Appendix 3.0-1

Preliminary Geotechnical Report (Project)

YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PRELIMINARY GEOTECHNICAL REPORT FOR ENVIRONMENTAL IMPACT REPORT REVIEW

SUBMITTED TO
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PROJECT NO.
13667.000.000

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this preliminary geotechnical exploration is to provide an assessment of the potential geotechnical concerns associated with the use of the site for the proposed technology campus. We performed the following tasks:

- Review of published geologic maps and geotechnical data for the site.
- Review of historic aerial photos.
- Acquisition of appropriate San Mateo County Environmental Health Services Division permits.
- Notification of Underground Services Alert a minimum of 48 hours prior to our exploration.
- Retention of a private utility locator to clear the proposed exploration locations of existing utilities.
- Preparation of a work plan including proposed locations for our explorations, as well as excavation checklists showing their proximity to existing utilities.
- Retention of a Professional Surveyor to determine the location and elevation of the proposed and as-drilled exploration locations.
- Subsurface field exploration and laboratory testing.
- Interpretation of subsurface field exploration data.
- Evaluation of potential geotechnical concerns.

For our use, we received the San Bruno Feasibility Study, provided by Google/REWS, dated August 2016.

This report was prepared for the exclusive use of Google, Inc. (Google) and its consultants. In the event that any changes are made in the character, design or layout of the development, we must be contacted to review the conclusions and recommendations contained in this report to evaluate the need for modifications.

1.2 SITE LOCATION AND DESCRIPTION

The project site is located in San Bruno, California as depicted on the Vicinity Map, Figure 1. The site is bounded on the north by Interstate 380, on the east by El Camino Real, on the west by Cherry Avenue, and on the south by San Bruno Avenue. Access is provided by Bayhill Drive and Grundy Lane.

The Site Plan, Figure 2A, shows site boundaries and the project site, which comprises eight parcels currently developed for commercial use. The approximately 40.2-acre site is identified by the Assessor's Parcel Numbers (APN), according to the County of San Mateo Assessor's Parcel Map, shown in the table below. The table also includes the associated parcel number as designated in the Feasibility Study and shown in Figure 2A, addresses associated with each APN, and summary of existing improvements.

TABLE 1.2-1: Project Parcels and Description

APN	FEASIBILITY STUDY PARCEL #	APPROXIMATE AREA (ACRES)	ASSOCIATED ADDRESSES	SUMMARY OF EXISTING IMPROVEMENTS
020-011-230	1 and 3	4.2	1000 Cherry Avenue	Three-story YouTube office building and surface parking lot
020-015-020	2 and 4	4.0	900 Cherry Avenue	Six-story YouTube office building and terraced surface parking lot
020-015-030	5	6.4	1150, 1200, 1250 Bayhill Drive	Three three-story office buildings with surface parking lot and ponds
020-018-010	6	9.8	1111 Bayhill Drive	Four-story office building with terraced surface parking lot, retaining wall and slope up to 20 feet high on south side
020-011-330	7	4.4	1100 Grundy Lane	Three-story office building and surface parking lot
020-019-070	8	6.1	999 and 1001 Bayhill Drive	Two three-story office buildings with surface parking lot, large pond, retaining wall up to 15 feet high in southwest corner
020-011-370	8a	0.9	N/A	Surface parking lot
020-015-040	9	4.4	950 Elm Avenue	Three-story office building and surface parking lot

Along with other utilities, a 60-inch-diameter culvert crosses the site at a depth ranging from approximately 15 to 20 feet below existing grade. The location of the culvert was identified by BKF Engineers (BKF) during their utility survey and is shown in Figure 4. Based on BKF's mapping, the culvert enters the site in the northwest corner of Parcel 7, runs east to the southeast portion of Parcel 7, continues south along the eastern boundary of Parcel 9, enters the northwest corner of Parcel 8, and exits the site at the southeastern portion of Parcel 8.

1.3 EXISTING GEOTECHNICAL DATA

We reviewed available reports for previous projects within the site vicinity. The following list includes the existing geotechnical reports, as well as environmental and groundwater monitoring reports, reviewed as part of this preliminary study:

1971 – L.T. Evans, Inc. Foundation Investigation Report

This is a foundation investigation report prepared for the, then named, Bayhill Office Building No. 1. The investigation was performed for a nine-story office building with a basement and a four-level garage located at the current 850 Cherry Avenue, northeast of the intersection of Cherry Avenue and San Bruno Avenue.

The field exploration included nine 20-inch-diameter test borings to depths ranging from 35 to 70 feet. The locations of the borings are shown on Figure 2A. The soil encountered was predominantly silty and clayey sand with lenses of silt and clay. Up to 20 feet of fill was encountered along Cherry Avenue.

Groundwater was encountered between 42 and 65 feet below ground surface.

<u>September 1974 - L.T. Evans, Inc. Foundation Investigation Report</u>

This is a foundation investigation report prepared for the N.V. Yusra Office Buildings. The investigation was performed for the existing structures located at 1150, 1200, and 1250 Bayhill Drive.

The field exploration included drilling four 20-inch-diameter test borings to maximum depths of 35 feet at the locations shown on Figure 2A. The soil encountered was predominantly sand with lenses of clay, silt, or mixtures of all three soil types. The borings encountered material with a low density and high moisture content at a depth of 6 feet in Boring 1 and a depth of 24 feet in Boring 4. The investigators suggest the subsurface conditions encountered indicate the site was previously traversed by gullies that flowed southeasterly. L.T. Evans concluded there was no evidence that fill that had been placed in the area prior to their study.

Groundwater was encountered at a depth of 10 feet in Borings 1 and 2, 21 feet in Boring 4, and not encountered in Boring 3. The investigators suggested the variation in groundwater elevation may indicate the infilling of an old channel.

L.T. Evans recommended over-excavating 6 feet below the building foundations, placing compacted fill, and embedding the shallow foundation 2 feet below finished grade.

<u>December 20, 2012 – Cornerstone Earth Group Design-Level Geotechnical Investigation</u>

This report is a design-level Geotechnical Investigation prepared for the San Francisco Police Credit Union Headquarters located at 1250 Grundy Lane. The proposed structure would include up to two levels of concrete-framed below-grade parking with a three-story steel-framed office building above. The project is currently under construction and the excavation for the below-grade parking appears to be nearly complete.

The field exploration included drilling nine auger borings using hollow-stem and solid-stem augers to depths ranging from 4 to 49½ feet below ground surface. The locations of the borings are shown on Figure 2A. The soil encountered included undocumented fill ranging in thickness from 2 to 5 feet across the majority of the site, but as thick as 12 feet in the northeast corner of the site. The fill generally consisted of medium-stiff to hard lean clay over medium dense sand. Beneath the fill, alternating layers of stiff to hard lean clay and medium dense to very dense sand with varying amounts of silt and clay were encountered to the maximum depth explored of 49½ feet.

Groundwater was not encountered in any of the borings to the maximum depth of 49½ feet below ground surface.

Cornerstone concluded that the primary geotechnical concerns at the site were the presence of non-engineered fill and moderately corrosive soil. Cornerstone also concluded that there was a low potential for liquefaction at the site due to the stiff to hard cohesive soils and medium-dense to very dense granular materials encountered, in addition to the deep groundwater level.

<u>February 10, 2017 – ENGEO Geotechnical Exploration</u>

We recently conducted a geotechnical exploration at a site located to the southwest of the intersection of San Bruno Avenue and El Camino Real. The site is currently occupied by one- to two-story commercial buildings and the proposed project includes two, four-story Type V residential units over a podium structure with one level of below-grade parking.

The field exploration included drilling five borings and advancing six cone penetration tests (CPT) to a maximum depth of 61½ feet below existing grade. The soil encountered included variable amounts of fill from 3 to 15 feet. The fill generally consisted of medium-stiff to stiff clay with some debris. Beneath the fill, stiff to hard sandy silt with traces of fine gravel, and medium-dense to dense silty sand with silty clay lenses were encountered. This soil was identified as the Colma Formation.

Groundwater was encountered at depths ranging from 15 to 20 feet during the field exploration.

<u>July 11, 2005 – RGA Environmental, Inc. Subsurface Investigation Report</u>

This report was prepared for the purpose of evaluating the environmental impact of hydraulic fluid in the soil and groundwater at the 999 and 1001 Bayhill Drive properties.

The subsurface investigation included drilling six boreholes to a maximum depth of 30 feet below ground surface. The soil encountered generally consisted of silt or clay with variable amounts of sand and gravel to a depth of approximately 22½ to 25½ feet below ground surface. Finer-grained material overlies a sand layer, which was encountered to the maximum depth of 30 feet below ground surface. The soil was identified as being part of the Colma Formation.

Groundwater was encountered at the time of drilling at depths ranging from 25 to 27 feet below ground surface. Groundwater was subsequently measured after leaving the boreholes open for a period of time and found to be at depths ranging from 18 to 19 feet below ground surface.

<u>April 15, 2015 – AECOM Report on 1st Semiannual 2015 Groundwater Monitoring</u>

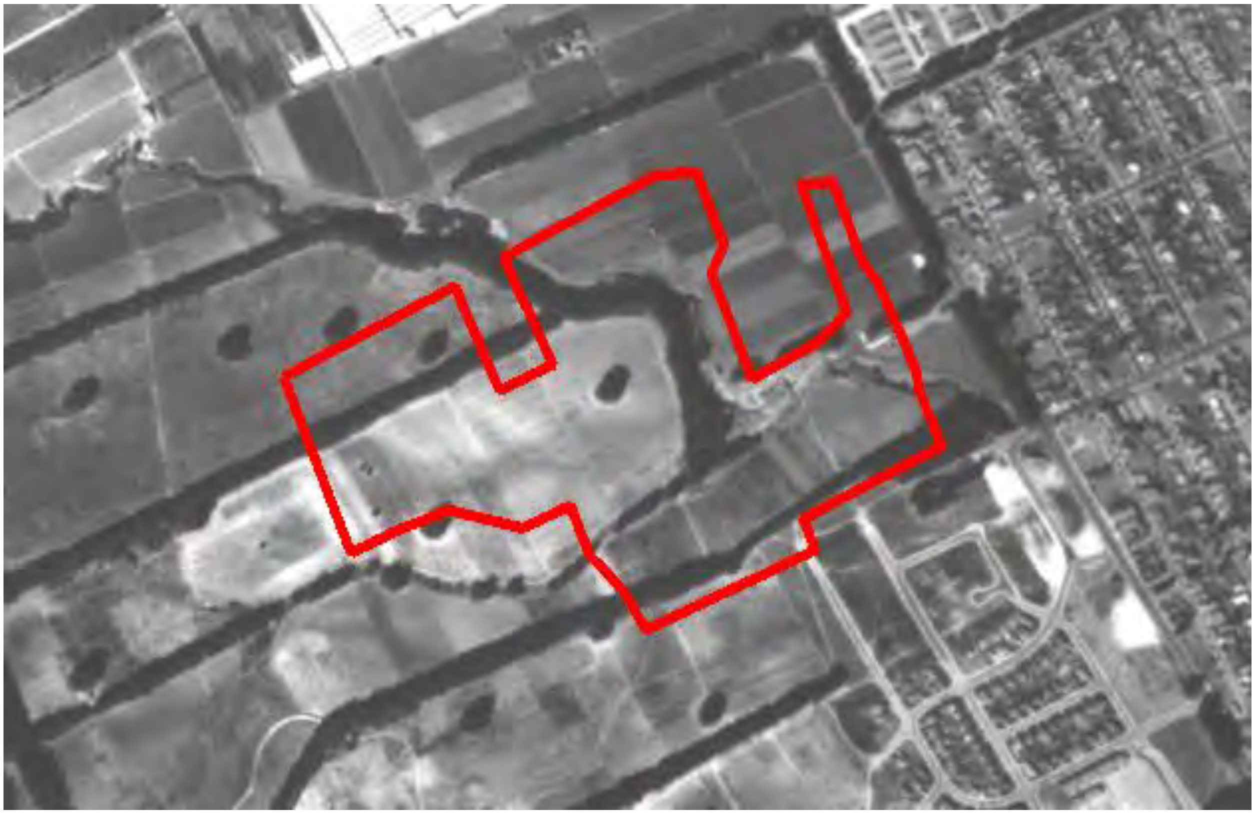
This report was prepared for the property at 801 El Camino Real, located at the east corner of the intersection of San Bruno Avenue and El Camino Real. The report indicates groundwater depth ranged from approximately 9 to 16 feet below ground surface, or elevation 24¾ to 27½ feet above mean sea level (MSL). The investigators stated groundwater flowed in the northeast direction. The report also includes a figure depicting groundwater elevation over time dating from 1989 to 2015. The groundwater elevation ranges from approximately 22 to 32 feet above MSL over this period.

2.0 FINDINGS

2.1 SITE BACKGROUND

As part of our current study, we reviewed historic aerial photographs dating back to 1943 and a U.S. Coast Historical Map from 1869. From review of stereo-paired aerial photographs from 1943, shown below, it is evident that San Bruno Creek and one of its tributaries historically traversed the site along an east-to-southeast trend prior to anthropogenic grading activities. Based on the review of the stereo-paired aerial photographs, it appears that San Bruno Creek was incised more than 10 to 15 feet. This is consistent with the depth of the culvert, which according to plans, ranges from approximately 15 to 20 feet below existing grade.

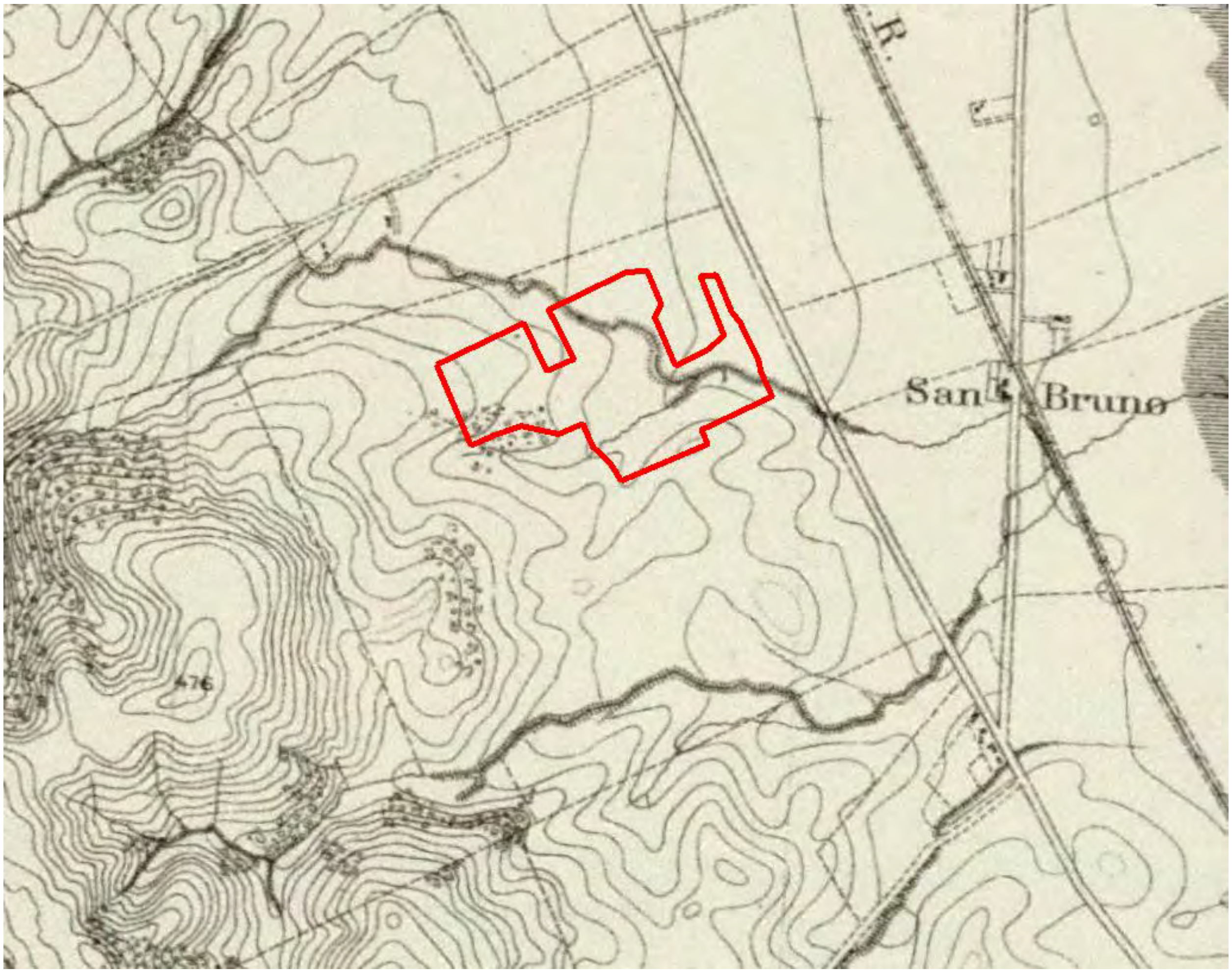
PHOTOGRAPH 2.1-1: Historic Aerial from 1943, Project Boundary in Red



Source: UC Berkeley Earth Sciences and Map Library

The 1869 U.S. Coast Survey map supports the historic presence of the incised creeks at the site. The San Bruno Creek entered the site in the northwest portion of Parcel 7, meandered south through the center of Parcel 9 and the northeast portion of Parcel 6, and cut through the center of Parcel 8 towards the east. The tributary entered the site in the western portion of Parcel 6, continued northeast to where it appears to have joined with San Bruno Creek in the northeastern portion of Parcel 6.

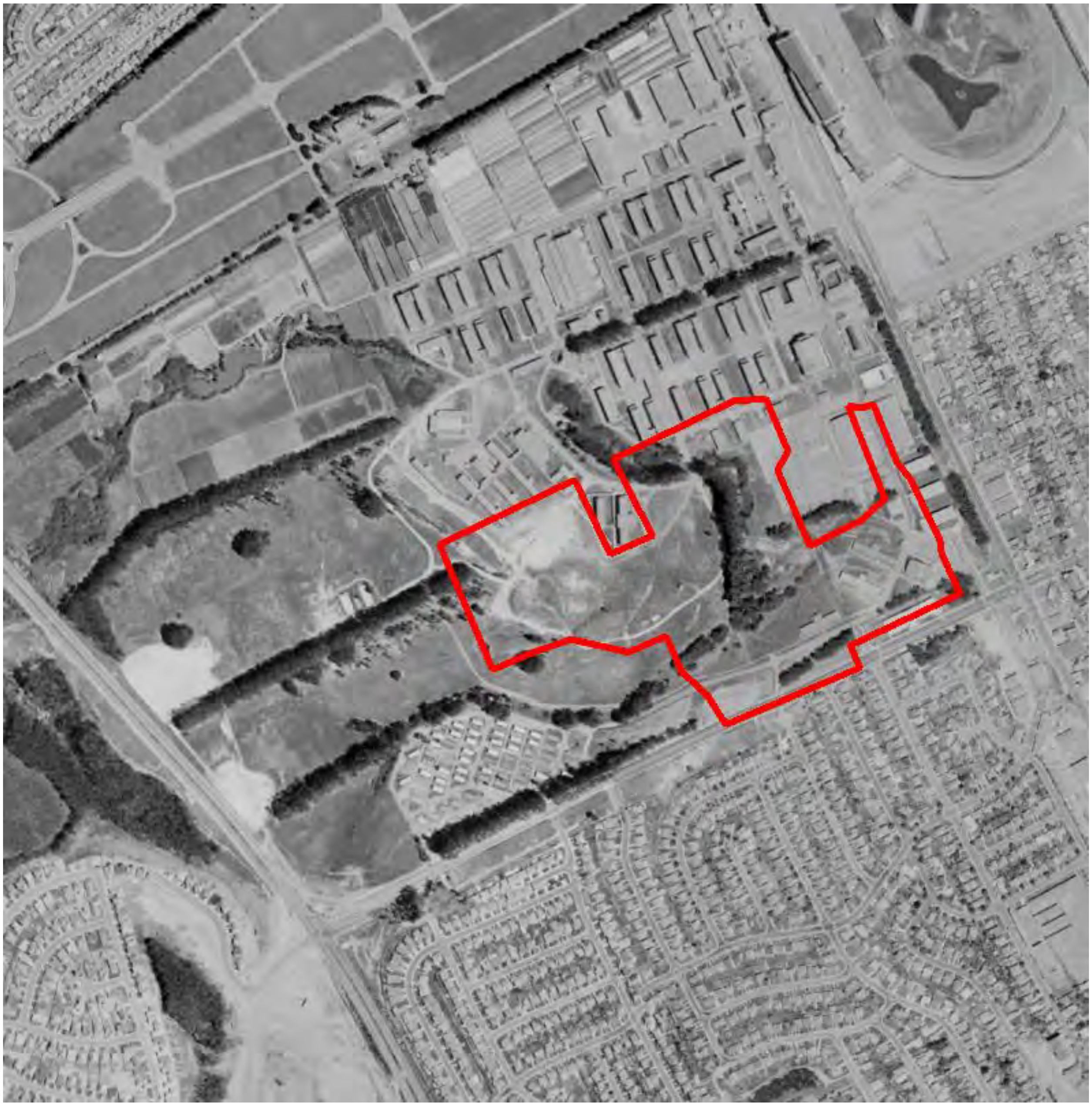
FIGURE 2.1-1: United States Coast Survey Map 1869, Project Boundary in Red



Source: UC Berkeley Earth Sciences and Map Library

Based on further review of historic documents, we understand the site was utilized as a dairy prior to development. During World War II, the U.S. Navy established a base on the site where it operated a Classification Center and Personnel Depot. It appears the site was graded between 1943 and 1946. San Bruno creek appears to have been dammed upstream of the site and infilled within the site limits. The existing culvert, previously mentioned in Section 1.2, was likely constructed during the infilling of the San Bruno Creek to redirect channel flow. Modular, barracks style structures were present at and within the site vicinity in 1946; located north of the site, between Parcels 3 and 7, and in Parcels 5, 8a and 8. The Naval Base remained operational following the conclusion of World War II.

PHOTOGRAPH 2.1-2: Historic Aerial from 1956 showing former Naval Base Facilities, Project Boundary in Red



Source: historicaerials.com

By 1968, several of the naval base structures north of the site were demolished. The structures between Parcels 3 and 7, and in Parcels 8a and 8 remained. By 1980, the remainder of the naval base structures were demolished, Interstate 380 was constructed to the north of the site, and the existing structures at Parcels 1, 2, and 5 were constructed. By 1987, the existing office buildings and associated improvements at Parcels 6, 7, and 9 had been constructed.

PHOTOGRAPH 2.1-3: Historic Aerial from 1980, Project Boundary in Red

Source: historicaerials.com

By 1993, the existing office buildings and associated improvements at Parcel 8 were constructed and the site appears substantially as it currently exists.

PHOTOGRAPH 2.1-4: Historic Aerial from 1993, Project Boundary in Red

Source: historicaerials.com

It is likely that the site has received fill during construction of the existing facilities and previously demolished facilities and there may be construction debris remaining from the previously demolished facilities. We suspect the early refusal of 1-CPT16 was caused by construction debris remaining from the demolition of one of the naval base structures previously located at Parcel 8a.

2.2 SURFACE CONDITIONS

Site topography generally slopes downward from the western corner of the site to the eastern corner of the site. The topography also slopes gradually downward from San Bruno Avenue towards Bayhill Drive. Site grades range from approximately Elevation 125 feet (Datum: NAVD88) in the northwestern portion of Parcel 1 to Elevation 47 feet in the southeast portion of Parcel 8.

The site is currently occupied by nine buildings ranging from three to six stories in height located within Parcels 1, 2, 5, 6, 7, 8, and 9. The four-lane Bayhill Drive, two-lane Grundy Lane, and two-lane Elm Avenue intersect the site.

Parcel 1 contains a three-story YouTube office building. Parcel 3 contains the accompanying asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures.

Parcel 2 contains a six-story YouTube office building. Parcel 4 contains the accompanying asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures. The parking lot is terraced with slopes ranging from 4 to 6 feet in height. The terraced slopes were likely constructed using artificial fill.

Parcel 5 contains three, three-story office buildings spaced approximately 50 feet apart. Ponds and water features are located adjacent to the buildings. The office buildings are bordered on the north, east, and west by asphalt-paved parking lots with associated planters, concrete curbs, young to mature trees, and light fixtures.

Parcel 6 contains a four-story office building in the north corner. The building is accompanied by an asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures. On the south side of the parcel near San Bruno Avenue, there is an approximately 5-foot-high retaining wall with a 2:1 backslope up to about 15 feet high.

Parcel 7 contains a three-story office building in the southern portion. The building is surrounded by an asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures.

Parcel 8 contains two three-story office buildings, which are attached. A large pond abuts the buildings to the north. The buildings are surrounded by an asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures. At the southern corner of the parcel near Elm Avenue, there is an approximately 15-foot-high retaining wall.

Parcel 8a contains an asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures.

Parcel 9 contains a three-story office building in the southeast portion. The building is surrounded by an asphalt-paved parking lot with associated planters, concrete curbs, young to mature trees, and light fixtures.

2.3 GEOLOGY AND SEISMICITY

2.3.1 Regional Geology

The site is located on the eastern side of the San Francisco Peninsula, in the Coast Ranges physiographic province of California. The Coast Ranges comprise a system of northwest-trending, fault-bounded mountain ranges and intervening valleys that trend approximately parallel to the right-lateral transform boundary between the North American and Pacific Plates. The present physiography and geology of the Coast Ranges are the result of deformation and deposition along the tectonic boundary between the North American plate and the Pacific plate. Plate boundary fault movements are largely concentrated along the well-known fault zones, which in the Bay Area include the San Andreas, Hayward, and Calaveras faults, as well as other lesser-order faults. Bedrock in the Coast Ranges consists of igneous, metamorphic and sedimentary rocks that range in age from Jurassic to Pleistocene.

2.3.2 Site Geology

Figure 4 shows mapped geology in the project site and vicinity. We created this map by review of aerial photographs, topographic maps, regional geologic maps, and site surface and subsurface explorations. The following sections describe each of the layers shown on Figure 4.

2.3.2.1 Artificial Fill, Qaf

Portions of the site at the location of the former San Bruno Creek are underlain by artificial fill that was placed in the 1940s and 1950s. As shown on Figure 4, the mapped artificial fill (Qaf) follows the former Creek Channel. Fill material was likely derived from local sources and, based on our field exploration, generally comprises silty sand and sandy lean clay. Due to previous activities and site use, minor fills are likely present at various locations across the site.

2.3.2.2 Holocene Alluvium, Qal

Based on our review of stereo-paired aerial photographs and historic topographic maps covering the site, it appears that the northeastern portion of the site is located along the southern margin of a Holocene alluvial fan deposit (Qal). Historic San Bruno Creek appears to form the southern boundary of the fan deposit (Figure 4).

2.3.2.3 Pleistocene Colma Formation, Qc

According to published geologic mapping covering the site by Bonilla (1998) and Brabb (1998), the site is underlain by Pleistocene Colma Formation (Qc). The Colma Formation is described as weakly consolidated, moderately well bedded, sandy clay and silty sand with well-rounded chert pebbles. Bedding structure within the vicinity is mapped as striking northwest and gently dipping 4 degrees towards the northeast (Figure 3). The Colma Formation is a late Pleistocene-age variable deposit of alluvium, sand dunes and marine sediments that has been uplifted from sea level and tilted and folded to its present configuration. The age of the Colma Formation has been estimated at approximately 80,000 to 120,000 years before present (Caskey, et. al. 2005).

2.3.3 Seismicity

Numerous small earthquakes occur every year in the San Francisco Bay Region, and larger earthquakes have been recorded and can be expected to occur in the future. Figure 6 shows the approximate locations of these faults and significant historic earthquakes recorded within the San Francisco Bay Region. Nearby active faults within 26 miles of the site and their estimated maximum earthquake magnitudes based on the USGS fault database are provided in the following table. 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 11,000 years) (Hart and Bryant, 1997).

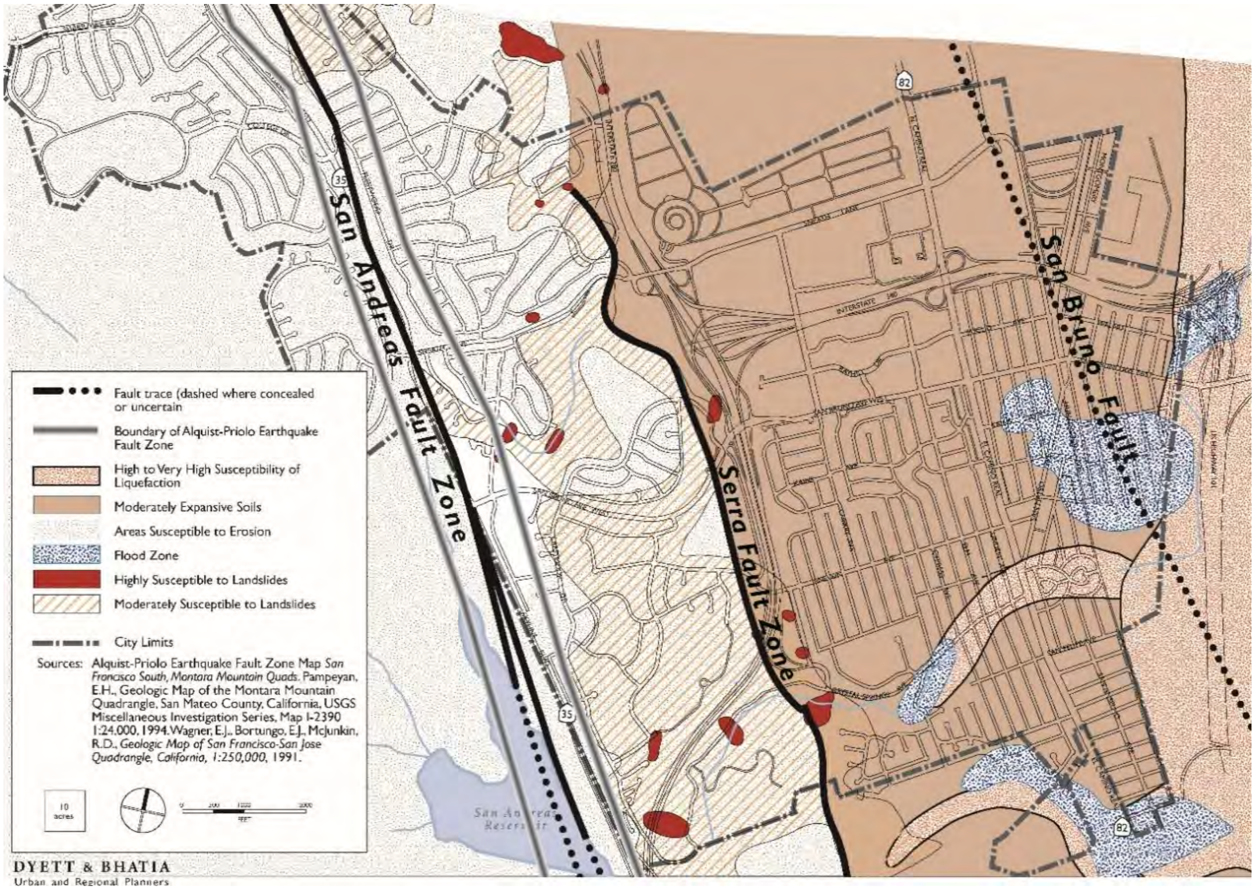
TABLE 2.3.3-1: Active Faults Capable of Producing Significant Ground Shaking at the Site

FAULT NAME	DISTANCE FROM SITE (MILES)	DIRECTION FROM SITE	MAXIMUM MOMENT MAGNITUDE
Serra	0.25	West	Unknown
San Andreas	0.9	Southwest	8.0
San Gregorio Connected	6.7	Southwest	7.5
Monte Vista-Shannon	16	Southeast	6.5
Hayward-Rodgers Creek	17	Northeast	7.3
Calaveras	26	Northeast	7.0

As shown in Figure 7, the site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site. Fault rupture through the site, therefore, is not anticipated.

The Serra fault is located approximately ½ mile west of the project site. The Serra fault, although not currently included on the Alquist-Priolo Earthquake Fault Zone map for the area, is considered to be an active fault that has experienced displacement within Holocene time (Jennings, 2010). The Serra fault forms the contact between the Colma Formation and Merced Formation and is a reverse fault that dips towards the southwest likely merging with the San Andreas fault at depth (Kennedy, 2002).

FIGURE 2.3.3-1: Health and Safety Element, San Bruno General Plan



According to the Health and Safety Element of the San Bruno General Plan, the San Bruno fault is mapped approximately ¼ mile east of the project site. According to the USGS Open-File Report 98-354, "A recent study of geophysical, geomorphic, and geological data found no evidence supporting the existence of the hypothetical San Bruno fault as a mappable structure (USGS Open-File Report 97-429, 1997), and the fault has been deleted."

The Uniform California Earthquake Rupture Forecast (UCERF3, 2013) evaluated the 30-year probability of a Moment Magnitude 6.7 or greater earthquake occurring on the known active fault systems in the Bay Area. The UCERF3 generated an overall probability of 72 percent for the San Francisco Region as a whole.

2.4 FIELD EXPLORATION

Our field exploration included drilling 11 exploratory borings and advancing 18 Cone Penetration Tests (CPTs) at various locations on the site. We performed our field exploration between January 23 and February 1, 2017.

For the purpose of constructing an additional monitoring well, we drilled an exploratory boring (1-B12) on April 12, 2017.

The proposed and as-drilled locations and elevations of our explorations were surveyed by a Professional Surveyor using a survey-grade GPS station; they should be considered accurate to the degree implied by the method used. The locations of the explorations are shown in Figures 2A, 2B and 4.

2.4.1 Exploratory Borings

We observed the drilling of 12 exploratory borings at the locations shown on the Site Plan, Figure 2A. An engineer observed the drilling and logged the subsurface conditions at each location. We retained a truck-mounted drill rig and crew to advance the borings using 4-inch- and 5-inch-diameter mud rotary methods. The borings were advanced to depths ranging from 50½ to 100½ feet below existing grade. We permitted and backfilled the borings in accordance with the requirements of the San Mateo County Environmental Health Services Division.

We obtained bulk soil samples from drill cuttings and retrieved disturbed samples at various intervals in the borings using standard penetration tests with a 2-inch outside diameter (O.D.) split spoon sampler. In addition, 2.5-inch inside diameter (I.D.) samples were obtained using a Modified California Sampler.

The standard penetration resistance blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The 2-inch O.D. split-spoon sampler was driven 18 inches and the number of blows was recorded for each 6 inches of penetration. In addition, 2.5-inch I.D. samples were obtained using a Modified California Sampler driven into the soil with the 140-pound hammer previously described. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows to drive the last 1 foot of penetration; the blow counts have not been converted using any correction factors. When sampler driving was difficult, penetration was recorded only as inches penetrated for 50 hammer blows.

We used the field logs to develop the exploration logs in Appendix A. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.4.2 Cone Penetration Tests

We retained a CPT rig to perform CPTs in general accordance with ASTM D-5778. Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and pore pressure (U) (Robertson and Campanella, 1988). The CPT logs are presented in Appendix B.

2.5 SUBSURFACE CONDITIONS

We encountered asphalt concrete (AC) and aggregate base (AB) in each of our explorations. The thickness of AC ranged from approximately 1½ to 5 inches. The thickness of AB encountered ranged from approximately 2 to 6 inches.

We encountered varying amounts of artificial fill across the site. The artificial fill encountered primarily consisted of medium-dense to dense silty sand and soft to hard sandy silt and sandy lean clay. The artificial fill was likely composed of locally derived material from either alluvial deposits or the Colma Formation. In general, our exploratory borings encountered between 2 and 5 feet of fill across the site. We expect minor fill to exist across the site as a result of previous construction activities.

We encountered more fill in exploratory borings located near or within the extents of the historic creeks. We encountered approximately 20 feet of artificial fill in Boring 1-B10, which we believe to be associated with the infilling of San Bruno Creek. We also encountered fill within the terraced parking lot located within Parcel 4. In Boring 1-B03, we encountered approximately 8 feet of fill, likely associated with the construction of the terraced slopes.

At portions of the site, we encountered soil deposits interpreted as Holocene alluvium (Qal) underlying the artificial fill. The alluvium encountered at our exploration points ranged from approximately 2 to 3 feet in thickness and consisted of medium-stiff to stiff sandy silt and sandy lean clay. The alluvium within and adjacent to the former creek channel could be greater than 10 feet in thickness. Subsurface data is scarce east of the historic San Bruno Creek; however, we expect the thickness of the alluvium to be greater in this area as it is located within an area with strong geomorphic expression indicative of an alluvial fan deposit.

We encountered the Colma Formation underlying the entire site. In the western portion of the site, the Colma Formation generally comprises dense to very dense sand with varying amounts of silt and clay. We believe these lenses of fine-grained material to be relatively discontinuous, as is characteristic of the deposits of the Colma Formation.

In the eastern portion of the site and near the historic creeks, the Colma Formation generally comprises medium-stiff to hard silts and clays with varying amounts of sand. The fine-grained materials were interbedded with layers of dense to very dense sand with varying amounts of silt and clay. In Boring 1-B08, we encountered a layer of soft clay at a depth of 45 feet below ground surface. The layer is approximately 5 to 7 feet thick and grades to very stiff at a depth of 53 feet below ground surface.

Sounding 1-CPT16 encountered early refusal, likely due to the remnants of a foundation associated with the military structures demolished by 1968.

We developed generalized cross sections of the subsurface conditions as presented in Figure 5. We include our exploration logs in Appendix A and CPT logs in Appendix B. The exploration logs contain the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The logs graphically depict the subsurface conditions encountered at the time of the exploration.

2.6 GROUNDWATER CONDITIONS

Due to the mud rotary drilling method, we were unable to measure groundwater conditions in our borings. We attempted to measure groundwater depth in each of our CPTs using pore pressure dissipation tests. The soils encountered at the site generally contained fines, which inhibit the equilibration of pore pressure and make measuring groundwater difficult. We were able to perform successful dissipation testing to measure groundwater in 1-CPT07 and 1-CPT12.

