Appendix G

GEOLOGICAL INVESTIGATION

DESIGN LEVEL GEOTECHNICAL INVESTIGATION
CARGILL HILL PARCEL
HICKORY STREET
NEWARK, CALIFORNIA

FOR
DUMBARTON AREA 2, LLC
October 14, 2013

Job No. 3268.001

BERLOGAR STEVENS & ASSOCIATES

Via E-Mail and Mail

October 14, 2013
Job No. 3268.001

BERLOGAR STEVENS & ASSOCIATES

Mr. C. Evan Knapp
Dumbarton Area 2, LLC
3 San Joaquin Plaza, Suite 100
Newport Beach, California 92660

Subject: Design Level Geotechnical Investigation
Cargill Hill Parcel
Hickory Street
Newark, California

Dear Mr. Knapp:

INTRODUCTION

This report presents the results of our design level geotechnical investigation for a proposed residential development for the Cargill Hill Parcel in Newark, California. The site is located on the west side of Hickory Street, just southwest of the intersection of Hickory Street and Enterprise Drive as shown on Plate 1, Vicinity Map. It is our understanding that the approximately 58-acre site will be developed with one- to four-story wood frame, single-family and multi-unit residential dwellings. The planned development is shown on Plate 2, Proposed Development, and consists of 656 units as follows:

- Villages 6A and 6B -- 3 story townhomes with a penthouse.
- Villages 7, 8 and 9 – 3 story townhomes.
- Villages 10 and 11 – 1 and 2 story single family detached residences.
- Village 12 – 4 story apartments.

Approximately 20 acres of the southwestern corner of the site is currently planned to be left undisturbed as wetlands. Several community parks and trails will be included in the development. Grading will consist of cutting two knobs on the site (referred as the North Hill and South Hill) and filling several feet the portions of the site to be developed.

We have performed several geotechnical investigations for this parcel and the adjacent Torian property as listed below. The data from these previous investigations have been reviewed and incorporated into this report:

- Deep Dynamic Compaction (DDC) Test Program Results and Recommendations, Torian Property, Tract 8085, Willow Street and Perrin Avenue, dated November 27, 2012.
- Naturally Occurring Asbestos Investigation, Hill Parcel of the Cargill Salt Property, BSA Project No. 2914.101, dated October 12, 2007. Seven test pits were excavated at the North hill and 10 surface samples were obtained from the South hill.

- Preliminary Geotechnical Investigation, Hill Parcel, BSA project No. 2914.100, dated December 12, 2006. Three borings were drilled up to about 30 feet deep and a single 50-foot deep boring.
- Quantity Investigation of Magnesia Material, FMC Site, (BSA Project No. 1629.403, dated July 30, 1998. Sixteen shallow borings were drilled to native material on the North hill.
- Due-Diligence Level Geotechnical Investigation, Cargill Hill Parcel, Project No. 3268.100, dated August 27, 2010.

PURPOSE AND SCOPE OF SERVICES

The purpose of this investigation was to evaluate the proposed development with respect to site soil, bedrock, and groundwater conditions, and to provide geotechnical recommendations for the design and construction of the proposed residential development. The scope of our services included a review of available geotechnical and geologic reference materials, previous geotechnical reports, field exploration, laboratory testing, engineering analyses based on field and laboratory data, and preparation of this report. Our services were performed in general conformance with our proposals dated September 23, 2011 and September 24, 2013.

FIELD EXPLORATION AND LABORATORY TESTING

Our field exploration was performed between December 13, 2011 and December 27, 2011, and consisted of drilling 4 borings (B-1 through B-4) and performing 14 cone penetration tests (C-1 through C-14) at the approximate locations shown on Plate 3, Site Plan.

Borings B-1 through B-4 were drilled by Exploration Geoservices, Inc. to depths ranging from about 30 to 33 feet below the existing ground surface using a truck-mounted, hollow-stem auger drilling rig. Materials encountered in each boring were visually classified in the field and a log was recorded. The boring logs showing soil classification and blow counts and a Key to Boring Log Symbols are presented in Appendix A.

Cone penetration tests (CPTs) C-1 through C-14 were performed by Gregg Drilling & Testing, Inc., to depths up to 50 feet using a 30-ton truck-mounted CPT rig. At C-10, refusal was encountered at a depth of approximately 10 feet. For confirmation, C-10A was performed about 15 feet away from C-10, where refusal was encountered at a depth of approximately 22½ feet. At C-11, refusal was encountered at a depth of approximately 7½ feet. For confirmation, C-11A was performed about 25 feet away from C-11, and refusal was also encountered at a depth of approximately 9 feet. Measurement of tip resistance, sleeve friction, and pore pressures at 5 centimeter intervals were recorded to a data file as the cone was advanced. The CPT logs are presented in Appendix B. Upon completion of the borings and CPTs, the holes were backfilled with neat cement grout as required by the Alameda County Water District.

Data from the previous investigations by Berlogar Geotechnical Consultants (BGC) was reviewed. The approximate locations of the previous borings (B06-1 through B06-4 and B98-1 through B98-16), CPTs (C10-1 through C10-5), and test pits (T07-1 to T07-7) by BGC are

shown on the Site Plan, Plate 2. The previous borings, CPTs, and test pit logs are also presented in Appendices A through C, respectively.

Laboratory testing was performed on selected samples from our borings, including moisture content, dry density, Atterberg limits, sieve analysis, percent passing number 200 sieve, hydrometer analysis, unconfined compressive strength, and consolidation tests. Most of the laboratory test data are presented on the boring logs. Detailed laboratory test results are presented in Appendix D.

A soil sample (from Boring B-3 at 1½ to 2 feet) was delivered to CERCO Analytical, Inc. in Concord, California for corrosivity testing. The results for corrosivity tests are included in Appendix D. The corrosivity test results should be forwarded to the structural and utility engineers.

SITE CONDITIONS

SURFACE CONDITIONS

The project site is irregularly-shaped and is bordered on the east by Hickory Street, on the south by open space, on the west by a levee for salt ponds, and on the north by industrial development and undeveloped land. Overhead electric transmission lines run north-south through the central portion of the site. A drainage ditch runs north to south through the site, which bisects the site on the north end and runs along the western property line on the south end. The ditch was dry at the time of our field exploration. Site elevations range between 4 to 9 feet (NGVD29), except for the two elongate hills.

Two elongate rock outcrops, which we refer to as the North Hill and South Hill, are aligned in a northwest-southeast direction at the site. The North Hill is approximately 1,000 feet long, approximately 400 feet wide, and has a top elevation of approximately 35 feet. Previous investigations indicate that the North Hill is composed of sandstone and claystone and is mantled with undocumented fill. The North Hill was partially covered with magnesia from salt production operations, which has been reportedly removed from the site. The South Hill is composed of serpentinite and is about 700 feet long in the northwest-southeast direction, approximately 200 feet wide, with two knobs that are about 30 feet (NGVD29).

Several areas of stockpiled fill are present at the site, and the approximate locations and thickness are shown on the Plate 3, Site Plan. These fill areas are located in the northern half of the site. A lower lying area in the northwest corner of the site, west of the North Hill, was used as a storage pond. Whitish-gray material lines the bottom of this pond, which is reported to be gypsum.

A pair of plastic pipelines was observed along the southwest boundary of the parcel. Currently, the western part of the North hill is occupied by construction equipment and materials. An abandoned shooting range with a small building and a dog training facility are located on the northeast and south sides of South Hill, respectively. Other areas are mostly covered by seasonal weeds and grasses.

It is our understanding that East Bay Dischargers Authority (EBDA)'s twin 33-inch sewer force mains are located in Hickory Street, which is adjacent to the eastern property boundary. The force mains turn westerly and through the northeast corner of the site. Based on the 1977 record drawings provided by EBDA, these force mains have about 5 to 10 feet of soil cover along Hickory Street. It is our understanding that the existing twin 33-inch diameter sanitary sewer force mains will either remain and be protected during construction or relocated.

SUBSURFACE CONDITIONS

Our previous test pits and borings indicate that the North Hill is composed of sandstone and claystone, and is generally capped with fill materials ranging from 1½ to 12 feet thick. This fill material is a mixture of clayey and silty gravel, silty clay, sandy clay, and clayey sand. Sandstone, claystone or very stiff soil (presumed to be soil over the bedrock) was encountered in the borings and test pits at elevations of approximately -2 to 7 feet (NGVD29) on the lower flanks and up to 27 feet in the central portion of the North Hill. The east side of the North Hill is covered with about 10 feet of stockpile soil, which in turn is underlain by alluvial soils. The South Hill is composed of serpentinite with silty sands and silty clays around the hill. Our previous investigation concluded that the serpentinite and soils adjacent to the outcrop contains naturally occurring asbestos (NOA).

B-1 and B-4 in the northwest portion of the site suggest that the alluvial soils are primarily clayey with interbedded sandy layers extending from about Elevation -13 to -26 feet, where bedrock or very stiff material is encountered. The northeastern portion of the site contained more silty material in the upper 30 feet, and sandier soil below 30 feet in depth. Based on the CPT and boring data from this study and from previous investigations, the alluvium underlying the remainder of the site was found to be predominately gray and brown, medium stiff to very stiff, clayey soil. A layer (2½ to 6 feet) of loose silty sand was encountered between 8 to 16½ feet deep in Borings B-1, B-3, and B-4. Bedrock or very stiff soil was encountered at approximately Elevation -5 to -15 feet in the southern part and 7 to below Elevation -44 feet in the northern portion of the parcel. The upper existing native soils at the site are marginally to highly expansive.

Plate 3, Site Plan, shows the elevation of the top of top of bedrock or stiff soil encountered in the borings, CPT's, and test pits. Estimated existing fill thicknesses are also shown on the Site Plan. For more detailed descriptions of the subsurface conditions, refer to the boring logs, CPT graphs, and test pit logs contained in Appendices A through C.

GROUNDWATER

Groundwater was encountered at depths ranging from 5 to 9 feet below existing ground surface in the borings. The groundwater map from the California Geological Survey's Seismic Hazard Zone Report 090 for Newark 7.5-Minute Quadrangle (CGS, 2003) indicates historically-high groundwater to be about 5 feet deep. It should be anticipated that the actual groundwater conditions may vary depending on factors such as tidal fluctuations, seasonal rainfall, time of the year, water level in the adjacent Cargill Salt ponds and local irrigation practices.

GEOLOGIC HAZARDS

SURFACE FAULT RUPTURE

The site is located outside the designated State of California Earthquake Fault Zone for active faults. According to published mapping by the California Geological Survey (CGS), no known fault traces cross the site, and no visible evidence of surface ground rupture was noted during our site reconnaissance. It is our opinion that the likelihood of surface fault rupture at the site is very low.

GROUND SHAKING

The site is located in a region of high seismicity. As for all sites in the San Francisco Bay Area, the site should be expected to experience at least one moderate to large earthquake during the lifespan of the development. According to the USGS 2008 Interactive Deaggregation website, the site peak ground acceleration for a CBC Site Class D (V_{s30} = 270 m/s) with a 10 percent probability of exceedance in 50 years (475-year return period) is 0.51g.

LIQUEFACTION

Liquefaction is the temporary transformation of saturated, loose to medium dense sandy soils into a viscous liquid during strong ground shaking from a major earthquake. The site is located within a State-designated Liquefaction Hazard Zone (CGS, Newark Quadrangle, 2003) and a liquefaction analysis is required to assess the liquefaction impacts to the site.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

We conclude that, from a geotechnical engineering standpoint, the proposed residential development can generally be constructed, provided the conclusions and recommendations contained in this report are incorporated into the design and construction of the project. The main geotechnical considerations for this site are:

- Liquefaction induced settlement
- Undocumented fill
- Presence of Naturally Occurring Asbestos
- Shallow bedrock
- Shallow groundwater
- Corrosive soils

LIQUEFACTION INDUCED SETTLEMENT

We have performed a liquefaction analysis using the CPT-based evaluation procedures as described in Idriss and Boulanger (2008): "Soil Liquefaction During Earthquakes, Monograph MNO-12, Earthquake Engineering Research Institute." The following input parameters were incorporated in our liquefaction analysis:

- Earthquake Magnitude (M_w = 6.65): This earthquake magnitude represents the most probable earthquake magnitude obtained from the USGS 2008 Interactive Deaggregation website with a 10 percent probability of exceedance in 50 years.
- Peak Ground Acceleration (PGA = 0.51g): This PGA value represents the peak ground acceleration obtained from the USGS 2008 Interactive Deaggregation website for CBC Site Class D (V_{s30} = 270 m/s) with a 10 percent probability of exceedance in 50 years.
- Groundwater Table: The groundwater table used in the liquefaction analysis was based on the historically-high groundwater indicated by CGS at a depth of approximately 5 feet as mentioned earlier.
- An Ic of 2.2 was utilized as the limit for sandy soil behavior based on the results of our DDC Test Program Results and Recommendations report dated November 27, 2012

We performed liquefaction analyses for the proposed development areas, and did not include the proposed wetland area at the south end of the site in our analyses. Total liquefaction induced settlement for the southern portion of the site around the South Hill was found to be zero to ½ inches. Hence, the southern portion of the site is considered to be minimally impacted by liquefaction.

The northern portion of the site east and west of North Hill was found to have total liquefaction induced settlement up to 6 inches. However, the total settlement of the soils in the upper 25 feet was found to be only up to 1 inch, and the total below 25 was up to 6 inches. The highest settlement was found in CPT C8. The remaining CPTs C6, C9, C10, C10-1, C10-2, C10-3 and C10-4 had up to 1 inch of settlement in the upper 25 feet and up to 1 inch of settlement below 25 feet in depth. Hence, we have delineated two areas on Plate 4, Liquefaction Remediation Plan, where liquefaction remediation should be performed. The following are pre-remediation estimated liquefaction induced differential settlements for the site.

Structures within the Designated Liquefaction Remediation Areas on Plate 4	3 inches differential settlement of the ground surface within a 50 foot horizontal distance
Structures not located within the Designated Liquefaction Remediation Areas on Plate 4	1 inch differential settlement of the ground surface within a 50 foot horizontal distance

UNDOCUMENTED FILL

Undocumented fill is prevalent in the northern two-thirds of the site as shown on the Site Plan, Plate 2. This material will have to be removed and replaced as engineered fill. The flanks of the North Hill are mantled with undocumented fill of varying thickness. The geotechnical

characteristics of the stockpile fills in the northeast corner of the site should be evaluated. Sampling this material should be performed with either an excavator or drill rig with large diameter augers.

NATURALLY OCCURRING ASBESTOS

The South Hill is composed of serpentinite bedrock that is likely to contain more than 0.25% Naturally Occurring Asbestos (NOA). NOA was found in the serpentinite and the soil immediately adjacent to the South Hill bedrock. The environmental consultant should determine the appropriate method to remediate bedrock and soil containing NOA.

SHALLOW BEDROCK EXCAVATION

Near surface bedrock is present in the areas designated as the South Hill and North Hill as shown on Plate 2, Site Plan. The North Hill was found to be composed of sandstone and claystone, and the South Hill was found to be hard serpentinite. The shallow bedrock at the site can be hard, but contains fractures, and should be able to be excavated with heavy grading equipment. Hard zones of serpentinite may be encountered when excavating the South Hill. These zones may need to be broken with rock hammers.

Overexcavation of the bedrock will be required under building pads to reduce potential differential settlement. We recommend a minimum 4 foot thick layer of engineered fill under building pads. If the structures are more than 3 stories tall and located around the perimeter of the bedrock outcrops, we may recommend additional overexcavation to offset potential differential settlement. Currently, some of the structures for Villages 6B, 8, and 9 have structures straddling the margins of the North Hill bedrock outcrop as shown on Plate 2, Proposed Development. Additional borings will likely be needed to determine the fill differential requirements to reduce potential differential settlements.

For utility corridors located in bedrock areas, consideration should be given to overexcavating the bedrock and backfilling with engineered fill during mass grading to facilitate utility trench excavation. The bedrock should be overexcavated to at least 1 foot below the deepest utilities. Oversize material generated from excavating the bedrock can be buried at least 5 feet below pad grade or at least 2 feet below the deepest utilities.

SHALLOW GROUNDWATER

Shallow groundwater was encountered during our field explorations. The groundwater at the site is likely influenced by tidal fluctuations. Water stops should be utilized to minimize tidal groundwater seepage through the bedding and shading material around utility pipes. The impacts of groundwater should be considered in planning underground improvements and site grading. In areas where deep utilities are planned, dewatering may be required. The contractor should be prepared to accommodate seepage and/or groundwater in excavations either with pumping from sumps (if minor seepage is encountered during excavation) or a dewatering system using well points (if heavy seepage is encountered during excavation). The dewatering system should be designed, installed and operated by an experienced contractor. The contractor should also be aware that grading in low-lying areas (near or below the groundwater table) may

need to be stabilized and/or dewatered to facilitate placement of structures and/or compaction of fill.

CORROSIVITY CONSIDERATIONS

A sample of soil from B-3 at 1½ to 2 feet was classified as severely corrosive by CERCO. The corrosion test results and a brief evaluation of the results are contained in Appendix D. The soil sample was found to contain chloride ion concentrations of 4,800 mg/kg, which is sufficient to attack steel embedded in a concrete mortar coating. Sulfate ion concentrations were found to be 1,000 mg/kg, which is corrosive to concrete in contact with the ground. It is suggested that the concrete mix be designed in conformance with the requirements in CBC. The corrosivity test results should be transmitted to your structural engineer and underground utility consultants, and should be incorporated in the design of underground utilities and structures that are buried or in contact with on-site soils.

LIQUEFACTION REMEDIATION

Villages 6A, 7, 9 and 12 are located within the Liquefaction Remediation Area shown on Plate 4. Given the length and height of the structures in Villages 6A, 7, 9 and 12, we recommend the following:

1. Once plans are finalized, additional CPTs and borings should be performed in these locations. Additional liquefaction settlement analyses should then be performed.
2. The structural engineer and the geotechnical engineer should discuss the potential liquefaction induced settlement impacts for the various structures.
    - If a structural system is able to withstand the potential liquefaction induced settlements, then ground improvement will not be required.
    - If ground improvement is required in order to reduce the amount of potential liquefaction induced settlement impacts on the structures, then a Liquefaction Remediation program contained in our DDC Test Program Results and Recommendations report should be implemented. A detailed ground improvement program can then be developed.

The twin EBDA pipelines are located within the liquefaction remediation zone shown on Plate 4. It is our understanding that a plan to replace the twin EBDA pipelines is currently being formulated. The Geotechnical engineer should review the impacts of a DDC ground improvement program on the EBDA pipelines.

SITE PREPARATION AND GRADING

Our general site preparation and grading recommendations are as follows:

1. Vegetation should be removed by mowing and raking. This material can be used in landscape areas or removed from the site. The remaining stubble can be disced into the surface soils.

2. If zones of soft or saturated soils are encountered during excavation and compaction, deeper excavations may be required to expose firm soils. This should be determined in the field by the soils engineer.

3. Following stripping and clearing operations, the exposed ground surface in building areas and areas to receive fill should be scarified to a depth of 1 foot, moisture conditioned and compacted.

4. Loose soil in the former water pond west of the North Hill and the ditch should be removed. A representative from our firm should observe the overexcavation and scarification of the soil in this area.

5. Import fill should contain no deleterious matter and rocks greater than 4 inches in largest dimension, and have Plasticity Index (PI) less than 20. Import fill materials should be subject to the evaluation by the soil engineer prior to their use. We suggest that the import fill be checked for toxic or hazardous materials prior to importing to the site.

6. Fill and backfill should be placed in thin lifts (normally 6 to 8 inches in loose lift thickness depending on the compaction equipment), properly moisture conditioned and compacted as discussed below:

On-site expansive soils	At least 88 percent relative compaction at not less than 5 percent above optimum moisture content.
Import fill (PI less than 20)	At least 90 percent relative compaction at not less than 3 percent above optimum moisture content.

Relative compaction refers to the in-place dry density of the soil expressed as a percentage of the maximum dry density determined by ASTM D1557 compaction test procedure. Optimum moisture is the water content (percentage by dry weight) corresponding to the maximum dry density.

7. Observations and soil density tests should be carried out during grading and backfilling operations to assist the contractor in obtaining the required degree of compaction and proper moisture content. Where the compaction or moisture content are outside the required range, the soil should be reworked until the specified compaction and moisture conditioning is achieved.

8. The soils engineer should be notified at least 48 hours prior to grading and backfill operations. The procedure and methods of grading may then be discussed between the contractor and the soils engineer.

SEISMIC DESIGN PARAMETERS

According to the United States Geologic Survey, Earthquake Ground Motion Parameters program, Version 5.1.0 dated February 10, 2011, the following California Building Code (CBC) seismic design criteria should be incorporated into the design of proposed structures (for a site located at 37.519 degrees latitude and -122.054 degrees longitude).

Site Class	D
Mapped Spectral Acceleration for Short Periods, Ss, for Site Class B with 5% damping Mapped Spectral Acceleration for 1-second Period, S1, for Site Class B with 5% damping	1.50 g 0.60 g
Site Coefficient F_a (for Site Class D) Site Coefficient F_v (for Site Class D)	1.00 1.50
SMs for Site Class D SM1 for Site Class D	1.50 g 0.90 g
SDs for Site Class D SD1 for Site Class D	1.00 g 0.60 g

PRELIMINARY POST-TENSIONED SLAB FOUNDATIONS

Preliminary recommendations are based on anticipated soil conditions after mass grading is completed. Actual conditions will most likely vary from our assumed soil conditions. We recommend that additional borings up to 15 feet deep be drilled in building pad areas to confirm the preliminary PT slab design criteria.

The proposed structures can generally be supported on post-tensioned (PT) slab foundations constructed on properly prepared subgrade soils. The upper 12 inches of subgrade soils should be pre-soaked to at least 7 percent above optimum moisture content prior to concrete placement. The pre-soaked pads should not be allowed to dry out to less than the recommended moisture content before concrete is placed. Subgrade moisture should be checked by a BSA representative prior to concrete placement. We recommend the following criteria be incorporated in the design of post-tensioned slab foundations, utilizing the third edition of the Post-Tensioning Institute (PTI) design manual:

Preliminary PT Slab Recommendations in Areas NOT Designated for Potential Liquefaction Remediation*

Allowable Bearing Capacity (may be increased by 1/3 for seismic and/or wind load to be used at the discretion of the structural engineer)	1,500 psf
Passive Equivalent Fluid Pressure	Not applicable due to the shallow PT slabs
Base Friction Coefficient	0.30
Edge Moisture Variation Distance Center Lift Edge Lift	 9.0 feet 4.8 feet
Differential Swell Center Lift Edge Lift	 1.05 inches 1.35 inches

*Additional shallow borings should be drilled after fill placement and mass grading is completed

Preliminary PT Slab Recommendations in Areas Designated for Potential Liquefaction Remediation **

Allowable Bearing Capacity (may be increased by 1/3 for seismic and/or wind load to be used at the discretion of the structural engineer)	1,500 psf
Passive Equivalent Fluid Pressure	Not applicable due to the shallow PT slabs
Base Friction Coefficient	0.30
Edge Moisture Variation Distance Center Lift Edge Lift	 9.0 feet 4.5 feet

Differential Swell	
Center Lift	1.54 inches
Edge Lift	2.35 inches

** Preliminary recommendations before additional field investigation to determine if liquefaction remediation ground improvement is necessary

Where moisture vapor through the slabs would be objectionable, the use of a vapor retarder and capillary moisture break should be considered by the slab designer. Compacted subgrade soils may become disturbed during utility trench excavation and backfilling. These soils should be uniformly moisture conditioned and recompacted as recommended in the grading section of this report.

REINFORCED CONCRETE MAT FOUNDATIONS

Minor structures, such as trash enclosures and equipment pads, can be supported on reinforced concrete mat foundations. Reinforced concrete mat foundations should be underlain by at least 6-inches of Class 2 aggregate baserock. The following are preliminary recommendations for reinforced concrete mat foundations. After mass grading and fill placement, the mat foundation recommendations should be reviewed to determine if the soil conditions of the new fill material impacts these recommendations.

Allowable Bearing Capacity (DL + LL) – (may be increased by one-third for seismic and wind loads)	1,500 psf
Modulus of Subgrade Reaction	70 pci
Minimum Thickness	8 inches

DRILLED PIER FOUNDATIONS

Drilled pier foundations can be utilized to support canopies, light poles or other lightly-loaded pole-type structures. We recommend that the following preliminary geotechnical criteria be used in the drilled pier foundation design. Again, these design parameters should be reviewed once mass grading has been completed.

Allowable Skin Friction • neglect the upper 1 foot if the ground surface is not confined by pavement or slabs • may be increased by 1/3 for seismic and/or wind loads to be used at the discretion of the structural engineer	500 psf
Allowable Passive Equivalent Fluid Pressure • neglect the upper 1 foot for flat ground condition if the ground surface is not confined by pavement or slab • neglect upper 3 feet for sloping ground condition	300 pcf
Minimum Pier Diameter Canopies Light poles or other lightly loaded pole-type structures	 18 inches 12 inches
Minimum Pier Depth Canopies Light poles or other lightly loaded pole-type structures	 10 feet 5 feet
Minimum Pier Spacing (center to center) Full skin friction Full passive resistance	 3 pier diameters 6 pier diameters

The piers should be drilled and poured on the same day. The pier holes should not be left open overnight or through the weekend. If the drilled hole is left open during the day, the hole should be covered to prevent tools, soil, or personnel from falling into the drilled hole.

When water is encountered during drilling, the water should be removed prior to placement of concrete. Casing may be needed for piers extending below the water table. Alternatively, the concrete may be placed using tremie method. Concrete placed using the tremie method should be pumped into the excavation with sufficient head to lift the groundwater and suspended particles present in the excavation to the ground surface. The concrete should be placed in one continuous pour and should continue until concrete is observed pouring out of the top of the pier hole.

The drilled pier should be advanced to at least the design depth. The completed pier hole should be verified by observations and measurement by this office. The bottom of pier holes should be verified to be clean and without significant slough. During rains, water should be prevented from flowing into the drilled hole.

EXTERIOR CONCRETE FLATWORK

Exterior concrete flatwork, such as sidewalks and patios, can be placed directly on the prepared subgrade. The subgrade should be presoaked to at least 5 percent over optimum moisture content prior to placing concrete. The moisture content of the subgrade soils should be checked immediately prior to the placement of baserock or concrete (if the flatwork is supported directly on the subgrade). Flatwork should be doweled into the foundation at doorways to reduce the potential for tripping hazards that could result from heaving of the underlying expansive soil. Reinforcing steel should be utilized to reduce potential tripping hazards caused by expansive soil swell and tree roots. Deep, scored joints spaced no more than about 6 feet apart should be considered. Placing aggregate base beneath flatwork is not recommended since the more permeable baserock can become saturated and provide moisture to the underlying expansive soil. Additional recommendations can be provided once more detailed information is available.

SITE RETAINING WALLS

Relatively low site retaining walls may be required for the project. Site retaining walls may consist of conventional concrete and masonry retaining walls, or mechanically stabilized earth (MSE) retaining walls. These recommendations are for soils that are similar to the onsite materials. These recommendations should be reviewed after soil import and mass grading.

CONCRETE AND MASONRY RETAINING WALLS

Concrete and masonry retaining walls can be supported by shallow foundations founded on compacted engineered fill or firm on-site soils. We recommend that the following geotechnical criteria be incorporated in the concrete and masonry retaining wall design:

Active Equivalent Fluid Pressure Level Backfill 3H:1V Backfill 2H:1V Backfill	 60 pcf 70 pcf 80 pcf
Traffic or other Surcharge Loads	To be determined by the structural engineer
Additional Seismic Lateral Pressure (for walls designed for active condition)	16H psf Rectangular pressure distribution where H is the total height of the backfill
Allowable Bearing Capacity (may be increased by one-third for seismic and/or wind loads at the discretion of the structural engineer)	2,500 psf
Passive Equivalent Fluid Pressure • neglect the upper 1 foot for flat ground condition if the ground surface is not confined by slabs or pavement • neglect upper 3 feet for sloping ground condition	300 pcf
Base Friction Coefficient	0.3
Minimum Footing Depth (below the lowest adjacent grade)	24 inches

The retaining walls should be provided with permanent backdrains. The above recommended lateral pressures are based on drained conditions to prevent hydrostatic pressure build-up. The backdrain should consist of a blanket of Class 2 Permeable Material and a 4-inch diameter perforated PVC pipe (SDR 35). The permeable materials should be in conformance with Section 68-1.025 of the May 2006 Caltrans "Standard Specifications." The permeable material blanket should be at least 12 inches thick and should be placed from the base of the retaining wall to about 1 foot below the finished grade behind the retaining wall. Alternatively, a geo-composite drain, such as Miradrain 6200 or approved equivalent, may be used in lieu of the Class 2 Permeable Material blanket. The perforated pipe should be placed near the bottom of the wall to carry collected water to a suitable gravity discharge. Backdrains are not required for retaining walls of 2 feet or less in height.

MSE RETAINING WALLS

If MSE walls are used for the retaining walls, we recommend that the following geotechnical criteria be incorporated in the retaining wall design:

Reinforced Fill, Retained Fill and Foundation Materials Unit Weight Friction Angle Cohesion	 125 pcf 28 degrees 0 psf

The base of the MSE walls should be at least 6 inches (level ground) and 18 inches (sloping ground) below the lowest adjacent finished grade.

Subdrains should be installed behind the MSE walls to prevent the buildup of hydrostatic pressure. Subdrains should consist of a vertical blanket of Class 2 Permeable Material (conforming to Section 68-1.025 of State of California Standard Specifications) a minimum of 1 foot thick and a 4-inch diameter perforated pipe (SDR 35). Subdrain pipes should be set at the level of the base of the wall's gravel pad. The perforated pipes should have two rows of holes

and be placed holes-down. The permeable material blanket should extend up to about 1 foot of finished ground surface at the top. Subdrain pipes from behind walls should be connected to solid collector pipes that outlet to drainage inlets, storm drains, or concrete-lined ditches.

UTILITY TRENCH EXCAVATION AND BACKFILL

Excavations should conform to applicable State and Federal safety requirements. Where trench excavations are more than 5 feet deep, they should be sloped and/or shored. Trench walls should be sloped no steeper than 1½ horizontal to 1 vertical (1½ H:1V) in dry granular soils, and no steeper than 1H:1V in dry cohesive soils. Flatter trench slopes may be required if seepage is encountered during construction or if exposed soil conditions differ from those encountered by the test borings and CPTs. If full-sloped trench walls cannot be excavated due to site constraints, shoring should be provided for trench stability and safety. We can provide soil parameters for shoring design on request.

Materials quality, placement procedures and compaction operations for utility pipe bedding and shading materials should meet local agency requirements. Utility trench backfill above the shading materials may consist of native soil, processed to remove rubble, rock fragments over 4 inches in largest dimension, rubbish, vegetation and other undesirable substances. Backfill materials should be placed in level lifts about 8 to 12 inches in loose thickness, moisture conditioned and compacted according to the recommendations in the grading section of this report. No jetting is permissible on this project.

STRUCTURAL PAVEMENT SECTIONS

We recommend the following structural asphalt pavement sections based on an assumed R-value of 5 for the subgrade soil and the Caltrans Design Method for Flexible Pavement. We have assumed that the assigned "T.I.'s" include provisions for heavy truck traffic related to construction activities.

Traffic Index (T.I.)	Thickness (inches)	
	Asphalt Concrete Type B	Aggregate Base Class 2
4	2½	8
4½	2½	10
5	2½	11
5½	3	12
6	3	14
6½	3½	15
7	4	16
7½	4½	17
8	5	18
8½	5½	19
9	6	20
9½	6	22
10	7	22

Prior to subgrade preparation, utility trench backfill in the pavement areas should be properly placed and compacted as previously recommended. Subgrade soils for asphalt concrete

pavement should be rolled to at least 95 percent relative compaction to provide a smooth, unyielding surface. Subgrade soils should be maintained in a moist and compacted condition until covered with the complete pavement section.

Class 2 aggregate base should conform to the requirements in Section 26, Caltrans "Standard Specifications," (May 2006). The aggregate base should be placed in thin lifts in a manner to prevent segregation, uniformly moisture conditioned, and compacted to at least 95 percent relative compaction to provide a smooth, unyielding surface.

To provide relief for water that is likely to infiltrate into the aggregate base layer, roadway pavement edge underdrains should be installed at the bottom of the aggregate base and below the curb and gutter, as shown on Plate 5, Pavement Edge Drain.

ADDITIONAL SOIL ENGINEERING SERVICES

Prior to construction, our firm should be provided the opportunity to review the plans and specifications to determine if the recommendations of this report have been implemented in those documents. We would appreciate the opportunity to meet with the contractors prior to the start of site grading, underground utility installation and pavement construction to discuss the procedures and methods of construction. This can facilitate the performance of the construction operation and minimize possible misunderstanding and construction delays.

To a degree, the performance of the proposed project is dependent on the procedures and quality of the construction. Therefore, we should provide observations of the contractor's procedures and the exposed soil conditions, and field and laboratory testing during site preparation and grading, placement and compaction of fill, underground utility installation, and foundation and pavement construction. These observations will allow us to check the contractor's work for conformance with the intent of our recommendations and to observe any unanticipated soil conditions that could require modification of our recommendations.

LIMITATIONS

The conclusions and recommendations of this report are based upon the information provided to us regarding the proposed development, subsurface conditions encountered at the CPT, boring and test pit locations, and professional judgment. This study has been conducted in accordance with currently accepted standards of geotechnical engineering practice; no other warranty is expressed or implied.

The field exploration locations were determined by pacing from the existing surface features and should be considered approximate only. Site conditions described in the text were existing at the time of our field exploration in December 2011, and are not necessarily representative of such conditions at other locations and times.

The logs show subsurface conditions at the locations and on the date indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. In the event that changes in the nature, design or location of the proposed residential development are

planned or if subsurface conditions differ from those described in this report, then the conclusions and recommendations in this report shall be considered invalid, unless the changes are reviewed and the conclusions and recommendations modified or approved in writing.

We trust this provides the necessary information at this time. If you have any questions, please contact us.

