

Project No.
14121.000.000

June 28, 2018

Mr. Clyde Wright
Google Incorporated
1600 Amphitheatre Parkway
Mountain View, CA 94043

Subject: Diridon Station – Project Spartan, Lot D
San Jose, California

PRELIMINARY GEOTECHNICAL EXPLORATION FOR LOT D

Reference: ENGEO, DRAFT Subsurface Characterization and Initial Geotechnical Assessment, Diridon Station – Project Spartan, San Jose California; September 25, 2017; Project No. 14121.000.000

Dear Mr. Wright:

At your request, we performed preliminary geotechnical explorations of Lot D to support your due diligence efforts on the Spartan Project at Diridon Station in San Jose, California. The master Spartan Project covers approximately 2.4 million-square-feet and multiple parcels surrounding the Caltrain Diridon Station in San Jose. Lot D occupy approximately 1.6 acres within the master Spartan Project. We performed a preliminary geotechnical exploration within Lot D on March 30, 2018 to collect subsurface data and assess geotechnical and geologic risks. This report provides a summary of our findings and preliminary recommendations for site development.

This report was prepared for the exclusive use of our client and its consultants for the design 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 findings of 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.

SITE LOCATION AND PROPOSED DEVELOPMENT

Lot D is also known as San Jose Arena Block 5A and encompasses Assessor's Parcel Number 259-38-130. The site is located at 8 South Montgomery Street in San Jose, California and is currently used as surface parking lot (Figure 1). The site is bounded by W Santa Clara Street to the North, S Montgomery Street to the west, S Autumn Street to the East, and various buildings and structures along the property line to the south.

Development plans for Lot D are not available at this time; however, we understand the Spartan Project consists of a mixed-use, transit-oriented development, including office buildings, retail spaces, and R&D spaces. The proposed buildings are expected to be multi-story structures with several below-grade levels. Moreover, above-grade or below-grade transportation hubs and stations will be incorporated into the project.

PREVIOUS GEOTECHNICAL STUDIES

We previously completed a subsurface characterization and initial geotechnical assessment of the Spartan Project area, which included this site (Reference 1). Reference 1 included extensive research on existing geotechnical information available near the project area. Based on existing data, Reference 1 presents general subsurface conditions within the Spartan Project and provide initial geotechnical recommendations for high-level planning purposes. The following reports reviewed as part of Reference 1 were identified as relating to Lot D during this assessment.

- PARIKH Consultants, Inc., (2014); DRAFT Bart Silicon Valley Phase II Santa, Clara Extension Project, Geotechnical Memorandum; February 2014.
- HMM/Bechtel, (2008); Central Area Guideway 65 percent Submittal: Combined Geotechnical Baseline Report P0503-D300-RPT-GEO-006; December 31, 2008.
- HMM/Bechtel, (2008); Silicon Valley Rapid Transit (SVRT) Project – Contract No. S03099 Central Area Guideway 65% Engineering Geotechnical Summary for Diridon Arena Station; July 8, 2008.
- HMM/Bechtel, (2008); Geotechnical Data Report – Phase Two 65% Engineering Design Investigation, P0503-D300-RPT-GEO-004; January 31, 2008.

The above reports were prepared for the BART Silicon Valley extension project and include 5 historic exploratory logs within Lot D and various historical exploration logs in the vicinity of lot D. We reviewed these reports to prepare this letter.

REGIONAL GEOLOGY AND SEISMIC SETTING

The upper soil profile is predominately alluvial fan deposits and alluvium of Holocene age (Qhb, Qhfp, and Qhf2). The Holocene Alluvial Fan Deposits (Qhf) and Holocene Alluvium Basin deposits (Qhb) primarily consist of medium stiff to very stiff silty clays and clayey silts with varying amounts of sand. The clays and silts are occasionally interbedded with medium dense to dense sand layers. The Holocene Alluvial Fan Deposits and Holocene Alluvium may be generally categorized with USCS designations of CL, ML, SC, and SM.

The Holocene Alluvial Fan Deposits and Alluvium are generally underlain by Latest Pleistocene Alluvial Fan Deposits (Qpf). The depths of the Pleistocene-age sediments are approximately 50 to 60 feet above Mean Sea Level (MSL) (E. J. Helley, 1990). These deposits are generally similar in composition to the younger Holocene-age deposits above, except that the sand layers are generally more dense. In addition, gravel layers with varying amounts of silt and clay are also common. The Latest Pleistocene Alluvial Fan Deposits may generally be categorized with USCS designations of CL, ML, SP, SM, SC, GP, GM, and GC.

The nearest active fault is the Hayward – South East extension, which is mapped approximately 6.2 miles northeast of the site. This fault is considered capable of a moment magnitude earthquake of 6.4. Other active faults in the region include the Hayward-Rodgers Creek and San Andreas faults approximately 9 and 11 miles away, capable of a moment magnitude of 7.4 and 8.0. For a more complete list of active faults within 100km of the project site refer Reference 1. In

addition to the active faults noted above, Bortugno (1991) and Jennings (1994) mapped two concealed faults, the Silver Creek fault and the San Jose fault, in the vicinity of the site; these faults are also discussed in Reference 1.

FIELD EXPLORATIONS

Our field exploration included advancing one Cone Penetration Tests, CPT-6, and one Seismic Cone Penetration Tests, S-CPT-6A at the site, as shown on Figure 2. We performed our field exploration on March 30, 2018. The locations of our explorations are approximate and were estimated by pacing from features at the site; they should be considered accurate only to the degree implied by the method used.

We retained the services of a subcontractor with a CPT rig to push the CPT and S-CPT to a maximum depth of approximately 160 feet. We performed the CPTs in general accordance with ASTM D-5778. Measurements include the tip resistance to penetration of the cone (Q_c), the resistance of the surface sleeve (F_s), and pore pressure (U) (Robertson and Campanella, 1988).

