GEOTECHNICAL EXPLORATION

MACEDO PROPERTY
1000 NORTH VASCO ROAD
LIVERMORE, CALIFORNIA

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Submitted to

Arbor Development Group, LLC
Danville, California

Prepared by
ENGEO Incorporated

Project No. 7380.000.000
October 21, 2010

- Expect Excellence -

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Mr. Scott A. Menard
Arbor Development Group, LLC
3650 Mt. Diablo Boulevard, Suite 200
Lafayette, CA 94549

Subject: Macedo Property
1000 North Vasco Rod
Livermore, California

GEOTECHNICAL EXPLORATION

Dear Mr. Menard:

With your authorization, we conducted a geotechnical exploration for the proposed single-family residential development in Livermore, California.

The accompanying report contains our finding, conclusions, and recommendations for construction at the subject area. It is our opinion that the proposed development is feasible from a geotechnical standpoint.

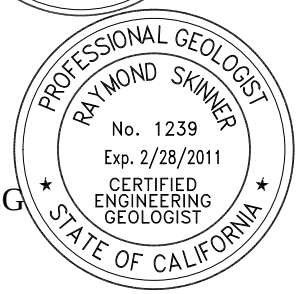
We are pleased to have been of service to you on this project and will continue to consult with you and your design team as project planning progresses.

Very truly yours,

ENGEO Incorporated

Macy Tong, GE

Donald E. Bruggers, GE



Raymond P. Skinner, CEG

mt/deb/rps/jf:gex

cc: 1 – Mr. Kevin Fryer, Mission Valley Properties
1 – Mr. Doug Albanowski, Arbor Development Group, LLC (email only)

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this geotechnical exploration report is to provide geotechnical recommendations for grading, foundation design, and site drainage for the proposed residential construction at the Macedo Property in Livermore, California.

The scope of our services included:

- Reviewing available literature, geologic maps, and previous geotechnical reports pertinent to the site.
- Advancing six cone penetration test (CPT) probes at accessible areas of the site.
- Sampling and laboratory testing of imported materials from the site.
- Analyzing the geotechnical data.
- Reporting our findings and recommendations.

This report was prepared for the exclusive use of Arbor Development Group, LLC and its design team consultants. In the event that any changes are made in the character, design or layout of the development, the conclusions and recommendations contained in this report should be reviewed by ENGEO to determine whether modifications to the report are necessary. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without the express written consent of ENGEO.

1.2 SITE LOCATION AND DESCRIPTION

The site is located between North Vasco Road and Central Avenue and south of the Arroyo Las Positas Flood Control Channel in Livermore as shown on the Site Vicinity Map, Figure 1.

According to published USGS topographic maps, the 5.8-acre site slopes gently westward at an elevation of approximately 525 to 530 feet above mean sea level (msl). The eastern two-thirds of the site are currently occupied by a Shell gasoline station, car wash and convenience store/restaurant, two metal buildings and paved parking lot. The gasoline station and related facilities are currently not operating. The western one-third of the site is undeveloped. Several soil stockpiles were observed at the site. The earthen slope of the flood control channel bordering the site along the eastern portion of the northern property line is approximately 8 feet high.

1.3 PROPOSED DEVELOPMENT

As depicted on the site plan, Figure 2, by MacKay & Somps, dated September 23, 2010, the proposed development consists of constructing 50 single-family residential lots with a main

access roadway (Street A) from Central Avenue. A recreation area is proposed at the northeastern corner of the site, just south of the flood channel.

It is our understanding that the existing buildings and improvements will be entirely removed from the site. The existing underground fuel tanks (USTs) will be removed and backfilled prior to site grading. Based on the current grades and the existing road grades, site grading will be anticipated to be minor to establish drainable building pads.

1.4 PREVIOUS FIELD EXPLORATIONS AND STUDIES

Field explorations were conducted in June and July 2006 throughout the site including three borings and eight cone penetration test (CPT) probes. Laboratory tests were performed on the soil samples collected during our boring drilling. In addition, two environmental studies (ENGEO, 2006 and 2007b) and preliminary hydraulic consultation (ENGEO, 2007a) were conducted at the site.

2.0 SITE GEOLOGY AND SEISMICITY

2.1 REGIONAL AND SITE GEOLOGY

The site is located within the Coast Ranges geomorphic province of California. The Coast Ranges are dominated by a series of northwest-trending mountain ranges that have been folded and faulted in a tectonic regime that involves both translational and compressional deformation.

The site is located in the southwest portion of the Livermore Valley, which is underlain by a thick sequence of alluvial deposits. The soil deposits in this area are mapped as Pleistocene alluvial fan and fluvial deposits (Helley & Graymer, 1997) (Figure 3).

2.2 SITE SEISMICITY

The site is not located within a State of California Earthquake Fault Zone for known active faults (State of California, 1982). The nearest known active[1] fault is the Greenville fault, which is located about 2 miles to northeast of the site. The Great Valley Trust Zone is located 7 miles to northeast of the site; and the Calaveras fault is located about 11 miles to the southwest of the site. The Hayward and Concord-Green Valley are located 16 miles and 18 miles, respectively, to the southwest.

Because of the presence of nearby active faults, the Bay Area Region is considered seismically active. Numerous small earthquakes occur every year in the region, and large (>M7) earthquakes have been recorded and can be expected to occur in the future. Figure 4 shows the approximate

[1] An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 10,000 years) (Hart, 1997). The State of California has prepared maps designating zones for special studies that contain these active earthquake faults.

locations of these faults and significant historic earthquakes recorded within the Greater Bay Area Region.

The Seismic Hazard Zones Map by California Geological Survey (2009) indicates that the southwestern portion of the site is within an area that may be susceptible to liquefaction. As described in subsequent sections of this report, subsurface exploration was performed to evaluate the potential for liquefaction at the site.

3.0 FIELD EXPLORATIONS

3.1 PREVIOUS FIELD EXPLORATION

As described in the previous section, field explorations were conducted in June and July 2006 throughout the site including three borings to a maximum depth of 41½ feet deep and eight cone penetration test (CPT) probes. The boring and CPT probe locations are approximately shown on the Site Plan, Figure 2. Logs of test borings and CPT probes are presented in Appendix C.

Samples recovered during borehole drilling in 2006 were tested to determine the following soil characteristics:

TABLE 1

Test	Designation	Location of Results
Natural Unit Weights and Moisture Contents	ASTM D-2216	Appendix A
Atterberg Limits	ASTM D-4318	Appendix B
Gradation	ASTM D-422	Appendix B
Unconfined Compressive Strength	ASTM D-2166	Appendix B

The laboratory test results are shown on the borelogs (Appendix C). Individual test results are presented as figures in Appendix C.

3.2 FIELD EXPLORATION

The field exploration for this study was conducted on October 8, 2010, and consisted of advancing six cone penetration test (CPT) soundings at the accessible area. The CPT locations are approximately shown on the Site Plan, Figure 2. The CPT probes were advanced to a maximum depth of approximately 50 feet below existing grades. The CPT probes were approximately located by taping and visual sighting from existing features and should be considered accurately located only to the degree implied by the method used.

The CPT equipment used was equipped with a 20-ton compression-type cone with a 15-square-centimeter (cm^2) base area, an apex angle of 60 degrees, and a friction sleeve with a surface area of 225 cm^2. The cone, connected with a series of rods, is pushed into the ground at a

constant rate. Cone readings are taken at approximately 5-cm intervals with a penetration rate of 2 cm per second in accordance with revised (2002) ASTM standards (D-5778-95). Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and dynamic pore pressure (U). The CPT logs and supporting empirical data are located in Appendix A.

3.3 LABORATORY TESTING

During our recent site visits in October 2010, representative soil samples of the imported soil and onsite soils were collected and tested to determine the following soil characteristics.

TABLE 2

Test	Designation	Location of Results
Atterberg Limits	ASTM D-4318	Appendix B
Gradation	ASTM D-422	Appendix B
pH	ASTM 4972	Appendix B
Sulfate	Caltrans 417	Appendix B

Individual laboratory test results are presented in Appendix B.

3.4 SUBSURFACE STRATIGRAPHY

Based on the findings of our field exploration, the site soils consist of fill over interbedded silty clay, sandy clay, clayey sand and silty sand with various amount of gravel. Fill found in the boring drilled at the eastern portion of the site is approximately 2 feet thick and consists of silty clay. The sandy deposits were found to be loose to medium dense in consistency. According to the CPT soundings, the sandy layers range from very thin to up to approximately 10 feet thick. The clayey soils were found to be very stiff.

The near-surface soils encountered in the 2006 borings have a Plasticity Index (PI) of 22 and 23. The imported fill at the site has a PI of 19. The test results indicate the site soils and imported fill have a moderate expansion potential.

3.5 GROUNDWATER

Groundwater encountered in our 2006 borings ranges from approximately 13 to 15 feet below grades. The water levels in the two onsite groundwater monitoring wells were measured to be 8 to 9 feet below ground in 2006.

Fluctuations in groundwater levels should be expected during seasonal changes or over a period of years because of precipitation changes, perched zones, and changes in drainage patterns.

4.0 DISCUSSION AND CONCLUSIONS

4.1 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, which is also called surface faulting. The common secondary seismic hazards include ground shaking, ground lurching, subsidence or uplift, landslides, tsunamis or seiches, soil liquefaction and lateral spreading. Based on lithologic and topographic data, risk from regional subsidence/uplift, landslides, tsunamis, or seiches is considered low to unlikely at the site. The ground rupture, ground shaking, ground lurching, soil liquefaction and lateral spreading hazards are discussed in the following sections.

4.1.1 Ground Rupture

Since there are no known active faults crossing the site and the property is not within a State of California Earthquake Fault Zone, the likelihood of ground rupture is considered remote.

4.1.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the San Francisco Bay Region could cause considerable ground shaking at the site, similar to that which has occurred in the past. To mitigate the shaking effects, the structure should be designed using sound engineering judgment and the 2007 California Building Code (CBC) requirements, as a minimum.

Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead and live loads. The code prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

4.1.3 Lurching

Ground lurching is a result of the rolling motion imparted to the ground surface during energy released by an earthquake. Such rolling motion can cause ground cracks to form. The potential for the formation of these cracks is considered greater at contacts between deep alluvium and bedrock. Such an occurrence is possible at the site as in other locations in the Bay Area, but based on the site location, it is our opinion that the offset is expected to be minor.

4.1.4 2007 California Building Code (CBC) Seismic Design Parameters

Based on the subsurface soil conditions encountered in our borings and local seismic sources, the site may be characterized for design based on 2007 California Building Code using the following information:

TABLE 3

Coefficient	Value
Site Class	D
Long-period Transition Period, T_L	8 sec
Mapped MCE Spectral Response Acceleration at Short Periods, S_S	1.83
Mapped MCE Spectral Response Acceleration at a Period of 1 second, S_1	0.69
MCE, 5% Damped, Spectral Response Acceleration at Short Periods Adjusted for Site Class Effects, S_{MS}	1.83
MCE, 5% Damped, Spectral Response Acceleration at a Period of 1 second Adjusted for Site Class Effects, S_{M1}	1.03
Design, 5% Damped, Spectral Response Acceleration at Short Periods, S_{DS}	1.22
Design, 5% Damped, Spectral Response Acceleration at a Period of 1 second, S_{D1}	0.69

4.1.5 Liquefaction

As noted above, the southwest portion of the site is mapped within a State of California Seismic Hazard Zone (2009) for areas that may be susceptible to liquefaction. Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary, but essentially total, loss of shear strength because of pore pressure build-up under the reversing cyclic shear stresses associated with earthquakes.

As described previously, according to the field exploration data, the site soils consist of fill over interbedded silty clay, sandy clay, clayey sand and silty sand with various amount of gravel. Groundwater was also encountered in the 2006 borings at a depth ranging from 13 to 15 feet below grade. The water levels in the two onsite groundwater monitoring wells were measured to be 8 to 9 feet below ground in 2006.

A detailed evaluation of liquefaction resistance was performed on CPT data in accordance with procedures developed by Robertson & Wride (1998) using the computer software Cliq. The procedure used in the software is largely based on procedures originally published in NCEER-97-002 and summarized by Youd and Idriss (2001). A conservative design groundwater level of 8 feet below existing grade and a site pga of 0.51g was utilized in our analyses.

The analyses indicate that zones of silty and sandy materials in each CPT may be susceptible to liquefaction or cyclic softening during a strong seismic event assuming a groundwater table of 8 feet below existing grade. The potentially liquefiable zones were as shallow as 8 feet below existing grade and up to approximately 2½ feet in thickness.

Ishihara (1985) has shown that the presence of a sufficient thickness of a non-liquefiable surface layer may prevent the observable effects of at-depth liquefaction from reaching the surface. This can occur when the surface layer is thick enough to resist upward pressure and the liquefying stratum is thin enough to provide only a limited reservoir of water.

Based on CPT data the site have thick enough clayey or nonliquefiable surface layer to prevent the damaging effects of at-depth liquefaction from reaching the ground surface.

4.1.6 Densification due to Earthquake Shaking

Densification of sandy soils above and below the groundwater level can cause settlement during an earthquake. Our calculations indicate that densification may result in about 1 to 2¼ inches of settlement where loose to medium dense sands were encountered. Therefore, a differential movement of 1 inch over a horizontal distance of 40 feet should be considered in the foundation design.

4.1.7 Lateral Spreading

Lateral spreading is a failure within a nearly horizontal soil zone (possibly due to liquefaction) that causes the overlying soil mass to move toward a free face or down a gentle slope. Generally, the effects of lateral spreading are most significant at the free face or the crest of a slope and diminish with distance from the slope.

Based on contours on the site plan, the existing flood control channel is approximately 6 to 8 feet high. The potential-liquefiable soil material is beneath slope face. Therefore, it is our opinion that potential for lateral spreading will be minimal.

4.2 FLOODING

According to the Flood Insurance Rate Map (FEMA, 2009), the area along the flood control channel is mapped within Zone X. In addition, a note on the map says “this area has 1% annual chance flood discharge contained in channel.” The project Civil Engineer should be consulted on the potential for localized flooding at the subject property and should provide appropriate design measures for development of the project, as necessary.

4.3 EXPANSIVE SOILS

An area of concern regarding the geotechnical aspects of the project is the presence of moderate expansive soil at the site. Expansive soils shrink and swell as a result of moisture changes. This

can cause heaving and cracking of slabs-on-grade, pavements and structures founded on shallow foundations.

Building damage due to volume changes associated with expansive soils can be reduced by: (1) using a rigid mat or slab foundation which is designed to resist the deflections associated with the soil expansion, (2) deepening the foundations to below the zone of moisture fluctuation, i.e., by using deep footings or drilled piers, and/or (3) using footings at normal shallow depths but bottomed on a layer of select fill having a low expansion potential. Post-tensioned slab foundations are the preferred foundation system for the residential construction at the subject site. Design criteria for this foundation type are contained in the "Foundation Design" section of this report.

Successful construction on expansive soils requires special attention during construction. It is imperative that exposed soils be kept moist by occasional sprinkling for several days prior to placement of concrete for foundation construction. It is extremely difficult to remoisturize clayey soils without excavation, moisture conditioning, and recompaction. Mitigation measures should include the prevention of moisture variation.

4.4 EXISTING FILL

As noted above, fill, approximately 2 feet thick, was encountered at the eastern boring drilled at the site. As described in the Phase 1 Environmental Assessment (ENGEO, 2006), four underground fuel tanks (USTs) were moved from the site in 1994. Existing fill materials should be anticipated around the existing structures, as utility trench backfill, and the backfill of the four underground storage tanks, as approximately depicted in Figure 2.

Existing fills could undergo vertical movement that is not easily characterized and could ultimately be inadequate to effectively support the proposed building loads. In general, undocumented fills should be excavated and replaced as engineered soil fill. The extent and quality of existing fills should be evaluated at the time of site grading activities.

4.5 DIFFERENTIAL FILL POTENTIAL

It is our understanding that the tank backfill is anticipated within the site and will be approximately 10 to 12 feet deep. The excavation and backfill of the four previous underground fuel tanks is estimated to be approximately 10 feet deep. Therefore, it is anticipated that differential fill thickness at the site will be about 10 to 12 feet.

4.6 SHALLOW GROUNDWATER

As discussed previously, the groundwater table was measured at a depth of 8 to 9 feet below existing grade. It is our understanding that the existing underground fuel tanks (USTs) at approximately 10 to 12 feet below current grade will be removed and backfilled. The tank removal and any deep utility trench excavation may encounter groundwater. Therefore, pumping and shoring may be necessary during tank removal or deep utility trench excavation. The project

contractor should evaluate the site conditions and selected properly designed dewatering and/or shoring systems as needed.

4.7 CORROSIVE SOILS

During our current site visits, two near-surface soil samples were collected at the site and submitted to our laboratory for sulfate concentration testing. The sulfate test results are included in Appendix B. The concentrations of water-soluble sulfate (SO_4) were determined in accordance with Caltrans Test Method 417. According to the laboratory testing on the near-surface soils, the sulfate ion concentration is reported as 1 and 3 mg/kg (ppm) of water-soluble sulfate (SO_4) concentration levels. The 2007 CBC references the ACI (Section 4.3, Table 4.3.2), which provides the following guidelines to characterize the potential exposure for sulfate attack and associated recommendations for concrete in contact with soil based upon the exposure risk.

TABLE 4

Sulfate Exposure	Sulfate In Soil		Cement Type	Maximum Water - Cement Ratio	Minimum F'_c (psi)
	mg/kg	(%)			
Negligible	0 – 1,000	0.0 – 0.1	---	---	---
Moderate	1,000 – 2,000	0.1 – 0.2	II, IP(MS), IS(MS)	0.50	4,000
Severe	2,000 – 20,000	0.2 – 2.0	V	0.45	4,500
Very Severe	over 20,000	over 2.0	V plus pozzolan	0.45	4,500

In accordance with the criteria presented in Table 4.3.1 of the 2007 ACI Building Code, the test results are classified in the “negligible” sulfate exposure range. Cement type, water-cement ratio and concrete strength are not specified by the CBC for this range. We recommend that Type II cement and a concrete mix design that incorporates a maximum water cement ratio of 0.5 and a minimum compressive strength of 3,000 psi be used in foundation concrete for structures at the project site. It should be noted, however, that the structural engineering design requirements for concrete might result in more stringent concrete specifications.

4.8 CONCLUSIONS

It is our opinion, based on this exploration and laboratory test results, that the project site is suitable for the proposed development from a geotechnical standpoint. The geotechnical recommendations contained herein are appropriate to use for the development of the building site.

5.0 RECOMMENDATIONS

5.1 SITE GRADING

The site grading will consist of cuts and fills to establish relatively level building pads and placement of fills associated with the removal of the underground storage tanks.

Prior to grading, a notification of at least 48 hours is needed in order for ENGEO to coordinate its schedule with the grading contractor. Grading operations should meet the requirements of the Guide Contract Specifications included in the Appendix D and must be observed and tested by ENGEO's field representative.

Ponding of stormwater should not be permitted at the site, particularly during work stoppage for rainy weather. Before the grading is halted by rain, positive slopes should be provided to direct the surface runoff water in a controlled manner.

5.1.1 Demolition and Tank Removal

Site development will commence with the removal of improvements and their foundations, and buried structures including abandoned utilities and their backfill.

It is our understanding that the existing underground fuel tanks (USTs) will be removed and backfilled prior to site grading. The tank removal should be conducted in accordance with the environmental protocol and under the observation of an environmental specialist.

It is anticipated that the tank excavation will extend below the shallow groundwater level. The backfill material below the groundwater level can consist of gravel or clean crushed rock. A layer of geofabric, such as Mirafi 600X, should be placed above the granular material. The onsite clayey soil material can be used as the backfill material above the geofabric. The requirements for backfill materials and placement operations are the same as for engineered fill.

On those lots where underground tanks are present, we recommend that the upper five feet of soil within and extending 5 feet beyond the house footprints be overexcavated and backfilled with engineered fill. This requirement is necessary to limit the potential for differential settlement associated with differential fill thicknesses beneath house footprints.

Undocumented fills should be excavated and replaced as engineered soil fill. The extent and quality of existing fills should be evaluated at the time of site grading activities.

The existing monitoring wells should be removed and abandoned in accordance the State or County regulations.

5.1.2 Stripping

All debris or soft compressible soils should be removed from any location to be graded, from areas to receive fill or structures, and from those areas to serve as borrow. The depth of removal of such materials should be determined by the Geotechnical Engineer in the field at the time of grading.

The existing vegetation and trees should be removed from areas to receive fill and those areas to serve for borrow. Topsoil is estimated to be from 2 to 4 inches in thickness depending on location. As a minimum, tree roots should be removed at least 3 feet below the existing grades. The actual depths of stripping and tree root removal should be determined by the Geotechnical Engineer's representative in the field. Subject to approval by the Landscape Architect, strippings and organically contaminated soils can be used in landscape areas. Otherwise, such soils should be removed from the project site. Any topsoil that will be retained for future use in landscape areas should be stockpiled in areas where it will not interfere with grading operations.

All excavations from demolition of the existing buildings and their foundation, and stripping below design grades should be cleaned to a firm undisturbed soil surface determined by the Geotechnical Engineer. This surface should then be scarified, moisture conditioned, and backfilled with compacted engineered fill. The requirements for backfill materials and placement operations are the same as for engineered fill.

No loose or uncontrolled backfilling of depressions resulting from demolition and stripping is permitted.

5.1.3 Graded Slopes

It is recommended that graded cut or fill slopes less than 10 feet in vertical height be no steeper than 2:1 (horizontal:vertical). All fill slopes should be adequately keyed into firm natural materials unaffected by shrinkage cracks.

5.1.4 Fill Placement

After the site top soil and organics are removed entirely, the area should be scarified to a depth of 12 inches, moisture conditioned and recompacted as follows:

The following compaction control requirements should be anticipated for general fill areas:

Test Procedures:	ASTM D-1557.
Required Moisture Content:	Not less than 3 percentage points above optimum moisture content for soil with Plasticity Index of greater than 12. Not less than 2 percentage points above optimum moisture content for soil with Plasticity Index of equal and less than 12.

Minimum Relative Compaction:	Not less than 90 percent for soil with Plasticity Index of greater than 12. Not less than 95 percent for soil with Plasticity Index of equal and less than 12.

Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material.

It is important that all site preparations for site grading be done under the observation of a Geotechnical Engineer's field representative. The Geotechnical Engineer's field representative should observe all graded area preparation, including demolition and stripping following the recommendations contained in the Guide Contract Specifications in Appendix D. The final grading plans should be submitted to the Geotechnical Engineer for review.

5.2 MAT FOUNDATIONS

It is anticipated that the residential dwellings will consist of wood-frame structures. Based on the soil data and the residential building type, it is our opinion that the proposed structures can be supported on structural mat foundations.

The soil design parameters presented below assume that post-tensioned mats are designed according to the method recommended in "Design of Post-Tensioned Slabs-On-Ground" (Post-Tensioning Institute, 2004, 3rd Edition).

Center Lift Condition:
Edge Moisture Variation Distance, e_m = 9.0 feet
Differential Soil Movement, y_m = 1.0 inch

Edge Lift Condition:
Edge Moisture Variation Distance, e_m = 4.8 feet
Differential Soil Movement, y_m = 1.5 inches

Post-tensioned mats should be designed for an average allowable soil pressure of 1,000 pounds per square foot (psf) or 1,500 psf for concentrated loads. These values may be increased by one-third when considering total loads, including wind or seismic loads.

A minimum mat thickness of 10 inches is recommended. The actual thickness of the mat should be determined by the project Structural Engineer. The perimeter should be thickened to at least 12 inches.

In addition, the mat foundations should be designed to accommodate differential movement of 1 inch over a horizontal distance of 40 feet as a result of settlement during an earthquake.

5.2.1 Subgrade Treatment for Structural Mat Foundations

The subgrade material under structural mats should be uniform. The pad subgrade should be moisture conditioned to a moisture content of at least 3 percentage points above optimum. The subgrade should be thoroughly soaked prior to placing the concrete. The subgrade should not be allowed to dry prior to concrete placement.

The Structural Engineer should be consulted on the advisability of using a 2-inch-thick sand cushion under mats for concrete curing purposes. Where floor coverings are anticipated, we recommend that the concrete be underlain by a tough, vapor retarder at least 10 mils thick to reduce moisture transmission through the concrete. The vapor retarder under the mats should meet ASTM E 1745 – 97 Class A requirements for vapor permeance, tensile strength, and puncture resistance.

5.2.2 Secondary Slabs-on-Grade

This section provides guidelines for secondary slabs, such as walkways around the buildings. Secondary slabs-on-grade should be constructed structurally independent of the foundation system. This allows slab movement to occur with reduced potential for foundation distress. Where secondary slab-on-grade construction is anticipated, care must be exercised in attaining a near-saturation condition of the subgrade soil before concrete placement.

Secondary slabs-on-grade should be designed specifically for their intended use and loading requirements. Cracking of conventional slabs should be expected due to concrete shrinkage. Slabs-on-grade should be reinforced for control of cracking, and frequent control joints should be provided to control the cracking. Reinforcement should be designed by the Structural Engineer. In our experience, welded wire mesh may not be sufficient to control slab cracking. As a minimum, secondary slabs-on-grade should be reinforced with No. 3 bars spaced 18 inches on center each way.

Secondary slabs-on-grade should have a minimum thickness of 4 inches. A 4-inch-thick layer of clean crushed rock or gravel (Section 2.04, Part I of Guide Contract Specifications) should be placed under slabs. Exterior slabs should be constructed with thickened edges extending at least beneath the granular material into compacted soil to reduce water infiltration. Slabs should slope away from the buildings at a slope of at least 2 percent to prevent water from flowing toward the building.

All backfill should be placed in accordance with recommendations provided above for engineered fill. Light equipment should be used during backfill compaction to reduce possible overstressing of the walls.

5.3 PRELIMINARY PAVEMENT DESIGN

Based on the previous soil test data (ENGEO, 2006), an R-value of 5 has been assumed in the preliminary pavement design. The following preliminary pavement sections have been

determined for Traffic Indices of 5 and 7, an assumed R-value of 5, and in accordance to the design methods contained in Topic 608 of Caltrans Highway Design Manual.

TABLE 5
Preliminary Pavement Sections

Traffic Index	AC (inches)	AB (inches)
5.0	4.0*	8.0*
7.0	4.0*	15.5

Note: AC – Asphalt Concrete
AB – Caltrans Class 2 aggregate base (R-value of 78 or greater)
Minimum paving thickness per City of Livermore

The above preliminary pavement section is provided for estimating only. We recommend that the R-Value of the actual subgrade material be confirmed through testing after pavement subgrades are established and the Traffic Index and minimum pavement section(s) be confirmed by the Civil Engineer and the City of Livermore.

Pavement materials and construction should comply with the specifications and requirements of the Standard Specifications by the State of California Division of Highways and the following minimum requirements.

- All pavement subgrades should be scarified to a depth of 12 inches below finished subgrade elevation, moisture conditioned to at least 3 percentage points above optimum, and compacted to at least 90 percent relative compaction.

- Subgrade soils should be in a stable, non-pumping condition at the time aggregate base materials are placed and compacted.

- Aggregate base materials should meet current Caltrans specifications for Class 2 aggregate base and should be compacted to at least 95 percent of maximum dry density.

- Asphalt paving materials should meet current Caltrans specifications for asphalt concrete.

- All concrete curbs separating pavement and irrigated landscaped areas should extend to below the bottom of adjacent aggregate baserock materials.

5.4 DRAINAGE

The building pads must be positively graded at all times to provide for rapid removal of surface water runoff from the foundation systems and to prevent ponding of water under floors or seepage toward the foundation systems at any time during or after construction.

Ponding of stormwater must not be permitted on the building pads during prolonged periods of inclement weather. As a minimum requirement, finished grades should have slopes of at least 3 to 5 percent within 7 feet from the exterior walls at right angles to them to allow surface water to drain positively away from the structures. For paved areas, the slope gradient can be reduced to 2 percent. All surface water should be collected and discharged into the storm drain system. Landscape mounds must not interfere with this requirement.

All roof stormwater should be collected and directed to downspouts. Stormwater from roof downspouts should be directed to a solid pipe that discharges to the street, to an approved outlet, or onto an impervious surface, such as the concrete apron or pavement area that will drain at a 2 percent slope gradient.

5.5 REQUIREMENTS FOR LANDSCAPING IRRIGATION

Vegetation should not be planted immediately adjacent to structures. If planting adjacent to the building is desired, we recommend using plants that require very little moisture with drip irrigation systems.

Sprinkler systems should not be installed where they may cause ponding or saturation of foundation soils within 5 feet of the walls or under structures. Ponding or saturation of foundation soils may cause loss of soil strength, and movements of the foundation and slabs.

Irrigation of landscaped areas should be strictly limited to that necessary to sustain vegetation. Excessive irrigation could result in saturation and weakening of foundation soils. The Landscape Architect and prospective owners should be informed of the surface drainage requirements included in this report.

5.6 UTILITIES

It is recommended that utility trench backfilling be done under the observation of a Geotechnical Engineer. Pipe zone backfill (i.e., material beneath and immediately surrounding the pipe) may consist of a well-graded import or native material less than ¾ inch in maximum dimension compacted in accordance with recommendations provided above for engineered fill. Trench zone backfill (i.e., material placed between the pipe zone backfill and the ground surface) may consist of native soil compacted in accordance with recommendations for engineered fill.

Material used for pipe zone backfill should consist of fine- to medium-grained sand or a well-graded mixture of sand and gravel, but this material should not be used within 2 feet of finish grades. In general, uniformly graded gravel should not be used for pipe or trench zone backfill due to the potential for migration of: (1) soil into the relatively large void spaces present in this type of material, and (2) water along trenches backfilled with this type of material. All utility trenches entering buildings and paved areas must be provided with an impervious seal consisting of native materials or concrete where the trenches pass under the building perimeter or curb lines. The impervious plug should extend at least 3 feet to both sides of the crossing.

Care should be exercised where utility trenches are located beside foundation areas. Utility trenches constructed parallel to foundations should be located entirely above a plane extending down from the lower edge of the footing at an angle of 45 degrees. Utility companies and Landscape Architects should be made aware of this information.

Utility trenches in paved areas should be constructed in accordance with City of Livermore requirements. Compaction of trench backfill by jetting should be avoided. The owner should be notified if a conflict between city or other agency requirements and the recommendations contained in this report is observed to provide a resolution prior to submitting bids.

6.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This preliminary geotechnical study is issued with the understanding that it is the responsibility of the owner to transmit the information and recommendations of this report to developers, contractors, buyers, architects, engineers, and designers for the project so that the necessary steps can be taken by the contractors and subcontractors to carry out such recommendations in the field. The conclusions and recommendations contained in this report are solely professional opinions.

The professional staff of ENGEO Incorporated strives to perform its services in a proper and professional manner with reasonable care and competence but is not infallible. There are risks of earth movement and property damages inherent in land development. We are unable to eliminate all risks or provide insurance; therefore, we are unable to guarantee or warrant the results of our services.

This study is based upon field and other conditions discovered at the time of preparation of ENGEO's documents of service. This document must not be subject to unauthorized reuse, that is, reuse without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time. Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to ENGEO's documents of service. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If ENGEO's scope of services does not include a design-level geotechnical exploration, on-site construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims, including, but not limited to claims arising from or resulting from the performance of such services by other persons or entities, and any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

SELECTED REFERENCES

California Department of Transportation, 1992, Highway Design Manual.

California Geological Survey (CGS), 2009, Seismic Hazard Zones, Altamont Quadrangle, February 27.

Dibblee, T. W., Jr., 2005, Geologic Map of Atlamont Quadrangle, Contra Costa & Alameda Counties, California.

ENGEO; 2006, Modified Phase One Environmental Site Assessment, 5.8-Acre Property, 1000 North Vasco Road, Livermore, California; October 27; Project No. 7380.2.001.02.

ENGEO; 2007a, Letter of Transmittal, 1000 N. Vasco Road Additional Hydraulic Modeling; April 13; Project No. 7380.1.001.05.

ENGEO; 2007b, Supplemental Environmental Services, Shell Gas Station, 1000 North Vasco Road, Livermore, California; June 20; Project No. 7380.2.001.04.

FEMA, 2009, Federal Emergency Management Agency, National Flood Insurance Program, Flood Insurance Rate Map (FIRM), Alameda County, California and Incorporated Areas; Panel 353 of 725; Map Number 06001C0353G; August 3.

Finn, W. D. L., 1996, Evaluation of Liquefaction Potential for Different Earthquake Magnitudes and Site Conditions, A Symposium on Recent Developments in Seismic Liquefaction Assessment, April 12.

Hart, E.W., 1997, Fault-Rupture Hazard Zones in California, California Division of Mines and Geology Special Publication 42, revised.

Helley, E. J and Graymer, R.W., 1997, Quaternary Geology of Alameda County and Parts of Contra Costa, Santa Clara, San Mateo, San Francisco, Stanislaus, and San Joaquin Counties, California; USGS, Open File Report OF-97-97.

Ishihara, K., 1985, Stability of Natural Deposits during Earthquakes: Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering.

Robertson, P. K. and R. G. Campanella, 1988, Guidelines for Geotechnical Design Using CPT and CPTU Data.

Robertson, P. K. and C. E. (Fear) Wride, 1998, Cyclic Liquefaction and its Evaluation based on SPT and CPT, NCEER Workshop.

SEAOC, 1996, Recommended Lateral Force Requirements and Tentative Commentary.

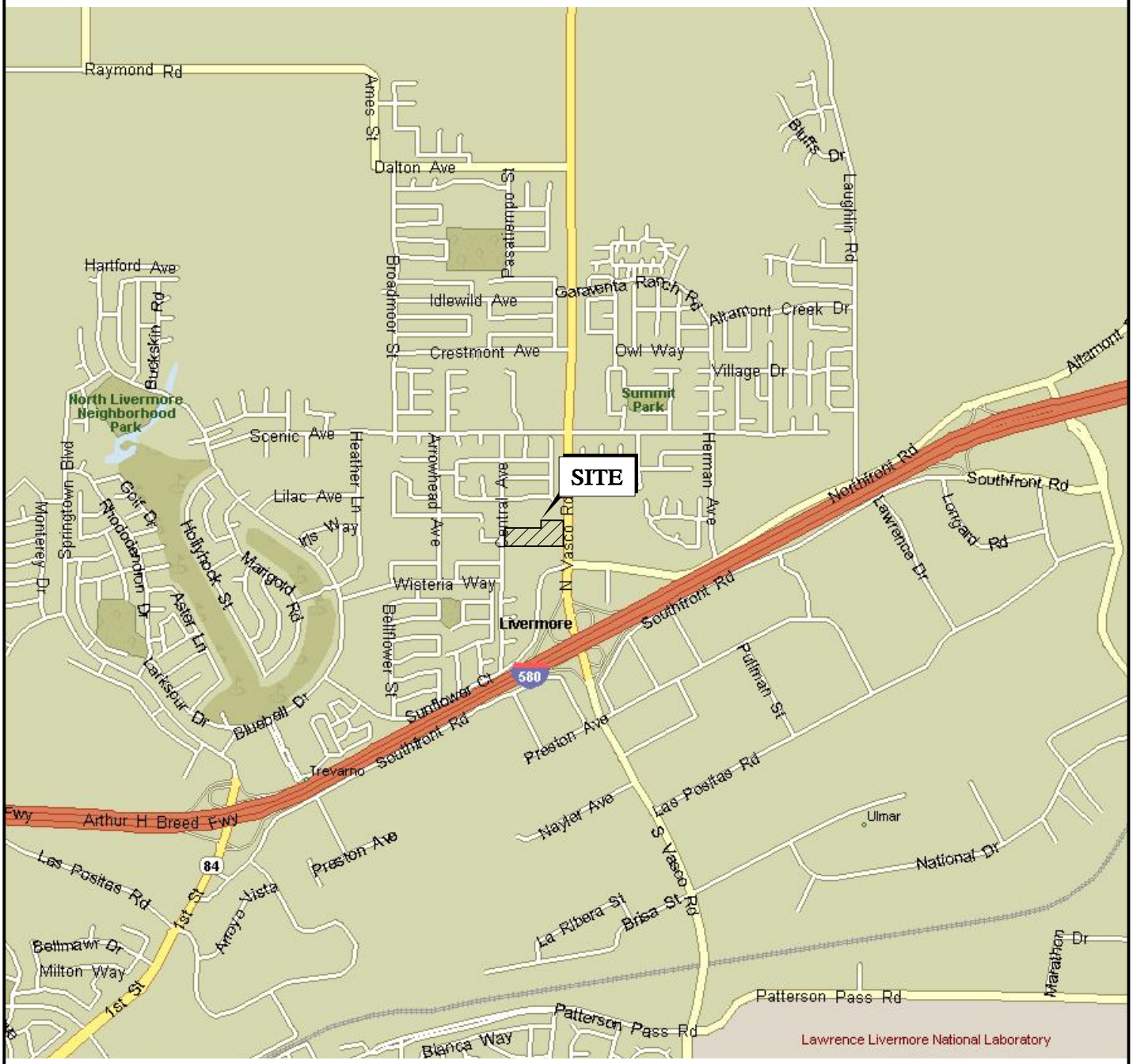
Youd, T. L. and S. N. Hoose, 1978, Historic Ground Failures in Northern California Triggered by Earthquakes, U.S. Geological Survey, Professional Paper 993.

Youd, T. L. and I. M. Idriss, 1997, Proceedings of the NCEER workshop on Evaluation of Liquefaction Resistance of Soils, Technical Report NCEER-97-0022.

Youd, T. L. and I. M. Idriss, 2001, Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils.