Respectfully submitted,

BERLOGAR STEVENS & ASSOCIATES

William R. Stevens
Principal Engineer
GE 2339

Frank Berlogar

WRS/FB:jmo

Attachments:

Plate 1 – Vicinity Map
Plate 2 – Proposed Development
Plate 3 – Site Plan
Plate 4 – Liquefiable Soil Remediation Plan
Plate 5 – Pavement Edge Drain
Appendix A – Boring Logs
Appendix B – CPT Graphs
Appendix C –Test Pit Logs
Appendix D - Laboratory Test Results

Copies Addressee (1)
Integral Communities (4), Peter Lezak
Integral Communities (email only), Glenn Brown
Integral Communities (email only), Mark Butler
CBG (1) Greg Miller

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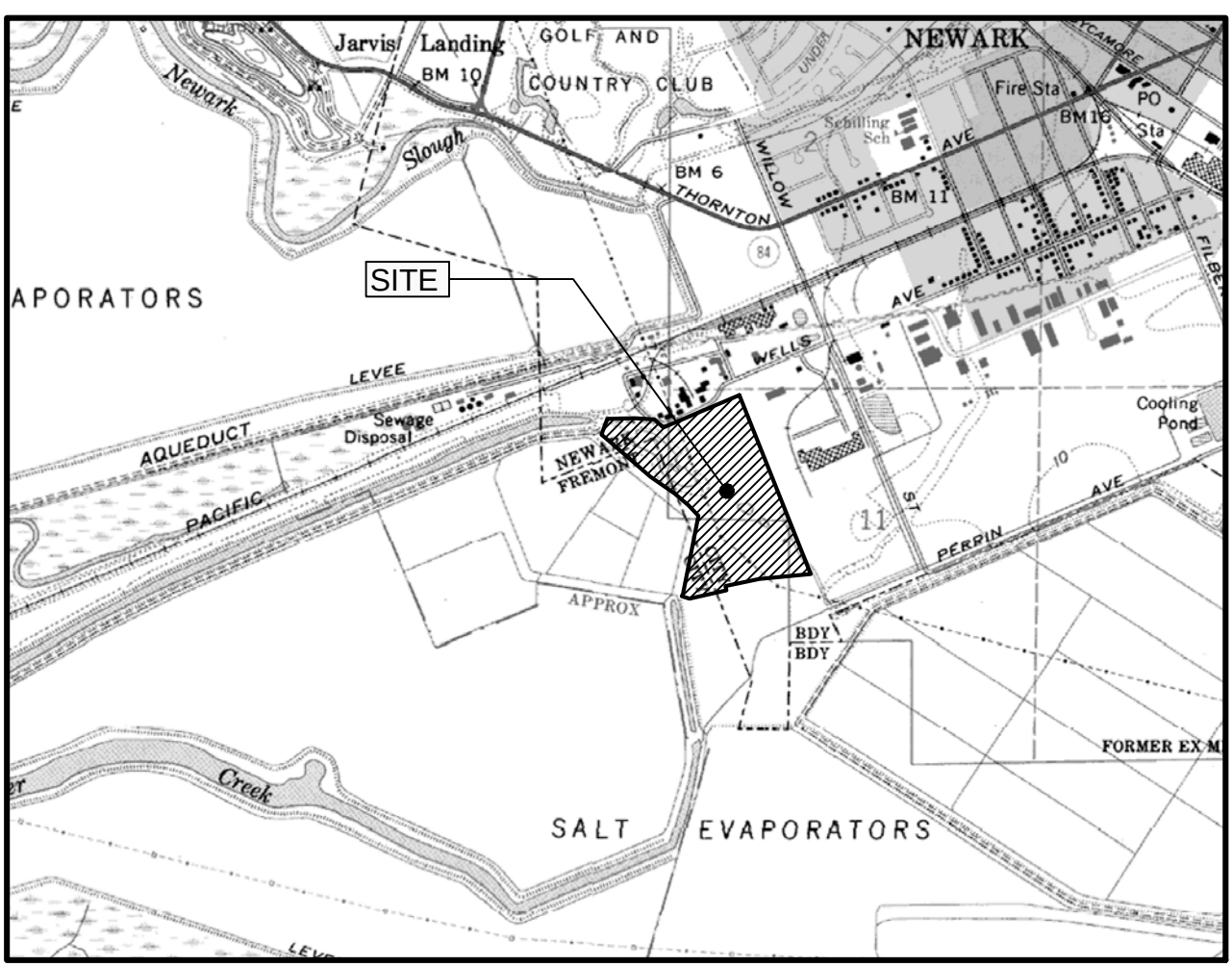
JOB NUMBER: 3268.001 DATE: 10-14-13 BY: CC



VICINITY MAP

CARGILL PARCEL

HICKORY STREET AND ENTERPRISE DRIVE

NEWARK, CALIFORNIA

FOR

DUMBARTON AREA 2, LLC

BASE: PORTION OF U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, NEWARK, CALIFORNIA, PHOTOREVISED 1983, AT A SCALE OF 1:24,000.

PLATE 1

DRAWN BY: CC

DATE: 10-10-13

JOB NUMBER: 3268.001

CARGILL SITE PLAN

VILLAGE 6A & 6B
Urban Arena Cube
Average SF: 2,020 SF
Total Units: 156
□STO□IES□□STO□Y TO□N□OMES AN□ PENT□OUSES

VILLAGE 7
Urban Arena Loft Split
Average SF: 1,798 SF
Total Units: 73
□STO□Y TO□N□OMES

VILLAGE 8
Urban Arena P9
Average SF: 1,639 SF
Total Units: 71
□STO□Y TO□N□OMES

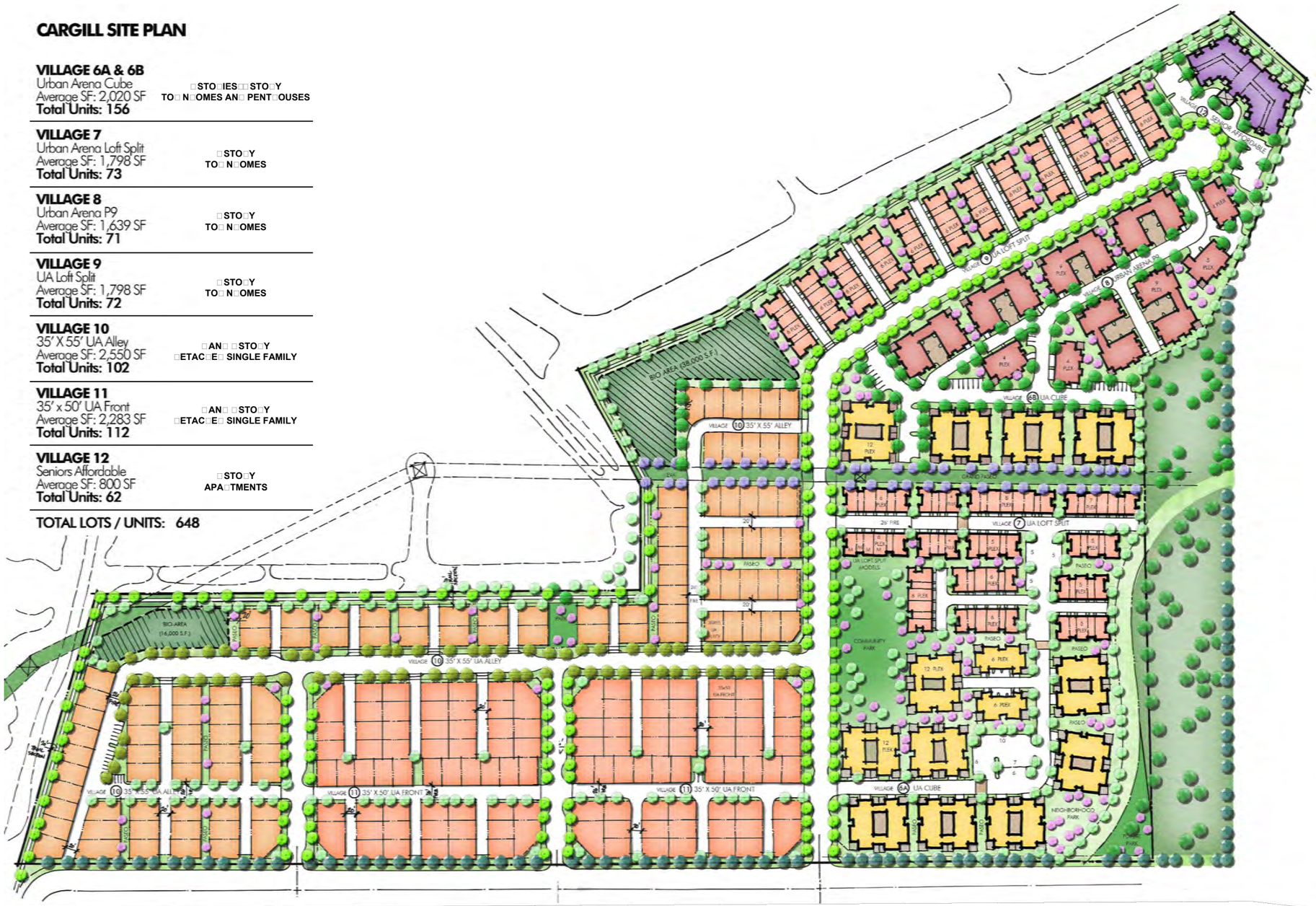
VILLAGE 9
UA Loft Split
Average SF: 1,798 SF
Total Units: 72
□STO□Y TO□N□OMES

VILLAGE 10
35' X 55' UA Alley
Average SF: 2,550 SF
Total Units: 102
□AN□ □STO□Y □ETAC□E□ SINGLE FAMILY

VILLAGE 11
35' x 50' UA Front
Average SF: 2,283 SF
Total Units: 112
□AN□ □STO□Y □ETAC□E□ SINGLE FAMILY

VILLAGE 12
Seniors Affordable
Average SF: 800 SF
Total Units: 62
□STO□Y APA□TMENTS

TOTAL LOTS / UNITS: 648



P□OPOSE□ □E□ELOPMENT

CA□GILL PA□CEL

HICKORY STREET AND
ENTERPRISE DRIVE
NEWARK, CALIFORNIA
FOR
DUMBARTON AREA 2, LLC

B□r□□□r S□□□□□□ □ A□□□□□□□□
SOIL ENGINEERS * ENGINEERING GEOLOGISTS

BASE: SHEET SP0.0 TITLED, "SITE PLAN", PREPARED BY URBAN ARENA, DATED 10-8-13

ENTERPRISE DRIVE

HICKORY STREET (UNPAVED ROAD)

NORTH HILL

SOUTH HILL

EXISTING SHOOTING RANGE

EXISTING DOG TRAINING FACILITY

PROPOSED WETLAND AREA

PROPOSED WETLAND AREA

PROPOSED WETLAND AREA

B-1 -6
C10-1 -13
B-2 -14
C10-3 -44
B-3 C-1 -16
B-4 -8
B06-01
B06-02
B06-03 -16
B06-04
C-2 -15
C-3 -14
C-4 -12
C-5 -15
C-6 -37
C-7 -7
C-8 -44
C-9 -25
C-10 -5
C-10A
C-11 C-11A 0
C-12 -8
C-13 -17
C-14 -6
C10-2 -14
C10-4 -13
C10-5 -9
B98-1 23
B98-2 20
B98-3 7
B98-4 24
B98-5 27
B98-6 2
B98-7 10
B98-8 6
B98-9 19
B98-10 24
B98-11
B98-12 10
B98-13 2
B98-14 3
B98-15 10
B98-16 27
T07-1 14
T07-2 14
T07-3 -2
T07-4 -2
T07-5 3
T07-6 14
T07-7 -6

E□PLANATION

- PROJECT BOUNDARY
- EXISTING EBDA TWIN 33 INCH DIAMETER SANITARY SEWER FORCE MAINS
- ELECTRICAL TRANSMISSION LINES
- 30 — ELEVATION OF TOP OF BEDROCK OR NON-LIQUEFIABLE SOILS
- B-4 — APPROXIMATE BORING LOCATION (THIS STUDY)
- B06-4 — APPROXIMATE BORING LOCATION (BGC, 2006)
- B98-16 — APPROXIMATE BORING LOCATION (BGC, 1998)
- C-14 — APPROXIMATE CONE PENETRATION TEST LOCATION (THIS STUDY)
- C10-5 — APPROXIMATE CONE PENETRATION TEST LOCATION (BGC, 2010)
- T07-7 — APPROXIMATE TEST PIT LOCATION (BGC, 2007)
- EXISTING UNDOCUMENTED FILL
- 25 — ESTIMATED EXISTING UNDOCUMENTED FILL THICKNESS IN FEET
- SERPENTINITE ROCK OUTCROP
- SHALLOW BEDROCK BLANKETED WITH FILL

CHECKED BY:

DRAWN BY: CC

DATE: 10-14-13

JOB NUMBER: 3268.001

N

0 100

1"=100'

SITE PLAN

CA□GILL PA□CEL

HICKORY STREET AND ENTERPRISE DRIVE

NEWARK, CALIFORNIA

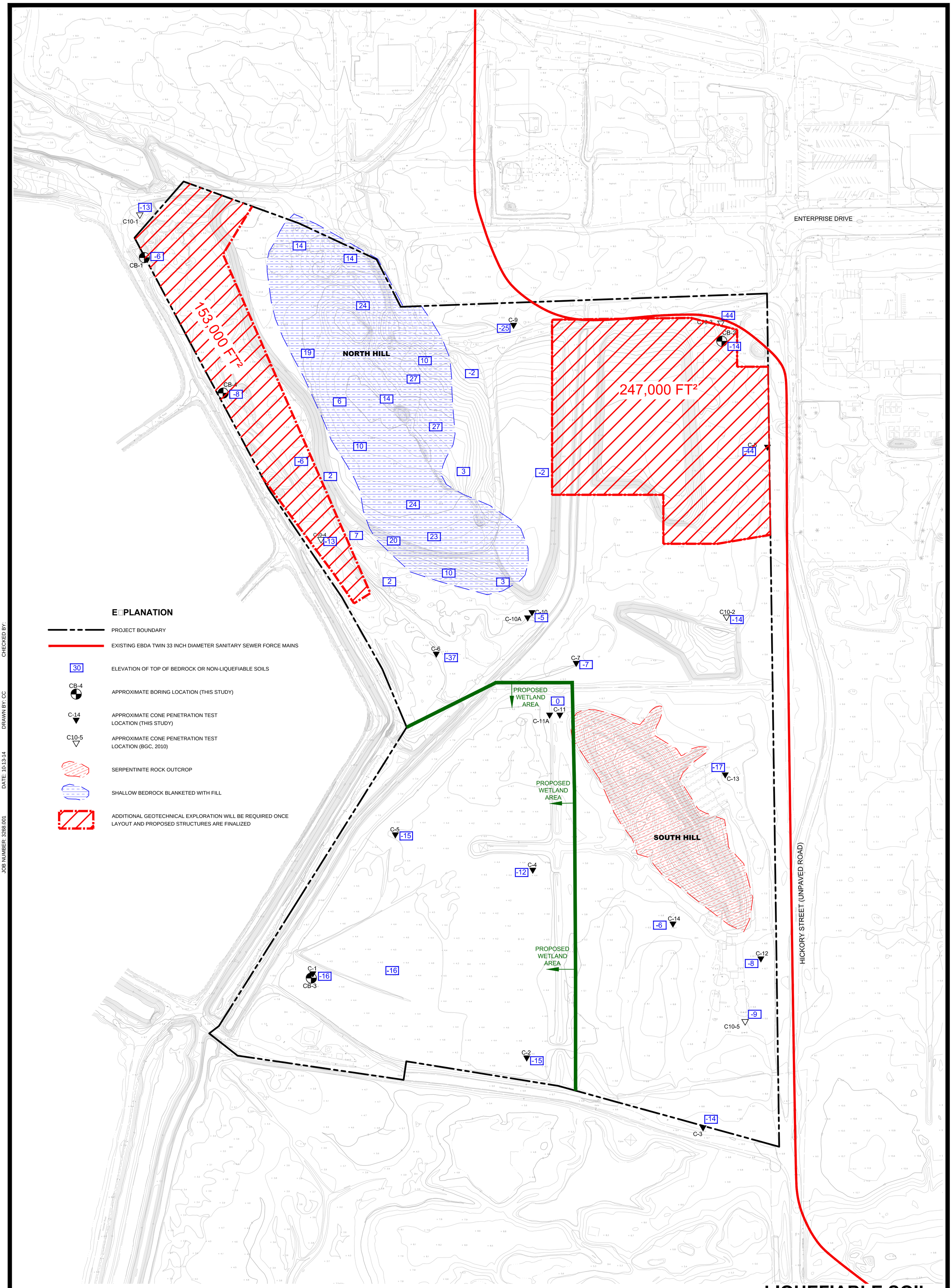
FOR

DUMBARTON AREA 2, LLC

B□r□□□r S□□□□□□ □ A□□□□□□□

SOIL ENGINEERS * ENGINEERING GEOLOGISTS

BASE: EXISTING TOPO PROVIDED BY CBG, VIA EMAIL DATED 12-20-11



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DATE: 10-13-14

JOB NUMBER: 3268.001

LIQUEFIABLE SOIL □EME□IATION PLAN

CA□GILL PA□CEL

HICKORY STREET AND ENTERPRISE DRIVE
NEWARK, CALIFORNIA
FOR
DUMBARTON AREA 2, LLC

B□r□□□r S□□□□□□ □ A□□□□□□□
SOIL ENGINEERS * ENGINEERING GEOLOGISTS

BASE: EXISTING TOPO PROVIDED BY CBG, VIA EMAIL DATED 12-20-11

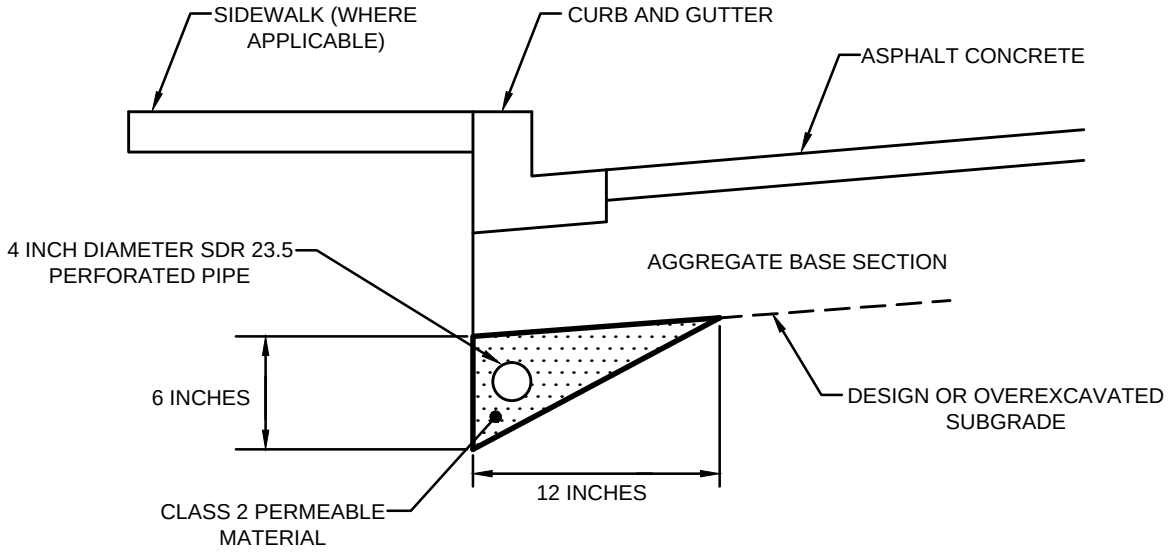
PLATE 4

CHECKED BY:

DRAWN BY: CC

DATE: 10-14-13

JOB NUMBER: 3268.001



NOTES

1. 4 INCH DIAMETER PERFORATED PIPE TO BE SURROUNDED BY AT LEAST 2 INCHES OF CLASS 2 PERMEABLE MATERIAL.

2. 4 INCH DIAMETER PERFORATED PIPE TO DISCHARGE INTO EACH CATCH BASIN/DRAIN INLET.

3. PERFORATED PIPE TO BE LOCATED BELOW EXISTING SHALLOW UNDERGROUND UTILITIES WHERE THEY CROSS.

SCALE NTS

PAVEMENT EDGE DRAIN

APPENDIX A

Boring Logs

BORING LOG B-1

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 10 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-21-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
2.5-inch I.D. Split Barrel	140	30
Standard Penetration Test	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
			0			
-	-	6				AKALINE MATERIAL (magnesia), white, wet, soft 96.2% passing #200 sieve, PI=2 LL=43
			5			
					CL	SILTY CLAY, olive-brown, saturated, very stiff
19.9	109	35				87.5% passing #200 sieve, PI=18 LL=35 unconfined compressive strength = 3,909 psf
			10			
-	-	18			CL-ML	SILTY CLAY with SAND, gray-brown, stiff, saturated 77.5% passing #200 sieve, PI=5 LL=26
			15			
					SM	SILTY SAND, brown-gray, saturated, dense, fine-to medium-grained sand
-	-	47				19.7% passing #200 sieve
			20			
					CL	SILTY CLAY, dark brown, saturated, stiff

BORING LOG B-1

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 10 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-21-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
2.5-inch I.D. Split Barrel	140	30
Standard Penetration Test	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
-	-	47	20		SM	SILTY SAND, brown-gray, saturated, dense, fine-to medium-grained sand
					CL	SILTY CLAY, dark brown, saturated, stiff
31.2	93	20	25			unconfined compressive strength = 1,904 psf
-	-	76/11”	30			below 29 feet, yellow-gray-brown, saturated, hard, trace coarse-grained sand
			35			Boring terminated at 30 feet Groundwater encountered at 6 feet
			40			

BORING LOG B-2

Job No.: 3268.102	**Client:** Dumbarton Area 2, LLC	**Elevation**: 8 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-21-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
2.5-inch I.D. Split Barrel	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
			0			
-	-	72			SC	CLAYEY SAND with GRAVEL, dark brown, dry to moist, dense, fine-to coarse-grained sand, fine subangular to subrounded gravel 30.6% passing #200 sieve, PI=15 LL=29
-	-	81	5		CL	SILTY CLAY with SAND, gray-brown, moist, hard
						below 7 feet, saturated
20.3	109	51	10			below 8-1/2 feet, orange-brown, very stiff 89.1% passing #200 sieve, PI=12 LL=32 unconfined compressive strength = 3,383 psf
					ML	SILT with SAND, yellow-brown, saturated, very stiff, fine-grained sand
-	-	24	15			71.1% passing #200 sieve
-	-	27	20		ML	SILT, yellow-brown, saturated, very stiff 92.3% passing #200 sieve, PI=6 LL=31

BORING LOG B-2

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 8 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-21-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
2.5-inch I.D. Split Barrel	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
-	-	27	20		ML	SILT, yellow-brown, saturated, very stiff
					CL	SILTY CLAY, gray, saturated, very stiff
31.7	88	29	25			unconfined compressive strength = 1,661 psf
-	-	74	30			below 28-1/2 feet, blue-gray, hard
			35			Boring terminated at 30 feet Groundwater encountered at 7 feet
			40			

BORING LOG B-3

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 4-1/2 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-21-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
2.5-inch I.D. Split Barrel	140	30
Standard Penetration Test	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
			0			
					CL	SILTY CLAY, dark brown, dry to moist, very stiff
-	-	42				
-	-	31				
						below 4 feet, moist
			5			below 5 feet, saturated
-	-	23				below 8-1/2 feet, olive-brown
			10			
-	-	20				
					ML	SANDY SILT, olive-brown, saturated, stiff, fine-grained sand
			15			
					SM	SILTY SAND, gray, saturated, loose
-	-	9				
					CL	SILTY CLAY, gray, saturated, stiff
			20			

BORING LOG B-3

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 4-1/2 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-21-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
2.5-inch I.D. Split Barrel	140	30
Standard Penetration Test	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
-	-	9	20		CL	SILTY CLAY, gray, saturated, stiff
-	-	46	25			below 23-1/2 feet, olive-gray, hard
-	-	69/11”	30			below 28-1/2 feet, blue-gray
			35			Boring terminated at 30 feet Groundwater encountered at 5 feet
			40			

BORING LOG B-4

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 6 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-27-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
Standard Penetration Test	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
			0			
					CL	SILTY CLAY, dark brown, moist, medium stiff
-	-	7	-			
			-			87.6% passing #200 sieve, PI=24 LL=41 below 2 feet, olive-brown
-	-	13	-			below 3 feet, stiff
			-			
-	-	6	5			below 5 feet, moist to wet, medium stiff, trace fine-grained sand 66.9% passing #200 sieve, PI=8 LL=25
			-			
			-			
			-			
					SM	SILTY SAND, olive-brown, saturated, loose, fine-grained sand
			10			
-	-	7	-			30.2% passing #200 sieve, non-plastic
			-			
			-			
			-			
			-			
					CL	SILTY CLAY, olive-brown, saturated, medium stiff
-	-	6	15			
			-			
			-			
			-			
			-			
-	-	6	20			

BORING LOG B-4

Job No.: 3268.102	**Client:** **Dumbarton Area 2, LLC**	**Elevation**: 6 feet (NGVD 29)
Job Name: Cargill Hill Parcel	**Drill Method**: Hollow-Stem Auger	**Date Drilled**: 12-27-11

SAMPLER TYPE:	DRIVE WEIGHT (LBS.)	HEIGHT OF FALL (IN.)
Standard Penetration Test	140	30

Moisture Content (%)	Dry Unit Weight (PCF)	Penetration Resistance (blows/foot)	Depth (feet)	Sample Symbol	USCS Classification	DESCRIPTION AND REMARKS
					CL	SILTY CLAY, olive-brown, saturated, medium stiff
-	-	6	20			at 20 feet, trace fine-grained sand
						86.9% passing # 200 sieve, PI=15 LL=32
-	-	5	25			
-	-	19	30			below 30 feet, very stiff
-	-	49				below 31-1/2 feet, hard
						Boring terminated at 33 feet Groundwater encountered at 9 feet
			35			
			40			

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			CLASSIFICATION SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS MORE THAN HALF OF THE MATERIAL IS LARGER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE TO NO FINES	GW	WELL GRADED GRAVELS, GRAVEL/SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL/SAND MIXTURES
		GRAVEL WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL/SAND/SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL/SAND/CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE TO NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND/SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND/CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF OF THE MATERIAL IS SMALLER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SILTS

KEY TO BORING LOG SYMBOLS

Depth in Feet	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per foot	Unified Soil Classification System	
					Bulk Sample
					2.5-inch I.D. Split Barrel Sample
					2.8-inch I.D. Shelby Tube Sample
					No Sample recovered
					Standard Penetration Test interval
					Well-defined stratum change
					Gradual stratum change
					Interpreted stratum change
					Apparent ground water level measured at date noted; seasonal weather conditions, site topography, etc., may cause fluctuations in water level indicated on boring logs
					Stabilized ground water level measured at date noted

Note: Soils described as dry, moist, and wet are estimated to be dry of optimum, near optimum, and more wet than optimum moisture content, respectively. Saturated soils are estimated to be within areas of free groundwater.

BY: CC

DATE: 1-9-12

JOB NUMBER: 3268.102

BORING LOG B06-1

JOB NUMBER: 2914.100 **DATE DRILLED:** 7-13-06

JOB NAME: Hill Parcel **SURFACE ELEVATION:** 5-1/2 feet

DRILL RIG: Rotary Wash **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel

DRIVE WEIGHT - LB: 140

HEIGHT OF FALL - IN: 30*

*Automatic Trip Hammer

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
				CL	SANDY CLAY with abundant GRAVEL, light gray-brown, dry to damp, stiff (fill)
				CL	SILTY CLAY, dark gray, damp, stiff, rootlets
20	18.7	106			
				CL	SILTY CLAY, yellow-brown, moist, stiff, gray rootlets
16	21.0	106	5		
				CL	SANDY CLAY,yellow-brown, saturated, medium stiff, fine-grained sand
6	24.3	101	10		
				CL/ML	SANDY CLAY/CLAYEY SILT, yellow-brown, moist to saturated, medium stiff, fine-grained sand
7	26.8	95	15		
				CL	SILTY CLAY, green-gray, moist, stiff
10	32.9	86	20		

PLATE 3

BORING LOG B06-1

JOB NUMBER: 2914.100 **SHEET:** 2 **OF:** 2

JOB NAME: Hill Parcel **DEPTH:** 20 feet **TO** 30-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
42	21.4	106	25	CL	SILTY CLAY, green-gray, moist, stiff below 23 feet, hard
21	-	-	30	CL	SILTY CLAY, yellow-brown, moist, very stiff, minor carbonate
			35 40		Boring terminated at 30-1/2 feet Groundwater obscured by rotary wash drill method

PLATE 4

BORING LOG B06-2

JOB NUMBER: 2914.100 **DATE DRILLED:** 7-14-06

JOB NAME: Hill Parcel **SURFACE ELEVATION:** 5-1/2 feet

DRILL RIG: Rotary Wash **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel

DRIVE WEIGHT – LB: 140

HEIGHT OF FALL – IN: 30*

*Automatic Trip Hammer

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
20	-	-		CL	SANDY CLAY, dark gray-brown, moist, stiff, fine-grained sand, rootlets
11	20.2	100	5	CL	SILTY CLAY, light gray-brown, wet, stiff, some fine-grained sand, trace fine gravel at 4 feet, clayey sand
9	21.1	107	10	CL	SILTY CLAY/SANDY CLAY, brown, saturated, medium stiff to stiff, fine-grained sand
24	20.6	101	15	CL/SC	SANDY CLAY/CLAYEY SAND, brown, saturated, very stiff/medium dense, fine-grained sand, some silt
				CL	SILTY CLAY, light gray-brown, saturated, stiff
11	-	-	20	SM	SILTY SAND, light gray-brown, saturated, loose, fine-grained sand, some clay

PLATE 5

BORING LOG B06-2

JOB NUMBER: 2914.100 **SHEET:** 2 **OF:** 2

JOB NAME: Hill Parcel **DEPTH:** 20 feet **TO** 34-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
				SM	SILTY SAND, light gray-brown, saturated, loose, fine-grained sand, some clay
				CL	SILTY CLAY, light gray to dark gray, saturated, very stiff
27	31.8	91			
			25	CL	SILTY CLAY, brown, saturated, very stiff to hard, trace fine-grained sand
31	21.1	106			
			30	CL	SILTY CLAY/SANDY CLAY, brown, saturated, stiff, fine-grained sand, some silt
11	22.4	111			
			35		Boring terminated at 34-1/2 feet Groundwater obscured by rotary wash drill method
			40		

PLATE 6

BORING LOG B06-3

JOB NUMBER: 2914.100 **DATE DRILLED:** 7-14-06

JOB NAME: Hill Parcel **SURFACE ELEVATION:** 4-1/2 feet

DRILL RIG: Rotary Wash **DATUM:** NGVD 29

SAMPLER TYPE:	DRIVE WEIGHT - LB	HEIGHT OF FALL - IN
■ 2.5 inch I.D. Split Barrel	140	30*
☑ Standard Penetration Test	140	30*

*Automatic Trip Hammer

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
				CL	SANDY CLAY, dark gray to light gray-brown, moist, very stiff, fine-grained sand, trace rootlets
24	14.8	112			
				CL	SILTY CLAY, light gray-brown, moist to wet, stiff
15	22.5	104	5		
23	18.8	110			below 9 feet, very stiff, trace coarse gravel
			10		
				CL/SC	SANDY CLAY/CLAYEY SAND, brown, saturated, loose to medium stiff
6	-	-			
			15		
				SM/ML	SILTY SAND/SANDY SILT, light gray-brown, saturated, loose to medium dense, fine-grained sand
17	23.9	99			
			20	CL	SILTY CLAY, light gray-brown, saturated, stiff

BORING LOG B06-3

JOB NUMBER: 2914.100 **SHEET:** 2 **OF:** 3

JOB NAME: Hill Parcel **DEPTH:** 20 feet **TO** 40 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
17	23.9	99		CL	SILTY CLAY, light gray-brown, saturated, stiff
				CL	SILTY CLAY, gray, saturated, very stiff to hard
35	27.9	95	25		
				CL	SILTY CLAY, brown with light gray mottling, saturated, hard
54	19.0	109	30		
				CL	SILTY CLAY, light gray-brown, saturated, stiff, some fine-grained sand, trace caliche
16	26.4	99	35		
					below 38 feet, very stiff
35	22.4	105	40		

PLATE 8

BORING LOG B06-3

JOB NUMBER: 2914.100 **SHEET:** 3 **OF:** 3

JOB NAME: Hill Parcel **DEPTH:** 40 feet **TO** 50-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
35	22.4	105		CL	SILTY CLAY, light gray-brown, saturated, very stiff, some fine-grained sand, trace caliche
27	29.0	93	45		below 44 feet, trace black mottling
48	-	-	50	SP/GP	SAND/GRAVEL, gray-brown, saturated, dense, fine-to coarse-grained sand, fine to coarse gravel
			55		Boring terminated at 50-1/2 feet Groundwater obscured by rotary wash drill method
			60		

BORING LOG B06-4

JOB NUMBER: 2914.100 **DATE DRILLED:** 7-14-06

JOB NAME: Hill Parcel **SURFACE ELEVATION:** 4-1/2 feet

DRILL RIG: Rotary Wash **DATUM:** NGVD 29

SAMPLER TYPE: 2.5 inch I.D. Split Barrel **DRIVE WEIGHT – LB** 140 **HEIGHT OF FALL – IN** 30*

*Automatic Trip Hammer

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
26	20.2	101		CL	SANDY CLAY/SILTY CLAY, dark gray, moist, very stiff, fine-grained sand, trace caliche
25	19.9	109	5	CL	SILTY CLAY, light gray-brown, moist, very stiff below 7 feet, stiff
12	-	-	10	CL/SC	SANDY CLAY/CLAYEY SAND, light gray-brown, saturated, medium stiff, loose to medium dense, fine-grained sand
				SM/SC	SILTY SAND/CLAYEY SAND, brown, saturated, loose, fine-grained sand
9	-	-	15	CL/ML	SANDY CLAY/SILTY CLAY/CLAYEY SILT, brown, satuarted, medium stiff to stiff, fine-grained sand
17	18.2	109	20	CL	SILTY CLAY, dark brown to light gray-brown, saturated, stiff, some fine-grained sand

BORING LOG B06-4

JOB NUMBER: 2914.100 **SHEET:** 2 **OF:** 2

JOB NAME: Hill Parcel **DEPTH:** 20 feet **TO** 30 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
				CL	SILTY CLAY, dark brown to light gray-brown, saturated, stiff, some fine-grained sand
				CL	SILTY CLAY, light gray-brown, saturated, hard, some bedrock structure
56	27.1	98	25		
				CL	SILTY CLAY with GRAVEL, saturated, hard, fine-gravel
60	24.7	101	30		
					Boring terminated at 30 feet Groundwater obscured by rotary wash drill method
			35		
			40		

PLATE 11

BY: CC

DATE: 10-10-06

JOB NUMBER: 2914.100

MAJOR DIVISIONS			CLASSIFICATION	TYPICAL NAMES
COARSE GRAINED SOILS MORE THAN HALF IS LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVEL WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL - SAND - CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND- SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF IS SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SILTS

UNIFIED SOIL CLASSIFICATION SYSTEM

Blows per ft.	Moisture Content (%)	Dry Unit Weight (pcf)	Depth in Feet	USCS Classification	
					Bulk Sample
					2.5" I.D. Split Barrel Sample
					2.8" I.D. Shelby Tube Sample
					No sample recovered
					Standard Penetration Test interval
					Well defined stratum change
					Gradual stratum change
					Interpreted stratum change
					Apparent ground water level at date noted. Seasonal weather conditions, site topography, etc., may cause changes in water level indicated on logs.

Note: Soils described as dry, moist, and wet are estimated to be dry of optimum, near optimum, and wet of optimum moisture content, respectively. Saturated soils are estimated to be within areas of free groundwater.

