

## **Appendix IS-3**

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### Surface Fault Rupture Hazard Evaluation

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## GEOLOGY REPORT APPROVAL LETTER

May 19, 2017

LOG # 97575  
SOILS/GEOLOGY FILE - 2

6436 Hollywood Blvd., LLC  
40 W. 57th Street, 23 Fl  
New York, NY 10019

TRACT: Hollywood (MR 28-59/60)  
BLOCK: 14  
LOT(S): FR 3, FR 4, FR 5 (Arb 1), FR 6 (Arb 1), FR 15 (Arb 2) & FR 16 (Arb 1)  
LOCATION: 1624-1644 N. Wilcox Avenue

<u>CURRENT REFERENCE</u> <u>REPORT/LETTER(S)</u>	<u>REPORT</u> <u>No.</u>	<u>DATE(S) OF</u> <u>DOCUMENT</u>	<u>PREPARED BY</u>
Geology Report	LA-01670-03	10/24/2016	Earth Systems So. Calif.

The Grading Division of the Department of Building and Safety has reviewed the referenced report that presents a fault rupture hazard investigation at 1624 to 1644 Wilcox Avenue for the future mixed-use development of the property. The site is not located within the Official Earthquake Fault Zone that was established by the California Geological Survey for the Hollywood fault (on the USGS 7.5 minute Hollywood Quadrangle). However, because of the proximity of the Hollywood fault, and to rule out the possibility that previously unrecognized splays traverse the site, a geologic investigation was conducted to evaluate the potential for surface fault rupture.

The field investigation included a transect of 22 CPT soundings and 3 continuous core borings. Dr. Thomas Rockwell provided a detailed soil stratigraphic/pedological analysis to estimate the age of the soil horizons encountered in the continuous cores. The investigation documents continuous stratigraphy of at least late Pleistocene alluvial units. No faults were observed within the sediments at the site. Therefore, no building restrictions are recommended by Earth Systems Southern California. The referenced report is acceptable, provided the following conditions are complied with during site development:

1. Prior to issuance of any permit, a soil engineering report shall be submitted to the Grading Division to provide design recommendations for the proposed grading/construction.

DANIEL C. SCHNEIDERREIT  
Engineering Geologist II

Log No. 97575  
213-482-0480

cc: Earth Systems So. Calif., Project Consultant  
LA District Office

**SURFACE FAULT RUPTURE HAZARD EVALUATION**

Proposed Mixed-Use Development  
6430-6440 Hollywood Boulevard and  
1624-1648 Wilcox Avenue  
Hollywood, California  
**LA-01670-03**

Prepared For

**6436 HOLLYWOOD BLVD., LLC**

**October 24, 2016**

Prepared By

**Earth Systems Southern California**  
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October 24, 2016

LA-01670-03

6436 Hollywood Blvd., LLC  
40 West 57th Street, 23 FL  
New York, New York 10019

Attention: Mr. David Twerdun

Subject: Surface Fault Rupture Hazard Evaluation Report  
Proposed Mixed-Use Development  
6430-6440 Hollywood Boulevard and  
1624-1648 Wilcox Avenue  
Hollywood, California

Presented herewith is a Surface Fault Rupture Hazard Evaluation prepared, as authorized, for the site of a proposed mixed-use development in the Hollywood community of the City of Los Angeles, California. The subject site is not located in an area delineated as an Earthquake Fault (Alquist-Priolo) Zone by the California Geological Survey (CGS); however, this fault study has been completed to evaluate the potential for secondary splays of the Hollywood fault through this property. Based on the work described herein there is no evidence of active faults beneath the subject site.

The conclusions contained in this report are based upon Earth Systems Southern California (Earth Systems) review of available documents at the time this investigation was completed and on analyses of the data obtained from the exploration and testing programs described herein.

Earth Systems strives to provide analyses and recommendations in accordance with the applicable standards of care for the geotechnical engineering profession at the time the study is conducted. The submittal of this report marks the completion of the scope of geotechnical engineering services described in Earth Systems' proposal dated May 17, 2016 and authorized on June 1, 2016 for the fault study phase. Earth Systems appreciates this opportunity to provide professional geotechnical engineering services for this project. If you need clarification of the information contained in this report, or if Earth Systems can be of additional service, please contact the undersigned.

Respectfully submitted,  
**Earth Systems**  
**Southern California**

  
Christopher F. Allen, P.G.  
Project Geologist

Distribution: 3 – Addressee (hard copy including one unbound copy), 1 – Addressee (CD, pdf copy)

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**SURFACE FAULT RUPTURE HAZARD INVESTIGATION  
PROPOSED MIXED USE DEVELOPMENT  
6430-6440 HOLLYWOOD BOULEVARD AND  
1624-1648 WILCOX AVENUE  
HOLLYWOOD, CALIFORNIA**

**INTRODUCTION**

Earth Systems was requested to conduct a Surface Fault Rupture Hazard Evaluation for a proposed mixed-use development project, located in the Hollywood district of the City of Los Angeles. The subject site is not located in an area delineated as an Earthquake Fault (Alquist-Priolo) zone by the California Geological Survey (CGS). However, as the Hollywood fault has been determined to be nearby and an active fault found during excavation and construction at the site would potentially be catastrophic, this fault study has been completed to evaluate the potential for secondary splays of the Hollywood fault through the area of a proposed high-rise to assure the absence of such hazards.

**GENERAL SITE DESCRIPTION**

The approximate 1.42-acre site is located at the southeast intersection of Hollywood Boulevard and Wilcox Avenue in the Hollywood community of the City of Los Angeles, California. The site is approximately one-third of a mile southwest of the Hollywood (hwy-101) freeway and south of the Cahuanga Pass (see Plate I). The project site is composed of multiple parcels currently occupied by one- and two-story buildings and an asphalt-covered parking lot (Site Exploration Map, Plate II). Topographically, the property consists of relatively flat ground at an elevation of approximately 380 to 386 feet above mean sea level. Surface drainage is directed toward the southwest via sheet flow. The above-cited descriptions are intended to be illustrative, and are specifically not intended for use as a legal description of the subject property.

**PURPOSE AND SCOPE OF SERVICES**

The purpose of this study was to evaluate the potential for surface fault rupture, through the subject property, by determining whether there is any evidence of late Quaternary faulting being present in sediments preserved below the subject property. The study was conducted in accordance with Note 49 - *Guidelines for Evaluating the Hazard of Surface Rupture* [California Geological Survey (CGS),

2002], and Information Bulletin P/BC 2014-113 - *Contents of Reports for Submittal to LADBS Grading Division* (LADBS, 2014).

Earth Systems' scope of services for this fault rupture evaluation included the following:

- A. A general reconnaissance of the site vicinity.
- B. A review of available regional geologic information, as contained in published and unpublished sources.
- C. Subsurface exploration of the project site by drilling three (3) continuous core borings and 22 Cone Penetrometer (CPT) soundings on an alignment that is roughly perpendicular to the regional trend of the Hollywood fault.
- D. Review of the continuous core samples and the CPT data with Dr. Thomas Rockwell, Ph.D., P.G. (SDSU).
- E. Analyses of the data obtained from the exploration and testing programs.
- F. A summary of findings, as provided in this written report.

### **FIELD EXPLORATION**

Earth Systems' field exploration for this study was initiated on July of 2016 with three (3) continuous core borings (C1, C2 and C3) to depths of 50 feet; logs of the cores are included in Appendix A. The purpose of the coring program was threefold: 1) to assess the subsurface stratigraphy at the site; 2) to determine the likely age range of the sediments based on the degree of soils developed in them; and 3) to assess whether trenching at the site was feasible based on the depth to top of the Pleistocene soils. Based on the initial assessment of the stratigraphy and soils exposed in the cores, it was determined that sediments of Pleistocene age are too deep to reasonably expose in a trench and that it would be best to move forward with a program of closely-spaced CPTs to determine continuity of the stratigraphy and buried soil surfaces.

On August 10 of 2016, 22 CPTs were completed along a north-south alignment oriented roughly perpendicular to the regional trend of the Hollywood fault. These CPTs were spaced at intervals of ten (10) feet and were aligned in as straight a configuration as field conditions allowed. The locations of the exploratory test borings and CPT soundings are indicated on the attached Exploration Map (Plate II) and the Cross Sections (Plates III and IV). The top elevation of the CPT plots, as indicated on Plates III and IV, are based on the surface elevation at which the test was completed. Plots of the CPT data are included in Appendix A.

Other field exploration was completed as part of Earth Systems' geotechnical evaluation of the site. That field exploration included drilling and sampling four (4) exploratory hollow-stem auger test borings to depths of approximately 50 to 90 feet below the existing ground surface. The location of those borings are included on the appended Exploration Map (Plate II) for reference.

## **GEOLOGIC SETTING**

### **Regional Geology**

The project site is located on the La Brea plain, an area of coalescing young alluvial fans that emanate from the south flank of the Hollywood Hills, which are the eastern extension of the Santa Monica Mountains. Regionally, the project site is located at the boundary of the Peninsular Ranges and Transverse Ranges geomorphic provinces.

The Peninsular Ranges geomorphic province is characterized by elongated northwest-southeast trending geologic structures such as the nearby Newport-Inglewood fault zone. In contrast, the Transverse Ranges geomorphic province is characterized by east-west trending geologic structures such as the nearby Santa Monica fault, the Hollywood fault, and the Santa Monica Mountains. The Santa Monica and Hollywood faults are typically considered the boundary between the two geomorphic provinces in the project vicinity.

The distinctive geologic structure of the Transverse Ranges is dominated by the effects of north-south compressive deformation that has resulted in thrust faulting, strike-slip faulting and bedrock folding. These active geologic features are attributed to convergence resulting from the "Big Bend" of the San Andreas fault and the northwestern motion of the Pacific Plate, which have caused thrust fault related earthquakes such as the 1994 Northridge (Mw6.7), the 1971 San Fernando (Mw6.7), and the 1987 Whittier Narrows (M6) earthquakes.

### **Regional Faulting**

The Hollywood fault is the most significant geologic feature of the area in terms of hazard. The projected surface trace of that fault is located approximately 700 feet north of the site. The California Geological Survey (CGS) has recently included the Hollywood fault in the Earthquake Fault (Alquist Priolo) Zoning program (CGS, 2014). This fault is considered part of the active Hollywood-Santa Monica-Raymond fault zone, a system of east trending reverse, oblique-slip, and left-lateral strike-slip faults that collectively form the southern boundary of the Transverse Ranges (Dolan, et al. 1997). Paleoseismic studies of the Hollywood and Santa Monica faults (Dolan et al., 1997, 2000a, and 2000b) suggest that these two faults have recurrence intervals of about 10,000 years or less, and that the Santa Monica fault last broke 1,000 to 3,000 years ago, while the Hollywood fault last ruptured 6,000 to 9,000 years ago, at least on the northern strand studied by Dolan's group. The Hollywood Fault Zone is considered capable of producing a Mw 6.6 earthquake if it ruptures by itself, and potentially larger if it fails with the adjacent Santa Monica or Raymond faults.



Other active or potentially active faults in the immediate vicinity of the site include the North Salt Lake fault, which forms the southern boundary of the Hollywood Basin approximately 0.8 miles south of the site; the Upper Elysian Park fault located approximately 2.1 miles east of the site; the San Vicente fault located approximately 2.7 miles south of the site; and the Newport-Inglewood fault located approximately 5.2 miles southwest of the site. The site does not fall within a currently designated CGS Earthquake Fault Rupture Hazard ("Alquist-Priolo") Zone as currently identified by CGS on the Earthquake Fault Zones Hollywood Quadrangle map dated 2014.

### **Depositional Environment**

The Hollywood fault traverses an area of recent sedimentation from coalescing alluvial fans generated from the Cahuanga Pass and Weid Canyon. Down-gradient, these fans merge onto the distal portion of a larger composite alluvial fan (the La Brea plain).

The mountainous terrain of the Hollywood Hills within these drainages consists almost entirely of mid-Cretaceous igneous intrusive quartz diorite rock. Consequently, the alluvial fan deposits are composed mostly of coarse- to medium-grained feldspathic sands that fine down gradient to playa deposits at Salt Lake. The sediment yield from the Weid canyon drainage, which now includes the Mulholland dam, appears to dominate deposition on the composite fan in the vicinity of the subject site. However, rapid sedimentation was also achieved in the past from the Cahuanga Pass, which is thought to have been a former path of the LA River (Dolan, 1998).

Conditions within these fans are generally poor for the preservation of detrital carbon, although several samples have been recovered and yielded radiocarbon ages that have determined the general ages of the near-surface alluvial deposits. The ages derived from these samples were used by Dolan et al. (1999, 2000) to date the stratigraphic sequence and to resolve the timing of the most recent surface rupture on the Hollywood fault in the vicinity of the subject site.

### **ONSITE ALLUVIAL STRATIGRAPHY AND SOILS**

Six stratigraphic units have been identified in the upper 50 feet below the subject site. These natural deposits generally exhibit weak soil development. The natural deposits are capped by artificial fill that varies in thickness across the site.

The artificial fill encountered in the subsurface explorations was observed as deep as approximately five feet at the location of B3 and B5. Where observed, the fill soils were found to consist predominantly of poorly to moderately compacted, silty sand and sandy silt (SM and ML soil types based upon the Unified Soil Classification System). The fill is likely locally derived and likely represents on-site surface modifications during the original development of the property.

The alluvial deposits observed below the fill soils were found to consist predominantly of loose to very dense silty sand, well-graded sand, and clayey sand (SM, SW and SC soil types). Each of the six major depositional units is distinguished by the presence of a soil profile that separates them, as the deposits

themselves are generally similar. Soil in this context is the weathering profile that evolves over time as surface deposits are exposed to weathering agents such as water and organic acids. In southern California, deposition of dust has also been shown to be a major factor in the development of soil profiles (Johnson et al., 1990; Reheis et al., 1997). The strength of a soil profile is therefore a function of several factors and how these factors, such as climate, have varied over time. In studies such as this one, time is the critical factor because the strength of the soil profile is in part a function of the length of time that it was exposed to weathering. When a sequence of soils is distinguished as a function of time, it is termed a chronosequence (Harden, 1982; Rockwell, 2000).

Soil-dating techniques are useful for determining the ages of soil stratigraphic units and geomorphic surfaces, and soils can be used to bracket the age of faulting events (Birkeland et al., 1991; Shlemon and LaChapelle, 1993; McCalpin, 1996a). A relative soil development evaluation of the buried soil horizons beneath the site was made by the consultant soil stratigrapher (Rockwell, 2016; see Appendix B). The logs of the continuous core test borings and CPT soundings in Appendix A contain more detailed descriptions of the soils encountered. Dr. Thomas Rockwell provided a detailed log of core C3 and prepared a letter summarizing the interpreted ages of the observed soils (see Appendix B).

A sample of detrital carbon was extracted from C1 at an approximate depth of 10.5 feet. That sample was transported to the UC Irvine, Department of Earth Systems Science for radiocarbon dating of which an age of 2,500 to 2,800 years before present (BP) was determined. Therefore, the top of the second stratigraphic unit, or Unit 2, is 2,500 to 2,800 years old. The B horizon of Units 2 and 3 would take 5,000 to 7,000 years to develop, possibly indicating a Pleistocene age (11,000 years BP) for the deposits below Unit 3 and very likely for those below Unit 4, which is approximately 25 feet deep. Based on the CPTs, distinct layering within the units can easily be traced at depths in excess of 40 feet.

In summary, the upper 25 feet of deposits are interpreted as an early to middle Holocene sequence of strata, with latest Pleistocene strata below. Deposition at the site continued into the late Holocene with unit 1 accumulating in the past 2,500 years or so. These observations suggest that the alluvium in the upper 50 feet may be on the order of 18,000 to 20,000 years in age and younger. The entire sequence accumulated due to aggradation of the local drainages in response to aggradation of the Los Angeles River during late Pleistocene and Holocene sea level rise. This is a significant length of time in fault hazard investigations, and the absence of deformation of these deposits would be a strong indicator that no active faults underlie the subject property.

### **GROUNDWATER**

Free groundwater was encountered at the base of boring B4 at an approximate depth of 90 feet. Based on the Seismic Hazards report for the Hollywood Quadrangle (CDMG, 1998), the shallowest historically recorded groundwater in the vicinity of the project site is approximately 80 feet. Fluctuations in groundwater levels may occur due to variations in rainfall, regional climate, and other factors.

### **FAULT RUPTURE HAZARD ASSESSMENT**

A program of closely spaced CPTs was chosen as the best method to assess whether the buried soils and associated stratigraphy are continuous and unbroken across the project site, or whether there is a discontinuity that could indicate the presence of a buried fault. The exploration for this evaluation extended to refusal at depths of approximately 62 to 92 feet below existing grade. The continuous soil profiles exposed in this exploration, together with the age evaluation provided by Dr. Thomas Rockwell, provide the basis for our conclusions regarding the risk of fault rupture at the site.

CPT tests record two primary types of data from which the soil type can be estimated. The cone tip records the resistance of the CPT probe being inserted into the ground, with sandy deposits usually having greater resistance than clayey deposits. In contrast, the sleeve records the frictional resistance to sliding of the CPT probe through a deposit; clayey deposits tend to have higher sleeve friction than sand, which has low friction values. The important point is that bedded stratigraphy, with interlayered sand, silt and clay, produces CPT tip and sleeve friction values that vary with depth, and if a sand layer is laterally continuous, the layer can be mapped in the subsurface by the continuity of the CPT signature from hole to hole. For this study, the buried soils along with other variations in stratigraphic characteristics, allowed for the evaluation of the lateral continuity of the subsurface soils across the site.

The continuous cores and CPTs are plotted on cross section A-A. Plate III includes the plots of soil type developed from CPT interpretation, while Plate IV utilizes the plots of the tip resistance as directly recorded by the CPT. The six units that were observed and described in the continuous cores are recognizable in the CPT soundings. Several contacts were traced across the site and show no significant deflections or other indications of being displaced. Considering the close spacing of the CPT soundings (10 feet or less), and the observable continuity of the site stratigraphy, the stratigraphic correlations allow the conclusion that there is no evidence of faulting beneath the project site that has disrupted any of the soil layers. In general, small vertical displacements of less than a foot can be recognized if the displacement is abrupt and the CPT soundings were emplaced vertically. In this study, we recognize no vertical anomalies or steps that could be attributed to faulting. Considering the estimated age of the lower strata being late Pleistocene in age, this implies that the site is free of faults that have produced recognizable deformation for this period of time. As the absence of displacement in the Holocene (past 11,500 Years) is the metric applied to the evaluation for active faulting in California, the subject site is free of active faults, at least within the resolution of the techniques applied.