LIST OF FIGURES

FIGURES



N

0 FEET 2000

0 METERS 1000

BASE MAP SOURCE: MS STREETS AND TRIPS

ENGEO Expect Excellence

VICINITY MAP

MACEDO PROPERTY

LIVERMORE, CALIFORNIA

PROJECT NO.: 7380.000.000		FIGURE NO. 1
DATE: OCTOBER 2010		
DRAWN BY: SRP	CHECKED BY: DEB	

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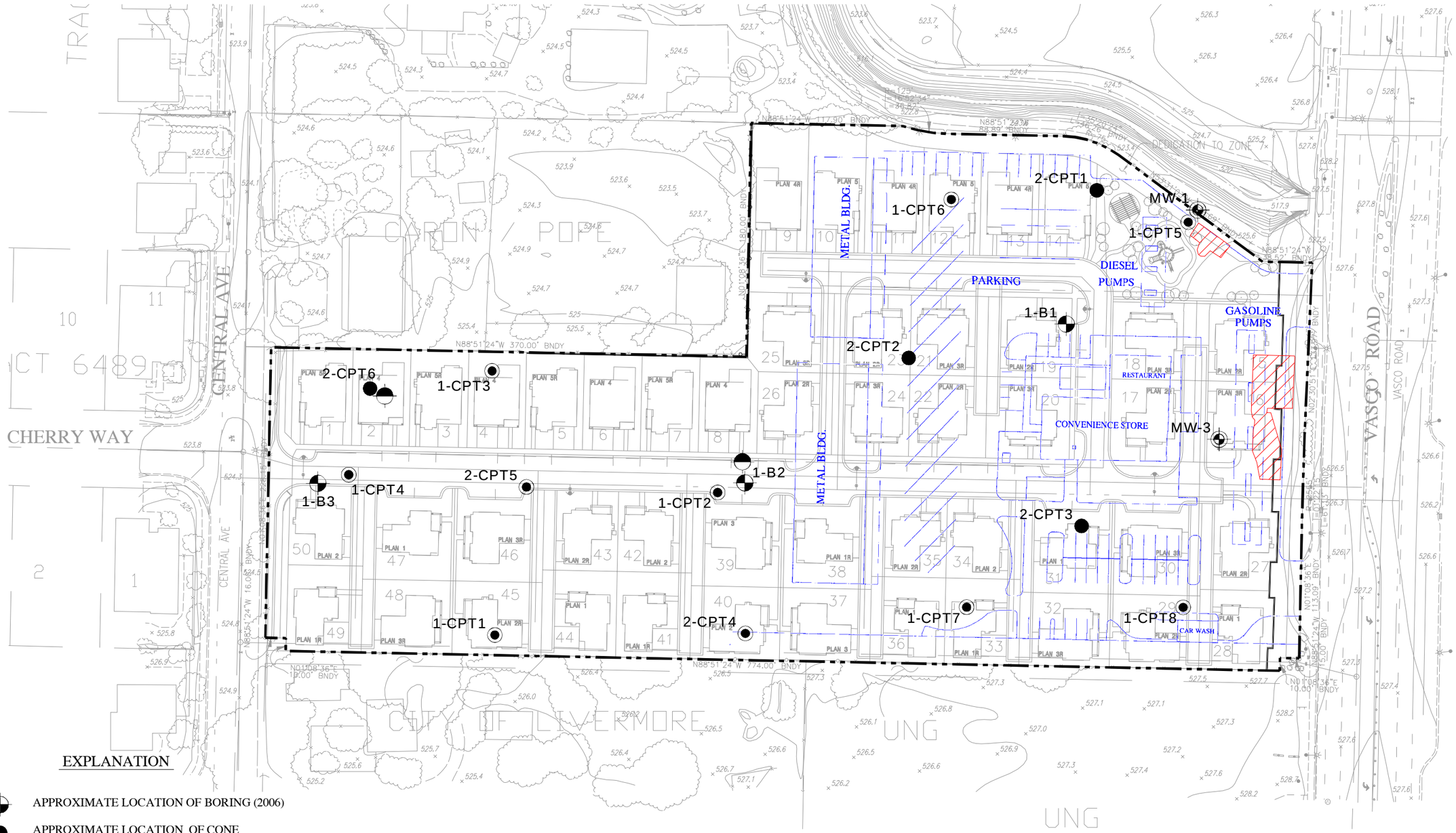

EXPLANATION

- 1-B3 — APPROXIMATE LOCATION OF BORING (2006)
- 2-CPT6 — APPROXIMATE LOCATION OF CONE PENETRATION TEST (THIS STUDY)
- 1-CPT8 — APPROXIMATE LOCATION OF CONE PENETRATION TEST (2006)
- MW-3 — APPROXIMATE LOCATION OF MONITORING WELL
- APPROXIMATE LOCATION OF SOIL SAMPLE (THIS STUDY)
- APPROXIMATE BOUNDARY OF PREVIOUS EXCAVATIONS

N

0 FEET 80
0 METERS 40

BASE MAP SOURCE: H2OGEOL AND MACKAY & SOMPS

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SITE PLAN
MACEDO PROPERTY
LIVERMORE, CALIFORNIA

PROJECT NO.:	7380.000.000
DATE:	OCTOBER 2010
DRAWN BY: SRP	CHECKED BY: DEB

FIGURE NO. 2

ORIGINAL FIGURE PRINTED IN COLOR

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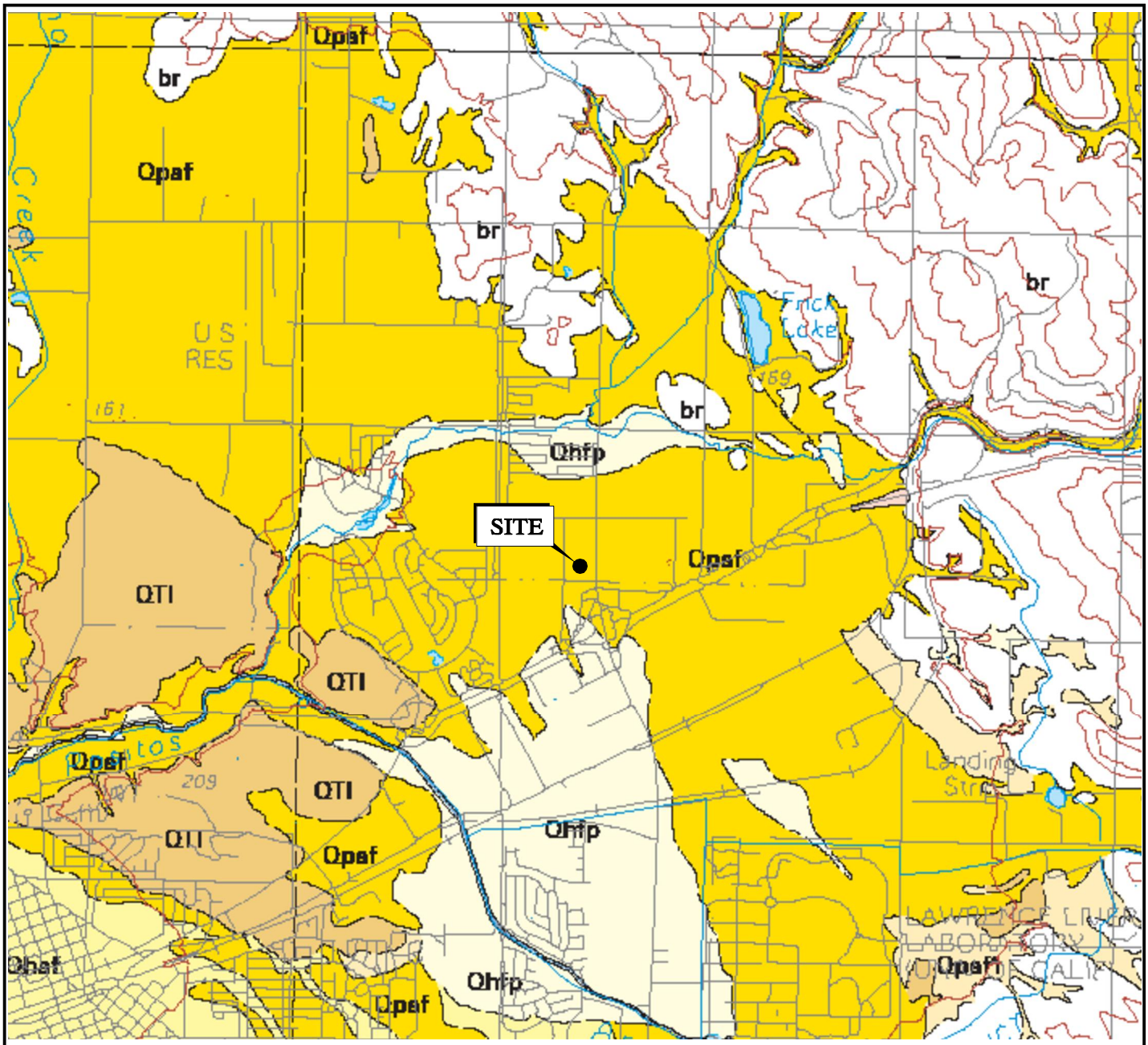

EXPLANATION

Qhfp	FLOODPLAIN DEPOSITS
Qpaf	ALLUVIAL FAN DEPOSITS
QTL	LIVERMORE GRAVELS
br	UNDIFFERENTIATED BEDROCK

N

0 FEET 4000

0 METERS 2000

BASE MAP SOURCE: HELLEY AND GRAYMER, 1997

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REGIONAL GEOLOGIC MAP

MACEDO PROPERTY

LIVERMORE, CALIFORNIA

PROJECT NO.: 7380.000.000		FIGURE NO. 3
DATE: OCTOBER 2010		
DRAWN BY: SRP	CHECKED BY: DEB	

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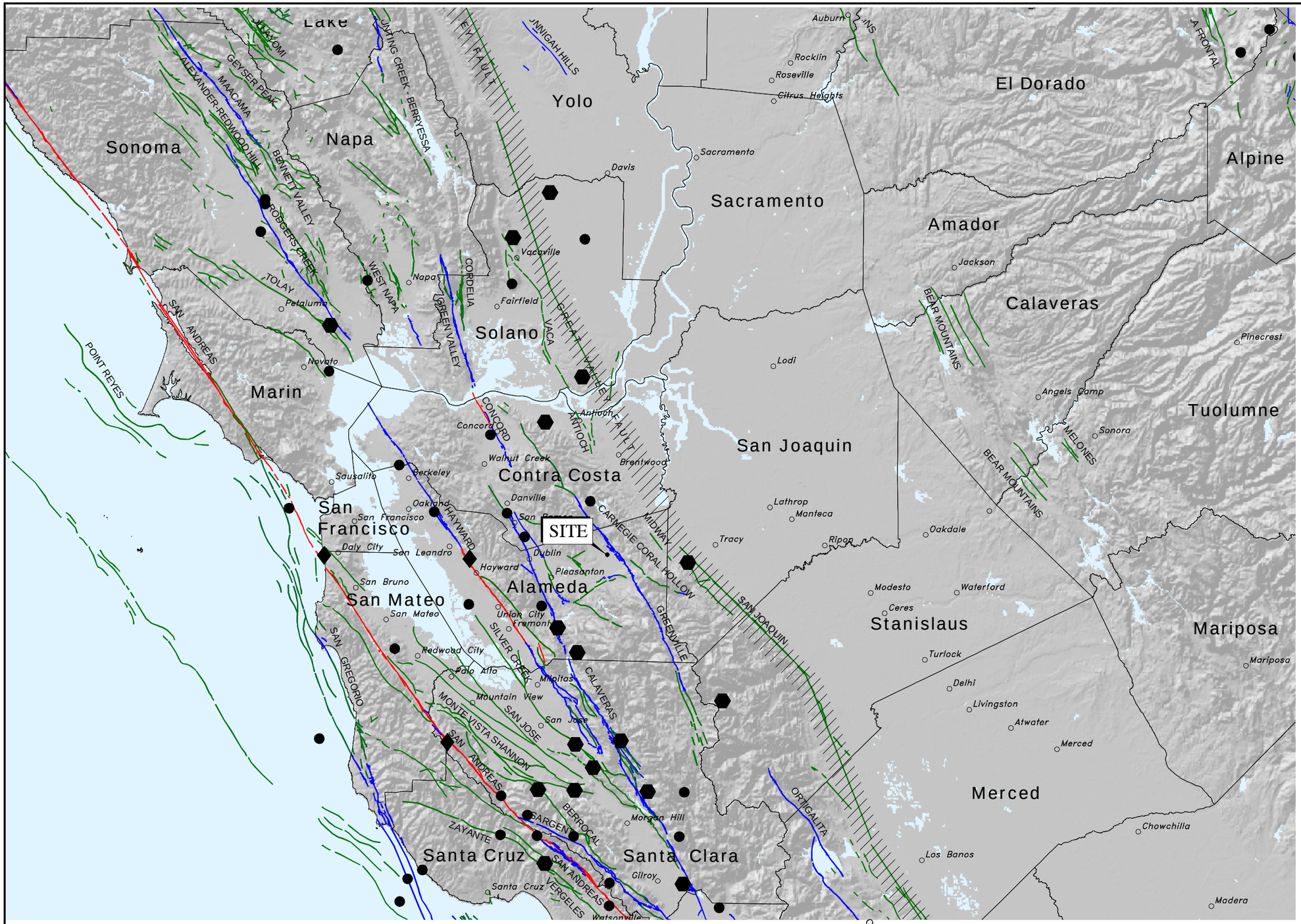

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U.S.G.S. QUATERNARY FAULT DATABASE, MARCH, 2006
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800-2000)

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REGIONAL FAULTING AND SEISMICITY

MACEDO PROPERTY

LIVERMORE, CALIFORNIA

PROJECT NO.: 7380.000.000			FIGURE NO 4
DATE: OCTOBER 2010			
DRAWN BY: SRP	CHECKED BY: DEB		

ORIGINAL FIGURE PRINTED IN COLOR

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APPENDIX A

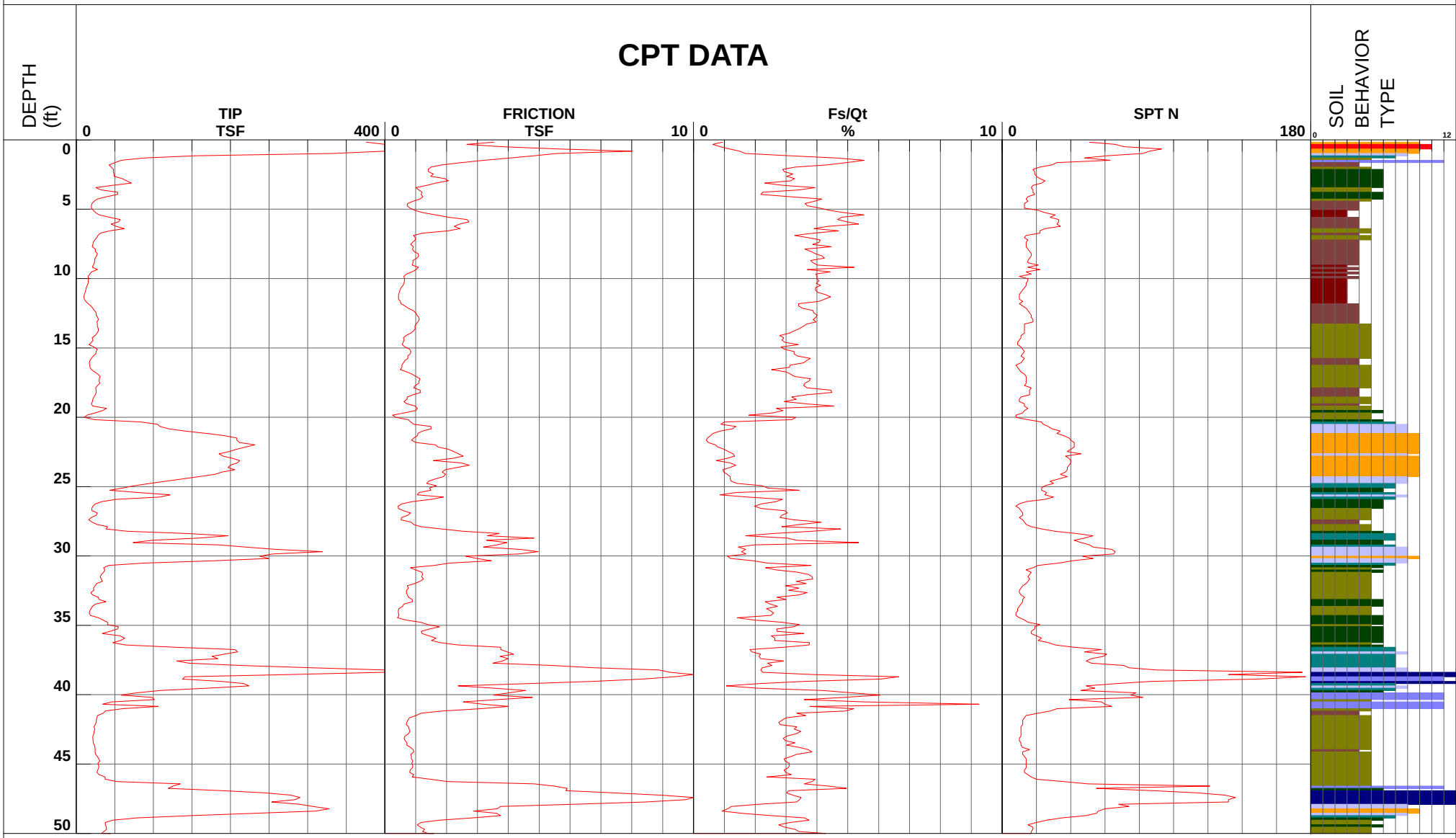
Logs of Cone Penetration Test Soundings

APPENDIX A

Engeo Inc

Location	1000 N Vasco Rd	Operator	BH-DM	Filename	SDF(520).cpt
Job Number	7380.000.000	Cone Number	DSG0786	GPS	
Hole Number	2-CPT-01	Date and Time	10/8/2010 11:04:01 AM	Maximum Depth	50.52 ft
Water Table Depth		8.00 ft			

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 (*)

Depth Increment

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

Data File:2-CPT-01
Operator:BH-DM
Cone ID:DSG0786
Customer:Engeo
10/8/2010 11:04:01 AM
Location:1000 N Vasco Rd
Job Number:7380.000.000
Units:

Depth (ft)	Qt TSF	Fs TSF	Fs/Qt (%)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	375.96	3.5331	0.940	9	sand	72
0.33	424.80	2.6586	0.626	10	gravelly sand to sand	68
0.49	438.28	3.7634	0.859	10	gravelly sand to sand	70
0.66	479.01	5.6258	1.174	9	sand	92
0.82	536.81	8.0154	1.493	9	sand	103
0.98	331.92	5.5827	1.682	8	sand to silty sand	79
1.15	153.90	4.8178	3.130	6	sandy silt to clayey silt	59
1.31	87.98	4.0604	4.615	11	very stiff fine grained (*)	84
1.48	58.23	3.2216	5.533	3	clay	56
1.64	50.22	2.4969	4.972	4	silty clay to clay	32
1.80	42.65	1.8495	4.336	4	silty clay to clay	27
1.97	45.28	1.4972	3.307	5	clayey silt to silty clay	22
2.13	48.36	1.3997	2.895	6	sandy silt to clayey silt	19
2.30	47.93	1.4135	2.949	6	sandy silt to clayey silt	18
2.46	48.67	1.5692	3.224	5	clayey silt to silty clay	23
2.62	49.16	1.4844	3.020	6	sandy silt to clayey silt	19
2.79	59.39	1.9448	3.274	6	sandy silt to clayey silt	23
2.95	65.18	2.0546	3.152	6	sandy silt to clayey silt	25
3.12	71.32	1.6451	2.307	6	sandy silt to clayey silt	27
3.28	46.27	1.3548	2.928	6	sandy silt to clayey silt	18
3.44	25.46	1.0025	3.938	4	silty clay to clay	16
3.61	32.08	1.0986	3.425	5	clayey silt to silty clay	15
3.77	53.68	1.2069	2.248	6	sandy silt to clayey silt	21
3.94	53.82	1.1721	2.178	6	sandy silt to clayey silt	21
4.10	39.43	1.2339	3.129	5	clayey silt to silty clay	19
4.27	27.41	1.1379	4.151	4	silty clay to clay	17
4.43	23.30	0.9151	3.927	4	silty clay to clay	15
4.59	20.44	0.7390	3.615	4	silty clay to clay	13
4.76	19.61	0.7240	3.691	4	silty clay to clay	13
4.92	19.88	0.8147	4.098	4	silty clay to clay	13
5.09	22.03	0.9693	4.399	3	clay	21
5.25	25.19	1.2274	4.872	3	clay	24
5.41	29.88	1.6489	5.519	3	clay	29
5.58	42.90	2.0596	4.801	4	silty clay to clay	27
5.74	56.96	2.6586	4.667	4	silty clay to clay	36
5.91	54.73	2.7265	4.981	4	silty clay to clay	35
6.07	45.32	2.4275	5.357	3	clay	43
6.23	51.58	2.2496	4.361	4	silty clay to clay	33
6.40	62.34	2.4348	3.905	5	clayey silt to silty clay	30
6.56	43.56	2.0497	4.705	4	silty clay to clay	28
6.73	31.27	1.2217	3.907	4	silty clay to clay	20
6.89	28.28	0.9282	3.282	5	clayey silt to silty clay	14
7.05	26.47	0.9833	3.715	5	clayey silt to silty clay	13
7.22	23.95	0.9846	4.110	4	silty clay to clay	15
7.38	22.03	0.8980	4.076	4	silty clay to clay	14
7.55	21.63	0.8372	3.870	4	silty clay to clay	14
7.71	20.70	0.9264	4.475	3	clay	20
7.87	24.68	0.8920	3.614	5	clayey silt to silty clay	12
8.04	24.71	0.9398	3.804	4	silty clay to clay	16
8.20	27.24	1.0735	3.941	4	silty clay to clay	17
8.37	26.33	1.0970	4.166	4	silty clay to clay	17
8.53	24.45	1.0389	4.249	4	silty clay to clay	16
8.69	23.89	0.9080	3.800	4	silty clay to clay	15
8.86	23.53	0.9130	3.879	4	silty clay to clay	15
9.02	22.01	0.8856	4.023	4	silty clay to clay	14
9.19	20.82	1.0857	5.214	3	clay	20
9.35	27.49	1.0160	3.696	5	clayey silt to silty clay	13
9.51	19.78	0.8782	4.440	3	clay	19

9.68	17.60	0.6995	3.975	4	silty clay to clay	11
9.84	15.40	0.6198	4.024	3	clay	15
10.01	15.76	0.6318	4.008	4	silty clay to clay	10
10.17	15.59	0.6360	4.081	3	clay	15
10.33	15.47	0.6178	3.994	4	silty clay to clay	10
10.50	14.25	0.5889	4.132	3	clay	14
10.66	13.20	0.5242	3.972	3	clay	13
10.83	12.40	0.4925	3.971	3	clay	12
10.99	11.59	0.4681	4.039	3	clay	11
11.15	10.35	0.4448	4.298	3	clay	10
11.32	9.92	0.4432	4.466	3	clay	10
11.48	10.35	0.4427	4.278	3	clay	10
11.65	12.22	0.4986	4.082	3	clay	12
11.81	15.32	0.5234	3.417	4	silty clay to clay	10
11.98	19.14	0.6539	3.416	5	clayey silt to silty clay	9
12.14	21.48	0.7608	3.542	5	clayey silt to silty clay	10
12.30	23.52	0.9114	3.875	4	silty clay to clay	15
12.47	25.67	1.0033	3.909	4	silty clay to clay	16
12.63	25.86	1.0383	4.015	4	silty clay to clay	17
12.80	27.58	1.0957	3.973	4	silty clay to clay	18
12.96	28.68	1.1130	3.881	4	silty clay to clay	18
13.12	26.87	1.0705	3.984	4	silty clay to clay	17
13.29	27.41	1.0068	3.673	5	clayey silt to silty clay	13
13.45	27.30	0.9712	3.557	5	clayey silt to silty clay	13
13.62	28.62	0.9820	3.431	5	clayey silt to silty clay	14
13.78	28.52	0.9314	3.265	5	clayey silt to silty clay	14
13.94	26.85	0.8339	3.106	5	clayey silt to silty clay	13
14.11	24.49	0.6852	2.798	5	clayey silt to silty clay	12
14.27	20.55	0.6028	2.934	5	clayey silt to silty clay	10
14.44	21.78	0.6259	2.874	5	clayey silt to silty clay	10
14.60	19.91	0.5918	2.973	5	clayey silt to silty clay	10
14.76	16.48	0.5618	3.409	4	silty clay to clay	11
14.93	22.90	0.6507	2.841	5	clayey silt to silty clay	11
15.09	27.36	0.8076	2.952	5	clayey silt to silty clay	13
15.26	25.83	0.8444	3.269	5	clayey silt to silty clay	12
15.42	25.33	0.8262	3.262	5	clayey silt to silty clay	12
15.58	21.97	0.7415	3.375	5	clayey silt to silty clay	11
15.75	19.55	0.7428	3.799	4	silty clay to clay	12
15.91	17.69	0.6503	3.677	4	silty clay to clay	11
16.08	16.86	0.6031	3.578	4	silty clay to clay	11
16.24	17.49	0.5496	3.141	5	clayey silt to silty clay	8
16.40	17.71	0.5527	3.120	5	clayey silt to silty clay	8
16.57	19.81	0.5020	2.534	5	clayey silt to silty clay	9
16.73	23.89	0.7198	3.014	5	clayey silt to silty clay	11
16.90	27.79	0.8773	3.157	5	clayey silt to silty clay	13
17.06	30.76	1.0081	3.277	5	clayey silt to silty clay	15
17.22	29.98	1.1382	3.797	5	clayey silt to silty clay	14
17.39	29.54	1.1081	3.752	5	clayey silt to silty clay	14
17.55	30.57	1.1041	3.612	5	clayey silt to silty clay	15
17.72	27.47	0.9828	3.578	5	clayey silt to silty clay	13
17.88	25.27	0.9323	3.689	4	silty clay to clay	16
18.04	25.57	1.1411	4.463	3	clay	24
18.21	25.82	1.1601	4.492	3	clay	25
18.37	24.78	0.9122	3.682	4	silty clay to clay	16
18.54	22.81	0.7282	3.192	5	clayey silt to silty clay	11
18.70	21.46	0.7148	3.331	5	clayey silt to silty clay	10
18.86	21.00	0.6191	2.948	5	clayey silt to silty clay	10
19.03	19.51	0.7101	3.640	4	silty clay to clay	12
19.19	21.55	0.9830	4.563	3	clay	21
19.36	39.22	1.0543	2.688	6	sandy silt to clayey silt	15
19.52	34.34	0.9970	2.903	5	clayey silt to silty clay	16
19.69	24.46	0.6310	2.580	5	clayey silt to silty clay	12
19.85	13.91	0.2505	1.801	5	clayey silt to silty clay	7
20.01	10.65	0.3546	3.330	4	silty clay to clay	7
20.18	23.66	0.7565	3.198	5	clayey silt to silty clay	11
20.34	84.00	0.8380	0.998	8	sand to silty sand	20

20.51	105.28	0.9344	0.888	8	sand to silty sand	25
20.67	108.50	1.4907	1.374	8	sand to silty sand	26
20.83	119.51	1.5036	1.258	8	sand to silty sand	29
21.00	141.00	1.2134	0.861	8	sand to silty sand	34
21.16	168.60	1.0738	0.637	9	sand	32
21.33	192.46	1.0540	0.548	9	sand	37
21.49	207.73	0.9414	0.453	9	sand	40
21.65	208.18	0.8627	0.414	9	sand	40
21.82	211.37	1.0053	0.476	9	sand	40
21.98	231.44	1.6371	0.707	9	sand	44
22.15	219.76	1.7254	0.785	9	sand	42
22.31	207.46	2.0640	0.995	9	sand	40
22.47	197.78	2.2373	1.131	9	sand	38
22.64	185.04	2.3809	1.287	8	sand to silty sand	44
22.80	190.25	2.5333	1.332	8	sand to silty sand	46
22.97	202.79	2.1899	1.080	9	sand	39
23.13	211.89	1.5719	0.742	9	sand	41
23.29	208.47	2.4767	1.188	9	sand	40
23.46	199.53	2.7316	1.369	8	sand to silty sand	48
23.62	196.66	2.3341	1.187	9	sand	38
23.79	205.24	1.9582	0.954	9	sand	39
23.95	188.94	1.8568	0.983	9	sand	36
24.11	179.64	1.9676	1.095	9	sand	34
24.28	159.13	1.8983	1.193	8	sand to silty sand	38
24.44	137.68	1.6325	1.186	8	sand to silty sand	33
24.61	115.64	1.4211	1.229	8	sand to silty sand	28
24.77	95.75	1.3555	1.416	8	sand to silty sand	23
24.93	74.98	1.6693	2.226	7	silty sand to sandy silt	24
25.10	60.03	1.4478	2.412	6	sandy silt to clayey silt	23
25.26	43.47	1.4926	3.433	5	clayey silt to silty clay	21
25.43	80.18	1.1068	1.380	7	silty sand to sandy silt	26
25.59	121.65	1.0451	0.859	8	sand to silty sand	29
25.75	108.16	1.8999	1.757	7	silty sand to sandy silt	35
25.92	52.03	1.5008	2.885	6	sandy silt to clayey silt	20
26.08	32.98	0.8837	2.679	6	sandy silt to clayey silt	13
26.25	24.98	0.5550	2.222	6	sandy silt to clayey silt	10
26.41	21.49	0.4277	1.990	6	sandy silt to clayey silt	8
26.57	19.95	0.4391	2.201	5	clayey silt to silty clay	10
26.74	20.29	0.6063	2.988	5	clayey silt to silty clay	10
26.90	27.17	0.8308	3.058	5	clayey silt to silty clay	13
27.07	25.86	0.7436	2.875	5	clayey silt to silty clay	12
27.23	19.19	0.5416	2.823	5	clayey silt to silty clay	9
27.40	15.98	0.5269	3.296	4	silty clay to clay	10
27.56	20.43	0.8516	4.169	4	silty clay to clay	13
27.72	26.88	0.9306	3.463	5	clayey silt to silty clay	13
27.89	40.44	1.1603	2.869	6	sandy silt to clayey silt	15
28.05	38.40	1.8376	4.785	4	silty clay to clay	25
28.22	66.07	2.5381	3.841	5	clayey silt to silty clay	32
28.38	142.11	3.6997	2.603	7	silty sand to sandy silt	45
28.54	196.45	3.3178	1.689	8	sand to silty sand	47
28.71	158.86	4.8332	3.042	6	sandy silt to clayey silt	61
28.87	98.48	3.2940	3.345	6	sandy silt to clayey silt	38
29.04	73.72	3.9523	5.361	11	very stiff fine grained (*)	71
29.20	184.74	3.6443	1.973	7	silty sand to sandy silt	59
29.36	219.47	3.1921	1.454	8	sand to silty sand	53
29.53	258.86	4.3778	1.691	8	sand to silty sand	62
29.69	319.31	4.9714	1.557	8	sand to silty sand	76
29.86	254.26	4.3259	1.701	8	sand to silty sand	61
30.02	238.06	2.6249	1.103	9	sand	46
30.18	249.04	2.9908	1.201	9	sand	48
30.35	177.79	3.4514	1.941	7	silty sand to sandy silt	57
30.51	87.45	2.1019	2.404	7	silty sand to sandy silt	28
30.68	42.00	1.6031	3.817	5	clayey silt to silty clay	20
30.84	35.46	0.8309	2.343	6	sandy silt to clayey silt	14
31.00	36.99	0.9935	2.686	6	sandy silt to clayey silt	14
31.17	35.43	1.2005	3.388	5	clayey silt to silty clay	17

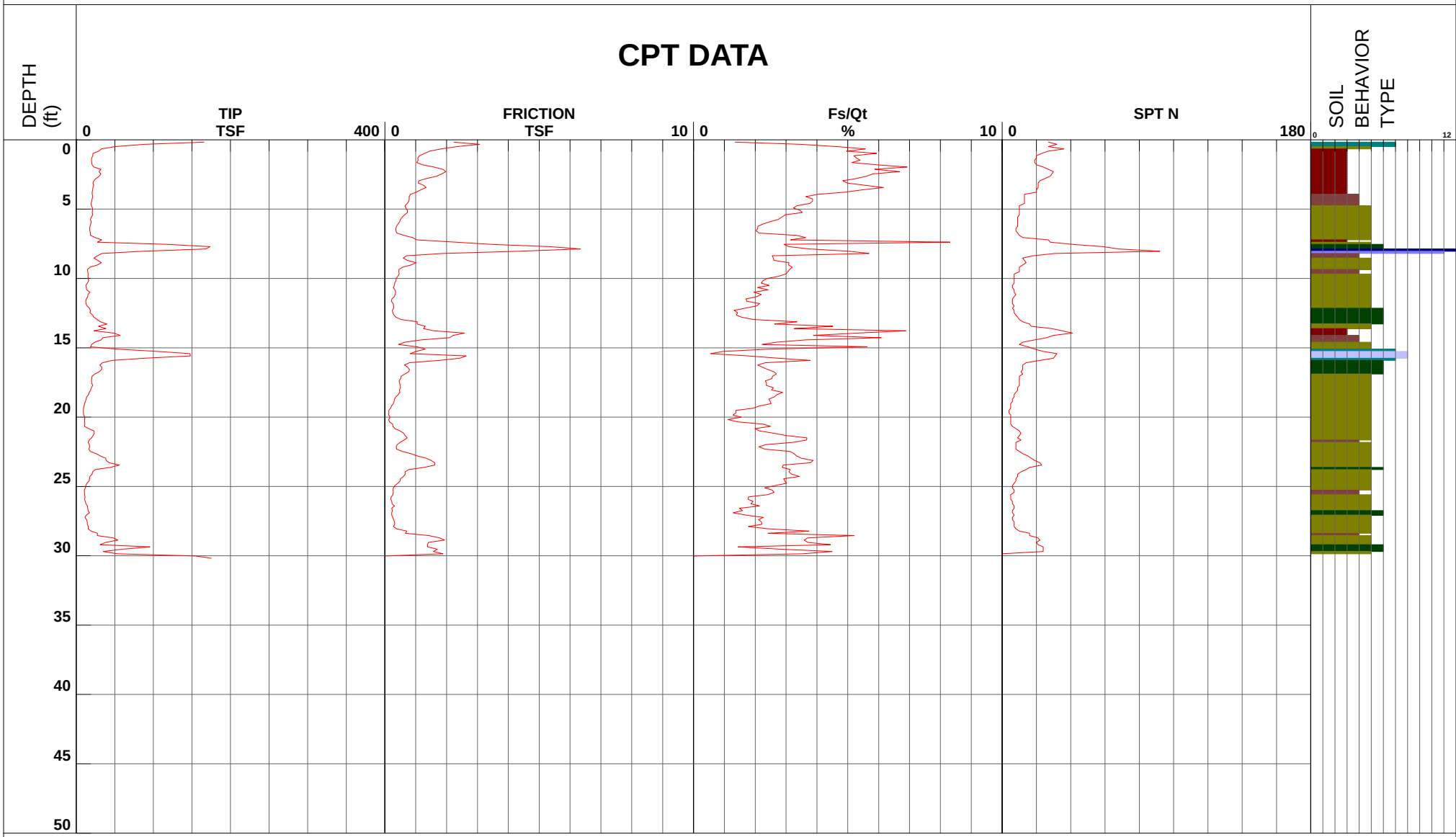
31.33	32.66	1.2228	3.744	5	clayey silt to silty clay	16
31.50	30.85	1.1908	3.859	4	silty clay to clay	20
31.66	32.27	1.2506	3.876	5	clayey silt to silty clay	15
31.82	33.97	1.1351	3.341	5	clayey silt to silty clay	16
31.99	26.53	0.9715	3.663	5	clayey silt to silty clay	13
32.15	24.21	0.7254	2.997	5	clayey silt to silty clay	12
32.32	22.30	0.7637	3.425	5	clayey silt to silty clay	11
32.48	22.67	0.7030	3.101	5	clayey silt to silty clay	11
32.64	18.86	0.6989	3.705	4	silty clay to clay	12
32.81	21.07	0.7249	3.441	5	clayey silt to silty clay	10
32.97	28.29	0.7693	2.720	5	clayey silt to silty clay	14
33.14	29.41	0.8828	3.002	5	clayey silt to silty clay	14
33.30	38.27	0.8941	2.336	6	sandy silt to clayey silt	15
33.46	24.89	0.6215	2.497	5	clayey silt to silty clay	12
33.63	20.89	0.5723	2.740	5	clayey silt to silty clay	10
33.79	19.16	0.4559	2.379	5	clayey silt to silty clay	9
33.96	17.34	0.4372	2.521	5	clayey silt to silty clay	8
34.12	16.78	0.4385	2.613	5	clayey silt to silty clay	8
34.28	18.16	0.4567	2.515	5	clayey silt to silty clay	9
34.45	28.67	0.4082	1.424	6	sandy silt to clayey silt	11
34.61	34.24	0.6655	1.944	6	sandy silt to clayey silt	13
34.78	40.43	1.1550	2.857	6	sandy silt to clayey silt	15
34.94	40.32	1.3857	3.437	5	clayey silt to silty clay	19
35.10	54.49	1.7714	3.251	5	clayey silt to silty clay	26
35.27	53.30	1.4403	2.702	6	sandy silt to clayey silt	20
35.43	43.48	1.1792	2.712	6	sandy silt to clayey silt	17
35.60	33.65	1.2074	3.588	5	clayey silt to silty clay	16
35.76	56.63	1.4308	2.527	6	sandy silt to clayey silt	22
35.93	62.73	1.6597	2.646	6	sandy silt to clayey silt	24
36.09	57.36	1.5088	2.630	6	sandy silt to clayey silt	22
36.25	47.48	1.7886	3.767	5	clayey silt to silty clay	23
36.42	63.25	2.3721	3.750	5	clayey silt to silty clay	30
36.58	128.50	3.7537	2.921	6	sandy silt to clayey silt	49
36.75	205.64	3.7562	1.827	8	sand to silty sand	49
36.91	209.19	3.9621	1.894	8	sand to silty sand	50
37.07	191.52	4.1713	2.178	7	silty sand to sandy silt	61
37.24	176.04	3.7383	2.124	7	silty sand to sandy silt	56
37.40	183.23	3.9903	2.178	7	silty sand to sandy silt	58
37.57	130.17	3.8103	2.927	6	sandy silt to clayey silt	50
37.73	145.80	3.4985	2.400	7	silty sand to sandy silt	47
37.89	213.47	5.4223	2.540	7	silty sand to sandy silt	68
38.06	304.92	6.8002	2.230	8	sand to silty sand	73
38.22	407.59	8.8727	2.177	8	sand to silty sand	98
38.39	412.77	9.2356	2.237	8	sand to silty sand	99
38.55	274.60	10.6776	3.888	12	sand to clayey sand (*)	131
38.71	140.98	9.3811	6.654	11	very stiff fine grained (*)	135
38.88	137.82	8.3432	6.054	11	very stiff fine grained (*)	132
39.04	187.53	6.7378	3.593	12	sand to clayey sand (*)	90
39.21	217.07	4.6705	2.152	7	silty sand to sandy silt	69
39.37	223.71	2.3721	1.060	9	sand	43
39.53	170.36	3.5356	2.075	7	silty sand to sandy silt	54
39.70	108.75	4.5526	4.186	11	very stiff fine grained (*)	104
39.86	78.40	4.0254	5.135	11	very stiff fine grained (*)	75
40.03	58.12	3.5223	6.060	3	clay	56
40.19	98.03	4.7765	4.873	11	very stiff fine grained (*)	94
40.35	101.18	3.6361	3.594	6	sandy silt to clayey silt	39
40.52	45.77	2.5412	5.553	3	clay	44
40.68	34.27	3.1780	9.273	3	clay	33
40.85	106.32	4.0092	3.771	6	sandy silt to clayey silt	41
41.01	59.64	3.1044	5.205	11	very stiff fine grained (*)	57
41.17	37.43	1.8497	4.942	3	clay	36
41.34	34.84	1.1714	3.362	5	clayey silt to silty clay	17
41.50	27.63	1.0080	3.649	5	clayey silt to silty clay	13
41.67	26.51	0.7982	3.011	5	clayey silt to silty clay	13
41.83	26.07	0.7539	2.892	5	clayey silt to silty clay	12
41.99	25.68	0.7131	2.777	5	clayey silt to silty clay	12

42.16	24.52	0.6914	2.820	5	clayey silt to silty clay	12
42.32	22.91	0.7705	3.363	5	clayey silt to silty clay	11
42.49	23.92	0.7852	3.283	5	clayey silt to silty clay	11
42.65	23.22	0.8108	3.492	5	clayey silt to silty clay	11
42.81	22.83	0.7643	3.348	5	clayey silt to silty clay	11
42.98	21.51	0.6545	3.043	5	clayey silt to silty clay	10
43.14	21.46	0.6265	2.919	5	clayey silt to silty clay	10
43.31	21.81	0.6522	2.990	5	clayey silt to silty clay	10
43.47	21.74	0.7175	3.301	5	clayey silt to silty clay	10
43.64	23.48	0.7120	3.032	5	clayey silt to silty clay	11
43.80	24.11	0.8326	3.454	5	clayey silt to silty clay	12
43.96	24.51	0.9152	3.734	4	silty clay to clay	16
44.13	24.26	0.9352	3.855	4	silty clay to clay	15
44.29	24.97	0.8401	3.364	5	clayey silt to silty clay	12
44.46	27.11	0.8629	3.183	5	clayey silt to silty clay	13
44.62	29.07	0.8566	2.947	5	clayey silt to silty clay	14
44.78	30.46	0.9081	2.981	5	clayey silt to silty clay	15
44.95	27.98	0.8716	3.115	5	clayey silt to silty clay	13
45.11	29.02	0.9053	3.120	5	clayey silt to silty clay	14
45.28	29.04	0.8931	3.076	5	clayey silt to silty clay	14
45.44	27.81	0.8199	2.948	5	clayey silt to silty clay	13
45.60	26.77	0.8033	3.001	5	clayey silt to silty clay	13
45.77	29.50	0.9377	3.179	5	clayey silt to silty clay	14
45.93	37.25	0.8885	2.385	6	sandy silt to clayey silt	14
46.10	37.39	1.4782	3.953	5	clayey silt to silty clay	18
46.26	52.80	2.0341	3.852	5	clayey silt to silty clay	25
46.42	134.74	4.8437	3.595	6	sandy silt to clayey silt	52
46.59	125.19	5.4811	4.378	11	very stiff fine grained (*)	120
46.75	119.05	5.9115	4.966	11	very stiff fine grained (*)	114
46.92	189.65	5.8625	3.091	7	silty sand to sandy silt	61
47.08	245.03	7.4035	3.021	12	sand to clayey sand (*)	117
47.24	278.20	8.9563	3.219	12	sand to clayey sand (*)	133
47.41	289.88	10.1136	3.489	12	sand to clayey sand (*)	139
47.57	283.47	9.7461	3.438	12	sand to clayey sand (*)	136
47.74	253.25	8.4614	3.341	12	sand to clayey sand (*)	121
47.90	289.42	6.1066	2.110	8	sand to silty sand	69
48.06	306.64	3.7473	1.222	9	sand	59
48.23	327.65	3.6362	1.110	9	sand	63
48.39	310.33	2.8763	0.927	9	sand	59
48.56	232.14	3.6181	1.559	8	sand to silty sand	56
48.72	150.35	3.7519	2.495	7	silty sand to sandy silt	48
48.88	78.95	2.8424	3.600	5	clayey silt to silty clay	38
49.05	47.17	1.7692	3.751	5	clayey silt to silty clay	23
49.21	37.43	1.1726	3.133	5	clayey silt to silty clay	18
49.38	37.76	1.0455	2.769	6	sandy silt to clayey silt	14
49.54	38.90	1.1494	2.955	6	sandy silt to clayey silt	15
49.70	39.07	1.2869	3.294	5	clayey silt to silty clay	19
49.87	35.64	1.2237	3.433	5	clayey silt to silty clay	17
50.03	32.62	1.4006	4.294	4	silty clay to clay	21
50.20	40.42	1.5942	3.944	5	clayey silt to silty clay	19
50.36	44.04	-32768	-32768	0	<out of range>	0
50.52	40.98	-32768	-32768	0	<out of range>	0