To monitor groundwater conditions over time, we installed monitoring wells using vibrating-wire piezometers at the locations of Borings 1-B02 and 1-B07 at depths of 50½ feet below ground surface and Boring 1-B12 at a depth of 100½ feet below ground surface. These monitoring wells will provide relatively continuous groundwater data for portions of site.

We summarize our observations in the table below:

TABLE 2.6-1: Groundwater Observations during Exploration

EXPLORATION LOCATION	APPROX. DEPTH TO GROUNDWATER (FEET)	APPROX. GROUNDWATER ELEVATION (FEET)
1-CPT07	39.2	39.2
1-CPT12	47.6	27.3
1-B02 (May 23, 2017 well reading)	>50.5	<63.7
1-B07 (May 23, 2017 well reading)	43.8	29.1
1-B12 (May 23, 2017 well reading)	>100.5	<5.0

Based on our review of existing geotechnical data at the site and in the site vicinity presented in Section 1.4, we summarize our estimates of historic groundwater depth based on our review of existing geotechnical data in the table below.

TABLE 2.6-2: Estimated Groundwater Depth from Review of Existing Geotechnical Data

REPORT	SITE ADDRESS	APPROX. DEPTH TO GROUNDWATER (FEET)	APPROX. GROUNDWATER ELEVATION (FEET)
L.T. Evans (1971)	850 Cherry Avenue	42 to 65	40 to 50 (NAVD88)
L.T. Evans (1974)	1150, 1200, 1250 Bayhill Drive	10 to 21	<45 to 70 (NAVD88)
Cornerstone (2012)	1250 Grundy Lane	>49.5	<40 (NAVD88)
ENGEO (February 10, 2017)	San Bruno Avenue and El Camino Real	15 to 20	25 (NAVD88)
RGA (2005)	999 and 1001 Bayhill Drive	18 to 19	31 to 32 (msl)
AECOM (2015)	801 El Camino Real	9 to 16	24¾ to 27½ (msl)

Based on a compilation of groundwater data from our exploration and a review of existing geotechnical data, we believe groundwater to exist across the site at a relatively stable elevation of approximately 25 to 30 feet (NAVD88). Based on site topography and direction of the historic San Bruno creek, it is likely that groundwater is gradually flowing from the west corner to the east corner of the site. Therefore, groundwater elevation may be slightly higher on the west side of the site. However, ground elevation is significantly higher on the west side so groundwater depth will be significantly deeper.

As supported by measurements in the monitoring well at 1-B12, groundwater is expected to be deepest at more than 100½ feet below existing grade within Parcels 1 and 3. Groundwater is expected to be shallowest at a depth of approximately 20 feet below existing grade within Parcel 8.

For the purpose of preliminary analyses and recommendations, we have assumed a groundwater level to be at an elevation of 30 feet NAVD 88.

Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practices, and other factors not evident at the time measurements were made.

2.7 LABORATORY TESTING

We performed laboratory tests on selected soil samples to evaluate their engineering properties. For this project, we performed laboratory testing as shown in the table below.

TABLE 2.7-1: Laboratory Testing

SOIL CHARACTERISTIC	TESTING METHOD	LOCATION OF RESULTS
Unconfined Compression	ASTM 2166	Appendix C
Consolidation – Incremental Loading	ASTM D2435	Appendix C
#200 Wash	ASTM D1140	Appendix C
Moisture Content and Unit Weight	ASTM D7263	Appendix A
Plasticity Index, Wet Method	ASTM D4318	Appendix C
Corrosivity	ASTM D1498, D4972, G57, D4327	Appendix C

3.0 DISCUSSION AND PRELIMINARY CONCLUSIONS

Based on this preliminary study, the project site is feasible for the proposed development provided the preliminary recommendations contained in this report and future design-level geotechnical studies are incorporated into the design plans. A site-specific geotechnical exploration should be performed as part of the design process for each phase and parcel. The exploration would include CPTs, borings and laboratory soil testing to provide data for preparation of specific recommendations regarding grading, foundation design, and drainage for the proposed buildings. The exploration will also allow for more detailed evaluations of the geotechnical issues discussed below and afford the opportunity to provide recommendations regarding techniques and procedures to be implemented during construction to mitigate potential geotechnical/geological hazards.

Based upon our field exploration and review of readily available published maps and reports for the site, the main geotechnical concerns for the proposed site development include:

- The presence of non-engineered fill related to historical creek filling, previous NAVY facilities and current development.
- The potential for cyclic softening of some of the silt below the groundwater table during a seismic event on the eastern side of the site.
- The potential presence of groundwater and its influence on below-grade construction.
- The need for shoring systems to protect the excavation walls, adjacent streets and improvements, and the potential need for dewatering of excavations extending below the groundwater surface.

These items and other geotechnical issues are discussed in the following sections of this report.

3.1 EXISTING FILL

As stated previously, based on our understanding of site history and development, the site is underlain by non-engineered fill up to 20 feet in thickness in some areas where the historical creek was backfilled (Figure 4). In areas outside of the historical creek, non-engineered fill ranges from 2 to 5 feet. The shallower fill appears to have been placed in order to grade the current site conditions.

Because no record exists regarding the placement of the fill, it should be considered non-engineered. Non-engineered fill can undergo excessive settlement, especially under new fill or building loads. Based on preliminary conversations with you and the design team, basements ranging from 30 to 40 feet in depth are planned below the proposed development. Therefore, the majority of the non-engineered fill will be removed during the excavation for the basements. If any buildings are constructed without basements, or the depth of basement does not extend below the bottom of the existing fill, the presence of the fill should be mitigated either by grading or through foundation design.

Fill also extends laterally beyond the borders of the building sites. Considering the type of soil encountered in the fill layer as discussed in Section 2.5, without proper shoring techniques, the remaining portion of the fill outside of the building footprint could potentially collapse into the building excavation.

In the event the development plans change and the excavation depth is less than the thickness of the existing fill, we should be contacted to discuss alternatives for site preparation. We present fill removal recommendations in Section 4.2.

3.2 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, also called surface faulting. The common secondary seismic hazards include ground shaking, soil liquefaction/cyclic softening and ground lurching. The following sections present a discussion of these hazards as they apply to the site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, landslides, tsunamis, or seiches is considered low to negligible at the site.

3.2.1 Ground Rupture

Since there are no known active faults crossing the property and the site is not located within an Earthquake Fault Special Study Zone (Figure 7), ground rupture is unlikely at the subject property.

3.2.2 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, structures should be designed using sound engineering judgment and the current 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 actual 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 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).

3.2.3 Liquefaction

Soil liquefaction results from loss of strength during cyclic loading, such as that imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded, fine-grained sands. Empirical evidence indicates that loose to medium-dense gravel, silty sand, low-plasticity silt, and some low-plasticity clay are also potentially liquefiable.

In order to assess liquefaction potential at the site, we first evaluated the susceptibility to liquefaction of the site soils. Since liquefaction potential is different for sand-like and clay-like soils our assessment included determining whether the soils were coarse grained or fine grained; and if they were considered fine-grained, would they behave like a sand or a clay for liquefaction analysis.

3.2.3.1 Liquefaction Assessment and Conclusions

Based on the susceptibly and classification of the site soils, we performed a detailed liquefaction potential analysis of the CPT soundings to estimate liquefaction potential using the computer software CLiq Version 1.7 developed by GeoLogismiki. The software is based on the procedure introduced by the 1996 National Center for Earthquake Engineering Research (NCEER) workshop and the 1998 NCEER/National Science Foundation (NSF) workshop. The workshops are summarized by Youd et al. (2001) and updated by Robertson (2009). We estimated the Cyclic Stress Ratio (CSR) for a Peak Ground Acceleration (PGA_M) value of 0.94g as outlined in the latest building code with an earthquake magnitude of 8.0. We used a groundwater elevation of 30 feet (NAVD88) for this analysis.

We performed our analysis of liquefaction potential using the Robertson (2009) method due to the fact that our site soil matches well with the criteria developed by the author. The criteria being that sand-like soils are evaluated based on their density, intermediate soils are evaluated based on their density and amount of fines, and clay-like soils are evaluated based on their undrained shear strength.

The analysis indicates that thin layers within the Colma formation will settle less than ¾ inch due to some cyclic softening and minor liquefaction. CPT 1-CPT-17, shows ½ inch of additional settlement at a depth of 36 to 40 feet, but the adjacent Boring 1-B10 shows that the material within the same depth is too dense to liquefy. Based on this, liquefaction and cyclic softening do not pose a hazard to the proposed development.

For design purposes, we recommend obtaining subsurface geotechnical data below the proposed foundation once the building layout and type are known.

3.2.4 Dynamic Densification Settlement

Densification of loose granular soils above the groundwater surface can cause settlement of the ground surface due to earthquake-induced vibrations. Because the excavation for the below-grade parking will extend below the existing fill above the water table and because of the relatively high density of the sand within the Colma formation, the risk of dynamic densification is negligible at the site.

3.2.5 Ground 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 in weaker soils. 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 region, but based on the site location, it is our opinion that the offset is expected to be minor. We provide recommendations for foundation and pavement design in this report that are intended to reduce the potential for adverse impacts from lurch cracking.

3.2.6 Flooding

Based on site elevation and distance from water sources, flooding is not expected at the subject site; however, the Civil Engineer should review pertinent information relating to possible flood levels for the subject site based on final pad elevations and provide appropriate design measures for development of the project.

3.3 2016 CBC SEISMIC DESIGN PARAMETERS

Based on the subsurface conditions encountered and CPT shear wave velocity testing, we classified proposed Parcels 1, 2, 3, and 4 as Site Class C and proposed Parcels 5, 6, 7, 8, 8a, and 9 as Site Class D in accordance with the 2016 CBC. We provide the 2016 CBC seismic design parameters for a Site Class C and Site Class D in Table 3.3-1 below, which includes design spectral response acceleration parameters based on the mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response acceleration parameters.

TABLE 3.3-1: 2016 CBC Seismic Design Parameters, Latitude: 37.62987° **Longitude:** -122.42481°

PARAMETER	VALUE	VALUE
Site Class	C	D
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S (g)	2.47	2.45
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1 (g)	1.19	1.18
Site Coefficient, F_A	1.00	1.00
Site Coefficient, F_V	1.30	1.50
MCE_R Spectral Response Acceleration at Short Periods, S_{MS} (g)	2.47	2.45
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1} (g)	1.55	1.76
Design Spectral Response Acceleration at Short Periods, S_{DS} (g)	1.65	1.63
Design Spectral Response Acceleration at 1-second Period, S_{D1} (g)	1.03	1.18
Mapped MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA (g)	0.95	0.94
Site Coefficient, F_{PGA}	1.00	1.00

PARAMETER	VALUE	VALUE
MCE_G Peak Ground Acceleration adjusted for Site Class effects, PGA_M (g)	0.95	0.94
Long-period transition-period, T_L	12 sec	12 sec

3.4 STATIC AND PERCHED GROUNDWATER

Based on our findings described in Section 2.6 of this report and the proposed development, groundwater may impact basement design and construction at the eastern half of the site. This includes proposed Parcels 8 and the eastern portions of proposed Parcels 6, 7 and 9. We believe that this would be the case, since proposed basement depths can range from 30 to 40 feet, and the shallowest groundwater depth at the eastern side of the site is 20 feet below ground surface. Groundwater above the proposed bottom of the excavations can:

1. Require construction dewatering.
2. Result in unstable conditions at the base of excavation requiring stabilization prior to foundation construction.
3. Cause moisture damage to sensitive floor coverings.
4. Transmit moisture vapor through slabs causing excessive mold/mildew build-up, fogging of windows, and damage to computers and other sensitive equipment.
5. Require waterproofing for the proposed basement structures.

3.5 EXCAVATION

As discussed previously, excavations may be necessary for the construction of the proposed basements. During excavation of the basements, the sides of the excavation may need to be shored. Support of adjacent settlement-sensitive structures should be addressed in the design of temporary construction support. The primary considerations related to the selection of the shoring systems are:

1. Distance of the excavation from improvements sensitive to movement that will remain after building construction, and
2. Potential presence of groundwater during construction.

4.0 PRELIMINARY RECOMMENDATIONS

The following preliminary recommendations are for initial land planning and preliminary estimating purposes. Final recommendations regarding site grading and foundation construction will be provided after design-level exploration has been undertaken.

4.1 DEMOLITION AND STRIPPING

Site development will commence with the removal of buried structures, including abandoned utilities. All debris should be removed from any location to be graded and from areas to receive fill or structures. The depth of removal of such material should be determined by the Geotechnical Engineer in the field at the time of grading.

The existing pavement section (asphalt concrete/concrete and underlying aggregate base) and all existing landscaping should be removed from areas to receive fill or structures, or those areas to serve for borrow.

4.2 EXISTING FILL REMOVAL

Most of the existing fill will be removed by the proposed basement excavations. We recommend removing existing fill to competent soils, as determined by ENGEO, in areas to receive new fill, pavement, and other ancillary improvements. Figure 4 displays the approximate lateral extent of existing fill at the site.

4.3 ACCEPTABLE FILL

Onsite soil material is suitable as fill material provided it is processed to remove concentrations of organic material, debris, and particles greater than 8 inches in maximum dimension. Imported fill material should meet the above requirements and have a plasticity index less than 25.

4.4 FILL PLACEMENT

For land planning and cost estimating purposes, the following compaction control requirements should be anticipated for general fill areas:

Test Procedures:	ASTM D-1557.
Required Moisture Content:	Not less than 2 percentage points above optimum moisture content.
Minimum Relative Compaction:	Not less than 90 percent relative compaction.

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

5.0 PRELIMINARY FOUNDATION RECOMMENDATIONS

The main considerations in foundation design for this project are the potential for groundwater to be shallower than the proposed foundations (see Section 3.4) and potential for uplift. During design-level exploration, We will develop foundation recommendations using data obtained from our field exploration, laboratory test results, and engineering analysis. For the preliminary planning purposes, we recommend the following recommended foundation options address the effects of the native expansive soil and differential soil movement:

1. Shallow foundations with slabs-on-grade.
2. Structural mat foundation.

6.0 FUTURE STUDIES

As previously discussed, a site-specific, design-level geotechnical exploration should be performed as part of the design process. The exploration should include borings and laboratory soil testing to provide data for preparation of specific recommendations regarding grading, foundation design, and drainage for the proposed development. The exploration will also allow for more detailed evaluations of the geotechnical issues discussed in this report and afford the opportunity to provide recommendations regarding techniques and procedures to be implemented during construction to mitigate potential geotechnical/geological hazards.

7.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents geotechnical recommendations for preliminary design of the improvements discussed in Section 1.3 for the YouTube campus project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers. The conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted geotechnical engineering principles and practices currently employed in the area; no warranty is expressed or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data are representative of the actual subsurface conditions across the site. Considering possible underground variability of soil, rock, stockpiled material, and groundwater, additional unexpected costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, ENGEO should be notified immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include excavation sloping or shoring, soil volume change factors, flood potential, or a geohazard exploration. In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, the proper regulatory officials should be notified immediately.

This document must not be subject to unauthorized reuse, that is, reusing 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 recommendations. 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 onsite construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

We determined the lines designating the interface between layers on the exploration logs using visual observations. The transitions between the materials may be abrupt or gradual. The exploration logs contain information concerning samples recovered, indications of the presence of various materials such as clay, sand, silt, rock, existing fill, etc., and observations of groundwater encountered. The field logs also contain our interpretation of the subsurface conditions between sample locations. Therefore, the logs contain both factual and interpretative information. Our recommendations are based on the contents of the final logs, which represent our interpretation of the field logs.

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FIGURES

ENGEO
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VICINITY MAP
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000	
SCALE: AS SHOWN	
DRAWN BY: LL	CHECKED BY: PJE

FIGURE NO. 1

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ORIGINAL FIGURE PRINTED IN COLOR

BASE SOURCE: GOOGLE EARTH MAPPING SERVICE

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GEOTECHNICAL EXPLORATION SITE PLAN
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000		FIGURE NO. 2A
SCALE: AS SHOWN		
DRAWN BY: LL	CHECKED BY: PJE	

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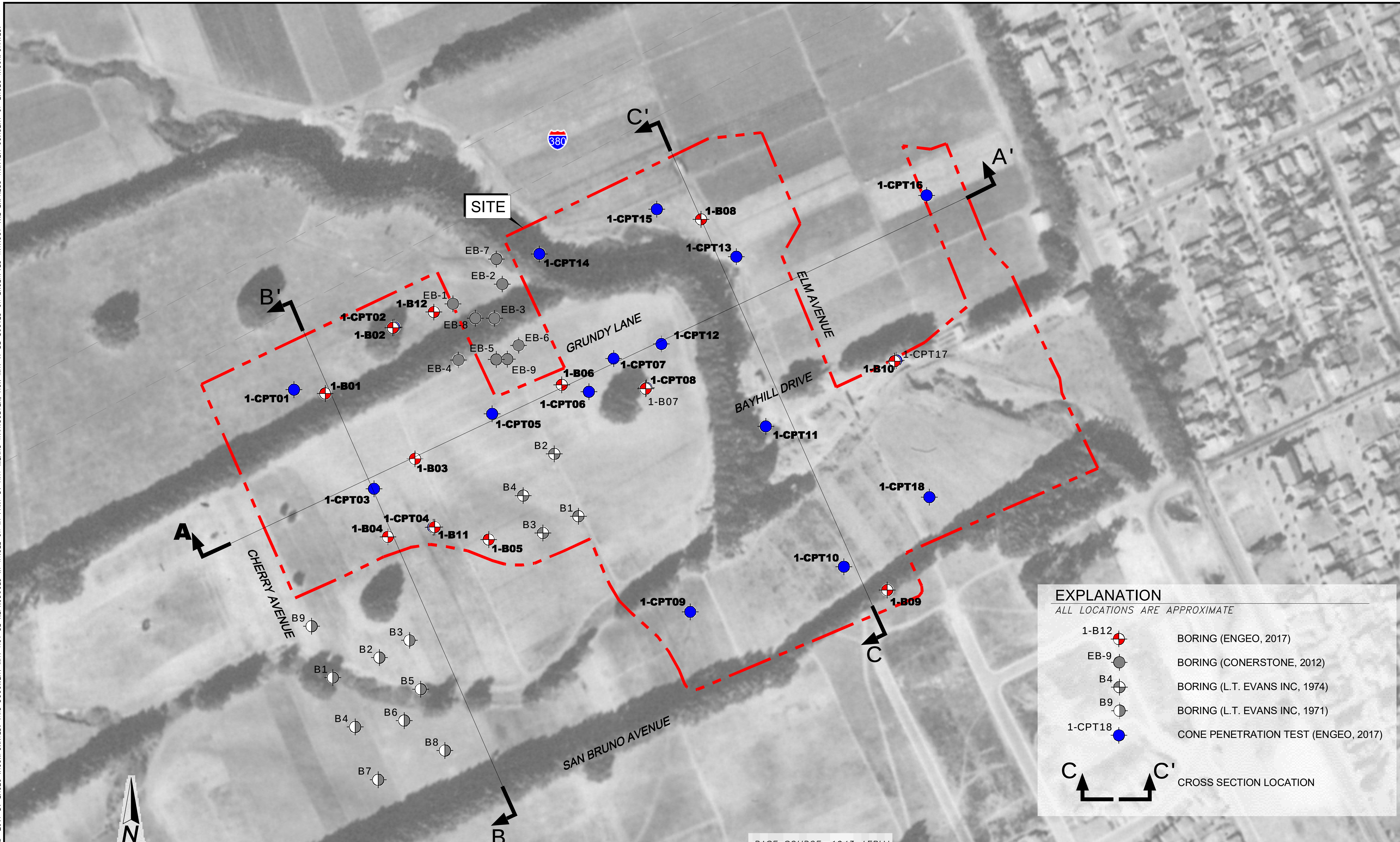
ORIGINAL FIGURE PRINTED IN COLOR



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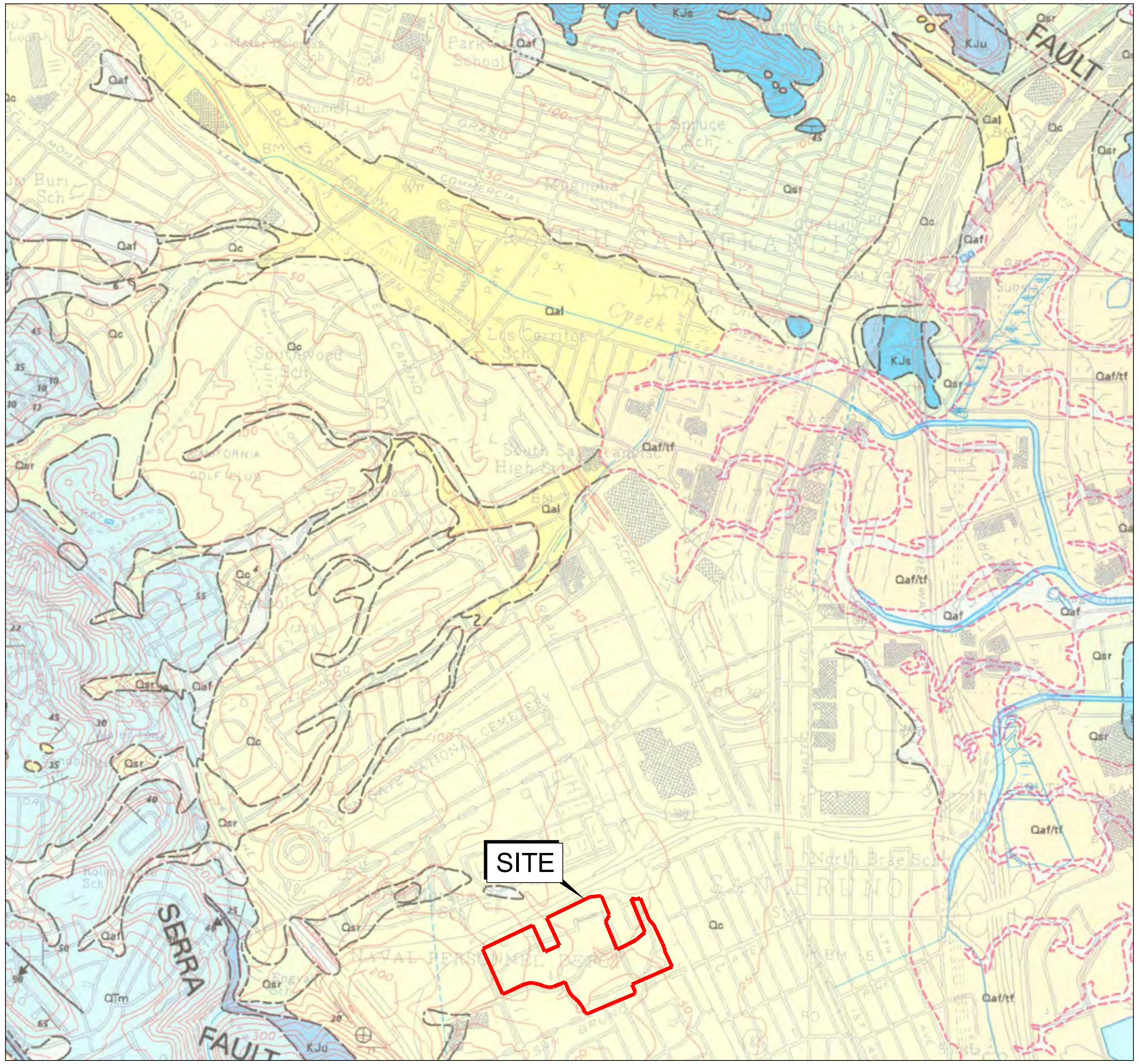
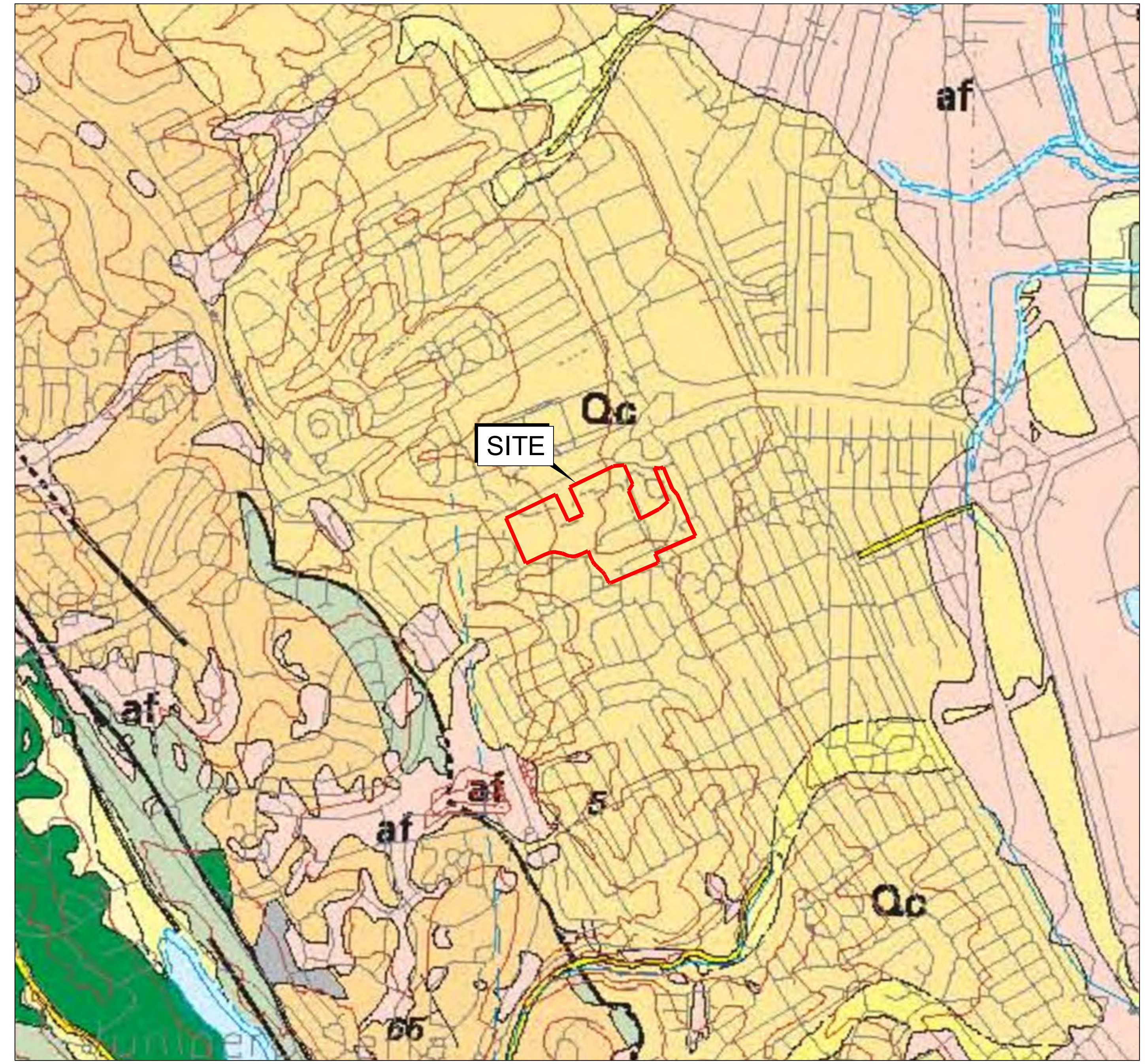
1943 HISTORIC AERIAL SITE PLAN
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000	FIGURE NO.
SCALE: AS SHOWN	2B
DRAWN BY: LL	CHECKED BY: PJE





N

0 FEET 2000
0 METERS 1000

EXPLANATION

Qaf	ARTIFICIAL FILL
Qaf/tf	ARTIFICIAL FILL OVER TIDAL FLAT
Qal	ALLUVIUM
Qsr	SLOPE DEBRIS AND RAVINE FILL
Qc	COLMA FORMATION
KJs	SANDSTONE AND SHALE
KJu	SHEARED ROCKS

REGIONAL GEOLOGIC MAP - BONILLA

BASE MAP SOURCE: BONILLA, OPEN FILE REPORT 98-0354

EXPLANATION

af	ARTIFICIAL FILL
Qcl	COLLUVIUM (HOLOCENE)
Qc	COLMA FORMATION

REGIONAL GEOLOGIC MAP - BRABB

BASE MAP SOURCE: BRABB, GRAYMER, AND JONES, 1998

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REGIONAL GEOLOGIC MAPS
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000
SCALE: AS SHOWN
DRAWN BY: LL
CHECKED BY: PJE
FIGURE NO. 3

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EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

1-B12	BORING (ENGEO, 2017)	Qaf	FILL
1-CPT18	CONE PENETRATION TEST (ENGEO, 2017)	Qc	COLMA FORMATION
— — —	GEOLOGIC CONTACT	━━━	EXISTING CULVERT LOCATION PROVIDED BY BKF
Qal	ALLUVIUM	C C'	CROSS SECTION LOCATION

N

FEET 0 80

METERS 0 40

BASE MAP SOURCE: BKF

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SITE-SPECIFIC GEOLOGIC MAP

YOUTUBE CAMPUS

SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000		FIGURE NO.
SCALE: AS SHOWN		4
DRAWN BY: SRP	CHECKED BY: PE	

ORIGINAL FIGURE PRINTED IN COLOR

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

Qal	ALLUVIUM
Qaf	FILL
Qc	COLMA FORMATION
1-B06	BORING
1-CPT13	CONE PENETRATION TEST

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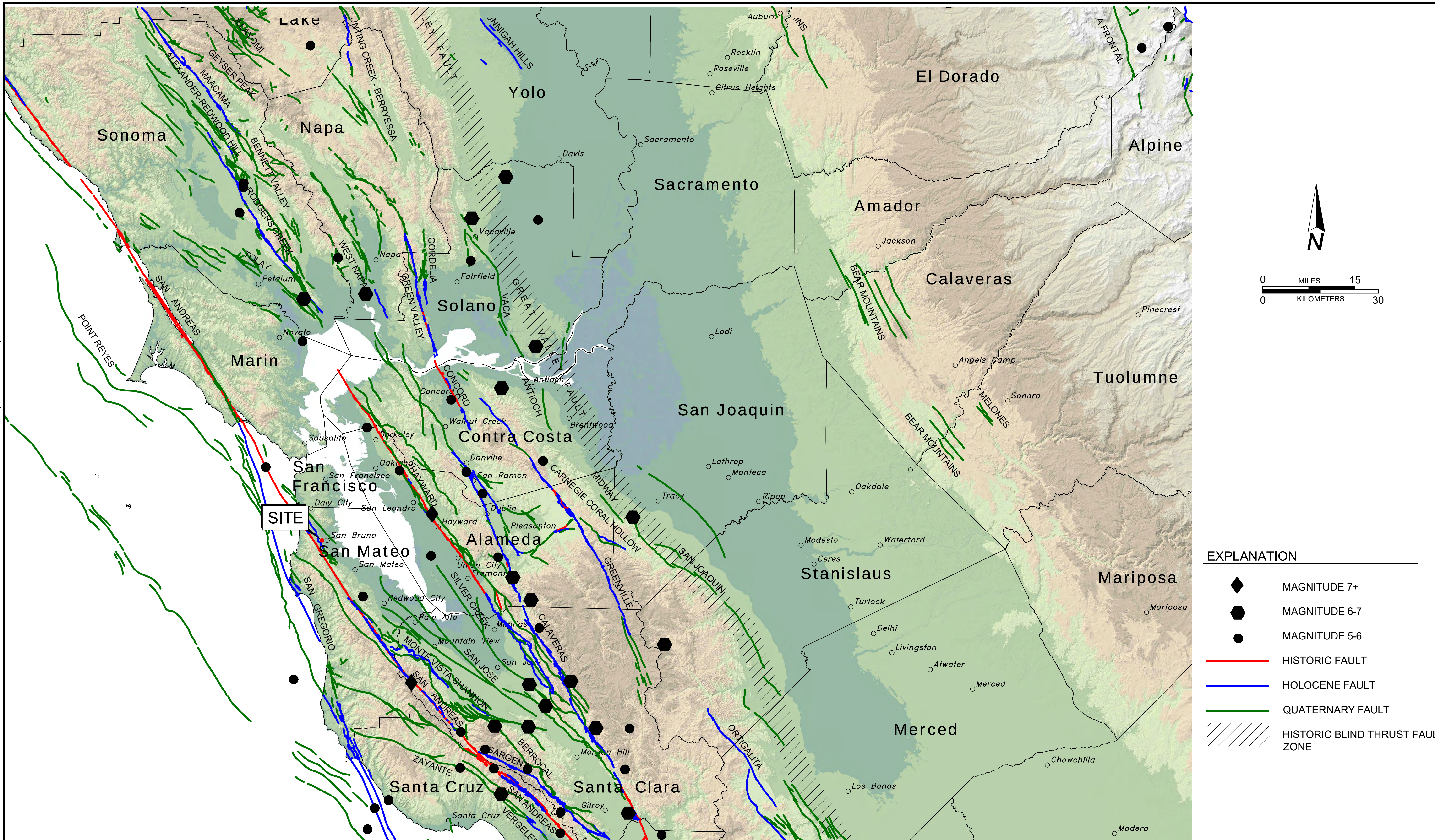
GEOLOGIC CROSS SECTIONS
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000
SCALE: AS SHOWN
DRAWN BY: SRP
CHECKED BY: PE
FIGURE NO. 5

ORIGINAL FIGURE PRINTED IN COLOR



BASE MAP SOURCE:
COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATASET (NED) AT 30 METER RESOLUTION
U.S.G.S. QUATERNARY FAULT DATABASE, NOVEMBER, 2010
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800–2000)

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REGIONAL FAULTING AND SEISMICITY
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000	FIGURE NO. 6
SCALE: AS SHOWN	
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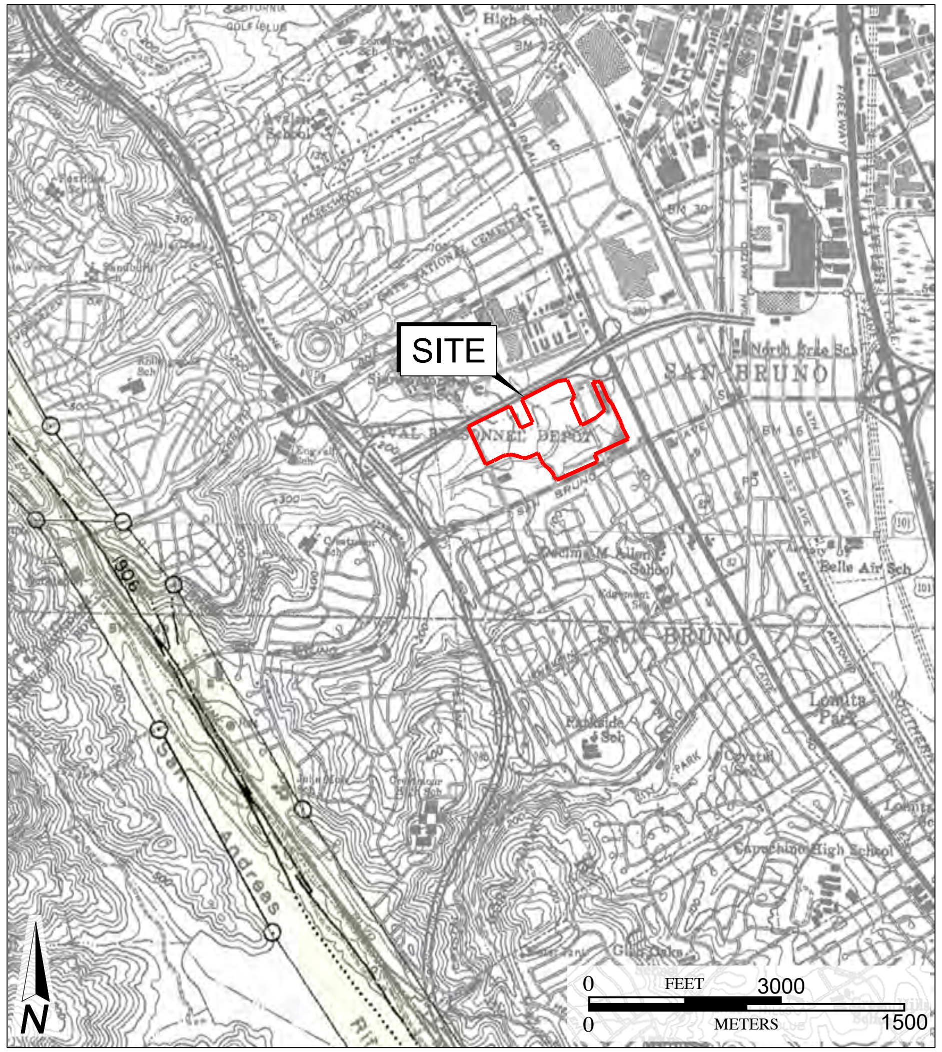