We also performed Seismic Cone Penetration Testing in conjunction with the CPTs to obtain shear wave soundings with the addition of a horizontally active geophone (28 Hertz) that is rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip. We generated shear waves by using an impact hammer horizontally striking a beam that is held in place by a normal load. We recorded the shear wave arrival time at the cone.

CPT data and shear wave velocities, are presented in Appendix A. The CPT holes were backfilled with cement grout upon completion in accordance with the requirements of the Santa Clara Valley Water District.

SUMMARY OF FINDINGS

Subsurface conditions

Fill depths ranged between 1 and 4 feet below grade, but deeper fill depths may be present locally. The fill may include loose to dense silty sand, sand, gravelly sand, silt, and variable amounts of debris. Since the fill sources are generally not known, we anticipate the fill may vary significantly between locations.

The alluvium consists of clay, silty clay, clayey silt, silt, silty sand, and gravelly sand beneath the fill. The upper alluvium, generally encountered within the upper 38 feet, consists of fine-grained soil that is typically soft to stiff. The upper alluvium also contains minor interbedded layers of loose to very dense silty and clayey sand, sand, and gravel vary in thickness and consistency. The interbedded granular layers generally range from ½ inch to 1 foot thick and are medium dense to dense. The upper alluvium may include layers of moderately compressible clay. Below 38 to 40 feet a 10 to 12 foot thick layer of medium dense to very dense sand and gravel exists.

Below the alluvium, the lower alluvium consists of sand and gravel interbedded with a clay and silt matrix. The coarse-grained deposits within the lower alluvium are interbedded with very stiff to hard clay and silt. The alluvial deposits are expected to continue to bedrock. Bedrock is estimated to be over 1,000 feet below ground surface.

Groundwater Levels

We performed pore pressure dissipation tests at various depths within the CPTs during our field exploration to estimate groundwater levels. We summarize the pore pressure dissipation tests in the table below;

Pore Pressure Dissipation Tests

TEST DEPTH (FEET)	EXPLORATION ID	APPROX. DEPTH TO GROUNDWATER (FEET)	APPROX. GROUNDWATER ELEVATION (FEET)
38	CPT-06	15.1	71.9
65	CPT-06	14.7	72.3
76	CPT-06A	14.4	73.6
93	CPT-06A	12.6	75.4
116	CPT-06A	14.3	73.7

We recommend using a preliminary design groundwater elevation of 75 feet NAVD88, which corresponds to a depth of about 12 feet below ground surface. During dry weather conditions, the stabilized groundwater level could be at much lower elevations. Perched water conditions may also be present.

Comparison to previous explorations

We compared our preliminary field explorations to that completed by others referenced above. These showed some agreement and also some inconsistencies were present, this may be attributed to the variable nature of the alluvial deposits. Many logs were in stick log form only and missing full exploration logs. The use of historical explorations should be used with caution for their applicability to Lot D.

GEOLOGIC HAZARDS AND DISCUSSIONS

The major geotechnical hazards at the site are listed below. The risks associated with these hazards should be addressed with site-specific geotechnical explorations during the project design development.

- Strong seismic ground shaking;
- High groundwater level and rapid groundwater flows during basement excavations;
- Liquefaction;
- Compressible soil;
- Undocumented fill;
- Expansive soil.

We briefly discuss each hazard in relation to the development and Lot D below;

Strong Seismic Ground Shaking

Multiple active faults capable of a magnitude 7.0 or greater are located within 20 miles of the project site; therefore, the potential for severe ground shaking should be expected during design.

High Groundwater Level

The groundwater level at the site is estimated at approximately 12 feet below the ground surface and granular layers consisting of sand and gravel within the Holocene-age alluvium are likely to be highly permeable. Previous pump tests by others in the vicinity of the site (HMM/Bechtel, (2008) indicate a potential for high groundwater flows in excavations extending below the groundwater table. The granular layer between 38 and 55 feet below the ground surface is likely to cause high groundwater flows if basement excavations are in close proximity. Special consideration of this layer should be included for future assessments for basement excavations extending into or near this layer, high groundwater flows or hydrostatic heave should be expected.

Liquefaction

Based on our preliminary explorations, liquefaction of the granular Holocene layers may occur during severe ground shaking. The planned basement excavation will remove some of the potentially liquefiable layers, reducing the effects of liquefaction on development at the site but development at Lot D will need to consider some limited liquefaction-induced total and differential settlement. This will be dependent on the final basement elevations and proposed foundation types. We estimate total liquefaction-induced settlement to be less than ½ inch and differential settlement of ¼ inch over a horizontal distance of 40 feet for a basement 30 feet below the existing ground surface. The risk for liquefaction settlements exceeding that above in localized areas of the site may occur due to the variable nature of the alluvial deposits and should be assessed in further stages of the project.

Compressible Soil

The planned basement excavations will result in the removal of soil and a decrease in overburden pressure on the underlying soils; thus, the effects of load-induced settlement are expected to be minimal under the building foundations.

Undocumented Fill

The planned basement excavations will result in removal of the majority of existing fill. Soil management and environmental characterization will be required.

Expansive Soil

The planned basement excavations will result in the mitigation of expansive soil hazards.

PROJECT SCOPING CONSIDERATIONS

Building Foundations Options

For project scoping considerations we recommend the most feasible foundation type for the proposed structures is a reinforced concrete mat foundation bearing on a prepared subgrade of crushed rock, geotextile, and a mud or non-structural concrete slab layer. As an alternative to the mat slab founded on a prepared subgrade, the building foundations can be supported on deep foundation piles. Due to the high groundwater levels, all below-grade basements will need to be waterproofed. Tie-down anchors may be needed to counteract buoyancy.

