

EXIT 45 EMBANKMENT  
PRELOAD

Scarborough - South  
Portland, Maine  
Contract ID: 2019.13

Geotechnical Design  
Report

JULY 26, 2019

PREPARED FOR

**The Maine Turnpike**  
2360 Congress Street  
Portland, ME 04102

PREPARED BY

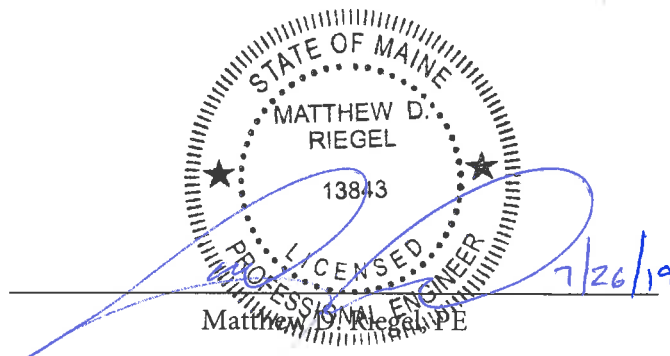
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MM 44.9

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## ATTACHMENTS

Attachment 1	Geotechnical Data Report (Preliminary Exploration)
Attachment 2	Geotechnical Data Report (Final Phase Exploration)
Attachment 3	Geotechnical Data Report (Supplemental Exploration)

## 1.0 PROJECT DESCRIPTION AND SCOPE

### 1.1 Introduction

The following represents the results of the geotechnical assessment prepared by HNTB for the reconfiguration of the existing Exit 45 Interchange connecting the Maine Turnpike and Route 703 in Scarborough and South Portland, Maine (**Figure 1: Project Site Location Map**). This report supports the preliminary design of the interchange reconfiguration as well as the final design of the embankment preload. The existing interchange is a trumpet type. The existing deficient Exit 45 Underpass Bridge is a non-composite bridge which connects the Maine Turnpike Southbound loop on-ramp and off-ramp travel lanes (one in each direction) to Route 703, which is functionally obsolete, having limited load rating and substandard vertical clearance not meeting the turnpike-wide standard. The existing tolling infrastructure is also obsolete and can no longer be maintained. The current interchange geometry has safety and operational deficiencies. Three phases of subsurface exploration were executed under the direction of HNTB and included a total of 26 borings, eight borings along the proposed Route 703 bridge approaches, one boring within the median of the Turnpike mainline where the center bridge pier is proposed, and 18 borings along the extents of the four proposed on-ramps and off-ramps including the locations of the proposed tolling structures. Along the proposed west side bridge approach one cone penetration test (CPT) and one dilatometer test (DMT) were performed adjacent to a boring. Along the proposed east side bridge approach two CPTs and two DMTs were performed adjacent to borings. This geotechnical assessment was prepared to determine the soil profile and design parameters for the embankment design discussed herein. The general layout is provided by **Figure 2: Key Plan**.

### 1.2 Scope of Services

HNTB has performed the following scope of services in support of the interchange design:

- Reviewed available geotechnical data for the project site.
- Implemented a subsurface exploration with three phases, a preliminary phase to determine general site stratification and perform preliminary assessments, a second phase to refine site stratification and perform laboratory testing geared towards the design approaches determined from the feasibility assessments, and a third phase to obtain information necessary to economize designs (minimize cost and impacts) in specific areas of the site.
- Analyzed the resulting data collected to identify subsurface conditions that impact the design and construction of the project.
- Prepared a subsurface profile summarizing geotechnical data from the borings and laboratory testing.
- Established geotechnical engineering design parameters based on the available borings and in-situ testing.

- Conducted geotechnical analyses, including stability assessment for embankment construction, and settlement assessments of proposed embankments.
- Provided design requirements for embankment construction for all proposed embankments with designs tailored to each proposed ramp and approach.
- Assessed potential impacts to utilities and provided mitigation alternatives.
- Provided modifications to culvert designs to allow one-time placement as temporary and permanent drainage which would otherwise be impacted by the anticipated preload settlement.

### 1.3 Existing Interchange and Proposed Reconfiguration

The Exit 45 Interchange was built in 1956 with partial deck replacement in 1979 and 1995 and repairs in 2000. The existing Exit 45 Underpass Bridge was designed to support two lanes of H-20 loading. The bridge has limited load rating, substandard vertical clearance, and a temporary railing system which replaced the previously substandard railing. The proposed improvements involve replacement of the existing trumpet interchange with a diamond interchange including a new two-span underpass bridge, new toll plazas along the on-ramps, and automated exit tolling along the off-ramps. The proposed diamond interchange will include two emergency vehicle ramps that will allow emergency vehicles to move directly from northbound to southbound I-95 or vice versa.

The southern limit of the project begins with the southbound on-ramp, Ramp A, which connects to the I-95 at station 2200+50. Ramp A runs adjacent to the southbound I-95, diverging gradually. Ramp A runs about 1,950 feet from STA 100+00 to 119+46.64 where it intersects with the west bridge approach and a southbound off-ramp, Ramp B. Ramp A will pass beneath the Cummings Road Underpass Bridge with the toll plaza at STA 113+00, about 400 feet north of the Cummings Road Underpass. An access road is planned to connect Ramp A at the toll plaza to Cummings Road, northeast of the Cummings Road Underpass. Roadway elevations are to vary between about 66 feet and 81 feet (NAVD 88) with a maximum embankment height of approximately 18 feet.

The southbound off-ramp, Ramp B, is to extend from the west bridge approach to I-95 STA 2235+80. Ramp B is to run about 1,650 feet from STA 200+00 to 216+50 running south to north. Roadway elevations are to vary between about 63 feet and 81 feet with a maximum embankment height of approximately 18 feet.

The northbound on-ramp, Ramp C, branches from Route 703 westbound beginning near Route 703 Diamond STA 1062+60. Ramp C is to run about 2,950 feet with stationing of 296+00 to 325+50, joining I-95 northbound near I-95 STA 2244+50. The toll plaza is at STA 310+00. Roadway elevations of Ramp C are to vary between about 57 feet and 70 feet with a maximum height of approximately 14 feet. The emergency vehicle ramp, NB On EVR, joins Route 703 westbound to Ramp C.



The northbound off-ramp, Ramp D, extends from I-95 beginning near I-95 STA 2206+40. Ramp D is to run about 1,250 feet with from STA 398+00 to 423+00, joining Route 703 eastbound at Route 703 Diamond STA 1063+00. Roadway elevations of Ramp D are to vary between about 57 feet and 77 feet with a maximum embankment height of approximately 15 feet. The emergency vehicle ramp, NB Off EVR, connects Ramp D to the east bridge approach.

The west approach is to run about 204 feet with stationing of 1046+35.26 to the bridge abutment at approximate STA 1048+50. Roadway elevations vary between about 81 and 85 with a maximum embankment height of about 25 feet.

The east approach is to run about 2270 feet with stationing from the bridge abutment at approximate STA 1051+50 to approximate STA 1074+17. Roadway elevations vary between about 56 feet and 86 feet with a maximum embankment height of 25 feet.

The bridge to cross the I-95 is proposed to be supported by integral abutments at each end and one concrete pier to be located in the I-95 median. The substructures are proposed to be founded on H-piles driven to bedrock. The bridge is to be constructed during a second contract.

#### **1.4 Survey Control**

The project vertical datum and elevations referenced are in feet and reference the North American Vertical Datum of 1988 (NAVD 88). Boring locations were field located with elevations estimated based on topographic survey data.

### **2.0 GEOLOGY AND SITE CONDITIONS**

#### **2.1 Site Geology**

The project is located within the Portland West 7.5-minute quadrangle in the Coastal Lowland of southwestern Maine. The region has been subjected to glaciation within the last 25,000 years (late Wisconsinian glaciation) resulting in a physiographic surficial geology primarily composed of unconsolidated sediments of glacial and nonglacial origin. The bedrock geology underlying the project site is the Eliot Formation of the Merrimack and Casco Bay Groups comprised of metamorphic rocks which are characteristically composed of fine grained, thinly layered phyllite.

Existing geologic mapping available for the project site include bedrock and surficial geology mapping prepared by the Maine Geological Survey (MEGS) for Portland West Quadrangle, Maine.

MEGS surficial geology mapping identifies soil overburden in the project area as marine regressive sand deposits. The marine regressive sand deposits are said to consist of sand, silt, and minor gravel deposited in shallow marine waters from the late-glacial regression of the sea; they also may include a variety of nearshore and fluvial sediments. They commonly occur as flat sandy areas and are likely to be underlain by marine clay-silt deposits. Test soil borings done along the Maine Turnpike suggest loose interbedded marine silts and sands underlain by soft sensitive marine silts and clays typical of the Presumpscot Formation. The soft silts and clays are particularly prone to problems associated with low strength, compressibility and

stability issues. A surficial geology map and the bedrock geology map are presented in Figures 3 and 4, respectively.

### 3.0 SUBSURFACE EXPLORATION

#### 3.1 General

The subsurface exploration for the geotechnical design was conducted in three phases. A preliminary exploration of seven borings was performed to determine the project scope, the additional information that would be needed from subsequent exploration, as well as to assess feasibility of design options. A final design subsurface exploration of 12 borings, three cone penetration tests, and three dilatometer tests, was performed to obtain the information necessary to establish subsurface stratification and geotechnical design parameters. A supplemental final design exploration was performed to fill information gaps and identify limits of thin layers.

The subsurface exploration borings were advanced using cased wash boring methods from a Mobile drill rig using 4.0 inch (HW-size) and 3.0 inch (NW-size) inside diameter steel casing. Standard Penetration Testing (SPT) was performed by driving a 1-3/8-inch ID split spoon sampler with a 140-lb hammer dropped 30 inches to obtain samples at approximately 5-foot intervals. Each sample was removed from the sampler in the field, examined, and classified in accordance with Maine DOT standards. The number of hammer blows required to advance the sampler through each six-inch interval using a safety hammer was recorded and is provided on each boring log. The uncorrected SPT N-value is defined as the total number of blows required to advance the sampler through the second and third six-inch interval of any given 24-inch sampling interval. All SPT N-values discussed in this report have been corrected to reflect the 60 percent hammer efficiency ( $N_{60}$ ) unless noted otherwise.

In-situ vane shear testing was completed in accordance with the requirements outlined in ASTM D 2573 and are outlined below. In-situ vane shear testing involves using a simple rotated blade of specified dimensions to evaluate undrained shear strengths ( $S_u$ ) and remolded shear strengths ( $S_r$ ) in soft to stiff clays (FHWA-IF-02-034 G.E.C. No. 5). The vane is advanced into the test soil and the blade is rotated at a maximum rate of six degrees per minute until failure of the soil occurs while the resulting torque measurement is recorded. This first test is used to approximate the peak undrained shear strength of the soil. Following the initial test, the remolded strength of the soil is measured after 10 rapid turns of the vane (FHWA-IF-02-034 G.E.C. No. 5).

A summary of the borings indicating approximate locations and depths of exploration are included in Table 3-1.

**Table 3-1: Summary of Subsurface Exploration**

Boring No.	Station	Offset (feet)	Ground Elevation (feet)	Depth of Boring (feet)	Bottom of Exploration Elevation (feet)
HB-EXIT45-101	114+18	12.4 RT	63.7	97.0	-33.5
HB-EXIT45-102	1048+03	11.6 LT	62.1	89.0	-27.0
HB-EXIT45-103	1051+64	13.0 RT	60.9	98.0	-37.5
HB-EXIT45-104	416+65	11.1 LT	58.9	60.0	1.0
HB-EXIT45-105	306+51	28.3 LT	57.3	43.0	15.0
HB-EXIT45-106	210+86	38.3 LT	57.1	52.0	5.0
HB-EXIT45-107	310+96	50.7 LT	60.4	47.0	13.0
HB-EXIT45-201	1055+23	27.0 LT	59.0	72.0	-13.0
HB-EXIT45-202	303+97	2.2 RT	64.0	71.0	-7.0
HB-EXIT45-203	1053+27	32.7 LT	59.8	65.0	-5.0
HB-EXIT45-204	304+52	10.0 LT	60.5	62.0	-1.5
HB-EXIT45-205	1051+40	93.0 LT	63.1	75.8	-12.8
HB-EXIT45-206	1050+23	94.3 LT	63.1	86.1	-23.1
HB-EXIT45-207	113+08	43.3 LT	64.2	100.2	-36.2
HB-EXIT45-208	116+59	49.7 LT	63.0	90.2	-27.2
HB-EXIT45-209	200+12	15.7 RT	62.6	90.6	-28.1
HB-EXIT45-210	202+06	35.2 RT	61.4	91.8	-30.3
HB-EXIT45-211	204+45	3.3 LT	62.4	83.0	-20.5
HB-EXIT45-212	204+81	54.6 LT	59.2	82.0	-23.0
HB-EXIT45-301	304+85	19.9 LT	60.3	20.0	40.3
HB-EXIT45-302	303+97	2.2 RT	60.0	20.0	40.0
HB-EXIT45-303	1048+18	41.0 LT	61.4	54.0	7.4
HB-EXIT45-303A	1048+14	44.2 LT	61.4	9.0	52.4
HB-EXIT45-304A	209+45	1.0 LT	56.1	14.0	42.1
HB-EXIT45-305	209+52	1.6 LT	56.1	83.0	-26.9
HB-EXIT45-306	309+27	1.1 LT	58.1	55.7	2.4
HB-EXIT45-307	407+82	27.0 RT	63.9	103.6	-39.7

Three Cone Penetration Tests and three flat-plate Dilatometer tests were performed by ConeTec on June 5 to June 6, 2018 under the supervision of Schonewald Engineering Associates, Inc (SchonewaldEA). A summary of the cone penetration tests and dilatometer tests indicating approximate locations and depths of exploration are included in Table 3-2. One CPT was performed with 13 shear wave velocity tests to provide additional data for seismic

liquefaction assessment. Nine pore pressure dissipation tests were performed to provide information for consolidation times.

**Table 3-2: CPT and DMT Summary**

Test No.	Depth (ft)
HB-CPT-203	60.0
HB-SCPT-205	66.8
HB-CPT-209	89.2
HB-DMT-203	50.0
HB-DMT-205	50.0
HB-DMT-209	60.0

Bedrock was encountered and sampled in borings HB-EXIT45-102, HB-EXIT45-103 (OW), HB-EXIT45-205, HB-EXIT45-206, HB-EXIT45-207, HB-EXIT45-305, HB-EXIT45-306, and HB-EXIT45-307. Rock was cored using a 2.0-inch inner diameter NQ-2 sized diamond-tipped core barrel. Approximately 5 feet of bedrock was cored in borings HB-EXIT45-207, and HB-EXIT45-305. Approximately 10 feet of bedrock was cored in borings HB-EXIT45-102, HB-EXIT45-103 (OW), HB-EXIT45-205, HB-EXIT45-206, and HB-EXIT45-307. The recovery and rock quality designation (RQD) of each core was calculated and is included on the borings logs. The final boring logs and boring location plans are included in **Attachments 1, 2, and 3**. **Table 3-3** presents the recovery and RQD of the rock samples obtained during the exploration.

**Table 3-3: Summary of Subsurface Exploration Rock REC and RQD**

Boring No.	Rock Core	Depth (feet)	REC (%)	RQD (%)
HB-EXIT45-102	R1	79.0 – 84.0	95	70
HB-EXIT45-102	R2	84.0 – 89.0	97	90
HB-EXIT45-103 (OW)	R1	88.5 – 93.0	96	67
HB-EXIT45-103 (OW)	R2	93.0 – 98.0	97	52
HB-EXIT45-205	R1	67.0 – 72.0	100	28
HB-EXIT45-205	R2	72.0 – 75.8	100	54
HB-EXIT45-206	R1	76.1 – 81.1	100	95
HB-EXIT45-206	R2	81.1 – 86.1	100	83
HB-EXIT45-207	R1	95.2 – 100.2	95	70
HB-EXIT45-305	C1	78.0 – 83.0	38	0
HB-EXIT45-306	C1	46.0 – 51.0	70	15

Boring No.	Rock Core	Depth (feet)	REC (%)	RQD (%)
HB-EXIT45-306	C2	51.0 – 55.7	87	78
HB-EXIT45-307	C1	93.2 – 97.4	46	8
HB-EXIT45-307	C2	97.4 – 97.8	100	0
HB-EXIT45-307	C3	97.8 – 98.8	25	0
HB-EXIT45-307	C4	98.8 – 103.6	95	83

### 3.2 Preliminary Design Phase Subsurface Exploration

For preliminary design of the proposed bridge foundations, approach embankments, and ramp embankments, seven soil borings were advanced between October 4<sup>th</sup> and October 24<sup>th</sup> of 2017 by New England Boring Contractors, with boring inspection carried out by HNTB’s subconsultant, SchonewaldEA. Borings of this phase are denoted HB-EXIT45-101 to HB-EXIT45-107.

### 3.3 Final Design Phase Subsurface Exploration

Twelve additional borings were advanced between April 3<sup>rd</sup> and May 9<sup>th</sup> of 2018 by New England Boring Contractors, with boring inspection carried out by SchonewaldEA. Three cone penetration tests and three dilatometer tests were advanced between June 5<sup>th</sup> and June 7<sup>th</sup> of 2018 by ConeTec with onsite engineering oversight provided by SchonewaldEA. Borings of this phase are denoted HB-EXIT45-201 to HB-EXIT45-212.

### 3.4 Supplemental Final Design Phase Subsurface Exploration

Seven additional borings were advanced between January 4<sup>th</sup> and January 17<sup>th</sup> of 2019 with boring inspection carried out by HNTB’s subconsultant, Haley and Aldrich (H&A). Of the seven borings, three were performed at the request of the structural team for bedrock elevations at proposed tolls and tolling equipment locations. Borings of this phase are denoted HB-EXIT45-301 to HB-EXIT45-307.

## 4.0 LABORATORY TESTING

### 4.1 Soil Classification Testing

Index, particle distribution, and other soil classification tests were performed in compliance with the following standards:

Natural Moisture Content	ASTM D2216
Atterberg Limits	ASTM D4318
Grain Size Analysis	ASTM D422
Percent Passing No. 200 Sieve	ASTM D1140

## 4.2 Consolidation Testing

In the preliminary subsurface exploration eight consolidation tests were performed on Marine Clay samples. In the final design phase subsurface exploration five consolidation tests were performed on Marine Clay samples. In the supplemental subsurface exploration two consolidation tests were performed on samples of the cohesive portion of the Interbedded Sand and Silt, four consolidation tests were performed on the Marine Clay Crust, and one consolidation test was performed on a sample of Marine Clay. The results are summarized in Table 4-1. Consolidation tests were performed by the standard ASTM D2435-M.

**Table 4-1: Consolidation Test Result Summary**

Boring	Sample	Depth (ft)	Estimated Elevation (ft)	Estimated Pre-consolidation Pressure (psf)	Initial Void Ratio, $e_0$	Compression Ratio, $C_c$	Recompression Ratio, $C_r$
HB-EXIT45-102	U-1	35-37	25 – 27	2,000	1.09	0.163	0.029
HB-EXIT45-102	U-2	45-47	15 – 27	3,000	1.21	0.136	0.041
HB-EXIT45-102	U-3	55-57	5 – 7	3,100	1.27	0.348	0.040
HB-EXIT45-102	U-4	65-67	(-3) – (-5)	3,800	1.22	0.307	0.050
HB-EXIT45-102	U-5	75-77	(-13)–(-15)	4,100	0.99	0.221	0.045
HB-EXIT45-103	U-3	60-62	1 – (-1)	3,100	1.23	0.287	0.049
HB-EXIT45-106	U-1	25-27	30 – 32	2,800	1.31	0.558	0.048
HB-EXIT45-106	U-2	40-42	15 – 17	4,100	1.18	0.455	0.046
HB-EXIT45-201	U-2	30-32	27 – 29	1,450	1.18	0.211	0.017
HB-EXIT45-201	U-3	40-42	17 – 19	1,900	1.01	0.154	0.017
HB-EXIT45-205	U-2	35-37	26 – 28	1,840	1.42	0.354	0.014
HB-EXIT45-211	U-2	45-47	15 – 17	2,500	1.45	0.306	0.022
HB-EXIT45-211	U-3	55-57	5 – 7	2,580	1.20	0.256	0.022
HB-EXIT45-301	U-2	12-14	46 – 48	8,200	0.95	0.154	0.022
HB-EXIT45-302	U-1	10-12	48 – 50	10,000	0.79	0.115	0.014
HB-EXIT45-303	U-1	10-12	49 – 51	-	0.54	-	-
HB-EXIT45-303	U-2	16-18	43 – 45	-	0.91	-	-
HB-EXIT45-303	U-4	30-32	29 – 31	-	1.23	-	-
HB-EXIT45-304A	U-1	2-4	52 – 54	8,400	0.79	0.100	0.015
HB-EXIT45-304A	U-2	6-8	48 – 50	6,000	0.88	0.118	0.019

## 4.3 Shear Strength Testing

Six Direct Simple Shear tests were performed on Marine Clay samples to provide support for undrained shear strengths determined by field testing, as well as establish parameters for undrained shear strength gain under preloading. The results are summarized in Table 4-2.

**Table 4-2: Direct Simple Shear Test Summary**

Boring & Sample No.	Test No.	Vertical Consolidation Stress (psf)	Vertical Stress at Shear (psf)	Corrected Peak Shear Stress (psf)	$\sigma'_{con}/\sigma'_v$	$s_u/\sigma'_v$
HB-EXIT45-209 U2	DSS-1	2200	2200	198.7	1.0	0.09
HB-EXIT45-209 U2	DSS-2	2845	2032	397.5	1.4	0.20
HB-EXIT45-209 U2	DSS-5	4064	2032	414	2.0	0.20
HB-EXIT45-210 U2	DSS-3	2500	2500	546.9	1.0	0.22
HB-EXIT45-210 U2	DSS-4	3150	2250	450.1	1.4	0.20
HB-EXIT45-210 U2	DSS-7	4500	2250	567	2.0	0.25

Three Direct Shear tests were performed on Marine Clay samples to determine an effective friction angle for drained strength analyses. The results are summarized in Table 4-3.

**Table 4-3: Direct Shear Test Summary**

Boring & Sample No.	Sample Depth (ft)	Test No.	Normal Stress (psf)	Shear Stress (psf)	$\phi'$ (degrees)
HB-EXIT45-211 U2	45 – 47	DS-1	2000	1520	37.2
HB-EXIT45-211 U2	45 – 47	DS-2	3500	2100	31.0
HB-EXIT45-211 U2	45 – 47	DS-3	5000	2990	30.9

The tests were performed by the following standards:

Consolidated Drained Direct Shear Test	ASTM D3080
Consolidated Undrained Direct Simple Shear Test	ASTM D6528

Unconsolidated Undrained (UU) Triaxial Tests were performed during the preliminary phase exploration but were determined unreliable in these soils given poor correlation to the in-situ vane shear test results. The considerably low shear strength results of the UU Triaxial tests are likely due to sample disturbance given the high sensitivity exhibited by the clay.

## 5.0 SUBSURFACE CONDITIONS

### 5.1 Generalized Subsurface Stratification

The interpretation of soil and groundwater conditions at the project site are based on information obtained at the boring locations only. This information has been used as the basis for the conclusions and recommendations contained in this report.

Generalized interpretive subsurface profiles developed along the various ramp alignments are presented in Figures 5A through 5G and are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, having been

developed through interpretations of widely spaced borings and samples. Actual soil transitions included in the subsurface profile will vary and may be more erratic than indicated.

Subsurface conditions encountered in the test borings generally consist of the following strata:

1. Granular Fill
2. Interbedded Sand and Silt (ISS)
  - a. ISS Upper
  - b. ISS Lower
3. Marine Clay
4. Marine Clay Crust
5. Glacial Till
6. Phyllite Bedrock

#### Stratum 1: Granular Fill

A blanket of Granular Fill was encountered at the ground surface in a majority of the borings. The composition of this layer is predominantly fine to coarse sand with trace to some silt and trace gravel. In addition, zones of silty clay fill and other reworked natural surficial soils are occasionally present throughout. The stratum generally ranges from 4 to 10 feet in thickness. This material is typically loose to medium dense with an SPT  $N_{60}$  blow count varying between 2 and 25 blows per foot. Noted that the project site is also crisscrossed by existing ramps of varying heights. These are also composed of fill, mainly common borrow.

#### Stratum 2: Interbedded Sand and Silt

This stratum is of marine origin and was encountered in all borings within the southwestern and southeastern quadrants of the project site. At most of locations the layer is further divided into “upper” and “lower” substrata, which are mainly distinguishable by the significant clay content of the lower member. The substrata may be further described as follows:

- a. ISS Upper: This substratum is non-cohesive and mainly consists of interbedded layers of gray fine to medium sand, silty sand, and silt. The layer ranges in thickness from 4 to 20 feet, and the density of the material is typically very loose to loose with an SPT  $N_{60}$  blow count varying between 1 and 15 blows per foot.

Two borings on the East side of the project site near Ramp C encountered thin, discontinuous pockets ( $\leq 4$  feet thick) of organic sand and silt within the Upper Interbedded Sand and Silt substratum. The “organic” label is based on visual descriptions of field samples as containing fibers or peat, although subsequent laboratory testing showed the Unified classification of the pockets actually range from SM to ML. Since these organic sands and silts were encountered immediately beneath the Granular Fill, they are interpreted to be remnants of the original surface organics.

- b. ISS Lower: This substratum continues the interbedded structure of the upper member, but it exhibits cohesive behavior with regard to shear strength and compressibility. The layer



mainly consists of interbedded layers of gray silty clay and gray fine sandy silt. The silty clay may contain trace to some fine sand, and occasional seams and partings of sand were also noted. The average liquid limit and plasticity index of the samples tested were 26 and 9, respectively. The average water content of samples tested was 34%. The substratum generally ranges in thickness from 5 to 15 feet, and the consistency of the material is very soft with an SPT  $N_{60}$  blow count varying between Weight of Rods (WOR) and 2 blows per foot. Measured shear strengths ranged from 192 psf to 620 psf with a general trend of increasing shear strength with depth.

Several borings at the southern end of the project site encountered surficial deposits of relatively clean, fine to medium sands above the Upper Interbedded Sands and Silts. The color of the material varied from gray to red-brown, indicating possible marine and/or glacial origins. Where encountered, the sand layers were relatively thin ranging from 2 to 12 feet thick. The density of the material was uniformly very loose to loose based on SPT  $N_{60}$  blow counts. Owing to the stratigraphic similarity of these sands with the Upper Interbedded Sand and Silt substratum, they have been mapped as part of the same unit.

#### Stratum 3: Marine Clay

The Marine Clay stratum was encountered in all borings performed within the project limits. The layer consists of a relatively uniform gray to dark gray silty clay. The average liquid limit and plasticity index of the samples tested were 35 and 15, respectively, which corresponds a Unified classification of CL. The average water content of samples tested was 41%. The layer contains frequent shell fragments, nodules, and concretions reflecting its marine origin. Black streaking and occasional “organic” descriptors indicate limited organic content at some elevations and locations. In addition, seams and layers of fine sand and silt were infrequently noted. The thickness of the stratum generally ranges from 25 to 55 feet across the site.

The consistency of the Marine Clay is very soft as indicated by SPT  $N_{60}$  blow counts ranging from WOR to Weight of Hammer (WOH). Numerous field vane shear tests were performed in the stratum to obtain the in-situ and remolded undrained shear strength. Measured shear strengths ranged from 96 psf to 1,050 psf with a general trend of increasing shear strength with depth. Additional discussion of the shear strength behavior of the Marine Clay is provided in *Section 8.2 Cohesive Soils*.

#### Stratum 4: Marine Clay Crust

The Marine Clay Crust was found to cap the Marine Clay within the northern section of the project site. The “Crust” is believed to be a highly desiccated variant of the much softer Marine Clay that lies below. The stratum principally consists of olive-brown to gray-brown silty clay (CL), although limited zones classify as silt (ML). The average liquid limit and plasticity index of the samples tested were 32 and 15, respectively, which corresponds a Unified classification of CL. The average water content of samples tested was 28%. The layer is occasionally mottled and may contain partings and seams of fine sand and sandy silt. The Crust generally ranges in thickness from 5 to 15 feet, and stratigraphically it grades relatively quickly into the underlying

Marine Clay. The consistency of the stratum is generally medium stiff to stiff as indicated SPT  $N_{60}$  blow counts ranging between 5 and 22 blows per foot.

#### Stratum 5: Glacial Till

A stratum of Glacial Till underlies the Marine Clay and overlies Phyllite Bedrock. It was encountered in every deep boring except HB-EXIT45-102, where the Marine Clay directly overlies the bedrock. The stratum is composed of variable amounts of gray to dark gray sand, silt and gravel. The more common textural descriptions include silty sand, sandy gravel, sandy silt. The thickness of the stratum ranges from approximately 2 to 35 feet, and the density is medium dense to dense with SPT  $N_{60}$  blow count typically varying between 10 and 50 blows per foot. Cobbles and boulders were occasionally identified throughout the layer either by coring or drilling action, especially in the lower half as bedrock was approached. Two borings at the northern end of the project encountered a granular layer described as "Marine Sands" to overlie bedrock in place of the more ubiquitous Glacial Till. This differentiation was based on textural structure and presence of fluvial nodules. Because the composition and density of the deep Marine Sand is so similar to the Till, it has been mapped as part of the same stratum.

#### Stratum 6: Phyllite Bedrock

The basement formation of the project site is Phyllite Bedrock. The stratum was cored and sampled in eight borings during the subsurface investigation. In addition, the top of the bedrock surface was inferred in six other borings based on practical refusal of the either split spoon or roller bit. The rock generally consists of medium hard to hard, slightly to highly weathered, aphanitic to fine grained, dark gray phyllite. The foliation was generally moderately to steeply dipping, and quartz veins and calcite infillings were frequently noted.

Rock quality designation (RQD) is a common parameter that is used to help assess the competency of the sampled bedrock. RQD is defined as the sum of the pieces of recovered bedrock greater than 4 inches in length divided by the total length of core run. RQD values of the bedrock that were encountered on site ranged from 0 to 95 percent.

## 5.2 Groundwater

The groundwater levels were measured in most of the borings as part of the subsurface investigation, either during drilling or upon completion of the borehole. These measurements are summarized below in Table 5-1.

**Table 5-1: Summary of Encountered Groundwater Elevations**

Boring No.	Ground Surface Elevation (ft)	Groundwater Depth B.G.S. (ft)
HB-EXIT45-101	63.7	2.8
HB-EXIT45-102	62.1	2.5
HB-EXIT45-103 (OW)	60.9	3.3

Boring No.	Ground Surface Elevation (ft)	Groundwater Depth B.G.S. (ft)
HB-EXIT45-201	59.0	0.0
HB-EXIT45-202	64.0	3.9
HB-EXIT45-203	59.8	0.9
HB-EXIT45-204	60.5	4.7
HB-EXIT45-205	63.1	4.7
HB-EXIT45-206	63.1	4.0
HB-EXIT45-207	64.2	1.2
HB-EXIT45-208	63.0	1.3
HB-EXIT45-209	62.6	1.5
HB-EXIT45-210	61.4	5.0
HB-EXIT45-211	62.4	4.0
HB-EXIT45-212	59.2	1.9
HB-EXIT45-301	60.3	3.8
HB-EXIT45-302	60.0	3.3
HB-EXIT45-304A	56.1	0.0
HB-EXIT45-305	56.1	0.0
HB-EXIT45-307	63.9	2.5

The data in Table 5-1 indicate that ground water generally occurs within a few feet of the ground surface, which is consistent with the wetland designation of a large majority of the site. Note that the ground water tables vary seasonally and with precipitation events. Readings may also be influenced by drilling fluids as monitoring wells were not installed (with the exception of HB-EXIT45-103).

### 5.3 General Site Variation

A majority of the project site is blanketed with approximately 5 to 15 feet of Granular Fill, which also contains occasional zones of silty clay fill and other reworked original surficial soils. The Granular Fill stratum thins to the North and is totally absent along the northern half of Ramps B and C. Towards the South, the Fill is underlain by the Upper Interbedded Sands and Silts, which generally range from 10 to 20 feet thick. At most locations this substratum is underlain by the Lower Interbedded Sands and Silts. The Lower Interbedded Sands and Silts are predominantly cohesive, and they range in thickness from approximately 10 to 15 feet. Note that at the proposed bridge crossing the combined thickness of the Upper and Lower substrata averages around 20 feet thick.

An abrupt stratigraphic change occurs approximately 300 feet north of the bridge. Here the Interbedded deposits totally pinch out and are replaced by Marine Clay Crust, which becomes

the uppermost natural stratum. The “Crust” ranges between 10 and 15 feet in thickness, and it continues to the northern extremities of the project site.

The next lowest stratum in sequence is the soft Marine Clay, which underlies the entire project site. South of existing Route 703 the Marine Clay has an average thickness of around 50 feet. The entire layer sinks deeper towards the southwest where the lowest top and bottom elevations of the stratum occur. Note that Marine Clay thins to the North eventually shrinking to a thickness of approximately 25 feet. Further note that here the soft clay is relatively close to the ground surface, lying just beneath the Marine Clay Crust.

A veneer of Glacial Till was encountered below the Marine Clay at most locations just overlying bedrock. The thickness of the Till is highly variable ranging from 2 to 35 feet. Cobbles and boulders were occasionally identified throughout the layer, especially in the lower half as bedrock was approached.

A basement of Phyllite Bedrock underlies the entire project site. The rock generally consists of slightly to highly weathered aphanitic phyllite, with frequent quartz veins and calcite infillings. The top of rock was determined at eight different locations based on coring and sampling, and it was also inferred in six other borings based on practical refusal of the either split spoon or roller bit.

Groundwater is typically encountered at the ground surface to about 4 feet below the ground surface.

## **6.0 GEOTECHNICAL EMBANKMENT DESIGN – SELECTED DESIGN ALTERNATIVES**

### **6.1 Preloading**

Preloading is a traditional and practical method of improving soft soils and mitigating service life settlements by loading the soils and causing compression of the soils to occur prior to the final construction. Preloading is typically performed with an excess loading referred to as a surcharge to accelerate the preloading and ensure required amounts of primary consolidation occur. Surcharging is also effective in mitigating secondary compression, which occur in soft soils after load-dependent compressions have subsided.

Preloading is considered appropriate where schedule allows time for consolidation and where influence upon adjacent facilities is not a major concern. Where thick deposits of soft soils are present such as at the Exit 45 project, preloading consolidation will take far longer than the construction schedule will permit. This is because the time required for consolidation is related to the thickness of the layer and the shortest drainage path for the expelled water. As an example, the thickness of the Marine Clay over much of the Exit 45 site averages around 50 feet. Assuming two-way drainage of the clay layer and applying consolidation parameters determined by field and laboratory testing, the time required to reach 95% primary settlement of an embankment is estimated at around 6 years.

For this reason, Prefabricated Vertical Drains (PVDs) will be installed in advance of the preload fills as a means of soil improvement. PVDs reduce the distance over which pore water must travel, allowing for an accelerated consolidation. If PVDs are installed through the Marine Clay at a spacing of 6 feet on center, settlement time is reduced to one year or less. Further note that consolidation is accompanied by a strengthening of the clay, which allows the implementation of multi-stage fill placement in providing adequate stability. For these reasons, utilizing PVDs with a preload scheme is justified.

## 6.2 Stability Berms

Stability berms are a conventional method of providing stabilization where deep global failures are of concern, by acting as counterweights. Through trial-and-error, it was determined berms of 5 to 7 feet high were effective, while greater berm heights provided limited increase to factors of safety. Stability berms were designed with 2:1 end-slopes.

Stability berms were used in all locations where the increase in undrained strengths provided from the first stage of preloading were not enough to provide adequate stability to the full preload height during the second stage of preload, except for locations where the space for stability berms was limited. The only locations where space was inadequate for the use of stability berms were the front end of each bridge approach where the Mainline I-95 is located.

Along the two-stage preload portion of Ramp D, stability berms are to be installed temporarily, which will be partially paved for a maintenance-of-traffic roadway. PVDs will be installed under these temporary berms to achieve necessary increases in undrained strengths of the underlying clay.

## 6.3 EPS Geofam

The use of lightweight materials is an effective method in reducing loading on soft soils and can be used to minimize horizontal earth pressures upon abutments. Expanded Polystyrene, better known as EPS Geofam, is the most effective of the lightweight material options having unit weights typically less than 5 lb/ft<sup>3</sup>. Most other lightweight materials range in unit weight from 20 to 70 lb/ft<sup>3</sup>. Geofam is typically provided in 2 ft x 4 ft x 8 ft blocks but can be cut to fit arrangements as needed. Given the weight of Geofam, placement can be performed with relative ease.

Standard practice requires a membrane be placed over the top of the constructed Geofam form to prevent petroleum-based products from seeping into the Geofam should a spill occur. Geofam exposed to petroleum-based products will deteriorate due to reaction with hydrocarbons.

Geofam placed near the base of the pavement box requires that a load transfer slab be placed on top of the Geofam to prevent concentrated stresses upon individual cells. This is typically achieved with a 4-inch thick concrete slab.

For the design, Geofam has been implemented in the embankments directly behind each of the proposed bridge abutments where the proposed embankments are the highest and stability

berms cannot be installed given the proximity to I-95. Wherever possible preloading is taken to the heights as controlled by stability to minimize the amount of Geofoam required. The top 8 to 9 feet of the preload material is expected to be stripped and replaced with Geofoam to provide an effective surcharge and to offset the weight of the roadway material. The maximum heights/thicknesses of the Geofoam sections are anticipated to be about 12 to 14 feet on the west approach and 9 to 11 feet on the east approach. The ends of the Geofoam configuration that are not against the abutment wall will be placed in a stepped manner to minimize horizontal earth pressures, which could otherwise be transferred to the abutment or cause unwanted displacement of the Geofoam.

Geofoam is proposed along the west and east approaches extending longitudinally from the bridge abutments. Along the west approach the Geofoam is anticipated to extend longitudinally at full thickness in the range of 60 to 70 feet before tapering over an anticipated 25 to 35 feet. Along the east approach the Geofoam is anticipated to extend longitudinally at full thickness in the range of 45 to 55 feet before tapering over an anticipated 25 to 35 feet. Note that Geofoam will not be installed during the Preload Contract but rather during the Phase 2 Bridge and Pavement Contract in 2021. While thicknesses and locations have been planned and cross-sections have been incorporated in the global stability assessment, final details will still need to be developed prior to the Phase 2 Contract.

Aside from reducing embankment loading on the subsurface, Geofoam also allows for a significant reduction in horizontal earth pressures upon the abutment.

Given the stresses that are to be imposed on the Geofoam once the embankment is in service, Expanded Polystyrene 22 or Expanded Polystyrene 29, as specified by ASTM D6817, will likely be utilized as these types will provide the necessary compressive resistance at less than 1% deformation.

## **7.0 GENERAL AND SPECIAL CONSIDERATIONS**

### **7.1 Schedule Considerations - Prefabricated Vertical Drains**

The Phase 1 Embankment Preload Contract is currently scheduled to extend for 19 months, from September 2019 to March 2021. The main construction activity of the contract will be earthwork construction. However, much of the timeline will be occupied by “waiting periods” while the preloaded embankments settle under the weight of fill and surcharge. To minimize the length of the waiting periods, the geotechnical design is employing PVDs or wick drains as a consolidation acceleration technique. As previously described, wick drains are installed in an array across the footprint of the embankment to expel water from the underlying clay strata.

The design of PVDs involves a cost-time tradeoff analysis. The closer the wicks are spaced, the faster the consolidation occurs and the shorter the waiting period. But a reduced spacing also increases the required lineal footage of wicks, which increases cost.

Another schedule consideration of the Preload Contract is that approximately 50% of the interchange requires two stages of preload. This occurs wherever the final embankment height

exceeds approximately 11 to 14 feet depending on locale. Because construction of 2-stage embankments requires two separate waiting periods, they become a critical path of the project timeline.

The influence of wick spacing on both the project timeline and cost is illustrated in Table 7-1. Note that a triangular wick array was selected for this project since it has the highest hydraulic efficiency.

**Table 7-1: Time Cost Comparison of Various Wick Spacings**

Wick Spacing (triangular array)	Estimated Waiting Period	Wick Cost per square foot of embankment*	Cost Proportion based on 6-foot Spacing
6 feet	10-12 months	\$2.73/ft <sup>2</sup>	100%
5 feet	6-9 months	\$3.99/ft <sup>2</sup>	146%
4 feet	4-6 months	\$6.16/ft <sup>2</sup>	226%

\* Assumes 70 ft average wick length at \$1.00/linear foot. This unit cost is based on general historical industry data and is not related to projected costs for this project.

The most economical wick spacing in the table is 6 feet at an estimated cost of \$2.73/ft<sup>2</sup>, but the required waiting period to complete primary consolidation may extend up to 12 months. The table also shows that the waiting period can be reduced to about 6 months or less with a wick spacing of 4 feet, but this increases cost by 225%. A 5-foot wick spacing yields intermediate results for both the waiting period and cost. Note that the closest practical wick spacing is generally acknowledged to be 4-feet, since the remolded clay zone surrounding each wick begins to occupy too much volume for closer spacings (remolding decreases hydraulic conductivity, thereby reducing wick efficiency).

The range of the waiting periods in Table 7-1 is related to variability of the time consolidation properties of the Marine Clay and Lower Interbedded Sands and Silts. Best possible estimates were made of the vertical and horizontal coefficients of consolidation based on field and laboratory testing, as well as by comparison with standard correlations. Even so, a degree of uncertainty always exists between predicted versus actual consolidation time for preload projects. Due to this uncertainty, actual waiting periods will be determined on a real-time basis during preload construction by the Geotechnical Engineer based on monitoring results from the field instrumentation and the progress of work. The installed instruments include the settlement plates and vibrating wire piezometers. In general, a preload stage cannot be considered as completed until: (1) the primary settlement rate as indicated by the settlement plates is negligible; and (2) the pore water pressure as indicated by the piezometers has stabilized to ground water level. Additional description of the instrumentation design is provided in *Section 13.0 Instrumentation*.

Other events or construction activities may also affect the critical path of the Preload Contract. These include a delayed project start, weather delays including severe winter conditions, and utility protections and relocations. A recent decision to extend the Preload Contract duration by more than one year should allow the Contractor to accommodate such events and activities

within the waiting preload periods so that the Phase 2 Interchange Reconfiguration Contract (bridge, toll plazas, and paving) can proceed on schedule.

The preceding discussion demonstrates the relationship between project schedule and wick drain spacing. Given the critical interdependence of the Preload Contract and the Phase 2 Bridge and Paving Contract, the following wick drain spacings were chosen for design:

- A 5-foot wick spacing will be used for all 2-stage, high embankments.
- A 5-foot wick spacing will be used for the 1-stage, low embankments in the Toll Plaza Areas.
- A 6-foot wick spacing will be used for all remaining 1-stage, low embankments.

The layout and spacing of PVDs across the site are presented by **Figures 6A** and **6B**.

## 7.2 Utility Crossings and Protection

The project site contains utility crossings that need to be accommodated as part of the Preload Contract. One crossing involves the existing power transmission lines owned by Central Maine Power Company (CMP) that cross over the Maine Turnpike and the northern part of Ramp C. At this location a number of existing CMP poles are directly within the future embankment footprint. Thus, it has been decided that all preload construction for Ramp C North of Station 310+00 will be delayed until CMP relocates their poles and lines.

CMP's relocation plan was also reviewed by the HNTB Design Team to assess the influence of the preload embankment on the relocated poles. The soft clays underlying this portion of the site will cause significant settlement of the new embankments, so an analysis was performed to check the influence on the poles and whether there is adequate lateral clearance from the preload embankment.

Three potential sources of ground movement for the poles were examined, including: (1) downward movement due to consolidation settlement of the clay strata; (2) upward movement due elastoplastic surface heave; and (3) cyclic ground movement due to natural moisture changes and freeze/thaw. The results of the assessment are summarized below.

- Consolidation Settlement: The height of the preload embankment near the CMP poles ranges from 6 to 7 feet, including embankment and surcharge. Potential settlement of the poles due to clay consolidation was estimated by modeling the stratigraphy and soil properties using SETTLE3D software. The results indicated that the estimated 30-year consolidation settlements generally ranged between 0.5 and 1.5 inches.
- Ground Surface Heave: Potential ground heave was examined by modeling the global stability of the preload embankment with Slope/W software. Using the design embankment heights along this section of Ramp C, the computed safety factors against stability failure were found to approach 2.0. Safety factors in this range are associated with negligible ground surface heaving.



- Natural Ground Movements: Soils containing clay are especially vulnerable to volume change (swell and shrinkage) as moisture content changes seasonally and with water table fluctuations. In addition, the Portland area is subject to significant annual ground freezing, which may cause frost heave and thaw settlement. The magnitude of natural movements varies widely according to local soil conditions, but they are commonly in the range of 1 to 3 inches.

It is concluded that the short- and long-term ground movements caused by preload construction are expected to be less than 1.5 inches, which is within the same range as natural cyclic ground movements. This is mainly due to the modest heights of fill and adequate lateral clearances. Note, however, that precautions need to be taken to exclude temporary filling in this section of the project site because it might trigger additional ground movements.

### 7.3 Culvert Drainage Considerations

More than one dozen culverts cross underneath the embankments of the new Exit 45 Interchange as part of the integrated drainage network with the Mainline. The design diameters of the culverts range from 12 to 48 inches, and all will consist of reinforced concrete pipe (RCP). In view of the significant settlements predicted for many of the preload embankments, a geotechnical evaluation was conducted at each culvert location to choose the most appropriate construction method. Several design factors were considered, including magnitude and rate of settlement, pipe diameter, fill height, and whether temporary drainage needs to be maintained during construction.

Working in coordination with the Highway and Drainage Groups, designs were developed for the culverts listed in Table 7-2. All other culverts either had negligible settlement or were deferred to Phase 2. The designs generally fell into one of three categories:

- Minimal settlement (<6 inches): For this condition, the pipe diameter is increased to the next size and installed to design grade.
- Significant settlement (>6 inches) with moderate to deep cover: For this condition, the pipe is increased two or more sizes and installed with a camber. Cambers were generally limited to 12 inches or less owing to the requirement that most culverts need to maintain temporary drainage during construction.
- Significant settlement (>6 inches) with shallow cover: For this condition, the pipe is installed to design diameter and grade during preload construction. The pipe is then scheduled for relay during Phase 2.

**Table 7-2: Summary of Design Treatments for Culverts**

Station	Diam. (in)	Length (ft)	Depth to Invert (ft)	Estimated Settlement (in)	Temporary Drainage Required?	Recommended Installation Method
00+75	18	64	7	4 @ 2-yrs 11 @ 30-yrs	Yes	Not wicked or preloaded. Oversize to 30 in. diameter. Install to design invert.
115+00	18	120	9	20 @ 2-yrs	Yes	Oversize to 24 in. diameter. Install with 12 in. max. camber.
116+00 (skewed)	18	156	10	10-14 @ 2-yrs	Yes	Oversize to 24 in. diameter. Install with 6 in. max. camber.
208+50	24	76	8.5	36 @ 2-yrs	Yes	Oversize to 36 in. diameter. Install with 12 in. max. camber.
304+25	18	110	13	31 @ 2-yrs	Yes	Oversize to 24 in. diameter. Install with 12 in. max. camber.
306+50	48	200	13.5	28 @ 2-yrs	Yes	Oversize to 60 in. diameter. Install with 12 in. max. camber.
312+00	24	96	6	18 @ 2-yrs	Yes	Install to design diameter and invert. Assume relay during Phase 2.
316+06	12	48	5.5	14 @ 2-yrs	Yes	Install to design diameter and invert. Assume relay during Phase 2.
318+44	18	32	6	13 @ 2-yrs	Yes	Install to design diameter and invert. Assume relay during Phase 2.

## 7.4 Ramp Crossovers

The geometry of the new Exit 45 Diamond interchange is superposed upon the existing trumpet interchange. As a consequence, three new ramps will need to cross over four existing ramps. This poses a construction challenge since traffic must be maintained on existing ramps until the new ramp is constructed and put in service. The four existing ramp locations requiring a crossover are Ramp A, Ramp B, Ramp A/B and Ramp C.

Various MOT design strategies were investigated to accomplish the crossovers, including lightweight fill, signalized crossings, and bypass ramps. The highly compressible soils underlying all three locations pose a constraint on potential design solutions in that preload activities will cause settlement of existing ramps while they remain in service. In addition, any portions of a new ramp not receiving a full preload treatment, e.g. wicks and surcharge, will exhibit more long-term settlement than adjoining ramp sections that are fully preloaded.

Working in coordination with the HNTB Highway Group, appropriate MOT schemes were developed for all four crossover locations. The scheme variations are briefly outlined as follows:

- **Full Preloading:** Install wicks and construct new preload fills up to the proposed pavement shoulder on both sides of the existing ramp, while still maintaining traffic

on that ramp. This creates a gap or “canyon” in the profile of the new preloaded ramp. When preloading is completed, a temporary bypass ramp will be constructed parallel to the existing ramp, cutting through the new preloaded ramp embankment. This will allow the canyons of the existing ramps to be wicked and surcharged.

- **Modified Preloading:** Similar to the Full Preloading scheme except wick drains are installed through the existing ramp at the beginning of construction.
- **No Preloading:** Where settlements generated by new adjoining embankments are low, no wick drains will be installed through the existing ramp. The canyon will be filled at the end of construction to complete the new ramp.

Traffic will be maintained on the existing ramps until completion of the Embankment Preload Contract. The final crossover to the new Exit 45 Diamond Interchange ramps will occur during the Phase 2 Interchange Reconfiguration Contract.

A summary of anticipated settlements is discussed in *Section 10.6, Ramp Crossovers*.

## 8.0 GEOTECHNICAL DESIGN PROPERTIES

### 8.1 Cohesionless Soils

Effective friction angles, unit weights, and elastic moduli of cohesionless soils were determined primarily through correlation to standard penetration test (SPT) results. Cone penetration test correlations were used where SPT correlations were insufficient. Cohesionless soil properties are provided in **Table 8-1**. A lower bound effective friction angle value is provided for the Existing Fill material given the high variability in test results and the variation of fines content.

**Table 8-1: Soil Properties of Cohesionless Strata**

Property	Existing Fill	Interbedded Sand and Silt – Upper	Glacial Till
$N_{60}$ (blows/ft) <sup>(1)</sup>	7	5	49
$N_{1,60}$ (blows/ft) <sup>(2)</sup>	11	8	34
$\gamma$ (pcf) <sup>(3)</sup>	113	110	121
$\phi'$ <sup>(4)</sup> (deg)	30	33	37
$E_s$ (ksf) <sup>(5)</sup>	357	318	906

(1)  $N_{60}$  – SPT N-value corrected for 60% hammer efficiency.

(2)  $N_{1,60}$  – SPT N-value corrected for 60% hammer efficiency, overburden pressure, rod length, and rod diameter.

(3)  $\gamma$  – Total unit weight, correlated from  $N_{1,60}$ .

(4)  $\phi'$  – Effective angle of internal friction.

(5)  $E_s$  – Secant modulus, correlated from  $N_{1,60}$ .

Properties for cohesionless soils were determined primarily through correlations with standard penetration testing and supplemented with correlations to cone penetration tests.

## 8.2 Cohesive Soils

Shear strength properties are either based upon effective stresses or total stresses. Cohesive soils are assessed in short-term conditions with total stress parameters. Short-term conditions occur at any time in which excess pore pressures developed under the new loading have not yet significantly dissipated. This is also known as an “undrained” condition. Design Properties for cohesive soils were determined through various methods, however initial undrained strengths were determined through vane shear test results.

General correlations and engineering judgement were employed to make decisions on properties where testing was inconclusive or provided significant discrepancies. Cohesive soil properties used for design are presented in Table 8-2 and Table 8-3.

**Table 8-2: Soil Properties of Cohesive Strata**

Property description	Property	Interbedded Sand and Silt – Lower	Marine Clay Crust	Marine Clay
Total Unit Weight	$\gamma$ (pcf)	106	121	112
Initial Undrained Shear Strength	$s_{uo}$ (psf)	345	1000	Varies by location and depth. See Table 8-3.
Increase in Undrained Shear Strength with Increased Stress	$\Delta s_u / \Delta \sigma$	0.12	N/A due to heavy overconsolidation.	0.20
Effective (Drained) Angle of Internal Friction	$\phi'$	31°	30°	30°
Compression ratio	$C_{ce}$	0.12	0.12	0.25
Recompression ratio	$C_{re}$	0.02	0.02	0.03
Overconsolidation ratio	OCR	1.2	-	1.0
Preconsolidation Pressure	$\sigma_p'$ (ksf)	-	6	-
Coefficient of consolidation (due to horizontal flow)	$C_h$ (ft <sup>2</sup> /day)	2.0	0.45	0.45
Coefficient of consolidation (due to vertical flow)	$C_v$ (ft <sup>2</sup> /day)	1.0	0.30	0.30
Secondary compression index	$C_{\alpha\epsilon}$ (strain rate)	0.007	0.007	0.007

**Table 8-3: Marine Clay Initial Undrained Shear Strengths**

Marine Clay Zone <sup>(1)</sup>	$s_{uo}$ (psf)	Data obtained from borings HB-EXIT45-
East Edge U	301	103, 205, 203
East Edge M	307	103, 205, 203
East Edge B	$= 432 + 11.9*(10-y)^{(2)}$	103, 205, 203
Southwest U	344	102, 210
Southwest M	437	101, 102, 207, 208, 209, 210
Southwest B	$= 556 + 6.0*(10-y)^{(2)}$	101, 102, 207, 208, 209, 210
North U	388	105, 106, 107, 204, 211, 212
North U*	500	301, 302, 304A, 305, 306
North M	435	105, 106, 107, 204, 211, 212
North B	$= 467 + 13.0*(10-y)^{(2)}$	204, 211, 212
East U	337	104, 201, 202, 203
East M	396	104, 201, 202, 203
East B	$= 450 + 4.9*(10-y)$	104, 201, 202, 203

(1) U – upper (above elevation +30’); M – middle (between el. +30’ and el. +10’); B – bottom (below el. +10’), U\* top 5-6 feet of Marine Clay layer

(2) y – elevation in feet

It was necessary to zone the Marine Clay shear strengths by regions of the site in order to appropriately optimize the design while satisfying global stability requirements. Generally, the Marine Clay shear strengths are highest in the “North” region of the site, which is bounded by the southbound off-ramp (Ramp B) and the northbound on-ramp (Ramp C). The “Southwest” portion of the site, which includes the footprint of the southbound on-ramp (Ramp A), the Route 703 West Approach, and the highest portion of the southbound off-ramp (Ramp B), offers slightly weaker conditions. The “East” region bounded by the northbound off-ramp (Ramp D) and much of the Route 703 East Approach are slightly weaker again. The “East Edge” region, including the northbound off Emergency Vehicle Ramp and highest couple hundred feet of the Route 703 East Approach, are underlain by the weakest soils of the site and pose the greatest stability challenges. The approximate extents of the regions where each set of undrained shear strengths were used are outlined by **Figure 7: Design Marine Clay Strength Zoning**. Undrained shear strength interpretations of the Marine Clay are provided graphically alongside the vane shear results in **Figures 8A** through **8D**.

The vane shear results in the Marine Clay in the upper and middle portions (above elevation +10 ft) did not clearly exhibit trends of strength increase with depth. Vane shear results in the bottom portion of the marine clay (below elevation +10 ft) clearly exhibited trends of strength increase with depth and were modeled using the best-fit linear equation of vane shear results versus elevation.

From the supplemental final design phase (Phase 3) subsurface exploration performed by H&A, the shear strength in the top 5 to 6 feet of the Marine Clay was shown to exhibit significantly greater strengths than below in the North end of the site. This is attributed to this soil being a transitional material between the stiff crust material and the softer clay below. This increased strength was applied to optimize the staging requirements along the northbound on-ramp and northbound on Emergency Vehicle Ramp.

The undrained strengths of cohesive soils are typically a function of the stresses under which the soils have consolidated. Undrained shear strength gains typically occur in cohesive soils when consolidated under higher stresses than previously experienced. Note these strength gains do not occur immediately but require primary consolidation to reach near completion. The correlation of undrained strength increase to increase in stress was estimated for the Marine Clay soils based upon the Direct Simple Shear test results and were compared with correlation of vane shear test results to estimated overburden pressures. The correlation of undrained strength increase to increase in stress was estimated for the Interbedded Sand and Silt – Lower by correlations of Cone Penetration Test undrained strength measurements to estimated overburden pressures.

The use of correlations with CPT results was limited to determination of select parameters where other testing performed did not provide the necessary information, are known to correlate poorly, or for which there are no established correlation. Where results of other tests were limited, correlations with CPT results were examined as supporting evidence for the selected values. CPT results were primarily utilized for gaps in information for the Interbedded Sand & Silt strata, and were not used for determination of Marine Clay shear strengths.

The compression ratio of 0.12 utilized for the Interbedded Sand and Silt-Lower was judged appropriate given (1) the consolidation tests performed on Interbedded Sand and Silt-Lower samples indicated slightly lesser compression ratios than the value selected, (2) field descriptions of the Interbedded Sand and Silt-Lower held similarities to descriptions of the Marine Clay Crust, and (3) in an assessment of four standard correlations for compression ratios the results ranged from 0.08 to 0.16 with an average of 0.12.

### **8.2.1 Consolidation Time Parameters**

Special focus was given to selecting time of consolidation design parameters as these directly influence preload waiting periods and construction schedule. Laboratory tests for the coefficient of consolidation,  $C_v$ , of the Marine Clay yielded a fairly wide range of results from 0.01 to 0.9  $\text{ft}^2/\text{day}$ , which is not unusual for such a vertically and laterally extensive clay deposit. By filtering the test results for stress level and then comparing them with standard correlations and field data from nearby sites, the range of likely design values was narrowed to 0.15 to 0.3  $\text{ft}^2/\text{day}$ . A sensitivity analysis was performed to assess the influence of different PVD spacings and  $C_h/C_v$  ratios. The sensitivity analysis results, which are summarized in **Table 8-4**, indicate expected consolidation times are predominantly 12 months or less. Such times are compatible with the overall constructions schedule. See *Section 7.1, Schedule Considerations – Prefabricated Vertical Drains*, for additional discussion of PVD spacings.

**Table 8-4: Consolidation Time Sensitivity Results**

C <sub>v</sub> (ft <sup>2</sup> /day)	C <sub>h</sub> /C <sub>v</sub>	C <sub>h</sub> (ft <sup>2</sup> /day)	Approx. Time 95% Consolidation (months)		
			4 ft PVD spacing	5 ft PVD spacing	6 ft PVD spacing
0.15	1.5	0.23	8	12	18
0.15	2.0	0.3	6	9	13
0.2	1.5	0.3	5	8	12
0.2	2.0	0.4	4	6	9
0.3	1.5	0.45	3-4	6	9
0.3	2.0	0.6	<3	4	6

## 9.0 GEOTECHNICAL DESIGN ANALYSIS - STABILITY ASSESSMENT

### 9.1 Stability Modeling and Design Criteria

#### 9.1.1 Design Criteria

The stability of embankments was assessed by two-dimensional limit equilibrium using Slope/W of the GeoStudio 2018 R2 software package made by GEOSLOPE. Embankments were designed to provide a minimum factor of safety of 1.3 during all preload condition as specified by AASHTO LRFD Bridge Design guidance.

The factor of safety of 1.3 was adhered to for assessment by circular potential failure surfaces. For the “undrained” conditions, which were shown to control the design, a non-circular optimization of the worst-case circular slip surface as provided by Slope/W was assessed. The resulting factor of safety for an “optimized” slip surface generally ranged from 0.05 to 0.15 less than that for the worst-case circular slip surface. Where the results of the “optimized” slip surface significantly deviated from the circular results, either in factor of safety or in shape, design discretion was applied to achieve a more stable design, either by decreasing first stage preload heights or by increasing berm sizes. A pseudo-static seismic slope stability check was not performed as *AASHTO LRFD Bridge Design Specifications Article 11.5.4.2* provides that seismic design is not required for locations within Seismic Zones 1 through 3, or where the site adjusted peak ground acceleration is less than or equal to 0.4g. These requirements are met by this site (see *Section 11.0 Seismic Design Recommendations*).

#### 9.1.2 Staging

The final embankment design scenario involved assessing stability with cohesive soils modeled with effective stress parameters for the “drained” condition. The final condition included a 250 lb/ft<sup>2</sup> applied loading to the extents of the travel lanes to account for traffic as specified by AASHTO LRFD Bridge Design guidance. Drained conditions were not shown to control the design. Short-term conditions, which include both stages of preloading, were assessed for the “undrained” condition with cohesive materials modeled with total stress parameters. The undrained conditions were shown to control design.

Where an adequate factor of safety could not be provided for building the entire preload (with surcharge) in a single stage, the embankment was designed for a two-stage preload to take advantage of increases in shear strength due to consolidation. The first stage of preload was optimized to the highest height to provide the best increase in shear strength of the cohesive soil. Where the increase in shear strength in the cohesive soils from the first stage of preload did not provide adequate stability for the second stage, a stability berm was used. The design height for the first stage was then reassessed with the berm accounted for to maximize the strength gains. Maximizing the strength gains from the first preload stage made it possible to minimize the size of berms required for stability in the second preload stage. Where berms are shown, it is required that berms be built at the same time or prior to the first preload stage.

### **9.1.3 Strength Gain of Cohesive Materials**

The strength of soil is related to the relative volume of voids. By allowing the cohesive soils to consolidate, the void spaces are significantly reduced, providing an increase in shear strengths. By building the embankments in stages and allowing consolidation to occur between the build stages, it is possible to build the embankments to higher heights.

Strength gains are proportional to the stress under which the cohesive soils are consolidated. Consolidated Undrained testing, such as the Direct Simple Shear testing, exemplifies this phenomenon. Strength gains under preloading are expected for the Interbedded Sand and Silt – Lower and the Marine Clay, but are not expected for the Marine Clay Crust due to its being heavily overconsolidated.

For embankments where single stage construction could not provide satisfactory global stability, the embankment was planned and modeled for a two-stage construction in which the undrained strength of the cohesive soils in the second stage would be increased from the initial strengths based upon the stress imposed by the first stage of embankment. Stresses were calculated based upon two-dimensional elastic stress theory (as considered appropriate for application along a long embankment).

The Marine Clays were zoned for initial strengths with cutoffs between initial strengths at elevations +30 feet and +10 feet. The cohesive layers (the Interbedded Sand and Silt – Lower and the Marine Clay) directly beneath the embankment were horizontally divided into five zones based upon the dimensions of the first stage of preloading to account for variability of stress distributed beneath different portions of the embankment. The offsets for horizontal divisions were standardized at the discretion of the designer. The elastic stress imposed by the first stage of embankment material placement was calculated for each of the subdivisions. For each subdivision the calculated imposed stress was multiplied by the undrained strength ratio (based upon Direct Simple Shear test results) and added to the initial strength, resulting in the undrained shear strength utilized in the stability analysis of the second stage of preload material placement.

Strength gains due to imposed stresses were only considered beneath the embankment within the extents of proposed Prefabricated Vertical Drains, since the consolidation necessary to



provide strength gains can be attained within scheduled time frames. Consolidation of the cohesive soils under the first stage of preload must meet 95% completion to adequately provide anticipated strengths. The second stage of preload shall not be placed without written approval by the Geotechnical Design Engineer after assessing the relevant instrumentation and testing data.

## 9.2 Stable Construction Sequencing Requirements

As the embankment design requires balancing of loads to prevent global stability failures, balanced conditions must be maintained during placement of materials. Guidance is provided to achieve balanced conditions during fill placement where fills are interdependent in providing resistance to global stability failure. Portions of the proposed embankments are outlined for simultaneous construction, in which given portions, designated as a “Simultaneous Build Group” are to be built with minimal differentials in height until achieving design heights. The simultaneous build groups designated are the following:

- Simultaneous Build Group 1:
  - Ramp A: STA 117+50 to STA 119+46
  - Ramp B: STA 200+00 to STA 203+00
  - Route 703: STA 1045+27 to STA 1049+00
- Simultaneous Build Group 2:
  - NB On EVR: STA 350+00 to STA 351+70
  - Ramp D: STA 409+50 to STA 415+50
  - NB Off EVR: STA 450+00 to STA 454+00
- Simultaneous Build Group 3:
  - NB On EVR: STA 352+34 to STA 354+71
  - Ramp C: STA 303+00 to STA 306+07

## 10.0 GEOTECHNICAL DESIGN ANALYSIS – SETTLEMENT ASSESSMENT

### 10.1 Preloading with Prefabricated Vertical Drains

In order to limit post-construction settlements, the majority of the site is to be preloaded with Prefabricated Vertical Drains (PVDs) with material placed to higher elevations than the final proposed embankment configurations to mitigate long-term settlements of the roadway. The PVDs allow the anticipated magnitudes of compression of the cohesive strata to occur in a reasonable amount of time for schedule requirements. The settlements produced during the preload periods would otherwise occur over several years. Consolidation (the time related process of compression of saturated cohesive soils) was modeled with consideration of time to occur with and without PVDs using the software SETTLE3D Version 4.0 by RocScience. PVD arrangement, spacing, drainage capacity, and effects of surrounding soil disturbance were accounted for in the models.

## 10.2 “Overbuild” Implementation

A preload embankment that is placed to its exact design width and height will become misshapen due to differential settlement. To more efficiently construct embankments to their design 4H:1V sideslopes and roadway widths, the preload needs to be built to a higher elevation and with steeper sideslopes so that it can settle into its final design configuration. In this manner, material should not have to be added unless predicted settlements are exceeded. If actual settlements are less than predicted settlements, material can be removed to establish the 4H:1V. Note that removing material from an embankment is easier than adding and compacting a thin veneer of material, especially on an incline.

## 10.3 Long Term Settlement Estimates

### 10.3.1 Surcharge Size Selection

The effectiveness of a surcharge in mitigating post-construction settlement is related to the size of the surcharge in proportion to the size of the embankment. For the Exit 45 project, surcharge thicknesses were selected with the goal of keeping 15-year settlements (typical paving cycle) to an amount tolerable for travel conditions. The surcharge thicknesses selected for the project varied from 2 to 4 feet according to the height of the embankment.

### 10.3.2 Effective Surcharge by Geofam Replacement

Geofam will be used behind the proposed bridge abutments to achieve the required design heights of the approach embankments, while still maintaining adequate stability. Note that during the current contract only preloading will occur, and the Geofam will be placed during the Phase 2 Contract.

The use of Geofam in combination with a two-stage preload fill is designed to provide an “effective surcharge” for the bridge approaches. This is accomplished by first building a preload composed of standard weight fill to a predetermined level at or below the final design elevation of the roadway. When consolidation is completed, part of the second stage preload is excavated and replaced with Geofam. The weight of fill cut from the embankment is chosen to be greater than the combined weight of Geofam and the future pavement box by an adequate margin. This produces stress relief, which also serves as an effective surcharge. This keeps post-construction settlements within tolerable limits within the transition zone between the approach fill and abutment.

## 10.4 Discussion of Results

A summary of estimated preload settlements for the various Exit 45 ramps is provided in **Table 10-1**. As indicated, the settlements range widely from 4 to 59 inches. All values represent estimated settlement during the construction period only.

**Table 10-1: Summary of Preload Settlements**

Embankment	Maximum Estimated Preload Settlements (inch)*	Corresponding Stations for Range of Max. Preload Settlements		Corresponding Approx. Heights (feet)	
		Low	High	Low	High
East Approach	19 – 57	1058+00	1052+50	6	25
West Approach	51 – 56	1048+00	1047+00	16	23
Ramp A	4 – 53	110+00	119+00	4	22
Ramp B	25 – 59	210+50	206+50	10	16
Ramp C	13 – 44	318+44	306+00	7	14
Ramp D	6 – 42	409+00	414+00	5	18
NB Off EVR	37 – 47	451+00	452+50	16	21
NB On EVR	24 – 46	353+00	354+00	15	20

A summary of estimated post-construction settlements of the preloaded embankments is provided in **Table 10-2**. These are the settlements that will be experienced by the pavements, which are estimated to range from 1 and 5 inches over 15 years. Since settlements are expected to be relatively uniform in most areas, local differential settlements should be less. Settlements of this magnitude are considered unavoidable for deep soft clays and we anticipate will be manageable with a maintenance paving program.

**Table 10-2: Summary of Post-Construction Pavement Settlements of Preloaded Embankments**

Embankment	Estimated 15-year Post-Construction Pavement Settlement (inch)*
East Approach	1 – 3
West Approach	2 – 3
Ramp A	2 – 4
Ramp B	Negligible – 5
Ramp C	Negligible – 3
Ramp D	2 – 4
NB Off EVR (D1)	1 – 3
NB On EVR (C1)	2 – 4

\*Note this table does not account for portions of the embankment which will not be preloaded.

#### 10.4.1 Settlements of Roadways Without Preloading

Special attention was given to predicting settlements in areas where the new low ramps transition into the Mainline or other roadways. At issue was where to terminate the preloading (wicks and surcharge) and begin building the new embankment with no special treatment. Working in coordination with the HNTB Highway Group, each transition zone was examined

on a case by case basis, although a general settlement tolerance ranging from 4 to 6 inches over a 15-year period was considered acceptable for most situations.

The portion of Ramp A downstation of STA 109+30 is proposed to be constructed without preloading. Settlement of the new embankment was analyzed at two locations along this section. At STA 102+49, estimated settlement ranges from 3 to 5 inches, and at STA 106+50, estimated settlement ranges from 2 to 4 inches, both over a 15-year paving cycle. Note that since settlements are expected to be relatively uniform in most areas, local differential settlements should be less.

The portion of Ramp B upstation of STA 211+00 is also proposed to be constructed without wick drains and surcharge. Settlement of the new embankment was analyzed at STA 213+00, and the results are provided in **Table 10-3** below. Here the estimated 15-year settlement ranges from 5 to 8 inches. Note that since settlements are expected to be relatively uniform in most areas, local differential settlements should be less.

**Table 10-3: Station 213+00 Estimated Pavement Settlements**

Time (years)	Total Settlement (inch)
2	2 – 4
5	4 – 6
10	5 – 7
15	5 – 8

#### 10.4.2 In-Service Roadway Settlements Induced During Preloading

Preloading will also induce settlement of adjacent in-service roadways where new ramps merge with existing roadways. A summary of estimated settlements at selected merge locations is provided in **Table 10-4**. The overall range of induced settlements is 1 to 5 inches.

**Table 10-4: Summary of Settlements of Existing Roadways Induced by Preloading**

Preloaded Embankment and Location	Roadway Influenced	Estimated Settlement at Influenced Edge of Pavement
Ramp B STA 210+50	Existing Mainline	2 – 3 inches at Mainline over two years
Ramp B STA 210+50	Proposed Mainline Widening	3 – 5 inches at Mainline over two years
East Approach	East Approach with Existing Route 703	2 – 3 inches of Route 703 over two years
Ramp C	Existing Route 703	2 – 3 inches of Route 703 over two years
Ramp C	Existing Northbound On Ramp	1 – 3 inches of Northbound On Ramp over two years

## 10.5 Optimization of PVD Layout

The areal extents of Prefabricated Vertical Drains were limited for single stage preloads as an economy measure. This was accomplished by eliminating PVDs beneath the outer portions of the embankment slopes. In two stage preloads, the PVDs were extended to the embankment toes as the strength gain of the clays is reliant on the its consolidation. This assured adequate shear strength for stability of the second stage preload.

## 10.6 Settlements at Ramp Crossovers

Settlement analyses were performed for all four crossover locations to estimate short-term construction settlements and long-term settlement of final pavements. These results allow estimation of maintenance paving both during and after construction. The various MOT schemes developed for the crossovers were previously described in *Section 7.4 Ramp Crossovers*. Settlement results of MOT schemes are presented in **Table 10-5**. Note that settlements were computed for the geographic center of the ramp crossing, so they represent estimated maximum values. Settlements will taper towards the outer limits of the ramp crossing. Further note that since settlements are expected to be relatively uniform in most areas, local differential settlements should be less.

**Table 10-5: Summary of Settlements for Ramp Crossovers**

Location	Estimated Primary Settlement during Phase 1 at Center of Existing Ramp (in)		Estimated <u>Additional</u> Long-Term Settlement at Center of New Ramp A/B (in)
	@ 12 months	@ 24 months	@ 15 years
Ramp A (assumes no preloading)	1.5 – 2.5	3 – 4	4 – 6
Ramp B (assumes modified preloading)	8 – 12	8 – 12	2 – 3
Ramp C (assumes no preloading)	3 – 4	4 – 6	3 – 5
Ramp A/B (assumes modified preloading)	12 – 18	18 – 28	4 - 7

## 11.0 SEISMIC DESIGN RECOMMENDATIONS

### 11.1 Design Spectrum using the Generalized Procedure

A seismic assessment has been performed for the project site. In accordance with AASHTO LRFD, seismic analysis was performed for a seismic event having a 7 percent probability of being exceeded in 75 years (1,000-year Return Period). Values for the peak ground coefficient (PGA) and the spectral coefficients (SS and SI) for the design event were obtained from the USGS web site using the longitude (-70.3479) and latitude (43.6286) for the bridge site. As per AASHTO Table 3.4.2.1-1, and given the soils encountered, the site is classified as Site Class E.

A preliminary analysis was performed and a design spectrum developed based on the general Three Point Method prescribed in Section 3.4.1 of AASHTO LRFD.

The ground peak acceleration (PGA) of bedrock and other parameters for designs obtained from AASHTO and the USGS map data are given in Table 11-1 below.

**Table 11-1: Recommended Seismic Design Parameters from USGS**

Return Period (years)	Peak Ground Acceleration (PGA)	Site Class B		Site Class E		
		S <sub>s</sub>	S <sub>l</sub>	A <sub>s</sub>	S <sub>DS</sub>	S <sub>DI</sub>
1,000	0.088	0.176	0.045	0.220	0.440	0.158

S<sub>s</sub>- horizontal spectral acceleration coefficient at 0.2-sec period on rock.

S<sub>l</sub>- horizontal spectral acceleration coefficient at 1.0-sec period on rock.

A<sub>s</sub>- Site adjusted peak ground acceleration.

S<sub>DS</sub>- design spectral acceleration coefficient at 0.2-sec period.

S<sub>DI</sub>- design spectral acceleration coefficient at 1.0-sec period.

## 11.1 Site Specific Study

In accordance with Table 3.10.6-1 of AASHTO LRFD, for a site with the SD1 larger than 0.15, the bridge is assigned as Seismic Performance Zone 2. A Zone 2 categorization requires a detailed seismic analysis to be performed as part of the assessment and design. Since the initially calculated value of SD1 was very close to the boundary between a Seismic Zone 1 and Seismic Zone 2 classification, a site-specific study was performed to refine the spectral acceleration shown in Table 8-1. The analysis relies on published correlations for index properties and shear wave velocities of the subsurface materials from SCPT data.

### 11.1.1 Selection of Ground Motions

Ground motions were selected from earthquakes with magnitudes ranging from 5.0 to 7.0. Acceleration time histories of these earthquakes were recorded at several instrumented locations. Ground motions for several earthquakes recorded within 5 miles to 100 miles of the instrument stations were selected for analysis and provided in Table 11-2 below.

**Table 11-2: List of Ground Motions used for Site Specific Study**

Earthquake	Magnitude	Distance from Instrumentation (miles)	PGA (g)
1984 Morgan Hill	6.2 M	10	0.095
1986 North Palm Springs	6.0 M	39	0.096
1987 Whittier Narrows	6.0 M	6	0.092
1988 Saguenay, Canada	5.7 m <sub>b</sub>	40	0.091
1982 New Hampshire	4.7 M	5	0.116

### 11.1.2 Scaling of Ground Motions

A target spectrum for the site was developed from the Three Point Method specified in Section 3.4.1 of AASHTO LRFD for the soft bedrock (Site Class B). The ground motions were spectrally matched using RspMatch2009 software to develop the site-specific ground motions. The target spectrum and the spectrally matched ground motions are shown in Figure 9.

### 11.1.3 Site Specific Geotechnical Parameters

Soil and rock material properties affect the shear wave amplification. In order to accommodate the site variability, upper bound, average, and lower bound material properties were used in the analysis.

Shear wave velocity ( $V_s$ ) profiles were developed from SCPT sounding HB-CPT-205 from an adjacent project site. The  $V_s$  values obtained from this sounding were considered as the average velocity profile. The lower bound and upper bound  $V_s$  data were obtained by lowering or increasing the average velocity by 30 percent. Established shear wave velocity profiles used in the analysis are shown in Figure 10.

Laboratory test results, as well as published correlations, were utilized to determine the unit weights and plasticity indices throughout the site. The plasticity index was utilized to obtain the shear modulus and damping ratio at different shear strains. Plasticity indices were adjusted to match the material classification in the boring logs. Unit weights were used for the determination of initial shear modulus. Unit weights were adjusted to 5 pcf above and below the values obtained at the midpoint of each stratum. Units weights obtained at the midpoint of each layer are indicated in Figure 10.

### 11.1.4 Modulus Reduction and Damping Ratio

The following published modulus reduction and damping ratio curves for sand, cohesive soils, and rock were utilized as shown in Table 11-3.

**Table 11-3: Published Modulus Reduction and Damping Ratio Curves for Sand, Cohesive Soils, and Rock**

Material	Models
Sand	Seed & Idriss 1970
	EPRI 1993
Cohesive	Vucetic & Dobry 1991
	Darendeli 2001
Rock	Idriss 1991
	Schnabal 1973

## 11.2 Site Specific Analysis

A one-dimensional analysis was performed using the software PRO SHAKE Version 1.1 at different locations to represent the entire project site. Several analyses were performed at each location by varying input parameters to accommodate the variants in ground motions and site soils as outlined above. The spectral acceleration-period data were obtained from the Shake analysis for a return period of 1,000 years. Mean and standard deviation of the scattered spectra were computed. The mean values and one standard deviation above and below were used in establishing the site-specific response spectrum. The site-specific analysis results are shown in Figure 11.

### 11.2.1 Site Specific Response Spectrum

The recommended horizontal response spectrum for the 1,000-Year return period is shown in Table 11-4. Based on the site-specific analysis and revised response spectrum, the design spectral acceleration coefficient at 1.0-sec period (SD1) is reduced to 0.13 and classified as Seismic Performance Zone 1.

**Table 11-4: List of Ground Motions used for Site Specific Study**

1,000-Year Event	
Period (sec.)	Spectral Acceleration (g)
0.00	0.17
0.07	0.36
0.40	0.36
0.52	0.30



1,000-Year Event	
Period (sec.)	Spectral Acceleration (g)
0.75	0.20
1.00	0.13
1.50	0.09
2.00	0.06
3.00	0.05
4.00	0.04
5.00	0.03

### 11.3 Liquefaction Screening

Given the results of the site-specific seismic assessment in which it was determined the 1-second period design spectral acceleration for the design earthquake, SD1, is less than 0.15, the site is categorized as a Seismic Design Category A as specified by AASHTO LRFD Section 3.5. Liquefaction assessment is therefore not required per AASHTO LRFD Section 3.5 Article C3.5 for sites fitting Seismic Design Category A.

## 12.0 EMBANKMENT MATERIALS AND SITE PREPARATION

### 12.1 Drainage Layer Requirements

The upper end of the PVD's or wick drains terminate in a granular drainage layer that is placed on new granular backfill over areas that have been grubbed or mucked.

The function of the drainage layer is to direct water expelled from the clay strata during the process of consolidation. The four key requirements of the drainage layer are that: (1) it have adequate hydraulic conductivity to transmit water; (2) it be of adequate thickness; (3) it be continuous, extending the full width of the embankment and adjoining stability berms (even if the wicks do not); and (4) it "daylight" the embankment at the toe. These all work together to create a deliberate drainage path for the expelled water from the wicks.

A secondary function of the drainage layer is that it serves as a "working platform" for wick installation and other early preload construction activities, which is important given the poor stability of the ground surface in many areas of the project site.

The material selected for the drainage layer is Aggregate Subbase Course - Gravel (Type D) or ASCG. This main advantage of ASCG is that it satisfies the hydraulic conductivity requirements, while also exhibiting adequate bearing strength. The favorable drainage characteristics are achieved through grading limits within the sand-size particle range, including <7% passing the No. 200 sieve. The strength of the material is assured by the mandatory gravel content and sizing. Note that even with these specification restrictions, the cost of the ASCG is modest compared with more highly processed sand and gravel aggregates.

For surface grading purposes, the drainage layer should be installed to generally follow existing ground. Low points along a section do not interfere with proper functioning since the draining water is driven by differences in total hydraulic head and not just elevation.

## 12.2 Muck Removal

The original natural surficial deposits of the entire project site consist of very poorly drained hydric soils. Subsequent construction of the Mainline and interchange ramps resulted in excavation and filling in limited areas, as well as installation of surface drainage improvements. However, natural or disturbed hydric soils still predominate the footprint of the new Exit 45 Interchange embankments.

Three soil units have been mapped along the proposed roadway alignment, including: (1) *Au Gres* loamy sand; (2) *Swanton* fine sandy loam; and (3) *Scantic* silt loam (note that “loam” is a blend of sand, silt, clay, and organic matter). In addition, occasional zones of organic Histosols (also known as muck) are reported ranging in depth from 10 to 18 inches. The combination of hydric soil, seasonal high-water table, and dominance of wetland plant species causes significant portions of the site to be considered as a functional wetland. The major classifications within the wetland complex are Palustrine Emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forest (PFO).

Organic soil exhibits poor engineering performance under loading, including high compressibility and very low strength. Significant secondary consolidation of organic soil can also persist for many decades. It was therefore decided to remove all surficial organics prior to construction of the roadway embankments, regardless of embankment height. A review of the “*Wetland and Waterbody Resource Delineation and Vernal Pool Survey Report, Exit 45 Interchange Project, Scarborough and South Portland, Maine*” was undertaken to develop an estimate of the average depths of muck excavation and grubbing throughout the site. In general, the PEM soil profiles contain ~6 inches of loam with rooted grasses, reeds, etc. The shrubs and trees occurring in the PSS and PFO wetland classes have deeper root zones and thicker organic soil, often extending 1 to 2 feet below the ground surface.

The actual depth of muck excavation and grubbing will vary throughout the site based on local field conditions. For quantity estimation purposes, grubbing depth is estimated as 6 inches in field areas and 12 inches in wooded areas. Average total muck excavation across the site, including grubbing, is estimated at 18 inches.

Backfilling of mucked areas with granular material is required prior to placement of the drainage layer or embankment fill. Since these areas are expected to contain standing water, the MDOT Standard Specification allows for Underwater Backfill to be used for this purpose. However, the gradation limits of Underwater Backfill are not strict, which may result in delivery of a product with inferior drainage and stability characteristics. Since the muck backfill also needs to support equipment loading during wick drain installation, Aggregate Subbase Course-Gravel (Type D) is recommended for use. This is the same material specified for the drainage layer for the wick drains (see above *Section 12.1, Drainage Layer Requirements*).

## 12.3 General Embankments

The general embankment fill materials (in between the drainage layer and the future pavement box) will consist of Common Borrow. Exceptions occur toward the final crest of the embankment where ASCG will be substituted, since it can be incorporated into the future pavement as the embankment settles to its final level. ASCG will also be used for all surcharge lifts for the same reason. Leftover surcharge above design grade will be stripped during the Phase 2 Contract and repurposed. Embankments less than 6 feet high will be completely constructed of ASCG to avoid having a thin layer of material that needs to be placed separately.

Excavated soil meeting the material and gradation requirements of Common Borrow may be used for embankment construction. All other soils and waste materials, including organic peat/muck, roots, and stumps, will be disposed of off the project site in accordance with federal, state, and local environmental regulations.

Common Borrow and ASCG shall be placed in uniform lifts not exceeding 2 feet in thickness to prevent unbalanced fill conditions that could lead to soil failure. Note that actual lifts may be less for compaction purposes to achieve required densities. Common Borrow shall be compacted to 90% of its maximum dry density as determined by the Modified Proctor test. ASCG shall be compacted to 98% of its maximum dry density as determined by the Modified Proctor test. MDOT specification section *203.12 Construction of Earth Embankment with Moisture and Density Control* is to be adhered to.

## 13.0 INSTRUMENTATION

### 13.1 Description of Instrumentation Plan

Geotechnical instrumentation will be installed throughout the preloaded embankments to track actual field settlements and to determine the actual required waiting periods. Design calculations only provide approximate values of settlement magnitude and rate. All final decisions as to the progress of work will be made by the Design Geotechnical Engineer based on a review of the field data from the instrumentation. The Contractor will not be allowed to proceed to the next preload stage or with removal of surcharge until notified by the Engineer.

Three kinds of instruments will be used on the project, including: (1) settlement plates; (2) piezometers; and (3) inclinometers. The settlement plates are installed at the base of the embankment with a stationary rod that extends to the top of the fill. The piezometers are drilled into the compressible clay layers beneath the embankment with lead wires that extend to the ground surface for pore water pressure readings. The inclinometers are drilled into the clay strata adjacent to the embankments and are monitored with a moving transducer.

Tracking of the settlement plates not only provide magnitudes for design verification purposes, but they also indicate the compression rate, which is necessary to provide clear confirmation as to when primary consolidation is substantially complete. The piezometers, which measure pore water pressure, supplement the settlement plates by indicating when the hydrostatic pressure has returned to the level of the local ground water table. The inclinometers monitor

whether lateral ground movements are occurring while the preload embankments are being constructed. Any significant deviations from vertical will indicate that the rate of fill placement needs to be reduced.

The responsibility for installation of the instrumentation will be split on the project. Settlement plates will be installed and maintained by the Contractor, while the installation of the piezometers and inclinometers will be the responsibility of the Authority. However, the Contractor will be tasked with protecting all instrumentation on the site regardless of the installer. Any damaged equipment will have to be replaced at the expense of the Contractor.

Responsibility for reading all instrumentation will reside with the Authority's authorized representative. In general, the required frequency of instrumentation readings will be weekly during fill/surcharge placement and monthly during waiting periods. Increased frequency of readings may also be necessary during other critical parts of the preloading work.

A complete schedule of settlement plate, piezometer, and inclinometer locations are included in the contract plans and special provisions.

## 14.0 LIMITATIONS OF REPORT

The conclusions and recommendations contained in this report are based upon the subsurface data obtained during this investigation and on details stated in this report. The validity of the conclusions and recommendations contained in this report are necessarily limited by, among other things, the scope of field investigation and by the number of borings. Therefore, given the nature of this subsurface study, there is a possibility that actual conditions encountered will differ from those discussed in this report. Should conditions arise which differ from those described in this report, HNTB should be notified immediately and provided with all information when available regarding subsurface conditions.

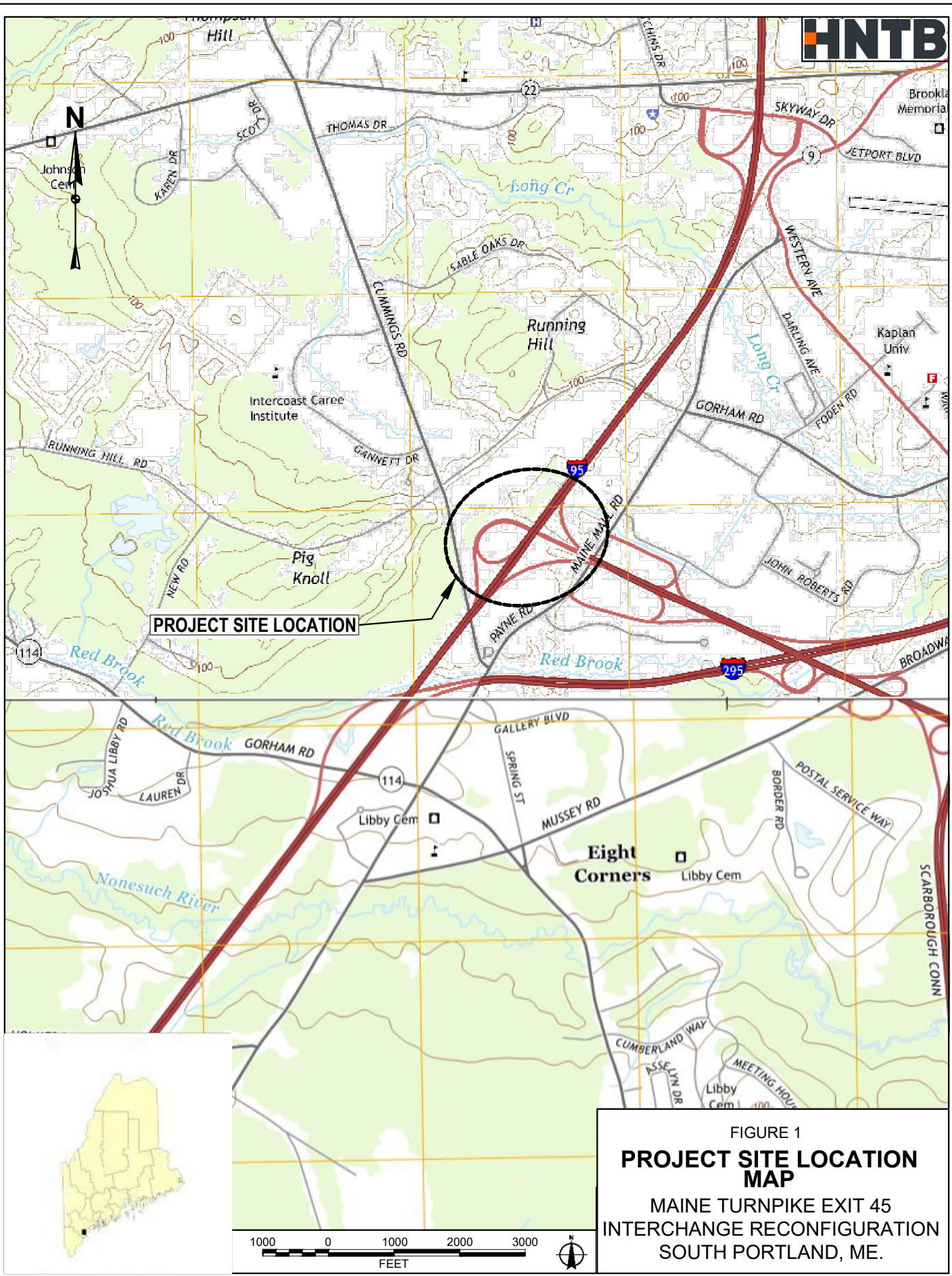
As part of the geotechnical recommendations presented in this report, HNTB makes no warranty as to the absence or presence of any environmental hazard or waste present on any property evaluated hereunder and all reports generated here to are qualified as being based upon existing data reasonably available to HNTB and not subject to independent verification. HNTB is not responsible for any latent defects that could not be reasonably discovered during the performance of its services and makes no legal representations whatsoever concerning any matter, including but not limited to, the ownership of any property or the interpretation of any law. These limitations form a material part of this report and are considered incorporated by reference therein. No warranty for the contents of this report, neither expressed nor implied, is made except that professional services were performed in accordance with generally accepted principles and practices.

## 15.0 REFERENCES

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2. AASHTO. "Standard Specifications for Highway Bridges" 17<sup>th</sup> Edition, 2002.
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12. Vucetic M., Dobry R. (1991). Effect of soil plasticity on cyclic response. Journal of the geotechnical Engineering Division, ASCE, 17(1), p.89-107.

## FIGURES



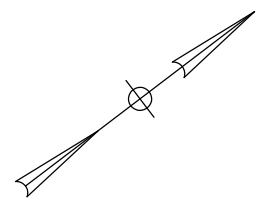
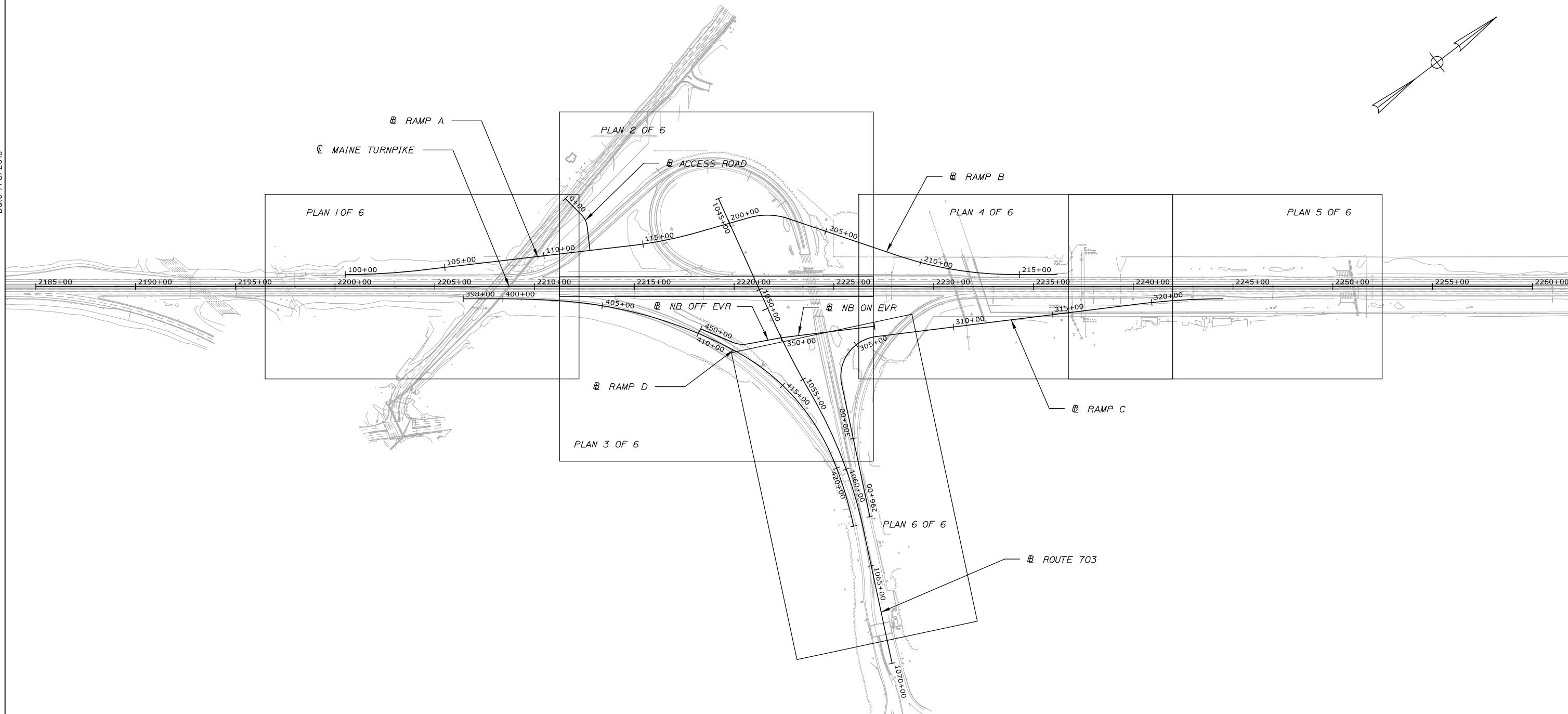
**PROJECT SITE LOCATION**

FIGURE 1  
**PROJECT SITE LOCATION  
MAP**

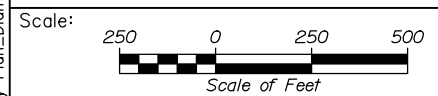
MAINE TURNPIKE EXIT 45  
INTERCHANGE RECONFIGURATION  
SOUTH PORTLAND, ME.

Basemap: U.S.G.S. Portland West Quadrangle, US Topo, 2014

Date: 7/8/2019



Filename: 0XX\_Key Plan\_Diamond.dgn




Designed by:

**HNTB**

CONSULTANT PROJECT MANAGER: Raymond W. Hanf, P.E.

	By	Date	By	Date	
Designed	EDD	05\19	Checked	JRH	05\19
Drawn	AJS	05\19	In Charge of	RAL	05\19

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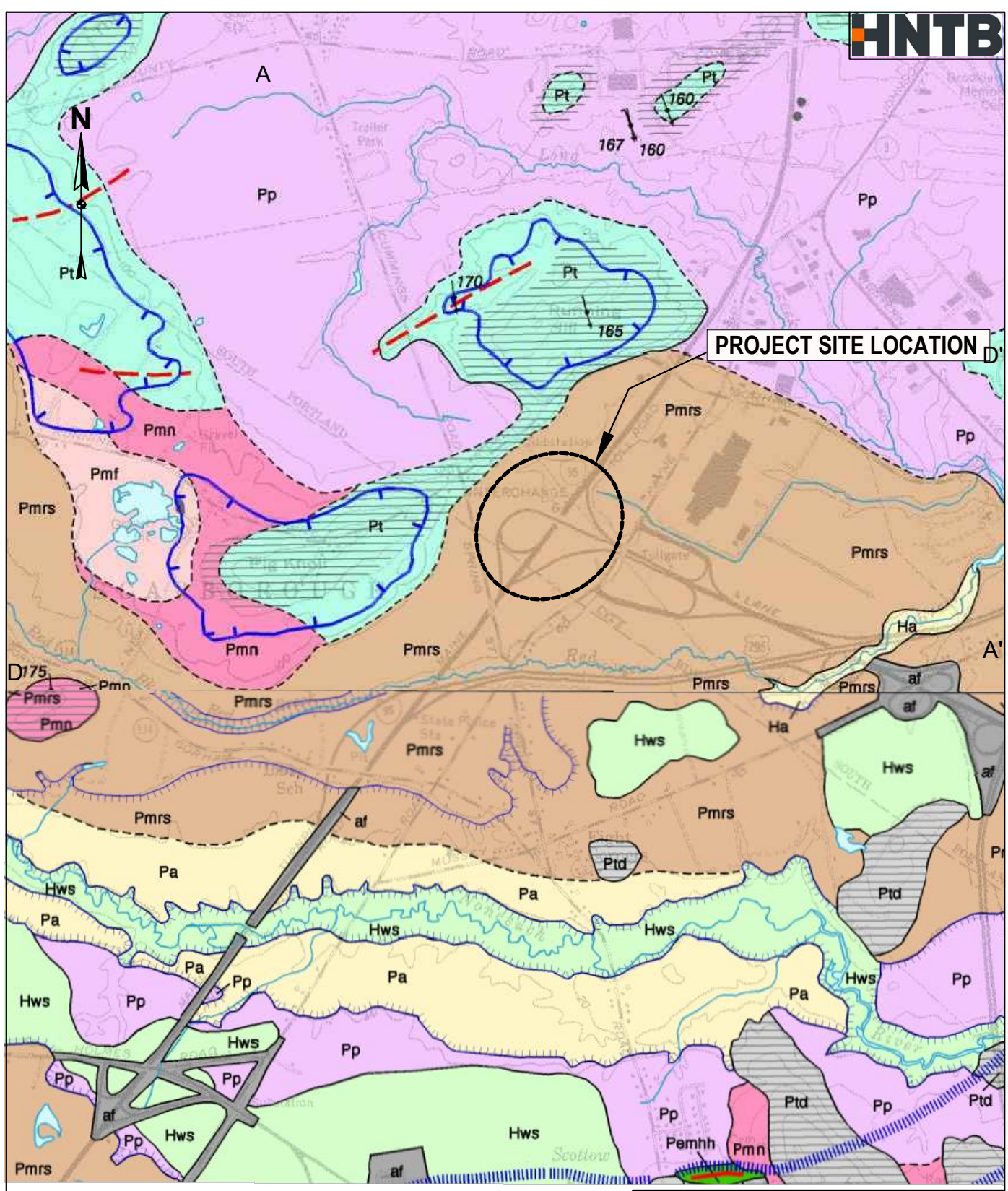


**THE GOLD STAR  
MEMORIAL HIGHWAY**

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

FIGURE 2  
KEY PLAN





**PROJECT SITE LOCATION**

**Pmrs** Marine regressive sand deposits - Sand, silt, and minor gravel deposited in shallow marine waters during late-glacial regression of the sea. May include a variety of nearshore and fluvial sediments. Commonly occurs as flat sandy areas and is likely to be underlain by marine clay-silt of the Presumpscot Formation.

