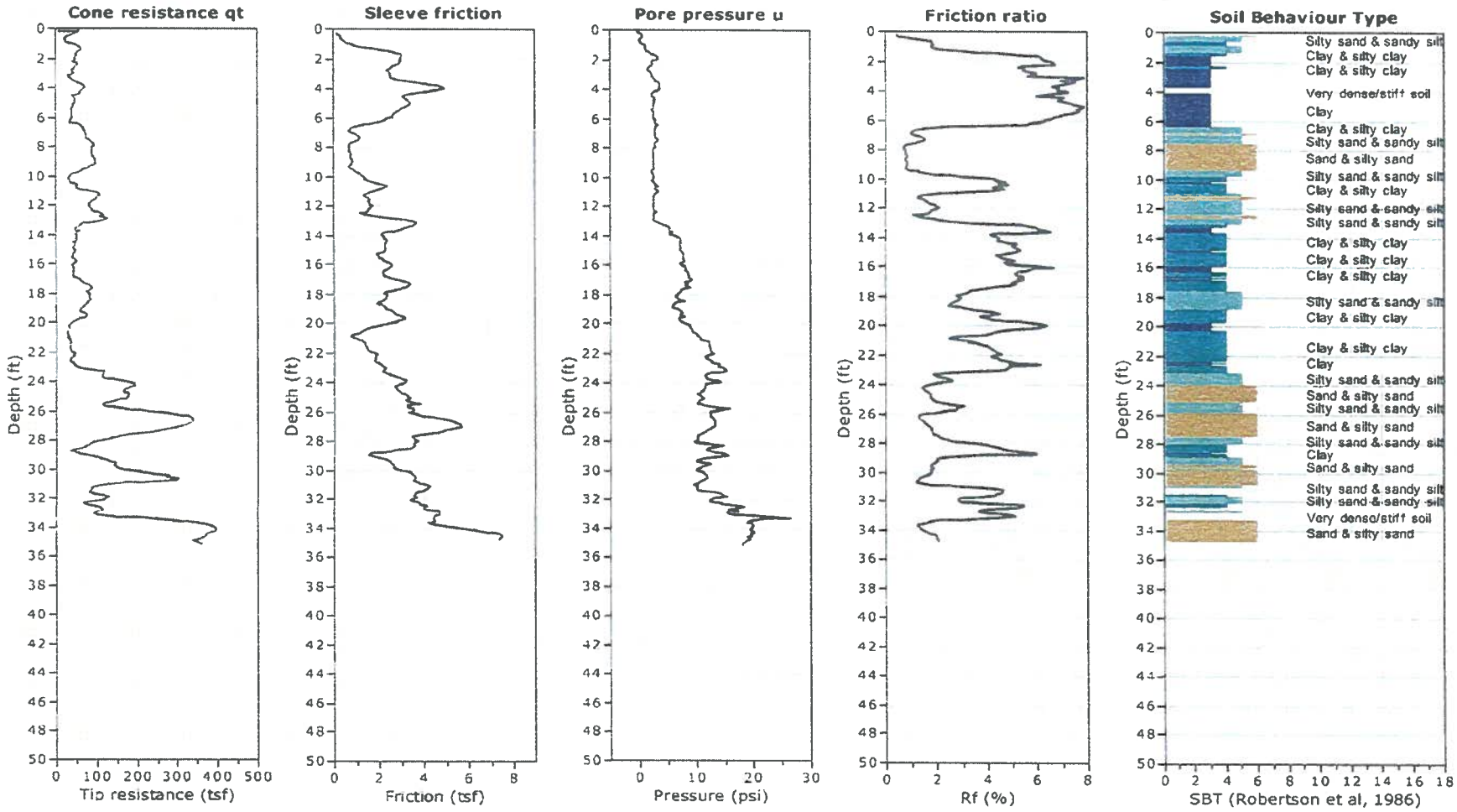
www.kehoetesting.com

Project: **Associated Soils Engineering, Inc.**
Location: **1560 Placentia Ave. Newport Beach, CA**

CPT: CPT-2
Total depth: 35.15 ft, Date: 2/17/2014
Cone Type: Vertek



Kehoe Testing and Engineering
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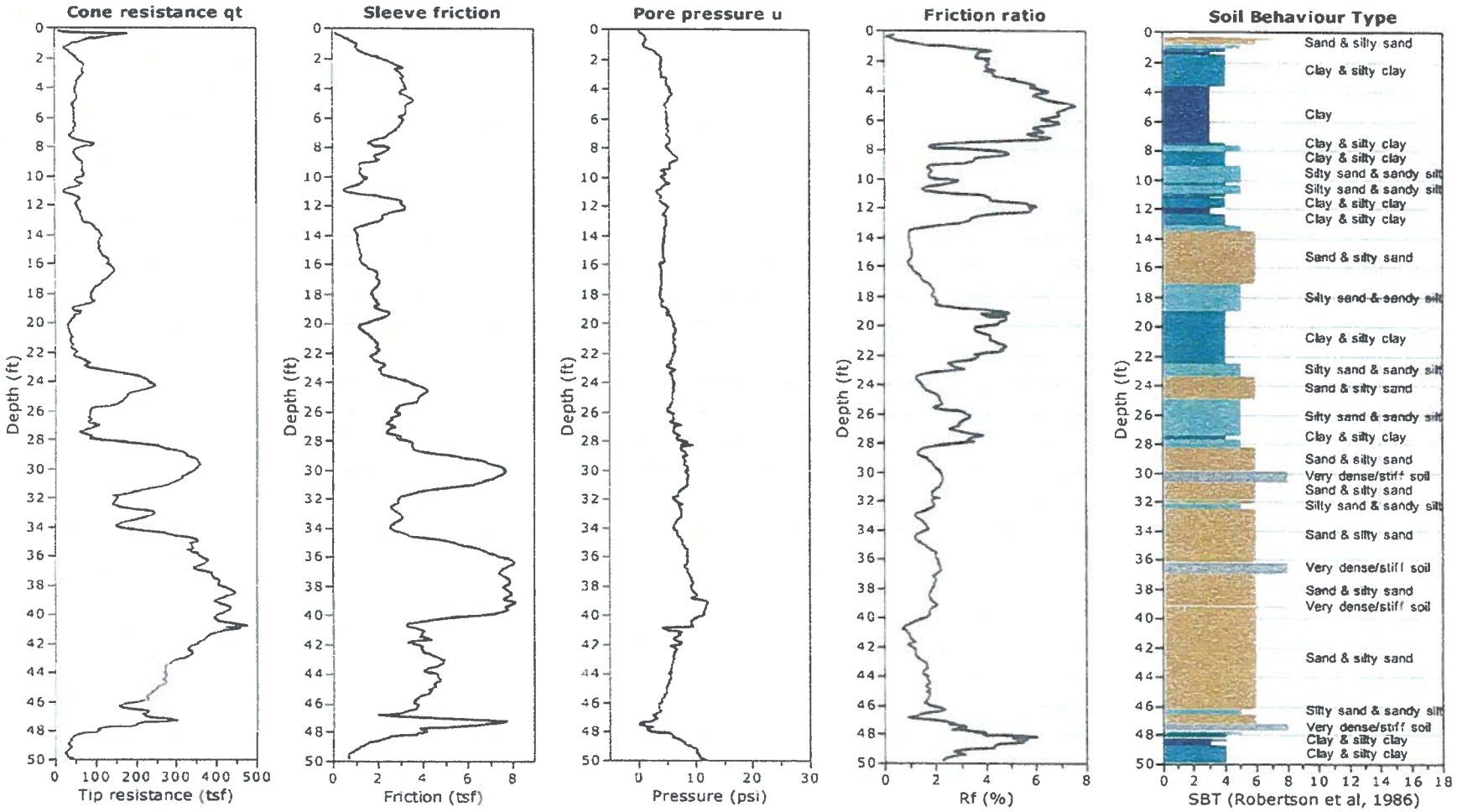
www.kehoetesting.com

Project: **Associated Soils Engineering, Inc.**
Location: **1560 Placentia Ave. Newport Beach, CA**

