July 25, 2017
File: 1911.029altr.doc

Alameda Unified School District
2060 Challenger Drive
Alameda, California 94501

Attention: Chad Pimentel, Legal Counsel for AUSD

Re: Geotechnical Engineering Investigation
Evaluation of Liquefaction Risk and Liquefaction Induced Settlement Potential
Encinal High School Campus
210 Central Avenue
Alameda, California

Introduction

This letter summarizes our geotechnical investigation of the Encinal High School Campus located at 210 Central Avenue in Alameda, California. The approximate site location is presented on Figure 1, Site Location Map. The purpose of our geotechnical investigation is to evaluate the site soil and groundwater conditions and to assess the liquefaction risk and liquefaction induced settlement potential across the school campus. Our scope includes exploring the subsurface conditions with eight Cone Penetration Tests (CPTs), conducting engineering analyses to evaluate the liquefaction risk and liquefaction induced settlement potential, and presentation of our geotechnical conclusions in this letter report.

Site Description

The Encinal High School campus is located on the southerly side of Central Avenue, west of Third Street, as shown on the Site Location Map, Figure 1. The existing campus consists of numerous permanent and portable buildings, paved driveways, parking areas, and play areas, and landscaping improvements, as shown on the Site Plan, Figure 2. The ground surface at the project site and the surrounding area is characterized by nearly level to slightly sloping terrain.

Regional Geology

The site is located within the Coast Range Geomorphic Province of California. The regional bedrock geology consists of complexly folded, faulted, sheared, and altered sedimentary, igneous, and metamorphic rock of the Franciscan Complex. Bedrock is characterized by a diverse assemblage of greenstone, sandstone, shale, chert, and melange, with lesser amounts of conglomerate, calc-silicate rock, schist and other metamorphic rocks.

The regional topography is characterized by northwest-southeast trending mountain ridges and intervening valleys that were formed by movement between the North American and the Pacific Plates. Continued deformation and erosion during the late Tertiary and Quaternary Age (the last several million years) formed the prominent coastal ridges and the inland depression that is now the San Francisco Bay. The more recent seismic activity within the Coast Range

Geomorphic Province is concentrated along the San Andreas Fault zone, a complex group of generally north to northwest trending faults.

Geologic mapping[1] indicates the site is located in an area underlain by artificial fill sands, as shown on Figure 3. These artificial (manmade) fills were placed over older dune sands and soft clay (Bay Mud).

Surface Conditions

The site is currently developed as a high school campus. The attached Site Plan, Figure 2, shows the locations of existing buildings, driveways, and play areas. Most of the ground surface immediately around the existing buildings consists of asphalt paved surfaces.

Seismicity

The San Francisco Bay Region is located in a seismically active area and the proposed improvements will therefore experience the effects of future earthquakes. Such earthquakes could occur on any of several active faults within the region. These faults are shown on the Active Fault Map, Figure 4.

Subsurface Exploration and Laboratory Testing

We explored the subsurface soil and groundwater conditions with eight Cone Penetration Tests (CPTs) at the approximate locations shown on the Site Plan, Figure 2. The CPTs were conducted with truck-mounted equipment on March 23, 2017 and August 29, 2014. The CPTs were extended to depths of 8 feet to 68 feet below the ground surface. A schematic of the CPT apparatus is provided on Figure A-1 and a CPT Soil Interpretation Chart is provided on Figure A-2. CPT logs (2017) are shown on Figures A-3 through A-8, and CPT logs (2014) are shown on Figures B-1 through B-3.

Subsurface Conditions

The subsurface conditions are consistent with the mapped geology. Review of subsurface data collected from the CPTs conducted at the site indicate that the campus is generally underlain by approximately ten to fifteen feet of loose to medium-dense sandy fill over a relatively thin layer of soft clay and organic material, interpreted as Bay Mud or similar marsh deposits. Beneath the soft clay, each CPT encountered predominantly medium-dense to dense silty sand and sandy silt extending to a depth of 50 feet or more.

Groundwater was measured at approximately seven (2017) to ten (2014) feet below the ground surface during our CPT investigations. It is anticipated that the groundwater level beneath the site is influenced by tidal activity in the nearby San Francisco Bay.

[1] Graymer, R. W., "Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California", 2000, USGS, MF-2342 Version 1.0., Scale 1:50,000.

Given the low site elevations and proximity to San Francisco Bay, the highest historic groundwater elevation is assumed to coincide with the ground surface.

Liquefaction Risk and Liquefaction Induced Settlement Potential

The project site lies within a California Seismic Hazard Zone of Required Investigation for Liquefaction, as mapped by CGS (2003).

Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena include liquefaction-induced settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular deposits. Recent advances in liquefaction studies indicate that liquefaction can occur in granular materials with a high fines content (35 to 50% clayey and silty materials that pass the #200 sieve) provided the fines exhibit a plasticity less than 7. Granular layers with a potential for liquefaction were observed during our subsurface exploration.

To evaluate soil liquefaction, the seismic energy from an earthquake is compared with the ability of the soil to resist pore pressure generation. The earthquake energy is termed the cyclic stress ratio (CSR) and is a function of the maximum credible earthquake peak ground acceleration (PGA) and depth. The soil resistance to liquefaction is based on the relative density, and the amount and plasticity of the fines (silts and clays). The relative density of cohesionless soil is correlated with Cone Penetration Test data measured in the field.

We analyzed the potential for liquefaction utilizing the CPT Liquefaction Assessment software program CLiq (2007, ver. 2.1.6.9), and the procedures outlined by Idriss and Boulanger (2014). The design seismic conditions consisted of a magnitude 7.3 earthquake producing a PGA of 0.53g, which corresponds to the PGA_M per ASCE 7-10 Section 11.8.3, and assuming groundwater at the ground surface. The results of our liquefaction analyses are presented on Figures 5 through 12, and indicate granular soil layers observed between roughly 4 and 16 feet, and discontinuous lenses between roughly 40 and 50 feet below the ground surface classify as liquefiable during the design seismic event. Therefore, we judge the risk of liquefaction at the site is high.

Potential liquefaction of sandy layers between 4 and 16 feet below the ground surface may result in ground surface settlement of between roughly 1-inch to 2.5-inches, based on the liquefaction analyses discussed above, and as shown on Figures 5 through 12. Potential liquefaction induced differential ground surface settlement within a given building footprint area is estimated to be approximately one half of the total settlement (approximately 0.5 to 1.5-inches).

Based on procedures outlined by Idriss and Boulanger, 2014, the discontinuous and relatively thin layers of potentially liquefiable soil observed 40-feet to 50-feet below the ground surface in the CPT's may experience 0.5-inch to 1.5-inch of post-liquefaction settlement. However, because there is a significant non-liquefiable soil "cap" overlying these deeper potentially liquefiable soil layers, we utilized the procedures outlined by Youd and Garris (1995) to determine if post-liquefaction settlement will be manifested in the form of ground surface settlement. As shown on Figure 13, based on the relative thicknesses of the non-liquefiable "cap" and the liquefiable layers, post-liquefaction settlements are not expected to result in ground surface settlement from the potentially liquefiable layers located below a depth of 40-feet.

If you have any questions, or if we can be of further assistance, please call us at your convenience.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP

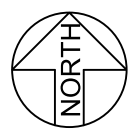
REGISTERED PROFESSIONAL ENGINEER
DANIEL S. CALDWELL
No GE002006
EXP. 9-30-17
GEOTECHNICAL
STATE OF CALIFORNIA

Daniel S. Caldwell
Geotechnical Engineer #2006
(Expires 9/30/17)

Attachments: Figures 1 through 13, A-1 through A-8, B-1 through B-5

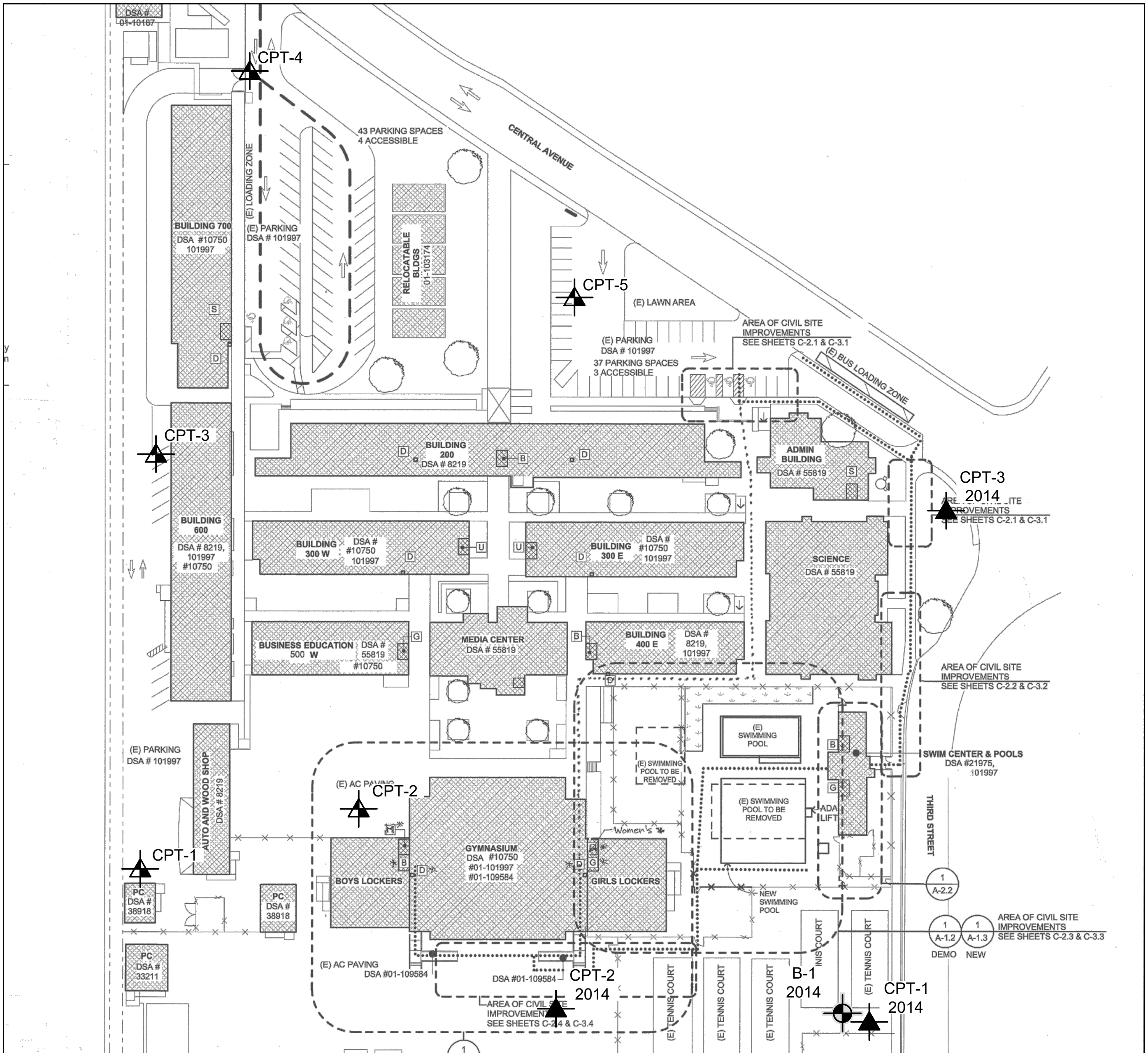
SITE: LATITUDE, 37.7722°
LONGITUDE, -122.2896°

SITE LOCATION
N.T.S.

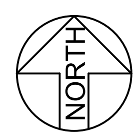


REFERENCE: Google Earth, 2017

MPEG MILLER PACIFIC ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	SITE LOCATION MAP		
A CALIFORNIA CORPORATION, © 2015, ALL RIGHTS RESERVED FILE: 1911.029 Figures.dwg		Encinal High School 210 Central Avenue Alameda, California Project No. 1911.029 Date: 3/16/17	Drawn MMT Checked	1 FIGURE



SITE PLAN



Approximate location of CPT completed by MPEG, 2017

Approximate location of CPT completed by MPEG, 2014

Approximate location of boring completed by MPEG, 2014

APROXIMATE SCALE

0 70 140 280 FEET

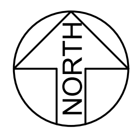
REFERENCE: Site Plan provided by QKA.

MPEG MILLER PACIFIC ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	SITE PLAN Encinal High School 210 Central Avenue Alameda, California Project No. 1911.029 Date: 3/16/17	Drawn MMT Checked	2 FIGURE

FILE: 1911.029 Figures.dwg

REGIONAL GEOLOGIC MAP

(NOT TO SCALE)



LEGEND

af — ARTIFICIAL FILL (HOLOCENE)
Man made deposit of various materials and ages. Some are compacted and quite firm, but fills made before 1865 are nearly everywhere not compacted and consist simply of dumped materials.