KEY TO BORING LOG SYMBOLS

BORING LOG B98-1

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 47 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
24	21.8	83			ALKALINE MATERIAL (magnesia), mottled gray-white and gray, very stiff, some gypsum
33	22.7	78			
22	28.5	77	5		at 5 feet, becomes dark gray at 5-1/2 feet, rust veinlet
37	34.2	58	10	ML	SANDY SILT, brown, moist, very stiff, yellow-white alkaline material
					ALKALINE MATERIAL (magnesia), gray-white, moist, very stiff
11	35.2	71	15	SW	SAND, light brown, moist, loose, medium grained
					ALKALINE MATERIAL (megnesia), gray-white, moist
35	23.5	85	20	ML	SANDY SILT, gray-brown, moist, medium stiff

BORING LOG B98-1

JOB NUMBER: 1629.403 **SHEET:** 2 **OF:** 2

JOB NAME: FMC Site **DEPTH:** 20 feet **TO** 25-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
35	23.5	85		ML	SANDY SILT, gray-brown, moist, medium stiff
					ALKALINE MATERIAL (magnesia), gray-white and yellow-white, moist, medium stiff
50/3"	-	-	25		SILTSTONE, red-brown, highly weathered, friable, highly fractured
					Boring terminated at 25-1/2 feet. No free water encountered.
			30		
			35		
			40		

BORING LOG B98-2

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 42 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
50	21.8	81		ML	SANDY SILT, gray, moist, hard, alkaline material
50/3"	23.1	74			ALKALINE MATERIAL (magnesia), mottled gray and white, moist, hard, trace sand
14	20.0	70	5		at 5 feet, mottled white and orange-white, stiff at 5-1/2 feet, white
19	19.7	75	10		
38	17.1	74	15		at 15 feet, siltstone fragments at 15-1/2 feet, white, very stiff, trace fine gravel
41	24.1	75	20		

BORING LOG B98-2

JOB NUMBER: 1629.403 **SHEET:** 2 **OF:** 2

JOB NAME: FMC Site **DEPTH:** 20 feet **TO** 21-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
41	24.1	75			ALKALINE MATERIAL (magnesia), white, moist, very stiff, trace fine gravel
				CL	SILTY CLAY, dark brown, moist, very stiff
					Boring terminated at 21-1/2 feet. No free water encountered.
			25		
			30		
			35		
			40		

BORING LOG B98-3

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 38 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
21	23.7	76			ALKALINE MATERIAL (magnesia), gray-white, moist, stiff
17	23.2	65			
13	25.3	69	5		at 6 feet, gypsum
14	26.7	61	10		at 10 feet, becomes white
20	30.0	61	15		at 15 feet, becomes gray-white
58	22.5	70	20		

BORING LOG B98-3

JOB NUMBER: 1629.403 **SHEET:** 2 **OF:** 2

JOB NAME: FMC Site **DEPTH:** 20 feet **TO** 31 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
58	22.5	70			ALKALINE MATERIAL (magnesia), gray-white, moist, stiff
					at 20 feet, becomes hard, wood debris and gypsum
22	26.3	72	25		at 25 feet, very stiff
32	53.3	59	30	CL	SILTY CLAY, dark brown, moist, very stiff
			35		Boring terminated at 31 feet. No free water encountered.
			40		

BORING LOG B98-4

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 50 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
50/5"	18.1	102		ML	SANDY SILT, gray-brown, dry to mist, hard
					ALKALINE MATERIAL (magnesia), gray-white, moist, hard, some silt
				ML	CLAYEY SILT, dry red, moist
76	30.9	79			ALKALINE MATERIAL (magnesia), mottled gray-white, dark gray and red, moist, hard
			5		
76	21.6	85			
				CL	SILTY CLAY, dark brown, moist
					Boring terminated at 7 feet. No free water encountered.
			10		
			15		
			20		

BORING LOG B98-5

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 32-1/2 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample

DRIVE WEIGHT - LB: 140

HEIGHT OF FALL - IN: 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
17	48.4	62			ALKALINE MATERIAL (magnesia), white, moist to wet, stiff
66	30.0	63			at 2 feet, some silty sand, gray-brown
50/5"	--	-	5		SANDSTONE, red-orange and light brown, highly weathered, friable, highly fractured
					Boring terminated at 6 feet. No free water encountered.
			10		
			15		
			20		

BORING LOG B98-6

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 21 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
25	33.4	75			ALKALINE MATERIAL (magnesia), white, dry to moist, very stiff
24	39.1	67			at 1/2 foot, mottled gray-brown and white, moist, trace medium-grained sand
13	30.1	75	5		at 5 feet, sandy silt, gray-brown, moist, stiff, white alkaline material
22	33.2	60	10		at 13-1/2 feet, more silt
			15		from 15 to 15-1/2 feet, clayey silt
37	33.7	87			from 17-1/2 to 18 feet, some gypsum
				CL	SILTY CLAY, dark brown, moist, very stiff
			20		Boring terminated at 19 feet. No free water encountered.

BORING LOG B98-7

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 26 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
16	33.3	79			ALKALINE MATERIAL (magnesia), gray-brown and white, moist, stiff, some gypsum
28	25.4	83			at 1-1/2 feet, more silt, trace fine to medium gravel
					at 2-1/2 feet, some sand
11	32.5	79	5		at 5 feet, medium stiff
15	31.8	75	10		at 10 feet, gray-white, stiff
21	26.6	85	15	CL	SILTY CLAY, dark brown, wet, stiff
					ALKALINE MATERIAL (magnesia), gray-white, moist, stiff
				CL	SILTY CLAY, dark brown
			20		Boring terminated at 20 feet. No free water encountered.

BORING LOG B98-8

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-26-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 12-1/2 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample

DRIVE WEIGHT - LB: 140

HEIGHT OF FALL - IN: 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
26	28.5	70		M L	SANDY SILT, tan, moist, very stiff with alkaline material
65	41.1	68			ALKALINE MATERIAL (magnesia), gray white
				M L	SANDY SILT, tan, moist, hard
14	76.9	48	5		ALKALINE MATERIAL (magnesia), white, wet, stiff,
				M L	SANDY SILT, brown, saturated, stiff
			10		Boring terminated at 6-1/2 feet. Free water encountered at 6-1/2 feet.
			15		
			20		

BORING LOG B98-9

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 34-1/2 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample

DRIVE WEIGHT – LB: 140

HEIGHT OF FALL – IN: 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
72	18.1	94			ALKALINE MATERIAL (magnesia), mottled off-white and white, dry , hard
29	31.0	78			
				S M	SILTY SAND, light brown, dry, very stiff, fine to medium-grained,
46	43.9	63	5		ALKALINE MATERIAL (magnesia), off-white and white, dry to moist, hard, gypsum at 5-1/2 feet
28	51.8	59	10		
50/5"	--		15		SILTSTONE, dry, highly weathered, friable, highly fractured
			20		Boring terminated at 16-1/2 feet. No free water encountered.

BORING LOG B98-10

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 31 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
20	31.8	76			ALKALINE MATERIAL (magnesia), white, moist, stiff,
					below 1/2 foot, red-brown and white
15	40.8	69			below 2 feet, white
59/9"	35.0	76	5		below 6 feet, white and tan, wet, gray, hard
				CL	SILTY CLAY, dark brown, moist with gravel
					Boring terminated at 7 feet.
					No free water encountered.
			10		
			15		
			20		

BORING LOG B98-11

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 30 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
73	25.0	76			ALKALINE MATERIAL (magnesia), gray-white, moist, hard,
				M L	SANDY SILT, mottled brown and dark brown, dry, hard with siltstone fragments
25	27.0	76			ALKALINE MATERIAL (magnesia), gray-white, moist, hard
					below 1-1/2 feet, white, very stiff
25	26.7	81	5		below 5 feet, mottled white and gray
					below 5-1/2 feet, white
					below 6 feet, dark gray
14	25.1	78	10	M L	SANDY SILT, brown, moist, stiff, trace fine gravel
					ALKALINE MATERIAL (magnesia), mottled white, tan and green, moist, stiff
45	35.2	71	15		below 15 feet, off-white and white
2	-		20	M L	CLAYEY SILT, brown, wet, very soft

BORING LOG B98-11

JOB NUMBER: 1629.403 **SHEET:** 2 **OF:** 2

JOB NAME: FMC Site **DEPTH:** 20 **TO** 21-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
2	-		-	M L	CLAYEY SILT, brown, wet, very soft
					Boring terminated at 21-1/2 feet. No free water encounterd.

25
30
35
40

BORING LOG B98-12

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 16-1/2 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
50/3"	30.4	60			ALKALINE MATERIAL (magnesia), gray-white, moist, hard below 1/2 foot, gray-brown, some fine-grained gravel between 1-1/2 feet and 3 feet, hard
			5		
28	47.6	64		ML	CLAYEY SILT, dark brown, moist, very stiff
					Boring terminated at 7-1/2 feet. No free water encountered.
			10		
			15		
			20		

BORING LOG B98-13

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 10 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
					ALKALINE MATERIAL (magnesia), gray-white, dry
8	31.5	60			below 2-1/2 feet, white, medium stiff, some medium-grained sand
			5		
36	35.9	80			
				C L	SILTY CLAY, black, moist to wet, very stiff
			10		Boring terminated at 8-1/2 feet. No free water encountered.
			15		
			20		

BORING LOG B98-14

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 22-1/2 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
41	32.3	76			ALKALINE MATERIAL (magnesia), light gray, moist, very stiff
					below 1-1/2 feet, hard
77	33.6	80			
95/ 11"	37.4	74	5		
			10		at 10 feet, orange veinlet
81	37.9	76			below 10-1/2 feet, light gray and white
					below 11 feet, tan
13	51.6	64	15		below 15 feet, white, wet
					below 16 feet, speckled black and white
50/1"	-	-	20		SANDSTONE, brown, highly weathered, friable, highly fractured

BORING LOG B98-14

JOB NUMBER: 1629.403 **SHEET:** 2 **OF:** 2

JOB NAME: FMC Site **DEPTH:** 20 **TO** 20-1/2 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
50/1"	-	-			SANDSTONE, brown, highly weathered, friable, highly fractured
					Boring terminated at 20-1/2 feet. No free water encountered at 18 feet.

BORING LOG B98-15

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 18 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample **DRIVE WEIGHT - LB** 140 **HEIGHT OF FALL - IN** 30

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSIFICATION	DESCRIPTION
				ML	CLAYEY SILT, gray-brown
21	35.5	66	5		ALKALINE MATERIAL (magnesia), white, moist, stiff
48	-	-		CL	SILTY CLAY, orange-brown, moist to wet, very stiff
			10		Boring terminated at 8-1/2 feet. No free water encountered.
			15		
			20		

BORING LOG B98-16

JOB NUMBER: 1629.403 **DATE DRILLED:** 3-27-98

JOB NAME: FMC Site **SURFACE ELEVATION:** 30 feet

DRILL RIG: Hollow Auger **DATUM:** NGVD 29

SAMPLER TYPE: ■ 2.5 inch I.D. Split Barrel Sample

DRIVE WEIGHT - LB: 140

HEIGHT OF FALL - IN: 30

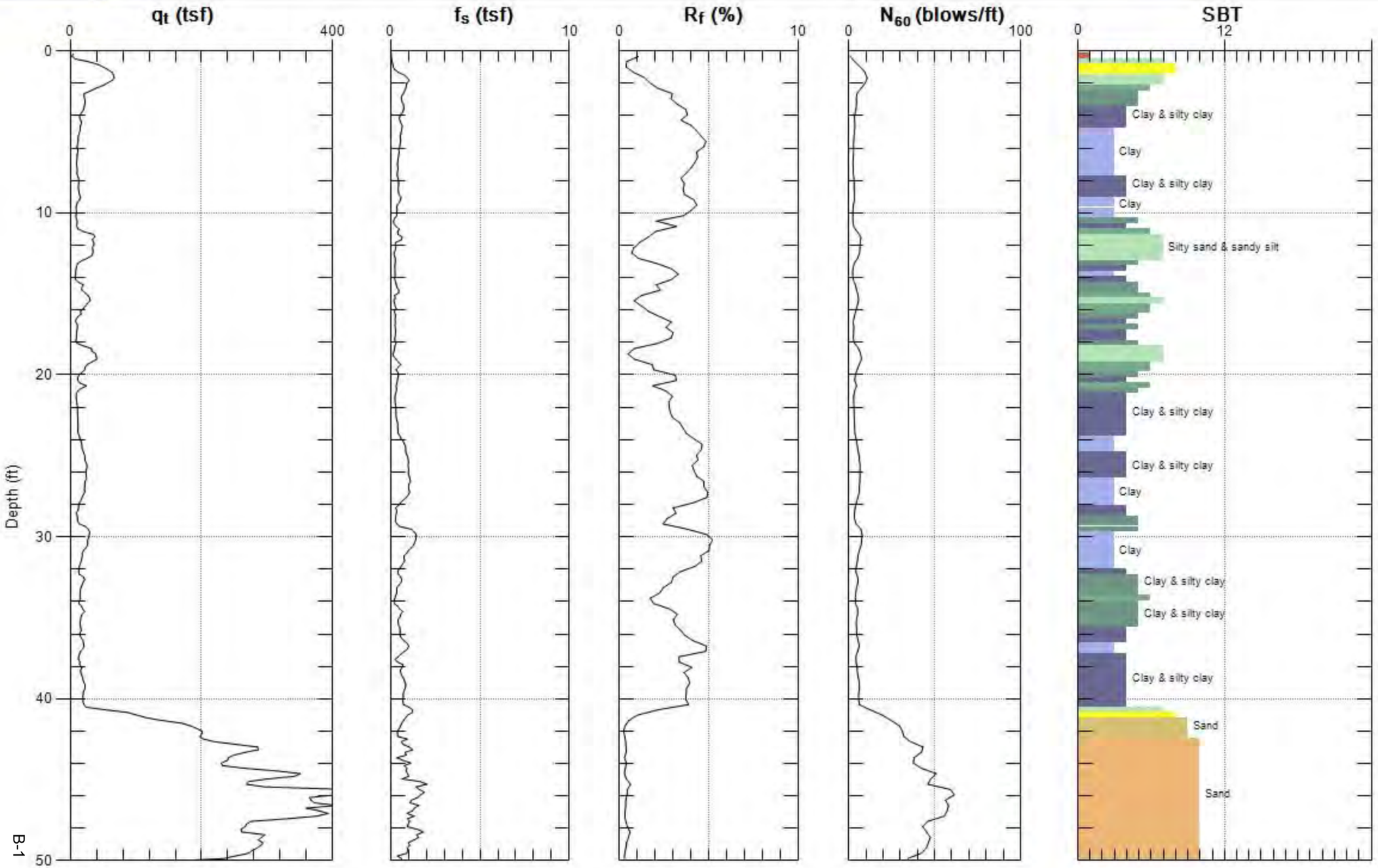
BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
					ALKALINE MATERIAL (magnesia), white, moist, stiff
16	-	-		M L	SANDY SILT, dark brown, moist, stiff, sitlstone fragments
			5		Boring terminated at 3-1/2 feet. No free water encountered.
			10		
			15		
			20		

APPENDIX B

CPT Graphs

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-01(C-1*)
Engineer: B.STEVENS
Date: 12/14/2011 07:46



Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

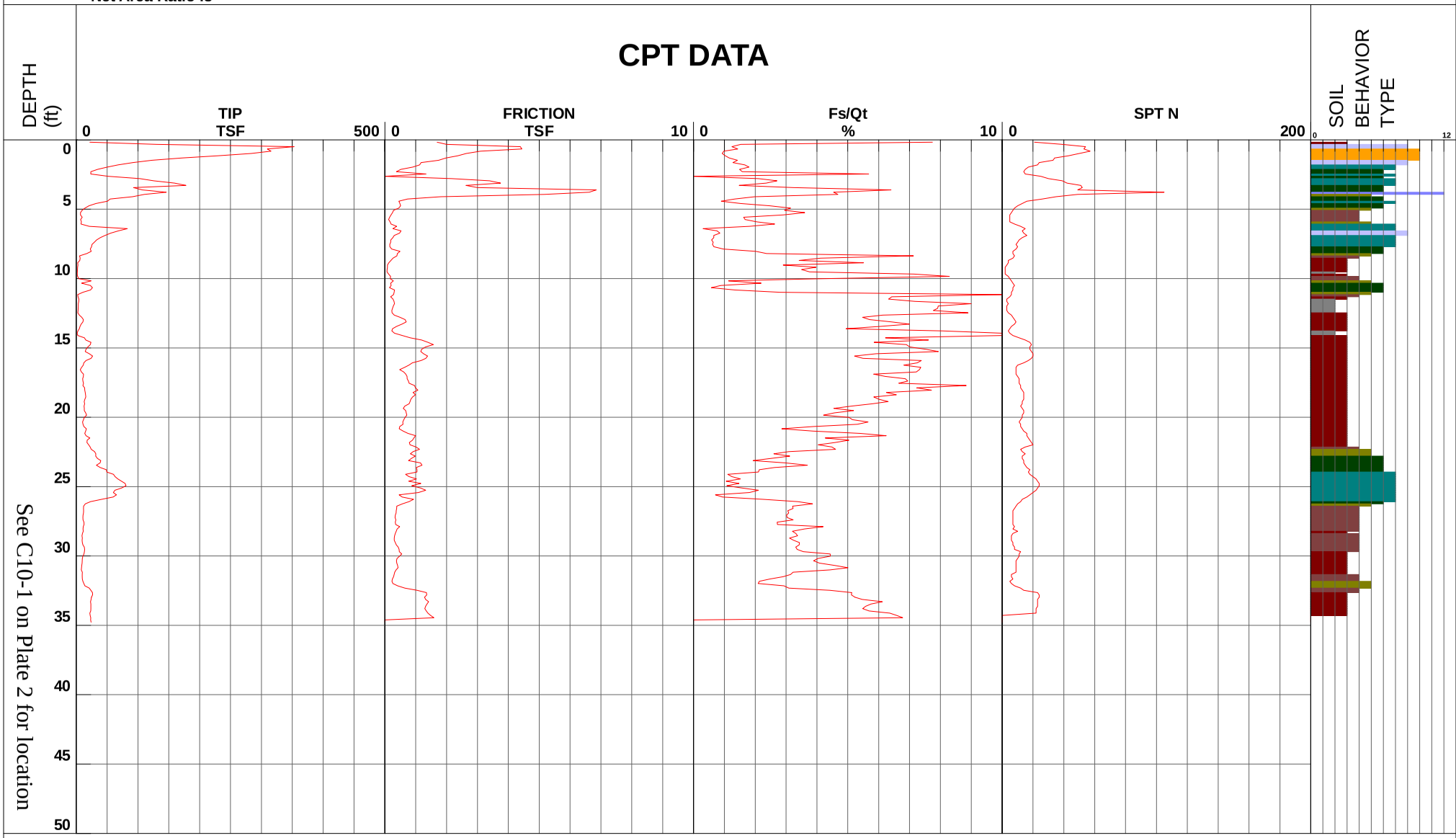
* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

Berlogar Geotechnical Consultants

Project	Hill Parcel	Operator	BH-TF	Filename	SDF(380).cpt
Job Number	3268.100	Cone Number	DSG0786	GPS	
Hole Number	CPT-01	Date and Time	7/27/2010 11:17:00 AM	Maximum Depth	34.78 ft
Water Table Depth		7.00 ft			

Net Area Ratio .8



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

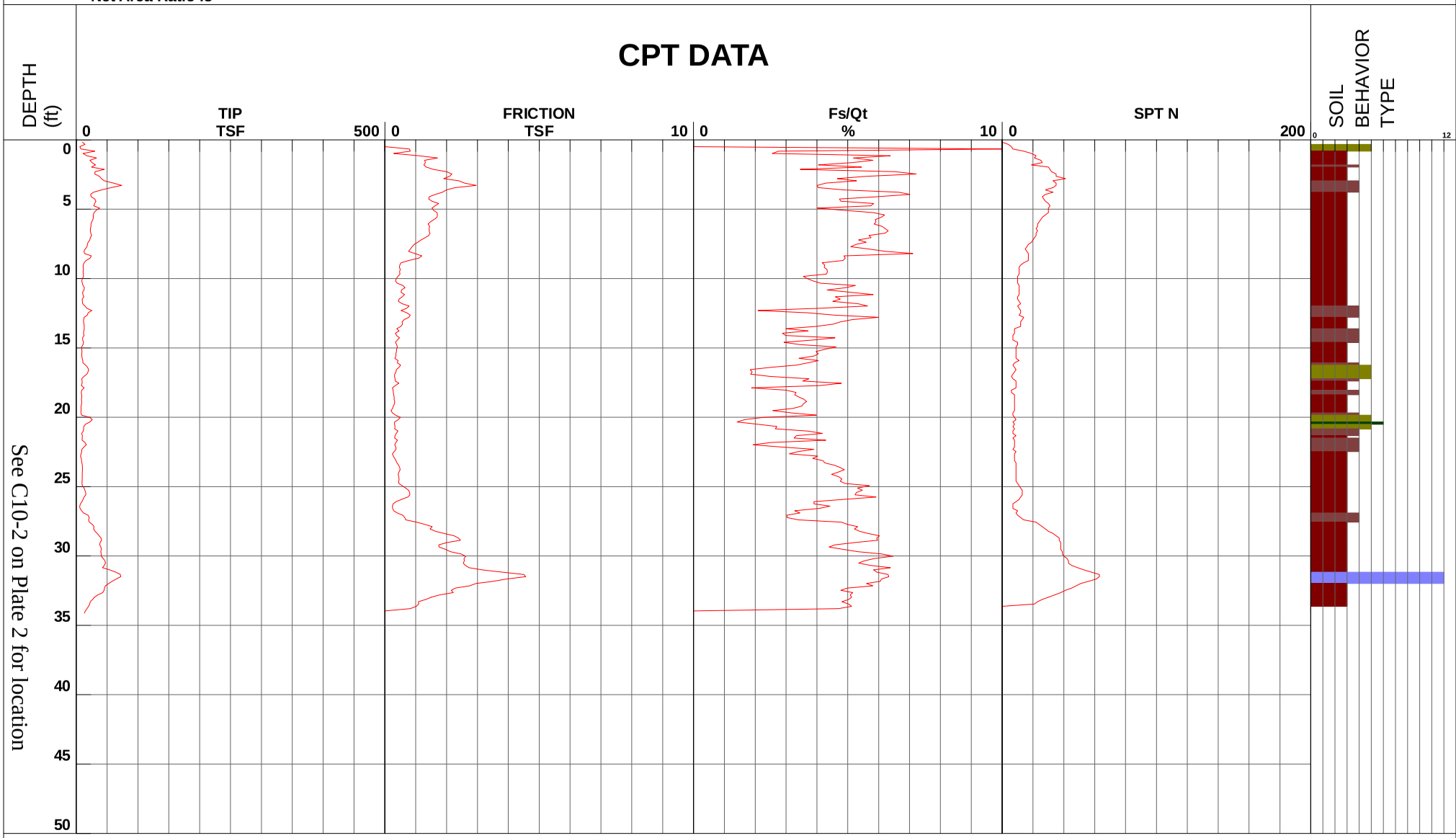
Cone Size 10cm squared

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

Berlogar Geotechnical Consultants

Project	Hill Parcel	Operator	BH-TF	Filename	SDF(378).cpt
Job Number	3268.100	Cone Number	DSG0786	GPS	
Hole Number	CPT-02	Date and Time	7/27/2010 10:10:50 AM	Maximum Depth	34.12 ft
Water Table Depth		7.00 ft			

Net Area Ratio .8



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

Cone Size 10cm squared

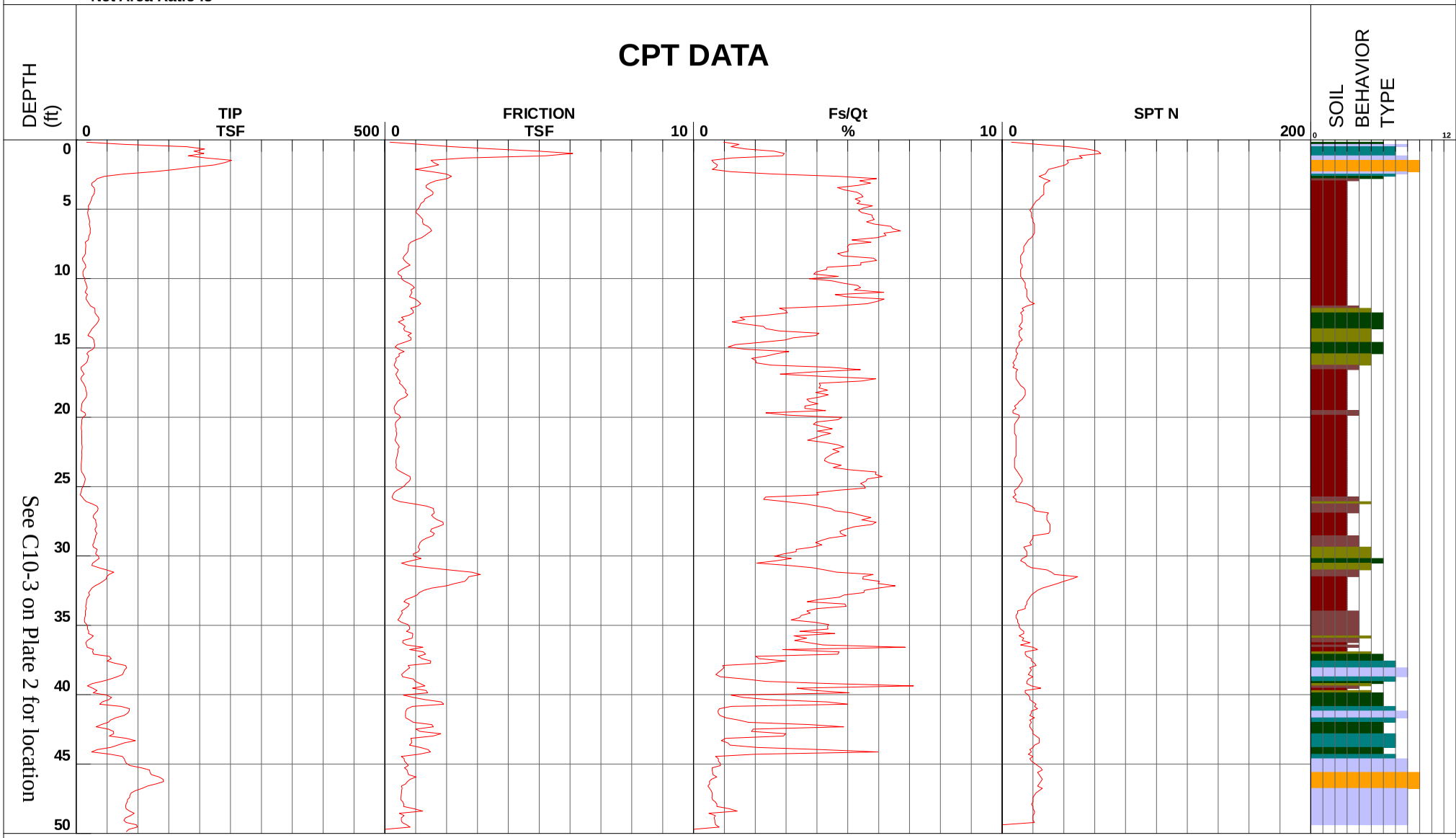
*Soil behavior type and SPT based on data from UBC-1983

Berlogar Geotechnical Consultants

Project	Hill Parcel	Operator	BH-TF	Filename	SDF(376).cpt
Job Number	3268.100	Cone Number	DSG0786	GPS	
Hole Number	CPT-03	Date and Time	7/27/2010 8:10:37 AM	Maximum Depth	49.87 ft
Water Table Depth	7.00 ft				

Net Area Ratio .8

CPT DATA



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

Cone Size 10cm squared

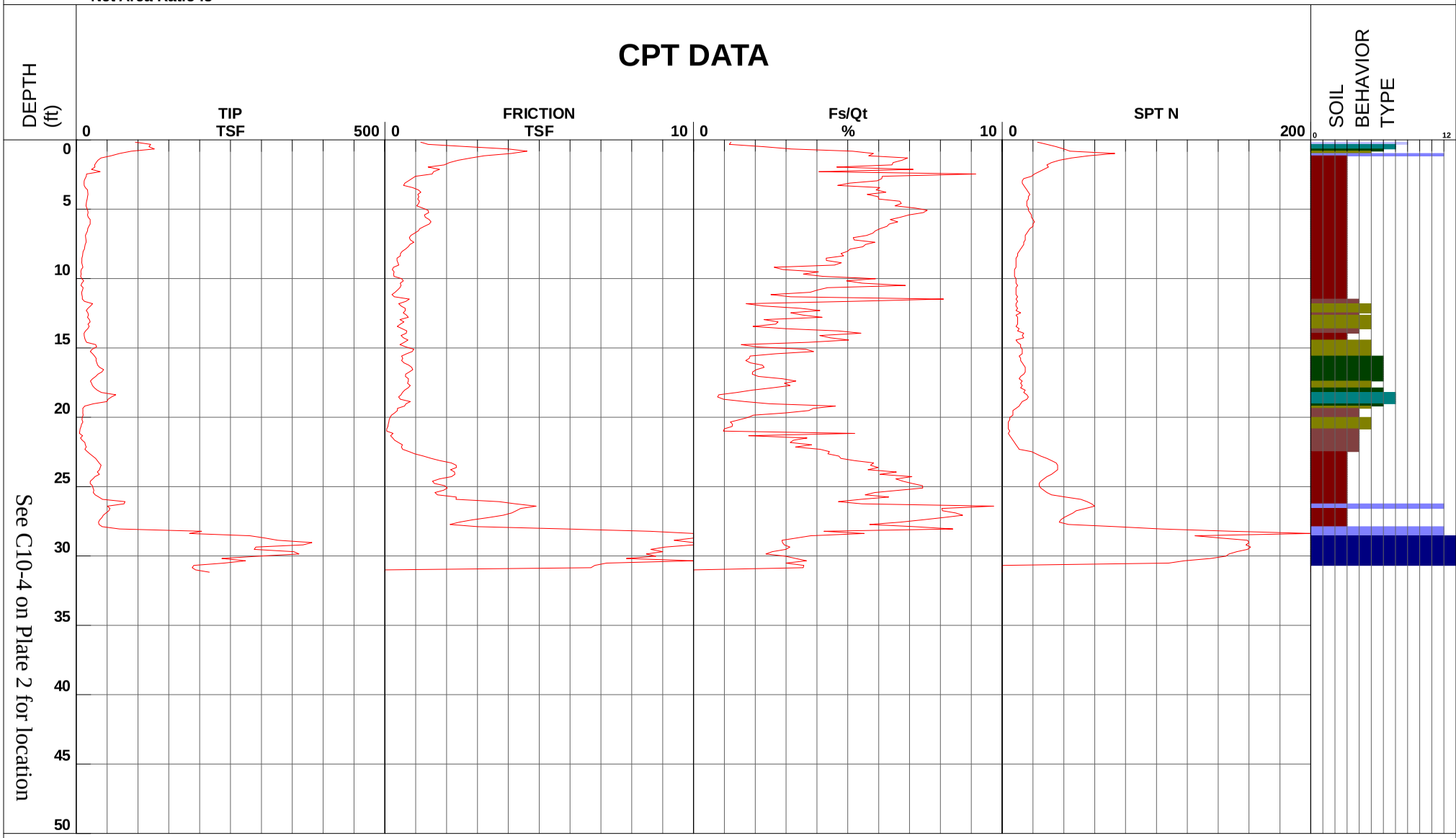
*Soil behavior type and SPT based on data from UBC-1983

Berlogar Geotechnical Consultants

Project	Hill Parcel	Operator	BH-TF	Filename	SDF(385).cpt
Job Number	3268-100	Cone Number	DSG0786	GPS	
Hole Number	CPT-04	Date and Time	8/10/2010 8:00:20 AM	Maximum Depth	31.17 ft
Water Table Depth		7.00 ft			

Net Area Ratio .8

CPT DATA



See C10-4 on Plate 2 for location

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

Cone Size 10cm squared

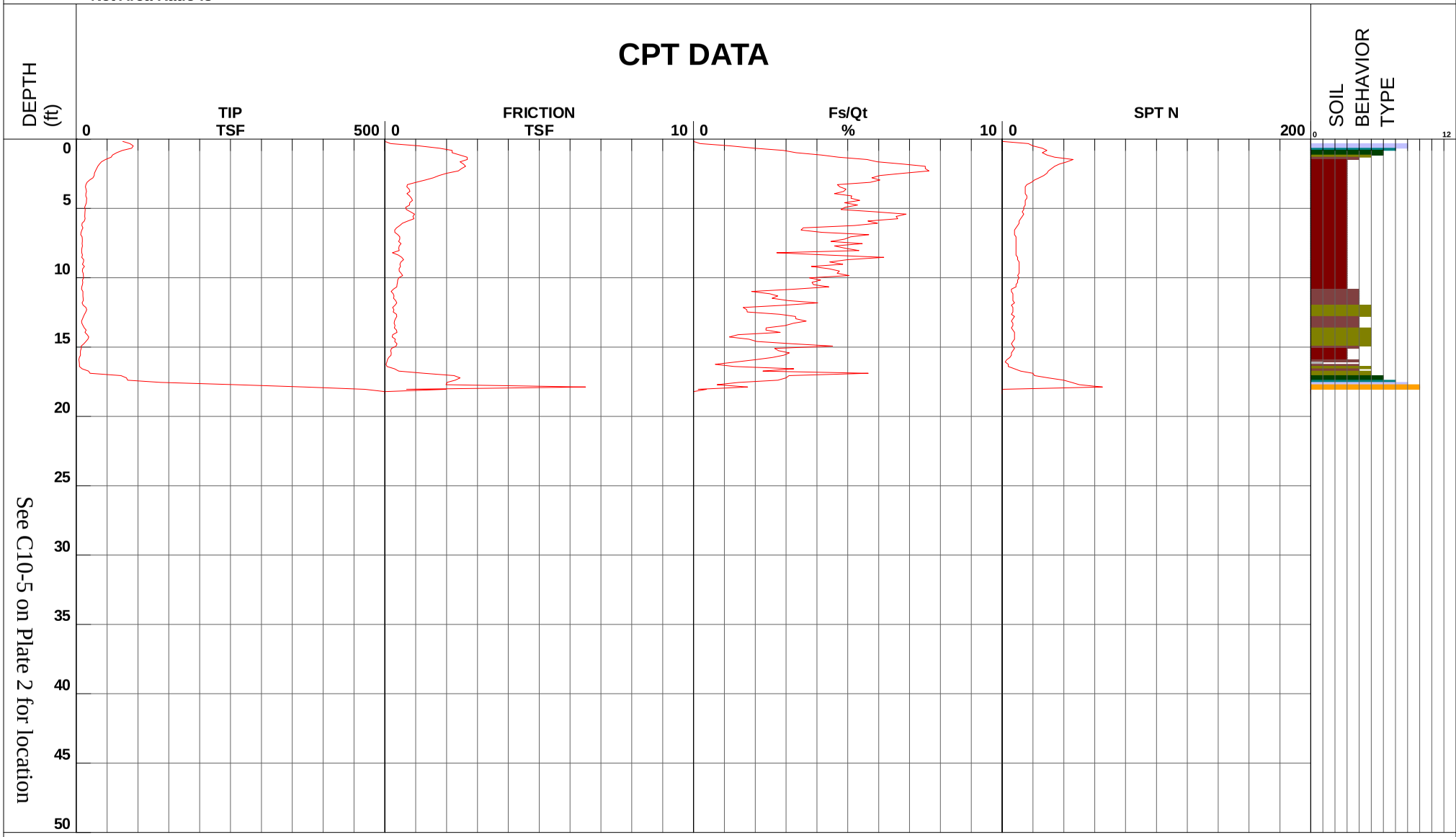
*Soil behavior type and SPT based on data from UBC-1983

Berlogar Geotechnical Consultants

Project	Hill Parcel	Operator	BH-TF	Filename	SDF(387).cpt
Job Number	3268-100	Cone Number	DSG0786	GPS	
Hole Number	CPT-05	Date and Time	8/10/2010 10:07:37 AM	Maximum Depth	18.37 ft
Water Table Depth		7.00 ft			