Excavation Shoring and Dewatering

For project scoping considerations we recommend the use of shoring systems designed to cut off lateral groundwater flows such as the use of cement-deep-soil-mixed (CDSM), secant-pile wall.

The CDSM should extend at least 10 to 15 feet of embedment into low-permeability clay layers below the bottom of the deep excavation; if low-permeability clay layers are not present, the secant pile walls may need to extend until low-permeability clays are encountered. The depth and extent of low permeability clay layers and predicted groundwater flows should be explored as part of the site-wide exploration program.

CLOSING

The comments provided in this letter are professional opinions developed in accordance with current standards of geotechnical engineering practice; no warranty is expressed or implied. If you have any questions or comments regarding this letter, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated



Ollie Van Rooyen
ovr/ylijk/bvv

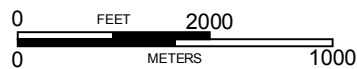
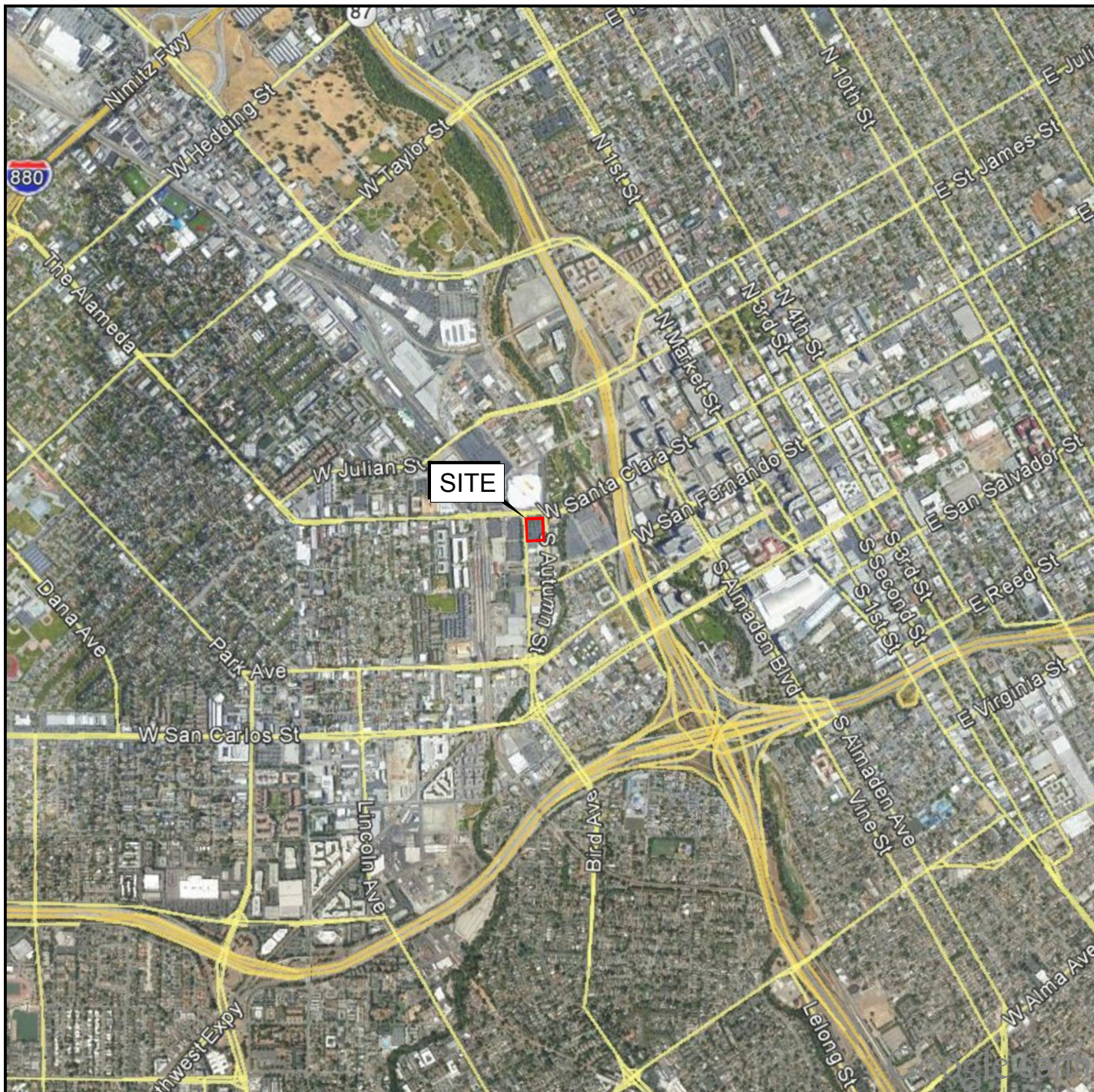


Yan Lap Janet Kan, GE, CEG

Attachments: Figure 1: Site Vicinity Map
Figure 2: Site Plan
Appendix A: Exploration Logs
Appendix B: Historic Logs

FIGURES

Figure 1: Site Vicinity Map
Figure 2: Site Plan



BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE



VICINITY MAP - LOT D
8 SOUTH MONTGOMERY STREET
SAN JOSE, CALIFORNIA

PROJECT NO.: 14121.000.000

SCALE: AS SHOWN

DRAWN BY: GLJ

CHECKED BY: DB




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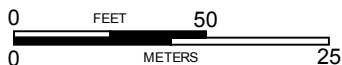
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EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

- CPT-6A**  CONE PENETRATION TEST (ENGEO, 2018)
- S-CPT-6A**  SEISMIC CONE PENETRATION TEST (ENGEO, 2018)
-  EXPLORATIONS BY OTHERS



BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE



SITE PLAN - LOT D
8 SOUTH MONTGOMERY STREET
SAN JOSE, CALIFORNIA

PROJECT NO.: 14121.000.000

SCALE: AS SHOWN

DRAWN BY: GLJ

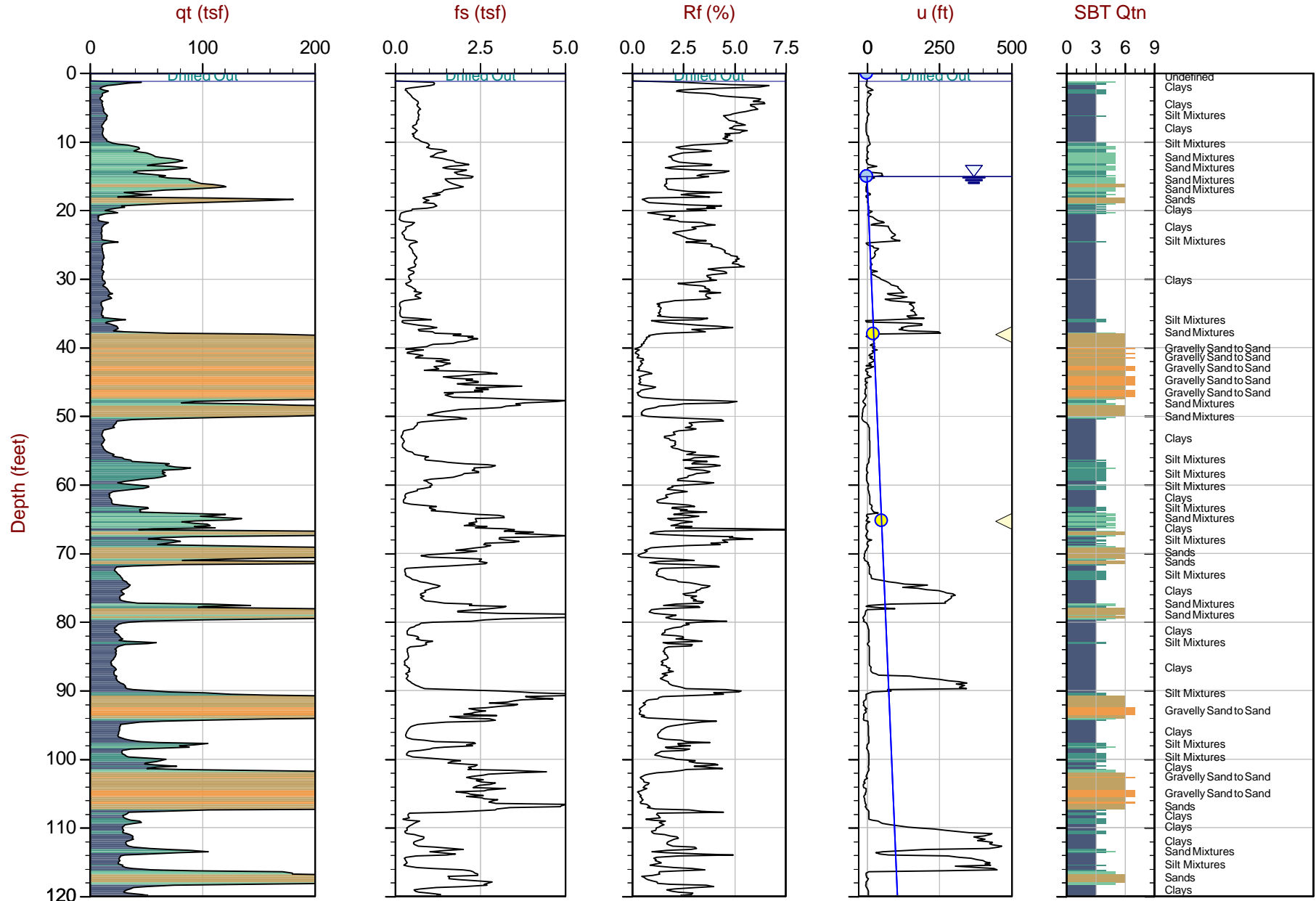
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FIGURE NO.

2

APPENDIX A

Exploration Logs



Max Depth: 41.750 m / 136.97 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: Every Point