Qds — DUNE SAND (HOLOCENE AND PLEISTOCENE)
Fine-grained, very well sorted, well-drained, eolian deposits.They occur mainly in large sheets, as well as many small hills, most displaying Barchan morphology.Dunes display as much as 30 m of erosional relief and are presently being buried by basin deposits (Qhb) and bay mud (Qhbm). They probably began accumulating after the last interglacial high stand of sea level began to recede about 71 ka, continued to form when sea level dropped to its Wisconsin minimum about 18 ka, and probably ceased to accumulate after sea level reached its present elevation (about 6 ka). Atwater (1982) recognized buried paleosols in the dunes, indicating periods of nondeposition

REFERENCE: Graymer, R.W. (2000), "Geologic Map of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California", United States Geological Survey Miscellaneous Field Studies Map MF-2342, Version 1.0, Map Scale 1:50,000.

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REGIONAL GEOLOGIC MAP

Encinal High School
210 Central Avenue
Alameda, California

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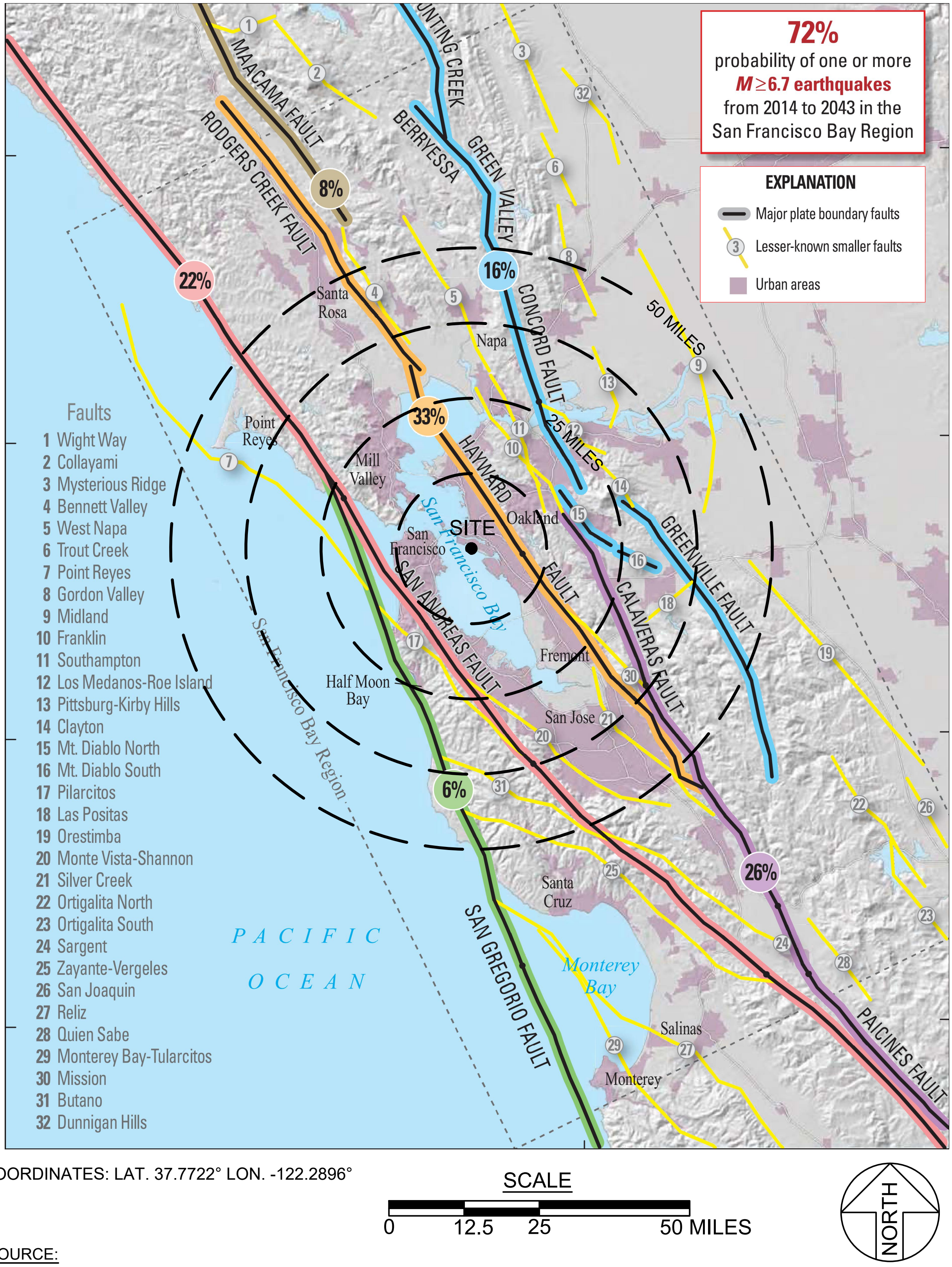
FIGURE 3



SITE COORDINATES: LAT. 37.7722° LON. -122.2896°

DATA SOURCE:
1) U.S. Geological Survey, U.S. Department of the Interior, "Earthquake Outlook for the San Francisco Bay Region 2014-2043", Map of Known Active Faults in the San Francisco Bay Region, Fact Sheet 2016-3020, Revised August 2016 (ver. 1.1).

MPEG MILLER PACIFIC ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	ACTIVE FAULT MAP Encinal High School 210 Central Avenue Alameda, California Project No. 1911.029 Date: 3/24/17	Drawn MMT Checked	4 FIGURE

FILE: 1911.029 FM.dwg

CPT name: CPT-01

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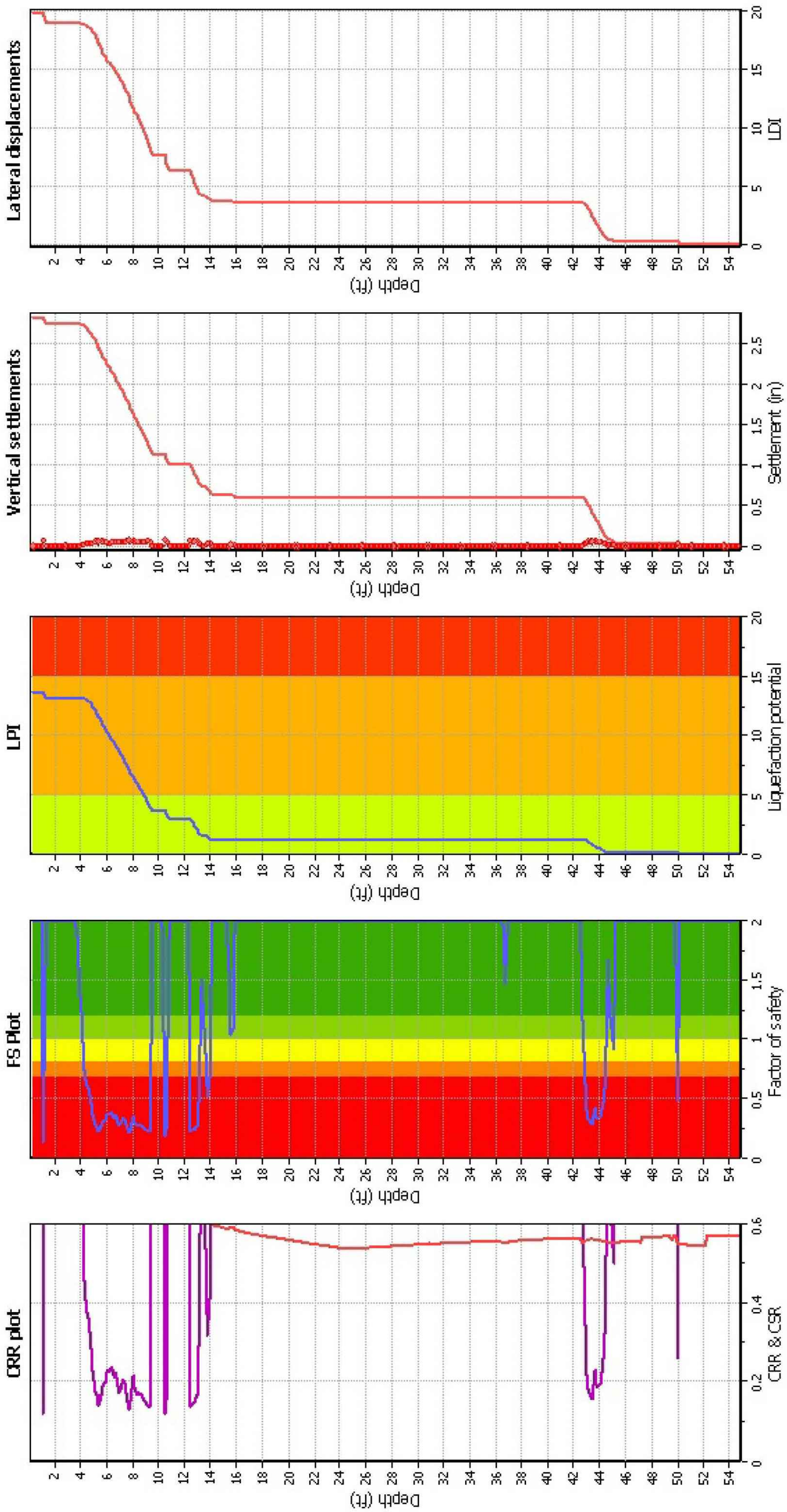
Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)
Fines correction method:	B&I (2014)
Points to test:	Based on Ic value
Earthquake magnitude M_w:	7.30
Peak ground acceleration:	0.53
Depth to water table (insitu):	0.00 ft
Depth to GWT (erthq.):	0.00 ft
Average results interval:	3
Ic cut-off value:	2.60
Unit weight calculation:	Based on SBT
Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Transition detect. applied:	Yes
K_σ applied:	Yes
Clay like behavior applied:	Sands only
Limit depth applied:	No
Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

CLiq v.2.1.6.9 - CPT Liquefaction Assessment Software - Report created on: 4/7/2017, 11:34:04 AM
Project file: H:\Jobs\1900-1999\1911.029\1911.029 -Encinal HS Liquefaction Eval\Analyses\1911.029 CPTLiq.clq

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CPT-1 LIQUEFACTION ANALYSIS

Encinal High School
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Project No. 1911.029 Date: 3/16/17

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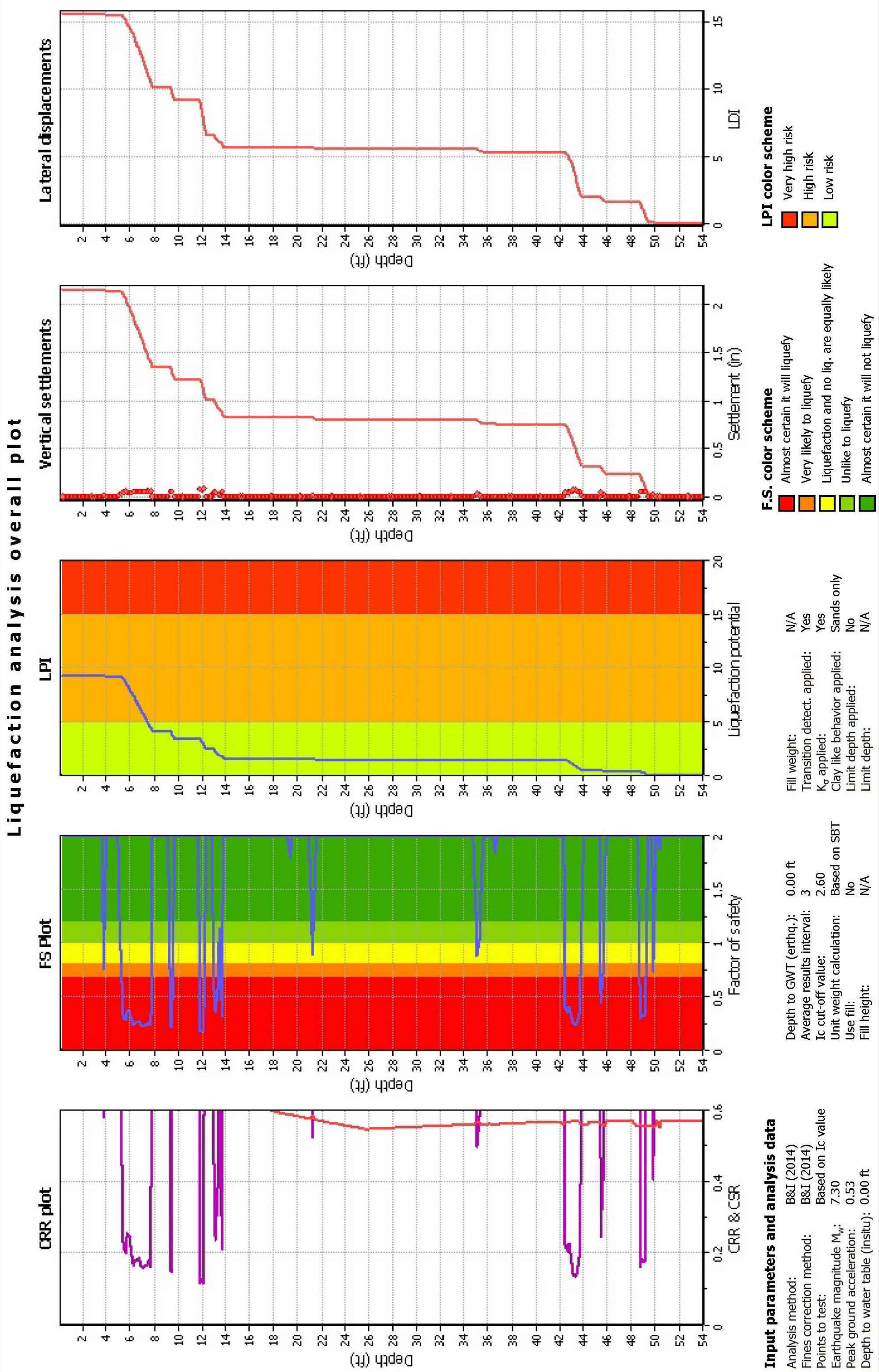
5
FIGURE