Net Area Ratio .8

CPT DATA



See C10-5 on Plate 2 for location

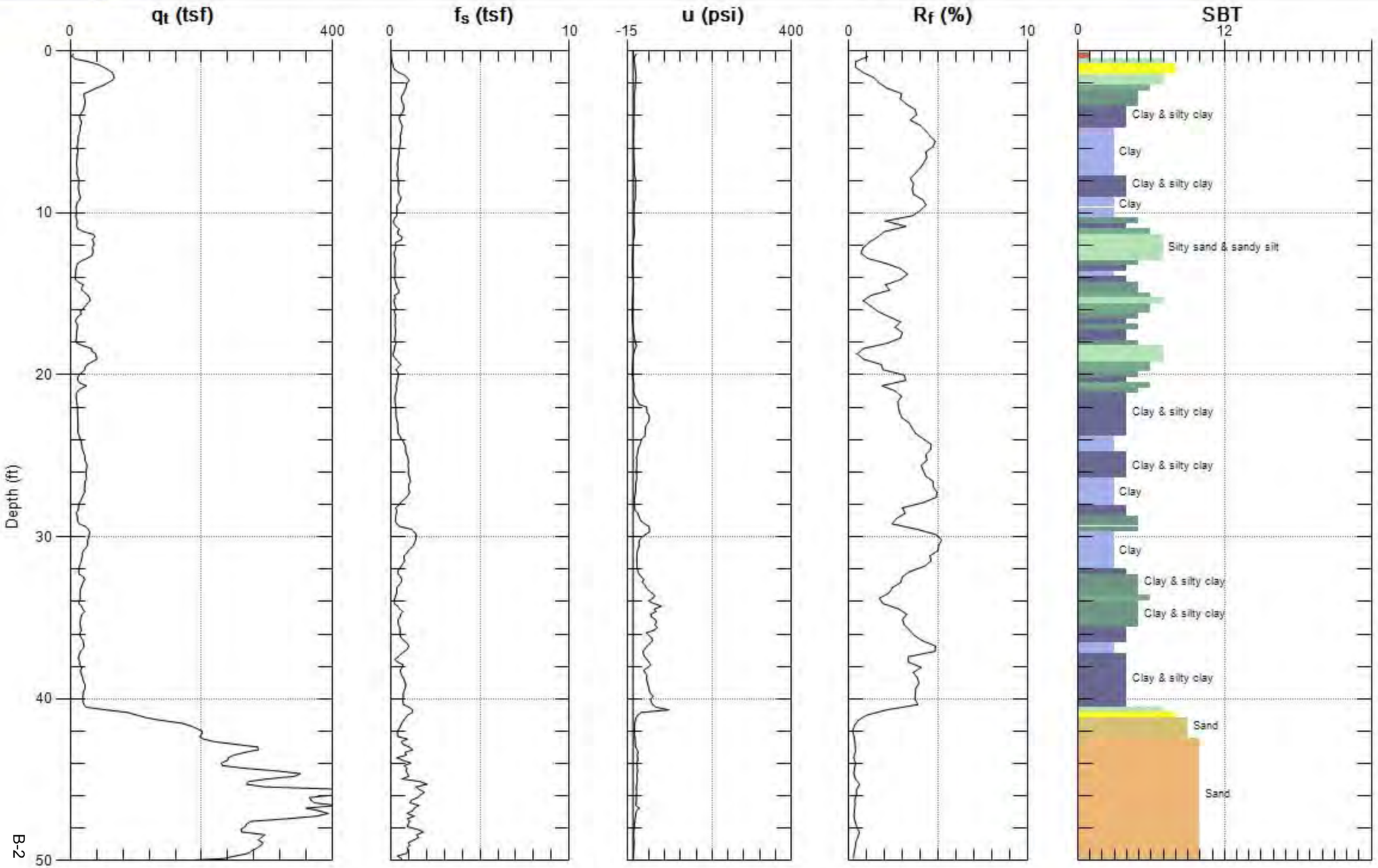
1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 10cm squared

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

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-01(C-1*)
Engineer: B.STEVENS
Date: 12/14/2011 07:46



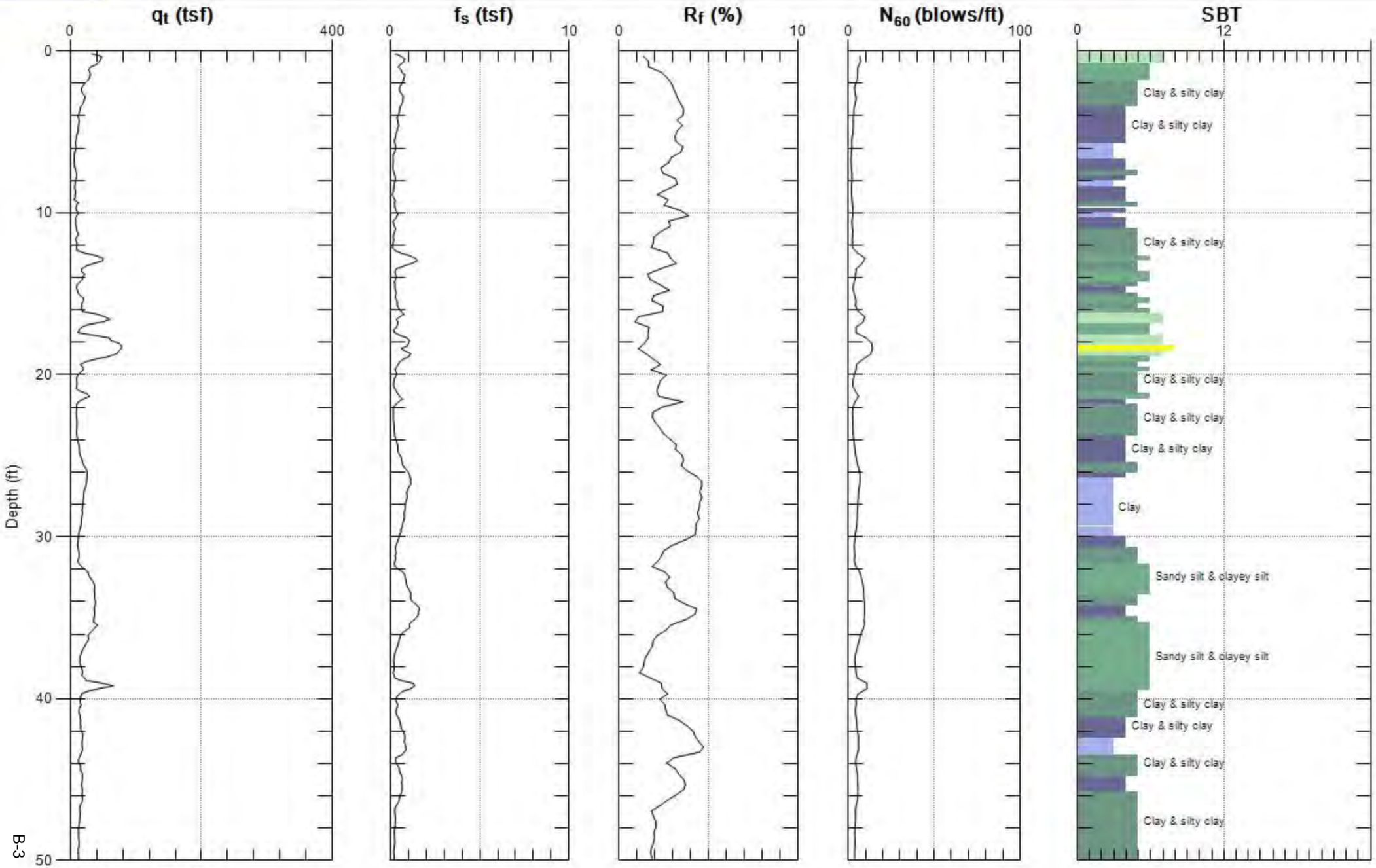
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-02(C-2*)
Engineer: B.STEVENS
Date: 12/14/2011 12:43



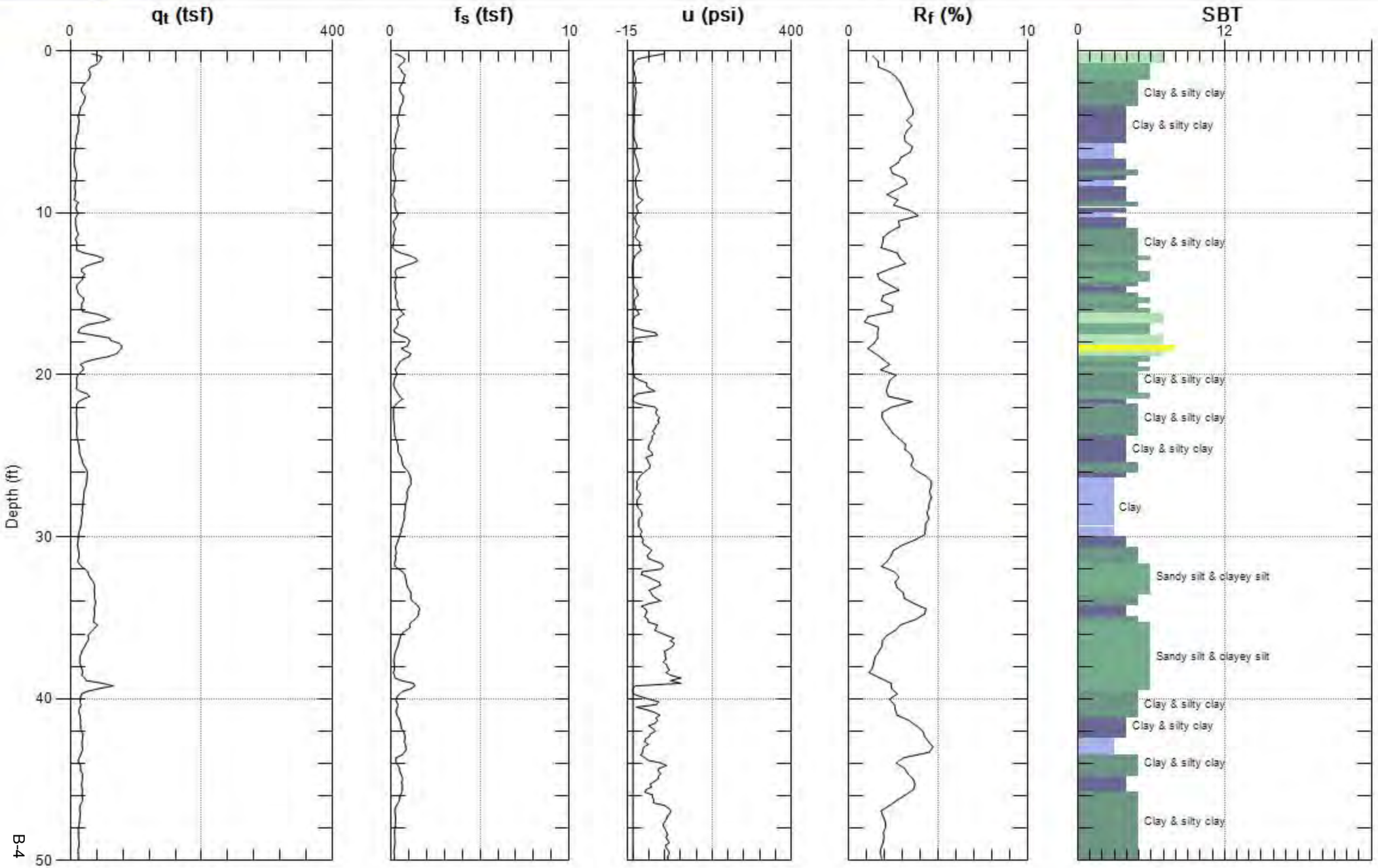
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-02 (C-2*)
Engineer: B.STEVENS
Date: 12/14/2011 12:43



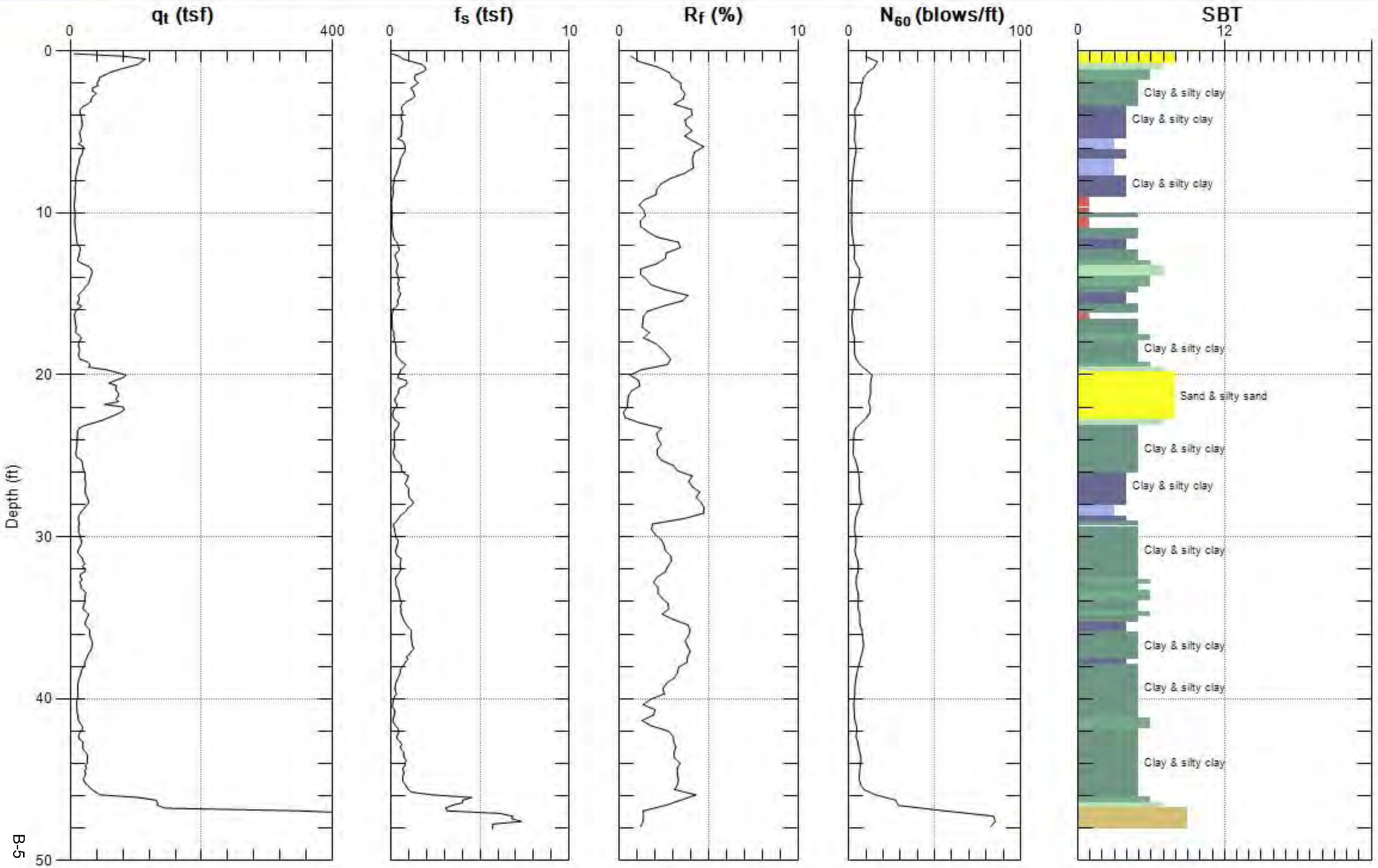
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-03(C-3*)
Engineer: B.STEVENS
Date: 12/13/2011 02:51



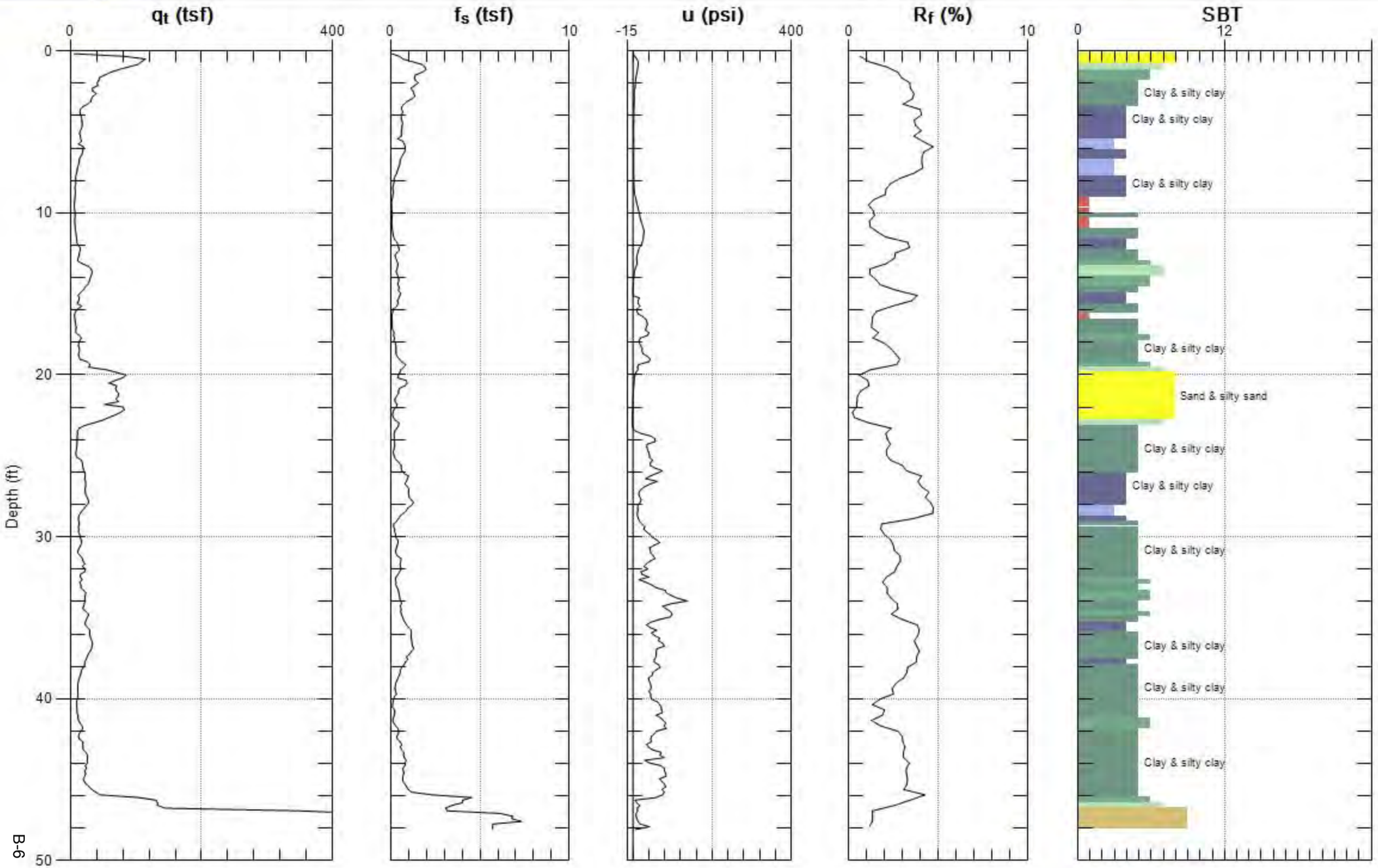
Max. Depth: 48.064 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-03 (C-3*)
Engineer: B.STEVENS
Date: 12/13/2011 02:51



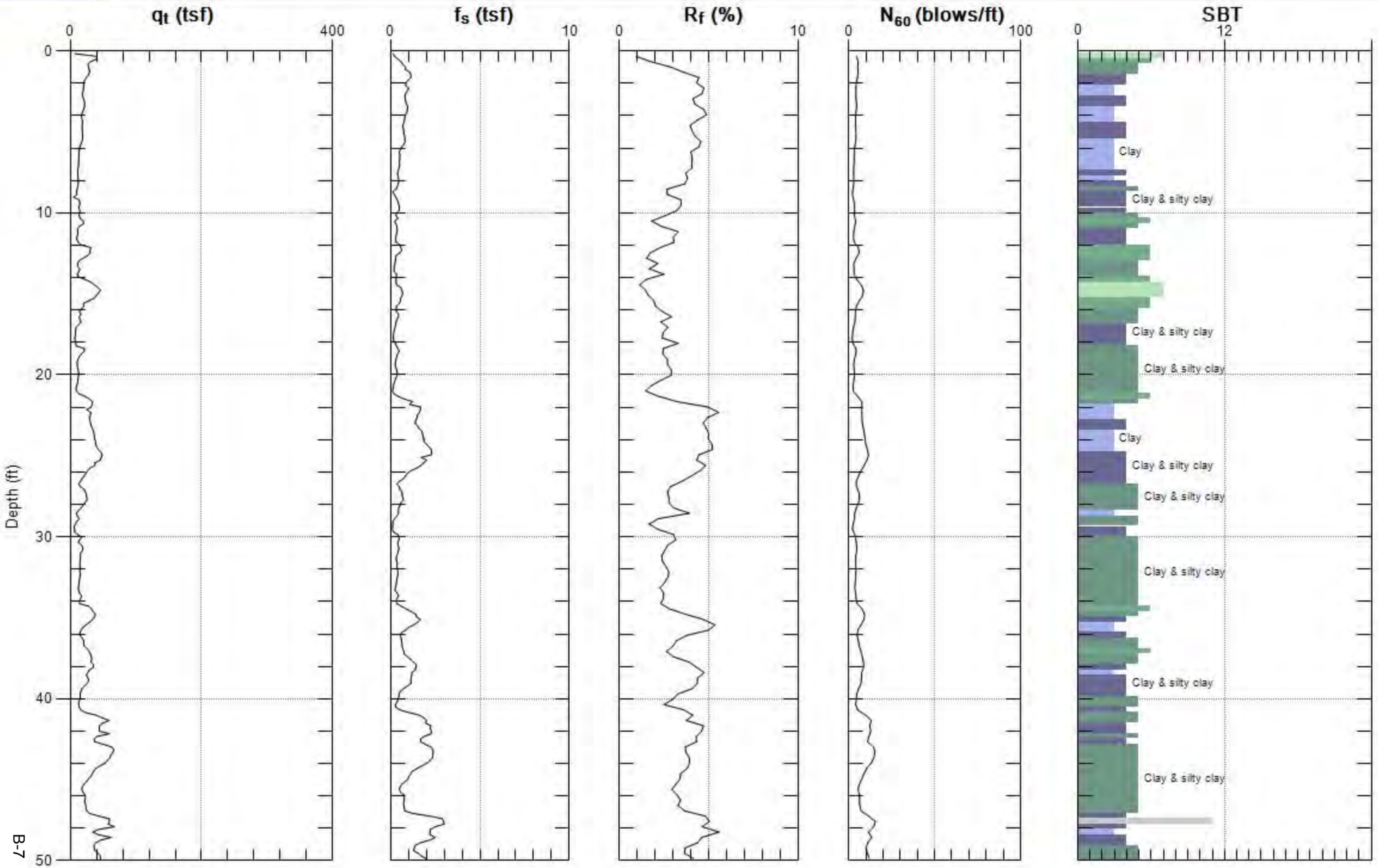
Max. Depth: 48.064 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-04 (C-4*)
Engineer: B.STEVENS
Date: 12/14/2011 10:42



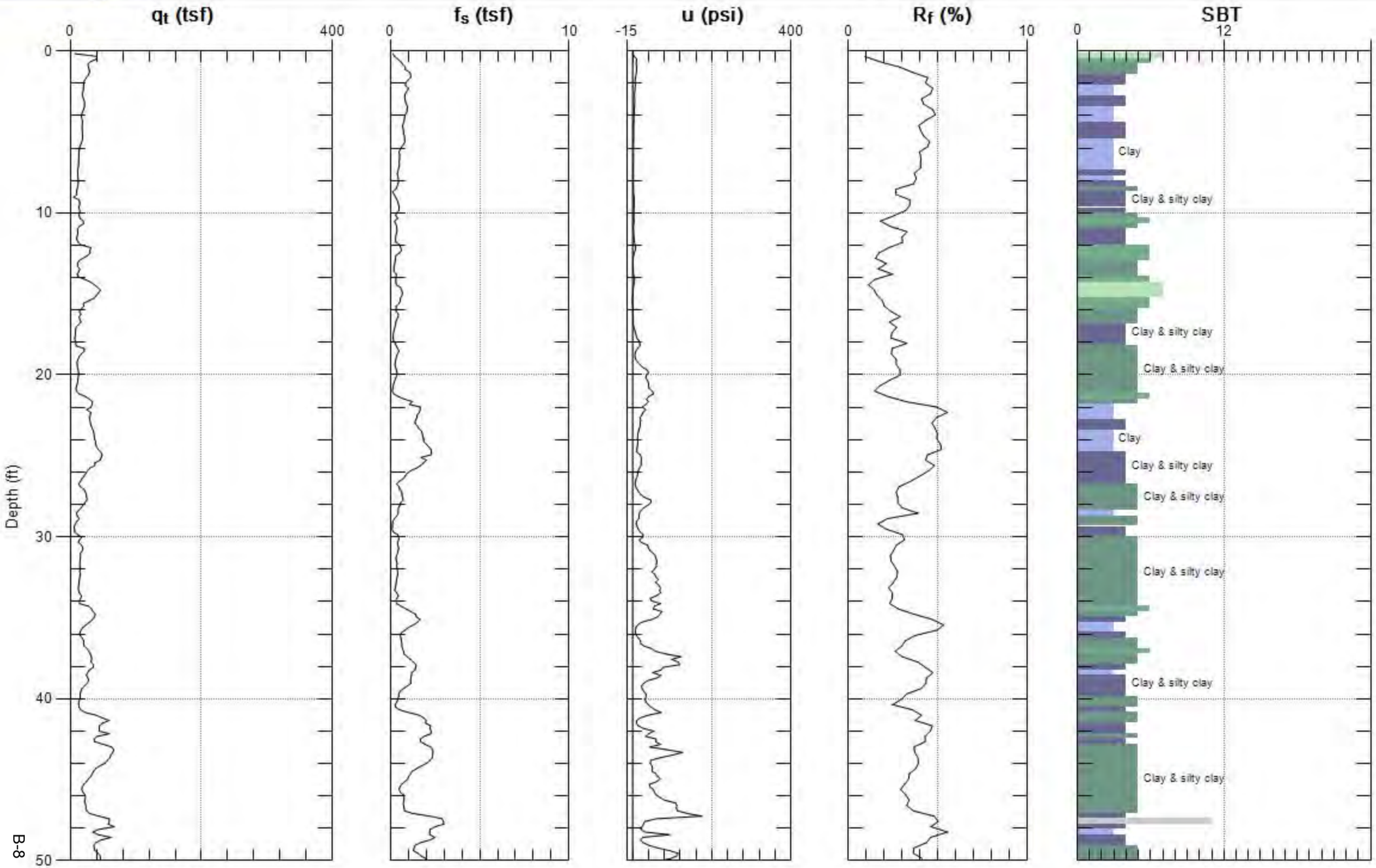
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-04 (C-4*)
Engineer: B.STEVENS
Date: 12/14/2011 10:42



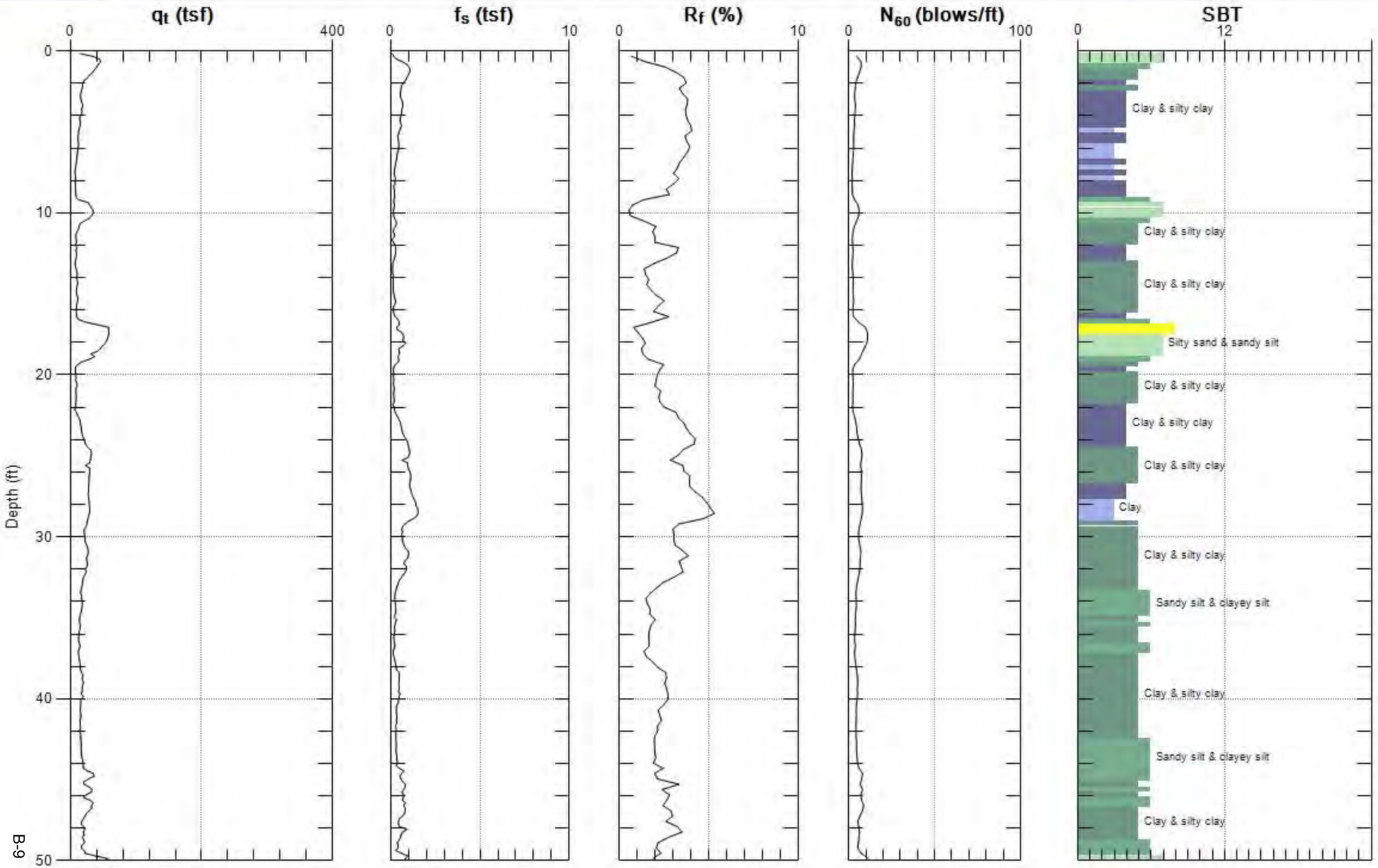
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-05 (C-5*)
Engineer: B.STEVENS
Date: 12/14/2011 09:09



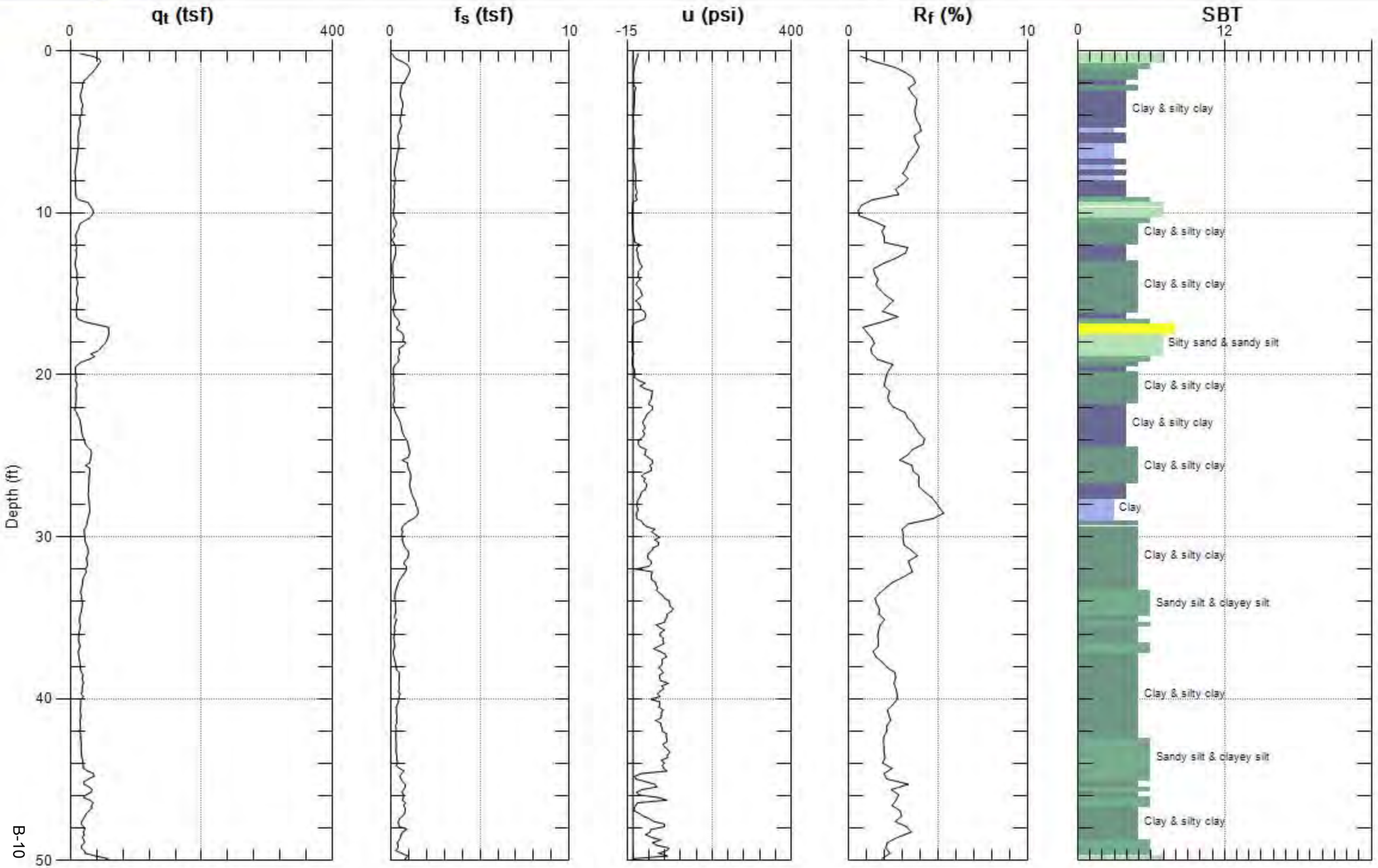
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-05(C-5*)
Engineer: B.STEVENS
Date: 12/14/2011 09:09