The undisrupted, laterally continuous pre-Holocene stratigraphy, as shown on Plates III and IV demonstrate the absence of faults beneath the subject property. Accordingly, no restricted use zones related to hazards of surface fault rupture will be defined on this site.

### **CONCLUSIONS AND RECOMMENDATIONS**

Based on the results of our investigation described above, it is Earth Systems opinion that there is no evidence of active faults being present at the site. Earth Systems has identified undisrupted, laterally continuous pre-Holocene age geologic strata across the site that indicates active faulting is not present within the depth and location explored. Therefore, the potential for surface fault rupture at the subject site during the design life of the structure is considered to be very low.

It is our opinion that no restrictions on future development at the site are necessary with respect to the hazard of surface fault rupture. The site is located in southern California, which is within an active seismic area. Large numbers of earthquakes are recorded each year in southern California. Provided the close proximity of the Hollywood Fault, the site could be subject to strong ground shaking in the event of a large earthquake on a nearby fault. The effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

### **LIMITATIONS AND UNIFORMITY OF CONDITIONS**

The conclusions and recommendations submitted in this report relative to the proposed mixed-use development are based, in part, upon the data obtained from site observations during the field exploration operations, and past experience. In the event of any change in the assumed nature or design of the proposed project as planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing. This report is issued with the understanding that it is the responsibility of 6436 Hollywood Blvd, LLC to insure that the information and recommendations contained in this report are called to the attention of the architects and engineers for the project and incorporated into the plan. It is also the responsibility of 6436 Hollywood Blvd, LLC, and its representatives, to insure that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

As the geotechnical engineers for this project, Earth Systems strives to provide its services in accordance with generally accepted geotechnical engineering practices in this community at this time. No warranty or guarantee is expressed or implied. This report was prepared for the exclusive use of 6436 Hollywood Blvd, LLC for the purposes stated in this document for the referenced project only. No third party may use or rely on this report without the express written authorization of Earth Systems for such use or reliance.

It is recommended that Earth Systems be provided the opportunity for a general review of final design and specifications of the project so that earthwork and foundation recommendations may be properly interpreted and implemented into the design specifications. If Earth Systems is not accorded the privilege of making this recommended review, it can assume no responsibility for misinterpretation of the recommendations.

The scope of current services for this report did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around the site.


The statements contained in this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or the broadening of knowledge. Accordingly, the conclusions of this report may be invalidated, wholly or partially, by changes outside of Earth Systems' control, and should therefore be reviewed after one year.

### CLOSURE

Earth Systems trusts this report is sufficient at this time and meets your current needs. Earth Systems appreciates this opportunity to provide professional geotechnical engineering services for this project. If you have any questions regarding the information contained in this report, or if you require additional geotechnical engineering services, please contact the undersigned.

Respectfully submitted,

**Earth Systems  
Southern California**

  
Christopher F. Allen, E.G.  
Project Engineering Geologist



END OF TEXT

REFERENCES

PLATES

APPENDICES

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Sieh, Kerry E., 1993, "evaluation of the potential for fault movements along the proposed route of the MetroRail Red Line", dated February 1, 1993.

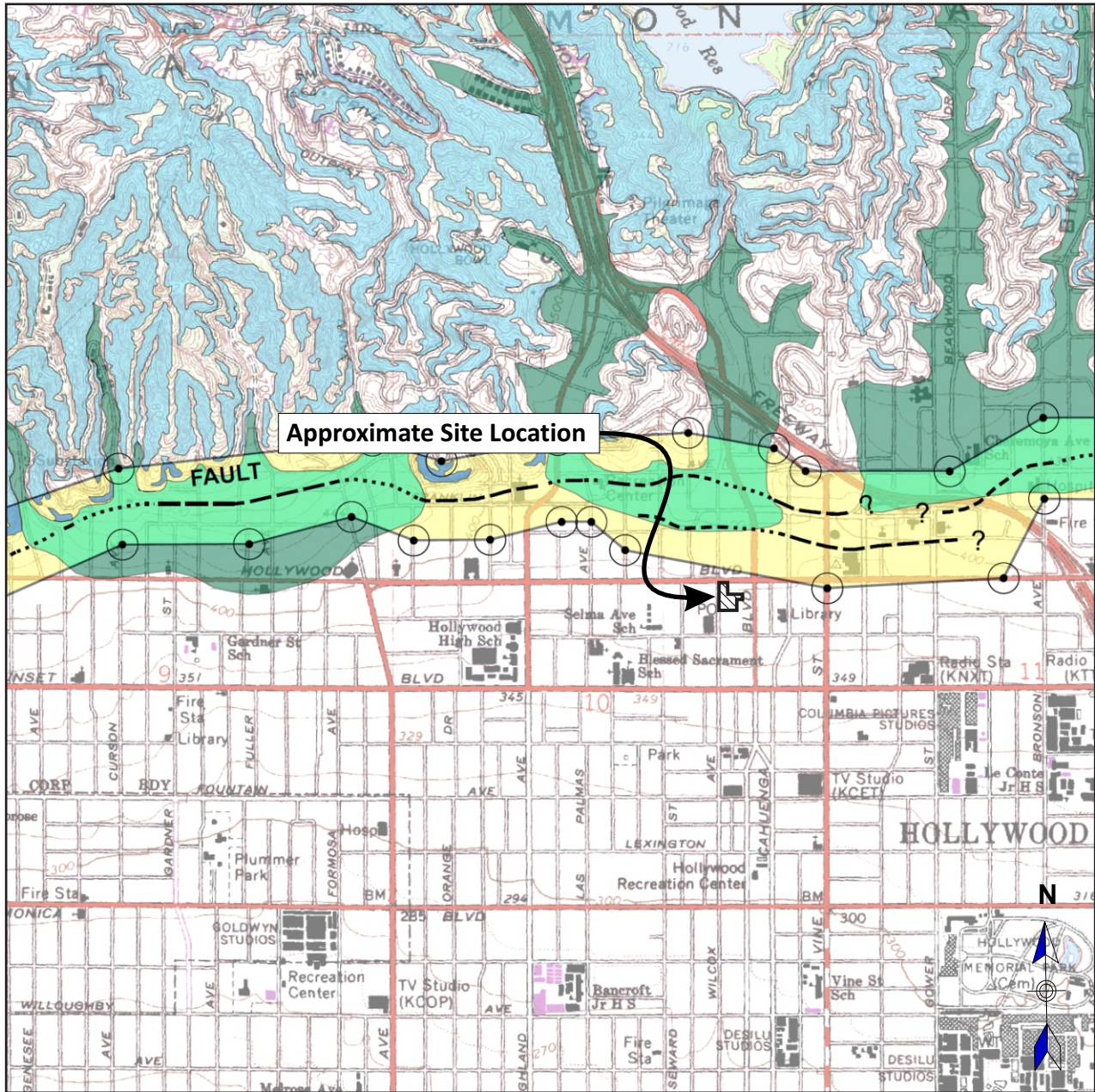
Southern California Earthquake Center (SCEC), 1999, *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California*, SCEC, University of Southern California, March 1999.

The Earth Technology Corporation, 2000, Los Angeles County Metropolitan Transportation Authority – Metro Red Line, LA CBD to N. Hollywood STA 630+00 to Universal City, Sheets 101 and 102, dated July 22, 1994, revised 1/11/2000.



**PLATES**

- PLATE I Earthquake Fault Zones Map
- PLATE II Exploration Map
- PLATE III Cross Section – CPT Soil Type
- PLATE IV Cross Section – CPT Sleeve Resistance



Source: CDMG, Hollywood Quadrangle, Seismic Hazard Zones Map, dated March 25, 1999, Earthquake Fault Zones, November 6, 2014.

**MAP EXPLANATION**



**Liquefaction**  
Areas where historic occurrences of liquefaction or local geological, geotechnical and groundwater conditions include a potential for Permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.



**Earthquake induced Landslides**  
Areas where previous occurrences of landslide movement, or local topographic, geologic, geotechnical and subsurface water conditions indicate a potential for permanent ground displacement such that mitigation as defined in Public Resources Code Section 2693(c) would be required.



**Earthquake Fault Zones**  
Zone boundaries are delineated by straight-line segments that connect encircled turning points; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.



**Active Fault Traces**  
Faults considered to have been active during Holocene time and to have potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

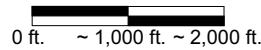


Plate I

**EARTHQUAKE FAULT ZONES MAP**

PROPOSED MIXED-USE DEVELOPMENT  
HOLLYWOOD BOULEVARD AND WILCOX AVENUE  
HOLLYWOOD, CALIFORNIA







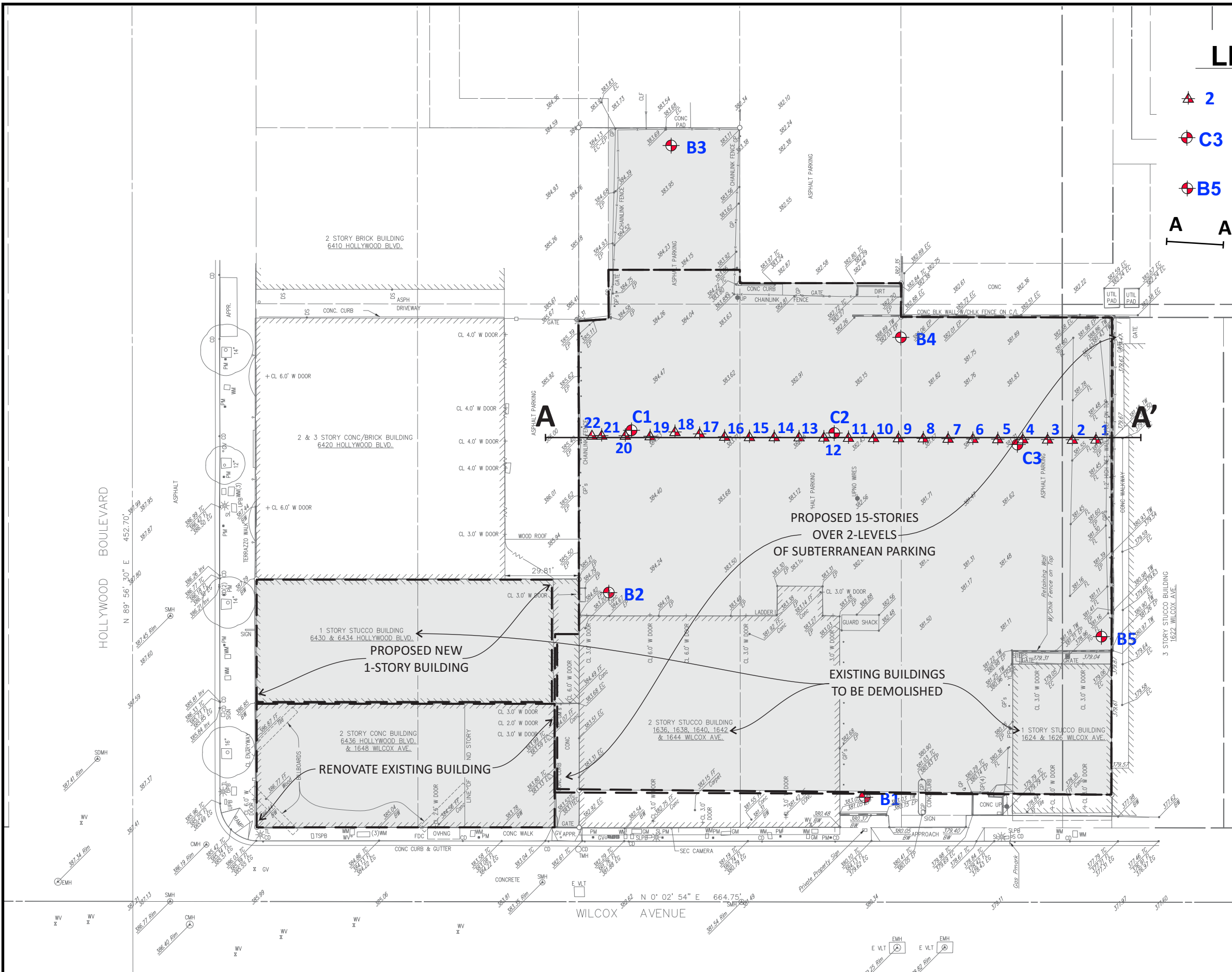
**Earth Systems**  
Southern California

10/24/2016

LA-01670-03

# LEGEND

-  2 APPROXIMATE CPT LOCATION
-  C3 APPROXIMATE CONTINUOUS CORE LOCATION
-  B5 APPROXIMATE BORING LOCATION
-  APPROXIMATE LOCATION OF CROSS SECTION



APPROXIMATE SCALE  
1 inch = 40 feet  
(1:480)

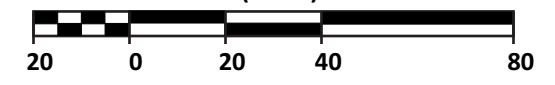


Plate II

<b>SITE EXPLORATION MAP</b>	
PROPOSED MIXED-USE DEVELOPMENT HOLLYWOOD BOULEVARD AND WILCOX AVENUE HOLLYWOOD, CALIFORNIA	
 <b>Earth Systems</b> Southern California	
10/24/2016	LA-01670-03

BASE MAP: Preliminary Survey (PSOMAS, 8/13/2007)



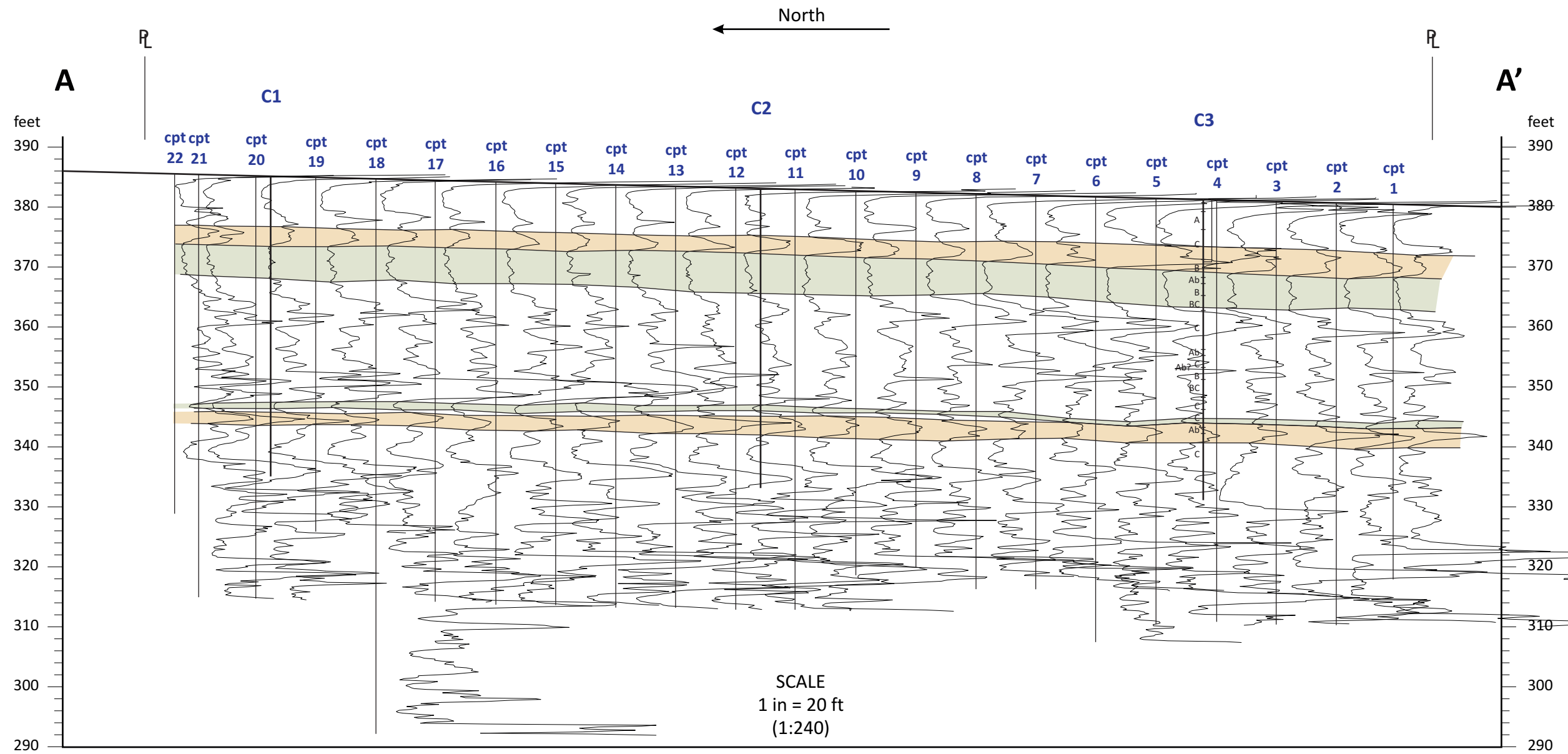


Plate IV

**CROSS SECTION - CPT TIP RESISTANCE**

PROPOSED MIXED-USE DEVELOPMENT  
HOLLYWOOD BOULEVARD AND WILCOX AVENUE  
HOLLYWOOD, CALIFORNIA



10/24/2016

LA-01670-03

**APPENDIX A**

Logs of Continuous Cores  
Logs of CPTs



PROJECT NAME:		Hollywood & Wilcox		BORING NO:		<b>C1</b>	
PROJECT NUMBER:		LA-01670-01		DRILL RIG:		CME 75	
DRILLING DATE:		7/20/2016		DRILLING METHOD:		8-inch hollow-stem auger	
BORING LOCATION:		See Map		LOGGED BY:		JS, JW, CA	
Vertical Depth	Box	Run	Sample recovery	Horizon	DESCRIPTION OF UNITS		
0				af	<b>Artificial Fill:</b> Upper 4 inches is import diatomaceous rock and soil, below is grayish brown Silt and Sand		
		1		A	<b>Alluvium:</b> Dark brown (10YR 3/3m, 4/3d); Loamy Sand texture; weak, fine subangular blocky to single grain structure; soft, non-sticky, non-plastic consistence; no clay films; boundary not observed as core is disrupted.		
5	1			Cox	Dark yellowish brown (10YR 3/4m, 4/4d); Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed, gravelly.		
		2		2Ab	Yellowish brown (10YR 5/4d); Sandy Loam texture; weak fine subangular block structure; soft, non-plastic.; charcoal extarcted for dating		
10				2Bb	Dark yellowish brown (10YR 4/4m, 4/5d); Sandy Loam texture; weak, fine subangular blocky structure; soft, non-sticky, non-plastic consistence; few, thin clay films in pores.		
		3		3Ab	Dark yellowish brown (10YR 4/4m); Loam texture; massive breaking to weak, coarse subangular blocky structure; slightly firm consistence; no clay films observed; clear boundary.		
15	2			3Bb	Dark yellowish brown (10YR 5/4d); Fine Sandy Loam texture; massive breaking to weak, coarse subangular blocky structure; soft, slightly sticky and non-plastic consistence; very few thin clay films in pores.		
		4		3Cox	Dark yellowish brown (10YR 4/4m, 5/4d); Pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.		
20				4Ab	Dark yellowish brown (10YR 4/4m, 5/4d); Pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.		
		6		4Cox	Dark yellowish brown (10YR 4/4d); Silty coarse to fine Sand some silty layers		
25	3			5Bb	Light yellowish brown (10YR 6/4d); Sand with very few thin clay films or strains on ped faces		
		7		5Cox	Light yellowish brown (10YR 6/4d); Fine Sandy Silt to Silty Sand		
30				6Ab	Light yellowish brown (10YR 6/4d); Silt with sand		
		8					
35	4						