CPT name: CPT-02

Liquefaction analysis overall plot



Input parameters and analysis data

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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.53	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 ft	Fill height:	N/A	Limit depth:	N/A

CLiq v.2.1.6.9 - CPT Liquefaction Assessment Software - Report created on: 4/7/2017, 11:34:04 AM
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CPT-2 LIQUEFACTION ANALYSIS

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6
FIGURE

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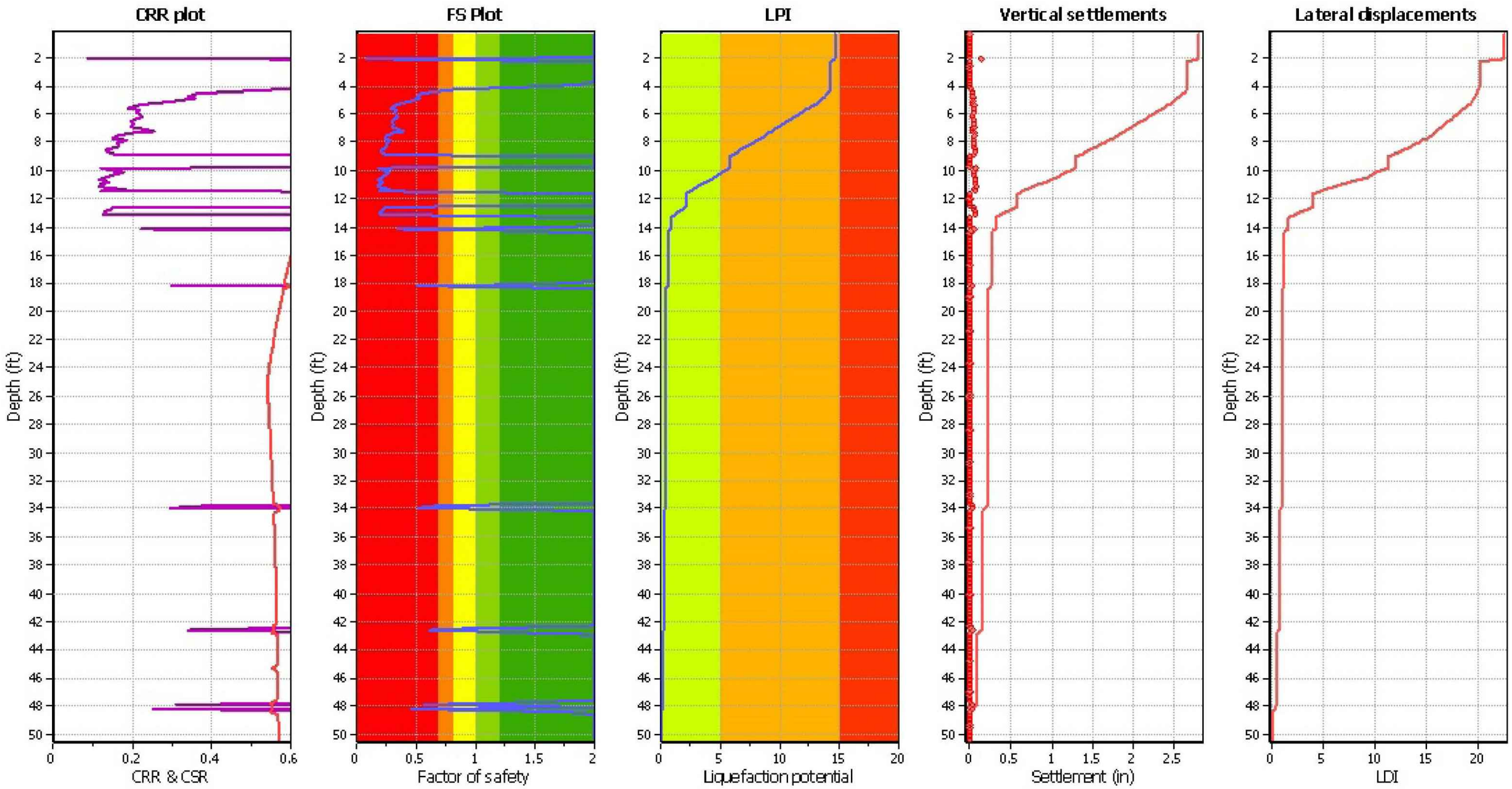
CPT name: CPT-03

Liquefaction analysis overall plot



Input parameters and analysis data

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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.53	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CLiq v.2.1.6.9 - CPT Liquefaction Assessment Software - Report created on: 4/7/2017, 11:34:05 AM
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CPT-3 LIQUEFACTION ANALYSIS

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7
FIGURE

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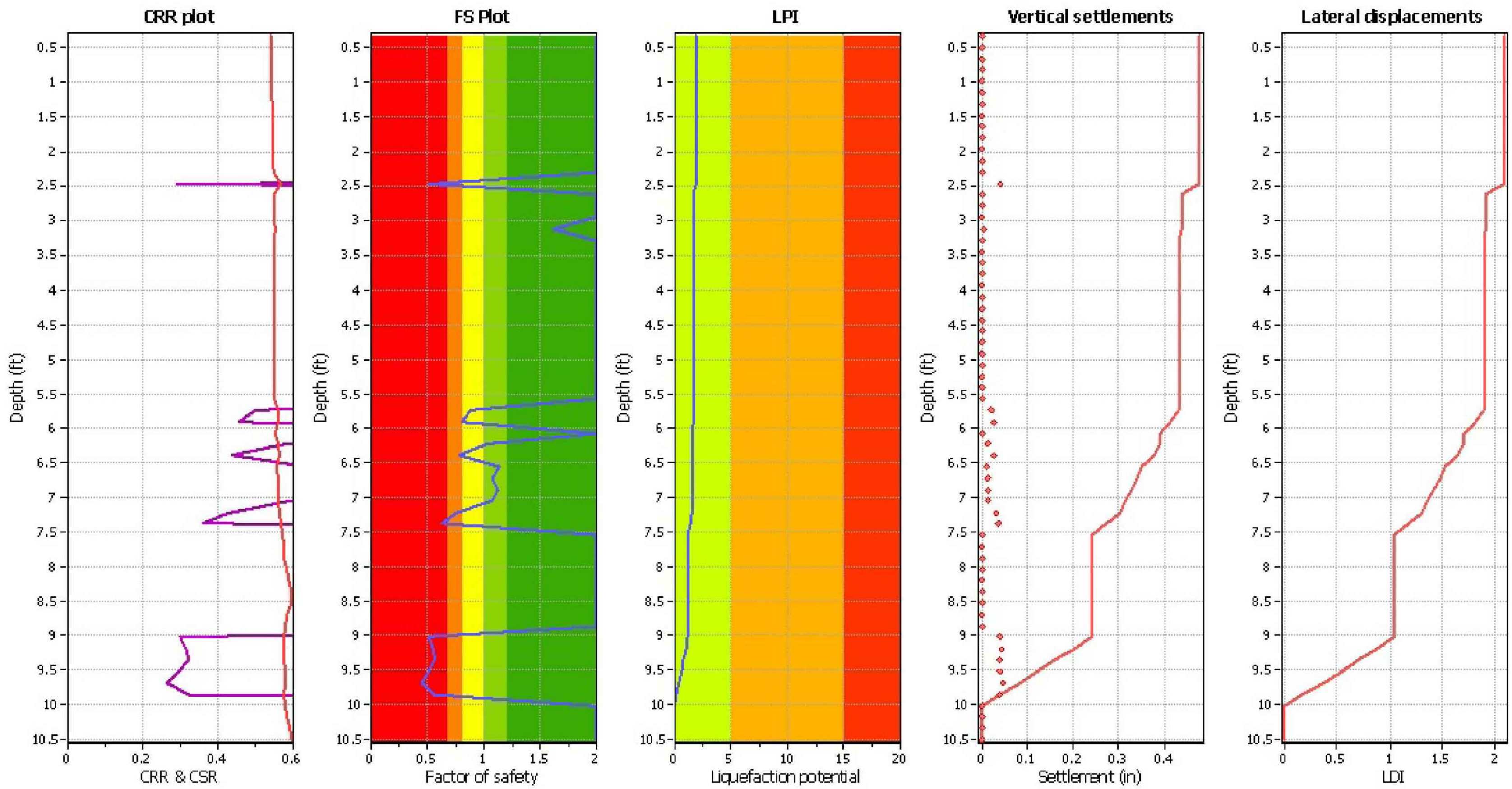
CPT name: CPT-04

Liquefaction analysis overall plot



Input parameters and analysis data

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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.53	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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LPI color scheme

- Very high risk
- High risk
- Low risk

CLiq v.2.1.6.9 - CPT Liquefaction Assessment Software - Report created on: 4/7/2017, 11:34:06 AM
Project file: H:\Jobs\1900-1999\1911.029 -Encinal HS Liquefaction Eval\Analyses\1911.029 CPTLiq.clq

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CPT-4 LIQUEFACTION ANALYSIS

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8
FIGURE

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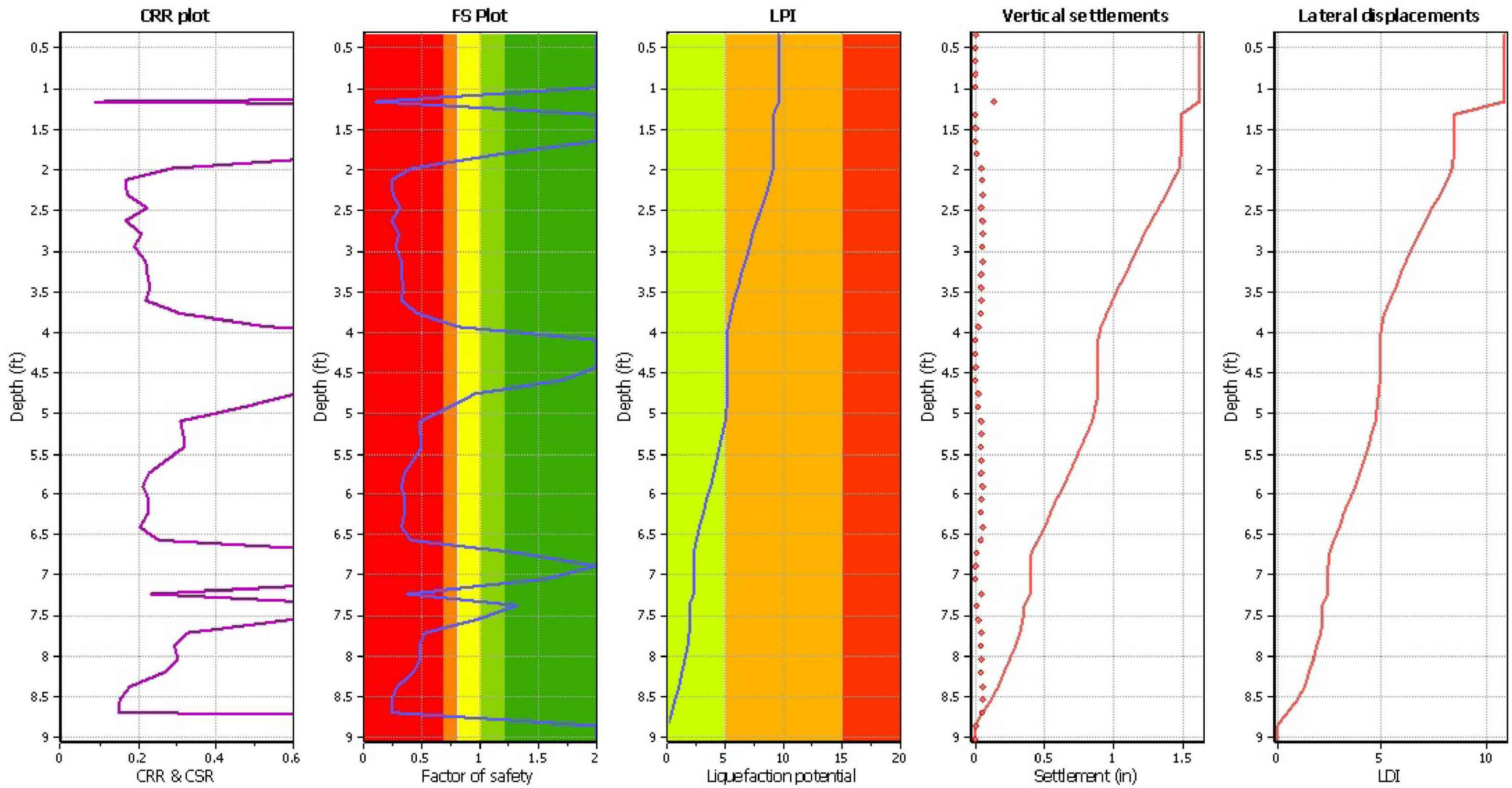
CPT name: CPT-04X

