APPENDIX C GEOTECHNICAL ENGINEERING REPORT

GEOTECHNICAL ENGINEERING REPORT
SHERMAN STREET COMBINED SEWER OVERFLOW (CSO)
STORAGE TANK
CITY OF CAMBRIDGE, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS
KLEINFELDER PROJECT #: 26001480.008A

August 10, 2026

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A Report Prepared for:

Department of Public Works
City of Cambridge, Massachusetts
147 Hampshire St.
Cambridge, MA 02139

GEOTECHNICAL ENGINEERING REPORT

SHERMAN STREET COMBINED SEWER OVERFLOW (CSO)
STORAGE TANK DESIGN

CITY OF CAMBRIDGE, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS (DPW)

Kleinfelder Project Number: 26001480.008A

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1 INTRODUCTION

1.1 GENERAL

This report presents to City of Cambridge - Department of Public Works (the Client) the results of Kleinfelder's geotechnical engineering services for the Sherman Street Combined Sewer Overflow (CSO) Storage Tank (the Project) planned in Cambridge, Massachusetts. The objective of this geotechnical engineering report is to present the results of Kleinfelder's geotechnical subsurface exploration program, and to provide geotechnical design recommendations and construction considerations for the planned development. Kleinfelder's geotechnical engineering services have been completed per the executed contract titled "House Doctor Engineering Service for Sherman Street CSO Storage Tank with Revision #1" dated January 2026.

This report was prepared in general accordance with the provision of the Massachusetts amendments to the 2021 International Building Code (IBC), 10th Edition (collectively MSBC, i.e., the Code). This report is subject to the Limitations included herein included in **Section 6**.

1.2 BACKGROUND INFORMATION

Our understanding of the Project is based on the following documents:

- Contract titled "House Doctor Engineering Service for Sherman Street CSO Storage Tank with Revision #1" executed between the City of Cambridge Department of Public Works and Kleinfelder Inc. in January 2026;
- Report titled "Conceptual Design Report - Sherman Street DPW Facility and CSO Storage Tank" prepared by Stantec Consulting Services Inc dated December 2025 (designated herein as the "Conceptual Report");
- Report titled "Preliminary Geotechnical Report – Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank" prepared by Kleinfelder Inc., dated June 2, 2025 (designated herein as the "Preliminary Geotechnical Report");
- Survey drawing titled "Existing Condition Survey Sherman St Cambridge, Massachusetts" prepared by WSP USA Inc, dated May 23, 2025;

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- Report titled “Phase I Environmental Site Assessment – City of Cambridge – 41 Bellis Circle – Cambridge, Massachusetts” dated August 11, 2023 (August 2023 Phase I ESA); and
- Conceptual drawing titled “CSO Storage Tank” prepared by Stantec Consulting Services Inc. dated June 29, 2026.

1.3 EXISITING CONDITIONS

The site consists of a parcel located at 41 Bellis Circle in Cambridge, Massachusetts, as shown on **Figure 1**. The area of the property is approximately 1 acre and is bounded by Sherman Street to the east, Bellis Circle to the South, residential properties to the West, and the Massachusetts Bay Transportation Authority Commuter Rail (MBTA) (Fitchburg Line) to the North. The site is comprised predominantly of an asphalt parking lot surrounded by landscaped areas and a perimeter chain link fence. The overall area is relatively flat with ground surface elevations ranging from approximately elevation (El.) 25 to 27 feet. The existing conditions are shown on **Figure 2**.

Based on our review of the August 2023 Phase I ESA, it is understood that the site was previously developed as the West Cambridge Depot, which included two railroad spurs as early as 1900 until 1934. By 1935, the site had been redeveloped by Diamond Coal Company which consisted of a coal storage area and adjacent structure with a small footprint. The Diamond Coal Company reportedly operated until late 1960’s and all buildings and underground storage were demolished in the early 1980’s. In August 2016, an area of contaminated soil was excavated from the parking lot under a Release Abatement Measure (RAM) plan. The average depth of the excavation was approximately 13 to 15 feet below the ground surface (bgs). The approximate disposal site boundary and historic building footprints are shown on **Figure 2.**

Unless otherwise specified, in this report, latitude and longitude are referenced to the Massachusetts State Plane Coordinate System (Main Zone)/North American Datum of 1983 (NAD83) horizontal datum. Elevations (El.) provided in this report reference to Cambridge City Base (CCB) and are in U.S. feet. Approximate elevations are based on the survey of “Existing condition of Sherman Street Cambridge, Massachusetts” plan prepared by WSP Inc., dated May 23, 2025. The approximate location of the site in relation to the surrounding area is presented as a vicinity map provided in **Figure 1**.

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1.4 PROPOPSED CONSTRUCTION

1.4.1 CSO Tank

Based on discussions with the design team and the concept plan dated June 29, 2026, the proposed development consists of construction of a 2.1 million gallon combined sewer overflow (CSO) tank situated on the eastern portion of the parcel, as shown in **Figure 2**. The exterior dimensions of the proposed CSO tank are approximately 166 feet long by 73 feet wide and 32 to 40 feet tall. The base of the tank varies between approximately El. -11 and El. -18 feet. The tank floor is designed to slope toward the east, reaching a maximum depth of approximately 45.1 feet bgs at the wet well/sump pit designated for dewatering and discharge pumps. Ancillary structures associated with the tank include a diversion structure, valve vault, solids holding tank, and inter-connecting pressure and gravity piping. We understand the finished grade over the tank will include parking and vehicular access to the proposed building that is planned for the west side of the parcel.

1.4.2 Diversion Structure and Solids Holding Tank

Based on correspondence with Stantec on July 22, 2026, we understand the diversion structure will be supported by a 2-foot-thick reinforced concrete mat foundation approximately 27 feet in length by 17 feet in width, bearing at approximately 18 feet below ground surface (bgs) or at approximately El. 7 feet, with a uniform service bearing pressure of 3 kips per square foot (ksf). The solids holding tank will be a pre-cast concrete structure bearing at approximately El. 15 feet. The loads for the solids holding tank were not available at the time of this report. Existing site features and the proposed project layout are presented in **Figure 2**.

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2 SUBSURFACE EXPLORATIONS

2.1 REGIONAL GEOLOGY

Based on mapped soil conditions in the "Surficial Materials Map of the Lexington South Quadrangle, Massachusetts" (Stone, B.D., and DiGiacomo-Cohen, M.L., 2018), surficial overburden within the vicinity of the site consist of glacial stratified deposits that include glaciomarine fine-grained deposits and coarse-grained deposits. Glaciomarine deposits, regionally referred to as Boston Blue Clay, generally are comprised of clay, silty clay, and fine sand. These deposits are characterized by a massive to laminated structure, frequently grading from fine sands at the surface into interbedded silts and clays at depth. Within the Boston Basin, these clay sequences can range in thickness from a few feet to over 75 feet. Coarse-grained deposits in the area typically consist of poorly to well-sorted gravel, sand and gravel mixtures, and stratified sands. These deposits reflect the high-energy glaciofluvial and glaciolacustrine environments present during the retreat of the Laurentide Ice Sheet.

Based on the "Bedrock Geology Map of Massachusetts" (Zen, E., et. al., 1983), the bedrock is primarily composed of gray argillite and minor interbedded quartzite, and infrequent sandstone and conglomerate. Argillite is a slightly metamorphosed mudstone/siltstone that often exhibits thin bedding and is susceptible to localized fracturing and weathering at the soil-rock interface.

2.2 PREVIOUS EXPLORATIONS

A subsurface exploration program was completed by CDM Smith for the City of Cambridge as part of the "Danehy Park Environmental Assessment" in October 2024. One test boring, designated MW-102S, was installed within the project site as a monitoring well. Kleinfelder performed a preliminary subsurface exploration program in April 2025 to provide preliminary design recommendations and construction considerations for the Project. Four (4) borings, designated KLF-1 through KLF-4, were completed within the project site. KLF-3 was converted to a monitoring well. The subsurface conditions encountered are consistent with the most recent subsurface investigation program. The previous exploration logs by CDM Smith (2024) and Kleinfelder (2025) are provided in **Appendix A** and **Appendix B,** respectively.

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2.3 RECENT SUBSURFACE EXPLORATIONS

A subsurface exploration program was performed by Kleinfelder between March 25 and April 3, 2026. An overview of the exploration locations performed at the site are shown on **Figure 2** and the boring logs and cone penetration testing report by ConeTec Inc. are provided in **Appendix C and Appendix D**, respectively.

2.3.1 Test Borings

Kleinfelder retained Soil X Corporation of Leominster, Massachusetts to advance six (6) test borings, designated KLF-101 through KLF-106, with an All-Terrain Vehicle (ATV) mounted drill rig using a combination of soft digging, hollow stem auger, and drive and wash drilling techniques. A 4-inch and 3-inch inside diameter (ID) casing were used during drilling to advance the boreholes. The depths of the borings ranged between approximately 27 and 89 feet bgs.

Prior to the start of drilling, a Kleinfelder representative marked the test borings in the field and contacted the driller to notify Digsafe to locate underground utilities. Soft digging was performed using vacuum excavation methods at borings to a depth of approximately 6 feet bgs to limit the risk of unknown utility strike during subsurface explorations. Soft digging included a combination of air-knife, vacuum excavation, and hand-tool digging.

Standard Penetration Test's (SPT's), in general accordance with ASTM D1586, were performed during drilling. Standard penetration testing entails driving a 1.38-inch ID (approximately 2-inch outside diameter - OD) split spoon sampler into a soil layer using a 140-lb weight (hammer) dropping freely from a height of 30 inches and recording the number of hammer blows (blow count) for four (4) consecutive advancements of the split spoon measuring 6 inches each, for a total advancement of the split spoon of 24 inches.

An automatic hammer was used to complete SPTs for this project. Split spoon samples were obtained continuously from the ground surface or the bottom of vacuum excavation where preclearing performed, to a depth of 12 feet bgs and at standard five-foot intervals thereafter. A photoionization detector (PID) was used to screen the headspace of the soil samples collected during explorations and the screening results are shown on the test boring logs.

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Thin-walled Shelby tube samples (undisturbed samples), approximately 24 inches in length and 3 inches in diameter, were collected in the borings, in general accordance with ASTM D1587, in the compressible clay layer.

Rock coring, using an NX-size rock core barrel, with an inside diameter of 2 inches, was performed in general accordance with ASTM D2113 for Borings KLF-101, KLF-102, and KLF-103. Upon drilling completion, Soil X Corporation backfilled the test borings with soil cuttings and gravel and restored the ground surface with cold patch bituminous pavement.

A Kleinfelder engineer performed full-time drilling observations during the subsurface exploration program. The Kleinfelder engineer prepared boring logs that included the blow counts recorded during the SPTs; a description of the soil samples in general accordance with the Unified Soil Classification System (USCS). Soil samples collected during drilling were stored in sealed soil jars and brought to the Kleinfelder office for review by a senior geotechnical engineer and selected for geotechnical laboratory testing. The test boring logs are provided in **Appendix C**.

2.3.2 Cone Penetration Test Soundings (CPT)

On March 25, 2026, Kleinfelder retained ConeTec, Inc. (ConeTec) of West Berlin, New Jersey to complete two (2) Cone Penetration Tests with Pore Water Pressure (CPTu) soundings and three (3) Seismic Cone Penetration Tests with Pore Water Pressure (SCPTu), designated KLF-CPT-1 through KLF-CPT-5. The soundings were advanced to refusal depths ranging between approximately 63.6 and 67.5 feet bgs. The three (3) SCPTu soundings were used to conduct shear wave velocity testing to support seismic site classification. Upon sounding completion, ConeTec backfilled the holes with sand and restored the ground surface with cold patch bituminous pavement. A copy of ConeTec's report titled "Presentation of Site Investigation Results, 41 Bellis Circle, Cambridge, Massachusetts," dated April 1, 2026, is included in **Appendix D**.

2.4 GEOTECHNICAL LABORATORY TESTING

Geotechnical laboratory testing was performed on select soil samples from the test borings to evaluate engineering soil properties and confirm soil classifications. The geotechnical laboratory testing was performed by GeoTesting Express Inc. of Acton, Massachusetts. The following lab tests were completed:

- Four (4) grain size analyses (ASTM D6913),

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- Four (4) hydrometer analyses (ASTM 7928),
- Seven (7) moisture content tests (ASTM D2216),
- Seven (7) Atterberg limits (ASTM D4318),
- Three (3) Unconsolidated Undrained Triaxial (UU) tests (ASTM D2850),
- One (1) Consolidated Undrained Triaxial (CU) test (ASTM D7181),
- Three (3) One-Dimensional Incremental Consolidation Test (ASTM D2435),
- Three (3) Bulk Density and Unconfined Compressive Strength of Rock Core Specimens (ASTM D7012 Method C), and
- Three (3) Composite soil samples for corrosivity suite (Sulfate ASTM C1580, Chloride ASTM D512, pH ASTM D4972, and Electrical Resistivity ASTM G57).

The results of the laboratory tests are included on the test boring logs and copies of the laboratory test results are included in **Appendix F**.

The results of the corrosivity suite analysis are presented in **Table 1**.

Table 1: Summary of Corrosion Testing

Composite Sample Boring No.	Depth *(ft)*	pH	Water-Soluble Ion Concentration		Electrical Resistivity *(ohm-com)*	Electrical Conductivity $(ohm\text{-}cm)^{-1}$
			Chloride *(ppm)*	Sulfate *(ppm)*		
KLF-102	0-6	9.1	210	20	1,842	5.34E-04
KLF-103	6-10	7.6	11	10	6,865	1.46E-4
KLF-104	14-21	7.8	19	10	2,672	3.74E-4

2.5 SUBSURFACE CONDITIONS

Kleinfelder's understanding of subsurface conditions at the site is based on the subsurface investigations performed by others and recent subsurface investigation by Kleinfelder. The soils encountered at the site consist of fill overlying sand and sandy silt deposits, Boston Blue Clay (BBC), glacial till and bedrock.

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Additional details of the soil strata are provided below. Geological cross-sections illustrating the subsurface conditions are provided on **Figure 3** through **Figure 6.**

2.5.1 Soil Stratigraphy

Surficial Materials: Approximately between 2 and 3 inches of asphalt was encountered in Borings KLF-102, KLF-103, KLF-105, and KLF-106. Approximately between 3 and 4 inches of topsoil was encountered in Borings KLF-101 and KLF-104

Granular Fill: Variable density inorganic, granular fill was encountered below the asphalt and generally extended to depths between approximately 2 to 7 feet bgs. Fill was encountered deeper, up to 14 feet bgs at KLF-3 within the disposal site boundary. The granular fill was generally described as silty sand or as poorly graded sand with various amounts of silt or poorly graded gravel with various amounts of silt and sand. The fill contained trace amounts of deleterious material including brick fragments and root pieces.

Alluvial Deposits: Beneath the fill, a deposit of very loose to medium dense sand or sandy silt was encountered. This layer was generally described as poorly graded sand with various amounts of silt and sand, silty sand, or sandy silt and ranged in thickness between approximately 7.5 and 17 feet.

Clay Crust: A deposit of BBC was encountered beneath the sand deposits and/or sandy silt layers. A medium stiff to stiff clay crust was observed at the top of the clay layer and ranged in thickness between approximately 15 and 20 feet and was encountered between approximately El. 6 and El. 14 feet. The BBC crust generally consists of medium stiff to very stiff clay with varying silt content, and intermittent sand and gravel seams.

Lower Clay: Below the crust was a clay layer consisting of very soft to stiff clay with varying silt content, and intermittent sand and gravel seams. The thickness of this layer ranged between approximately 25 and 40 feet.

Glacial Till: Glacial till layer was encountered beneath the BBC, in Borings KLF-101 through KLF-104, at approximately between El. -33.5 feet and -43.5 feet. The glacial till consists of medium dense to very dense poorly graded gravel with varying amounts of silt and sand, clayey sand with varying amount of silt and gravel and clayey gravel with varying amounts of sand.

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Weathered Rock: Weathered bedrock was encountered beneath the glacial till layer in Borings KLF-101, KLF-103, and KLF-104. The weathered bedrock was inferred from the roller bit cuttings and penetration rate and consisted of very dense poorly graded gravel. The thickness of this layer was approximately between 2.5 and 4 feet in the borings.

Bedrock: Rock coring was performed in Borings KLF-101, KLF-102, and KLF-103. Bedrock was generally described as light to dark gray, unweathered to slightly weathered, moderately to intensely fracture, medium strong to strong, Cambridge Argillite. The top of bedrock was encountered at approximately between El. -48.5 feet and -53.5 feet. The rock quality designation (RQD) was approximately between 28 and 97 percent. Rock core photographs are available in **Appendix E**.

2.5.2 Groundwater

On April 2, 2026, stabilized groundwater measurements were collected from existing monitoring wells designated KLF-3 and MW-102S. Depth to groundwater varied from approximately 7.1 to 8.1 feet bgs. The series of groundwater measurements are shown in the appendices in **Table 1** and the locations of the wells are shown on **Figure 2.**

Groundwater measurements noted on the boring logs (not completed as monitoring wells) were taken during drilling and should not be considered to be representative of stabilized groundwater levels. It should be noted groundwater levels will vary depending on seasonal variations in temperature and precipitation and can also be influenced by subsurface utilities, construction activities and other factors.

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3 GEOTECHNICAL IMPLICATIONS OF SUBSURFACE CONDITIONS

The primary geotechnical issues associated with the design of the proposed development, based on the subsurface conditions observed in the borings and the project's context, are as follows:

MBTA Corridor and Adjacent Utility Constraints:

The MBTA Right-of-Way (ROW) runs parallel to the northern boundary of the project site, within approximately 20 feet of the northern extent of the proposed CSO tank. Due to this proximity, the design of both the permanent structure and the Support of Excavation (SOE) should account for lateral surcharges from rail traffic. While structural design will follow IBC and by extension ASCE 7-22 criteria, it is anticipated that the MBTA authority may impose stricter deflection limits on movement within their zone of influence, which is defined as 30 feet horizontally from their property line. Existing utilities, including local sewer and water mains, are also located running generally north to south within the Sherman Street and Bellis Circle corridors. The protection of these existing features from vibrations and ground movement during deep excavation and foundation installation should be considered in the design of permanent and temporary systems.

Geotechnical Instrumentation and Monitoring:

The proposed excavation depth of approximately 50 feet will result in stress relief and lateral relaxation of the surrounding soil mass. Within the clay profiles identified at the site, this relaxation can translate as lateral wall deflections and associated surface settlement behind the proposed SOE, dependent upon the selected temporary works. The magnitude of these movements is dependent upon the stiffness of the implemented SOE system. Given the proximity of the MBTA tracks and adjacent sensitive structures, a high-stiffness SOE system (such as a secant pile or reinforced slurry wall) is recommended to mitigate the potential for lateral movement. A comprehensive instrumentation and monitoring program is recommended to verify that real-time movements remain within specified project and third-party tolerances.

Basal Heave:

With an extended excavation within the deep clay profile, the potential for basal heave should be considered, dependent upon where the SOE wall embedment is terminated and if there is potential for seepage below the SOE. Basal stability is a function of the SOE wall embedment depth, the potential for seepage below the wall toe, and the shear strength of the clay at the excavation interface.

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Previously Developed Site:

Based on our review of historic site use, the remnants of demolished historical structures, including foundation elements, slabs, and abandoned utility lines, may be encountered during excavation. These features constitute potential obstructions for foundation and SOE installation. Buried foundation elements and utility lines encountered within the CSO tank footprint should be removed.

Presence of Variable Density Fill:

Up to approximately 7 feet bgs of fill were encountered within KLF-102. Based on the Preliminary Geotechnical Report, the fill was encountered to a depth of 14 feet at KLF-3 within the CSO tank footprint that was placed during the remedial excavation. The fill has variable density and may contain pockets of debris and other deleterious materials that are considered unsuitable for support of foundation elements. Weak or unsuitable materials identified within the zone of influence of proposed foundations should be removed and replaced with structural fill. Pre-excavation may be necessary prior to foundation or support of excavation installation to remove any potential obstructions.

Presence of Compressible Layer:

A soft to medium-stiff clay layer (Boston Blue Clay) was encountered beneath the clay crust. This stratum is susceptible to long-term consolidation settlement under surcharge loading. Excavated clay from this layer is considered unsuitable for reuse as structural fill due to its high moisture sensitivity and fines content.

Excavation Support:

Due to the depth of the excavation and deflection control, a comprehensive SOE system is recommended. Due to site constraints, it is also recommended this SOE be incorporated into the permanent structure. While sheet piling may be feasible for shallower ancillary excavations, the primary CSO tank excavation will likely require a secant pile wall or a reinforced slurry wall that is internally braced. These systems provide high lateral stiffness and act as a reliable groundwater cutoff, minimizing the drawdown impacts on adjacent structures.

Dewatering:

Dewatering will be necessary to manage the hydrostatic head and perched groundwater during the CSO Tank construction. Because the excavation extends deep into the clay, dewatering efforts will focus on managing seepage and maintaining "in-the-dry" conditions at the subgrade interface. Dewatering will be designed to minimize impacts to adjacent structures by limiting drawdown.

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4 GEOTECHINCAL DESIGN RECOMMENDATIONS

The analyses and recommendations included in this report are based on the data obtained from the relatively widely spaced borings and our understanding of the proposed project. The nature and extent of variations between explorations may not become evident until construction. If significant variations from the subsurface conditions observed in the borings appear during construction, or if changes occur in the design of the proposed structures, it will be necessary to re-evaluate the following recommendations.

4.1 GENERAL

4.1.1 Seismic Design Considerations

Based on the subsurface conditions, we estimate the Seismic Site Class to be **Site Class D**. This estimate is based on average shear wave velocities and shear strength profiles provided in the SCPT report. The results of the shear wave velocity test results are shown in **Appendix D**. The seismic design parameters shown in **Table 2** below are based on the ASCE Hazard Tool and verified in conjunction with ASCE 7-22.

Table 2: Seismic Design Parameters

Design Parameter	Recommended Value
Seismic Design Category (SDC):	**B**
S_s	0.27
S_1	0.056
F_A	1.577
F_V	2.4
S_{MS}	0.31
S_{M1}	0.12
S_{DS}	0.210
S_{D1}	0.078
T_L	6
PGA_M	0.16
F_{PGA}	1.467
I_e	1.5
C_V	0.857

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4.1.2 Liquefaction

Based on the soil and groundwater conditions encountered, the proposed structures are not susceptible to liquefaction based on the criteria set forth in Section 1806.4 of the Code.

4.2 FOUNDATIONS

The CSO tank foundations and below-grade structures should be designed and constructed in accordance with the Massachusetts State Building Code, 10th Edition, which incorporates the 2021 International Building Code (IBC) with Massachusetts Amendments (Building Code).

We recommend the Project utilizes a foundation system consisting of secant piles to act as the permanent below-grade foundation walls, and the column loads of the proposed CSO tank be supported by a mat foundation on drilled shafts socketed into bedrock. Further details on the foundations and support of excavation system are described in the following sections.

4.2.1 Diversion Structure and Solids Holding Tank

The proposed diversion structure will be supported by 2-foot-thick mat foundation bearing within the clay crust. The solids holding tank will be pre-cast concrete structure founded on 12-inches of crushed stone bearing on the clay crust. Provided the subgrade is prepared in accordance with recommendations in Section 5, we recommend an allowable net bearing pressure of 4 ksf for both structures.. Based on anticipated service loading, the total and differential settlement is not expected to exceed 1 inch and ½-inch, respectively.

4.2.2 Perimeter Foundation Walls

We recommend a secant pile wall as the support of excavation system and should also be used for the permanent below-grade foundations walls. Based on our analyses, we recommend the following:

- Secant pile walls shall be designed for the permanent soil, water, surcharge, and seismic lateral pressures. Our recommended pressures are presented in **Table 7**.
- Secant piles shall extend a minimum of at least 2 feet into competent bedrock to establish watertight cutoff or into sufficient material such that the temporary SOE and braced excavation

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is supported through global and rotational toe stability. A seepage analysis will need to be completed to support shallower embedment for groundwater cutoff.

- Project specifications should define clear criteria for the remediation or replacement of out-of-tolerance or damaged piles. Specified installation tolerances and minimum overlap requirements should be maintained to ensure geometric continuity required for adequate interface shear transfer between primary and secondary members and allow for watertight cutoff to support slurry construction. Contract documents may provide mitigation recommendations to adhere to watertight construction.

- Secant pile walls shall be designed for the temporary soil, water, and surcharge pressures based on the Contractor's means and methods.

4.3 UNDERGROUND STORAGE TANK

Based on conceptual drawings provided by Stantec, the base of the proposed stormwater tank is designed with a downward slope towards the east with the deepest part of the tank at the northeast corner of the tank base. The base of the tank ranges between approximately El. -12.8 at the west end and approximately El. -20.1 feet at the east end. At these elevations, the foundation will sit within the lower clay.

According to structural modeling data provided by Stantec on July 7, 2026, the CSO tank will be supported by a 4-foot-thick reinforced concrete mat foundation founded on drilled shafts. The structural analysis used a subgrade modulus, k_s, of 100 kips per cubic foot (kcf) assuming a fixed connection between the base slab and the secant pile wall. Under these boundary conditions, the slab soil pressures exhibit a non-uniform distribution, ranging from a minimum of approximately 1.2 kips per square foot (ksf) near the perimeter walls to a peak of approximately 5.2 ksf within the interior span of the mat. Structural modeling of the "Empty Tank" condition indicated uplift reactions at the interior column locations, ranged from approximately 225 to 415 kips at discrete locations, where a nominal grid spacing of 15 feet by 16 feet was assumed. Additionally, the anticipated maximum service downward load provided by Stantec is approximately 6.9 ksf, with a maximum service uplift pressure of 1.4 ksf. These governing loads were utilized to establish settlement criteria and define the design requirements for the deep foundation system. The length and capacity of the rock sockets should be designed to safely transfer these tensile loads into the competent bedrock. A generalized plan and cross section of the CSO tank is presented in **Figure 2** through **Figure 6**.

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4.3.1 Settlement Analysis

The following performance analysis was evaluated for a deep foundation system bearing in competent bedrock. Utilizing a deep foundation system socketed into competent bedrock anticipated total and differential settlements estimated to be negligible. Given the non-uniform bearing pressures identified in the structural heat map and the inherent sensitivity of the CSO tank to differential movement, a deep foundation system is recommended to effectively mitigate long-term consolidation risks within the lower clay stratum.

Settlement of the proposed tank is expected to be less than 1 inch total and ½ between columns. These settlements will largely occur during construction as load is applied (short-term settlement).

4.3.2 Deep Foundations

We recommend the CSO tank is supported on drilled shafts to limit vibrations generated during construction due to sensitive site conditions. The drilled shafts shall be designed in accordance with the IBC. Drilled shafts shall be designed to support loads through a combination of skin friction and end bearing in competent bedrock. No loads shall be assumed to be carried in the overburden soils.

4.3.3 Drilled Shafts

The parameters provided below are intended to assist with drilled shaft design. The design engineer should determine the appropriate strata thicknesses for each material based on the location of the drilled shaft, the available subsurface information provided in this report, and the final grading plans.

Note that the design parameters provided are ultimate values, the foundation designer should consider appropriate safety factors for the final design. We have assumed that drilled shaft concrete having a minimum compressive strength (f'c) of 4,000 psi will be used for design. Drilled shafts may require a temporary cylindrical steel casing to support the soil around the drill hole during drilling. The temporary casing is withdrawn as the hole is filled with concrete. General design criteria for drilled shafts are provided below in **Table 3** and associated ultimate axial, uplift, and lateral capacities are provided in **Table 4**.

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Table 3: Drilled Shaft Design Criteria

Stratum	Lower Clay	Glacial Till	Weathered Bedrock	Bedrock [Cambridge Argillite]
Total Unit Weight (pcf)	110	130	140	168
Effective Unit Weight (pcf)	47.6	67.6	77.6	105.6
Effective Friction Angle (degrees)	26	32	36	40
Effective Cohesion, c' (psf)	50	-	-	125,000[1]
Undrained Shear Strength, Su (psf)	800	-	-	-
UCS (psi)	-	-	-	14,000
RQD (percentage)	-	-	-	65
Cohesion (psf), c	400	-	-	-
Intact Modulus, Ei (ksi)	-	-	-	2,900
Deformation Modulus, E (ksi)	-	-	-	1,600
Ultimate Skin Friction (ksf)	0.5	1.5	2.0	8.0
Ultimate End Bearing (ksf)	5.0	30.0	110.0	250.0

Notes:

1. Effective Cohesion for Bedrock
2. pcf = pounds per cubic foot;; psi = pounds per square inch; ksf = kips per square foot; psf = pounds per square foot; RQD = Rock Quality Designation; UCS = unconfined compressive strength (psi), ksi = kips per square inch

Table 4: Ultimate Capacities for Drilled Shafts

Shaft Diameter (inches)	Bearing Stratum	Estimated Tip Elevation (feet)[1]	Estimated Ult. Axial Compression Capacity, q_{ult} (tons)[2,6]	Estimated Ult. Uplift Capacity, T_{ult} (tons)[2,6]	Estimated Ult. Lateral Capacity (tons)[3]
36	5ft - Rock Socket	-59	750	525	39
42	5ft - Rock Socket	-59	950	665	49
36	10ft - Rock Socket	-64	1050	735	39
42	10ft - Rock Socket	-64	1250	875	49

Notes:

1. Geotechnical capacities for rock-socketed elements assume competent bedrock is encountered at an approximate elevation of El. -54 feet (NAVD88). Actual bedrock elevations and rock mass quality must be field-verified by the Geotechnical Engineer of Record (GER) during installation. A minimum rock socket length of five (5) feet into competent bedrock is recommended to develop the reported resistances.
2. Geotechnical capacities assume a minimum center-to-center (O.C.) spacing of three (3) shaft diameters. Structural design, including concrete strength and reinforcement detailing for deep foundation elements, shall be performed by the Structural Engineer in accordance with ACI 318, ASCE 7-22, and ACI 336.3R.
3. The reported allowable lateral capacity represents the service load required to produce a maximum of 0.25 inches of lateral deflection at the shaft head (Serviceability Limit State). Lateral analyses were performed assuming an axial service load of 600 kips and are based on a simply elastic, uncracked concrete section with no reinforcement. Final lateral performance should be verified by the Structural Engineer once reinforcement ratios are finalized.

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4. Allowable Geotechnical Resistances for straight-shaft drilled foundations were developed assuming a shaft head elevation of El. -12.8 (corresponding to the proposed shallowest subgrade elevation of the CSO tank). These capacities are subject to revision based on the final structural layout, actual top-of-shaft elevations, and refined axial/lateral loading combinations provided by the Structural Engineer.
5. Axial capacity computations were performed using Ensoft SHAFT (Version 2023.9.05).
6. Evaluation of downdrag and site-specific seismic soil-structure interaction response was not included in the scope of this design report.

Structures which bear on more than one subgrade material type should be designed using the lowest applicable bearing pressure to reduce the potential for excessive differential settlement

4.3.4 Drilled Shaft Construction Consideration

The following items should be adhered to during construction of the drilled shafts:

- Temporary casing may be required to stabilize the borehole through the variable granular fill and clay strata to prevent caving or squeezing. If temporary casings are used during concrete placement, the volume of concrete must be monitored relative to the theoretical volume during casing extraction to ensure potential for voids or "necking" is properly mitigated.
- If drilling slurry is utilized, concrete shall be placed via the tremie method. An adequate head of concrete must be maintained to effectively displace all water or slurry, with the pour continuing until the head of the concrete column is observed to be free of slurry and suspended sediment.
- Adjacent shafts shall not be installed until the concrete has attained its initial set (24-hour minimum) to prevent interconnection or disturbance of the curing concrete.
- A minimum concrete compressive strength of 4,000 psi is recommended, though final strength will be dictated by the Structural Engineer. Representative concrete cylinders must be obtained on-site and subjected to compressive strength analysis.
- All installation procedures, including verification of the rock socket depth, final foundation depth, subgrade cleanliness, and slurry installation compliance must be observed and inspected on a full-time basis by a representative of Kleinfelder in order to satisfy applicable building code requirements. Rock quality and depth are expected to vary during foundation installation; therefore, the final foundation depth should be field-verified by a representative of Kleinfelder at the time of construction. Kleinfelder should prepare a permanent record of caisson or mini-pile installation activities and recommend changes during production should

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field conditions warrant such action, with documentation including elevations of the base, top, and center of each drilled pier; a professional surveyor should be employed to provide the required elevation and center location information.

- In accordance with International Building Code (IBC) regulations, deep foundations providing a design capacity greater than forty (40) tons must undergo static load testing. We recommend one static axial load test performed in accordance with ASTM D1143.
- Drilled shaft construction should conform to requirements of ACI 336.1.
- The location of any existing utilities at the site should be verified prior to installation of the foundations.

4.3.5 Lateral Resistance

Lateral load response of pile foundations can be calculated with the computer program L-Pile, created by Ensoft, Inc. The stiffness of the pile and the stress-strain properties of the surrounding soils determine the lateral resistance of the foundation. Recommended L-Pile input parameters for the soils encountered during our exploration are included below.

Table 5: Lateral (LPILE) Parameters for Drilled Shaft Design

Material Type	Soil Model	Effective Unit Weight (pcf)	Friction Angle (deg.)	Undrained Shear Strength, Su (psf)	Soil Strain, E50	Soil Modulus k-above GWT[2] (pci)	Soil Modulus k-below GWT[2] (pci)
Granular Fill/Alluvial Deposit	Sand (Reese)	120	32	-	-	125	80
Clay Crust	Stiff Clay w/ Free Water	57.5	-	1,000	0.007	400	400
Lower Clay (BBC Soft)	Stiff Clay w/ Free Water	47.6	-	800	0.02	200	200
Glacial Till	Sand (Reese)	67.6	36	-	-	225	225
Weathered Rock[3]	Sand (Reese)	77.6	38	-	-	-	250
Bedrock[3]	Massive Rock	105.6	40	125,000	0.0005	-	-

Notes:
1. GWT = Ground Water Table
2. See Table 3 for inputs regarding Bedrock and Weathered Rock Profiles.

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4.3.6 Load Testing Program

In accordance with International Building Code (IBC) regulations, deep foundations providing a design capacity greater than forty (40) tons are required to undergo static load testing. Regardless of the final deep foundation type selected for the project, Kleinfelder recommends that a static axial load test be conducted in accordance with ASTM D1143 to confirm the adequacy of the embedment depth, verify the design capacity, and aid in establishing the installation criteria for the production elements.

Instrumentation, load test configuration, and loading procedures must comply with the latest version of ASTM D1143. Technical details of the load test setup and the certification of the loading device must be prepared by a Professional Engineer registered in the Commonwealth of Massachusetts and submitted to Kleinfelder for review and approval a minimum of two weeks prior to the test. Load test locations should be selected by the Engineer. Provided that the load test confirms the ability of the test pile to support the design load, the tested shaft may be utilized as a production shaft. No construction activity transmitting significant vibratory or impact loads shall be permitted on-site during the duration of the load test.

The installation of all drilled shafts should be monitored on a full-time basis by a representative of Kleinfelder. Once the borehole has been augered to the required bearing stratum or design depth, the shaft base should be thoroughly cleaned of loose cuttings and debris. The cleanliness of the bearing surface and the integrity of the rock socket should be verified using a Shaft Inspection Device (Mini-SID), measuring tape, or a high-resolution down-hole camera. These devices allow for real-time visual confirmation that the shaft is free of sediment or "soft-bottom" conditions which could compromise end-bearing resistance. If large boulders are encountered during augering that prevent shaft continuity, they must be removed.

Following the inspection and approval of the borehole, the reinforcement cage shall be inserted, and concrete placed via freefall (if the hole is dry) or tremie methods. If temporary casing is utilized, it must be withdrawn in a controlled manner while maintaining sufficient head of concrete to prevent soil intrusion or "necking."

The project specifications should be of a performance-based type, requiring the contractor to provide a foundation element of a specified capacity and material.

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4.3.7 Waterproofing and Insulation

Foundation walls for the CSO tank, diversion structure, and solids holding tank should be designed and constructed in accordance with the Code and standard environmental engineering practices for water-retaining structures. Given the nature of the facility, we recommend that waterproofing systems be implemented for below-grade exterior surfaces.

For the mat foundation and below-grade walls, a moisture vapor retarder or waterproofing membrane should be provided. While the facility is not an occupied space, control of moisture migration and vapor pressure is essential for the long-term durability of the reinforced concrete and associated mechanical/electrical equipment. We recommend the use of a high-density polyethylene (HDPE) or high-performance bituminous membrane with a water permeance of 0.3 perms or lower. The concrete mix design and placement procedures should specifically account for the presence of this membrane to ensure a proper mechanical bond and to mitigate the risk of air entrapment.

Because the CSO tank is located at depths of up to 45.1 feet bgs, the walls and base slabs should be designed for full hydrostatic pressure relative to the Design Groundwater Elevation. Waterproofing systems must be continuous and integrated between the mat and the foundation walls to create a fully encapsulated "bathtub" system, limiting groundwater infiltration and ensuring the containment of stored combined sewage and stormwater.

4.3.8 Design Groundwater

The FEMA Flood Insurance Rate Map places the project site within the “Zone X-Area of Minimal Flood Hazard”. A 100-year flood elevation was not defined for this site. Based on stabilized groundwater measurements in KLF-3 and MW-102S wells, we recommend using a design groundwater level of 8 feet bgs to calculate hydrostatic pressures and uplift pressures.

4.3.9 Hydraulic Conductivity

The estimated hydraulic conductivities for the various soil types encountered during subsurface exploration are provided in **Table 6** below and were based on the hydraulic conductivity measured using in-situ slug testing provided in the Preliminary Geotechnical Report, as well as based on published values and our experience.

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Table 6: Hydraulic Conductivity

Material	Estimated Hydraulic Conductivity, k (cm/s)
Fill[1]	1×10^{-2} to 2×10^{-2}
Silty Sand/Sandy Silt[1]	6×10^{-4} to 2×10^{-3}
Clay [Boston Blue Clay][1]	1×10^{-7} to 3.5×10^{-7}
Glacial Till[1]	1×10^{-4}
Bedrock[3]	1×10^{-6}

Notes:

1. The hydraulic conductivity was measured using in-situ slug testing.
2. The hydraulic conductivity was estimated from published values: (Fetter 2014).
3. Bedrock hydraulic conductivity was estimated as two orders of magnitude less than glacial till.

4.3.10 Lateral Earth Pressures

Support of excavation structures and the below grade tank will extend into the granular fill, silty sand, and clay layers. We recommend that below grade walls be designed using the active, passive, and at-rest coefficients provided in **Table 7**.

Table 7: Earth Pressure Design Parameters

Strata	Moist Unit Weight	Undrained Shear Strength	Friction Angle	Triangular Pressure Diagrams (Unbraced Wall and Braced Wall Below Bottom of Excavation)			Rectangular Pressure Diagrams (Braced Walls above Excavation)
	γ_m (pcf)	S_u (psf)	f' (deg)	Ka	Ko	Kp	Pressure Above Bottom of Excavation, p (psf)
Granular Fill/Alluvial Deposit	120	-	32	0.31	0.47	3.25	24H
Clay Crust	110	1,000	-	-	-	-	40H
Lower Clay	105	800	-	-	-	-	37H
Glacial Till	130	-	34	0.28	0.44	3.54	24H
Weathered Rock	140	-	36	0.26	0.41	3.85	24H

Below-grade structures, including the CSO tank, diversion structure, and solids holding tank should be designed to resist lateral earth, hydrostatic, and surcharge pressures. These recommendations assume the height of the wall (H) is defined as the distance in feet between the top of the slab and the top of adjacent finished-floor level (or exterior site grade) on the retained earth side of the wall, the wall is drained full hydrostatic height, and the grade is level within a lateral distance H of the backside of wall.

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For the purpose of structural design, we distinguish between two primary wall conditions:

- Restrained Walls: This applies to the primary CSO walls and any structures rigidly connected to floor slabs or internal bracing. These walls shall be designed in accordance with Ko procedures.
- Unrestrained Walls: This applies to cantilevered retaining walls that are free to rotate at the top and shall be designed in accordance with Ka procedures.

Recommended lateral pressure parameters for the upper Granular Fill stratum are summarized below:
Static Earth Pressure (Drained):

- Restrained Walls: 60 pcf Equivalent Fluid Unit Weight (EFUW).
- Unrestrained Walls: 45 pcf EFUW.
- Hydrostatic Pressure: For undrained conditions, a triangular hydrostatic pressure of 62.4 pcf shall be utilized to the buoyant lateral earth pressures for the portion of the wall below the design groundwater table.
- Seismic Earth Pressure: To account for regional seismicity and Site Class D, incremental seismic loading should be applied as an inverted triangular distribution with a peak intensity at the top of the wall equal to 11.0H psf.
- Surcharge Loading: Lateral pressure from surface surcharges should include traffic and the railroad loading associated with the MBTA corridor.

Reductions to surcharge pressures based on the specific geometry or offset of the load from the wall may be evaluated on a case-by-case basis.

Design and Stability Requirements:

- Force Application: The force resulting from active and passive earth pressure should be applied at a height of H/3 from the base. Surcharge-induced lateral forces should be applied at H/2.
- Factors of Safety: Yielding retaining walls should be designed for a minimum Factor of Safety of 1.5 against sliding and overturning under static conditions, and 1.2 under seismic loading.

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- Passive Resistance: Passive soil pressure should generally be neglected unless specific measures are taken to ensure the soil on the passive side is not disturbed or removed during the life of the structure. Where utilized, the resultant passive force should be applied at a height of H/3 from the base.

- Construction Sequencing: For restrained walls, the contract documents or design submittal(s) should clearly indicate the required construction and backfilling sequence.

4.4 GEOTECHNICAL INSTRUMENTATION MONITORING PLAN

Geotechnical instrumentation will be installed to monitor performance of the construction and to protect sensitive receptors, such as MBTA infrastructure, adjacent homes, and nearby utilities. Geotechnical instrumentation will include ground settlement points, inclinometers surrounding the site (cast into the secant pile wall), groundwater monitoring, odor monitoring, and dust monitoring. The earthwork contractor and their respective surveyor will be responsible for installing the ground settlement points, collecting data with an automated total station (if access points are available) and providing data to our team for review. In addition, vibration monitoring will be performed throughout construction using four (4) automated seismographs with a triaxial geophone located at the perimeter of the site. A recommended geotechnical instrumentation and monitoring plan will be submitted under separate cover with the contract documents.

4.5 PAVEMENT DESIGN

Pavement areas should be constructed in accordance with guidelines and specifications provided by the Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges: 2025 Edition.

Traffic loading and frequency was not provided at the time of this report. The following sections provide general recommendations regarding both standard duty and heavy-duty pavement designs for each design scenario presented. It is up to the project Civil Engineer to determine which thickness of pavement to use and where, based on the desired design life.

We recommend the following (minimum) flexible pavement cross-sections for both standard and heavy-duty applications. These recommendations are made based on the 1993 AASHTO Design Guide for Pavement Structures developed by the American Concrete Pavement Association, our understanding

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of local and MassDOT design guidelines, and our experience on similar projects. Recommended pavement sections for the planned parking lot improvements are summarized in the following table.

Table 8: Minimum Pavement Design Criteria

Layer	Standard	Heavy Duty
	Thickness (inches)	
Asphaltic Concrete Surface Course (MassDOT item M3.11.03)	2	2
Asphaltic Binder Course (MassDOT Item M3.11.03)	2	4
Aggregate Base Course (MassDOT Item 1.09.0) or Dense-graded Crushed Stone, (MassDOT Item M2.01.7)	12	12

4.5.1 General Pavement Construction Guidelines

At all times during construction, the subgrade and all ditches shall be constructed and maintained such that the roadbed will be effectively drained by means of positive drainage such as stub drains to inlets to prevent erosion.

The recommended pavement sections do not consider “staged” construction, where construction traffic “runs” on the base course and the final wearing surface is placed near project completion. Construction traffic running on the base course will more than likely result in base course failure. Pavement materials and construction methods should comply with the latest edition of the Massachusetts Department of Transportation (MassDOT) Highway Design Manual.

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5 CONSTRUCTION CONSIDERATIONS

5.1 SITE PREPARATIONS

Remove pavement and topsoil, where applicable, from within the proposed excavation area. Care should be taken to avoid mixing of these materials with other excavated soils. Stockpile, transport and dispose all excavated material in accordance with Federal, State, and local regulations.

5.2 SITE EXCAVATIONS

5.2.1 General

Excavation should conform to OSHA health and safety standards for excavation contained in 29 CFR Part 1926, latest edition. Excavation height, depth and slope should conform to these OSHA standards and all local, State, and Federal safety regulations. As a safety measure, it is recommended that vehicles and soil piles be kept a minimum lateral distance of 5 feet from the edge of excavations. On-site construction safety is solely a responsibility of the Contractor. The information provided herein is provided as a service to our Client and should not be interpreted to mean that Kleinfelder is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

5.2.2 Excavation Equipment for Soil

It is anticipated that conventional heavy-duty construction equipment is considered practical for the excavation of the overburden soils. However, the contractor should anticipate encountering cobbles and boulders within the granular fill and the underlying glacial till stratum, which may necessitate specialized attachments for removal.

Due to the significant depth of the proposed CSO tank and the proximity to site boundaries and the MBTA corridor, open-cut and benching excavations may be limited to certain areas of the site. The primary excavation for the CSO tank is anticipated to be performed using a top-down approach from the existing ground surface. The majority of the earthwork will be conducted within a SOE system. Depending on the final design, this shoring may consist of temporary systems or a permanent secant pile or slurry wall system that will be integrated into the final tank structure.

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Excavation geometry and procedures should conform to Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926). Given that equipment will be operating from the surface to reach the maximum subgrade depth of approximately 45.1 feet at certain portions of the site, the contractor should utilize high-reach excavators or specialized material-handling equipment. All surface-mounted equipment and material stockpiles which can remain onsite should be situated behind the SOE at a distance that avoids excessive surcharge loading, unless these loads have been accounted for in the structural design of the shoring. All interfaces should be continuously supported by the SOE to prevent lateral relaxation and movement of adjacent infrastructure.

5.3 SUPPORT OF EXCAVATION RECOMMENDATIONS

5.3.1 Design Considerations

It is generally recommended, given site constraints, overburden materials, and design criteria, the construction of a secant pile wall be selected for the deep excavation required for the CSO tank. This system would provide temporary SOE during the approximately 45-foot- cut and function as the permanent exterior structural foundation wall for the final design.

An advantage of this system is also its ability to provide a reliable groundwater cutoff, enabling construction of the interior base slab and structural elements "in-the-dry" while minimizing drawdown impacts on the adjacent MBTA corridor and municipal utilities. The selected system should be designed to integrate with the interior reinforced concrete structure, allowing for structural continuity between the SOE and the permanent base slab, internal shear walls, and the final top slab.

Due to the depth of the excavation and the sensitivity of the surrounding infrastructure, the contractor should account for construction phasing and internal lateral support. The design will likely necessitate multiple levels of temporary internal cross-bracing (struts and walers) to control wall deflections during the top-down excavation process. These temporary supports should be sequenced to allow for the staged construction of the interior mat, columns, and permanent bracing elements. The final SOE design and the construction sequence shall be the responsibility of the awarded contractor and should be designed by a Professional Engineer licensed in the Commonwealth of Massachusetts.

5.3.2 General Excavation Slopes and Support

We anticipate that CSO tank, diversion structure, and solids holding tank excavations and associated features will be accomplished by top-down excavations. Where necessary and given site constraints, cut

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slopes are recommended to be no steeper than 2 horizontal (H) to 1 vertical (V). Flatter slopes may be required once final design grades are established.

For the proposed CSO tank, diversion structure, and solids holding tank we anticipate engineered SOE systems will be required. We anticipate that a secant pile wall will be utilized for the CSO tank which can be integrated into the final structure. A cantilevered system such as soldier pile and lagging should be considered for the diversion structure and solids holding tank located to the east of the CSO tank. We recommend supporting the excavations with a system that provides an effective groundwater cutoff to control seepage and maintain stability. Based on the excavation depths and proximity to adjacent infrastructure, we anticipate multiple levels of internal bracing will be required for the CSO tank SOE. The engineered SOE system should be selected by the Contractor and designed by an experienced Professional Engineer registered in the Commonwealth of Massachusetts retained by the Contractor.

Trench boxes may be used for support of shallower, incidental excavations, but should be noted they do not provide continuous contact and can lead to sloughing or soil loss towards the excavation. Trench boxes are not recommended if utilities or structures sensitive to movement are located within a 1 horizontal (H) to 1 vertical (V) soil wedge extending from the bottom of the excavation base to the ground surface. Trench excavations for duct banks and utilities should be accomplished using shield systems such as trench boxes or slide rails. Shield systems are only for protection of workers during utility installation and should not be used as an engineered support of excavation for excavation extending within the zone of influence of existing or new structures. When advancing shield systems, the maximum unsupported trench height should not be more than 2 feet or as recommended by the Engineer.

The design of any shoring systems must be provided by a qualified engineer registered in the Commonwealth of Massachusetts and experienced in the design and construction of shoring under similar conditions. The design should take into account lateral loading exerted by soil, groundwater, and surcharge loads such as sloped backfill, stockpiled soil, adjacent loading, and construction equipment as appropriate. Once the final excavation and shoring plans are complete, the plans and design should be reviewed by Kleinfelder for conformance with the design intent and geotechnical recommendations provided in this report.

5.3.3 Excavation Dewatering

Based on the groundwater levels measured in our explorations, groundwater will be encountered during the excavation for the proposed CSO tank and associated structures. Construction dewatering should be

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designed to lower the groundwater to a minimum depth of 2 feet below the proposed excavation subgrade to maintain stability.

If a permanent watertight SOE system, such as a secant pile or diaphragm wall which mitigates under seepage, is selected for the CSO tank, active dewatering requirements within the primary tank footprint would likely be limited to the initial drawdown and the management of precipitation. In this scenario, sustained construction dewatering efforts would focus primarily on the diversion structure, solids holding tank, ancillary utility trenches, and adjacent open-cut areas where a full hydraulic cutoff is not implemented.

If construction dewatering is required, dewatering may be accomplished by means of a series of sump pits and/or diversion trenches within and around excavations. Sumps should be provided with filters suitable to prevent pumping of fine-grained soil particles. Sumps should be located outside of the zone of influence of the proposed CSO tank foundation. It is anticipated that most of the construction dewatering for the tank will be from the silty sand and fill above the clay stratum. Installation and operation of the contractor's dewatering system should be integrated with other earthwork operations such as sequence of excavation, foundation construction, and backfilling. The contractor should control water seepage, precipitation, groundwater infiltration, and surface water inflow within the excavation and site at all times to minimize subgrade disturbance, maintain integrity of soil surfaces, and permit foundation and structure construction proceed in-the-dry.

Based on construction and/or weather conditions, the bottoms of excavations should be protected by completing excavations immediately before placing formwork and not allowing excavations to remain open overnight. If excavations must be allowed to remain open for longer periods, the bottom of excavations may be protected by placing a 2-inch-thick mud mat of lean concrete or a 6-inch-thick working mat of crushed stone wrapped in non-woven geotextile.

The Contractor should dispose of water produced during dewatering in accordance with local, State and Federal regulations. Recommendations for environmental disposal of water produced during dewatering is beyond the scope of this report and should be evaluated separately. At this site, after the necessary treatment, water produced during dewatering could either be reinfiltrated, discharged to the local sewer system or transported and disposed off-site. Refer to Hydraulic Conductivity results presented in **Table 6** with respect to anticipated infiltration rates.

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5.4 SUBGRADE PREPARATION

Areas of weak, unstable, or organic soils identified at the final excavation subgrade must be over-excavated and replaced with compacted structural fill or ¾-inch crushed stone wrapped in a non-woven geotextile. For the CSO tank and the diversion structure, we recommend a minimum over-excavation of six (6) inches below the design footing/mat elevation within the structural zone of influence.

The structural zone of influence (or bearing zone) is defined as the volume of soil beneath the footings delineated by a 1-horizontal to 1-vertical (1H:1V) plane extending downward and outward from a point one foot beyond the edge of the foundation. All foundation subgrades must be inspected and approved by a Kleinfelder representative to ensure the complete removal of unsuitable materials prior to fill placement.

Exposed subgrades in the Boston Blue Clay (BBC) must be excavated using a smooth-edged bucket to minimize disturbance and remolding of the clay. For the ancillary structure foundations bearing on clay, the subgrade should be over-excavated six (6) inches below final grade and backfilled with ¾-inch crushed stone wrapped in a non-woven geotextile to serve as a working mat. For the primary CSO tank and diversion structure, the 6-inches over-excavation described above should be backfilled with crushed stone or a lean concrete mud mat to establish a bearing interface.

If encountered at the excavation subgrade, boulders must be removed from within the zone of influence of all proposed structures and replaced with compacted structural fill or stabilized with crushed stone. Following the completion of subgrade preparation and inspection, backfill shall be placed and compacted in controlled lifts in accordance with the methods described herein.

5.5 FILL

Backfill should be placed in 12-inch maximum loose lift thickness (evaluated prior to compaction). or 6-inch lifts thickness in restricted areas such as trenches, behind walls or around footings. Backfill should be compacted to a minimum Relative Compaction (RC, defined as backfill target dry density as a percentage of backfill maximum dry density, obtained as described in ASTM D1557) presented in **Table 9**.

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Table 9: Fill Compaction Specification

Fill Placement Location	Minimum Compaction (ASTM D1557)	Moisture Content
Underneath Structures/pavement/utilities	95 (%)	-2 to +2% of optimum
Landscape area	92 (%)	-2 to +2% of optimum

Structural fill should be used for replacement of unsuitable materials, as described herein, below structures and pavement areas, as trench backfill underneath structures and for other over-excavations. Dense graded crushed stone may be used underneath structures in lieu of structural fill. On-Site fill should be used in landscaping areas or as trench backfill as described herein. On-Site fill should not be used within the zone of influence of new or existing structures or as pavement base or subbase.

Trenches in landscape areas may be backfilled with On-Site fill. Trenches within the zone of influence of new or existing structures should be backfilled with structural fill. Trenches underneath pavements may be backfilled with On-Site fill. **Table 10** presents the gradation requirements for imported and on-site material.

Table 10: Gradation Requirements of Imported and On-Site Material

Sieve Size	Percent Finer by Weight				
	On-Site Fill	Structural Fill	3/4" Crushed Stone	MassDOT Item M1.03.1-1: Processed Gravel for Subbase	MassDOT Item M2.01.7-1: Dense Graded Crushed Stone
6-inch	100	-	-	-	-
3-inch	-	-	-	100	-
2-inch	90-100	100	-	-	100
1-1/2 inch	-	-	-	70-100	70-100
1-inch	-	-	100	-	-
3/4-inch	-	-	90-100	50-85	50-85
1/2-inch	-	50-85	10-50	-	-
3/8-inch	-	-	0-20	-	-
No. 4	20-65	40-75	0-5	30-60	30-55
No. 10	-	-	-	-	-
No. 16	-	-	-	-	-
No. 50	-	8-28	-	-	8-24
No. 60	-	-	-	-	-
No. 200	0-25	0-10	-	0-10	3-10

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Testing of the placed and compacted backfill should be performed to verify that the recommended relative compaction and moisture content have been achieved by the Contractor. Backfill testing should be performed by an experienced testing agency using methods and equipment as described in ASTM D6938 or, alternatively, ASTM D1556. Testing frequency should be 1 test per backfill lift per every 1,000 square feet of backfill placed or 1 test per lift in confined spaces.

5.6 REUSE OF ON-SITE SOILS

Existing site soils, excluding topsoil, may be re-used as on-site fill, provided the soil meets environmental requirements, gradation requirements as specified above, is free of organic matter, debris, or other unsuitable material, and can be compacted to the required density and moisture content. On-Site soils can be re-used as structural fill, provided they meet the gradations requirements described herein. If off-site disposal of soil is required, it must be performed in accordance with applicable Federal, State, and local regulations.

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6 LIMITATIONS

This report was prepared for the proposed Sherman Street Combined Sewer Overflow Storage Tank Design project in Cambridge, MA in accordance with generally accepted soil engineering practices, the Limitations in this section and throughout this report as well as the document titled "Important Information about your Geotechnical Engineering Report" by Geoprofessional Business Association (GBA) in **Appendix G**. This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than four (4) years from the date of the report.

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is possible that soil or groundwater conditions could vary between or beyond the points explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, we must be notified immediately so that we may reevaluate the recommendations of this report. If the scope of the proposed construction changes from that described in this report, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions of this report are modified or approved in writing, by Kleinfelder. Kleinfelder cannot be responsible for interpretation by others of this report or the conditions encountered in the field.

The scope of services for this geotechnical report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the soil, surface water, or groundwater at this site. Kleinfelder has prepared a separate report under a separate cover to present the assessment of environmental conditions at this site.

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The work performed was based on project information provided by Kleinfelder's project design team. Kleinfelder cannot be responsible for interpretation by others of this report or the conditions encountered in the field. Kleinfelder must be retained so that all geotechnical aspects of construction will be monitored on a full-time basis by a representative from Kleinfelder, including site preparation, preparation of subgrades, and placement of engineered fill and trench backfill. These services provide Kleinfelder the opportunity to observe the actual soil, rock, and groundwater conditions encountered during construction and to evaluate the applicability of the recommendations presented in this report to the site conditions. If changed site conditions affect the recommendations presented herein, Kleinfelder must also be retained to perform a supplemental evaluation and to issue a revision to our original report. In addition, if there are any changes in the field to the plans and specifications, the Client must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will invalidate our recommendations.

The boring logs and laboratory test data attached to this report may be made available to bidders to supply them with only the data contained in the report regarding subsurface conditions and laboratory test results at the point and time noted. Because of the limited nature of any subsurface study, the contractor may encounter conditions during construction which differ from those presented in this report. In such event, the contractor should promptly notify the owner so that the Team's geotechnical engineer can be contacted to confirm those conditions. We recommend the contractor describe the nature and extent of the differing conditions in writing and that the construction contract include provisions for dealing with differing conditions.

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7 REFERENCES

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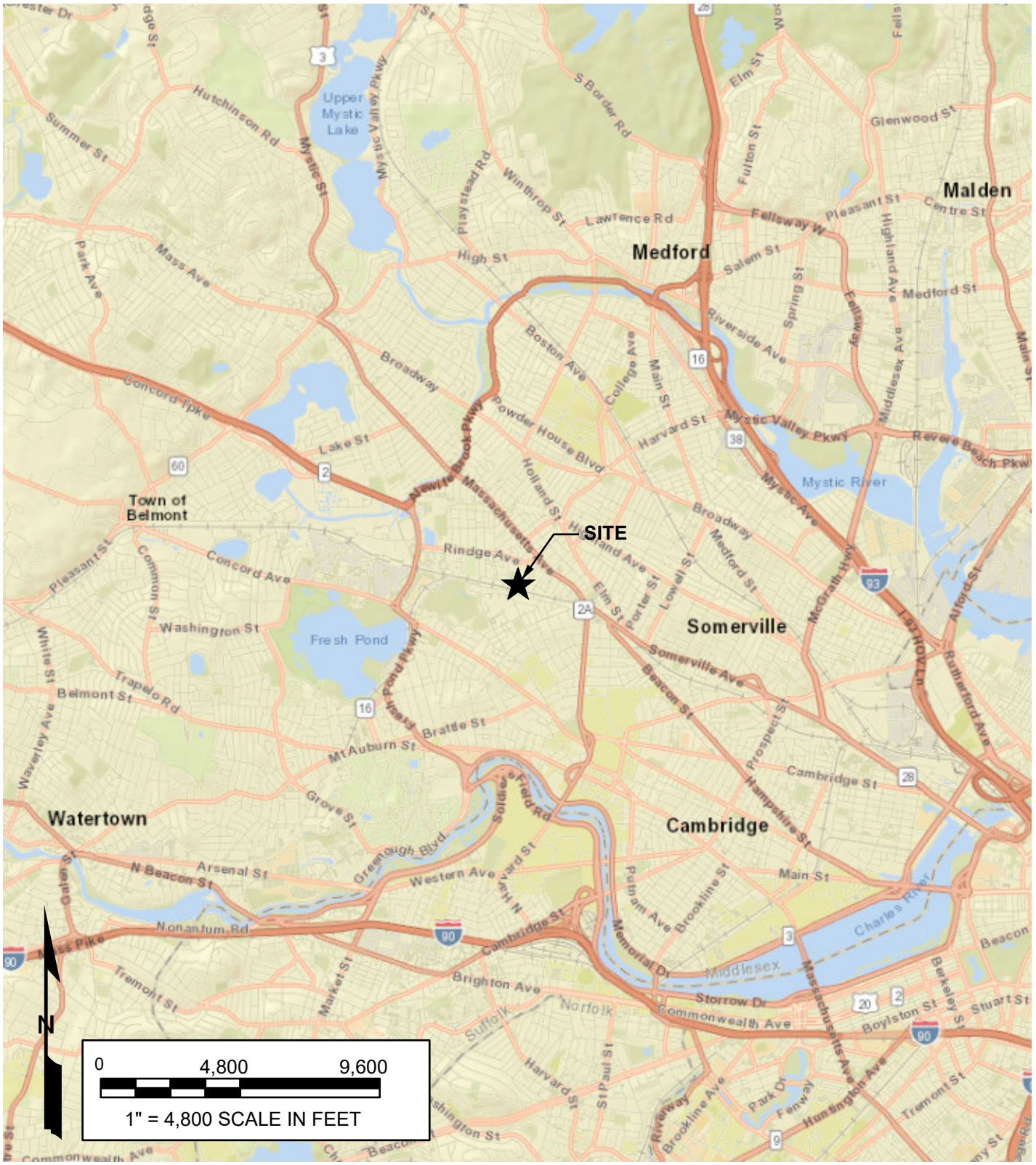
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FIGURES

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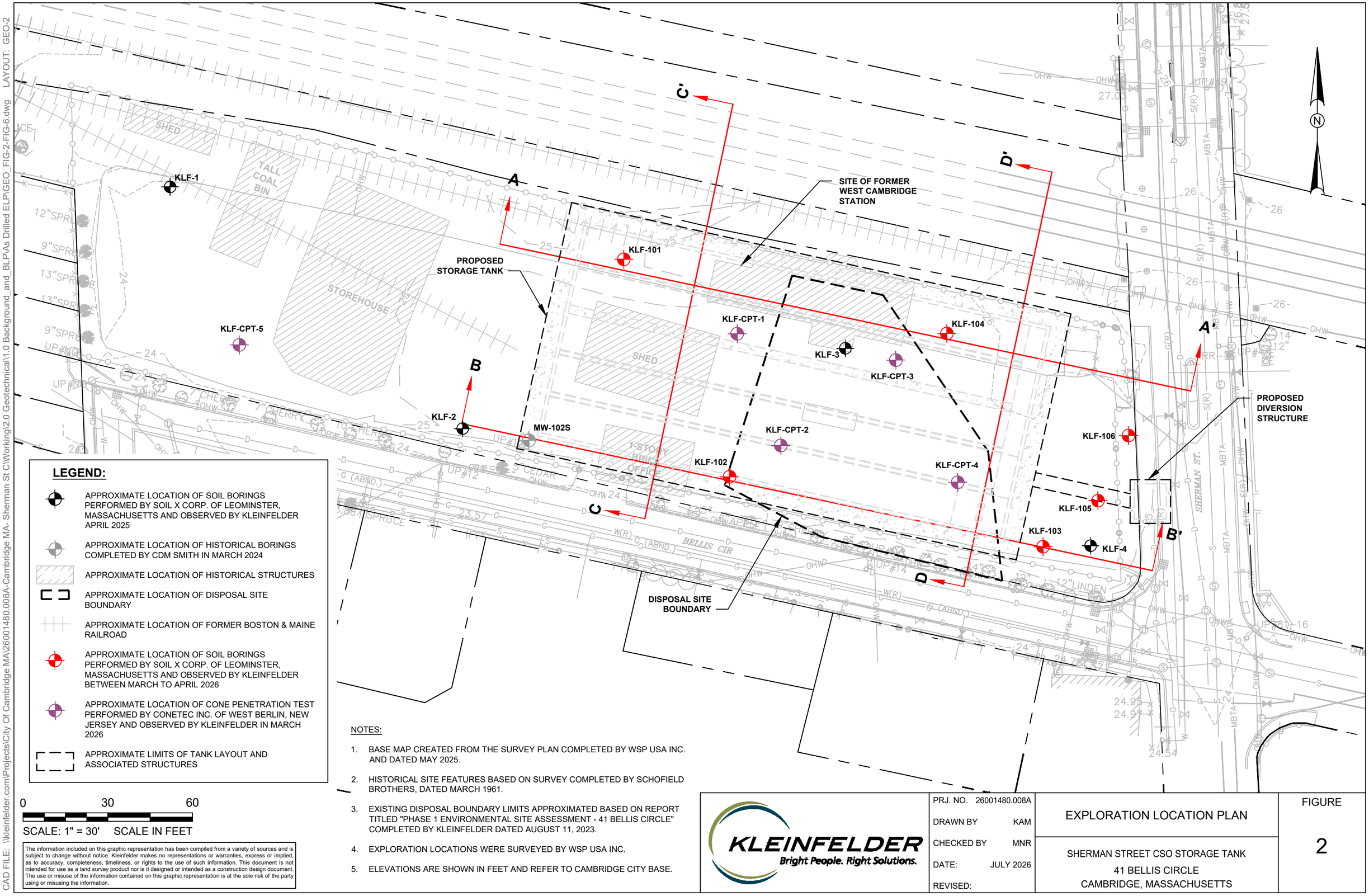
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NOTES:
1. BASE MAPPING CREATED FROM LAYERS COMPILED BY ESRI PRODUCTS.
2. COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001

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PROJECT NO. 26001480.008A	VICINITY MAP	FIGURE 1
DRAWN BY: AD CHECKED BY: HK DATE: JULY 2026	SHERMAN STREET CSO STORAGE TANK 41 BELLIS CIRCLE CAMBRIDGE, MASSACHUSETTS	

GIS FILE PATH: \\azrgisstorp03\working_clients_Automated_Exploration Plans\26001480.008A_ShermanStreetCSOStorageTank_20260715_adarajat\APRX\
GIS FILE NAME: gINT_20260715_2109_ad
PLOTTED: 7/15/2026 9:19 PM BY: ADARAJAT



LEGEND:

- APPROXIMATE LOCATION OF SOIL BORINGS PERFORMED BY SOIL X CORP. OF LEOMINSTER, MASSACHUSETTS AND OBSERVED BY KLEINFELDER APRIL 2025
- APPROXIMATE LOCATION OF HISTORICAL BORINGS COMPLETED BY CDM SMITH IN MARCH 2024
- APPROXIMATE LOCATION OF HISTORICAL STRUCTURES
- APPROXIMATE LOCATION OF DISPOSAL SITE BOUNDARY
- APPROXIMATE LOCATION OF FORMER BOSTON & MAINE RAILROAD
- APPROXIMATE LOCATION OF SOIL BORINGS PERFORMED BY SOIL X CORP. OF LEOMINSTER, MASSACHUSETTS AND OBSERVED BY KLEINFELDER BETWEEN MARCH TO APRIL 2026
- APPROXIMATE LOCATION OF CONE PENETRATION TEST PERFORMED BY CONETEC INC. OF WEST BERLIN, NEW JERSEY AND OBSERVED BY KLEINFELDER IN MARCH 2026
- APPROXIMATE LIMITS OF TANK LAYOUT AND ASSOCIATED STRUCTURES

0 30 60

SCALE: 1" = 30' SCALE IN FEET

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NOTES:

1. BASE MAP CREATED FROM THE SURVEY PLAN COMPLETED BY WSP USA INC. AND DATED MAY 2025.
2. HISTORICAL SITE FEATURES BASED ON SURVEY COMPLETED BY SCHOFIELD BROTHERS, DATED MARCH 1961.
3. EXISTING DISPOSAL BOUNDARY LIMITS APPROXIMATED BASED ON REPORT TITLED "PHASE 1 ENVIRONMENTAL SITE ASSESSMENT - 41 BELLIS CIRCLE" COMPLETED BY KLEINFELDER DATED AUGUST 11, 2023.
4. EXPLORATION LOCATIONS WERE SURVEYED BY WSP USA INC.
5. ELEVATIONS ARE SHOWN IN FEET AND REFER TO CAMBRIDGE CITY BASE.

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REVISED:	

EXPLORATION LOCATION PLAN

SHERMAN STREET CSO STORAGE TANK
41 BELLIS CIRCLE
CAMBRIDGE, MASSACHUSETTS

FIGURE
2

CAD FILE: \\kleinfelder.com\Projects\City Of Cambridge MA\26001480.008A-Cambridge MA- Sherman St.C\Working\2.0 Geotechnical\1.0 Background_and_BLP\As Drilled ELP\GEO_FIG-2-FIG-6.dwg LAYOUT: GEO-2

CAD FILE: \\kleinfelder.com\Projects\City Of Cambridge MA\26001480.008A-Cambridge MA- Sherman St C\Working\2.0 Geotechnical\1.0 Background_and_BLP\As Drilled ELP\GEO_FIG-2-FIG-6.dwg LAYOUT: GEO-3

LEGEND

KLF-100 — EXPLORATION ID

EL = 100' — EXPLORATION ELEVATION

OFF = 10 FT — EXPLORATION OFFSET

SM — SOIL CLASSIFICATION

GROUND WATER ENCOUNTERED

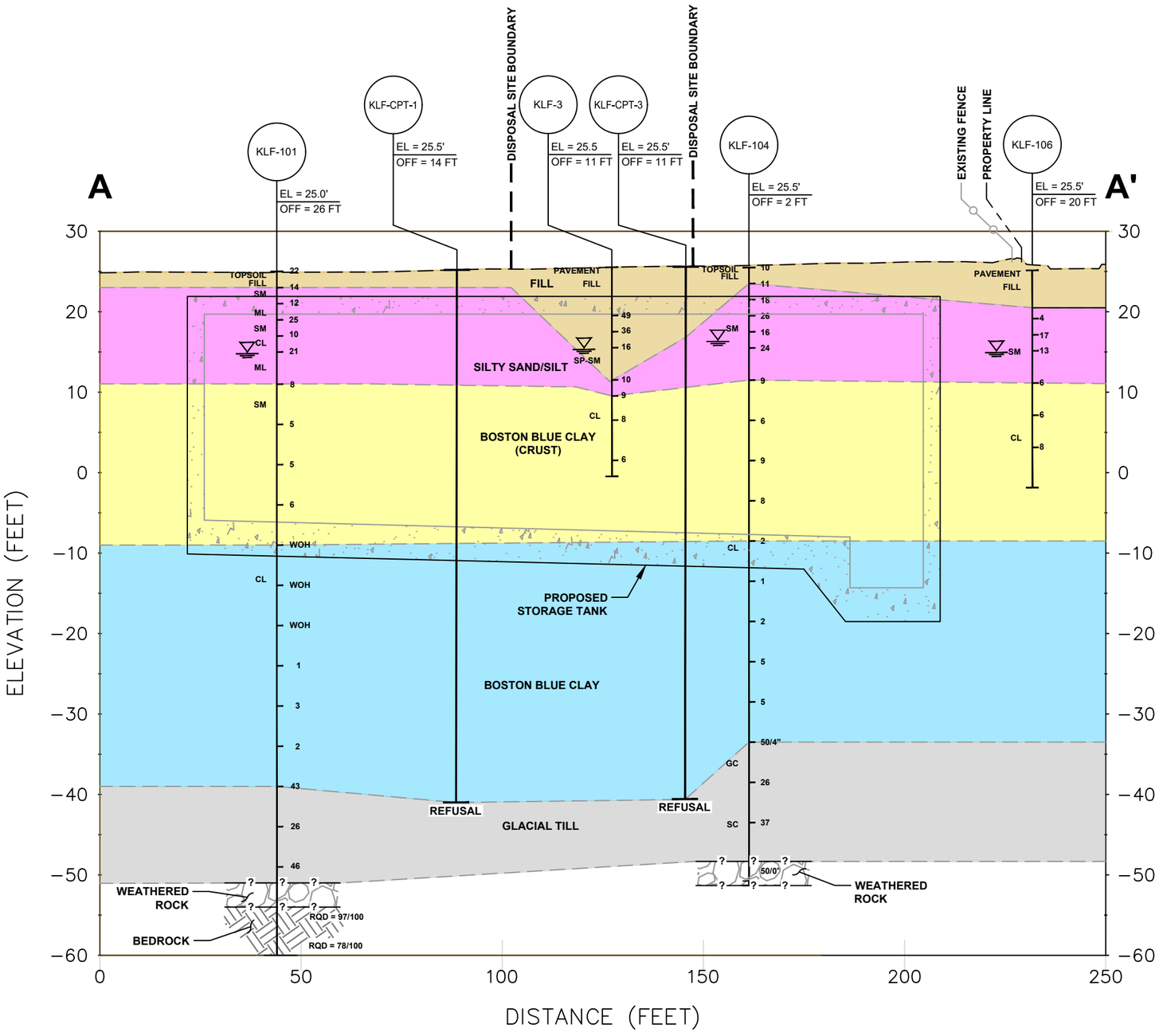
10 — BLOW COUNT

RQD — (ROCK QUALITY DESIGNATION) INTERVAL RECOVERED

- FILL
- SILTY SAND/SILT
- BOSTON BLUE CLAY (CRUST)
- BOSTON BLUE CLAY
- GLACIAL TILL
- WEATHERED ROCK
- BEDROCK

NOTES:

1. THE SUBSURFACE CONDITIONS SHOWN ARE BASED ON INTERPOLATION BETWEEN WIDELY SPACED EXPLORATIONS AND SHOULD BE CONSIDERED APPROXIMATE. ACTUAL SUBSURFACE CONDITIONS MAY VARY FROM THOSE SHOWN.
2. THIS DRAWING IS FOR INFORMATIONAL PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT. KLEINFELDER, INC. CANNOT GUARANTEE THE ACCURACY OF AND CONTENT OF ELECTRONIC FILES. THE MASTER FILE IS STORED BY KLEINFELDER, INC., AND WILL SERVE AS THE OFFICIAL RECORD OF THIS COMMUNICATION.
3. ELEVATIONS ARE SHOWN IN FEET AND REFER TO CAMBRIDGE CITY BASE.



0 30 60

SCALE: 1" = 30' SCALE IN FEET

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SECTION
A-A'

SHERMAN STREET CSO STORAGE TANK
41 BELLIS CIRCLE
CAMBRIDGE, MASSACHUSETTS

FIGURE
3

LEGEND

KLF-100 — EXPLORATION ID

EL = 100' / OFF = 10 FT — EXPLORATION ELEVATION / EXPLORATION OFFSET

SM — SOIL CLASSIFICATION

GROUND WATER ENCOUNTERED

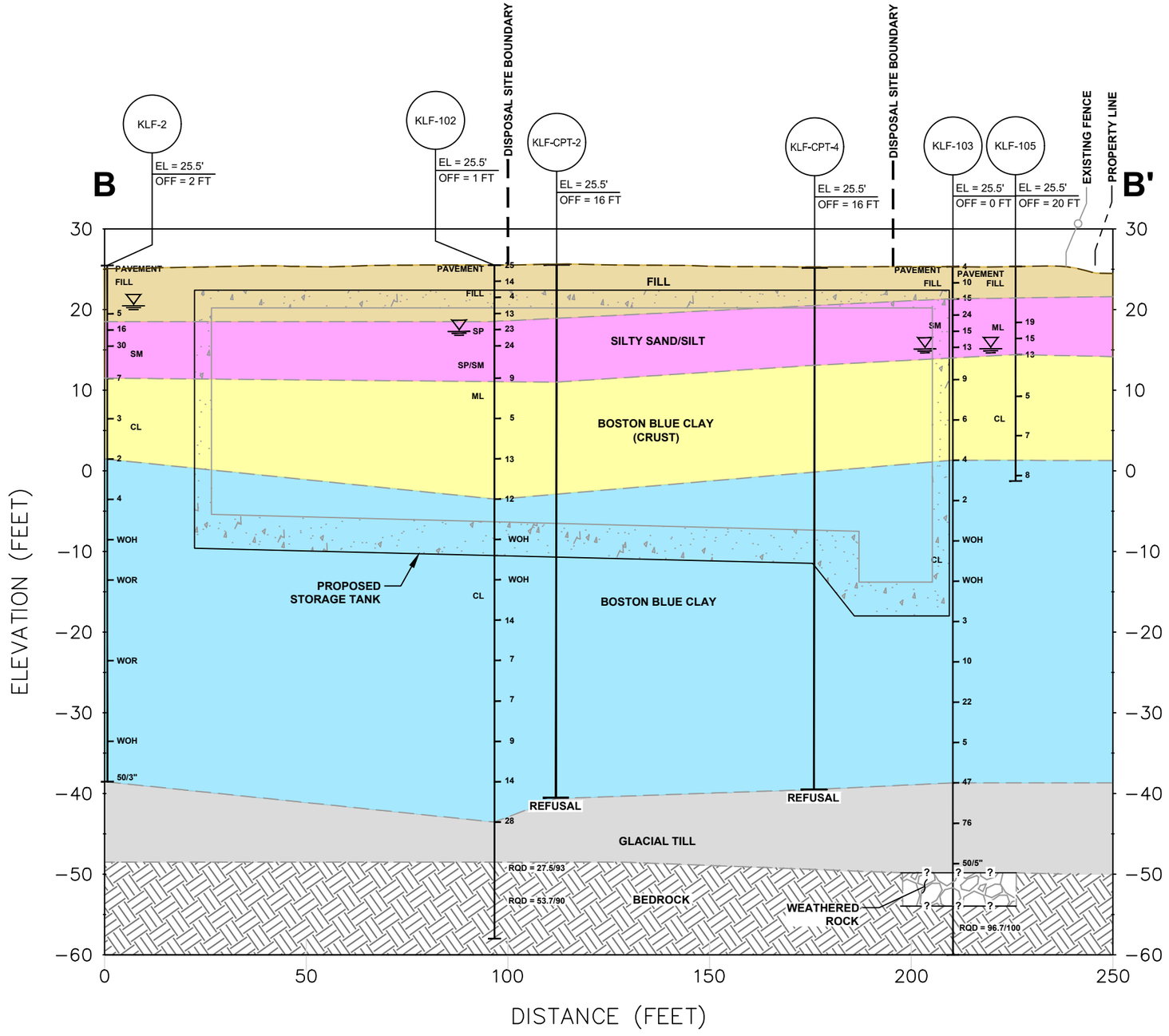
10 — BLOW COUNT

RQD — (ROCK QUALITY DESIGNATION) INTERVAL RECOVERED

- FILL
- SILTY SAND/SILT
- BOSTON BLUE CLAY (CRUST)
- BOSTON BLUE CLAY
- GLACIAL TILL
- WEATHERED ROCK
- BEDROCK

NOTES:

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0 30 60

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SECTION
B-B'

SHERMAN STREET CSO STORAGE TANK
41 BELLIS CIRCLE
CAMBRIDGE, MASSACHUSETTS

FIGURE
4

CAD FILE: L:\City Of Cambridge MA\26001480.008A-Cambridge MA- Sherman St CWorking\2.0 Geotechnical\1.0 Background_and_BLPVAs Drilled ELP\GEO_FIG-2-FIG-6.dwg LAYOUT: GEO-4

CAD FILE: \\kleinfelder.com\Projects\City Of Cambridge MA\26001480.008A-Cambridge MA- Sherman St C\Working\2.0 Geotechnical\1.0 Background_and_BLP\As Drilled ELP\GEO_FIG-2-FIG-6.dwg LAYOUT: GEO-5

LEGEND

KLF-100 — EXPLORATION ID

EL = 100' — EXPLORATION ELEVATION

OFF = 10 FT — EXPLORATION OFFSET

SM — SOIL CLASSIFICATION

GROUND WATER ENCOUNTERED

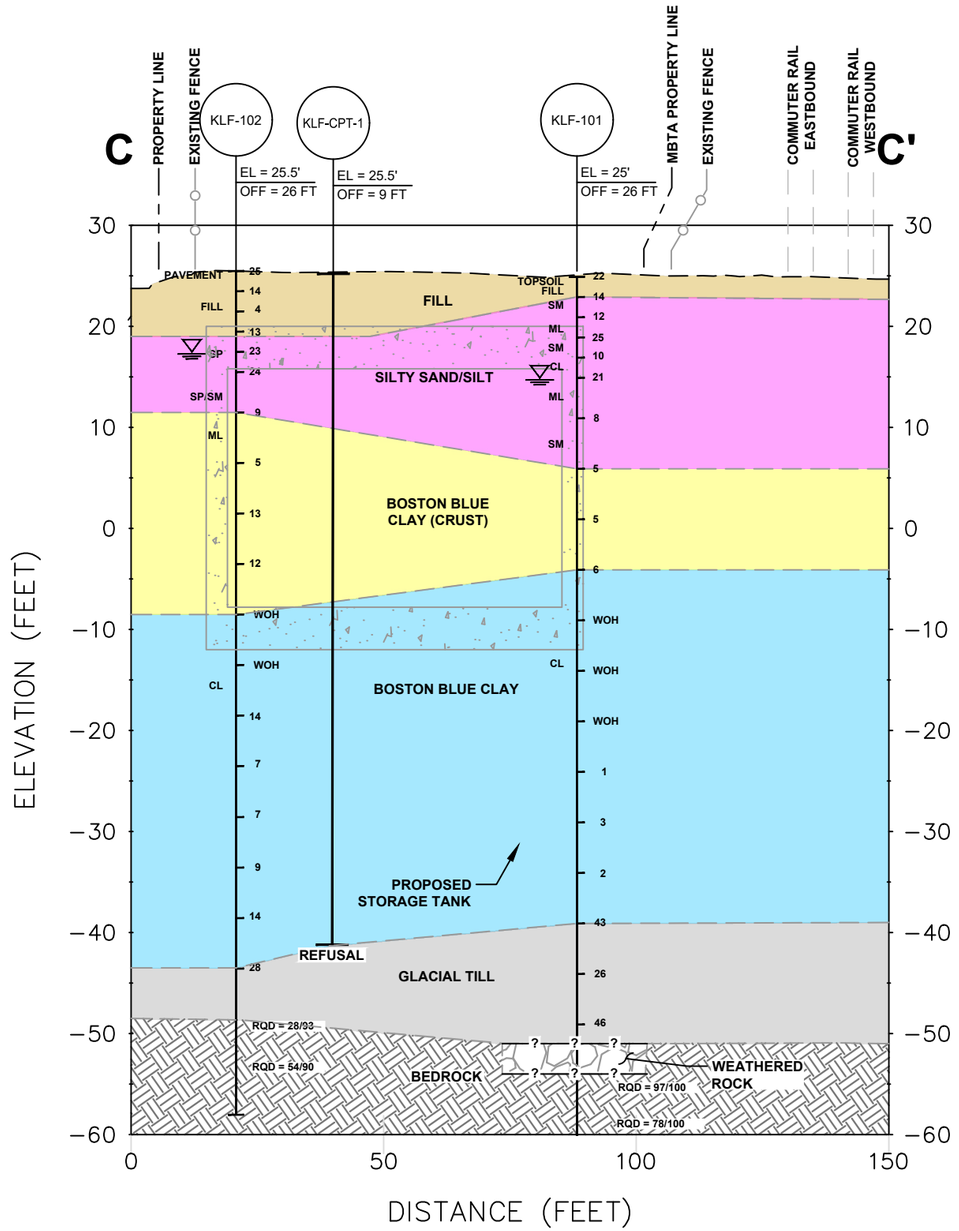
10 — BLOW COUNT

RQD — (ROCK QUALITY DESIGNATION) INTERVAL RECOVERED

- FILL
- SILTY SAND/SILT
- BOSTON BLUE CLAY (CRUST)
- BOSTON BLUE CLAY
- GLACIAL TILL
- WEATHERED ROCK
- BEDROCK

NOTES:

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0 30 60

SCALE: 1" = 30' SCALE IN FEET

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SECTION
C-C'

SHERMAN STREET CSO STORAGE TANK
41 BELLIS CIRCLE
CAMBRIDGE, MASSACHUSETTS

FIGURE
5

CAD FILE: \\kleinfelder.com\Projects\City Of Cambridge MA\26001480.008A-Cambridge MA- Sherman St C\Working\2.0 Geotechnical\1.0 Background_and_BLP\As Drilled ELP\GEO_FIG-2-FIG-6.dwg LAYOUT: GEO-6

LEGEND

KLF-100 — EXPLORATION ID

EL = 100' — EXPLORATION ELEVATION

OFF = 10 FT — EXPLORATION OFFSET

SM — SOIL CLASSIFICATION

GROUND WATER ENCOUNTERED

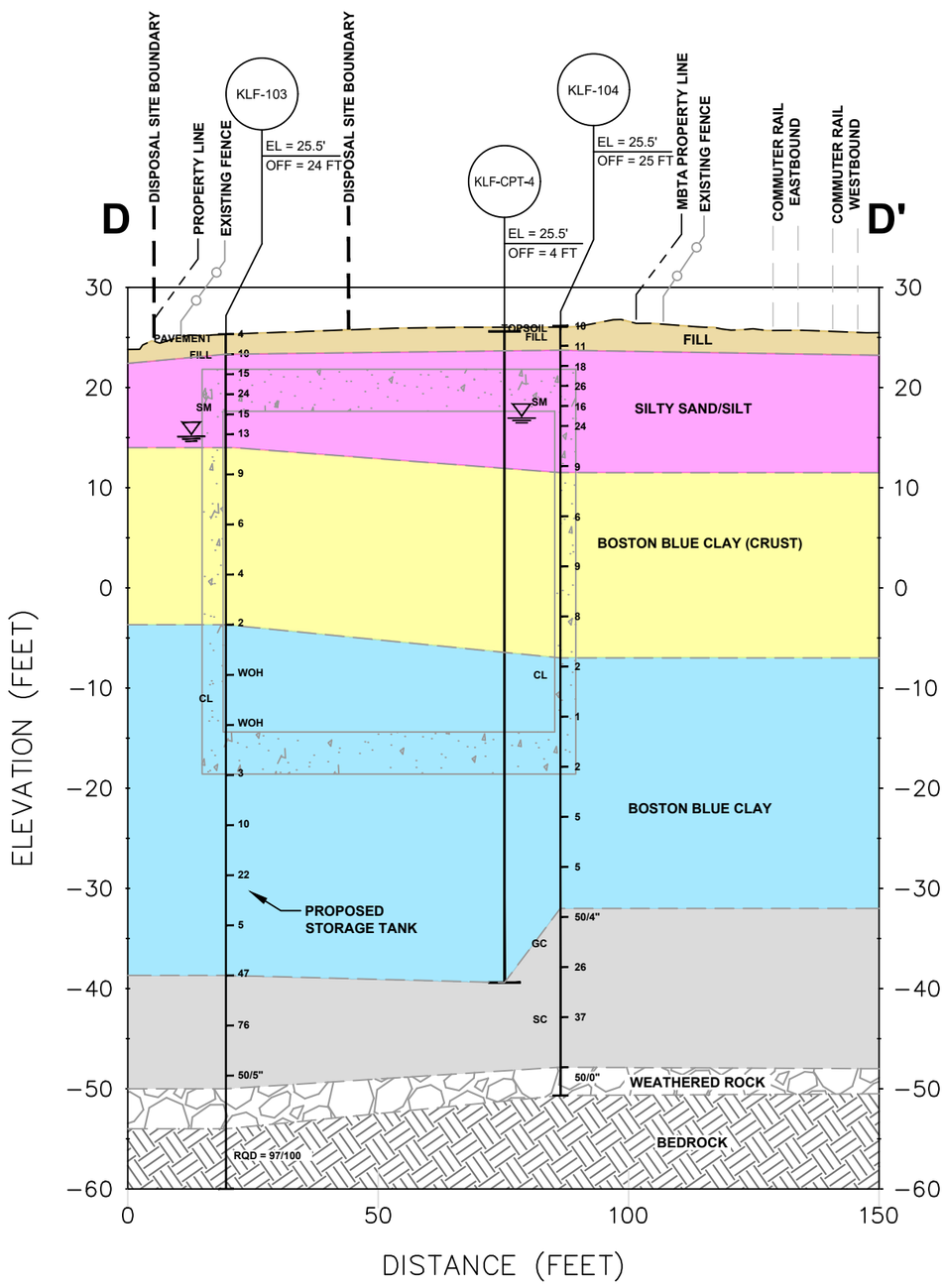
10 — BLOW COUNT

RQD — (ROCK QUALITY DESIGNATION) INTERVAL RECOVERED

- FILL
- SILTY SAND/SILT
- BOSTON BLUE CLAY (CRUST)
- BOSTON BLUE CLAY
- GLACIAL TILL
- WEATHERED ROCK
- BEDROCK

NOTES:

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0 30 60

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SECTION
D-D'

SHERMAN STREET CSO STORAGE TANK
41 BELLIS CIRCLE
CAMBRIDGE, MASSACHUSETTS

FIGURE
6

TABLES

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Table 1 Summary of Groundwater Elevations
Sherman Street CSO Storage Tank, Cambridge, Massachusetts

Monitoring Well	KLF-3	MW-102S[3]
Top of Ground Surface Elevation (ft, CCB)	25.05	25.28
Top of PVC to Ground Surface (ft)	0.27	0.29
Top of PVC Elevation (ft, CCB)	24.78	24.99
Date of Measurement: 4/22/2025		
Depth to Water **from Top of PVC (ft)**	7.95	7.31
Groundwater Elevation (ft, CCB)	16.83	17.68
Date of Measurement: 4/28/2025		
Depth to Water **from Top of PVC (ft)**	7.97	7.51
Groundwater Elevation (ft, CCB)	16.81	17.48
Date of Measurement: 4/30/2025		
Depth to Water **from Top of PVC (ft)**	8	7.15
Groundwater Elevation (ft, CCB)	16.78	17.84
Date of Measurement: 4/2/2026		
Depth to Water **from Top of PVC (ft)**	8.1	7.2
Groundwater Elevation (ft, CCB)	16.68	17.79

Notes:
1. Data presented are based on water level measurements performed by Kleinfelder, Inc. (KLF), on the dates shown.
2. Elevations are referenced to the Cambridge City Base (CCB). Depths shown are in feet.
3. Monitoring Well MW-120S completed by CDM Smith on March 21, 2024 to a total depth of 20 feet below ground surface.