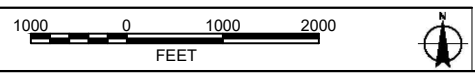
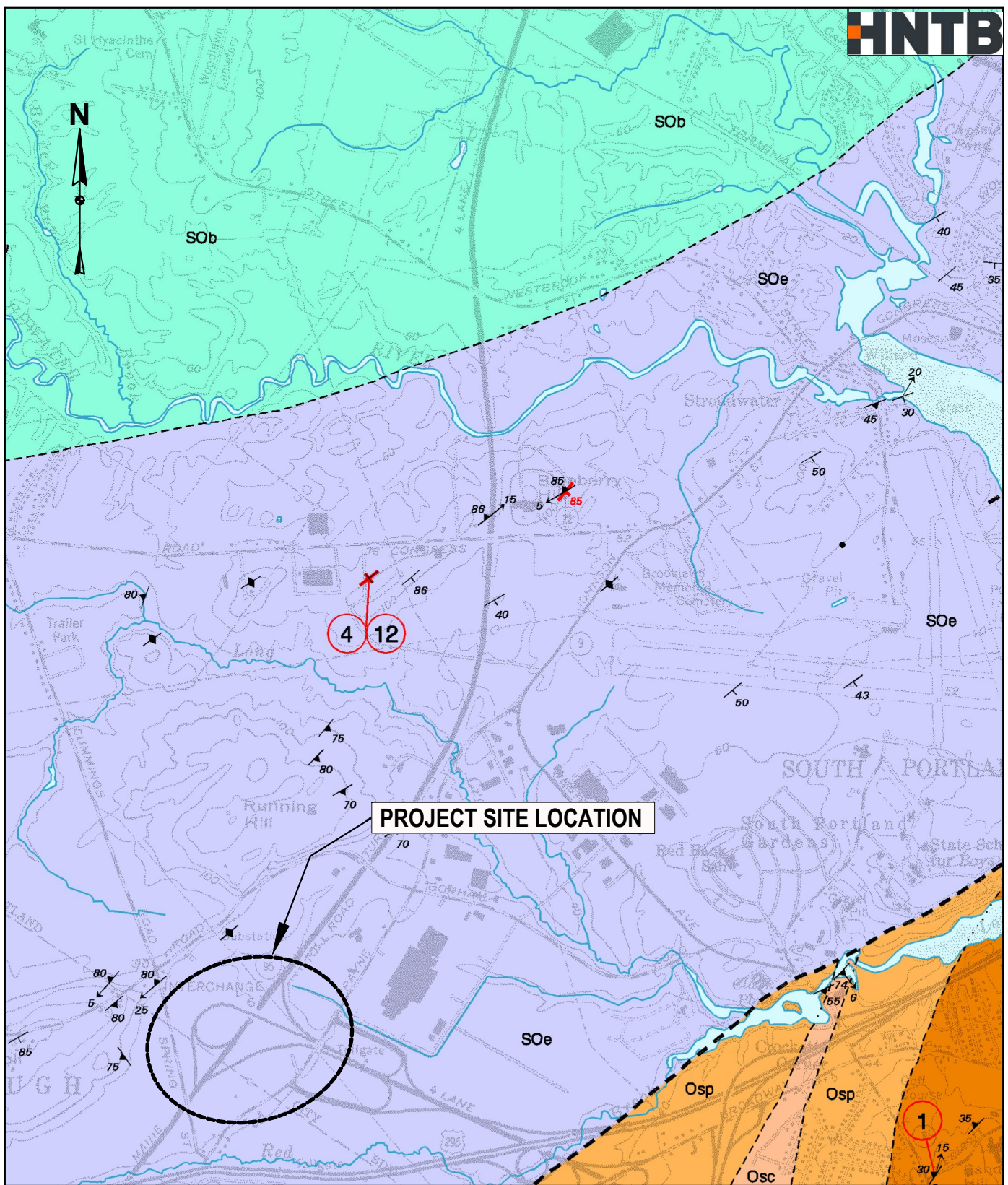


FIGURE 3  
**SURFICIAL GEOLOGY MAP**  
 EXIT 45 INTERCHANGE  
 RECONFIGURATION  
 SOUTH PORTLAND, ME.



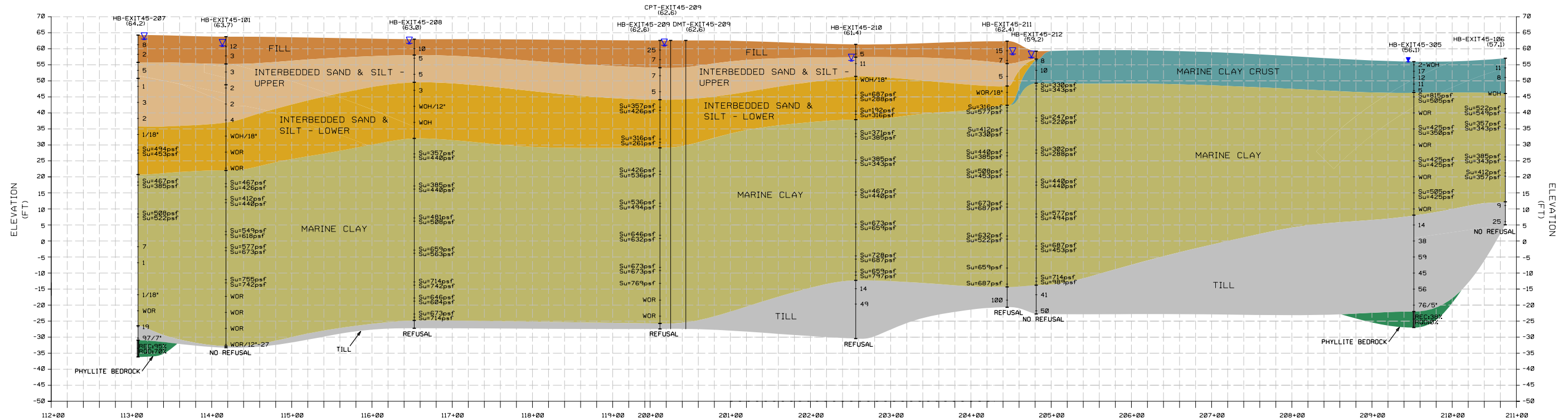
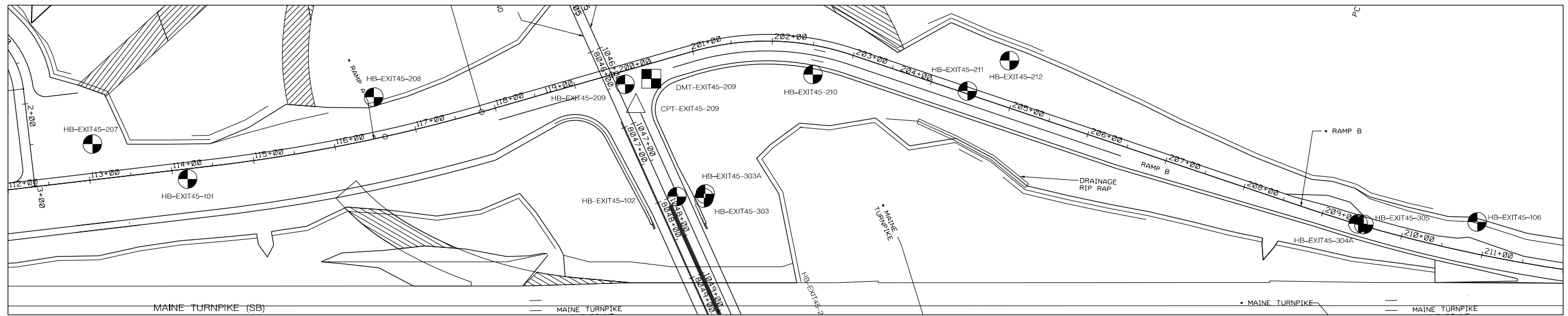
SOe

**Eliot Formation:** Fine-grained buff-weathering, medium-gray quartz-plagioclase-biotite phyllite with abundant carbonate at lowest grades, calc-silicate minerals (clinzoisite, sphene, diopside, and rarely grossular) at higher grades of metamorphism; with interlayered dark gray phyllite. Formation is strongly sheared throughout.



FIGURE 4  
**BEDROCK GEOLOGY MAP**  
 EXIT 45 INTERCHANGE  
 RECONFIGURATION  
 SOUTH PORTLAND, ME.

Date: \$date\$

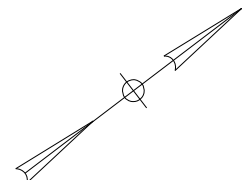


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4. BORING LOCATIONS AND RESULTS HAVE BEEN PROJECTED TO THE ALIGNMENT PROFILE. BORING ELEVATIONS MAY DIFFER FROM APPROXIMATE GROUND SURFACE ELEVATIONS AT THE ROADWAY CENTERLINE.

**LEGEND:**

	FILL		BORING LOCATIONS FOR EXIT45 PROJECT	<b>HB-EXIT45-XX</b>	= BORING NUMBER/DESIGNATION
	INTERBEDDED SAND & SILT - UPPER		DILATOMETER LOCATION	<b>#</b>	= SPT-N VALUE (BLOWS/FT) CORRECTED TO N60
	INTERBEDDED SAND & SILT - LOWER		CONE PENETRATION TEST LOCATION	<b>Su=(#)psf</b>	= UNDRAINED STRENGTH IN-SITU VANE SHEAR
	MARINE CLAY CRUST		GROUNDWATER OBSERVED WHILE DRILLING		= COBBLES OR BOULDERS ENCOUNTERED
	MARINE CLAY		GROUNDWATER OBSERVED AFTER DRILLING COMPLETED	<b>REFUSAL</b>	= PRACTICAL REFUSAL OF SPLIT SPOON OR ROLLER BIT INDICATE POSSIBLE TOP OF BEDROCK
	TILL	<b>REC:XXX</b>	= ROCK CORE RECOVERY	<b>ROD:XXX</b>	= ROCK QUALITY DESIGNATION
	PHYLLITE BEDROCK				



**FIGURE 5A**

Scale:  
  
 HORIZONTAL SCALE (FEET)  
  
 VERTICAL SCALE (FEET)

Designed by:

**HNTB**

No.	Revision	By	Date

CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.

	By	Date		By	Date
Designed	JDZ	05/19	Checked	JRS	05/19
Drawn	MEB	05/19	In Charge of	RAL	05/19

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**MAINE TURNPIKE**

THE GOLD STAR  
 MEMORIAL HIGHWAY

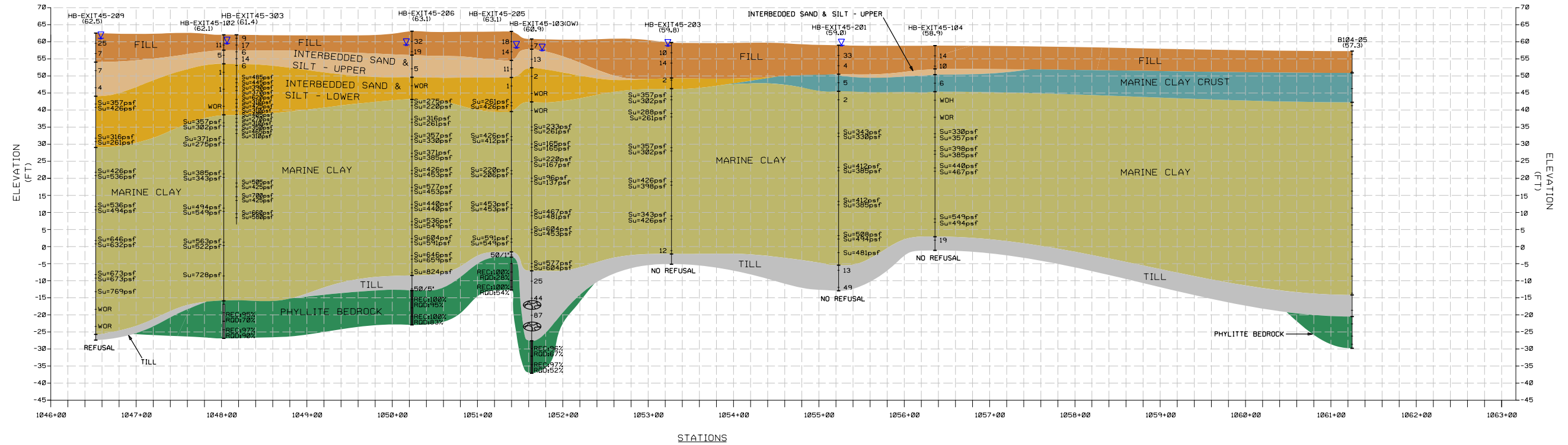
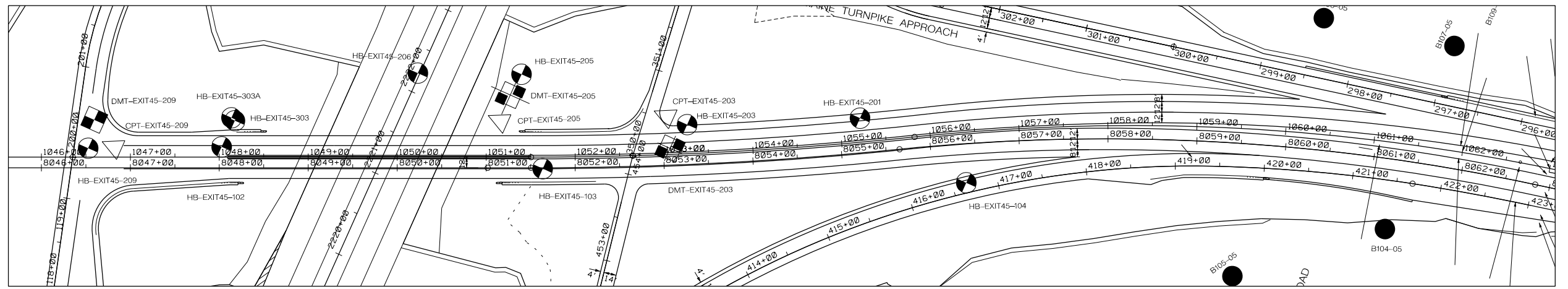
MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.

EXIT 45 INTERCHANGE RECONFIGURATION  
 SUBSURFACE PROFILE  
 PROFILE 1 OF 7  
 STA. 113+00 TO STA. 210+80

CONTRACT:2019.13

Filename: \$file\$

Date: \$date\$



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4. BORING LOCATIONS AND RESULTS HAVE BEEN PROJECTED TO THE ALIGNMENT PROFILE. BORING ELEVATIONS MAY DIFFER FROM APPROXIMATE GROUND SURFACE ELEVATIONS AT THE ROADWAY CENTERLINE.

**LEGEND:**

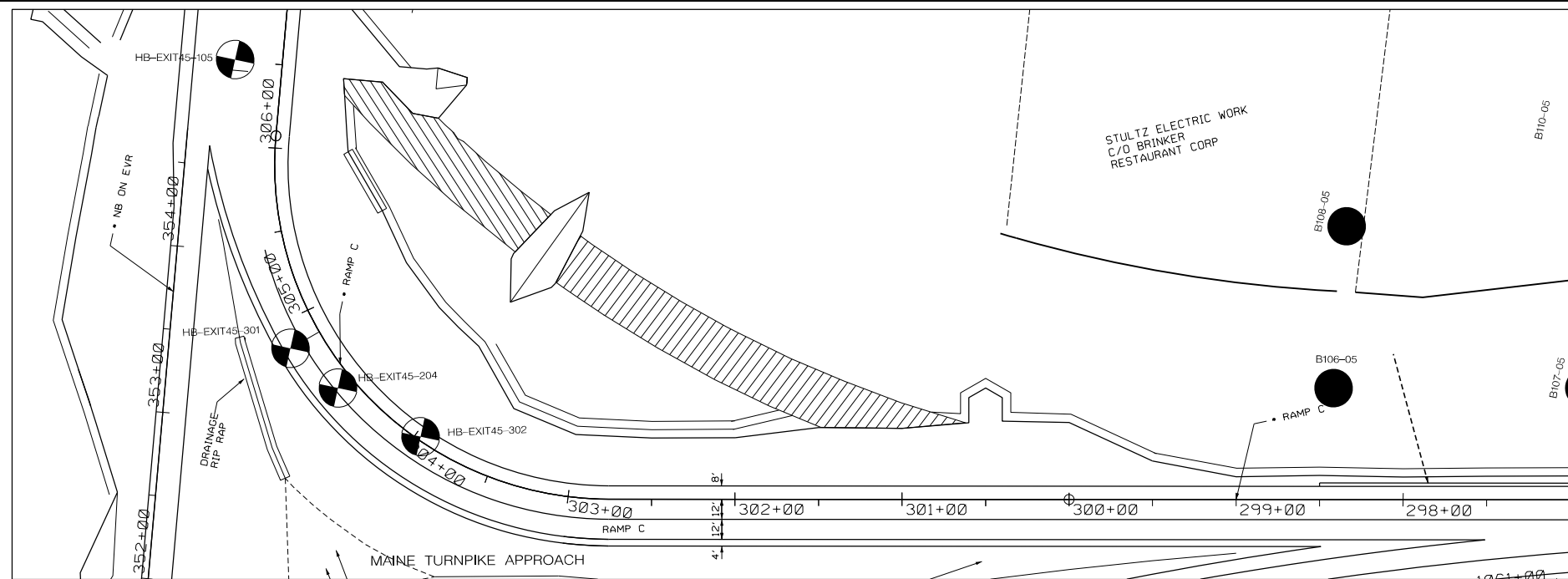
- FILL
- INTERBEDDED SAND & SILT - UPPER
- INTERBEDDED SAND & SILT - LOWER
- MARINE CLAY CRUST
- MARINE CLAY
- TILL
- PHYLLITE BEDROCK
- BORING LOCATIONS FOR EXIT45 PROJECT
- BORINGS PERFORMED BY HALEY & ALDRICH, INC. (2005)
- DILATOMETER LOCATION
- CONE PENETRATION TEST LOCATION
- GROUNDWATER OBSERVED WHILE DRILLING
- GROUNDWATER OBSERVED AFTER DRILLING COMPLETED
- HB-EXIT45-XX = BORING NUMBER/DESIGNATION
- = SPT-N VALUE (BLOWS/FT) CORRECTED TO N60
- Su=(\*)psf = UNDRAINED STRENGTH IN-SITU VANE SHEAR
- = COBBLES OR BOULDERS ENCOUNTERED
- REFUSAL = PRACTICAL REFUSAL OF SPLIT SPOON OR ROLLER BIT INDICATE POSSIBLE TOP OF BEDROCK
- REC:XX% = ROCK CORE RECOVERY
- RQD:XX% = ROCK QUALITY DESIGNATION

**FIGURE 5B**

<p>Scale:</p> <p>0 20 40 60 80 HORIZONTAL SCALE (FEET)</p> <p>0 5 10 15 20 VERTICAL SCALE (FEET)</p>	<p>Designed by:</p> <p style="text-align: center; font-size: 24px; font-weight: bold; margin: 0;">HNTB</p> <p>HNTB CORPORATION 340 COUNTY ROAD, SUITE 6-C WESTBROOK, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909</p>	<p style="font-size: 18px; font-weight: bold; margin: 0;">THE GOLD STAR MEMORIAL HIGHWAY</p>	<p style="text-align: center; font-size: 18px; font-weight: bold; margin: 0;">EXIT 45 INTERCHANGE RECONFIGURATION SUBSURFACE PROFILE PROFILE 2 OF 7 STA. 1046+50 TO STA. 1056+40</p>																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Revision</th> <th>By</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No.	Revision	By	Date					<p>CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th> </th> <th>By</th> <th>Date</th> <th> </th> <th>By</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Designed</td> <td>JDZ</td> <td>05/19</td> <td>Checked</td> <td>JRS</td> <td>05/19</td> </tr> <tr> <td>Drawn</td> <td>MEB</td> <td>05/19</td> <td>In Charge of</td> <td>RAL</td> <td>05/19</td> </tr> </tbody> </table>		By	Date		By	Date	Designed	JDZ	05/19	Checked	JRS	05/19	Drawn	MEB	05/19	In Charge of	RAL	05/19	<p style="font-size: 12px; margin: 0;">MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.</p>	<p style="text-align: right; font-size: 12px; margin: 0;">CONTRACT: 2019.13</p>
No.	Revision	By	Date																										
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Designed	JDZ	05/19	Checked	JRS	05/19																								
Drawn	MEB	05/19	In Charge of	RAL	05/19																								

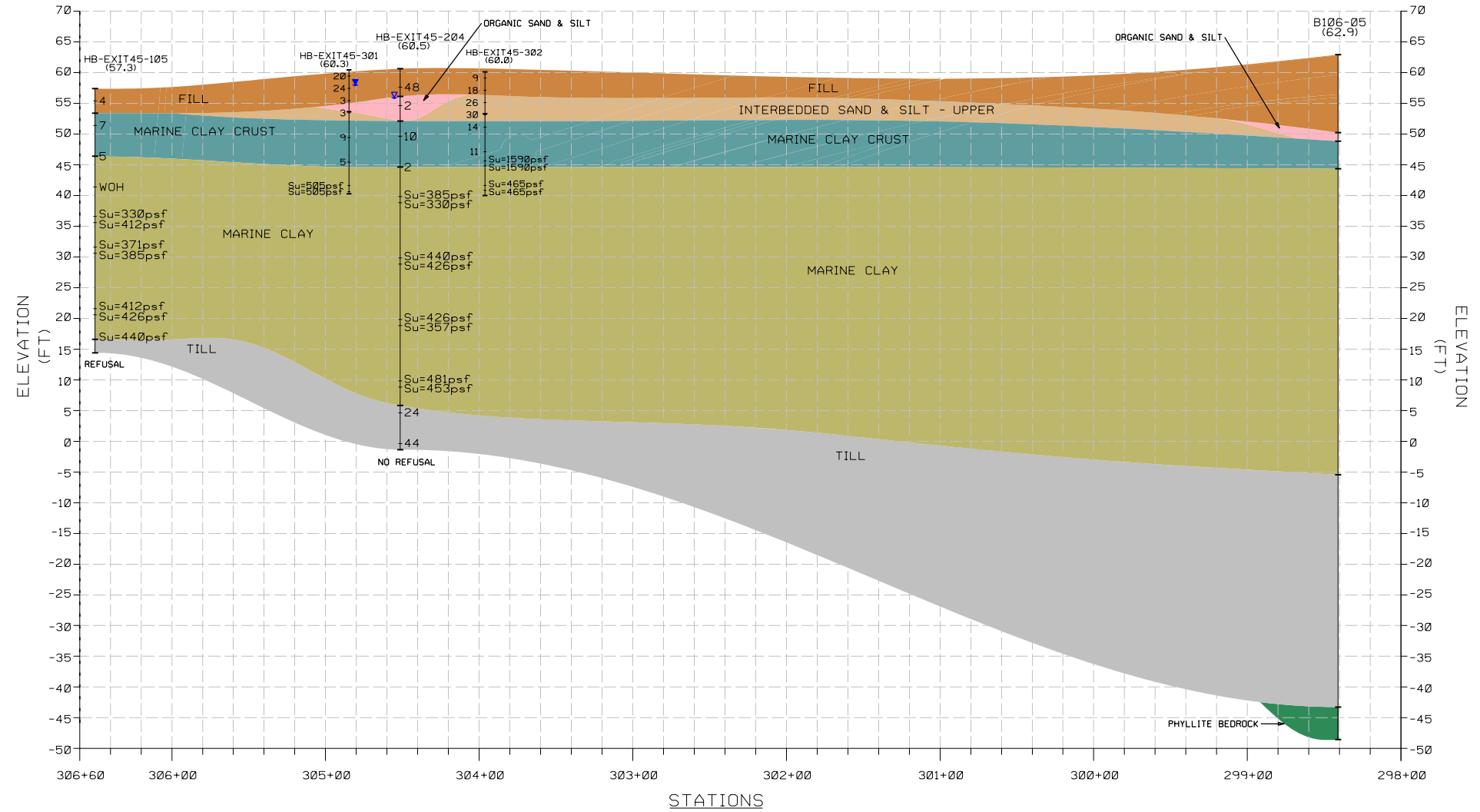
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Date: \$date\$



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**LEGEND:**

- FILL
  - INTERBEDDED SAND & SILT - UPPER
  - INTERBEDDED SAND & SILT - LOWER
  - MARINE CLAY CRUST
  - MARINE CLAY
  - TILL
  - PHYLLITE BEDROCK
  - ORGANIC SAND & SILT
- 
- BORING LOCATIONS FOR EXIT 45 PROJECT
  - BORINGS PERFORMED BY HALEY & ALDRICH, INC. (2005)
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- REC:XXX = ROCK CORE RECOVERY
- ROD:XXX = ROCK QUALITY DESIGNATION

**FIGURE 5C**

Scale:  
 20 0 20 40 60 80 5 0 5 10 15 20  
 HORIZONTAL SCALE (FEET) VERTICAL SCALE (FEET)

No.	Revision	By	Date

Designed by:

HNTB

CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.

	By	Date		By	Date
Designed	JDZ	05/19	Checked	JRS	05/19
Drawn	MEB	05/19	In Charge of	RAL	05/19

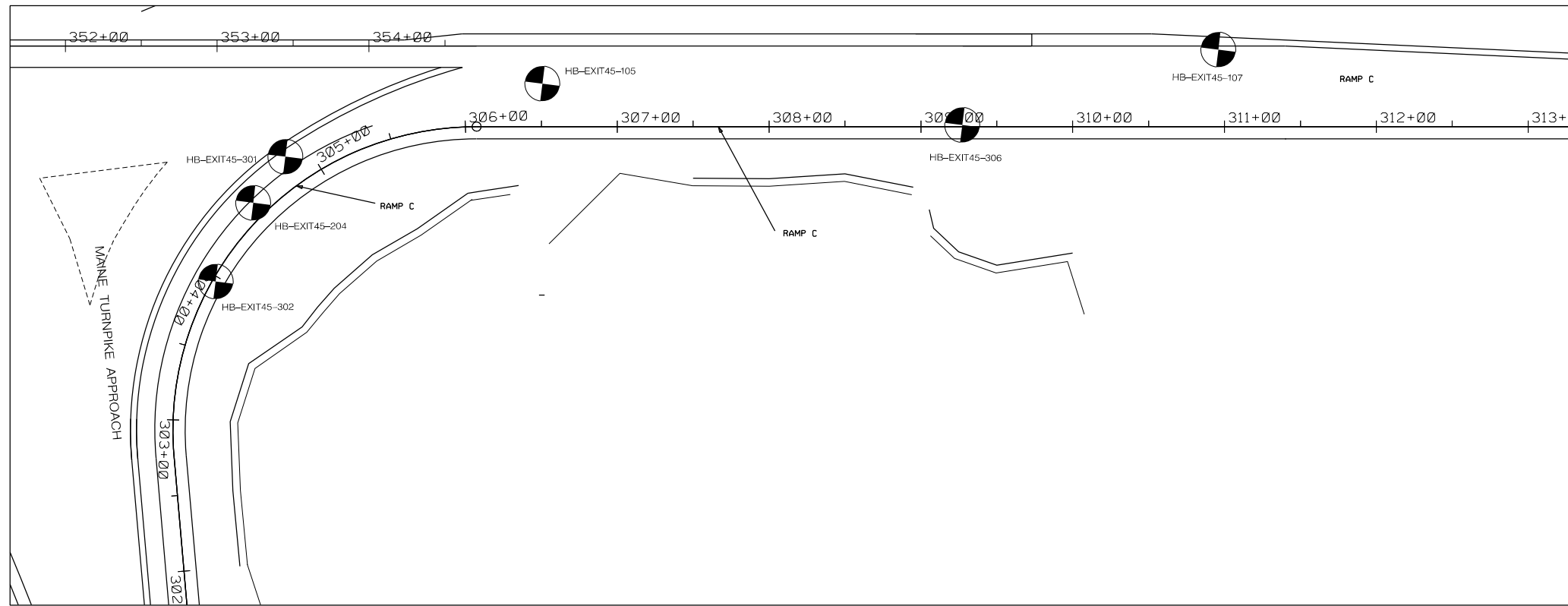
HNTB CORPORATION  
 340 COUNTY ROAD, SUITE 6-C  
 WESTBROOK, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909

THE GOLD STAR  
MEMORIAL HIGHWAY

MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.

EXIT 45 INTERCHANGE RECONFIGURATION  
 SUBSURFACE PROFILE  
 PROFILE 3 OF 7  
 STA. 306+60 TO STA. 299+60

CONTRACT:2019.13

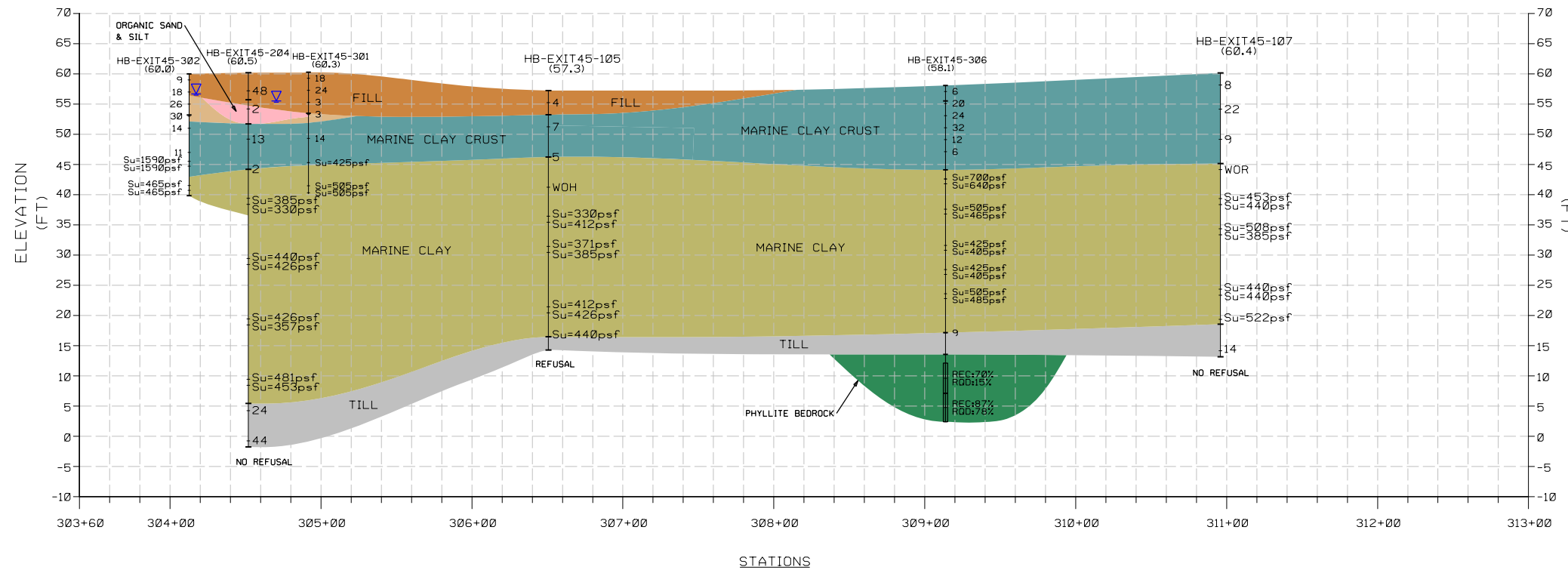


**NOTES:**

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2. VERTICAL AND HORIZONTAL SCALES ARE SHOWN ON PLANS. THE VERTICAL SCALE IS EXAGGERATED.
3. THE DEPTH AND THICKNESS OF SUBSURFACE STRATA INDICATED ON THE PROFILE WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORING LOCATIONS. THE TRANSITION BETWEEN MATERIALS MAY BE MORE OR LESS GRADUAL THAN INDICATED.
4. BORING LOCATIONS AND RESULTS HAVE BEEN PROJECTED TO THE ALIGNMENT PROFILE. BORING ELEVATIONS MAY DIFFER FROM APPROXIMATE GROUND SURFACE ELEVATIONS AT THE ROADWAY CENTERLINE.

**LEGEND:**

- FILL
  - INTERBEDDED SAND & SILT - UPPER
  - INTERBEDDED SAND & SILT - LOWER
  - MARINE CLAY CRUST
  - MARINE CLAY
  - TILL
  - PHYLLITE BEDROCK
  - ORGANIC SAND & SILT
- BORING LOCATIONS FOR EXIT 45 PROJECT
  - GROUNDWATER OBSERVED WHILE DRILLING
  - GROUNDWATER OBSERVED AFTER DRILLING COMPLETED



- HB-EXIT45-XX = BORING NUMBER/DESIGNATION
- \* = SPT-N VALUE (BLOWS/FT) CORRECTED TO N60
- Su=(\*)psf = UNDRAINED STRENGTH IN-SITU VANE SHEAR
- = COBBLES OR BOULDERS ENCOUNTERED
- REFUSAL = PRACTICAL REFUSAL OF SPLIT SPOON OR ROLLER BIT INDICATE POSSIBLE TOP OF BEDROCK
- REC:XXX% = ROCK CORE RECOVERY
- RQD:XXX% = ROCK QUALITY DESIGNATION

**FIGURE 5D**

Scale:  
 20 0 20 40 60 80 5 0 5 10 15 20  
 HORIZONTAL SCALE (FEET) VERTICAL SCALE (FEET)

No.	Revision	By	Date

Designed by:

**HNTB**

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 340 COUNTY ROAD, SUITE 6-C  
 WESTBROOK, ME 04092  
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 FAX (207) 228-0909

CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.			
	By	Date	
Designed	JDZ	05/19	Checked JRS 05/19
Drawn	MEB	05/19	In Charge of RAL 05/19

HNTB CORPORATION  
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 FAX (207) 228-0909

**THE GOLD STAR  
MEMORIAL HIGHWAY**

MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.

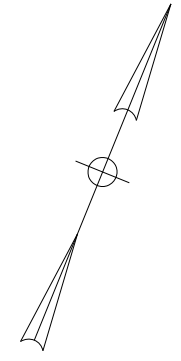
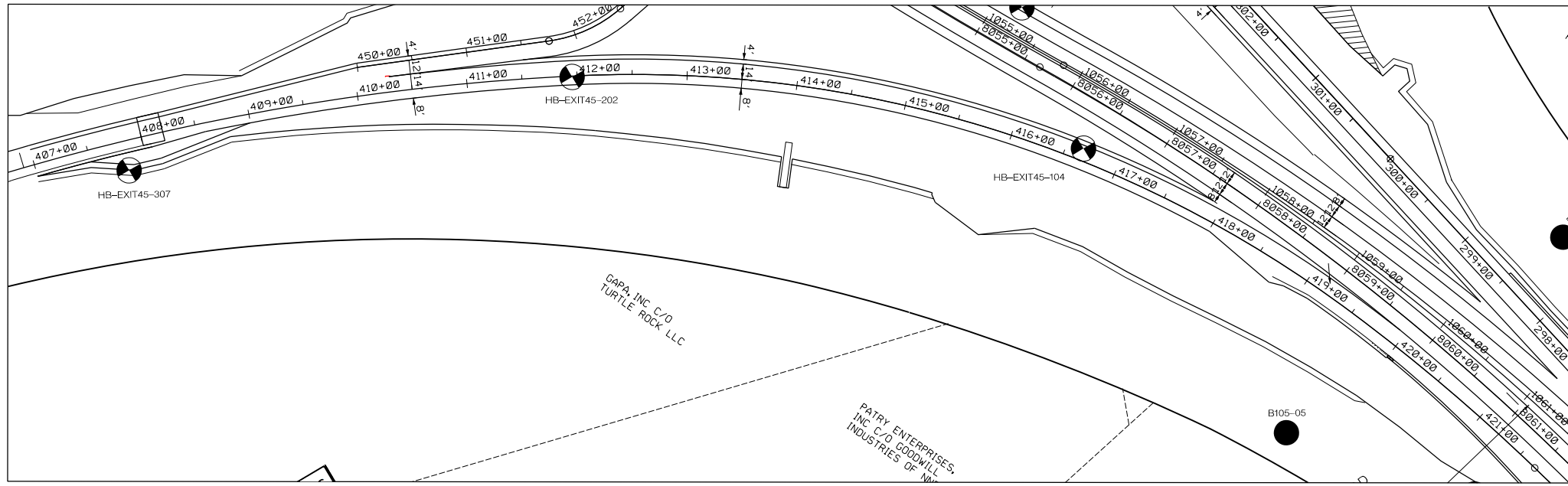
EXIT 45 INTERCHANGE RECONFIGURATION  
 SUBSURFACE PROFILE  
 PROFILE 4 OF 7  
 STA. 304+10 TO STA. 311+00

CONTRACT:2019.13

Date: \$date\$

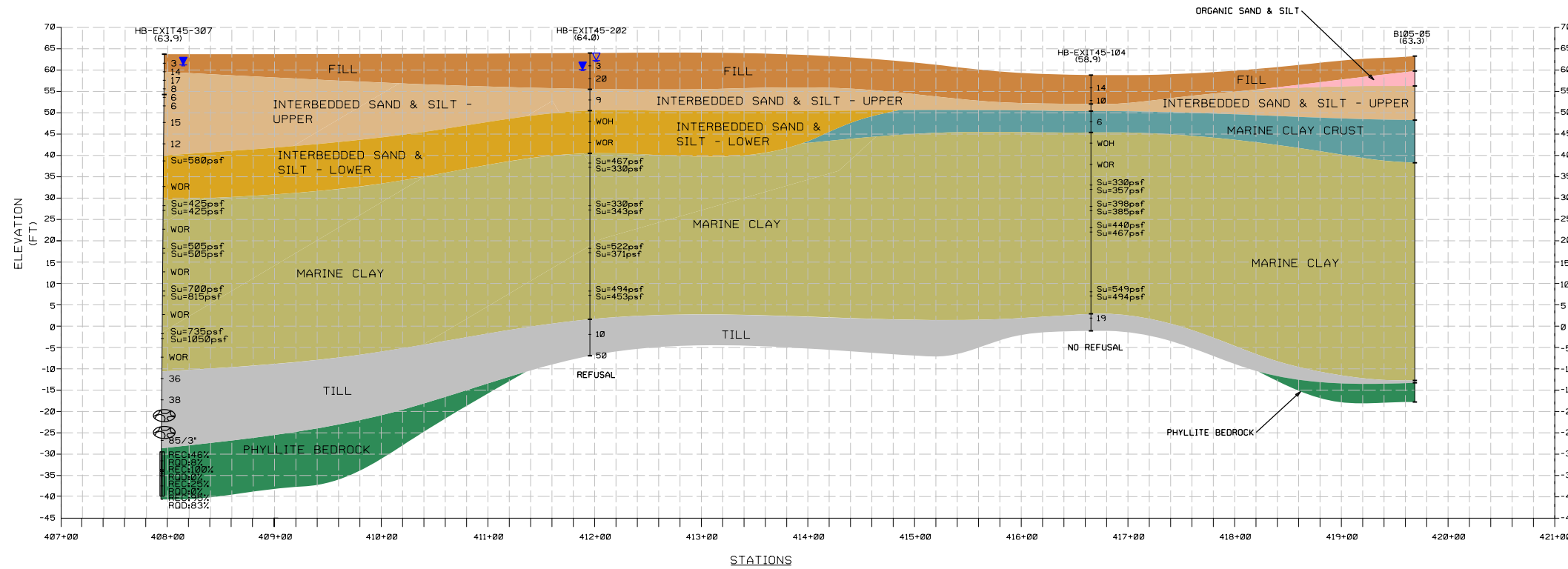
Filename: \$file\$

Date: \$date\$



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**LEGEND:**

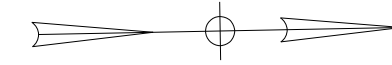
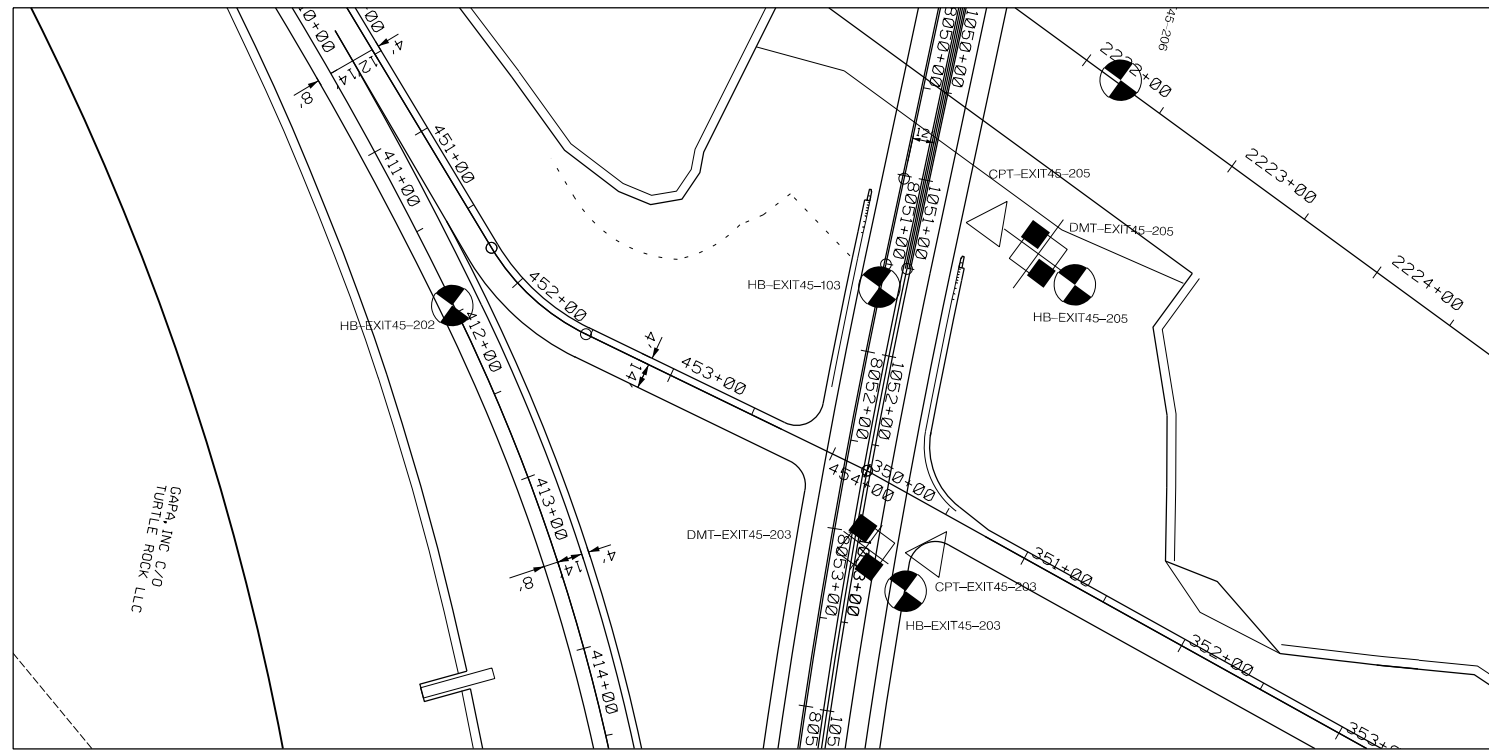
- FILL
  - INTERBEDDED SAND & SILT - UPPER
  - INTERBEDDED SAND & SILT - LOWER
  - MARINE CLAY CRUST
  - MARINE CLAY
  - TILL
  - PHYLLITE BEDROCK
  - ORGANIC SAND & SILT
- BORING LOCATIONS FOR EXIT 45 PROJECT
  - BORINGS PERFORMED BY HALEY & ALDRICH, INC. (2005)
  - GROUNDWATER OBSERVED WHILE DRILLING
  - GROUNDWATER OBSERVED AFTER DRILLING COMPLETED

- HB-EXIT45-XX = BORING NUMBER/DESIGNATION
- \* = SPT-N VALUE (BLOWS/FT) CORRECTED TO N60
- Su>(\*psf) = UNDRAINED STRENGTH IN-SITU VANE SHEAR
- = COBBLES OR BOULDERS ENCOUNTERED
- REFUSAL = PRACTICAL REFUSAL OF SPLIT SPOON OR ROLLER BIT INDICATE POSSIBLE TOP OF BEDROCK
- REC:XX% = ROCK CORE RECOVERY
- RQD:XX% = ROCK QUALITY DESIGNATION

**FIGURE 5E**

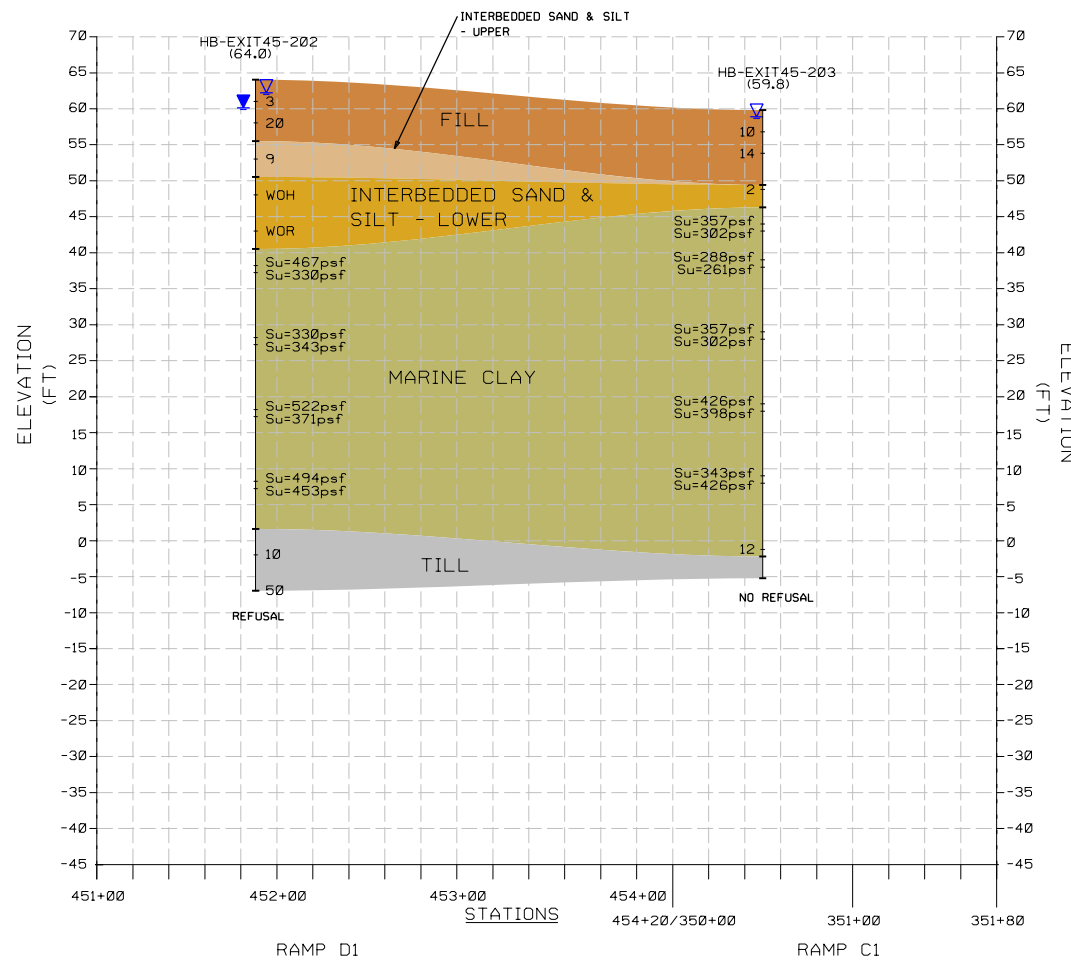
<p>Scale:</p> <p>20 0 20 40 60 80 HORIZONTAL SCALE (FEET)</p> <p>5 0 5 10 15 20 VERTICAL SCALE (FEET)</p>	<p>Designed by:</p> <p style="text-align: center; font-size: 24px; font-weight: bold;">HNTB</p> <p style="text-align: center;">CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>By</td> <td>Date</td> <td>By</td> <td>Date</td> </tr> <tr> <td>Designed</td> <td>JDZ 05/19</td> <td>Checked</td> <td>JRS 05/19</td> </tr> <tr> <td>Drawn</td> <td>MEB 05/19</td> <td>In Charge of</td> <td>RAL 05/19</td> </tr> </table>	By	Date	By	Date	Designed	JDZ 05/19	Checked	JRS 05/19	Drawn	MEB 05/19	In Charge of	RAL 05/19	<p>HNTB CORPORATION 340 COUNTY ROAD, SUITE 6-C WESTBROOK, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909</p>		<p>THE GOLD STAR MEMORIAL HIGHWAY</p>	<p>EXIT 45 INTERCHANGE RECONFIGURATION SUBSURFACE PROFILE PROFILE 5 OF 7 STA. 408+00 TO STA. 419+70</p>
By	Date	By	Date														
Designed	JDZ 05/19	Checked	JRS 05/19														
Drawn	MEB 05/19	In Charge of	RAL 05/19														
<p>MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.</p>					<p>CONTRACT: 2019.13</p>												

Filename: \$file\$



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**LEGEND:**

- FILL
- INTERBEDDED SAND & SILT - UPPER
- INTERBEDDED SAND & SILT - LOWER
- MARINE CLAY CRUST
- MARINE CLAY
- TILL
- PHYLLITE BEDROCK
- BORING LOCATIONS FOR EXIT45 PROJECT
- DILATOMETER LOCATION
- CONE PENETRATION TEST LOCATION
- GROUNDWATER OBSERVED WHILE DRILLING
- GROUNDWATER OBSERVED AFTER DRILLING COMPLETED

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- REC:XXX = ROCK CORE RECOVERY
- RGD:XXX = ROCK QUALITY DESIGNATION

**FIGURE 5F**

Scale:  
 20 0 20 40 60 80 HORIZONTAL SCALE (FEET)  
 5 0 5 10 15 20 VERTICAL SCALE (FEET)

Designed by:



HNTB CORPORATION  
 340 COUNTY ROAD, SUITE 6-C  
 WESTBROOK, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909



THE GOLD STAR  
 MEMORIAL HIGHWAY

EXIT 45 INTERCHANGE RECONFIGURATION  
 SUBSURFACE PROFILE  
 PROFILE 6 OF 7  
 STA. 451+85 TO STA. 350+50

No.	Revision	By	Date

CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.			
	By	Date	
Designed	JDZ	05/19	Checked JRS 05/19
Drawn	MEB	05/19	In Charge of RAL 05/19

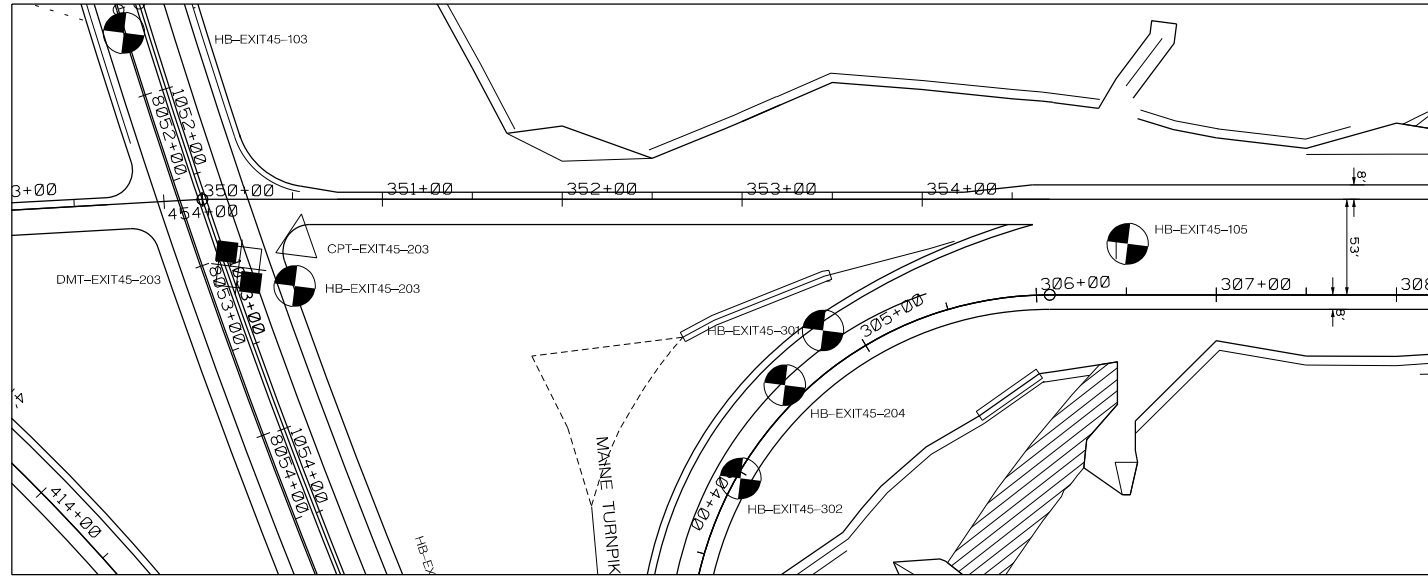
MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.

CONTRACT:2019.13

Date: \$date\$

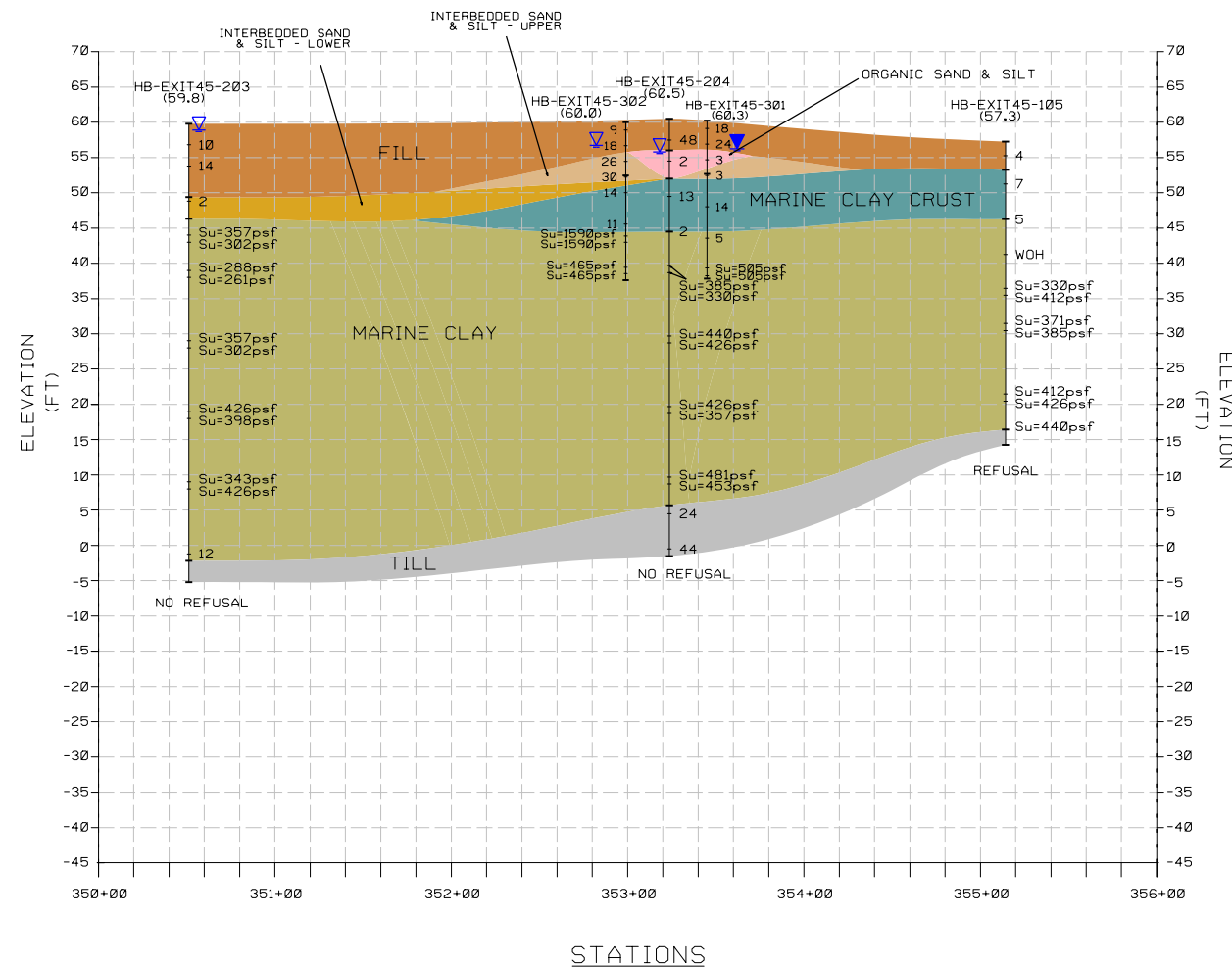
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**LEGEND:**

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- MARINE CLAY CRUST
- MARINE CLAY
- TILL
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- BORING LOCATIONS FOR EXIT45 PROJECT
- DILATOMETER LOCATION
- CONE PENETRATION TEST LOCATION
- GROUNDWATER OBSERVED WHILE DRILLING
- GROUNDWATER OBSERVED AFTER DRILLING COMPLETED

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- REC:XXX = ROCK CORE RECOVERY
- ROD:XXX = ROCK QUALITY DESIGNATION

**FIGURE 5G**

Scale:  
 20 0 20 40 60 80 HORIZONTAL SCALE (FEET)  
 5 0 5 10 15 20 VERTICAL SCALE (FEET)

Designed by:



HNTB CORPORATION  
 340 COUNTY ROAD, SUITE 6-C  
 WESTBROOK, ME 04092  
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 FAX (207) 228-0909



THE GOLD STAR  
 MEMORIAL HIGHWAY

EXIT 45 INTERCHANGE RECONFIGURATION  
 SUBSURFACE PROFILE  
 PROFILE 7 OF 7  
 STA. 350+50 TO STA. 355+20

No.	Revision	By	Date

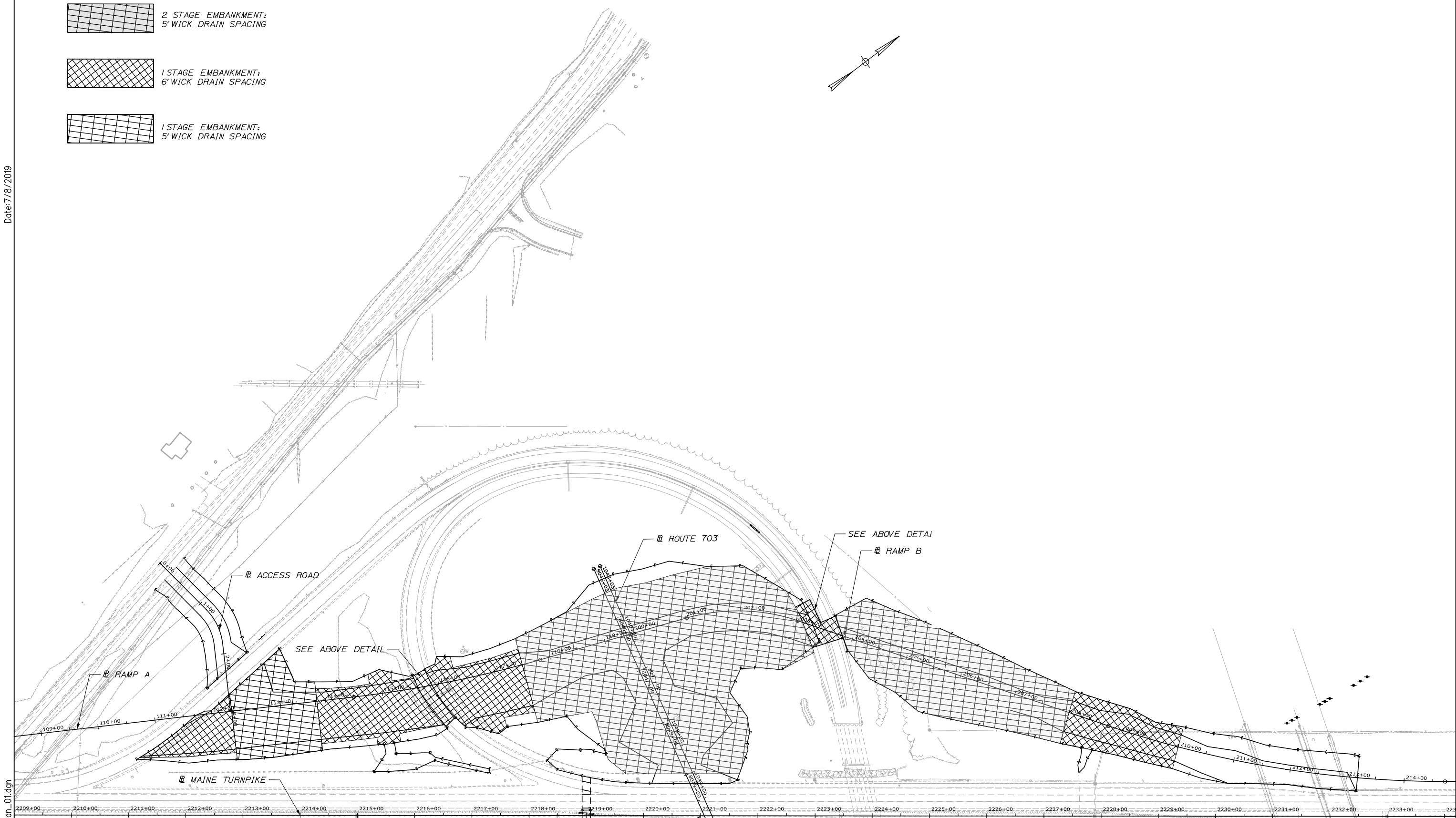
CONSULTANT PROJECT MANAGER: RAYMOND W. HANF, P.E.

	By	Date		By	Date
Designed	JDZ	05/19	Checked	JRS	05/19
Drawn	MEB	05/19	In Charge of	RAL	05/19

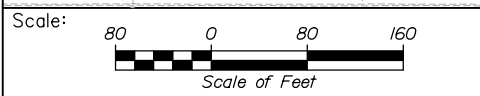
MTA PROJECT MANAGER: RALPH C. NORWOOD, IV, P.E., P.T.O.E.

CONTRACT:2019.13

Date: 7/8/2019



Filename: 00X\_Geotechnical Plan\_01.dgn



Designed by:

**HNTB**

CONSULTANT PROJECT MANAGER: Raymond W. Hanf, P.E.

No.	Revision	By	Date

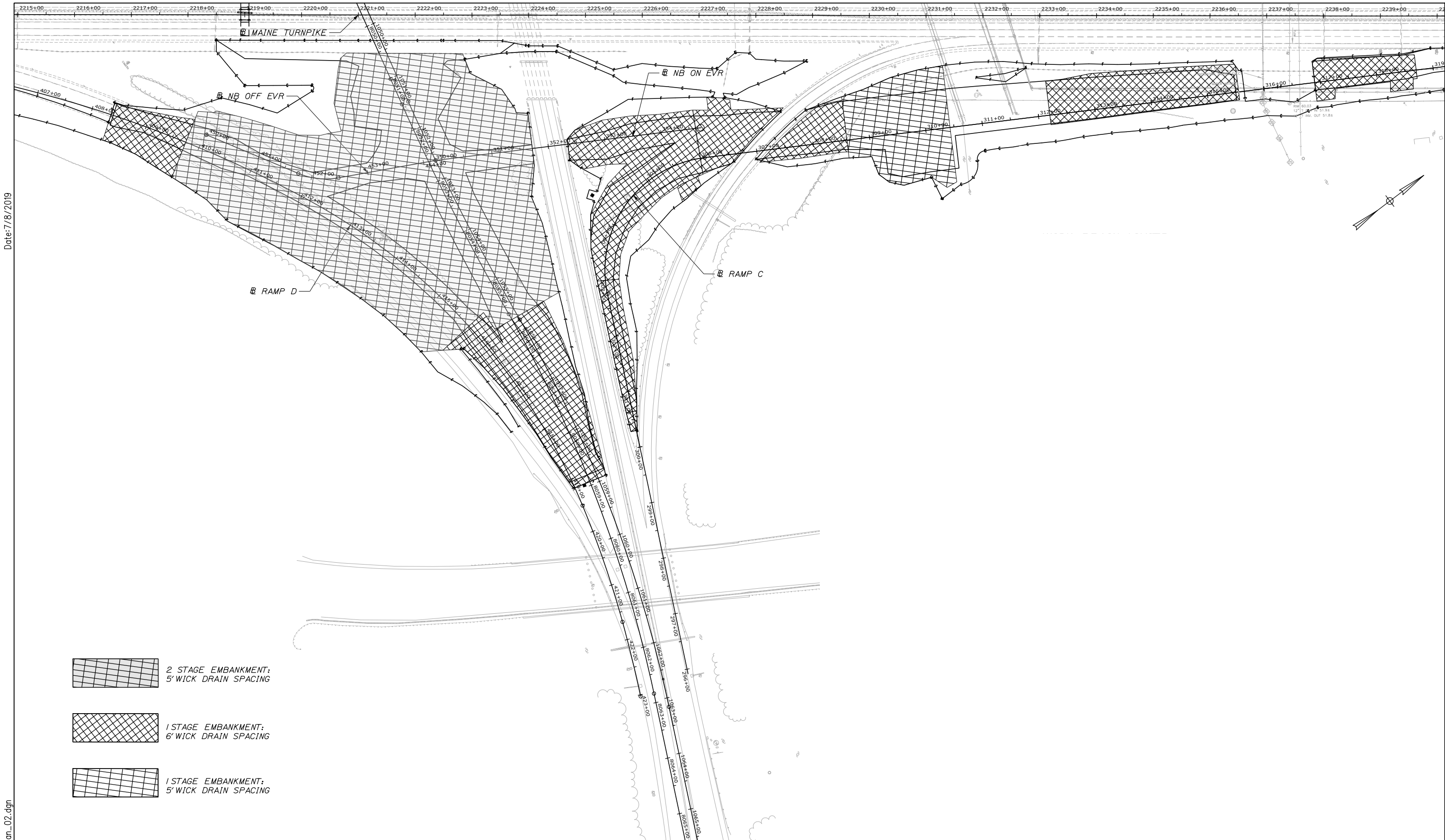
	By	Date		By	Date
Designed	BCS	05\19	Checked	JRS	05\19
Drawn	CRC	05\19	In Charge of	RAL	05\19

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Westbrook, ME 04092  
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FAX (207) 228-0909

**THE GOLD STAR  
MEMORIAL HIGHWAY**


MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

**FIGURE 6A  
PVD EXTENTS AND LAYOUT  
1 of 2**



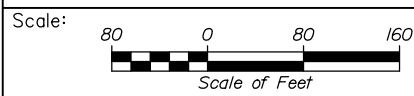
Date: 7/8/2019

Filename: 00X\_Geotechnical Plan\_02.dgn

 2 STAGE EMBANKMENT:  
5' WICK DRAIN SPACING

 1 STAGE EMBANKMENT:  
6' WICK DRAIN SPACING

 1 STAGE EMBANKMENT:  
5' WICK DRAIN SPACING



Designed by:



HNTB CORPORATION  
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Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



THE GOLD STAR  
MEMORIAL HIGHWAY

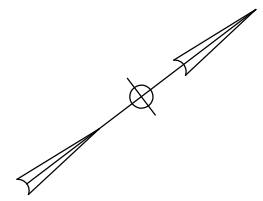
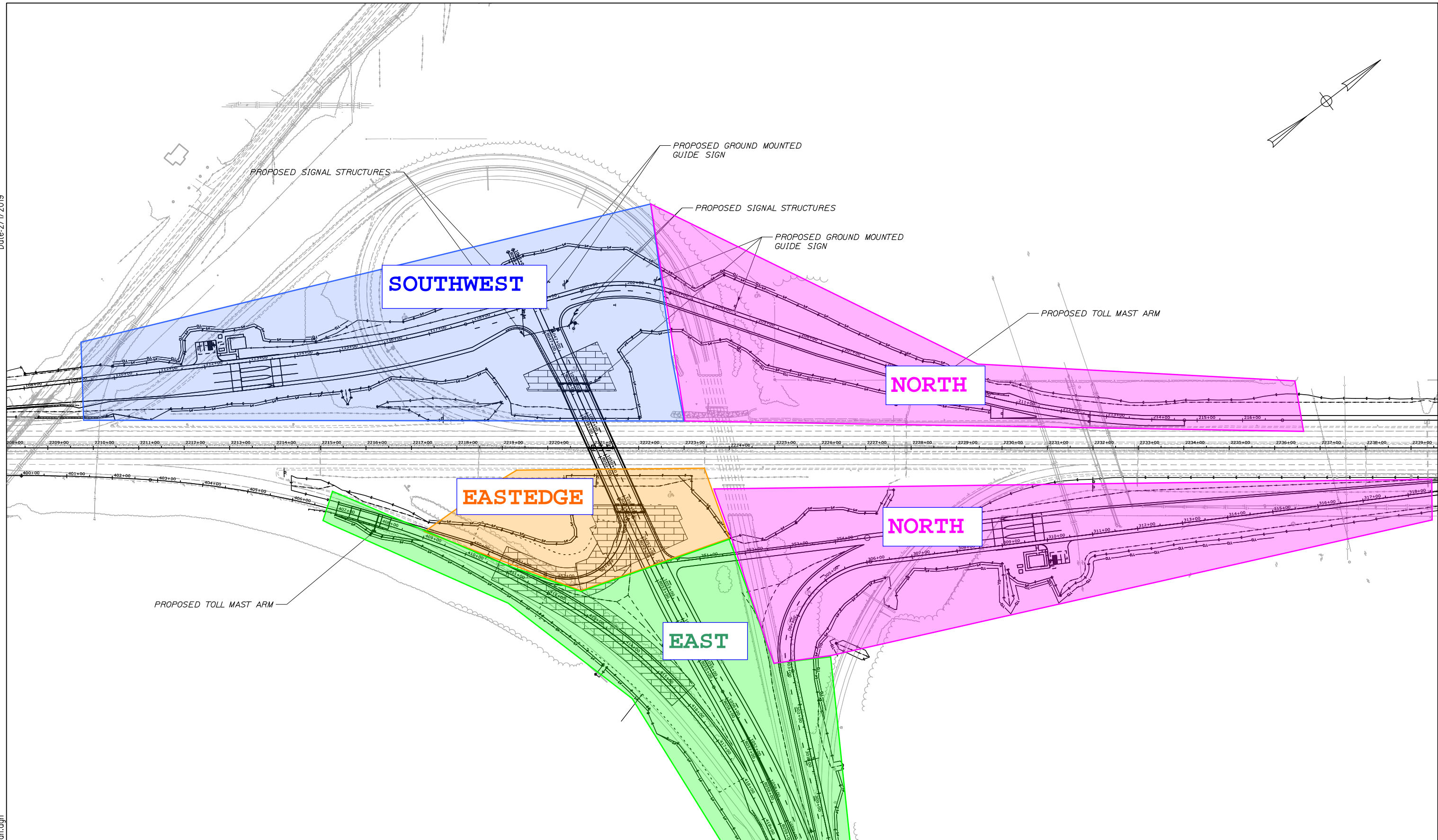
FIGURE 6B  
PVD EXTENTS AND LAYOUT  
2 of 2

No.	Revision	By	Date

CONSULTANT PROJECT MANAGER: Raymond W. Hanf, P.E.					
	By	Date		By	Date
	Designed	BCS 05\19	Checked	JRS 05\19	
	Drawn	CRC 05\19	In Charge of	RAL 05\19	

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

Date: 2/1/2019



Scale: 100 0 100 200  
Scale of Feet

No.	Revision	By	Date

Designed by:

**HNTB**

CONSULTANT PROJECT MANAGER: Raymond W. Hanf, P.E.

	By	Date	Checked	By	Date
Designed	CDH	02\19	Checked	JRH	02\19
Drawn	CDH	02\19	In Charge of	RAL	02\19

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**MAINE TURNPIKE**

**THE GOLD STAR MEMORIAL HIGHWAY**

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

**FIGURE 7**  
**DESIGN MARINE CLAY**  
**STRENGTH ZONING**

Filename: 0XX\_Geotechnical Plan.dgn

Figure 8A: Vane Shear Undrained Strength Interpretation - East Edge

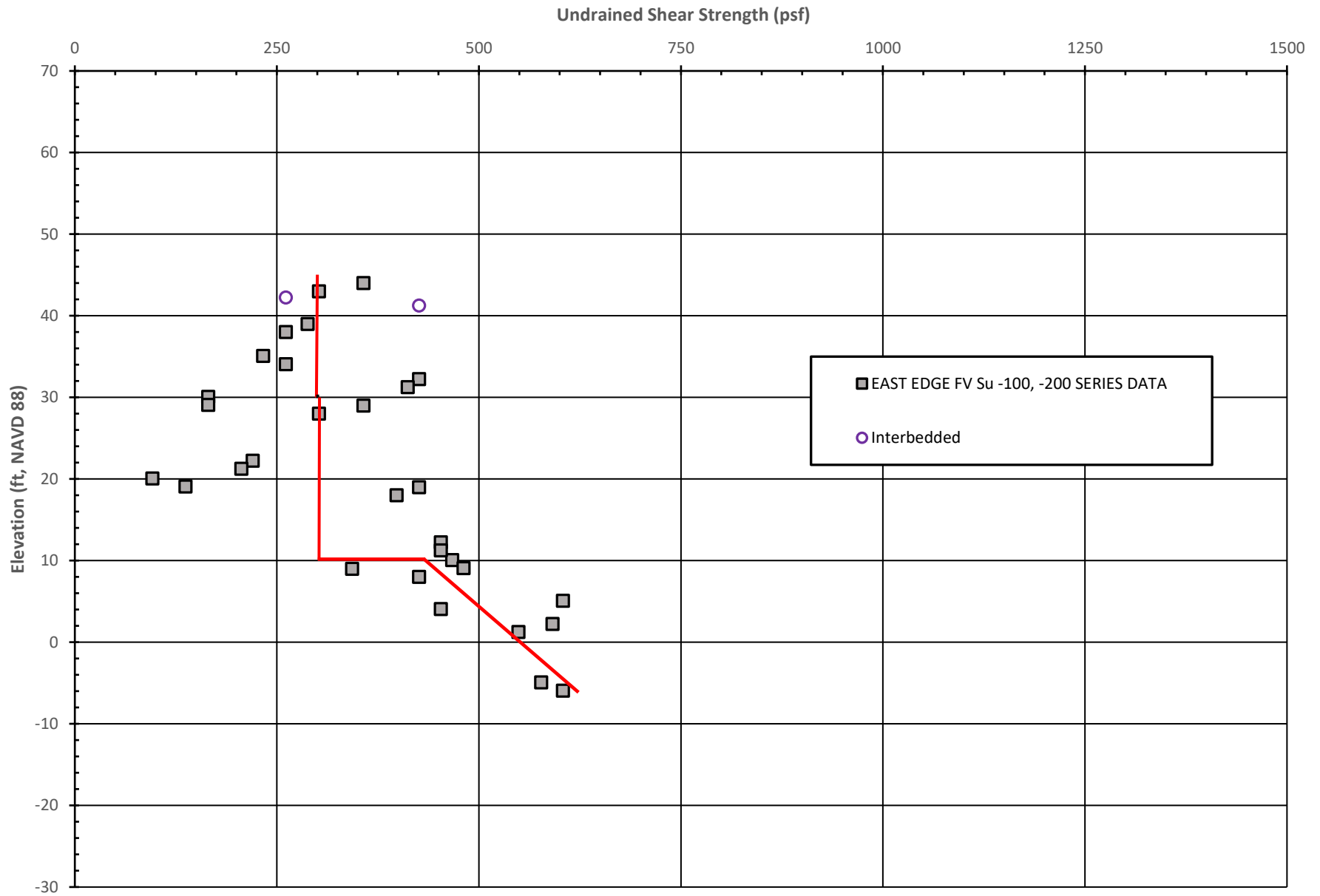


Figure 8B: Vane Shear Undrained Strength Interpretation - Southwest

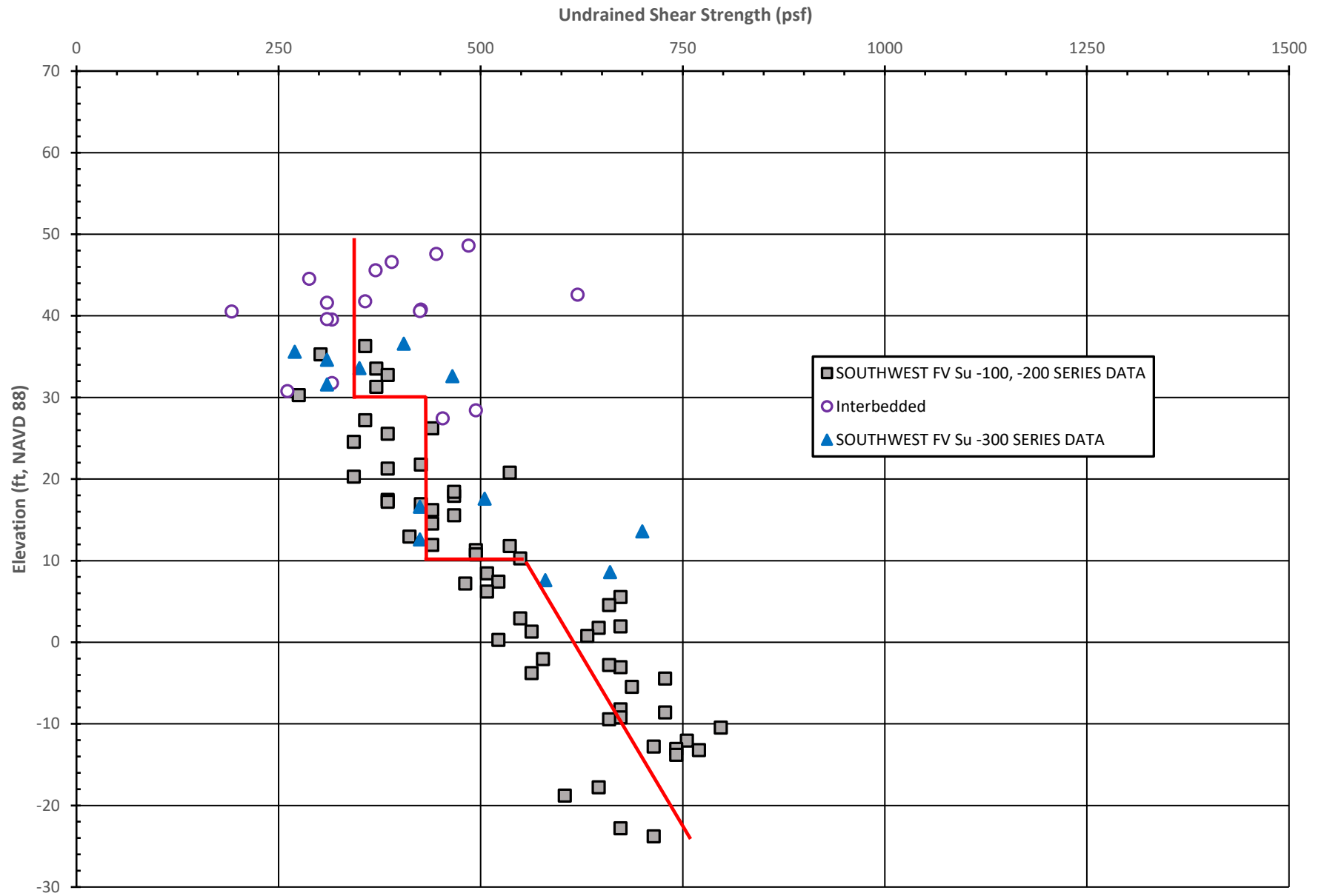


Figure 8C: Vane Shear Undrained Strength Interpretation - North

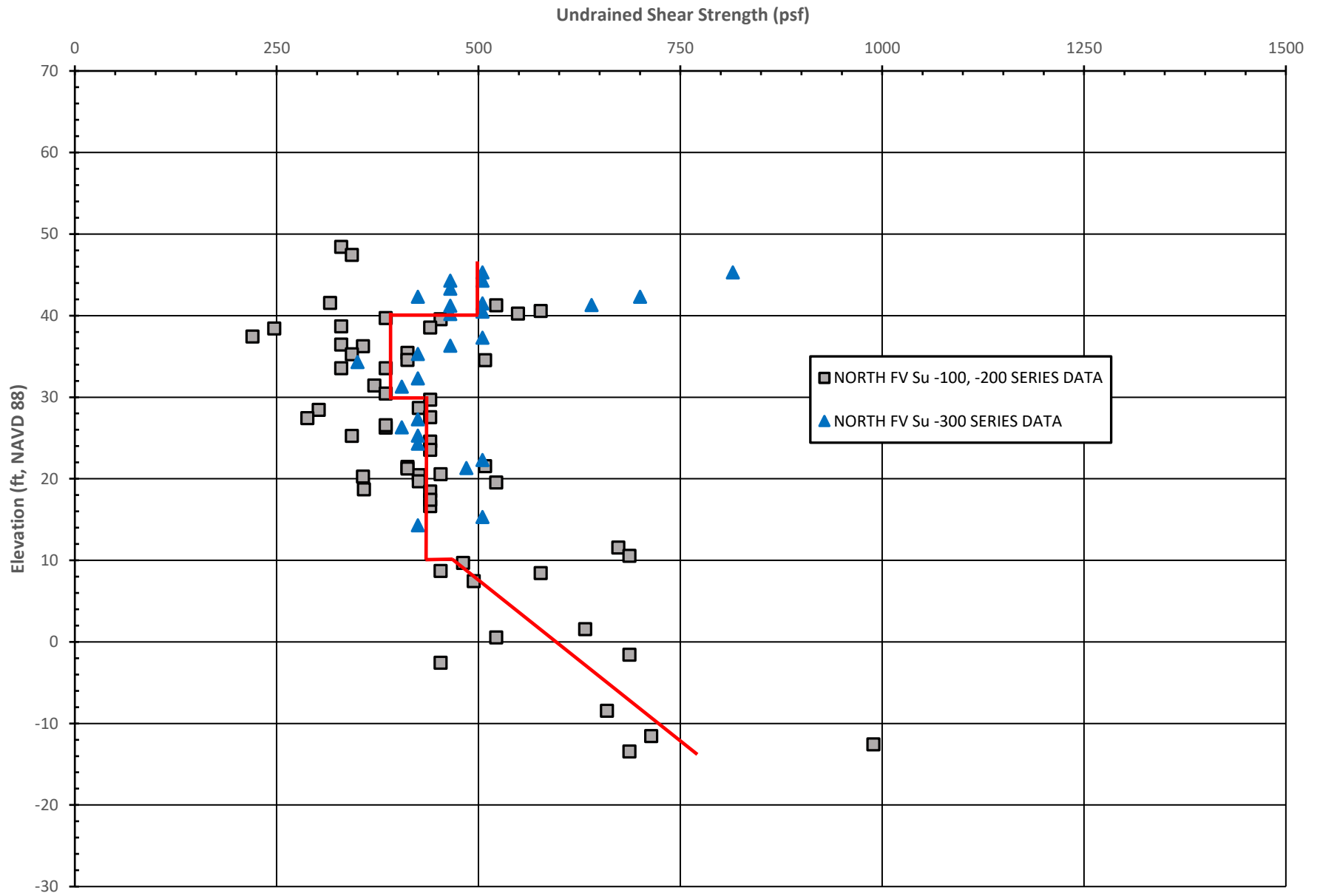
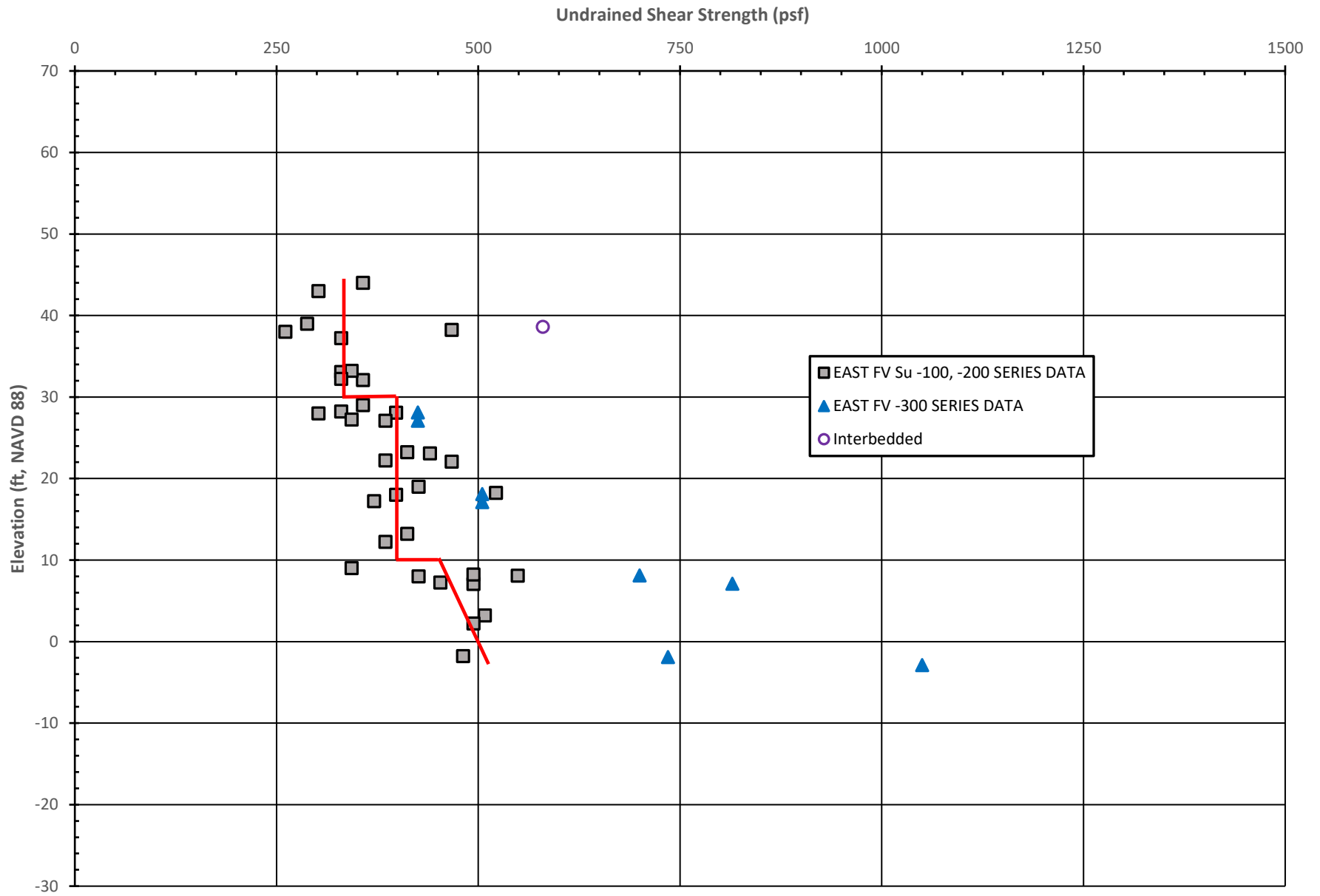
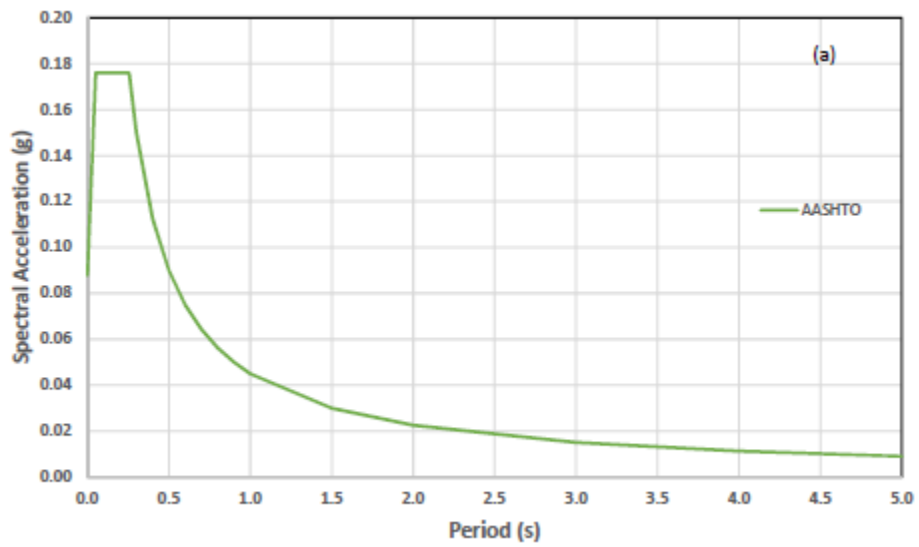


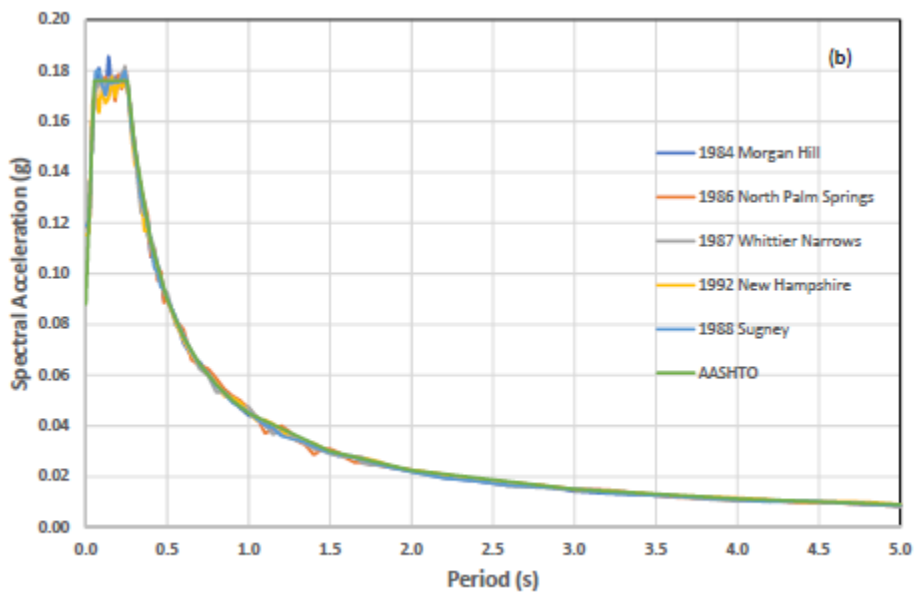
Figure 8D: Vane Shear Undrained Strength Interpretation - East







(a) Target Spectrum

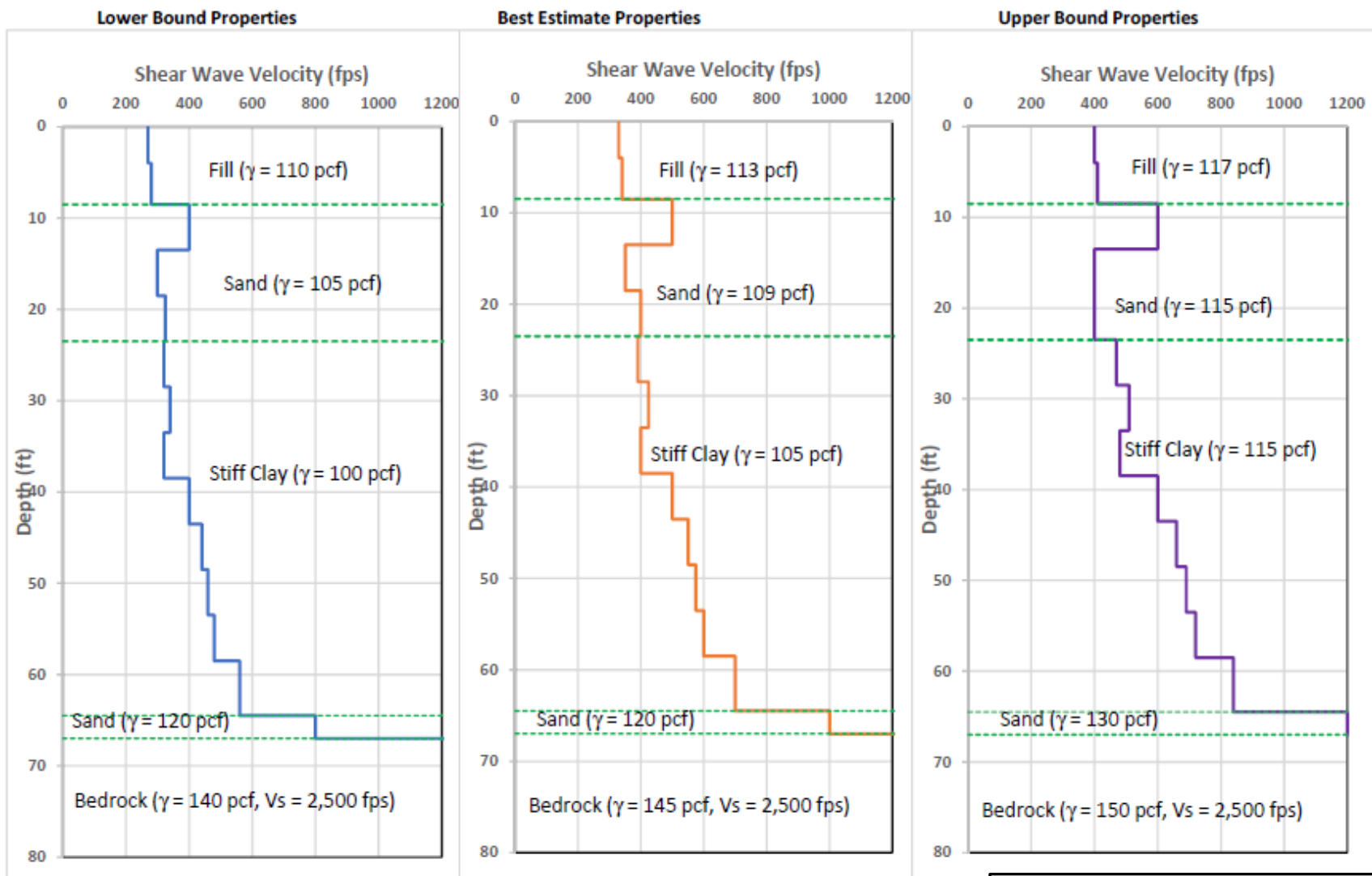


(b) Spectrum of Input Motions

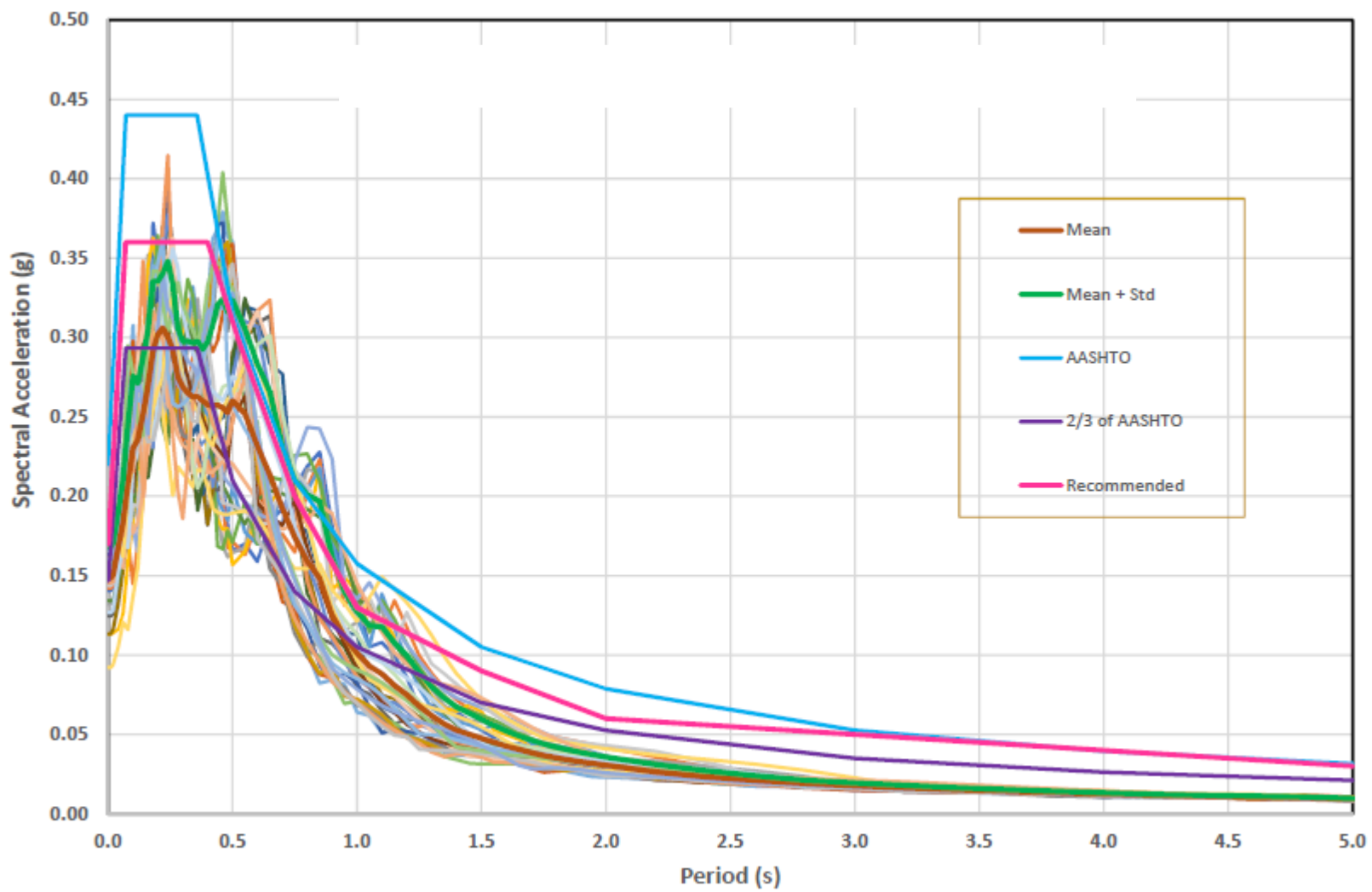
FIGURE 9

**Response Spectrum of Input Motions**

EXIT 45 INTERCHANGE  
RECONFIGURATION  
SOUTH PORTLAND, ME.



**FIGURE 10**  
**Shear Wave Velocity Profiles**  
 EXIT 45 INTERCHANGE  
 RECONFIGURATION  
 SOUTH PORTLAND, ME.



**FIGURE 11**  
**Site Specific Response Spectrum**  
EXIT 45 INTERCHANGE  
RECONFIGURATION  
SOUTH PORTLAND, ME.

**ATTACHMENT 1**  
**GEOTECHNICAL DATA REPORT (PRELIMINARY**  
**EXPLORATION)**



**FIELD AND LABORATORY DATA REPORT  
PRELIMINARY GEOTECHNICAL PROGRAM  
MAINE TURNPIKE EXIT 45 RECONFIGURATION  
SOUTH PORTLAND, MAINE**

**PREPARED FOR:**

HNTB Corporation  
Westbrook, Maine

**PREPARED BY:**

A handwritten signature in black ink, appearing to read "Isabel V. Schonewald".