Liquefaction analysis overall plot



Input parameters and analysis data

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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.53	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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LPI color scheme

- Very high risk
- High risk
- Low risk

CLiq v.2.1.6.9 - CPT Liquefaction Assessment Software - Report created on: 4/7/2017, 11:34:07 AM

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CPT-4X LIQUEFACTION ANALYSIS

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9
FIGURE

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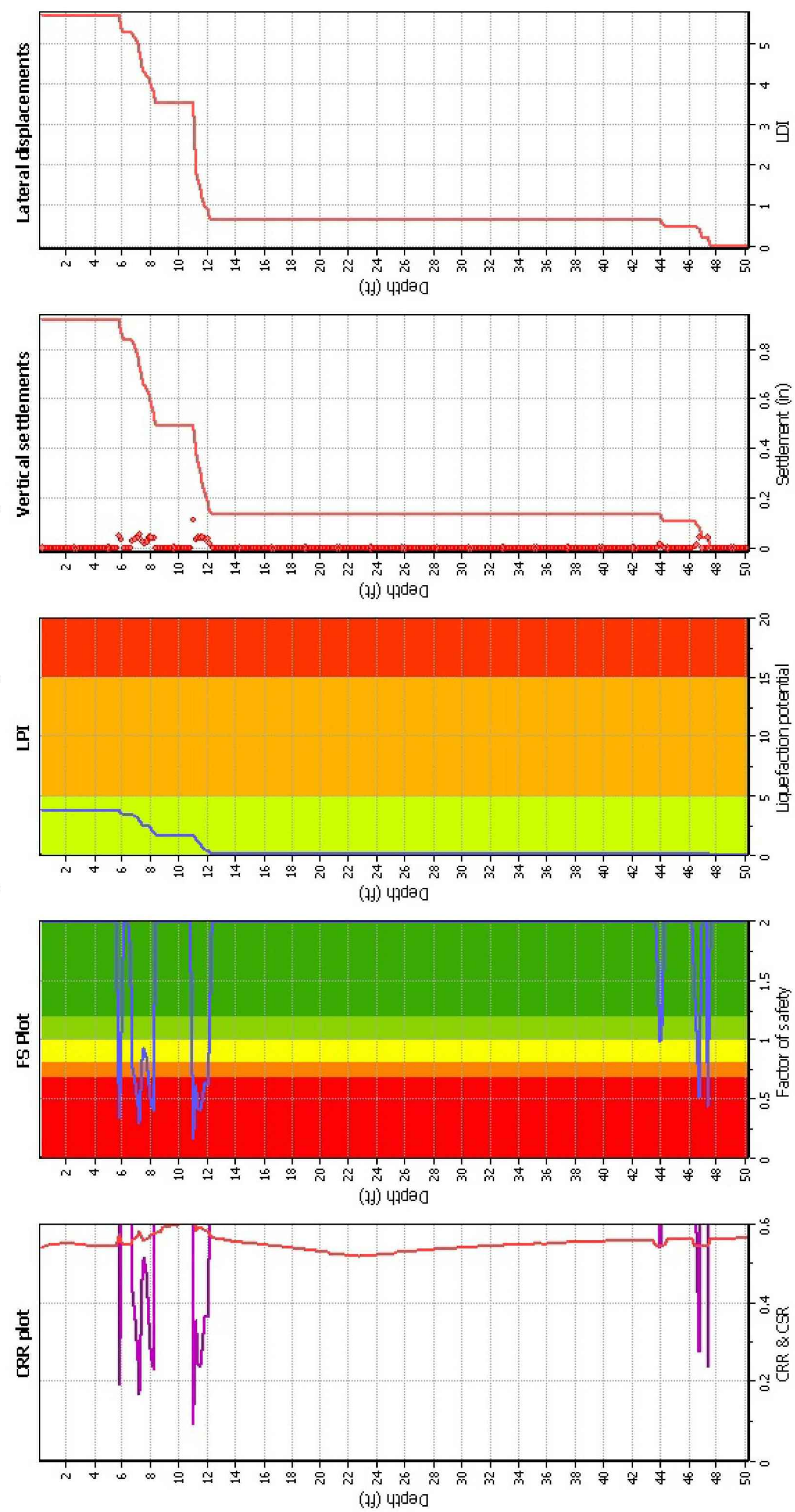
CPT name: CPT-05

Liquefaction analysis overall plot



Input parameters and analysis data

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Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.53	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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LPI color scheme

- Very high risk
- High risk
- Low risk

CLiq v.2.1.6.9 - CPT Liquefaction Assessment Software - Report created on: 4/7/2017, 11:34:08 AM
Project file: H:\Jobs\1900-1999\1911.029 -Encinal HS Liquefaction Eval\Analyses\1911.029 CPTLiq.clq

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CPT-5 LIQUEFACTION ANALYSIS

Encinal High School
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10
FIGURE

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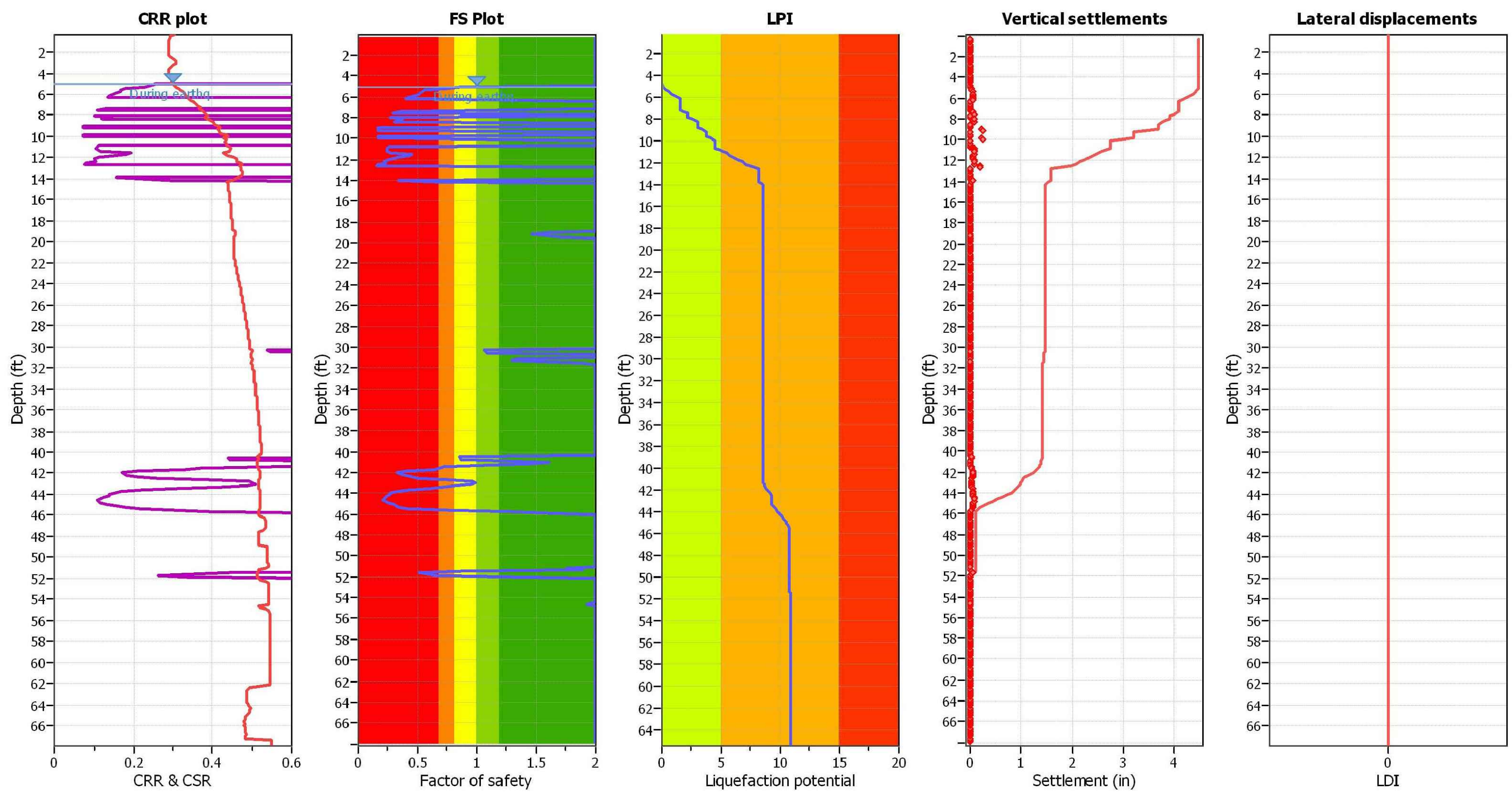
CPT name: CPT-01

Liquefaction analysis overall plots



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Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.53	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	10.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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LPI color scheme

- Very high risk
- High risk
- Low risk

CLiq v.1.7.6.49 - CPT Liquefaction Assessment Software - Report created on: 6/18/2015, 5:38:16 PM
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FILE: 1911.022 CPTLiq(REV).dwg