Engeo Inc

Location	1000 N Vasco Rd	Operator	BH-DM	Filename	SDF(517).cpt
Job Number	7380.000.000	Cone Number	DSG0786	GPS	
Hole Number	2-CPT-02	Date and Time	10/8/2010 8:32:21 AM	Maximum Depth	30.18 ft
Water Table Depth		8.00 ft			

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 (*)

Depth Increment

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

Data File:2-CPT-02
Operator:BH-DM
Cone ID:DSG0786
Customer:Engeo
10/8/2010 8:32:21 AM
Location:1000 N Vasco Rd
Job Number:7380.000.000
Units:

Depth (ft)	Qt TSF	Fs TSF	Fs/Qt (%)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	165.76	2.2364	1.349	8	sand to silty sand	40
0.33	88.46	3.0644	3.464	6	sandy silt to clayey silt	34
0.49	50.07	2.3340	4.662	4	silty clay to clay	32
0.66	32.63	1.8163	5.566	3	clay	31
0.82	29.30	1.4536	4.961	3	clay	28
0.98	21.70	1.2879	5.934	3	clay	21
1.15	21.55	1.1194	5.194	3	clay	21
1.31	20.18	1.0636	5.269	3	clay	19
1.48	19.95	1.0771	5.399	3	clay	19
1.64	20.14	1.0326	5.128	3	clay	19
1.80	20.62	1.2251	5.942	3	clay	20
1.97	22.90	1.5858	6.923	3	clay	22
2.13	31.96	1.8801	5.882	3	clay	31
2.30	29.55	1.9767	6.690	3	clay	28
2.46	31.63	1.8408	5.820	3	clay	30
2.62	29.79	1.6735	5.617	3	clay	29
2.79	25.52	1.3481	5.283	3	clay	24
2.95	22.69	1.1009	4.853	3	clay	22
3.12	21.72	1.0858	4.998	3	clay	21
3.28	22.54	1.2591	5.586	3	clay	22
3.44	21.61	1.3343	6.174	3	clay	21
3.61	21.25	1.1654	5.484	3	clay	20
3.77	20.63	1.0198	4.943	3	clay	20
3.94	20.69	0.8354	4.037	4	silty clay to clay	13
4.10	21.46	0.7828	3.648	4	silty clay to clay	14
4.27	20.45	0.7912	3.868	4	silty clay to clay	13
4.43	20.17	0.7796	3.865	4	silty clay to clay	13
4.59	19.14	0.7230	3.778	4	silty clay to clay	12
4.76	19.58	0.6580	3.360	5	clayey silt to silty clay	9
4.92	20.95	0.6793	3.242	5	clayey silt to silty clay	10
5.09	21.04	0.7275	3.459	5	clayey silt to silty clay	10
5.25	20.79	0.7334	3.527	4	silty clay to clay	13
5.41	21.32	0.6348	2.977	5	clayey silt to silty clay	10
5.58	19.57	0.5610	2.867	5	clayey silt to silty clay	9
5.74	18.32	0.5038	2.750	5	clayey silt to silty clay	9
5.91	19.40	0.4800	2.475	5	clayey silt to silty clay	9
6.07	18.81	0.4260	2.265	5	clayey silt to silty clay	9
6.23	17.83	0.3726	2.089	5	clayey silt to silty clay	9
6.40	17.24	0.3591	2.083	5	clayey silt to silty clay	8
6.56	17.58	0.3569	2.029	5	clayey silt to silty clay	8
6.73	18.25	0.3874	2.123	5	clayey silt to silty clay	9
6.89	18.47	0.6182	3.348	5	clayey silt to silty clay	9
7.05	24.44	0.8890	3.637	5	clayey silt to silty clay	12
7.22	32.86	1.0350	3.149	5	clayey silt to silty clay	16
7.38	27.61	2.2967	8.318	3	clay	26
7.55	117.44	3.4421	2.931	6	sandy silt to clayey silt	45
7.71	173.21	5.3539	3.091	6	sandy silt to clayey silt	66
7.87	168.08	6.3324	3.768	12	sand to clayey sand (*)	80
8.04	85.43	4.3189	5.056	11	very stiff fine grained (*)	82
8.20	33.15	1.8923	5.708	3	clay	32
8.37	27.53	0.7045	2.560	6	sandy silt to clayey silt	11
8.53	22.85	0.5935	2.597	5	clayey silt to silty clay	11
8.69	27.81	0.7262	2.611	6	sandy silt to clayey silt	11
8.86	32.54	1.0104	3.105	5	clayey silt to silty clay	16
9.02	27.39	0.8470	3.093	5	clayey silt to silty clay	13
9.19	17.78	0.5721	3.217	5	clayey silt to silty clay	9
9.35	14.53	0.4561	3.139	4	silty clay to clay	9
9.51	14.81	0.4556	3.077	4	silty clay to clay	9

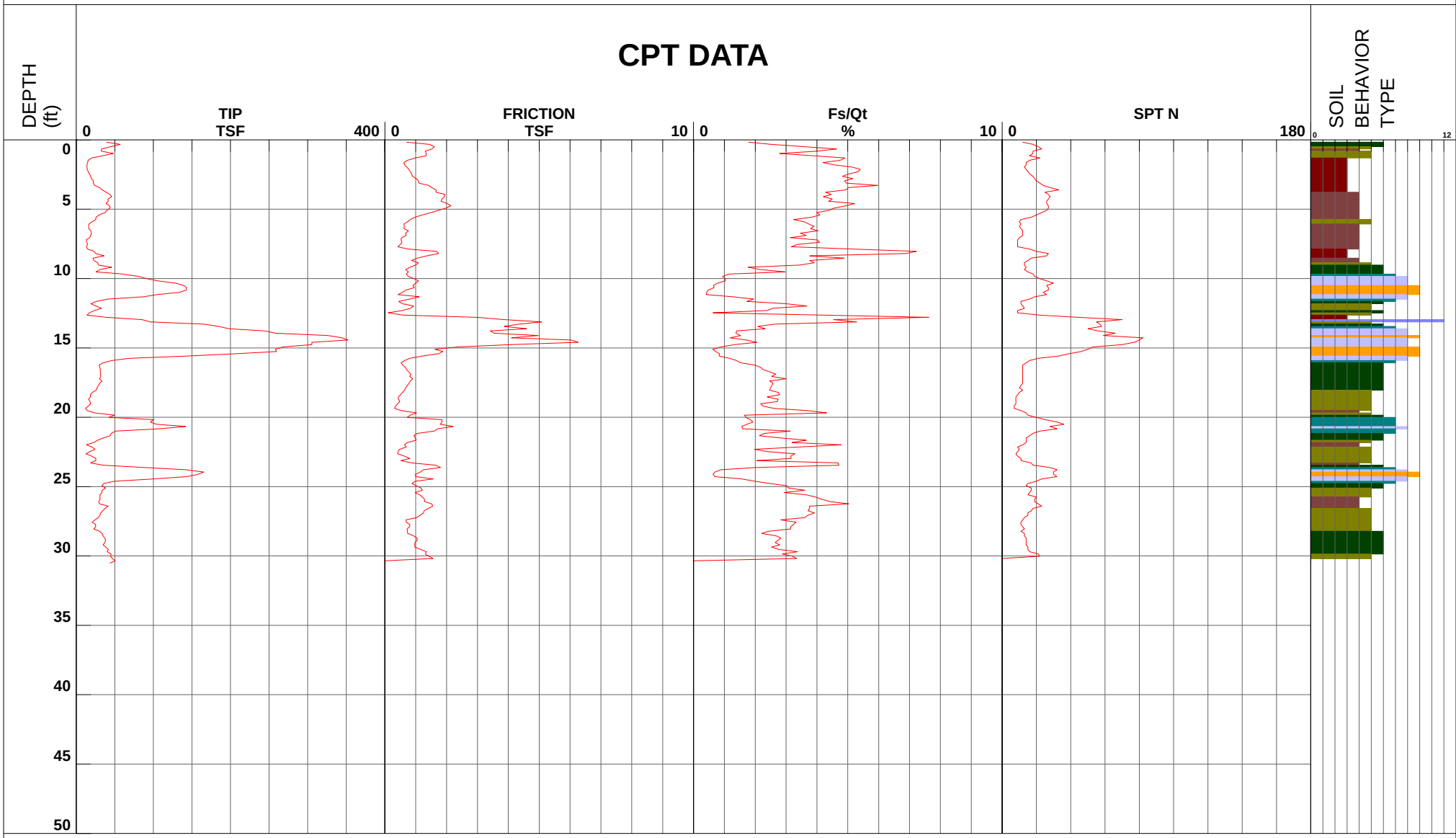
9.68	15.41	0.4647	3.015	5	clayey silt to silty clay	7
9.84	15.10	0.4189	2.775	5	clayey silt to silty clay	7
10.01	15.40	0.3678	2.389	5	clayey silt to silty clay	7
10.17	16.01	0.3622	2.262	5	clayey silt to silty clay	8
10.33	14.37	0.3179	2.213	5	clayey silt to silty clay	7
10.50	12.48	0.3083	2.470	5	clayey silt to silty clay	6
10.66	13.12	0.2745	2.092	5	clayey silt to silty clay	6
10.83	13.44	0.3280	2.440	5	clayey silt to silty clay	6
10.99	17.66	0.3474	1.968	5	clayey silt to silty clay	8
11.15	15.03	0.3325	2.213	5	clayey silt to silty clay	7
11.32	14.79	0.3043	2.058	5	clayey silt to silty clay	7
11.48	13.13	0.2249	1.714	5	clayey silt to silty clay	6
11.65	12.26	0.2134	1.741	5	clayey silt to silty clay	6
11.81	12.58	0.2712	2.156	5	clayey silt to silty clay	6
11.98	13.81	0.2843	2.059	5	clayey silt to silty clay	7
12.14	17.07	0.2879	1.687	6	sandy silt to clayey silt	7
12.30	18.20	0.2403	1.320	6	sandy silt to clayey silt	7
12.47	17.80	0.2558	1.437	6	sandy silt to clayey silt	7
12.63	21.05	0.2929	1.392	6	sandy silt to clayey silt	8
12.80	22.72	0.3548	1.562	6	sandy silt to clayey silt	9
12.96	26.98	0.5269	1.953	6	sandy silt to clayey silt	10
13.12	31.20	1.0501	3.366	5	clayey silt to silty clay	15
13.29	39.64	1.0433	2.632	6	sandy silt to clayey silt	15
13.45	28.94	1.3112	4.530	4	silty clay to clay	18
13.62	38.20	1.2502	3.272	5	clayey silt to silty clay	18
13.78	22.95	1.5853	6.907	3	clay	22
13.94	48.52	2.5767	5.311	3	clay	46
14.11	56.89	2.2152	3.894	5	clayey silt to silty clay	27
14.27	34.31	2.0934	6.102	3	clay	33
14.44	32.33	1.1794	3.648	5	clayey silt to silty clay	15
14.60	23.96	0.6435	2.686	5	clayey silt to silty clay	11
14.76	19.72	0.4407	2.234	5	clayey silt to silty clay	9
14.93	18.49	1.0459	5.655	3	clay	18
15.09	52.97	1.3063	2.466	6	sandy silt to clayey silt	20
15.26	105.49	1.0126	0.960	8	sand to silty sand	25
15.42	147.26	0.8257	0.561	9	sand	28
15.58	147.94	2.6318	1.779	7	silty sand to sandy silt	47
15.75	88.35	2.4319	2.753	6	sandy silt to clayey silt	34
15.91	46.41	1.7571	3.786	5	clayey silt to silty clay	22
16.08	33.95	0.7933	2.337	6	sandy silt to clayey silt	13
16.24	30.53	0.6367	2.085	6	sandy silt to clayey silt	12
16.40	32.98	0.7385	2.239	6	sandy silt to clayey silt	13
16.57	32.93	0.7957	2.417	6	sandy silt to clayey silt	13
16.73	29.62	0.7761	2.620	6	sandy silt to clayey silt	11
16.90	23.97	0.6465	2.697	5	clayey silt to silty clay	11
17.06	20.31	0.5217	2.569	5	clayey silt to silty clay	10
17.22	20.12	0.5132	2.550	5	clayey silt to silty clay	10
17.39	19.76	0.4619	2.338	5	clayey silt to silty clay	9
17.55	20.01	0.4752	2.375	5	clayey silt to silty clay	10
17.72	21.19	0.5024	2.371	5	clayey silt to silty clay	10
17.88	19.50	0.5071	2.601	5	clayey silt to silty clay	9
18.04	18.55	0.4720	2.545	5	clayey silt to silty clay	9
18.21	16.86	0.4896	2.904	5	clayey silt to silty clay	8
18.37	15.88	0.4319	2.719	5	clayey silt to silty clay	8
18.54	13.45	0.3549	2.639	5	clayey silt to silty clay	6
18.70	12.68	0.3116	2.457	5	clayey silt to silty clay	6
18.86	11.88	0.2978	2.506	5	clayey silt to silty clay	6
19.03	10.85	0.2746	2.531	4	silty clay to clay	7
19.19	9.97	0.2158	2.165	5	clayey silt to silty clay	5
19.36	9.26	0.1805	1.949	5	clayey silt to silty clay	4
19.52	9.18	0.1268	1.381	5	clayey silt to silty clay	4
19.69	9.09	0.1264	1.390	5	clayey silt to silty clay	4
19.85	9.66	0.1249	1.293	5	clayey silt to silty clay	5
20.01	11.06	0.1723	1.558	5	clayey silt to silty clay	5
20.18	10.72	0.1206	1.125	5	clayey silt to silty clay	5
20.34	10.69	0.1539	1.440	5	clayey silt to silty clay	5

20.51	11.09	0.2520	2.273	5	clayey silt to silty clay	5
20.67	10.54	0.2646	2.510	4	silty clay to clay	7
20.83	16.24	0.3251	2.002	5	clayey silt to silty clay	8
21.00	22.91	0.4919	2.147	6	sandy silt to clayey silt	9
21.16	23.28	0.6087	2.614	5	clayey silt to silty clay	11
21.33	21.72	0.6557	3.018	5	clayey silt to silty clay	10
21.49	19.68	0.7266	3.692	4	silty clay to clay	13
21.65	16.89	0.6216	3.680	4	silty clay to clay	11
21.82	15.31	0.4963	3.241	4	silty clay to clay	10
21.98	17.02	0.3993	2.346	5	clayey silt to silty clay	8
22.15	17.29	0.3681	2.129	5	clayey silt to silty clay	8
22.31	16.38	0.3813	2.328	5	clayey silt to silty clay	8
22.47	18.12	0.5688	3.140	5	clayey silt to silty clay	9
22.64	25.80	0.8424	3.265	5	clayey silt to silty clay	12
22.80	31.22	1.0455	3.349	5	clayey silt to silty clay	15
22.97	38.28	1.3410	3.503	5	clayey silt to silty clay	18
23.13	38.62	1.5003	3.885	5	clayey silt to silty clay	18
23.29	42.57	1.6159	3.796	5	clayey silt to silty clay	20
23.46	55.67	1.6196	2.909	6	sandy silt to clayey silt	21
23.62	44.27	1.2747	2.879	6	sandy silt to clayey silt	17
23.79	24.68	0.7762	3.145	5	clayey silt to silty clay	12
23.95	21.12	0.6553	3.103	5	clayey silt to silty clay	10
24.11	20.64	0.6584	3.189	5	clayey silt to silty clay	10
24.28	17.54	0.6038	3.442	4	silty clay to clay	11
24.44	17.29	0.5071	2.933	5	clayey silt to silty clay	8
24.61	16.52	0.4917	2.976	5	clayey silt to silty clay	8
24.77	13.83	0.4194	3.033	4	silty clay to clay	9
24.93	12.30	0.3274	2.661	5	clayey silt to silty clay	6
25.10	11.73	0.2725	2.323	5	clayey silt to silty clay	6
25.26	10.45	0.2680	2.565	4	silty clay to clay	7
25.43	10.47	0.2753	2.629	4	silty clay to clay	7
25.59	10.86	0.2622	2.415	5	clayey silt to silty clay	5
25.75	11.44	0.2052	1.794	5	clayey silt to silty clay	5
25.92	10.72	0.1907	1.779	5	clayey silt to silty clay	5
26.08	11.60	0.2253	1.941	5	clayey silt to silty clay	6
26.25	12.51	0.2340	1.870	5	clayey silt to silty clay	6
26.41	14.44	0.3106	2.151	5	clayey silt to silty clay	7
26.57	14.84	0.2218	1.494	6	sandy silt to clayey silt	6
26.74	15.35	0.2440	1.590	5	clayey silt to silty clay	7
26.90	17.06	0.2204	1.292	6	sandy silt to clayey silt	7
27.07	12.97	0.2202	1.698	5	clayey silt to silty clay	6
27.23	11.31	0.2574	2.276	5	clayey silt to silty clay	5
27.40	13.34	0.2825	2.117	5	clayey silt to silty clay	6
27.56	14.24	0.3155	2.215	5	clayey silt to silty clay	7
27.72	14.36	0.3199	2.227	5	clayey silt to silty clay	7
27.89	15.58	0.2778	1.784	5	clayey silt to silty clay	7
28.05	15.46	0.3760	2.432	5	clayey silt to silty clay	7
28.22	19.05	0.7142	3.750	4	silty clay to clay	12
28.38	27.57	0.6669	2.419	6	sandy silt to clayey silt	11
28.54	27.36	1.4285	5.220	3	clay	26
28.71	48.00	1.7777	3.704	5	clayey silt to silty clay	23
28.87	53.80	1.9317	3.590	5	clayey silt to silty clay	26
29.04	38.00	1.4094	3.709	5	clayey silt to silty clay	18
29.20	30.97	1.3783	4.450	4	silty clay to clay	20
29.36	95.60	1.3809	1.444	8	sand to silty sand	23
29.53	60.23	1.7009	2.824	6	sandy silt to clayey silt	23
29.69	34.97	1.5746	4.502	4	silty clay to clay	22
29.86	53.19	1.8826	3.539	5	clayey silt to silty clay	25
30.02	154.53	-32768	-32768	0	<out of range>	0
30.18	175.00	-32768	-32768	0	<out of range>	0

Engeo Inc

Location	1000 N Vasco Rd	Operator	BH-DM	Filename	SDF(521).cpt
Job Number	7380.000.000	Cone Number	DSG0786	GPS	
Hole Number	2-CPT-03	Date and Time	10/8/2010 12:47:16 PM	Maximum Depth	30.51 ft
Water Table Depth		8.00 ft			

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 (*)

Depth Increment

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

Data File:2-CPT-03
Operator:BH-DM
Cone ID:DSG0786
Customer:Engeo
10/8/2010 12:47:16 PM
Location:1000 N Vasco Rd
Job Number:7380.000.000
Units:

Depth (ft)	Qt TSF	Fs TSF	Fs/Qt (%)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	39.44	0.7075	1.794	6	sandy silt to clayey silt	15
0.33	57.04	1.4408	2.526	6	sandy silt to clayey silt	22
0.49	44.81	1.6036	3.579	5	clayey silt to silty clay	21
0.66	32.82	1.5225	4.639	4	silty clay to clay	21
0.82	32.64	1.3108	4.016	4	silty clay to clay	21
0.98	48.04	1.3425	2.794	6	sandy silt to clayey silt	18
1.15	34.14	1.3330	3.905	5	clayey silt to silty clay	16
1.31	19.99	0.9832	4.918	3	clay	19
1.48	15.45	0.7378	4.775	3	clay	15
1.64	14.53	0.6125	4.215	3	clay	14
1.80	13.99	0.6415	4.585	3	clay	13
1.97	13.86	0.7154	5.160	3	clay	13
2.13	14.26	0.7735	5.425	3	clay	14
2.30	15.45	0.8278	5.357	3	clay	15
2.46	17.21	0.8670	5.039	3	clay	16
2.62	18.44	0.8931	4.843	3	clay	18
2.79	19.69	1.0182	5.170	3	clay	19
2.95	22.11	1.0835	4.901	3	clay	21
3.12	22.21	1.1002	4.954	3	clay	21
3.28	23.82	1.4225	5.972	3	clay	23
3.44	30.16	1.5149	5.022	3	clay	29
3.61	33.58	1.6613	4.946	3	clay	32
3.77	38.71	1.6571	4.281	4	silty clay to clay	25
3.94	43.55	1.9434	4.463	4	silty clay to clay	28
4.10	45.92	1.9327	4.209	4	silty clay to clay	29
4.27	41.10	1.8501	4.502	4	silty clay to clay	26
4.43	41.47	1.8195	4.388	4	silty clay to clay	26
4.59	38.61	2.0167	5.223	3	clay	37
4.76	43.33	2.1379	4.933	3	clay	41
4.92	43.64	1.9841	4.547	4	silty clay to clay	28
5.09	39.52	1.7401	4.403	4	silty clay to clay	25
5.25	37.40	1.4938	3.994	5	clayey silt to silty clay	18
5.41	29.68	1.2164	4.098	4	silty clay to clay	19
5.58	25.53	0.9777	3.829	4	silty clay to clay	16
5.74	25.43	0.8247	3.243	5	clayey silt to silty clay	12
5.91	20.28	0.7287	3.593	4	silty clay to clay	13
6.07	16.51	0.6179	3.743	4	silty clay to clay	11
6.23	16.13	0.6300	3.906	4	silty clay to clay	10
6.40	16.25	0.6172	3.799	4	silty clay to clay	10
6.56	18.90	0.7634	4.039	4	silty clay to clay	12
6.73	19.49	0.6753	3.464	4	silty clay to clay	12
6.89	18.83	0.6879	3.654	4	silty clay to clay	12
7.05	17.28	0.5427	3.140	5	clayey silt to silty clay	8
7.22	12.99	0.5212	4.013	3	clay	12
7.38	13.52	0.5525	4.086	3	clay	13
7.55	14.76	0.4985	3.377	4	silty clay to clay	9
7.71	13.33	0.4225	3.169	4	silty clay to clay	9
7.87	14.51	0.7480	5.157	3	clay	14
8.04	23.27	1.6805	7.222	3	clay	22
8.20	25.27	1.7380	6.879	3	clay	24
8.37	35.98	1.3575	3.773	5	clayey silt to silty clay	17
8.53	21.62	1.0548	4.880	3	clay	21
8.69	22.95	0.8643	3.767	4	silty clay to clay	15
8.86	27.77	1.0862	3.911	4	silty clay to clay	18
9.02	29.03	0.9978	3.437	5	clayey silt to silty clay	14
9.19	45.87	0.8141	1.775	7	silty sand to sandy silt	15
9.35	31.09	0.6726	2.163	6	sandy silt to clayey silt	12
9.51	25.53	0.7589	2.972	5	clayey silt to silty clay	12

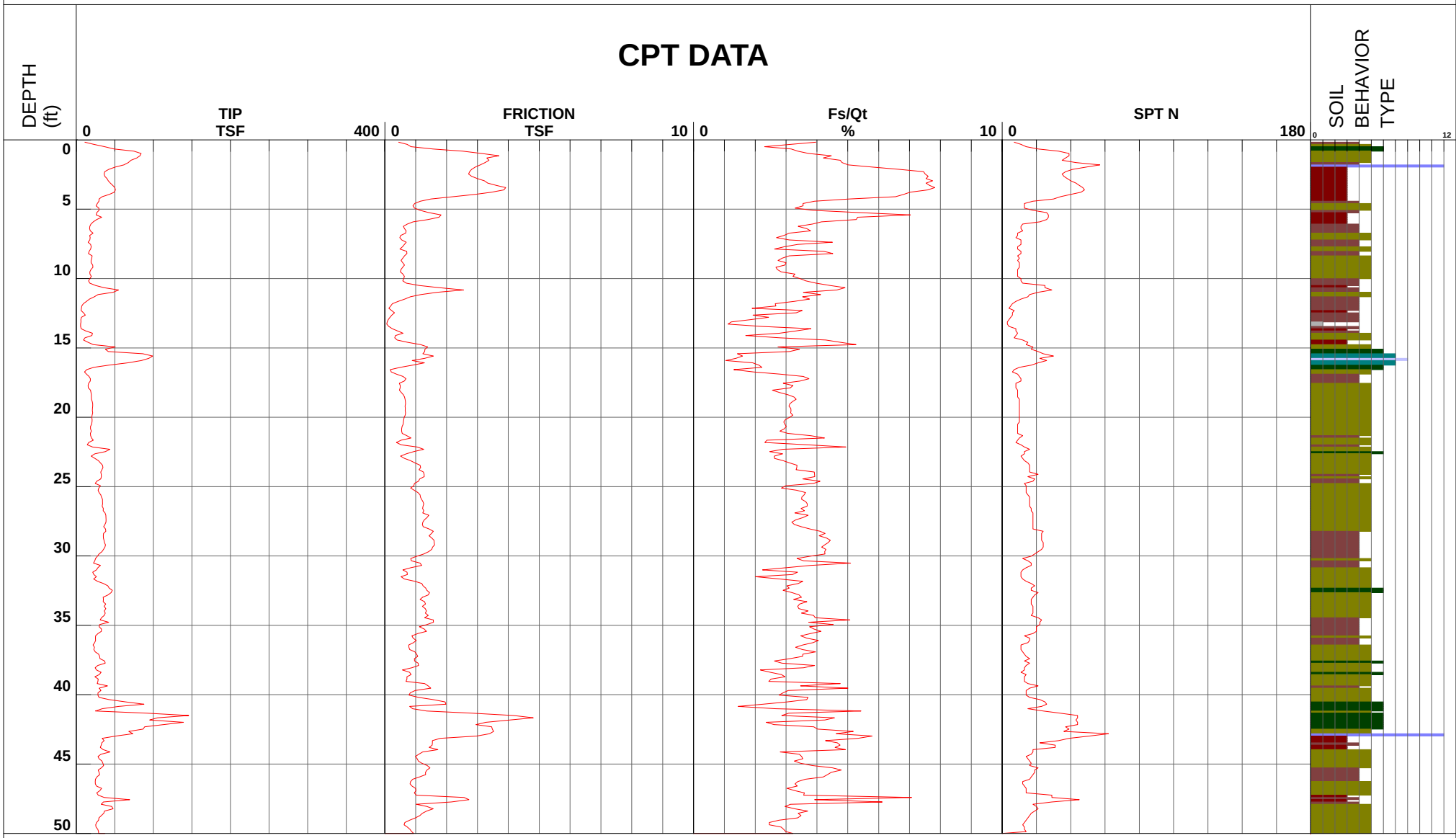
9.68	60.22	0.6903	1.146	7	silty sand to sandy silt	19
9.84	80.56	0.7593	0.942	8	sand to silty sand	19
10.01	91.38	0.9445	1.034	8	sand to silty sand	22
10.17	105.82	1.0893	1.029	8	sand to silty sand	25
10.33	128.86	1.0022	0.778	8	sand to silty sand	31
10.50	139.26	0.9076	0.652	9	sand	27
10.66	143.04	0.9525	0.666	9	sand	27
10.83	142.51	0.6884	0.483	9	sand	27
10.99	133.99	0.5715	0.427	9	sand	26
11.15	104.64	0.4335	0.414	9	sand	20
11.32	87.28	1.1118	1.274	8	sand to silty sand	21
11.48	40.90	0.7992	1.954	6	sandy silt to clayey silt	16
11.65	26.21	0.4557	1.738	6	sandy silt to clayey silt	10
11.81	18.73	0.5637	3.009	5	clayey silt to silty clay	9
11.98	25.27	0.9328	3.691	4	silty clay to clay	16
12.14	32.40	0.8312	2.565	6	sandy silt to clayey silt	12
12.30	23.60	0.5662	2.399	5	clayey silt to silty clay	11
12.47	16.97	0.1079	0.636	6	sandy silt to clayey silt	6
12.63	14.02	0.5929	4.230	3	clay	13
12.80	38.84	2.9683	7.643	3	clay	37
12.96	85.10	3.8652	4.542	11	very stiff fine grained (*)	81
13.12	95.91	5.0744	5.291	11	very stiff fine grained (*)	92
13.29	164.78	4.3516	2.641	7	silty sand to sandy silt	53
13.45	184.73	3.8679	2.094	7	silty sand to sandy silt	59
13.62	197.71	4.5921	2.323	7	silty sand to sandy silt	63
13.78	244.35	3.4150	1.398	8	sand to silty sand	58
13.94	258.17	3.5417	1.372	8	sand to silty sand	62
14.11	325.85	4.9698	1.525	8	sand to silty sand	78
14.27	344.51	4.1032	1.191	9	sand	66
14.44	351.91	6.0373	1.716	8	sand to silty sand	84
14.60	305.36	6.2617	2.051	8	sand to silty sand	73
14.76	305.33	4.0689	1.333	9	sand	58
14.93	267.64	2.3711	0.886	9	sand	51
15.09	258.15	1.6204	0.628	9	sand	49
15.26	259.37	1.8756	0.723	9	sand	50
15.42	206.69	1.7384	0.841	9	sand	40
15.58	143.86	1.2071	0.839	9	sand	28
15.75	68.64	0.8049	1.173	7	silty sand to sandy silt	22
15.91	46.14	0.6442	1.396	7	silty sand to sandy silt	15
16.08	34.34	0.5275	1.536	6	sandy silt to clayey silt	13
16.24	29.39	0.5864	1.995	6	sandy silt to clayey silt	11
16.40	30.49	0.6634	2.176	6	sandy silt to clayey silt	12
16.57	31.11	0.7052	2.267	6	sandy silt to clayey silt	12
16.73	31.11	0.7758	2.494	6	sandy silt to clayey silt	12
16.90	31.40	0.8390	2.672	6	sandy silt to clayey silt	12
17.06	31.57	0.8030	2.544	6	sandy silt to clayey silt	12
17.22	29.99	0.9030	3.011	5	clayey silt to silty clay	14
17.39	33.26	0.8246	2.479	6	sandy silt to clayey silt	13
17.55	30.22	0.7819	2.587	6	sandy silt to clayey silt	12
17.72	28.48	0.7255	2.547	6	sandy silt to clayey silt	11
17.88	26.90	0.6738	2.505	6	sandy silt to clayey silt	10
18.04	25.63	0.6344	2.476	5	clayey silt to silty clay	12
18.21	20.68	0.5733	2.772	5	clayey silt to silty clay	10
18.37	18.14	0.5093	2.808	5	clayey silt to silty clay	9
18.54	18.14	0.4367	2.407	5	clayey silt to silty clay	9
18.70	15.83	0.4380	2.767	5	clayey silt to silty clay	8
18.86	17.77	0.4852	2.731	5	clayey silt to silty clay	9
19.03	18.57	0.4074	2.194	5	clayey silt to silty clay	9
19.19	15.39	0.3491	2.268	5	clayey silt to silty clay	7
19.36	11.95	0.3139	2.626	4	silty clay to clay	8
19.52	14.08	0.5223	3.709	4	silty clay to clay	9
19.69	23.66	1.0253	4.334	4	silty clay to clay	15
19.85	49.47	0.8180	1.653	7	silty sand to sandy silt	16
20.01	42.47	0.7247	1.706	7	silty sand to sandy silt	14
20.18	100.33	1.8449	1.839	7	silty sand to sandy silt	32
20.34	96.08	1.8538	1.929	7	silty sand to sandy silt	31

20.51	103.92	1.7963	1.729	7	silty sand to sandy silt	33
20.67	141.76	2.2129	1.561	8	sand to silty sand	34
20.83	107.93	1.7150	1.589	7	silty sand to sandy silt	34
21.00	51.08	1.6004	3.133	6	sandy silt to clayey silt	20
21.16	45.52	1.0446	2.295	6	sandy silt to clayey silt	17
21.33	44.16	0.9399	2.129	6	sandy silt to clayey silt	17
21.49	34.94	0.9900	2.834	6	sandy silt to clayey silt	13
21.65	27.82	1.0146	3.647	5	clayey silt to silty clay	13
21.82	22.73	0.7239	3.185	5	clayey silt to silty clay	11
21.98	13.26	0.6334	4.775	3	clay	13
22.15	20.42	0.6938	3.398	5	clayey silt to silty clay	10
22.31	24.38	0.4808	1.972	6	sandy silt to clayey silt	9
22.47	17.61	0.4218	2.395	5	clayey silt to silty clay	8
22.64	12.80	0.4175	3.263	4	silty clay to clay	8
22.80	20.11	0.6326	3.146	5	clayey silt to silty clay	10
22.97	25.46	0.8037	3.157	5	clayey silt to silty clay	12
23.13	25.46	0.5209	2.046	6	sandy silt to clayey silt	10
23.29	18.64	0.8725	4.681	3	clay	18
23.46	34.96	1.6433	4.701	4	silty clay to clay	22
23.62	88.65	1.8007	2.031	7	silty sand to sandy silt	28
23.79	141.77	1.2510	0.882	8	sand to silty sand	34
23.95	165.09	1.1493	0.696	9	sand	32
24.11	157.84	0.9970	0.632	9	sand	30
24.28	143.04	0.9977	0.698	9	sand	27
24.44	99.98	1.5648	1.565	7	silty sand to sandy silt	32
24.61	49.67	0.9854	1.984	6	sandy silt to clayey silt	19
24.77	35.72	0.8765	2.454	6	sandy silt to clayey silt	14
24.93	33.43	1.0095	3.020	5	clayey silt to silty clay	16
25.10	37.98	1.1701	3.081	5	clayey silt to silty clay	18
25.26	33.69	1.2147	3.605	5	clayey silt to silty clay	16
25.43	33.35	0.9791	2.936	5	clayey silt to silty clay	16
25.59	30.88	1.1275	3.652	5	clayey silt to silty clay	15
25.75	30.82	1.2183	3.953	4	silty clay to clay	20
25.92	30.94	1.2862	4.157	4	silty clay to clay	20
26.08	29.12	1.2918	4.436	4	silty clay to clay	19
26.25	30.18	1.5174	5.028	3	clay	29
26.41	41.40	1.5543	3.754	5	clayey silt to silty clay	20
26.57	37.41	1.4056	3.757	5	clayey silt to silty clay	18
26.74	34.34	1.2727	3.707	5	clayey silt to silty clay	16
26.90	31.90	1.2474	3.910	4	silty clay to clay	20
27.07	30.82	1.1421	3.705	5	clayey silt to silty clay	15
27.23	28.71	1.0347	3.604	5	clayey silt to silty clay	14
27.40	24.33	0.6890	2.832	5	clayey silt to silty clay	12
27.56	20.72	0.6880	3.320	5	clayey silt to silty clay	10
27.72	25.09	0.8127	3.239	5	clayey silt to silty clay	12
27.89	25.32	0.7976	3.151	5	clayey silt to silty clay	12
28.05	22.86	0.7196	3.148	5	clayey silt to silty clay	11
28.22	30.22	0.7328	2.425	6	sandy silt to clayey silt	12
28.38	33.55	0.7402	2.207	6	sandy silt to clayey silt	13
28.54	34.80	0.9289	2.669	6	sandy silt to clayey silt	13
28.71	36.86	1.0413	2.825	6	sandy silt to clayey silt	14
28.87	38.29	1.0486	2.739	6	sandy silt to clayey silt	15
29.04	36.95	0.9783	2.647	6	sandy silt to clayey silt	14
29.20	34.73	0.9687	2.789	6	sandy silt to clayey silt	13
29.36	38.36	0.9710	2.531	6	sandy silt to clayey silt	15
29.53	41.76	1.1511	2.756	6	sandy silt to clayey silt	16
29.69	40.04	1.3473	3.365	5	clayey silt to silty clay	19
29.86	45.36	1.3074	2.882	6	sandy silt to clayey silt	17
30.02	44.47	1.4255	3.205	5	clayey silt to silty clay	21
30.18	46.70	1.5588	3.338	5	clayey silt to silty clay	22
30.35	50.69	-32768	-32768	0	<out of range>	0
30.51	43.99	-32768	-32768	0	<out of range>	0

Engeo Inc

Location	1000 N Vasco Rd	Operator	BH-DM	Filename	SDF(519).cpt
Job Number	7380.000.000	Cone Number	DSG0786	GPS	
Hole Number	2-CPT-04	Date and Time	10/8/2010 9:55:00 AM	Maximum Depth	50.36 ft
Water Table Depth		8.00 ft			

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 (*)

Depth Increment

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

Data File:2-CPT-04
Operator:BH-DM
Cone ID:DSG0786
Customer:Engeo
10/8/2010 9:55:00 AM
Location:1000 N Vasco Rd
Job Number:7380.000.000
Units:

Depth (ft)	Qt TSF	Fs TSF	Fs/Qt (%)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	11.23	0.4455	3.966	3	clay	11
0.33	22.93	0.7226	3.151	5	clayey silt to silty clay	11
0.49	36.78	0.8472	2.304	6	sandy silt to clayey silt	14
0.66	49.01	1.5512	3.165	5	clayey silt to silty clay	23
0.82	74.83	2.5304	3.381	6	sandy silt to clayey silt	29
0.98	83.98	3.1330	3.731	5	clayey silt to silty clay	40
1.15	82.72	3.6941	4.466	5	clayey silt to silty clay	40
1.31	78.48	3.3015	4.207	5	clayey silt to silty clay	38
1.48	71.01	3.3745	4.752	11	very stiff fine grained (*)	68
1.64	67.42	3.2453	4.814	4	silty clay to clay	43
1.80	61.70	3.0917	5.011	4	silty clay to clay	39
1.97	50.51	2.9289	5.799	3	clay	48
2.13	42.09	2.8115	6.679	3	clay	40
2.30	36.89	2.7496	7.454	3	clay	35
2.46	36.16	2.7151	7.509	3	clay	35
2.62	36.94	2.8097	7.605	3	clay	35
2.79	39.81	2.9998	7.536	3	clay	38
2.95	41.64	3.2259	7.748	3	clay	40
3.12	44.23	3.3346	7.538	3	clay	42
3.28	47.27	3.6149	7.648	3	clay	45
3.44	50.08	3.9146	7.817	3	clay	48
3.61	50.79	3.8549	7.589	3	clay	49
3.77	49.26	3.4581	7.019	3	clay	47
3.94	42.84	2.9179	6.810	3	clay	41
4.10	33.65	2.2049	6.553	3	clay	32
4.27	29.57	1.4879	5.032	3	clay	28
4.43	29.32	1.1511	3.925	4	silty clay to clay	19
4.59	27.21	0.9658	3.549	5	clayey silt to silty clay	13
4.76	25.58	0.9086	3.552	5	clayey silt to silty clay	12
4.92	29.21	0.9623	3.294	5	clayey silt to silty clay	14
5.09	29.50	1.1409	3.867	4	silty clay to clay	19
5.25	26.45	1.4245	5.386	3	clay	25
5.41	25.90	1.8210	7.029	3	clay	25
5.58	32.94	1.7525	5.320	3	clay	32
5.74	26.57	1.4010	5.273	3	clay	25
5.91	22.04	0.9144	4.149	4	silty clay to clay	14
6.07	18.98	0.7329	3.861	4	silty clay to clay	12
6.23	17.62	0.5978	3.393	4	silty clay to clay	11
6.40	17.34	0.6366	3.671	4	silty clay to clay	11
6.56	18.16	0.6891	3.794	4	silty clay to clay	12
6.73	21.79	0.6764	3.104	5	clayey silt to silty clay	10
6.89	17.48	0.5127	2.933	5	clayey silt to silty clay	8
7.05	17.99	0.4838	2.690	5	clayey silt to silty clay	9
7.22	17.64	0.5479	3.106	5	clayey silt to silty clay	8
7.38	15.36	0.6920	4.504	3	clay	15
7.55	18.71	0.6307	3.371	5	clayey silt to silty clay	9
7.71	19.41	0.5715	2.944	5	clayey silt to silty clay	9
7.87	18.65	0.4901	2.627	5	clayey silt to silty clay	9
8.04	16.68	0.7051	4.228	3	clay	16
8.20	15.85	0.7159	4.517	3	clay	15
8.37	20.58	0.6379	3.100	5	clayey silt to silty clay	10
8.53	20.18	0.5808	2.878	5	clayey silt to silty clay	10
8.69	19.25	0.5273	2.739	5	clayey silt to silty clay	9
8.86	19.34	0.5796	2.997	5	clayey silt to silty clay	9
9.02	21.41	0.6341	2.961	5	clayey silt to silty clay	10
9.19	21.62	0.5771	2.670	5	clayey silt to silty clay	10
9.35	19.10	0.5191	2.718	5	clayey silt to silty clay	9
9.51	17.63	0.5011	2.842	5	clayey silt to silty clay	8