APPENDIX A

Previous Exploration Logs by CDM Smith (2024)

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CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-102S

Client: City of Cambridge
Project Name: Danehy Park Environmental Assessment
Project Location: Cambridge, MA
Project Number: 285308

Drilling Contractor: Geosearch
Surface Elevation (ft.): 25.2
Drilling Method/Rig: DPT/Track-Mounted Geoprobe 6822DT
Top of PVC Riser Elevation (ft.): 24.99
Drillers: E. Belsky / M. Kelly
Total Depth (ft.): 20
Drilling Date: Start: 3/19/2024 **End:** 3/21/2024
Depth to Initial Water Level (ft. BGS): 7.26
Logged By: S. Marshall
Development Method: Surge and purge
Field Screening Instrument: PID and 4-gas

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
					ASPH	(0-0.25') Asphalt.		25.2 / 0	Protective Casing Top of Riser @ 24.99 ft. *Ground Surface* (0-1') Concrete
HA	S-1	0.0	NA	6/6	FILL	(0.25-0.75') Moist, gray-brown, coarse-medium-fine SAND, some fine gravel, trace silt and asphalt. (0.75-2') Air knife-vac to 2' BGS.			
HA	S-2	0.0	NA	6/6	FILL	(2-2.5') Moist, dark gray-brown, coarse-medium-fine SAND, some coarse-medium-fine gravel, trace silt. (2.5-4') Air knife-vac to 4' BGS. Note: Fill sand encountered at approximately 3.75' BGS.			(1-8') Medium Bentonite Chips
HA	S-3	0.0	NA	6/6	FILL	(4-4.5') Moist, tan-brown, medium-fine SAND, little fine gravel, trace silt. (4.5-8') Air knife-vac to 8' BGS.		20.2 / 5	(0-8') 2" Schedule 40 PVC riser
								15.2	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- AH - Air Hammer
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

BGS = Below Ground Surface
PID = Photoionization Detection
TBC = To Be Completed
NA = Not Applicable
NM = Not Measured

Depth to water measured from top of inner PVC on 5/1/2024

Reviewed by: N. Castonguay **Date:** 8/21/2024

BEEBE MW LOG DANEHY PARK 2024 SOIL BORING AND MONITORING WELL LOGS - UPDATED 10-16-2024.GPJ CDM_MA.GDT 10/23/24

CDM Smith
75 State Street Suite 701
Boston, MA 02109

MONITORING WELL DETAIL
MW-102S

Client: City of Cambridge
Project Name: Danehy Park Environmental Assessment
Project Location: Cambridge, MA
Project Number: 285308

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (inches)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								15.2	
GP	S-4	0.0	NA	60/57	CL-ML	(10-15') Top 14": Moist to wet, tan-olive, SILT and CLAY, some fine sand. Middle 17": Wet, very light brown, medium-fine SAND, little silt (sand seam). Bottom 26": Moist to wet, light gray-olive, SILT and CLAY, little medium-fine sand.		10	(8-20') #1 Silica Sand
								10.2	
GP	S-5	0.0	NA	60/59	CL-ML	(15-20') Top 7": Wet, gray-brown, fine SAND and SILT (slough). Middle 34": Wet, light gray, SILT, some fine sand and clay. Bottom 18": Moist to wet, gray, SILT and CLAY, little fine sand.		15	(10-20') 2" (0.01") Slot Schedule 40 PVC Screen
								5.2	
						End of Exploration at 20' BGS.		20	Bottom of Well at 20' BGS
								0.2	
								25	
								-4.8	

BEEBE MW LOG DANEHY PARK 2024 SOIL BORING AND MONITORING WELL LOGS - UPDATED 10-16-2024.GPJ CDM_MA.GDT 10/23/24

APPENDIX B

Previous Exploration Logs by Kleinfelder (2025)

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DRILLING METHOD/SAMPLER TYPE GRAPHICS



STANDARD PENETRATION SPLIT SPOON SAMPLER (2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

VacTruck

GROUND WATER GRAPHICS

- WATER LEVEL (level where first observed)
- WATER LEVEL (level after stabilizing period)
- WATER LEVEL (additional levels after exploration)
- OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Solid lines separating strata on the logs represent approximate boundaries only, dashed lines are inferred or extrapolated boundaries. Actual transitions may be gradual or differ from those represented.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System (ASTM D2488/D2487) designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., CL-ML, GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS

WOH - Weight of Hammer
WOR - Weight of Rod

REFERENCES

1. American Society for Testing and Materials (ASTM), 2011, ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).

UNIFIED SOIL CLASSIFICATION SYSTEM[1]

COARSE GRAINED SOILS (More than 50% retained on No. 200 Sieve)	**GRAVELS** (More than 50% of coarse fraction retained on No. 4 Sieve)	CLEAN GRAVEL WITH <5% FINES	**GW**	WELL-GRADED GRAVEL, WELL-GRADED GRAVEL WITH SAND
			GP	POORLY GRADED GRAVEL, POORLY GRADED GRAVEL WITH SAND
		GRAVELS WITH 5% TO 12% FINES	**GW-GM**	WELL-GRADED GRAVEL WITH SILT, WELL-GRADED GRAVEL WITH SILT AND SAND
			GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY), WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILT CLAY AND SAND)
			GP-GM	POORLY GRADED GRAVEL WITH SILT, POORLY GRADED GRAVEL WITH SILT AND SAND
			GP-GC	POORLY GRADED GRAVEL WITH CLAY (OR SILTY CLAY), POORLY GRADED GRAVEL WITH CLAY AND (OR SILTY CLAY AND SAND)
		GRAVELS WITH > 12% FINES	**GM**	SILTY GRAVEL, SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL, CLAYEY GRAVEL WITH SAND
			GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND
	SANDS (50% or more of coarse fraction passes the No. 4 Sieve)	CLEAN SANDS WITH <5% FINES	**SW**	WELL-GRADED SAND, WELL-GRADED SAND WITH GRAVEL
			SP	POORLY GRADED SAND, POORLY GRADED SAND WITH GRAVEL
		SANDS WITH 5% TO 12% FINES	**SW-SM**	WELL-GRADED SAND WITH SILT, WELL-GRADED SAND WITH SILT AND GRAVEL
			SW-SC	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY), WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
			SP-SM	POORLY GRADED SAND WITH SILT, POORLY GRADED SAND WITH SILT AND GRAVEL
			SP-SC	POORLY GRADED SAND WITH CLAY, POORLY GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
		SANDS WITH > 12% FINES	**SM**	SILTY SAND, SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND, CLAYEY SAND WITH GRAVEL
			SC-SM	SILTY, CLAYEY SAND, SILTY, CLAYEY SAND WITH GRAVEL
FINE GRAINED SOILS (50% or more passes the No. #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)		**ML**	SILT, SILT WITH SAND, SILT WITH GRAVEL
			CL	LEAN CLAY, LEAN CLAY WITH SAND, LEAN CLAY WITH GRAVEL
			CL-ML	SILTY CLAY, SILTY CLAY WITH SAND, SILTY CLAY WITH GRAVEL
			OL	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL
	SILTS AND CLAYS (Liquid Limit 50 or greater)		**MH**	ELASTIC SILT. ELASTIC SILT WITH SAND, ELASTIC SILT WITH GRAVEL
			CH	FAT CLAY, FAT CLAY WITH SAND, FAT CLAY WITH GRAVEL
			OH	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL

NOTE: USE MATERIAL DESCRIPTION ON THE LOG TO DEFINE A GRAPHIC THAT MAY NOT BE PROVIDED ON THIS LEGEND.

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PROJECT NO.: 20231168.006A
DRAWN BY: RD/AD
CHECKED BY: MNR
DATE: 4/17/2025

GRAPHICS KEY

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_GEO_LEG1_GRAPHICS_KEY_W_USCS]
PROJECT NUMBER: 20231168.006A
OFFICE FILTER: BOSTON
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GRAIN SIZE[1]

DESCRIPTION		SIEVE SIZE	GRAIN SIZE
Boulders		>12 in.	>12 in. (304.8 mm.)
Cobbles		3 - 12 in.	3 - 12 in. (76.2 - 304.8 mm.)
Gravel	coarse	3/4 -3 in.	3/4 -3 in. (19 - 76.2 mm.)
	fine	#4 - 3/4 in.	0.19 - 0.75 in. (4.8 - 19 mm.)
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)
Fines		Passing #200	<0.0029 in. (<0.07 mm.)

SECONDARY CONSTITUENT[1]

Term of Use	AMOUNT	
	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

PLASTICITY[1]

DESCRIPTION	CRITERIA
Non-Plastic	A 1/8 in. (3 mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

MOISTURE CONTENT[1]

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CONSISTENCY - FINE-GRAINED SOIL[2, 3]

CONSISTENCY	SPT - N (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q_u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Easily penetrated several inches by fist
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1,000	Easily penetrated several inches by thumb
Medium Stiff	4 - 8	0.5 ≤ PP <1	1,000 - 2,000	Can be penetrated several inches by thumb with moderate effort
Stiff	8 - 15	1 ≤ PP <2	2,000 - 4,000	Readily indented by thumb but penetrated only with great effort
Very Stiff	15 - 30	2 ≤ PP <4	4,000 - 8,000	Readily indented by thumbnail
Hard	>30	4 ≤ PP	>8,000	Indented by thumbnail with difficulty

APPARENT DENSITY - COARSE-GRAINED SOIL[2]

APPARENT DENSITY	SPT-N (# blows / ft)
Very Loose	<4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

STRUCTURE[1]

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. (6mm) thick, note thickness.
Laminated	Alternating layers of varying material or color with the layers less than 1/4-in. (6 mm) thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.
Homogeneous	Same color and appearance throughout

ANGULARITY[1]

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

REACTION WITH HYDROCHLORIC ACID[1]

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

CEMENTATION[1]

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or little finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

REFERENCES

1. American Society for Materials and Testing (ASTM), 2017, ASTM D2488: Standard Practice for Description and Identification of Soils (Visual Manual Procedures).
2. Terzaghi, K and Peck, R., 1948, Soil Mechanics in Engineering Practice, John Wiley & Sons, New York.
3. United States Department of the Interior Bureau of Reclamation (USBR), 1998, Earth Manual, Part I.

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PROJECT NO.: 20231168.006A
DRAWN BY: RD/AD
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SOIL DESCRIPTION KEY
(For additional tables, see ASTM D2488)

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:17 AM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 20231168.006A
gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [KLF_GEO_LEG2_SOIL_DESC_KEY]

BORING LOG KLF-1

Date Begin - End:	4/07/2025 - 4/08/2025	**Drilling Company:**	Soil X Corp.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Rainy 30-40s	**Exploration Diameter:**	4 and 3 in. I.D.		

Latitude: 42.39073°
Longitude: -71.13406°
Ground Surface Elevation (ft.): 24.05
Surface Condition: Asphalt

Elevation (feet)	Depth (feet)	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		Asphalt 2.5 Inches	G-1				SP-SM							PID 0.0
		23.86 **FILL**												
		Poorly Graded SAND with Silt and Gravel (SP-SM): fine to coarse sand, brown, moist 23.05	G-2				SP							PID: 0.1
		Poorly Graded SAND (SP): fine to coarse sand, black, moist, trace bricks and roots 22.05	G-3				SM							PID: 0.1
		Silty SAND (SM): fine to medium sand, light brown, moist	G-4											PID: 0.1
20			G-5											PID: 0.1
	5	becomes wet	G-6											PID: 0.1
		SILT with Sand (ML): light brown, wet, stiff 18.05	S-1		BC=5 6 9 10	16"	ML			100	77			PID: 0.0
			S-2		BC=10 7 7 9	22"								PID: 0.0
15														
	10	**Lean CLAY (CL)**: gray, wet, stiff 14.05	S-3		BC=8 7 6 6 PP=1.25	24"	CL	26.4				34	14	PID: 0.0
10		**Sandy CLAY (CL)**: gray, wet, medium stiff 10.05	S-4		BC=10 4 2 4 PP=0.5	18"	CL							PID: 0.1
	15													
5			S-5		BC=3 3 3 3 PP=0.5	22"								PID: 0.3
	20													
0		**Lean CLAY (CL)**: gray, wet, medium stiff 0.05	S-6		BC=3 3	24"								PID: 0.0

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PROJECT NO.: 20231168.006A
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BORING LOG KLF-1

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:18 AM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 20231168.006A
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]
gINT FILE: Klf_gint_master_2023

Date Begin - End: 4/07/2025 - 4/08/2025 **Drilling Company:** Soil X Corp.

BORING LOG KLF-1

Logged By: A. Darajat **Drill Crew:** C. Targ

Hor.-Vert. Datum: NAD83 - Cambridge City **Drilling Equipment:** B29 Mobile **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** HSA and Drive and Wash

Weather: Rainy 30-40s **Exploration Diameter:** 4 and 3 in. I.D.

FIELD EXPLORATION

Latitude: 42.39073°
Longitude: -71.13406°
Ground Surface Elevation (ft.): 24.05
Surface Condition: Asphalt

LABORATORY RESULTS

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
				S-6 *(cont.)*		4 3 PP=0.5	24" *(cont.)*								
-5	30			S-7		BC=2 2 3 4 PP=0.25	24"								PID: 0.1
-10	35		becomes soft	S-8		BC=4 2 2 3 TV=1	24"								PID: 0.0
-15	40		becomes very soft	S-9		BC=WOH WOH WOH WOH TV=0.5	24"								PID: 0.0
-20	45			S-10		BC=WOR WOR WOR WOR	10"								PID: 0.1
-25				S-11		BC=WOR WOR	16"								PID: 0.2

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PROJECT NO.: 20231168.006A

DRAWN BY: RD

CHECKED BY: MNR

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BORING LOG KLF-1

Combined Sewer Overflow Long-Term
Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:18 AM BY: ADarajat
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gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/07/2025 - 4/08/2025 **Drilling Company:** Soil X Corp.

BORING LOG KLF-1

Logged By: A. Darajat **Drill Crew:** C. Targ

Hor.-Vert. Datum: NAD83 - Cambridge City **Drilling Equipment:** B29 Mobile **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** HSA and Drive and Wash

Weather: Rainy 30-40s **Exploration Diameter:** 4 and 3 in. I.D.

Elevation (feet) / Depth (feet)	Graphical Log	FIELD EXPLORATION: Latitude: 42.39073° Longitude: -71.13406° Ground Surface Elevation (ft.): 24.05 Surface Condition: Asphalt — Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			S-11 *(cont.)*		WOR WOR	16" *(cont.)*								
-26.95		The boring was terminated at approximately 51 ft. below ground surface. The boring was backfilled with auger cuttings and patched at surface on April 08, 2025.												

GROUNDWATER LEVEL INFORMATION:

▽ Perched groundwater was observed at approximately 5.5 ft. below ground surface during drilling.

▼ Groundwater was observed at approximately 10 ft. below ground surface at the end of drilling.

GENERAL NOTES:

1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples G-3 to G-5 was submitted for environmental analysis.
5. The top 6 feet was pre-cleared using vacuum excavation.
6. Hollow Stem Auger with 4" ID was used from ground surface to depth of 10 feet bgs then switched to Drive and Wash with 3" ID casing to termination depth.

-30 55 -35 60 -40 65 -45 70 -50

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BORING LOG KLF-2

Date Begin - End:	4/07/2025 - 4/11/2025	**Drilling Company:**	Soil X Corp.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Rainy 30-40s	**Exploration Diameter:**	4 and 3 in. I.D.		

Latitude: 42.39050°
Longitude: -71.13368°
Ground Surface Elevation (ft.): 25.06
Surface Condition: Asphalt

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			Asphalt 2.5 Inches	G-1				GP-GM							PID: 0.1
			24.86 **FILL**												
			Poorly Graded GRAVEL with Silt and Sand (GP-GM): fine to coarse gravel, reddish brown, moist	G-2				SP							PID: 0.1
			24.06												
			Poorly Graded SAND (SP): fine to coarse sand, black, moist, with cobbles	G-3				SM							PID: 0.1
			23.06 **Silty SAND (SM)**: fine to medium sand, dark brown/yellow, moist, trace roots, brick fragments	G-4											PID: 0.0
				G-5											PID: 0.0
20	5		becomes light brown	G-6				SM							PID: 0.0
			20.06 **Silty SAND (SM)**: fine to medium sand, light brown/gray, moist	S-1		BC=2 2 3 6	15"	ML			100	68			PID: 0.0
			19.06 **Sandy SILT (ML)**: light brown/gray, moist, medium stiff	S-2A		BC=3 10	12"								PID: 0.0 Soil Mottling Observed
				S-2B		BC=6 6	4"	CL							
15	10		**Lean CLAY (CL)**: brown, wet 16.06 becomes light gray	S-3A		BC=3 12	12"								PID: 0.0
			Silty SAND (SM): light gray, wet 14.06	S-3B		BC=18 25	12"	SM							
10	15		**Sandy CLAY (CL)**: gray, wet, medium stiff 11.06	S-4		BC=WOH 4 3 2 PP=0.5	24"	CL							PID: 0.
5	20		**Lean CLAY (CL)**: gray, wet, soft 6.06	S-5		BC=WOH WOH 3 2 PP=0.25	24"	CL							PID: 0.0
			becomes very soft	S-6		BC=1 1	24"								PID: 0.0

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PROJECT NO.: 20231168.006A
DRAWN BY: AD
CHECKED BY: MNR
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BORING LOG KLF-2

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
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BORING LOG KLF-2

Date Begin - End:	4/07/2025 - 4/11/2025	**Drilling Company:**	Soil X Corp.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Rainy 30-40s	**Exploration Diameter:**	4 and 3 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39050°
Longitude: -71.13368°
Ground Surface Elevation (ft.): 25.06
Surface Condition: Asphalt

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
				S-6 *(cont.)*		1 1 PP=0.25	24" *(cont.)*								
			becomes soft	S-7		BC=1 2 2 4 PP=0.25	16"								PID: 0.0 2" Sand seam at bottom of spoon
-5	30		becomes very soft	S-8		BC=WOH WOH WOH 1 TV=0.25	6"								PID: 0.0
-10	35		**Clayey SILT (ML)**: gray, wet, very soft -13.94	S-9		BC=WOR WOR WOR WOH TV=0.25	24"	ML	39.3				39	13	PID: 0.0
-15	40														
-20	45		**Silty CLAY (CL)**: gray, wet, very soft -23.94	S-10		BC=WOR WOR	6"								PID: 0.0

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Date Begin - End:	4/07/2025 - 4/11/2025	**Drilling Company:**	Soil X Corp.	**BORING LOG KLF-2**	
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Rainy 30-40s	**Exploration Diameter:**	4 and 3 in. I.D.		

Latitude: 42.39050°
Longitude: -71.13368°
Ground Surface Elevation (ft.): 25.06
Surface Condition: Asphalt

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
				S-10 *(cont.)*		WOR WOR	6" *(cont.)*								
-30	55														
				S-11		BC=WOH WOH WOH 6	24"								PID: 0.0
-35	60														
			Glacial Till -37.94 **Poorly Graded GRAVEL with Silt (GP-GM)**: fine to coarse gravel, gray, wet, very dense					GP-GM							Drill rig chattered at 63 feet bgs.
				S-12		BC=42 48 50/3"	12"								PID: 0.0
-40	65		-40.19												
-45	70														

The boring was terminated at approximately 65.25 ft. below ground surface. The boring was backfilled with auger cuttings and patched at surface on April 11, 2025.

GROUNDWATER LEVEL INFORMATION:
▽ Perched groundwater was observed at approximately 5 ft. below ground surface during drilling.
▼ Groundwater was observed at approximately 8 ft. below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples G-1 to G-5 was submitted for environmental analysis.
5. The top 6 feet was pre-cleared using vacuum excavation.
6. Hollow Stem Auger with 4" ID was used from ground surface to depth of 10 feet bgs then switched to Drive and Wash with 3" ID casing to termination depth.

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PROJECT NO.: 20231168.006A
DRAWN BY: AD
CHECKED BY: MNR
DATE: 4/17/2025

BORING LOG KLF-2

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:19 AM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 20231168.006A
gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]

BORING LOG KLF-3

Date Begin - End:	4/07/2025 - 4/10/2025	**Drilling Company:**	Soil X Corp.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Sunny-Rainy 30-40s	**Exploration Diameter:**	4 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39057°
Longitude: -71.13317°
Ground Surface Elevation (ft.): 25.69
Surface Condition: Asphalt

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25 / 0		Asphalt 2.5 Inches 25.49	G-1				SP-SM							PID: 0.1
		FILL												
		Poorly Graded SAND with Gravel and Silt (SP-SM): fine to coarse sand, brown, moist 24.69	G-2											PID: 0.1
		Poorly Graded GRAVEL with Silt and Sand (GP-GM): fine to coarse gravel, brown, moist, trace brick and concrete pieces	G-3				GP-GM							PID: 0.0
			G-4											PID: 0.0
			G-5											PID: 0.0
5			G-6											PID: 0.0
20		becomes dense	S-1		BC=11 19 30 31	16"								PID: 0.1
		Poorly Graded SAND with Gravel and Silt (SP-SM): fine to coarse sand, brown, moist, dense 17.69	S-2		BC=28 21 15 11	20"	SP-SM			68	10			PID: 2.3
10 ▽		becomes medium dense, wet	S-3		BC=5 6 10 5	6"								PID: 0.0
15														
		Sandy CLAY (CL): gray, wet, stiff 11.69	S-4		BC=5 5 5 5 PP=0.75	24"	CL	29.6				25	8	PID: 0.0
15 / 10		**Lean CLAY (CL)**: gray, wet, stiff 9.69	S-5		BC=6 5 4 5 PP=0.75	24"	CL							PID: 0.1
			S-6		BC=WOH 4 4 6 PP=1	18"								PID: 0.0
20 / 5		becomes medium stiff	S-7		BC=2 3	20"								PID: 0.0

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PROJECT NO.: 20231168.006A
DRAWN BY: RD
CHECKED BY: MNR
DATE: 4/17/2025

BORING LOG KLF-3

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:20 AM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 20231168.006A
gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End:	4/07/2025 - 4/10/2025	**Drilling Company:**	Soil X Corp.	**BORING LOG KLF-3**	
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Sunny-Rainy 30-40s	**Exploration Diameter:**	4 in. I.D.		

Elevation (feet) / Depth (feet)	Graphical Log	FIELD EXPLORATION: Latitude: 42.39057° Longitude: -71.13317° Ground Surface Elevation (ft.): 25.69 Surface Condition: Asphalt / Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	LABORATORY RESULTS: USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0			S-7 *(cont.)*		3 4 PP=0.5	20" *(cont.)*								
-0.31		The boring was terminated at approximately 26 ft. below ground surface. Monitoring Well installed to a depth of 15 feet.												
30 -5														
35 -10														
40 -15														
45 -20														

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples G-1 to G-5 and S4 to S-5 were submitted for environmental analysis.
5. The top 6 feet was pre-cleared using vacuum excavation.
6. Hollow Stem Auger with 4" ID was used from ground surface to depth of 10 feet bgs then switched to Drive and Wash with 4" ID casing to termination depth.
A PID (ppmv) was used for environmental field screening.

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PROJECT NO.:	20231168.006A
DRAWN BY:	RD
CHECKED BY:	MNR
DATE:	4/17/2025

BORING LOG KLF-3

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:20 AM BY: ADarajat
gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]
PROJECT NUMBER: 20231168.006A
OFFICE FILTER: BOSTON

PLOTTED: 06/02/2025 11:21 AM BY: ADarajat

Date Begin - End:	4/07/2025 - 4/10/2025	**Drilling Company:**	Soil X Corp.	**BORING LOG KLF-3**	
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny-Rainy 30-40s	**Exploration Diameter:**	4 in. I.D.		

FIELD EXPLORATION | MONITORING WELL CONSTRUCTION

Latitude: 42.39057°
Longitude: -71.13317°
Ground Surface Elevation (ft.): 25.69
Surface Condition: Asphalt

Completion Method: Roadbox

Elevation (feet) / Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
25 / 0							Asphalt 2.5 Inches — 25.49
							FILL — 24.69
							Poorly Graded SAND with Gravel and Silt (SP-SM): fine to coarse sand, brown, moist
							Poorly Graded GRAVEL with Silt and Sand (GP-GM): fine to coarse gravel, brown, moist, trace brick and concrete pieces
20 / 5							becomes dense
							17.69
							Poorly Graded SAND with Gravel and Silt (SP-SM): fine to coarse sand, brown, moist, dense
15 / 10							becomes medium dense, wet
							11.69
							Sandy CLAY (CL): gray, wet, stiff
10 / 15							9.69
							Lean CLAY (CL): gray, wet, stiff
5 / 20							becomes medium stiff

Concrete
Soil cuttings
2" SCH 40 Solid PVC Riser
Bentonite Chips
2" SCH 40 Slotted 0.010 PVC Screen
Sand

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PROJECT NO.: 20231168.006A
DRAWN BY: RD
CHECKED BY: MNR
DATE: 4/17/2025

BORING LOG KLF-3

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [KLF_ENVIRONMENTAL LOG]
PROJECT NUMBER: 20231168.006A
OFFICE FILTER: BOSTON

Date Begin - End:	4/07/2025 - 4/10/2025	**Drilling Company:**	Soil X Corp.	**BORING LOG KLF-3**	
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny-Rainy 30-40s	**Exploration Diameter:**	4 in. I.D.		

FIELD EXPLORATION | MONITORING WELL CONSTRUCTION

Elevation (feet) / Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Latitude: 42.39057° Longitude: -71.13317° Ground Surface Elevation (ft.): 25.69 Surface Condition: Asphalt Lithologic Description	Completion Method: Roadbox
0							-.31	

The exploration was terminated at approximately 26 ft. below ground surface.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples G-1 to G-5 and S4 to S-5 were submitted for environmental analysis.
5. The top 6 feet was pre-cleared using vacuum excavation.
6. Hollow Stem Auger with 4" ID was used from ground surface to depth of 10 feet bgs then switched to Drive and Wash with 4" ID casing to termination depth.
A PID (ppmv) was used for environmental field screening.
Monitoring Well installed to a depth of 15 feet.

30 / -5
35 / -10
40 / -15
45 / -20

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PROJECT NO.: 20231168.006A
DRAWN BY: RD
CHECKED BY: MNR
DATE: 4/17/2025

BORING LOG KLF-3

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:21 AM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 20231168.006A
gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [KLF_ENVIRONMENTAL LOG]

BORING LOG KLF-4

Date Begin - End:	4/07/2025 - 4/10/2025	**Drilling Company:**	Soil X Corp.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Sunny-Rainy 30-40s	**Exploration Diameter:**	4 and 3 in. I.D.		

Latitude: 42.39038°
Longitude: -71.13285°
Ground Surface Elevation (ft.): 25.45
Surface Condition: Asphalt

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25 / 0		Asphalt 2.5 Inches 25.20	G-1				GP-GM							PID: 0.1
		FILL												
		Poorly Graded GRAVEL with Silt (GP-GM) fine to coarse gravel, reddish brown, moist 24.45	G-2				SM			100	39			PID: 0.0
		Silty SAND (SM): fine to medium sand, black, moist, with brick pieces 23.45	G-3				SM							PID: 0.0 Soil Mottling Observed
		Silty SAND (SM): fine to medium sand, light brown, moist	G-4											PID: 0.0
			G-5											PID: 0.0
20 / 5			G-6											PID: 0.0
		becomes medium dense	S-1		BC=2 5 7 11	16"	SM			100	21			PID: 0.0
		becomes brown	S-2		BC=12 10 9 11	16"								PID: 0.0 Soil Mottling Observed In Bottom 4 Inches
▽ 15 / 10		**Sandy CLAY (CL)**: gray, wet, stiff 15.28	S-3		BC=3 4 5 6	24"	CL							PID: 0.1
			S-4		BC=3 4 5 5 PP=1	24"								PID: 0.5
10 / 15														
		Lean CLAY (CL): gray, wet, medium stiff 6.45	S-5		BC=3 3 5 7 PP=0.5	15"	CL							PID: 0.6
5 / 20														
		becomes stiff	S-6		BC=1 2	18"								PID: 0.4 2" Sand seam at bottom of

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PROJECT NO.: 20231168.006A
DRAWN BY: RD
CHECKED BY: MNR
DATE: 4/17/2025

BORING LOG KLF-4

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:20 AM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 20231168.006A
gINT FILE: Klf_gint_master_2023
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End:	4/07/2025 - 4/10/2025	**Drilling Company:**	Soil X Corp.	**BORING LOG KLF-4**	
Logged By:	A. Darajat	**Drill Crew:**	C. Targ		
Hor.-Vert. Datum:	NAD83 - Cambridge City	**Drilling Equipment:**	B29 Mobile	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA and Drive and Wash		
Weather:	Sunny-Rainy 30-40s	**Exploration Diameter:**	4 and 3 in. I.D.		

Elevation (feet) / Depth (feet)	Graphical Log	FIELD EXPLORATION: Latitude: 42.39038° Longitude: -71.13285° Ground Surface Elevation (ft.): 25.45 Surface Condition: Asphalt — Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. / Pocket Pen(PP)= tsf / Torvane(TV)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0			S-6 *(cont.)*		7 4 PP=0.5	18" *(cont.)*								spoon.
-0.55		The boring was terminated at approximately 26 ft. below ground surface. The boring was backfilled with auger cuttings and patched at surface on April 10, 2025.												
30 / -5														
35 / -10														
40 / -15														
45 / -20														

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. The top 6 feet was pre-cleared using vacuum excavation.
5. Hollow Stem Auger with 4" ID was used from ground surface to depth of 10 feet bgs then switched to Drive and Wash with 3" ID casing to termination depth.

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PROJECT NO.:	20231168.006A
DRAWN BY:	RD
CHECKED BY:	MNR
DATE:	4/17/2025

BORING LOG KLF-4

Combined Sewer Overflow Long-Term Control Plan Update Bellis Circle Facility/Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 06/02/2025 11:20 AM BY: ADarajat
PROJECT NUMBER: 20231168.006A OFFICE FILTER: BOSTON
gINT FILE: Klf_gint_master_2023 gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2023.GLB [_KLF_BORING/TEST PIT SOIL LOG]

APPENDIX C

Recent Test Boring Logs by Kleinfelder

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DRILLING METHOD/SAMPLER TYPE GRAPHICS

NX CORE SAMPLE
(2.154 in. (54.7 mm.) core diameter)

SHELBY TUBE SAMPLER

STANDARD PENETRATION SPLIT SPOON SAMPLER
(2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

VacTruck

ROCK LITHOLOGY GRAPHICS

ARGILLITE

GROUND WATER GRAPHICS

WATER LEVEL (level where first observed)

WATER LEVEL (level after stabilizing period)

WATER LEVEL (additional levels after exploration)

OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Solid lines separating strata on the logs represent approximate boundaries only, dashed lines are inferred or extrapolated boundaries. Actual transitions may be gradual or differ from those represented.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System (ASTM D2488/D2487) designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., CL-ML, GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS
C_u - Coefficients of Uniformity
C_c - Coefficients of Curvature
WOH - Weight of Hammer
WOR - Weight of Rod

REFERENCES
1. American Society for Testing and Materials (ASTM), 2011, ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).

UNIFIED SOIL CLASSIFICATION SYSTEM[1]

COARSE GRAINED SOILS (More than 50% retained on No. 200 Sieve)	**GRAVELS** (More than 50% of coarse fraction retained on No. 4 Sieve)	CLEAN GRAVEL WITH <5% FINES	**GW**	WELL-GRADED GRAVEL, WELL-GRADED GRAVEL WITH SAND
			GP	POORLY GRADED GRAVEL, POORLY GRADED GRAVEL WITH SAND
		GRAVELS WITH 5% TO 12% FINES	**GW-GM**	WELL-GRADED GRAVEL WITH SILT, WELL-GRADED GRAVEL WITH SILT AND SAND
			GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY), WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILT CLAY AND SAND)
			GP-GM	POORLY GRADED GRAVEL WITH SILT, POORLY GRADED GRAVEL WITH SILT AND SAND
			GP-GC	POORLY GRADED GRAVEL WITH CLAY (OR SILTY CLAY), POORLY GRADED GRAVEL WITH CLAY AND (OR SILTY CLAY AND SAND)
		GRAVELS WITH > 12% FINES	**GM**	SILTY GRAVEL, SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL, CLAYEY GRAVEL WITH SAND
			GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND
	SANDS (50% or more of coarse fraction passes the No. 4 Sieve)	CLEAN SANDS WITH <5% FINES	**SW**	WELL-GRADED SAND, WELL-GRADED SAND WITH GRAVEL
			SP	POORLY GRADED SAND, POORLY GRADED SAND WITH GRAVEL
		SANDS WITH 5% TO 12% FINES	**SW-SM**	WELL-GRADED SAND WITH SILT, WELL-GRADED SAND WITH SILT AND GRAVEL
			SW-SC	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY), WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
			SP-SM	POORLY GRADED SAND WITH SILT, POORLY GRADED SAND WITH SILT AND GRAVEL
			SP-SC	POORLY GRADED SAND WITH CLAY, POORLY GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
		SANDS WITH > 12% FINES	**SM**	SILTY SAND, SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND, CLAYEY SAND WITH GRAVEL
			SC-SM	SILTY, CLAYEY SAND, SILTY, CLAYEY SAND WITH GRAVEL

FINE GRAINED SOILS (50% or more passes the No. #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)	**ML**	SILT, SILT WITH SAND, SILT WITH GRAVEL
		CL	LEAN CLAY, LEAN CLAY WITH SAND, LEAN CLAY WITH GRAVEL
		CL-ML	SILTY CLAY, SILTY CLAY WITH SAND, SILTY CLAY WITH GRAVEL
		OL	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL
	SILTS AND CLAYS (Liquid Limit 50 or greater)	**MH**	ELASTIC SILT. ELASTIC SILT WITH SAND, ELASTIC SILT WITH GRAVEL
		CH	FAT CLAY, FAT CLAY WITH SAND, FAT CLAY WITH GRAVEL
		OH	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL

NOTE: USE MATERIAL DESCRIPTION ON THE LOG TO DEFINE A GRAPHIC THAT MAY NOT BE PROVIDED ON THIS LEGEND.

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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

GRAPHICS KEY

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_GEO_LEG1_GRAPHICS_KEY_W_USCS]
PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON
PLOTTED: 05/26/2026 02:25 PM BY: ADarajat

GRAIN SIZE[1]

DESCRIPTION		SIEVE SIZE	GRAIN SIZE
Boulders		>12 in.	>12 in. (304.8 mm.)
Cobbles		3 - 12 in.	3 - 12 in. (76.2 - 304.8 mm.)
Gravel	coarse	3/4 -3 in.	3/4 -3 in. (19 - 76.2 mm.)
	fine	#4 - 3/4 in.	0.19 - 0.75 in. (4.8 - 19 mm.)
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)
Fines		Passing #200	<0.0029 in. (<0.07 mm.)

SECONDARY CONSTITUENT[1]

Term of Use	AMOUNT	
	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

PLASTICITY[1]

DESCRIPTION	CRITERIA
Non-Plastic	A 1/8 in. (3 mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

MOISTURE CONTENT[1]

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CONSISTENCY - FINE-GRAINED SOIL[2, 3]

CONSISTENCY	SPT - N (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q_u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Easily penetrated several inches by fist
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1,000	Easily penetrated several inches by thumb
Medium Stiff	4 - 8	0.5 ≤ PP <1	1,000 - 2,000	Can be penetrated several inches by thumb with moderate effort
Stiff	8 - 15	1 ≤ PP <2	2,000 - 4,000	Readily indented by thumb but penetrated only with great effort
Very Stiff	15 - 30	2 ≤ PP <4	4,000 - 8,000	Readily indented by thumbnail
Hard	>30	4 ≤ PP	>8,000	Indented by thumbnail with difficulty

APPARENT DENSITY - COARSE-GRAINED SOIL[2]

APPARENT DENSITY	SPT-N (# blows / ft)
Very Loose	<4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

STRUCTURE[1]

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. (6mm) thick, note thickness.
Laminated	Alternating layers of varying material or color with the layers less than 1/4-in. (6 mm) thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.
Homogeneous	Same color and appearance throughout

ANGULARITY[1]

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

REACTION WITH HYDROCHLORIC ACID[1]

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

CEMENTATION[1]

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or little finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

REFERENCES

1. American Society for Materials and Testing (ASTM), 2017, ASTM D2488: Standard Practice for Description and Identification of Soils (Visual Manual Procedures).
2. Terzaghi, K and Peck, R., 1948, Soil Mechanics in Engineering Practice, John Wiley & Sons, New York.
3. United States Department of the Interior Bureau of Reclamation (USBR), 1998, Earth Manual, Part I.

KLEINFELDER
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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

SOIL DESCRIPTION KEY
(For additional tables, see ASTM D2488)

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 05/26/2026 02:26 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [KLF_GEO_LEG2_SOIL_DESC_KEY]

INFILLING TYPE[3]

NAME	ABBR	NAME	ABBR
Albite	Al	Muscovite	Mus
Apatite	Ap	None	No
Biotite	Bi	Pyrite	Py
Clay	Cl	Quartz	Qz
Calcite	Ca	Sand	Sd
Chlorite	Ch	Sericite	Ser
Epidote	Ep	Silt	Si
Gypsum	Gy	Talc	Ta
Iron Oxide	Fe	Unknown	Uk
Manganese	Mn		

DENSITY/SPACING OF DISCONTINUITIES[5]

DESCRIPTION	SPACING CRITERIA
Unfractured	>6 ft. (>1.83 meters)
Slightly Fractured	2 - 6 ft. (0.061 - 1.83 meters)
Moderately Fractured	8 in - 2 ft. (203.20 - 609.60 mm)
Highly Fractured	2 - 8 in (50.80 - 203.30 mm)
Intensely Fractured	<2 in (<50.80 mm)

ADDITIONAL TEXTURAL ADJECTIVES[5]

DESCRIPTION	RECOGNITION
Pit (Pitted)	Pinhole to 0.03 ft. (3/8 in.) (>1 to 10 mm.) openings
Vug (Vuggy)	Small openings (usually lined with crystals) ranging in diameter from 0.03 ft. (3/8 in.) to 0.33 ft. (4 in.) (10 to 100 mm.)
Cavity	An opening larger than 0.33 ft. (4 in.) (100 mm.), size descriptions are required, and adjectives such as small, large, etc., may be used
Honeycombed	If numerous enough that only thin walls separate individual pits or vugs, this term further describes the preceding nomenclature to indicate cell-like form.
Vesicle (Vesicular)	Small openings in volcanic rocks of variable shape and size formed by entrapped gas bubbles during solidification.

WEATHERING[5]

DESCRIPTION	CRITERIA
Unweathered	No evidence of chemical / mechanical alternation; rings with hammer blow.
Slightly Weathered	Slight discoloration on surface; slight alteration along discontinuities; <10% rock volume altered.
Moderately Weathered	Discoloring evident; surface pitted and alteration penetration well below surface; Weathering "halos" evident; 10-50% rock altered.
Highly Weathered	Entire mass discolored; Alteration pervading most rock, some slight weathering pockets; some minerals may be leached out.
Decomposed	Rock reduced to soil with relic rock texture/structure; Generally molded and crumbled by hand.

RELATIVE HARDNESS / STRENGTH DESCRIPTIONS[4]

GRADE		UCS (MPa)	FIELD TEST
R0	Extremely Weak	0.25 - 1.0	Indented by thumbnail
R1	Very Weak	1.0 - 5.0	Crumbles under firm blows of geological hammer, can be peeled by a pocket knife.
R2	Weak	5.0 - 25	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer.
R3	Medium Strong	25 - 50	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single firm blow of a geological hammer.
R4	Strong	50 - 100	Specimen requires more than one blow of geological hammer to fracture it.
R5	Very Strong	100 - 250	Specimen requires many blows of geological hammer to fracture it.
R6	Extremely Strong	> 250	Specimen can only be chipped with a geological hammer.

ROCK QUALITY DESIGNATION (RQD)[2]

DESCRIPTION	RQD (%)
Very Poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 - 100

APERTURE[1]

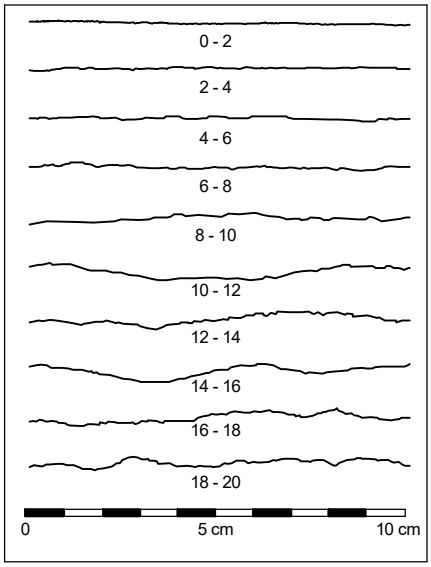
DESCRIPTION	CRITERIA [in (mm)]
Tight	<0.04 (<1)
Open	0.04 - 0.20 (1 - 5)
Wide	>0.20 (>5)

BEDDING CHARACTERISTICS[6]

DESCRIPTION	Thickness [in (mm)]
Very Thick Bedded	>36 (>915)
Thick Bedded	12 - 36 (305 - 915)
Moderately Bedded	4 - 12 (102 - 305)
Thin Bedded	1 - 4 (25 - 102)
Very Thin Bedded	0.4 - 1 (10 - 25)
Laminated	0.1 - 0.4 (2.5 - 10)
Thinly Laminated	<0.1 (<2.5)

Bedding Planes	Planes dividing the individual layers, beds, or stratigraphy of rocks.
Joint	Fracture in rock, generally more or less vertical or traverse to bedding.
Seam	Applies to bedding plane with unspecified degree of weather.

JOINT ROUGHNESS COEFFICIENT (JRC)[4]



RQD Rock-quality designation (RQD) Rough measure of the degree of jointing or fracture in a rock mass, measured as a percentage of the drill core in lengths of 4 in. (10 cm.) or more.

REFERENCES

1. Bieniawski, Z.T., 1989, Engineering Rock Mass Classifications. John Wiley & Sons, New York. (Mod. by Kleinfelder).
2. Deere, D.U., and Deere, D.W., 1989, Rock Quality Designation (RQD) After Twenty Years, USACE Contract Report GL-89-1.
3. Federal Highway Administration (FHWA), 2002, Subsurface Investigations, FHWA-NHI-01-031. (Mod. by Kleinfelder).
4. International Society for Rock Mechanics (ISRM), 1978, "Suggested Methods for the Quantitative Description of Discontinuities in Rock Masses," International Joint Rock Mechanics and Mining Sciences & Geomechanics Abstracts, Vol. 15.
5. United States Army Corps of Engineers (USACE), 1994, Rock Foundations, EM 1110-1-2908, November 30, 1994.
6. United States Department of the Interior Bureau of Reclamation (USBR), 1998, Engineering Geology Field Manual, Volume 1.

CORE SAMPLER TYPE GRAPHICS



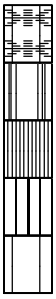
CORE SAMPLER

AQ CORE BARREL
(1.067 in. (27.1 mm.) core diameter)

AX CORE BARREL
(1.185 in. (30.1 mm.) core diameter)

BQ CORE BARREL
(1.433 in. (36.4 mm.) core diameter)

CONTINUOUS CORE SAMPLE
(2.000 in. (50.8 mm.) core diameter)



EX CORE BARREL
(0.846 in. (21.5 mm.) core diameter)

HQ CORE SAMPLE
(2.500 in. (63.5 mm.) core diameter)

NQ CORE SAMPLE
(1.874 in. (47.6 mm.) core diameter)

NO RECOVERY CORE SAMPLE

NX CORE SAMPLE
(2.154 in. (54.7 mm.) core diameter)

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PROJECT NO.: 26001480.008A

DRAWN BY: EV

CHECKED BY: MR

DATE: 6/8/2026

ROCK DESCRIPTION KEY

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 05/26/2026 02:26 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [KLF_GEO_LEG3_ROCK_DESC_KEY]

BORING LOG KLF-101

Date Begin - End:	4/01/2026 - 4/02/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Overcast	**Exploration Diameter:**	4.25 in. O.D.		

FIELD EXPLORATION

Latitude: 42.39066°
Longitude: -71.12246°
Approximate Ground Surface Elevation (ft.): 25
Surface Condition: Grass

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			Topsoil: 4 inches	S-1		BC=5 11 11 6	15"
			GRANULAR FILL: **Silty SAND with Gravel (SM)**: fine to coarse, black/dark brown, moist, medium dense				
			ALLUVIAL DEPOSIT: **Silty SAND (SM)**: brown, moist, medium dense	S-2		BC=7 6 8 7	18"
20	5		**Sandy SILT (ML)**: brown/gray, moist, stiff	S-3		BC=8 5 7 9	14"
			Silty SAND (SM): fine to coarse, brown, moist, medium dense	S-4		BC=12 10 15 9	18"
			Sandy Lean CLAY (CL): gray, moist, stiff	S-5		BC=4 4 6 9	20"
15 ▽	10		**Silty SAND (SM)**: fine to coarse, mottled brown, wet, medium dense	S-6		BC=10 9 12 9	18"
			BOSTON BLUE CLAY: **Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-7		BC=4 4 4 4 PP=0.75	20"
10	15						
				S-8		BC=2 2 3 4 PP=0.5	20"
5	20						
				S-9		BC=2 1	24"

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
							PID: 0.1
							PID: 0.2
							PID: 0.0
							PID: 0.1 Tip of spoon is wet
							PID: 0.1
							PID: 0.1
	30.1				32	16	PID: 0.0
							PID: 0.0 2" sand seam observed
							PID: 0.0

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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-101

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:23 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

BORING LOG KLF-101

Date Begin - End:	4/01/2026 - 4/02/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Overcast	**Exploration Diameter:**	4.25 in. O.D.		

Latitude: 42.39066°
Longitude: -71.12246°
Approximate Ground Surface Elevation (ft.): 25
Surface Condition: Grass

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			BOSTON BLUE CLAY: **Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-9 *(cont.)*		4 3 PP=0.5	24" *(cont.)*								
-5	30			S-10		BC=7 3 3 2 PP=0.5	14"								PID: 0.1
			Lean CLAY (CL): gray, wet, very soft	S-11		BC=WOH WOH WOH 2 PP=0.25	24"								PID: 0.1
-10	35														
				S-12		BC=WOH WOH WOH WOH PP=0.25	24"								PID: 0.1
-15	40														
				U-1					35.2				38	18	**Unconsolidated-Undrained (3-Point) Triaxial Comp.=** Total C: 784 psf
				S-13		BC=WOH WOH WOH 1 PP=0.25	24"								PID: 0.0
-20	45														
				S-14		BC=WOH WOH	24"								PID: 0.0

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BORING LOG KLF-101

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:23 PM BY: ADarajat
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gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/01/2026 - 4/02/2026 **Drilling Company:** SoilX Corporation, Inc.

BORING LOG KLF-101

Logged By: A. Darajat **Drill Crew:** E. Fajardo

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** Diedrich D-70 Turbo **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** Drive and Wash

Weather: 50s Overcast **Exploration Diameter:** 4.25 in. O.D.

FIELD EXPLORATION

Latitude: 42.39066°
Longitude: -71.12246°
Approximate Ground Surface Elevation (ft.): 25
Surface Condition: Grass

LABORATORY RESULTS

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			Lean CLAY (CL): gray, wet, very soft	S-14 *(cont.)*		1 3 PP=0.25	24" *(cont.)*								
				U-2					29.7				32	10	
			Becomes soft	S-15		BC=WOH 1 2 2 PP=0.25	24"								PID: 0.0
-30	55														
				S-16		BC=1 1 1 2 PP=0.3	24"								PID: 0.0
-35	60														
			GLACIAL TILL: **Silty Clayey SAND with Gravel (SC-SM)**: fine to coarse, gray, wet, dense	S-17		BC=14 21 22 21	12"				73	43			PID: 0.0
-40	65														
			Poorly Graded GRAVEL with Silt and Sand (GP-GM): fine to coarse, gray, wet, medium dense	S-18		BC=20 11 15 16	5"								PID: 0.0
-45	70														
			Becomes dense, with rock fragments	S-19		BC=38 23	9"								PID: 0.0

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BORING LOG KLF-101

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41 Bellis Circle
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gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

PLOTTED: 07/16/2026 03:23 PM BY: ADarajat

BORING LOG KLF-101

Date Begin - End:	4/01/2026 - 4/02/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Overcast	**Exploration Diameter:**	4.25 in. O.D.		

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			Latitude: 42.39066° Longitude: -71.12246° Approximate Ground Surface Elevation (ft.): 25 Surface Condition: Grass												
				S-19 *(cont.)*		23 29	9" *(cont.)*								
			Weathered Rock Recovered As: **Poorly Graded GRAVEL (GP)**: fine to medium, gray, wet												Weathered rock observed from rollerbit cuttings
-55	80		**CAMBRIDGE ARGILLITE:** **ARGILLITE**: light gray, unweathered to slightly weathered, moderately fractured, R4, joints 0 and 30 degrees, JRC=6-8	C-1		RQD=97	97%								Core Rate (ft - ft min:sec) 79-80 7:53 80-81 6:39 81-82 6:21 82-83 5:54 93-84 6:00
-60	85		Becomes moderately to highly fractured	C-2		RQD=78	100%			168.0					Core Rate (ft - ft min:sec) 84-85 5:40 85-86 5:46 86-87 3:22 87-88 4:04 88-89 3:39 **Unc. Comp. Str.-Rock=** q_u: 12818 psi
-65	90		The boring was terminated at approximately 89 ft. below ground surface. The boring was backfilled with auger cuttings and gravel on April 02, 2026. Rock was encountered at a depth of 79 ft. during this exploration. Coring started at a depth of 79 ft.												
-70	95														

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples S-2 to S-3 was submitted for environmental analysis.

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PROJECT NO.: 26001480.008A
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BORING LOG KLF-101

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]
PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON

PLOTTED: 07/16/2026 03:24 PM BY: ADarajat

BORING LOG KLF-102

Date Begin - End:	4/01/2026 - 4/02/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	J. Fetterman	**Drill Crew:**	J. Luis		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	CME-750X	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA/Drive and Wash		
Weather:	60s Cloudy, 38 Rainy	**Exploration Diameter:**	4.25 in. I.D.		

Latitude: 42.39045°
Longitude: -71.13333°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25	0		**3" Asphalt**	S-1		BC=14 17 8 8	13"								PID: 0.2 Corrosivity Suite (0-6): pH = 9.3 resistivity = 1,842 ohm-cm chloride = 210 ppm sulfate = 20 ppm
			GRANULAR FILL: **Well-Graded SAND with Gravel (SW)**: medium coarse, grayish brown, moist, medium dense	S-2		BC=7 7 7 7	8"								PID: 0.2
			Becomes loose with brick fragments	S-3		BC=2 2 2 2	6"								PID: 1.5
20	5		**Poorly Graded GRAVEL (GP)**: coarse, gray, moist	S-4		BC=40 6 7 7	12"								PID: 2.5
			ALLUVIAL DEPOSIT: **Poorly Graded SAND (SP)**: medium, brown, moist, medium dense	S-5		BC=9 9 14 14	18"								PID: 18.9
15	10		**Poorly Graded SAND with Silt (SP-SM)**: fine to coarse, brown, wet, medium dense	S-6		BC=12 13 11 17	18"								PID: 2.1
			BOSTON BLUE CLAY: **Sandy SILT (ML)**: gray, wet, stiff	S-7		BC=4 4 5 4	24"								PID: 1.0
10	15		**Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-8		BC=4 2 3 3 PP=0.5	24"								PID: 0.3
5	20		Becomes stiff	S-9		BC=5 4	24"								PID: 0.7

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PROJECT NO.: 26001480.008A
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CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-102

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]
PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON

Date Begin - End: 4/01/2026 - 4/02/2026 **Drilling Company:** SoilX Corporation, Inc.

BORING LOG KLF-102

Logged By: J. Fetterman **Drill Crew:** J. Luis

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** CME-750X **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** HSA/Drive and Wash

Weather: 60s Cloudy, 38 Rainy **Exploration Diameter:** 4.25 in. I.D.

FIELD EXPLORATION

Latitude: 42.39045°
Longitude: -71.13333°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0			**Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-9 *(cont.)*		9 7 PP=0.5	24" *(cont.)*								
	30		**Lean CLAY (CL)**: gray, wet, stiff	S-10		BC=5 6 6 7 PP=0.1	24"				100	90			PID: 0.4
-5			Becomes very soft	S-11		BC=WOH WOH WOH 1	24"								PID: 0.3
	35			U-1					35.9				36	15	**Consolidated-Undrained Triaxial Compression=** Eff. C: 327 psf Eff. Phi: 27.6° Eff. Tan ♦: 0.52
-10				S-12		BC=WOH WOH WOH 1 PP=0.25	24"								PID: 0.1
	40		Becomes very stiff	S-13		BC=WOH 6 8 8 PP=0.25	24"								PID: 0.2
-15				S-14		BC=3 3	24"								PID: 0.3
-20	45														

KLEINFELDER
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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-102

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:24 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/01/2026 - 4/02/2026 **Drilling Company:** SoilX Corporation, Inc.

BORING LOG KLF-102

Logged By: J. Fetterman **Drill Crew:** J. Luis

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** CME-750X **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** HSA/Drive and Wash

Weather: 60s Cloudy, 38 Rainy **Exploration Diameter:** 4.25 in. I.D.

FIELD EXPLORATION

Latitude: 42.39045°
Longitude: -71.13333°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-25			**Lean CLAY (CL)**: gray, wet, stiff Becomes with sand, medium stiff	S-14 *(cont.)*		4 4 PP=0.25	24" *(cont.)*								
	55		Becomes with gravel	S-15		BC=3 3 4 7 PP=0.25	24"								PID: 0.2
-30															
	60		Becomes stiff	S-16		BC=3 3 6 6 PP=0.25	24"								PID: 0.3
-35															
	65		Becomes very stiff	S-17		BC=3 7 7 7 PP=0.2	24"								PID: 0.3
-40															
	70		**GLACIAL TILL:** **Clayey GRAVEL with Sand (GC)**: fine to coarse, gray, wet, medium dense	S-18		BC=8 10 18 11	10"	GM			45	14			PID: 2.5
-45															
				C-1		RQD=28	93%								Core Rate (ft - ft min:sec) 74-75 3:11

LABORATORY RESULTS

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PROJECT NO.: 26001480.008A
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BORING LOG KLF-102

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:24 PM BY: ADarajat
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PROJECT NUMBER: 26001480.008A
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PLOTTED: 07/16/2026 03:24 PM BY: ADarajat

BORING LOG KLF-102

Date Begin - End:	4/01/2026 - 4/02/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	J. Fetterman	**Drill Crew:**	J. Luis		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	CME-750X	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA/Drive and Wash		
Weather:	60s Cloudy, 38 Rainy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39045°
Longitude: -71.13333°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-50			**CAMBRIDGE ARGILLITE:** **ARGILLITE**: dark gray, unweatheared, highly to intensely fractured, R-5, joints 0, 45, and 60 degrees, JRC=10-12	C-1 *(cont.)*			93% *(cont.)*								75-76 4:57 76-77 5:51 77-78 2:53 78-79 2:26
	80			C-2		RQD=54	90%			168.0					Core Rate (ft - ft min:sec) 79-80 2:01 80-81 1:16 81-82 1:47 82-83 1:50 83-84 3:55 **Unc. Comp. Str.-Rock=** q_u: 16277 psi
-55															
-60	85		The boring was terminated at approximately 83.5 ft. below ground surface. The boring was backfilled with auger cuttings and gravel on April 02, 2026. Rock was encountered at a depth of 74 ft. during this exploration. Coring started at a depth of 74 ft.												
-65	90														
-70	95														

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 8 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples S-5 to S-6 was submitted for environmental analysis.
5. Hollow Stem Auger with 4.25" ID was used from ground surface to depth of 14 feet bgs then switched to Drive and Wash with 3.25/4.25" ID casing.

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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-102

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2026
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PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON

BORING LOG KLF-103

Date Begin - End:	3/30/2026 - 4/01/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Cloudy/Rainy	**Exploration Diameter:**	4.25 in. I.D.		

Latitude: 42.39038°
Longitude: -71.13292°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25	0		**2" Asphalt**	S-1		BC=3 2 2 2	11"								PID: 0.0
			GRANULAR FILL: **Silty SAND (SM)**: fine to coarse, black, moist, loose												
			Becomes dark brown, trace root pieces	S-2A		BC=2 2	5"								PID: 0.1
			ALLUVIAL DEPOSIT: **Silty SAND (SM)**: light brown, moist, medium dense	S-2B		BC=8 10	6"								
				S-3		BC=13 9 6 7	18"								PID: 0.1
20	5			S-4		BC=12 12 12 11	16"								PID: 0.1 Corrosivity Suite (6-10): pH = 7.6 resistivity = 6,865 ohm-cm chloride = 11 ppm sulfate = 10 ppm
			Becomes brown/gray, mottled	S-5		BC=10 8 7 9	12"								PID: 0.1
15	10		Becomes wet	S-6A		BC=2 5 8	14"								PID: 0.6
			BOSTON BLUE CLAY: **Sandy Lean CLAY (CL)**: gray, wet	S-6B		BC=10 PP=1.75	6"								
			Becomes stiff	S-7		BC=5 5 4 5 PP=1.75	22"								PID: 0.1
10	15														
			Becomes medium stiff	S-8		BC=3 2 4 4 PP=0.5	18"								PID: 0.1 2" sand seam observed
5	20														
			Lean CLAY with Sand (CL): gray, wet, medium stiff	S-9		BC=1 2	23"								PID: 0.1

KLEINFELDER
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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-103

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:24 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
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gINT FILE: Klf_gint_master_2026

BORING LOG KLF-103

Date Begin - End:	3/30/2026 - 4/01/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Cloudy/Rainy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39038°
Longitude: -71.13292°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0			**Lean CLAY with Sand (CL)**: gray, wet, medium stiff	S-9 *(cont.)*		2 3 PP=0.25	23" *(cont.)*								1" sand seam observed
	30		**Lean CLAY (CL)**: gray, wet, soft	S-10		BC=1 1 1 1 PP=0.25	24"								PID: 0.0
-5			Becomes very soft	S-11		BC=WOH WOH WOH 1 PP=0.25	24"								PID: 0.1
	35														
-10				U-1			24"		36.8				39	17	**Unconsolidated-Undrained (3-Point) Triaxial Comp.=** Total C: 923 psf
				S-12		BC=WOH WOH WOH WOH PP=0.25	24"								PID: 0.0
	40														
-15															
			Becomes soft	S-13		BC=WOH 1 2 1 PP=0.25	24"								PID: 0.0
	45														
-20															
			Becomes stiff	S-14		BC=3 4	17"								PID: 0.0

KLEINFELDER
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BORING LOG KLF-103

Date Begin - End:	3/30/2026 - 4/01/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Cloudy/Rainy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39038°
Longitude: -71.13292°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-25			**Lean CLAY (CL)**: gray, wet, soft	S-14 *(cont.)*		6 6 PP=0.25	17" *(cont.)*								
															Drill rig chattered
	55		**Gravelly Lean CLAY (CL)**: gray, wet, very stiff	S-15		BC=24 15 7 6	8"								PID: 0.0
-30															
			Lean CLAY (CL): gray, wet, medium stiff	S-16		BC=WOH 2 3 4	24"								PID: 0.0
	60														
-35															
			GLACIAL TILL: **Clayey GRAVEL with Sand (GC)**: fine to coarse gravel, gray, wet, dense	S-17		BC=13 22 25 20	9"								PID: 0.0 Drill rig chattered
	65														
-40															
			Becomes very dense	S-18		BC=33 39 37 41	8"								PID: 0.0
	70							GM			52	14			
-45															
				S-19		BC=32 27	9"								PID: 0.0

KLEINFELDER
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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-103

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

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PLOTTED: 07/16/2026 03:25 PM BY: ADarajat

BORING LOG KLF-103

Date Begin - End:	3/30/2026 - 4/01/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash		
Weather:	50s Cloudy/Rainy	**Exploration Diameter:**	4.25 in. I.D.		

Latitude: 42.39038°
Longitude: -71.13292°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in / Pocket Pen(PP)= tsf / RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-50						50/5"									
			Weathered Rock Recovered As: **Poorly Graded GRAVEL (GP)**: fine to medium gravel, gray, wet, very dense												Weathered rock observed from rollerbit cuttings SPT attempted at 79 feet bgs with blowcount 50/0"
	80		**CAMBRIDGE ARGILLITE:** **ARGILLITE**: light gray, slightly weathered to unweathered, moderately fractured to highly fractured, R4	C-1		RQD=97	100%								Core Rate (ft - ft min:sec) 79-80 7:03 80-81 5:08 81-82 4:42 82-83 6:10 83-84 6:47
-55															
				C-2		RQD=50	100%			168.0					**Unc. Comp. Str.-Rock=** q_u: 14252 psi
	85		Becomes highly fractured to intensely fractured												Core Rate (ft - ft min:sec) 84-85 5:40 85-86 6:40 86-87 7:04
-60															
	90														
-65															
	95														
-70															

The boring was terminated at approximately 87 ft. below ground surface. The boring was backfilled with auger cuttings and gravel on April 01, 2026. Rock was encountered at a depth of 79 ft. during this exploration. Coring started at a depth of 79 ft.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.

KLEINFELDER
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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-103

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

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PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON

BORING LOG KLF-104

Date Begin - End:	4/02/2026 - 4/03/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	J. Luis, C. Targ		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	CME-750X	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA/Drive and Wash		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39059°
Longitude: -71.13304°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Grass

LABORATORY RESULTS

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25	0		**3" Topsoil**	S-1		BC=5 6 4 5	13"								PID: 0.1
			GRANULAR FILL: **Silty SAND (SM)**: fine, brown, moist, loose to medium dense												
			ALLUVIAL DEPOSIT: **Silty SAND (SM)**: fine, light brown, moist, medium dense	S-2		BC=3 4 7 14	24"								PID: 0.1
			Becomes brown	S-3		BC=6 8 10 8	18"								PID: 0.1
20	5			S-4		BC=12 13 13 14	16"								PID: 2.7
			Becomes light brown, wet	S-5		BC=4 7 9 10	19"								PID: 0.2
15	10			S-6		BC=10 12 12 13	21"								PID: 0.4
			BOSTON BLUE CLAY: **Sandy Lean CLAY (CL)**: gray, wet, stiff	S-7		BC=4 5 4 8	24"								PID: 0.4 Corrosivity Suite (14-21): pH = 7.8 resistivity = 2,672 ohm-cm chloride = 19 ppm sulfate = 10 ppm
10	15														
			Becomes medium stiff	S-8		BC=3 2 4 6	24"								PID: 0.4
5	20														
			Becomes stiff	S-9		BC=5 4	23"								

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 26001480.008A
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BORING LOG KLF-104

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:25 PM BY: ADarajat
OFFICE FILTER: BOSTON
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Date Begin - End:	4/02/2026 - 4/03/2026	**Drilling Company:**	SoilX Corporation, Inc.	**BORING LOG KLF-104**	
Logged By:	A. Darajat	**Drill Crew:**	J. Luis, C. Targ		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	CME-750X	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA/Drive and Wash		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

Latitude: 42.39059°
Longitude: -71.13304°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Grass

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0			**BOSTON BLUE CLAY:** **Sandy Lean CLAY (CL)**: gray, wet, stiff	S-9 *(cont.)*		5 8	23" *(cont.)*								
	30		Becomes medium stiff	S-10		BC=7 4 4 6	24"								
-5															
	35		Becomes very soft	S-11		BC=WOH WOH 2 4	24"								
-10				U-1					34.7				37	15	
	40			S-12		BC=WOH WOH 1 3	24"								
-15															
	45		Becomes soft	S-13		BC=WOH 1 1 1	13"								
-20				U-2					33.3				34	15	**Unconsolidated-Undrained (3-Point) Triaxial Comp.=** Total C: 706 ksf
			Becomes medium stiff	S-14		BC=2 2	24"								

KLEINFELDER
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PROJECT NO.: 26001480.008A
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BORING LOG KLF-104

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:25 PM BY: ADarajat
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BORING LOG KLF-104

Date Begin - End:	4/02/2026 - 4/03/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	J. Luis, C. Targ		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	CME-750X	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA/Drive and Wash		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

Latitude: 42.39059°
Longitude: -71.13304°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Grass

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-25			**BOSTON BLUE CLAY:** **Sandy Lean CLAY (CL)**: gray, wet, stiff	S-14 *(cont.)*		3 4	24" *(cont.)*								
	55			S-15		BC=2 3 2 4	9"								
-30															
	60		**GLACIAL TILL:** **Clayey GRAVEL (GC)**: fine to coarse, gray, wet, very dense	S-16		BC=2 50/4""	10"								Drill rig chatter observed from 60-63 feet bgs indicating presence of possible boulders
-35															
	65		**Clayey SAND with Gravel (SC)**: fine to coarse, gray, wet, dense	S-17		BC=11 15 11 21	9"								
-40															
	70		**Poorly Graded GRAVEL with Silt (GP-GM)**: fine to coarse, gray, wet, dense	S-18		BC=10 13 24 30	5"								
-45															
			Weathered Rock Recovered As: **Poorly Graded GRAVEL (GP)**: fine, gray, wet	S-19		BC=50/0""	NR								Weathered rock observed from rollerbit cuttings

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-104

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:25 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End:	4/02/2026 - 4/03/2026	**Drilling Company:**	SoilX Corporation, Inc.	**BORING LOG KLF-104**	
Logged By:	A. Darajat	**Drill Crew:**	J. Luis, C. Targ		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	CME-750X	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA/Drive and Wash		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

Approximate Elevation (feet)	Depth (feet)	Graphical Log	FIELD EXPLORATION: Latitude: 42.39059° Longitude: -71.13304° Approximate Ground Surface Elevation (ft.): 25.5 Surface Condition: Grass Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	LABORATORY RESULTS: USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-50			**Weathered Rock Recovered As:** **Poorly Graded GRAVEL (GP)**: fine, gray, wet												
	80		The boring was terminated at approximately 76 ft. below ground surface. The boring was backfilled with auger cuttings and gravel on April 03, 2026.												
-55															
	85														
-60															
	90														
-65															
	95														
-70															

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 8 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples S-4 to S-6 was submitted for environmental analysis.

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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-104

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:25 PM BY: ADarajat
PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

BORING LOG KLF-105

Date Begin - End:	3/27/2023 - 3/30/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ, E. Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39042°
Longitude: -71.13284°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
25			**2" Asphalt**	G-1			
			GRANULAR FILL: **Silty GRAVEL (GM)**: fine to coarse, black, moist	G-2			
			Silty SAND (SM): fine to coarse, mottled dark brown, moist	G-3			
			Trace root pieces	G-4			
			Becomes brown				
			Becomes brown/gray	G-5			
	5		**ALLUVIAL DEPOSIT:** **Silty SAND (SM)**: fine to coarse, mottled brown/gray, moist	G-6			
20			Becomes light brown, medium dense	S-1		BC=7 9 10 9	15"
			Becomes brown	S-2		BC=7 7 8 8	18"
	10		Becomes wet	S-3A		BC=4 4 3	14"
15			**BOSTON BLUE CLAY:** **Sandy Lean CLAY (CL)**: gray, wet	S-3B		BC=3 PP=0.75	6"
	15		Becomes medium stiff	S-4		BC=1 3 2 4 PP=0.75	20"
10							
	20		**Sandy SILT (ML)**: gray, wet, medium stiff	S-5		BC=1 2 5 4 PP=0.5	24"
5							

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)

Additional Tests/ Remarks
PID: 0.0
PID: 0.0
PID: 0.0
PID: 0.1
PID: 0.1
PID: 0.1
PID: 0.1
PID: 0.0
PID: 0.1 Tip of spoon wet
PID: 0.0
PID: 0.0 2" sand seam observed

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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-105

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:25 PM BY: ADarajat
OFFICE FILTER: BOSTON
PROJECT NUMBER: 26001480.008A
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 3/27/2023 - 3/30/2026 **Drilling Company:** SoilX Corporation, Inc.

BORING LOG KLF-105

Logged By: A. Darajat **Drill Crew:** C. Targ, E. Fajardo

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** Diedrich D-70 Turbo **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** HSA

Weather: 40s Cloudy **Exploration Diameter:** 4.25 in. I.D.

Approximate Elevation (feet) / Depth (feet)	Graphical Log	FIELD EXPLORATION: Latitude: 42.39042° Longitude: -71.13284° Approximate Ground Surface Elevation (ft.): 25.5 Surface Condition: Asphalt — Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	LABORATORY RESULTS: USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0		**Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-6		BC=2 3 5 5 PP=0.5	23"								PID: 0.1
30 / -5		The boring was terminated at approximately 27 ft. below ground surface. The boring was backfilled with auger cuttings and gravel on March 30, 2026.												
35 / -10														
40 / -15														
45 / -20														

GROUNDWATER LEVEL INFORMATION:

▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:

1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples G-1 to G-4 was submitted for environmental analysis.
5. The top 6 feet was pre-cleared using vacuum excavation.

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PROJECT NO.: 26001480.008A

DRAWN BY: EV

CHECKED BY: MR

DATE: 6/8/2026

BORING LOG KLF-105

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:25 PM BY: ADarajat
PROJECT NUMBER: 26001480.008A OFFICE FILTER: BOSTON
gINT FILE: Klf_gint_master_2026 gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

PLOTTED: 07/16/2026 03:26 PM BY: ADarajat

BORING LOG KLF-106

Date Begin - End:	3/27/2026 - 3/30/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ, E Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39048°
Longitude: -71.13280°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	LABORATORY RESULTS: USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25			**3" Asphalt**	G-1											PID: 0.1
			GRANULAR FILL: **Silty SAND (SM)**: fine to coarse, brown, moist, trace gravel	G-2											PID: 0.0
				G-3											PID: 0.0
				G-4											PID: 0.1
			Becomes trace root and asphalt pieces	G-5											PID: 0.0
	5		**ALLUVIAL DEPOSIT:** **Silty SAND (SM)**: light brown, moist	G-6											PID: 0.7
20			Becomes brown, loose trace roots	S-1		BC=3 2 2 4	9"								PID: 1.8
			Becomes medium dense	S-2		BC=7 8 9 10	16"								PID: 0.1 Sample wet at top of spoon
▽	10		Becomes fine to medium gray, wet	S-3		BC=6 6 7 7	13"								PID: 0.2
15															
	15		**BOSTON BLUE CLAY:** **Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-4		BC=1 3 3 3 PP=0.5	20"								PID: 0.4
10															
	20			S-5		BC=1 3 3 5 PP=0.75	22"								PID: 0.1
5															

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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-106

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]
PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON

BORING LOG KLF-106

Date Begin - End:	3/27/2026 - 3/30/2026	**Drilling Company:**	SoilX Corporation, Inc.		
Logged By:	A. Darajat	**Drill Crew:**	C. Targ, E Fajardo		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Diedrich D-70 Turbo	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	HSA		
Weather:	40s Cloudy	**Exploration Diameter:**	4.25 in. I.D.		

FIELD EXPLORATION

Latitude: 42.39048°
Longitude: -71.13280°
Approximate Ground Surface Elevation (ft.): 25.5
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. blows/6 in Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
0			**BOSTON BLUE CLAY:** **Sandy Lean CLAY (CL)**: gray, wet, medium stiff	S-6		BC=1 4 4 6 PP=0.5	24"

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
							PID: 0.0

The boring was terminated at approximately 27 ft. below ground surface. The boring was backfilled with auger cuttings and gravel on March 30, 2026.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 10 ft. below ground surface during drilling.

GENERAL NOTES:
1. Ground Surface Elevation based on drawing titled "Existing Condition Survey Sherman Street Cambridge, Massachusetts" prepared by WSP USA Inc., dated May 23, 2025.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.).
3. A Photo Ionization Detector (PID in ppm) was used for environmental field screening.
4. A composite sample with equal aliquots from grab samples G-1 to G-5 was submitted for environmental analysis.
5. The top 6 feet was pre-cleared using vacuum excavation.

30 -5
35 -10
40 -15
45 -20

KLEINFELDER
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PROJECT NO.: 26001480.008A
DRAWN BY: EV
CHECKED BY: MR
DATE: 6/8/2026

BORING LOG KLF-106

Sherman Street CSO Storage Tank
41 Bellis Circle
Cambridge, MA

PLOTTED: 07/16/2026 03:26 PM BY: ADarajat
PROJECT NUMBER: 26001480.008A
OFFICE FILTER: BOSTON
gINT FILE: Klf_gint_master_2026
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2026.GLB [_KLF_BORING/TEST PIT SOIL LOG]

APPENDIX D

Cone Penetration Testing Report by ConeTec Inc.

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PRESENTATION OF SITE INVESTIGATION RESULTS

41 Bellis Circle - Cambridge, MA

Prepared for:
Kleinfelder

ConeTec Job No: **26-55-31074**

Project Start Date: 2026-03-25
Project End Date: 2026-03-25
Release Date: 2026-04-01

Report prepared by:
ConeTec, Inc.

436 Commerce Lane, Unit C, West Berlin, NJ 08091
Tel: (856) 767-8600

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www.conetec.com
www.conetecdataservices.com



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ABOUT THIS REPORT

The attached report presents the findings of the site investigation program.

At the request of: Kleinfelder.

Conducted by: ConeTec, Inc.

Please be advised that this report, along with all associated data, is subject to the Third-Party Disclaimer and the Client Disclaimer contained in the 'Limitations' section of this report. For further reference, please consult the list of attached documents following the main body of the report.

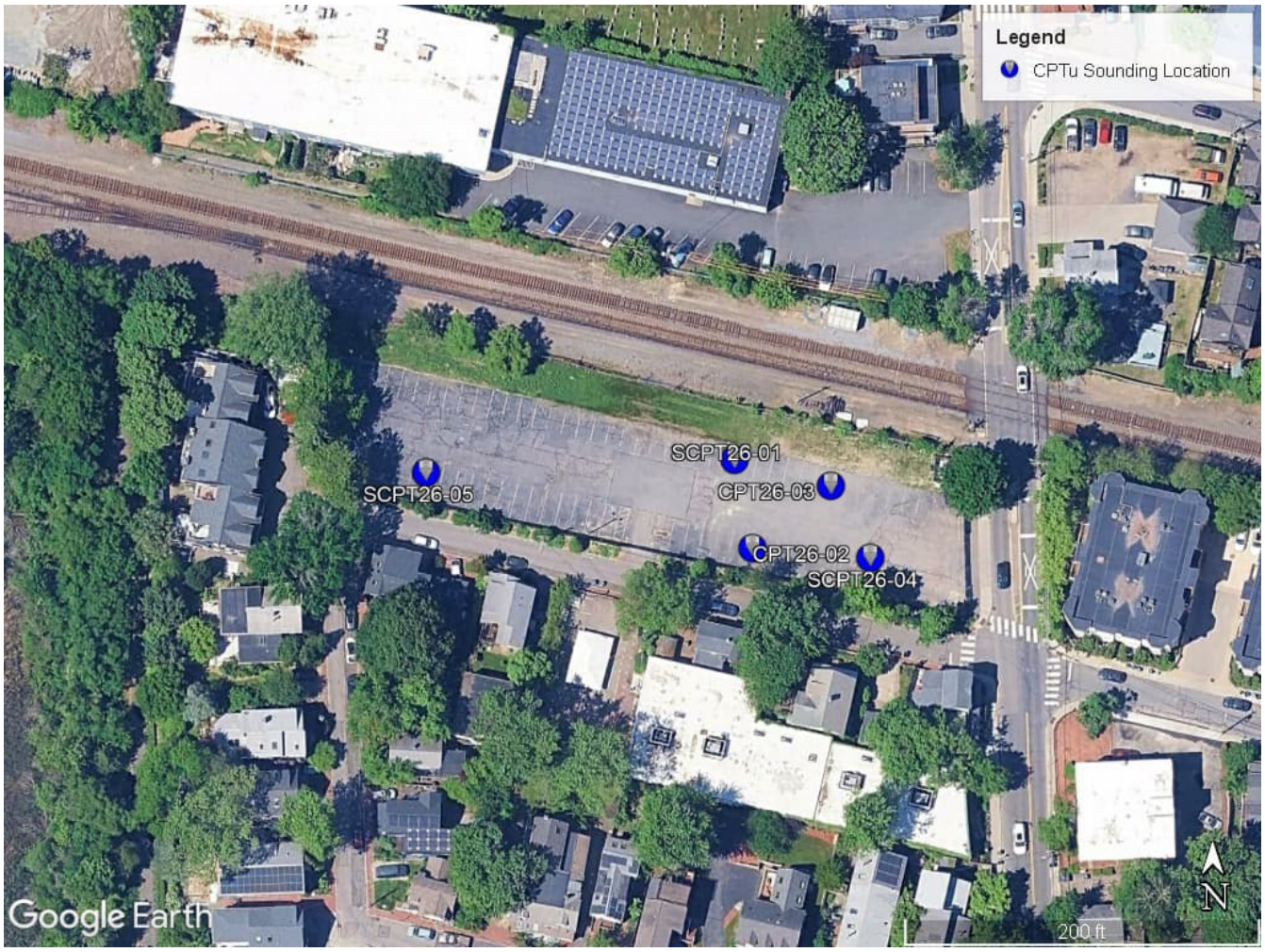
PROJECT	
Client Name	Kleinfelder
Project Name	41 Bellis Circle - Cambridge, MA
Test Types	CPTu/SCPTu
ConeTec Project Number	26-55-31074
Additional Comments	None

CONTENTS

The following are included in the body of the report:

- Site Map
- Limitations and Closure
- Project Information
- Test Summaries and Plots
- Supporting Documents and Materials

SITE MAP



All locations are approximate unless otherwise stated in the body of the report.

ConeTec Job Number: 26-55-31074

Client: Kleinfelder

Project: 41 Bellis Circle - Cambridge, MA

Date: 2026-04-01

LIMITATIONS

Third-Party Disclaimer

'Report' refers to this document titled: 41 Bellis Circle - Cambridge, MA

The Report was prepared by ConeTec for: Kleinfelder

The Report is confidential and may not be distributed to or relied upon by any third parties without the express written consent of ConeTec. Third parties who gain access to the Report do not acquire any rights by virtue of such access. Any use which a third party makes of the Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. ConeTec accepts no responsibility for loss, damage and/or expense, if any, suffered by any third parties as a result of decisions made, or actions taken or not taken, which are in any way based on, or related to, the Report or any portion(s) thereof.

Client Disclaimer

ConeTec was retained by: Kleinfelder

'Report' refers to this document titled: 41 Bellis Circle - Cambridge, MA

ConeTec was retained to collect and provide the raw data ('Data') which is included in the Report.

ConeTec has collected and reported the Data in accordance with current industry standards. No other warranties, either expressed or implied, with respect to the Data is made by ConeTec. To fully understand the Data included in the Report, reference must be made to the supporting documents and other sources referenced in the Report in their entirety. Other than the Data, the contents of the Report, including any Interpretations, should not be relied upon in any fashion without independent verification. ConeTec is in no way responsible for any loss, damage or expense resulting from the use of, and/or reliance on, such material by any party.

Closure

Thank you for the opportunity to contribute to this project. The equipment utilized, as well as the field procedures followed, fully complied with currently accepted best practice standards.

Report prepared by: Jenna Griggs, Ashlan Heavens

PROJECT INFORMATION

Rig Utilized		
Description	**Deployment System**	**Test Type**
C02-019 CPT Truck Rig	Twin mounted cylinders	CPTu/SCPTu

Coordinates			
Test Type	Number of Locations	GPS Collection Method	EPSG Number
CPTu	2	Consumer Grade GPS	32619 (WGS84 / UTM Zone 19 North)
SCPTu	3	Consumer Grade GPS	32619 (WGS84 / UTM Zone 19 North)

Piezocones 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** (bar)
EC1230:T1000F10U35	1230	15	225	1000	10	35

Cone Penetration Test (CPTu)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Tip and sleeve data offset	0.1 Meters. This has been accounted for in the CPT data files.
Additional Comments	None

Calculated Geotechnical Parameters	
Additional information	The Normalized Soil Behavior Type Chart based on Q_{tn} (SBT Q_{tn}) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPTu parameters have been generated and are provided in Excel format files in the release folder. The CPTu parameter calculations are based on values of corrected tip resistance (q_t) sleeve friction (f_s) and pore pressure (u_2). Effective stresses are calculated based on unit weights that have been assigned to the individual soil behavior type zones and the assumed equilibrium pore pressure profile. Soils were classified as either drained or undrained based on the Q_{tn} Normalized Soil Behavior Type Chart (Robertson, 2009). Calculations for both drained and undrained parameters were included for materials that classified as silt mixtures (zone 4). For calculating undrained shear strength based on pore pressure ($S_u(N_{\Delta u})$) and undrained shear strength based on cone tip resistance ($S_u(N_{kt})$), an $N_{\Delta u}$ value of 9 and an N_{kt} value of 15 were selected.