Isabel V. (Be) Schonewald, P.E.  
Schonewald Engineering Associates, Inc. (SchonewaldEA)  
129 Middle Road  
Cumberland, Maine 04021  
Be@SchonewaldEngineering.com

**December 28, 2017**

SchonewaldEA Project No. 17-028

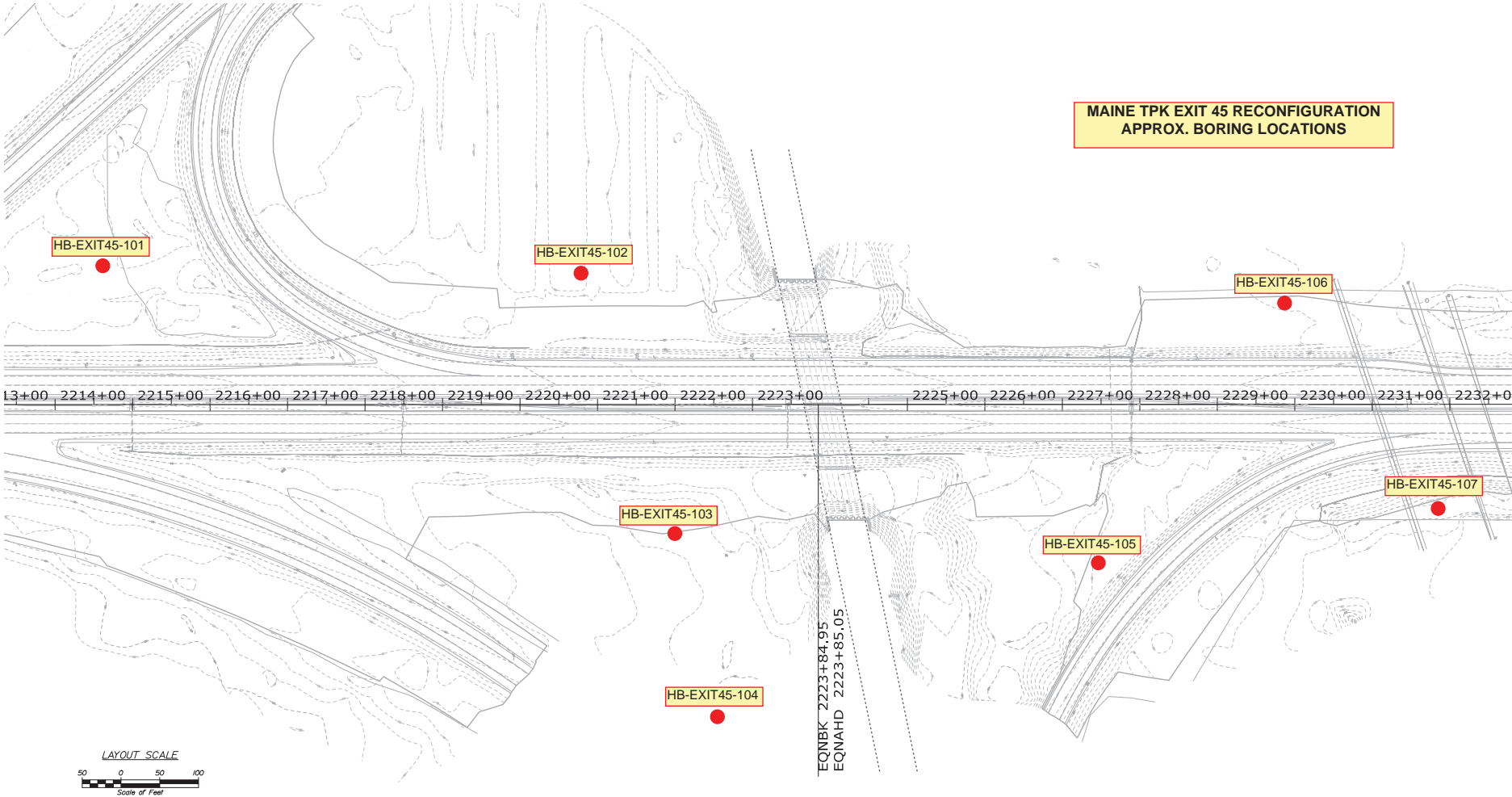
**FIELD AND LABORATORY DATA REPORT  
PRELIMINARY GEOTECHNICAL PROGRAM  
MAINE TURNPIKE EXIT 45 RECONFIGURATION  
SOUTH PORTLAND, MAINE**

**TABLE OF CONTENTS**

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LOGS OF PRELIMINARY SUBSURFACE EXPLORATIONS	<b>4-25</b>
PHOTOGRAPHS OF ROCK CORE OBTAINED IN PRELIMINARY SUBSURFACE EXPLORATIONS	<b>27-28</b>
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RWG&A: RESULTS OF CONSOLIDATION AND ATTERBERG LIMITS LABORATORY TESTS ON UNDISTURBED SOIL SAMPLES	<b>39-96</b>
GTX: RESULTS OF 2-POINT UNCONSOLIDATED UNDRAINED LABORATORY TESTS ON UNDISTURBED SOIL SAMPLES	<b>98-101</b>
THIELSCH: RESULTS OF UNCONFINED COMPRESSION LABORATORY TESTS ON ROCK CORE SPECIMENS	<b>103-111</b>

## SUBSURFACE EXPLORATION LOCATION SKETCH

**MAINE TPK EXIT 45 RECONFIGURATION  
APPROX. BORING LOCATIONS**





## LOGS OF PRELIMINARY SUBSURFACE EXPLORATIONS



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-101  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63.5 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/23/17; 1135-10/24/17; 1700	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB on ramp/ toll plaza)	<b>Casing ID/OD:</b> HW to 95 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.8 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0								SSA				
	1D	24/16	2.0 - 4.0	3-6-6-8	12	12					1D: Red brown, wet, m. dense, fine to medium SAND, trace coarse Sand, trace Silt. CLEAN SANDS	
5												
	2D	24/15	5.0 - 7.0	1-1-2-2	3	3	3				2D: Red brown grading to brown, wet, v. loose, fine to coarse SAND, trace Silt.	
							4					
							11					
							15		55.0	-----8.5		
							15					
10												
	3D	24/5	10.0 - 12.0	1-1-2-1	3	3	8				3D: Grey brown, v. loose, fine to medium SAND, trace Silt. GREY MARINE SAND	
							11					
							25					
							25		50.0	-----13.5		
							23					
15												
	4D	24/15	15.0 - 17.0	1-2/12*-2	2	2	PUSH				4D: Grey, v. loose, interbedded Silty fine SAND; fine to medium SAND, little Silt; and Silty CLAY, trace fine Sand. INTERBEDDED MARINE SILTS AND SANDS	
20												
	5D	24/7	20.0 - 22.0	2-1-1/12*	2	2	PUSH				5D: Grey, v. loose, interbedded Silty fine SAND and fine to medium SAND, little to some Silt.	
25							14					

**Remarks:**



SCHONEWALD  
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**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-101  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63.5 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/23/17; 1135-10/24/17; 1700	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB on ramp/ toll plaza)	<b>Casing ID/OD:</b> HW to 95 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.8 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
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 MD = Unsuccessful Split Spoon Sample attempt  
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Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
25	6D	24/7	25.0 - 27.0	2-1-3-2	4	4	PUSH			6D: Grey, v. loose, fine SAND, trace medium to coarse Sand, trace Silt.	
30	7D	24/0	30.0 - 32.0	WOH/18"-1	0	0	PUSH			7D: No recovery. Very fine SAND, some Silt in tip of spoon.	
35	8D	24/22	35.0 - 37.0	WOR/24"	0	0	PUSH			8D: Grey, v. soft, Silty CLAY, with one 4-inch layer and several seams of very fine Sandy SILT.	
40	9D	24/24	40.0 - 42.0	WOR/24"	0	0	PUSH			9D: Grey, v. soft, Silty CLAY, with one 5-inch layer and occasional seams of very fine Sandy SILT; changing at 41.7 ft to:	
45	10D V1	24/24	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 467 / 14 psf			PUSH			Dark grey with black streaks, Silty CLAY. ORGANIC MARINE SILT-CLAY	
	V2		46.6 - 47.0	Su= 426 / 0 psf					10D: Grey, Silty CLAY, trace fine Sand, with nodules throughout V1: Tu=17 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V2: Tu=15.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
50											

**Remarks:**



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**Boring No.:** HB-EXIT45-101  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63.5 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/23/17; 1135-10/24/17; 1700	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB on ramp/ toll plaza)	<b>Casing ID/OD:</b> HW to 95 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.8 ft (open)

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 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push UCT<sub>qp</sub> = peak compressive strength of rock

**LABORATORY TEST RESULTS:**  
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 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
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 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
50	11D V3	24/18	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 412 / 14 psf			PUSH		3.5	11D: Grey, Silty CLAY, with occasional nodules. V3: Tu=15 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V4: Tu=16 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
	V4		51.6 - 52.0	Su= 440 / 0 psf								
55	U1	24/23	55.0 - 57.0	HYD PUSH			PUSH			U1: Dark grey with black streaks, Silty CLAY.		
60	12D V5	24/22	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 549 / 14 psf			PUSH		3.5	12D: Black and dark grey, Silty CLAY, with shell fragments, one concretion, and nodules throughout. V5: Tu=20 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V6: Tu=22.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	WC=45.8% LL=45.9 PL=22.6 PI=23.3	
	V6		61.6 - 62.0	Su= 618 / 14 psf								
65	13D V7	24/24	65.0 - 67.0 65.6 - 66.0	VANE INTERVAL Su= 577 / 14 psf			PUSH		3.5	13D: Black and dark grey, Silty CLAY, with shell fragments and nodules throughout. V7: Tu=21 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V8: Tu=24.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	WC=50.6% LL=52.8 PL=23.9 PI=28.9	
	V8		66.6 - 67.0	Su= 673 / 14 psf								
70	U2	24/24	70.0 - 72.0	HYD PUSH			PUSH			U2: Grey and dark grey, Silty CLAY, with shell fragments.		
75												

**Remarks:**



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**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-101  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63.5 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/23/17; 1135-10/24/17; 1700	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB on ramp/ toll plaza)	<b>Casing ID/OD:</b> HW to 95 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.8 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
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 MD = Unsuccessful Split Spoon Sample attempt  
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 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
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 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push UCT<sub>qp</sub> = peak compressive strength of rock

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75	14D V9	24/22	75.0 - 77.0 75.6 - 76.0	VANE INTERVAL Su= 755 / 27 psf			PUSH			14D: Dark grey and grey, Silty CLAY, with shell fragments, nodules, and few concretions. V9: Tu=27.5 / Tr=1 ft-lbs (65 mm x 130 mm vane) V10: Tu=27 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
	V10		76.6 - 77.0	Su= 742 / 0 psf								
80							↓			MV: Unable to push vane at 80 ft.		
	15D	24/6	80.0 - 82.0	WOR/24*	0	0	PUSH			15D: Dark grey, v. soft, Silty CLAY, with large concretion at top of sample and black streaks and nodules throughout.		
85							↓					
	16D	24/19	85.0 - 87.0	WOR/24*	0	0	PUSH			16D: Dark grey, v. soft, Silty CLAY, with nodules throughout.		
90							↓					
	17D	24/13	90.0 - 92.0	WOR/24*	0	0	PUSH			17D: Dark grey, v. soft, Silty CLAY, with nodules throughout and one large concretion.		
95							↓					
	18D	24/24	95.0 - 97.0	WOR/12*-27-39	27	27				Dark grey, Silty CLAY, with nodules throughout; changing at 96.5 to: 18D: Dark grey, Silty fine to medium SAND, some Gravel, trace coarse Sand. TILL		
								-33.0 -33.5		<b>Bottom of Exploration at 97.0 feet below ground surface.</b> No refusal.		

**Remarks:**



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**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-102  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/18/17; 1340-10/20/17; 1400	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed west abutment)	<b>Casing ID/OD:</b> HW to 78 ft; NW to 79 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.5 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
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**ADDITIONAL DEFINITIONS:**  
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**ADDITIONAL DEFINITIONS:**  
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**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
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**LABORATORY TEST RESULTS:**  
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 #200 = percent fines WC = water content (%)  
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0												
	1D	24/17	2.0 - 4.0	5-6-5-7	11	11					Grey tan, damp, fine SAND, some Silt; changing at 3.1 ft to 1D: Brown, moist, fine to coarse SAND, trace fine Gravel, trace Silt. FILL	
5									57.5			
	2D	24/18	5.0 - 7.0	5-3-2-4	5	5	PUSH				2D: Grey, wet, loose, interbedded Silty fine SAND; fine SAND, little to some Silt; and SILT, little to some very fine Sand. INTERBEDDED MARINE SILTS AND SANDS	
10												
	3D	24/19	10.0 - 12.0	1/12"-1/12"	1	1	PUSH				3D: Grey, v. soft, interbedded Silty CLAY; fine to medium SAND, trace to little Silt; and Silty fine SAND.	
15												
	4D	24/22	15.0 - 17.0	WOR-1/18"	1	1	PUSH				4D: Grey, v. soft, interbedded Silty CLAY and fine Sandy SILT.	
20												
	5D	24/16	20.0 - 22.0	WOR/24"	0	0	PUSH				5D: Grey, v. soft, interbedded Silty CLAY and fine Sandy SILT.	
25									38.5			
											ORGANIC MARINE SILT-CLAY	

**Remarks:**



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**Boring No.:** HB-EXIT45-102  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/18/17; 1340-10/20/17; 1400	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed west abutment)	<b>Casing ID/OD:</b> HW to 78 ft; NW to 79 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.5 ft (open)

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Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)				
25	6D V1	24/16	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 357 / 14 psf			PUSH		[Hatched Pattern]	6D: Dark grey, Silty CLAY, trace very fine Sand. ORGANIC MARINE SILT-CLAY V1: Tu=13 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V2: Tu=11 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	CONSOL WC=41.0% LL=27.5 PL=18.2 PI=9.3	
	V2		26.6 - 27.0	Su= 302 / 14 psf								
30	7D V3	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 371 / 14 psf			PUSH		[Hatched Pattern]	7D: Dark grey, Silty CLAY, with few nodules. V3: Tu=13.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V4: Tu=10 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)		
	V4		31.6 - 32.0	Su= 275 / 14 psf								
35	U1	24/24	35.0 - 37.0	HYD PUSH			PUSH		[Hatched Pattern]	U1: Dark grey, Silty CLAY.		
40	8D V5	24/16	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 385 / 14 psf			PUSH		[Hatched Pattern]	8D: Dark grey, Silty CLAY. V5: Tu=14.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V6: Tu=12.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)		
	V6		41.6 - 42.0	Su= 343 / 14 psf								
45	U2	24/24	45.0 - 47.0	HYD PUSH			PUSH		[Hatched Pattern]	U2: Dark grey with black partings, Silty CLAY, trace fine Sand (shell fragments).		CONSOL WC=41.1% LL=37.8 PL=20.0 PI=17.8
50												

**Remarks:**



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MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-102  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/18/17; 1340-10/20/17; 1400	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed west abutment)	<b>Casing ID/OD:</b> HW to 78 ft; NW to 79 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.5 ft (open)

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 MD = Unsuccessful Split Spoon Sample attempt  
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 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)			
50	9D V7	24/16	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 494 / 14 psf			PUSH		[Hatched pattern]	9D: Black grey, Silty CLAY, trace to little fine to medium Sand (shell fragments); nodules throughout. V7: Tu=18 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V8: Tu=20 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
		V8		51.6 - 52.0	Su= 549 / 0 psf						
55							↓		[Hatched pattern]	U3: Dark grey with black streaks, Silty CLAY, trace fine Sand (shell fragments).	CONSOL WC=43.8% LL=41.6 PL=20.4 PI=21.2
		U3	24/24	55.0 - 57.0	HYD PUSH			PUSH			
60							↓		[Hatched pattern]	10D: Grey black, Silty CLAY, trace fine Sand (shell fragments); nodules throughout. V9: Tu=20.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V10: Tu=19 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
		10D V9	24/19	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 563 / 14 psf			PUSH			
65							↓		[Hatched pattern]	U4: Dark grey with black streaks, Silty CLAY.	CONSOL WC=40.9% LL=42.0 PL=20.7 PI=21.3
		U4	24/23	65.0 - 67.0	HYD PUSH			PUSH			
70							↓		[Hatched pattern]	11D: Dark grey, Silty CLAY with one large concretion at 70.9 ft; no black (organic) staining observed. V11: Tu=26.5 / Tr=3.5 ft-lbs (65 mm x 130 mm vane) MV: Unable to push vane past 70.9 ft.	
		11D V11 MV	24/20	70.0 - 72.0 70.5 - 70.9	VANE/12"-WOR/12" Su= 728 / 96 psf	--		PUSH			
75							↓		[Hatched pattern]		

**Remarks:**





SCHONEWALD  
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**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-102  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/18/17; 1340-10/20/17; 1400	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed west abutment)	<b>Casing ID/OD:</b> HW to 78 ft; NW to 79 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 2.5 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT qp = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75	U5	24/23	75.0 - 77.0	HYD PUSH			PUSH				U5: Dark grey, Silty CLAY. NORMALLY CONSOLIDATED MARINE SILT-CLAY	CONSOL WC=40.6% LL=38.6 PL=20.6 PI=18.0
							bounc	-16.0				
80	R1	60/57	79.0 - 84.0	RQD: 42%=70%							R1: Hard, typically fresh, aphanitic to fine grained, light and medium grey PHYLLITE, with typically high-angle relic bedding and calcsilicate veining. Typically moderately spaced, moderately dipping breaks; undulating, rough, fresh and open. Core times: 1:40/ 1:35/ 1:30/ 1:35/ 1:35 min:sec/ft FAIR TO GOOD ROCK QUALITY	UCT qp= 2.75 ksi
				test: 80.7-81.3								
85	R2	60/58	84.0 - 89.0	RQD: 54%=90%							R2: Same as R1, but with only one break. Core times: 2:10/ 1:50/ 1:40/ 1:50/ 1:45 min:sec/ft GOOD TO EXCELLENT ROCK QUALITY	
								-27.0				
90											Bottom of Exploration at 89.0 feet below ground surface.	
95												
100												

**Remarks:**



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**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-103 (OW)

**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60.5 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/4/17; 10/25-10/6/17; 13/40	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed east abutment)	<b>Casing ID/OD:</b> HW to 80.7 ft; NW to 88.5 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 3.3 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
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 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0												
	1D	24/17	1.0 - 3.0	4-4-3-5	7	7			57.5		1D: Tan, moist, fine to medium SAND, trace Silt, trace fine Gravel, trace coarse Sand; changing at 2.3 ft to dark brown, fine Sandy ORGANIC SILT (likely former topsoil). FILL Grey, fine Sandy SILT in tip of spoon.	
5												
	2D	24/16	5.0 - 7.0	2-5-8-3	13	13	PUSH				2D: Grey, wet, m. dense, interbedded very fine Sandy SILT and Clayey SILT, trace very fine Sand. INTERBEDDED MARINE SANDS AND SILTS	
10												
	3D	24/20	10.0 - 12.0	WOH-1-1/12"	2	2	PUSH				3D: Grey, v. soft, interbedded Silty CLAY; very fine Sandy SILT; and fine SAND, little Silt.	
15												
	4D	24/24	15.0 - 17.0	WOR/18"-1	0	0	PUSH				4D: Grey, v. loose, interbedded, Silty fine SAND; very fine Sandy SILT; and Silty CLAY, trace to little very fine Sand.	
18.5									42.0		18.5 ft: Shell fragments in wash water; occasional grinding when roller-coning.	
20												
	5D	24/24	20.0 - 22.0	WOR/24"	0	0	PUSH				5D: Grey, v. soft, Silty CLAY, with one 1-1/2-inch seam and occasional partings very fine Sandy SILT. ORGANIC MARINE SILT-CLAY	
25												

**Remarks:**

1. Groundwater level observation well installed in adjacent borehole upon completion of test boring. HB-EXIT45-103 (OW): 3-inch diameter casing to 12.5 ft BGS finished as follows:  
 filter sand 12.5 to 6.0 ft; 1-inch diameter Sch 40 slotted well screen 12.0 to 7.0 ft; bentonite chip plug 6.0 to 3.0 ft; locking protective casing.



**SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.**

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-103 (OW)  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60.5 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/4/17; 10/25-10/6/17; 13/40	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed east abutment)	<b>Casing ID/OD:</b> HW to 80.7 ft; NW to 88.5 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 3.3 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
N<sub>60</sub> = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

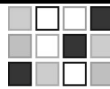
**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
25	6D V1	24/20	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 233 / 14 psf				OPEN		6D: Grey, Silty CLAY, trace very fine Sand. V1: Tu=8.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V2: Tu=9.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
		V2		Su= 261 / 0 psf								
30	7D V3	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 165 / 0 psf						7D: Grey, Silty CLAY, with small nodules. V3: Tu=6 / Tr=0 ft-lbs (65 mm x 130 mm vane) V4: Tu=6 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	WC=43.4% LL=32.6 PL=22.4 PI=10.2	
		V4		Su= 165 / 14 psf								
35	U1	24/24	35.0 - 37.0	HYD PUSH						U1: Dark grey with black streaks, Silty CLAY.	2-PT UU TEST	
40	8D V5	24/24	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 96 / 14 psf						8D: Dark grey with black streaks, Silty CLAY with small nodules throughout. V5: Tu=3.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V6: Tu=5 / Tr=2 ft-lbs (65 mm x 130 mm vane) Resistance to push; possible shell fragments.	WC=46.6% LL=44.4 PL=22.8 PI=21.6	
		V6		Su= 137 / 55 psf								
45	U2	24/24	45.0 - 47.0	HYD PUSH						U2: Dark grey with black streaks, Silty CLAY with shell fragments.	2-PT UU TEST	
50												

**Remarks:**

1. Groundwater level observation well installed in adjacent borehole upon completion of test boring. HB-EXIT45-103 (OW): 3-inch diameter casing to 12.5 ft BGS finished as follows:  
filter sand 12.5 to 6.0 ft; 1-inch diameter Sch 40 slotted well screen 12.0 to 7.0 ft; bentonite chip plug 6.0 to 3.0 ft; locking protective casing.



SCHONEWALD  
ENGINEERING  
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**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-103 (OW)  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60.5 (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/4/17; 10/25-10/6/17; 13/40	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed east abutment)	<b>Casing ID/OD:</b> HW to 80.7 ft; NW to 88.5 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> 3.3 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt


**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	9D V7	24/6	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 467 / 14 psf							9D: Dark grey, Silty CLAY with nodules; liquid. V7: Tu=17 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	CONSOL WC=42.1% LL=37.9 PL=20.3 PI=17.6
	V8		51.6 - 52.0	Su= 481 / 0 psf							V8: Tu=17.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
55	10D V9	24/15	55.0 - 57.0 55.6 - 56.0	VANE INTERVAL Su= 604 / 0 psf							10D: Dark grey with black streaks, Silty CLAY with nodules throughout. V9: Tu=22 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
	V10		56.6 - 57.0	Su= 453 / 0 psf							V10: Tu=16.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
60	U3	24/24	60.0 - 62.0	HYD PUSH							U3: Dark grey with black streaks, Silty CLAY.	
65	11D V11	24/18	65.0 - 67.0 65.6 - 66.0	VANE INTERVAL Su= 577 / 0 psf							11D: Dark grey, Silty CLAY, with one 1- inch seam of Silty fine SAND. V11: Tu=21 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
	V12		66.6 - 67.0	Su= 604 / 14 psf							V12: Tu=22 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
70	12D	24/10	70.0 - 72.0	15-16-9-11	25	25	25				12D: Grey, m. dense, Silty fine to medium SAND, little to some rounded Gravel, trace coarse Sand. TILL	
							28					
								35				
								41				
								57				
75												

**Remarks:**  
 1. Groundwater level observation well installed in adjacent borehole upon completion of test boring. HB-EXIT45-103 (OW): 3-inch diameter casing to 12.5 ft BGS finished as follows:  
 filter sand 12.5 to 6.0 ft; 1-inch diameter Sch 40 slotted well screen 12.0 to 7.0 ft; bentonite chip plug 6.0 to 3.0 ft; locking protective casing.

 <b>SCHONEWALD ENGINEERING ASSOCIATES, INC.</b>		<b>PROJECT:</b> Preliminary Test Borings MeTPK Exit 45 Reconfiguration <b>LOCATION:</b> South Portland, Maine		<b>Boring No.:</b> HB-EXIT45-103 (OW) <b>Proj. No.:</b> 17-028	
<b>Driller:</b> New England Boring Contractors		<b>Elevation (ft.):</b> 60.5 (est'd)		<b>Core Barrel:</b> NQ2	
<b>Operator:</b> Schaefer / Titus		<b>Datum:</b>		<b>Sampler:</b> std split-spoon	
<b>Logged By:</b> Schonewald		<b>Rig Type:</b> Mobile Drill B-51 (track mounted)		<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches	
<b>Date Start/Finish:</b> 10/4/17; 10/25-10/6/17; 13/40		<b>Drilling Method:</b> cased wash boring		<b>Hammer Type:</b> rope and cathead	
<b>Boring Location:</b> see plot (proposed east abutment)		<b>Casing ID/OD:</b> HW to 80.7 ft; NW to 88.5 ft		<b>Hammer Efficiency:</b> 0.60	
		<b>Auger ID/OD:</b> SSA to 5 ft		<b>Water Level*:</b> 3.3 ft (open)	

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
75	13D	24/14	75.0 - 77.0	32-21-23-32	44	44	52			13D: Dark grey, dense, fine to medium SAND, some Silt, some Gravel, trace coarse Sand.		
							59					
							128					
							RC			78 ft: Nested cobbles based on drilling behavior.		
80	14D	24/14	80.0 - 82.0	48-46-41-34	87	87	RC			14D: Grey, v. dense, fine to coarse Sandy GRAVEL, little to some Silt.		
										84.3 ft: Boulder; 0.7 ft thick		
85							RC			85 ft: Blowing sands; did not attempt sample.		
	R1	54/52	88.5 - 93.0	RQD: 36* = 67%					-28.0	88.5 ft: Practicable roller cone refusal.		
90				test: 89.7-90.3						R1: Hard, slightly weathered to fresh, aphanitic to fine grained, medium grey PHYLLITE, with thinly-laminated, typically high-angle relic bedding and carbonate-rich pockets. Moderately spaced, moderately dipping breaks; undulating, rough, shiny, typically fresh, partially open to open, with occasional mud infilling. Moderately weathered and broken from 88.5 to 89.7 feet. Core times: 2:05/ 1:40/ 1:35/ 1:30/ -- min:sec/ft FAIR ROCK QUALITY	UCT qp= 0.89 ksi	
	R2	60/58	93.0 - 98.0	RQD: 31* = 52%						R2: Same as R1. Moderately weathered and broken from 93.1 to 94.0 feet. Core times: 1:50/ 1:35/ 1:30/ 1:45/ 1:45 min:sec/ft POOR TO FAIR ROCK QUALITY		
95												
									-37.5	Bottom of Exploration at 98.0 feet below ground surface.		
100												

**Remarks:**

1. Groundwater level observation well installed in adjacent borehole upon completion of test boring. HB-EXIT45-103 (OW): 3-inch diameter casing to 12.5 ft BGS finished as follows:  
 filter sand 12.5 to 6.0 ft; 1-inch diameter Sch 40 slotted well screen 12.0 to 7.0 ft; bentonite chip plug 6.0 to 3.0 ft; locking protective casing.



**SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.**

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-104  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/11/17; 0700-1630	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB off ramp)	<b>Casing ID/OD:</b> HW to 60 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0							SSA					
	1D	24/15	2.0 - 4.0	3-5-9-13	14	14				1D: Brown tan, damp to moist, m. dense, fine to medium SAND, trace to little Silt, trace coarse Sand. GRANULAR FILL		
5							↓	56.5		4.5		
	2D	24/13	5.0 - 7.0	2-3-7-8	10	10	PUSH				2D: Olive brown grey, mottled, moist (tight), stiff, SILT & CLAY, little fine Sand; appears disturbed. MISCELLANEOUS FILL Changing at 6.8 ft to:	
										54.2	6.8	
											6.8 ft: Grey, fine SAND, some Silt; appears undisturbed. INTERBEDDED MARINE SANDS AND SILTS	
											52.5	8.5
10												
	3D	24/24	10.0 - 12.0	5-3-3-3	6	6					3D: Olive brown, mottled, moist (tight), m. stiff, SILT & CLAY, trace fine Sand, with pockets and partings fine Sandy SILT. MARINE SILT-CLAY CRUST	
15												
	4D	24/21	15.0 - 17.0	WOH/24*	0	0					4D: Grey, v. soft, CLAY & SILT, trace very fine Sand.	
20												
	5D	24/24	20.0 - 22.0	WOR/24*	0	0	PUSH				5D: Grey with darker grey streaks, Silty CLAY, trace fine Sand and nodules throughout. ORGANIC MARINE SILT-CLAY	
25							↓					

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-104  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/11/17; 0700-1630	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB off ramp)	<b>Casing ID/OD:</b> HW to 60 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
25	6D V1	24/24	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 330 / 14 psf			PUSH		[Hatched Pattern]	6D: Dark grey with black streaks, Silty CLAY with nodules and shell fragments throughout. V1: Tu=12 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V2: Tu=13 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	WC=51.2% LL=49.1 PL=25.3 PI=23.8
		V2		Su= 357 / 14 psf							
30	7D V3	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 398 / 14 psf			PUSH		[Hatched Pattern]	7D: Dark grey with black streaks, Silty CLAY with nodules throughout. V3: Tu=14.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V4: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
		V4		Su= 385 / 0 psf							
35	8D V5	24/24	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 440 / 14 psf			PUSH		[Hatched Pattern]	8D: Dark grey with black streaks, Silty CLAY with nodules throughout. V5: Tu=16 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V6: Tu=17 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
		V6		Su= 467 / 0 psf							
40	U1	24/23	40.0 - 42.0	HYD PUSH			PUSH		[Hatched Pattern]	U1: Dark grey with black, Silty CLAY.	
45							PUSH		[Hatched Pattern]	45.0 ft: Skip vane test this depth. Piston sampler slipped and disturbed vane shear test depth.	
50									[Hatched Pattern]		

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-104  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/11/17; 0700-1630	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB off ramp)	<b>Casing ID/OD:</b> HW to 60 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	V7		50.6 - 51.0	Su= 549 / 27 psf			PUSH			V7: Tu=20 / Tr=1 ft-lbs (65 mm x 130 mm vane) V8: Tu=18 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)		
	V8		51.6 - 52.0	Su= 494 / 14 psf								
55							40			U2: (Tube not extend fully. Large piece rounded Gravel in bottom of tube. Material in bottom of tube: Grey, Silty fine to medium SAND.)		
	U2	16/16	55.0 - 56.3	HYD PUSH								
	9D	24/16	56.0 - 58.0	9-9-10-11	a		35				9D: Grey, Silty fine to medium SAND, some Gravel, trace coarse Sand; one piece coarse gravel. TILL (a = 3-inch dia. spoon)	
60							70			<b>Bottom of Exploration at 60.0 feet below ground surface.</b> No refusal.		
							90					
75												

**Remarks:**





**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-105  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 58 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/12/17; 0800-1410	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB on ramp / toll plaza)	<b>Casing ID/OD:</b> HW to 42 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
N<sub>60</sub> = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0								SSA				
	1D	24/8	1.0 - 3.0	4-3-1-1	4	4					1D: Brown, moist, v. loose, fine to coarse SAND, some Gravel, some Silt. FILL	
									54.0			
5												
	2D	24/22	5.0 - 7.0	2-3-4-5	7	7	24				2D: Olive brown, mottled and desiccated, damp (tight), m. stiff, Clayey SILT, little very fine Sand as numerous partings and seams. MARINE SILT-CLAY CRUST	
							30					
							37					
							46					
							52					
10												
	3D	24/20	10.0 - 12.0	2-3-2-3	5	5	42				3D: Olive brown grey, moist (tight), m. stiff CLAY & SILT, trace very fine Sand as few partings.	
							38		47.0			
							38					
							36					
							36					
15												
	4D	24/21	15.0 - 17.0	WOR/12"-WOH/12"	0	0	PUSH				4D: Dark grey with black pockets, v. soft, Silty CLAY with two partings very fine Sandy SILT. ORGANIC MARINE SILT-CLAY	
20												
	5D	24/24	20.0 - 22.0	VANE INTERVAL								
	V1		20.6 - 21.0	Su= 330 / 14 psf			PUSH				5D: Dark grey, Silty CLAY with nodules throughout. V1: Tu=12 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
	V2		21.6 - 22.0	Su= 412 / 0 psf							V2: Tu=15 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
25												

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-105  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 58 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/12/17; 0800-1410	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB on ramp / toll plaza)	<b>Casing ID/OD:</b> HW to 42 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push UCT<sub>qp</sub> = peak compressive strength of rock

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 RC=roller cone/OPEN/PUSH=hydraulic push UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	6D V3	24/16	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 371 / 14 psf			PUSH		17.2	6D: Dark grey, Silty CLAY with nodules throughout. V3: Tu=13.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)		
	V4		26.6 - 27.0	Su= 385 / 0 psf								V4: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane)
30	U1	24/23	30.0 - 32.0	HYD PUSH			PUSH		15.0	U1: Dark grey with black laminations, Silty CLAY.	2-PT UU TEST	
35	7D V5	24/18	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 412 / 27 psf			PUSH		15.0	7D: Dark grey with black streaks, Silty CLAY with numerous nodules. V5: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane)	WC=41.8% LL=40.0 PL=20.5 PI=19.5	
	V6		36.6 - 37.0	Su= 426 / 14 psf								V6: Tu=15.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)
40	8D V7	24/24	40.0 - 42.0 40.4 - 40.8	VANE-2-6-1 Su= 440 / 0 psf	a		30		15.0	V7: Tu=16 / Tr=0 ft-lbs (65 mm x 130 mm vane) Unable to push past 40.8 ft. Dark grey, Silty CLAY with numerous nodules and few concretions; changing at 40.8 ft to:		
							32					40.8 ft: Dark grey, medium to coarse SAND, little to some fine Gravel, trace to little Silt, trace fine Sand; changing at 41.0 ft to: 41.0 ft: 8D: Grey, Silty fine to medium SAND, little to some fine Gravel. TILL (a = 3-inch dia. spoon) 42.0 ft: Abrupt split spoon and casing refusal; drilling behavior suggest possible weathered rock.
45									15.0	<b>Bottom of Exploration at 43.0 feet below ground surface.</b> Practicable refusal of roller cone.		
50												

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-106  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 57 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/17/17; 0845-1615	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB off ramp)	<b>Casing ID/OD:</b> HW to 45 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0								SSA		Low wet area; thick topsoil/root mat		
	1D	24/19	2.0 - 4.0	4-5-6-8	11	11				1D: Olive brown, slightly mottled with desiccated pockets, stiff, SILT & CLAY, trace to little fine Sand as pockets and partings. MARINE SILT-CLAY CRUST		
5										2D: Olive brown, slightly mottled, m. stiff, CLAY & SILT, trace fine Sand as partings.		
	2D	24/20	5.0 - 7.0	2-4-4-5	8	8		22				
								38				
								40				
								40				
								40				
10								37				
	3D	24/24	10.0 - 12.0	WOH/24*	0	0		22		3D: Olive grey grading to dark grey with black streaks, v. soft, CLAY & SILT grading to Silty CLAY with one parting Silty fine SAND. Transition to: ORGANIC MARINE SILT-CLAY		
								20				
								20				
								21				
								20				
15												
	4D	24/9	15.0 - 17.0	VANE INTERVAL						4D: Dark grey, Silty CLAY.		
	V1		15.6 - 16.0	Su= 522 / 27 psf						V1: Tu=19 / Tr=1 ft-lbs (65 mm x 130 mm vane)		
	V2		16.6 - 17.0	Su= 549 / 0 psf						V2: Tu=20 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
20												
	5D	24/20	20.0 - 22.0	VANE INTERVAL						5D: Dark grey with black, Silty CLAY with nodules throughout.		
	V3		20.6 - 21.0	Su= 357 / 0 psf						V3: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
	V4		21.6 - 22.0	Su= 343 / 0 psf						V4: Tu=12.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
25												

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-106  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 57 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/17/17; 0845-1615	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB off ramp)	<b>Casing ID/OD:</b> HW to 45 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
25	U1	24/23	25.0 - 27.0	HYD PUSH			PUSH			U1: Dark grey with black, Silty CLAY with shell fragments.	CONSOL WC=48.4% LL=46.4 PL=22.2 PI=24.2	
30	6D V5	24/6	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 385 / 0 psf			PUSH			6D: Dark grey, Silty CLAY with nodules throughout. V5: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
	V6		31.6 - 32.0	Su= 343 / 0 psf						V6: Tu=12.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
35	7D V7	24/18	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 412 / 0 psf			PUSH			7D: Dark grey, Silty CLAY with nodules throughout. V7: Tu=15 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
	V8		36.6 - 37.0	Su= 357 / 0 psf						V8: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
40	U2	24/24	40.0 - 42.0	HYD PUSH			PUSH			U2: Dark grey, Silty CLAY, trace fine Sand.	CONSOL WC=36.8% LL=36.2 PL=19.2 PI=17.0	
45	8D	24/7	45.0 - 47.0	13-6-3-3	9	9	RC	12.2		8D: Dark grey, fine to medium Sandy SILT, little to some Gravel, trace coarse Sand. TILL (Behavior during SPT suggests seams of soft silt-clay present.)		
50												

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-106  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 57 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/17/17; 0845-1615	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed SB off ramp)	<b>Casing ID/OD:</b> HW to 45 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	9D	24/7	50.0 - 52.0	15-11-14-9	25	25			5.0	9D: Dark grey, m. dense, GRAVEL, some fine to coarse Sand, trace to little Silt.		
										Bottom of Exploration at 52.0 feet below ground surface. No refusal.		
55												
60												
65												
70												
75												

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-107  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/13/17; 0940-10/16/17; 1800	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB on ramp)	<b>Casing ID/OD:</b> HW to 45 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0								SSA				
	1D	24/16	1.0 - 3.0	4-4-4-5	8	8				1D: Olive tan, mottled and desiccated, dry, m. stiff, SILT & CLAY, little to some fine Sand, with roots.		
5												
	2D	24/16	5.0 - 7.0	6-10-12-15	22	22		52		2D: Olive brown, mottled, damp, v. stiff, SILT & CLAY, trace to little fine Sand.		
								80				
								85				
								85				
10								84				
	3D	24/18	10.0 - 12.0	3-4-5-4	9	9		52		3D: Olive brown, mottled, damp, stiff, Clayey SILT, trace fine Sand as numerous partings.		
								58				
								65				
								70				
								85				
15									45.0			
	4D	24/24	15.0 - 17.0	WOR/24*	0	0		PUSH		14.9 ft: Olive-brown, silt-clay on roller cone. 4D: Dark grey with black pockets, Silty CLAY, trace fine Sand. (Olive brown, silt-clay at top of sample.)		
20												
	5D	24/19	20.0 - 22.0	VANE INTERVAL				PUSH		5D: Dark grey with black streaks, Silty CLAY, trace fine Sand.		
	V1		20.6 - 21.0	Su= 453 / 27 psf						V1: Tu=16.5 / Tr=1 ft-lbs (65 mm x 130 mm vane)		
	V2		21.6 - 22.0	Su= 440 / 27 psf						V2: Tu=16 / Tr=1 ft-lbs (65 mm x 130 mm vane)		
25												

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Preliminary Test Borings  
MeTPK Exit 45 Reconfiguration  
**LOCATION:** South Portland, Maine

**Boring No.:** HB-EXIT45-107  
**Proj. No.:** 17-028

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60 (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer / Titus	<b>Datum:</b>	<b>Sampler:</b> std split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-51 (track mounted)	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 10/13/17; 0940-10/16/17; 1800	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> see plot (proposed NB on ramp)	<b>Casing ID/OD:</b> HW to 45 ft	<b>Hammer Efficiency:</b> 0.60
	<b>Auger ID/OD:</b> SSA to 5 ft	<b>Water Level*:</b> --

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
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 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	6D V3	24/22	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 508 / 27 psf							6D: Dark grey with black streaks, Silty CLAY. V3: Tu=18.5 / Tr=1 ft-lbs (65 mm x 130 mm vane)	
	V4		26.6 - 27.0	Su= 385 / 27 psf								
30	U1	24/24	30.0 - 32.0	HYD PUSH							U1: Dark grey, Silty CLAY.	2-PT UU TEST
35	7D V5	24/24	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 440 / 55 psf							7D: Dark grey, Silty CLAY, trace very fine Sand. V5: Tu=16 / Tr=2 ft-lbs (65 mm x 130 mm vane)	WC=43.7% LL=37.8 PL=20.6 PI=17.2
	V6		36.6 - 37.0	Su= 440 / 27 psf							V6: Tu=16 / Tr=1 ft-lbs (65 mm x 130 mm vane)	
40	8D V7	24/24	40.0 - 42.0 40.6 - 41.0	VANE-WOR-8 Su= 522 / 55 psf	a		72				V7: Tu=19 / Tr=2 ft-lbs (65 mm x 130 mm vane) MV: Unable to push vane past 41.4 ft. Dark grey, Silty CLAY, trace fine Sand; grading at 41.6 ft.	
							52				18.4	8D: Grey, SILT, some fine to medium Sand, some Gravel, interbedded with layers of Silty CLAY. Possible transition to TILL (a = VANE INTERVAL 40 to 41.1 ft)
45	9D	24/12	45.0 - 47.0	10-6-8-13		14	14				9D: Grey, m. dense, fine to medium SAND, little to some Silt, trace to little Gravel, trace coarse Sand. TILL	
											13.0	<b>Bottom of Exploration at 47.0 feet below ground surface.</b> No refusal.
50												

**Remarks:**

**PHOTOGRAPHS OF ROCK CORE OBTAINED IN PRELIMINARY SUBSURFACE EXPLORATIONS**



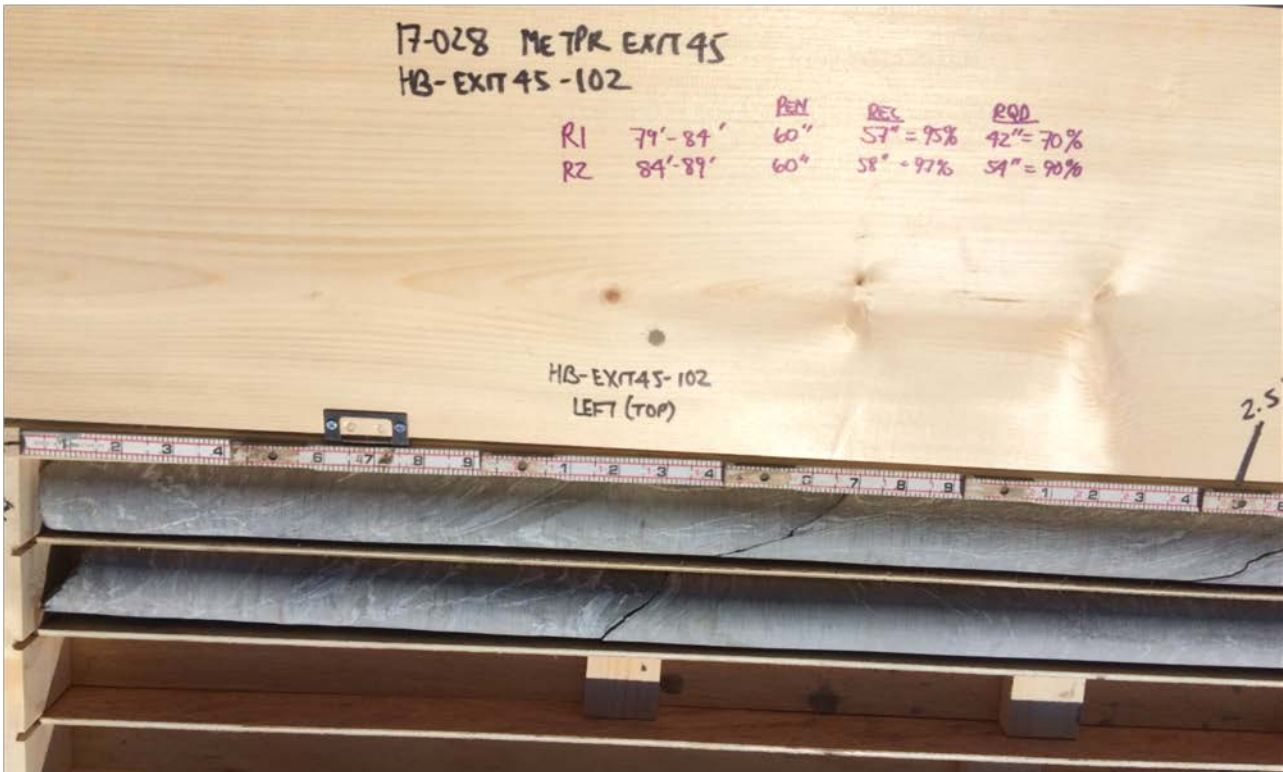


Photo 1: Core box containing dried rock core from test boring HB-EXIT45-102 left side of core box (top portion of cores).

- Slots from top to bottom:
- 1) HB-EXIT45-102, R1
  - 2) HB-EXIT45-102, R2.



Photo 2: Core box containing dried rock core from test boring HB-EXIT45-102 – right side of core box (bottom portion of cores).

- Slots from top to bottom
- 1) HB-EXIT45-102, R1
  - 2) HB-EXIT45-102, R2.



Photo 1: Core box containing dried rock core from test boring HB-EXIT45-103 left side of core box (top portion of cores).

- Slots from top to bottom:
- 1) HB-EXIT45-103, R1
  - 2) HB-EXIT45-103, R2.

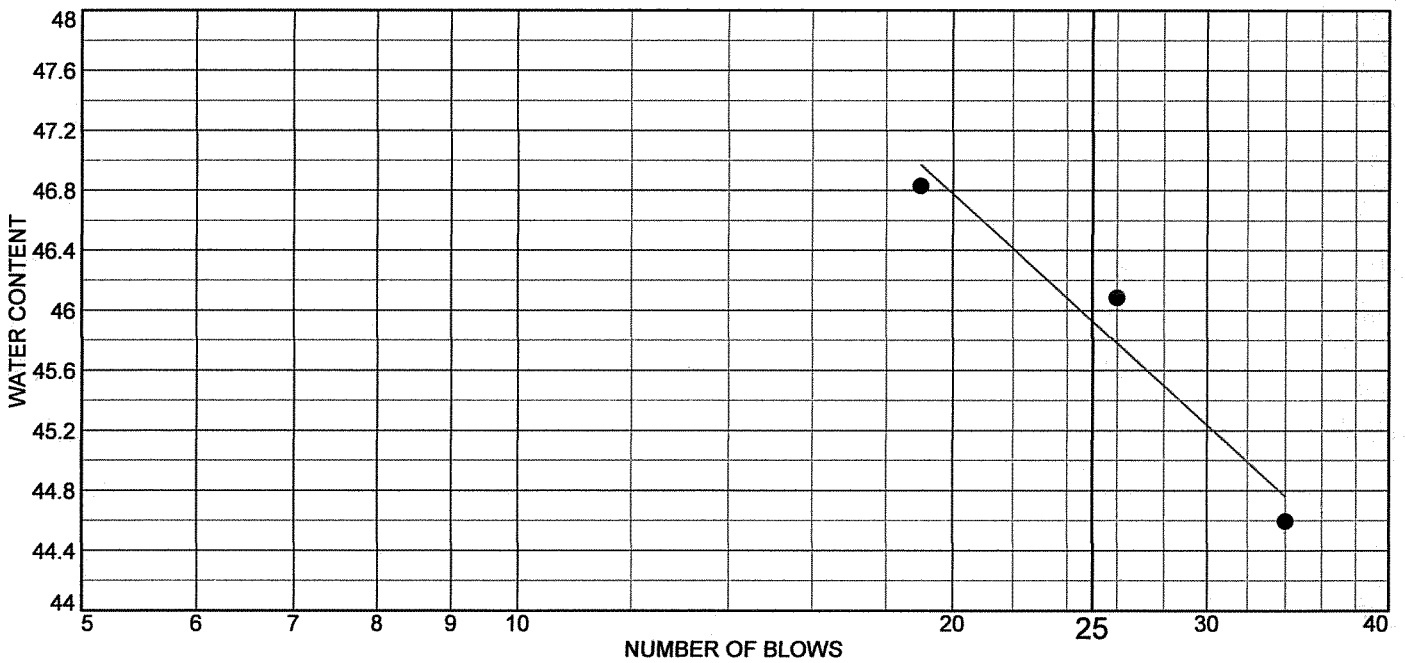
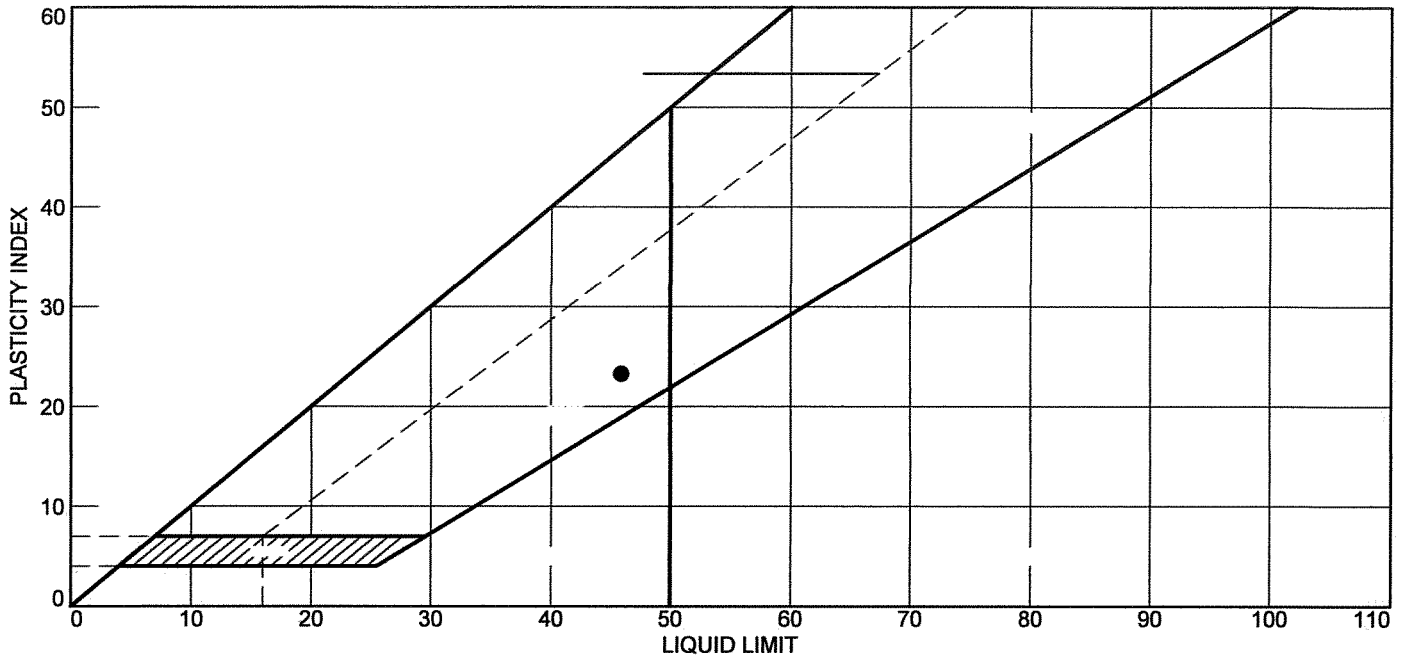


Photo 2: Core box containing dried rock core from test boring HB-EXIT45-103 – right side of core box (bottom portion of cores).

- Slots from top to bottom
- 1) HB-EXIT45-103, R1
  - 2) HB-EXIT45-103, R2.

**RWG&A: RESULTS OF ATTERBERG LIMITS LABORATORY INDEX TESTS ON SOIL SAMPLES**

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Lean Clay	45.9	22.6	23.3			

**Project No.** 1368-009     **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-101  
**Sample Number:** 12D     **Depth:** 60'-62'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

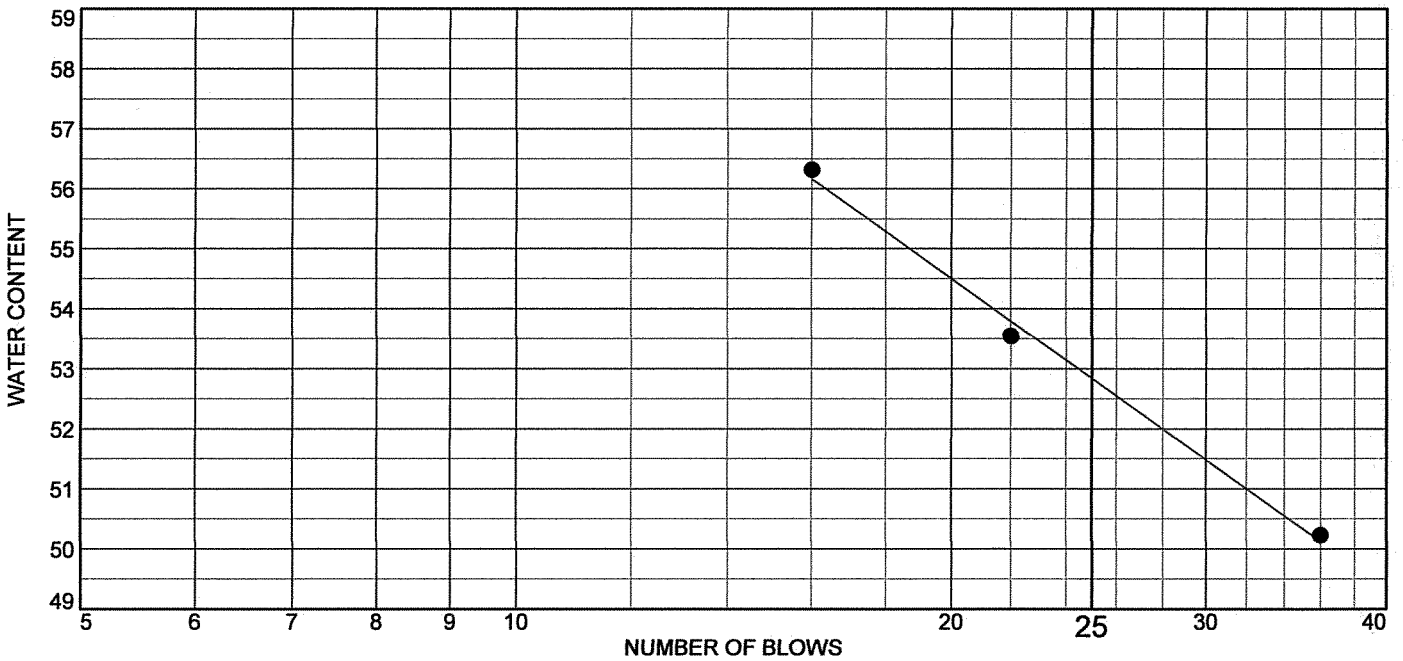
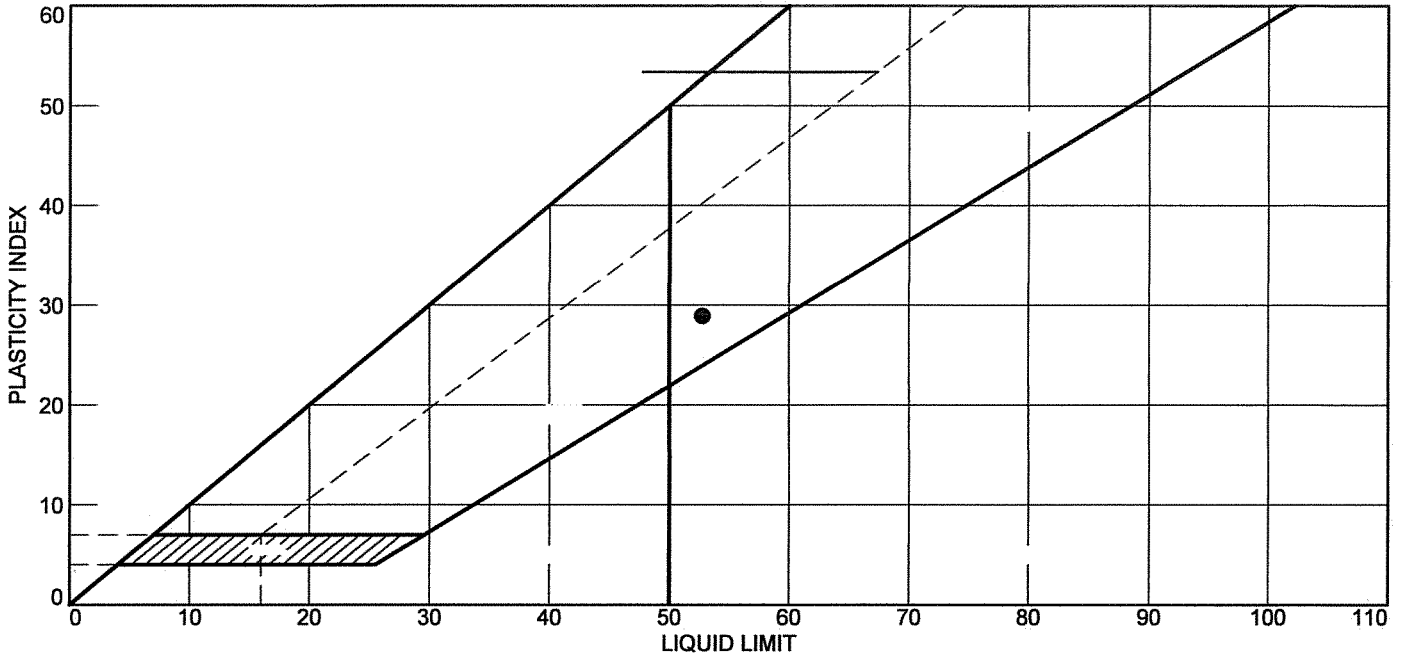
**Remarks:**  
 ● Natural Moisture: 45.8%  
  
**Lab No.** 14779a

Tested By: AGS

Checked By: *MTG* ~~MB~~

*MB*

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• Lean Clay	52.8	23.9	28.9			

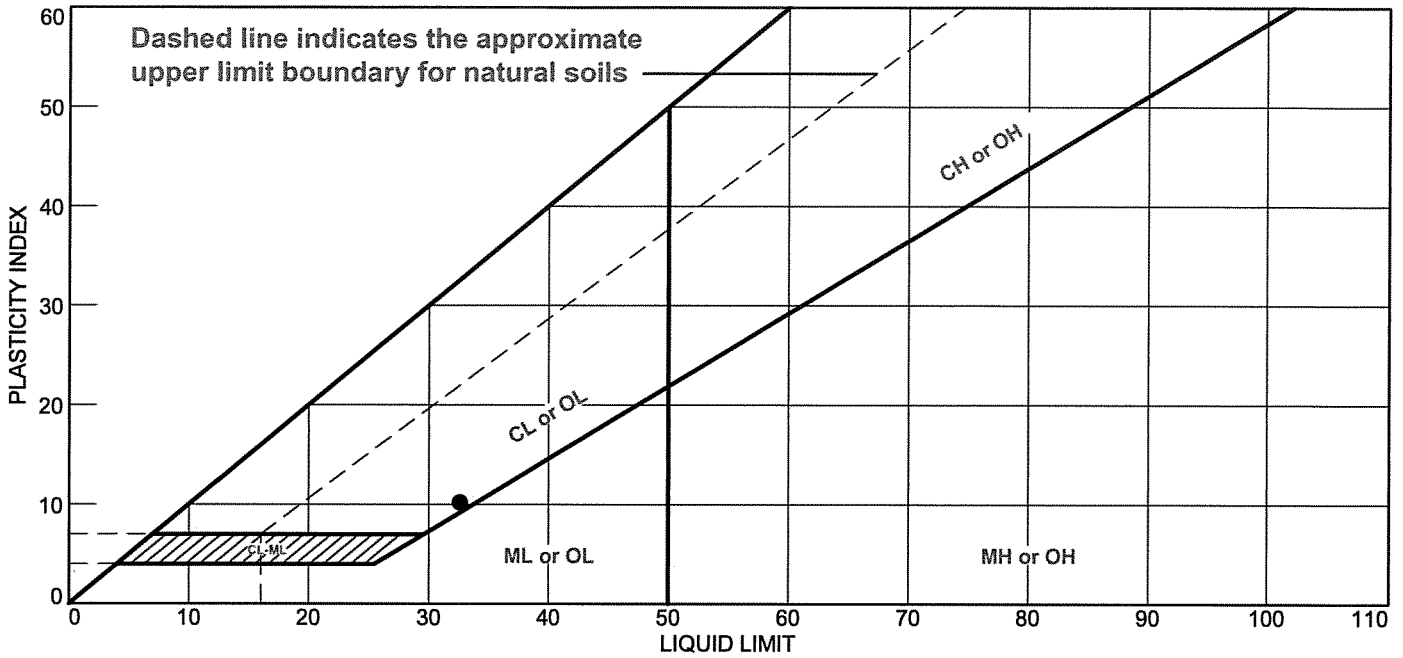
**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-101      **Depth:** 65'-67'  
**Sample Number:** 13D  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Moisture Content: 50.6%  
  
**Lab No.** 14779b

**Tested By:** AGS

**Checked By:** MTG

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	32.6	22.4	10.2			

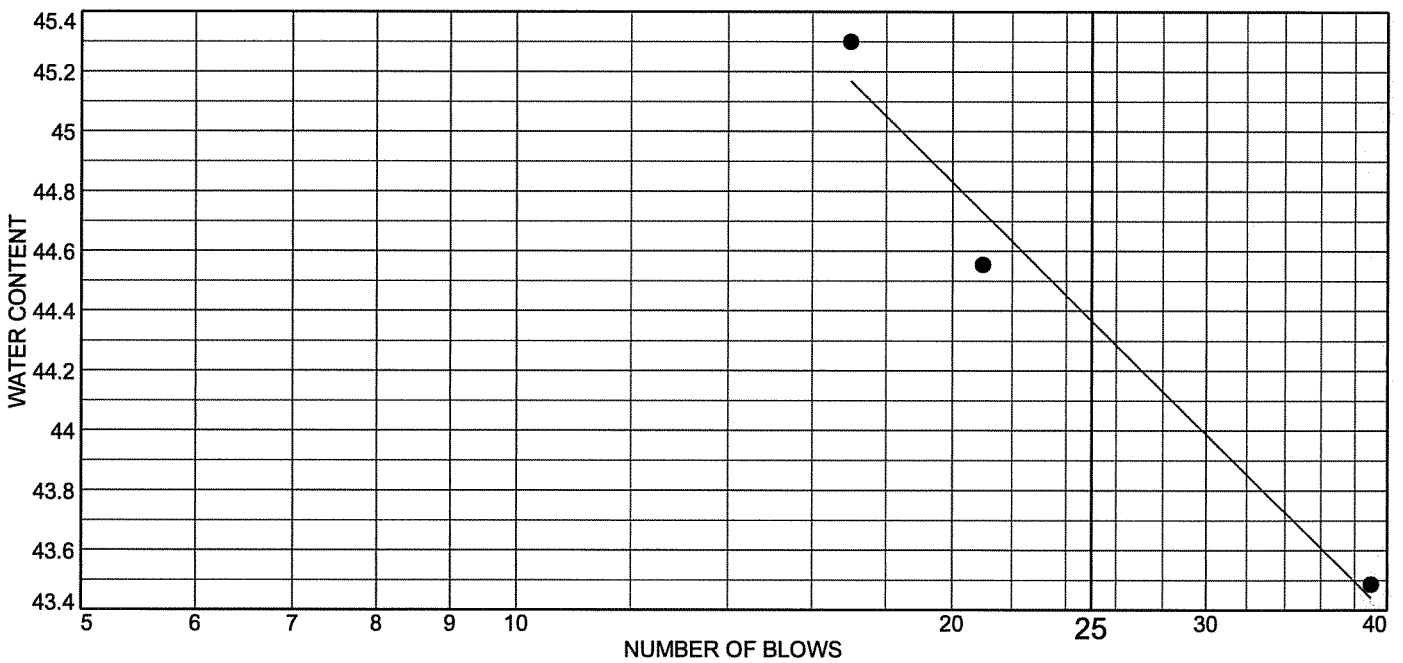
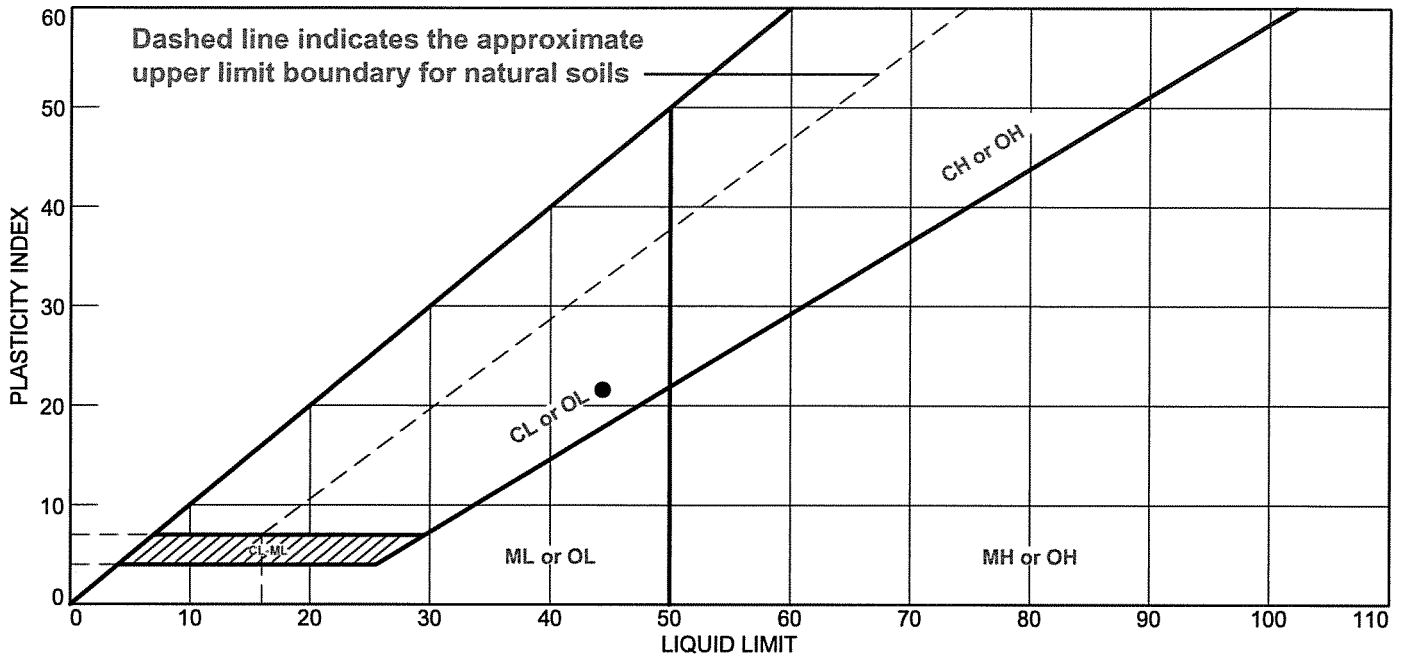
**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-103      **Depth:** 30'-32'  
**Sample Number:** 7D  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Natural Moisture Content: 43.4%

**Lab No.** 14780a

**Tested By:** AGS      **Checked By:** MTG *MTG*

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	44.4	22.8	21.6			

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-103      **Depth:** 40'-42'  
**Sample Number:** 8D

**R.W. Gillespie & Associates, Inc.**

**Saco, Maine**

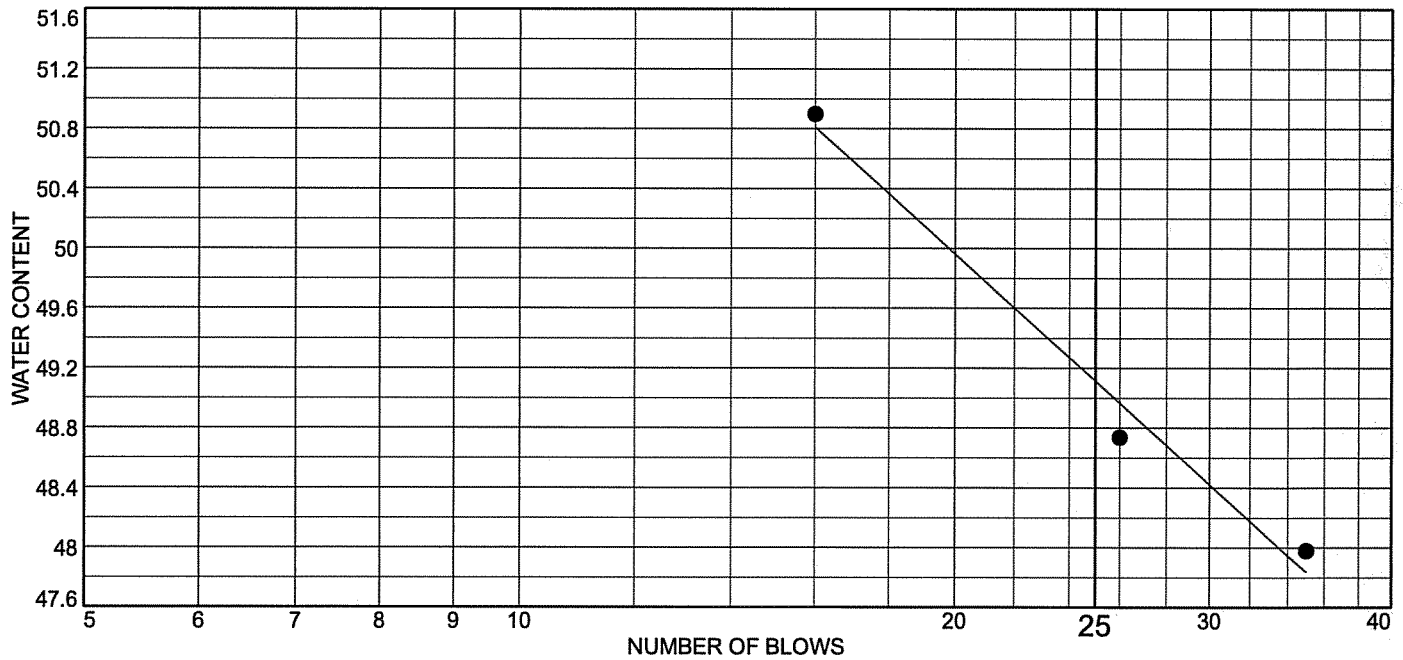
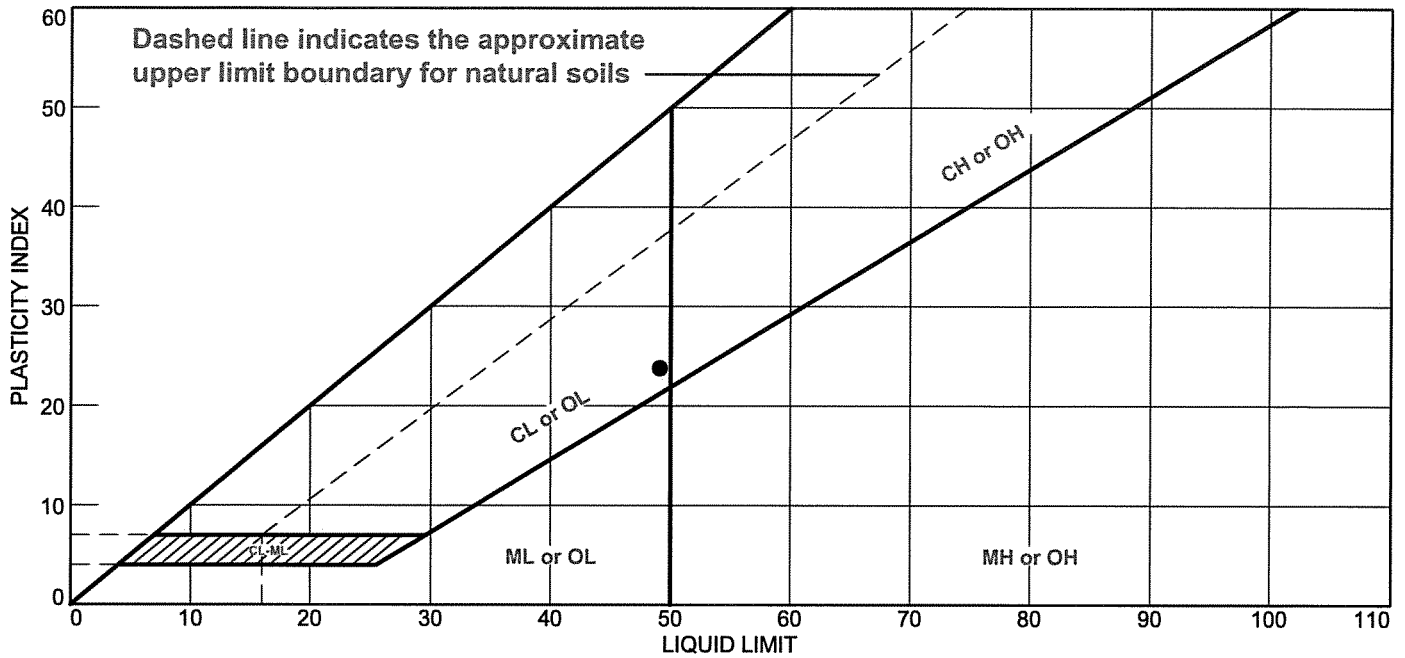
**Remarks:**

- Natural Moisture Content: 46.6%

**Lab No.** 14780b

**Tested By:** AGS      **Checked By:** MTG *MTG*

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	49.1	25.3	23.8			

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-104  
**Sample Number:** 7D      **Depth:** 30'-32'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

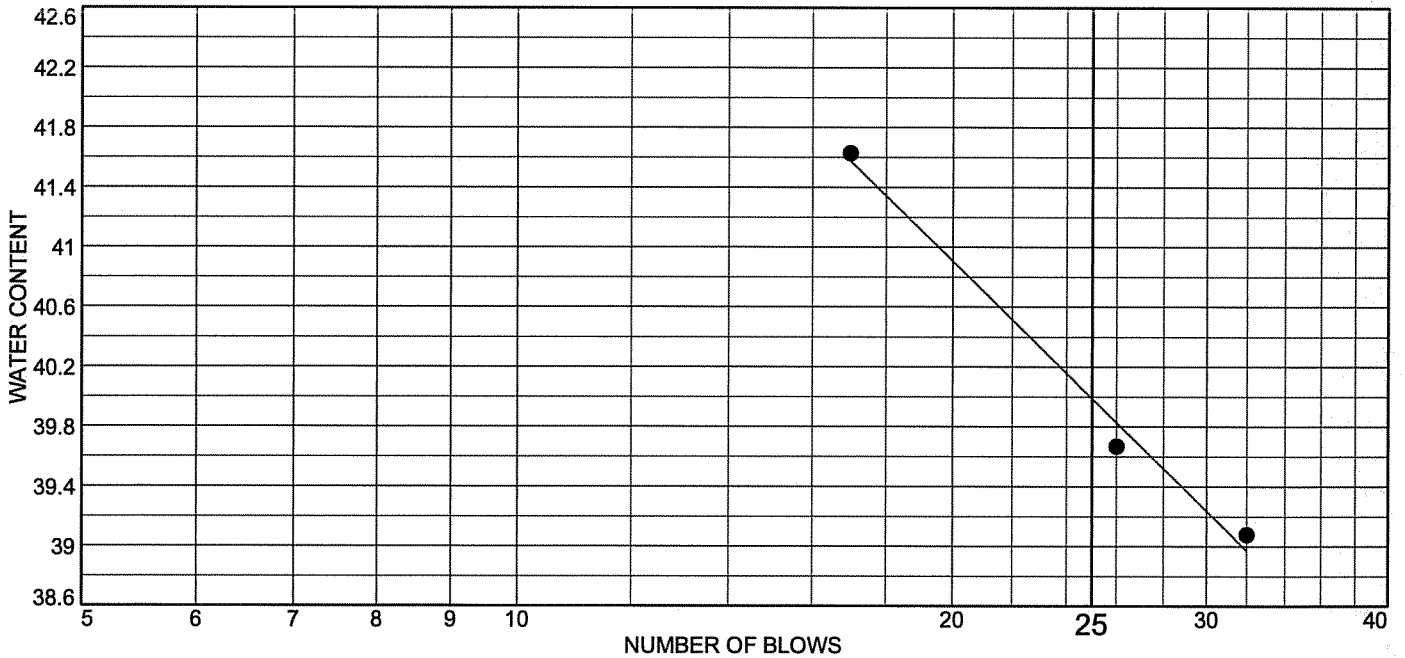
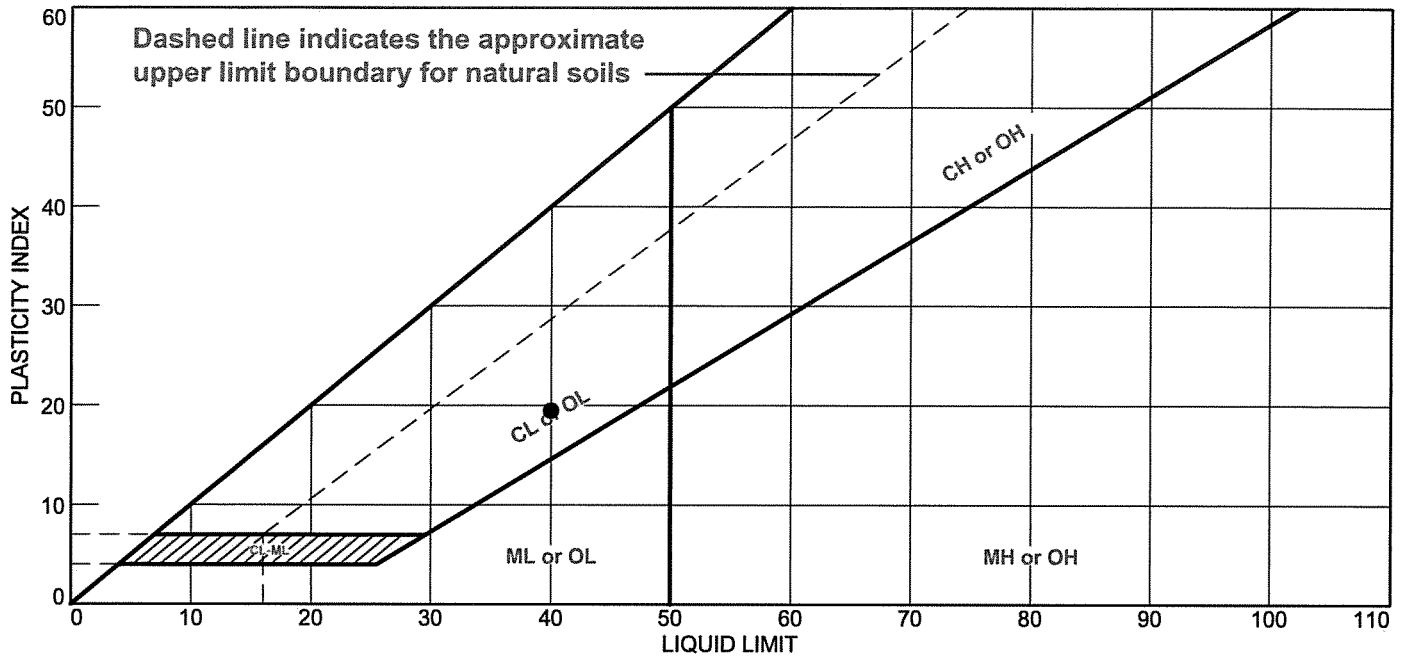
**Remarks:**  
 • Natural Moisture Content: 51.2%  
**Lab No.** 14781

Tested By: AGS

Checked By: MTG



# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	40.0	20.5	19.5			

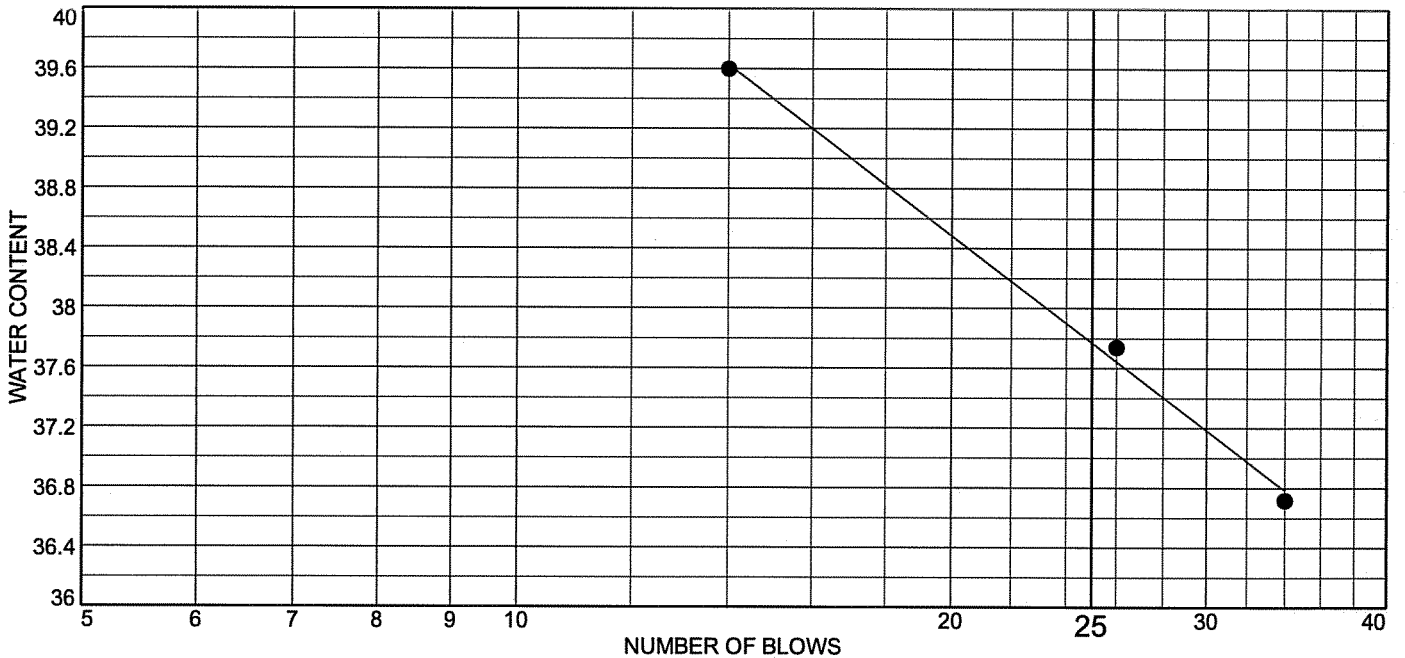
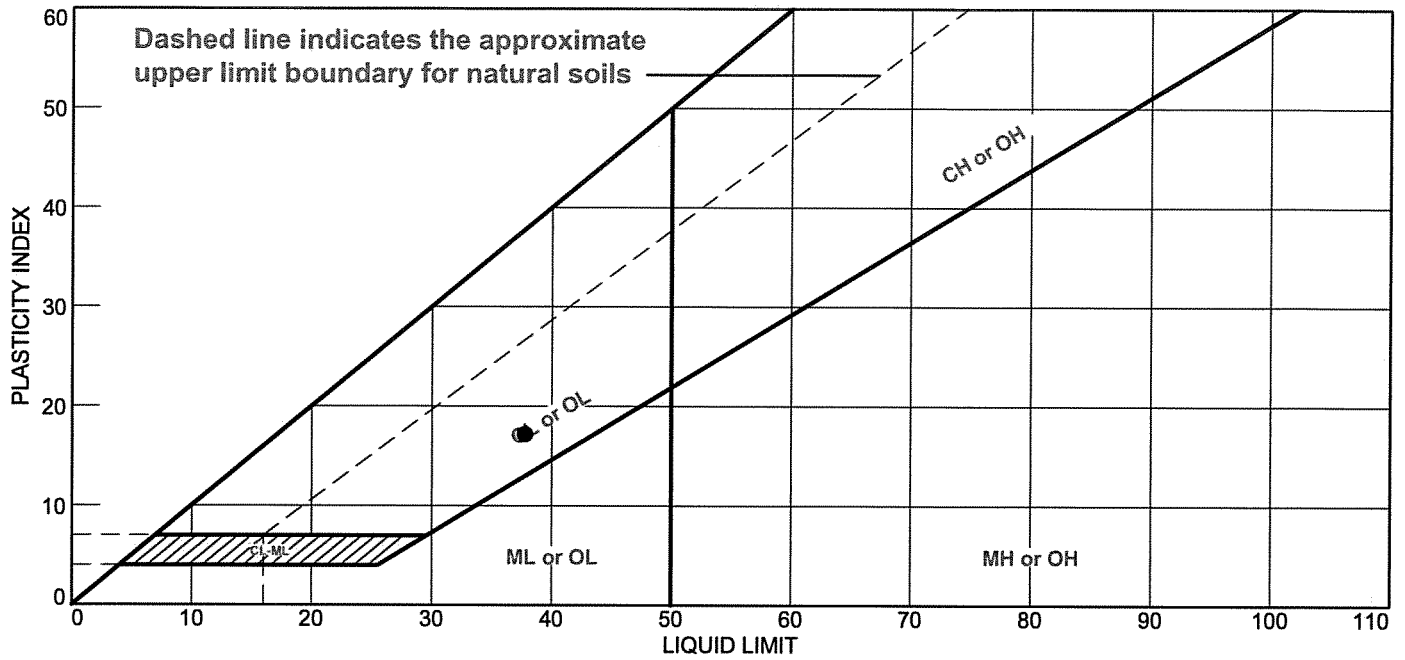
**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-105  
**Sample Number:** 7D      **Depth:** 35'-37'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Natural Moisture: 41.8%

**Lab No.** 14782

**Tested By:** AGS, JJB      **Checked By:** MTG *MTG*

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	37.8	20.6	17.2			

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-107  
**Sample Number:** 7D      **Depth:** 35'-37'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Natural Moisture: 43.7%  
  
**Lab No.** 14783

**Tested By:** AGS, JJB      **Checked By:** MTG *MTG*



**R. W. Gillespie & Associates, Inc.**

86 Industrial Park Road, Suite 4, Saco, ME 04072 207-286-8008  
177 Shattuck Way, Suite 1 West, Newington NH 03801 603-427-0244  
44 Wood Avenue, Suite I, Mansfield, MA 508-623-0101

**LETTER OF TRANSMITTAL**

Date: November 30, 2017	Project No.: 1368-009
Attention: Isabel V. (Be) Schonewald, P.E. (Be@schonewaldengineering.co	
Re: Laboratory Testing MTA Exit 45 Reconfiguration South Portland, Maine	

Schonewald Engineering Associates, Inc.

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129 Middle Road

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Cumberland, ME 04021

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We are sending you attached Laboratory Test Results.	
Laboratory No. (s)	Test (s) Performed
14779a & 14779b	Liquid and Plastic Limits
14780a & 14780b	Liquid and Plastic Limits
14781	Liquid and Plastic Limits
14782	Liquid and Plastic Limits
14783	Liquid and Plastic Limits

Remarks:

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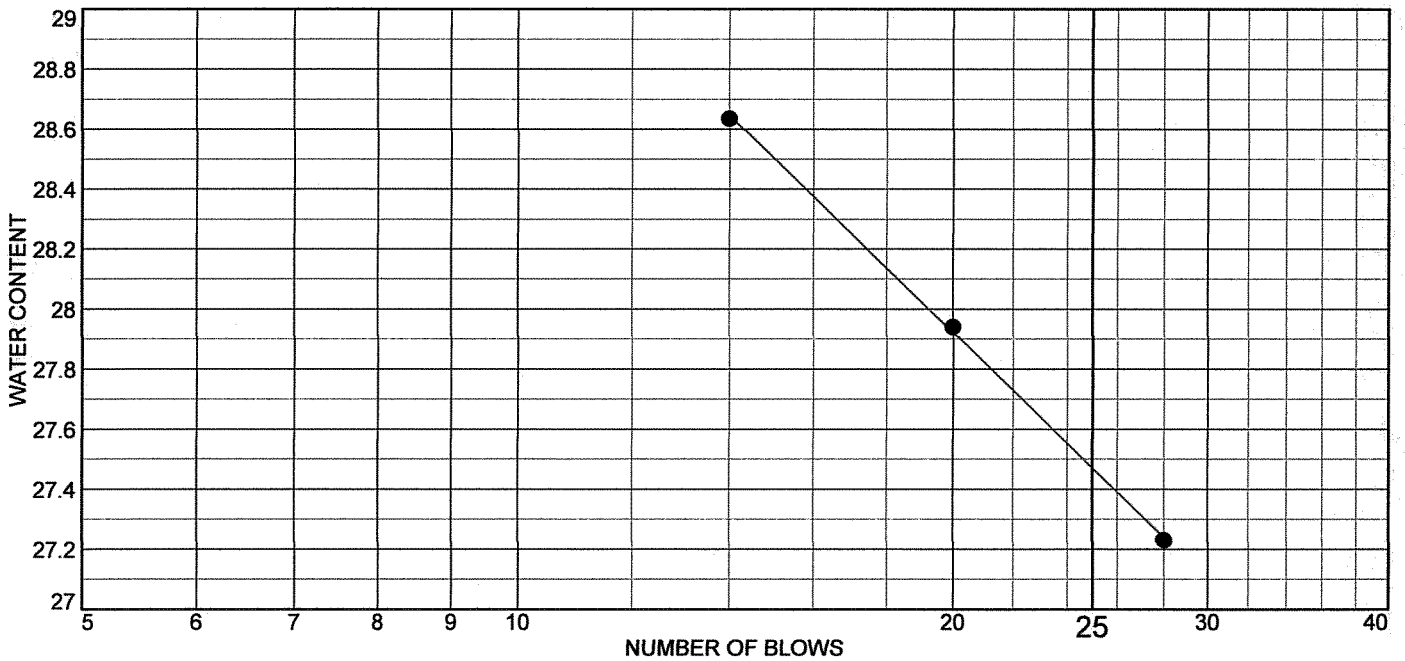
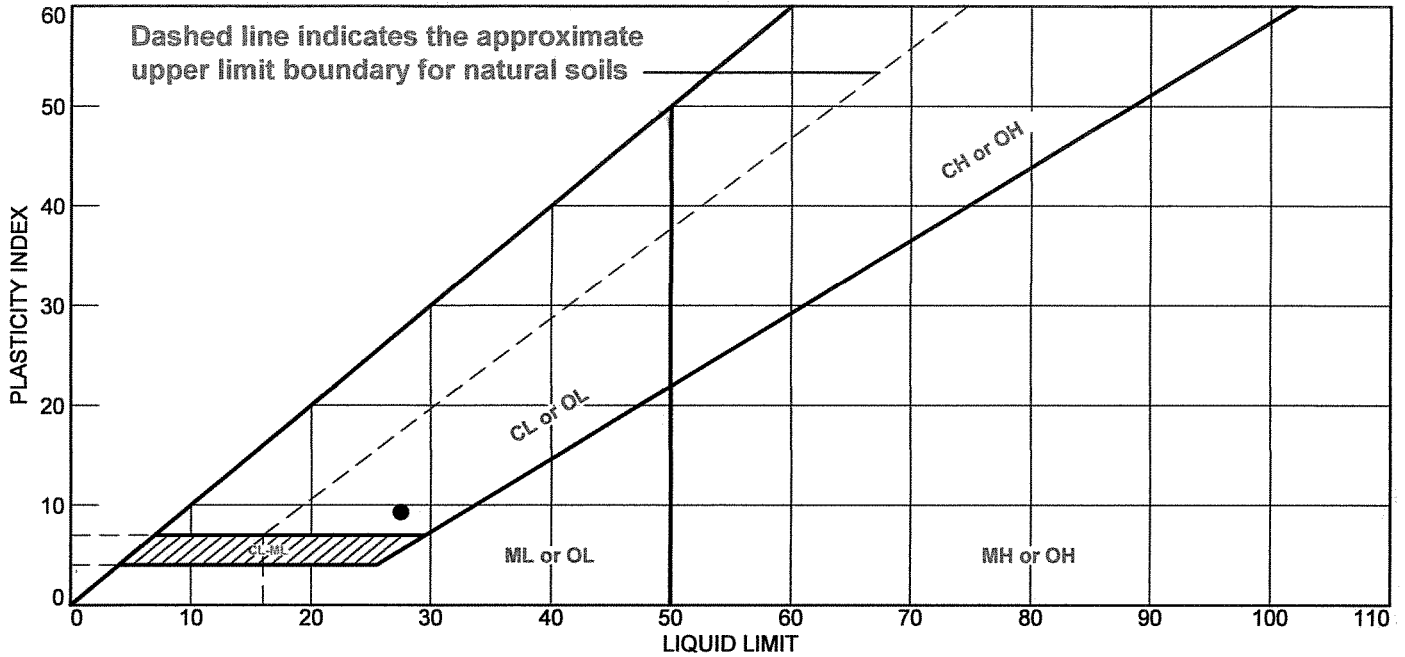
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Copy to:

If enclosures are not noted, kindly notify us at once.