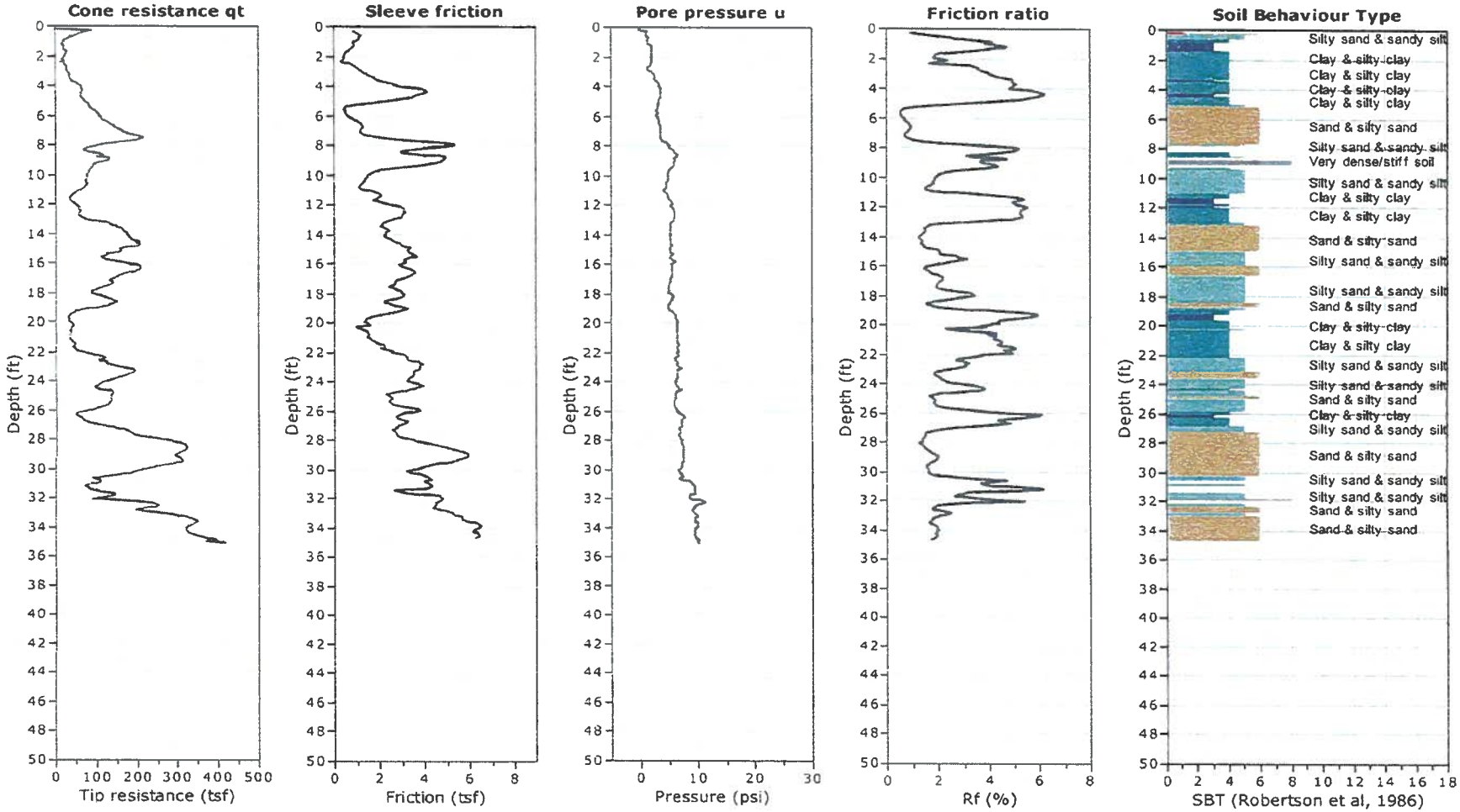
CPT: CPT-3
Total depth: 50.18 ft, Date: 2/17/2014
Cone Type: Vertek



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

Project: **Associated Soils Engineering, Inc.**
Location: **1560 Placentia Ave. Newport Beach, CA**

CPT: CPT-4
Total depth: 35.09 ft, Date: 2/17/2014
Cone Type: Vertek



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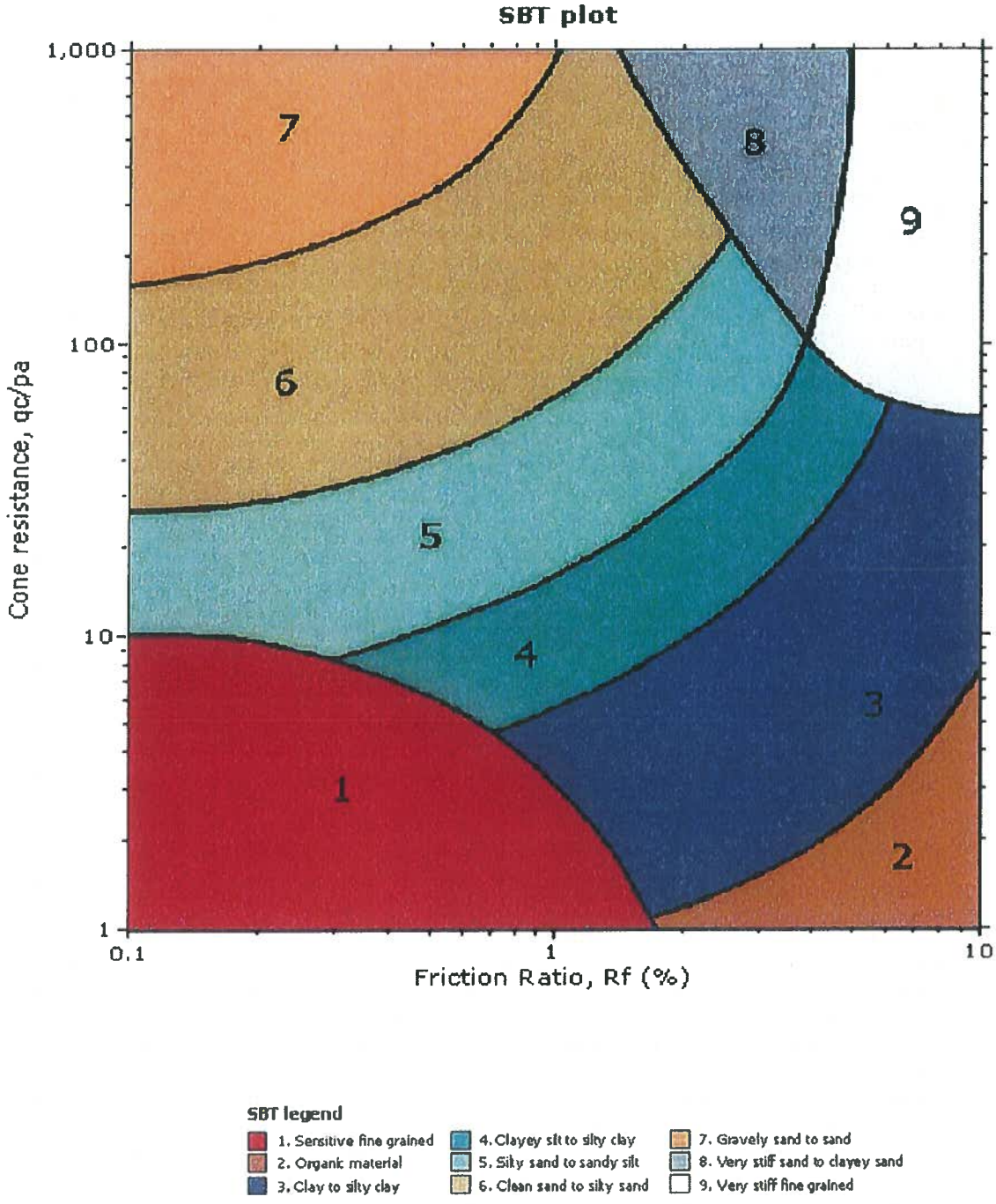