REPORT APPENDICES

The appendices listed below are included in the report:

- **Cone Penetration Test (CPTu) Summary and Standard CPTu Plots**
- **Standard CPTu Plots with Reduced Scales**
- **Advanced Cone Penetration Test Plots with Ic, Su(Nkt), Phi, and N1(60)Ic**
- **Soil Behavior Type (SBT) Scatter Plots**
- **Pore Pressure Dissipation Test (PPD) Summary and PPD Plots**
- **Seismic Cone Penetration Test (SCPTu) Tabular Results**
- **SCPTu Test Plots**
- **SCPTu Velocity Wave Traces**
- **Supporting Documents and Materials**

Cone Penetration Test (CPTu) Summary and Standard CPTu Plots

CONETEC

Job No: 26-55-31074
Client: Kleinfelder
Project: 41 Bellis Circle - Cambridge, MA
Start Date: 25-Mar-2026
End Date: 25-Mar-2026

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Rig	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing[2] (m)	Easting[2] (m)	Refer to Notation Number
SCPT26-01	26-55-31074_SP01	25-Mar-2026	C-19	1230:T1000F10U35	15	8.0	66.11	20	4695350	324406	3
CPT26-02	26-55-31074_CP02	25-Mar-2026	C-19	1230:T1000F10U35	15	8.0	67.50		4695335	324409	3
CPT26-03	26-55-31074_CP03	25-Mar-2026	C-19	1230:T1000F10U35	15	8.0	63.57		4695345	324422	
SCPT26-04	26-55-31074_SP04	25-Mar-2026	C-19	1230:T1000F10U35	15	8.1	64.96	20	4695333	324429	
SCPT26-05	26-55-31074_SP05	25-Mar-2026	C-19	1230:T1000F10U35	15	5.5	65.70	20	4695349	324353	
Totals	5 Soundings						327.83 ft	60 Tests			

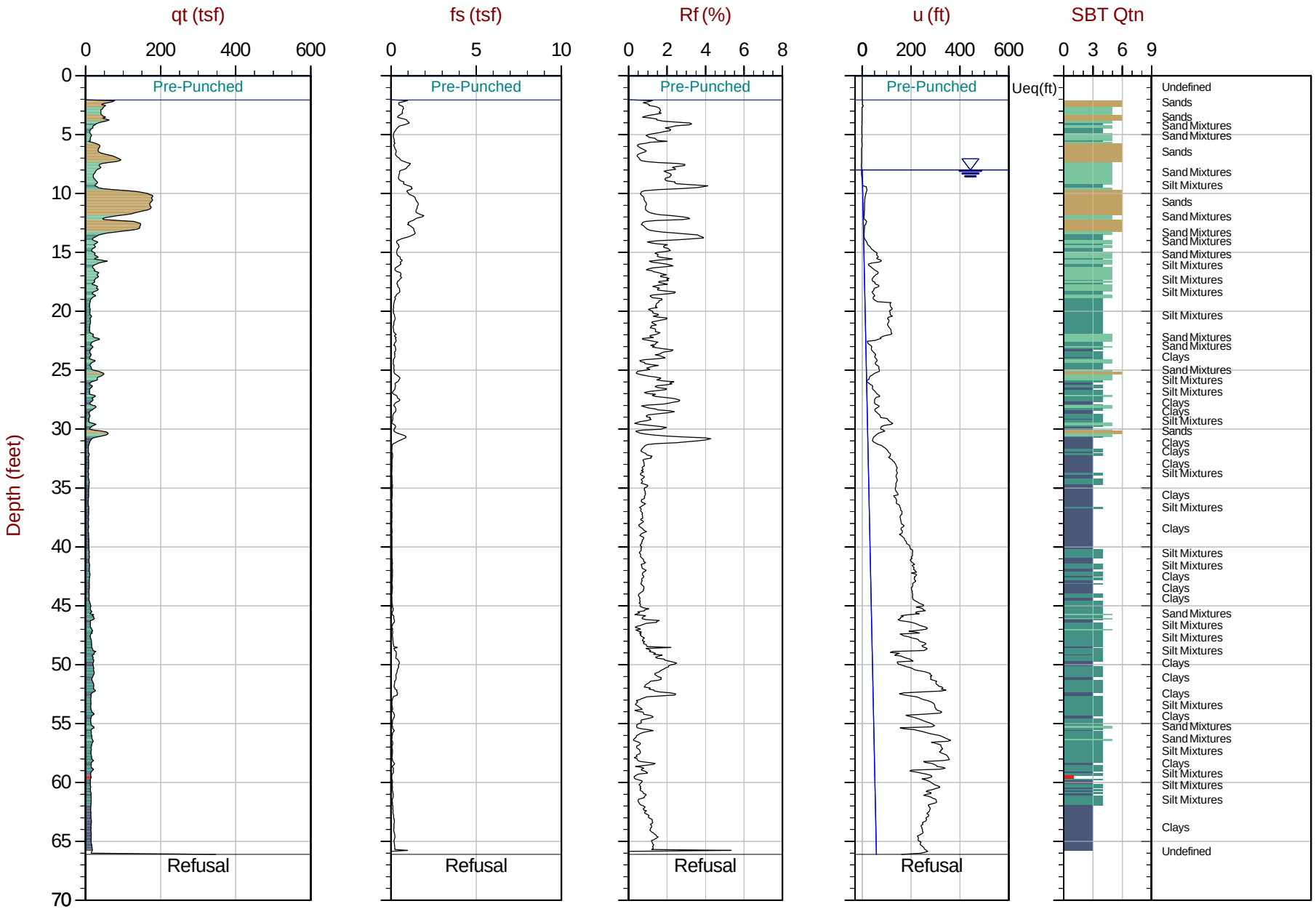
1. The assumed phreatic surface was based off the shallowest pore pressure dissipation test performed within the sounding. Hydrostatic conditions were assumed for the calculated parameters.
2. The coordinates were collected using a MR-350 Global Sat GPS receiver. EPSG number: 32619 (WGS84 / UTM Zone 19 North).
3. The assumed phreatic surface was based off an adjacent CPT sounding.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 11:04
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-01
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695350m E: 324406m

Overplot Item: Hydrostatic Line; Ueq; Assumed Ueq; PPD, Ueq achieved; PPD, Ueq not achieved; PPD, Ueq assumed

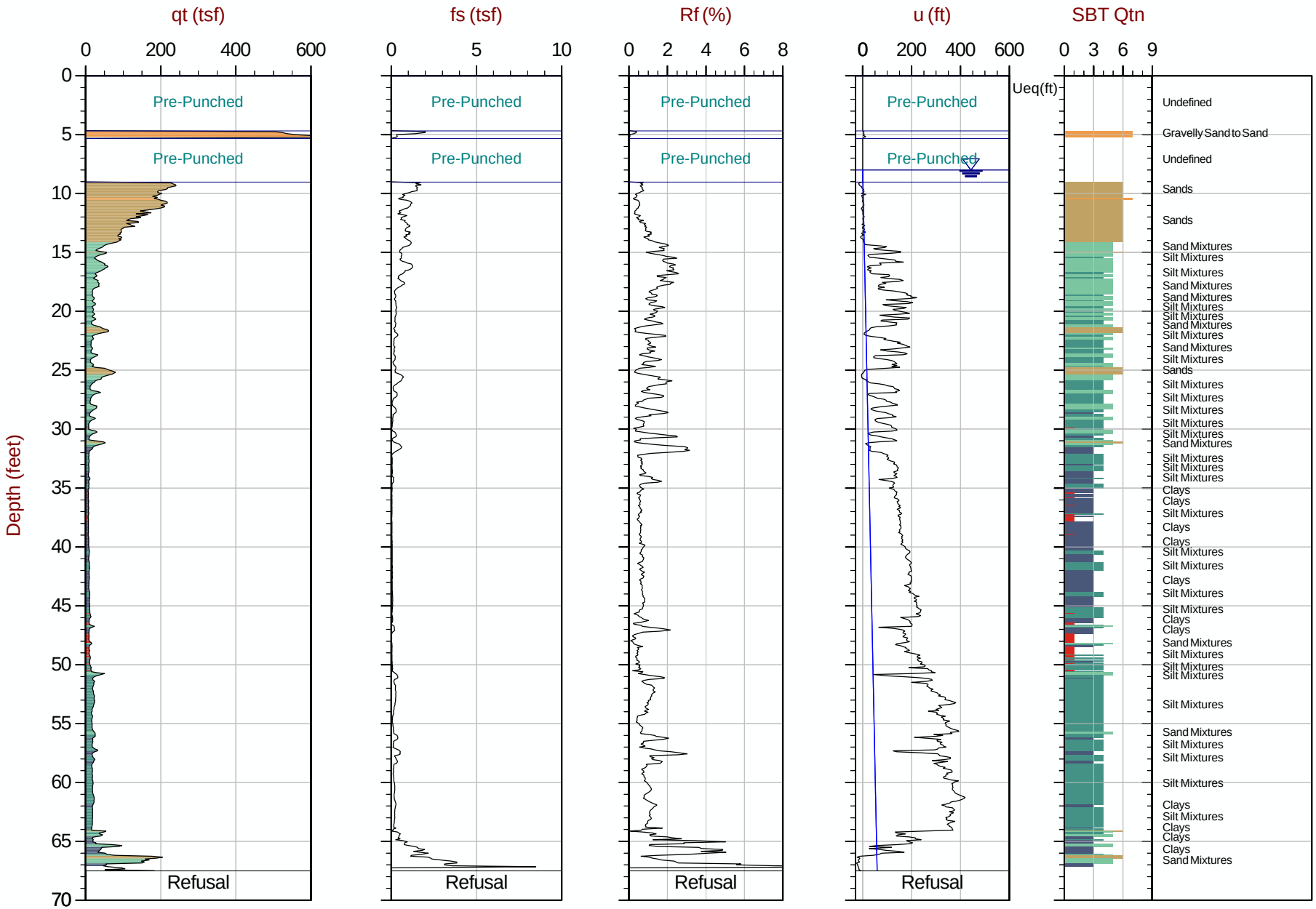
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 09:47
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-02
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.575 m / 67.50 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_CP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695335m E: 324409m

Overplot Item: Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved PPD, Ueq assumed

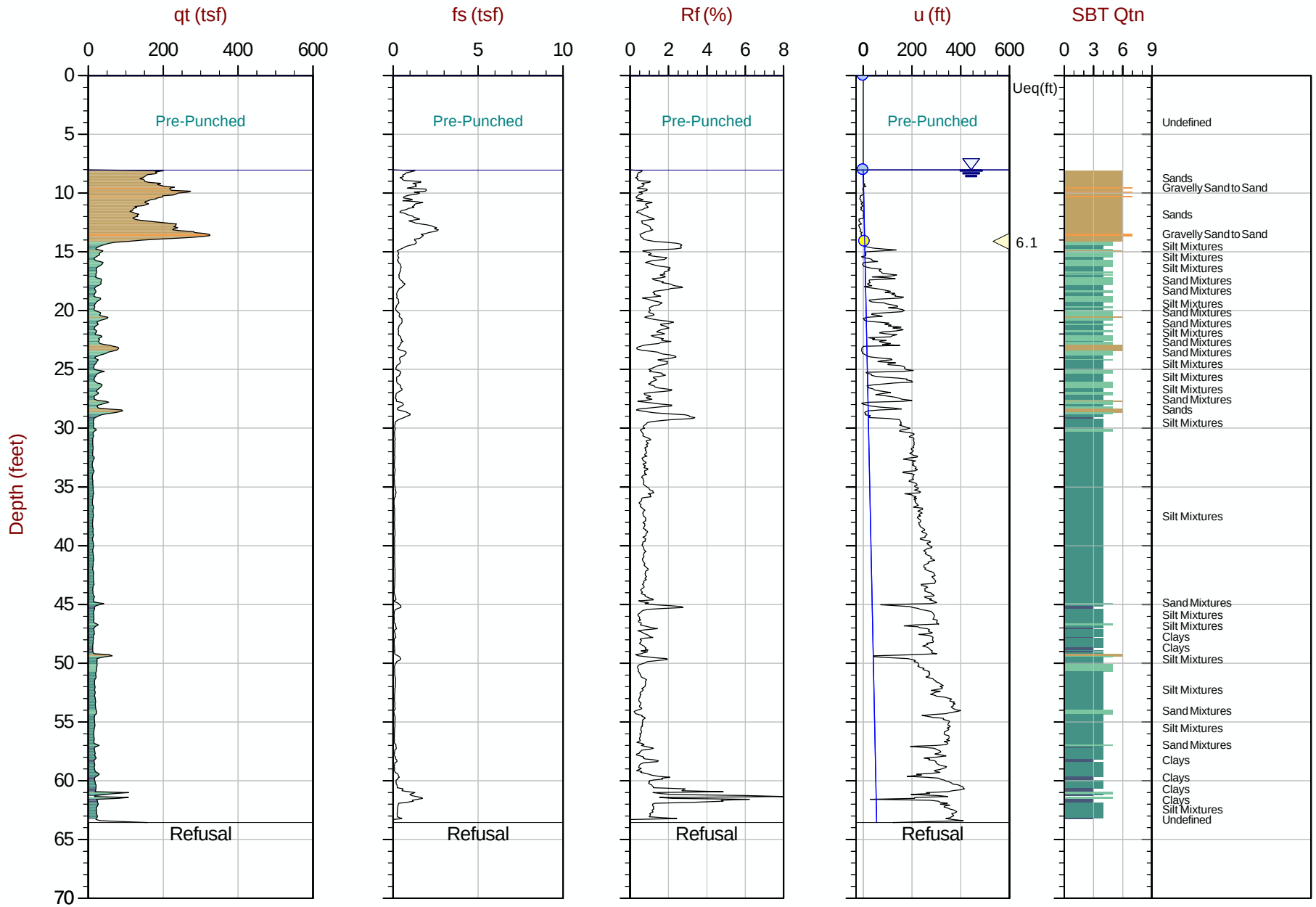
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 13:38
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-03
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 19.375 m / 63.57 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_CP03.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695345m E: 324422m

Overplot Item: Hydrostatic Line; Ueq; Assumed Ueq; PPD, Ueq achieved; PPD, Ueq not achieved; PPD, Ueq assumed

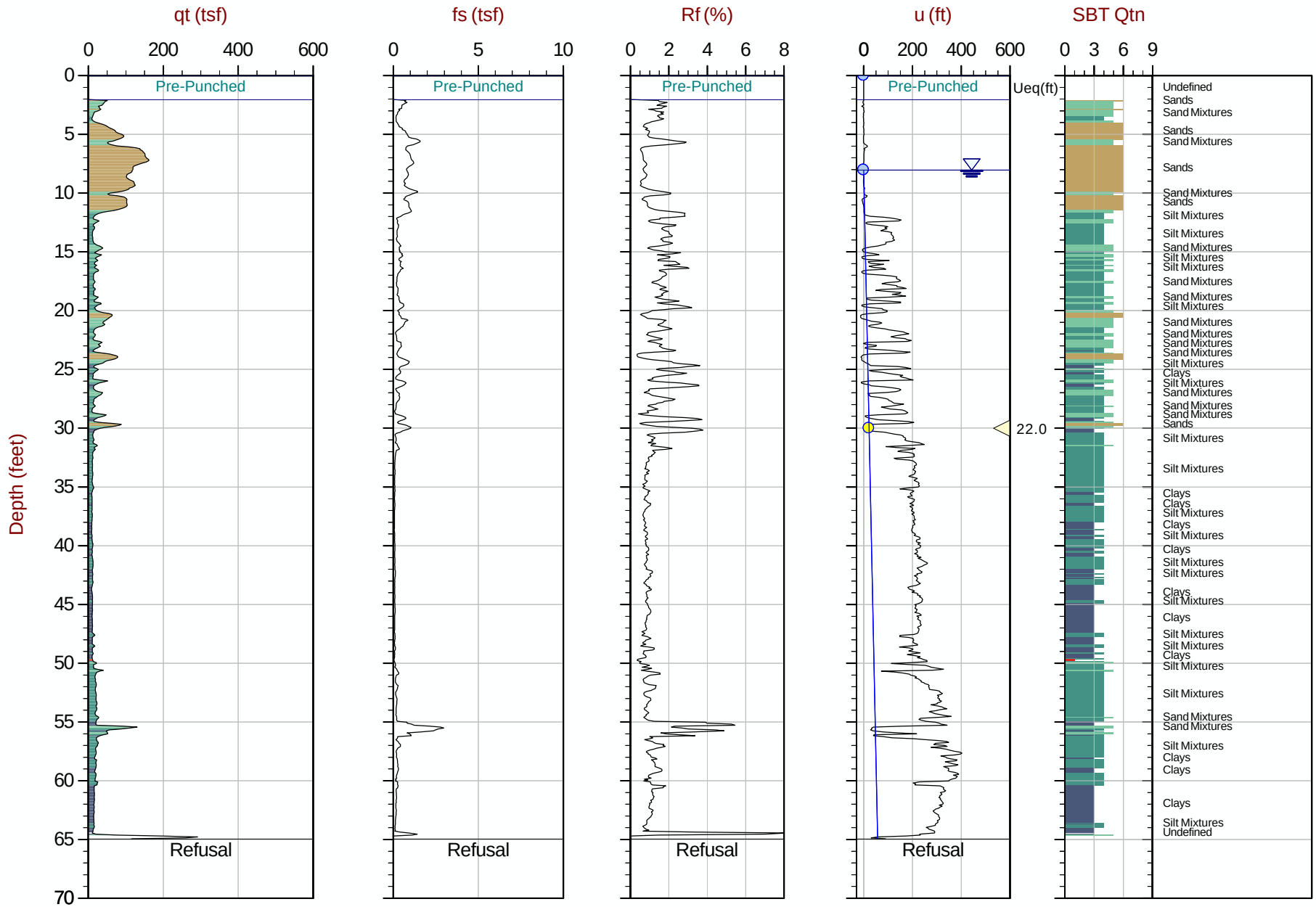
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 08:34
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-04
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 19.800 m / 64.96 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695333m E: 324429m

Overplot Item: Hydrostatic Line; Ueq; Assumed Ueq; PPD, Ueq achieved; PPD, Ueq not achieved; PPD, Ueq assumed

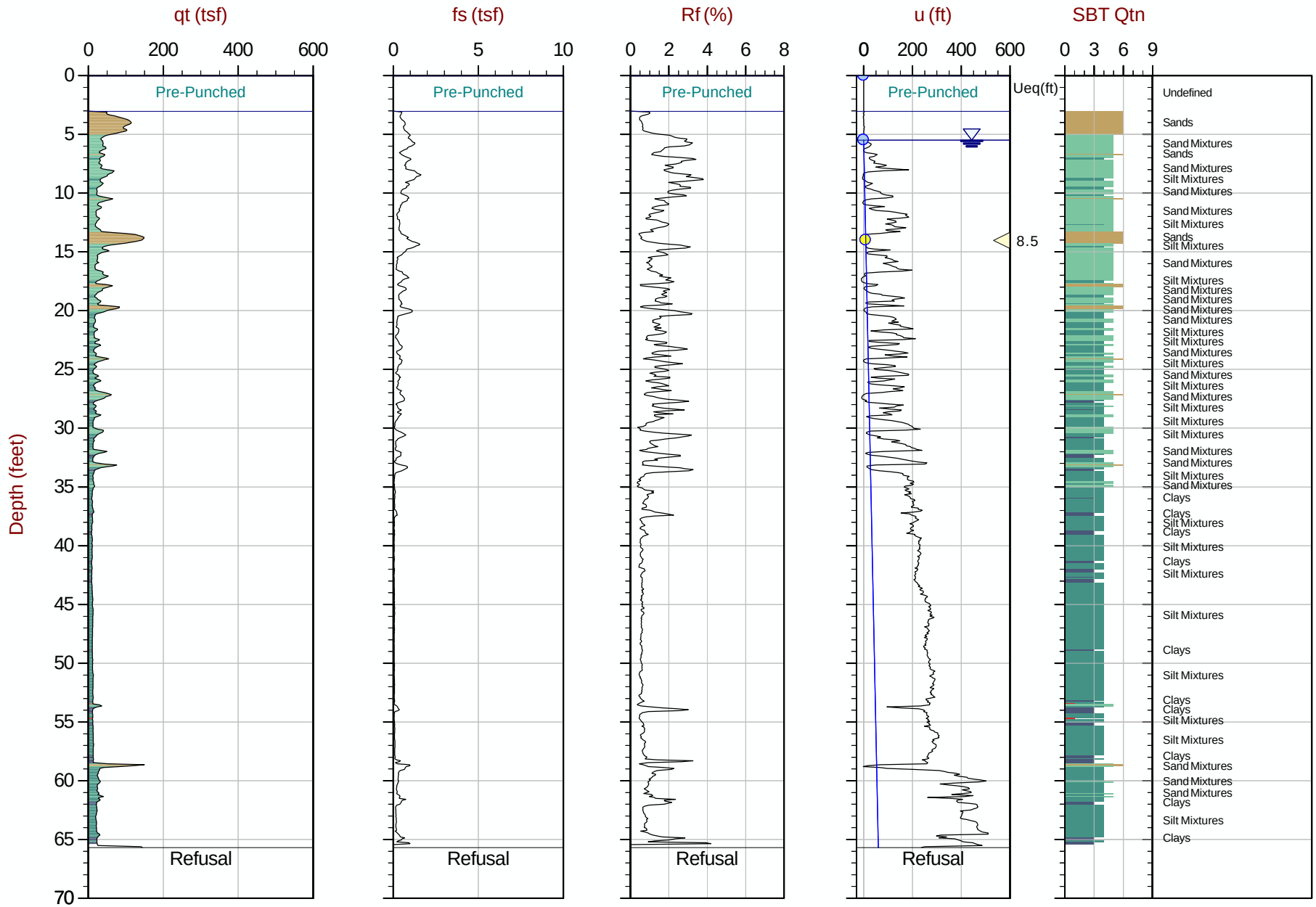
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 12:17
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-05
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.025 m / 65.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP05.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695349m E: 324353m

Overplot Item: Hydrostatic Line; Ueq; Assumed Ueq; PPD, Ueq achieved; PPD, Ueq not achieved; PPD, Ueq assumed

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

Standard CPTu Plots with Reduced Scales

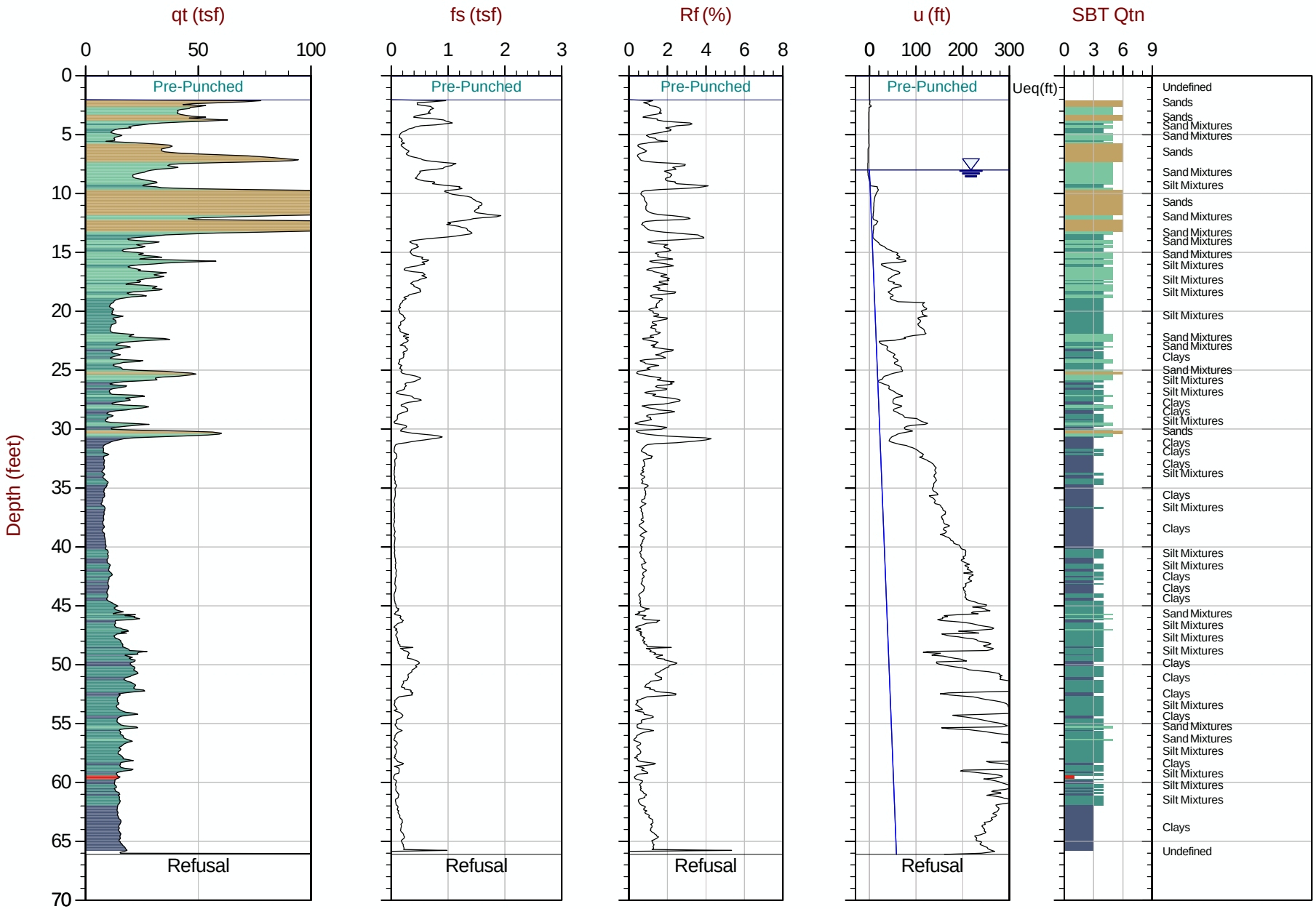
CONETEC

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 11:04
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-01
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695350m E: 324406m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

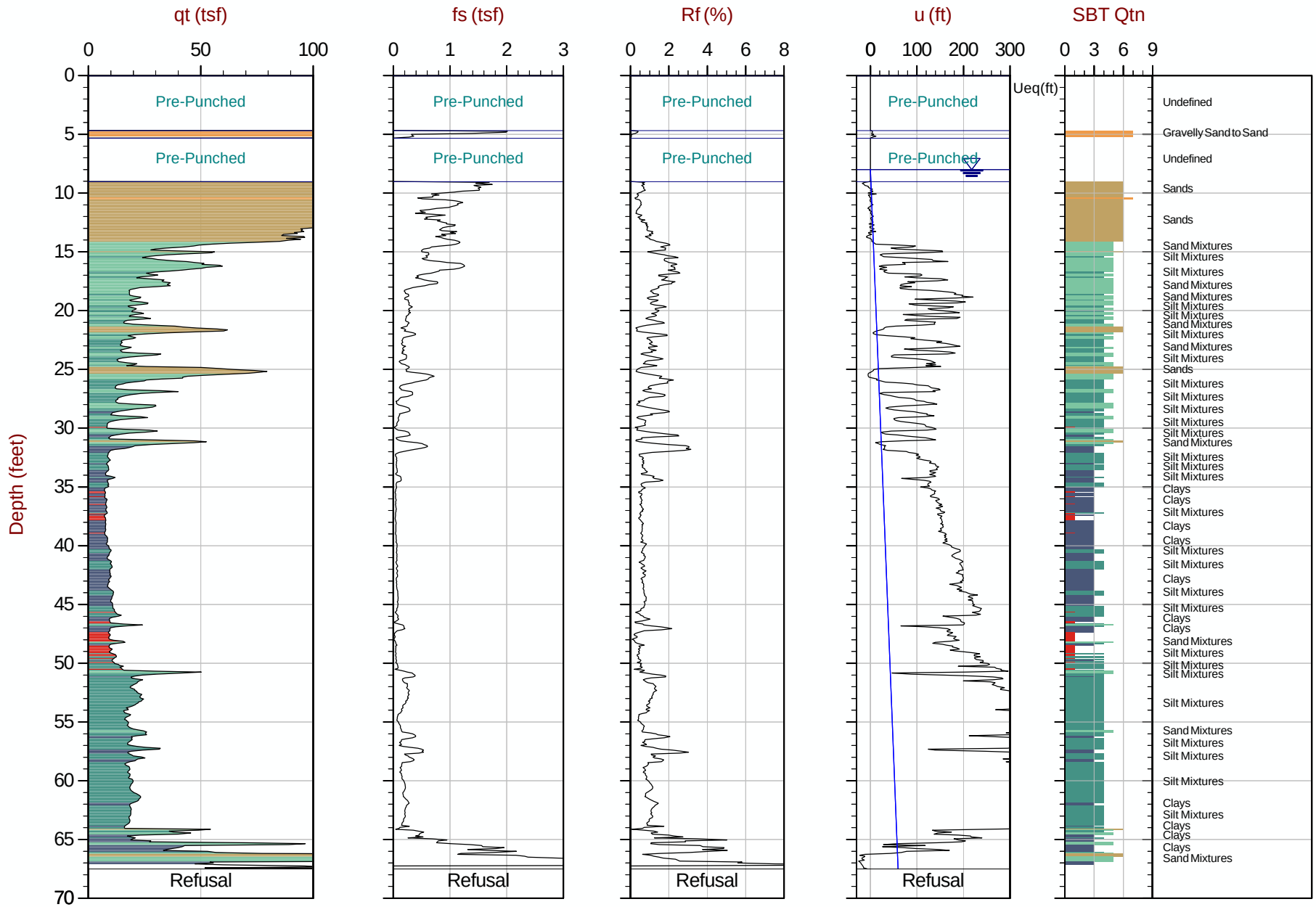
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 09:47
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-02
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.575 m / 67.50 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_CP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695335m E: 324409m

Overplot Item: Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved PPD, Ueq assumed

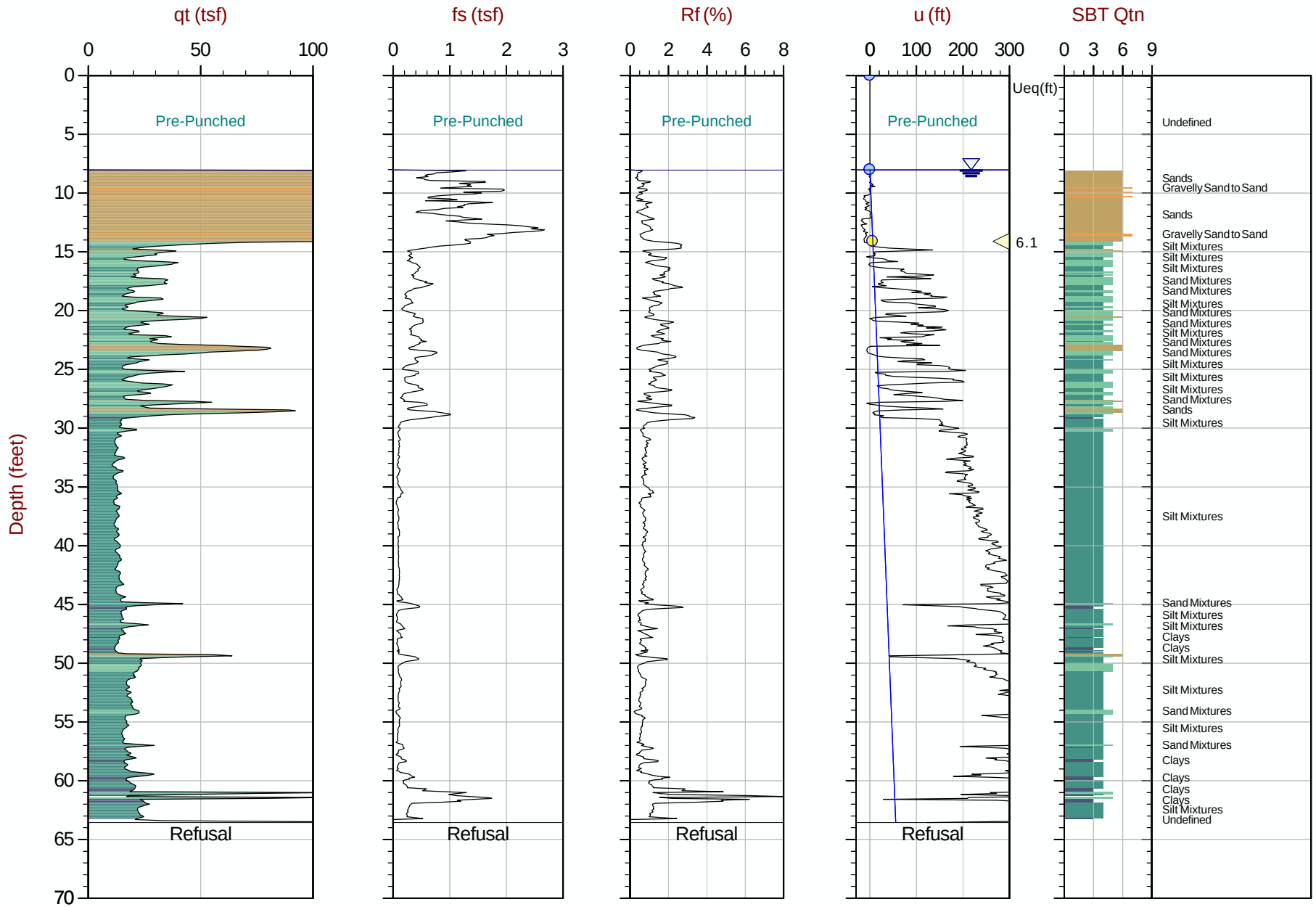
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 13:38
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-03
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 19.375 m / 63.57 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_CP03.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695345m E: 324422m

Overplot Item: Hydrostatic Line; Ueq; Assumed Ueq; PPD, Ueq achieved; PPD, Ueq not achieved; PPD, Ueq assumed

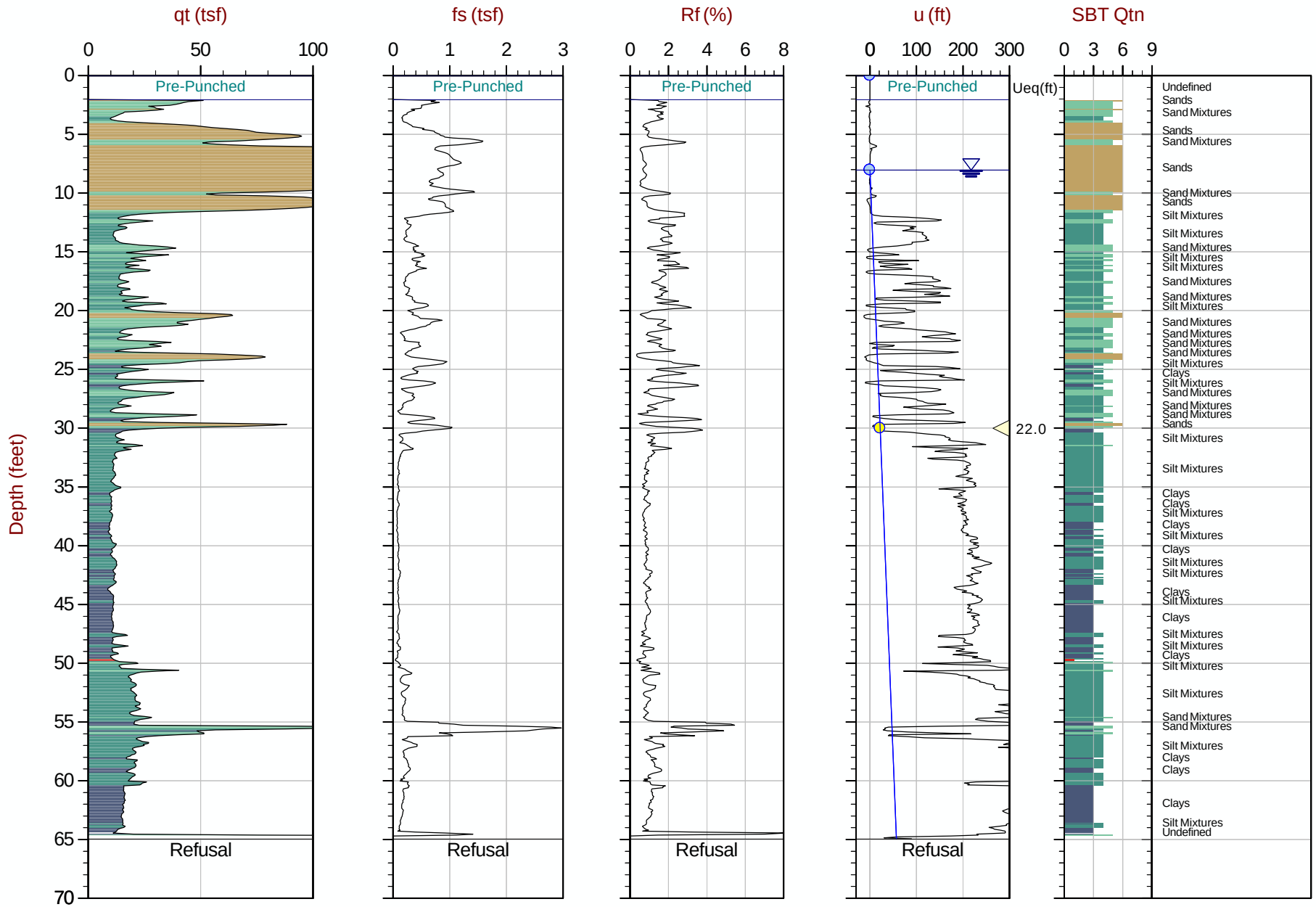
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 08:34
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-04
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 19.800 m / 64.96 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695333m E: 324429m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

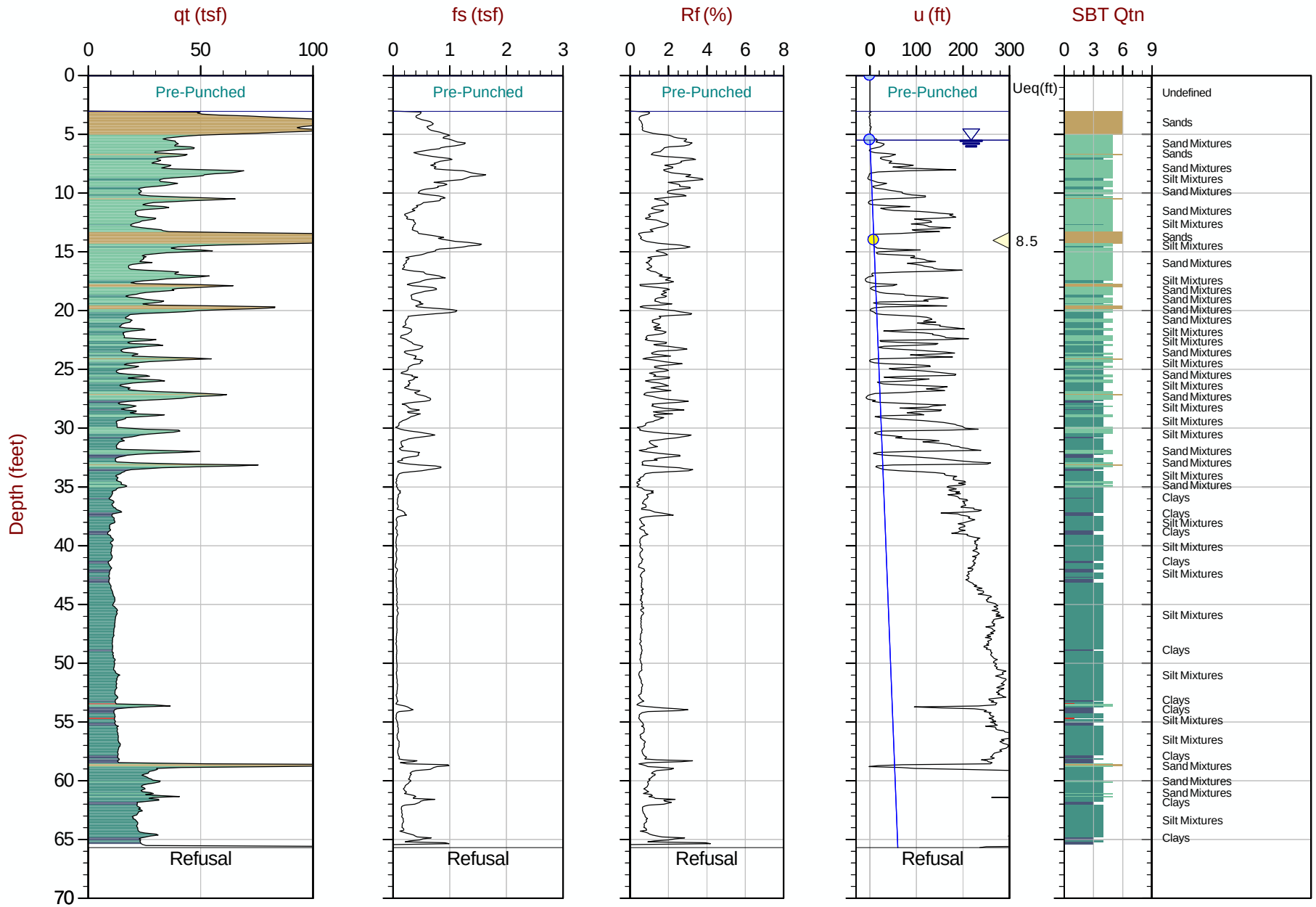
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 12:17
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-05
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.025 m / 65.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP05.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695349m E: 324353m

Overplot Item: Hydrostatic Line; Ueq; Assumed Ueq; PPD, Ueq achieved; PPD, Ueq not achieved; PPD, Ueq assumed

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, Su(Nkt), Phi, and N1(60)Ic

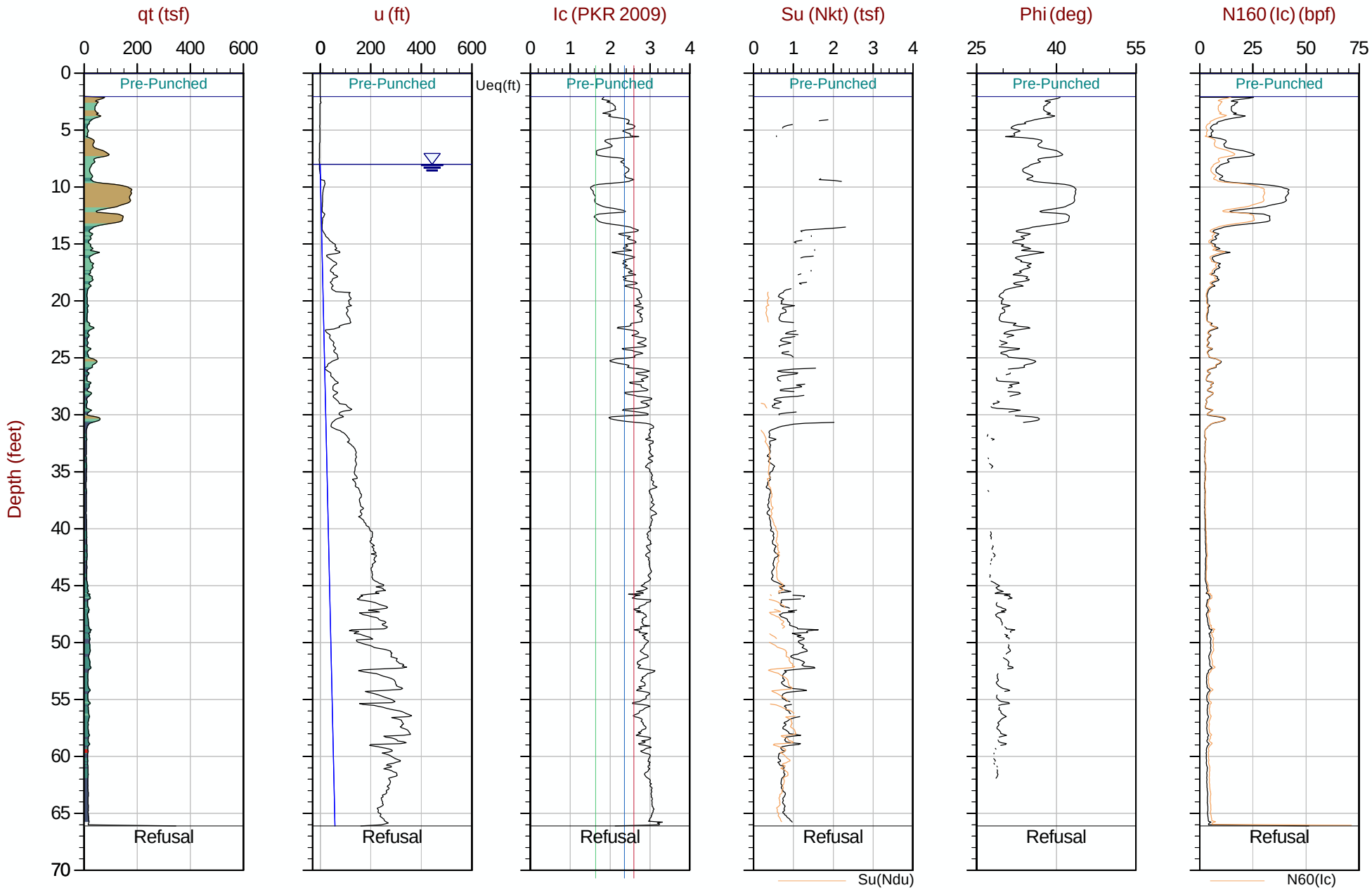
CONETEC

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 11:04
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-01
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP01.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695350m E: 324406m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

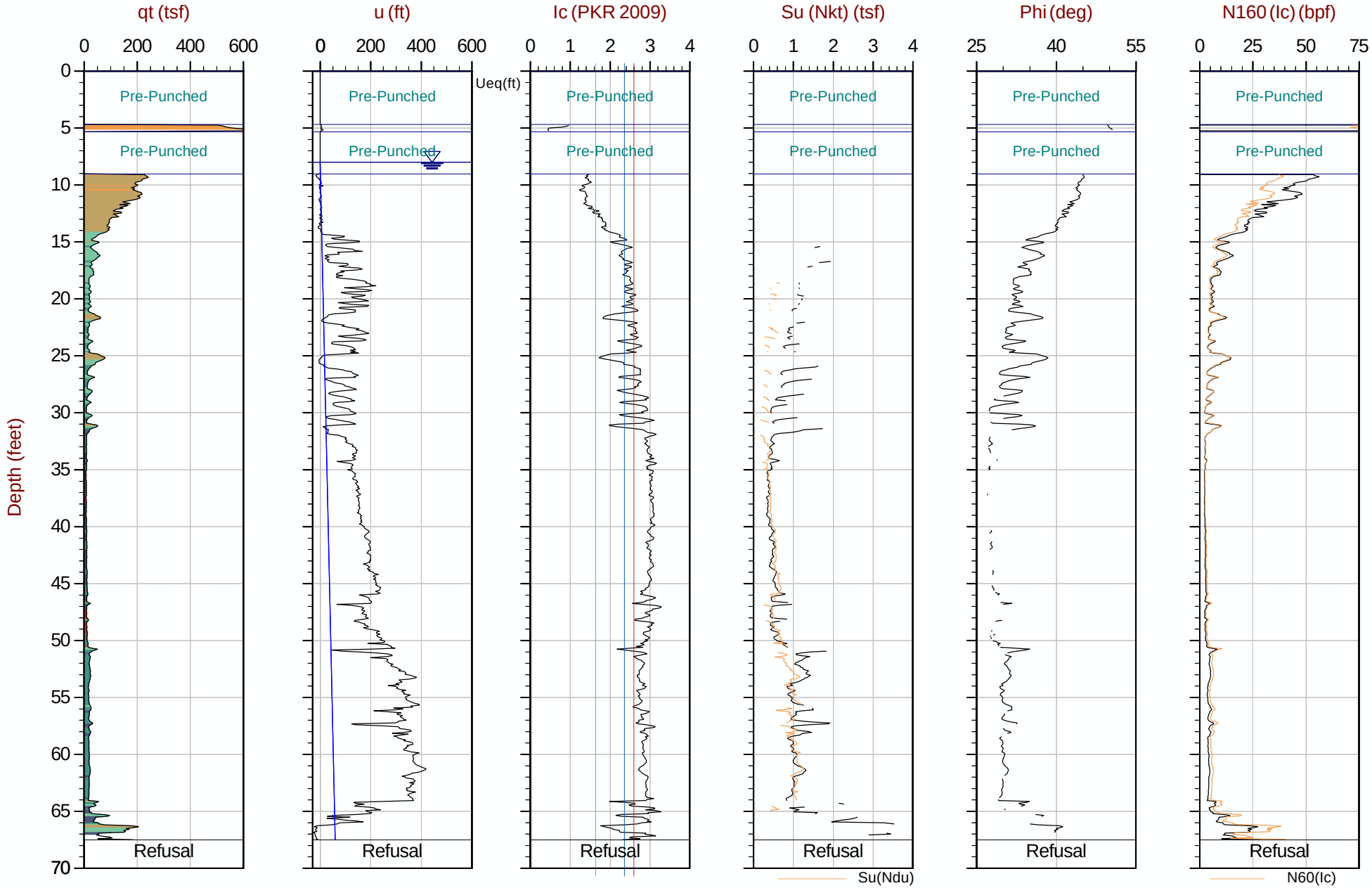
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 09:47
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-02
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.575 m / 67.50 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_CP02.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695335m E: 324409m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

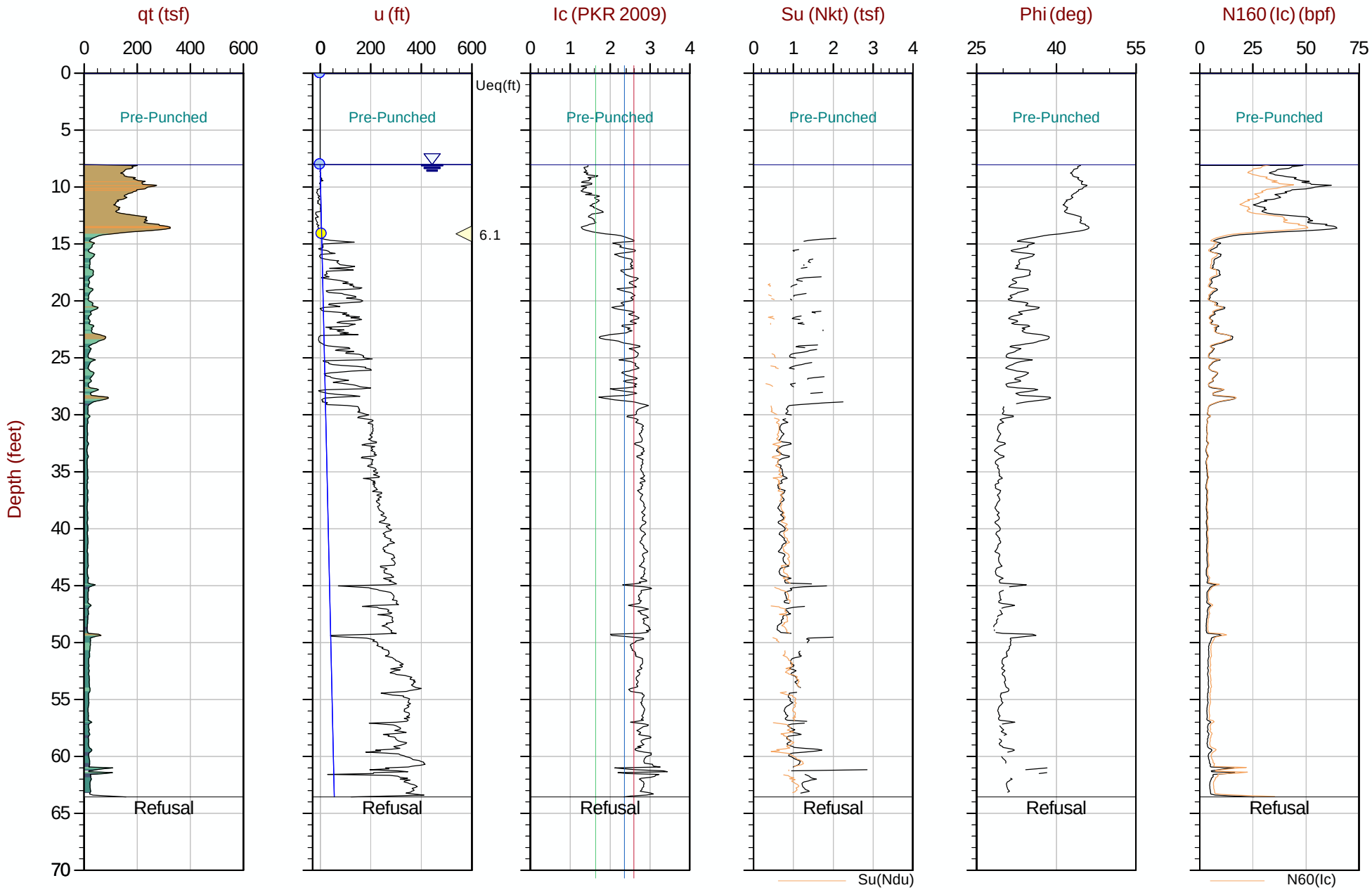
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 13:38
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-03
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 19.375 m / 63.57 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_CP03.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695345m E: 324422m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

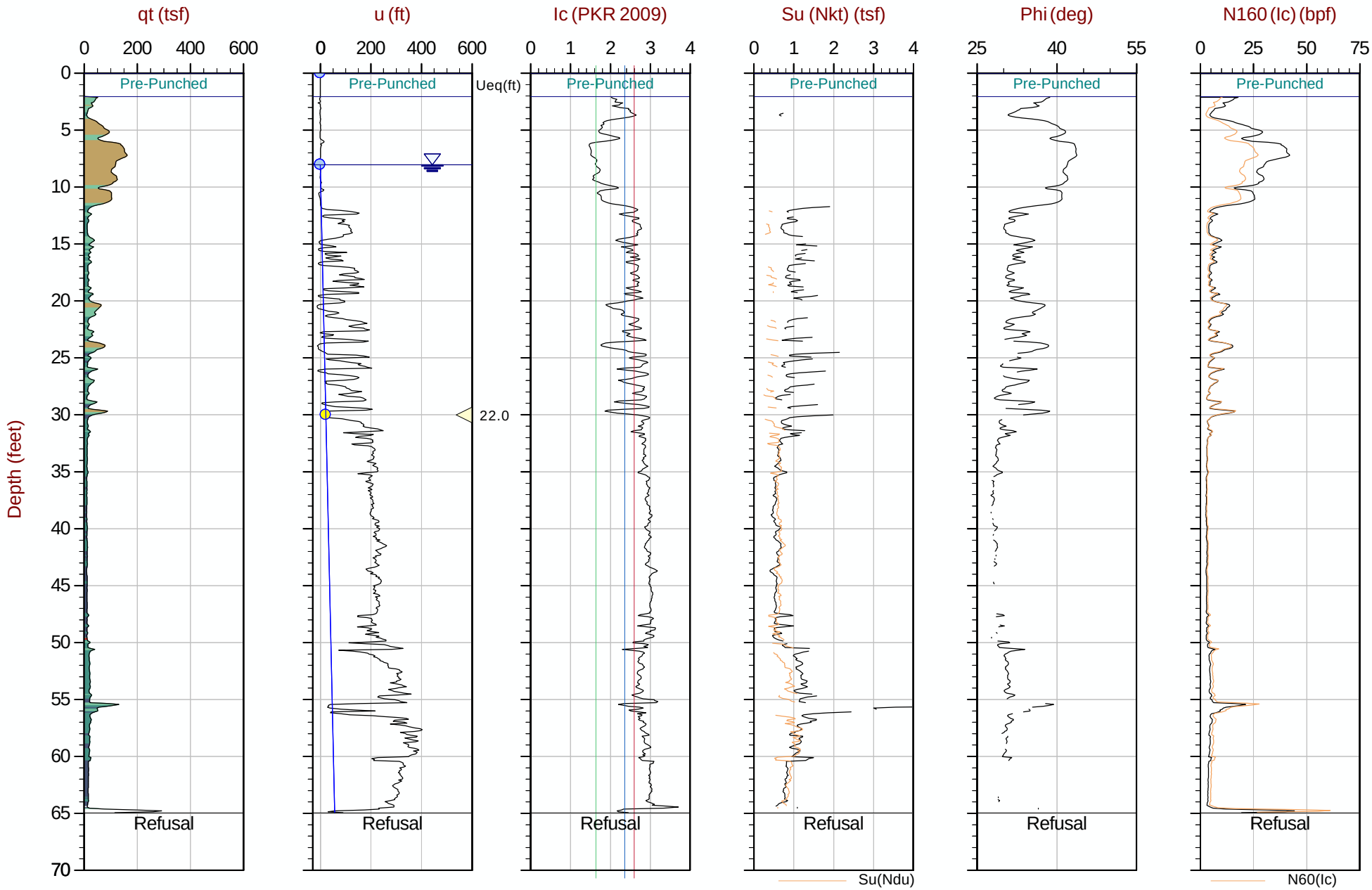
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 08:34
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-04
Cone: 1230:T1000F10U35 Area=15 cm²



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File: 26-55-31074_SP04.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695333m E: 324429m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

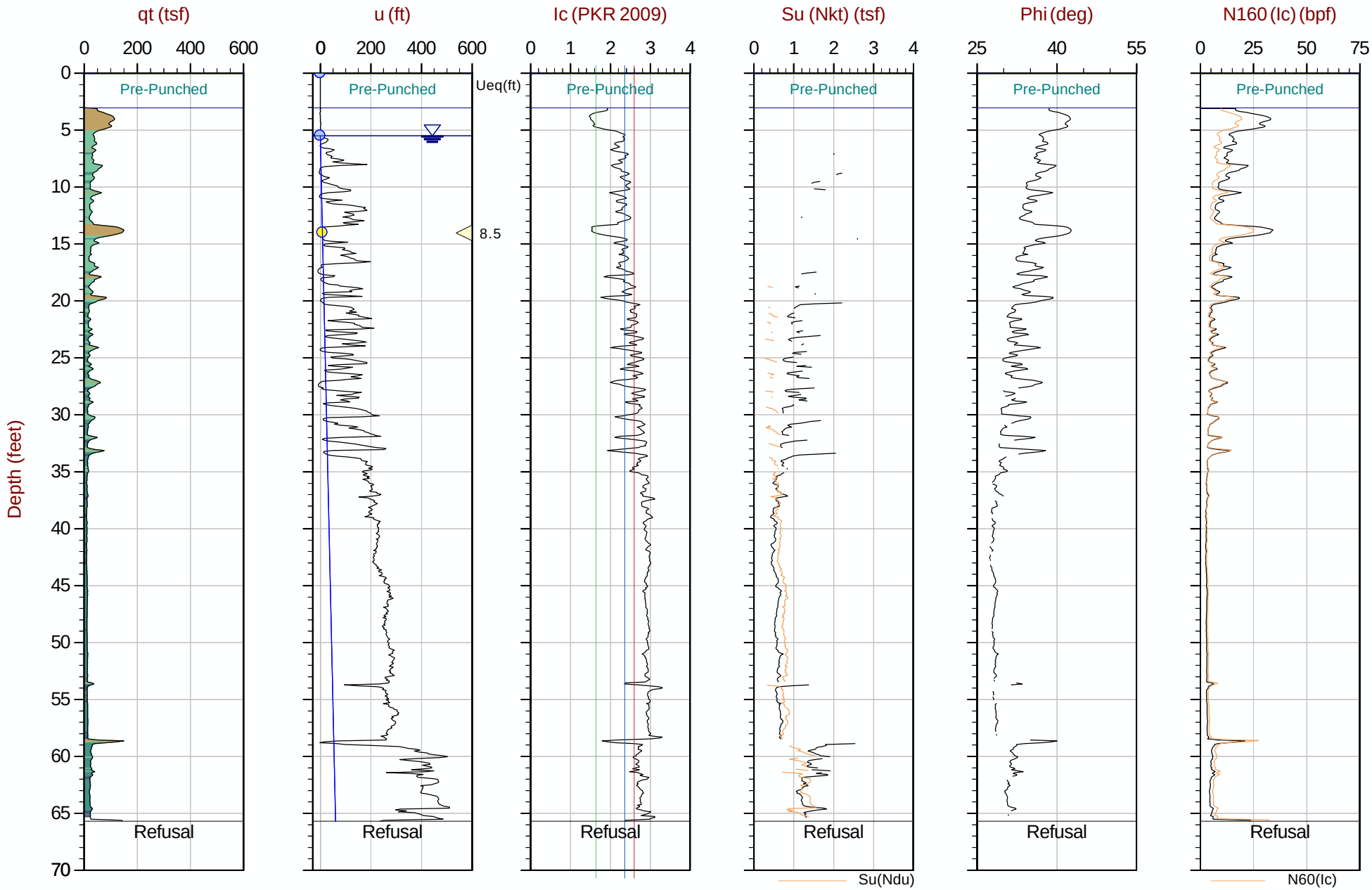
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CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 12:17
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-05
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.025 m / 65.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP05.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695349m E: 324353m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

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

CONETEC

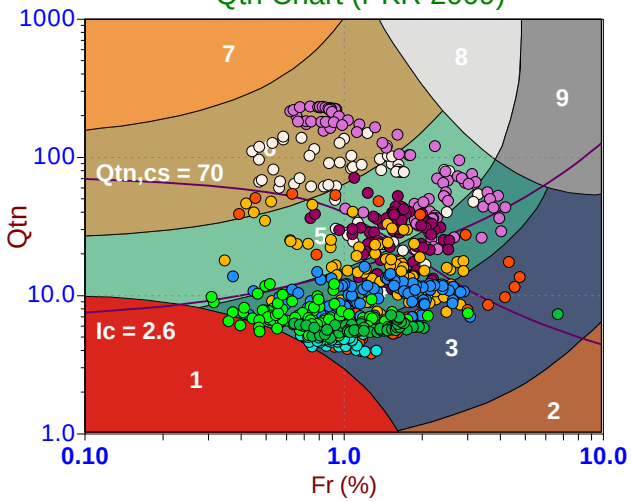
CONETEC

Kleinfelder

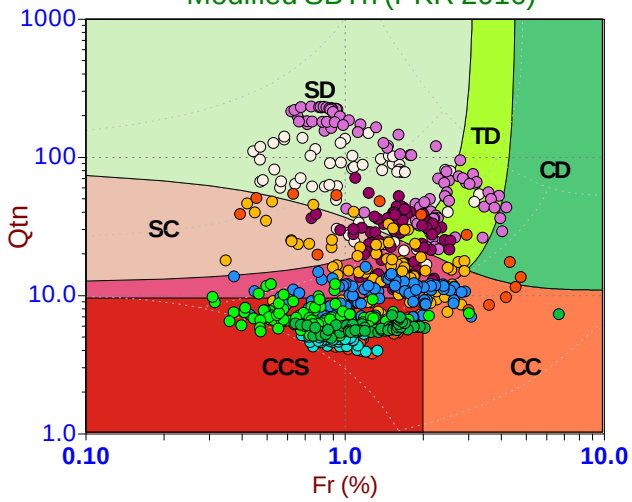
Job No: 26-55-31074
Date: 2026-03-25 11:04
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-01
Cone: 1230:T1000F10U35 Area=15 cm²

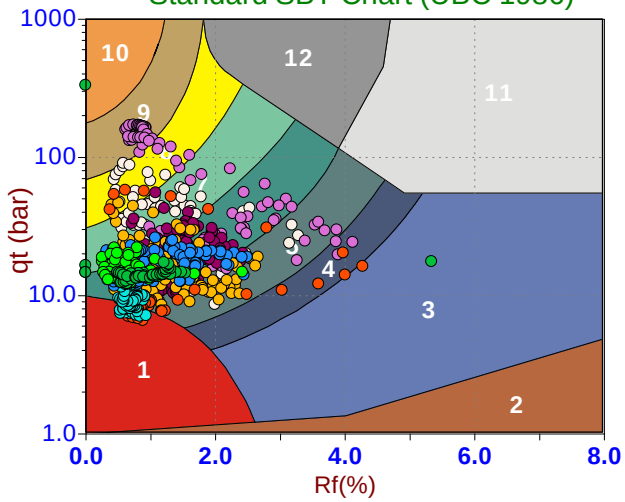
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 ft
- >7.5 to 15.0 ft
- >15.0 to 22.5 ft
- >22.5 to 30.0 ft
- >30.0 to 37.5 ft
- >37.5 to 45.0 ft
- >45.0 to 52.5 ft
- >52.5 to 60.0 ft
- >60.0 to 67.5 ft
- >67.5 to 75.0 ft
- >75.0 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

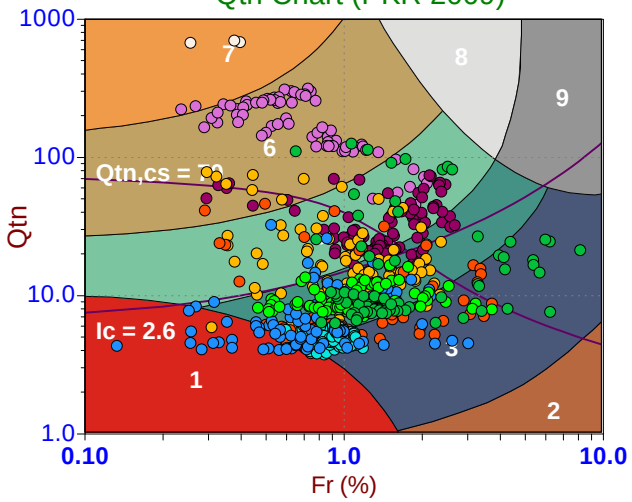
CONETEC

Kleinfelder

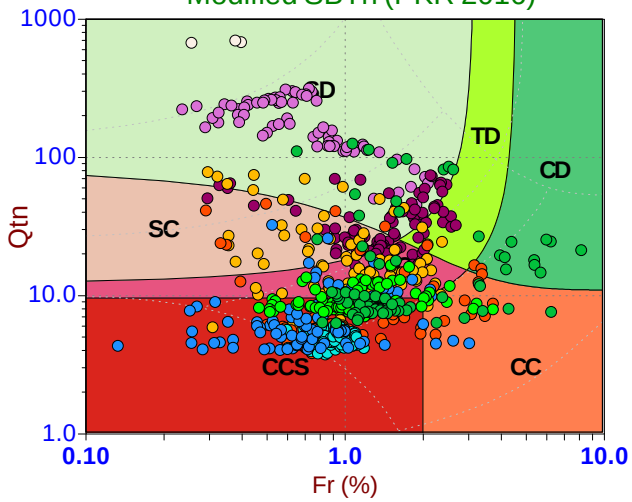
Job No: 26-55-31074
Date: 2026-03-25 09:47
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-02
Cone: 1230:T1000F10U35 Area=15 cm²

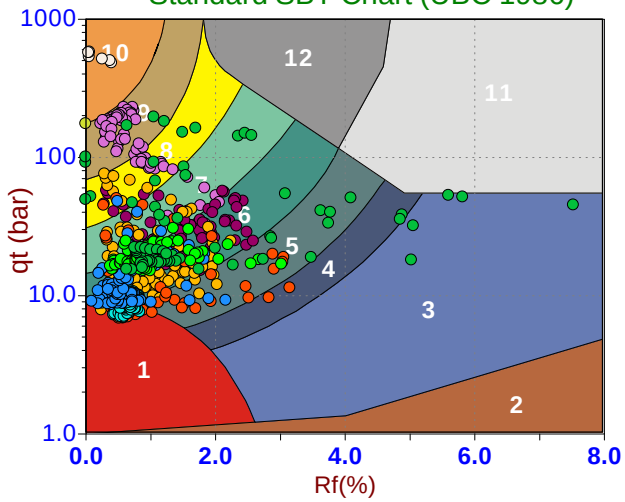
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 ft
- >7.5 to 15.0 ft
- >15.0 to 22.5 ft
- >22.5 to 30.0 ft
- >30.0 to 37.5 ft
- >37.5 to 45.0 ft
- >45.0 to 52.5 ft
- >52.5 to 60.0 ft
- >60.0 to 67.5 ft
- >67.5 to 75.0 ft
- >75.0 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

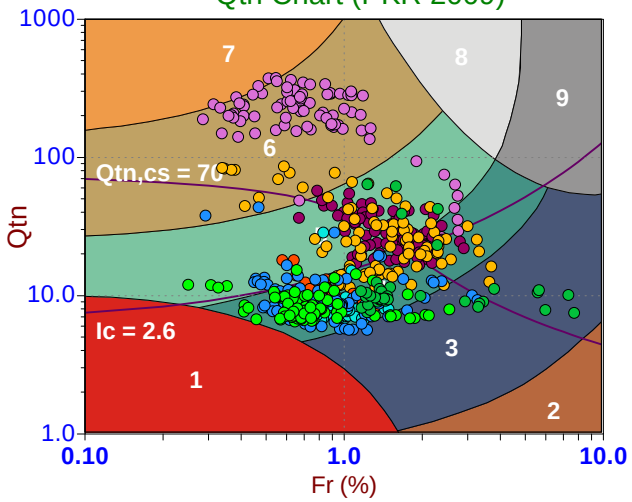
CONETEC

Kleinfelder

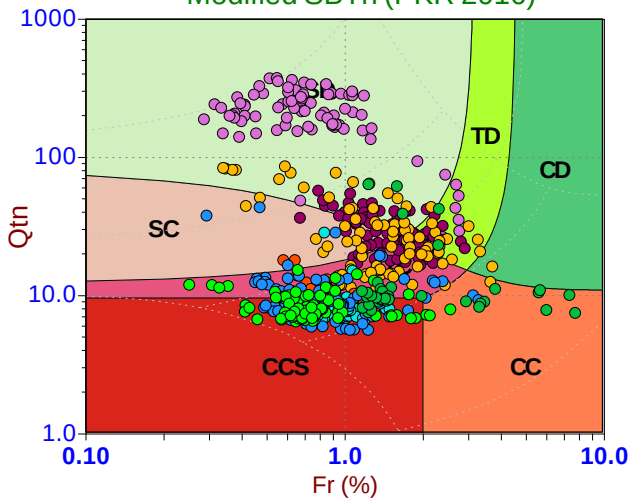
Job No: 26-55-31074
Date: 2026-03-25 13:38
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-03
Cone: 1230:T1000F10U35 Area=15 cm²

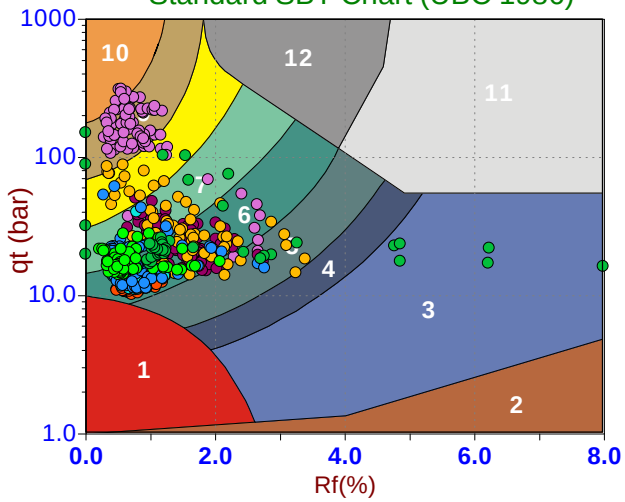
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 ft
- >7.5 to 15.0 ft
- >15.0 to 22.5 ft
- >22.5 to 30.0 ft
- >30.0 to 37.5 ft
- >37.5 to 45.0 ft
- >45.0 to 52.5 ft
- >52.5 to 60.0 ft
- >60.0 to 67.5 ft
- >67.5 to 75.0 ft
- >75.0 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

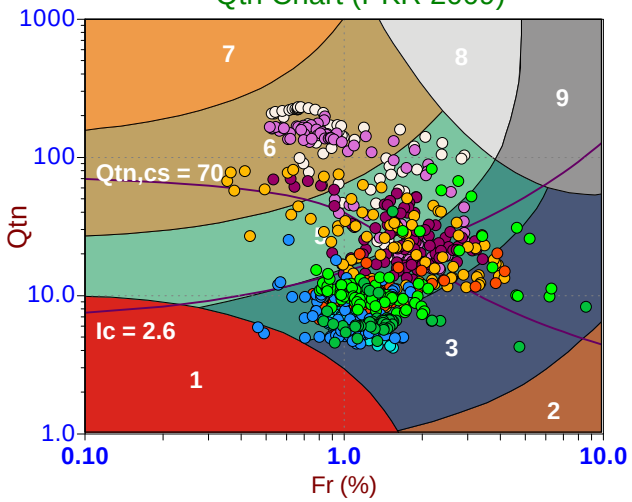
CONETEC

Kleinfelder

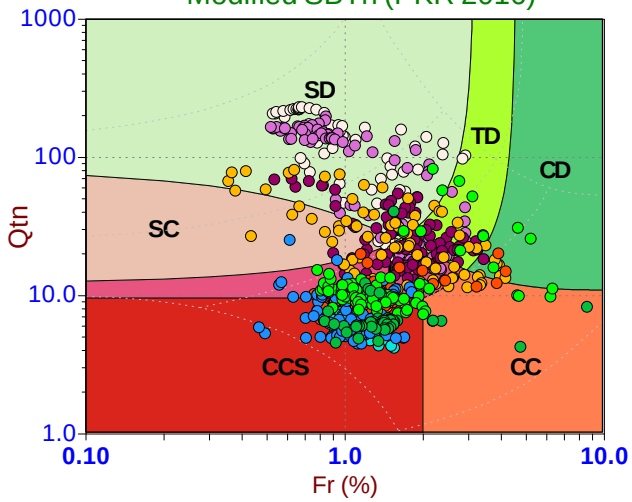
Job No: 26-55-31074
Date: 2026-03-25 08:34
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-04
Cone: 1230:T1000F10U35 Area=15 cm²

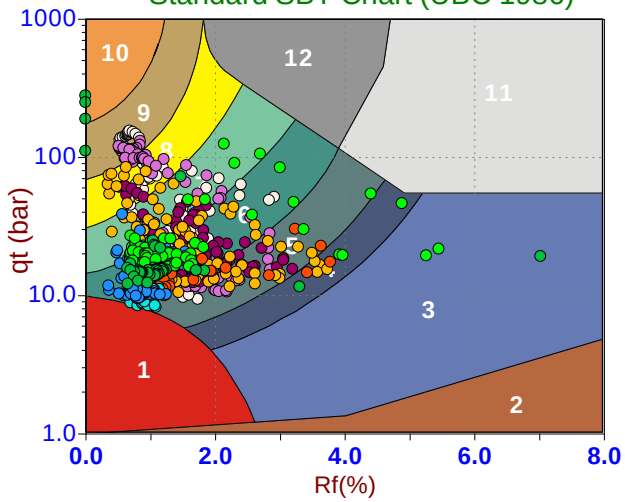
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 ft
- >7.5 to 15.0 ft
- >15.0 to 22.5 ft
- >22.5 to 30.0 ft
- >30.0 to 37.5 ft
- >37.5 to 45.0 ft
- >45.0 to 52.5 ft
- >52.5 to 60.0 ft
- >60.0 to 67.5 ft
- >67.5 to 75.0 ft
- >75.0 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

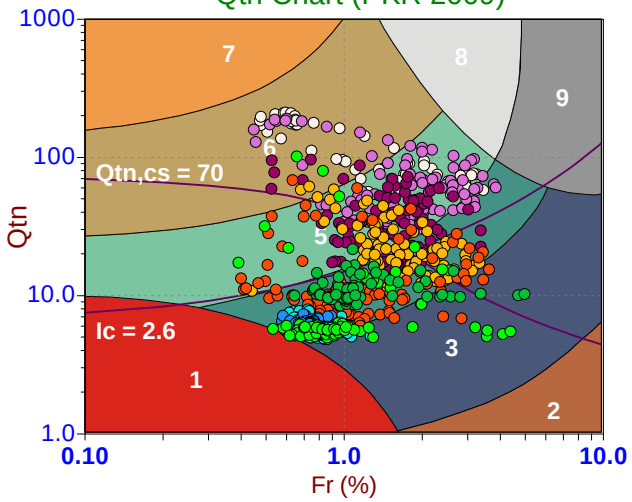
CONETEC

Kleinfelder

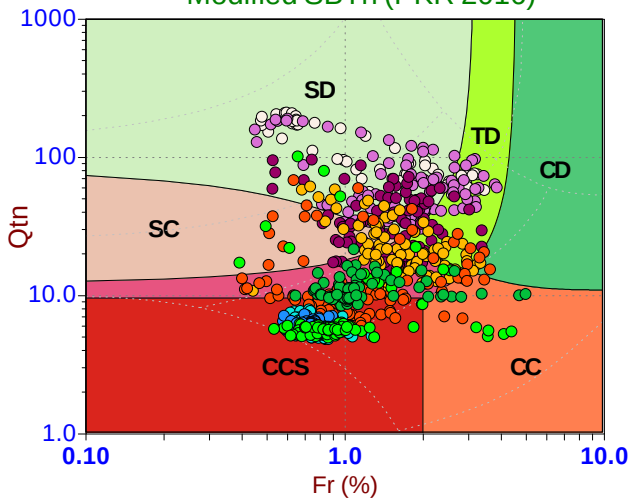
Job No: 26-55-31074
Date: 2026-03-25 12:17
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-05
Cone: 1230:T1000F10U35 Area=15 cm²

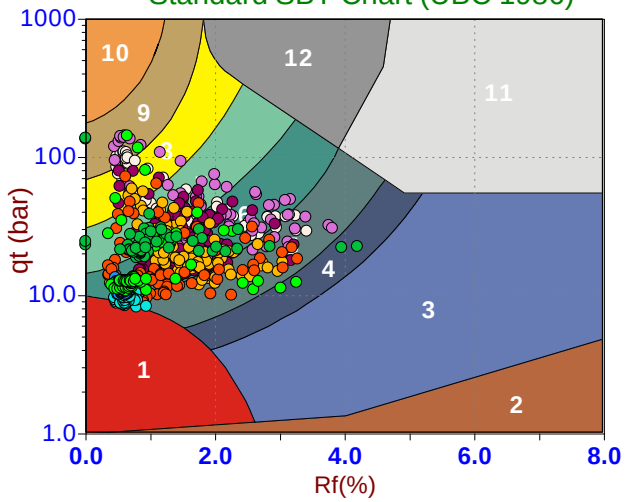
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 ft
- >7.5 to 15.0 ft
- >15.0 to 22.5 ft
- >22.5 to 30.0 ft
- >30.0 to 37.5 ft
- >37.5 to 45.0 ft
- >45.0 to 52.5 ft
- >52.5 to 60.0 ft
- >60.0 to 67.5 ft
- >67.5 to 75.0 ft
- >75.0 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 Test (PPD) Summary and PPD Plots

CONETEC

Job No:	26-55-31074
Client:	Kleinfelder
Project:	41 Bellis Circle - Cambridge, MA
Start Date:	25-Mar-2026
End Date:	25-Mar-2026

CPTu PORE PRESSURE DISSIPATION SUMMARY

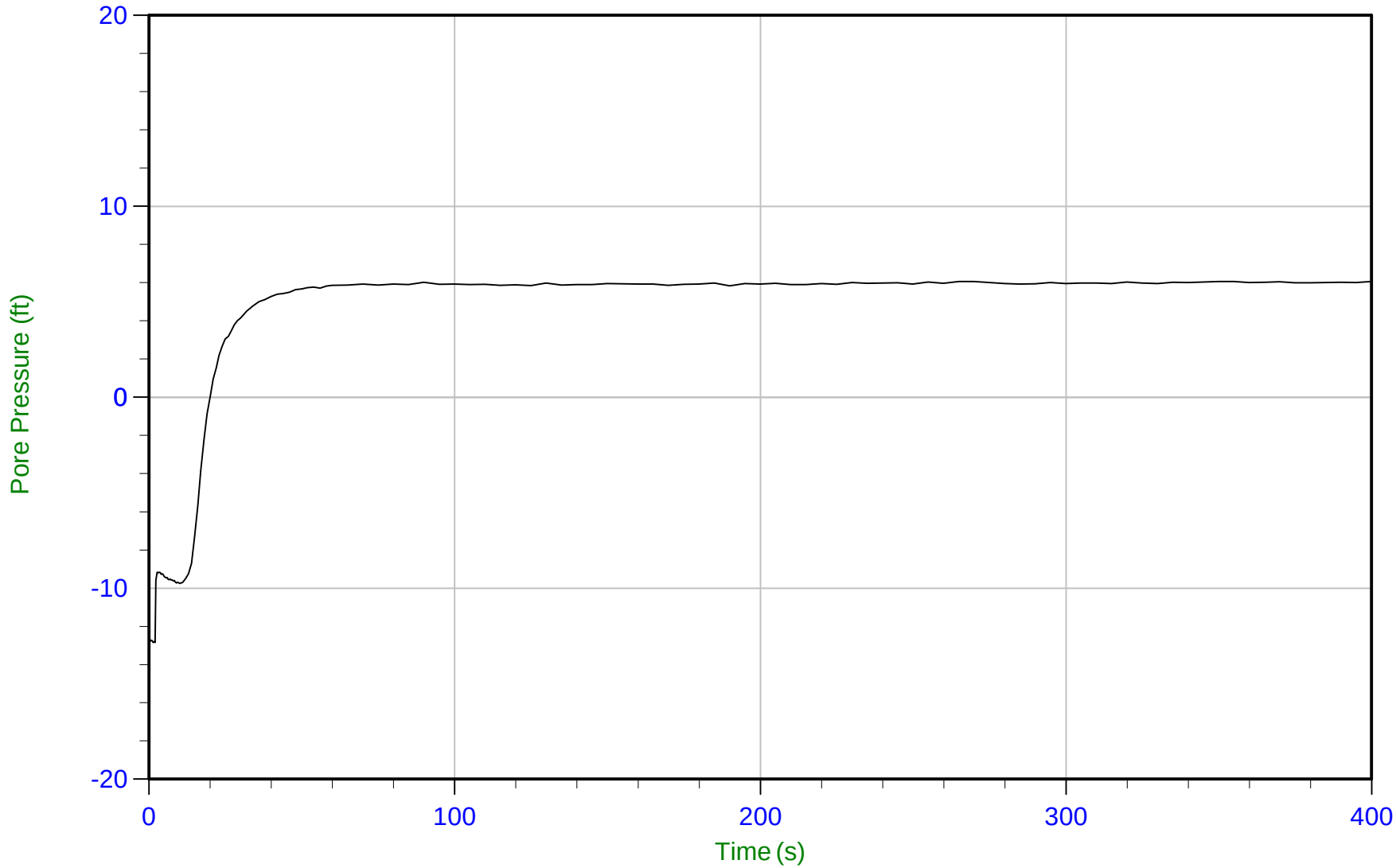
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
CPT26-03	26-55-31074_CP03	15	400	14.11	6.1	8.0
SCPT26-04	26-55-31074_SP04	15	315	30.02	22.0	8.0
SCPT26-05	26-55-31074_SP05	15	600	14.03	8.5	5.5
Totals	3 Dissipations		22 min			

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 13:38
Site: 41 Bellis Circle - Cambridge, MA

Sounding: CPT26-03
Cone: 1230:T1000F10U35 Area=15 cm²



Trace Summary:

Filename: 26-55-31074_CP03.PPF2
Depth: 4.300 m / 14.107 ft
Duration: 400.0 s

u Min: -12.8 ft
u Max: 6.1 ft
u Final: 6.1 ft

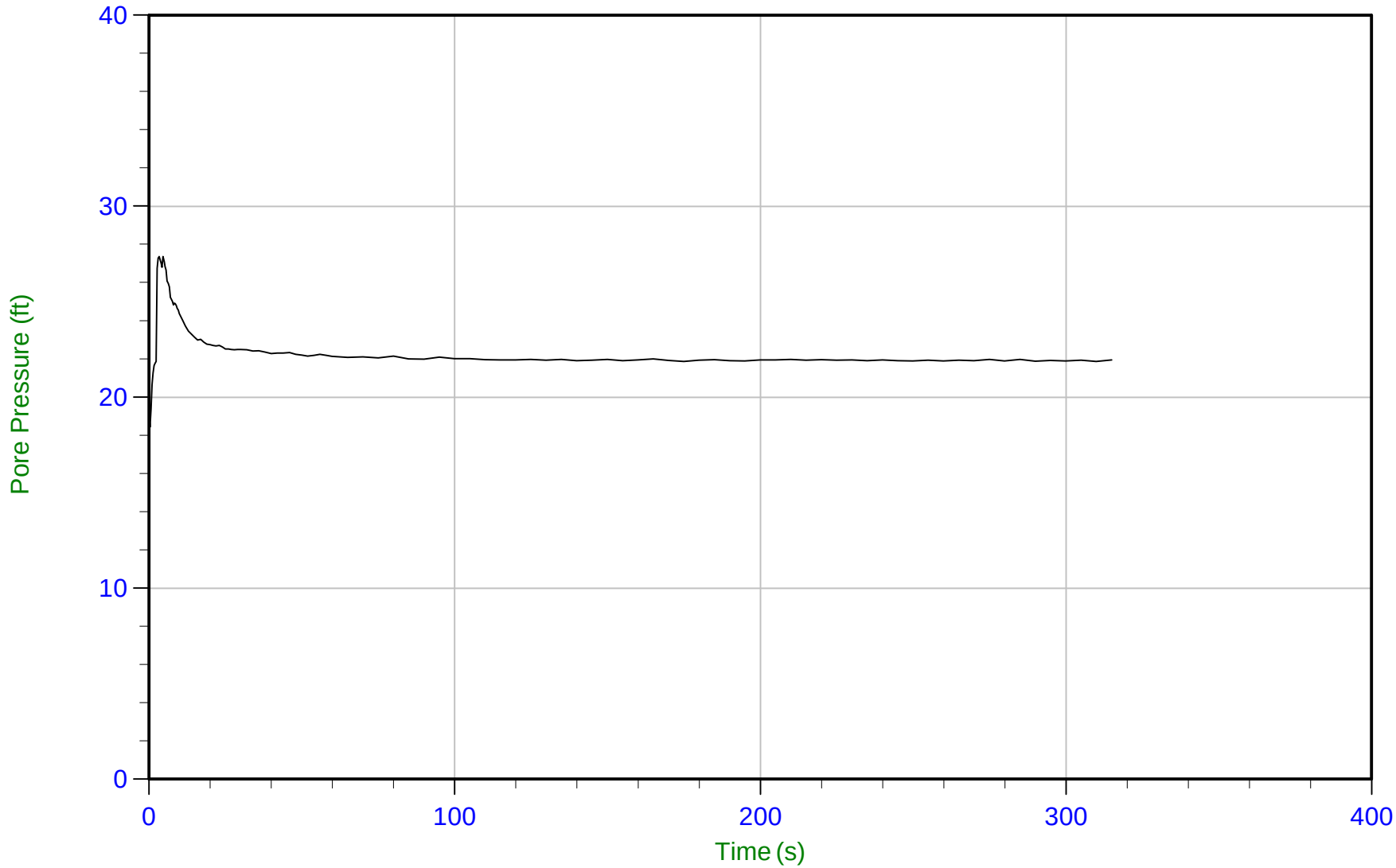
WT: 2.4 m / 8.0 ft
Ueq: 6.1 ft

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 08:34
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-04
Cone: 1230:T1000F10U35 Area=15 cm²



Trace Summary:

Filename: 26-55-31074_SP04.PPF2
Depth: 9.150 m / 30.019 ft
Duration: 315.0 s

u Min: 18.4 ft
u Max: 27.4 ft
u Final: 22.0 ft

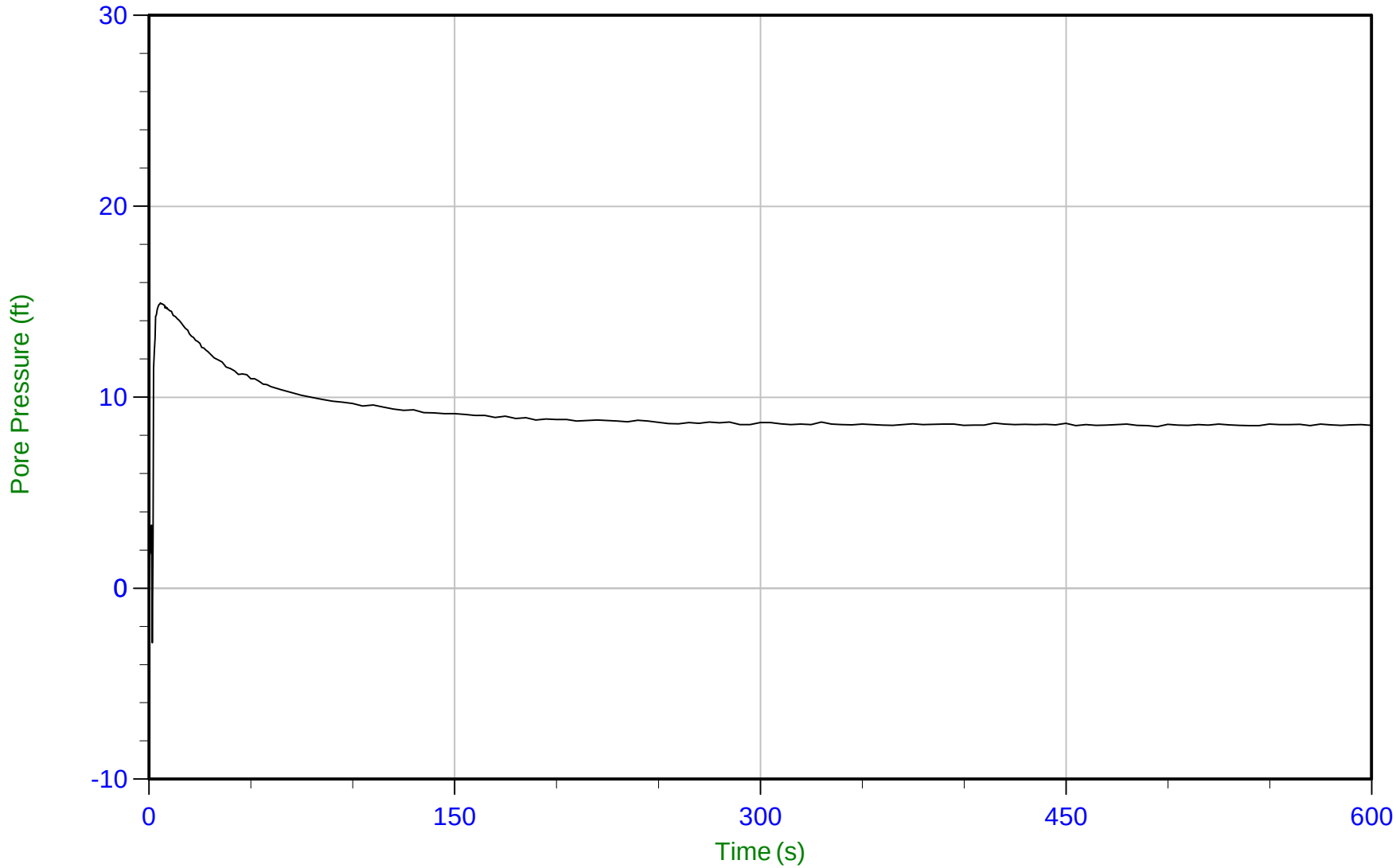
WT: 2.5 m / 8.0 ft
Ueq: 22.0 ft

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 12:17
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-05
Cone: 1230:T1000F10U35 Area=15 cm²



Trace Summary:

Filename: 26-55-31074_SP05.PPF2
Depth: 4.275 m / 14.025 ft
Duration: 600.0 s

u Min: -2.9 ft
u Max: 14.9 ft
u Final: 8.5 ft

WT: 1.7 m / 5.5 ft
Ueq: 8.5 ft

Seismic Cone Penetration Test (SCPTu) Tabular Results

CONETEC

Job No:	26-55-31074
Client:	Kleinfelder
Project:	41 Bellis Circle - Cambridge, MA
Sounding ID:	SCPT26-01
Date:	25-Mar-2026
Seismic Source:	Beam
Source Offset (ft):	1.97
Source Depth (ft):	0.00
Sensor Type:	Geophone
Sensor Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Sensor Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.62	1.97	2.78			
6.07	5.41	5.76	2.98	7.56	393
9.35	8.69	8.91	3.15	5.36	589
12.63	11.98	12.14	3.22	4.43	728
15.91	15.26	15.38	3.25	5.00	649
19.19	18.54	18.64	3.26	5.16	631
22.47	21.82	21.91	3.27	5.51	593
25.75	25.10	25.18	3.27	5.76	567
29.04	28.38	28.45	3.27	6.29	520
32.32	31.66	31.72	3.27	5.63	582
35.60	34.94	35.00	3.28	6.29	521
38.88	38.22	38.27	3.28	5.82	563
42.16	41.50	41.55	3.28	5.44	602
45.44	44.78	44.83	3.28	4.90	668
48.72	48.06	48.10	3.28	4.47	733
52.00	51.35	51.38	3.28	3.87	848
55.28	54.63	54.66	3.28	4.61	712
58.56	57.91	57.94	3.28	4.75	691
61.84	61.19	61.22	3.28	4.54	723
65.12	64.47	64.50	3.28	5.16	635

Job No:	26-55-31074
Client:	Kleinfelder
Project:	41 Bellis Circle - Cambridge, MA
Sounding ID:	SCPT26-04
Date:	25-Mar-2026
Seismic Source:	Beam
Source Offset (ft):	1.97
Source Depth (ft):	0.00
Sensor Type:	Geophone
Sensor Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Sensor Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.95	2.30	3.03			
6.23	5.58	5.92	2.89	4.86	595
9.51	8.86	9.07	3.16	4.93	640
12.80	12.14	12.30	3.22	5.00	646
16.08	15.42	15.55	3.25	6.02	539
19.36	18.70	18.80	3.26	5.43	600
22.64	21.98	22.07	3.27	5.16	633
25.92	25.26	25.34	3.27	5.24	624
29.20	28.54	28.61	3.27	5.59	585
32.48	31.82	31.89	3.27	5.25	623
35.76	35.11	35.16	3.28	5.36	612
39.04	38.39	38.44	3.28	5.26	623
42.32	41.67	41.71	3.28	5.31	617
45.60	44.95	44.99	3.28	5.41	606
48.88	48.23	48.27	3.28	5.09	644
52.17	51.51	51.55	3.28	4.52	725
55.45	54.79	54.83	3.28	3.74	876
58.73	58.07	58.10	3.28	4.05	809
62.01	61.35	61.38	3.28	3.87	848
64.96	64.30	64.33	2.95	3.05	967

Job No:	26-55-31074
Client:	Kleinfelder
Project:	41 Bellis Circle - Cambridge, MA
Sounding ID:	SCPT26-05
Date:	25-Mar-2026
Seismic Source:	Beam
Source Offset (ft):	1.97
Source Depth (ft):	0.00
Sensor Type:	Geophone
Sensor Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Sensor Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.69	2.03	2.83			
6.00	5.35	5.70	2.87	6.33	453
9.25	8.60	8.82	3.12	6.65	469
12.53	11.88	12.04	3.22	5.10	631
15.81	15.16	15.28	3.25	5.19	625
19.19	18.54	18.64	3.36	5.25	640
22.47	21.82	21.91	3.27	5.00	653
25.75	25.10	25.18	3.27	5.25	623
29.04	28.38	28.45	3.27	5.15	635
32.32	31.66	31.72	3.27	5.02	652
35.60	34.94	35.00	3.28	4.96	660
38.88	38.22	38.27	3.28	5.01	654
42.16	41.50	41.55	3.28	5.22	628
45.44	44.78	44.83	3.28	5.16	635
48.72	48.06	48.10	3.28	5.12	641
52.00	51.35	51.38	3.28	5.22	628
55.28	54.63	54.66	3.28	5.00	656
58.56	57.91	57.94	3.28	4.73	694
61.84	61.19	61.22	3.28	3.45	951
65.12	64.47	64.50	3.28	3.04	1080

SCPTu Test Plots

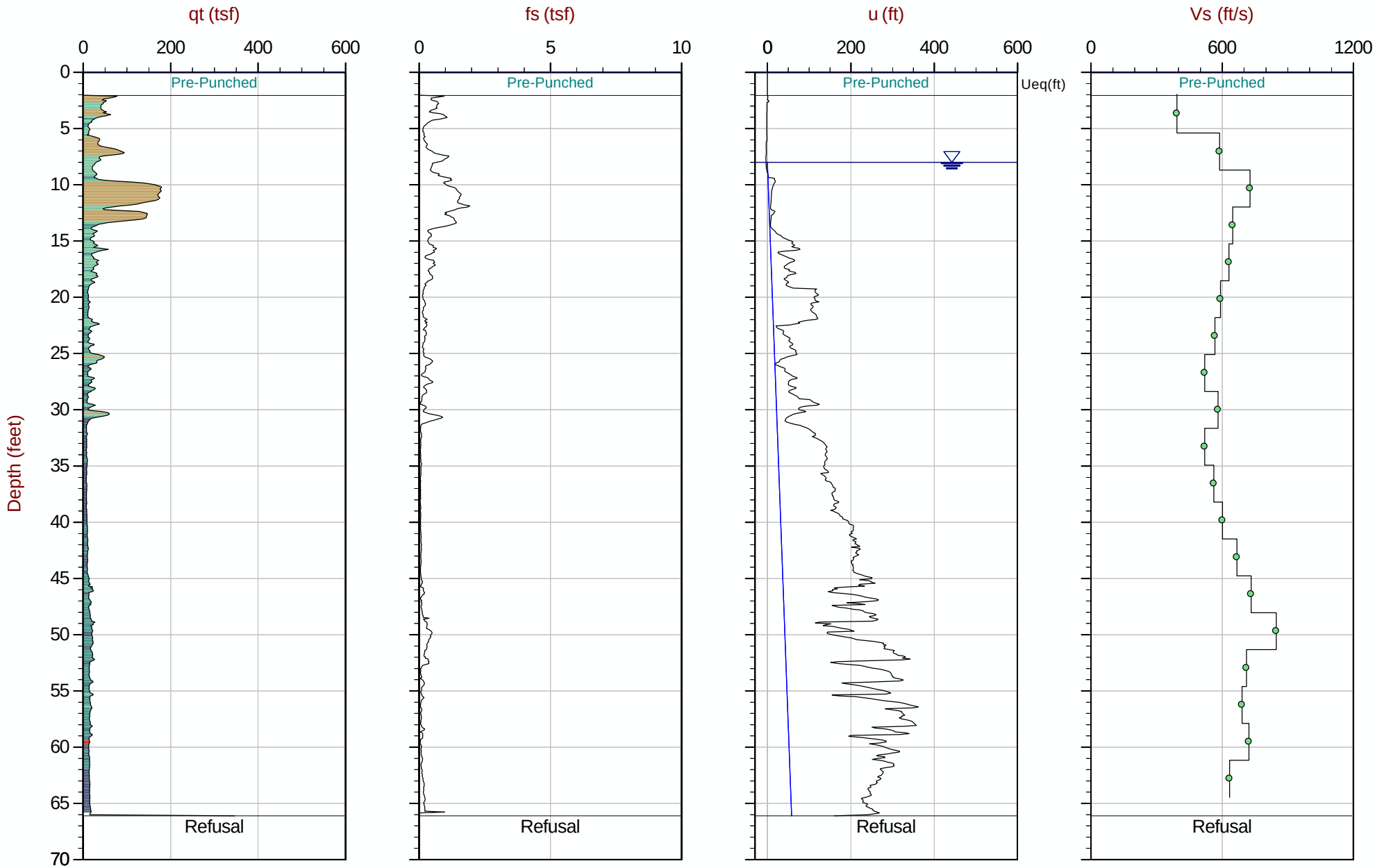
CONETEC

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 11:04
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-01
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695350m E: 324406m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

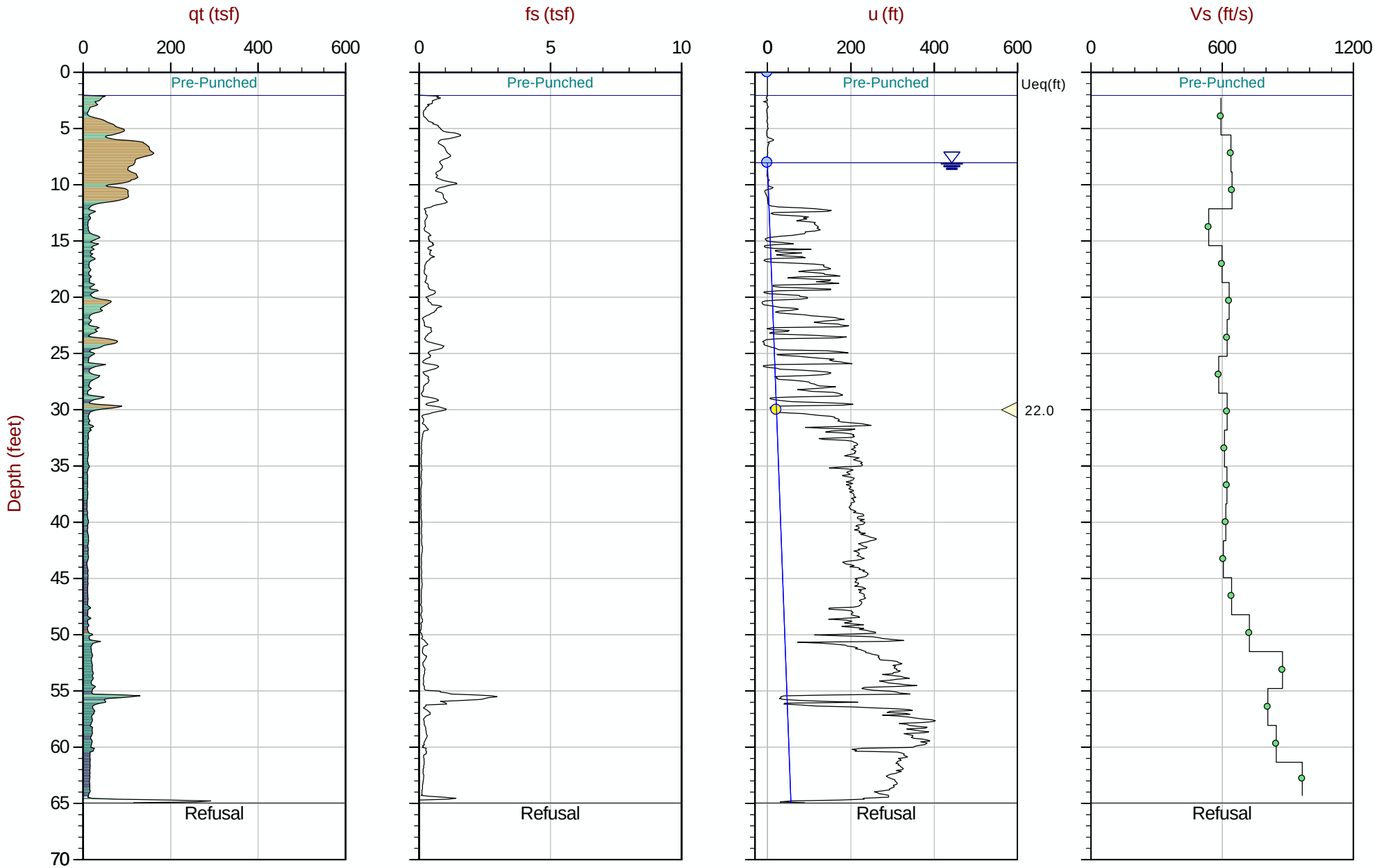
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 08:34
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-04
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 19.800 m / 64.96 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695333m E: 324429m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