**RWG&A: RESULTS OF CONSOLIDATION AND ATTERBERG LIMITS LABORATORY TESTS ON  
UNDISTURBED SOIL SAMPLES**

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	27.5	18.2	9.3			

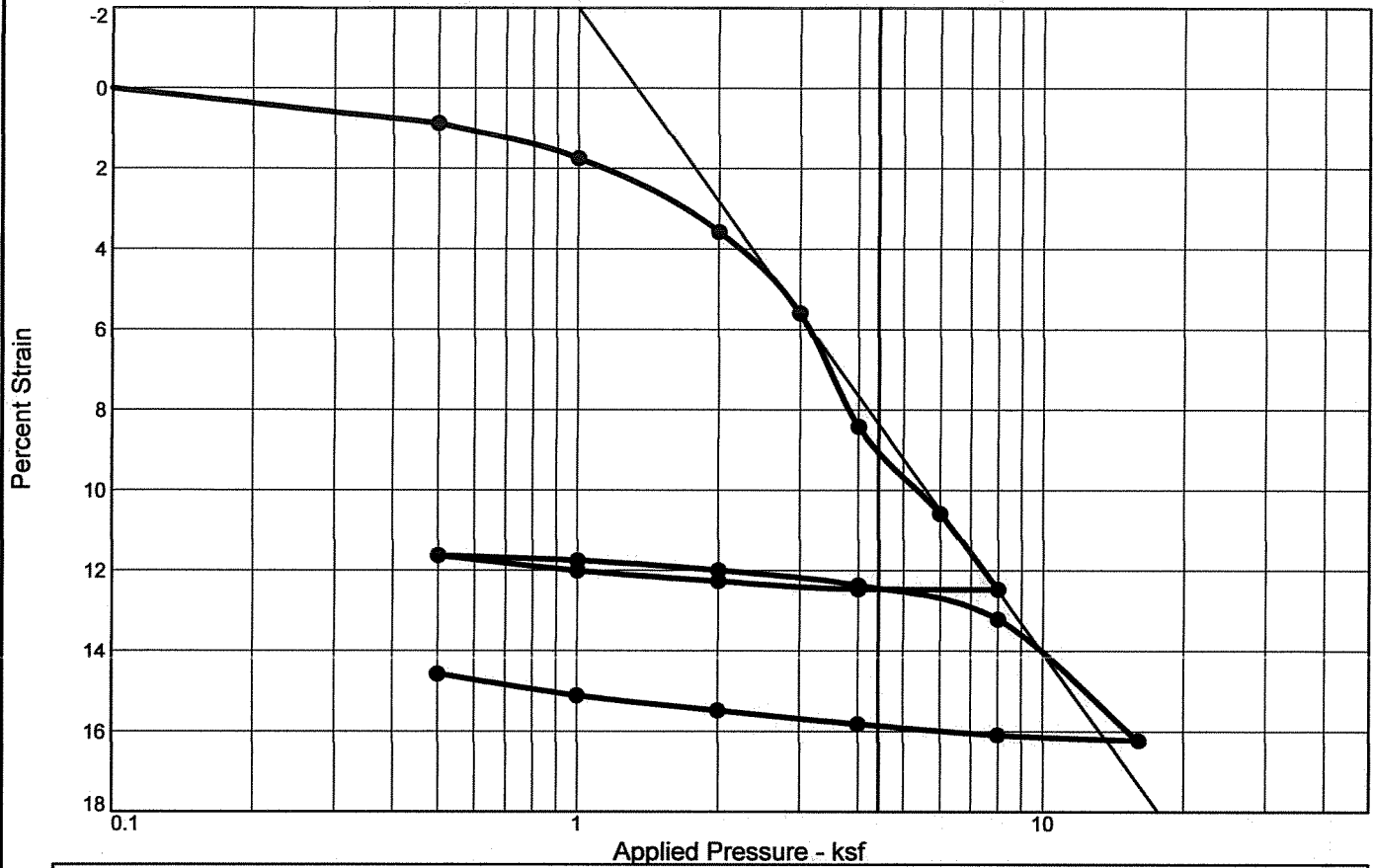
**Project No.** 1368-009     **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-102: South Portland, ME  
**Sample Number:** U-1     **Depth:** 35'-37'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Natural Moisture: 41.0%  
**Lab No.** 14784a

**Tested By:** AGS, JJB

**Checked By:** MTG

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	0.913		8	4.00	5.656		15	8.00	3.020	
2	1.00	1.260		9	2.00	2.442		16	16.00	1.096	
3	2.00	1.003		10	1.00	1.156		17	8.00	8.014	
4	3.00	0.264		11	0.50	0.654		18	4.00	3.467	
5	4.00	0.219		12	1.00	2.961		19	2.00	2.037	
6	6.00	0.471		13	2.00	2.715		20	1.00	0.669	
7	8.00	0.454		14	4.00	3.275		21	0.50	0.328	

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_o$
Sat.	Moist.											
108.9 %	42.9 %	80.6	27.5	9.3	2.77		5.3	0.34	0.06			1.090

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

<b>Project No.</b> 1368-009 <b>Client:</b> Schonewald Engineering Associates, Inc. <b>Project:</b> MTA Exit 45 Reconfiguration  <b>Loc.:</b> HB-EXIT45-102: South Portland, ME <b>Depth:</b> 35'-37' <b>Sample No.:</b> U-1 <b>R.W. Gillespie &amp; Associates, Inc.</b>  <b>Saco, Maine</b>	<b>Remarks:</b>      <div style="text-align: right;"><b>Lab No.</b> 14784a</div>
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Tested By: JRF/AGS

Checked By: MTG *MTG*

# Dial Reading vs. Time

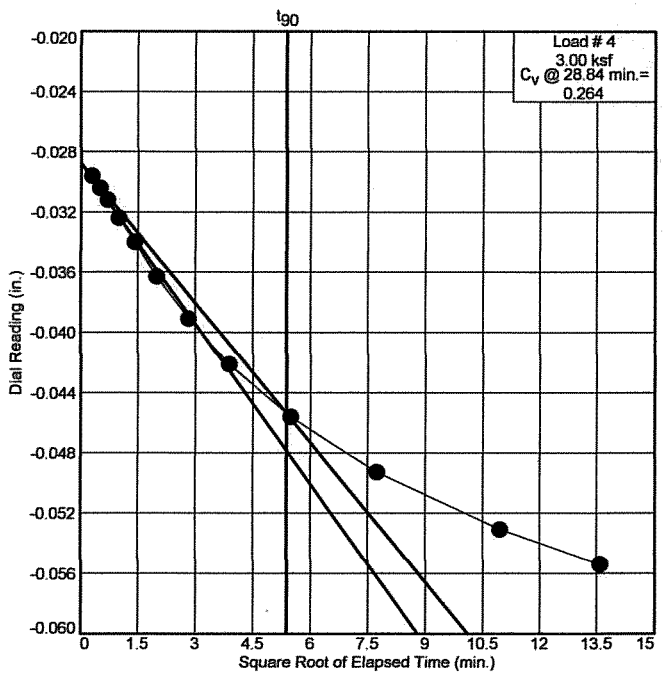
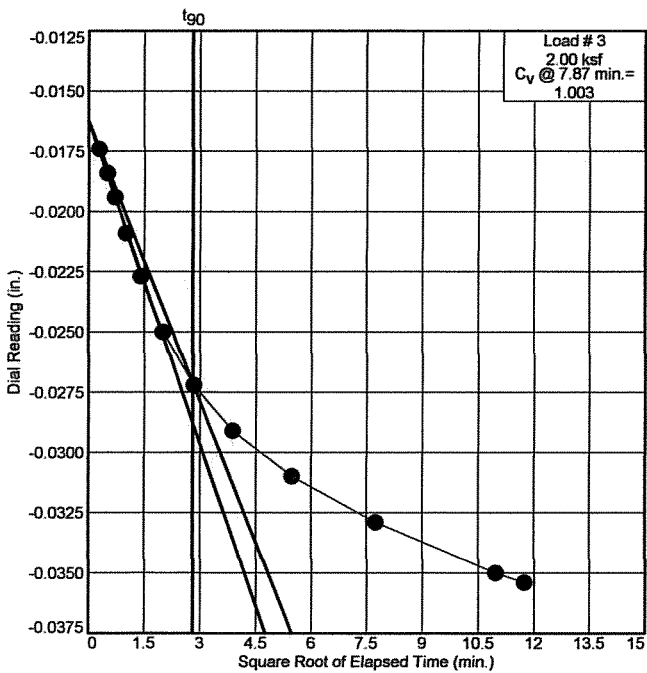
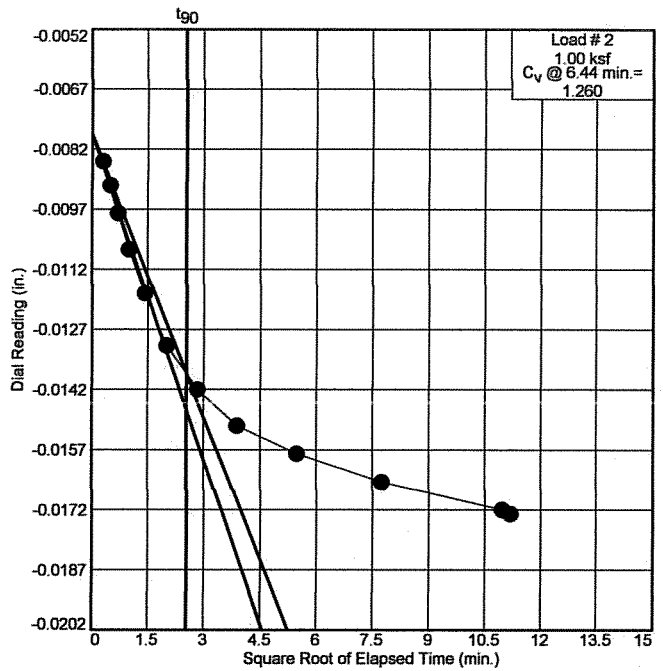
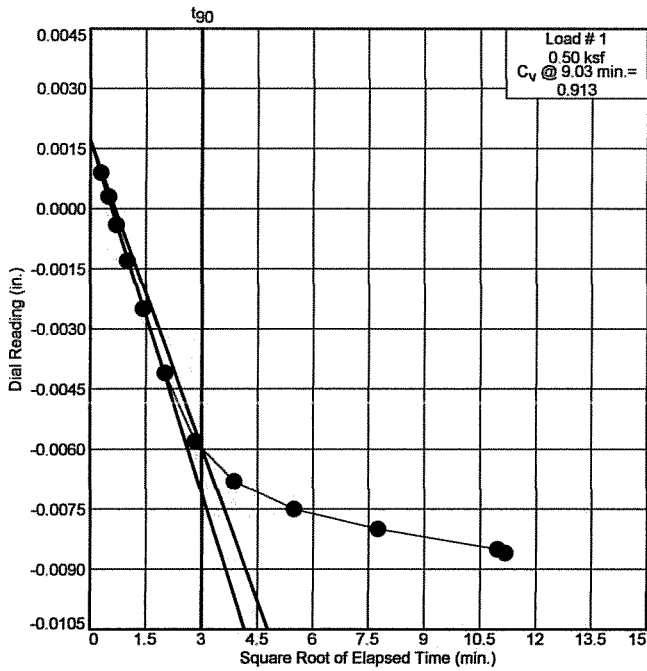
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 35'-37'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14785a

# Dial Reading vs. Time

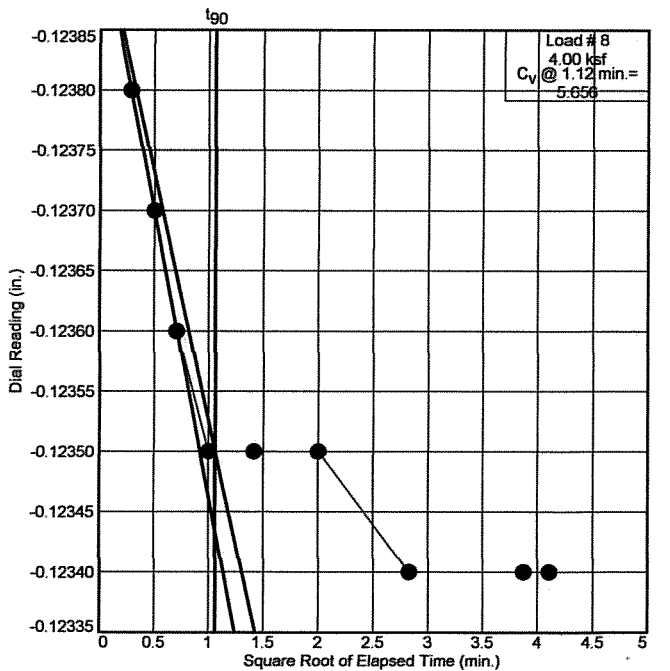
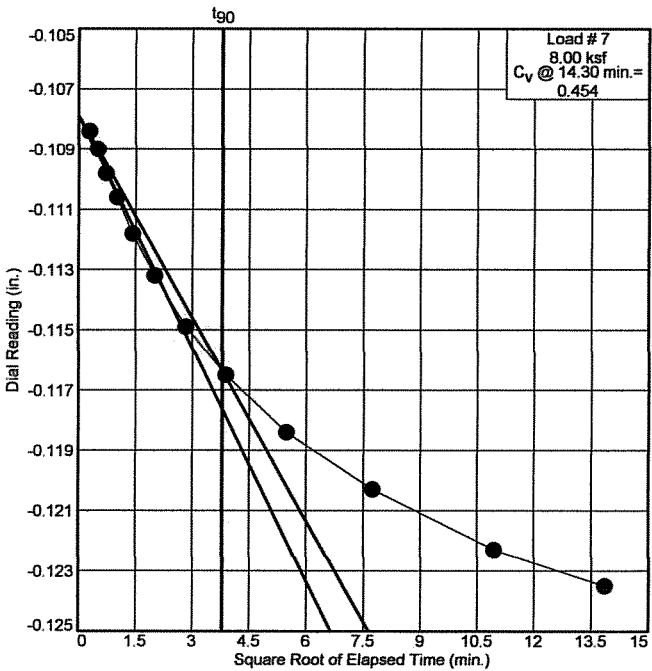
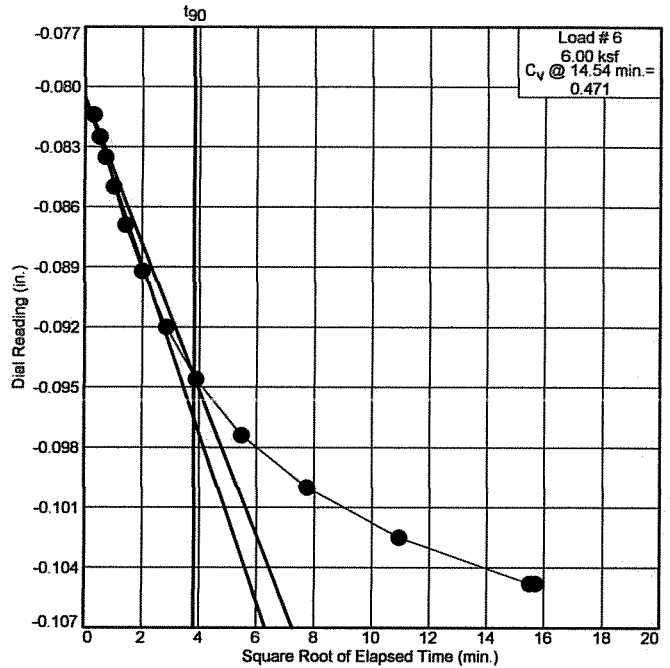
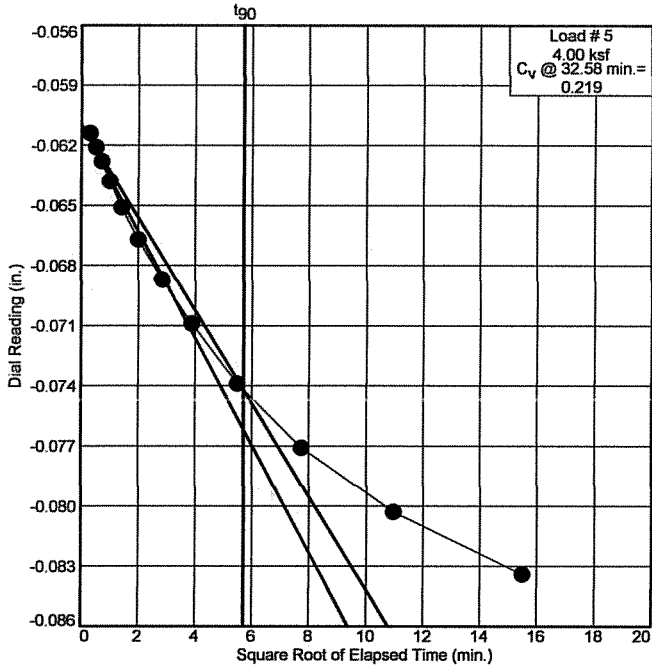
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 35'-37'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14786a



# Dial Reading vs. Time

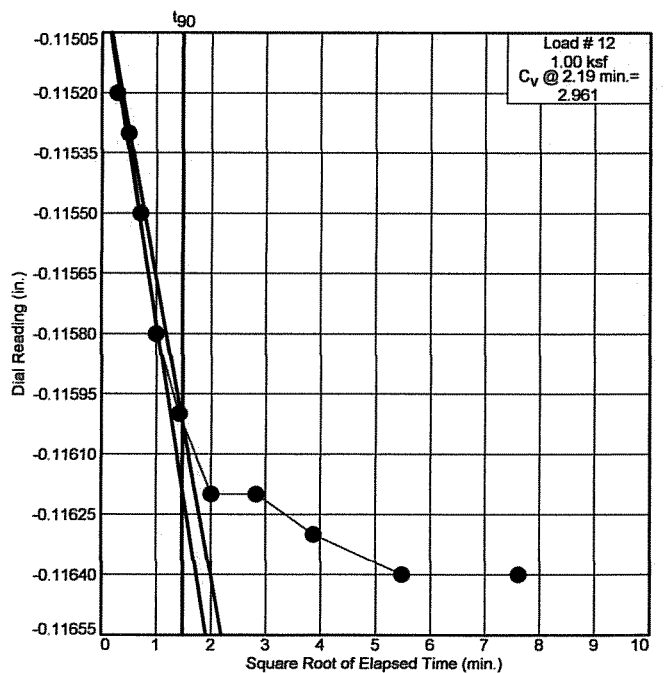
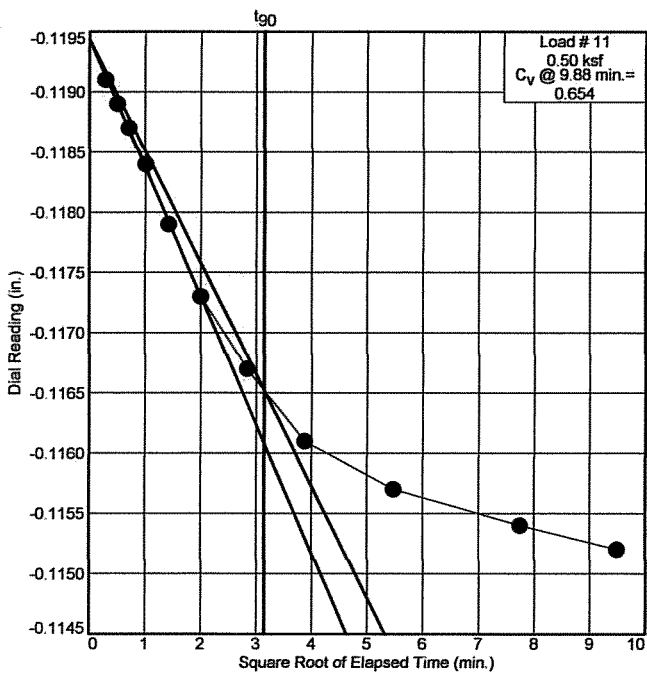
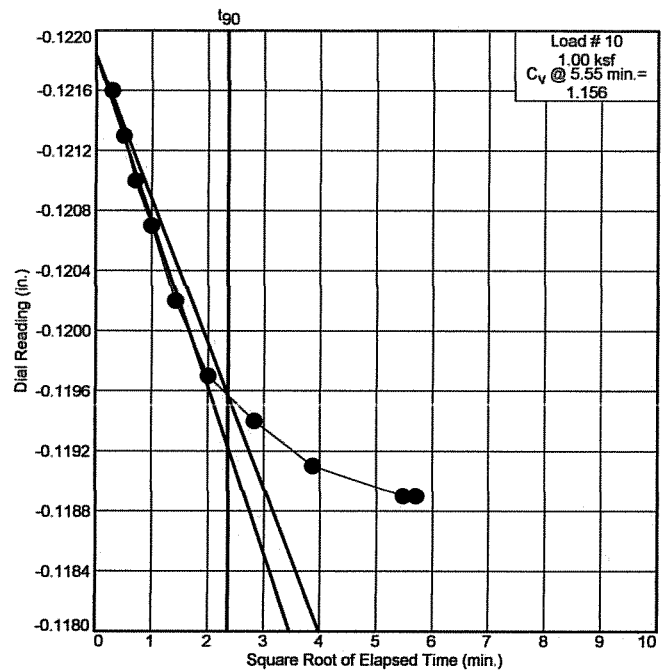
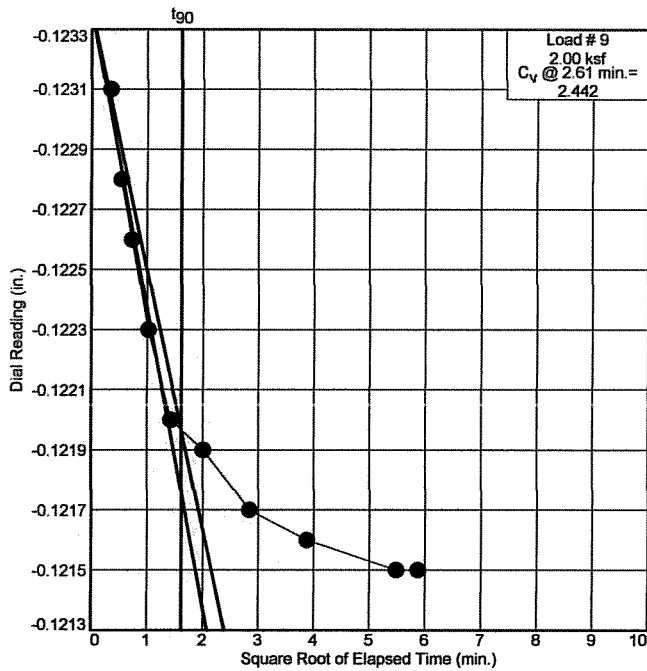
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 35'-37'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTA*

Lab No. 14787a

# Dial Reading vs. Time

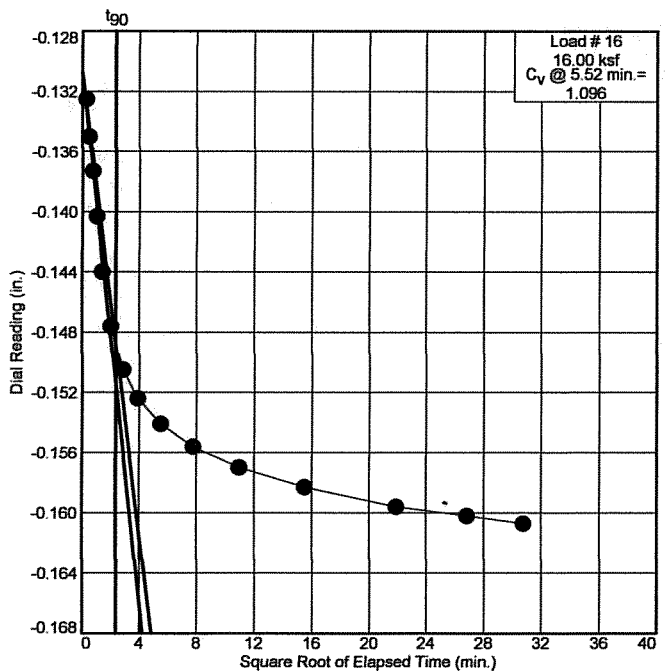
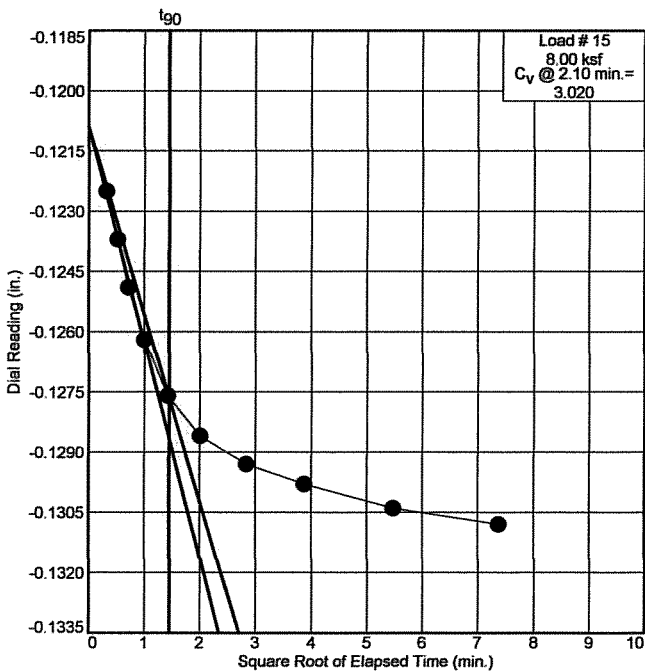
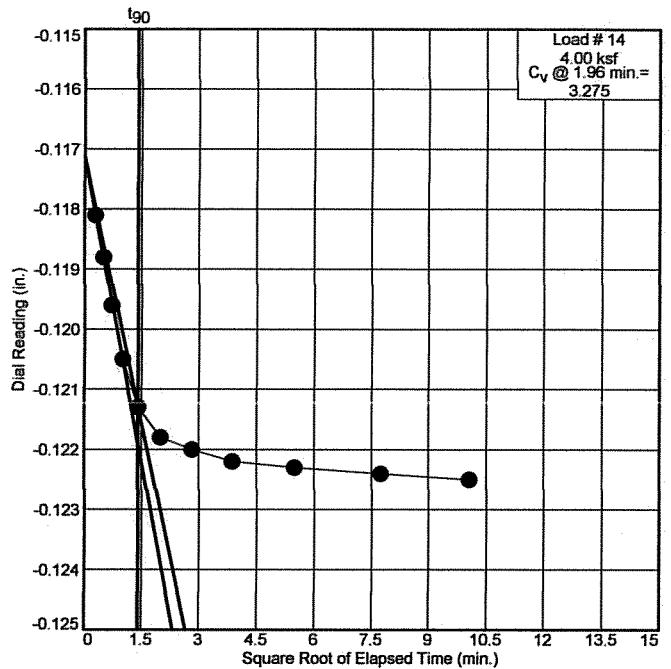
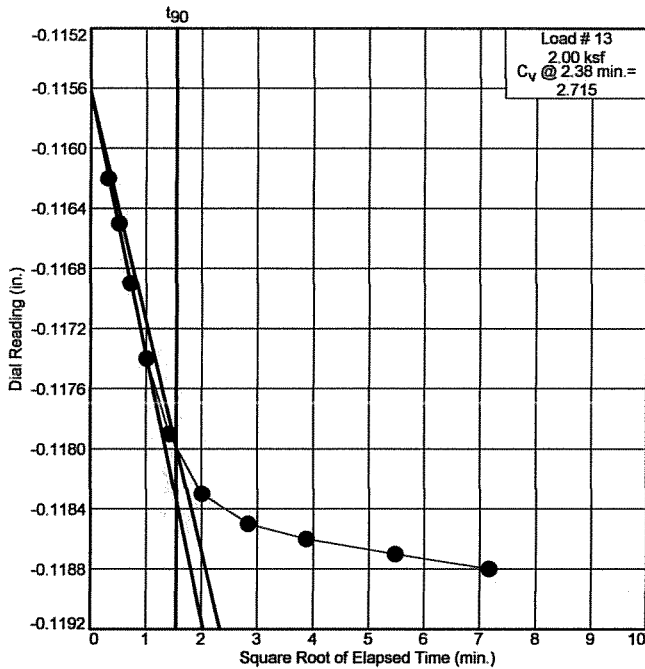
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 35'-37'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTB*

Lab No. 14788a

# Dial Reading vs. Time

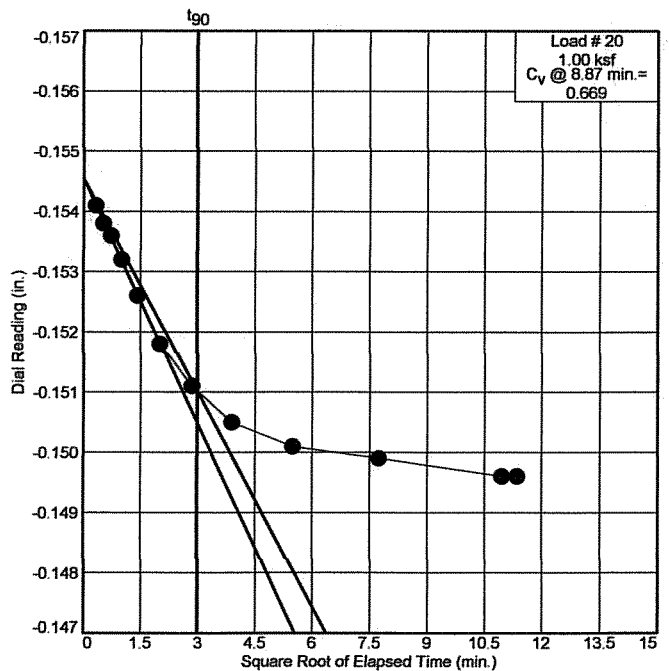
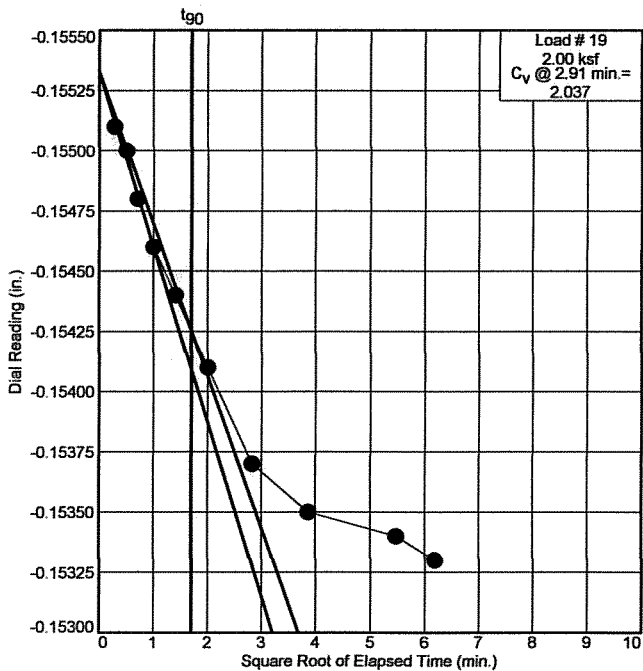
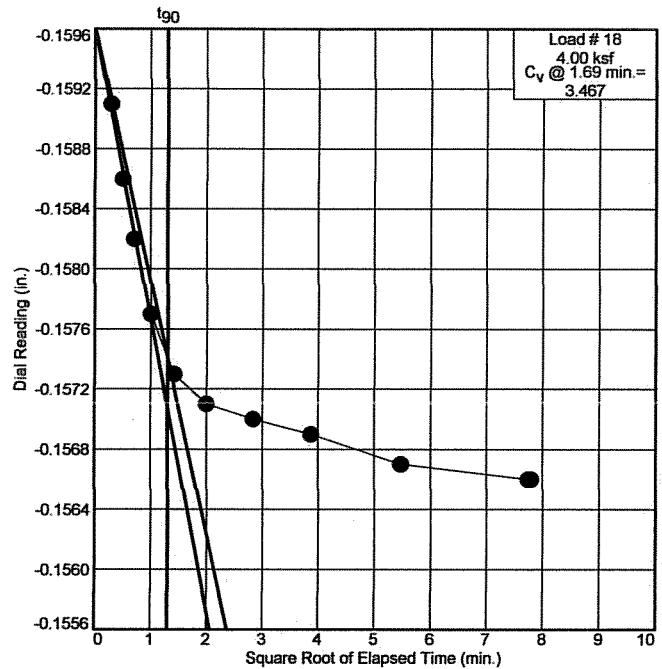
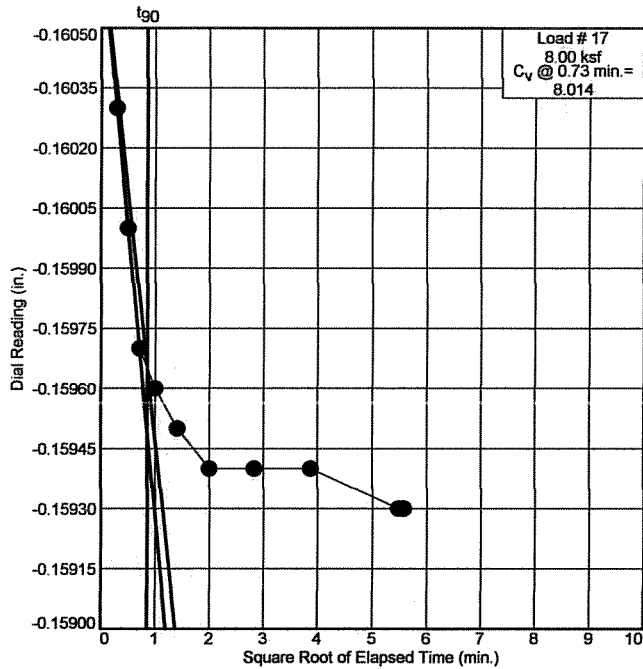
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 35'-37'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14789a

# Dial Reading vs. Time

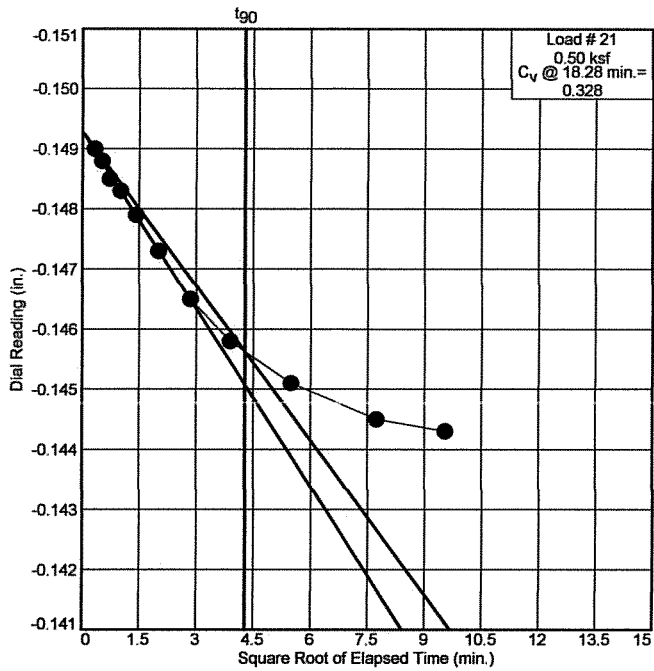
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 35'-37'

Sample Number: U-1



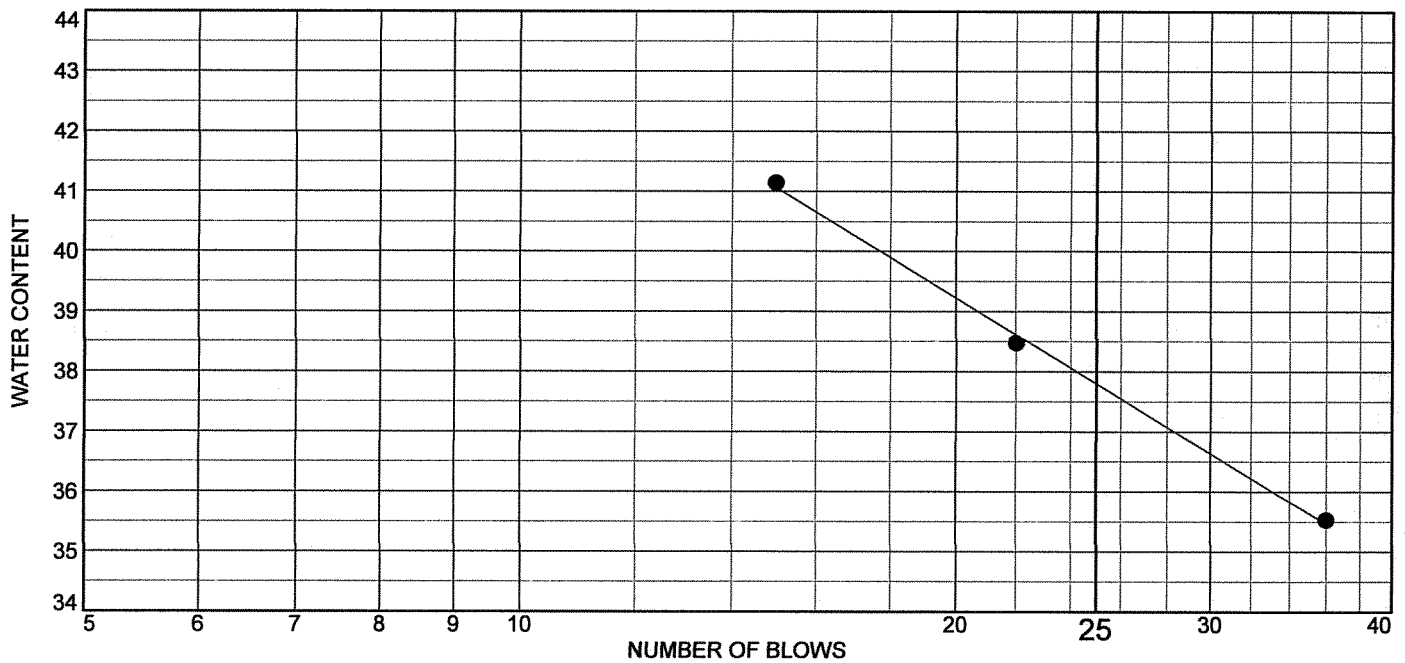
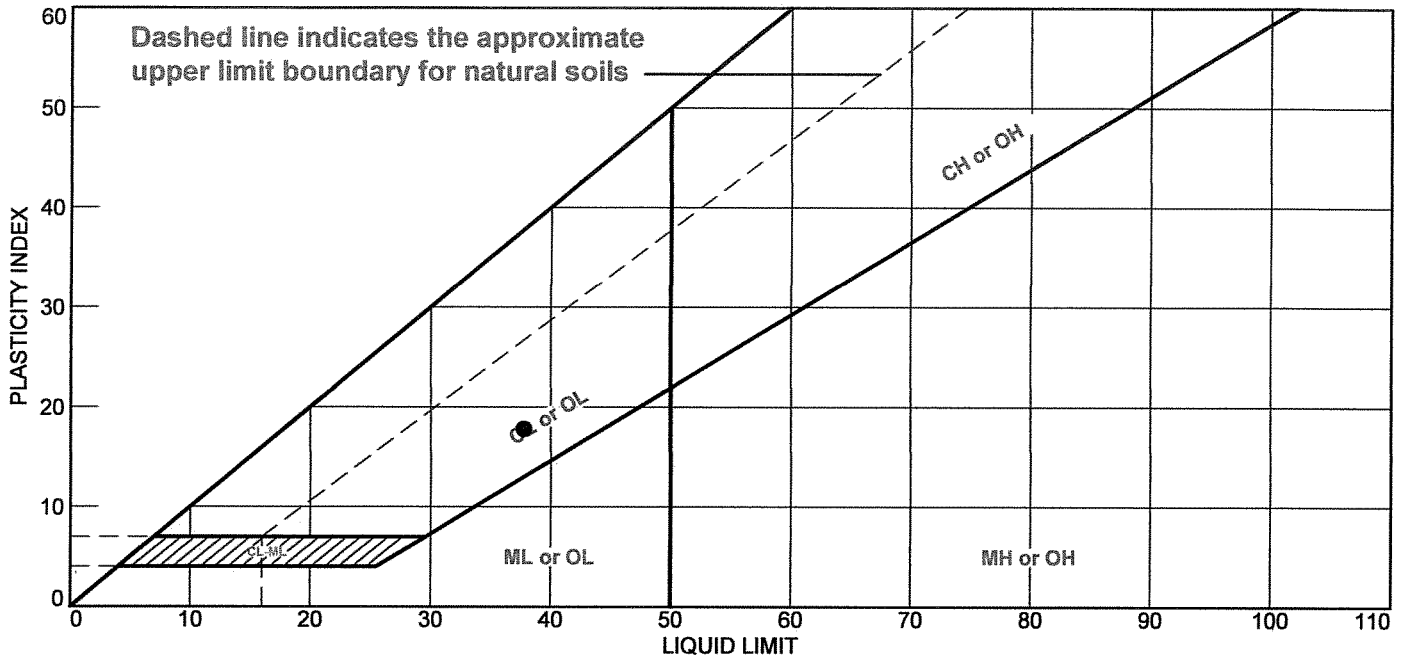
R.W. Gillespie & Associates, Inc.

Saco, Maine

MTA

Lab No. 14790a

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	37.8	20.0	17.8			

**Project No.** 1368-009     **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-102: South Portland, ME  
**Sample Number:** U-2     **Depth:** 45'-47'

**R.W. Gillespie & Associates, Inc.**

**Saco, Maine**

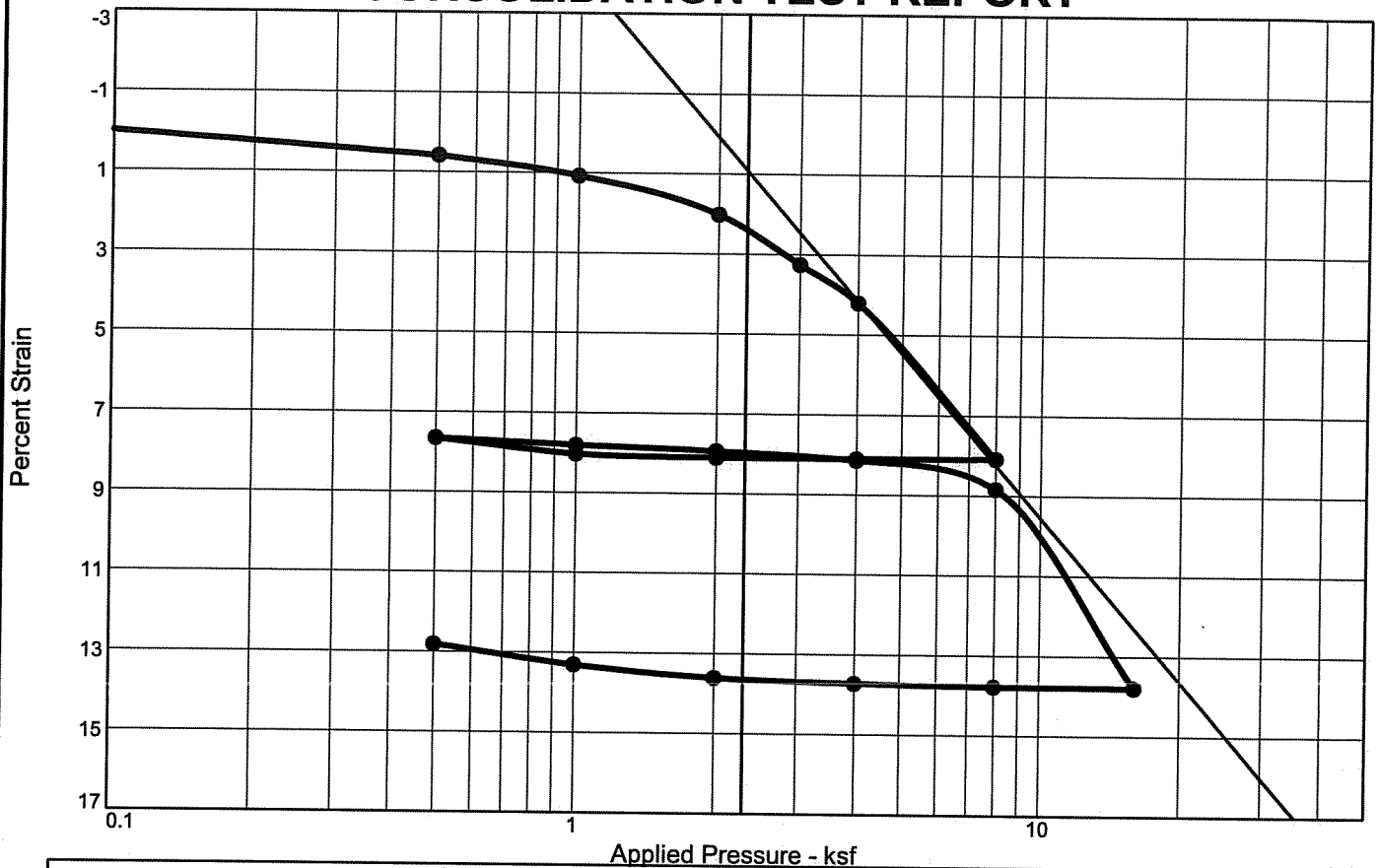
**Remarks:**  
 • Natural Moisture: 41.1%

**Lab No.** 14784b

**Tested By:** AGS, JJB

**Checked By:** MTG

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	1.895		8	2.00	21.339		15	16.00	0.432	
2	1.00	2.288		9	1.00	5.041		16	8.00	7.755	
3	2.00	1.645		10	0.50	0.859		17	4.00	6.210	
4	3.00	0.536		11	1.00	5.079		18	2.00	3.865	
5	4.00	0.435		12	2.00	3.856		19	1.00	0.905	
6	8.00	0.556		13	4.00	5.915		20	0.50	0.360	
7	4.00	0.316		14	8.00	2.570					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_0$
Sat.	Moist.											
91.6 %	40.2 %	80.5	37.8	17.8	2.75		3.2	0.30	0.09			1.206

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

<p><b>Project No.</b> 1368-009      <b>Client:</b> Schonewald Engineering Associates, Inc.</p> <p><b>Project:</b> MTA Exit 45 Reconfiguration</p> <p><b>Loc.:</b> HB-EXIT45-102: South Portland, ME      <b>Depth:</b> 45'-47'      <b>Sample No.:</b> U-2</p> <p style="text-align: center;"><b>R.W. Gillespie &amp; Associates, Inc.</b></p> <p style="text-align: center;"><b>Saco, Maine</b></p>	<p><b>Remarks:</b></p> <p style="text-align: right;"><b>Lab No.</b> 14784b</p>
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**Tested By:** JRF/AGS      **Checked By:** MTG *MTG*

# Dial Reading vs. Time

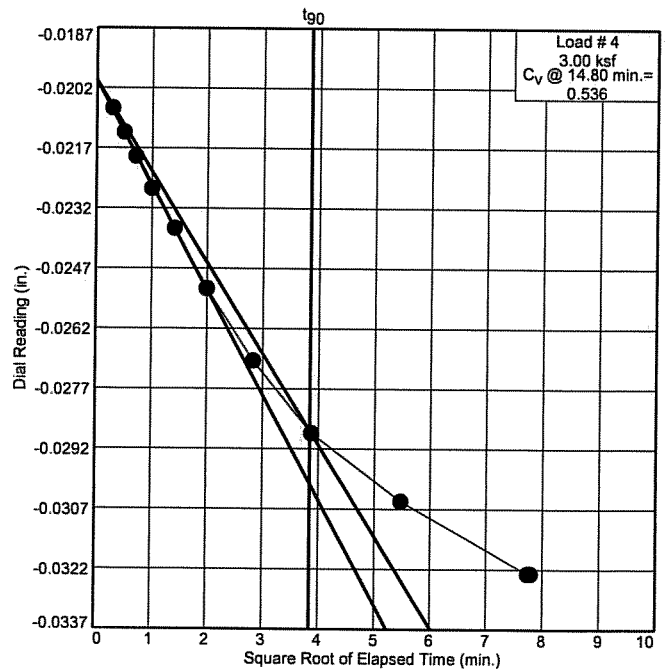
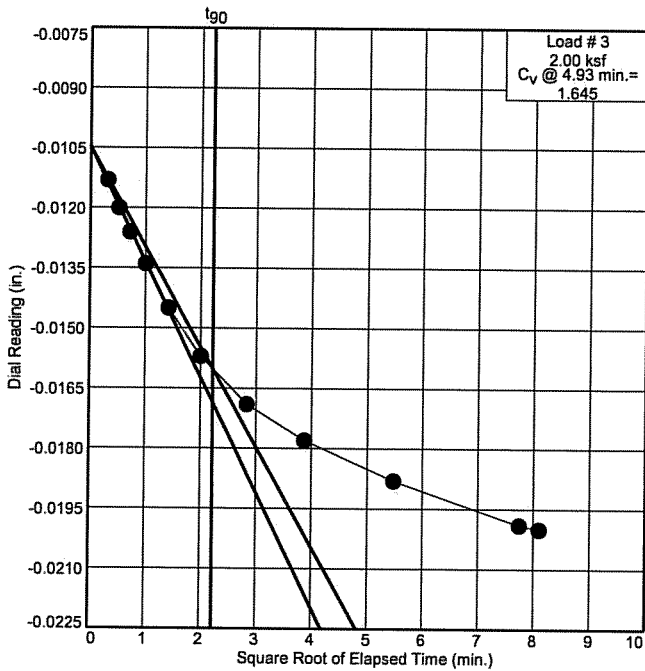
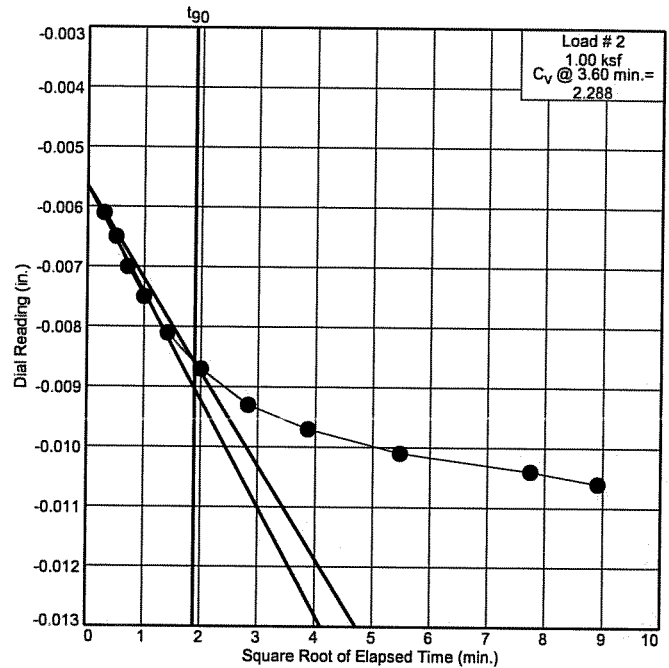
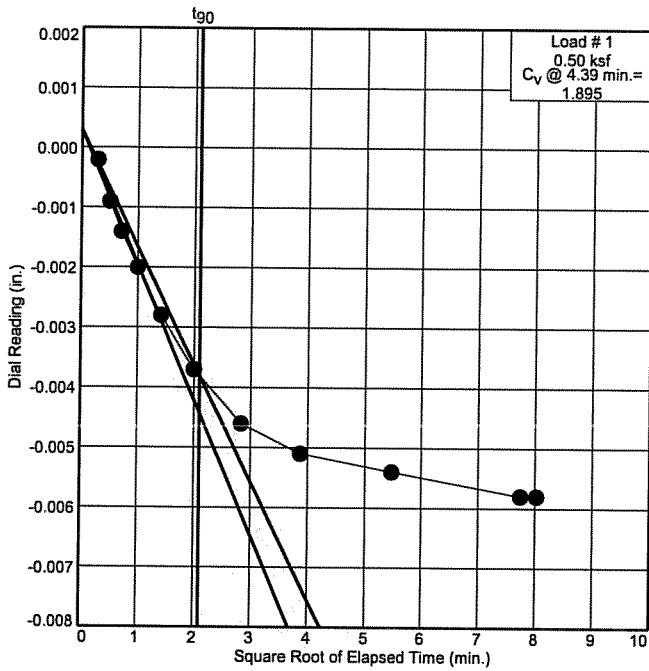
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 45'-47'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MB*  
Lab No. 14785b

# Dial Reading vs. Time

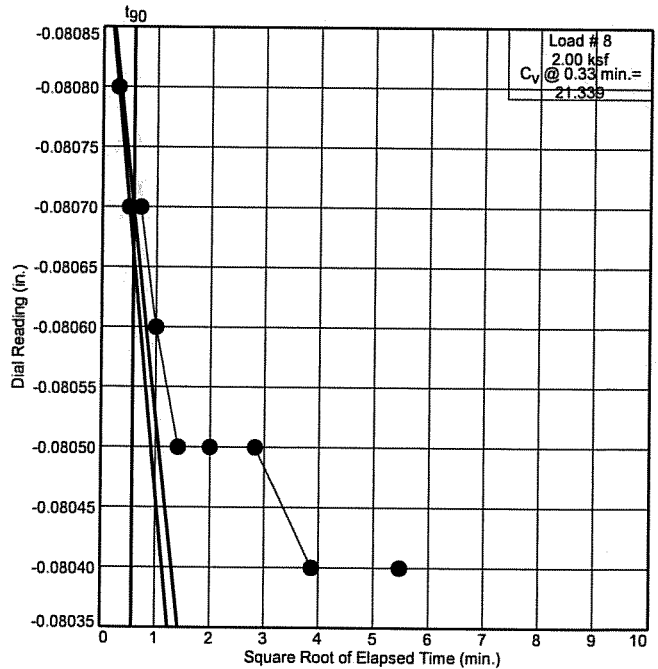
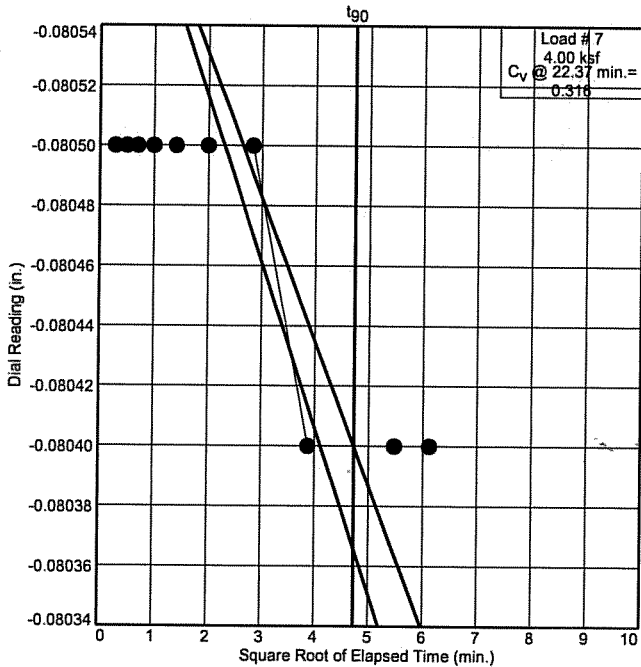
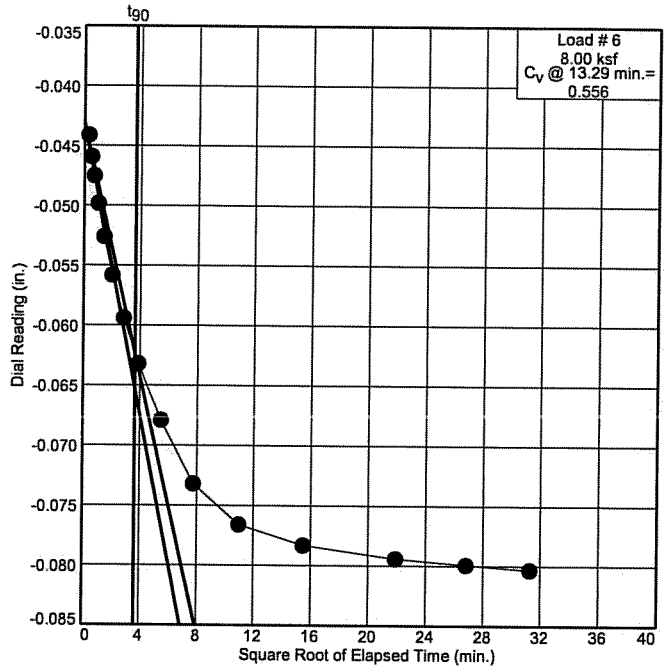
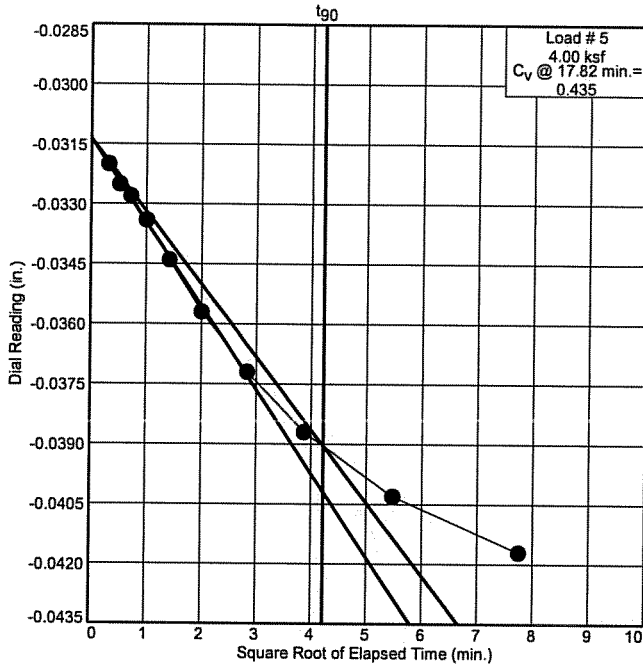
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 45'-47'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MB*

Lab No. 14786b



# Dial Reading vs. Time

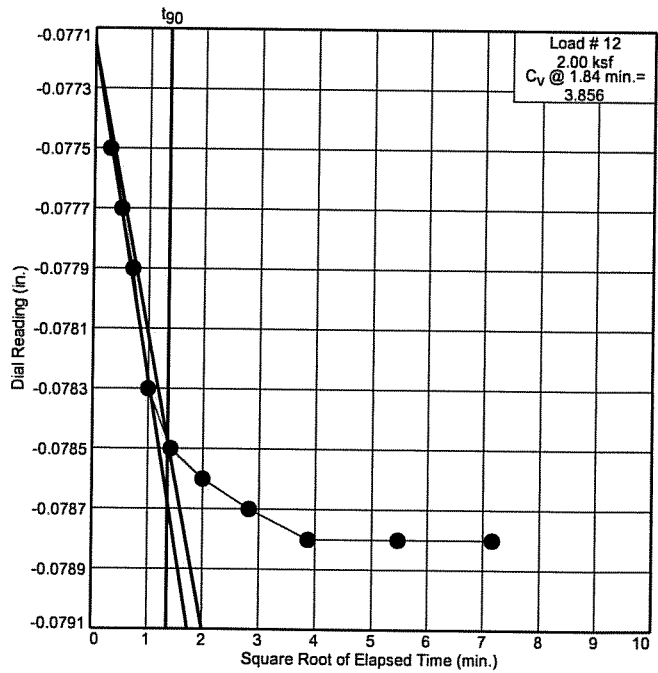
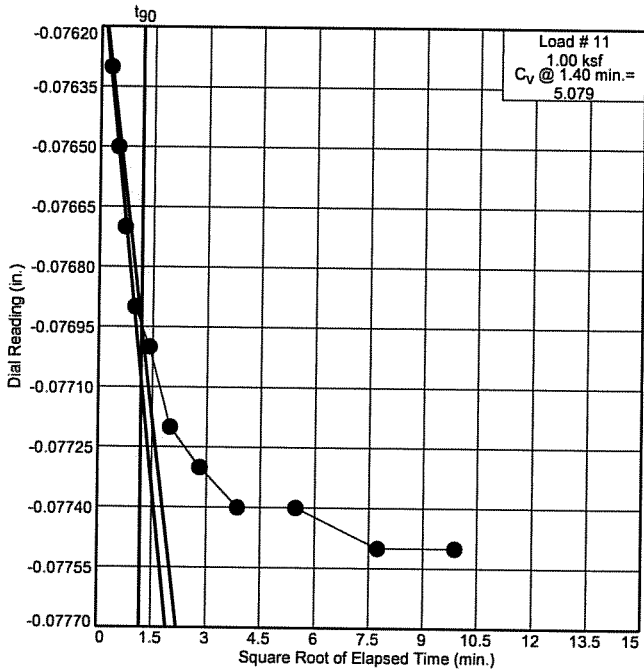
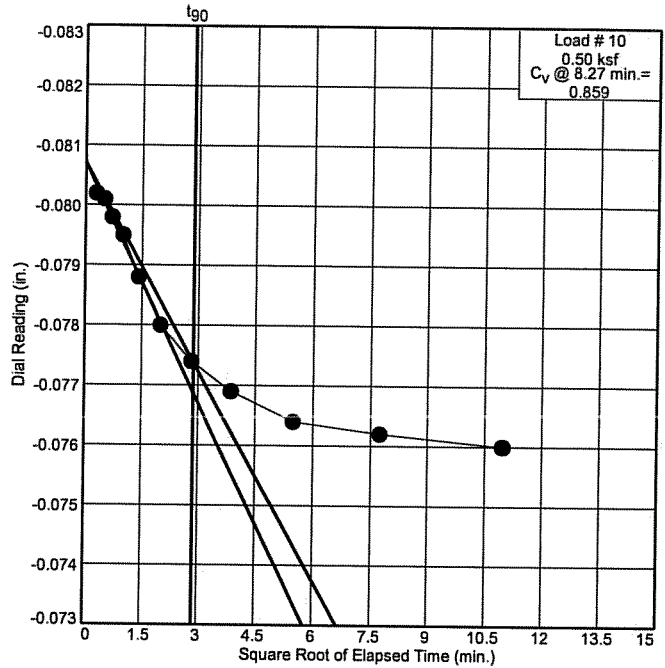
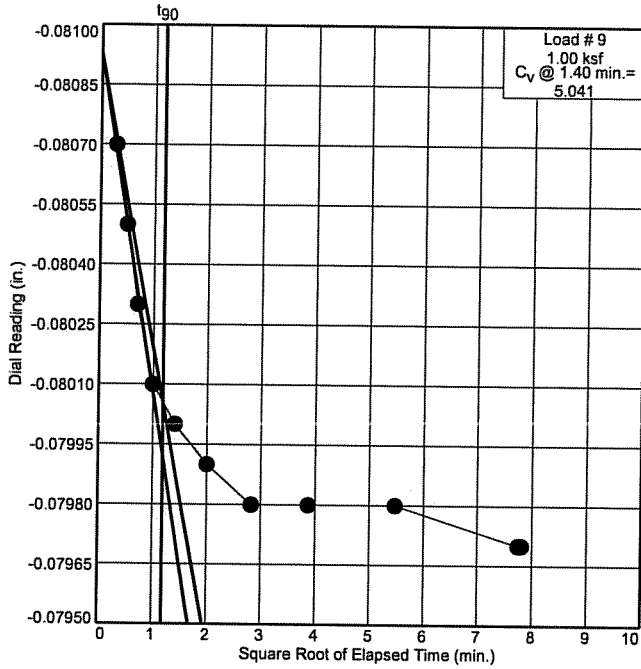
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 45'-47'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14787b

# Dial Reading vs. Time

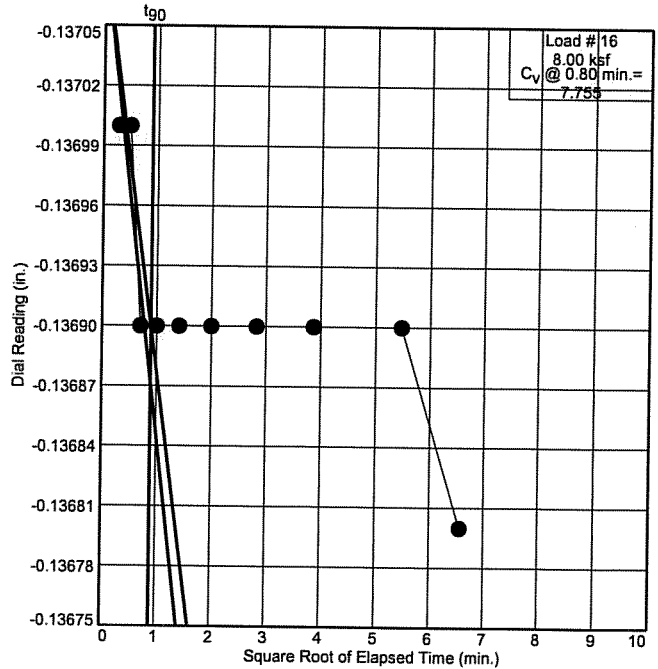
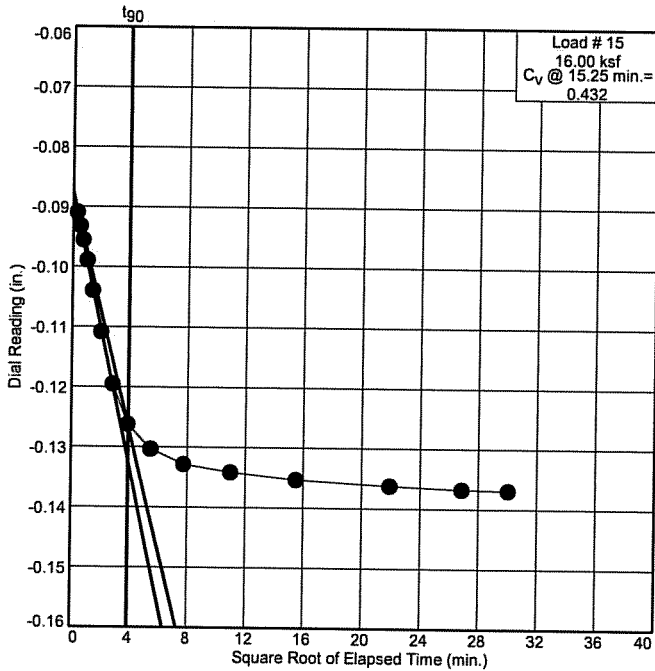
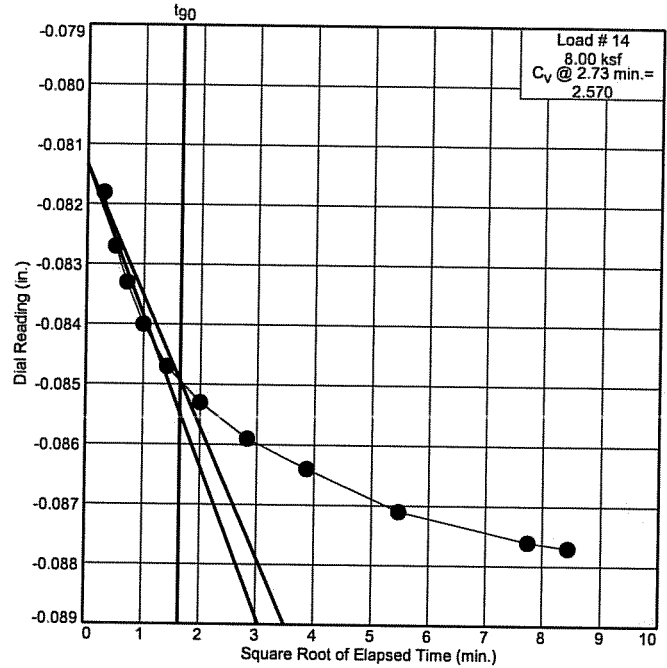
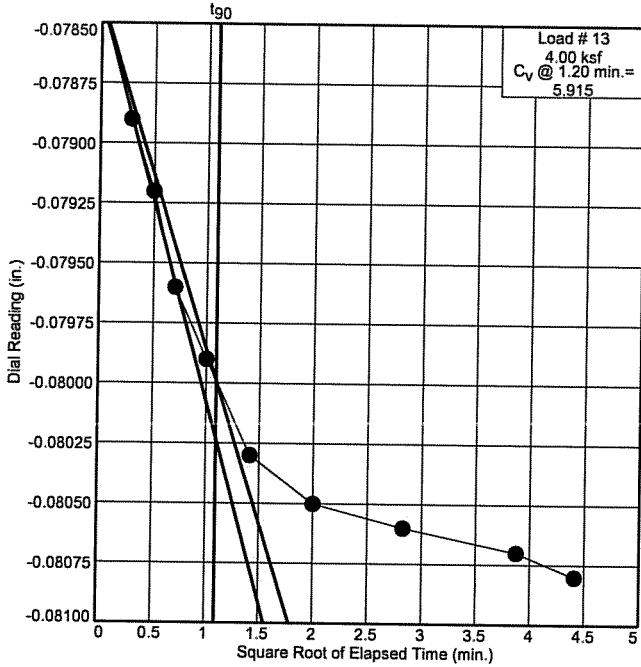
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 45'-47'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTA*

Lab No. 14788b

# Dial Reading vs. Time

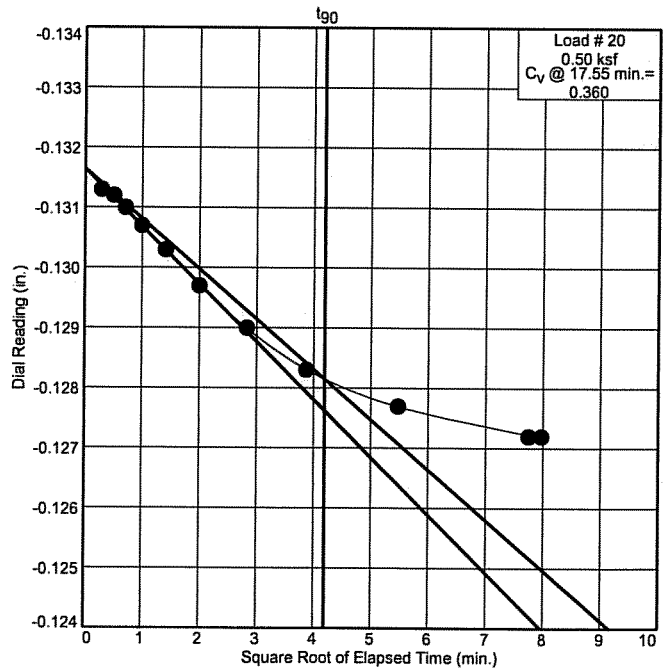
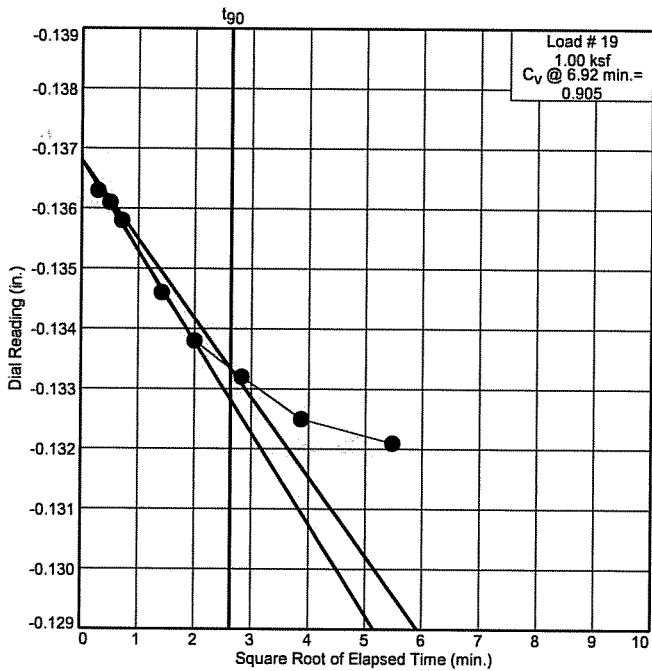
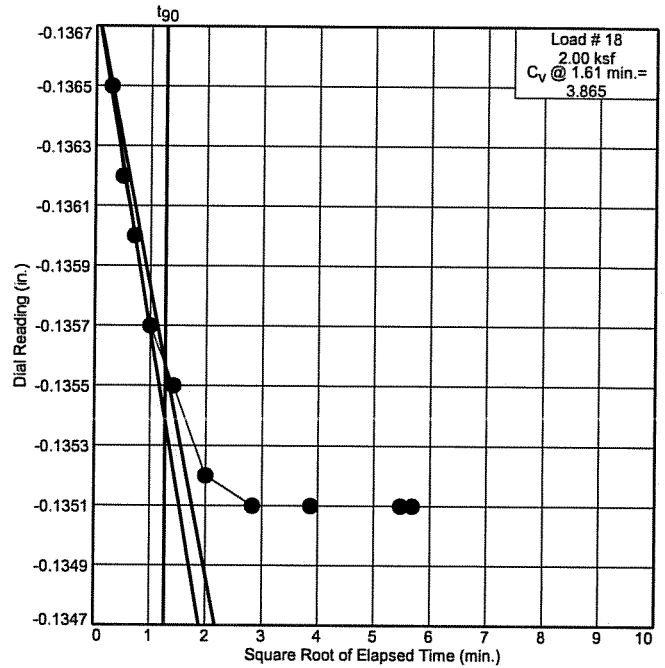
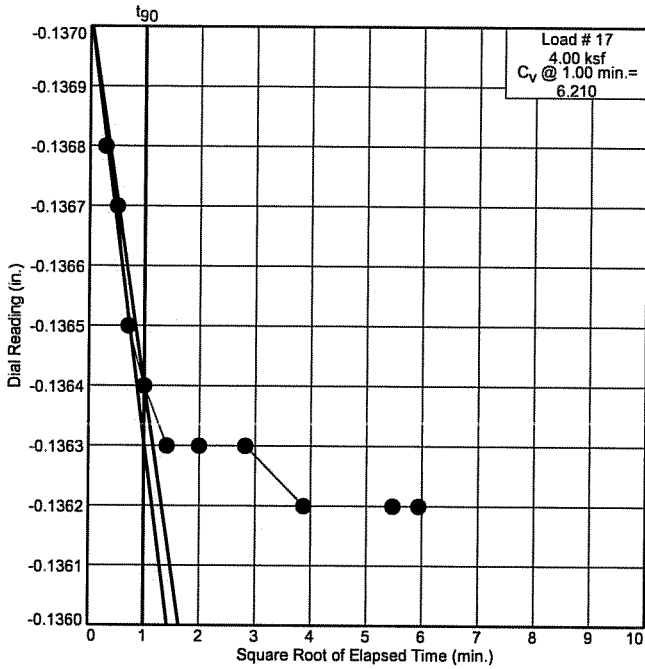
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 45'-47'

Sample Number: U-2



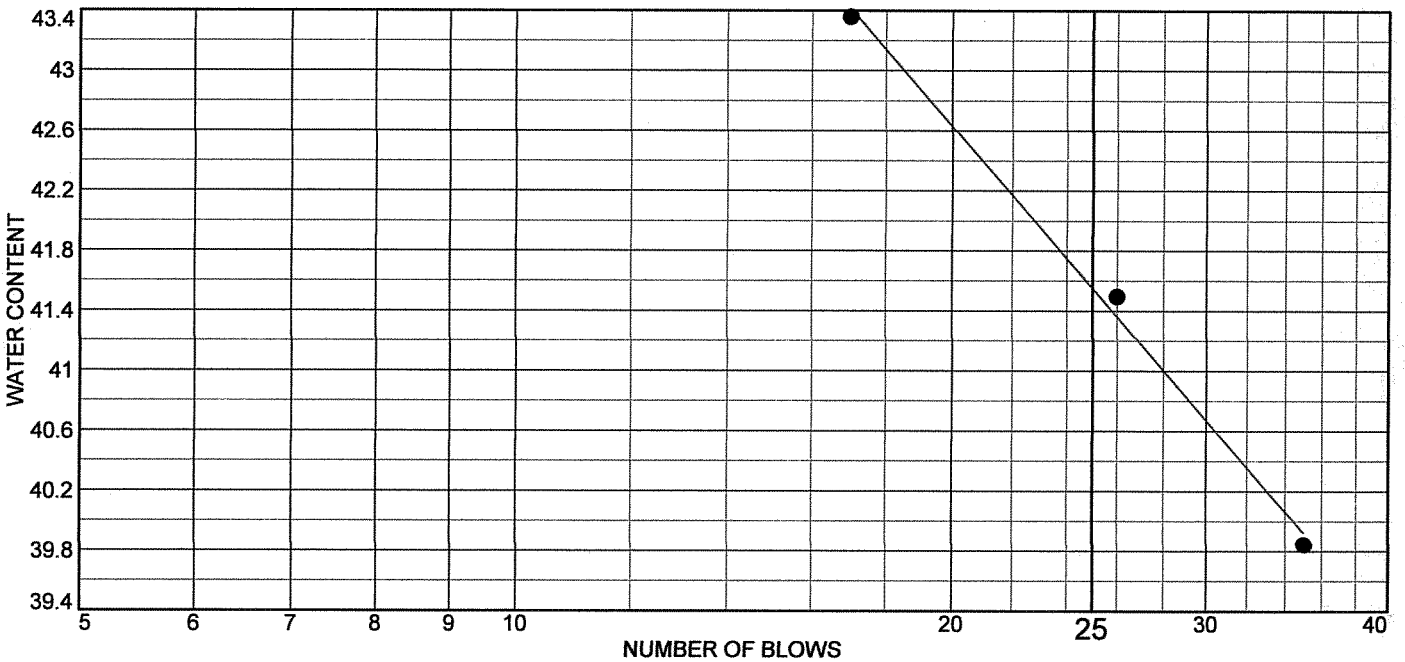
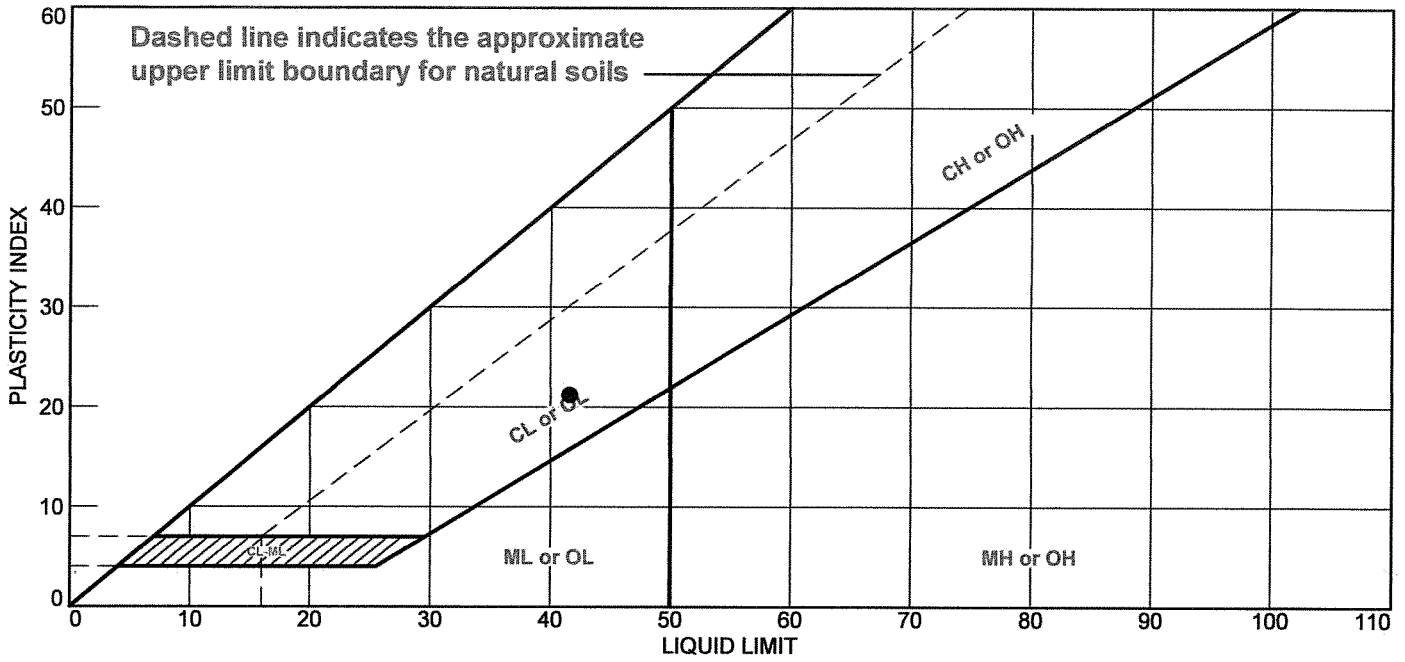
R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14789b

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Silty Clay	41.6	20.4	21.2			

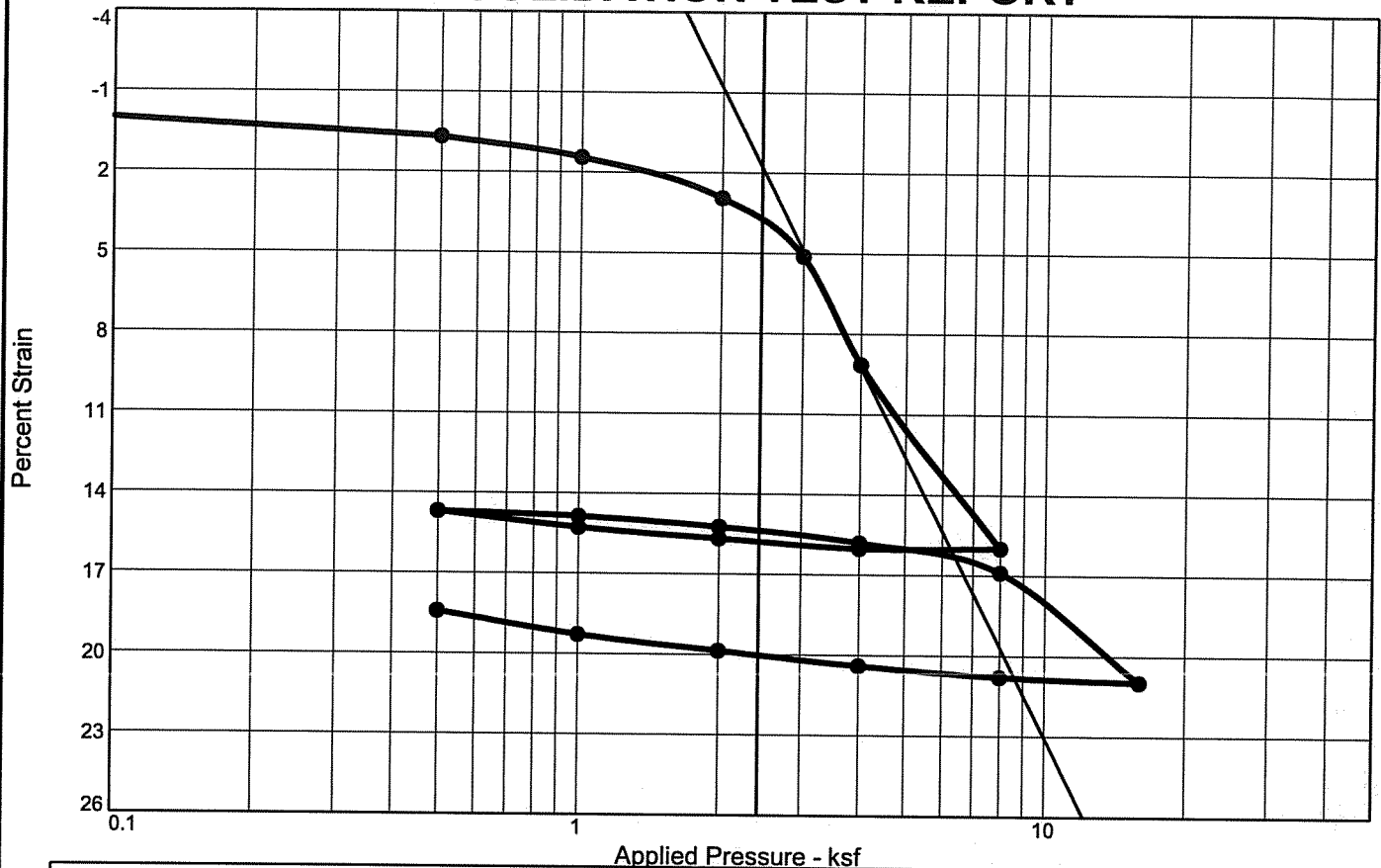
**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-102: South Portland, ME  
**Sample Number:** U-3      **Depth:** 55'-57'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 ● Natural Moisture Content: 43.8%  
  
**Lab No.** 14784c

**Tested By:** AGS

**Checked By:** MTG

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	2.463		8	2.00	0.883		15	16.00	0.236	
2	1.00	0.993		9	1.00	0.506		16	8.00	2.492	
3	2.00	0.569		10	0.50	0.120		17	4.00	1.003	
4	3.00	0.190		11	1.00	0.431		18	2.00	0.325	
5	4.00	0.034		12	2.00	0.633		19	1.00	0.153	
6	8.00	0.060		13	4.00	0.658		20	0.50	0.050	
7	4.00	2.117		14	8.00	0.655					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_o$
Sat.	Moist.											
94.9 %	43.8 %	76.7	41.6	21.2	2.75		2.8	0.79	0.09			1.269

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

<p><b>Project No.</b> 1368-009      <b>Client:</b> Schonewald Engineering Associates, Inc.</p> <p><b>Project:</b> MTA Exit 45 Reconfiguration</p> <p><b>Loc.:</b> HB-EXIT45-102: South Portland, ME      <b>Depth:</b> 55'-57'      <b>Sample No.:</b> U-3</p> <p style="text-align: center;"><b>R.W. Gillespie &amp; Associates, Inc.</b></p> <p style="text-align: center;"><b>Saco, Maine</b></p>	<p><b>Remarks:</b></p>          <p style="text-align: right;"><b>Lab No.</b> 14784c</p>
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Tested By: JRF/AGS

Checked By: MTG *MTG*

# Dial Reading vs. Time

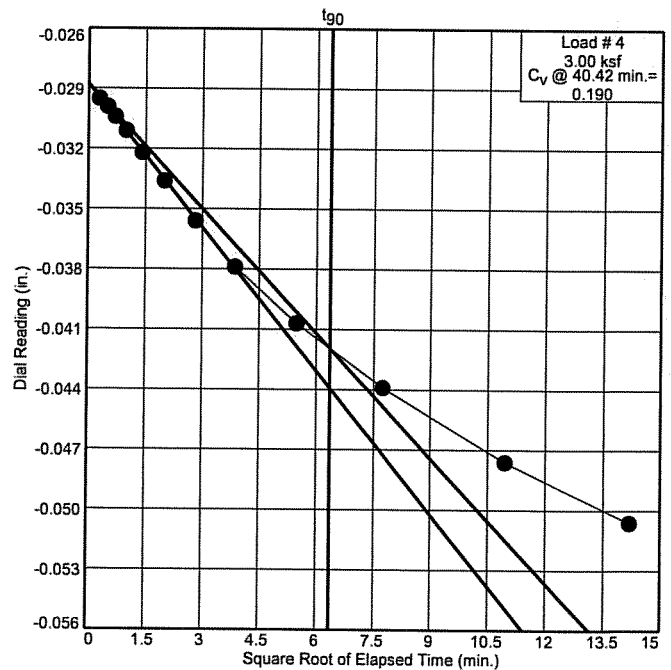
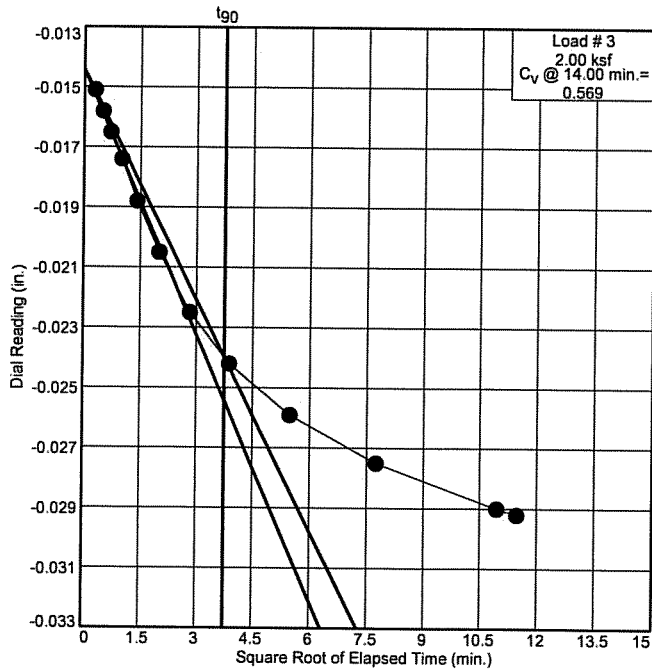
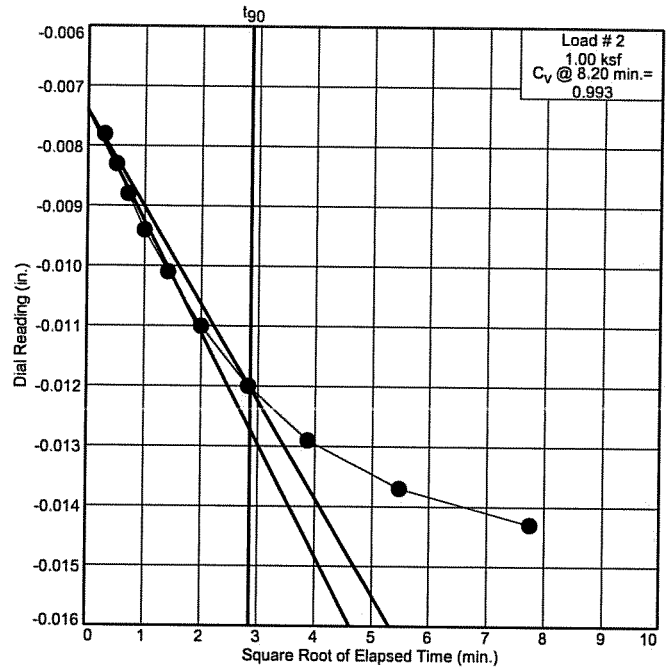
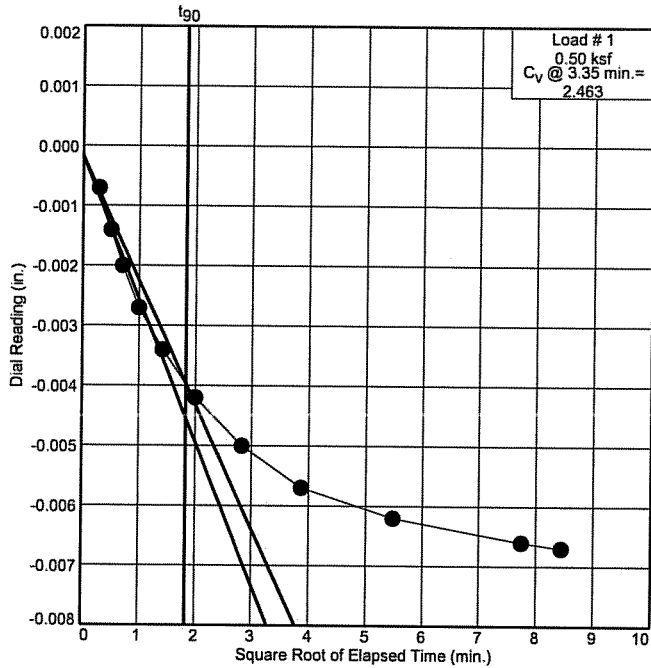
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 55'-57'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14785c

# Dial Reading vs. Time

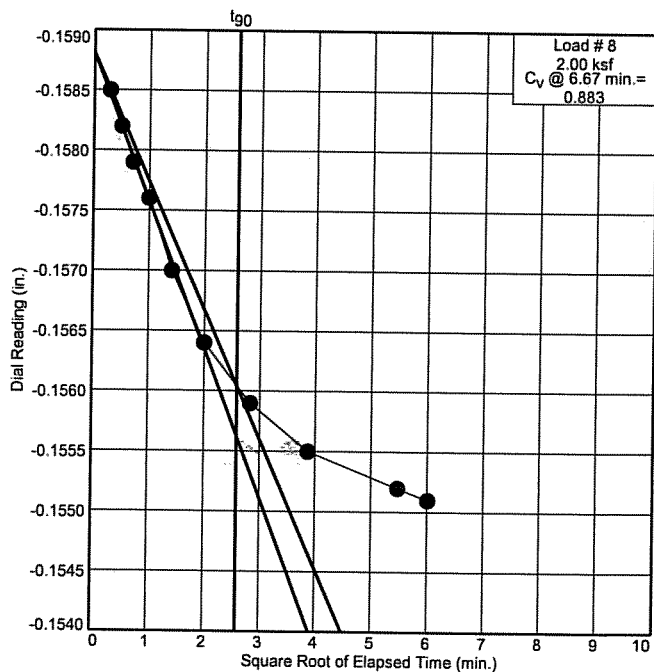
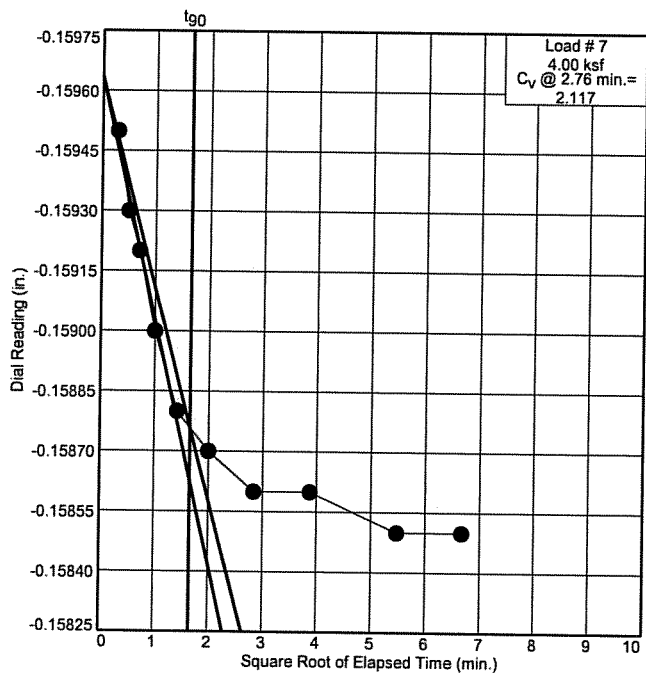
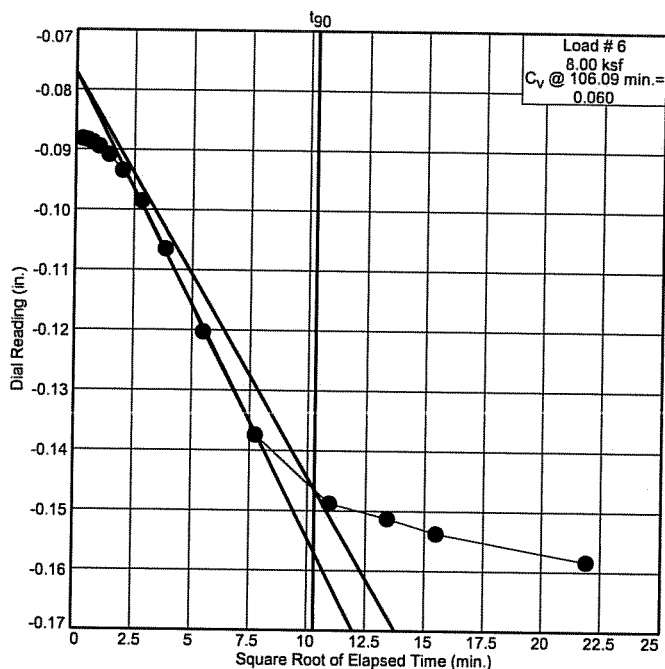
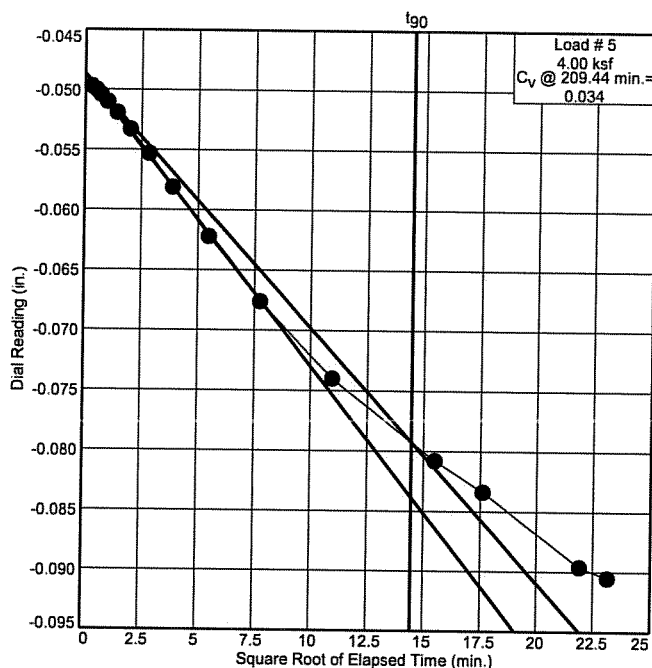
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 55'-57'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14786c

# Dial Reading vs. Time

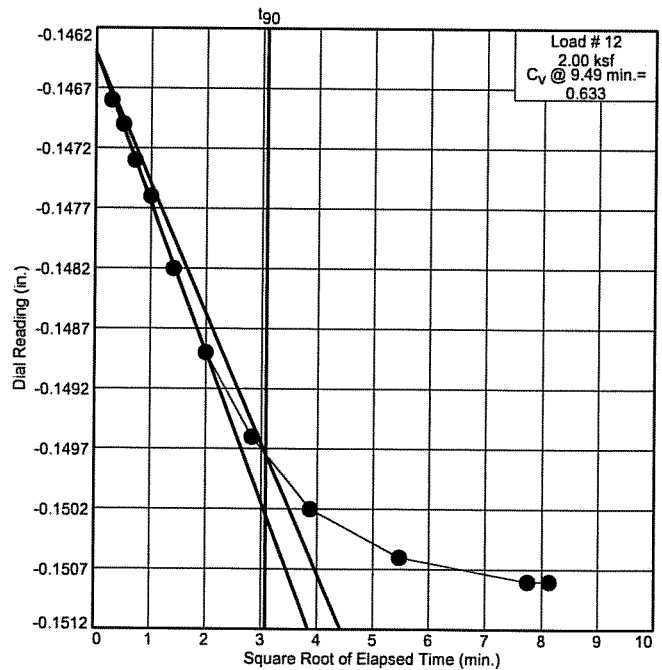
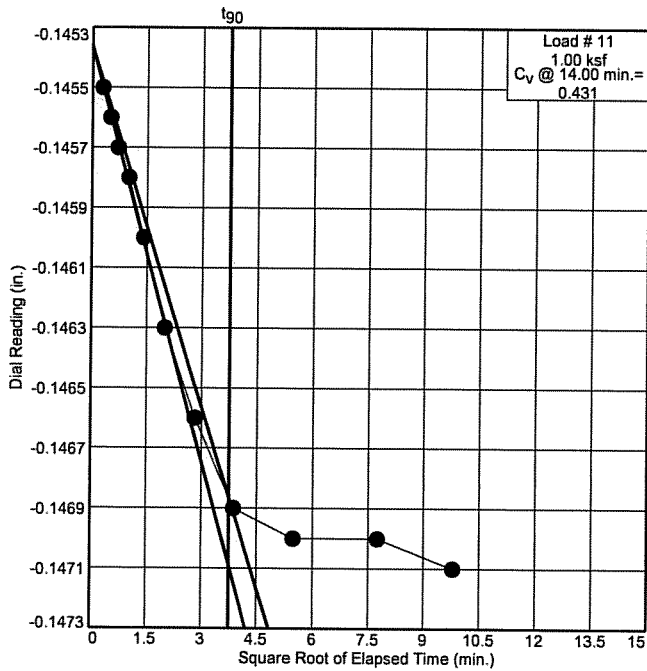
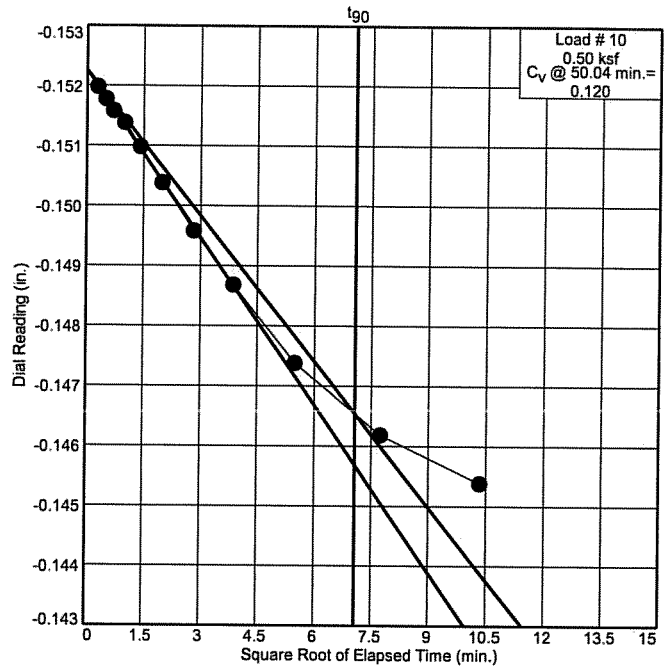
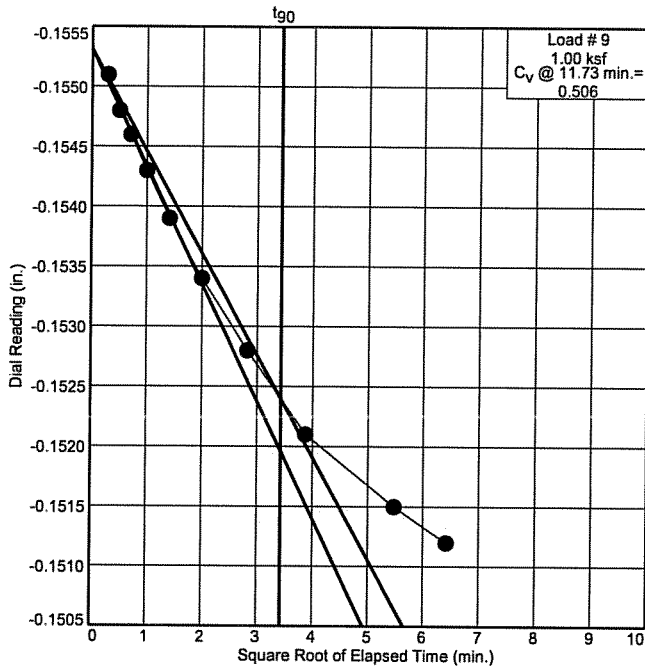
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 55'-57'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MRB*  
Lab No. 14787c



# Dial Reading vs. Time

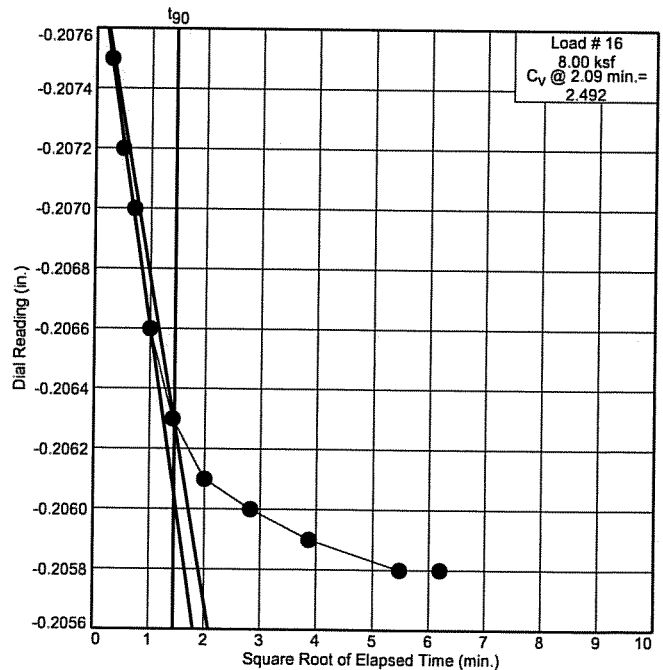
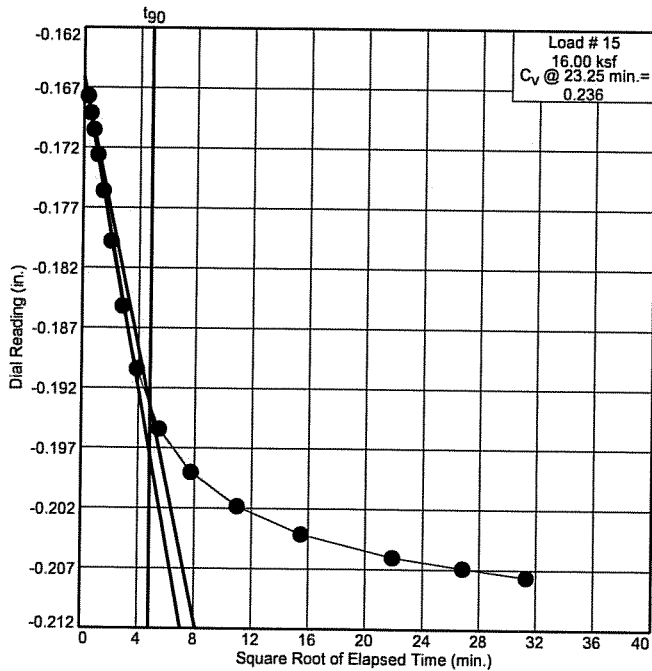
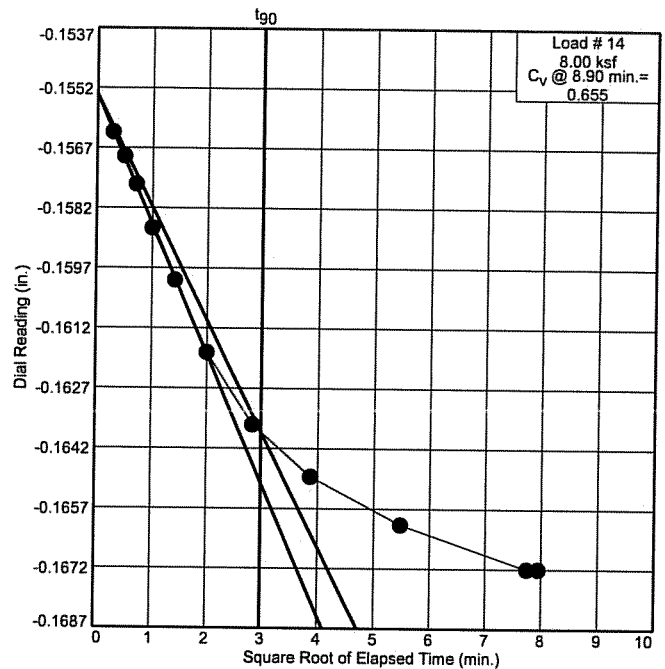
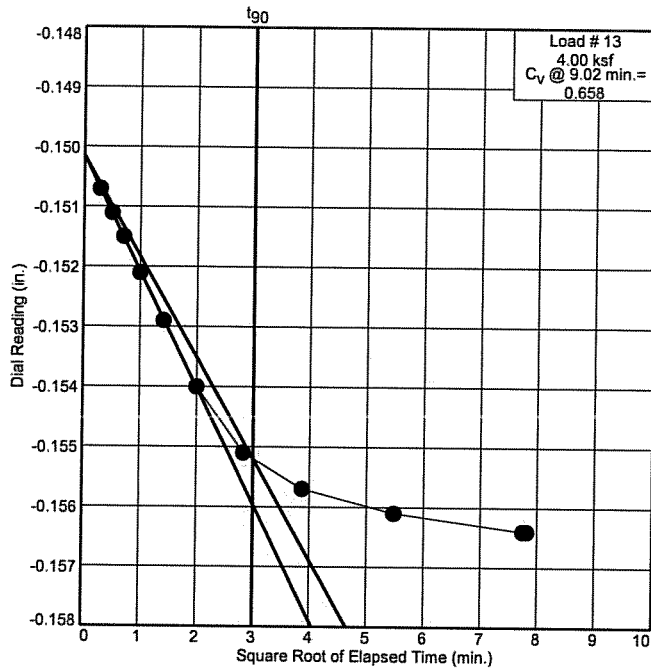
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 55'-57'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14788c

# Dial Reading vs. Time

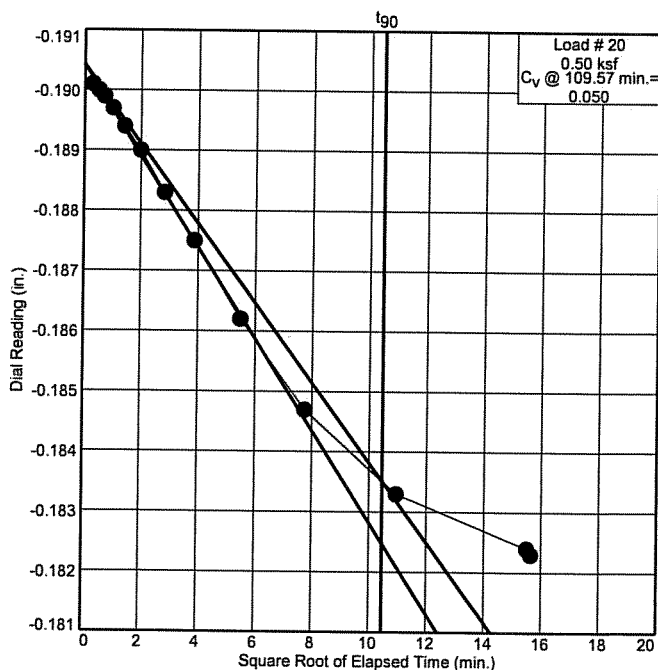
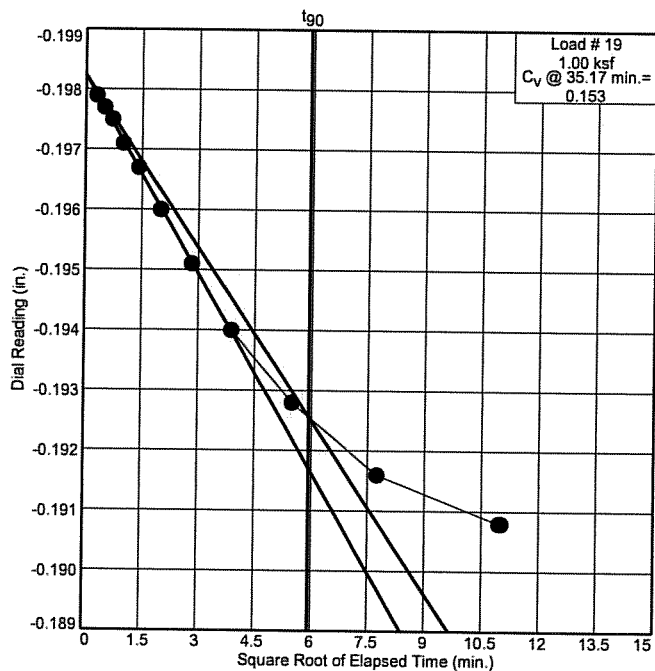
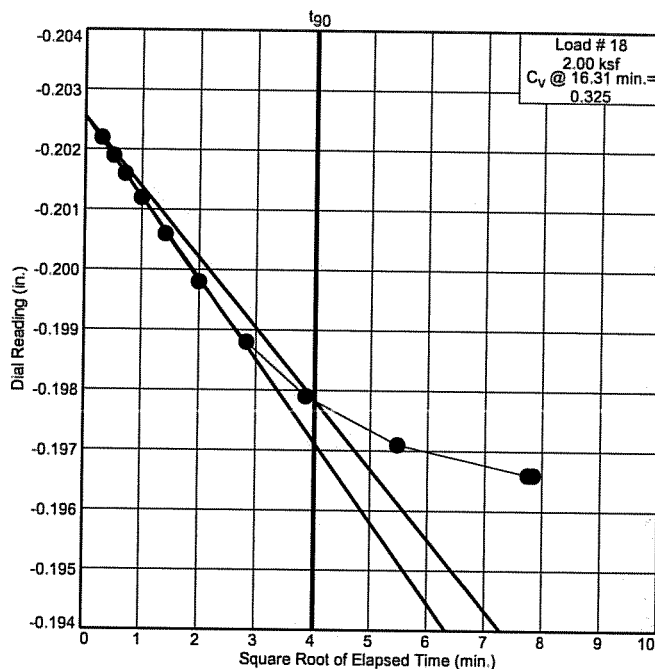
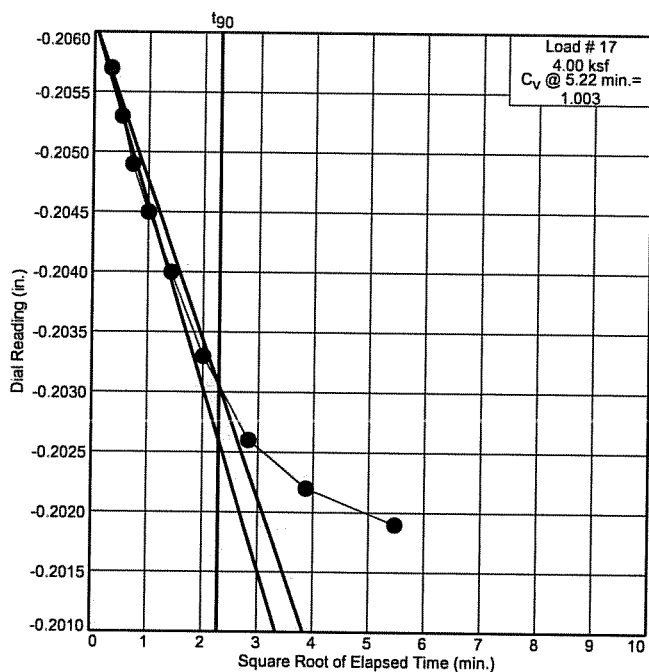
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 55'-57'