9.68	17.77	0.5840	3.287	5	clayey silt to silty clay	9
9.84	19.58	0.6306	3.220	5	clayey silt to silty clay	9
10.01	17.67	0.6112	3.459	4	silty clay to clay	11
10.17	15.89	0.5785	3.640	4	silty clay to clay	10
10.33	17.52	0.6966	3.975	4	silty clay to clay	11
10.50	25.13	1.1116	4.424	4	silty clay to clay	16
10.66	35.90	1.7627	4.910	3	clay	34
10.83	54.84	2.5476	4.646	4	silty clay to clay	35
10.99	47.76	1.7005	3.561	5	clayey silt to silty clay	23
11.15	28.24	1.1632	4.119	4	silty clay to clay	18
11.32	23.44	0.8290	3.537	5	clayey silt to silty clay	11
11.48	17.14	0.6443	3.758	4	silty clay to clay	11
11.65	13.26	0.4325	3.262	4	silty clay to clay	8
11.81	9.25	0.2454	2.653	4	silty clay to clay	6
11.98	7.09	0.1896	2.676	4	silty clay to clay	5
12.14	6.76	0.1285	1.903	4	silty clay to clay	4
12.30	6.16	0.2173	3.529	3	clay	6
12.47	9.33	0.3106	3.330	3	clay	9
12.63	11.84	0.2282	1.927	5	clayey silt to silty clay	6
12.80	6.72	0.1637	2.437	4	silty clay to clay	4
12.96	5.92	0.1102	1.861	4	silty clay to clay	4
13.12	6.06	0.0743	1.228	1	sensitive fine grained	3
13.29	5.68	0.0637	1.122	1	sensitive fine grained	3
13.45	5.64	0.1239	2.195	4	silty clay to clay	4
13.62	6.31	0.2405	3.814	3	clay	6
13.78	12.24	0.4075	3.330	4	silty clay to clay	8
13.94	21.07	0.5875	2.789	5	clayey silt to silty clay	10
14.11	20.33	0.3442	1.693	6	sandy silt to clayey silt	8
14.27	11.30	0.3166	2.801	4	silty clay to clay	7
14.44	9.31	0.3995	4.292	3	clay	9
14.60	15.45	0.7362	4.764	3	clay	15
14.76	21.97	1.1571	5.267	3	clay	21
14.93	50.65	1.3880	2.740	6	sandy silt to clayey silt	19
15.09	37.76	1.2976	3.437	5	clayey silt to silty clay	18
15.26	41.39	1.2882	3.112	5	clayey silt to silty clay	20
15.42	86.34	1.2294	1.424	7	silty sand to sandy silt	28
15.58	98.94	1.5693	1.586	7	silty sand to sandy silt	32
15.75	94.05	1.2918	1.374	8	sand to silty sand	23
15.91	84.47	0.8835	1.046	8	sand to silty sand	20
16.08	66.73	1.2823	1.922	7	silty sand to sandy silt	21
16.24	42.23	0.8966	2.123	6	sandy silt to clayey silt	16
16.40	22.57	0.5009	2.219	6	sandy silt to clayey silt	9
16.57	13.49	0.1765	1.309	6	sandy silt to clayey silt	5
16.73	10.62	0.2071	1.949	5	clayey silt to silty clay	5
16.90	13.29	0.3732	2.808	5	clayey silt to silty clay	6
17.06	16.51	0.5876	3.558	4	silty clay to clay	11
17.22	18.28	0.6845	3.746	4	silty clay to clay	12
17.39	18.21	0.6292	3.456	4	silty clay to clay	12
17.55	16.11	0.4684	2.908	5	clayey silt to silty clay	8
17.72	15.47	0.4990	3.226	4	silty clay to clay	10
17.88	15.71	0.4939	3.143	4	silty clay to clay	10
18.04	18.49	0.4730	2.558	5	clayey silt to silty clay	9
18.21	19.14	0.5332	2.786	5	clayey silt to silty clay	9
18.37	19.57	0.6001	3.066	5	clayey silt to silty clay	9
18.54	19.58	0.6377	3.257	5	clayey silt to silty clay	9
18.70	19.66	0.6550	3.332	5	clayey silt to silty clay	9
18.86	20.78	0.6675	3.212	5	clayey silt to silty clay	10
19.03	21.39	0.6687	3.126	5	clayey silt to silty clay	10
19.19	21.26	0.6579	3.095	5	clayey silt to silty clay	10
19.36	21.03	0.6635	3.154	5	clayey silt to silty clay	10
19.52	20.85	0.6595	3.163	5	clayey silt to silty clay	10
19.69	21.28	0.6701	3.149	5	clayey silt to silty clay	10
19.85	20.52	0.6610	3.221	5	clayey silt to silty clay	10
20.01	20.11	0.6261	3.114	5	clayey silt to silty clay	10
20.18	20.47	0.6097	2.979	5	clayey silt to silty clay	10
20.34	20.43	0.5979	2.927	5	clayey silt to silty clay	10

20.51	19.92	0.5908	2.966	5	clayey silt to silty clay	10
20.67	18.55	0.5581	3.008	5	clayey silt to silty clay	9
20.83	18.49	0.5445	2.944	5	clayey silt to silty clay	9
21.00	19.48	0.5460	2.803	5	clayey silt to silty clay	9
21.16	18.46	0.5645	3.059	5	clayey silt to silty clay	9
21.33	18.64	0.7095	3.807	4	silty clay to clay	12
21.49	19.95	0.8467	4.245	3	clay	19
21.65	22.04	0.5248	2.381	5	clayey silt to silty clay	11
21.82	16.21	0.3751	2.314	5	clayey silt to silty clay	8
21.98	14.33	0.5304	3.702	4	silty clay to clay	9
22.15	21.20	1.0474	4.940	3	clay	20
22.31	43.57	1.2601	2.892	6	sandy silt to clayey silt	17
22.47	37.87	0.9368	2.473	6	sandy silt to clayey silt	15
22.64	24.13	0.6975	2.891	5	clayey silt to silty clay	12
22.80	19.44	0.5093	2.620	5	clayey silt to silty clay	9
22.97	24.09	0.6334	2.629	5	clayey silt to silty clay	12
23.13	28.61	0.8291	2.898	5	clayey silt to silty clay	14
23.29	31.31	0.9761	3.118	5	clayey silt to silty clay	15
23.46	33.99	1.1402	3.355	5	clayey silt to silty clay	16
23.62	34.58	1.1575	3.347	5	clayey silt to silty clay	17
23.79	33.32	1.1076	3.325	5	clayey silt to silty clay	16
23.95	31.92	1.2488	3.913	4	silty clay to clay	20
24.11	32.34	1.2690	3.924	4	silty clay to clay	21
24.28	32.49	1.2766	3.929	4	silty clay to clay	21
24.44	31.83	1.1285	3.546	5	clayey silt to silty clay	15
24.61	26.54	1.0885	4.102	4	silty clay to clay	17
24.77	24.66	0.9588	3.888	4	silty clay to clay	16
24.93	31.40	0.9405	2.995	5	clayey silt to silty clay	15
25.10	29.28	0.8340	2.849	5	clayey silt to silty clay	14
25.26	28.43	0.9493	3.339	5	clayey silt to silty clay	14
25.43	29.46	1.0695	3.631	5	clayey silt to silty clay	14
25.59	31.85	1.1423	3.586	5	clayey silt to silty clay	15
25.75	32.76	1.1508	3.513	5	clayey silt to silty clay	16
25.92	33.96	1.1904	3.506	5	clayey silt to silty clay	16
26.08	33.97	1.2366	3.640	5	clayey silt to silty clay	16
26.25	34.24	1.2619	3.686	5	clayey silt to silty clay	16
26.41	33.66	1.2398	3.683	5	clayey silt to silty clay	16
26.57	35.05	1.2224	3.488	5	clayey silt to silty clay	17
26.74	35.00	1.2590	3.597	5	clayey silt to silty clay	17
26.90	37.34	1.2270	3.286	5	clayey silt to silty clay	18
27.07	38.38	1.4257	3.714	5	clayey silt to silty clay	18
27.23	38.48	1.3652	3.548	5	clayey silt to silty clay	18
27.40	38.66	1.2801	3.311	5	clayey silt to silty clay	19
27.56	38.63	1.2308	3.186	5	clayey silt to silty clay	18
27.72	37.22	1.2168	3.269	5	clayey silt to silty clay	18
27.89	35.61	1.2430	3.490	5	clayey silt to silty clay	17
28.05	37.93	1.4308	3.772	5	clayey silt to silty clay	18
28.22	38.31	1.5721	4.104	4	silty clay to clay	24
28.38	35.39	1.5091	4.264	4	silty clay to clay	23
28.54	35.14	1.4306	4.071	4	silty clay to clay	22
28.71	35.28	1.5224	4.315	4	silty clay to clay	23
28.87	35.96	1.5939	4.432	4	silty clay to clay	23
29.04	36.56	1.5962	4.366	4	silty clay to clay	23
29.20	37.91	1.6116	4.251	4	silty clay to clay	24
29.36	37.23	1.5460	4.152	4	silty clay to clay	24
29.53	35.41	1.5196	4.292	4	silty clay to clay	23
29.69	33.33	1.4168	4.251	4	silty clay to clay	21
29.86	29.56	1.2596	4.261	4	silty clay to clay	19
30.02	27.48	1.0401	3.785	4	silty clay to clay	18
30.18	24.97	0.8374	3.354	5	clayey silt to silty clay	12
30.35	23.99	0.8558	3.568	5	clayey silt to silty clay	11
30.51	22.39	1.1395	5.090	3	clay	21
30.68	31.36	1.1922	3.802	5	clayey silt to silty clay	15
30.84	28.05	0.8405	2.996	5	clayey silt to silty clay	13
31.00	26.09	0.5837	2.238	6	sandy silt to clayey silt	10
31.17	21.32	0.7182	3.368	5	clayey silt to silty clay	10

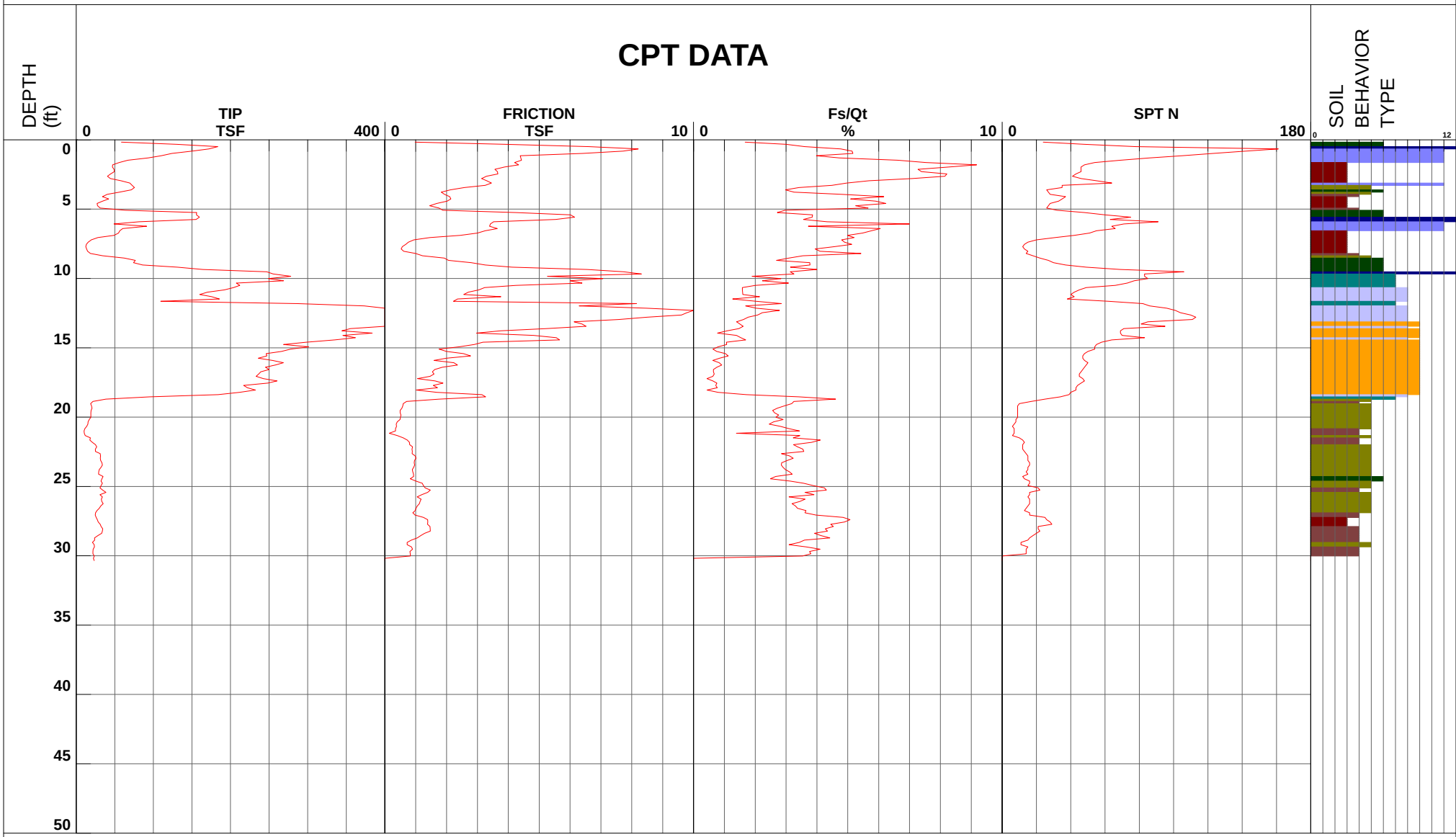
31.33	22.78	0.7316	3.211	5	clayey silt to silty clay	11
31.50	26.09	0.5240	2.009	6	sandy silt to clayey silt	10
31.66	22.55	0.6318	2.802	5	clayey silt to silty clay	11
31.82	27.47	0.9719	3.538	5	clayey silt to silty clay	13
31.99	35.20	1.1951	3.395	5	clayey silt to silty clay	17
32.15	40.95	1.2397	3.027	5	clayey silt to silty clay	20
32.32	42.65	1.3220	3.099	5	clayey silt to silty clay	20
32.48	46.85	1.3588	2.900	6	sandy silt to clayey silt	18
32.64	45.33	1.4473	3.193	5	clayey silt to silty clay	22
32.81	41.17	1.4076	3.419	5	clayey silt to silty clay	20
32.97	34.95	1.2216	3.496	5	clayey silt to silty clay	17
33.14	35.23	1.1428	3.244	5	clayey silt to silty clay	17
33.30	34.99	1.2855	3.674	5	clayey silt to silty clay	17
33.46	38.28	1.3164	3.439	5	clayey silt to silty clay	18
33.63	36.05	1.2169	3.376	5	clayey silt to silty clay	17
33.79	38.41	1.3117	3.415	5	clayey silt to silty clay	18
33.96	36.31	1.3472	3.711	5	clayey silt to silty clay	17
34.12	37.55	1.3137	3.499	5	clayey silt to silty clay	18
34.28	36.19	1.4076	3.889	5	clayey silt to silty clay	17
34.45	32.78	1.2919	3.941	4	silty clay to clay	21
34.61	30.97	1.5689	5.067	3	clay	30
34.78	42.14	1.5735	3.733	5	clayey silt to silty clay	20
34.94	30.21	1.3665	4.524	4	silty clay to clay	19
35.10	29.76	1.1188	3.759	5	clayey silt to silty clay	14
35.27	32.70	1.2764	3.903	4	silty clay to clay	21
35.43	32.63	1.3479	4.131	4	silty clay to clay	21
35.60	28.21	1.0691	3.790	4	silty clay to clay	18
35.76	25.20	0.8756	3.475	5	clayey silt to silty clay	12
35.93	24.96	0.9161	3.670	5	clayey silt to silty clay	12
36.09	25.18	1.0187	4.045	4	silty clay to clay	16
36.25	23.94	0.9265	3.870	4	silty clay to clay	15
36.42	21.85	0.7748	3.545	5	clayey silt to silty clay	10
36.58	23.54	0.7787	3.308	5	clayey silt to silty clay	11
36.75	22.82	0.8052	3.528	5	clayey silt to silty clay	11
36.91	24.64	0.9746	3.955	4	silty clay to clay	16
37.07	28.96	1.0265	3.545	5	clayey silt to silty clay	14
37.24	30.24	1.0681	3.533	5	clayey silt to silty clay	14
37.40	30.72	0.9584	3.120	5	clayey silt to silty clay	15
37.57	36.69	0.9617	2.621	6	sandy silt to clayey silt	14
37.73	37.57	1.0762	2.864	6	sandy silt to clayey silt	14
37.89	27.84	1.0924	3.923	4	silty clay to clay	18
38.06	24.47	0.8719	3.563	5	clayey silt to silty clay	12
38.22	26.24	0.5681	2.165	6	sandy silt to clayey silt	10
38.39	32.24	0.8011	2.485	6	sandy silt to clayey silt	12
38.55	29.87	0.8512	2.849	5	clayey silt to silty clay	14
38.71	24.21	0.7174	2.964	5	clayey silt to silty clay	12
38.88	28.52	0.7169	2.514	6	sandy silt to clayey silt	11
39.04	28.11	0.6849	2.437	6	sandy silt to clayey silt	11
39.21	27.18	1.2918	4.752	3	clay	26
39.37	40.49	1.4050	3.470	5	clayey silt to silty clay	19
39.53	29.71	1.4862	5.002	3	clay	28
39.70	32.11	0.9846	3.067	5	clayey silt to silty clay	15
39.86	28.23	0.8204	2.906	5	clayey silt to silty clay	14
40.03	28.16	0.7801	2.770	5	clayey silt to silty clay	13
40.19	29.61	1.0969	3.705	5	clayey silt to silty clay	14
40.35	42.55	1.5627	3.673	5	clayey silt to silty clay	20
40.52	64.18	1.9514	3.041	6	sandy silt to clayey silt	25
40.68	87.89	1.9787	2.251	7	silty sand to sandy silt	28
40.85	55.26	0.8015	1.450	7	silty sand to sandy silt	18
41.01	33.69	0.8952	2.657	6	sandy silt to clayey silt	13
41.17	24.87	1.3493	5.425	3	clay	24
41.34	92.16	2.8414	3.083	6	sandy silt to clayey silt	35
41.50	145.85	4.1698	2.859	7	silty sand to sandy silt	47
41.67	105.27	4.8072	4.567	11	very stiff fine grained (*)	101
41.83	95.16	4.0482	4.254	5	clayey silt to silty clay	46
41.99	138.88	3.2741	2.357	7	silty sand to sandy silt	44

42.16	113.02	2.9512	2.611	7	silty sand to sandy silt	36
42.32	88.81	3.4614	3.898	5	clayey silt to silty clay	43
42.49	86.61	3.4835	4.022	5	clayey silt to silty clay	41
42.65	68.05	3.5225	5.177	11	very stiff fine grained (*)	65
42.81	73.34	3.3912	4.624	4	silty clay to clay	47
42.98	51.49	2.9805	5.788	3	clay	49
43.14	33.66	1.7930	5.327	3	clay	32
43.31	36.06	1.5416	4.275	4	silty clay to clay	23
43.47	33.07	1.5416	4.662	4	silty clay to clay	21
43.64	32.32	1.5347	4.748	3	clay	31
43.80	31.28	1.4343	4.586	4	silty clay to clay	20
43.96	34.94	1.7188	4.919	3	clay	33
44.13	43.72	1.2267	2.806	6	sandy silt to clayey silt	17
44.29	32.07	1.0998	3.429	5	clayey silt to silty clay	15
44.46	28.32	0.9924	3.504	5	clayey silt to silty clay	14
44.62	29.54	1.0457	3.540	5	clayey silt to silty clay	14
44.78	33.25	1.0861	3.267	5	clayey silt to silty clay	16
44.95	34.47	1.1946	3.466	5	clayey silt to silty clay	16
45.11	35.65	1.3713	3.847	5	clayey silt to silty clay	17
45.28	32.53	1.4643	4.502	4	silty clay to clay	21
45.44	28.56	1.3668	4.787	3	clay	27
45.60	29.48	1.3155	4.463	4	silty clay to clay	19
45.77	30.40	1.3190	4.339	4	silty clay to clay	19
45.93	26.72	1.1228	4.203	4	silty clay to clay	17
46.10	24.96	0.9038	3.621	5	clayey silt to silty clay	12
46.26	24.65	0.8332	3.380	5	clayey silt to silty clay	12
46.42	24.76	0.8140	3.288	5	clayey silt to silty clay	12
46.59	26.22	0.8813	3.361	5	clayey silt to silty clay	13
46.75	32.86	0.9964	3.032	5	clayey silt to silty clay	16
46.92	30.69	1.0085	3.285	5	clayey silt to silty clay	15
47.08	26.51	0.9517	3.590	5	clayey silt to silty clay	13
47.24	28.58	1.0195	3.568	5	clayey silt to silty clay	14
47.41	36.34	2.5664	7.062	3	clay	35
47.57	69.39	2.7228	3.924	5	clayey silt to silty clay	33
47.74	35.18	2.1505	6.113	3	clay	34
47.90	32.41	1.0182	3.142	5	clayey silt to silty clay	16
48.06	45.88	1.3615	2.967	6	sandy silt to clayey silt	18
48.23	47.81	1.5662	3.276	5	clayey silt to silty clay	23
48.39	36.61	1.3549	3.701	5	clayey silt to silty clay	18
48.56	35.75	1.2129	3.393	5	clayey silt to silty clay	17
48.72	32.49	1.1324	3.485	5	clayey silt to silty clay	16
48.88	29.39	0.9924	3.376	5	clayey silt to silty clay	14
49.05	28.95	0.8026	2.772	5	clayey silt to silty clay	14
49.21	26.35	0.6479	2.459	6	sandy silt to clayey silt	10
49.38	25.32	0.6218	2.456	5	clayey silt to silty clay	12
49.54	25.61	0.7272	2.840	5	clayey silt to silty clay	12
49.70	27.85	0.8127	2.918	5	clayey silt to silty clay	13
49.87	29.06	0.8682	2.987	5	clayey silt to silty clay	14
50.03	29.05	0.9366	3.224	5	clayey silt to silty clay	14
50.20	31.05	-32768	-32768	0	<out of range>	0
50.36	37.26	-32768	-32768	0	<out of range>	0

Engeo Inc

Location	1000 N Vasco Rd	Operator	BH-DM	Filename	SDF(523).cpt
Job Number	7380.000.000	Cone Number	DSG0786	GPS	
Hole Number	2-CPT-05	Date and Time	10/8/2010 2:15:03 PM	Maximum Depth	30.35 ft
Water Table Depth		8.00 ft			

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 (*)

Depth Increment

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

Data File:2-CPT-05
Operator:BH-DM
Cone ID:DSG0786
Customer:Engeo
10/8/2010 2:15:03 PM
Location:1000 N Vasco Rd
Job Number:7380.000.000
Units:

Depth (ft)	Qt TSF	Fs TSF	Fs/Qt (%)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	58.54	0.9802	1.675	7	silty sand to sandy silt	19
0.33	130.22	3.9101	3.003	6	sandy silt to clayey silt	50
0.49	183.34	6.6090	3.605	12	sand to clayey sand (*)	88
0.66	171.95	8.2094	4.774	11	very stiff fine grained (*)	165
0.82	150.18	7.7185	5.140	11	very stiff fine grained (*)	144
0.98	123.99	6.4054	5.166	11	very stiff fine grained (*)	119
1.15	110.16	4.3858	3.981	5	clayey silt to silty clay	53
1.31	93.24	4.4051	4.725	11	very stiff fine grained (*)	89
1.48	66.91	4.4284	6.619	11	very stiff fine grained (*)	64
1.64	55.84	4.2031	7.527	3	clay	53
1.80	47.25	4.3334	9.171	3	clay	45
1.97	46.90	3.8763	8.265	3	clay	45
2.13	48.96	3.5621	7.276	3	clay	47
2.30	49.41	3.6483	7.384	3	clay	47
2.46	44.61	3.6618	8.209	3	clay	43
2.62	40.43	3.2917	8.142	3	clay	39
2.79	44.24	3.1337	7.083	3	clay	42
2.95	57.98	3.2987	5.690	3	clay	56
3.12	69.51	3.4524	4.966	11	very stiff fine grained (*)	67
3.28	72.53	3.2513	4.483	5	clayey silt to silty clay	35
3.44	75.47	2.5807	3.420	6	sandy silt to clayey silt	29
3.61	71.30	2.1230	2.978	6	sandy silt to clayey silt	27
3.77	56.09	1.8261	3.255	6	sandy silt to clayey silt	21
3.94	40.25	1.9317	4.799	4	silty clay to clay	26
4.10	34.11	2.1015	6.162	3	clay	33
4.27	42.04	2.1374	5.085	3	clay	40
4.43	34.24	2.0191	5.897	3	clay	33
4.59	27.02	1.6839	6.231	3	clay	26
4.76	27.69	1.4539	5.250	3	clay	27
4.92	31.02	1.7536	5.653	3	clay	30
5.09	63.19	1.8755	2.968	6	sandy silt to clayey silt	24
5.25	156.11	4.2341	2.712	7	silty sand to sandy silt	50
5.41	155.95	6.0150	3.857	12	sand to clayey sand (*)	75
5.58	159.71	6.1426	3.846	12	sand to clayey sand (*)	76
5.74	155.33	5.5343	3.563	6	sandy silt to clayey silt	59
5.91	81.43	3.5238	4.328	5	clayey silt to silty clay	39
6.07	48.89	3.4171	6.990	3	clay	47
6.23	91.23	3.3918	3.718	5	clayey silt to silty clay	44
6.40	60.15	3.6421	6.055	11	very stiff fine grained (*)	58
6.56	56.35	3.2509	5.769	3	clay	54
6.73	54.76	3.0001	5.478	3	clay	52
6.89	48.89	2.4389	4.988	4	silty clay to clay	31
7.05	28.14	1.4641	5.204	3	clay	27
7.22	19.60	0.9412	4.802	3	clay	19
7.38	15.60	0.7636	4.896	3	clay	15
7.55	13.20	0.6770	5.131	3	clay	13
7.71	12.41	0.5667	4.566	3	clay	12
7.87	13.43	0.5298	3.946	3	clay	13
8.04	14.85	0.6090	4.102	3	clay	14
8.20	18.37	0.9967	5.426	3	clay	18
8.37	34.37	1.2190	3.547	5	clayey silt to silty clay	16
8.53	62.19	1.9230	3.092	6	sandy silt to clayey silt	24
8.69	76.71	2.0632	2.690	6	sandy silt to clayey silt	29
8.86	74.22	2.7968	3.768	5	clayey silt to silty clay	36
9.02	86.08	3.2486	3.774	5	clayey silt to silty clay	41
9.19	131.26	4.1225	3.141	6	sandy silt to clayey silt	50
9.35	164.01	6.5561	3.997	12	sand to clayey sand (*)	79
9.51	246.90	7.7401	3.135	12	sand to clayey sand (*)	118

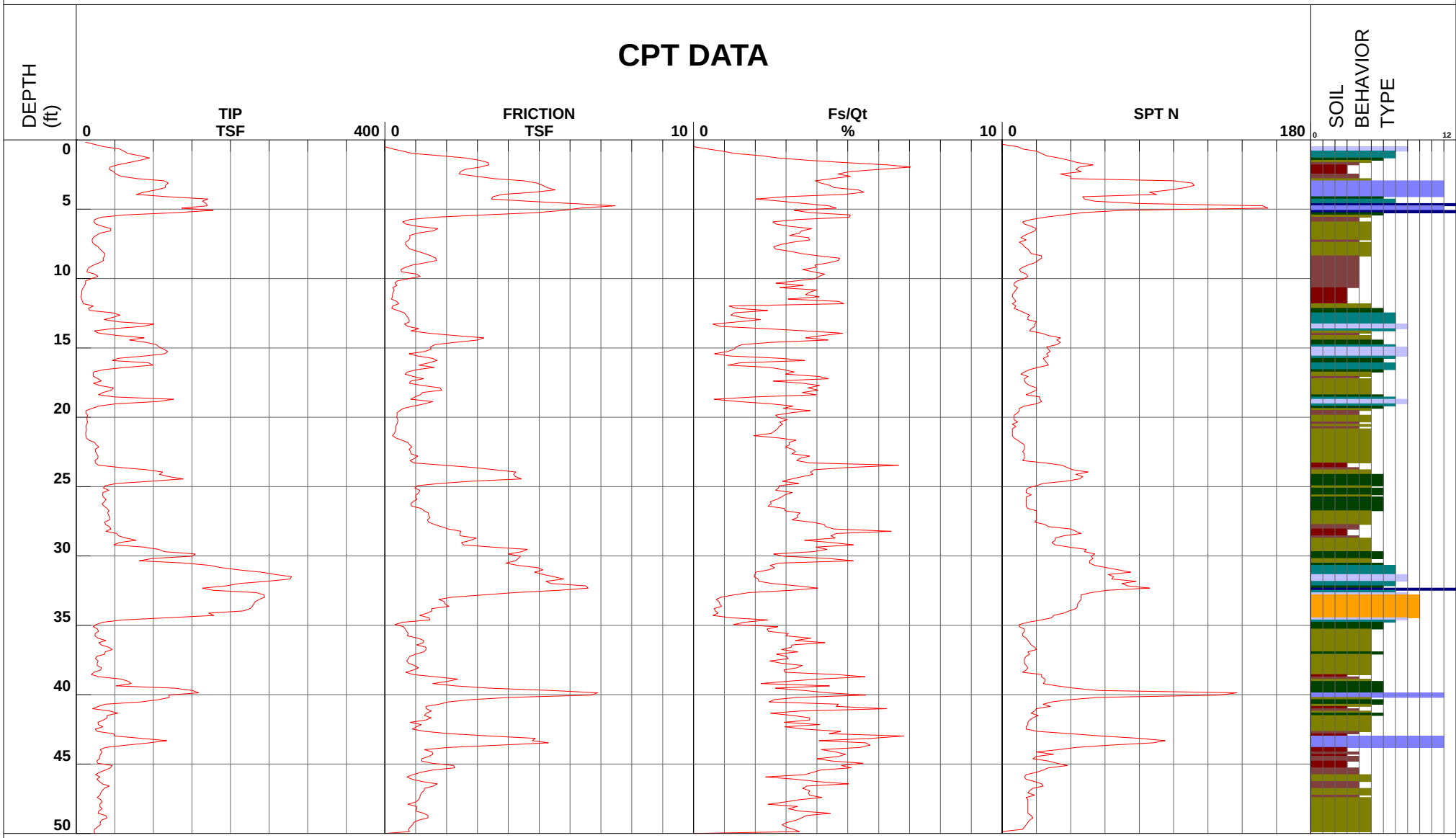
9.68	255.23	8.3086	3.255	12	sand to clayey sand (*)	122
9.84	277.89	5.2657	1.895	8	sand to silty sand	67
10.01	248.95	7.0641	2.838	7	silty sand to sandy silt	79
10.17	268.64	6.0071	2.236	7	silty sand to sandy silt	86
10.33	207.50	6.3867	3.078	7	silty sand to sandy silt	66
10.50	211.96	4.2486	2.004	8	sand to silty sand	51
10.66	203.91	3.2300	1.584	8	sand to silty sand	49
10.83	192.02	3.0426	1.584	8	sand to silty sand	46
10.99	169.85	2.7030	1.591	8	sand to silty sand	41
11.15	159.98	2.5546	1.597	8	sand to silty sand	38
11.32	175.46	3.7586	2.142	7	silty sand to sandy silt	56
11.48	185.41	2.3572	1.271	8	sand to silty sand	44
11.65	109.40	2.2227	2.032	7	silty sand to sandy silt	35
11.81	286.31	8.1551	2.848	12	sand to clayey sand (*)	137
11.98	373.12	6.2946	1.687	8	sand to silty sand	89
12.14	416.48	8.4745	2.035	8	sand to silty sand	100
12.30	406.95	11.3414	2.787	12	sand to clayey sand (*)	195
12.47	439.16	9.7868	2.229	8	sand to silty sand	105
12.63	462.47	9.6097	2.078	8	sand to silty sand	111
12.80	479.92	8.5009	1.771	8	sand to silty sand	115
12.96	467.34	7.5847	1.623	8	sand to silty sand	112
13.12	438.46	6.1301	1.398	9	sand	84
13.29	425.89	6.3869	1.500	9	sand	82
13.45	404.86	6.5201	1.610	8	sand to silty sand	97
13.62	355.37	5.2299	1.472	8	sand to silty sand	85
13.78	344.32	3.7610	1.092	9	sand	66
13.94	383.40	2.9757	0.776	10	gravelly sand to sand	61
14.11	345.50	4.8184	1.395	9	sand	66
14.27	361.75	5.5554	1.536	8	sand to silty sand	87
14.44	334.95	5.6588	1.689	8	sand to silty sand	80
14.60	298.24	3.1818	1.067	9	sand	57
14.76	268.76	2.8933	1.077	9	sand	51
14.93	301.09	2.4054	0.799	9	sand	58
15.09	277.88	1.7549	0.632	9	sand	53
15.26	266.05	1.9957	0.750	9	sand	51
15.42	246.06	2.5464	1.035	9	sand	47
15.58	247.16	2.7774	1.124	9	sand	47
15.75	236.06	1.9917	0.844	9	sand	45
15.91	254.14	1.5948	0.628	9	sand	49
16.08	268.43	2.2338	0.832	9	sand	51
16.24	257.87	2.3574	0.914	9	sand	49
16.40	245.19	1.8656	0.761	9	sand	47
16.57	249.99	1.6138	0.646	9	sand	48
16.73	239.08	1.5409	0.644	9	sand	46
16.90	236.49	1.5927	0.673	9	sand	45
17.06	233.16	1.4656	0.629	9	sand	45
17.22	242.30	1.0577	0.437	9	sand	46
17.39	260.17	1.6272	0.625	9	sand	50
17.55	248.10	1.8816	0.758	9	sand	48
17.72	217.10	1.5693	0.723	9	sand	42
17.88	221.80	1.7047	0.769	9	sand	42
18.04	232.18	1.0163	0.438	9	sand	44
18.21	211.64	1.6849	0.796	9	sand	41
18.37	183.85	3.1429	1.710	8	sand to silty sand	44
18.54	95.53	3.2644	3.417	6	sandy silt to clayey silt	37
18.70	38.26	1.7647	4.612	4	silty clay to clay	24
18.86	21.57	0.7030	3.259	5	clayey silt to silty clay	10
19.03	18.68	0.5952	3.186	5	clayey silt to silty clay	9
19.19	19.72	0.5806	2.945	5	clayey silt to silty clay	9
19.36	20.33	0.5521	2.716	5	clayey silt to silty clay	10
19.52	19.28	0.4953	2.569	5	clayey silt to silty clay	9
19.69	18.86	0.4959	2.630	5	clayey silt to silty clay	9
19.85	18.84	0.5209	2.766	5	clayey silt to silty clay	9
20.01	18.93	0.5067	2.677	5	clayey silt to silty clay	9
20.18	16.93	0.4928	2.910	5	clayey silt to silty clay	8
20.34	15.44	0.4017	2.603	5	clayey silt to silty clay	7

20.51	14.98	0.3682	2.458	5	clayey silt to silty clay	7
20.67	13.51	0.3807	2.818	5	clayey silt to silty clay	6
20.83	11.12	0.3447	3.100	4	silty clay to clay	7
21.00	10.05	0.3466	3.449	3	clay	10
21.16	10.38	0.1446	1.393	5	clayey silt to silty clay	5
21.33	11.61	0.4015	3.459	4	silty clay to clay	7
21.49	18.35	0.5941	3.238	5	clayey silt to silty clay	9
21.65	17.60	0.7244	4.116	4	silty clay to clay	11
21.82	20.82	0.7980	3.833	4	silty clay to clay	13
21.98	24.86	0.8073	3.247	5	clayey silt to silty clay	12
22.15	26.57	0.8976	3.379	5	clayey silt to silty clay	13
22.31	24.69	0.8768	3.552	5	clayey silt to silty clay	12
22.47	24.84	0.8890	3.578	5	clayey silt to silty clay	12
22.64	31.03	0.8844	2.850	5	clayey silt to silty clay	15
22.80	31.47	0.9820	3.120	5	clayey silt to silty clay	15
22.97	31.27	1.0116	3.235	5	clayey silt to silty clay	15
23.13	31.57	0.9613	3.045	5	clayey silt to silty clay	15
23.29	33.24	0.9507	2.860	5	clayey silt to silty clay	16
23.46	33.86	0.9645	2.848	6	sandy silt to clayey silt	13
23.62	32.08	0.9314	2.904	5	clayey silt to silty clay	15
23.79	29.87	0.8901	2.980	5	clayey silt to silty clay	14
23.95	29.06	0.9052	3.115	5	clayey silt to silty clay	14
24.11	28.93	0.9261	3.201	5	clayey silt to silty clay	14
24.28	34.84	0.9294	2.668	6	sandy silt to clayey silt	13
24.44	33.17	0.8261	2.491	6	sandy silt to clayey silt	13
24.61	32.07	1.0039	3.131	5	clayey silt to silty clay	15
24.77	33.87	1.2100	3.572	5	clayey silt to silty clay	16
24.93	32.15	1.2473	3.880	5	clayey silt to silty clay	15
25.10	30.71	1.3043	4.247	4	silty clay to clay	20
25.26	34.15	1.4709	4.308	4	silty clay to clay	22
25.43	38.41	1.3891	3.617	5	clayey silt to silty clay	18
25.59	30.67	1.1993	3.911	4	silty clay to clay	20
25.75	33.79	1.0479	3.101	5	clayey silt to silty clay	16
25.92	32.42	1.1738	3.621	5	clayey silt to silty clay	16
26.08	33.03	1.1376	3.444	5	clayey silt to silty clay	16
26.25	34.92	1.1162	3.197	5	clayey silt to silty clay	17
26.41	31.84	1.0528	3.307	5	clayey silt to silty clay	15
26.57	29.90	1.0075	3.370	5	clayey silt to silty clay	14
26.74	26.92	0.9824	3.649	5	clayey silt to silty clay	13
26.90	25.05	0.9058	3.616	5	clayey silt to silty clay	12
27.07	24.66	0.9806	3.977	4	silty clay to clay	16
27.23	25.73	1.2492	4.855	3	clay	25
27.40	27.34	1.3881	5.078	3	clay	26
27.56	28.44	1.3926	4.896	3	clay	27
27.72	31.05	1.3820	4.451	4	silty clay to clay	20
27.89	32.26	1.4624	4.533	4	silty clay to clay	21
28.05	34.32	1.4677	4.277	4	silty clay to clay	22
28.22	33.90	1.4715	4.341	4	silty clay to clay	22
28.38	32.91	1.2918	3.925	4	silty clay to clay	21
28.54	28.15	1.1637	4.134	4	silty clay to clay	18
28.71	23.76	1.0508	4.423	3	clay	23
28.87	23.85	0.8579	3.598	5	clayey silt to silty clay	11
29.04	21.00	0.7210	3.434	5	clayey silt to silty clay	10
29.20	23.25	0.7208	3.100	5	clayey silt to silty clay	11
29.36	23.52	0.8588	3.651	4	silty clay to clay	15
29.53	21.88	0.8985	4.107	4	silty clay to clay	14
29.69	21.60	0.8129	3.764	4	silty clay to clay	14
29.86	21.67	0.8251	3.808	4	silty clay to clay	14
30.02	23.38	0.8276	3.539	5	clayey silt to silty clay	11
30.18	22.32	-32768	-32768	0	<out of range>	0
30.35	23.25	-32768	-32768	0	<out of range>	0

