AT DUBLIN
DUBLIN, CALIFORNIA

PRELIMINARY GEOTECHNICAL EXPLORATION

SUBMITTED TO
Shea Properties
130 Vantis, Suite 200
Aliso Viejo, CA 94656

PREPARED BY
ENGEO Incorporated

January 31, 2018

PROJECT NO.
9429.001.000

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GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES

Project No.
9429.001.000

January 31, 2018

Ms. Elizabeth Cobb
Vice President, Development
Shea Properties
130 Vantis, Suite 200
Aliso Viejo, CA 94656

Subject: AT Dublin
Tassajara Road
Dublin, California

PRELIMINARY GEOTECHNICAL EXPLORATION

Dear Ms. Cobb:

We prepared this preliminary geotechnical report for the AT Dublin site in Dublin, California as outlined in our agreement dated November 30, 2017. This report presents our geotechnical observations, as well as our preliminary conclusions and recommendations. We also provide preliminary site grading, drainage, and foundation recommendations for use during land planning.

Based upon our initial assessment, the proposed residential development at the AT Dublin site is feasible from a geotechnical standpoint. Design-level exploration(s) should be conducted prior to site development once more detailed land plans have been prepared. Please let us know when working drawings are nearing completion, and we will be glad to discuss these additional services with you.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

We prepared this geotechnical report for design of AT Dublin in Dublin, California. We prepared this report as outlined in our agreement dated November 30, 2017. Shea Properties authorized us to conduct the following scope of services:

- Review of published geologic maps and reports.
- Drilling and logging of four borings ranging up to 50 feet deep.
- Conducting twelve Cone Penetration Tests (CPTs) ranging up to 50 feet deep.

For our use, we received the following:

1. *Ruggeri, Jensen, Azar (RJA); Parcel Map Exhibit, Dimanto Property, City of Dublin, Alameda County, California; May 15, 2017; Job No. 171026.*

2. *Ruggeri, Jensen, Azar (RJA); Base Site Plan Exhibit, AT Dublin, City of Dublin, Alameda County, California; October 26, 2017; Received October 26, 2017.*

3. *Shea Properties; Grading and Drainage Sheets C2.1, C2.2, C2.3; Storm Control Sheet C3.1, C3.2, C3.3, C3.4; September 1, 2017; Project No. 171026E.*

4. *Shea Properties; Stage 1 Submittal, AT Dublin, Dublin, California, October 10, 2017; Project No. 1098.003.*

We performed previous subsurface exploration at the site as referenced in our report titled "Preliminary Geotechnical Report for DiManto Property" dated March 1, 2013.

This report was prepared for the exclusive use of our client and their consultants for evaluation of this project. In the event that any changes are made in the character, design or layout of the development, we must be contacted to review the preliminary conclusions and recommendations contained in this report to evaluate whether modifications are recommended. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROJECT LOCATION

Figure 1 displays a Site Vicinity Map. This site is located north of Interstate-580 and east of Tassajara Road in Dublin, California. The site is approximately 76 acres in area and is identified by Assessor's Parcel Numbers (APN) 985-51-4, 985-51-5, 985-51-6, 985-52-24, and 985-52-25. Figure 2 shows site boundaries, proposed building and pavement areas, and our exploratory locations.

The site consists of undeveloped land that is generally bound by Interstate 580 to the south, Tassajara Road to the west, Brannigan Street to the east, and an existing residential development to the north. Gleason Drive, Central Parkway, and Dublin Boulevard currently cross the site in the east-west direction. Review of historic records indicate that the site has remained as undeveloped land since 1939, with the exception of residential/agricultural structures that were on the property from at least 1949 until the mid/late 1990s.

1.3 PROJECT DESCRIPTION

Based on our discussion with Shea Properties and review of the information provided, we understand the following site improvements are proposed:

- 415,000 square feet of general commercial, inclusive of the potential for two hotels.
- 280 to 290 apartment units, 4-story Type V (wood) surrounding a 5-story parking garage.
- 200 medium-high density, wood-frame residential townhomes.
- 180 medium density, wood-frame residential townhomes.
- Earthwork cut and fill up 2 and 5 feet, respectively.
- Paved streets, parking and drive lanes.
- Utilities and other infrastructure improvements.
- Concrete flatwork.
- Water quality facilities.

1.4 EXISTING GEOTECHNICAL DATA

We reviewed available geotechnical reports for previous projects within the site vicinity. The following list of selected references includes the existing geotechnical reports reviewed as part of this evaluation.

2013 – ENGEO Preliminary Geotechnical Exploration – DiManto Property

Our preliminary geotechnical exploration included in part or entirety County of Alameda Assessor's Parcel Numbers (APN) 985-52-25, 985-52-24, and 985-51-06, totaling approximately 39 acres. The exploration included seven borings to a maximum depth of 52 feet below ground surface. Soil samples from the borings were submitted for moisture content, plasticity index, gradation and corrosivity testing. Testing results indicated a moderately high expansion potential in surface samples, with subsurface conditions consisting of lean clay with occasional sand lenses with fines. These sand lenses are suspected to have liquefaction potential, but their effects are likely minor. Preliminary recommendations for site preparation and foundation design were also provided in the report. The boring locations from this previous exploration are presented in Figure 2 and the complete boring logs are included in Appendix A. The laboratory data from this previous exploration are included in Appendix C.

1998 – Berlogar Geotechnical Consultants - Dublin Ranch Assessment District

The project site is located within an area designated as the Dublin Ranch Assessment District in Dublin, California. This District area was previously investigated by Berlogar Geotechnical Consultants (BGC) in 1999. Three solid flight auger borings from this previous exploration are within the vicinity of the project site. The locations of the borings are presented in Figure 2 and the available boring logs are presented in Appendix F of this report.

2.0 FINDINGS

2.1 FIELD EXPLORATION

Our field exploration included drilling 4 borings and advancing 12 Cone Penetration Tests (CPT) at various locations on the site. We performed our field exploration between December 8 and December 13, 2017.

The location and elevations of our explorations are approximate. We estimated the locations of features shown on Figure 2; they should be considered accurate only to the degree implied by the method used.

2.1.1 Borings

We observed the drilling of four borings at the locations shown on the Site Plan, Figure 2. An ENGEO representative observed the drilling and logged the subsurface conditions at each location. We retained a truck-mounted Mobile B53 drill rig and crew to advance the borings using 6-inch-diameter hollow-stem auger methods. We advanced the borings to maximum depths of 31½ feet below existing grade. We permitted and backfilled the borings in accordance with the requirements of Zone 7.

We obtained bulk soil samples from drill cuttings and retrieved both disturbed and relatively undisturbed soil samples at various intervals in the borings using a standard penetration sampler.

We obtained the standard penetration resistance blow counts by dropping a 140-pound hammer through a 30-inch free fall. We drove the 2-inch O.D. split-spoon sampler 18 inches and recorded the number of blows for each 6 inches of penetration. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows to drive the last 1 foot of penetration; we have not converted the blow counts using any correction factors. When sampler driving was difficult, we recorded penetration only as inches penetrated for 50 hammer blows.

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

2.1.2 Cone Penetration Tests

We retained a CPT rig to push the cone penetrometer to a maximum depth of approximately 50 feet in general accordance with ASTM D-5778. Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and pore pressure (U) (Robertson and Campanella, 1988). CPT logs are presented in Appendix B.

2.2 SITE BACKGROUND

According to available historic aerials, the property has been used for agricultural purposes since at least 1939. Four to six structures are evident in aerials from approximately 1958 to 1998 near the intersection of Tassajara Road and Central Parkway up until to 1993. The property and adjacent parcels appear to have been used primarily for agricultural purposes in all of the available aerial photographs. There are no visual indicators of large amounts of fill placement onsite in the photographs reviewed.

2.3 GEOLOGY AND SEISMICITY

2.3.1 Geology

The study area is located within the Coast Ranges geomorphic province of California. The Coast Ranges are dominated by a series of northwest-trending mountain ranges that have been folded and faulted in a tectonic regime that involves both translational and compressional deformation. The study area is located near the northern margin of the Livermore Valley, which is underlain by a thick sequence of alluvial deposits (Figure 3, Dibblee, 2006). Quaternary geologic mapping in the area indicate that the alluvial deposits underlying the site are either Pleistocene (Graymer, 1997) or Holocene in age (Witter, 2006). A portion of the site near the northern site boundary is mapped as underlain by alluvial terrace and colluvial deposits from historic landslides of Quaternary age (Nilson, 1975).

2.3.2 Seismicity

The San Francisco Bay Area contains numerous active earthquake faults. Nearby active faults are listed in Table 2.3.2-1. An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 11,000 years) (Bryant and Hart, 2007). Figure 5 shows the approximate locations of these faults and significant historic earthquakes recorded within the San Francisco Bay Region.

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

The active faults mapped within 20 miles of the site are listed in Table 2.3.2-1 by proximity to the site with their estimated maximum moment magnitude.

TABLE 2.3.2-1: Active Faults Capable of Producing Significant Ground Shaking at the Site
Latitude: 37.70769 **Longitude:** -121.87034

FAULT NAME	DISTANCE FROM SITE (MILES)	DIRECTION FROM SITE	MAXIMUM MOMENT MAGNITUDE
Mount Diablo Thrust	2.8	North	6.7
Calaveras	3.6	West	7.0
Greenville	8.2	Northeast	7.0
Hayward-Rodgers	10.4	West	7.3
Green Valley	14.8	Northwest	6.8
Great Valley	19.0	East	6.9

The bedrock formations in the area south of Mount Diablo and north of the Livermore Valley have been folded and cut by thrust faults that typically dip toward the north, according to geologic mapping by Crane (1995) and Graymer, et al. (1996). Geologic studies by Unruh and Sawyer (1997) suggest that the core of Mount Diablo may be underlain at depth (several thousand feet) by an active “blind” thrust fault system (a “blind” thrust fault does not extend to the surface). According to Unruh and Sawyer (1997), movement on the blind thrust fault system is responsible for the uplift of Mount Diablo and the folding of the rocks in the site vicinity. Unruh and Sawyer believe that surface effects of the deeply buried blind thrust fault system are typically relatively slow, diffuse, and distributed vertical movements associated with the growth of folds. According to their cross sections, the leading edge of the buried Mount Diablo thrust fault may exist at depths of 3 to 5 miles somewhere in the vicinity of the Tassajara Anticline, located approximately 4 miles to the north of the site.

The Working Group on California Earthquake Probabilities (WGCEP, 2008) evaluated the 30-year probability of a Moment Magnitude 6.7 or greater earthquake occurring on the known active fault systems in the Bay Area, including the Hayward fault. The UCERF generated an overall probability of 63 percent for the Bay Area as a whole, and a probability of 31 percent for the Hayward fault, 21 percent for the Northern San Andreas fault, 7 percent for the Calaveras fault, 3 percent for the Greenville fault, and 1 percent for the Mount Diablo Thrust fault.

The study area is located within a State of California Seismic Hazard Zone (CGS, 2008) for areas that may be susceptible to liquefaction (Figure 4).

2.4 SURFACE CONDITIONS

The approximately 76.1-acre site slopes from north to south, with elevations ranging from approximately 391 feet in the northern portion of the site to 348 feet in the southern portion of the site, based on the plans provide by RJA (local benchmark; NGS Benchmark T-1257). The site is currently not occupied and was previously used for agriculture.

We observed the following site features during our reconnaissance:

- The majority of the site is recently tilled with some tall grasses.
- The site is relatively flat in topography and no stockpiled soil was observed.
- Two areas of previous structures are visible with some debris in the central portion of the site.

Please refer to the Site Plan, Figure 2, for more information on site features.

2.5 SUBSURFACE CONDITIONS

We observed subsurface conditions using the exploratory borings and CPTs. Subsurface conditions observed in the borings were fairly consistent across the site, with lean clay extending to a maximum depth of 19 feet, underlain by a sand layer ranging from 5 to 11½ feet thick. The sand layers encountered in our explorations tend to be terminated by another lean clay layer, similar to that seen near the surface. The plasticity indices of the clay layers ranged from 11 to 55, indicating a low to high expansion potential.

The Site Plan (Figure 2), exploration logs (Appendix A) and CPT data (Appendix B) provide subsurface conditions at each exploration location. The logs contain the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The logs graphically depict the subsurface conditions encountered at the time of the exploration.

2.6 GROUNDWATER CONDITIONS

We observed groundwater in several of our subsurface explorations. We summarize our observations in the table below:

TABLE 2.6-1: Groundwater Observations

EXPLORATION LOCATION	APPROX. DEPTH TO GROUNDWATER (FEET)	APPROX. GROUNDWATER ELEVATION (FEET)
2-B01	20	333
2-B02	21	330
2-B03	15	332
2-B04	20	328
B-1	28	339
B-6	48	332

The groundwater levels measured during our explorations likely do not represent the equilibrium groundwater level. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, and other factors not evident at the time measurements were made.

According to the CGS Seismic Hazard Zone Report (2008) for the Livermore Quadrangle, the highest groundwater levels expected at the site range from approximately 15 feet below existing ground surface (bgs) in the southern portion of the site to greater than 40 feet bgs in the northern portions of the site.

2.7 LABORATORY TESTING

We tested select samples recovered during drilling activities to determine various soil characteristics as presented on the following table.

TABLE 2.7-1: Laboratory Testing

SOIL CHARACTERISTIC	TESTING METHOD	LOCATION OF RESULTS
Moisture Content	ASTM D-2216	Appendix A
Plasticity Index	ASTM D-4318	Appendix C
Grain Size Distribution	ASTM D-1140	Appendix C
Corrosivity Analysis	ASTM D-4327	Appendix D

3.0 PRELIMINARY CONCLUSIONS

From a geotechnical engineering viewpoint, the site is suitable for the proposed development, provided the preliminary geotechnical recommendations in this report and future design-level geotechnical exploration studies are properly incorporated into the design plans and specifications.

A design-level geotechnical exploration should be performed as part of the design process. The exploration may include additional borings and/or cone penetration tests and laboratory soil testing to provide data for preparation of specific recommendations regarding grading, foundation design, and drainage for the proposed development. The exploration will also allow for more detailed evaluations of the geotechnical issues, discussed below, and afford the opportunity to provide recommendations regarding techniques and procedures to be implemented during construction to mitigate potential geotechnical/geological hazards.

The primary geotechnical concerns that could affect development on the site are expansive soil surface soil compaction and liquefaction hazards. We summarize our conclusions below.

3.1 EXPANSIVE SOIL

We tested samples of the existing near-surface soil for plasticity index (PI) to estimate expansive potential. As discussed in Section 2.5, the existing near-surface soil samples tested yielded PIs that ranged from 11 to 55, which indicate moderately high expansion potential. The majority of the test results are in the mid-20s to 40s. These results generally indicate that most of the clay is moderately to highly expansive.

Expansive soil can change in volume with changes in moisture. They can shrink or swell and cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to volume changes associated with expansive soil can be reduced by: (1) using a rigid mat foundation that is designed to resist the settlement and heave of expansive soil, (2) deepening the foundations to below the zone of moisture fluctuation, i.e. by using deep footings or drilled piers, and/or (3) using footings at normal shallow depths, but bottomed on a layer of select fill having a low expansion potential.

Post-tensioned mat foundations are the preferred foundation system for the residential construction at the subject site. Mat foundations may not be the ideal option for the commercial spaces due to the normal need to move utilities based on tenant improvements; therefore, we provide an alternative to use deepened foundations combined with non-expansive building pad soil.

Successful performance of structures on expansive soil requires special attention during construction. It is imperative that exposed soils be kept moist prior to placement of concrete for foundation construction. It can be difficult to remoisturize clayey soil without excavation, moisture conditioning, and recompaction.

3.2 SOIL VOLUME LOSS (SHRINKAGE)

The upper soil is relatively soft and loose as a result of past agricultural practices at the site. Because of this, we anticipate the potential for some volume loss once this soil is compacted as engineered fill. This should be evaluated during design-level exploration of the site.

3.3 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking and ground lurching. The following sections present a discussion of these hazards as they apply to the site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, lateral spreading, landslides, tsunamis, flooding or seiches is considered low at the site.

3.3.1 Ground Rupture

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

3.3.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the San Francisco Bay Region could cause considerable ground shaking at the site, similar to that which has occurred in the past. To mitigate the shaking effects, all structures should be designed using sound engineering judgment and the current California Building Code (CBC) requirements, as a minimum. Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage, but with some nonstructural damage, and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

3.3.3 Liquefaction

Liquefaction is the loss of strength to soil layers due to cyclic loading or seismic shaking. Generally, loose coarse-grained material will undergo liquefaction under a seismic event. Based on observations of soil behavior under seismic shaking and laboratory testing, some fine-grained material, such as silt and clay, can also undergo liquefaction or cyclic softening. In order for a soil to be potentially liquefiable, it must be saturated. For this site, we considered the design groundwater depth to be at 15 feet bgs.

We performed a detailed liquefaction potential analysis of the CPT soundings to estimate liquefaction potential using the computer software CLiq Version 2.1.6.11 developed by GeoLogismiki. We used a Peak Ground Acceleration (PGA) value of 0.66g as outlined in the latest building code and moment magnitude of 7.0. We performed our analysis of liquefaction potential using the Robertson (2009) method due to the fact that our site soil matches well with the criteria developed by the author. The criteria being that sand-like soil is evaluated based on density, intermediate soil is evaluated based on density and amount of fines, and clay-like soil is evaluated based on undrained shear strength.

The results of these calculations are presented in Appendix E, with our estimation of post-earthquake settlements. The analysis sheets in Appendix E summarize the CPT tip resistance, computed factor of safety, volumetric strain, and resulting settlement as a function of depth for each CPT. The plots directly show which soil layers liquefy and which do not. They also relate to soil behavior type zones that may contribute to site settlement, as well as the relative contribution of each zone, and the distribution of settlements with depth.

The analysis indicates that interbedded layers of clay sand and sandy clay will settle approximately 3 inches due to cyclic softening and liquefaction. Based on the high end of the calculated total liquefaction settlements, the site improvements should be designed to withstand a differential settlement of 1½ inches over a 30-foot distance and perform as intended. To mitigate the differential settlement for structures, we recommend post-tensioned mat foundations for the residential structures and commercial structures.

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

3.3.4 Lateral Spreading

Lateral spreading is a failure within a nearly horizontal soil zone that causes the overlying soil mass to move toward a free face or down a gentle slope. Generally, the effects of lateral spreading are most significant at a free face or the crest of a slope, and diminish with distance from the slope. Based on the lack of a laterally continuous layer of potentially liquefiable soil at the site and general flatness of the site, the risk of lateral spreading is low.

3.3.5 Ground Lurching

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

3.3.6 Flooding

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

3.4 SOIL CORROSION POTENTIAL

As part of this study, we obtained a representative soil sample and submitted to a qualified analytical lab for determination of pH, resistivity, sulfate, and chloride. The results are included in Appendix D and summarized in the table below.

TABLE 3.4-1: Corrosivity Test Results

SAMPLE LOCATION	DEPTH (feet)	PH	RESISTIVITY (OHMS-CM)	CHLORIDE (MG/KG)	SULFATE* (MG/KG)
2-B01	1	8.51	370	120	19

* ASTM D4327

The 2016 CBC references the 2014 American Concrete Institute Manual, ACI 318-14, Section 19.3.1 for concrete durability requirements. ACI Table 19.3.1.1 provides the following exposure categories and classes, and Table 19.3.2.1 provides requirements for concrete in contact with soil based upon the exposure class.

In accordance with the criteria presented in the above table, the soil tested is categorized as Not Applicable, and is within the F0 freeze-thaw class, S0 sulfate exposure class, P0 exposure class and C1 corrosion class. Cement type, water-cement ratio, and concrete strength, are not specified for these ranges.

Considering a ‘Not Applicable’ sulfate exposure, there is no requirement for cement type or water-cement ratio; however, a minimum concrete compressive strength of 2,500 psi is specified by the building code. For this sulfate range, we recommend Type II cement and a concrete mix design for foundations and building slabs-on-grade that incorporates a maximum water-cement ratio of 0.50. It should be noted, however, that the structural engineering design requirements for concrete may result in more stringent concrete specifications.

Based on the resistivity measurements, the soil is considered moderately corrosive to buried metal piping. Values tested for chloride do not pose a significant impact to metals or concrete.

If desired to investigate this further, we recommend a corrosion consultant be retained to evaluate if specific corrosion recommendations are advised for the project. Note that ASTM Test Method D4327 was used in lieu of the ACI-designated sulfate test methods as it provides better test results.

3.5 2016 CBC SEISMIC DESIGN PARAMETERS

We provide the 2016 CBC seismic design parameters in the table below, which include design spectral response acceleration parameters based on the mapped Risk-Targeted Maximum Considered Earthquake (MCER) spectral response acceleration parameters.

TABLE 3.5-1: 2016 CBC Seismic Design Parameters, Latitude: 37.70769 **Longitude:** -121.87034

PARAMETER	VALUE
Site Class	D
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S (g)	1.76
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1 (g)	0.60
Site Coefficient, F_A	1.00
Site Coefficient, F_V	1.50
MCE_R Spectral Response Acceleration at Short Periods, S_{MS} (g)	1.76
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1} (g)	0.91
Design Spectral Response Acceleration at Short Periods, S_{DS} (g)	1.18
Design Spectral Response Acceleration at 1-second Period, S_{D1} (g)	0.60
Mapped MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA (g)	0.66
Site Coefficient, F_{PGA}	1.00
MCE_G Peak Ground Acceleration adjusted for Site Class effects, PGA_M (g)	0.77
Long period transition-period, T_L	8 sec

4.0 PRELIMINARY EARTHWORK RECOMMENDATIONS

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

4.1 GENERAL SITE CLEARING

Site development will commence with the removal of existing improvements and their foundations, and buried structures, including abandoned utilities and their backfill. All debris or soft compressible soil should be removed from any location to be graded, from areas to receive fill or structures, and from those areas to serve as borrow. Because the site was previously used for agriculture, we typically expect that the upper 2 to 3 feet of soil will need to be reworked to produce appropriately moisture conditioned and compacted material. The depth of removal of such materials should be determined by the Geotechnical Engineer in the field at the time of grading.

Existing vegetation should be removed from areas to receive fill or structures, or those areas to serve for borrow. Tree roots should be removed down to a depth of at least 3 feet below existing grade. The actual depths of tree root removal should be determined by the Geotechnical Engineer's representative in the field. Subject to approval by the Landscape Architect, strippings and organically contaminated soils can be used in landscape areas. Otherwise, such soil should be removed from the study areas. Any topsoil that will be retained for future use in landscape areas should be stockpiled in areas where it will not interfere with grading operations.

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

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

4.2 EXPANSIVE SOIL MITIGATION

We observed potentially expansive clay near the surface as discussed in Section 3.1. Our laboratory testing indicates that this soil exhibits moderate to high shrink/swell potential with variations in moisture content.

As previously mentioned, we recommend post-tensioned mat foundations as the preferred foundation system for the residential structures. Design criteria for this foundation type are presented in Section 5.0. Successful performance of structures on expansive soil requires special attention during construction. It is imperative that exposed soil be kept moist prior to placement of concrete for foundation construction. It can be difficult to remoisturize clayey soil without excavation, moisture conditioning, and recompaction.

We provide specific grading recommendations for compaction of clay soil at the site. The purpose of these recommendations is to reduce the swell potential of the clay by compacting the soil at a high moisture content and controlling the amount of compaction.

4.3 SELECTION OF MATERIALS

With the exception of construction debris (wood, brick, asphalt, concrete, metal, etc.), trees, organically contaminated materials (soil which contains more than 3 percent organic content by weight), and environmentally impacted soils (if any), we anticipate the site soil is suitable for use as engineered fill provided they are broken down to 6 inches or less in size. Other materials and debris, including trees with their root balls, should be removed from the study areas.

Imported fill material should meet the above requirements and have a plasticity index similar to onsite soil material. We should be given the opportunity to sample and test proposed imported fill material at least 5 days prior to delivery to the site.

4.4 OVER-OPTIMUM SOIL MOISTURE CONDITIONS

The contractor should anticipate encountering excessively over-optimum (wet) soil moisture conditions during winter or spring grading, or during or following periods of rain. Wet soil can make proper compaction difficult or impossible.

Wet soil conditions can be mitigated by:

1. Frequent spreading and mixing during warm dry weather;
2. Mixing with drier materials;
3. Mixing with a lime, lime-flyash, or cement product; or
4. Stabilizing with aggregate, geotextile stabilization fabric, or both.

Options 3 and 4 should be evaluated and approved by the Geotechnical Engineer prior to implementation.

4.5 FILL COMPACTION

4.5.1 Grading in Structural Areas

The contractor should perform subgrade compaction prior to fill placement, following cutting operations, and in areas left at grade as follows.

1. Scarify to a depth of at least 12 inches.
2. Moisture condition soil to at least 4 percentage points over the optimum moisture content; **and**
3. Compact the soil to between 87 and 92 percent relative compaction. Compact the upper 6 inches of finish pavement subgrade to at least 90 percent relative compaction prior to aggregate base placement.

After the subgrade has been compacted, the contractor should place and compact acceptable fill as follows:

1. Spread fill in loose lifts that do not exceed 12 inches.
2. Moisture condition lifts to at least 4 percentage points over the optimum moisture content; **and**
3. Compact fill to between 87 and 92 percent relative compaction; compact the upper 6 inches of fill in pavement areas to at least 90 percent relative compaction prior to aggregate base placement.

The contractor should compact the pavement Caltrans Class 2 Aggregate Base section to at least 95 percent relative compaction (ASTM D1557). Moisture condition aggregate base to a minimum moisture content of optimum prior to compaction.

4.5.2 Underground Utility Backfill

4.5.2.1 General

The contractor is responsible for conducting trenching and shoring in accordance with CALOSHA requirements. Project consultants involved in utility design should specify pipe bedding materials.

4.5.2.2 Structural Areas

The contractor should place and compact trench backfill as follows:

1. Trench backfill should have a maximum particle size of 6 inches.
2. Moisture condition trench backfill to at least 4 percentage points above the optimum moisture content. Moisture condition backfill outside the trench.
3. Place fill in loose lifts not exceeding 12 inches;
   and
4. Compact fill to between 87 and 92 percent relative compaction.

Where utility trenches cross underneath buildings, we recommend that a plug be placed within the trench backfill to help prevent the normally granular bedding materials from acting as a conduit for water to enter beneath the building. The plug should be constructed using a sand cement slurry (minimum 28-day compressive strength of 500 psi) or relatively impermeable native soil for pipe bedding and backfill. We recommend that the plug extend for a distance of at least 3 feet in each direction from the point where the utility enters the building perimeter.

Jetting of backfill is not an acceptable means of compaction. We may allow thicker loose lift thicknesses based on acceptable density test results, where increased effort is applied to rocky fill or for the first lift of fill over pipe bedding.

4.5.3 Landscape Fill

The contractor should process, place and compact fill in accordance with the recommendations in Section 5.0 except compact to at least 85 percent relative compaction (ASTM D1557).

4.6 SITE DRAINAGE

4.6.1 Surface Drainage

The project civil engineer is responsible for designing surface drainage improvements. With regard to geotechnical engineering issues, we recommend that finish grades be sloped away from buildings and pavements to the maximum extent practical to reduce the potentially damaging effects of expansive soil. The latest California Building Code Section 1804.3 specifies minimum slopes of 5 percent away from foundations. Where lot lines or surface improvements restrict meeting this slope requirement, we recommend that specific drainage requirements be developed. As a minimum, we recommend the following:

1. Discharge roof downspouts into closed conduits and direct away from foundations to appropriate drainage devices.

2. Consider the use of rear lot surface drainage collection systems to reduce overland surface drainage from back to front of lot.

3. Do not allow water to pond near foundations, pavements, or exterior flatwork.

4.6.2 Subsurface Drainage

Based on our site exploration and current grading concepts for the site, we do not anticipate that subdrainage systems will be recommended. We recommend that we observe the earthwork operations during site grading to determine if subdrains are needed. Depending on the actual conditions encountered during grading, similar subsurface drainage facilities may be recommended within low-lying areas. Subdrains should also be added where wet conditions are encountered during grading.

4.7 STORMWATER INFILTRATION AND SELECT PROJECT RISK LEVEL FACTORS

Due to the density of the site soil and fines content (percentage passing the No. 200 sieve) generally exceeding 30 percent, the near-surface site soil is expected to have a low to moderate permeability value for stormwater infiltration in grassy swales or permeable pavers, unless subdrains are installed. Therefore, Best Management Practices should assume that limited stormwater infiltration will occur at the site.

4.8 STORMWATER BIORETENTION AREAS

If bioretention areas are implemented, we recommend that, when practical, they be planned a minimum of 5 feet away from structural site improvements, such as buildings, streets, retaining walls, and sidewalks/driveways. When this is not practical, bioretention areas located within 5 feet of structural site improvements can either:

1. Be constructed with structural side walls capable of withstanding the loads from the adjacent improvements, or

2. Incorporate filter material compacted to between 85 and 90 percent relative compaction (and a waterproofing system designed to reduce the potential for moisture transmission into the subgrade soil beneath the adjacent improvement.

In addition, one of the following options should be followed.

1. We recommend that bioretention design incorporate a waterproofing system lining the bioswale excavation and a subdrain, or other storm drain system, to collect and convey water to an approved outlet. The waterproofing system should cover the bioretention area excavation in such a manner as to reduce the potential for moisture transmission beneath the adjacent improvements.

2. Alternatively, and with some risk of movement of adjacent improvements, if infiltration is desired, we recommend the perimeter of the bioretention areas be lined with an HDPE tree root barrier that extends at least 1 foot below the bottom of the bioretention areas/infiltration trenches.

Site improvements located adjacent to bioretention areas that are underlain by base rock, sand, or other imported granular materials, should be designed with a deepened edge that extends to the bottom of the imported material underlying the improvement.

Where adjacent site improvements include buildings greater than three stories, streets steeper than 3 percent, or design elements subject to lateral loads (such as from impact or traffic patterns), additional design considerations may be recommended. If the surface of the bioretention area is depressed, the slope gradient should follow the slope guidelines described in earlier section(s) of this document. In addition, although not recommended, if trees are to be planted within bioretention areas, HDPE Tree Boxes that extend below the bottom of the bioretention system should be installed to reduce potential impact to subdrain systems that may be part of the bioretention area design. For this condition, the waterproofing system should be connected to the HPDE Tree Box with a waterproof seal.

Given the nature of bioretention systems and possible proximity to improvements, we recommend we be retained to review design plans and provide testing and observation services during the installation of linings, compaction of the filter material, and connection of designed drains.

The contractor is responsible for conducting all excavation and shoring in a manner that does not cause damage to adjacent improvements during construction and future maintenance of the bioretention areas. As with any excavation adjacent to improvements, the contractor should reduce the exposure time such that the improvements are not detrimentally impacted.

4.9 LANDSCAPING CONSIDERATION

As the near-surface soil is moderately to highly expansive, we recommend greatly restricting the amount of surface water infiltration near structures, pavements, flatwork, and slabs-on-grade. This may be accomplished by:

- Selecting landscaping that requires little or no watering, especially within 3 feet of structures, slabs-on-grade, or pavements.
- Using low precipitation sprinkler heads.
- Regulating the amount of water distributed to lawn or planter areas by installing timers on the sprinkler system.
- Providing surface grades to drain rainfall or landscape watering to appropriate collection systems and away from structures, slabs-on-grade, or pavements.
- Preventing water from draining toward or ponding near building foundations, slabs-on-grade, or pavements.
- Avoiding open planting areas within 3 feet of the building perimeter.

We recommend that these items be incorporated into the landscaping plans.

5.0 PRELIMINARY FOUNDATION RECOMMENDATIONS

We developed preliminary foundation recommendations using data obtained from our field exploration, laboratory test results, and engineering analysis. The following preliminary recommended foundation options address the effects of the native expansive soil and differential soil movement:

1. Post-tensioned mat foundation.
2. Structural mat foundation.
3. Deepened spread footings with non-expansive fill under the slab

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

5.1 POST-TENSIONED MAT FOUNDATIONS

We recommend that the proposed residential structures and commercial structures be supported on post-tensioned (PT) mat foundations bearing on prepared natural soil or compacted fill. In addition to the parameters below, foundations should be designed for 1½ inches of differential movement over a distance of 30 feet for the seismic case.

PT mats should be designed for an average allowable bearing pressure of 1,000 pounds per square foot (psf) for dead-plus-live loads, with maximum localized bearing pressures of 1,500 psf at column or wall loads. Allowable bearing pressures can be increased by one-third for all loads including wind or seismic. Design PT mats using the criteria presented in Table 5.1-1 below; the differential liquefaction settlement noted above should be combined with the movements in Table 5.1-1 when evaluating foundation performance under seismic loading. Typically, when evaluating the effects of seismic loading a larger amount of architectural distress is allowed versus static load combinations.

TABLE 5.1-1: Post-Tensioned Mat Design Recommendations

CONDITION	CENTER LIFT	EDGE LIFT
Edge Moisture Variation Distance, e_m (feet)	**7.1**	**3.8**
Differential Soil Movement, y_m (inches)	**0.5**	**1.2**

<u>Subgrade Treatment for Mat Foundations</u>. The subgrade material under structural mats should be uniform. The upper 12 inches of pad subgrade should be moisture conditioned to a moisture content of at least 5 percentage points above optimum. The subgrade should be thoroughly soaked prior to placing the concrete. The subgrade should not be allowed to dry prior to concrete placement.

<u>Moisture Vapor Reduction</u>. When buildings are constructed with post-tensioned mats, water vapor from beneath the mat will migrate through the foundation and into the building. This water vapor can be reduced but not eliminated. Vapor transmission can negatively affect floor coverings and lead to increased moisture within a building. Where water vapor migrating through the mat would be undesirable, we recommend the following measures to reduce water vapor transmission upward through the mat foundations.

1. Install a vapor retarder membrane directly beneath the mat. Seal the vapor retarder at all seams and pipe penetrations. Vapor retarders should conform to Class A vapor retarder in accordance with ASTM E 1745-11 “Standard Specification for Plastic Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs.”

2. Concrete should have a concrete water-cement ratio of no more than 0.5.

3. Provide inspection and testing during concrete placement to check that the proper concrete and water cement ratio are used.

4. Consider and implement adequate moist cure procedures for mat foundations.

Protect foundation subgrade soils from seepage by providing impermeable plugs within utility trenches.

5.2 STRUCTURAL MAT FOUNDATIONS

Where post-tensioned mats are not economical due to building dimensions, a structural mat foundation system can be used. We anticipate that structural mats constructed on swelling soil will move differentially. Structural mats may need to be stiffened to reduce differential movements due to swelling/shrinkage to a value compatible with the type of superstructure that will be constructed on them. The structural engineer should be consulted on this matter. In addition to the parameters below, foundations should be designed for 1½ inches of differential movement over a distance of 30 feet for the seismic case.

The perimeter should be thickened by 2 inches, and the minimum soil backfill height against the slab at the perimeter should be 6 inches. Mat foundations should be designed for a uniform bearing pressure of 1,500 pounds per square foot (psf) for dead-plus-live load. This value may be increased to 2,000 psf under individual columns or walls to accommodate stress concentrations at those locations. These values can be increased by one-third for seismic loading. If a structural mat is used, we recommend that it be designed for an edge cantilever length of 8 feet with a random, interior unsupported span of 25 feet.

The thickness of the structural mat will be driven by the structural design. The structural mat should be underlain by a water vapor transmission reduction system as in Section 5.1.

5.3 DEEPENED SPREAD FOOTINGS WITH SLAB-ON-GRADE

We understand that typically post-tensioned mats or structural mats are avoided for commercial spaces to make relocation of utilities below the slab easier. Some of our clients use a lowered mat with a layer of soil on top and a slab-on-grade floor on top of the soil to allow ease of utility relocation for changing tenants. If this alternative is not consistent with the planning for the building, the building can be founded on deepened spread footings with a slab-on-grade floor. To address the expansive potential of the soil, we recommend that the upper 24 inches of building pad grade comprise a non-expansive fill. The non-expansive fill can comprise imported soil with a Plasticity Index less than 12 or native soil chemically treated with lime to so that the soil is essentially non-expansive.

We recommend the minimum footing dimensions shown in Table 5.3-1 below.

TABLE 5.3-1: Minimum Footing Dimensions

FOOTING TYPE	*MINIMUM DEPTH (INCHES)	MINIMUM WIDTH (INCHES)
Continuous	**36**	**18**
Isolated	**36**	**24**

* below lowest adjacent pad grade

The cold joint between the exterior footing and slab-on-grade should be located at least 4 inches above adjacent exterior grade. If this is not done, then we recommend the addition of a waterstop between the two pours to reduce moisture penetration through the cold joint and migration under the slab. Use of a monolithic pour would eliminate the need for the waterstop.

The footings can be designed for a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for dead-plus-live loads. This bearing capacity can be increased by one-third for the short-term effects of wind or seismic loading.

The maximum allowable bearing pressure is a net value; the weight of the footing may be neglected for design purposes. Footings located adjacent to utility trenches should have their bearing surfaces below an imaginary 1:1 (horizontal:vertical) plane projected upward from the bottom edge of the trench to the footing.

5.3.1 Reinforcement

The structural engineer should design footing reinforcement to support the intended structural loads without excessive settlement. Reinforce continuous footings with top and bottom steel to provide structural continuity and to permit spanning of local irregularities. At a minimum, continuous footings should be designed to structurally span a clear distance of 5 feet. They should also be designed for 1½ inches of differential movement over a distance of 30 feet for the seismic case; in our experience, buildings are typically designed with a larger allowance for architectural distress under the seismic loading case.

5.3.2 Foundation Lateral Resistance

Lateral loads may be resisted by friction along the base and by passive pressure along the sides of foundations. The passive pressure is based on an equivalent fluid pressure in pounds per cubic foot (pcf). We recommend the following allowable values for design:

- Passive Lateral Pressure: 250 pcf
- Coefficient of Friction: 0.25

The above allowable values include a factor of safety of 1.5.

Passive lateral pressure should not be used for footings on or above slopes.

5.3.3 Slab-on-Grade Floor Minimum Design Section

At a minimum, we recommend that slab-on-grade floors be at least 5 inches in thickness and be internally reinforced with at least No. 3 reinforcing steel spaced 18 inches on center, each way. The slab-on-grade floor should be underlain by a water vapor transmission reduction system as in Section 5.1 with the exception that we recommend underlaying the system with a 4-inch-thick layer of clean crushed rock to act as a capillary break. The crushed rock should have 100 percent passing the ¾-inch sieve and less than 5 percent passing the No. 4 Sieve.

The structural engineer should provide final design thickness and additional reinforcement, as necessary, for the intended structural loads.

6.0 PRELIMINARY PAVEMENT DESIGN

6.1 FLEXIBLE PAVEMENTS

Based on the site soil, a Resistance (R-Value) of 5 is appropriate for design. The design sections may be reduced based on R-Value testing of samples collected from actual pavement subgrade. Using the traffic indices provided by the civil engineer, we developed the following recommended pavement sections using Chapter 630 of the Caltrans Highway Design Manual (including the asphalt factor of safety), presented in Table 6.1-1 below.

TABLE 6.1-1: Recommended Asphalt Concrete Pavement Sections

TRAFFIC INDEX	SECTION BASED ON R-VALUE 5	
	ASPHALT CONCRETE (INCHES)	CLASS 2 AGGREGATE BASE (INCHES)
5	3.0	10.0
6	3.5	13.0
7	4.0	16.0
9	5.5	20.5
11	7	25.0

Notes: AC is asphalt concrete
AB is Class 2 aggregate base material with a minimum R-value of 78

Pavement construction and all materials should comply with the requirements of the Standard Specifications of the State of California Department of Transportation, Civil Engineer, and appropriate public agency.

6.2 RIGID PAVEMENTS

Concrete pavement sections can be used to resist heavy loads and turning forces in areas such as fire lanes or trash enclosures. Final design of rigid pavement sections, and accompanying reinforcement, should be performed based on estimated traffic loads and frequencies. We recommend the following minimum design sections for rigid pavements:

- Use a minimum section of 6 inches of Portland Cement concrete over 4 inches of Caltrans Class 2 Aggregate Base.
- Concrete pavement should have a minimum 28-day compressive strength of 3,500 psi.
- Provide minimum control joint spacing in accordance with Portland Cement Association guidelines.

6.3 SUBGRADE AND AGGREGATE BASE COMPACTION

The contractor should compact finish subgrade and aggregate base in accordance with the design-level geotechnical report. Aggregate Base should meet the requirements for ¾-inch maximum Class 2 AB in accordance with Section 26-1.02a of the latest Caltrans Standard Specifications.

6.4 CUT-OFF CURBS

Saturated pavement subgrade or aggregate base can cause premature failure or increased maintenance of asphalt concrete pavements. This condition often occurs where landscape areas directly abut and drain toward pavements. If desired to install pavement cutoff barriers, they should be considered where pavement areas lie downslope of any landscape areas that are to be sprinklered or irrigated, and should extend to a depth of at least 4 inches below the base rock layer. Cutoff barriers may consist of deepened concrete curbs or deep-root moisture barriers.

If reduced pavement life and greater than normal pavement maintenance are acceptable to the owner, then the cutoff barrier may be eliminated.

7.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

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

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

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

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

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to ENGEO's documents. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If ENGEO's scope of services does not include on-site construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

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

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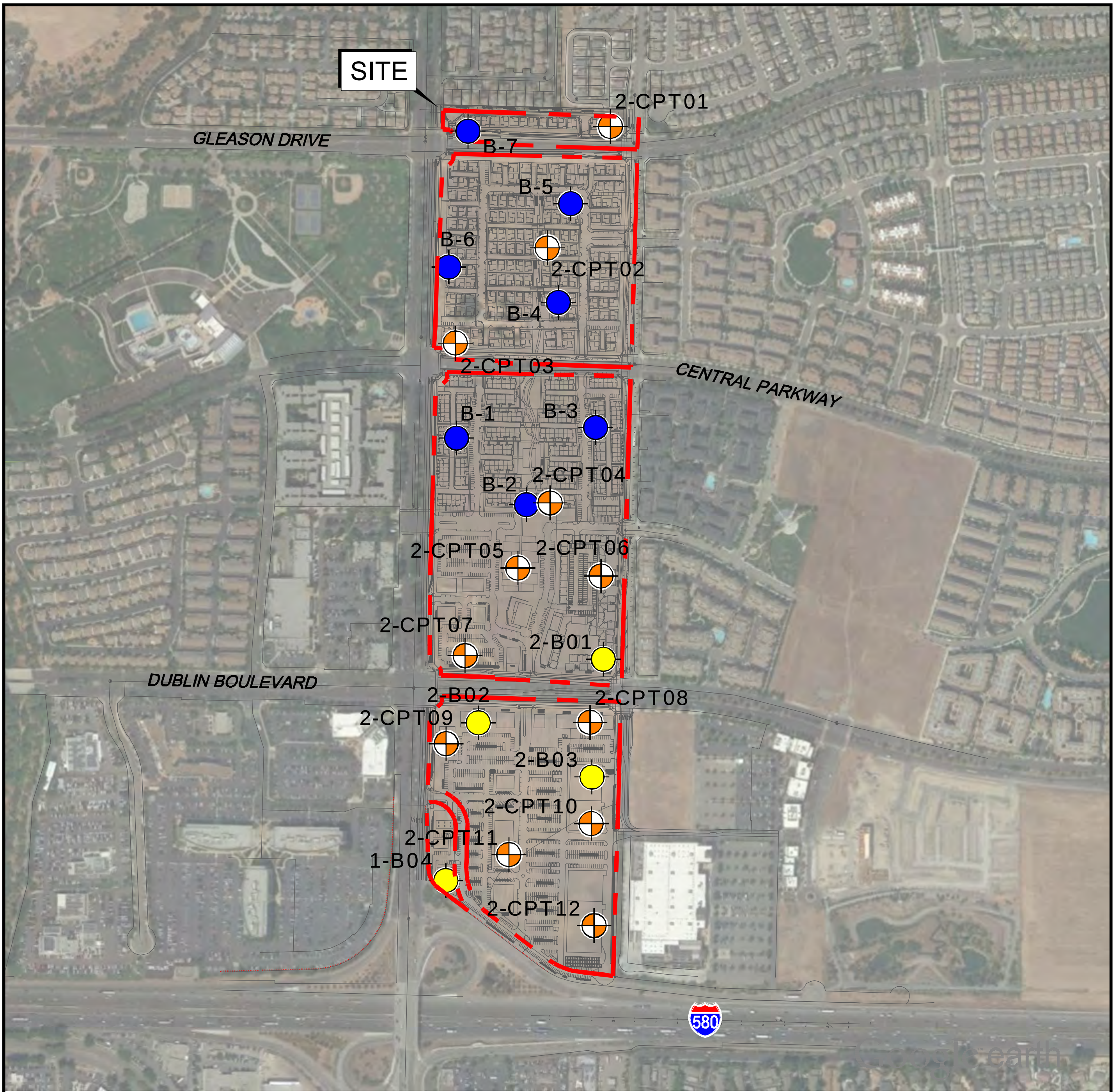
FIGURES

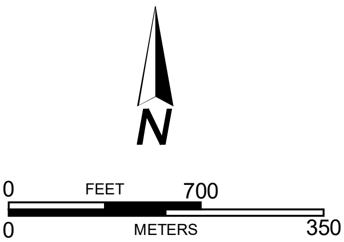
BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO Expect Excellence	VICINITY MAP AT DUBLIN DUBLIN, CALIFORNIA	PROJECT NO.: 9429.001.000 SCALE: AS SHOWN DRAWN BY: SRP CHECKED BY: ARC	FIGURE NO. 1

G:\Drafting\DRAFTING2_Dwg\9429\001\GEX\9429001000-GEX-1-VicinityMap-1217.dwg Plot Date:1-08-18 llee

ORIGINAL FIGURE PRINTED IN COLOR





EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

2-B04 — BORING (ENGEO, 2017)

B-7 — BORING (ENGEO, 2013)

2-CPT12 — CONE PENETRATION TEST (ENGEO, 2017)

BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE AND FIELD PAOLI ARCHITECTS 09/12/17

ENGEO Expect Excellence	SITE PLAN AT DUBLIN DUBLIN, CALIFORNIA	PROJECT NO.: 9429.001.000 SCALE: AS SHOWN DRAWN BY: SRP CHECKED BY: ARC	FIGURE NO. 2

G:\Drafting\DRAFTING2_Dwg\9429\001\GEX\9429001000-GEX-2-SitePlan-1217.dwg Plot Date: 1-08-18 llee

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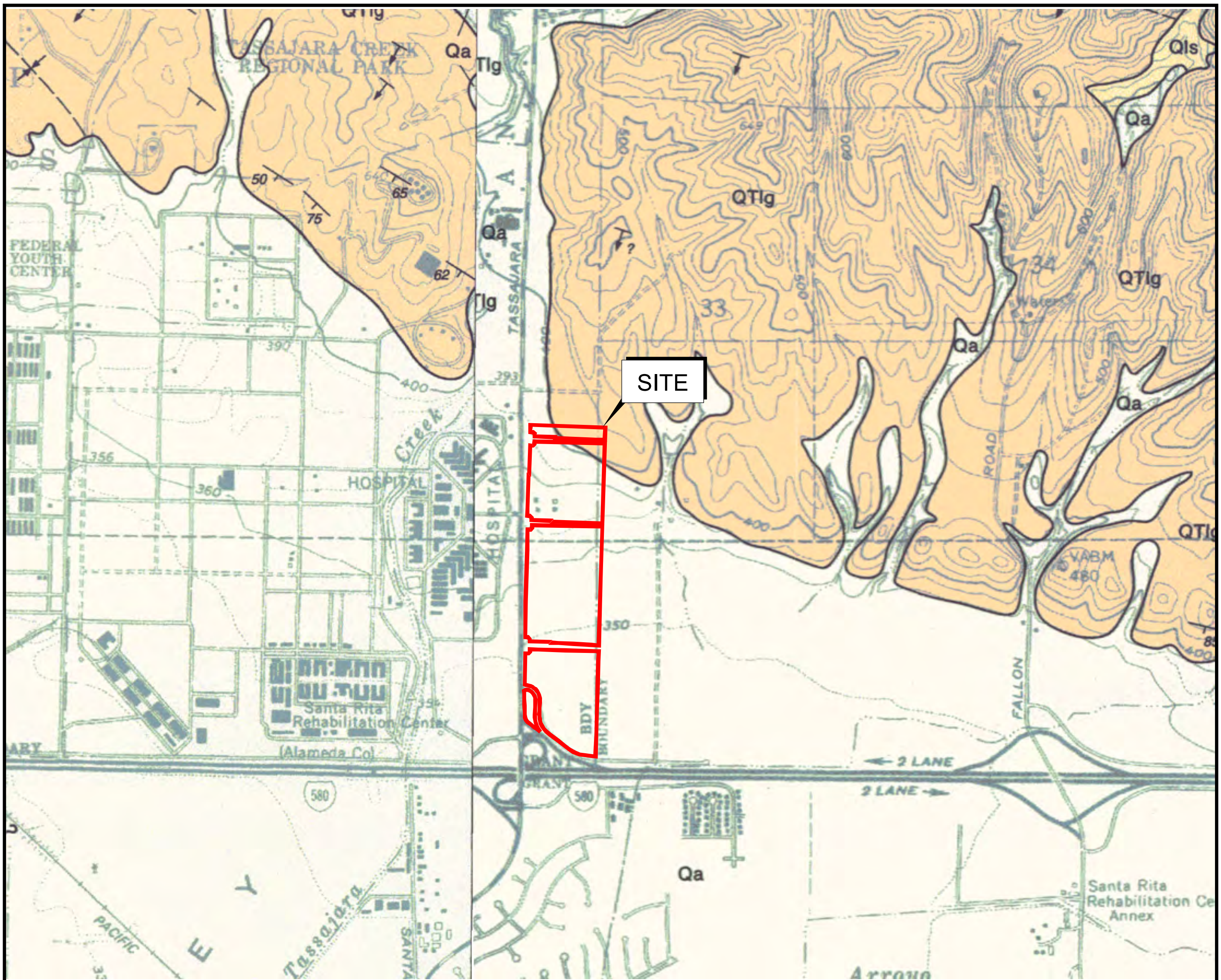

EXPLANATION

BEDROCK CONTACT-DASHED WHERE GRADATIONAL OR APPROXIMATELY LOCATED

FAULT-DASHED WHERE INFERRED, DOTTED WHERE CONCEALED, QUERIED WHERE EXISTENCE IS DOUBTFUL ; DOUBLE ARROWS INDICATE STRIKE-SLIP MOVEMENT

AXIS OF FOLD

ANTICLINE

SYNCLINE

STRIKE AND DIP OF STRATA

INCLINED

Qa ALLUVIAL GRAVEL

QTlg LIVERMORE FORMATION

N

0 FEET 2000

0 METERS 1000

BASE MAP SOURCE: DIBBLEE, 2006

ENGEO Expect Excellence	GEOLOGIC MAP AT DUBLIN DUBLIN, CALIFORNIA	PROJECT NO.: 9429.001.000 SCALE: AS SHOWN DRAWN BY: SRP CHECKED BY: ARC	FIGURE NO. 3

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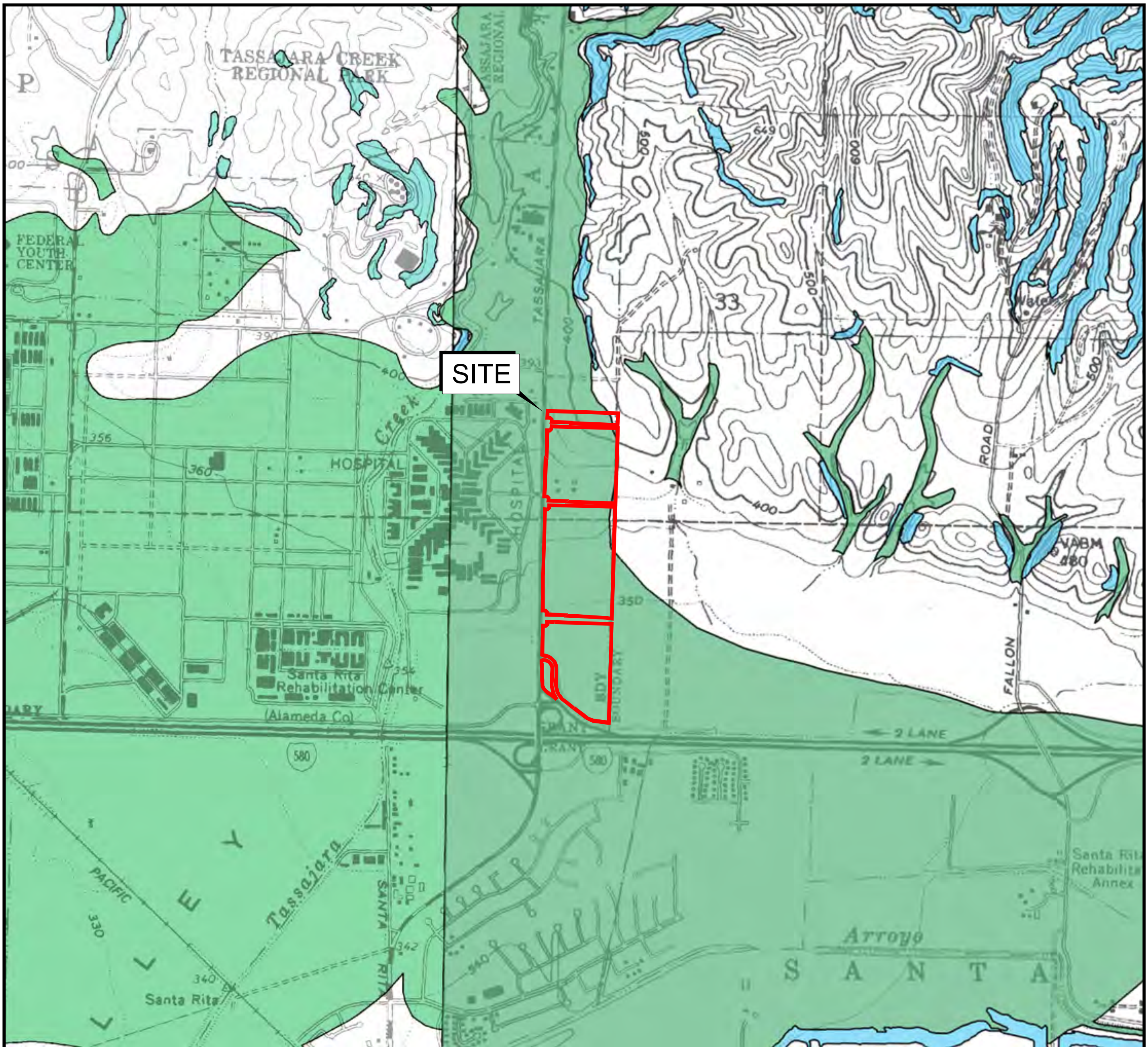
ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

LIQUEFACTION

AREAS WHERE HISTORIC OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTECHNICAL AND GROUNDWATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED

EARTHQUAKE-INDUCED LANDSLIDES

AREAS WHERE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED

N

0 FEET 2000
0 METERS 1000

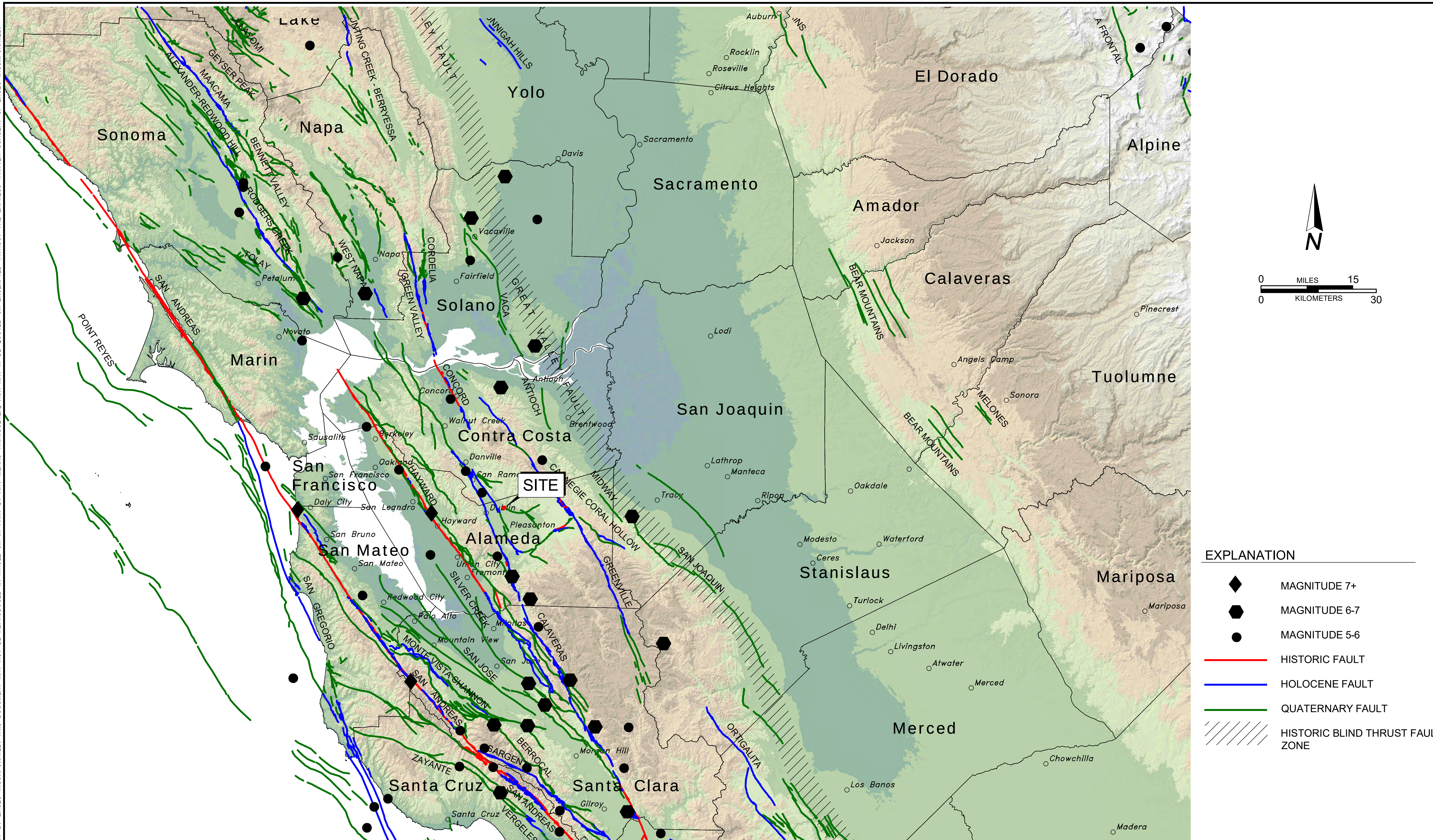
BASE MAP SOURCE: CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY, 2006

ENGEO Expect Excellence

SEISMIC HAZARD ZONES MAP AT DUBLIN DUBLIN, CALIFORNIA	PROJECT NO.: 9429.001.000		FIGURE NO. 4
	SCALE: AS SHOWN		
	DRAWN BY: LL	CHECKED BY: ARC	

G:\Drafting\DRAFTING2_Dwg\9429\001\GEX\9429001000-GEX-4-SeisHazMap-1217.dwg Plot Date: 1-08-18 llee

ORIGINAL FIGURE PRINTED IN COLOR



BASE MAP SOURCE:

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

ENGEO Expect Excellence	REGIONAL FAULTING AND SEISMICITY AT DUBLIN DUBLIN, CALIFORNIA	PROJECT NO.: 9429.001.000 SCALE: AS SHOWN DRAWN BY: SRP CHECKED BY: SRJ	FIGURE NO. 5

G:\Drafting\DRAFTING2_Dwg\9429\001\GEX\9429001000-GEX-5-FaultMap-1217.dwg Plot Date:12-19-17 spatters

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

BORING LOG KEY
EXPLORATION LOGS, 2017
PREVIOUS EXPLORATION LOGS, 2013

KEY TO BORING LOGS

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

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

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

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE: 200, 40, 10, 4 — CLEAR SQUARE SIEVE OPENINGS: 3/4 ", 3", 12"

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

RELATIVE DENSITY

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

CONSISTENCY

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

MOISTURE CONDITION

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

SAMPLER SYMBOLS

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

LINE TYPES

- Solid - Layer Break
- Dashed - Gradational or approximate layer break

GROUND-WATER SYMBOLS

- Groundwater level during drilling
- Stabilized groundwater level

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

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

ENGEO
Expect Excellence

LOG OF BORING 2-B01

LATITUDE: 37.706391 LONGITUDE: -121.868914

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 352 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			LEAN CLAY (CL), dark gray, stiff, moist, medium plasticity, trace organics and fine- to medium-grained sand [NATIVE]			47							
	350		FAT CLAY (CH), pale olive to olive, stiff to very stiff, moist, high plasticity, mottled with pale yellowish brown [NATIVE]										
5						22	57	17	40				
	345												
			Transitions to lean clay, with fine-grained sand.										
10						25	30	19	11	52	13.2		
			POORLY GRADED SAND WITH CLAY (SP), olive to brown, medium dense, moist, sand grains subangular to subrounded, some fines, medium plasticity [NATIVE]										
	340												
			Contains more clay content.										
15						20							
			SILTY SAND (SM), olive to dark olive, medium dense, moist, sand grains subangular to subrounded, some fines, medium plasticity [NATIVE]										
	335												
20					∇								

ENGEO
Expect Excellence

LOG OF BORING 2-B01

LATITUDE: 37.706391 LONGITUDE: -121.868914

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED:	12/13/2017	LOGGED / REVIEWED BY:	S. Waganaar / AC
HOLE DEPTH:	31.5 ft.	DRILLING CONTRACTOR:	West Coast Exploration
HOLE DIAMETER:	4.0 in.	DRILLING METHOD:	Hollow Stem Auger
SURF ELEV (WGS84):	352 ft.	HAMMER TYPE:	140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	330		SILTY SAND (SM), olive to dark olive, medium dense, moist, sand grains subangular to subrounded, some fines, medium plasticity [NATIVE]			16	22	22	NP	44	24.9		
25	325		LEAN CLAY WITH SAND (CL), dark olive to brown, stiff to very stiff, saturated, medium plasticity, mottled with light brown, slow dilatancy, some subangular to subrounded sand [NATIVE]			18	43	21	22				
													1.0*
30			SANDY LEAN CLAY (CL-SC), dark olive to light olive brown, medium stiff to stiff, saturated, fast dilatancy, some poorly graded, subangular to subrounded sand [NATIVE]			30							
			Borehole terminated at 31-1/2 feet below ground surface. Groundwater encountered at 20 feet below ground surface.										

ENGEO
Expect Excellence

LOG OF BORING 2-B02

LATITUDE: 37.7031 LONGITUDE: -121.8715

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 347 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	345		SANDY LEAN CLAY (CL), dark olive mottled with white, medium dense to dense, moist, low plasticity, trace organics [NATIVE]			12				69			
			LEAN CLAY (CL), dark brown to dark gray, medium stiff, moist, high plasticity, no organics [NATIVE]										
5	340		Becomes soft			10							0.75*
10			FAT CLAY (CH), olive mottled with light yellowish brown, medium stiff to stiff, moist, medium plasticity [NATIVE]			20	56	19	37		27.5		1.75*
15	335		Fine sand in cuttings, 20-30% sand content			18				89			
20	330		CLAYEY SAND (SC), olive to light brown, medium dense, moist, medium plasticity, sand grains subangular, some clay content [NATIVE]										

ENGEO
Expect Excellence

LOG OF BORING 2-B02

LATITUDE: 37.7031 LONGITUDE: -121.8715

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 347 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			LEAN CLAY WITH SAND (CL), olive mottled with brownish gray, medium stiff, very moist, low plasticity, fine-grained sand, high dilatancy [NATIVE]		▽	8							
	325		Saturated soft cuttings										
			Cuttings becoming more plastic										
			LEAN CLAY (CL), olive mottled with dark yellowish brown, stiff to very stiff, moist, medium plasticity, trace fine-grained angular sand. [NATIVE]										
25						15	49	21	28		30.7		
	320												
30						21							2.0*
			Borehole terminated at 31-1/2 feet below ground surface. Groundwater encountered at 21 feet below ground surface.										

LOG OF BORING 2-B03

LATITUDE: 37.704421 LONGITUDE: -121.869039

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 346 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	345		FAT CLAY (CH), dark gray, stiff, moist, high plasticity, trace organics. [NATIVE]			12							1.75*
5	340		LEAN CLAY (CL), olive mottled with yellowish brown, very stiff, moist, medium plasticity, no organics [NATIVE]			24							2.0*
10	335					16	42	17	25	85			
			LEAN CLAY WITH SAND (CL), dark olive to olive, stiff to very stiff, moist, medium plasticity, some sand content, white carbonate seams [NATIVE]										
15	330				∇	11							
			CLAYEY SAND (SC), dark olive, loose to medium dense, saturated, low plasticity, sand grains mulitcolored and subangular, portions of sample liquefied, fast dilatancy, some clay content [NATIVE]										
20													

LOG OF BORING 2-B03

LATITUDE: 37.704421 LONGITUDE: -121.869039

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 346 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	325		CLAYEY SAND (SC), dark olive, loose to medium dense, saturated, low plasticity, sand grains mulitcolored and subangular, portions of sample liquefied, fast dilatancy, some clay content [NATIVE]			18				39			
25	320		LEAN CLAY (CL), dark olive mottled with yellowish brown, very stiff, moist, medium plasticity, carbonate seams [NATIVE]			24					25.4		2.5*
30	315					30							
			Borehole terminated at 31-1/2 feet below ground surface. Groundwater encountered at 15 feet below ground surface.										