Sample Number: U-3



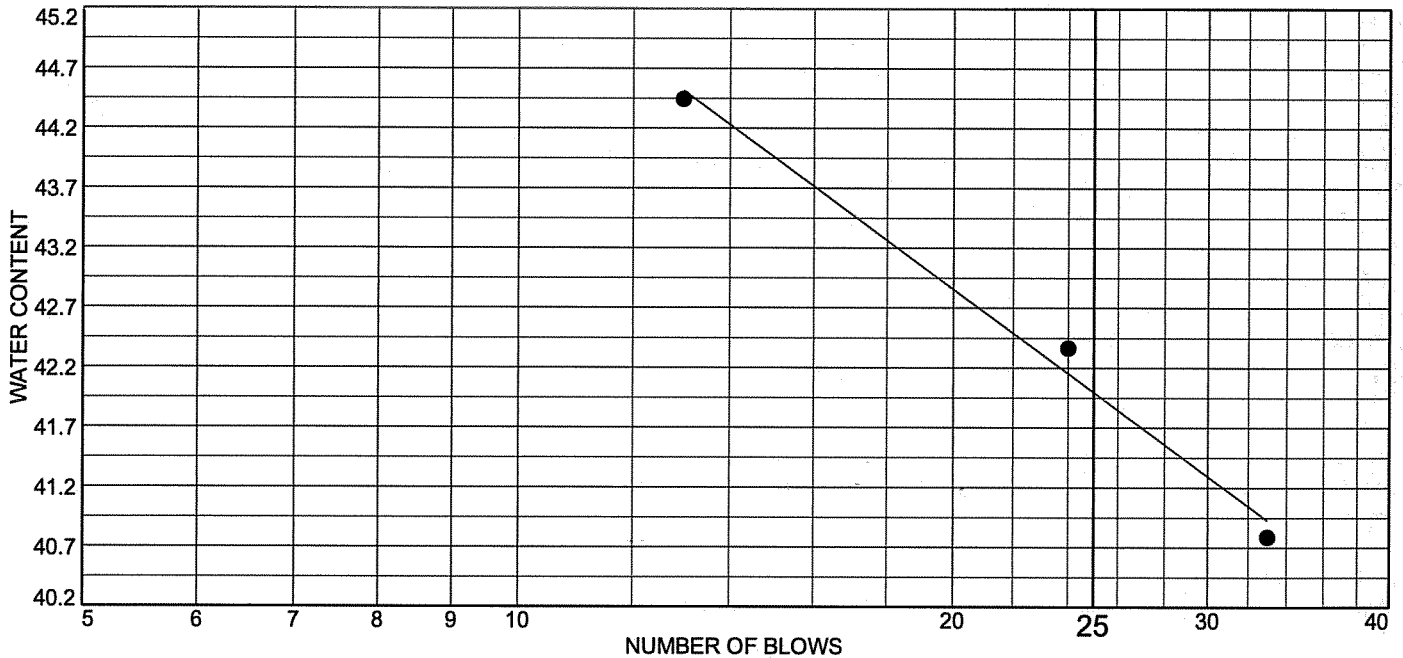
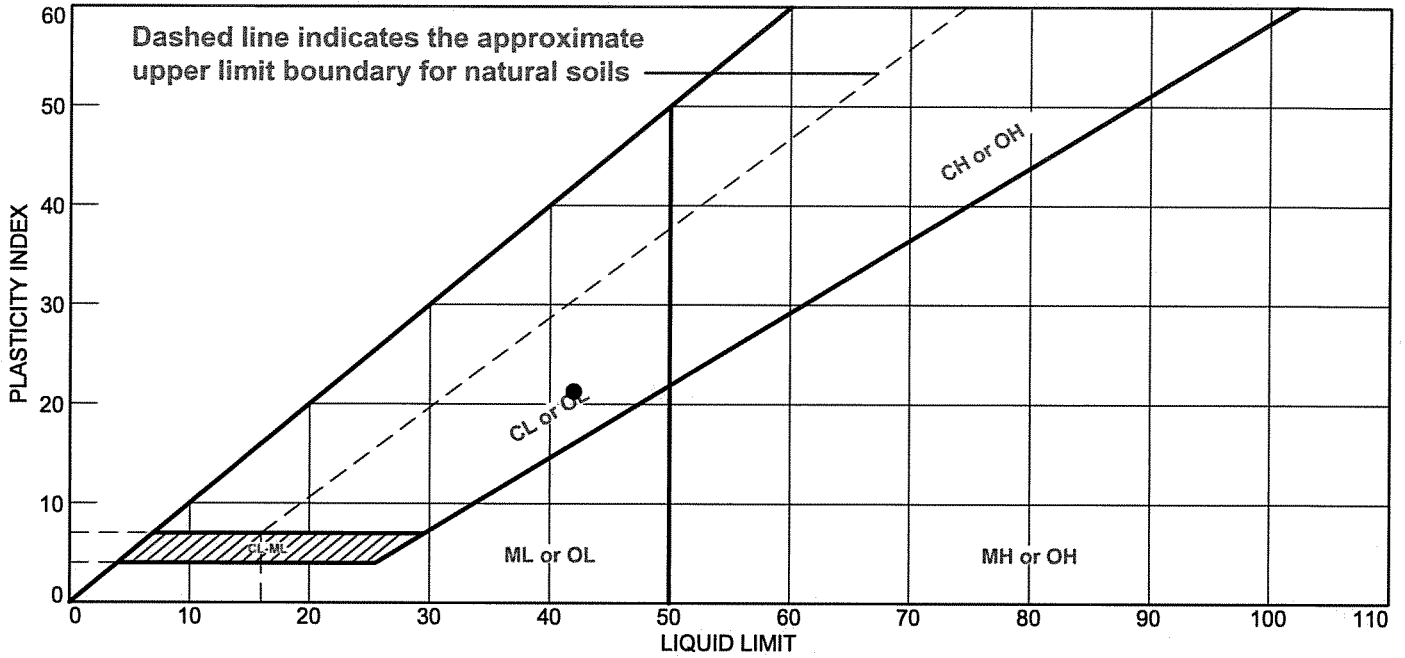
R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14789c

# LIQUID AND PLASTIC LIMITS TEST REPORT



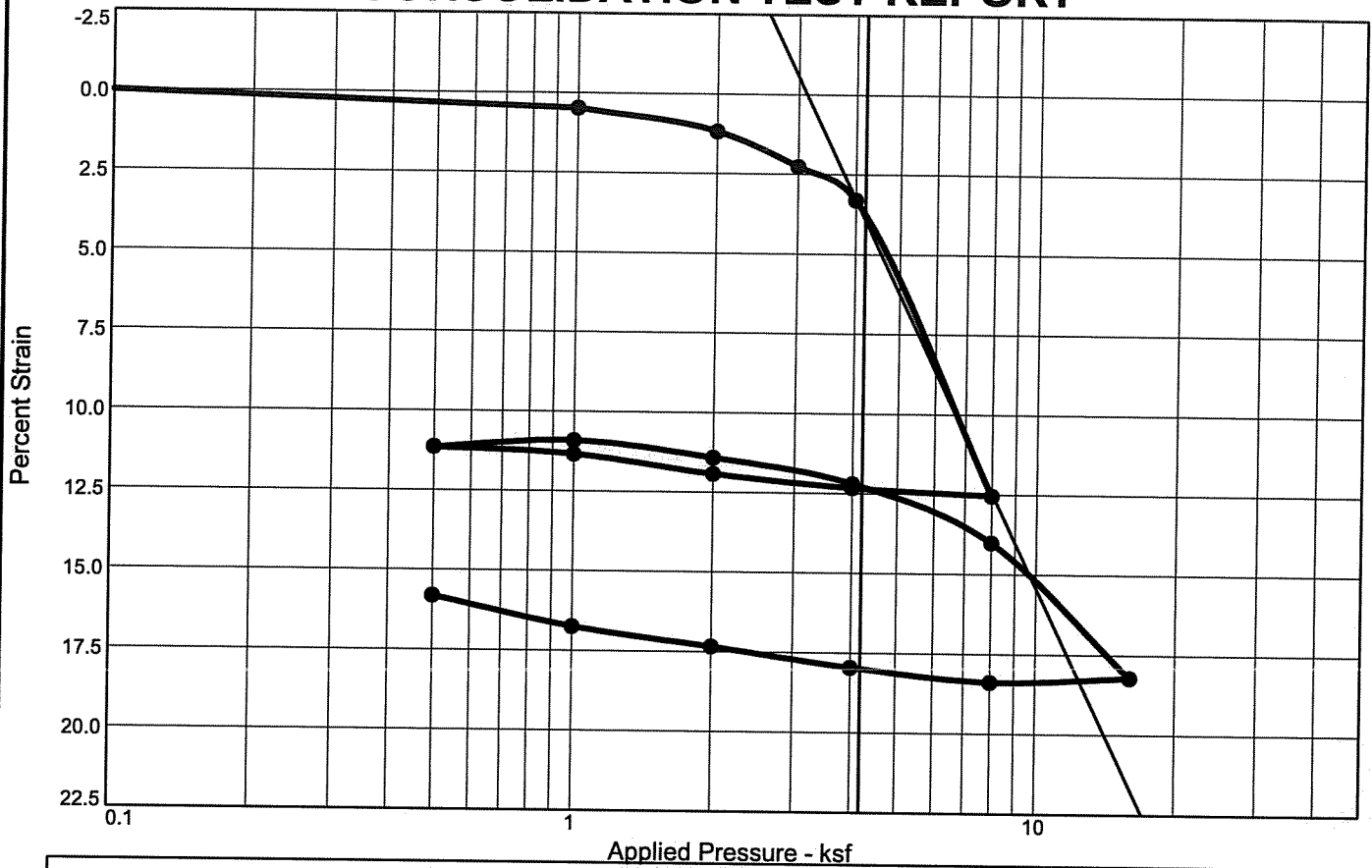
MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	42.0	20.7	21.3			

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-102: South Portland, ME  
**Sample Number:** U-4      **Depth:** 65'-67'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Natural Moisture Content: 40.9%  
**Lab No.** 14784d

**Tested By:** AGS      **Checked By:** MTG *MTG*

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	1.00	1.008		8	1.00	0.363		15	8.00	3.292	
2	2.00	1.490		9	0.50	0.160		16	4.00	0.946	
3	3.00	0.641		10	1.00	2.720		17	2.00	0.343	
4	4.00	0.508		11	2.00	0.610		18	1.00	0.182	
5	8.00	0.082		12	4.00	0.703		19	0.50	0.081	
6	4.00	2.002		13	8.00	0.606					
7	2.00	0.882		14	16.00	0.332					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_o$
Sat.	Moist.											
101.9 %	45.1 %	77.5	42.0	21.3	2.75		4.1	0.68	0.11			1.218

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

<p><b>Project No.</b> 1368-009      <b>Client:</b> Schonewald Engineering Associates, Inc.</p> <p><b>Project:</b> MTA Exit 45 Reconfiguration</p> <p><b>Loc.:</b> HB-EXIT45-102: South Portland, ME      <b>Depth:</b> 65'-67'      <b>Sample No.:</b> U-4</p> <p style="text-align: center;"><b>R.W. Gillespie &amp; Associates, Inc.</b></p> <p style="text-align: center;"><b>Saco, Maine</b></p>	<p><b>Remarks:</b></p> <p style="text-align: right;"><b>Lab No.</b> 14784d</p>
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Tested By: JRF/AGS

Checked By: MTG *MTG*

# Dial Reading vs. Time

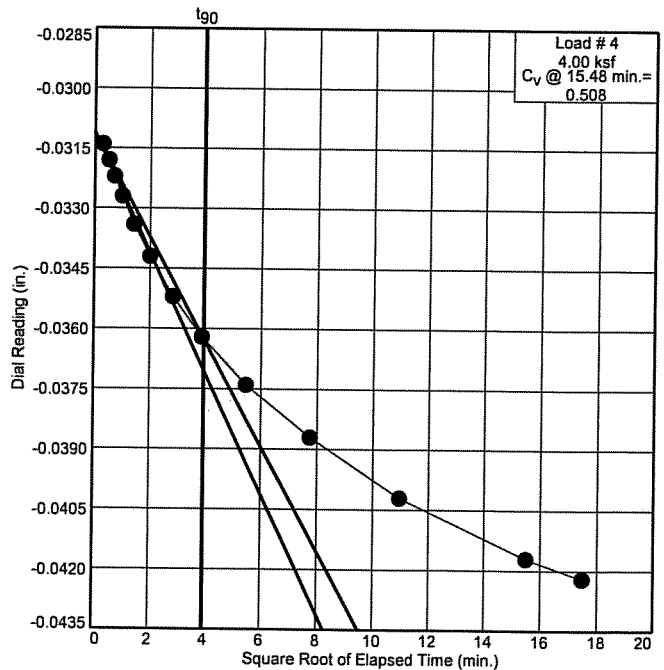
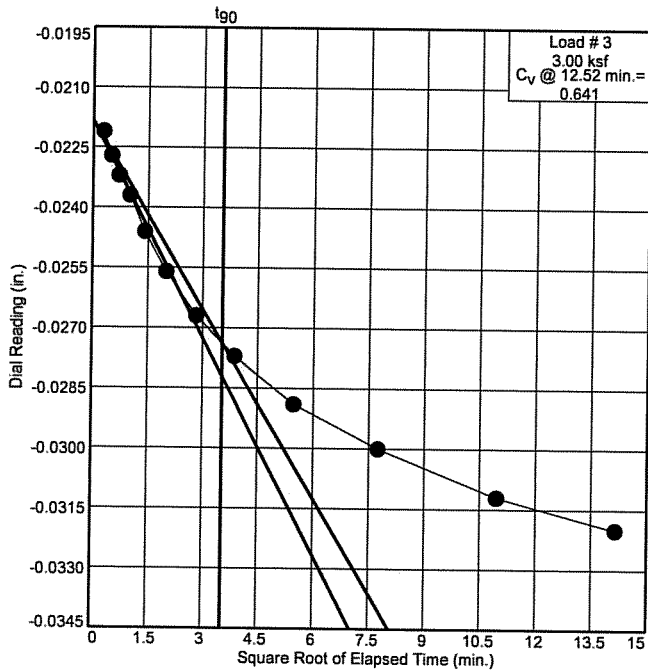
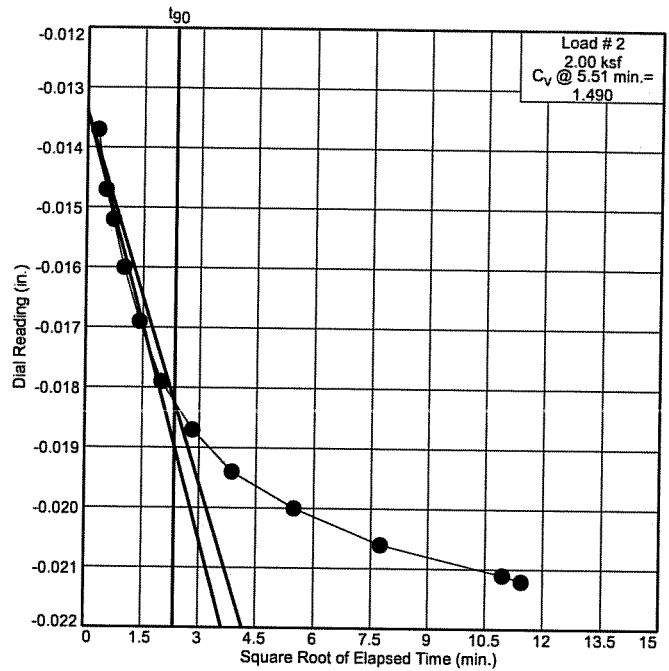
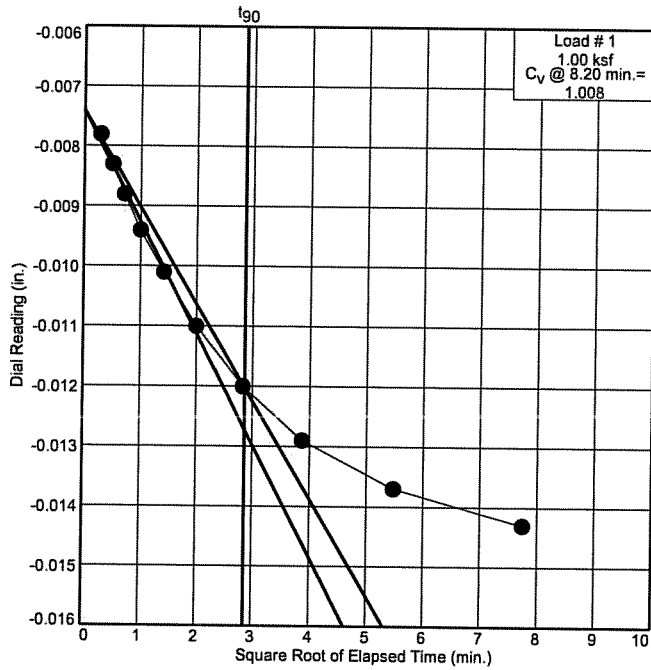
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 65'-67'

Sample Number: U-4



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MB*

Lab No. 14785d

# Dial Reading vs. Time

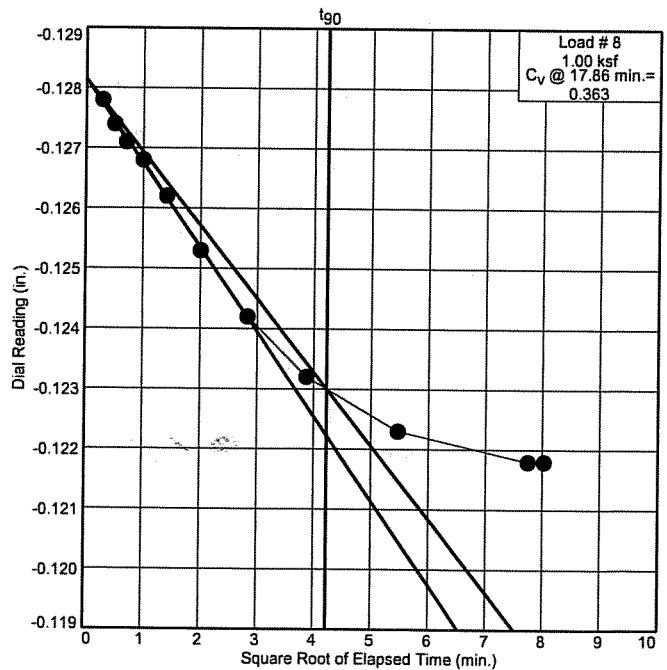
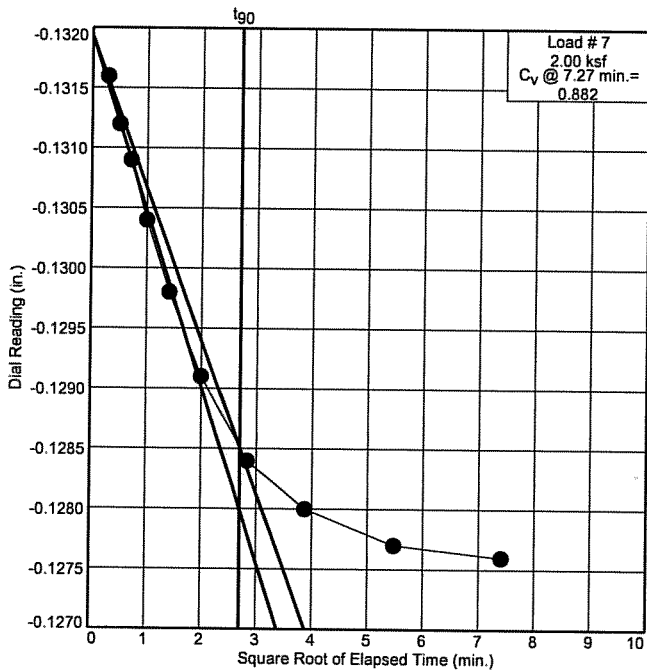
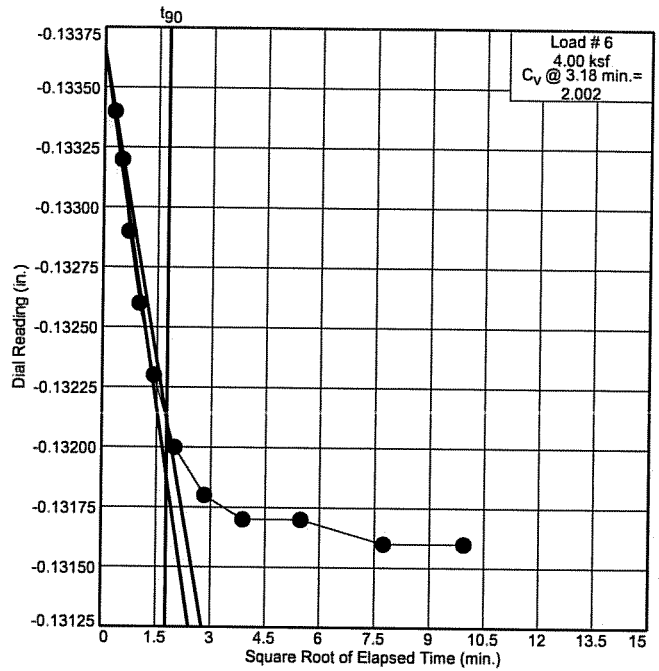
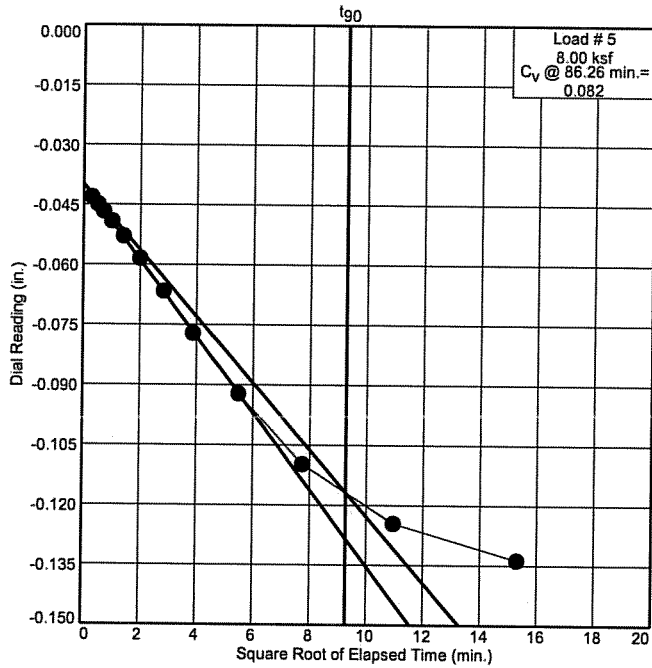
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 65'-67'

Sample Number: U-4



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14786d

# Dial Reading vs. Time

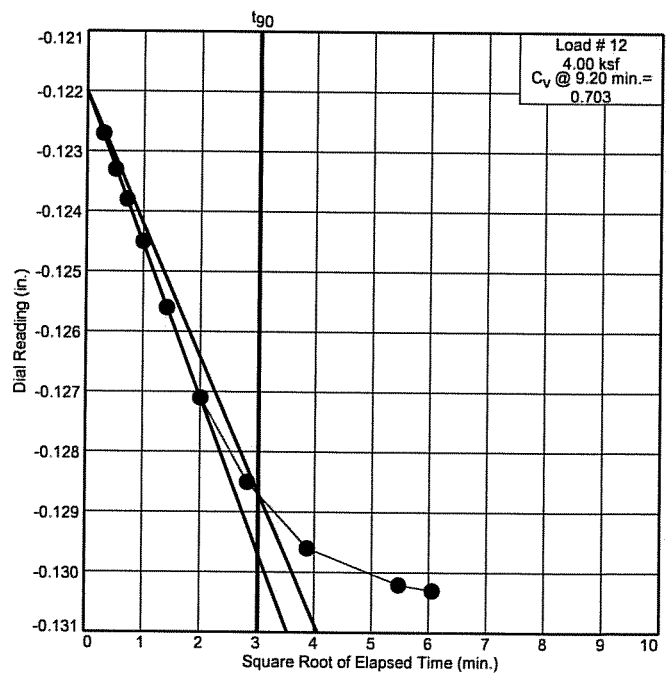
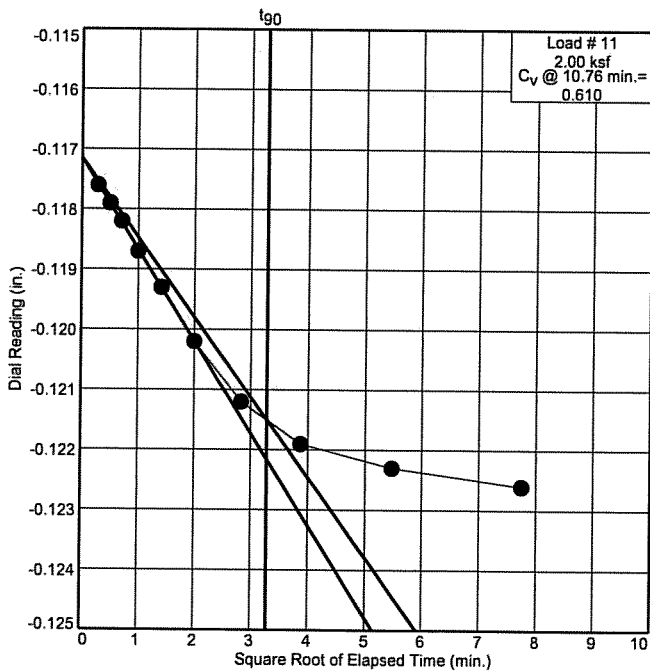
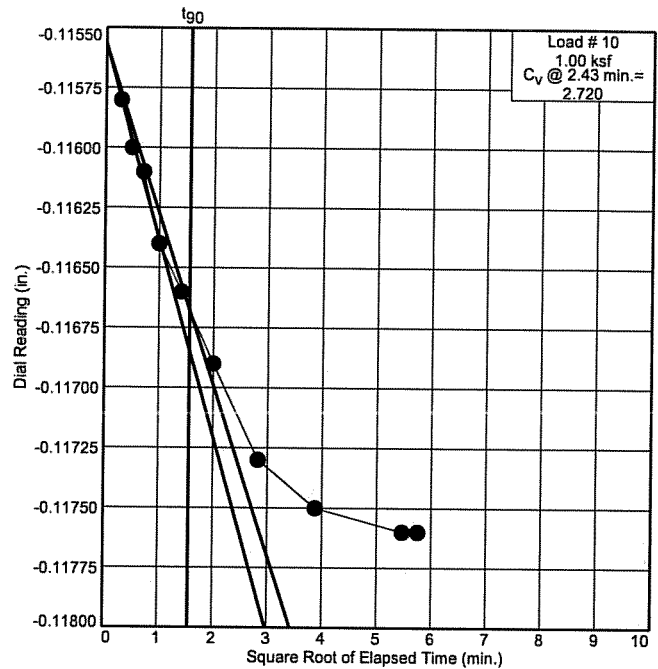
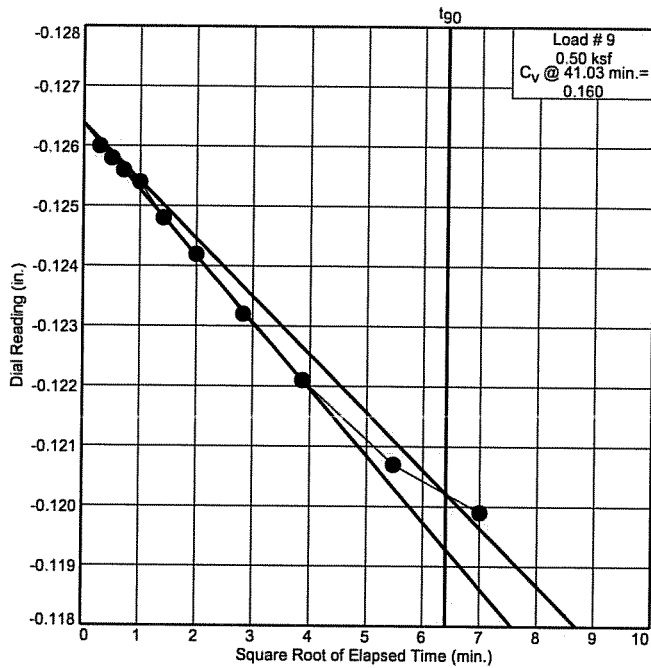
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 65'-67'

Sample Number: U-4



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MB*

Lab No. 14787d

# Dial Reading vs. Time

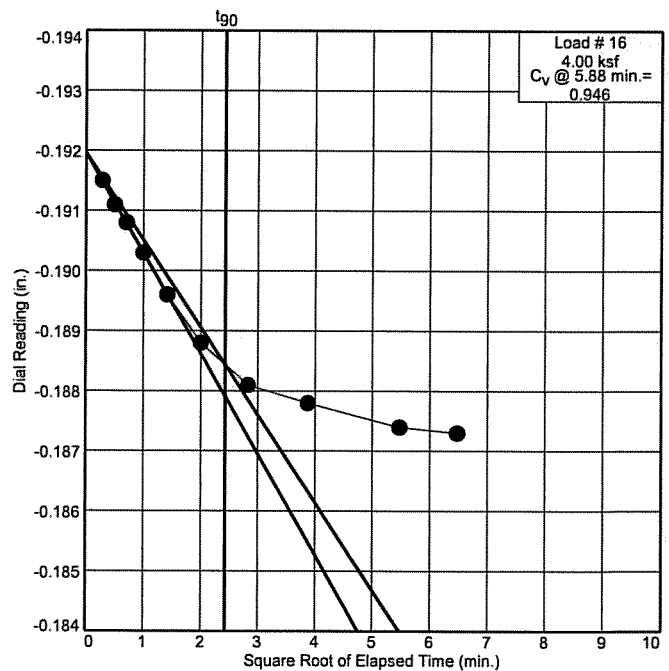
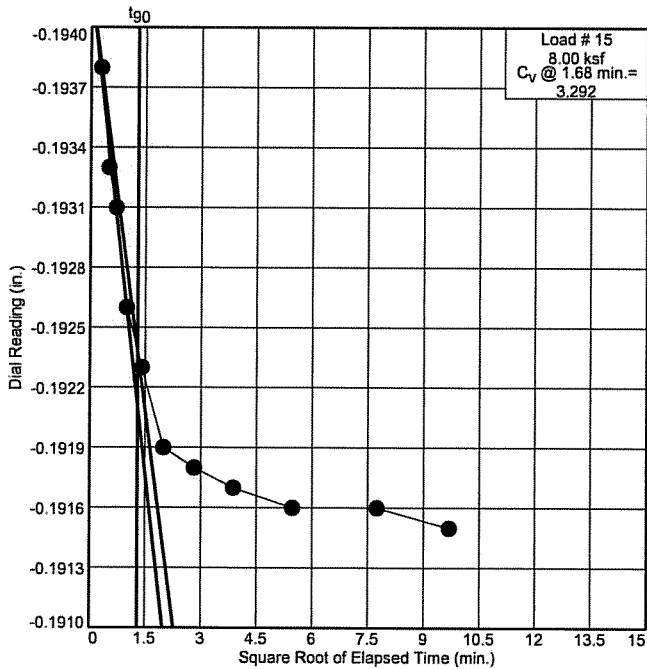
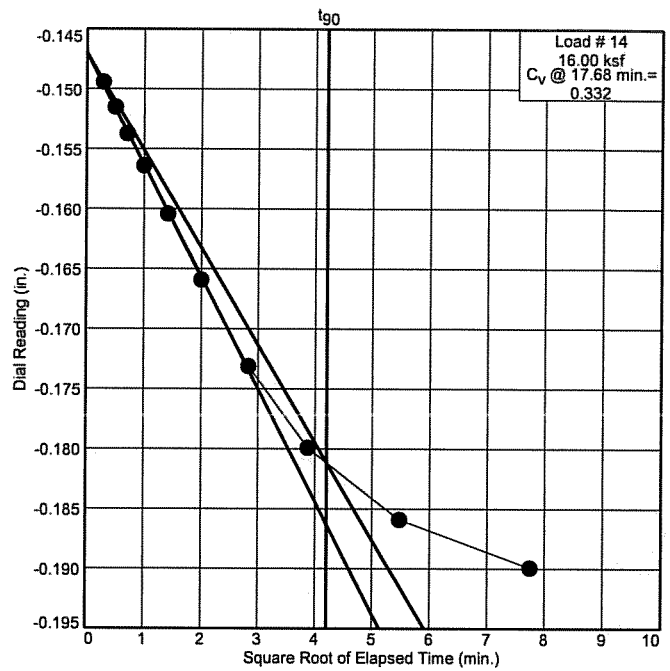
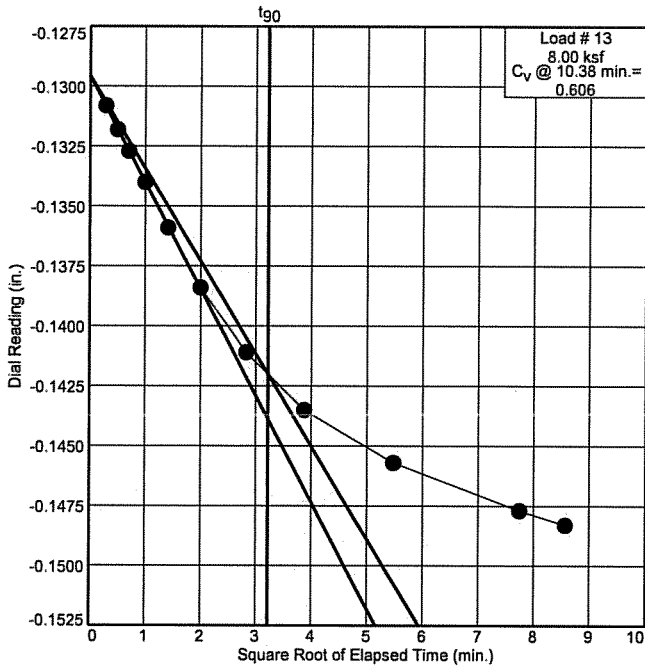
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 65'-67'

Sample Number: U-4



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14788d



# Dial Reading vs. Time

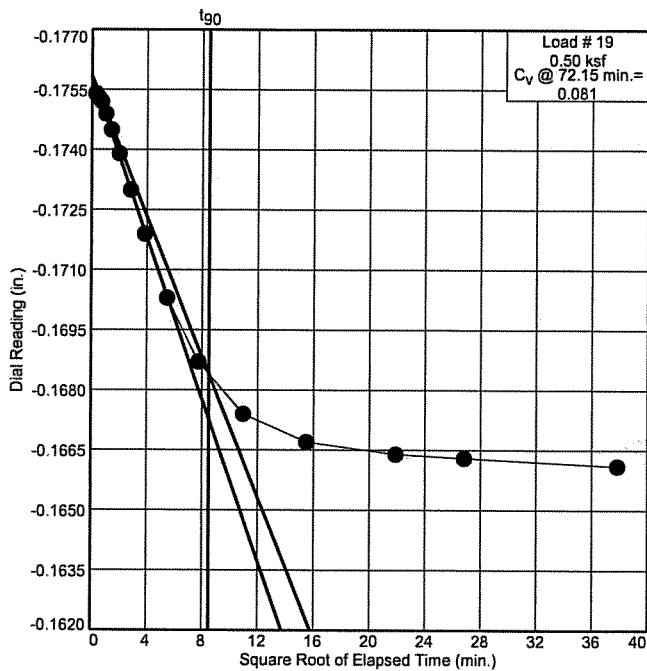
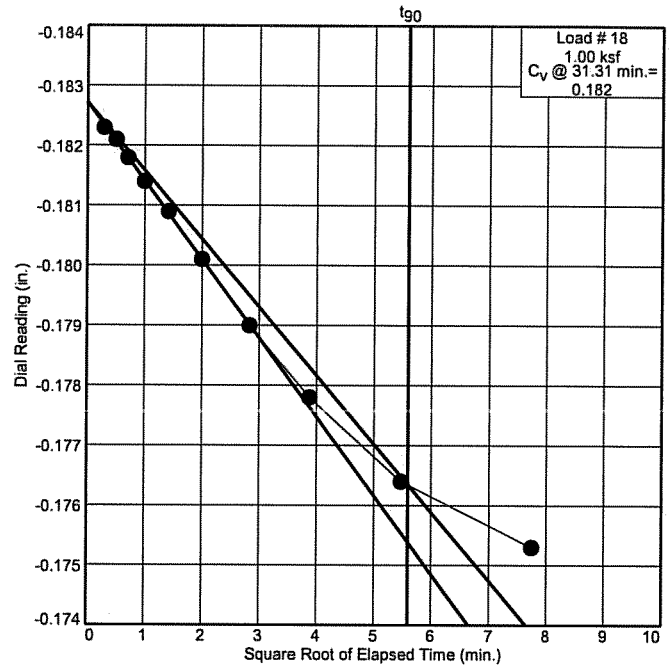
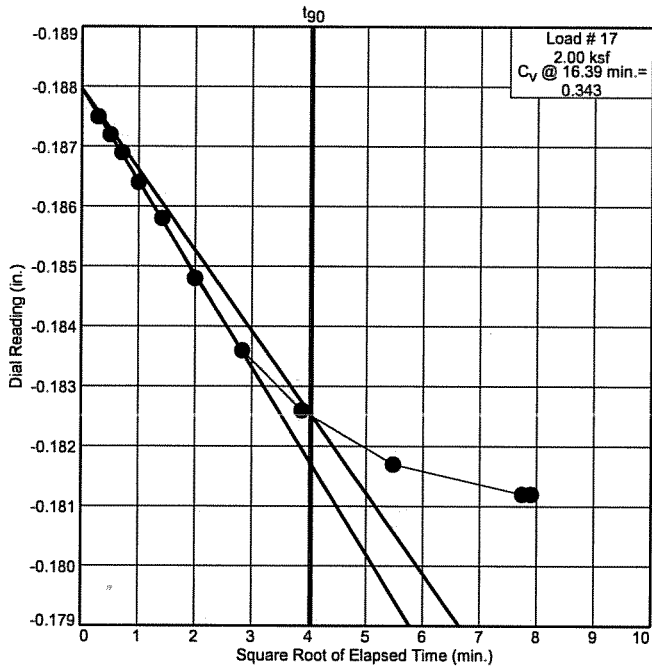
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 65'-67'

Sample Number: U-4



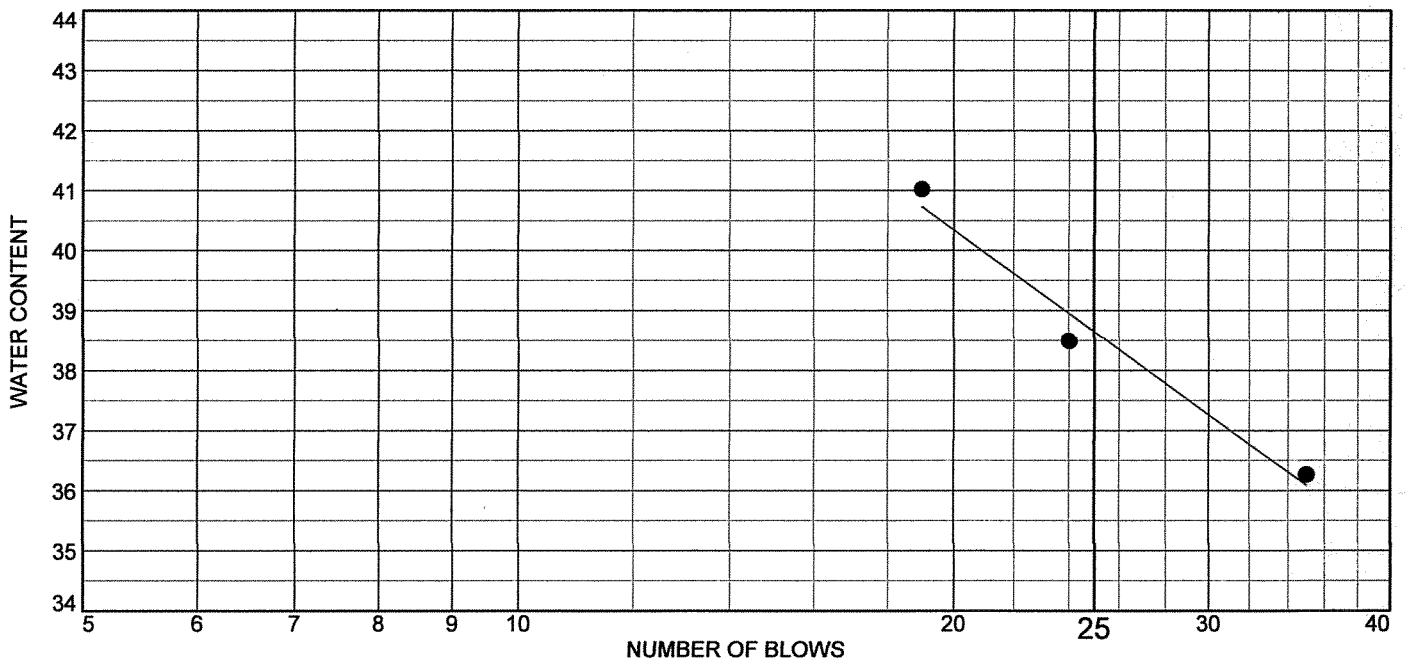
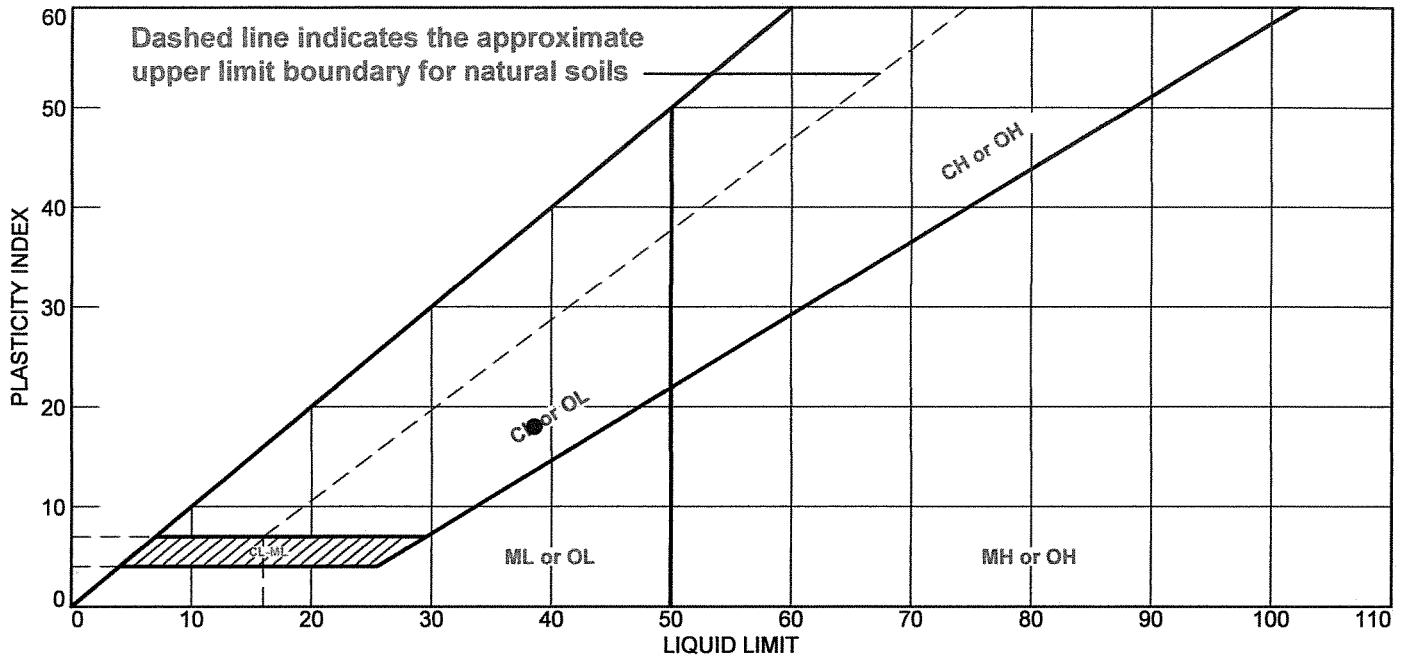
R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14789d

# LIQUID AND PLASTIC LIMITS TEST REPORT

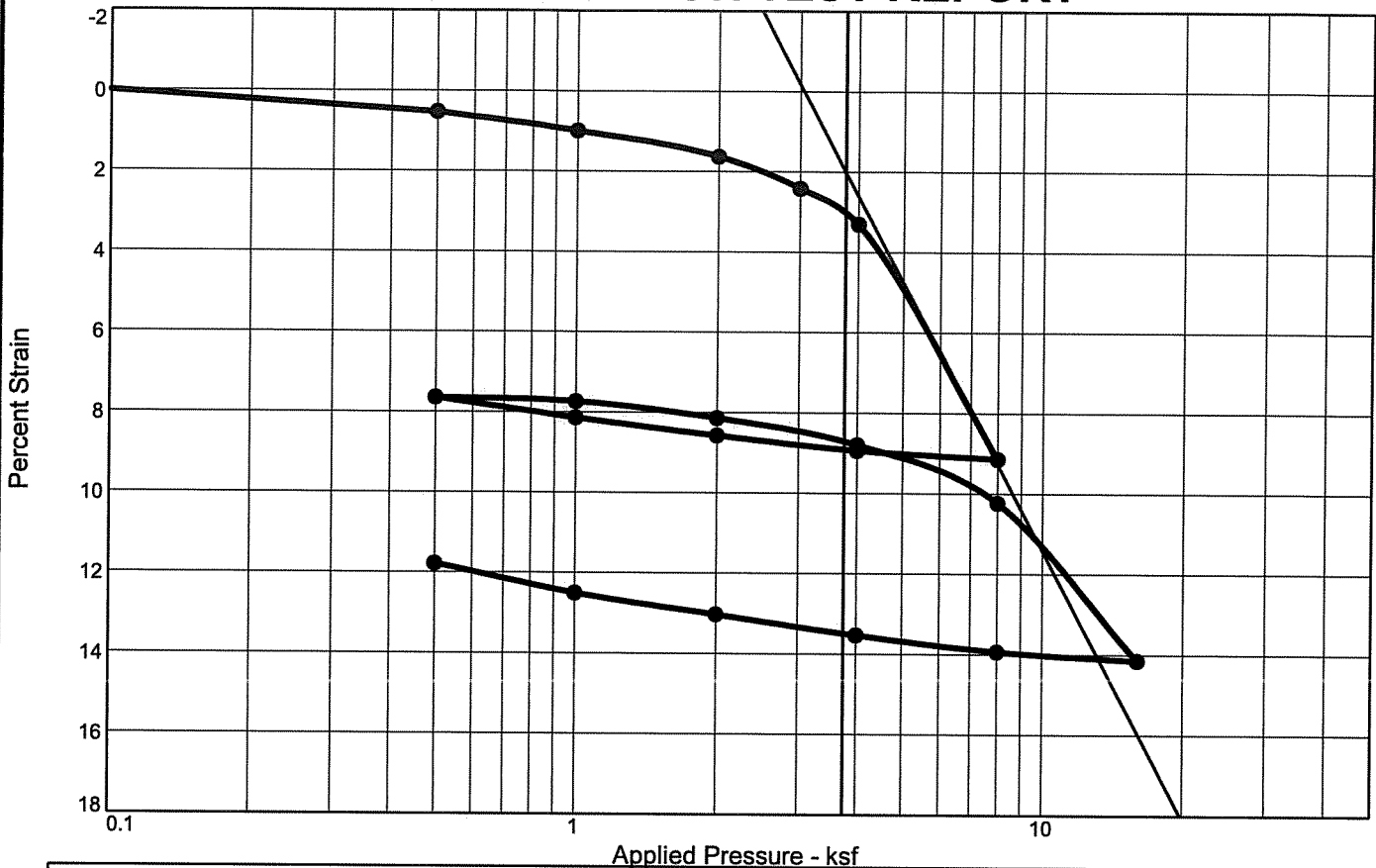


MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	38.6	20.6	18.0			

**Project No.** 1368-009    **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-102: South Portland, ME  
**Sample Number:** U-5    **Depth:** 75'-77'  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
 • Natural Moisture: 40.6%  
**Lab No.** 14784e

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	1.346		8	2.00	2.973		15	16.00	0.722	
2	1.00	1.430		9	1.00	1.050		16	8.00	5.833	
3	2.00	3.273		10	0.50	0.384		17	4.00	3.086	
4	3.00	1.943		11	1.00	1.293		18	2.00	1.186	
5	4.00	0.895		12	2.00	1.390		19	1.00	0.414	
6	8.00	0.449		13	4.00	1.581		20	0.50	0.194	
7	4.00	7.087		14	8.00	1.462					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_o$
Sat.	Moist.											
102.6 %	36.9 %	86.3	38.6	18.0	2.75		4.3	0.44	0.09			0.990

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Loc.:** HB-EXIT45-102: South Portland, ME      **Depth:** 75'-77'      **Sample No.:** U-5  
**R.W. Gillespie & Associates, Inc.**  
**Saco, Maine**

**Remarks:**  
  
  
  
  
  
  
  
  
  
**Lab No.** 14784e

**Tested By:** AGS, JRF      **Checked By:** MTG *MTG*

# Dial Reading vs. Time

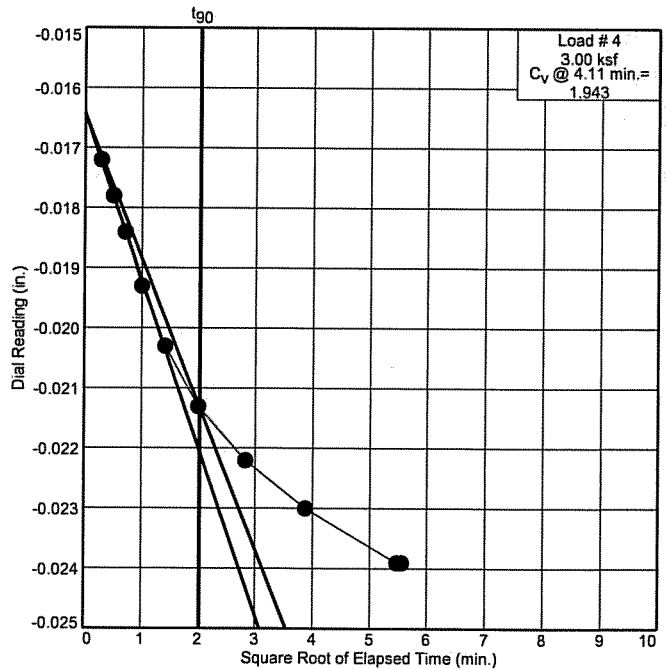
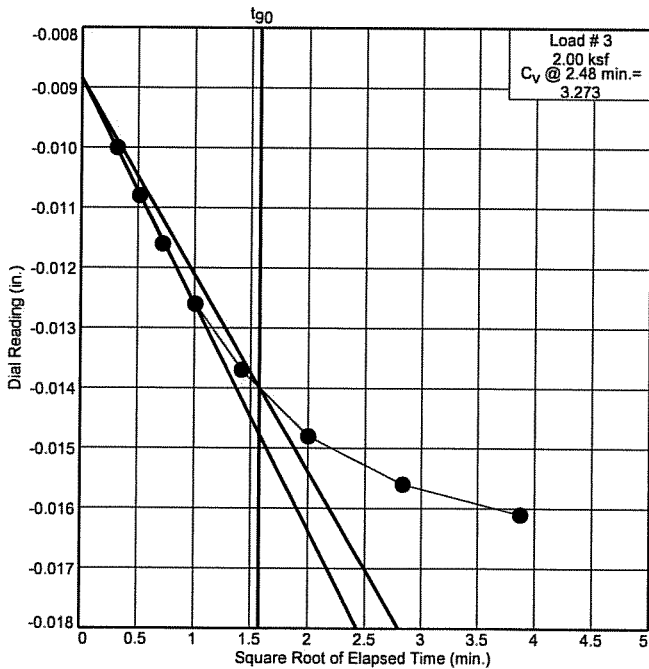
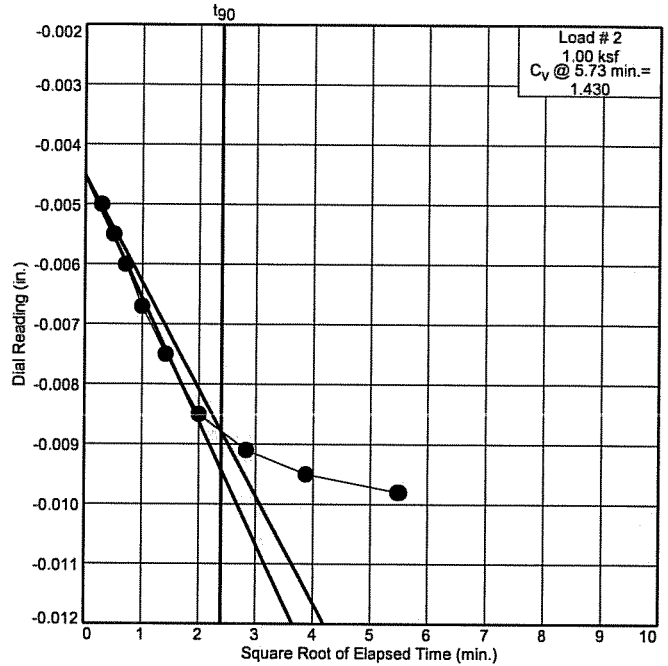
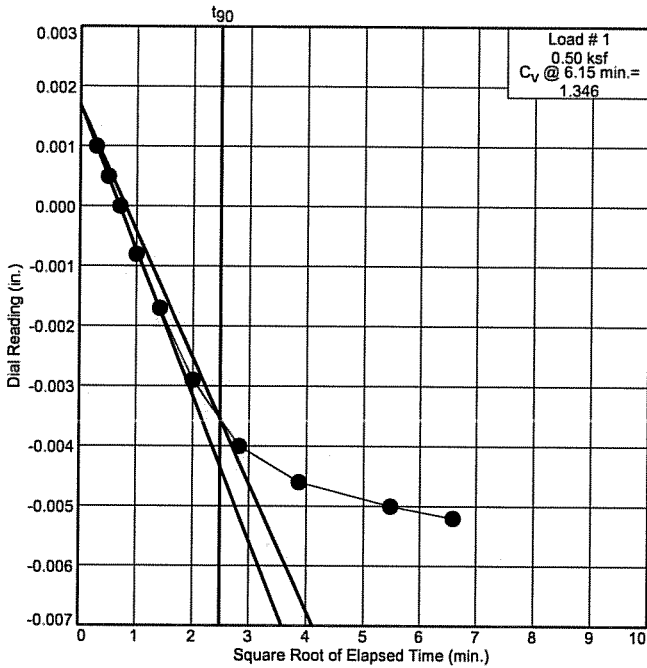
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 75'-77'

Sample Number: U-5



R.W. Gillespie & Associates, Inc.

Saco, Maine

*AS*  
Lab No. 14784e

# Dial Reading vs. Time

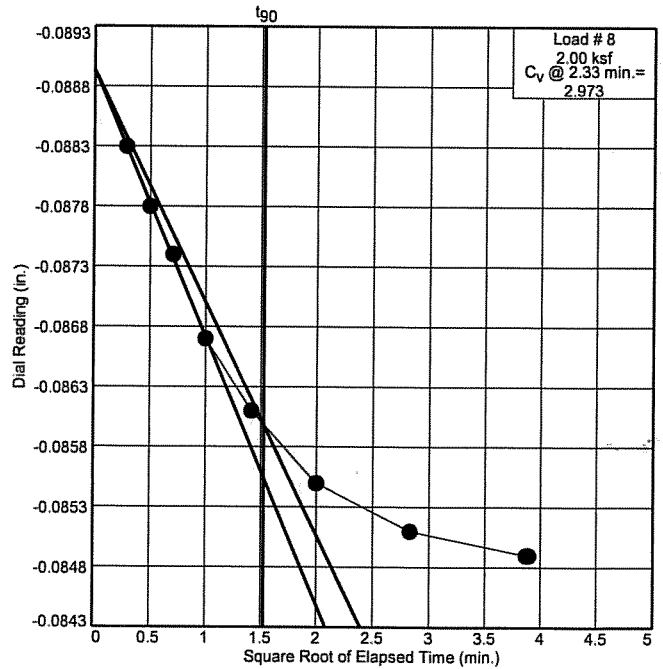
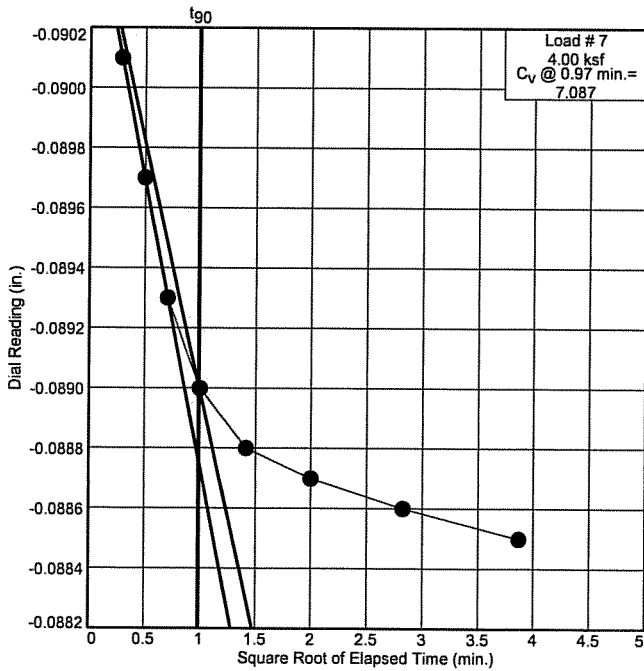
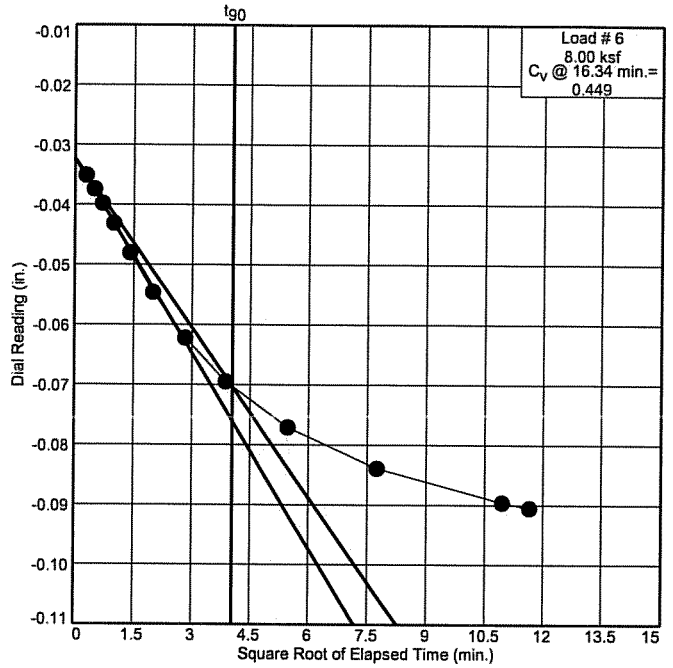
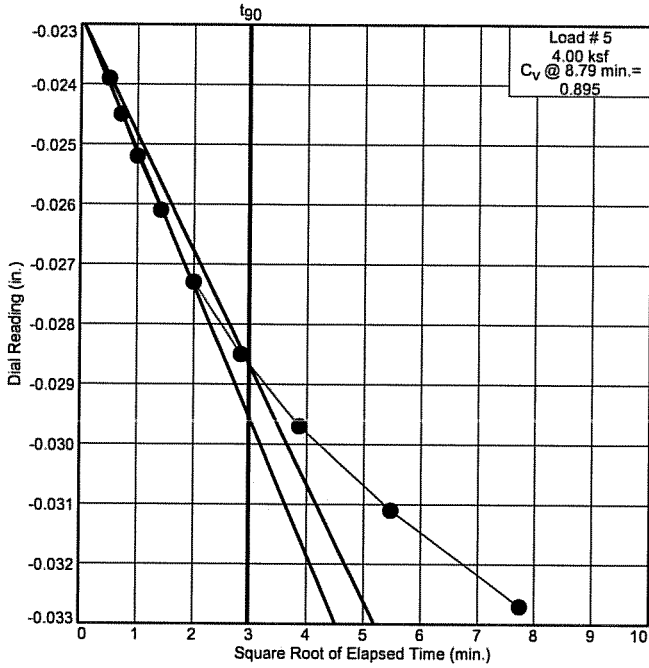
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 75'-77'

Sample Number: U-5



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*  
Lab No. 14784e

# Dial Reading vs. Time

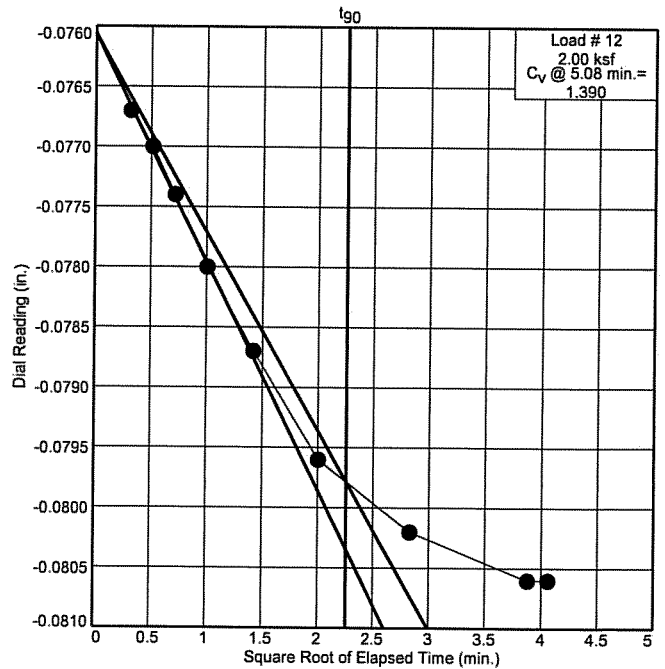
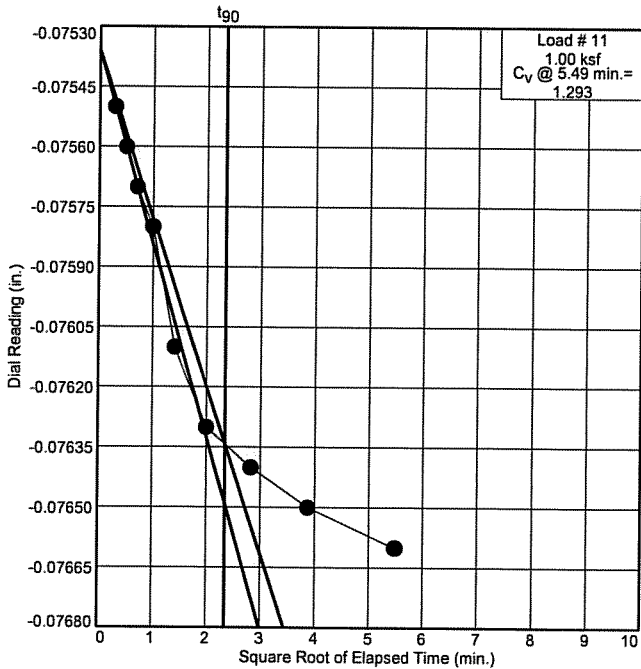
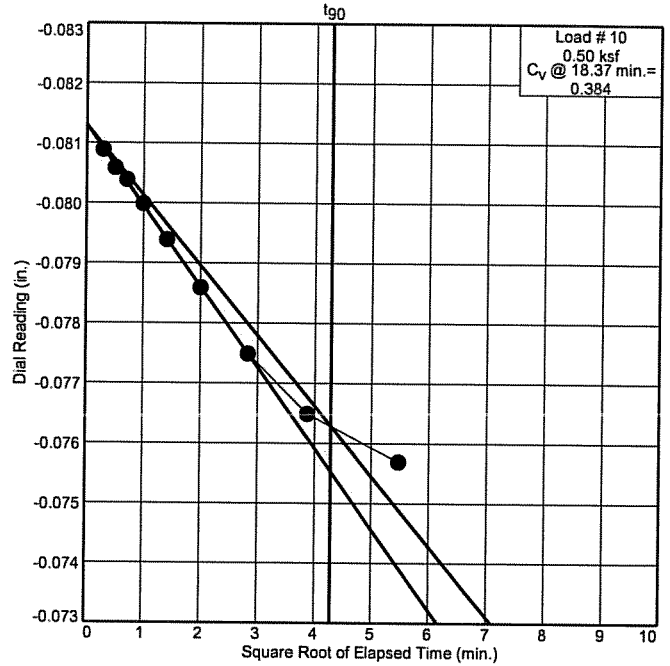
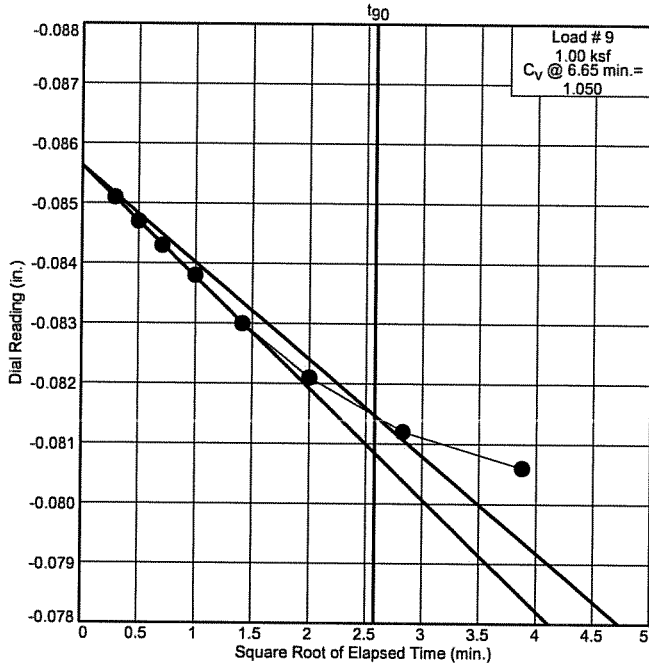
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 75'-77'

Sample Number: U-5



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MJC*

Lab No. 14784e

# Dial Reading vs. Time

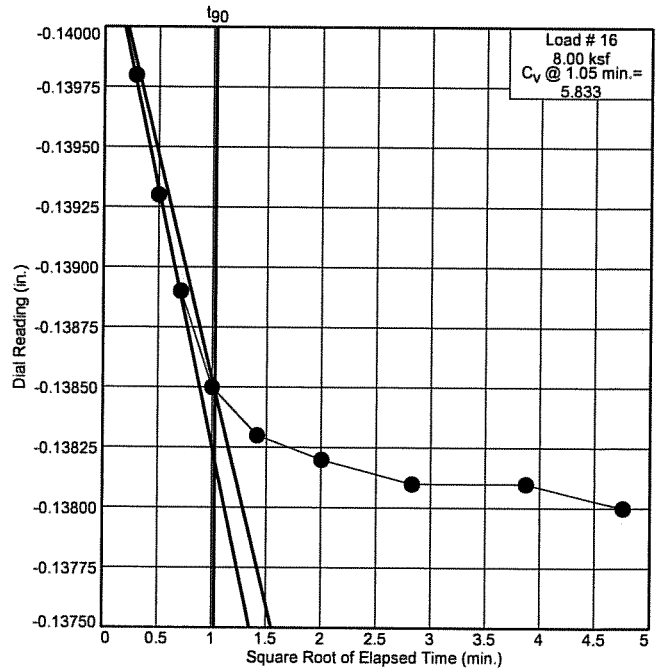
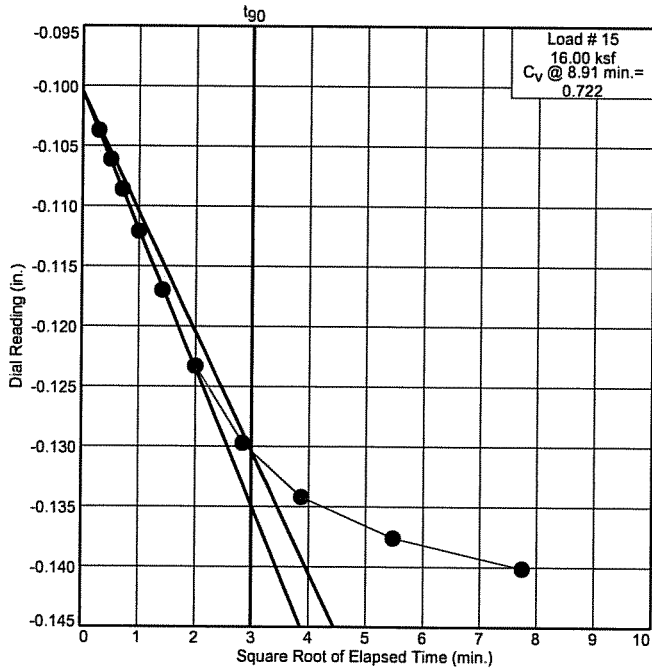
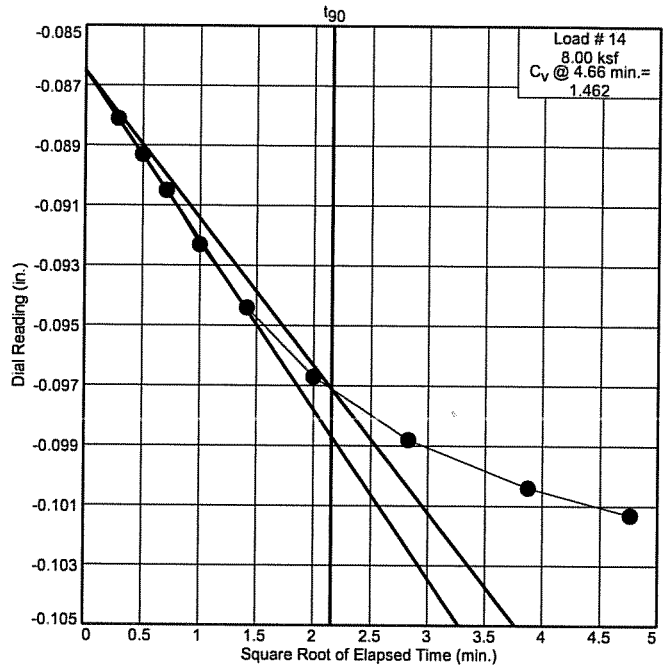
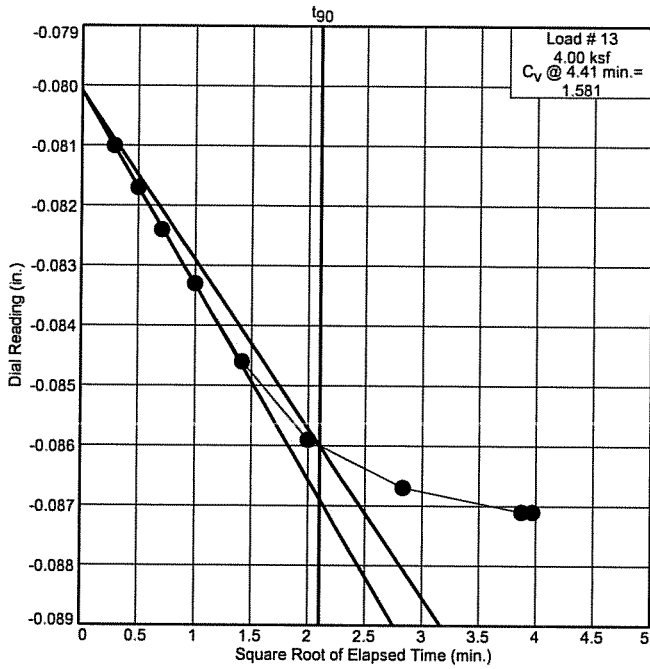
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 75'-77'

Sample Number: U-5



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14784e

# Dial Reading vs. Time

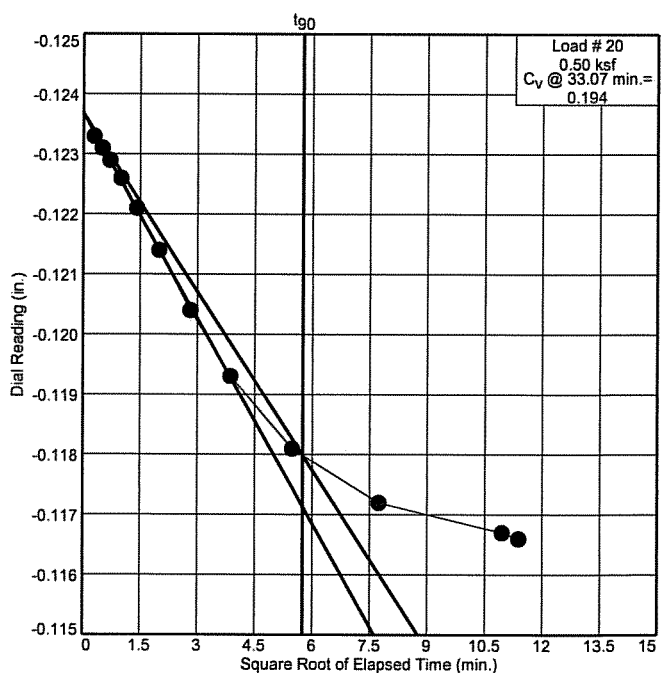
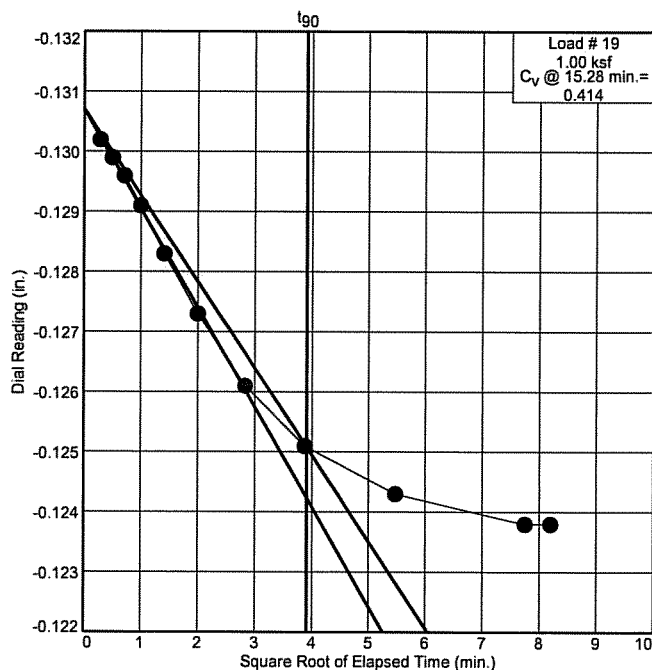
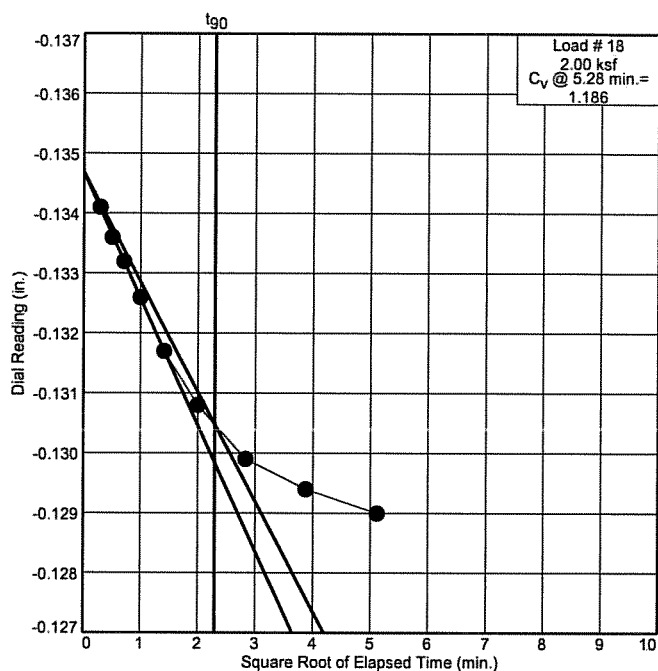
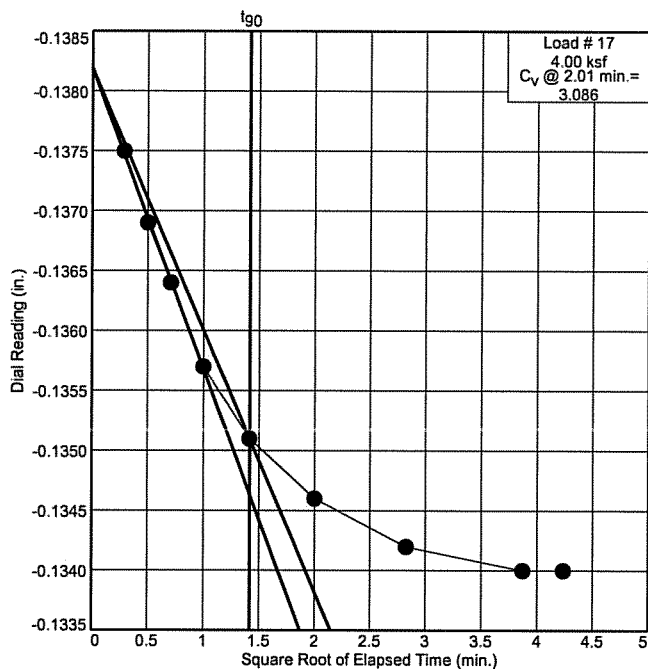
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-102: South Portland, ME

Depth: 75'-77'

Sample Number: U-5



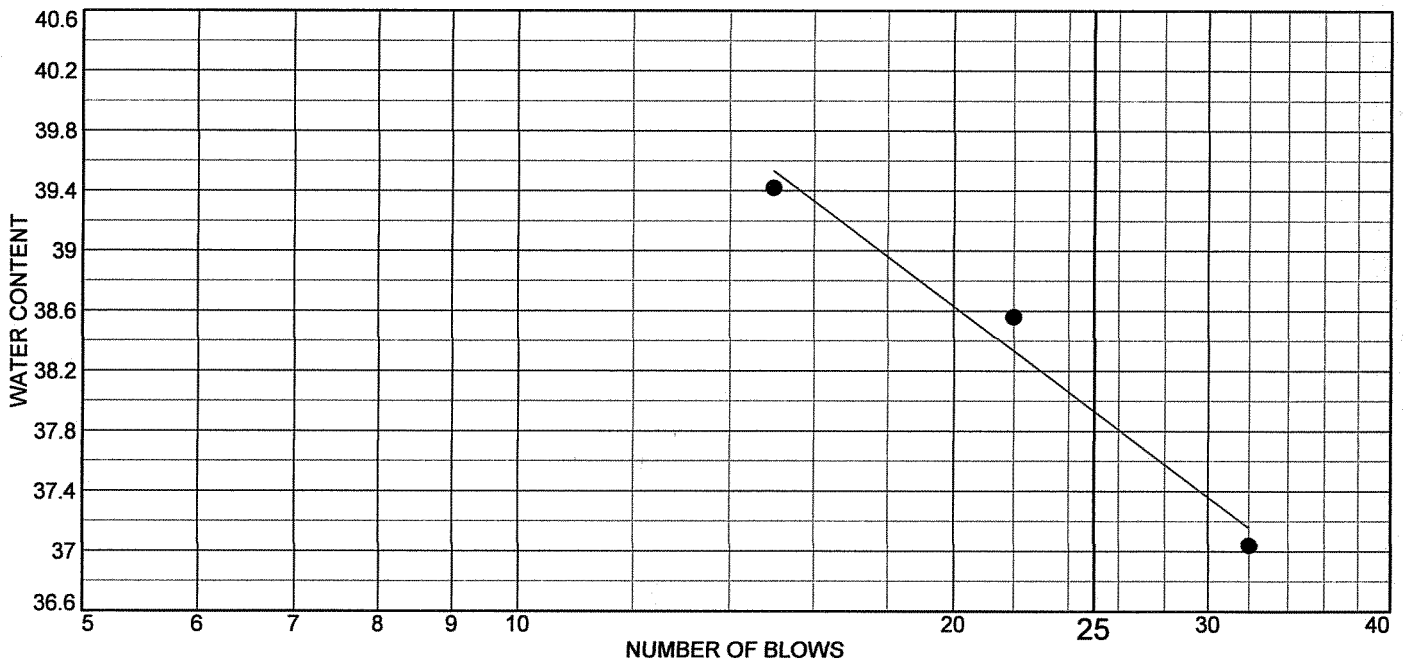
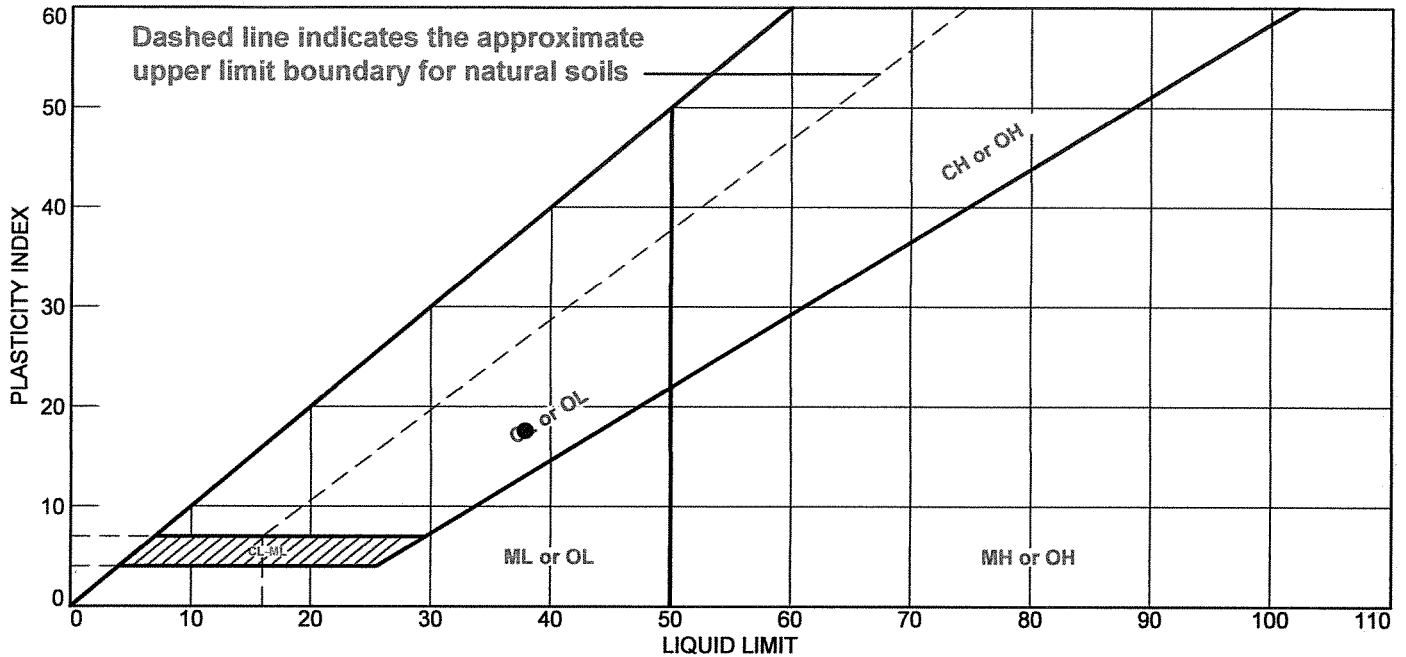
R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14784e



# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Lean Clay	37.9	20.3	17.6			

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.

**Project:** MTA Exit 45 Reconfiguration

**Location:** HB-EXIT45-103

**Sample Number:** U-3      **Depth:** 60'-62'

**R.W. Gillespie & Associates, Inc.**

**Saco, Maine**

**Remarks:**

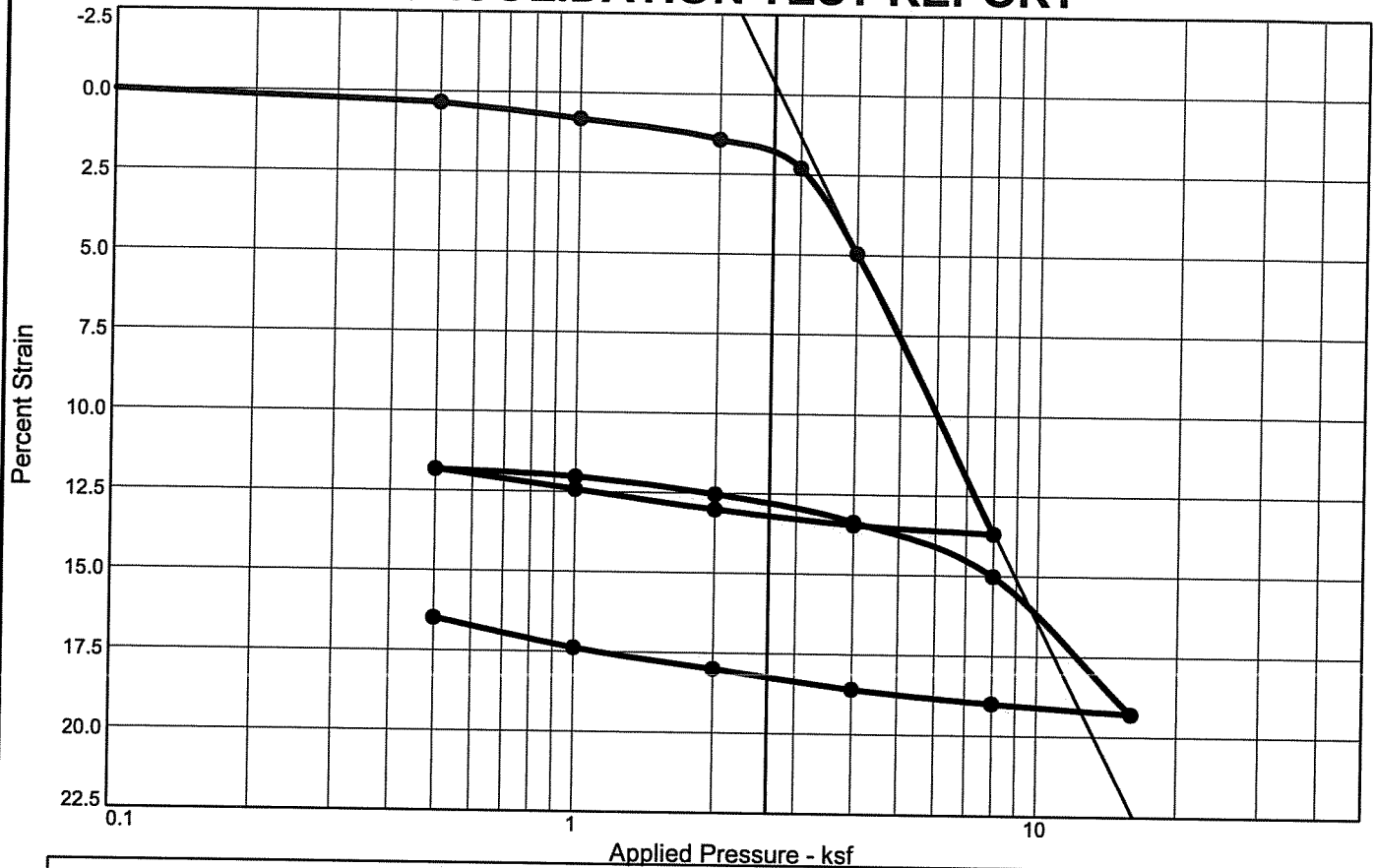
● Natural Moisture: 42.1%

**Lab No.** 14785

**Tested By:** AGS, JJB

**Checked By:** MTG

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	1.782		8	2.00	1.237		15	16.00	0.231	
2	1.00	1.924		9	1.00	0.468		16	8.00	2.961	
3	2.00	2.062		10	0.50	0.185		17	4.00	1.276	
4	3.00	1.239		11	1.00	1.399		18	2.00	0.489	
5	4.00	0.053		12	2.00	0.704		19	1.00	0.200	
6	8.00	0.121		13	4.00	0.722		20	0.50	0.095	
7	4.00	2.997		14	8.00	0.608					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_o$
Sat.	Moist.											
92.6 %	41.4 %	79.1	37.9	17.6	2.75		3.2	0.64	0.11			1.230

**MATERIAL DESCRIPTION**

Lean Clay

**USCS**

**AASHTO**

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.