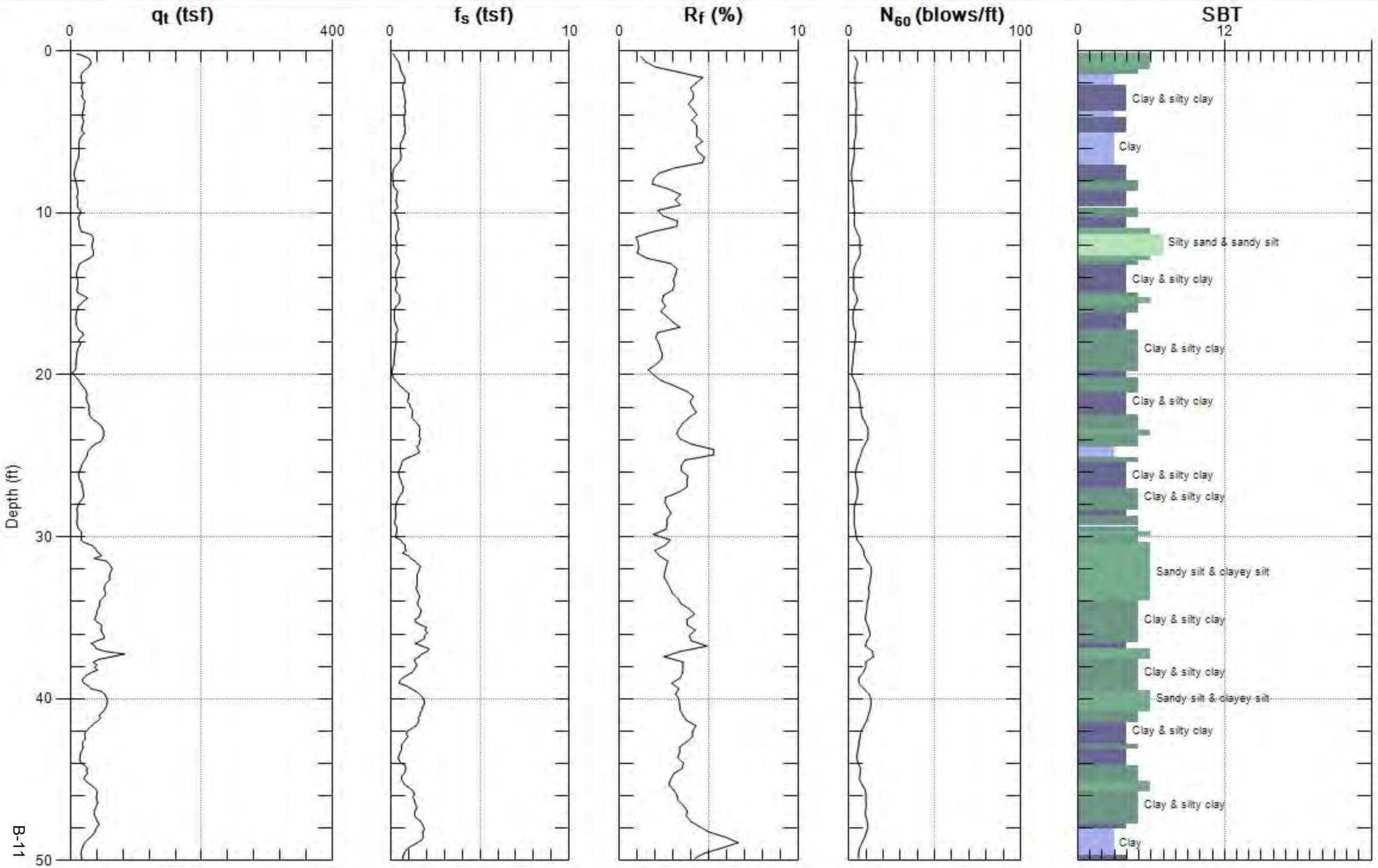
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-06(C-6*)
Engineer: B.STEVENS
Date: 12/13/2011 09:35



B-11

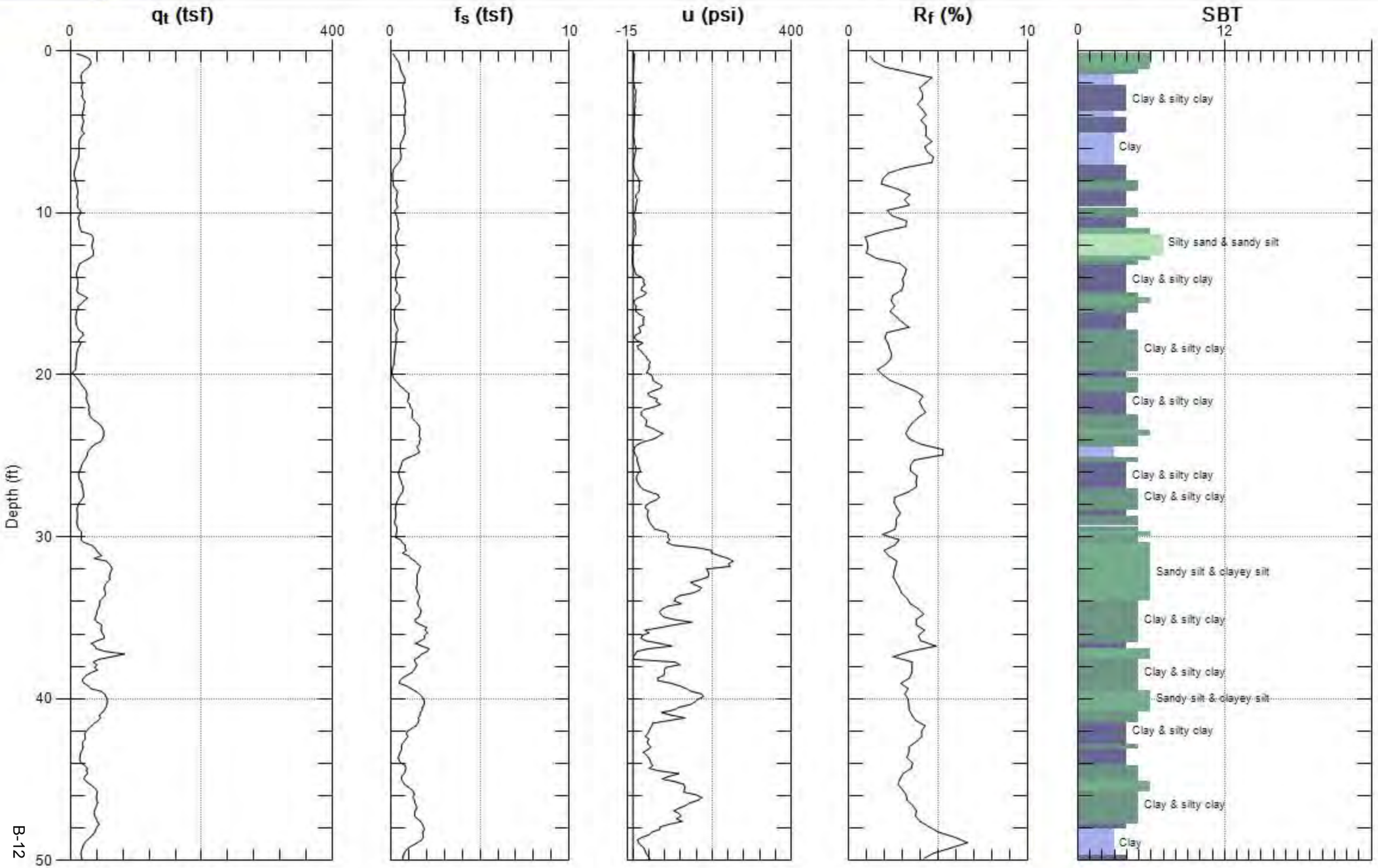
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-06 (C-6*)
Engineer: B.STEVENS
Date: 12/13/2011 09:35



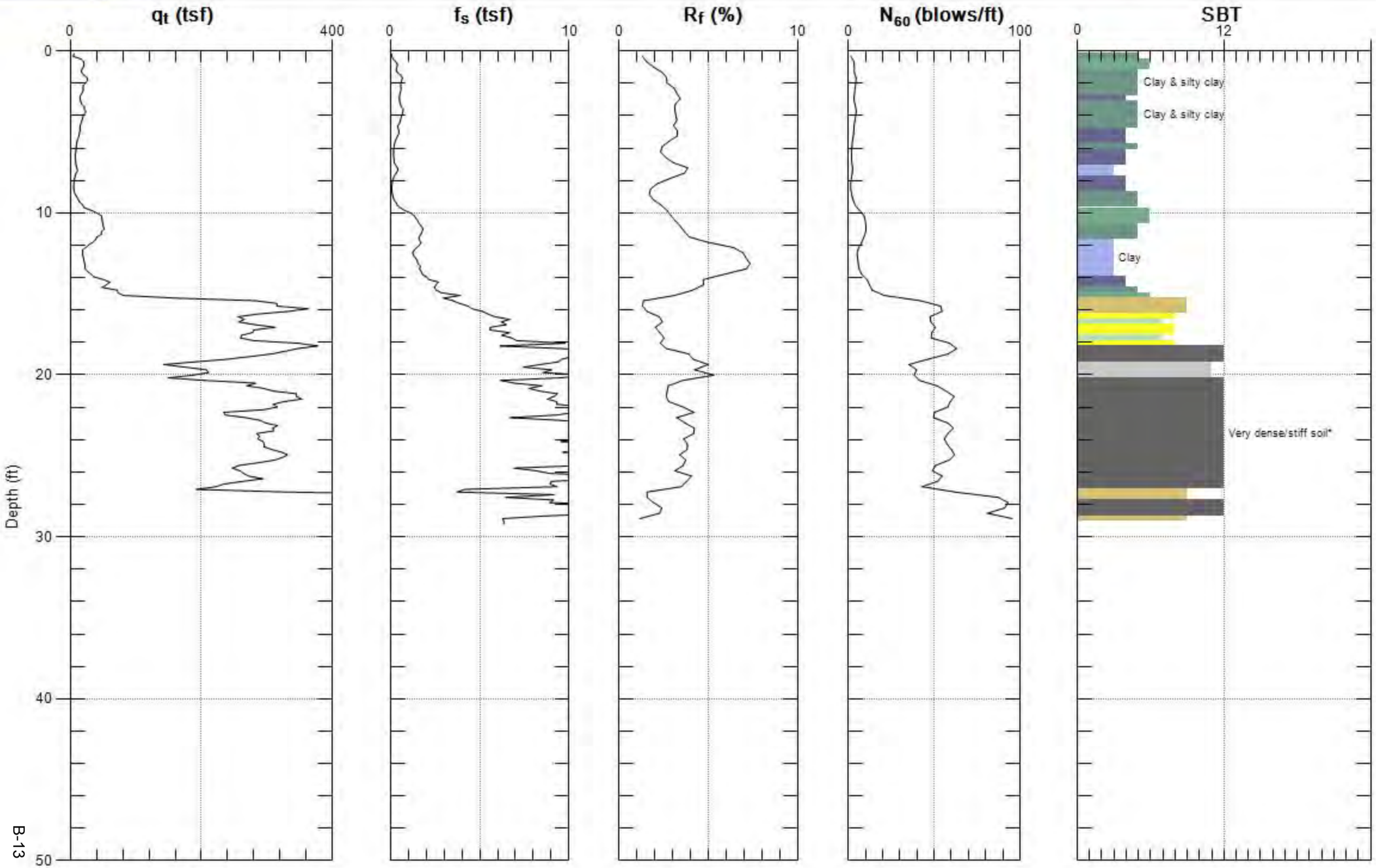
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-07(C-7*)
Engineer: B.STEVENS
Date: 12/13/2011 10:54



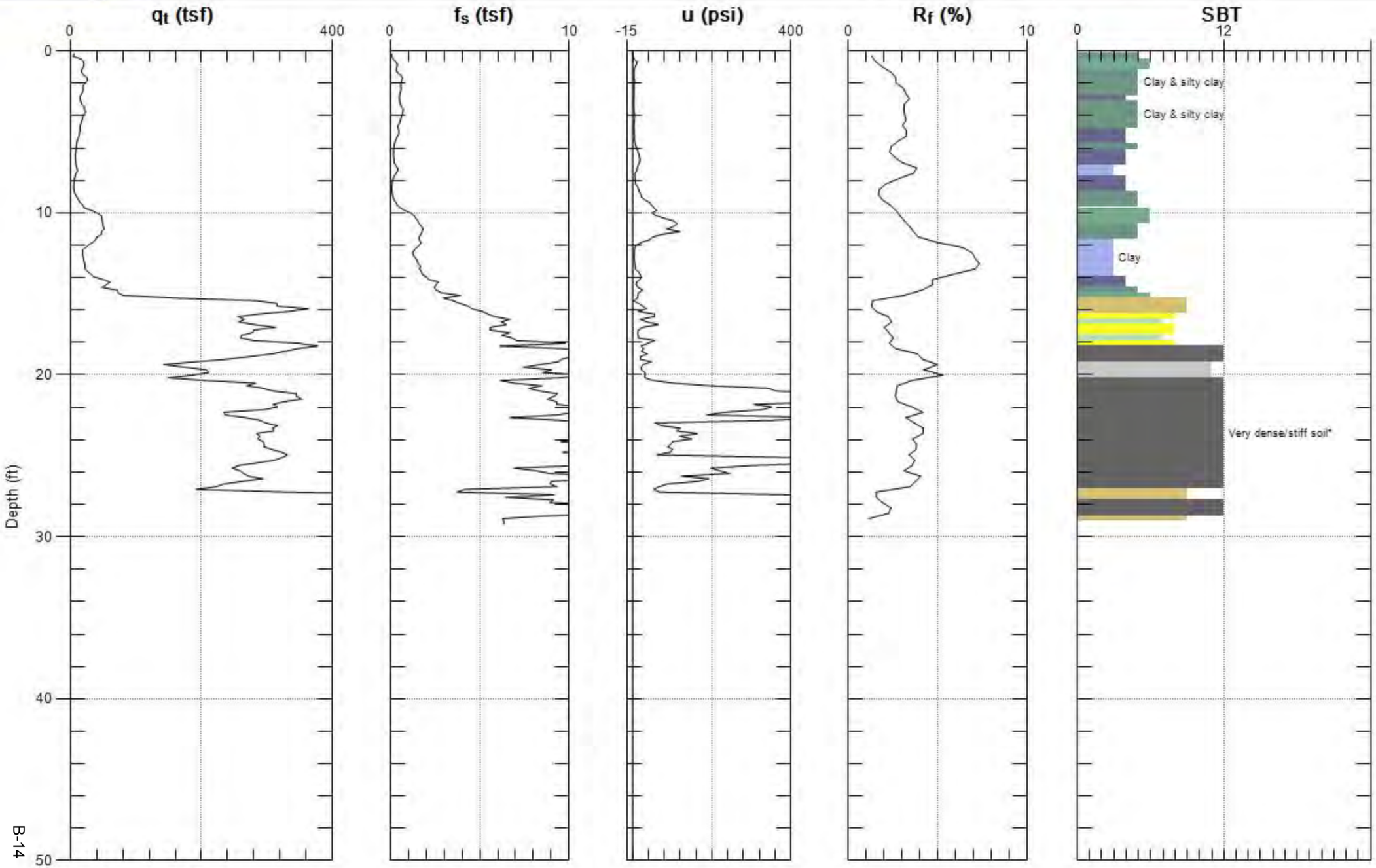
Max. Depth: 29.199 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-07(C-7*)
Engineer: B.STEVENS
Date: 12/13/2011 10:54



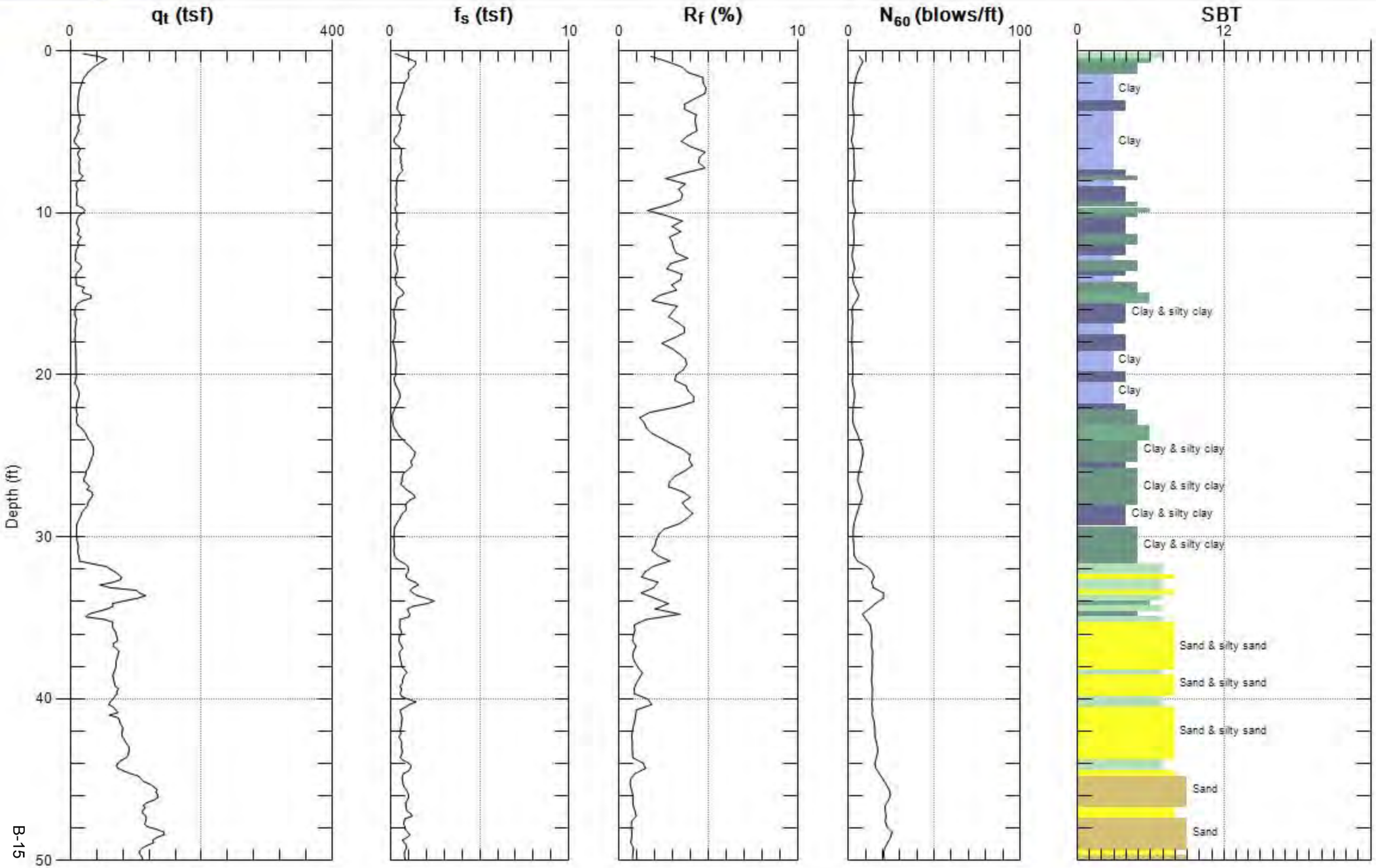
Max. Depth: 29.199 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-08 (C-8*)
Engineer: B.STEVENS
Date: 12/13/2011 12:56



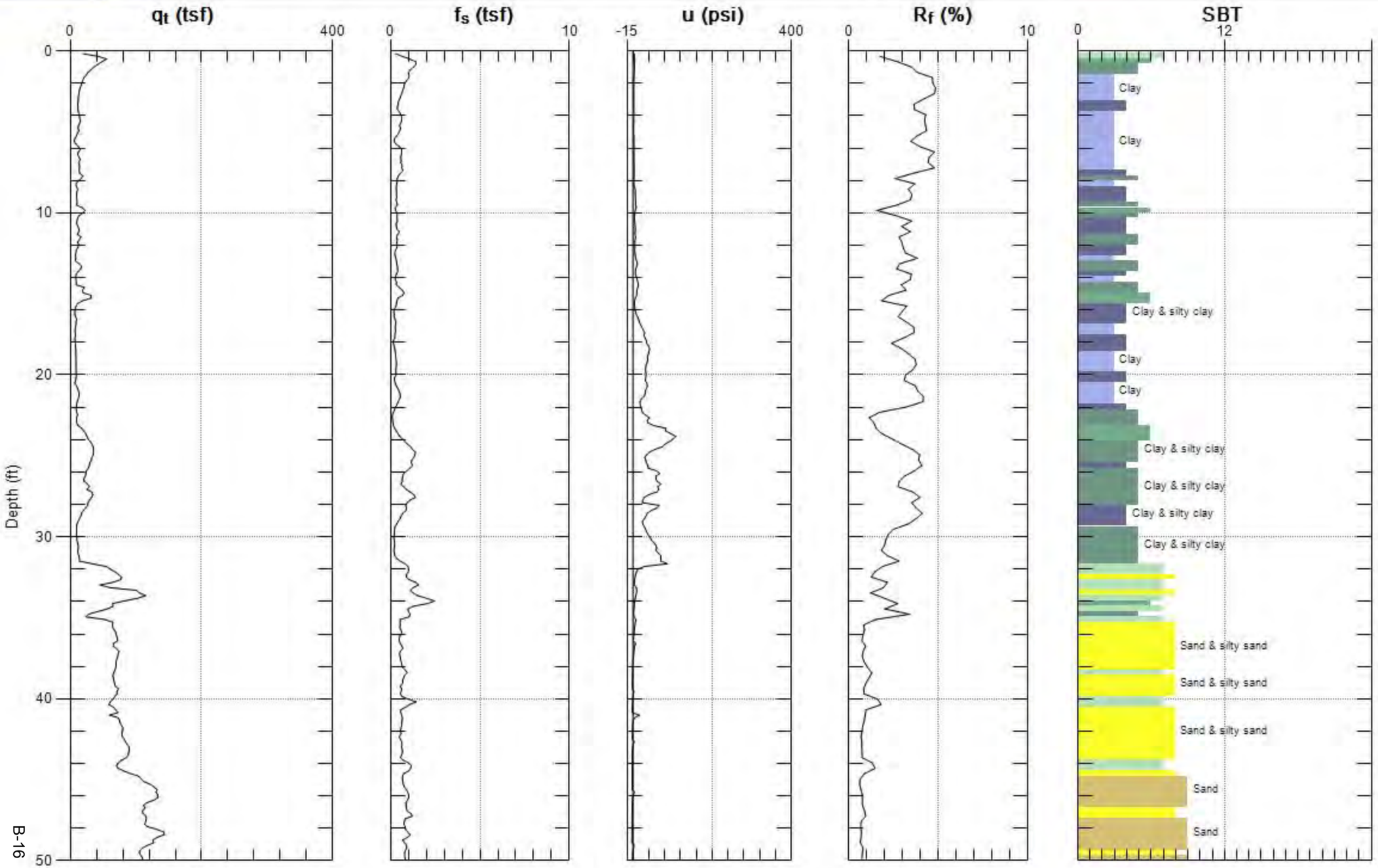
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-08(C-8*)
Engineer: B.STEVENS
Date: 12/13/2011 12:56



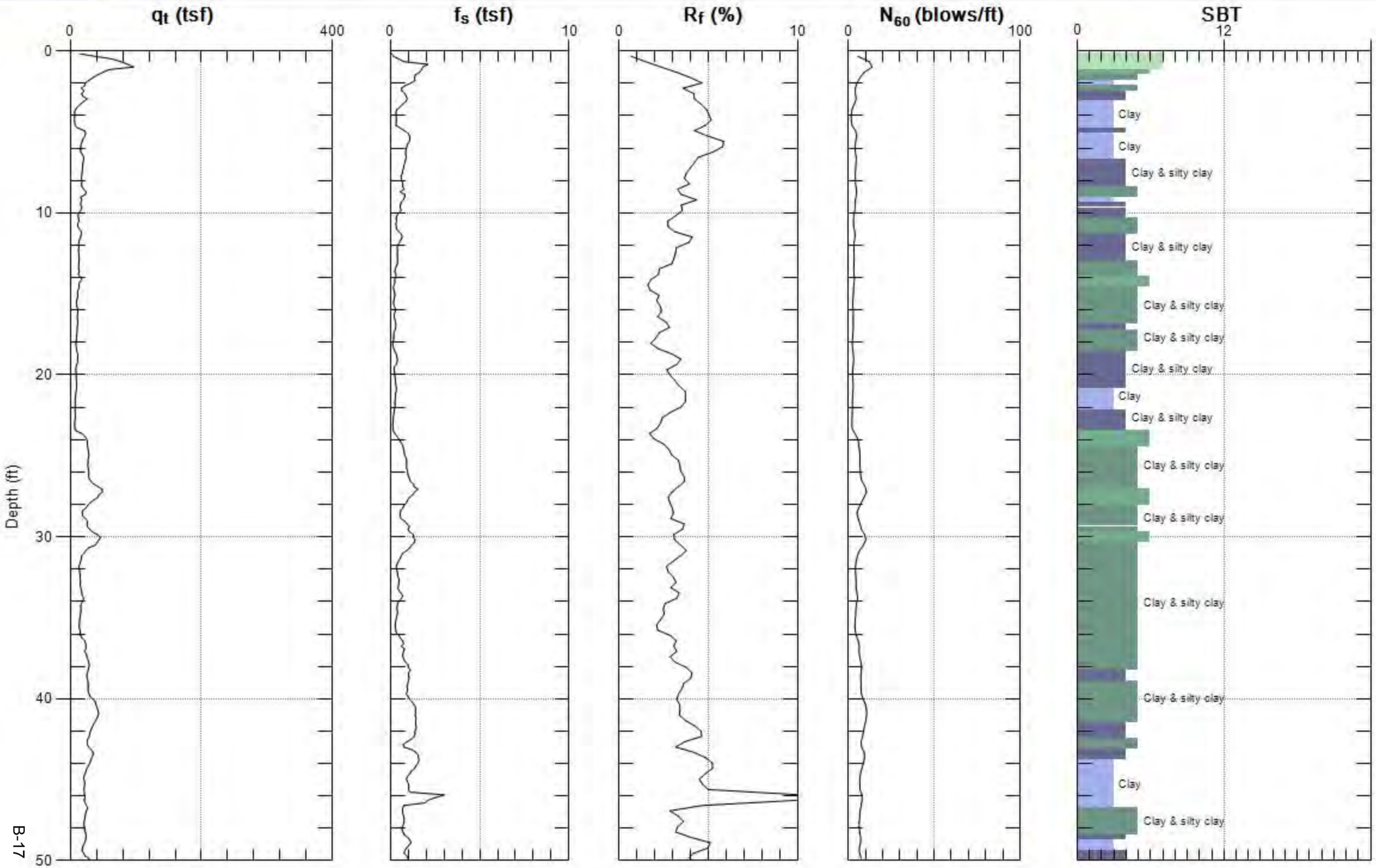
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-09 (C-9*)
Engineer: B.STEVENS
Date: 12/13/2011 07:44



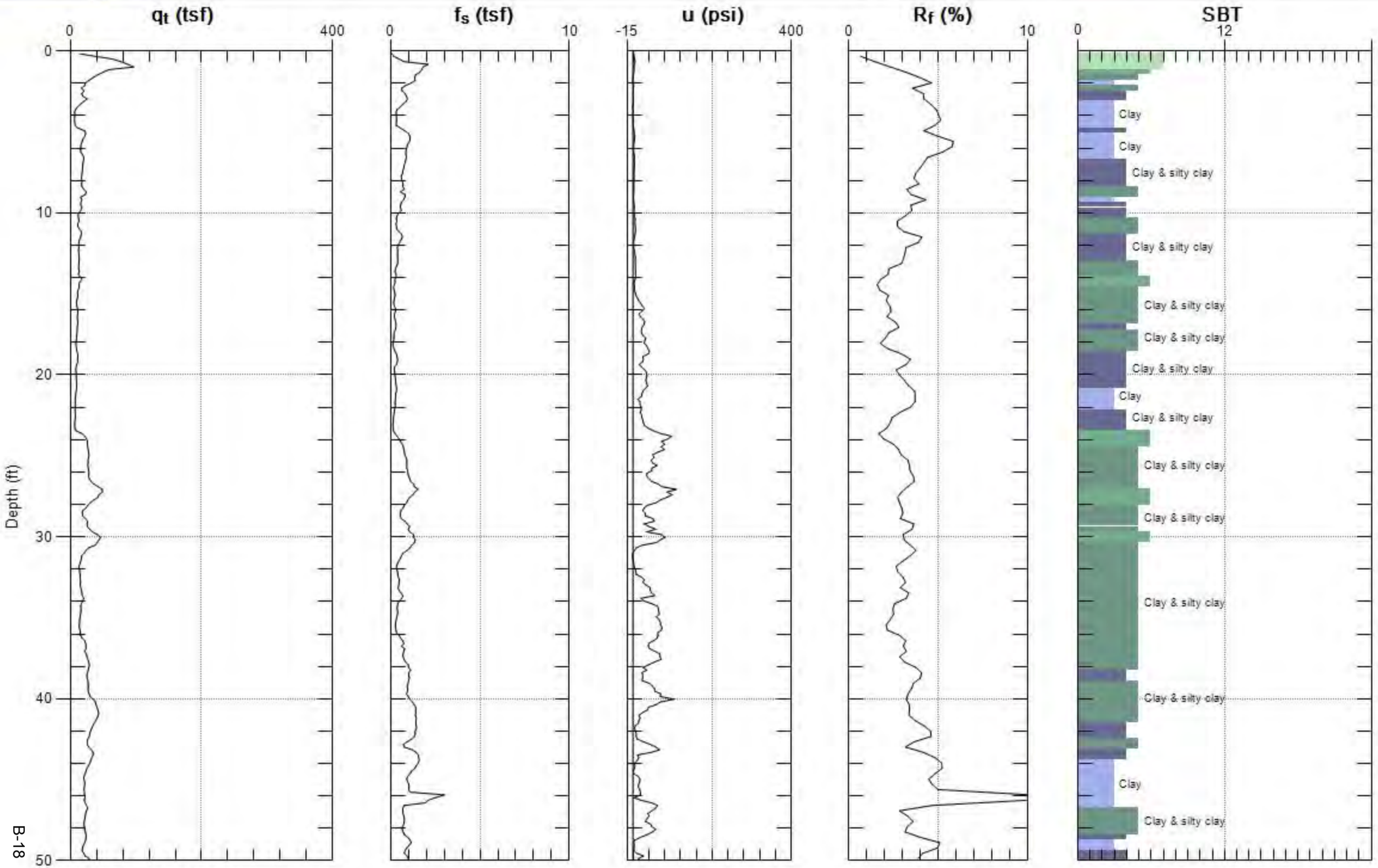
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-09(C-9*)
Engineer: B.STEVENS
Date: 12/13/2011 07:44



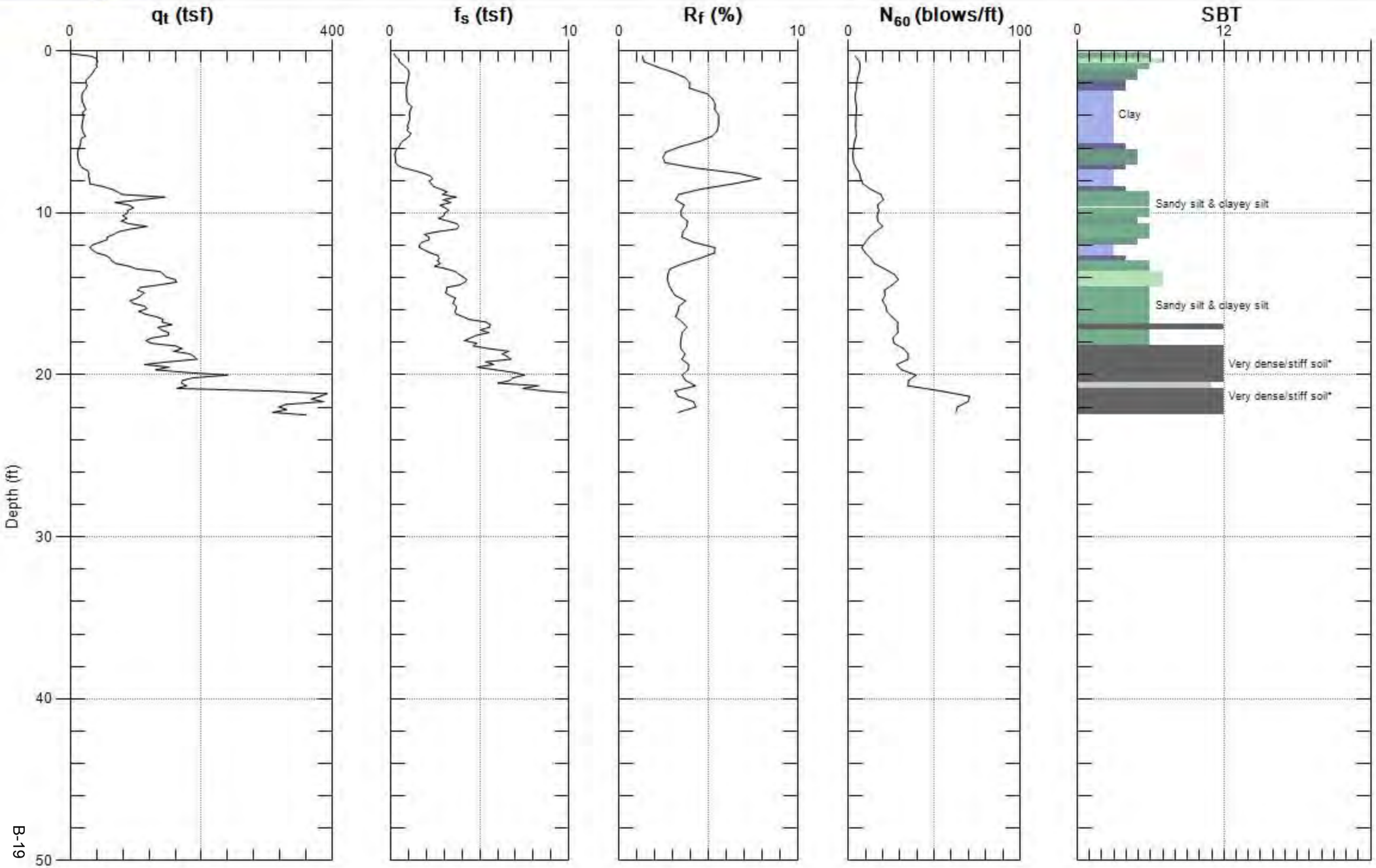
Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-10A (C-10A*)
Date: 12/16/2011 08:21



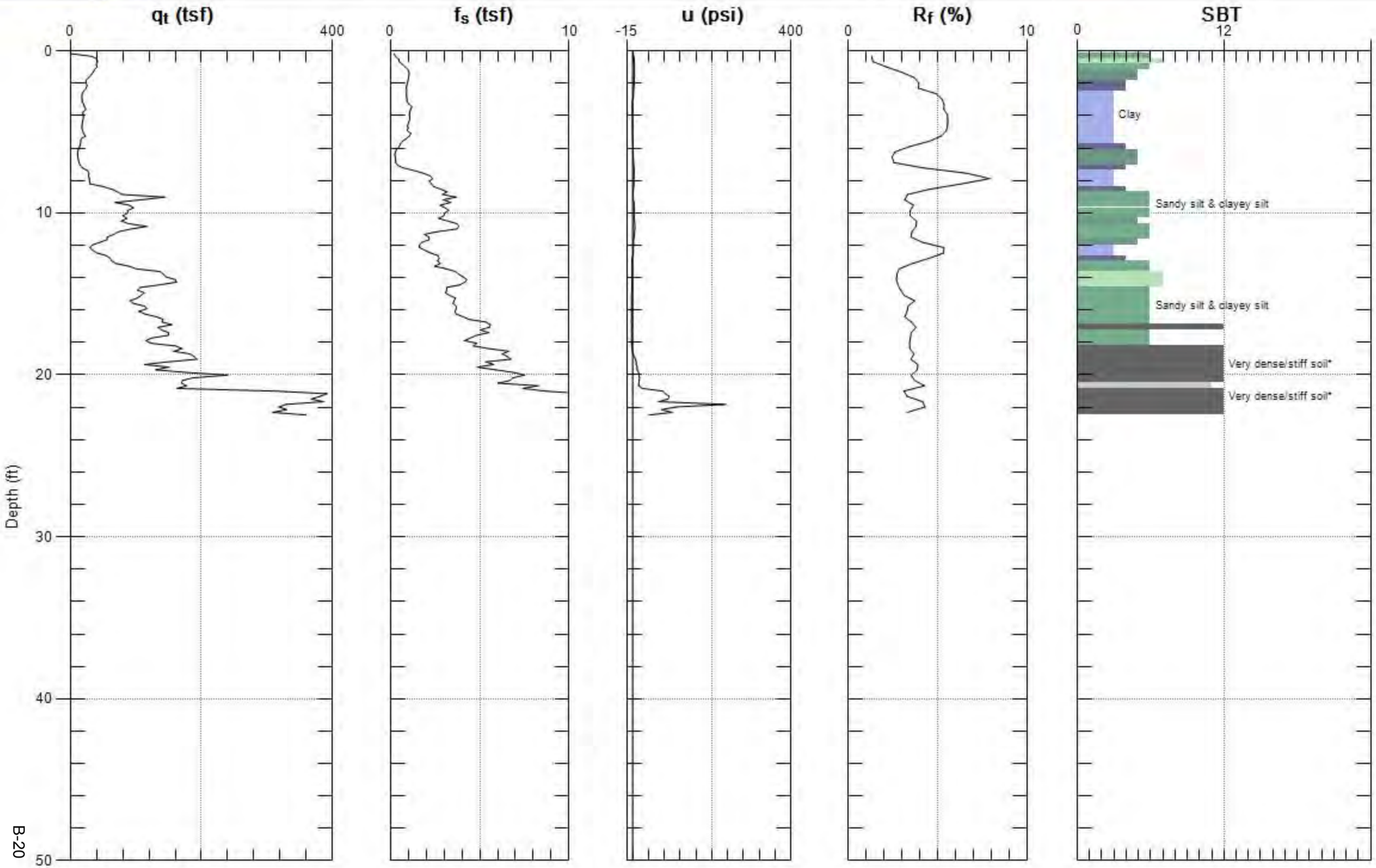
Max. Depth: 22.474 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-10A (C-10A*)
Date: 12/16/2011 08:21