PROJECT NAME:	Hollywood & Wilcox	BORING NO:	<b>C1</b>
PROJECT NUMBER:	LA-01670-01	DRILL RIG:	CME 75
DRILLING DATE:	7/20/2016	DRILLING METHOD:	8-inch hollow-stem auger
BORING LOCATION:	See Map	LOGGED BY:	JS, JW, CA

Vertical Depth	Box	Run	Sample recovery	Horizon	DESCRIPTION OF UNITS
40					
45	4	9		6Cox2	Dark yellowish brown (10YR 4/4d); Silty coarse to fine Sand some silty layers, possible weak pedogenesis
50	5	10			
55					Total depth 50 feet No free groundwater encountered. Backfilled with soil cuttings. Note: The stratification lines shown represent the approximate boundaries between materials and may be gradational.
60					
65					
70					
75					





PROJECT NAME:	Hollywood & Wilcox	BORING NO:	<b>C2</b>
PROJECT NUMBER:	LA-01670-01	DRILL RIG:	CME 75
DRILLING DATE:	7/20/2016	DRILLING METHOD:	8-inch hollow-stem auger
BORING LOCATION:	See Map	LOGGED BY:	JS, JW, CA

Vertical Depth	Box	Run	Sample recovery	Horizon	DESCRIPTION OF UNITS
0					<b>Artificial Fill:</b> Grayish brown, to yellowish brown Silty Sand
		1		A	<b>Alluvium:</b> Dark brown (10YR 3/3m, 4/3d); Loamy Sand texture; weak, fine subangular blocky to single grain structure; soft, non-sticky, non-plastic consistence; no clay films; boundary not observed as core is disrupted.
5		2		Cox	<b>Alluvium:</b> Dark yellowish brown (10YR 3/4m, 4/4d); Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed; gravelly .
10	1				
		3		2Bb	Dark yellowish brown (10YR 4/4m, 4/5d) sandy loam texture; weak, fine subangular blocky structure; soft, non-sticky, non-plastic consistence; few, thin clay films in pores.
15				3Ab	Dark yellowish brown (10YR4/4m) loam texture; massive breaking to weak, coarse subangular blocky structure; slightly firm consistence; no clay films observed; clear boundary.
		4		3Bcb	Dark yellowish brown (10YR 4/4m; fine sandy loam texture; massive breaking to weak, coarse subangular blocky structure; soft, slightly sticky and non-plastic consistence; very few thin clay films in pores.
20				3Cox	Dark yellowish brown (10YR 4/4m, 5/4d); pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.
	2				
		5		4Ab	Dark yellowish brown (10YR 4/4m, 5/4d); pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.
25				4Cox	Dark yellowish brown (10YR 4/4d); Silty coarse to fine Sand some silty layers, some fine gravel
		6			
30				5Bb	Light yellowish brown (10YR 6/4d); Silty Sand few thin clay films lining pores
	3				
		7			
35				5Cox	Light yellowish brown (10YR 6/4d); Fine Sandy Silt to Silty fine to medium Sand
		8			
	4			6Ab	Light yellowish brown (10YR 6/4d); Silt with sand



PROJECT NAME:	Hollywood & Wilcox	BORING NO:	<b>C2</b>
PROJECT NUMBER:	LA-01670-01	DRILL RIG:	CME 75
DRILLING DATE:	7/20/2016	DRILLING METHOD:	8-inch hollow-stem auger
BORING LOCATION:	See Map	LOGGED BY:	JS, JW, CA

Vertical Depth	Box	Run	Sample recovery	Horizon	DESCRIPTION OF UNITS
40					
45	4	9		6Cox2	Dark yellowish brown (10YR 4/4d); Silty coarse to fine Sand some silty layers, possible weak pedogenesis
50	5	10			
55					Total depth 50 feet No free groundwater encountered. Backfilled with soil cuttings. Note: The stratification lines shown represent the approximate boundaries between materials and may be gradational.
60					
65					
70					
75					



PROJECT NAME:		Hollywood & Wilcox		BORING NO:		<b>C3</b>	
PROJECT NUMBER:		LA-01670-01		DRILL RIG:		CME 75	
DRILLING DATE:		7/20/2016		DRILLING METHOD:		8-inch hollow-stem auger	
BORING LOCATION:		See Map		LOGGED BY:		TR, JS, CA	
Vertical Depth	Box	Run	Sample recovery	Horizon	DESCRIPTION OF UNITS		
0					<b>Artificial Fill:</b> Silty Sand trace clay and cobbles		
5	1	1		A	<b>Alluvium:</b> Dark brown (10YR 3/3m, 4/3d); Loamy Sand texture; weak, fine subangular blocky to single grain structure; soft, non-sticky, non-plastic consistence; no clay films; boundary not observed as core is disrupted. No recovery		
10		2		Cox	Dark yellowish brown (10YR 3/4m, 4/4d); Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed; gravelly with quartzite clasts at base (abrupt erosive contact).		
15	2	3		2Bwb	Dark yellowish brown (10YR 4/4m, 4/5d); Sandy Loam texture; weak, fine subangular blocky structure; soft, non-sticky, non-plastic consistence; few, thin clay films in pores.		
				2Btb	Dark yellowish brown (10YR 4/4m, 4/5d); fine Sandy Loam texture; moderate, coarse subangular blocky structure; slightly hard, slightly sticky and slightly plastic consistence; common, thin clay films in pores and lining ped faces.		
				3Ab	Dark yellowish brown (10YR 4/4m); Loam texture; massive breaking to weak, coarse subangular blocky structure; slightly firm consistence; no clay films observed; clear boundary.		
				3Btb	Dark yellowish brown (10YR 4/4m); slightly pebbly Sandy Loam texture; massive breaking to weak, coarse subangular blocky structure; soft, very slightly sticky and non-plastic consistence; common thin clay films in pores and few thin clay films lining ped faces.		
20		4		3Bcb	Dark yellowish brown (10YR 4/4m); fine Sandy Loam texture; massive breaking to weak, coarse subangular blocky structure; soft, slightly sticky and non-plastic consistence; very few thin clay films in pores.		
25		5		3Cox	Dark yellowish brown (10YR 4/4m, 5/4d); pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.		
	3	6		4Ab	Dark yellowish brown (10YR 4/4m, 5/4d); pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.		
				4Cox1	Pebbly sand		
				4Cox2	Coarse to fine sand		
				4Cox3	Silty fine sand bedded with sand possible weak A		
				5Ab			
				5Bwb	Few thin clay films on ped faces and in pores		
30		7		5Bcb	Sand with very few thin clay films or strains on ped faces		
35	4	8		5Cox	Fine sandy silt to silty sand No recovery		
				6Ab	Sand with some bedding Buried A horizon with some charcoal flecks (charcoal was not recovered upon processing)		



PROJECT NAME:	Hollywood & Wilcox	BORING NO:	<b>C3</b>
PROJECT NUMBER:	LA-01670-01	DRILL RIG:	CME 75
DRILLING DATE:	7/20/2016	DRILLING METHOD:	8-inch hollow-stem auger
BORING LOCATION:	See Map	LOGGED BY:	TR, JS, CA

Vertical Depth	Box	Run	Sample recovery	Horizon	DESCRIPTION OF UNITS
40	4	9	[Solid black bar]	6Ab	Buried A horizon with some charcoal flecks (charcoal was not recovered upon processing)
				6Cox1	Coarse sand
				6Cox2	Silty sand
45				6Cox3	Fine Sand
	5	10	[Solid black bar]	6Cox4	Silty sand, possible weak pedogenesis
50				<p>Total depth 50 feet</p> <p>No free groundwater encountered.</p> <p>Backfilled with soil cuttings.</p> <p>Note: The stratification lines shown represent the approximate boundaries between materials and may be gradational.</p>	
55					
60					
65					
70					
75					



# Earth Systems

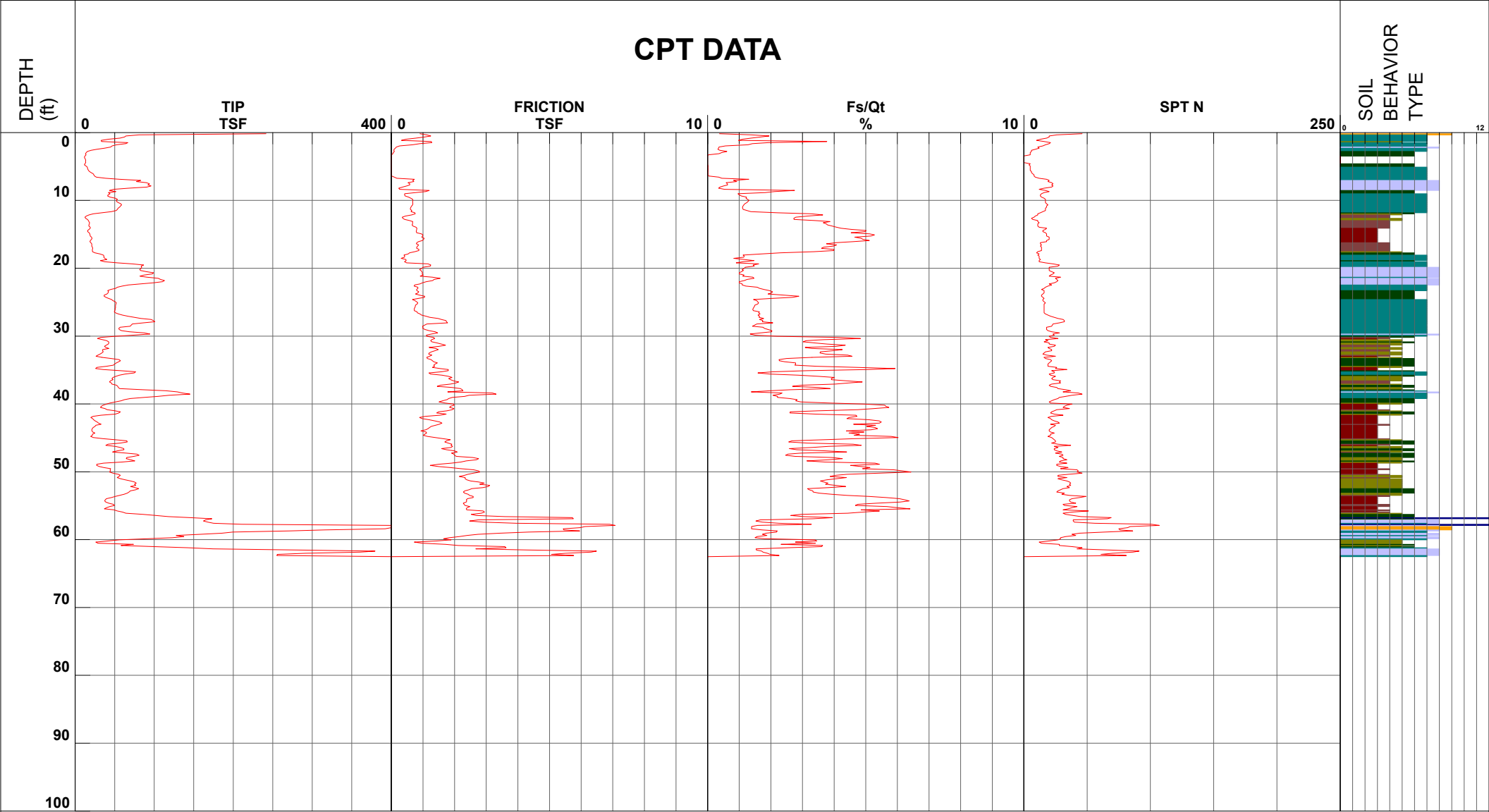
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 Maximum Depth 62.66 ft

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



# Earth Systems

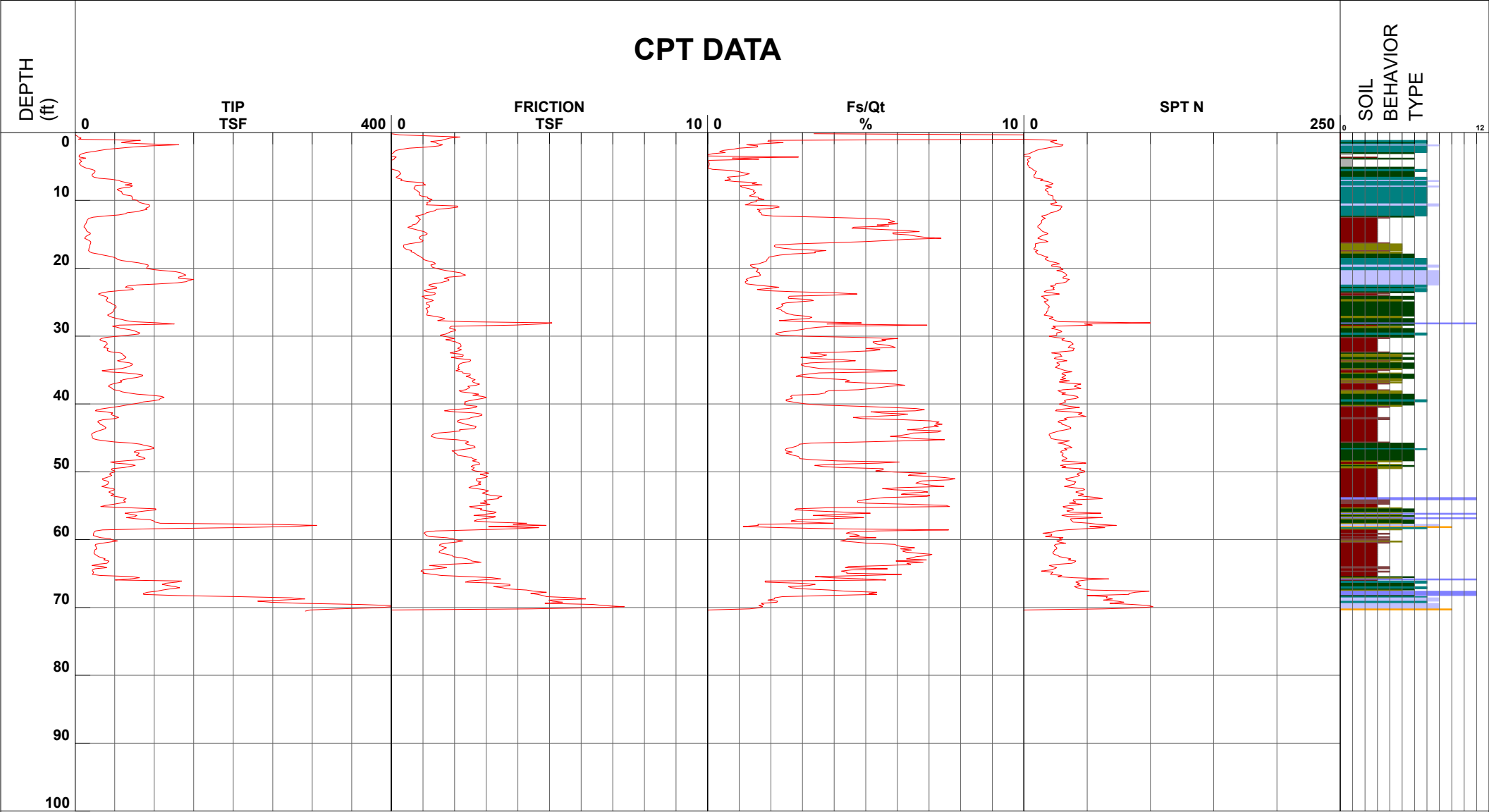
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 Cone Number DDG1281  
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Filename SDF(732).cpt  
 GPS  
 Maximum Depth 70.54 ft