	CPT-1	In situ data						Basic output data												
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	106.8	0.87	1.35	0.81	106.817	0.8145	6	1.85141	120.6452	0.06032	0	0.0603	1769.8	0.8149	0.0009	6	0.4715	2	1.6239	201.787
2	18.1	0.34	0	1.85	18.1	1.8785	4	2.68979	109.4408	0.11504	0	0.115	156.33	1.8905	0	5	0.7885	2	2.4491	33.99456
3	24.3	0.42	14.73	1.72	24.4803	1.7157	4	2.55918	111.7235	0.1709	0	0.1709	142.24	1.7277	0.0436	5	0.7428	2	2.3221	45.94879
4	48.1	2.15	3.39	4.46	48.1415	4.466	4	2.60384	125.3213	0.23357	0	0.2336	205.12	4.4878	0.0051	9	0.7781	2	2.4071	90.55395
5	46.9	3.01	2.44	6.43	46.9299	6.4138	3	2.72632	127.7211	0.29743	0	0.2974	156.79	6.4547	0.0038	9	0.8313	2	2.5388	88.14306
6	67.2	4.67	7.04	6.94	67.2862	6.9405	9	2.65083	131.8136	0.36333	0	0.3633	184.19	6.9782	0.0076	9	0.8105	2	2.4759	126.4953
7	48.5	3.47	1.27	7.15	48.5155	7.1524	3	2.75219	128.8427	0.42775	0	0.4278	112.42	7.216	0.0019	9	0.8493	2	2.5698	90.89392
8	49.3	2.57	1.9	5.21	49.3233	5.2105	4	2.64515	126.6861	0.4911	0	0.4911	99.435	5.2629	0.0028	9	0.8164	1.8713	2.474	86.36202
9	33.9	2.4	0.92	7.08	33.9113	7.0773	3	2.85349	125.2716	0.55373	0	0.5537	60.241	7.1948	0.002	3	0.9034	1.795	2.695	56.58976
10	30.2	1.28	2.59	4.23	30.2317	4.234	4	2.73257	120.3919	0.61393	0	0.6139	48.243	4.3217	0.0063	4	0.8692	1.605	2.5975	44.92721
11	23.9	0.79	3.1	3.31	23.9379	3.3002	4	2.73818	116.2915	0.67207	0	0.6721	34.618	3.3955	0.0096	4	0.8818	1.4921	2.6237	32.80944
12	26.5	1.43	3.89	5.38	26.5476	5.3866	3	2.8451	120.8858	0.73252	0	0.7325	35.242	5.5394	0.0109	3	0.9346	1.4102	2.7556	34.40427
13	29.3	1.57	4.86	5.34	29.3595	5.3475	3	2.81125	121.8148	0.79342	0	0.7934	36.003	5.496	0.0123	3	0.9335	1.3083	2.7451	35.32045
14	32.4	1.53	5.86	4.72	32.4717	4.7118	3	2.74163	121.8717	0.85436	0	0.8544	37.007	4.8391	0.0133	4	0.918	1.2169	2.697	36.36345
15	79.7	3.37	3.62	4.23	79.7443	4.226	4	2.43815	129.8408	0.91928	0	0.9193	85.746	4.2753	0.0033	4	0.8129	1.1211	2.4131	83.51908
16	90.3	1.41	1.08	1.56	90.3132	1.5617	5	2.08943	123.7689	0.98117	0	0.9812	91.047	1.5784	0.0009	5	0.6887	1.0534	2.0796	88.93206
17	96.4	1.69	0.58	1.75	96.4071	1.753	5	2.10333	125.2536	1.04379	0	1.0438	91.362	1.7722	0.0004	5	0.7021	1.0096	2.107	90.99235
18	80.3	1.8	0.24	2.24	80.3029	2.2415	5	2.23474	125.2692	1.10643	0	1.1064	71.579	2.2728	0.0002	5	0.761	0.9666	2.2538	72.34667
19	31.2	1.36	4.48	4.34	31.2548	4.3513	4	2.73	120.9167	1.16689	0	1.1669	25.785	4.5201	0.0107	3	0.9657	0.9098	2.7836	25.87159
20	31.5	0.98	12.69	3.1	31.6553	3.0959	4	2.62738	118.55	1.22616	0	1.2262	24.817	3.2206	0.03	4	0.9356	0.8712	2.6973	25.05322
21	32.4	1.41	18.85	4.31	32.6307	4.3211	4	2.71426	121.2859	1.2868	0	1.2868	24.358	4.4985	0.0133	3	0.9777	0.8259	2.8002	24.4646
22	29.9	1.49	22.49	4.91	30.1753	4.9378	3	2.77873	121.4989	1.34755	0	1.3476	21.393	5.1686	0.0562	3	1	0.7852	2.8838	21.39265
23	40	1.86	33.86	4.6	40.4145	4.6023	4	2.66648	123.8344	1.40947	0	1.4095	27.674	4.7686	0.0625	3	0.9741	0.7563	2.7755	27.87982
24	93.2	1.86	2.49	2	93.2305	1.9951	5	2.15309	125.8732	1.47241	0	1.4724	62.318	2.0271	0.002	5	0.7745	0.7742	2.243	67.13921
25	40.2	2.62	2.77	6.5	40.2339	6.5119	3	2.7763	126.3303	1.53557	0	1.5356	25.201	6.7703	0.0052	3	1	0.6891	2.9127	25.20125
26	39.9	2.13	12.27	5.32	40.0496	5.3184	3	2.71394	124.8041	1.59797	0	1.598	24.063	5.5394	0.0229	3	1	0.6622	2.8667	24.06272
27	43.6	2.13	6.24	4.88	43.6764	4.8768	4	2.6607	125.0155	1.66048	0	1.6605	25.303	5.0695	0.0107	3	1	0.6372	2.8244	25.30344
28	64.2	2.35	5.46	3.66	64.2668	3.6566	4	2.45434	126.6768	1.72382	0	1.7238	36.282	3.7574	0.0063	4	0.9261	0.6364	2.6098	37.61506
29	134.3	2.07	2.17	1.54	134.327	1.541	6	1.96186	127.5466	1.78759	0	1.7876	74.144	1.5618	0.0012	5	0.7306	0.6817	2.0894	85.39432
30	98.6	1.75	0.43	1.77	98.6053	1.7748	5	2.10006	125.5638	1.85038	0	1.8504	52.289	1.8087	0.0003	5	0.7962	0.6408	2.2539	58.5972
31	80.9	3.26	2.61	4.03	80.932	4.0281	4	2.4182	129.6341	1.91519	0	1.9152	41.258	4.1257	0.0024	4	0.9301	0.5759	2.5965	43.00564
32	265.3	3.32	3.76	1.25	265.346	1.2512	6	1.69758	132.6636	1.98152	0	1.9815	132.91	1.2606	0.001	6	0.6358	0.6711	1.8165	167.0259
33	217.5	4.27	3.58	1.96	217.544	1.9628	6	1.90458	134.0205	2.04853	0	2.0485	105.19	1.9815	0.0012	5	0.7255	0.6192	2.0436	126.1111
34	254	4.52	4.1	1.78	254.05	1.7792	6	1.82997	134.8152	2.11594	0	2.1159	119.06	1.7941	0.0012	6	0.6999	0.6157	1.9678	146.5952
35	216.3	4.07	3.17	1.88	216.339	1.8813	6	1.89146	133.6559	2.18277	0	2.1828	98.112	1.9005	0.0011	5	0.7333	0.588	2.0472	119.0168
36	188.1	3.56	2.73	1.89	188.133	1.8923	6	1.9312	132.3356	2.24894	0	2.2489	82.654	1.9152	0.0011	5	0.7582	0.5646	2.1043	99.18814
37	244.4	2.14	2	0.87	244.424	0.8755	6	1.60467	129.25	2.31356	0	2.3136	104.65	0.8839	0.0006	6	0.6323	0.6098	1.7655	139.5281
38	262.4	3.1	1.46	1.18	262.418	1.1813	6	1.68137	132.1349	2.37963	0	2.3796	109.28	1.1921	0.0004	6	0.6659	0.5829	1.8457	143.2545
39	277.5	3.55	2.85	1.28	277.535	1.2791	6	1.69285	133.2633	2.44626	0	2.4463	112.45	1.2905	0.0008	6	0.6749	0.568	1.8608	147.6783
40	259.8	5.63	6.89	2.16	259.884	2.1664	6	1.89371	136.4773	2.5145	0	2.5145	102.35	2.1875	0.0019	5	0.7599	0.518	2.0759	125.9954
41	183.8	2.45	4.66	1.33	183.857	1.3326	6	1.82242	129.5454	2.57927	0	2.5793	70.283	1.3515	0.0019	5	0.7486	0.5132	2.0379	87.92669
42	191.2	2.46	2.79	1.29	191.234	1.2864	6	1.79959	129.6711	2.64411	0	2.6441	71.325	1.3044	0.0011	6	0.7448	0.5055	2.0197	90.10396
43	235.2	3.69	3.39	1.57	235.241	1.5686	6	1.80689	133.143	2.71068	0	2.7107	85.783	1.5869	0.0011	5	0.7473	0.4951	2.018	108.8066
44	214.7	3.51	-1.43	1.64	214.683	1.635	6	1.84578	132.5541	2.77696	0	2.777	76.309	1.6564	-5E-04	5	0.7712	0.4752	2.0727	95.15692
45	181.5	2.77	0.71	1.52	181.509	1.5261	6	1.86998	130.4122	2.84216	0	2.8422	62.863	1.5504	0.0003	5	0.7923	0.4571	2.1198	77.18432
46	204.2	3.49	1.06	1.71	204.213	1.709	6	1.8744	132.3903	2.90836	0	2.9084	69.216	1.7337	0.0004	5	0.7961	0.4471	2.1215	85.05611
47	196.9	4.23	1.49	2.15	196.918	2.1481	6	1.962	133.7087	2.97521	0	2.9752	65.186	2.1811	0.0006	5	0.8372	0.4208	2.2214	77.135
48	38.5	0.85	11.14	2.23	38.6364	2.2259	5	2.46896	118.0804	3.03425	0	3.0343	11.733	2.4156	0.0225	3	1	0.3487	2.8866	11.7334
49	46.7	0.88	131.54	1.81	48.3101	1.8216	5	2.33872	118.7936	3.09365	0	3.0937	14.616	1.9462	0.2095	4	1	0.342	2.7553	14.61588
50	30.2	0	116.57	0	31.6268	0	0	0	769.6	3.47845	0	3.4785	8.0922	0	0.2982	0	1	0.3042	0	0