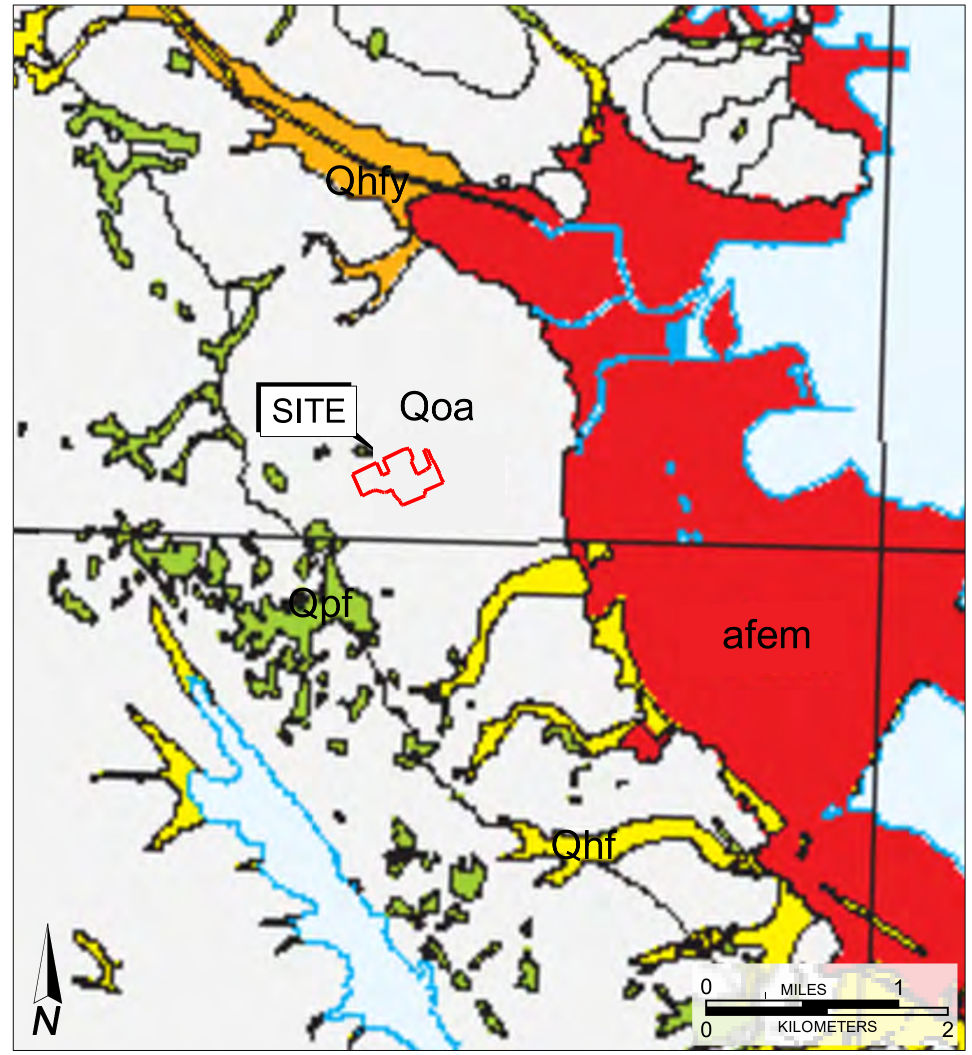
EXPLANATION

1906 C — FAULTS CONSIDERED TO HAVE BEEN ACTIVE DURING HOLOCENE TIME AND TO HAVE A RELATIVELY HIGH POTENTIAL FOR SURFACE RUPTURE; SOLID LINE WHERE ACCURATELY LOCATED, LONG DASH WHERE APPROXIMATELY LOCATED, SHORT DASH WHERE INFERRED, DOTTED WHERE CONCEALED; QUERY (?) INDICATES ADDITIONAL UNCERTAINTY. EVIDENCE OF HISTORIC OFFSET INDICATED BY YEAR OF EARTHQUAKE-ASSOCIATED EVENT OR C FOR DISPLACEMENT CAUSED BY CREEP OR POSSIBLE CREEP

EARTHQUAKE FAULT ZONE BOUNDARIES; DELINEATED AS STRAIGHT-LINE SEGMENTS THAT CONNECT ENCIRCLED TURNING POINTS SO AS TO DEFINE EARTHQUAKE FAULT ZONE SEGMENTS

EARTHQUAKE FAULT ZONE MAP

BASE MAP SOURCE: CDMG, 1993

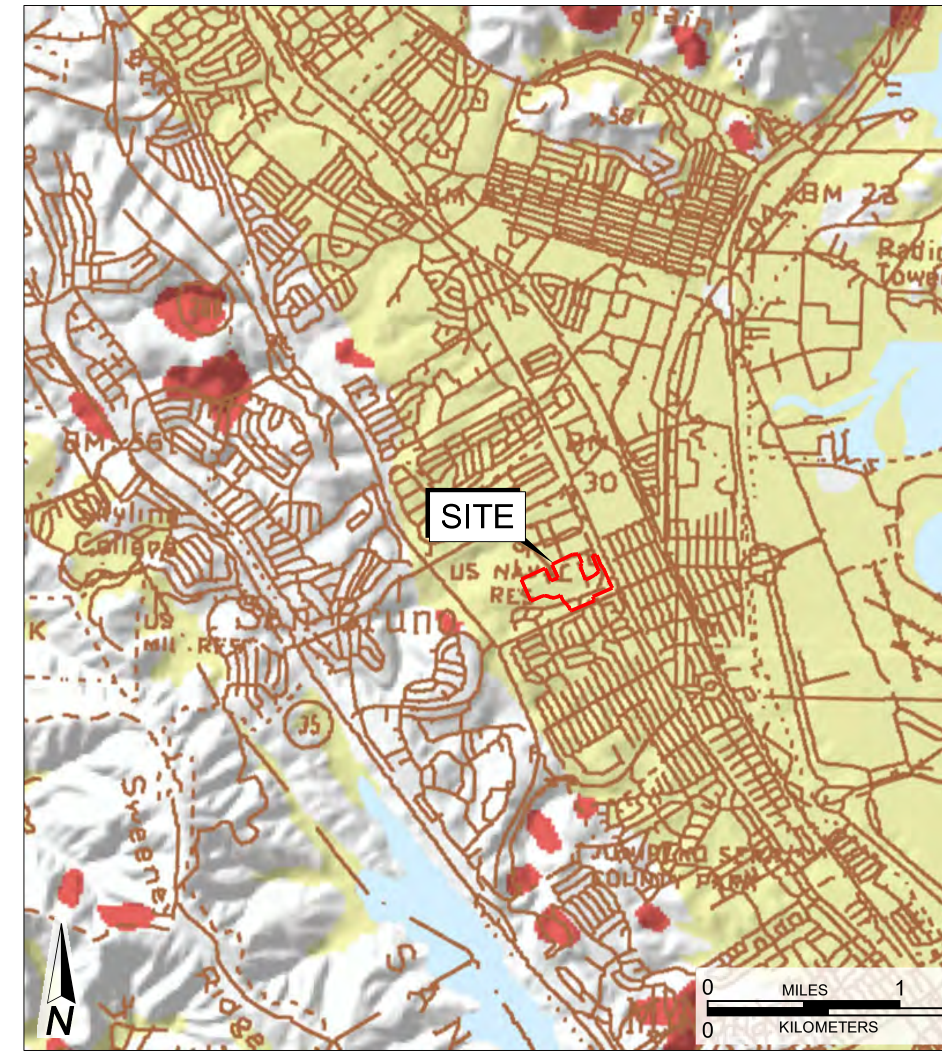


EXPLANATION

- VERY HIGH
- HIGH
- MEDIUM
- LOW
- VERY LOW

LIQUEFACTION SUSCEPTIBILITY MAP

BASE MAP SOURCE: WITTER, 2006



EXPLANATION

- MOSTLY LANDSLIDE
- MANY LANDSLIDES
- FEW LANDSLIDES
- FLAT LAND

LANDSLIDE SUSCEPTIBILITY MAP

BASE MAP SOURCE: WENTWORTH,1997

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REGIONAL HAZARD MAPS
YOUTUBE CAMPUS
SAN BRUNO, CALIFORNIA

PROJECT NO.: 13667.000.000	FIGURE NO. 7
SCALE: AS SHOWN	
DRAWN BY: LL	CHECKED BY: PJE

APPENDIX A

BORING LOG KEY
EXPLORATION LOGS

KEY TO BORING LOGS

MAJOR TYPES			DESCRIPTION
COARSE-GRAINED SOILS MORE THAN HALF OF MAT'L LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW - Well graded gravels or gravel-sand mixtures
			GP - Poorly graded gravels or gravel-sand mixtures
		GRAVELS WITH OVER 12 % FINES	GM - Silty gravels, gravel-sand and silt mixtures
			GC - Clayey gravels, gravel-sand and clay mixtures
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	SW - Well graded sands, or gravelly sand mixtures
			SP - Poorly graded sands or gravelly sand mixtures
		SANDS WITH OVER 12 % FINES	SM - Silty sand, sand-silt mixtures
			SC - Clayey sand, sand-clay mixtures
FINE-GRAINED SOILS MORE THAN HALF OF MAT'L SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50 % OR LESS		ML - Inorganic silt with low to medium plasticity
			CL - Inorganic clay with low to medium plasticity
			OL - Low plasticity organic silts and clays
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 %		MH - Elastic silt with high plasticity
			CH - Fat clay with high plasticity
			OH - Highly plastic organic silts and clays
	HIGHLY ORGANIC SOILS		PT - Peat and other highly organic soils

For fine-grained soils with 15 to 29% retained on the #200 sieve, the words "with sand" or "with gravel" (whichever is predominant) are added to the group name.

For fine-grained soil with >30% retained on the #200 sieve, the words "sandy" or "gravelly" (whichever is predominant) are added to the group name.

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE: 200, 40, 10, 4

CLEAR SQUARE SIEVE OPENINGS: 3/4 ", 3", 12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS AND GRAVELS	BLOWS/FOOT (S.P.T.)
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

CONSISTENCY

SILTS AND CLAYS	STRENGTH*
VERY SOFT	0-1/4
SOFT	1/4-1/2
MEDIUM STIFF	1/2-1
STIFF	1-2
VERY STIFF	2-4
HARD	OVER 4

SAMPLER SYMBOLS

- Modified California (3" O.D.) sampler
- California (2.5" O.D.) sampler
- S.P.T. - Split spoon sampler
- Shelby Tube
- Dames and Moore Piston
- Continuous Core
- Bag Samples
- Grab Samples
- NR No Recovery

MOISTURE CONDITION

DRY	Dusty, dry to touch
MOIST	Damp but no visible water
WET	Visible freewater

LINE TYPES

Solid	Layer Break
Dashed	Gradational or approximate layer break

GROUND-WATER SYMBOLS

- Groundwater level during drilling
- Stabilized groundwater level

(S.P.T.) Number of blows of 140 lb. hammer falling 30" to drive a 2-inch O.D. (1-3/8 inch I.D.) sampler

* Unconfined compressive strength in tons/sq. ft., asterisk on log means determined by pocket penetrometer

LOG OF BORING 1-B01

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/25/2017
HOLE DEPTH: Approx. 50½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 114.17 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 4.5"												
			AGGREGATE BASE (AB) 2"												
			SILTY SAND (SM), dark brown, organic odor, wood debris [FILL]												
	110		SILTY SAND (SM), yellowish brown, dense, moist, fine- to coarse-grained sand, contains trace angular fine gravel [FILL]			37									
5			SILTY SAND (SM), light grayish brown, dense, moist, fine- to medium-grained sand, iron oxide staining, contains clay, trace fine gravel [COLMA FORMATION]			39									
	105		Reddish brown, less fines												
10			Yellowish brown, very dense, fine-grained sand			68				17					
15	100		Light grayish brown, cemented			97/10"									
20, 25	95, 90		More silt			88									
			SANDY LEAN CLAY (CL), light grayish brown, hard, moist			50/6"								>4.5*	PP
30	85		POORLY GRADED SAND (SP), reddish brown, very dense, moist, fine- to medium-grained sand												

ENGEO INCORPORATED

LOG OF BORING 1-B01

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/25/2017
HOLE DEPTH: Approx. 50½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 114.17 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SANDY LEAN CLAY (CL), light grayish brown, very stiff to hard, moist, fine-grained sand			52				63			2500*	>4.5*	PP+TV
35	80														
40	75		Mottled with reddish brown			82/10"								>4.5*	PP
			POORLY GRADED SAND WITH SILT (SP-SM), reddish brown, very dense, moist, fine-grained sand												
45	70														
	65		POORLY GRADED SAND (SP), reddish brown, very dense, moist, fine- to medium-grained sand												
50						50/6"									
			Boring terminated at a depth of 50 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

ENGEO INCORPORATED

LOG OF BORING 1-B02

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/26/2017
HOLE DEPTH: Approx. 52½ ft.
HOLE DIAMETER: 5.0 in.
SURF ELEV (NAVD88): 108.2 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 4"												
			AGGREGATE BASE (AB) 5"												
			SANDY SILT (ML), light yellowish brown, hard, moist, fine-grained sand [COLMA FORMATION]												
	105					54									
5						50									
			More clay												
	100														
			SANDY LEAN CLAY (CL), brown mottled with light grayish brown, hard, moist, fine-grained sand, iron oxide staining												
10						34									
	95		SILTY SAND (SM), light grayish brown mottled with orange, dense to very dense, moist, manganese staining												
15						71									
	90														
20			Very dense, more fines, cemented, contains clay			75									
	85														
25			SANDY SILT (ML), light grayish brown mottled with orange, hard, moist, fine-grained sand			74					15	102		0.47	UC
	80														
			SILTY SAND (SM), light grayish brown, dense to very dense, moist, fine-grained sand, manganese staining, cemented												
30															

LOG OF BORING 1-B02

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/26/2017
HOLE DEPTH: Approx. 52½ ft.
HOLE DIAMETER: 5.0 in.
SURF ELEV (NAVD88): 108.2 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SILTY SAND (SM), light grayish brown, dense to very dense, moist, fine-grained sand, manganese staining, cemented			49									
	75														
35			WELL GRADED SAND WITH SILT AND GRAVEL (SW), reddish brown mottled with light grayish brown, very dense, moist, fine- to coarse-grained sand, fine to coarse gravel, subrounded to rounded gravel, pockets of silt			50/4"									
	70														
40			Less gravel, some weathered rock fragments			85									
	65														
45															
	60														
50			SILTY CLAYEY SAND (SC-SM), light yellowish brown mottled with orange, medium dense to dense, fine-grained sand			31	23	19	4	45	16				
			Boring terminated at a depth of 52 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

SHEAR AND UNCONF STRENGTH W/ ELEV 1-B01 THRU 1-B11_UPDATE.GPJ ENGEO INC.GDT 6/5/17

LOG OF BORING 1-B03

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/25/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 108.86 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 1.5"												
			AGGREGATE BASE (AB) 5"												
			SILTY SAND (SM), reddish brown, loose, moist, fine- to medium-grained sand [FILL]												
	105														
5															
			Light gray mottled with reddish brown			5									
			SANDY SILT (ML), dark brown, medium stiff, moist, fine-grained sand, organic odor, roots [FILL]												
			More sand, trace fine gravel			14									
			SANDY LEAN CLAY (CL), reddish brown, medium stiff to stiff, moist, iron oxide staining [HOLOCENE ALLUVIUM]												
	100														
10			SILTY SAND (SM), light grayish brown, very dense, fine-grained sand, contains trace coarse-grained sand and fine gravel, cemented [COLMA FORMATION]			56									
	95														
15															
			Dense			41				34					
	90														
20															
			Very dense			51									
	85														
25															
			Less fines			50/5"									
	80														
30															

ENGEO INCORPORATED

LOG OF BORING 1-B03

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/25/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 108.86 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			POORLY GRADED SAND (SP), yellowish brown, very dense, moist, fine- to medium-grained sand, some fine gravel and coarse-grained sand, cemented			94/11"									
	75														
35															
	70														
40			SILTY SAND (SM), light grayish brown, very dense, moist, fine- to medium-grained sand, some fine gravel and coarse-grained sand			87/11.5"				25					
	65														
45															
	60														
50			Less gravel and coarse-grained sand			58									
			Boring terminated at a depth of 51 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

SHEAR AND UNCONF STRENGTH W/ ELEV 1-B01 THRU 1-B11_UPDATE.GPJ ENGEO INC.GDT 6/5/17

LOG OF BORING 1-B04

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/26/2017
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 105.1 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 2.5"												
			AGGREGATE BASE (AB) 4"												
			SILTY SAND (SM), light yellowish brown mottled with reddish brown, medium dense, moist, fine- to medium-grained sand, some coarse-grained sand, trace fine gravel [FILL]			20									
5	100					24									
			SANDY SILT (ML), dark brown, medium stiff to stiff, moist, fine-grained sand, organic odor, contains trace organics [HOLOCENE ALLUVIUM]												
			SILTY SAND (SM), yellowish brown mottled with reddish brown, dense to very dense, moist, fine-grained sand, manganese staining [COLMA FORMATION]												
10	95					40				45					
15	90		Light grayish brown, very dense, cemented			97/11"									
20	85		Light grayish brown mottled with reddish brown			98/11"									
25	80		More coarse-grained sand, rounded to subrounded fine gravel, more fines, iron oxide staining			50/5.5"									
30															

SHEAR AND UNCONF STRENGTH W/ ELEV 1-B01 THRU 1-B11_UPDATE.GPJ ENGEO INC.GDT 6/5/17

LOG OF BORING 1-B04

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/26/2017
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 105.1 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SILTY SAND (SM), light grayish brown mottled with reddish brown, very dense, moist, fine-grained sand, some coarse-grained sand and fine gravel, cemented			50/6"				18					
35	70					50/4"									
40	65					50/6"									
45	60														
50	55		Reddish brown, fine- to medium-grained sand			50/6"									
			Boring terminated at a depth of 51 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

SHEAR AND UNCONF STRENGTH W/ ELEV 1-B01 THRU 1-B11_UPDATE.GPJ ENGEO INC.GDT 6/5/17

LOG OF BORING 1-B05

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/27/2017
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 88.59 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

DESCRIPTION	Blow Count/Foot	Liquid Limit (Atterberg Limits)	Plastic Limit (Atterberg Limits)	Plasticity Index (Atterberg Limits)	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
CONCRETE Asphaltic concrete, 5"										
AGGREGATE BASE (AB) 4"										
SILTY SAND (SM), light grayish brown mottled with orange, very dense, dry, fine-grained sand, some clay [COLMA FORMATION]	73									
Dense, more clay, trace coarse-grained sand	44				27	8.8				
CLAYEY SAND (SC), light grayish brown, dense, moist, fine- to coarse-grained sand, contains trace fine subrounded to rounded gravel, cementation										
SILTY SAND (SM), light yellowish brown, very dense, moist, fine-grained sand, light cementation	71									
	72									
Dense, more silt, thin clay lenses	36									
SANDY LEAN CLAY (CL), light grayish brown, stiff to hard, moist, low plasticity, fine-grained sand, contains silt	17	39	21	18	69	22.8				
More silt	78/11"								>4.5*	PP
SILTY CLAYEY SAND (SC-SM), light grayish brown, very dense, moist, fine-grained sand										

Depth in Feet: 5, 10, 15, 20, 25, 30

Elevation in Feet: 85, 80, 75, 70, 65, 60

LOG OF BORING 1-B05

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/27/2017
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 88.59 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SILTY CLAYEY SAND (SC-SM), light grayish brown, medium dense to dense, moist, fine-grained sand			33	26	21	5	47	19.3				
35	55		SILTY SAND (SM), light grayish brown mottled with orange, very dense, moist, fine-grained sand, light cementation			95/11"									
40	50		Reddish brown, fine to medium-grained sand			93/11"									
45	45					50/5"									
50	40		Less fines			50/6"									
			Boring terminated at a depth of 51 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

SHEAR AND UNCONF STRENGTH W/ ELEV 1-B01 THRU 1-B11_UPDATE.GPJ ENGEO INC.GDT 6/5/17

ENGEO INCORPORATED

LOG OF BORING 1-B06

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/30/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 84.85 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 4"												
			AGGREGATE BASE (AB) 6"												
			SILTY SAND (SM), dark brown, moist, fine-grained sand, contains organics [FILL]												
			SANDY LEAN CLAY (CL), reddish yellow, very stiff, moist, fine-grained sand, contains some coarse-grained sand, trace organics, roots [FILL]			26									
5	80		SILTY SAND (SM), yellowish brown, very dense, moist, fine-grained sand, manganese staining, contains trace coarse-grained sand and fine gravel, cementation [COLMA FORMATION]			79									
10	75		Light grayish brown mottled with orange, dense, fine to medium-grained sand, trace fine gravel			44									
15	70		POORLY GRADED SAND WITH SILT (SP-SM), light grayish brown mottled with orange, very dense, moist, fine- to medium-grained sand, cemented			50/4.5"									
20	65		SANDY SILT (ML), light grayish brown mottled with orange, very stiff to hard, fine-grained sand, iron oxide staining, contains trace fine gravel			57									
25	60		SILTY SAND (SM), light grayish brown, very dense, moist, contains clay, trace fine gravel and rock fragments			80									
30	55														

ENGEO INCORPORATED

LOG OF BORING 1-B06

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/30/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 84.85 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	DESCRIPTION	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
		SILTY SAND (SM), light grayish brown, dense, moist, contains clay, trace fine gravel and rock fragments		51									
35	50												
		Dark reddish brown, fine- to coarse-grained sand		36				25					
		SANDY SILTY CLAY (CL-ML), yellowish brown, dense to very stiff, moist, fine-grained sand, iron oxide staining											
40	45												
		Gray, more fines		22	27	22	5	70	17.6				
45	40	More clay											
		SILTY SAND (SM), grayish brown, dense, moist, fine- to medium-grained sand, iron oxide staining, contains clay		59				21					
50	35												
		Yellowish brown, very dense, fine- to coarse-grained sand, trace fine gravel		50/5"									
55	30												
		POORLY GRADED SAND WITH SILT (SP-SM), light grayish brown, very dense, moist, fine- to medium-grained sand											
60	25												

LOG OF BORING 1-B06

ENGEO INCORPORATED

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YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/30/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 84.85 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			POORLY GRADED SAND WITH SILT (SP-SM), light grayish brown, very dense, moist, fine- to medium-grained sand			50/4"									
65	20														
			SILTY SAND (SM), light grayish brown, very dense, moist to wet, fine- to medium-grained sand												
70	15					50/6"									
75	10														
			SILT WITH SAND (ML), grayish brown, stiff to very stiff, moist to wet, fine-grained sand, contains clay, iron oxide staining												
80	5														
			LEAN CLAY WITH SAND (CL), bluish gray, stiff to very stiff, moist to wet, low plasticity, fine-grained sand			22									
85	0		POORLY GRADED SAND WITH SILT (SP-SM), yellowish brown, very dense, moist to wet, fine-grained sand												
90	-5														

LOG OF BORING 1-B06

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/30/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 84.85 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			POORLY GRADED SAND WITH SILT (SP-SM), yellowish brown, very dense, moist to wet, fine-grained sand			50/6"									
95	-10														
100	-15					50/5.5"									
			Boring terminated at a depth of 100 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

LOG OF BORING 1-B07

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/31/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 5.0 in.
SURF ELEV (NAVD88): 72.35 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 2"												
			AGGREGATE BASE (AB) 3"												
			SILTY SAND (SM), dark grayish brown, moist to dry, contains organics [FILL]												
	70		LEAN CLAY (CL), reddish brown, stiff to very stiff, moist [FILL]			32					25.7	103.3	4000*	>4.5*	PP+TV
5			LEAN CLAY WITH SAND (CL), yellowish brown mottled with orange, hard, moist, fine-grained sand [COLMA FORMATION]												
	65		SANDY LEAN CLAY (CL), yellowish brown mottled with reddish brown, hard, moist, fine- to coarse-grained sand, contains fine rounded gravel			70								>4.5*	PP
10	60		SILTY SAND (SM), light yellowish brown, dense to very dense, moist, fine-grained sand, contains pockets of silty clay			51									
15			Light grayish brown, trace fine gravel, iron oxide staining			17	32	16	16		20				
	55		LEAN CLAY (CL), grayish brown mottled with reddish brown, stiff to very stiff, moist, contains some fine-grained sand												
20			SANDY LEAN CLAY (CL), light grayish brown, very stiff to hard, moist, fine-grained sand			55				55					
	50		Mottled with orange												
25	45		SILTY SAND (SM), light grayish brown mottled with dark red, dense, moist to wet, fine- to coarse-grained sand, contains trace fine gravel			43									
30			LEAN CLAY WITH SAND (CL), bluish gray, stiff, moist, fine-grained sand												

LOG OF BORING 1-B07

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/31/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 5.0 in.
SURF ELEV (NAVD88): 72.35 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	DESCRIPTION	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
		LEAN CLAY WITH SAND (CL), bluish gray, stiff, moist, fine-grained sand	16									
	40		30	29	21	8		25.1	102.9	1200*	2.5*	PP+TV
		More fine-grained sand										
35		Less fine-grained sand	15							1100*	1.25*	PP+TV
	35	More fine-grained sand and silt										
40		Stiff to very stiff, more fine-grained sand, contains silt, trace fine gravel	21					20.3	108.9		1.25	UC
										1200*	2.25*	PP+TV
	30											
45		Dark grayish brown, hard, more silt	77				72	18	112.9			
										3400*	>4.5*	PP+TV
	25							28.6	93.5			
50		SILTY SAND (SM), reddish brown, dense, moist to wet, fine- to medium-grained sand, contains trace fine gravel	57									
		Boring terminated at a depth of 51 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.										

ENGEO INCORPORATED

LOG OF BORING 1-B08

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/31/2017
HOLE DEPTH: Approx. 54½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 66.72 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 2"												
			AGGREGATE BASE (AB) 4"												
	65		LEAN CLAY WITH SAND (CL), dark yellowish brown, stiff, moist, fine-grained sand, contains trace coarse-grained sand and fine gravel [FILL]			25									
			SILT WITH SAND (ML), dark brown, very stiff to hard, moist, fine-grained sand, organic odor, contains trace organics [FILL]										1520*	2.75*	PP+TV
5	60		CLAYEY GRAVEL (GC), dark yellowish brown, dense, dry to moist, fine to coarse gravel, fine- to coarse-grained sand, angular to subangular [COLMA FORMATION]			66									
10	55		LEAN CLAY (CL), dark yellowish brown, medium stiff to stiff, moist, medium plasticity, some fine-grained sand, some coarse, angular gravel			17									
15	50		CLAYEY SAND WITH GRAVEL (SC), dark yellowish brown mottled with reddish orange, medium dense to dense, moist, fine- to coarse-grained sand, fine to coarse gravel, angular rock fragments, iron oxide staining			44									
20			Medium dense, fine gravel, pockets of clean sand			26									
	45		LEAN CLAY WITH SAND (CL), yellowish brown mottled with orange, stiff, moist, fine-grained sand												
25			Grayish brown mottled with orange, very stiff, more fine gravel			31							2800*	3.25*	PP+TV
	40		No fine gravel												
30															

LOG OF BORING 1-B08

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/31/2017
HOLE DEPTH: Approx. 54½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 66.72 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	DESCRIPTION	Blow Count/Foot	Atterberg Limits: Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
	35	SANDY SILTY CLAY (CL-ML), light grayish brown mottled with orange, stiff to very stiff, moist to wet, fine-grained sand, iron oxide staining	21					25.4 26.1	100 103.7	 800*	0.94 1.5*	UC PP+TV
35		Becomes wet	32	27	22	5	63			800*	1.5*	PP+TV
	30	SILTY SAND (SM), light grayish brown mottled with orange, medium dense to dense, wet, fine-grained sand, iron oxide staining										
40		More fines	59									
	25	SANDY SILT (ML), bluish gray, hard, wet, fine-grained sand										
45	20	FAT CLAY (CH), bluish gray mottled with black, soft, wet, contains silt, lens of organic material	6 11							1000*	0.75*	PP+TV
50	15	Very stiff	36							3500*	4*	PP+TV
		Boring terminated at a depth of 54 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.										

LOG OF BORING 1-B09

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/27/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 86.78 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CONCRETE Asphaltic concrete, 2"												
			AGGREGATE BASE (AB) 4"												
	85		SILTY SAND (SM), light reddish brown, moist, organic odor, contains trace organics [FILL]												
5	80		SANDY SILT (ML), reddish brown, hard, moist, fine-grained sand, contains trace fine gravel and clay [COLMA FORMATION]			80								>4.5*	PP
10	75		Mottled with black, trace rock fragments, roots, manganese staining			98/9"								>4.5*	PP
15	70		Mottled with black and light grayish brown, no gravel, more clay			61									
20	65		WELL GRADED SAND (SW), dark reddish brown, very dense, moist, fine- to coarse-grained sand, rock fragments, angular, organic odor, contains clay			77									
25	60		SILTY SAND (SM), light grayish brown mottled with orange, very dense, dry to moist, fine-grained sand, contains clay, trace medium-grained sand			58									
30															

LOG OF BORING 1-B09

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 1/27/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 86.78 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
	55		SILTY SAND (SM), light grayish brown mottled with orange, dense to very dense, dry to moist, fine-grained sand, contains clay, trace medium-grained sand			43									
35	50		Reddish brown mottled with light grayish brown, fine- to medium-grained sand, trace rock fragments, trace fine gravel, pockets of silty clay, manganese staining			47									
40	45					53									
45	40		Light grayish brown mottled with orange, moist, fine-grained sand			64									
50			More fines			54									
			Boring terminated at a depth of 51 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

SHEAR AND UNCONF STRENGTH W/ ELEV 1-B01 THRU 1-B11_UPDATE.GPJ ENGEO INC.GDT 6/5/17

ENGEO INCORPORATED

LOG OF BORING 1-B10

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 2/1/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 54.53 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	DESCRIPTION	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
		CONCRETE Asphaltic concrete, 2"										
		AGGREGATE BASE (AB) 6"										
		SANDY SILT (ML), brown, dry, fine-grained sand, contains trace organics [FILL]										
		SANDY LEAN CLAY (CL), yellowish brown, hard, moist, fine- to medium-grained sand, fine to coarse gravel, angular rock fragments, iron oxide staining, contains silt, pockets of silty sand [FILL]	37								>4.5*	PP
5	50											
		Mottled with dark brown, very stiff, contains roots, more clay	26							1250*	2.75*	PP+TV
10	45	SILTY SAND (SM), gray, medium dense, wet, fine- to medium-grained sand, contains organics, wood debris [FILL]	17									
15	40	SANDY SILT (ML), gray mottled with grayish green, soft to medium stiff, wet, fine- to medium-grained sand, contains trace fine gravel, contains clay, glass fragment, wood debris [FILL]	28									
		SANDY GRAVEL (GW), greenish gray mottled with reddish brown, dense, wet, fine to coarse gravel, rock fragments, angular fine- to coarse-grained sand [FILL]										
20	35	LEAN CLAY WITH SAND (CL), pale olive mottled with reddish yellow, soft to medium stiff, medium plasticity, fine-grained sand, manganese and iron oxide staining [COLMA FORMATION]	8									
25	30	SANDY LEAN CLAY (CL), light grayish brown mottled with reddish yellow, medium stiff, wet, low plasticity, fine-grained sand, contains trace fine gravel	30									
			15					21.4	107.3		0.70	UC
										600*	0.75*	PP+TV
30	25											

ENGEO INCORPORATED

LOG OF BORING 1-B10

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 2/1/2017
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 54.53 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	DESCRIPTION	Blow Count/Foot	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
		SANDY LEAN CLAY (CL), light grayish brown mottled with reddish yellow, very stiff, low plasticity, fine-grained sand, contains trace fine gravel	29							2000*	4*	PP+TV
35	20	SILTY SAND (SM), light grayish brown mottled with reddish yellow, dense to very dense, wet, fine-grained sand	65							2500*	>4.5*	PP+TV
40	15	Cemented	87/11"								>4.5*	PP
45	10		32				37					
50	5	SANDY SILT (ML), light grayish brown mottled with reddish yellow, very stiff to hard, wet, fine-grained sand	25				68					

Boring terminated at a depth of 51 1/2 feet below ground surface. Depth to groundwater was not measured due to drilling method.

LOG OF BORING 1-B11

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 2/1/2017
HOLE DEPTH: Approx. 50¾ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 99.96 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	DESCRIPTION	Blow Count/Foot	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
		CONCRETE Asphaltic concrete, 2"										
		AGGREGATE BASE (AB) 4"										
		SILTY SAND (SM), light yellowish brown mottled with reddish brown, dry, fine- to coarse-grained sand, contains trace fine gravel [FILL]										
		SANDY SILT (ML), dark brown, dry, fine-grained sand [COLMA FORMATION]										
5	95											
		Light brown, more fines										
		SILTY SAND (SM), yellowish brown, very dense, moist, fine-grained sand, cemented, some pockets of cemented silt										
10	90		50/6"									
15	85											
20	80	Light grayish brown, manganese staining	68									
		SANDY SILT (ML), light grayish brown mottled with reddish yellow, very stiff to hard, moist, fine-grained sand										
25	75		35				64	17				
		SILTY SAND (SM), light grayish brown mottled with reddish yellow, very dense, moist, fine-grained sand										
30	70											

ENGEO INCORPORATED

LOG OF BORING 1-B11

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 2/1/2017
HOLE DEPTH: Approx. 50¾ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): 99.96 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Pitcher Drilling
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			SILTY SAND (SM), light grayish brown mottled with reddish yellow, very dense, moist, fine-grained sand			69									
35	65		More medium-grained sand, less fines			92/11"									
40	60					50/5.5"									
45	55		More fines			90/10"									
50	50		Less fines			50/4"									
			Boring terminated at a depth of 50 3/4 feet below ground surface. Depth to groundwater was not measured due to drilling method.												

LOG OF BORING 1-B12

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 4/12/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (NAVD88): 105.54 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
	105		Asphaltic concrete, 3"												
			AGGREGATE BASE (AB) 5"												
			SILTY SAND WITH GRAVEL (SM), brown, dry, fine- to coarse-grained sand, subrounded fine to coarse gravel, contains clay [FILL]												
5	100														
			SILTY SAND (SM), reddish yellow, moist, fine-grained sand, contains clay [COLMA FORMATION]												
10	95														
			SANDY LEAN CLAY (CL), yellowish brown, hard, moist, iron oxide and manganese staining												
15	90					40									
			SILTY SAND (SM), yellowish brown, dense, moist, fine-grained sand, iron oxide staining												
20	85														
25	80														
30															

LOG OF BORING 1-B12

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 4/12/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (NAVD88): 105.54 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
	75		SILTY SAND (SM), light grayish brown, dense, moist, fine-grained sand, iron oxide staining			44									
35	70														
40	65		medium dense, more fines			20									
45	60														
50	55		dense, less fines			49									
55	50														
60															

LOG OF BORING 1-B12

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 4/12/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (NAVD88): 105.54 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
	45		SILTY SAND (SM), light grayish brown, very dense, moist, fine-grained sand, iron oxide staining			62									
65	40														
70	35														
75	30														
80	25		less fines, trace coarse-grained sand			83									
85	20														
90															

LOG OF BORING 1-B12

ENGEO INCORPORATED

Prelim. Geotechnical Exploration
YouTube Campus
San Bruno, California
13367.000.000

DATE DRILLED: 4/12/2017
HOLE DEPTH: Approx. 100½ ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (NAVD88): 105.54 ft.

LOGGED / REVIEWED BY: N. Serra / PE
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

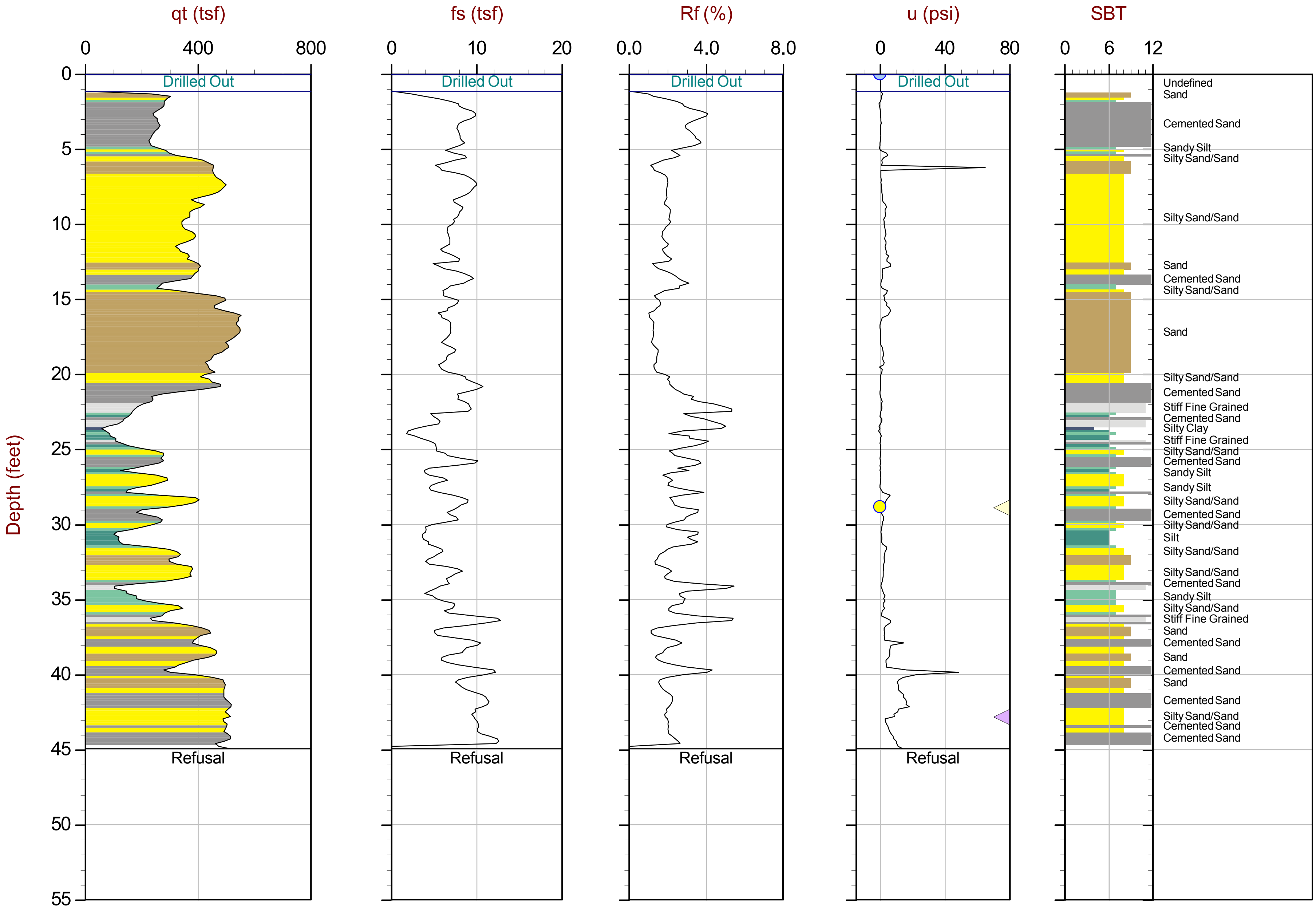
Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
	15		SILTY SAND (SM), light grayish brown, very dense, moist, fine-grained sand, iron oxide staining												
95	10														
100						50/6"									
			Boring terminated at a depth of 100 1/2 feet below ground surface. Groundwater was not encountered at the time of drilling.												