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



# Earth Systems

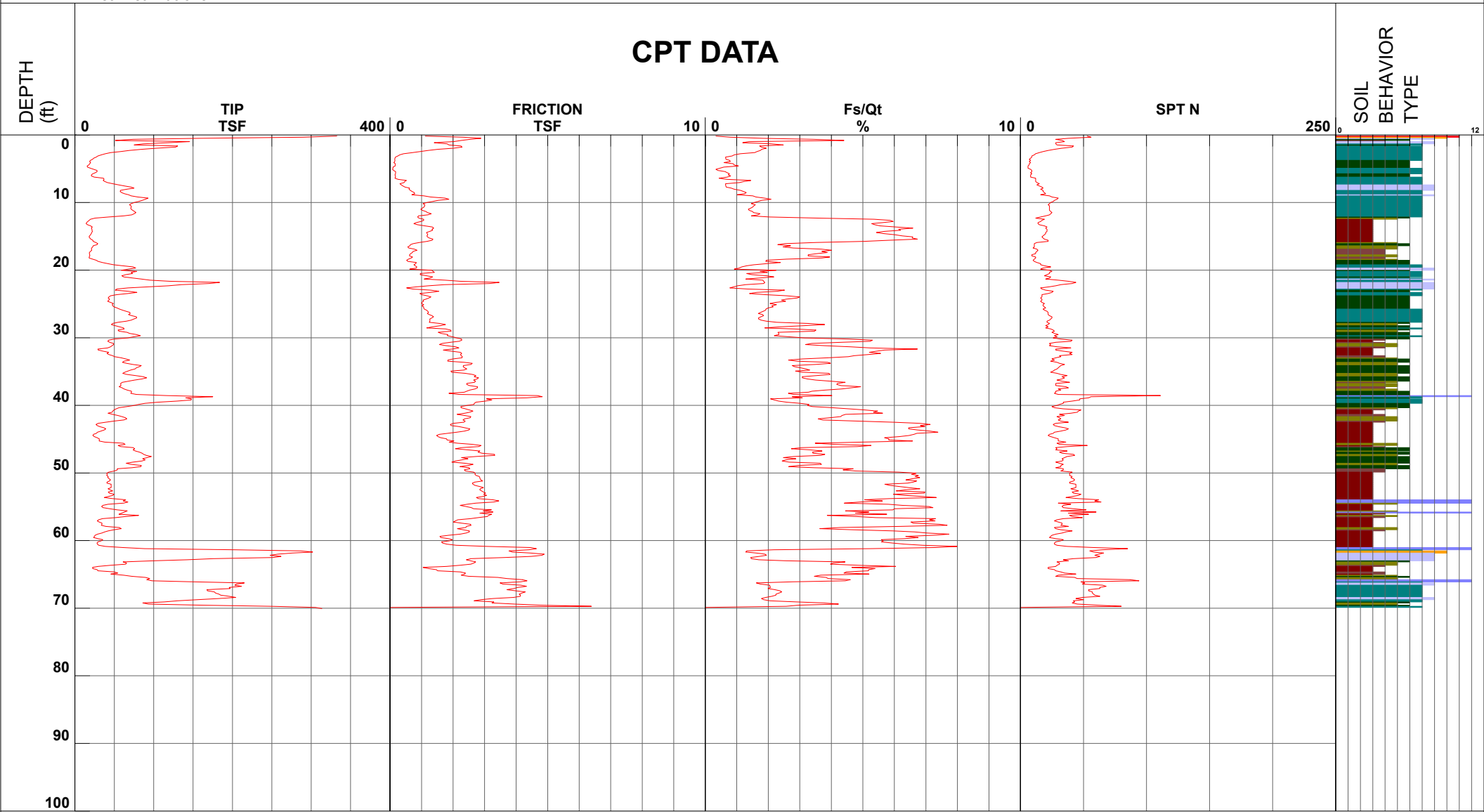
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 Hole Number CPT-03  
 EST GW Depth During Test

Operator DG-RC  
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Filename SDF(733).cpt  
 GPS  
 Maximum Depth 70.05 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



# Earth Systems

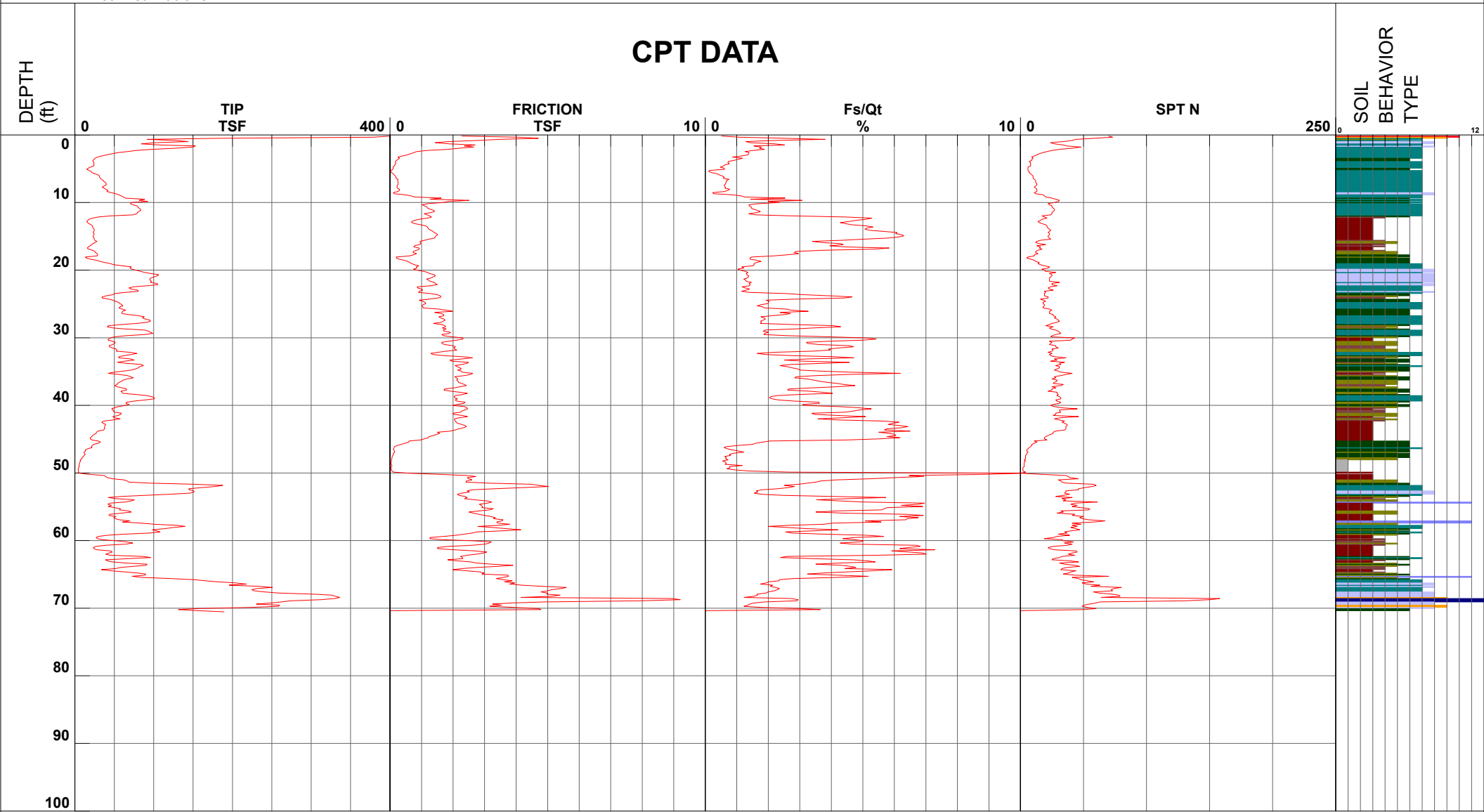
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Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/9/2016 5:26:57 PM

Filename SDF(734).cpt  
 GPS  
 Maximum Depth 70.54 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





# Earth Systems

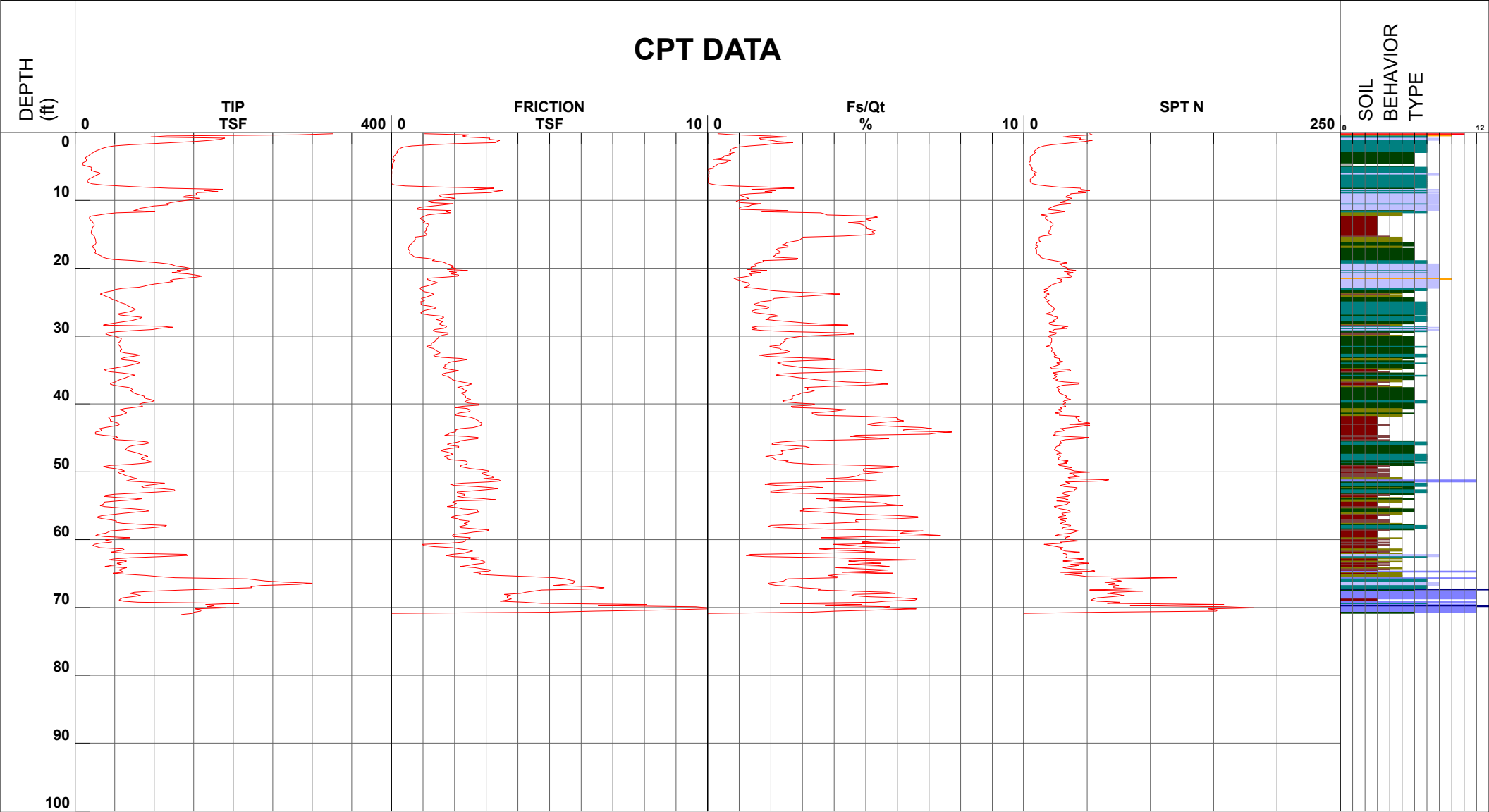
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Operator DG-RC  
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 Date and Time 8/9/2016 6:17:24 PM

Filename SDF(735).cpt  
 GPS  
 Maximum Depth 71.03 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



# Earth Systems

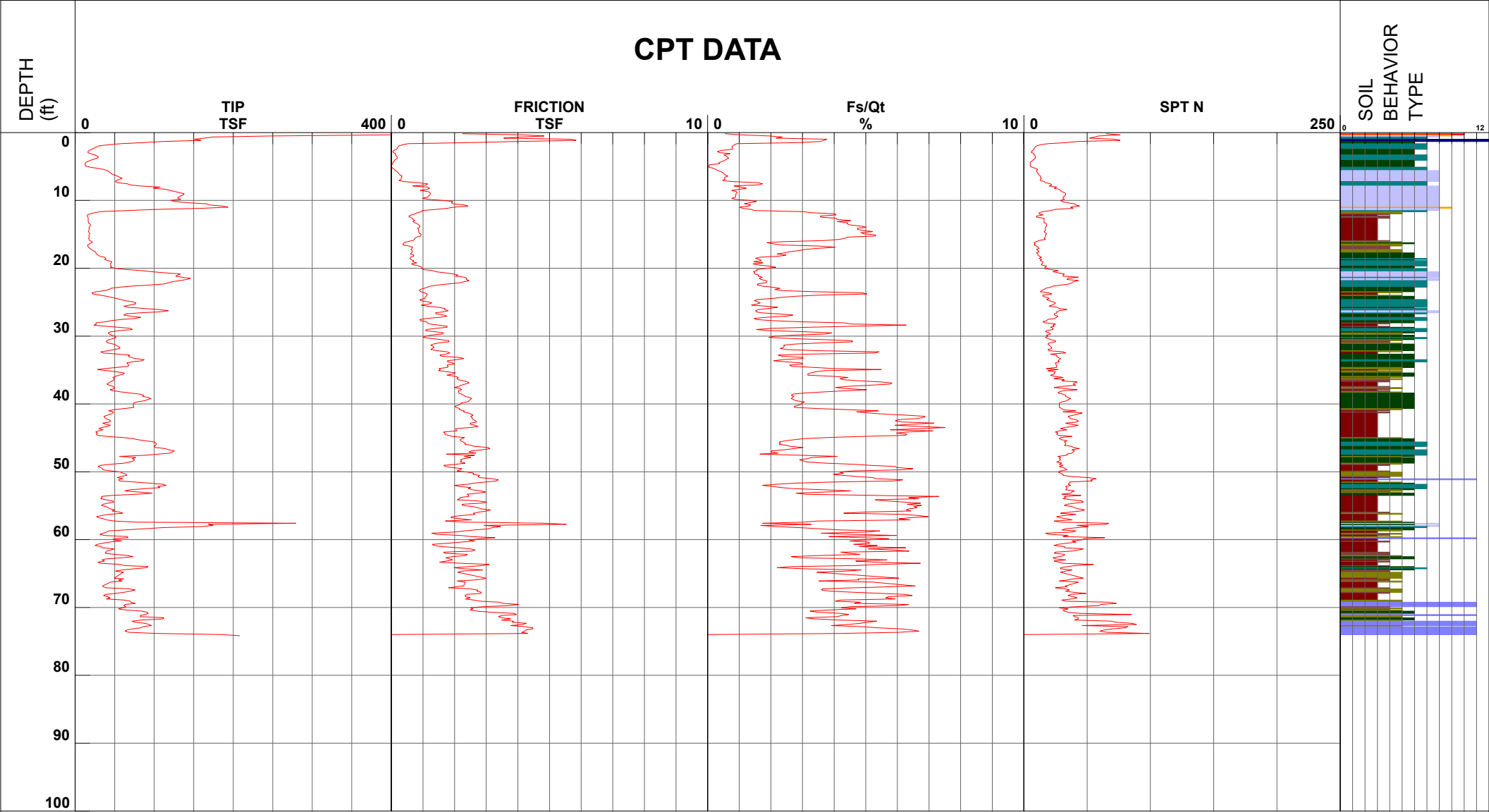
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Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 8:00:31 AM  
 >74.15 ft

Filename SDF(738).cpt  
 GPS  
 Maximum Depth 74.15 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



# Earth Systems

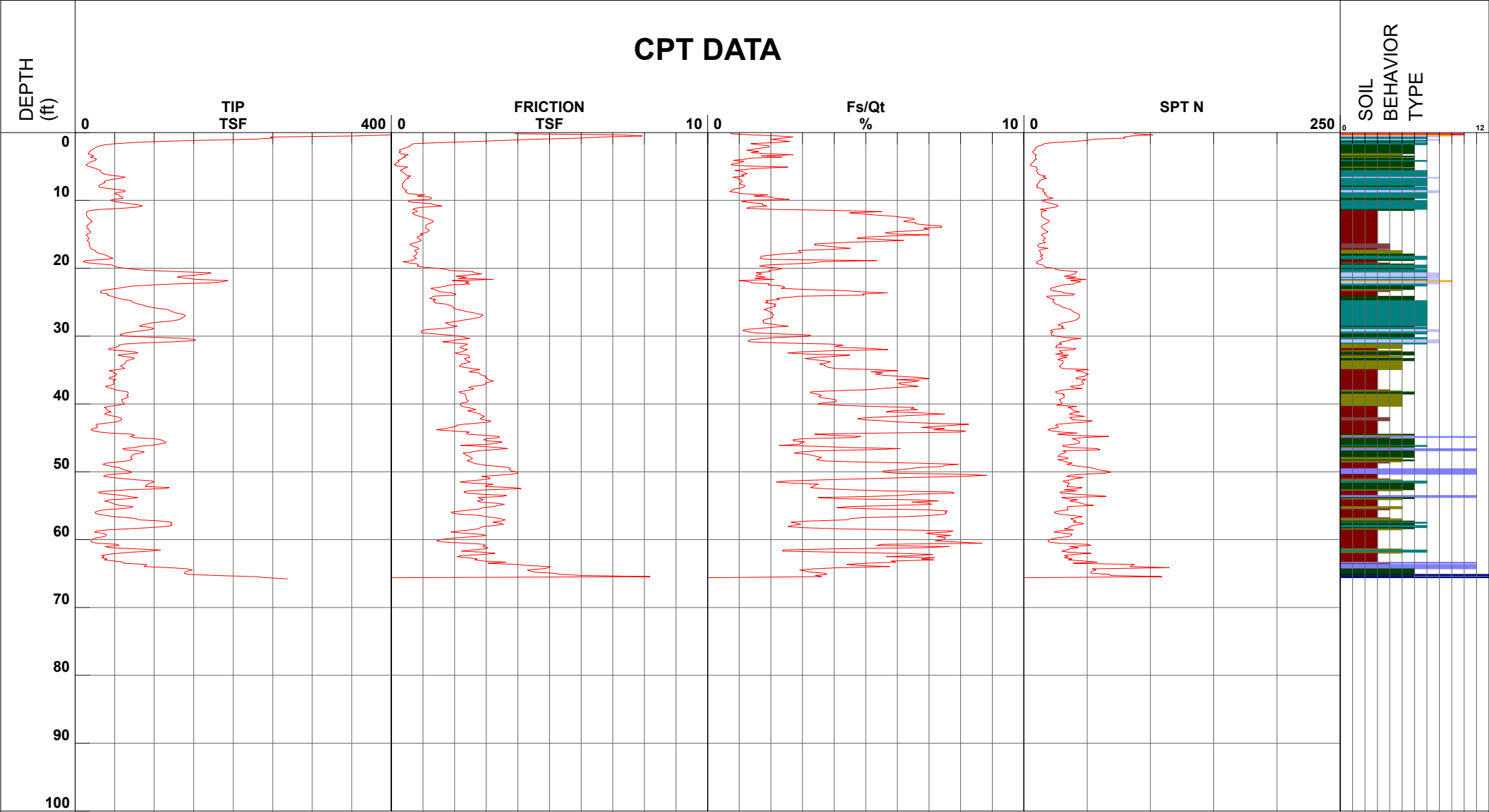
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 Job Number LA-01670-01  
 Hole Number CPT-07  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 9:32:38 PM  
 >65.78 ft