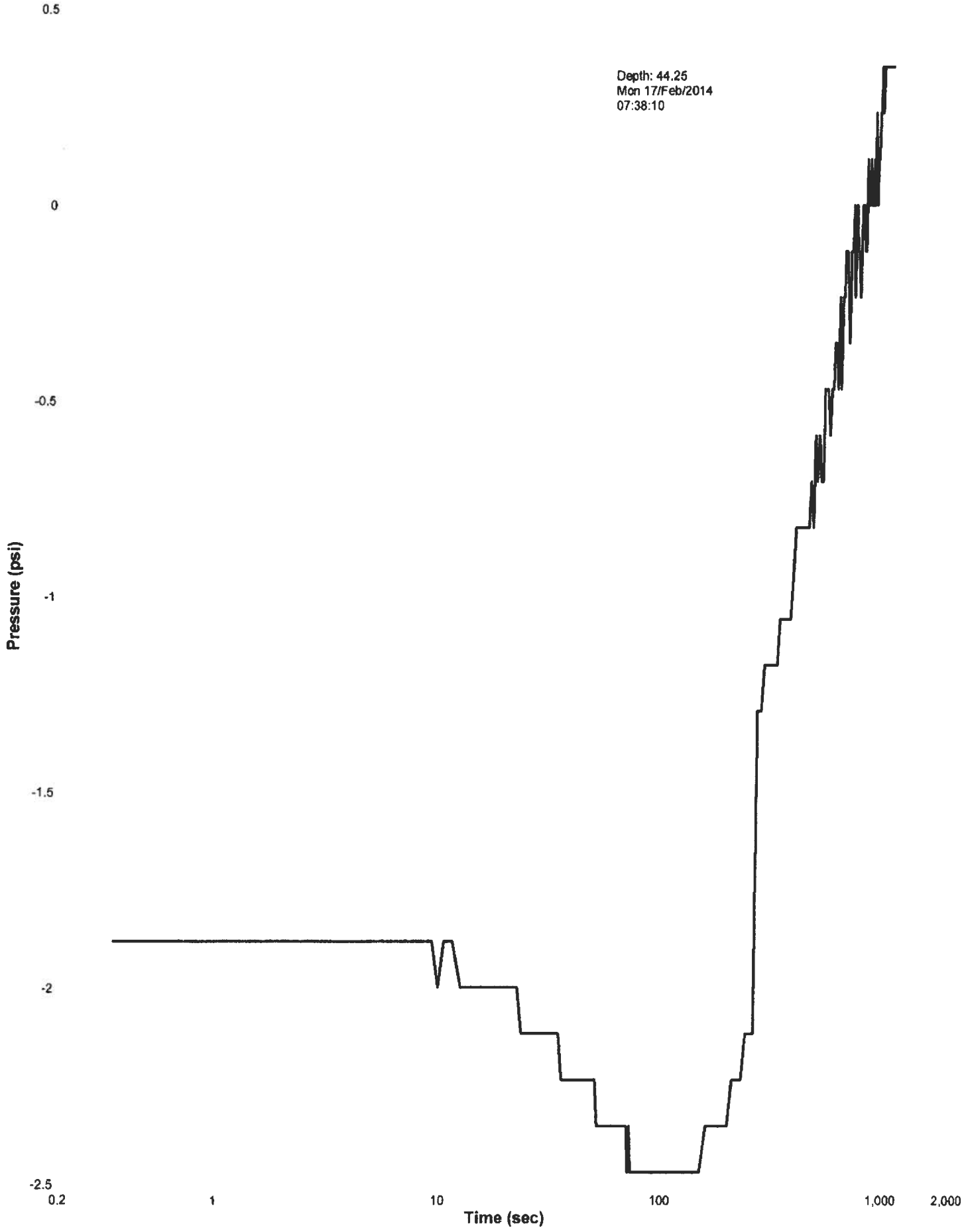
	CPT-2	In situ data					Basic output data													
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	37.8	0.69	0.95	1.82	37.8116	1.8248	5	2.42251	116.4162	0.05821	0	0.0582	648.59	1.8277	0.0018	5	0.6883	2	2.193	71.36024
2	46.8	3.01	2.98	6.42	46.8365	6.4266	3	2.72754	127.7162	0.12207	0	0.1221	382.7	6.4434	0.0046	9	0.8226	2	2.5377	88.298
3	44.7	2.54	2.21	5.69	44.7271	5.6789	3	2.70146	126.3616	0.18525	0	0.1853	240.45	5.7025	0.0036	9	0.8144	2	2.5082	84.19141
4	69.4	4.88	3.41	7.04	69.4417	7.0275	9	2.64646	132.2124	0.25135	0	0.2514	275.27	7.053	0.0036	9	0.8037	2	2.4718	130.7813
5	45.2	3.44	2.7	7.59	45.2331	7.6051	3	2.79228	128.6083	0.31566	0	0.3157	142.3	7.6585	0.0043	9	0.8586	2	2.6081	84.90133
6	38.7	2.45	2.81	6.33	38.7344	6.3251	3	2.77835	125.7468	0.37853	0	0.3785	101.33	6.3876	0.0053	9	0.8536	2	2.5871	72.49896
7	72.4	0.8	2.82	1.1	72.4345	1.1045	5	2.06577	119.0841	0.43807	0	0.4381	164.35	1.1112	0.0028	6	0.5924	1.6862	1.8951	114.73
8	91.7	0.69	2.82	0.75	91.7345	0.7522	6	1.88386	118.5779	0.49736	0	0.4974	183.44	0.7563	0.0022	6	0.5386	1.5017	1.7466	129.4857
9	98	0.84	2.7	0.85	98.0331	0.8569	6	1.89438	120.1792	0.55745	0	0.5575	174.86	0.8618	0.002	6	0.5536	1.4258	1.7781	131.3506
10	32.9	1.37	2.63	4.17	32.9322	4.1601	4	2.70009	121.0978	0.618	0	0.618	52.288	4.2396	0.0059	4	0.8584	1.5866	2.5686	48.45485
11	81.8	1.7	3.13	2.08	81.8383	2.0773	5	2.20573	124.8971	0.68045	0	0.6805	119.27	2.0947	0.0028	5	0.6891	1.3556	2.1181	103.9749
12	81.7	1.73	2.7	2.12	81.7331	2.1167	5	2.21183	125.022	0.74296	0	0.743	109.01	2.1361	0.0029	5	0.7011	1.2813	2.1418	98.0765
13	109.9	3.5	3	3.19	109.937	3.1837	5	2.25406	130.9009	0.80841	0	0.8084	134.99	3.2072	0.002	5	0.7284	1.2166	2.2046	125.4739
14	48.9	2.17	6.15	4.43	48.9753	4.4308	4	2.59618	125.4309	0.87113	0	0.8711	55.221	4.5111	0.0092	4	0.8654	1.1833	2.5569	53.79439
15	45.3	2.32	7.45	5.11	45.3912	5.1111	4	2.66379	125.7347	0.93399	0	0.934	47.599	5.2185	0.0121	4	0.9012	1.119	2.6431	47.01578
16	40.8	2.61	7.6	6.38	40.893	6.3825	3	2.76511	126.3419	0.99716	0	0.9972	40.009	6.542	0.0137	3	0.9501	1.058	2.7637	39.891
17	54.2	2.79	9.24	5.13	54.3131	5.1369	4	2.61226	127.5221	1.06093	0	1.0609	50.194	5.2392	0.0125	4	0.9003	0.9976	2.6251	50.20741
18	81	2.32	6.82	2.86	81.0835	2.8613	5	2.30759	127.1497	1.1245	0	1.1245	71.106	2.9015	0.0061	5	0.7911	0.953	2.3306	72.016
19	60.6	2.33	7.08	3.85	60.6867	3.8394	4	2.48684	126.4744	1.18774	0	1.1877	50.094	3.916	0.0086	4	0.8698	0.9044	2.5292	50.85392
20	38.9	2.49	8.24	6.38	39.0009	6.3845	3	2.77926	125.882	1.25068	0	1.2507	30.184	6.596	0.0157	3	0.9948	0.8468	2.8492	30.21023
21	30.1	1.02	10.93	3.38	30.2338	3.3737	4	2.66688	118.7307	1.31004	0	1.31	22.078	3.5265	0.0272	4	0.9643	0.8139	2.7672	22.2474
22	42	1.85	13	4.38	42.1591	4.3881	4	2.63887	123.8981	1.37199	0	1.372	29.728	4.5357	0.023	4	0.9576	0.7798	2.7368	30.05772
23	49.1	2.33	14.74	4.73	49.2804	4.728	4	2.61467	125.9666	1.43498	0	1.435	33.342	4.8699	0.0222	3	0.9547	0.7476	2.7214	33.80541
24	176.9	3.14	12.71	1.77	177.056	1.7735	6	1.92639	131.269	1.50061	0	1.5006	116.99	1.7886	0.0052	6	0.683	0.7877	2.0002	130.6902
25	177.1	3.4	11.23	1.92	177.237	1.9183	6	1.95224	131.8536	1.56654	0	1.5665	112.14	1.9354	0.0046	5	0.6997	0.7599	2.0359	126.1628
26	223.7	3.41	12.66	1.52	223.855	1.5233	6	1.81048	132.4446	1.63276	0	1.6328	136.1	1.5345	0.0041	6	0.6491	0.7546	1.8947	158.4823
27	309.3	5.68	13.12	1.83	309.461	1.8355	6	1.79147	136.9679	1.70124	0	1.7012	180.9	1.8456	0.0031	6	0.6438	0.7366	1.8725	214.2386
28	103	3.73	9.88	3.62	103.121	3.6171	5	2.31441	131.2105	1.76685	0	1.7669	57.364	3.6802	0.007	4	0.8686	0.6406	2.4533	61.36173
29	77.3	1.61	14.35	2.08	77.4756	2.0781	5	2.22297	124.3655	1.82903	0	1.829	41.359	2.1283	0.0137	5	0.8466	0.6292	2.387	44.98207
30	164.5	2.94	10.34	1.79	164.627	1.7859	6	1.94928	130.6099	1.89434	0	1.8943	85.905	1.8067	0.0046	5	0.7331	0.6525	2.0827	100.3514
31	140.3	4.09	9.85	2.91	140.421	2.9127	5	2.15674	132.6376	1.96066	0	1.9607	70.619	2.9539	0.0051	5	0.8226	0.6021	2.3094	78.78477
32	119.1	3.44	12.62	2.89	119.254	2.8846	5	2.19854	130.9728	2.02614	0	2.0261	57.858	2.9344	0.0078	5	0.849	0.576	2.3707	63.82
33	96.7	4.74	15.37	4.89	96.8881	4.8922	9	2.43332	132.8118	2.09255	0	2.0926	45.302	5.0002	0.0117	4	0.9515	0.5227	2.6307	46.82604
34	389.5	5.54	19.64	1.42	389.74	1.4215	6	1.64352	137.78	2.16119	0	2.1612	179.34	1.4294	0.0037	6	0.6731	0.6408	1.7606	234.7359
35	348.3	0	18.19	0	348.523	0	0	0	769.6	2.51599	0	2.546	135.89	0	0.0038	0	1	0.4156	0	0