APPENDIX B

CONE PENETRATION TEST LOGS

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56008	Sounding: 1-CPT01
	Date: 01:23:17 12:01	Cone: 448:T1500F15U500
	Site: You Tube Campus, San Bruno, CA	



Max Depth: 13.700 m / 44.95 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP01.COR
Unit Wt: SBT Zones

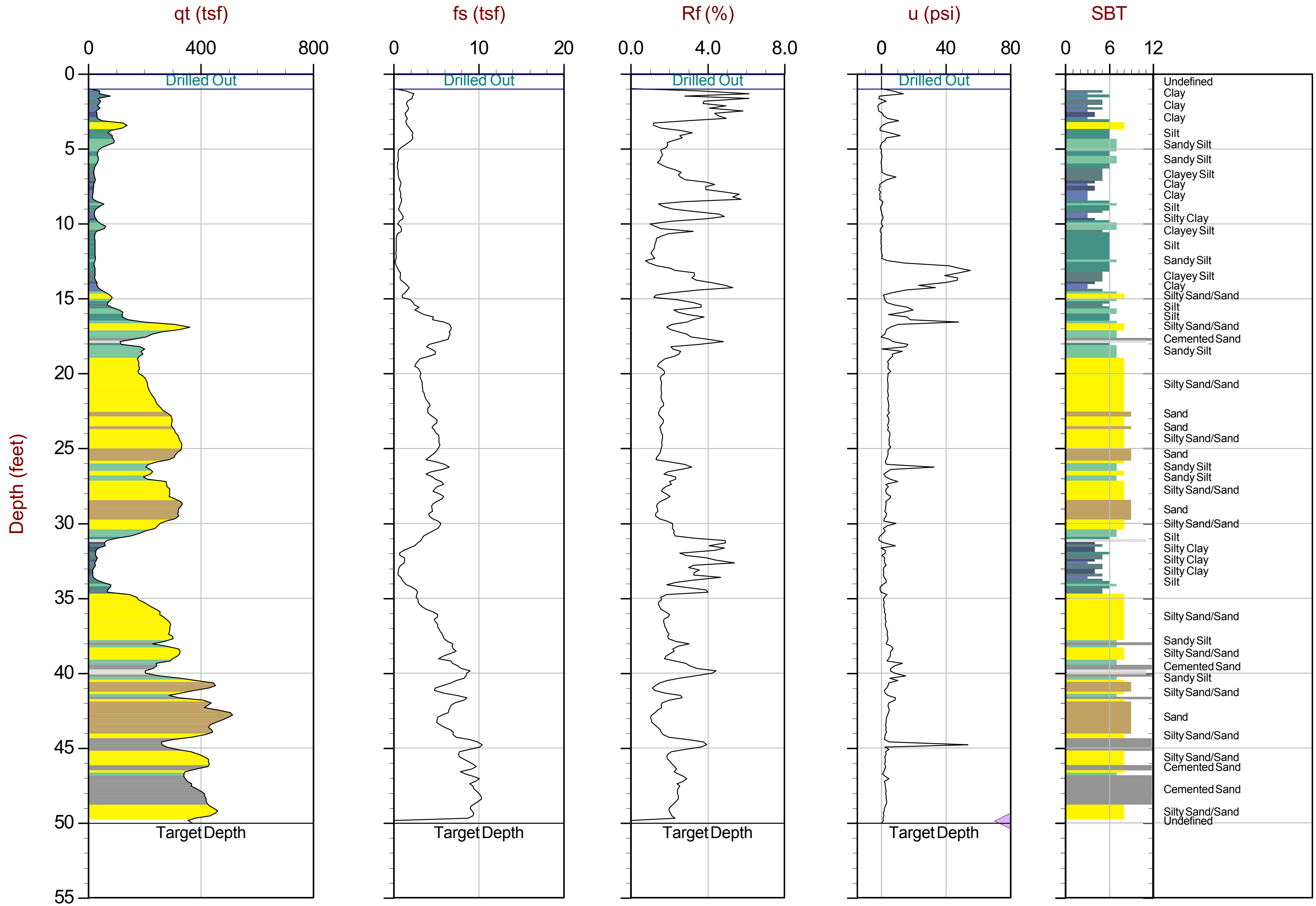
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164855m E:550710m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 08:03
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT03
Cone: 448:T1500F15U500



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP03.COR
Unit Wt: SBT Zones

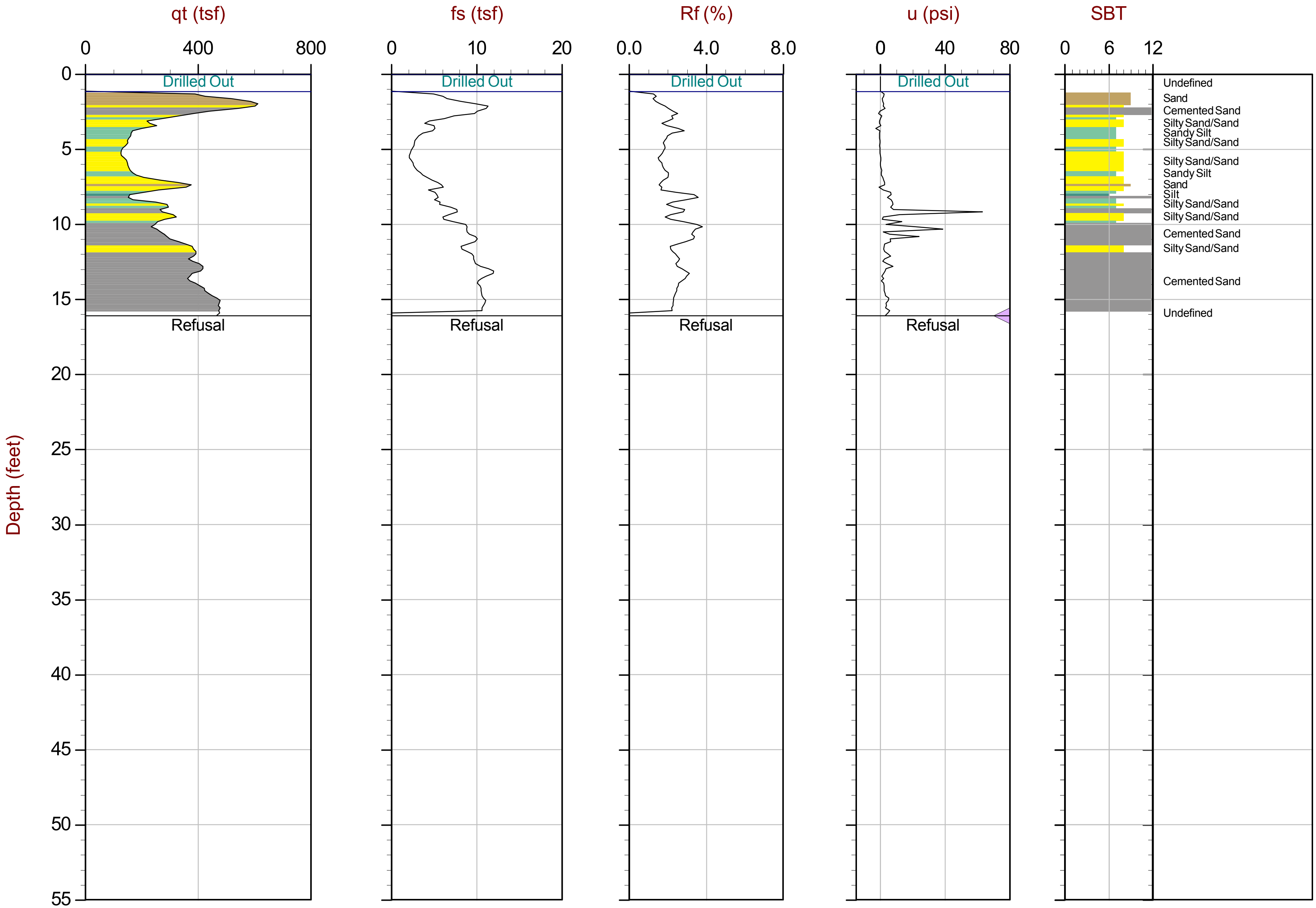
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164766m E:550781m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 09:10
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT04
Cone: 448:T1500F15U500



Max Depth: 4.900 m / 16.08 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP04.COR
Unit Wt: SBT Zones

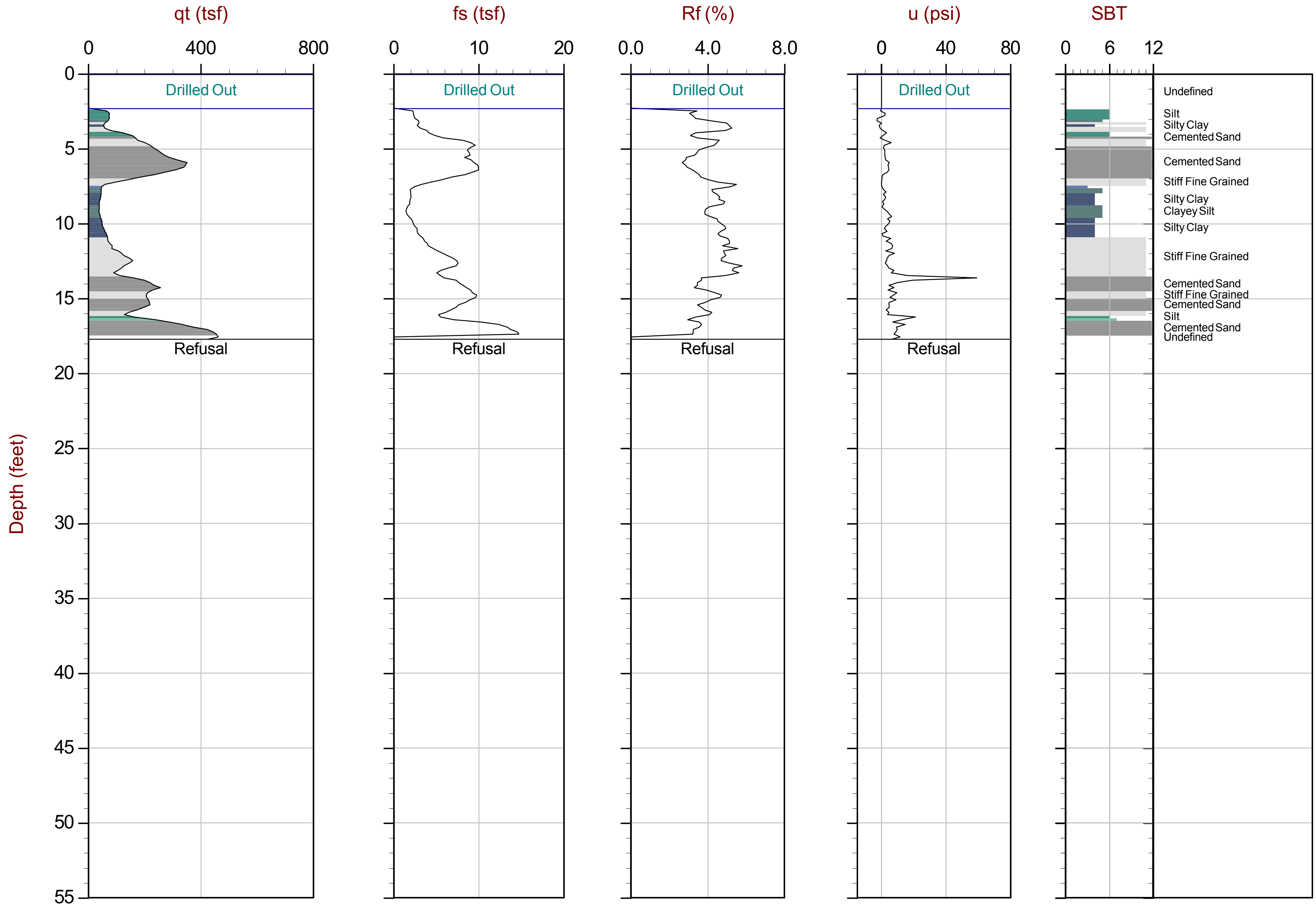
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164733m E: 550832m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 12:12
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT05b
Cone: 448:T1500F15U500



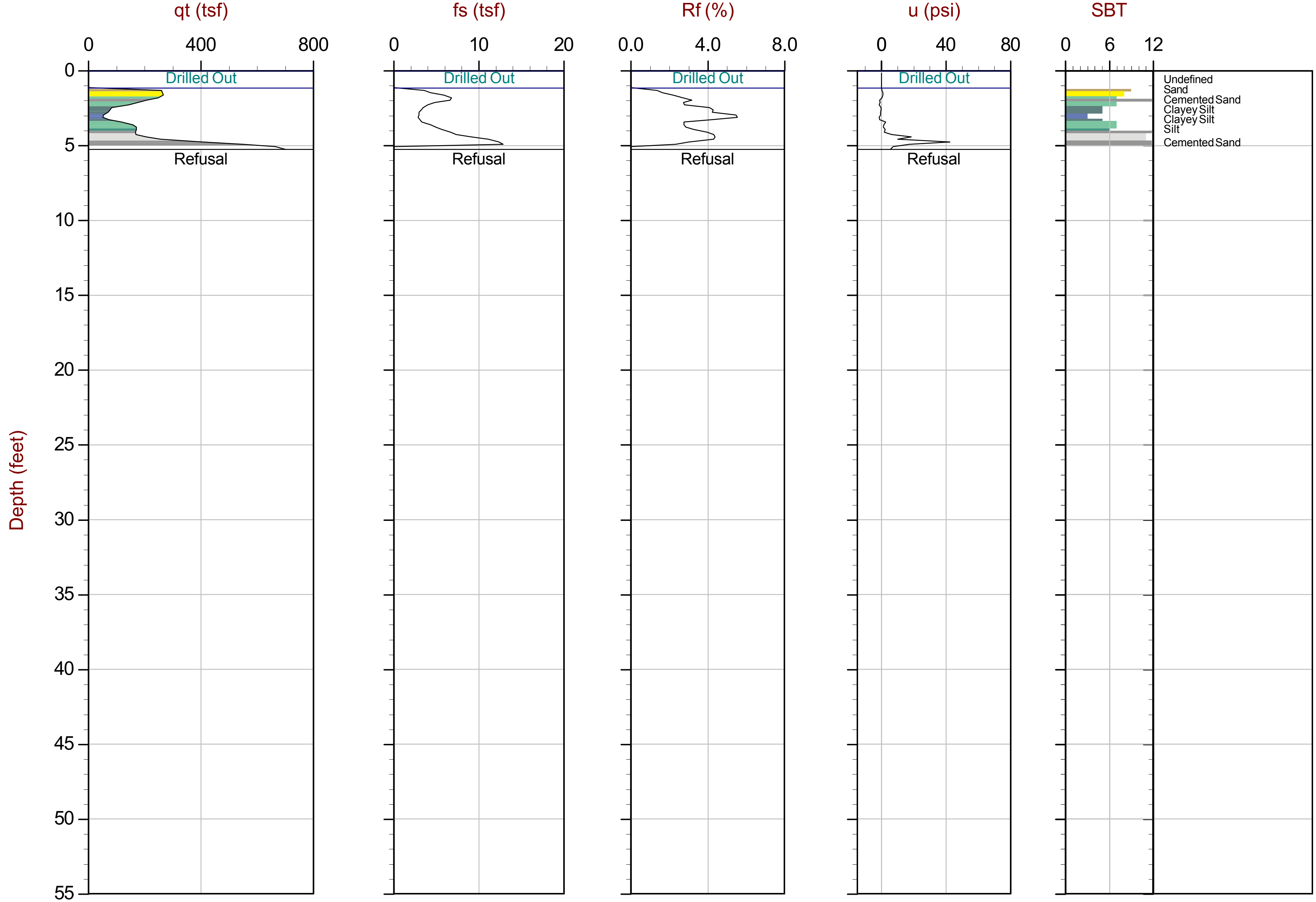
Max Depth: 5.400 m / 17.72 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
File: 17-56008_CP05B.COR
Unit Wt: SBT Zones
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164832m E: 550882m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 10:11
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT05
Cone: 448:T1500F15U500



Max Depth: 1.600 m / 5.25 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP05.COR
Unit Wt: SBT Zones

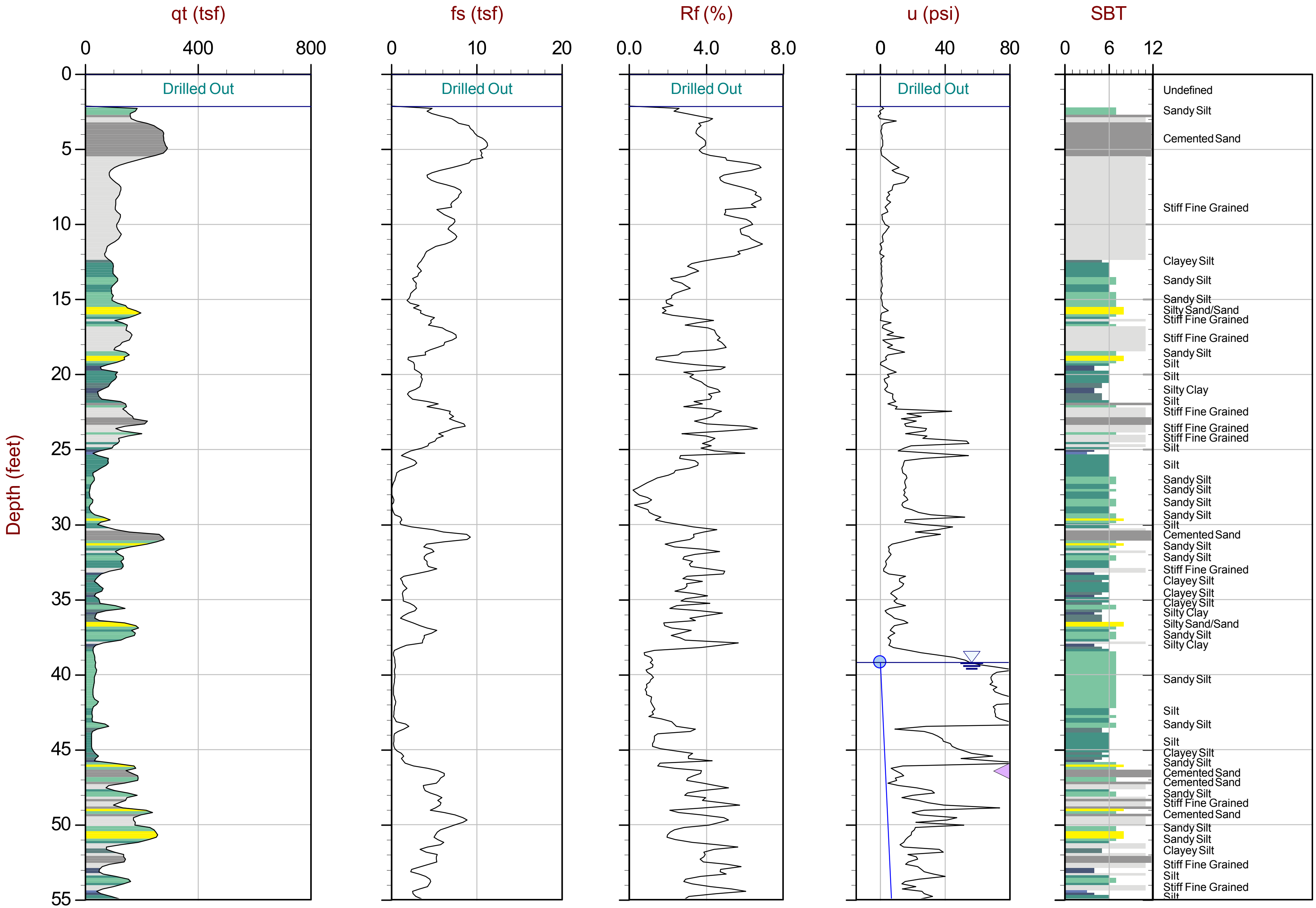
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164830m E: 550881m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 10:53
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT06
Cone: 448:T1500F15U500



Max Depth: 19.250 m / 63.16 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP06.COR
Unit Wt: SBT Zones

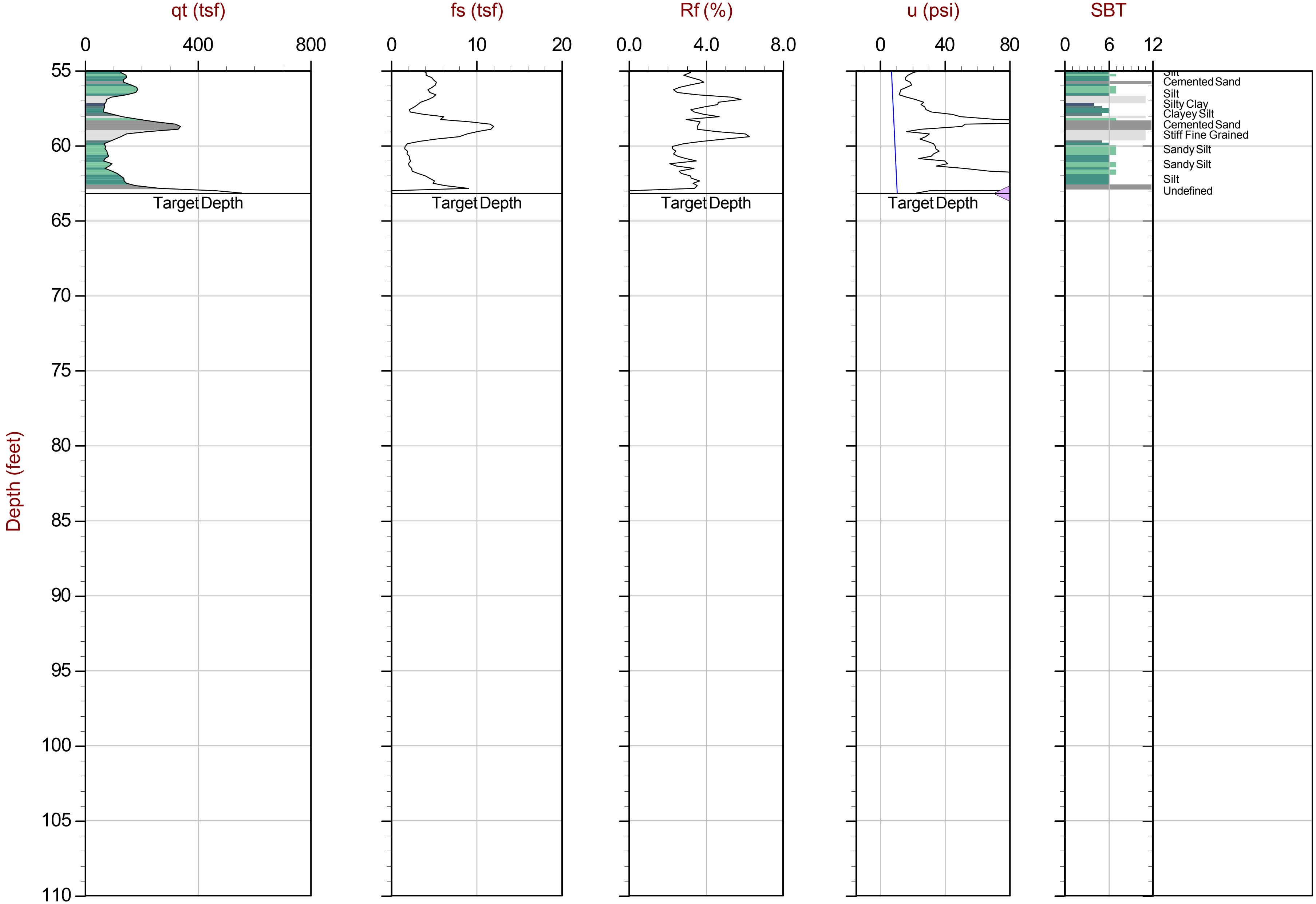
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164849m E:550963m
Page No: 1 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 10:53
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT06
Cone: 448:T1500F15U500

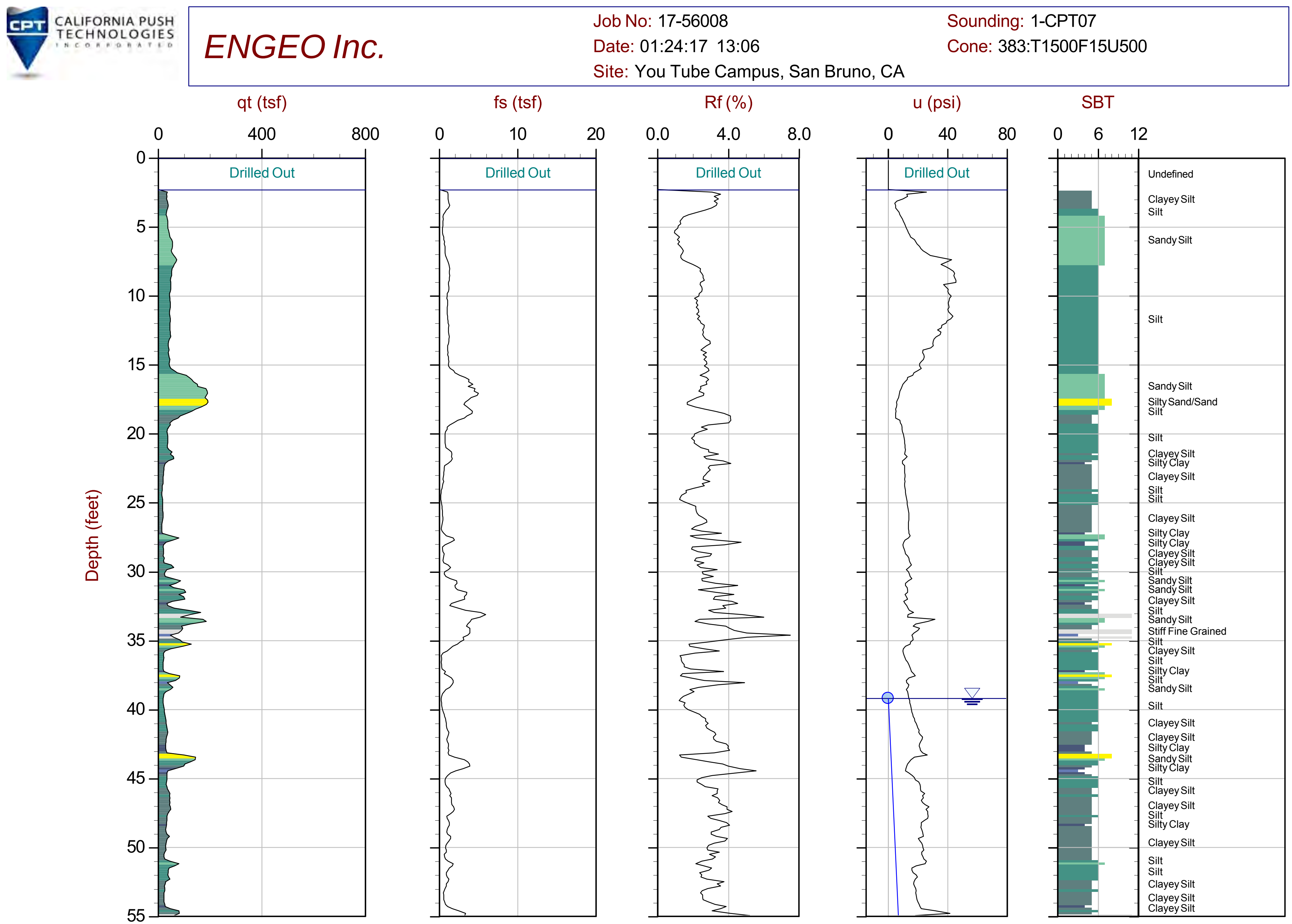


Max Depth: 19.250 m / 63.16 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP06.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164849m E:550963m
Page No: 2 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line



Max Depth: 24.250 m / 79.56 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP07.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164882m E: 550982m
Page No: 1 of 2

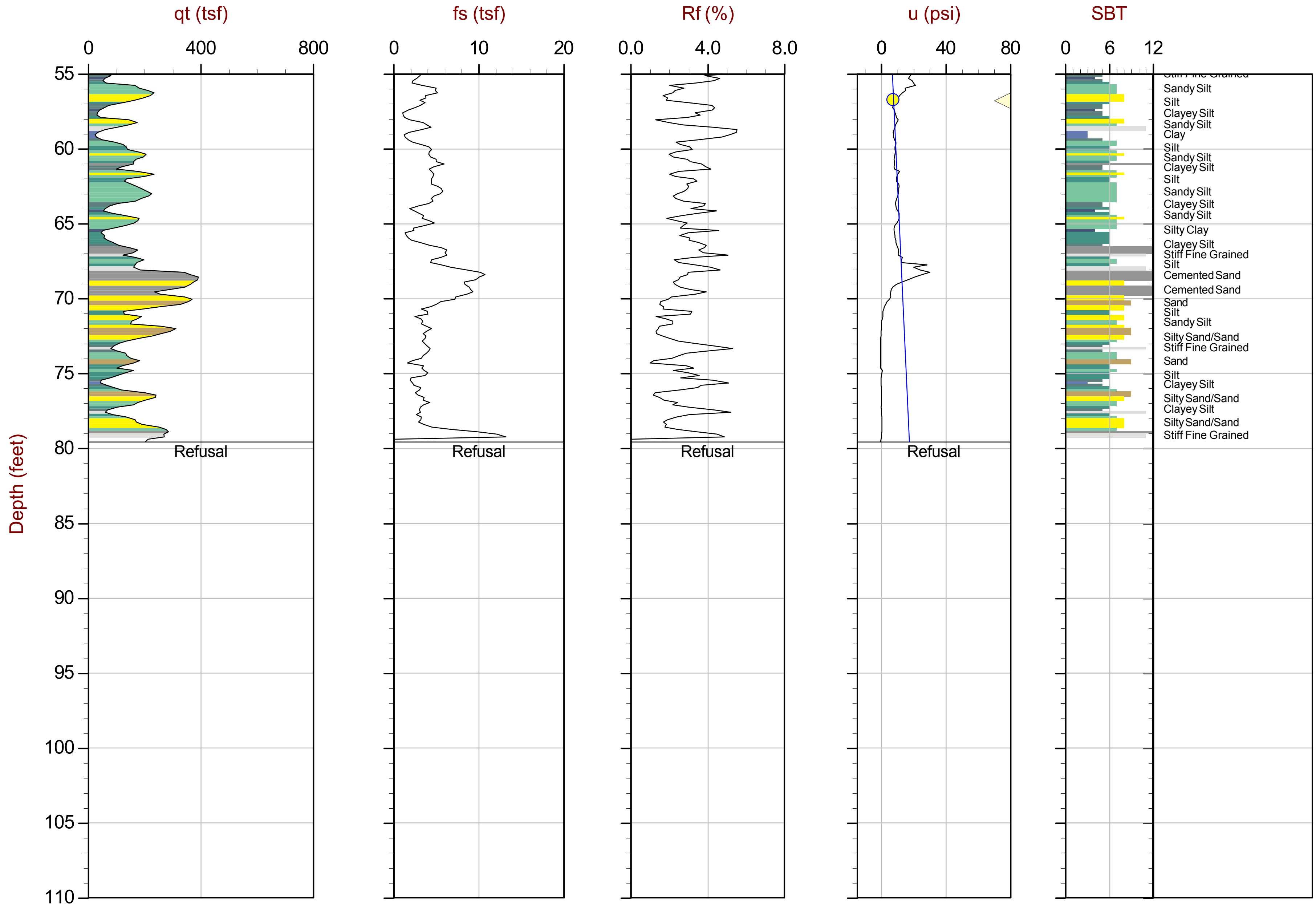
Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 13:06
Site: You Tube Campus, San Bruno, CA

Sounding: 1-CPT07
Cone: 383:T1500F15U500



Max Depth: 24.250 m / 79.56 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

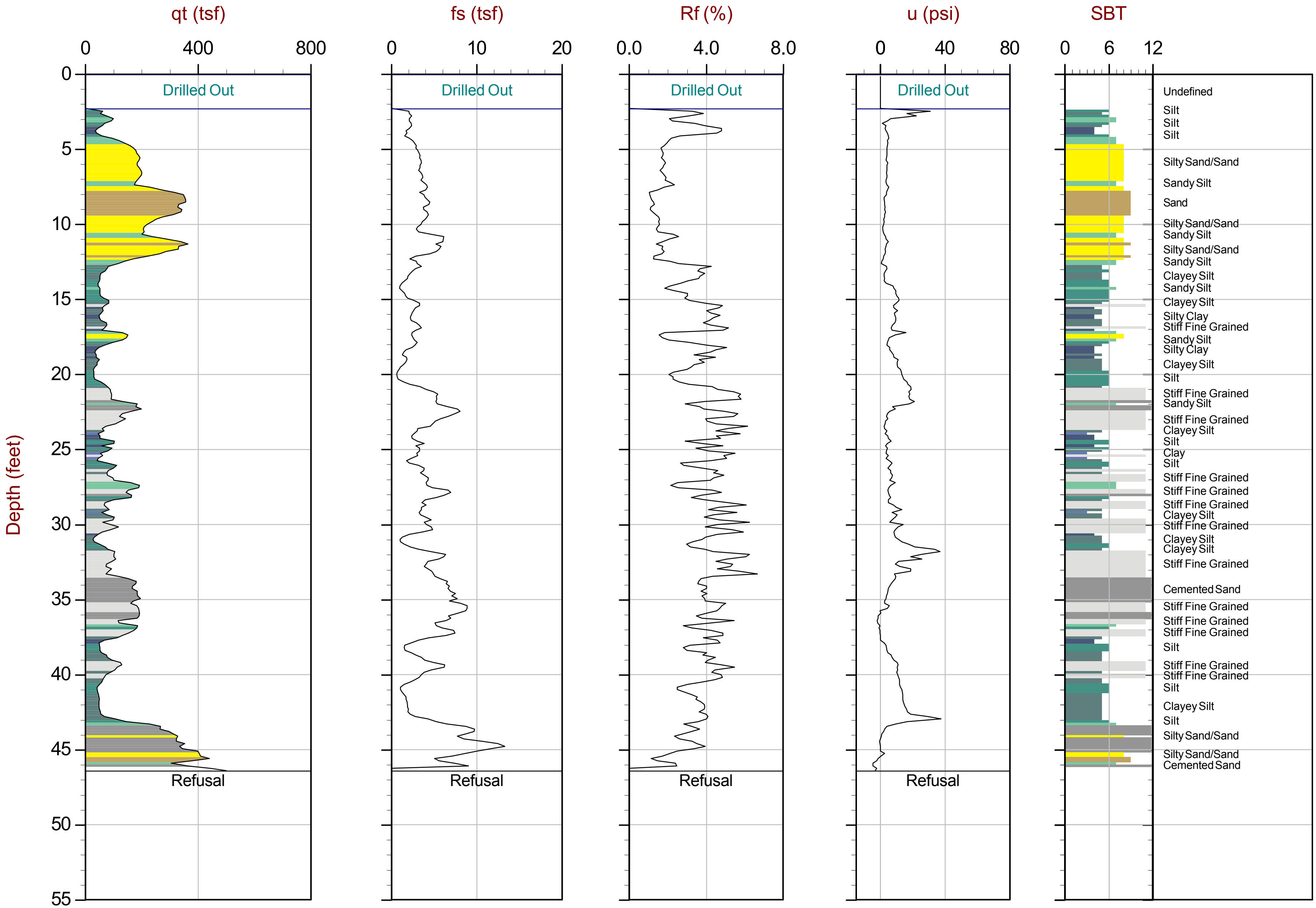
File: 17-56008_CP07.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164882m E:550982m
Page No: 2 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 10:13
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT11
Cone: 383:T1500F15U500



Max Depth: 14.150 m / 46.42 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
File: 17-56008_CP11.COR
Unit Wt: SBT Zones
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164824m E: 551113m
Page No: 1 of 1