File: 18-56026_CP06.COR

Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010

Coords: UTM 10N N: 4132240m E: 597389m

Sheet No: 1 of 2

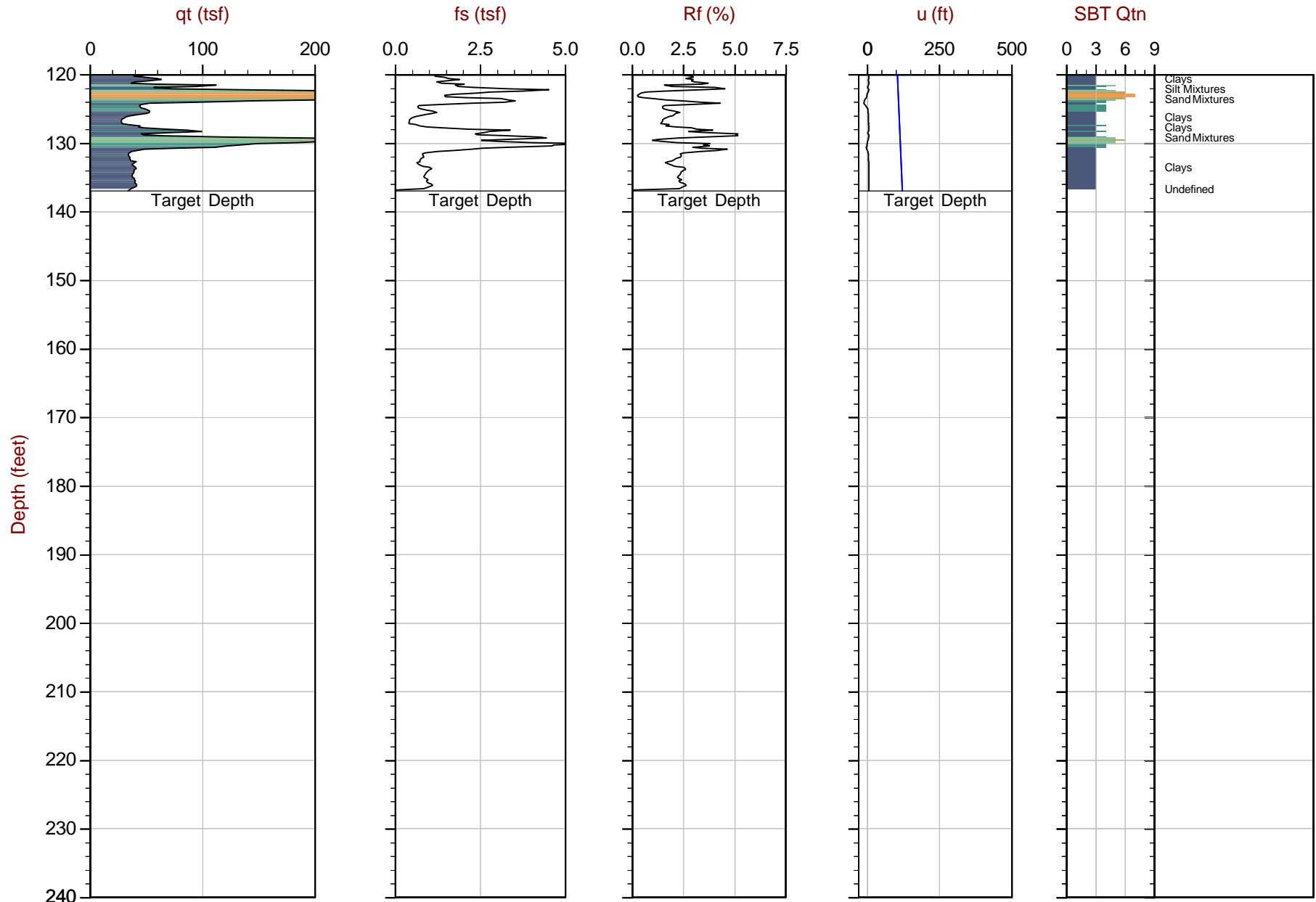
● Equilibrium Pore Pressure (Ueq)

● Assumed Ueq

◀ Dissipation, Ueq 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.



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

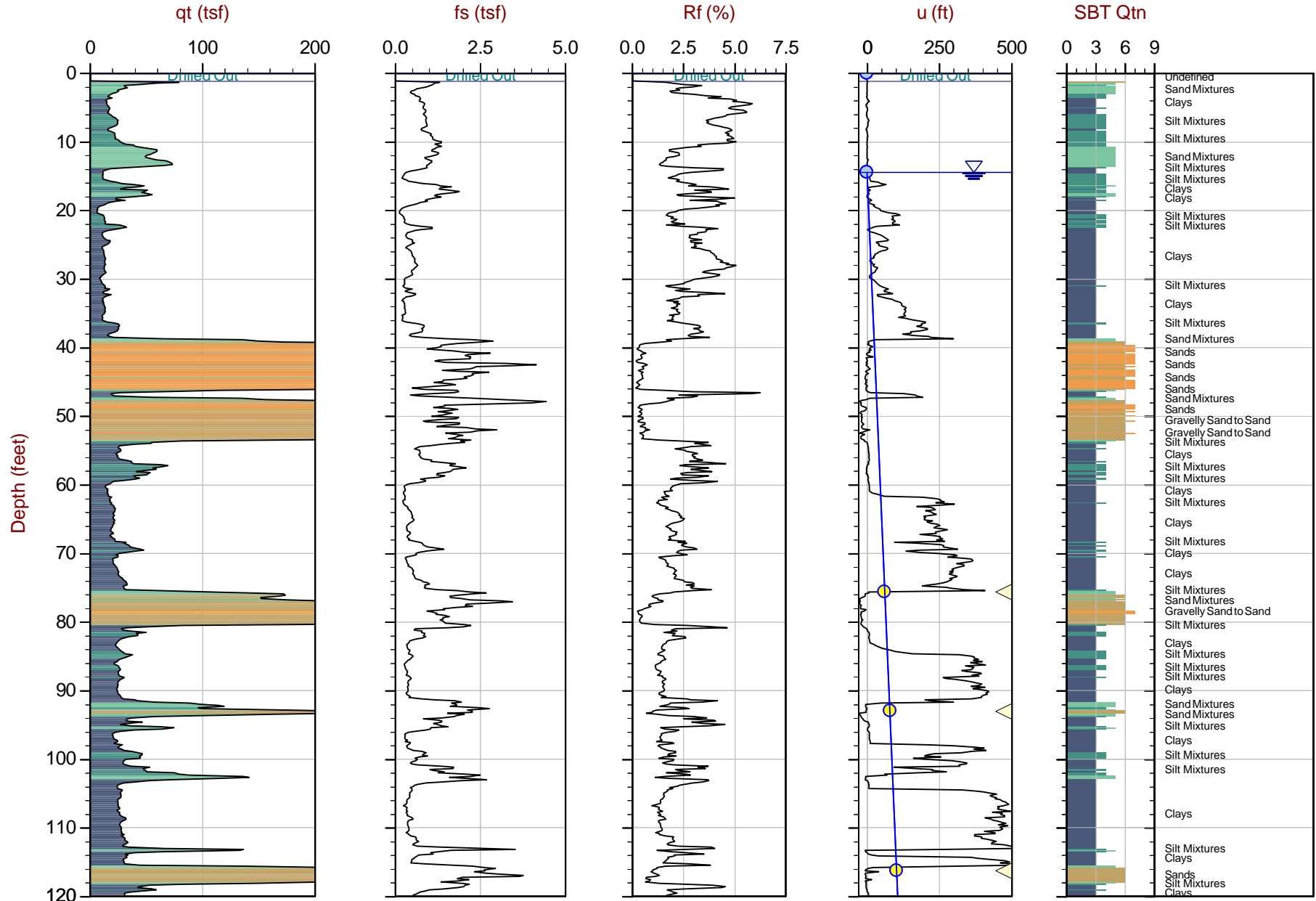
File: 18-56026_CP06.COR
Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM10N N: 4132240m E: 597389m
Sheet No: 2 of 2

● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◀ Dissipation, Ueq 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.



Max Depth: 48.800 m / 160.10 ft

Depth Inc: 0.050 m / 0.164 ft

Avg Int: Every Point

File: 18-56026_SP06A.COR

Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010

Coords: UTM10N N:4132176m E:597411m

Sheet No: 1 of 2

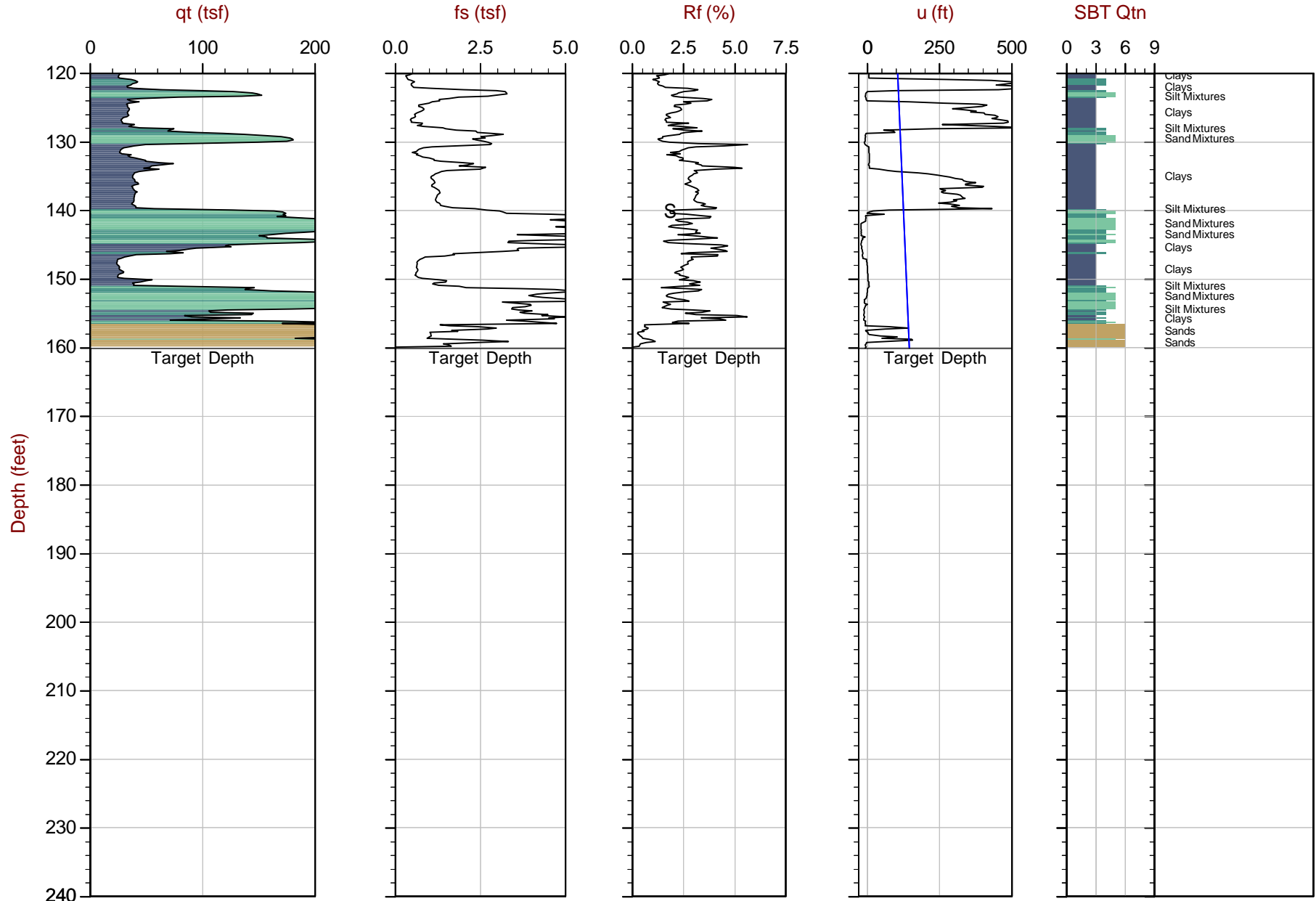
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Sheet No: 2 of 2