LOG - GEOTECHNICAL W/ELEV. GINT LOGS.GPJ ENGEO INC.GDT 1/30/18

LOG OF BORING 2-B04

ENGEO Expect Excellence

LATITUDE: 37.70504 LONGITUDE: -121.871609

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 351 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	350		FAT CLAY (CH), dark gray to dark brown, medium stiff, moist, high plasticity, mottledpale olive, carbonate staining, trace organics [NATIVE]			14							
5	345		LEAN CLAY WITH SAND (CL), dark olive mottled with light yellowish brown, stiff, moist, low plasticity, seams of clayey sand, some fine- to medium-grained, subrounded sand [NATIVE]			11	39	18	21				
			LEAN CLAY (CL), dark olive, medium stiff to stiff, moist, medium plasticity, carbonate seams [NATIVE]										
10	340					16							
15	335					10					31.7		
			SANDY LEAN CLAY (CL), dark olive and yellowish brown, medium stiff to stiff, moist, medium plasticity, some fine- to medium- grained sand [NATIVE]										
20			Transitions to loose non-cohesive, saturated silt with fine sand.		▽								

LOG OF BORING 2-B04

ENGEO Expect Excellence

LATITUDE: 37.70504 LONGITUDE: -121.871609

Geotechnical Exploration
AT Dublin
Dublin, California
09429.001.000

DATE DRILLED: 12/13/2017
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS84): 351 ft.

LOGGED / REVIEWED BY: S. Waganaar / AC
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Rope and Pulley

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	330		LEAN CLAY (CL), dark olive, stiff, medium plasticity, mottled with dark yellowish brown, carbonate seams, trace coarse-grained sand [NATIVE]			11							
			Transitions to plastic and stiff consistency										
25	325					16							
			Transitions to stiff to very stiff, dark olive mottled with yellowish brown, some carbonate seams, medium to high plasticity, with trace medium- to coarse-grained sand										
30	320		Transitions to non-cohesive silty sand, fast dilatancy			14							
			Borehole terminated at 31-1/2 feet below ground surface. Groundwater encountered at 20 feet below ground surface.										

LOG OF BORING B1

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 367 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			CLAY (CL), dark brown, stiff, moist, trace silt, carbonates										
	1					20							2.0*
			SILTY CLAY (CL), dark brown, very stiff, moist to dry, carbonates										
5						39							4.5+*
	2		SANDY SILT (ML), tan, stiff, dry, carbonates, grades to more sandy										
						29							3.5*
10	3												
	4					24							
			SANDY SILT (ML), brown, stiff, moist to dry, coarse gravel										
15						14				72			
	5		LEAN CLAY (CL), brown, stiff, moist, 5 to 10% silt										
			SILT WITH CLAY (ML), light brown, hard, moist, trace organics										
						20							4.5*
20	6												
	7					19							2.5*
													1.5*
25													

ENGEO INCORPORATED

LOG OF BORING B1

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 367 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	DESCRIPTION	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
		CLAYEY SILT (ML), light brown, stiff, moist, trace fine-grained sand									
	8	SILTY SAND (SM), light brown, medium dense, wet	▽								
		WELL GRADED SAND (SW), light brown, medium dense, wet		10				73			
30	9	SANDY CLAY (CL), light brown, very stiff, wet, becomes more clayey in shoe									
	10	SILTY SAND (SM), light brown, loose, wet to moist									
35		SANDY LEAN CLAY (CL), brown, medium stiff, moist, organic odor		9							1.0*
	11										
	12	SANDY CLAY (CL), light brown mottled with gray, medium stiff, moist to wet, trace coarse-grained sand, silt, carbonates, black staining		16							
40											
	13	WELL GRADED SAND (SW), light brown, medium dense, wet, gravel		19							
45	14	LEAN CLAY (CL), light brown, stiff, moist									2.5*
		SILTY SAND (SM), light brown, dense, wet									
		WELL GRADED SAND (SW), light brown, dense, wet		60							
50	15	WELL GRADED GRAVEL (SW), light brown, dense, wet, rounded gravel									

LOG OF BORING B1

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 51 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 367 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			WELL GRADED GRAVEL (SW), light brown, dense, wet, rounded gravel			44							
			Bottom of boring at 51 feet. Groundwater encountered at 28 feet.										

ENGEO INCORPORATED

LOG OF BORING B2

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 26½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 363 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	DESCRIPTION	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	1	LEAN CLAY (CL), very dark brown, very stiff, moist, organics, organic odor	17							2.5* 3.5*
5	2	LEAN CLAY (CL), light grayish brown, very stiff, moist, organics, carbonates	32							4.0-4.5*
		fine gravels in shoe								
10	3	as above	28							4.0*
15	4, 5	CLAYEY SILT (ML), light brown, very stiff, moist, carbonates	15							3.0*
20	6	SILTY SAND (SM), light brown, medium dense, moist	29							
	7	WELL GRADED SAND (SW), light brown, loose to medium dense, moist to dry	11	23	17	6	74	18.8		
25		LEAN CLAY (CL), light brown, stiff, moist, carbonates								

LOG - GEOTECHNICAL 9429GINT.GPJ ENGEO INC.GDT 2/28/13

LOG OF BORING B2

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 26½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 363 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	8		LEAN CLAY (CL), light brown, stiff, moist, carbonates			18							2.5*
			Bottom of boring at 26.5 feet. No groundwater encountered.										

ENGEO INCORPORATED

LOG OF BORING B3

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED:	2/11/2013	LOGGED / REVIEWED BY:	J. Kelson / JAF
HOLE DEPTH:	Approx. 26½ ft.	DRILLING CONTRACTOR:	V&W Drilling
HOLE DIAMETER:	6.0 in.	DRILLING METHOD:	Hollow Stem Auger
SURF ELEV ():	Approx. 366 ft.	HAMMER TYPE:	140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			CLAY (CL), very dark brown, medium stiff, moist, silt			10							0.5* 1.5*
	1		LEAN CLAY (CL), light brown, hard, moist, carbonates			36							
5	2												4.5++*
			SANDY SILT (ML), light brown, very stiff, dry										
10	3					20							4.0*
			SILTY SAND (SM), light brown, medium dense, dry										
			SANDY SILT (ML), light brown, very stiff, dry in shoe										
	4		CLAYEY SILT (ML), light brown, very stiff, dry, organics										
15						22							4.0*
	5		SANDY SILT (ML), light brown, very stiff, dry										
20	6		WELL GRADED SAND (SW), light brown, medium dense, dry			30							
	7					15							
25			CLAYEY SILT (ML), brown, hard, dry to moist, sand, carbonates										

LOG OF BORING B3

Geotechnical Exploration DiManto Property Dublin, California 9429.000.000	DATE DRILLED: 2/11/2013 HOLE DEPTH: Approx. 26½ ft. HOLE DIAMETER: 6.0 in. SURF ELEV (): Approx. 366 ft.
	LOGGED / REVIEWED BY: J. Kelson / JAF DRILLING CONTRACTOR: V&W Drilling DRILLING METHOD: Hollow Stem Auger HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	8		CLAYEY SILT (ML), brown, hard, dry to moist, sand, carbonates			48							4.5+* 4.5*
			SANDY SILT (ML), light brown, very stiff, dry										3.25-3.5*
			Bottom of boring at 26.5 feet. No groundwater encountered.										

LOG - GEOTECHNICAL 9429GINT.GPJ ENGEO INC.GDT 2/28/13

ENGEO INCORPORATED

LOG OF BORING B4

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 26½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 376 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	1		CLAY (CL), very dark brown, stiff to very stiff, moist, silt, rootlets			16							1.5* 2.5*
5	2		SANDY SILT (ML), light brown gray, hard, dry			40							4.5+* 4.5+*
10	3		SILTY SAND (SM), light brown, dense, dry										
	4		SANDY SILT (ML), light brown, hard, dry, carbonates			38							4.5+*
15	5		same as above, with trace clay			23							
			SILTY SAND (SM), light brown, medium dense, dry										
20	6		SANDY SILT (ML), light brown, hard, dry, fine gravel, carbonates			26							4.5+*
	7		SILTY SAND (SM), light brown, medium dense, dry			15				33			
25			SANDY CLAY (CL), reddish brown, hard, dry, manganese staining										

LOG OF BORING B4

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 26½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 376 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
						55							4.0-4.5*
	8		CLAYEY SAND (SC), reddish brown, dense, dry										4.5*
			SANDY CLAY (CL), brown, hard, dry										
			Bottom of boring at 26.5 feet. No groundwater encountered.										

ENGEO INCORPORATED

LOG OF BORING B5

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 28 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 394 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

DESCRIPTION	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
SANDY LEAN CLAY (CL), dark brown, stiff, moist, gravel	20							2.5-3* 4.0*
SANDY SILT (ML), light brown, very stiff, moist, gravel								
SANDY SILT (ML), light brown, hard, moist, carbonates, fine-grained sand	30							4.5+*
WELL GRADED SAND (SW), light brown, medium dense, dry, silt, gravel	22 18	23	20	3		11.5		
LEAN CLAY (CL), light brown, hard, dry, silt, carbonates	41							4.5+*
SANDY LEAN CLAY (CL), light brown, hard, dry, carbonates	36							4.5+* 4.5+*
SANDY SILT (ML), light brown, hard, dry	33				58			
SANDY SILT (ML), light brown, hard, dry								

ENGEO INCORPORATED

LOG OF BORING B5

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/11/2013
HOLE DEPTH: Approx. 28 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 394 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	8		SANDY SILT (ML), light brown, hard, dry			62							4.5+*
			WELL GRADED SAND (SW), light brown, very dense, dry, gravel			54							
			Bottom of boring at 28 feet. No groundwater encountered.										

ENGEO INCORPORATED

LOG OF BORING B6

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/12/2013
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 380 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

DESCRIPTION	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
LEAN CLAY (CL), very dark brown, stiff to very stiff, moist		19	50	18	32				1.5* 3.0*
SANDY SILT (ML), brown, hard, moist to dry		28	45	18	27				4.5+* 4.5+*
LEAN CLAY WITH SAND (CL), light brown, hard, dry		39							4.5+*
CLAYEY SAND (SC), light brown, medium dense, dry									
LEAN CLAY WITH SAND (CL), light brown, very stiff, dry		15							
WELL GRADED SAND (SW), light brown, medium dense, dry, silt		37							4.5+*
SANDY SILT (ML), light brown, hard, dry									
LEAN CLAY WITH SAND (CL), light brown, very stiff, dry, carbonates		23							4.0*
WELL GRADED SAND (SW), light brown, medium dense, dry, gravel		25				29			
LEAN CLAY WITH SAND (CL), light brown, very stiff, dry, carbonates									
LEAN CLAY (CL), light brown, hard, moist, carbonates									

LOG OF BORING B6

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/12/2013
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 380 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	DESCRIPTION	Blow Count/Foot	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	8	LEAN CLAY (CL), reddish brown, hard, moist, sand, some orange and black staining	29							4.5* 4.5*
30	9	LEAN CLAY WITH SAND (CL), brown, hard, moist, carbonates	45							4.5+*
		WELL GRADED SAND (SW), brown, medium dense, dry to moist, gravel	23							4.5+*
	10	SILTY CLAY (CL), brown, stiff, moist, sand, gravel		28	16	12		16.1		
35	11	LEAN CLAY WITH SAND (CL), brown, very stiff, moist, manganese staining	24							3.5* 2.0*
40	12	LEAN CLAY WITH SAND (CL), light brown, stiff, moist, fine-grained sand	20					26.9		2.5* 2.0*
45	13, 14	LEAN CLAY WITH SAND (CL), light brown, medium stiff, moist to wet	12							0.5* 0.5* 1.0-1.5*
50	15	CLAYEY SAND (SC), brown, medium dense, wet, manganese staining								

LOG OF BORING B6

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/12/2013
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 380 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			LEAN CLAY WITH SAND (CL), light brown, medium stiff, wet			22							1.0*
			WELL GRADED SAND (SW), light brown, medium dense, wet, manganese staining										
			LEAN CLAY WITH SAND (CL), light brown observed in shoe Bottom of boring at 51.5 feet. Groundwater encountered at 50 feet.										

LOG OF BORING B7

ENGEO INCORPORATED

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/12/2013
HOLE DEPTH: Approx. 28 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 397 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
							Liquid Limit	Plastic Limit	Plasticity Index				
	1		SILT (ML), brown, very stiff, moist, clay, fine-grained sand			20	53	19	34				2.25* 2.5*
5	2		LEAN CLAY (CL), light brown, very stiff, moist, carbonates, sand			25							3.25-3.5*
10	3 4		LEAN CLAY (CL), light brown, hard, moist to dry, fine-grained sand, carbonates			30							4.25-4.5* 4.5+*
15	5		LEAN CLAY (CL), brown, hard, moist to dry, fine-grained sand, manganese staining			37							4.5+*
20	6 7		WELL GRADED SAND (SW), light brown, dense, dry, silt, gravel			49 31							
25			WELL GRADED SAND WITH GRAVEL (SW), brown, dense, dry, gravels rounded and fine to coarse in size										

LOG - GEOTECHNICAL 9429GINT.GPJ ENGEO INC.GDT 2/28/13

ENGEO INCORPORATED

LOG OF BORING B7

Geotechnical Exploration
DiManto Property
Dublin, California
9429.000.000

DATE DRILLED: 2/12/2013
HOLE DEPTH: Approx. 28 ft.
HOLE DIAMETER: 6.0 in.
SURF ELEV (): Approx. 397 ft.

LOGGED / REVIEWED BY: J. Kelson / JAF
DRILLING CONTRACTOR: V&W Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
	8		WELL GRADED SAND WITH GRAVEL (SW), brown, dense, dry, gravels rounded and fine to coarse in size			55							
			LEAN CLAY WITH SAND (CL), brown, very stiff, moist to dry, fine gravel			22							
			Bottom of boring at 28 feet. No groundwater encountered.										

APPENDIX B

CPT DATA

PRESENTATION OF SITE INVESTIGATION RESULTS

At Dublin

Prepared for:

ENGEO Incorporated

CPT Inc. Job No: 17-56137

Project Start Date: 08-Dec-2017
Project End Date: 09-Dec-2017
Report Date: 12-Dec-2017

Prepared by:

California Push Technologies Inc.
820 Aladdin Avenue
San Leandro, CA 94577

Tel: (510) 357-3677

Email: cpt@cptinc.com
www.cptinc.com

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

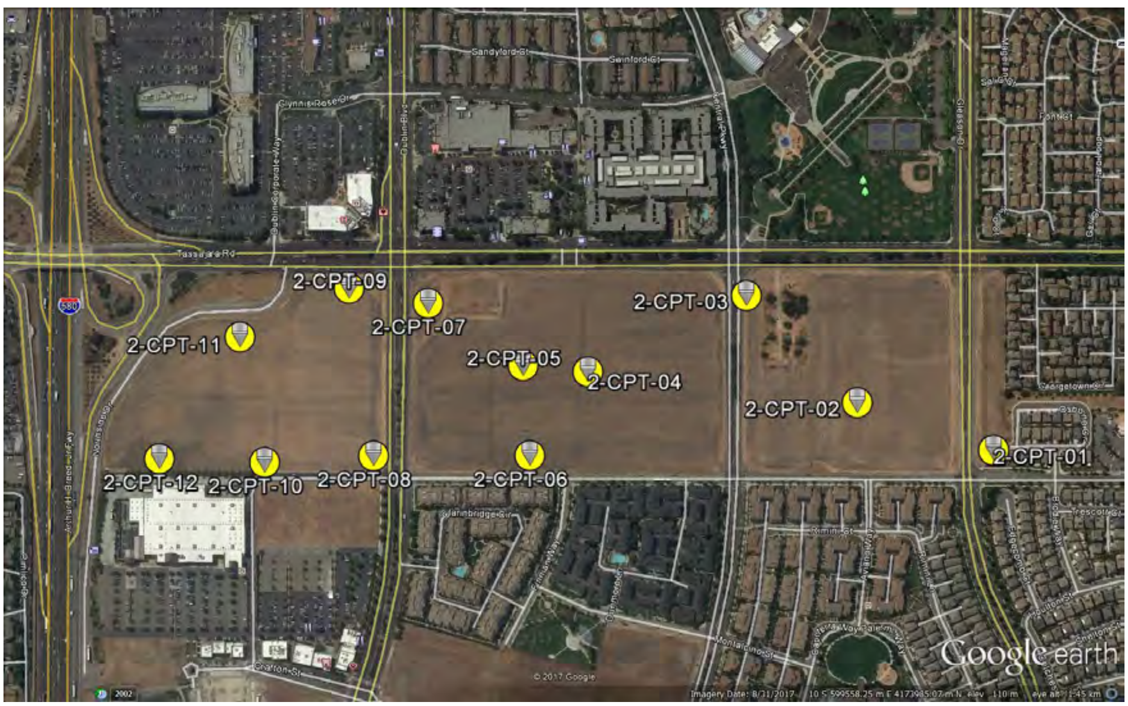
Introduction

The enclosed report presents the results of the site investigation program conducted by CPT Inc. for ENGEO Incorporated at the "At Dublin" project site along Tassajara Rd in Dublin, CA. The program consisted of 12 cone penetration tests (CPT) performed on December 8 and 9, 2017.

Project Information

Project	
Client	ENGEO Incorporated
Project	At Dublin
CPT Inc. project number	17-56137

An image from Google Earth displaying the CPT locations is presented below.



Rig Description	Deployment System	Test Type
CPT track rig (GPT2)	20 ton rig cylinder	CPT

Coordinates		
Test Type	Collection Method	EPSG Reference
CPT	Consumer grade GPS	32610

Cone Penetration Test (CPT)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Tip and sleeve data offset	0.1 meter This has been accounted for in the CPT data files.
Additional plots	Advanced plots with Ic, Phi and N1(60) and Soil Behavior Type (SBT) scatter plots are provided in the data release package.
Additional comments	Annotations are provided on the CPT plots to indicate soil sampling intervals.

Cone Penetrometers Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
443:T1500F15U500	443	15	225	1500	15	500
Cone 443 was used for all soundings.						

CPT Calculated Parameters	
Additional information	The Normalized Soil Behavior Type Chart based on Q_{tn} (SBT Qtn) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPT parameters have been generated and are provided in Excel format files in the release folder. The CPT parameter calculations are based on values of corrected tip resistance (q_t), sleeve friction (f_s) and pore pressure (u_2). Soils were classified as either drained or undrained based on the Normalized Soil Behavior Type Chart (SBT Qtn) (Robertson, 2009. Calculations for both drained and undrained parameters were included for materials that classified as silt mixtures (zone 4).

Limitations

This report has been prepared for the exclusive use of ENGEO Incorporated (Client) for the project titled "At Dublin". The report's contents may not be relied upon by any other party without the express written permission of CPT Inc. CPT Inc. has provided site investigation services, prepared the factual data reporting and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to CPT Inc. by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

CPT Inc.'s piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

The penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table presented in the first appendix. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. Our calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

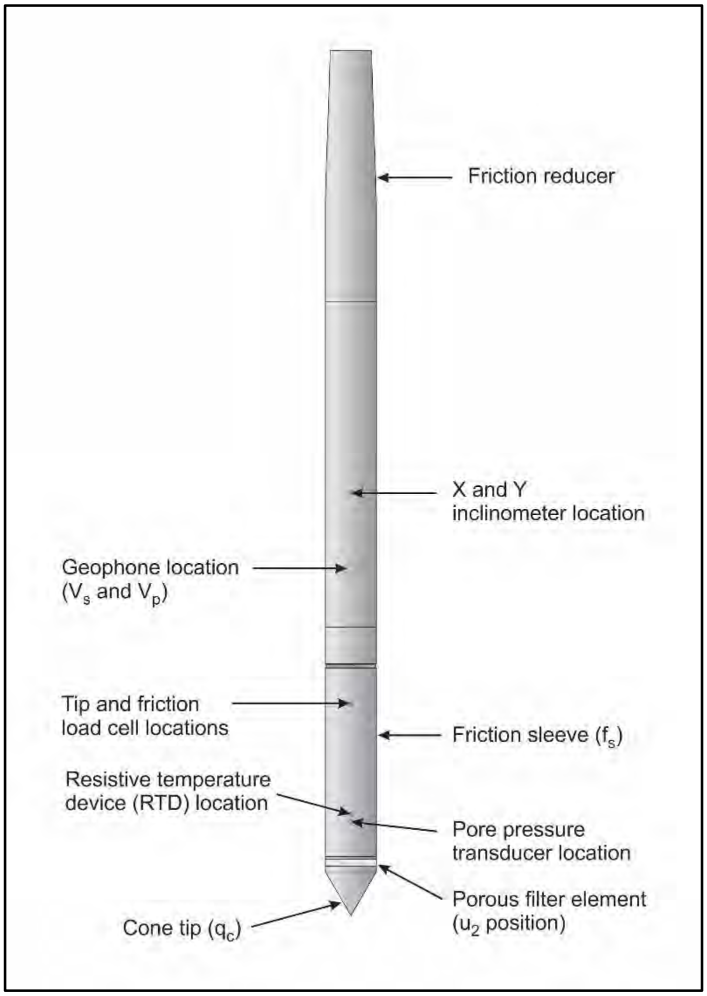


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to CPT Inc.'s CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to CPT Inc.'s cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of the piezocone data and associated calculated parameters for this report are based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1\text{-}a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for CPT Inc. probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all CPT Inc. piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of files with calculated geotechnical parameters were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the methods used is also included in the data release folder.

For additional information on CPTu interpretations and calculated geotechnical parameters, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

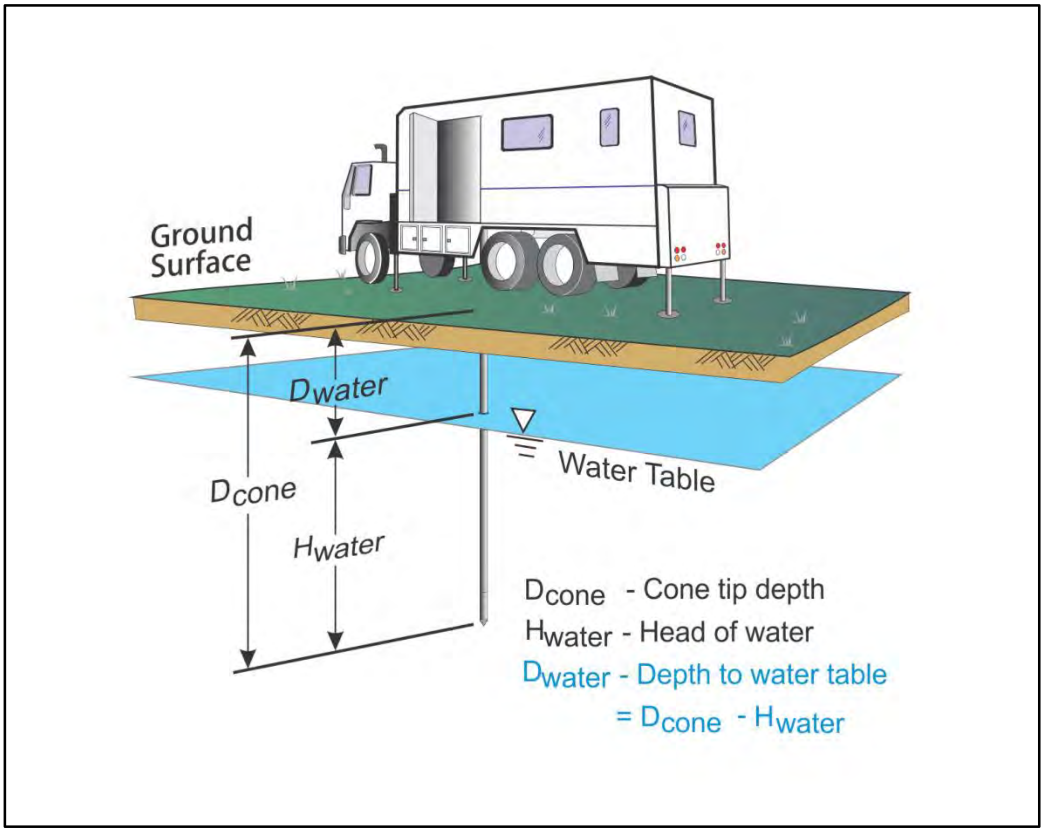


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

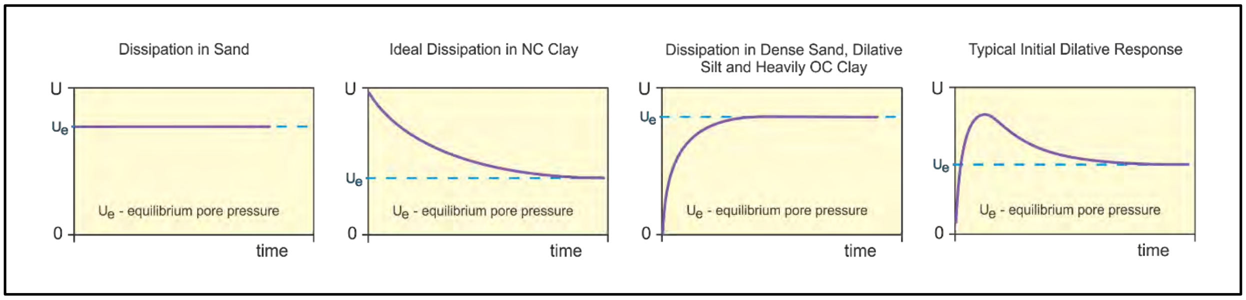


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:
- T* is the dimensionless time factor (Table Time Factor)
- a is the radius of the cone
- I_r is the rigidity index
- t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

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Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, “Estimating coefficient of consolidation from piezocone tests”, Canadian Geotechnical Journal, 29(4): 551-557.

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Teh, C.I., and Houlsby, G.T., 1991, “An analytical study of the cone penetration test in clay”, Geotechnique, 41(1): 17-34.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Advanced Cone Penetration Test Plots with Ic, Phi and N1(60)
- Soil Behavior Type (SBT) Scatter Plots
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and
Standard Cone Penetration Test Plots

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

Job No:	17-56137
Client:	ENGEO Incorporated
Project:	At Dublin
Start Date:	08-Dec-2017
End Date:	09-Dec-2017

CONE PENETRATION TEST SUMMARY

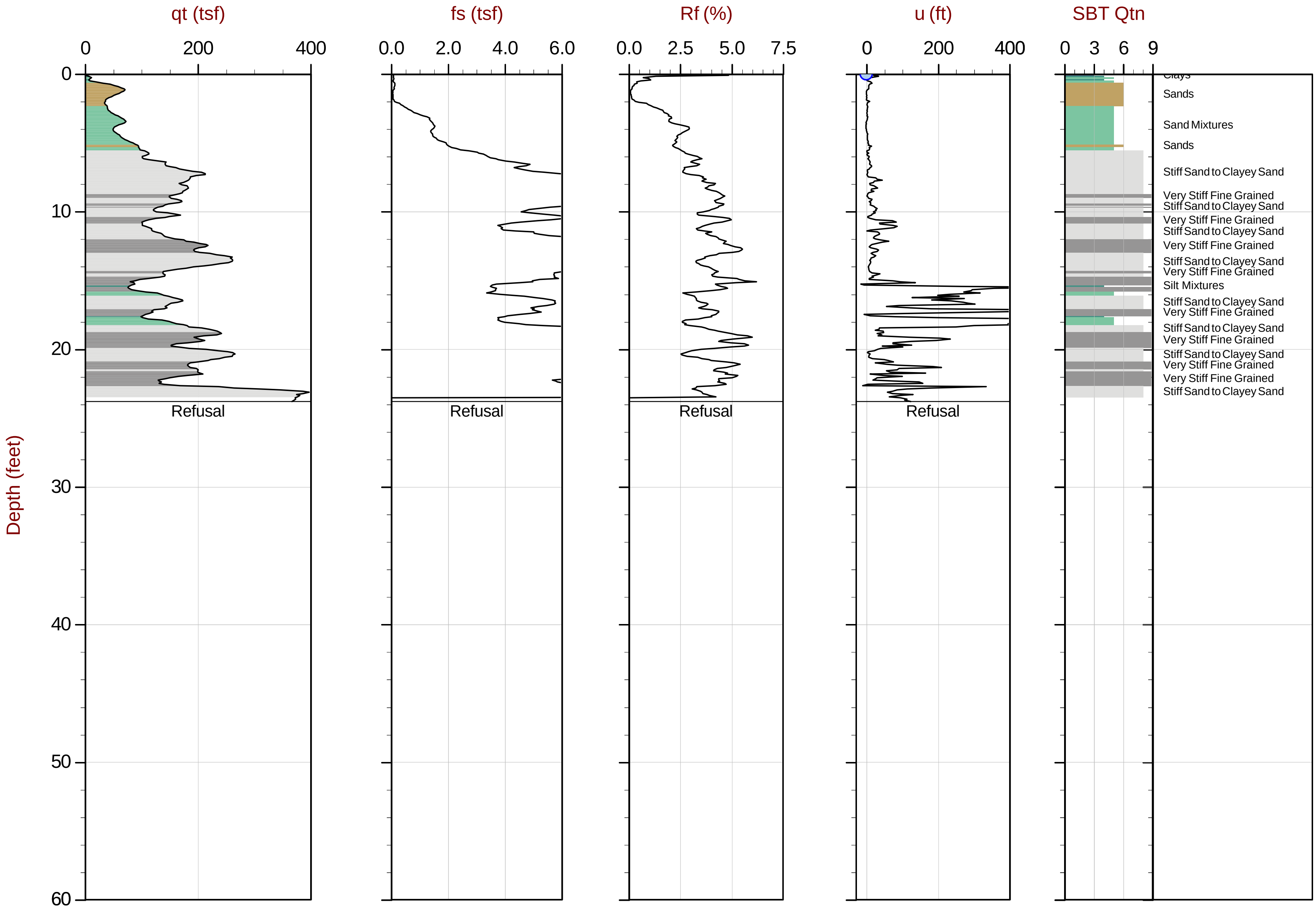
Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Northing[2] (m)	Easting (m)	Refer to Notation Number
2-CPT-01	17-56137_CP01	08-Dec-2017	443:T1500F15U500		23.79	4174567	599684	3
2-CPT-02	17-56137_CP02	08-Dec-2017	443:T1500F15U500	33.2	50.52	4174385	599621	4
2-CPT-03	17-56137_CP03	08-Dec-2017	443:T1500F15U500	33.2	50.52	4174233	599475	
2-CPT-04	17-56137_CP04	09-Dec-2017	443:T1500F15U500	24.0	50.52	4174017	599581	5, 6
2-CPT-05	17-56137_CP05	08-Dec-2017	443:T1500F15U500	24.0	50.52	4173928	599573	
2-CPT-06	17-56137_CP06	08-Dec-2017	443:T1500F15U500	21.3	50.52	4173938	599697	
2-CPT-07	17-56137_CP07	08-Dec-2017	443:T1500F15U500	20.1	50.52	4173797	599488	
2-CPT-08	17-56137_CP08	09-Dec-2017	443:T1500F15U500	15.8	50.52	4173723	599699	
2-CPT-09	17-56137_CP09	09-Dec-2017	443:T1500F15U500	17.6	50.52	4173688	599468	
2-CPT-10	17-56137_CP10	09-Dec-2017	443:T1500F15U500	14.5	50.61	4173573	599709	7
2-CPT-11	17-56137_CP11	09-Dec-2017	443:T1500F15U500	15.3	50.52	4173538	599536	
2-CPT-12	17-56137_CP12	09-Dec-2017	443:T1500F15U500	14.5	50.52	4173428	599705	8

1. Assumed phreatic surface was based on pore pressure dissipation tests, unless otherwise noted. Hydrostatic conditions were assumed for calculated parameters.
2. Coordinates were acquired using consumer grade GPS equipment in datum: WGS 1984 / UTM Zone 10 North.
3. No phreatic surface detected.
4. Assumed phreatic surface was based on 2-CPT-03.
5. Assumed phreatic surface was based on 2-CPT-05.
6. Samples taken at intervals 6 - 10 ft and 20 - 24 ft.
7. Assumed phreatic surface was based on 2-CPT-12.
8. Samples taken at intervals 2 - 6 ft and 10 - 14 ft.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 14:56
Site: At Dublin
Sounding: 2-CPT-01
Cone: 443:T1500F15U500



Max Depth: 7.250 m / 23.79 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174567m E: 599684m
Sheet No: 1 of 1

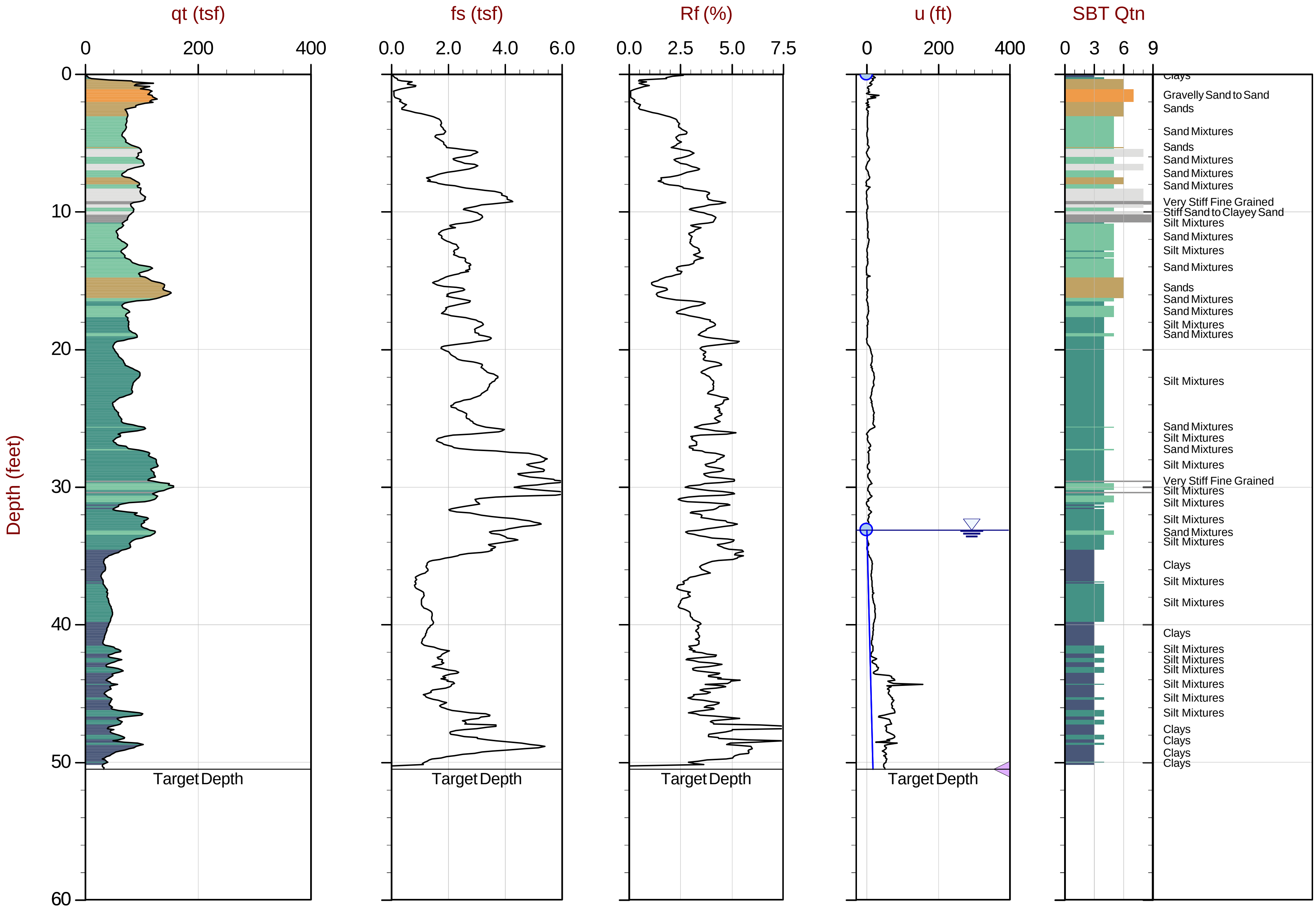
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 13:42
Site: At Dublin

Sounding: 2-CPT-02
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174385m E: 599621m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

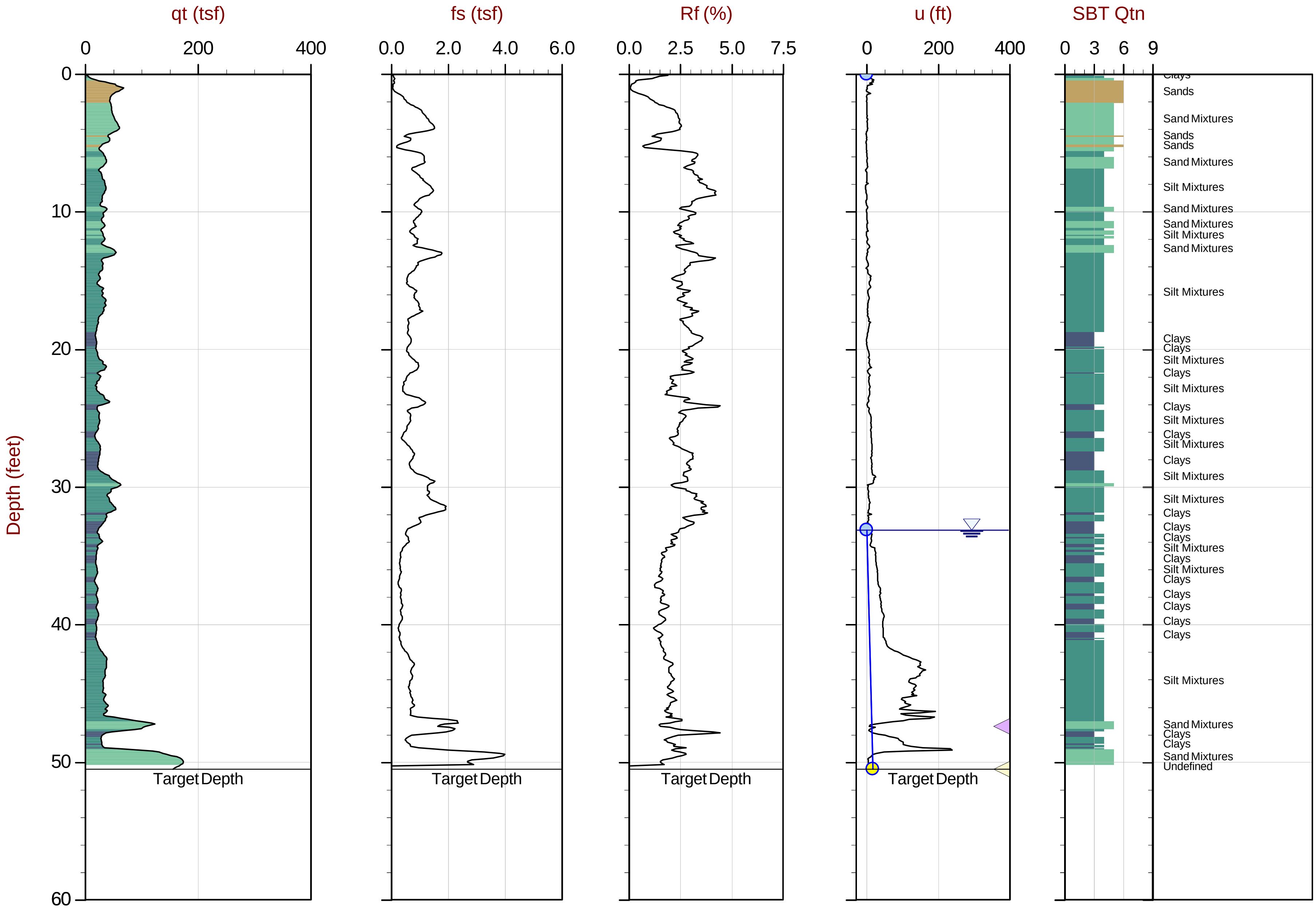
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 12:24
Site: At Dublin

Sounding: 2-CPT-03
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP03.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174233m E: 599475m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

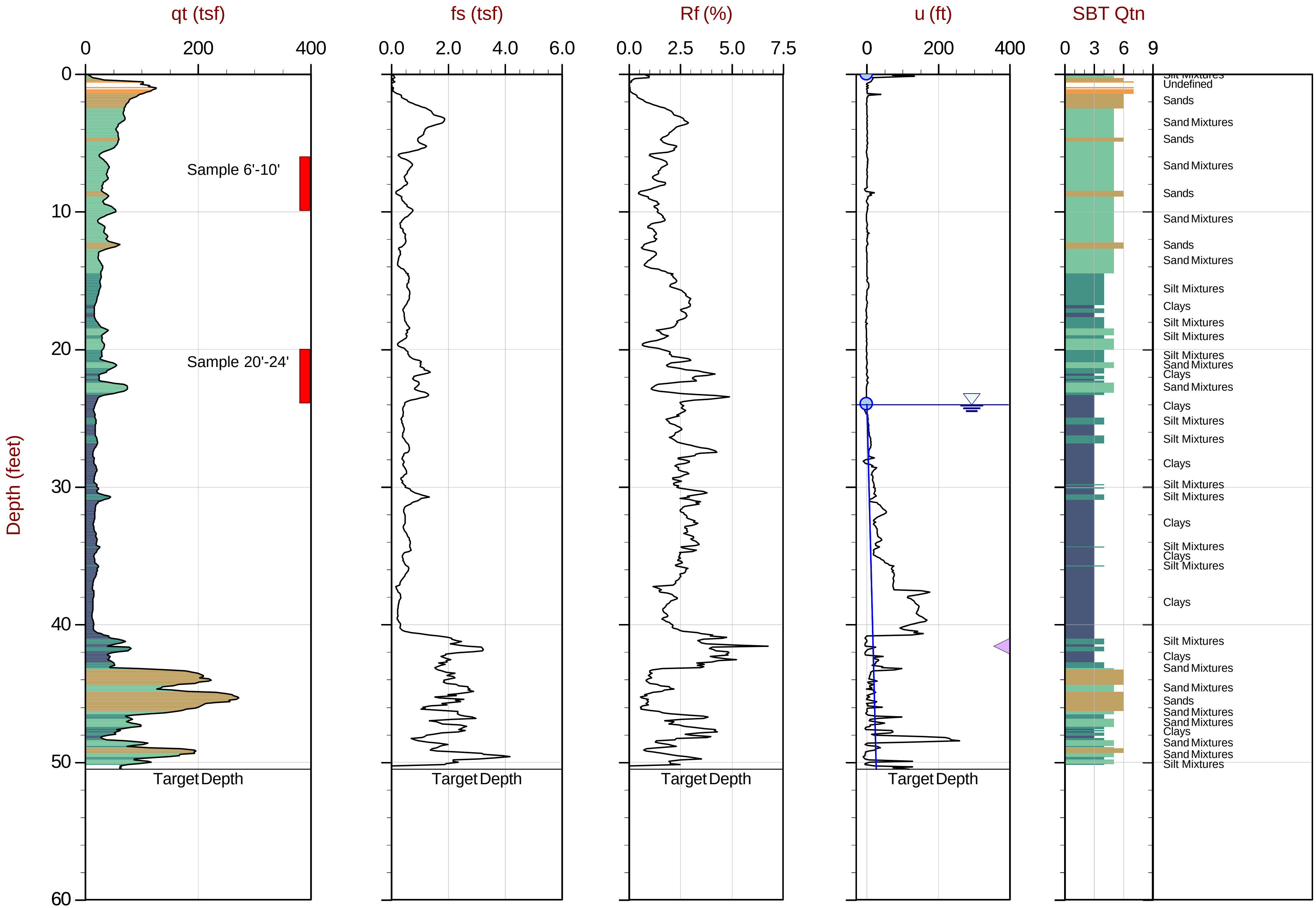
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 08:17
Site: At Dublin

Sounding: 2-CPT-04
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174017m E: 599581m
Sheet No: 1 of 1

Sample | Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

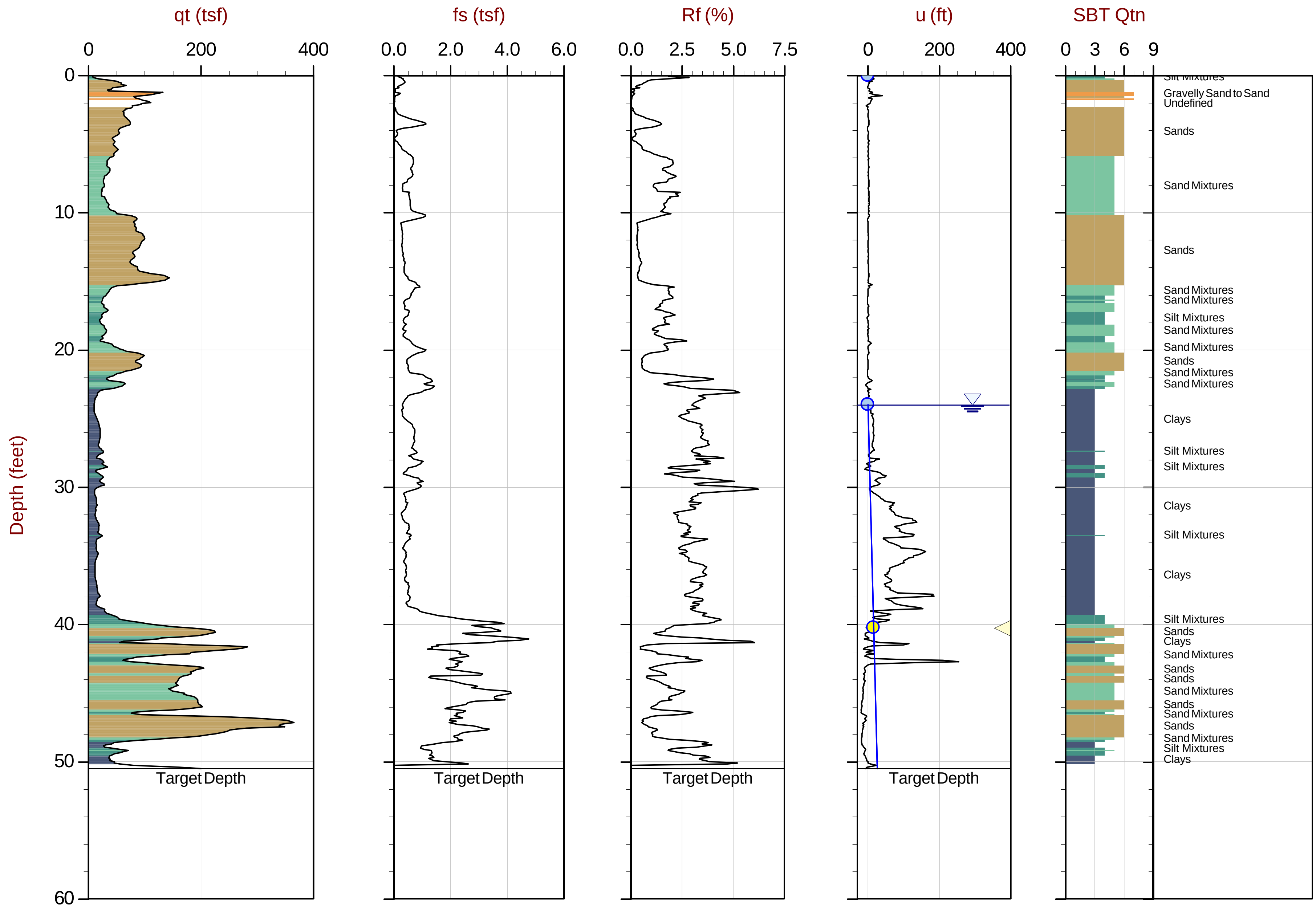
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 07:50
Site: At Dublin

Sounding: 2-CPT-05
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP05.COR
Unit Wt: SBTQtn (PKR2009)

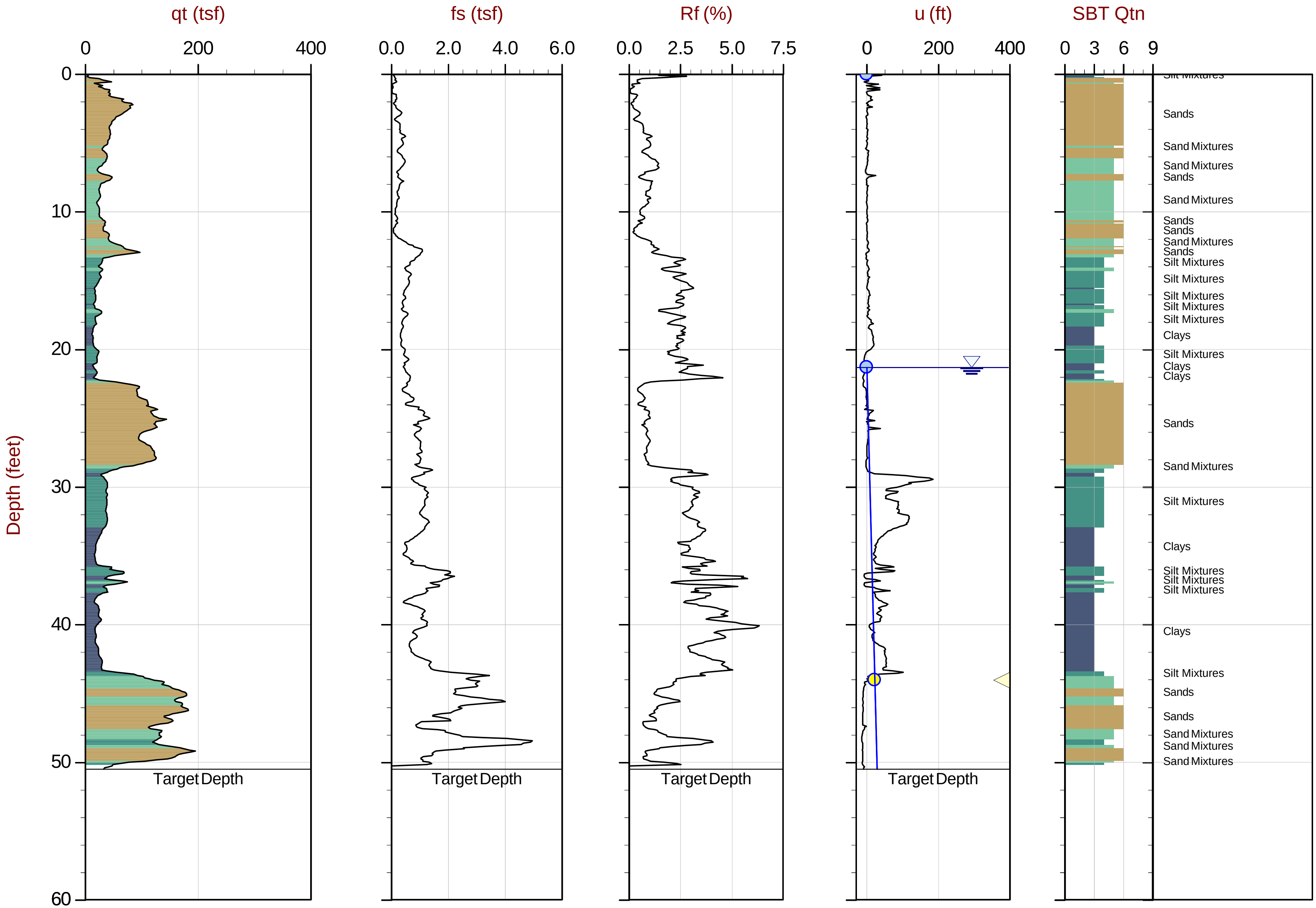
SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173928m E: 599573m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56137	Sounding: 2-CPT-06
	Date: 2017-12-08 09:05	Cone: 443:T1500F15U500
	Site: At Dublin	



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP06.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173938m E: 599697m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq)   Assumed Ueq   Dissipation, Ueq achieved   Dissipation, Ueq not achieved   Hydrostatic Line

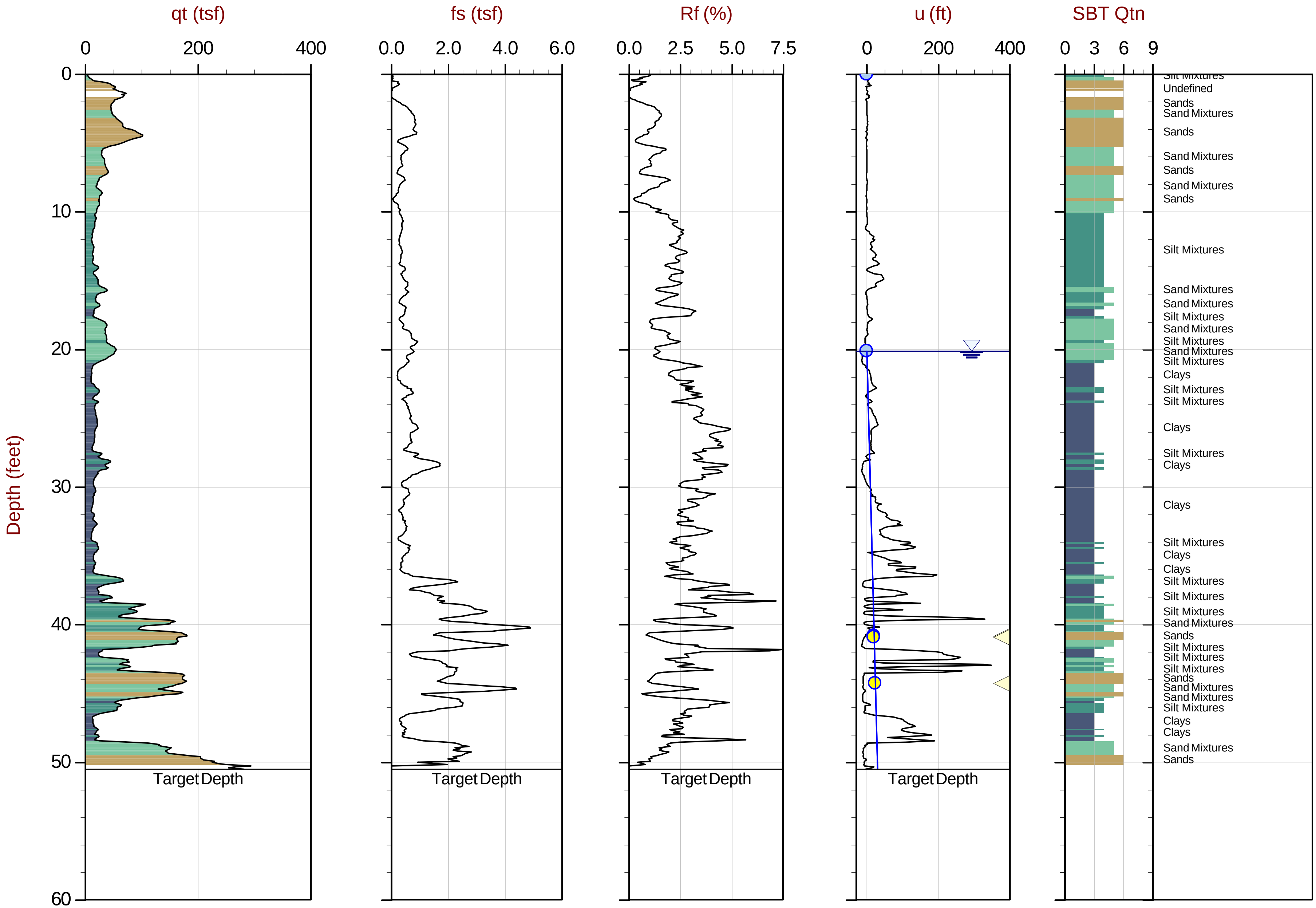
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 10:20
Site: At Dublin

Sounding: 2-CPT-07
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP07.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173797m E: 599488m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

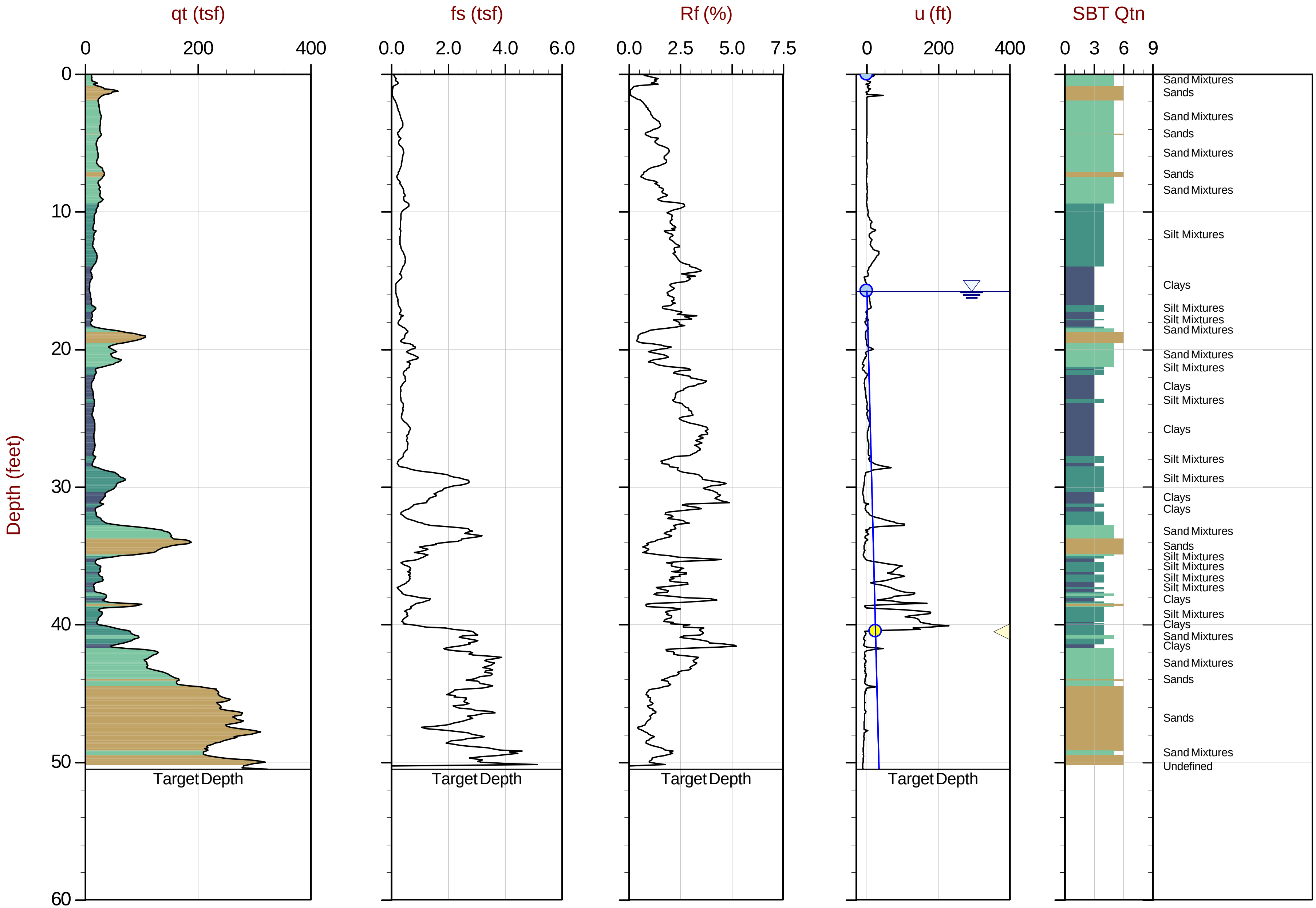
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 10:23
Site: At Dublin

Sounding: 2-CPT-08
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP08.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173723m E: 599699m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

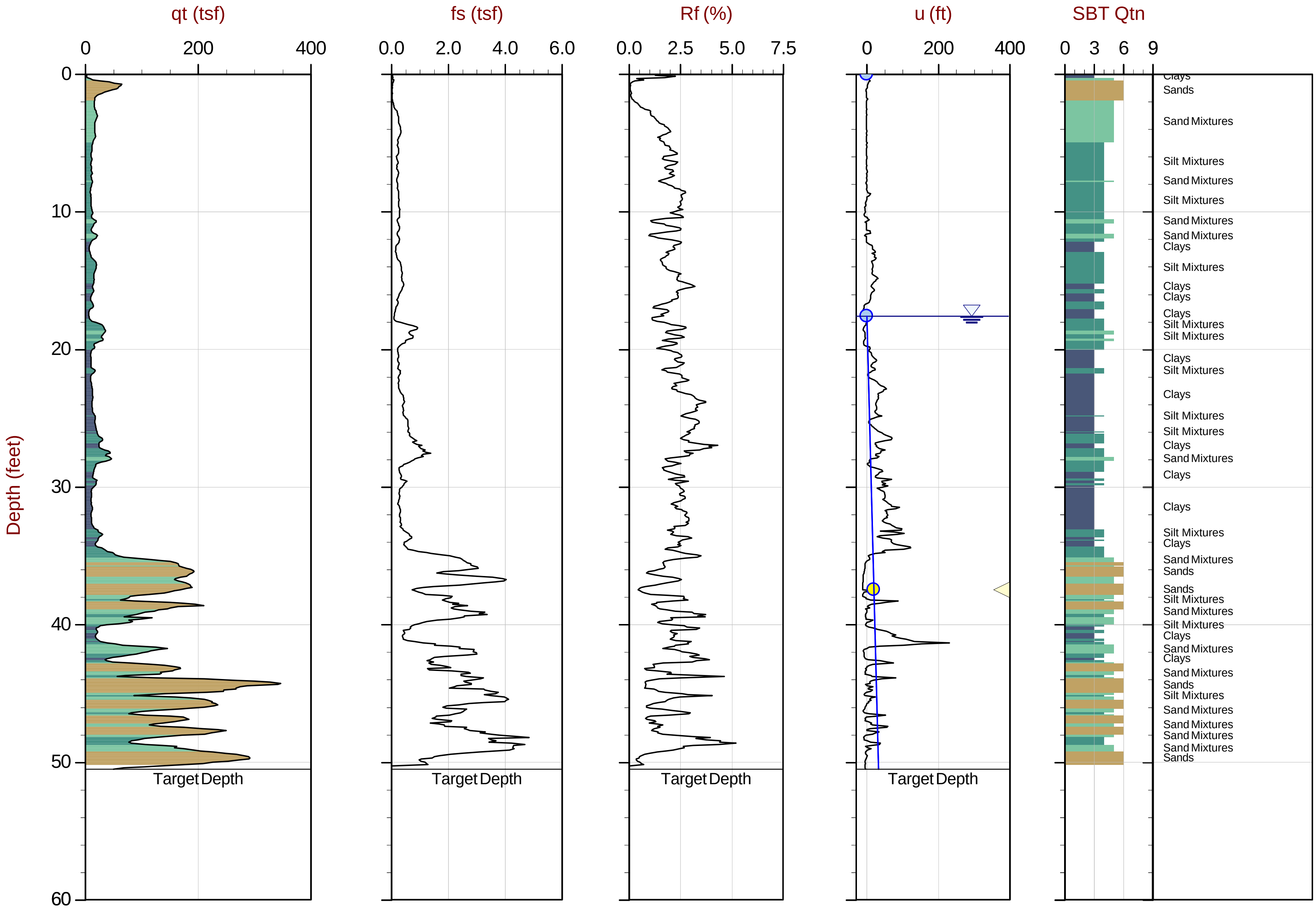
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 11:16
Site: At Dublin

Sounding: 2-CPT-09
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP09.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173688m E: 599468m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

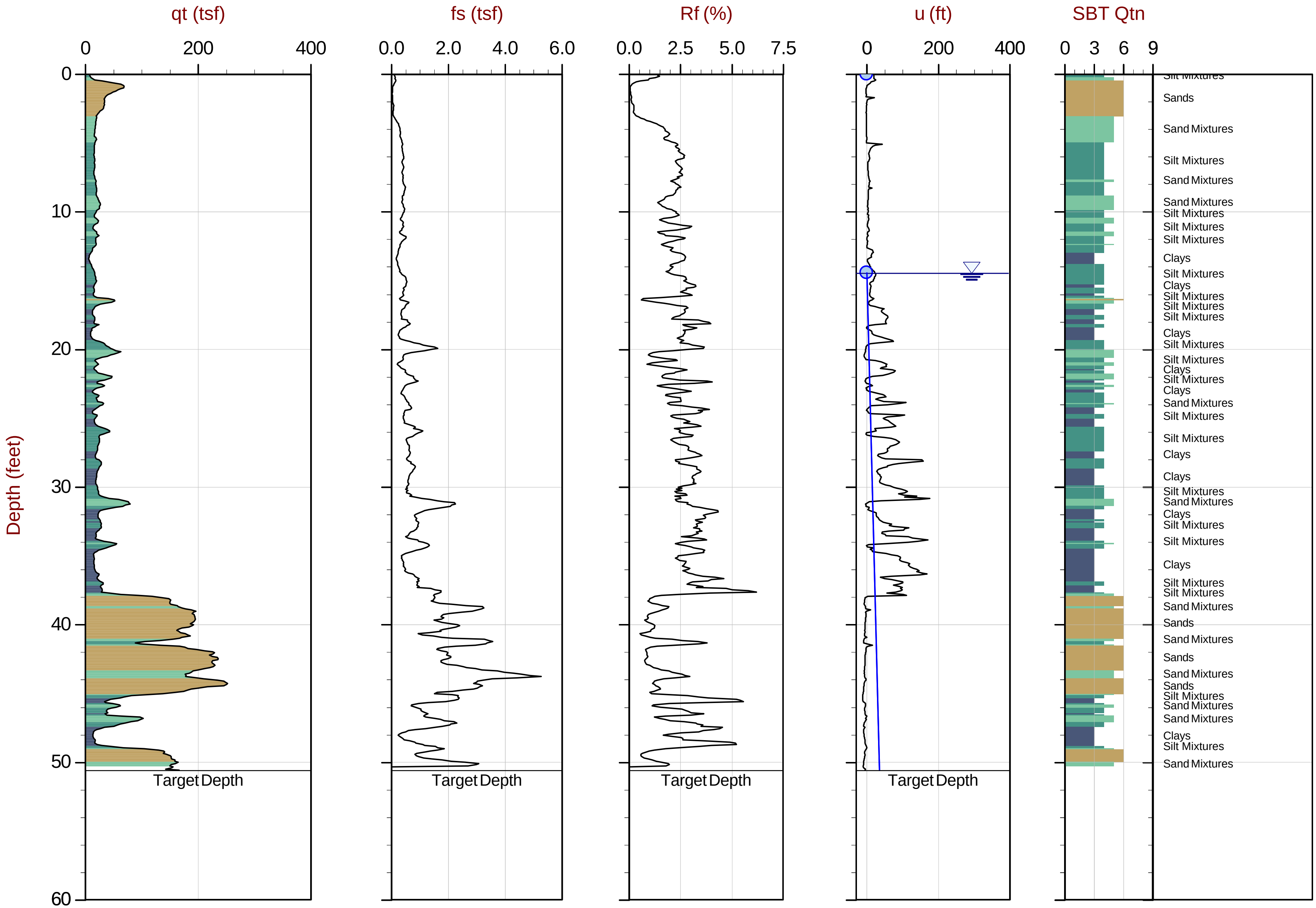
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 13:26
Site: At Dublin