**Project:** MTA Exit 45 Reconfiguration

**Location:** HB-EXIT45-103      **Depth:** 60'-62'      **Sample Number:** U-3

**R.W. Gillespie & Associates, Inc.**

**Saco, Maine**

**Remarks:**

**Lab No. 14785**

**Tested By:** AGS/JRF

**Checked By:** MTG *MTG*

# Dial Reading vs. Time

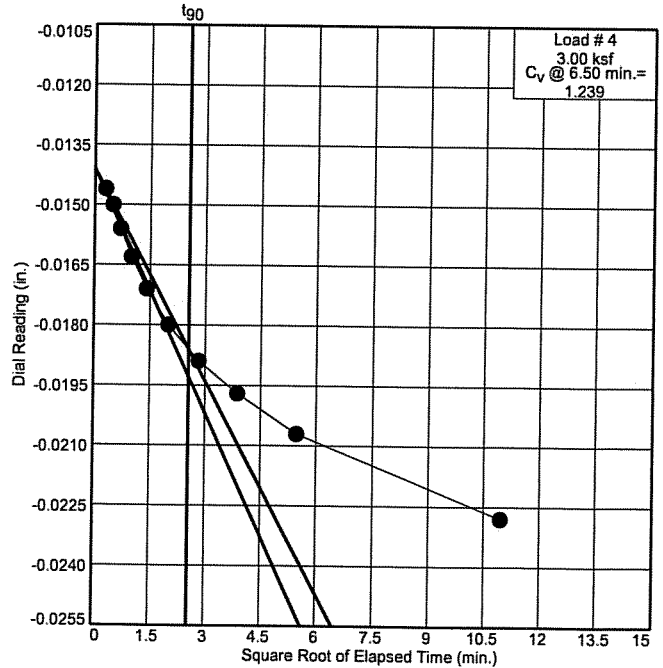
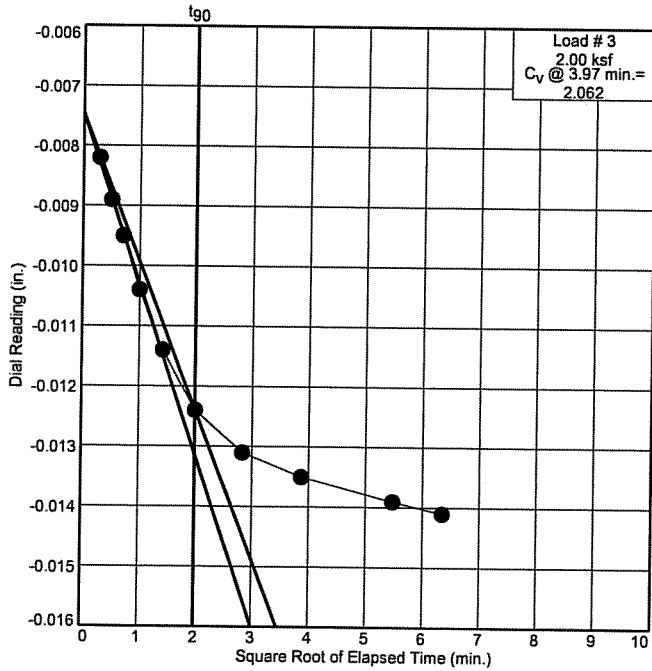
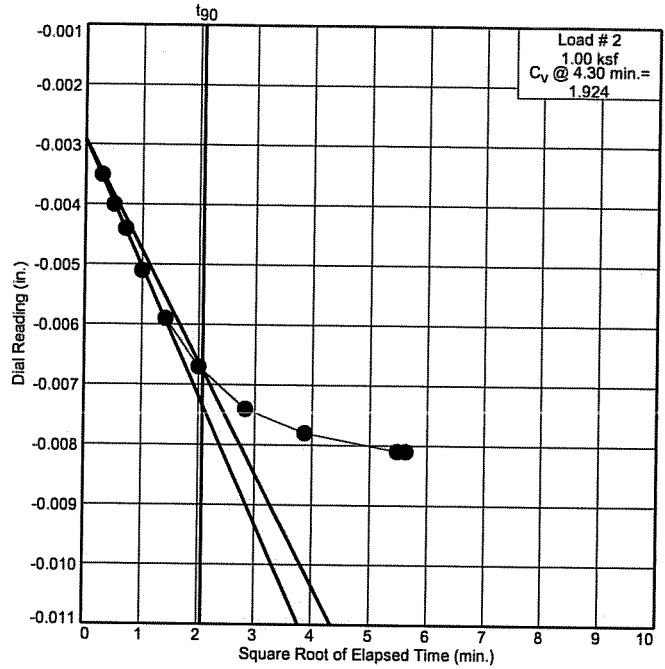
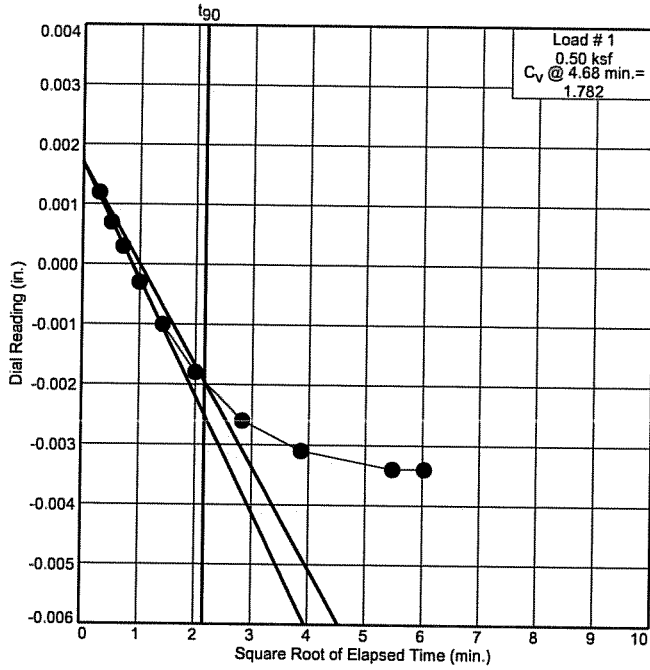
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-103

Depth: 60'-62'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MFG*

Lab No. 14785

# Dial Reading vs. Time

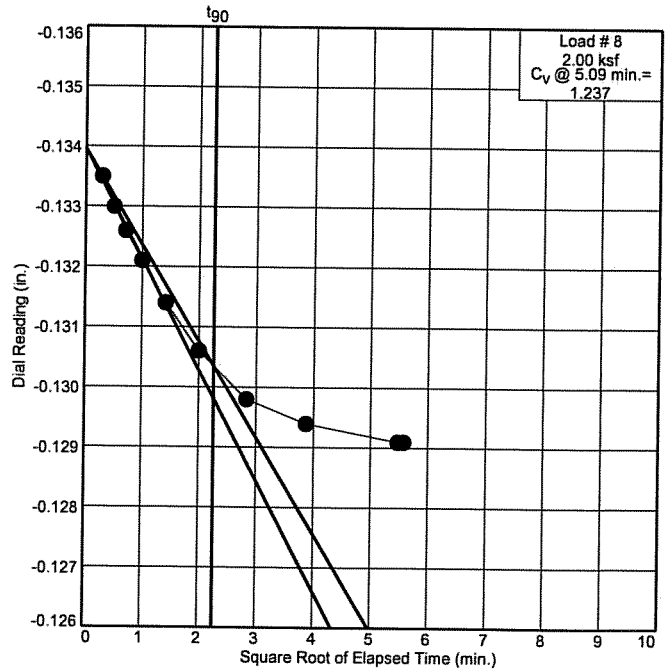
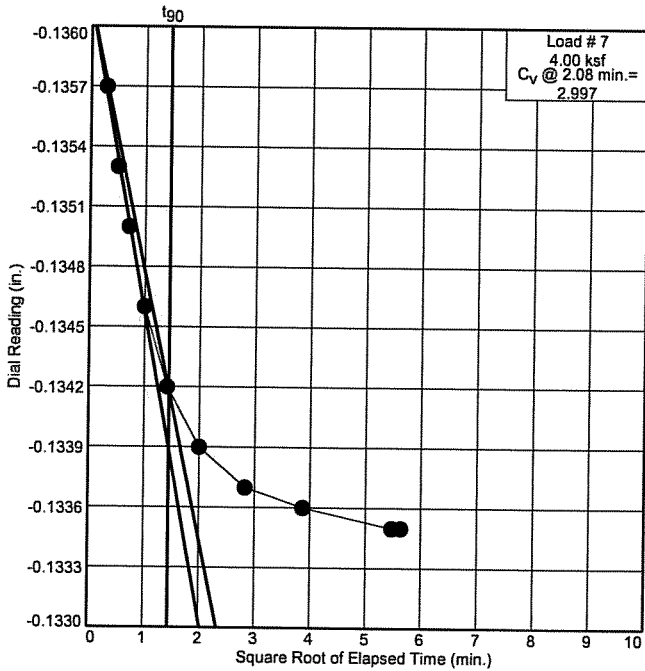
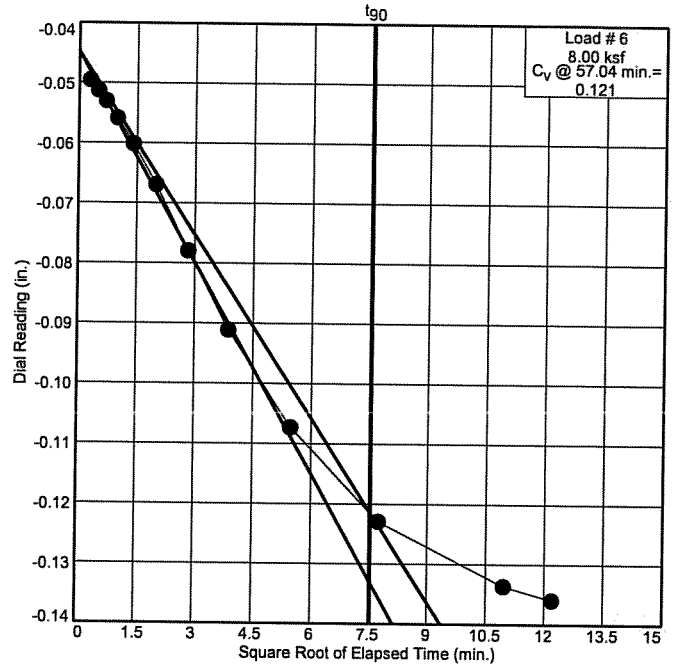
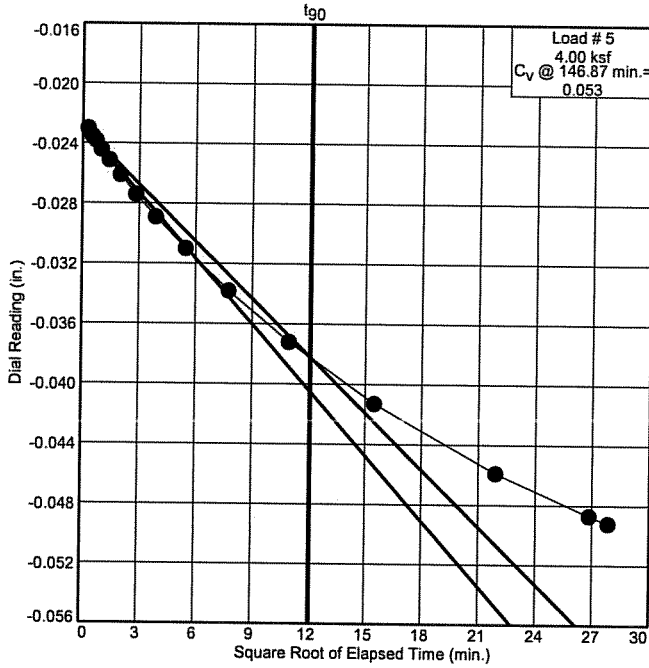
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-103

Depth: 60'-62'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14785

# Dial Reading vs. Time

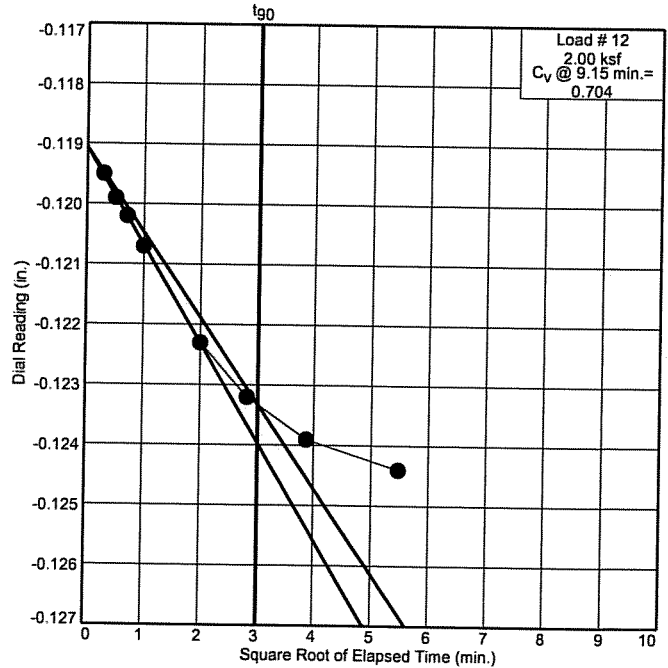
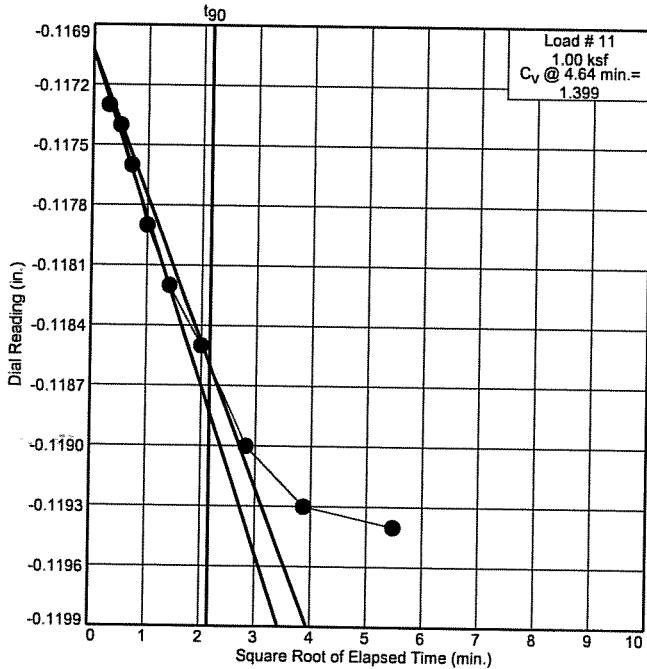
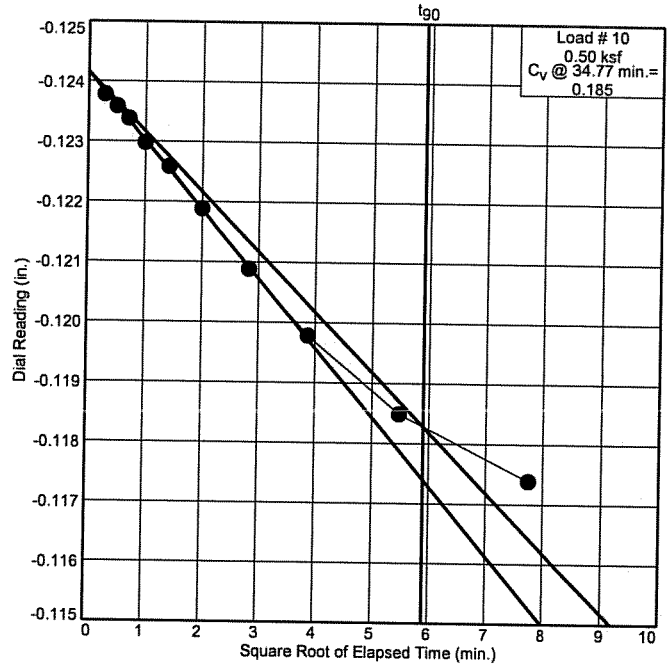
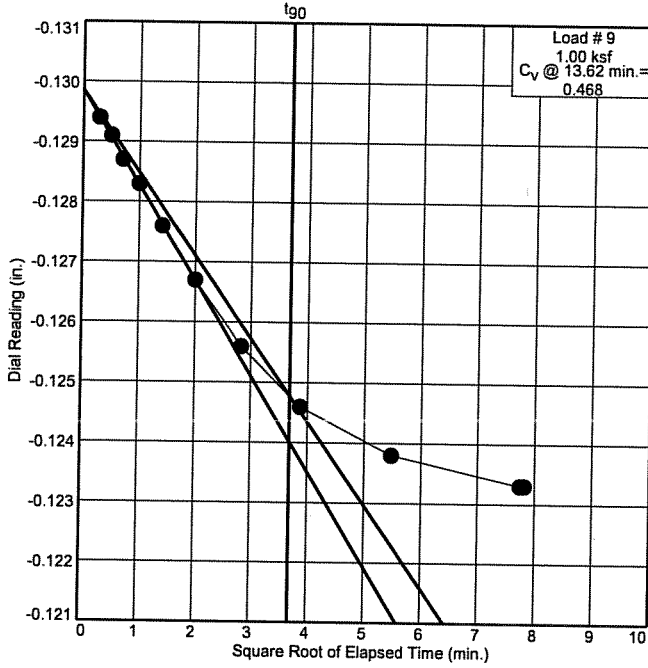
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-103

Depth: 60'-62'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MB*

Lab No. 14785

# Dial Reading vs. Time

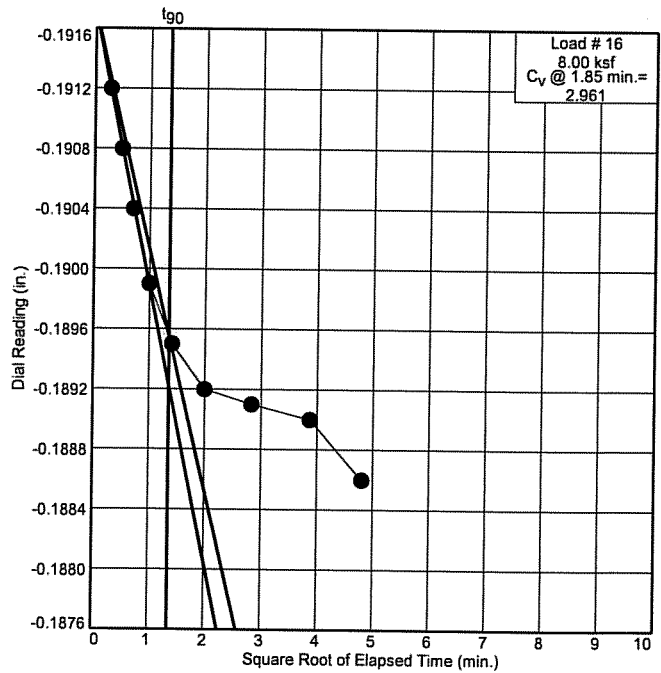
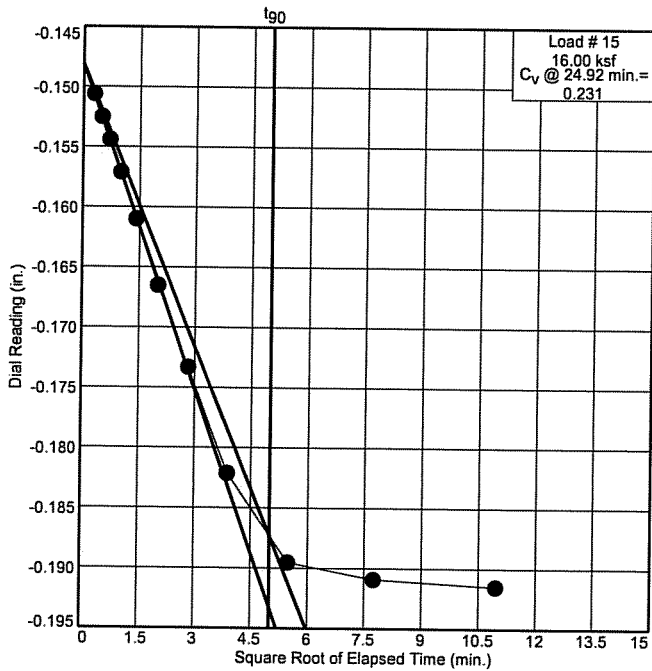
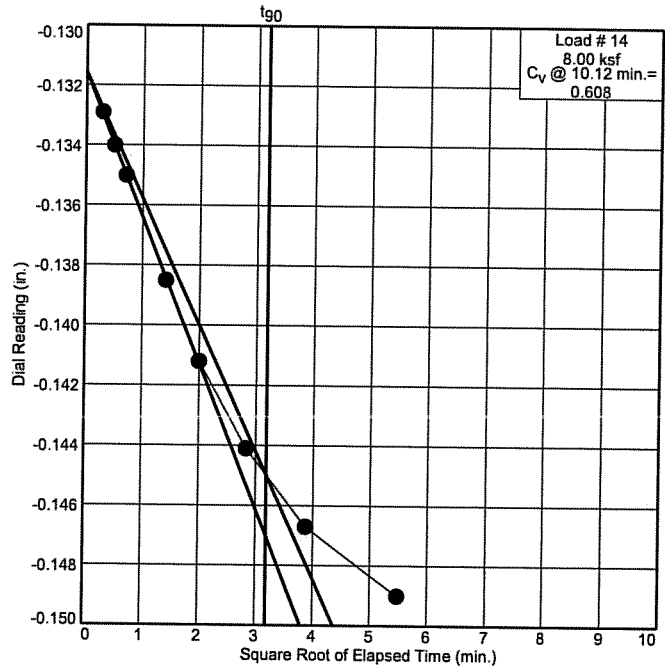
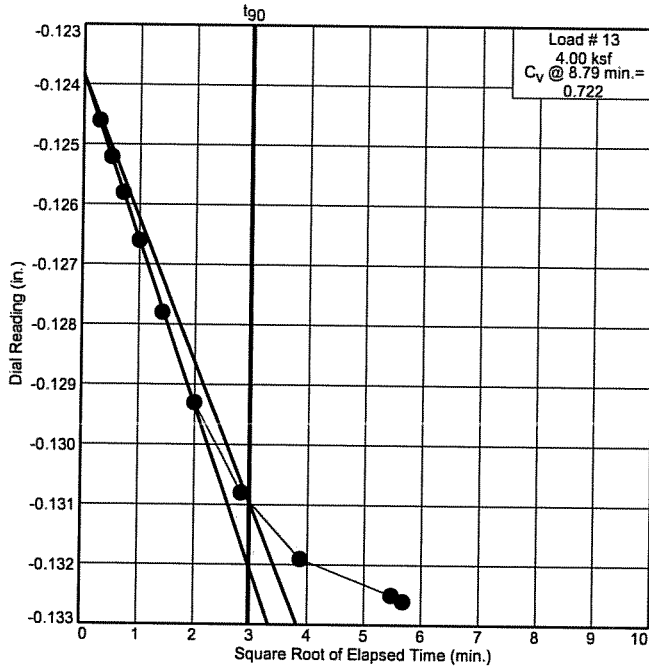
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-103

Depth: 60'-62'

Sample Number: U-3



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MB*

Lab No. 1478g

# Dial Reading vs. Time

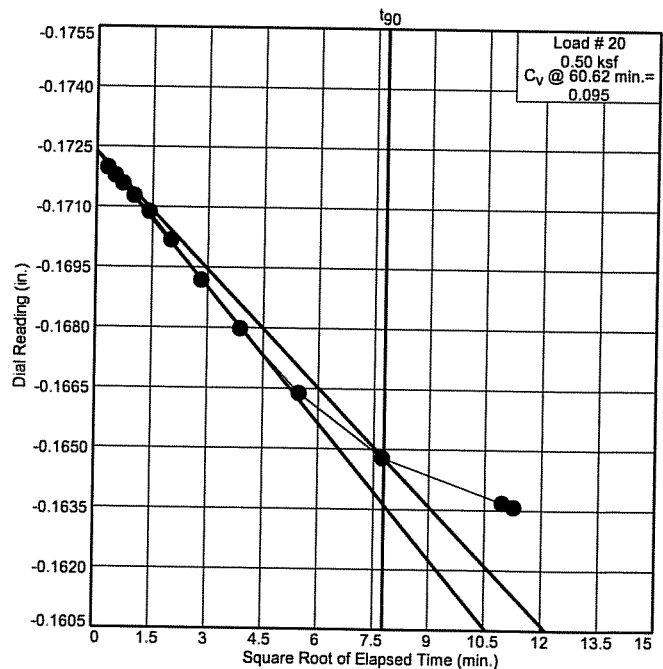
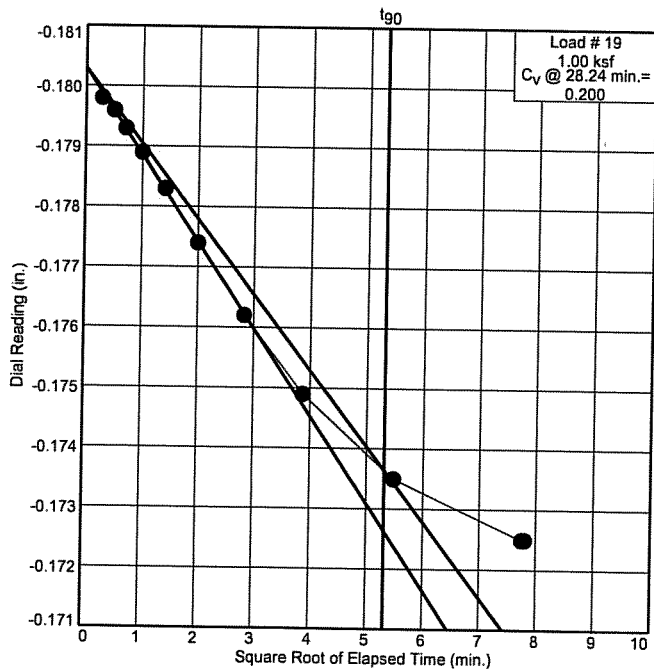
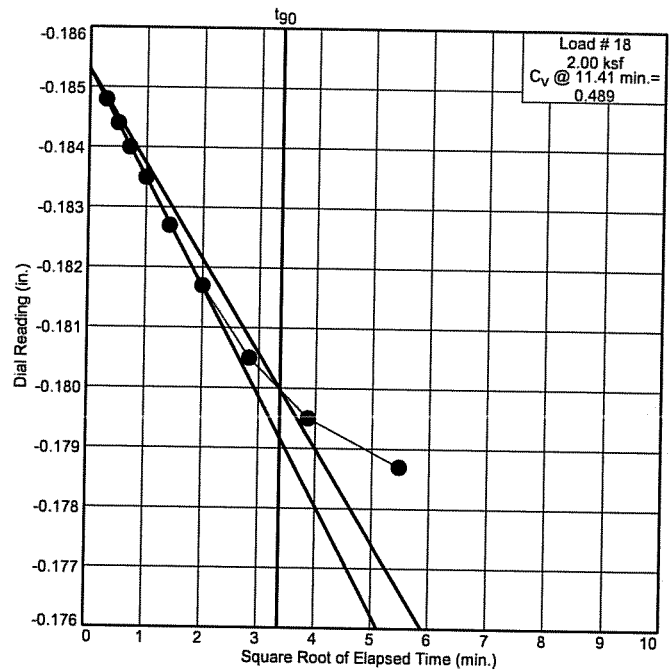
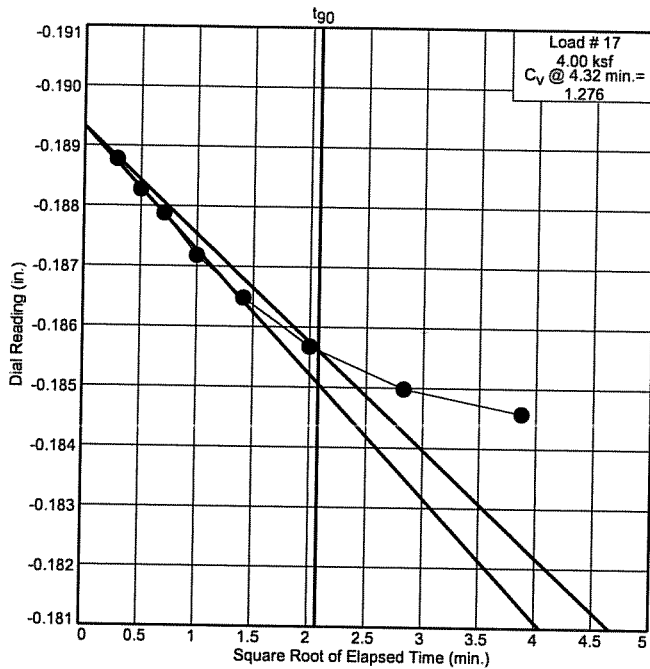
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-103

Depth: 60'-62'

Sample Number: U-3



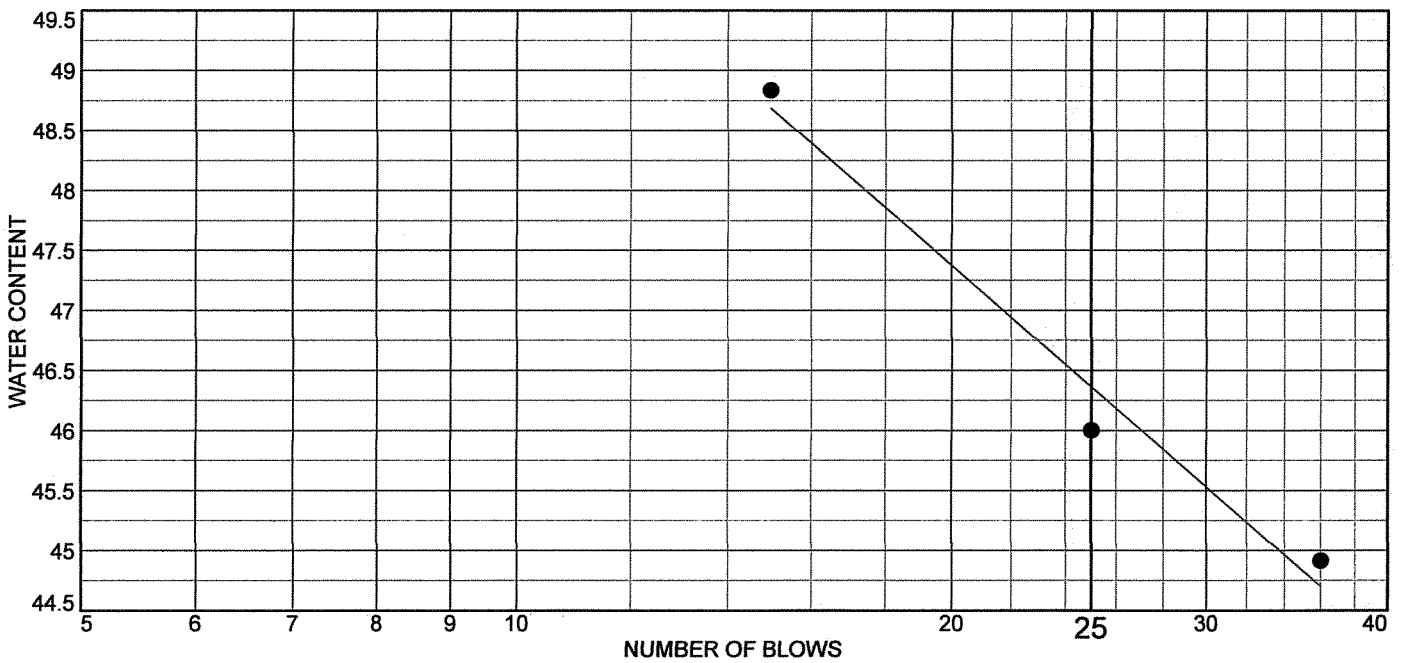
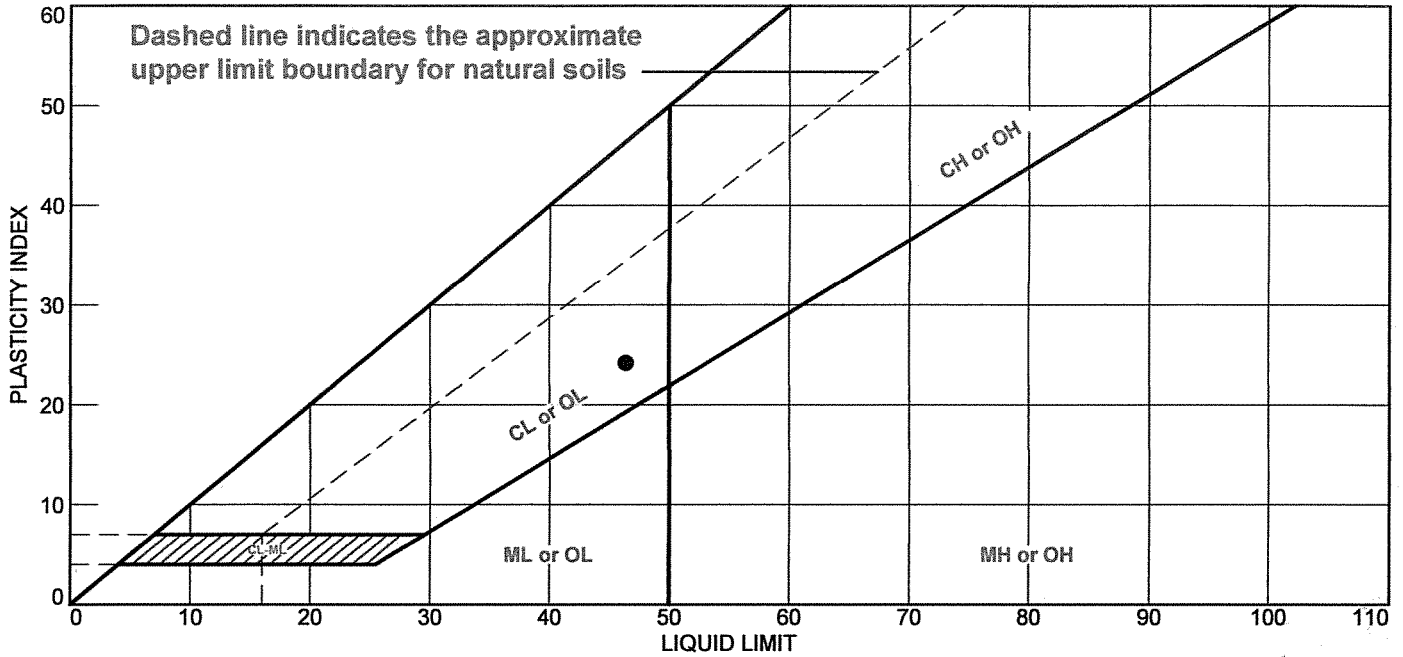
R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14795

# LIQUID AND PLASTIC LIMITS TEST REPORT



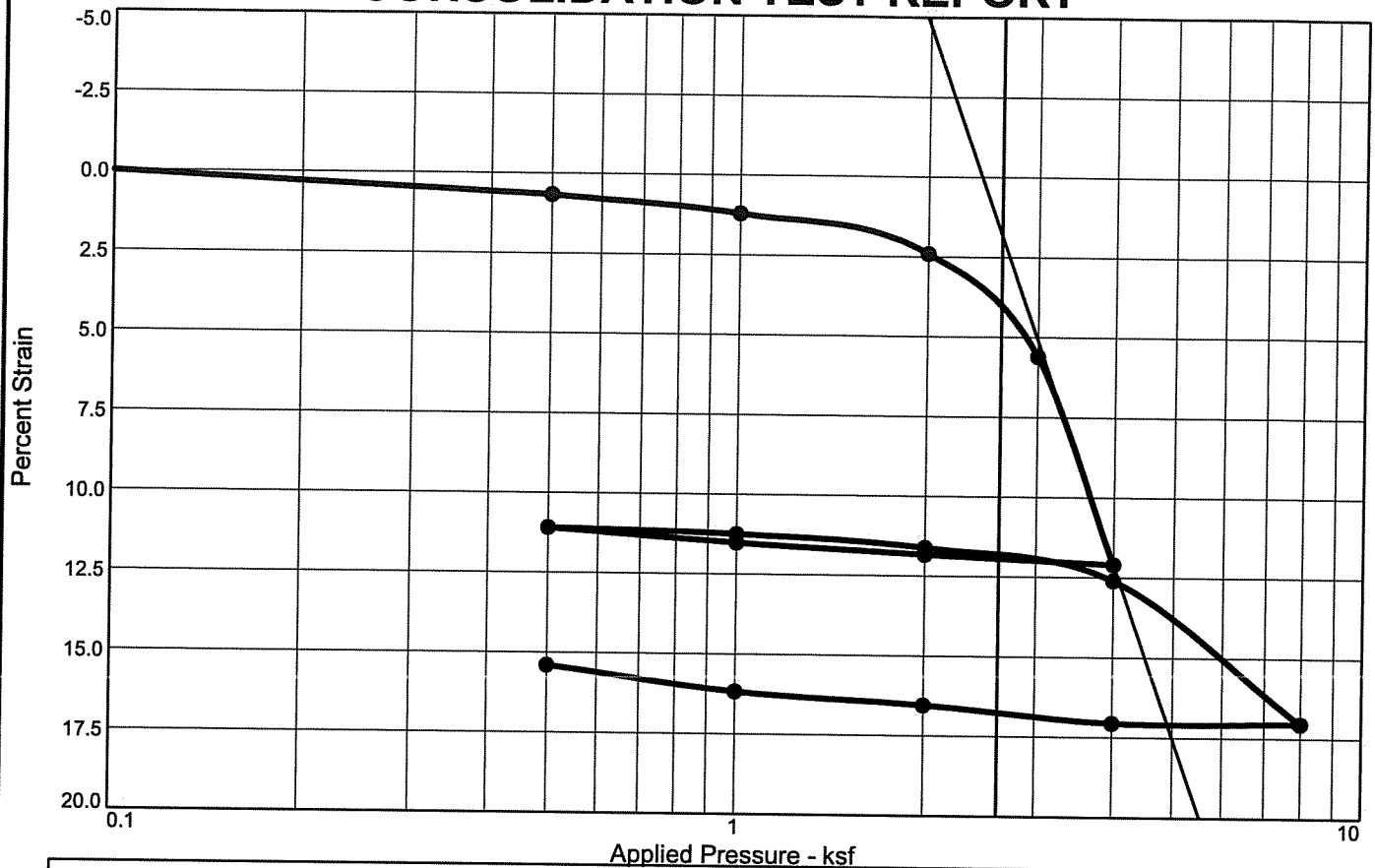
MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Lean Clay	46.4	22.2	24.2			

<p><b>Project No.</b> 1368-009      <b>Client:</b> Schonewald Engineering Associates, Inc.</p> <p><b>Project:</b> MTA Exit 45 Reconfiguration</p> <p><b>Location:</b> HB-EXIT45-106      <b>Depth:</b> 25'-27'</p> <p><b>Sample Number:</b> U-1</p> <p style="text-align: center;"><b>R.W. Gillespie &amp; Associates, Inc.</b></p> <p style="text-align: center;"><b>Saco, Maine</b></p>	<p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>● Natural Moisture: 48.4%</li> </ul> <p style="text-align: right;"><b>Lab No.</b> 14786a</p>
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**Tested By:** AGS, JJB      **Checked By:** MTG *MTG*



# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	4.114		8	0.50	0.402		15	1.00	0.514	
2	1.00	1.711		9	1.00	1.206		16	0.50	0.189	
3	2.00	1.990		10	2.00	1.343					
4	3.00	0.288		11	4.00	0.838					
5	4.00	0.033		12	8.00	0.290					
6	2.00	4.227		13	4.00	3.125					
7	1.00	1.322		14	2.00	1.268					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_0$
Sat.	Moist.											
99.7 %	47.6 %	74.3	46.4	24.2	2.75		2.9	1.29	0.11			1.312

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

<b>Project No.</b> 1368-009 <b>Client:</b> Schonewald Engineering Associates, Inc. <b>Project:</b> MTA Exit 45 Reconfiguration <b>Location:</b> HB-EXIT45-106 <b>Depth:</b> 25'-27' <b>Sample Number:</b> U-1 <b>R.W. Gillespie &amp; Associates, Inc.</b> <b>Saco, Maine</b>	<b>Remarks:</b>          <div style="text-align: right;"><b>Lab No.</b> 14786a</div>
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**Tested By:** JRF/AGS      **Checked By:** MTG *MTG*

# Dial Reading vs. Time

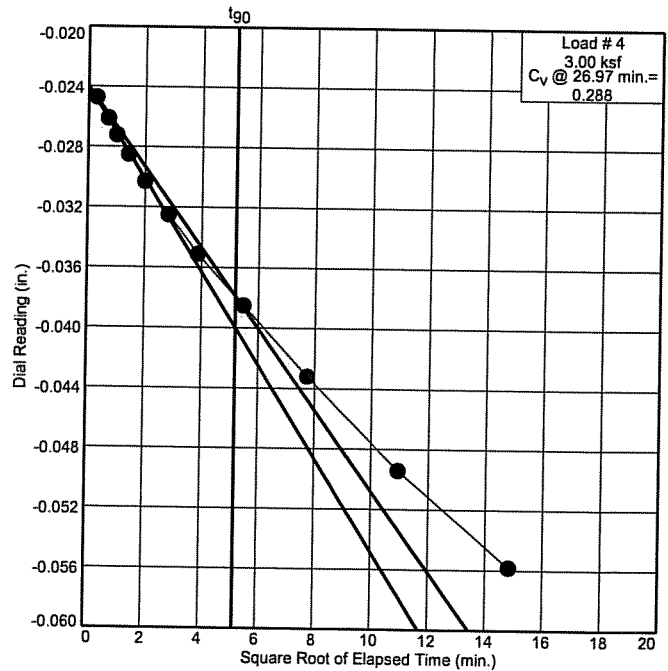
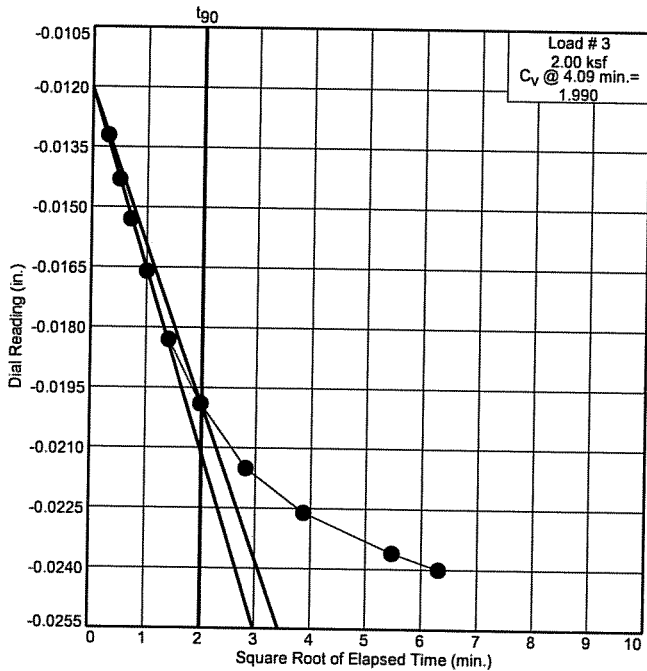
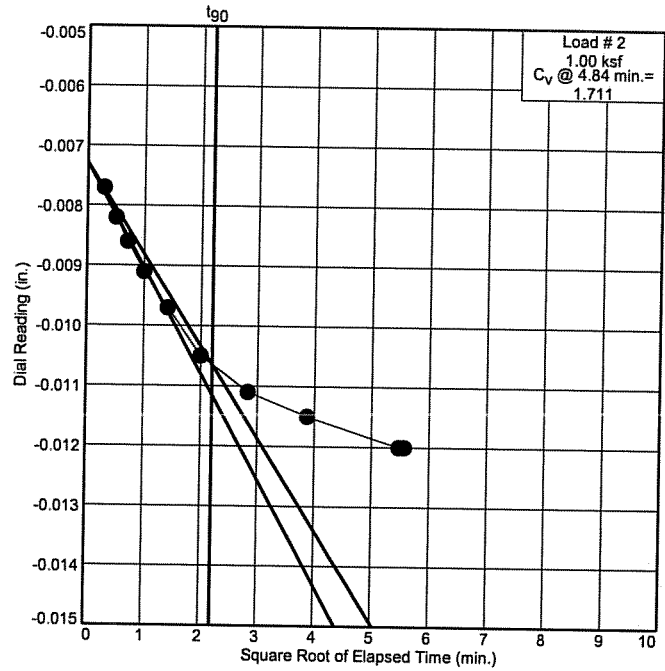
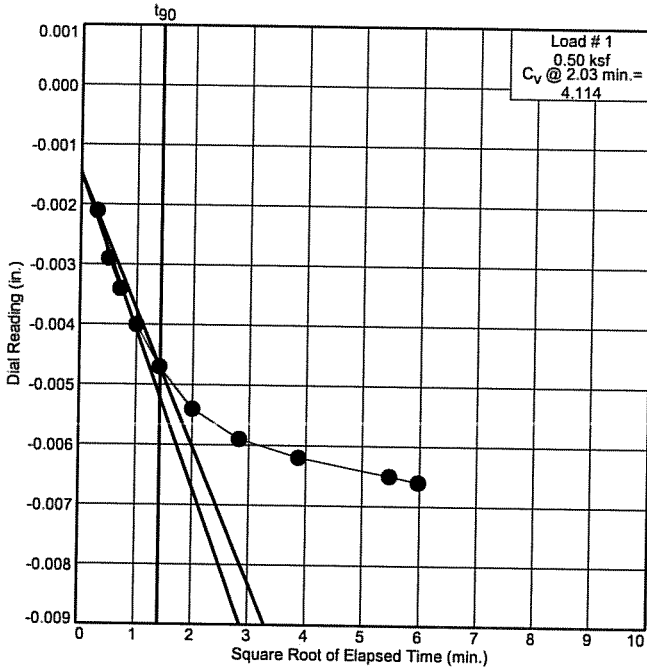
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106

Depth: 25'-27'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTA*

Lab No. 14780a

# Dial Reading vs. Time

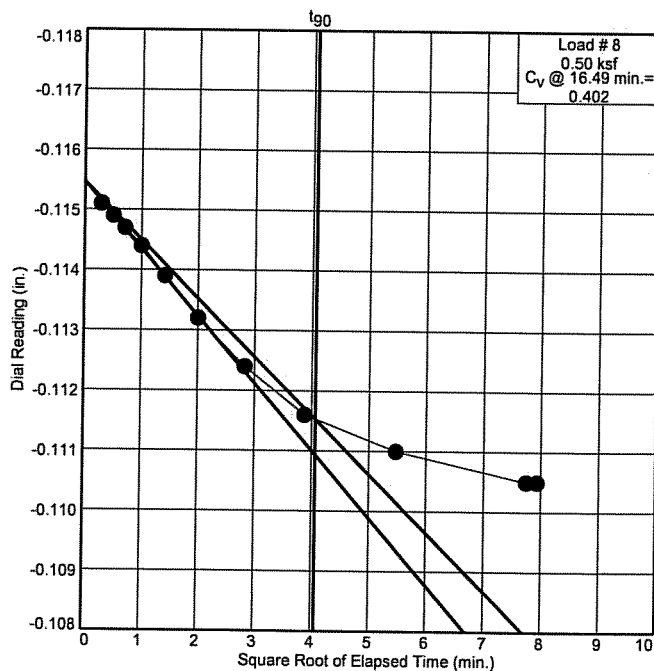
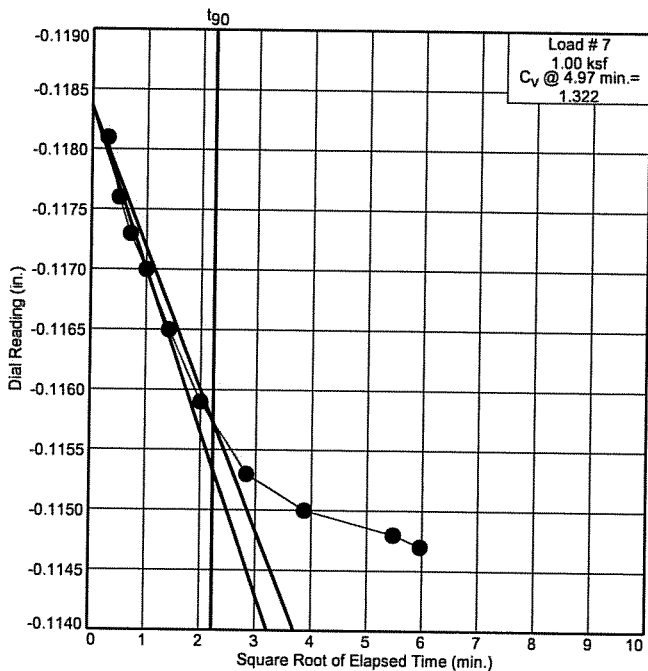
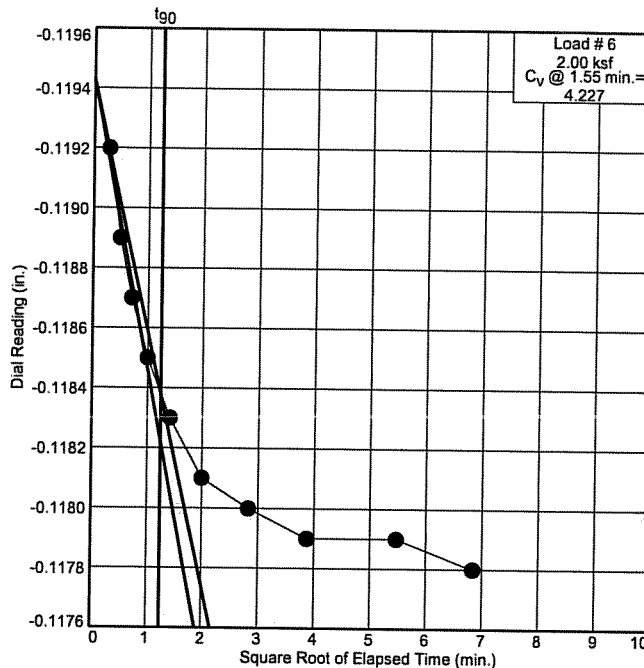
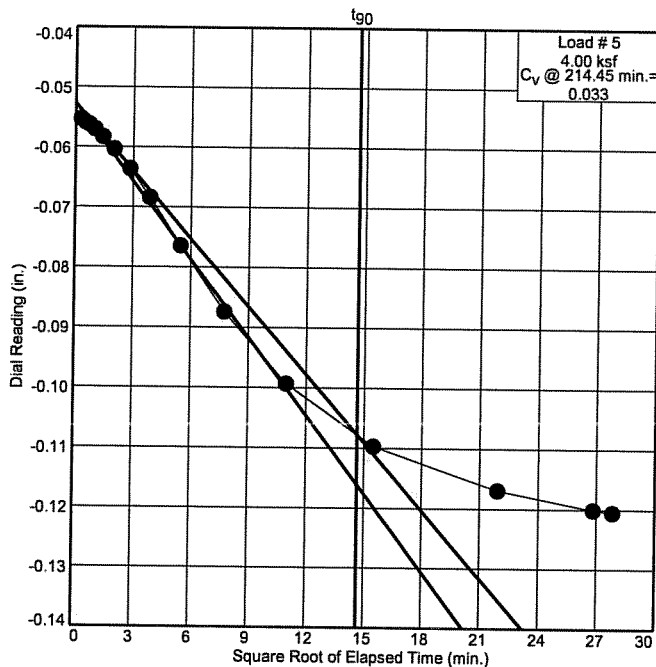
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106

Depth: 25'-27'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14780a

# Dial Reading vs. Time

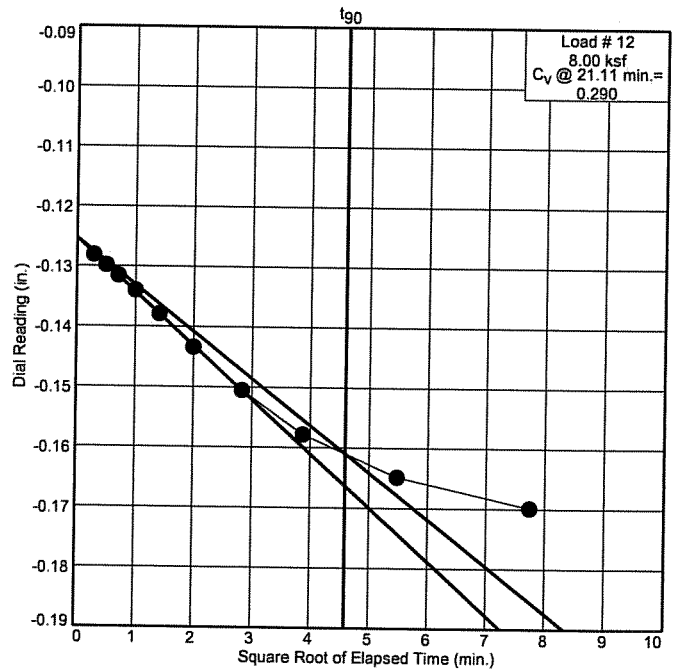
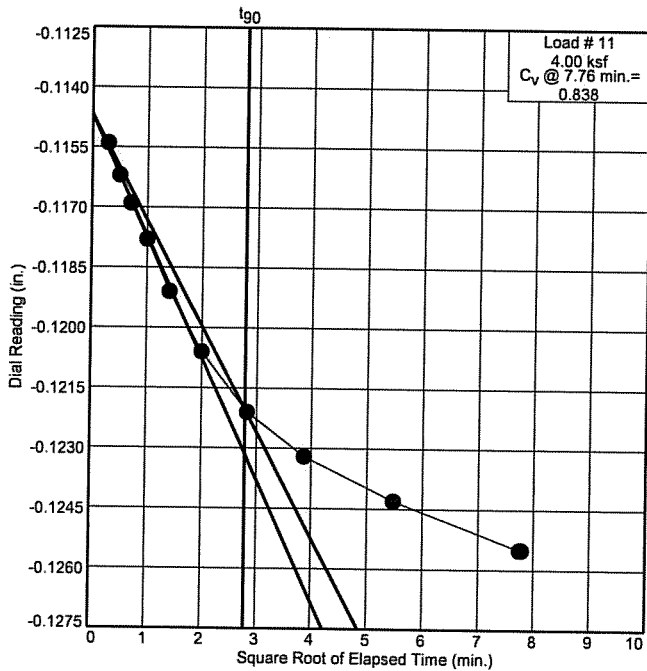
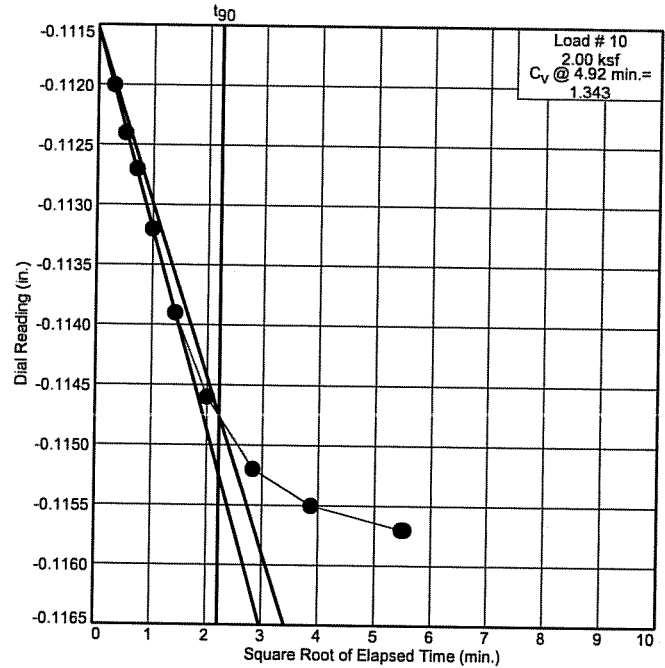
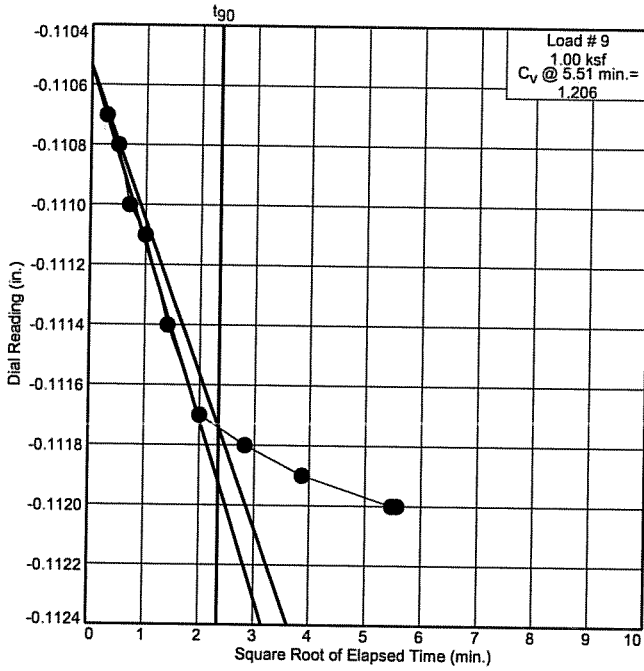
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106

Depth: 25'-27'

Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTA*  
Lab No. 14786a

# Dial Reading vs. Time

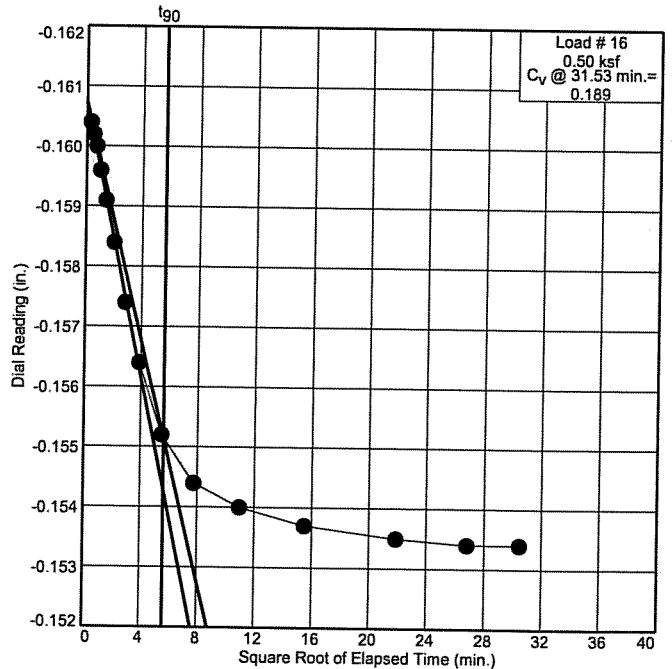
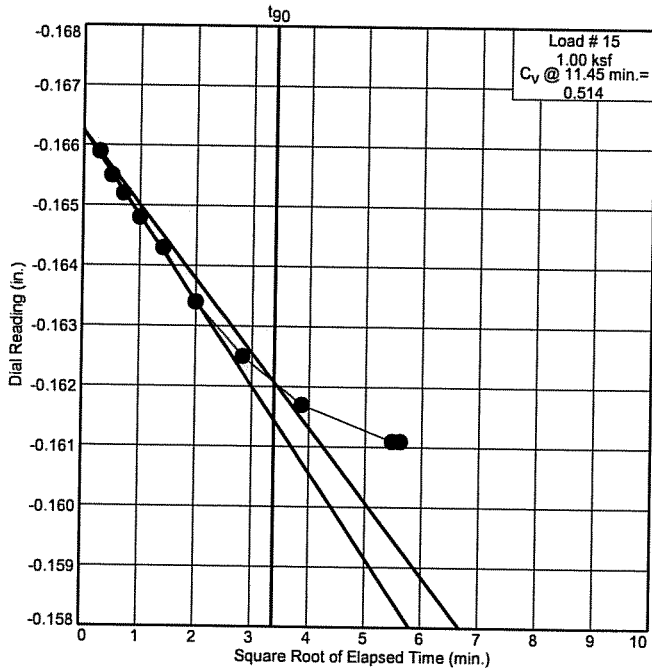
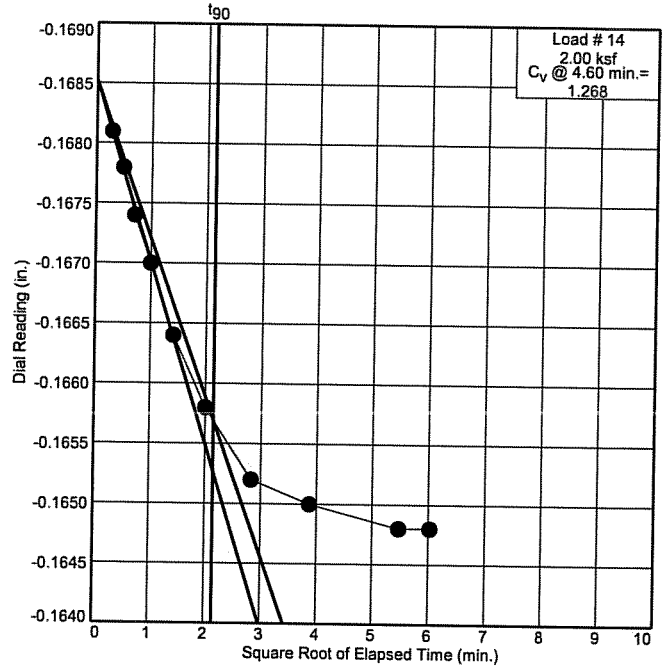
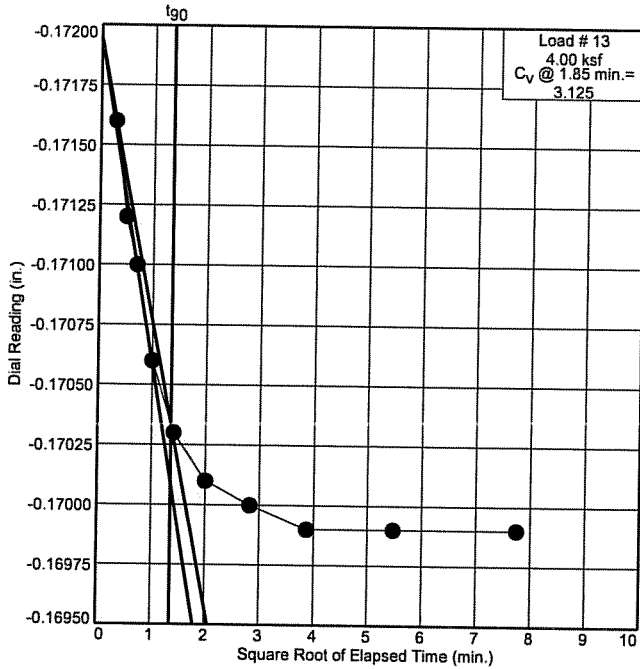
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106

Depth: 25'-27'

Sample Number: U-1

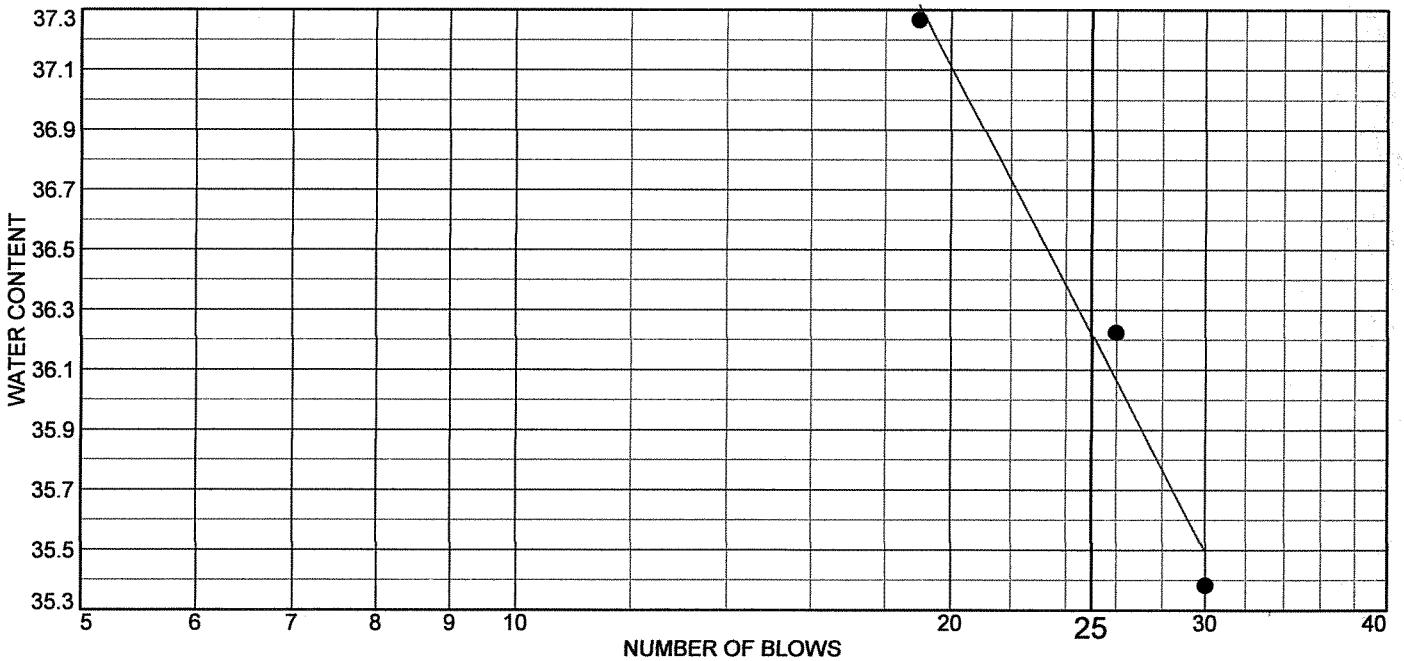
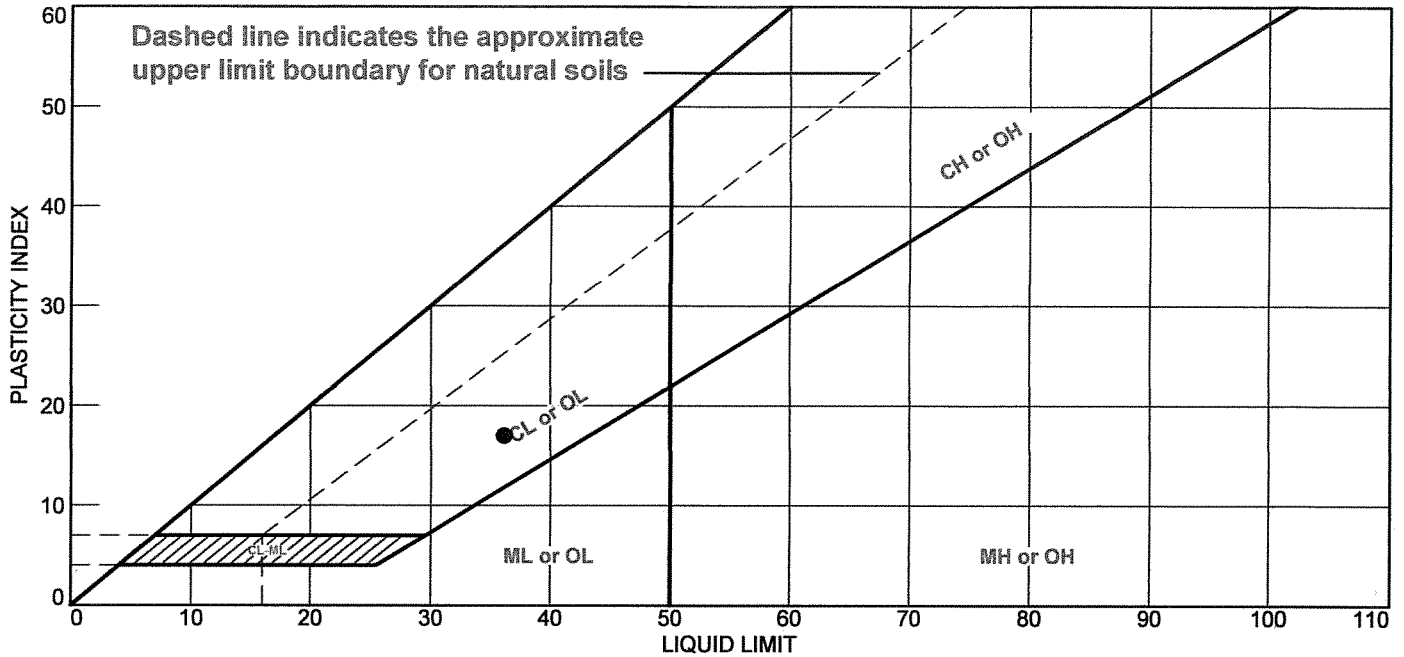


R.W. Gillespie & Associates, Inc.

Saco, Maine

*[Signature]*  
Lab No. 14780a

# LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Lean Clay	36.2	19.2	17.0			

**Project No.** 1368-009      **Client:** Schonewald Engineering Associates, Inc.  
**Project:** MTA Exit 45 Reconfiguration  
**Location:** HB-EXIT45-106 South Portland, ME  
**Sample Number:** U-2      **Depth:** 40'-42'

**R.W. Gillespie & Associates, Inc.**

**Saco, Maine**

**Remarks:**  
 ● Natural Moisture: 36.8%

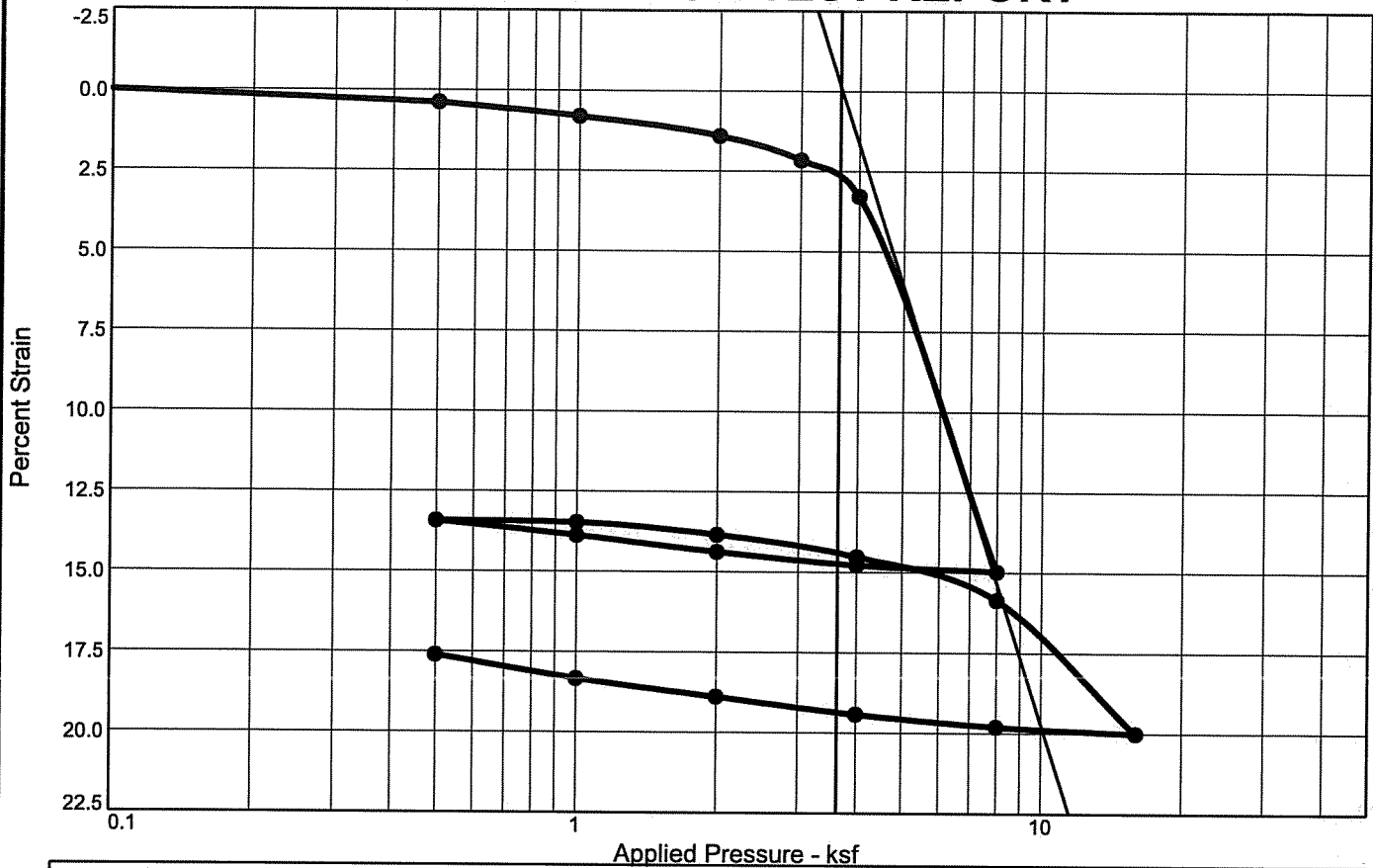
**Lab No.** 14786b

**Tested By:** AGS

**Checked By:** MTG

*MTG*

# CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$	No.	Load (ksf)	$C_v$ (ft.2/day)	$C_\alpha$
1	0.50	2.434		9	1.00	0.606		16	8.00	3.251	
2	1.00	2.460		10	0.50	0.256		17	4.00	2.057	
3	2.00	3.928		11	1.00	0.963		18	2.00	0.628	
4	3.00	1.757		12	2.00	1.122		19	1.00	0.280	
5	4.00	0.906		13	4.00	1.129		20	0.50	0.128	
6	8.00	0.141		14	8.00	0.964					
8	2.00	1.443		15	16.00	0.353					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	$P_c$ (ksf)	$C_c$	$C_r$	Swell Press. (ksf)	Swell %	$e_o$
Sat.	Moist.											
100.9 %	43.2 %	78.8	36.2	17.0	2.75		4.3	0.99	0.10			1.178

MATERIAL DESCRIPTION	USCS	AASHTO
Lean Clay		

<p><b>Project No.</b> 1368-009      <b>Client:</b> Schonewald Engineering Associates, Inc.</p> <p><b>Project:</b> MTA Exit 45 Reconfiguration</p> <p><b>Loc.:</b> HB-EXIT45-106 South Portland, ME      <b>Depth:</b> 40'-42'      <b>Sample No.:</b> U-2</p> <p style="text-align: center;"><b>R.W. Gillespie &amp; Associates, Inc.</b></p> <p style="text-align: center;"><b>Saco, Maine</b></p>	<p><b>Remarks:</b> Natural Moisture: 43.2%</p> <p style="text-align: right;"><b>Lab No.</b> 14786b</p>
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**Tested By:** AGS, JRF      **Checked By:** MTG *MTG*

# Dial Reading vs. Time

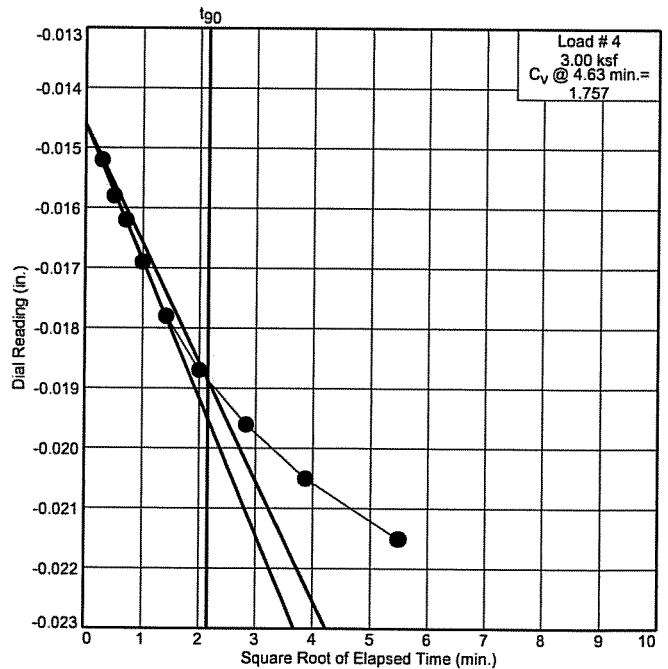
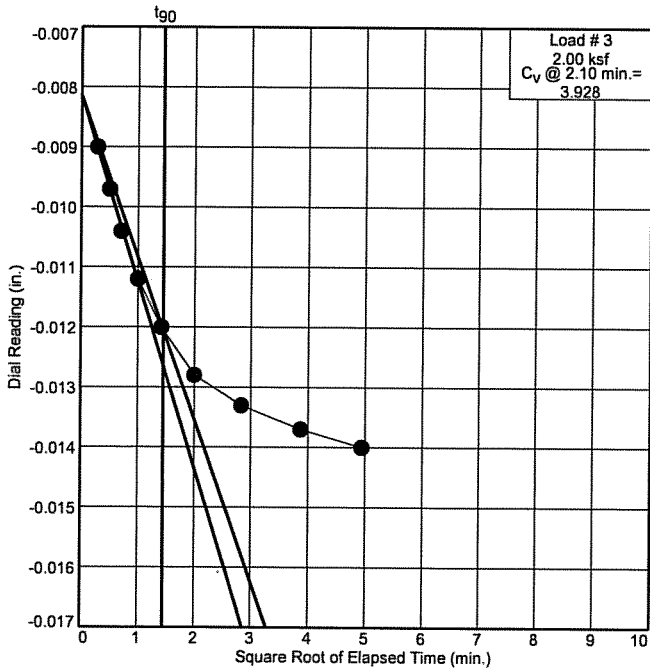
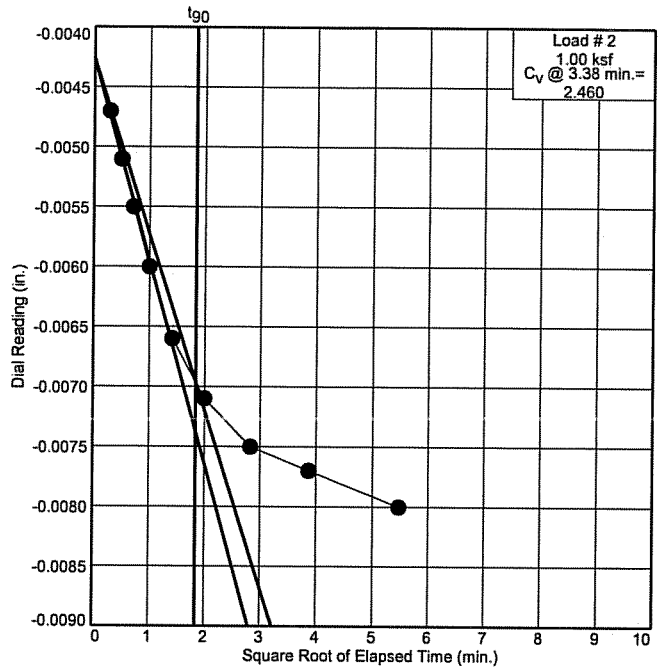
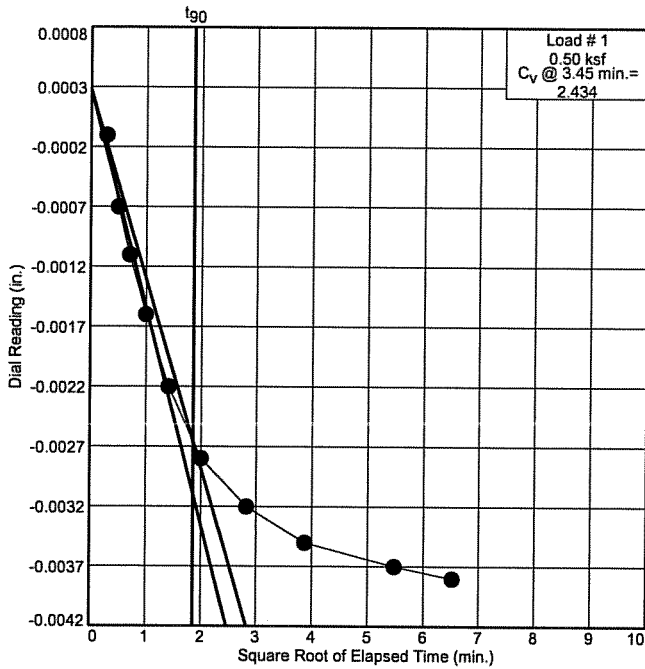
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106 South Portland, ME

Depth: 40'-42'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTG*

Lab No. 14780b



# Dial Reading vs. Time

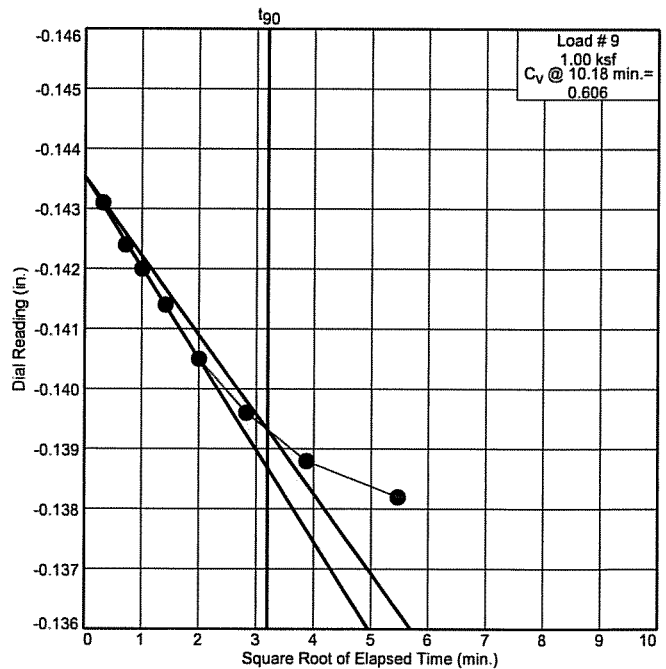
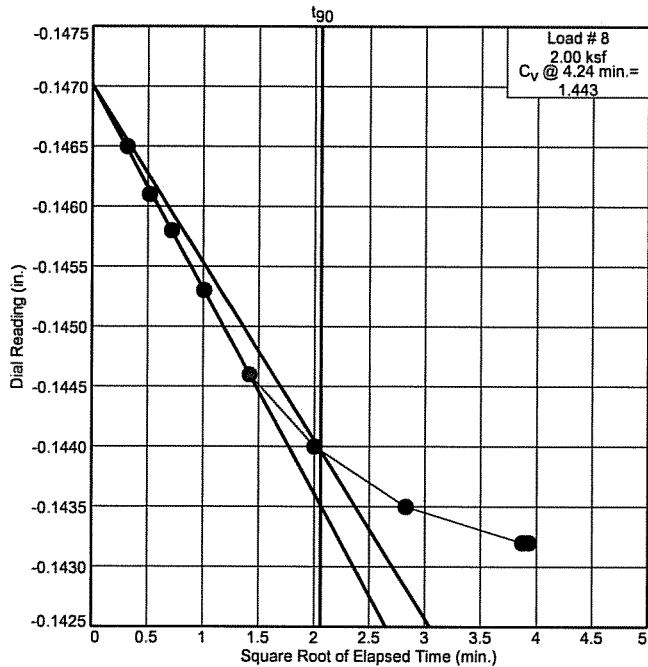
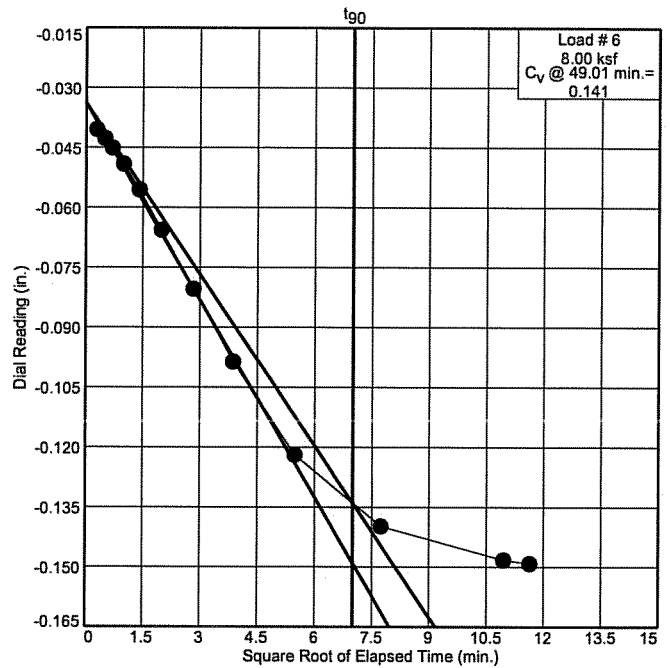
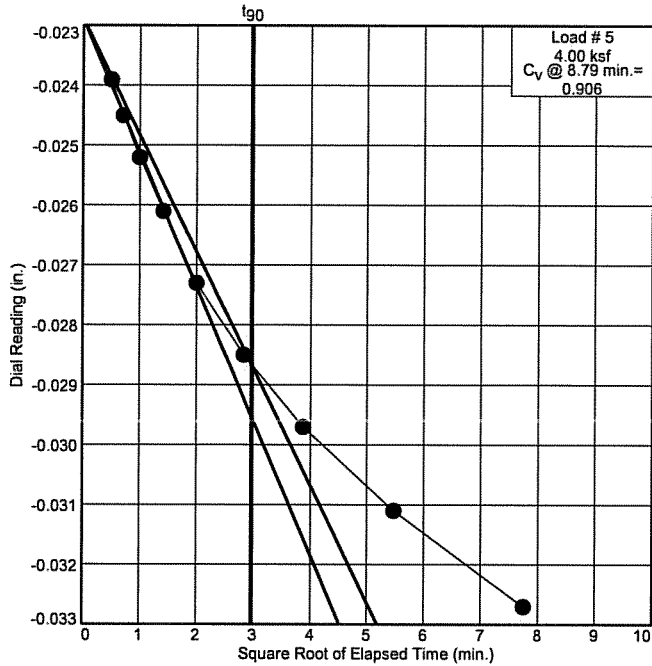
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106 South Portland, ME

Depth: 40'-42'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MTA*

Lab No. 14786b

# Dial Reading vs. Time

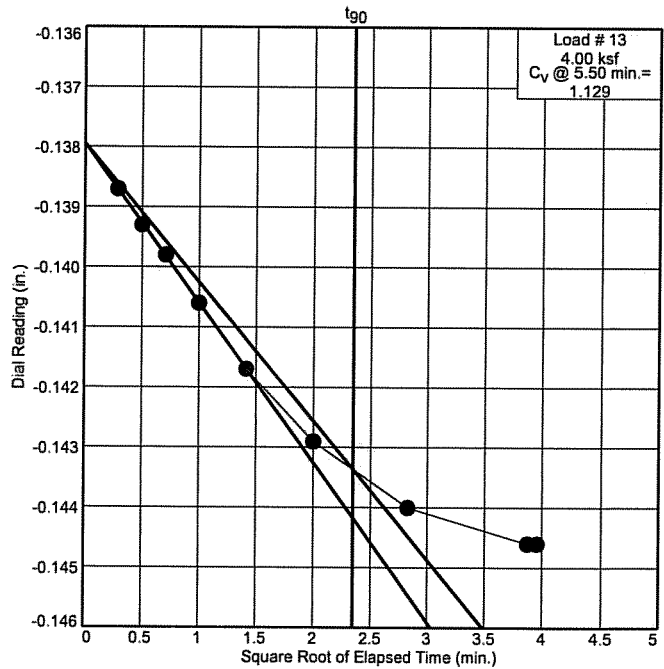
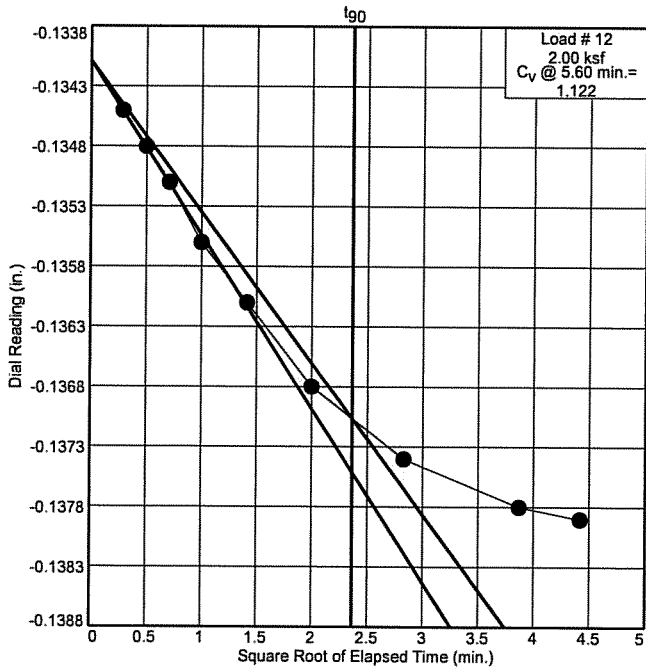
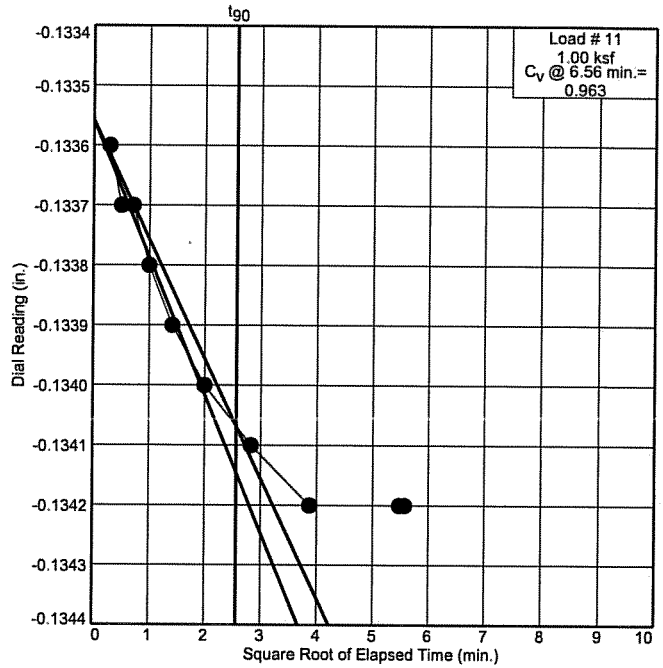
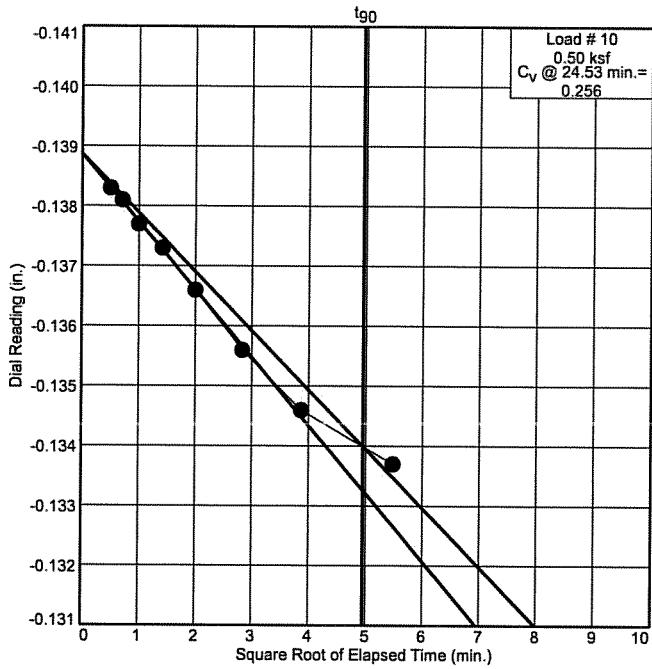
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106 South Portland, ME

Depth: 40'-42'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MRB*

Lab No. 14780b

# Dial Reading vs. Time

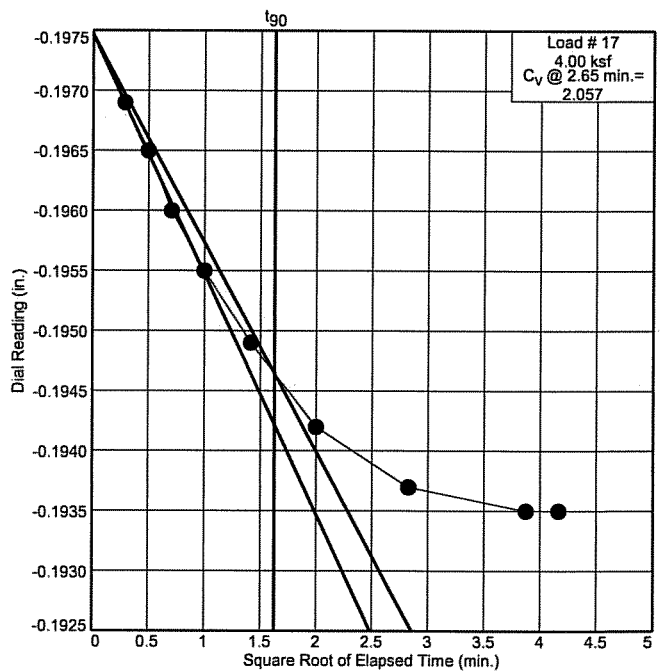
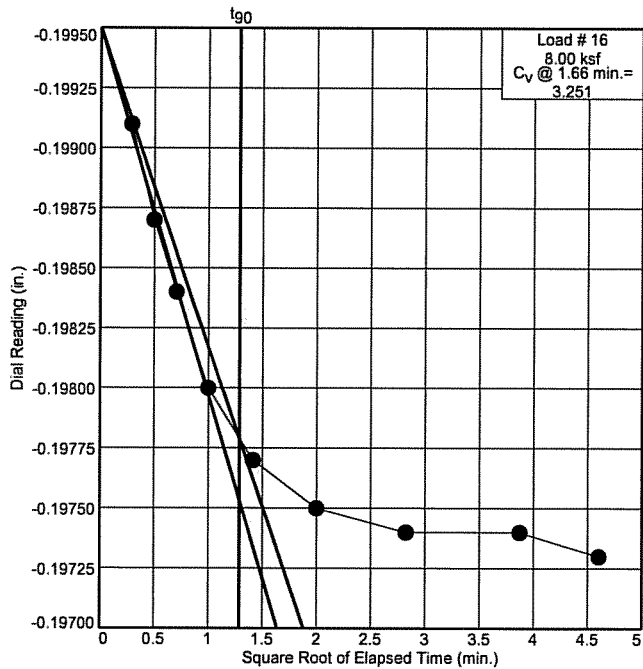
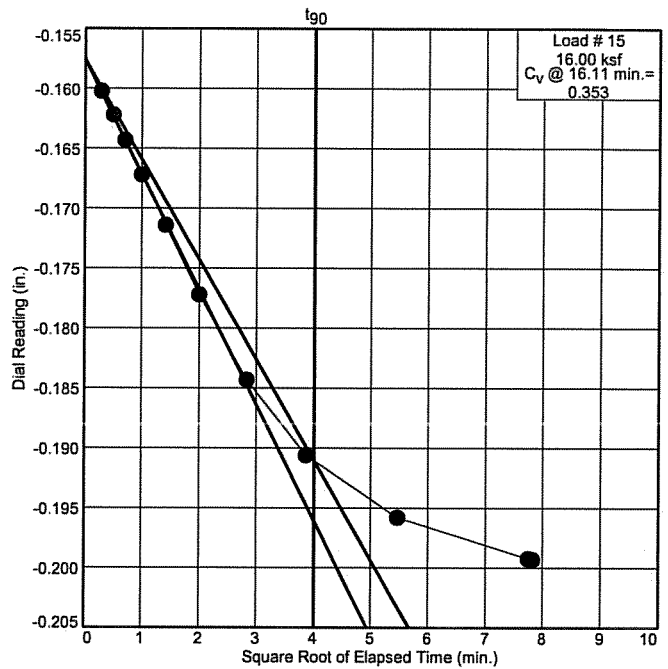
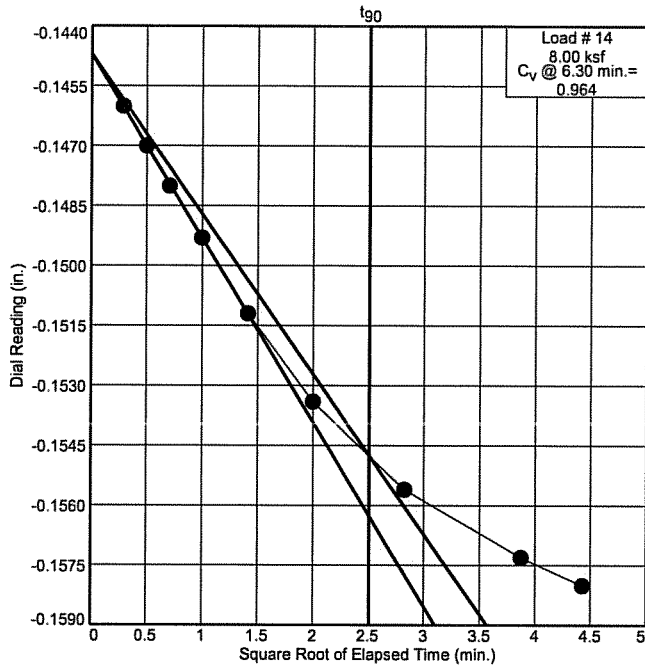
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106 South Portland, ME

Depth: 40'-42'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

Lab No. 14780b

# Dial Reading vs. Time

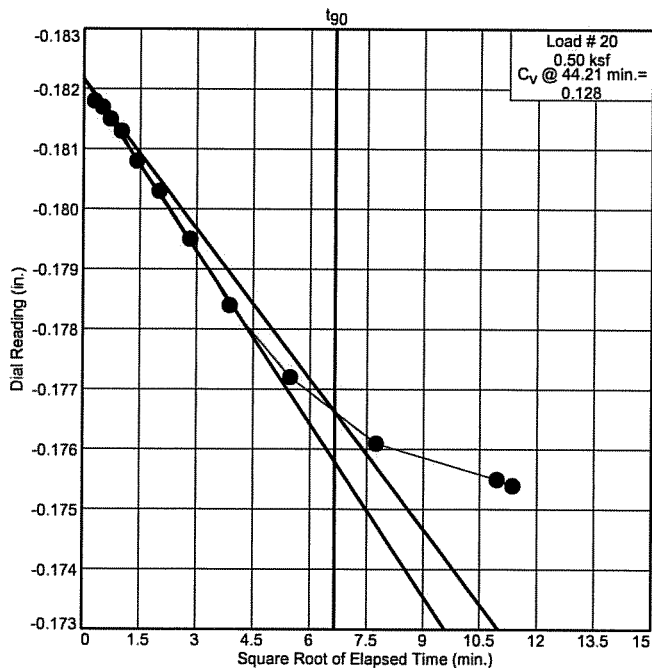
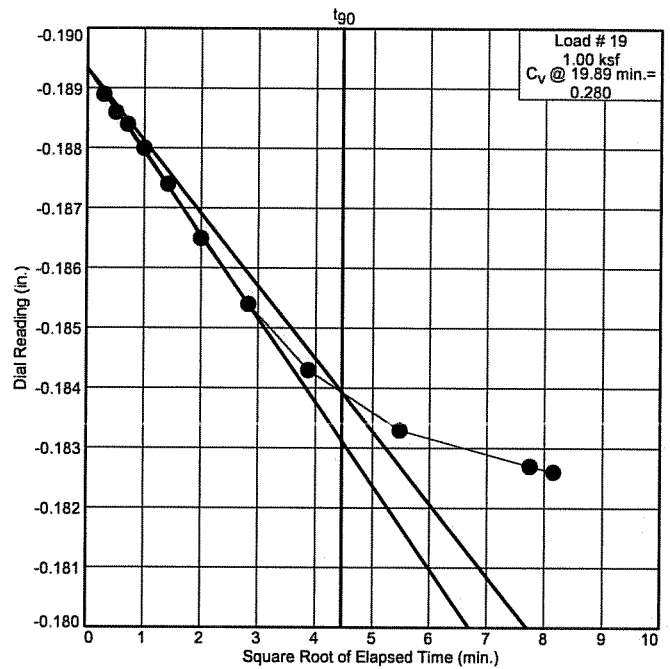
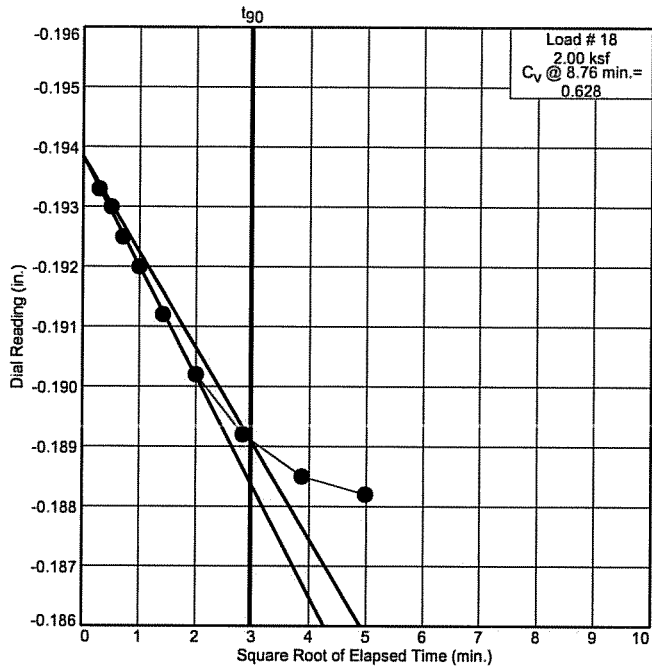
Project No.: 1368-009

Project: MTA Exit 45 Reconfiguration

Location: HB-EXIT45-106 South Portland, ME

Depth: 40'-42'

Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Saco, Maine

*MJG*  
Lab No. 14796b



**R. W. Gillespie & Associates, Inc.**

86 Industrial Park Road, Suite 4, Saco, ME 04072 207-286-8008  
177 Shattuck Way, Suite 1 West, Newington NH 03801 603-427-0244  
44 Wood Avenue, Suite I, Mansfield, MA 508-623-0101

**LETTER OF TRANSMITTAL**

Date: December 8, 2017	Project No.: 1368-009
Attention: Isabel V. (Be) Schonewald, P.E. (Be@schonewaldengineering.com)	
Re: Laboratory Testing MTA Exit 45 Reconfiguration South Portland, Maine	

Schonewald Engineering Associates, Inc.

---

129 Middle Road

---

Cumberland, ME 04021

We are sending you attached Laboratory Test Results.

Laboratory No. (s)	Test (s) Performed
14784a	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time
14784b	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time
14784c	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time
14784d	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time

Remarks:

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Copy to:

If enclosures are not noted, kindly notify us at once.



**R. W. Gillespie & Associates, Inc.**

86 Industrial Park Road, Suite 4, Saco, ME 04072 207-286-8008  
177 Shattuck Way, Suite 1 West, Newington NH 03801 603-427-0244  
44 Wood Avenue, Suite I, Mansfield, MA 508-623-0101

**LETTER OF TRANSMITTAL**

Date: December 18, 2017	Project No.: 1368-009
Attention: Isabel V. (Be) Schonewald, P.E. (Be@schonewaldengineering.com)	
Re: Laboratory Testing MTA Exit 45 Reconfiguration South Portland, Maine	

Schonewald Engineering Associates, Inc.

129 Middle Road

Cumberland, ME 04021

We are sending you attached Laboratory Test Results.

Laboratory No. (s)	Test (s) Performed
14784e	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time
14785	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time
14786a	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time
14786b	Liquid& Plastic Limits, Consolidation, & Dial Reading vs. Time

Remarks:

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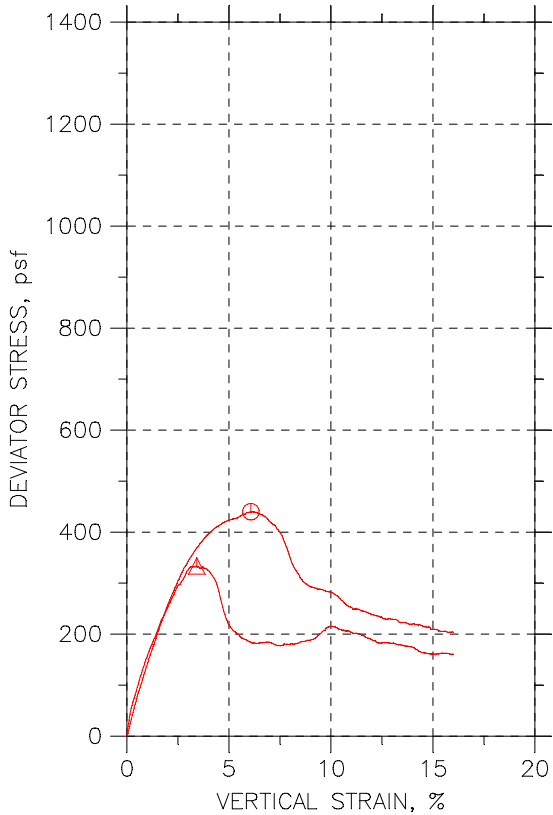
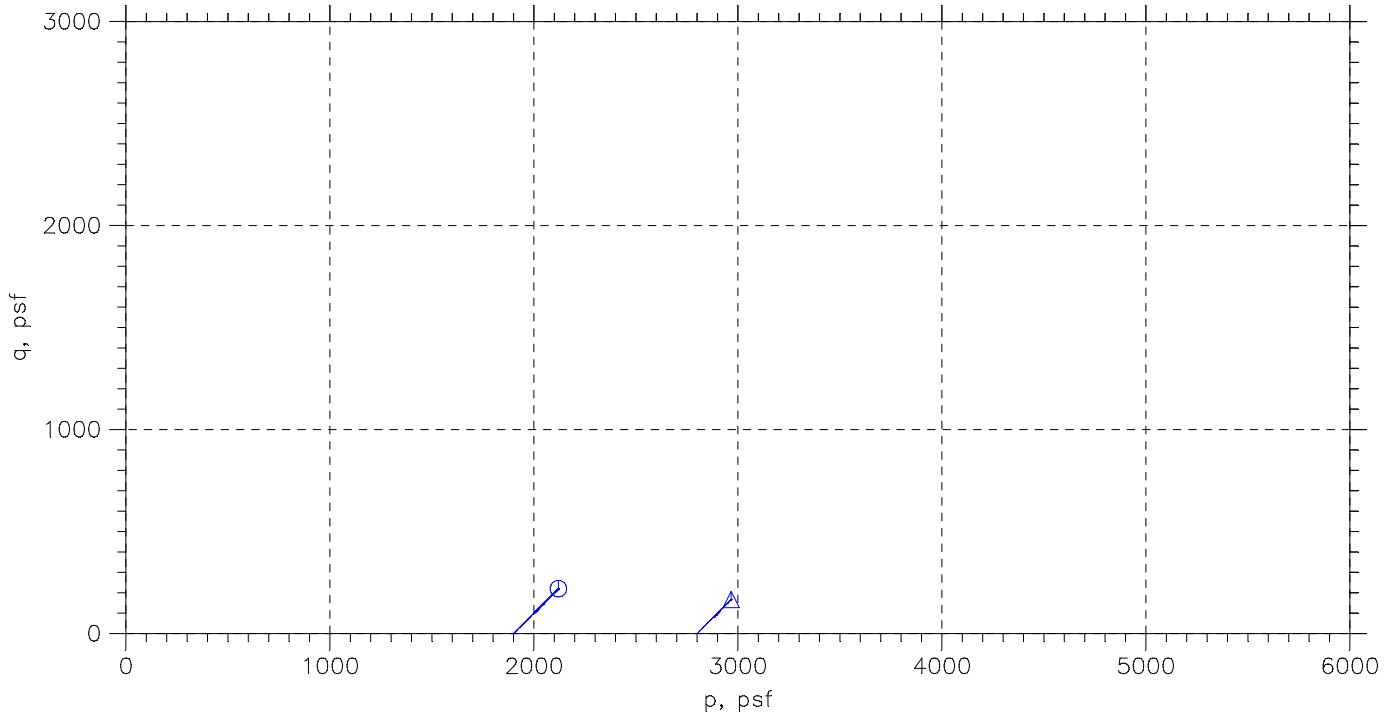
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Copy to:

If enclosures are not noted, kindly notify us at once.