Engeo Inc

Location	1000 N Vasco Rd	Operator	BH-DM	Filename	SDF(522).cpt
Job Number	7380.000.000	Cone Number	DSG0786	GPS	
Hole Number	2-CPT-06	Date and Time	10/8/2010 1:30:58 PM	Maximum Depth	50.20 ft
Water Table Depth		8.00 ft			

CPT DATA



1 - sensitive fine grained
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8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Depth Increment

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

Data File:2-CPT-06
Operator:BH-DM
Cone ID:DSG0786
Customer:Engeo
10/8/2010 1:30:58 PM
Location:1000 N Vasco Rd
Job Number:7380.000.000
Units:

Depth (ft)	Qt TSF	Fs TSF	Fs/Qt (%)	Zone	Soil Behavior Type UBC-1983	SPT N* 60% Hammer
0.16	12.30	-0.0431	-0.351	0	<out of range>	0
0.33	23.67	-0.0597	-0.252	0	<out of range>	0
0.49	35.85	-0.0813	-0.227	0	<out of range>	0
0.66	56.39	0.2630	0.466	8	sand to silty sand	13
0.82	61.80	0.5839	0.945	7	silty sand to sandy silt	20
0.98	67.03	0.8964	1.337	7	silty sand to sandy silt	21
1.15	82.74	1.8334	2.216	7	silty sand to sandy silt	26
1.31	94.84	2.5974	2.739	6	sandy silt to clayey silt	36
1.48	82.79	3.0748	3.714	5	clayey silt to silty clay	40
1.64	68.09	3.3427	4.909	11	very stiff fine grained (*)	65
1.80	53.51	3.3675	6.293	3	clay	51
1.97	43.89	3.0860	7.032	3	clay	42
2.13	43.14	2.5968	6.019	3	clay	41
2.30	48.56	2.4515	5.048	3	clay	46
2.46	51.42	2.4044	4.676	4	silty clay to clay	33
2.62	58.30	2.9626	5.082	4	silty clay to clay	37
2.79	78.75	3.5300	4.483	5	clayey silt to silty clay	38
2.95	113.95	4.5034	3.952	5	clayey silt to silty clay	55
3.12	119.35	4.9286	4.130	11	very stiff fine grained (*)	114
3.28	115.65	5.1153	4.423	11	very stiff fine grained (*)	111
3.44	115.40	5.2563	4.555	11	very stiff fine grained (*)	110
3.61	103.44	5.5190	5.336	11	very stiff fine grained (*)	99
3.77	87.64	4.8379	5.520	11	very stiff fine grained (*)	84
3.94	77.96	3.8116	4.889	11	very stiff fine grained (*)	75
4.10	117.75	3.4997	2.972	6	sandy silt to clayey silt	45
4.27	170.58	3.4570	2.027	7	silty sand to sandy silt	54
4.43	163.70	4.6293	2.828	7	silty sand to sandy silt	52
4.59	168.59	6.0636	3.597	12	sand to clayey sand (*)	81
4.76	170.11	7.4597	4.385	11	very stiff fine grained (*)	163
4.92	136.75	6.3206	4.622	11	very stiff fine grained (*)	131
5.09	177.60	5.7977	3.264	6	sandy silt to clayey silt	68
5.25	130.89	4.9378	3.773	6	sandy silt to clayey silt	50
5.41	63.16	3.2092	5.081	11	very stiff fine grained (*)	60
5.58	32.30	1.6298	5.046	3	clay	31
5.74	24.17	0.8190	3.388	5	clayey silt to silty clay	12
5.91	22.64	0.5819	2.570	5	clayey silt to silty clay	11
6.07	25.36	0.6776	2.672	5	clayey silt to silty clay	12
6.23	34.04	1.0574	3.106	5	clayey silt to silty clay	16
6.40	44.94	1.7218	3.831	5	clayey silt to silty clay	22
6.56	44.69	1.5666	3.506	5	clayey silt to silty clay	21
6.73	30.91	1.0593	3.427	5	clayey silt to silty clay	15
6.89	25.83	0.8036	3.111	5	clayey silt to silty clay	12
7.05	21.90	0.8141	3.717	4	silty clay to clay	14
7.22	20.68	0.7775	3.760	4	silty clay to clay	13
7.38	21.00	0.6723	3.201	5	clayey silt to silty clay	10
7.55	23.64	0.6699	2.833	5	clayey silt to silty clay	11
7.71	28.39	0.7361	2.593	6	sandy silt to clayey silt	11
7.87	30.77	0.8163	2.653	6	sandy silt to clayey silt	12
8.04	33.83	1.0630	3.142	5	clayey silt to silty clay	16
8.20	36.90	1.2882	3.491	5	clayey silt to silty clay	18
8.37	36.93	1.4941	4.046	4	silty clay to clay	24
8.53	34.95	1.6521	4.728	4	silty clay to clay	22
8.69	35.60	1.6708	4.693	4	silty clay to clay	23
8.86	29.94	1.3119	4.382	4	silty clay to clay	19
9.02	22.55	0.8882	3.938	4	silty clay to clay	14
9.19	17.02	0.6765	3.975	4	silty clay to clay	11
9.35	14.64	0.5189	3.543	4	silty clay to clay	9
9.51	14.00	0.5437	3.885	4	silty clay to clay	9

9.68	24.05	1.0216	4.248	4	silty clay to clay	15
9.84	28.13	1.1452	4.071	4	silty clay to clay	18
10.01	19.53	0.7712	3.950	4	silty clay to clay	12
10.17	12.16	0.4042	3.323	4	silty clay to clay	8
10.33	12.13	0.3242	2.672	4	silty clay to clay	8
10.50	10.92	0.3878	3.553	3	clay	10
10.66	9.16	0.2566	2.800	4	silty clay to clay	6
10.83	7.50	0.2987	3.983	3	clay	7
10.99	7.17	0.2694	3.755	3	clay	7
11.15	6.88	0.2494	3.626	3	clay	7
11.32	5.94	0.2416	4.064	3	clay	6
11.48	6.96	0.2132	3.064	3	clay	7
11.65	8.13	0.3820	4.698	3	clay	8
11.81	9.34	0.4546	4.868	3	clay	9
11.98	22.08	0.2551	1.156	6	sandy silt to clayey silt	8
12.14	16.00	0.2220	1.388	6	sandy silt to clayey silt	6
12.30	17.31	0.4154	2.399	5	clayey silt to silty clay	8
12.47	47.20	0.6250	1.324	7	silty sand to sandy silt	15
12.63	56.73	0.6877	1.212	7	silty sand to sandy silt	18
12.80	47.87	0.7410	1.548	7	silty sand to sandy silt	15
12.96	36.26	0.7875	2.172	6	sandy silt to clayey silt	14
13.12	55.77	0.7904	1.417	7	silty sand to sandy silt	18
13.29	100.45	0.6335	0.631	8	sand to silty sand	24
13.45	85.71	0.7470	0.872	8	sand to silty sand	21
13.62	46.11	1.0942	2.373	6	sandy silt to clayey silt	18
13.78	23.36	0.8494	3.636	4	silty clay to clay	15
13.94	29.40	1.4203	4.831	3	clay	28
14.11	54.00	2.2559	4.178	5	clayey silt to silty clay	26
14.27	88.06	3.2042	3.638	5	clayey silt to silty clay	42
14.44	69.11	3.0118	4.358	5	clayey silt to silty clay	33
14.60	90.05	2.2910	2.544	6	sandy silt to clayey silt	34
14.76	103.99	1.6270	1.565	7	silty sand to sandy silt	33
14.93	107.17	1.4755	1.377	8	sand to silty sand	26
15.09	113.44	1.4971	1.320	8	sand to silty sand	27
15.26	118.28	1.2913	1.092	8	sand to silty sand	28
15.42	114.84	0.7838	0.683	8	sand to silty sand	27
15.58	88.34	1.0669	1.208	8	sand to silty sand	21
15.75	54.07	1.5441	2.856	6	sandy silt to clayey silt	21
15.91	46.75	1.6909	3.617	5	clayey silt to silty clay	22
16.08	93.72	1.4150	1.510	7	silty sand to sandy silt	30
16.24	99.34	1.1086	1.116	8	sand to silty sand	24
16.40	65.16	1.5928	2.445	6	sandy silt to clayey silt	25
16.57	35.76	1.0488	2.933	5	clayey silt to silty clay	17
16.73	22.46	0.7351	3.274	5	clayey silt to silty clay	11
16.90	21.81	0.6538	2.997	5	clayey silt to silty clay	10
17.06	22.28	0.9113	4.090	4	silty clay to clay	14
17.22	28.43	1.2484	4.391	4	silty clay to clay	18
17.39	32.35	0.8402	2.597	6	sandy silt to clayey silt	12
17.55	22.28	0.7926	3.557	5	clayey silt to silty clay	11
17.72	29.96	1.2273	4.096	4	silty clay to clay	19
17.88	48.07	1.7891	3.722	5	clayey silt to silty clay	23
18.04	45.59	1.8439	4.045	5	clayey silt to silty clay	22
18.21	34.60	1.2247	3.539	5	clayey silt to silty clay	17
18.37	28.87	1.1481	3.977	4	silty clay to clay	18
18.54	50.01	0.9744	1.949	6	sandy silt to clayey silt	19
18.70	125.96	0.8480	0.673	9	sand	24
18.86	105.33	1.5522	1.474	8	sand to silty sand	25
19.03	51.86	1.2896	2.486	6	sandy silt to clayey silt	20
19.19	28.97	0.9355	3.230	5	clayey silt to silty clay	14
19.36	20.64	0.6044	2.929	5	clayey silt to silty clay	10
19.52	12.81	0.4883	3.811	3	clay	12
19.69	12.38	0.3922	3.167	4	silty clay to clay	8
19.85	14.84	0.3986	2.685	5	clayey silt to silty clay	7
20.01	13.88	0.3837	2.765	5	clayey silt to silty clay	7
20.18	13.72	0.4205	3.064	4	silty clay to clay	9
20.34	14.76	0.4154	2.815	5	clayey silt to silty clay	7

20.51	13.34	0.3880	2.908	4	silty clay to clay	9
20.67	12.62	0.3527	2.795	4	silty clay to clay	8
20.83	13.12	0.3607	2.749	5	clayey silt to silty clay	6
21.00	12.90	0.3421	2.652	5	clayey silt to silty clay	6
21.16	12.10	0.3067	2.534	5	clayey silt to silty clay	6
21.33	12.56	0.2484	1.978	5	clayey silt to silty clay	6
21.49	12.94	0.3617	2.796	4	silty clay to clay	8
21.65	16.43	0.5484	3.337	4	silty clay to clay	10
21.82	23.88	0.7439	3.115	5	clayey silt to silty clay	11
21.98	25.80	0.8065	3.126	5	clayey silt to silty clay	12
22.15	29.18	0.8721	2.989	5	clayey silt to silty clay	14
22.31	24.38	0.7856	3.222	5	clayey silt to silty clay	12
22.47	25.10	0.8332	3.320	5	clayey silt to silty clay	12
22.64	26.29	0.8423	3.204	5	clayey silt to silty clay	13
22.80	28.28	1.0666	3.771	5	clayey silt to silty clay	14
22.97	27.72	0.9579	3.456	5	clayey silt to silty clay	13
23.13	24.27	0.8159	3.362	5	clayey silt to silty clay	12
23.29	24.71	0.9347	3.783	4	silty clay to clay	16
23.46	28.63	1.9089	6.669	3	clay	27
23.62	57.17	2.8725	5.025	4	silty clay to clay	36
23.79	90.73	3.5529	3.916	5	clayey silt to silty clay	43
23.95	111.84	4.2451	3.796	6	sandy silt to clayey silt	43
24.11	107.79	4.1737	3.872	5	clayey silt to silty clay	52
24.28	119.68	4.2315	3.536	6	sandy silt to clayey silt	46
24.44	138.63	4.4231	3.191	6	sandy silt to clayey silt	53
24.61	96.62	2.7873	2.885	6	sandy silt to clayey silt	37
24.77	52.33	1.7856	3.412	5	clayey silt to silty clay	25
24.93	37.54	1.0464	2.788	6	sandy silt to clayey silt	14
25.10	35.08	0.9667	2.755	6	sandy silt to clayey silt	13
25.26	42.29	1.1289	2.669	6	sandy silt to clayey silt	16
25.43	34.50	1.1065	3.207	5	clayey silt to silty clay	17
25.59	34.14	1.0143	2.971	5	clayey silt to silty clay	16
25.75	35.03	1.0003	2.855	6	sandy silt to clayey silt	13
25.92	38.56	1.0428	2.705	6	sandy silt to clayey silt	15
26.08	36.51	0.9132	2.501	6	sandy silt to clayey silt	14
26.25	33.33	0.8423	2.527	6	sandy silt to clayey silt	13
26.41	35.88	0.8677	2.418	6	sandy silt to clayey silt	14
26.57	39.81	1.1759	2.954	6	sandy silt to clayey silt	15
26.74	42.44	1.2631	2.976	6	sandy silt to clayey silt	16
26.90	40.79	1.4108	3.459	5	clayey silt to silty clay	20
27.07	42.00	1.4147	3.369	5	clayey silt to silty clay	20
27.23	43.23	1.4578	3.372	5	clayey silt to silty clay	21
27.40	43.04	1.3773	3.200	5	clayey silt to silty clay	21
27.56	36.81	1.4159	3.846	5	clayey silt to silty clay	18
27.72	37.88	1.6092	4.248	4	silty clay to clay	24
27.89	42.64	1.8313	4.295	4	silty clay to clay	27
28.05	44.99	2.0514	4.560	4	silty clay to clay	29
28.22	38.49	2.4717	6.421	3	clay	37
28.38	52.33	2.4288	4.642	4	silty clay to clay	33
28.54	54.73	2.4403	4.459	4	silty clay to clay	35
28.71	64.30	2.9558	4.597	4	silty clay to clay	41
28.87	77.41	2.7922	3.607	5	clayey silt to silty clay	37
29.04	55.26	2.4849	4.497	4	silty clay to clay	35
29.20	48.93	2.5396	5.191	3	clay	47
29.36	87.10	3.4640	3.977	5	clayey silt to silty clay	42
29.53	106.76	4.6188	4.326	11	very stiff fine grained (*)	102
29.69	114.44	4.4387	3.878	5	clayey silt to silty clay	55
29.86	154.01	4.0029	2.599	7	silty sand to sandy silt	49
30.02	150.79	4.3897	2.911	6	sandy silt to clayey silt	58
30.18	98.56	4.3243	4.388	11	very stiff fine grained (*)	94
30.35	81.66	4.2310	5.181	11	very stiff fine grained (*)	78
30.51	141.47	3.9186	2.770	7	silty sand to sandy silt	45
30.68	173.19	4.3047	2.486	7	silty sand to sandy silt	55
30.84	188.51	4.9564	2.629	7	silty sand to sandy silt	60
31.00	210.75	5.1195	2.429	7	silty sand to sandy silt	67
31.17	240.26	4.8498	2.019	8	sand to silty sand	58

31.33	258.39	5.1398	1.989	8	sand to silty sand	62
31.50	278.76	5.4758	1.964	8	sand to silty sand	67
31.66	277.07	5.7983	2.093	8	sand to silty sand	66
31.82	247.10	5.2218	2.113	8	sand to silty sand	59
31.99	211.40	5.3792	2.545	7	silty sand to sandy silt	67
32.15	195.13	6.5052	3.334	12	sand to clayey sand (*)	93
32.32	163.56	6.5855	4.026	12	sand to clayey sand (*)	78
32.48	177.38	5.6347	3.177	6	sandy silt to clayey silt	68
32.64	233.11	4.1961	1.800	8	sand to silty sand	56
32.81	243.47	3.1871	1.309	9	sand	47
32.97	244.08	2.1623	0.886	9	sand	47
33.14	237.26	1.7534	0.739	9	sand	45
33.30	231.81	1.9190	0.828	9	sand	44
33.46	230.00	1.9532	0.849	9	sand	44
33.63	228.06	2.0800	0.912	9	sand	44
33.79	225.22	1.5118	0.671	9	sand	43
33.96	216.28	1.5278	0.706	9	sand	41
34.12	171.73	1.3626	0.793	9	sand	33
34.28	178.23	1.1318	0.635	9	sand	34
34.45	119.59	1.4323	1.198	8	sand to silty sand	29
34.61	60.56	1.4565	2.405	6	sandy silt to clayey silt	23
34.78	34.50	0.5749	1.666	6	sandy silt to clayey silt	13
34.94	25.56	0.3325	1.301	6	sandy silt to clayey silt	10
35.10	22.05	0.6044	2.741	5	clayey silt to silty clay	11
35.27	27.49	0.6568	2.389	6	sandy silt to clayey silt	11
35.43	28.82	0.7057	2.448	6	sandy silt to clayey silt	11
35.60	24.50	0.7548	3.081	5	clayey silt to silty clay	12
35.76	24.21	0.7275	3.004	5	clayey silt to silty clay	12
35.93	28.04	1.0701	3.816	4	silty clay to clay	18
36.09	38.06	1.2606	3.312	5	clayey silt to silty clay	18
36.25	29.26	1.2491	4.269	4	silty clay to clay	19
36.42	32.41	1.0366	3.199	5	clayey silt to silty clay	16
36.58	41.95	1.3314	3.174	5	clayey silt to silty clay	20
36.75	46.74	1.3363	2.859	6	sandy silt to clayey silt	18
36.91	37.33	1.2638	3.385	5	clayey silt to silty clay	18
37.07	37.01	0.9993	2.700	6	sandy silt to clayey silt	14
37.24	26.57	0.8026	3.020	5	clayey silt to silty clay	13
37.40	24.79	0.7636	3.081	5	clayey silt to silty clay	12
37.57	28.47	0.7072	2.484	6	sandy silt to clayey silt	11
37.73	27.04	0.7679	2.840	5	clayey silt to silty clay	13
37.89	27.06	0.9560	3.533	5	clayey silt to silty clay	13
38.06	32.30	1.0883	3.369	5	clayey silt to silty clay	15
38.22	31.67	0.9304	2.938	5	clayey silt to silty clay	15
38.39	22.84	0.6814	2.983	5	clayey silt to silty clay	11
38.55	19.78	0.9247	4.675	3	clay	19
38.71	29.18	1.6279	5.578	3	clay	28
38.88	58.22	2.3617	4.056	5	clayey silt to silty clay	28
39.04	67.43	2.0278	3.007	6	sandy silt to clayey silt	26
39.21	71.15	1.5570	2.188	7	silty sand to sandy silt	23
39.37	51.75	2.2820	4.410	4	silty clay to clay	33
39.53	127.57	3.3923	2.659	7	silty sand to sandy silt	41
39.70	150.35	5.3970	3.590	6	sandy silt to clayey silt	58
39.86	158.48	6.8950	4.351	11	very stiff fine grained (*)	152
40.03	120.02	6.6934	5.577	11	very stiff fine grained (*)	115
40.19	120.66	4.0621	3.367	6	sandy silt to clayey silt	46
40.35	107.48	2.8221	2.626	6	sandy silt to clayey silt	41
40.52	84.01	2.0638	2.457	6	sandy silt to clayey silt	32
40.68	37.41	1.7617	4.709	4	silty clay to clay	24
40.85	28.62	1.3286	4.643	3	clay	27
41.01	21.31	1.3402	6.288	3	clay	20
41.17	43.25	1.5052	3.480	5	clayey silt to silty clay	21
41.34	53.72	1.3446	2.503	6	sandy silt to clayey silt	21
41.50	39.74	1.2815	3.225	5	clayey silt to silty clay	19
41.67	39.76	1.5009	3.775	5	clayey silt to silty clay	19
41.83	35.30	1.3320	3.774	5	clayey silt to silty clay	17
41.99	27.99	0.8244	2.946	5	clayey silt to silty clay	13

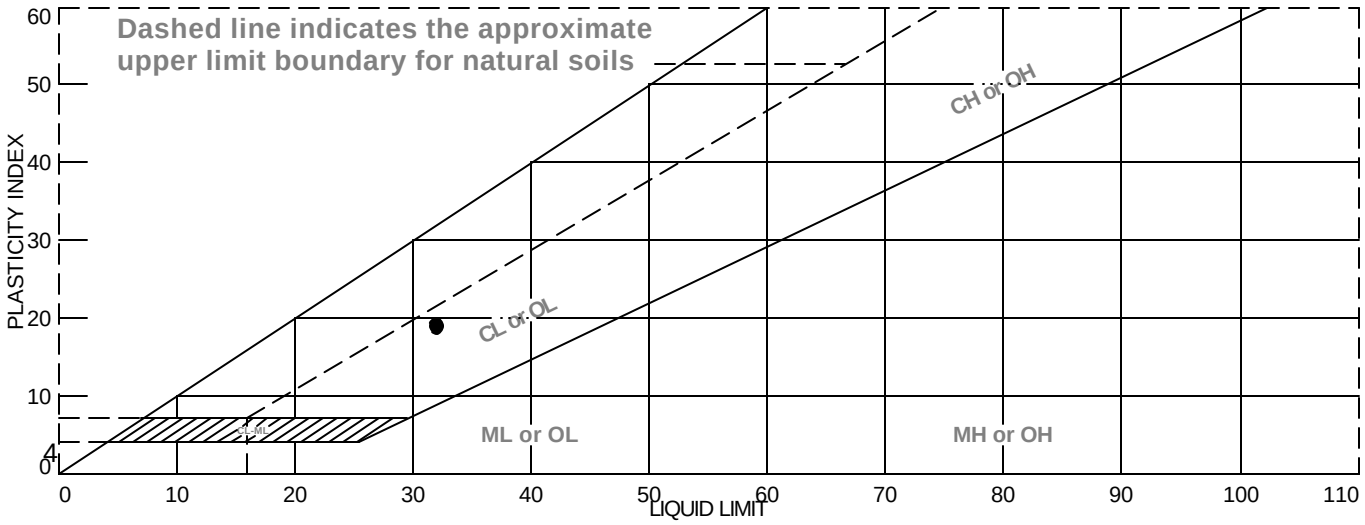
42.16	28.73	1.1756	4.092	4	silty clay to clay	18
42.32	34.37	1.0225	2.975	5	clayey silt to silty clay	16
42.49	24.69	0.8904	3.607	5	clayey silt to silty clay	12
42.65	27.28	1.3041	4.781	3	clay	26
42.81	48.18	2.1233	4.407	4	silty clay to clay	31
42.98	50.00	3.4126	6.826	3	clay	48
43.14	84.29	4.8704	5.778	11	very stiff fine grained (*)	81
43.31	117.16	4.7769	4.077	11	very stiff fine grained (*)	112
43.47	94.87	5.2939	5.580	11	very stiff fine grained (*)	91
43.64	65.03	3.7252	5.728	11	very stiff fine grained (*)	62
43.80	37.98	2.0531	5.406	3	clay	36
43.96	30.93	1.2848	4.154	4	silty clay to clay	20
44.13	33.23	1.5337	4.615	4	silty clay to clay	21
44.29	31.48	1.5553	4.940	3	clay	30
44.46	30.29	1.4285	4.716	3	clay	29
44.62	29.87	1.1997	4.017	4	silty clay to clay	19
44.78	26.49	1.1953	4.512	3	clay	25
44.95	27.79	1.5281	5.499	3	clay	27
45.11	46.49	2.2322	4.801	4	silty clay to clay	30
45.28	44.14	2.2608	5.122	3	clay	42
45.44	37.65	1.5517	4.121	4	silty clay to clay	24
45.60	30.02	1.1663	3.885	4	silty clay to clay	19
45.77	25.09	0.9089	3.623	5	clayey silt to silty clay	12
45.93	30.49	0.7158	2.347	6	sandy silt to clayey silt	12
46.10	26.64	0.8842	3.320	5	clayey silt to silty clay	13
46.26	30.24	1.2166	4.024	4	silty clay to clay	19
46.42	33.68	1.6967	5.038	3	clay	32
46.59	42.63	1.5666	3.675	5	clayey silt to silty clay	20
46.75	36.24	1.2848	3.545	5	clayey silt to silty clay	17
46.92	33.64	1.2714	3.780	5	clayey silt to silty clay	16
47.08	31.67	1.1845	3.740	5	clayey silt to silty clay	15
47.24	30.61	1.1529	3.767	5	clayey silt to silty clay	15
47.41	27.07	1.1298	4.174	4	silty clay to clay	17
47.57	31.69	1.0977	3.464	5	clayey silt to silty clay	15
47.74	33.64	1.0003	2.974	5	clayey silt to silty clay	16
47.90	30.56	0.7428	2.431	6	sandy silt to clayey silt	12
48.06	30.50	1.0303	3.378	5	clayey silt to silty clay	15
48.23	33.50	1.0341	3.087	5	clayey silt to silty clay	16
48.39	29.13	1.0064	3.455	5	clayey silt to silty clay	14
48.56	28.28	1.2597	4.454	4	silty clay to clay	18
48.72	38.24	1.4045	3.673	5	clayey silt to silty clay	18
48.88	39.73	1.3957	3.513	5	clayey silt to silty clay	19
49.05	32.69	1.0917	3.340	5	clayey silt to silty clay	16
49.21	30.74	0.9299	3.025	5	clayey silt to silty clay	15
49.38	31.27	0.9007	2.880	5	clayey silt to silty clay	15
49.54	27.29	0.8254	3.025	5	clayey silt to silty clay	13
49.70	23.63	0.7685	3.252	5	clayey silt to silty clay	11
49.87	23.12	0.7954	3.441	5	clayey silt to silty clay	11
50.03	24.47	-32768	-32768	0	<out of range>	0
50.20	23.41	-32768	-32768	0	<out of range>	0

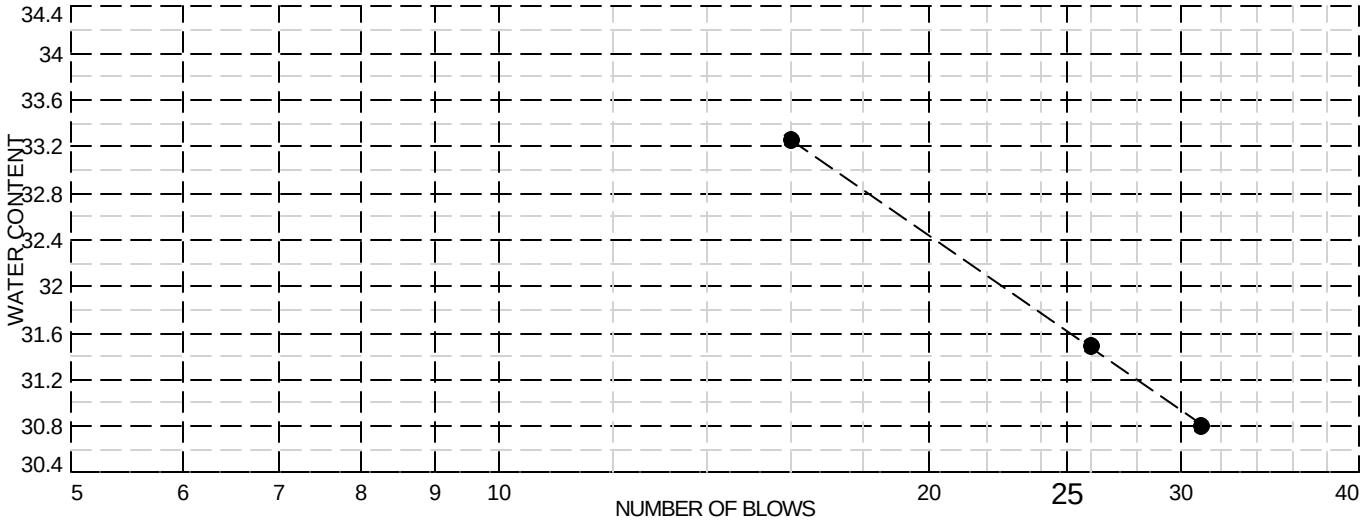
APPENDIX B

Laboratory Test Data

APPENDIX B

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark grayish brown sandy CLAY to clayey SAND.	32	13	19	82.5	51.9	CL-SC

Project No. 7380.000.000 **Client:**

Project: 1000 North Vasco Road

● **Sample Number:** 1

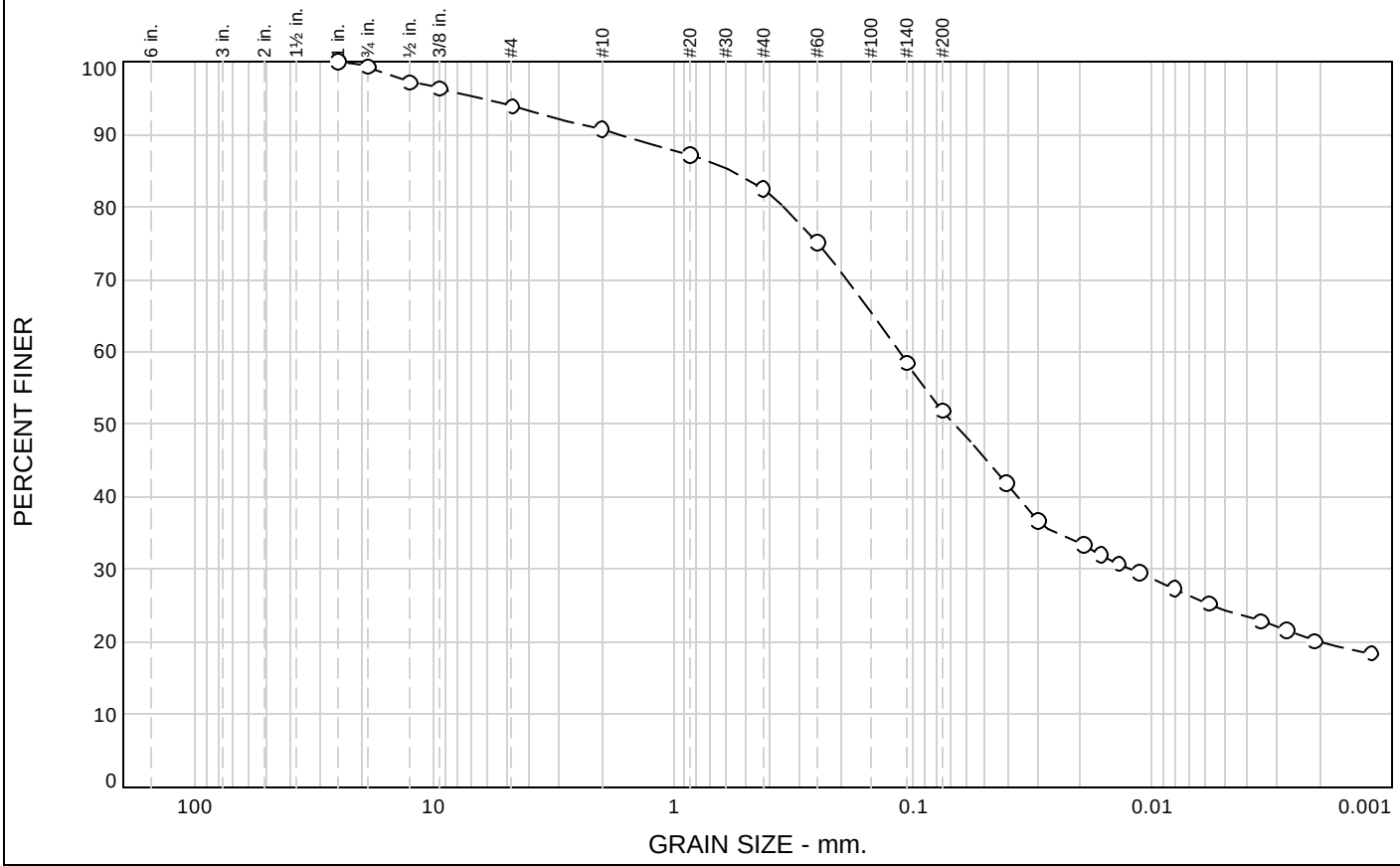
Remarks:

● Import material

ENGEO INCORPORATED GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS MATERIALS TESTING

Plate

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.6	5.5	3.2	8.2	30.6	32.0	19.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	99.4		
.50	97.2		
.375	96.4		
#4	93.9		
#10	90.7		
#20	87.1		
#40	82.5		
#60	75.2		
#140	58.5		
#200	51.9		

* (no specification provided)

Soil Description

Dark grayish brown sandy CLAY to clayey SAND.

Atterberg Limits

PL= 13 LL= 32 PI= 19

Coefficients

D_{85}= 0.5745 D_{60}= 0.1142 D_{50}= 0.0672
D_{30}= 0.0123 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-SC AASHTO= A-6(6)

Remarks

Import material

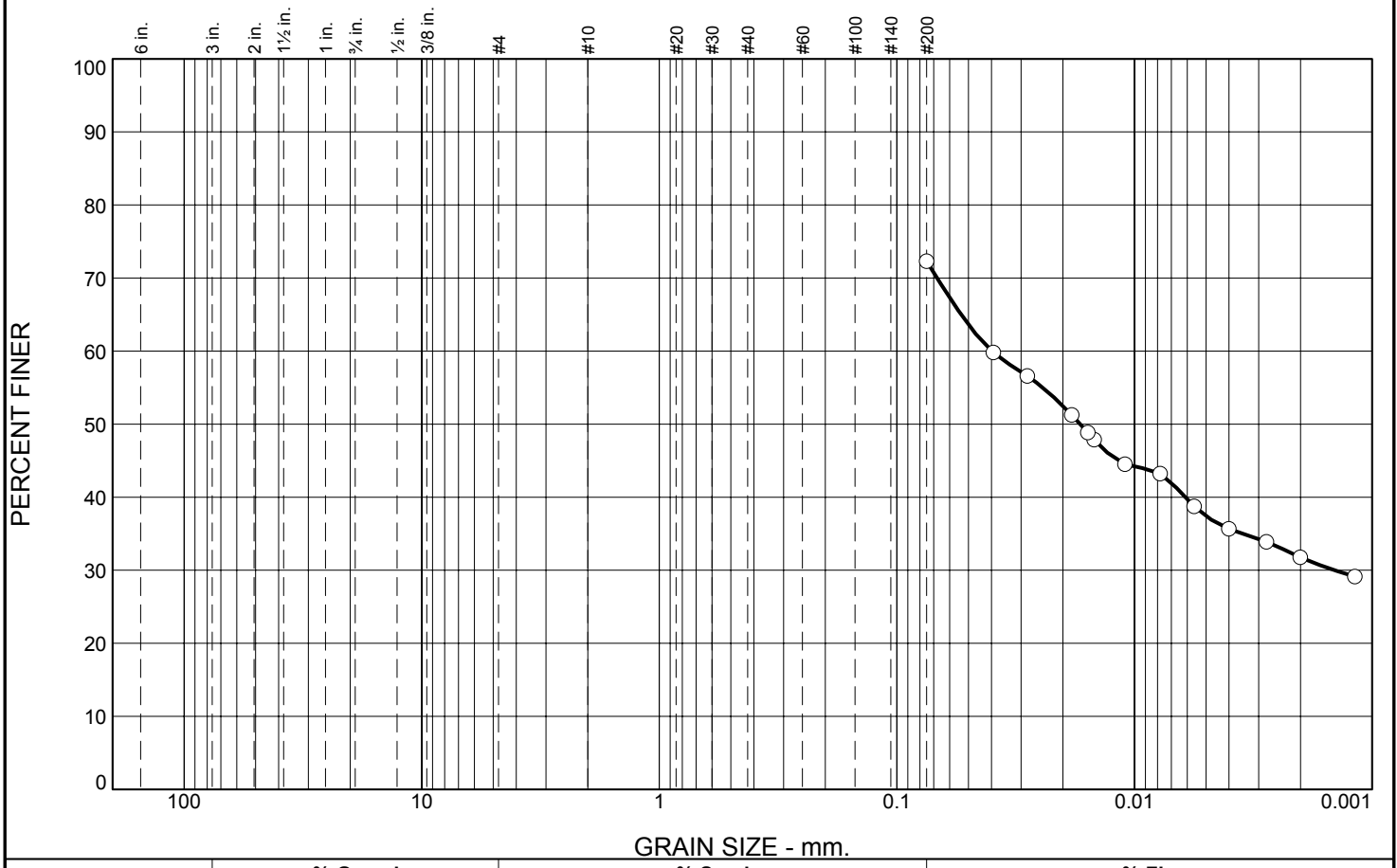
Sample No.: 1 **Source of Sample:** **Date:** 10/13/10
Location: **Elev./Depth:**

ENGEO INCORPORATED — GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS — MATERIALS TESTING

Client:
Project: 1000 North Vasco Road
Project No: 7380.000.000 **Plate**

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						40.5	31.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	72.3		

* (no specification provided)

Material Description

Dark yellowish brown and very dark grayish brown silty CLAY with sand.

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= 0.0398 D_{50}= 0.0169
D_{30}= 0.0014 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

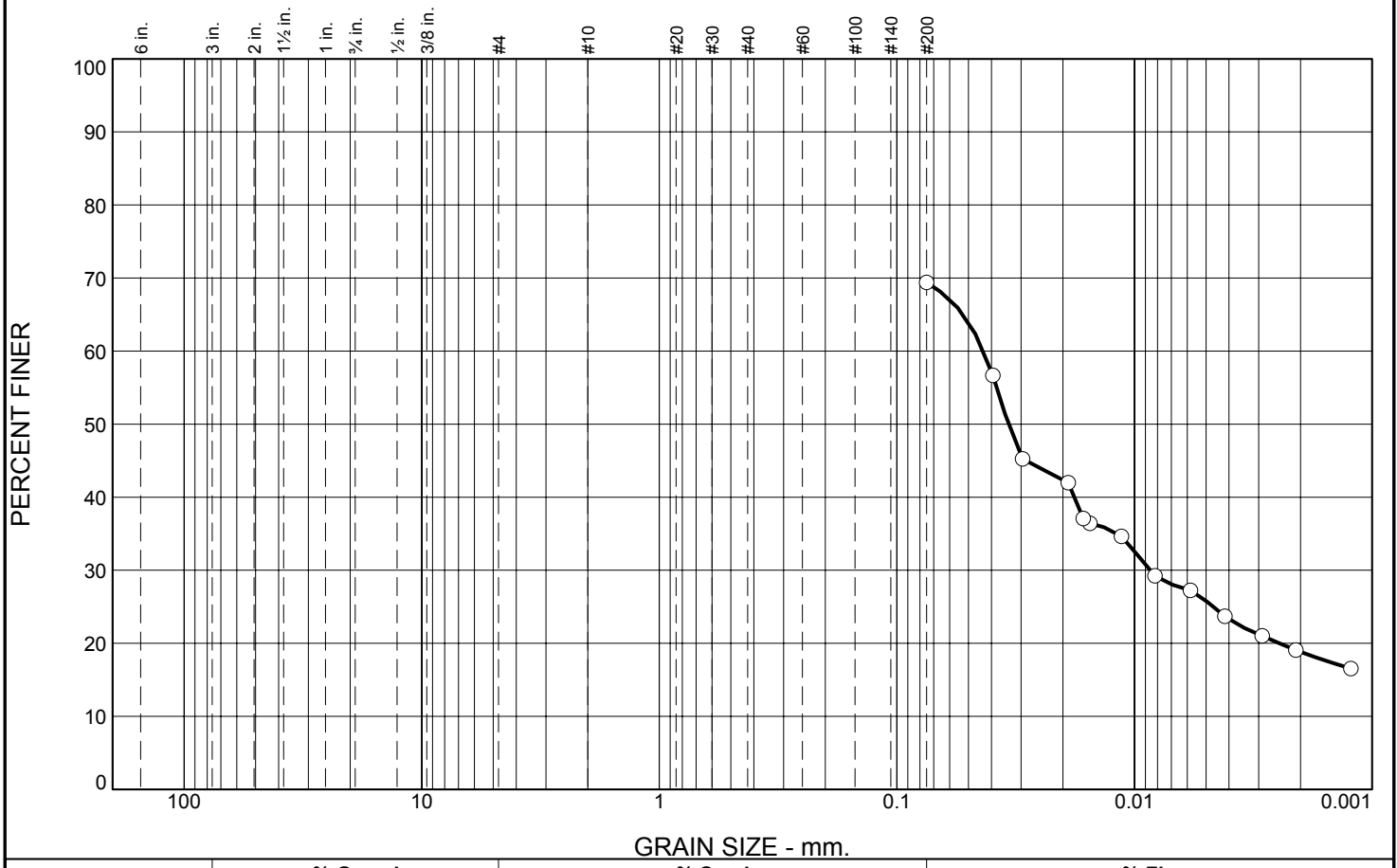
Remarks

Sample Number: 1-B2 **Date:** 10/19/10

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: 1000 North Vasco Road
Project No: 7380.000.000 **Plate**

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						50.6	18.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	69.4		

* (no specification provided)

Material Description

Very dark brown sandy SILT with clay.