Sounding: 2-CPT-10
Cone: 443:T1500F15U500



Max Depth: 15.425 m / 50.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP10.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173573m E: 599709m
Sheet No: 1 of 1

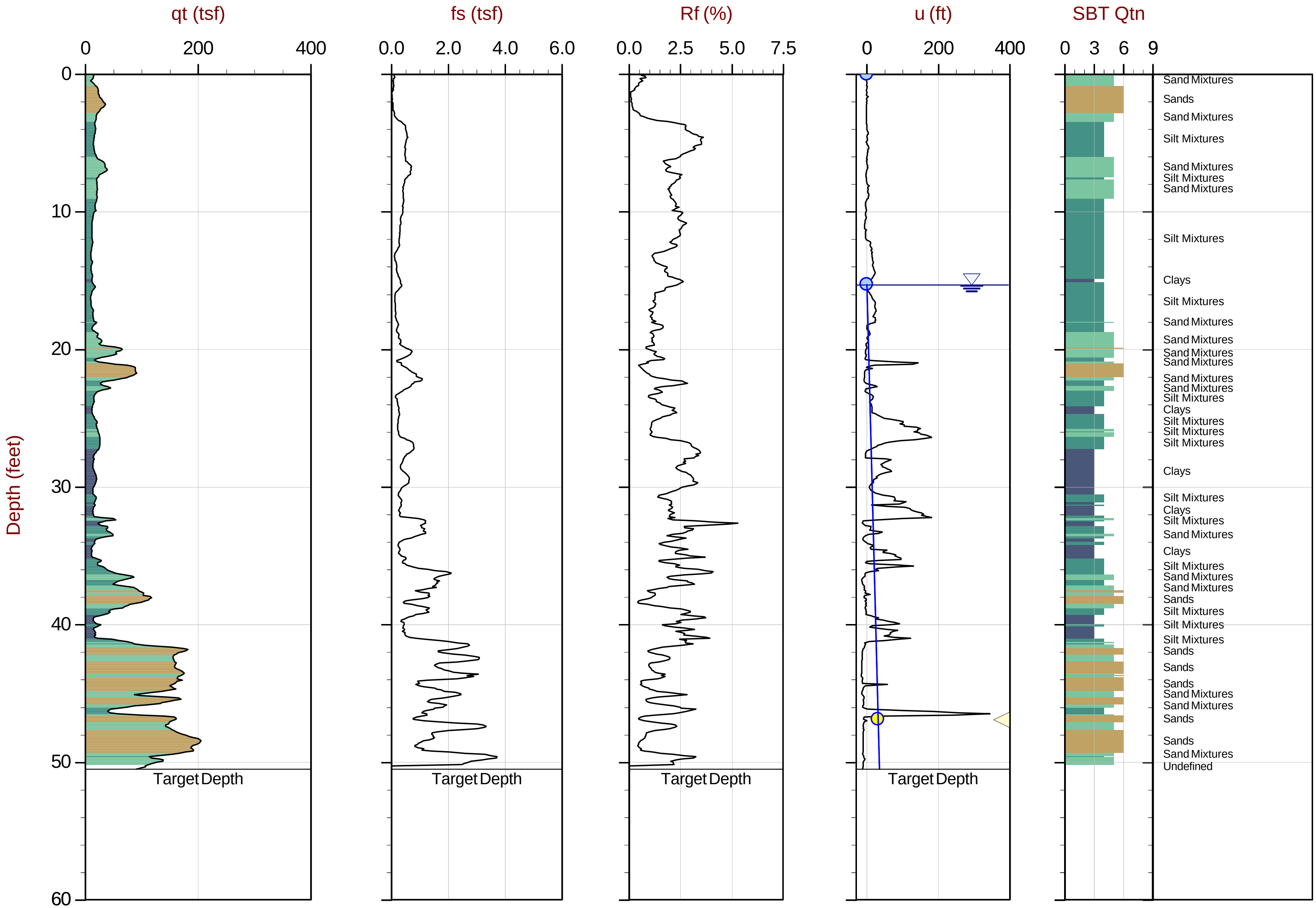
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 12:12
Site: At Dublin

Sounding: 2-CPT-11
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP11.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173538m E: 599536m
Sheet No: 1 of 1

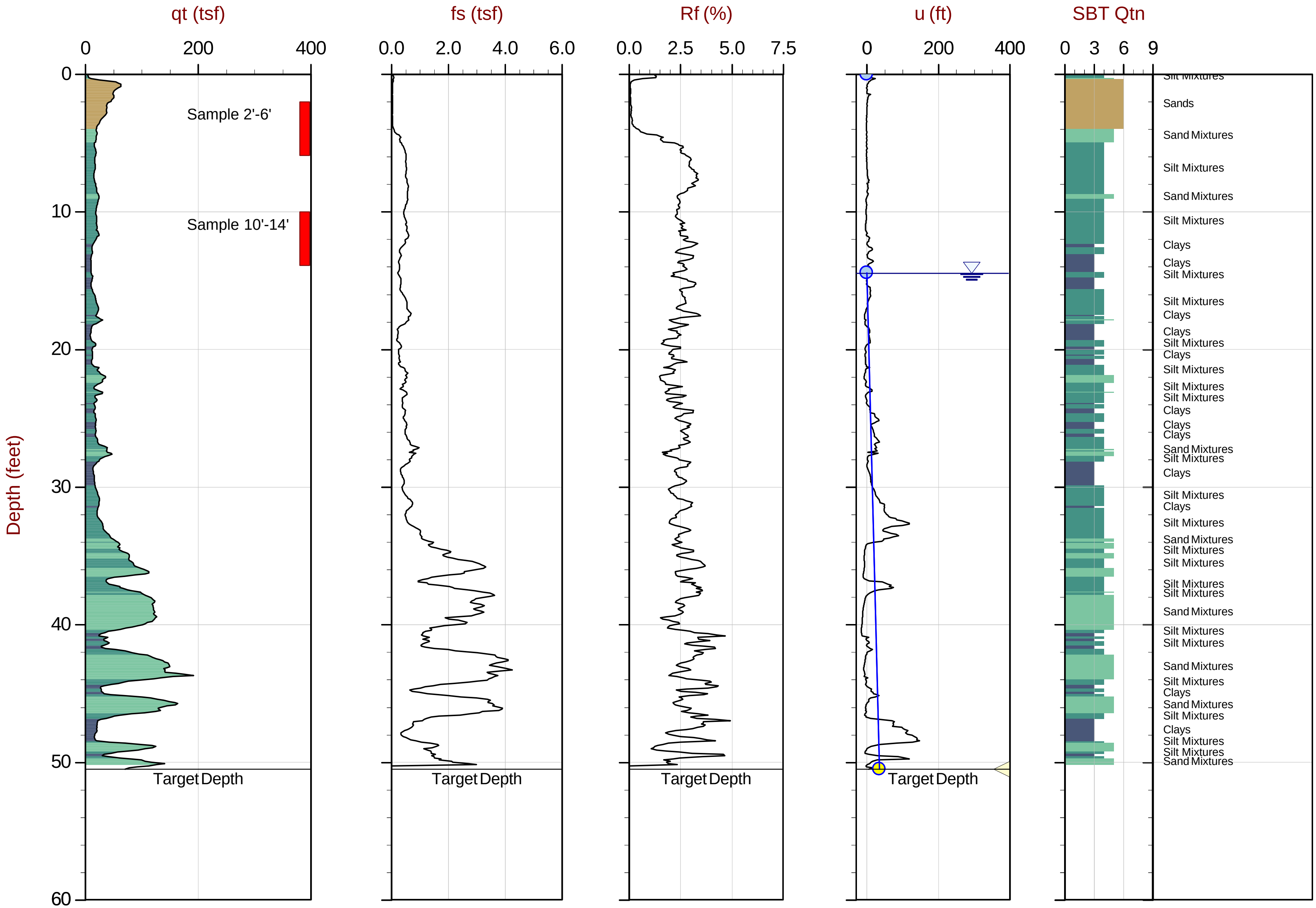
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 14:25
Site: At Dublin
Sounding: 2-CPT-12
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP12.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173428m E: 599705m
Sheet No: 1 of 1

Sample   Equilibrium Pore Pressure (Ueq)   Assumed Ueq   Dissipation, Ueq achieved   Dissipation, Ueq not achieved   Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

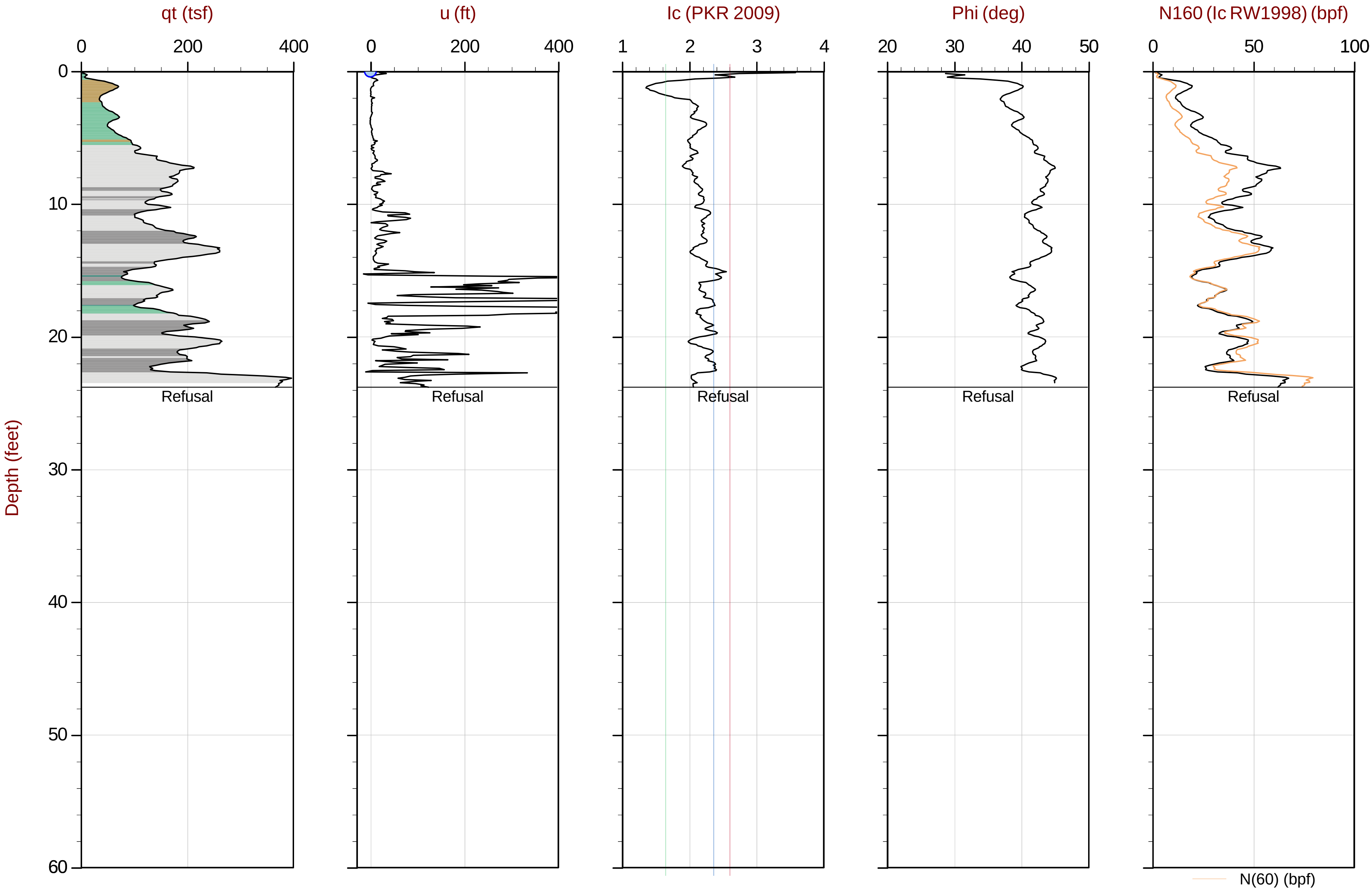
Advanced Cone Penetration Test Plots with Ic, Phi and N1(60)

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 14:56
Site: At Dublin
Sounding: 2-CPT-01
Cone: 443:T1500F15U500



Max Depth: 7.250 m / 23.79 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174567m E: 599684m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) · Assumed Ueq · Dissipation, Ueq achieved · Dissipation, Ueq not achieved · Hydrostatic Line

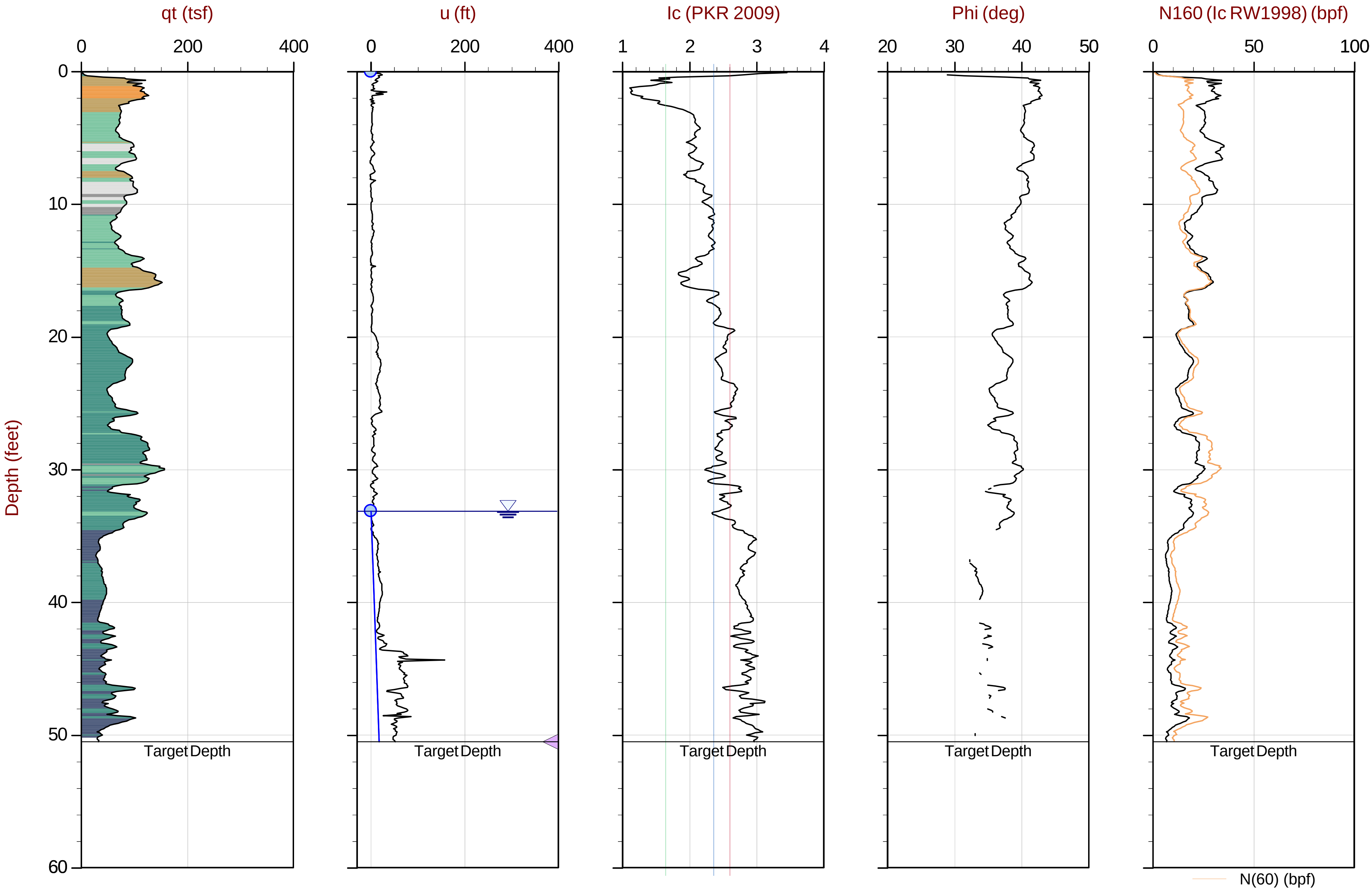
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 13:42
Site: At Dublin

Sounding: 2-CPT-02
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174385m E: 599621m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

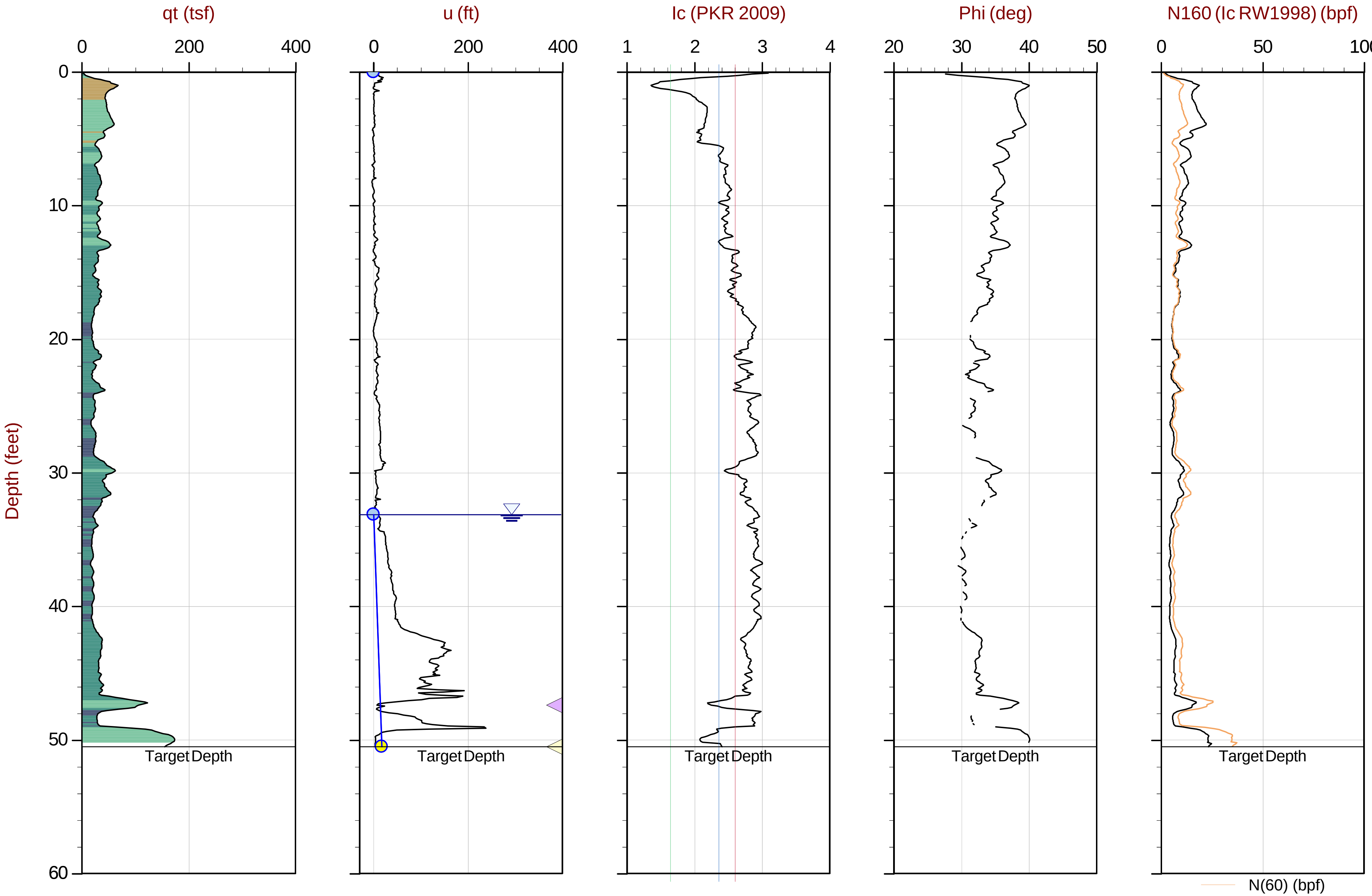
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 12:24
Site: At Dublin

Sounding: 2-CPT-03
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP03.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174233m E: 599475m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

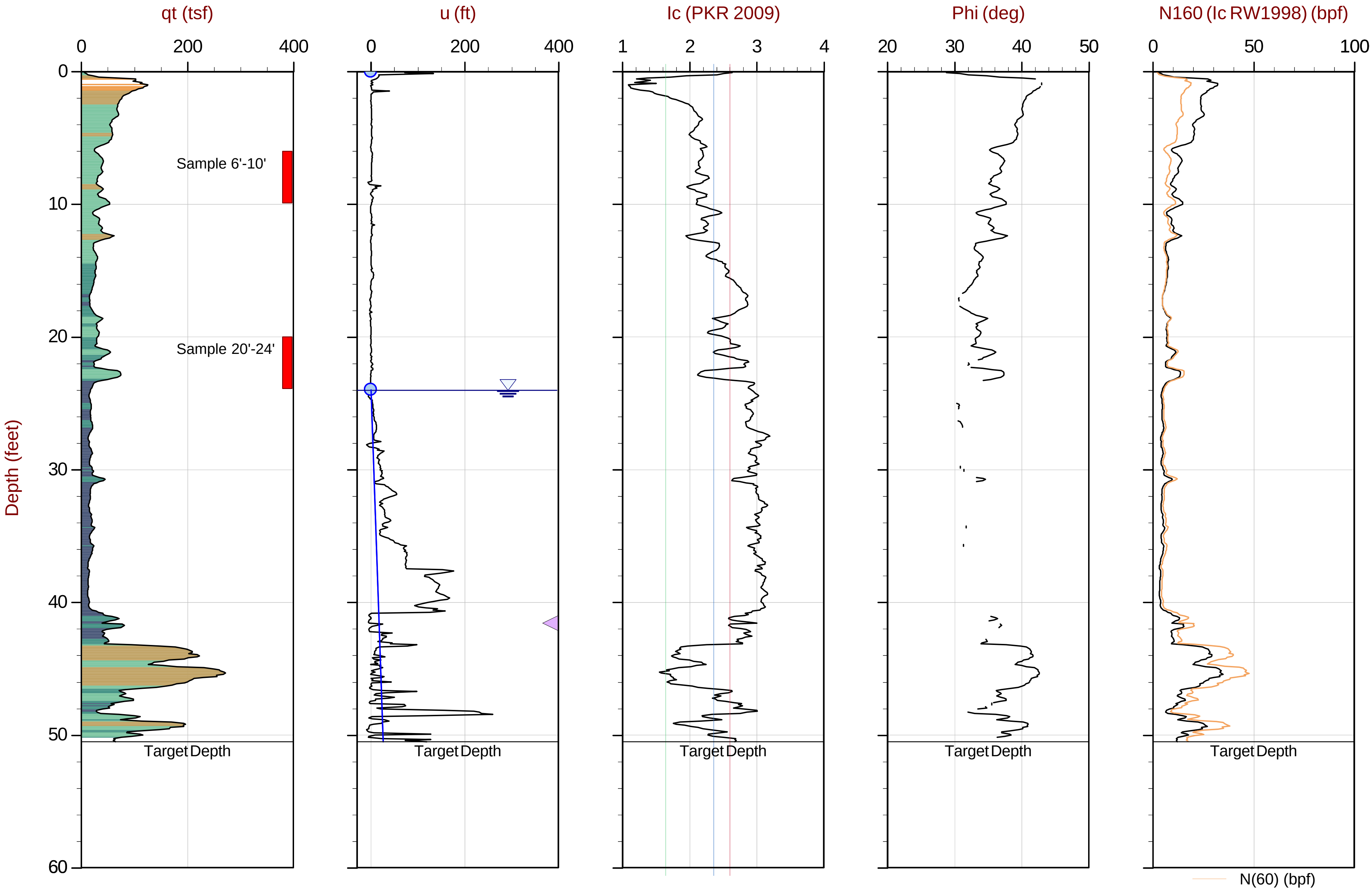
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 08:17
Site: At Dublin

Sounding: 2-CPT-04
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP04.COR
Unit Wt: SBTQtn (PKR2009)

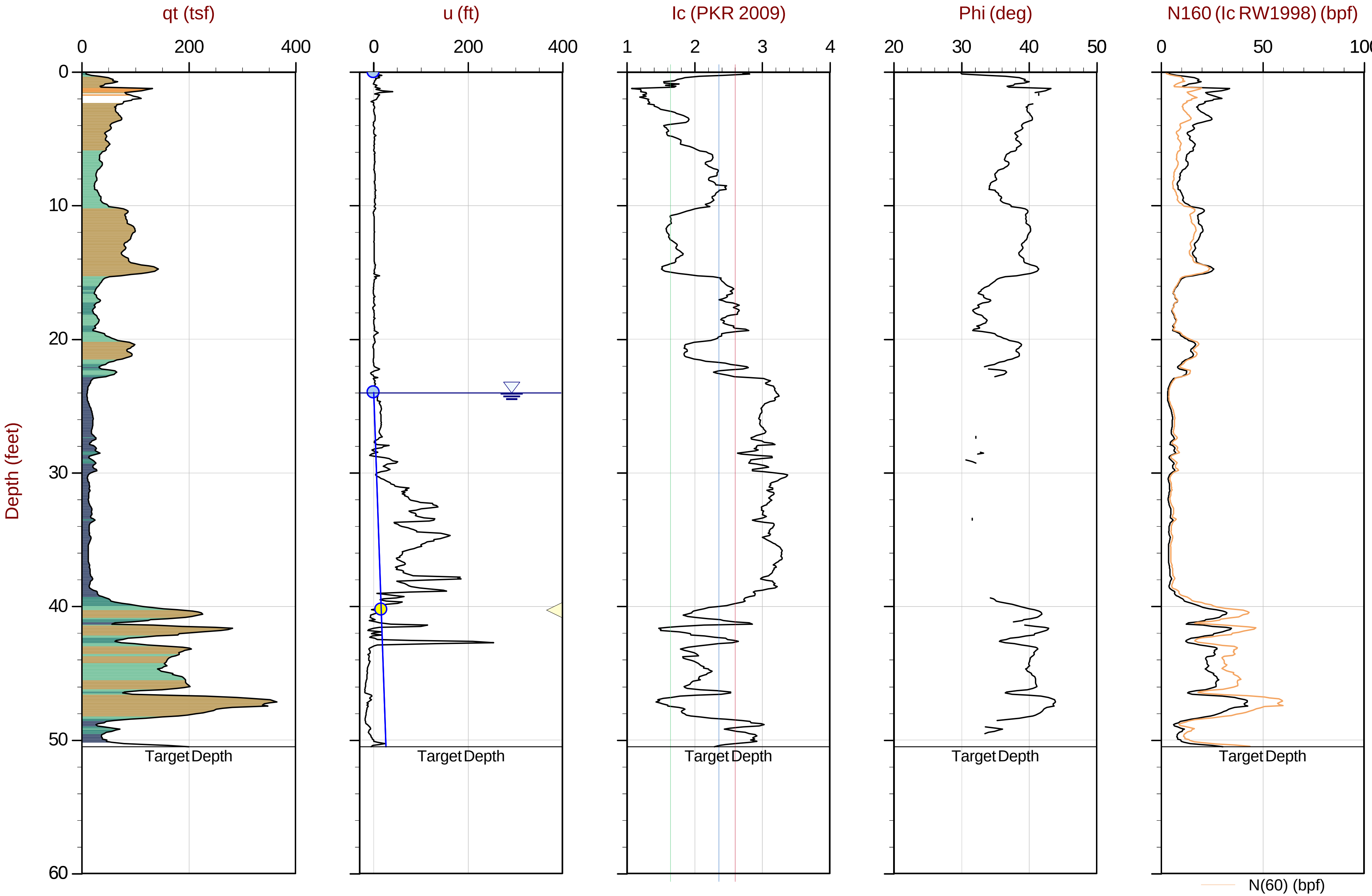
SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4174017m E: 599581m
Sheet No: 1 of 1

Sample   Equilibrium Pore Pressure (Ueq)   Assumed Ueq   Dissipation, Ueq achieved   Dissipation, Ueq not achieved   Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 07:50
Site: At Dublin
Sounding: 2-CPT-05
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP05.COR
Unit Wt: SBTQtn (PKR2009)

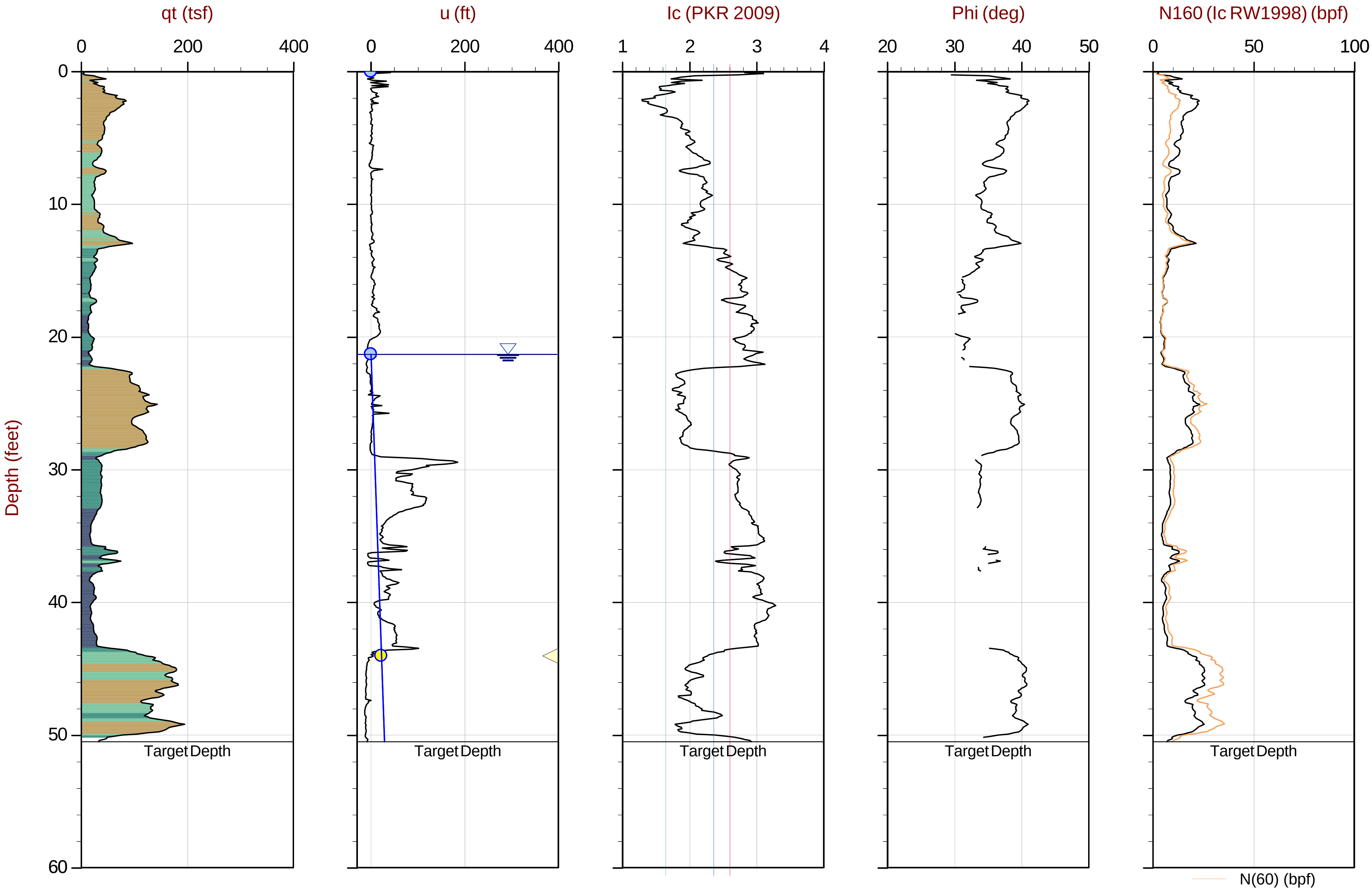
SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173928m E: 599573m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56137	Sounding: 2-CPT-06
	Date: 2017-12-08 09:05	Cone: 443:T1500F15U500
	Site: At Dublin	



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP06.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173938m E: 599697m
Sheet No: 1 of 1

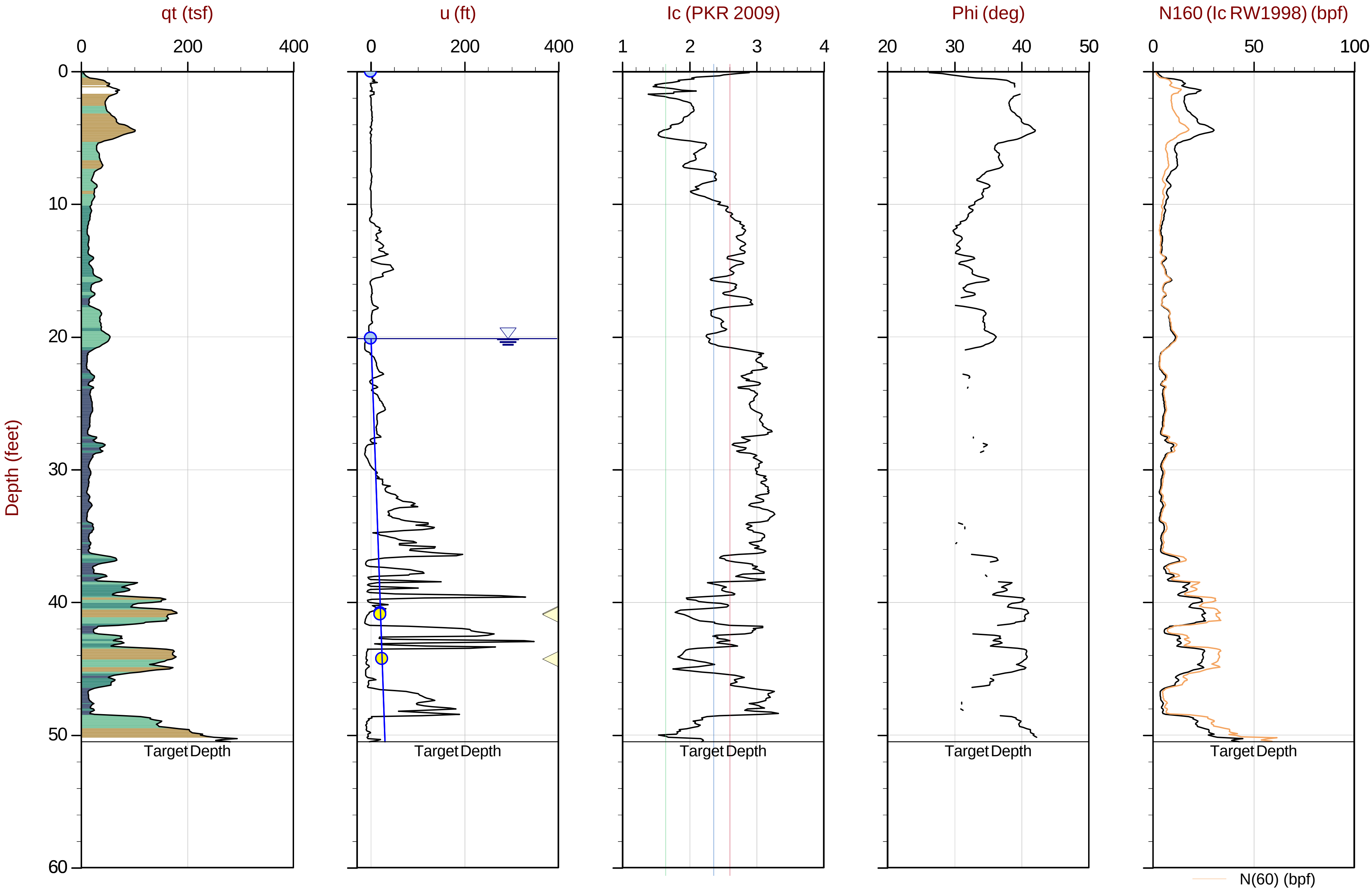
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 10:20
Site: At Dublin
Sounding: 2-CPT-07
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP07.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173797m E: 599488m
Sheet No: 1 of 1

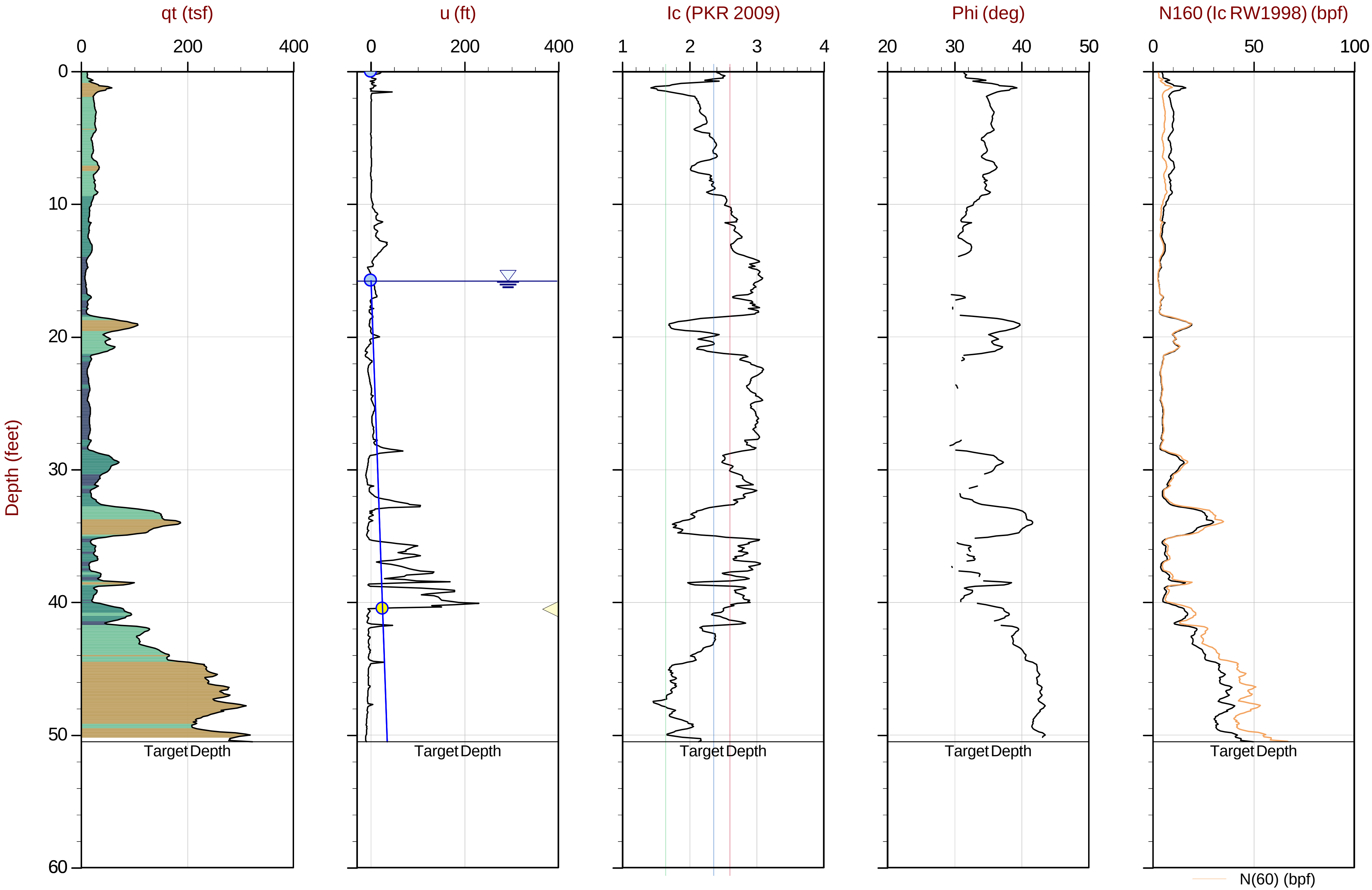
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 10:23
Site: At Dublin
Sounding: 2-CPT-08
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP08.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173723m E: 599699m
Sheet No: 1 of 1

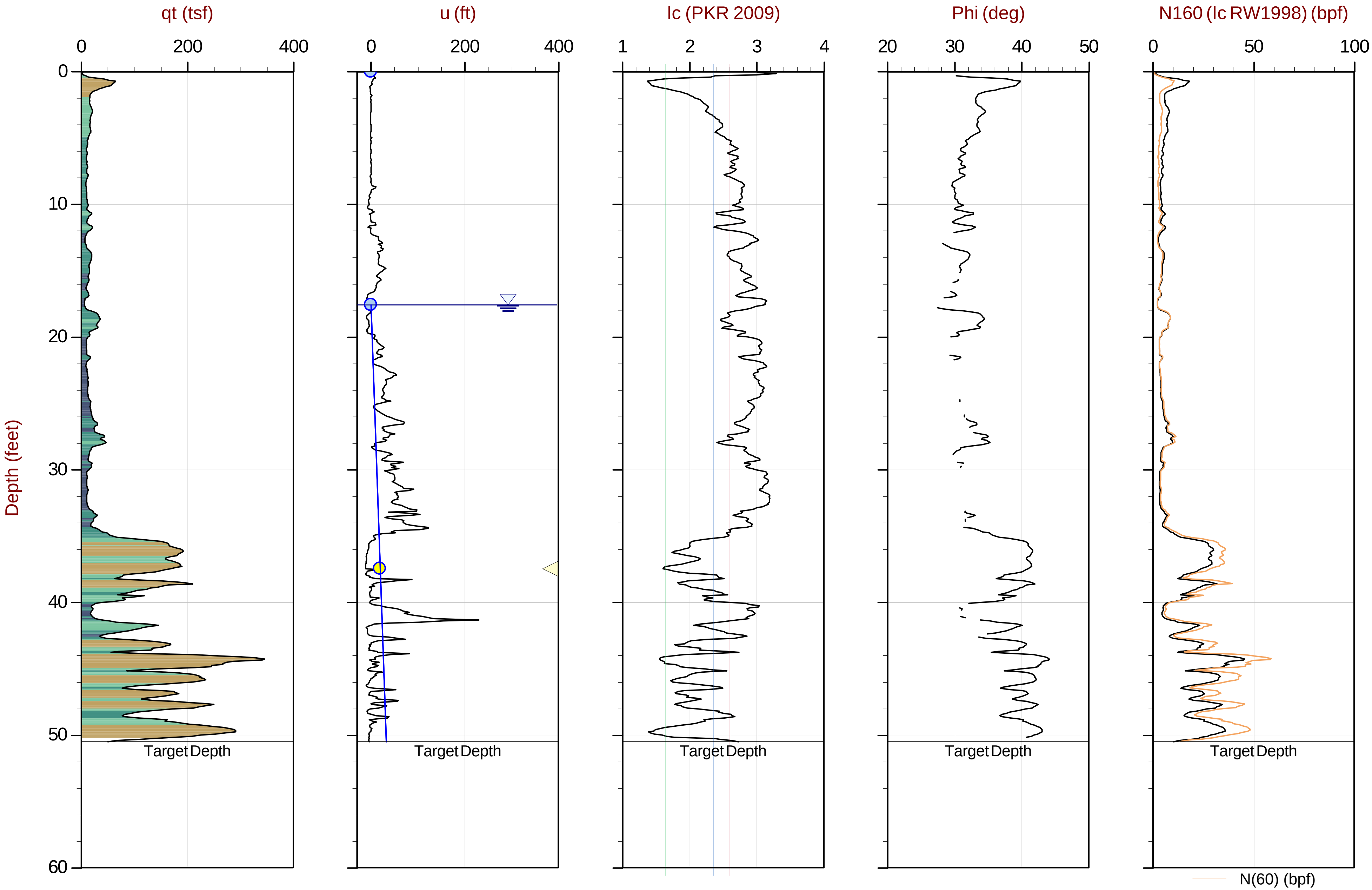
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 11:16
Site: At Dublin
Sounding: 2-CPT-09
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP09.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173688m E: 599468m
Sheet No: 1 of 1

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

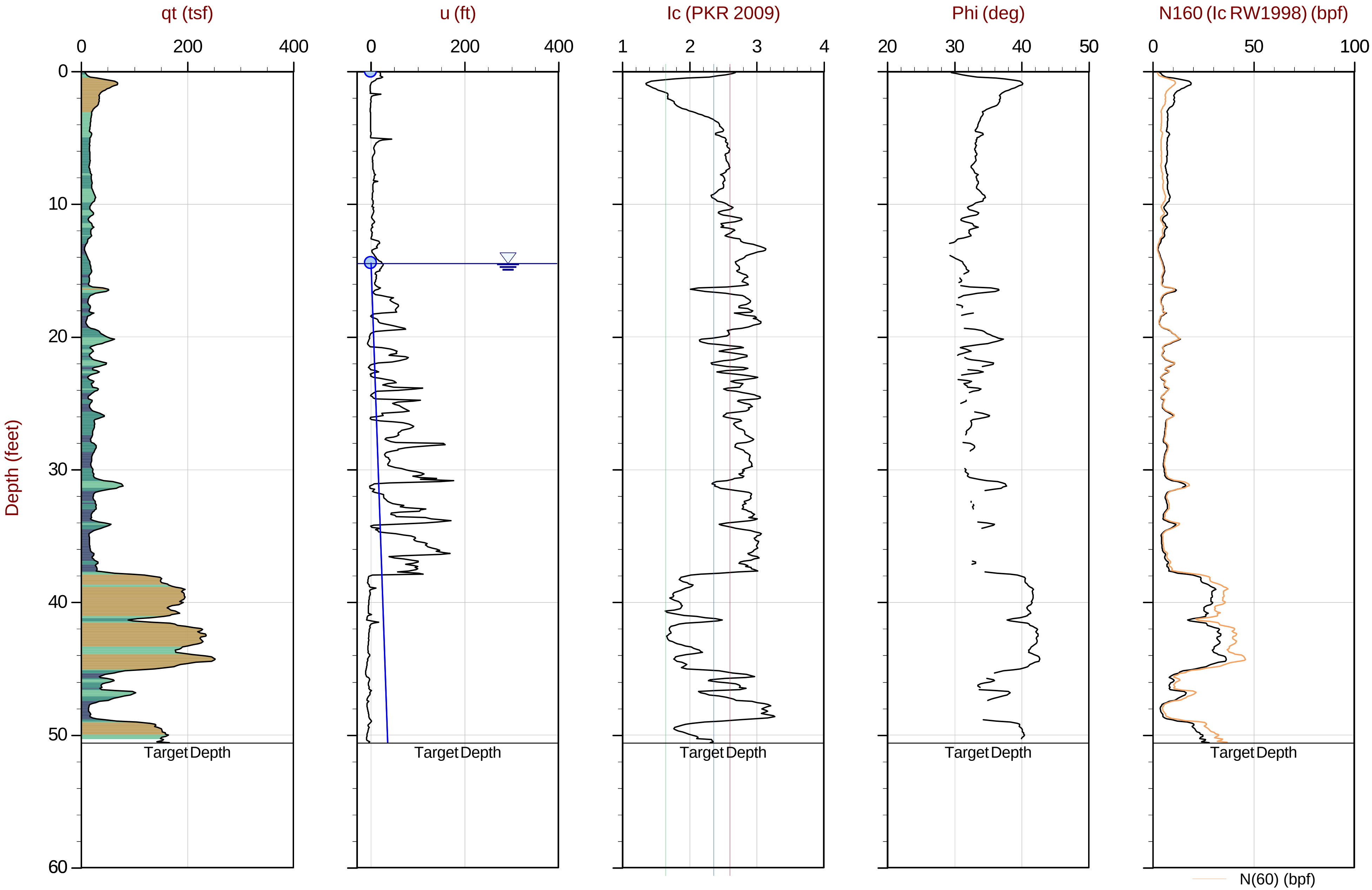
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 13:26
Site: At Dublin

Sounding: 2-CPT-10
Cone: 443:T1500F15U500



Max Depth: 15.425 m / 50.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP10.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173573m E: 599709m
Sheet No: 1 of 1

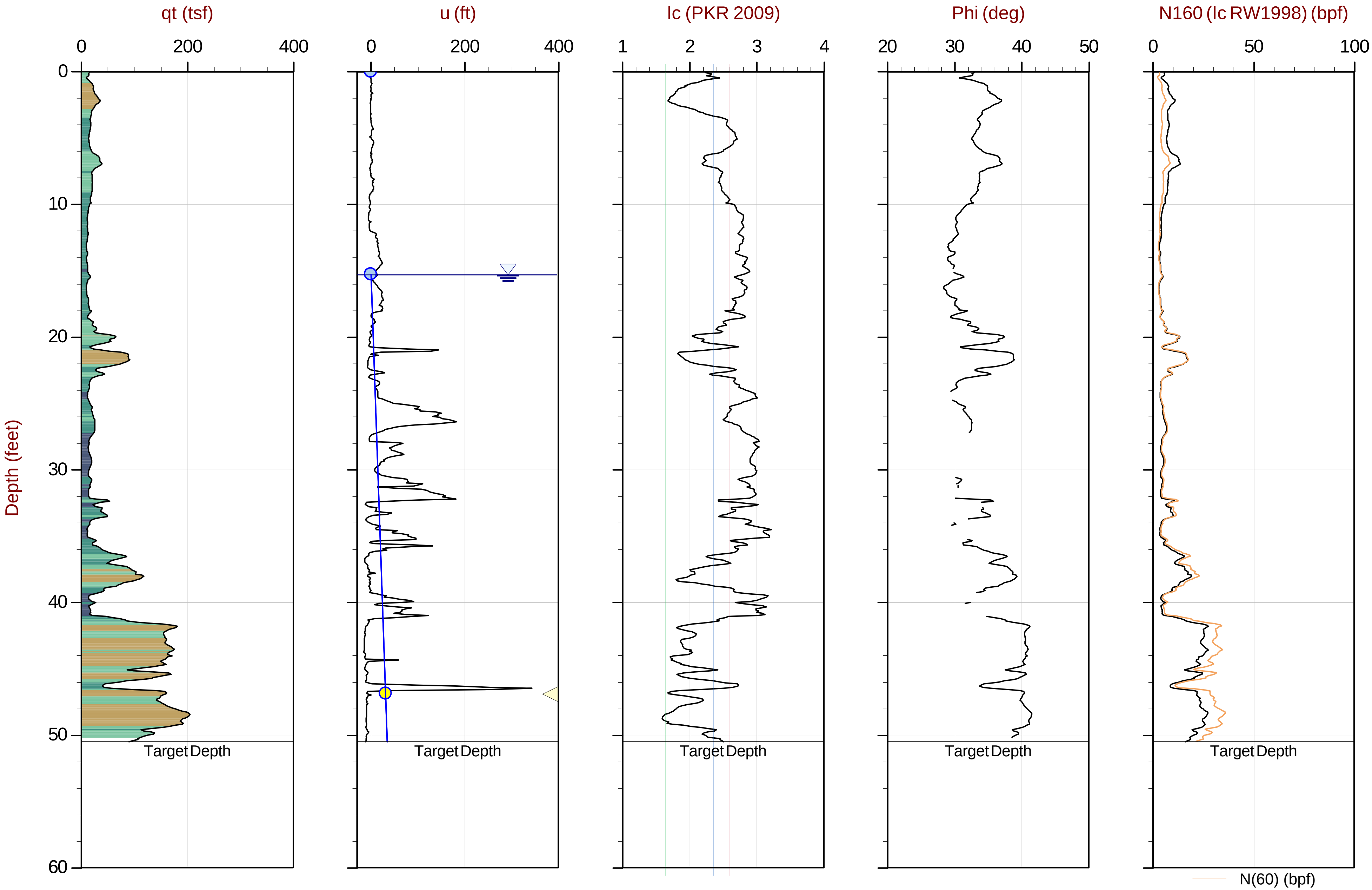
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 12:12
Site: At Dublin
Sounding: 2-CPT-11
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP11.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173538m E: 599536m
Sheet No: 1 of 1

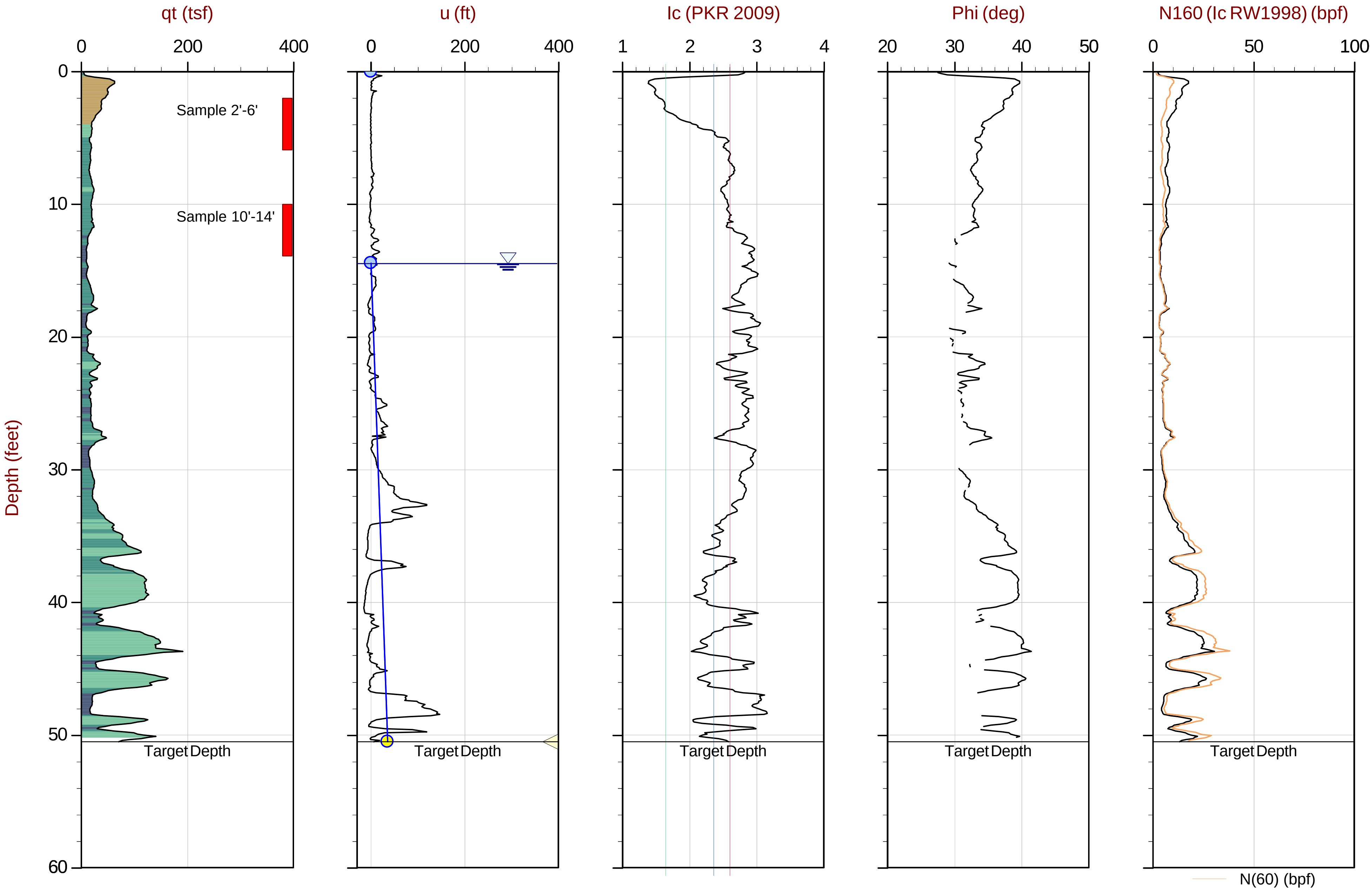
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-09 14:25
Site: At Dublin

Sounding: 2-CPT-12
Cone: 443:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-56137_CP12.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173428m E: 599705m
Sheet No: 1 of 1

Sample Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

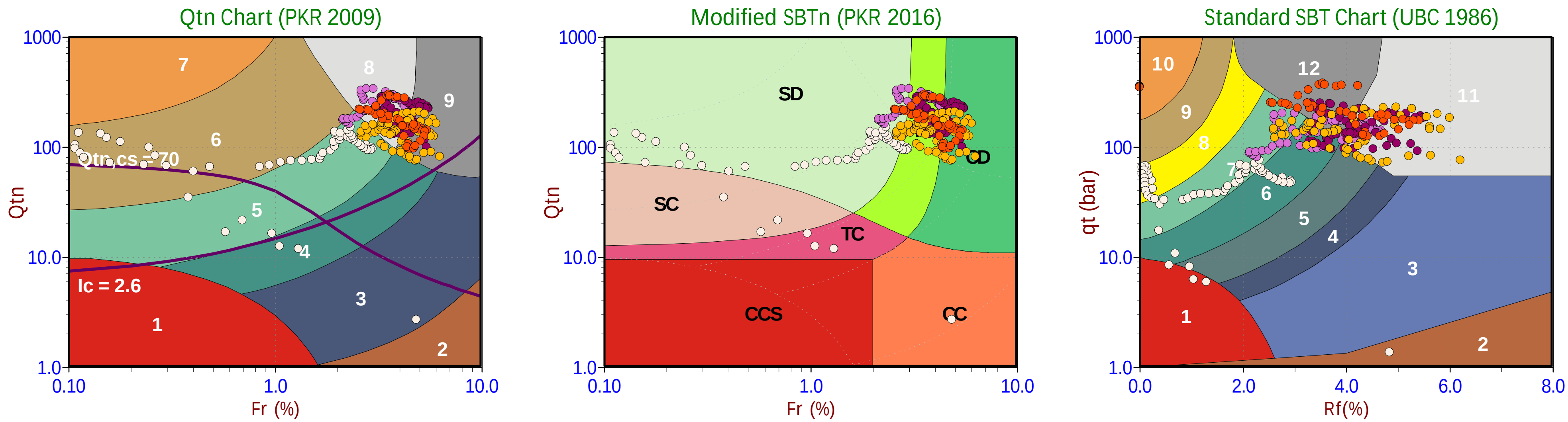
Soil Behavior Type (SBT) Scatter Plots

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 14:56
Site: At Dublin

Sounding: 2-CPT-01
Cone: 443:T1500F15U500



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

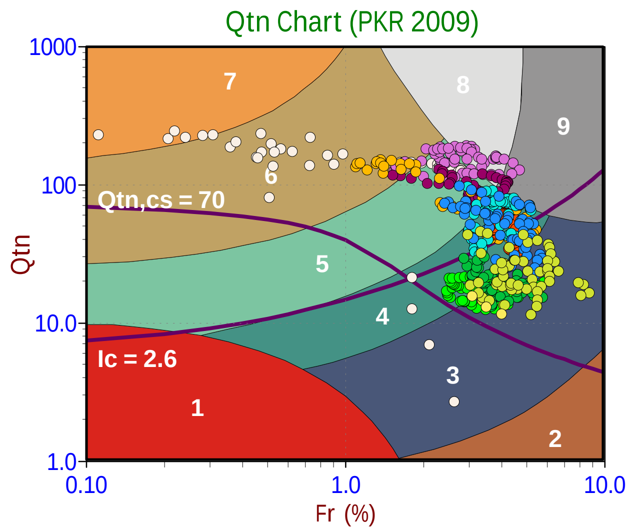
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

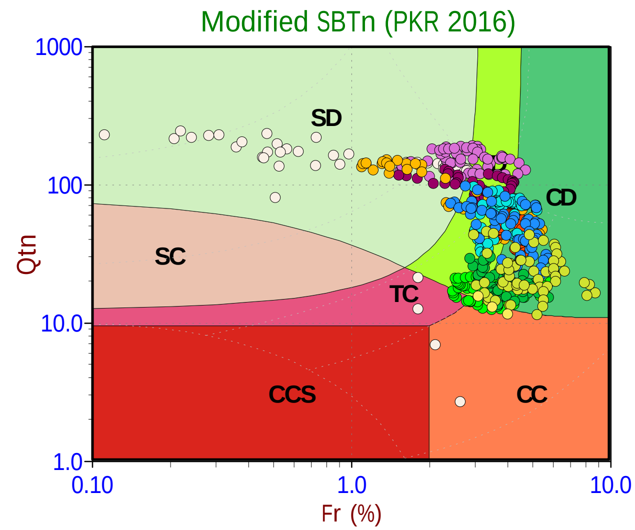
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

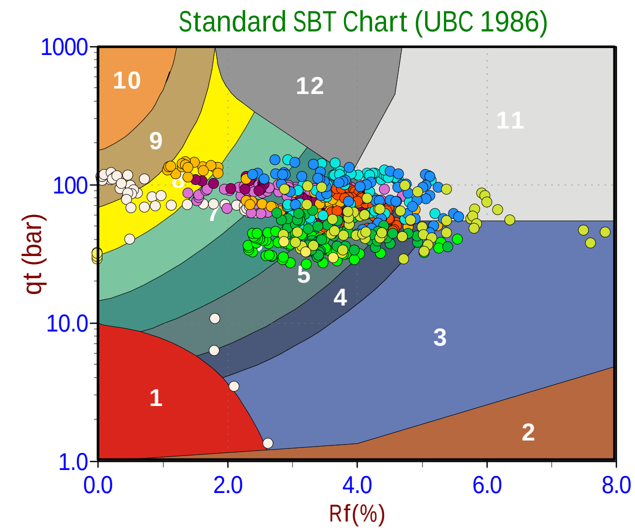
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56137 Date: 2017-12-08 13:42 Site: At Dublin	Sounding: 2-CPT-02 Cone: 443:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

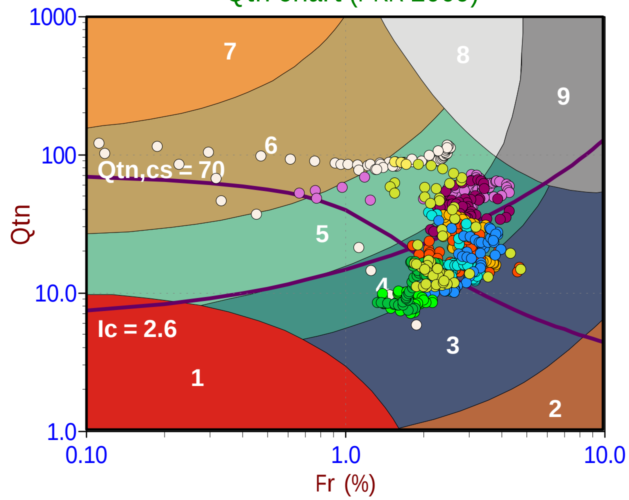
CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

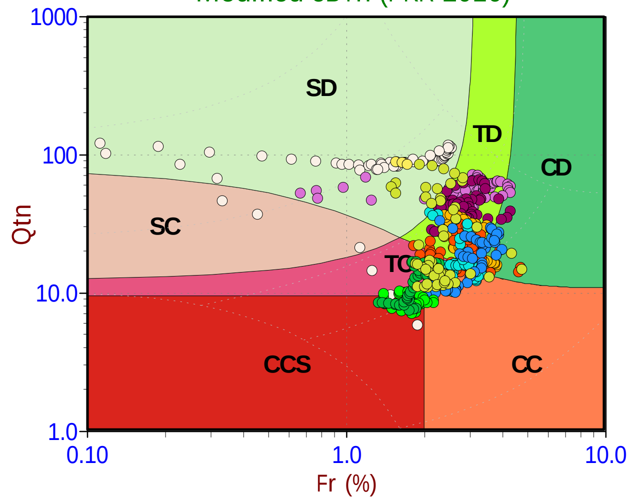
Job No: 17-56137
Date: 2017-12-08 12:24
Site: At Dublin

Sounding: 2-CPT-03
Cone: 443:T1500F15U500

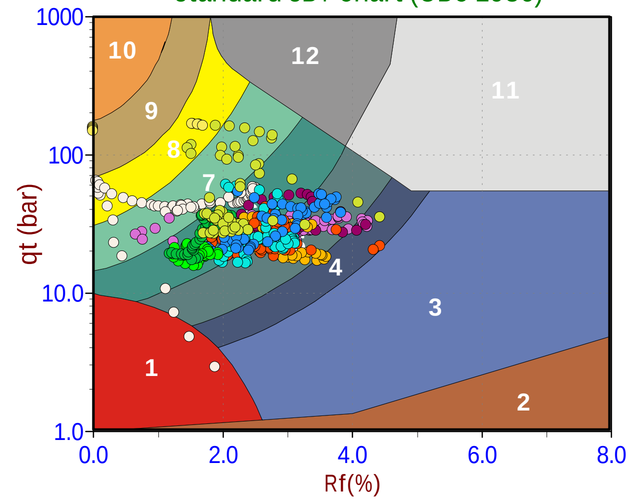
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

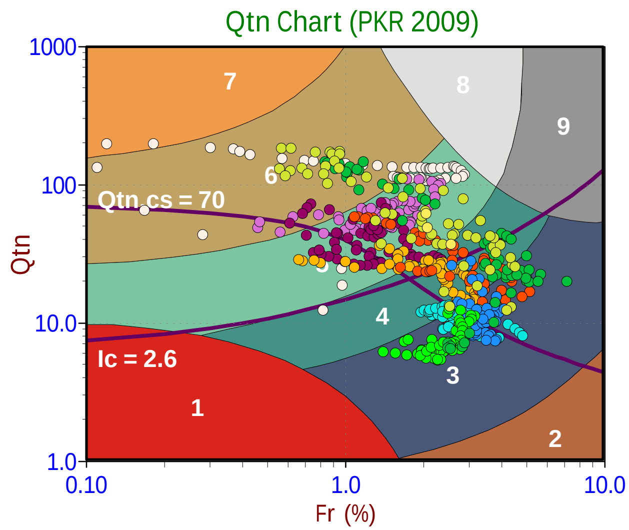
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

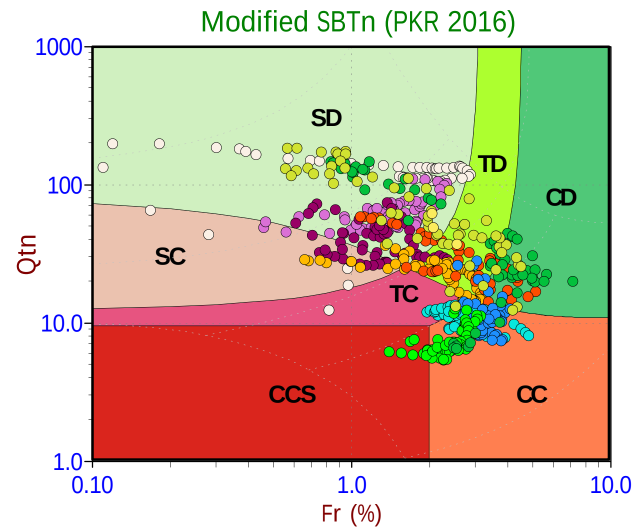
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

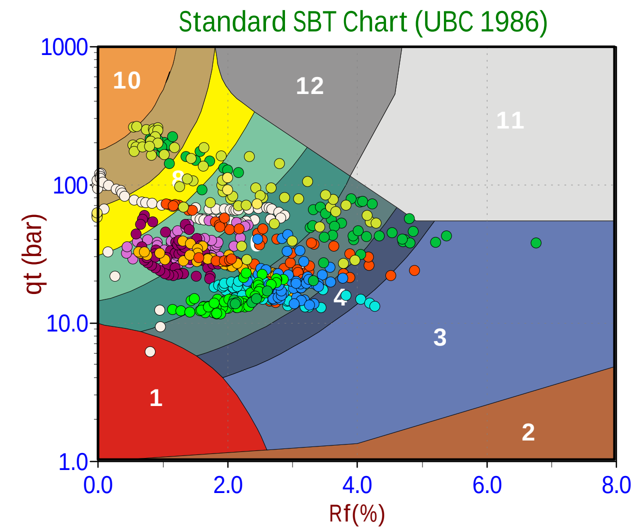
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56137 Date: 2017-12-09 08:17 Site: At Dublin	Sounding: 2-CPT-04 Cone: 443:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

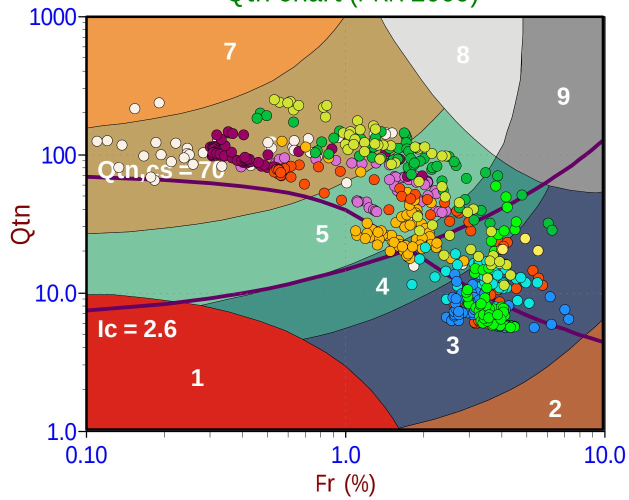
CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

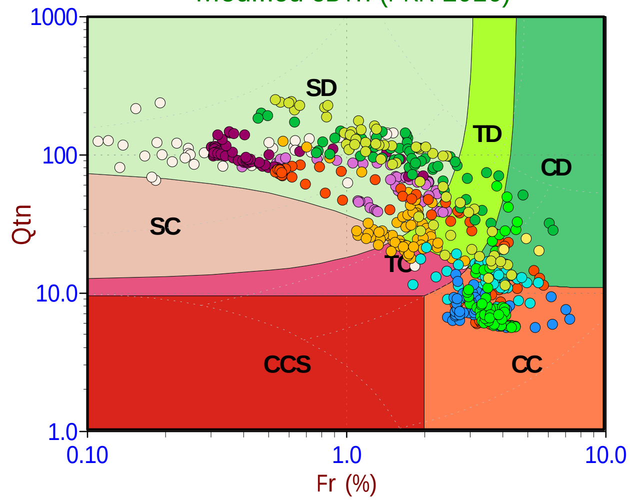
Job No: 17-56137
Date: 2017-12-08 07:50
Site: At Dublin

Sounding: 2-CPT-05
Cone: 443:T1500F15U500

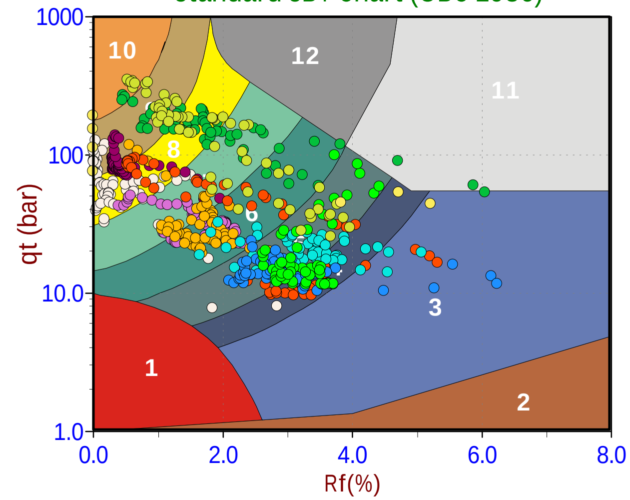
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

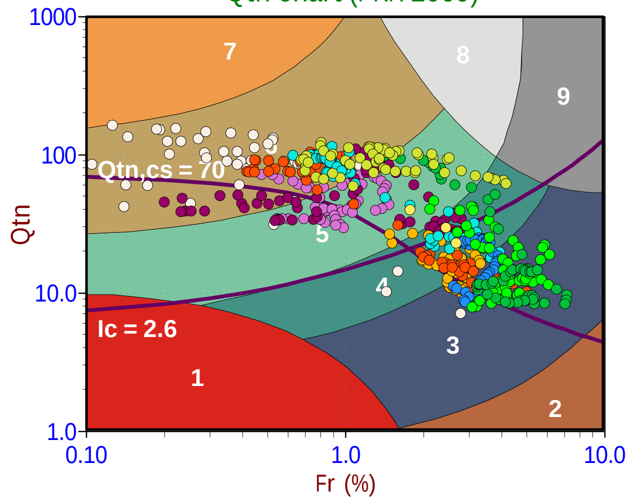
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

ENGEO Inc.