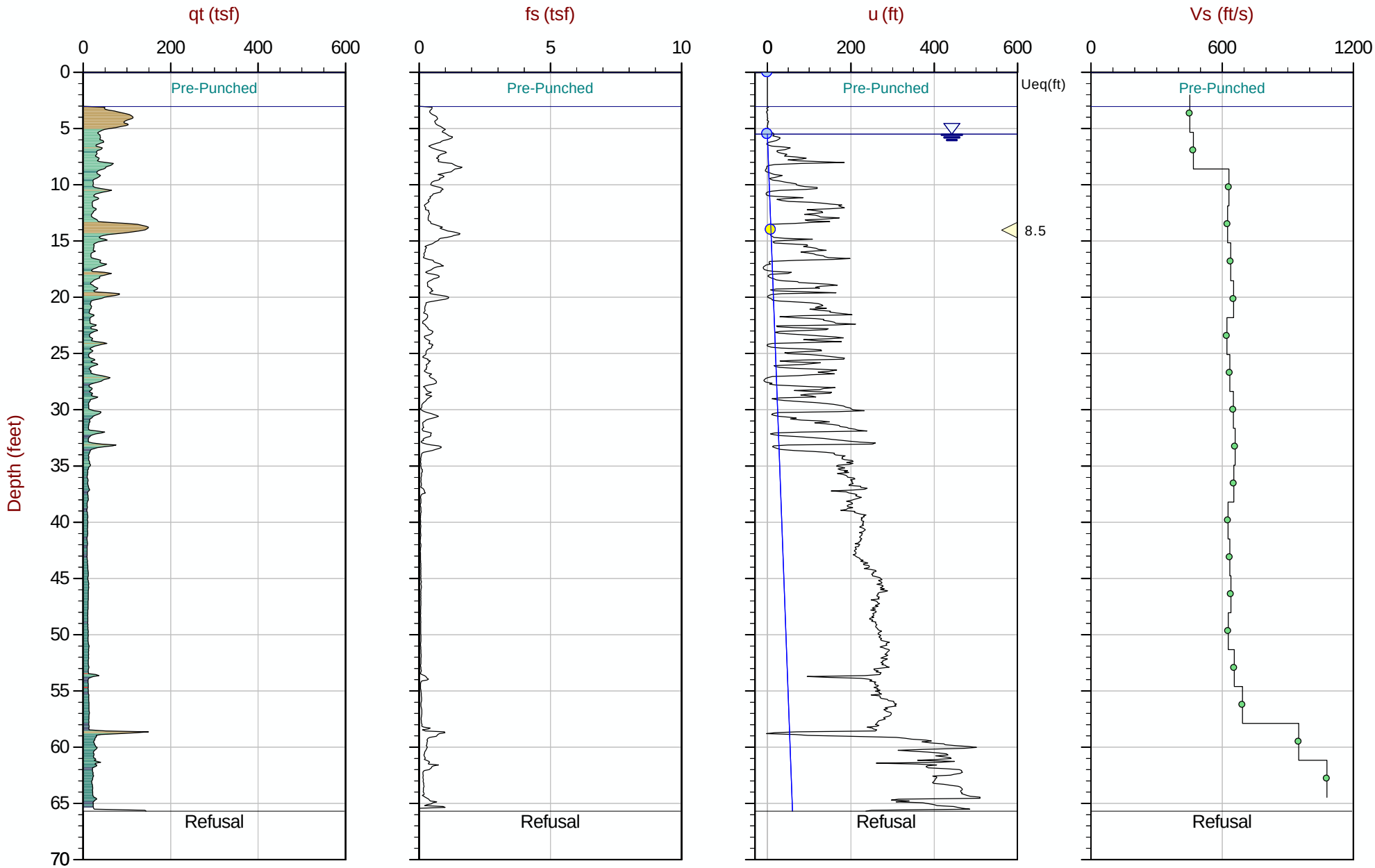
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 26-55-31074
Date: 2026-03-25 12:17
Site: 41 Bellis Circle - Cambridge, MA

Sounding: SCPT26-05
Cone: 1230:T1000F10U35 Area=15 cm²



Max Depth: 20.025 m / 65.70 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 26-55-31074_SP05.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19 N: 4695349m E: 324353m

Overplot Item: Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved, PPD, Ueq assumed

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

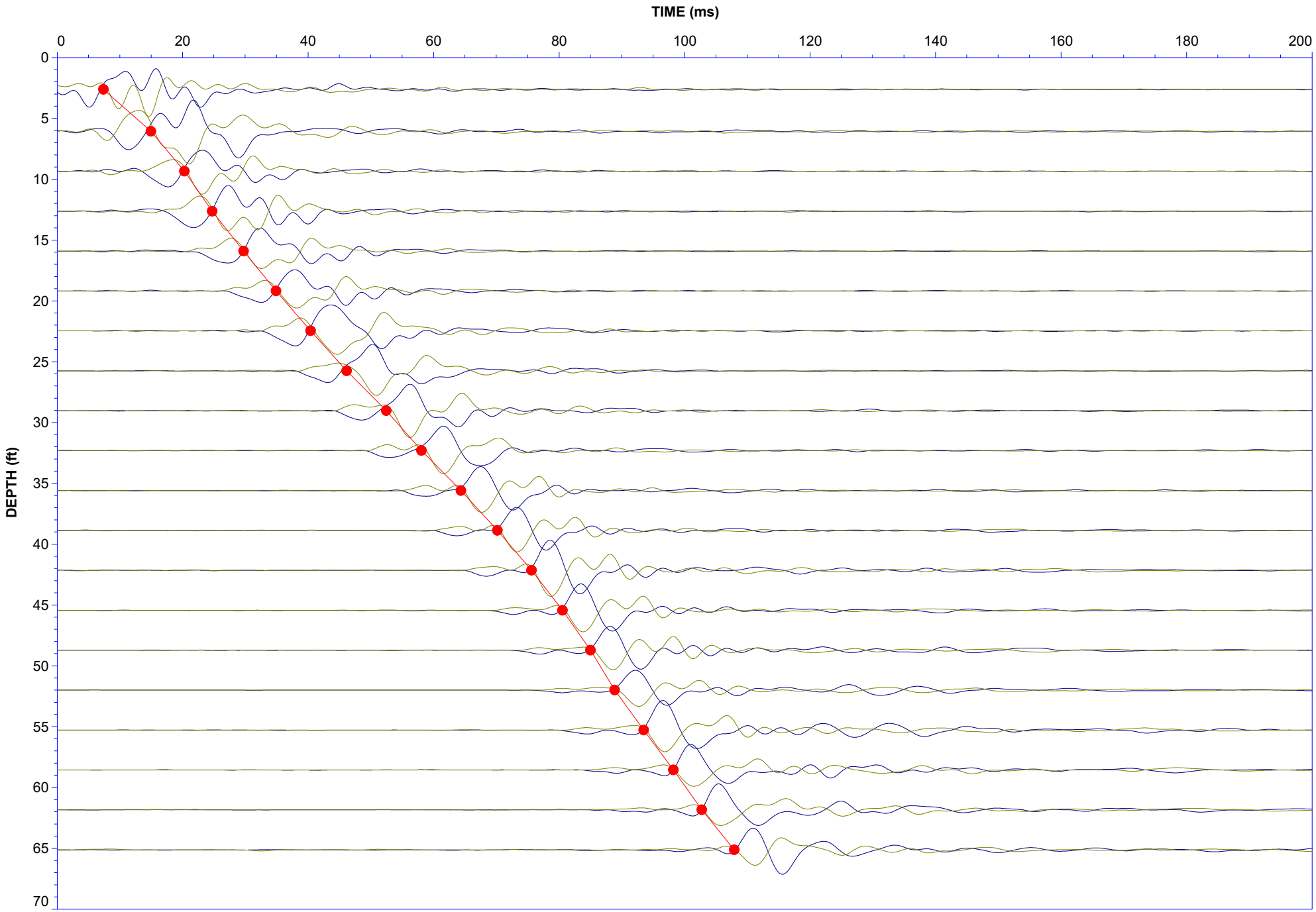
SCPTu Velocity Wave Traces

CONETEC

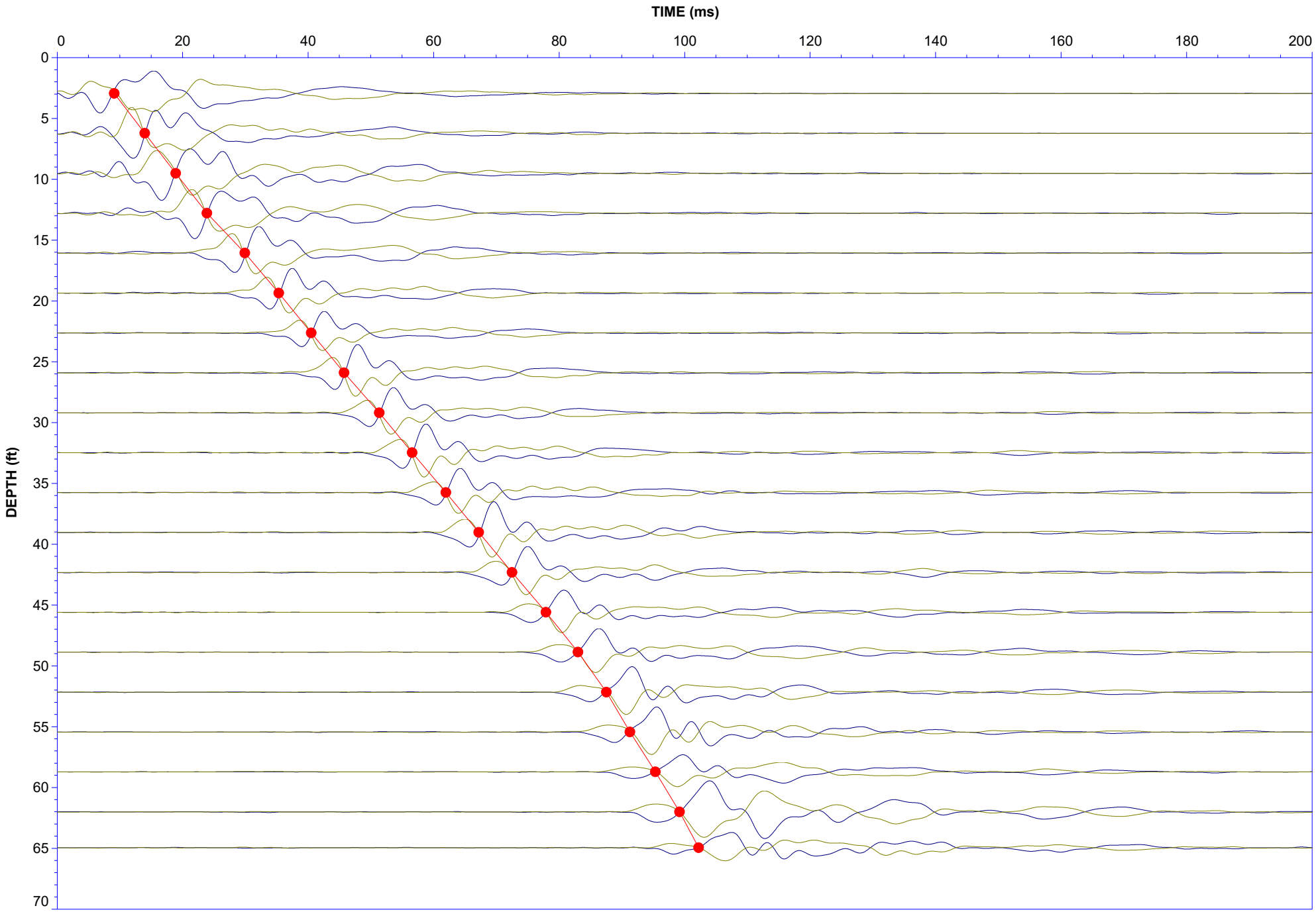
CONETEC

Job No: 26-55-31074 | Client: Kleinfelder | Project: 41 Bellis Circle - Cambridge, MA | Analysis: Shear Wave | Sounding: SCPT26-01

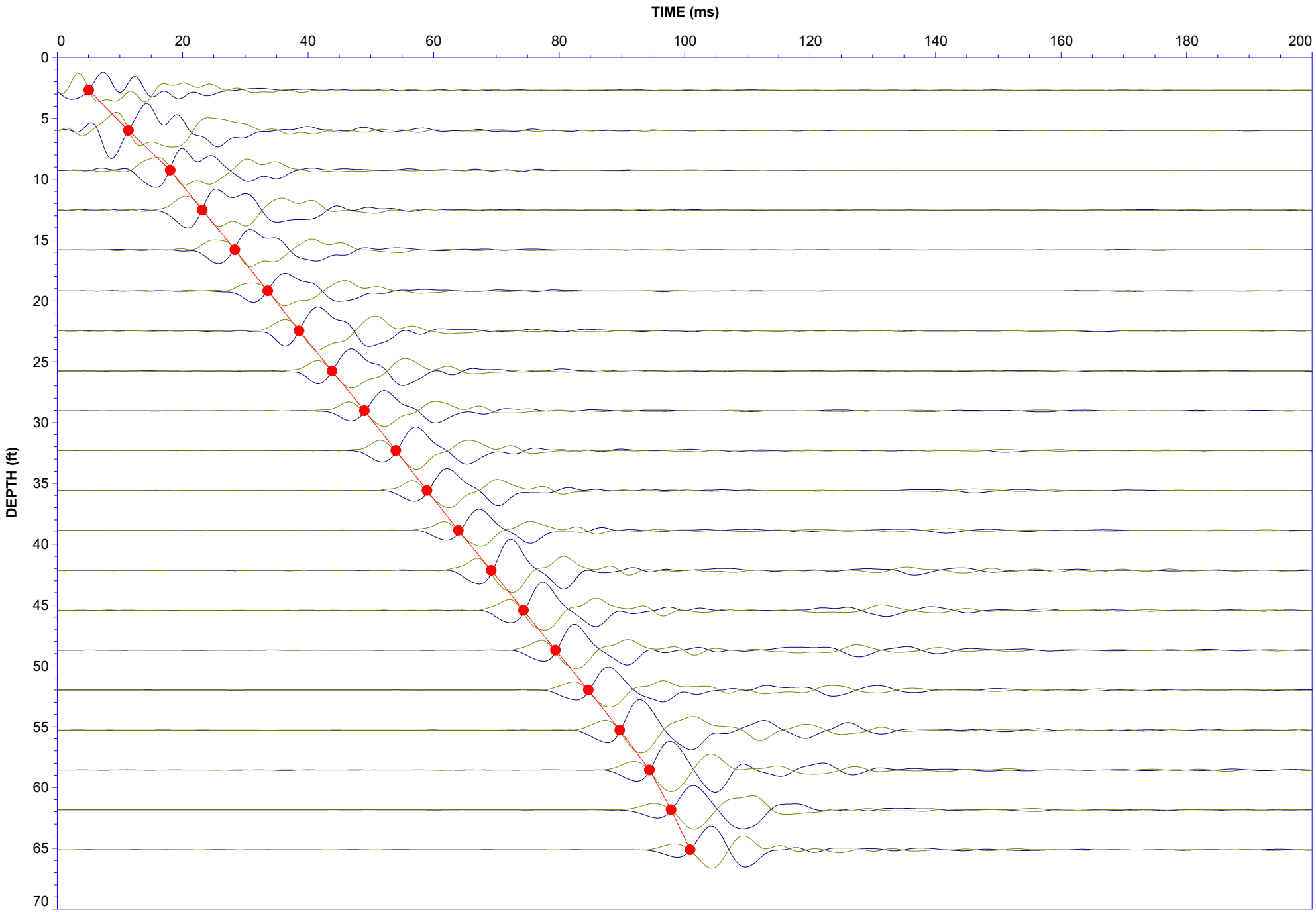
Filter: BP 0-250 Hz | Date: 25-Mar-2026



Job No: 26-55-31074 | Client: Kleinfelder | Project: 41 Bellis Circle - Cambridge, MA | Analysis: Shear Wave | Sounding: SCPT26-04
Filter: BP 0-250 Hz | Date: 25-Mar-2026



Job No: 26-55-31074 | Client: Kleinfelder | Project: 41 Bellis Circle - Cambridge, MA | Analysis: Shear Wave | Sounding: SCPT26-05
Filter: BP 0-250 Hz | Date: 25-Mar-2026



Supporting Documents and Materials

CONETEC

SUPPORTING DOCUMENTS AND MATERIALS

The documents and materials listed below are included in the report:

- **Methodology Statements**
- **Cone Penetration Digital File Formats**
- **Description of Methods for Calculated CPTu Geotechnical Parameters**
- **Calibration Records**

Methodology Statements

CONETEC

METHODOLOGY STATEMENTS



CONE PENETRATION TEST (CPTu) - eSeries

Cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd., a subsidiary of ConeTec.

ConeTec'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 two geophone sensors for recording seismic signals. All signals are amplified and measured with minimum sixteen-bit resolution down hole within the cone body, and the signals are sent to the surface using a high bandwidth, error corrected digital interface through a shielded cable.

ConeTec 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. 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 millimeters diameter over a length of 32 millimeters with tapered leading and trailing edges) located at a distance of 585 millimeters 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 ConeTec 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 six millimeters 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. ConeTec's calibration criteria also meets or exceeds those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

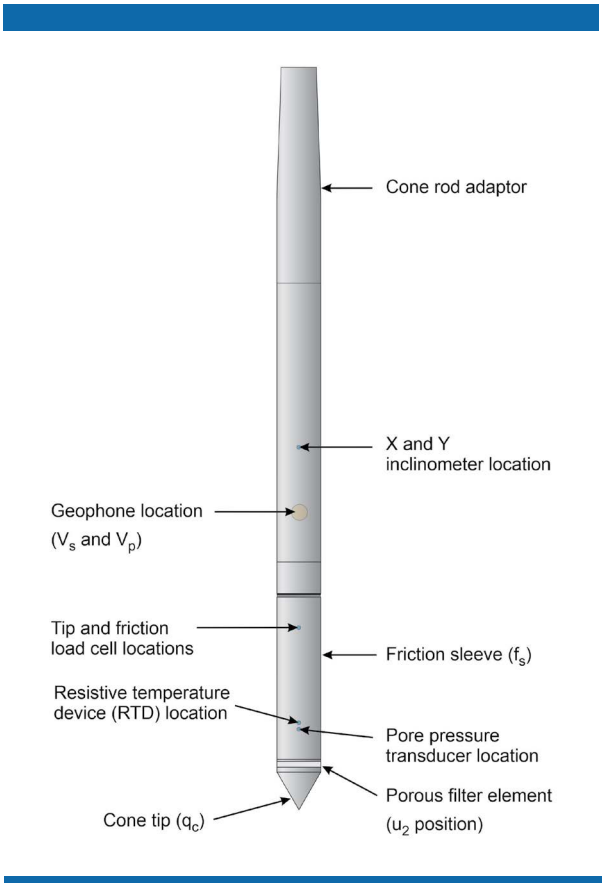


Figure CPTu. Piezocone Penetrometer (15 cm²)

The ConeTec data acquisition system consists of a Windows based computer, signal interface box, and power supply. The signal interface combines depth increment signals, seismic trigger signals and the downhole digital data. This combined data is then sent to the Windows based computer for collection and presentation. The data is recorded at fixed depth increments using a depth encoder that is either portable or integrated into the rig. The typical recording interval is 2.5 centimeters; 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 ConeTec's CPTu 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 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 two centimeters per second, 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 ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil under vacuum pressure prior to use
- 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 piezocone data for this report is 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, P.K., 2010. The Soil Behavior Type (SBT) classification chart developed by Robertson, P.K., 2010 is presented in Figure SBT. It should be noted that it is not always possible to accurately identify a soil behavior type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

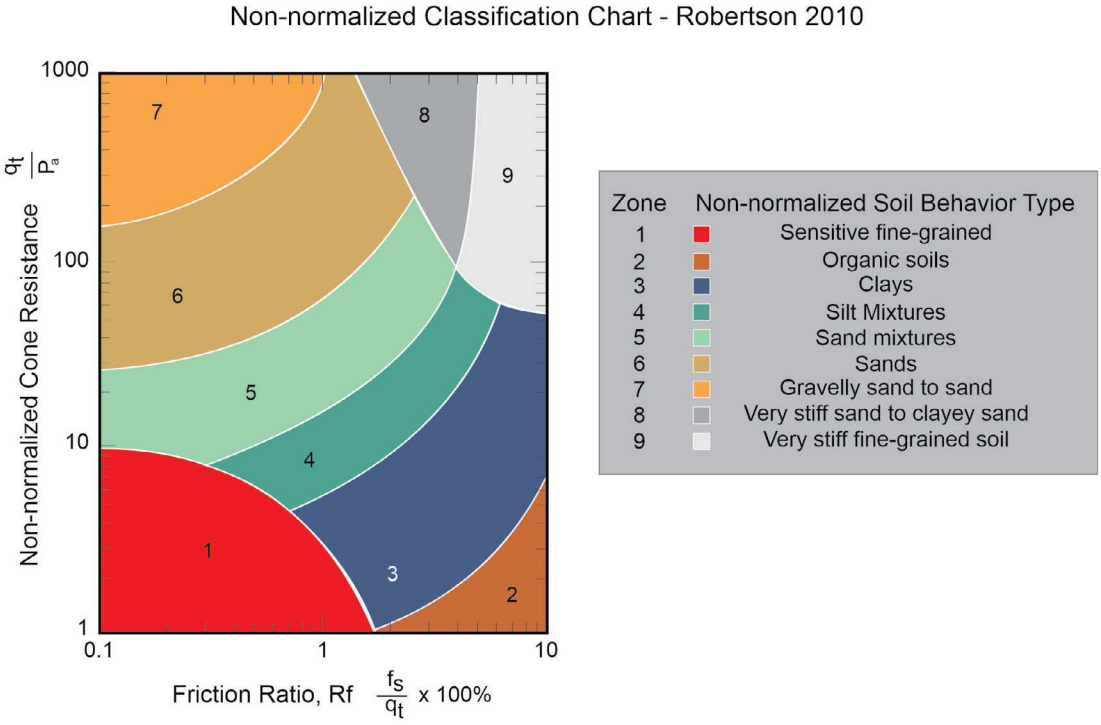


Figure SBT. Non-Normalized Soil Behavior Type Classification Chart (SBT)

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):

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

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 ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec 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.

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).

REFERENCES

ASTM D5778-20, 2020, “Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils”, ASTM International, West Conshohocken, PA. DOI: 10.1520/D5778-20.

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, “Cone Penetration Testing in Geotechnical Practice”, Blackie Academic and Professional.

Mayne, P.W., 2013, “Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests”, Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420. DOI: 10.1061/9780784412770.027.

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PORE PRESSURE DISSIPATION TEST

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).

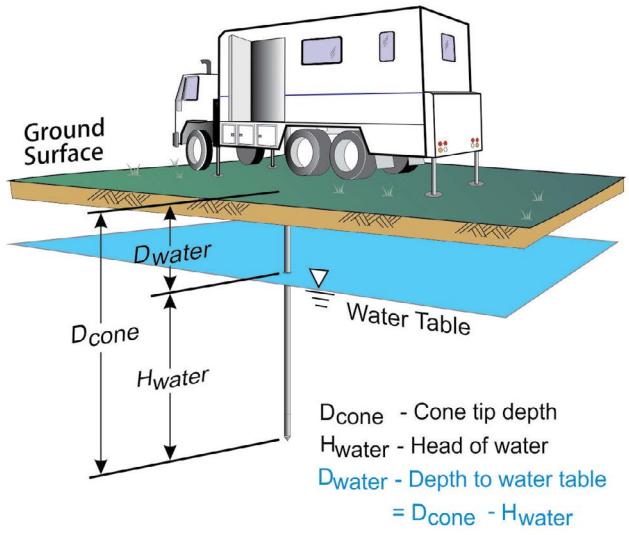


Figure PPD-1. Pore pressure dissipation test setup

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.

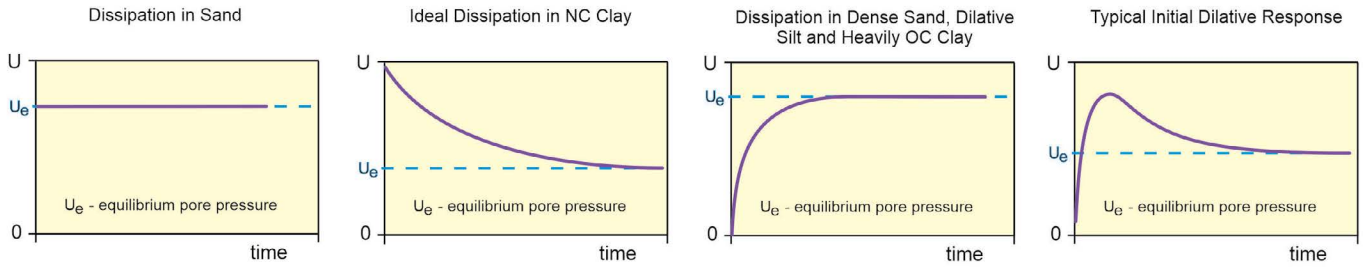


Figure PPD-2. Pore pressure dissipation curve examples

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 in Figure PPD-2.



SEISMIC CONE PENETRATION TEST (SCPTu) - eSeries

Shear wave velocity (Vs) testing is performed in conjunction with the piezocone penetration test (SCPTu) in order to collect interval velocities. For some projects seismic compression wave velocity (Vp) testing is also performed.

ConeTec's piezocone penetrometers are manufactured with one horizontally active geophone (28 hertz) and one vertically active geophone (28 hertz). Both geophones are rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip. The vertically mounted geophone is more sensitive to compression waves.

Shear waves are typically generated by using an impact hammer horizontally striking a beam that is held in place by a normal load. In some instances, an auger source or an imbedded impulsive source may be used for both shear waves and compression waves. The hammer and beam act as a contact trigger that initiates the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded in the memory of the cone using a fast analog to digital converter. The seismic trace is then transmitted digitally uphole to a Windows based computer through a signal interface box for recording and analysis. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

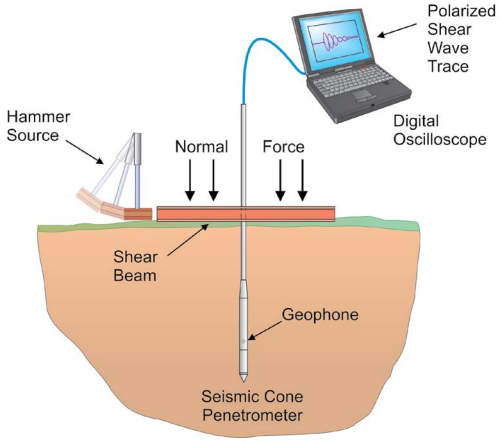


Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures which are in general accordance with the current ASTM D5778 and ASTM D7400 standards.

Prior to the start of a SCPTu sounding, the procedures described in the Cone Penetration Test section are followed. In addition, the active axis of the geophone is aligned parallel to the beam (or source) and the horizontal offset between the cone and the source is measured and recorded.

Prior to recording seismic waves at each test depth, cone penetration is stopped and the rods are decoupled from the rig to avoid transmission of rig energy down the rods. Typically, five wave traces for each orientation are recorded for quality control and uncertainty analysis purposes. After reviewing wave traces for consistency the cone is pushed to the next test depth (typically one meter intervals or as requested by the client). Figure SCPTu-2 presents an illustration of a SCPTu test.

For additional information on seismic cone penetration testing refer to Robertson et al. (1986).

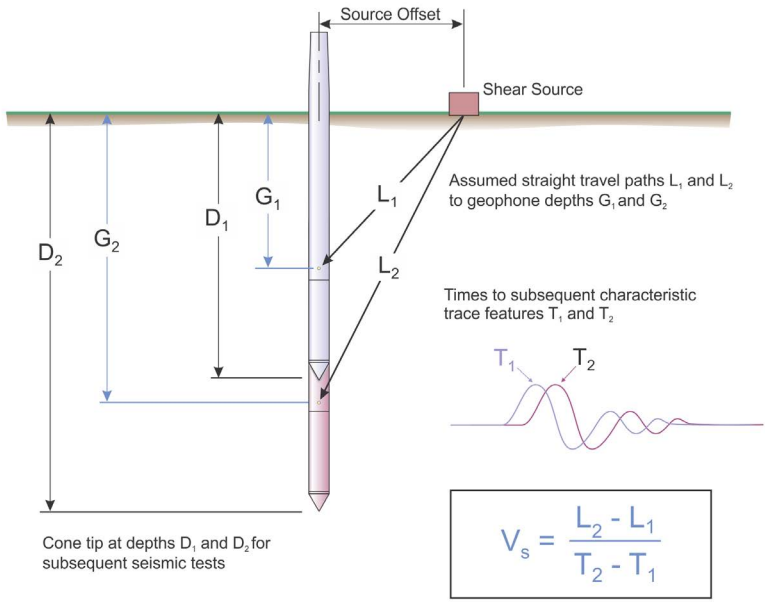


Figure SCPTu-2. Illustration of a seismic cone penetration test

For the determination of interval travel times the wave traces from all depths are displayed in analysis software. The results of the interval picks are supplied in the relevant appendix of this report. Standard practice for ConeTec is to record five wave traces for each source direction at each test depth. Outlier impacts are identified in the field and the impacts are repeated. For the final wave trace profile, the traces are stacked in the time domain to display a single average trace.

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.

In some cases, usually for shear wave velocity testing, more than one characteristic marker may be used. If there is an overlap between different sets of characteristic markers, then the average time value for those sets of interval times is applied to the determination of velocity.

Ideally, all depths are used for the determination of the velocity profile. However, an interval may be skipped if there is some ambiguity or quality concern with a particular depth, resulting in a larger interval.

Tabular velocity results and SCPTu plots are presented in the relevant appendix.

For all SCPTu soundings that have achieved a depth of at least 100 feet (30 meters), the average shear wave velocity to a depth of 100 feet ($\overline{v}_S$) has been calculated and provided for all applicable soundings using the following equation presented in ASCE (2010).

$$\bar{v}_s = \frac{\sum_{i=1} d_i}{\sum_{i=1}^{n} \frac{d_i}{v_{si}}}$$

where: $\bar{v}_s$ = average shear wave velocity ft/s (m/s)
d_i = the thickness of any layer between 0 and 100 ft (30 m)
v_{si} = the shear wave velocity in ft/s (m/s)
$\sum_{i=1}^{n} d_i$ = the total thickness of all layers between 0 and 100 ft (30 m)

Average shear wave velocity, $\bar{v}_s$ is also referenced to V_{s100} or V_{s30}.

The layer travel times refers to the travel times propagating in the vertical direction, not the measured travel times from an offset source.

REFERENCES

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Cone Penetration Digital File Formats

CONETEC

CONE PENETRATION DIGITAL FILE FORMATS - eSeries

CPT Data Files (COR Extension)

ConeTec CPT data files are stored in ASCII text files that are readable by almost any text editor. ConeTec file names start with the job number (which includes the two digit year number) an underscore as a separating character, followed by two letters based on the type of test and the sounding ID. The last character position is reserved for an identifier letter (such as b, c, d etc) used to uniquely distinguish multiple soundings at the same location. The CPT sounding file has the extension COR. As an example, for job number 21-02-00001 the first CPT sounding will have file name 21-02-00001_CP01.COR

The sounding (COR) file consists of the following components:

1. Two lines of header information
2. Data records
3. End of data marker
4. Units information

Header Lines

Line 1: Columns 1-6 may be blank or may indicate the version number of the recording software
Columns 7-21 contain the sounding Date and Time (Date is MM:DD:YY)
Columns 23-38 contain the sounding Operator
Columns 51-100 contain extended Job Location information

Line 2: Columns 1-16 contain the Job Location
Columns 17-32 contain the Cone ID
Columns 33-47 contain the sounding number
Columns 51-100 may contain extended sounding ID information

Data Records

The data records contain 4 or more columns of data in floating point format. A comma and spaces separate each data item:

Column 1: Sounding Depth (meters)
Column 2: Tip (q_c), recorded in units selected by the operator
Column 3: Sleeve (f_s), recorded in units selected by the operator
Column 4: Dynamic pore pressure (u), recorded in units selected by the operator
Column 5: Empty or may contain other requested data such as Gamma, Resistivity or UVIF data

End of Data Marker

After the last line of data there is a line containing an ASCII 26 (CTL-Z) character (small rectangular shaped character) followed by a newline (carriage return / line feed). This is used to mark the end of data.

Units Information

The last section of the file contains information about the units that were selected for the sounding. A separator bar makes up the first line. The second line contains the type of units used for depth, q_c, f_s and u. The third line contains the conversion values required for ConeTec's software to convert the recorded data to an internal set of base units (bar for q_c, bar for f_s and meters for u). Additional lines intended for internal ConeTec use may appear following the conversion values.

CPT Data Files (XLS Extension)

Excel format files of ConeTec CPT data are also generated from corresponding COR files. The XLS files have the same base file name as the COR file with a -BSC suffix. The information in the file is presented in table format and contains additional information about the sounding such as coordinate information, and tip net area ratio.

The BSCI suffix is given to XLS files which are enhanced versions of the BSC files and include the same data records in addition to inclination data collected for each sounding.

CPT Dissipation Files (XLS Extension)

Pore pressure dissipation files are provided in Excel format and contain each dissipation trace that exceeds a minimum duration (selected during post-processing) formatted column wise within the spreadsheet. The first column (Column A) contains the time in seconds and the second column (Column B) contains the time in minutes. Subsequent columns contain the dissipation trace data. The columns extend to the longest trace of the data set.

Detailed header information is provided at the top of the worksheet. The test depth in meters and feet, the number of points in the trace and the particular units are all presented at the top of each trace column.

CPT Dissipation files have the same naming convention as the CPT sounding files with a "–PPD" suffix.

Data Records

Each file will contain dissipation traces that exceed a minimum duration (selected during post-processing) in a particular column. The dissipation pore pressure values are typically recorded at varying time intervals throughout the trace; rapidly to start and increasing as the duration of the test lengthens. The test depth in meters and feet, the number of points in the trace and the trace number are identified at the top of each trace column.

Cone Type Designations

Cone ID	Cone Description	Tip Cross Sect. Area (cm^2)	Tip Capacity (bar)	Sleeve Area (cm^2)**	Sleeve Capacity (bar)	Pore Pressure Capacity (bar)
EC###	A15T1500F15U35	15	1500	225	15	35
EC###	A15T375F10U35	15	375	225	10	35
EC###	A10T1000F10U35	10	1000	150	10	35

refers to the Cone ID number
**Outer Cylindrical Area

Description of Methods for Calculated CPT Geotechnical Parameters

CONETEC

CALCULATED CPT GEOTECHNICAL PARAMETERS

A Detailed Description of the Methods Used in ConeTec's CPT Geotechnical Parameter Calculation and Plotting Software



Revision SZW-Rev 18

Revised February 10, 2023
Prepared by Jim Greig, M.A.Sc, P.Eng (BC, AB, ON)

Limitations

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Group (ConeTec) or any of its affiliates. For this project, ConeTec has provided site investigation services, prepared factual data reporting and produced geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

To understand the calculations that have been performed and to be able to reproduce the calculated parameters the user is directed to the basic descriptions for the methods in this document and the detailed descriptions and their associated limitations and appropriateness in the technical references cited for each parameter.

ConeTec's Calculated CPT Geotechnical Parameters as of February 10, 2023.

ConeTec's CPT parameter calculation and plotting routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. Due to drainage conditions and the basic assumptions and limitations of the correlations, not all geotechnical parameters provided are considered applicable for all soil types. The results are presented only as a guide for geotechnical use and should be carefully examined for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the correctness or the applicability of any of the geotechnical parameters calculated by the program and does not assume liability for any use of the results in any design or review. For verification purposes we recommend that representative hand calculations be done for any parameter that is critical for design purposes. The end user of the parameter output should also be fully aware of the techniques and the limitations of any method used by the program. The purpose of this document is to inform the user as to which methods were used and to direct the end user to the appropriate technical papers and/or publications for further reference.

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Group (ConeTec) or any of its affiliates.

The CPT calculations are based on values of tip resistance, sleeve friction and pore pressures considered at each data point or averaged over a user specified layer thickness (e.g., 0.20 m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. The corrected tip resistance (corrected using u_2 pore pressure values) is used for all calculations. Since all ConeTec cones have equal end area friction sleeves pore pressure corrections to sleeve friction, f_s, are not performed.

Corrected tip resistance: $q_t = q_c + (1-a) \cdot u_2$ (consistent units are required)

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure from behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.80 for ConeTec cones)

The total stress calculations are based on soil unit weight values that have been assigned to the Soil Behavior Type (SBT) zones, from a user defined unit weight profile, by using a single uniform value throughout the profile, through unit weight estimation techniques described in various technical papers or from a combination of these methods. The parameter output files indicate the method(s) used.

Effective vertical overburden stresses are calculated using the total stress and equilibrium pore pressure (u_{eq} or u_o) values derived from an assumed hydrostatic distribution of pore pressures below the water table or from a user defined equilibrium pore pressure profile (typically obtained from CPT dissipation tests) or a combination of the two. For over water projects the stress effects of the column of water above the mudline are taken into account as is the appropriate unit weight of water. How this is done depends on where the instruments are zeroed (i.e. on deck or at the mudline). The parameter output files indicate the method(s) used.

A majority of parameter calculations are derived from or driven by results based on material types as determined by the various soil behavior type charts depicted in Figures 1 through 6. The parameter output files indicate the method(s) used.

The Soil Behavior Type classification chart shown in Figure 1 is the classic non-normalized SBT Chart developed at the University of British Columbia and reported in Robertson, Campanella, Gillespie and Greig (1986). Figure 2 shows the original normalized (linear method) SBTn chart developed by Robertson (1990). The Bq classification charts

shown in Figures 3a and 3b incorporate pore pressures into the SBT classification and are based on the methods described in Robertson (1990). Many of these charts have been summarized in Lunne, Robertson and Powell (1997). The Jefferies and Davies SBT chart shown in Figure 3c is based on the techniques discussed in Jefferies and Davies (1993) which introduced the concept of the Soil Behavior Type Index parameter, I_c. Take note that the I_c parameter developed by Robertson and Fear (1995) and Robertson and Wride (1998) is similar in concept but uses a slightly different calculation method than that defined by Jefferies and Davies (1993) as the latter incorporates pore pressure in their technique through the use of the Bq parameter. The normalized Qtn SBT chart shown in Figure 4 is based on the work by Robertson (2009) utilizing a variable stress ratio exponent, n, for normalization based on a slightly modified redefinition and iterative approach for I_c. The boundary curves drawn on the chart are based on the work described in Robertson (2010).

Figure 5 shows a revised 1986 SBT Chart presented to CPT'10 by Robertson (2010b). It is known as the Updated non-normalized Soil Behavior Chart (also referred to as the Rev SBT Chart (PKR2010) in our output files). This chart was produced to be more in line with all post-1986 Robertson charts having the same 9 soil type zones, a $\log_{10}$ axis for friction ratio, R_f in this case, and a unitless tip resistance axis.

Figure 6 shows a revised behavior based chart by Robertson (2016) depicting contractive-dilative zones. As the zones represent material behavior rather than soil gradation ConeTec has chosen a set of zone colors that are less likely to be confused with material type colors from previous SBT charts. These colors differ from those used by Dr. Robertson. A green palette was selected for the dilative (desirable) side of the chart and a red palette for the contractive side of the chart.

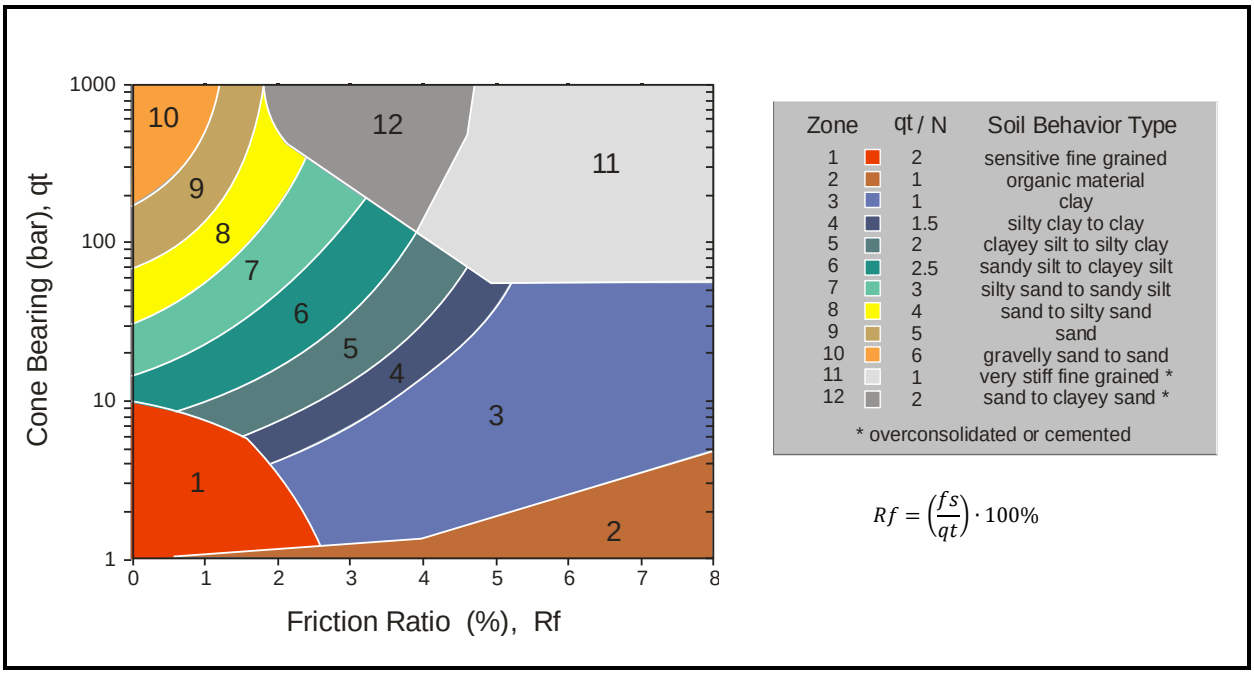


Figure 1. Non-normalized Soil Behavior Type Classification Chart (SBT)

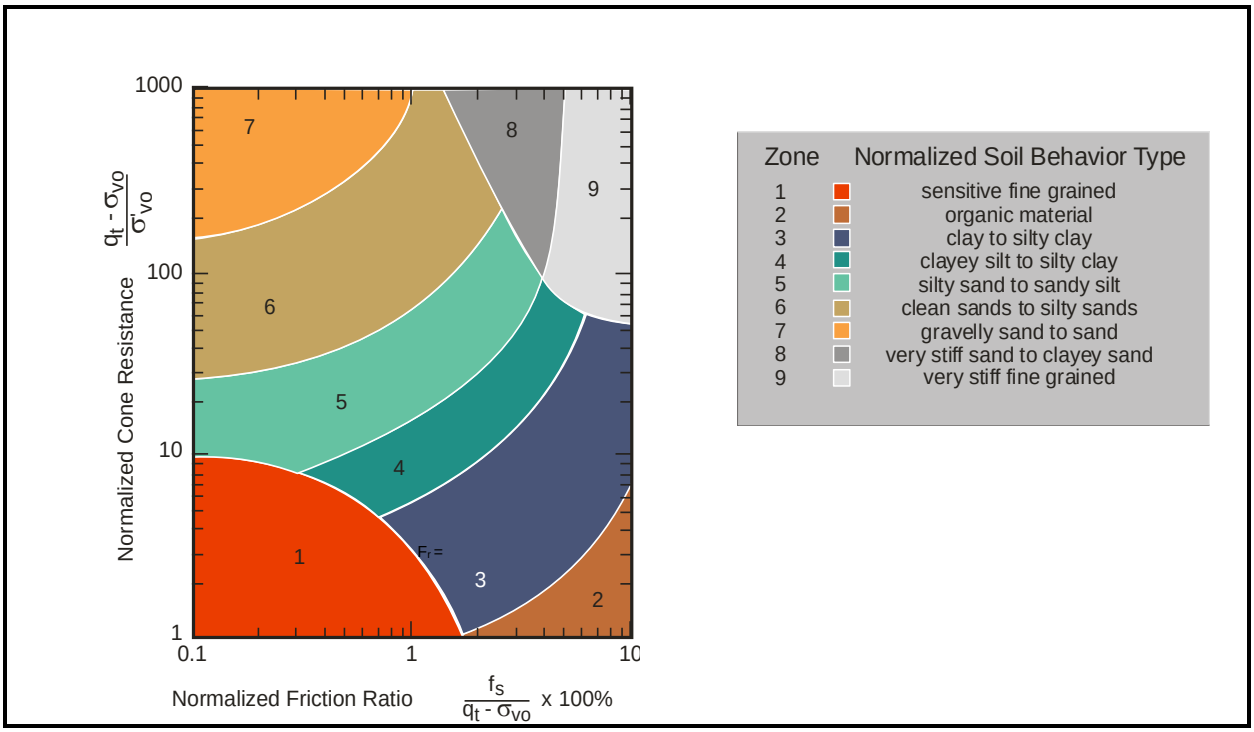


Figure 2. Normalized Soil Behavior Type Classification Chart (SBTn)

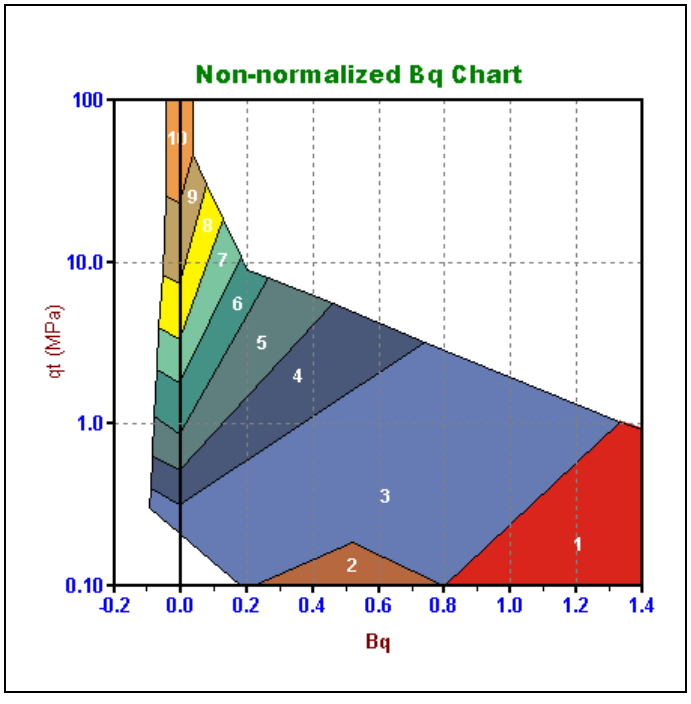


Figure 3a. Alternate Soil Behavior Type Chart (SBT Bq): q_t - B_q

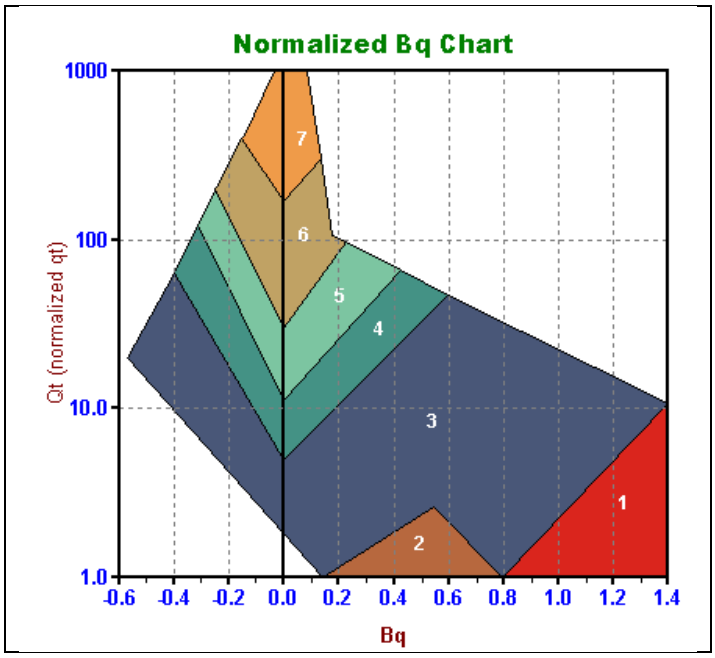


Figure 3b. Alternate Soil Behavior Type Charts (SBT Bqn): Q_t-B_q

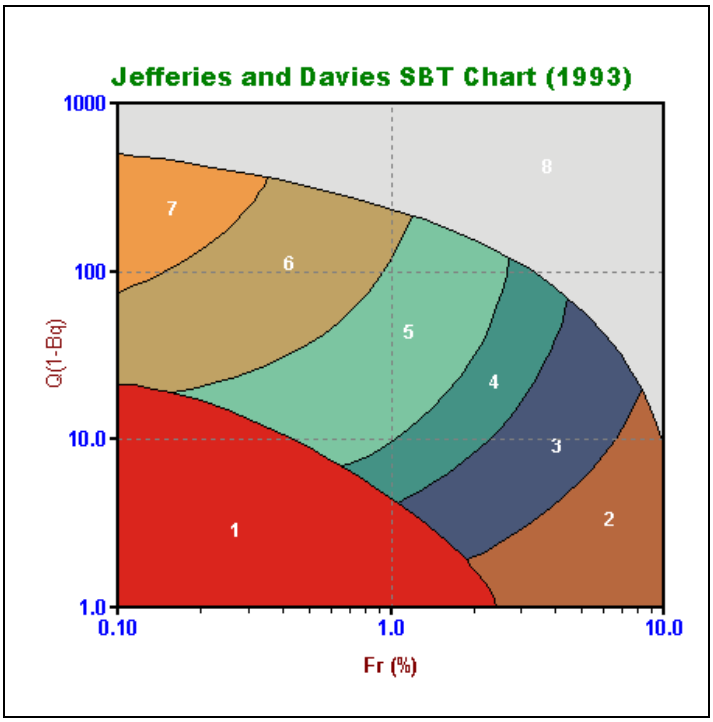


Figure 3c. Alternate Soil Behavior Type Charts: $Q(1-B_q)$ - F_r

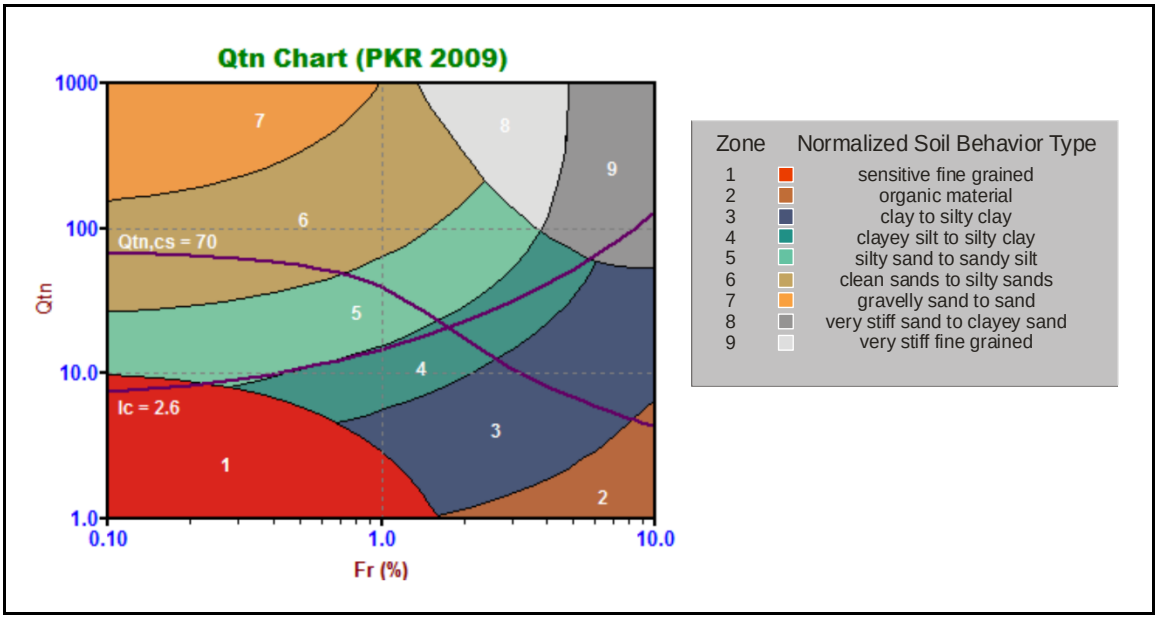


Figure 4. Normalized Soil Behavior Type Chart using Q_{tn} (SBT Qtn)

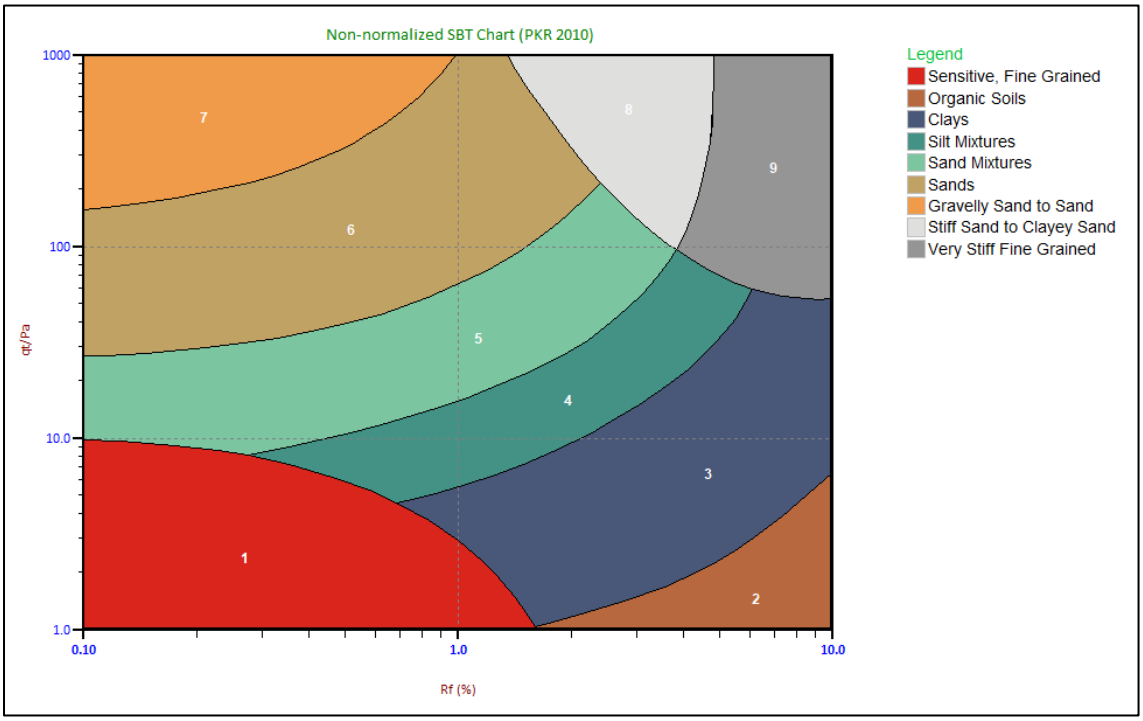


Figure 5. Non-normalized Soil Behavior Type Chart (2010)

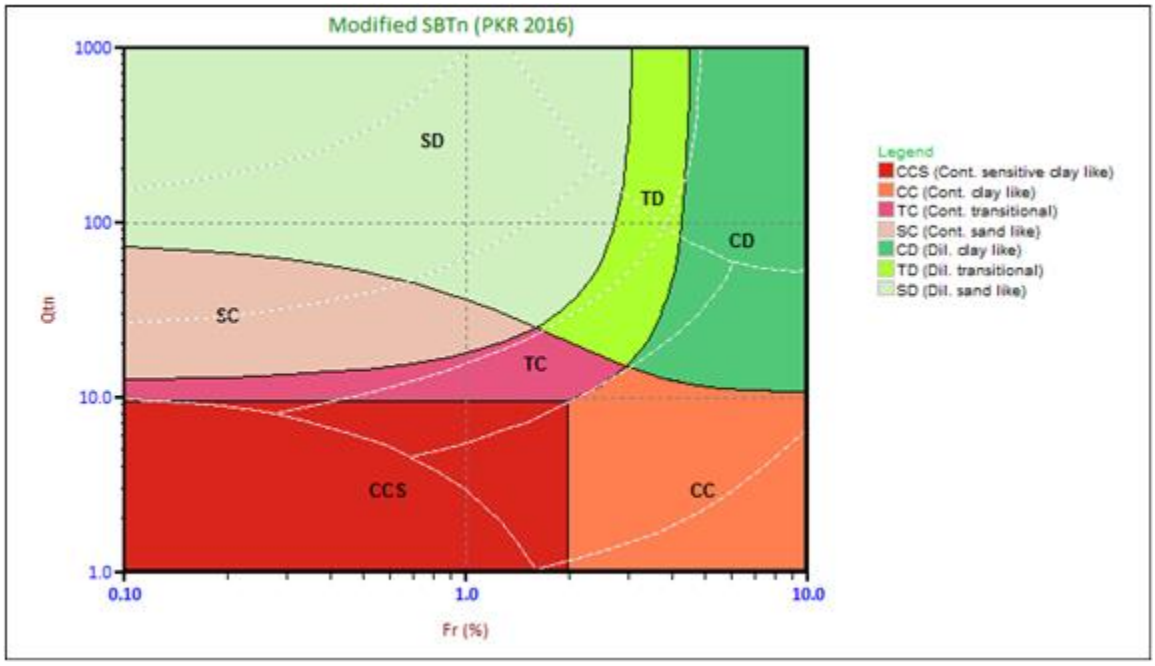


Figure 6. Modified SBTn Behavior Based Chart

Details regarding the geotechnical parameter calculations are provided in Tables 1a and 1b. The appropriate references cited are listed in Table 2. Non-liquefaction specific parameters are detailed in Table 1a and liquefaction specific parameters are detailed in Table 1b.

Where methods are based on charts or techniques that are too complex to describe in this summary, we recommend that the user refer to the cited material. Specific limitations for each method are described in the cited material.

Where the results of a calculation/correlation are deemed *'invalid'* the value will be represented by the text strings "-9999", "-9999.0", the value 0.0 (Zero) or an empty cell. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g., drilled out section or data gap).

2. Where the calculation method is inappropriate, for example, drained parameters in a material behaving in an undrained manner (and vice versa).

3. Where input values are beyond the range of the referenced charts or specified limitations of the correlation method.

4. Where pre-requisite or intermediate parameter calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the calculated parameters listed in Tables 1and 1a may be included in the output files delivered with this report.

The output files are typically provided in Microsoft Excel XLS, XLSX or CSV format. The ConeTec software has several options for output depending on the number or types of calculated parameters desired or those specifically contracted for by the client. Each output file is named using the original file base name (from the .COR file) followed

by a three or four character indicator of the output set selected (e.g. BSC, TBL, NLI, NL2, IFI, IFI2, IFI3) and possibly followed by an operator selected suffix identifying the characteristics of the particular calculation run.

Table 1a. CPT Parameter Calculation Methods – Non liquefaction Parameters

Reference Notes: CK* - Common Knowledge, U* - Unpublished

Calculated Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where calculations are done at each point then Mid Layer Depth = Recorded Depth)*	*[Depth (Layer Top) + Depth (Layer Bottom)]/ 2.0*	CK*
Elevation	Elevation of Mid Layer is based on the sounding collar elevation supplied by the client or through a site survey In Sweden a variation of elevation is used where the elevation increases with depth. We refer to this as inverse elevation.	Elevation = Collar Elevation – Depth InverseElevation = Collar Elevation + Depth	CK* N/A
Avg qc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when calculations are done at each point*	CK*
Avg qt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a)\cdot u_2$ Averaged q_t is not calculated using the average q_c and averaged u values. Averaged q_t is based on the average of the q_t values calculated at each data point.	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when calculations are done at each point*	1
Avg fs	Averaged sleeve friction (f_s) No pore pressure corrections are applied to f_s.	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when calculations are done at each point*	CK*
Avg Rf	Averaged friction ratio (R_f) where friction ratio is defined as: $R_f = 100\% \cdot \frac{fs}{q_t}$	$AvgRf = 100\% \cdot \frac{Avgfs}{Avgqt}$ *not an average of individual R_f values*	CK*
Avg u	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when calculations are done at each point*	CK*
Avg Res	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$AvgRes = \frac{1}{n}\sum_{i=1}^{n} Resistivity_i$ *n=1 when calculations are done at each point*	CK*
Avg UVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$AvgUVIF = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when calculations are done at each point*	CK*
Avg Temp	Averaged Temperature (this data is not always available)	$AvgTemp = \frac{1}{n}\sum_{i=1}^{n} Temperature_i$ *n=1 when calculations are done at each point*	CK*
Avg Gamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$AvgGamma = \frac{1}{n}\sum_{i=1}^{n} Gamma_i$ *n=1 when calculations are done at each point*	CK*
SBT	Soil Behavior Type as defined by Robertson et al 1986 (often referred to as Robertson and Campanella, 1986)	See Figure 1	1, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson 1990 (linear normalization using Q_t, now referred to as Q_{t1})	See Figure 2	2, 5

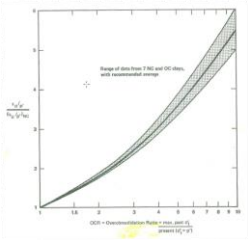
Calculated Parameter	Description	Equation	Ref
SBT-Bq	Non-normalized Soil Behavior type based on non-normalized tip resistance and the B_q parameter	See Figure 3a	1, 2, 5
SBT-Bqn	Normalized Soil Behavior type based on normalized tip resistance (Q_t, now called Q_{t1}) and the B_q parameter	See Figure 3b	2, 5
SBT-JandD	Soil Behavior Type as defined by Jeffries and Davies	See Figure 3c	7
SBT Qtn	Soil Behavior Type as defined by Robertson (2009) using a variable stress ratio exponent for normalization based on $I_{c\ (PKR\ 2009)}$	See Figure 4	15
Modified Non-normalized SBT Chart SBT (PKR2010)	This is a revised version of the simple 1986 non-normalized SBT chart (presented at CPT '10). The revised version has been reduced from 12 zones to 9 zones to be similar to the normalized Robertson charts. Other updates include a dimensionless tip resistance normalized to atmospheric pressure, q_t/P_a, on the vertical axis and a log scale for non-normalized friction ratio, R_f, along the horizontal axis.	See Figure 5	33
Modified SBTn (contractive /dilative)	Modified SBTn chart as defined by Robertson (2016) indicating zones of contractive/dilative behavior. Note that ConeTec displays the chart with colors different from Robertson. ConeTec's colors were chosen to avoid confusion with soil type descriptions.	See Figure 6	30
Unit Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) value assigned to each SBTn zone 4) value assigned to SBTn zone as determined from Robertson and Wride (1998) based on q_{c1n} 5) values assigned to SBT Qtn zones 6) values based on Robertson updated non-normalized Soil Behavior Type Chart (2010b) 6) Mayne f_s (sleeve friction) method 7) Robertson and Cabal 2010 method 8) user supplied unit weight profile The last option may co-exist with any of the other options.	See references	3, 5, 15, 21, 24, 29, 33

Calculated Parameter	Description	Equation	Ref
TStress σ_v	Total vertical overburden stress at Mid Layer Depth *A layer is defined as the averaging interval specified by the user where depths are reported at their respective mid-layer depth.* For data calculated at each point layers are defined using the recorded depth as the mid-point of the layer. Thus, a layer starts half-way between the previous depth and the current depth unless this is the first point in which case the layer start is at zero depth. The layer bottom is half-way from the current depth to the next depth unless it is the last data point. Defining layers affects how stresses are calculated since the unit weight attributed to a data point is used throughout the entire layer. This means that to calculate the stresses the total stress at the top and bottom of a layer are required. The stress at mid layer is determined by adding the incremental stress from the layer top to the mid-layer depth. The stress at the layer bottom becomes the stress at the top of the subsequent layer. Stresses are NOT calculated from mid-point to mid-point. For over-water work the total stress due to the column of water above the mid line is taken into account where appropriate.	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ *where* γ_i is layer unit weight h_i is layer thickness CPT Data Point Depths first depth Layer 1 0.025 m Layer 2 0.050 m Layer 3 0.075 m Layer 4 ···· • • • Repeats for each layer Layer *i* Layer *i+1* Final Layer final depth	CK*
EStress σ_v'	Effective vertical overburden stress at mid-layer depth.	$\sigma_v' = \sigma_v - u_{eq}$	CK*
Equil u u_{eq} or u_0	Equilibrium pore pressures are determined from one of the following user selectable options: 1) hydrostatic below the water table 2) user supplied profile 3) combination of those above When a user supplied profile is used/provided a linear interpolation is performed between equilibrium pore pressures defined at specific depths. If the profile values start below the water table then a linear transition from zero pressure at the water table to the first defined pointed is used. Equilibrium pore pressures may come from dissipation tests, adjacent piezometers or other sources. Occasionally, an extra equilibrium point ("assumed value") will be provided in the profile that does not come from a recorded value to smooth out any abrupt changes or to deal with material interfaces. These "assumed" values will be indicated on our plots and in tabular summaries.	For the hydrostatic option: $u_{eq} = \gamma_w \cdot (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is the unit weight of water D is the current depth D_{wt} is the depth to the water table	CK*
K_0	Coefficient of earth pressure at rest, K_0.	$K_O = (1 - \sin\Phi') OCR^{\sin\Phi'}$	17
C_n	Overburden stress correction factor used for $(N_1)_{60}$ and older CPT parameters.	$C_n = (P_a/\sigma_v')^{0.5}$ where *0.0 < C_n < 2.0 (user adjustable, typically ranging from 1.7 to 2.0)* *P_a is atmospheric pressure (100 kPa)*	4, 12

Calculated Parameter	Description	Equation	Ref
C_q	Overburden stress normalizing factor.	$C_q = 1.8 / [0.8 + (\sigma_v'/P_a)]$ where *$0.0 < C_q < 2.0$ (user adjustable)* *P_a is atmospheric pressure (100 kPa)* *Robertson and Wride define C_q to be the same as C_n. The Olson definition above is used in the program.*	3, 12
N_{60}	SPT N value at 60% energy calculated from q_t/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	5
$(N_1)_{60}$	SPT N_{60} value corrected for overburden pressure.	$(N_1)_{60} = C_n \bullet N_{60}$	4
$N_{60}I_c$	SPT N_{60} values based on the I_c parameter, as defined by Robertson and Wride 1998 (3), or by Robertson 2009 (15).	$(q_t/P_a)/ N_{60} = 8.5 (1 – I_c/4.6)$ $(q_t/P_a)/ N_{60} = 10^{(1.1268 – 0.2817Ic)}$ P_a being atmospheric pressure	3, 5 15, 31
$(N_1)_{60}I_c$	SPT N_{60} value corrected for overburden pressure (using N_{60} I_c). User has 3 options.	*1) $(N_1)_{60}Ic = C_n \bullet (N_{60} I_c)$* 2) $q_{c1n}/ (N_1)_{60}I_c = 8.5 (1 – I_c/4.6)$ 3) $(Q_{tn})/ (N_1)_{60}I_c = 10^{(1.1268 – 0.2817Ic)}$	4 5 15, 31
S_u or S_u (N_{kt})	Undrained shear strength based on q_t S_u factor N_{kt} is user selectable.	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
S_u or S_u (N_{du}) or S_u ($N_{\Delta u}$)	Undrained shear strength based on pore pressure S_u factor $N_{\Delta u}$ is user selectable.	$Su = \frac{u_2 - u_{eq}}{N_{\Delta u}}$	1, 5
D_r	Relative Density determined from one of the following user selectable options: 1) Ticino Sand 2) Hokksund Sand 3) Schmertmann (1978) 4) Jamiolkowski (1985) - All Sands 5) Jamiolkowski et al (2003) (various compressibilities, K_o)	See reference (methods 1 through 4) Jamiolkowski et al (2003) reference	5 14
PHI ϕ	Friction Angle determined from one of the following user selectable options (methods 1 through 4 are for sands and method 5 is for silts and clays): 1) Campanella and Robertson 2) Durgunoglu and Mitchel 3) Janbu 4) Kulhawy and Mayne 5) NTH method (clays and silts)	See appropriate reference	5 5 5 11 23
Delta U/q_t $\Delta u/q_t$ du/q_t	Differential pore pressure ratio (older parameter used before B_q was established)	$= \frac{\Delta u}{qt}$ *where:* $\Delta u = u - u_{eq}$ *and u = dynamic pore pressure* *u_{eq} = equilibrium pore pressure*	39

Calculated Parameter	Description	Equation	Ref
B_q	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ where: $\Delta u = u - u_{eq}$ *and* u *= dynamic pore pressure* u_{eq} *= equilibrium pore pressure*	1, 2, 5
Net q_t or qtNet	Net tip resistance (used in many subsequent correlations)	$qt - \sigma_v$	36
q_e or qE or q_E	Effective tip resistance (using the dynamic pore pressure u_2 and not equilibrium pore pressure)	$q_t - u_2$	36
qeNorm	Normalized effective tip resistance	$\frac{qt - u_2}{\sigma_v'}$	36
Q_t or Norm: Qt or Q_{t1}	Normalized q_t for Soil Behavior Type classification as defined by Robertson (1990) using a linear stress normalization. Note this is different from Q_{tn}. This parameter was renamed to Q_{t1} in Robertson, 2009. Without normalization limits this parameter calculates to very high unrealistic values at low stresses.	$Qt = \frac{qt - \sigma_v}{\sigma_v'}$	2, 5, 15
F_r or Norm: Fr	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson (1990)	$Fr = 100\% \cdot \frac{fs}{qt - \sigma_v}$	2, 5
Q(1-B_q) Q(1-B_q) + 1	Q(1-B_q) grouping as suggested by Jefferies and Davies for their classification chart and the establishment of their I_c parameter. Later papers added the +1 term to the equation.	$Q \cdot (1 - Bq)$ $Q \cdot (1 - Bq) + 1$ *where Bq is defined as above and Q is the same as the normalized tip resistance,* Q_{t1}*, defined above*	6, 7, 34
q_{c1}	Normalized tip resistance, q_{c1}, using a fixed stress ratio exponent, n (this method has stress units)	$q_{c1} = q_t \cdot (Pa/\sigma_v')^{0.5}$ where: P_a = atmospheric pressure	21
q_{c1} (0.5)	Normalized tip resistance, q_{c1}, using a fixed stress ratio exponent, n (this method is unit-less)	$q_{c1}(0.5) = (q_t/P_a) \cdot (Pa/\sigma_v')^{0.5}$ where: P_a = atmospheric pressure	5
q_{c1} (C_n)	Normalized tip resistance, q_{c1}, based on C_n (this method has stress units)	$q_{c1}(Cn) = C_n * q_t$	5, 12
q_{c1} (C_q)	Normalized tip resistance, q_{c1}, based on C_q (this method has stress units)	$q_{c1}(Cq) = C_q * q_t$ (some papers use q_c)	5, 12
q_{c1n}	normalized tip resistance, q_{c1n}, using a variable stress ratio exponent, n (where n=0.0, 0.70, or 1.0) (this method is unit-less)	$q_{c1n} = (q_t / P_a)(P_a/\sigma_v')^n$ where: P_a = atm. Pressure and n varies as described below	3

Calculated Parameter	Description	Equation	Ref
I_c or Ic (RW1998)	Soil Behavior Type Index as defined by Robertson and Wride (1997, 1998) for estimating grain size characteristics and providing smooth gradational changes across the SBTn chart. Ic(RW1998) is different from that of Jefferies and Davies (7) and is different from Ic(PKR2009).	$I_c = [(3.47 - \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_a}\right)\left(\frac{P_a}{\sigma_v'}\right)^n$ *Or* $Q = q_{c1n} = \left(\frac{qt}{P_a}\right)\left(\frac{P_a}{\sigma_v'}\right)^n$ *depending on the iteration in determining I_c* *And Fr is in percent* *P_a = atmospheric pressure* *n has the following distinct values:* *0.5, 0.75 and 1.0* *and is determined in an iterative manner based on the resulting I_c in each iteration* *Note that NCEER replaced 0.75 with 0.70*	3, 4, 5 10
I_c (PKR 2009)	Soil Behavior Type Index, I_c (PKR 2009) is based on a variable stress ratio exponent n, which itself is based on I_c (PKR 2009). An iterative calculation is required to determine I_c (PKR 2009) and its corresponding n (PKR 2009).	*I_c (PKR 2009) =* *$[(3.47 - \log_{10}Q_{tn})^2 + (1.22 + \log_{10}F_r)^2]^{0.5}$*	15
n (PKR 2009)	Stress ratio exponent n, based on I_c (PKR 2009). An iterative calculation is required to determine n (PKR 2009) and its corresponding I_c (PKR 2009).	*n (PKR 2009) = 0.381 (I_c) + 0.05 (σ_v'/P_a) – 0.15*	15
Q_{tn} (PKR 2009)	Normalized tip resistance using a variable stress ratio exponent based on I_c (PKR 2009) and n (PKR 2009). An iterative calculation is required to determine Q_{tn} (PKR 2009).	*$Q_{tn} = [(qt - \sigma_v)/P_a](P_a/\sigma_v')^n$* *where P_a = atmospheric pressure (100 kPa)* *n = stress ratio exponent described above*	15
FC	Apparent fines content (%)	*FC=1.75($Ic^{3.25}$) - 3.7* *FC=100 for $I_c > 3.5$* *FC=0 for $I_c < 1.26$* *FC = 5% if 1.64 < I_c < 2.6 AND F_r<0.5*	3
I_c Zone	This parameter is the Soil Behavior Type zone based on the I_c parameter (valid for zones 2 through 7 on SBTn or SBT Qtn charts)	I_c < 1.31 Zone = 7 1.31 < I_c < 2.05 Zone = 6 2.05 < I_c < 2.60 Zone = 5 2.60 < I_c < 2.95 Zone = 4 2.95 < I_c < 3.60 Zone = 3 I_c > 3.60 Zone = 2	3
CD	The contractive / dilative boundary on Robertson's Modified SBTn (contractive/dilative) Chart shown in Figure 6 above. The boundary is marked as CD = 70 on the chart in the relevant paper. Similar to the $Q_{tn,cs}$ = 70 line in Figure 4.	CD = 70 = $(Q_{tn} - 11)(1 + 0.06F_r)^{17}$ lower bound of CD = 60: CD = 60 = $(Q_{tn} - 9.5)(1 + 0.06F_r)^{17}$	30

Calculated Parameter	Description	Equation	Ref
I_B	Hyberbolic fit defining the boundary between SBT soil types proposed by Schneider as a better fit than the I_c circles. I_B = 32 represents the boundary for most sand like soils. I_B = 22 represents the upper boundary for most clay like soils. The region between I_B=22 and I_B=32 is the "transitional soil" zone.	$I_B = 100\ (Q_{tn} + 10) / (70 + Q_{tn} F_r)$	30
State Param or State Parameter or ψ	The state parameter index, ψ, is defined as the difference between the current void ratio, e, and the critical void ratio, e_c. Positive ψ - contractive soil Negative ψ - dilative soil This is based on the work by Been and Jefferies (1985) and Plewes, Davies and Jefferies (1992) This method uses mean normal stresses based on a uniform value of K_0 or a calculated K_0 using methods described elsewhere in this document	See reference	6, 8
Yield Stress σ_p'	Yield stress is calculated using the following methods 1) General method 2) 1st order approximation using q_tNet (clays) 3) 1st order approximation using Δu_2 (clays) 4) 1st order approximation using q_e (clays) 5) Based on Vs	All stresses in kPa 1) $\sigma_p' = 0.33 \cdot (q_t - \sigma_v)^{m'} (\sigma_{atm}/100)^{1-m'}$ where $m' = 1 - \frac{0.28}{1 + (I_c / 2.65)^{25}}$ 2) $\sigma_p' = 0.33 \cdot (q_t - \sigma_v)$ 3) $\sigma_p' = 0.54 \cdot (\Delta u_2)$ $\Delta u_2 = u_2 - u_0$ 4) $\sigma_p' = 0.60 \cdot (q_t - u_2)$ 5) $\sigma_p' = (Vs/4.59)^{1.47}$	19 20 20 20 18
OCR OCR(JS1978) YSR(Mayne2014) YSR (qtNet) YSR (deltaU) YSR (qe) YSR (Vs) OCR (PKR2015)	Over Consolidation Ratio based on 1) Schmertmann (1978) method involving a plot plot of S_u/σ_v' /($S_u/\sigma_v')_{NC}$ and OCR  2) based on Yield stresses described above 3) approximate version based on qtNet 4) approximate version based on Δu 5) approximate version based on effective tip, q_e 6) approximate version based on shear wave velocity, V_s and σ_v' 7) based on Qt	1) requires a user defined value for NC Su/P_c' ratio 2 through 5) *based on yield stresses* 6) YSR (Vs) = $\sigma_p'(Vs) / \sigma_v'$ 7) OCR = $0.25 \cdot (Qt)^{1.25}$	9 19 20 20 20 18 32
Es/qt	Intermediate parameter for calculating Young's Modulus, E, in sands. It is the Y axis of the reference chart. Note that Figured 5.59 from reference 5, Lunne, Robertson and Powell, (LRP) has an error. The X axis values are too high by a factor of 10. The plot is based on Baldi's (not Bellotti as cited in	Based on Figure 5.59 in the reference	5, 37

Calculated Parameter	Description	Equation	Ref
	LRP) original Figure 3 where the X axis is: $\frac{q_c}{\sqrt{\sigma'_v}}$ (both in kPa) with a range of 200 to 3000. Figure 5.59 from LRP shows a dimensionless form of the equation, q_{c1}, displaying the same range of values. Figure 5.59's X axis uses $q_{c1} = \left(\frac{q_c}{P_a}\right)\left(\frac{P_a}{\sigma'_v}\right)^{0.5}$ The two expressions are not the same: they differ by a factor of $\frac{\sqrt{P_a}}{P_a}$. With P_a taken to be 100 kPa the factor is 1/10. Substituting typical values of 200 bar (20000 kPa) for q_c and 225 kPa for σ_v' one gets: 20000 / 15 = 1333.33 for Bellotti's axis and $(200/1)(100/225)^{0.5}$ = 200 * (10/15) = 133.3 for LRP's axis (noting that P_a = 1 bar) showing a factor of 10 difference.		
Es or E_s Young's Modulus E	Young's Modulus based on the work done in Italy. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in the E_s/q_t chart. E_s is evaluated for an axial strain of 0.1%.	Mean normal stress is evaluated from: $\sigma'_m = \frac{1}{3}(\sigma'_v + \sigma'_h + \sigma'_h)$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress *and* $\sigma_h = K_o \cdot \sigma_v'$ with K_o assumed to be 0.5	5
Delta U/TStress $\Delta u / \sigma_v$	Differential pore pressure ratio with respect to total stress	$= \frac{\Delta u}{\sigma_v}$ *where:* $\Delta u = u - u_{eq}$	39
Delta U/EStress, P Value, Excess Pore Pressure Ratio $\Delta u/\sigma_v'$	Differential pore pressure ratio with respect to effective stress. Key parameter (P, Normalized Pore Pressure Parameter, Excess Pore Pressure Ratio) in the Winckler et. al. static liquefaction method.	$= \frac{\Delta u}{\sigma'_v}$ *where:* $\Delta u = u - u_{eq}$	25, 25a
Su/EStress S_u/σ_v'	Undrained shear strength ratio with respect to vertical effective overburden stress using the S_u (N_{kt}) method	= *Su* (N_{kt}) / σ_v'	9, 23
Vs or V_s	Recorded shear wave velocities (not estimated). The shear wave velocities are typically collected over 1 m depth intervals. Each data point over the relevant depth range is assigned the same V_s value.	recorded data	27
Vp or V_p	Recorded compression wave (or P wave) velocities (not estimated). The P wave velocities are typically collected over 1 m depth intervals. Each data point over the relevant depth range is assigned the same V_p value.	recorded data	27

Calculated Parameter	Description	Equation	Ref
V_{s30} V_{s100}	The average shear wave velocity of the near surface materials to a depth of 30 m (100 ft). It is based on the sum of all travel times through all layers in the top 30m (100 ft). V_{s100} is the same calculation as V_{s30} except down to a depth of 100 feet.	$V_{s30} = \frac{total\ thickness\ of\ all\ layers\ to\ 30\ m}{\Sigma\left(\frac{layer\ thickness}{layer\ shear\ wave\ velocity}\right)}$ $V_{s30} = \frac{total\ thickness\ of\ all\ layers\ to\ 30\ m}{\Sigma\ (layer\ travel\ times)}$	38
G_{max}	G_{max} determined from SCPT shear wave velocities (not estimated values). Note that seismic data (V_s) is collected over set depth intervals (typically 1 meter). Each data point over the test segment is assigned the same V_s value. Since soil density changes with depth, slightly different G_{max} values may be calculated over the test depth interval.	$G_{max} = \rho V_s^2$ where ρ is the mass density of the soil determined from the estimated unit weights at each test depth	27
qtNet/G_{max}	Net tip resistance ratio with respect to the small strain modulus G_{max} determined from SCPT shear wave velocities (not estimated values)	$= (qt - \sigma_v) / G_{max}$ where $G_{max} = \rho V_s^2$ and ρ is the mass density of the soil determined from the estimated unit weights at each test depth	15, 28, 30
qUlt	A site specific and client specific parameter for estimating the limiting stress for "crane walk" accessibility	$q_{ult} = CraneWalkFactor \cdot S_u$ Where: *CraneWalkFactor* is client provided	U*
Estimated G_o	Estimated value for small strain shear modulus	$G_o = 0.0188[10^{(0.55Ic + 1,68)}](q_t - \sigma_v)$	15
Estimated E_{25}	Estimated value for Young's Modulus, E, at a 25% working load	$E_{25} = \alpha_E$ (qtNet) where $\alpha_E = 0.015[10^{(0.55Ic + 1,68)}]$	15
k_{SBT}	Estimated soil permeability derived from Soil Behavior Type (SBT) Chart I_c values.	For $1.0 < I_c \leq 3.27$: $k = 10^{(0.952 - 3.04Ic)}$ in m/s For $3.27 < Ic < 4.0$: $k = 10^{(-4.52 - 1.37Ic)}$ in m/s	35
M or D' Constrained Modulus	Constrained Modulus based on 1) Robertson, M 2) Mayne, D'	1) Robertson $M = \alpha_M (q_t - \sigma_v)$ $I_c > 2.2$ (fine grained) $\alpha_M = Qt$ when $Qt < 14$ $\alpha_M = 14$ when $Qt > 14$ $Ic < 2.2$ (coarse grained) $\alpha_M = 0.0188\ [10^{(0.55Ic + 1.68)}]$ $D' = \alpha_D (qt - \sigma_v)$ where $\alpha_D = 5$	32 23

Table 1b. CPT Parameter Calculation Methods – Liquefaction Parameters

Calculated Parameter	Description	Equation	Ref
K_{SPT} or K_s	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) \bullet (FC - 5))$	10
K_{CPT} or K_c (RW1998)	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ (see reference) $K_c = -0.403\ I_c^4 + 5.581\ I_c^3 - 21.63 I_c^2 + 33.75\ I_c - 17.88$	3, 10
K_c (PKR 2010)	Clean sand equivalent factor to be applied to Q_{tn}	$K_c = 1.0$ for $I_c \leq 1.64$ $K_c = -0.403\ I_c^4 + 5.581\ I_c^3 - 21.63 I_c^2 + 33.75\ I_c - 17.88$ for $I_c > 1.64$	16
$(N_1)_{60cs}I_C$	Clean sand equivalent SPT $(N_1)_{60}I_c$. User has 3 options.	1) $(N_1)_{60cs}Ic = \alpha + \beta((N_1)_{60}I_c)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}I_c)$ 3) $(q_{c1ncs})/(N_1)_{60cs}I_c = 8.5\ (1 - I_c/4.6)$ FC ≤ 5%: $\alpha = 0,\ \beta = 1.0$ FC ≥ 35% $\alpha = 5.0,\ \beta = 1.2$ 5% < FC < 35% $\alpha = exp[1.76 - (190/FC^2)]$ $\beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \bullet K_{cpt}$	3
$Q_{tn,cs}$ (PKR 2010)	Clean sand equivalent for Q_{tn} described above - Q_{tn} being the normalized tip resistance based on a variable stress exponent as defined by Robertson (2009)	$Q_{tn,cs} = Q_{tn} \cdot K_c$ (PKR 2016)	16
Su(Liq)/ESv or $S_u(Liq)/\sigma_v'$	Liquefied shear strength ratio as defined by Olson and Stark	$\frac{S_u(Liq)}{\sigma_v'} = 0.03 + 0.0143(q_{c1})$ Note: σ_v' and s_v' are synonymous	13
Su(Liq)/ESv or $S_u(Liq)/\sigma_v'$ (PKR 2010)	Liquefied shear strength ratio as defined by Robertson (2010)	$\frac{S_u(Liq)}{\sigma_v'}$ Based on a function involving $Q_{tn,cs}$	16
S_u (Liq) (PKR 2010)	Liquefied shear strength derived from the liquefied shear strength ratio and effective overburden stress	$S_u(Liq) = \sigma_v' \cdot \left(\frac{S_u(Liq)}{\sigma_v'}\right)$	16
Cont/Dilat Tip	Contractive / Dilative q_{c1} Boundary based on $(N_1)_{60}$	$(\sigma_v')_{boundary} = 9.58 \times 10^{-4}\ [(N_1)_{60}]^{4.79}$ q_{c1} is calculated from specified q_t(MPa)/N ratio	13
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833\ [q_{c1ncs}/1000] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93\ [q_{c1ncs}/1000]^3 + 0.08$	10
Kg or K_g	Small strain Stiffness Ratio Factor, K_g	$[G_{max}/q_t]/[q_{c1n}{}^{-m}]$ m = empirical exponent, typically 0.75	26

Calculated Parameter	Description	Equation	Ref
K_g*	Revised K_g factor extended to fine grained soils (Robertson).	$K_g^* = (G_o / q_n)(Q_{tn})^{0.75}$ where q_n is the net tip resistance = $q_t - \sigma_v$	30
SP Distance	State Parameter Distance, Winckler static liquefaction method	Perpendicular distance on Q_{tn} chart from plotted point to state parameter Ψ = -0.05 curve	25
URS NP Fr	Normalized friction ratio point on Ψ = -0.05 curve used in SP distance calculation		25
URS NP Q_{tn}	Normalized tip resistance (Q_{tn}) point on Ψ = -0.05 curve used in SP Distance calculation		25

Table 2. References

No.	Reference
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No.	Reference
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Calibration Records

CONETEC

ADARA

Adara Systems Ltd.
201-8327 Eastlake Drive, Burnaby, BC, Canada V5A4W2
Tel: 1-604-273-6013

CERTIFICATE OF CALIBRATION

Calibration Information			
Cone Serial Number	EC1230	Model	A15 T1000 F10 U35
Calibration Date (YYYY-MM-DD)	2026-02-05		
Calibration Due (YYYY-MM-DD)	2027-02-05		
Calibration Performed By	Richard Chen	Signature	
Calibration Approved By	Diane Eden	Signature	

Lab Condition	As Found	As Left		
Lab Temperature	N/A	23˚C		
Lab Humidity	N/A	34%	Reason for Calibration	new

Cone Information				
Tip Stress Limit	1000	bar	Tip End Area	15 cm²
Friction Stress Limit	10	bar	Friction Surface Area	225 cm²
Pressure Limit	35	bar	RTD Location	Pressure Carrier
X-Inclinometer Limit	30	degrees	Geophone	X and Z
Y-Inclinometer Limit	30	degrees	Temperature Range	-20°C to 60°C

Baseline Summary: (For Reference Only)

Channel	Units	As Found	As Left
Tip	bar	N/A	0.428
Sleeve	bar	N/A	-0.024
Pressure	bar	N/A	0.998
X-Inclinometer	degrees	N/A	0.025
Y-Inclinometer	degrees	N/A	0.050
Temperature	˚C	N/A	23.482

Classified in accordance with ISO 22476-1:2012 Class 1
Classified in accordance with ISO 22476-1:2012 Class 2

Calibrated in general accordance with the ASTM D5778-20 and D7400-19 standards

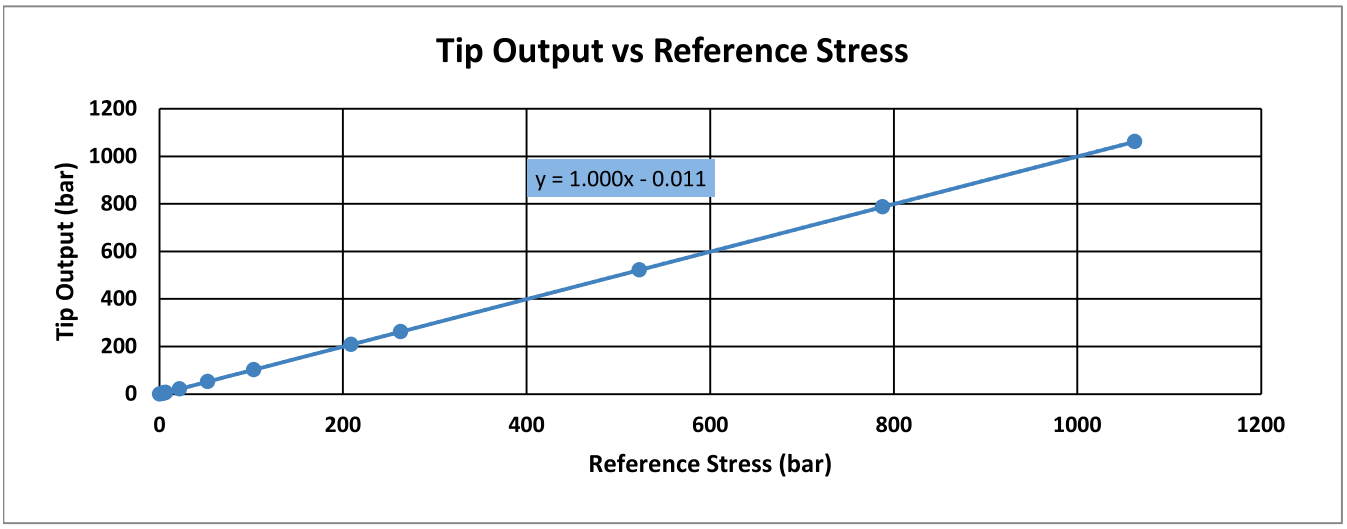
Calibrated with Adara calibration procedure EC_CPTCAL-2.3

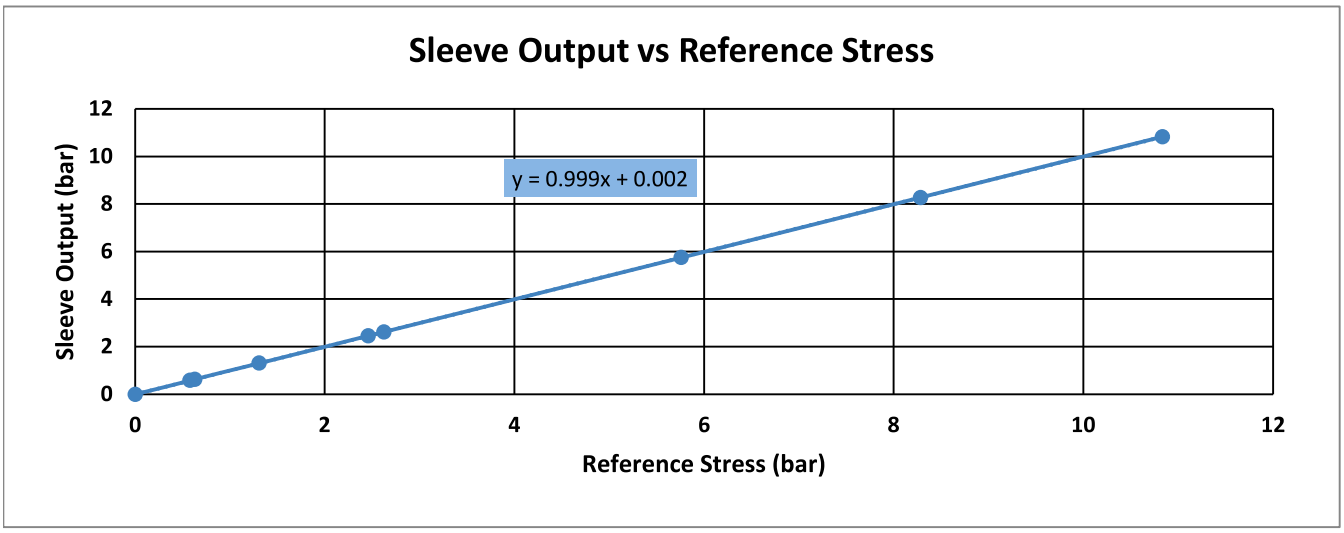
Collective uncertainty of the measurement standards conforms to a test uncertainty ratio (TUR) of 3:1 for tip and sleeve measurement and 4:1 for pressure measurement with a confidence level k=2

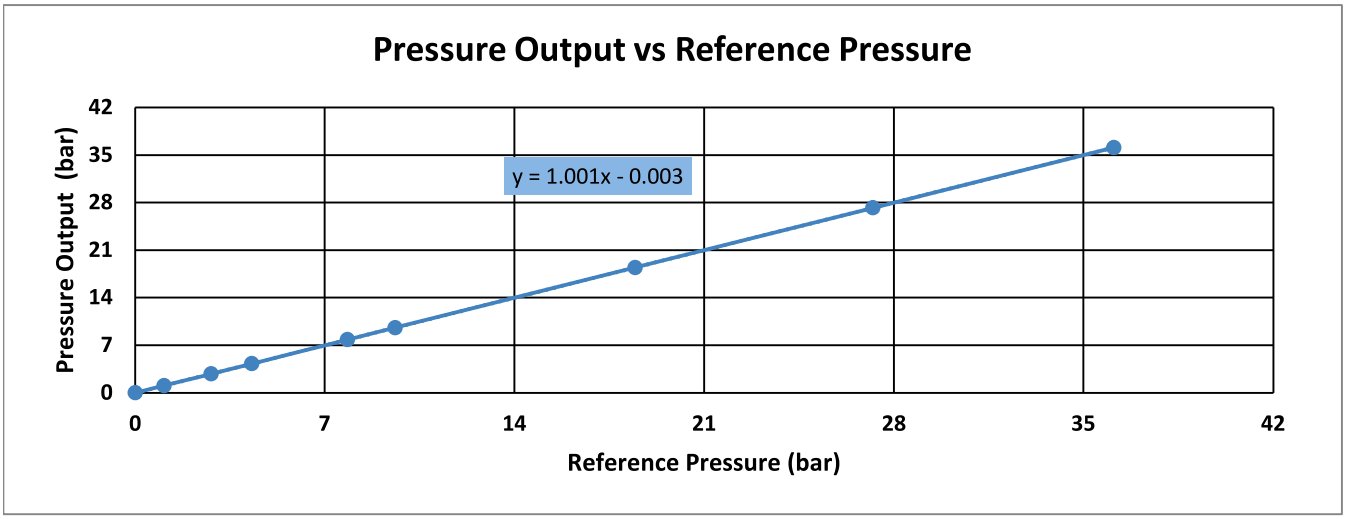
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Cone Output vs Reference Stress/Pressure Plots







ADARA

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Tel: 1-604-273-6013

Calibration Results

Tip Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	0.02%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.04%	PASS

Sleeve Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	0.07%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.20%	PASS

Pressure Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	0.05%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.12%	PASS

X-Inclinometer Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.08%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.17%	PASS

Y-Inclinometer Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.29%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.58%	PASS

Seismic Calibration					
	As Found			As Left	
Trigger Delay Error	N/A	N/A	Trigger Delay Error	0.02%	PASS

Temperature Calibration			
Full Scale Error	0.03%	PASS	

Channel	Cold	Room	Hot	Units
Ref_Temp	2.7	29.3	42.0	˚C
Tip	-0.062	0.535	1.054	bar
Sleeve	0.016	-0.014	0.001	bar
Pressure	1.053	1.051	1.031	bar
Temperature	2.711	29.262	41.961	˚C

Tip Temperature Coefficient	0.028 bar/˚C	PASS
Sleeve Temperature Coefficient	-0.001 bar/˚C	PASS
Pressure Temperature Coefficient	0.000 bar/˚C	PASS

ADARA

Adara Systems Ltd.
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Tel: 1-604-273-6013

Testing Equipment Details

Testing Machines	Model Number	Serial Number	Calibration Number	Due Date
Tip Load Cell	Precision	P-10289	101452	2026-07-22
Sleeve Load Cell	Interface	1054842	101520	2026-10-13
Digital Loadcell Indicator	9840-200-1-T	88364	101408	2026-06-17
Fluke Reference Pressure Monitor	RPM4 A10Ms	3910	101555	2026-12-02
Tektronix Function Generator	AFG3021B	C030955	101490	2026-09-04
Thermoworks THERMOMETER	THS-222-555	D23255834	101441	2026-07-14
Thermoworks THERMOMETER	THS-222-555	D23255829	101441	2026-07-14
Thermoworks THERMOMETER	THS-222-555	D20345575	101441	2026-07-14

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Tel: 1-604-273-6013

Adara Error Definitions

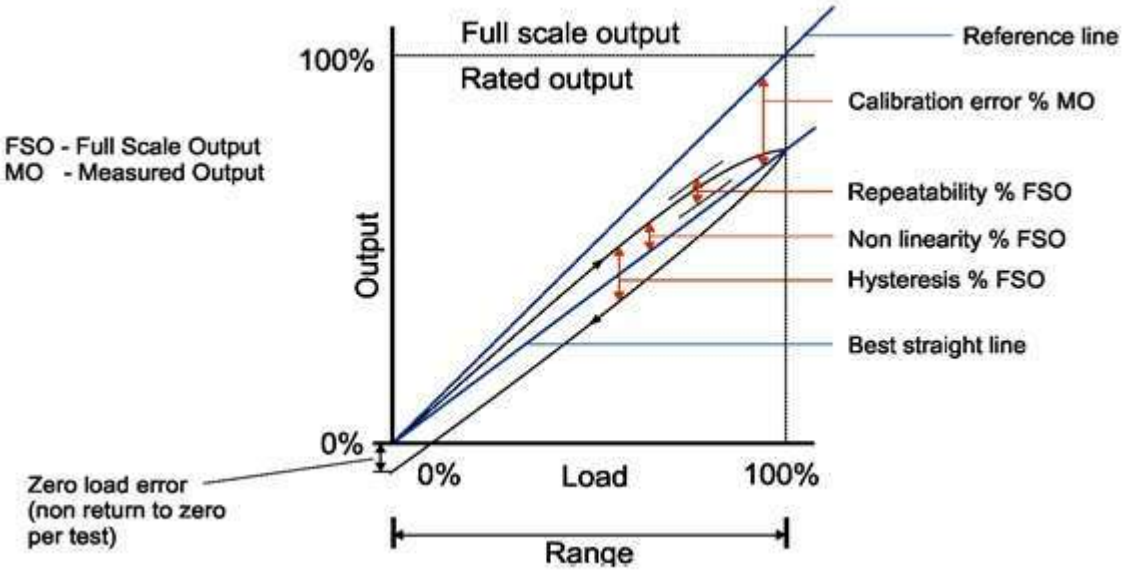


Figure 1: Definition of Calibration Terms for Load Cell and Transducers (Adapted from [1])

Actual Sensitivity	The slope of the best fit line through all data points starting at zero load.
Slope Error	The error in the best fit line compared to the ideal linear calibration in % . Slope Error = (Best Fit Slope - Ideal Slope) / Ideal Slope
Maximum Non Linearity	This value represents the maximum error (absolute value) relative to the best fit line considering each calibration point starting at loads greater than approximately 10% of FSO. The reported errors are a percent error of FSO. Adara's Pass/Fail criteria is 0.5% of FSO (ASTM is 0.5% of FSO at loads > 20% FSO).
Calibration Error	This value represents the maximum error (absolute value) in the recorded load value as compared to the actual load value for each calibration point for loads greater than approximately 10% of FSO. Adara's Pass/Fail criteria for the tip and sleeve is 0.5% of MO and 1.0% of MO for the pore pressure (ASTM for the tip and sleeve is 1.5% and 1.0% of MO respectively at loads greater than 20% of FSO)

Temperature Check Passing Criteria

Tip Temperature Coefficient	<0.200	bar/˚C
Sleeve Temperature Coefficient	<0.005	bar/˚C
Pressure Temperature Coefficient	<0.0196	bar/˚C

Adara Systems Ltd.
201-8327 Eastlake Drive, Burnaby, BC, Canada V5A4W2
Tel: 1-604-273-6013

ASTM D5778-20 Annex A Summary [1]

A1.4 Force Transducer Calibration Requirements

A1.4.1 states the following limits:

Non Linearity	Tip	≤ +0.5% of FSO
	Sleeve	≤ +1.0% of FSO
Calibration Error	Tip	≤ +1.5% of MO at loads > 20% FSO
	Sleeve	≤ +1.0% of MO at loads > 20% FSO

A1.5 Pressure Transducer Calibrations

A1.5.1 limits:

Non Linearity	Pore Pressure	≤ +1.0% of FSO
Calibration Error	Pore Pressure	not specified

ISO 22476 -1:2012 Summary [2]

Section 5.2 states the following allowable minimum accuracy

Class 1	Cone Resistance	35 kPa or 5%
	Sleeve Friction	5 kPa or 10%
	Pore Pressure	10 kPa or 2%
Class 2	Cone Resistance	100 kPa or 5%
	Sleeve Friction	15 kPa or 15%
	Pore Pressure	25 kPa or 3%

Note: ISO Compliance is based on low end calibration only.