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= 0.0432 D_{50}= 0.0340
D_{30}= 0.0087 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: 2-CPT6 **Date:** 10/19/10

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: 1000 North Vasco Road
Project No: 7380.000.000 **Plate**

ENGEO
INCORPORATED

STANDARD pH OF SOILS

ASTM D 4972-01 Method A

Project name: 1000 North Vasco Road **Date:** 10/18/10

Project number: 7380.000.000 **Tested by:** GC

Sample No.	Sample ID	Temperature (^{o}C)	pH
1	1-B2	22.6	**7.4**
2	2-CPT6	24.6	**6.2**

*EN*GEO Incorporated

SULFATE TEST RESULTS

CALTRANS Test Method 417

Project Name: 1000 North Vasco Road Project Number: 7380.000.000

Tested By: GC Date: 10/18/10

Sample Number	Sample Location	Matrix	Water Soluble Sulfate (SO_4) in Soil	
			mg/kg	% by Weight
1	1-B2	soil	1	0.0001
2	2-CPT6	soil	3	0.0003

APPENDIX C

Logs of Test Borings and CPT Soundings and Laboratory Test Data
(ENGEO, 2006)

APPENDIX C

ENGEO INCORPORATED

LOG OF BORING 01-B01

VASCO ROAD PROJECT
1000 NORTH VASCO ROAD
LIVERMORE, CALIFORNIA
7380.1.001.01

DATE DRILLED: June 21, 2006
HOLE DEPTH (FT): 30 ft.
HOLE DIAMETER: 6 in.
SURF ELEV (FT-MSL): 530 ft.

LOGGED / REVIEWED BY: K. Nowell / B.R.
DRILLING CONTRACTOR: Spectrum Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count / Foot	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
0	0		Pavement section-- 7 inches of concrete over 6 inches of aggregate base material. (FILL)						
			SILTY CLAY, CL, grayish brown becoming dark yellowish brown, slightly moist, with sand, stiff to very stiff. PI=22, LL=36, %<200= 84.2			19	16.5	113.7	3.3*
	1								
			SILTY CLAY, CL, grayish brown, slightly moist, to moist, with sand, minor moderate iron oxide staining, minor carbonates, very stiff.			28	16.5	114.3	3.0
5									
	2		SILTY CLAY, CL, as above, with zone bearing abundant carbonates below 6.5 feet						
						14			
			CLAYEY SAND, SC, yellowish brown, very moist, loose to medium dense, sand is fine grained.						
10	3								
						9	22.2		
			SANDY CLAY, CL, grayish brown, moist, stiff.						
	4								
			Water encountered between 14.5 and 15 feet while drilling.				19.6		2.2*
			CLAYEY SAND, SC, grayish brown, very moist, sand is fine to medium grained.		▼				
15			SILTY SAND, SM, yellowish brown, wet, medium dense, sand is fine to medium grained, sand is locally well graded.						
						22			
	5		SILTY CLAY, CL, grayish brown to dark yellowish brown, slightly moist, medium stiff to stiff.						
						13			
			SILTY SAND-POORLY GRADED SAND, SM-SP, yellowish brown, wet, medium dense, sand is fine to medium grained.						
20	6								
						14	23.2		
			CLAYEY SAND, SC, light grayish brown, wet, medium dense, sand is fine grained.						
	7		As above, becoming CLAYEY SAND - SANDY CLAY, SC - CL						
						14	18.9		
25			SILTY SAND, SM, light grayish brown, wet.						
	8		CLAYEY SAND- SANDY CLAY, SC - CL, grayish brown, wet, medium dense, sand is fine grained.						
			SILTY GRAVEL, GM, yellowish brown, wet, gravel to 1-2/3-inch maximum dimension primarily sub rounded, medium dense, with sand.			42			
			POORLY GRADED SAND, SP, yellowish brown, wet, sand is primarilly fine grained, medium dense.						
	9					28	14.0		
30			Bottom of boring at approximately 30 feet below ground surface.						
			Groundwater measured at approximately 15 feet upon completion of drilling.						

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ENGEO INCORPORATED

LOG OF BORING 01-B02

VASCO ROAD PROJECT
1000 NORTH VASCO ROAD
LIVERMORE, CALIFORNIA
7380.1.001.01

DATE DRILLED: June 21, 2006
HOLE DEPTH (FT): 41.5 ft.
HOLE DIAMETER: 6 in.
SURF ELEV (FT-MSL): 530 ft.

LOGGED / REVIEWED BY: K. Nowell / B.R.
DRILLING CONTRACTOR: Spectrum Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count / Foot	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
0	0		CLAYEY SAND, SC, grayish brown, damp, loose, sand is fine to coarse grained, trace fine subangular gravel, fine roots common in upper one foot.						
	1		SILTY CLAY, SC, dark grayish brown to black, damp, very stiff, and sand. PI=23, LL=36, %<200 = 59.3			33	8.5		
5			No recovery-- cuttings of fine to coarse gravel-sized -stone						
	2					18			
10	3								
			CLAYEY SAND, SC, dark grayish brown, very moist becoming wet, sand is fine to coarse grained, trace fine subangular gravel. Water encountered at 13 feet while drilling.						
	4		SILTY SAND - POORLY GRADED SAND, SM-SP, yellowish brown, wet, medium dense, sand is fine to medium grained, locally poorly graded.			43	16.8	114.6	
15						25			
	5		CLAYEY SILT, ML, grayish brown, wet, with fine grained sand.						
			SILTY SAND, SM, grayish brown, wet, sand is fine grained.						
20	6		CLAYEY SAND, SC, yellowish brown, very moist, loose, medium plasticity.			8	25.2		
	7		SILTY CLAY, CL, yellowish brown, moist to very moist, very stiff, with sand, locally very silty.						
25						20	22.5		
	8								
	9		CLAYEY SAND, SC, grayish brown, very moist, medium dense, sand is primarilly fine grained.						
30									

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ENGEO INCORPORATED

LOG OF BORING 01-B02

VASCO ROAD PROJECT
1000 NORTH VASCO ROAD
LIVERMORE, CALIFORNIA
7380.1.001.01

DATE DRILLED: June 21, 2006
HOLE DEPTH (FT): 41.5 ft.
HOLE DIAMETER: 6 in.
SURF ELEV (FT-MSL): 530 ft.

LOGGED / REVIEWED BY: K. Nowell / B.R.
DRILLING CONTRACTOR: Spectrum Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count / Foot	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
31	10		CLAYEY SAND, SC, grayish brown, very moist, medium dense, primarilly having medium plasticity, with local wet zones associated with lower clay content, sand is primarilly fine grained.			22			
36	11								
	12								
41			SILTY SAND, SM, grayish brown, wet, sand is primarilly fine grained, medium dense to dense.			21			
	13		Bottom of boring at approximately 41.5 feet below ground surface.						
46	14								
	15								
51	16								
56	17								
	18								
61									

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ENGEO INCORPORATED

LOG OF BORING 01-B03

VASCO ROAD PROJECT
1000 NORTH VASCO ROAD
LIVERMORE, CALIFORNIA
7380.1.001.01

DATE DRILLED: June 21, 2006
HOLE DEPTH (FT): 28 ft.
HOLE DIAMETER: 6 in.
SURF ELEV (FT-MSL): 530 ft.

LOGGED / REVIEWED BY: K. Nowell / B.R.
DRILLING CONTRACTOR: Spectrum Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count / Foot	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
0	0		SILTY CLAY, CL, gray, damp, loose, with fine to coarse grained sand, roots common in upper one foot.						
	1		No recovery-- cuttings of fine to coarse gravel-sized -stone			50/4"			
5	2					50/4"			
10	3		CLAYEY SAND, SC, grayish brown, very moist becoming wet, sand is fine to coarse grained.						
	4		SILTY SAND, SM, grayish brown to yellowish brown, wet, sand is fine to coarse grained. Water encountered at 13.4 feet while drilling.		▼	13	15.3		
15			SILT, ML, dark brown, wet, medium dense, with fine sand.						
	5		SILTY SAND, SM, grayish brown to yellowish brown, wet, sand is fine to coarse grained.						
	6		SILTY CLAY, CL, dark yellowish brown, moist to very moist, stiff, with sand and with carbonates.			12	24.4		
20			SILTY CLAY, CL, grayish brown, very moist, medium stiff, with varying percentages of sand.			6			
	7		SILTY SAND, SM, grayish brown, wet, sand is primarilly fine to medium grained.						
25	8		SILTY CLAY, CL, dark yellowish brown, very moist, stiff, with trace fine sand.			14	23.4		
			SILTY SAND, SM, grayish brown, wet, medium dense, sand is primarilly fine grain and coarsening downward becoming coarse grain.						
	9		CLAYEY SAND, SC, grayish brown, wet, medium plasticity, sand is primarilly fine grained, medium dense.						
30			Bottom of boring at approximately 28 feet below ground surface.						

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GREGG IN SITU, INC.

GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

July 12, 2006

Engeo
Attn: Keith Nowell
690 Walnut Ave.
Mare Island, California 94592

Subject: CPT Site Investigation
North Vasco Rd.
Livermore, California
GREGG Project Number: 06-224MA

Dear Mr. Nowell:

The following report presents the results of GREGG Drilling & Testing's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☒
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (925) 313-5800.

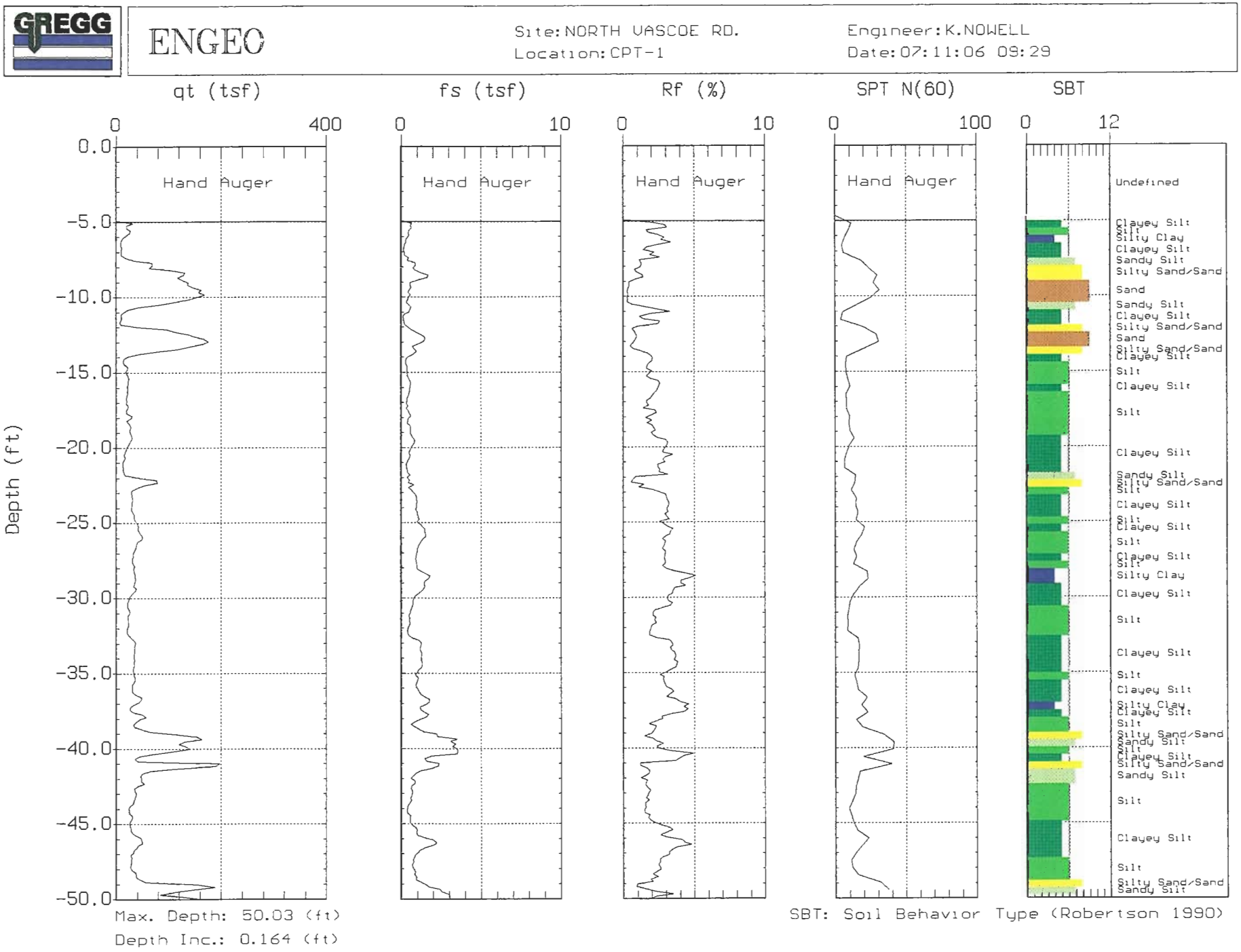
Sincerely,
GREGG Drilling & Testing, Inc.

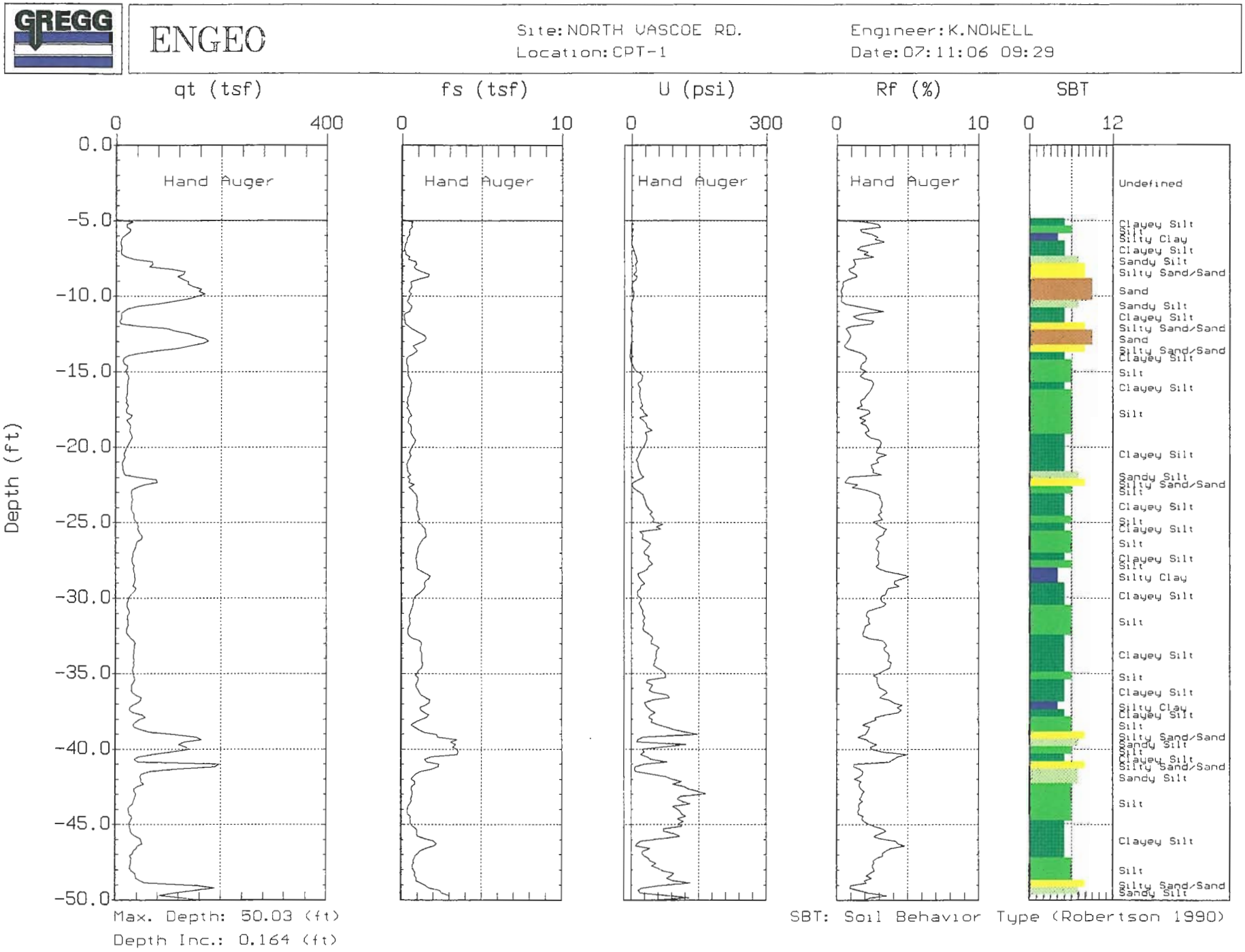
Mary Walden
Operations Manager

Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (Feet)	Depth of Groundwater Samples (Feet)	Depth of Soil Samples (Feet)	Depth of Pore Pressure Dissipation Tests (Feet)
CPT-01	7/11/06	50	-	-	49.4
CPT-02	7/11/06	15	-	-	-
CPT-03	7/11/06	30	-	-	-
CPT-04	7/11/06	15	-	-	-
CPT-05	7/11/06	20	-	-	-
CPT-06	7/11/06	50	-	-	-
CPT-07	7/11/06	30	-	-	-
CPT-08	7/11/06	50	-	-	-


GREGG
ENGEO
Site: NORTH VASCOE RD.
Location: CPT-1
Engineer: K.NOWELL
Date: 07:11:06 09:29
qt (tsf)
fs (tsf)
Rf (%)
SPT N(60)
SBT
0
400
10
100
12
Hand Auger
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
Undefined
Clayey Silt
Silty Clay
Sandy Silt
Silty Sand/Sand
Sand
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

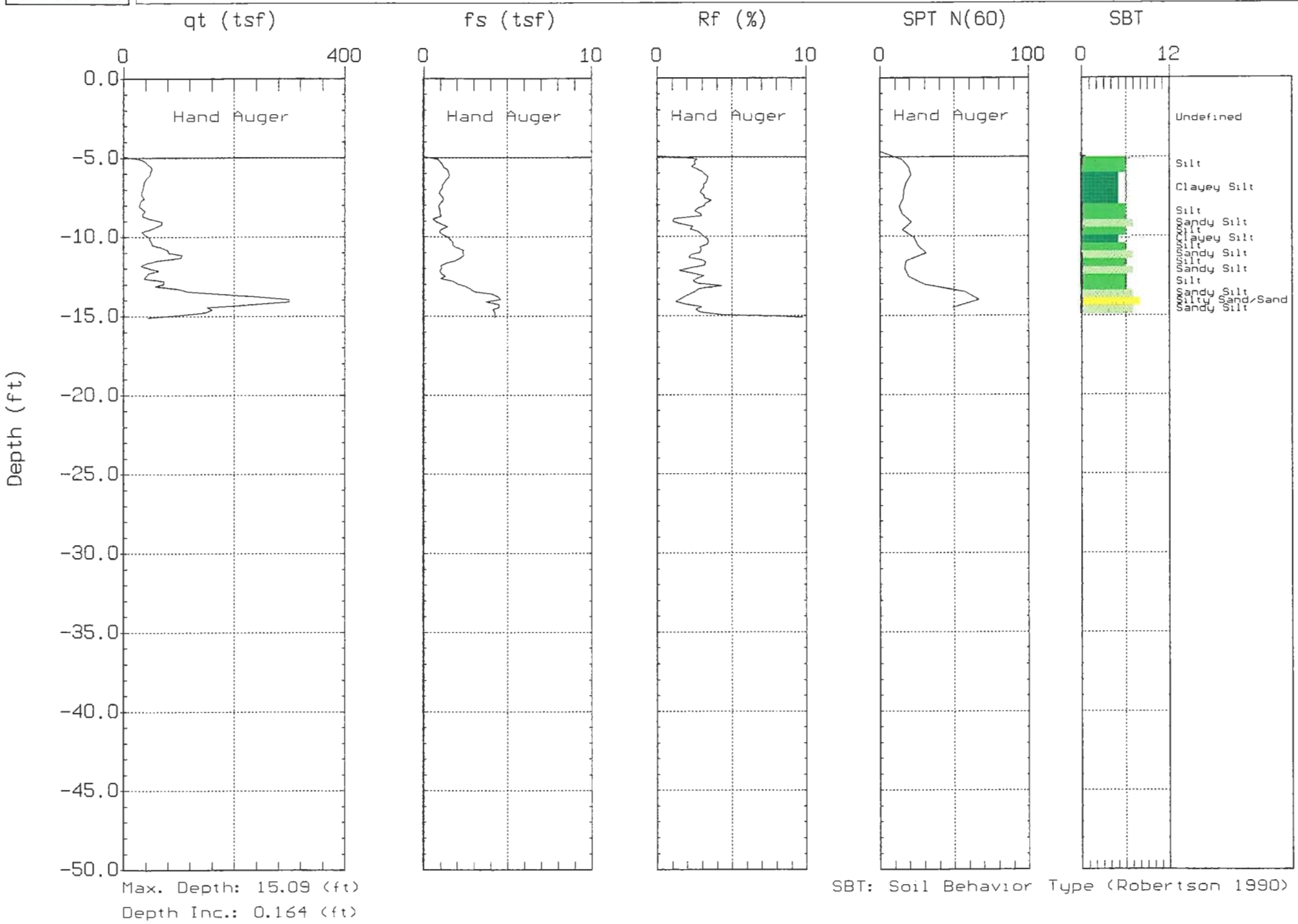

GREGG
ENGEO
Site: NORTH VASCOE RD.
Location: CPT-1
Engineer: K.NOWELL
Date: 07:11:06 09:29
qt (tsf)
fs (tsf)
U (psi)
Rf (%)
SBT
0
400
10
300
12
Hand Auger
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
Undefined
Clayey Silt
Silty Clay
Sandy Silt
Silty Sand/Sand
Sand
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

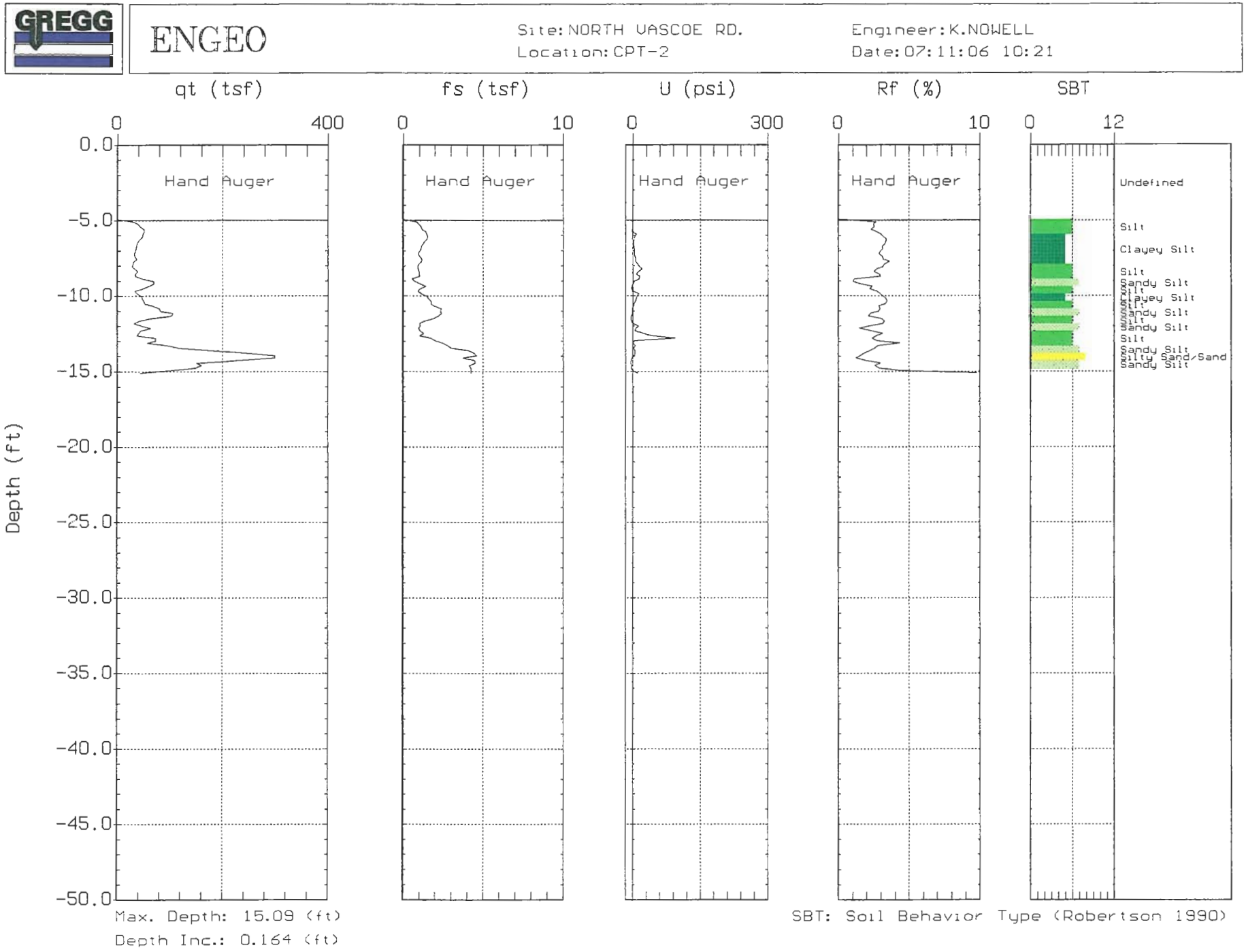
Site: NORTH VASCOE RD.
Location: CPT-2

Engineer: K.NOWELL
Date: 07:11:06 10:21



Max. Depth: 15.09 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

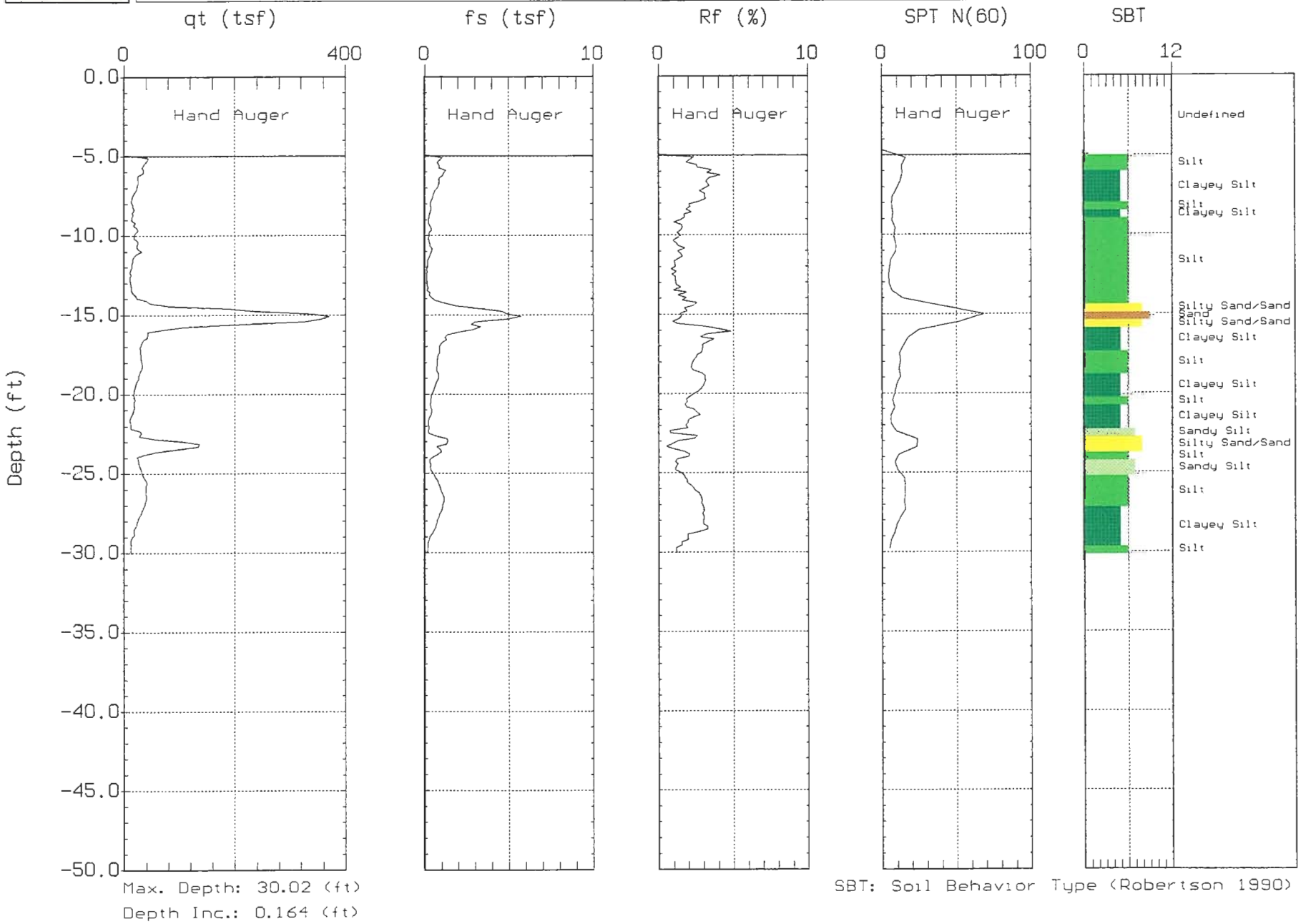

GREGG
ENGEO
Site: NORTH VASCOE RD.
Location: CPT-2
Engineer: K.NOWELL
Date: 07:11:06 10:21
qt (tsf)
fs (tsf)
U (psi)
Rf (%)
SBT
0
400
10
300
12
Hand Auger
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
Undefined
Silt
Clayey Silt
Silt
Sandy Silt
Silt
Clayey Silt
Silt
Sandy Silt
Silt
Sandy Silt
Silt
Sandy Silt
Silty Sand/Sand
Sandy Silt
Max. Depth: 15.09 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

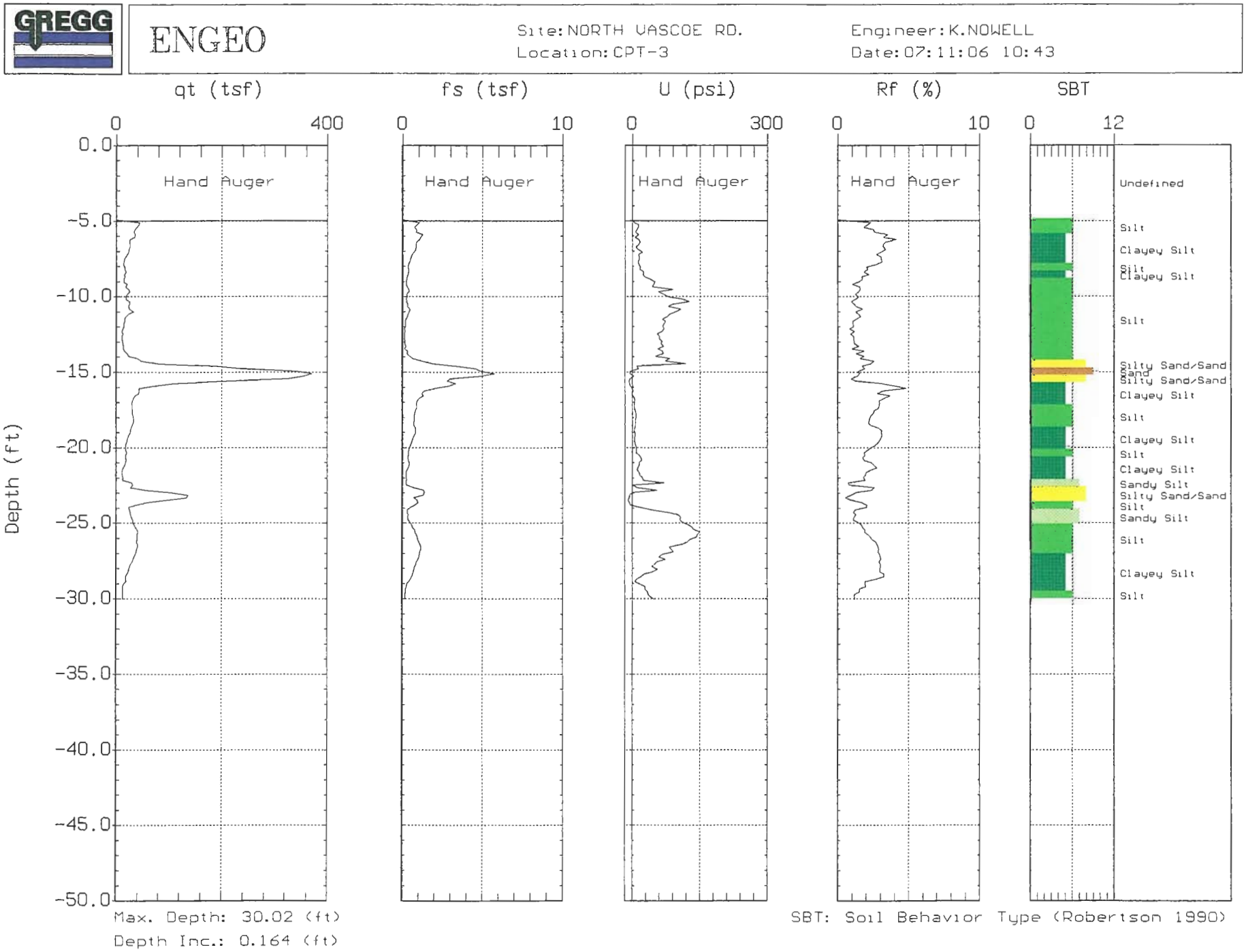
Site: NORTH VASCOE RD.
Location: CPT-3

Engineer: K.NOWELL
Date: 07:11:06 10:43



Max. Depth: 30.02 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

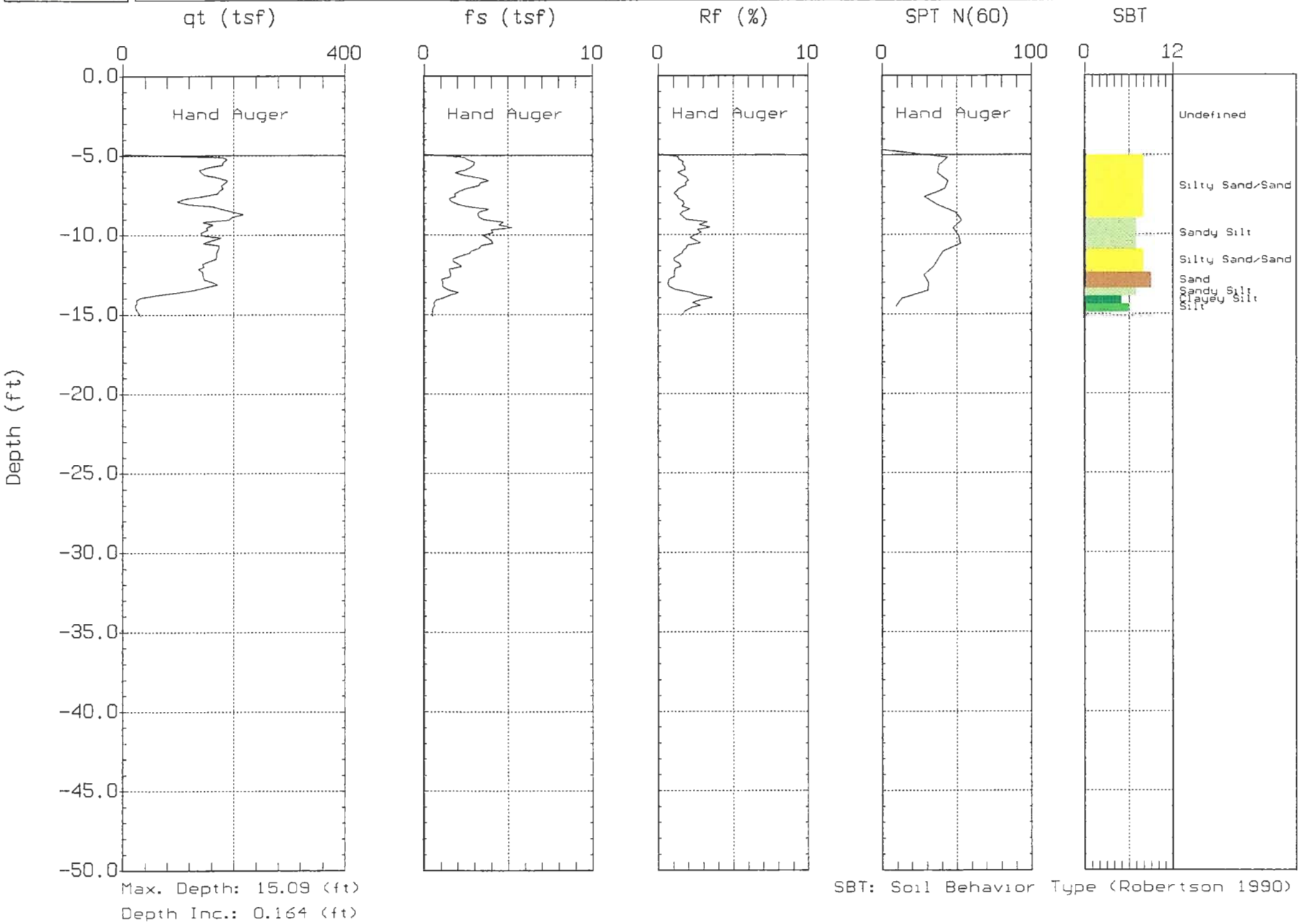

GREGG
ENGEO
Site: NORTH VASCOE RD.
Location: CPT-3
Engineer: K.NOWELL
Date: 07:11:06 10:43
qt (tsf)
fs (tsf)
U (psi)
Rf (%)
SBT
0
400
10
300
12
Hand Auger
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
Undefined
Silt
Clayey Silt
Silt
Clayey Silt
Silt
Silty Sand/Sand
Sand
Silty Sand/Sand
Clayey Silt
Silt
Clayey Silt
Silt
Clayey Silt
Sandy Silt
Silty Sand/Sand
Silt
Sandy Silt
Silt
Clayey Silt
Silt
Max. Depth: 30.02 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-4

Engineer: K.NOWELL
Date: 07:11:06 11:09



Max. Depth: 15.09 (ft)
Depth Inc.: 0.164 (ft)