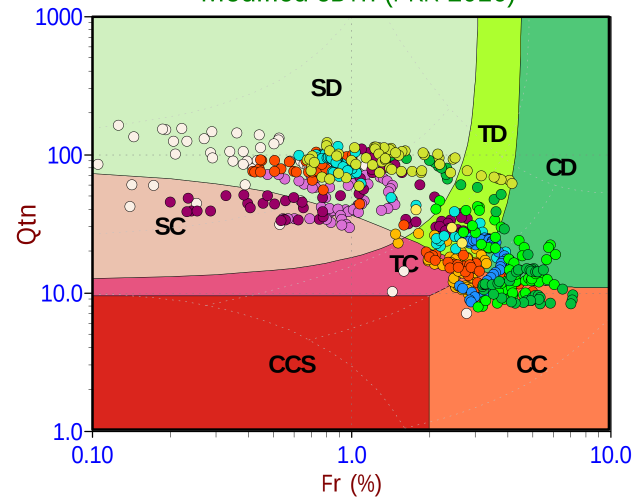
Job No: 17-56137
Date: 2017-12-08 09:05
Site: At Dublin

Sounding: 2-CPT-06
Cone: 443:T1500F15U500

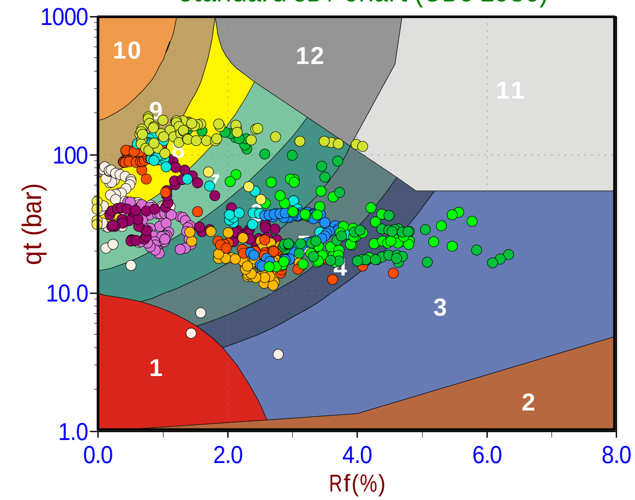
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

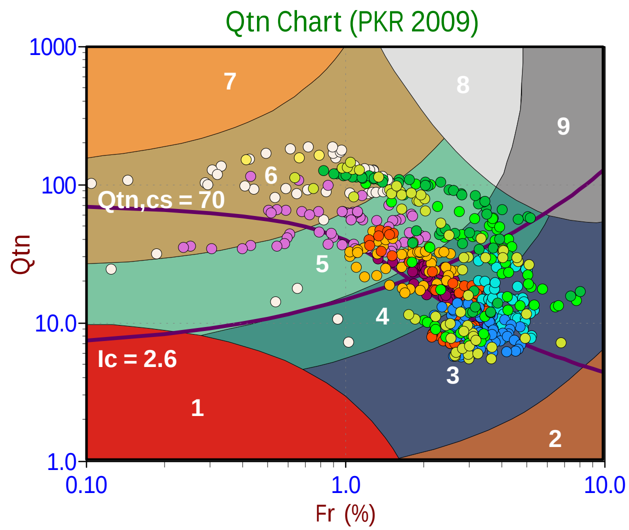
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

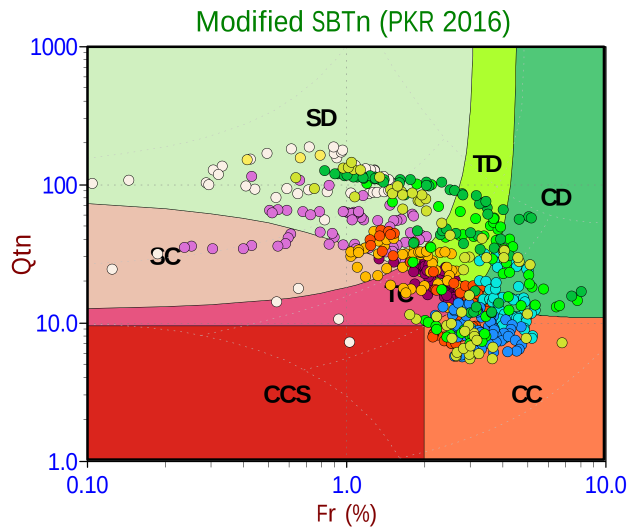
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

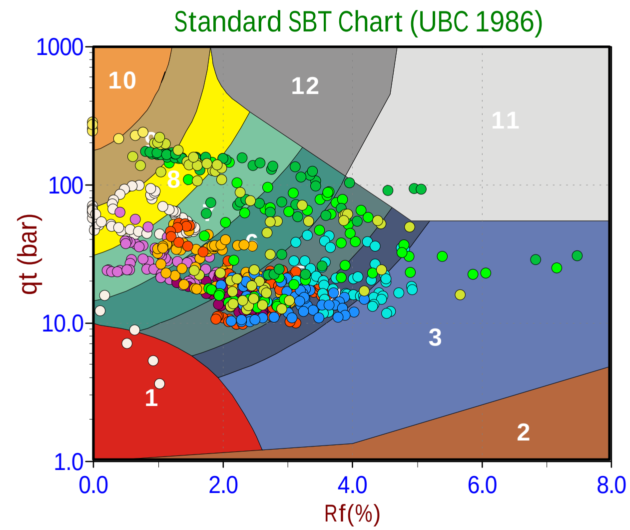
CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 2017-12-08 10:20
Site: At Dublin
Sounding: 2-CPT-07
Cone: 443:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

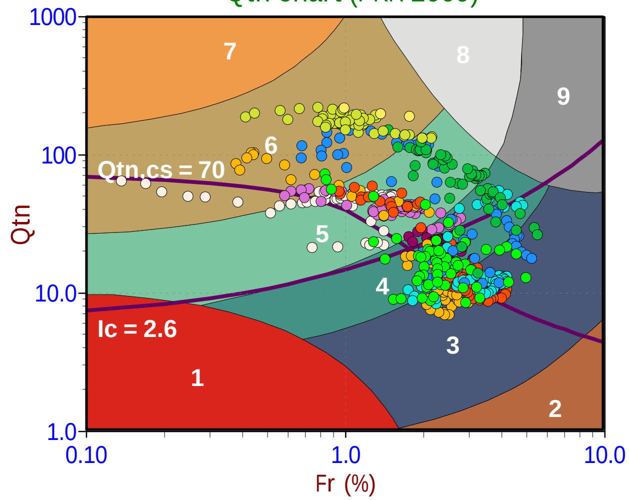
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

ENGEO Inc.

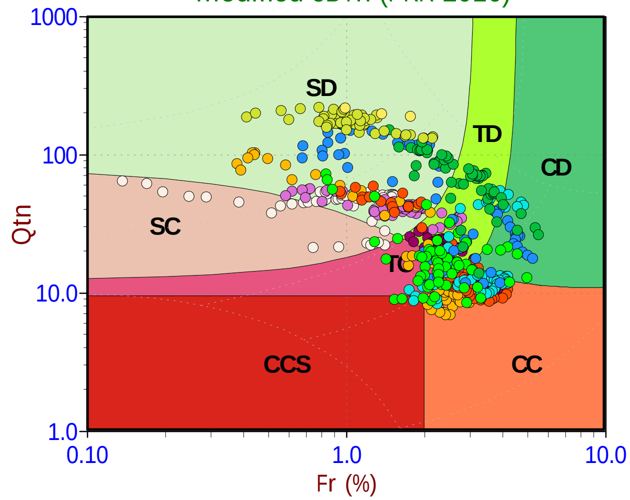
Job No: 17-56137
Date: 2017-12-09 10:23
Site: At Dublin

Sounding: 2-CPT-08
Cone: 443:T1500F15U500

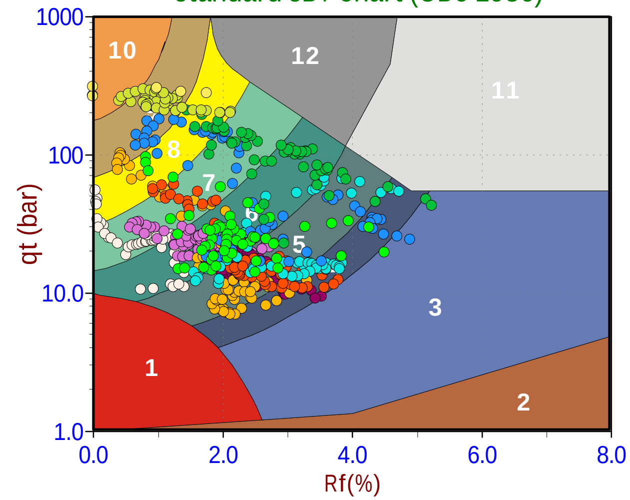
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

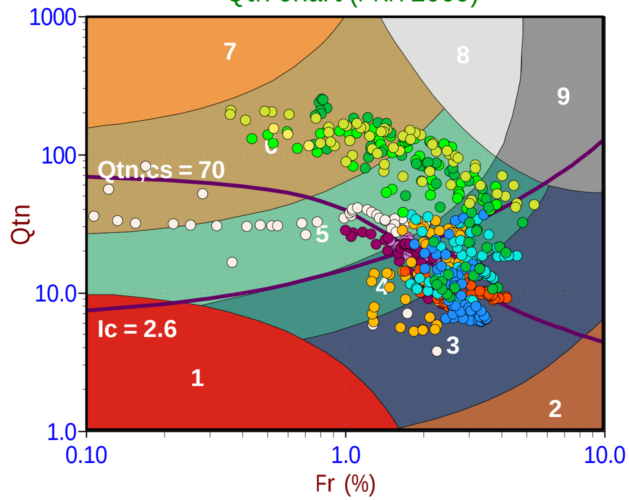
CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

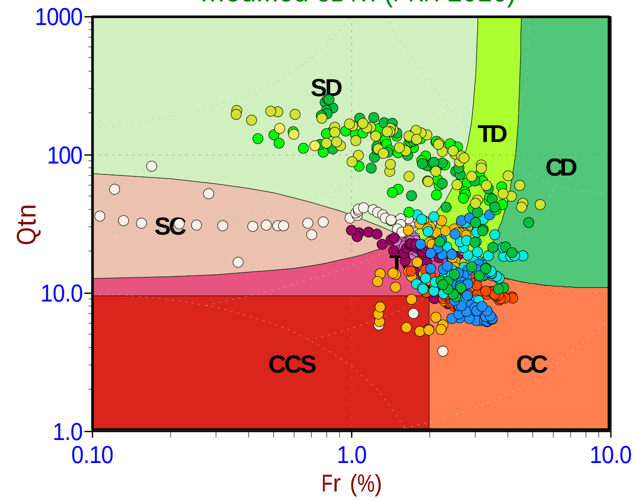
Job No: 17-56137
Date: 2017-12-09 11:16
Site: At Dublin

Sounding: 2-CPT-09
Cone: 443:T1500F15U500

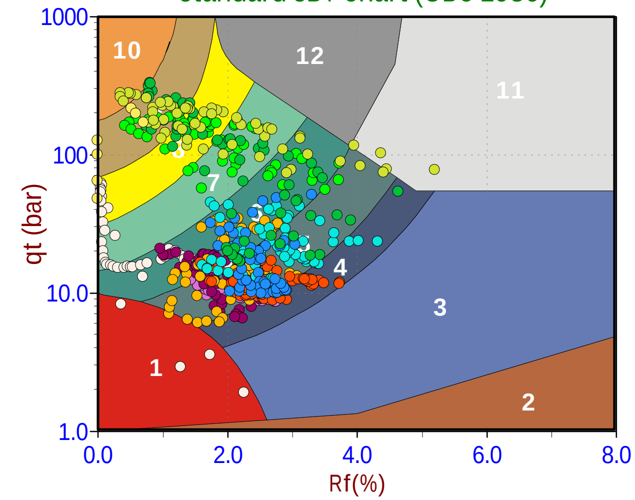
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

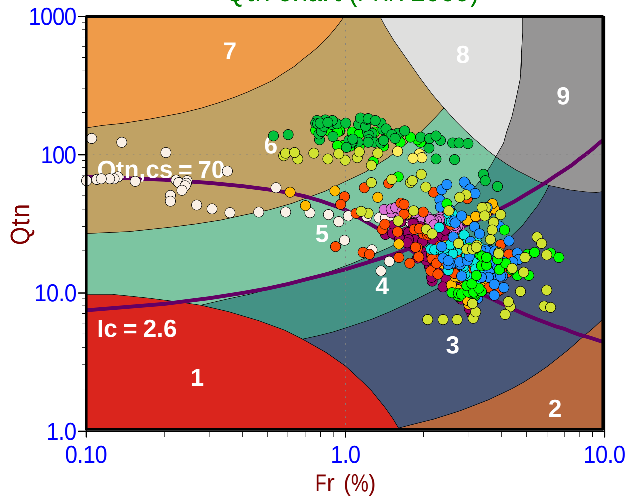
CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

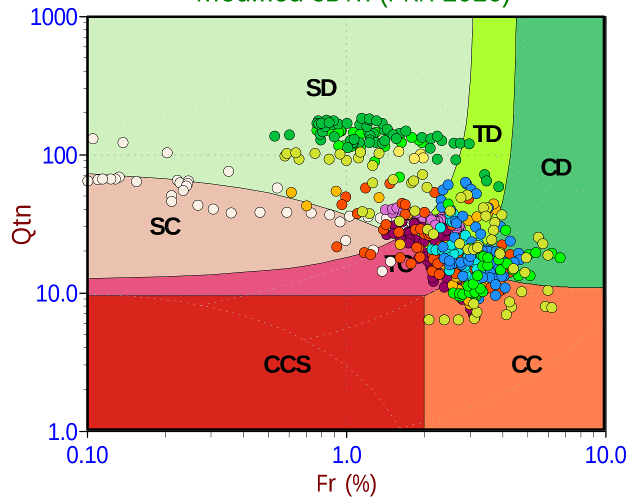
Job No: 17-56137
Date: 2017-12-09 13:26
Site: At Dublin

Sounding: 2-CPT-10
Cone: 443:T1500F15U500

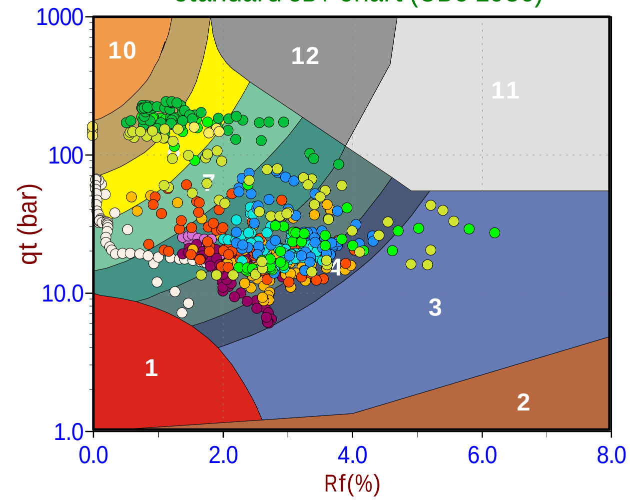
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

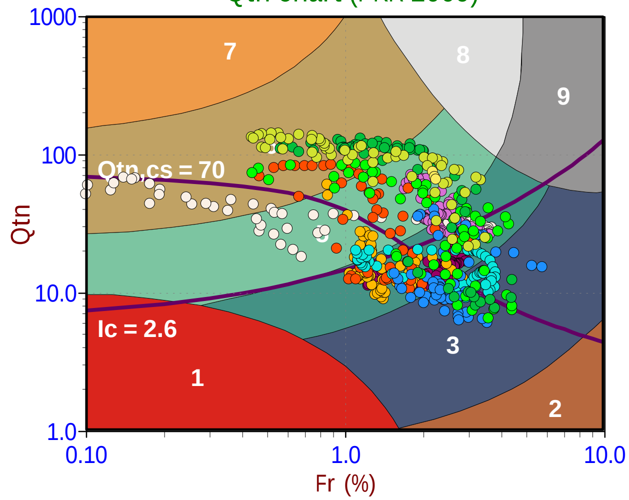
CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

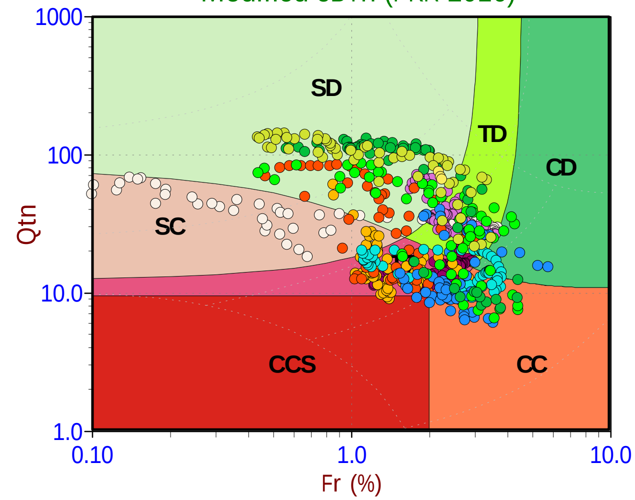
Job No: 17-56137
Date: 2017-12-09 12:12
Site: At Dublin

Sounding: 2-CPT-11
Cone: 443:T1500F15U500

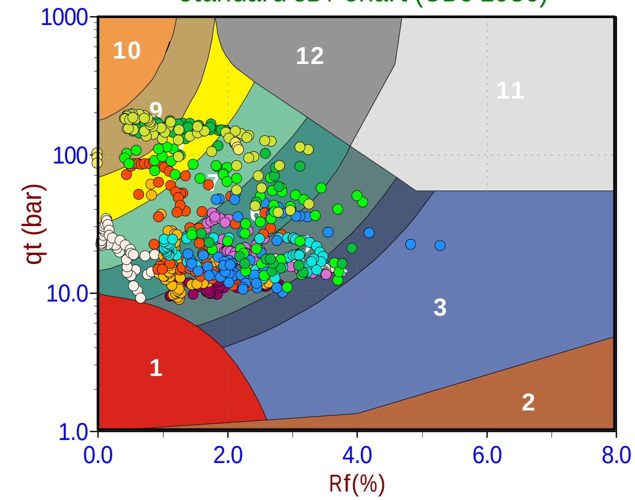
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

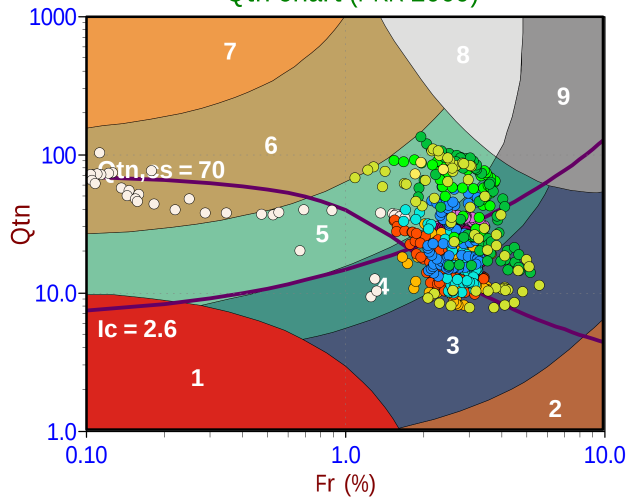
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

ENGEO Inc.

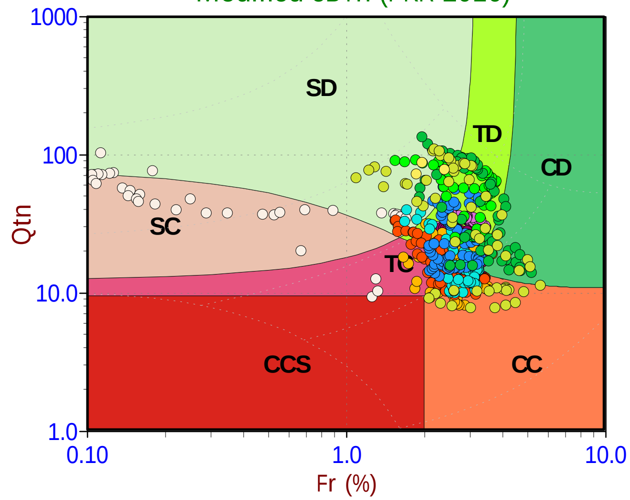
Job No: 17-56137
Date: 2017-12-09 14:25
Site: At Dublin

Sounding: 2-CPT-12
Cone: 443:T1500F15U500

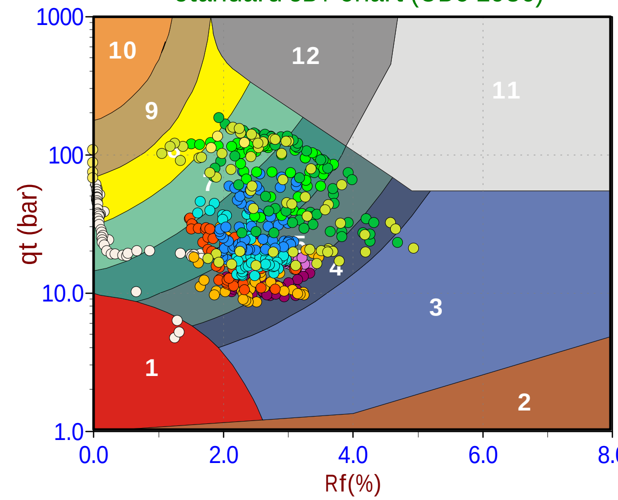
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

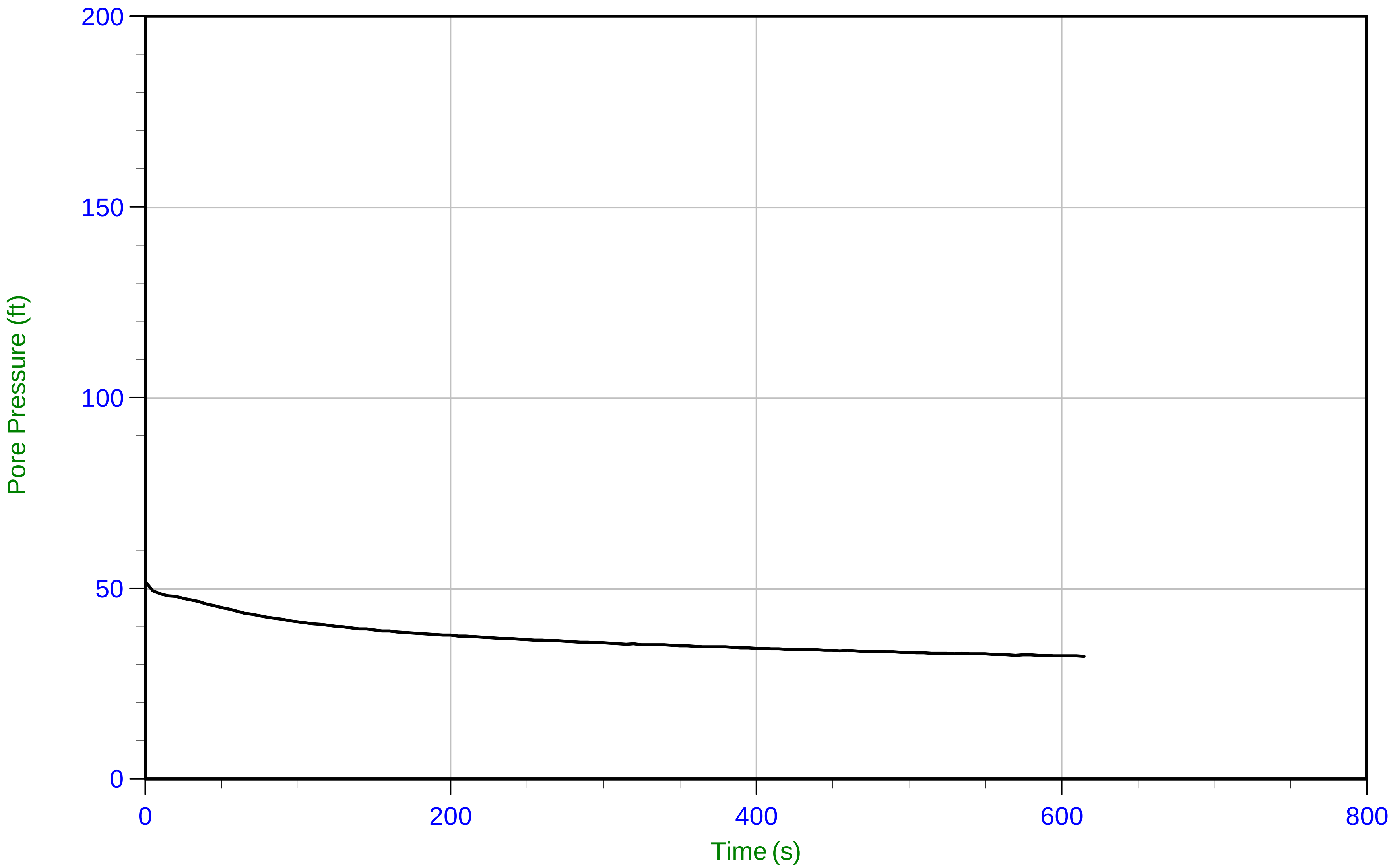
Job No: 17-56137
Client: ENGEO Incorporated
Project: At Dublin
Start Date: 08-Dec-2017
End Date: 09-Dec-2017

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
2-CPT-02	17-56137_CP02	15	615	50.52	Not Achieved	
2-CPT-03	17-56137_CP03	15	500	47.41	Not Achieved	
2-CPT-03	17-56137_CP03	15	400	50.52	17.4	33.2
2-CPT-04	17-56137_CP04	15	800	41.58	Not Achieved	
2-CPT-05	17-56137_CP05	15	365	40.27	16.3	24.0
2-CPT-06	17-56137_CP06	15	400	44.04	22.7	21.3
2-CPT-07	17-56137_CP07	15	400	40.85	20.7	20.1
2-CPT-07	17-56137_CP07	15	140	40.93	20.7	20.2
2-CPT-07	17-56137_CP07	15	115	44.29	23.9	20.4
2-CPT-08	17-56137_CP08	15	205	40.52	24.7	15.8
2-CPT-09	17-56137_CP09	15	325	37.48	19.9	17.6
2-CPT-11	17-56137_CP11	15	200	46.92	31.6	15.3
2-CPT-12	17-56137_CP12	15	200	50.52	36.1	14.5

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.	Job No: 17-56137 Date: 12/08/2017 13:42 Site: At Dublin	Sounding: 2-CPT-02 Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

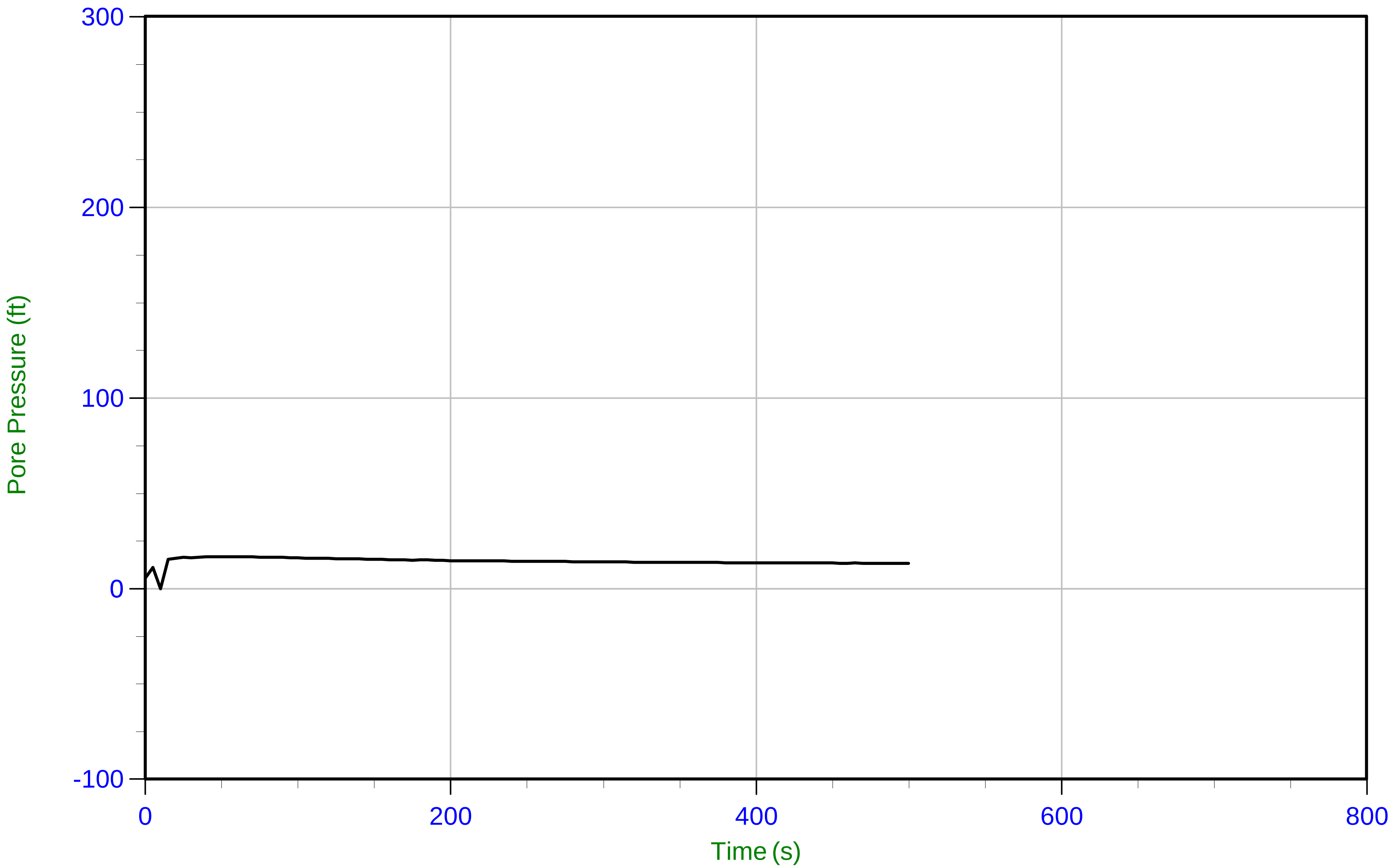
Filename: 17-56137_CP02.PPF
Depth: 15.400 m / 50.524 ft
Duration: 615.0 s

U Min: 32.2 ft
U Max: 52.0 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 12:24
Site: At Dublin

Sounding: 2-CPT-03
Cone: 443:T1500F15U500 Area=15 cm²

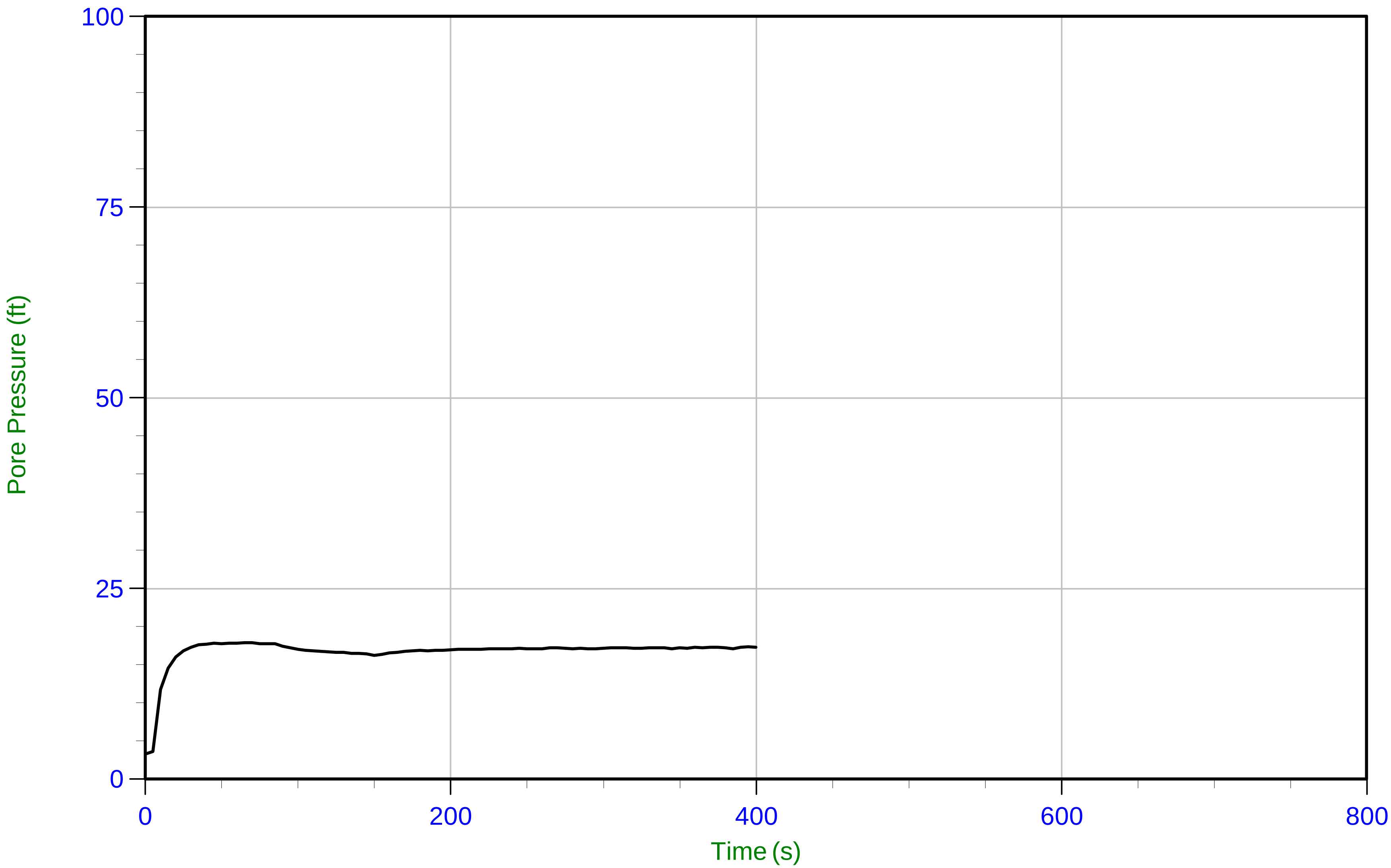


Trace Summary:
Filename: 17-56137_CP03.PPF
Depth: 14.450 m / 47.408 ft
Duration: 500.0 s
U Min: -0.1 ft
U Max: 16.7 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 12:24
Site: At Dublin

Sounding: 2-CPT-03
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP03.PPF
Depth: 15.400 m / 50.524 ft
Duration: 400.0 s

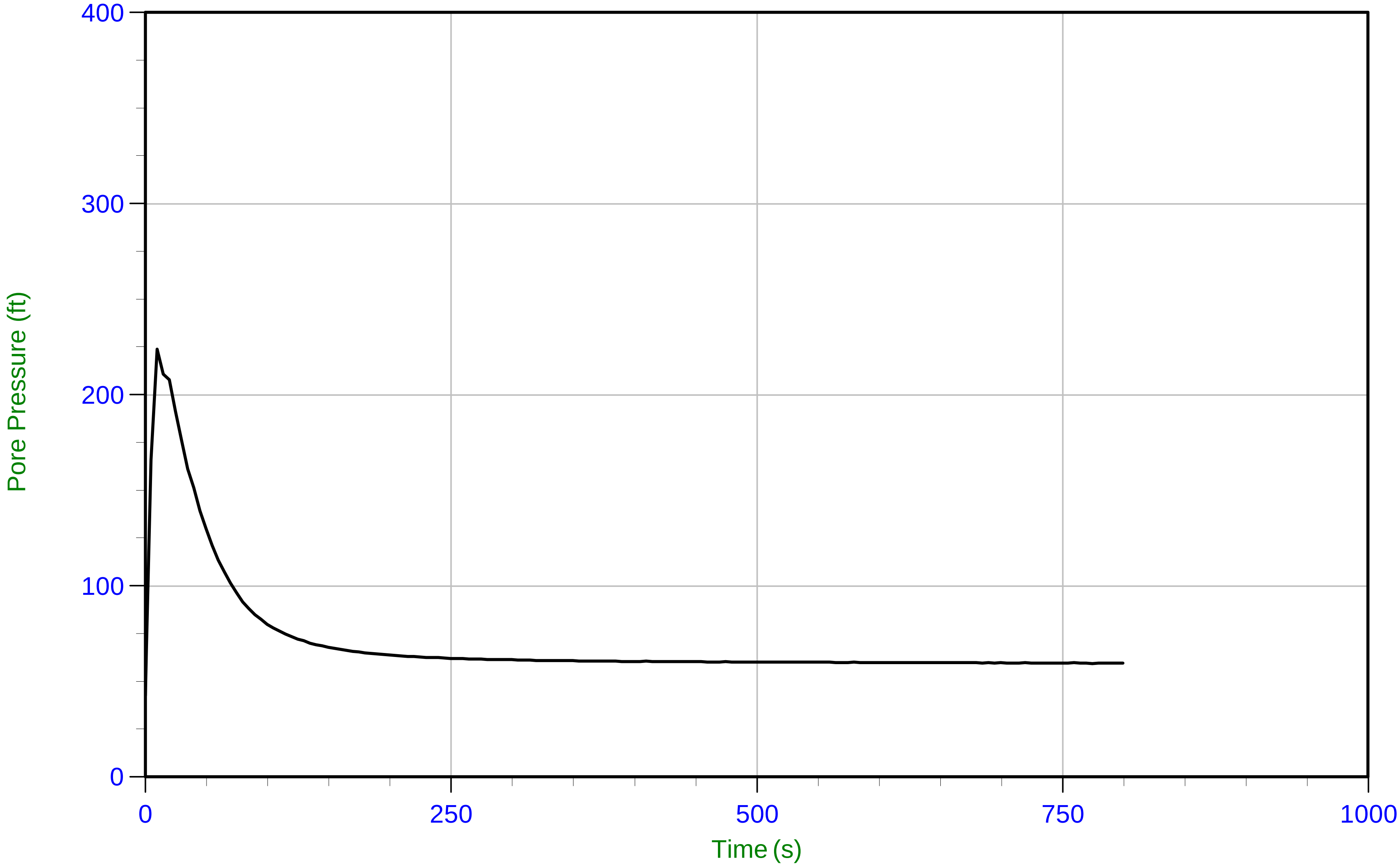
U Min: 3.3 ft
U Max: 17.9 ft

WT: 10.104 m / 33.149 ft
Ueq: 17.4 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/09/2017 08:17
Site: At Dublin

Sounding: 2-CPT-04
Cone: 443:T1500F15U500 Area=15 cm²

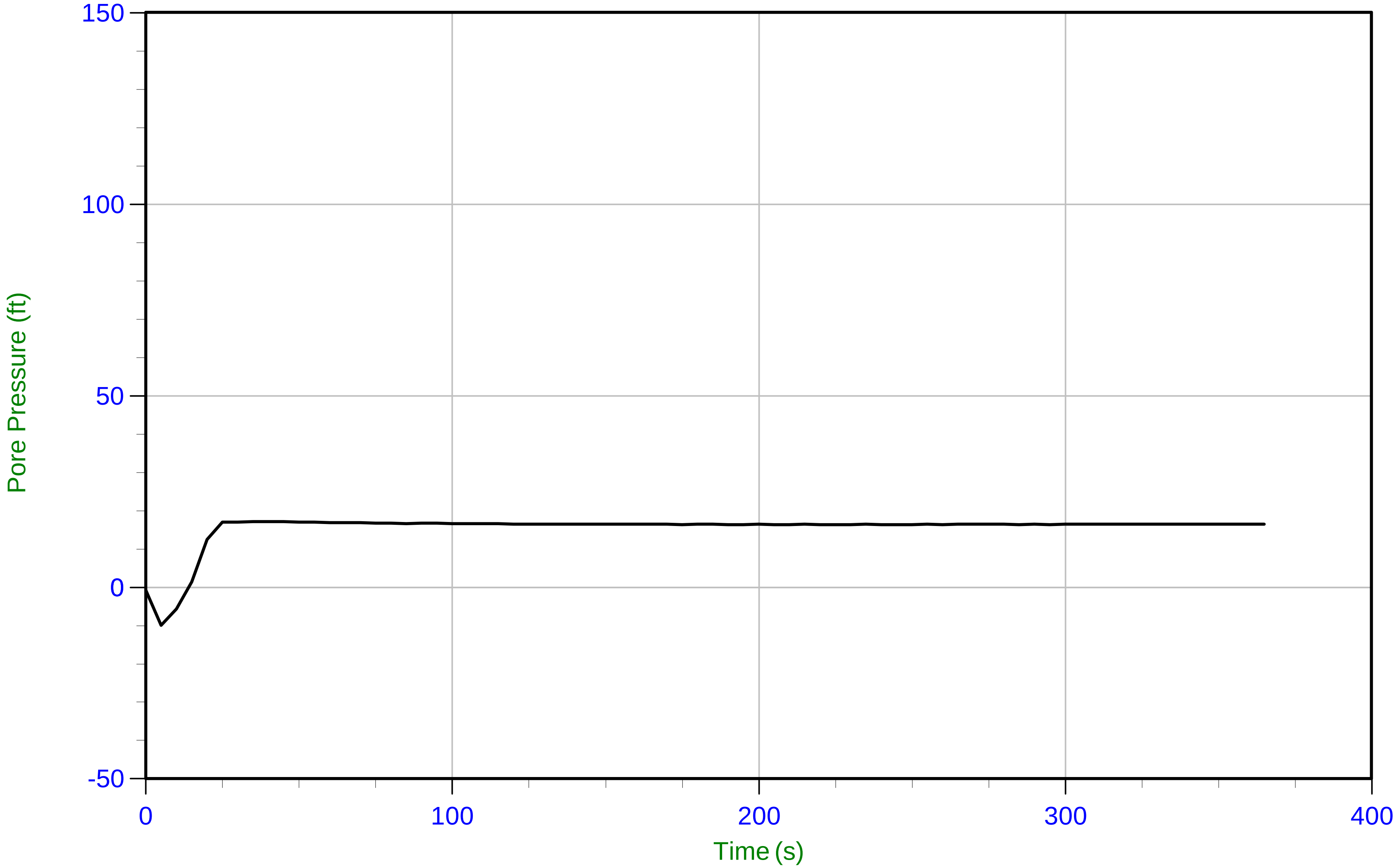


Trace Summary:
Filename: 17-56137_CP04.PPF
Depth: 12.675 m / 41.584 ft
Duration: 800.0 s
U Min: 42.5 ft
U Max: 223.9 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 07:50
Site: At Dublin

Sounding: 2-CPT-05
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP05.PPF
Depth: 12.275 m / 40.272 ft
Duration: 365.0 s

U Min: -9.9 ft
U Max: 17.2 ft

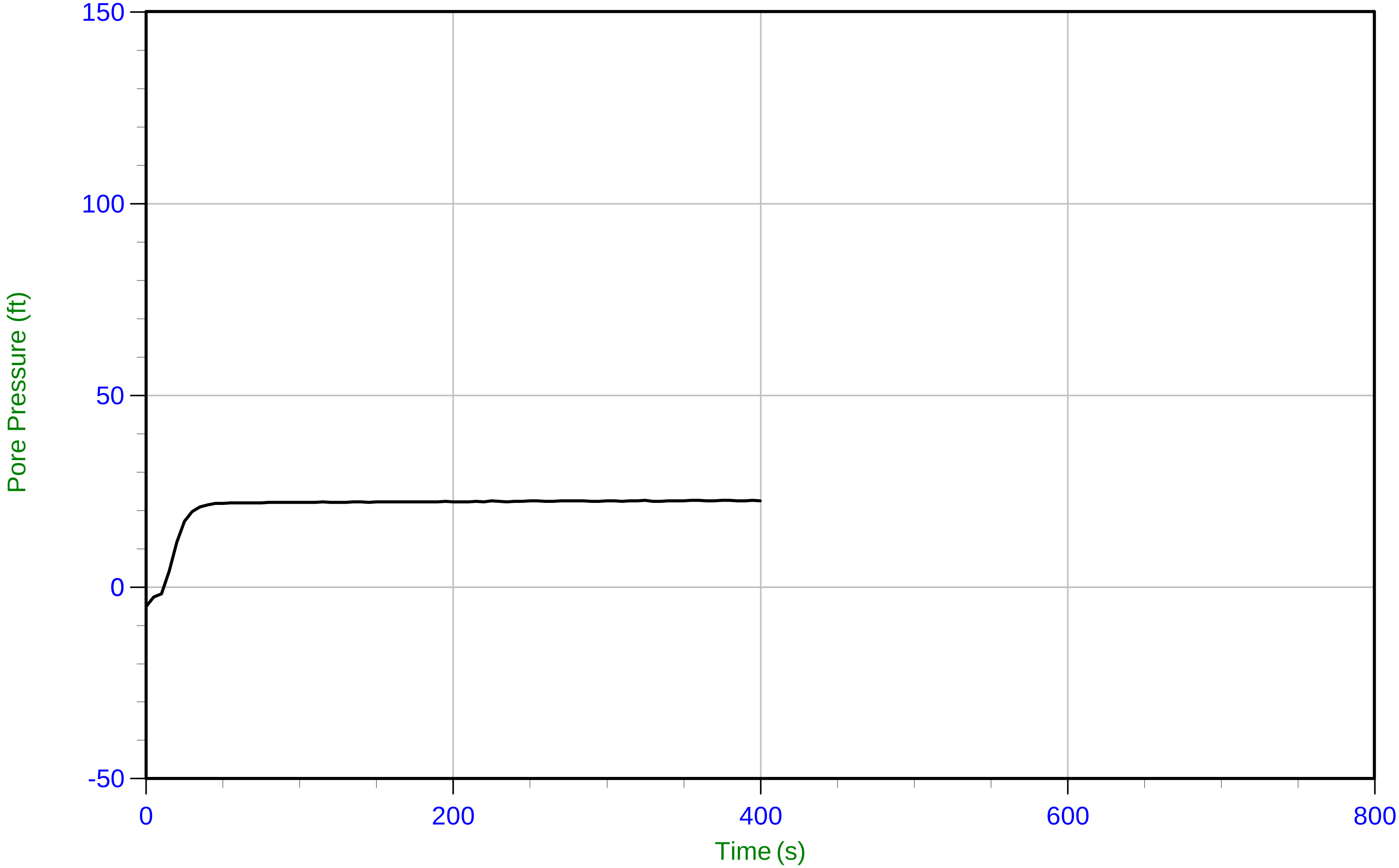
WT: 7.318 m / 24.009 ft
Ueq: 16.3 ft

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 09:05
Site: At Dublin

Sounding: 2-CPT-06
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP06.PPF
Depth: 13.425 m / 44.045 ft
Duration: 400.0 s

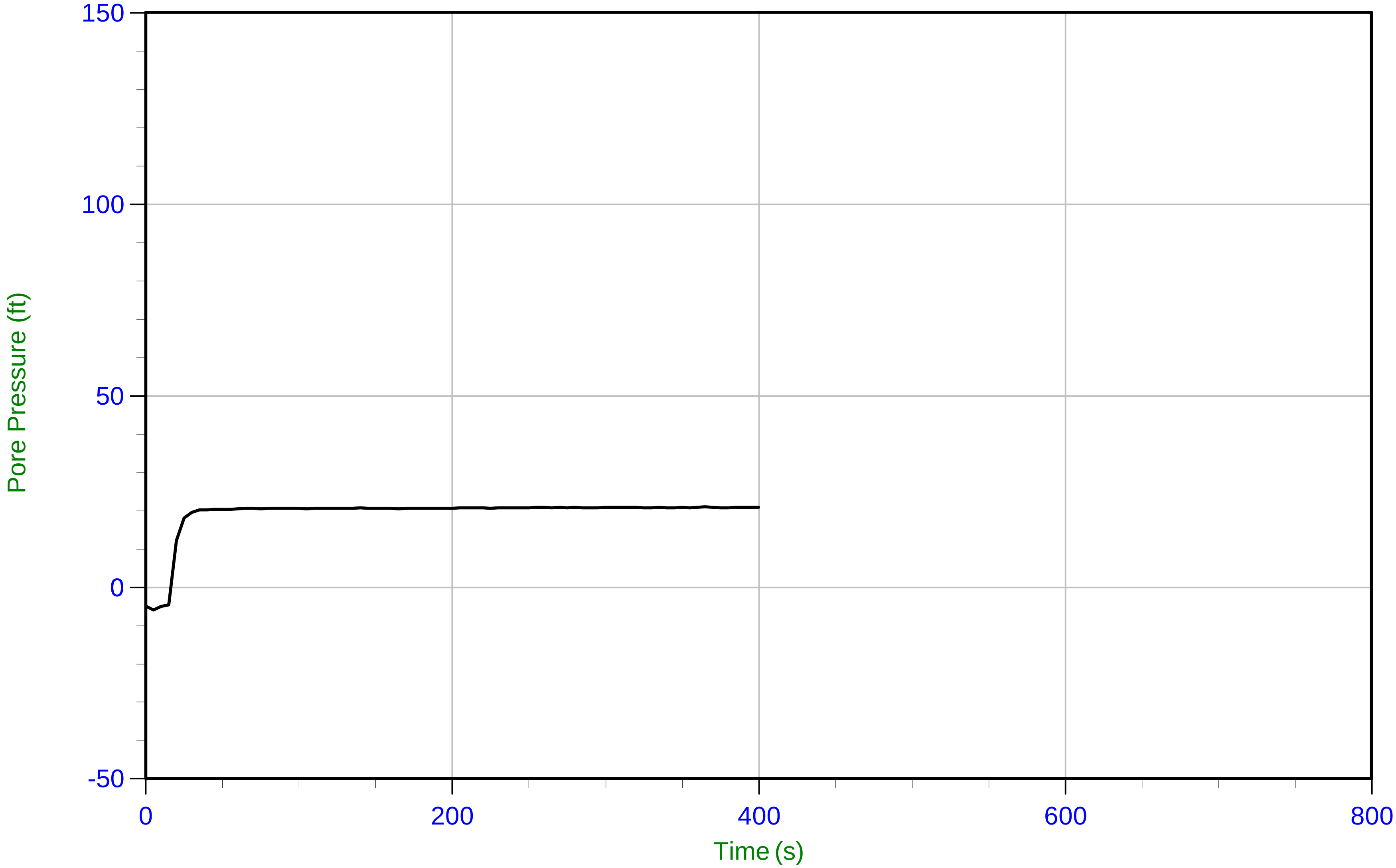
U Min: -5.1 ft
U Max: 22.6 ft

WT: 6.498 m / 21.319 ft
Ueq: 22.7 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 10:20
Site: At Dublin

Sounding: 2-CPT-07
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP07.PPF
Depth: 12.450 m / 40.846 ft
Duration: 400.0 s

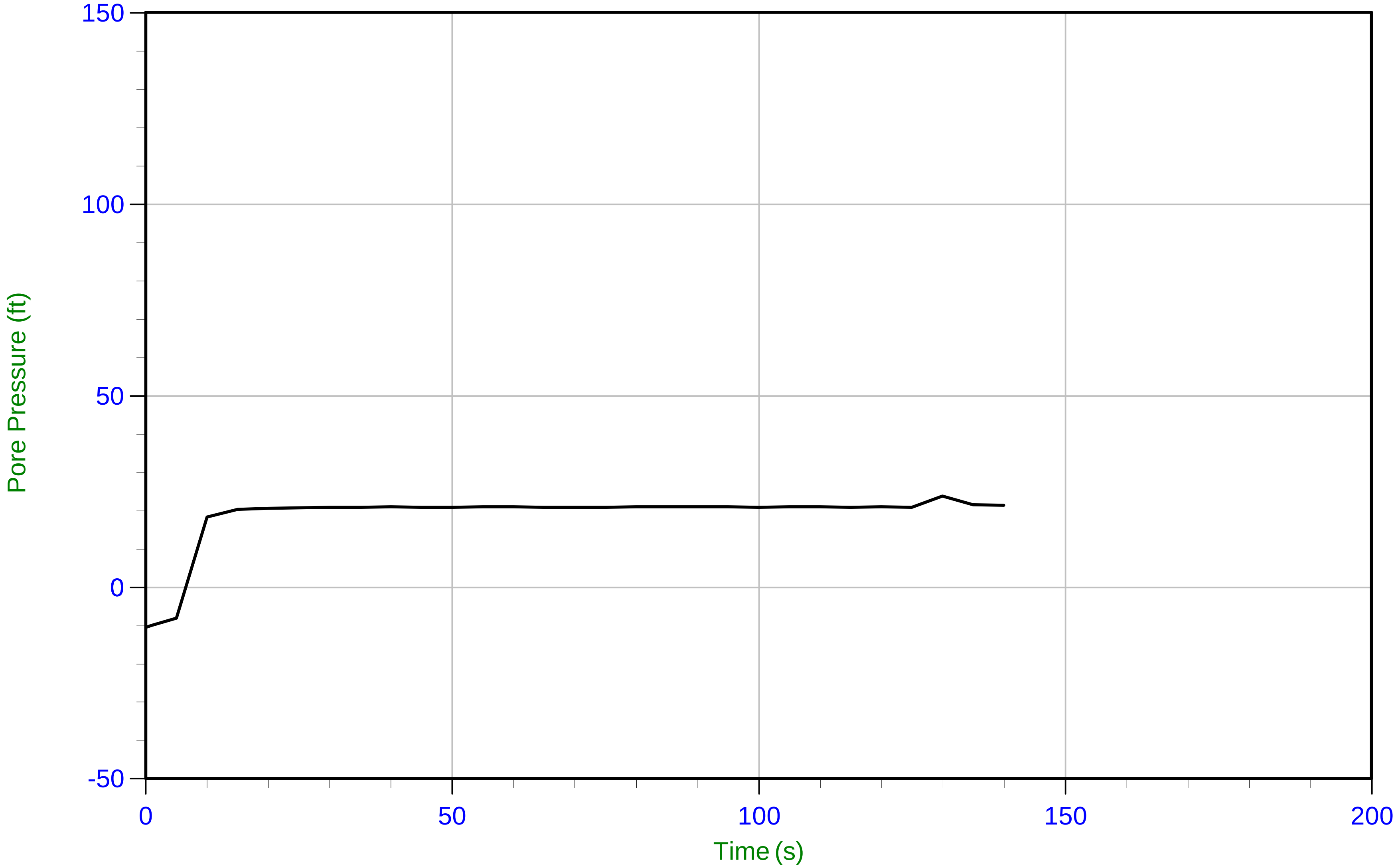
U Min: -6.0 ft
U Max: 21.0 ft

WT: 6.138 m / 20.138 ft
Ueq: 20.7 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 10:20
Site: At Dublin

Sounding: 2-CPT-07
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP07.PPF
Depth: 12.475 m / 40.928 ft
Duration: 140.0 s

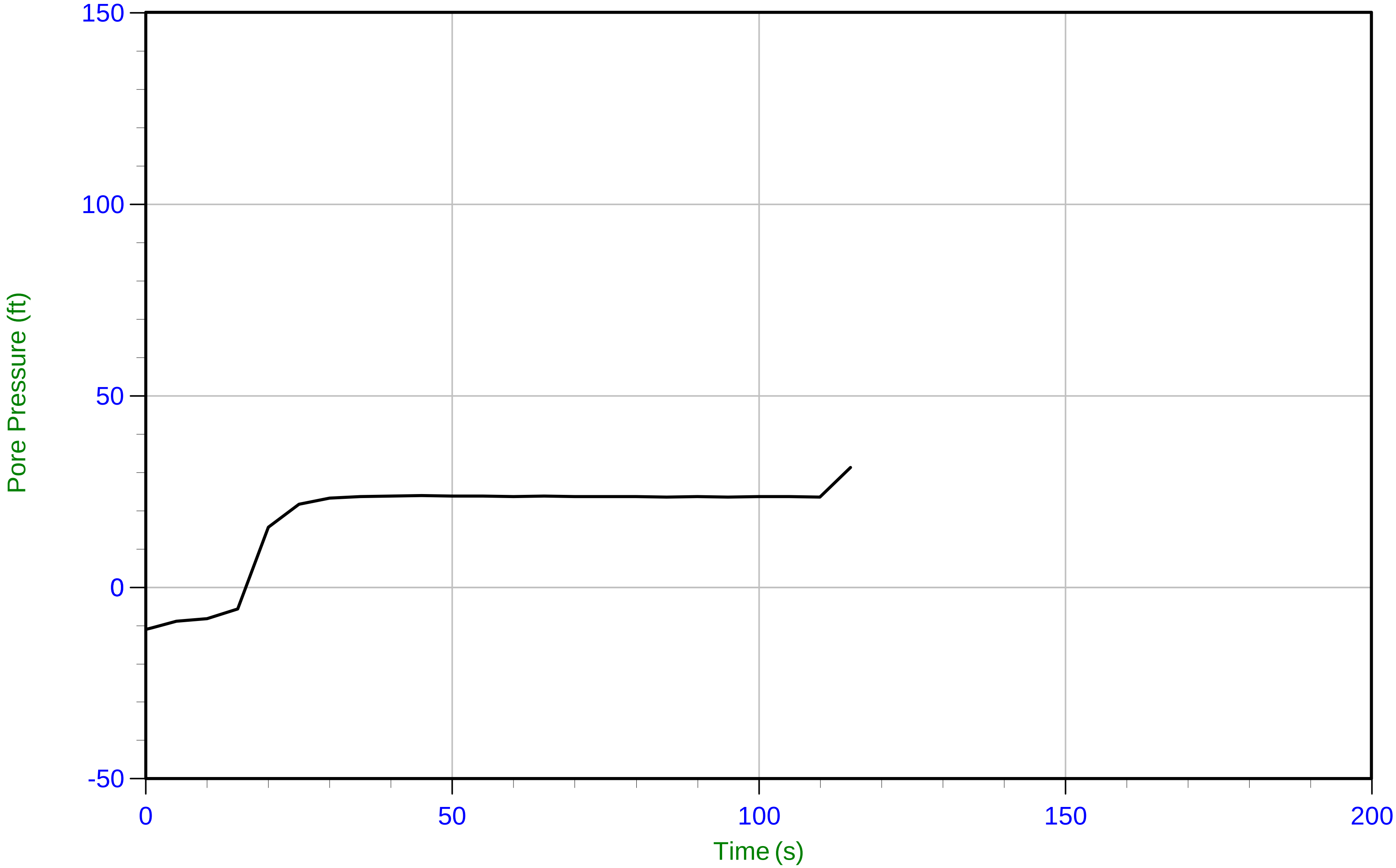
U Min: -10.5 ft
U Max: 23.8 ft

WT: 6.163 m / 20.220 ft
Ueq: 20.7 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/08/2017 10:20
Site: At Dublin