Filename SDF(754).cpt  
 GPS  
 Maximum Depth 65.78 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



# Earth Systems

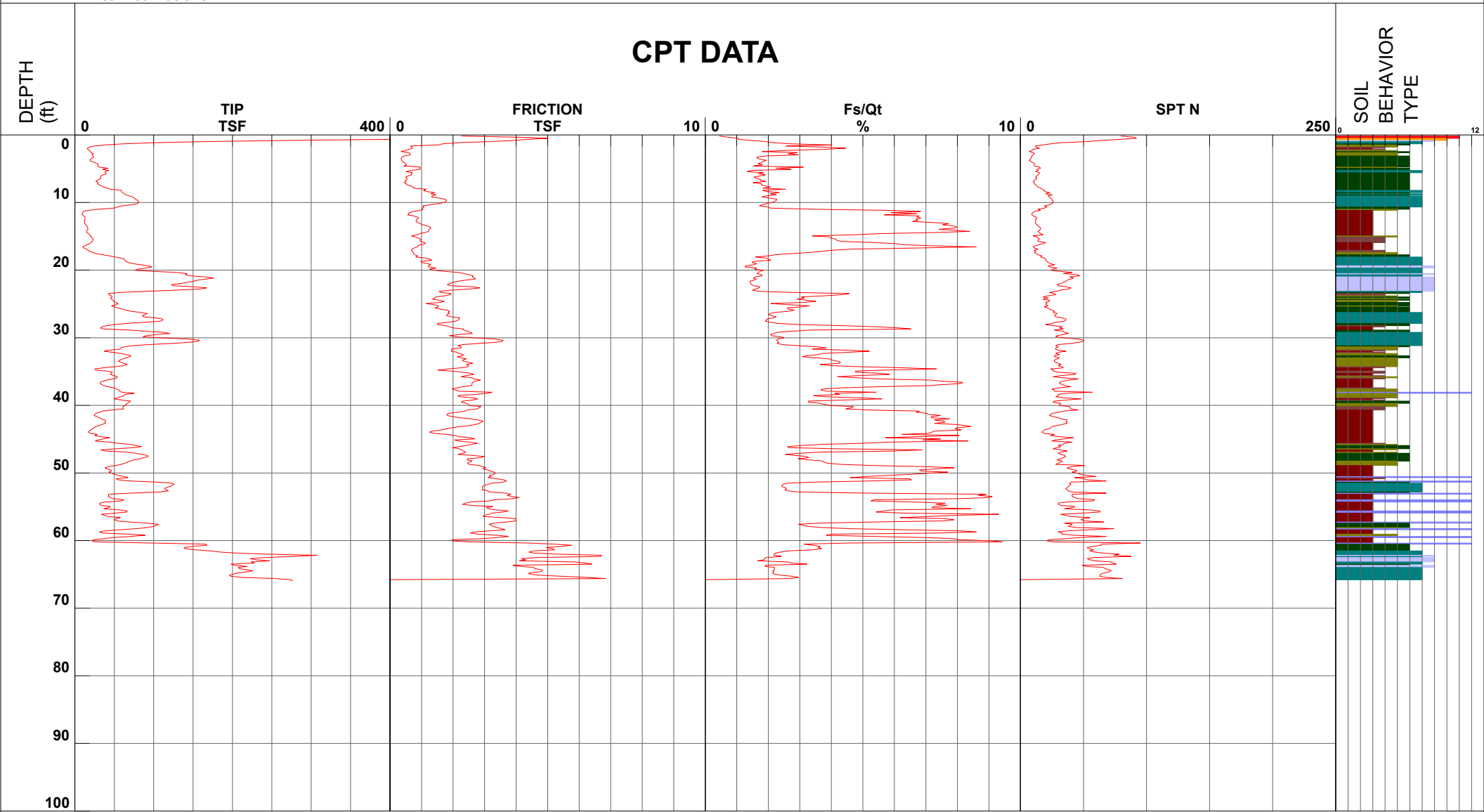
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 Hole Number CPT-08  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 8:38:12 PM  
 >65.94 ft

Filename SDF(753).cpt  
 GPS  
 Maximum Depth 65.94 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



# Earth Systems

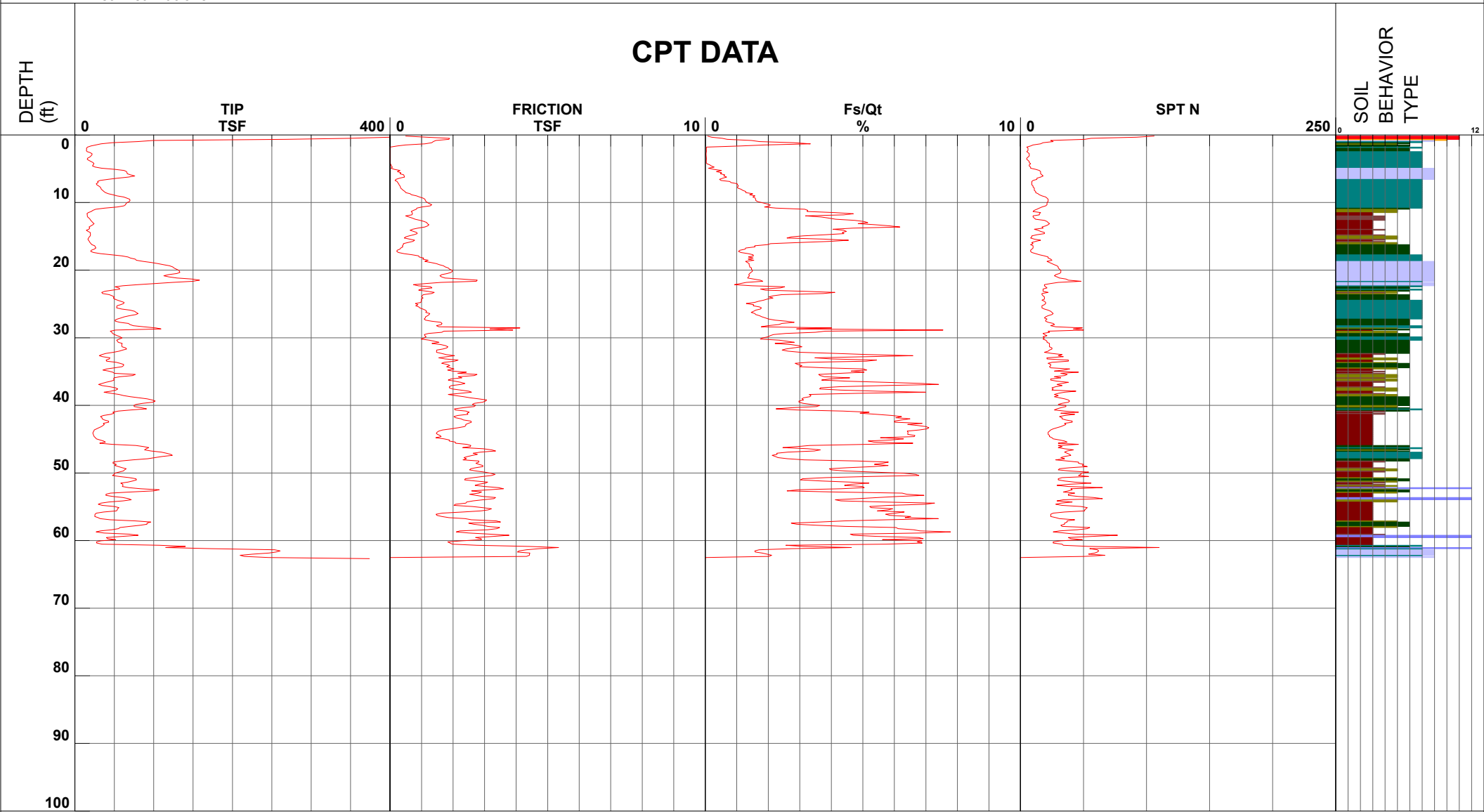
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Operator DG-RC  
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Filename SDF(752).cpt  
 GPS  
 Maximum Depth 62.66 ft

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



# Earth Systems

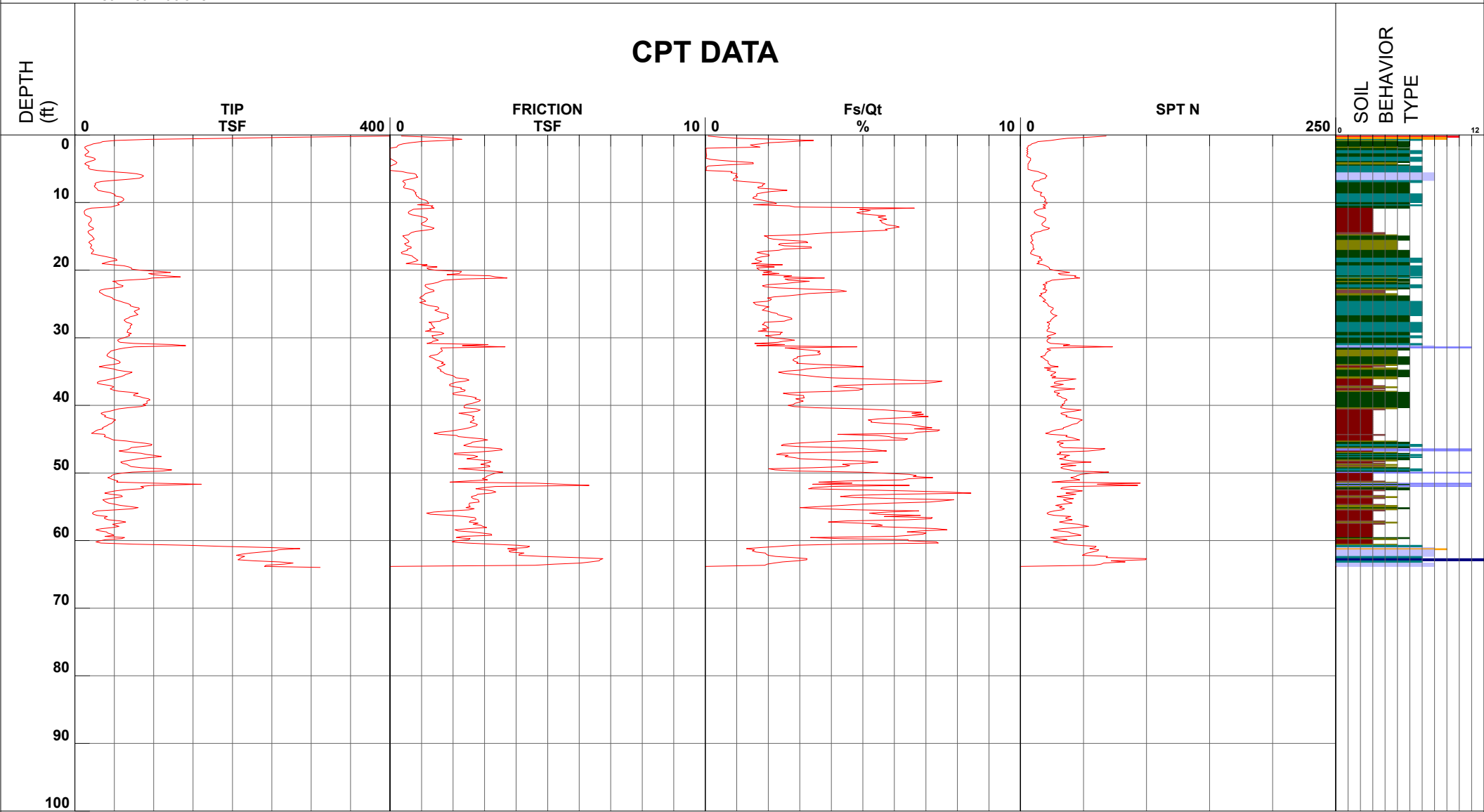
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 Hole Number CPT-10  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 6:52:57 PM  
 >63.98 ft

Filename SDF(751).cpt  
 GPS  
 Maximum Depth 63.98 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



# Earth Systems

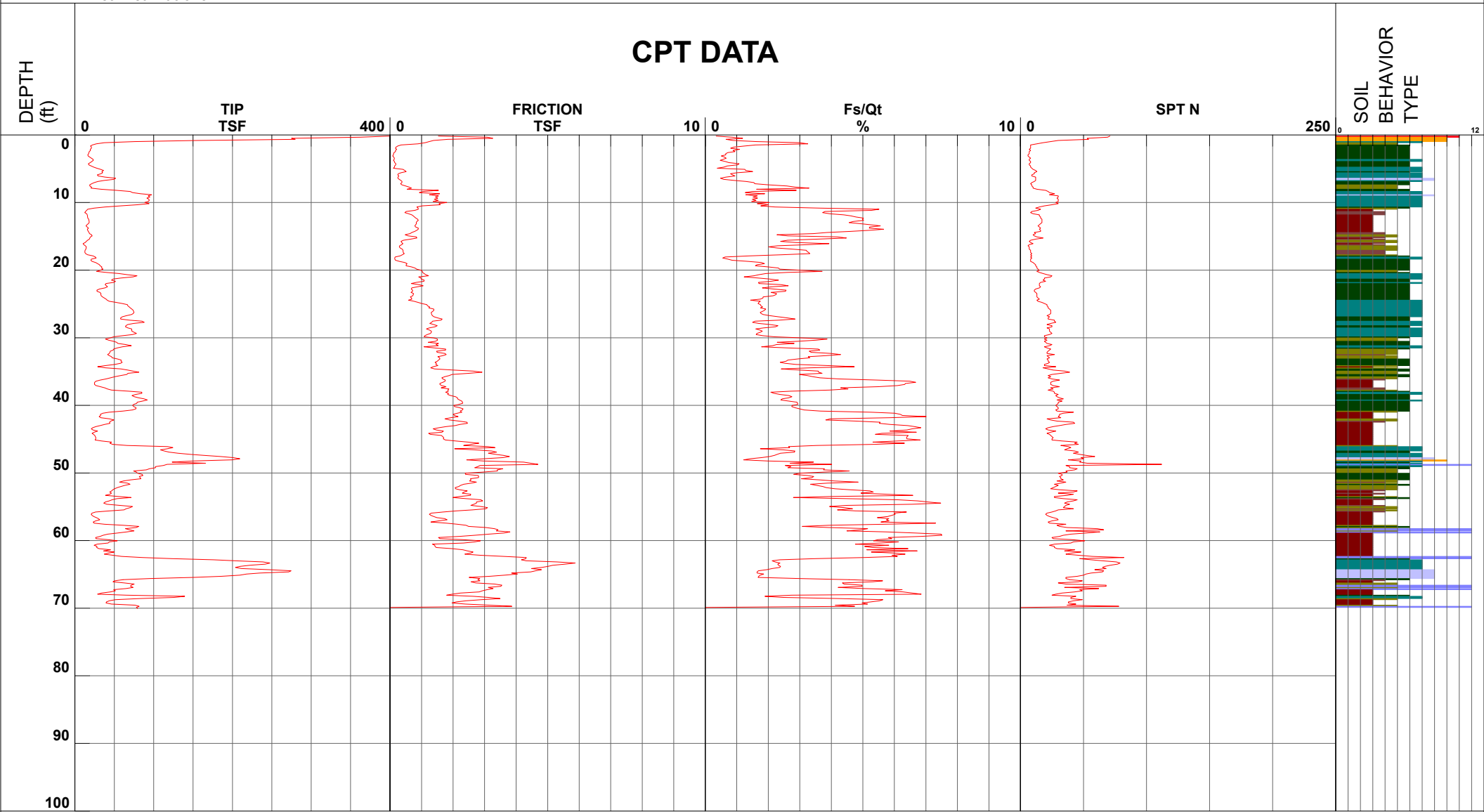
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-11  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 6:09:02 PM

Filename SDF(750).cpt  
 GPS  
 Maximum Depth 70.05 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



# Earth Systems

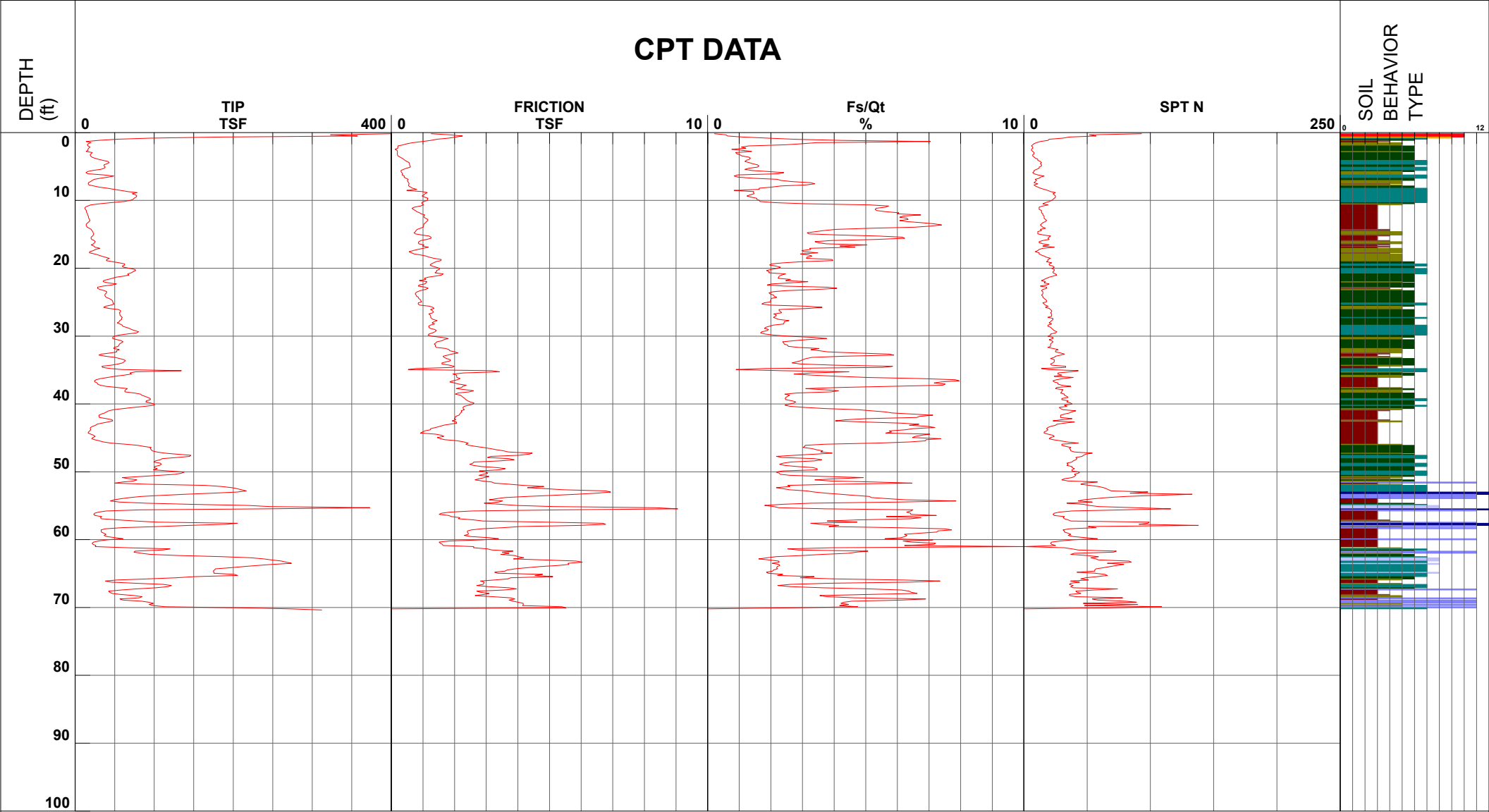
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-12  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 5:24:45 PM