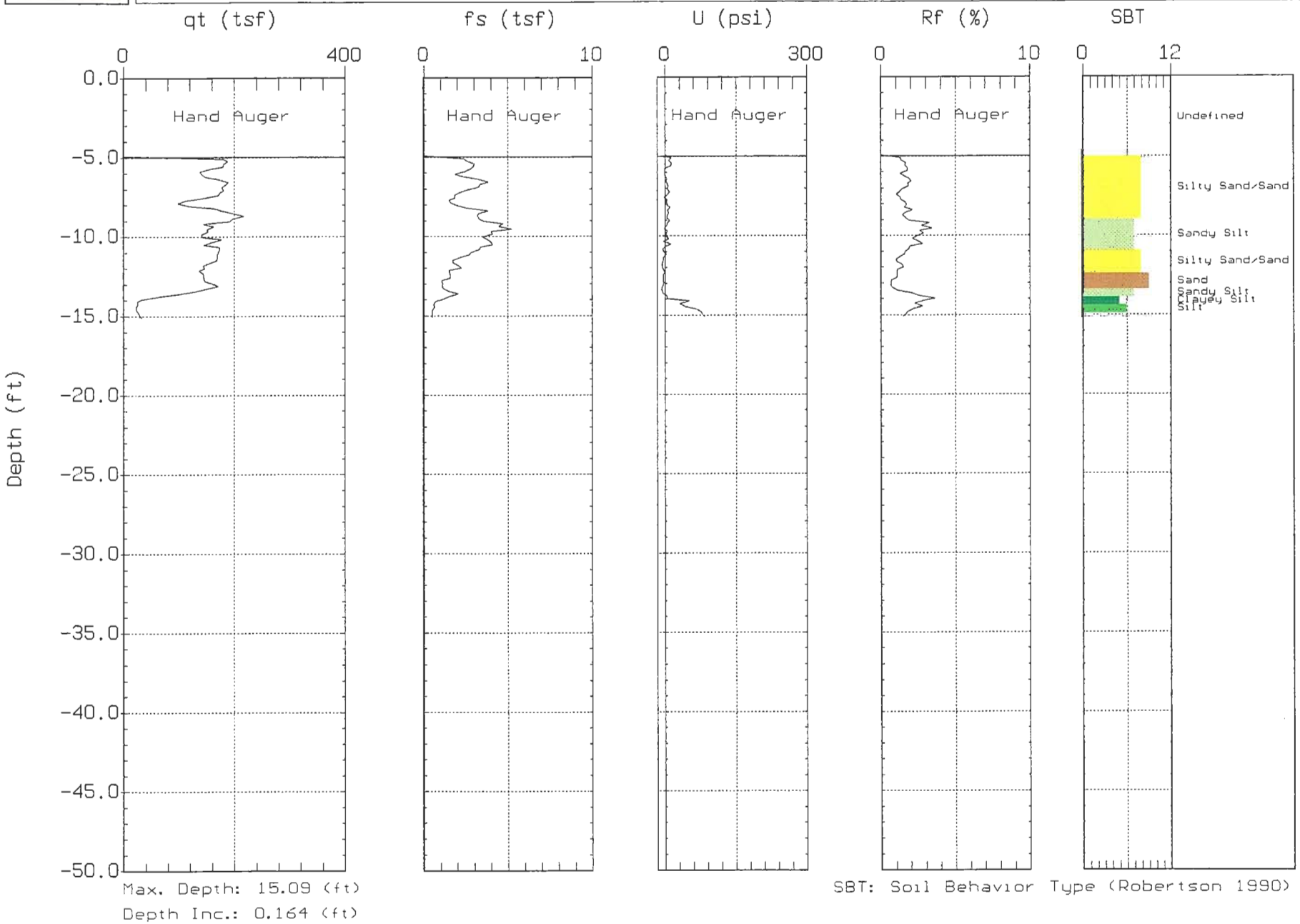
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-4

Engineer: K.NOWELL
Date: 07:11:06 11:09



Max. Depth: 15.09 (ft)
Depth Inc.: 0.164 (ft)

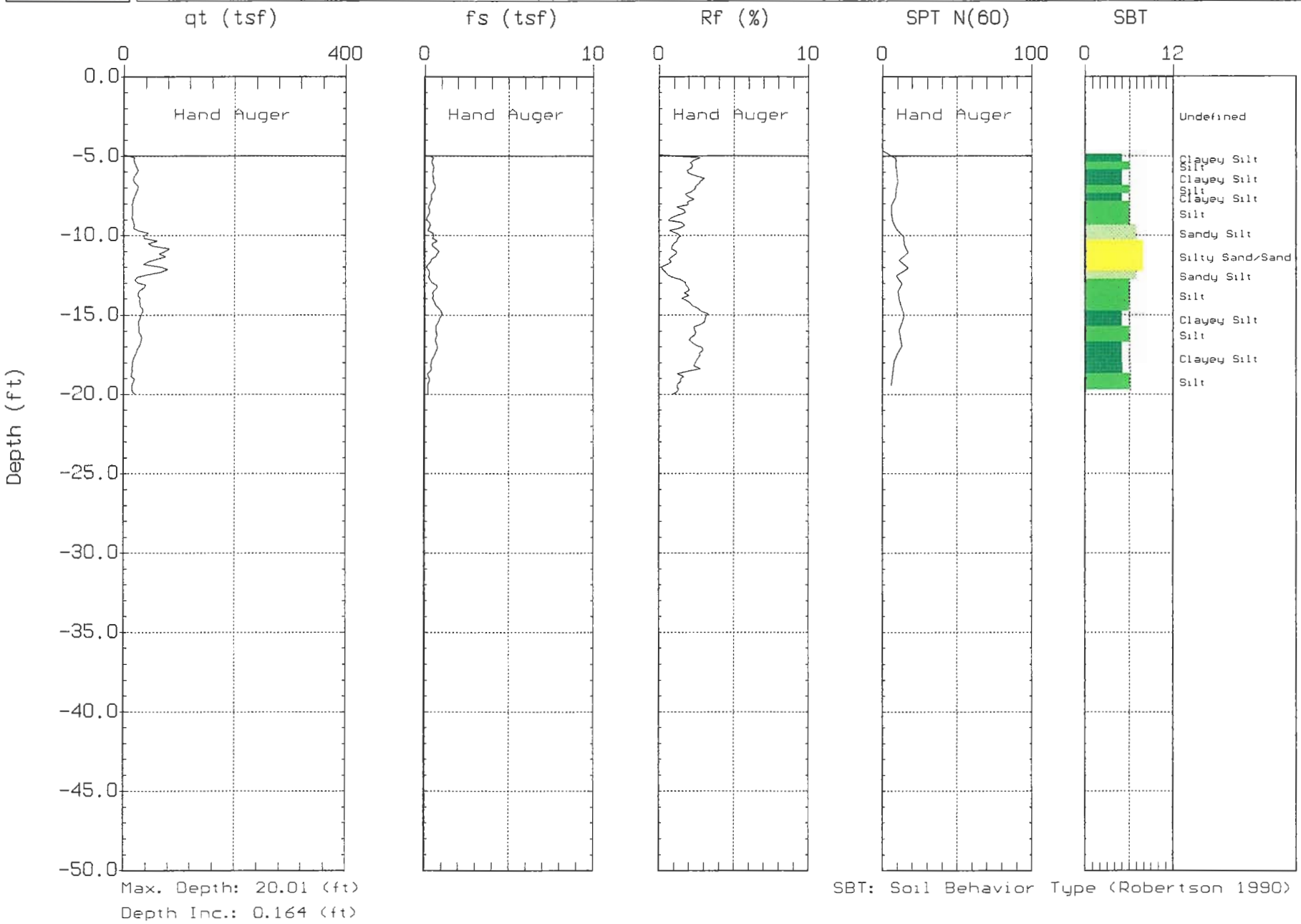
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-5

Engineer: K.NOWELL
Date: 07:11:06 12:34



Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

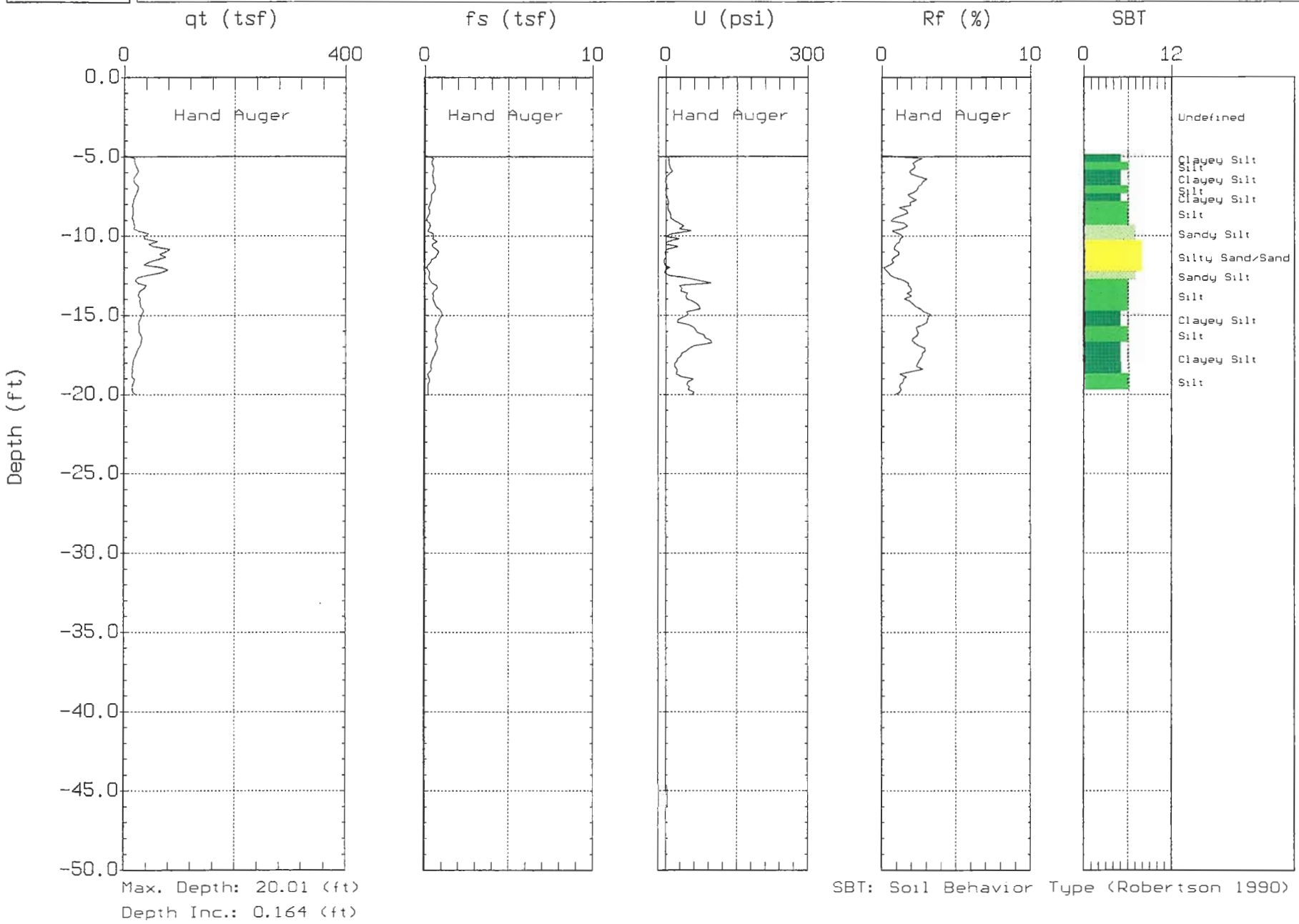
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-5

Engineer: K.NOWELL
Date: 07:11:06 12:34



Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

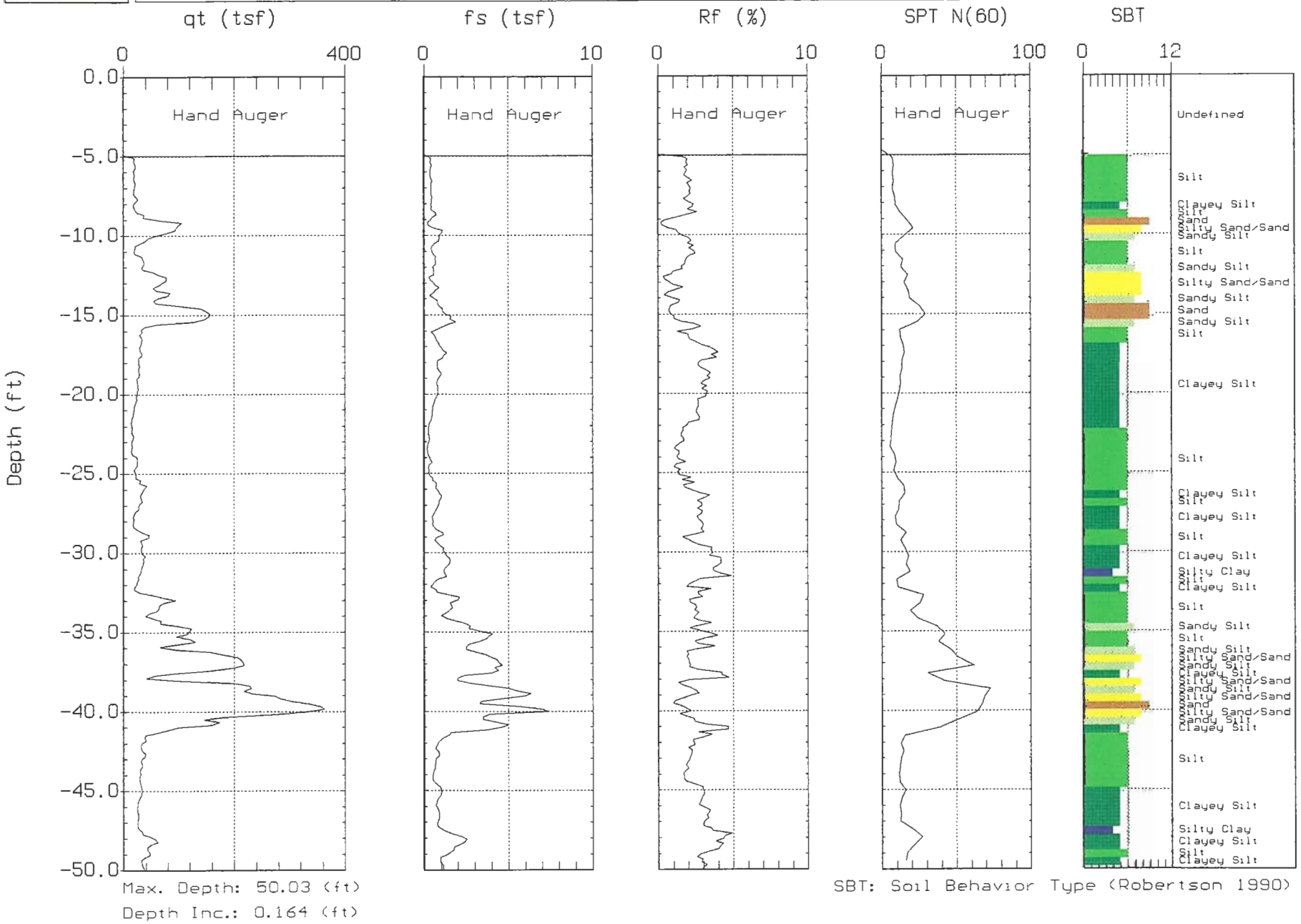
SBT: Soil Behavior Type (Robertson 1990)

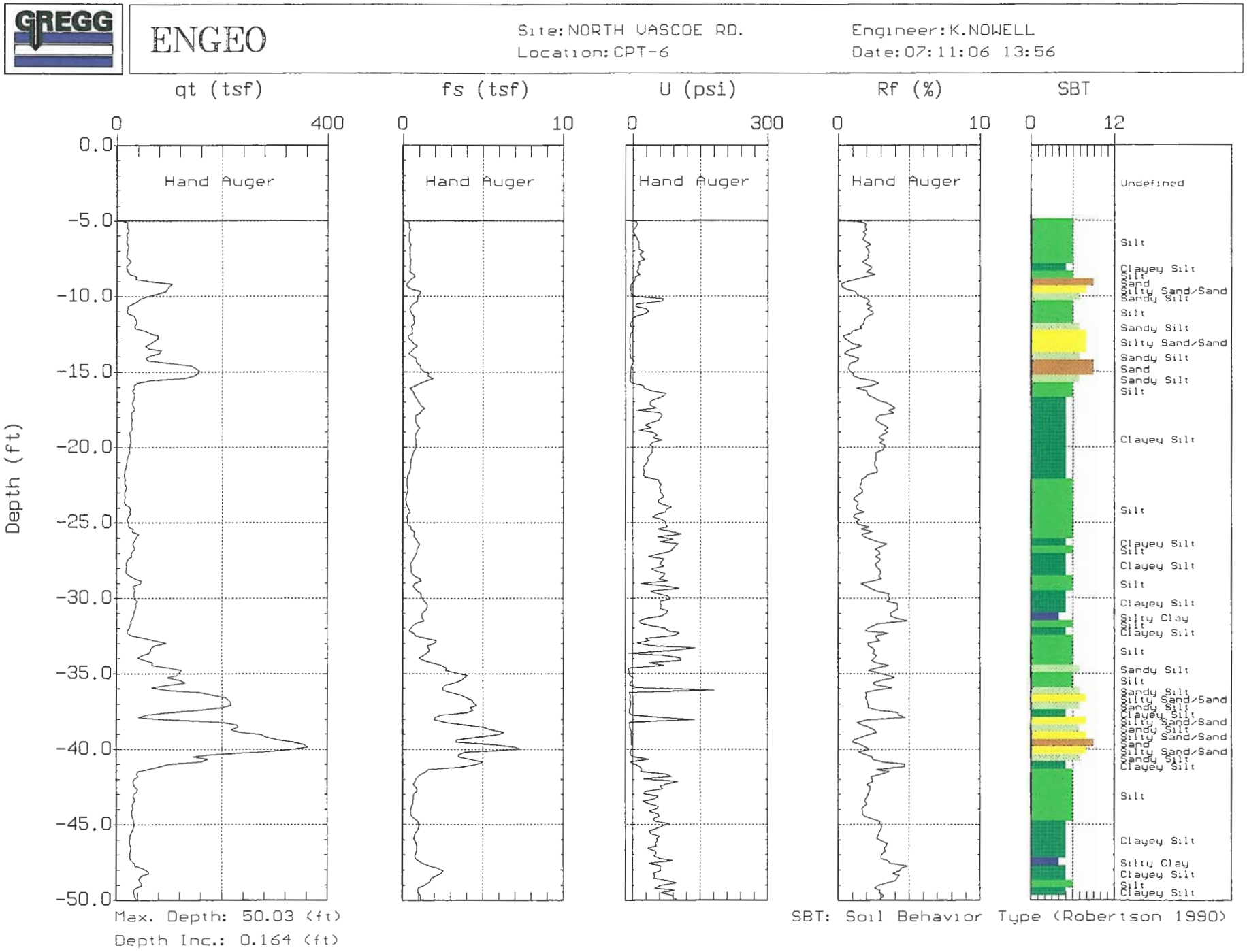
GREGG

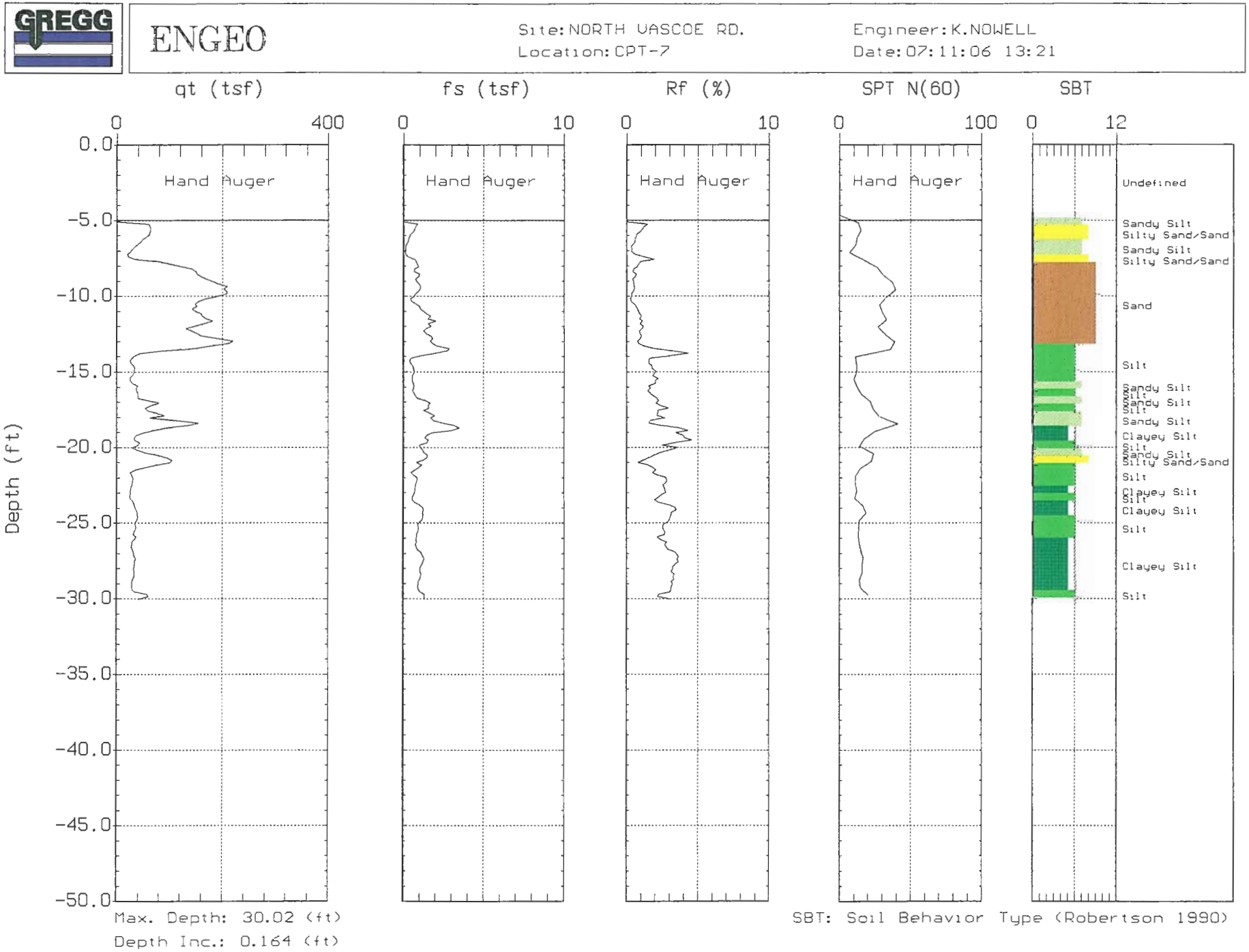
ENGEO

Site: NORTH VASCOE RD.
Location: CPT-6

Engineer: K.NOWELL
Date: 07:11:06 13:56




GREGG
ENGEO
Site: NORTH VASCOE RD.
Location: CPT-6
Engineer: K.NOWELL
Date: 07:11:06 13:56
qt (tsf)
fs (tsf)
U (psi)
Rf (%)
SBT
0
400
10
300
12
Hand Auger
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
Undefined
Silt
Clayey Silt
Silty Sand/Sand
Sandy Silt
Sand
Silty Clay
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

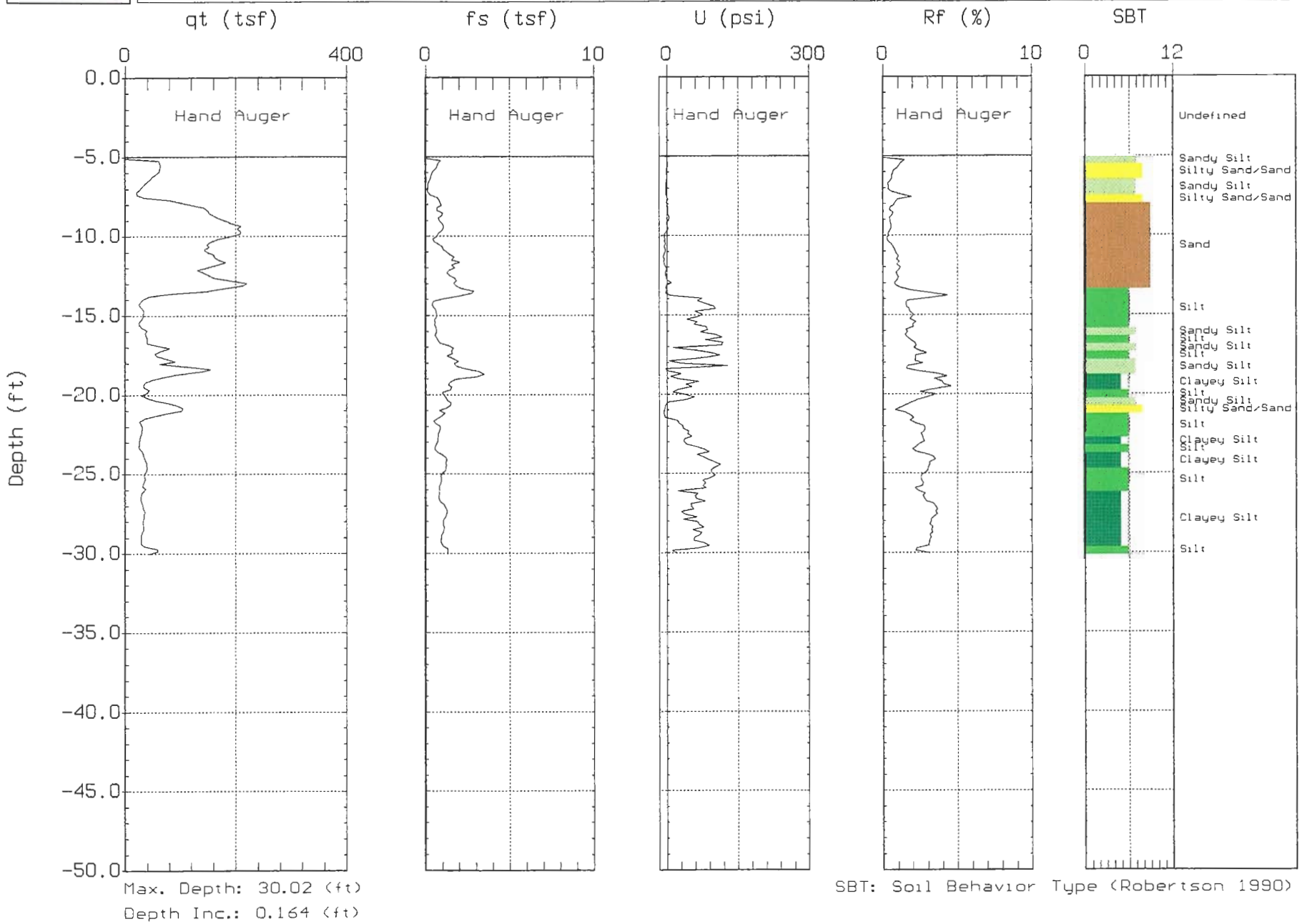

GREGG
ENGEO
Site: NORTH VASCOE RD.
Location: CPT-7
Engineer: K.NOWELL
Date: 07:11:06 13:21
qt (tsf)
fs (tsf)
Rf (%)
SPT N(60)
SBT
0
400
10
100
12
Hand Auger
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
Undefined
Sandy Silt
Silty Sand/Sand
Sand
Silt
Clayey Silt
Max. Depth: 30.02 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-7

Engineer: K.NOWELL
Date: 07:11:06 13:21



Max. Depth: 30.02 (ft)
Depth Inc.: 0.164 (ft)

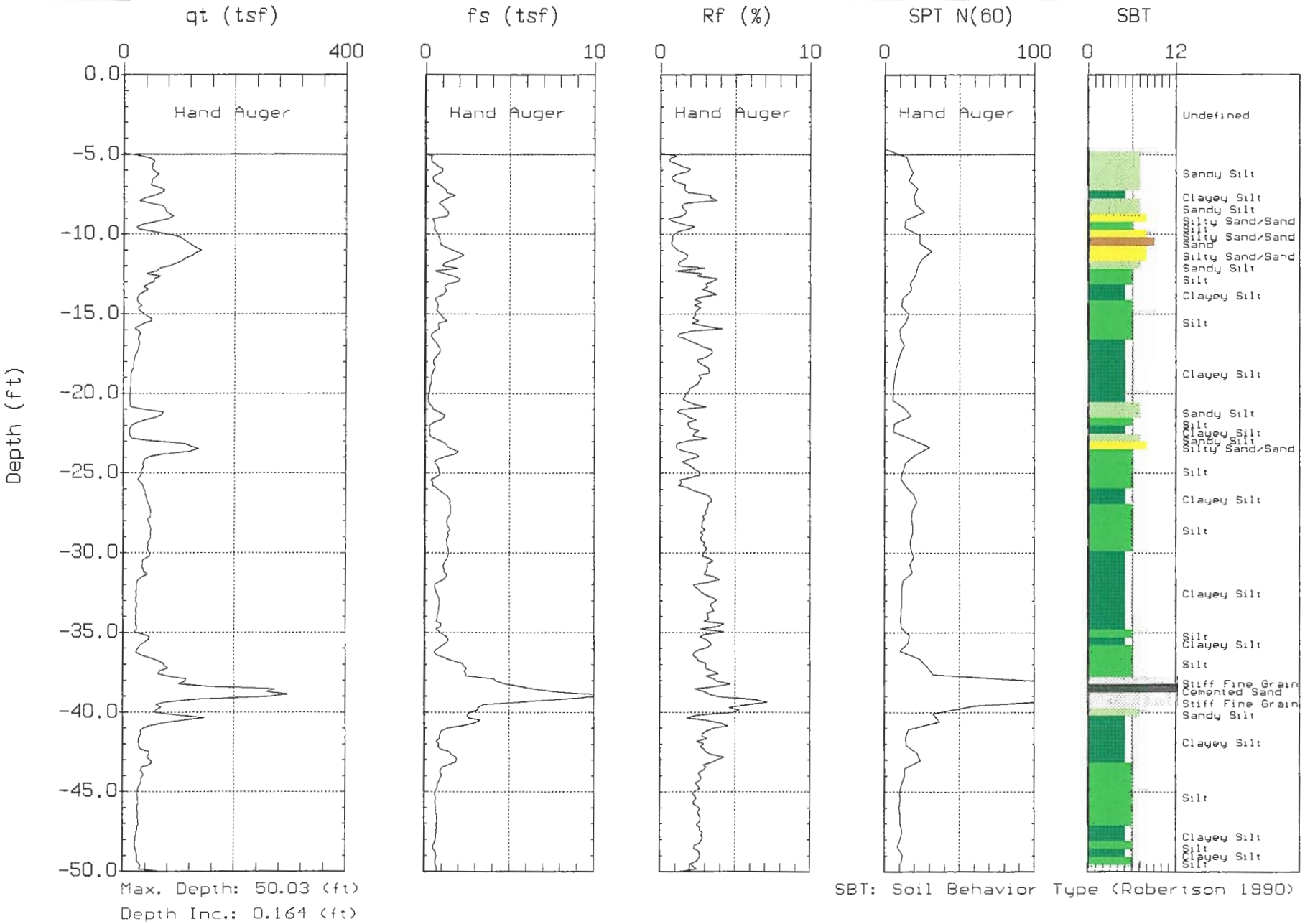
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-8

Engineer: K.NOWELL
Date: 07:11:06 14:49



Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

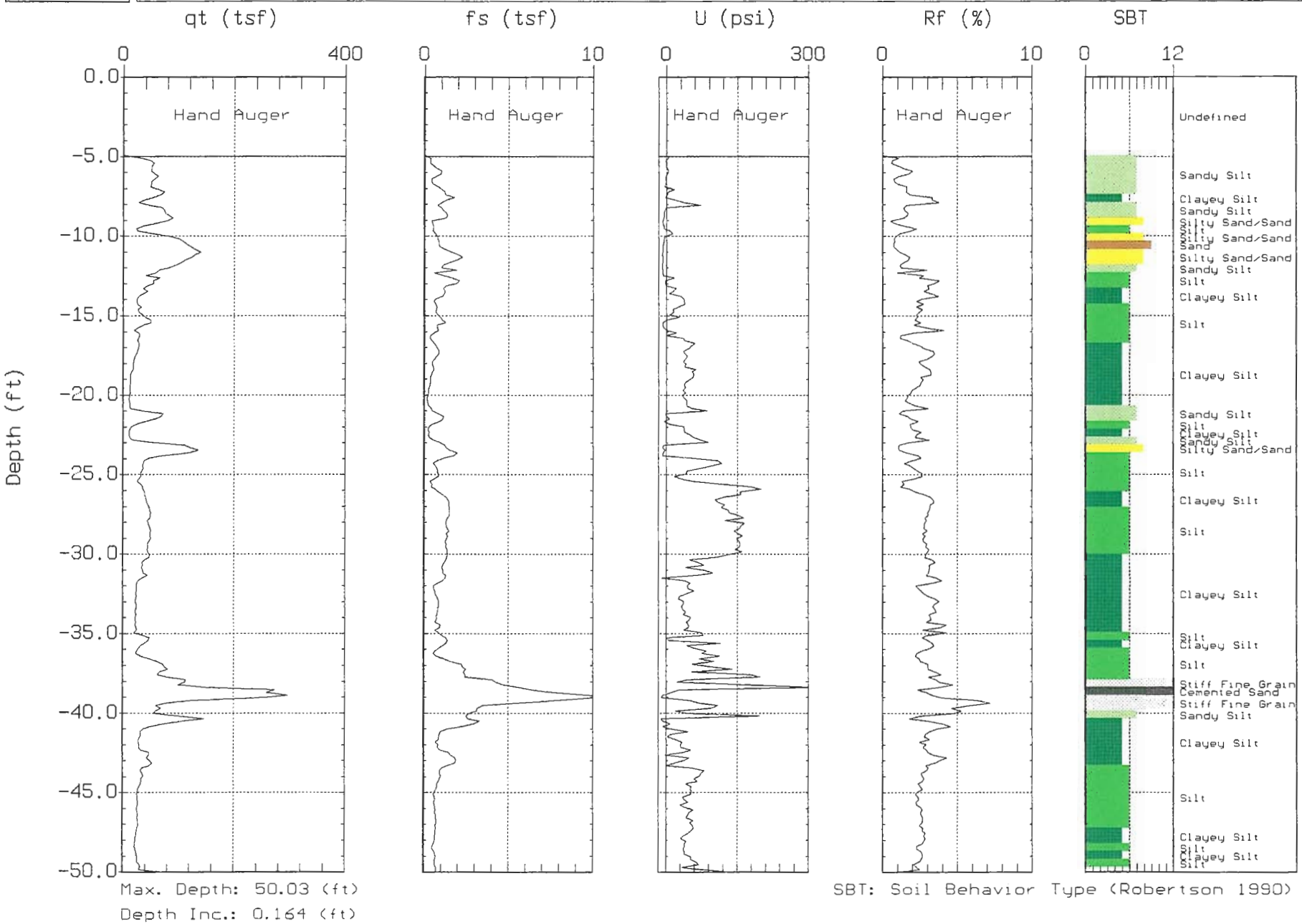
SBT: Soil Behavior Type (Robertson 1990)

GREGG

ENGEO

Site: NORTH VASCOE RD.
Location: CPT-8

Engineer: K.NOWELL
Date: 07:11:06 14:49



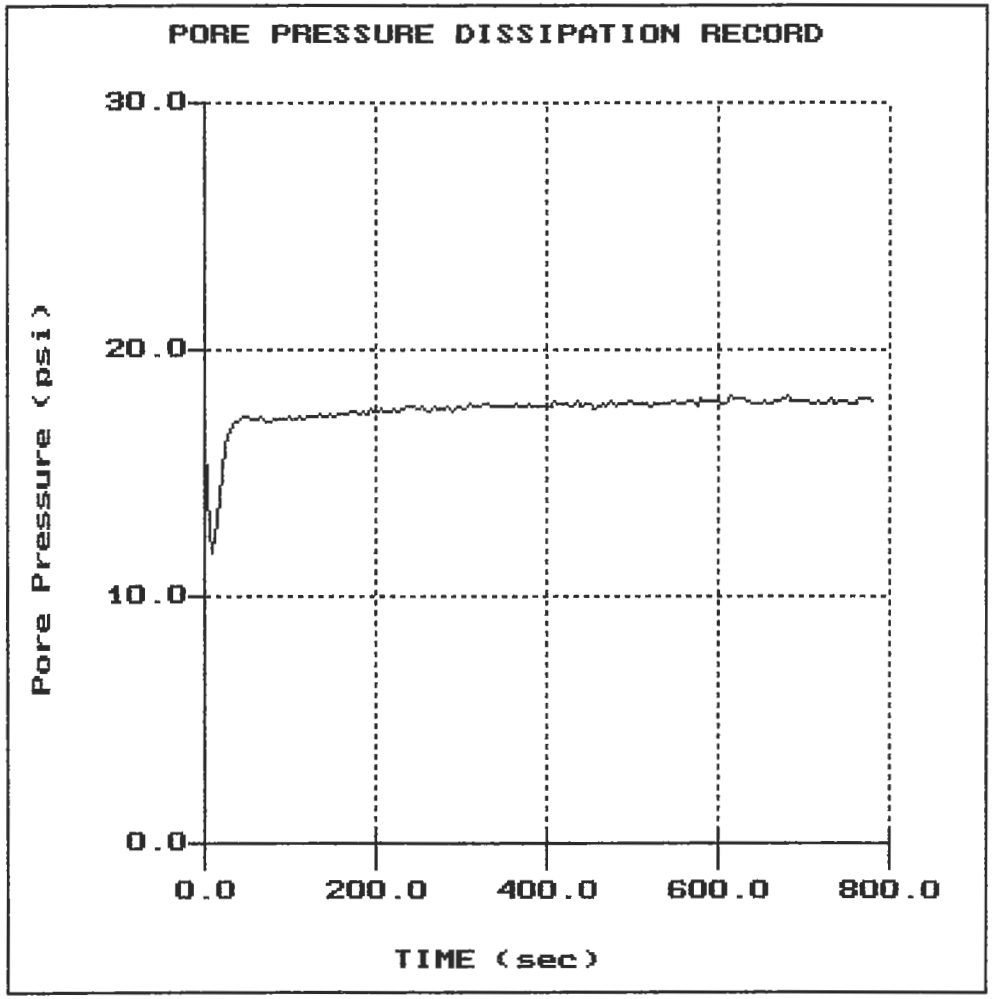
Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

ENGEO

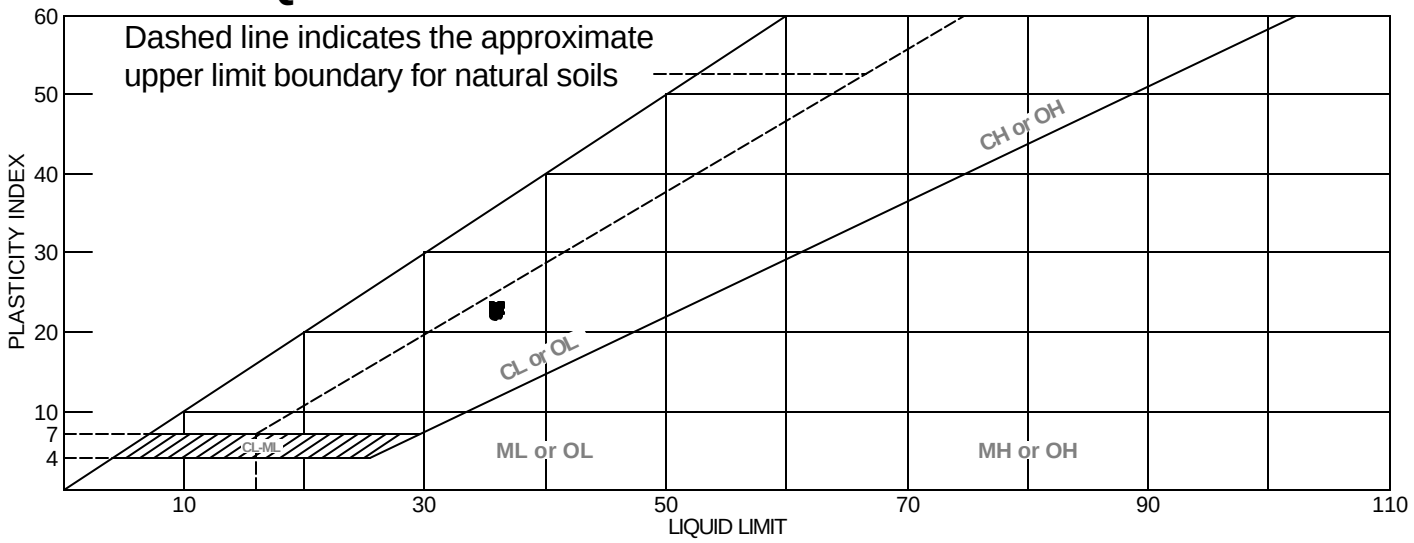
Site:NORTH VASCOE RD.
Location:CPT-1

Engineer:K.NOWELL
Date:07:11:06 09:29



File: 224C01.PPC
Depth (m): 15.05
(ft): 49.38
Duration : 780.0s
U-min: 11.82 10.0s
U-max: 18.11 680.0s