References

[1] ASTM D5778-20. "Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils". ASTM, West Conshohocken, PA, USA.

[2] ISO 22476-1:2012. "Geotechnical investigation and testing - Field Testing - Part 1: Electrical cone and piezocone penetration test". ISO, Geneva, Switzerland.

ASTM D7400-19. "Standard Test Methods for Downhole Seismic Testing". ASTM, West Conshohocken, PA, USA.

APPENDIX E

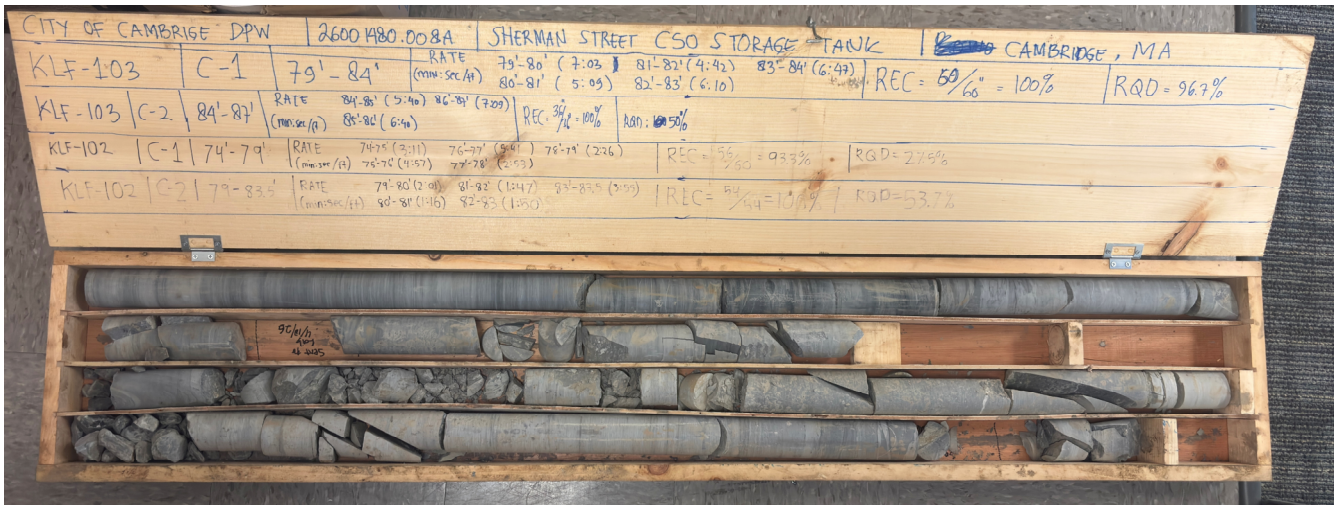
Rock Core Photographs

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Appendix E: Core Box Photographs



CSO Storage Tank (Box 1 of 2)
[KLF-101: C-1 to C-2]



CSO Storage Tank (Box 2 of 2)
[KLF-102: C-1 to C-2 and KLF:103: C-1 to C-2]

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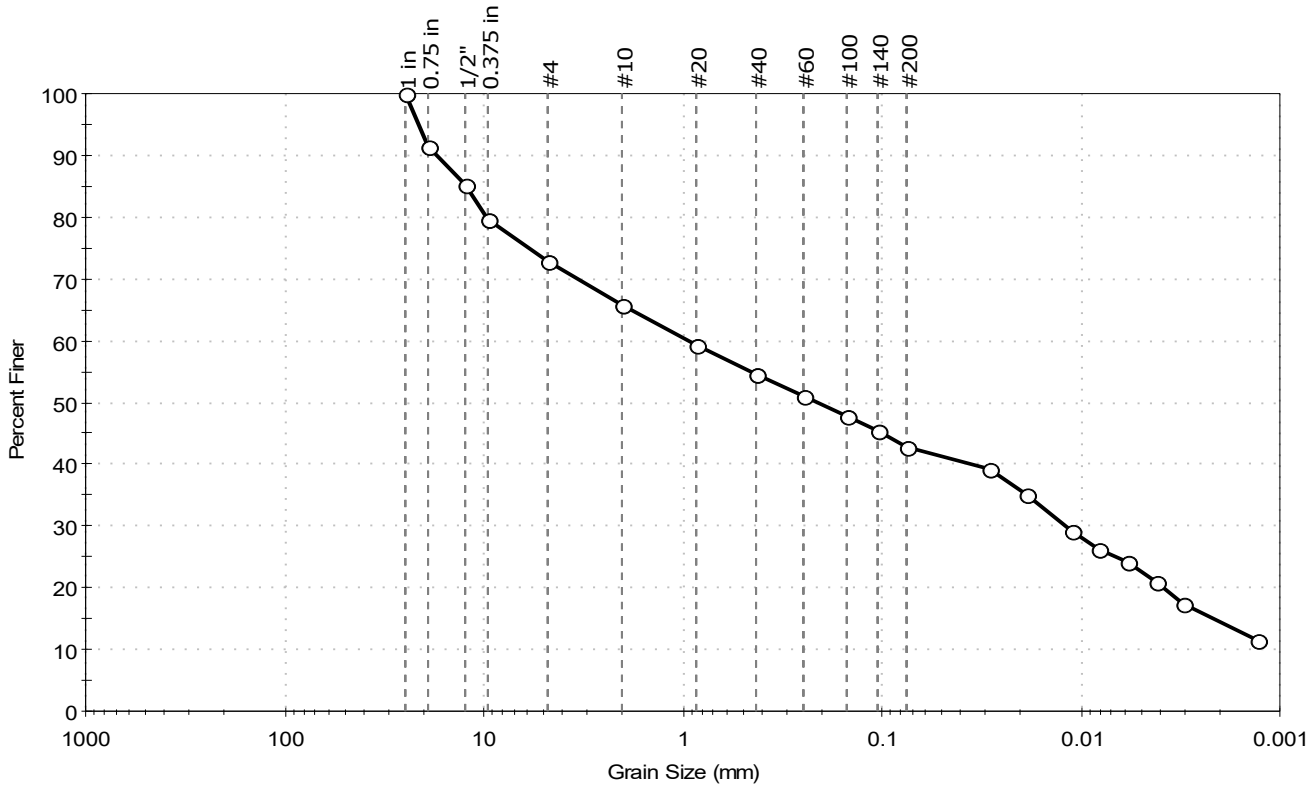
APPENDIX F

Geotechnical Laboratory Test Results

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Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-101	Sample Type:	Bag	Tested By:	ajl
Sample ID:	S-17	Test Date:	04/17/26	Checked By:	ank
Depth :	64-66'	Test Id:	863597		
Test Comment:	---				
Visual Description:	Moist, gray clayey sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	27.2	30.0	42.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	91		
1/2"	12.50	85		
0.375 in	9.50	80		
#4	4.75	73		
#10	2.00	66		
#20	0.85	59		
#40	0.42	55		
#60	0.25	51		
#100	0.15	48		
#140	0.11	45		
#200	0.075	43		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0287	39		
---	0.0187	35		
---	0.0111	29		
---	0.0081	26		
---	0.0058	24		
---	0.0042	21		
---	0.0030	17		
---	0.0013	11		

Coefficients

D_{85} = 12.2841 mm	D_{30} = 0.0118 mm
D_{60} = 0.9384 mm	D_{15} = 0.0022 mm
D_{50} = 0.2120 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

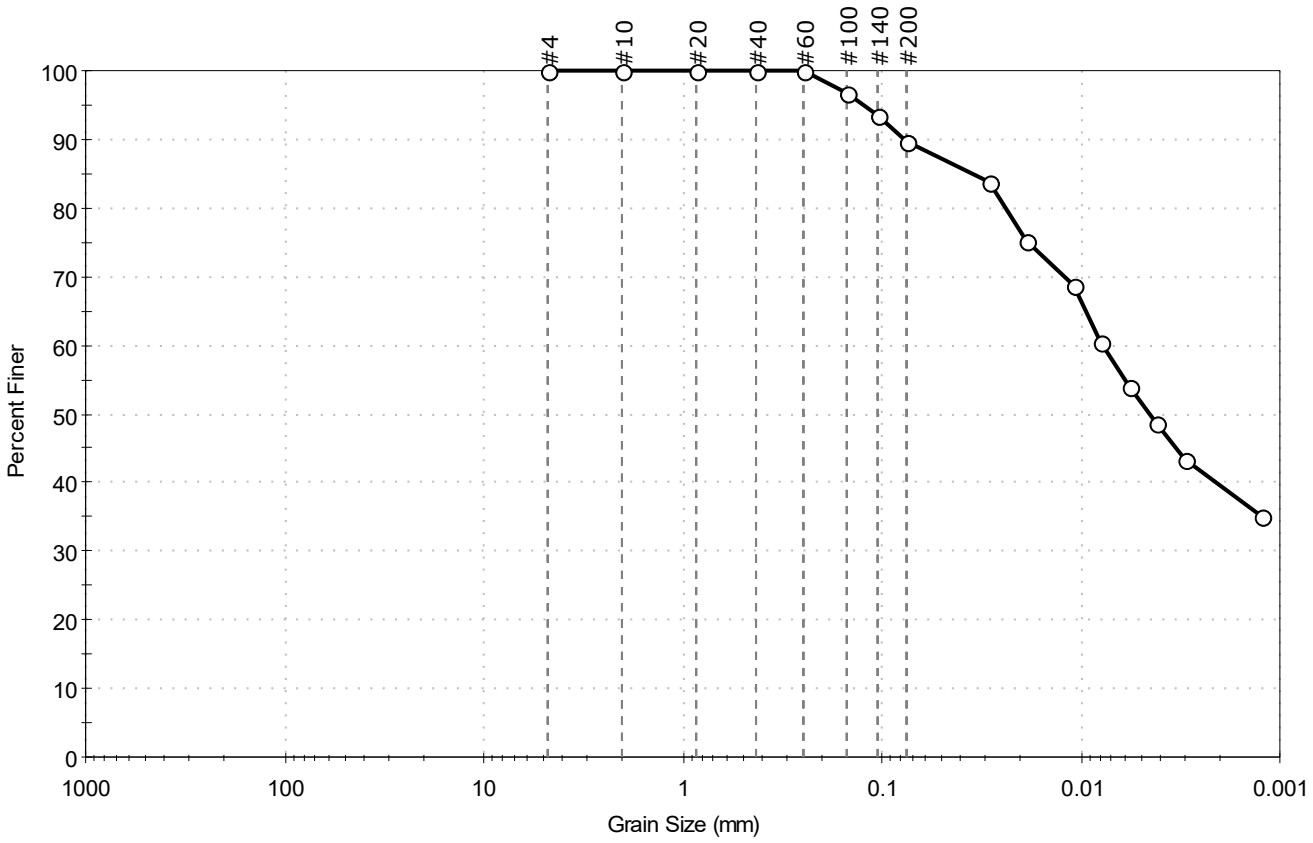
Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-102	Sample Type:	Bag	Tested By:	ajl
Sample ID:	S-10	Test Date:	04/16/26	Checked By:	ank
Depth :	29-31'	Test Id:	863598		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	10.4	89.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	97		
#140	0.11	94		
#200	0.075	90		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0290	84		
---	0.0187	75		
---	0.0110	69		
---	0.0080	60		
---	0.0058	54		
---	0.0041	49		
---	0.0030	43		
---	0.0013	35		

Coefficients

D_{85} = 0.0358 mm	D_{30} = N/A
D_{60} = 0.0078 mm	D_{15} = N/A
D_{50} = 0.0045 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

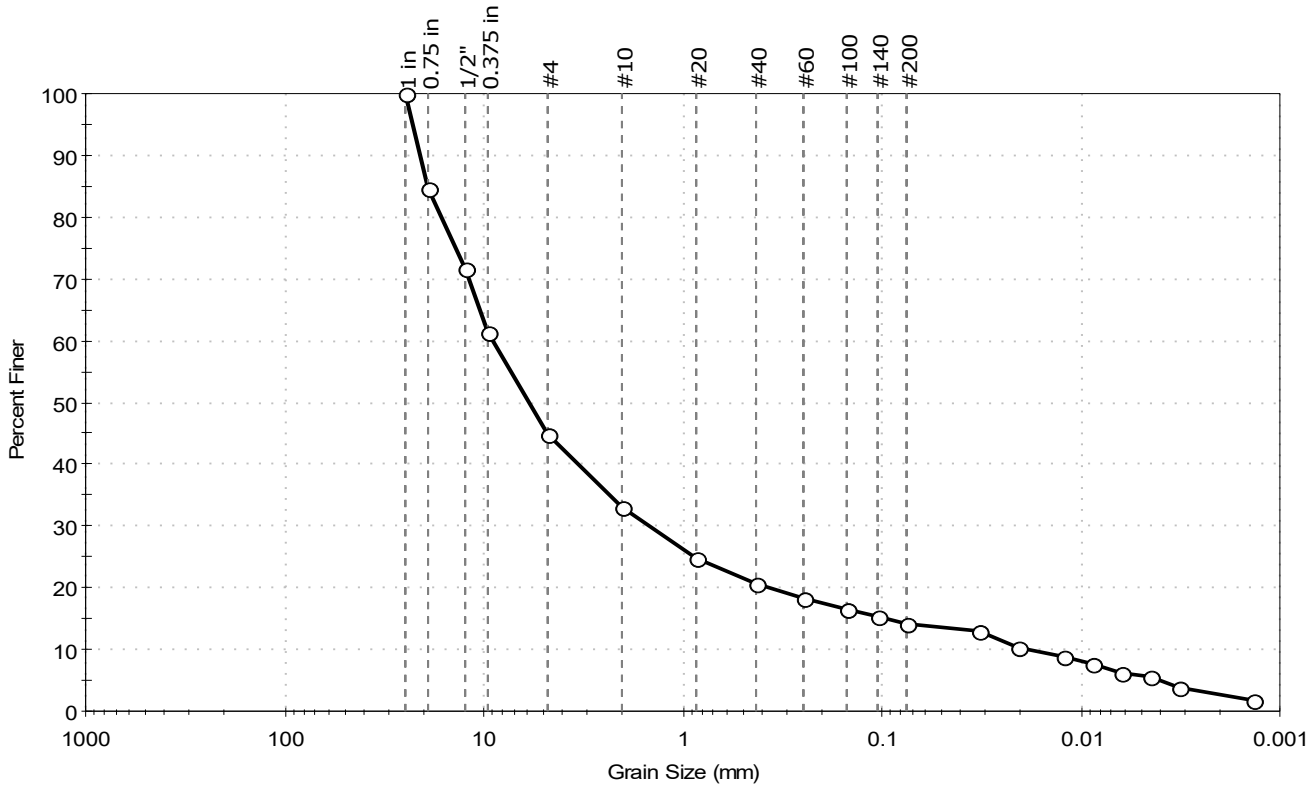
Separation of Sample: #200 Sieve

GeoTesting EXPRESS
A Sercel Business

should be S-18

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-102	Sample Type:	Bag	Tested By:	ajl
Sample ID:	S-19	Test Date:	04/17/26	Checked By:	ank
Depth :	69-71'	Test Id:	863599		
Test Comment:	---				
Visual Description:	Moist, gray clayey gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	55.1	30.6	14.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	85		
1/2"	12.50	72		
0.375 in	9.50	61		
#4	4.75	45		
#10	2.00	33		
#20	0.85	25		
#40	0.42	21		
#60	0.25	18		
#100	0.15	16		
#140	0.11	15		
#200	0.075	14		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0325	13		
---	0.0209	10		
---	0.0122	9		
---	0.0088	8		
---	0.0063	6		
---	0.0045	5		
---	0.0032	4		
---	0.0014	2		

Coefficients

D_{85} = 19.1433 mm
D_{30} = 1.4756 mm
D_{60} = 8.9490 mm
D_{15} = 0.0963 mm
D_{50} = 5.8892 mm
D_{10} = 0.0179 mm
C_u = 499.944
C_c = 13.593

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

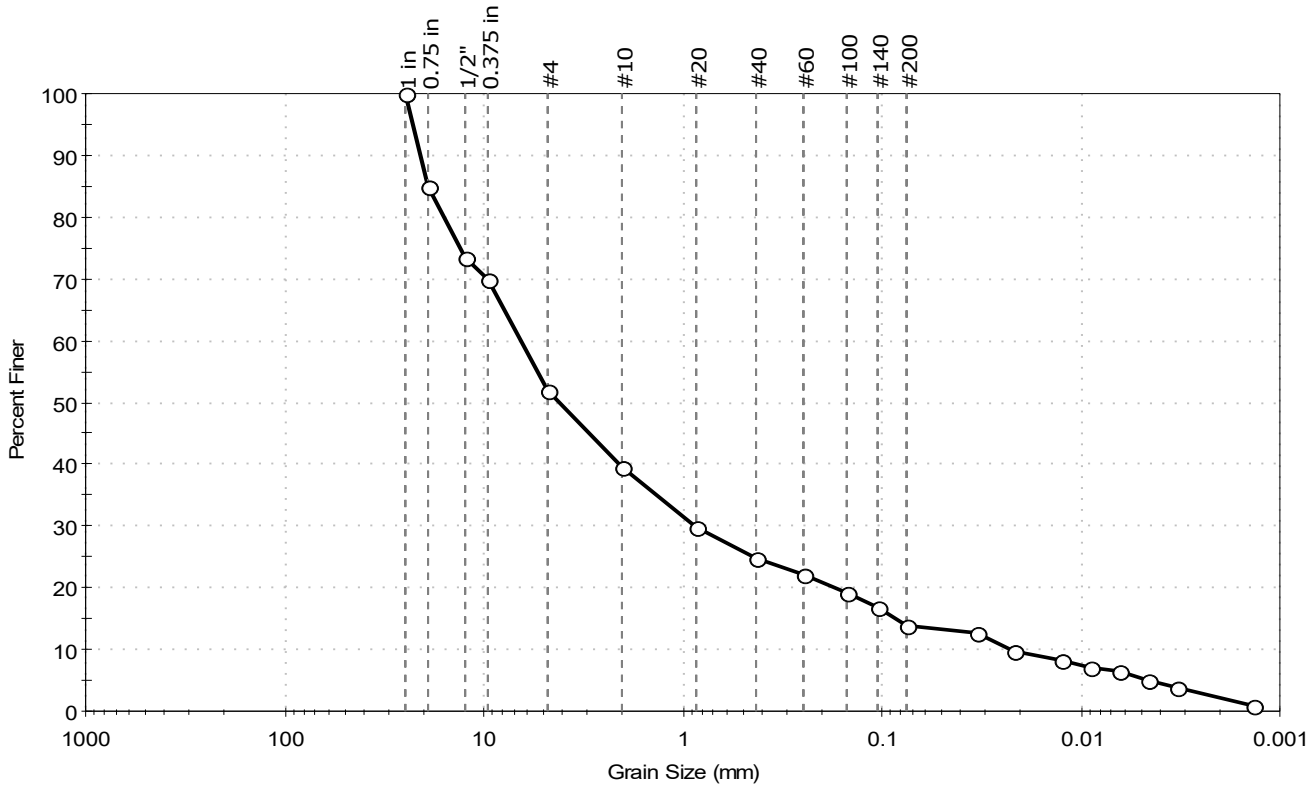
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

GeoTesting EXPRESS
A Sercel Business

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-103	Sample Type:	Bag	Tested By:	ajl
Sample ID:	S-19	Test Date:	04/17/26	Checked By:	ank
Depth :	71-72.6'	Test Id:	863600		
Test Comment:	---				
Visual Description:	Moist, gray clayey gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	48.2	37.9	13.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	85		
1/2"	12.50	73		
0.375 in	9.50	70		
#4	4.75	52		
#10	2.00	39		
#20	0.85	30		
#40	0.42	25		
#60	0.25	22		
#100	0.15	19		
#140	0.11	17		
#200	0.075	14		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0337	13		
---	0.0216	10		
---	0.0126	8		
---	0.0090	7		
---	0.0064	6		
---	0.0046	5		
---	0.0033	4		
---	0.0014	1		

Coefficients

D_{85} = 19.0463 mm	D_{30} = 0.8605 mm
D_{60} = 6.4955 mm	D_{15} = 0.0858 mm
D_{50} = 4.1862 mm	D_{10} = 0.0225 mm
C_u = 288.689	C_c = 5.066

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

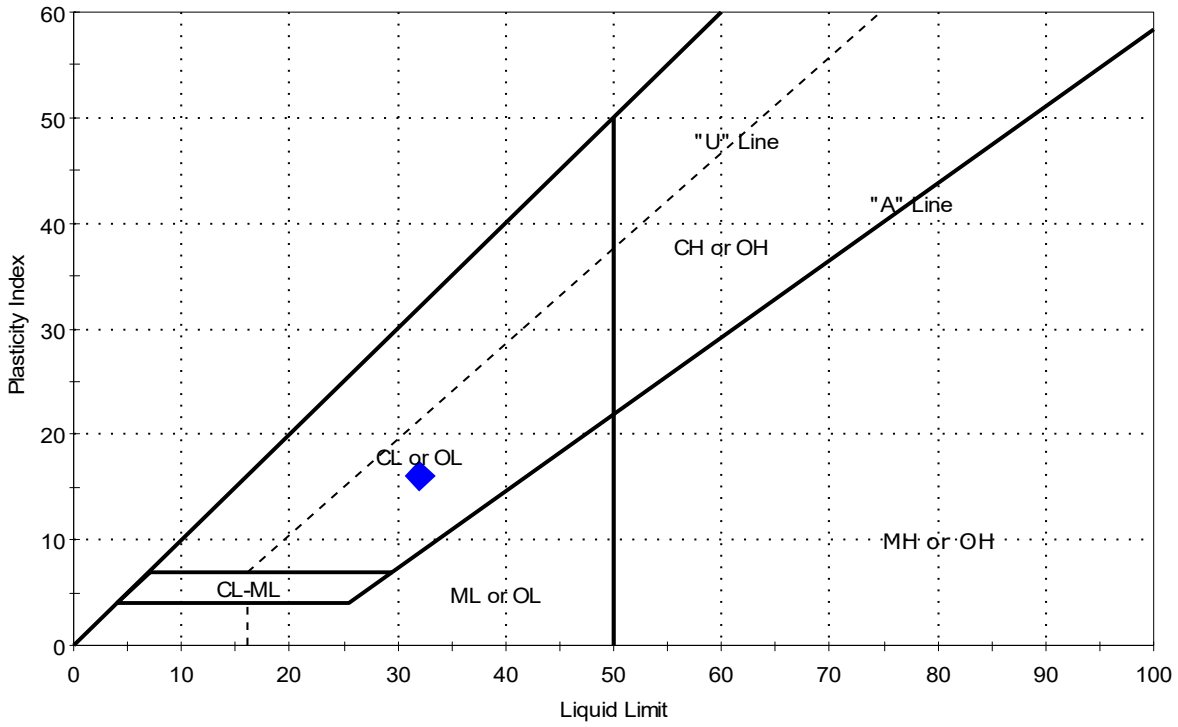
Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-101	Sample Type:	Bag	Tested By:	ajl
Sample ID:	S-7	Test Date:	04/17/26	Checked By:	ank
Depth :	14-16'	Test Id:	863591		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-7	KLF-101	14-16'	30	32	16	16	0.9	

Sample Prepared using the WET method

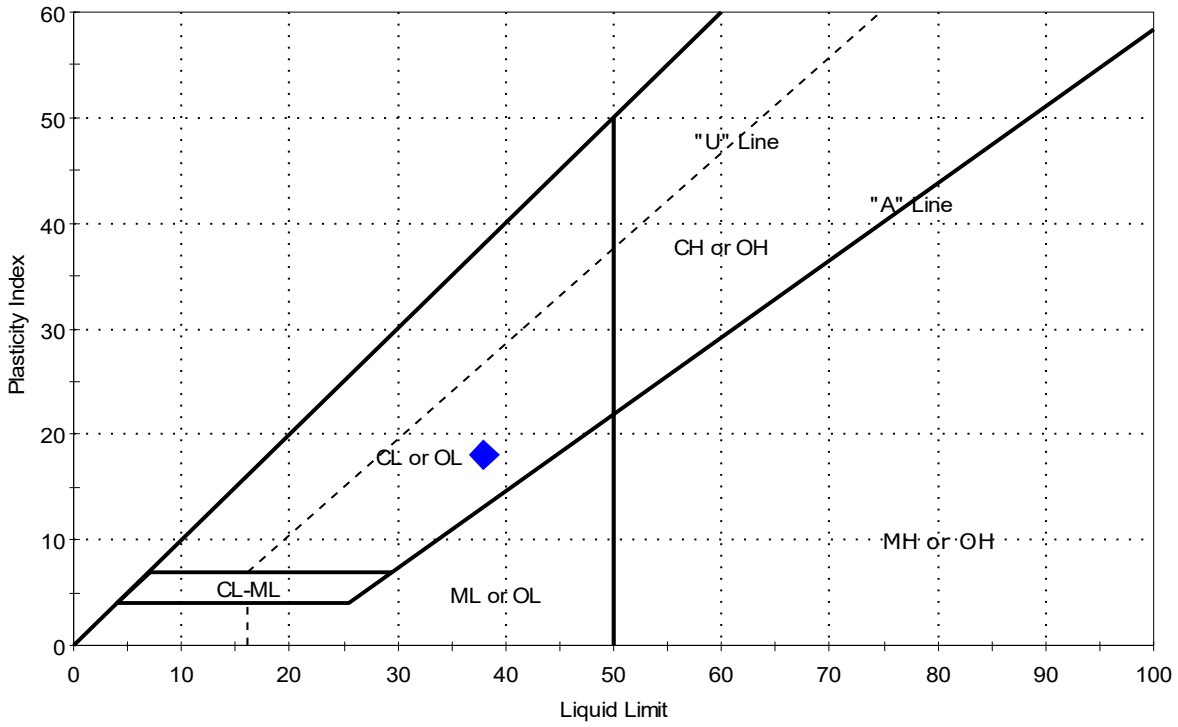
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-101	Sample Type:	Tube	Tested By:	ajl
Sample ID:	U-1	Test Date:	05/05/26	Checked By:	ank
Depth :	42-44'	Test Id:	863240		
Test Comment:	---				
Visual Description:	Moist, greenish gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-1	KLF-101	42-44'	35	38	20	18	0.8	

Sample Prepared using the WET method

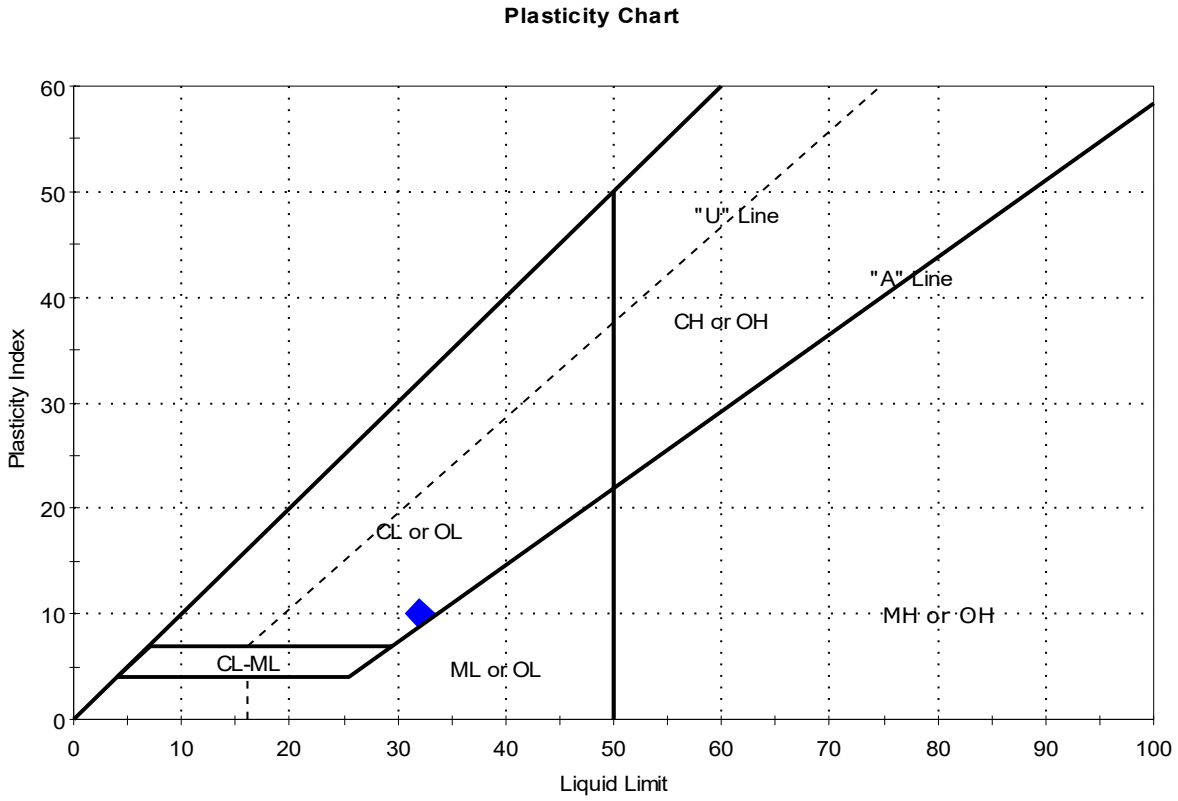
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-101	Sample Type:	Tube	Tested By:	ajl
Sample ID:	U-2	Test Date:	05/02/26	Checked By:	ank
Depth :	52-54'	Test Id:	863241		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-2	KLF-101	52-54'	30	32	22	10	0.8	

Sample Prepared using the WET method

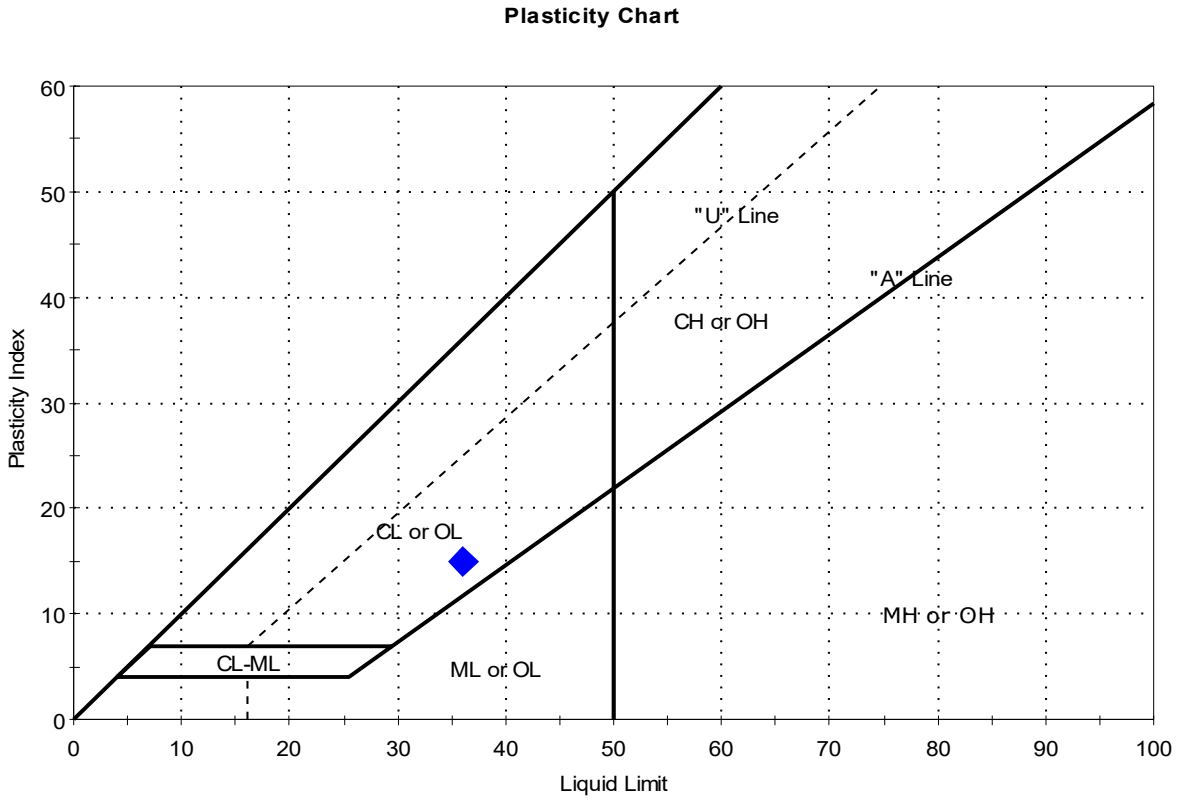
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-102	Sample Type:	Tube	Tested By:	ajl
Sample ID:	U-1	Test Date:	05/04/26	Checked By:	ank
Depth :	37-39'	Test Id:	863242		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-1	KLF-102	37-39'	36	36	21	15	1	

Sample Prepared using the WET method

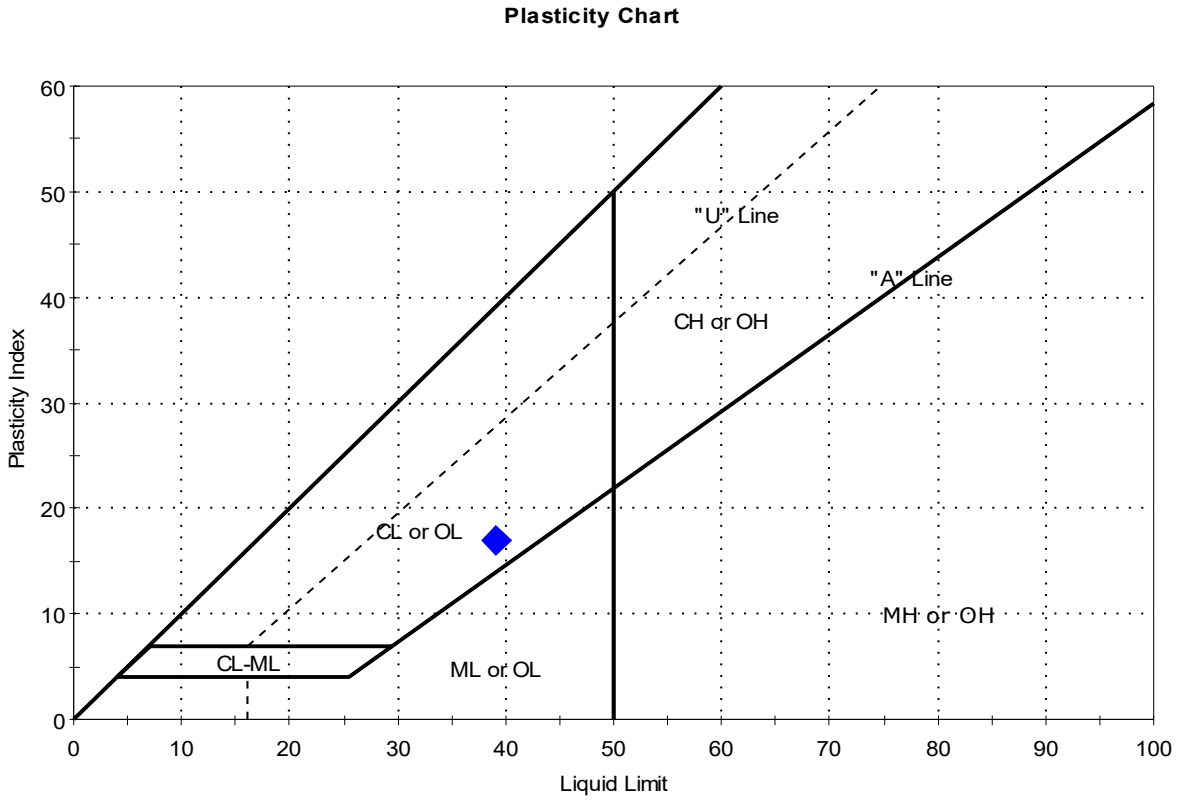
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-103	Sample Type:	Tube	Tested By:	ajl
Sample ID:	U-1	Test Date:	05/04/26	Checked By:	ank
Depth :	37-39'	Test Id:	863243		
Test Comment:	---				
Visual Description:	Moist, dark gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-1	KLF-103	37-39'	37	39	22	17	0.9	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

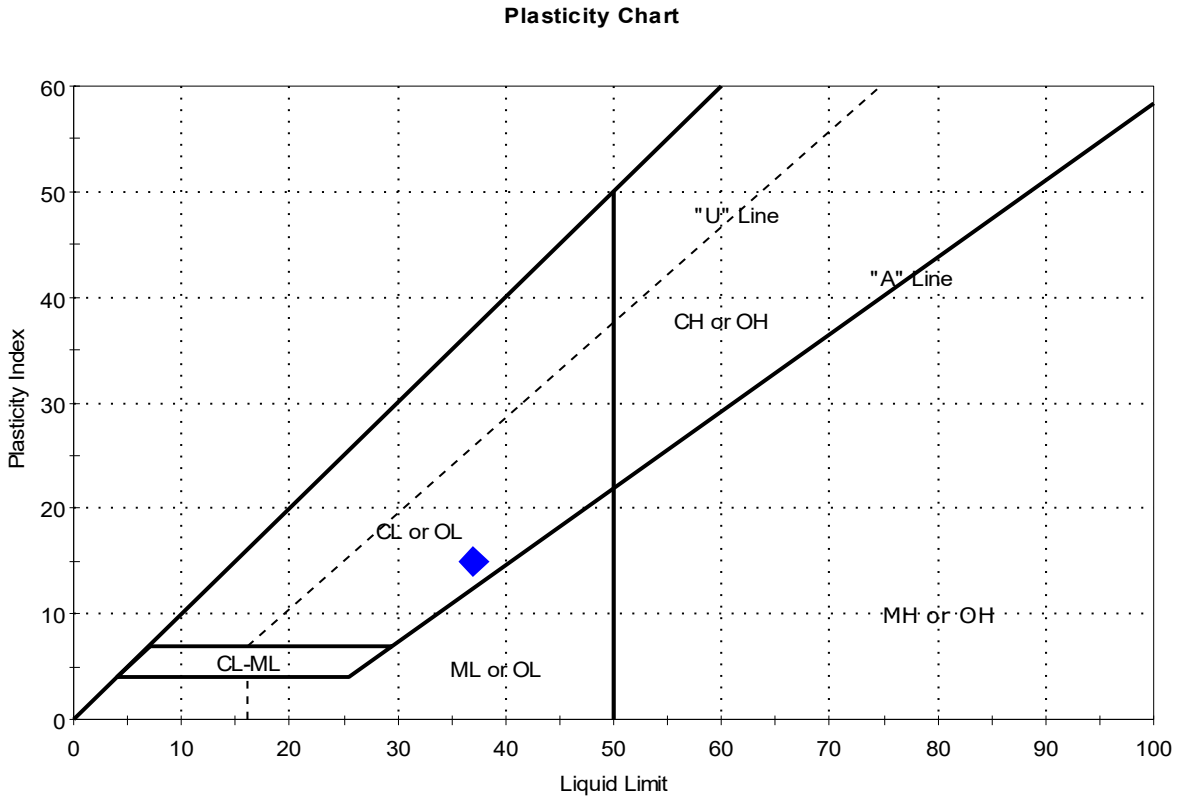
Dilatancy: SLOW

Toughness: LOW

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Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-104	Sample Type:	Tube	Tested By:	ajl
Sample ID:	U-1	Test Date:	05/02/26	Checked By:	ank
Depth :	37-39'	Test Id:	863244		
Test Comment:	---				
Visual Description:	Moist, dark gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-1	KLF-104	37-39'	35	37	22	15	0.8	

Sample Prepared using the WET method

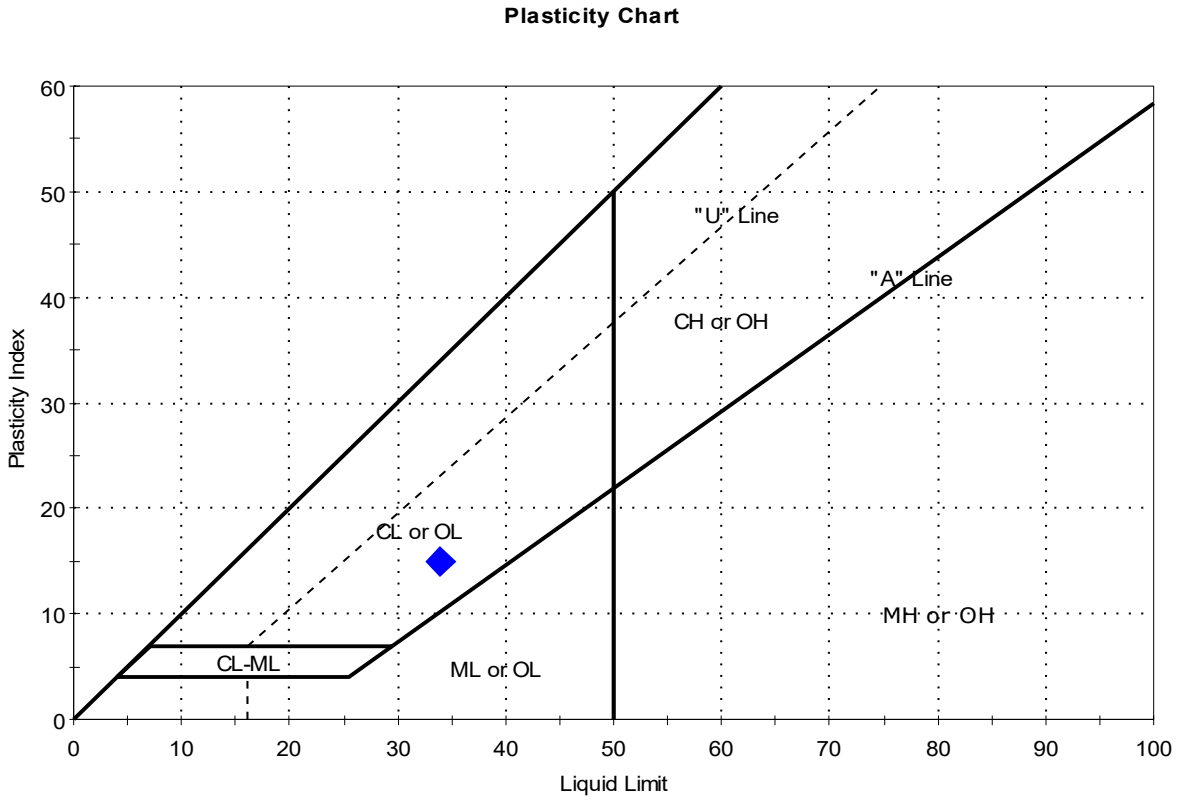
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-104	Sample Type:	Tube	Tested By:	ajl
Sample ID:	U-2	Test Date:	05/05/26	Checked By:	ank
Depth :	49-51'	Test Id:	863245		
Test Comment:	---				
Visual Description:	Moist, greenish gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-2	KLF-104	49-51'	33	34	19	15	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

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Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	---	Sample Type:	---	Tested By:	ajl
Sample ID:	---	Test Date:	05/05/26	Checked By:	ank
Depth :	---	Test Id:	863253		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
KLF-101	U- 1	42-44'	Moist, greenish gray clay	35.2
KLF-101	U- 2	52-54'	Moist, gray clay	29.7
KLF-102	U- 1	37-39'	Moist, gray clay	35.9
KLF-103	U- 1	37-39'	Moist, dark gray clay	36.8
KLF-104	U- 1	37-39'	Moist, dark gray clay	34.7
KLF-104	U- 2	49-51'	Moist, greenish gray clay	33.3

Notes: Temperature of Drying : 110º Celsius

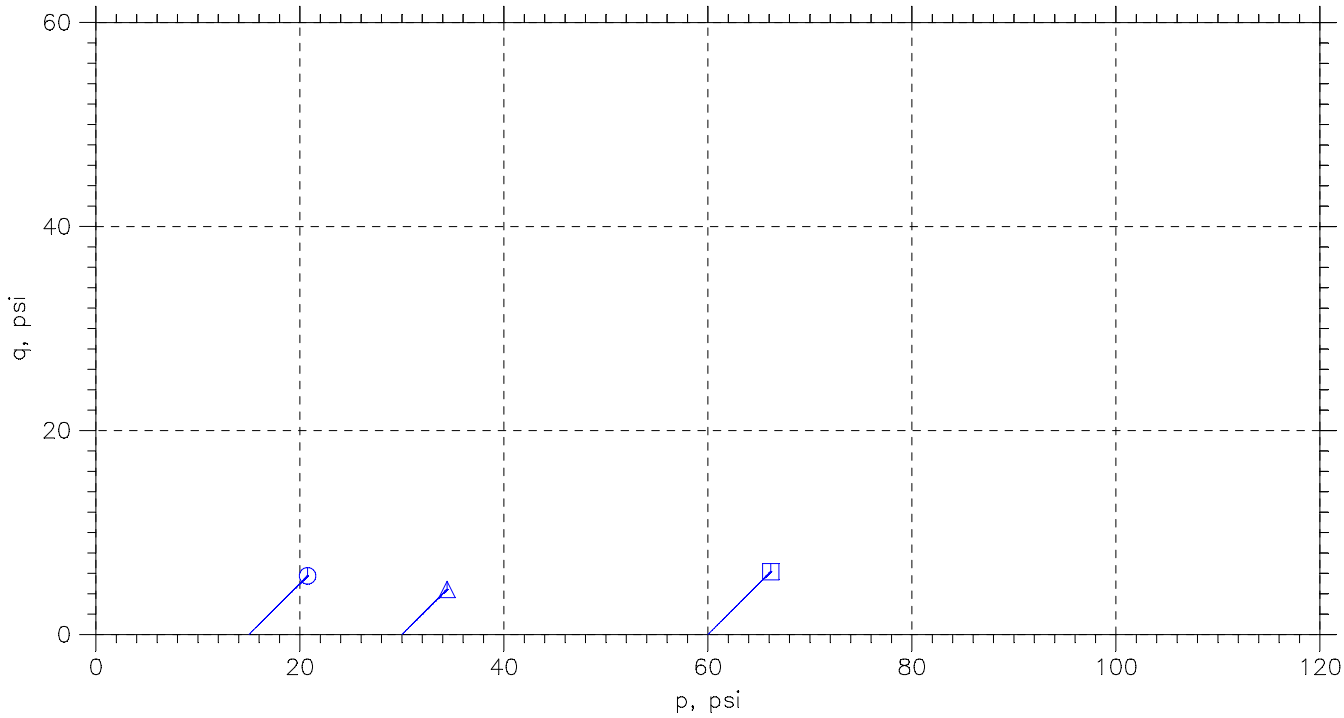
Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	KLF-101	Sample Type:	Bag	Tested By:	ajl
Sample ID:	S-7	Test Date:	04/17/26	Checked By:	ank
Depth :	14-16'	Test Id:	863592		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

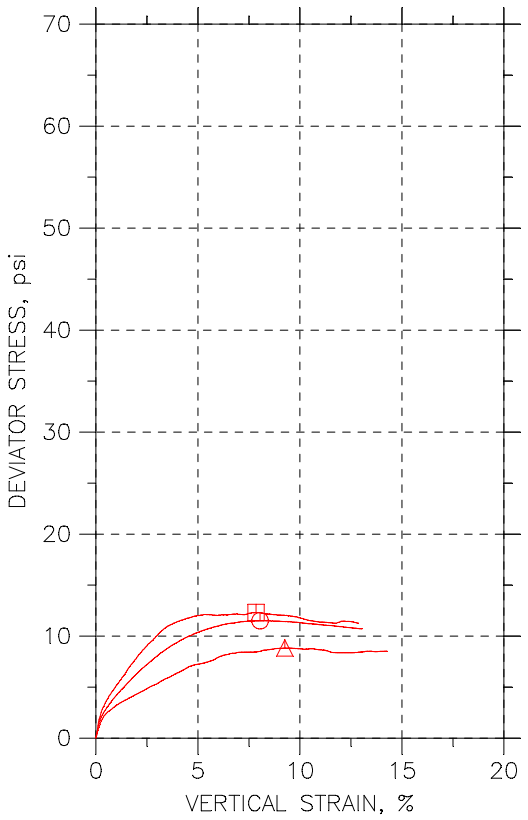
Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
KLF-101	S- 7	14-16'	Moist, gray clay	30.1

Notes: Temperature of Drying : 110º Celsius

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	○	△	□	
Sample No.	U-1	U-1	U-1	
Test No.	UU-2-1	UU-2-2	UU-2-3	
Depth	42-44'	42-44'	42-44'	
Tested by	dmt	dmt	dmt	
Test Date	5/4/26	5/4/26	5/4/26	
Checked by	ab	ab	ab	
Check Date	5/6/26	5/6/26	5/6/26	
Diameter, in	2.03	2.02	2.02	
Height, in	4.6	4.75	4.45	
Water Content, %	33.7	34.9	32.6	
Dry Density, pcf	87.09	84.06	88.82	
Saturation, %	95.9	92.5	96.5	
Void Ratio	0.964	1.03	0.926	
Confining Stress, psi	15	30	60	
Undrained Strength, psi	5.754	4.42	6.161	
Max. Dev. Stress, psi	11.51	8.84	12.32	
Strain at Failure, %	8.05	9.26	7.85	
Strain Rate, %/min	1	1	1	
Estimated Specific Gravity	2.74	2.74	2.74	
Liquid Limit	38	38	38	
Plastic Limit	20	20	20	
Plasticity Index	18	18	18	

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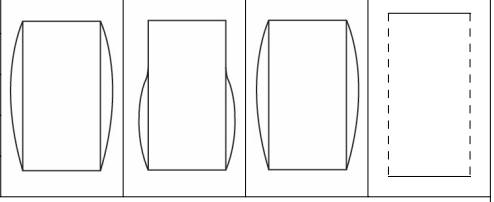
Project: Sherman Street-41 Bellis

Location: Cambridge, MA

Project No.: GTX-323051

Boring No.: KLF-101

Sample Type: intact



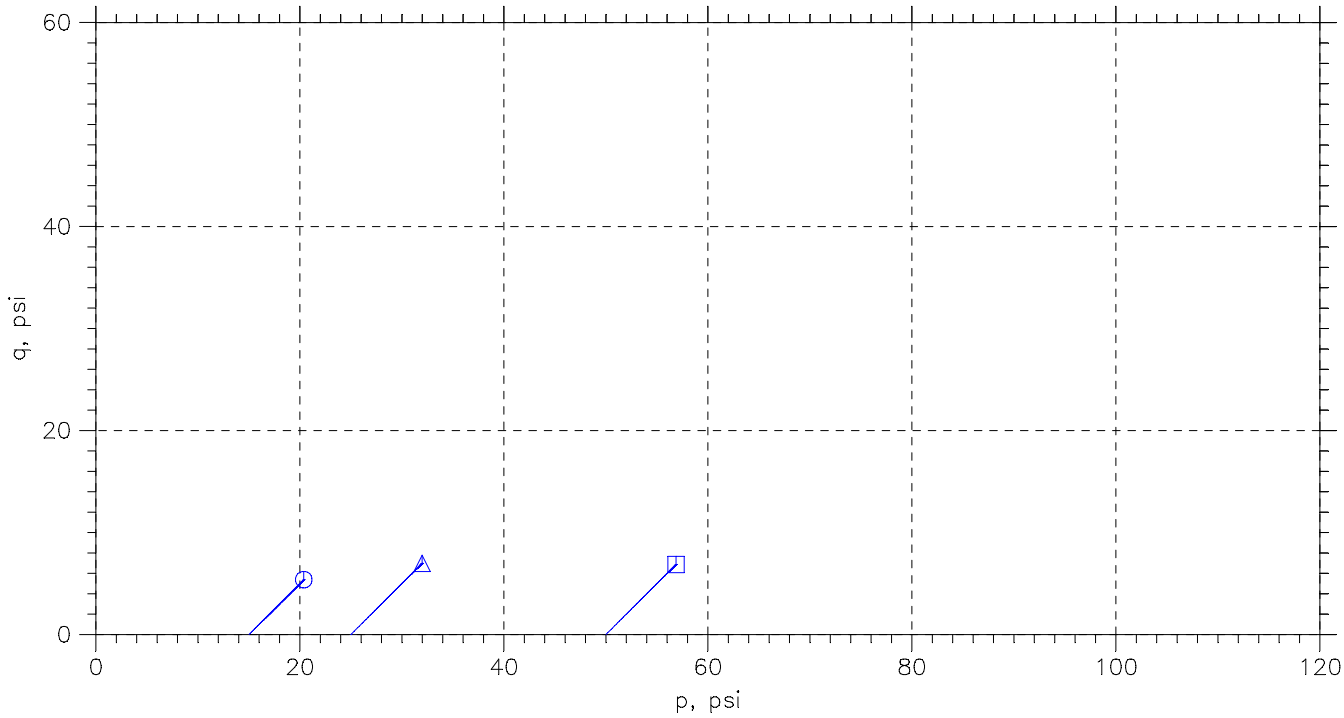
Description: Moist, greenish gray clay

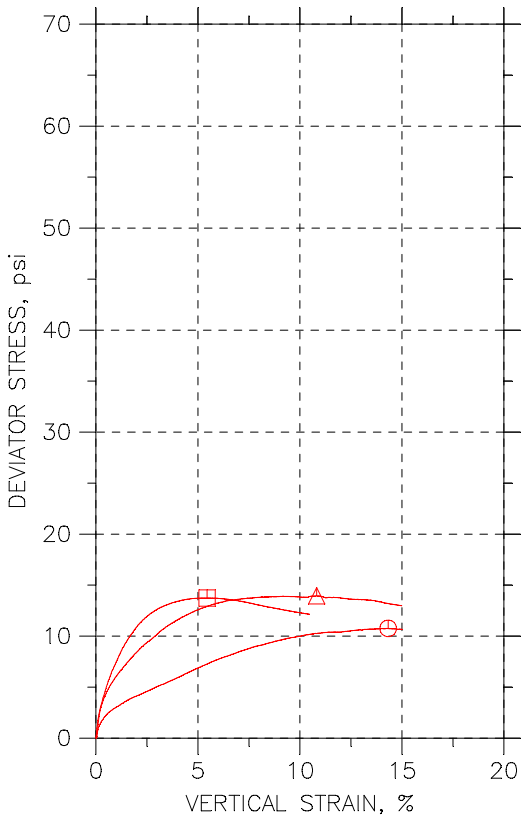
Remarks: TX-027

Phase calculations based on start of test.

Wed, 06-MAY-2026 12:37:37

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	○	△	□	
Sample No.	U-1	U-1	U-1	
Test No.	UU-1-1	UU-1-2	UU-1-3	
Depth	37-39'	37-39'	37-39'	
Tested by	dmt	dmt	dmt	
Test Date	5/4/26	5/4/26	5/4/26	
Checked by	ab	ab	ab	
Check Date	5/6/26	5/6/26	5/6/26	
Diameter, in	2	2.01	2.03	
Height, in	4.55	4.6	4.55	
Water Content, %	33.2	34.3	35.3	
Dry Density, pcf	88.84	85.76	83.97	
Saturation, %	98.0	94.1	93.0	
Void Ratio	0.932	1	1.04	
Confining Stress, psi	15	25	50	
Undrained Strength, psi	5.38	6.974	6.87	
Max. Dev. Stress, psi	10.76	13.95	13.74	
Strain at Failure, %	14.3	10.8	5.45	
Strain Rate, %/min	1	1	1	
Estimated Specific Gravity	2.75	2.75	2.75	
Liquid Limit	39	39	39	
Plastic Limit	22	22	22	
Plasticity Index	17	17	17	

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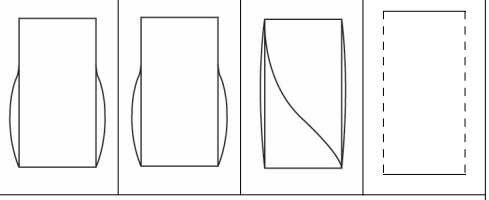
Project: Sherman Street-41 Bellis

Location: Cambridge, MA

Project No.: GTX-323051

Boring No.: KLF-103

Sample Type: intact



Description: Moist, dark gray clay

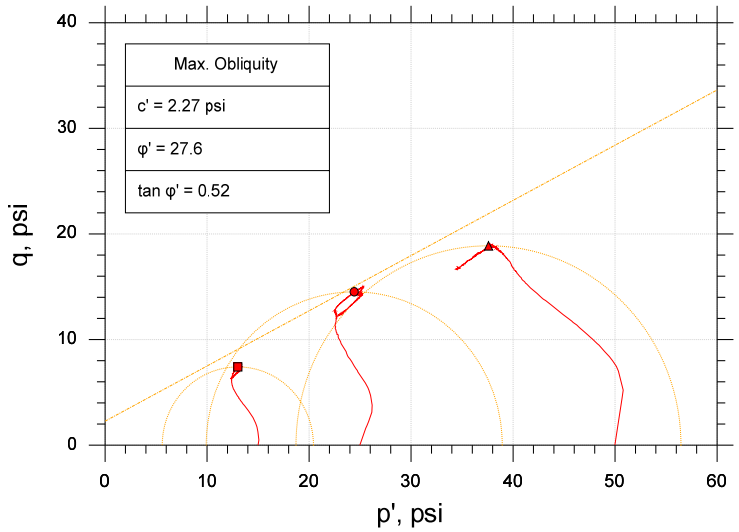
Remarks: TX-028

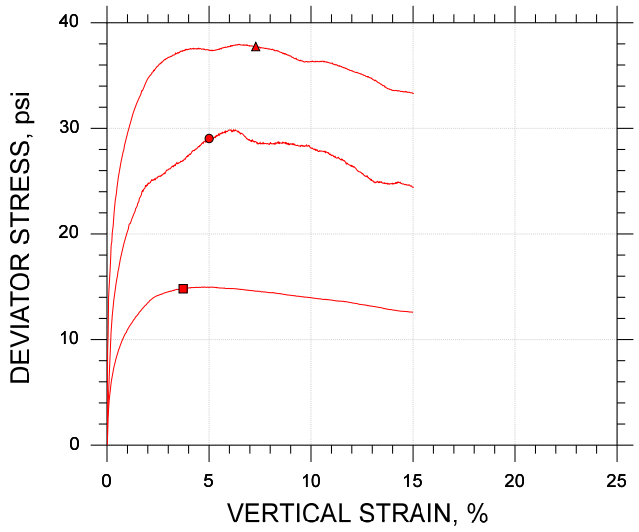
Phase calculations based on start of test.

Wed, 06-MAY-2026 11:02:04

Client: Kleinfelder, Inc.	
Project Name: Sherman Street - 41 Bellis	
Project Location: Cambridge, MA	
Project Number: GTX-323051	
Tested By: sjt	Checked By: anm
Boring ID: KLF-102	
Preparation: intact	
Description: Moist, gray clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: 36	Plastic Limit: 21
Plasticity Index: 15	Estimated Specific Gravity: 2.75

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

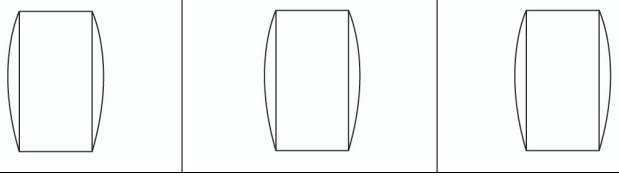




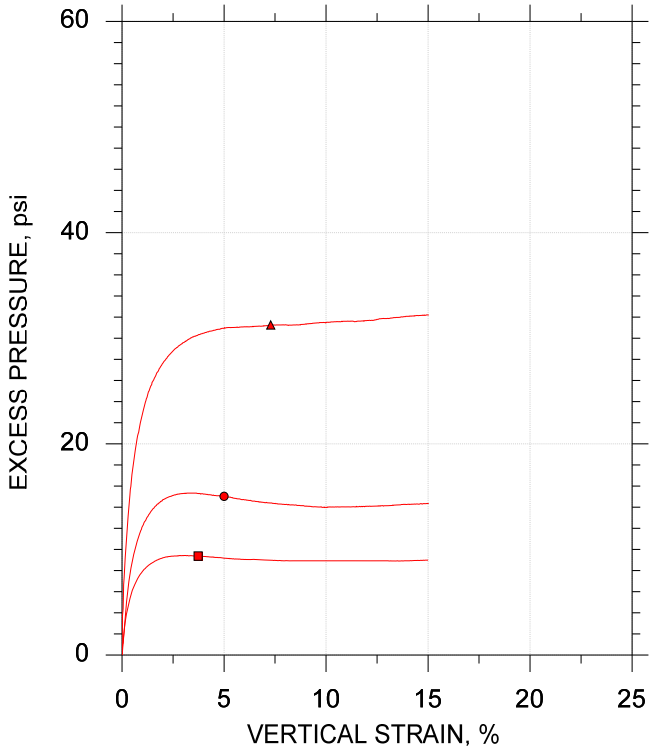
Symbol		■	●	▲	
Sample ID		U-1	U-1	U-1	
Depth, ft		37-39'	37-39'	37-39'	
Test Number		CU-1-1	CU-1-2	CU-1-3	
Initial	Height, in	4.600	4.700	4.740	
	Diameter, in	2.010	2.010	2.010	
	Moisture Content (from Cuttings), %	35.7	34.1	31.3	
	Dry Density, pcf	86.5	88.0	92.2	
	Saturation (Wet Method), %	99.6	98.6	99.9	
	Void Ratio	0.984	0.951	0.862	
Before Shear	Moisture Content, %	32.8	31.8	28.5	
	Dry Density, pcf	90.3	91.6	96.3	
	Cross-sectional Area (Method A), in²	3.096	3.125	3.117	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.901	0.875	0.783	
	Back Pressure, psi	159.0	179.0	158.7	
Vertical Effective Consolidation Stress, psi		14.91	24.81	49.80	
Horizontal Effective Consolidation Stress, psi		15.00	24.97	49.98	
Vertical Strain after Consolidation, %		1.054	2.011	2.362	
Volumetric Strain after Consolidation, %		1.958	2.683	3.768	
Time to 50% Consolidation, min		---	---	36.00	
Shear Strength, psi		7.407	14.52	18.87	
Strain at Failure, %		3.73	5.00	7.29	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		14.81	29.03	37.75	
Effective Minor Principal Stress at Failure, psi		5.611	9.912	18.72	
Effective Major Principal Stress at Failure, psi		20.43	38.94	56.47	
B-Value		0.89	0.94	0.86	

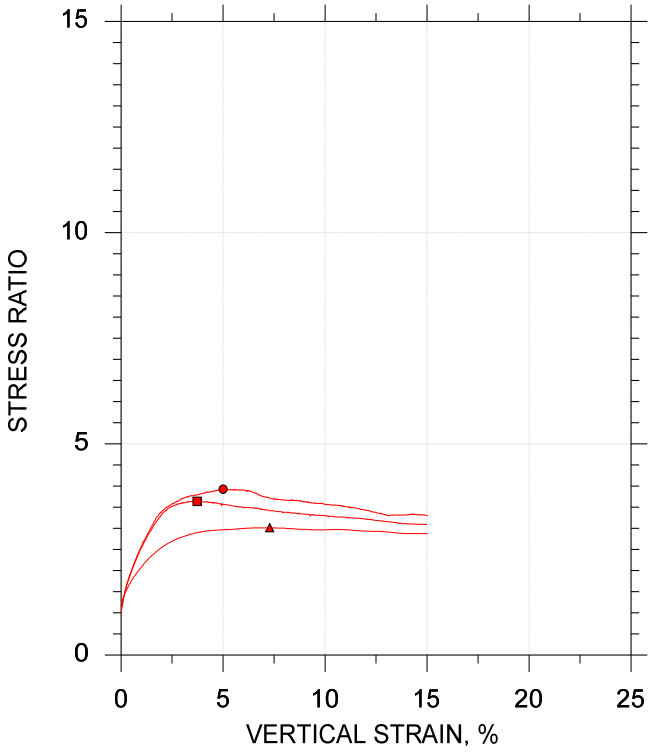
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Atterberg Limits determined by ASTM D4318.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

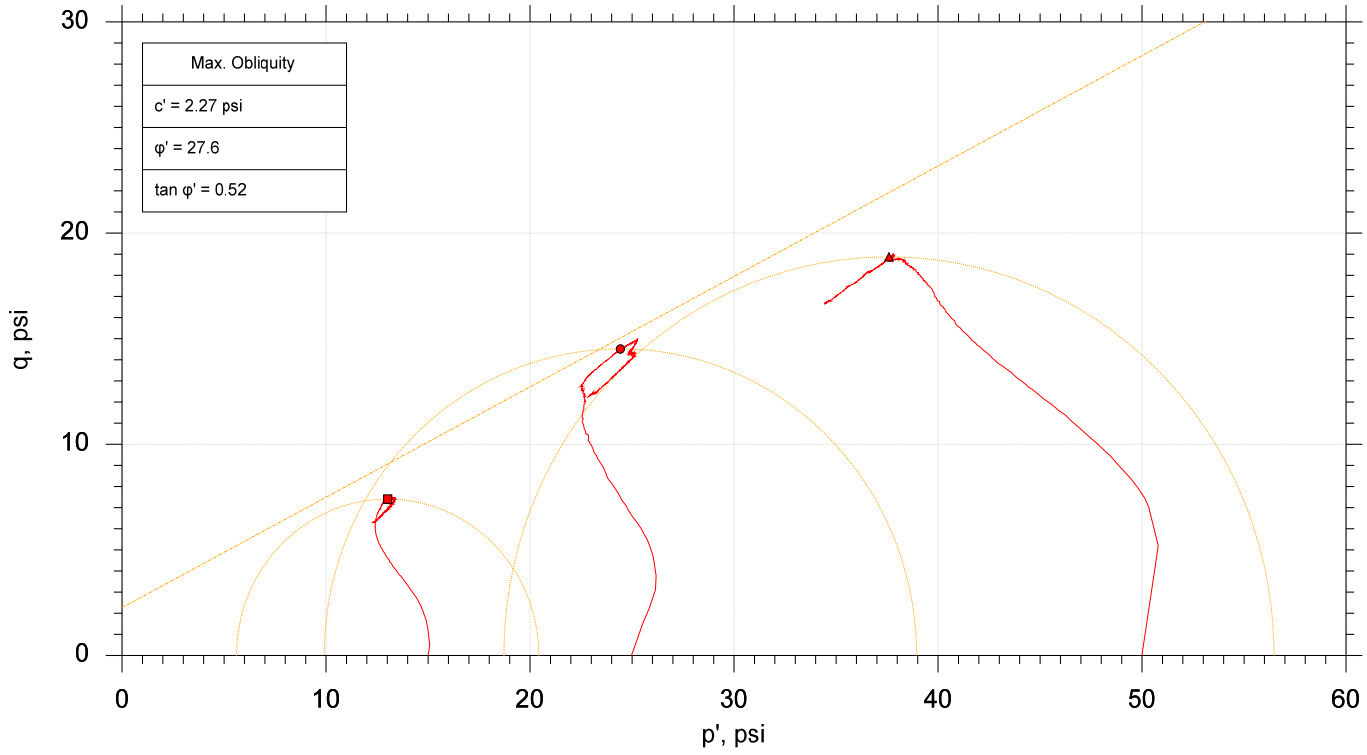
Remarks:



CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







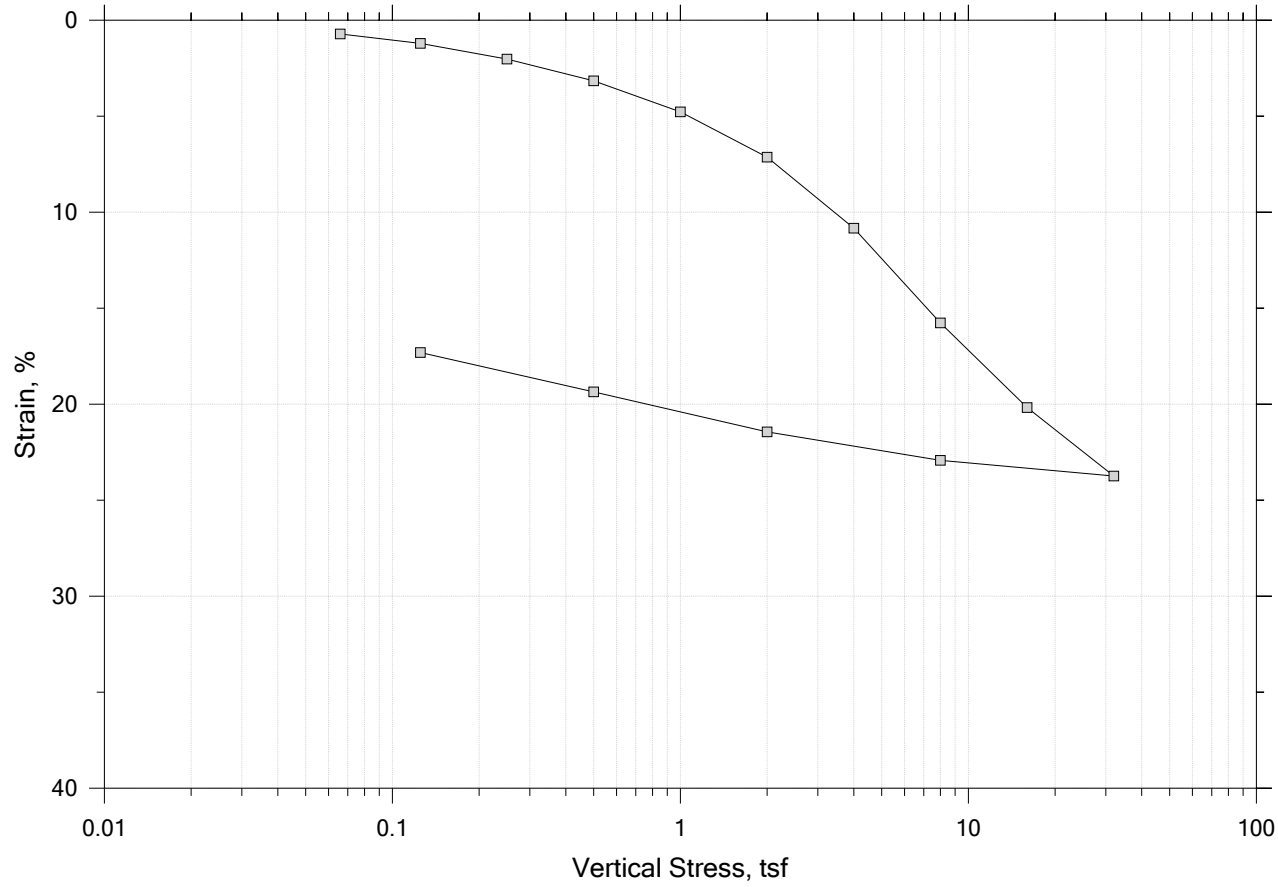
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U-1	CU-1-1	37-39'	sjt	04/29/26	anm	5/5/26	323051-CU-1-1v.dat
●	U-1	CU-1-2	37-39'	sjt	04/29/26	anm	5/5/26	323051-CU-1-2v.dat
▲	U-1	CU-1-3	37-39'	sjt	04/29/26	anm	5/5/26	323051-CU-1-3v.dat

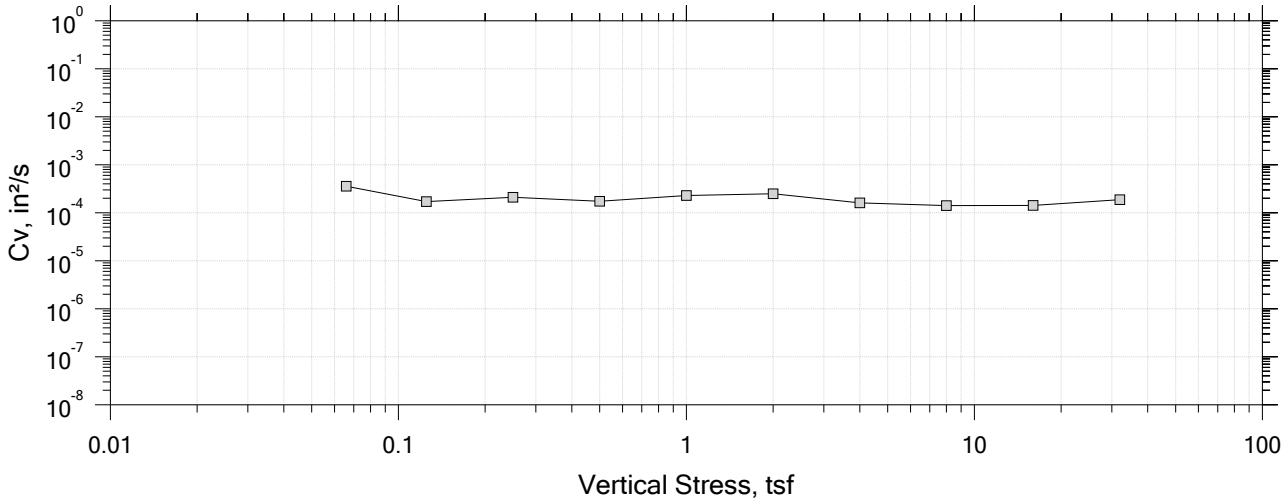
GeoTesting EXPRESS
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Project: Sherman Street - 41 Bellis	Location: Cambridge, MA	Project No.: GTX-323051
Boring No.: KLF-102	Sample Type: intact	
Description: Moist, gray clay		
Remarks: TX-018		

One-Dimensional Consolidation by ASTM D2435 - Method B

Summary Report

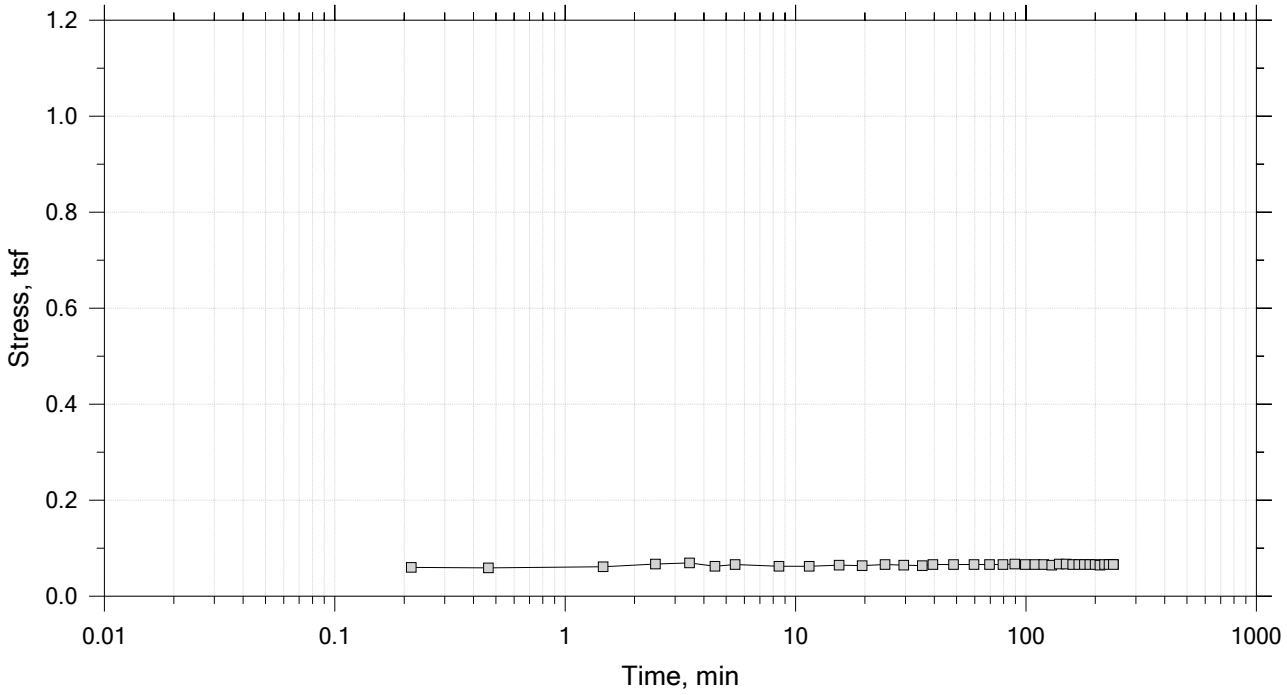


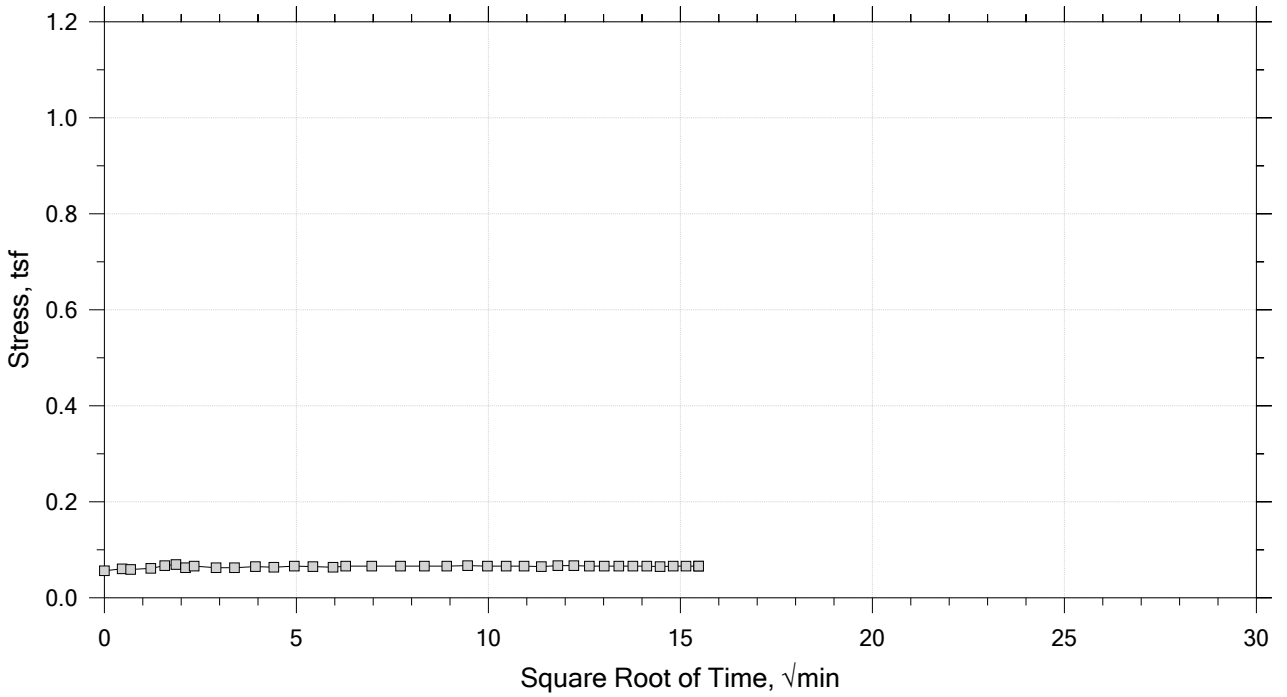


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 14
Constant Volume Step
Stress: 0.0659 tsf





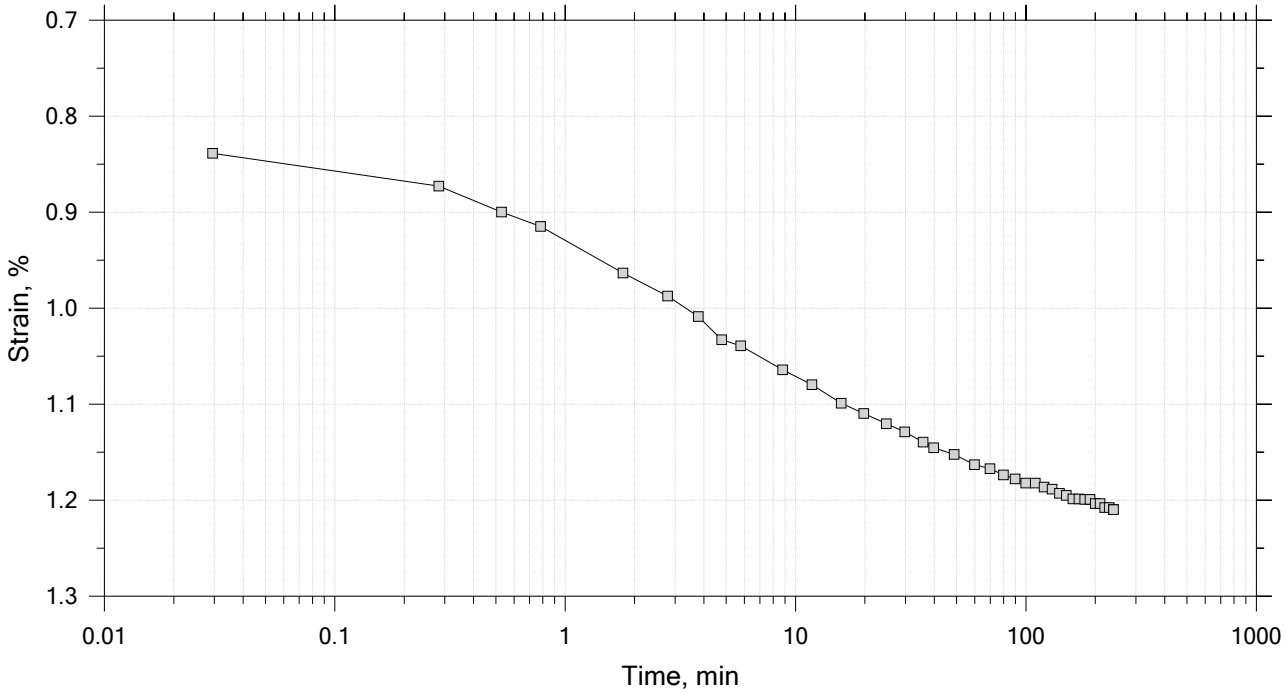
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

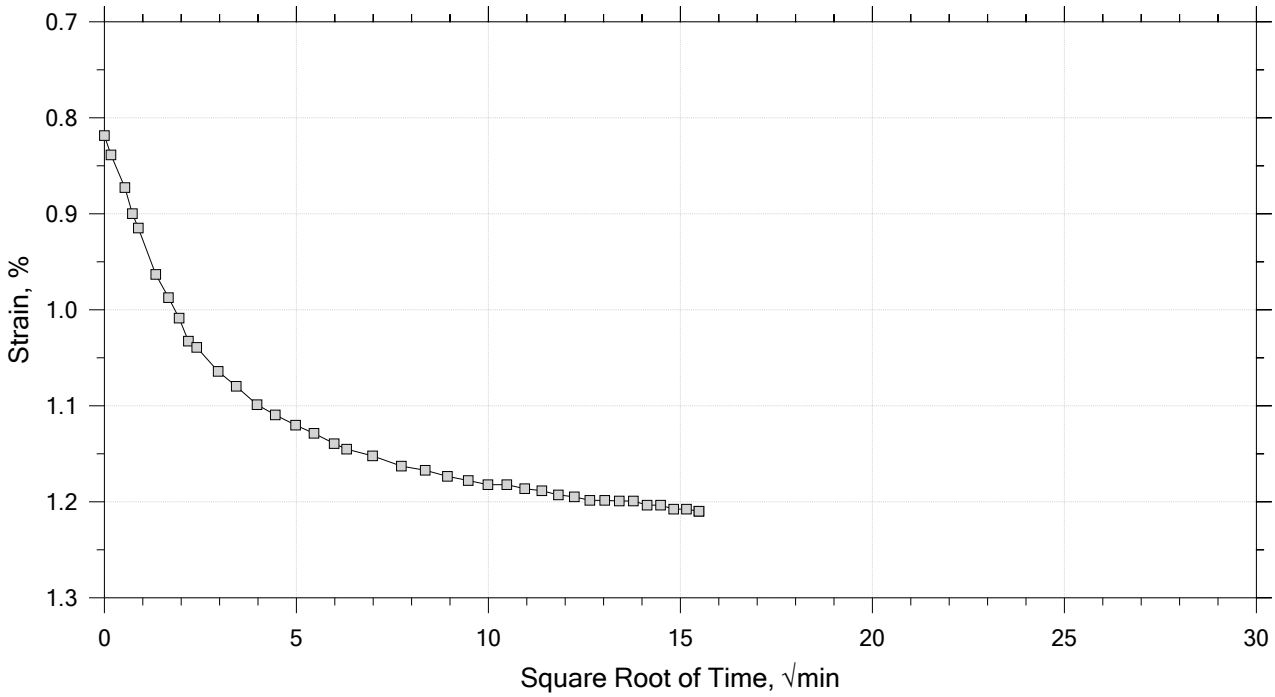
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 14