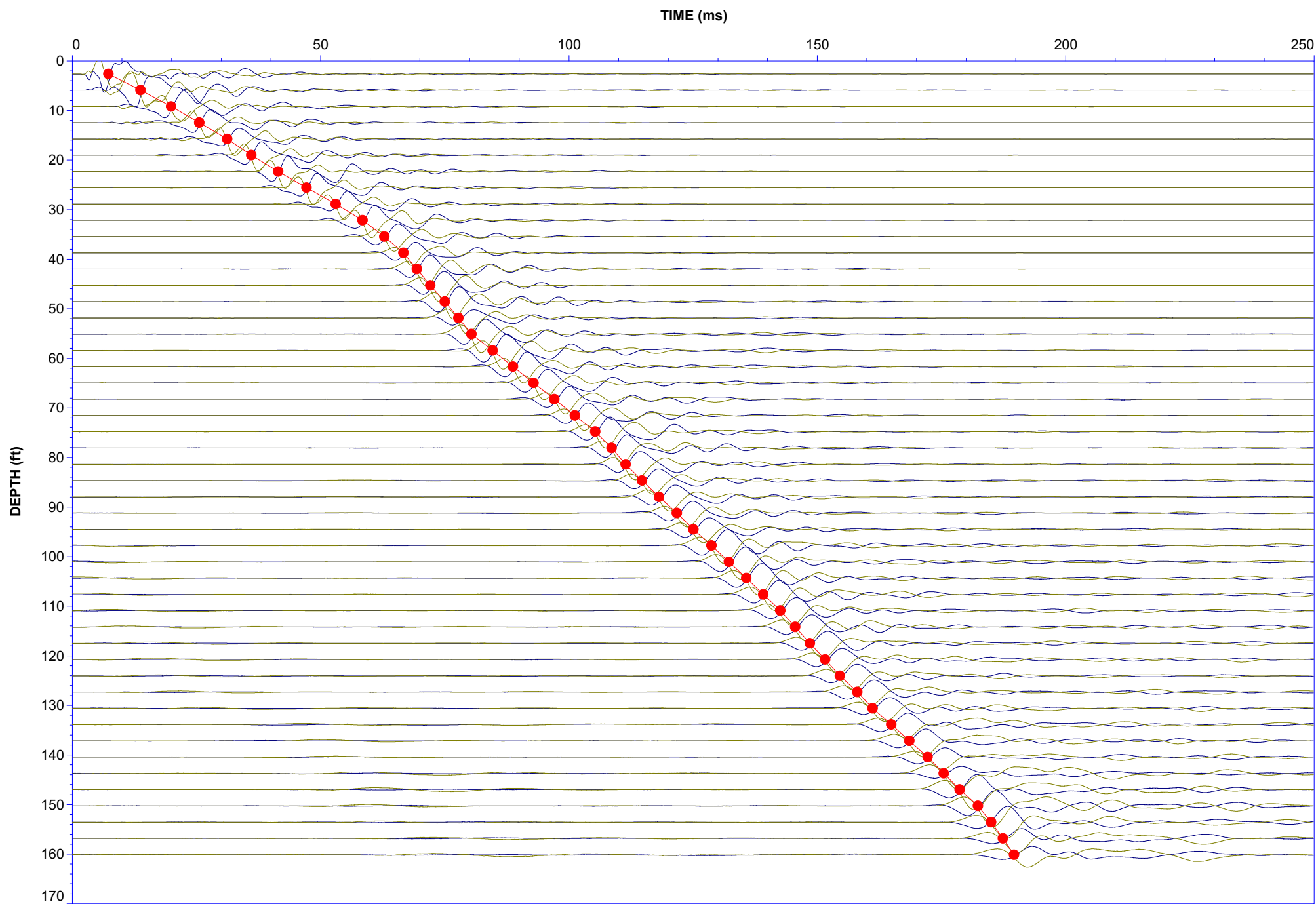
● Equilibrium Pore Pressure (Ueq)