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark olive brown silty CLAY with sand	36	14	22		84.2	CL
■	Yellowish brown sandy CLAY	36	13	23		59.3	CL

Project No. 7380.1.001.01 **Client:**

Project: Macedo Property- Livermore

● **Source:** **Sample No.:** 1-1-2

■ **Source:** **Sample No.:** 1-2-2.5

Remarks:

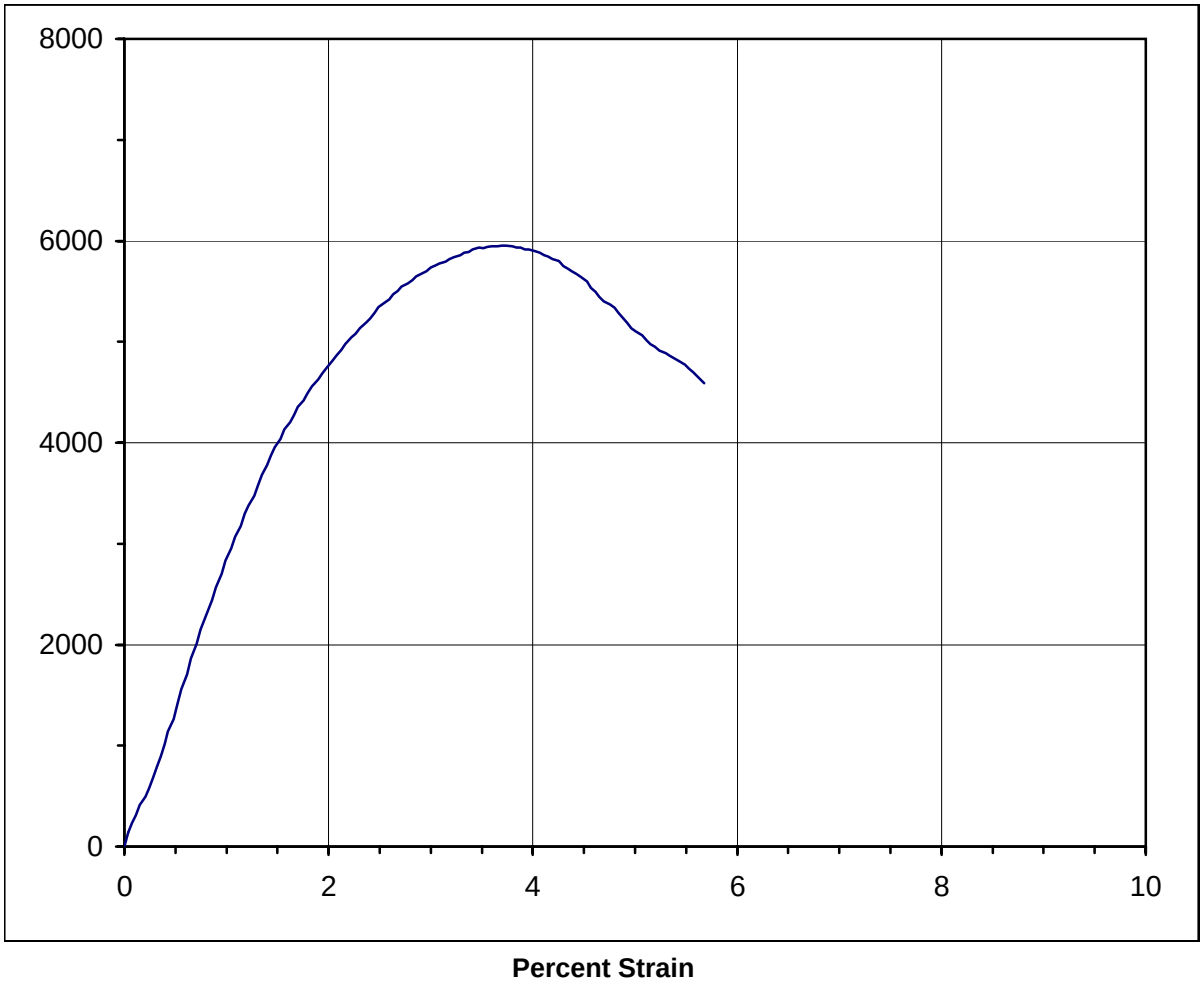
● 1@2'

■ 2@2.5'

ENGEO INCORPORATED

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS MATERIALS TESTING

Unconfined Compression Test
ASTM Test Method D2166



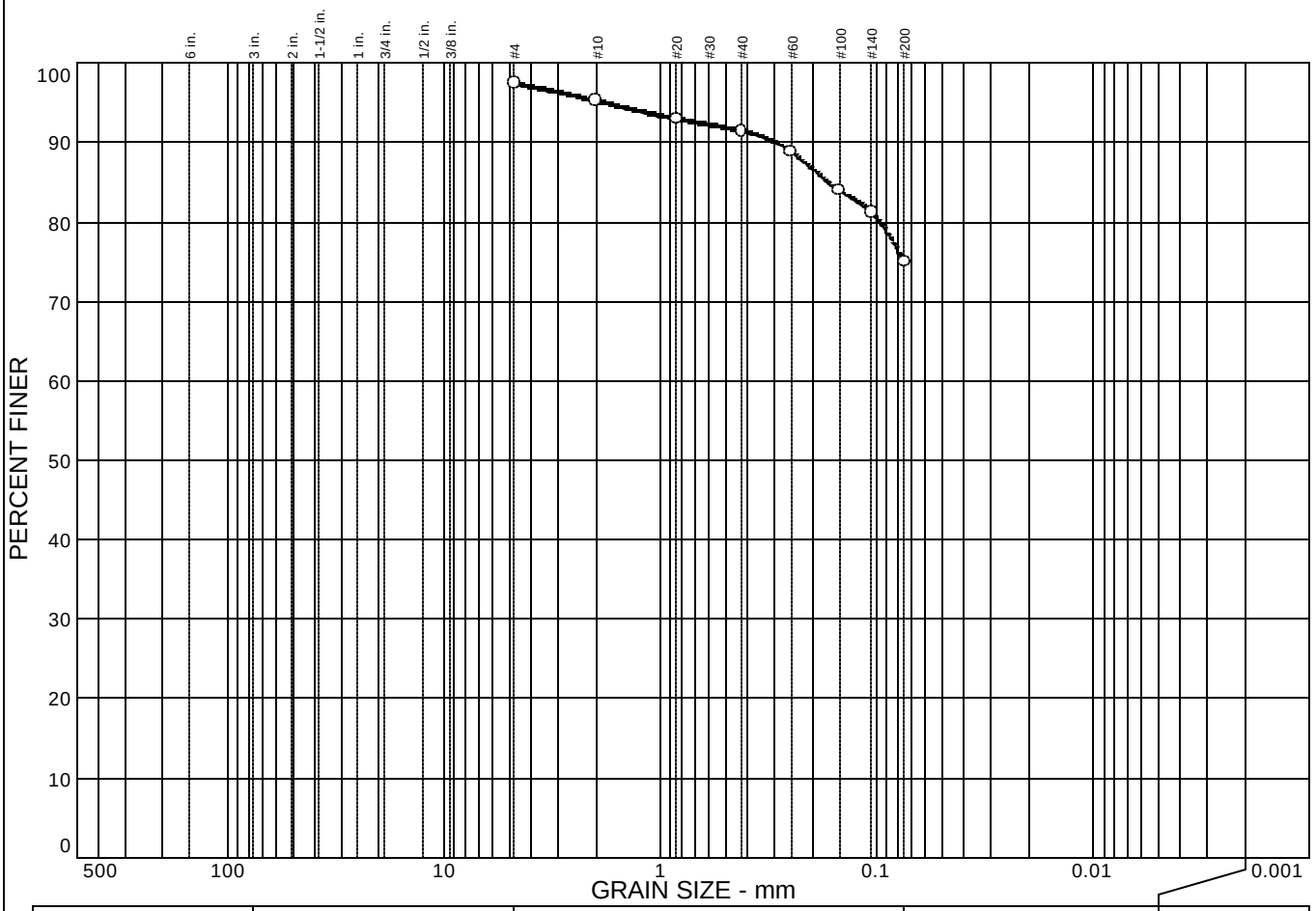
Unconfined Compressive Strength: **5950 psf** **3.0 tsf**

Sample Description: **Grayish brown silty CLAY with sand and trace gravel**

Initial Diameter:	**2.420**	**in.**	**Sample Number:**	**1-1-5**	
Initial Height:	**4.70**	**in.**	**Dry Unit Weight:**	**114.3**	**pcf**
Strain Rate:	**1.848**	**%/min**	**Moisture Content:**	**16.5**	**%**
Total Strain:	**5.68**	**%**	**Depth of Sample:**	**5.0**	**ft.**

***EN*GEO** INCORPORATED	**MACEDO PROPERTY** **1000 North Vasco Road** **Livermore, California**	**Job No.:** 7380.1.001.01 **Sample Number:** 1-1-5 **Date:** 7/17/2006	**Figure No.**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
		22.5	75.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	97.5		
#10	95.3		
#20	93.0		
#40	91.5		
#60	88.9		
#100	84.0		
#140	81.2		
#200	75.0		

* (no specification provided)

Soil Description

Olive brown SILT with sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.168 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

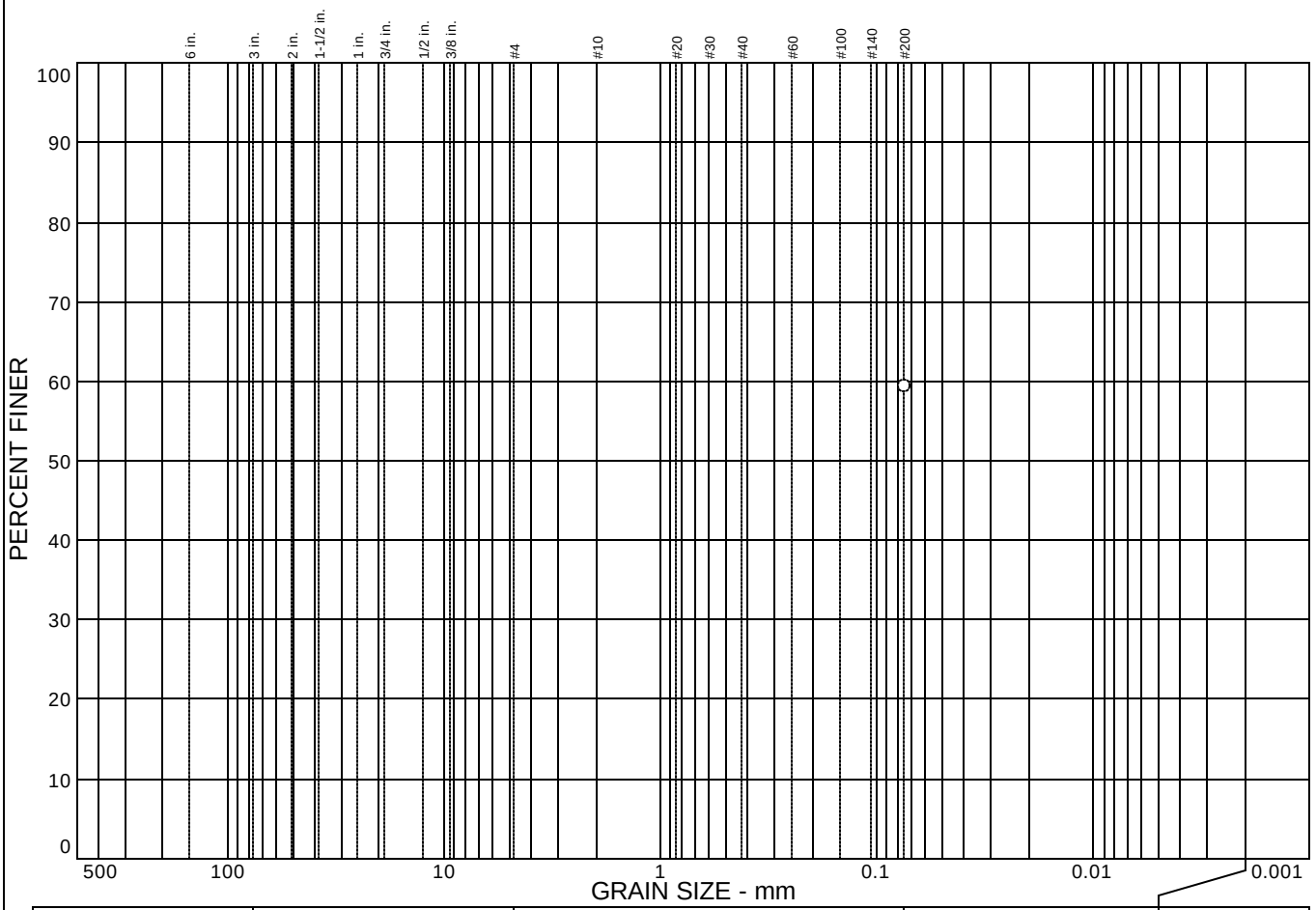
Sample No.: 1-1-10 **Source of Sample:** **Date:** 7/23/06
Location: **Elev./Depth:**

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Macedo Property- Livermore

Project No: 7380.1.001.01

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
			59.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	59.3		

* (no specification provided)

Soil Description

Yellowish brown sandy CLAY

Atterberg Limits

PL= 13 LL= 36 PI= 23

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Sample No.: 1-2-2.5 **Source of Sample:** **Date:** 7/21/06

Location: **Elev./Depth:**

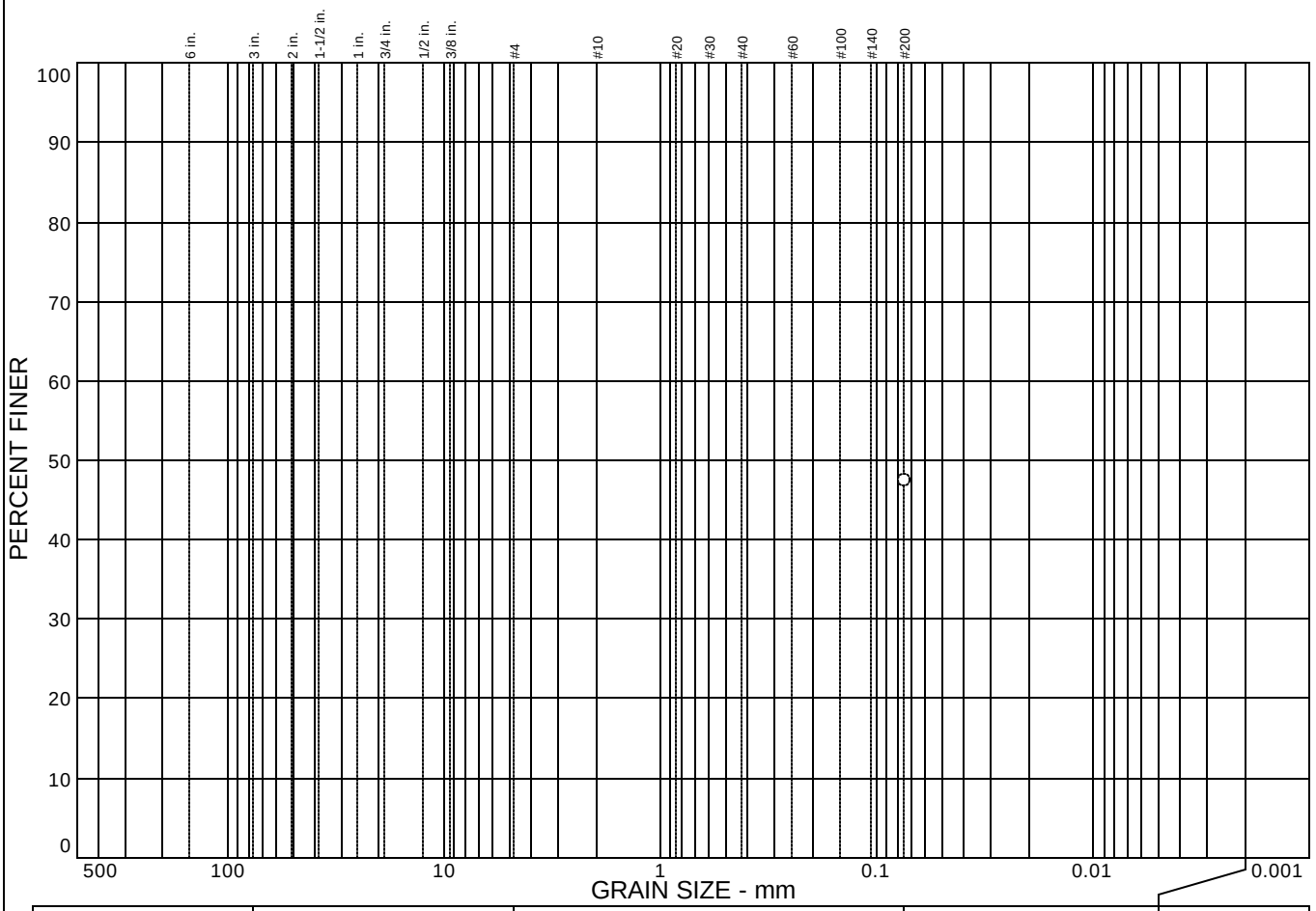
ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:

Project: Macedo Property- Livermore

Project No: 7380.1.001.01

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
			47.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	47.4		

* (no specification provided)

Soil Description

Yellowish brown clayey SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

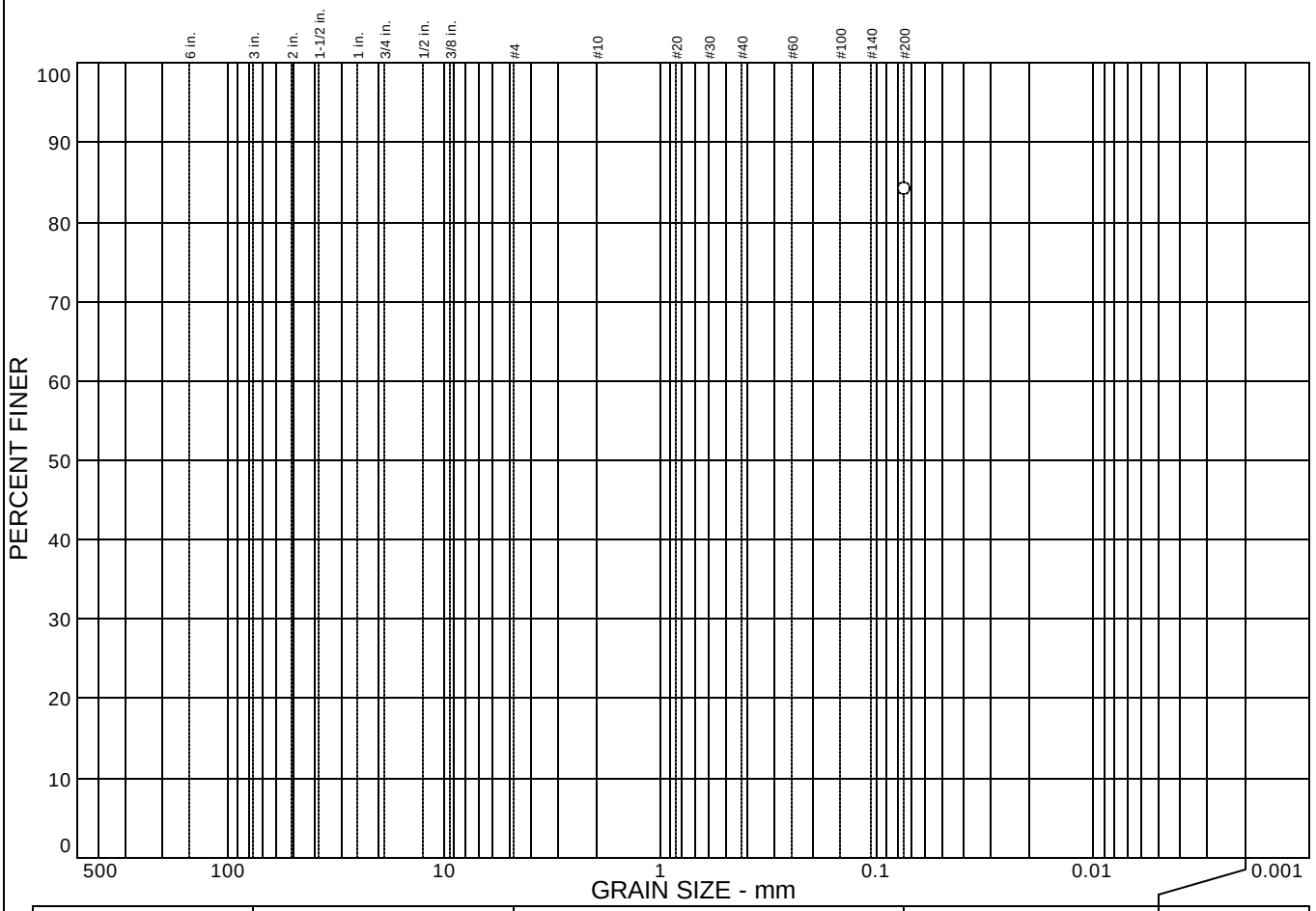
Sample No.: 1-1-20 **Source of Sample:** **Date:** 7/21/06
Location: **Elev./Depth:**

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Macedo Property- Livermore

Project No: 7380.1.001.01

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
			84.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	84.2		

* (no specification provided)

Soil Description

Dark olive brown silty CLAY with sand

Atterberg Limits

PL= 14 LL= 36 PI= 22

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Sample No.: 1-1-2 **Source of Sample:** **Date:** 7/21/06
Location: **Elev./Depth:**

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Macedo Property- Livermore

Project No: 7380.1.001.01

APPENDIX D

Guide Contract Specifications

APPENDIX D

GUIDE CONTRACT SPECIFICATIONS

PART I - EARTHWORK

PREFACE

These specifications are intended as a guide for the earthwork performed at the subject development project. If there is a conflict between these specifications (including the recommendations of the geotechnical report) and agency or code requirements, it should be brought to the attention of ENGEO and Owner prior to contract bidding.

PART 1 - GENERAL

1.01 WORK COVERED

A. Grading, excavating, filling and backfilling, including trenching and backfilling for utilities as necessary to complete the Project as indicated on the Drawings.

B. Subsurface drainage as indicated on the Drawings.

1.02 CODES AND STANDARDS

A. Excavating, trenching, filling, backfilling, and grading work shall meet the applicable requirements of the Uniform Building Code and the standards and ordinances of state and local governing authorities.

1.03 SUBSURFACE SOIL CONDITIONS

A. The Owners' Geotechnical Exploration report is available for inspection by bidder or Contractor. The Contractor shall refer to the findings and recommendations of the Geotechnical Exploration report in planning and executing his work.

1.04 DEFINITIONS

A. Fill: All soil, rock, or soil-rock materials placed to raise the grades of the site or to backfill excavations.

B. Backfill: All soil, rock or soil-rock material used to fill excavations and trenches.

C. On-Site Material: Soil and/or rock material which is obtained from the site.

D. Imported Material: Soil and/or rock material which is brought to the site from off-site areas.

E. Select Material: On-site and/or imported material which is approved by ENGEO as a specific-purpose fill.

F. Engineered Fill: Fill upon which ENGEO has made sufficient observations and tests to confirm that the fill has been placed and compacted in accordance with specifications and requirements.

G. Degree of Compaction or Relative Compaction: The ratio, expressed as a percentage, of the in-place dry density of the fill and backfill material as compacted in the field to the maximum dry density of the same material as determined by ASTM D-1557 or California 216 compaction test method.

H. Optimum Moisture: Water content, percentage by dry weight, corresponding to the maximum dry density as determined by ASTM D-1557.

I. ENGEO: The project geotechnical engineering consulting firm, its employees or its designated representatives.

J. Drawings: All documents, approved for construction, which describe the Work.

1.05 OBSERVATION AND TESTING

A. All site preparation, cutting and shaping, excavating, filling, and backfilling shall be carried out under the observation of ENGEO, employed and paid for by the Owners. ENGEO will perform appropriate field and laboratory tests to evaluate the suitability of fill material, the proper moisture content for compaction, and the degree of compaction achieved. Any fill that does not meet the specification requirements shall be removed and/or reworked until the requirements are satisfied.

B. Cutting and shaping, excavating, conditioning, filling, and compacting procedures require approval of ENGEO as they are performed. Any work found unsatisfactory or any work disturbed by subsequent operations before approval is granted shall be corrected in an approved manner as recommended by ENGEO.

C. Tests for compaction will be made in accordance with test procedures outlined in ASTM D-1557, as applicable. Field testing of soils or compacted fill shall conform with the applicable requirements of ASTM D-2922.

D. All authorized observation and testing will be paid for by the Owners.

1.06 SITE CONDITIONS

A. Excavating, filling, backfilling, and grading work shall not be performed during unfavorable weather conditions. When the work is interrupted by rain, excavating, filling, backfilling, and grading work shall not be resumed until the site and soil conditions are suitable.
B. Contractor shall take the necessary measures to prevent erosion of freshly filled, backfilled, and graded areas until such time as permanent drainage and erosion control measures have been installed.

PART 2 - PRODUCTS

2.01 GENERAL

A. Contractor shall furnish all materials, tools, equipment, facilities, and services as required for performing the required excavating, filling, backfilling, and grading work, and trenching and backfilling for utilities.

2.02 SOIL MATERIALS

A. Fill

1. Material to be used for engineered fill and backfill shall be free from organic matter and other deleterious substances, and of such quality that it will compact thoroughly without excessive voids when watered and rolled. Excavated on-site material will be considered suitable for engineered fill and backfill if it contains no more than 3 percent organic matter, is free of debris and other deleterious substances and conforms to the requirements specified above. Rocks of maximum dimension in excess of two-thirds of the lift thickness shall be removed from any fill material to the satisfaction of ENGEO.

2. Excavated earth material which is suitable for engineered fill or backfill, as determined by ENGEO, shall be conditioned for reuse and properly stockpiled as required for later filling and backfilling operations. Conditioning shall consist of spreading material in layers not to exceed 8 inches and raking free of debris and rubble. Rocks and aggregate exceeding the allowed largest dimension, and deleterious material shall be removed from the site and disposed off site in a legal manner.

3. ENGEO shall be immediately notified if potential hazardous materials or suspect soils exhibiting staining or odor are encountered. Work activities shall be discontinued within the area of potentially hazardous materials. ENGEO environmental personnel will conduct an assessment of the suspect hazardous

material to determine the appropriate response and mitigation. Regulatory agencies may also be contacted to request concurrence and oversight. *ENGEO will rely on the Owner, or a designated Owner's representative, to make necessary notices to the appropriate regulatory agencies. The Owner may request ENGEO's assistance in notifying regulatory agencies, provided ENGEO receives Owner's written authorization to expand its scope of services.*

4. ENGEO shall be notified at least 48 hours prior to the start of filling and backfilling operations so that it may evaluate samples of the material intended for use as fill and backfill. All materials to be used for filling and backfilling require the approval of ENGEO.

B. Import Material: Where conditions require the importation of fill material, the material shall be an inert, nonexpansive soil or soil-rock material free of organic matter and meeting the following requirements unless otherwise approved by ENGEO.

Gradation (ASTM D-421):	Sieve Size	Percent Passing
	2-inch	100
	#200	15 - 70
Plasticity (ASTM D-4318):	Liquid Limit	Plasticity Index
	< 30	< 12
Swell Potential (ASTM D-4546B): (at optimum moisture)	Percent Heave	Swell Pressure
	< 2 percent	< 300 psf
Resistance Value (ASTM D-2844):	Minimum 25	
Organic Content (ASTM D-2974):	Less than 2 percent	

A sample of the proposed import material should be submitted to ENGEO for evaluation prior to delivery at the site.

2.03 SAND

A. Sand for sand cushion under slabs and for bedding of pipe in utility trenches shall be a clean and graded, washed sand, free from clay or organic material, suitable for the intended purpose with 90 to 100 percent passing a No. 4 U.S. Standard Sieve, not more

than 5 percent passing a No. 200 U.S. Standard Sieve, and generally conforming to ASTM C33 for fine aggregate.

2.04 AGGREGATE DRAINAGE FILL

A. Aggregate drainage fill under concrete slabs and paving shall consist of broken stone, crushed or uncrushed gravel, clean quarry waste, or a combination thereof. The aggregate shall be free from fines, vegetable matter, loam, volcanic tuff, and other deleterious substances. It shall be of such quality that the absorption of water in a saturated surface dry condition does not exceed 3 percent of the oven dry weight of the samples.

B. Aggregate drainage fill shall be of such size that the percentage composition by dry weight as determined by laboratory sieves (U. S. Series) will conform to the following grading:

Sieve Size	Percentage Passing Sieve
1½-inches	100
1-inch	90 - 100
#4	0 - 5

2.05 SUBDRAINS

A. Perforated subdrain pipe of the required diameter shall be installed as shown on the drawings. The pipe(s) shall also conform to these specifications unless otherwise specified by ENGEO in the field.

Subdrain pipe shall be manufactured in accordance with one of the following requirements:

Design depths less than 30 feet

- Perforated ABS Solid Wall SDR 35 (ASTM D-2751)
- Perforated PVC Solid Wall SDR 35 (ASTM D-3034)
- Perforated PVC A-2000 (ASTM F949)
- Perforated Corrugated HDPE double-wall (AASHTO M-252 or M-294, Caltrans Type S, 50 psi minimum stiffness)

Design depths less than 50 feet

- Perforated PVC SDR 23.5 Solid Wall (ASTM D-3034)
- Perforated Sch. 40 PVC Solid Wall (ASTM-1785)

- Perforated ABS SDR 23.5 Solid Wall (ASTM D-2751)
- Perforated ABS DWV/Sch. 40 (ASTM D-2661 and D-1527)
- Perforated Corrugated HDPE double-wall (AASHTO M-252 or M-294, Caltrans Type S, 70 psi minimum stiffness)

Design depths less than 70 feet

- Perforated ABS Solid Wall SDR 15.3 (ASTM D-2751)
- Perforated Sch. 80 PVC (ASTM D-1785)
- Perforated Corrugated Aluminum (ASTM B-745)

B. Permeable Material (Class 2): Class 2 permeable material for filling trenches under, around, and over subdrains, behind building and retaining walls, and for pervious blankets shall consist of clean, coarse sand and gravel or crushed stone, conforming to the following grading requirements:

Sieve Size	Percentage Passing Sieve
1-inch	100
¾-inch	90 - 100
⅜-inch	40 - 100
#4	25 - 40
#8	18 - 33
#30	5 - 15
#50	0 - 7
#200	0 - 3

C. Filter Fabric: All filter fabric shall meet the following Minimum Average Roll Values unless otherwise specified by ENGEO.

Grab Strength (ASTM D-4632).....180 lbs
Mass Per Unit Area (ASTM D-4751).....6 oz/yd^2
Apparent Opening Size (ASTM D-4751).....70-100 U.S. Std. Sieve
Flow Rate (ASTM D-4491).....80 gal/min/ft^2
Puncture Strength (ASTM D-4833).....80 lbs

D. Vapor Retarder: Vapor Retarders shall consist of PVC, LDPE or HDPE impermeable sheeting at least 10 mils thick.

2.06 PERMEABLE MATERIAL (Class 1; Type A)

A. Class 1 permeable material to be used in conjunction with filter fabric for backfilling of subdrain excavations shall conform to the following grading requirements:

Sieve Size	Percentage Passing Sieve
¾-inch	100
½-inch	95 - 100
⅜-inch	70 - 100
#4	0 - 55
#8	0 - 10
#200	0 - 3

PART 3 - EXECUTION

3.01 STAKING AND GRADES

A. Contractor shall lay out all his work, establish all necessary markers, bench marks, grading stakes, and other stakes as required to achieve design grades.

3.02 EXISTING UTILITIES

A. Contractor shall verify the location and depth (elevation) of all existing utilities and services before performing any excavation work.

3.03 EXCAVATION

A. Contractor shall perform excavating as indicated and required for concrete footings, drilled piers, foundations, floor slabs, concrete walks, and site leveling and grading, and provide shoring, bracing, underpinning, cribbing, pumping, and planking as required. The bottoms of excavations shall be firm undisturbed earth, clean and free from loose material, debris, and foreign matter.

B. Excavations shall be kept free from water at all times. Adequate dewatering equipment shall be maintained at the site to handle emergency situations until concrete or backfill is placed.

C. Unauthorized excavations for footings shall be filled with concrete to required elevations, unless other methods of filling are authorized by ENGEO.

D. Excavated earth material which is suitable for engineered fill or backfill, as determined by ENGEO, shall be conditioned for reuse and properly stockpiled for later filling and backfilling operations as specified under Section 2.02, "Soil Materials."

E. Abandoned sewers, piping, and other utilities encountered during excavating shall be removed and the resulting excavations shall be backfilled with engineered fill as required by ENGEO.

F. Any active utility lines encountered shall be reported immediately to the Owner's Representative and authorities involved. The Owner and proper authorities shall be permitted free access to take the measures deemed necessary to repair, relocate, or remove the obstruction as determined by the responsible authority or Owner's Representative.

3.04 SUBGRADE PREPARATION

A. All brush and other rubbish, as well as trees and root systems not marked for saving, shall be removed from the site and legally disposed of.

B. Any existing structures, foundations, underground storage tanks, or debris must be removed from the site prior to any building, grading, or fill operations. Septic tanks, including all drain fields and other lines, if encountered, must be totally removed. The resulting depressions shall be properly prepared and filled to the satisfaction of ENGEO.

C. Vegetation and organic topsoil shall be removed from the surface upon which the fill is to be placed and either removed and legally disposed of or stockpiled for later use in approved landscape areas. The surface shall then be scarified to a depth of at least eight inches until the surface is free from ruts, hummocks, or other uneven features which would tend to prevent uniform compaction by the equipment to be used.

D. After the foundation for the fill has been cleared and scarified, it shall be made uniform and free from large clods. The proper moisture content must be obtained by adding water or aerating. The foundation for the fill shall be compacted at the proper moisture content to a relative compaction as specified herein.

3.05 ENGINEERED FILL

A. Select Material: Fill material shall be "Select" or "Imported Material" as previously specified.

B. Placing and Compacting: Engineered fill shall be constructed by approved and accepted methods. Fill material shall be spread in uniform lifts not exceeding 8 inches in uncompacted thickness. Each layer shall be spread evenly, and thoroughly blade-mixed to obtain uniformity of material. Fill material which does not contain sufficient moisture as specified by ENGEO shall be sprinkled with water; if it contains excess moisture it shall be aerated or blended with drier material to achieve the proper water content. Select material and water shall then be thoroughly mixed before being compacted.

C. Unless otherwise specified in the Geotechnical Exploration report, each layer of spread select material shall be compacted to at least 90 percent relative compaction at a moisture content of at least three percentage points above the optimum moisture content. Minimum compaction in all keyways shall be a minimum of 95 percent with a minimum moisture content of at least 1 percentage point above optimum.

D. Unless otherwise specified in the Geotechnical Exploration report or otherwise required by the local authorities, the upper 6 inches of engineered fill in areas to receive pavement shall be compacted to at least 95 percent relative compaction with a minimum moisture content of at least 3 percentage points above optimum.

E. Testing and Observation of Fill: The work shall consist of field observation and testing to determine that each layer has been compacted to the required density and that the required moisture is being obtained. Any layer or portion of a layer that does not attain the compaction required shall be reworked until the required density is obtained.

F. Compaction: Compaction shall be by sheepsfoot rollers, multiple-wheel steel or pneumatic-tired rollers or other types of acceptable compaction equipment. Rollers shall be of such design that they will be able to compact the fill to the specified compaction. Rolling shall be accomplished while the fill material is within the specified moisture content range. Rolling of each layer must be continuous so that the required compaction may be obtained uniformly throughout each layer.

G. Fill slopes shall be constructed by overfilling the design slopes and later cutting back the slopes to the design grades. No loose soil will be permitted on the faces of the finished slopes.

H. Strippings and topsoil shall be stockpiled as approved by Owner, then placed in accordance with ENGEO's recommendations to a minimum thickness of 6 inches and a maximum thickness of 12 inches over exposed open space cut slopes which are 3:1 or flatter, and track walked to the satisfaction of ENGEO.

I. Final Prepared Subgrade: Finish blading and smoothing shall be performed as necessary to produce the required density, with a uniform surface, smooth and true to grade.

3.06 BACKFILLING

A. Backfill shall not be placed against footings, building walls, or other structures until approved by ENGEO.

B. Backfill material shall be Select Material as specified for engineered fill.

C. Backfill shall be placed in 6-inch layers, leveled, rammed, and tamped in place. Each layer shall be compacted with suitable compaction equipment to 90 percent relative compaction at a moisture content of at least 3 percent above optimum.

3.07 TRENCHING AND BACKFILLING FOR UTILITIES

A. Trenching:

1. Trenching shall include the removal of material and obstructions, the installation and removal of sheeting and bracing and the control of water as necessary to provide the required utilities and services.

2. Trenches shall be excavated to the lines, grades, and dimensions indicated on the Drawings. Maximum allowable trench width shall be the outside diameter of the pipe plus 24 inches, inclusive of any trench bracing.

3. When the trench bottom is a soft or unstable material as determined by ENGEO, it shall be made firm and solid by removing said unstable material to a sufficient depth and replacing it with on-site material compacted to 90 percent minimum relative compaction.

4. Where water is encountered in the trench, the contractor must provide materials necessary to drain the water and stabilize the bed.

B. Backfilling:

1. Trenches must be backfilled within 2 days of excavation to minimize desiccation.

2. Bedding material shall be sand and shall not extend more than 6 inches above any utility lines.

3. Backfill material shall be select material.

4. Trenches shall be backfilled as indicated or required and compacted with suitable equipment to 90 percent minimum relative compaction at the required moisture content.

3.08 SUBDRAINS

A. Trenches for subdrain pipe shall be excavated to a minimum width equal to the outside diameter of the pipe plus at least 12 inches and to a depth of approximately 2 inches below the grade established for the invert of the pipe, or as indicated on the Drawings.

B. The space below the pipe invert shall be filled with a layer of Class 2 permeable material, upon which the pipe shall be laid with perforations down. Sections shall be joined as recommended by the pipe manufacturer.

C. Rocks, bricks, broken concrete, or other hard material shall not be used to give intermediate support to pipes. Large stones or other hard objects shall not be left in contact with the pipes.

D. Excavations for subdrains shall be filled as required to fill voids and prevent settlement without damaging the subdrain pipe. Alternatively, excavations for subdrains may be filled with Class 1 permeable material (as defined in Section 2.06) wrapped in Filter Fabric (as defined in Section 2.05).

3.09 AGGREGATE DRAINAGE FILL

A. ENGEO shall approve finished subgrades before aggregate drainage fill is installed.

B. Pipes, drains, conduits, and any other mechanical or electrical installations shall be in place before any aggregate drainage fill is placed. Backfill at walls to elevation of drainage fill shall be in place and compacted.

C. Aggregate drainage fill under slabs and concrete paving shall be the minimum uniform thickness after compaction of dimensions indicated on Drawings. Where not indicated, minimum thickness after compaction shall be 4 inches.

D. Aggregate drainage fill shall be rolled to form a well-compacted bed.

E. The finished aggregate drainage fill must be observed and approved by ENGEO before proceeding with any subsequent construction over the compacted base or fill.

3.10 SAND CUSHION

A. A sand cushion shall be placed over the vapor retarder membrane under concrete slabs on grade. Sand cushion shall be placed in uniform thickness as indicated on the Drawings. Where not indicated, the thickness shall be 2 inches.

3.11 FINISH GRADING

A. All areas must be finish graded to elevations and grades indicated on the Drawings. In areas to receive topsoil and landscape planting, finish grading shall be performed to a uniform 6 inches below the grades and elevations indicated on the Drawings, and brought to final grade with topsoil.

3.12 DISPOSAL OF WASTE MATERIALS

A. Excess earth materials and debris shall be removed from the site and disposed of in a legal manner. Location of dump site and length of haul are the Contractor's responsibility.