	CPT-3	In situ data						Basic output data											
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	48.1	1.06	0.83	2.2	48.1102	2.2033	5	2.39324	120.1452	0.06007	0	0.0601	799.87	2.206	0.0012	5	0.6815	2	2.175	90.82265
2	52.5	2.13	3.96	4.05	52.5485	4.0534	4	2.54713	125.4666	0.12281	0	0.1228	426.9	4.0629	0.0054	9	0.7507	2	2.3489	99.09322
3	70	3.04	4.1	4.34	70.0502	4.3398	4	2.4839	128.7706	0.18719	0	0.1872	373.22	4.3514	0.0042	9	0.7339	2	2.2967	132.0527
4	49.9	3.25	5.54	6.5	49.9678	6.5042	3	2.71273	128.4354	0.25141	0	0.2514	197.75	6.5371	0.008	9	0.8245	2	2.5266	93.97226
5	46.2	3.48	4.74	7.53	46.258	7.523	3	2.78233	128.7476	0.31578	0	0.3158	145.49	7.5747	0.0074	9	0.855	2	2.5985	86.83846
6	47.9	3.09	5.14	6.43	47.9629	6.4425	3	2.72145	127.9661	0.37977	0	0.3798	125.3	6.4939	0.0078	9	0.834	2	2.5356	89.94006
7	46.1	2.67	5.21	5.78	46.1638	5.7838	3	2.69794	126.8039	0.44317	0	0.4432	103.17	5.8398	0.0082	9	0.827	2	2.5094	86.41954
8	72	2.44	4.98	3.39	72.061	3.386	5	2.39596	127.2309	0.50678	0	0.5068	141.19	3.41	0.005	5	0.7301	1.7116	2.2473	115.7481
9	67.2	1.93	5.74	2.86	67.2703	2.869	5	2.36489	125.3475	0.56946	0	0.5695	117.13	2.8935	0.0062	5	0.7288	1.5707	2.2362	99.01605
10	66.7	1.38	4.31	2.07	66.7528	2.0673	5	2.26861	122.8743	0.63089	0	0.6309	104.81	2.0871	0.0047	5	0.703	1.4384	2.1609	89.88724
11	22.3	0.58	3.16	2.61	22.3387	2.5964	4	2.69708	113.8619	0.68782	0	0.6878	31.477	2.6789	0.0105	4	0.8692	1.4541	2.5888	29.75341
12	54.5	3.16	4.98	5.79	54.561	5.7917	3	2.64969	128.4444	0.75205	0	0.7521	71.55	5.8726	0.0067	9	0.8667	1.3444	2.5747	68.36604
13	69.1	2.14	4.67	3.09	69.1572	3.0944	5	2.37993	126.1707	0.81513	0	0.8151	83.842	3.1313	0.0049	5	0.7753	1.2242	2.327	79.06797
14	116.7	1.11	4.43	0.95	116.754	0.9507	6	1.86343	122.6448	0.87645	0	0.8765	132.21	0.9579	0.0028	6	0.5894	1.1174	1.8314	122.3725
15	108.3	1.18	4.31	1.09	108.353	1.089	6	1.92636	122.9101	0.93791	0	0.9379	114.53	1.0985	0.0029	6	0.621	1.0778	1.9072	109.41
16	130.7	1.36	3.73	1.04	130.746	1.0402	6	1.85192	124.4071	1.00011	0	1.0001	129.73	1.0482	0.0021	6	0.6005	1.0344	1.8457	126.842
17	127.5	2.02	3.96	1.59	127.548	1.5837	6	1.98605	127.2414	1.06373	0	1.0637	118.91	1.597	0.0023	6	0.6593	0.9965	1.9923	119.1214
18	91	1.78	3.84	1.95	91.047	1.955	5	2.15421	125.4937	1.17648	0	1.1765	79.824	1.9795	0.0031	5	0.7323	0.9552	2.1761	81.1734
19	46.3	1.97	5.01	4.24	46.3613	4.2492	4	2.59985	124.5897	1.18878	0	1.1888	37.999	4.3611	0.008	4	0.9153	0.8989	2.6486	38.37588
20	34.9	1.37	6.24	3.91	34.9764	3.9169	4	2.66312	121.2447	1.2494	0	1.2494	26.995	4.062	0.0133	4	0.9515	0.8537	2.7361	27.21291
21	41.4	1.8	6.5	4.33	41.4796	4.3395	4	2.64047	123.6579	1.31123	0	1.3112	30.634	4.4811	0.0117	4	0.9498	0.8157	2.7238	30.96607
22	53	1.93	6.31	3.64	53.0772	3.6362	4	2.51043	124.7695	1.37361	0	1.3736	37.641	3.7328	0.0088	4	0.9056	0.7895	2.5999	38.5798
23	79.3	2.11	5.8	2.67	79.371	2.6584	5	2.29093	126.4034	1.43681	0	1.4368	54.241	2.7074	0.0054	5	0.8248	0.777	2.3798	57.2276
24	233	3.52	6.2	1.51	233.076	1.5102	6	1.79653	132.7754	1.5032	0	1.5032	154.05	1.52	0.0019	6	0.6306	0.8014	1.8623	175.3876
25	177.7	3.87	5.98	2.18	177.773	2.1769	5	1.99401	132.8084	1.56961	0	1.5696	112.26	2.1963	0.0024	5	0.716	0.754	2.0782	125.5639
26	85.2	2.84	5.88	3.33	85.272	3.3305	5	2.34128	128.7523	1.63398	0	1.634	51.187	3.3956	0.0051	4	0.8669	0.6861	2.4655	54.235
27	105	2.81	6.48	2.67	105.079	2.6742	5	2.20975	129.184	1.69857	0	1.6986	60.863	2.7181	0.0045	5	0.8207	0.6781	2.3356	66.25529
28	122.9	3.39	8.37	2.76	123.002	2.756	5	2.17474	130.9411	1.76404	0	1.764	68.728	2.7961	0.005	5	0.8112	0.6606	2.304	75.68907
29	324.4	5.35	8.17	1.65	324.5	1.6487	6	1.74134	136.6456	1.83237	0	1.8324	176.09	1.6581	0.0018	6	0.6357	0.7054	1.8347	215.0953
30	345.7	7.71	8.55	2.23	345.805	2.2296	8	1.83649	137.28	1.90101	0	1.901	180.91	2.2419	0.0018	6	0.6772	0.6725	1.9351	218.5748
31	283	6.19	8.53	2.19	283.104	2.1865	6	1.87611	137.28	1.96965	0	1.9697	142.73	2.2018	0.0022	5	0.7021	0.6465	1.9919	171.762
32	151.7	2.89	6.54	1.9	151.78	1.9041	6	1.99345	130.2863	2.03479	0	2.0348	73.592	1.9299	0.0031	5	0.7659	0.606	2.1513	85.76629
33	246.2	2.99	7.53	1.22	246.292	1.214	6	1.70815	131.7159	2.10065	0	2.1007	116.25	1.2245	0.0022	6	0.6523	0.6393	1.8449	147.5446
34	154.6	2.54	6.2	1.65	154.676	1.6421	6	1.94003	129.3878	2.16534	0	2.1653	70.433	1.6655	0.0029	5	0.7581	0.5811	2.1145	83.7535
35	344.4	5.45	7.84	1.58	344.496	1.582	6	1.71192	136.927	2.23381	0	2.2338	153.22	1.5924	0.0017	6	0.6582	0.6115	1.8439	197.7973
36	361.5	7.64	8.43	2.11	361.603	2.1128	6	1.80645	137.28	2.30245	0	2.3025	156.05	2.1264	0.0017	6	0.6993	0.5806	1.9433	197.15
37	365.8	7.44	8.66	2.03	365.906	2.0333	6	1.78954	137.28	2.37109	0	2.3711	153.32	2.0466	0.0017	6	0.6984	0.5692	1.9322	195.5677
38	406.3	7.67	9.41	1.89	406.415	1.8872	6	1.73831	137.28	2.43973	0	2.4397	165.58	1.8986	0.0017	6	0.6818	0.5658	1.8801	216.0072
39	397.3	7.92	11.67	1.99	397.443	1.9927	6	1.76358	137.28	2.50837	0	2.5084	157.45	2.0054	0.0021	6	0.6978	0.5476	1.9136	204.3732
40	401.9	6.14	11.01	1.53	402.035	1.5272	6	1.66238	137.28	2.57701	0	2.577	155.01	1.5371	0.002	6	0.6643	0.5536	1.8169	209.0025
41	425.3	4.04	5.08	0.95	425.362	0.9498	6	1.47779	135.2508	2.64463	0	2.6446	159.84	0.9557	0.0009	6	0.5973	0.5786	1.6323	231.1572
42	350	3.81	7.12	1.09	350.087	1.0883	6	1.57562	134.3469	2.7118	0	2.7118	128.1	1.0968	0.0015	6	0.6463	0.5443	1.7525	178.7023
43	306.7	4.95	6.14	1.61	306.775	1.6136	6	1.74758	135.9401	2.77977	0	2.7798	109.36	1.6283	0.0015	6	0.7222	0.4978	1.9437	143.0116
44	270.6	4.65	5.31	1.72	270.665	1.718	6	1.80143	135.1771	2.84736	0	2.8474	94.058	1.7363	0.0014	5	0.7529	0.4746	2.0158	120.1224
45	252.5	4.39	4.78	1.74	252.559	1.7382	6	1.82338	134.5873	2.91466	0	2.9147	85.651	1.7585	0.0014	5	0.7697	0.4585	2.0515	108.1662
46	197.9	3.7	3.87	1.87	197.947	1.8692	6	1.91316	132.7418	2.98103	0	2.981	65.402	1.8978	0.0014	5	0.8188	0.4282	2.1723	78.90428
47	227.8	5.13	2.93	2.25	227.836	2.2516	6	1.94044	135.4758	3.04877	0	3.0488	73.731	2.2822	0.0009	5	0.8304	0.4153	2.1943	88.22868
48	101.1	3.97	3.31	3.92	101.141	3.9252	4	2.34713	131.6194	3.11458	0	3.1146	31.473	4.05	0.0024	4	1	0.3397	2.6886	31.4733
49	34.7	1.26	9.21	3.62	34.8127	3.6194	4	2.64139	120.6208	3.17489	0	3.1749	9.965	3.9826	0.021	3	1	0.3333	3.0694	9.96504
50	42.5	0	11.79	0	42.6443	0	0	0	769.6	3.55969	0	3.5597	10.98	0	0.0217	0	1	0.2973	0	0