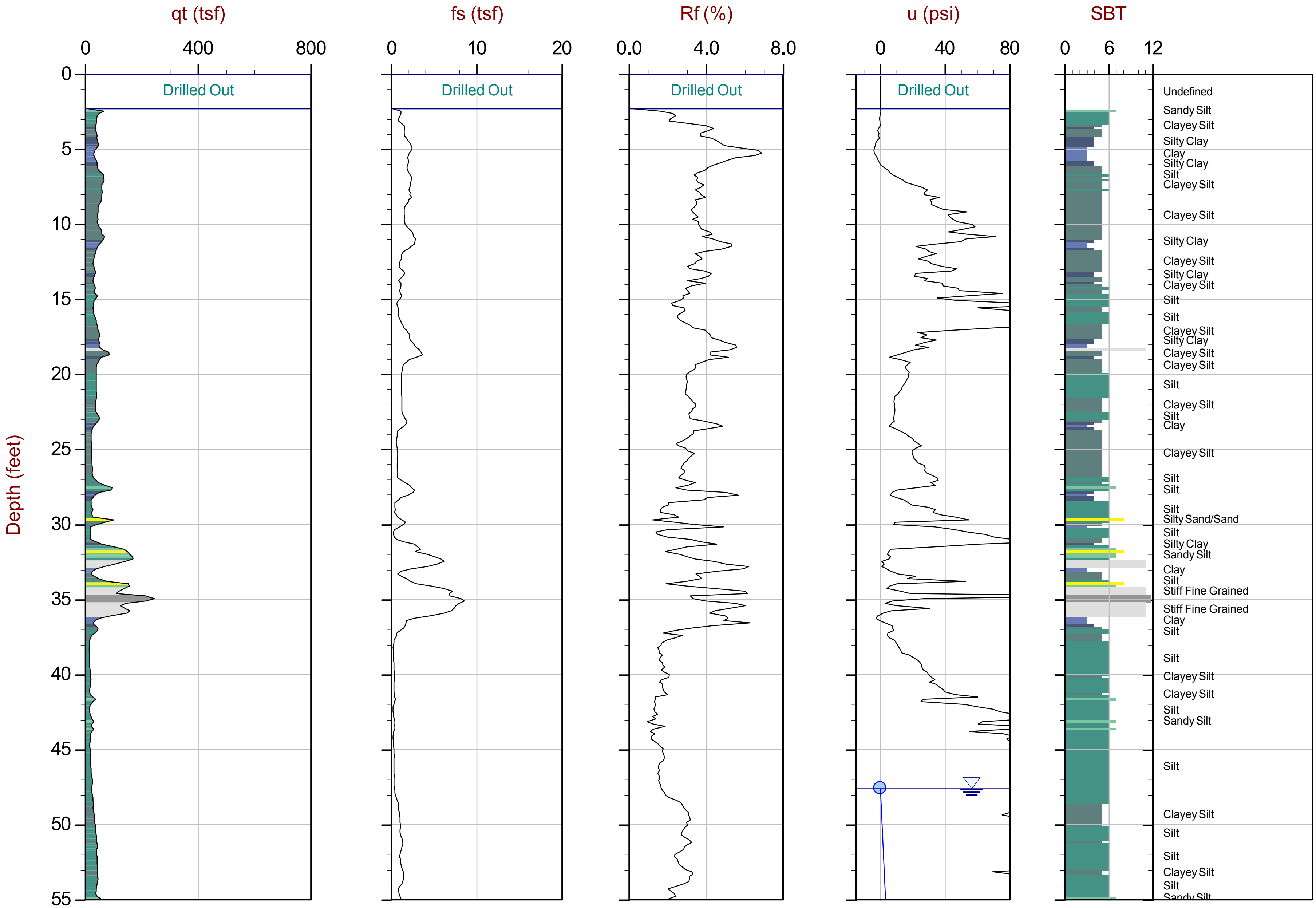
Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 11:17
Site: You Tube Campus, San Bruno, CA

Sounding: 1-CPT12
Cone: 383:T1500F15U500



Max Depth: 21.900 m / 71.85 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP12.COR
Unit Wt: SBT Zones

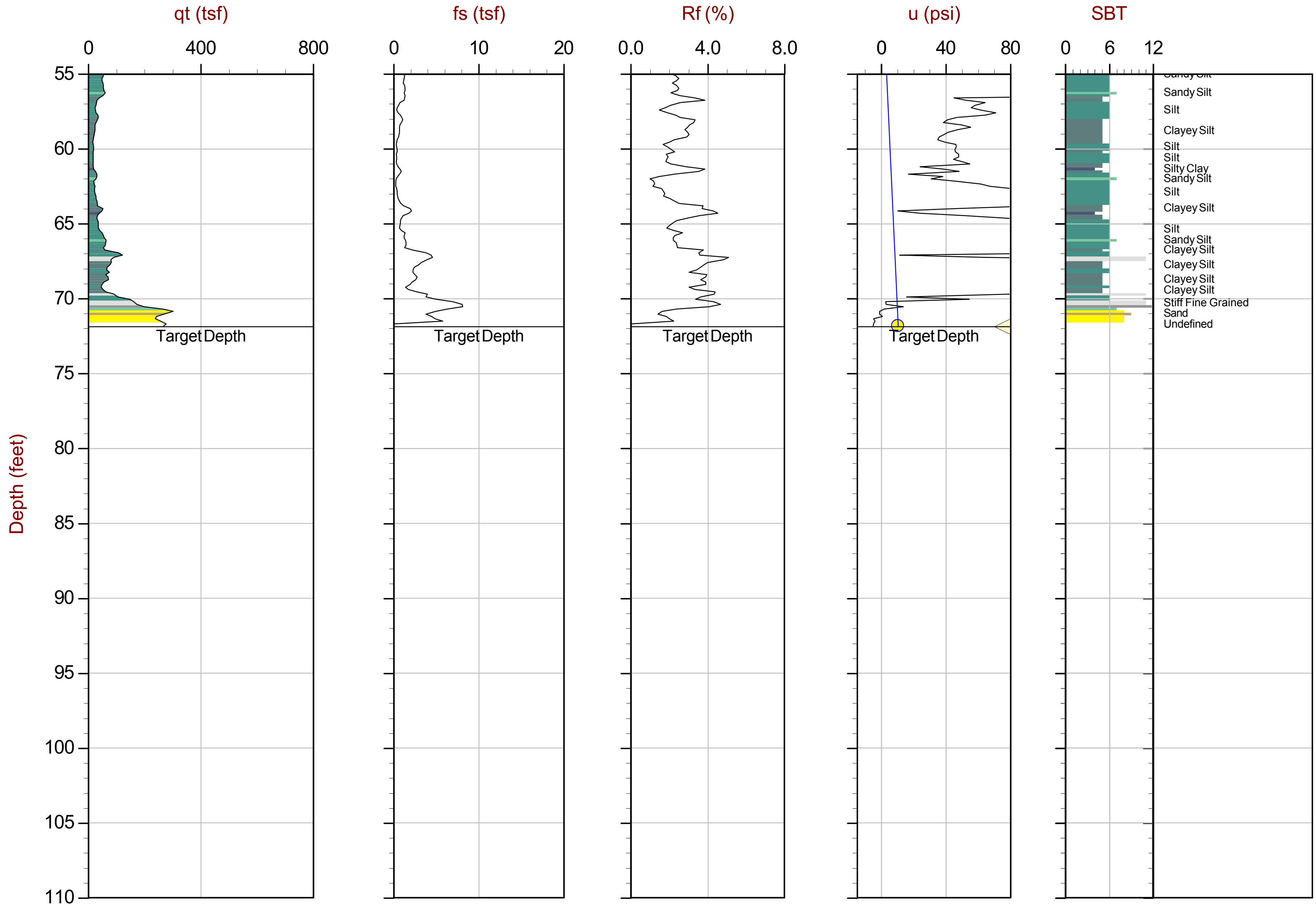
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164894m E:551022m
Page No: 1 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 11:17
Site: You Tube Campus, San Bruno, CA

Sounding: 1-CPT12
Cone: 383:T1500F15U500



Max Depth: 21.900 m / 71.85 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

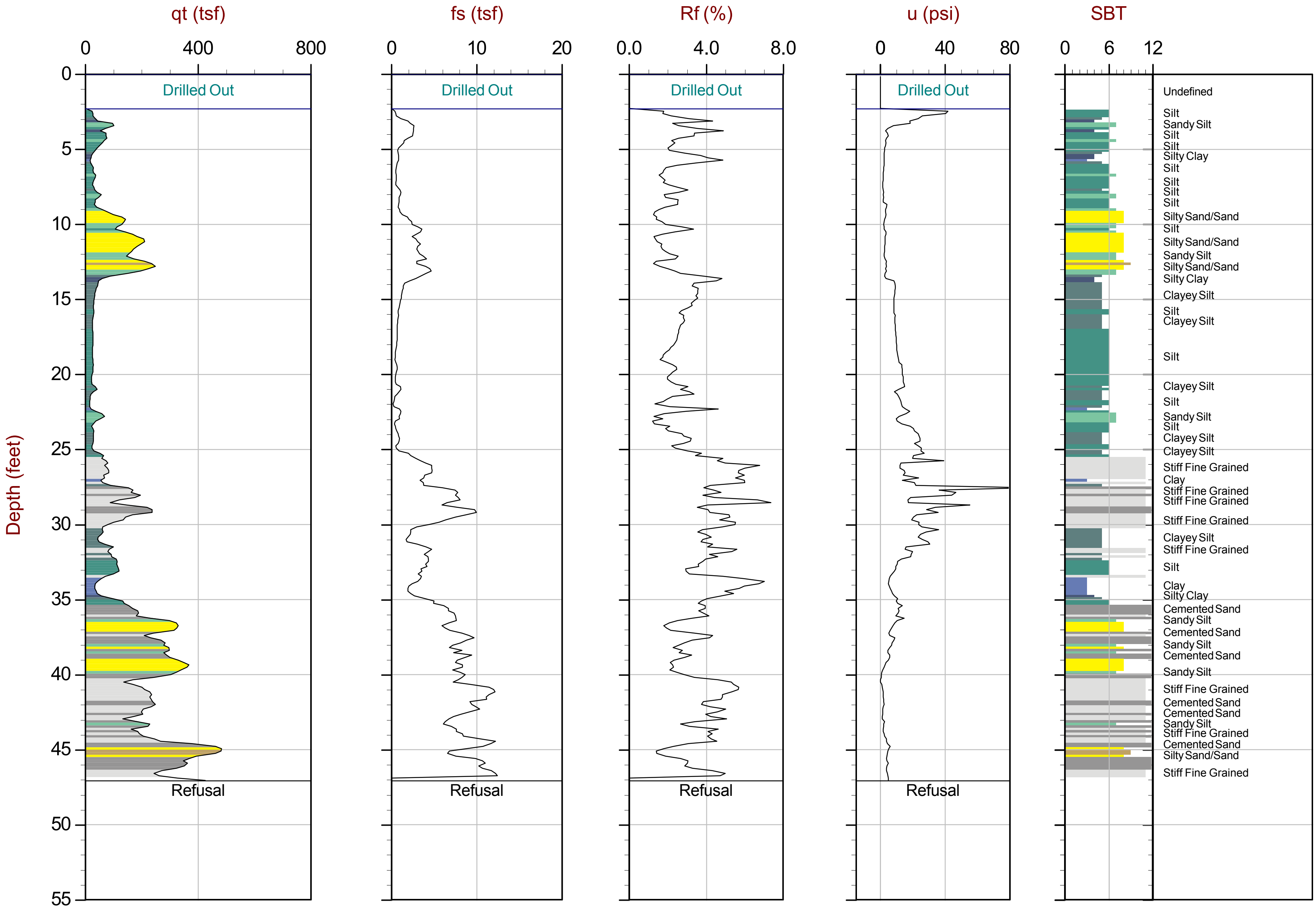
File: 17-56008_CP12.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164894m E: 551022m
Page No: 2 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56008	Sounding: 1-CPT13
	Date: 01:25:17 12:35	Cone: 383:T1500F15U500
	Site: You Tube Campus, San Bruno, CA	



Max Depth: 14.350 m / 47.08 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

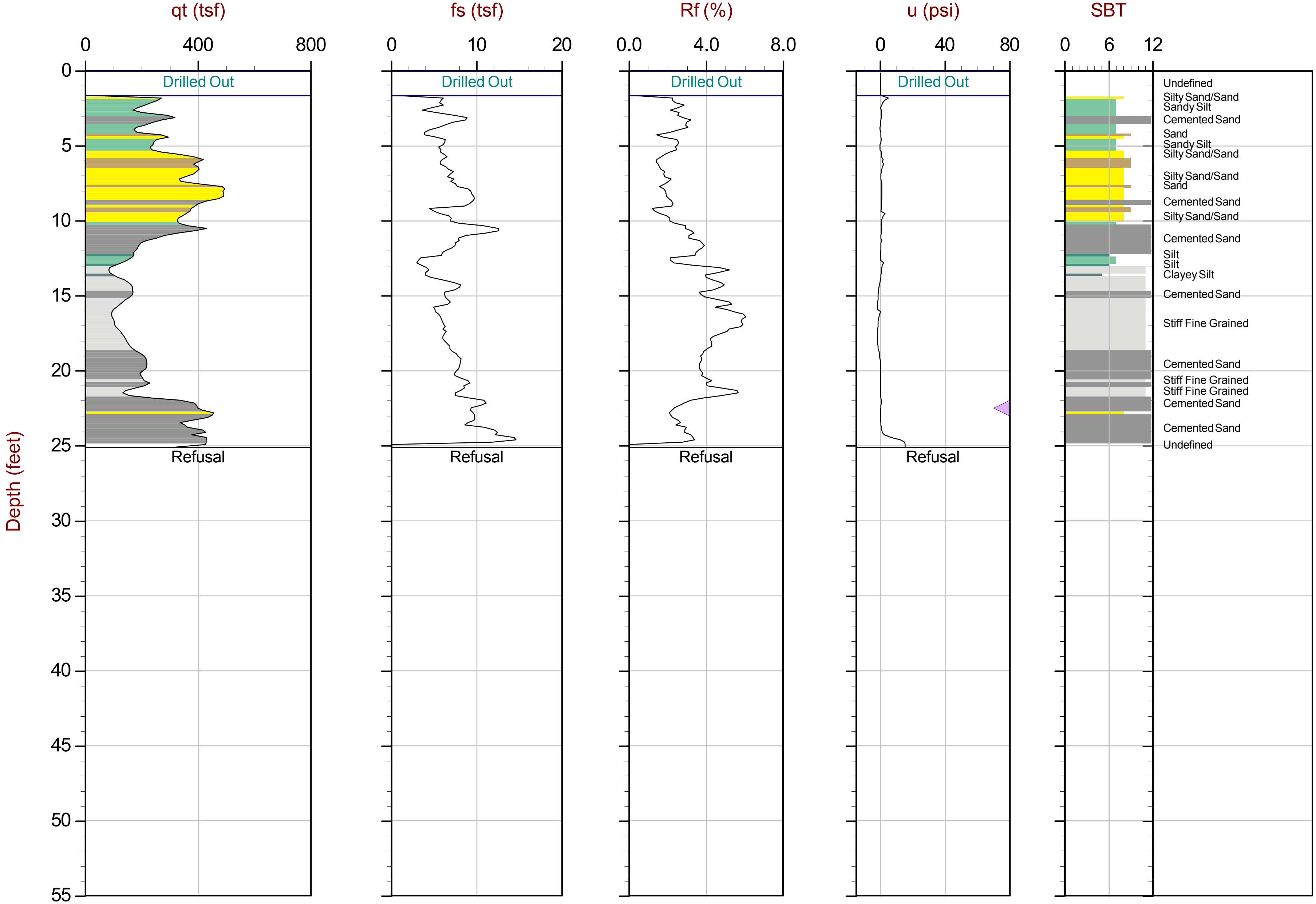
File: 17-56008_CP13.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164968m E: 551086m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 13:46
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT14
Cone: 383:T1500F15U500



Max Depth: 7.650 m / 25.10 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP14.COR
Unit Wt: SBT Zones

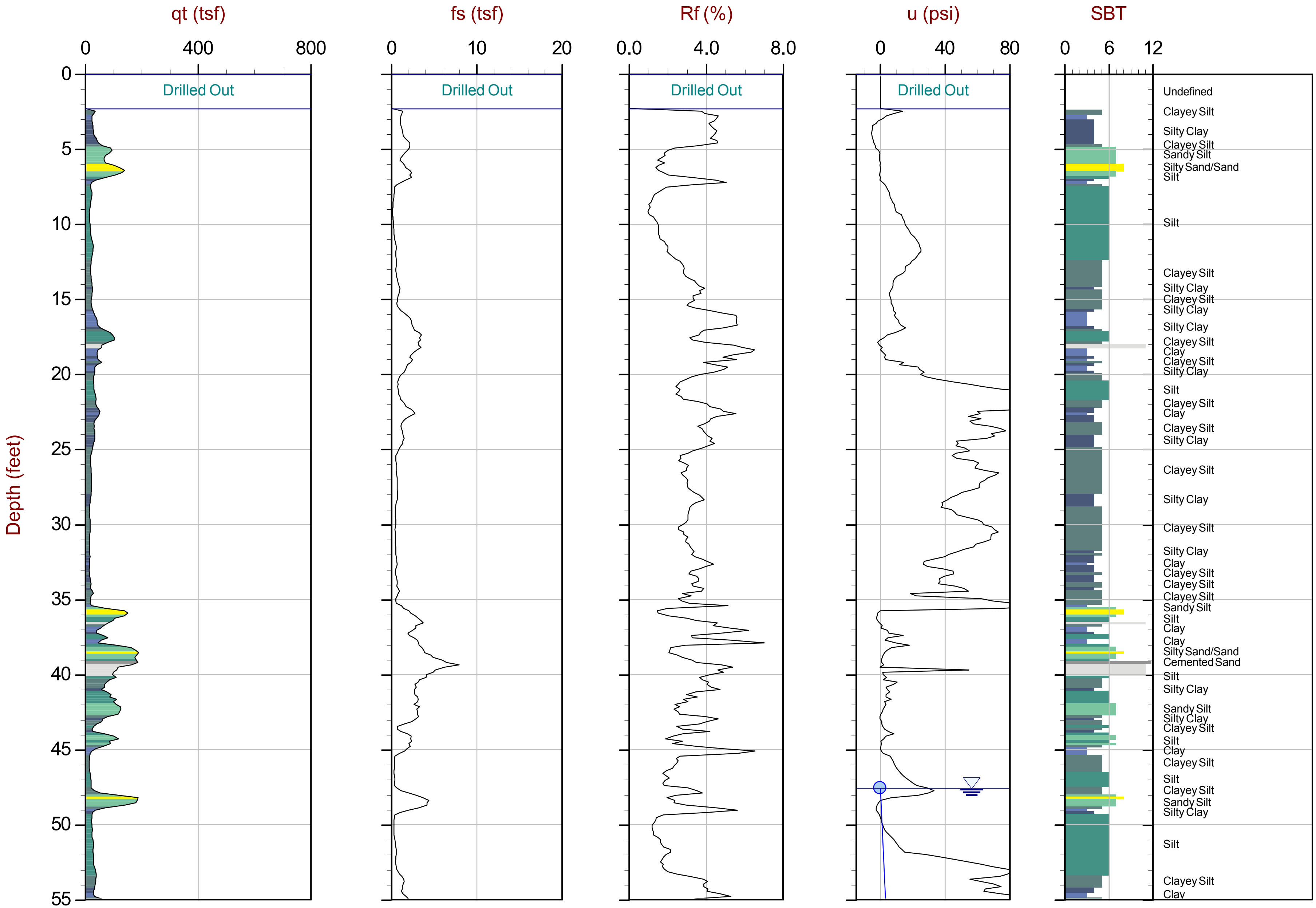
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164965m E:550918m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 14:39
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT15
Cone: 383:T1500F15U500



Max Depth: 24.400 m / 80.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP15.COR
Unit Wt: SBT Zones

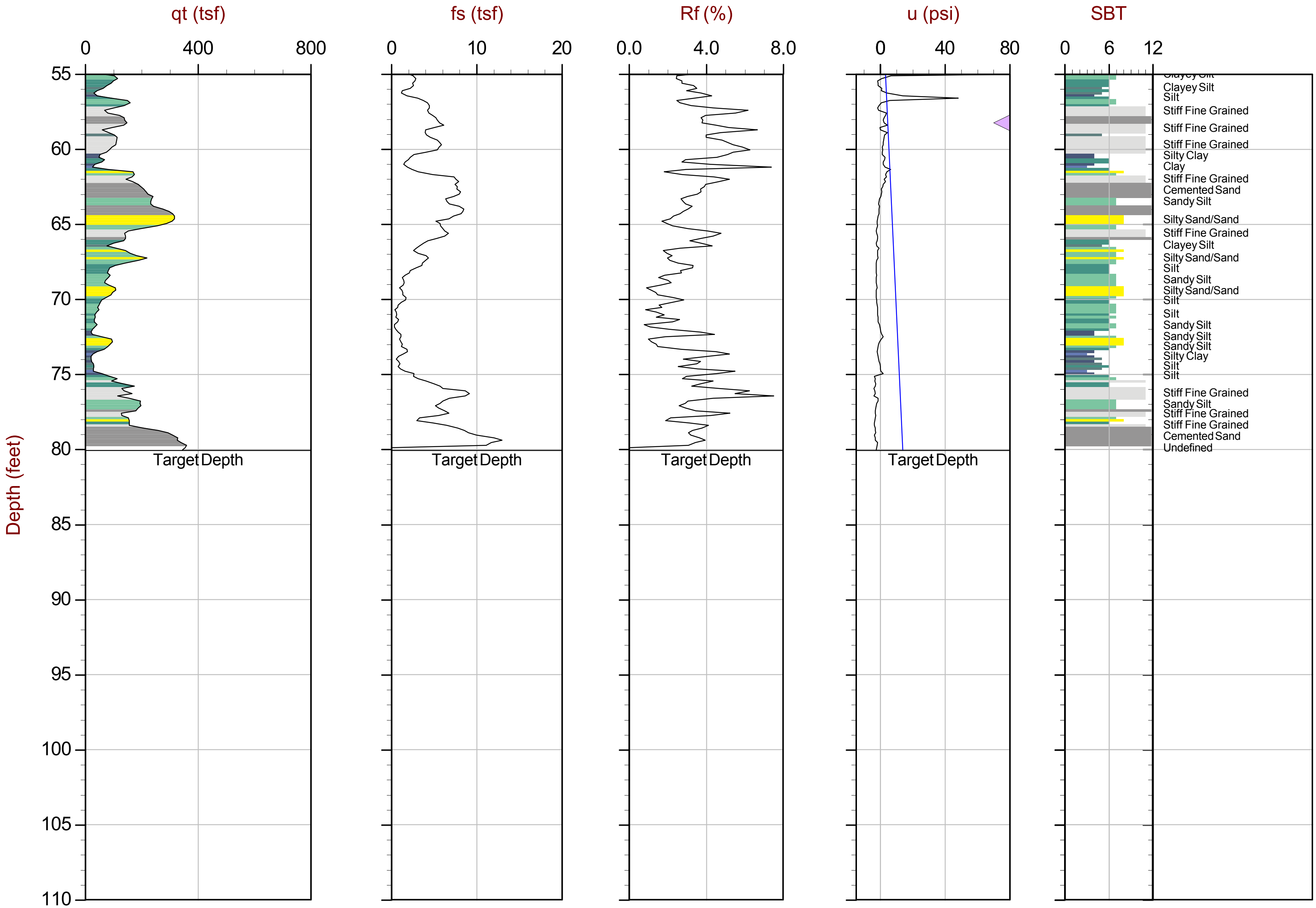
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4165008m E: 551018m
Page No: 1 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 14:39
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT15
Cone: 383:T1500F15U500



Max Depth: 24.400 m / 80.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_CP15.COR
Unit Wt: SBT Zones

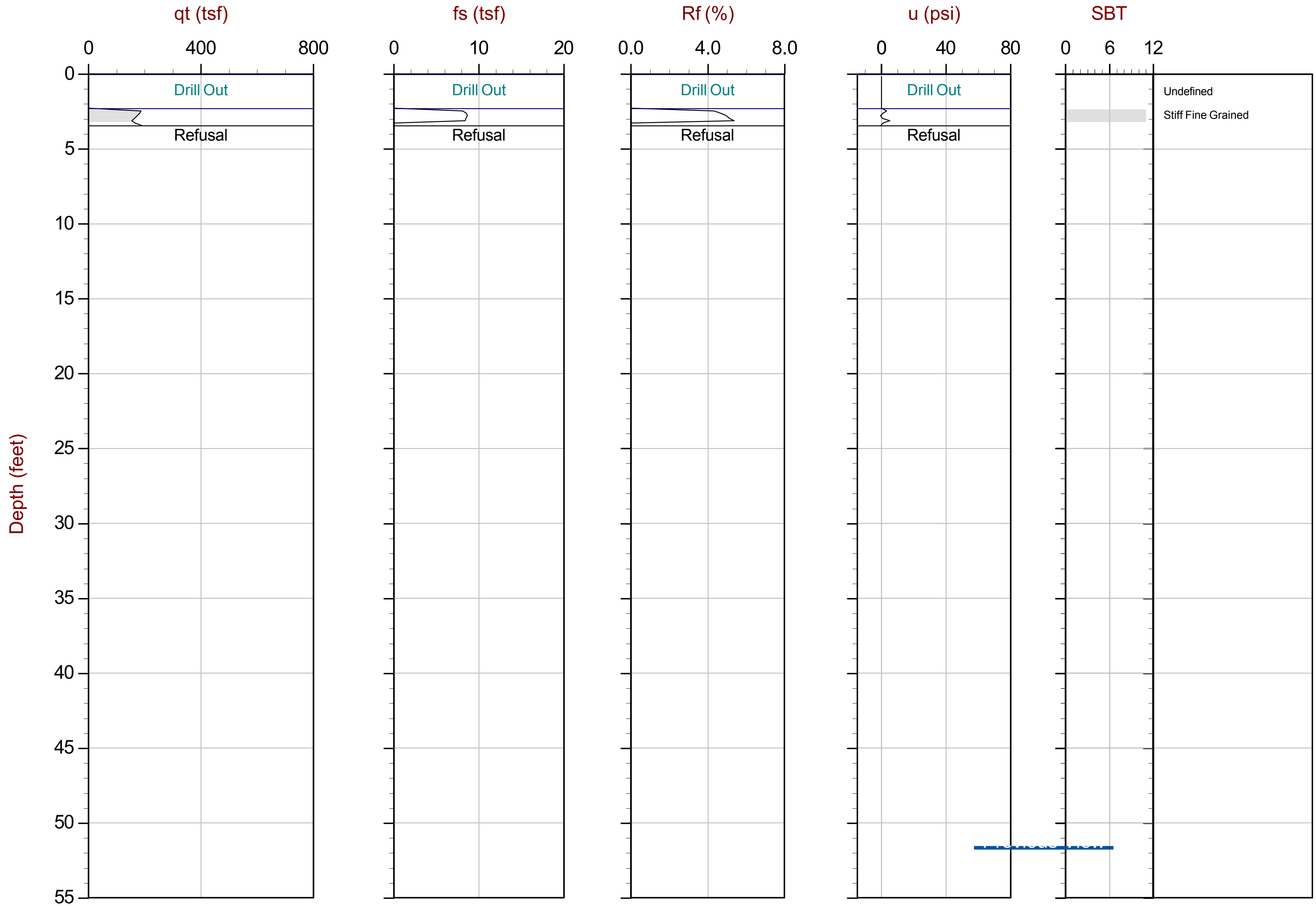
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4165008m E:551018m
Page No: 2 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:26:17 09:51
Site: You Tube Campus, San Bruno, CA
Sounding: 1-CPT18
Cone: 383:T1500F15U500



Max Depth: 1.050 m / 3.44 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

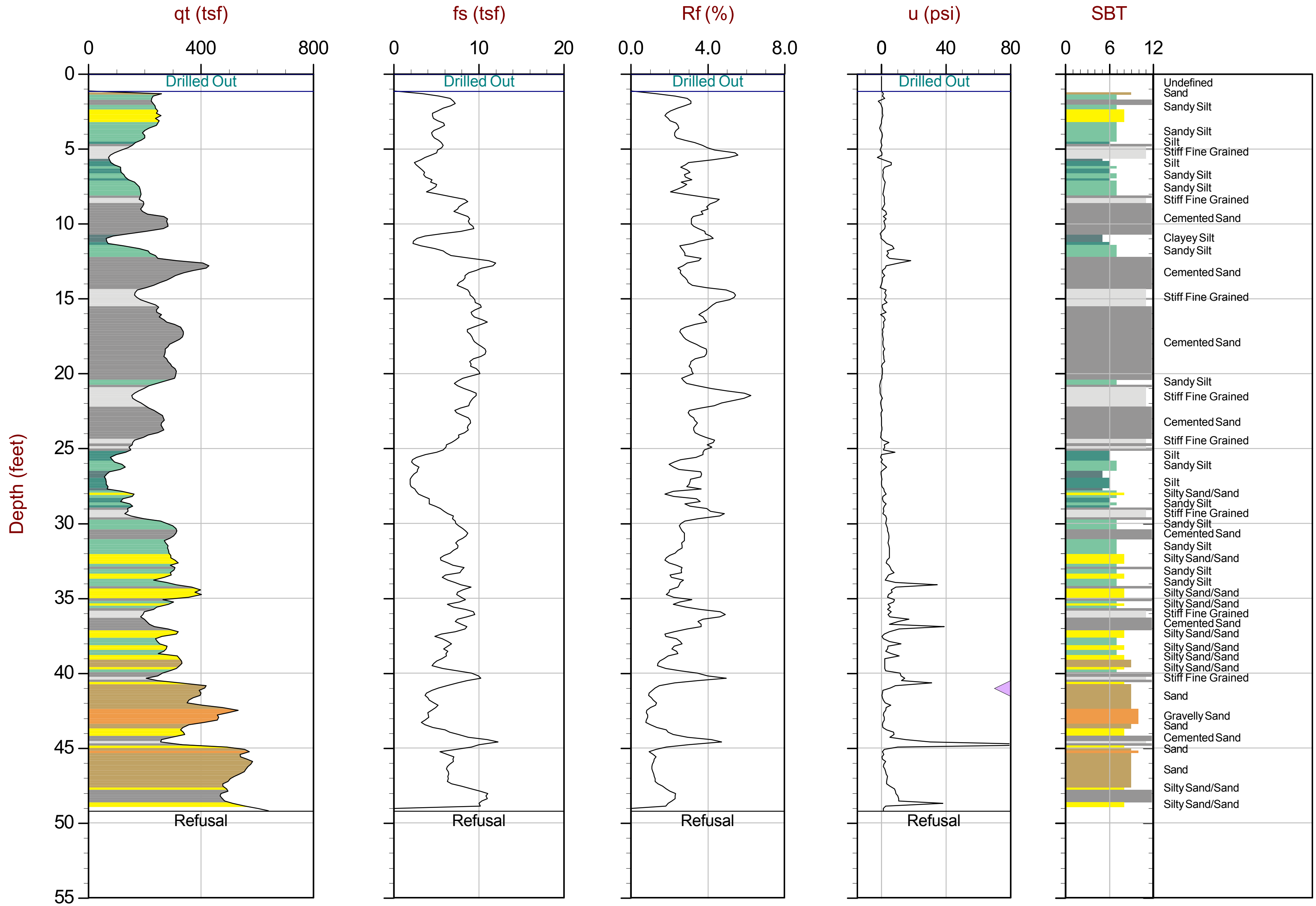
File: 17-56008_CP18.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164769m E: 551252m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

ENGEO Inc.

Job No: 17-56008
Date: 01:23:17 14:22
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT02
Cone: 448:T1500F15U500



Max Depth: 15.000 m / 49.21 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_SP02.COR
Unit Wt: SBT Zones

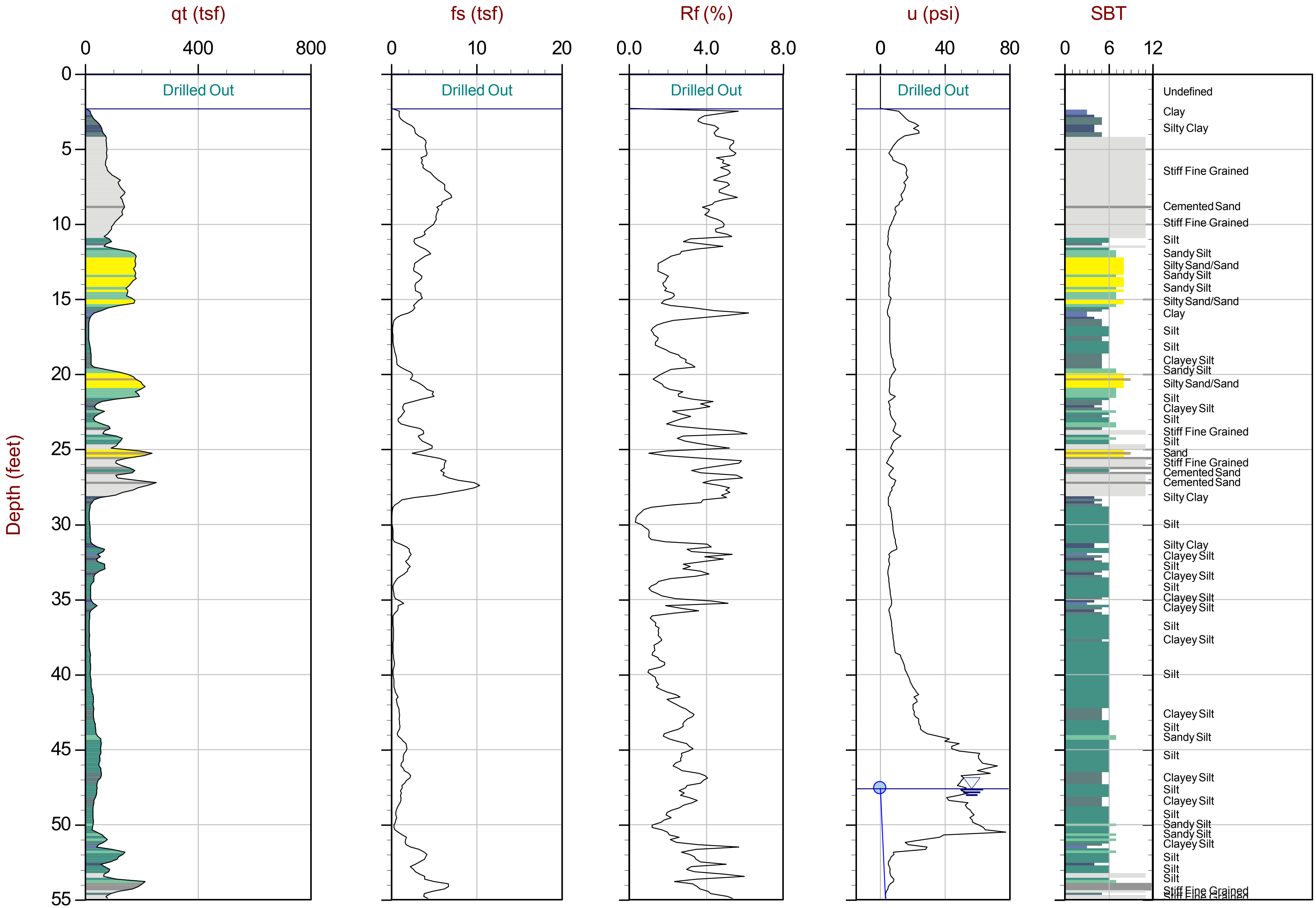
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164903m E: 550798m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 14:30
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT08
Cone: 383:T1500F15U500



Max Depth: 21.750 m / 71.36 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_SP08.COR
Unit Wt: SBT Zones

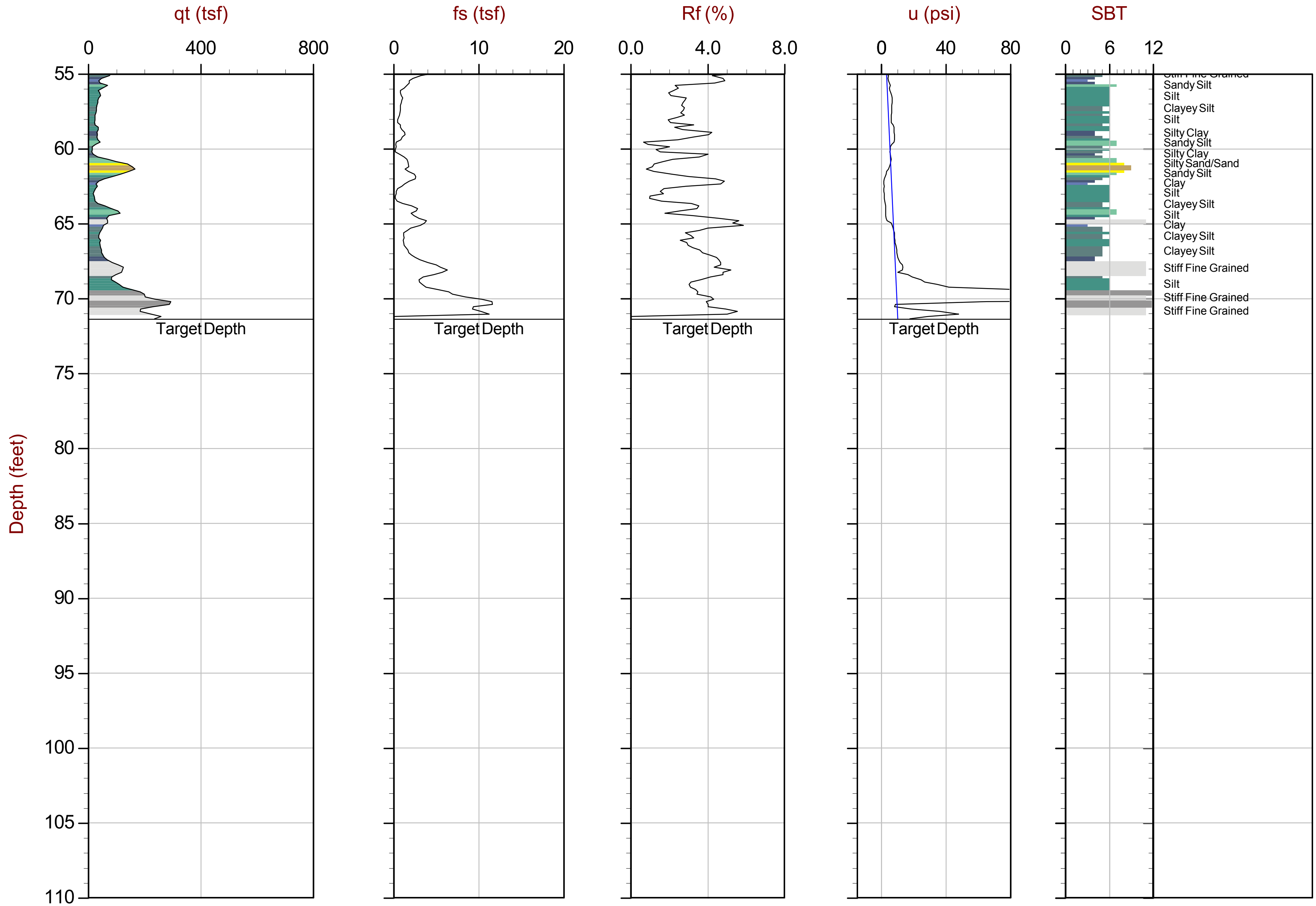
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164853m E: 551013m
Page No: 1 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:24:17 14:30
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT08
Cone: 383:T1500F15U500