Sounding: 2-CPT-07
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP07.PPF
Depth: 13.500 m / 44.291 ft
Duration: 115.0 s

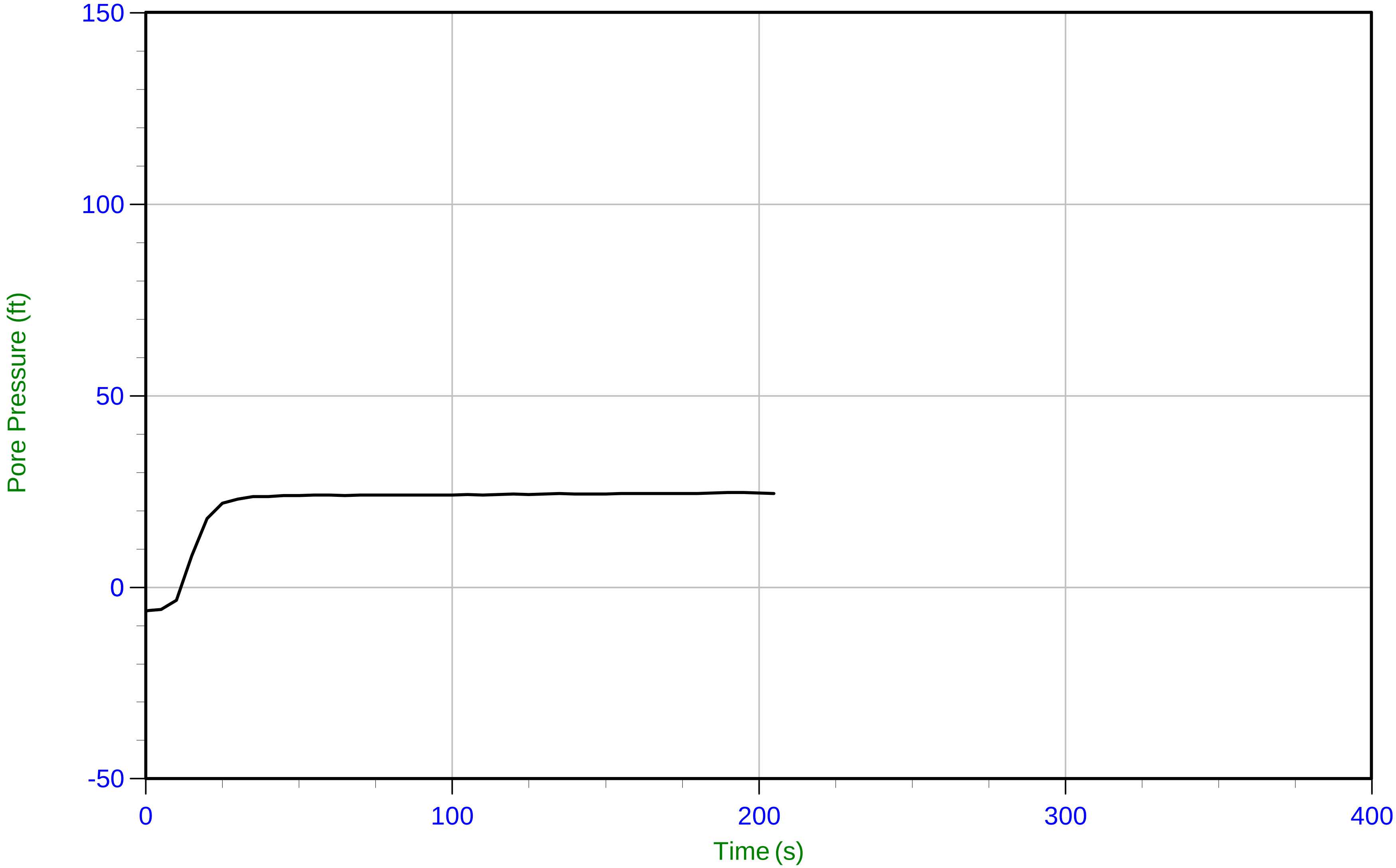
U Min: -11.0 ft
U Max: 31.3 ft

WT: 6.203 m / 20.351 ft
Ueq: 23.9 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/09/2017 10:23
Site: At Dublin

Sounding: 2-CPT-08
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP08.PPF
Depth: 12.350 m / 40.518 ft
Duration: 205.0 s

U Min: -6.2 ft
U Max: 24.7 ft

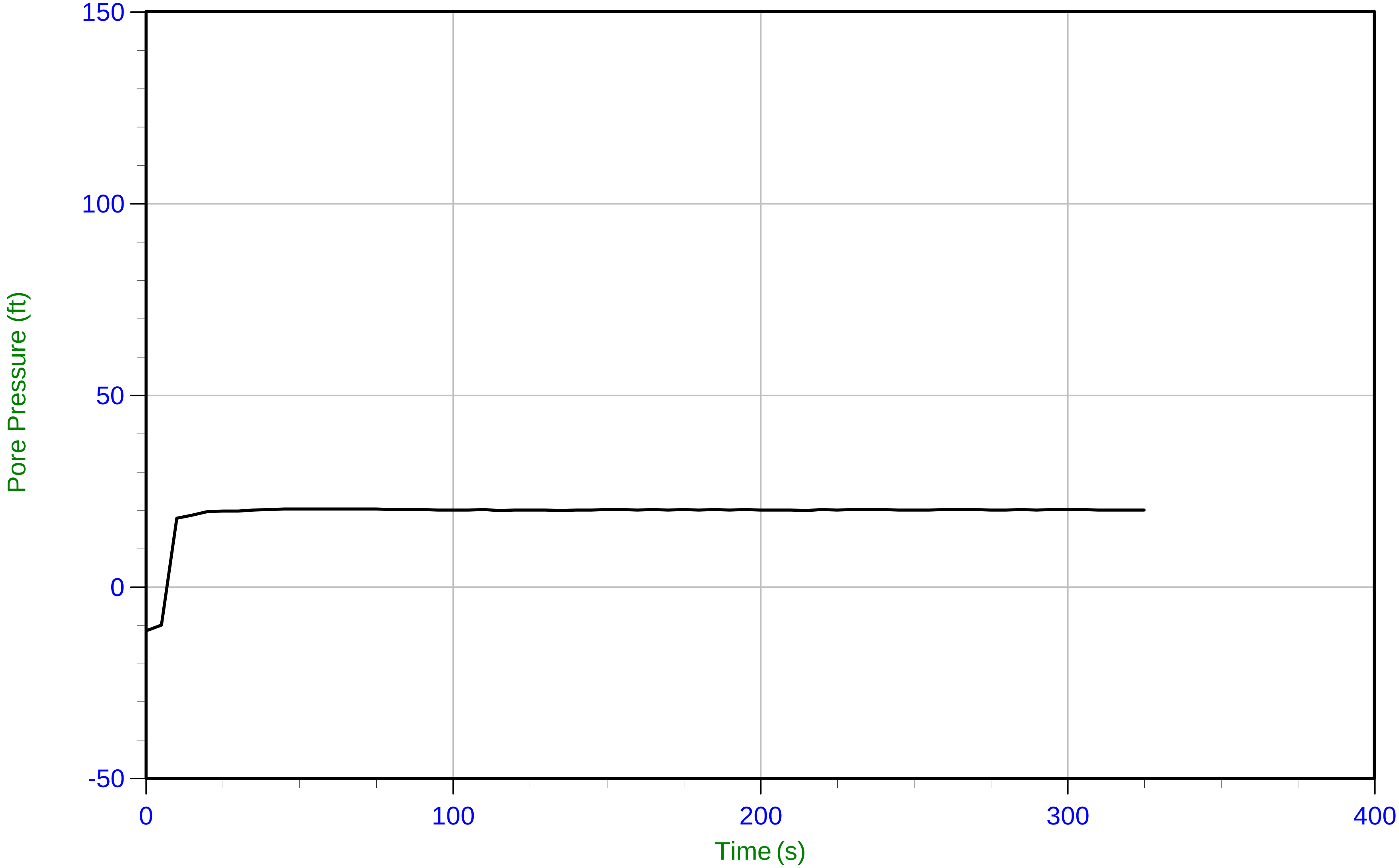
WT: 4.807 m / 15.771 ft
Ueq: 24.7 ft

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 12/09/2017 11:16
Site: At Dublin

Sounding: 2-CPT-09
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP09.PPF
Depth: 11.425 m / 37.483 ft
Duration: 325.0 s

U Min: -11.5 ft
U Max: 20.4 ft

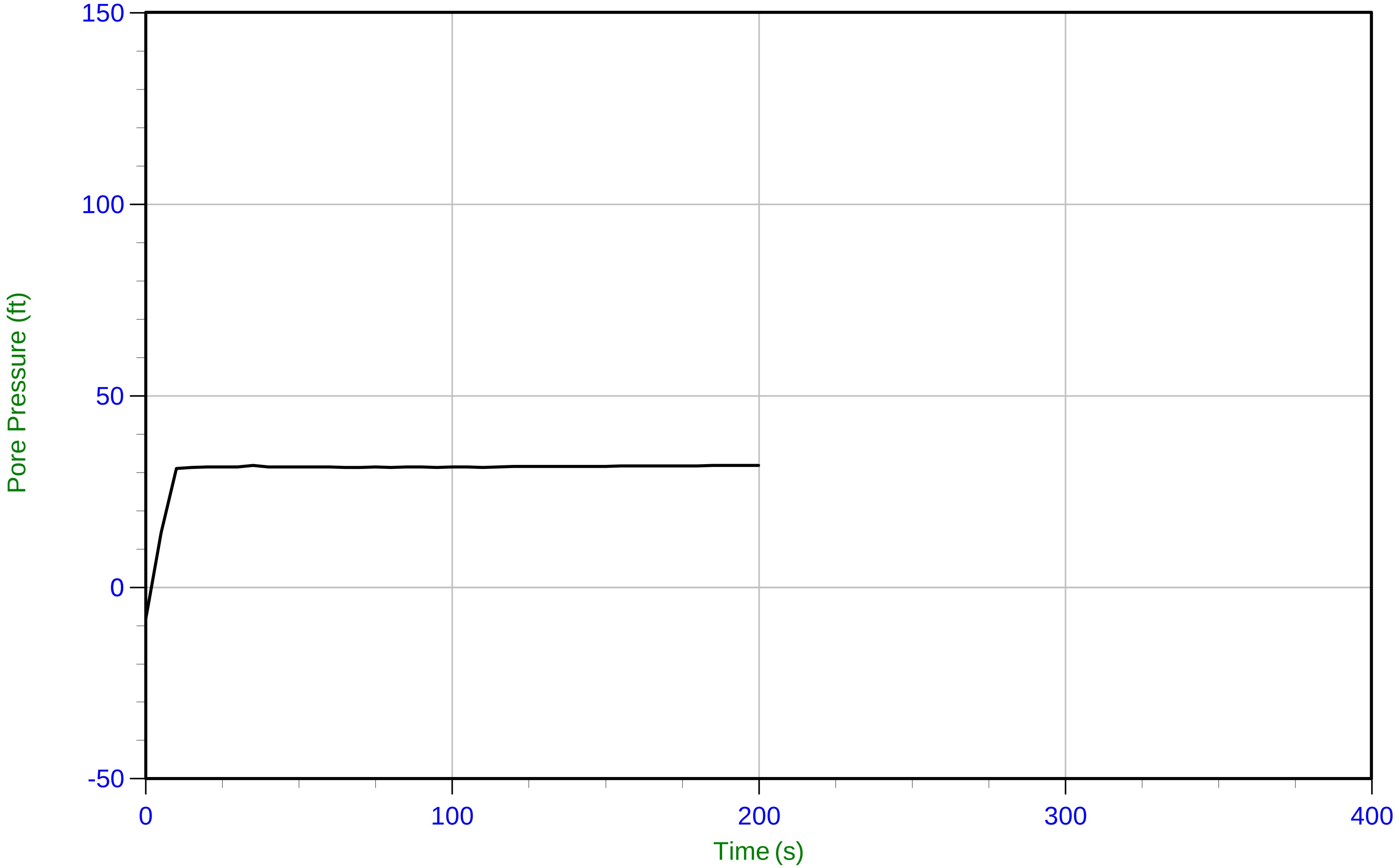
WT: 5.360 m / 17.585 ft
Ueq: 19.9 ft

CALIFORNIA PUSH TECHNOLOGIES INCORPORATED

ENGEO Inc.

Job No: 17-56137
Date: 12/09/2017 12:12
Site: At Dublin

Sounding: 2-CPT-11
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP11.PPF
Depth: 14.300 m / 46.915 ft
Duration: 200.0 s

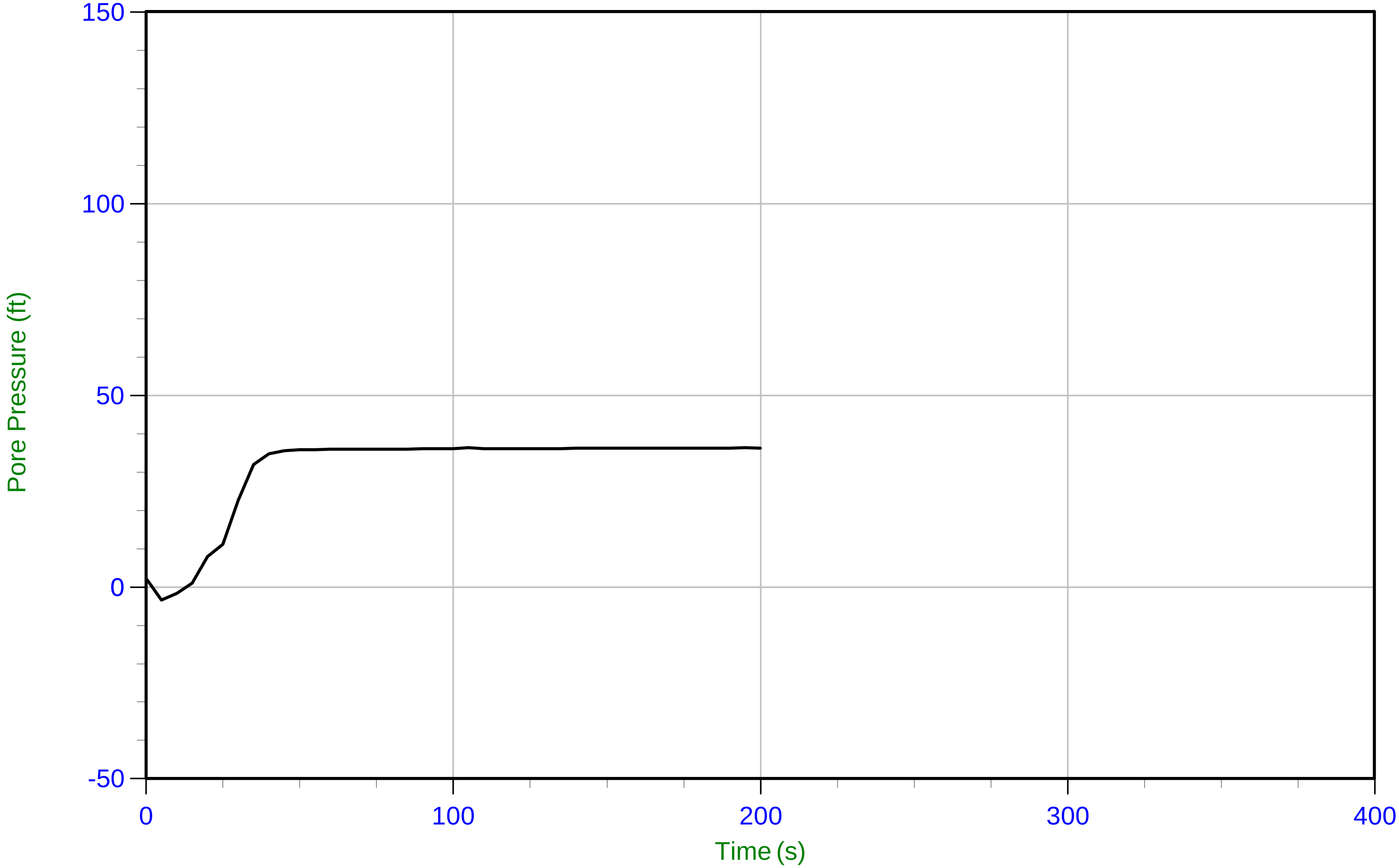
U Min: -8.2 ft
U Max: 31.8 ft

WT: 4.663 m / 15.298 ft
Ueq: 31.6 ft

ENGEO Inc.

Job No: 17-56137
Date: 12/09/2017 14:25
Site: At Dublin

Sounding: 2-CPT-12
Cone: 443:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 17-56137_CP12.PPF
Depth: 15.400 m / 50.524 ft
Duration: 200.0 s

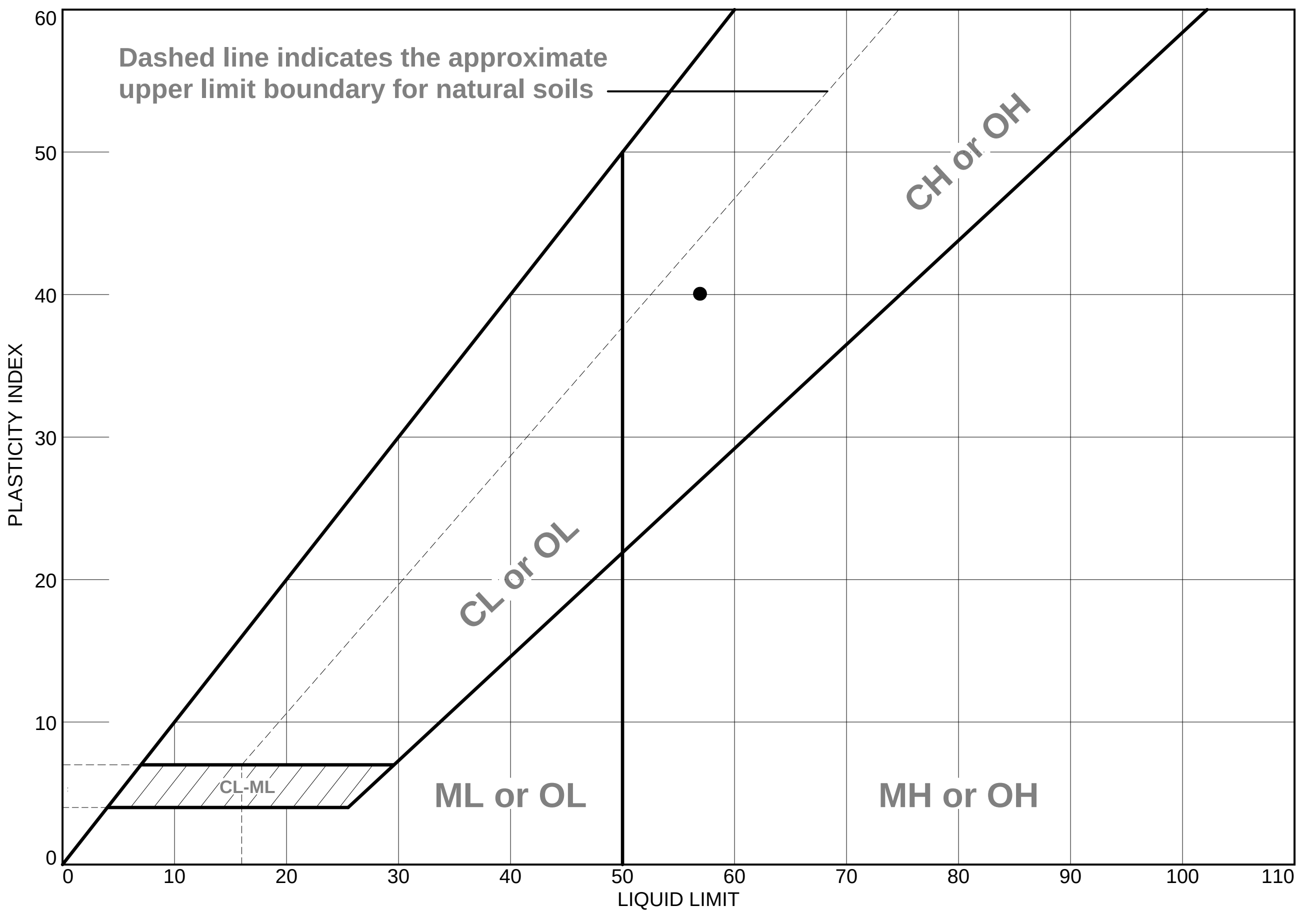
U Min: -3.4 ft
U Max: 36.4 ft

WT: 4.409 m / 14.465 ft
Ueq: 36.1 ft

APPENDIX C

LABORATORY TEST DATA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	57	17	40			

Project No. 9429.001.000 **Client:** Shea Properties

Project: AT Dublin

●**Depth:** 5.5-6.5 feet **Sample Number:** 2-B1 @ 5.5-6.5

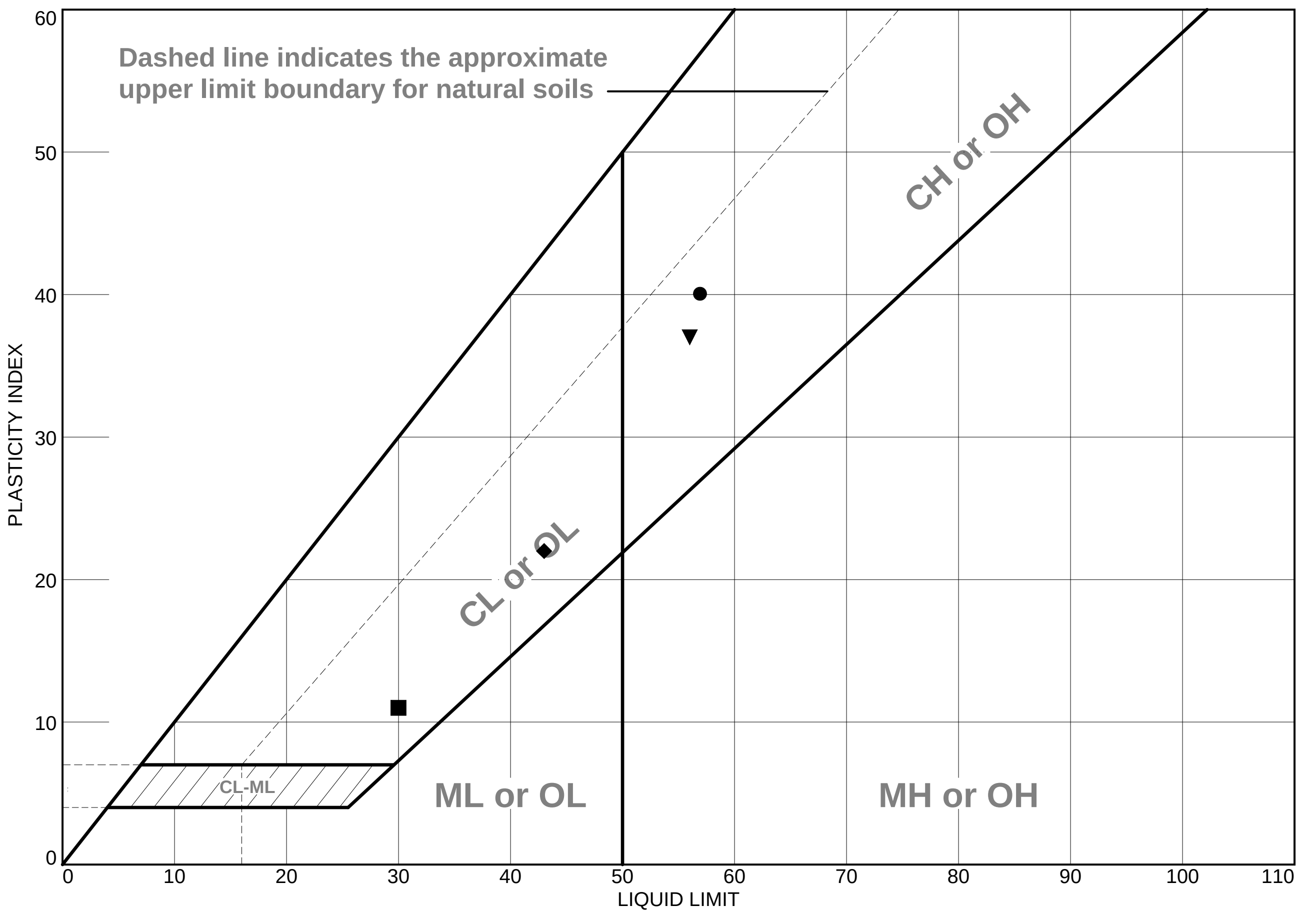
Remarks:

●ASTM D4318, Wet method

ENGEO INCORPORATED

Tested By: G. Criste **Checked By:** D. Seibold

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	57	17	40			
■	See exploration logs	30	19	11		52.1	
▲	See exploration logs	22	22	NP		44.1	
◆	See exploration logs	43	21	22			
▼	See exploration logs	56	19	37			

Project No. 9429.001.000 **Client:** Shea Properties

Project: AT Dublin

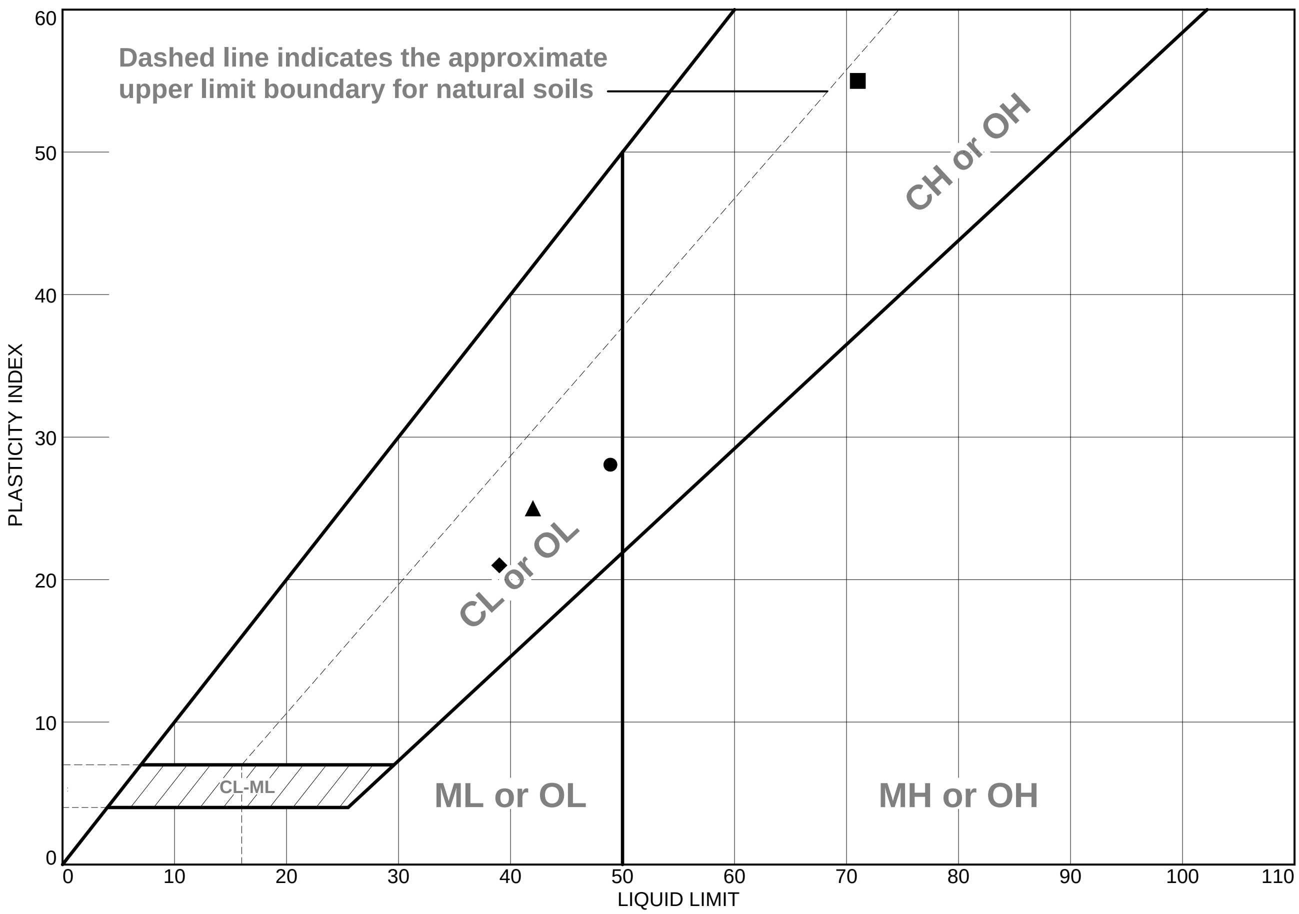
●**Depth:** 5.5-6.5 feet **Sample Number:** 2-B1 @ 5.5-6.5
■**Depth:** 10.5-11.5 feet **Sample Number:** 2-B1 @ 10.5-11.5
▲**Depth:** 20.5-21.5 feet **Sample Number:** 2-B1 @ 20.5-21.5
◆**Depth:** 25.5-26.5 feet **Sample Number:** 2-B1 @ 25.5-26.5
▼**Depth:** 10.5-11.5 feet **Sample Number:** 2-B2 @ 10.5-11.5

ENGEO INCORPORATED

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

Tested By: ○ G. Criste □ M. Quasem △ M. Quasem ◇ M. Quasem ▽ M. Quasem **Checked By:** D. Seibold

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	49	21	28			
■	See exploration logs	71	16	55			
▲	See exploration logs	42	17	25		85.1	
◆	See exploration logs	39	18	21			

Project No. 9429.001.000 **Client:** Shea Properties

Project: AT Dublin

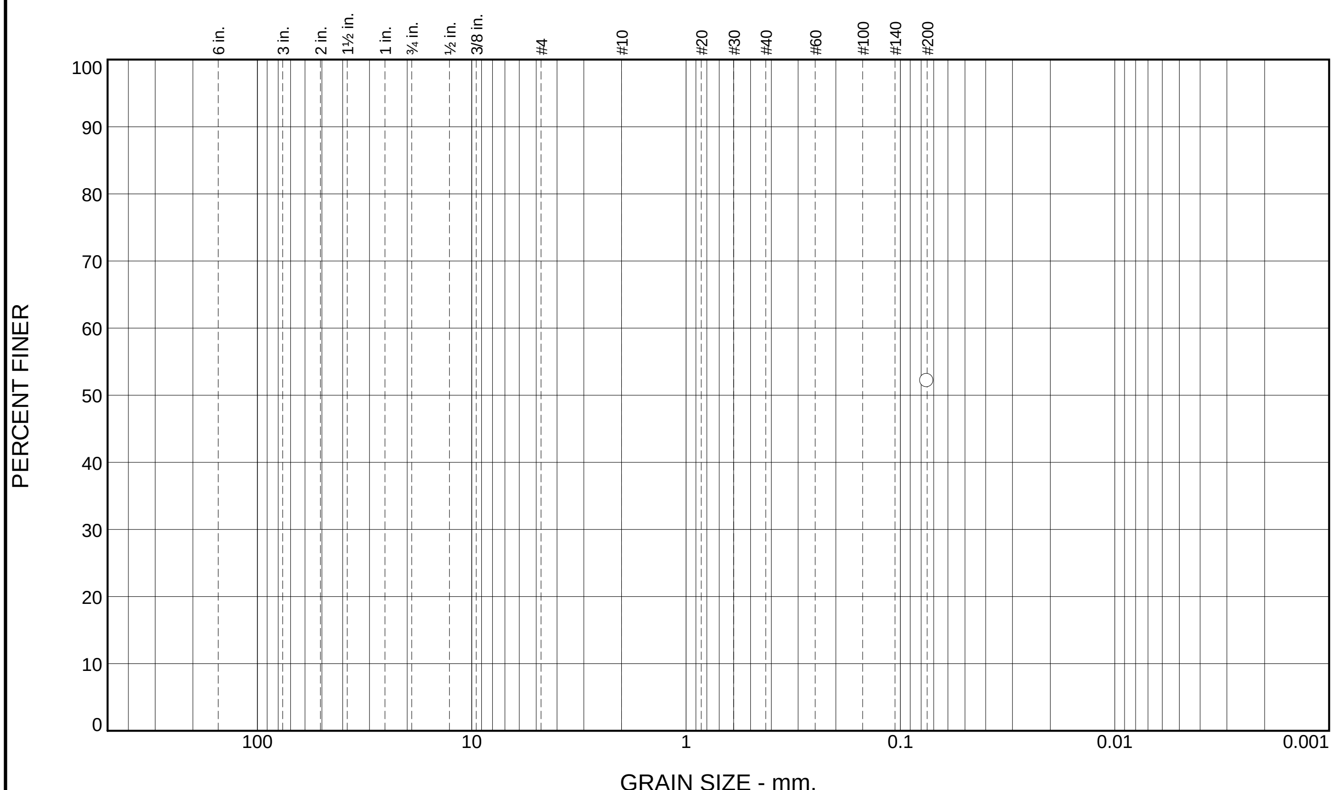
●**Depth:** 25.5-26.5 feet **Sample Number:** 2-B2 @ 25.5-26.5
■**Depth:** 1.5-2.5 feet **Sample Number:** 2-B3 @ 1.5-2.5
▲**Depth:** 10.5-11.5 feet **Sample Number:** 2-B3 @ 10.5-11.5
◆**Depth:** 5.5-6.5 feet **Sample Number:** 2-B4 @ 5.5-6.5

ENGEO INCORPORATED

Remarks:
●ASTM D4318, Wet method
■ASTM D4318, Wet method
▲PI: ASTM D4318, Wet method
GS: ASTM D1140
◆ASTM D4318, Wet method

Tested By: M. Quasem **Checked By:** G. Criste

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						52.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	52.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 19 LL= 30 PI= 11

Coefficients

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

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 2-B1 @ 10.5-11.5 **Depth:** 10.5-11.5 feet

Date: 12/28/17

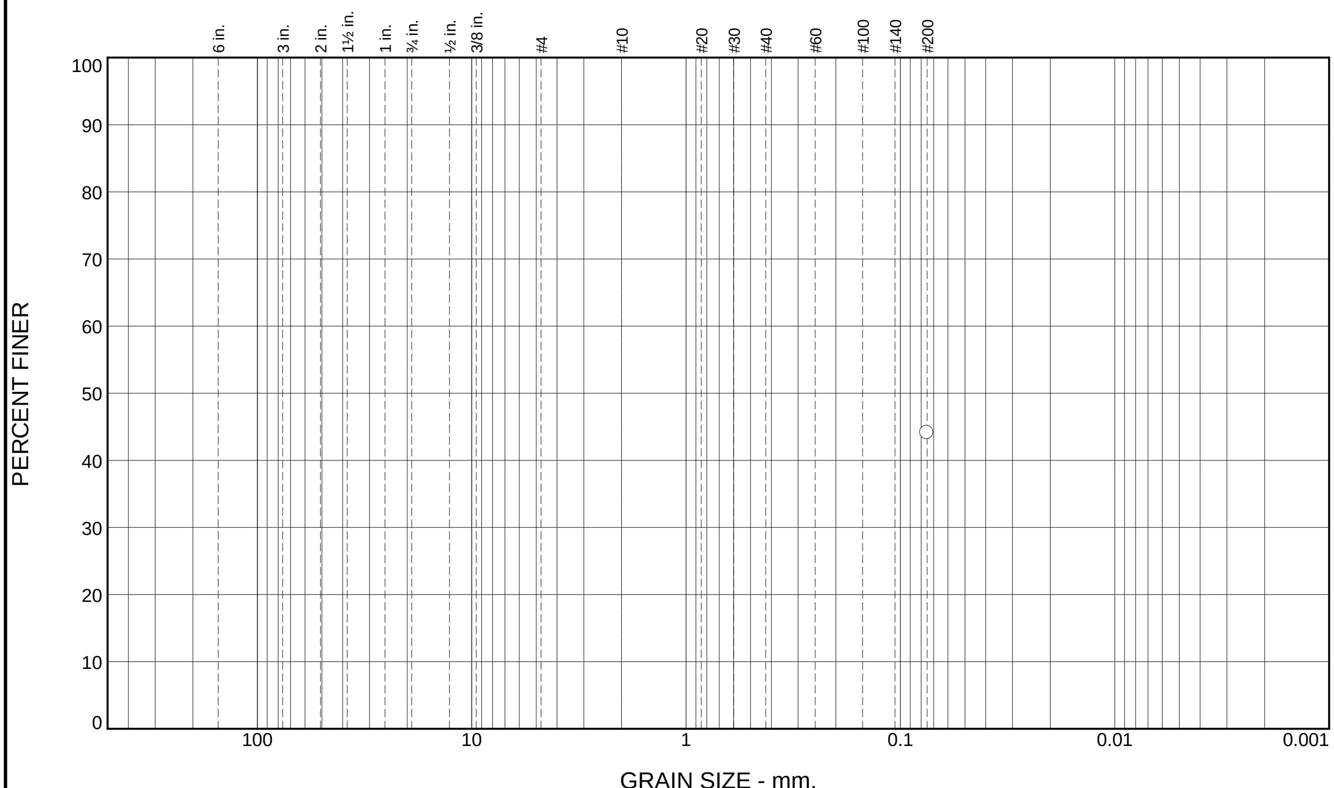
ENGEO INCORPORATED

Client: Shea Properties
Project: AT Dublin

Project No: 9429.001.000

Tested By: G. Criste **Checked By:** D. Seibold

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						44.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	44.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 22 LL= 22 PI= NP

Coefficients

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

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 2-B1 @ 20.5-21.5 **Depth:** 20.5-21.5 feet

Date: 12/28/17

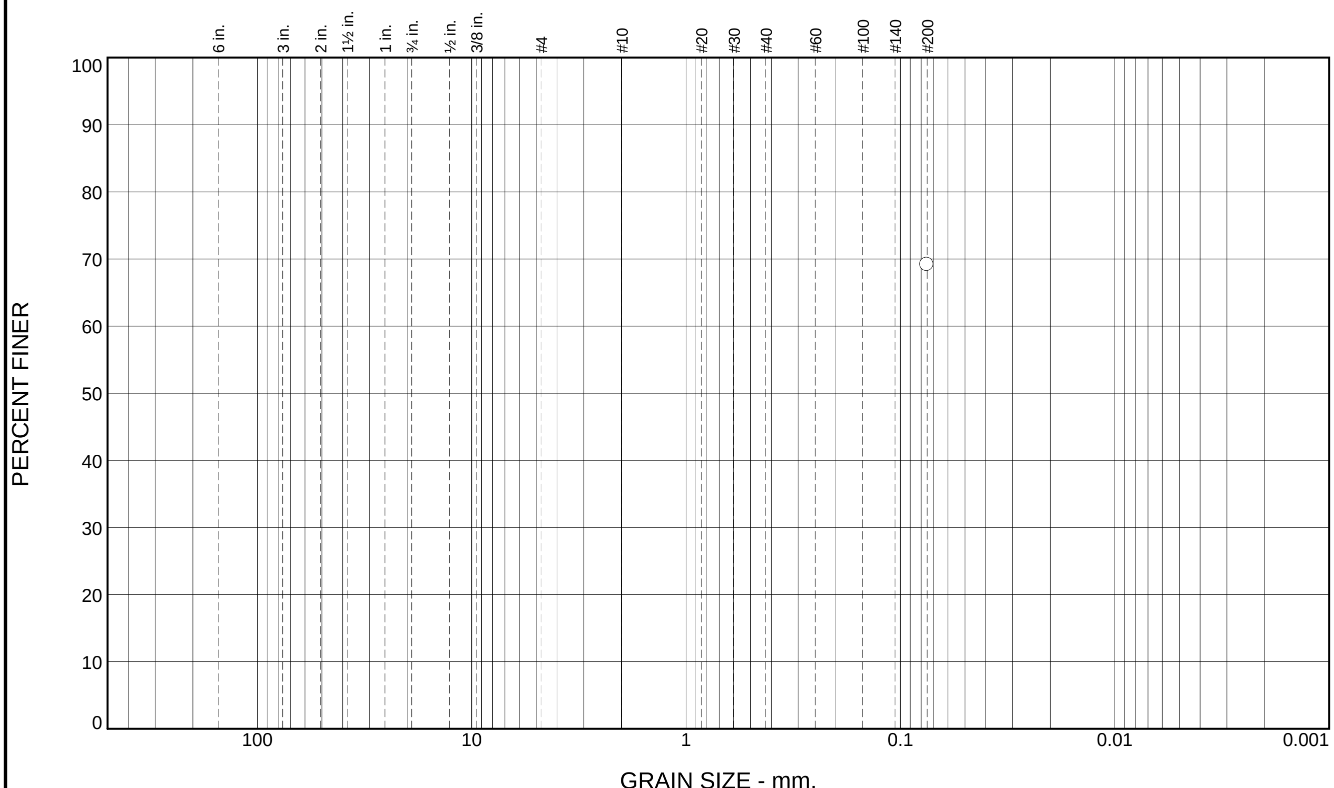
ENGEO INCORPORATED

Client: Shea Properties
Project: AT Dublin

Project No: 9429.001.000

Tested By: G. Criste **Checked By:** D. Seibold

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						69.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	69.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: 2-B2 @ 1.5-2.5 **Depth:** 1.5-2.5 feet

Date: 12/29/17

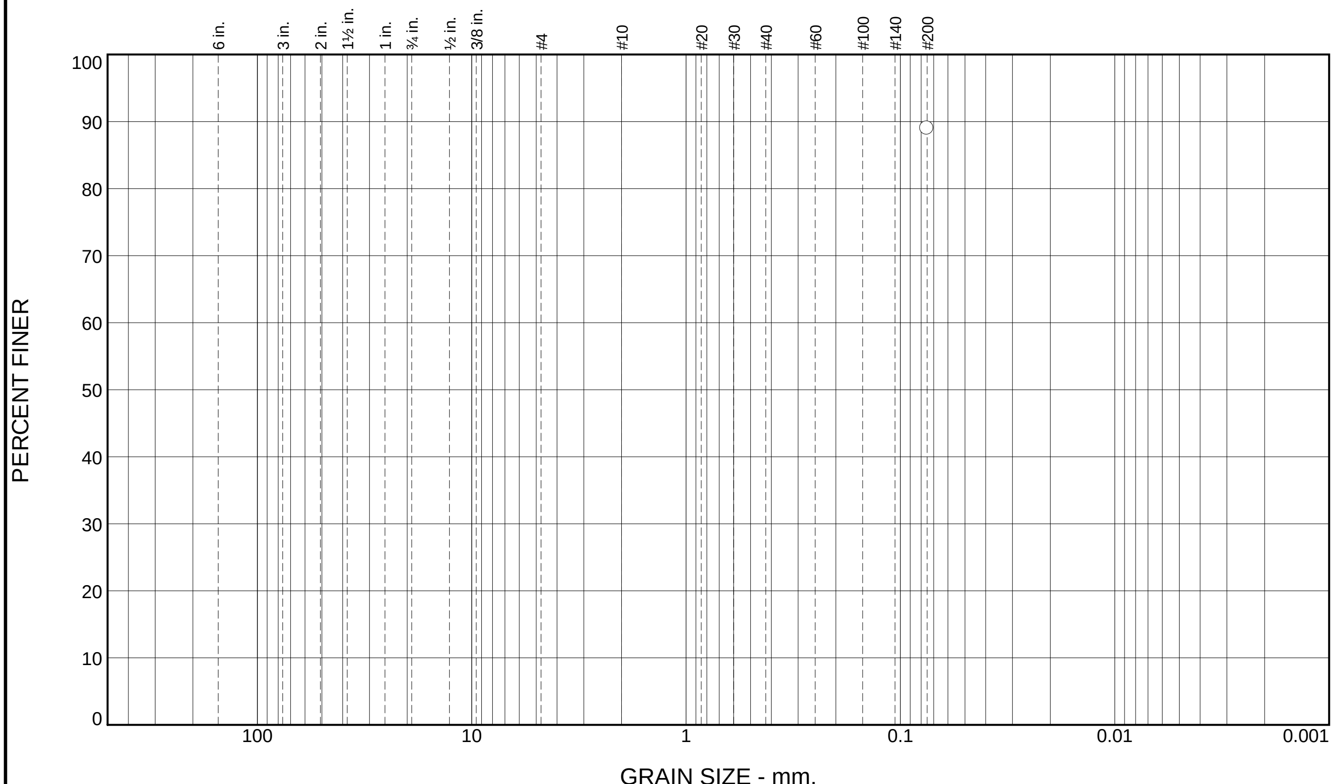
ENGEO INCORPORATED

Client: Shea Properties
Project: AT Dublin

Project No: 9429.001.000

Tested By: G. Criste **Checked By:** D. Seibold

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						89.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	89.0		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 2-B2 @ 15.5-16.5 **Depth:** 15.5-16.5 feet

Date: 12/28/17

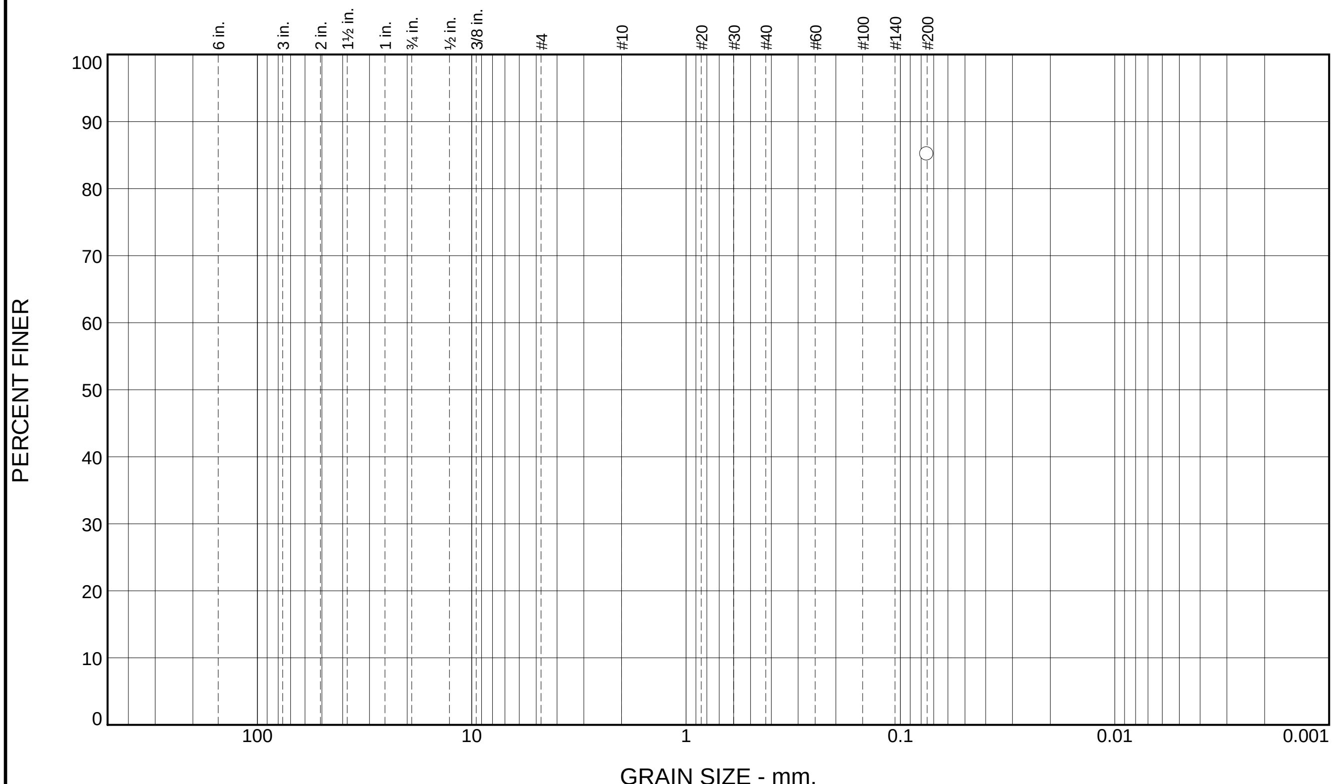
ENGEO INCORPORATED

Client: Shea Properties
Project: AT Dublin

Project No: 9429.001.000

Tested By: G. Criste **Checked By:** D. Seibold

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						85.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	85.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 17 LL= 42 PI= 25

Coefficients

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

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 2-B3 @ 10.5-11.5 **Depth:** 10.5-11.5 feet

Date: 12/29/17

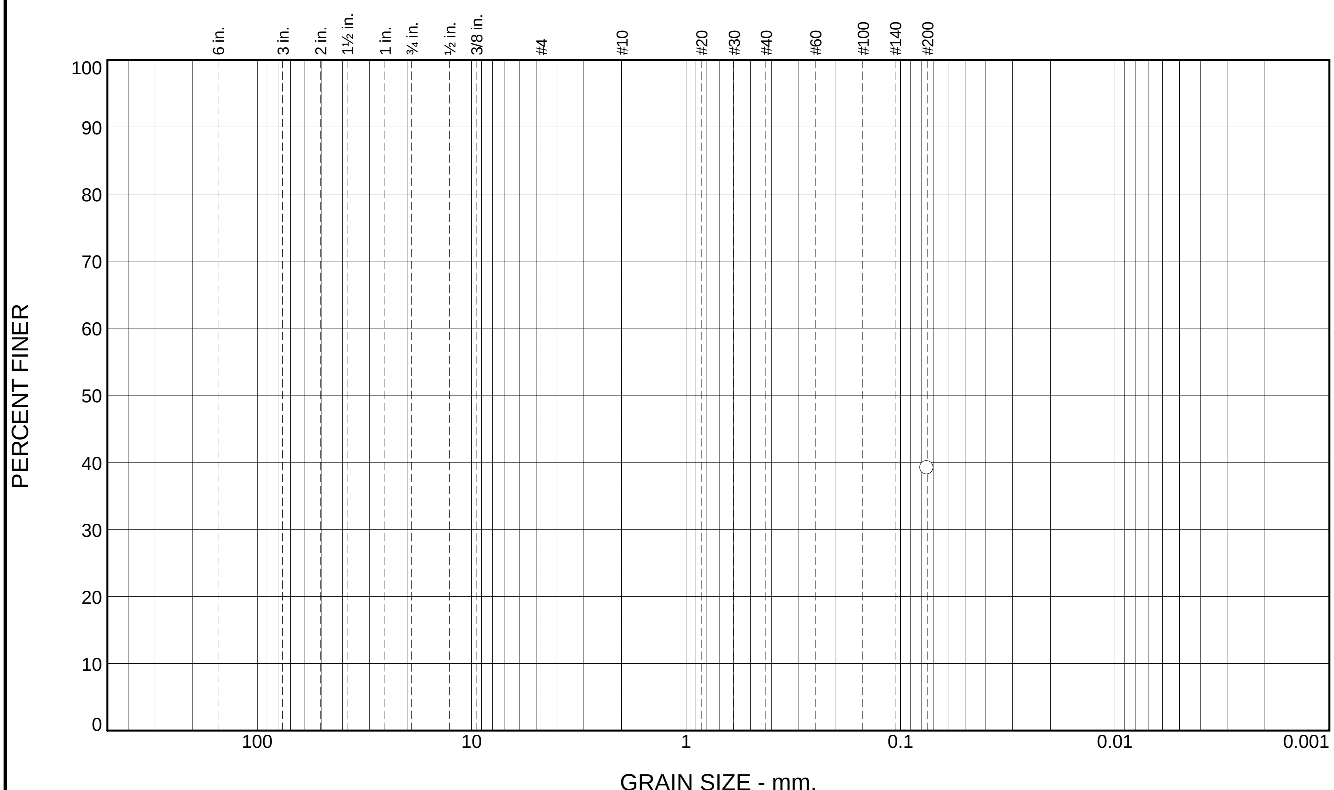
ENGEO INCORPORATED

Client: Shea Properties
Project: AT Dublin

Project No: 9429.001.000

Tested By: G. Criste **Checked By:** D. Seibold

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						39.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	39.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 2-B3 @ 20.5-21.5 **Depth:** 20.5-21.5 feet

Date: 12/29/17

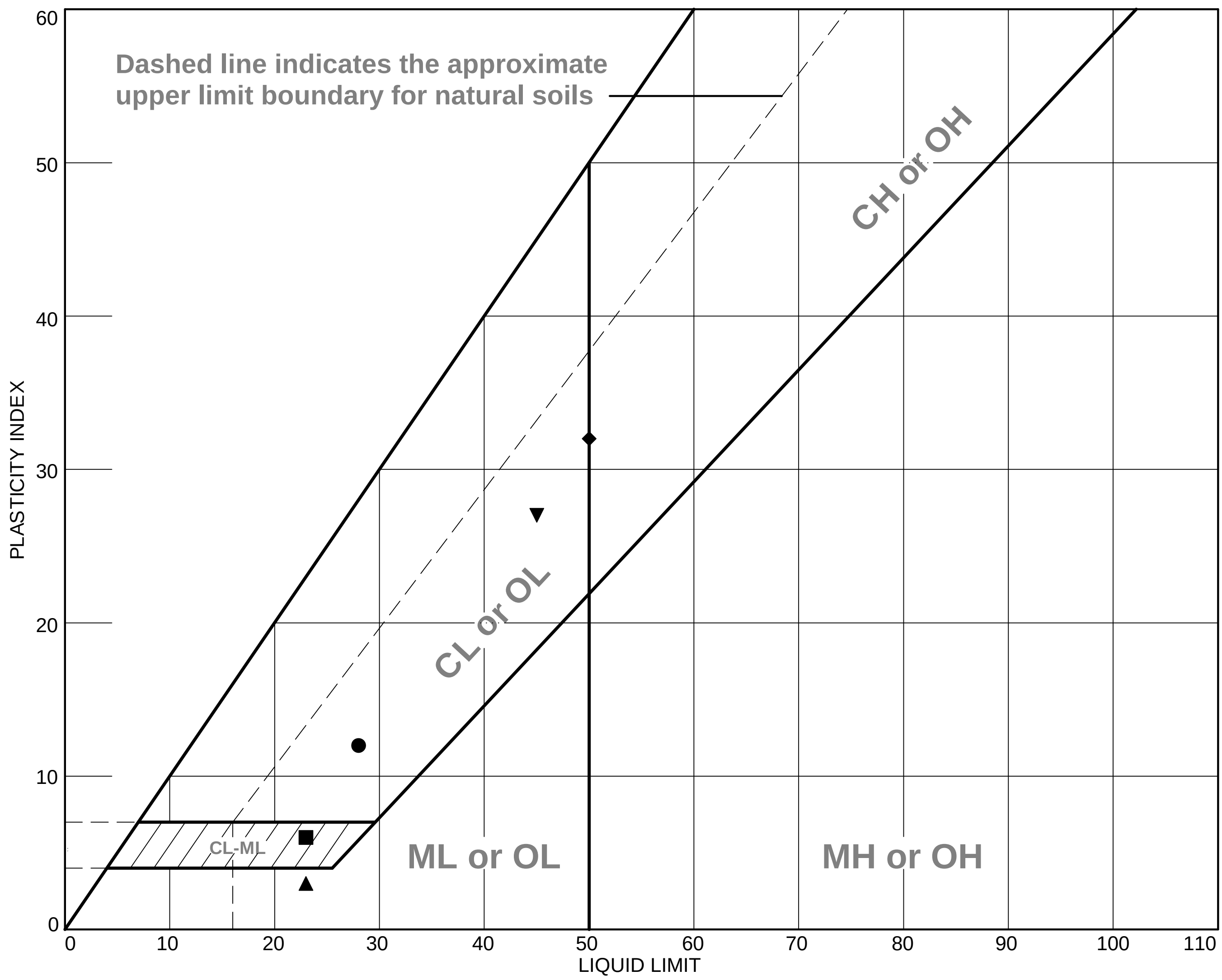
ENGEO INCORPORATED

Client: Shea Properties
Project: AT Dublin

Project No: 9429.001.000

Tested By: G. Criste **Checked By:** D. Seibold

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	28	16	12			
■	See exploration logs	23	17	6		73.7	
▲	See exploration logs	23	20	3			
◆	See exploration logs	50	18	32			
▼	See exploration logs	45	18	27			

Project No. 9429.000.000 **Client:** SummerHill Homes

Project: DiMarnto Property PGEX East Dublin

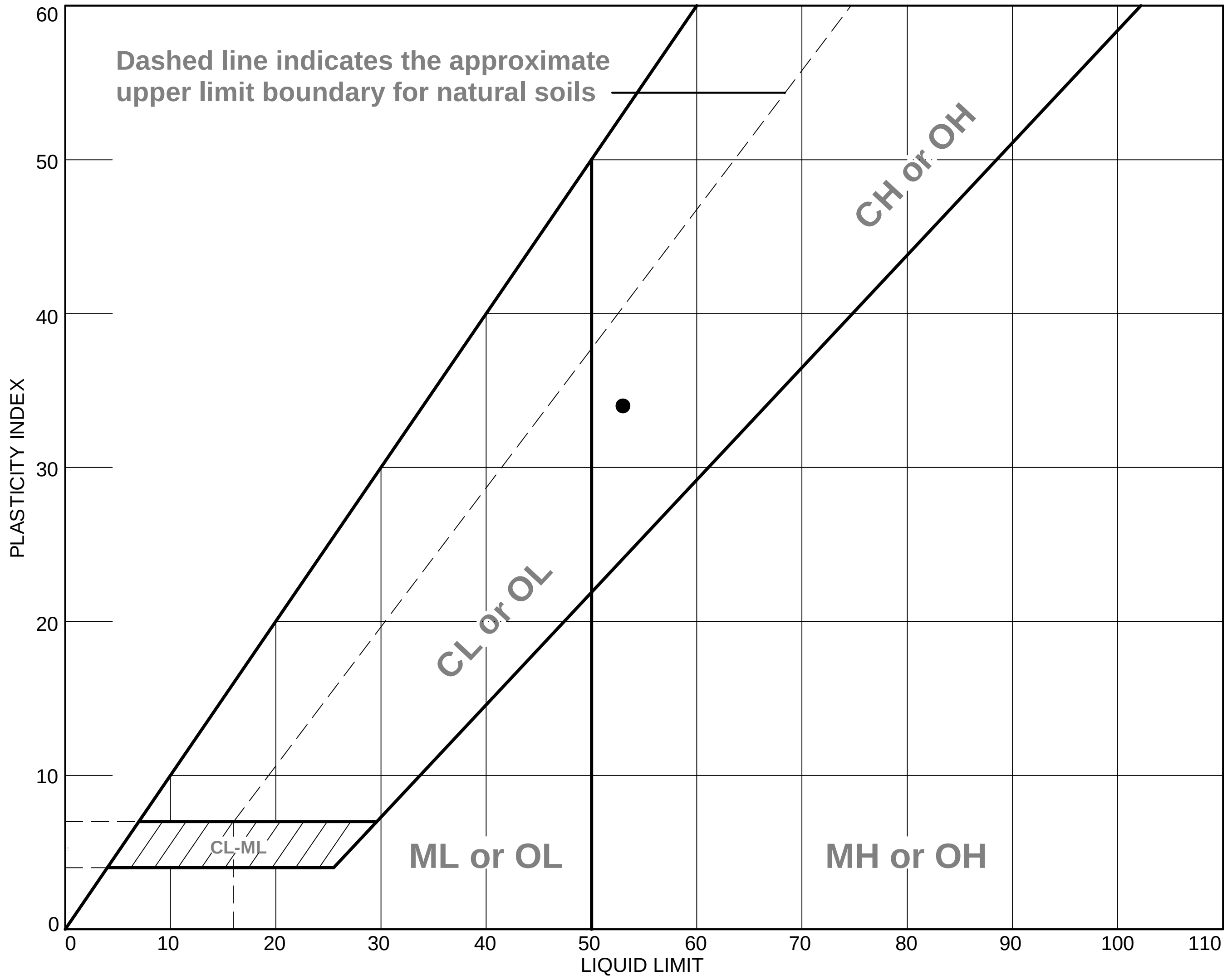
●**Depth:** 33.0 feet **Sample Number:** B6 @ 33
■**Depth:** 22.5 feet **Sample Number:** B2 @ 22.5
▲**Depth:** 13.0 feet **Sample Number:** B5 @ 13
◆**Depth:** 3.0 feet **Sample Number:** B6 @ 3
▼**Depth:** 6.0 feet **Sample Number:** B6 @ 6

ENGEO INCORPORATED

Remarks:
●ASTM D4318
■ASTM D4318
◆ASTM D4318
▼ASTM D4318

Tested By: ○AV □JL △AV ◇AV ▽AV **Checked By:** DS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	53	19	34			

Project No. 9429.000.000 **Client:** SummerHill Homes

Project: DiMarnto Property PGEX East Dublin

● **Depth:** 4.0 feet **Sample Number:** B7 @ 4

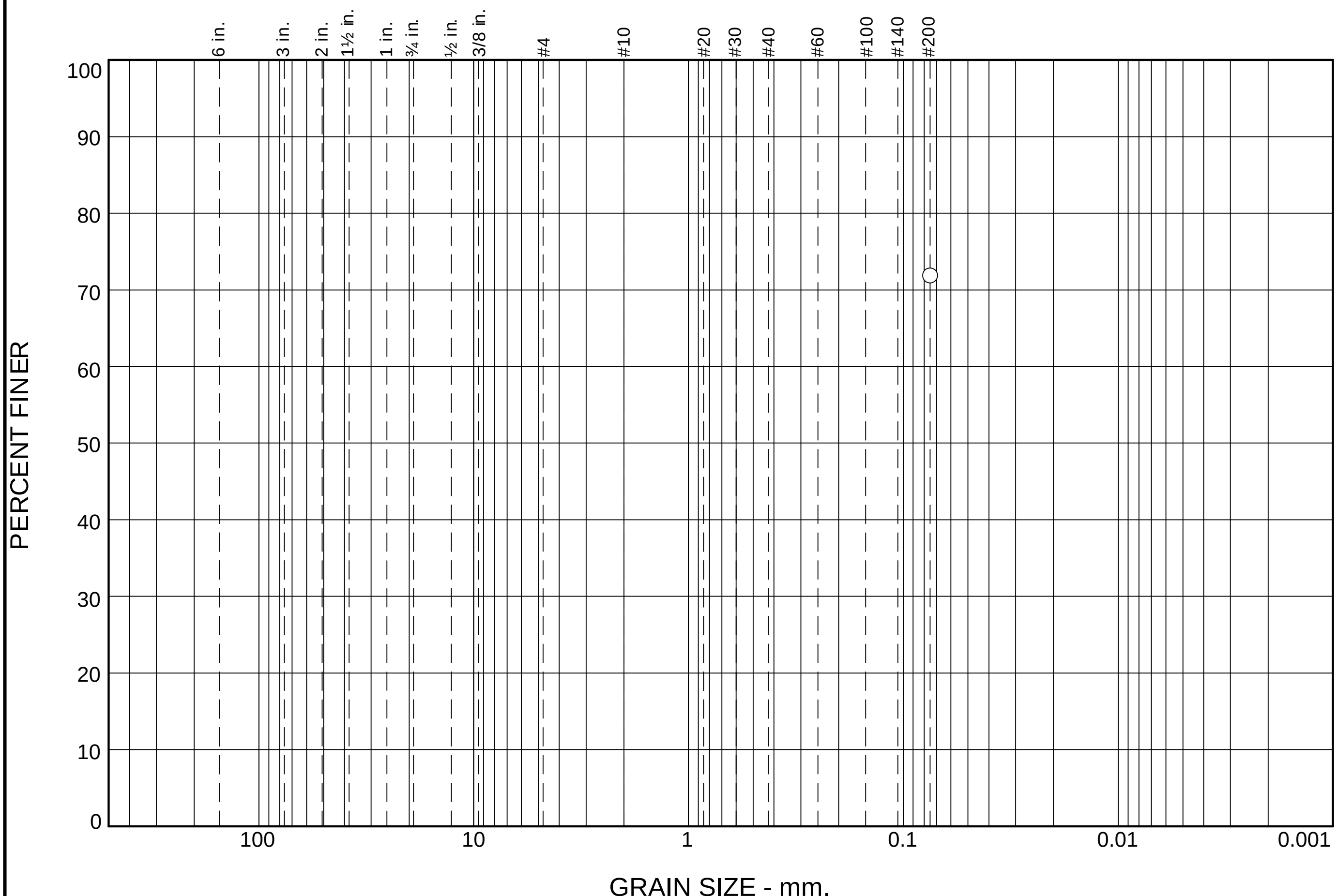
Remarks:

● ASTM D4318

ENGEO INCORPORATED

Tested By: AV **Checked By:** DS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						71.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	71.9		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: B1 @ 15.5 **Depth:** 15.5 Feet

Date: 2.15.13

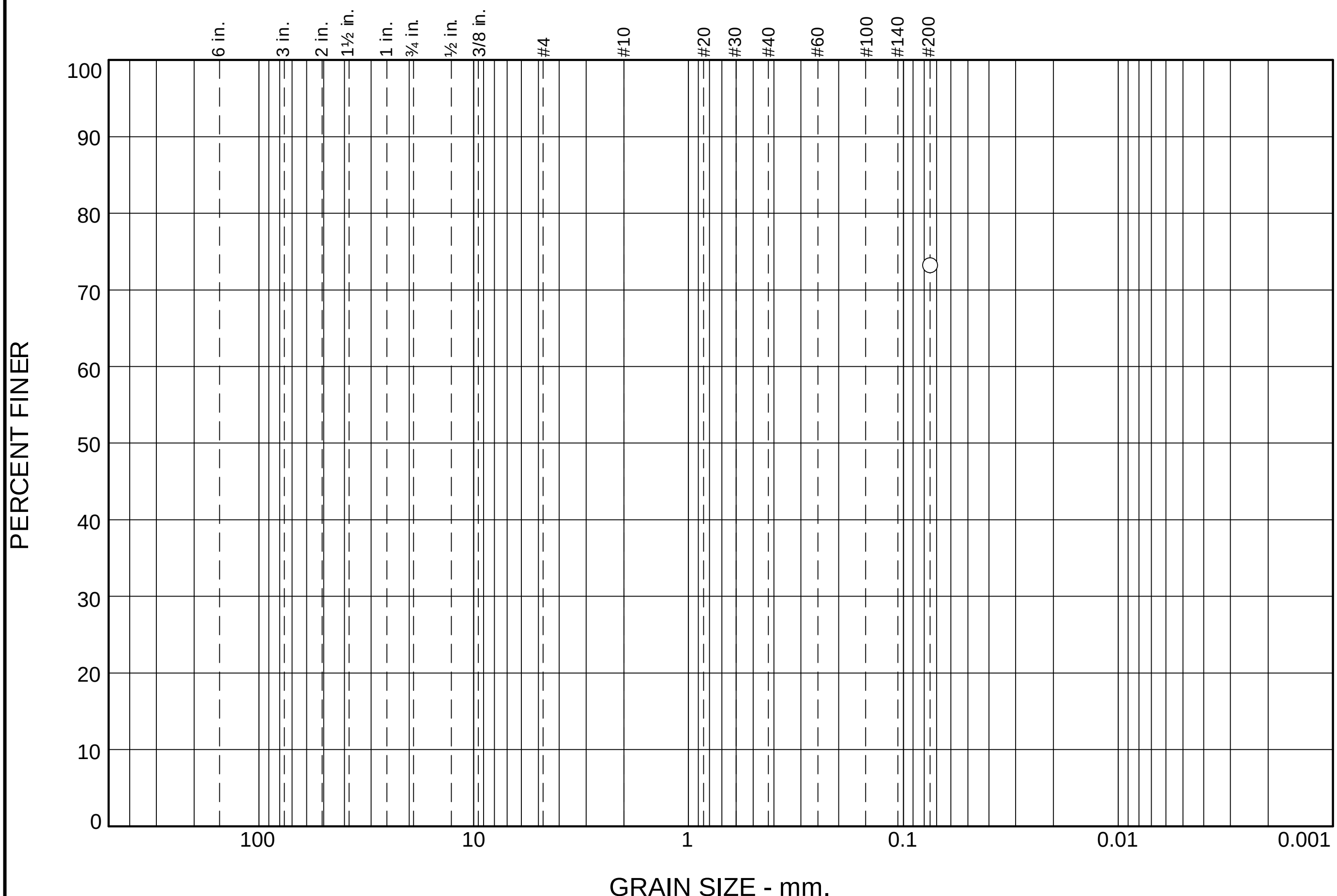
ENGEO INCORPORATED

Client: SummerHill Homes
Project: DiMarnto Property PGEX East Dublin

Project No: 9429.000.000

Tested By: AV **Checked By:** DS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						73.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	73.2		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: B1 @ 29 **Depth:** 29.0 feet

Date: 2.15.13

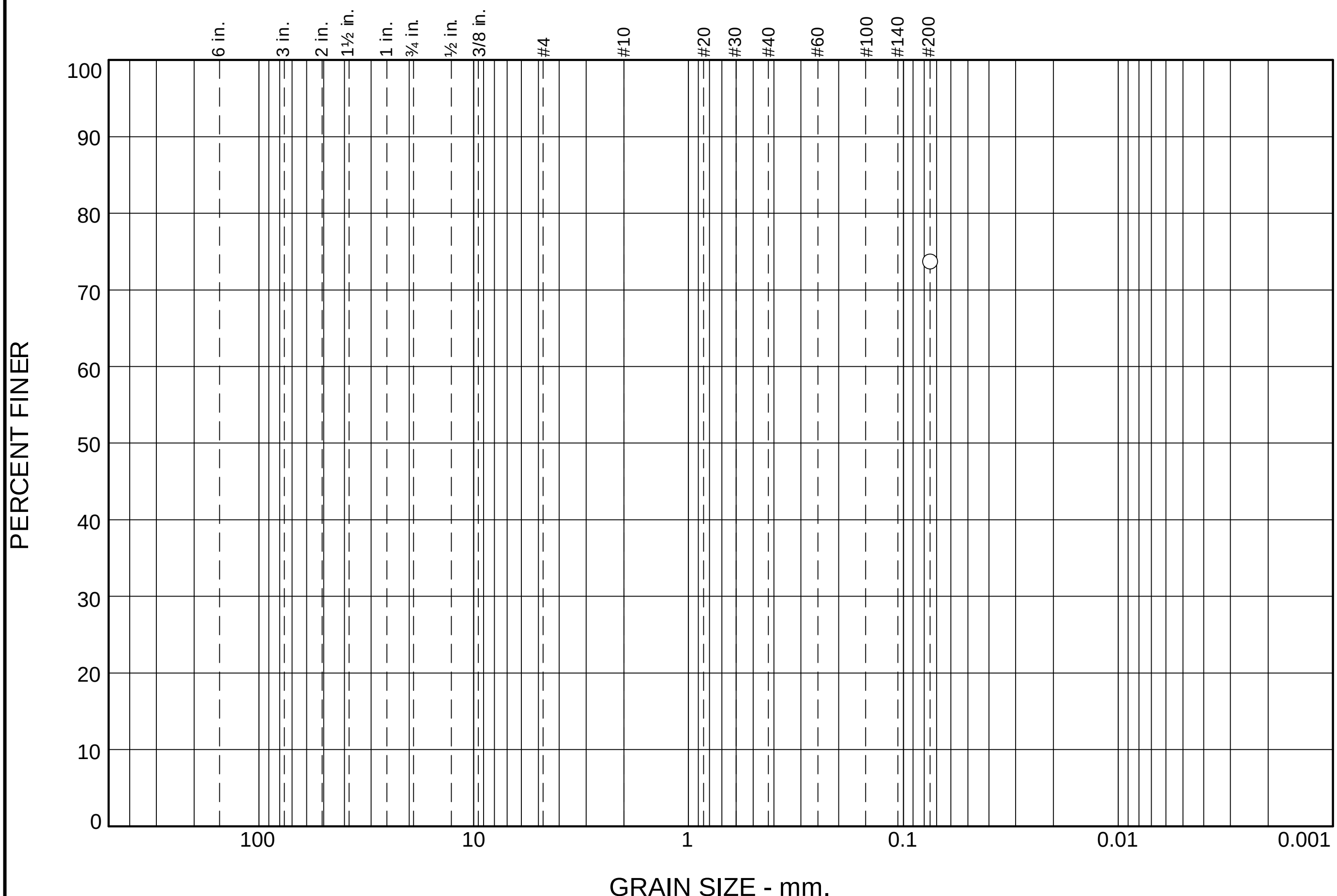
ENGEO INCORPORATED

Client: SummerHill Homes
Project: DiMarnto Property PGEX East Dublin

Project No: 9429.000.000

Tested By: AV **Checked By:** DS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						73.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	73.7		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: B2 @ 22.5 **Depth:** 22.5 feet

Date: 2.15.13

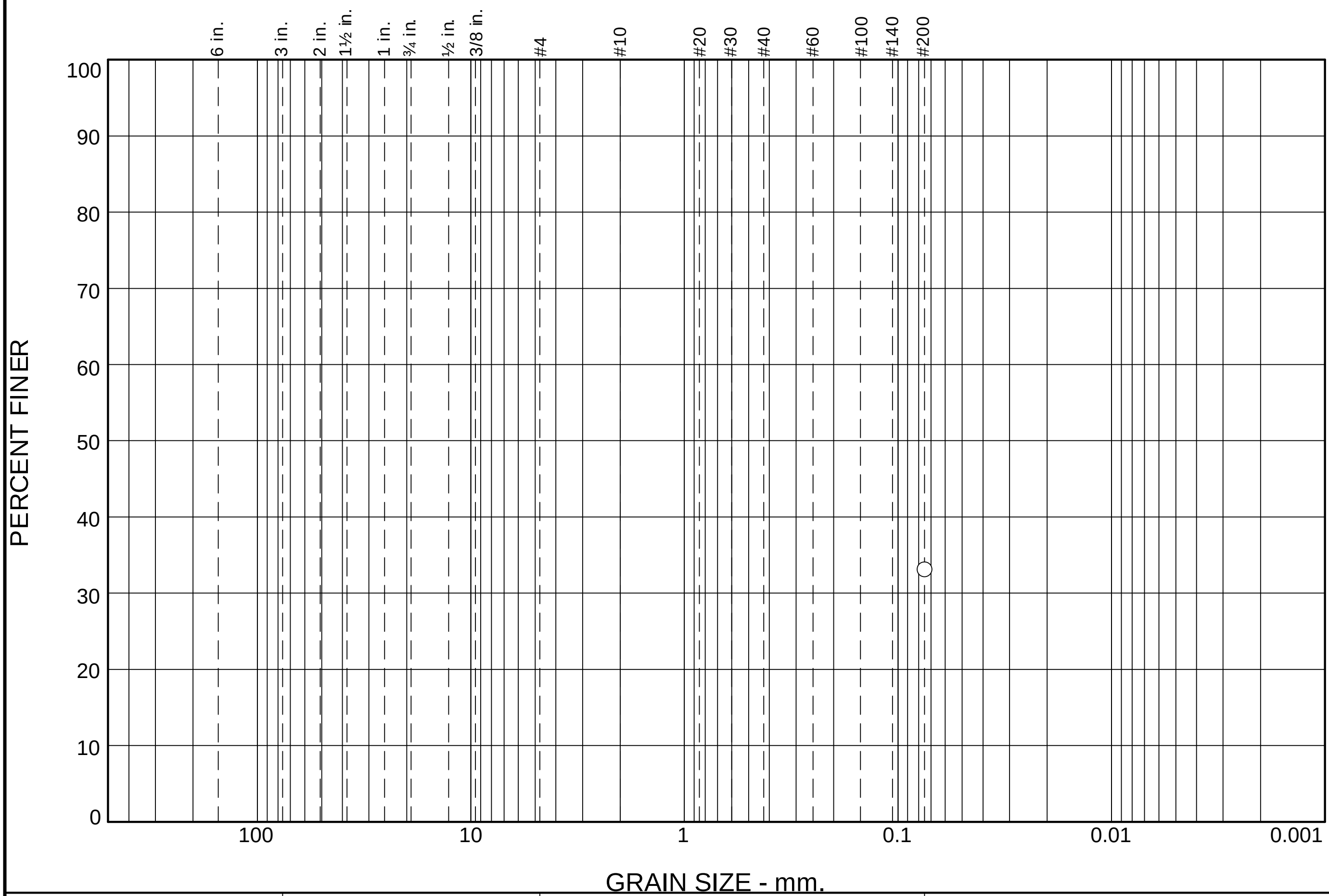
ENGEO INCORPORATED

Client: SummerHill Homes
Project: DiMarnto Property PGEX East Dublin

Project No: 9429.000.000

Tested By: AV **Checked By:** DS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						33.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	33.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: B4 @ 23 **Depth:** 23.0 feet

Date: 2.15.13

ENGEO INCORPORATED

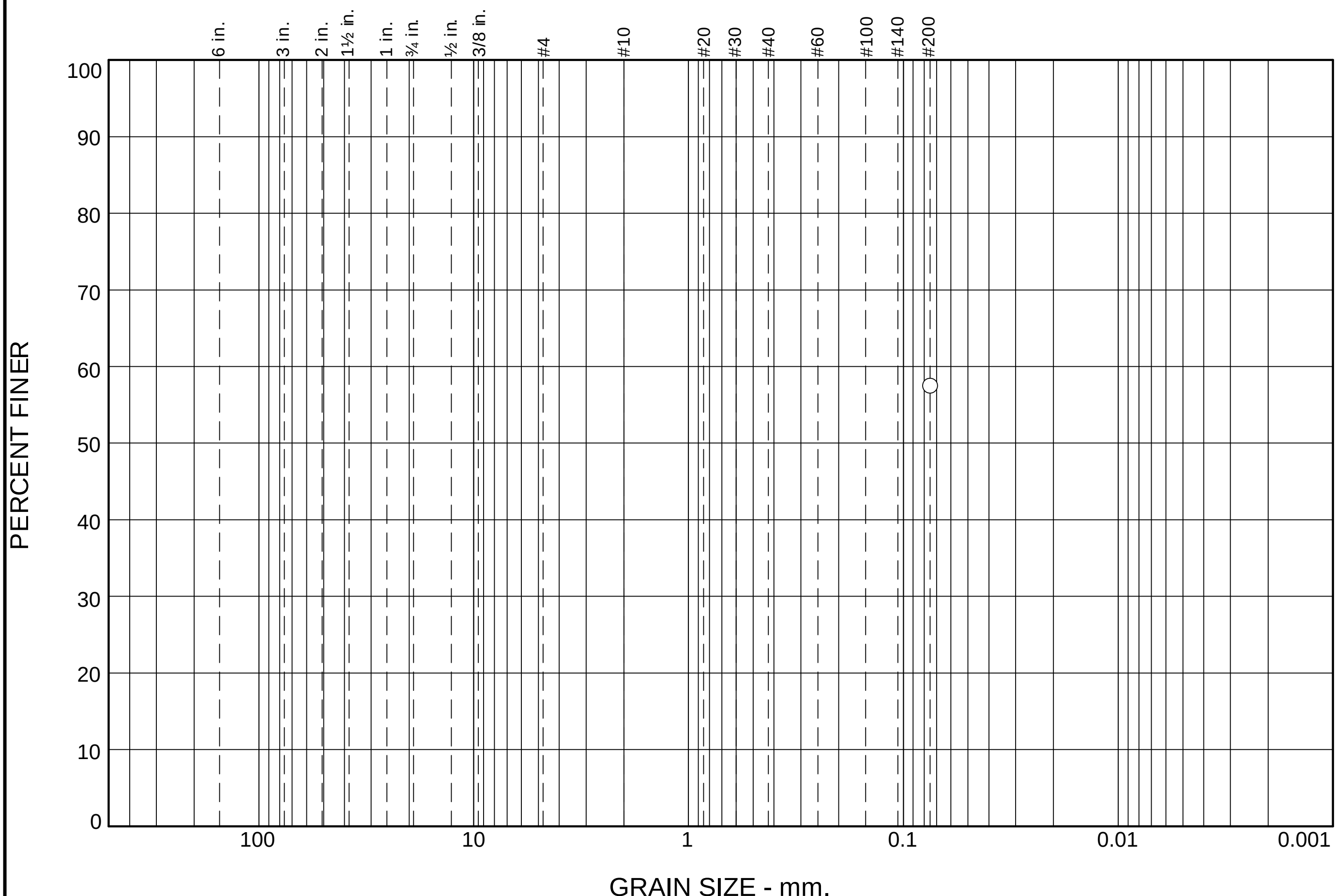
Client: SummerHill Homes

Project: DiMarnto Property PGEX East Dublin

Project No: 9429.000.000

Tested By: AV **Checked By:** DS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						57.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	57.5		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: B5 @ 23 **Depth:** 23.0 feet

Date: 2.15.13

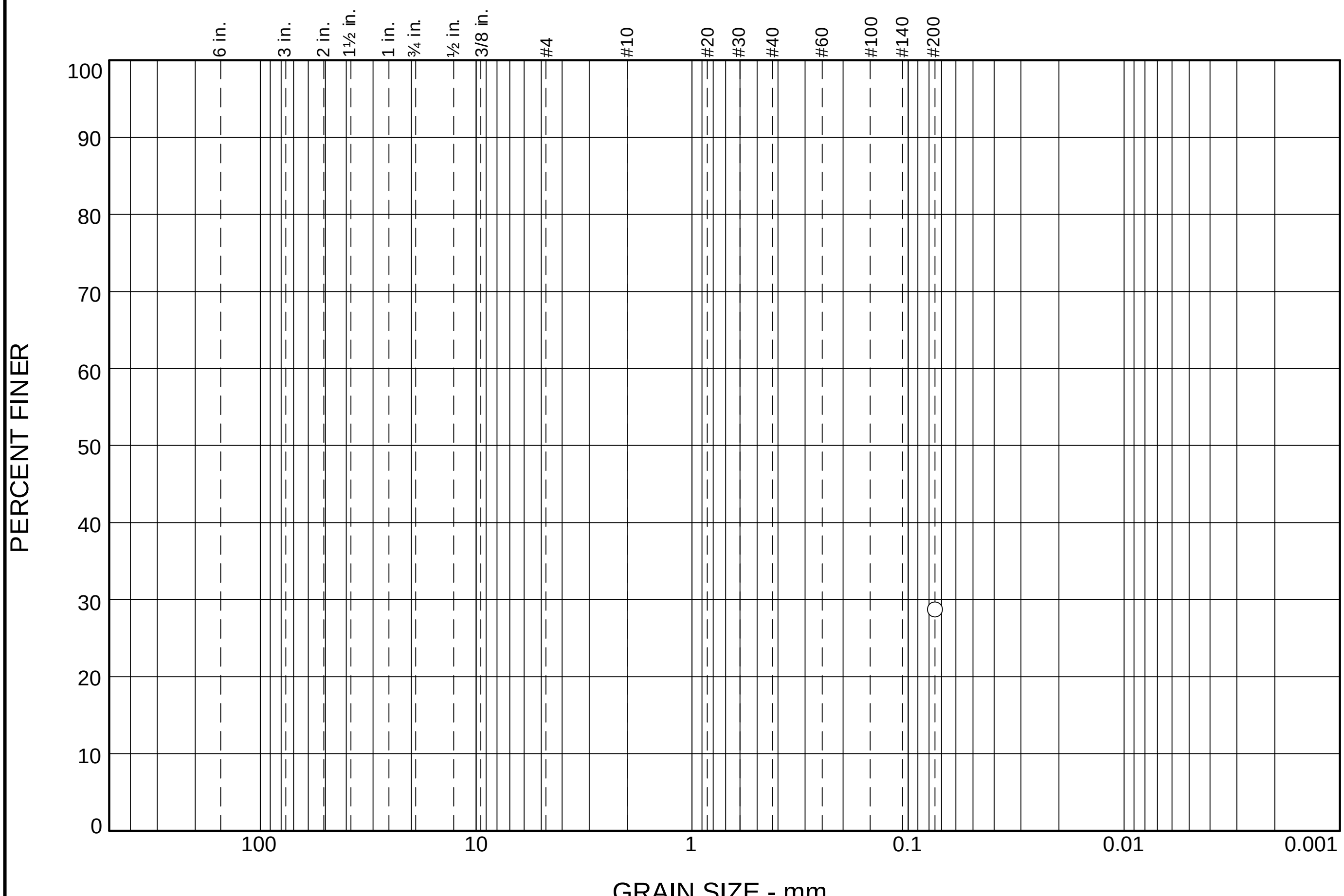
ENGEO INCORPORATED

Client: SummerHill Homes
Project: DiMarnto Property PGEX East Dublin

Project No: 9429.000.000

Tested By: AV **Checked By:** DS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						28.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	28.7		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

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

Classification

USCS= AASHTO=

Remarks

ASTM D1140

Sample Number: B6 @ 23 **Depth:** 23.0

Date: 2.15.13

ENGEO INCORPORATED

Client: SummerHill Homes
Project: DiMarnto Property PGEX East Dublin

Project No: 9429.000.000

Tested By: AV **Checked By:** DS

APPENDIX D

CORROSIVITY 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

28 December, 2017

Job No. 1712145
Cust. No. 10169

Mr. Spencer Waganaar
ENGEO Inc.
2010 Crow Canyon Place, Suite 250
San Ramon, CA 94583

Subject: Project No.: 9429.001.000
Project Name: SPT Sample at Dublin
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Waganaar:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on December 19, 2017. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, the sample is classified as "severely 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 120 mg/kg. Because the chloride ion concentration is less than 300 mg/kg, it is determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentration is 19 mg/kg and is determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soil is 8.51, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 390-mV which is indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control 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.

for

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: ENGEO Incorporated
Client's Project No.: 9429.001.000
Client's Project Name: SPT Sample at Dublin
Date Sampled: 13-Dec-17
Date Received: 19-Dec-17
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 28-Dec-2017

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1712145-001	2-B01 @ 1'	390	8.51	-	370	-	120	19

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
	27-Dec-2017	20-Dec-2017	-	20-Dec-2017	-	22-Dec-2017	22-Dec-2017

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

1T 12475

Chain of Custody

Concord, CA 94520-1006
925 462 2771
Fax: 925 462 2775
CERCO analytical

Job No.	CU#	Client Project I.D.	Schedule / Analyte	Date Sampled	Date Due
9429.001.000	10169	AT Dublin			1/05/2017

Full Name Spencer Waganaar-ENGEO, Inc.

Phone (925) 866-9000 X

Fax

Company and/or Mailing Address 2010 Crow Canyon Place Suite 250 San Ramon, CA 94582

Cell ☒

Sample Source SPT Sample

Lab No.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qty.	Redox Potential	pH	Sulfate	Chloride	Resistivity-100% Saturated			Brief Evaluation						
1	2-B01 @ 1'	12/13/2017	AM	Soil	Baggie		None	1	X	X	X	X	X			X						

ANALYSIS — ASTM

MATRIX
DW - Drinking Water
GW - Ground Water
SW - Surface Water
WW - Waste Water
Water
SL - Sludge
S - Soil
Product

ABBREVIATIONS
HB - Hosebib
PV - Petcock Valve
PT - Pressure Tank
PH - Pump House
RR - Restroom
GL - Glass
PL - Plastic
ST - Sterile

SAMPLE RECEIPT
Total No. of Containers
Rec'd Good Cond/Cold
Conforms to Record
Temp. a t Lab -°C
Sampler

		Date	Time
Relinquished By:	Spencer Wag	12/19/17	12:59
Received By:	[signature]	12/19/17	1256
Relinquished By:			
Received By:			
Relinquished By:			
Received By:			

Comments:

THERE IS AN ADDITIONAL CHARGE FOR EXTRUDING SOIL FROM METAL TUBES

Email Address: SWaganaar@engeo.com

APPENDIX E

LIQUEFACTION ANALYSIS

ENGEO Incorporated
2010 Crow Canyon Place, Suite 250
San Ramon, California
www.engeo.com

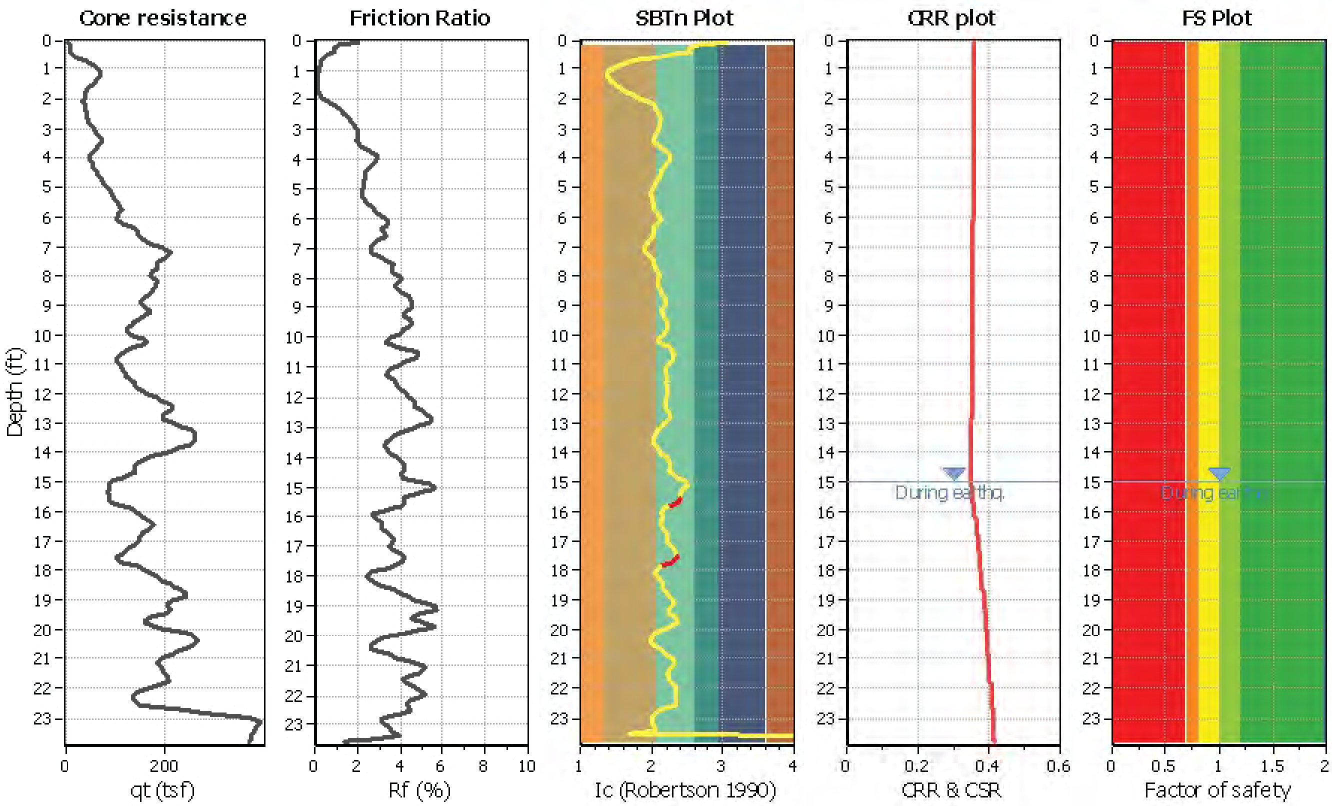
LIQUEFACTION ANALYSIS REPORT

Project title : AT Dublin **Location : Dublin, California**

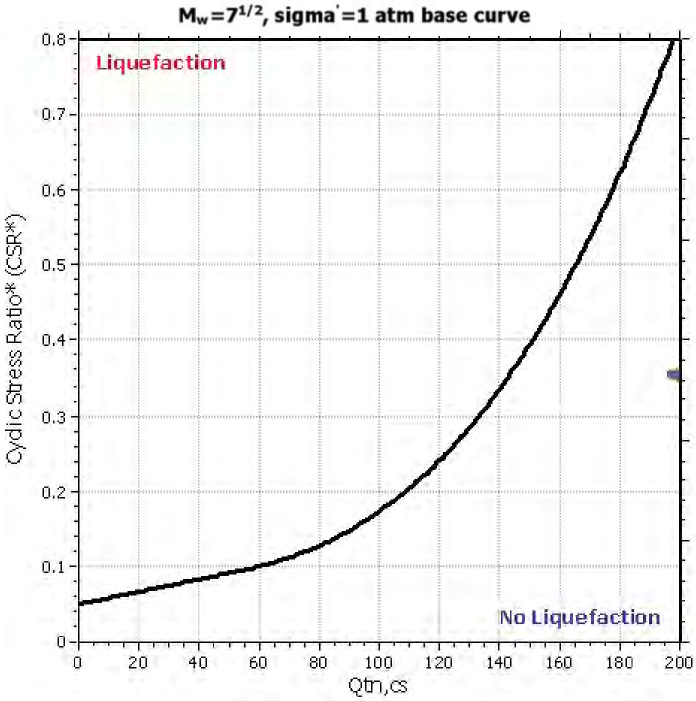
CPT file : 2-CPT01

Input parameters and analysis data

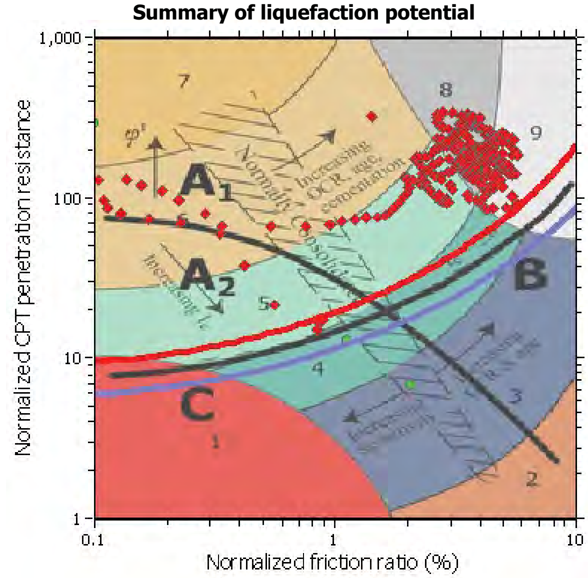
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		



M_w=7$^{1/2}$, sigma'=1 atm base curve

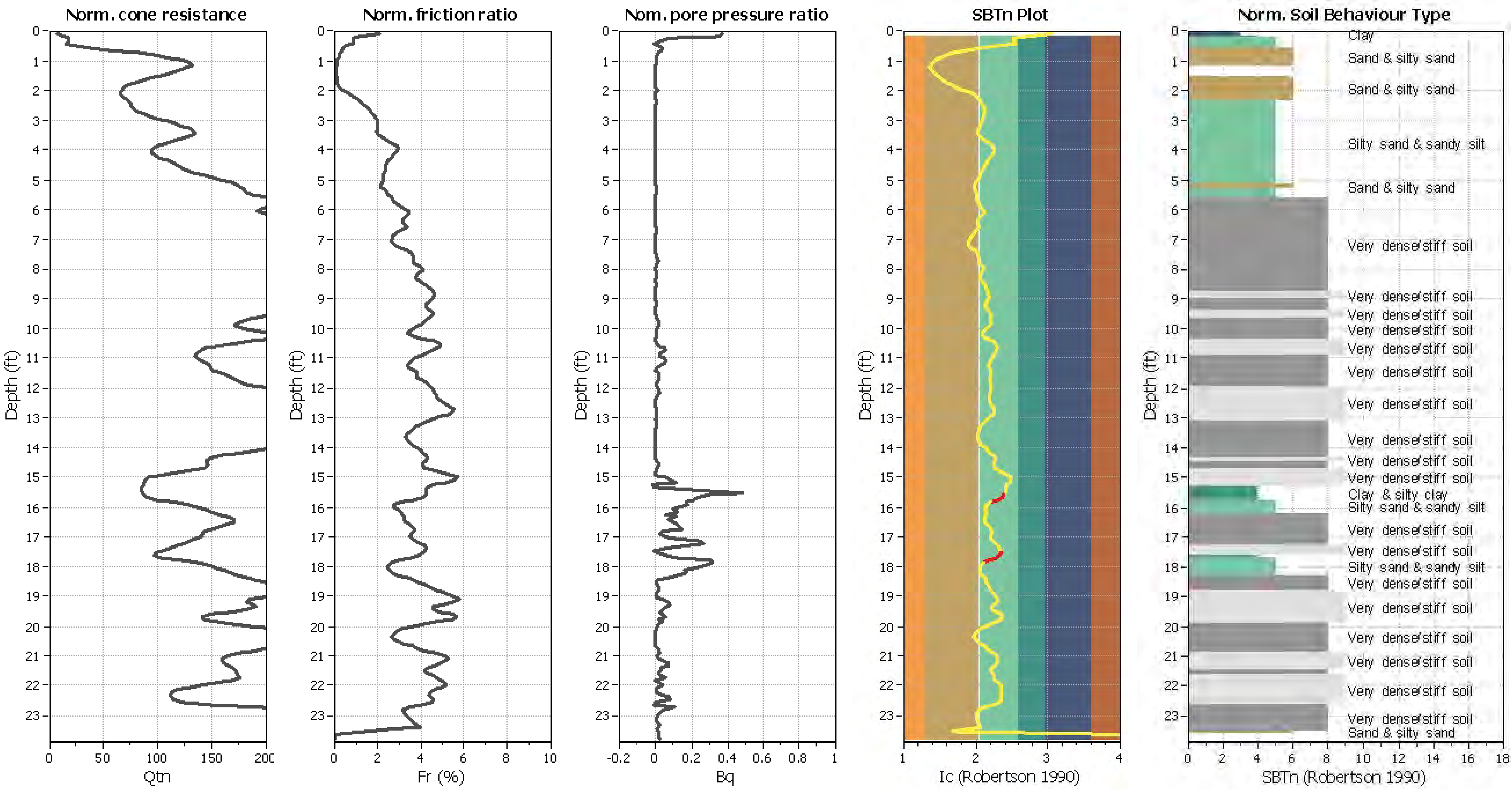


Summary of liquefaction potential



Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



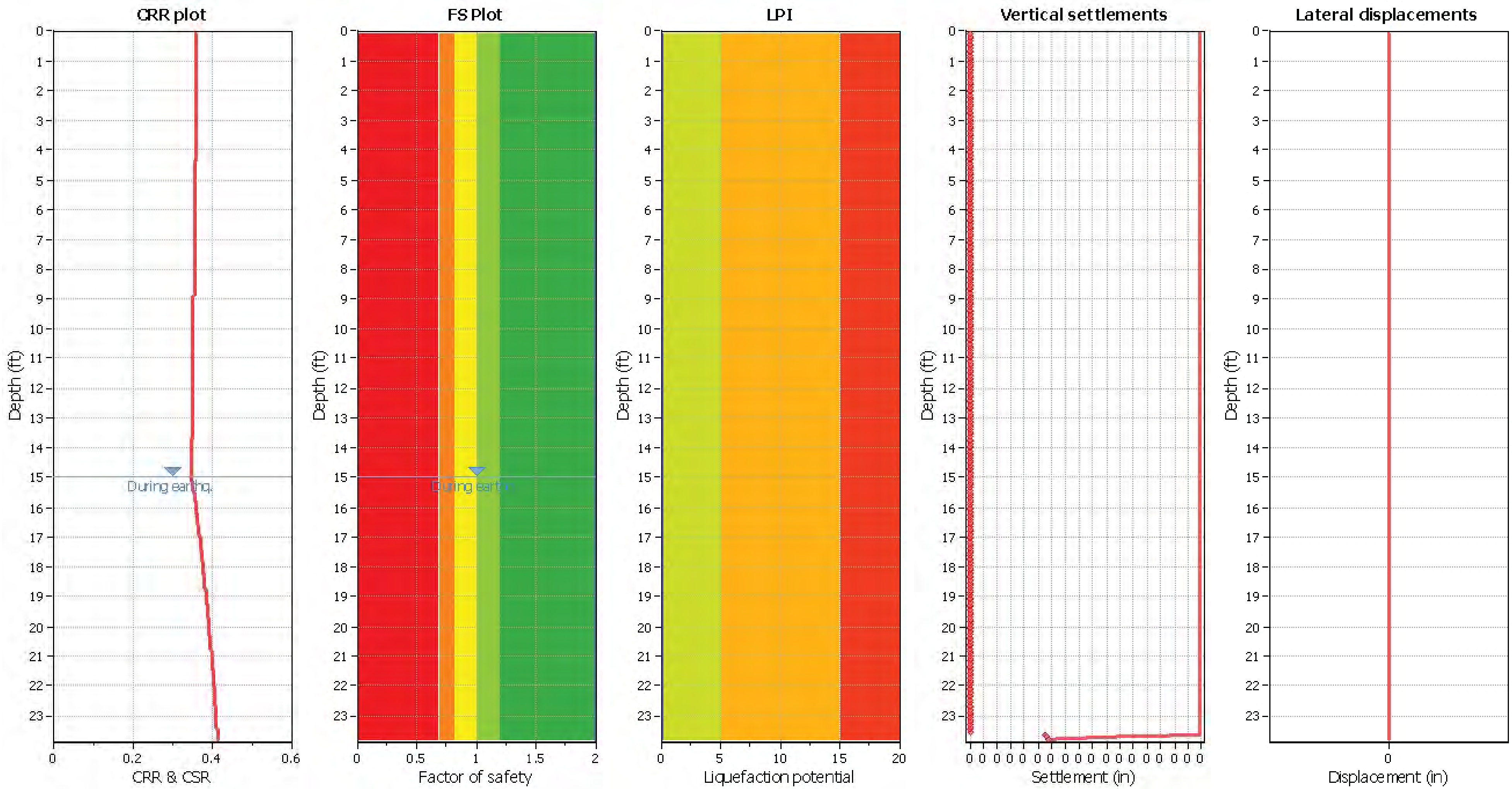
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

ENGEO Incorporated
2010 Crow Canyon Place, Suite 250
San Ramon, California
www.engeo.com

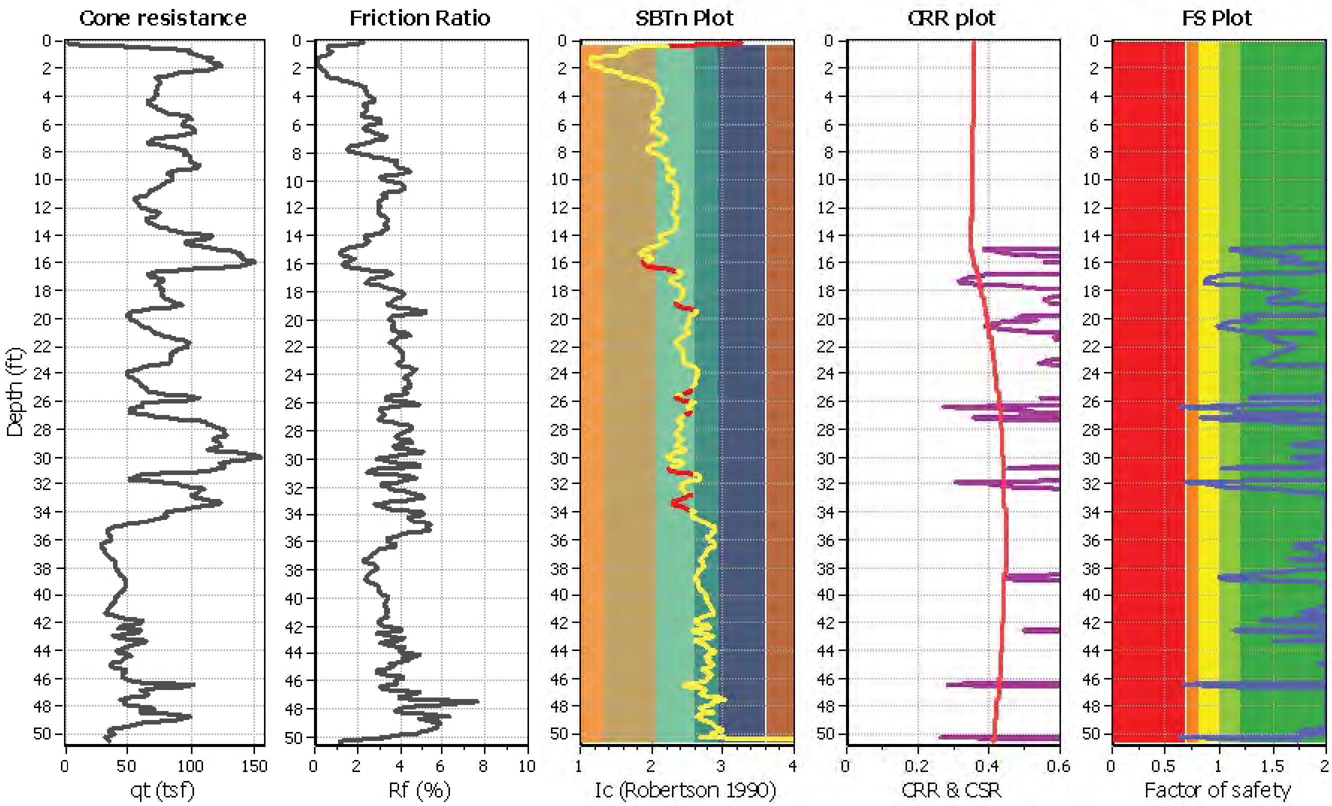
LIQUEFACTION ANALYSIS REPORT

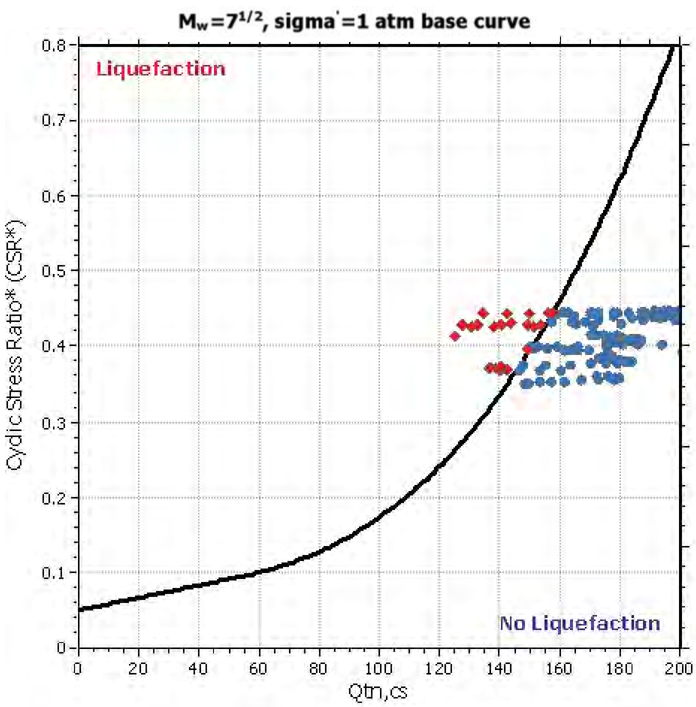
Project title : AT Dublin **Location : Dublin, California**

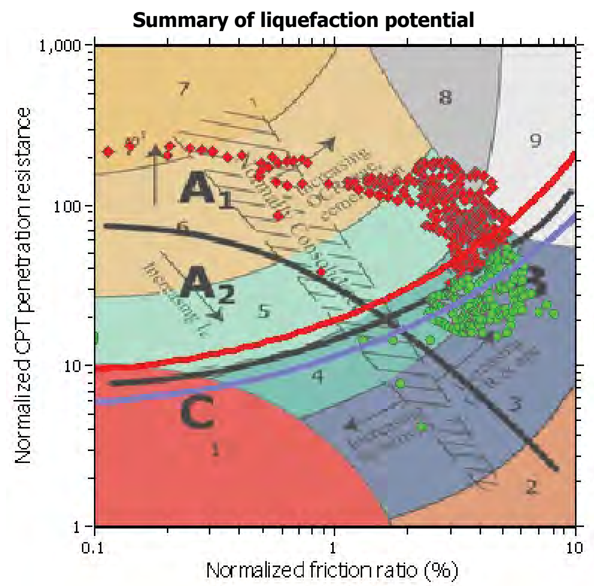
CPT file : 2-CPT02

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	0.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	0.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

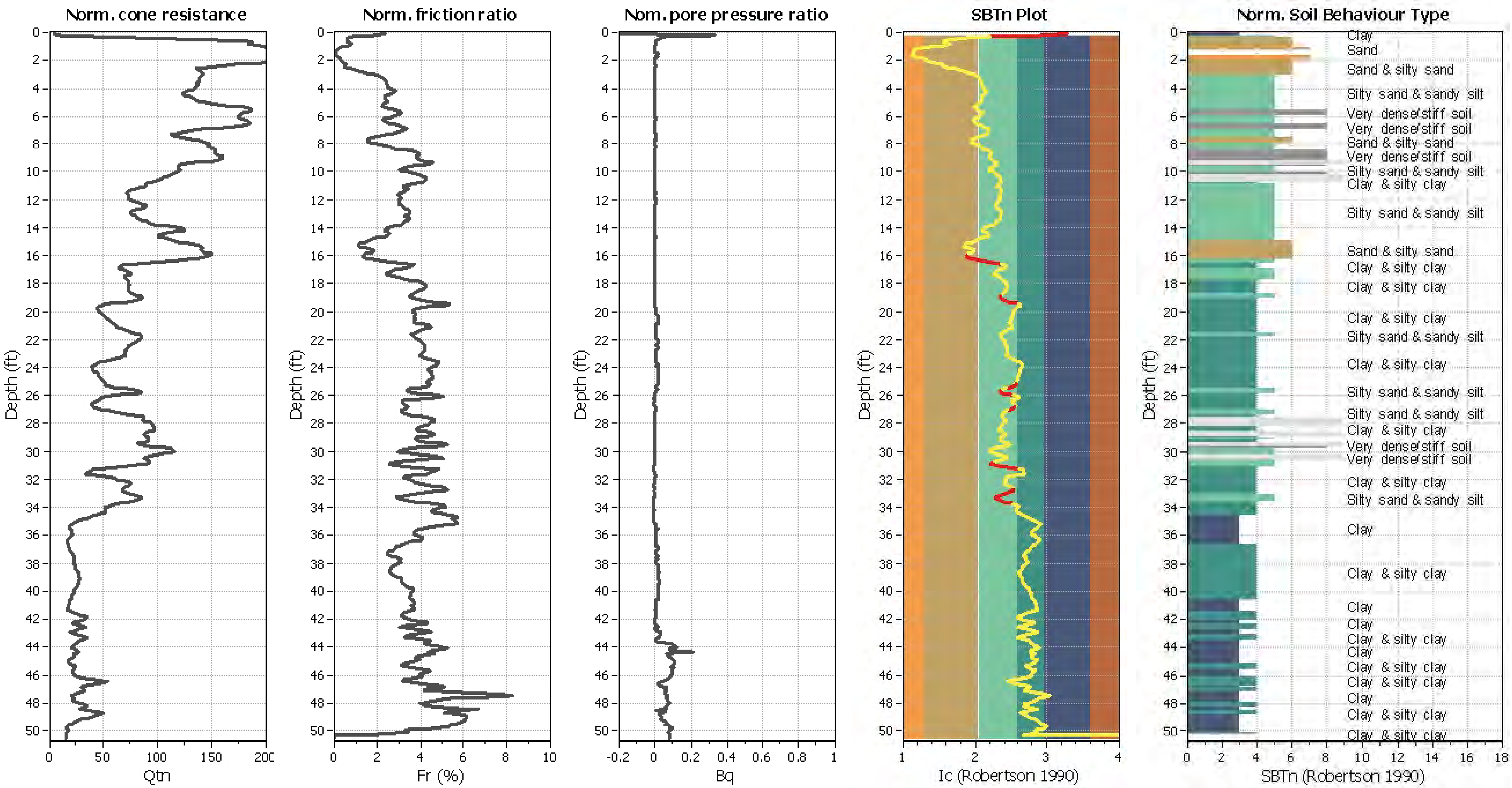






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



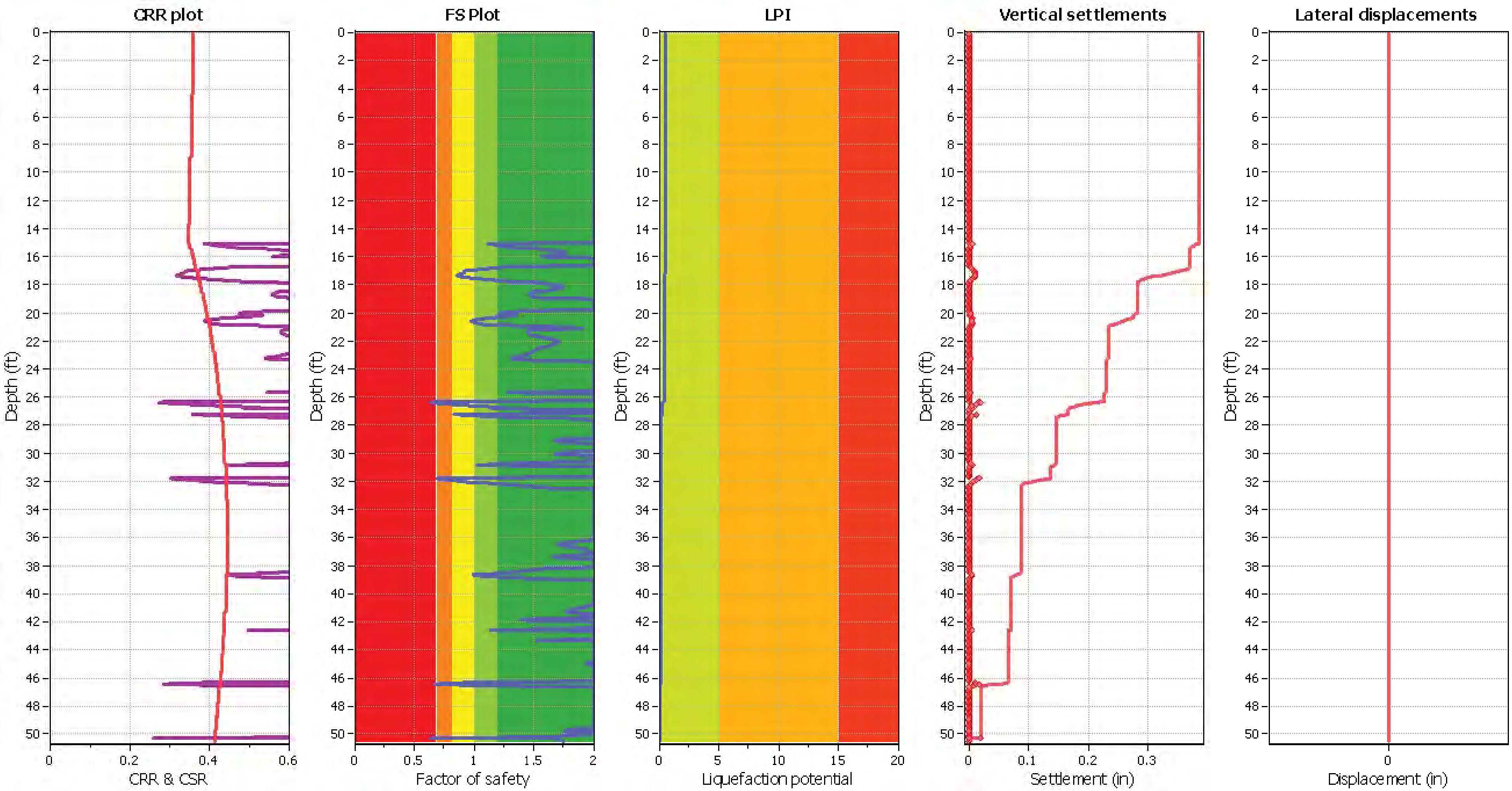
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	0.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	0.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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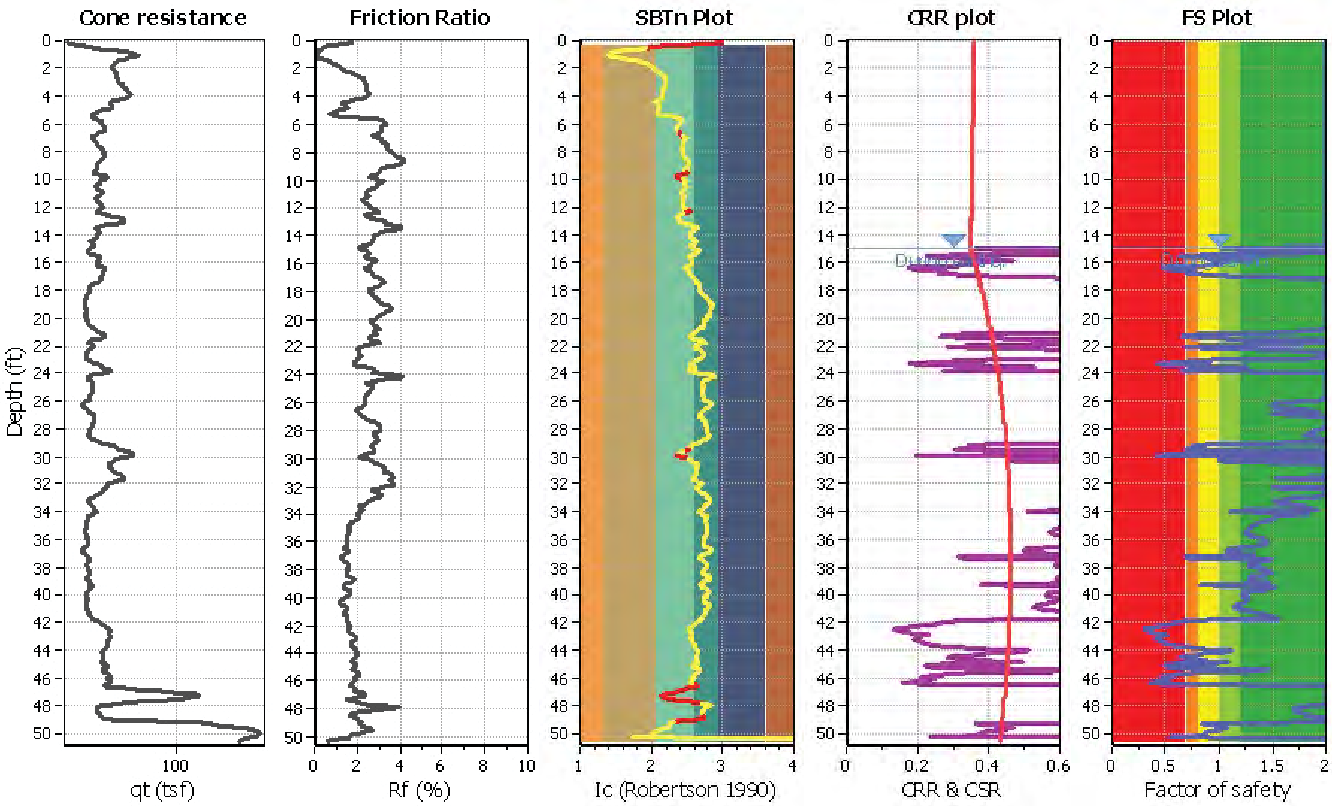
LIQUEFACTION ANALYSIS REPORT

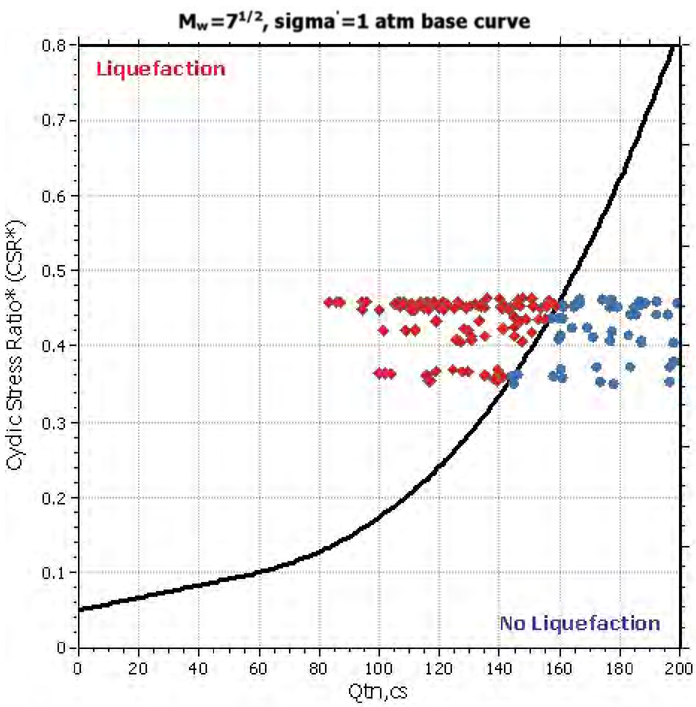
Project title : AT Dublin **Location : Dublin, California**

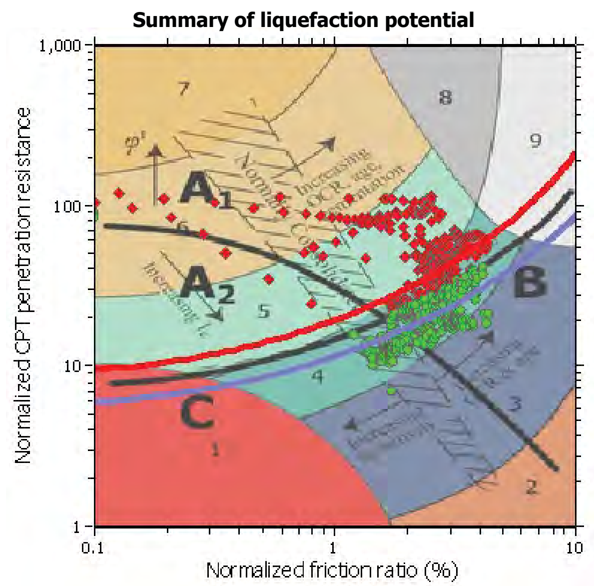
CPT file : 2-CPT03

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

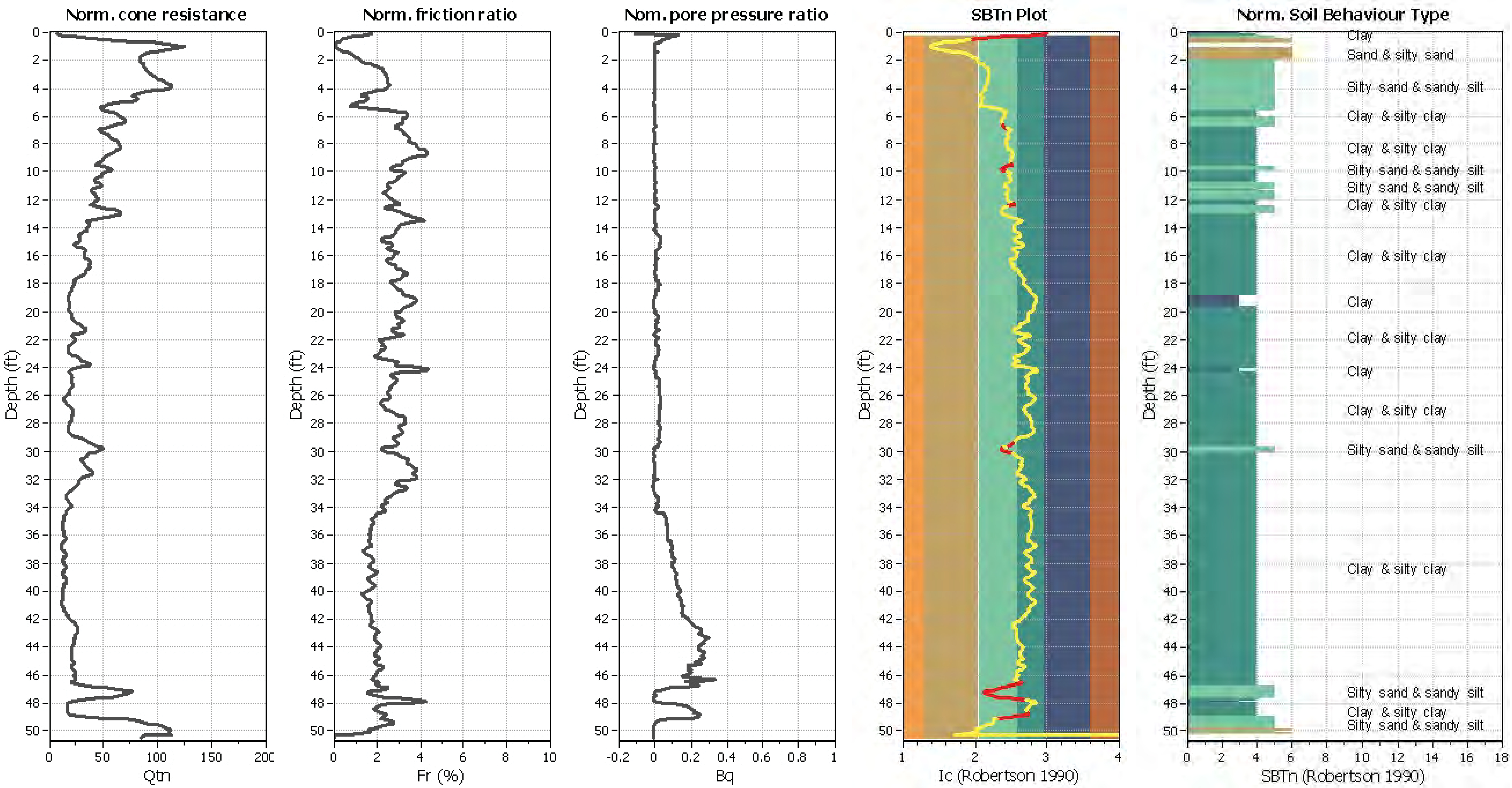






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



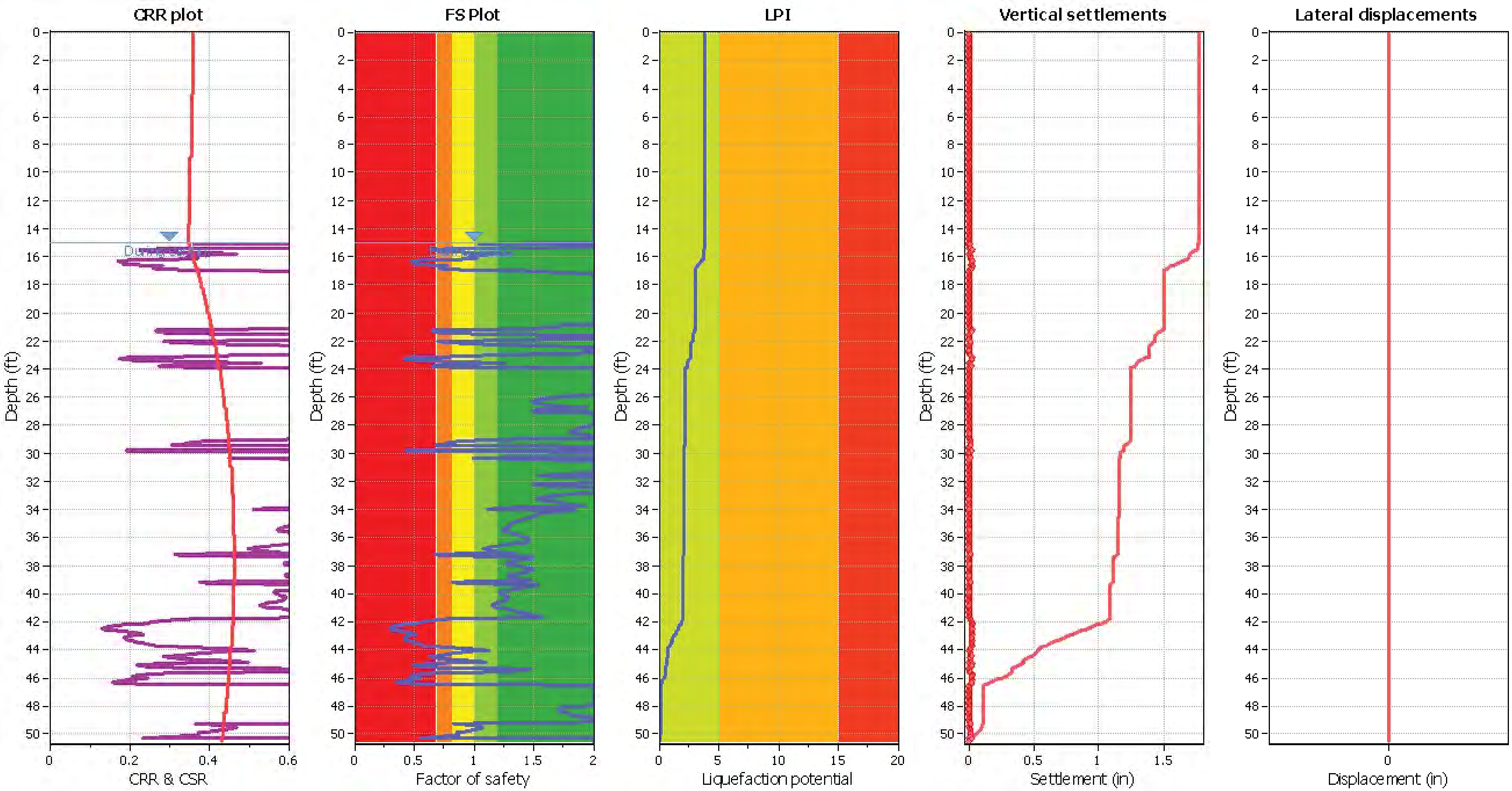
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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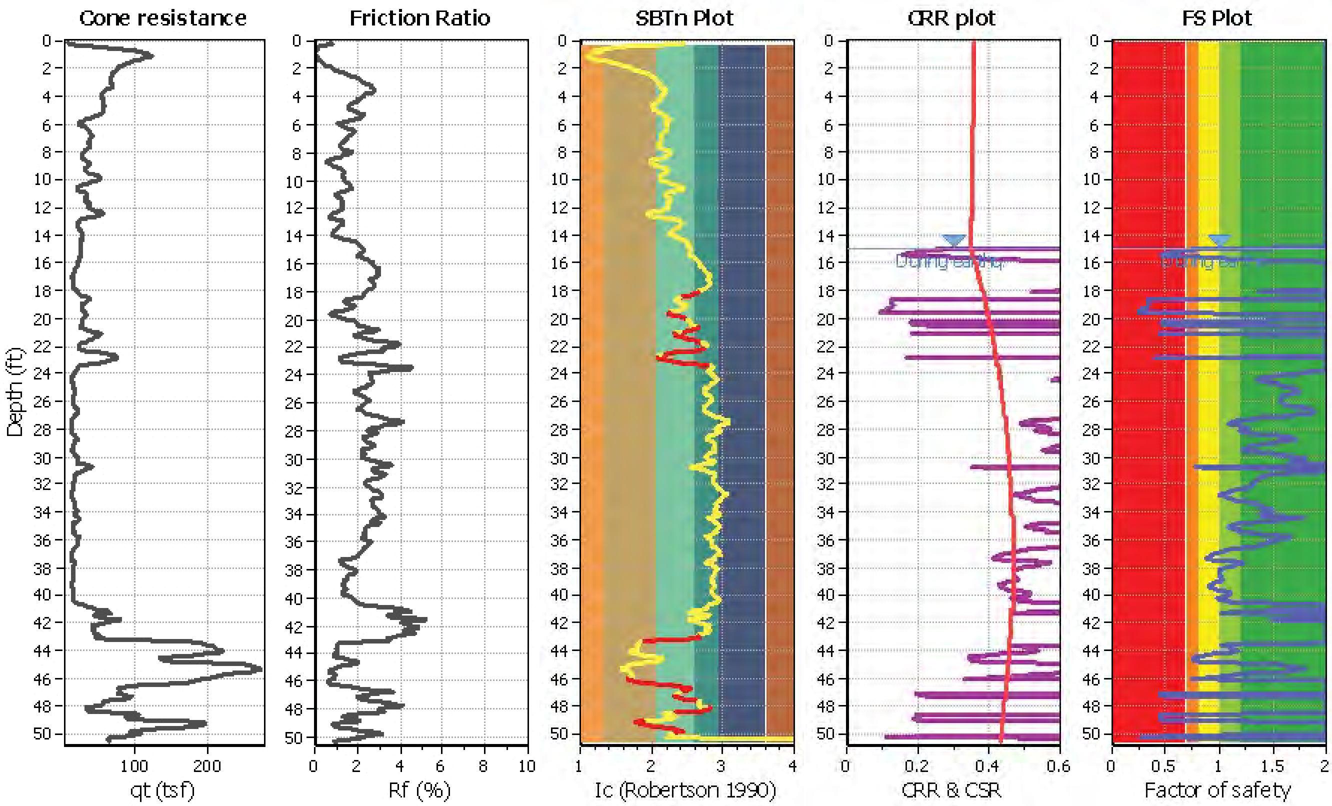
LIQUEFACTION ANALYSIS REPORT