	CPT-4	In situ data						Basic output data											
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Ft (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	21.2	0.83	1.36	3.93	21.2167	3.912	3	2.82567	116.3586	0.05818	0	0.0582	363.68	3.9228	0.0046	4	0.8447	2	2.6036	39.99302
2	22.5	0.46	2	2.06	22.5245	2.0422	4	2.63227	112.186	0.11427	0	0.1143	196.11	2.0526	0.0064	5	0.7685	2	2.3968	42.35902
3	30.1	1.21	1.97	4.04	30.1241	4.0167	4	2.71831	119.9717	0.17426	0	0.1743	171.87	4.0401	0.0047	4	0.8133	2	2.5068	56.6102
4	61.9	3.2	3.38	5.16	61.9414	5.1662	4	2.57601	128.8459	0.23868	0	0.2387	258.52	5.1862	0.0039	9	0.7719	2	2.3901	116.6283
5	75	2.2	3.17	2.93	75.0388	2.9318	5	2.33846	126.5721	0.30197	0	0.302	247.5	2.9437	0.0031	5	0.681	2	2.1435	141.265
6	108.3	0.63	3.01	0.58	108.337	0.5815	6	1.76075	118.318	0.36113	0	0.3611	299	0.5835	0.002	6	0.4706	1.6584	1.5854	169.2376
7	160.1	1.19	3.41	0.74	160.142	0.7431	6	1.68954	123.9247	0.42309	0	0.4231	377.51	0.7451	0.0015	6	0.4621	1.5275	1.5552	230.57
8	100	5.13	5.1	5.12	100.062	5.1268	9	2.44072	133.4689	0.48982	0	0.4898	203.28	5.152	0.0037	9	0.749	1.7804	2.2989	167.5441
9	131.2	4.83	6.22	3.68	131.276	3.6793	8	2.25461	133.6902	0.55667	0	0.5567	234.82	3.6949	0.0034	8	0.6933	1.561	2.1446	192.8429
10	79.9	1.54	4.82	1.93	79.959	1.926	5	2.19029	124.1172	0.61873	0	0.6187	128.23	1.941	0.0044	5	0.6731	1.435	2.0839	107.6019
11	60.4	1.47	4.23	2.43	60.4518	2.4317	5	2.34813	123.0947	0.68027	0	0.6803	87.864	2.4594	0.0051	5	0.7407	1.3871	2.2535	78.35456
12	47.4	2.59	5.5	5.46	47.4673	5.4564	3	2.67116	126.6493	0.7436	0	0.7436	62.835	5.5432	0.0085	4	0.8728	1.3605	2.5917	60.07683
13	76.7	2.62	5.9	3.41	76.7722	3.4127	5	2.37976	127.9062	0.80755	0	0.8076	94.068	3.449	0.0056	5	0.7745	1.2328	2.3257	88.50601
14	176.5	2.29	5.29	1.3	176.565	1.297	6	1.82573	128.9525	0.87203	0	0.872	201.48	1.3034	0.0022	6	0.5757	1.1178	1.7961	185.602
15	163	3.46	5.29	2.12	163.065	2.1219	5	2.00905	131.7783	0.93792	0	0.9379	172.86	2.1341	0.0024	5	0.6529	1.0819	1.9909	165.7736
16	180	3.01	5.71	1.67	180.07	1.6716	6	1.90209	131.0008	1.00342	0	1.0034	178.46	1.6809	0.0023	6	0.6199	1.0335	1.8962	174.8927
17	137.5	2.95	5.41	2.15	137.566	2.1444	5	2.06042	130.1968	1.06852	0	1.0685	127.75	2.1612	0.0029	5	0.6881	0.9933	2.0671	128.1358
18	89.6	3.09	5.5	3.44	89.6673	3.4461	5	2.33787	129.4922	1.13326	0	1.1333	78.123	3.4902	0.0045	5	0.8033	0.9464	2.3615	79.18477
19	93.2	3.27	4.88	3.51	93.2597	3.5063	5	2.33234	130.0023	1.19826	0	1.1983	76.829	3.552	0.0038	5	0.8093	0.9042	2.3691	78.67355
20	35.8	1.48	6.46	4.12	35.8791	4.125	4	2.67042	121.8719	1.2592	0	1.2592	27.494	4.275	0.0134	4	0.9555	0.8468	2.7452	27.70747
21	35.6	1.54	6.7	4.31	35.682	4.3159	4	2.6857	122.1493	1.32027	0	1.3203	26.026	4.4817	0.014	3	0.9705	0.8067	2.7771	26.19694
22	58.3	2.61	6.75	4.47	58.3826	4.4705	4	2.54658	127.2104	1.38388	0	1.3839	41.188	4.5791	0.0085	4	0.9195	0.7813	2.6352	42.08734
23	155.5	3.82	6.88	2.45	155.584	2.4553	5	2.07101	132.388	1.45007	0	1.4501	106.29	2.4784	0.0032	5	0.7347	0.7933	2.1414	115.5625
24	122.8	3.34	6.26	2.72	122.877	2.7182	5	2.17044	130.8299	1.51549	0	1.5155	80.081	2.7521	0.0037	5	0.7827	0.7549	2.259	86.58429
25	137.9	2.47	6.35	1.79	137.978	1.7901	6	2.00117	128.9047	1.57994	0	1.5799	86.331	1.8109	0.0034	5	0.7231	0.7484	2.0955	96.46754
26	81.3	3.73	6.46	4.58	81.3791	4.5835	4	2.45927	130.633	1.64526	0	1.6453	48.463	4.6781	0.0058	4	0.914	0.668	2.5882	50.33708
27	110.7	2.81	7.37	2.53	110.79	2.5363	5	2.1773	129.3131	1.70991	0	1.7099	63.793	2.5761	0.0049	5	0.8081	0.6785	2.3025	69.94843
28	263.6	3.63	7.18	1.38	263.688	1.3766	6	1.73166	133.3015	1.77656	0	1.7766	147.43	1.386	0.002	6	0.6302	0.7214	1.8271	178.5701
29	296.1	5.94	7.52	2.01	296.192	2.0055	6	1.834	137.1885	1.84516	0	1.8452	159.52	2.018	0.0018	6	0.6738	0.6875	1.9333	191.2468
30	215	3.52	6.84	1.64	215.084	1.6366	6	1.8456	132.5794	1.91145	0	1.9115	111.52	1.6513	0.0023	6	0.69	0.6649	1.9675	133.9615
31	93.2	4.25	9.2	4.55	93.3126	4.5546	9	2.41929	131.9216	1.97741	0	1.9774	46.189	4.6532	0.0073	8	0.9343	0.5575	2.5998	48.1267
32	94.7	4.8	9.02	5.06	94.8104	5.0627	9	2.45084	132.8509	2.04383	0	2.0438	45.389	5.1743	0.007	9	0.9533	0.5339	2.6417	46.8051
33	241.9	5.26	9.61	2.17	242.018	2.1734	6	1.91267	135.8062	2.11174	0	2.1117	113.61	2.1925	0.0029	5	0.7323	0.6029	2.0535	136.6943
34	319.6	6.43	9.88	2.01	319.721	2.0111	6	1.81673	137.28	2.18038	0	2.1804	145.64	2.0249	0.0022	6	0.6955	0.6048	1.9485	181.4965
35	376.5	0	10.14	0	376.624	0	0	0	769.6	2.56518	0	2.5652	145.82	0	0.002	0	1	0.4125	0	0