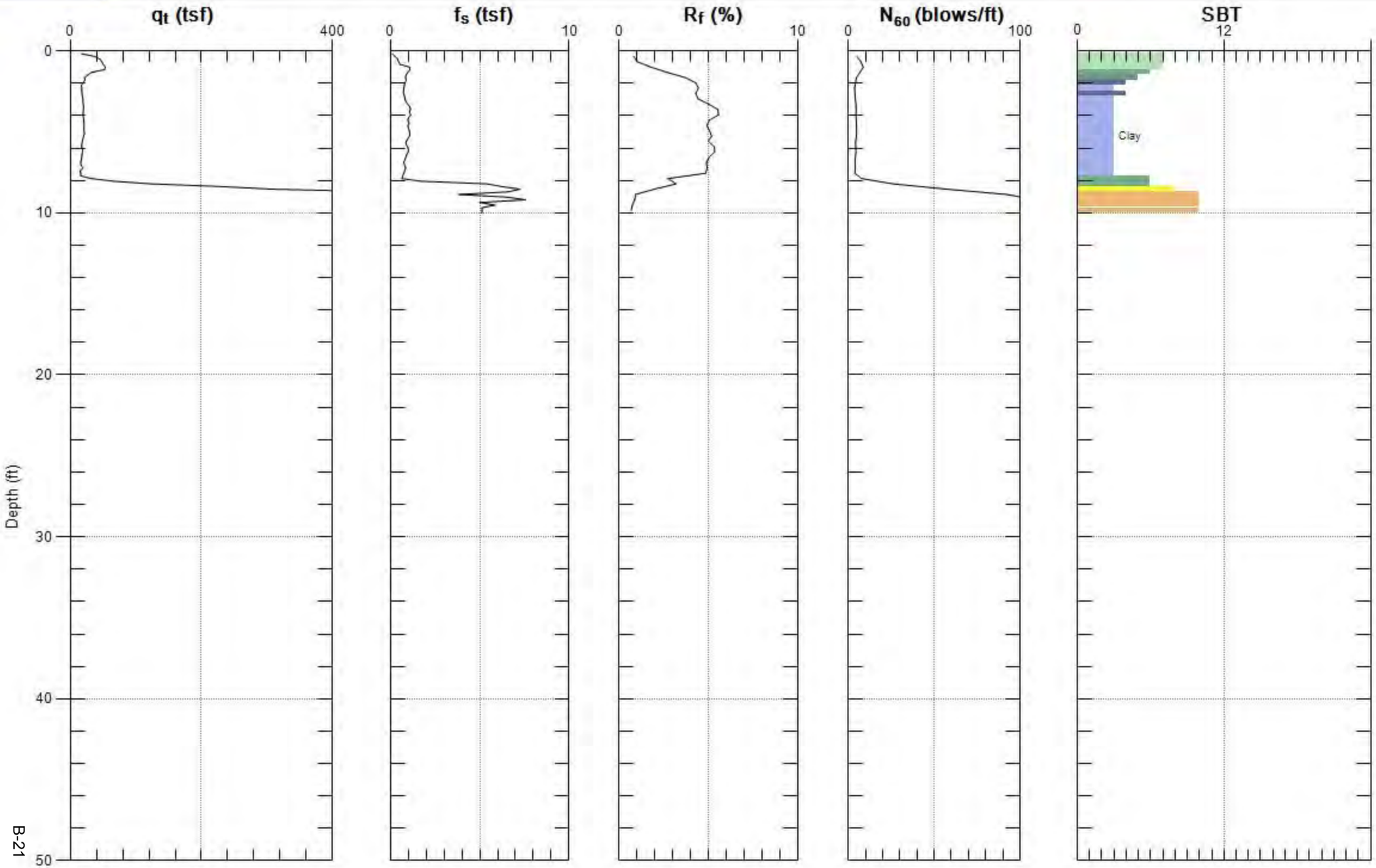
Max. Depth: 22.474 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-10(C-10*)
Engineer: B.STEVENS
Date: 12/16/2011 08:00



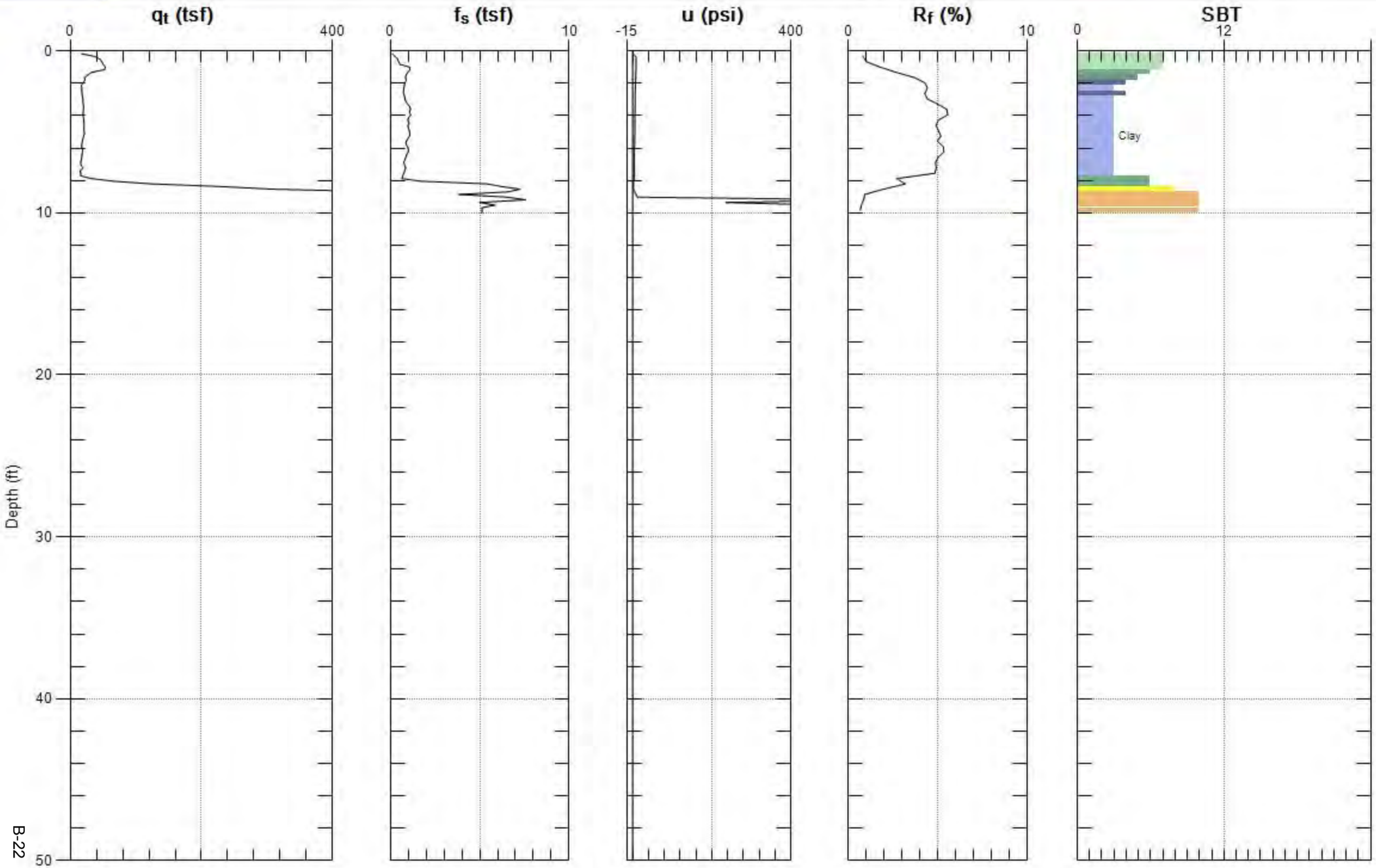
Max. Depth: 10.007 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-10(C-10*)
Engineer: B.STEVENS
Date: 12/16/2011 08:00



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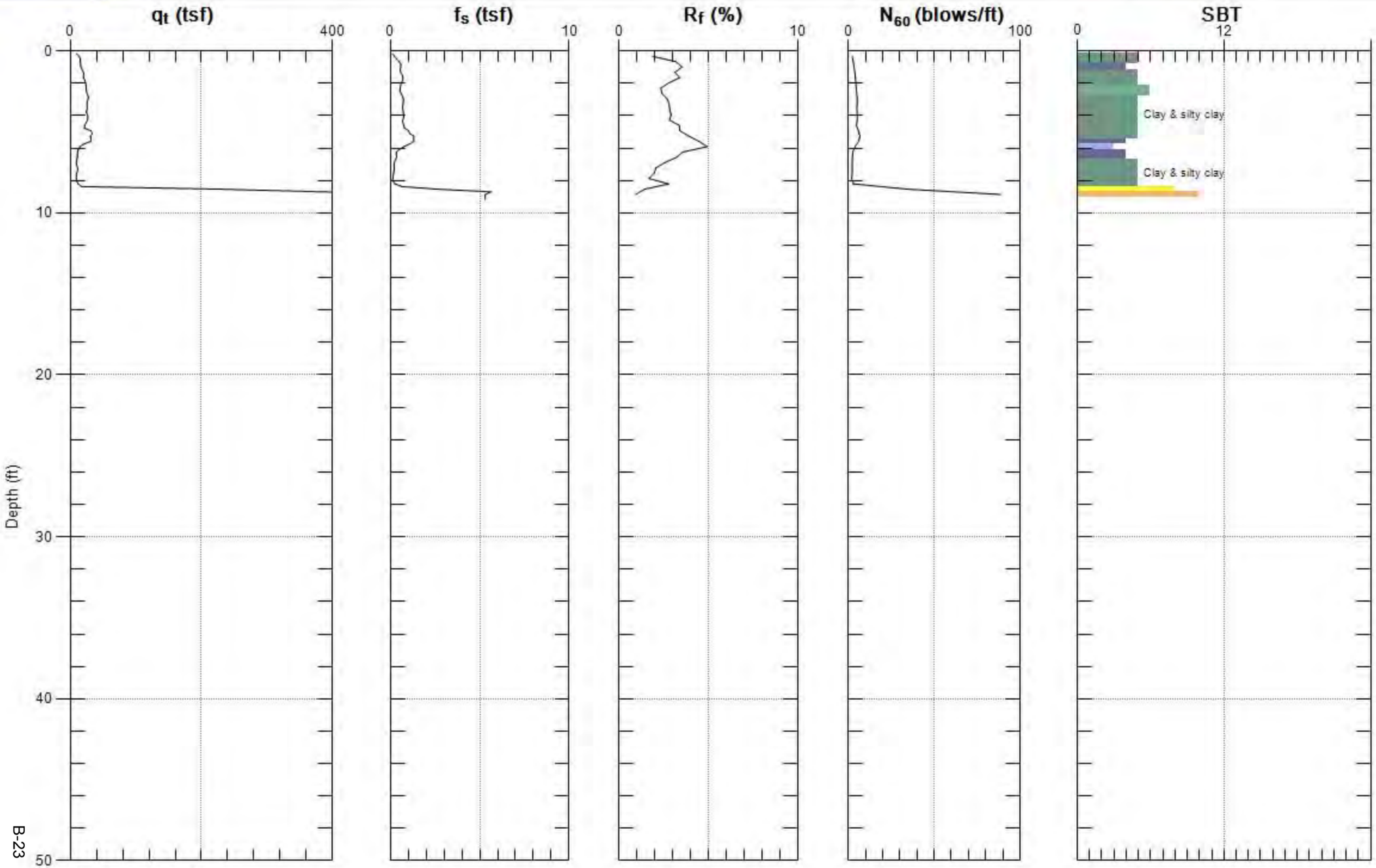
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-11A(C-11A*)
Date: 12/16/2011 09:53



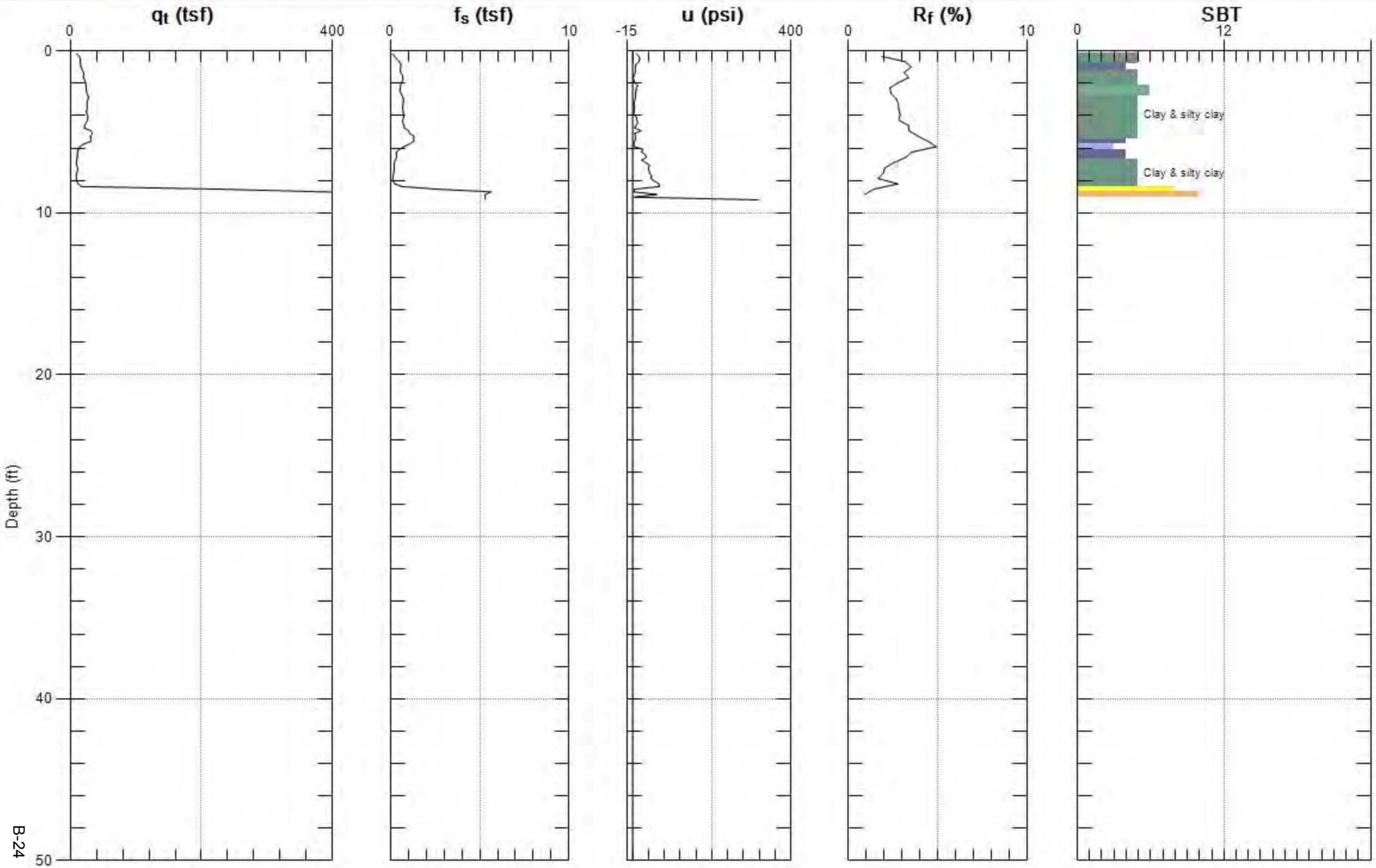
Max. Depth: 9.186 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-11A (C-11A*)
Date: 12/16/2011 09:53



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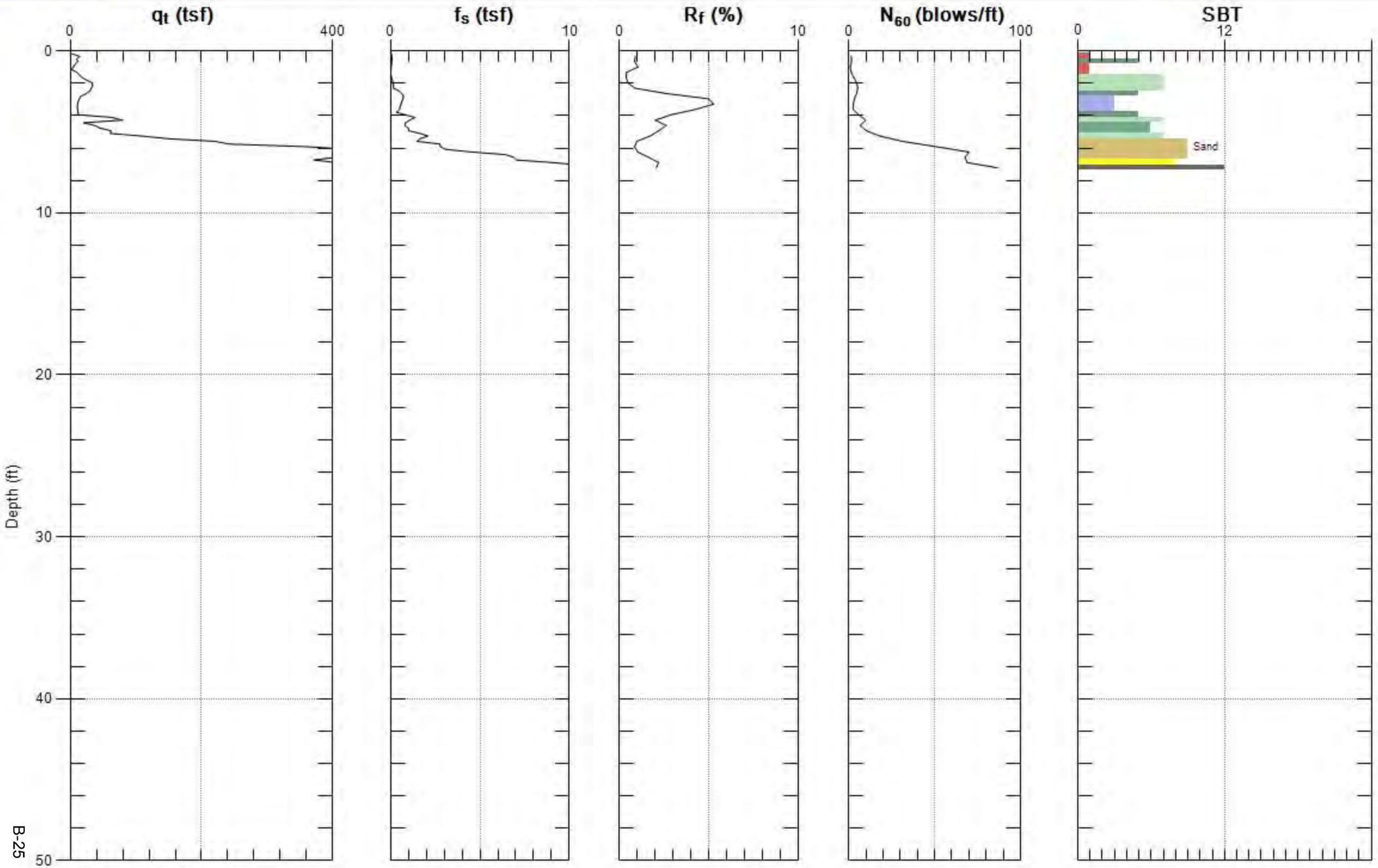
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-11(C-11*)
Engineer: B.STEVENS
Date: 12/16/2011 09:29



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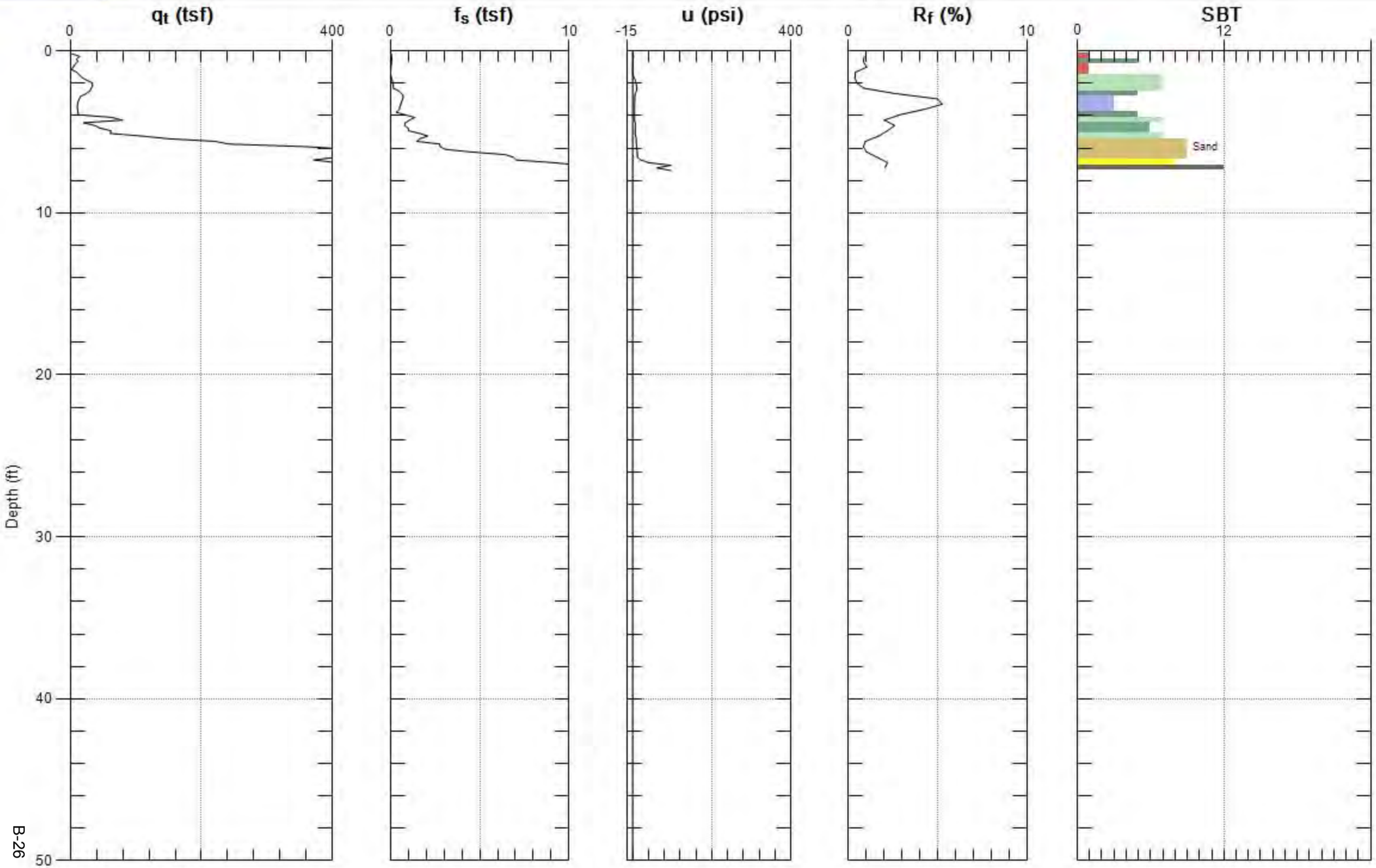
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-11(C-11*)
Engineer: B.STEVENS
Date: 12/16/2011 09:29



Max. Depth: 7.382 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-12 (C-12*)
Engineer: B.STEVENS
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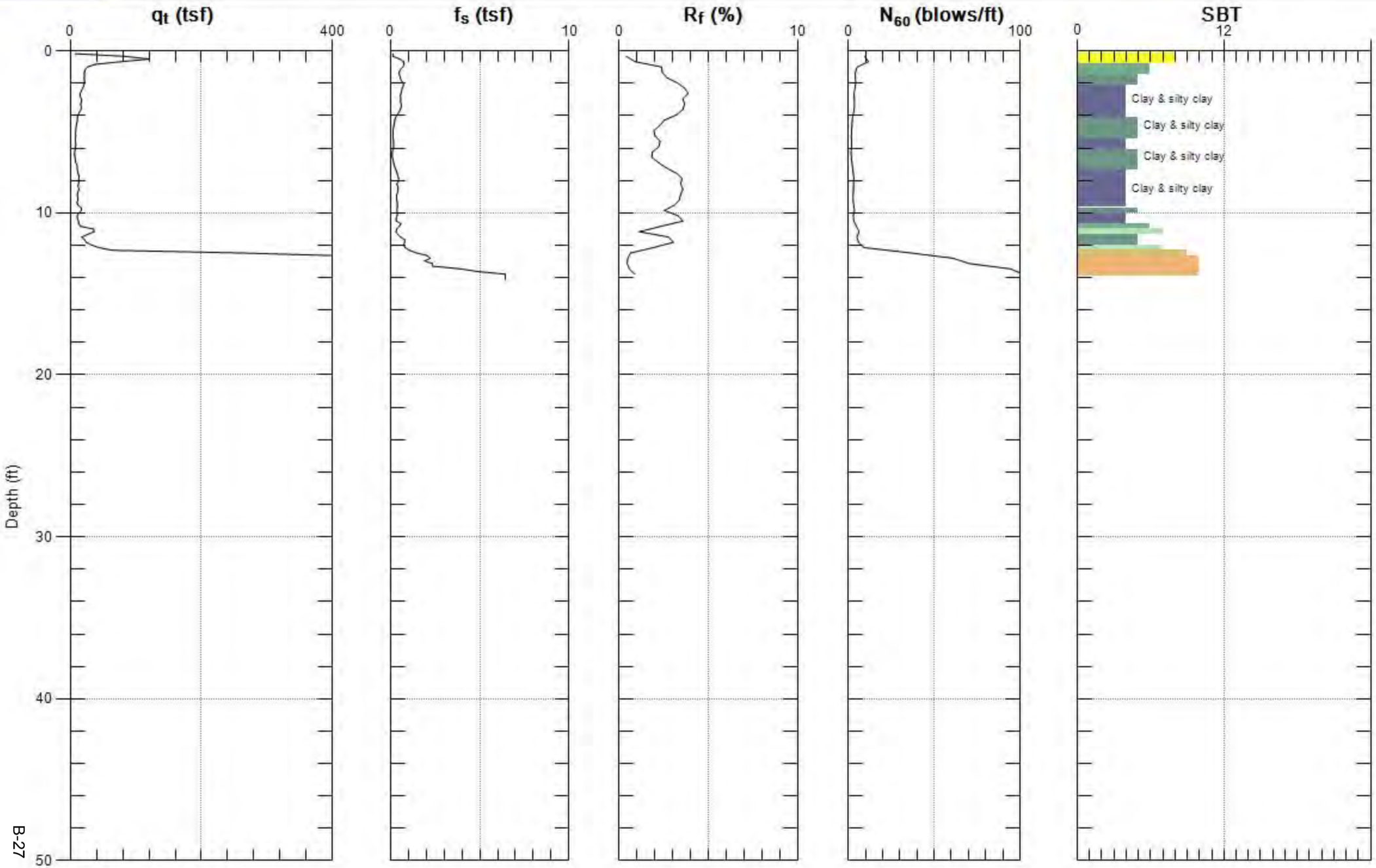

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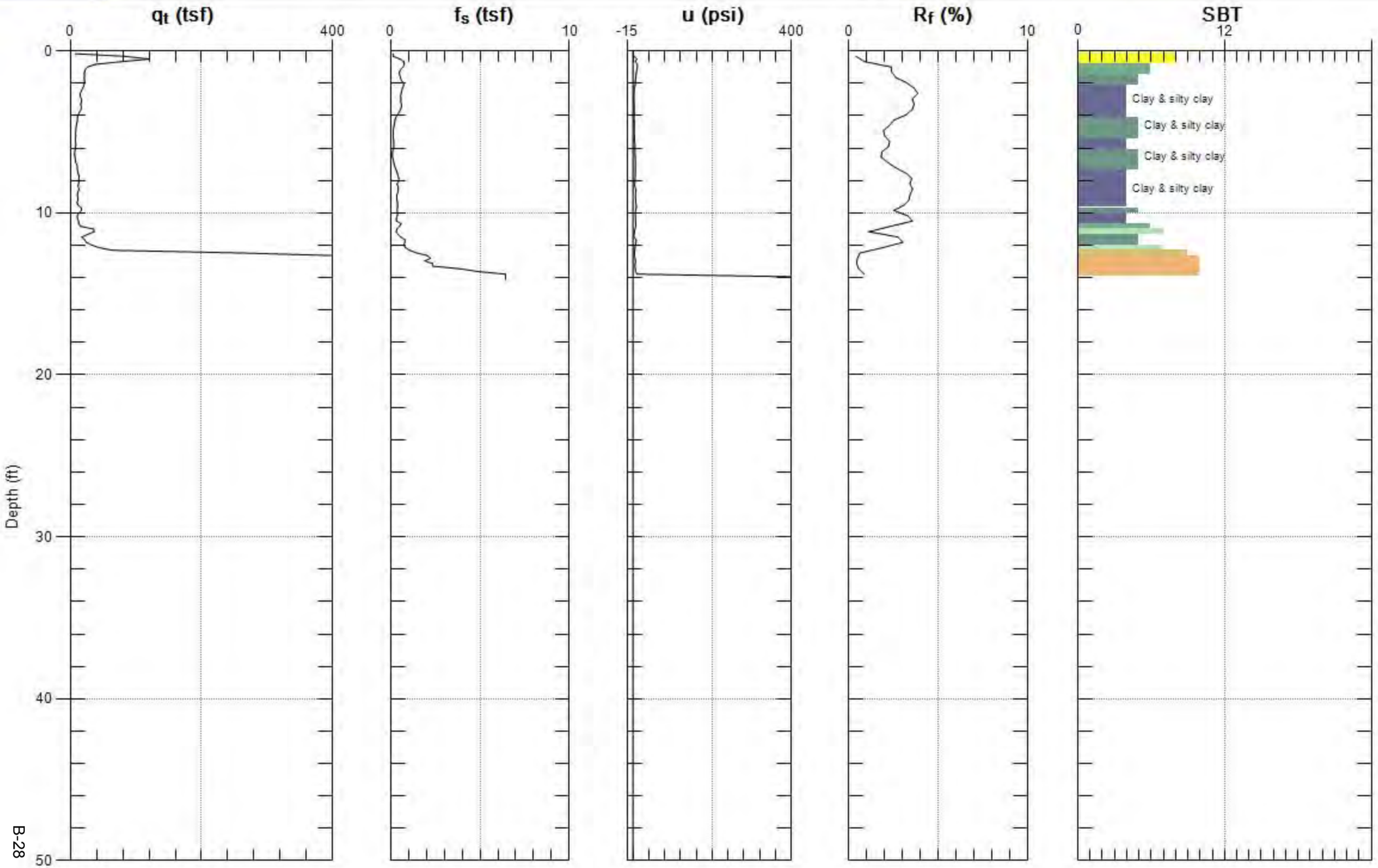
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-12(C-12*)
Date: 12/16/2011 10:51



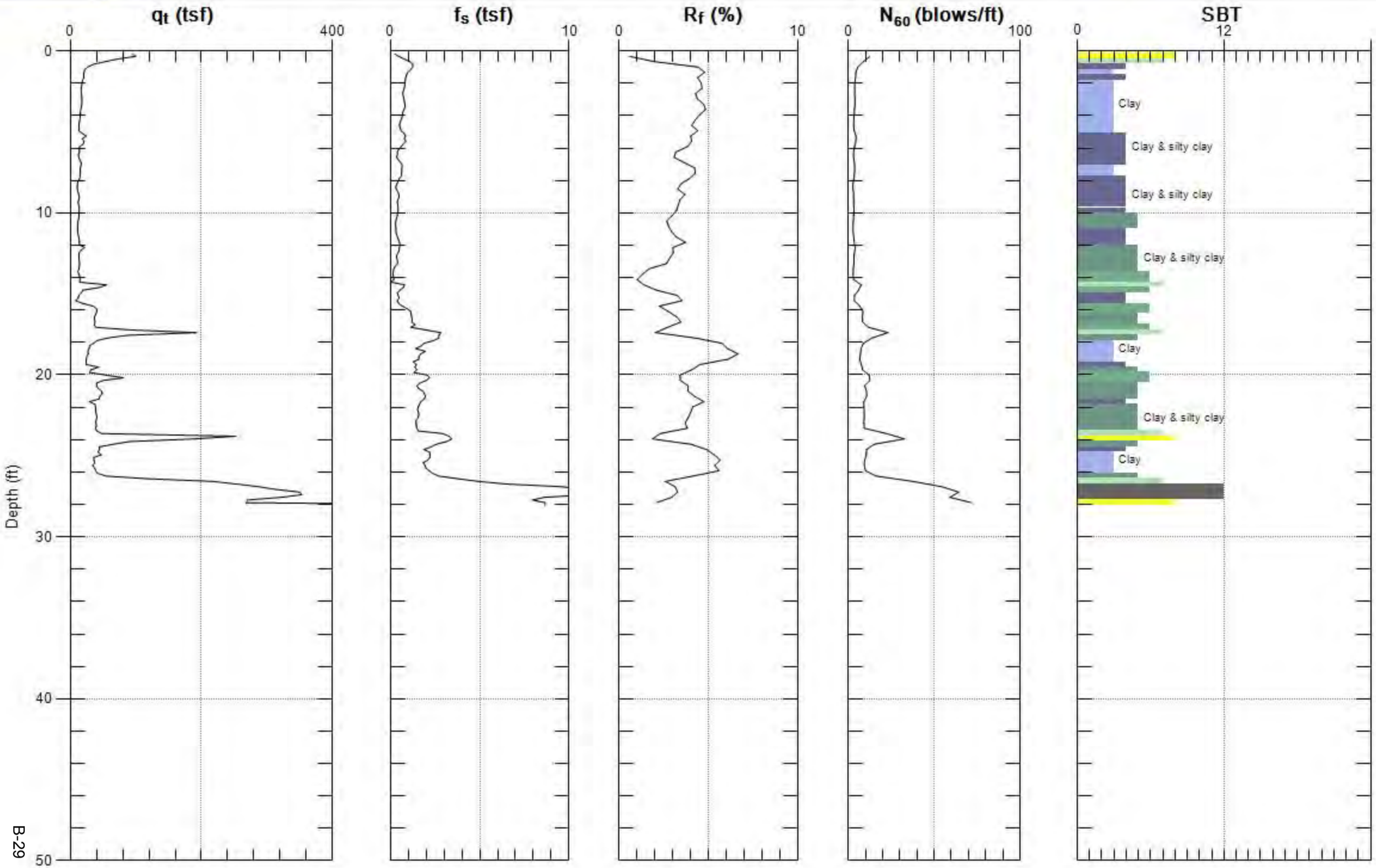
Max. Depth: 14.108 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-13(C-13*)
Engineer: B.STEVENS
Date: 12/16/2011 12:15