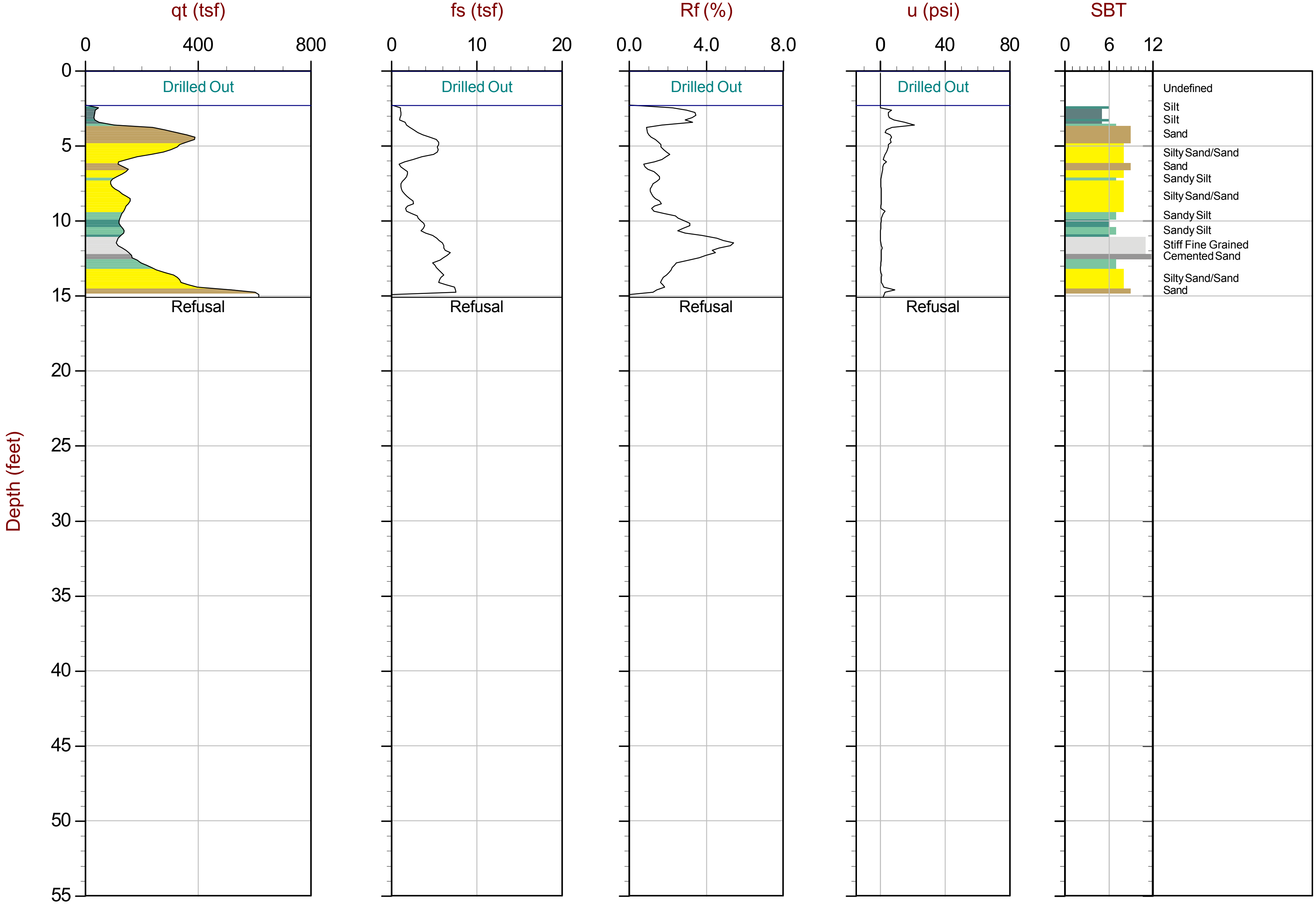
Max Depth: 21.750 m / 71.36 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
File: 17-56008_SP08.COR
Unit Wt: SBT Zones
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164853m E: 551013m
Page No: 2 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 07:35
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT09
Cone: 383:T1500F15U500



Max Depth: 4.600 m / 15.09 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_SP09.COR
Unit Wt: SBT Zones

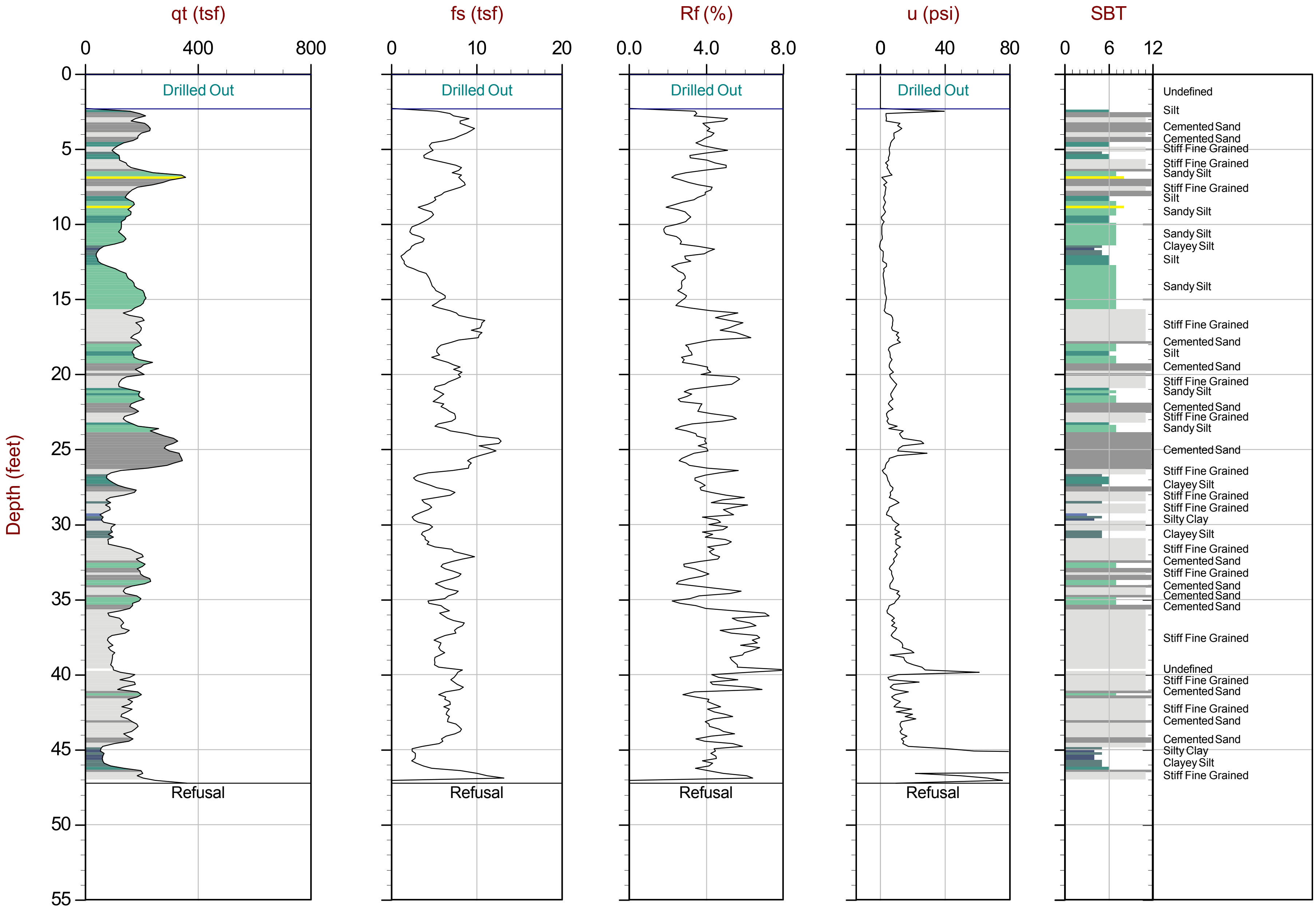
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164668m E: 551056m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:25:17 08:45
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT10
Cone: 383:T1500F15U500



Max Depth: 14.400 m / 47.24 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_SP10.COR
Unit Wt: SBT Zones

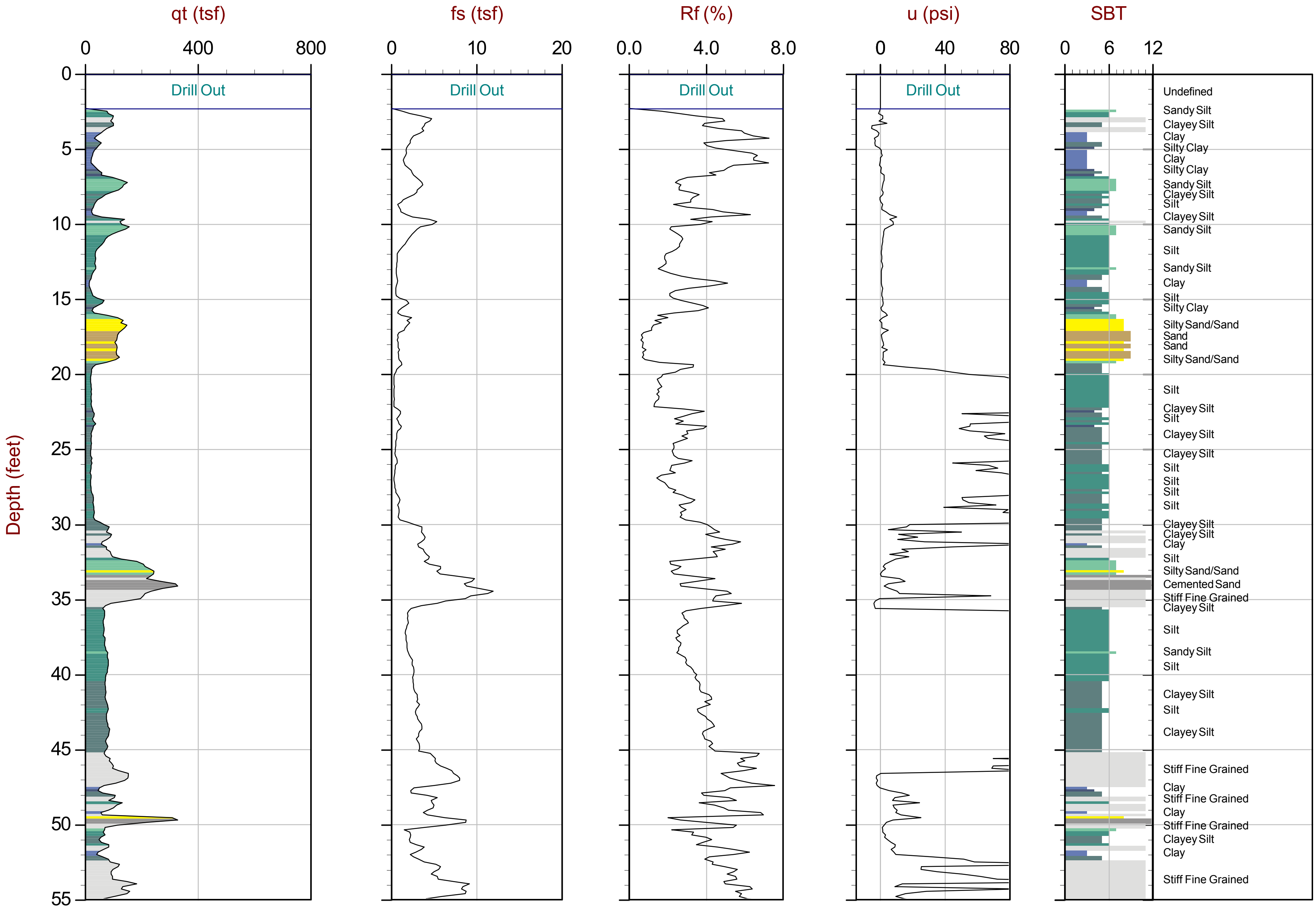
SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164706m E: 551183m
Page No: 1 of 1

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56008
Date: 01:26:17 08:11
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT17
Cone: 383:T1500F15U500



Max Depth: 18.450 m / 60.53 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

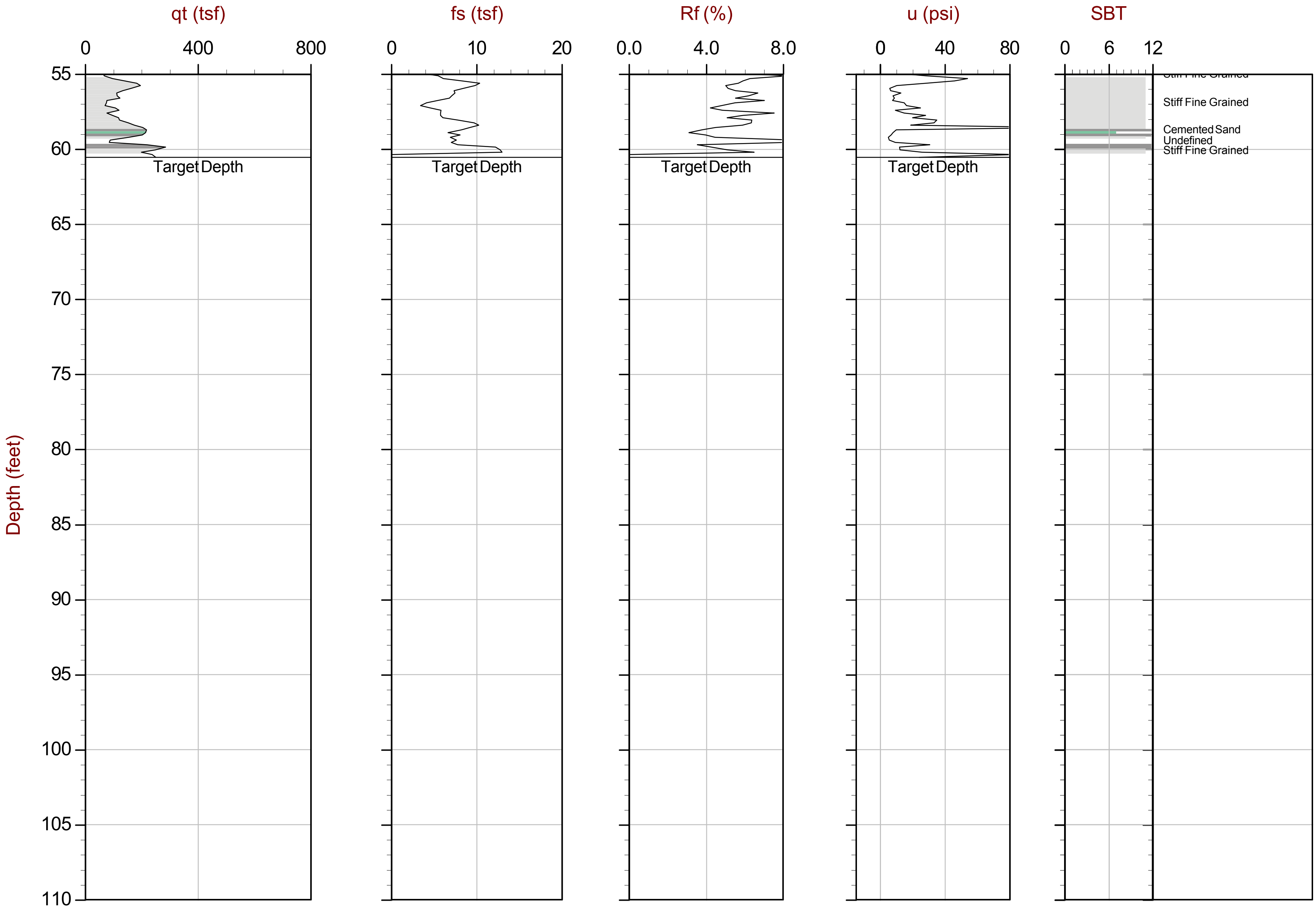
File: 17-56008_SP17.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N: 4164887m E: 551217m
Page No: 1 of 2

Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

ENGEO Inc.

Job No: 17-56008
Date: 01:26:17 08:11
Site: You Tube Campus, San Bruno, CA
Sounding: 1-SCPT17
Cone: 383:T1500F15U500



Max Depth: 18.450 m / 60.53 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-56008_SP17.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: UTM 10N N:4164887m E:551217m
Page No: 2 of 2

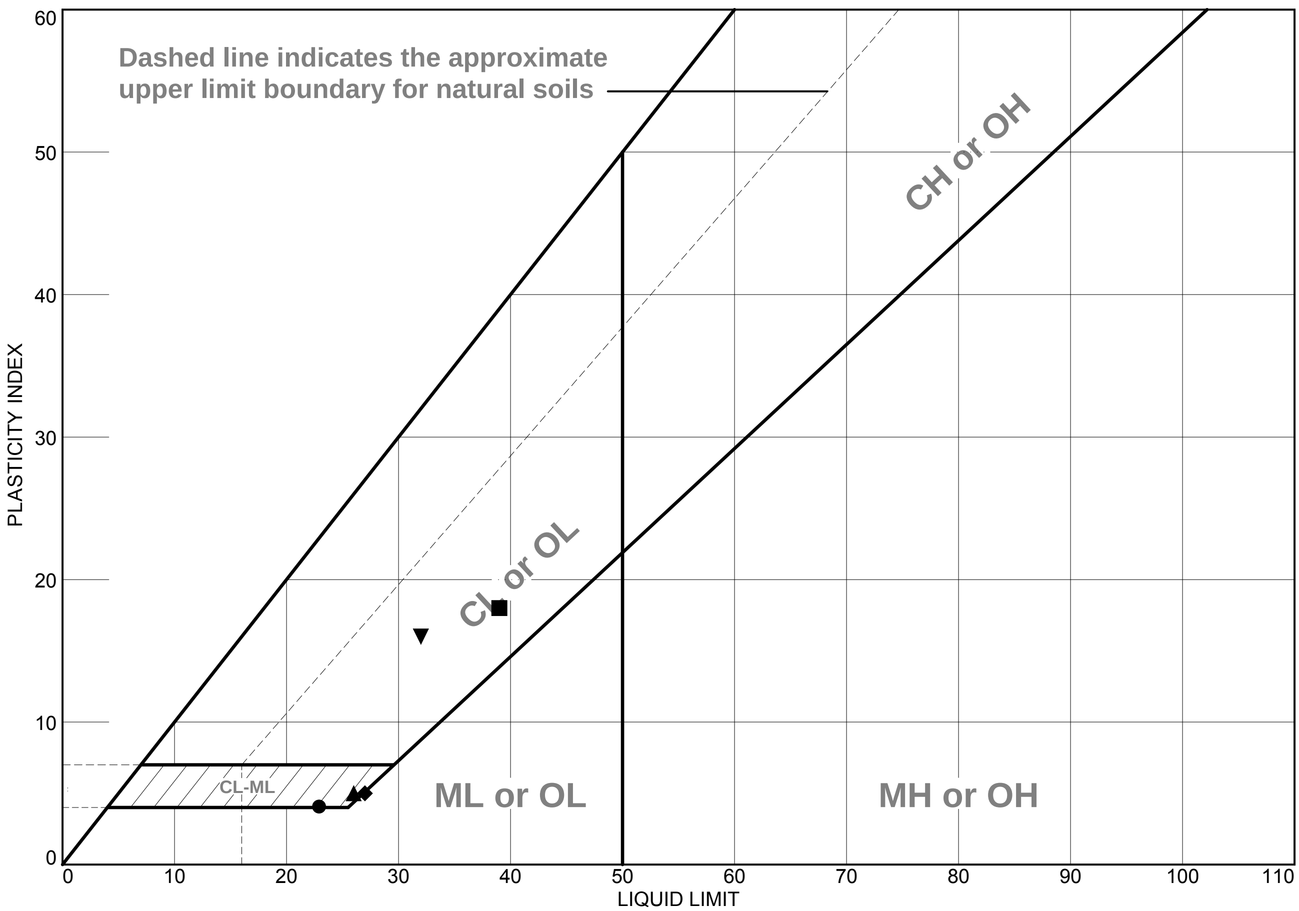
Overplot Item: Assumed Ueq; Ueq; Dissipation, equilibrium achieved; Dissipation, equilibrium not achieved; Hydrostatic Line

APPENDIX C

LABORATORY TEST DATA

Liquid and Plastic Limits Test Report
Particle Size Distribution Report
Unconfined Compression Test
Incremental Consolidation Report
Analytical Results of Soil Corrosion

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	23	19	4		44.5	
■	See exploration logs	39	21	18		68.6	
▲	See exploration logs	26	21	5		47.2	
◆	See exploration logs	27	22	5			
▼	See exploration logs	32	16	16			

Project No. 13667.000.000 **Client:** Google Incorporated

Project: Google Master Planning Services - Geotechnical Engineering

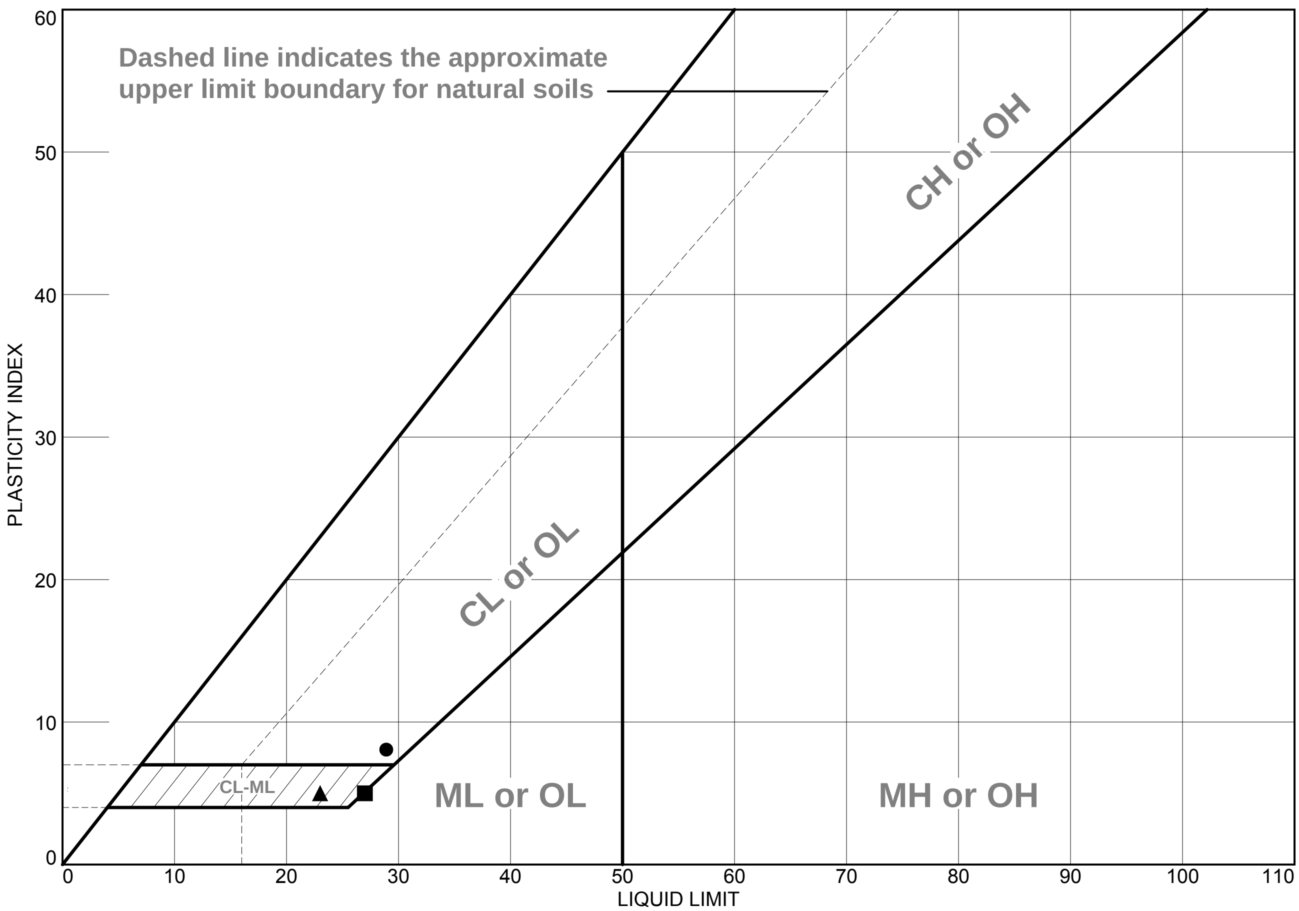
●**Depth:** 51.5 feet **Sample Number:** 1-B02 @ 51.5
■**Depth:** 25.5 feet **Sample Number:** 1-B05 @ 25.5
▲**Depth:** 30.5 feet **Sample Number:** 1-B05 @ 30.5
◆**Depth:** 40.8-41.2 feet **Sample Number:** 1-B06 @ 40.8
▼**Depth:** 15.5-16.0 feet **Sample Number:** 1-B07 @ 15.5

ENGEO INCORPORATED

Remarks:
●PI: ASTM D4318, Wet method
Grain Size: ASTM D1140
■PI: ASTM D4318, Wet method
Grain Size: ASTM D1140
▲PI: ASTM D4318, Wet method
Grain Size: ASTM D1140
◆ASTM D4318, Wet method
▼ASTM D4318, Wet method

Tested By: M. Quasem **Checked By:** T. Borde

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	29	21	8			
■	See exploration logs	27	22	5		62.8	
▲	See exploration logs	23	18	5			

Project No. 13667.000.000 **Client:** Google Incorporated

Project: Google Master Planning Services - Geotechnical Engineering

●**Depth:** 32.5-33.0 feet **Sample Number:** 1-B07 @ 32.5

■**Depth:** 35.5-36.0 feet **Sample Number:** 1-B08 @ 35.5

▲**Depth:** 27.5-28.0 feet **Sample Number:** 1-B10 @ 27.5

ENGEO INCORPORATED

Remarks:

●ASTM D4318, Wet method

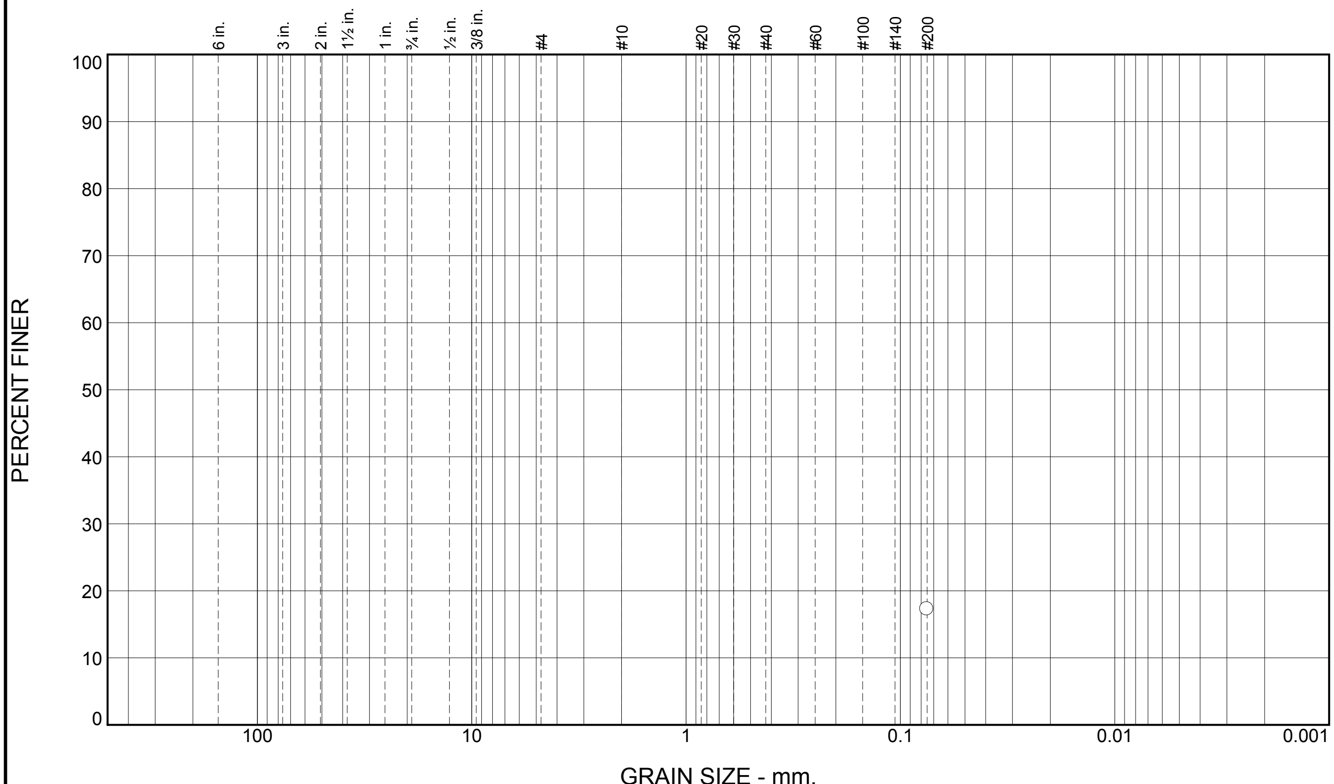
■PI: ASTM D4318, Wet method
Grain Size: ASTM D1140

▲ASTM D4318, wet method

Figure

Tested By: ○ M. Quasem □ M. Quasem △ I. McCauley **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						17.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	17.3		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B01 @ 10.5 **Depth:** 10.5 feet

Date: 2.15.17

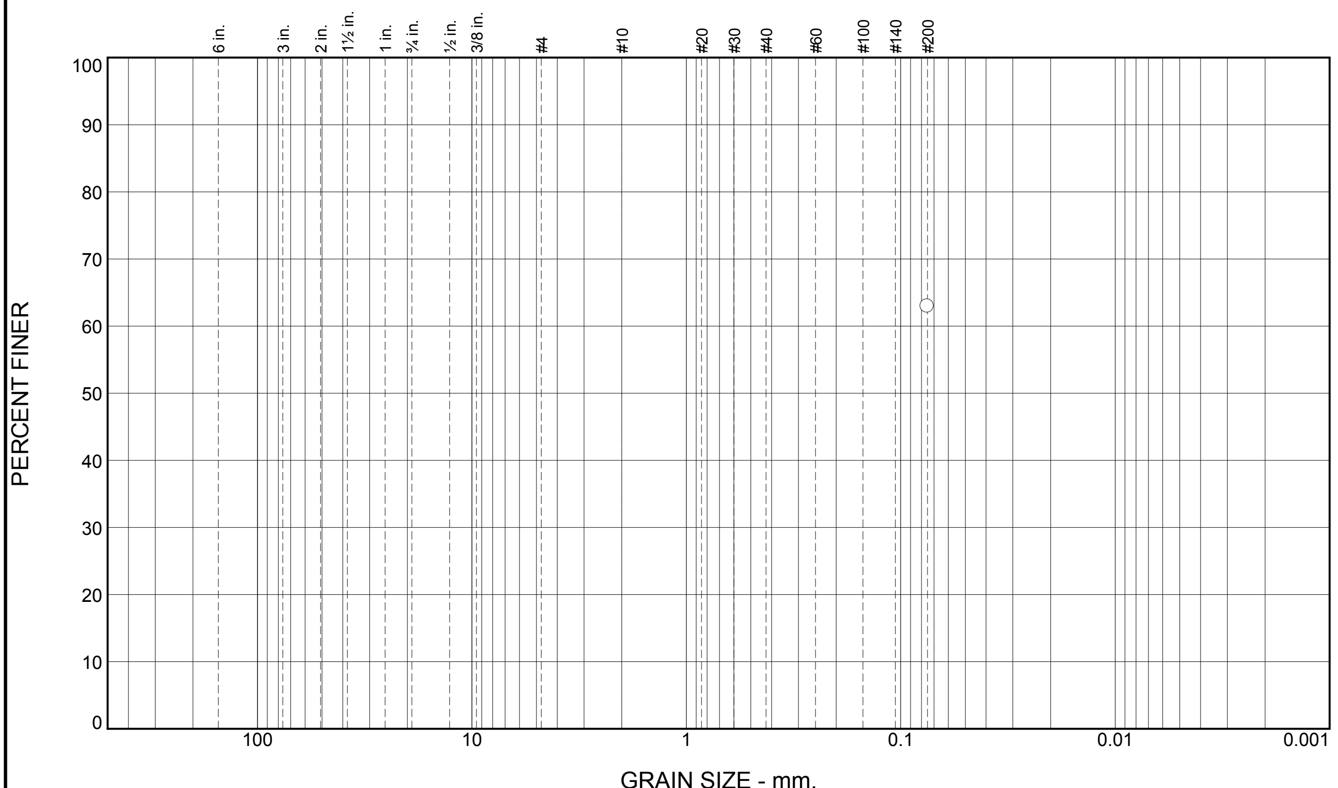
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						62.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	62.9		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: 1-B01 @ 33 **Depth:** 33.0-33.5 feet

Date: 2/16/17

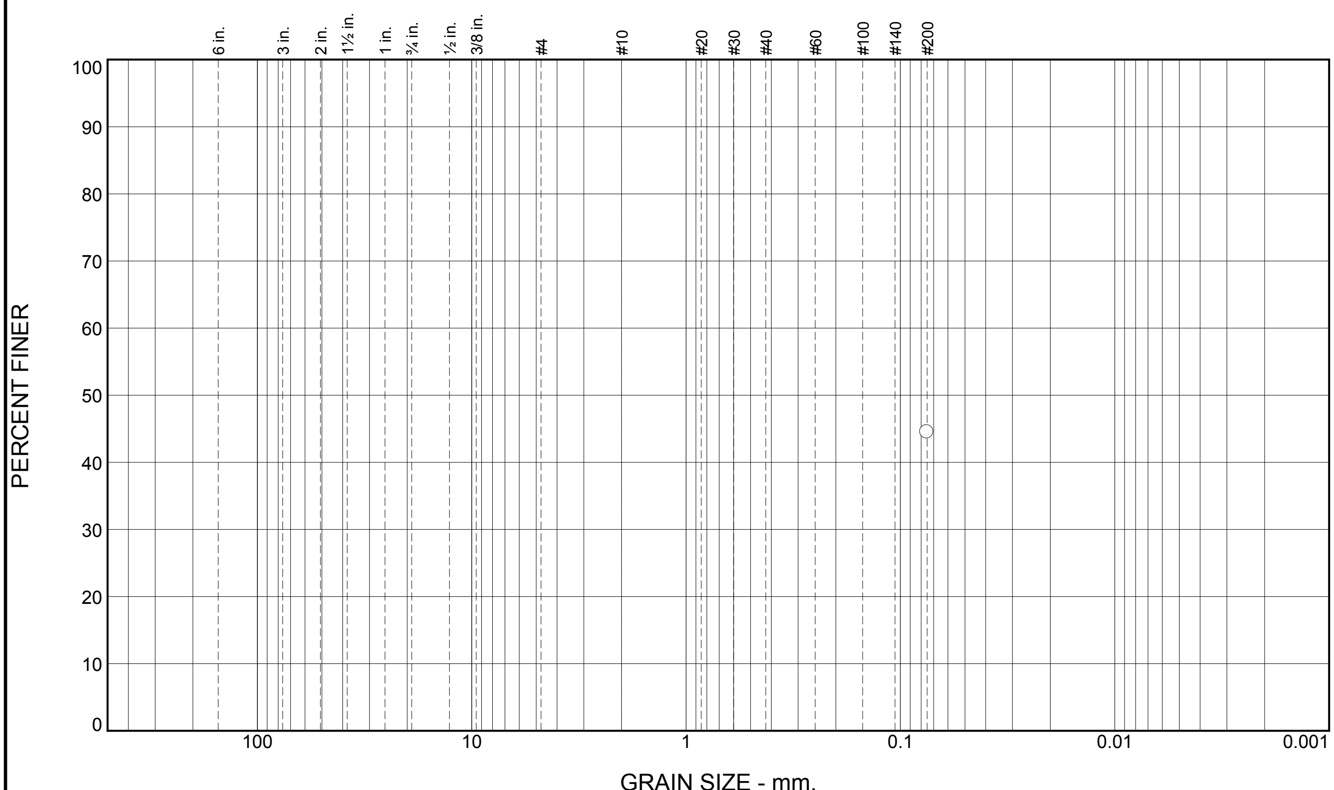
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: T. Borde **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						44.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	44.5		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 19 LL= 23 PI= 4

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140
PI: ASTM D4318, Wet Method

Sample Number: 1-B02 @ 51.5 **Depth:** 51.5 feet

Date: 2.15.17

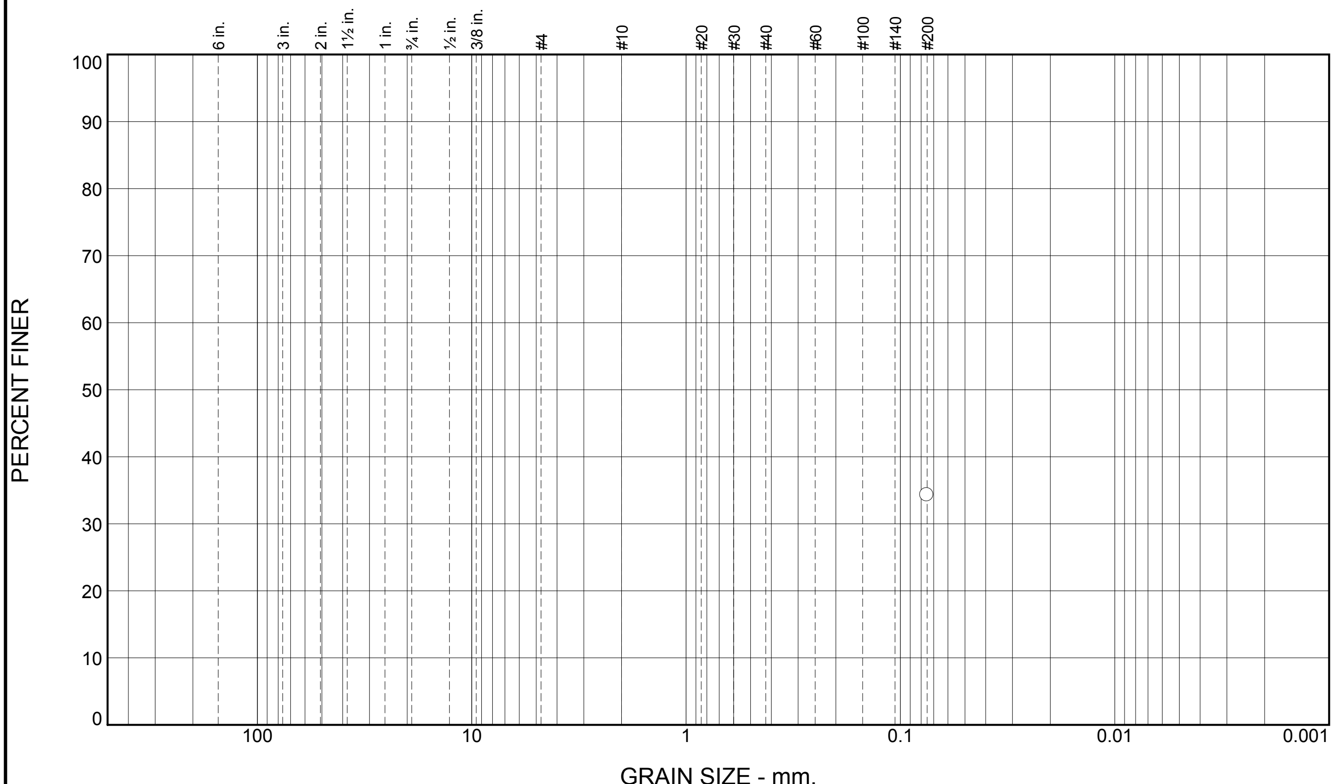
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						34.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	34.3		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B03 @ 15.5 **Depth:** 15.5 feet