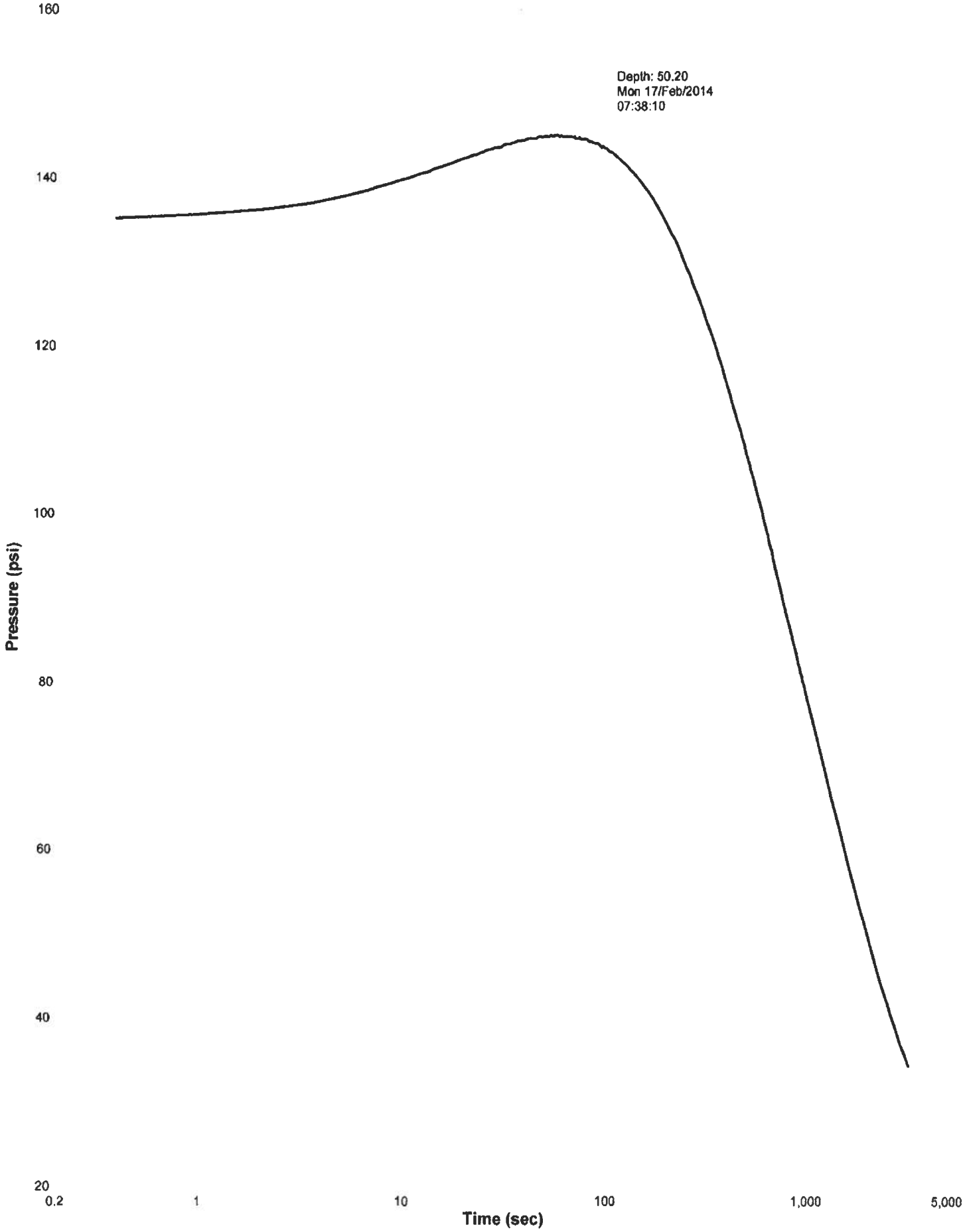
Associated Soils Engineering, Inc. CPT-1