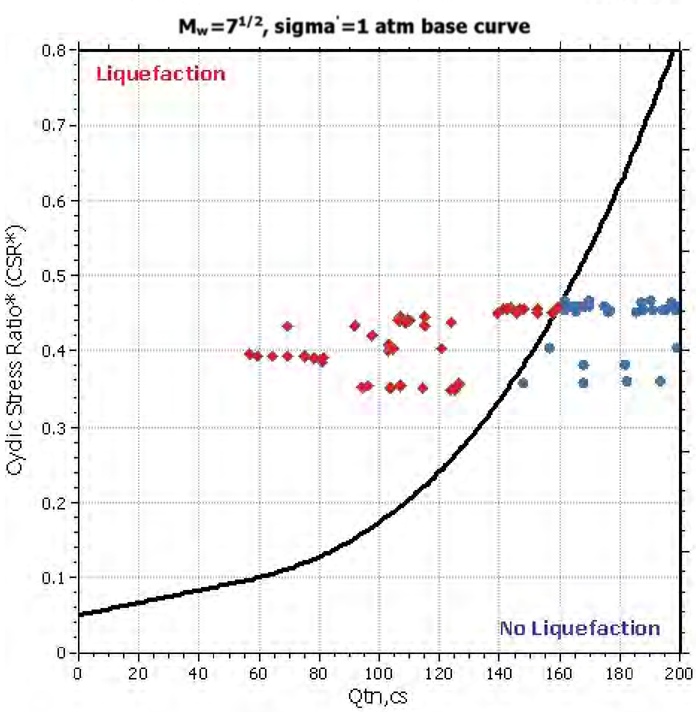
Project title : AT Dublin **Location : Dublin, California**

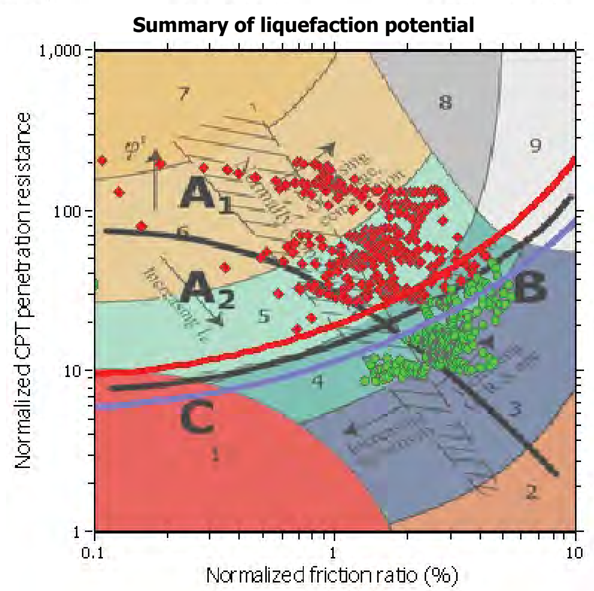
CPT file : 2-CPT04

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

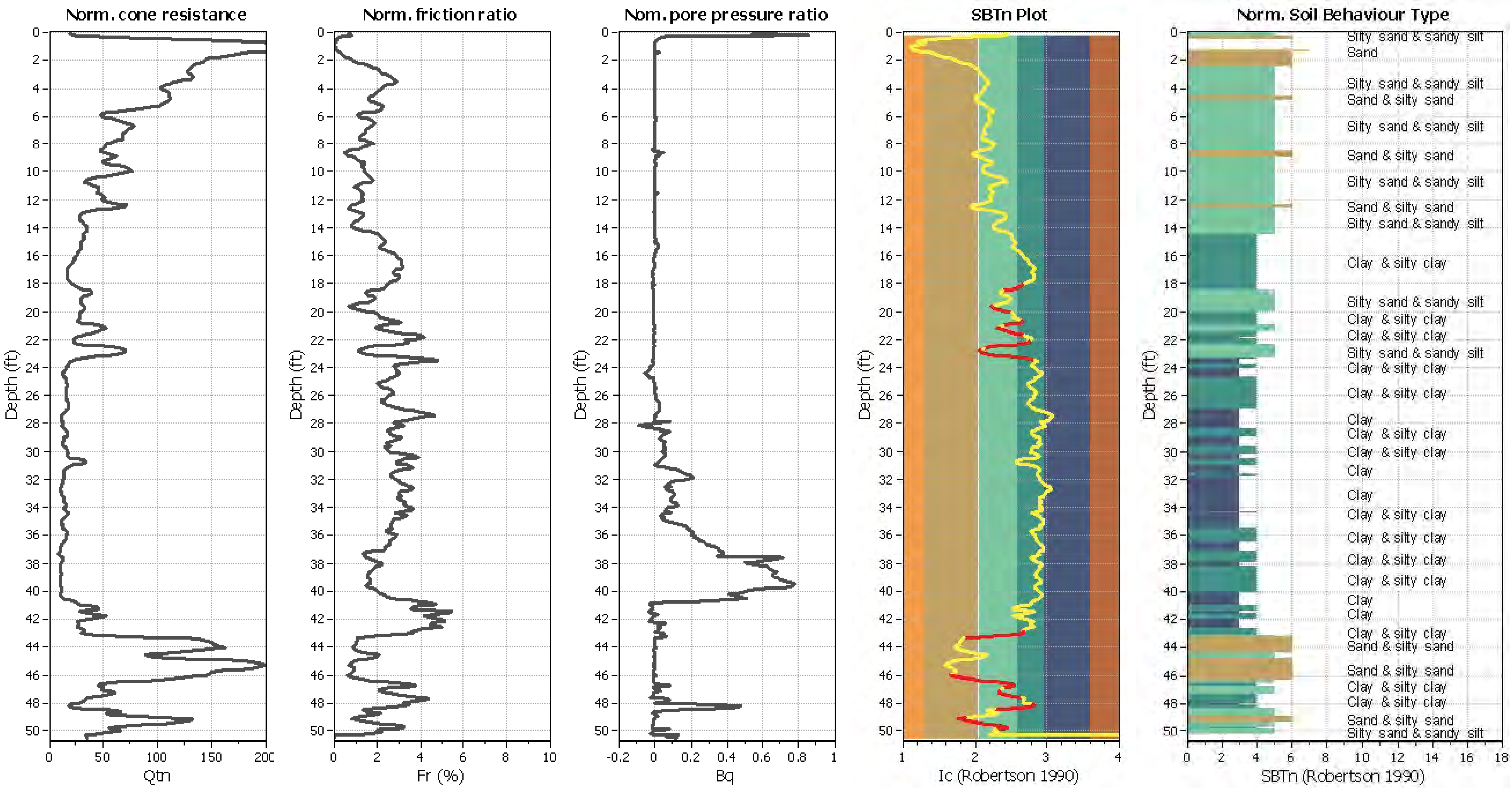






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



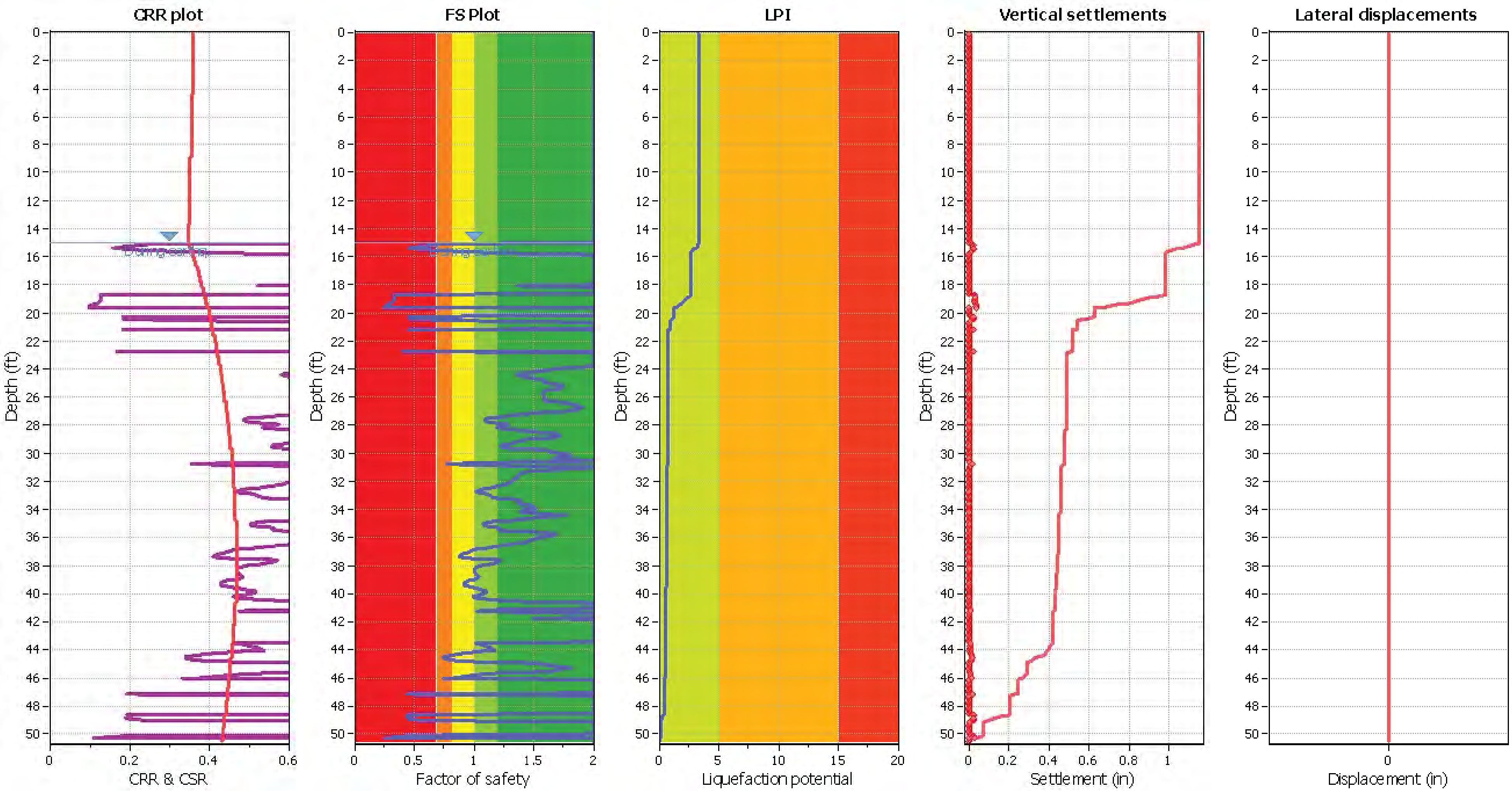
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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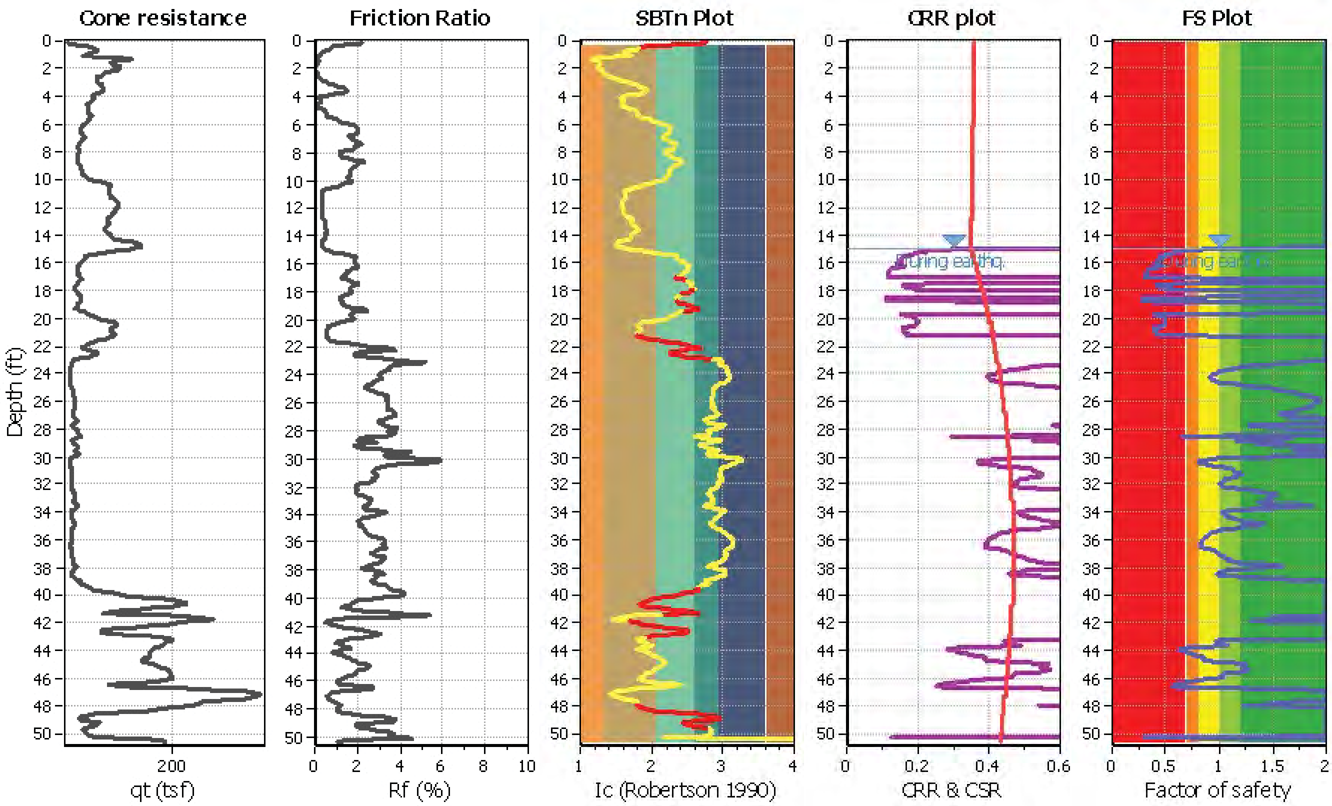
LIQUEFACTION ANALYSIS REPORT

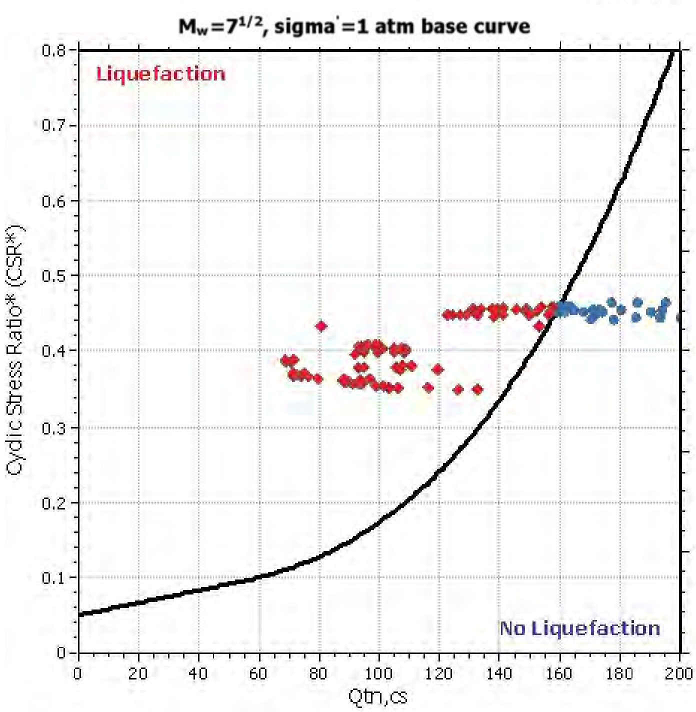
Project title : AT Dublin **Location : Dublin, California**

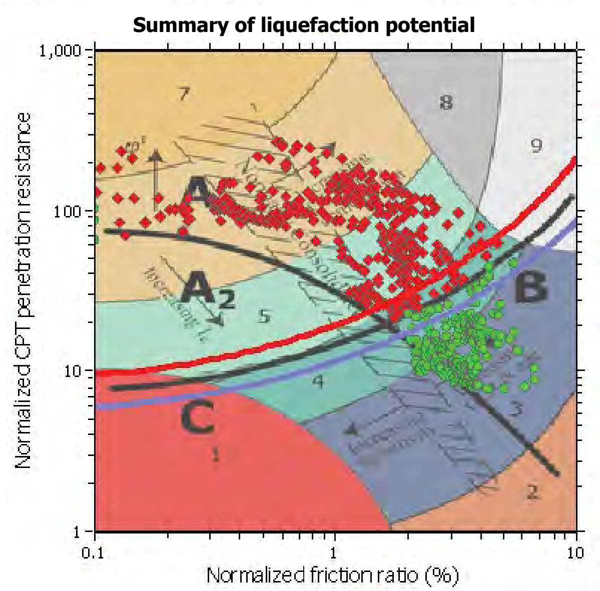
CPT file : 2-CPT05

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

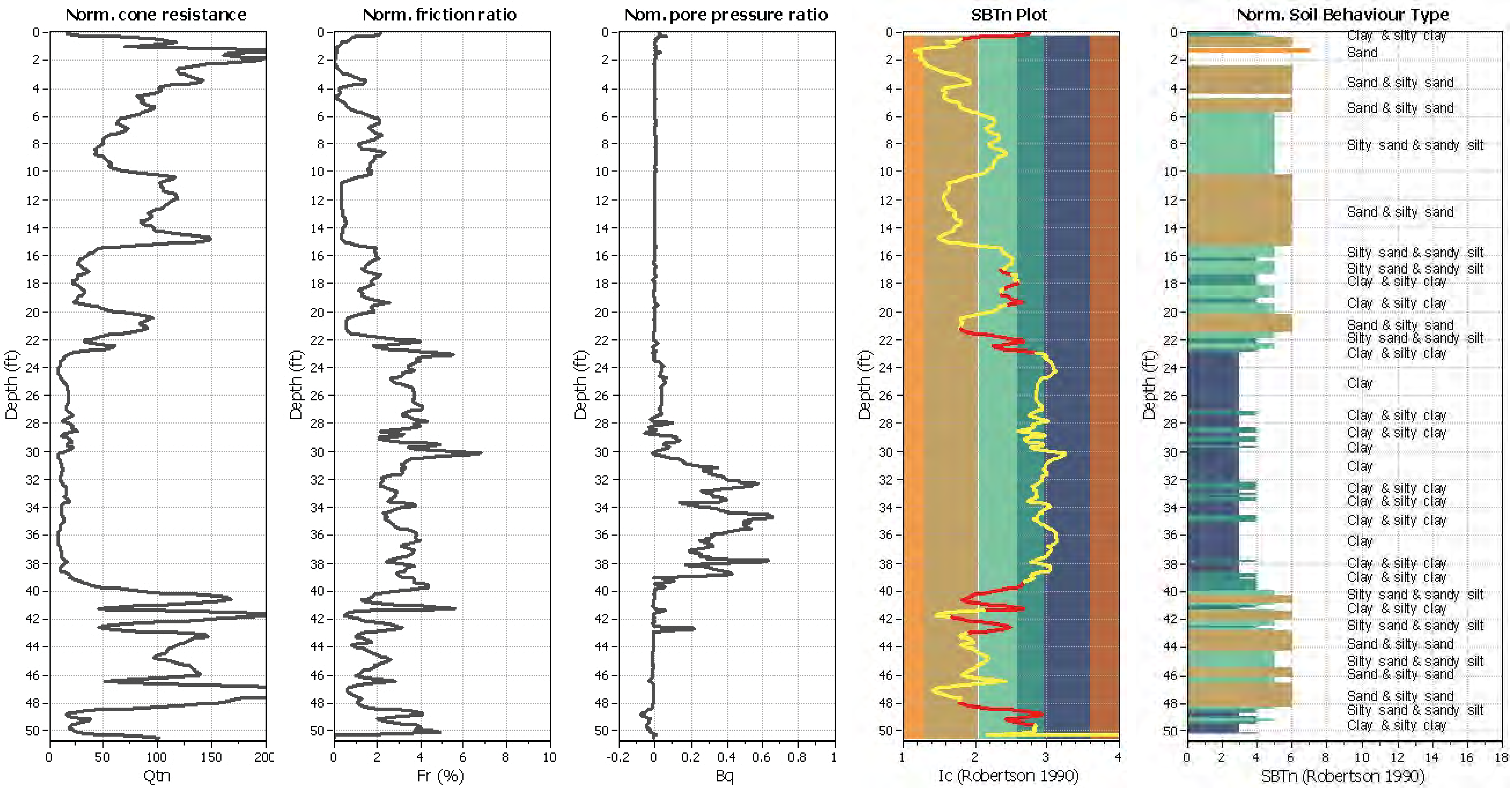






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



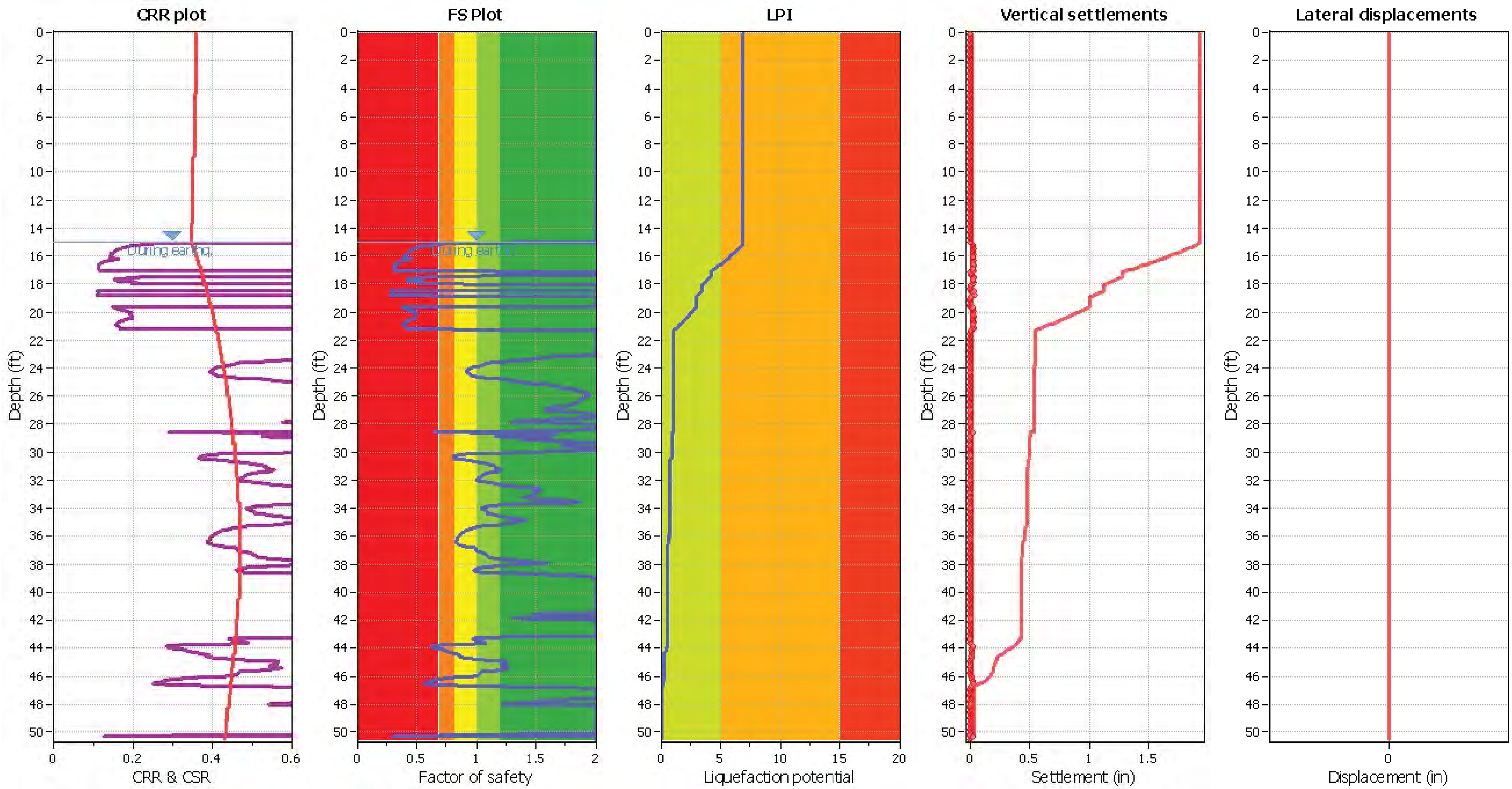
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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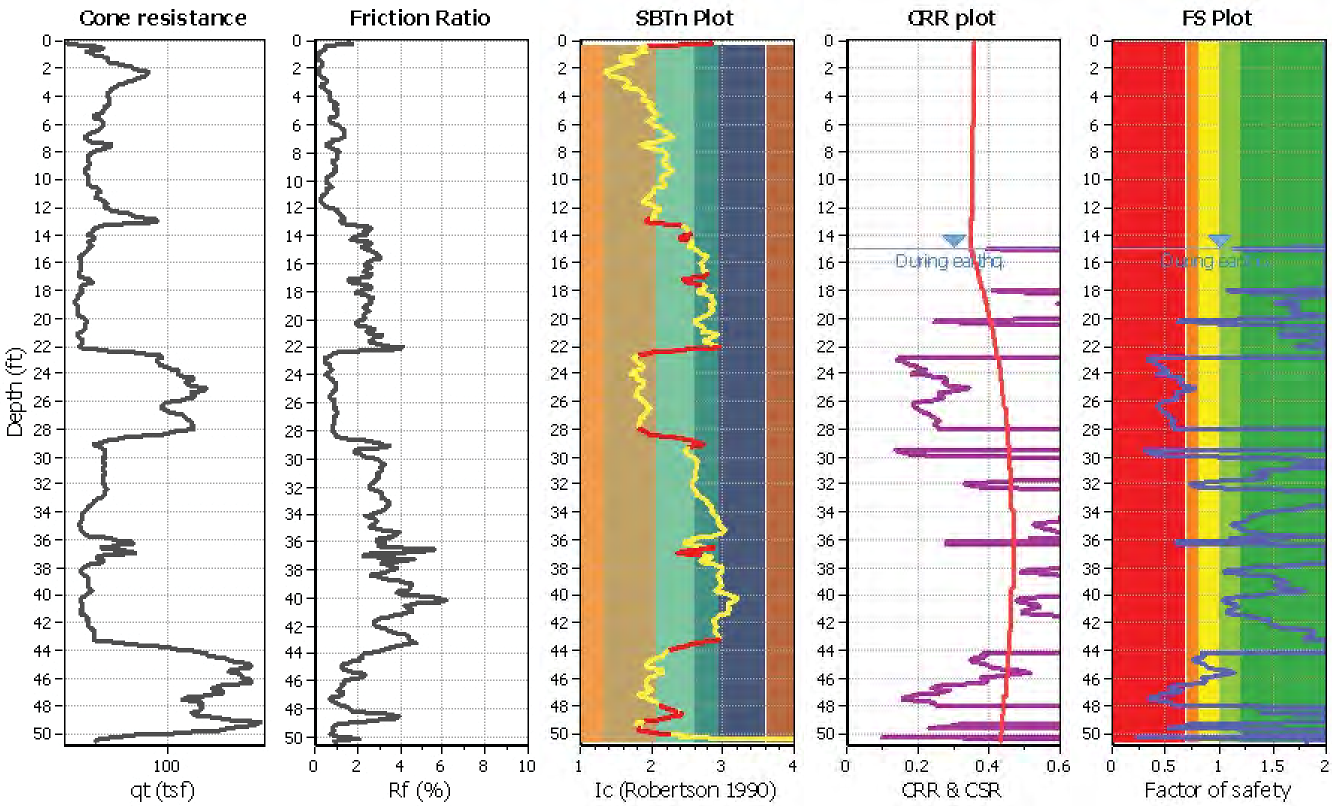
LIQUEFACTION ANALYSIS REPORT

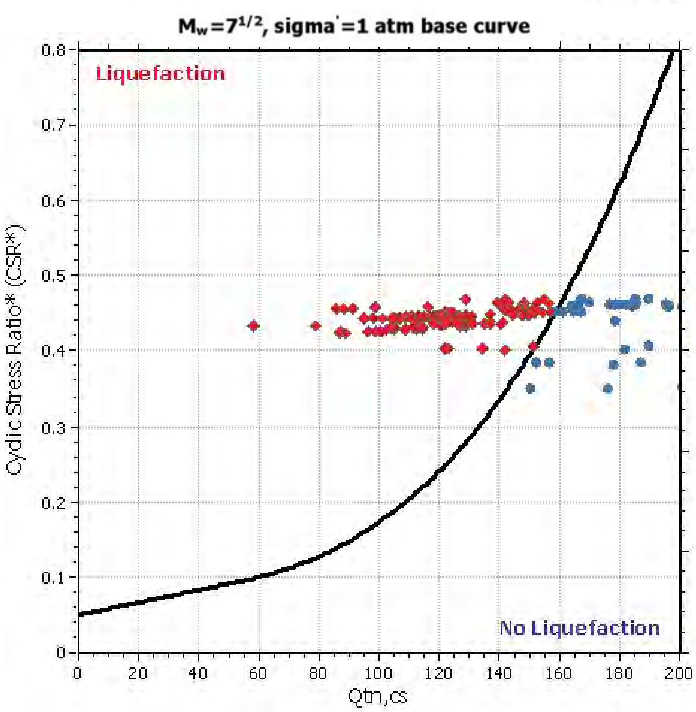
Project title : AT Dublin **Location : Dublin, California**

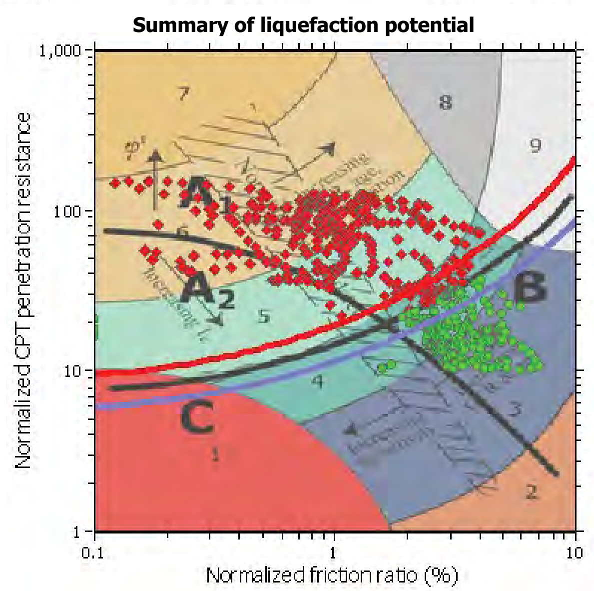
CPT file : 2-CPT06

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

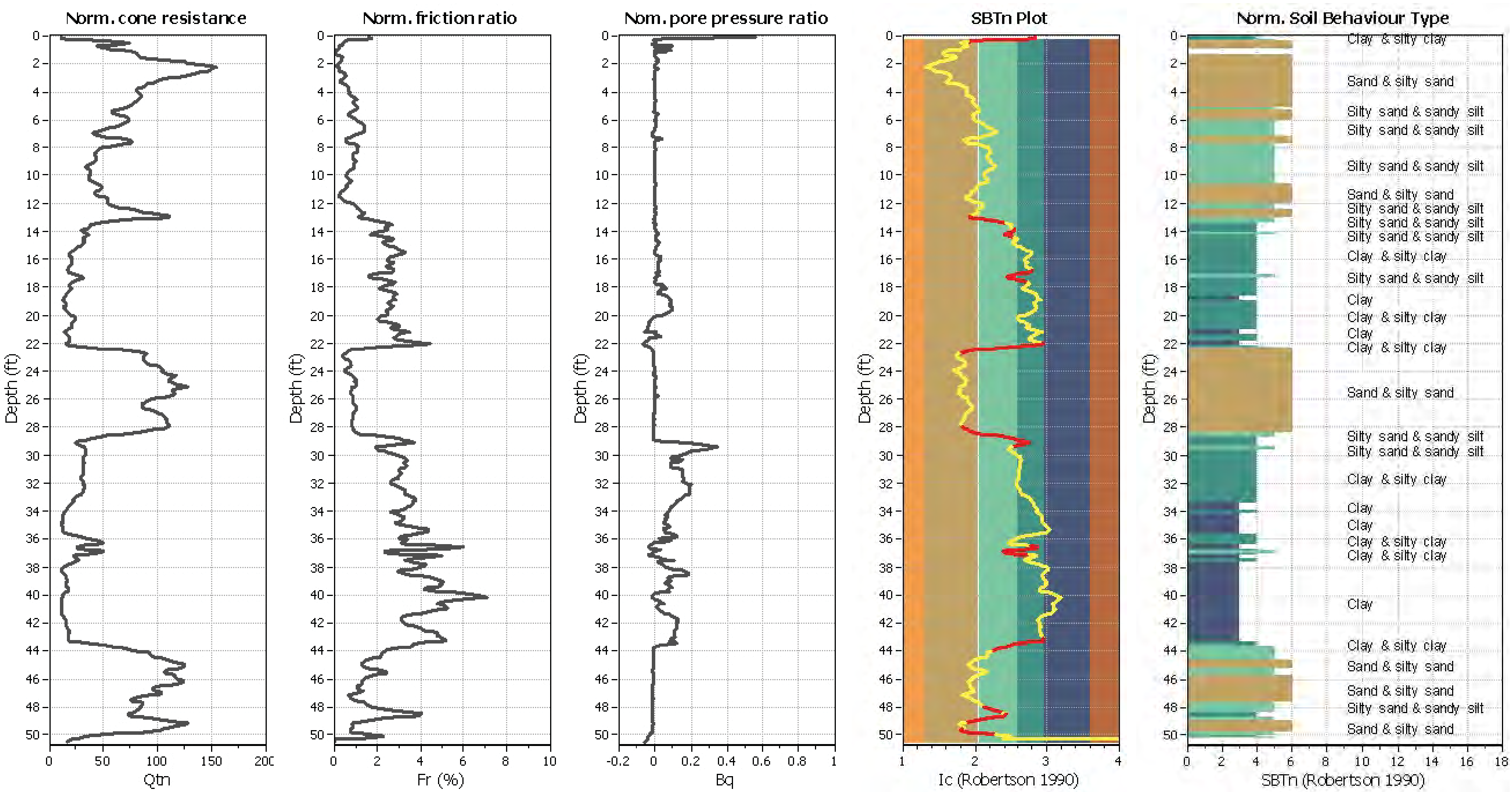






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



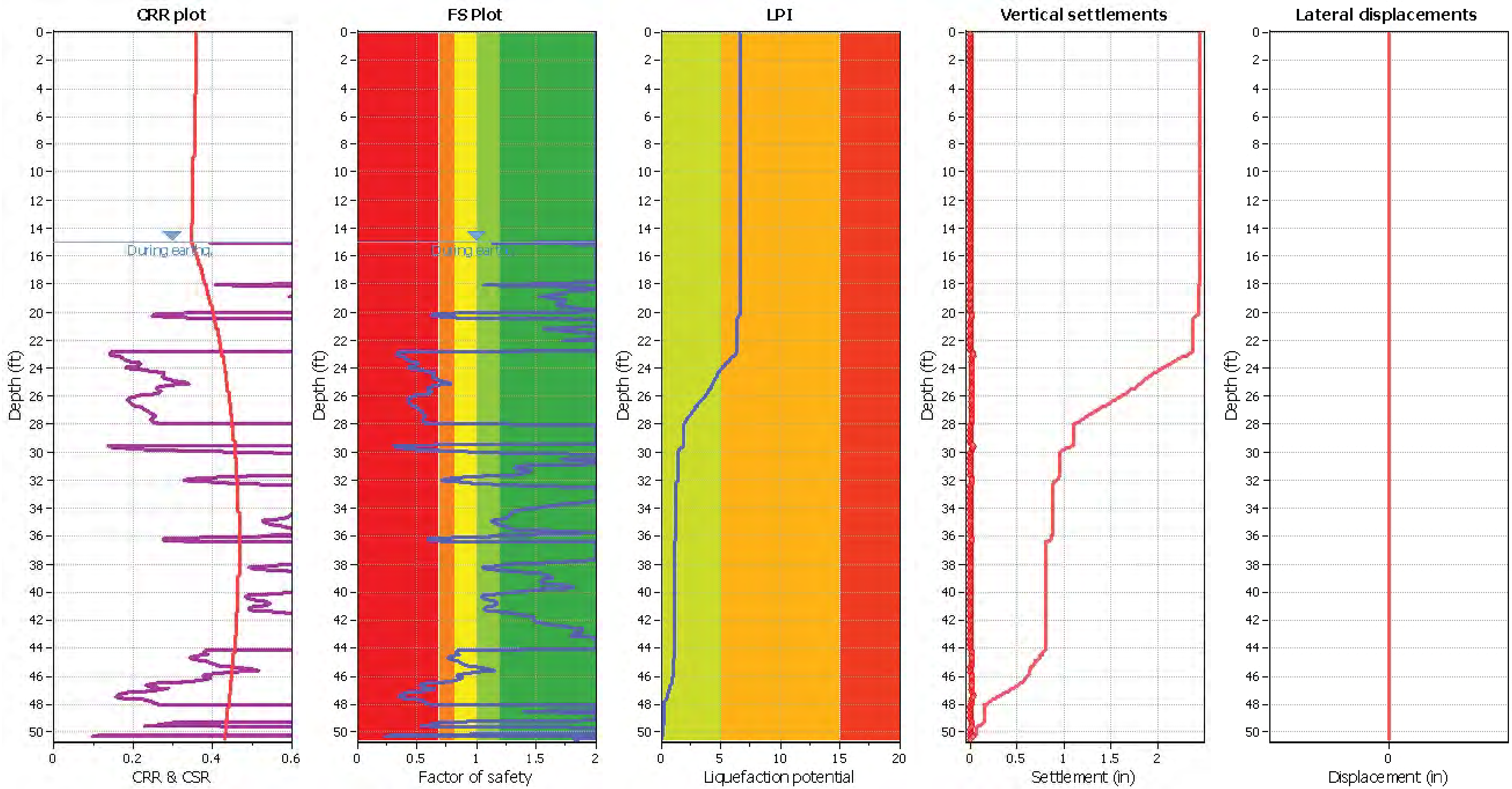
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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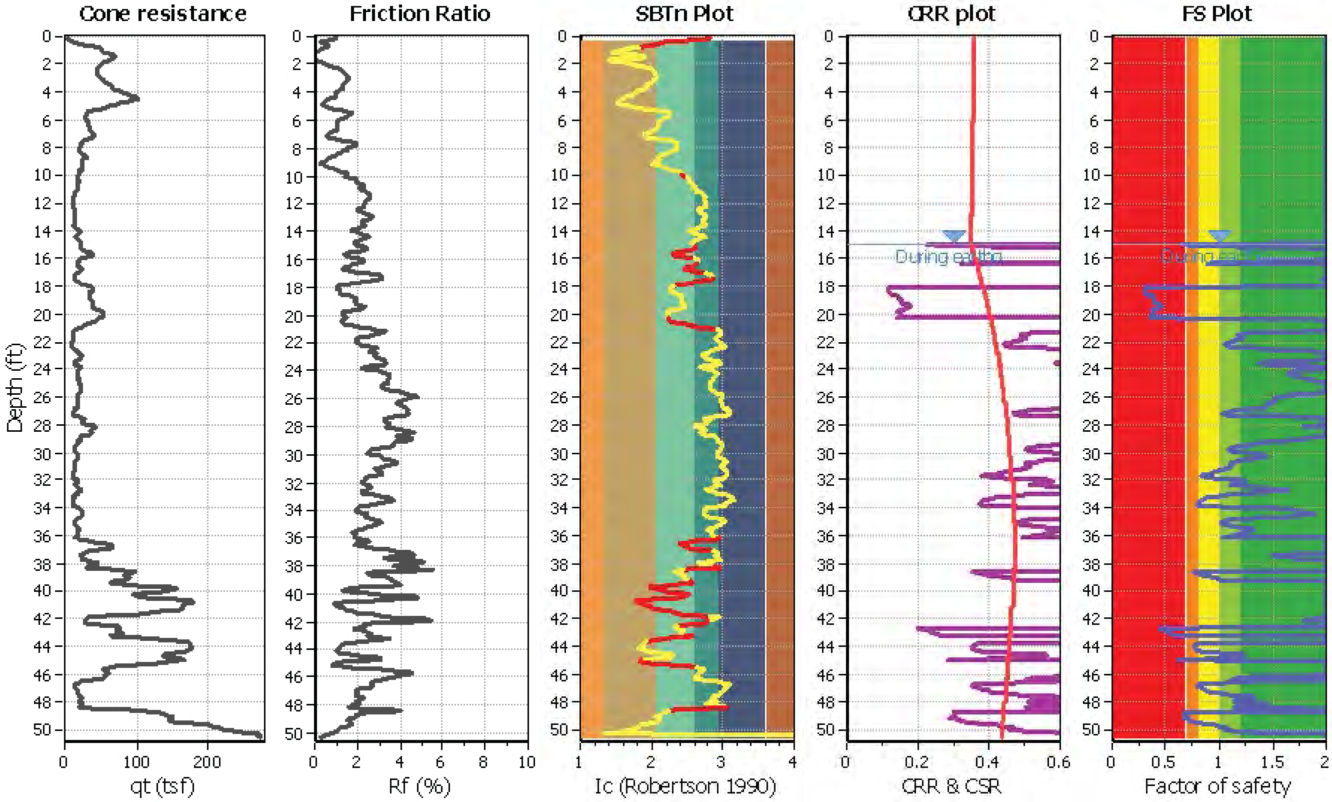
LIQUEFACTION ANALYSIS REPORT

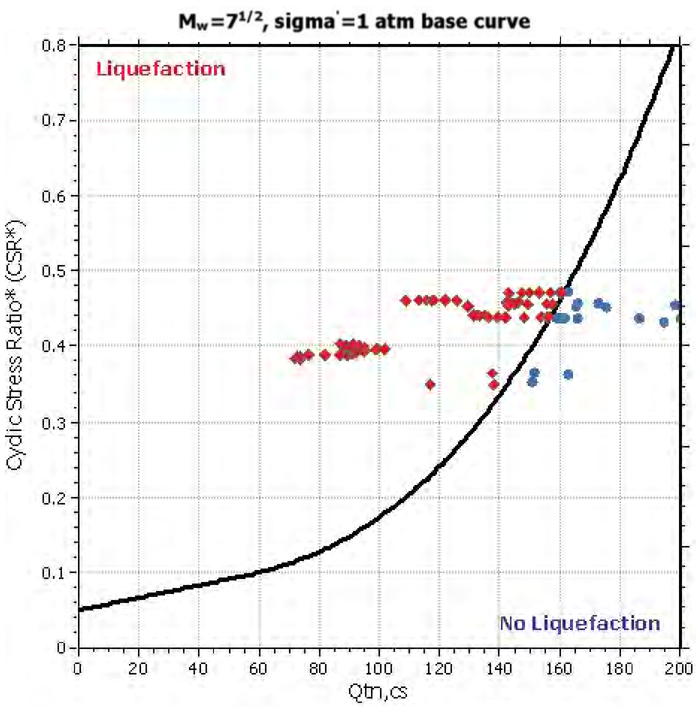
Project title : AT Dublin **Location : Dublin, California**

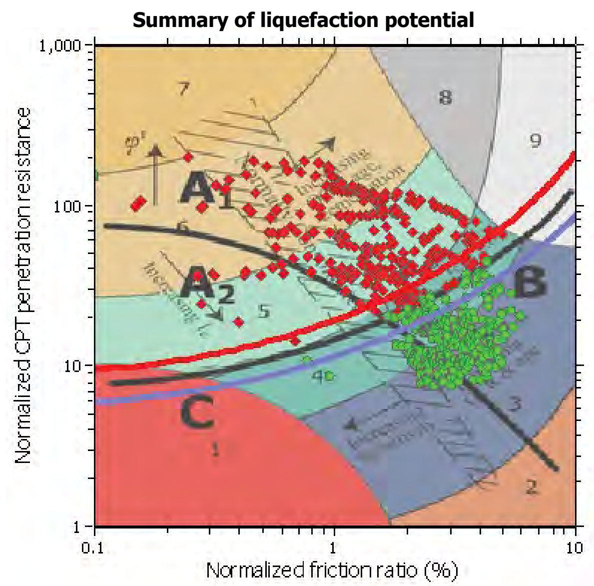
CPT file : 2-CPT07

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

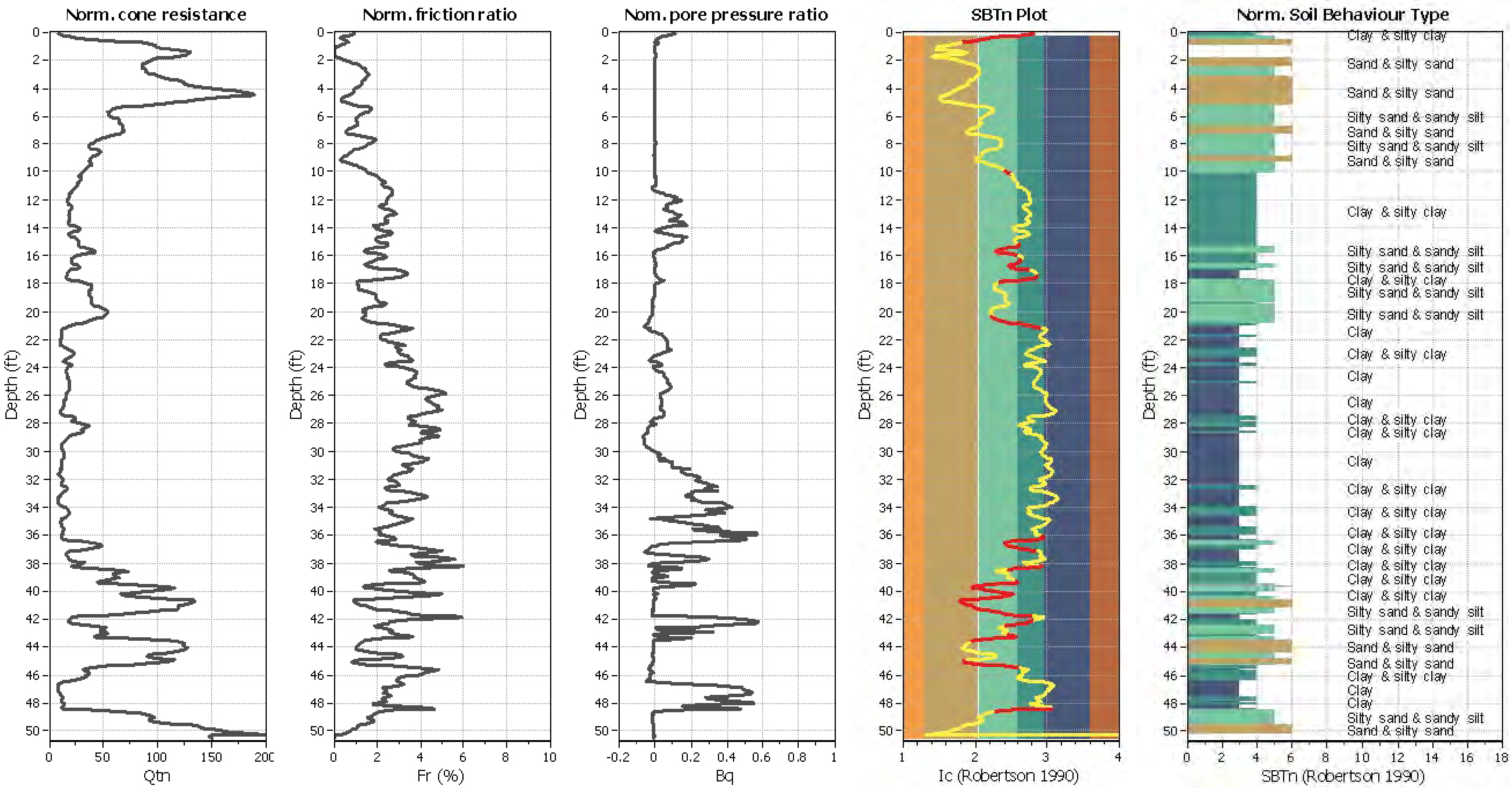






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



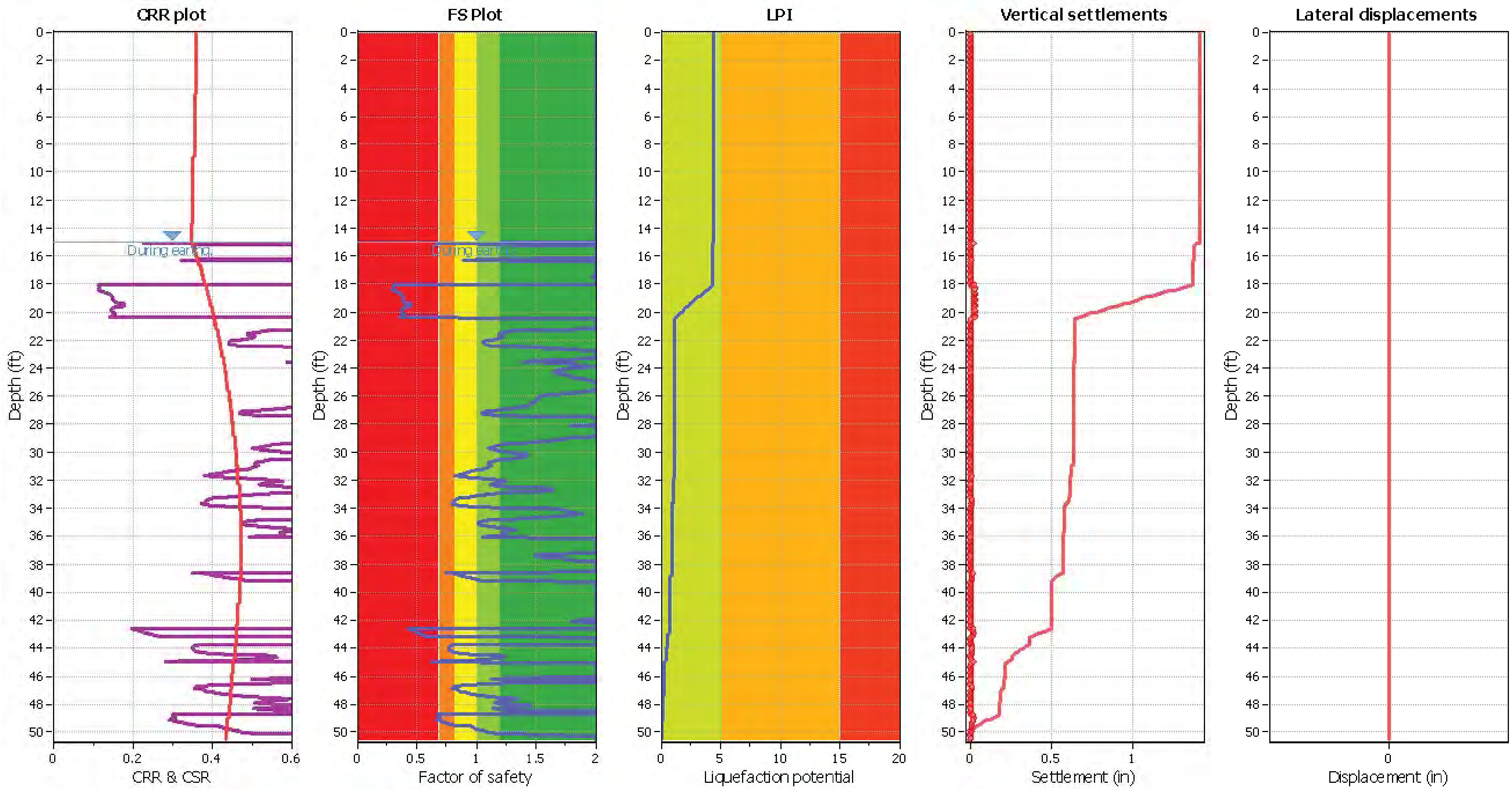
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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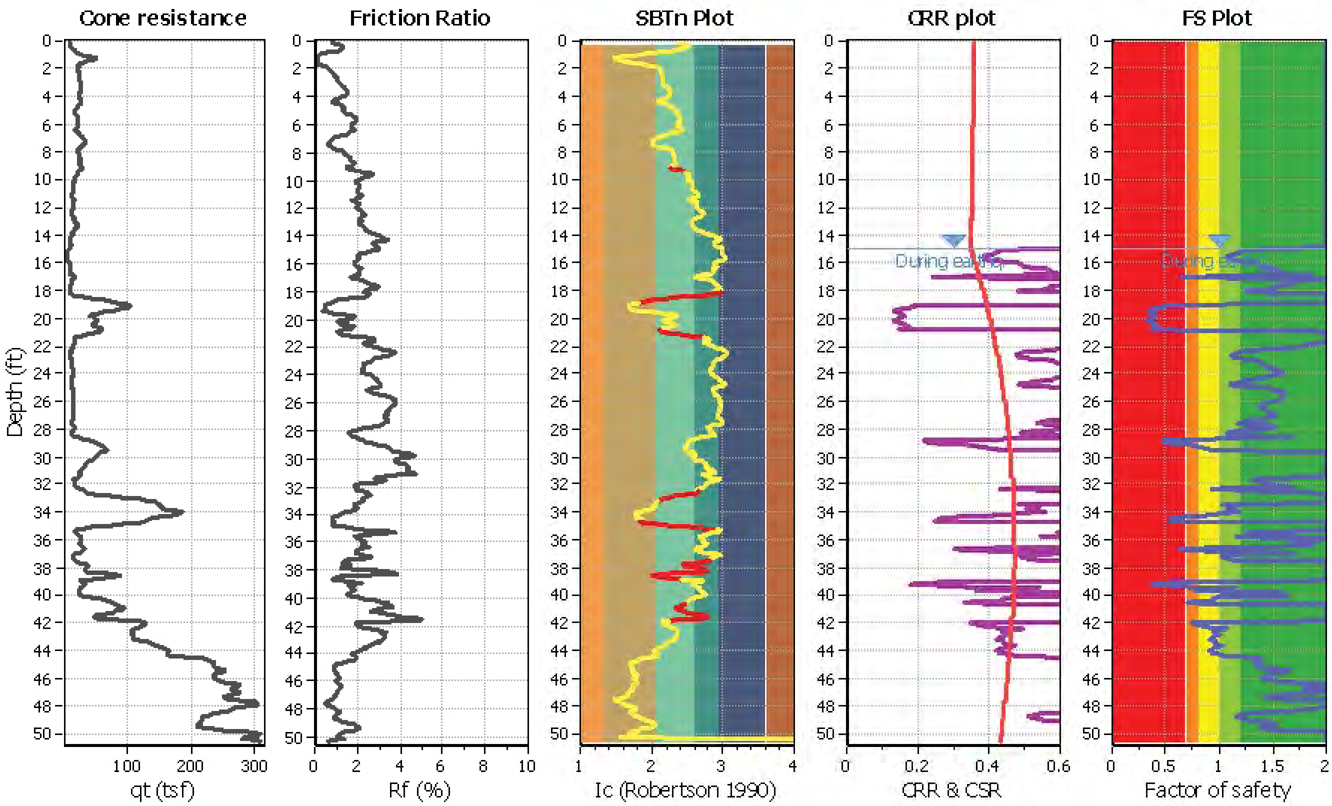
LIQUEFACTION ANALYSIS REPORT

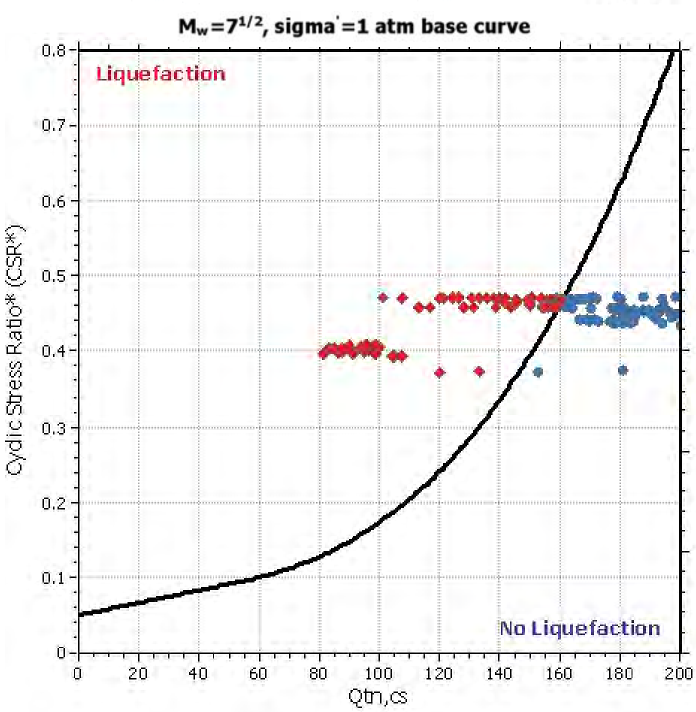
Project title : AT Dublin **Location : Dublin, California**

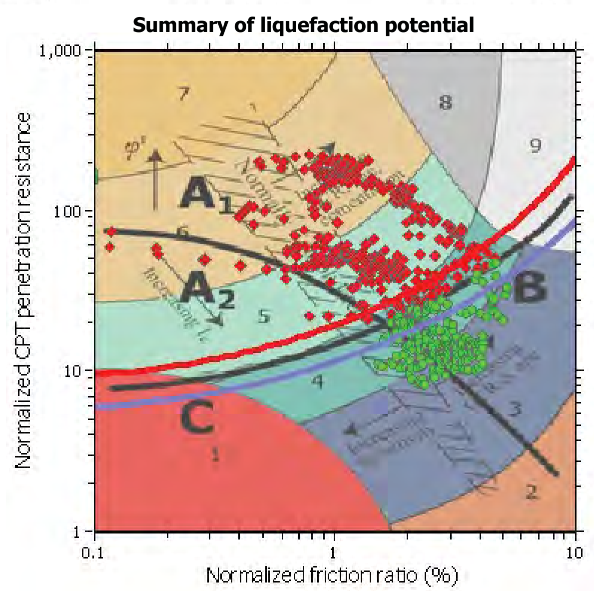
CPT file : 2-CPT08

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

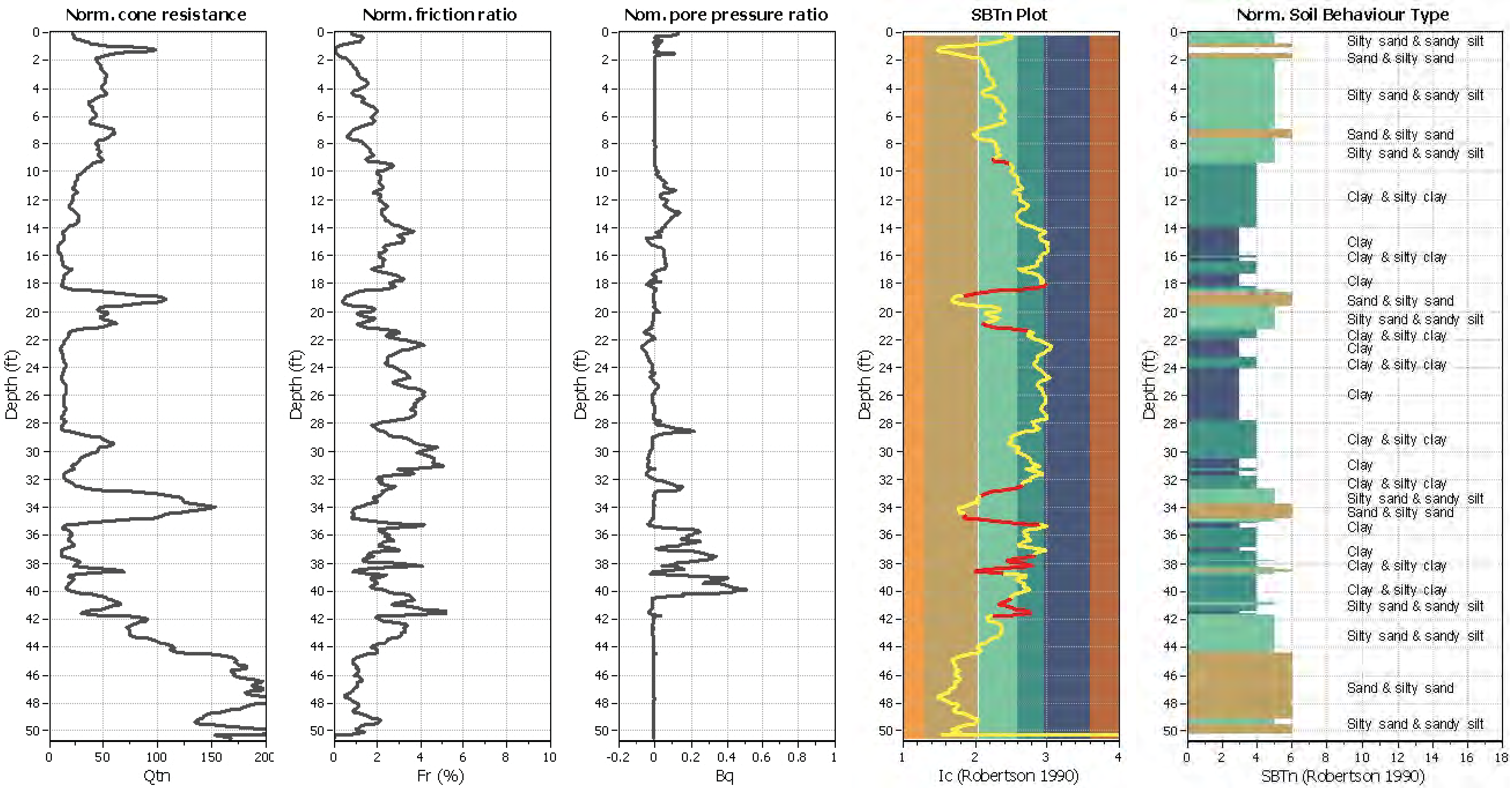






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



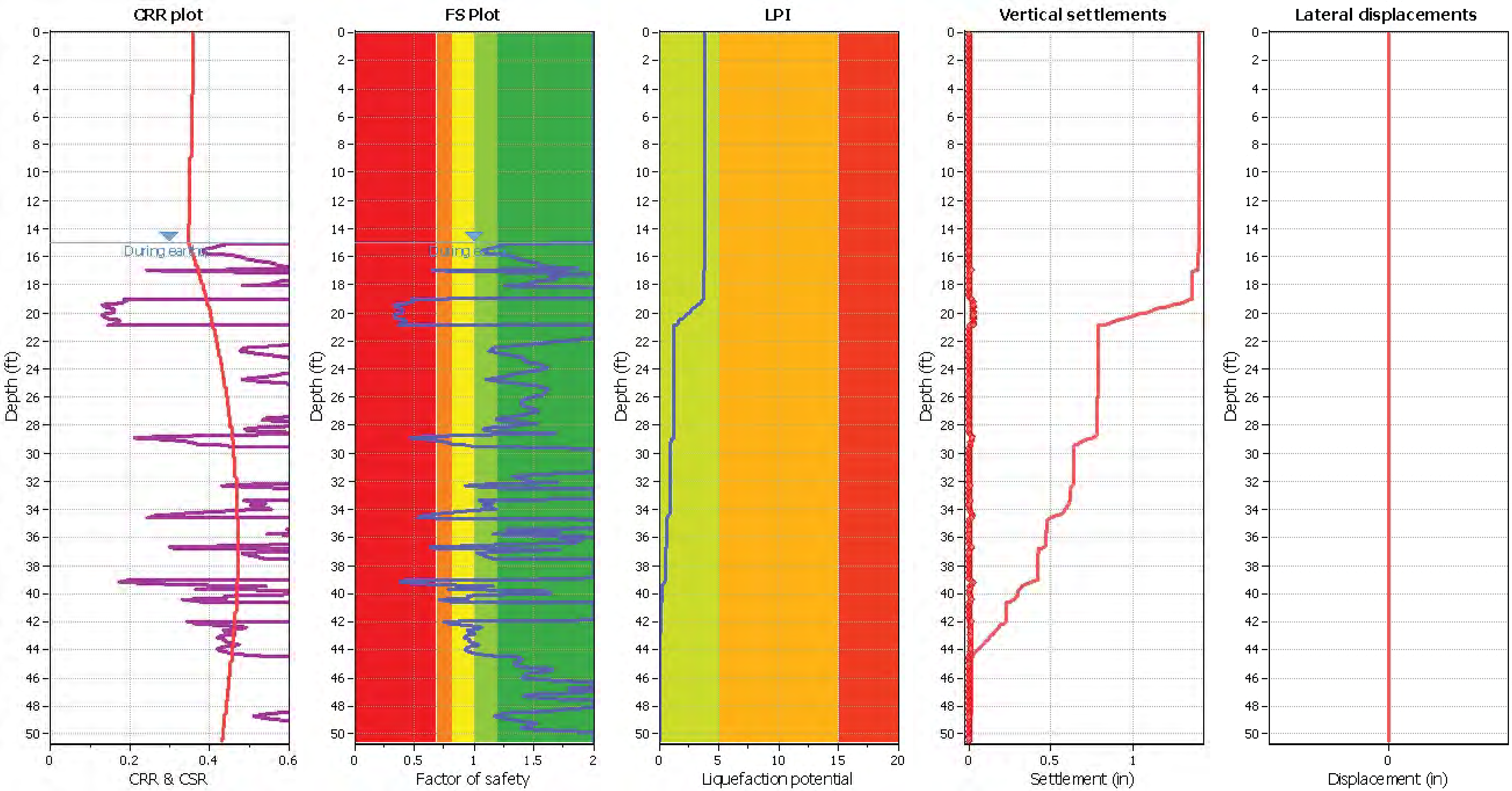
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