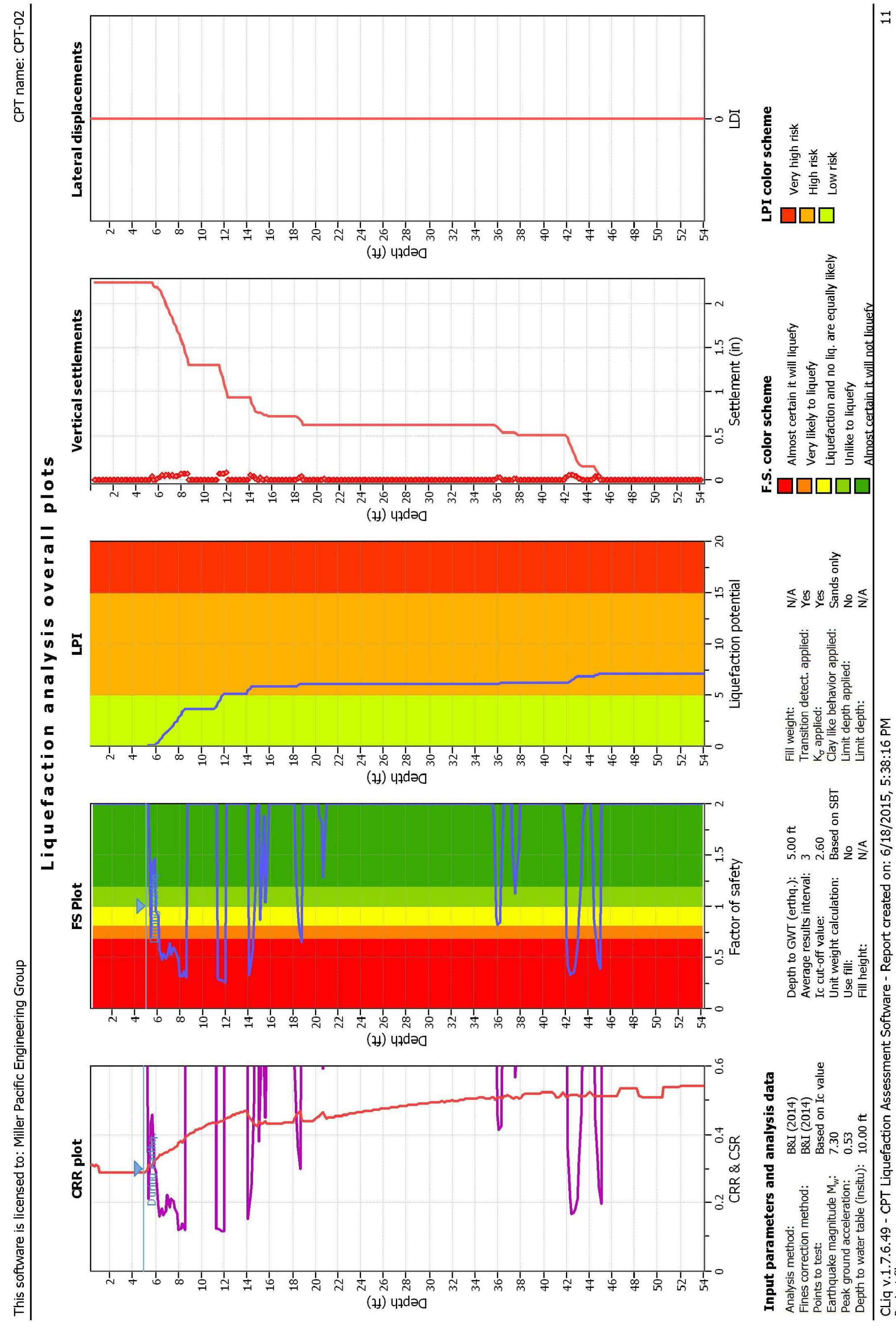
LIQUEFACTION POTENTIAL - CPT-1 2014

Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.022 Date: 6/18/15

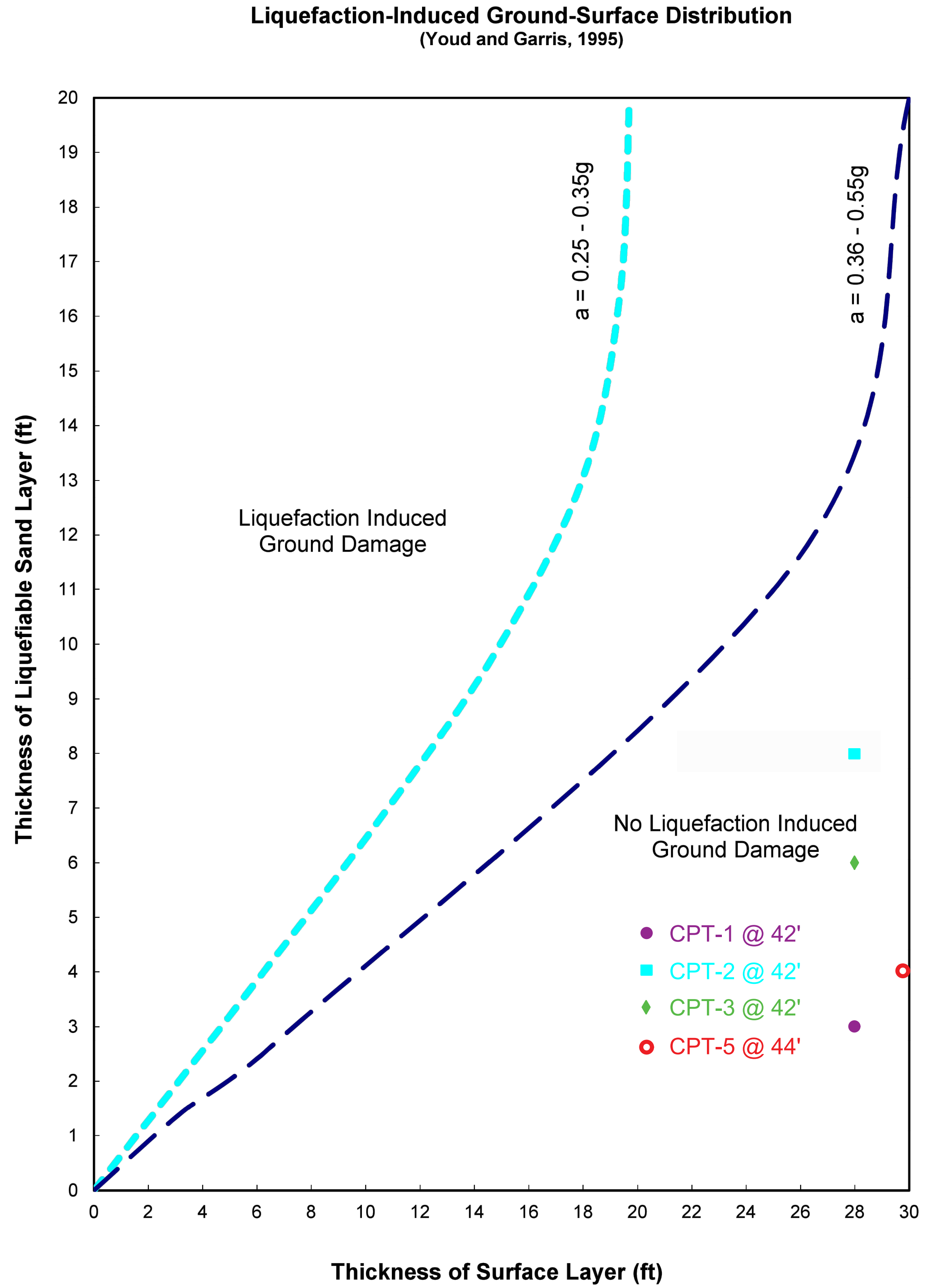
Drawn BSP
Checked

11
FIGURE



MPEG MILLER PACIFIC ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	LIQUEFACTION POTENTIAL - CPT-2 2014		
		Encinal High School 210 Central Avenue Alameda, California	Drawn BSP Checked	12 FIGURE
		Project No. 1911.022 Date: 6/18/15		

FILE: 1911.022 CPTLiq(REV).dwg



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FILE: 1911.029 Figures.dwg

LIQUEFACTION ANALYSIS - SURFACE EFFECTS

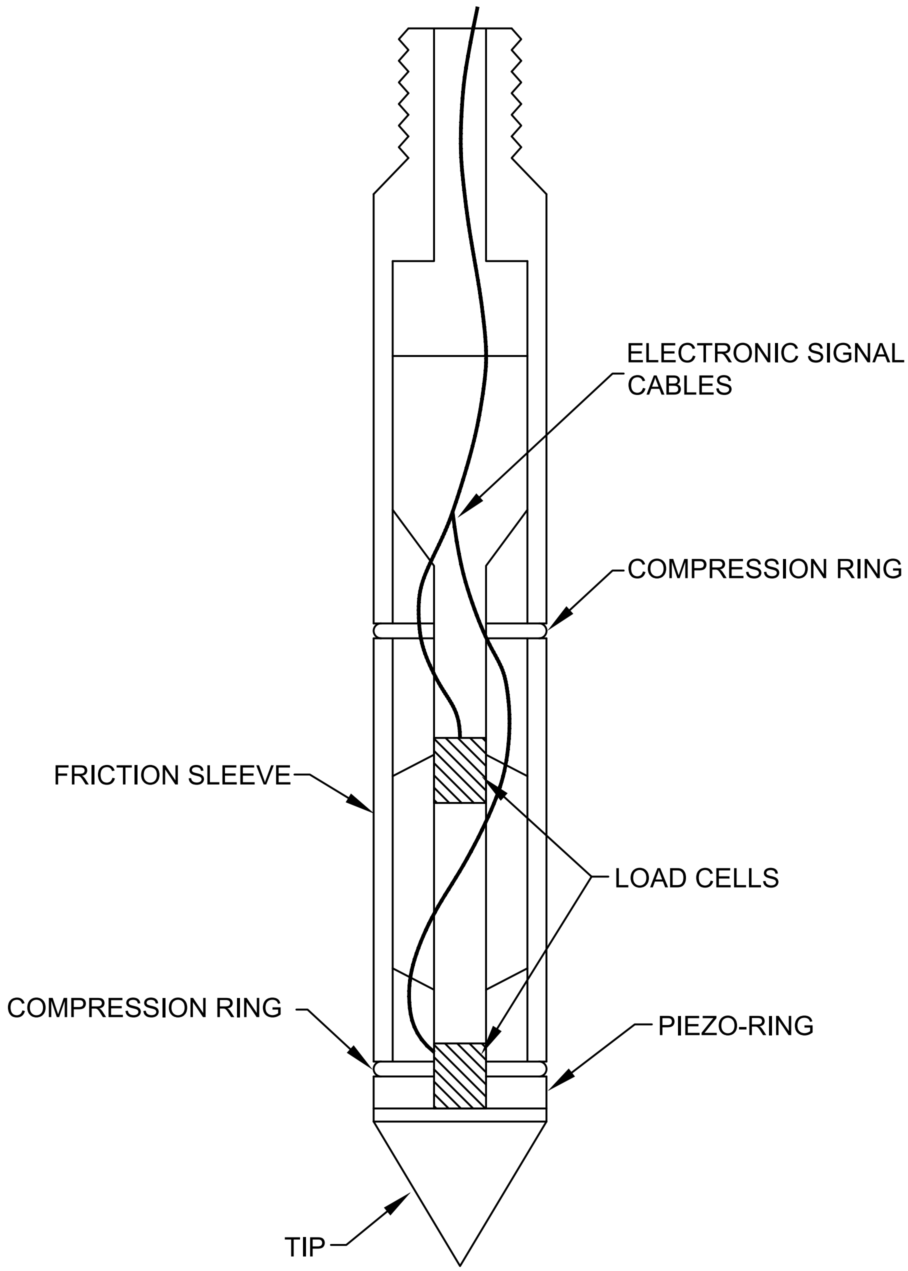
Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

13
FIGURE

APPENDIX A



CONE PENETROMETER

(NO SCALE)

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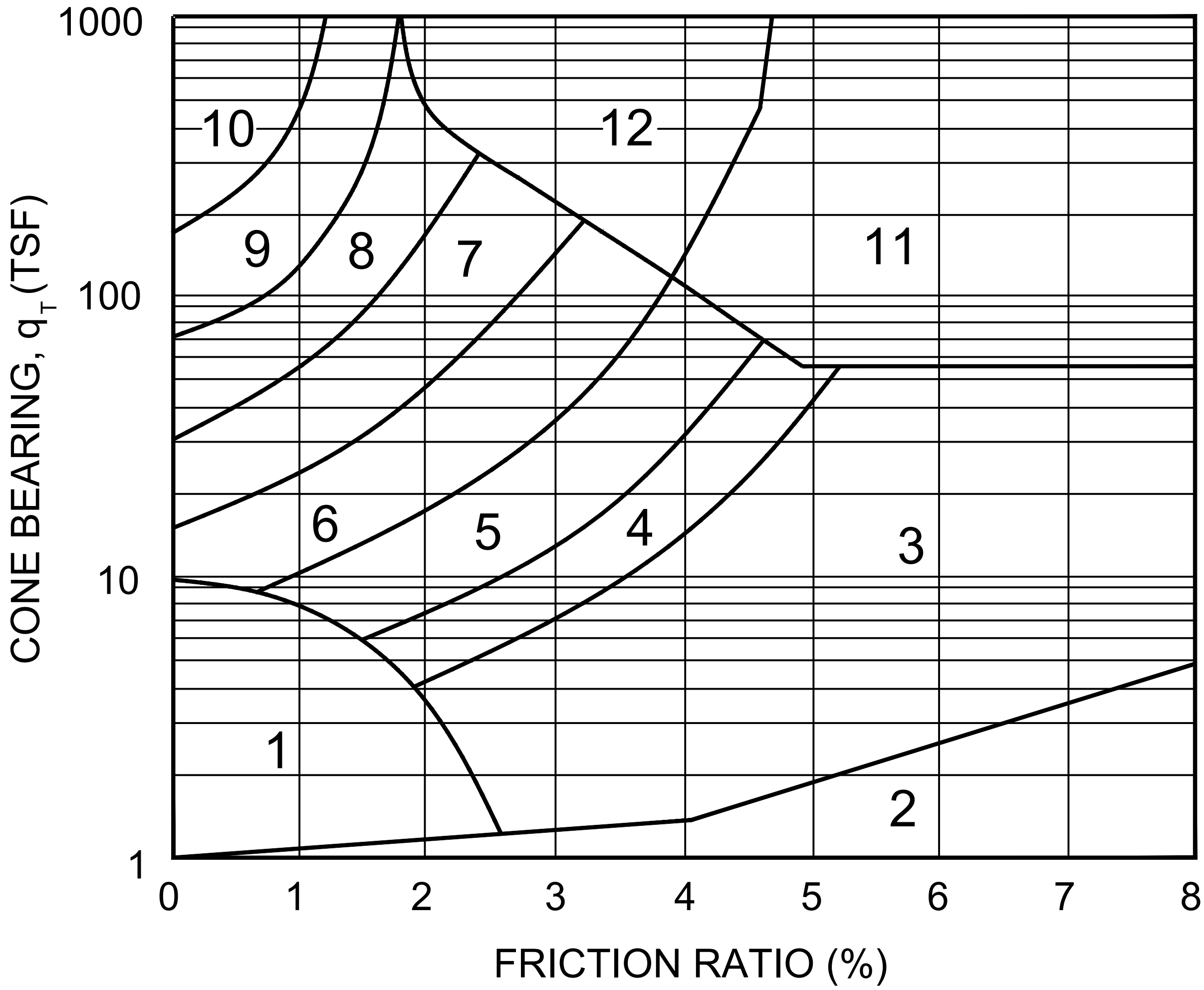
		Encinal High School 210 Central Avenue Alameda, California Project No. 1911.029 Date: 3/16/17	Drawn MMT Checked	A-1 FIGURE

FILENAME: 1911.029 CPT.dwg



Zone:	Qc/N	Soil Behavior Type:
1)	2	Sensitive Fine Grained
2)	1	Organic Material
3)	1	Clay
4)	1.5	Silty Clay to Clay
5)	2	Clayey Silt to Silty Clay
6)	2.5	Sandy Silt to Clayey Silt
7)	3	Silty Sand to Sandy Silt
8)	4	Sand to Silty Sand
9)	5	Sand
10)	6	Gravelly Sand to Sand
11)	1	Very Stiff Fine Grained (*)
12)	2	Sand to Clayey Sand (*)

(*) Overconsolidated or Cemented

Reference: Robertson, P.K. (1986), "In-Situ Testing and Its Application to Geotechnical Engineering," Canadian Geotechnical Journal, Vol. 23; No. 23; No. 4, pp. 573-594

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FILENAME: 1911.029 CPT.dwg

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CPT SOIL INTERPRETATION CHART

Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
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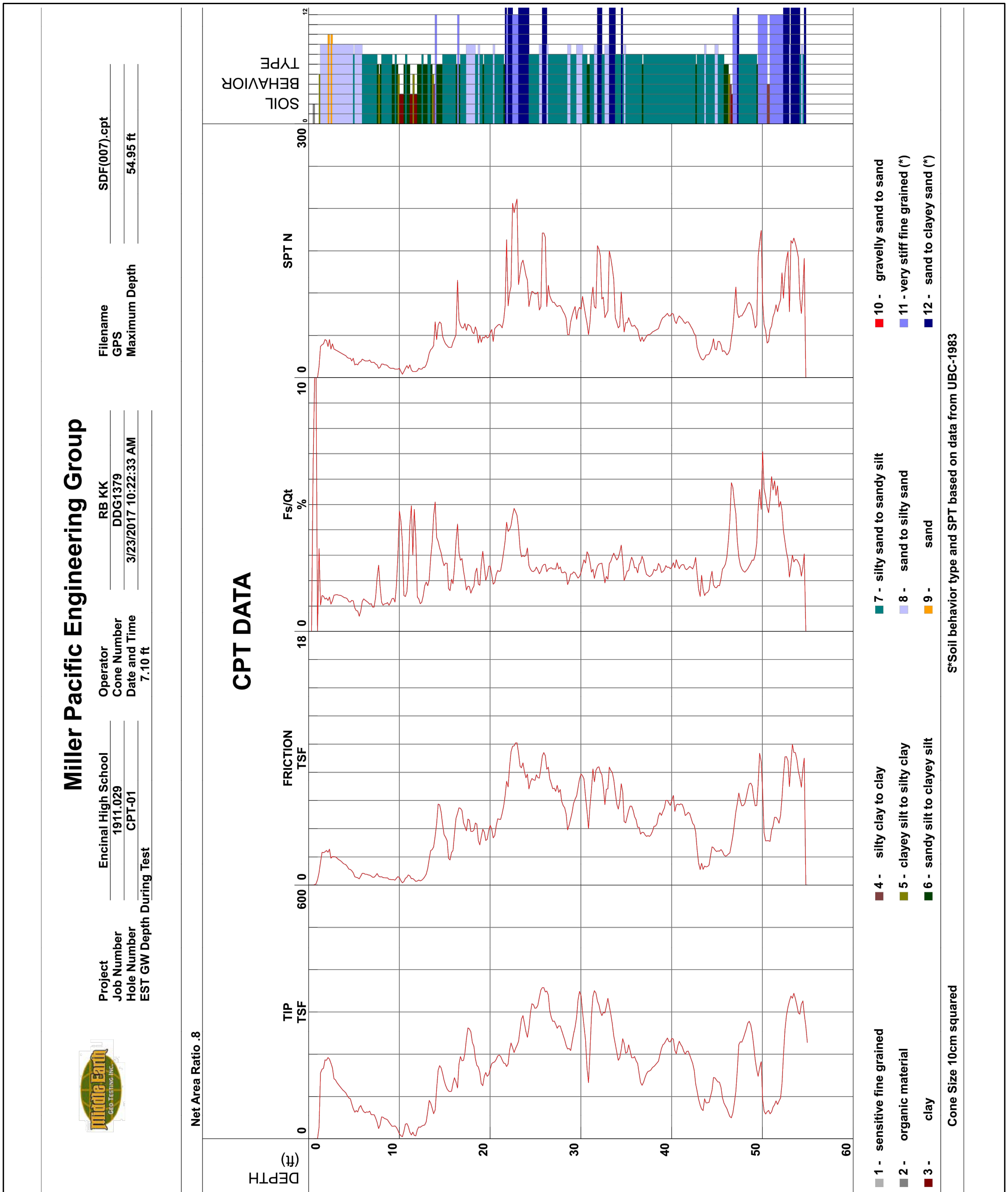
A-2
FIGURE



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CPT-1 PLOT

Encinal High School
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Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

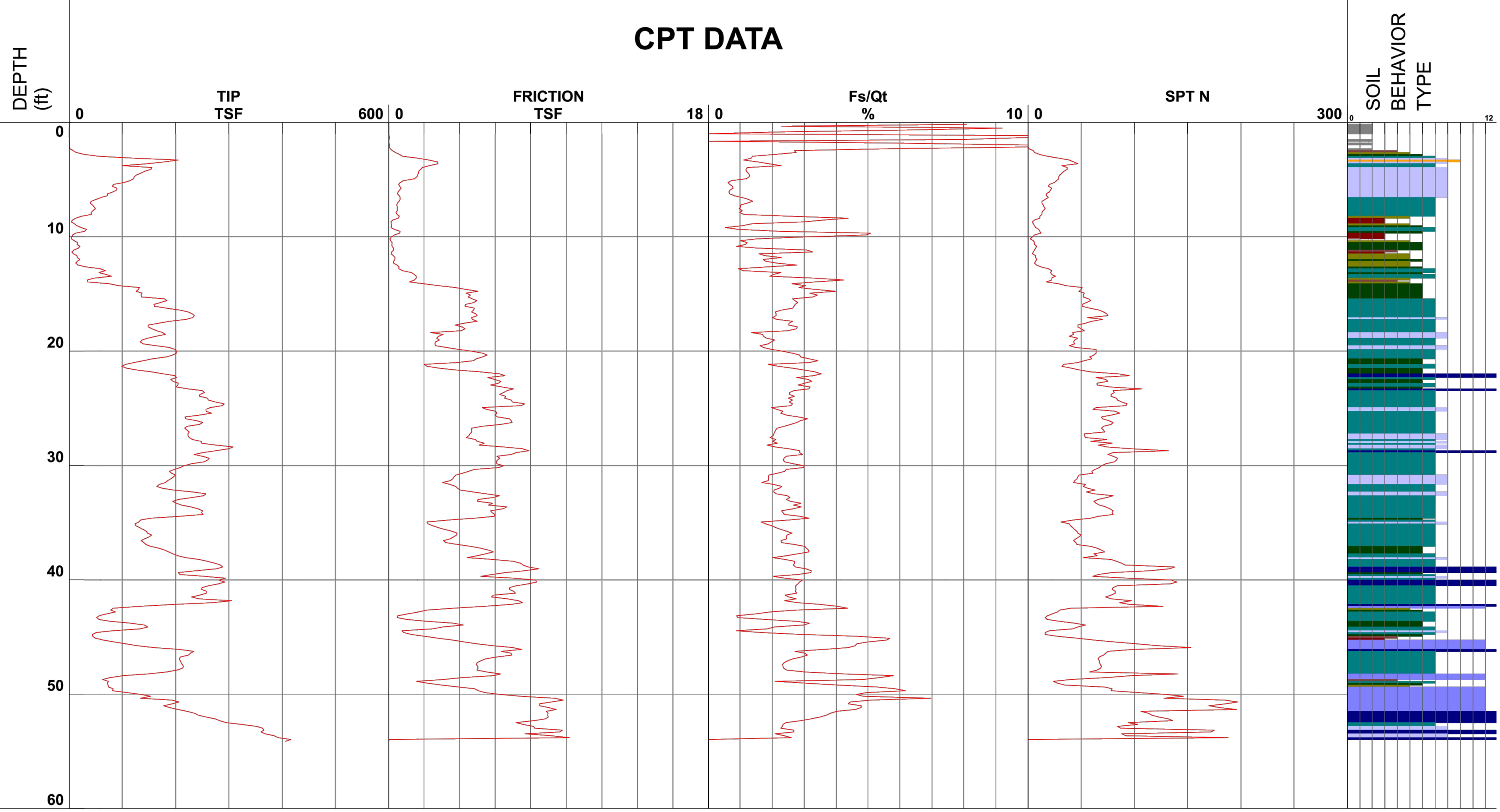
A-3
FIGURE

Miller Pacific Engineering Group

Project	Encinal High School	Operator	RB KK	Filename	SDF(006).cpt
Job Number	1911.029	Cone Number	DDG1379	GPS	
Hole Number	CPT-02	Date and Time	3/23/2017 8:35:49 AM	Maximum Depth	54.13 ft
EST GW Depth During Test		7.00 ft			

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

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

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CPT-2 PLOT

Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

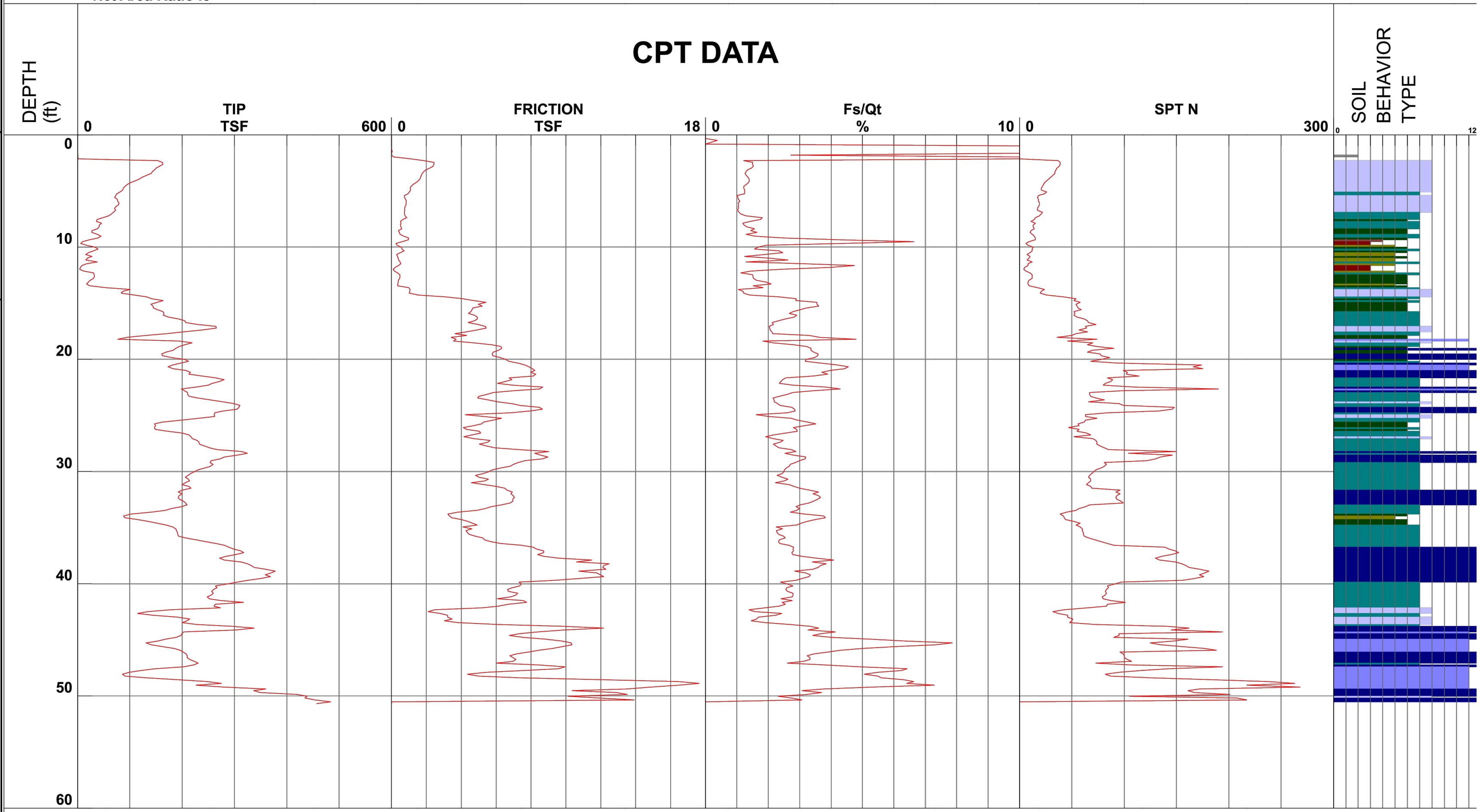
A-4
FIGURE

Miller Pacific Engineering Group

Project	Encinal High School	Operator	RB KK	Filename	SDF(008).cpt
Job Number	1911.029	Cone Number	DDG1379	GPS	
Hole Number	CPT-03	Date and Time	3/23/2017 11:34:48 AM	Maximum Depth	50.69 ft
EST GW Depth During Test	7.00 ft				

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

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

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CPT-3 PLOT

Encinal High School
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Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