Filename SDF(749).cpt  
 GPS  
 Maximum Depth 70.37 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





# Earth Systems

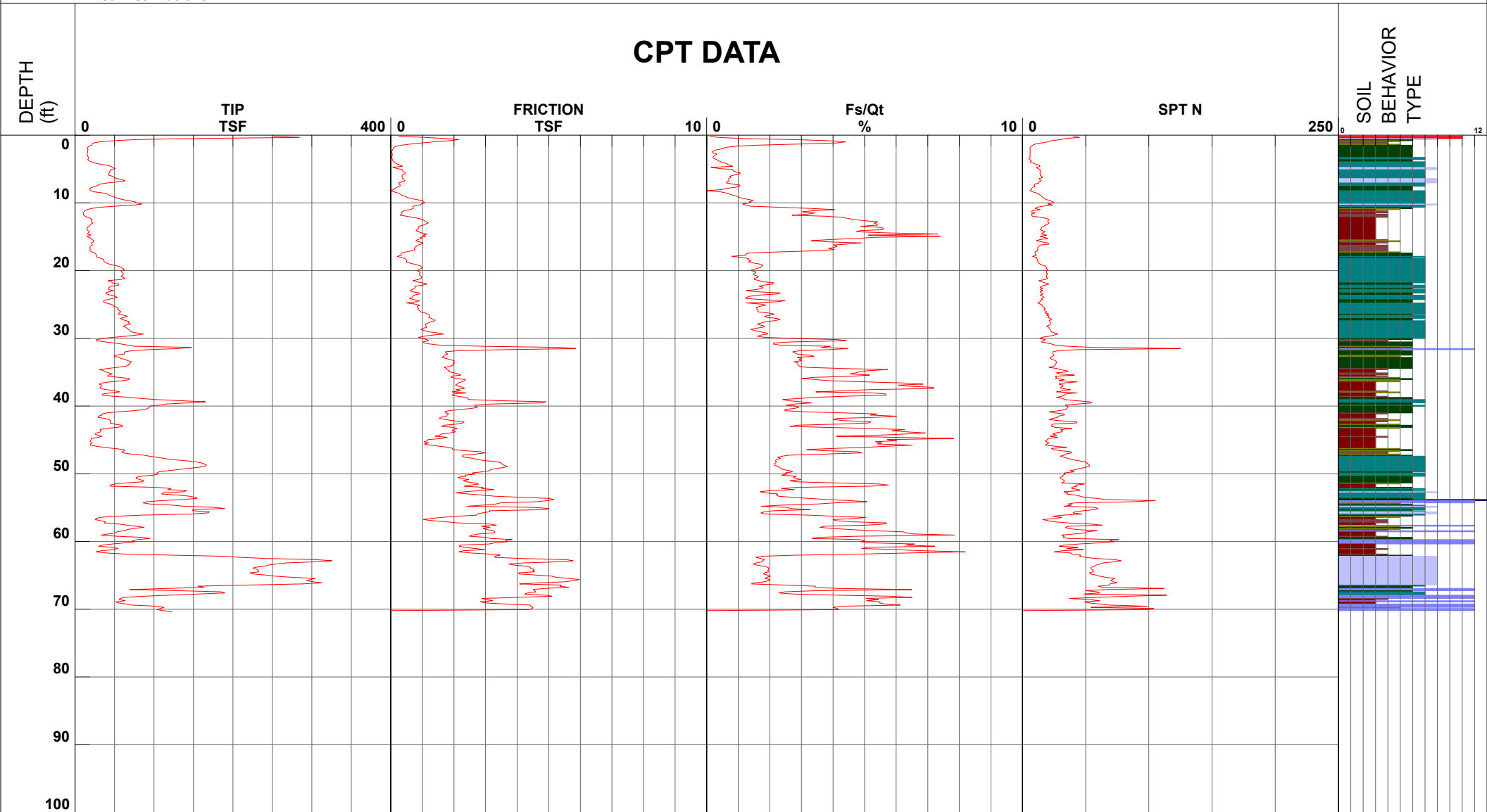
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-13  
 EST GW Depth During Test \_\_\_\_\_

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 4:38:53 PM

Filename SDF(748).cpt  
 GPS \_\_\_\_\_  
 Maximum Depth 70.37 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



# Earth Systems

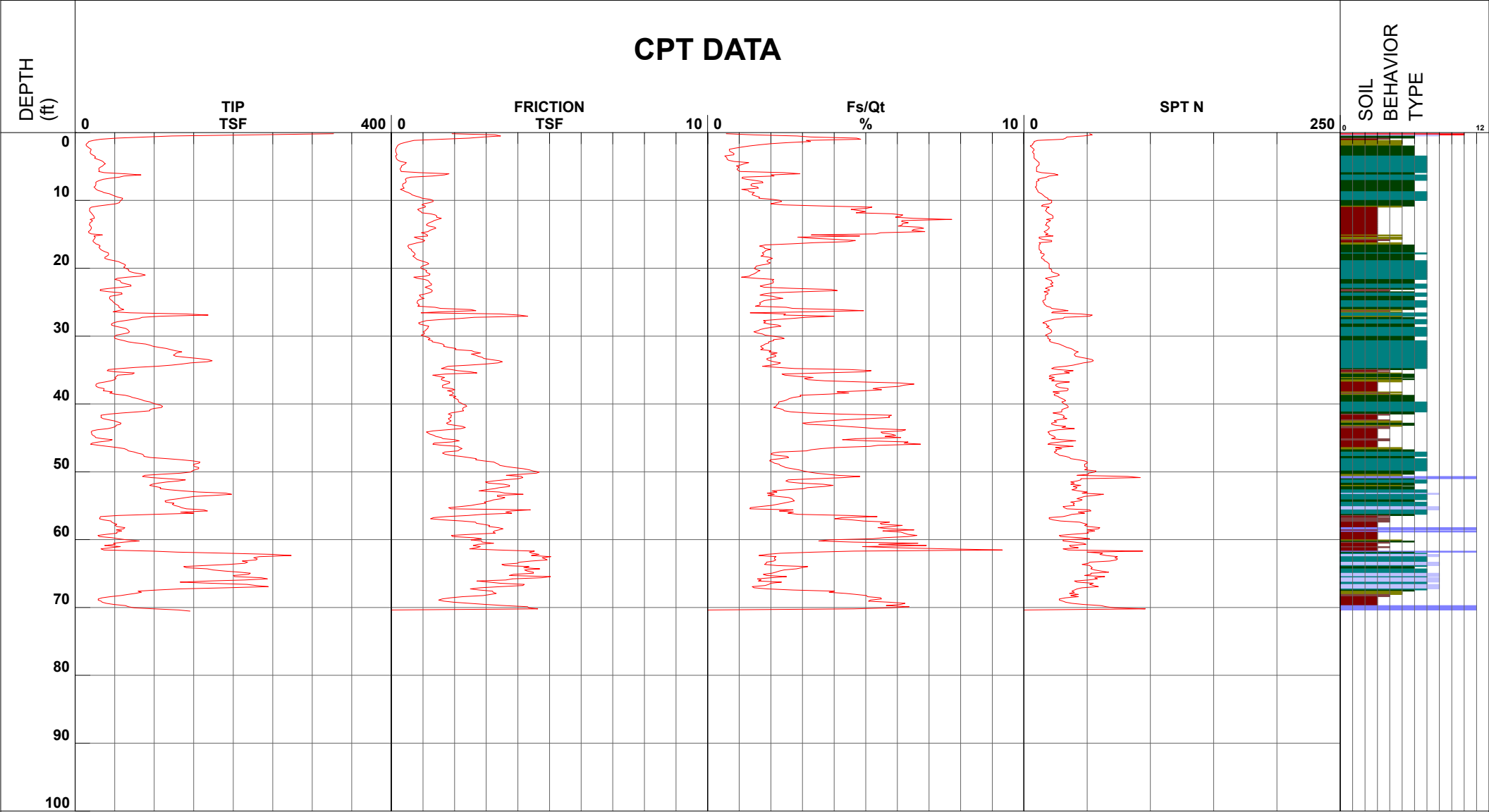
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-14  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 3:56:30 PM

Filename SDF(747).cpt  
 GPS  
 Maximum Depth 70.54 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



# Earth Systems

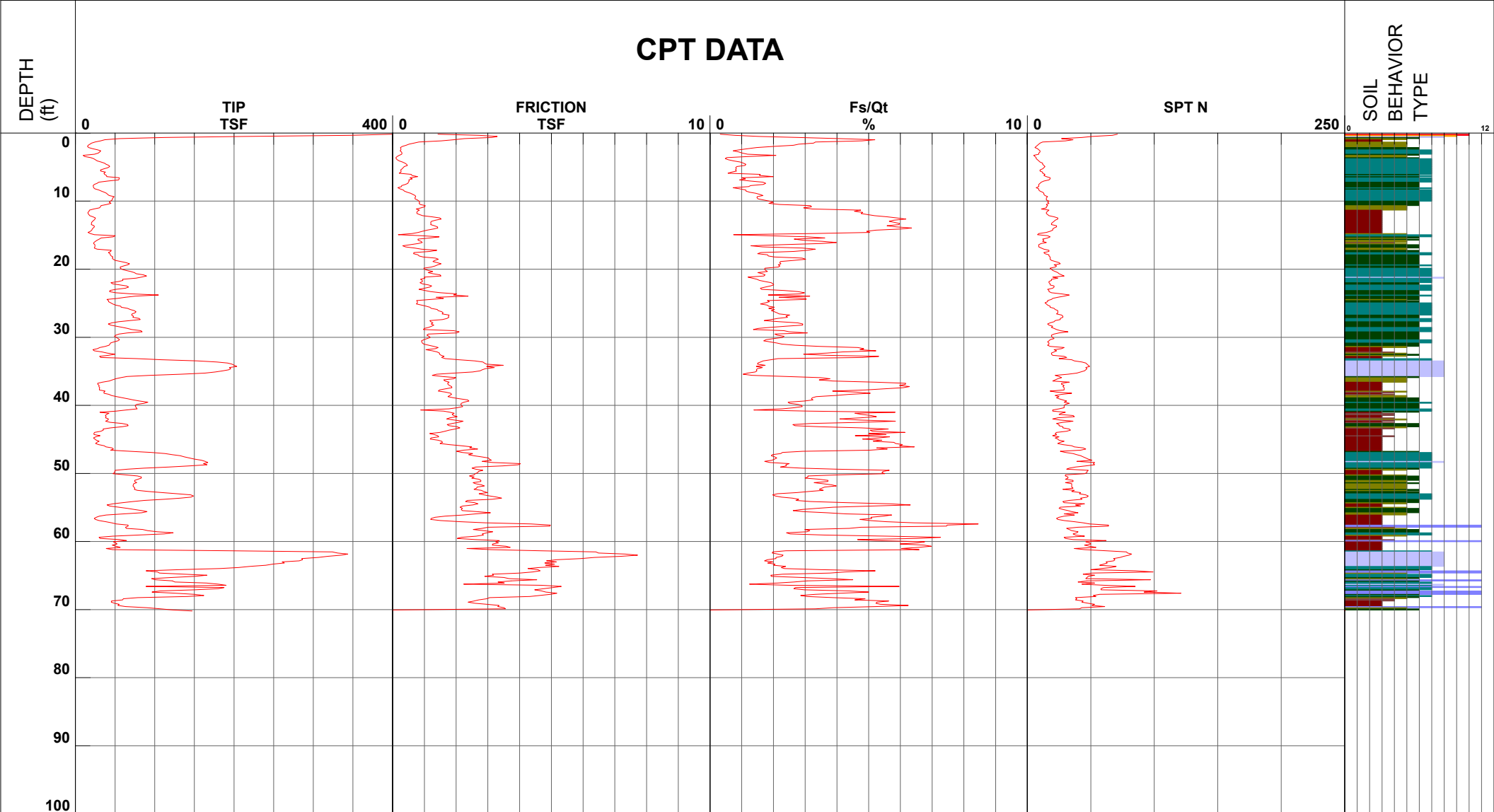
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-15  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 3:11:14 PM

Filename SDF(746).cpt  
 GPS  
 Maximum Depth 70.21 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



# Earth Systems

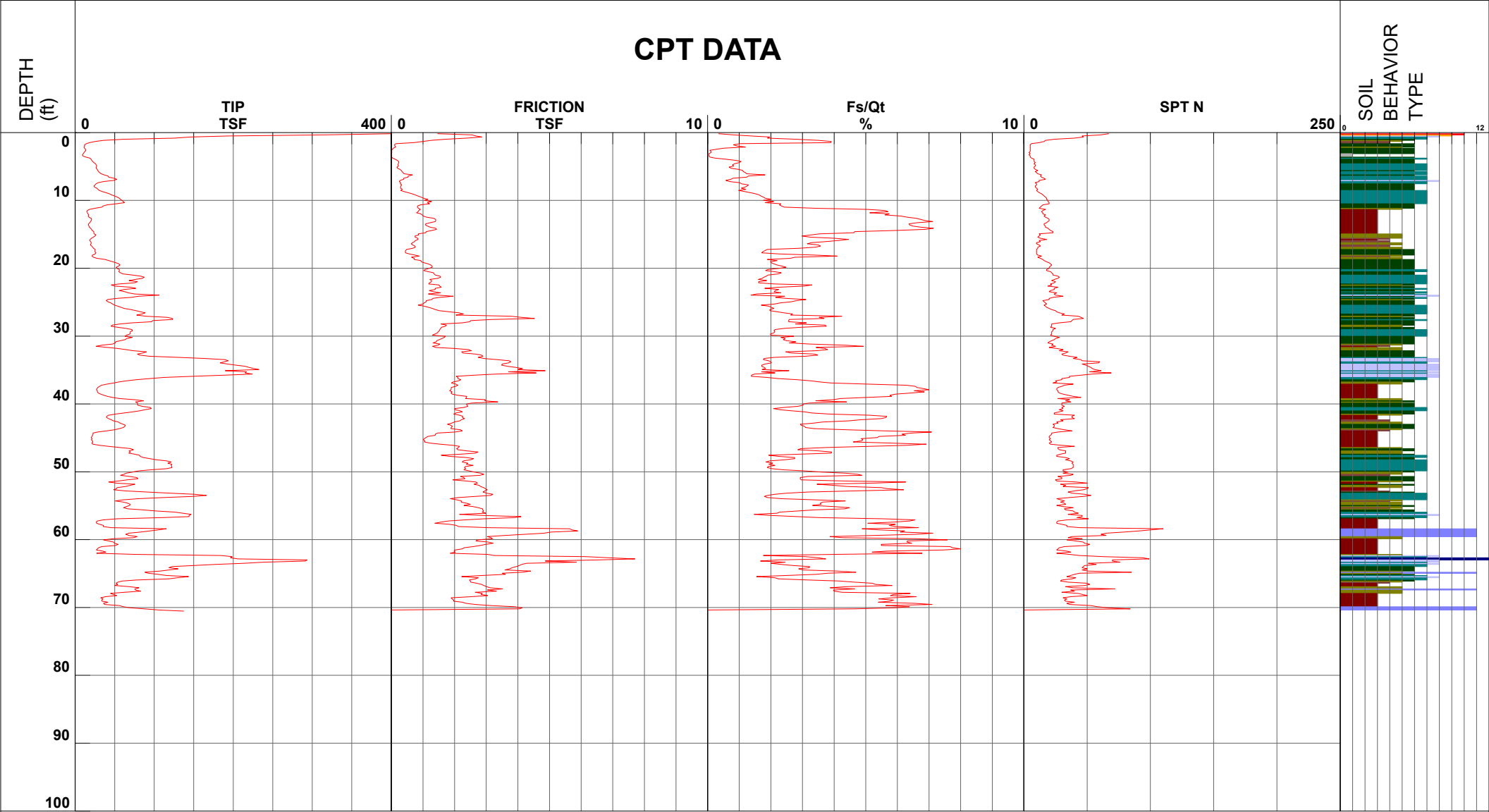
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-16  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 2:29:05 PM

Filename SDF(745).cpt  
 GPS  
 Maximum Depth 70.54 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