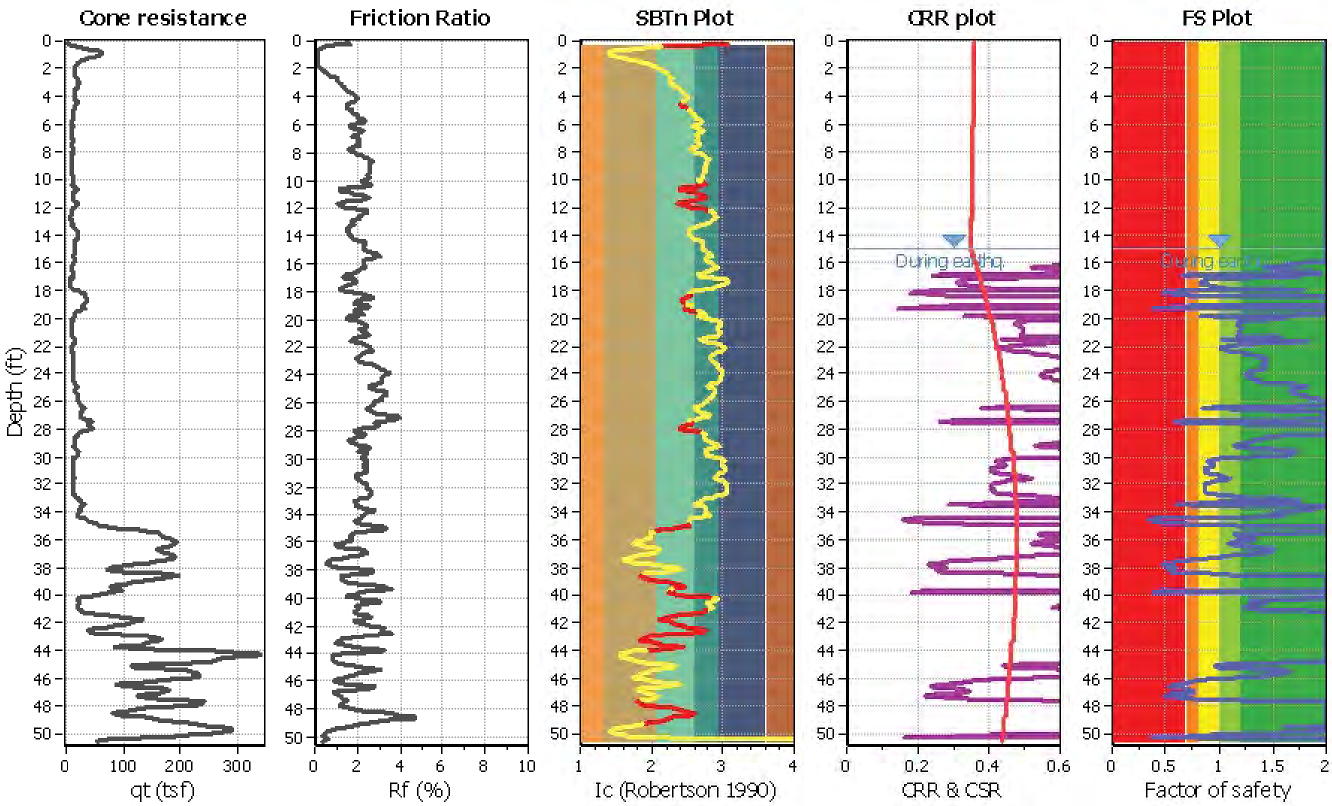
LIQUEFACTION ANALYSIS REPORT

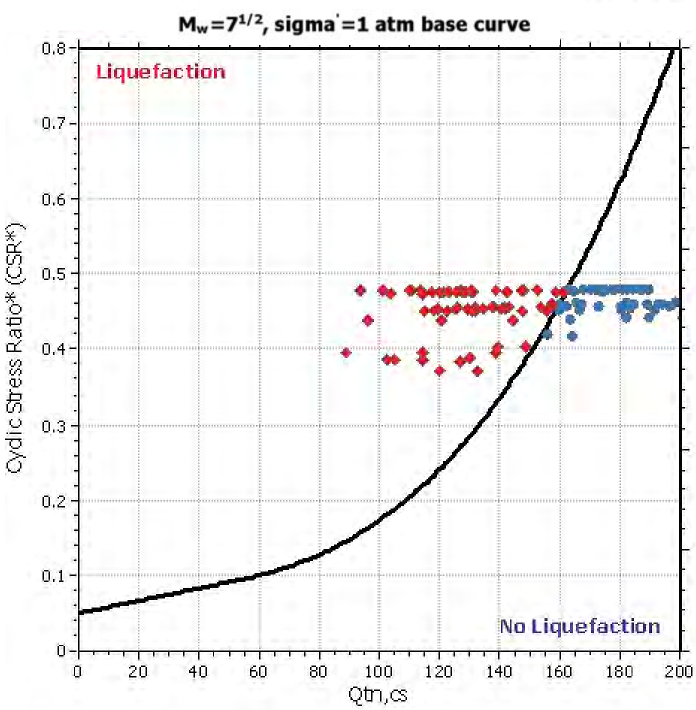
Project title : AT Dublin **Location : Dublin, California**

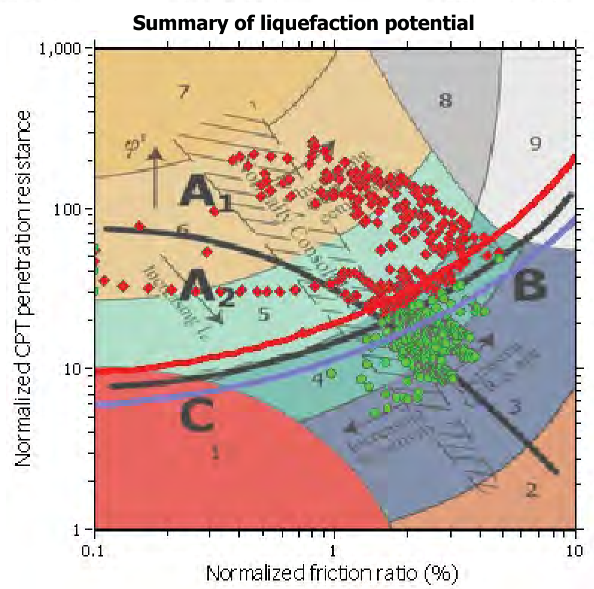
CPT file : 2-CPT09

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

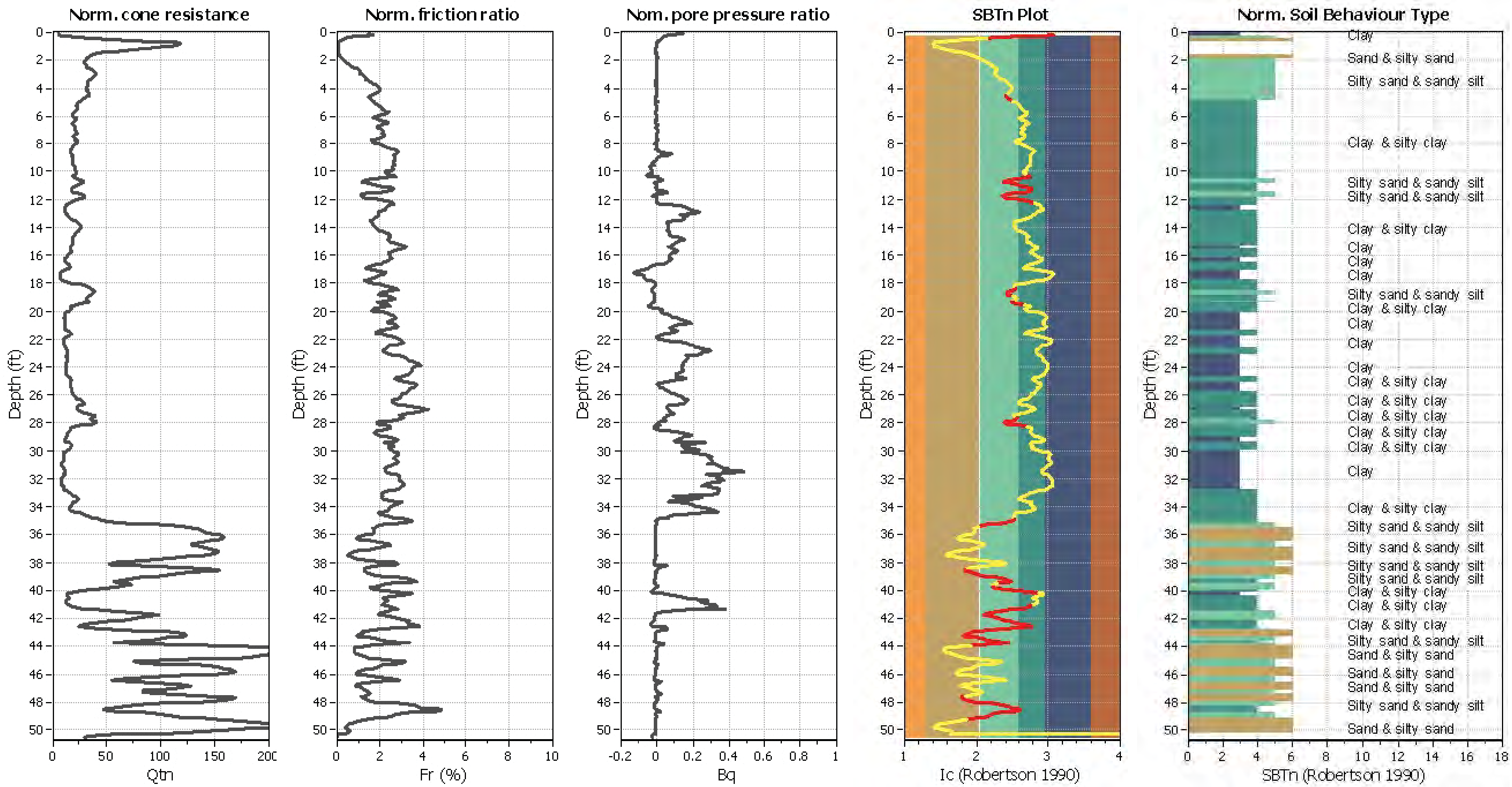






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



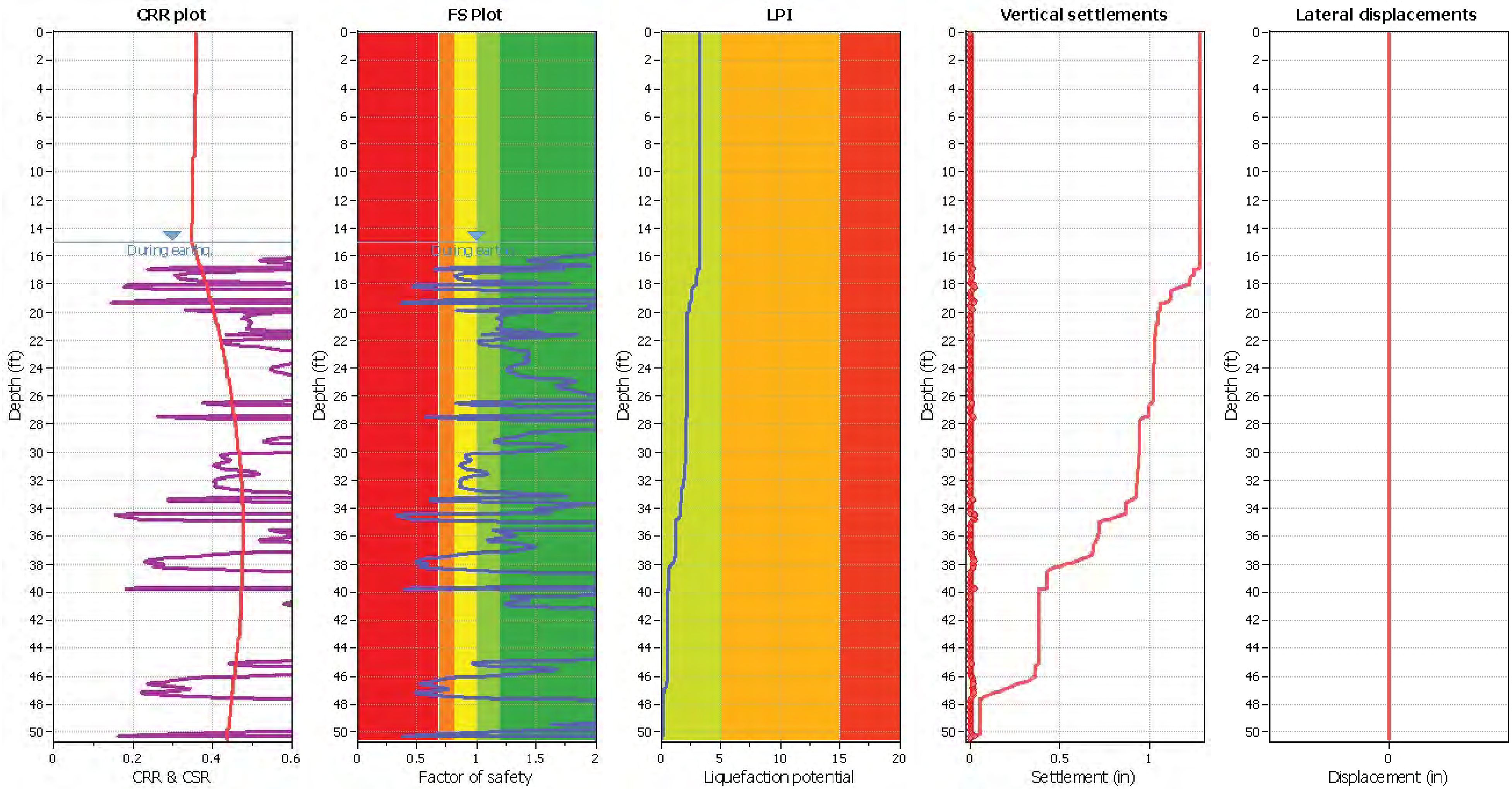
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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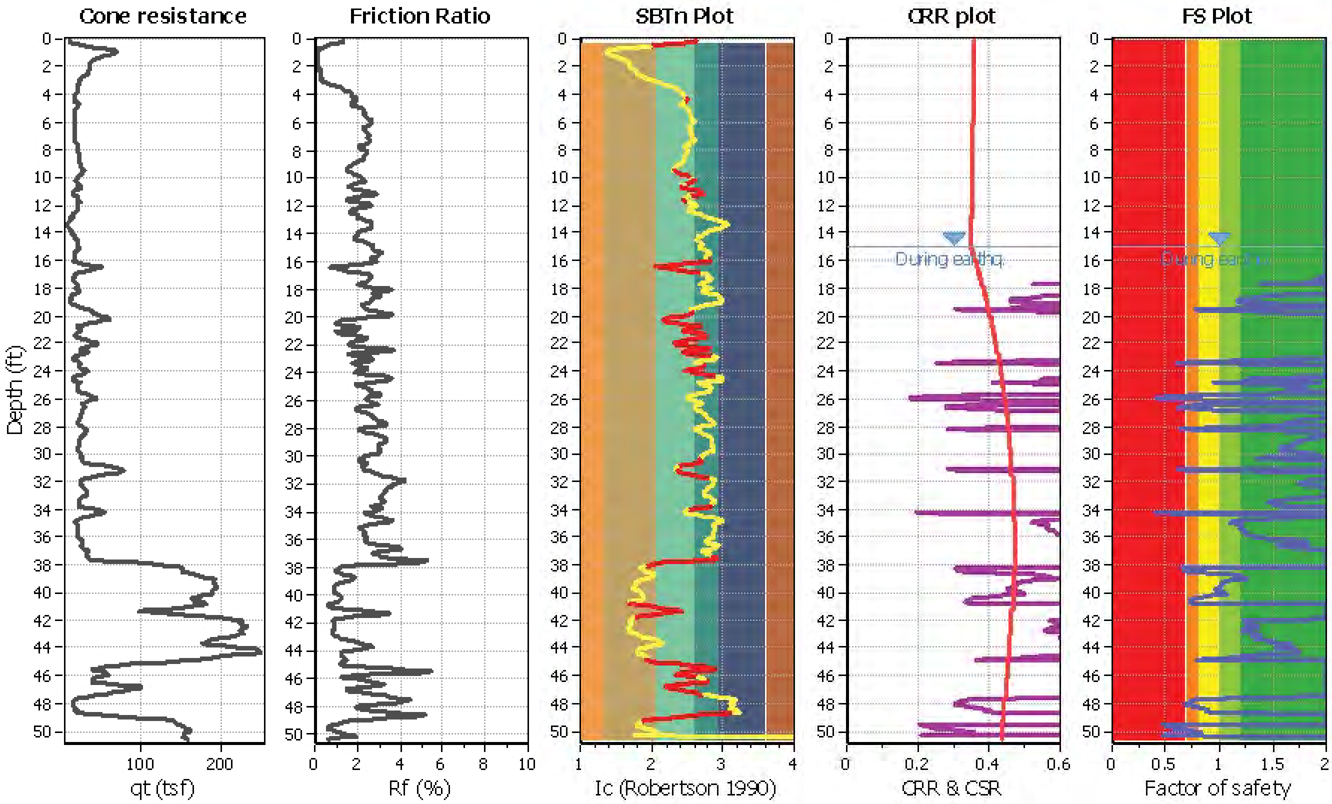
LIQUEFACTION ANALYSIS REPORT

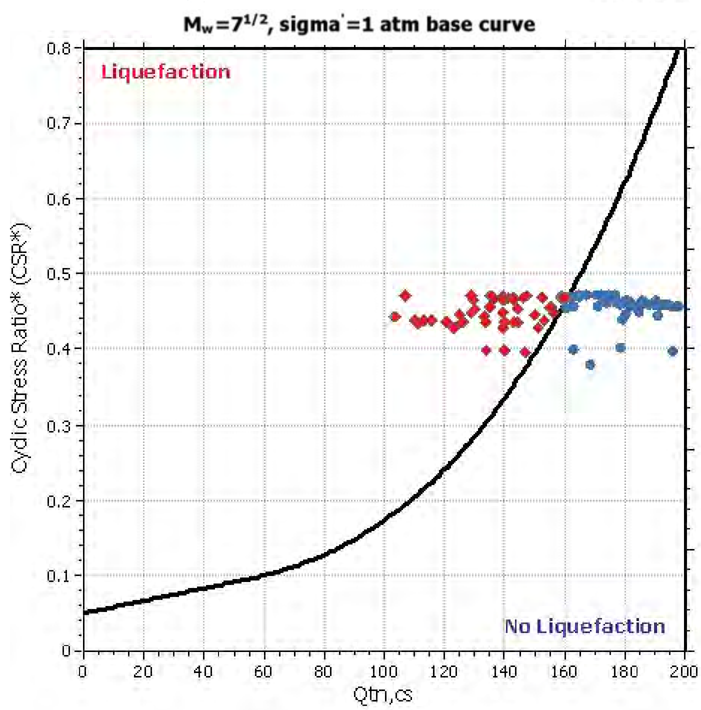
Project title : AT Dublin **Location : Dublin, California**

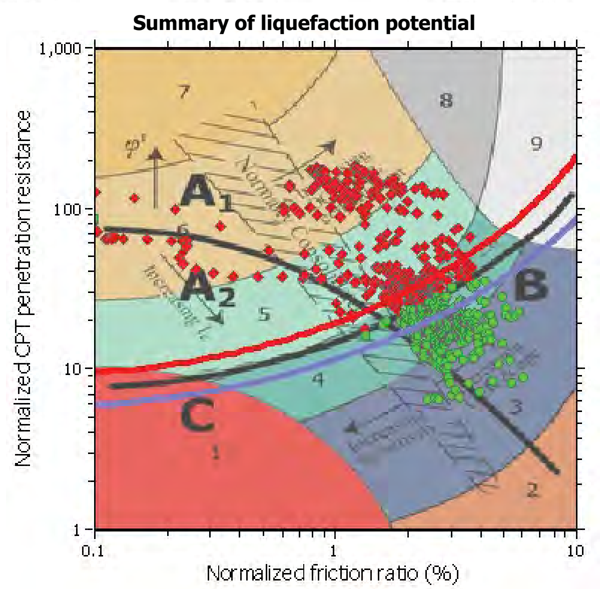
CPT file : 2-CPT10

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

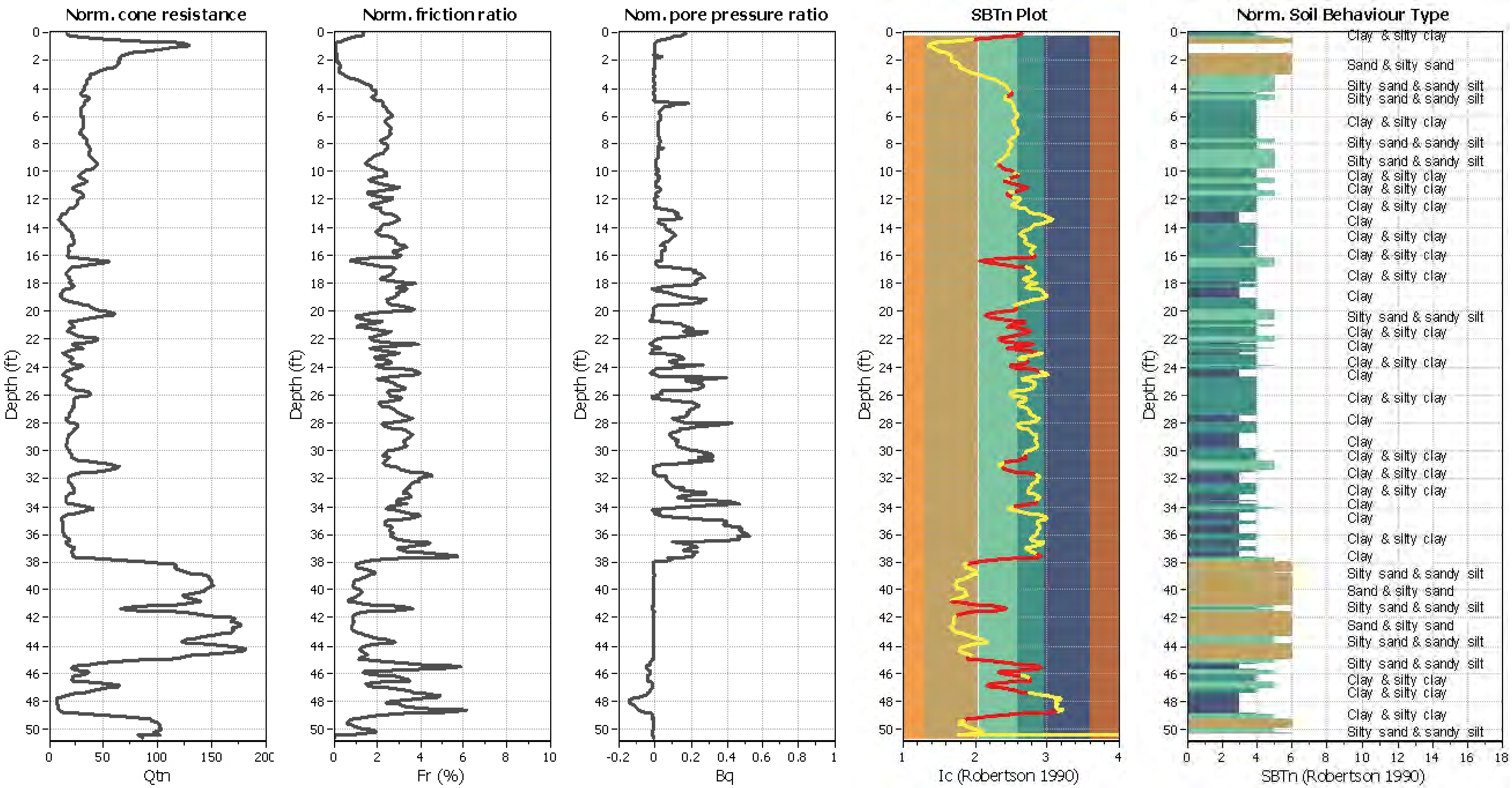






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



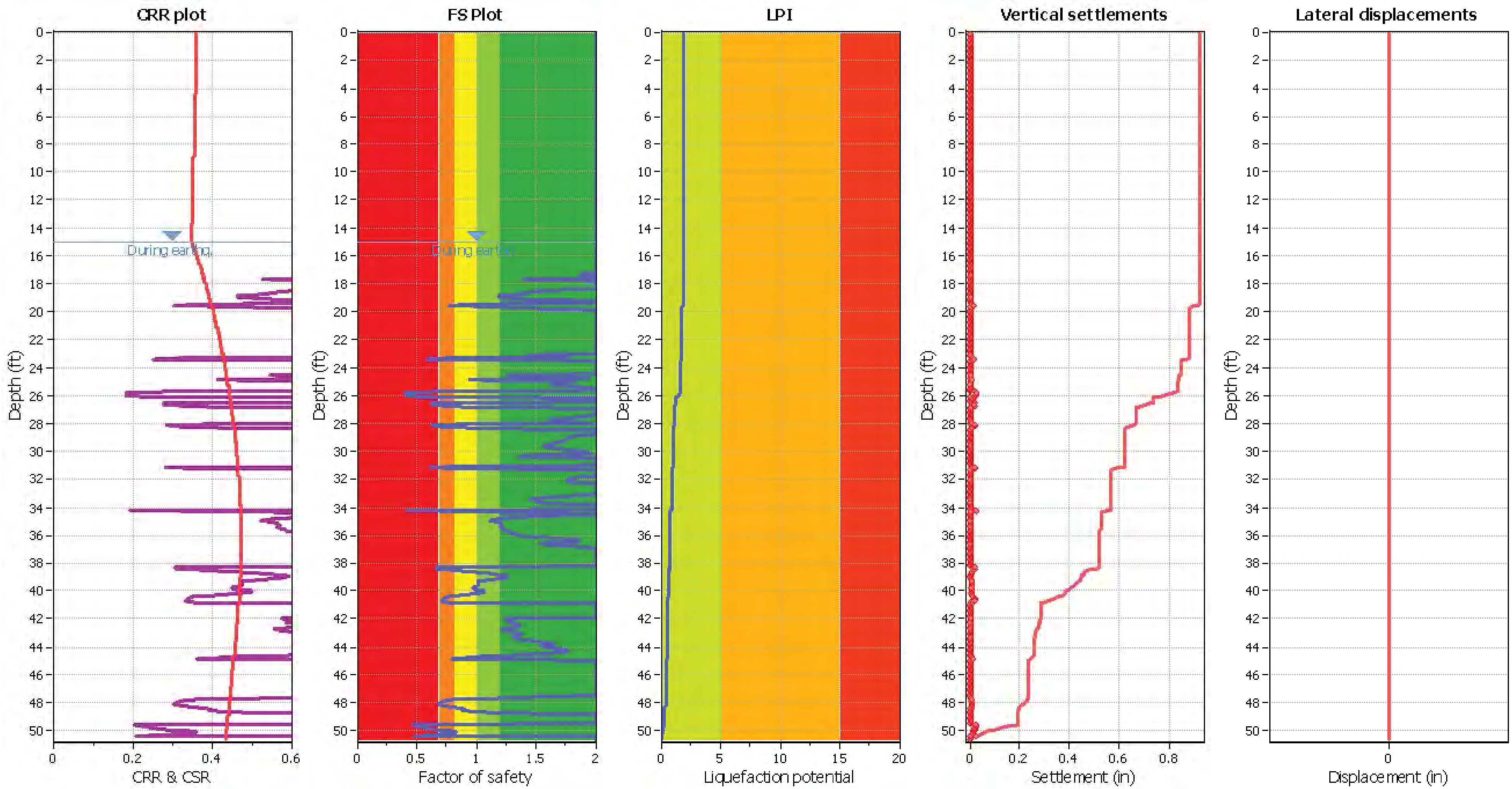
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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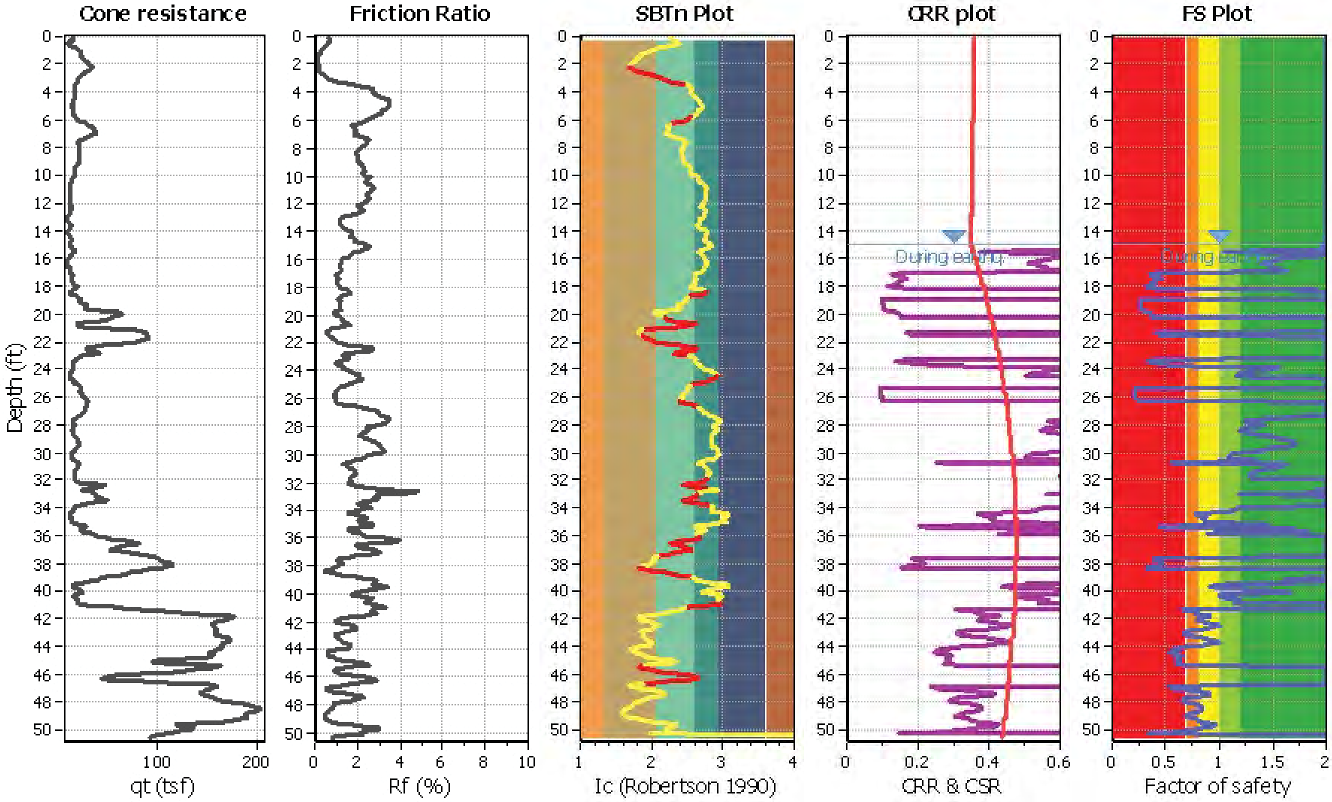
LIQUEFACTION ANALYSIS REPORT

Project title : AT Dublin **Location : Dublin, California**

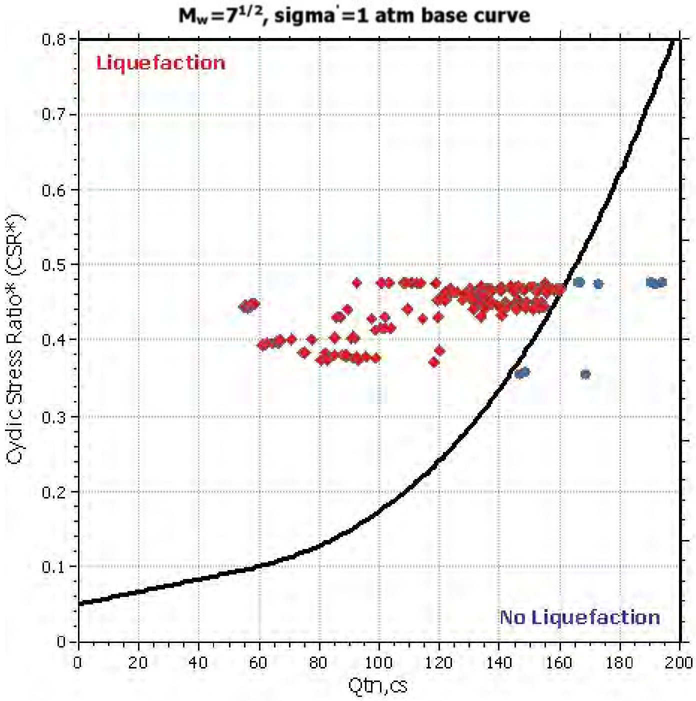
CPT file : 2-CPT11

Input parameters and analysis data

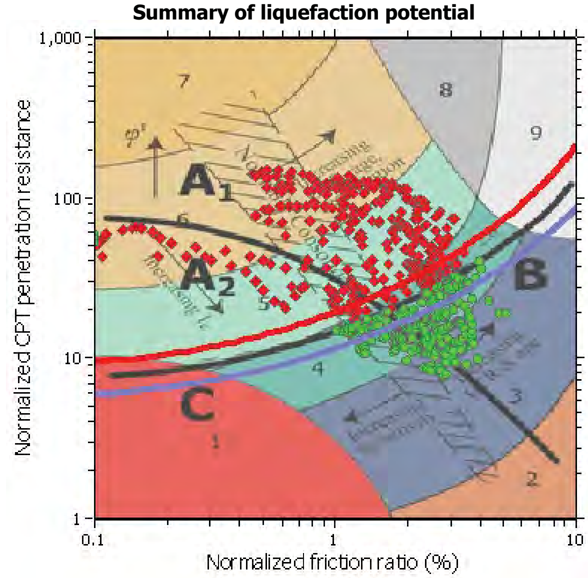
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		



$M_w=7^{1/2}$, sigma'=1 atm base curve

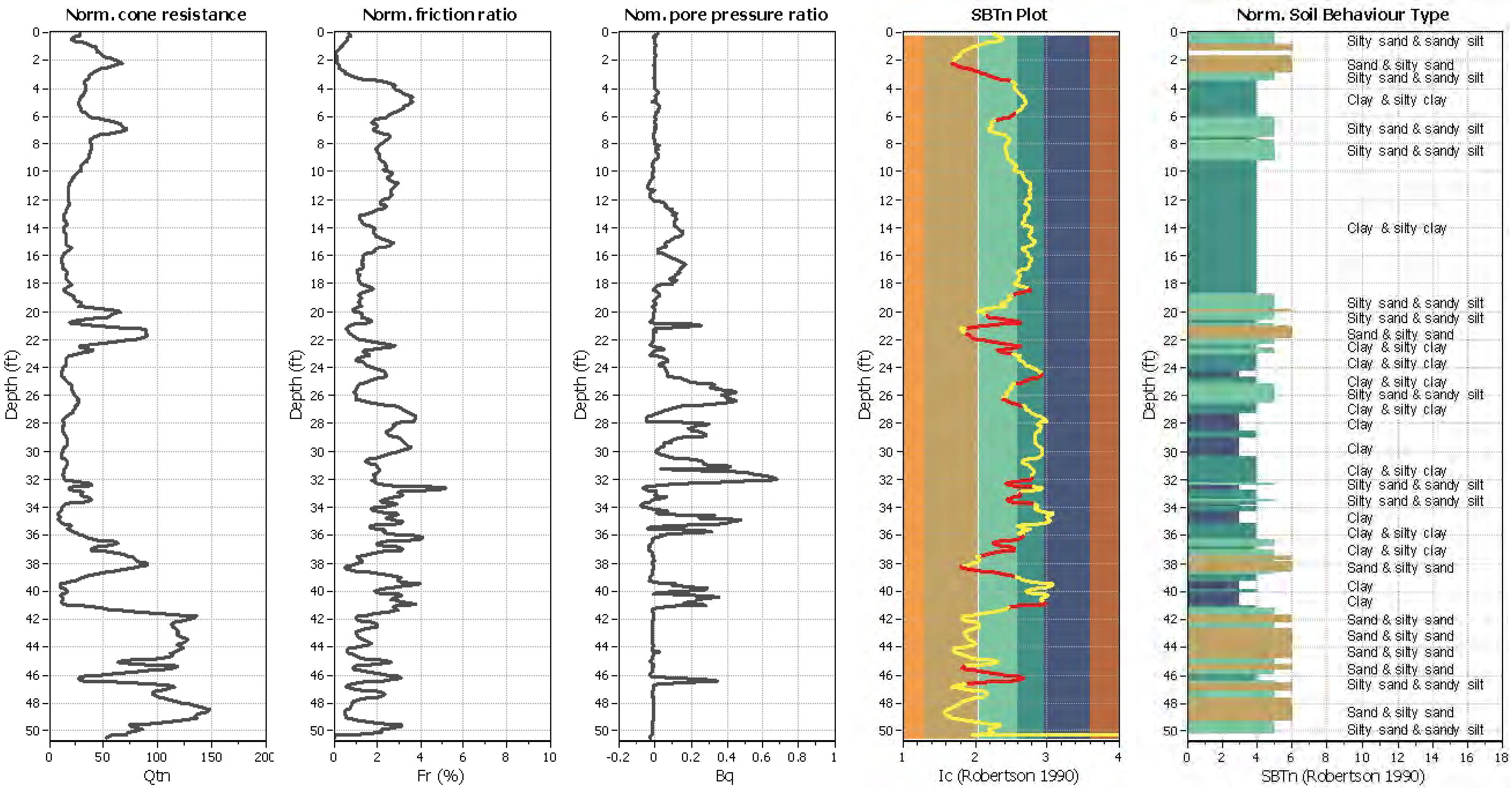


Summary of liquefaction potential



Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



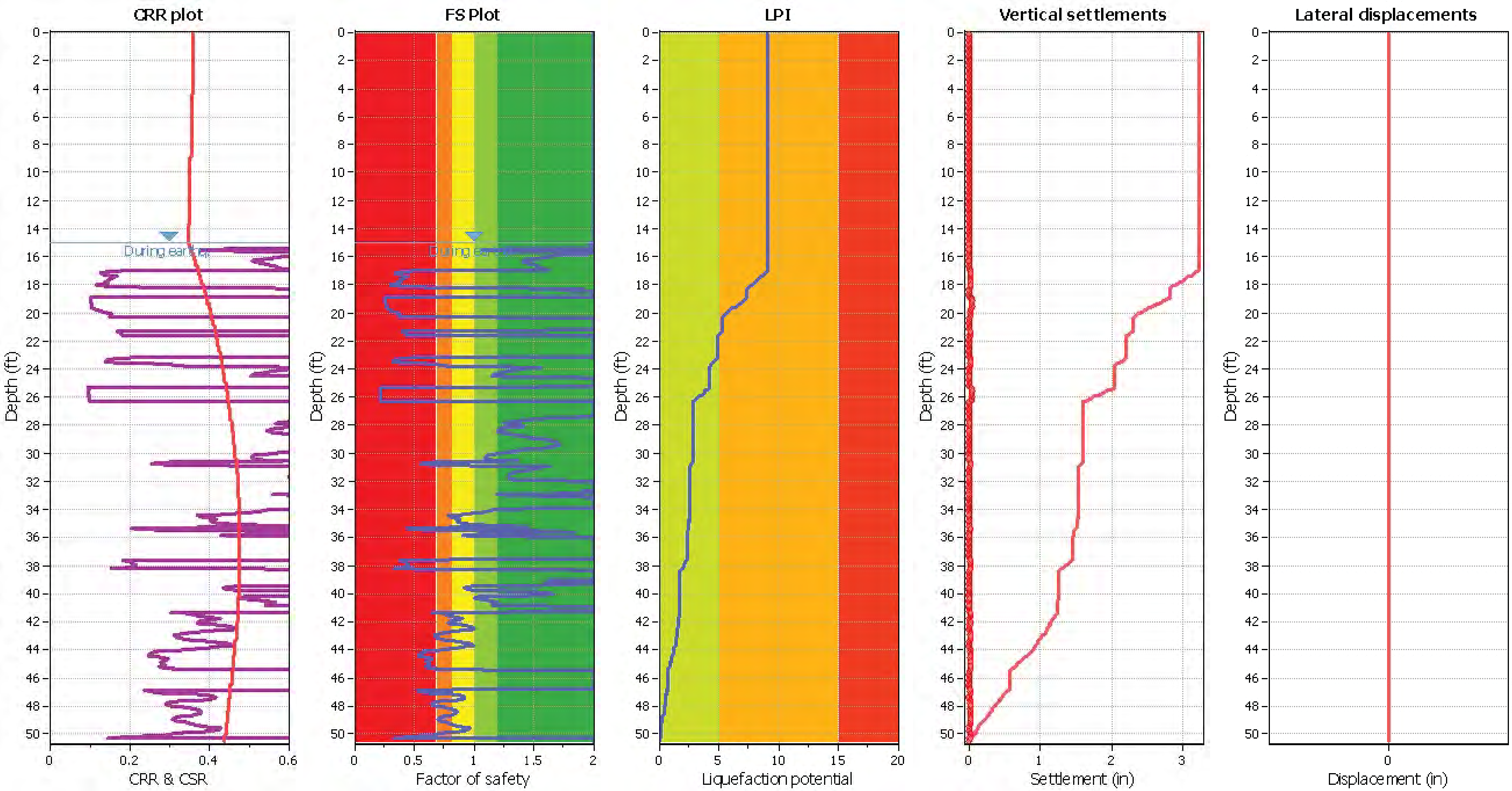
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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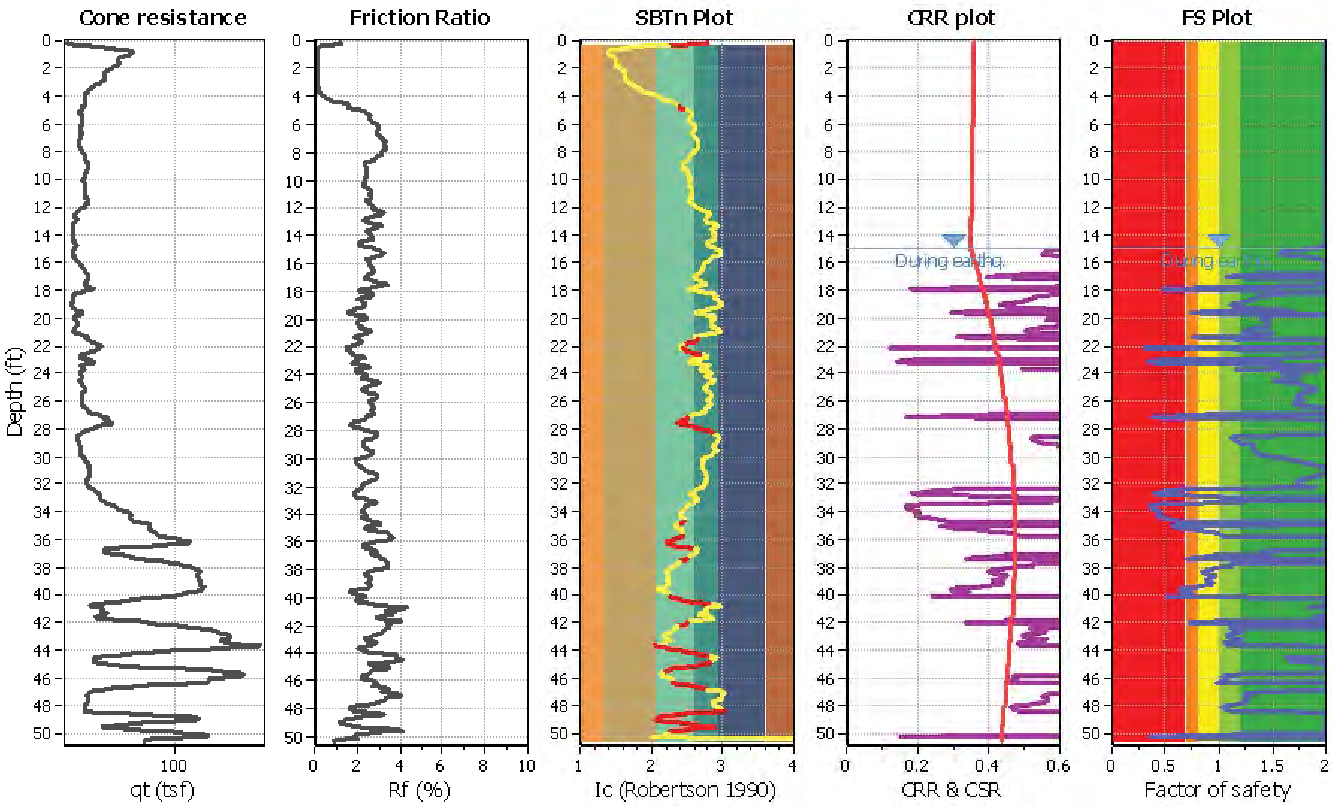
LIQUEFACTION ANALYSIS REPORT

Project title : AT Dublin **Location : Dublin, California**

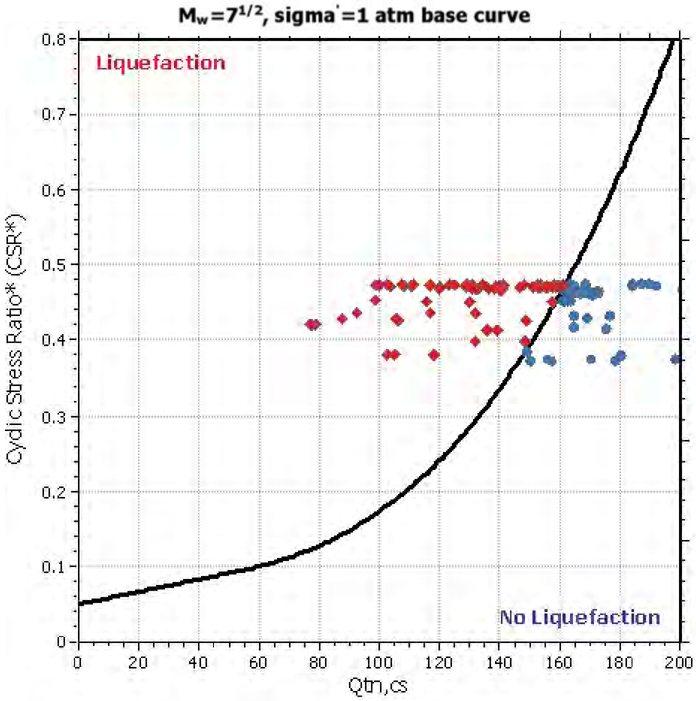
CPT file : 2-CPT12

Input parameters and analysis data

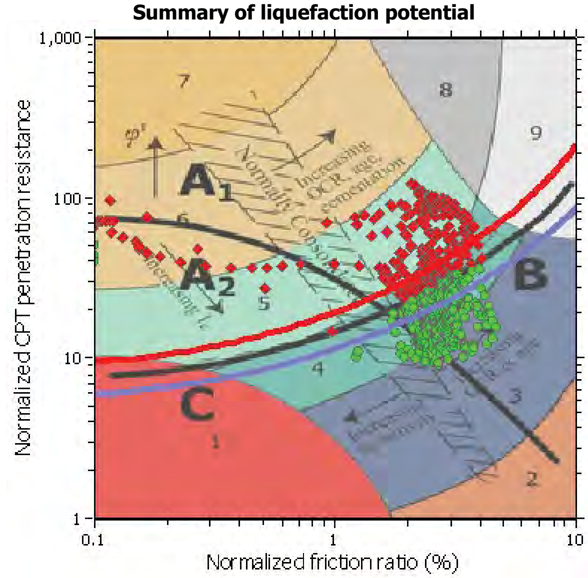
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		



$M_w=7^{1/2}$, sigma'=1 atm base curve

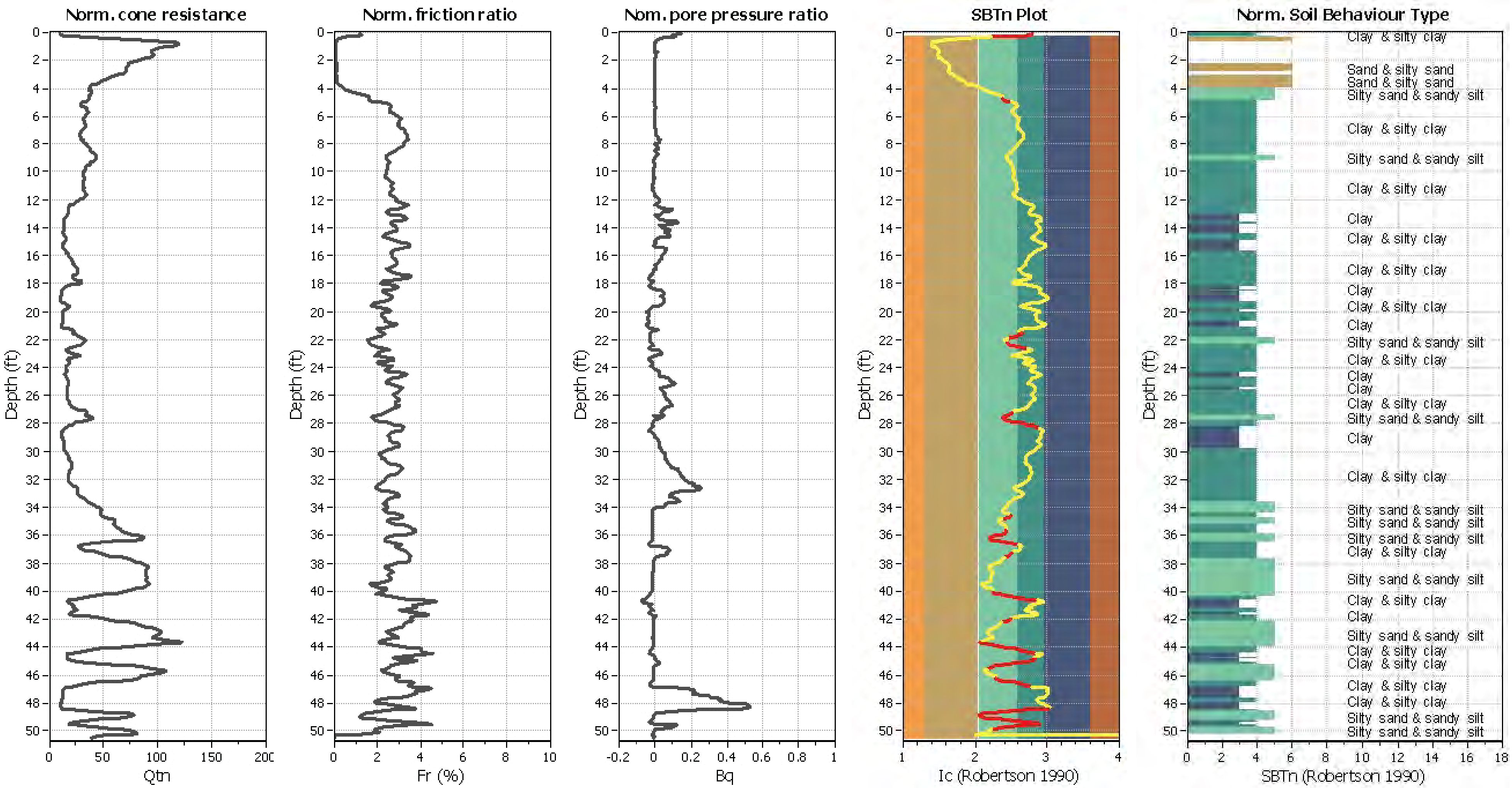


Summary of liquefaction potential



Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normaliz



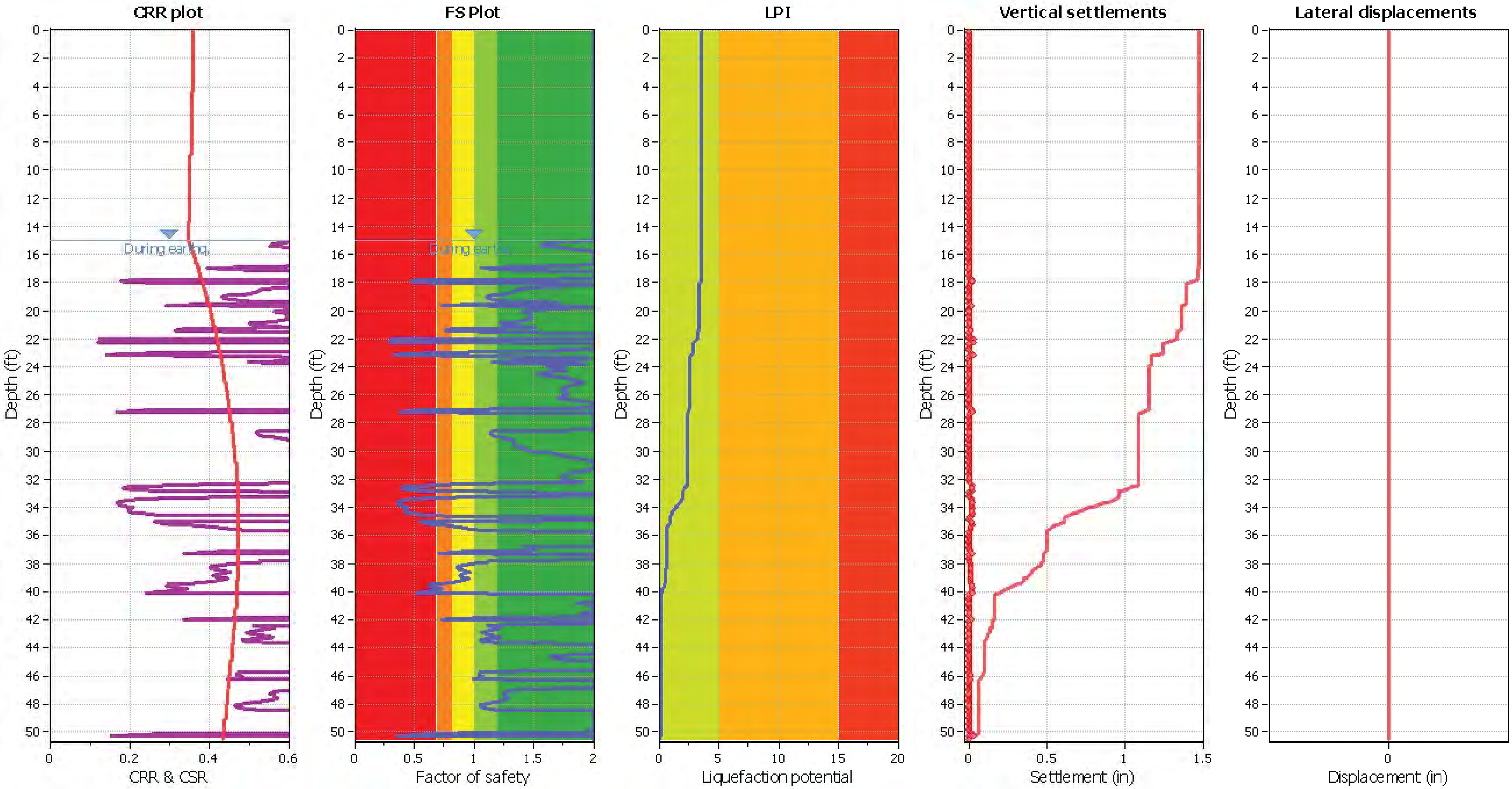
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

APPENDIX F

PREVIOUS EXPLORATION LOGS BY OTHERS

BORING LOG B1-1

JOB NUMBER: 1394.112 **DATE DRILLED:** 1-15-98

JOB NAME: Dublin Ranch - Assessment District **SURFACE ELEVATION:** 388 feet

DRILL RIG: Solid Flight Auger **DATUM:** Mean Sea Level

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

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
15	23.0	95		CL	SILTY CLAY, gray-brown, wet, stiff, trace gravel
18	21.9	91			
				SP	SAND, gray-brown, moist, medium dense, fine to medium-grained
17	4.9	99			
			5	ML	CLAYEY SILT, light brown, moist to wet, stiff, with sand
				ML	SANDY SILT, light brown, moist to wet, medium dense
35	17.6	106		SM	SILTY SAND, light brown, moist to wet, medium dense, fine-grained
			10		
				ML	SANDY SILT, light brown, moist to wet, medium dense, fine-grained sand
32	29.3	92		ML	CLAYEY SILT, light brown, moist to wet, very stiff
			15		Boring terminated at 15 feet. No free water encountered.
			20		

BORING LOG B1-2

JOB NUMBER: 1394.112 **DATE DRILLED:** 1-15-98

JOB NAME: Dublin Ranch - Assessment District **SURFACE ELEVATION:** 370 feet

DRILL RIG: Solid Flight Auger **DATUM:** Mean Sea Level

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

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
				GC	CLAYEY GRAVEL, gray-brown, moist, medium dense, fine gravel
20	3.6	104			
14	9.0	112			
				CL	SILTY CLAY, gray-brown, wet, stiff, some gravel at 2-1/2 feet, brown
				ML	CLAYEY SILT, brown to light brown, moist to wet, very stiff, trace sand
37	21.1	99			
			5		
				ML	SANDY SILT, light brown, moist to wet, medium dense, fine-grained sand
36	22.8	95			
			10		
38	17.7	101			
			15		
					Boring terminated at 15 feet. No free water encountered.
			20		

BORING LOG B1-13

JOB NUMBER: 1394.112 **DATE DRILLED:** 1-6-99

JOB NAME: Dublin Ranch - Assessment District **SURFACE ELEVATION:** 366 feet

DRILL RIG: Solid Flight Auger **DATUM:** Mean Sea Level

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

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
90	13.4	106		CL	SILTY CLAY, dark gray-brown, dry to moist, hard, trace fine-grained sand
60/ 6"	-	-		CL	SILTY CLAY, light gray-brown, dry, hard, trace fine-grained sand
80	13.6	101	5		
91	9.3	110		ML	SANDY SILT, light gray-brown, dry, very dense, trace clay, fine-grained sand
				SM	SILTY SAND, light gray-brown, dry, very dense, fine to medium-grained sand
50/ 6"	10.4	105			
			10		
60	13.3	112		ML	CLAYEY SILT, light gray-brown, mosit, very stiff
				SM	GRAVELLY SAND, light gray-brown, moist, dense, fine to coarse-grained sand, fine gravel
25	13.5	107		CL	SANDY CLAY, light gray-brown, moist, very stiff
			15	SM/ ML	SILTY SAND / SANDY SILT, light gray-brown, moist, medium dense, fine-grained sand, trace interbedded sandy silt
42	13.4	100			
			20		

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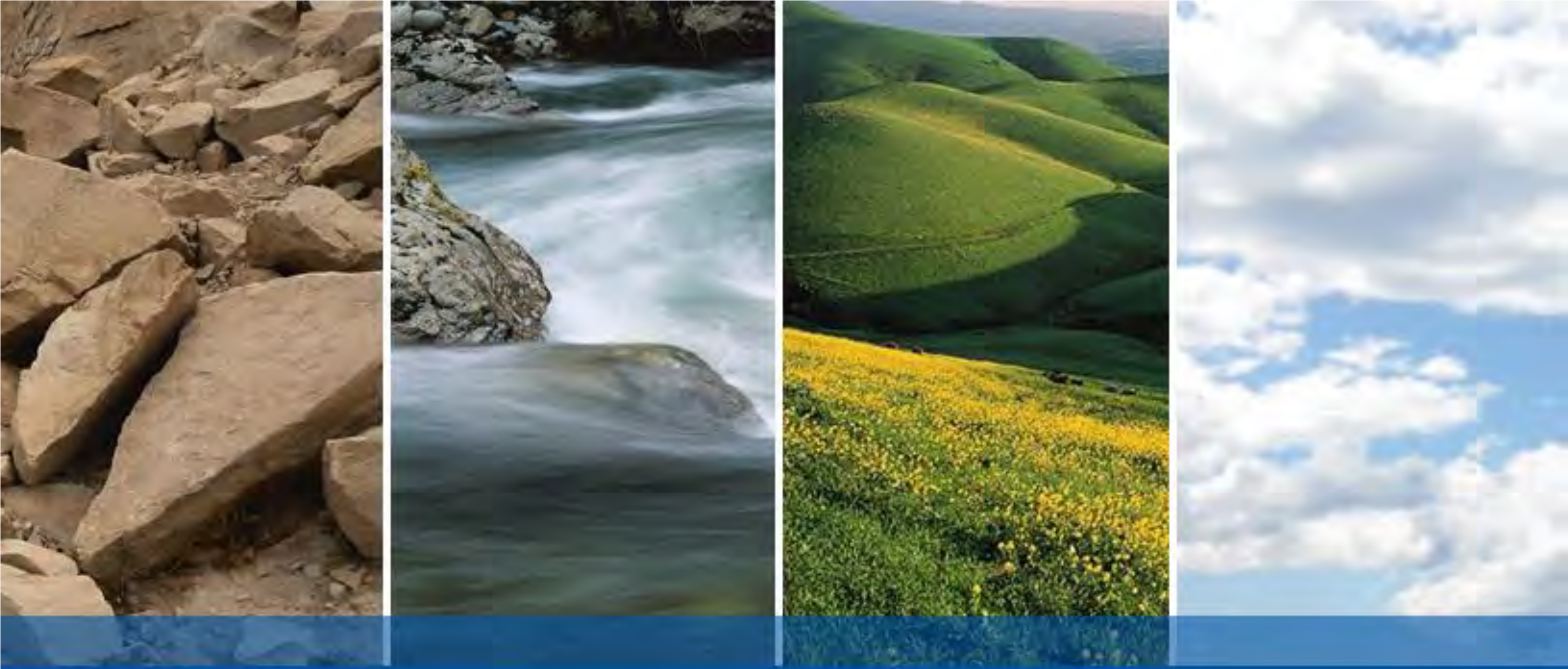
BORING LOG B1-13

JOB NUMBER: 1394.112 **SHEET:** 2 **OF:** 2

JOB NAME: Dublin Ranch - Assessment District **DEPTH:** 20 feet **TO** 25 feet

NOTES:

BLOWS PER FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT p.c.f.	DEPTH IN FEET	USCS CLASSI-FICATION	DESCRIPTION
				SM/ML	SILTY SAND/SANDY SILT, light gray-brown, moist, medium dense, fine-grained sand, trace interbedded sandy silt
27	19.4	104			
			25	CL	SANDY CLAY, red-brown, moist to wet, very stiff, fine to medium-grained sand
					Boring terminated at 25 feet. No free water encountered.
			30		
			35		
			40		



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