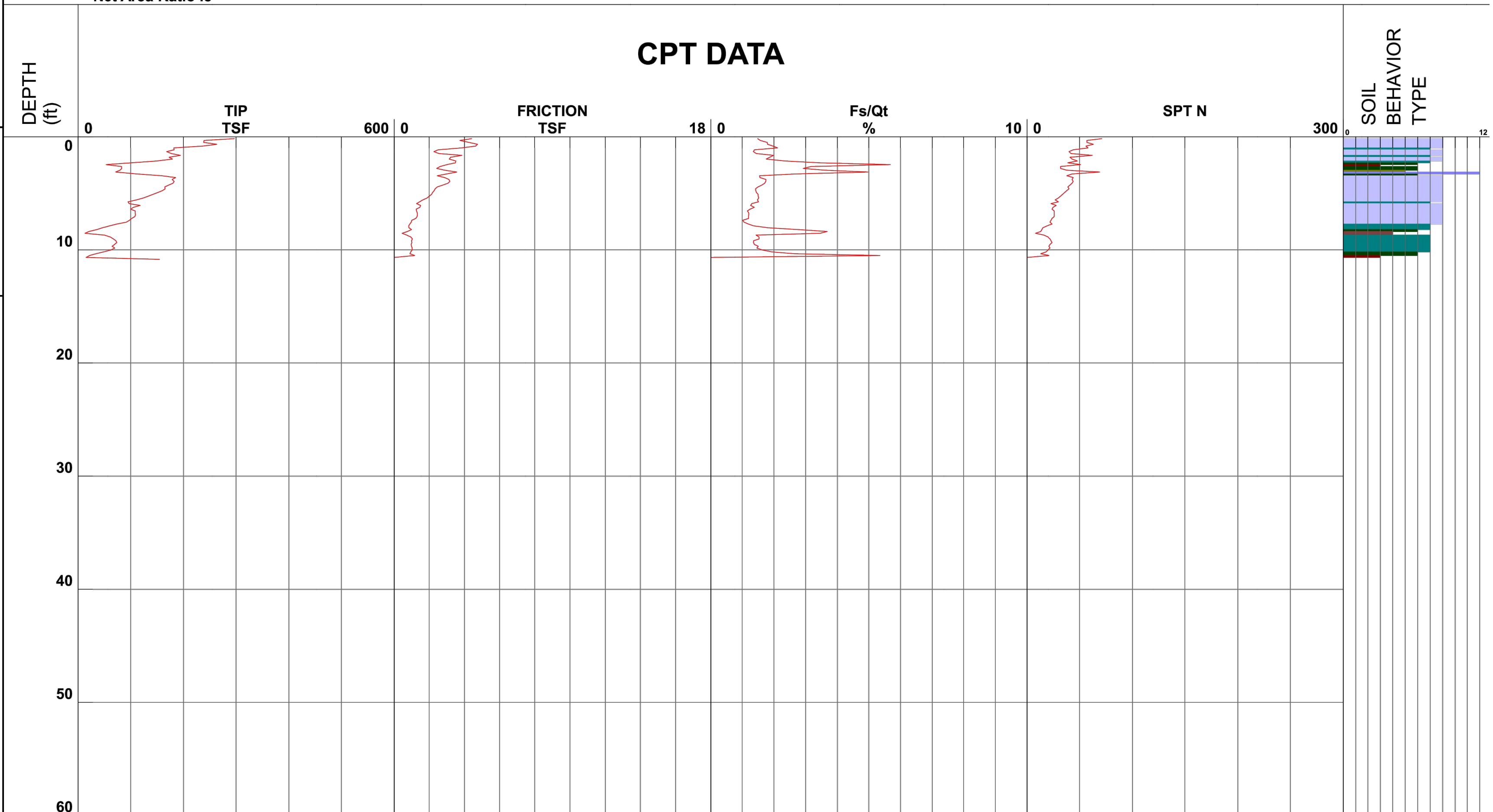
A-5
FIGURE

Miller Pacific Engineering Group

Project	Encinal High School	Operator	RB KK	Filename	SDF(010).cpt
Job Number	1911.029	Cone Number	DDG1379	GPS	
Hole Number	CPT-04	Date and Time	3/23/2017 12:40:00 PM	Maximum Depth	10.83 ft
EST GW Depth During Test	7.00 ft				

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

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

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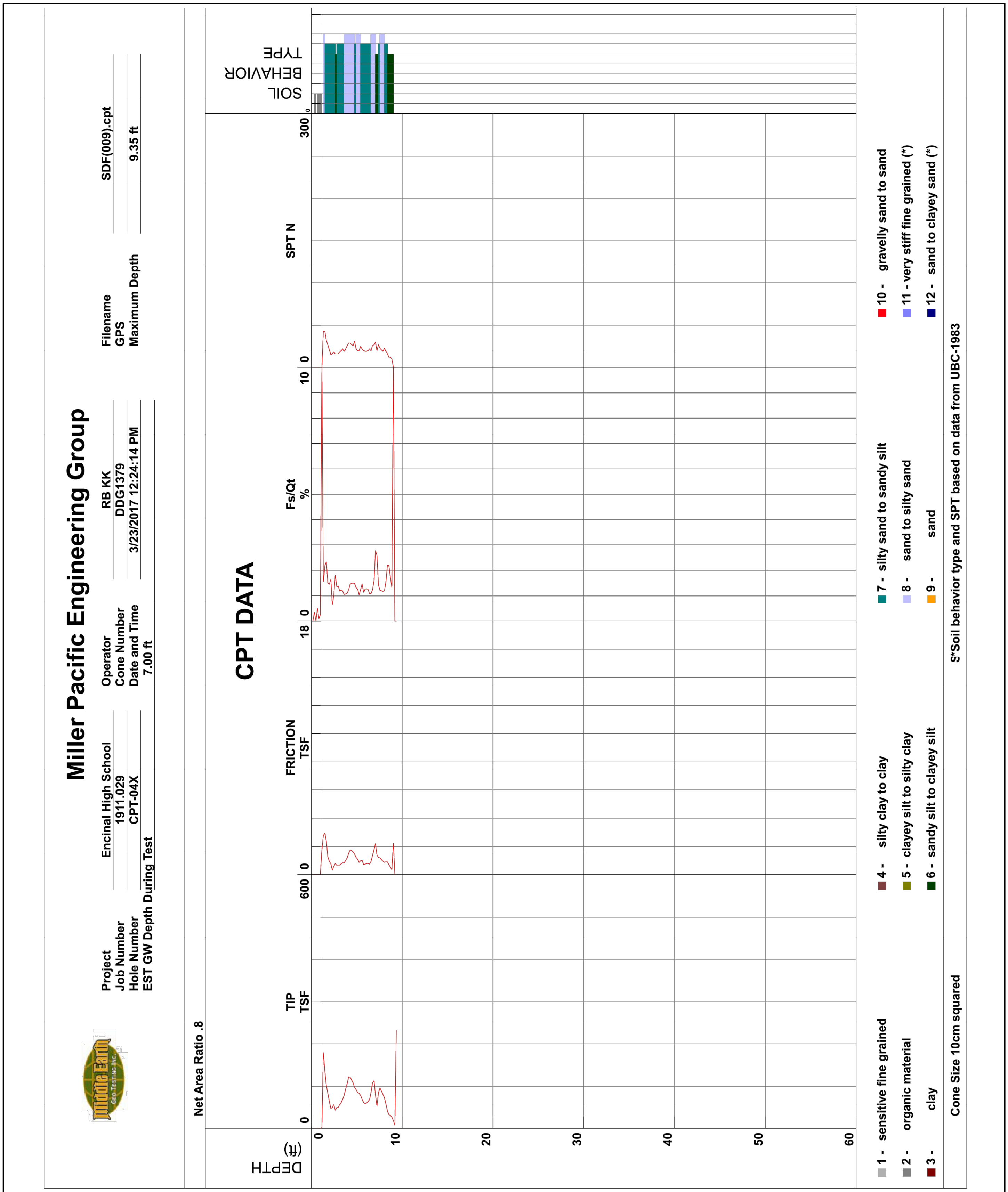
CPT-4 PLOT

Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

A-6
FIGURE



MPEG MILLER PACIFIC ENGINEERING GROUP

FILENAME: 1911.029 CPT.dwg

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CPT-4X PLOT

Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

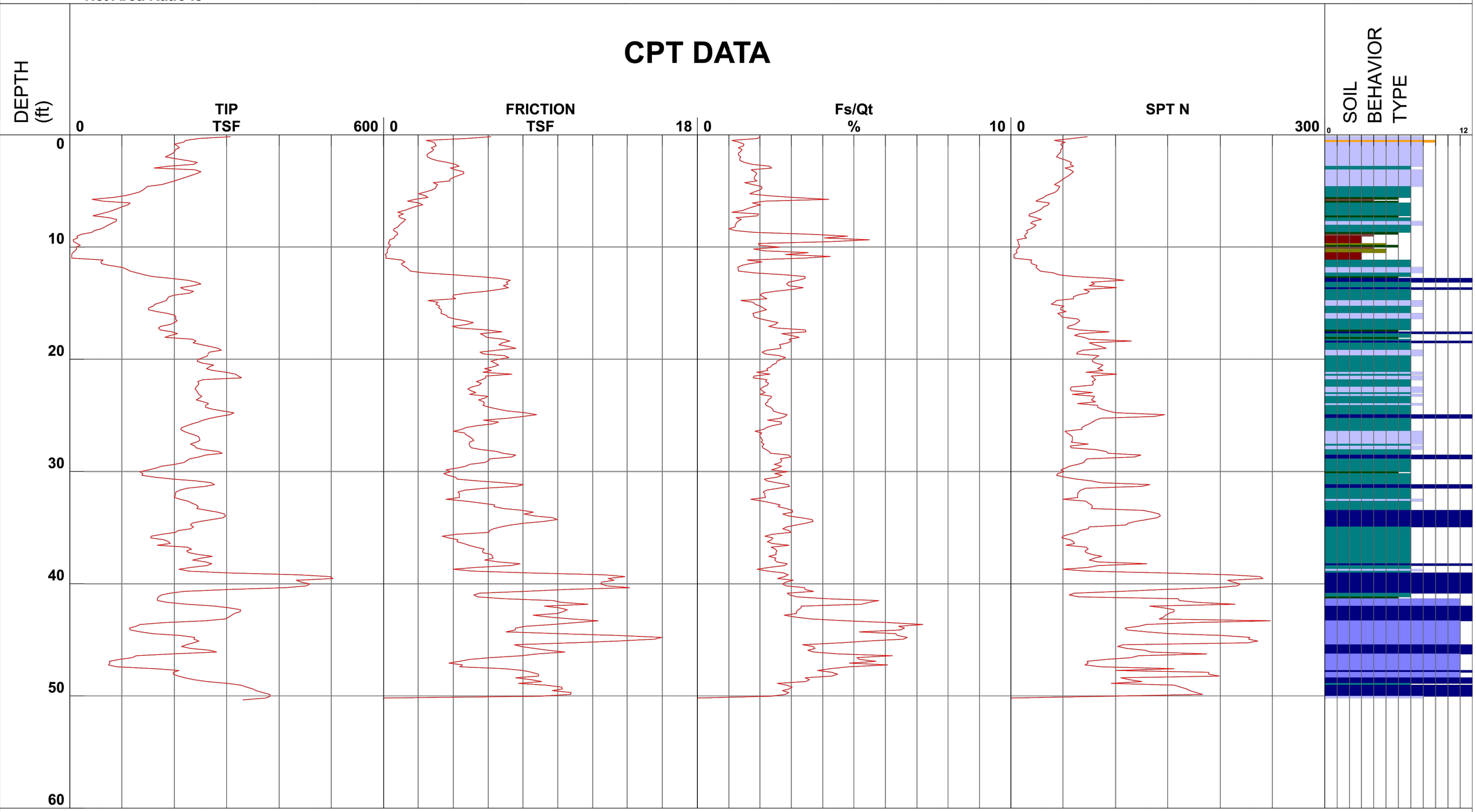
A-7
FIGURE

Miller Pacific Engineering Group

Project	Encinal High School	Operator	RB KK	Filename	SDF(011).cpt
Job Number	1911.029	Cone Number	DDG1379	GPS	
Hole Number	CPT-05	Date and Time	3/23/2017 1:04:57 PM	Maximum Depth	50.36 ft
EST GW Depth During Test	7.00 ft				

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

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

MPEG
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CPT-5 PLOT

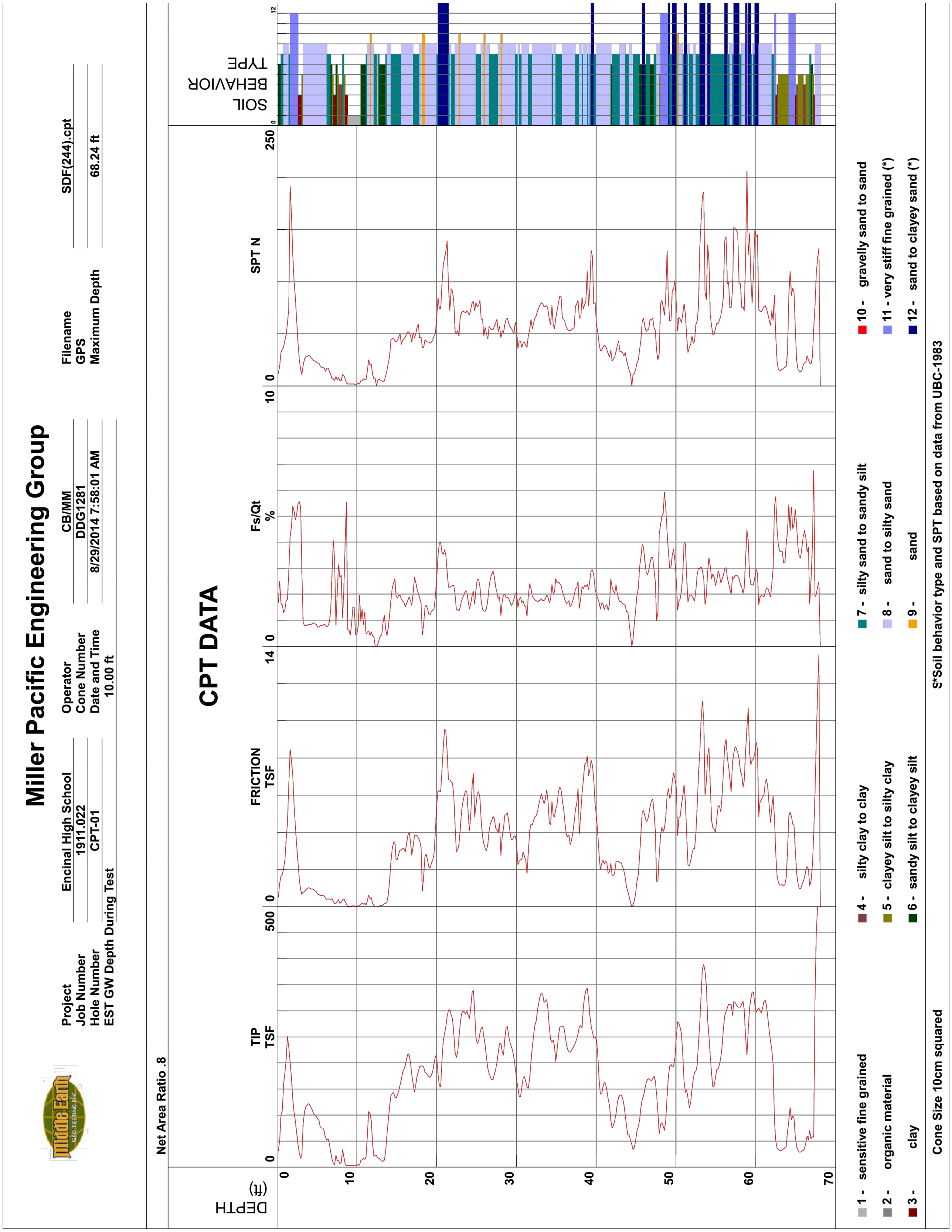
Encinal High School
210 Central Avenue
Alameda, California