Constant Load Step

Stress: 0.125 tsf

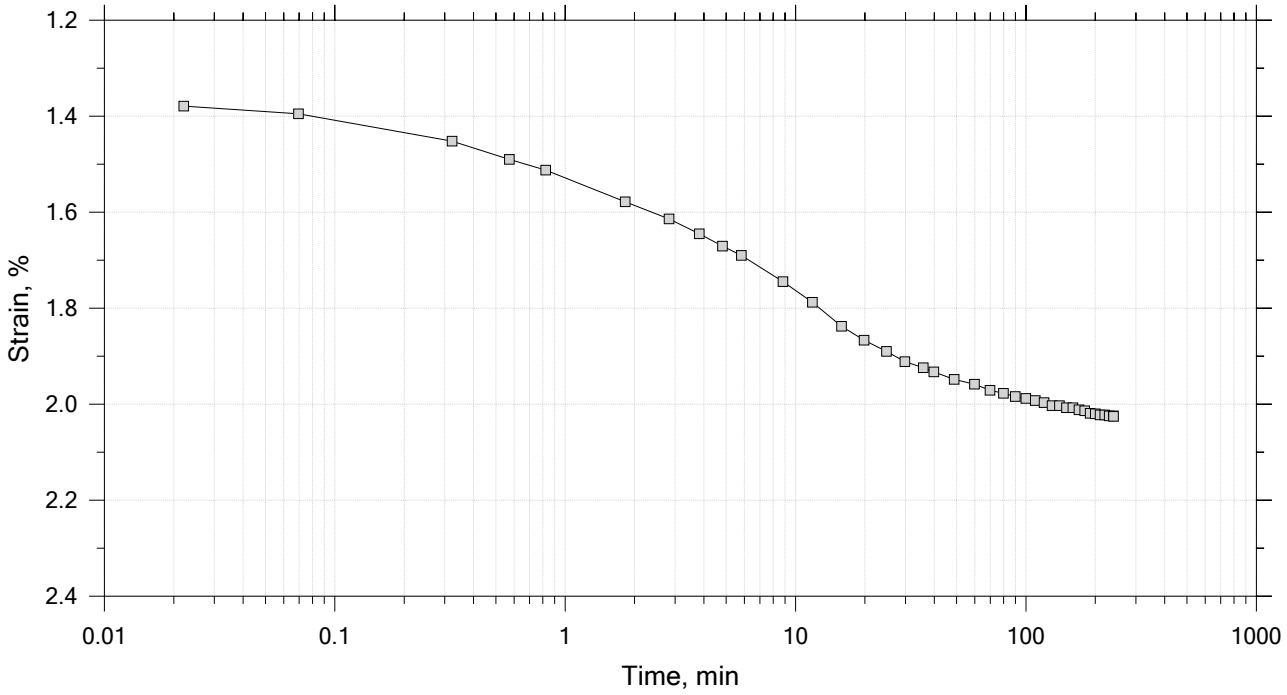


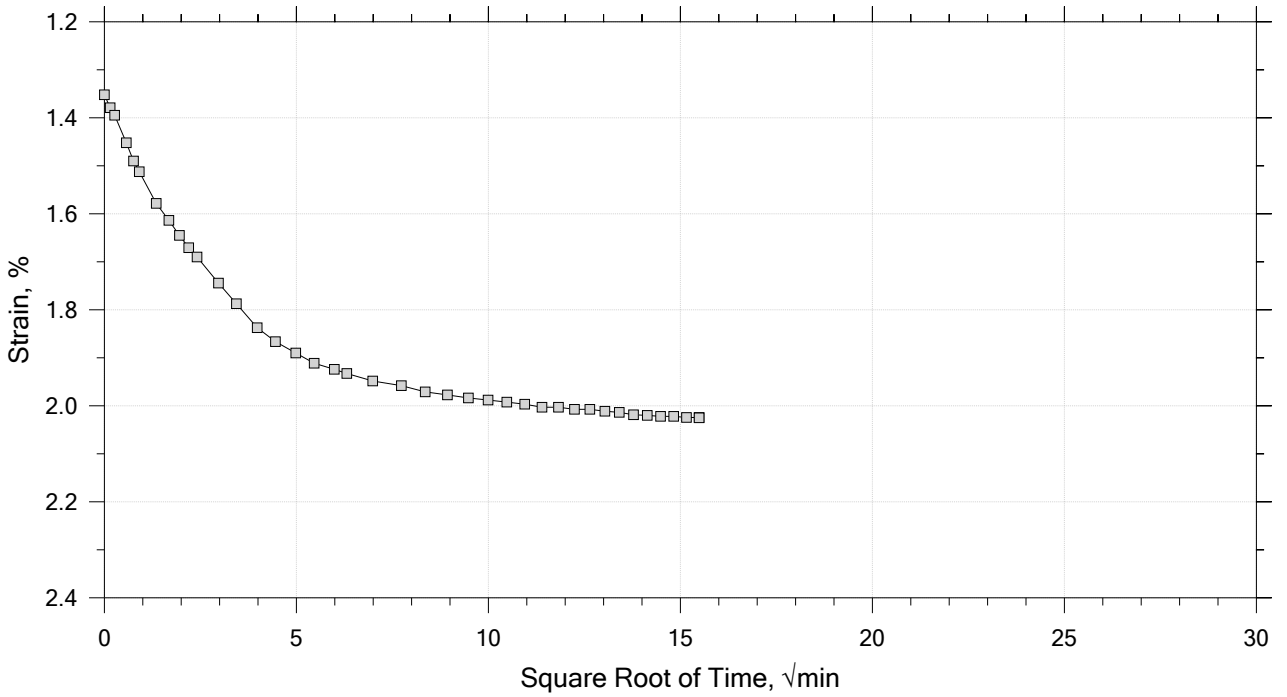


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 14
Constant Load Step
Stress: 0.25 tsf

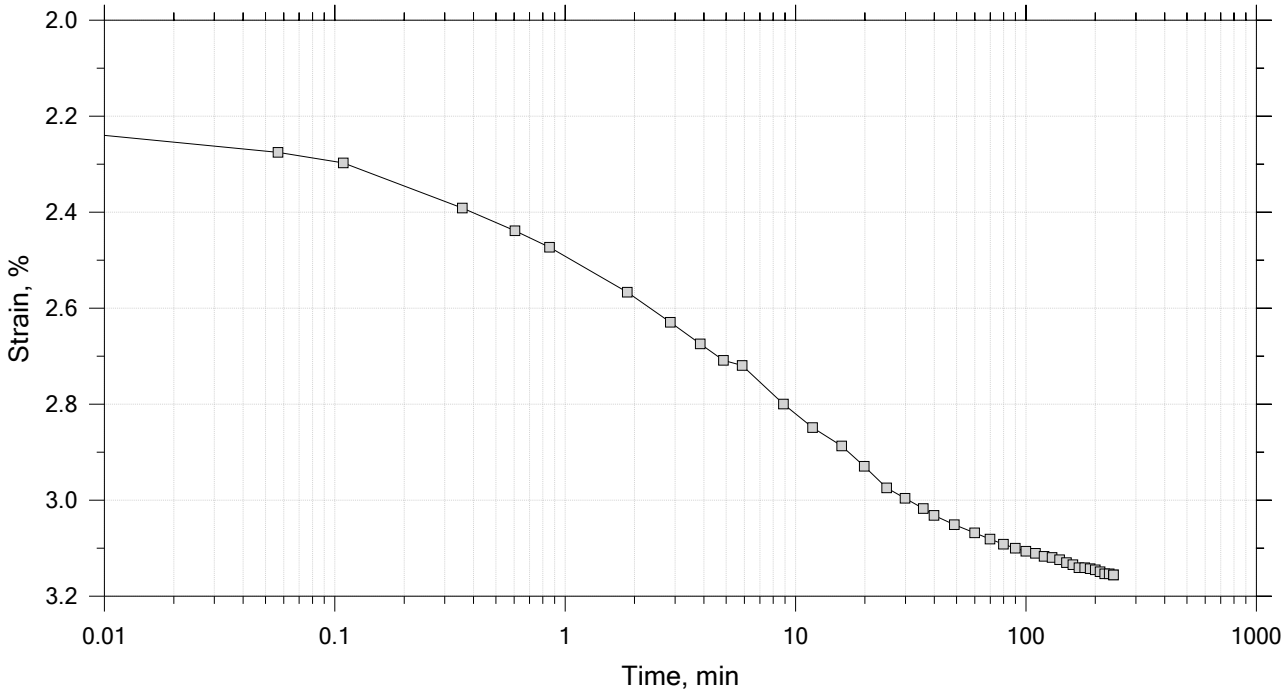


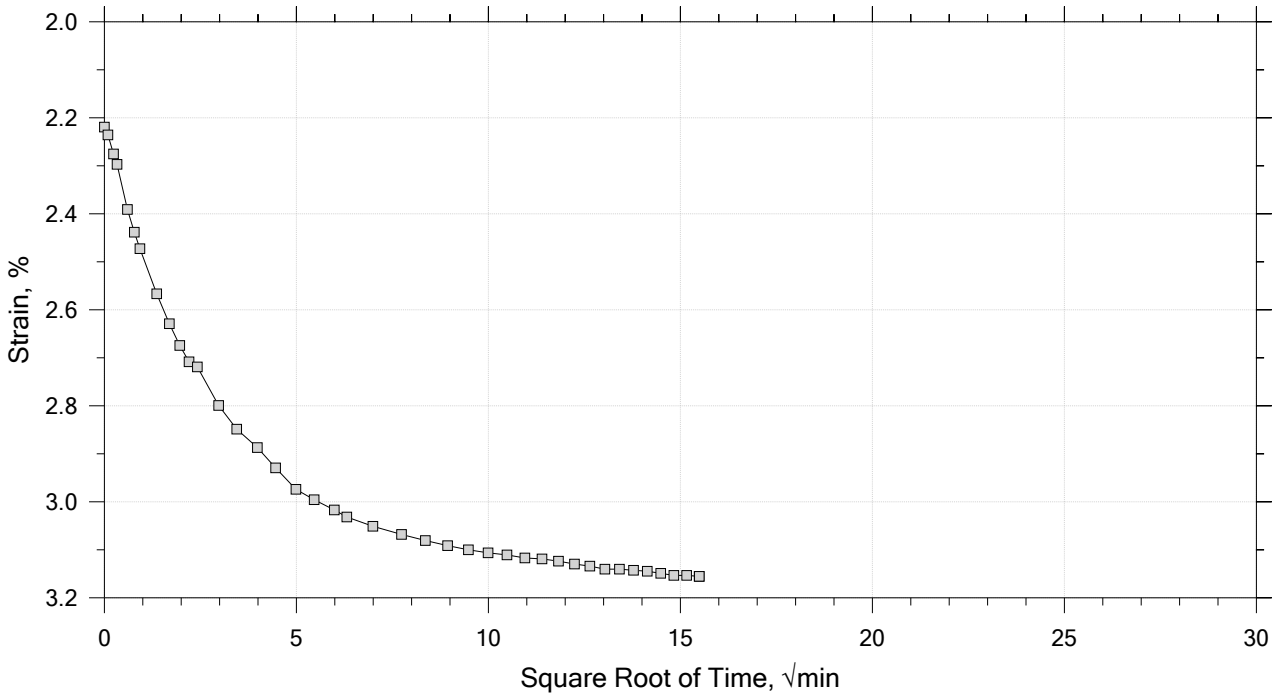


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 14
Constant Load Step
Stress: 0.5 tsf





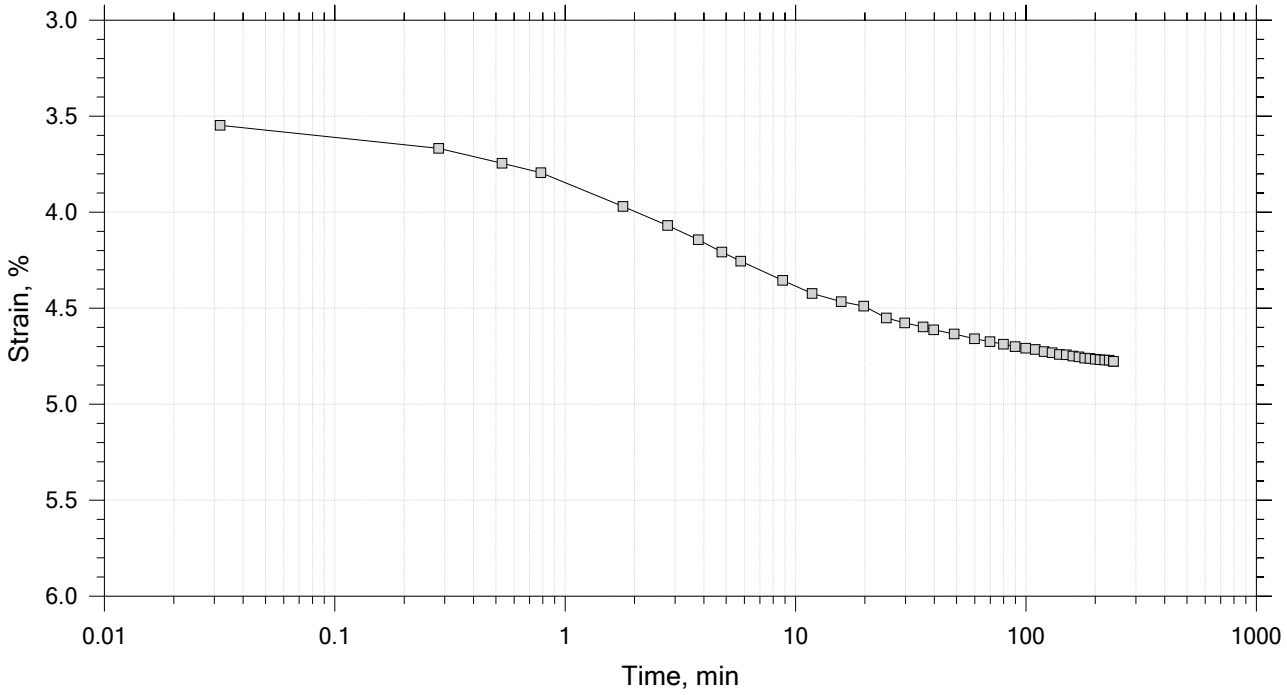
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

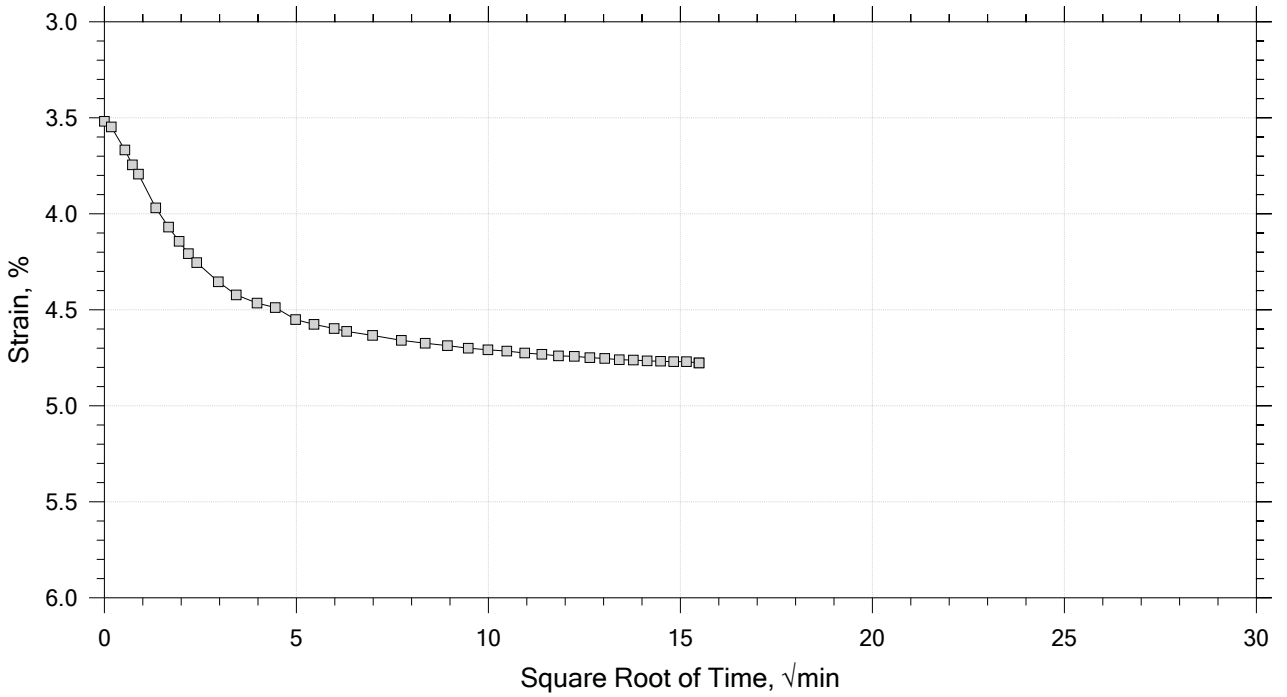
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 14

Constant Load Step

Stress: 1 tsf





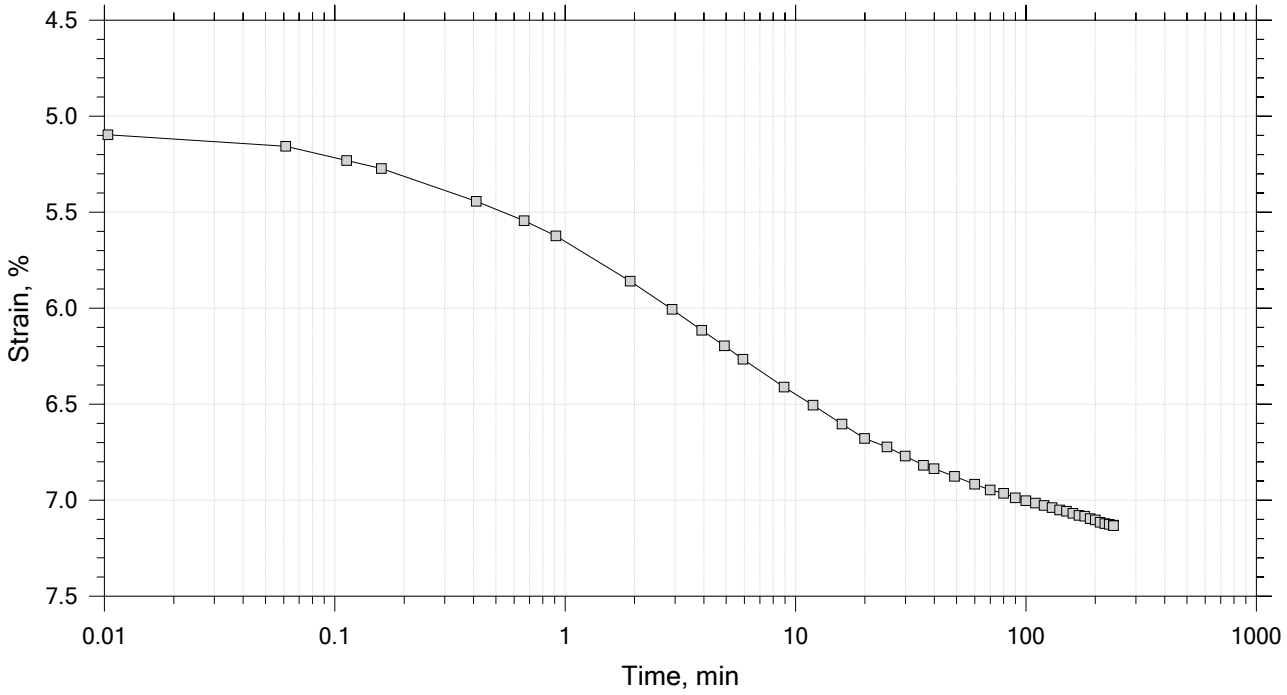
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

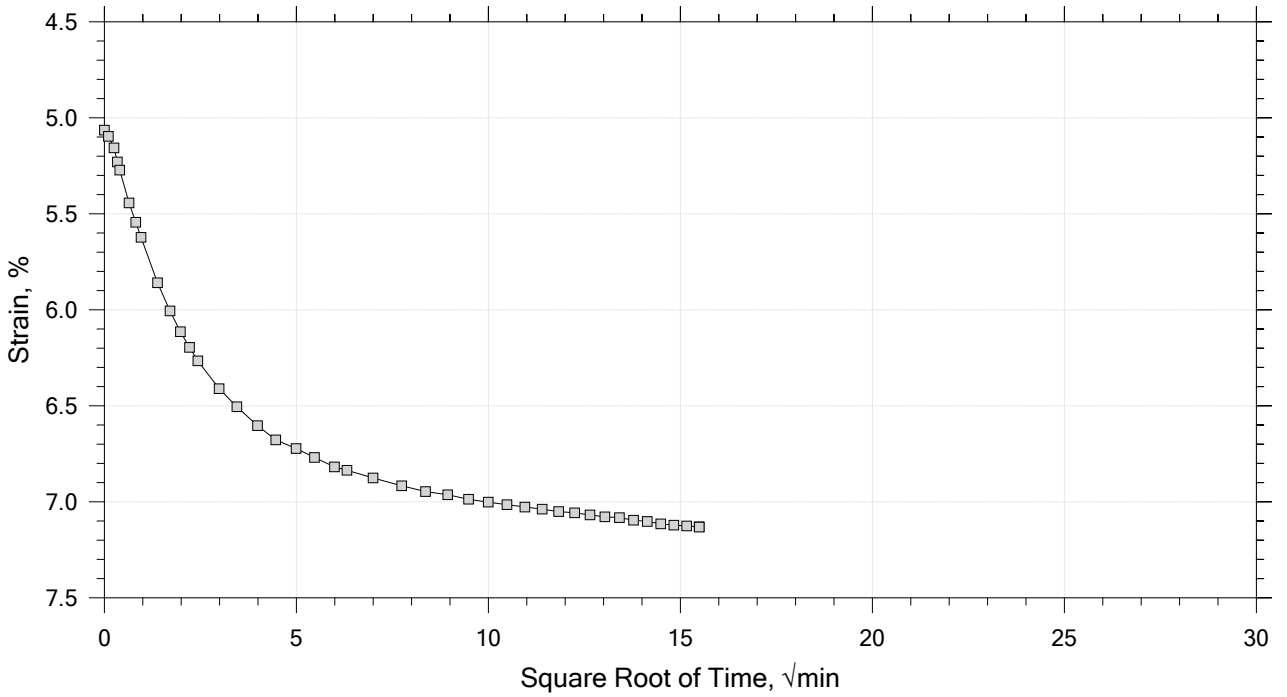
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 14

Constant Load Step

Stress: 2 tsf





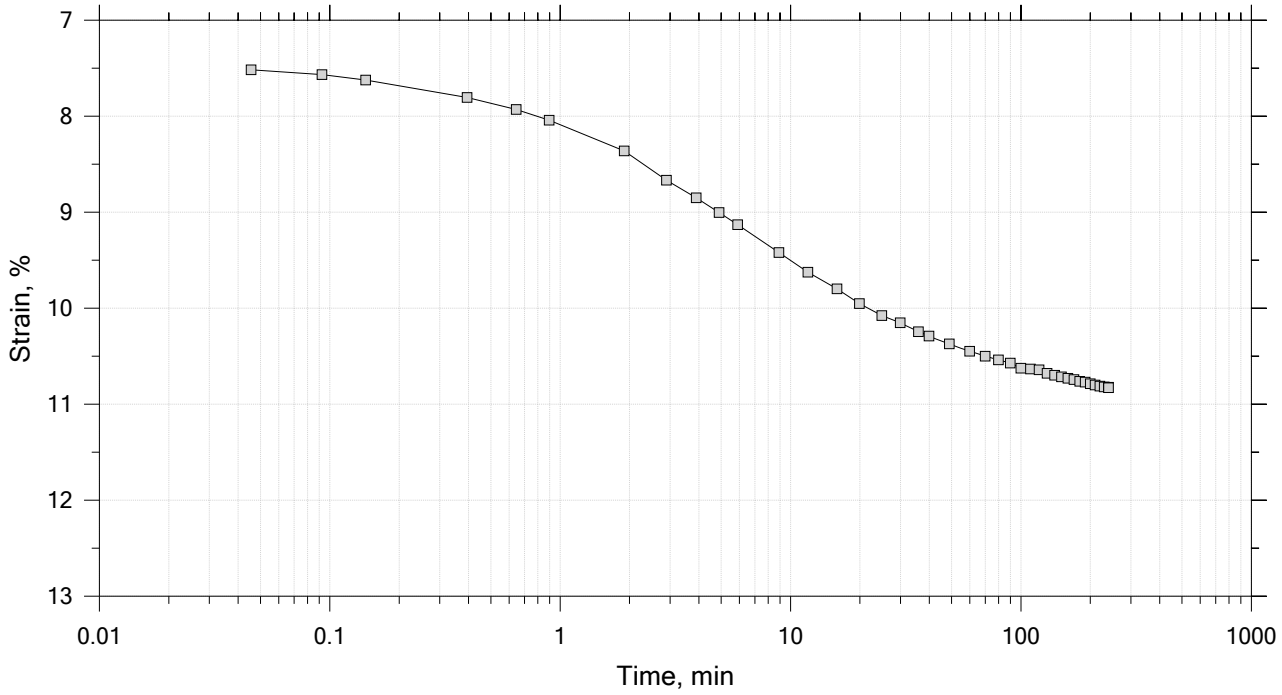
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

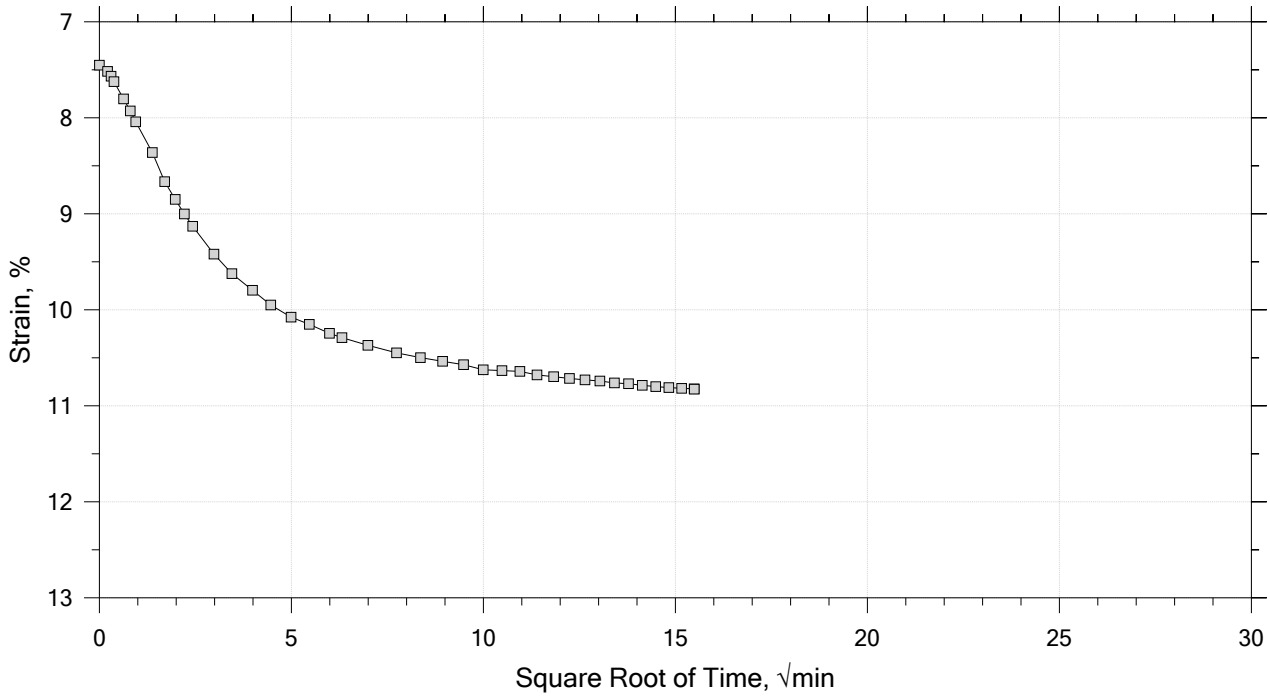
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 14

Constant Load Step

Stress: 4 tsf





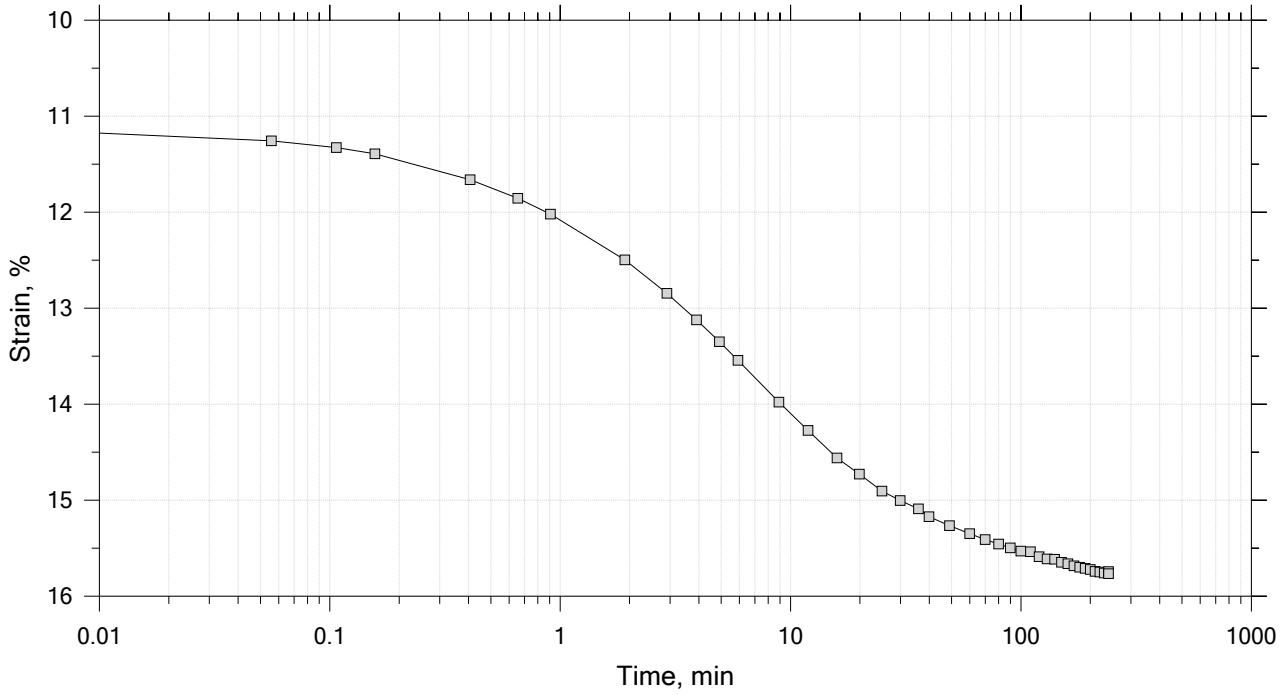
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

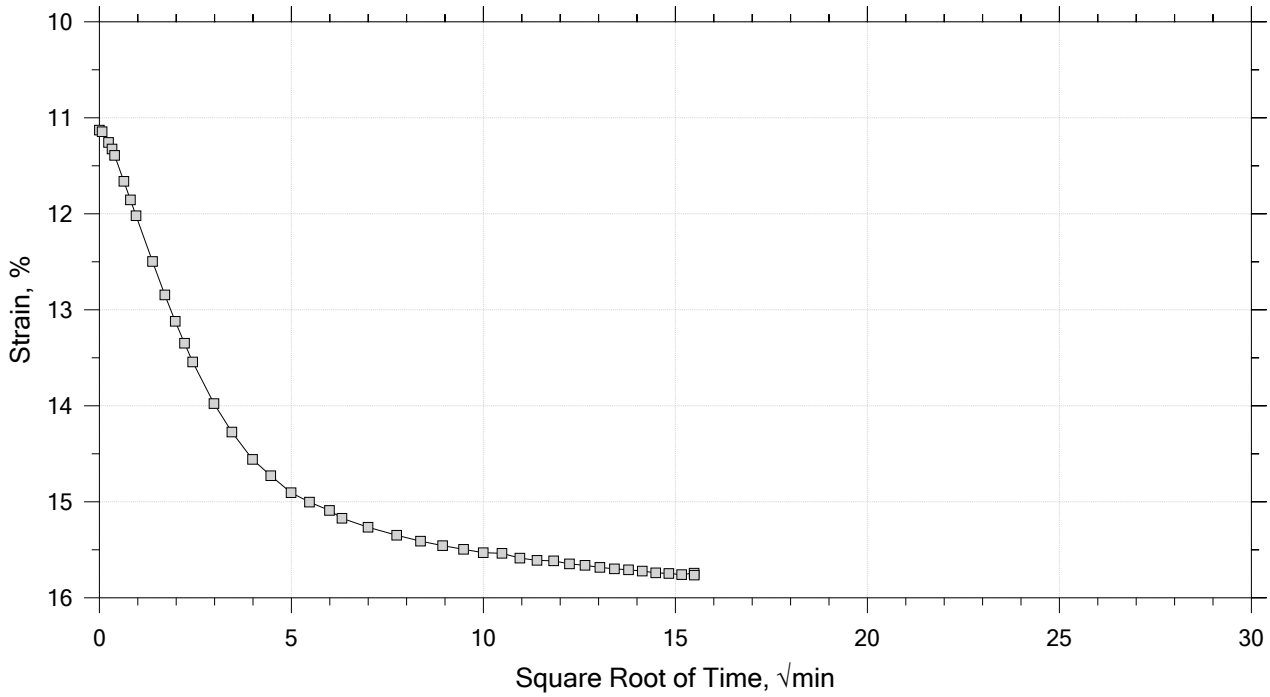
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 14

Constant Load Step

Stress: 8 tsf





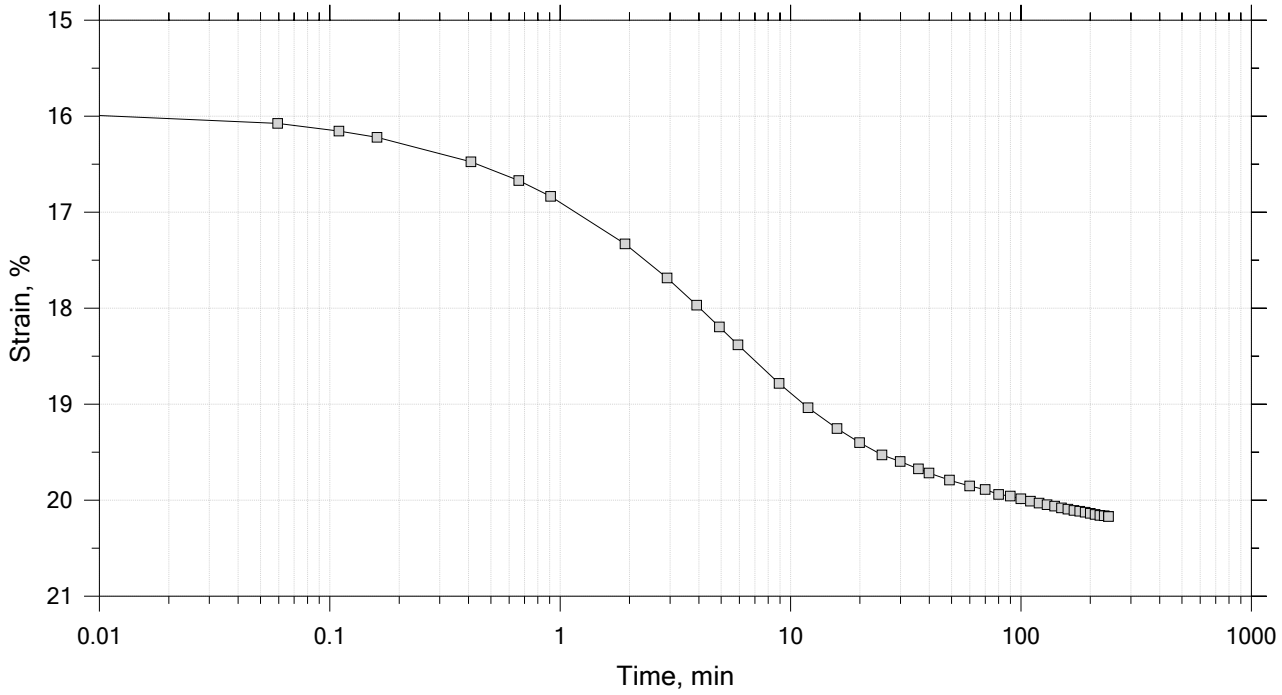
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

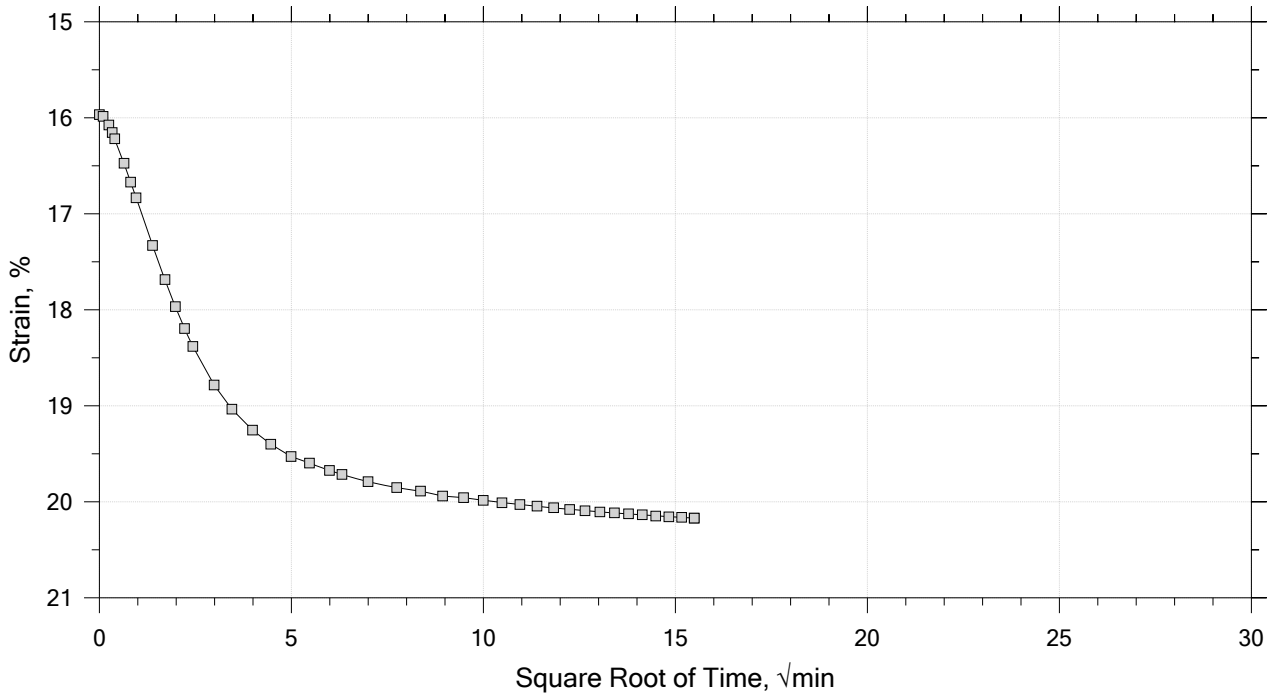
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 14

Constant Load Step

Stress: 16 tsf

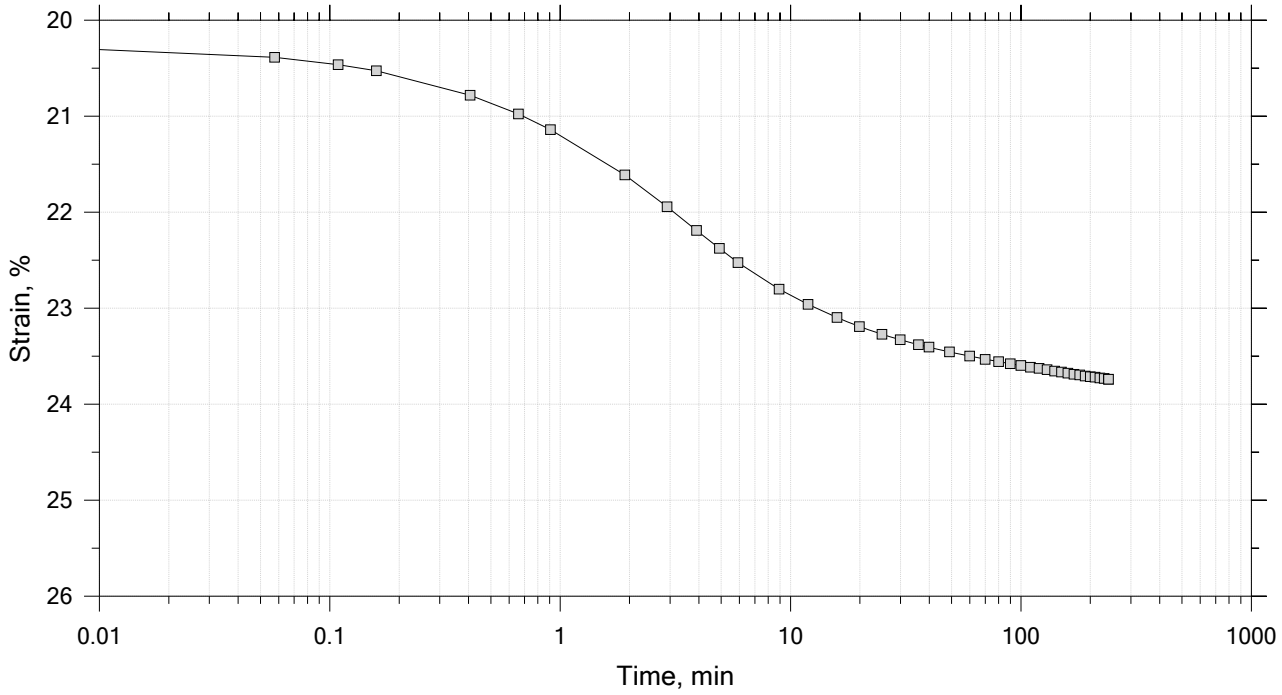


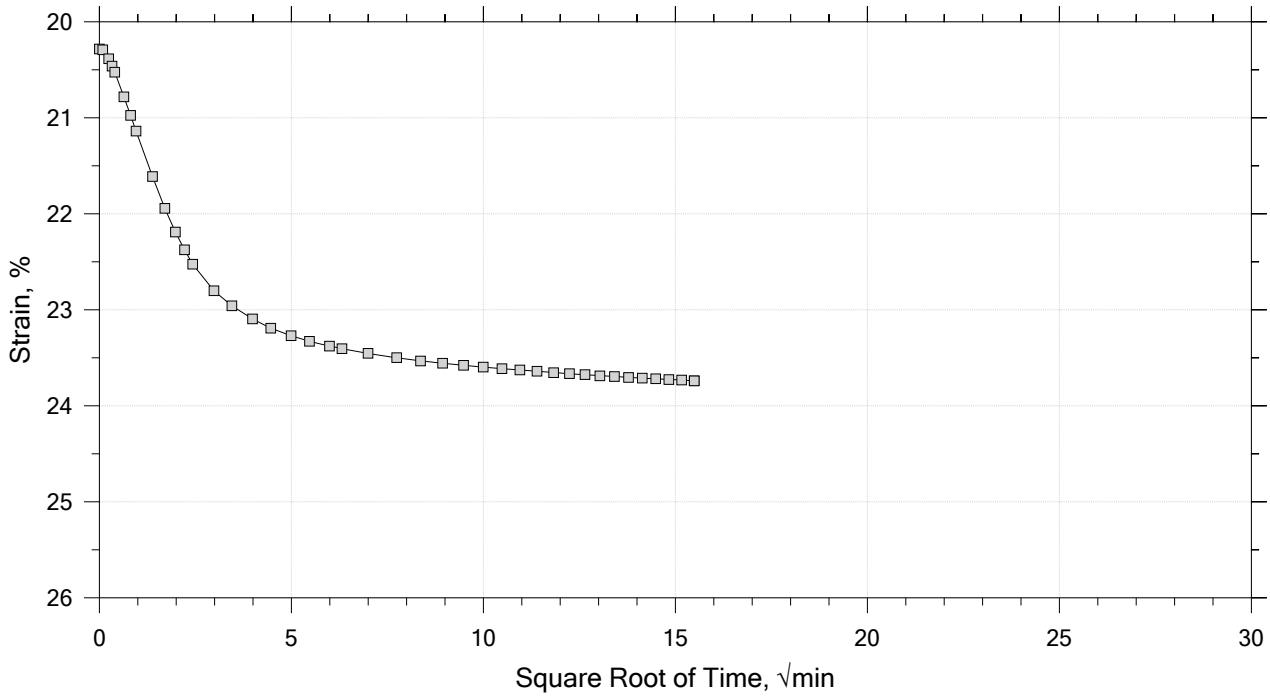


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 14
Constant Load Step
Stress: 32 tsf

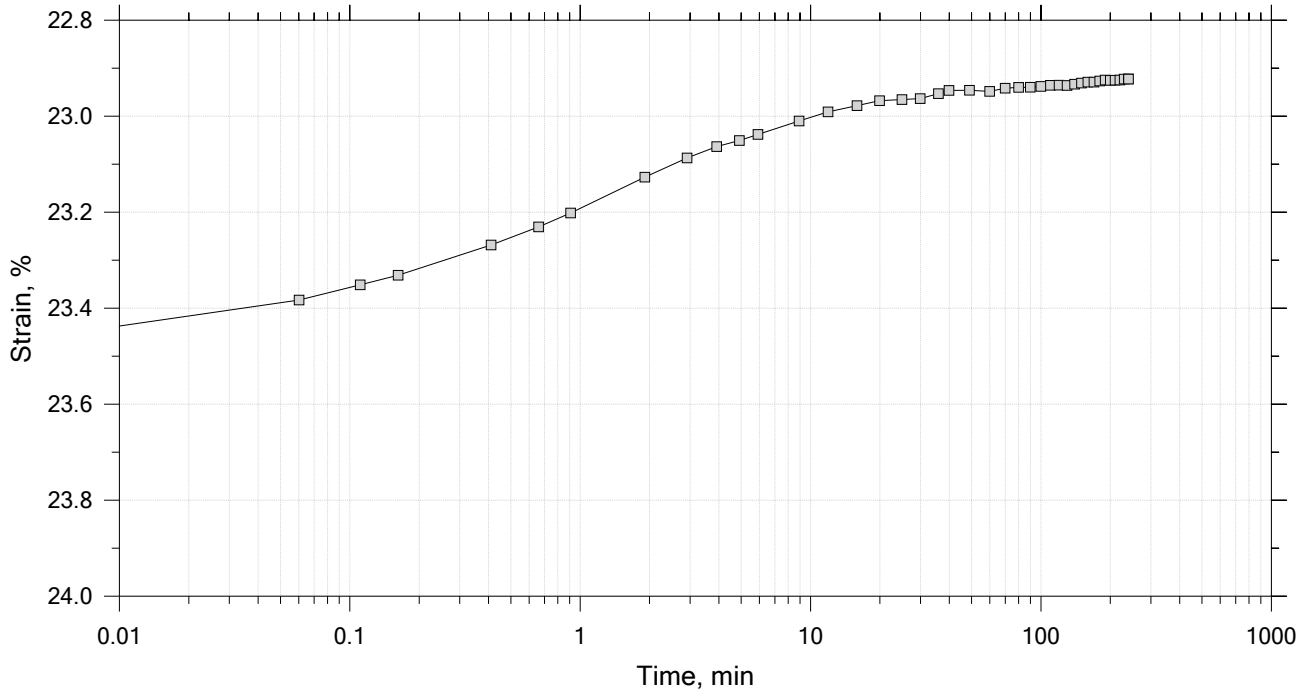


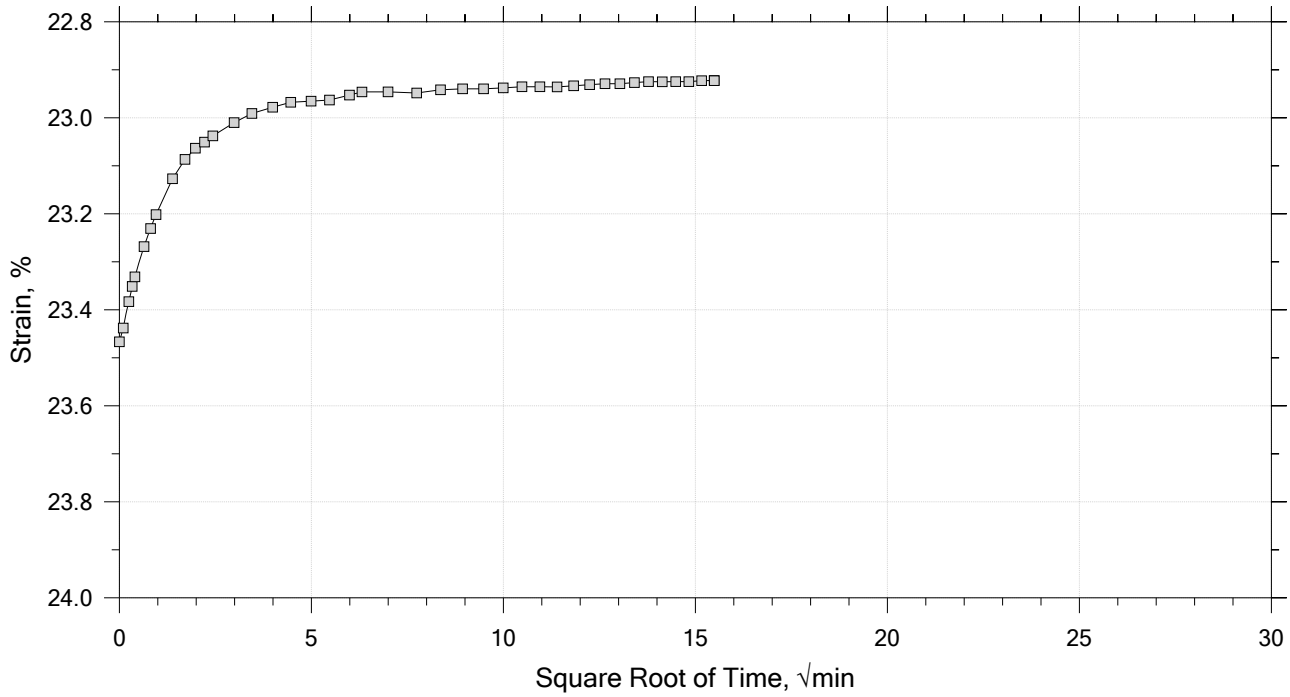


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 14
Constant Load Step
Stress: 8 tsf

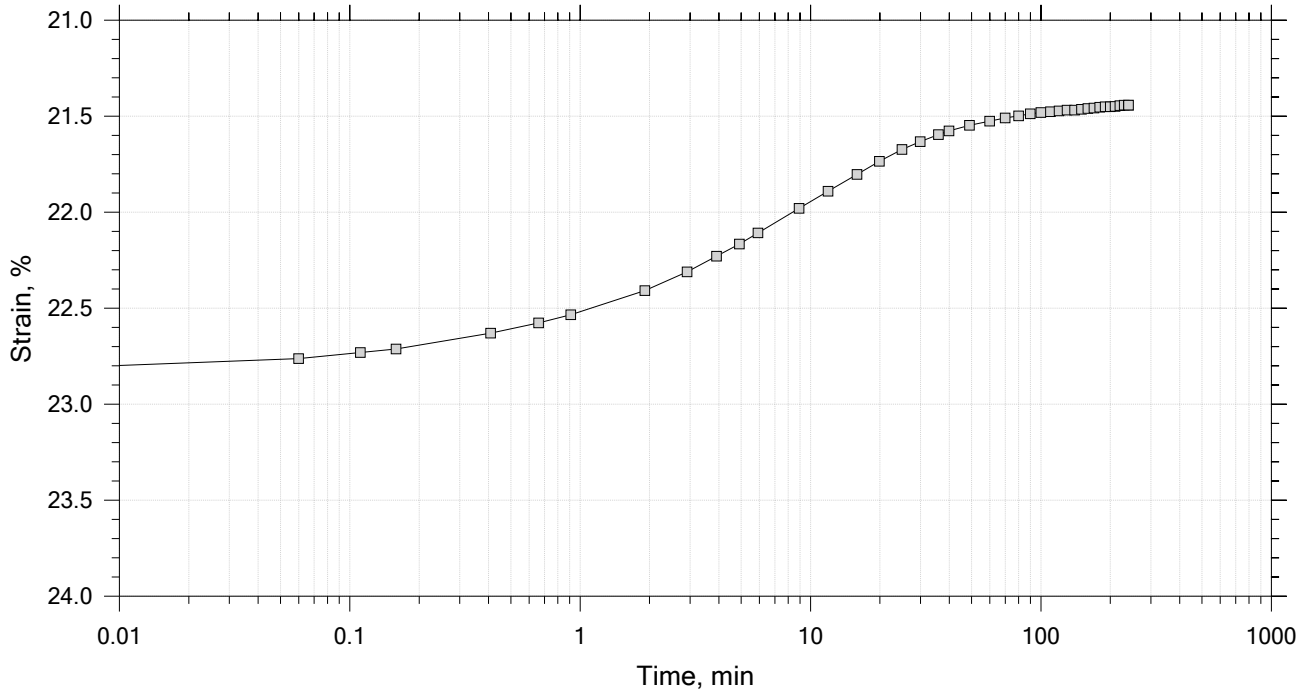


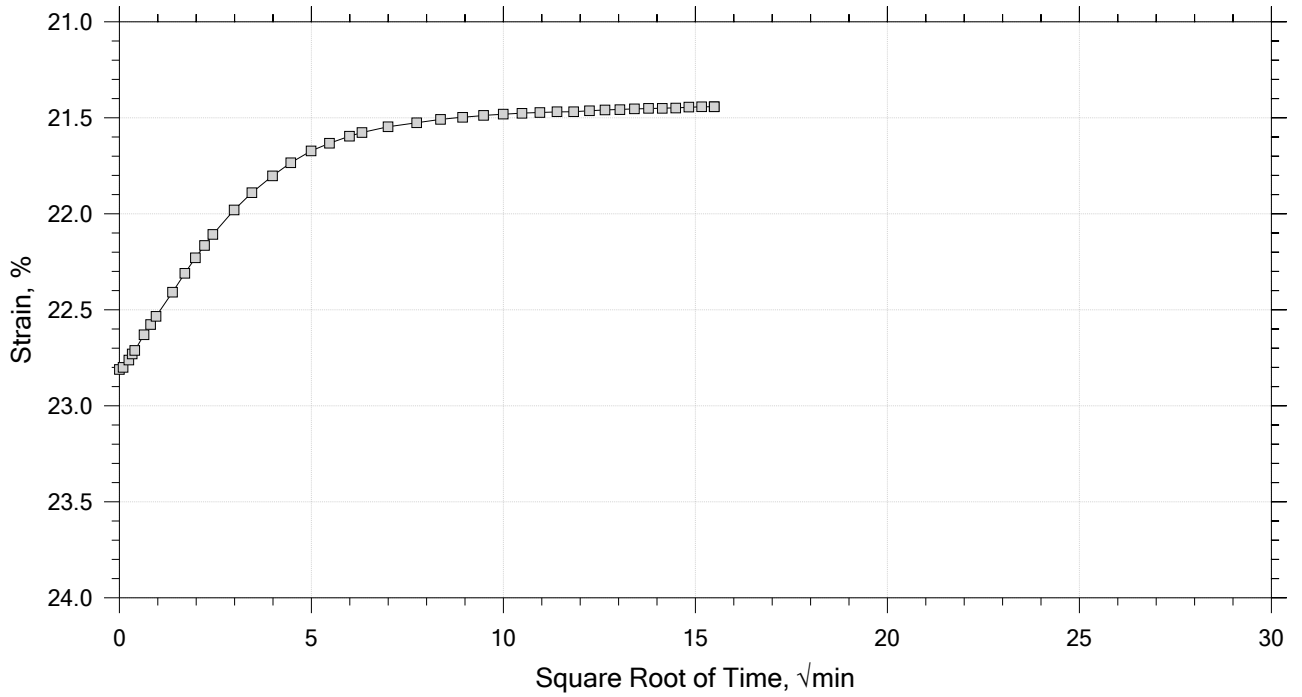


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 14
Constant Load Step
Stress: 2 tsf

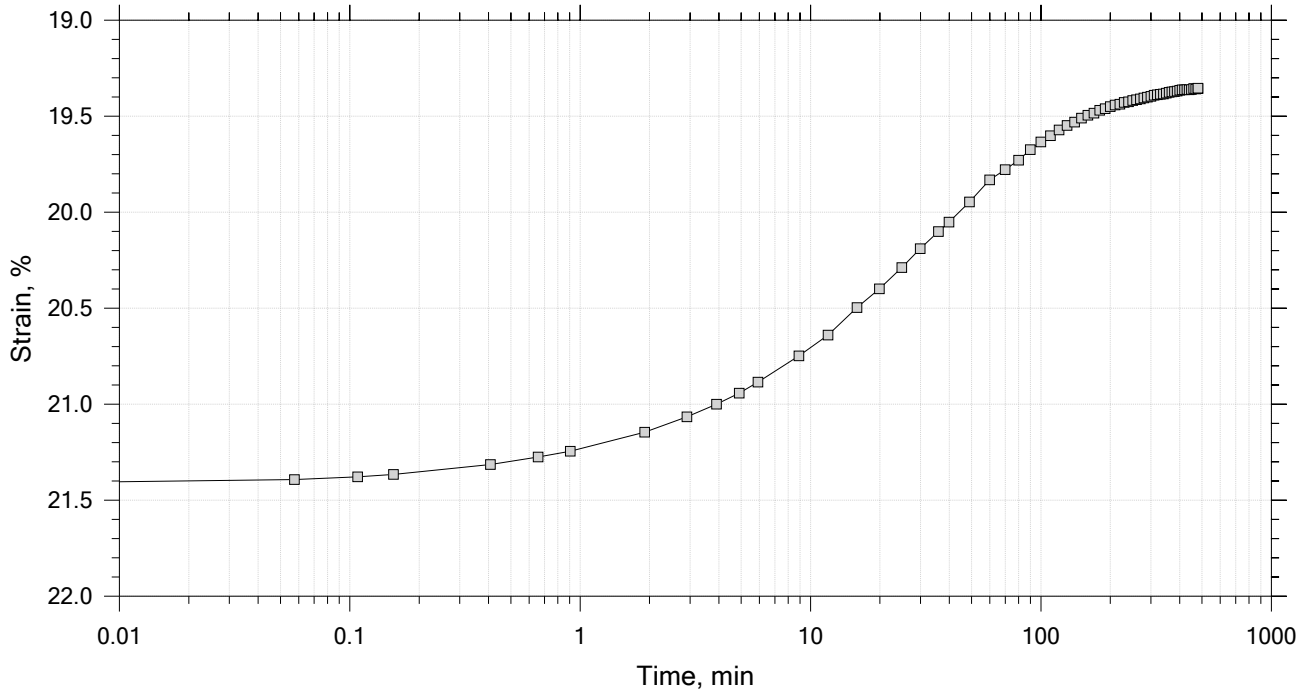


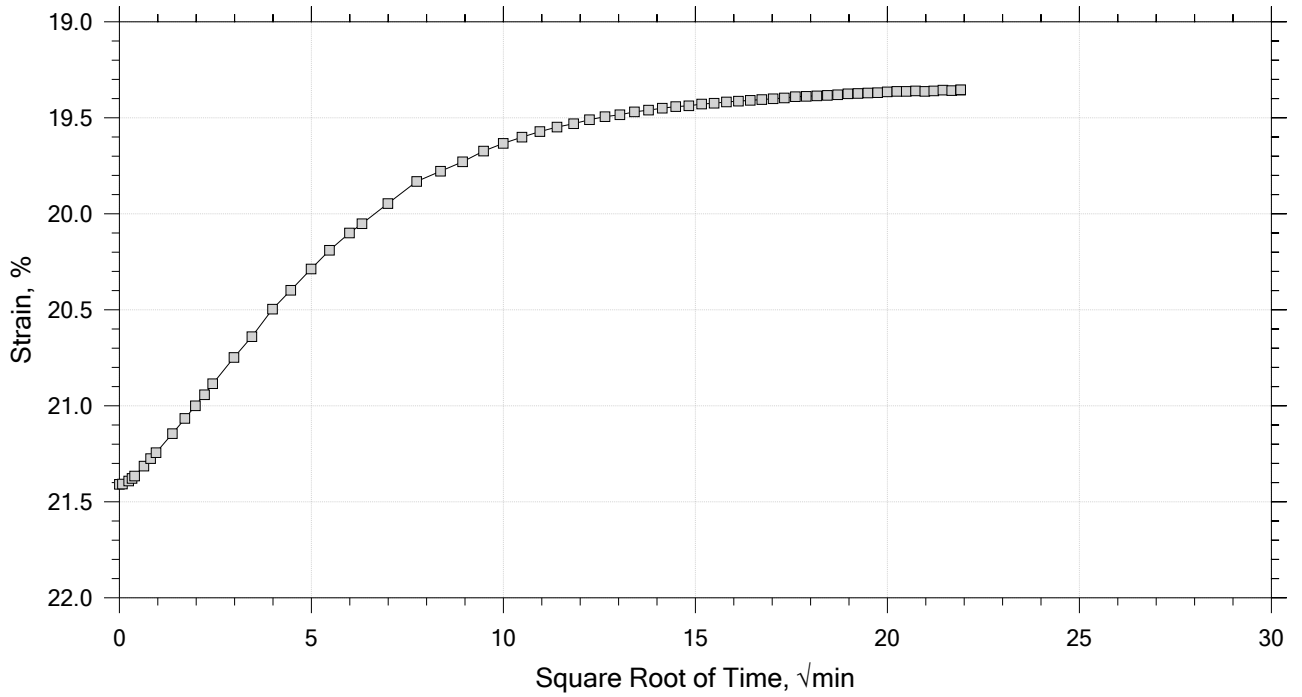


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 14
Constant Load Step
Stress: 0.5 tsf

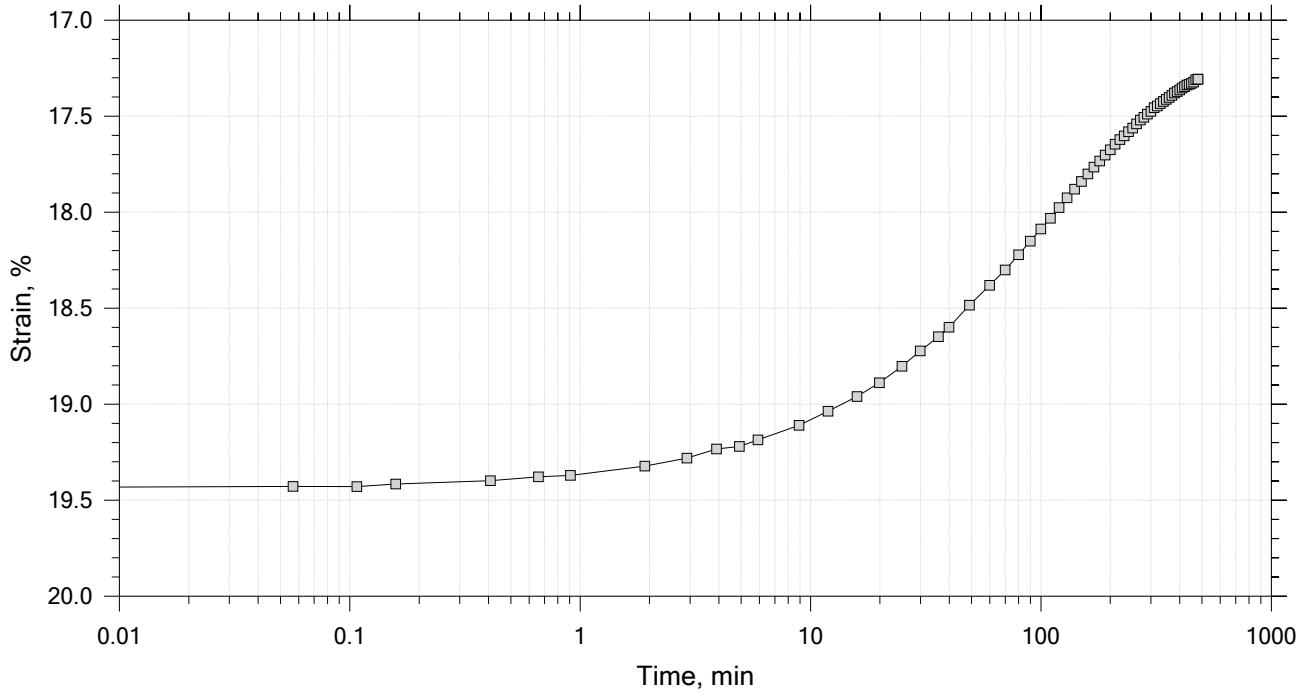


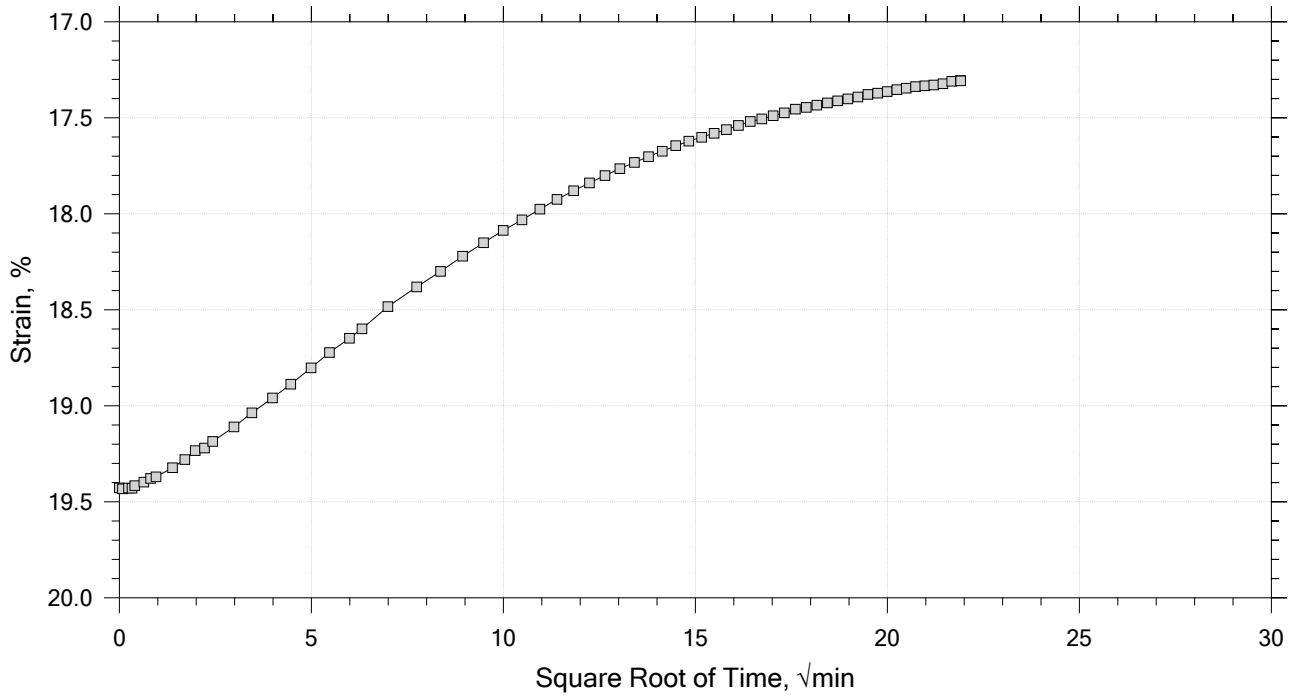


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 14
Constant Load Step
Stress: 0.125 tsf





GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.74	Liquid Limit: 38
Initial Height: 1.00 in	Initial Void Ratio: 0.971	Plastic Limit: 20
Final Height: 0.84 in	Final Void Ratio: 0.656	Plasticity Index: 18

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	E16669	RING		E13898
Mass Container, gm	8.27	108.86	108.86	8.3
Mass Container + Wet Soil, gm	227.31	260.43	247.58	148.73
Mass Container + Dry Soil, gm	171.87	220.82	220.82	121.64
Mass Dry Soil, gm	163.6	111.96	111.96	113.34
Water Content, %	33.89	35.38	23.90	23.90
Void Ratio	---	0.97	0.66	---
Degree of Saturation, %	---	99.95	100.00	---
Dry Unit Weight, pcf	---	86.89	103.44	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

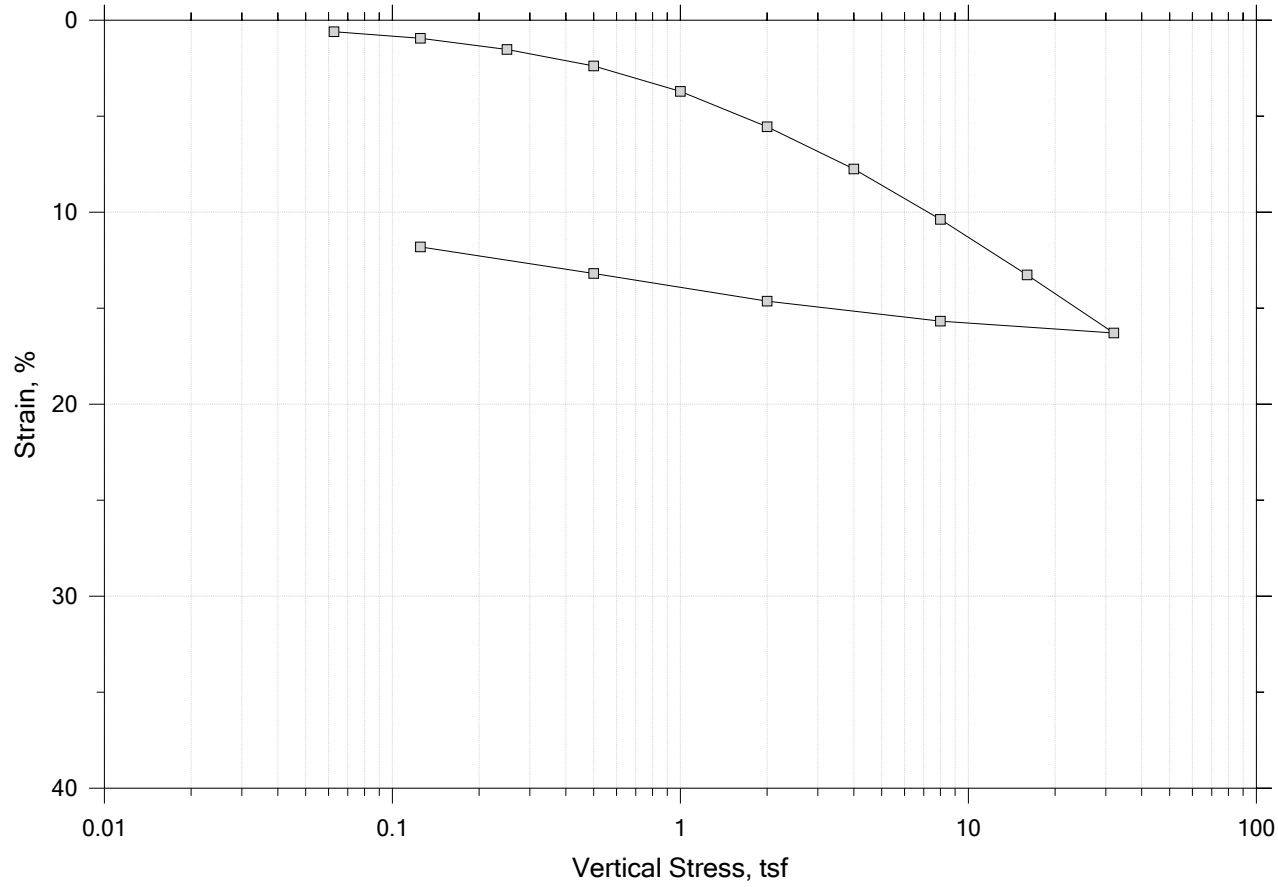
Square Root of Time Coefficients

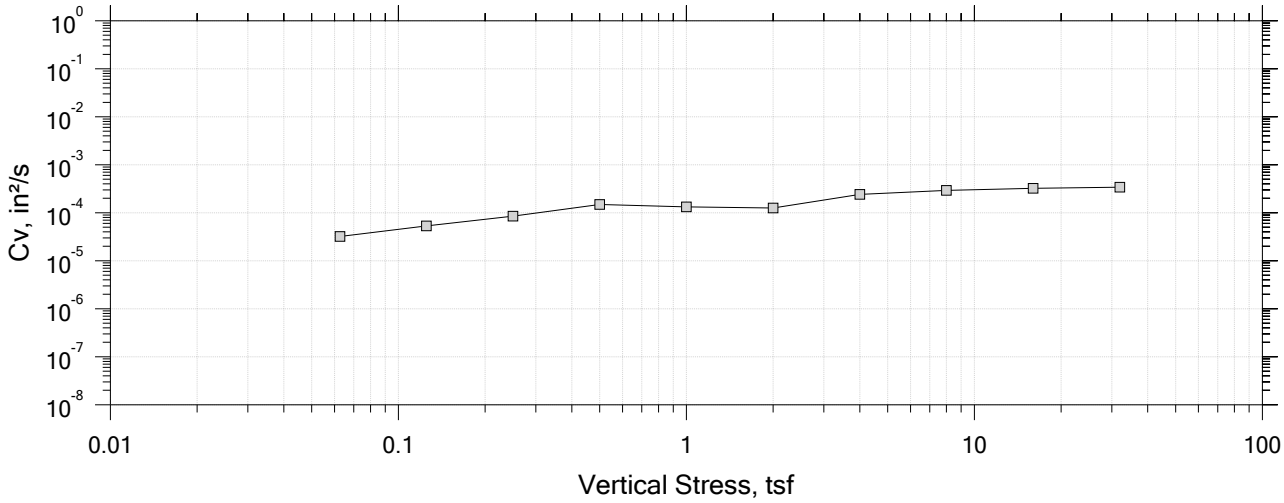
Step	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv in²/s	Mv 1/tsf	k ft/day
1	0.0659	0.007136	0.957	0.714	9.798	3.58e-04	1.08e-01	7.26e-04
2	0.125	0.01210	0.947	1.21	20.332	1.70e-04	8.40e-02	2.68e-04
3	0.250	0.02025	0.931	2.03	16.303	2.10e-04	6.52e-02	2.56e-04
4	0.500	0.03156	0.909	3.16	19.279	1.74e-04	4.52e-02	1.47e-04
5	1.00	0.04777	0.877	4.78	14.197	2.30e-04	3.24e-02	1.39e-04
6	2.00	0.07132	0.831	7.13	12.541	2.49e-04	2.36e-02	1.10e-04
7	4.00	0.1083	0.758	10.8	18.249	1.60e-04	1.85e-02	5.55e-05
8	8.00	0.1576	0.660	15.8	18.806	1.41e-04	1.23e-02	3.26e-05
9	16.0	0.2017	0.574	20.2	16.763	1.42e-04	5.51e-03	1.46e-05
10	32.0	0.2374	0.503	23.7	11.485	1.87e-04	2.23e-03	7.83e-06
11	8.00	0.2292	0.519	22.9	3.903	5.32e-04	3.41e-04	3.39e-06
12	2.00	0.2144	0.548	21.4	17.650	1.21e-04	2.47e-03	5.60e-06
13	0.500	0.1935	0.590	19.4	78.365	2.86e-05	1.39e-02	7.45e-06
14	0.125	0.1731	0.630	17.3	276.957	8.51e-06	5.46e-02	8.70e-06

GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-101	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 42-44'
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: LTIII-H, Swell Pressure = 0.0659 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Summary Report

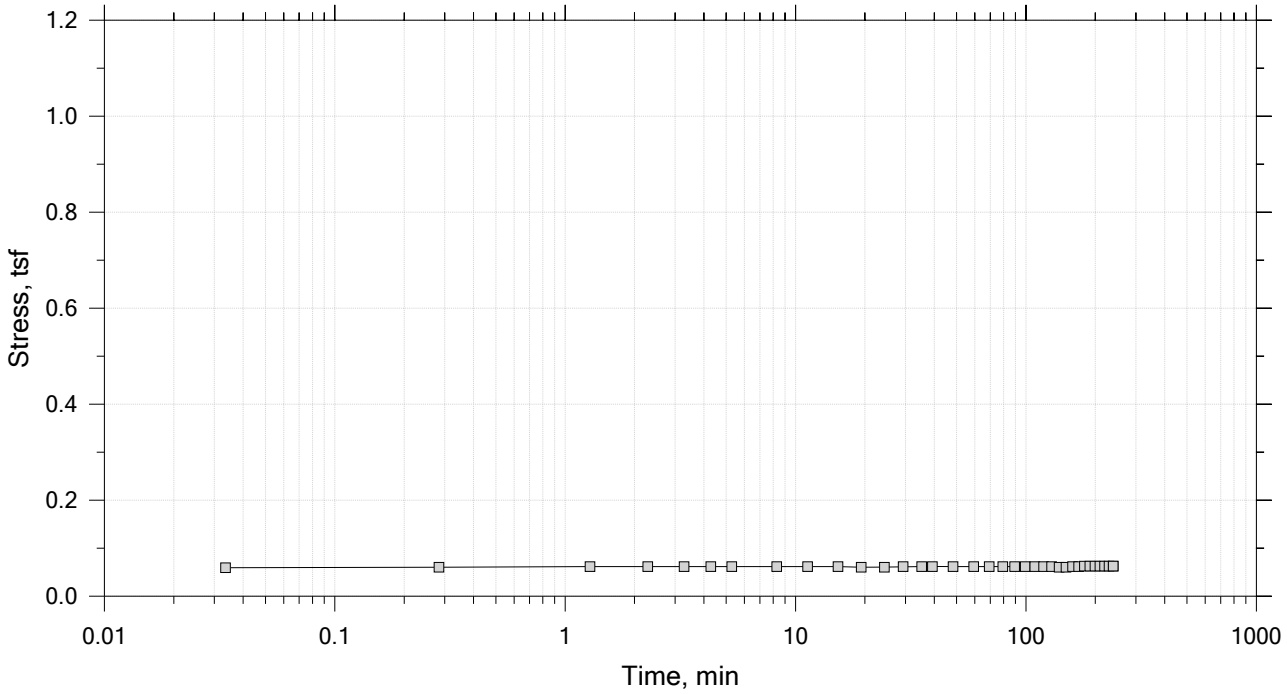


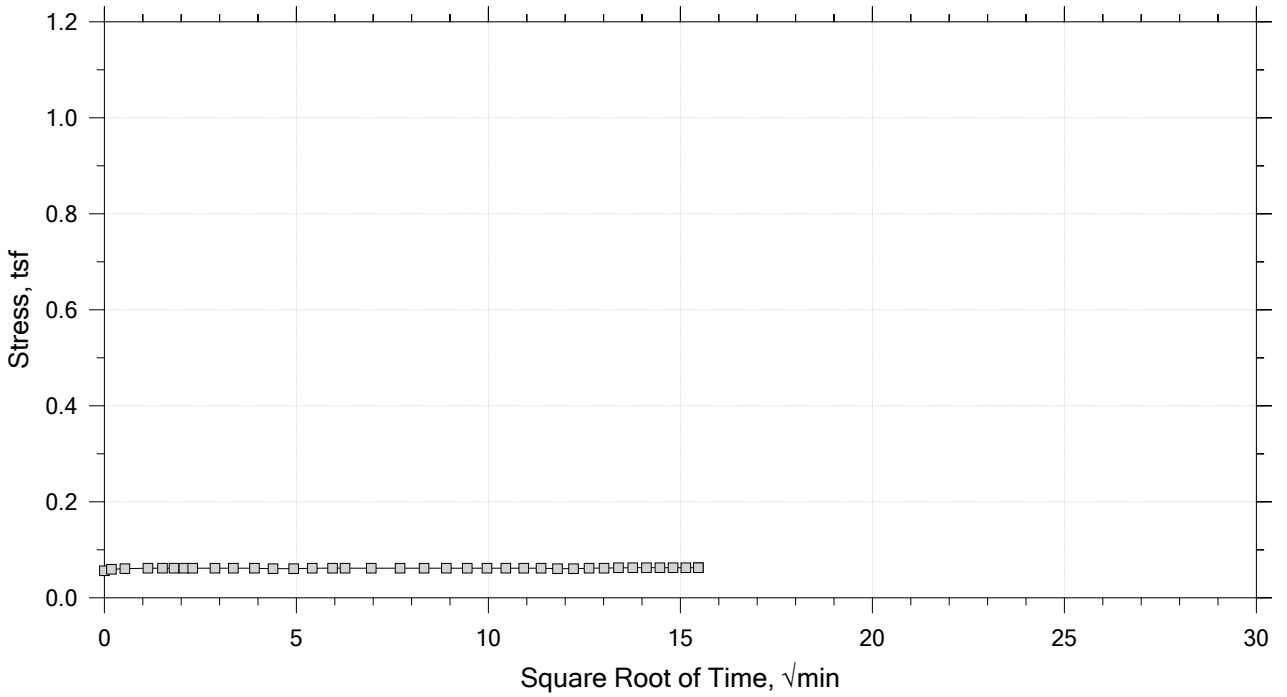


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 14
Constant Volume Step
Stress: 0.0627 tsf





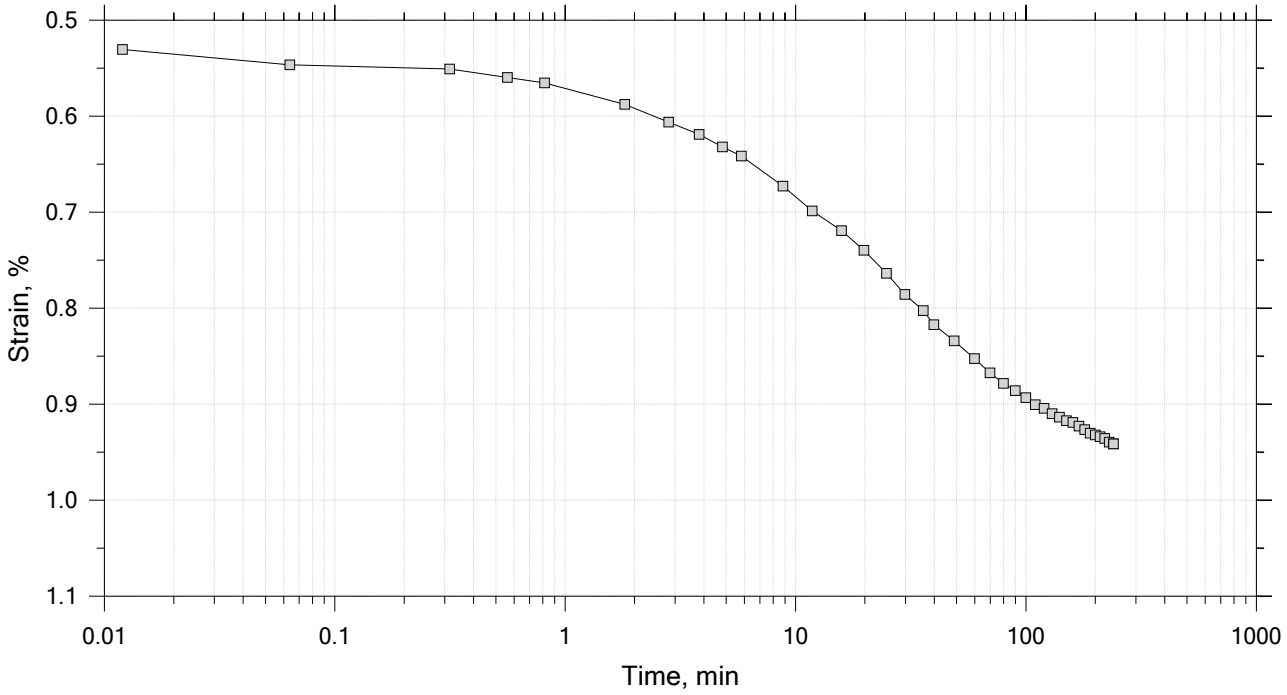
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

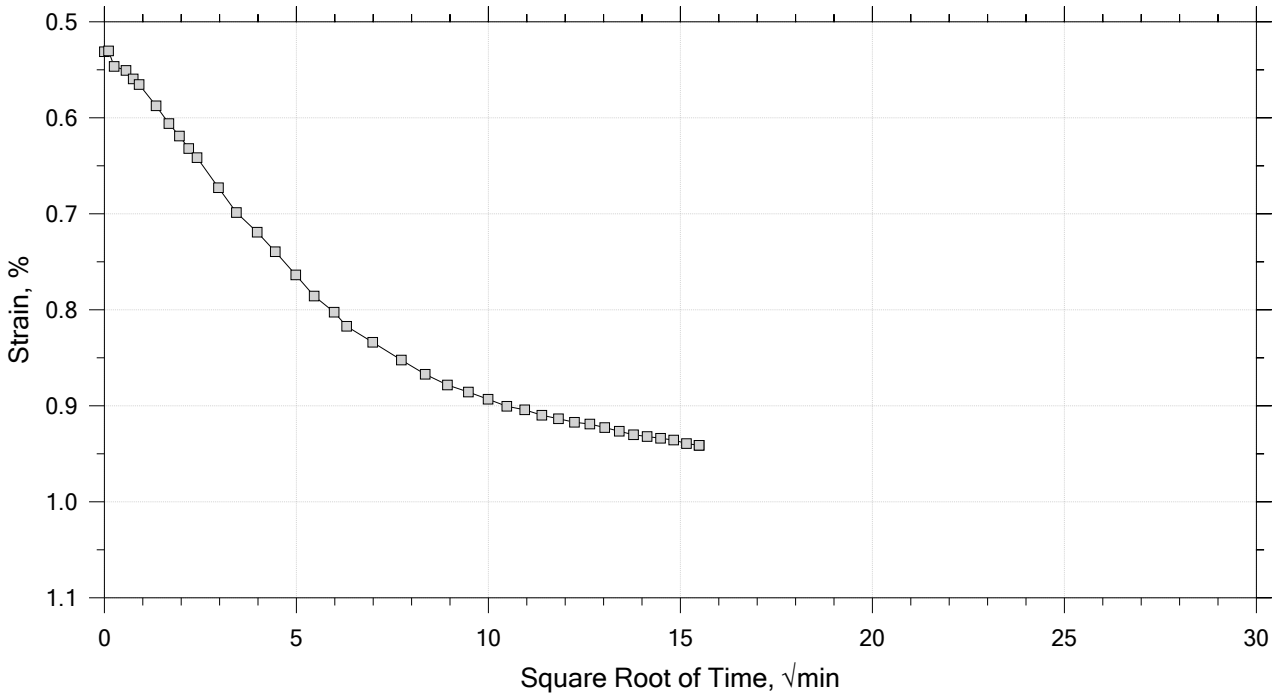
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 14

Constant Load Step

Stress: 0.125 tsf





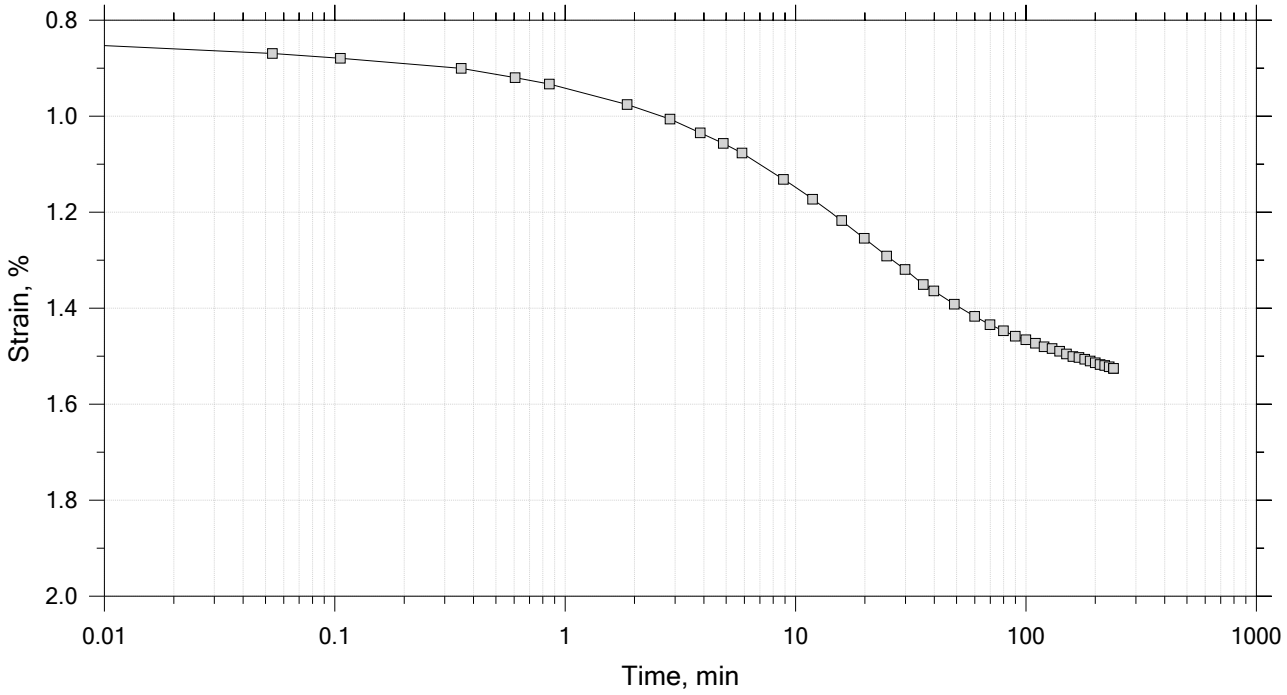
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