● Assumed Ueq

◀ Dissipation, Ueq achieved

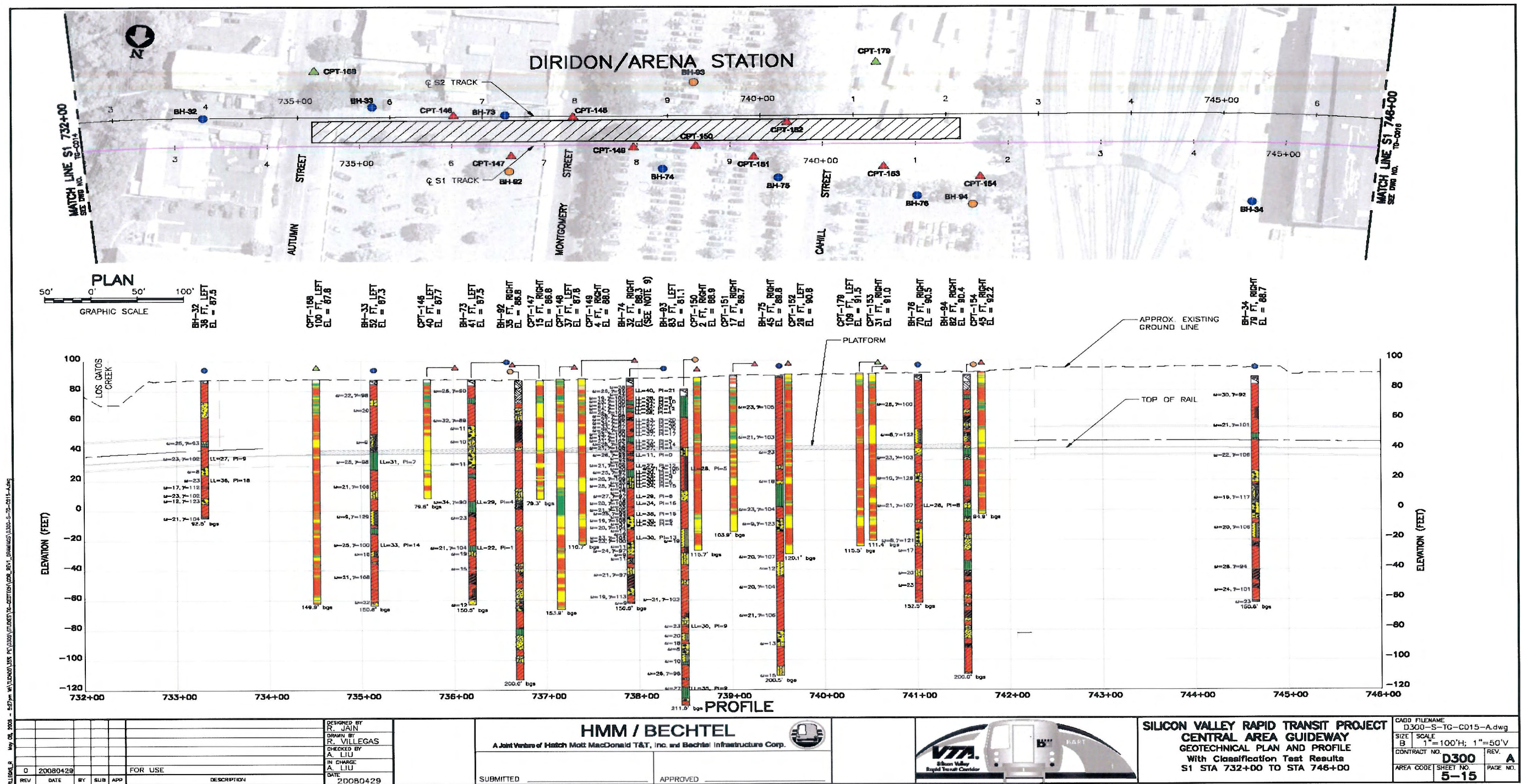
— Hydrostatic Line

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



APPENDIX B

Historic Logs



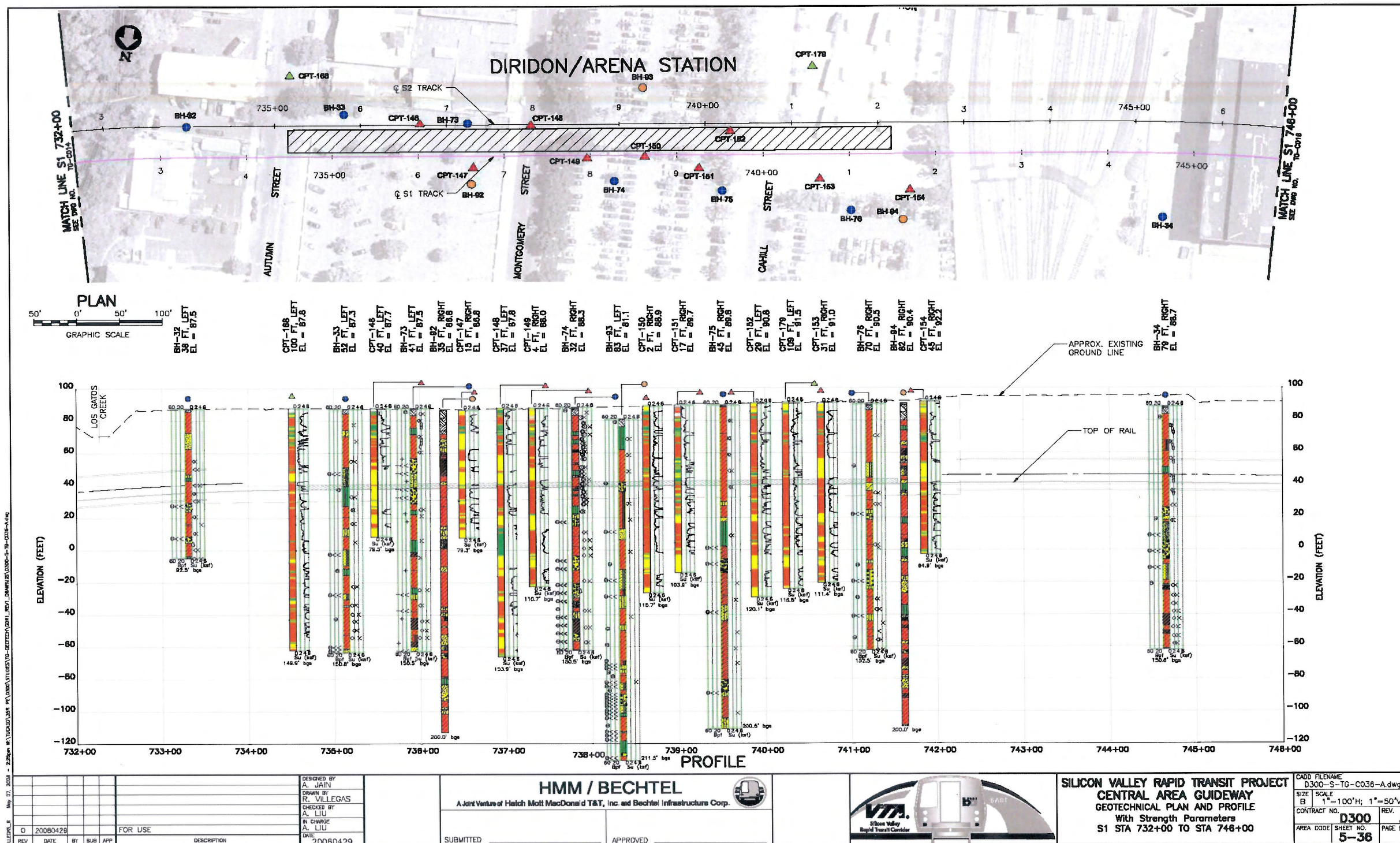


Figure 4b Geotechnical Plan and Profile with Strength Parameters at Diridon/Arena Vicinity (from HMM/Bechtel 2008a, Not to Scale)