Date: 2.15.17

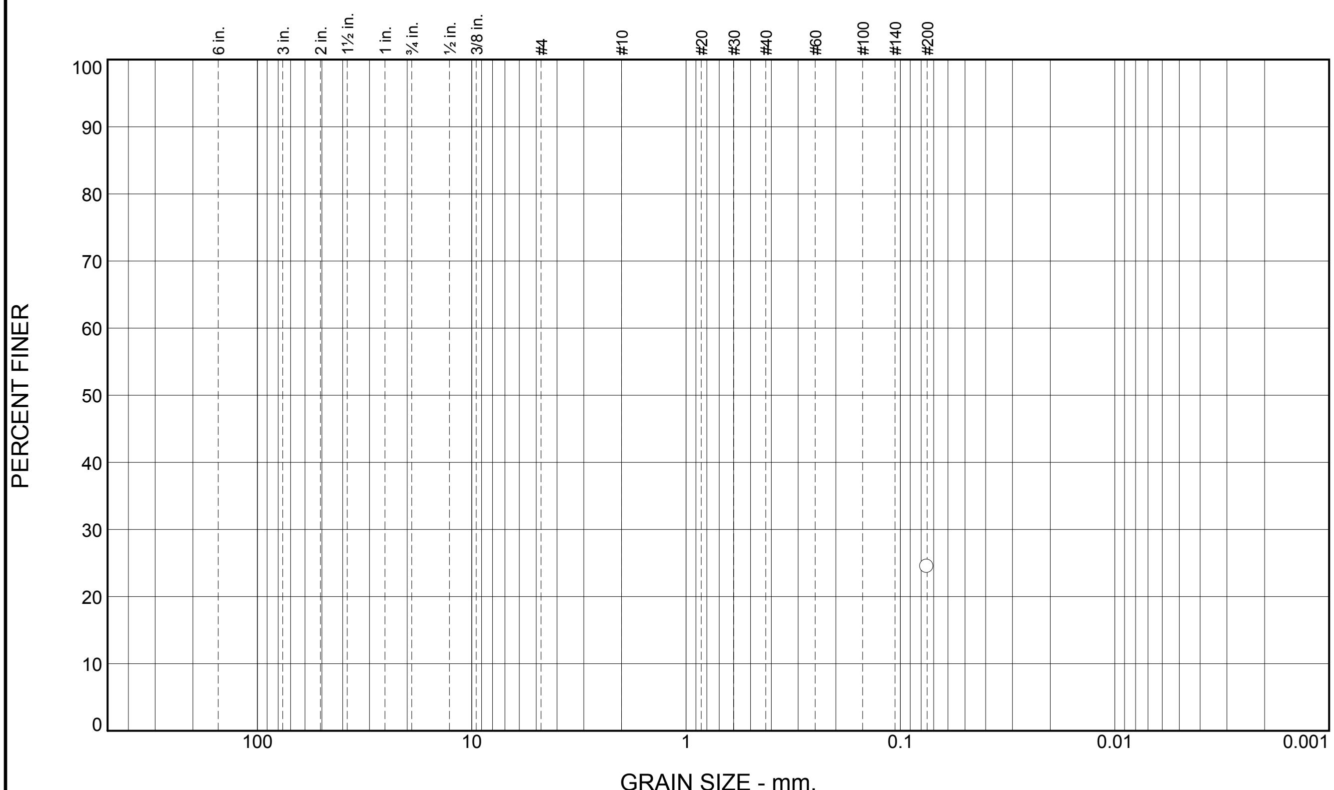
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						24.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	24.5		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B03 @ 40.5 **Depth:** 40.5 feet

Date: 2.15.17

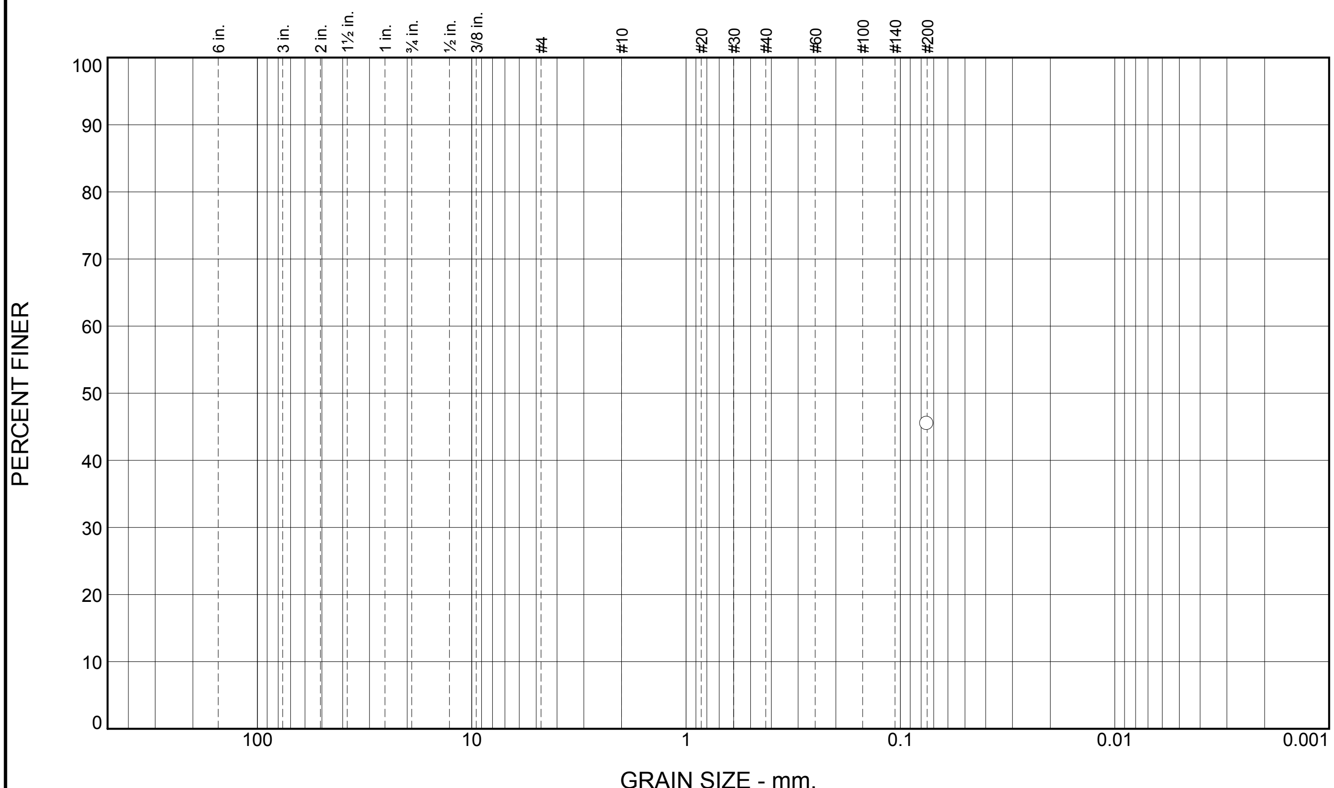
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						45.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	45.4		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B04 @ 10.5 **Depth:** 10.5 feet

Date: 2.15.17

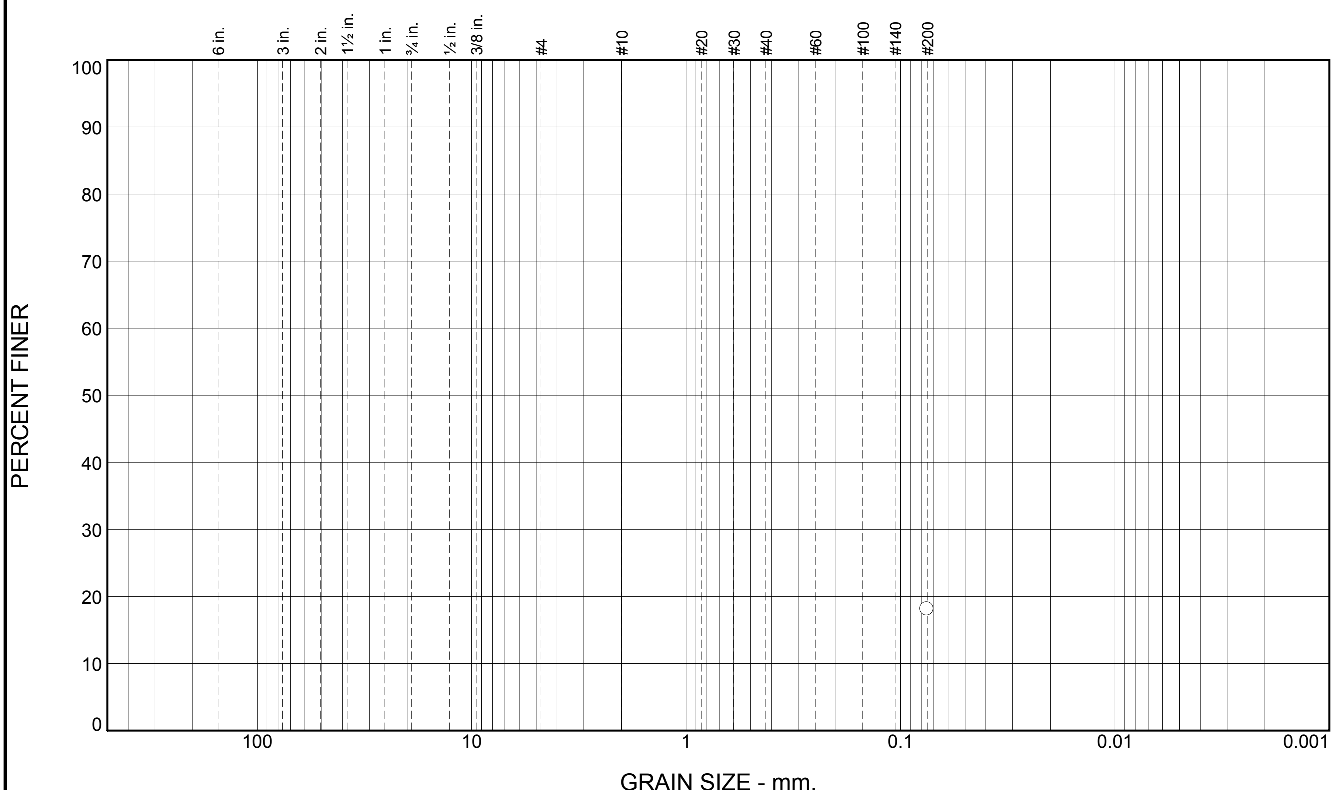
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						18.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	18.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B04 @ 30.5 **Depth:** 30.5 feet

Date: 2.15.17

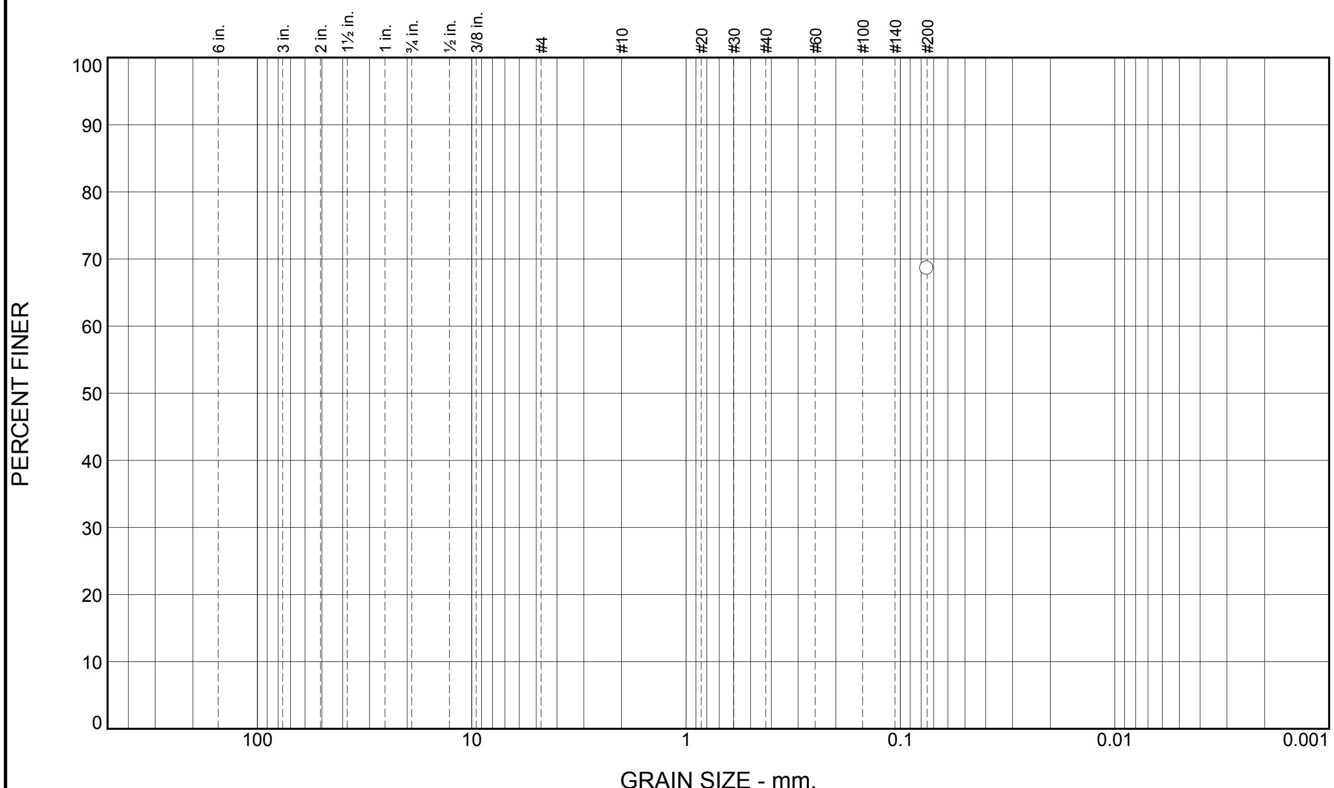
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						68.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	68.6		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 21 LL= 39 PI= 18

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140
PI: ASTM D4318, Wet Method

Sample Number: 1-B05 @ 25.5 **Depth:** 25.5 feet

Date: 2.15.17

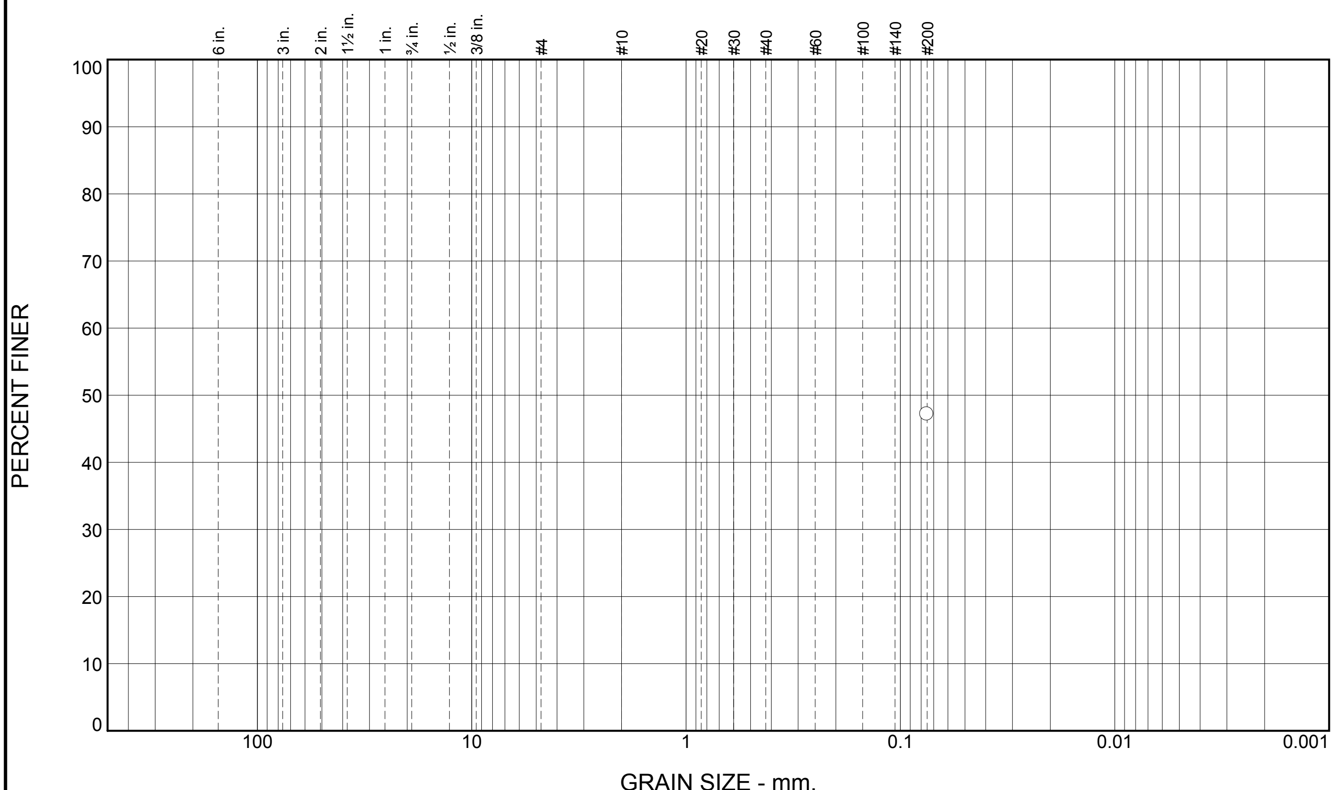
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						47.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	47.2		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 21 LL= 26 PI= 5

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140
PI: ASTM D4318, Wet Method

Sample Number: 1-B05 @ 30.5 **Depth:** 30.5 feet

Date: 2.15.17

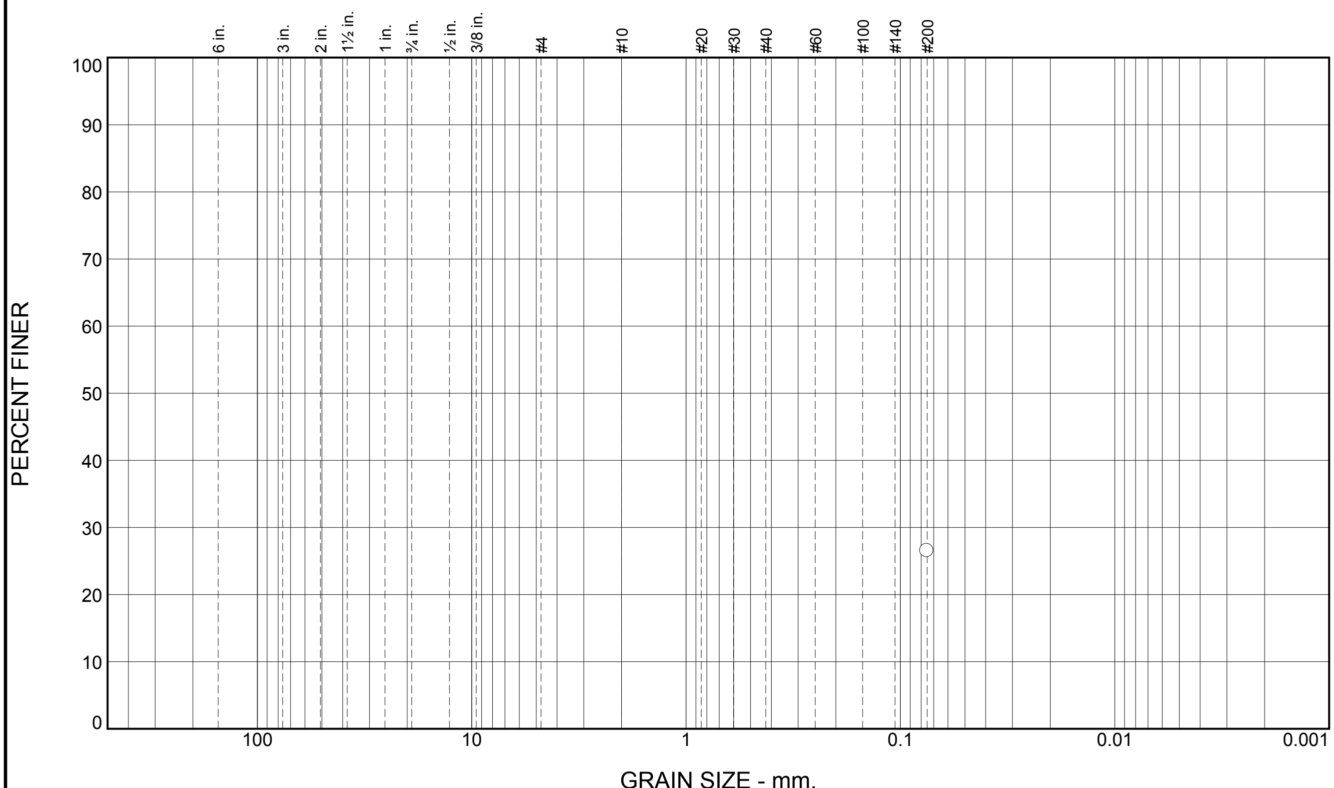
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						26.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	26.5		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B05 @ 6 **Depth:** 6.0-6.5 feet

Date: 2.15.17

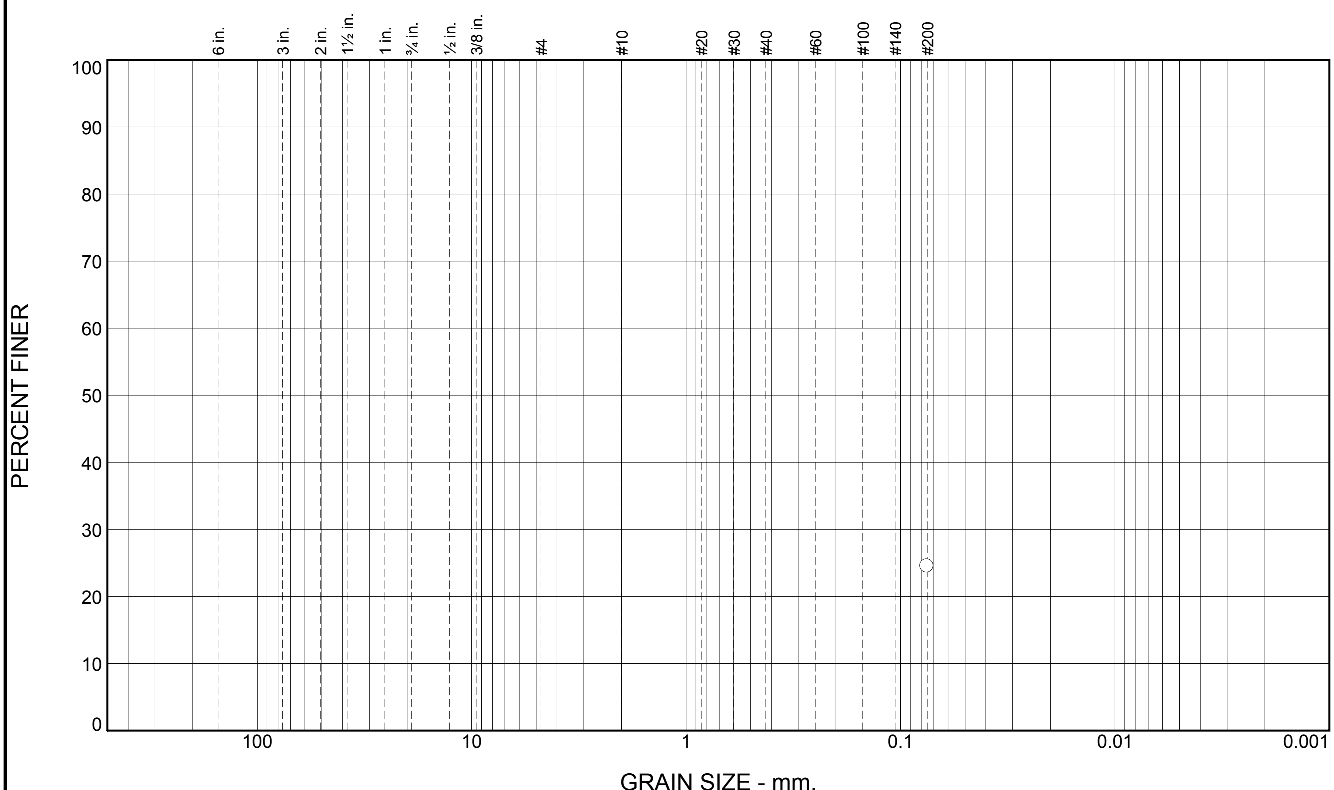
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						24.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	24.5		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B06 @ 35.5 **Depth:** 35.5-36.25 feet

Date: 2.15.17

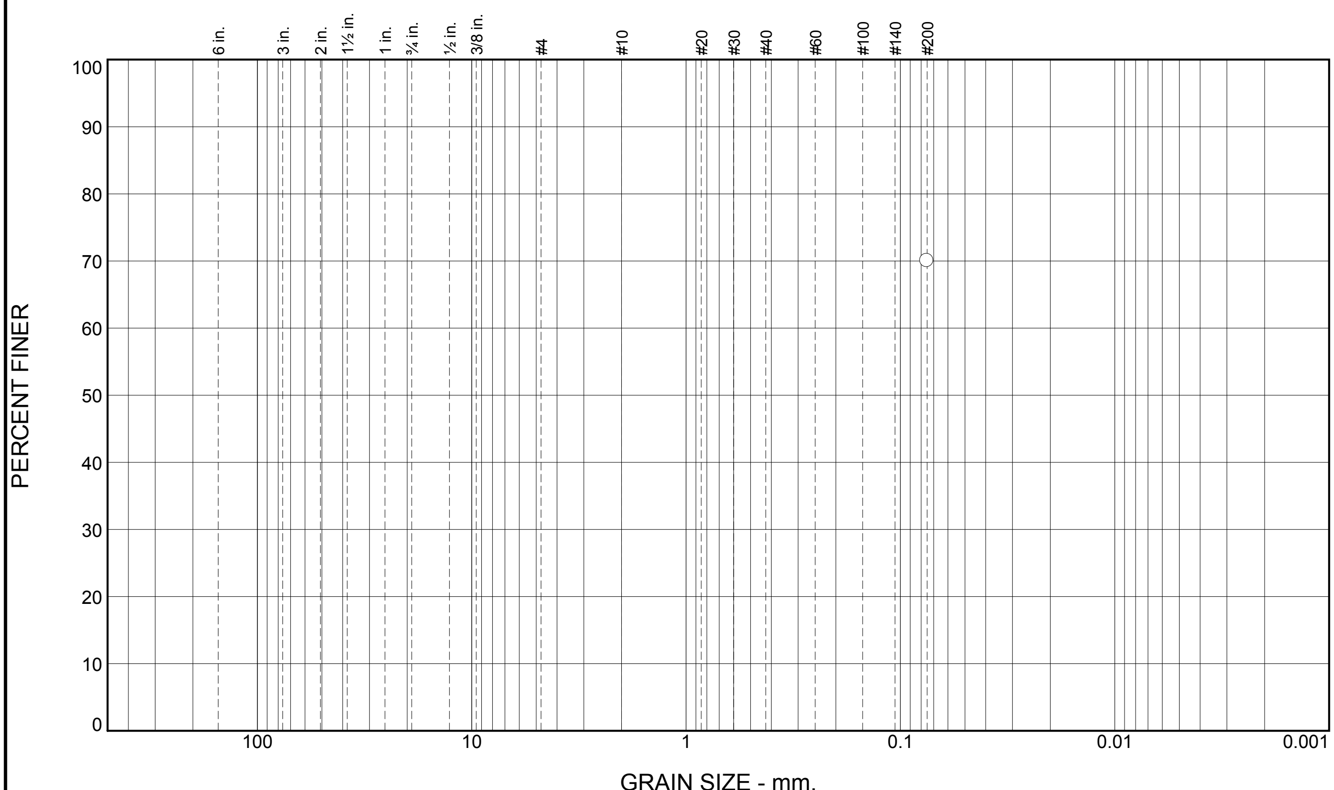
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						70.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	70.0		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B06 @ 40.5 **Depth:** 40.5-40.8 feet

Date: 2.15.17

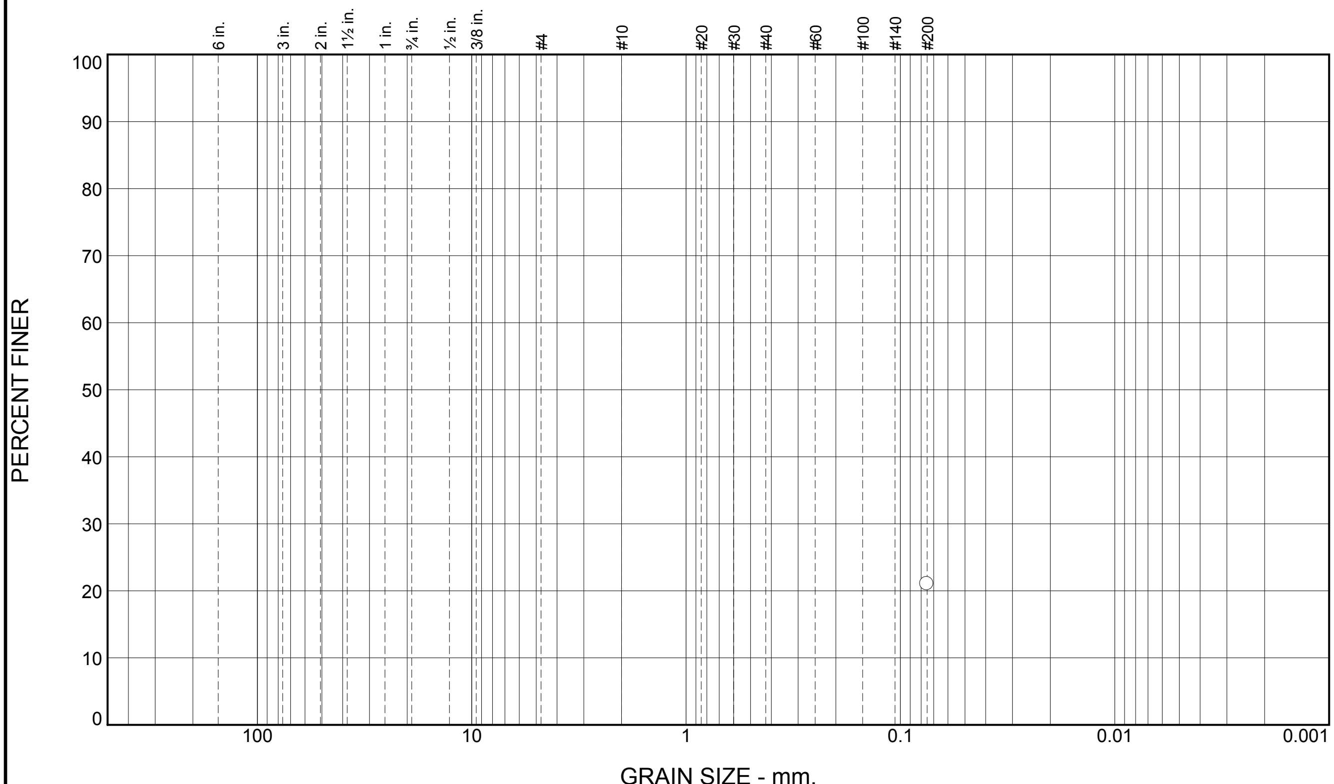
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						21.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	21.0		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: 1-B06 @ 46 **Depth:** 46.0-46.5 feet

Date: 2/16/17

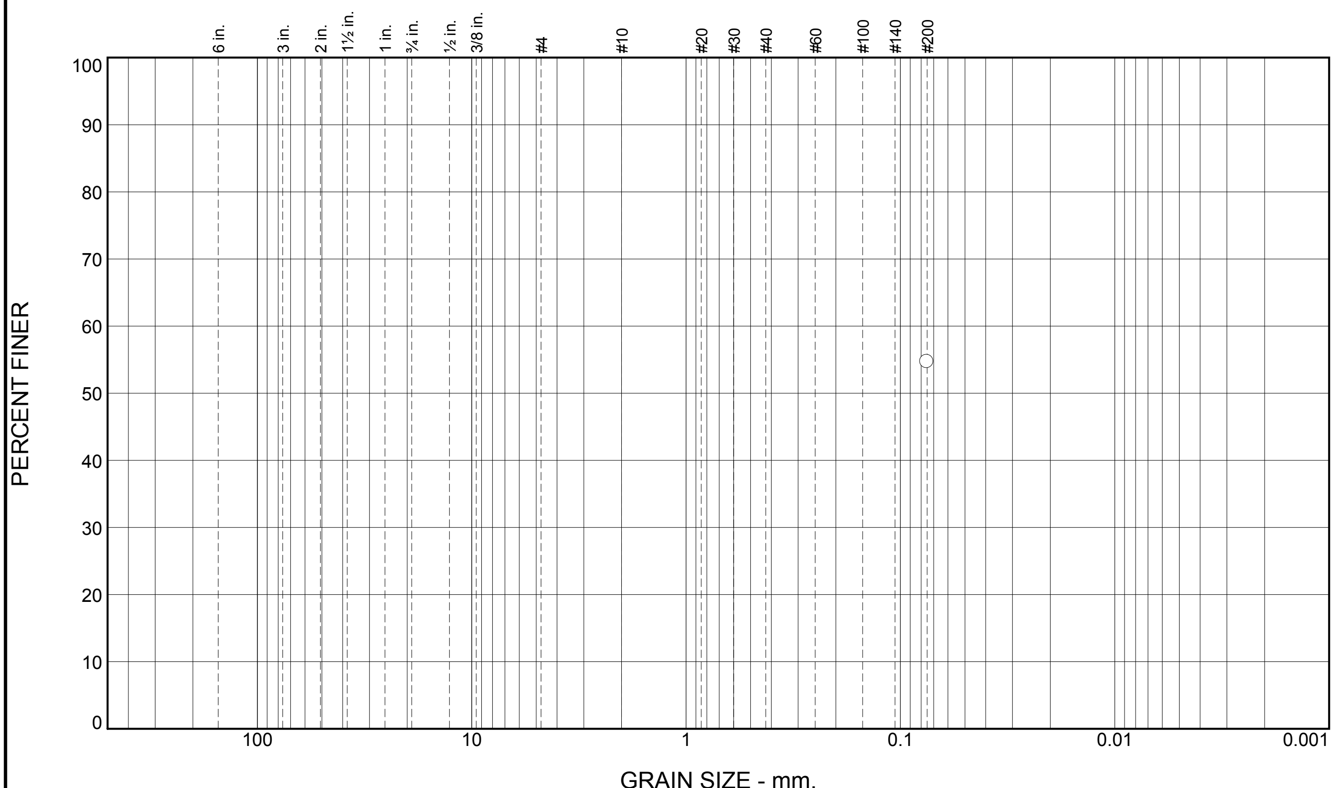
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: T. Borde **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						54.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	54.7		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: 1-B07 @ 20.5 **Depth:** 20.5-21.0 feet