Project No. 1911.029 Date: 3/16/17

Drawn MMT
Checked

A-8
FIGURE

APPENDIX B



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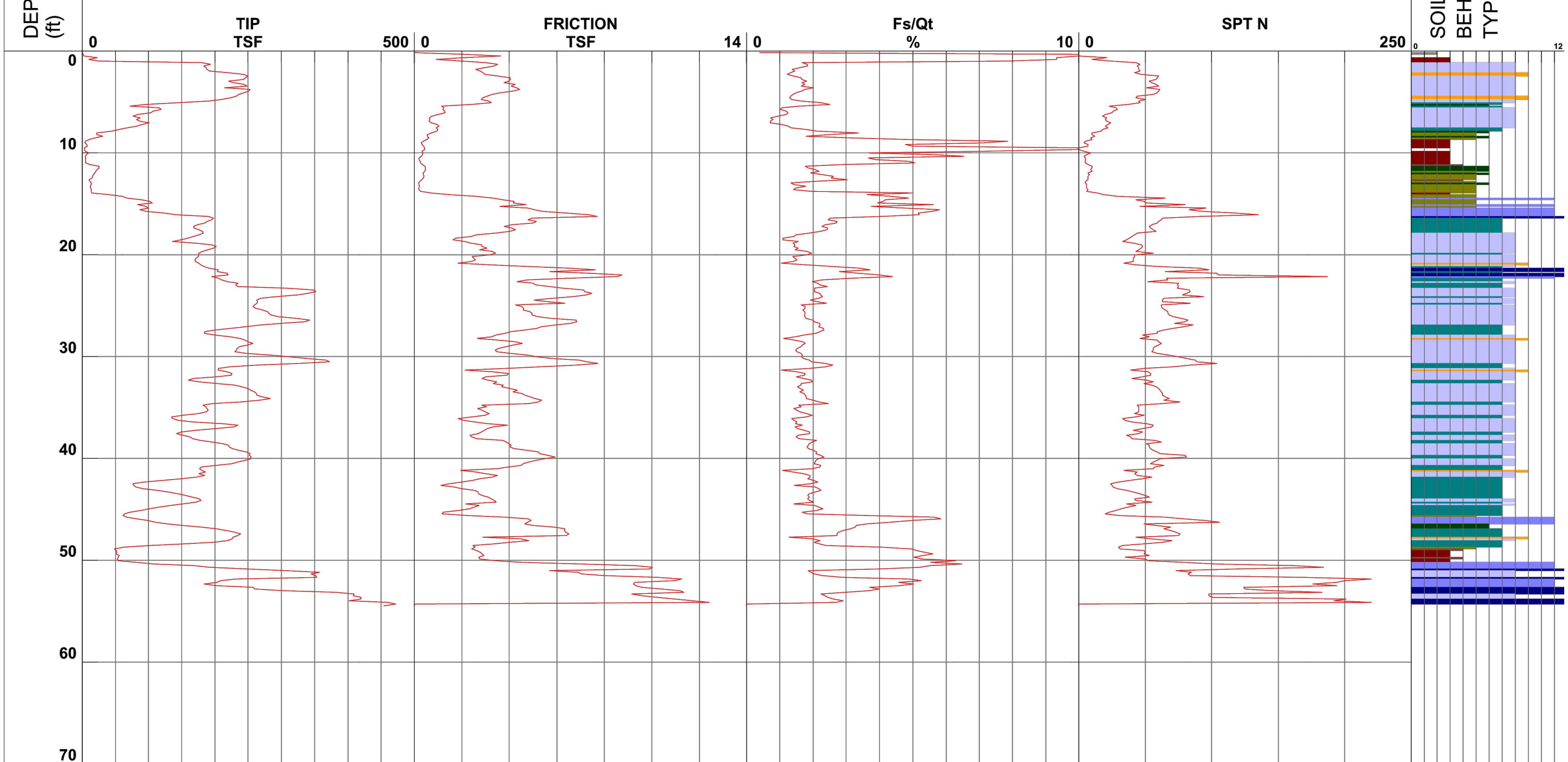
FILE: 1911.022 CPT.dwg

Miller Pacific Engineering Group

Project	Encinal High School	Operator	CB/MM	Filename	SDF(246).cpt
Job Number	1911.022	Cone Number	DDG1281	GPS	
Hole Number	CPT-02	Date and Time	8/29/2014 9:03:28 AM	Maximum Depth	54.46 ft
EST GW Depth During Test	10.00 ft				

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

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

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FILE: 1911.022 CPT.dwg

CPT-2 2014 PLOT

Alameda Unified School Dist.
Encinal High School Pools
Alameda, California

Project No. 1911.022 Date: 11/12/14

Drawn NGK
Checked

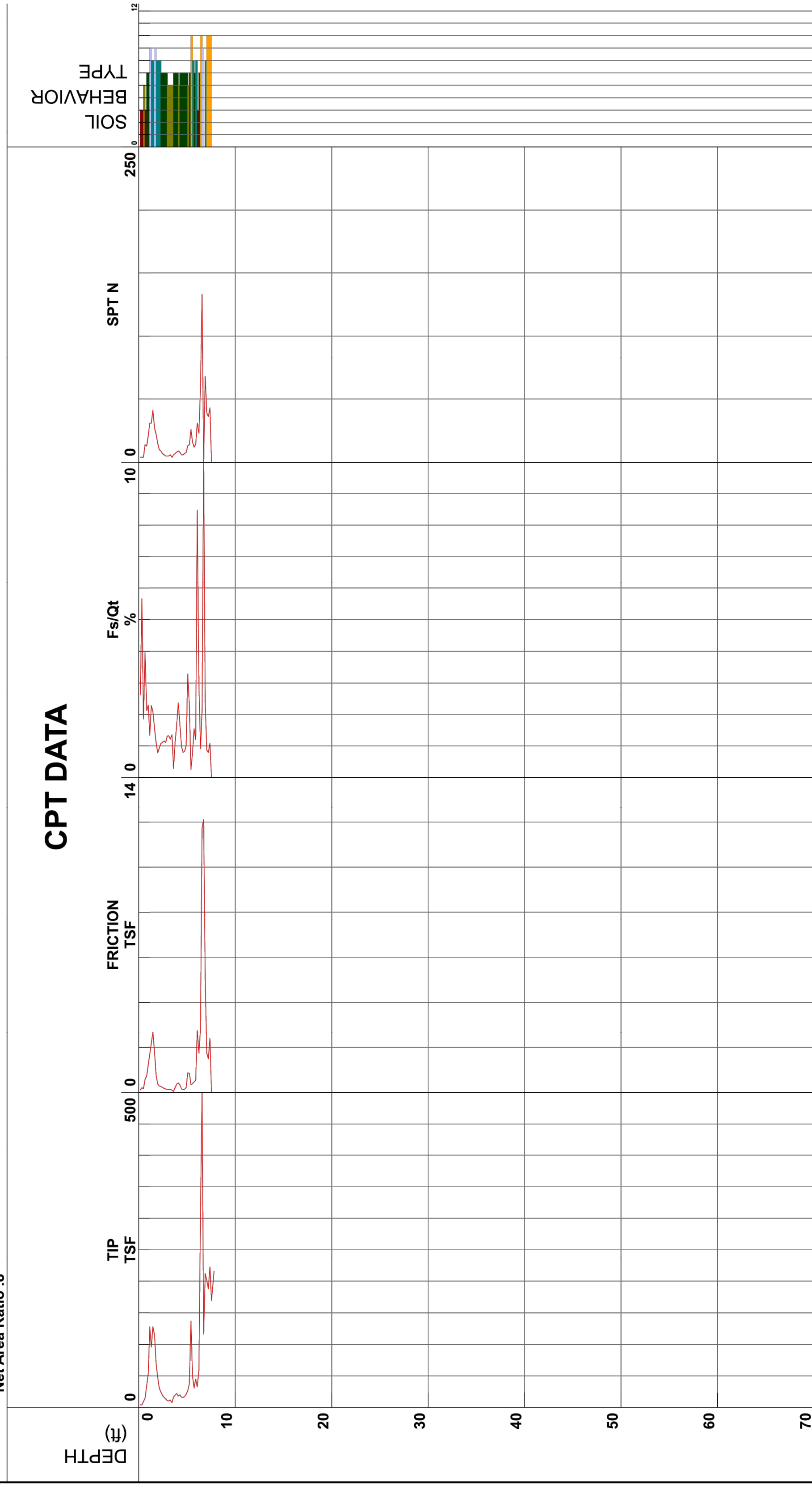
B-2
FIGURE

Miller Pacific Engineering Group

Project	Encinal High School	Operator	CB/MM	Filename	SDF(249).cpt
Job Number	1911.022	Cone Number	DDG1281	GPS	
Hole Number	CPT-03B	Date and Time	8/29/2014 10:31:02 AM	Maximum Depth	7.81 ft
EST GW Depth During Test	10.00 ft				

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

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

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FILE: 1911.022 CPT.dwg

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CPT-3 2014 PLOT

Alameda Unified School Dist.
Encinal High School Pools
Alameda, California

Project No. 1911.022 Date: 11/12/14

Drawn NGK
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B-3
FIGURE

MAJOR DIVISIONS		SYMBOL		DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
		GP		Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW		Well-graded sands or gravelly sands, little or no fines
		SP		Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM		Silty sands, sand-silt mixtures
		SC		Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL		Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
		OL		Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH		Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH		Inorganic clays of high plasticity, fat clays
		OH		Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT		Peat, muck, and other highly organic soils
ROCK				Undifferentiated as to type or composition

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

PI	PLASTICITY INDEX
LL	LIQUID LIMIT
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

SAMPLER TYPE

MODIFIED CALIFORNIA

HAND SAMPLER

STANDARD PENETRATION TEST

ROCK CORE

THIN-WALLED / FIXED PISTON

X DISTURBED OR BULK SAMPLE

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

25	sampler driven 12 inches with 25 blows after initial 6-inch drive
85/7"	sampler driven 7 inches with 85 blows after initial 6-inch drive
50/3"	sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

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FILE: 1911.022 BL.dwg

SOIL CLASSIFICATION

Alameda Unified School Dist.
Encinal High School Pools
Alameda, California

Project No. 1911.022 Date: 11/13/14

Drawn NGK
Checked

B-4
FIGURE

BORING 1 2014

EQUIPMENT: 3.25 inch manual bucket auger

DATE: 9/5/14
ELEVATION: 9-Feet*
*REFERENCE: Google Earth, 2014

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	DESCRIPTION
						0	0			SAND with Gravel (SP) Light brown, moist, medium dense, fine to medium sand, fine to medium gravel. [Fill]
							1			
							2			Clayey SAND (SC) Medium brown, moist, medium dense, fine to medium sand, ~15-25% low plasticity clay. [Fill]
										CLAY with Sand (CL/CH) Light to dark brown with olive mottling, moist, medium stiff, medium plasticity clay, ~10-15% fine to medium sand. [Fill]
							3			
						1				SAND (SP) Dark gray-brown, moist, medium dense, fine to coarse sand, trace fines. [Fill] Saturated at 4.0 feet.
							4			
							5			
							6			
						2				Bottom of boring at 6.5 feet. Groundwater observed at 4.0 feet during drilling.
							7			
							8			
							9			
						3	10			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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FILE: 1911.022 BL.dwg

BORING LOG

Alameda Unified School Dist.
Encinal High School Pools
Alameda, California

Project No. 1911.022 Date: 11/13/14

Drawn NGK
Checked

B-5
FIGURE