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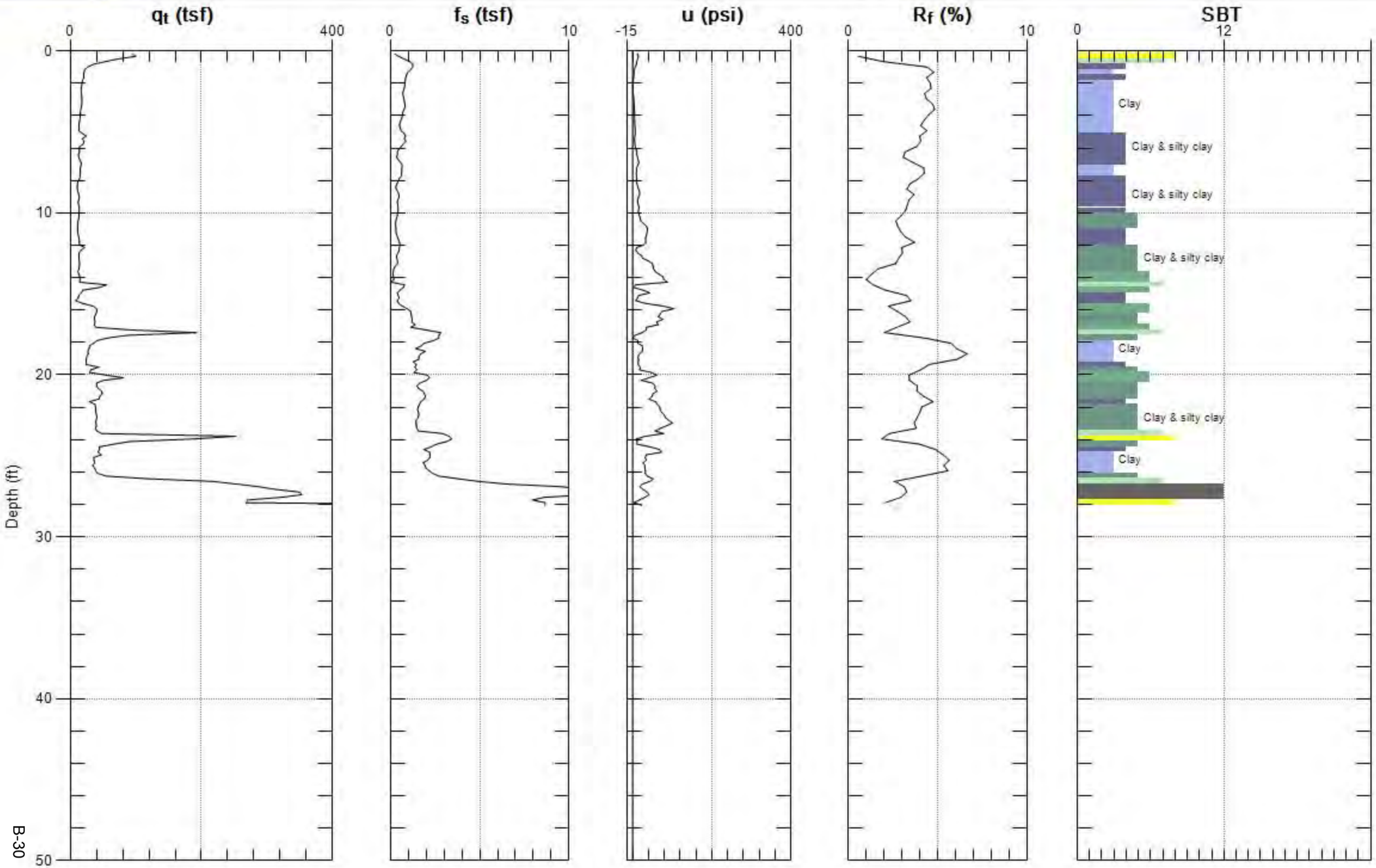
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-13(C-13*)
Date: 12/16/2011 12:15



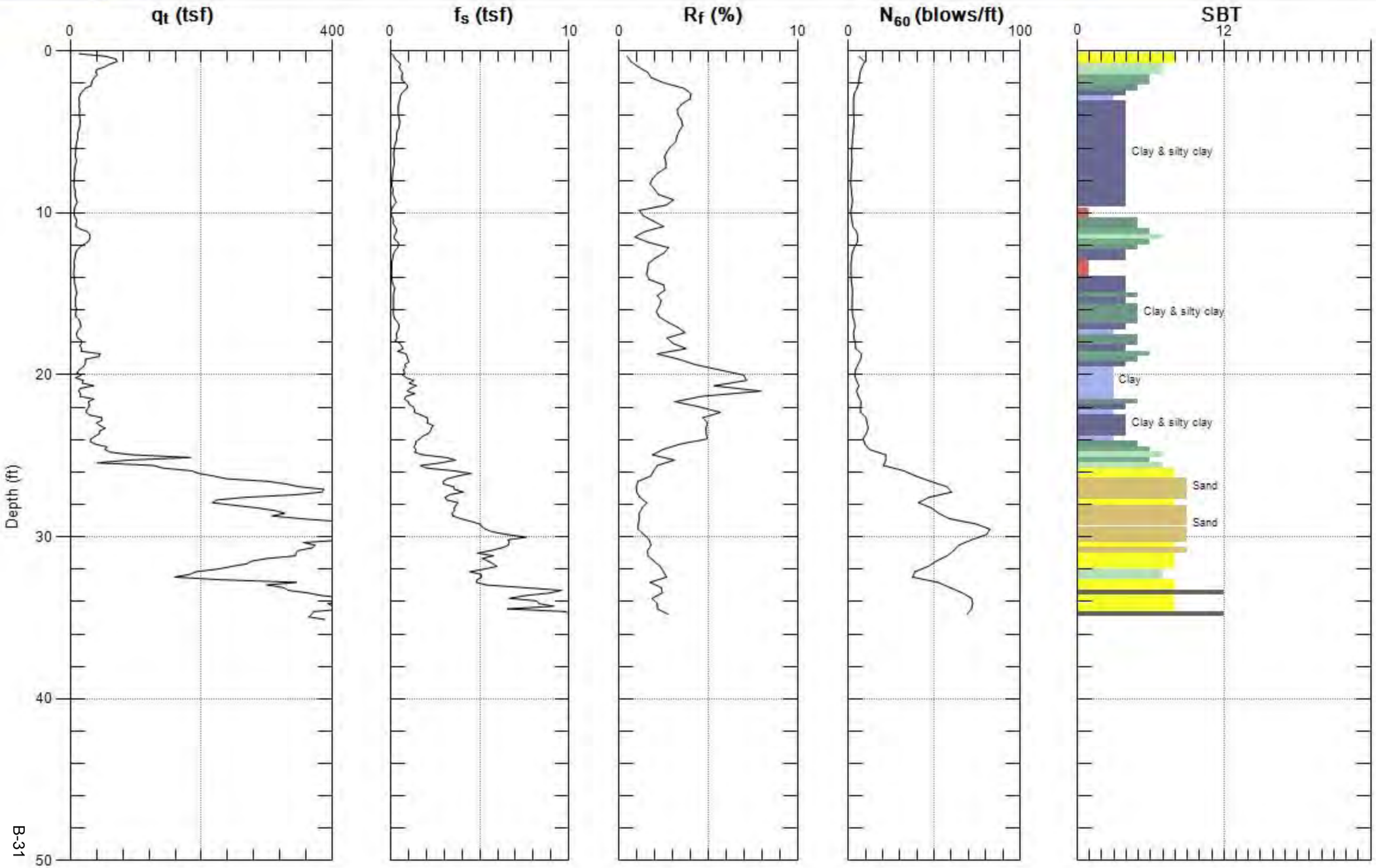
Max. Depth: 28.051 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Sounding: CPT-14 (C-14*)
Engineer: B.STEVENS
Date: 12/16/2011 01:21



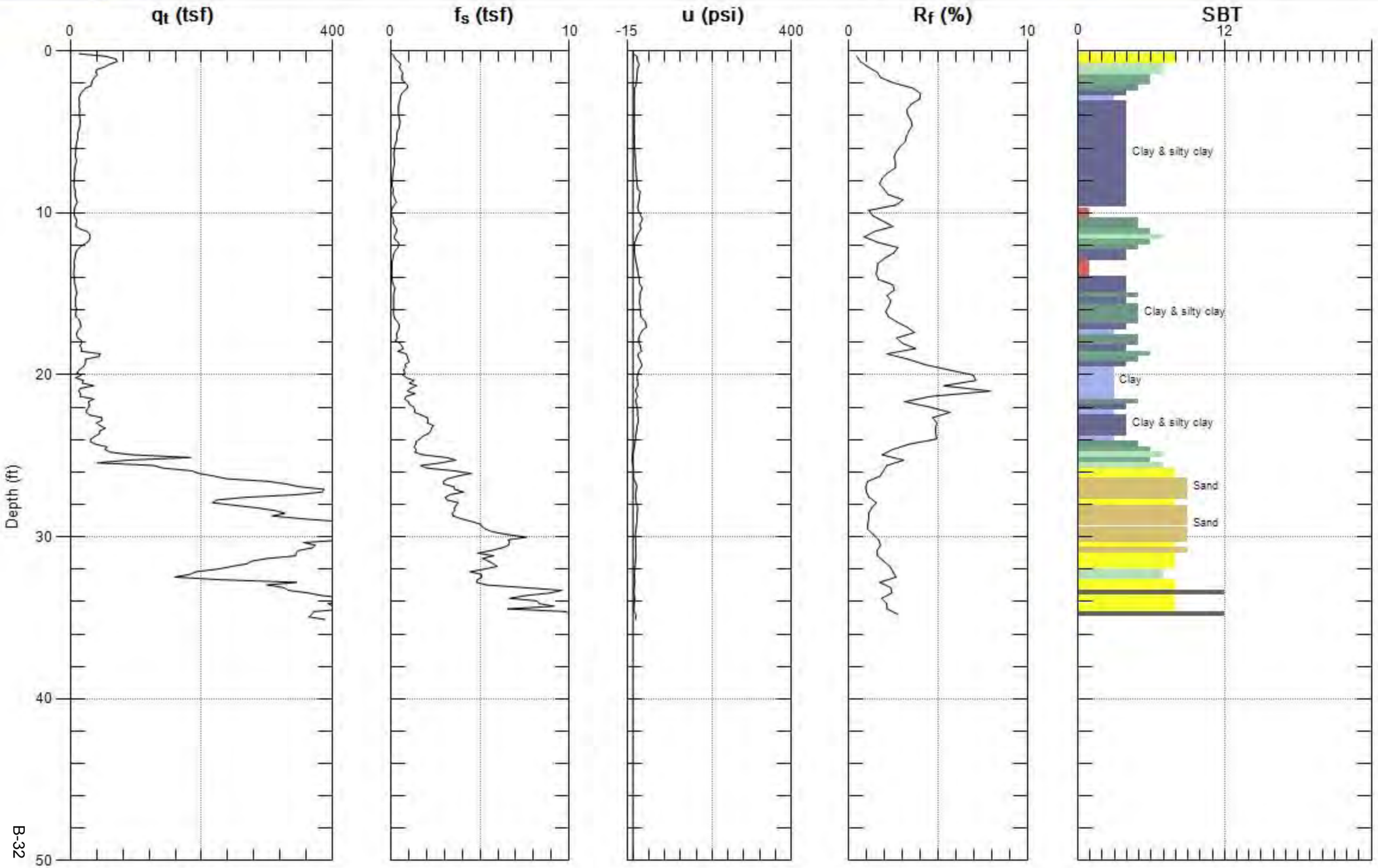
Max. Depth: 35.105 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

BERLOGAR STEVENS

Site: TORIAN-CARGILL
Engineer: B.STEVENS
Sounding: CPT-14(C-14*)
Date: 12/16/2011 01:21



Max. Depth: 35.105 (ft)
Avg. Interval: 0.328 (ft)

* CPT NUMBER USED BY BERLOGAR STEVENS AND ASSOCIATES

SBT: Soil Behavior Type (Robertson 1990)

APPENDIX C

Test Pit Logs

Job No. 2914.101
Cargill Parcel 2
Newark, California

TEST PIT LOGS – 9/27/07

Test Pit Number	Depth (feet)	Description
TP-1 Elev. 23 feet	0 – 2	Clayey Gravel, gray-brown, moist, medium dense, with sand, trace roots, concrete and brick fragments, well-graded sand and gravel (FILL).
	2 – 6	Silty Clay, dark gray-brown, moist, very stiff.
	6 – 7	SANDSTONE, fine-grained, reddish-brown, weathered, fractured, moderately strong to weak, some oxidation staining. Top of Sandstone at 17-feet elevation
		Total Depth 7 feet No free groundwater encountered
TP-2 Elev. 19 feet	0 – 1½	Silty Gravel, gray-brown, dry, loose, trace brick fragments, some magnesium concretions (FILL).
	1½ – 3	SANDSTONE, fine-grained, tan, weathered, slightly fractured, moderately strong, some oxidation staining. Top of Sandstone at 17-feet elevation.
		Total Depth 3 feet No free groundwater encountered
TP-3 Elev. 14 feet	0 – 8	Silty Clay, dark gray, moist, stiff, some medium fine sand, trace gravel and asphalt concrete fragments, trace rootlets, sod, wood fragments and light brown and black mottling (FILL).
	8 – 12	Silty Clay, olive-brown, moist, stiff, slightly porous, trace oxidation, staining. No bedrock above 2-feet elevation.
		Total Depth 12 feet No free groundwater encountered
TP-4 Elev. 11 feet	0 – 2	Clayey Gravel, tan, slightly moist to dry, dense, trace rootlets, wood fragments (FILL).
	2 – 10	Sandy Clay, brown to reddish brown, moist, stiff, trace gravel.
	10 – 11	CLAYSTONE, reddish-brown, highly weathered, weak, moist, some oxidation staining.
	11 – 12	SANDSTONE, fine-grained, tan, highly weathered, friable, moist with some oxidation staining.
		Total Depth 12 feet No free groundwater encountered

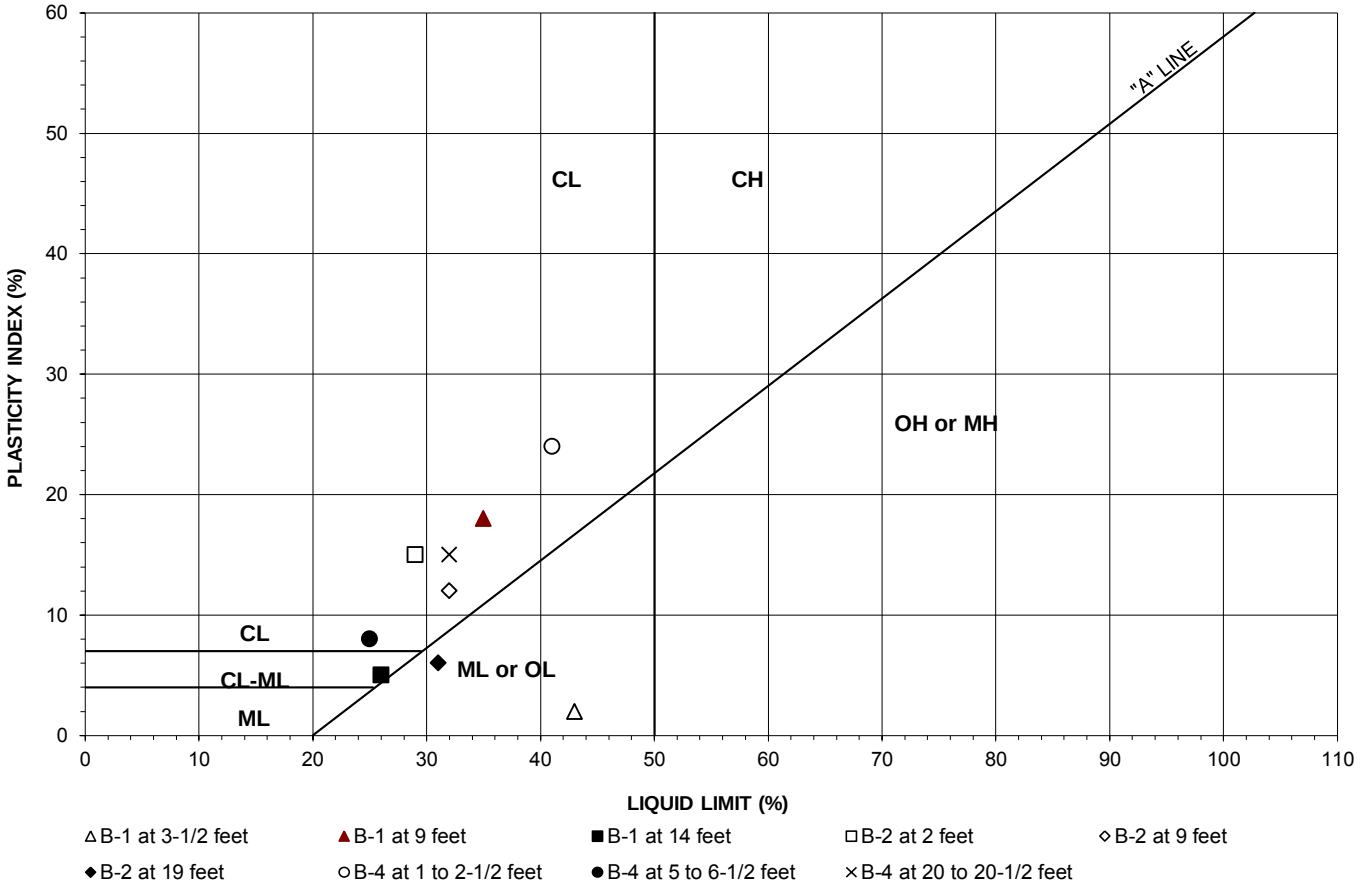
TEST PIT LOGS – 9/27/07

Test Pit Number	Depth (feet)	Description
TP-5 Elev. 12 feet	0 – 2	Silty Gravel, tan, moist to dry, some sand and magnesium concretions.
	2 – 6	Silty Clay, dark gray-brown, moist, stiff.
	6 – 7	SANDSTONE, fine-grained, reddish brown, highly weathered, highly fractured, friable to weak, some oxidation staining. Top of sandstone at 6-feet elevation.
		Total Depth 7 feet No free groundwater encountered
TP-6 Elev. 29 feet	0 – 2	Silty Gravel, gray-brown, slightly moist to dry, dense, fine to medium gravel, trace concrete fragments (FILL).
	2 – 12	Sandy Clay, dark gray-brown, moist, stiff, some gravel, trace concrete fragments, wood and plastic (FILL).
	12 – 14	SANDSTONE, fine-grained, reddish-brown, highly weathered, friable to weak, highly fractured, oxidation staining along fractures. Top of sandstone at 17-feet elevation.
TP-7 Elev. 9 feet	0 – 1	Sandy Clay, dark gray-brown, moist, medium stiff, trace magnesium concretions (FILL).
	1 – 4	Silty Clay, dark gray-brown, moist, stiff, trace fine sand.
	4 – 8	Clayey Silt, olive-brown, moist, medium stiff, trace oxidation staining, slightly porous.
	8 – 12	Clayey Sand, olive-brown, moist, medium dense, trace oxidation staining, fine sand.
	12 – 14	Sandy Clay, red-brown, very moist, stiff, fine-grained sand, trace oxidation staining. No bedrock above -5 feet elevation.
		Total Depth 14 feet Trace groundwater seepage at 9 feet

APPENDIX D

Laboratory Test Results

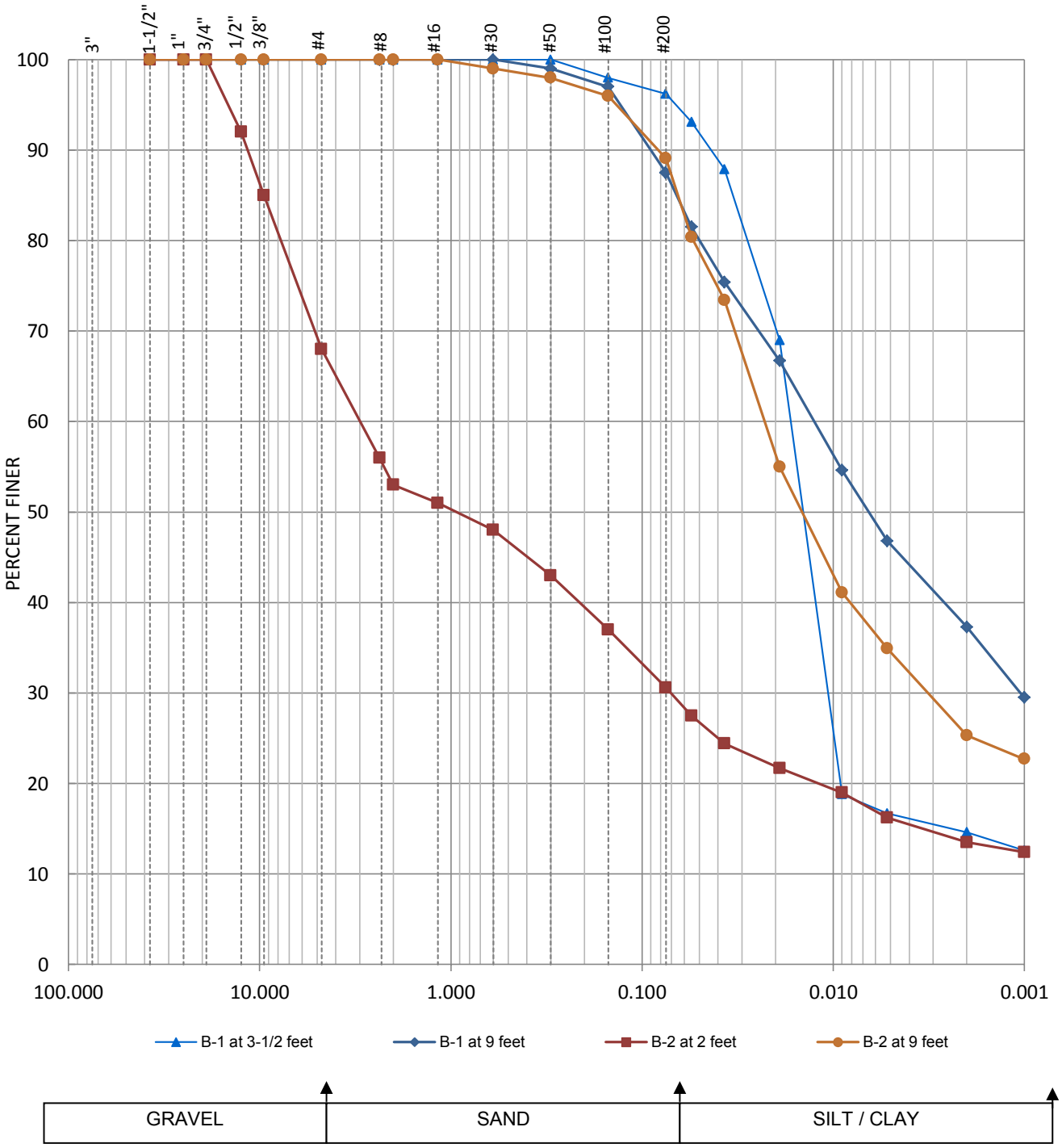
JOB NUMBER: 3286.102 DATE: 1-16-12 BY: CC



LOCATION	LIQUID LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION
B-1 at 3-1/2 feet	43	2	**ML**
B-1 at 9 feet	35	18	**CL**
B-1 at 14 feet	26	5	**CL-ML**
B-2 at 2 feet	29	15	**CL**
B-2 at 9 feet	32	12	**CL**
B-2 at 19 feet	31	6	**ML**
B-4 at 1 to 2-1/2 feet	41	24	**CL**
B-4 at 5 to 6-1/2 feet	25	8	**CL**
B-4 at 20 to 20-1/2 feet	32	15	**C L**

ATTERBERG LIMITS TEST

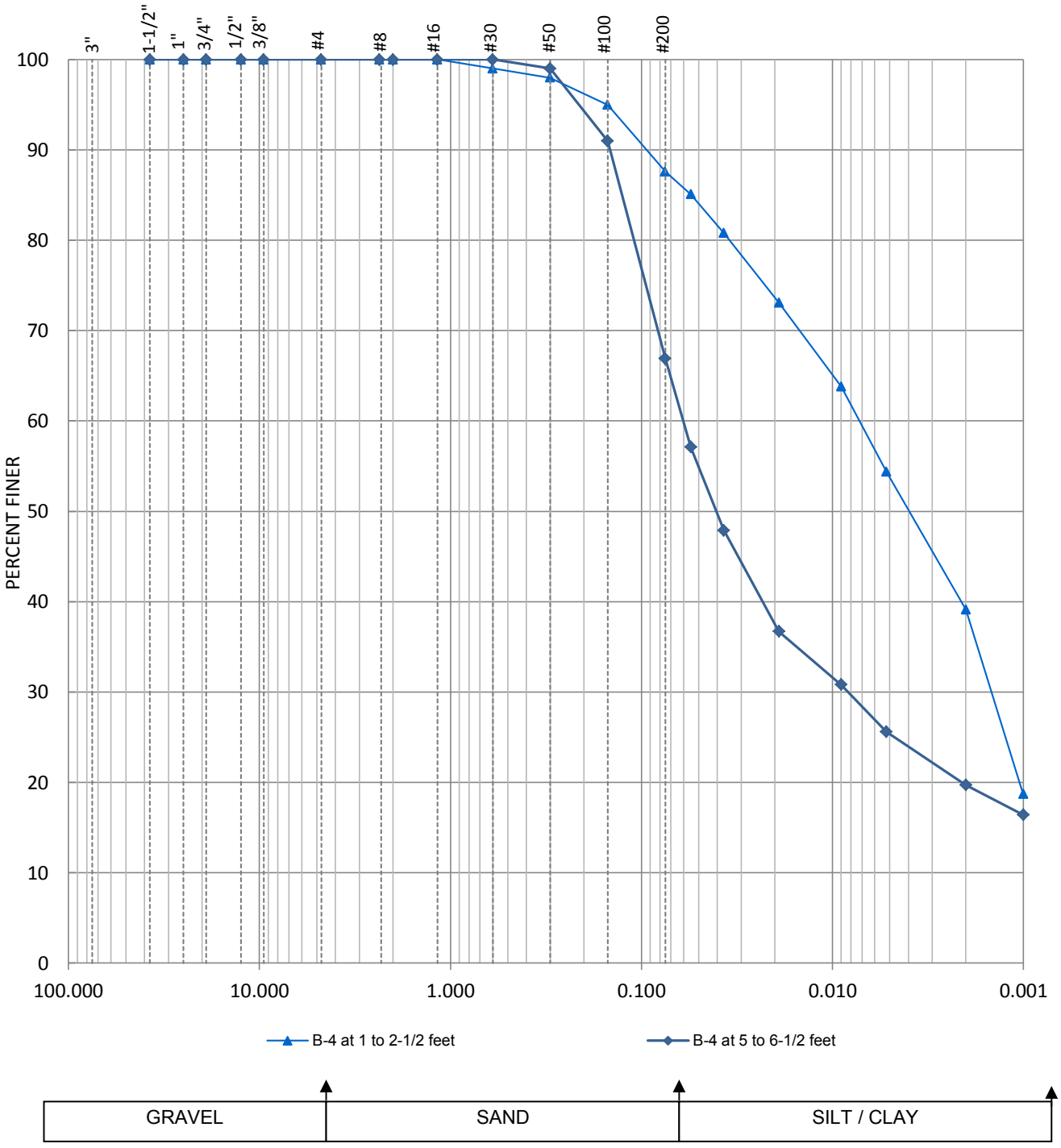
JOB NUMBER: 3268.102 DATE: 1-16-12 BY: CC



LOCATION	DESCRIPTION
B-1 at 3-1/2 feet	SILT, light gray-white
B-1 at 9 feet	SILTY CLAY, gray-brown
B-2 at 2 feet	CLAYEY SAND, gray
B-2 at 9 feet	SILTY CLAY with SAND, light gray-brown

GRADATION TEST DATA

JOB NUMBER: 3268.102 DATE: 1-24-12 BY: CC



LOCATION	DESCRIPTION
B-4 at 1 to 2-1/2 feet	SILTY CLAY, gray-brown
B-4 at 5 to 6-1/2 feet	SANDY CLAY, light yellow-brown

GRADATION TEST DATA

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

9 January 2012

Job No.1112193
Cust. No.10598

Mr. Wilson Wong
Berlogar Stevens & Associates
5587 Sunol Blvd.
Pleasanton, CA 94566

Subject: Project No.: 3268.102
Project Name: Hollow Stem Auger Boring, Cargill Site
Corrosivity Analysis – ASTM Test Methods with Brief Evaluation

Dear Mr. Wong:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on December 27, 2011. Based on the analytical results, a brief corrosivity evaluation is enclosed for your consideration.

Based upon the conductivity measurements, the sample is classified as "severly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration is 4,800 mg/kg. Because the chloride ion concentrations is greater than 300 mg/kg, it is determined to be sufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentration is 1,000 mg/kg and is determined to be sufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations. Therefore, concrete that comes into contact with this soil should use sulfate resistant cement such as Type II, in accordance with the Uniform building Code requirements.

The sulfide ion concentration is none detected.

The pH of the soil is 7.7 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 460-mV which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

California State Certified Laboratory No. 2153

CERCO analytical

1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

Client: Berlogar Stevens & Associates
Client's Project No.: 3268.102
Client's Project Name: Howwlow Stem Auger Boring, Cargill Site
Date Sampled: 21-Dec-11
Date Received: 27-Dec-11
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 9-Jan-2012

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)*
1112193-001	B-3 @ 1.5-2'	460	7.7	28,000	-	N.D.	4,800	1,000

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Detection Limit:	-	-	10	-	50	150	15
Date Analyzed:	30-Dec-2011	30-Dec-2011	3-Jan-2012	-	6-Jan-2012	3-Jan-2012	30-Dec-2011

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis

N.D. - None Detected

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

Via E-mail Only

October 7, 2014
Job No. 3268.002

BERLOGAR STEVENS & ASSOCIATES

Mr. Glenn Brown
Dumbarton Area 2, LLC
500 La Gonda Way, Suite 102
Danville, California 94526

Subject: Geology, Geologic Hazards and CBC Update
Gateway Station West
Enterprise Drive
Newark, California

Dear Mr. Brown:

Berlogar Stevens & Associates (BSA) has been requested to provide a discussion on the regional and site geology, geologic hazards, and updated 2013 California Building Code seismic design parameters. We previously prepared a Design Level Geotechnical Investigation report for the site dated October 14, 2013. We discussed geologic and geotechnical impacts from liquefaction, undocumented fill, naturally occurring asbestos and shallow bedrock excavations in the 2013 report. Additional and updated geologic information is being provided herein as requested by the Environmental Impact Report consultants.

GEOLOGIC SETTING

REGIONAL GEOLOGY

The Gateway Station West site region lies in the Coast Range Geomorphic Province characterized by northwest trending mountain ranges and valleys. The San Francisco Bay area is underlain and bounded by thick sequences of Mesozoic and Cenozoic rocks. The San Francisco Bay is a tectonic trough locally bounded by the active San Andreas and Hayward faults. The East Bay Hills occur just east of the project site and the site is located on a gently, westward sloping alluvial plain that lies at the edge of San Francisco Bay.

Franciscan Complex rocks of Jurassic and Cretaceous age and Quaternary alluvium and sediments underlie the site region. The Franciscan Complex is composed of serpentinite, sandstone and claystone that are complexly interbedded and structurally deformed by faulting and folding. Cenozoic rocks overlie the Franciscan Complex in the East Bay Hills that are also complexly interbedded and deformed. Pleistocene to Quaternary age sediments deposited on alluvial fans and the edge of San Francisco Bay are composed of mixtures of gravel, sand, silt, clay and Bay Mud (Helley and LaJoie 1979). An area geologic map of the site is presented in Plate 1.

SITE GEOLOGY

BSA's 2013 on-site geotechnical investigation revealed the North Hill is composed of sandstone and claystone that is overlain by up to 12 feet of fill material. The South Hill is composed of naturally occurring asbestos bearing serpentinite with silty sand and silty clay around this hill.

Exploratory drilling revealed interbedded silty, sandy and clayey soil to depths of between 15 to 50 feet below the surface. Groundwater was observed in boreholes at depths of 5 to 9 feet below the surface.

2013 CBC SEISMIC DESIGN PARAMETERS

The project is at approximately 37.519 degrees North latitude and 122.054 degrees West longitude. The peak ground acceleration (PGA) according to the 2013 CBC is 0.52 g. The following are the 2013 California Building Code seismic design criteria using the USGS Seismic Design Maps program, Version 3.1.0, dated July 11, 2013.

California Building Code	
Mapped Spectral Acceleration for Short Periods, S_s	1.500 g
Mapped Spectral Acceleration for 1-Second Period, S_1	0.600 g
Site Class	D
Site Coefficient F_a (for Site Class D)	1.0
Site Coefficient F_v (for Site Class D)	1.5
Acceleration Parameter S_{MS} (adjusted for Site Class D)	1.500 g
Acceleration Parameter, S_{M1} (adjusted for Site Class D)	0.900 g
Acceleration Parameter, S_{DS}(adjusted for Site Class D)	1.00 g
Acceleration Parameter, S_{D1} (adjusted for Site Class D)	0.600 g

GEOLOGIC HAZARDS

REGIONAL SEISMICITY AND MAJOR FAULTS

The project site lies in an active and highly seismic region with numerous faults that have historically caused damaging earthquakes. The Regional Fault Map depicts major Bay Area faults and is attached as Plate 2. The faults generally trend northwest-southeast across the entire San Francisco Bay area. Table 1 lists the major active faults and their estimated earthquake magnitudes expected in future earthquakes. Recent damaging earthquakes in the region include the 1989 Loma Prieta and 2014 South Napa earthquakes. The Hayward fault is the nearest active fault and lies about 5½ miles northeast of the subject site. The site is not located within a California Alquist-Priolo earthquake fault zone.

The major site development risks created by earthquakes are surface rupture, ground shaking and liquefaction. The BSA site investigation reports that no faults are mapped crossing the site so the likelihood of surface rupture is very low. The site will very likely experience strong earthquake ground shaking.