Date: 2/16/17

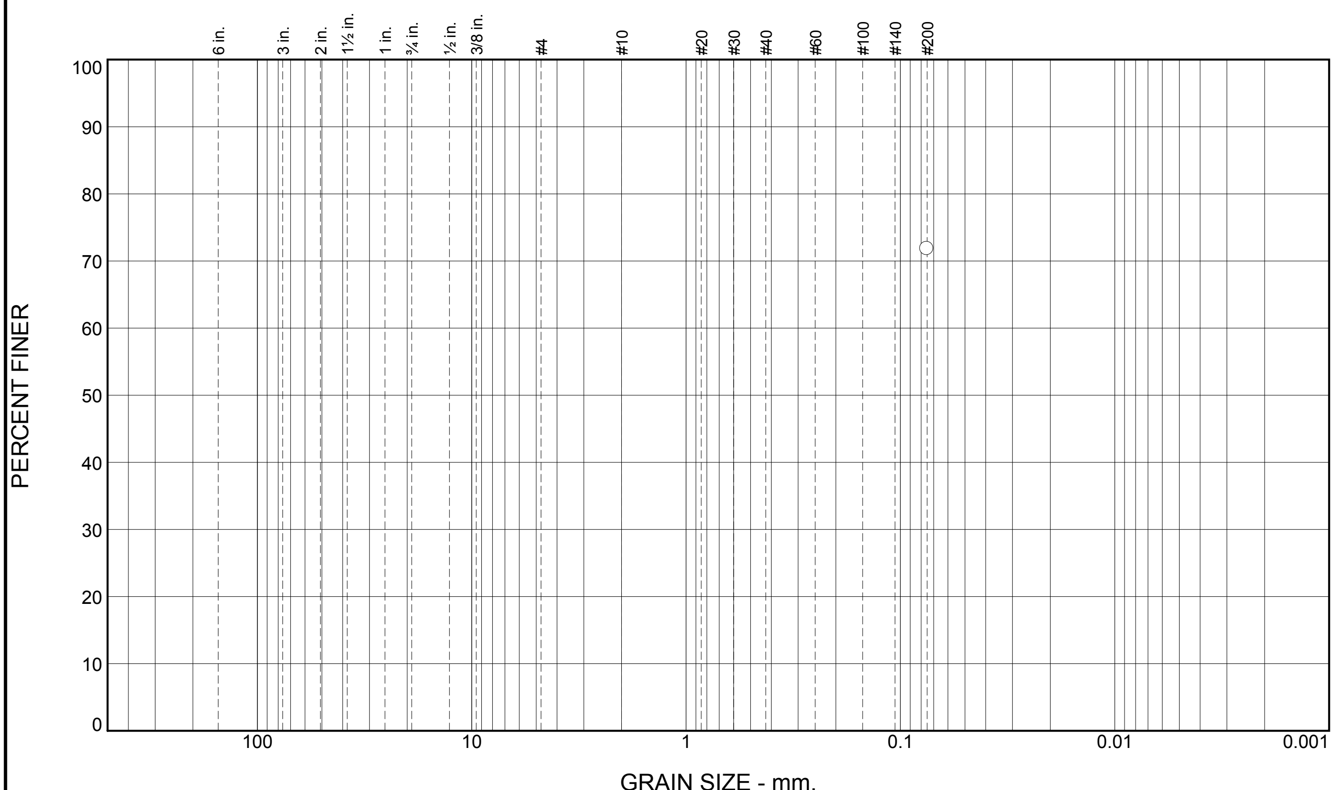
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: T. Borde **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						71.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	71.8		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: 1-B07 @ 45.5 **Depth:** 45.5-46.0 feet

Date: 2/16/17

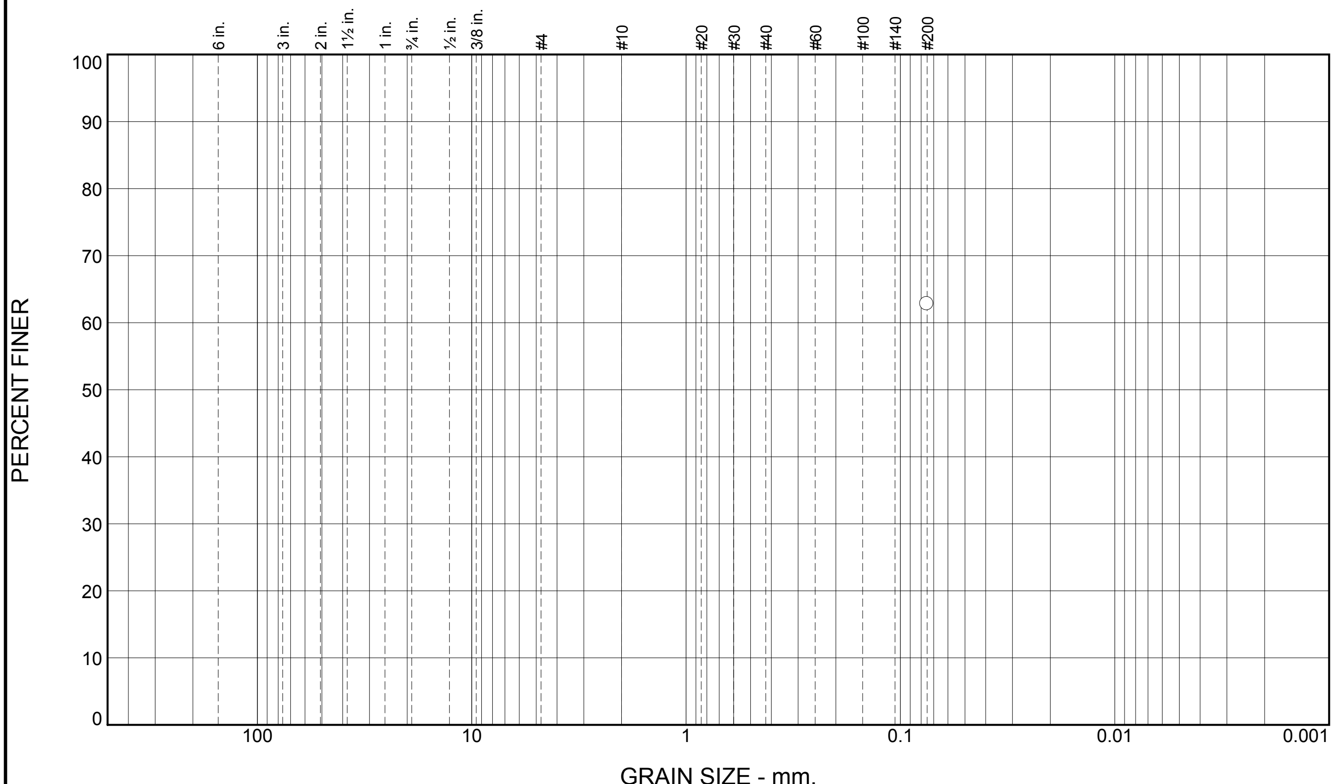
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: T. Borde **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						62.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	62.8		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 22 LL= 27 PI= 5

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 1-B08 @ 35.5 **Depth:** 35.5-36.0 feet

Date: 2/16/17

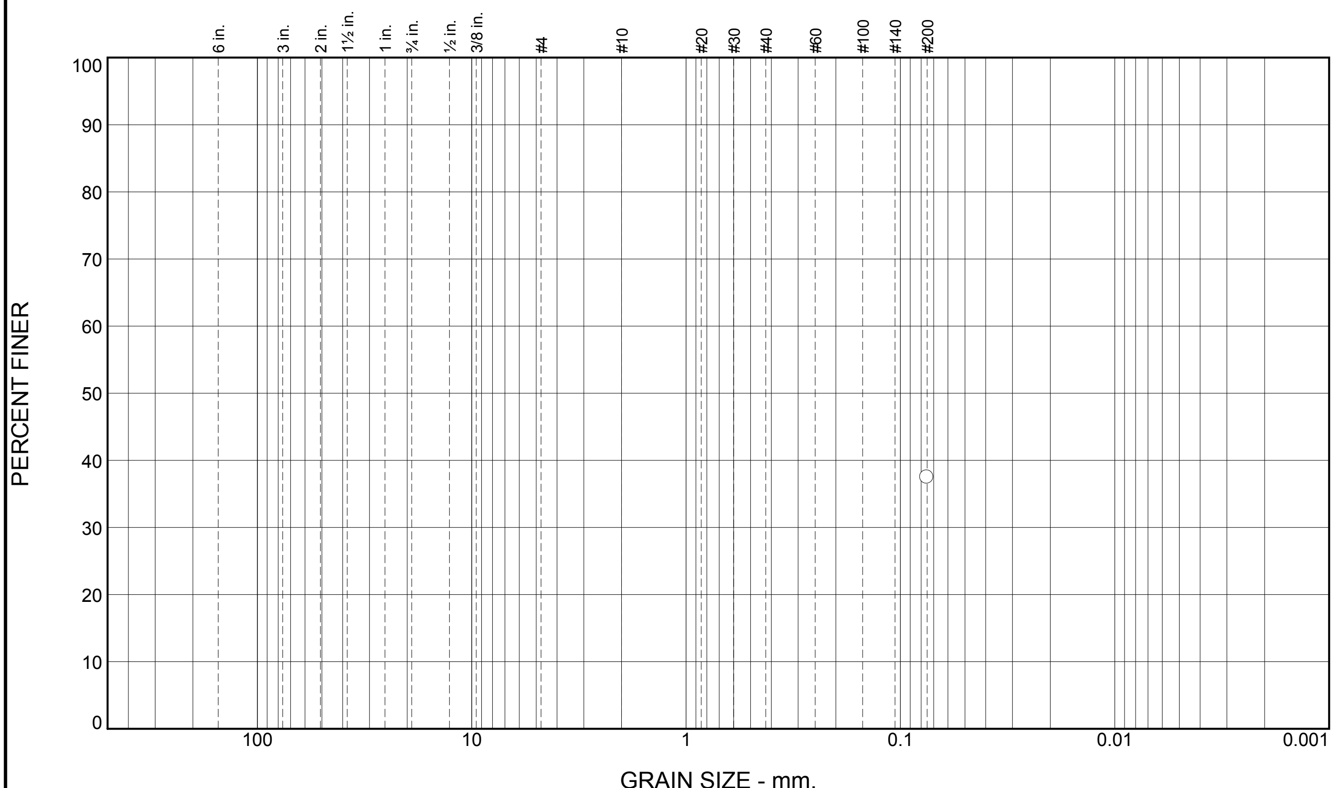
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: T. Borde **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						37.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	37.4		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B10 @ 45.5 **Depth:** 45.5 feet

Date: 2.15.17

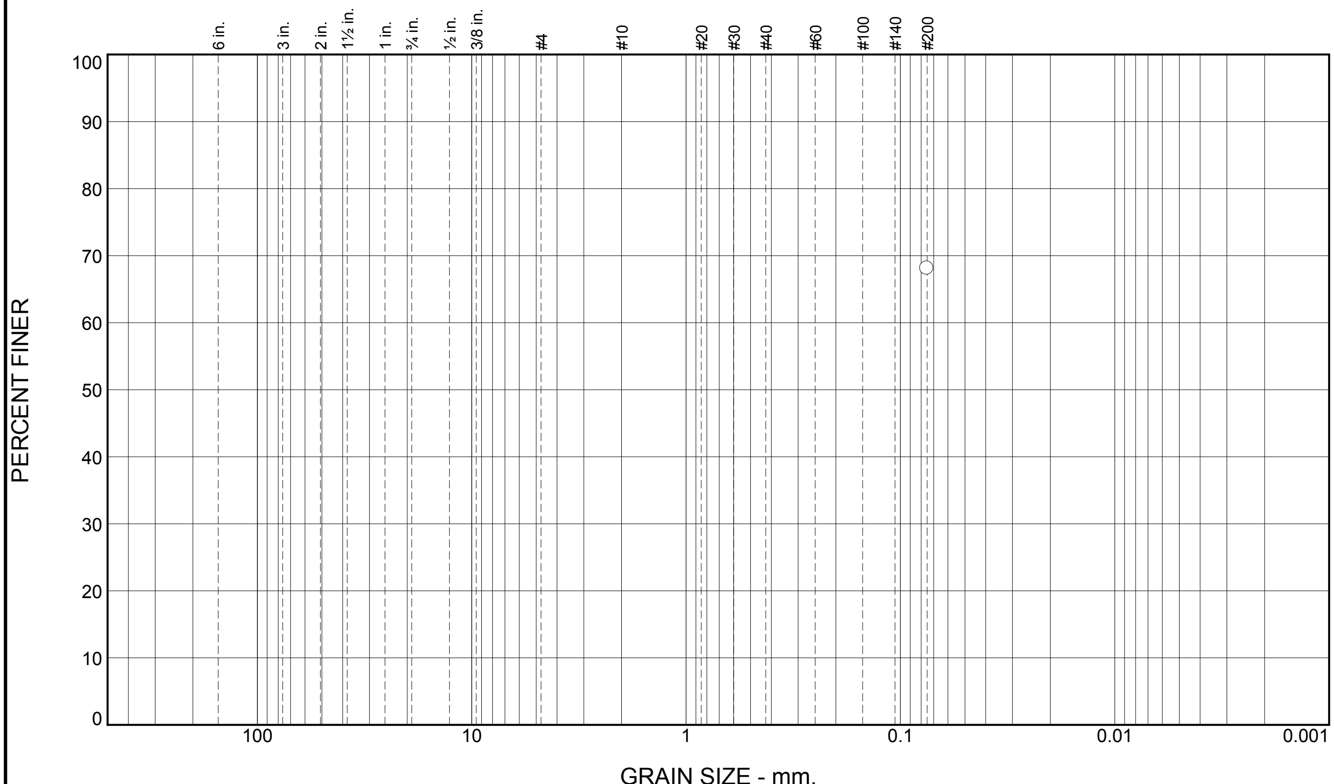
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						68.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	68.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B10 @ 50.5 **Depth:** 50.5 feet

Date: 2.15.17

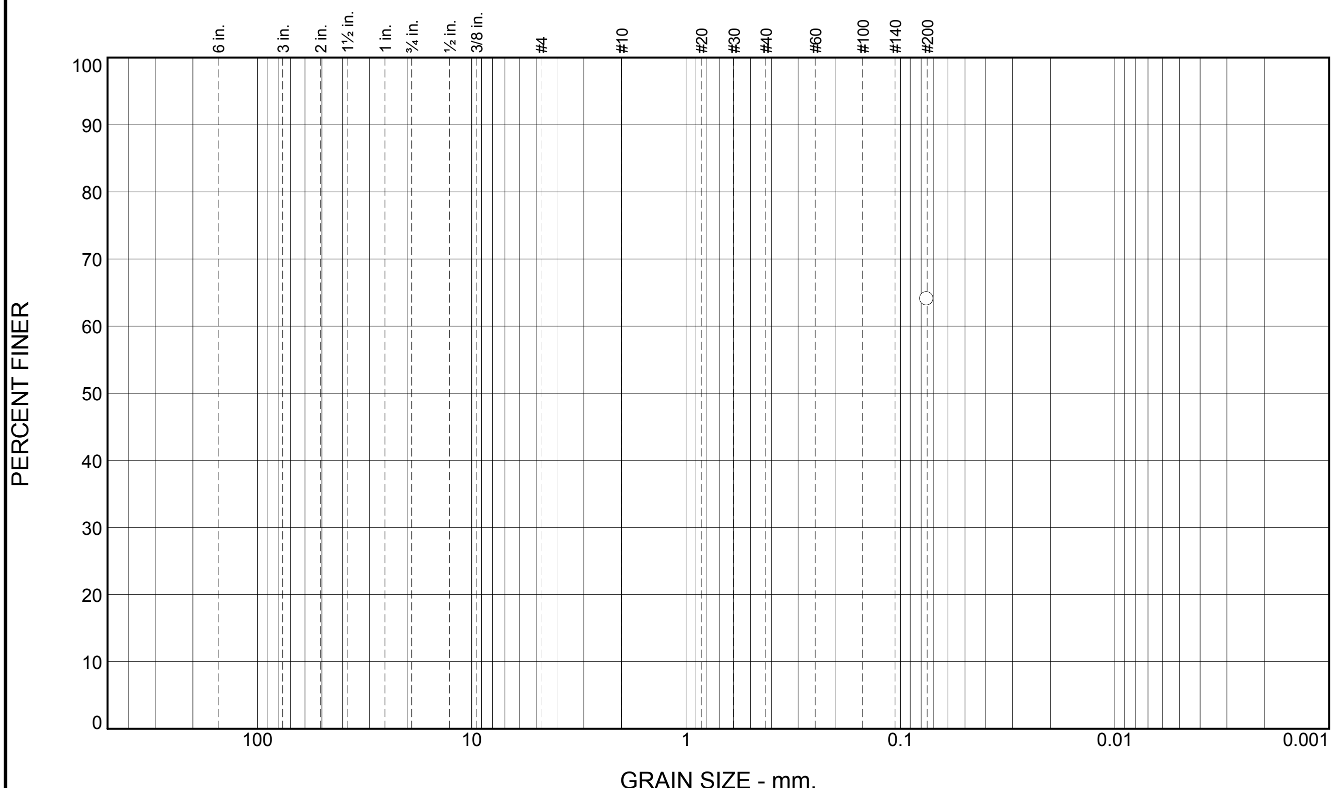
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						64.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	64.0		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Grain Size: ASTM D1140

Sample Number: 1-B11 @ 25.5 **Depth:** 25.5 feet

Date: 2.15.17

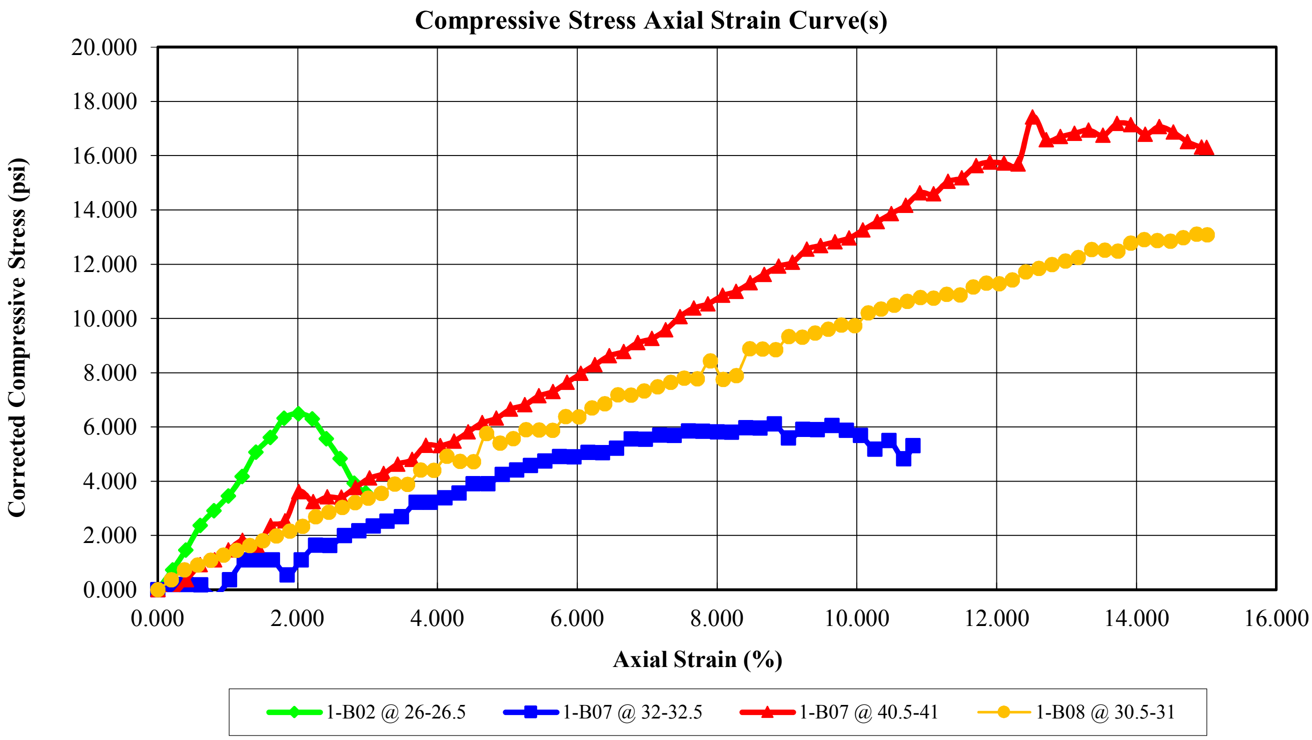
ENGEO INCORPORATED

Client: Google Incorporated
Project: Google Master Planning Services - Geotechnical Engineering

Project No: 13667.000.000

Tested By: M. Quasem **Checked By:** T. Borde

UNCONFINED COMPRESSION TEST REPORT
(ASTM D2166)



BEFORE TEST	SPECIMEN 1-B02@26-26.5	1-B07@32-32.5	1-B07@40.5-41	1-B08@30.5-31
Moisture Content (%)	14.9	25.1	20.3	25.4
Dry Density (pcf)	102.1	102.9	108.9	100.0
Saturation (%)	63.51	100.00	100.00	100.00
Void Ratio	0.62	0.61	0.52	0.65
Diameter (in)	2.389	2.375	2.386	2.394
Height (in)	5.030	4.916	4.998	5.361
Height-To-Diameter Ratio	2.105	2.070	2.095	2.239
TEST DATA				
Unconfined Compressive Strength (psf)	934.261	879.608	2508.660	1886.098
Undrained Shear Strength (psf)	467.131	439.804	1254.330	943.049
Strain Rate (in./min.)	0.05	0.05	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650	2.650	2.650
Strain at Failure (%)	2.01	8.82	12.51	14.86

Test Remarks

SPECIMEN	DESCRIPTION
1-B02@26-26.5	See exploration logs
1-B07@32-32.5	See exploration logs
1-B07@40.5-41	See exploration logs
1-B08@30.5-31	See exploration logs

PROJECT NAME: Google Master Planning Services - Geotechnical Engineering
Test Date: 02/14/17
PROJECT NO: 13667.000.000
Tested By: T. Borde
CLIENT: Google Incorporated
Reviewed By: M. Quasem
LOCATION: Mountain View, CA
PHASE NO: 001

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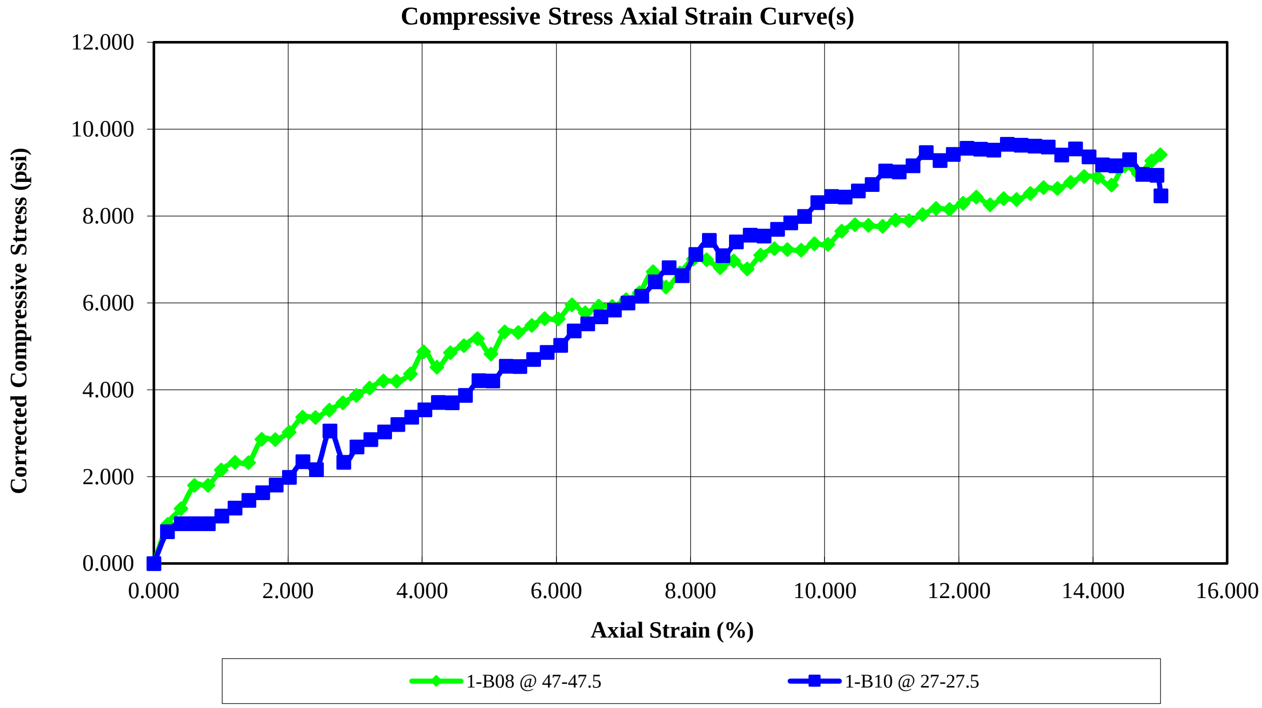
UNCONFINED COMPRESSION TEST REPORT
(ASTM D2166)



BEFORE TEST	SPECIMEN 1-B08@47-47.5	1-B10@27-27.5
Moisture Content (%)	28.6	21.4
Dry Density (pcf)	93.5	107.3
Saturation (%)	98.73	100.00
Void Ratio	0.77	0.54
Diameter (in)	2.405	2.386
Height (in)	5.017	4.992
Height-To-Diameter Ratio	2.086	2.092
TEST DATA		
Unconfined Compressive Strength (psf)	1354.946	1390.314
Undrained Shear Strength (psf)	677.473	695.157
Strain Rate (in./min.)	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650
Strain at Failure (%)	15.00	12.72

Test Remarks

SPECIMEN	DESCRIPTION
1-B08@47-47.5	See exploration logs
1-B10@27-27.5	See exploration logs

PROJECT NAME: Google Master Planning Services - Geotechnical Engineering

PROJECT NO: 13667.000.000

CLIENT: Google Incorporated

LOCATION: Mountain View, CA

PHASE NO: 001

Test Date: 02/14/17

Tested By: T. Borde

Reviewed By: M. Quasem

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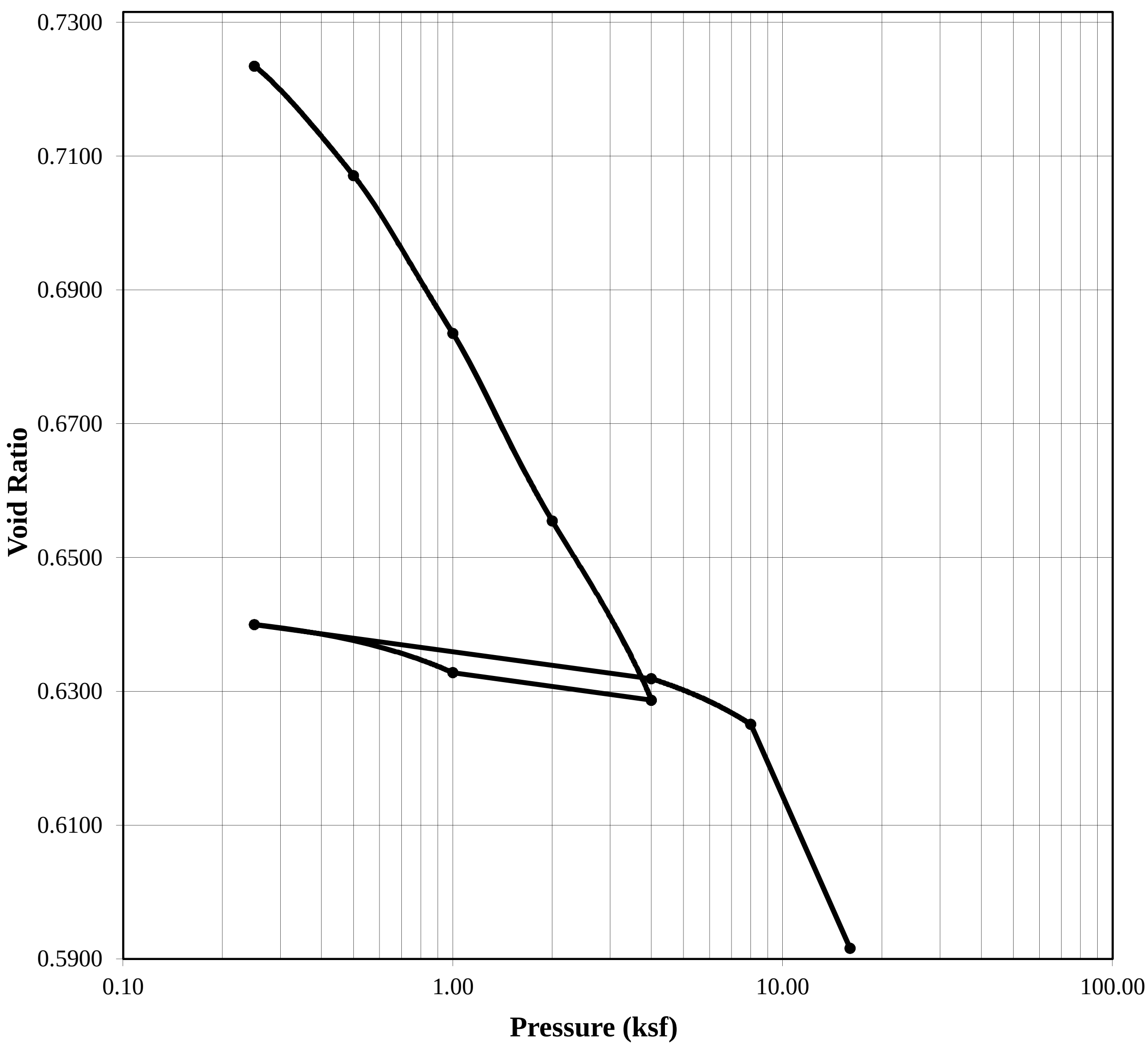
Incremental Consolidation

ASTM D2435 - Method B



	Before	After	ASTM D4318 - Wet Method		Test Date:	02/14/17
Moisture (%):	24.50	20.67	**Liquid Limit:**	**n/a**		
Dry Density (pcf):	94.81	109.10	**Plastic Limit:**	**n/a**		
Saturation (%):	83.63	100.00	ASTM D854 - Measured			
Void Ratio:	0.8004	0.5931	**Specific Gravity:**	**2.736**		
Soil Description:	See exploration logs		**Remarks:**			

Project Number: 13667.000.000 **Depth:** 35.5-36
Sample Number: 1-B07 @ 35.5-36 **Boring #:** 1-B07
Project Name: Google Master Planning Services - Geotech
Client: Google Incorporated
Location: San Bruno, CA
Tested By: I. McCauley **Checked By:** K. Lecce

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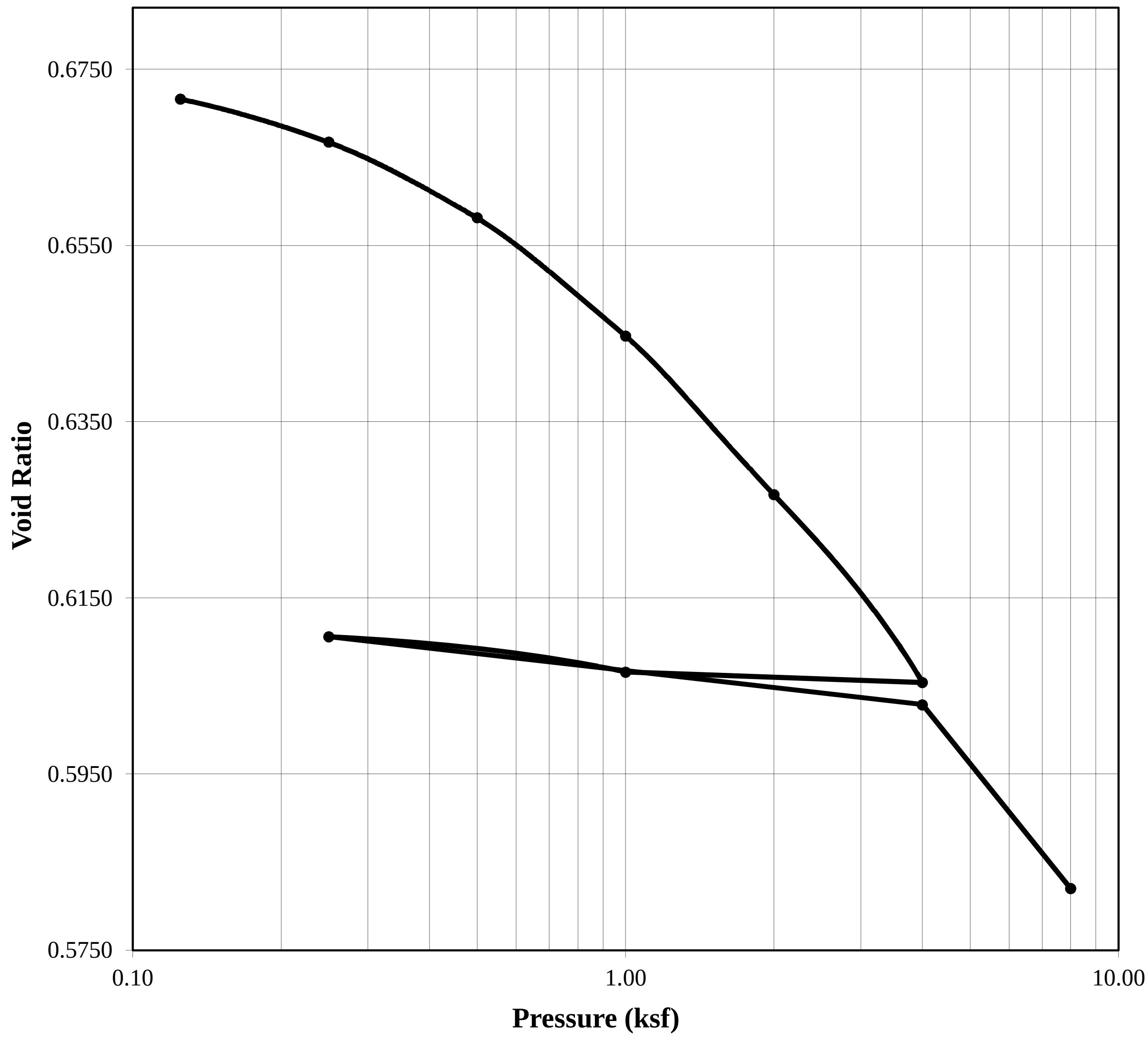
Incremental Consolidation

ASTM D2435 - Method B



	Before	After	ASTM D4318 - Wet Method		Test Date:	02/15/17
Moisture (%):	23.07	18.09	**Liquid Limit:**	**23**		
Dry Density (pcf):	99.29	112.35	**Plastic Limit:**	**18**		
Saturation (%):	90.86	100.03	ASTM D854 - Measured			
Void Ratio:	0.6769	0.5735	**Specific Gravity:**	**2.668**		
Soil Description:	See exploration logs		**Remarks:**			

Project Number: 13667.000.000 **Depth:** 27.5-28
Sample Number: 1-B10 @ 27.5 **Boring #:** 1-B10
Project Name: Google Master Planning - Geotec
Client: Google Incorporated
Location: San Bruno, CA
Tested By: I. McCauley **Checked By:** K. Lecce

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California State Certified Laboratory No. 2153

CERCO analytical
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925 462 2771 Fax. 925 462 2775
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Client: ENGEO Incorporated
Client's Project No.: 13667.000.000
Client's Project Name: You Tube Campus
Date Sampled: 17-Feb-17
Date Received: 17-Feb-17
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 23-Feb-2017

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1702137-001	1-BO5 @ 15.5'	470	7.37	-	5,200	-	N.D.	28
1702137-002	1-BO7 @ 30.5'	460	8.46	-	1,900	-	N.D.	22
1702137-003	1-BO2 @ 2.5'	420	5.41	-	1,000	-	52	85

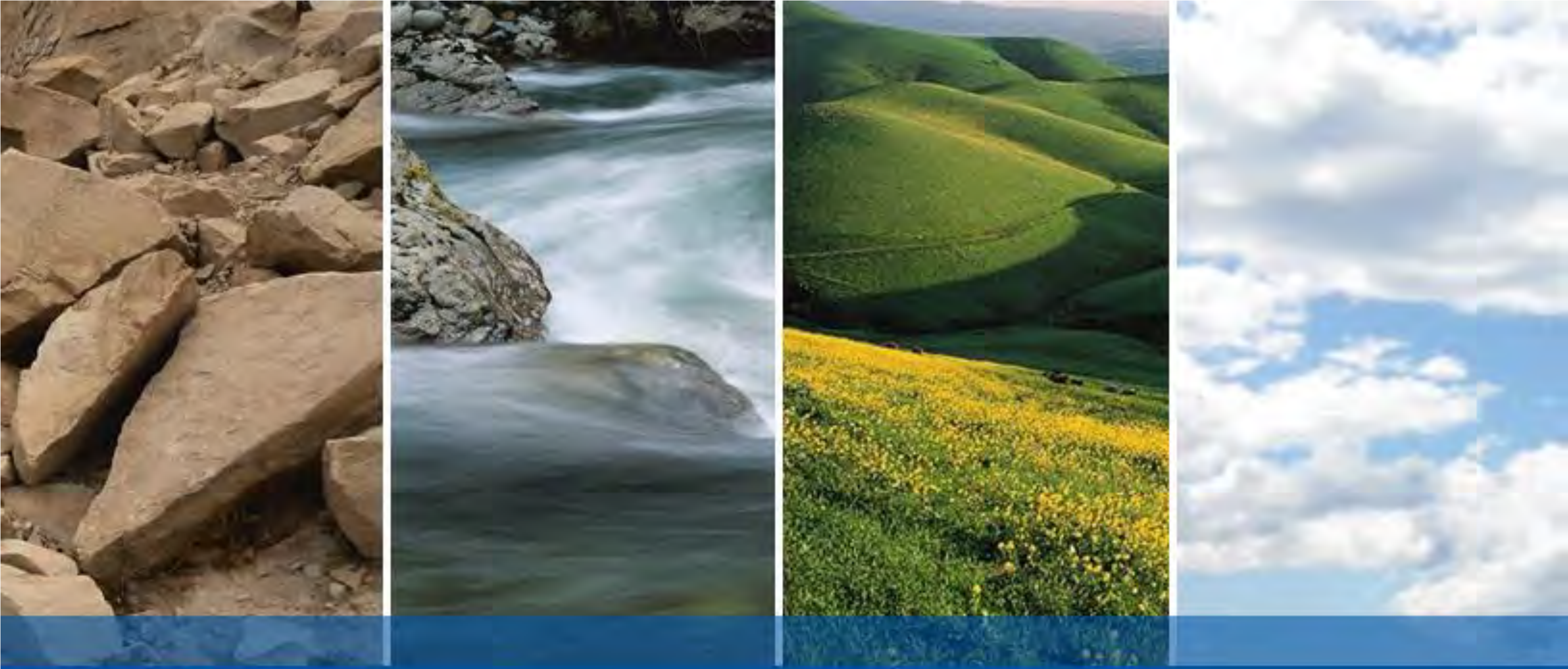
Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	22-Feb-2017	22-Feb-2017	-	21-Feb-2017	-	22-Feb-2017	22-Feb-2017

* Results Reported on "As Received" Basis

N.D. - None Detected

Cheryl McMillen
Laboratory Director

Quality Control Summary - All laboratory quality control parameters were found to be within established limits



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