**GTX: RESULTS OF 2-POINT UNCONSOLIDATED UNDRAINED LABORATORY TESTS ON  
UNDISTURBED SOIL SAMPLES**

# UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

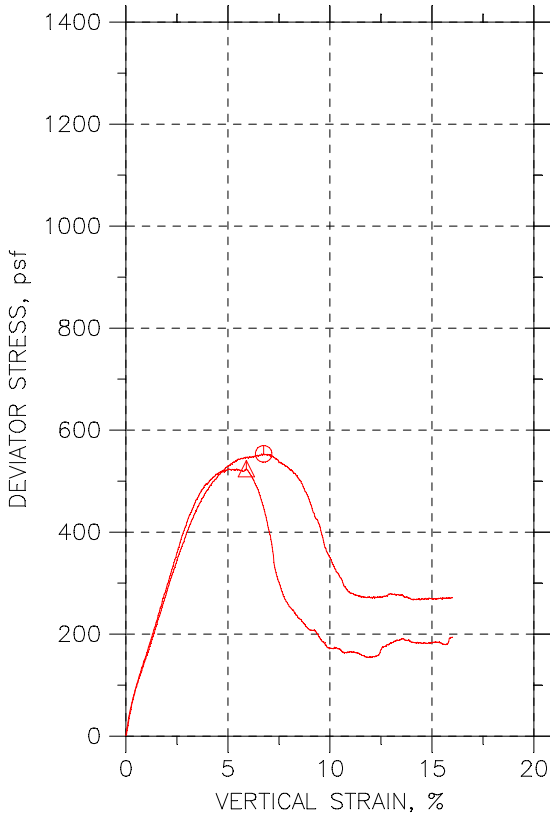
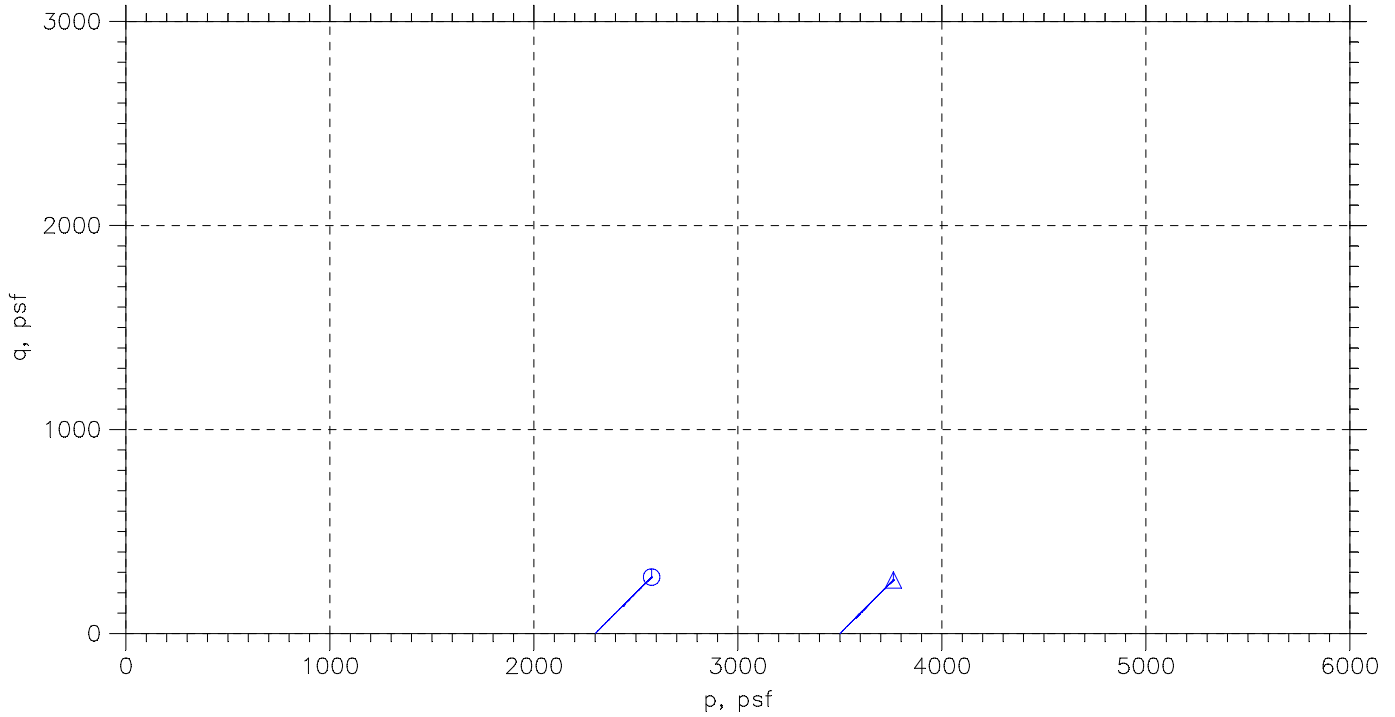


Symbol	⊙	△		
Sample No.	U1	U1		
Test No.	UU-5	UU-6		
Depth	35-37 ft	35-37 ft		
Tested by	md	md		
Test Date	12/1/17	12/1/17		
Checked by	njh	njh		
Check Date	<b>12/6/17</b>	<b>12/6/17</b>		
Diameter, in	2.65	2.7		
Height, in	5.9	5.9		
Water Content, %	37.5	34.4		
Dry Density, pcf	82.09	81.31		
Saturation, %	96.1	86.5		
Void Ratio	1.05	1.07		
Confining Stress, psf	1900	2800		
Undrained Strength, psf	220	166.8		
Max. Dev. Stress, psf	440	333.5		
Strain at Failure, %	6.07	3.43		
Strain Rate, %/min	1	1		
Estimated Specific Gravity	2.7	2.7		
Liquid Limit	---	---		
Plastic Limit	---	---		
Plasticity Index	---	---		

	Project: METPK Exit 45	
	Location: South Portland, ME	
	Project No.: GTX-307327	
	Boring No.: 103	
	Sample Type: intact	
	Description: Wet, dark gray clay and silt	
Remarks: System R - Boring Number: HB-EXIT 45-103		



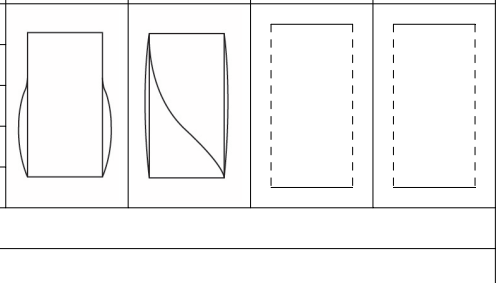
# UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



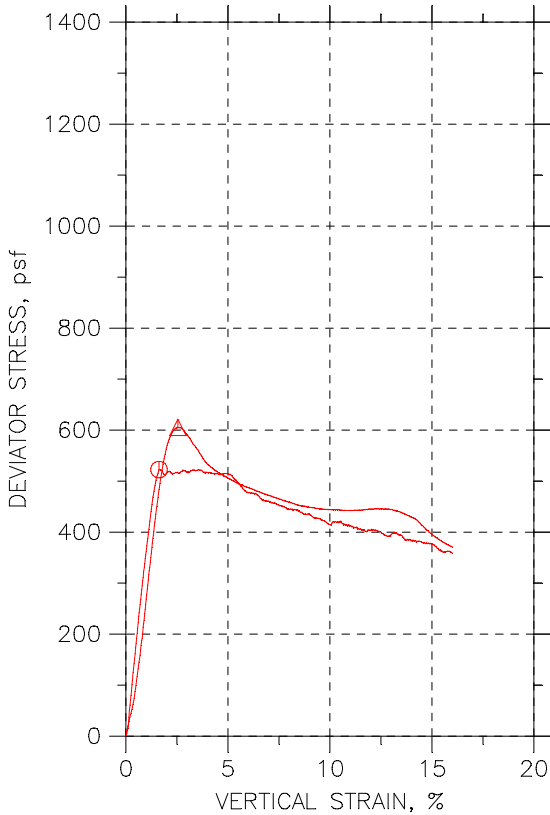
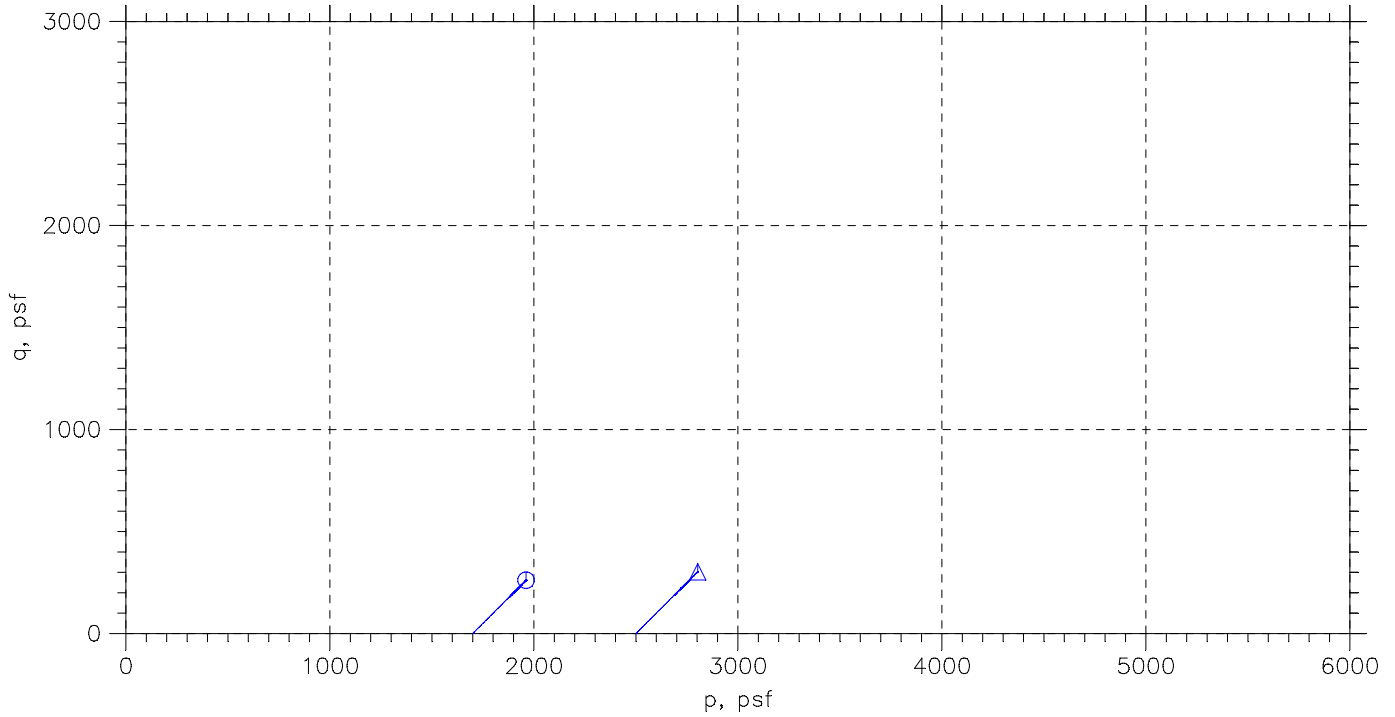
Symbol	⊙	△		
Sample No.	U2	U2		
Test No.	UU-3	UU-4		
Depth	45-47 ft	45-47 ft		
Tested by	md	md		
Test Date	11/28/17	11/28/17		
Checked by	njh	njh		
Check Date	<b>12/6/17</b>	<b>12/6/17</b>		
Diameter, in	2.72	2.69		
Height, in	6.02	5.97		
Water Content, %	38.4	44.1		
Dry Density, pcf	75.53	74.74		
Saturation, %	84.2	94.8		
Void Ratio	1.23	1.26		
Confining Stress, psf	2300	3500		
Undrained Strength, psf	276.7	262.2		
Max. Dev. Stress, psf	553.5	524.3		
Strain at Failure, %	6.75	5.9		
Strain Rate, %/min	1	1		
Estimated Specific Gravity	2.7	2.7		
Liquid Limit	---	---		
Plastic Limit	---	---		
Plasticity Index	---	---		



Project: METPK Exit 45
Location: South Portland, ME
Project No.: GTX-307327
Boring No.: 103
Sample Type: intact
Description: Wet, gray clay and silt
Remarks: System S - Boring Number: HB-EXIT 45-103



# UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

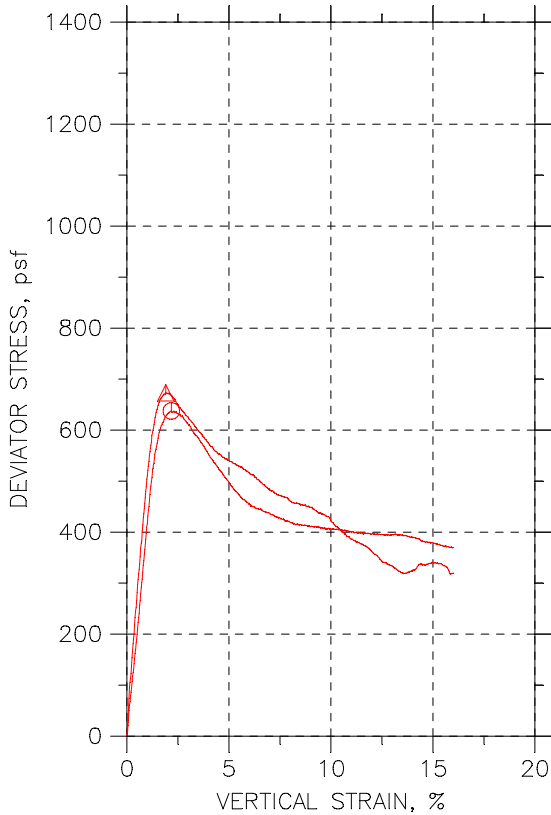
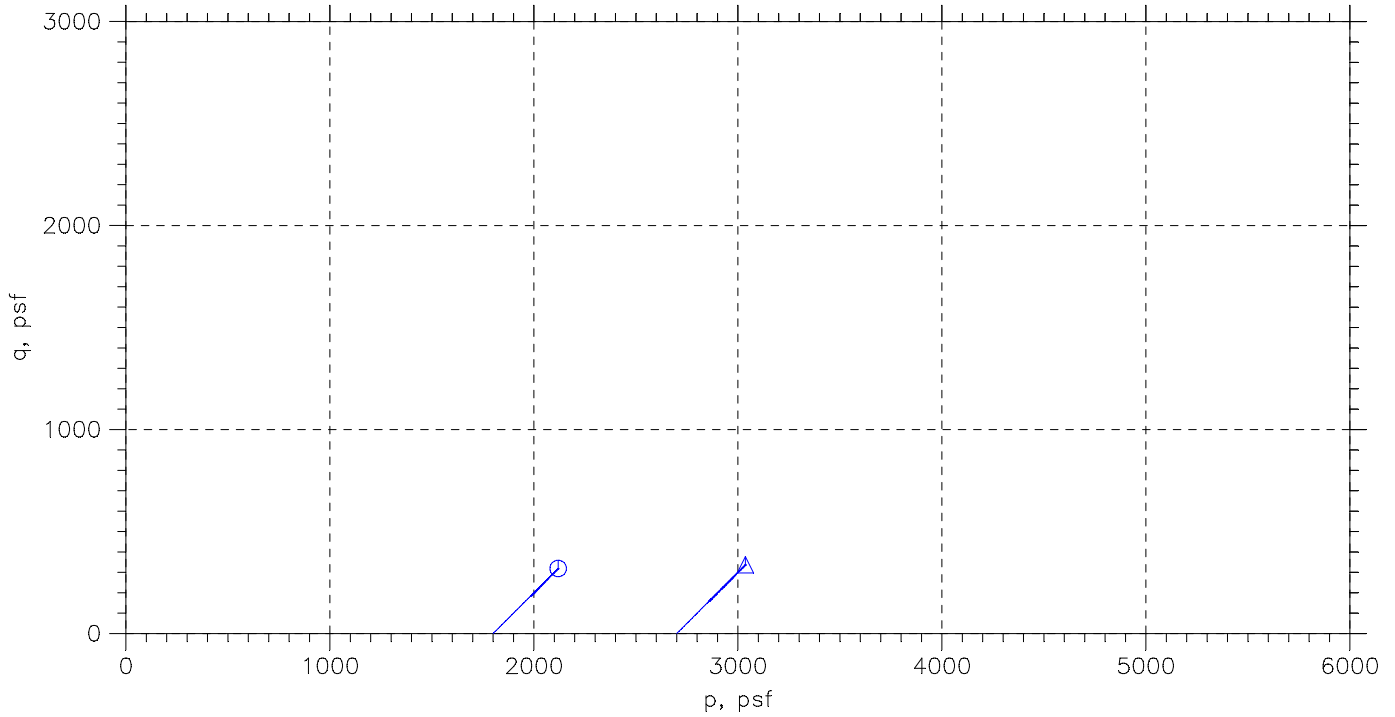


Symbol	⊙	△		
Sample No.	U1	U1		
Test No.	UU-7	UU-8		
Depth	30-32 ft	30-32 ft		
Tested by	md	md		
Test Date	12/1/17	12/1/17		
Checked by	njh	njh		
Check Date	<b>12/6/17</b>	<b>12/6/17</b>		
Diameter, in	2.72	2.73		
Height, in	5.97	5.98		
Water Content, %	39.0	40.4		
Dry Density, pcf	82.07	80.62		
Saturation, %	100.0	100.0		
Void Ratio	1.05	1.09		
Confining Stress, psf	1700	2500		
Undrained Strength, psf	261.3	302.7		
Max. Dev. Stress, psf	522.7	605.4		
Strain at Failure, %	1.62	2.55		
Strain Rate, %/min	1	1		
Estimated Specific Gravity	2.7	2.7		
Liquid Limit	---	---		
Plastic Limit	---	---		
Plasticity Index	---	---		



Project: METPK Exit 45	
Location: South Portland, ME	
Project No.: GTX-307327	
Boring No.: 105	
Sample Type: intact	
Description: Wet, dark gray clay and silt	
Remarks: System R - Boring Number: HB-EXIT 45-105	

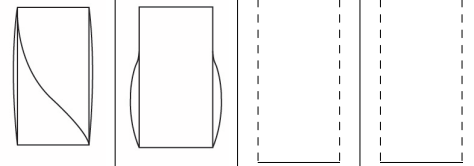
# UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



Symbol	⊙	△		
Sample No.	U1	U1		
Test No.	UU-1	UU-2		
Depth	30-32 ft	30-32 ft		
Tested by	md	md		
Test Date	11/28/17	11/28/17		
Checked by	njh	njh		
Check Date	<b>12/6/17</b>	<b>12/6/17</b>		
Diameter, in	2.85	2.85		
Height, in	5.97	6.07		
Water Content, %	45.4	46.2		
Dry Density, pcf	72.37	70.65		
Saturation, %	92.2	90.0		
Void Ratio	1.33	1.39		
Confining Stress, psf	1800	2700		
Undrained Strength, psf	318.8	336.5		
Max. Dev. Stress, psf	637.5	673.1		
Strain at Failure, %	2.18	1.9		
Strain Rate, %/min	1	1		
Estimated Specific Gravity	2.7	2.7		
Liquid Limit	---	---		
Plastic Limit	---	---		
Plasticity Index	---	---		



Project: METPK Exit 45  
 Location: South Portland, ME  
 Project No.: GTX-307327  
 Boring No.: 107  
 Sample Type: intact  
 Description: Wet, gray clay and silt  
 Remarks: System S - Boring Number: HB-EXIT 45-107



**THIELSCH: RESULTS OF UNCONFINED COMPRESSION LABORATORY TESTS  
ON ROCK CORE SPECIMENS**

## LABORATORY TESTING DATA SHEET

Project Name MeTPK Exit 45 Reconfiguration

Location South Portland, ME

Reviewed By *Matthew J. Coburn*

Project No. 17-028

Assigned By Be Schonewald

Project Manager Be Schonewald

Report Date 11.28.17

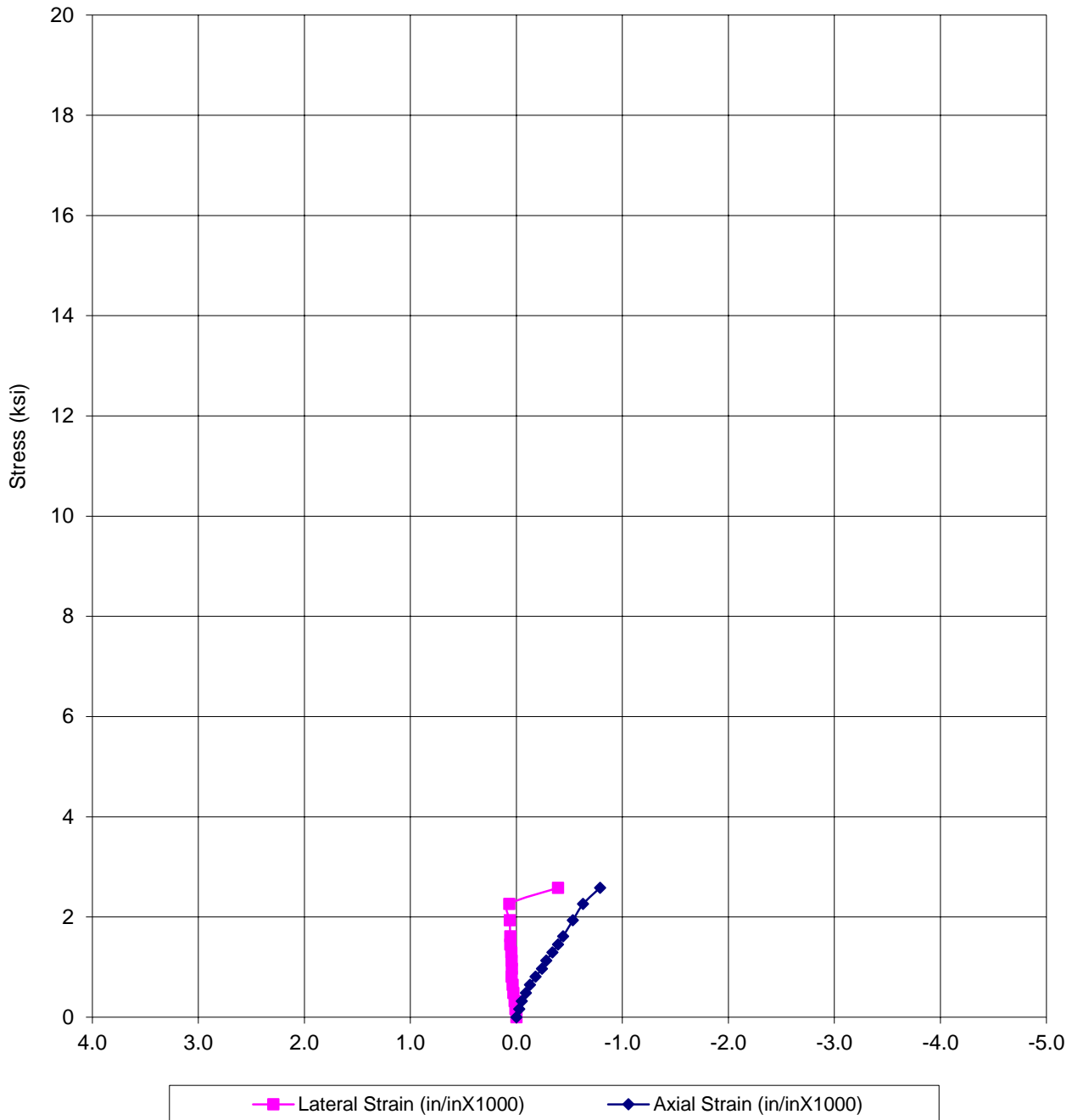
Date Reviewed 11.29.17

Boring No.	Sample No.	Depth Ft.	Laboratory No.	Sample Data						Compression Tests								Rock Formation or Description or Remarks			
				Moh's Hardness	Do in.	L in.	(1) Unit Wt. PCF	(2) Wet Density PCF	Bulk Gs.	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) Conf. Stress	(7) E sec PSI EE+06	(8) Poisson's Ratio	$\sigma$ PSI	Is <sub>50</sub> PSI				
HB-EXIT45-102	R1	80.7-81.3	17-R-1805		1.987	4.686	170.4				U	2,749	0.049		4.00	0.16			Slate; broke along foliation		
HB-EXIT45-103	R1	89.7-90.3	17-R-1806		1.986	4.735	146.2				U	885	0.118		1.12	0.13			Weathered slate; broke partly along foliation		
(1) Volume Determined By Measuring Dimensions				(3) P=Petrographic PLD=Point Load (diametrical),				(5) Strain at Peak Deviator Stress													
(2) Determined by Measuring Dimensions and Weight of Saturated Sample				PLA= Point Load (Axial) ST= Splitting Tensile				(6) Represents Confining Stress on Triaxial Tests													
				U= Unconfined Compressive Strength				(7) Represents Secant Modulus at 50% of Total Failure Stress													
				(4) Taken at Peak Deviator Stress				(8) Represents Secant Poisson's Ratio at 50% of Total Failure Stress													



195 Frances Avenue  
Cranston, RI 02910 401-467-6454

**MeTPK Exit 45 Reconfiguration  
South Portland, ME**



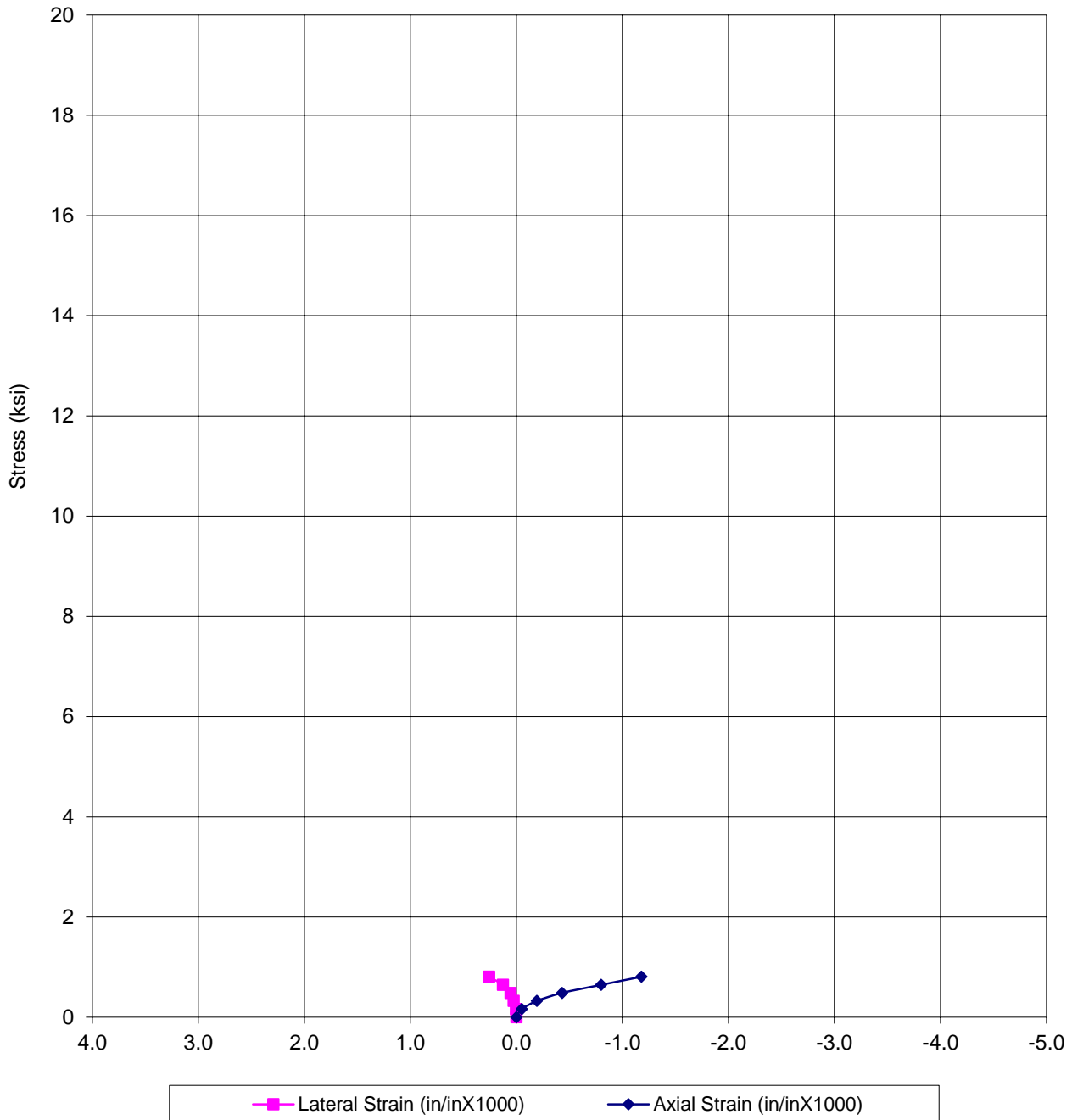
**Rock Unconfined Compression Testing - ASTM D7012**

Boring No. HB-EXIT45-102  
 Sample No. R-1  
 Depth: 81.0-81.4

File No. 17-028  
 Date: 11.28.17  
 Test No. 17-R-1805



**MeTPK Exit 45 Reconfiguration  
South Portland, ME**



**Rock Unconfined Compression Testing - ASTM D7012**

Boring No. HB-EXIT45-103  
 Sample No. R-1  
 Depth: 89.7-90.1

File No. 17-028  
 Date: 11/27/17  
 Test No. 17-R-1806



MeTPK Exit 45 Reconfiguration  
South Portland, ME  
74-17-0002.18

1 2 3 4 5 6  
195 Frances Avenue  
Cranston, RI 02910  
**THIELSCH ENGINEERING, INC.**  
24 HOUR EMERGENCY SERVICE  
Tel. (401) 467-6454  
Fax (401) 467-2398



Boring No.	Sample No.	Depth
<u>HB-EXIT45-102</u>	<u>R-1</u>	<u>80.7-81.3'</u>



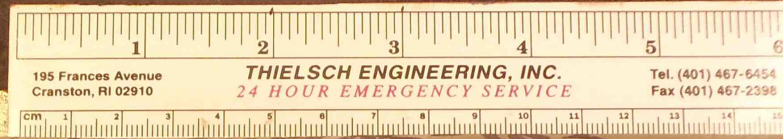
MeTPK Exit 45 Reconfiguration  
South Portland, ME  
74-17-0002.18



102-84  
81.3

Boring No.	Sample No.	Depth
<u>HB-EXIT45-</u> <u>102</u>	<u>R-1</u>	<u>80.7-81.3'</u>

MeTPK Exit 45 Reconfiguration  
South Portland, ME  
74-17-0002.18



Boring No.	Sample No.	Depth
<u>HB-EXIT45-103</u>	<u>R-1</u>	<u>89.7-90.3'</u>

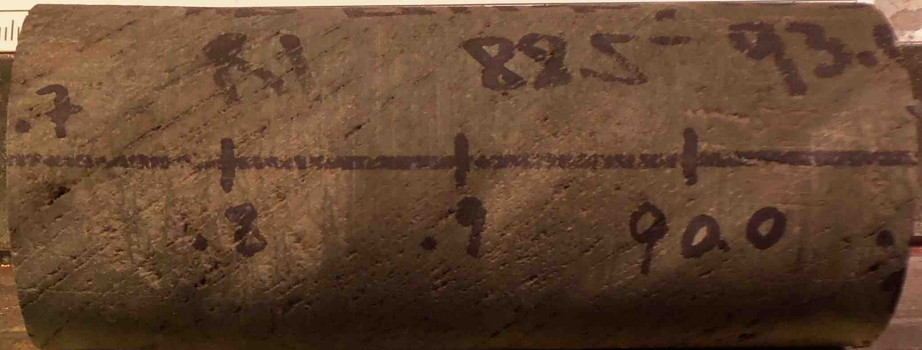
MeTPK Exit 45 Reconfiguration  
South Portland, ME  
74-17-0002.18

195 Frances Avenue  
Cranston, RI 02910

**THIELSCH ENGINEERING, INC.**  
24 HOUR EMERGENCY SERVICE

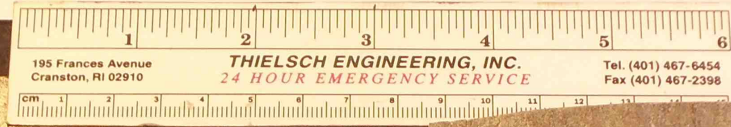
Tel. (401) 467-6454  
Fax (401) 467-2398

cm 1



Boring No.	Sample No.	Depth
<u>HB-EXIT45-103</u>	<u>R-1</u>	<u>89.7-90.3'</u>

MeTPK Exit 45 Reconfiguration  
South Portland, ME  
74-17-0002.18



Boring No.	Sample No.	Depth
<u>HB-EXIT45-</u> <u>102</u>	<u>R-1</u>	<u>80.7-81.3'</u>

MeTPK Exit 45 Reconfiguration  
South Portland, ME  
74-17-0002.18



Boring No.	Sample No.	Depth
<u>HB-EXIT45-103</u>	<u>R-1</u>	<u>89.7-90.3'</u>

**ATTACHMENT 2**  
**GEO TECHNICAL DATA REPORT (FINAL PHASE**  
**EXPLORATION)**



**FIELD AND LABORATORY DATA REPORT  
PHASE 2 GEOTECHNICAL PROGRAM  
MAINE TURNPIKE EXIT 45 RECONFIGURATION  
SOUTH PORTLAND-SCARBOROUGH, MAINE**

**PREPARED FOR:**

HNTB Corporation  
Westbrook, Maine

**PREPARED BY:**

Isabel V. (Be) Schonewald, P.E.  
Schonewald Engineering Associates, Inc. (SchonewaldEA)  
129 Middle Road  
Cumberland, Maine 04021  
Be@SchonewaldEngineering.com

A handwritten signature in black ink, appearing to read "Isabel V. Schonewald", written over a horizontal line.

**October 8, 2018**

SchonewaldEA Project No. 18-008

**FIELD AND LABORATORY DATA REPORT  
PHASE 2 GEOTECHNICAL PROGRAM  
MAINE TURNPIKE EXIT 45 RECONFIGURATION  
SOUTH PORTLAND-SCARBOROUGH, MAINE**

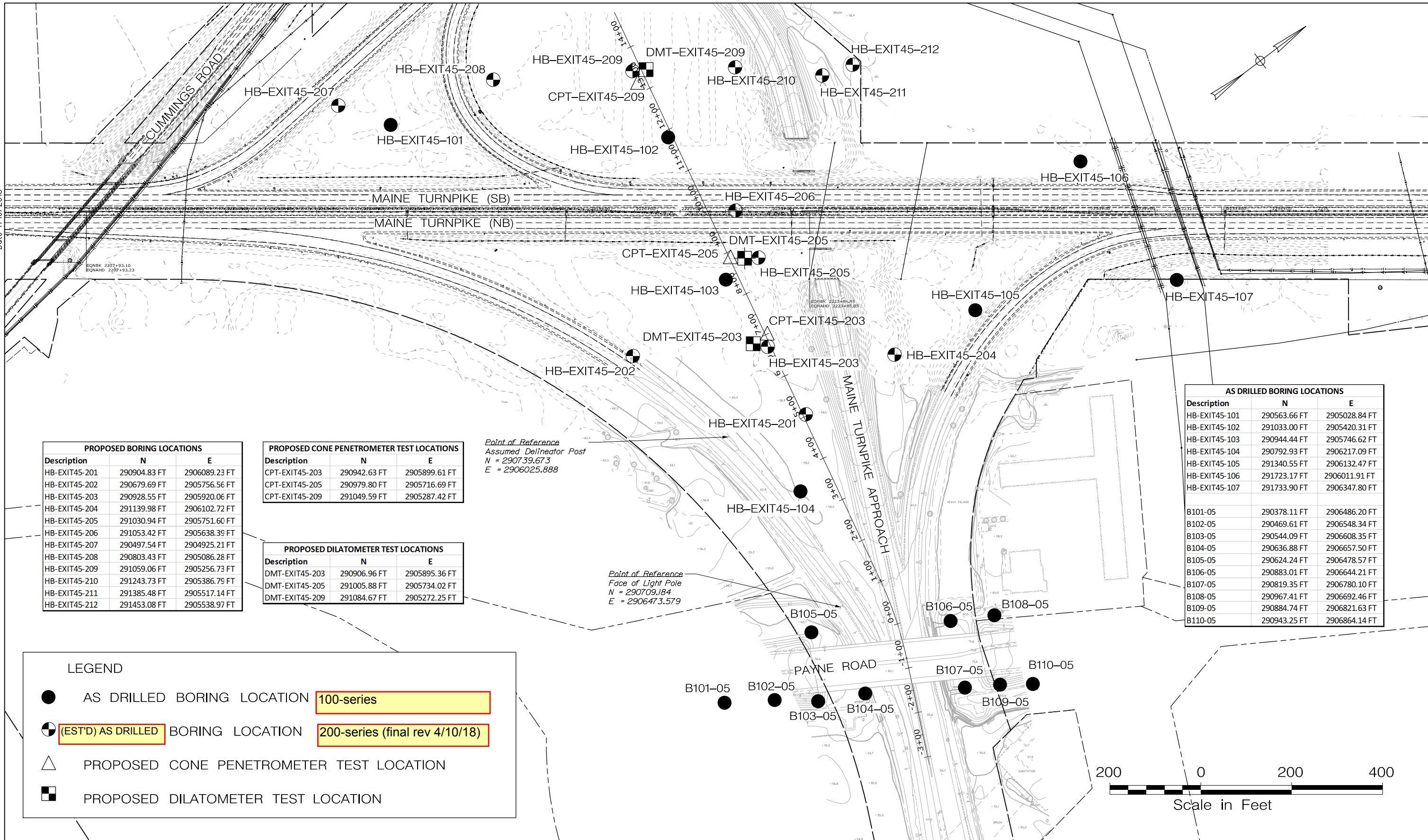
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LOGS OF 200-SERIES SUBSURFACE EXPLORATIONS	<b>4-49</b>
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## SUBSURFACE EXPLORATION LOCATION SKETCH

Date: 4/10/2018



PROPOSED BORING LOCATIONS		
Description	N	E
HB-EXIT45-201	290904.83 FT	2906089.23 FT
HB-EXIT45-202	290679.69 FT	2905756.56 FT
HB-EXIT45-203	290928.55 FT	2905920.06 FT
HB-EXIT45-204	291139.98 FT	2906102.72 FT
HB-EXIT45-205	291030.94 FT	2905751.60 FT
HB-EXIT45-206	291053.42 FT	2905638.39 FT
HB-EXIT45-207	290497.54 FT	2904925.21 FT
HB-EXIT45-208	290803.43 FT	2905086.28 FT
HB-EXIT45-209	291059.06 FT	2905256.73 FT
HB-EXIT45-210	291243.73 FT	2905386.79 FT
HB-EXIT45-211	291385.48 FT	2905517.14 FT
HB-EXIT45-212	291453.08 FT	2905538.97 FT

PROPOSED CONE PENETROMETER TEST LOCATIONS		
Description	N	E
CPT-EXIT45-203	290942.63 FT	2905899.61 FT
CPT-EXIT45-205	290979.80 FT	2905716.69 FT
CPT-EXIT45-209	291049.59 FT	2905287.42 FT

PROPOSED DILATOMETER TEST LOCATIONS		
Description	N	E
DMT-EXIT45-203	290906.96 FT	2905895.36 FT
DMT-EXIT45-205	291005.88 FT	2905734.02 FT
DMT-EXIT45-209	291084.67 FT	2905272.25 FT

Point of Reference  
Assumed Delineator Post  
N = 290739.673  
E = 2906025.888

Point of Reference  
Face of Light Pole  
N = 290709.184  
E = 2906473.579

AS DRILLED BORING LOCATIONS		
Description	N	E
HB-EXIT45-101	290563.66 FT	2905028.84 FT
HB-EXIT45-102	291033.00 FT	2905420.31 FT
HB-EXIT45-103	290944.44 FT	2905746.62 FT
HB-EXIT45-104	290792.93 FT	2906217.09 FT
HB-EXIT45-105	291340.55 FT	2906132.47 FT
HB-EXIT45-106	291723.17 FT	2906011.91 FT
HB-EXIT45-107	291733.90 FT	2906347.80 FT
B101-05	290378.11 FT	2906486.20 FT
B102-05	290469.61 FT	2906548.34 FT
B103-05	290544.09 FT	2906608.35 FT
B104-05	290636.88 FT	2906657.50 FT
B105-05	290624.24 FT	2906478.57 FT
B106-05	290883.01 FT	2906644.21 FT
B107-05	290819.35 FT	2906780.10 FT
B108-05	290967.41 FT	2906692.46 FT
B109-05	290884.74 FT	2906821.63 FT
B110-05	290943.25 FT	2906864.14 FT

**LEGEND**

- AS DRILLED BORING LOCATION 100-series
- ⊗ (EST'D) AS DRILLED BORING LOCATION 200-series (final rev 4/10/18)
- △ PROPOSED CONE PENETROMETER TEST LOCATION
- ⊠ PROPOSED DILATOMETER TEST LOCATION



Scale:

No.	Revision	By	Date

Designed by:

**HNTB**

CONSULTANT PROJECT MANAGER: -----

	By	Date	By	Date	
Designed	---	--/--	Checked	---	--/--
Drawn	---	--/--	In Charge of	RAL	--/--

HNTB CORPORATION  
340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909

**THE GOLD STAR MEMORIAL HIGHWAY**

MTA PROJECT MANAGER: -----

**MeTPK EXIT 45 PHASE 2 EXPLORATIONS**

BORING LOCATION PLAN

SHEET NUMBER:

CONTRACT: XXXX.XXX

Filename: BLPlan.dgn

**LOGS OF 200-SERIES SUBSURFACE EXPLORATIONS**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-201  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 59 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/8/18; 1530 - 5/9/18; 1620	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 64.5'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> ground surface

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
--	---	--	--

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0												
	1D	24/10	2.0 - 4.0	7-15-18-7	33	33					1D: Red brown and grey brown, wet, fine to coarse SAND, some Silt; changing at 2.4 ft to Red brown, m. dense, fine to coarse Sandy GRAVEL, some Silt. FILL	
5	2D	24/11	5.0 - 7.0	1-1-3-6	4	4	6				2D: Olive blue grey, saturated, soft, SILT, little to some fine SAND; appears to be reworked.	#200=79.0% WC=21% LL=27 PL=17 PI=10
10	3D	24/24	10.0 - 12.0	3-2-3-3	5	5	30				3D: Olive brown, m. stiff, slightly mottled, SILT & CLAY, with one 2-inch and smaller seams Silty fine SAND. MARINE SILT-CLAY CRUST	CL A-6(11) #200=98% WC=28% LL=29 PL=17 PI=12
15	4D	24/22	15.0 - 17.0	WOR-1-1-2	2	2	PUSH				4D: Olive grey, soft, CLAY & SILT, with occasional seams Silty fine SAND.	WC=34% LL=29 PL=19 PI=10
20	U1	24/21	20.0 - 22.0	HYD PUSH			PUSH				U1: Dark grey, Silty CLAY with Silty fine SAND on top and bottom of sample and shell fragments in bottom of sample. MARINE SILT-CLAY	X-RAY
25												

**Remarks:**



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<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 64.5'	<b>Hammer Efficiency:</b> 0.6
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 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
25	5D V1	24/24	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 343/ 0 psf			PUSH		[Hatched Pattern]	5D: Dark grey black, Silty CLAY, trace very fine Sand with nodules throughout. V1: Tu=12.5 / Tr=0 ft-lbs (65 mm x 130 mm vane) V2: Tu=12 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
		V2		Su= 330/ 0 psf							
30							↓		[Hatched Pattern]	U2: Dark grey black, Silty CLAY.	X-RAY CONSOL (C <sub>v</sub> , C <sub>α</sub> ) WC=41% LL=35 PL=20 PI=15
		U2	24/23	30.0 - 32.0	HYD PUSH		PUSH				
35							↓		[Hatched Pattern]	6D: Dark grey black, Silty CLAY with nodules throughout. V3: Tu=15 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V4: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane)	WC=44% LL=40 PL=20 PI=20
		6D V3	24/24	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 412/ 14 psf		PUSH				
40							↓		[Hatched Pattern]	U3: Dark grey black, Silty CLAY.	X-RAY CONSOL (C <sub>v</sub> , C <sub>α</sub> ) WC=39% LL=27 PL=18 PI=9
		U3	24/24	40.0 - 42.0	HYD PUSH		PUSH				
45							↓		[Hatched Pattern]	7D: Dark grey black, Silty CLAY with nodules throughout. V5: Tu=15 / Tr=0 ft-lbs (65 mm x 130 mm vane) V6: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
		7D V5	24/8	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 412/ 0 psf		PUSH				
50							↓		[Hatched Pattern]		
		V6		46.6 - 47.0	Su= 385/ 0 psf						

**Remarks:**



**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-201  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 59 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/8/18; 1530 - 5/9/18; 1620	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 64.5'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> ground surface

**IN-SITU SAMPLING AND TESTING:**  
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U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
 $N_{60}$  = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
 $S_u$  = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	U4	24/24	50.0 - 52.0	HYD PUSH			PUSH			U4: Dark grey, Silty CLAY.	X-RAY	
55	8D V7	24/24	55.0 - 57.0 55.6 - 56.0	VANE INTERVAL $S_u = 508/0$ psf			PUSH			8D: Dark grey, Silty CLAY with nodules throughout. V7: $T_u = 18.5$ / $T_r = 0$ ft-lbs (65 mm x 130 mm vane)	#200=99.5% WC=34% LL=33 PL=18 PI=15	
	V8		56.6 - 57.0	$S_u = 494/14$ psf						V8: $T_u = 18$ / $T_r = 0.5$ ft-lbs (65 mm x 130 mm vane)		
60	9D V9	24/18	60.0 - 62.0 60.6 - 61.0	(VANE)-WOR/12" $S_u = 481/14$ psf			PUSH			9D: Dark grey, Silty CLAY with nodules and multiple seams fine Sandy SILT. V9: $T_u = 17.5$ / $T_r = 0.5$ ft-lbs (65 mm x 130 mm vane)		
	MV									MV: Unable to push vane past 61.3 ft.		
65	10D	24/10	65.0 - 67.0	9-8-5-9	13	13	RC		-5.5	64.5 ft: Apparent stratum change based on drilling behavior. 10D: Grey, m. dense, Silty fine to medium SAND, some fine Gravel, trace coarse Sand. TILL		
70	11D	24/4	70.0 - 72.0	23-24-25-19	49	49			-13.0	11D: Grey, dense, fine to medium SAND, little to some fine Gravel, little to some Silt, trace coarse Sand.		
75										<b>Bottom of Exploration at 72.0 feet below ground surface.</b> No refusal.		

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-202  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 64 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/27/18; 1030 - 5/1/18; 1125	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 70'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.8 ft (open) / 3.9 ft (60 hrs)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0												
	1D	24/8	2.0 - 4.0	2-1-2-4	3	3					1D: Brown, wet, v. loose, fine to coarse SAND, some Silt. FILL	A-2-4(0) #200=24%
5												
	2D	24/16	5.0 - 7.0	2-8-12-13	20	20	PUSH				Brown, GRANULAR FILL overlying SILT-CLAY FILL; changing at 6.0 ft to:	
								58.0			6.0	
											2D: Dark red brown, wet, fine to coarse SAND, little to some Silt. REDDISH CLEAN SAND	
											55.5	
10												
	3D	24/8	10.0 - 12.0	10-6-3-2	9	9					3D: Grey, loose, fine SAND, trace to little Silt with one 2-inch layer SILT, little to some fine Sand at top of sample. INTERBEDDED MARINE FINE SANDS AND SILT	
15												
	4D	24/24	15.0 - 17.0	WOH/24*	0	0	PUSH				4D: Olive grey, v. soft, Silty CLAY with three 1-inch seams and occasional partings fine SAND, some Silt.	#200=89% WC=33% LL=29 PL=17 PI=12
20												
	5D	24/24	20.0 - 22.0	WOR/24*	0	0	PUSH				5D: Olive grey, v. soft, interbedded, Silty CLAY, trace very fine Sand; and fine SAND, some Silt.	
25												

**Remarks:**



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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
25	6D V1	24/21	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 467/ 14 psf					35.5	6D: Grey, interbedded, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. V1: Tu=17 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V2: Tu=12 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	#200=99.5% WC=34% LL=23 PL=16 PI=7	
		V2		Su= 330/ 14 psf								
30	U1	24/24	30.0 - 32.0	HYD PUSH						U1: Grey, Silty CLAY, trace fine Sand. MARINE SILT-CLAY	X-RAY	
35	7D V3	24/24	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 330/ 0 psf					28.5	7D: Grey black, Silty CLAY. V3: Tu=12 / Tr=0 ft-lbs (65 mm x 130 mm vane) V4: Tu=12.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	WC=36% LL=31 PL=19 PI=12	
		V4		Su= 343/ 14 psf								
40	U2	24/24	40.0 - 42.0	HYD PUSH						U2: Grey black, Silty CLAY.	X-RAY	
45	8D V5	24/24	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 522/ 0 psf						8D: Dark grey black, Silty CLAY with nodules and shell fragments throughout. V5: Tu=19 / Tr=0 ft-lbs (65 mm x 130 mm vane) V6: Tu=13.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
		V6		Su= 371/ 0 psf								
50												

**Remarks:**





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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-202  
**Proj. No.:** 18-008

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<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
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<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 70'	<b>Hammer Efficiency:</b> 0.6
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	U3	24/24	50.0 - 52.0	HYD PUSH			PUSH			U3: Dark grey black, Silty CLAY.	X-RAY	
55	9D V7 V8	24/16	55.0 - 57.0 55.6 - 56.0 56.6 - 57.0	VANE INTERVAL Su= 494/ 0 psf Su= 453/ 0 psf			PUSH			9D: Dark grey black, Silty CLAY with nodules throughout. V7: Tu=18 / Tr=0 ft-lbs (65 mm x 130 mm vane) V8: Tu=16.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)	WC=40% LL=29 PL=17 PI=12	
60	U4	24/22	60.0 - 62.0	HYD PUSH			PUSH			U4: Dark grey, Silty CLAY.	X-RAY	
65	10D	24/6	65.0 - 67.0	12-7-3-7	10	10	RC	-0.2		64.2 ft: Apparent stratum change (gravelly) based on drilling behavior. 10D: Grey, loose, fine to coarse Sandy GRAVEL, some Silt. TILL		
70	11D	12/4	70.0 - 71.0	12" drop-50/0"				-7.0		68.5 to 70 ft: Open-work till; cobbles and voids based on drilling behavior. 11D: Grey GRAVEL, some Silt, little fine to coarse Sand. TILL		
75										<b>Bottom of Exploration at 71.0 feet below ground surface.</b> At split-spoon refusal.		

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-203  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/7/18; 1030 - 5/8/18; 1220	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 65'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 6'	<b>Water Level*:</b> 0.9 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0												
	1D	24/11	2.0 - 4.0	5-7-3-5	10	10					1D: Red brown and grey brown, wet, loose, fine to coarse SAND, some Gravel, little to some Silt; somewhat layered; possibly reworked. FILL	
5												
	2D	24/13	5.0 - 7.0	5-5-9-9	14	14	∇				2D: Olive brown and grey, mottled, Clayey SILT and Silty fine SAND, with grey very fine Sandy SILT in tip of spoon; possibly reworked.	
10												
	3D	24/1	10.0 - 12.0	2-1-1-1	2	2	∇		49.6		Brown, GRANULAR FILL; changing at 10.4 ft to:	
	3D-A	24/24	11.0 - 13.0	--	3"dia						3D-A: Grey, Silty CLAY with multiple seams Silty fine SAND. INTERBEDDED MARINE FINE SANDS AND SILT	
15												
	4D V1	24/24	15.0 - 17.0	VANE INTERVAL Su= 357/ 0 psf			∇				4D: Grey, interbedded, Silty CLAY, trace very fine Sand; and very fine Sandy SILT.	#200=98% WC=32% LL=25 PL=16 PI=9
	V2		16.6 - 17.0	Su= 302/ 0 psf							V1: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V2: Tu=11 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	
20												
	5D V3	24/9	20.0 - 22.0	VANE INTERVAL Su= 288/ 0 psf			∇		41.5		5D: Dark grey, Silty CLAY, trace very fine Sand. MARINE SILT-CLAY	WC=36% LL=28 PL=17 PI=11
	V4		21.6 - 22.0	Su= 261/ 14 psf							V3: Tu=10.5 / Tr=0 ft-lbs (65 mm x 130 mm vane) V4: Tu=9.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
25												

**Remarks:**

1. Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.



**SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.**

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-203  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/7/18; 1030 - 5/8/18; 1220	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 65'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 6'	<b>Water Level*:</b> 0.9 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

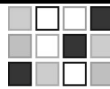
**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
N<sub>60</sub> = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL = 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
25	U1	24/24	25.0 - 27.0	HYD PUSH			PUSH		U1: Dark grey black, Silty CLAY with shell fragments.	X-RAY	
30	6D V5	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 357/ 0 psf			PUSH		6D: Dark grey, Silty CLAY with nodules throughout. V5: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane) V6: Tu=11 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)		
	V6		31.6 - 32.0	Su= 302/ 14 psf							
35	U2	24/24	35.0 - 37.0	HYD PUSH			PUSH		U2: Dark grey black, Silty CLAY with shell fragments.	X-RAY	
40	7D V7	24/24	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 426/ 0 psf			PUSH		7D: Dark grey, Silty CLAY with nodules throughout. V7: Tu=15.5 / Tr=0 ft-lbs (65 mm x 130 mm vane) V8: Tu=14.5 / Tr=0 ft-lbs (65 mm x 130 mm vane)	WC=45% LL=33 PL=19 PI=14	
	V8		41.6 - 42.0	Su= 398/ 0 psf							
45	U3	24/23	45.0 - 47.0	HYD PUSH			PUSH		U3: Dark grey, Silty CLAY.	X-RAY	
50											

**Remarks:**  
1. Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-203  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/7/18; 1030 - 5/8/18; 1220	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 65'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 6'	<b>Water Level*:</b> 0.9 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	8D V9	24/24	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL $S_u = 343/0$ psf			PUSH			8D: Dark grey, Silty CLAY with nodules throughout. V9: $T_u = 12.5$ / $T_r = 0$ ft-lbs (65 mm x 130 mm vane)		
	V10		51.6 - 52.0	$S_u = 426/0$ psf						V10: $T_u = 15.5$ / $T_r = 0$ ft-lbs (65 mm x 130 mm vane)		
55	U4	24/22	55.0 - 57.0	HYD PUSH			PUSH			U4: Dark grey, Silty CLAY with fine SAND, some Silt on bottom of sample.	X-RAY	
60	9D	24/11	60.0 - 62.0	12-7-5-5	12	12	33	18	58.8	58.8 ft: Driller notes probable stratum change based on drilling behavior. 9D: Grey, m. dense, fine to medium SAND, some Silt, little to some Gravel, trace coarse SAND. TILL		
65							29	19	65.0	<b>Bottom of Exploration at 65.0 feet below ground surface.</b> No refusal.		
70							21					
75							42					

**Remarks:**

- Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.



**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-204  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/1/18; 1220 - 5/2/18; 1220	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 55'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 15'	<b>Water Level*:</b> 4.7 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
 $N_{60}$  = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
 $S_u$  = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
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**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
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LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0												
	1D	24/14	2.0 - 4.0	16-22-26-8	48	48					1D: Dark brown black, dry, dense WEATHERED (WASTE) ASPHALT. FILL	
5								56.0				
	2D	24/9	5.0 - 7.0	1-1-1-2	2	2					2D: Dark (red) brown, and grey, wet, v. loose, ORGANIC SILT and PEAT; organic odor. ORIGINAL GROUND	SC-SM A-4(0) #200=36% WC=21% LL=27 PL=20 PI=7
10								52.0				
	3D	24/18	10.0 - 12.0	4-5-8-8	13	13					3D: Olive brown, mottled, moist (tight), stiff, Clayey SILT, trace fine Sand. MARINE SILT-CLAY CRUST	WC=27% LL=32 PL=18 PI=14
15												
	4D	24/20	15.0 - 17.0	1-1-1-1	2	2	PUSH				4D: Olive brown, slightly mottled, SILT & CLAY with numerous partings fine Sandy SILT; grading at 16.0 ft to: Dark grey, Silty CLAY, trace fine Sand with black streaks at tip of spoon. MARINE SILT-CLAY	
20												
	5D V1	24/24	20.0 - 22.0 20.6 - 21.0	VANE INTERVAL Su= 385/ 27 psf							5D: Dark grey black, Silty CLAY with nodules throughout. V1: Tu=14 / Tr=1 ft-lbs (65 mm x 130 mm vane).	WC=42% LL=34 PL=20 PI=14
	V2		21.6 - 22.0	Su= 330/ 14 psf							V2: Tu=12 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
25												

**Remarks:**



SCHONEWALD  
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ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-204  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/1/18; 1220 - 5/2/18; 1220	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 55'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 15'	<b>Water Level*:</b> 4.7 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
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 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
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 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL = 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)			
25	U1	24/24	25.0 - 27.0	HYD PUSH			PUSH			U1: Dark grey, Silty CLAY.	X-RAY
30	6D V3	24/18	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 440/ 0 psf			PUSH			6D: Dark grey black, Silty CLAY with nodules and shell fragments. V3: Tu=16 / Tr=0 ft-lbs (65 mm x 130 mm vane). V4: Tu=15.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
	V4		31.6 - 32.0	Su= 426/ 0 psf							
35	U2	24/23	35.0 - 37.0	HYD PUSH			PUSH			U2: Dark grey, Silty CLAY.	X-RAY
40	7D V5	24/22	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 426/ 0 psf			PUSH			7D: Dark grey black, Silty CLAY with nodules. V5: Tu=15.5 / Tr=0 ft-lbs (65 mm x 130 mm vane). V6: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
	V6		41.6 - 42.0	Su= 357/ 0 psf							
45	U3	24/24	45.0 - 47.0	HYD PUSH			PUSH		U3: Grey, Silty CLAY.	X-RAY	
50											

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-204  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 60.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/1/18; 1220 - 5/2/18; 1220	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 55'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 15'	<b>Water Level*:</b> 4.7 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	8D V7	24/23	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL $S_u$ = 481/ 41 psf			PUSH			8D: Dark grey, Silty CLAY, trace very fine Sand. V7: $T_u=17.5$ / $T_r=1.5$ ft-lbs (65 mm x 130 mm vane).		
	V8		51.6 - 52.0	$S_u$ = 453/ 41 psf						V8: $T_u=16.5$ / $T_r=1.5$ ft-lbs (65 mm x 130 mm vane).		
55	9D	24/12	55.0 - 57.0	15-12-12-14	24	24	RC	5.7		9D: Grey, m. dense, Silty fine to medium SAND, little Gravel, trace coarse Sand. TILL	54.8	
60	10D	24/2	60.0 - 62.0	15-19-25-30	44	44		-1.5		10D: Grey, dense, fine to medium SAND, some Silt, trace Gravel, trace coarse Sand; appears spoon pushed a piece of gravel.	62.0	
										<b>Bottom of Exploration at 62.0 feet below ground surface.</b> No Refusal.		
65												
70												
75												

**Remarks:**



**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-205  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/2/18; 1235 - 5/4/18; 1330	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 66'; NW to 67'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.7 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
 $N_{60}$  = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
 $S_u$  = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0								SSA				
	1D	24/18	2.0 - 4.0	12-11-7-9	18	18					1D: GRANULAR FILL changing at 3.3 ft to SILT-CLAY FILL. FILL	
5												
	2D	24/15	5.0 - 7.0	7-9-5-5	14	14	20				2D: Brown grey, wet, m. dense/stiff, layers of fine to coarse SAND, little to some Silt; and Clayey SILT, trace to little fine Sand.	
							14					
							17					
							22					
							25					
10									54.5			
	3D	24/14	10.0 - 12.0	4-8-3-4	11	11	30				3D: Olive grey, m. dense, interbedded, SILT, little fine Sand; fine to medium Sandy SILT; and mottled Clayey SILT; appears undisturbed. INTERBEDDED MARINE FINE SANDS AND SILT	
							23					
							19					
							18					
15												
	4D	24/24	15.0 - 17.0	1/24*	0	0	PUSH				4D: Grey, v. soft, interbedded, Silty CLAY, trace very fine Sand; and Silty fine SAND.	WC=31% LL=21 PL=17 PI=4
20												
	5D	24/24	20.0 - 22.0	VANE INTERVAL								
	V1		20.6 - 21.0	Su= 261/ 0 psf			PUSH				5D: Dark grey, Silty CLAY with seams of Silty fine SAND.	WC=32% LL=26 PL=17 PI=9
	V2		21.6 - 22.0	Su= 426/ 0 psf							V1: Tu=9.5 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	
											V2: Tu=15.5 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	
									39.5			
25												

**Remarks:**

1. Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.





**SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.**

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-205  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/2/18; 1235 - 5/4/18; 1330	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 66'; NW to 67'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.7 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL = 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
25	U1	24/23	25.0 - 27.0	HYD PUSH			PUSH			U1: Grey, Silty CLAY, trace very fine Sand. MARINE SILT-CLAY	X-RAY
30	6D V3	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 426/ 0 psf			PUSH			6D: Dark grey black, Silty CLAY, trace very fine Sand with occasional nodules. V3: Tu=15.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
	V4		31.6 - 32.0	Su= 412/ 0 psf						V4: Tu=15 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
35	U2	24/24	35.0 - 37.0	HYD PUSH			PUSH			U2: Dark grey black, Silty CLAY.	X-RAY CONSOL (C <sub>v</sub> , C <sub>α</sub> ) WC=52% LL=39 PL=21 PI=18
	7D V5	24/19	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 220/ 0 psf			PUSH			7D: Dark grey black, Silty CLAY with nodules throughout. V5: Tu=8 / Tr=0 ft-lbs (65 mm x 130 mm vane).	#200=98% WC=34% LL=27 PL=17 PI=10
40	V6		41.6 - 42.0	Su= 206/ 0 psf					V6: Tu=7.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
	U3	24/24	45.0 - 47.0	HYD PUSH			PUSH		U3: Dark grey black, Silty CLAY.	X-RAY	
50											

**Remarks:**

1. Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.



**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-205  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/2/18; 1235 - 5/4/18; 1330	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 66'; NW to 67'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.7 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
N<sub>60</sub> = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT.qp = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
50	8D V7	24/11	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 453/ 0 psf							8D: Dark grey black, Silty CLAY with nodules throughout. V7: Tu=16.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).  V8: Tu=16.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).	WC=42% LL=34 PL=21 PI=13
	V8		51.6 - 52.0	Su= 453/ 0 psf								
55	U4	24/23	55.0 - 57.0	HYD PUSH							U4: Dark grey, Silty CLAY.	X-RAY
60	9D V9	24/24	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 591/ 27 psf							9D: Dark grey, Silty CLAY with nodules throughout and one 2-inch seam and occasional partings Silty fine SAND. V9: Tu=21.5 / Tr=1 ft-lbs (65 mm x 130 mm vane). V10: Tu=20 / Tr=1 ft-lbs (65 mm x 130 mm vane).	
	V10		61.6 - 62.0	Su= 549/ 27 psf								
65	10D	13/7	65.0 - 66.1	2-30-50/1"	--						64.6 ft: Apparent stratum change based on drilling behavior and wash water. 10D: Grey, GRAVEL, some Silt, some fine to coarse Sand; appears to be crushed rock in tip of spoon. TILL	
	R1	60/60	67.0 - 72.0	RQD: 17%=28%							R1: Hard, typically fresh, aphanitic to fine grained, grey, PHYLLITE, with numerous calcsilicate veins and typically moderately dipping relic bedding. One 4-inch thick quartzite layer at 70.2 to 70.5 ft. Typically close, predominately moderately dipping with occasional low angle breaks; undulating, rough, typically fresh, and open often with mud infilling; shiny. Core times: 5:05/ 3:30/ 2:15/ 3:15/ 2:20 min:sec/ft POOR ROCK QUALITY	
	R2	46/46	72.0 - 75.8	RQD: 25%=54%							R2: Same as R1, except no quartzite layer and breaks are close to moderately spaced. Highly fractured 73.3 to 74.1 ft. Core times: 3:15/ 2:50/ 2:15/- min:sec ft. FAIR ROCK QUALITY	
75												

**Remarks:**  
1. Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-205  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 5/2/18; 1235 - 5/4/18; 1330	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 66'; NW to 67'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.7 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75									-12.8		Bottom of Exploration at 75.8 feet below ground surface.	
80												
85												
90												
95												
100												

**Remarks:**  
 1. Drill two pilot holes for future CPT and DMT; approx. 10-ft apart in triangular spacing. Pilot holes to 8 ft BGS; 2-inch dia. PVC into holes to hold open; marked with traffic cones.



**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-206  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/3/18; 2000-4/6/18; 0030	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (6.3' off guardrail; 123' SB of CB)	<b>Casing ID/OD:</b> HW to 65'; NW to 76.1'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.0 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
 $N_{60}$  = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
 $S_u$  = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0								SSA				
	1D	24/20	2.0 - 4.0	8-10-18-22	28	32				Top 4 inches: topsoil and organics. 1D: Tan brown, moist, m. dense, fine to coarse SAND, some Gravel, little Silt. FILL		
5												
	2D	24/19	5.0 - 7.0	5-4-13-11	17	19	38			2D: Predominately grey, damp, m. dense, very fine Sandy SILT with tan fine to coarse SAND, some Gravel, little Silt top and bottom.		
							71					
							55					
							58					
10							72					
	3D	24/20	10.0 - 12.0	9-2-2-2	4	5	OPEN			3D: Grey tan, v. loose, interbedded, fine SAND, trace Silt; fine to medium SAND, little Silt; fine Sandy SILT; and Silty CLAY, trace very fine Sand. INTERBEDDED MARINE FINE SANDS AND SILT		
15												
	4D	24/24	15.0 - 17.0	WOR/24*	0	0	33			4D: Grey, v. soft, interbedded, Organic Silty CLAY, trace very fine Sand; Silty CLAY, some very fine Sand; and fine Sandy SILT.	WC=34% LL=29 PL=17 PI=12	
							30					
							28					
							24					
							24					
20												
	5D V1	24/24	20.0 - 22.0 20.6 - 21.0	VANE INTERVAL Su= 275/ 14 psf			PUSH			5D: Grey, Silty CLAY, trace to little fine Sand as partings and seams. MARINE SILT-CLAY V1: Tu=10 / Tr=0.5 ft-lbs (65 mm x 130 mm vane). V2: Tu=8 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
25												

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-206  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/3/18; 2000-4/6/18; 0030	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (6.3' off guardrail; 123' SB of CB)	<b>Casing ID/OD:</b> HW to 65'; NW to 76.1'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.0 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)				
25	6D V3	24/24	25.0 - 27.0 25.6 - 26.0	VANE INTERVAL Su= 316/ 14 psf			OPEN			6D: Grey, Silty CLAY with pockets and seams fine Sandy SILT. V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	#200=99.7% WC=36% LL=28 PL=18 PI=10	
	V4		26.6 - 27.0	Su= 261/ 0 psf								V4: Tu=9.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).
30	7D V5	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 357/ 14 psf			OPEN			7D: Dark grey black, Silty CLAY.		V5: Tu=13 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).
	V6		31.6 - 32.0	Su= 330/ 0 psf						V6: Tu=12 / Tr=0 ft-lbs (65 mm x 130 mm vane).		
35	8D V7	24/24	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 371/ 27 psf			OPEN			8D: Dark grey black, Silty CLAY.		V7: Tu=13.5 / Tr=1 ft-lbs (65 mm x 130 mm vane).
	V8		36.6 - 37.0	Su= 385/ 14 psf						V8: Tu=14 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
40	9D V9	24/24	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 426/ 14 psf			OPEN			9D: Dark grey black, Silty CLAY with nodules throughout.		V9: Tu=15.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).
	V10		41.6 - 42.0	Su= 453/ 14 psf						V10: Tu=16.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
45	10D V11	24/24	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 577/ 0 psf			OPEN			10D: Dark grey black, Silty CLAY with nodules and shell fragments.		V11: Tu=21 / Tr=0 ft-lbs (65 mm x 130 mm vane).
	V12		46.6 - 47.0	Su= 453/ 14 psf						V12: Tu=16.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
50												

**Remarks:**



**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-206  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/3/18; 2000-4/6/18; 0030	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (6.3' off guardrail; 123' SB of CB)	<b>Casing ID/OD:</b> HW to 65'; NW to 76.1'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.0 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push UCT<sub>qp</sub> = peak compressive strength of rock

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)			
50	11D V13	24/24	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 440/ 14 psf			OPEN		11D: Dark grey black, Silty CLAY with nodules and shell fragments. V13: Tu=16 / Tr=0.5 ft-lbs (65 mm x 130 mm vane). V14: Tu=16 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
	V14		51.6 - 52.0	Su= 440/ 14 psf							
55	12D V15	24/24	55.0 - 57.0 55.6 - 56.0	VANE INTERVAL Su= 536/ 14 psf			PUSH		12D: Dark grey black, Silty CLAY with nodules. V15: Tu=19.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane). V16: Tu=20 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	WC=43% LL=34 PL=20 PI=14	
	V16		56.6 - 57.0	Su= 549/ 14 psf							
60	13D V17	24/24	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 604/ 27 psf			PUSH		13D: Dark grey black, Silty CLAY with nodules and one concretion. V17: Tu=22 / Tr=1 ft-lbs (65 mm x 130 mm vane). V18: Tu=21.5 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V18		61.6 - 62.0	Su= 591/ 27 psf							
65	14D V19	24/24	65.0 - 67.0 65.6 - 66.0	VANE INTERVAL Su= 646/ 41 psf			OPEN		14D: Dark grey, Silty CLAY. V19: Tu=23.5 / Tr=1.5 ft-lbs (65 mm x 130 mm vane). V20: Tu=24 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V20		66.6 - 67.0	Su= 659/ 27 psf							
70	15D V21	24/20	70.0 - 72.0 70.6 - 71.0	VANE INT/18"-2 Su= 824/ 69 psf	--		RC		Dark grey, Silty CLAY; changing at 71.6 ft to: V21: Tu=30 / Tr=2.5 ft-lbs (65 mm x 130 mm vane). 71.2 ft: MV: Unable to push vane past 71.2 ft. 71.6 ft: 15D: Grey, Silty GRAVEL, some Sand. TILL		
	MV		71.2 - 71.2								
75											

**Remarks:**



SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-206  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/3/18; 2000-4/6/18; 0030	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (6.3' off guardrail; 123' SB of CB)	<b>Casing ID/OD:</b> HW to 65'; NW to 76.1'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 4.0 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
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**ADDITIONAL DEFINITIONS:**  
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 N<sub>60</sub> = N value corrected for hammer efficiency  
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 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT qp = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75	16D	11/4	75.0 - 75.9	9-50/5"	-		RC	-13.0		16D: Grey, Silty GRAVEL, some fine to coarse Sand. TILL		
	R1	60/60	76.1 - 81.1	RQD: 57"-95%						R1: Hard, fresh, aphanitic to fine grained, medium grey, METAPELITE with highly undulating and/or high angle relic bedding (typically thin beds with calcsilicate veins/laminations). Moderately spaced, typically low angle to horizontal breaks; undulating, rough, typically fresh and open; dull. Core times: 2:25/ 2:20/ 2:10/ 2:10/ 2:05 min:sec/ft. EXCELLENT ROCK QUALITY		
80										R2: Same as R1, except close to moderately spaced breaks with some discoloration and infilling. Significantly fractured from 83.1 to 83.4 and 83.8 to 84.0 ft. Core times: 1:55/ 1:40/ 2:40/ 1:55/ 1:50 min:sec/ft. GOOD ROCK QUALITY		
	R2	60/60	81.1 - 86.1	RQD: 50"-83%						Bottom of Exploration at 86.1 feet below ground surface.		
85												
90												
95												
100												

**Remarks:**



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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-207  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 64 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/24/18; 1020 - 4/26/18; 1550	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 2.5 ft NW (compass) of staked location	<b>Casing ID/OD:</b> HW to 90'; NW to 95.2'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.2 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
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MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
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 $S_u$  = Insitu Field Vane Shear Strength (psf)  
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LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>gp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0												
	1D	24/12	2.0 - 4.0	2-4-4-4	8	8					1D: Dark red brown, wet, loose, fine to coarse SAND, trace to little Silt. REDDISH CLEAN SANDS	
5												
	2D	24/9	5.0 - 7.0	1-1-1-2	2	2					2D: Brown, wet, v. loose, fine to medium SAND, trace to little Silt.	#200=5%
								55.5				
10												
	3D	24/11	10.0 - 12.0	4-4-1-1	5	5					3D: Grey, loose, fine SAND, little to some Silt. GREY SANDS	
								50.5				
15												
	4D	24/21	15.0 - 17.0	2/18*-2	0	0					4D: Grey, v. loose, interbedded, fine SAND, little to some Silt; fine to medium SAND, trace to little Silt; and Silty CLAY. INTERBEDDED MARINE FINE SAND AND SILT	#200=70%
20												
	5D	24/13	20.0 - 22.0	2-1-2-2	3	3					5D: Grey, v. loose, fine to medium SAND, trace Silt with one 4-inch layer fine SAND, some Silt.	
25												

**Remarks:**





**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-207  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 64 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/24/18; 1020 - 4/26/18; 1550	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 2.5 ft NW (compass) of staked location	<b>Casing ID/OD:</b> HW to 90'; NW to 95.2'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.2 ft (open)

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**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
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LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)			
25	6D	24/11	25.0 - 27.0	1-1-1/12"	2	2	PUSH			6D: Grey, v. loose, interbedded, fine to medium SAND, little to some Silt; Silty fine SAND; and Silty CLAY.	
30	7D	24/24	30.0 - 32.0	WOR-1/18"	1	1	PUSH			7D: Grey, v. loose, interbedded, fine Sandy SILT; fine to medium SAND, little to some Silt; and Silty CLAY.	
35	8D V1	24/8	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 494/ 14 psf			PUSH			8D: Grey, interbedded, Silty CLAY; and fine SAND, some Silt. V1: Tu=18 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
	V2		36.6 - 37.0	Su= 453/ 27 psf						V2: Tu=16.5 / Tr=1 ft-lbs (65 mm x 130 mm vane).	
40	U1	24/20	40.0 - 42.0	HYD PUSH			PUSH			U1: Grey, Silty CLAY with Silty fine SAND on top and bottom surface of sample.	X-RAY
45	9D V3	24/24	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 467/ 14 psf			PUSH			9D: Dark grey, Silty CLAY with nodules throughout. MARINE SILT-CLAY V3: Tu=17 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
	V4		46.6 - 47.0	Su= 385/ 0 psf						V4: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
50											

**Remarks:**



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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-207  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 64 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/24/18; 1020 - 4/26/18; 1550	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 2.5 ft NW (compass) of staked location	<b>Casing ID/OD:</b> HW to 90'; NW to 95.2'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.2 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
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**ADDITIONAL DEFINITIONS:**  
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**ADDITIONAL DEFINITIONS:**  
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 WOR = weight of rods  
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**BOREHOLE ADVANCEMENT METHODS:**  
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**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
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 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
50	U2	24/24	50.0 - 52.0	HYD PUSH			PUSH			U2: Dark grey, Silty CLAY.	X-RAY
55	10D V5	24/24	55.0 - 57.0 55.6 - 56.0	VANE INTERVAL Su= 508/ 0 psf			PUSH			10D: Dark grey black, Silty CLAY with nodules throughout. V5: Tu=18.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
	V6		56.6 - 57.0	Su= 522/ 0 psf						V6: Tu=19 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
60	U3	24/24	60.0 - 62.0	HYD PUSH			PUSH			U3: Dark grey black, Silty CLAY.	X-RAY
65	MV									MV: Unable to push vane at 65.0 ft.	
	11D	24/24	65.0 - 67.0	4-4-3-3	3"dia		PUSH			11D: Dark grey black, Silty CLAY with (large) nodules throughout.	
70	MU									MU: Tube attempted at 70.0 ft. Piston sampler not extend fully; tube dented.	
	12D	24/2	70.0 - 72.0	1/24"	3"dia		PUSH			12D: Dark grey black, Silty CLAY with blocky structure of stiff clay nodules throughout; shell fragments.	
75											

**Remarks:**



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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-207  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 64 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/24/18; 1020 - 4/26/18; 1550	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 2.5 ft NW (compass) of staked location	<b>Casing ID/OD:</b> HW to 90'; NW to 95.2'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.2 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
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 #200 = percent fines WC = water content (%)  
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75	U4	24/24	75.0 - 77.0	HYD PUSH			PUSH			U4: Dark grey black, Silty CLAY.	X-RAY	
80	13D	24/0	80.0 - 82.0	1-1/18"	1	1	OPEN			13D: No recovery.		
85	14D	24/24	85.0 - 87.0	WOR/24"		3"dia	RC			14D: Grey with occasional darker grey streaks, Silty CLAY with semi-hard nodules throughout and one concretion.	#200=98% WC=35% LL=35 PL=18 PI=17	
90	15D	24/18	90.0 - 92.0	1-5-14-12		19	RC		-26.7	Grey, Silty CLAY with semi-hard nodules throughout and several concretions; changing at 90.7 ft to: 15D: Grey, Silty GRAVEL, some fine to coarse SAND. TILL		
95	16D	13/7	94.0 - 95.1	45-47-50/1"		--	RC			16D: Grey, GRAVEL, some Silt, some fine to coarse Sand with broken rock in tip of spoon.		
	R1	60/57	95.2 - 100.2	RQD: 42%=70%					-31.2	R1: Hard, fresh to slightly weathered, aphanitic to fine grained, grey, PHYLLITE with significant calcisilicate pockets and veins (typically high angle and highly undulating). Typically moderately close, low and high angle breaks; undulating, rough, typically fresh, and open; shiny when oriented along foliation. Open fracture at 96.1 ft. Core times: 2:55/ 3:20/ 2:45/ 2:50/ 3:25 min:sec/ft. FAIR ROCK QUALITY		
100												

**Remarks:**



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ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-207  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 64 ft (est'd)	<b>Core Barrel:</b> NQ2
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/24/18; 1020 - 4/26/18; 1550	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 2.5 ft NW (compass) of staked location	<b>Casing ID/OD:</b> HW to 90'; NW to 95.2'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.2 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
100									-36.2		Bottom of Exploration at 100.2 feet below ground surface.	
105												
110												
115												
120												
125												

**Remarks:**



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<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/20/18; 0830 - 4/23/18; 1600	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 3.7 ft S (compass) of staked location	<b>Casing ID/OD:</b> HW to 60'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.3 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0												
	1D	24/16	2.0 - 4.0	4-3-7-7	10	10					1D: Red brown, wet, loose, fine to coarse SAND, trace to little Silt. REDDISH CLEAN SANDS	
5								58.0			2D: Grey brown, wet, loose, fine to medium SAND, little Silt, trace coarse Sand. GREY SANDS	
	2D	24/13	5.0 - 7.0	4-3-2-3	5	5	PUSH					
10								54.5			3D: Grey, loose, interbedded, fine to medium SAND, little Silt; fine SAND, some Silt, trace fine Gravel; and Silty CLAY, trace fine Sand, INTERBEDDED MARINE FINE SANDS AND SILT	
	3D	24/10	10.0 - 12.0	1-2-3-2	5	5	PUSH					
15											4D: Grey, v. loose, fine SAND, little Silt with one seam SILT & CLAY, little fine Sand.	
	4D	24/5	15.0 - 17.0	1-2-1-2	3	3	PUSH					
20											5D: Grey, v. soft, interbedded, Silty CLAY, trace fine Sand; and Silty fine SAND.	
	5D	24/15	20.0 - 22.0	WOR-WOH/12"-1	0	0	PUSH					CL A-4(6) #200=91% WC=33% LL=25 PL=16 PI=9
25												

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<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
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MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
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N<sub>60</sub> = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

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WOH = weight of 140lb. hammer  
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SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

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AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
25	6D	24/24	25.0 - 27.0	WOH/24*	0	0	PUSH			6D: Grey, v. soft, interbedded, Silty CLAY, trace fine Sand; and Silty fine SAND.		
30	U1	24/23	30.0 - 32.0	HYD PUSH			PUSH			U1: Top of sample: Silty fine Sand. U1 (cont'd): Bottom of sample: Silty CLAY, trace to little fine SAND.	X-RAY	
35	7D V1	24/24	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 357/ 0 psf			PUSH			7D: Grey, Silty CLAY. MARINE SILT-CLAY V1: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane).		
	V2		36.6 - 37.0	Su= 440/ 14 psf						V2: Tu=16 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
40	U2	24/24	40.0 - 42.0	HYD PUSH			PUSH			U2: Grey, Silty CLAY.	X-RAY CK0U (2 point) WC=40% LL=27 PL=16 PI=11	
45	8D V3	24/24	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 385/ 14 psf			PUSH			8D: Grey, Silty CLAY. V3: Tu=14 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	#200=99.9% WC=45% LL=36 PL=20 PI=16	
	V4		46.6 - 47.0	Su= 440/ 14 psf						V4: Tu=16 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
50												

**Remarks:**



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**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 63 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/20/18; 0830 - 4/23/18; 1600	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 3.7 ft S (compass) of staked location	<b>Casing ID/OD:</b> HW to 60'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.3 ft (open)

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 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
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**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
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 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL = 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
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Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
50	U3	24/24	50.0 - 52.0	HYD PUSH			PUSH			U3: Dark grey black, Silty CLAY.	X-RAY
55	9D V5	24/24	55.0 - 57.0 55.6 - 56.0	VANE INTERVAL Su= 481/ 14 psf			PUSH			9D: Dark grey black, Silty CLAY with nodules throughout. V5: Tu=17.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
	V6		56.6 - 57.0	Su= 508/ 14 psf						V6: Tu=18.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
60	U4	24/24	60.0 - 62.0	HYD PUSH			OPEN			U4: Dark grey black, Silty CLAY.	X-RAY
65	10D V7	24/24	65.0 - 67.0 65.6 - 66.0	VANE INTERVAL Su= 659/ 0 psf			OPEN			10D: Dark grey black, Silty CLAY with nodules throughout. V7: Tu=24 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
	V8		66.6 - 67.0	Su= 563/ 0 psf						V8: Tu=20.5 / Tr=0 ft-lbs (65 mm x 130 mm vane).	
70	U5	24/23	70.0 - 72.0	HYD PUSH			OPEN		U5: Dark grey, Silty CLAY.	X-RAY	
75											

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<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/20/18; 0830 - 4/23/18; 1600	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> 3.7 ft S (compass) of staked location	<b>Casing ID/OD:</b> HW to 60'	<b>Hammer Efficiency:</b> 0.6
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75	11D V9	24/24	75.0 - 77.0 75.6 - 76.0	VANE INTERVAL Su= 714/ 27 psf			OPEN			11D: Dark grey black, Silty CLAY with nodules throughout and occasional small concretions. V9: Tu=26 / Tr=1 ft-lbs (65 mm x 130 mm vane). V10: Tu=27 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
	V10		76.6 - 77.0	Su= 742/ 14 psf								
80	12D V11	24/24	80.0 - 82.0 80.6 - 81.0	VANE INTERVAL Su= 646/ 14 psf			OPEN			12D: Dark grey with darker grey streaks, Silty CLAY with nodules throughout. V11: Tu=23.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane). V12: Tu=22 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V12		81.6 - 82.0	Su= 604/ 27 psf								
85	13D V13	24/24	85.0 - 87.0 85.6 - 86.0	VANE INTERVAL Su= 673/ 14 psf			RC			13D: Dark grey, Silty CLAY, trace fine Sand with nodules throughout. V13: Tu=24.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane). V14: Tu=26 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
	V14		86.6 - 87.0	Su= 714/ 14 psf								
								-24.8		87.8 ft: Probable stratum change based on drilling behavior; very boney.		
90								-27.2		89.7 ft: Possible top of rock. <b>Bottom of Exploration at 90.2 feet below ground surface.</b> Roller cone refusal.		
95												
100												

**Remarks:**





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**Boring No.:** HB-EXIT45-209  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/17/18; 0945 - 4/18/18; 1600	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per location	<b>Casing ID/OD:</b> HW to 60'	<b>Hammer Efficiency:</b> 0.6
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0								SSA				
	1D	24/14	2.0 - 4.0	5-12-13-15	25	25					1D: Red brown, wet, m. dense, fine to coarse SAND, trace to little Gravel, trace to little Silt. REDDISH CLEAN SAND	
5												
	2D	24/20	5.0 - 7.0	4-4-3-4	7	7	10				2D: Brown, wet, loose, fine to coarse SAND, little Gravel, trace Silt.	
							12					
							13					
							13					
10							9					
	3D	24/17	10.0 - 12.0	WOH-4-3-3	7	7	5				3D: Grey, loose, interbedded, fine SAND, some Silt; Silty CLAY, trace fine Sand; and fine to medium SAND, trace Silt. INTERBEDDED MARINE FINE SANDS AND SILT	WC=28% LL=20 PL=13 PI=7
							12					
							20					
							18					
15							14					
	4D	24/14	15.0 - 17.0	2-2-3-8	5	5	15				4D: Grey, loose, interbedded, Silty fine SAND; fine to medium SAND, trace Silt; and Silty CLAY.	WC=28% LL=NP PL=NP PI=NP
							15					
							18					
							14					
20							12					
	5D V1	24/0	20.0 - 22.0 20.6 - 21.0	VANE INTERVAL Su= 357/ 14 psf				PUSH			5D: No recovery. V1: Tu=13 / Tr=0.5 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	
	V2		21.6 - 22.0	Su= 426/ 14 psf							V2: Tu=15.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	
25												

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**Proj. No.:** 18-008

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<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
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	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	U1	24/21	25.0 - 27.0	HYD PUSH			PUSH			U1: Grey, Silty CLAY with fine Sandy SILT on bottom of sample.	X-RAY	
30	6D V3	24/2	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL Su= 316/ 0 psf			PUSH			6D: Grey, fine Sandy SILT. V3: Tu=11.5 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V4: Tu=9.5 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted.		
	V4		31.6 - 32.0	Su= 261/ 0 psf								
35	U2	24/23	35.0 - 37.0	HYD PUSH			PUSH			U2: Grey, Silty CLAY. MARINE SILT-CLAY	X-RAY CK0U (2 point) DSS (3 point) WC=41% LL=33 PL=21 PI=12	
40	7D V5	24/24	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 426/ 14 psf			PUSH			7D: Grey, Silty CLAY. V5: Tu=15.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane). V6: Tu=19.5 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V6		41.6 - 42.0	Su= 536/ 27 psf								
45	U3	24/23	45.0 - 47.0	HYD PUSH			PUSH			U3: Grey, Silty CLAY.	X-RAY	
50												

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-209  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/17/18; 0945 - 4/18/18; 1600	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per location	<b>Casing ID/OD:</b> HW to 60'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.5 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
50	8D V7	24/24	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 536/ 27 psf			PUSH		[Hatched Pattern]	8D: Dark grey black, Silty CLAY. V7: Tu=19.5 / Tr=1 ft-lbs (65 mm x 130 mm vane). V8: Tu=18 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
	V8		51.6 - 52.0	Su= 494/ 14 psf							
55	U4	24/24	55.0 - 57.0	HYD PUSH			PUSH		[Hatched Pattern]	U4: Dark grey black, Silty CLAY.	X-RAY
60	9D V9	24/24	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 646/ 27 psf			OPEN		[Hatched Pattern]	9D: Dark grey black, Silty CLAY. V9: Tu=23.5 / Tr=1 ft-lbs (65 mm x 130 mm vane). V10: Tu=23 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).	
	V10		61.6 - 62.0	Su= 632/ 14 psf							
65	U5	24/24	65.0 - 67.0	HYD PUSH			OPEN		[Hatched Pattern]	U5: Dark grey black, Silty CLAY.	X-RAY
70	MD V11	24/0	70.0 - 72.0 70.6 - 71.0	VANE INTERVAL Su= 673/ 55 psf			OPEN		[Hatched Pattern]	MD: No recovery. V11: Tu=24.5 / Tr=2 ft-lbs (65 mm x 130 mm vane). V12: Tu=24.5 / Tr=2 ft-lbs (65 mm x 130 mm vane).	
	V12		71.6 - 72.0	Su= 673/ 55 psf							
75									[Hatched Pattern]		

**Remarks:**



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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-209  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Schaefer/ Titus	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/17/18; 0945 - 4/18/18; 1600	<b>Drilling Method:</b> cased wash boring	<b>Hammer Type:</b> rope and cathead
<b>Boring Location:</b> per location	<b>Casing ID/OD:</b> HW to 60'	<b>Hammer Efficiency:</b> 0.6
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.5 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL = 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
75	10D V13	24/24	75.0 - 77.0 75.6 - 76.0	VANE INTERVAL Su= 769/ 55 psf			OPEN			10D: Dark grey black, Silty CLAY with nodules throughout and occasional concretions. V13: Tu=28 / Tr=2 ft-lbs (65 mm x 130 mm vane). MV: Unable to push vane past 76.6 ft.		
	MV											
80	11D	24/18	80.0 - 82.0	WOR/24*	0	0	OPEN			11D: Dark grey black, v. soft, Silty CLAY.		
85	12D	24/22	85.0 - 87.0	WOR/24*	0	0	OPEN			12D: Grey with occasional black streaks, v. soft, Silty CLAY with numerous partings and seams Silty fine SAND.		
							RC	-25.8		88.3 ft: Gravelly material based on drilling behavior; probable stratum change. TILL		
90								-27.5 -28.1		90.0 ft: Very boney; possible weathered rock.		
										<b>Bottom of Exploration at 90.6 feet below ground surface.</b> Roller cone refusal; chips in wash water appear to be crushed Phyllite.		
95												
100												

**Remarks:**



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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-210  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/12/18; 1345-4/13/18; 1355	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> 6.4 ft E (compass) of staked location	<b>Casing ID/OD:</b> HW to 20'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 5 ft (approx)

**IN-SITU SAMPLING AND TESTING:**  
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 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
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 hammer efficiency = calculated hammer efficiency  
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 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
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**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
0								SSA		(ponded water)		
	1D	24/16	2.0 - 4.0	2-2-2-2	4	5				Top two inches of sample: ROOT MAT/ORGANIC SILT. 1D: Brown, moist, v. loose, fine to coarse SAND, little Silt, grading to grey, Silty fine to medium SAND. FILL		
5									57.5	-----4.0		
	2D	24/4	5.0 - 7.0	1-4-6-6	10	11	10			2D: Grey, moist, m. dense, fine to medium SAND, some Silt; appears to have pushed something ahead of spoon.		
							18					
							19					
							10					
10							26					
	3D	24/15	10.0 - 12.0	WOR-WOH/18"	0	0	4			3D: Grey, v. soft, interbedded, Silty CLAY, trace very fine Sand; Silty fine SAND; and fine to medium SAND, little Silt. INTERBEDDED MARINE FINE SANDS AND SILT		
							2					
							6					
							4					
							1					
15								PUSH				
	4D V1	24/23	15.0 - 17.0	VANE INTERVAL Su= 687/ 27 psf						4D: Grey, interbedded, Silty CLAY, trace very fine Sand; and Silty fine SAND. V1: Tu=25 / Tr=1 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V2: Tu=10.5 / Tr=1 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	CL A-4(7) #200=91% WC=38% LL=24 PL=14 PI=10	
	V2		16.6 - 17.0	Su= 288/ 27 psf								
20								OPEN				
	5D V3	24/24	20.0 - 22.0	VANE INTERVAL Su= 192/ 0 psf						5D: Dark grey, Silty CLAY with occasional partings and seams fine Sandy SILT. V3: Tu=7 / Tr=0 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V4: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	WC=35% LL=27 PL=17 PI=10	
	V4		21.6 - 22.0	Su= 316/ 14 psf								
									38.0	-----23.5		
25												

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-210  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/12/18; 1345-4/13/18; 1355	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> 6.4 ft E (compass) of staked location	<b>Casing ID/OD:</b> HW to 20'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 5 ft (approx)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	6D	24/6	25.0 - 27.0	HYD PUSH (MU)			OPEN			Poor recovery on tube sample; sample extracted and jarred. 6D: Dark grey, Silty CLAY, trace to little fine Sand. MARINE SILT CLAY		
	V5		27.6 - 28.0	Su= 371/ 27 psf						V5: Tu=13.5 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V6		28.6 - 29.0	Su= 385/ 27 psf						V6: Tu=14 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
30	U1	24/24	30.0 - 32.0	HYD PUSH			OPEN			U1: Dark grey, Silty CLAY.	X-RAY	
35	7D V7	24/22	35.0 - 37.0 35.6 - 36.0	VANE INTERVAL Su= 385/ 27 psf			OPEN			7D: Dark grey occasional black, Silty CLAY with small nodules in upper half of sample. V7: Tu=14 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V8		36.6 - 37.0	Su= 343/ 14 psf						V8: Tu=12.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
40	U2	24/13	40.0 - 42.0	HYD PUSH			OPEN			U2: Dark grey, Silty CLAY.	X-RAY DSS (3 point) WC=44% LL=29 PL=18 PI=11	
45	8D V9	24/24	45.0 - 47.0 45.6 - 46.0	VANE INTERVAL Su= 467/ 27 psf			OPEN		8D: Dark grey occasional darker grey streaks, Silty CLAY. V9: Tu=17 / Tr=1 ft-lbs (65 mm x 130 mm vane).			
	V10		46.6 - 47.0	Su= 440/ 27 psf					V10: Tu=16 / Tr=1 ft-lbs (65 mm x 130 mm vane).			
50												

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-210  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/12/18; 1345-4/13/18; 1355	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> 6.4 ft E (compass) of staked location	<b>Casing ID/OD:</b> HW to 20'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 5 ft (approx)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL = 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
50	U3	24/23	50.0 - 52.0	HYD PUSH			OPEN			U3: Dark grey black, Silty CLAY.	X-RAY	
55	9D V11 V12	24/24	55.0 - 57.0 55.6 - 56.0 56.6 - 57.0	VANE INTERVAL Su= 673/ 27 psf Su= 659/ 27 psf			OPEN			9D: Dark grey black, Silty CLAY. V11: Tu=24.5 / Tr=1 ft-lbs (65 mm x 130 mm vane). V12: Tu=24 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
60	U4	24/23	60.0 - 62.0	HYD PUSH			OPEN			U4: Dark grey black, Silty CLAY with shell fragments on bottom of sample.	X-RAY	
65	10D V13 V14	24/24	65.0 - 67.0 65.6 - 66.0 66.6 - 67.0	VANE INTERVAL Su= 728/ 55 psf Su= 687/ 41 psf			OPEN			10D: Dark grey, Silty CLAY with few Silty fine SAND partings. V13: Tu=26.5 / Tr=2 ft-lbs (65 mm x 130 mm vane). V14: Tu=25 / Tr=1.5 ft-lbs (65 mm x 130 mm vane).	#200=99.1% WC=37% LL=36 PL=18 PI=18	
70	11D V15 V16	24/24	70.0 - 72.0 70.6 - 71.0 71.6 - 72.0	VANE INTERVAL Su= 669/ 69 psf Su= 797/ 55 psf			OPEN			11D: Dark grey, Silty CLAY, trace very fine Sand. V15: Tu=24 / Tr=2.5 ft-lbs (65 mm x 130 mm vane). V16: Tu=29 / Tr=2 ft-lbs (65 mm x 130 mm vane).		
75								-12.1			73.6	

**Remarks:**



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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-210  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 61.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/12/18; 1345-4/13/18; 1355	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> 6.4 ft E (compass) of staked location	<b>Casing ID/OD:</b> HW to 20'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 5 ft (approx)

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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
75	12D	24/5	75.0 - 77.0	18-7-5-8	12	14	RC			12D: Grey, m. dense, GRAVEL, little to some Silt, little to some fine to coarse Sand. TILL		
										75 to 80 ft: Very boney.		
80	13D	18/5	80.0 - 81.5	22-22-21	43	49	RC			13D: Grey, dense, Silty GRAVEL, little to some fine to coarse Sand.		
										81.5 to 91.8 ft: Drive probe rods with 300 lb hammer to refusal.		
85												
90												
								-30.3		<b>Bottom of Exploration at 91.8 feet below ground surface.</b> Driven rod probe refusal (100 blows with 300 lb hammer for 10 inches penetration; bouncing at 91.8 ft).		
95												
100												

**Remarks:**





**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-211  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/9/18; 1140-4/10/18; 1520	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 30'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 10'	<b>Water Level*:</b> 4.0 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows						
0								SSA					
	1D	24/20	2.0 - 4.0	6-8-5-2	13	15				1D: Brown tan, moist to wet, m. dense, fine to coarse SAND, some Gravel, little to some Silt. Bottom 3 inches of sample: Brown, fine Sandy ORGANIC SILT. FILL			
5													
	2D	24/17	5.0 - 7.0	1-2-4-4	6	7				2D: Olive brown, mottled, wet, m. stiff, CLAY & SILT, little fine Sand with one 1-inch layer grey, fine SAND, trace Silt; appears reworked.			
									55.5				
10													
	3D	24/16	10.0 - 12.0	7-3-3-6	6	7	27			3D: Grey, loose, interbedded, fine to medium SAND, trace to little Silt; Silty fine SAND; and Silty CLAY, trace fine Sand. INTERBEDDED MARINE FINE SANDS AND SILT	WC=26% LL=22 PL=14 PI=8		
							28						
							29						
							24						
15							13						
	4D	24/23	15.0 - 17.0	WOR/18"-WOH	0	0	20			4D: Grey, v. soft, Silty CLAY, trace fine Sand with one 2-inch layer Silty fine SAND at top of sample.			
							12						
							11						
							11						
20							13						
	5D V1	24/24	20.0 - 22.0 20.6 - 21.0	VANE INTERVAL Su= 316/ 27 psf			12		42.5		5D: Grey with occasional black, Silty CLAY, little very fine Sand with occasional layers fine to medium SAND, some Silt and fine Sandy SILT. MARINE SILT-CLAY V1: Tu=11.5 / Tr=1 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V2: Tu=21 / Tr=3 ft-lbs (65 mm x 130 mm vane); sandy seams noted.	WC=37% LL=30 PL=18 PI=12	
	V2		21.6 - 22.0	Su= 577/ 82 psf			11						
							10						
							7						
25							7						

**Remarks:**



SCHONEWALD  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-211  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/9/18; 1140-4/10/18; 1520	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 30'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 10'	<b>Water Level*:</b> 4.0 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT qp = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	6D	24/6	25.0 - 27.0	HYD PUSH (MU)				PUSH		Poor recovery on tube sample; sample extracted and jarred. 6D: Grey, Silty CLAY, trace fine Sand.		
	V3		27.6 - 28.0	Su= 412/ 27 psf						V3: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	V4		28.6 - 29.0	Su= 330/ 27 psf						V4: Tu=12 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
30	7D	24/0	30.0 - 32.0	HYD PUSH (MU)	3"dia			OPEN		No recovery on tube sample; resample interval using 3-inch dia. split-spoon. 7D: Grey, Silty CLAY, trace fine Sand.		
	MU	24/0	32.0 - 34.0	PUSH						MU: No recovery; inside of tube gritty.		
35	8D V5	24/24	34.0 - 36.0 34.6 - 35.0	VANE INTERVAL Su= 440/ 41 psf				OPEN		8D: Grey, Silty CLAY, trace fine Sand. V5: Tu= 16 / Tr=1.5 ft-lbs (65 mm x 130 mm vane).		
	V6		35.6 - 36.0	Su= 385/ 27 psf				OPEN		V6: Tu= 14 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
	U1	24/22	37.0 - 39.0	HYD PUSH						U1: Dark grey black, Silty CLAY.	X-RAY CONSOL (Cv, Cα) WC=42% LL=31 PL=19 PI=12	
40	9D V7	24/24	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL Su= 508/ 41 psf				OPEN		9D: Dark grey black, Silty CLAY; organic odor. V7: Tu= 18.5 / Tr=1.5 ft-lbs (65 mm x 130 mm vane).		
	V8		41.6 - 42.0	Su= 453/ 27 psf						V8: Tu= 16.5 / Tr=1 ft-lbs (65 mm x 130 mm vane).		
45	U2	24/24	45.0 - 47.0	HYD PUSH				OPEN		U2: Dark grey black, Silty CLAY.	X-RAY CONSOL (Cv, Cα) DIRECT SHEAR (3 point) WC=47% LL=37 PL=21 PI=16	
50												

**Remarks:**



SCHONEWALD  
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ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-211  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/9/18; 1140-4/10/18; 1520	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 30'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 10'	<b>Water Level*:</b> 4.0 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results			
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)						
50	10D V9	24/24	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 673/ 27 psf			OPEN			10D: Dark grey black, Silty CLAY; organic odor. V9: Tu=24.5 / Tr=1 ft-lbs (65 mm x 130 mm vane). V10: Tu=25 / Tr=1 ft-lbs (65 mm x 130 mm vane).	CL A-6(20) #200=99.1% WC=44% LL=39 PL=19 PI=20			
	V10		51.6 - 52.0	Su= 687/ 27 psf										
55	U3	24/24	55.0 - 57.0	HYD PUSH			OPEN			U3: Dark grey black, Silty CLAY.	X-RAY CONSOL (Cv, Cα) WC=43% LL=31 PL=19 PI=12			
60	11D V11	24/24	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 632/ 41 psf			OPEN				11D: Dark grey black, Silty CLAY. V11: Tu=23 / Tr=1.5 ft-lbs (65 mm x 130 mm vane). V12: Tu=19 / Tr=1 ft-lbs (65 mm x 130 mm vane).			
	V12		61.6 - 62.0	Su= 522/ 27 psf										
65	U4	24/24	65.0 - 67.0	HYD PUSH			OPEN				U4: Dark grey, Silty CLAY.	X-RAY		
70	12D V13	24/24	70.0 - 72.0 70.6 - 71.0	VANE INTERVAL Su= 669/ 55 psf			OPEN					12D: Dark grey, Silty CLAY. V13: Tu=24 / Tr=2 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V14: Unable to turn vane; possible concretion or gravel.		
	V14		71.6 - 72.0	Su= -- / -- psf										
75														

**Remarks:**



SCHONEWALD  
ENGINEERING  
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**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-211  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 62.5 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/9/18; 1140-4/10/18; 1520	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan	<b>Casing ID/OD:</b> HW to 30'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 10'	<b>Water Level*:</b> 4.0 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT qp = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
75	13D V15	24/24	75.0 - 77.0 75.6 - 76.0	VANE/12"-11-12 Su= 687/ 82 psf	3"dia		RC		-14.2	Dark grey, Silty CLAY with occasional concretions; changing at 76.7 ft to: V15: Tu=25 / Tr=3 ft-lbs (65 mm x 130 mm vane). MV: Unable to push vane past 76.0 ft.		
	MV											
										13D: Grey, Silty GRAVEL, some fine to coarse Sand. TILL		
80	14D	18/18	80.0 - 81.5	31-33-56	89	100	RC			14D: Grey, v. dense, fine to coarse Sandy GRAVEL, some Silt.		
										82.2 ft: Possible top of rock.		
									-20.5	<b>Bottom of Exploration at 83.0 feet below ground surface.</b> Roller cone refusal.		
85												
90												
95												
100												

**Remarks:**





**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-212  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 59 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/11/18; 1125-4/12/18; 1315	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (dated 4/10/18)	<b>Casing ID/OD:</b> HW to 25'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.9 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
D = Split Spoon Sample  
MD = Unsuccessful Split Spoon Sample attempt  
U = Thin Wall Tube Sample  
MU = Unsuccessful Thin Wall Tube Sample attempt  
V = Insitu Vane Shear Test  
MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
N-uncorrected = N value  
N<sub>60</sub> = N value corrected for hammer efficiency  
hammer efficiency = calculated hammer efficiency  
S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
R = Rock Core Sample  
RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
WOH = weight of 140lb. hammer  
WOR = weight of rods  
-- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
SSA/HSA=solid/hollow stem auger  
RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
AASHTO / USCS soil classifications  
#200 = percent fines WC = water content (%)  
CONSOL= 1-D consolidation test  
UU=Unconsolidated undrained triaxial test  
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0								SSA				
	1D	24/21	2.0 - 4.0	2-4-3-4	7	8			56.5	Wet, ROOT MAT AND ORGANIC SILT; changing at 2.5 ft to: 1D: Olive brown, mottled, m. stiff, Clayey SILT with one 2-inch layer fine Sandy SILT; grading to grey at 3.7 ft. MARINE SILT-CLAY CRUST (WEATHERED)	#200=98% WC=30% LL=36 PL=18 PI=18	
5	2D	24/14	5.0 - 7.0	4-6-3-3	9	10	20			2D: Olive grey, wet, loose, fine Sandy SILT with one 1-inch grey SILT at bottom of sample.		
							13					
							15					
							9					
							6					
10	3D V1	24/23	10.0 - 12.0 10.6 - 11.0	VANE INTERVAL Su= 330/ 41 psf				OPEN	49.0	3D: Olive grey, Silty CLAY, trace fine Sand with multiple seams and partings very fine Sandy SILT. MARINE SILT-CLAY V1: Tu=12 / Tr=1.5 ft-lbs (65 mm x 130 mm vane); sandy seams noted. V2: Tu=12.5 / Tr=2 ft-lbs (65 mm x 130 mm vane)	#200=99.7% WC=40% LL=34 PL=18 PI=16	
	V2		11.6 - 12.0	Su= 343/ 55 psf								
15	U1	24/24	15.0 - 17.0	HYD PUSH				OPEN		U1: Olive grey, Silty CLAY with very fine Sand on bottom of sample.	X-RAY	
20	4D V3	24/23	20.0 - 22.0 20.6 - 21.0	VANE INTERVAL Su= 247/ 27 psf				PUSH		4D: Dark grey with occasional black, Silty CLAY, trace very fine Sand. V3: Tu=9 / Tr=1 ft-lbs (65 mm x 130 mm vane). V4: Tu=8 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
	V4		21.6 - 22.0	Su= 220/ 14 psf								
25												

**Remarks:**



**SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.**

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-212  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 59 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/11/18; 1125-4/12/18; 1315	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (dated 4/10/18)	<b>Casing ID/OD:</b> HW to 25'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.9 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value $N_{60}$ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency $S_u$ = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL = 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
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Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows	Elevation (ft.)			
25	U2	24/24	25.0 - 27.0	HYD PUSH			OPEN			U2: Dark grey, Silty CLAY.	X-RAY
30	5D V5	24/24	30.0 - 32.0 30.6 - 31.0	VANE INTERVAL $S_u = 302/27$ psf			OPEN			5D: Dark grey with occasional black, Silty CLAY V5: $T_u = 11 / T_r = 1$ ft-lbs (65 mm x 130 mm vane).	
	V6		31.6 - 32.0	$S_u = 288/14$ psf						V6: $T_u = 10.5 / T_r = 0.5$ ft-lbs (65 mm x 130 mm vane).	
35	U3	24/24	35.0 - 37.0	HYD PUSH			OPEN			U3: Dark grey black, Silty CLAY; gritty from possible shell fragments.	X-RAY
40	6D V7	24/24	40.0 - 42.0 40.6 - 41.0	VANE INTERVAL $S_u = 440/14$ psf			OPEN			6D: Dark grey black, Silty CLAY. V7: $T_u = 16 / T_r = 0.5$ ft-lbs (65 mm x 130 mm vane).	
	V8		41.6 - 42.0	$S_u = 440/14$ psf						V8: $T_u = 16 / T_r = 0.5$ ft-lbs (65 mm x 130 mm vane).	
45	U4	24/24	45.0 - 47.0	HYD PUSH			OPEN			U4: Dark grey black, Silty CLAY.	X-RAY
50											

**Remarks:**



**SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.**

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-212  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 59 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/11/18; 1125-4/12/18; 1315	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (dated 4/10/18)	<b>Casing ID/OD:</b> HW to 25'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.9 ft (open)

**IN-SITU SAMPLING AND TESTING:**  
 D = Split Spoon Sample  
 MD = Unsuccessful Split Spoon Sample attempt  
 U = Thin Wall Tube Sample  
 MU = Unsuccessful Thin Wall Tube Sample attempt  
 V = Insitu Vane Shear Test  
 MV = Unsuccessful Insitu Vane Shear Test attempt

**ADDITIONAL DEFINITIONS:**  
 N-uncorrected = N value  
 N<sub>60</sub> = N value corrected for hammer efficiency  
 hammer efficiency = calculated hammer efficiency  
 S<sub>u</sub> = Insitu Field Vane Shear Strength (psf)  
 R = Rock Core Sample  
 RQD = Rock Quality Designation (%)

**ADDITIONAL DEFINITIONS:**  
 WOH = weight of 140lb. hammer  
 WOR = weight of rods  
 -- = not recorded  
**BOREHOLE ADVANCEMENT METHODS:**  
 SSA/HSA=solid/hollow stem auger  
 RC=roller cone/OPEN/PUSH=hydraulic push

**LABORATORY TEST RESULTS:**  
 AASHTO / USCS soil classifications  
 #200 = percent fines WC = water content (%)  
 CONSOL= 1-D consolidation test  
 UU=Unconsolidated undrained triaxial test  
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index  
 UCT<sub>qp</sub> = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
50	7D V9	24/24	50.0 - 52.0 50.6 - 51.0	VANE INTERVAL Su= 577/ 27 psf			OPEN		50.0	7D: Dark grey with occasional black, Silty CLAY with small nodules throughout. V9: Tu=21 / Tr=1 ft-lbs (65 mm x 130 mm vane). V10: Tu=18 / Tr=0.5 ft-lbs (65 mm x 130 mm vane).		
	V10		51.6 - 52.0	Su= 494/ 14 psf								
55	U5	24/24	55.0 - 57.0	HYD PUSH			OPEN		55.0	U5: Dark grey, Silty CLAY.	X-RAY	
60	8D V11	24/24	60.0 - 62.0 60.6 - 61.0	VANE INTERVAL Su= 687/ 27 psf			OPEN		60.0	8D: Dark grey, Silty CLAY with nodules throughout. V11: Tu=25 / Tr=1 ft-lbs (65 mm x 130 mm vane). V12: Tu=16.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane); sand parting or concretion noted at approx. 61.2 ft.		
	V12		61.6 - 62.0	Su= 453/ 14 psf								
65	U6	24/23	65.0 - 67.0	HYD PUSH			OPEN		65.0	U6: Dark grey, Silty CLAY.	X-RAY	
70	9D V13	24/24	70.0 - 72.0 70.6 - 71.0	VANE INTERVAL Su= 714/ 41 psf			OPEN		70.0	9D: Dark grey, Silty CLAY with nodules throughout, one large (sand dollar) concretion, and one 2-inch layer Silty fine to medium SAND. V13: Tu=26 / Tr=1.5 ft-lbs (65 mm x 130 mm vane). V14: Tu=36 / Tr=3 ft-lbs (65 mm x 130 mm vane); several concretions and/or sand partings noted.	CL A-6(15) #200=91% WC=28% LL=33 PL=16 PI=17	
	V14		71.6 - 72.0	Su= 989/ 82 psf								
75							RC	-14.0	73.0	73.0 ft: Probable stratum change; gravelly material based on drilling behavior.		