Kehoe Testing



Associated Soils Engineering, Inc. CPT-1

Kehoe Testing



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

:: Unit Weight, g (kN/m³) ::

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

where g_w = water unit weight

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

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

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

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

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

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

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

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

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

:: Relative Density, Dr (%) ::

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

:: State Parameter, ψ ::

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

:: Peak drained friction angle, φ (°) ::

$\varphi = 17.60 + 11 \cdot \log(Q_{tn})$

(applicable only to SBT_n: 5, 6, 7 and 8)

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

If $I_c > 2.20$

$\alpha = 14$ for $Q_{tn} > 14$

$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$

$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \leq 2.20$

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

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

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

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

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

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

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

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

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

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

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

:: Overconsolidation Ratio, OCR ::

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

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

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

:: In situ Stress Ratio, Ko ::

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

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

:: Soil Sensitivity, S_t ::

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

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

:: Effective Stress Friction Angle, φ' (°) ::

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

(applicable for $0.10 < B_q < 1.00$)

References

- Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012
- Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

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*                    *
*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 6467.14

DATE: 02-25-2014

JOB NAME: Residential Development (Newport 83)
1560 Placentia Avenue,Newport Beach,CA
CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\Cgsflte.dat

SITE COORDINATES:
SITE LATITUDE: 33.6311
SITE LONGITUDE: 117.9307

SEARCH RADIUS: 62 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\Cgsflte.dat

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (MW)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	0.8(1.3)	7.1	0.537	X
SAN JOAQUIN HILLS	2.9(4.6)	6.6	0.516	X
NEWPORT-INGLEWOOD (Offshore)	2.9(4.7)	7.1	0.436	X
PALOS VERDES	12.4(20.0)	7.3	0.234	IX
WHITTIER	20.7(33.3)	6.8	0.116	VII
PUENTE HILLS BLIND THRUST	20.8(33.4)	7.1	0.177	VIII
CHINO-CENTRAL AVE. (Elsinore)	22.6(36.3)	6.7	0.127	VIII
ELSINORE (GLEN IVY)	22.9(36.8)	6.8	0.104	VII
CORONADO BANK	25.0(40.3)	7.6	0.152	VIII
SAN JOSE	28.3(45.6)	6.4	0.078	VII
UPPER ELYSIAN PARK BLIND THRUST	31.8(51.2)	6.4	0.067	VI
ELSINORE (TEMECULA)	33.6(54.0)	6.8	0.067	VI
SIERRA MADRE	35.2(56.7)	7.2	0.107	VII
RAYMOND	35.5(57.1)	6.5	0.064	VI
CUCAMONGA	36.0(58.0)	6.9	0.084	VII
VERDUGO	36.8(59.3)	6.9	0.082	VII
HOLLYWOOD	37.8(60.9)	6.4	0.054	VI
CLAMSHELL-SAWPIT	38.0(61.1)	6.5	0.058	VI
SANTA MONICA	40.9(65.8)	6.6	0.057	VI
MALIBU COAST	44.3(71.3)	6.7	0.056	VI
ROSE CANYON	45.7(73.5)	7.2	0.061	VI
SAN JACINTO-SAN BERNARDINO	47.1(75.8)	6.7	0.040	V
SAN JACINTO-SAN JACINTO VALLEY	48.2(77.5)	6.9	0.045	VI
SIERRA MADRE (San Fernando)	49.3(79.4)	6.7	0.048	VI
NORTHRIDGE (E. Oak Ridge)	49.5(79.7)	7.0	0.061	VI
ANACAPA-DUME	50.3(80.9)	7.5	0.086	VII
SAN GABRIEL	51.5(82.9)	7.2	0.052	VI
SAN ANDREAS - SB-Coach. M-1b-2	51.8(83.3)	7.7	0.075	VII
SAN ANDREAS - SB-Coach. M-2b	51.8(83.3)	7.7	0.075	VII
SAN ANDREAS - Whole M-1a	51.8(83.3)	8.0	0.092	VII
SAN ANDREAS - San Bernardino M-1	51.8(83.3)	7.5	0.065	VI
SAN ANDREAS - Mojave M-1c-3	51.8(83.4)	7.4	0.060	VI
SAN ANDREAS - Cho-Moj M-1b-1	51.8(83.4)	7.8	0.080	VII
SAN ANDREAS - 1857 Rupture M-2a	51.8(83.4)	7.8	0.080	VII
CLEGHORN	54.1(87.1)	6.5	0.028	V
ELSINORE (JULIAN)	55.6(89.5)	7.1	0.044	VI
SANTA SUSANA	57.8(93.1)	6.7	0.039	V
SAN JACINTO-ANZA	58.8(94.6)	7.2	0.044	VI
NORTH FRONTAL FAULT ZONE (West)	60.0(96.6)	7.2	0.055	VI

-END OF SEARCH- 39 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 0.8 MILES (1.3 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5367 g