Table 1. San Francisco Bay Area Major Faults Summary

Fault Name	Fault Length (Kilometers)	Estimated Earthquake Magnitude
San Andreas (North Coast South)	190	7.4
San Andreas (Peninsula)	85	7.1
San Andreas (Santa Cruz Mtn.)	62	7.0
Northern San Gregorio	110	7.2
Hayward (Southern)	53	6.7
Hayward (Northern)	35	6.4
Rogers Creek	62	7.0
Healdsburg-Rogers Creek	57	7.1
Southern Maacama	41	6.9
Calaveras (Northern)	45	6.8
Calaveras (Central)	59	6.2
Calaveras (Southern)	19	5.8
Calaveras (Northern) Amador Valley Segment	15	6.5
Calaveras (Northern) San Ramon Segment	13	6.4
Concord-Green Valley	53	7.1
Concord	17	6.2
Hunting Creek-Berryessa	60	7.2
Greenville	51	6.6
Ortigalita	66	7.2
West Napa	30	6.5
Monte Vista-Shannon thrust	45	6.7
Collayomi	29	6.5
Point Reyes	47	7.0
Zayante	58	7.0

SHALLOW GROUNDWATER

Shallow groundwater at the site may impact construction by requiring dewatering during installation of underground utilities. Additionally, the bottom of excavations may be soft and wet, and will require stabilization of the bottoms of excavations prior to placement of engineered fill. Soft and wet excavation bottoms can be mitigated with the use of geotextiles and imported aggregate, which should be specified by the geotechnical engineer for each specific condition. Since the elevations of the site will be raised by the placement of approximately 3 to 4 feet of fill, long term impacts from the shallow groundwater are not expected. A vapor retarder will be placed under structural concrete floor slabs to minimize moisture vapor transmission through the structural concrete floor slab.

EXPANSIVE SOILS

Shallow, native soils were found to have Plasticity Indices (PI) between 2 and 24, which are indicative of soils that range from low expansion potential to high expansion potential. Site elevations will be raised approximately 3 to 4 feet with select import fill with low expansion potential. Additional shallow soil samples should be obtained and tested for expansion potential before import material is brought to the site and after grading is completed.

SOIL CORROSIVITY

A sample of soil was found to be corrosive to steel and concrete in contact with the ground. The California Building Code provides guidelines protecting concrete and reinforcing bars when structures are in contact with the ground. Concrete mix designs and epoxy coated reinforcing steel can mitigate for corrosive soils. Concrete mix designs can also mitigate for high sulfate soils by specifying the type of cement to be utilized in the concrete, the minimum unconfined compressive strength, and the water to cementitious material ratio. Buried utility lines can be protected from the corrosive soils by utilizing plastic pipes, or providing a protective coating and/or cathodic protection for steel pipes. Additional soil samples will need to be obtained for corrosion testing after the site grades have been raised with import soil.

REFERENCES

Association of Bay Area Governments, Working Group on Northern California Earthquake Potential (1996), in On Shaky Ground, a Guide to Assessing Impacts of Future Earthquakes Using Shaking Hazard Maps for the San Francisco Bay Area, 1998.

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Department of Conservation, California Geological Survey, 2003, Seismic Hazard Zone Report for the Newark 7.5 Minute Quadrangle, Alameda County, California: Seismic Hazard Zone Report 090.

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Jennings, C. W., and Bryant, W. A, 2010, Fault Activity Map of California: State of California, California Geological Survey, Scale 1:750,000.

Tianquin, C., Bryant, W. A., Rowshandel, B., Branum, D., and Wills, C. J., June 2003, The Revised 2002 California probabilistic Seismic Hazard Maps with Appendices A, B and C.

Witter, R. C. Et Al, 2006, Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California: U. S. Geological Survey Open-File Report 06-1037, Sheet 2 of 2.

We trust this provides the necessary information at this time. If you have any questions, please contact the undersigned at (925) 484-0220.

Respectfully Submitted,

BERLOGAR STEVENS & ASSOCIATES

William R. Stevens
Principal Engineer
GE 2339

Chris Palmer
Senior Consulting Geologist
CEG 1262

CP/WRS/FB:jmo

Attachments: Plate 1 Area Geologic Map
Plate 2 – Regional Fault Map
Plate 3 – Liquefaction Susceptibility Map

Copies: Mr. Mark Butler
Mr. Doug Buzbee
Dr. Stephen Neudecker, drneudecker@gmail.com

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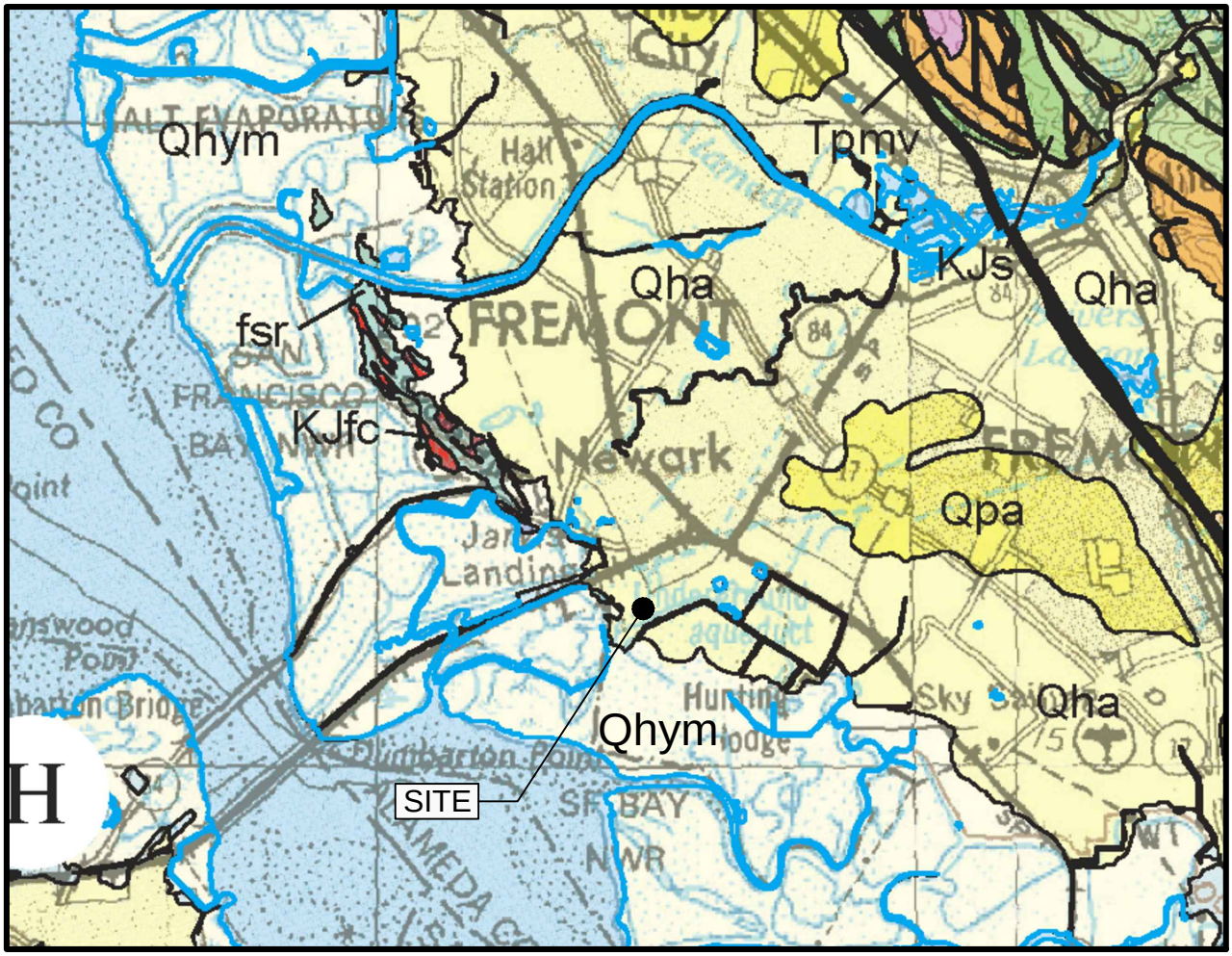


0 10,000

1"= 10,000 FEET

EXPLANATION

Qhym	LATE HOLOCENE MUD DEPOSITS
Qha	LATE HOLOCENE ALLUVIUM
Qpa	PLEISTOCENE ALLUVIUM
KJfc	EARLY CRETACEOUS AND/OR LATE JURRASIC FRANCISCAN COMPLEX CHERT

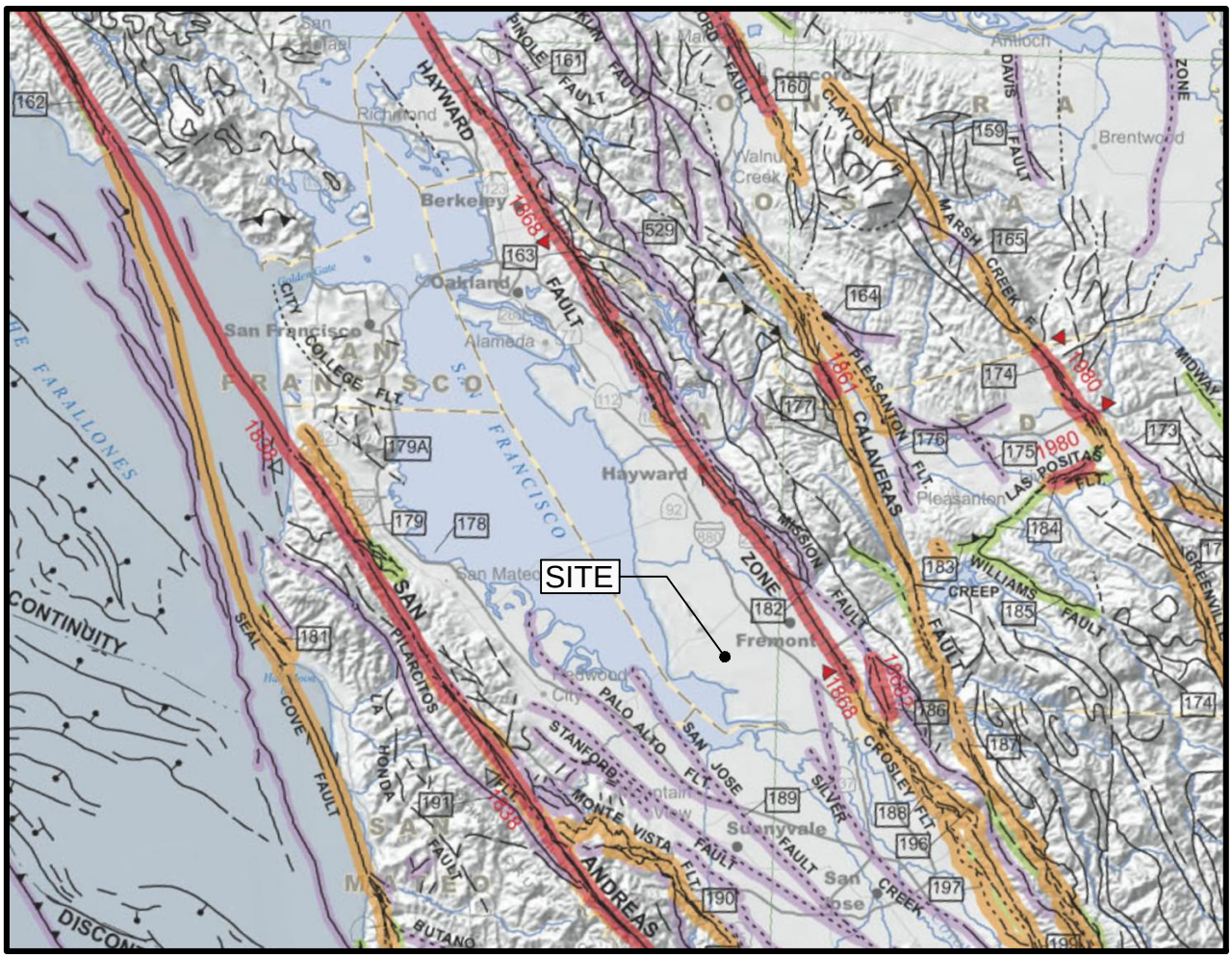
AREA GEOLOGIC MAP

GATEWAY STATION WEST
ENTERPRISE DRIVE AND HICKORY STREET
NEWARK, CALIFORNIA
FOR
DUMBARTON AREA 2, LLC

BASE: PORTION OF GEOLOGIC MAP OF THE SAN FRANCISCO BAY REGION:
U.S. GEOLOGICAL SURVEY, SCIENTIFIC INVESTIGATIONS MAP 2918

PLATE 1

JOB NUMBER: 3268.002 DATE: 10-2-14 BY: CC



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E□PLANATION

Fault along which historic (last 200 years) displacement has occurred.

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

□EGIONAL FAULT MAP

GATEWAY STATION WEST
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NEWARK, CALIFORNIA
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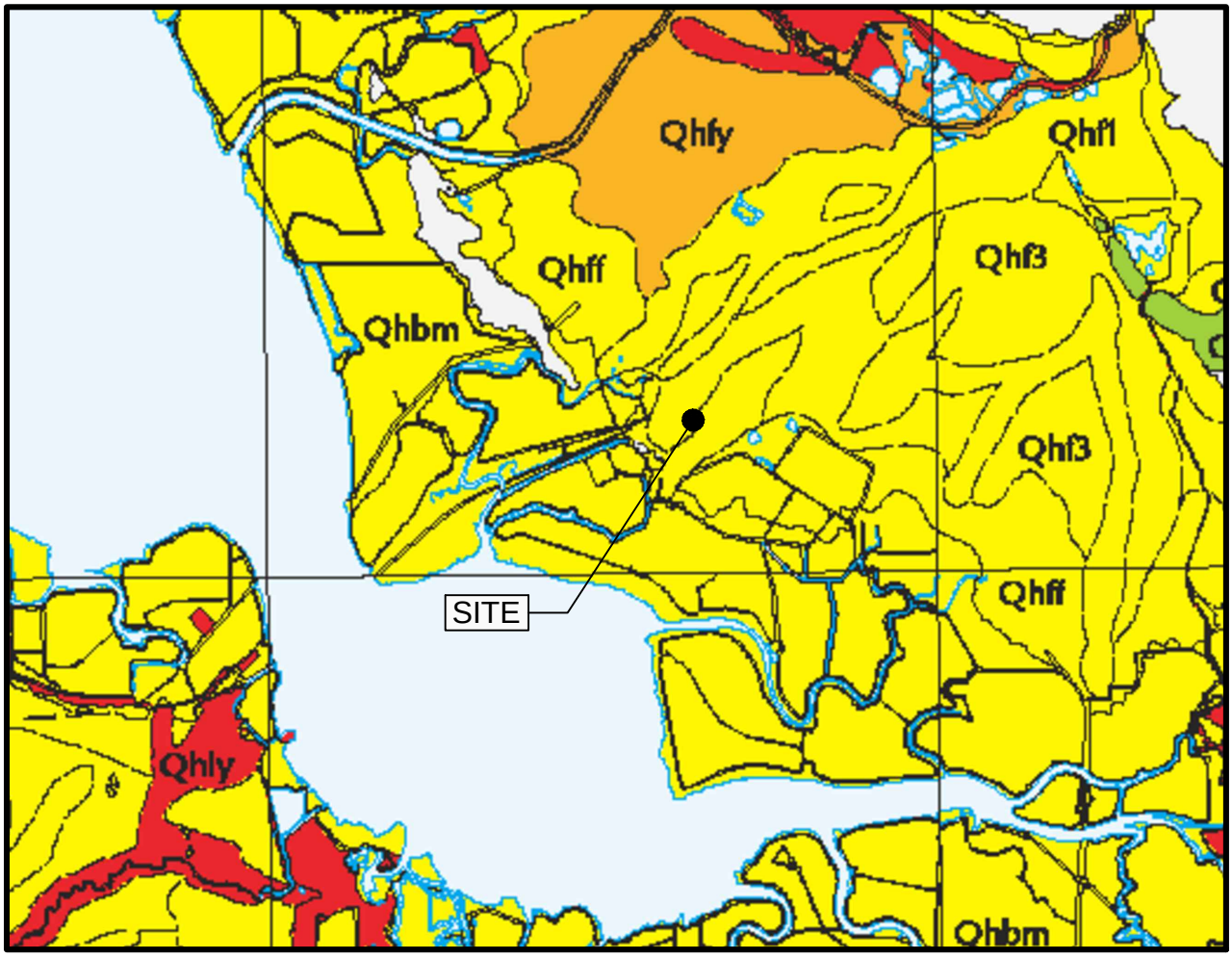
BASE: PORTION OF 2010 FAULT ACTIVITY MAP, PREPARED BY JENNINGS, C.W. AND BRYANT, W.A., STATE OF CALIFORNIA, CALIFORNIA GEOLOGICAL SURVEY

PLATE 2

JOB NUMBER: 3268.002 DATE: 10-2-14 BY: CC



	GEOLOGIC UNITS	LIQUEFACTION SUSCEPTIBILTY
Qhbm	HOLOCENE BAY MUD	VERY HIGH
Qhf	HOLOCENE ALLUVIAL FAN DEPOSITS	HIGH
Qhff	HOLOCENE ALLUVIAL FAN DEPOSITS, FINE GRAINED FACIES	MODERATE

LIQUEFACTION SUSCEPTIBILITY MAP

GATEWAY STATION WEST
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BASE: PORTION OF MAPS OF QUATERNARY DEPOSITS AND LIQUIFICATION SUSCEPTIBILITY IN THE CENTRAL SAN FRANCISCO BAY REGION, CALIFORNIA: U. S. GEOLOGICAL SURVEY, PREPARED BY: WITTER, R. C. ET AL, 2006, OPEN-FILE REPORT 06-1037, SHEET 2 OF 2.

Via E-mail Only

October 7, 2014
Job No. 3268.002

BERLOGAR STEVENS & ASSOCIATES

Mr. Glenn Brown
Dumbarton Area 2, LLC
500 La Gonda Way, Suite 102
Danville, California 94526

Subject: Geology, Geologic Hazards and CBC Update
Gateway Station West
Enterprise Drive
Newark, California

Dear Mr. Brown:

Berlogar Stevens & Associates (BSA) has been requested to provide a discussion on the regional and site geology, geologic hazards, and updated 2013 California Building Code seismic design parameters. We previously prepared a Design Level Geotechnical Investigation report for the site dated October 14, 2013. We discussed geologic and geotechnical impacts from liquefaction, undocumented fill, naturally occurring asbestos and shallow bedrock excavations in the 2013 report. Additional and updated geologic information is being provided herein as requested by the Environmental Impact Report consultants.

GEOLOGIC SETTING

REGIONAL GEOLOGY

The Gateway Station West site region lies in the Coast Range Geomorphic Province characterized by northwest trending mountain ranges and valleys. The San Francisco Bay area is underlain and bounded by thick sequences of Mesozoic and Cenozoic rocks. The San Francisco Bay is a tectonic trough locally bounded by the active San Andreas and Hayward faults. The East Bay Hills occur just east of the project site and the site is located on a gently, westward sloping alluvial plain that lies at the edge of San Francisco Bay.

Franciscan Complex rocks of Jurassic and Cretaceous age and Quaternary alluvium and sediments underlie the site region. The Franciscan Complex is composed of serpentinite, sandstone and claystone that are complexly interbedded and structurally deformed by faulting and folding. Cenozoic rocks overlie the Franciscan Complex in the East Bay Hills that are also complexly interbedded and deformed. Pleistocene to Quaternary age sediments deposited on alluvial fans and the edge of San Francisco Bay are composed of mixtures of gravel, sand, silt, clay and Bay Mud (Helley and LaJoie 1979). An area geologic map of the site is presented in Plate 1.

SITE GEOLOGY

BSA's 2013 on-site geotechnical investigation revealed the North Hill is composed of sandstone and claystone that is overlain by up to 12 feet of fill material. The South Hill is composed of naturally occurring asbestos bearing serpentinite with silty sand and silty clay around this hill.

Exploratory drilling revealed interbedded silty, sandy and clayey soil to depths of between 15 to 50 feet below the surface. Groundwater was observed in boreholes at depths of 5 to 9 feet below the surface.

2013 CBC SEISMIC DESIGN PARAMETERS

The project is at approximately 37.519 degrees North latitude and 122.054 degrees West longitude. The peak ground acceleration (PGA) according to the 2013 CBC is 0.52 g. The following are the 2013 California Building Code seismic design criteria using the USGS Seismic Design Maps program, Version 3.1.0, dated July 11, 2013.

California Building Code	
Mapped Spectral Acceleration for Short Periods, S_s	1.500 g
Mapped Spectral Acceleration for 1-Second Period, S_1	0.600 g
Site Class	D
Site Coefficient F_a (for Site Class D)	1.0
Site Coefficient F_v (for Site Class D)	1.5
Acceleration Parameter S_{MS} (adjusted for Site Class D)	1.500 g
Acceleration Parameter, S_{M1} (adjusted for Site Class D)	0.900 g
Acceleration Parameter, S_{DS}(adjusted for Site Class D)	1.00 g
Acceleration Parameter, S_{D1} (adjusted for Site Class D)	0.600 g

GEOLOGIC HAZARDS

REGIONAL SEISMICITY AND MAJOR FAULTS

The project site lies in an active and highly seismic region with numerous faults that have historically caused damaging earthquakes. The Regional Fault Map depicts major Bay Area faults and is attached as Plate 2. The faults generally trend northwest-southeast across the entire San Francisco Bay area. Table 1 lists the major active faults and their estimated earthquake magnitudes expected in future earthquakes. Recent damaging earthquakes in the region include the 1989 Loma Prieta and 2014 South Napa earthquakes. The Hayward fault is the nearest active fault and lies about 5½ miles northeast of the subject site. The site is not located within a California Alquist-Priolo earthquake fault zone.

The major site development risks created by earthquakes are surface rupture, ground shaking and liquefaction. The BSA site investigation reports that no faults are mapped crossing the site so the likelihood of surface rupture is very low. The site will very likely experience strong earthquake ground shaking.

Table 1. San Francisco Bay Area Major Faults Summary

Fault Name	Fault Length (Kilometers)	Estimated Earthquake Magnitude
San Andreas (North Coast South)	190	7.4
San Andreas (Peninsula)	85	7.1
San Andreas (Santa Cruz Mtn.)	62	7.0
Northern San Gregorio	110	7.2
Hayward (Southern)	53	6.7
Hayward (Northern)	35	6.4
Rogers Creek	62	7.0
Healdsburg-Rogers Creek	57	7.1
Southern Maacama	41	6.9
Calaveras (Northern)	45	6.8
Calaveras (Central)	59	6.2
Calaveras (Southern)	19	5.8
Calaveras (Northern) Amador Valley Segment	15	6.5
Calaveras (Northern) San Ramon Segment	13	6.4
Concord-Green Valley	53	7.1
Concord	17	6.2
Hunting Creek-Berryessa	60	7.2
Greenville	51	6.6
Ortigalita	66	7.2
West Napa	30	6.5
Monte Vista-Shannon thrust	45	6.7
Collayomi	29	6.5
Point Reyes	47	7.0
Zayante	58	7.0

SHALLOW GROUNDWATER

Shallow groundwater at the site may impact construction by requiring dewatering during installation of underground utilities. Additionally, the bottom of excavations may be soft and wet, and will require stabilization of the bottoms of excavations prior to placement of engineered fill. Soft and wet excavation bottoms can be mitigated with the use of geotextiles and imported aggregate, which should be specified by the geotechnical engineer for each specific condition. Since the elevations of the site will be raised by the placement of approximately 3 to 4 feet of fill, long term impacts from the shallow groundwater are not expected. A vapor retarder will be placed under structural concrete floor slabs to minimize moisture vapor transmission through the structural concrete floor slab.

EXPANSIVE SOILS

Shallow, native soils were found to have Plasticity Indices (PI) between 2 and 24, which are indicative of soils that range from low expansion potential to high expansion potential. Site elevations will be raised approximately 3 to 4 feet with select import fill with low expansion potential. Additional shallow soil samples should be obtained and tested for expansion potential before import material is brought to the site and after grading is completed.

SOIL CORROSIVITY

A sample of soil was found to be corrosive to steel and concrete in contact with the ground. The California Building Code provides guidelines protecting concrete and reinforcing bars when structures are in contact with the ground. Concrete mix designs and epoxy coated reinforcing steel can mitigate for corrosive soils. Concrete mix designs can also mitigate for high sulfate soils by specifying the type of cement to be utilized in the concrete, the minimum unconfined compressive strength, and the water to cementitious material ratio. Buried utility lines can be protected from the corrosive soils by utilizing plastic pipes, or providing a protective coating and/or cathodic protection for steel pipes. Additional soil samples will need to be obtained for corrosion testing after the site grades have been raised with import soil.

REFERENCES

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We trust this provides the necessary information at this time. If you have any questions, please contact the undersigned at (925) 484-0220.

Respectfully Submitted,

BERLOGAR STEVENS & ASSOCIATES

William R. Stevens
Principal Engineer
GE 2339

Chris Palmer
Senior Consulting Geologist
CEG 1262

CP/WRS/FB:jmo

Attachments: Plate 1 Area Geologic Map
Plate 2 – Regional Fault Map
Plate 3 – Liquefaction Susceptibility Map

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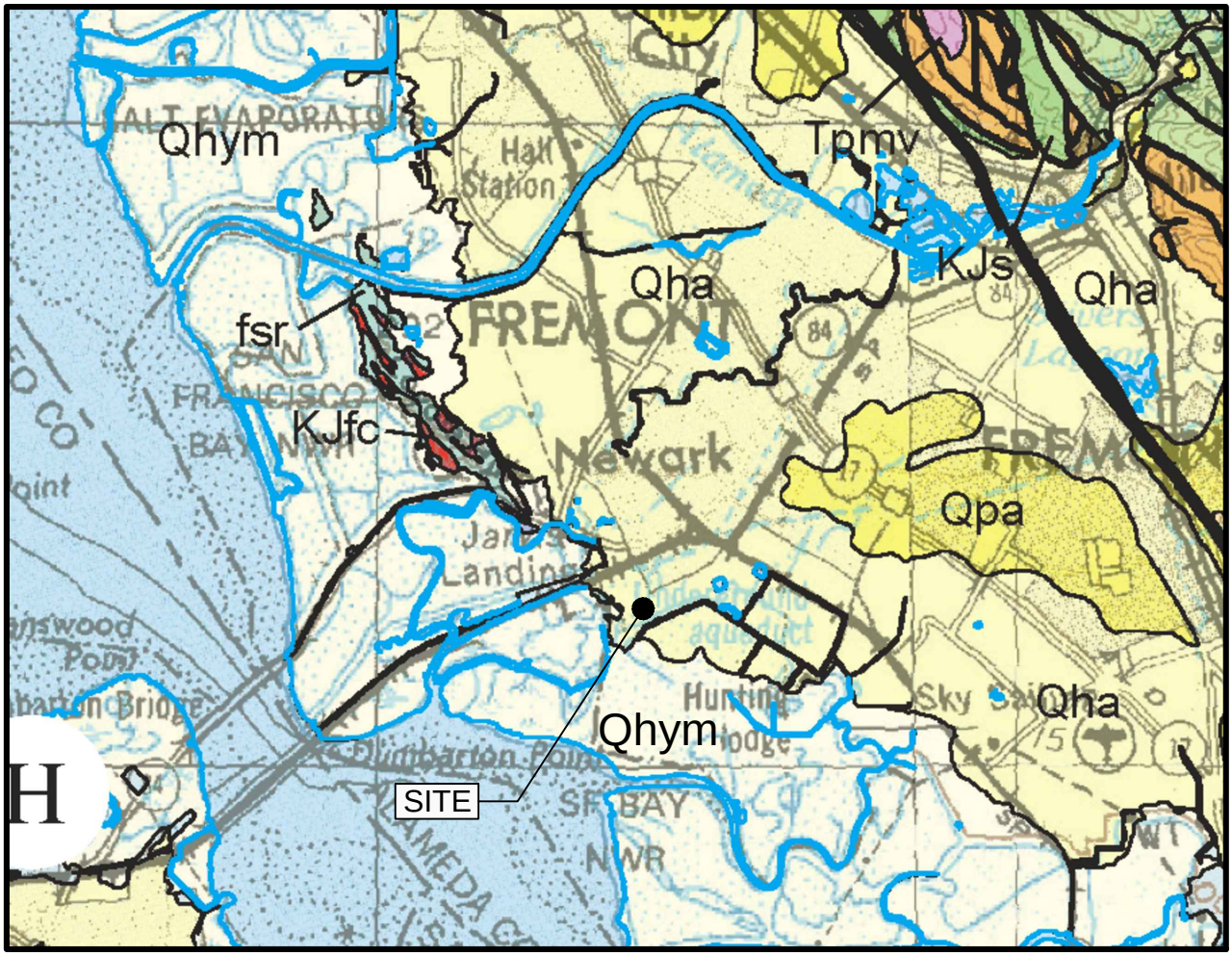

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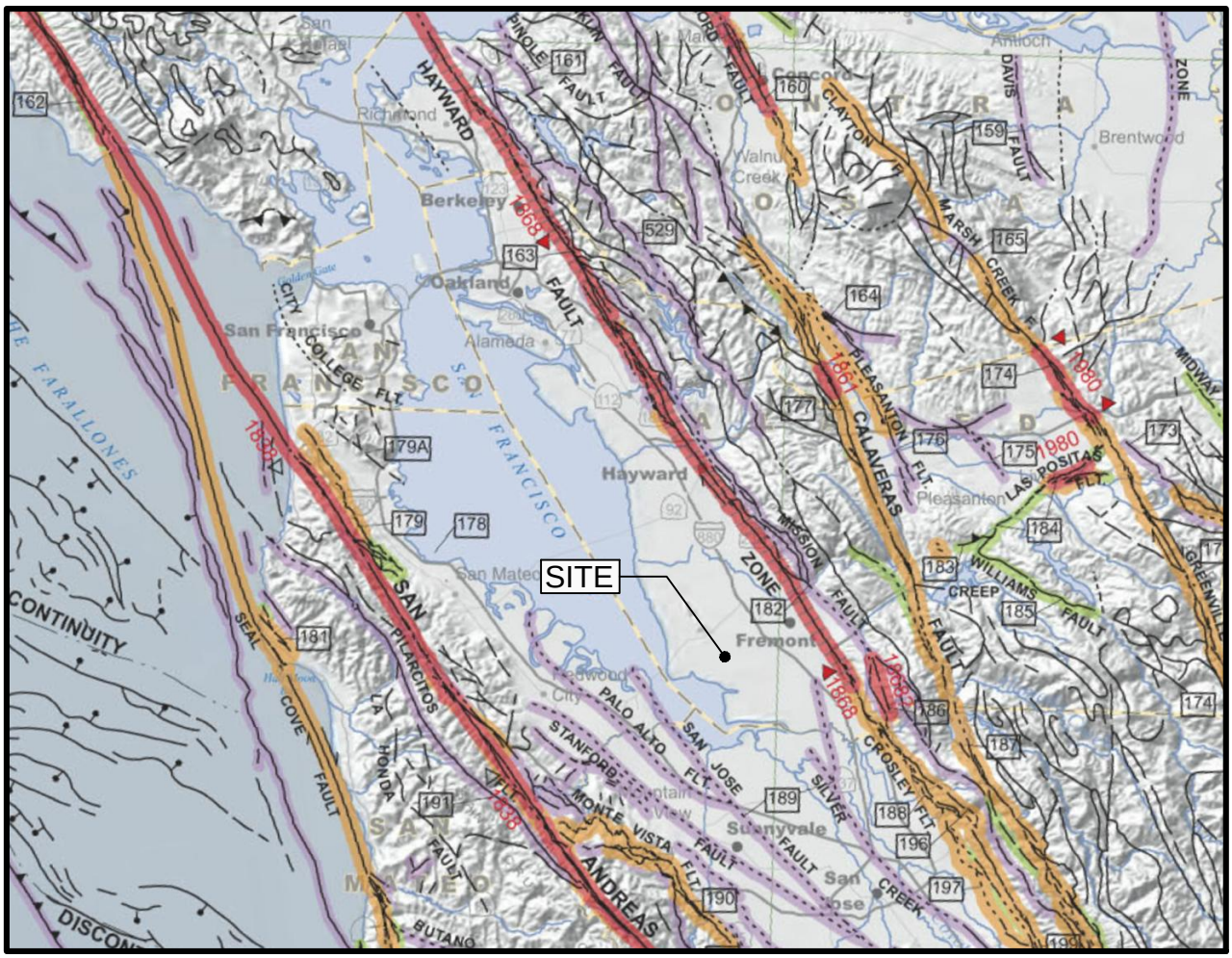

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PLATE 2

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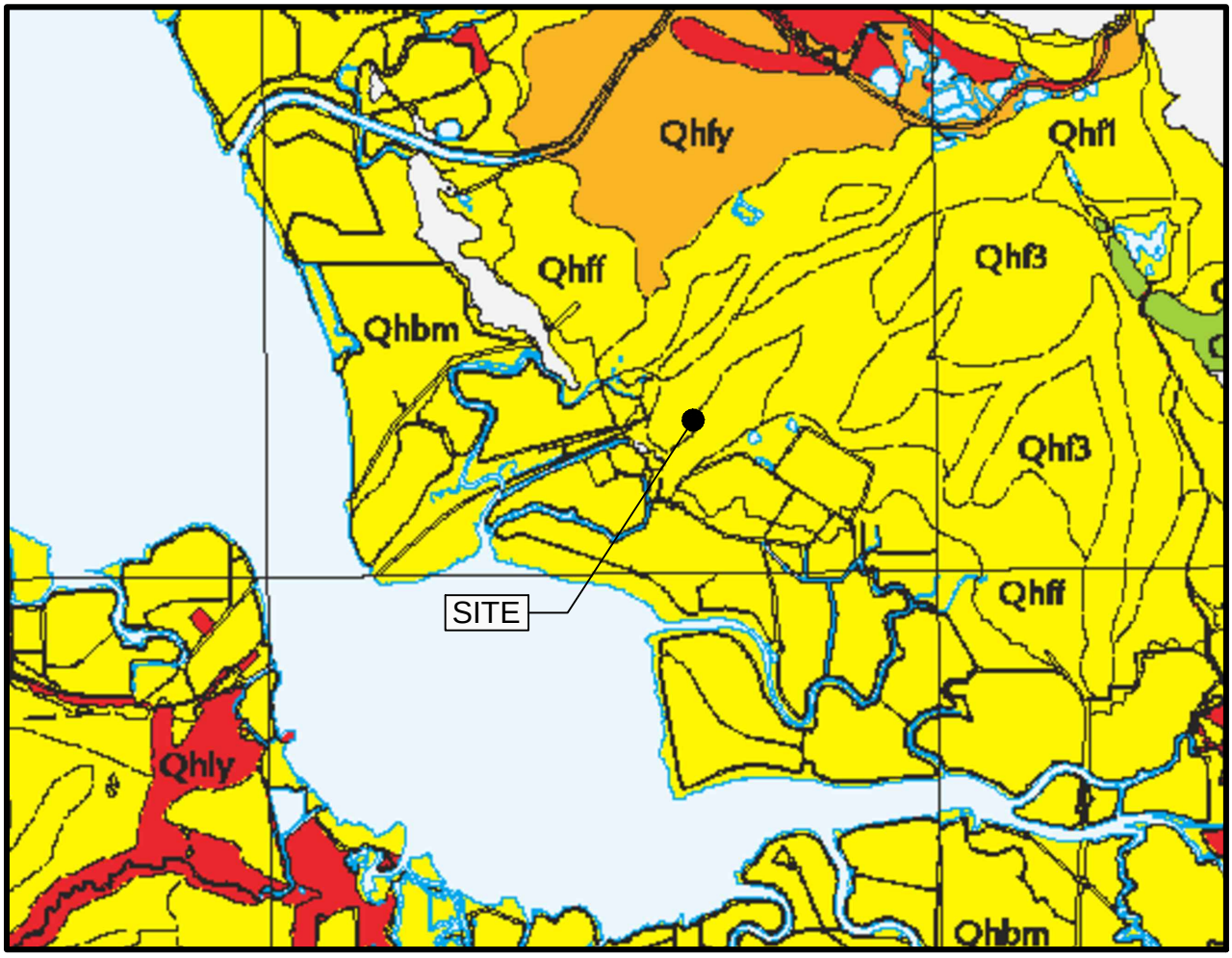

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