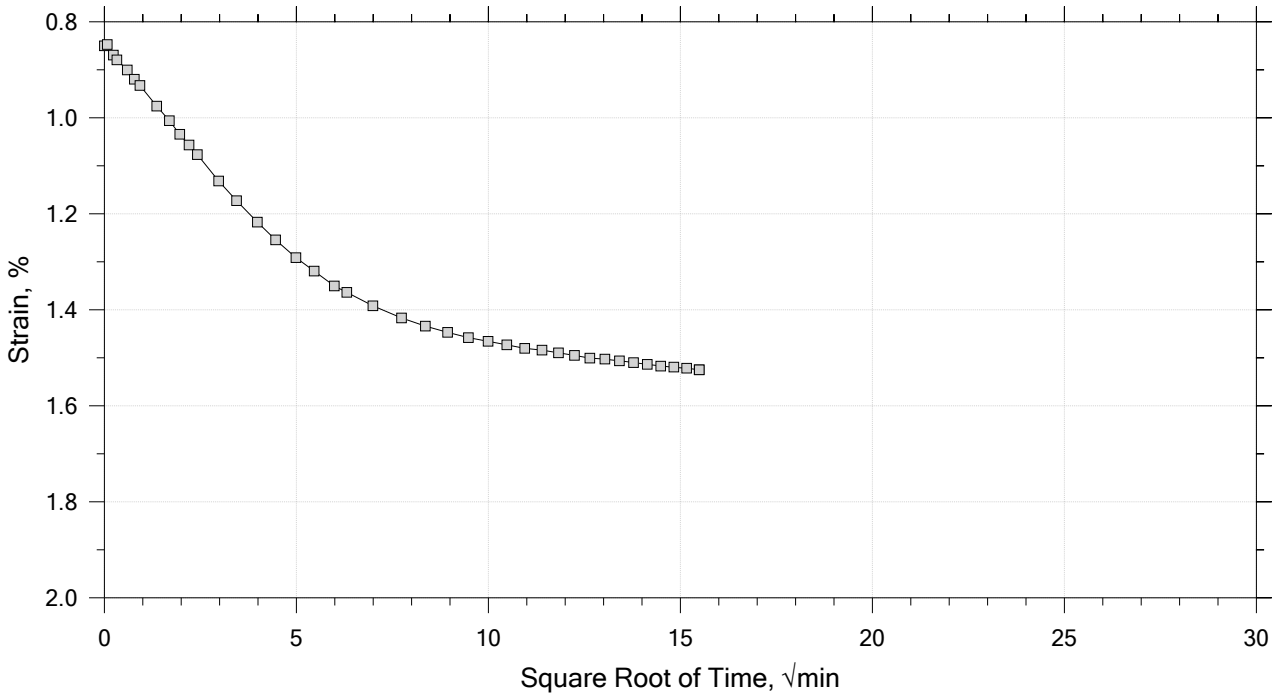
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 14

Constant Load Step

Stress: 0.25 tsf

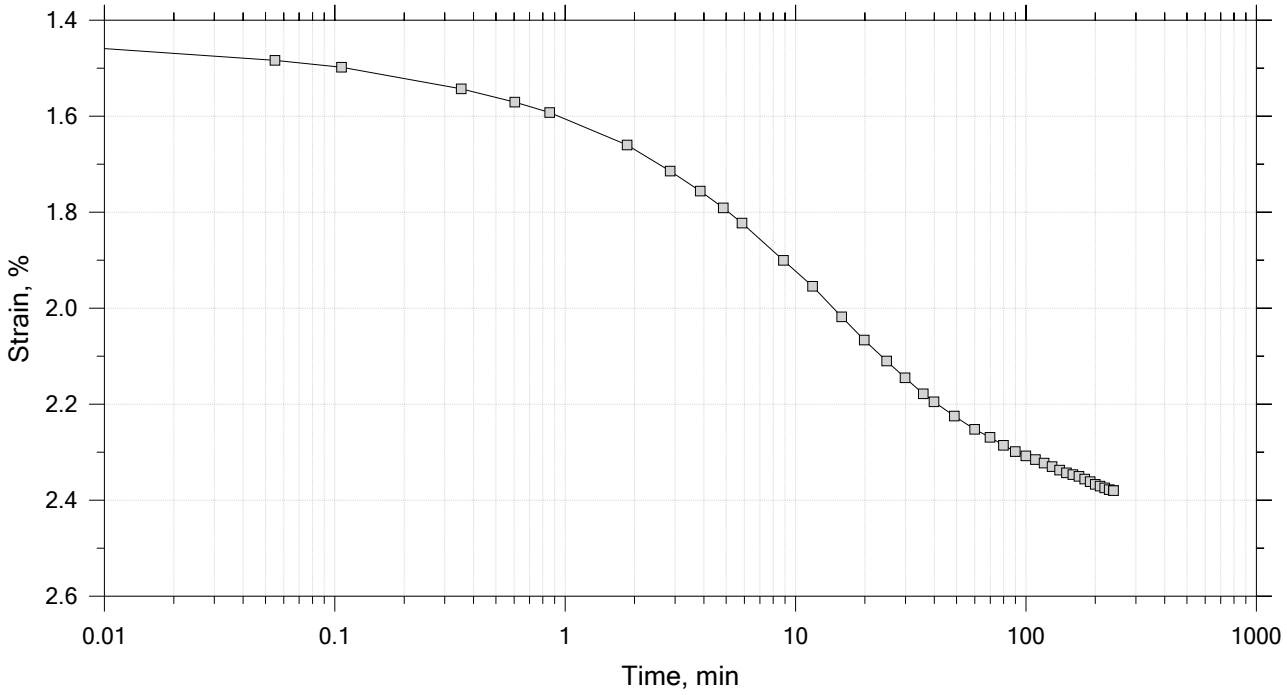


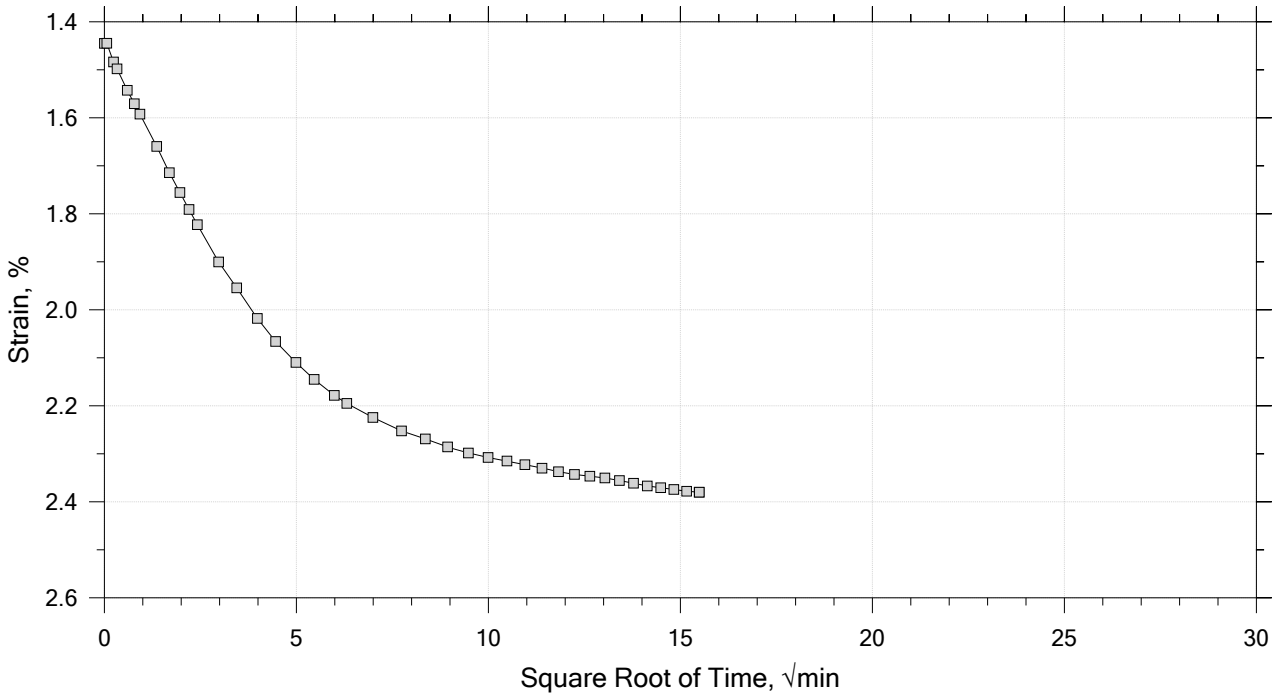


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 14
Constant Load Step
Stress: 0.5 tsf





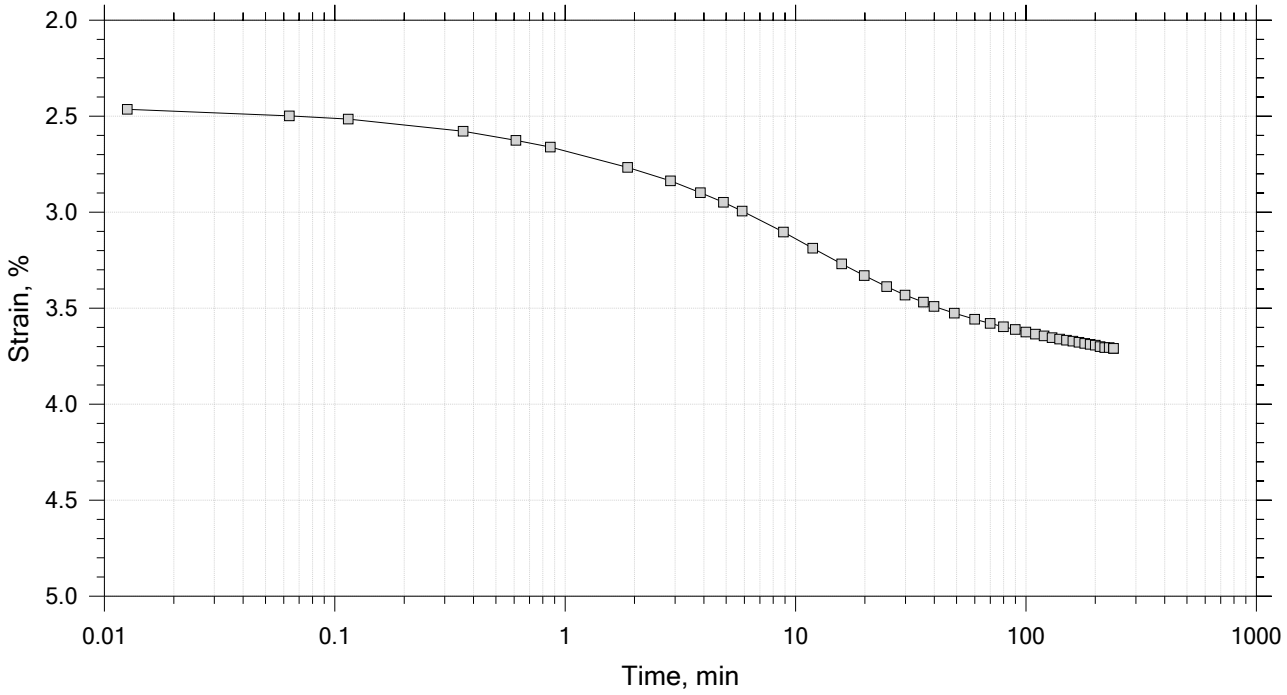
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

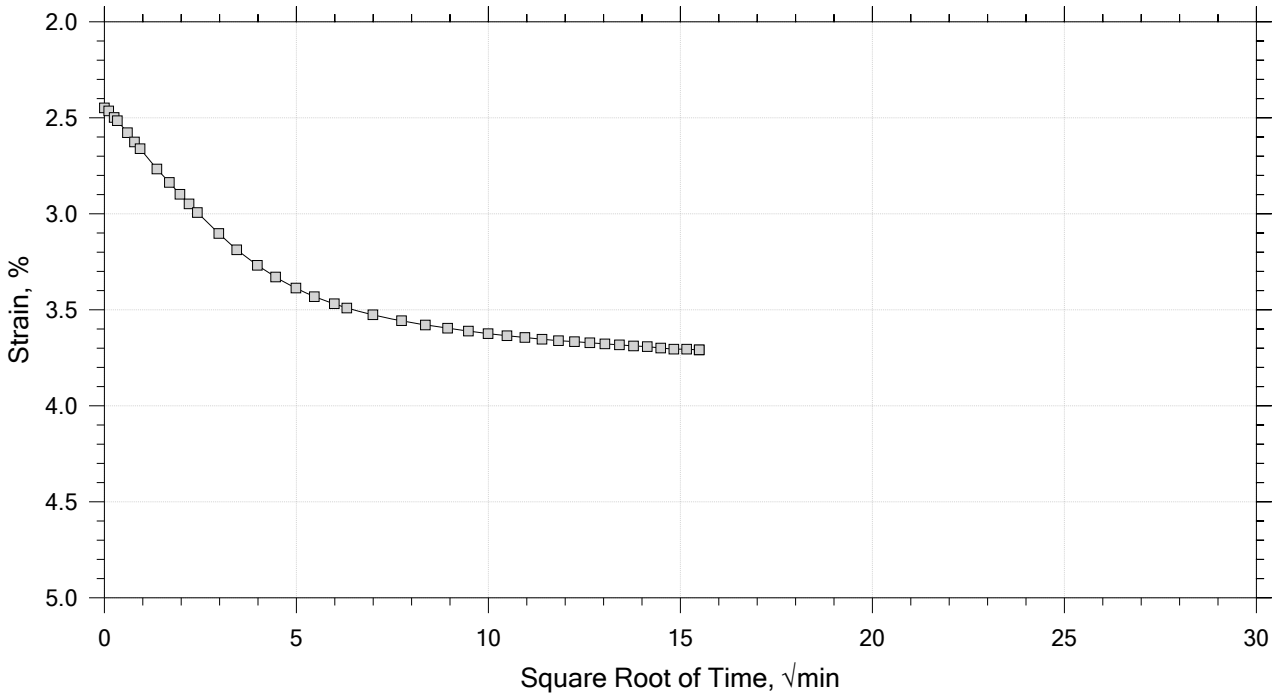
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 14

Constant Load Step

Stress: 1 tsf





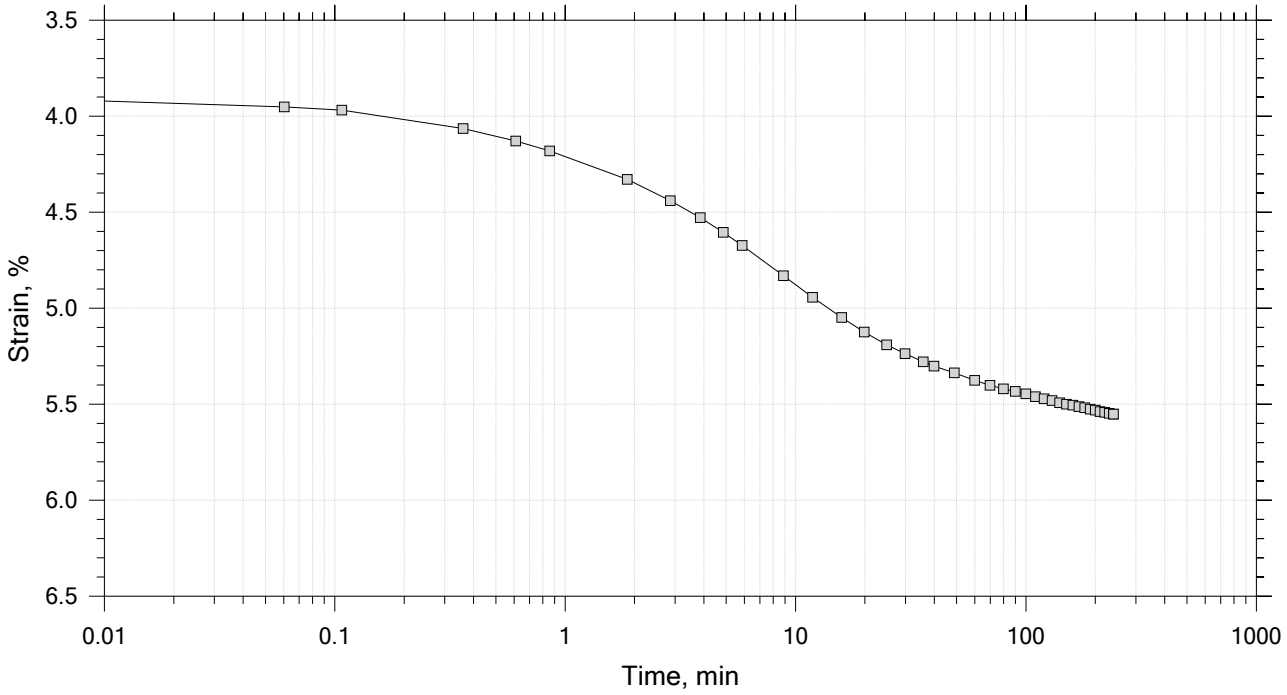
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

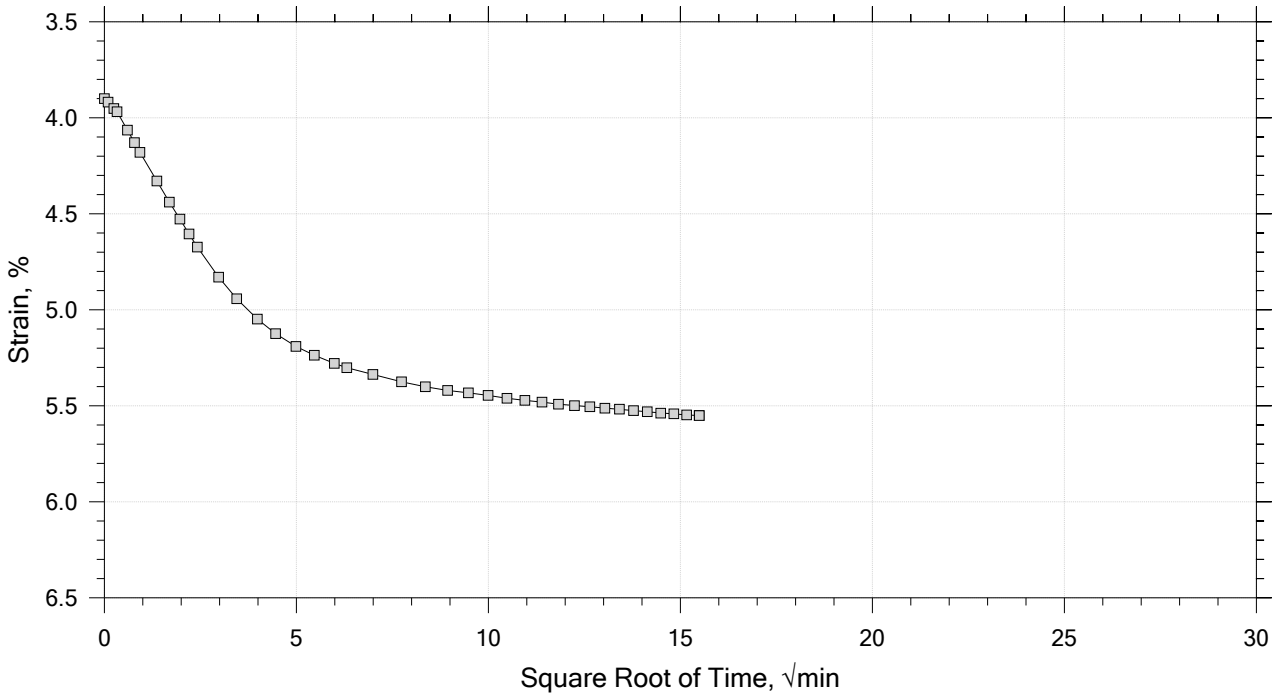
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 14

Constant Load Step

Stress: 2 tsf





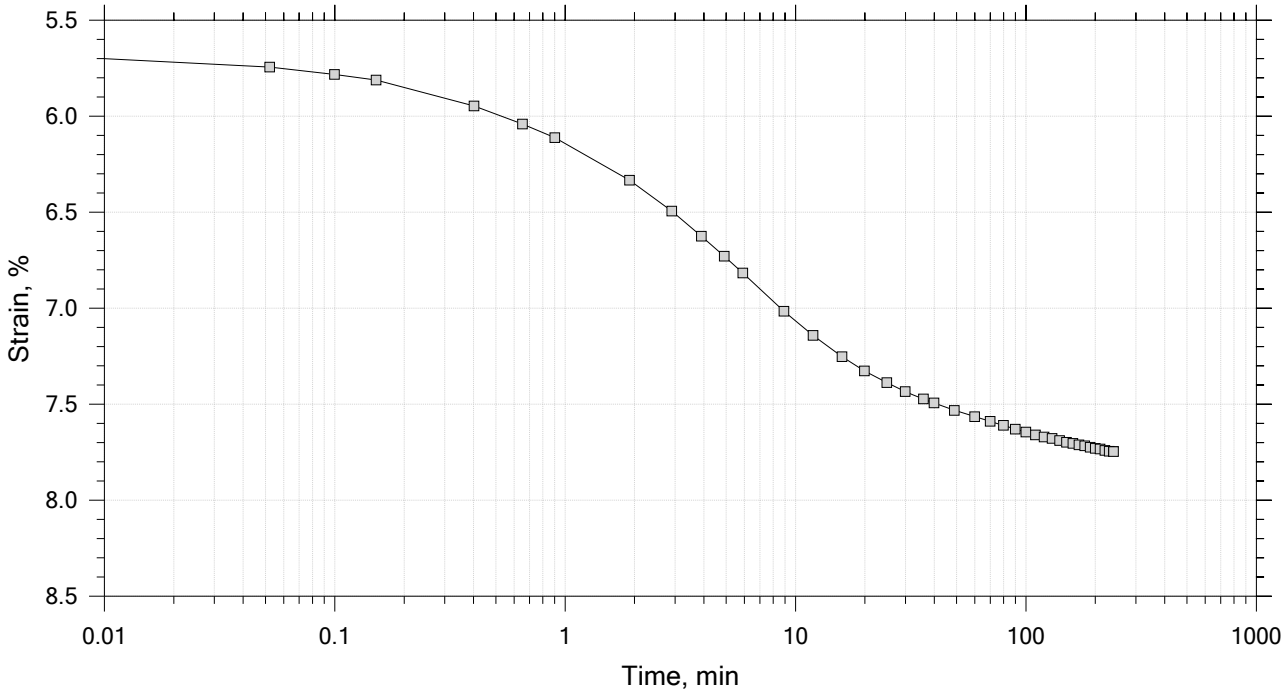
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

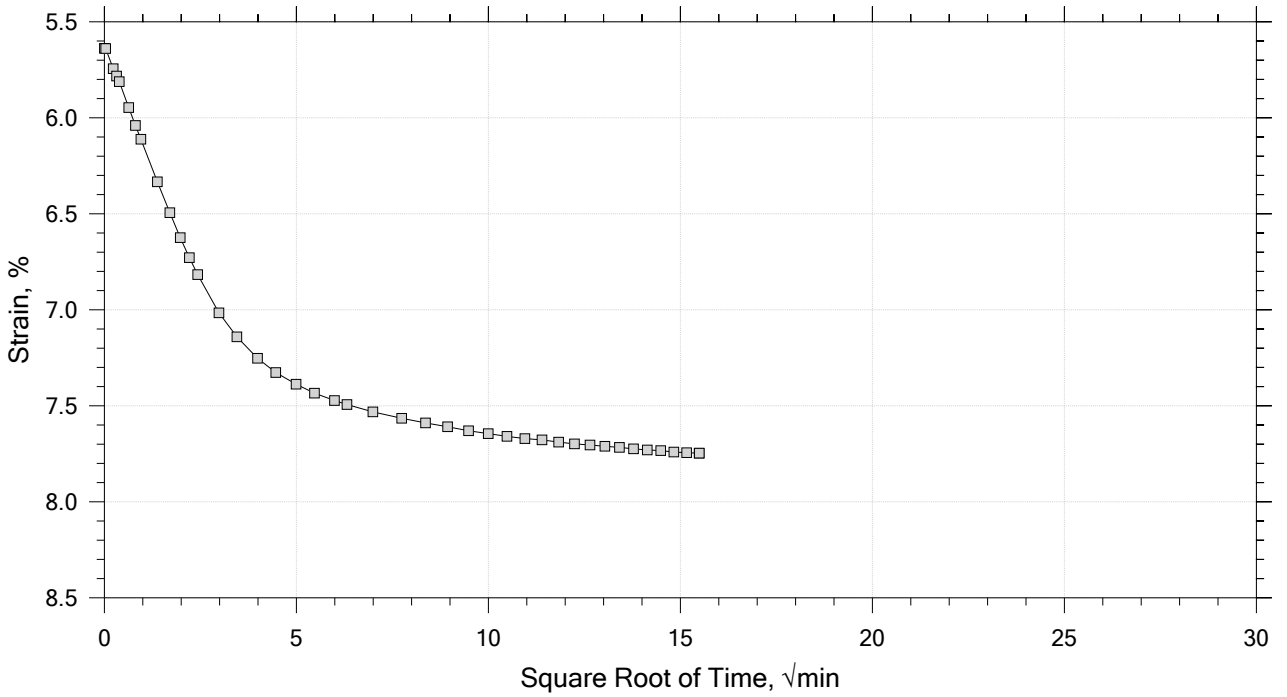
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 14

Constant Load Step

Stress: 4 tsf





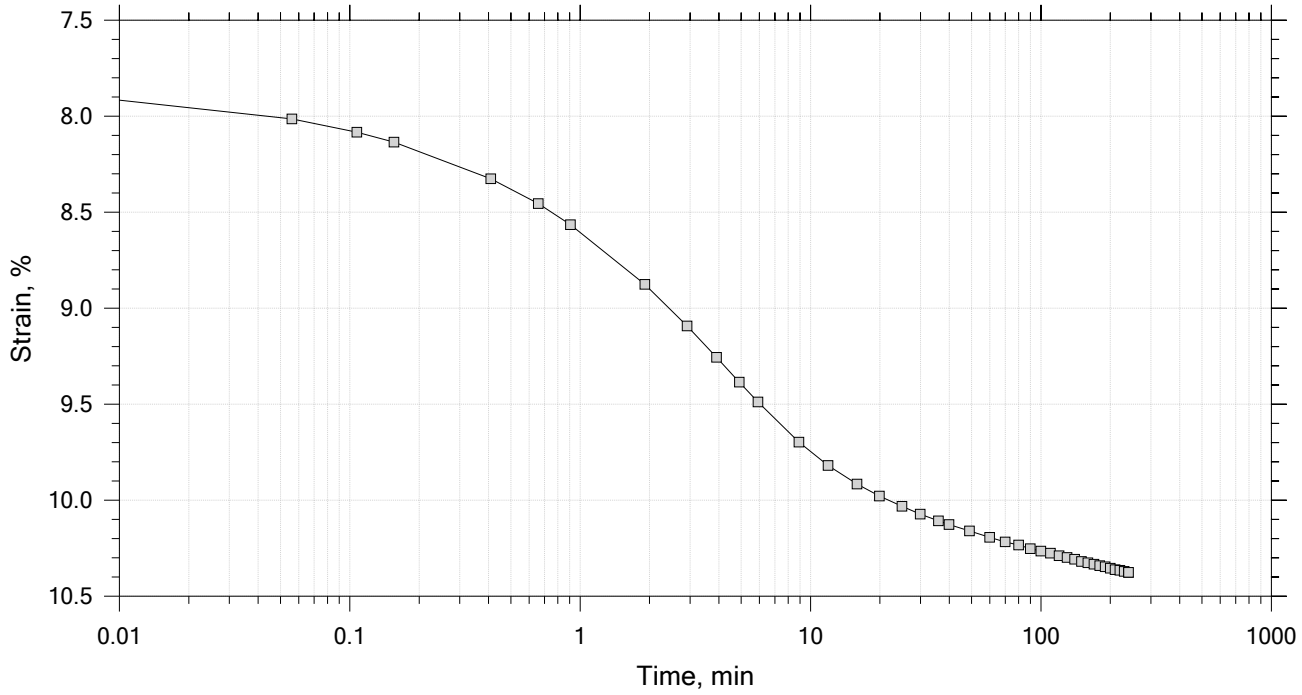
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

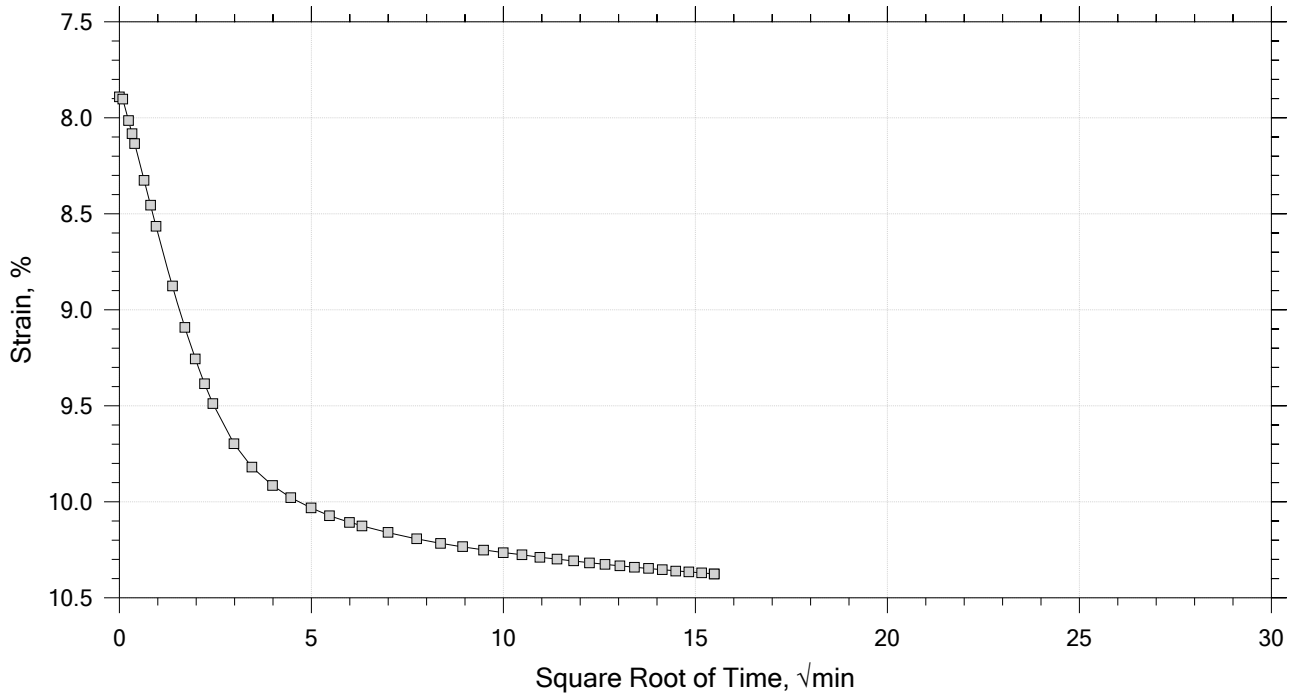
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 14

Constant Load Step

Stress: 8 tsf





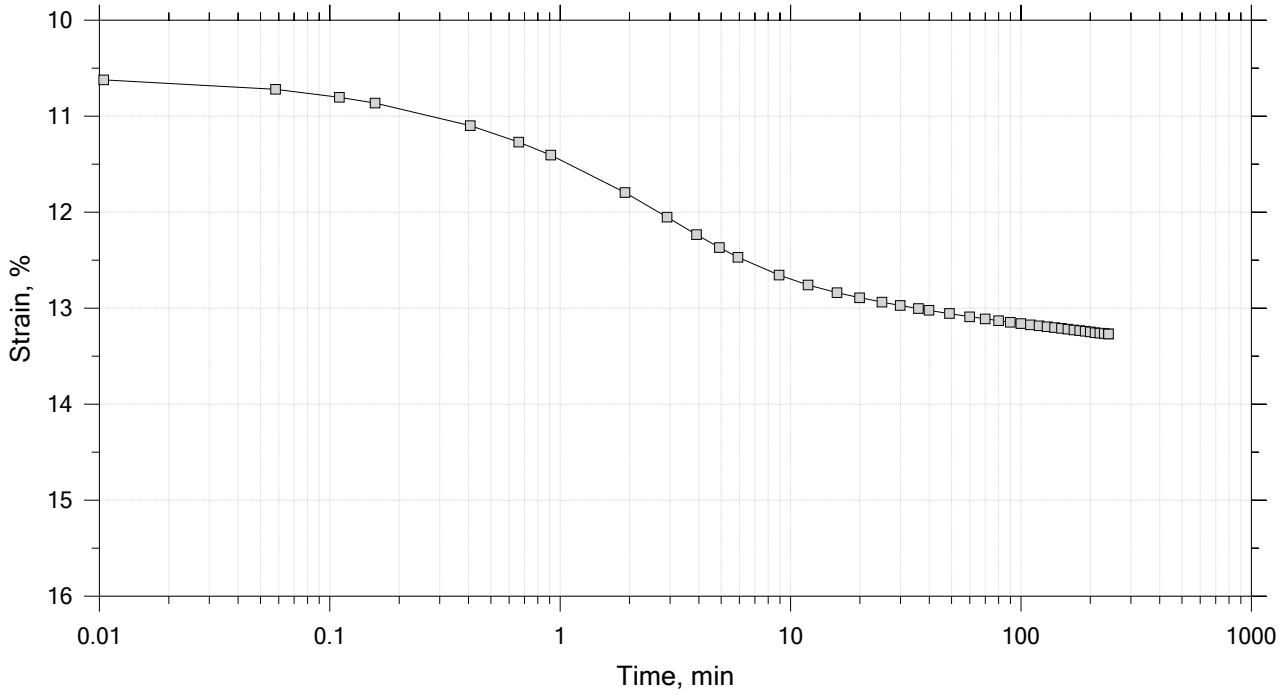
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

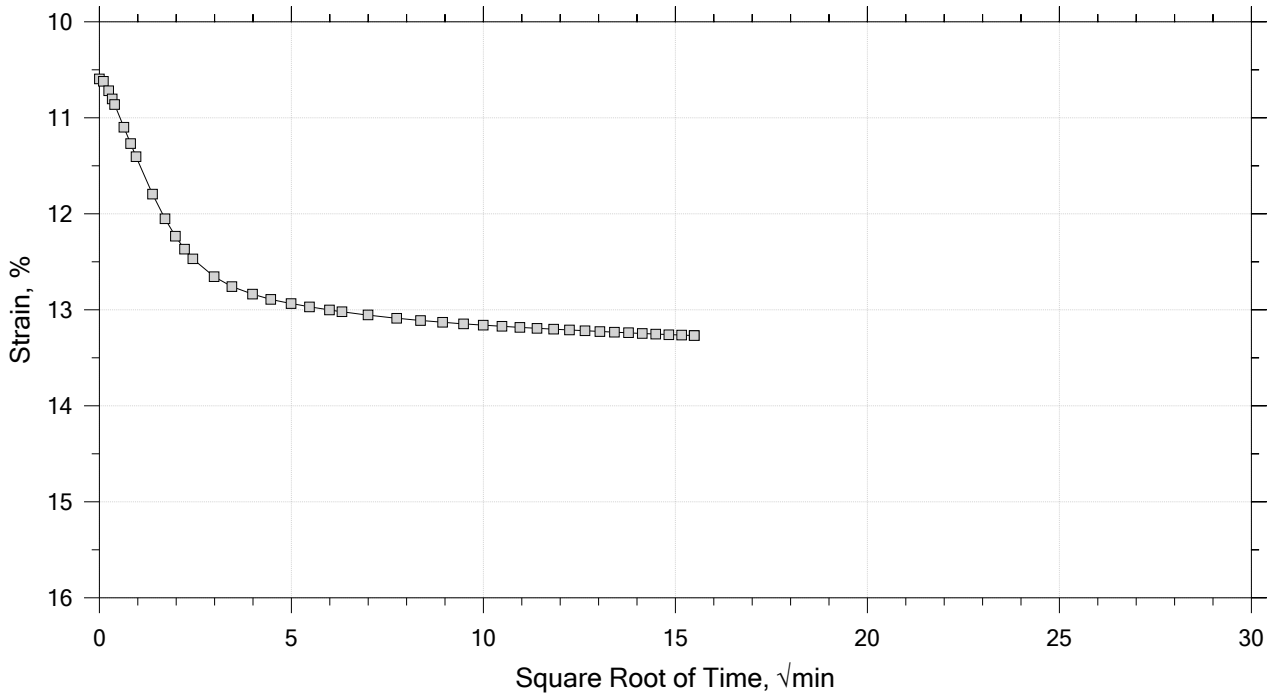
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 14

Constant Load Step

Stress: 16 tsf

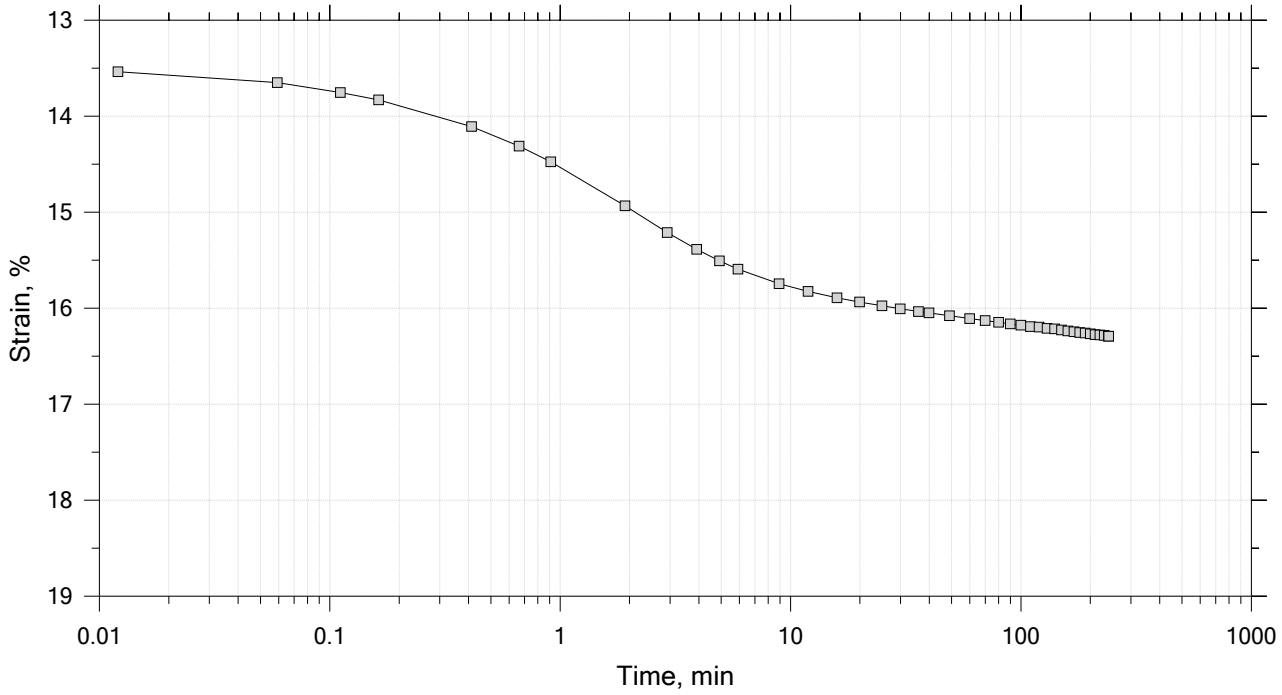


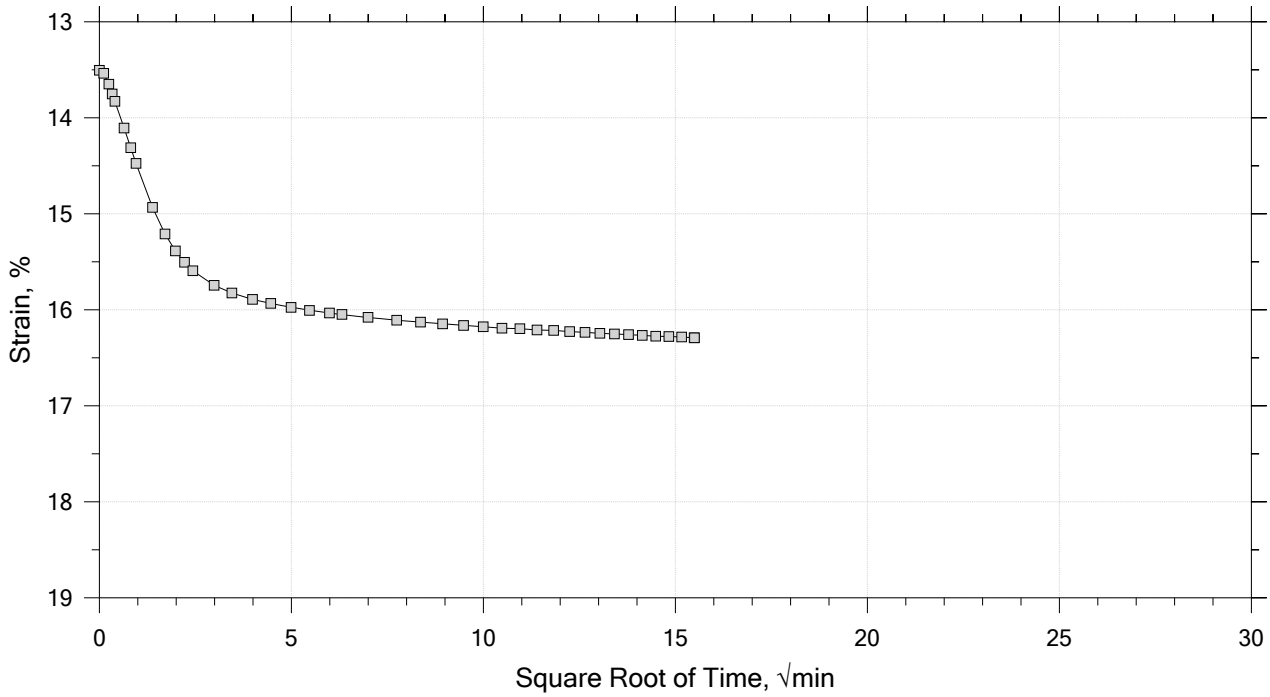


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 14
Constant Load Step
Stress: 32 tsf





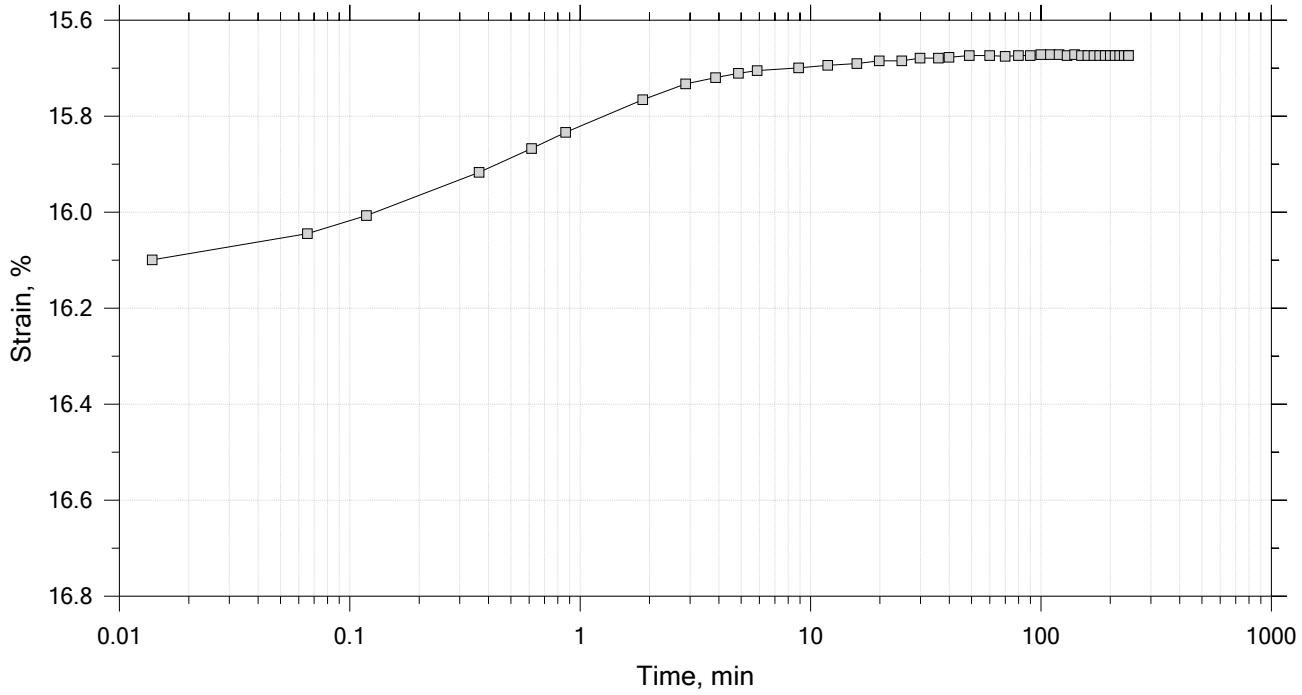
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

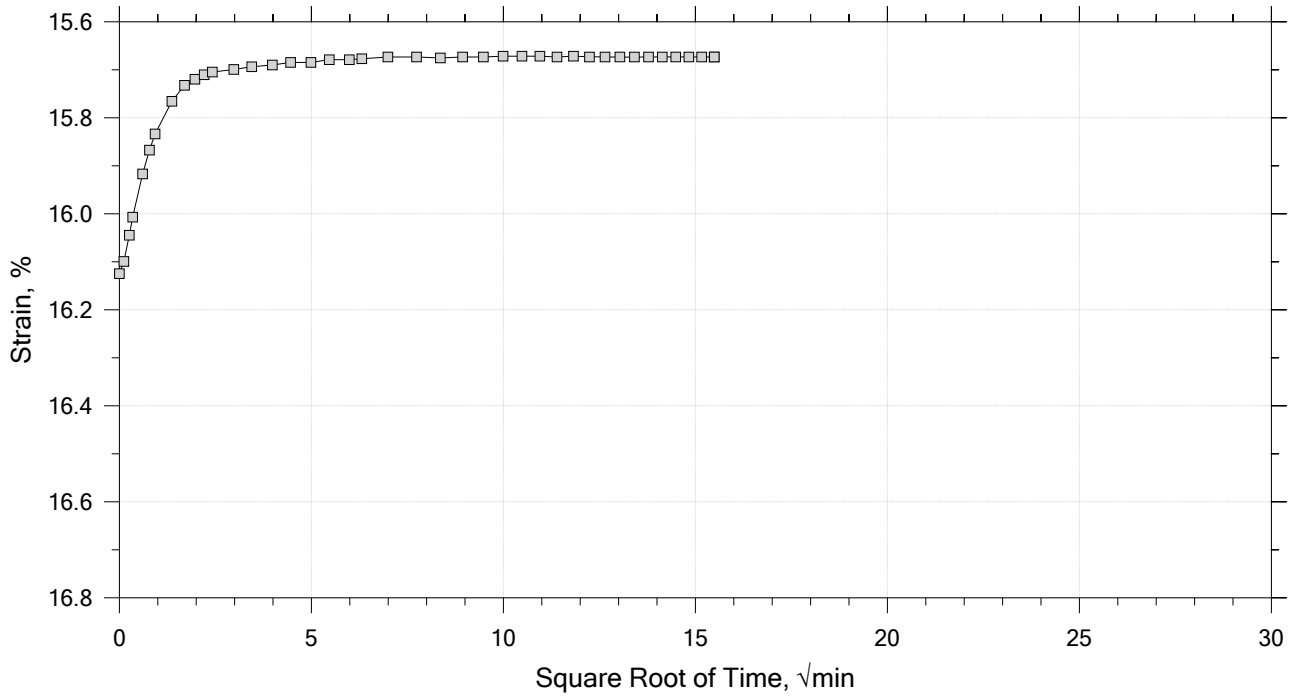
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 14

Constant Load Step

Stress: 8 tsf

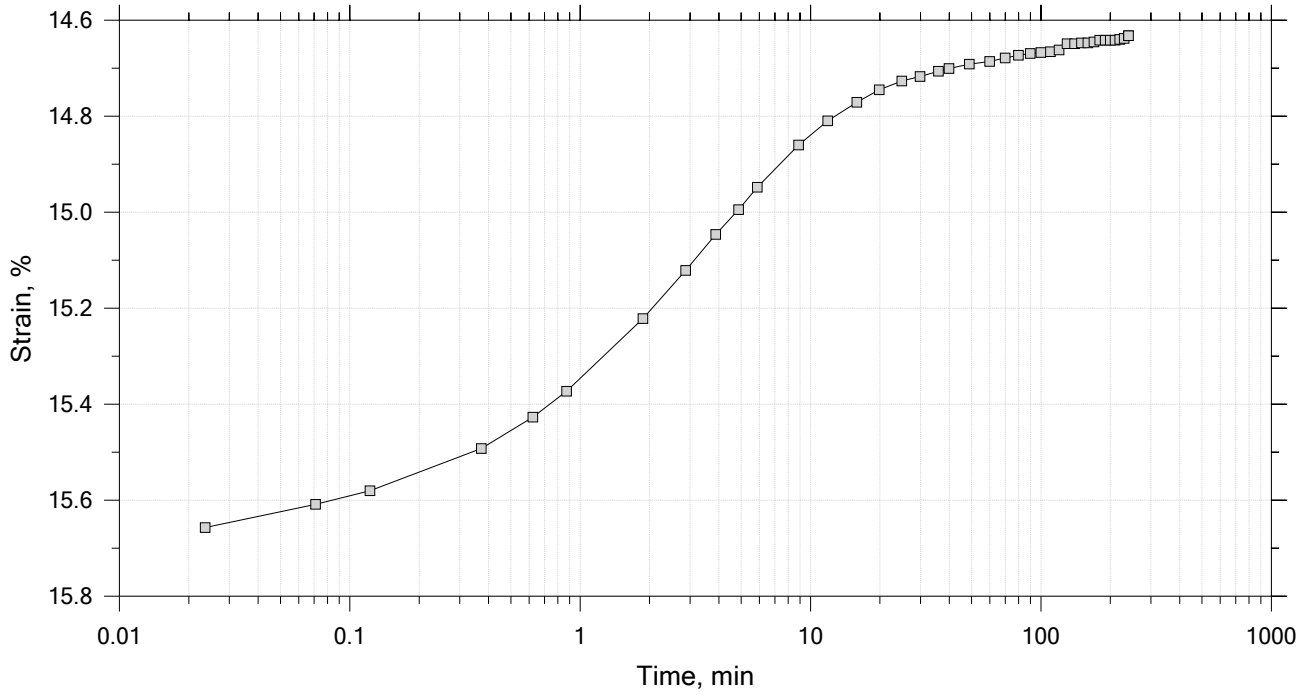


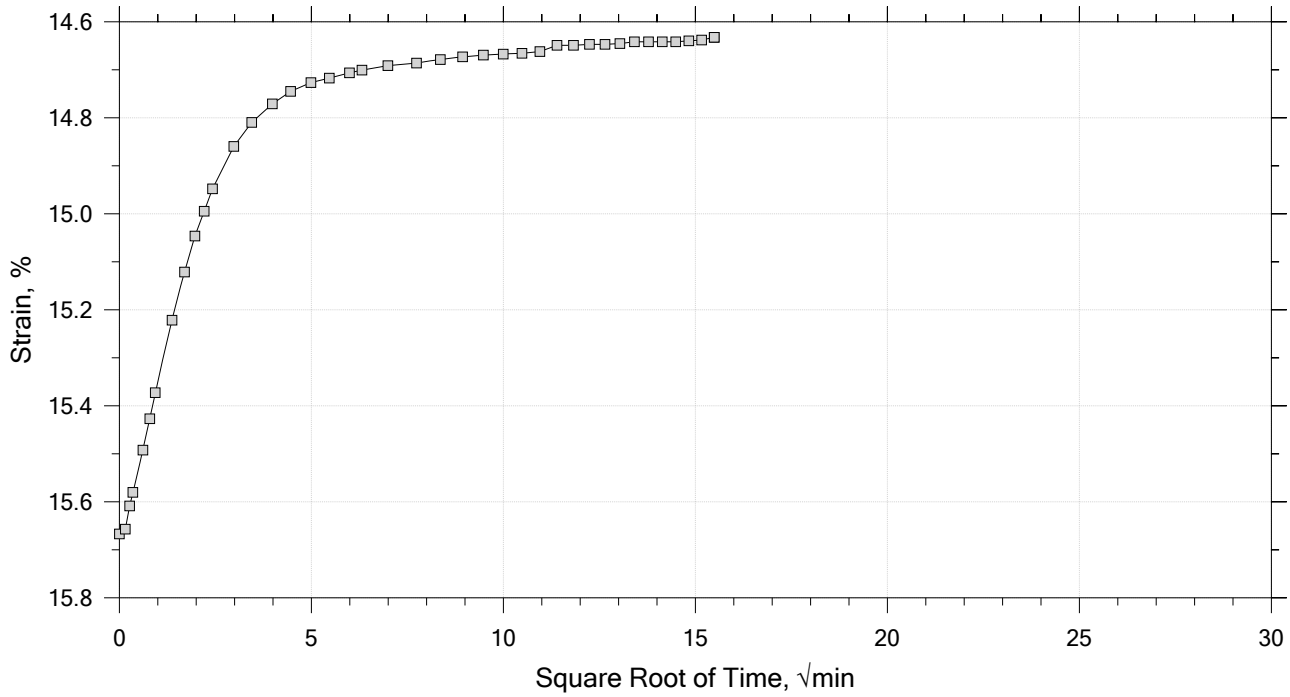


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 14
Constant Load Step
Stress: 2 tsf

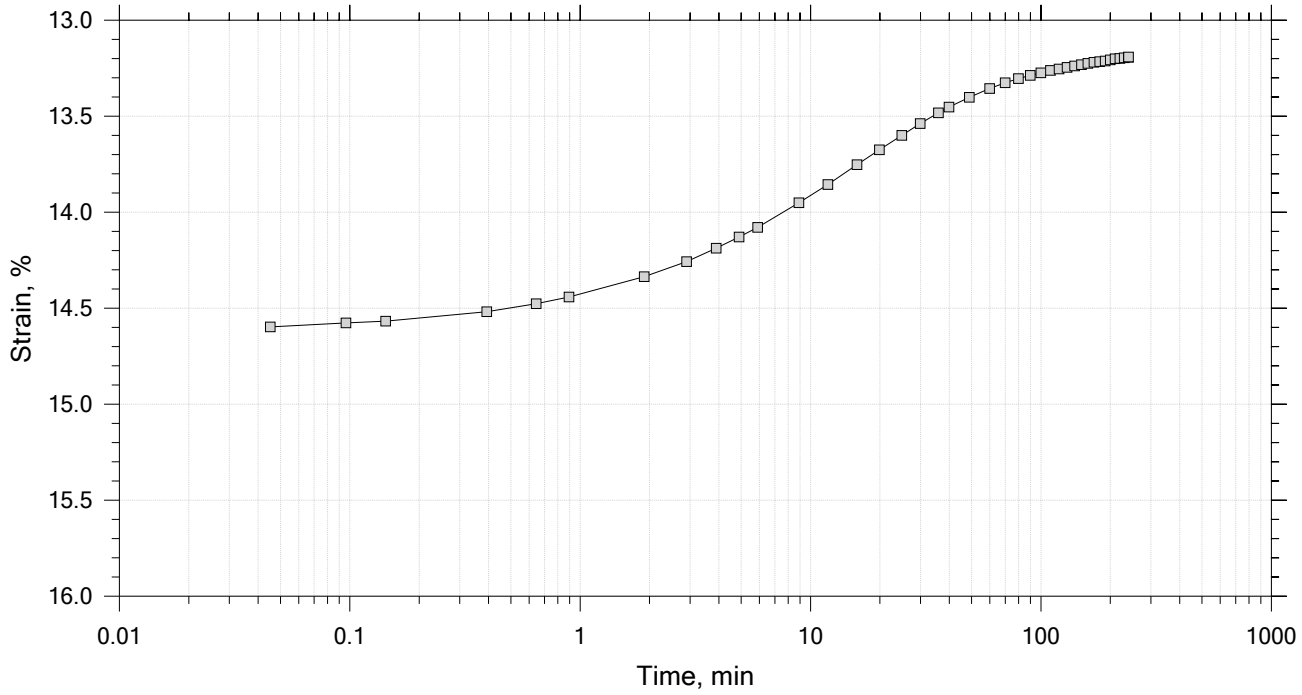


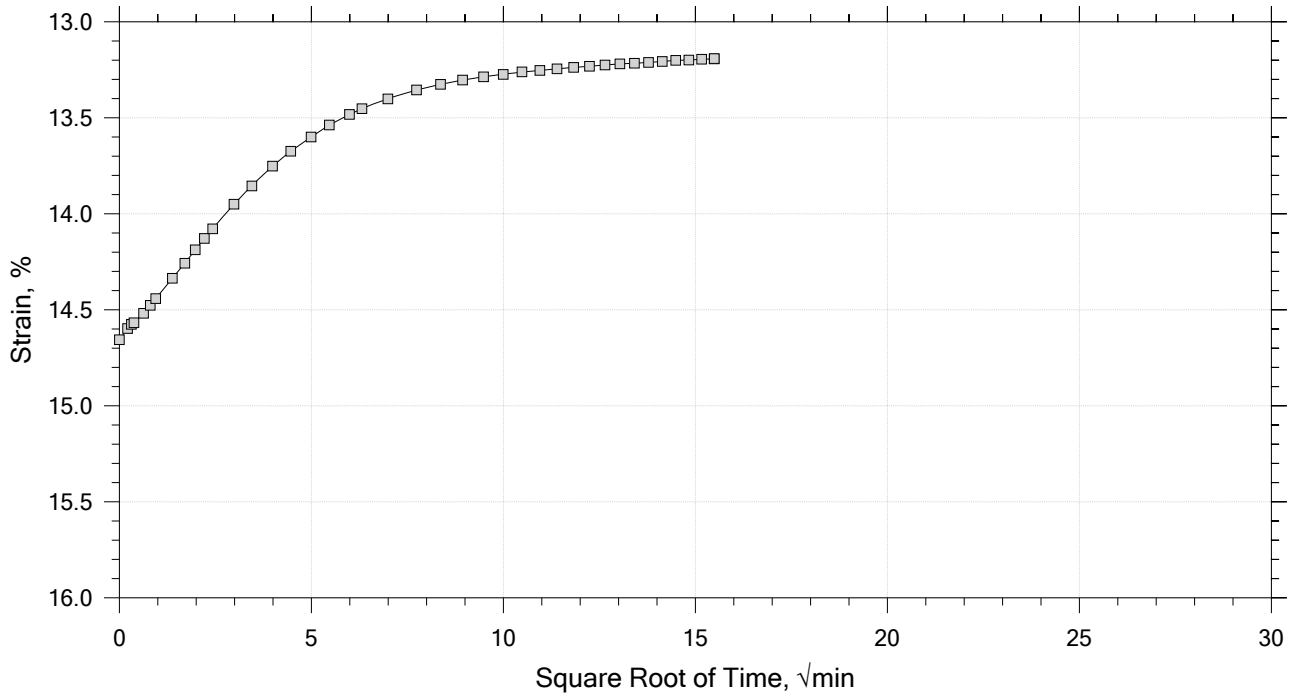


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 14
Constant Load Step
Stress: 0.5 tsf

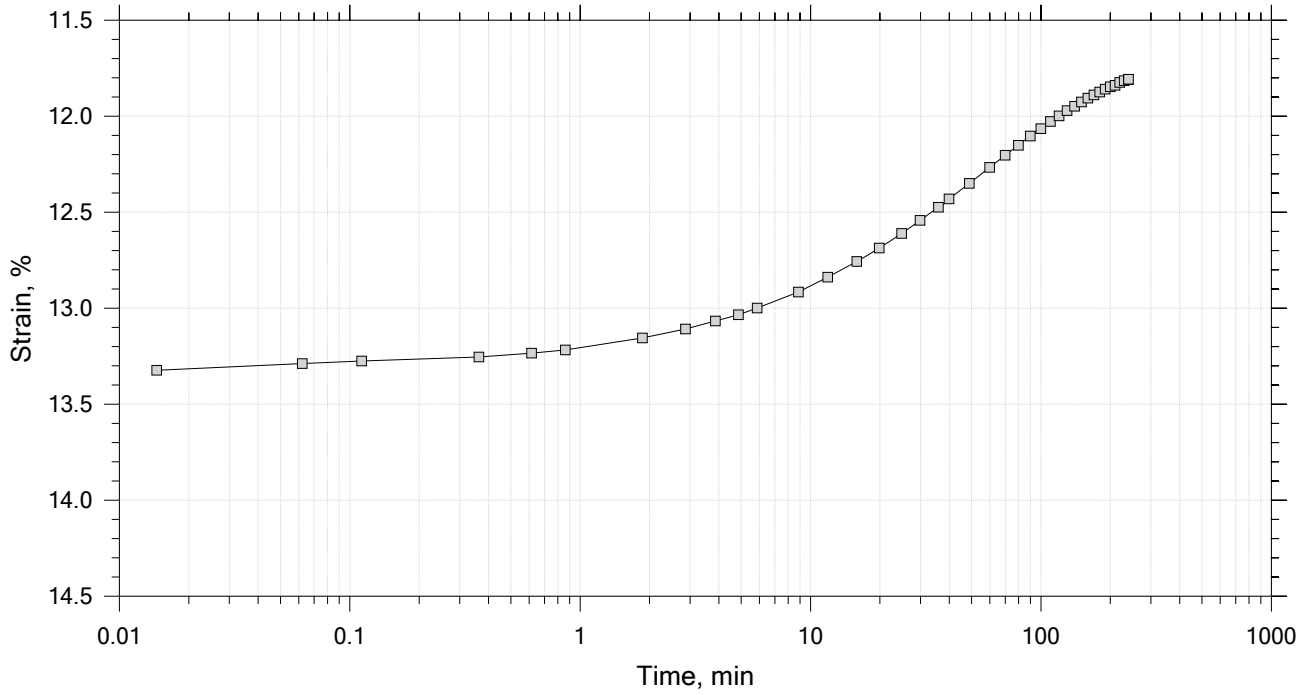


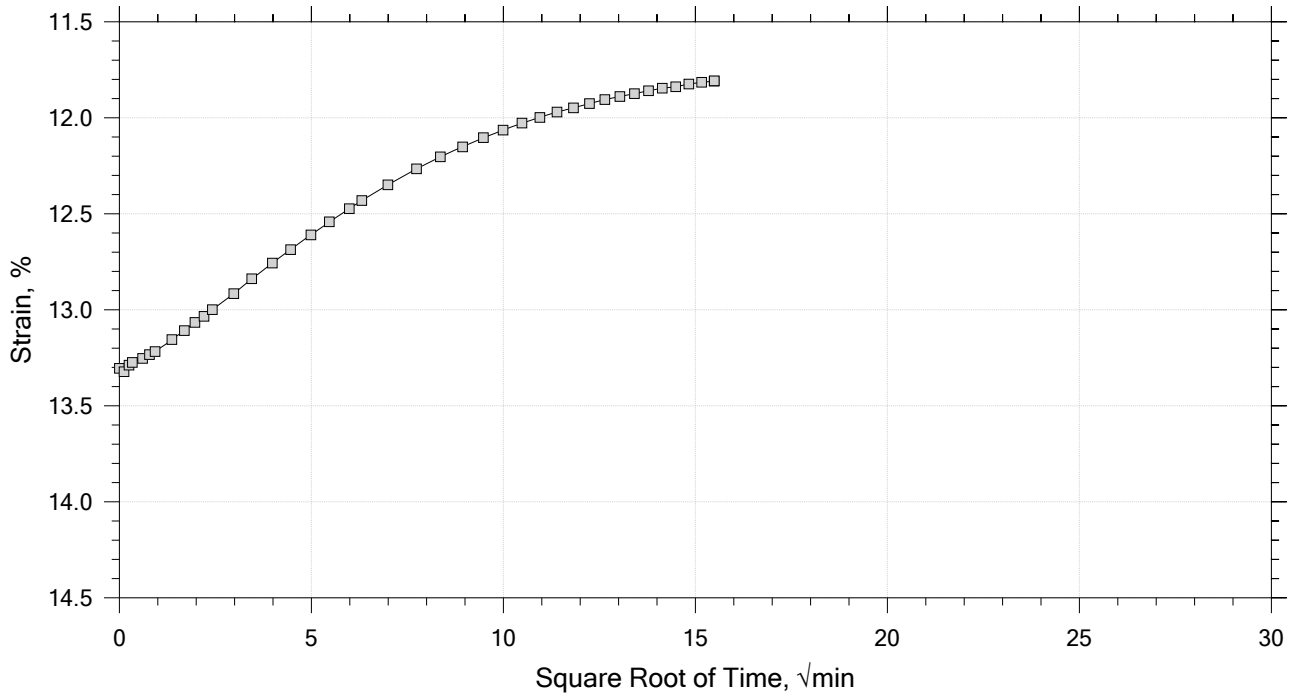


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 14
Constant Load Step
Stress: 0.125 tsf





GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.75	Liquid Limit: 36
Initial Height: 1.00 in	Initial Void Ratio: 0.785	Plastic Limit: 21
Final Height: 0.86 in	Final Void Ratio: 0.535	Plasticity Index: 15

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	E16473	RING		E16339
Mass Container, gm	8.44	109.29	109.29	8.33
Mass Container + Wet Soil, gm	372.86	268.68	257.45	158.03
Mass Container + Dry Soil, gm	285.96	233.34	233.34	133.67
Mass Dry Soil, gm	277.52	124.05	124.05	125.34
Water Content, %	31.31	28.49	19.44	19.44
Void Ratio	---	0.78	0.53	---
Degree of Saturation, %	---	99.91	100.00	---
Dry Unit Weight, pcf	---	96.274	111.95	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

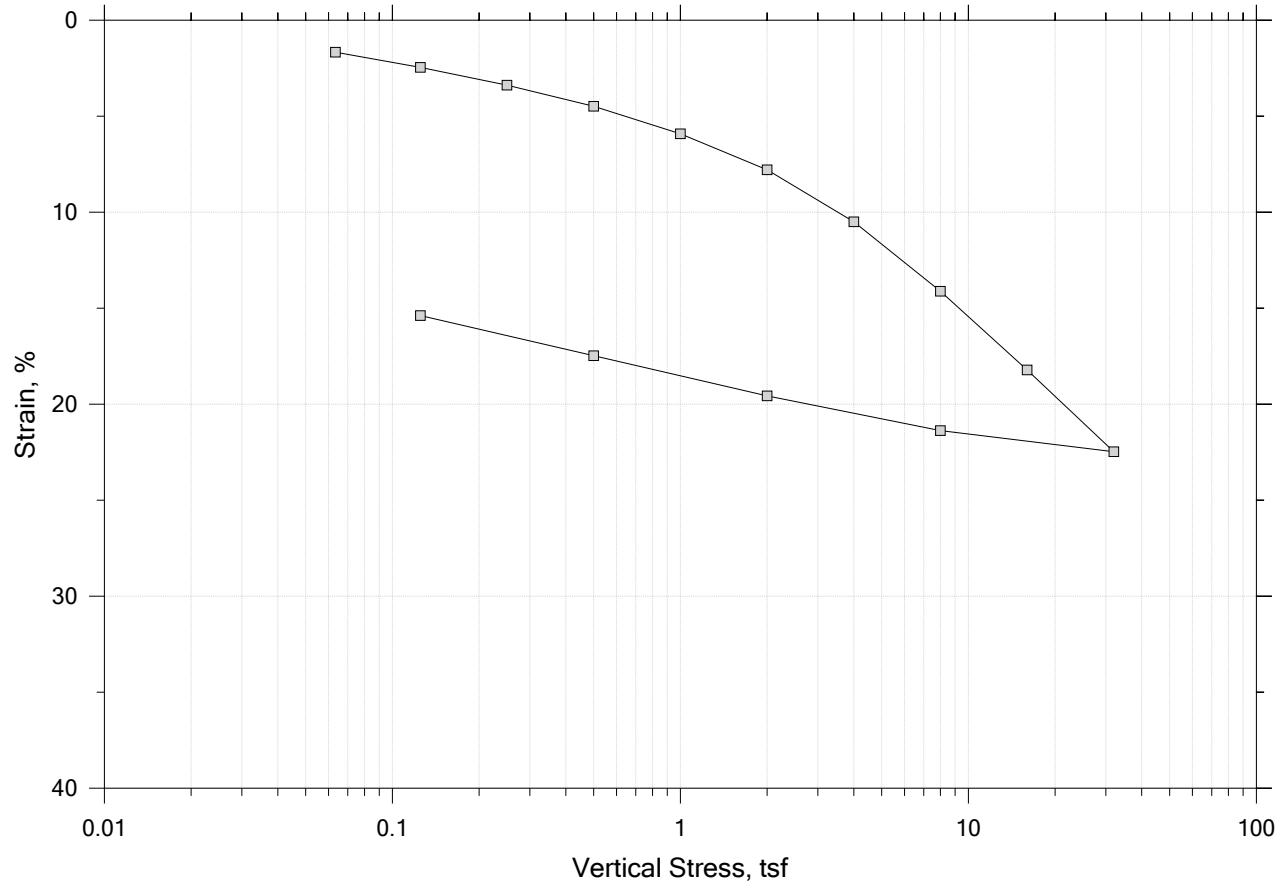
Square Root of Time Coefficients

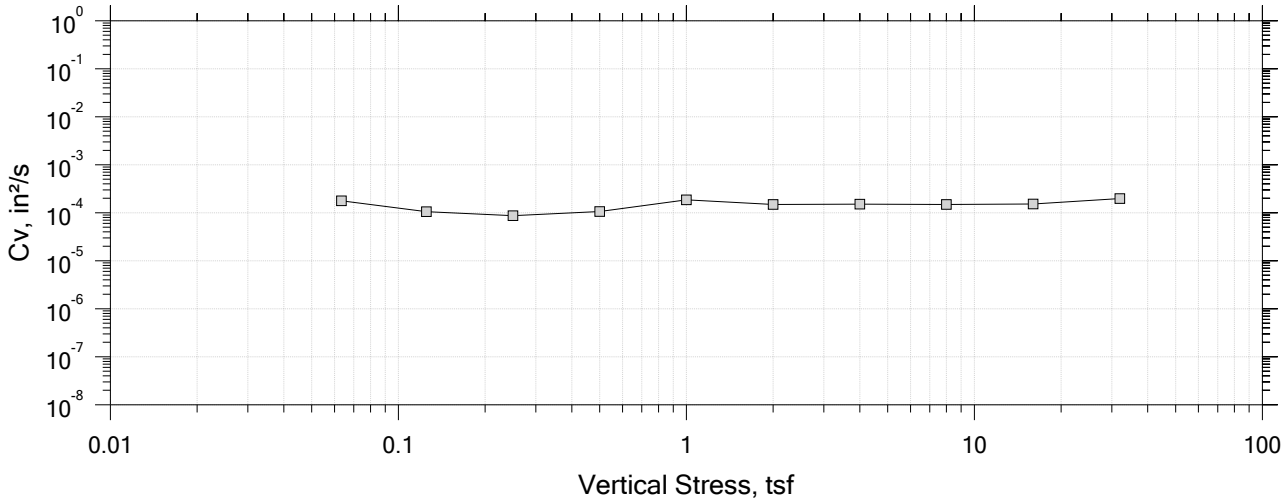
Step	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv in²/s	Mv 1/tsf	k ft/day
1	0.0627	0.005975	0.774	0.598	109.283	3.21e-05	9.53e-02	5.74e-05
2	0.125	0.009413	0.768	0.941	65.190	5.34e-05	5.52e-02	5.52e-05
3	0.250	0.01525	0.758	1.53	40.470	8.52e-05	4.67e-02	7.45e-05
4	0.500	0.02380	0.742	2.38	22.832	1.49e-04	3.42e-02	9.53e-05
5	1.00	0.03709	0.719	3.71	24.958	1.33e-04	2.66e-02	6.62e-05
6	2.00	0.05551	0.686	5.55	25.490	1.26e-04	1.84e-02	4.35e-05
7	4.00	0.07747	0.647	7.75	12.763	2.41e-04	1.10e-02	4.96e-05
8	8.00	0.1038	0.600	10.4	10.016	2.92e-04	6.57e-03	3.59e-05
9	16.0	0.1327	0.548	13.3	8.515	3.23e-04	3.62e-03	2.18e-05
10	32.0	0.1629	0.494	16.3	7.549	3.40e-04	1.89e-03	1.20e-05
11	8.00	0.1567	0.505	15.7	3.087	8.08e-04	2.57e-04	3.89e-06
12	2.00	0.1463	0.524	14.6	11.550	2.20e-04	1.74e-03	7.16e-06
13	0.500	0.1319	0.549	13.2	42.470	6.17e-05	9.61e-03	1.11e-05
14	0.125	0.1181	0.574	11.8	116.030	2.33e-05	3.69e-02	1.61e-05

GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-102	Tested By: dmt	Checked By: ab
	Sample No.: U-1	Test Date: 4/29/26	Depth: 37-39'
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, gray clay		
	Remarks: LTIII-J, Swell Pressure = 0.0627 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Summary Report

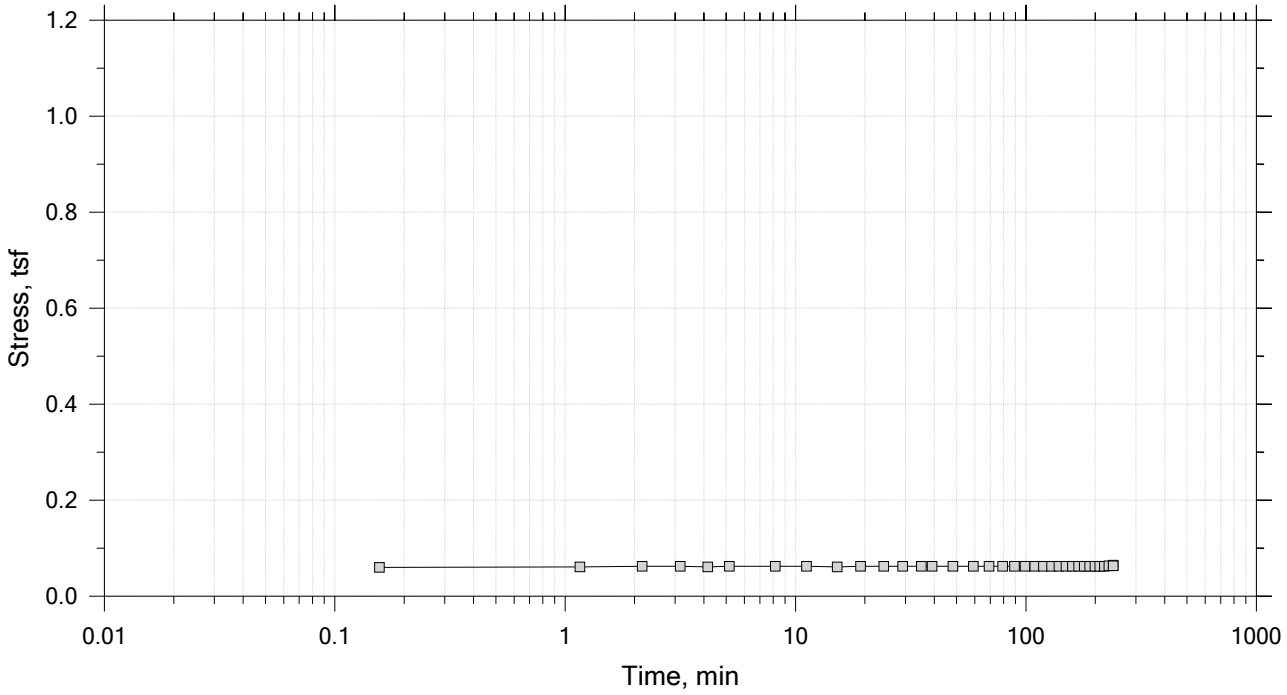


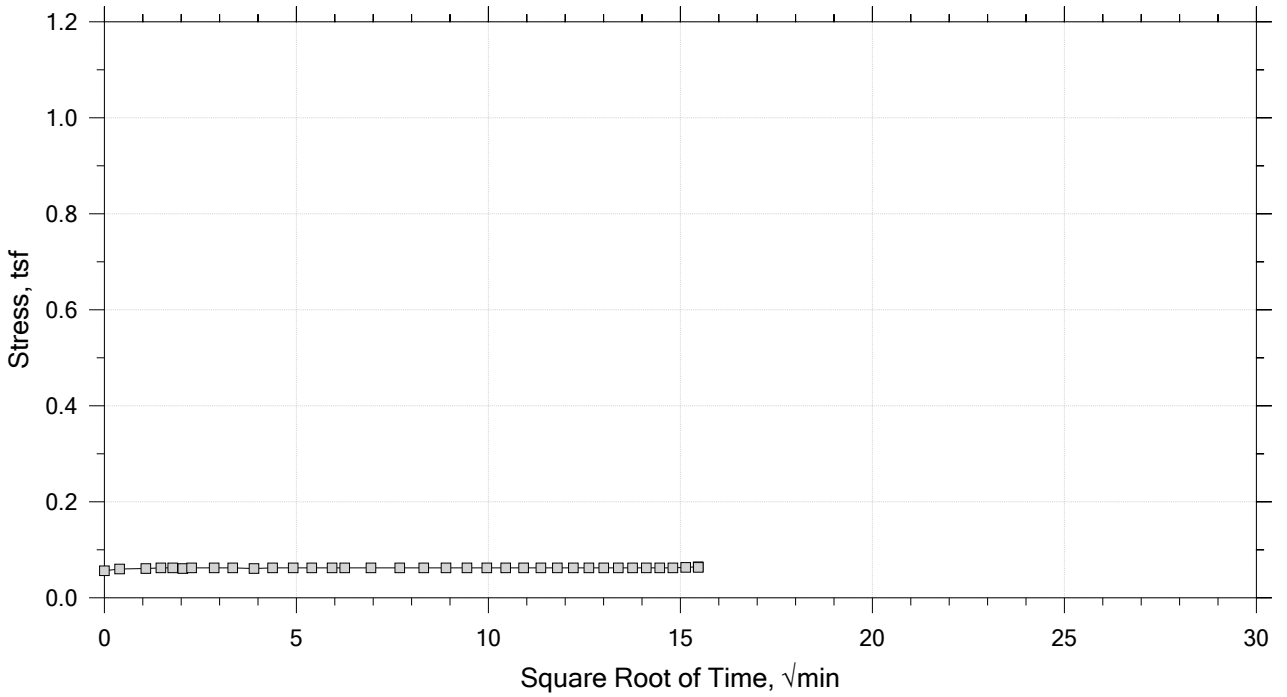


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 14
Constant Volume Step
Stress: 0.0634 tsf

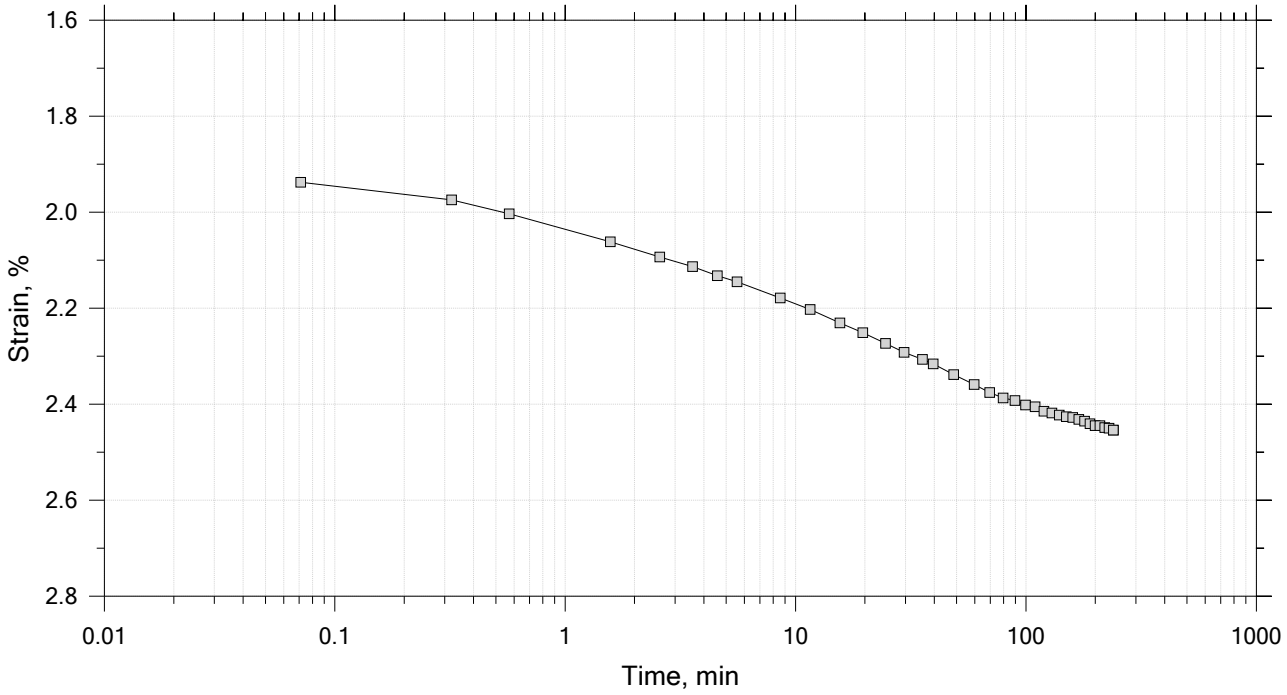


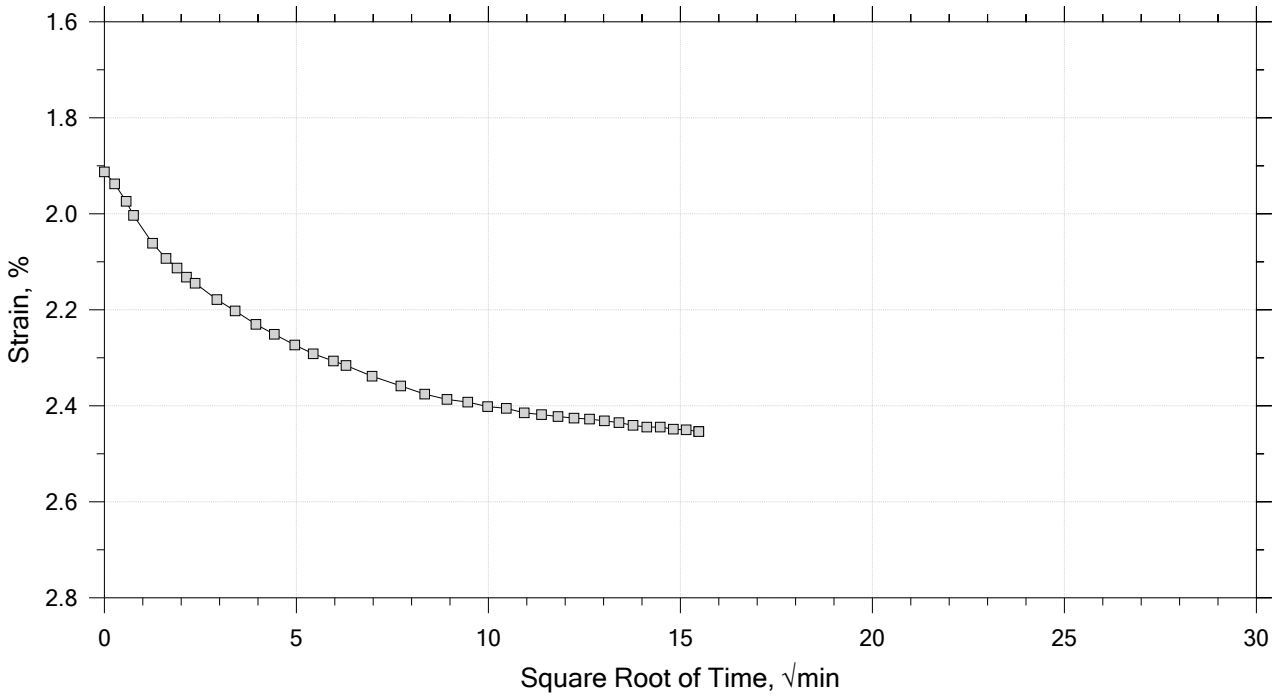


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 14
Constant Load Step
Stress: 0.125 tsf





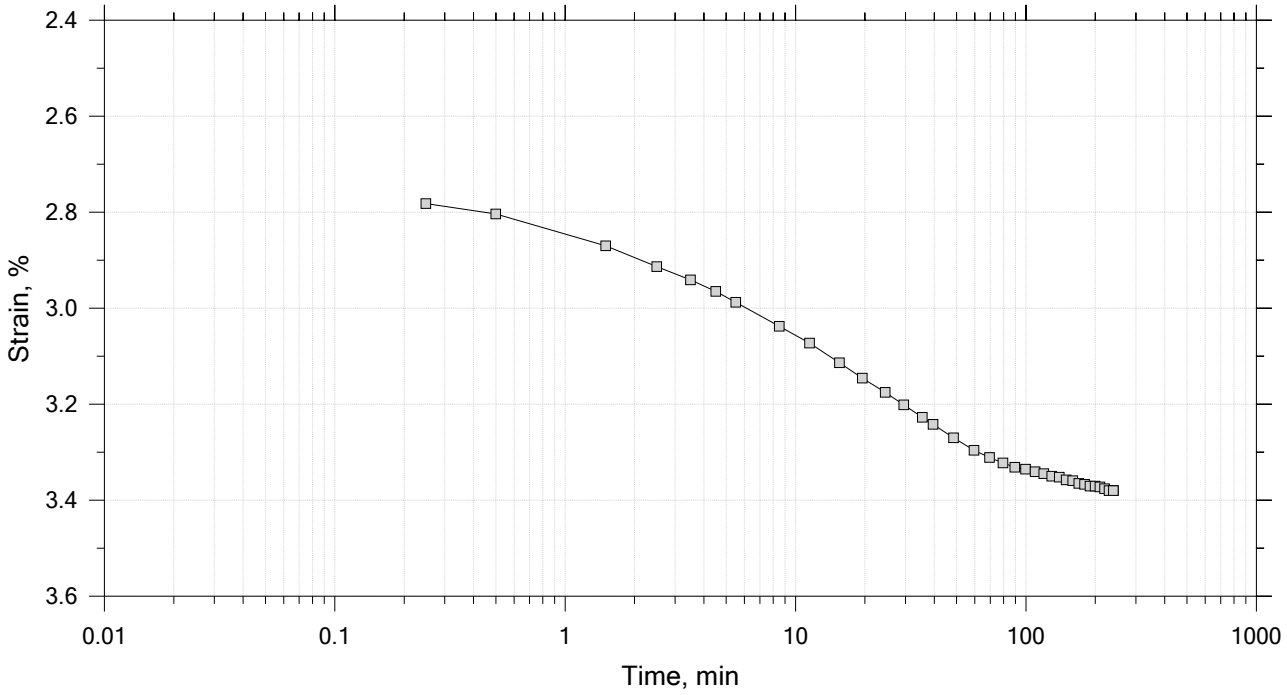
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

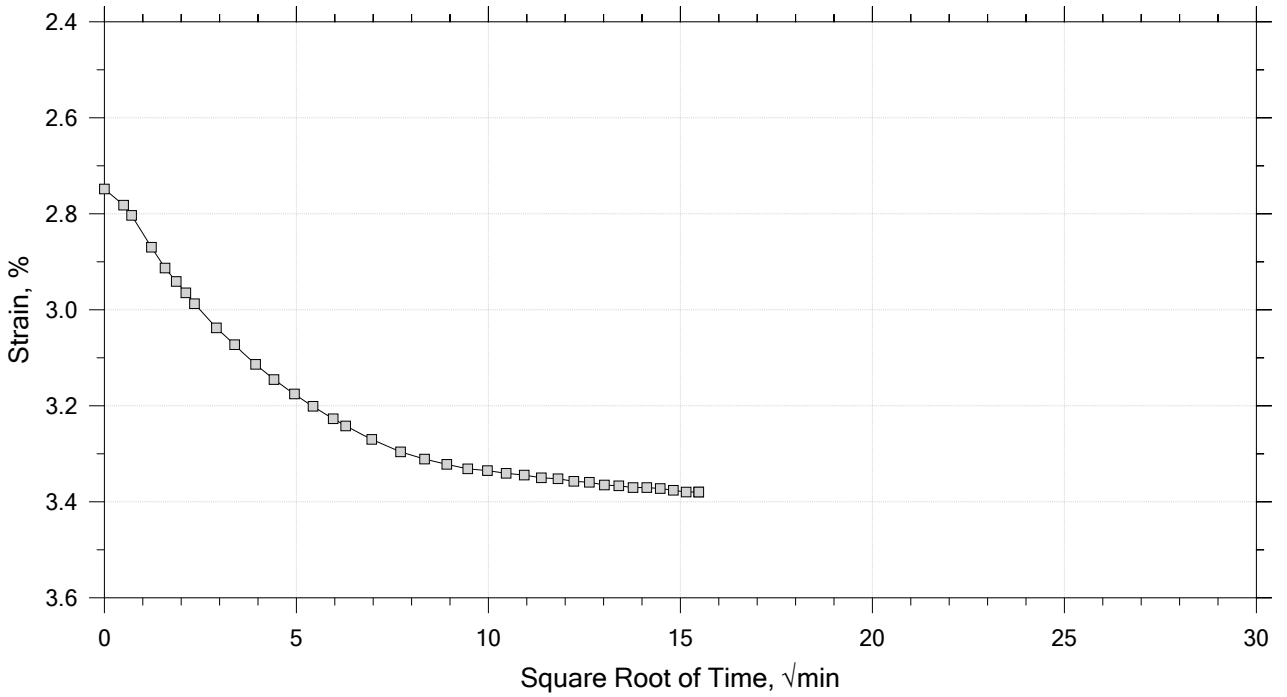
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 14

Constant Load Step

Stress: 0.25 tsf

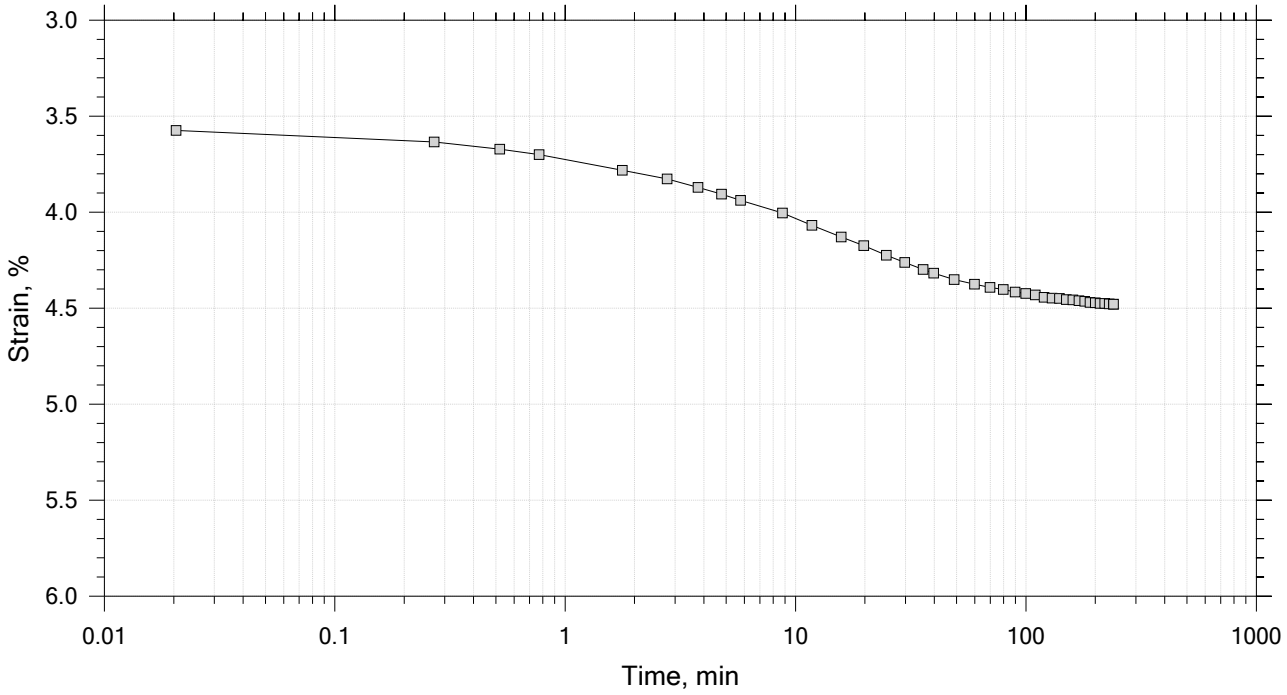


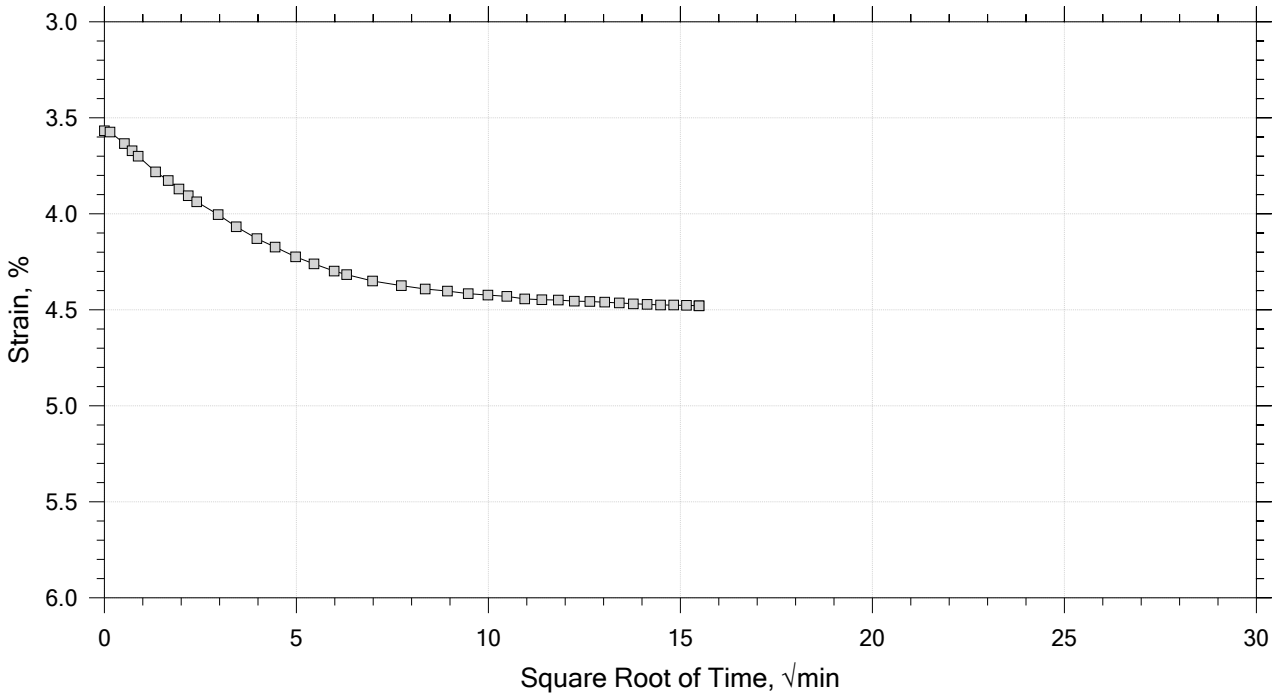


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 14
Constant Load Step
Stress: 0.5 tsf