# Earth Systems

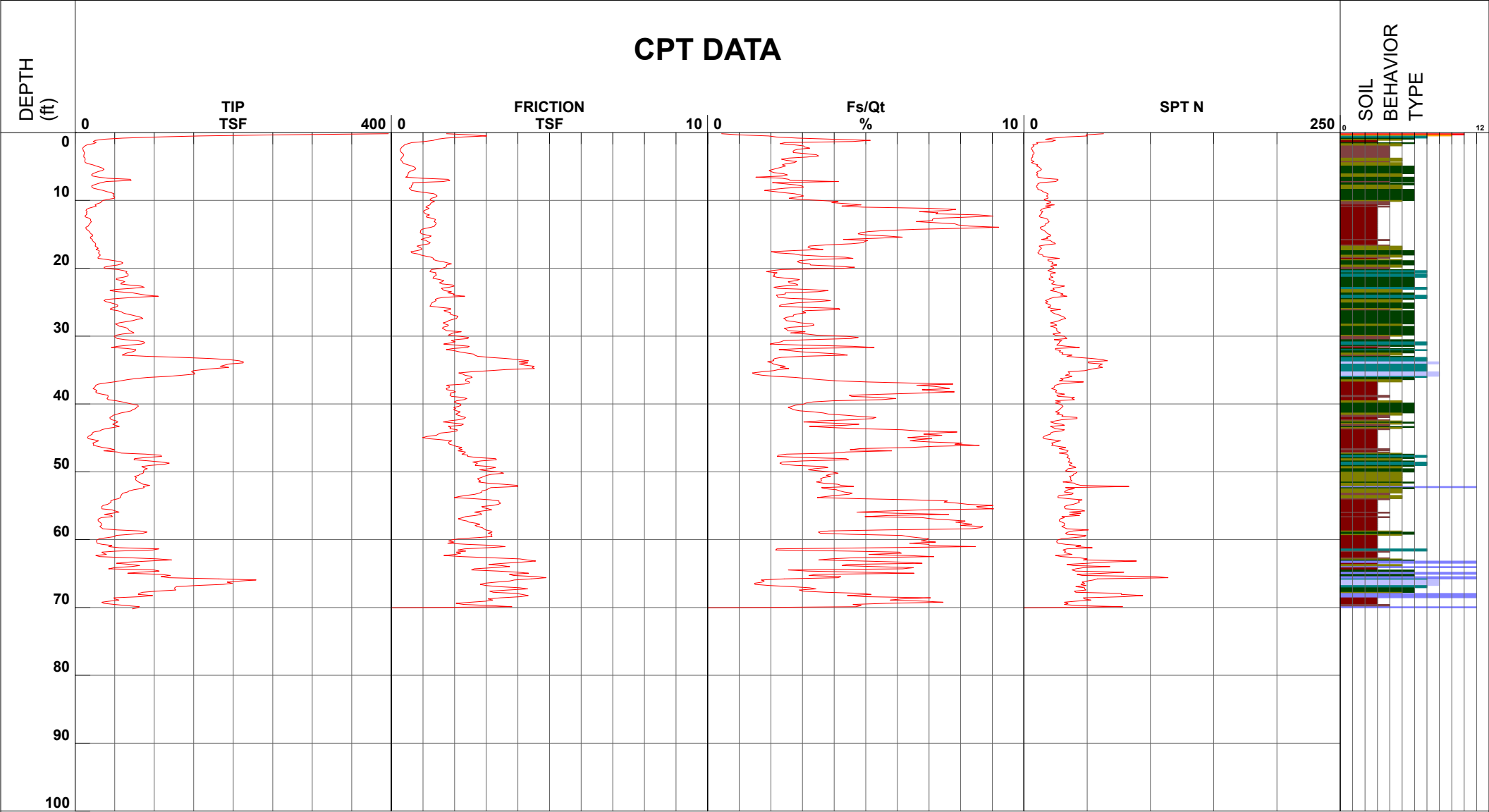
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-17  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 1:45:52 PM

Filename SDF(744).cpt  
 GPS  
 Maximum Depth 70.21 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



# Earth Systems

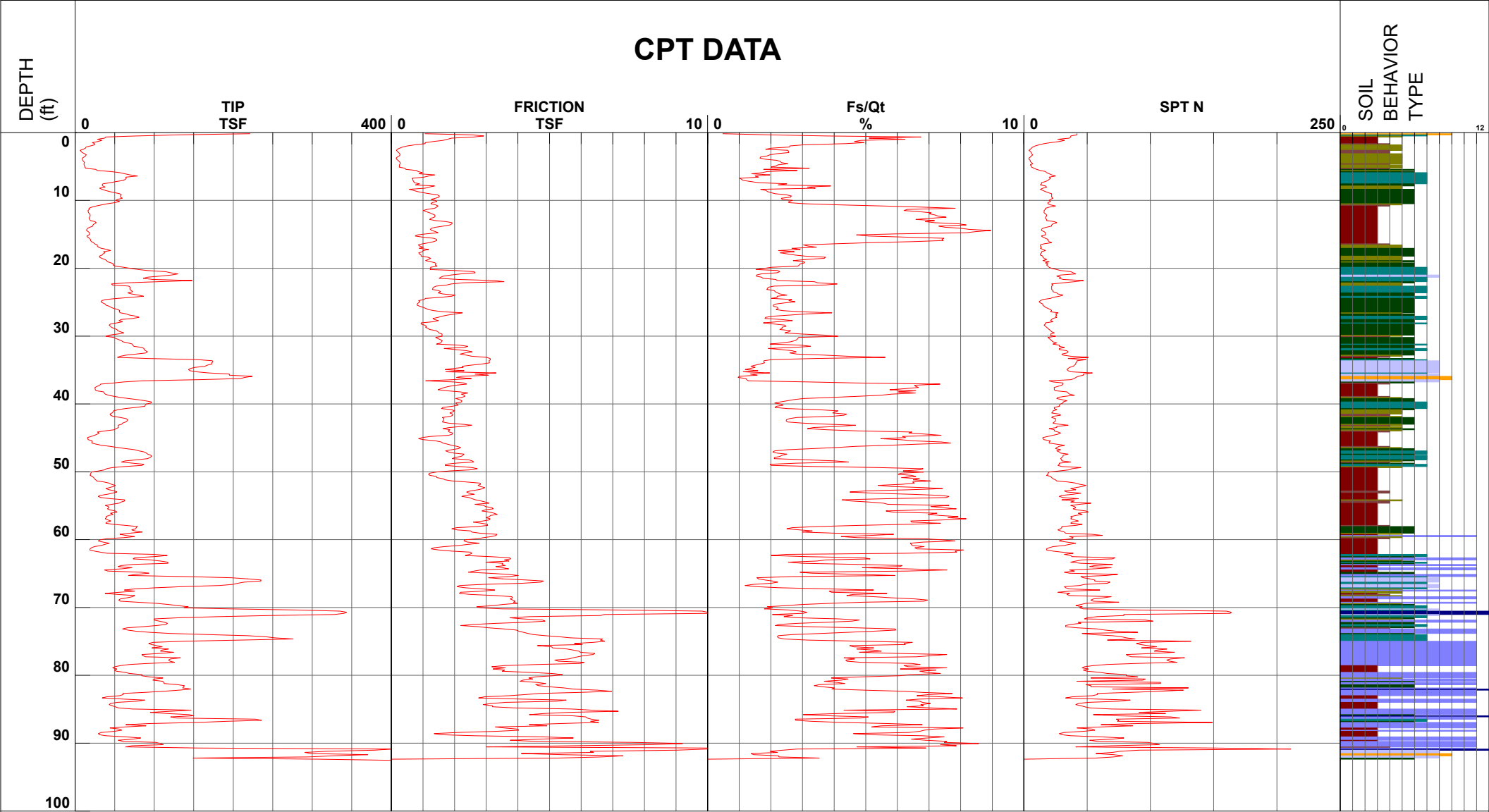
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number SCPT-18  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 6:52:15 AM

Filename SDF(737).cpt  
 GPS  
 Maximum Depth 92.52 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



# Earth Systems

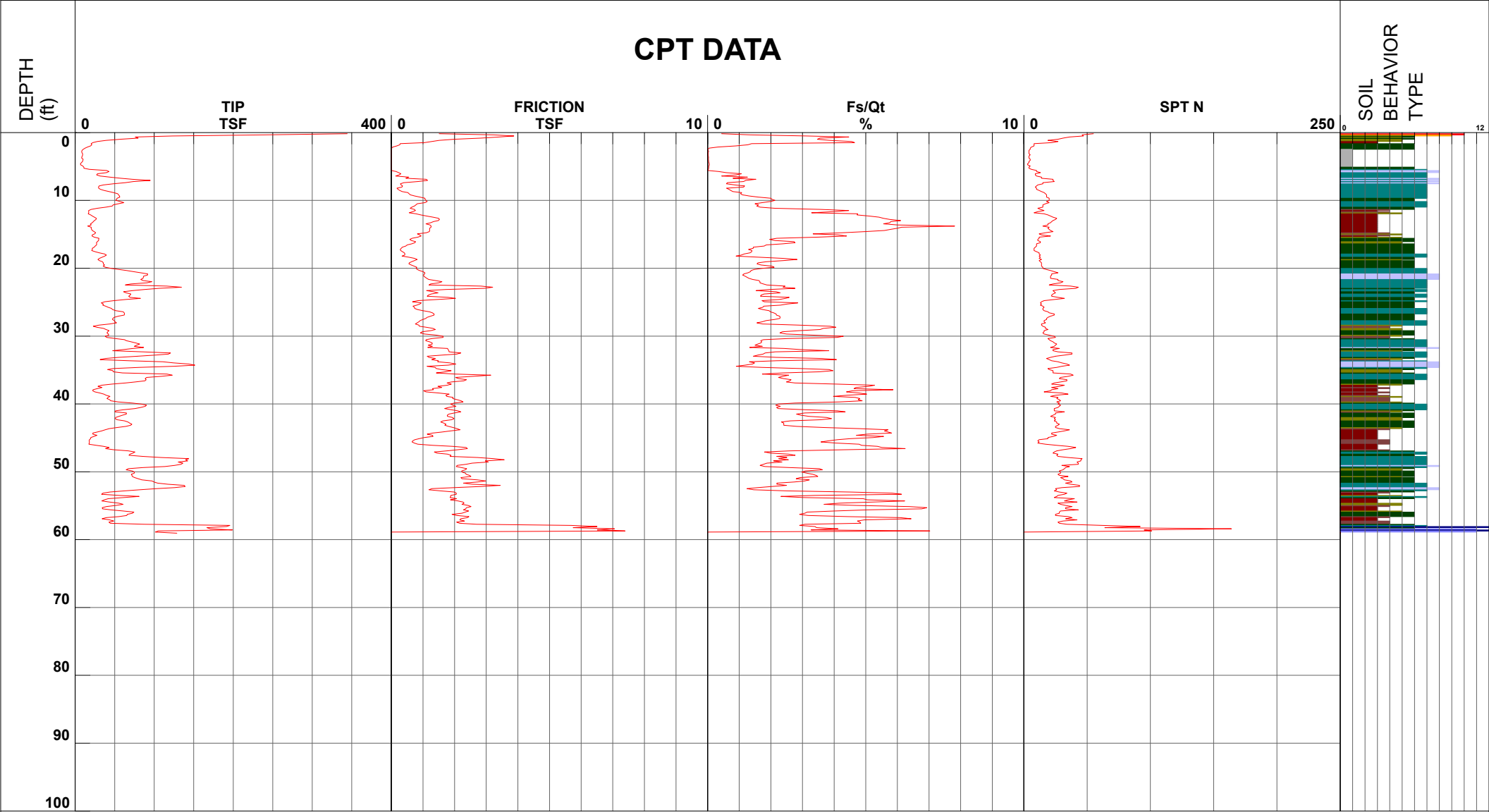
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-19  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 1:06:44 PM

Filename SDF(743).cpt  
 GPS  
 Maximum Depth 59.05 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



# Earth Systems

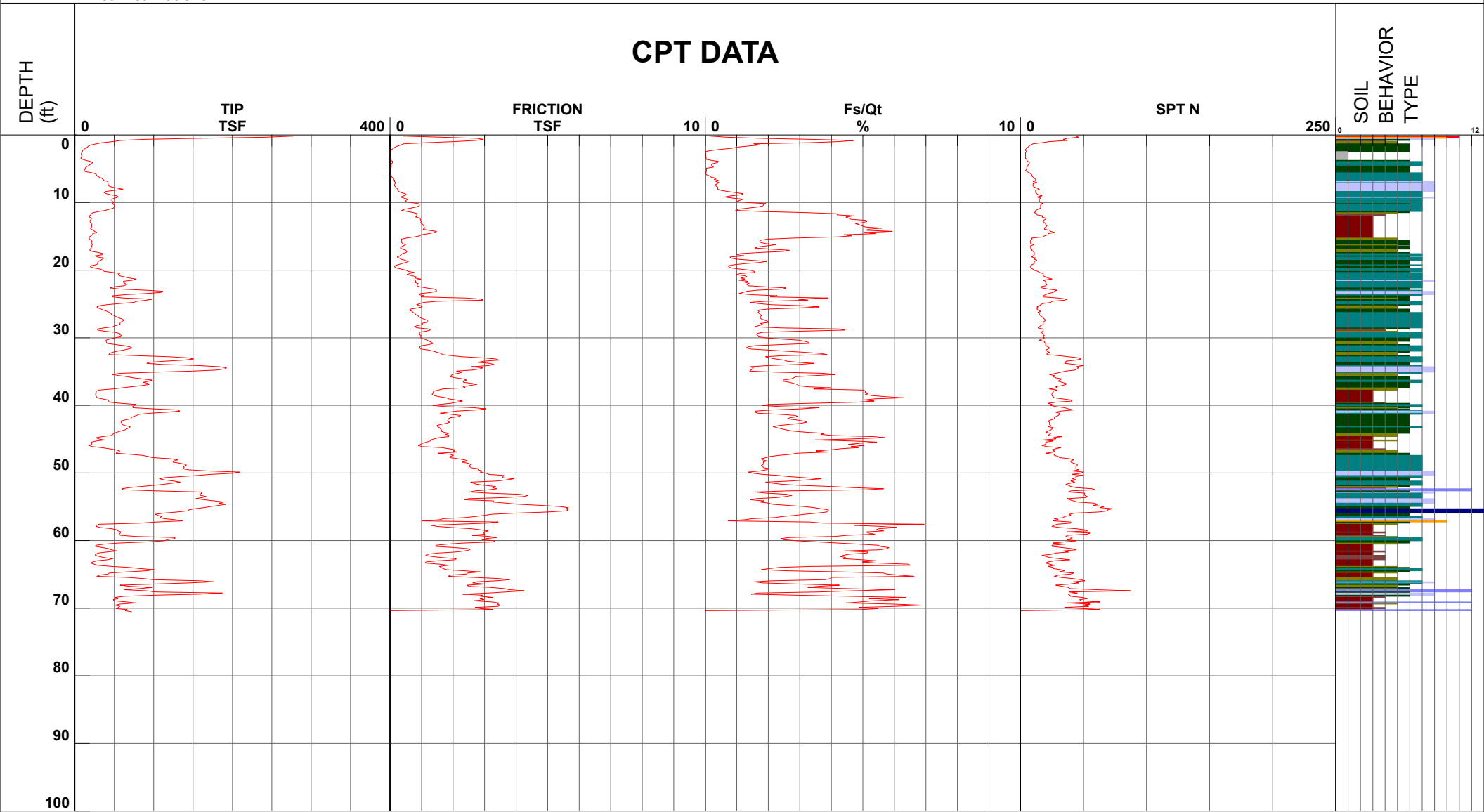
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 Job Number LA-01670-01  
 Hole Number CPT-20  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 12:14:52 PM

Filename SDF(742).cpt  
 GPS  
 Maximum Depth 70.54 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





# Earth Systems

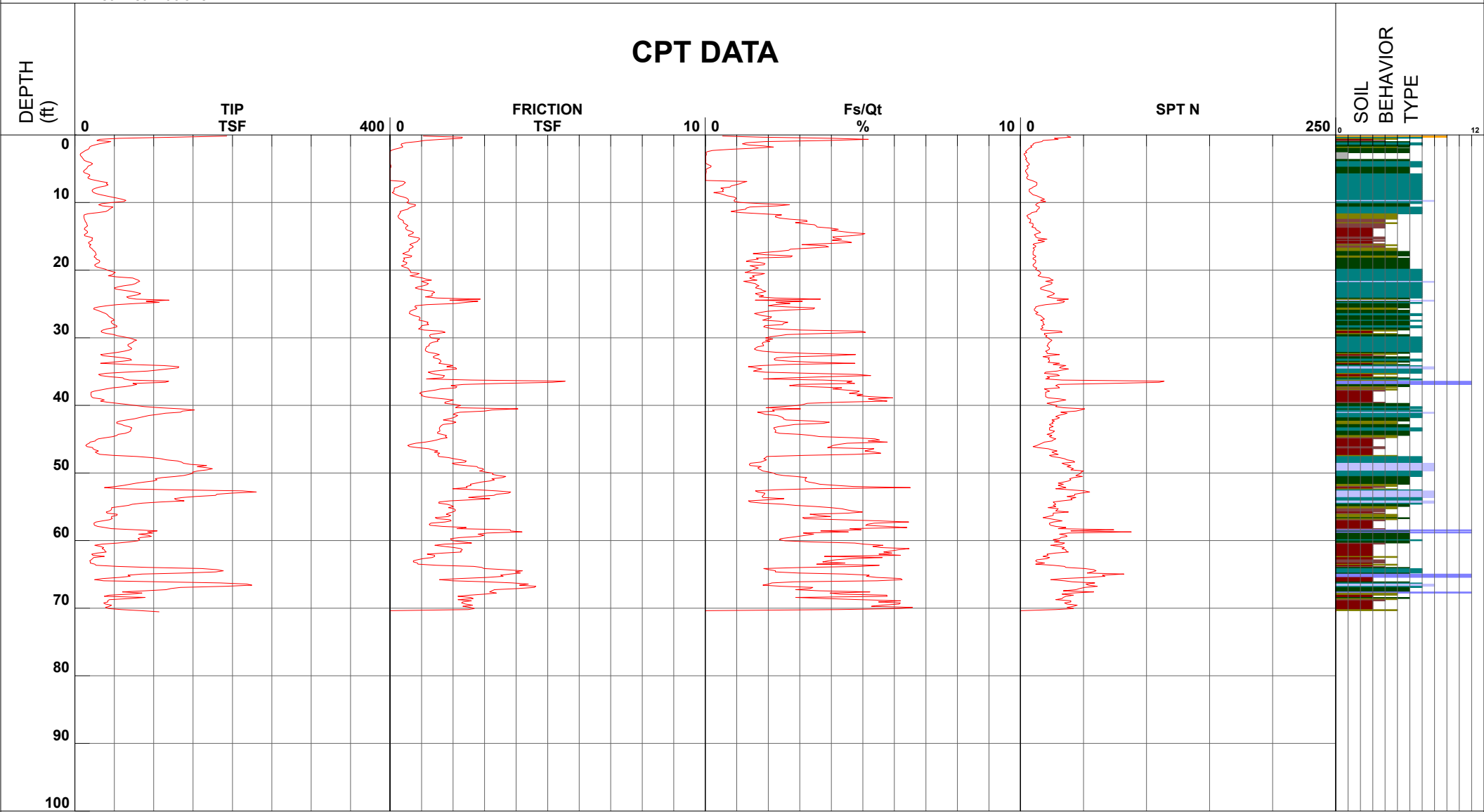
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-21  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 11:27:50 AM