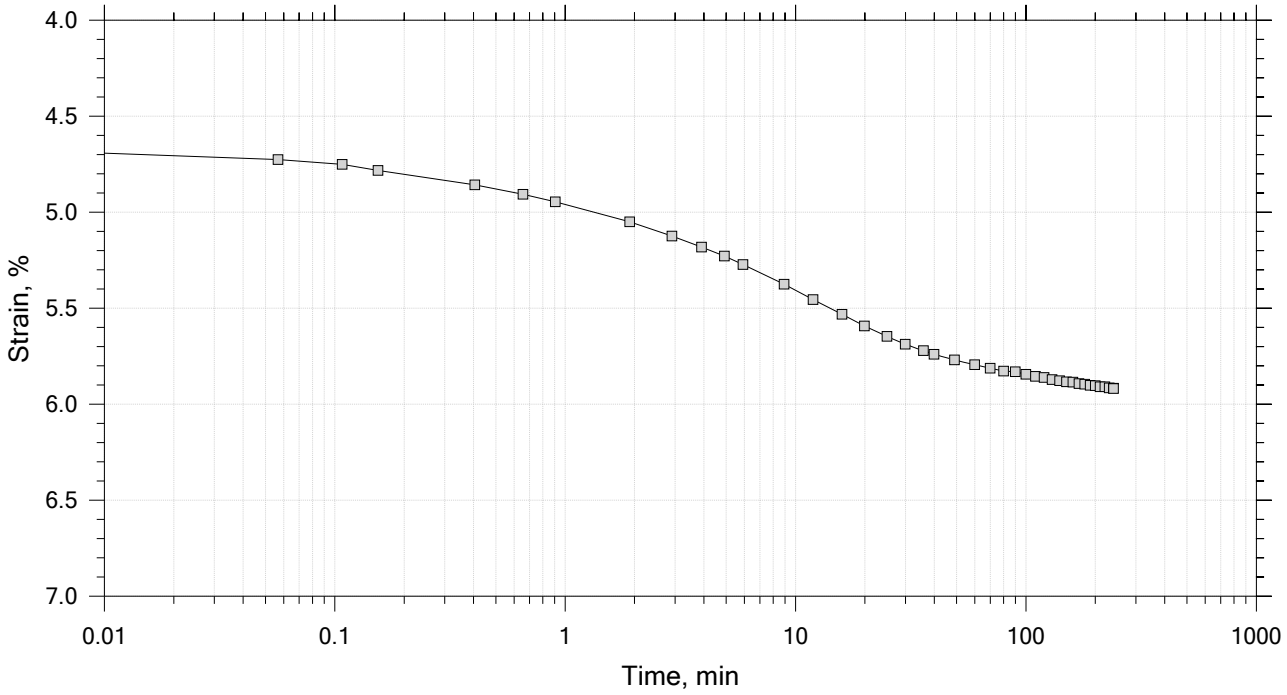
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

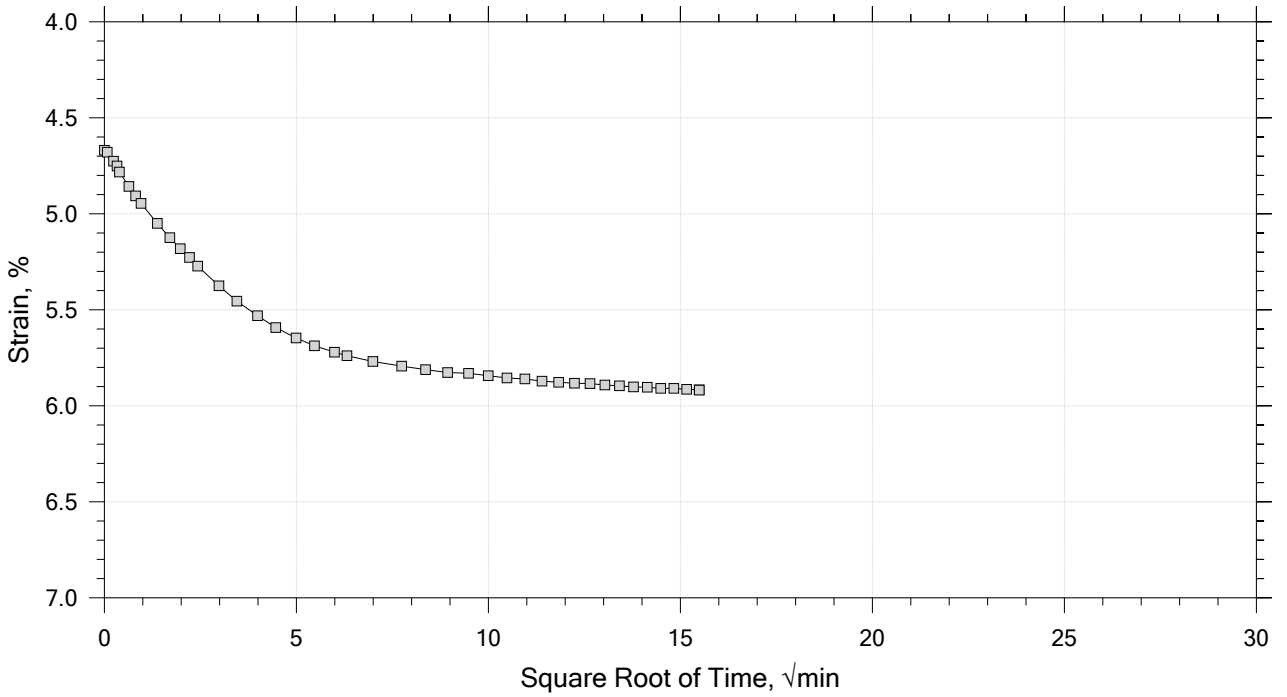
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 14

Constant Load Step

Stress: 1 tsf





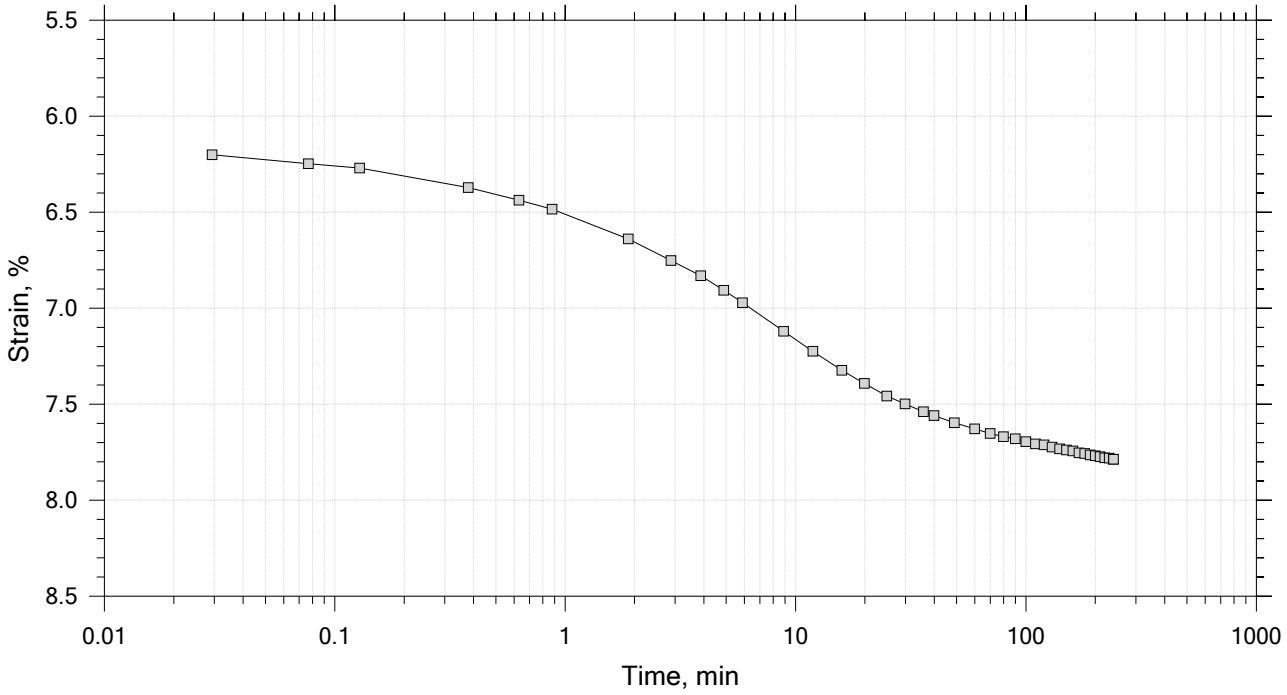
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

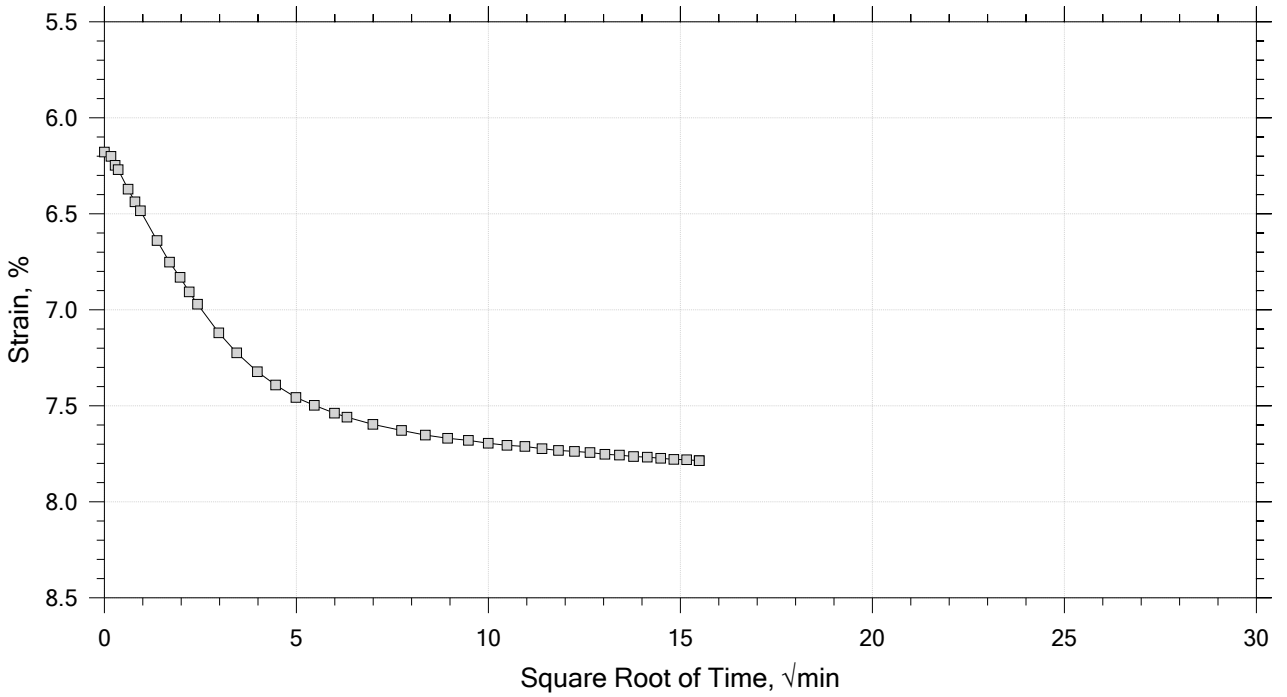
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 14

Constant Load Step

Stress: 2 tsf





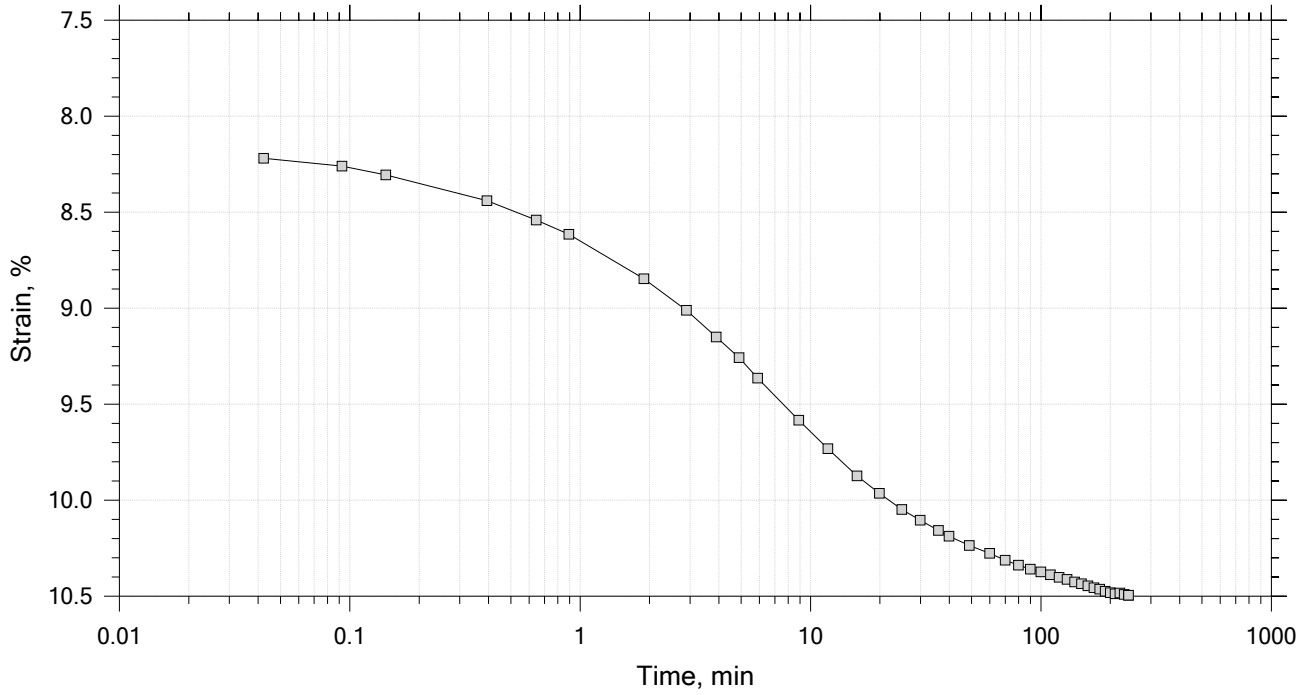
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

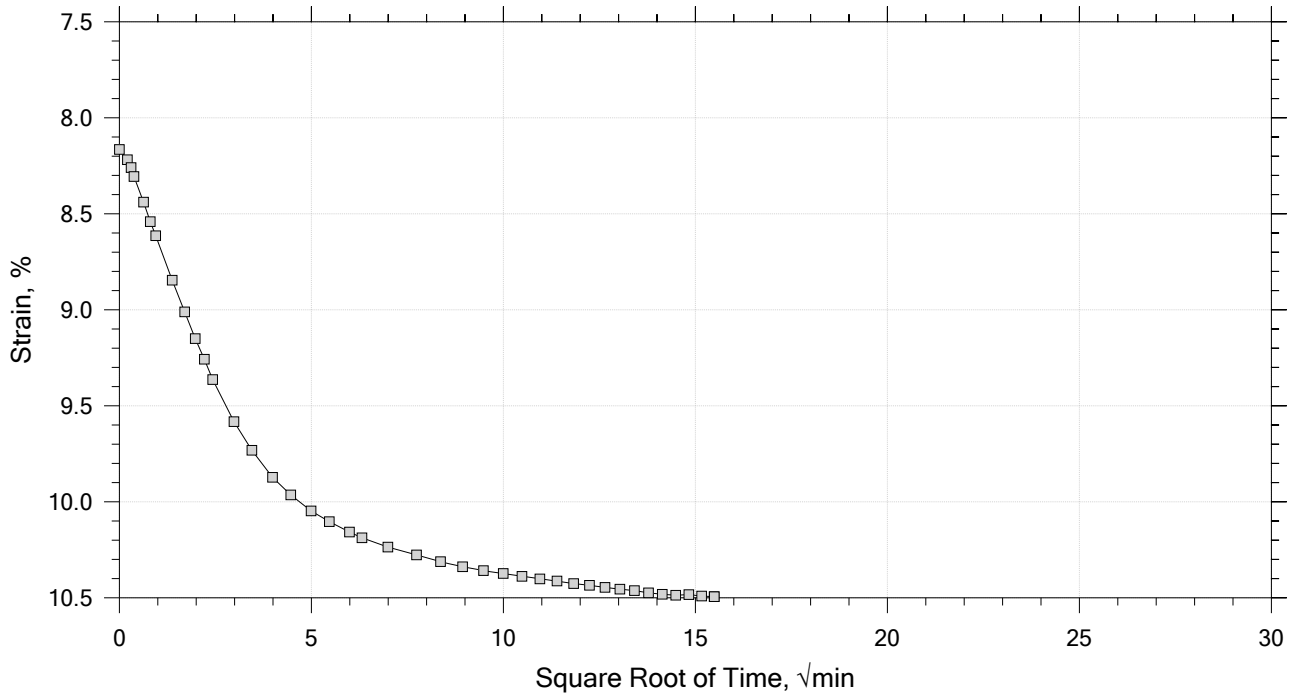
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 14

Constant Load Step

Stress: 4 tsf





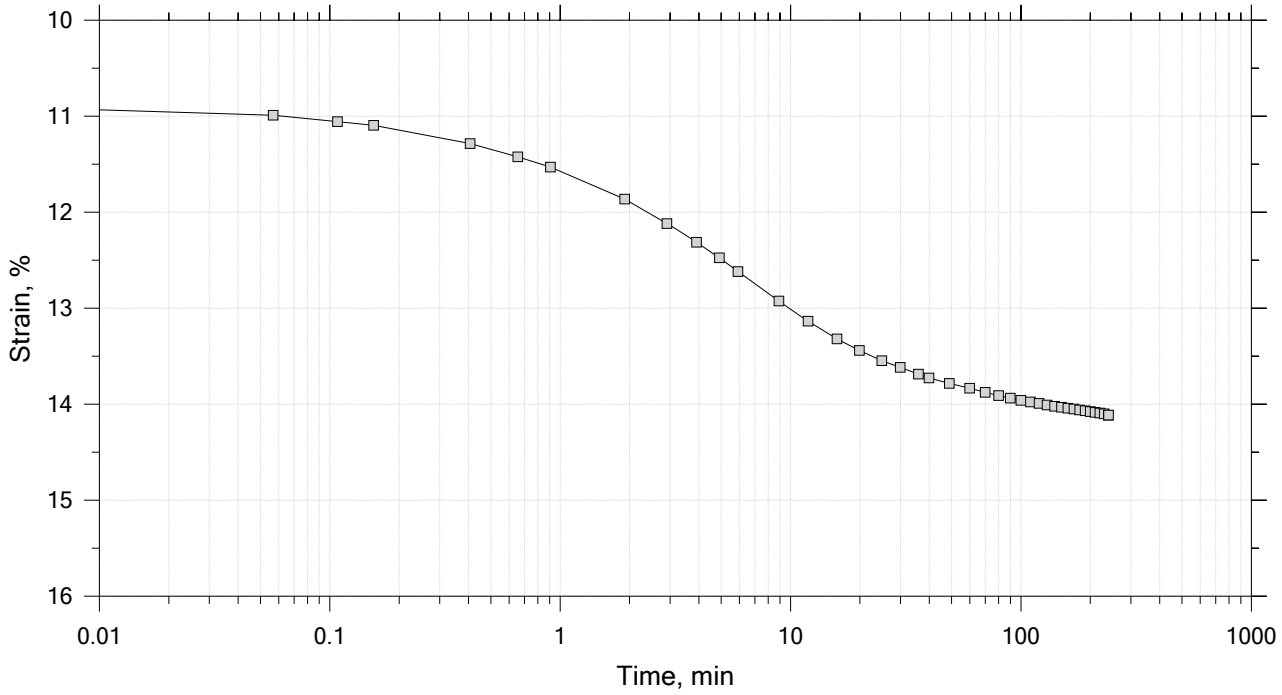
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

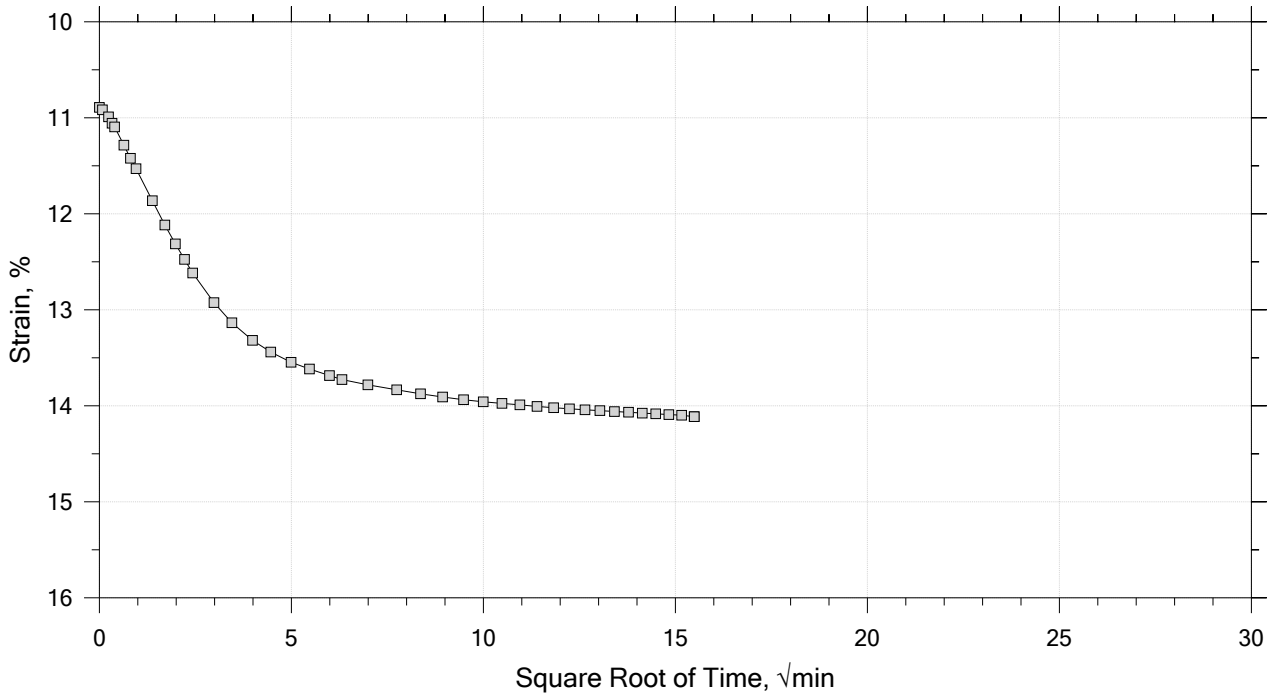
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 14

Constant Load Step

Stress: 8 tsf





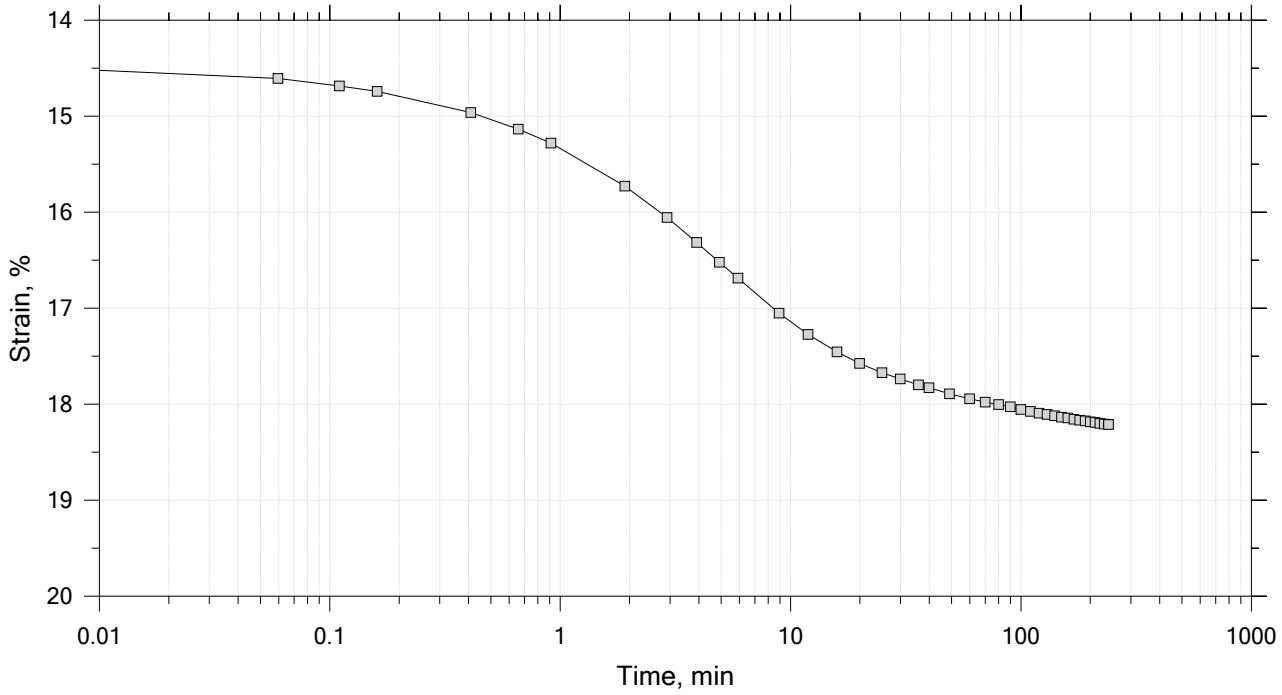
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

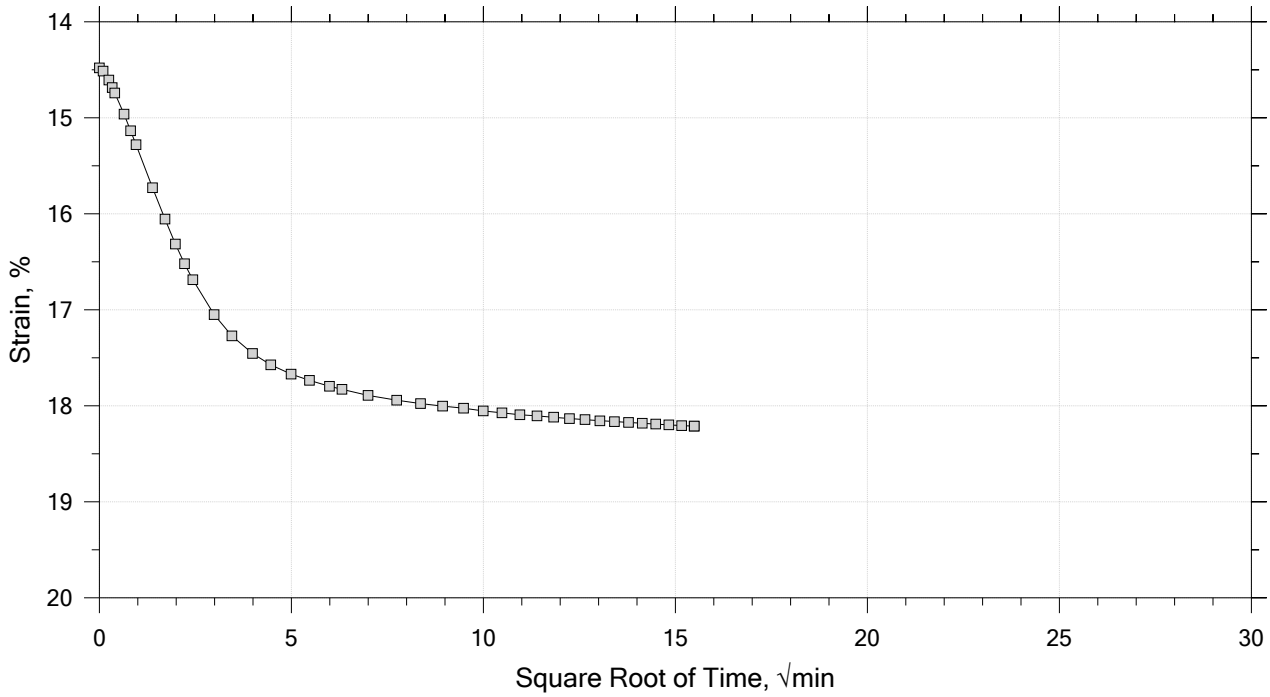
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 14

Constant Load Step

Stress: 16 tsf

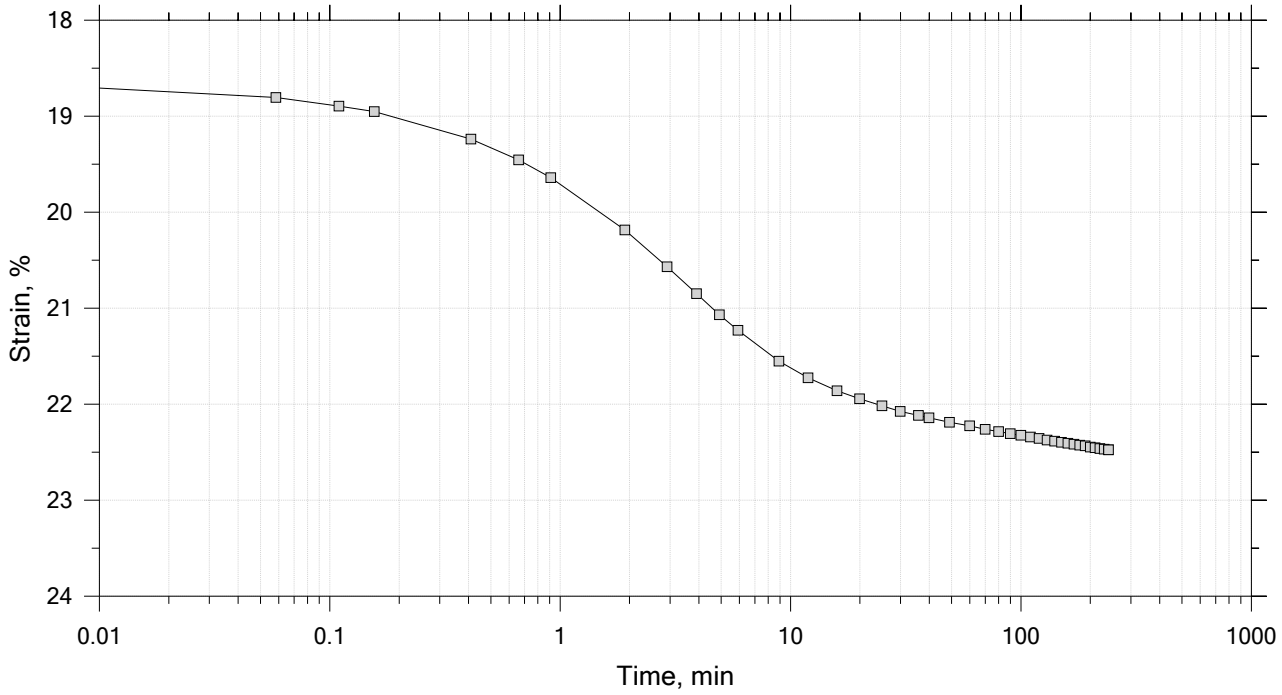


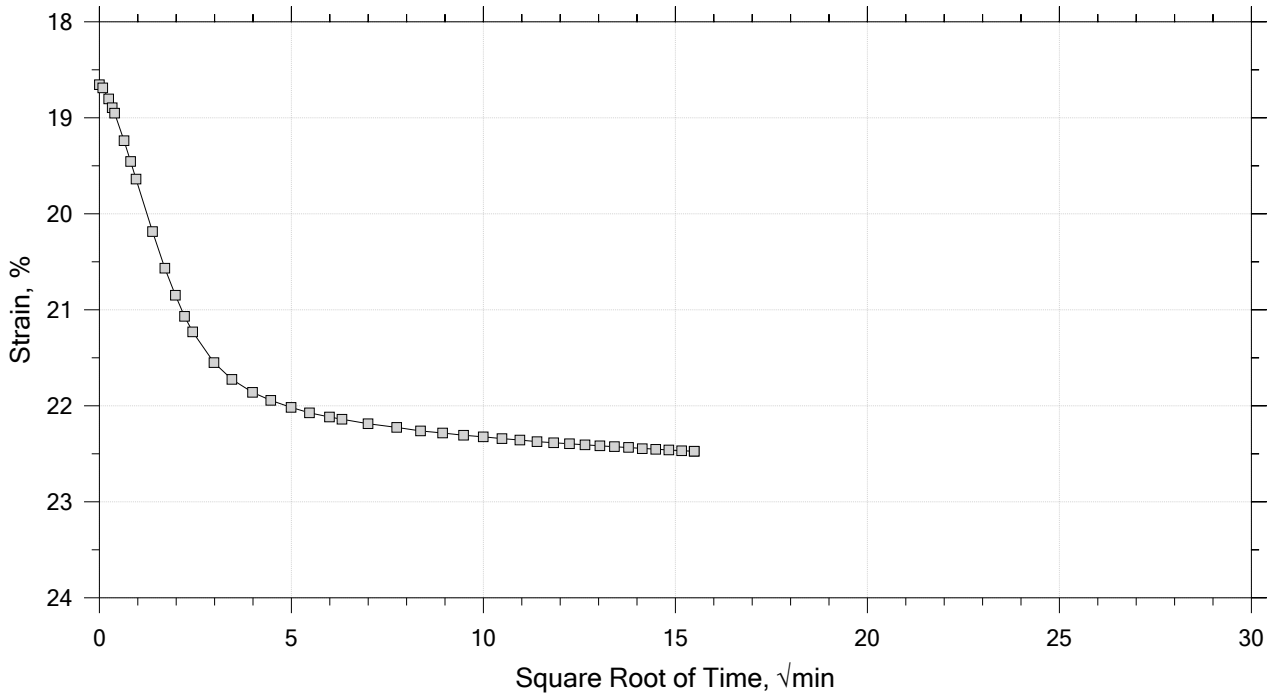


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 14
Constant Load Step
Stress: 32 tsf

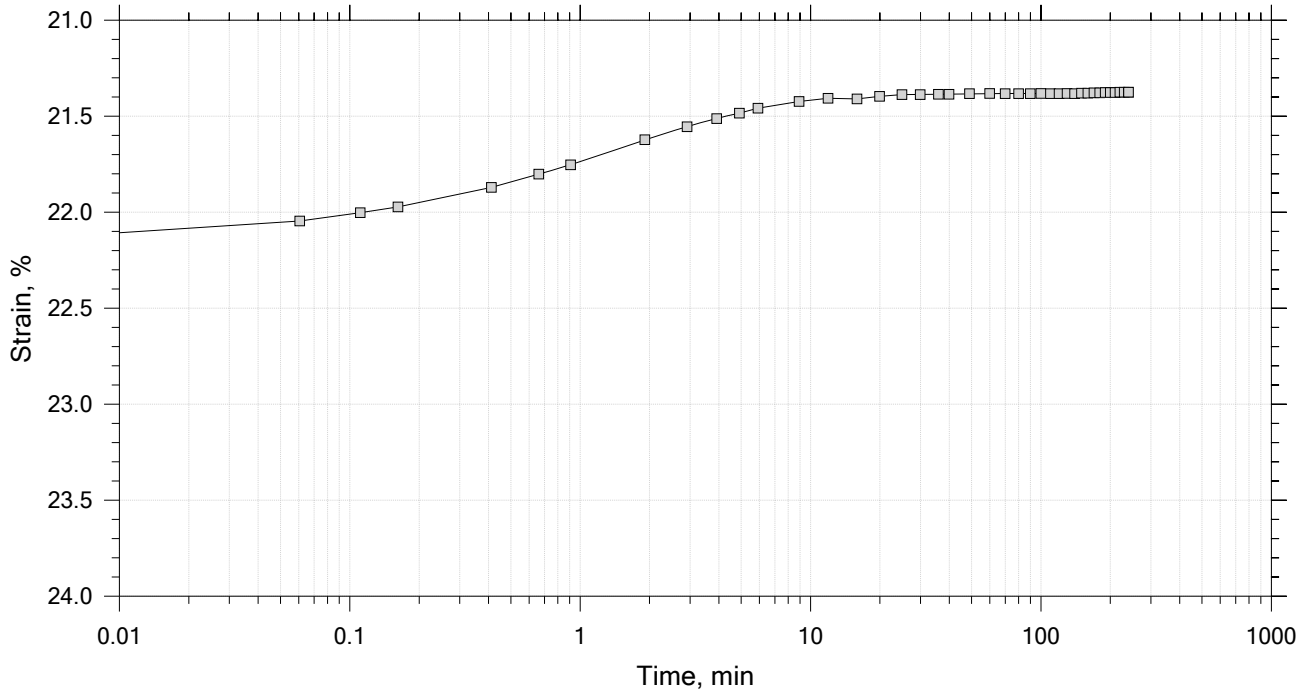


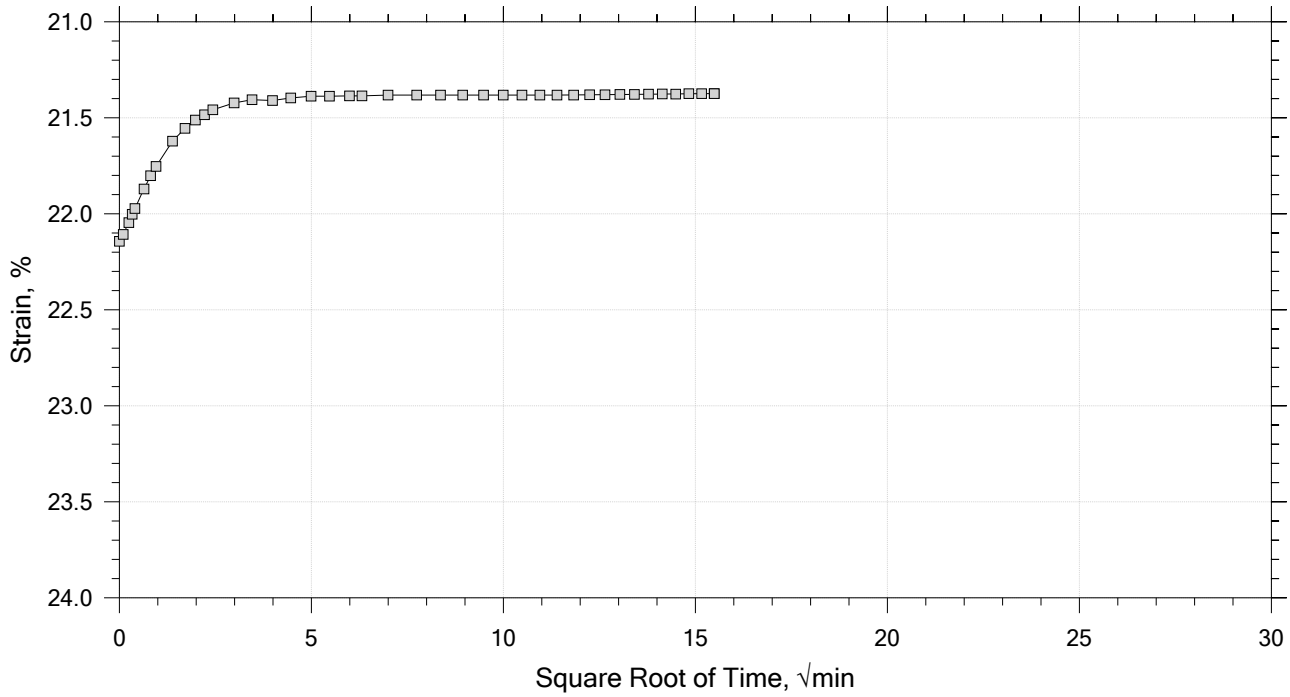


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 14
Constant Load Step
Stress: 8 tsf





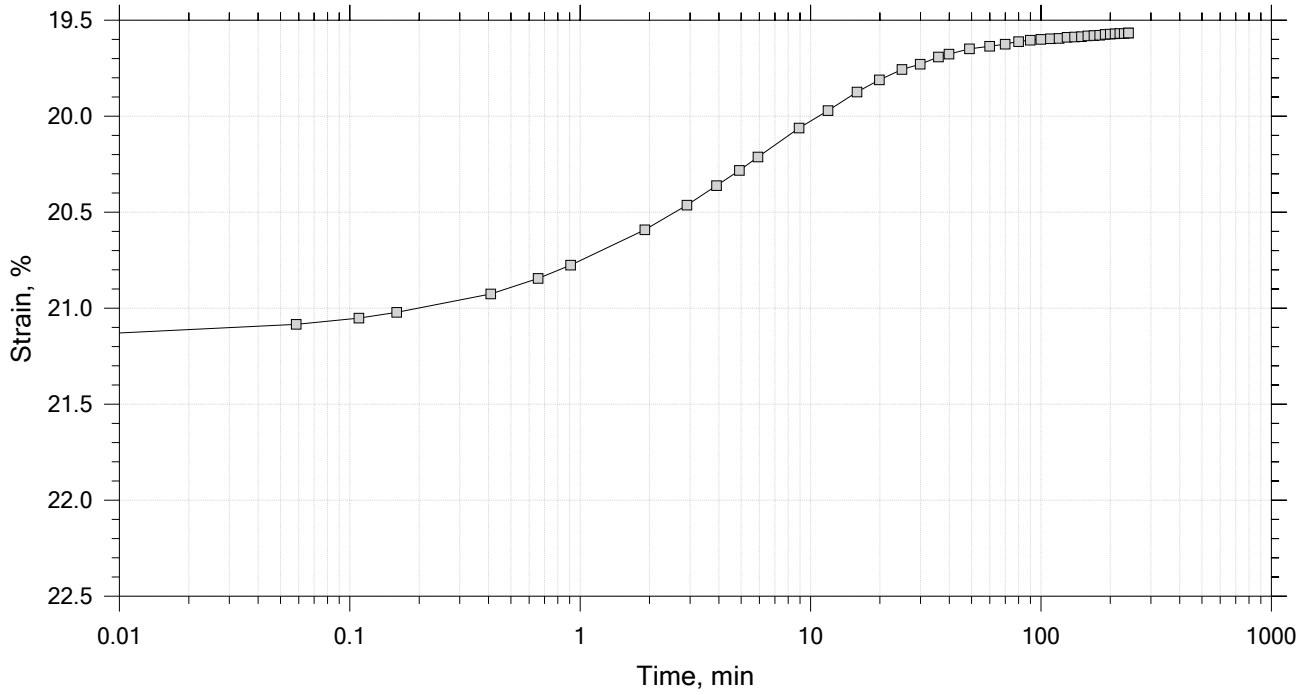
GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

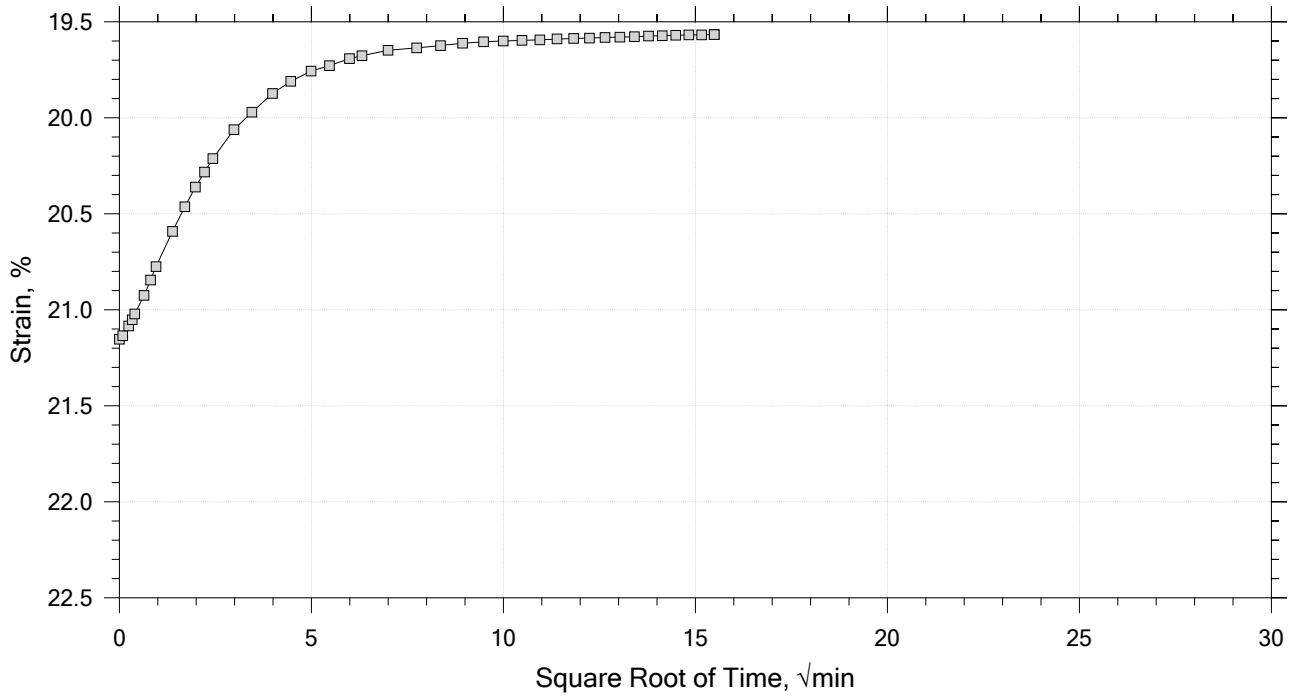
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 14

Constant Load Step

Stress: 2 tsf

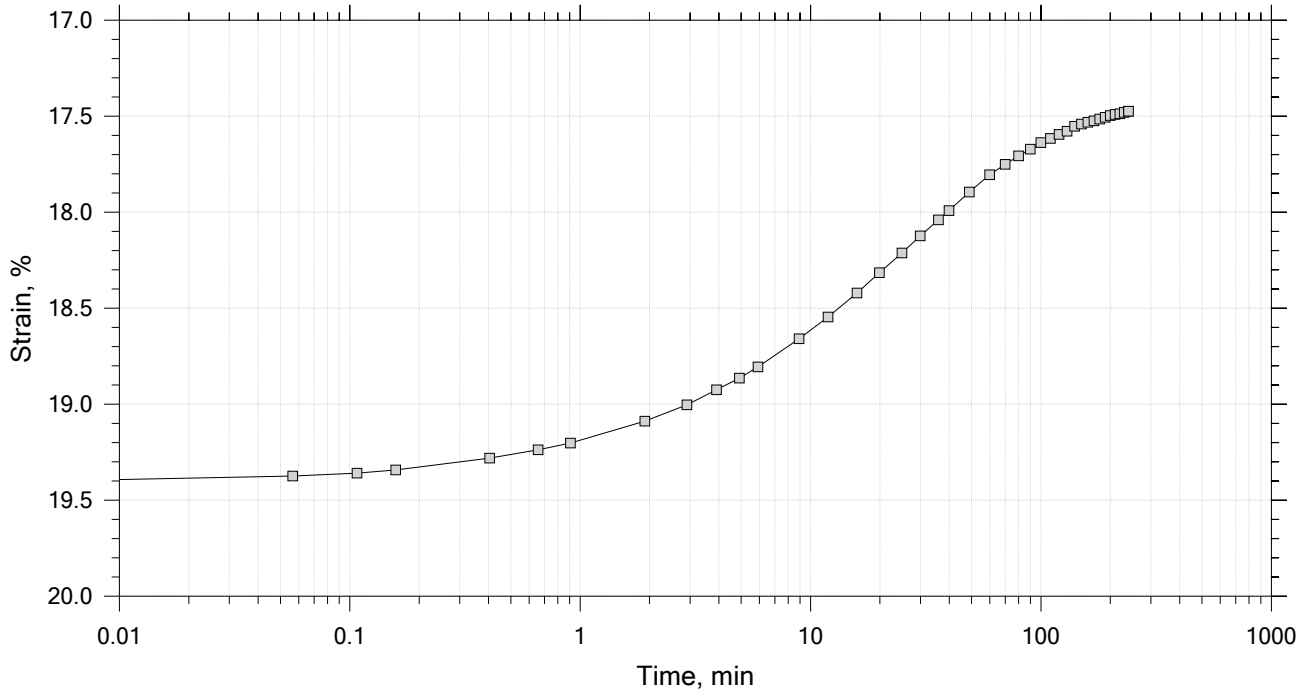


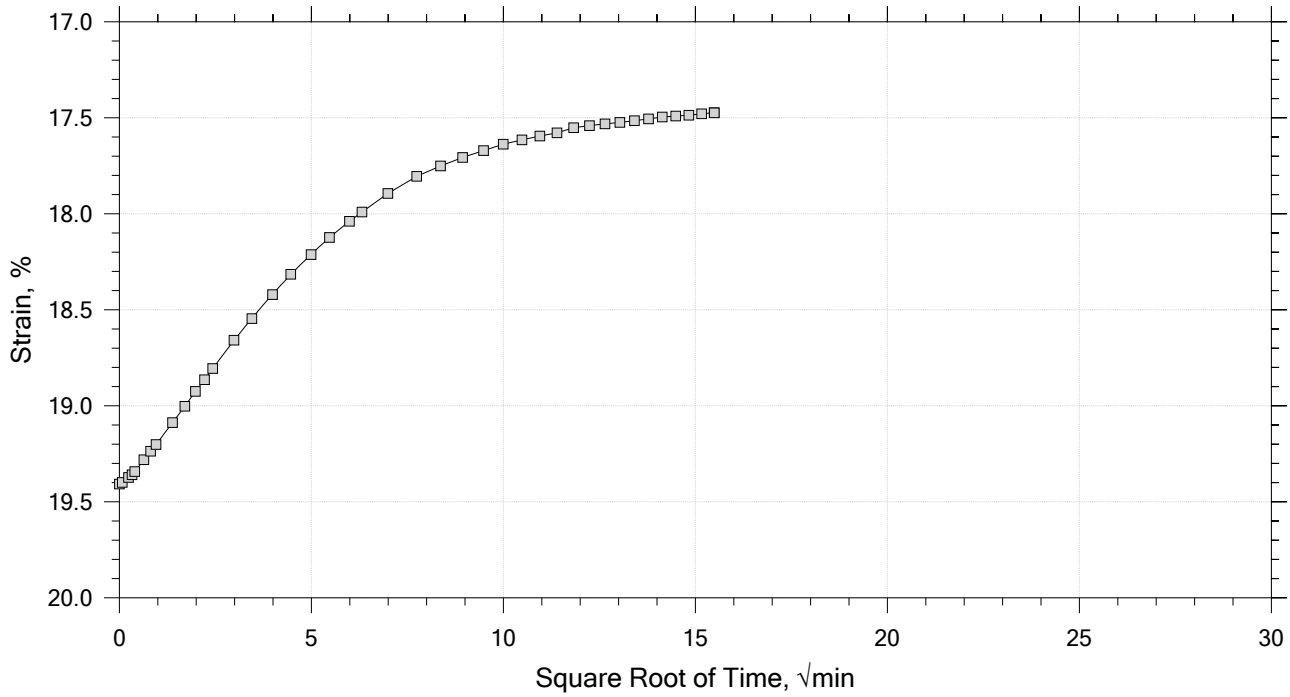


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 14
Constant Load Step
Stress: 0.5 tsf

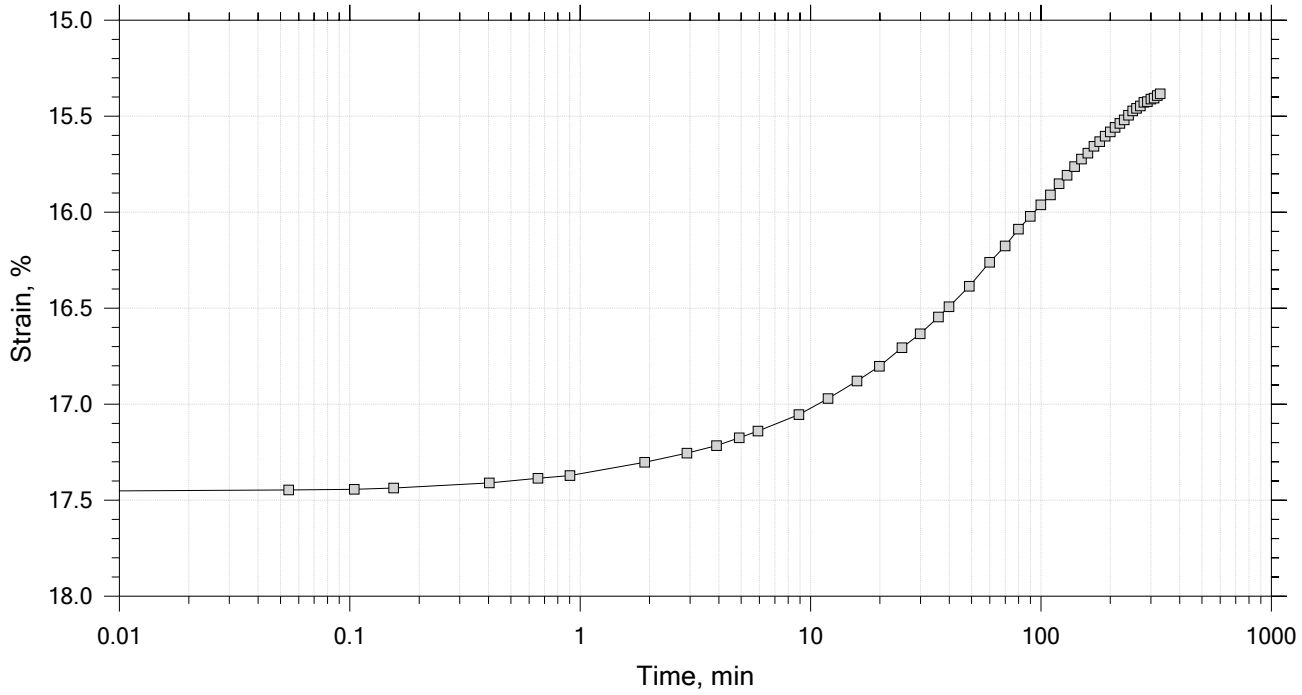


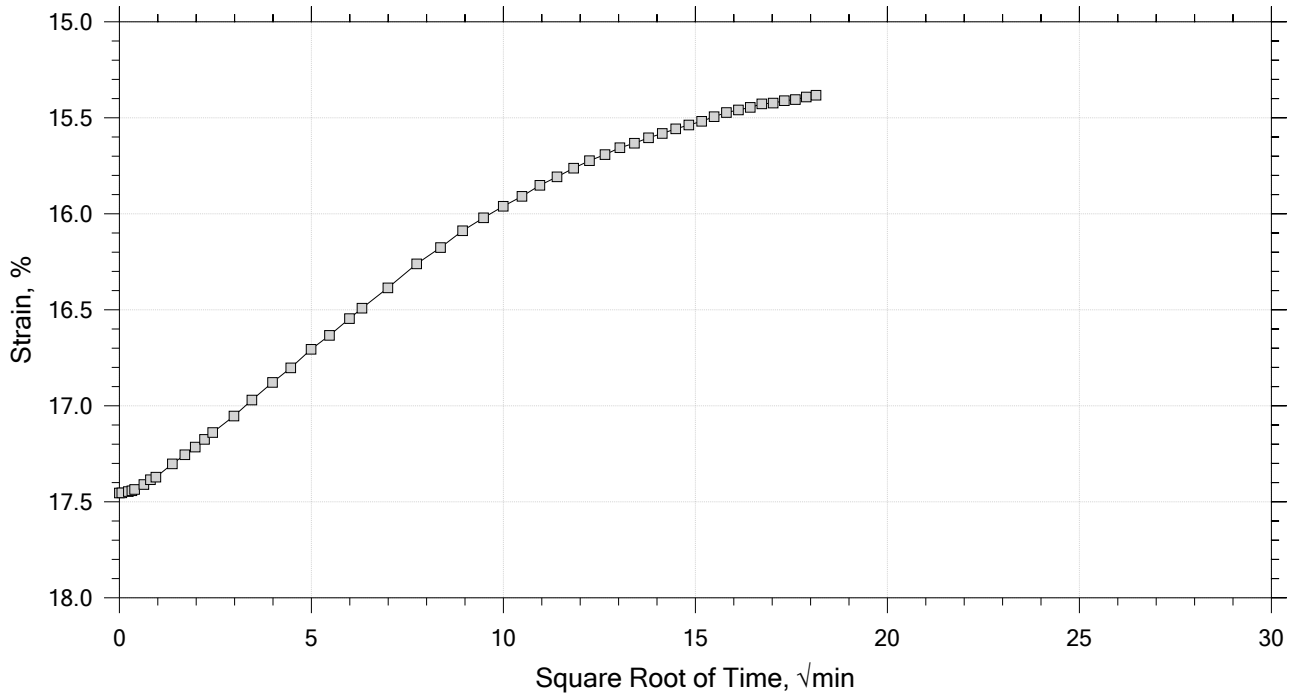


GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 14
Constant Load Step
Stress: 0.125 tsf





Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
Boring No.: KLF-103	Tested By: sjt	Checked By: ab
Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
Test No.: IP-2	Sample Type: intact	Elevation: ---
Description: Moist, dark gray clay		
Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.75	Liquid Limit: 39
Initial Height: 1.00 in	Initial Void Ratio: 0.83	Plastic Limit: 22
Final Height: 0.87 in	Final Void Ratio: 0.592	Plasticity Index: 17

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	E17164	RING		E16539
Mass Container, gm	8.42	110.71	110.71	8.17
Mass Container + Wet Soil, gm	284.18	268.26	257.83	155.43
Mass Container + Dry Soil, gm	217.9	231.8	231.8	129.38
Mass Dry Soil, gm	209.48	121.09	121.09	121.21
Water Content, %	31.64	30.10	21.49	21.49
Void Ratio	---	0.83	0.59	---
Degree of Saturation, %	---	99.93	100.00	---
Dry Unit Weight, pcf	---	93.98	108.02	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		

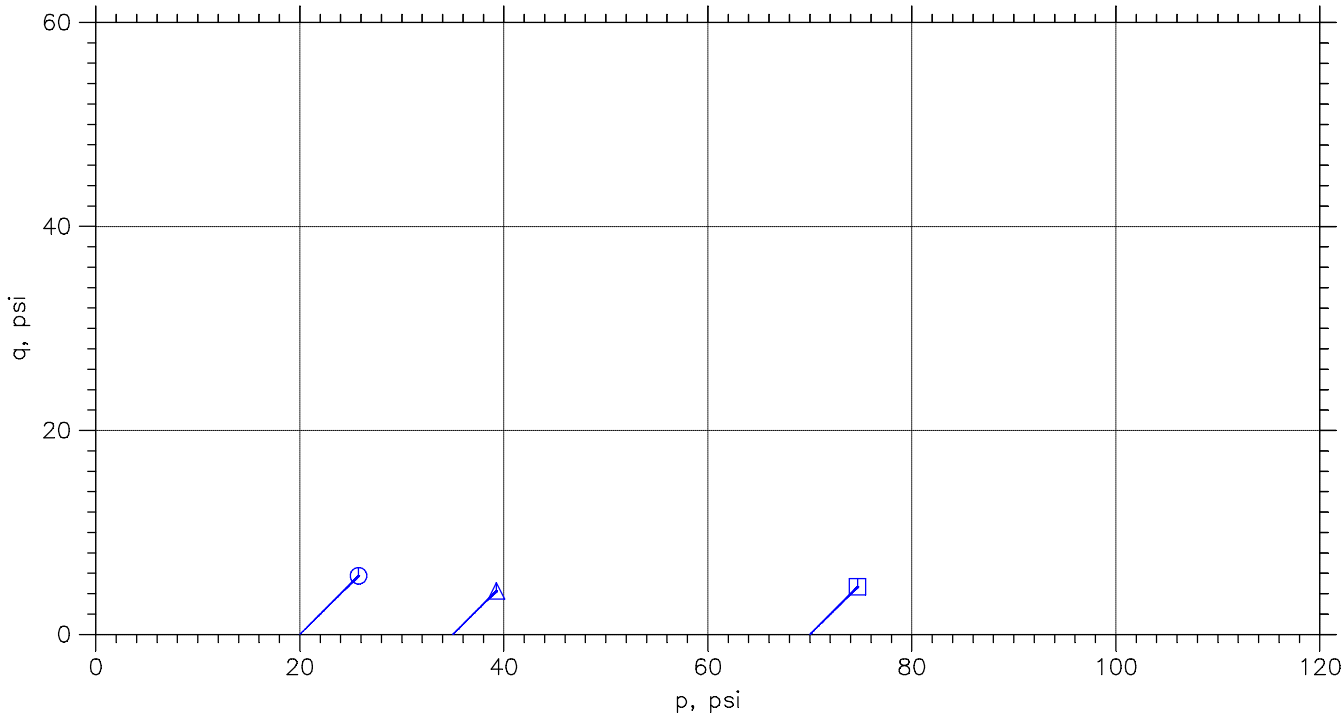
One-Dimensional Consolidation by ASTM D2435 - Method B

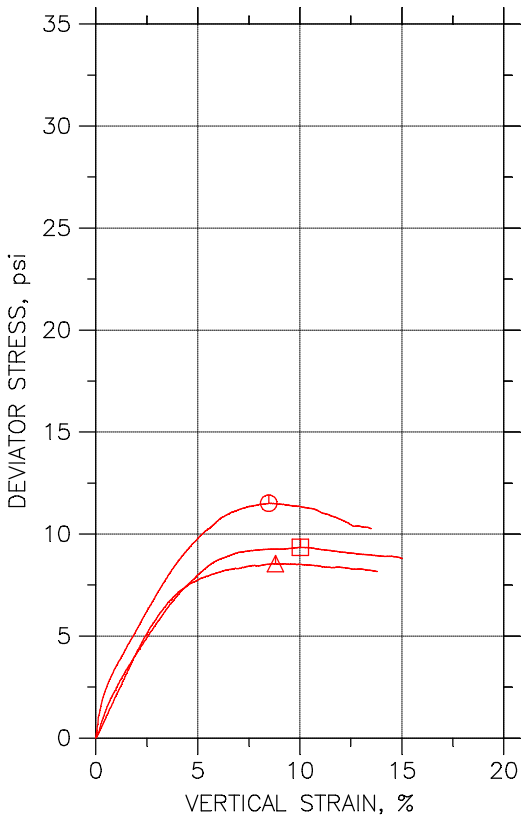
Square Root of Time Coefficients

Step	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv in²/s	Mv 1/tsf	k ft/day
1	0.0634	0.01666	0.799	1.67	19.618	1.77e-04	2.63e-01	8.72e-04
2	0.125	0.02454	0.785	2.45	32.156	1.05e-04	1.28e-01	2.52e-04
3	0.250	0.03380	0.768	3.38	38.168	8.73e-05	7.41e-02	1.21e-04
4	0.500	0.04479	0.748	4.48	30.744	1.06e-04	4.40e-02	8.73e-05
5	1.00	0.05918	0.722	5.92	17.089	1.86e-04	2.88e-02	1.00e-04
6	2.00	0.07786	0.687	7.79	20.558	1.49e-04	1.87e-02	5.22e-05
7	4.00	0.1049	0.638	10.5	19.241	1.52e-04	1.35e-02	3.84e-05
8	8.00	0.1411	0.572	14.1	18.242	1.49e-04	9.05e-03	2.52e-05
9	16.0	0.1821	0.497	18.2	16.330	1.52e-04	5.12e-03	1.46e-05
10	32.0	0.2247	0.419	22.5	11.383	1.97e-04	2.66e-03	9.83e-06
11	8.00	0.2137	0.439	21.4	4.027	5.35e-04	4.58e-04	4.59e-06
12	2.00	0.1957	0.472	19.6	14.092	1.59e-04	3.01e-03	8.95e-06
13	0.500	0.1747	0.510	17.5	54.866	4.28e-05	1.40e-02	1.12e-05
14	0.125	0.1538	0.548	15.4	210.085	1.17e-05	5.58e-02	1.23e-05

GeoTesting EXPRESS A Sercel Business	Project: Sherman Street-41 Bellis Circle	Location: Cambridge, MA	Project No.: GTX-323051
	Boring No.: KLF-103	Tested By: sjt	Checked By: ab
	Sample No.: U-1	Test Date: 04/30/26	Depth: 37-39'
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: LTIII-G, Swell Pressure = 0.0634 tsf		
	Displacement at End of Increment		

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	◷	△	◫	
Sample No.	U-2	U-2	U-2	
Test No.	UU-3-1	UU-3-2	UU-3-3R	
Depth	47-49'	47-49'	47-49'	
Tested by	dmt	dmt	dmt	
Test Date	5/5/26	5/5/26	5/8/26	
Checked by	ab	ab	njh	
Check Date	5/6/26	5/6/26	5/11/26	
Diameter, in	2.03	2.02	2	
Height, in	4.6	4.4	4.5	
Water Content, %	32.1	28.1	35.3	
Dry Density, pcf	89.37	95.17	85.13	
Saturation, %	98.0	98.4	97.4	
Void Ratio	0.886	0.771	0.98	
Confining Stress, psi	20	35	70	
Undrained Strength, psi	5.755	4.273	4.674	
Max. Dev. Stress, psi	11.51	8.545	9.349	
Strain at Failure, %	8.48	8.8	10	
Strain Rate, %/min	1	1	1	
Estimated Specific Gravity	2.7	2.7	2.7	
Liquid Limit	34	34	34	
Plastic Limit	19	19	19	
Plasticity Index	15	15	15	

GeoTesting EXPRESS
A Sercel Business

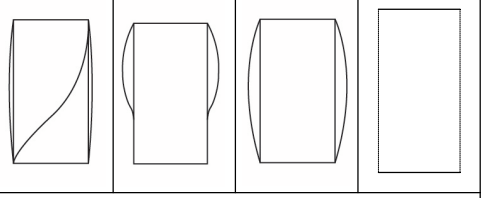
Project: Sherman Street-41 Bellis

Location: Cambridge, MA

Project No.: GTX-323051

Boring No.: KLF-104

Sample Type: intact



Description: Moist, greenish gray clay

Remarks: TX-028

Phase calculations based on start of test.

Mon, 11-MAY-2026 10:01:31

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	---	Sample Type:	---	Tested By:	gp
Sample ID:	---	Test Date:	05/05/26	Checked By:	smd
Depth :	---	Test Id:	863596		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
KLF-101	C-1	86.81-87.16 ft	168	12818	1	Yes	---
KLF-102	C-2	82.72-83.09 ft	168	16277	1	Yes	---
KLF-103	C-2	84.75-85.12 ft	168	14252	1	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Kleinfelder, Inc.	Test Date:	5/3/2026
Project Name:	Sherman Street- 41 Bellis Circle	Tested By:	brv
Project Location:	Cambridge, MA	Checked By:	smd
GTX #:	323051		
Boring ID:	KLF-101		
Sample ID:	C-1		
Depth (ft):	86.81-87.16		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.11	4.11	4.11
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	560.04		
Bulk Density, lb/ft^3	168	**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.1	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

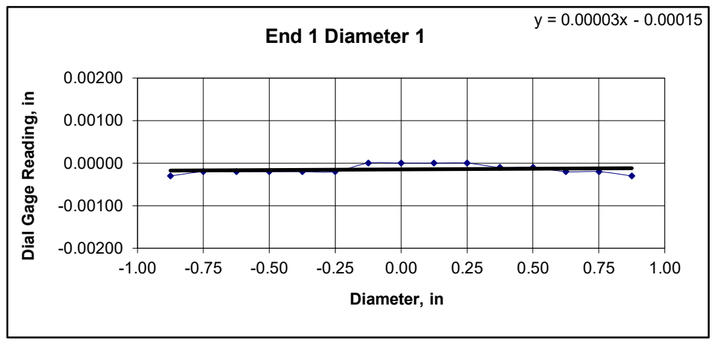
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00020	-0.00030
Diameter 2, in (rotated 90°)	-0.00030	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00010	-0.00030	-0.00030	-0.00030	-0.00030

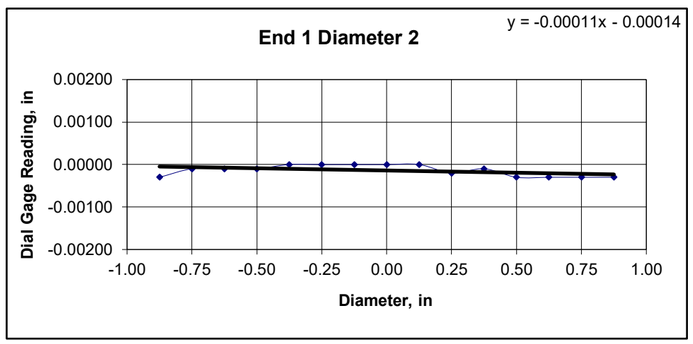
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00030

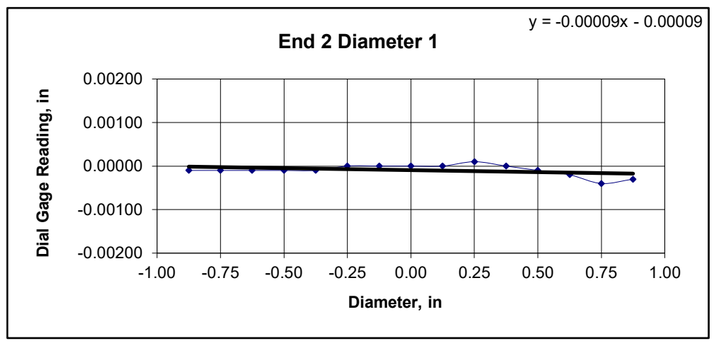
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	-0.00010	-0.00020	-0.00040	-0.00030
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00070

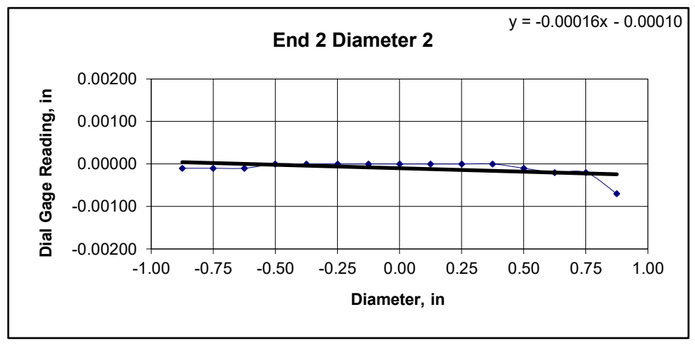
Difference between max and min readings, in:
0° = 0.0005 90° = 0.0007

Maximum difference must be < 0.0020 in. Difference = ± 0.00035
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00003
Angle of Best Fit Line: 0.00180

End 2:
Slope of Best Fit Line 0.00009
Angle of Best Fit Line: 0.00524

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00011
Angle of Best Fit Line: 0.00606

End 2:
Slope of Best Fit Line 0.00016
Angle of Best Fit Line: 0.00933

Maximum Angular Difference: 0.00327

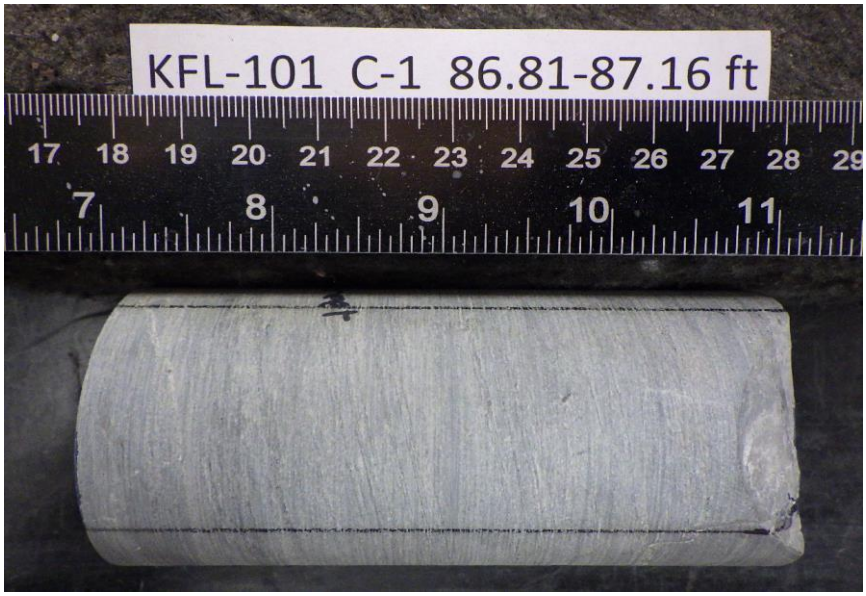
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.982	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00030	1.982	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00050	1.982	0.00025	0.014	YES
Diameter 2, in (rotated 90°)	0.00070	1.982	0.00035	0.020	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Kleinfelder, Inc.
Project Name:	Sherman Street - 41 Bellis Circle
Project Location:	Cambridge, MA
GTX #:	323051
Test Date:	5/5/2026
Tested By:	gp
Checked By:	smd
Boring ID:	KLF-101
Sample ID:	C-1
Depth, ft:	86.81-87.16



After cutting and grinding



After break

Client:	Kleinfelder, Inc.	Test Date:	5/3/2026
Project Name:	Sherman Street- 41 Bellis Circle	Tested By:	brv
Project Location:	Cambridge, MA	Checked By:	smd
GTX #:	323051		
Boring ID:	KLF-102		
Sample ID:	C-2		
Depth (ft):	82.72-83.09		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.26	4.26	4.26
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	585.69		
Bulk Density, lb/ft^3	168	**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.1	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

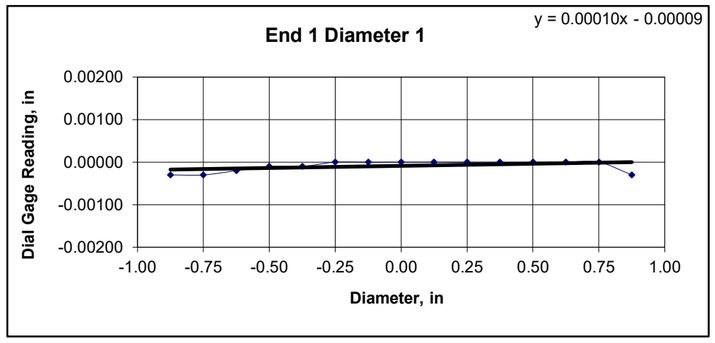
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00030
Diameter 2, in (rotated 90°)	-0.00020	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020

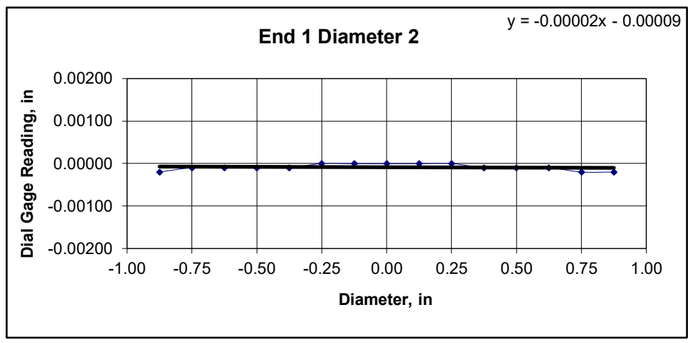
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00020

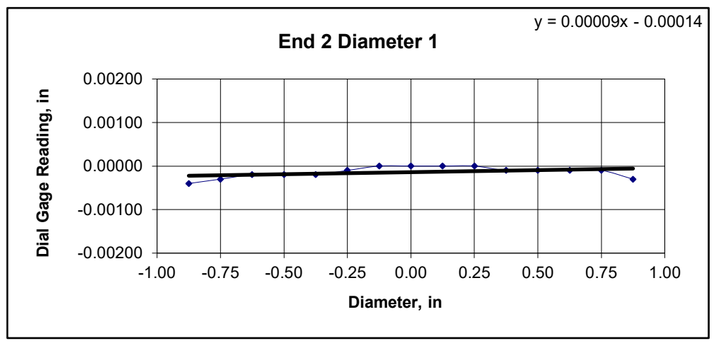
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00040	-0.00030	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00030
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010

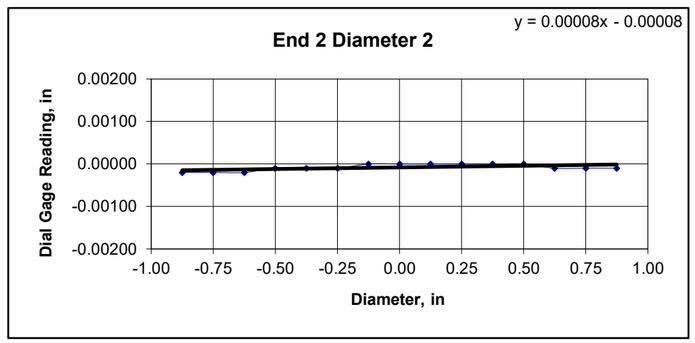
Difference between max and min readings, in:
0° = 0.0004 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = ± 0.00020
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00573

End 2:
Slope of Best Fit Line 0.00009
Angle of Best Fit Line: 0.00540

Maximum Angular Difference: 0.00033

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00002
Angle of Best Fit Line: 0.00098

End 2:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00442

Maximum Angular Difference: 0.00344

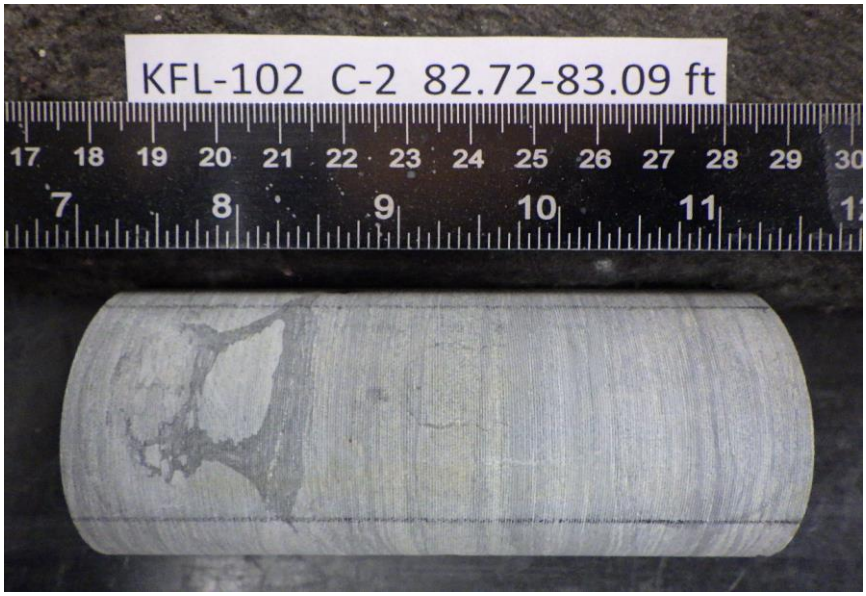
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.989	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00020	1.989	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00040	1.989	0.00020	0.012	YES
Diameter 2, in (rotated 90°)	0.00020	1.989	0.00010	0.006	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Kleinfelder, Inc.
Project Name:	Sherman Street - 41 Bellis Circle
Project Location:	Cambridge, MA
GTX #:	323051
Test Date:	5/5/2026
Tested By:	gp
Checked By:	smd
Boring ID:	KLF-102
Sample ID:	C-2
Depth, ft:	82.72-83.09



After cutting and grinding



After break

Client:	Kleinfelder, Inc.	Test Date:	5/3/2026
Project Name:	Sherman Street- 41 Bellis Circle	Tested By:	brv
Project Location:	Cambridge, MA	Checked By:	smd
GTX #:	323051		
Boring ID:	KLF-103		
Sample ID:	C-2		
Depth (ft):	84.75-85.12		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.29	4.29	4.29
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	587.89		
Bulk Density, lb/ft^3	168	**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

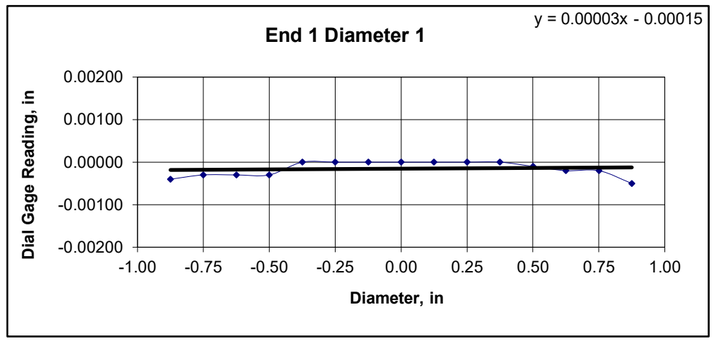
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00040	-0.00030	-0.00030	-0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00050
Diameter 2, in (rotated 90°)	-0.00030	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00030	-0.00050

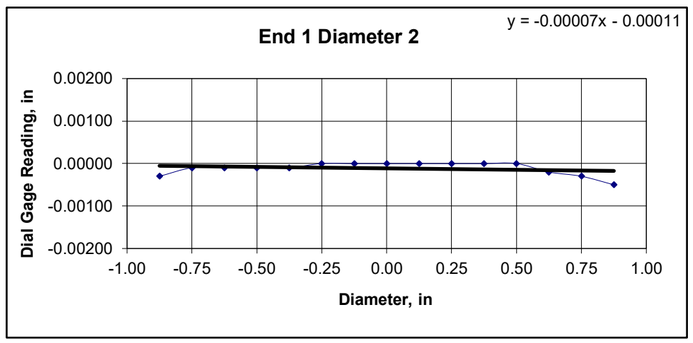
Difference between max and min readings, in:
0° = 0.00050 90° = 0.00050

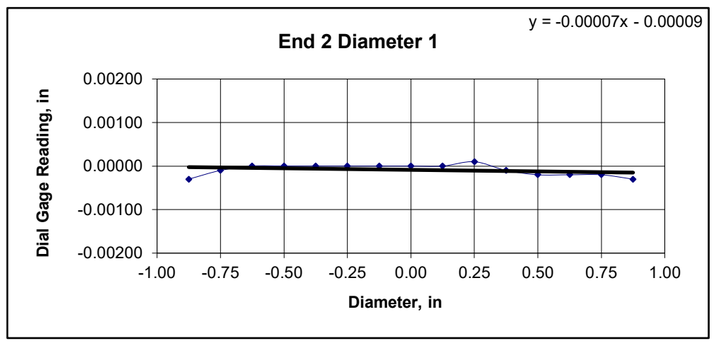
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	-0.00010	-0.00020	-0.00020	-0.00020	-0.00030
Diameter 2, in (rotated 90°)	-0.00040	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00040

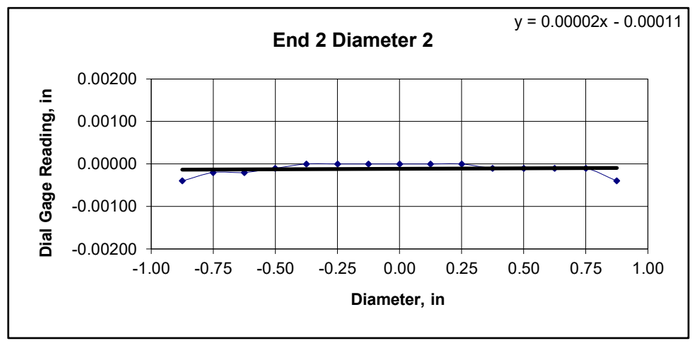
Difference between max and min readings, in:
0° = 0.0004 90° = 0.0004

Maximum difference must be < 0.0020 in. Difference = ± 0.00025
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00003
Angle of Best Fit Line: 0.00196

End 2:
Slope of Best Fit Line 0.00007
Angle of Best Fit Line: 0.00409

Maximum Angular Difference: 0.00213

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00007
Angle of Best Fit Line: 0.00393

End 2:
Slope of Best Fit Line 0.00002
Angle of Best Fit Line: 0.00131

Maximum Angular Difference: 0.00262

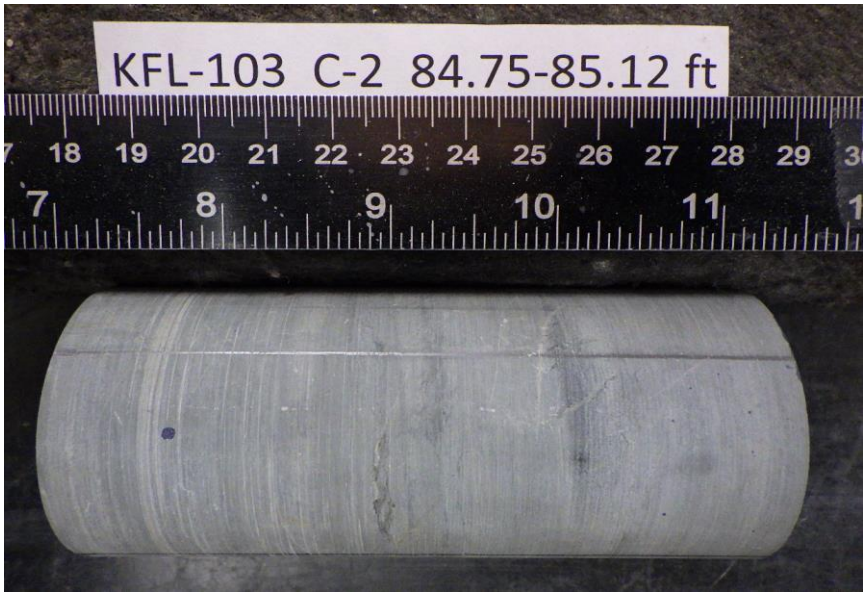
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00050	1.987	0.00025	0.014	YES
Diameter 2, in (rotated 90°)	0.00050	1.987	0.00025	0.014	YES
END 2					
Diameter 1, in	0.00040	1.987	0.00020	0.012	YES
Diameter 2, in (rotated 90°)	0.00040	1.987	0.00020	0.012	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Kleinfelder, Inc.
Project Name:	Sherman Street - 41 Bellis Circle
Project Location:	Cambridge, MA
GTX #:	323051
Test Date:	5/5/2026
Tested By:	gp
Checked By:	smd
Boring ID:	KLF-103
Sample ID:	C-2
Depth, ft:	84.75-85.12



After cutting and grinding



After break

GeoTesting EXPRESS
A Sercel Business

Client:	Kleinfelder, Inc.				
Project:	Sherman Street - 41 Bellis Circle				
Location:	Cambridge, MA			Project No:	GTX-323051
Boring ID:	---	Sample Type:	---	Tested By:	ajl
Sample ID:	---	Test Date:	07/02/26	Checked By:	ank
Depth :	---	Test Id:	880209		

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
KLF-102	S-1, S-2, S-3	0-6	Moist, dark grayish brown sandy silt with gravel	9.3	9.1
KLF-103	S-4 & S-5	6-10	Moist, brown sand with clay	7.6	6.8
KLF-104	S-7 & S-8	14-21	Moist, gray sandy clay	7.8	7.7

Notes: Sample Preparation: screened through #10 sieve

Method A, pH meter used

GeoTesting EXPRESS
A Sercel Business

Client:	Kleinfelder, Inc
Project:	Sherman Street - 41 Bellis Circle
Location:	Cambridge, MA
GTX#:	323051
Test Date:	07/02/26
Tested By:	AED/NMK
Checked By:	ANK

Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, $(ohm\text{-}cm)^{-1}$
KLF-102	S-1, S-2, S-3	0-6'	Moist, dark grayish brown sandy silt with gravel	1,842	5.43E-04
KLF-103	S-4, S-5	6-10'	Moist, brown sand with clay	6,865	1.46E-04
KLF-104	S-7, S-8	14-21'	Moist, gray sandy clay	2,672	3.74E-04

Notes: Test Equipment: Nilsson Model 400 Soil Resistance Meter, MC Miller Soil Box
Water added to sample to create a thick slurry prior to testing (saturated condition).
Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G57)
Test conducted in standard laboratory atmosphere: 68-73 F



PO Box 572455 / Salt Lake City UT 84157-2455 / USA
TEL +1 801 262 2448 · Director-TS-A@TEi-Test.com
www.TEi-Test.com

GEOTESTING EXPRESS INCORPORATED
125 NAGOG PARK
ACTON MA 01720-3451
USA

Analysis No.	TS-A2614116
Report Date	06 July 2026
Date Sampled	02 July 2026
Date Received	01 July 2026
Where Sampled	Acton, MA USA
Sampled By	Client

This is to attest that we have examined: Soil: Sherman Street – 41 Bellis Circle; Site Location: – — –; Job Number: GTX-323051

When examined to the applicable requirements of:

ASTM D 512-23	“Standard Test Methods for Chloride Ion in Water” Method B
ASTM C 1580-20	“Standard Test Method for Water-Soluble Sulfate in Soil”

Results:

ASTM D 512 - Chloride Method B

Sample		Results		Minimum Detection Limit
		ppm (mg/kg)	%[1]	
KLF-102		210.	0.0210	10.
S-1, S-2, S-3	0 – 6’			
KLF-103		11.	0.0011	
S-4, & S-5	6 – 10’			
KLF-104		19.	0.0019	
S-7 & S-8	14 – 21’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

Testing Services analytical Laboratory
3455 South 500 West
Salt Lake City, UT 84115-4234 USA
TEL: +1 801 262 2448
EMAIL: Director-TS-A@TEi-Test.com

ASTM C 1580 - Sulfates (Soluble)

Sample		Results		Minimum Detection Limit
		ppm (mg/kg)	%[1]	
KLF-102		20.	0.0020	10.
S-1, S-2, S-3	0 – 6’			
KLF-103		10.	0.0010	
S-4, & S-5	6 – 10’			
KLF-104		10.	0.0010	
S-7 & S-8	14 – 21’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

END OF ANALYSIS

USEPA Laboratory ID UT00930



Merrill Gee P.E. – Engineer in Charge

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APPENDIX G

GBA Geotechnical Report Insert

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

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