Filename SDF(741).cpt  
 GPS  
 Maximum Depth 70.54 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



# Earth Systems

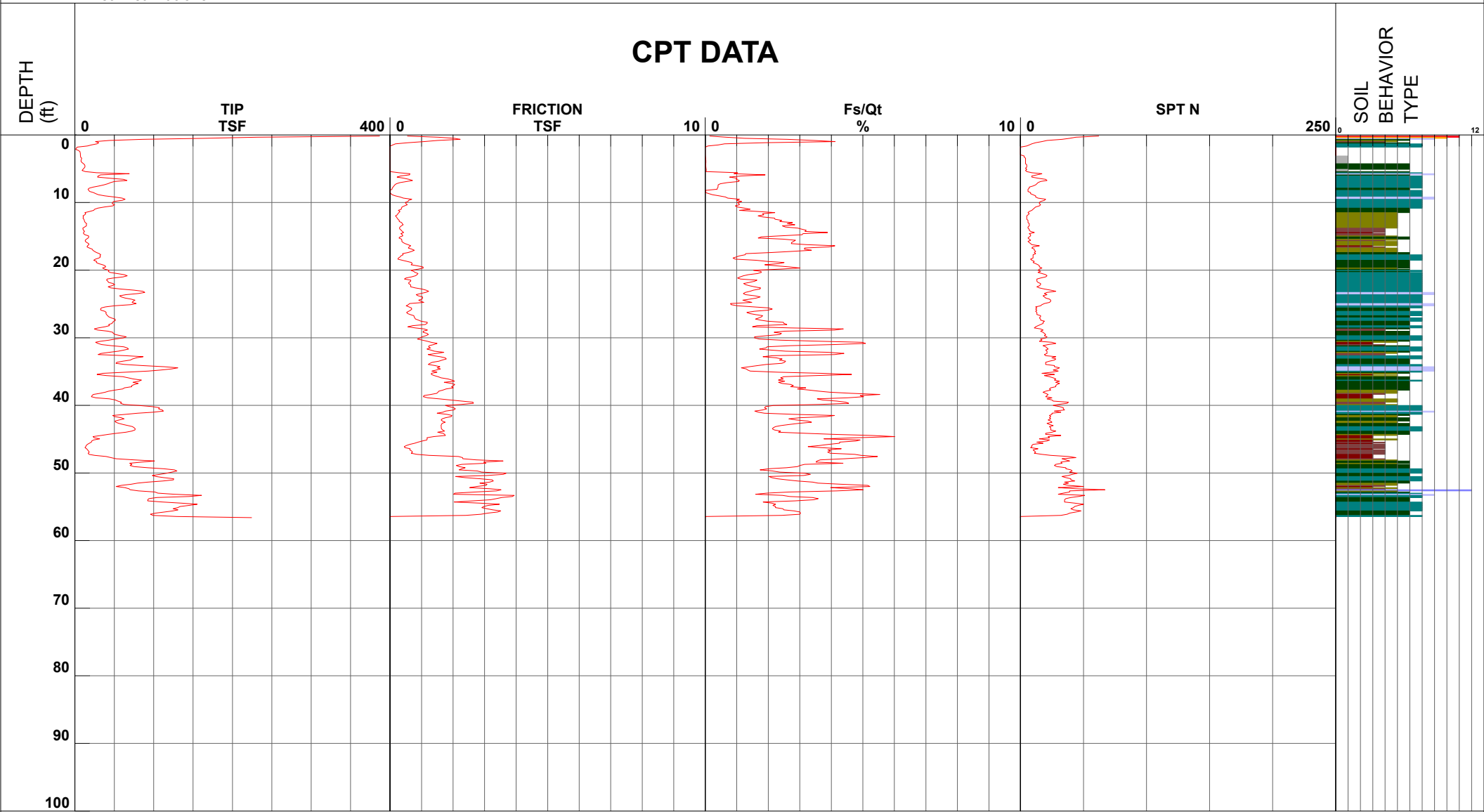
Project Hollywood and Wilcox  
 Job Number LA-01670-01  
 Hole Number CPT-22  
 EST GW Depth During Test

Operator DG-RC  
 Cone Number DDG1281  
 Date and Time 8/10/2016 10:48:29 AM  
 >56.59 ft

Filename SDF(740).cpt  
 GPS  
 Maximum Depth 56.59 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

**APPENDIX B**

“Investigation for the potential for active faulting at Hollywood Boulevard and Wilcox, Los Angeles, California”, by Rockwell Consulting dated October 7, 2016

**ROCKWELL CONSULTING**  
**4560 PANORAMA DRIVE**  
**LA MESA, CA 91941**  
**TROCKWELL@MAIL.SDSU.EDU**

October 7, 2016

Earth Systems Southern California  
Attn: Mr. Chris Allen  
2122 East Walnut Street, Suite 200  
Pasadena, CA 91107

Subject: Investigation for the potential for active faulting at Hollywood Boulevard and Wilcox,  
Los Angeles, California

Dear Mr. Allen:

This letter report primarily addresses the ages of alluvial deposits that are present beneath the proposed project site at Hollywood Boulevard and Wilcox Street in Los Angeles, CA. A detailed soil description (attached) was completed to characterize the soil stratigraphy at the site, as recovered in core C3, and it is this soil description that forms the basis for my interpretation of the ages of stratigraphic units that underlie the site in the shallow subsurface. The primary purpose of my involvement was to make assessments on the age of alluvium at the site to assess whether the site is impacted by active faulting. This report is intended to complement the fault evaluation conducted by Earth Systems, with the purpose of assessing the soil ages at this site to provide age control for the alluvium that is interpreted to be present beneath the site; it is not the primary report for the evaluation of on-site faulting.

*Age of alluvial deposits in the core C3* – There are up to six primary alluvial units identified in core C3 that are interpreted to be present beneath the subject property. Each primary stratigraphic unit below the upper 10.4 feet of unit 1 is capped by a buried soil, with the strength of soil development ranging from very weak to moderate, as discussed below.

Four of the six stratigraphic units are capped by only an A/C profile with no observable clay films or development of a B horizon. These soils are considered very weakly developed and constitute relatively short intervals of surface exposure that probably range from a few hundred to no more than a couple thousand years. Two of the buried soils exhibit development of a weak argillic horizon with the presence of secondary clay in the form of argillans (clay films). These soils are interpreted to represent significantly more surface exposure age ranging from several thousand to as much as ten thousand years. Collectively, the entire section is interpreted to be late Pleistocene (lower part) to Holocene in age because a definitive, well-developed soil indicative of tens of thousands of years of surface exposure was not observed in boring B8 and because most units preserved most or all of the soil that had developed on each respective paleo-surface indicating that deep erosion and removal of a well-developed soil is unlikely.

Soil, in this context, is the weathering profile that develops at Earth's surface over time. The expression of a weathering profile is affected by many parameters, including the characteristics of the parent material, the climatic conditions that prevailed during the period of development along with the associated vegetation that was dominant, the amount of surface slope and aspect that may affect surface stability, and the length of time that a stable surface has been exposed to weathering. In this study, the parent material for each stratigraphic unit is alluvium derived from the Hollywood Hills and varies between gravelly sand to sandy silt, as is expected for an alluvial fan environment. Variations in the climate in the Hollywood/Los Angeles basin region are well documented: climate was substantially cooler and wetter in the late Pleistocene than today, with conifer forests growing throughout the coastal region until early Holocene time, whereas the climate during the last interglacial was warm and probably drier than today (Huesser, 1978, and many other studies by the same author). These changes in climate over time are important in understanding and correctly assessing the ages of the alluvial units beneath the project site. Assessment of time is a critical component of this study: the strength of a soil profile increases with time such that the characteristics of a soil profile change in a predictable fashion over time with strongly-developed soils requiring a longer period of formation than weakly-developed soils, assuming surface stability and little to no erosion as appears to be the case in boring C3.

The description of the 6 units and their respective soils preserved in Core C3 are presented in Table 1. The site is capped by 1 to 2 feet of artificial fill or disturbed soil at the core C3 location, under which the natural soil is well preserved. The upper unit is about 8 to 9 feet in thickness and has a very weakly developed soil profile that is composed of a buried A horizon (A) and an oxidized C horizon (Cox). It should be noted that there was no recovery between 3 and 5 feet depth and there could have been a cambic or weak argillic horizon starting to form that was not recovered in the core. However, a radiocarbon sample recovered from the underlying buried soil (unit 2Ab in core C1, which correlates to the top of unit 2Bwb in core C3) dated to 2500-2800 years before present (BP), which is consistent with the development of an A/C profile and the extent of oxidation observed in the overlying C horizon of unit 1.

The uppermost buried soil is developed into stratigraphic unit 2 and exhibits a cambic (2Bwb) and weak argillic (2Btb) horizon indicating significantly more time of surface exposure than the capping unit 1 and its associated soil. There are common, thin clay films lining pores and ped faces, which along with the soil color, the weak subangular blocky structure, and the sandy loam texture, are typical of mid-Holocene soils in the Hollywood-Beverly Hills area. The overall B horizon thickness is only about 2.5 feet, which is also consistent with development under a Holocene climate. Based on comparison to dated soils in the Hollywood area, this soil is interpreted to have been exposed at the surface for about 5,000 to 7,000 years.

The soil developed into stratigraphic unit 3 is similar to that in unit 2 in terms of color, texture, structure, consistence and clay film development. The buried soil is capped by a preserved A horizon (3Ab), which indicates little or no erosion of the paleosurface prior to deposition of unit 2. The argillic horizon is about 2 feet thick and overlies another 2+ feet of transitional horizon (3BCb) that grades to a oxidized C horizon (3Cox) that extends to 25 feet depth. The similarity of the buried soils associated with units 2 and 3 indicate that they were exposed at the surface for similar lengths of time. Consequently, this soil is also interpreted to have been at the surface for 5,000 to 7,000 years. However, the thickness of the B horizon indicates development primarily under the relatively dry Holocene climate suggesting that unit 3 is earliest Holocene in age.

Based on the above, the Pleistocene/Holocene boundary is interpreted at about 25 feet depth in this area, although the underlying soils all exhibit very weak development and the uppermost of these developed into unit 4 is an A/C profile that may also be earliest Holocene in age.

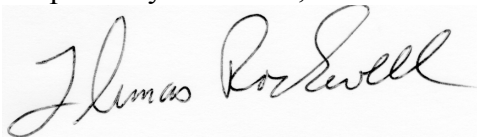
The soil developed into unit 5 appears truncated, in that the remnant buried A horizon (5Ab) is only a couple inches thick. There is a cambic B horizon (5Bwb) with a few thin clay films observed on ped faces and in pores that indicates several thousand years of exposure age. Together with the overlying soils, this unit along with underlying units are likely late Pleistocene in age.

Finally, a weak soil (A/C profile) is developed into unit 6 that represents no more than 2000 to 3000 years of surface exposure. The several buried oxidized C horizons (6Cox1 through 6Cox4) indicate primary depositional stratigraphic sub-units that vary in grain size, and these overlie a fine sand stratum to 50 feet depth.

The above sequence of depositional strata and buried soils are interpreted to represent a period of aggradation during the late Pleistocene and Holocene. This is consistent with other observations in the Hollywood, West Hollywood and Santa Monica region, where 20 to 30 feet (or more, locally) of Holocene alluvium buries late Pleistocene alluvial fan deposits. The thick and rapid aggradation is interpreted to represent local streams grading to a rising or aggrading Los Angeles River bed, which in the Port of LA area is known to have incised more than 150 feet in the late Pleistocene (McNeilan et al., 1996) when sea level was much lower. As sea level rose rapidly in the latest Pleistocene, between about 18,000 and 7,000 years ago, the Los Angeles River aggraded its course, forcing tributary drainages to do the same. This aggradation phase has been observed in most studies along the northern flank of the Los Angeles Basin adjacent to the Hollywood Hills (Dolan et al., 1998, 1999, 2000). This implies that the age of the lower strata observed in core C3 probably do not exceed 18,000 to 20,000 years in age unless a major erosional contact was missed or misidentified in the core. This is unlikely considering the nearly intact preservation of the surface soils associated with each depositional unit. Furthermore, considering the general coarseness of the deposits encountered beneath the site, these strata are probably best interpreted to be axial channel deposits associated with alluvial fan deposition, which is consistent with a phase of forced aggradation during the late Pleistocene. In other areas where only finer-grained alluvial fan deposits were encountered, there is commonly a well-developed buried soil that dates to the last interglacial period about 100,000 years ago. That soil was not encountered in this study, most likely because the site is situated above a deeply incised paleo-drainage that was backfilled during the late Pleistocene aggradation phase.

Thank you for the opportunity to assist you on this project, and I look forward to continued assistance in the future.

Respectfully submitted,

A handwritten signature in black ink that reads "Thomas Rockwell". The signature is written in a cursive, flowing style.

Thomas Rockwell, PhD, PG

Table 1. Soil Profile Description (upper part) and sediment description (lower part) for boring C3 at Hollywood and Wilcox Street (LA-01670-01)

Top of core at ~ 1 foot depth

1-2 ft.	Probable fill or disrupted soil
2-3 ft.	Gravelly (pebbly) A horizon: 10YR 3/3m, 4/3d; Loamy Sand texture; weak, fine subangular blocky to single grain structure; soft, non-sticky, non-plastic consistence; no clay films; boundary not observed as core is disrupted.
3-5 ft.	No recovery
5-10.4 ft.	Cox horizon: 10YR 3/4m, 4/4d; Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed; gravelly with quartzite clasts at base (abrupt erosive contact).
10.4-12.15	Buried Bw horizon (2Bwb): 10YR 4/4m, 4.5/4d; Sandy Loam texture; weak, fine subangular blocky structure; soft, non-sticky, non-plastic consistence; few, thin clay films in pores.
12.15-12.9	Buried Bt horizon (2Btb): 10YR 4/4m, 4/5d; fine Sandy Loam texture; moderate, coarse subangular blocky structure; slightly hard, slightly sticky and slightly plastic consistence; common, thin clay films in pores and lining ped faces.
12.9-14.4 ft.	Buried A horizon (3Ab): 10YR4/4m; Loam texture; massive breaking to weak, coarse subangular blocky structure; slightly firm consistence; no clay films observed; clear boundary.
14.4-16.2 ft.	Buried Bt horizon (3Btb): 10YR 4.5/4m; slightly pebbly Sandy Loam texture; massive breaking to weak, coarse subangular blocky structure; soft, very slightly sticky and non-plastic consistence; common thin clay films in pores and few thin clay films lining ped faces.
16.2-18.5 ft.	Buried BC horizon (3BCb): 10YR 4/4m; fine Sandy Loam texture; massive breaking to weak, coarse subangular blocky structure; soft, slightly sticky and non-plastic consistence; very few thin clay films in pores.
18.5-25 ft.	Buried Cox horizon (3Cox): 10YR 4/4m, 5/4d; pebbly Sand texture; single grain structure; loose, non-sticky and non-plastic consistence; no clay films observed.
25-25.9 ft.	Buried A horizon (4Ab): Weakly-formed buried A horizon that exhibits slight darkening and slightly finer texture.
25.9-26.5 ft.	Buried Cox horizon (4Cox1): pebbly Sand
26.5-27.6 ft.	Buried Cox horizon (4Cox2): coarse to fine sand
27.6-28 ft.	Buried Cox horizon (4Cox3): silty fine sand bedded with sand
28-28.2 ft.	Possible very weak A horizon enriched in organics (5Ab)
28.2-30.5	(some section is missing) Buried Bw horizon (5Bwb) with few thin clay films on ped faces and in pores.
30.5-33 ft.	Buried BC horizon (5BCb) (very weak): Sand with very few thin clay films or stains on ped faces.

33-33.9 ft. Buried Cox horizon (5Cox): fine sandy silt to silty sand  
33.9-34 ft. Coarse pebbly sand  
34-35 ft. No recovery  
35-38.3 ft. Sand with some bedding  
38.3-38.8 ft. Buried A horizon (6Ab) with some charcoal flecks (charcoal was not recovered upon processing)  
38.8-40 ft. Buried Cox (6Cox1): coarse sand  
40-41.4 ft. Buried Cox (6Cox2): silty sand  
41.4-43 ft. Buried Cox (6Cox3): fine sand  
43-46 ft. Buried Cox (6Cox4): silty sand, possible weak pedogenesis  
46-50 ft. Fine sand.



**APPENDIX C**

Radiocarbon Results

**KECK CARBON CYCLE AMS FACILITY**  
*EARTH SYSTEM SCIENCE DEPT, UC IRVINE*

<sup>14</sup>C results

Rockwell

Sep 16 2016

UCIAMS #	Sample name	Other ID	$\delta^{13}\text{C}$ (‰)	±	fraction Modern	±	D <sup>14</sup> C (‰)	±	<sup>14</sup> C age (BP)	±	dendro-calibrated age
178462	LA-01670-03	C1 at ~10.5 feet			0.7289	0.0011	-271.1	1.1	2540	15	BC 796 to 571

Radiocarbon concentrations are given as fractions of the Modern standard, D<sup>14</sup>C, and conventional radiocarbon age, following the conventions of Stuiver and Polach (Radiocarbon, v. 19, p.355, 1977).

Sample preparation backgrounds have been subtracted, based on measurements of <sup>14</sup>C-free wood.

All results have been corrected for isotopic fractionation according to the conventions of Stuiver and Polach (1977), with  $\delta^{13}\text{C}$  values measured on prepared graphite using the AMS spectrometer. These can differ from  $\delta^{13}\text{C}$  of the original material, if fractionation occurred during sample graphitization or the AMS measurement, and are not shown.