**Remarks:**





SCHONEWALD  
ENGINEERING  
ASSOCIATES, INC.

**PROJECT:** Maine Turnpike I-95  
Exit 45 Reconfiguration  
**LOCATION:** South Portland-Scarborough, ME

**Boring No.:** HB-EXIT45-212  
**Proj. No.:** 18-008

<b>Driller:</b> New England Boring Contractors	<b>Elevation (ft.):</b> 59 ft (est'd)	<b>Core Barrel:</b> n/a
<b>Operator:</b> Enos / Share	<b>Datum:</b> NAVD88	<b>Sampler:</b> standard split-spoon
<b>Logged By:</b> Schonewald	<b>Rig Type:</b> Mobile Drill B-53	<b>Hammer Wt./Fall:</b> 140 lbs / 30 inches
<b>Date Start/Finish:</b> 4/11/18; 1125-4/12/18; 1315	<b>Drilling Method:</b> cased wash borings	<b>Hammer Type:</b> auto hammer
<b>Boring Location:</b> per plan (dated 4/10/18)	<b>Casing ID/OD:</b> HW to 25'	<b>Hammer Efficiency:</b> 0.677
	<b>Auger ID/OD:</b> SSA to 5'	<b>Water Level*:</b> 1.9 ft (open)

<b>IN-SITU SAMPLING AND TESTING:</b> D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	<b>ADDITIONAL DEFINITIONS:</b> N-uncorrected = N value N <sub>60</sub> = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S <sub>u</sub> = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	<b>ADDITIONAL DEFINITIONS:</b> WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded <b>BOREHOLE ADVANCEMENT METHODS:</b> SSA/HSA=solid/hollow stem auger RC=roller cone/OPEN/PUSH=hydraulic push	<b>LABORATORY TEST RESULTS:</b> AASHTO / USCS soil classifications #200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index UCT <sub>qp</sub> = peak compressive strength of rock
--	---	--	--

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-unconnected	N-60	Casing Blows					
75	10D	24/10	75.0 - 77.0	13-14-22-27	36	41	RC		-23.0	10D: Grey, dense, GRAVEL, some Silt, little to some fine to coarse Sand. TILL		
80	11D	24/10	80.0 - 82.0	16-16-28-46	44	50				11D: Grey, dense, Silty GRAVEL, little to some fine to coarse Sand.	A-1-b(0) -#200=20%	
										<b>Bottom of Exploration at 82.0 feet below ground surface.</b> No refusal.		
85												
90												
95												
100												

**Remarks:**

**PHOTOGRAPHS OF ROCK CORE OBTAINED IN 200-SERIES SUBSURFACE EXPLORATIONS**



Photo 1: Core box containing wetted rock core from test boring HB-EXIT45-205 left side of core box (top portion of cores).

- Slots from top to bottom:
- 1) HB-EXIT45-205, R1
  - 2) HB-EXIT45-205, R2.



Photo 2: Core box containing wetted rock core from test boring HB-EXIT45-205 – right side of core box (bottom portion of cores).

- Slots from top to bottom
- 1) HB-EXIT45-205, R1
  - 2) HB-EXIT45-205, R2.



Photo 3: Core box containing wetted rock core from test borings HB-EXIT45-206 and -207 left side of core box (top portion of cores).

- Slots from top to bottom:
- 1) HB-EXIT45-206, R1
  - 2) HB-EXIT45-206, R2
  - 3) Empty
  - 4) HB-EXIT45-207, R1.



Photo 4: Core box containing wetted rock core from test borings HB-EXIT45-206 and -207 – right side of core box (bottom portion of cores).

- Slots from top to bottom
- 1) HB-EXIT45-206, R1
  - 2) HB-EXIT45-206, R2
  - 3) Empty
  - 4) HB-EXIT45-207, R1.

**RESULTS OF LABORATORY TESTS COMPLETED BY GTX ON  
SPLIT-SPOON AND UNDISTURBED TUBE SOIL SAMPLES**

**(Note that due to the file sizes, x-rays of the tube samples are not included herein.  
The x-rays were shared via Dropbox.)**



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	---	Sample Type:	---
Sample ID:	---	Test Date:	07/26/18
Depth :	---	Test Id:	462294
		Tested By:	GA
		Checked By:	emm

**Amount of Material Passing #200 Sieve - ASTM D1140**

Boring ID	Sample ID	Depth	Visual Description	Fines, %
HB-EXIT45-201	2D	5-7 ft	Moist, olive gray clay with sand	79.0
HB-EXIT45-201	8D	55-57 ft	Moist, very dark gray clay	99.5
HB-EXIT45-202	4D	15-17 ft	Wet, dark gray clay	89.3
HB-EXIT45-202	6D	25-27 ft	Wet, dark gray silty clay	99.5
HB-EXIT45-203	4D	15-17 ft	Wet, dark gray clay	97.9
HB-EXIT45-205	7D	40-42 ft	Wet, very dark gray clay	97.6
HB-EXIT45-206	6D	25-27 ft	Wet, dark gray clay	99.7
HB-EXIT45-207	2D	5-7 ft	Moist, gray sand	4.6
HB-EXIT45-207	4D	15-17 ft	Moist, gray sandy clay	70.0
HB-EXIT45-207	14D	85-87 ft	Moist, dark gray clay	98.4

Notes: Tests performed using Method B - washing using a wetting agent  
 Dry mass of test specimen was determined directly



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	---	Sample Type:	---
Sample ID:	---	Test Date:	07/26/18
Depth :	---	Test Id:	462298
		Tested By:	GA
		Checked By:	emm

**Amount of Material Passing #200 Sieve - ASTM D1140**

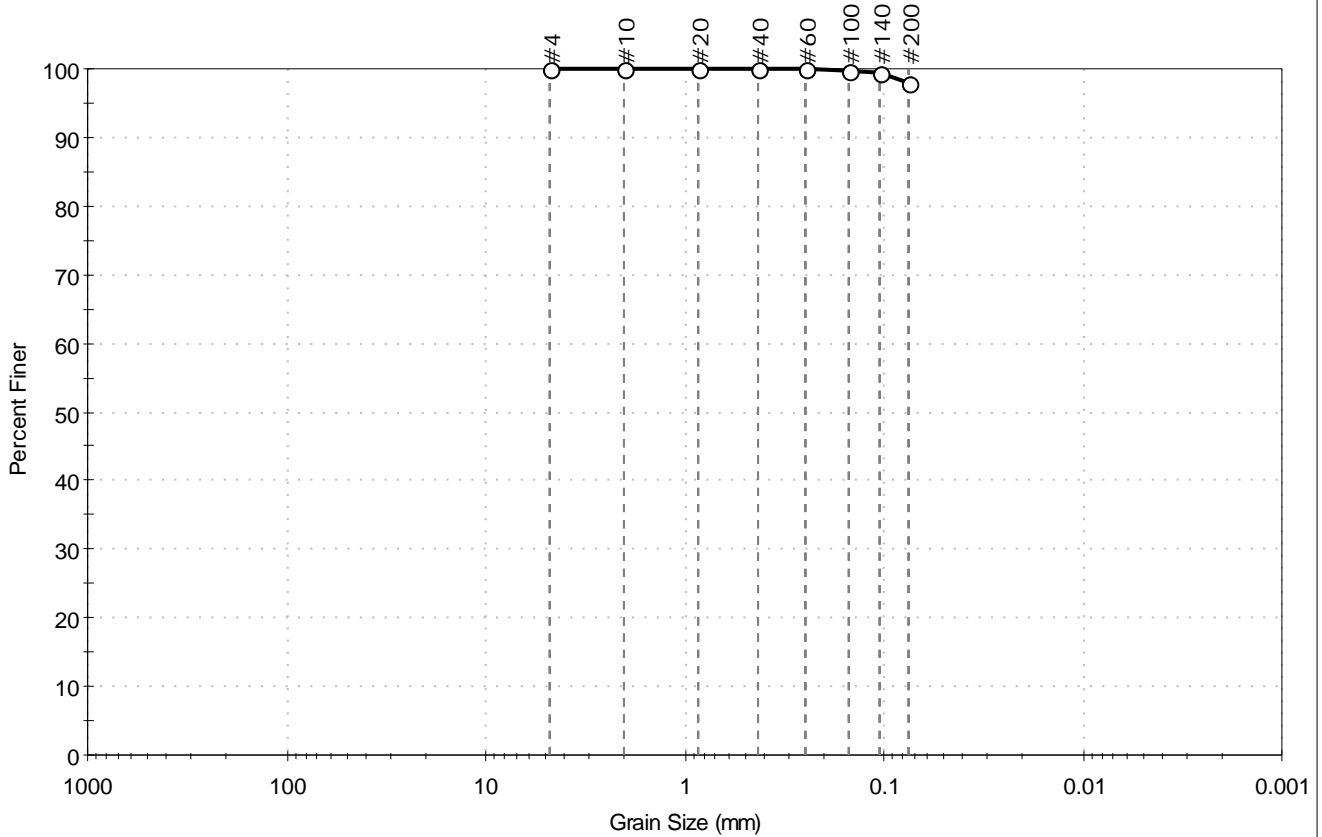
Boring ID	Sample ID	Depth	Visual Description	Fines, %
HB-EXIT45-208	8D	45-47 ft	Wet, dark gray clay	99.9
HB-EXIT45-210	10D	65-67 ft	Moist, dark gray clay	99.1
HB-EXIT45-212	1D	2-4 ft	Moist, olive gray clay	97.5
HB-EXIT45-212	3D	10-12 ft	Wet, dark gray clay	99.7

Notes: Tests performed using Method B - washing using a wetting agent  
 Dry mass of test specimen was determined directly



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 201	Sample Type:	jar
Sample ID:	3D	Test Date:	07/26/18
Depth :	10-12 ft	Test Id:	462299
Test Comment:	---		
Visual Description:	Moist, olive gray clay		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	0.0	2.0	98.0

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	100		
#140	0.11	99		
#200	0.075	98		

<u>Coefficients</u>	
D <sub>85</sub> = N/A	D <sub>30</sub> = N/A
D <sub>60</sub> = N/A	D <sub>15</sub> = N/A
D <sub>50</sub> = N/A	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

<u>Classification</u>	
<u>ASTM</u>	Lean CLAY (CL)
<u>AASHTO</u>	Clayey Soils (A-6 (11))

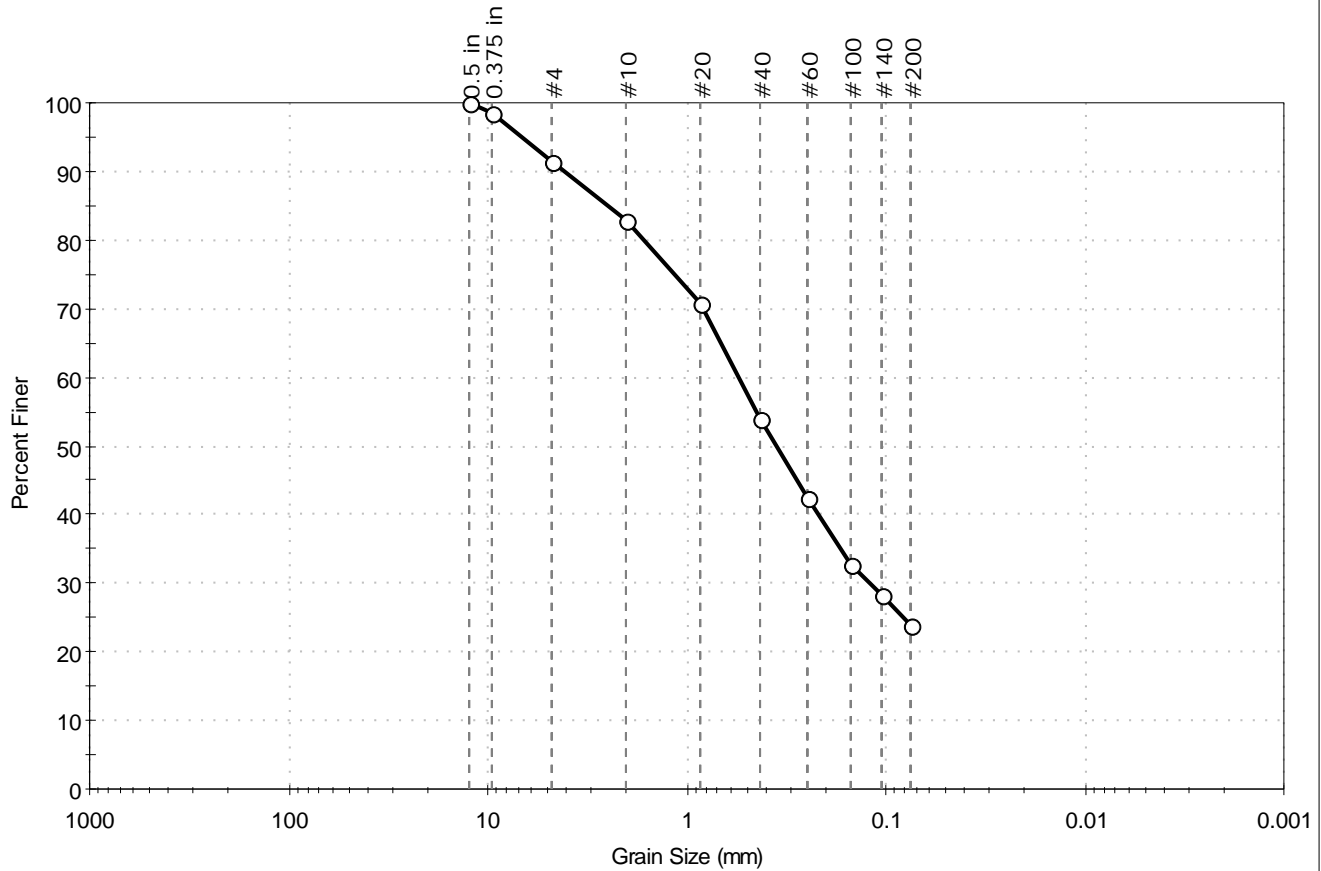
<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---





Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 202	Sample Type:	jar
Sample ID:	1D	Test Date:	07/26/18
Depth :	2-4 ft	Test Id:	462300
Test Comment:	---		
Visual Description:	Moist, reddish brown silty sand		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	8.5	67.6	23.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	98		
#4	4.75	92		
#10	2.00	83		
#20	0.85	71		
#40	0.42	54		
#60	0.25	42		
#100	0.15	33		
#140	0.11	28		
#200	0.075	24		

<u>Coefficients</u>	
D <sub>85</sub> = 2.4601 mm	D <sub>30</sub> = 0.1204 mm
D <sub>60</sub> = 0.5446 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.3531 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

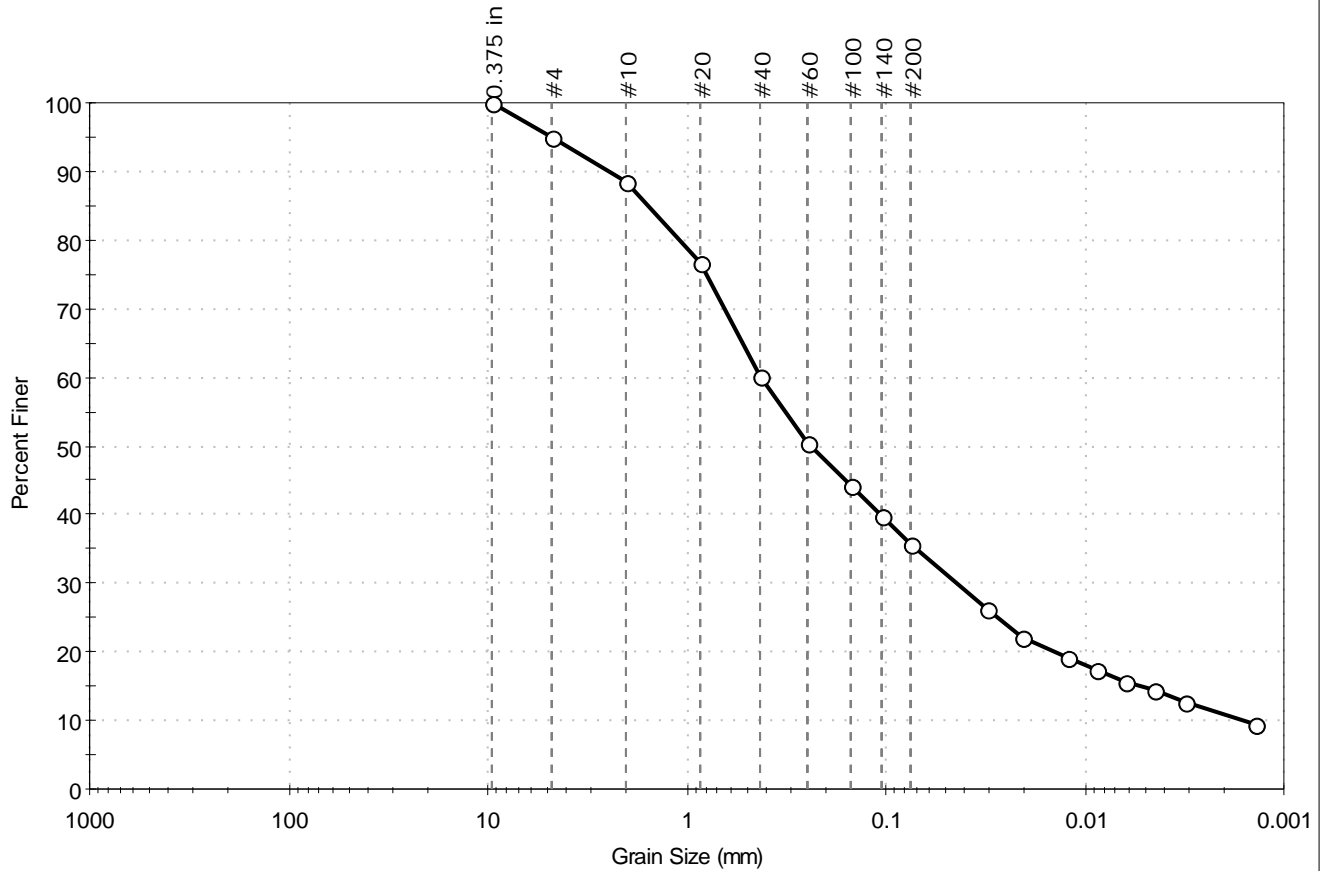
<u>Classification</u>	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 204	Sample Type:	jar
Sample ID:	2D	Test Date:	07/26/18
Depth :	5-7 ft	Test Id:	462304
Test Comment:	---		
Visual Description:	Moist, dark gray silty, clayey sand		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	4.8	59.4	35.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	95		
#10	2.00	89		
#20	0.85	77		
#40	0.42	60		
#60	0.25	50		
#100	0.15	44		
#140	0.11	40		
#200	0.075	36		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0307	26		
---	0.0208	22		
---	0.0122	19		
---	0.0088	17		
---	0.0063	16		
---	0.0045	14		
---	0.0032	13		
---	0.0014	9		

Coefficients	
D <sub>85</sub> = 1.5529 mm	D <sub>30</sub> = 0.0434 mm
D <sub>60</sub> = 0.4236 mm	D <sub>15</sub> = 0.0053 mm
D <sub>50</sub> = 0.2403 mm	D <sub>10</sub> = 0.0016 mm
C <sub>u</sub> = 264.750	C <sub>c</sub> = 2.779

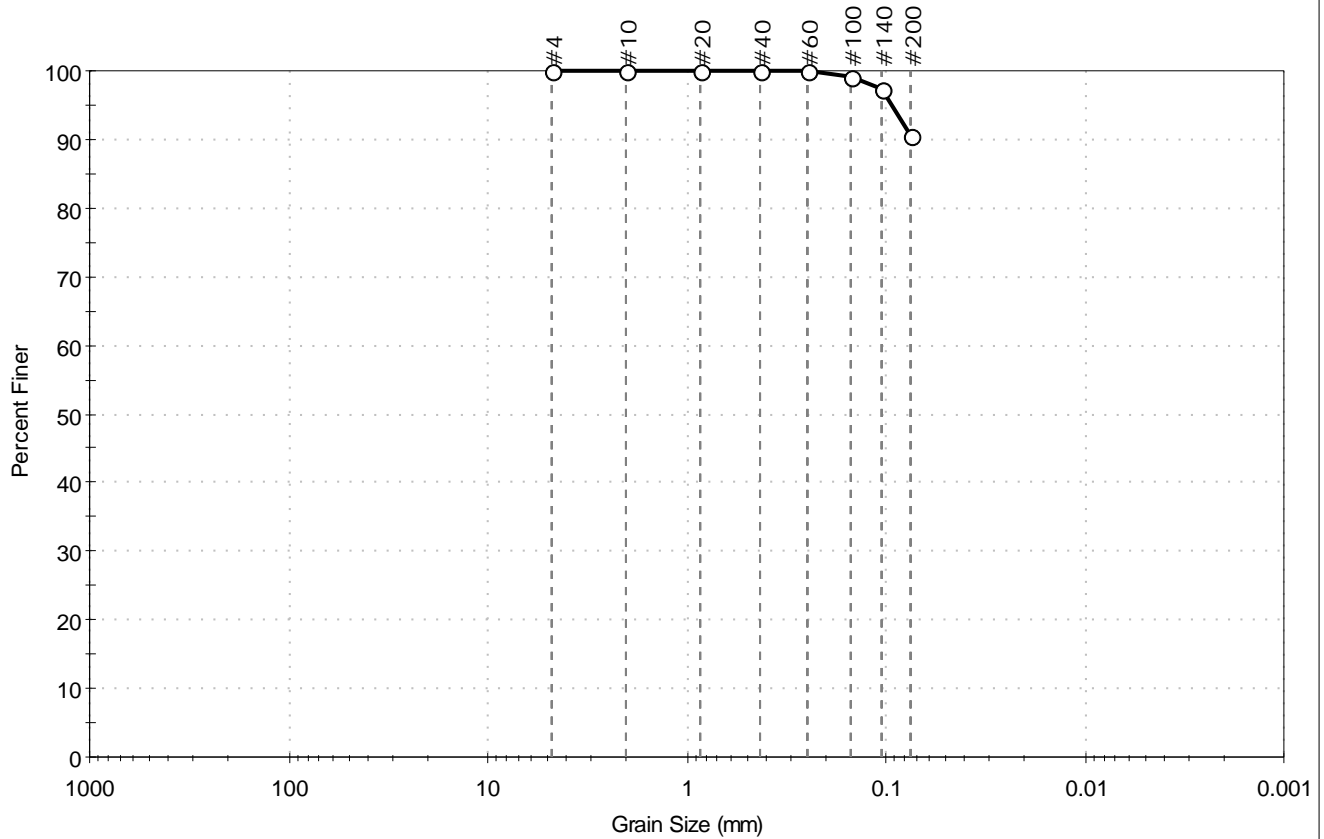
Classification	
ASTM	Silty, Clayey SAND (SC-SM)
AASHTO	Silty Soils (A-4 (0))

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:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 208	Sample Type:	jar
Sample ID:	5D	Test Date:	07/26/18
Depth :	20-22 ft	Test Id:	462301
Test Comment:	---		
Visual Description:	Wet, dark gray clay		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	9.4	90.6

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	99		
#140	0.11	97		
#200	0.075	91		

<u>Coefficients</u>	
D <sub>85</sub> = N/A	D <sub>30</sub> = N/A
D <sub>60</sub> = N/A	D <sub>15</sub> = N/A
D <sub>50</sub> = N/A	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

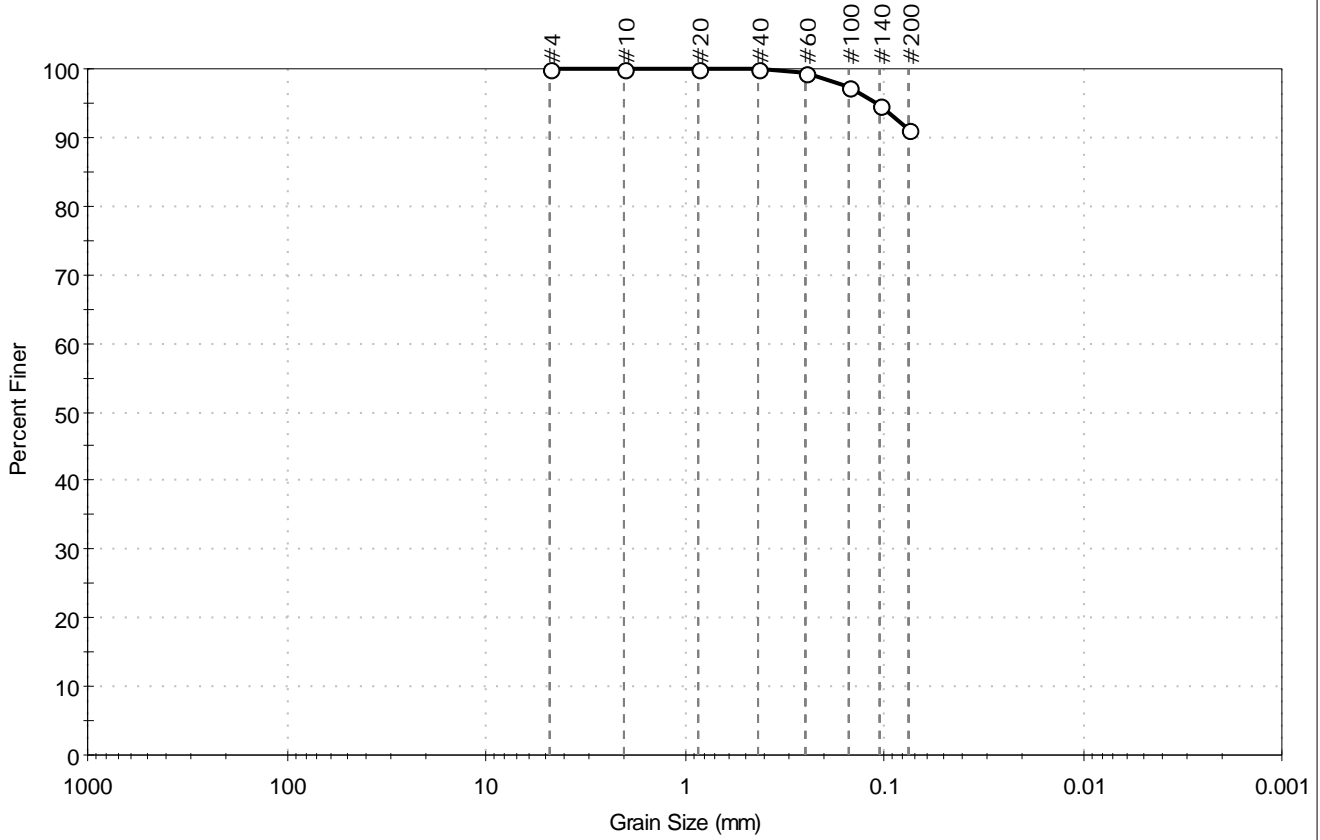
<u>Classification</u>	
<u>ASTM</u>	Lean CLAY (CL)
<u>AASHTO</u>	Silty Soils (A-4 (6))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 210	Sample Type:	jar
Sample ID:	4D	Test Date:	07/26/18
Depth :	15-17 ft	Test Id:	462302
Test Comment:	---		
Visual Description:	Wet, dark gray clay		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	8.9	91.1

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	99		
#100	0.15	97		
#140	0.11	95		
#200	0.075	91		

<u>Coefficients</u>	
D <sub>85</sub> = N/A	D <sub>30</sub> = N/A
D <sub>60</sub> = N/A	D <sub>15</sub> = N/A
D <sub>50</sub> = N/A	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

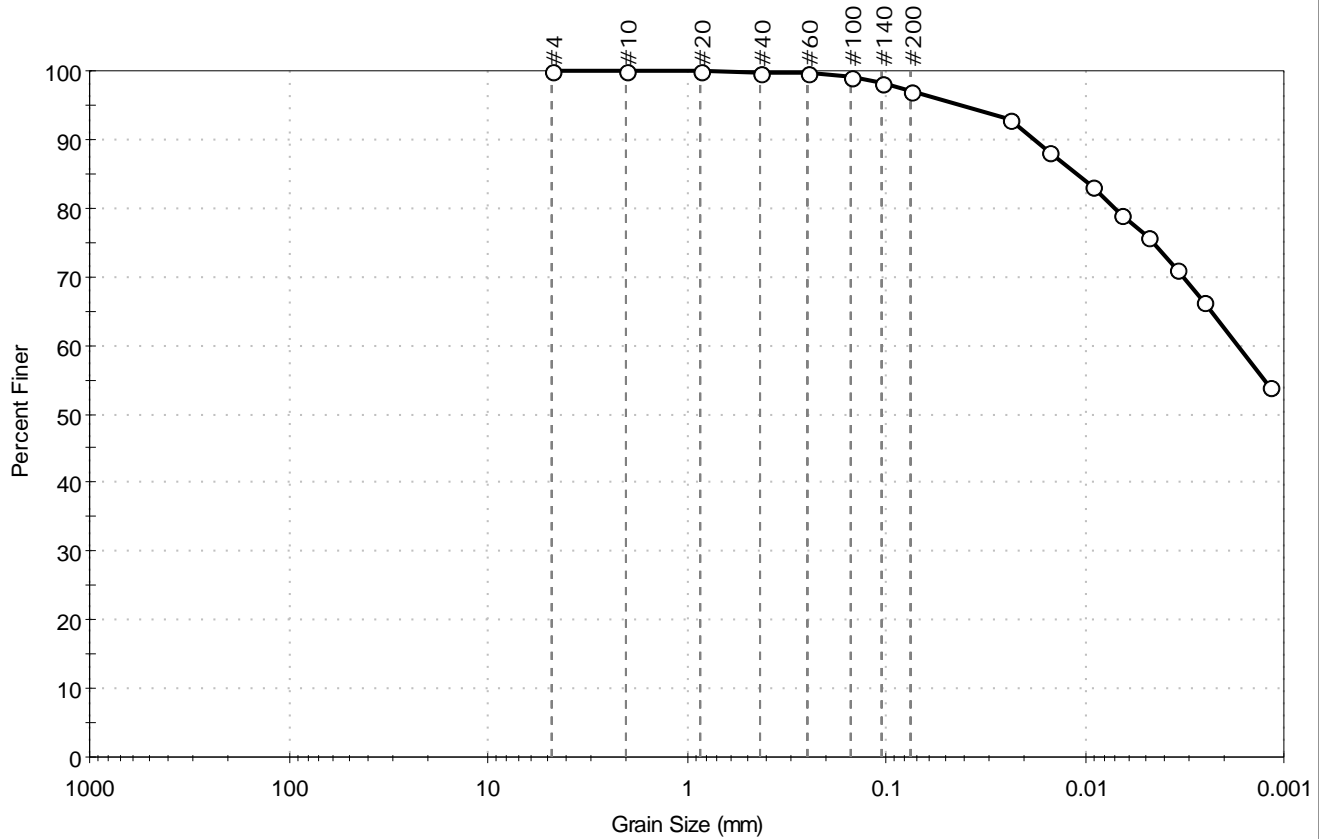
<u>Classification</u>	
<u>ASTM</u>	Lean CLAY (CL)
<u>AASHTO</u>	Silty Soils (A-4 (7))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 211	Sample Type:	jar
Sample ID:	10D	Test Date:	07/26/18
Depth :	50-52 ft	Test Id:	462305
Test Comment:	---		
Visual Description:	Wet, very dark gray clay		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	3.0	97.0

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	99		
#140	0.11	98		
#200	0.075	97		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0241	93		
---	0.0153	88		
---	0.0091	83		
---	0.0066	79		
---	0.0048	76		
---	0.0035	71		
---	0.0025	66		
---	0.0012	54		

<u>Coefficients</u>	
D <sub>85</sub> = 0.0110 mm	D <sub>30</sub> = N/A
D <sub>60</sub> = 0.0017 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = N/A	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

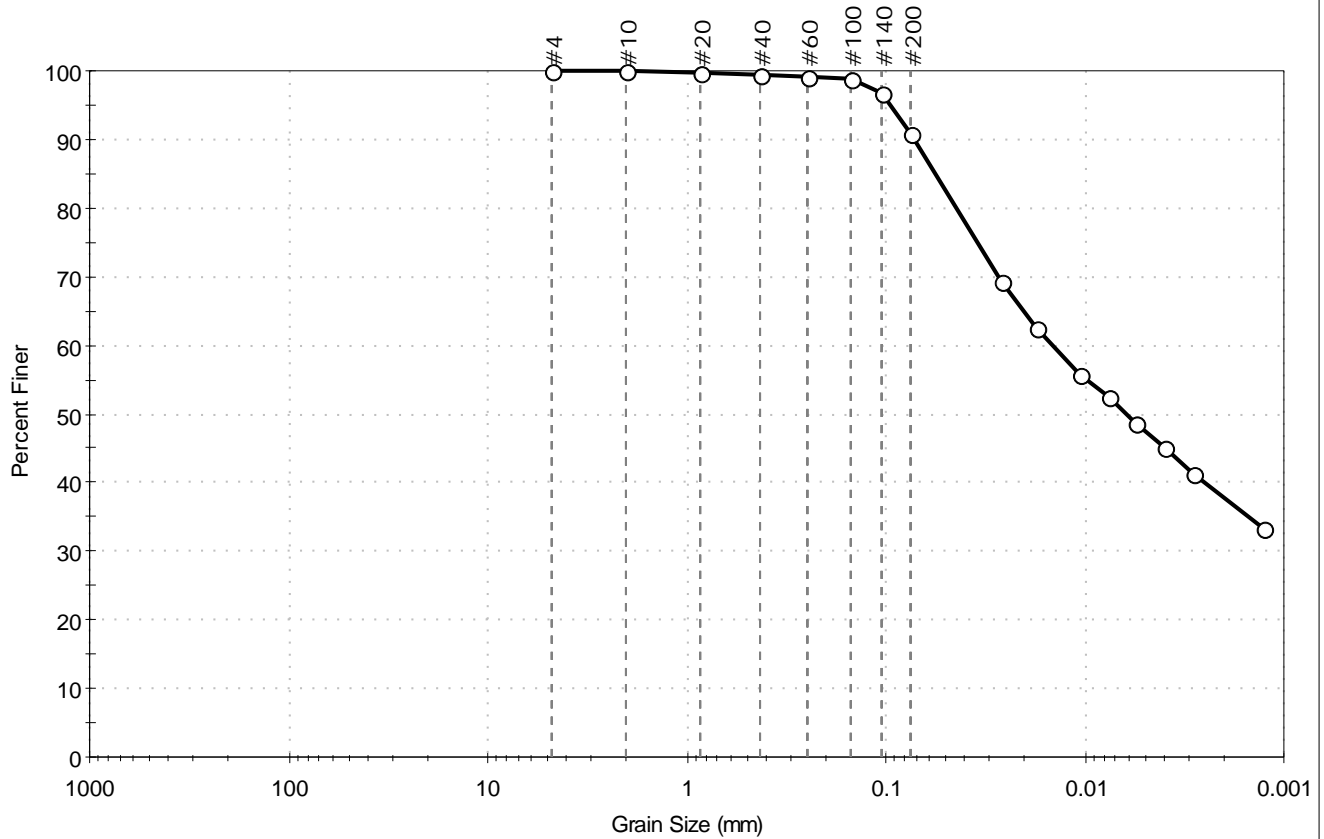
<u>Classification</u>	
<u>ASTM</u>	Lean CLAY (CL)
<u>AASHTO</u>	Clayey Soils (A-6 (20))

<u>Sample/Test Description</u>
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



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 212	Sample Type:	jar
Sample ID:	9D	Test Date:	07/26/18
Depth :	70-72 ft	Test Id:	462306
Test Comment:	---		
Visual Description:	Moist, dark gray clay		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	0.0	9.2	90.8

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	99		
#60	0.25	99		
#100	0.15	99		
#140	0.11	97		
#200	0.075	91		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0265	69		
---	0.0175	62		
---	0.0107	56		
---	0.0077	53		
---	0.0055	49		
---	0.0040	45		
---	0.0029	41		
---	0.0013	33		

<u>Coefficients</u>	
D <sub>85</sub> = 0.0567 mm	D <sub>30</sub> = N/A
D <sub>60</sub> = 0.0146 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.0062 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

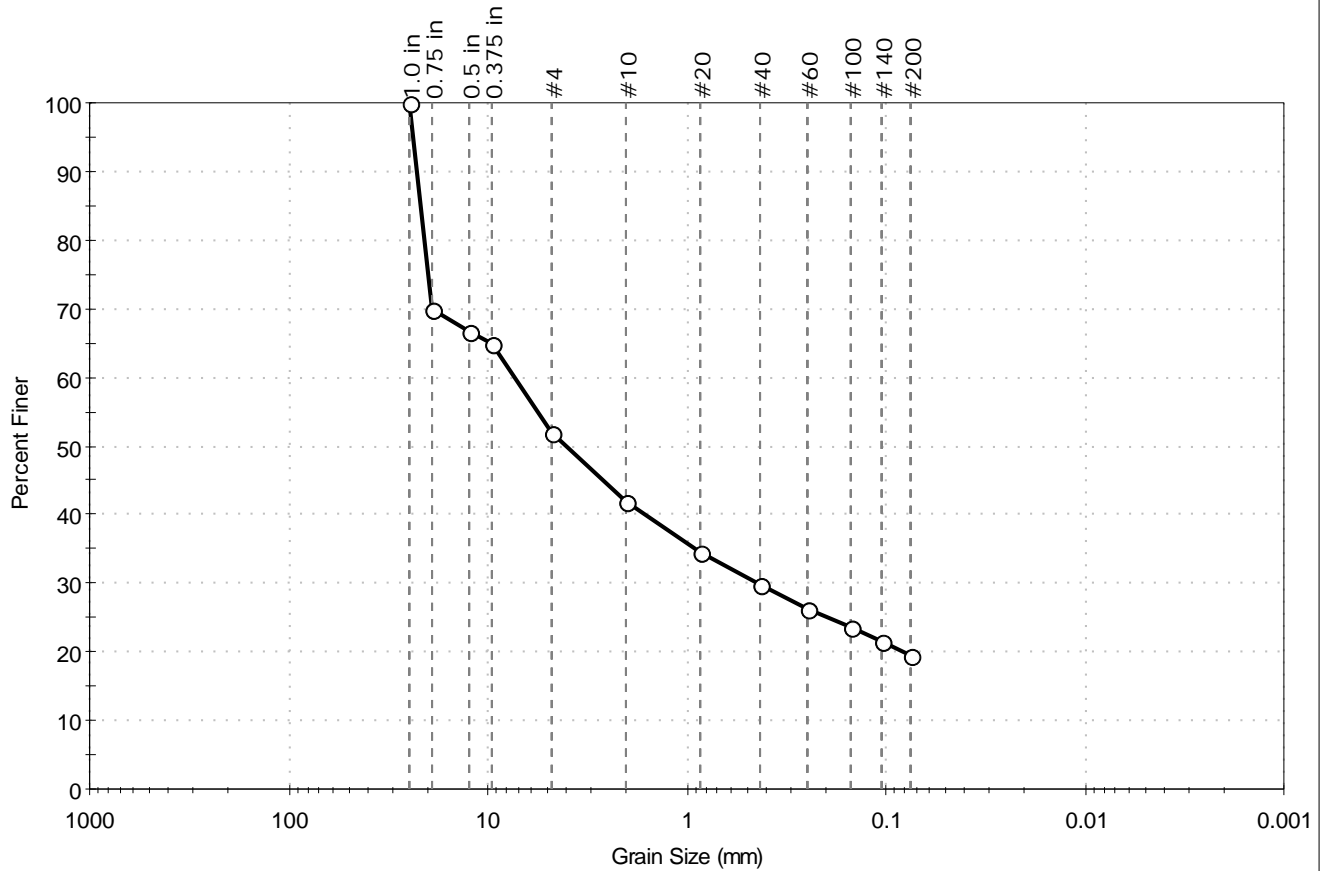
<u>Classification</u>	
<u>ASTM</u>	Lean CLAY (CL)
<u>AASHTO</u>	Clayey Soils (A-6 (15))

<u>Sample/Test Description</u>	
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	



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 212	Sample Type:	jar
Sample ID:	11D	Test Date:	07/26/18
Depth :	80-82 ft	Test Id:	462303
Test Comment:	---		
Visual Description:	Moist, gray silty gravel with sand		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	48.0	32.4	19.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.0 in	25.00	100		
0.75 in	19.00	70		
0.5 in	12.50	67		
0.375 in	9.50	65		
#4	4.75	52		
#10	2.00	42		
#20	0.85	35		
#40	0.42	30		
#60	0.25	26		
#100	0.15	24		
#140	0.11	22		
#200	0.075	20		

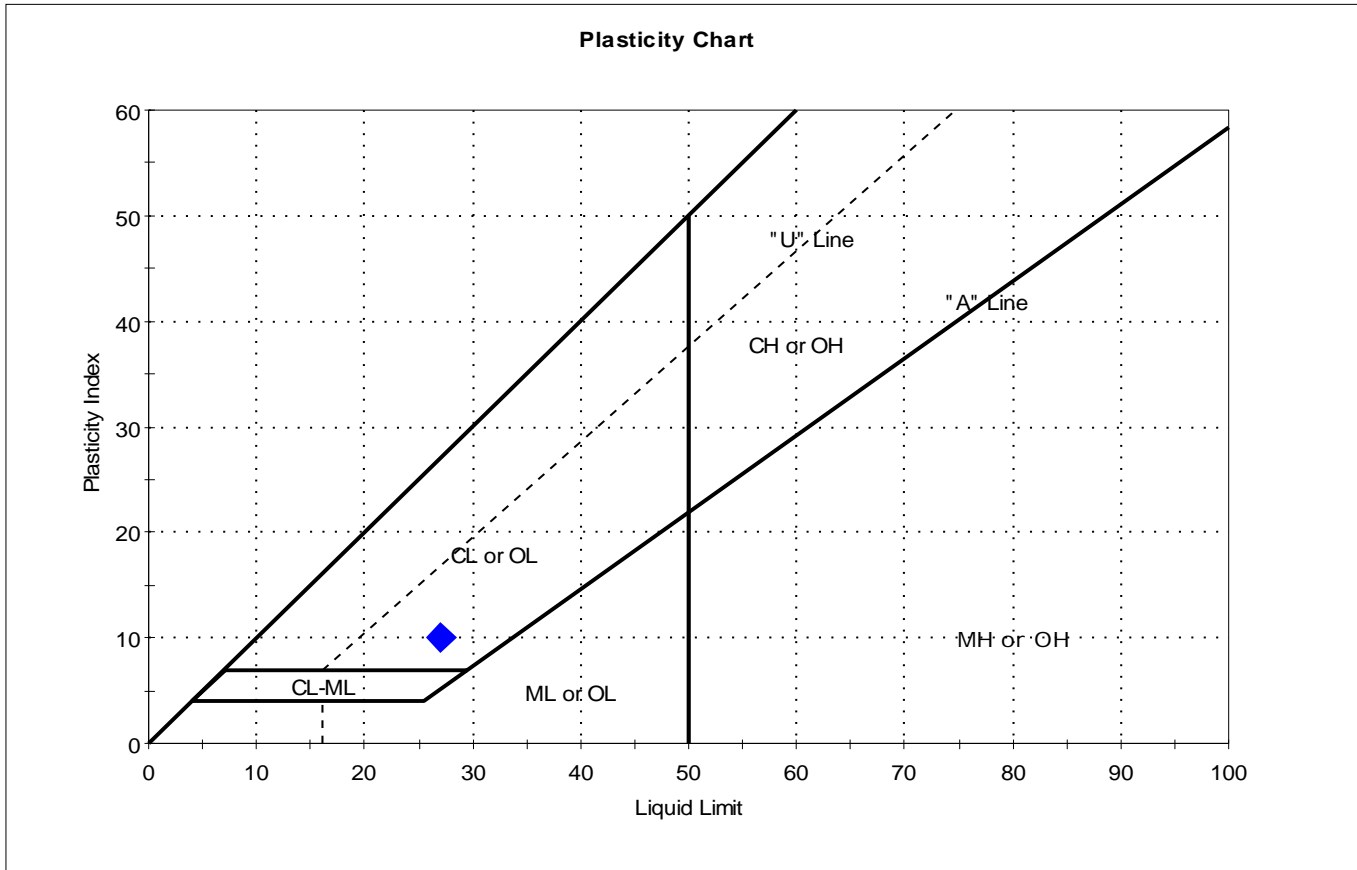
<u>Coefficients</u>	
D <sub>85</sub> = 21.8018 mm	D <sub>30</sub> = 0.4453 mm
D <sub>60</sub> = 7.3179 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 4.0056 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD

Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 201	Sample Type:	jar
Sample ID:	2D	Test Date:	07/19/18
Depth :	5-7 ft	Test Id:	462249
Test Comment:	---		
Visual Description:	Moist, olive gray clay with sand		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	2D	B-EXIT45 201	5-7 ft	21	27	17	10	0.4	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

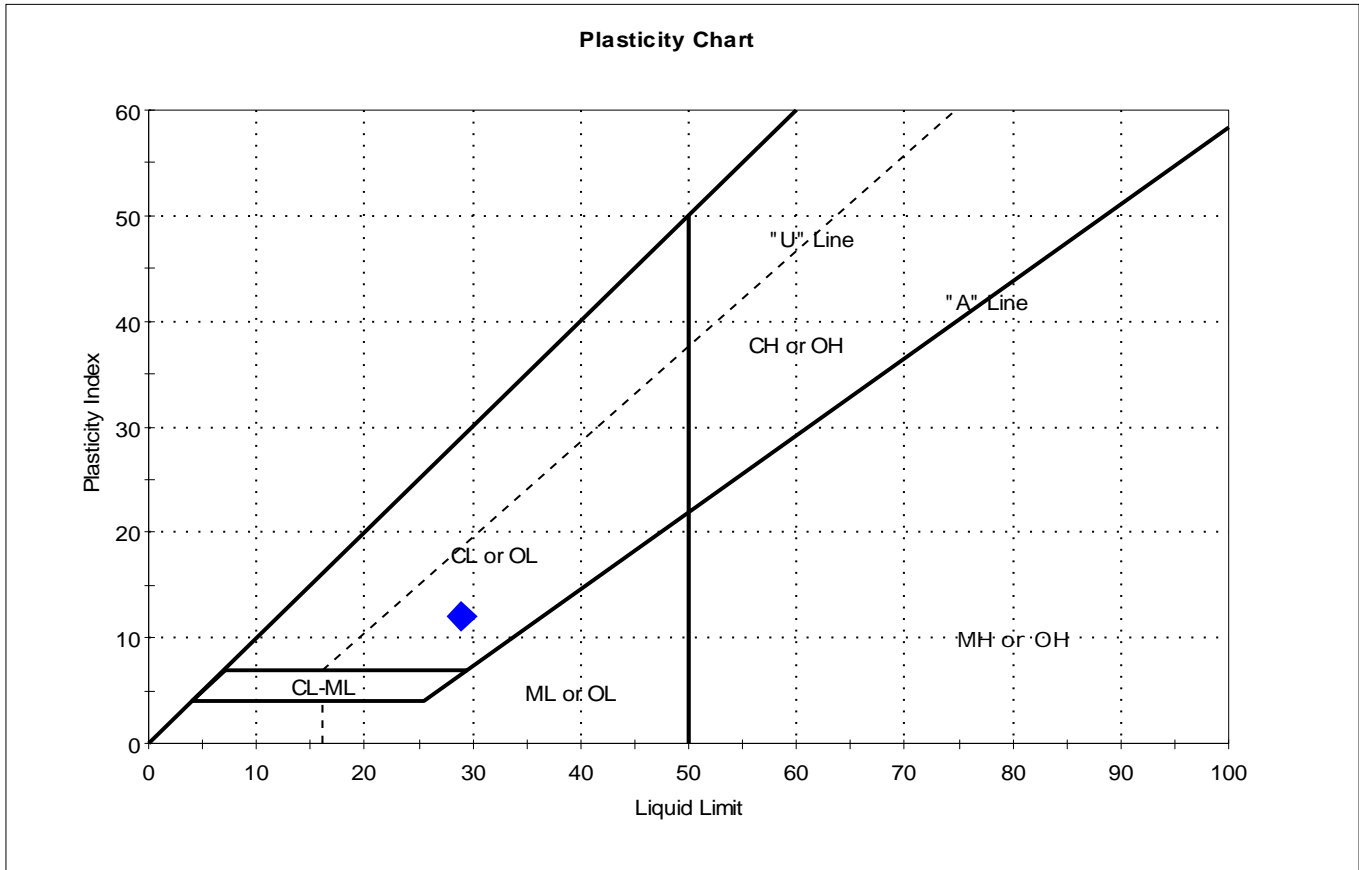
Toughness: MEDIUM





Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 201	Sample Type:	jar
Sample ID:	3D	Test Date:	07/19/18
Depth :	10-12 ft	Test Id:	462250
Test Comment:	---		
Visual Description:	Moist, olive gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



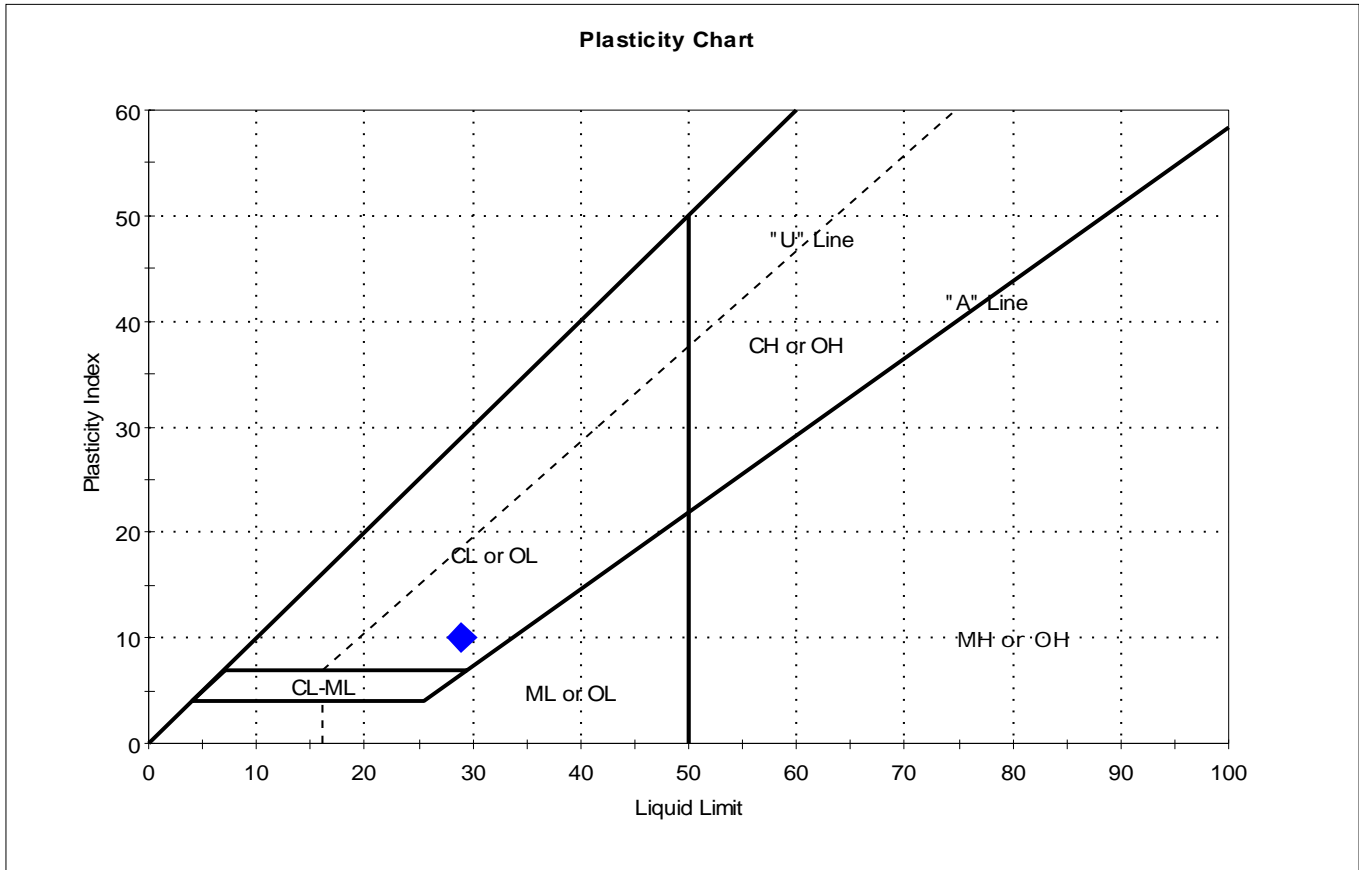
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	3D	B-EXIT45 201	10-12 ft	28	29	17	12	0.9	Lean CLAY (CL)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 201	Sample Type:	jar
Sample ID:	4D	Test Date:	07/26/18
Depth :	15-17 ft	Test Id:	462251
Test Comment:	---		
Visual Description:	Wet, 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
◆	4D	B-EXIT45 201	15-17 ft	34	29	19	10	1.5	

Sample Prepared using the WET method

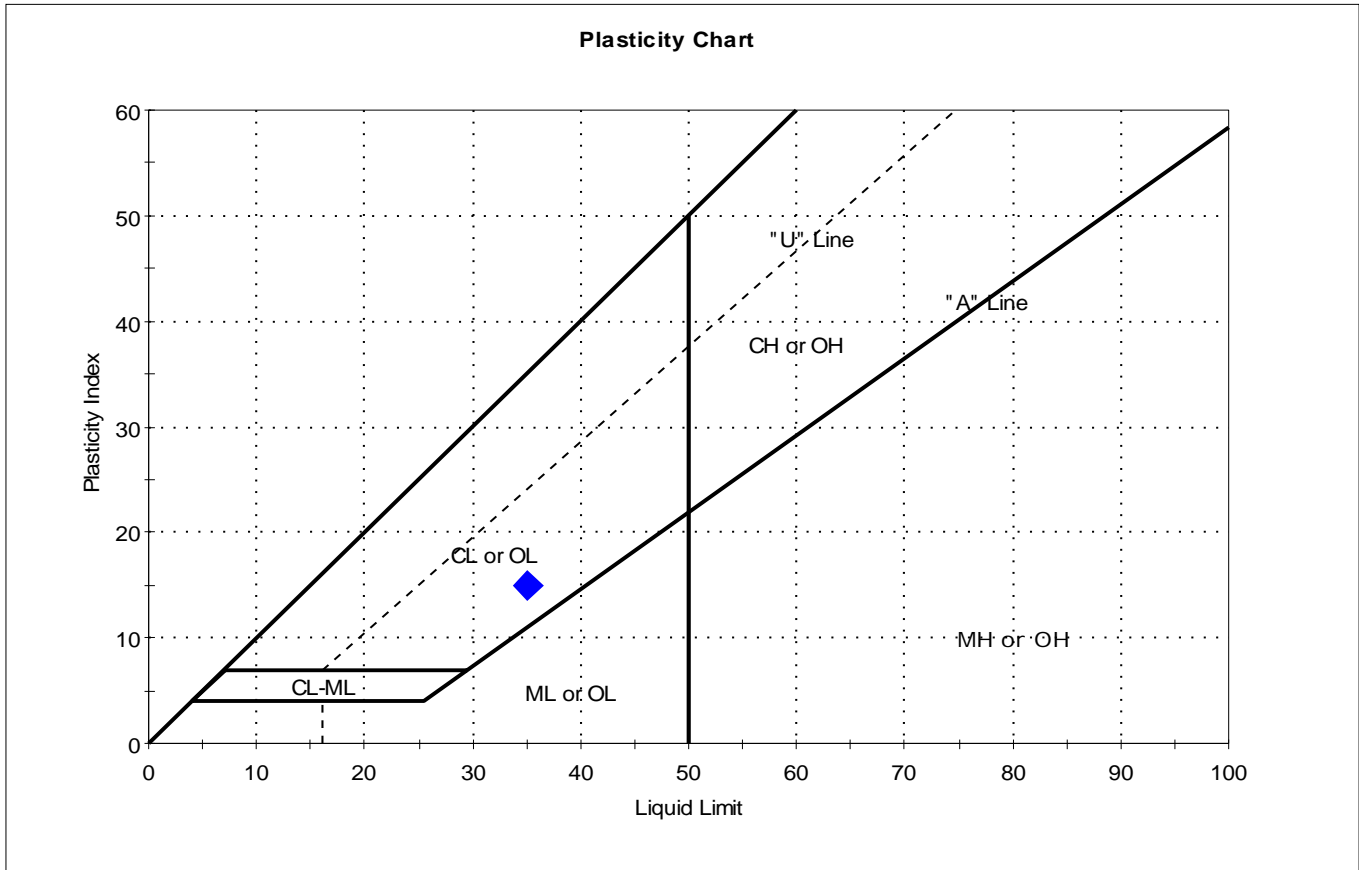
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-201	Sample Type:	tube
Sample ID:	U2	Test Date:	08/15/18
Depth:	30-32 ft	Test Id:	466571
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-2	30-32 ft	41	35	20	15	1.4	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

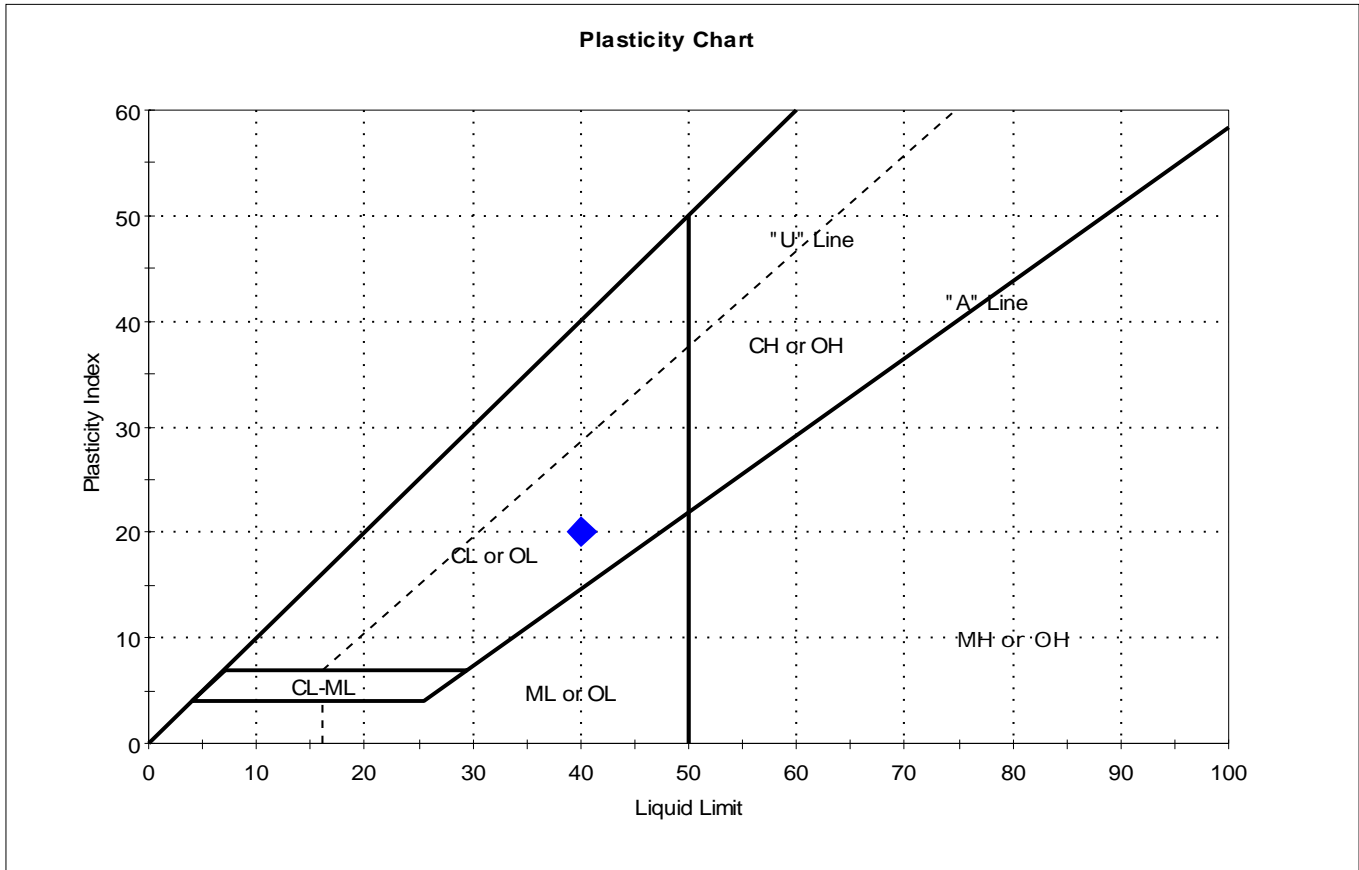
Dilatancy: SLOW

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 201	Sample Type:	jar
Sample ID:	6D	Test Date:	07/26/18
Depth :	35-37 ft	Test Id:	462252
Test Comment:	---		
Visual Description:	Wet, very 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
◆	6D	B-EXIT45 201	35-37 ft	44	40	20	20	1.2	

Sample Prepared using the WET method

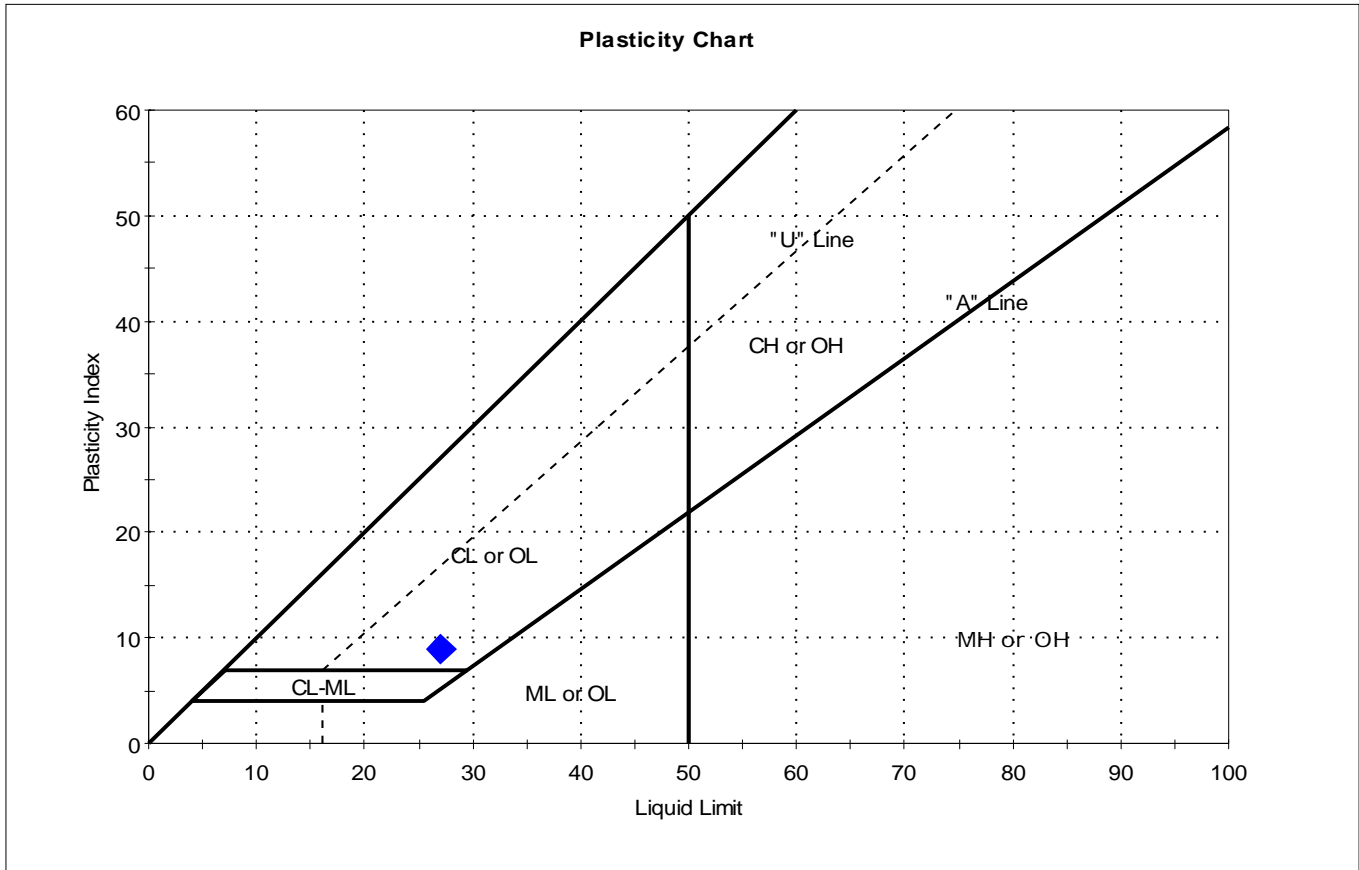
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-201	Sample Type:	tube
Sample ID:	U3	Test Date:	08/03/18
Depth:	40-42 ft	Test Id:	466572
Test Comment:	---		
Visual Description:	Wet, 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
◆	U3	EXIT45-2	40-42 ft	39	27	18	9	2.3	

Sample Prepared using the WET method

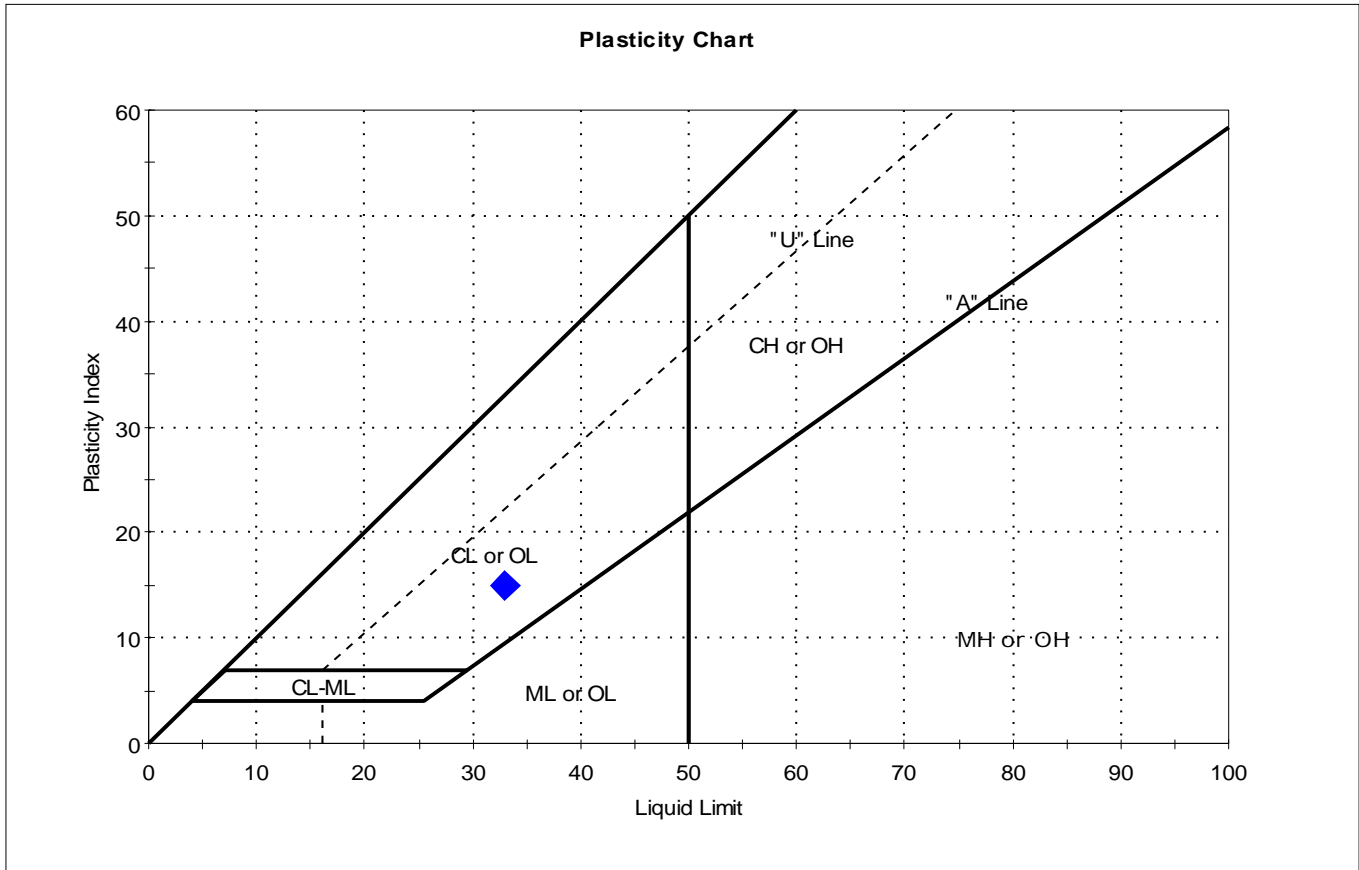
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 201	Sample Type:	jar
Sample ID:	8D	Test Date:	07/19/18
Depth :	55-57 ft	Test Id:	462253
Test Comment:	---		
Visual Description:	Moist, very 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
◆	8D	B-EXIT45 201	55-57 ft	34	33	18	15	1.1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

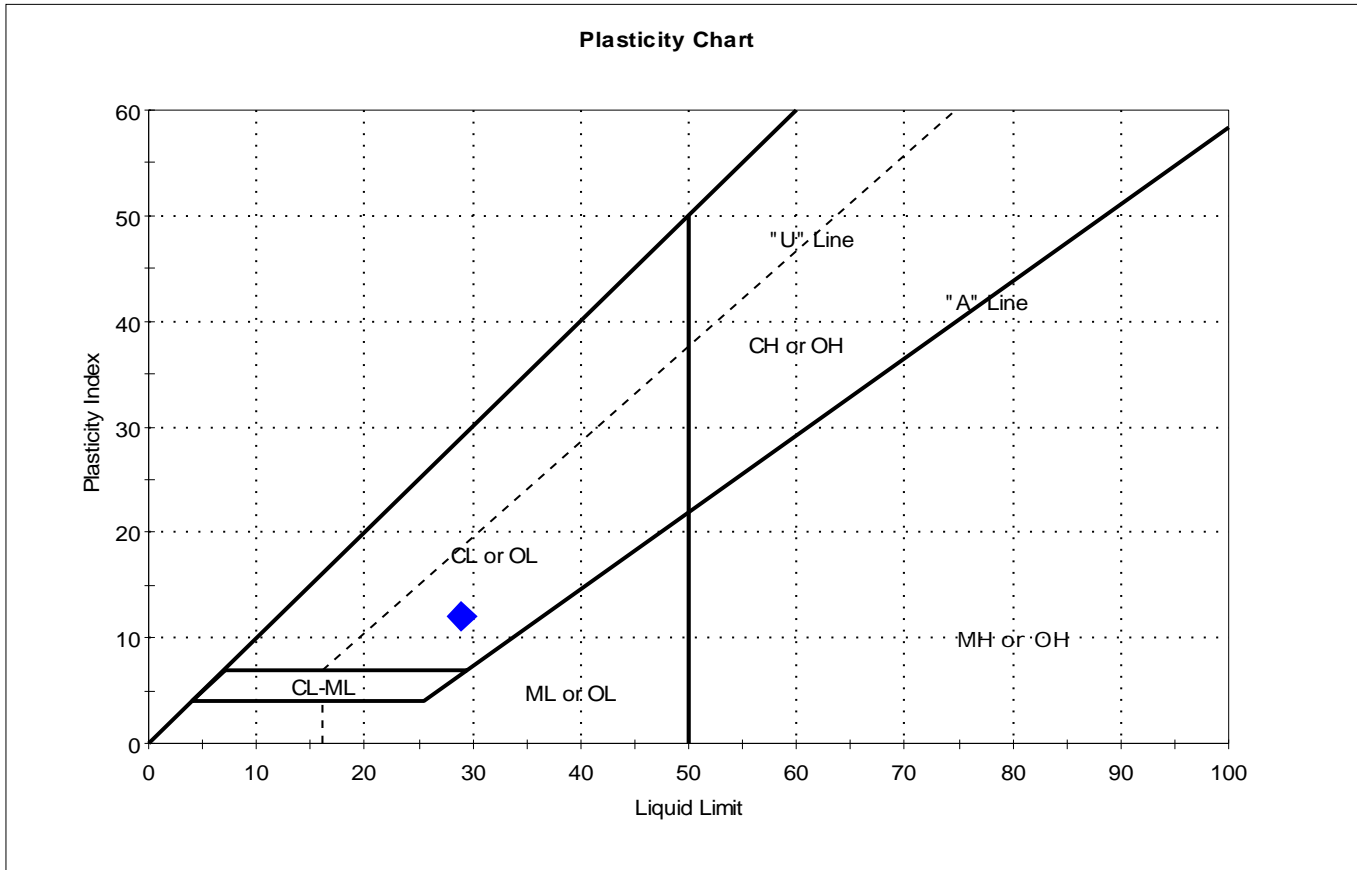
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 202	Sample Type:	jar
Sample ID:	4D	Test Date:	07/20/18
Depth :	15-17 ft	Test Id:	462254
Test Comment:	---		
Visual Description:	Wet, 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
◆	4D	B-EXIT45 202	15-17 ft	33	29	17	12	1.4	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

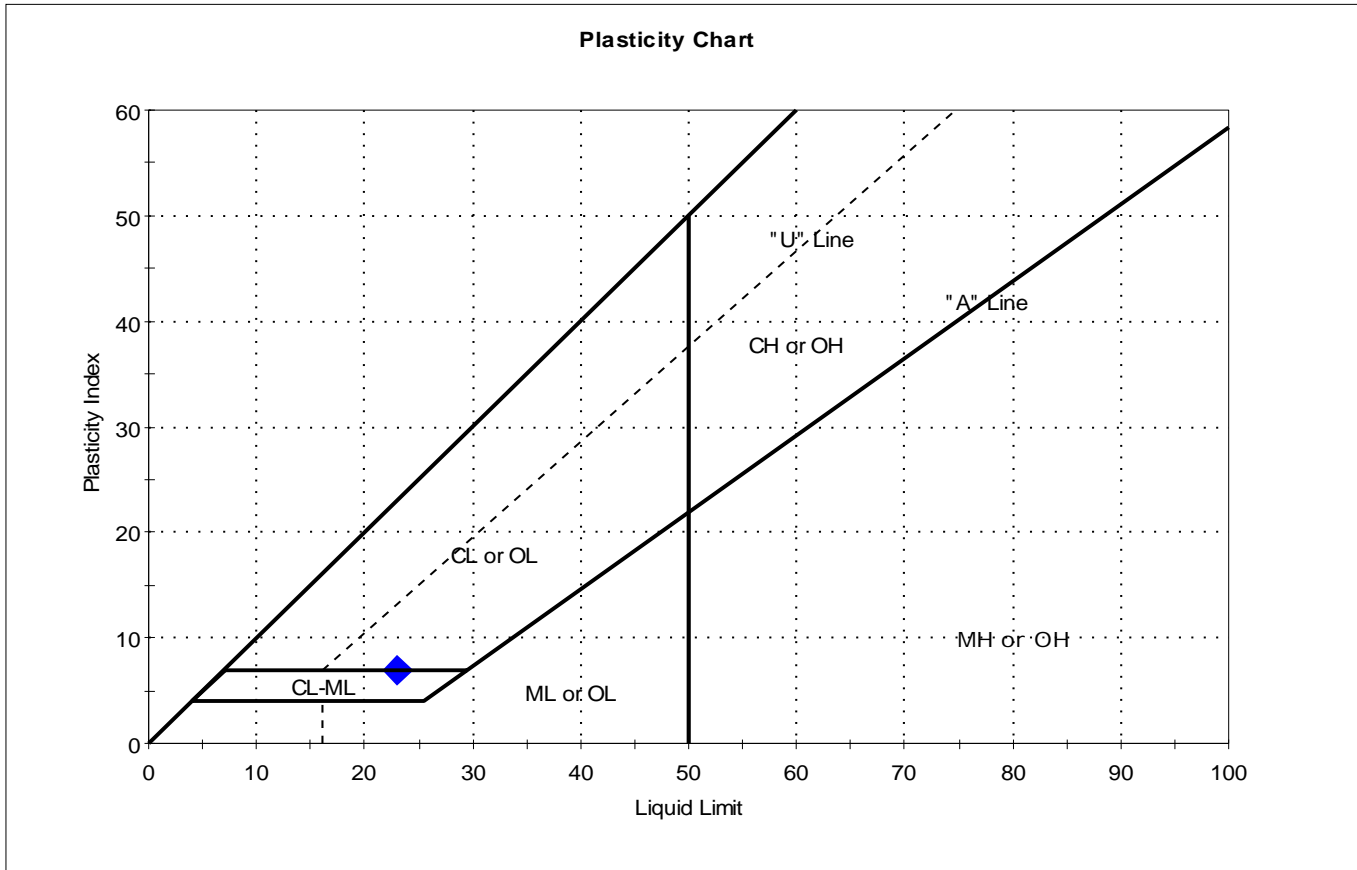
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 202	Sample Type:	jar
Sample ID:	6D	Test Date:	07/20/18
Depth :	25-27 ft	Test Id:	462255
Test Comment:	---		
Visual Description:	Wet, dark gray silty 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
◆	6D	B-EXIT45 202	25-27 ft	34	23	16	7	2.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

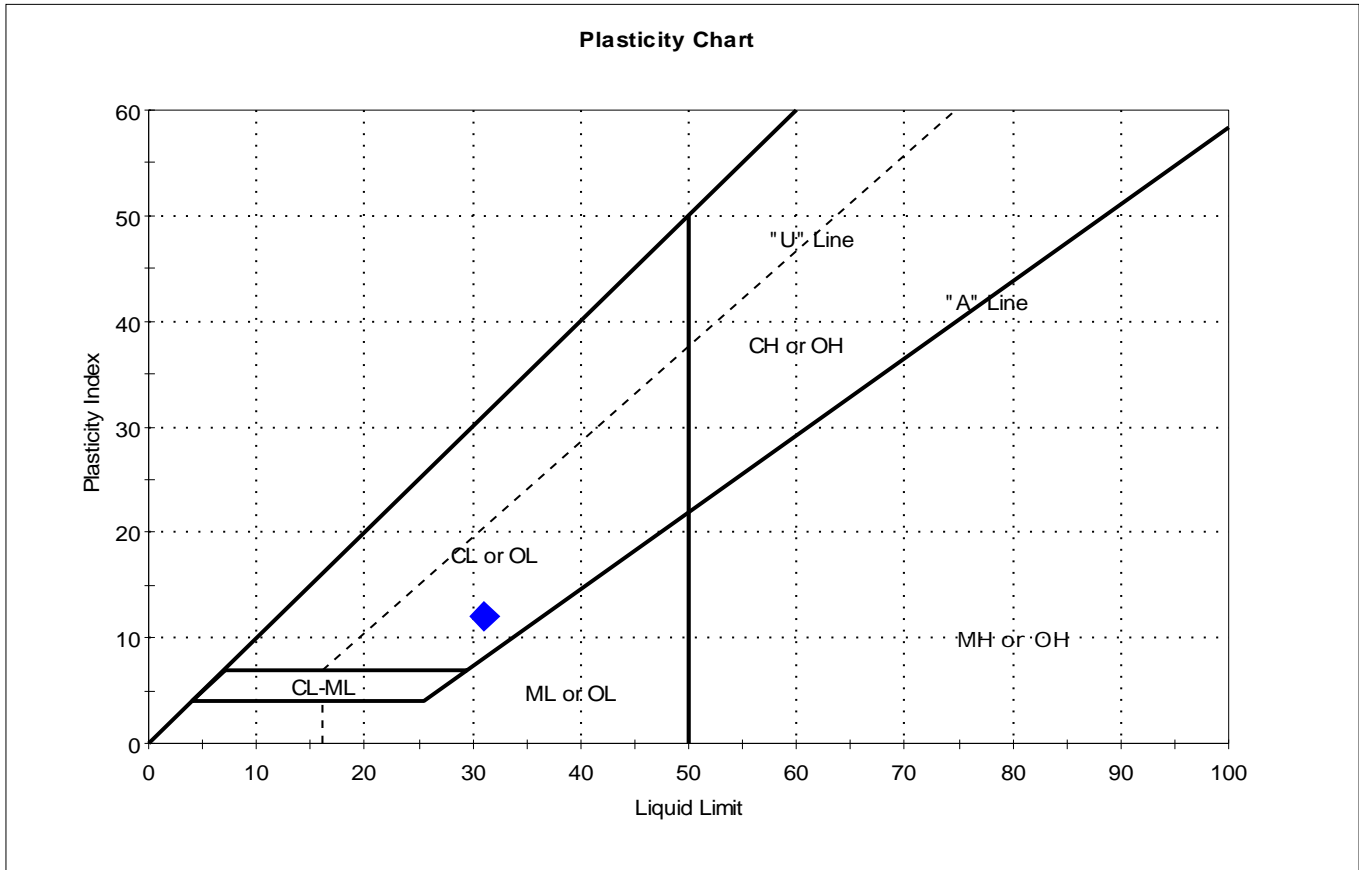
Toughness: MEDIUM





Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 202	Sample Type:	jar
Sample ID:	7D	Test Date:	07/25/18
Depth :	35-37 ft	Test Id:	462256
Test Comment:	---		
Visual Description:	Wet, olive 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
◆	7D	B-EXIT45 202	35-37 ft	36	31	19	12	1.4	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

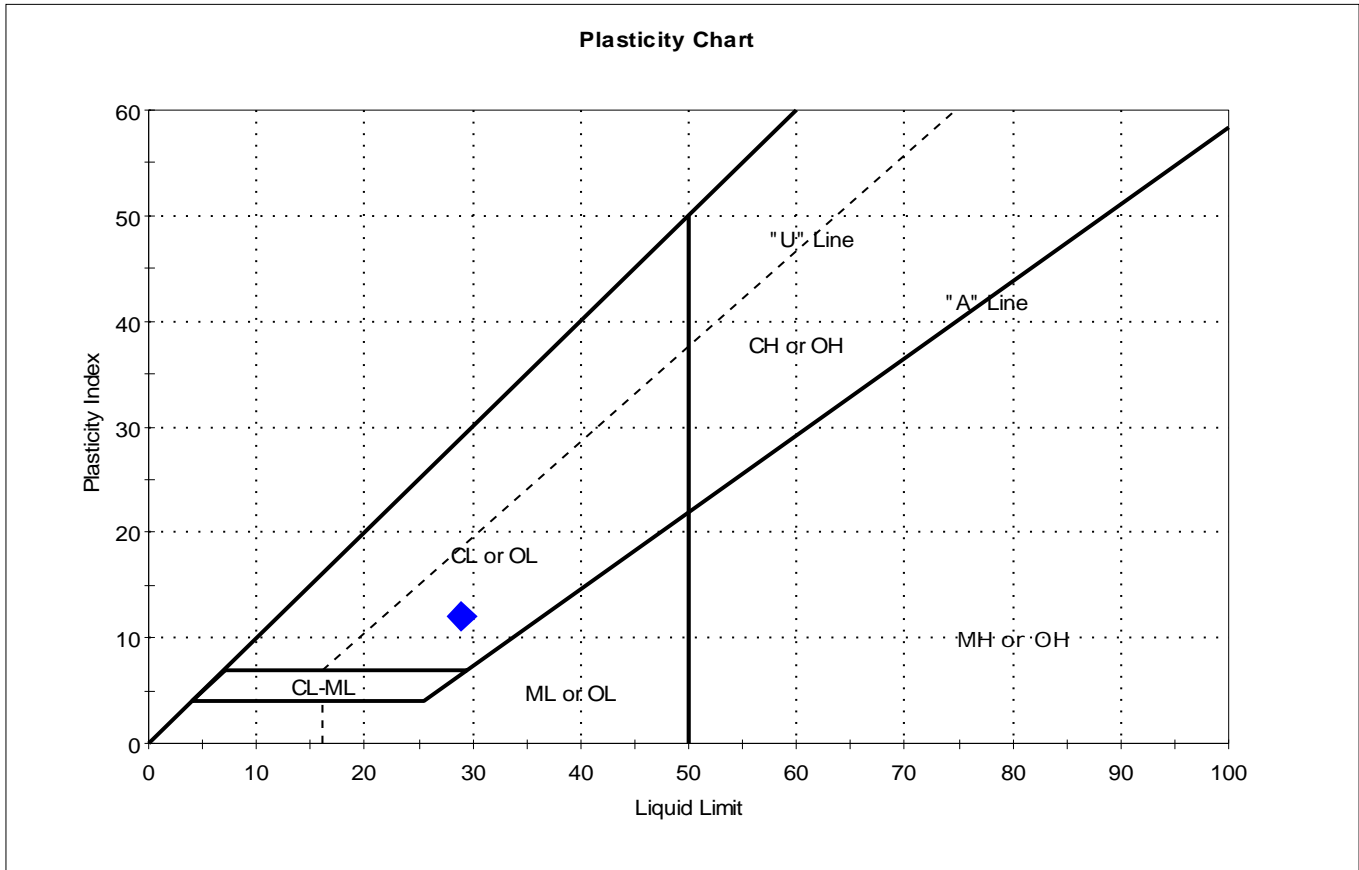
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 202	Sample Type:	jar
Sample ID:	9D	Test Date:	07/25/18
Depth :	55-57 ft	Test Id:	462257
Test Comment:	---		
Visual Description:	Wet, 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
◆	9D	B-EXIT45 202	55-57 ft	40	29	17	12	1.9	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

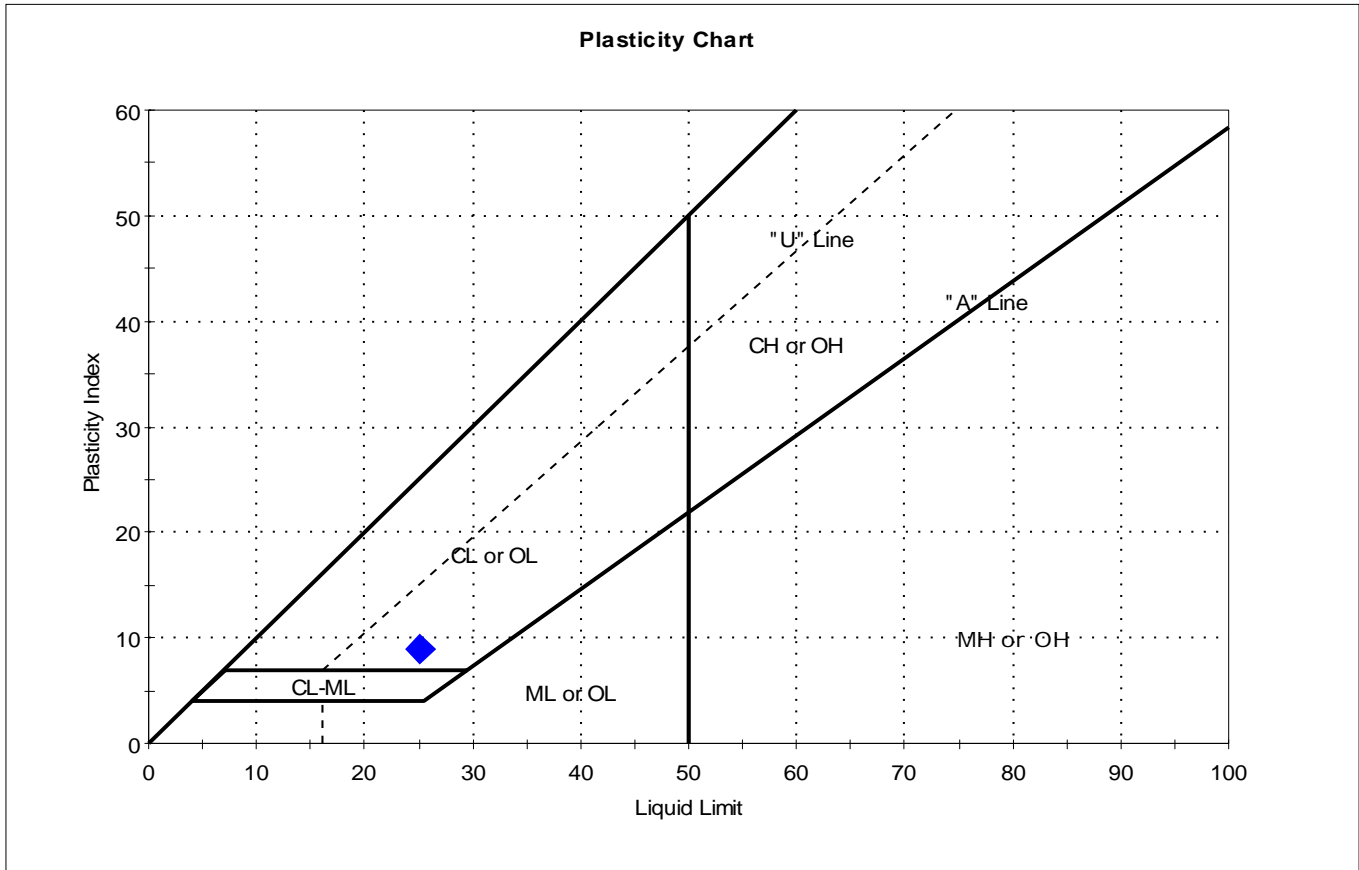
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 203	Sample Type:	jar
Sample ID:	4D	Test Date:	07/19/18
Depth :	15-17 ft	Test Id:	462258
Test Comment:	---		
Visual Description:	Wet, 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
◆	4D	B-EXIT45 203	15-17 ft	32	25	16	9	1.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

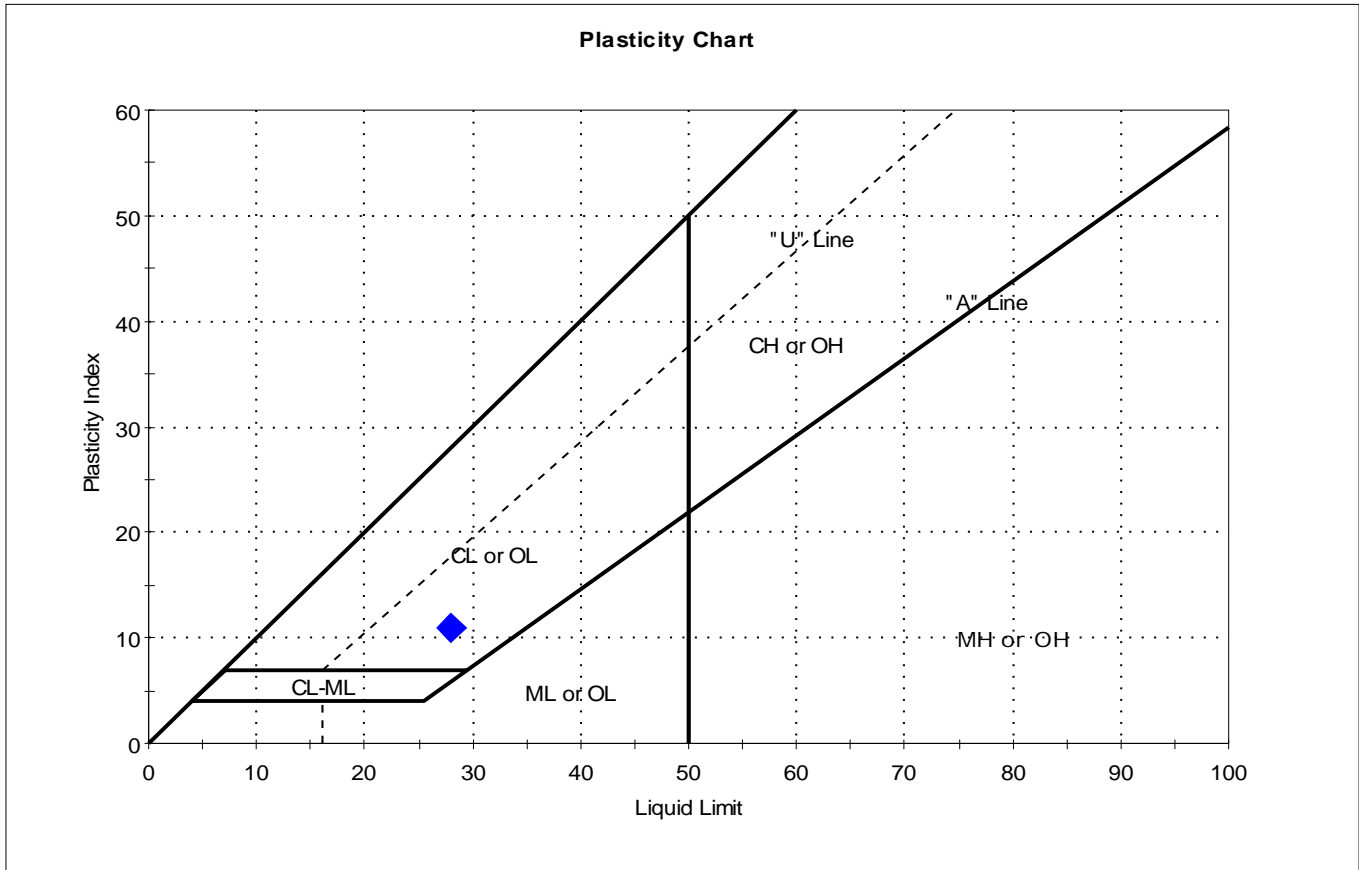
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 203	Sample Type:	jar
Sample ID:	5D	Test Date:	07/25/18
Depth :	20-22 ft	Test Id:	462259
Test Comment:	---		
Visual Description:	Wet, 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
◆	5D	B-EXIT45 203	20-22 ft	36	28	17	11	1.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

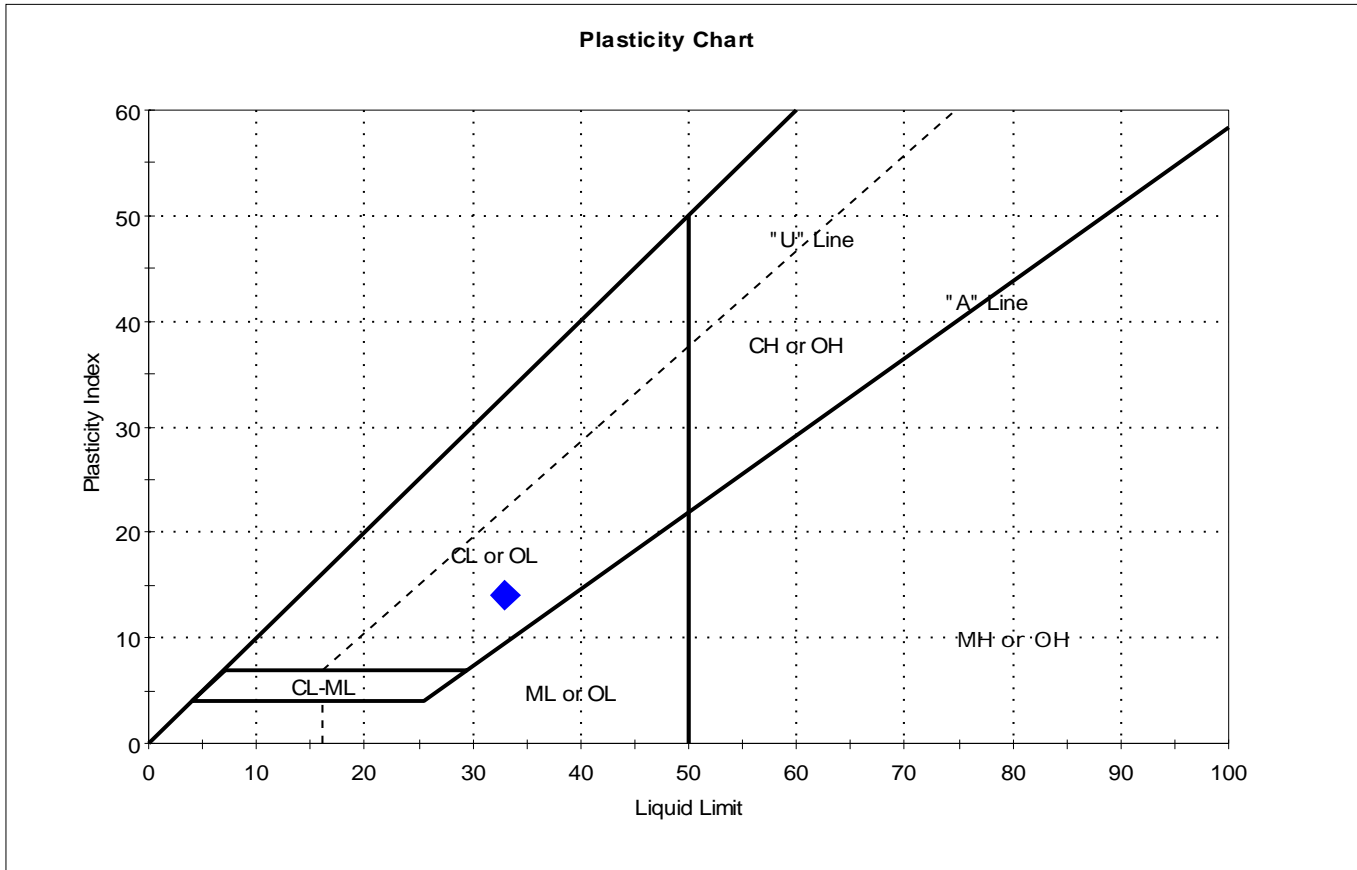
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 203	Sample Type:	jar
Sample ID:	7D	Test Date:	07/26/18
Depth :	40-42 ft	Test Id:	462260
Test Comment:	---		
Visual Description:	Wet, 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
◆	7D	B-EXIT45 203	40-42 ft	45	33	19	14	1.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

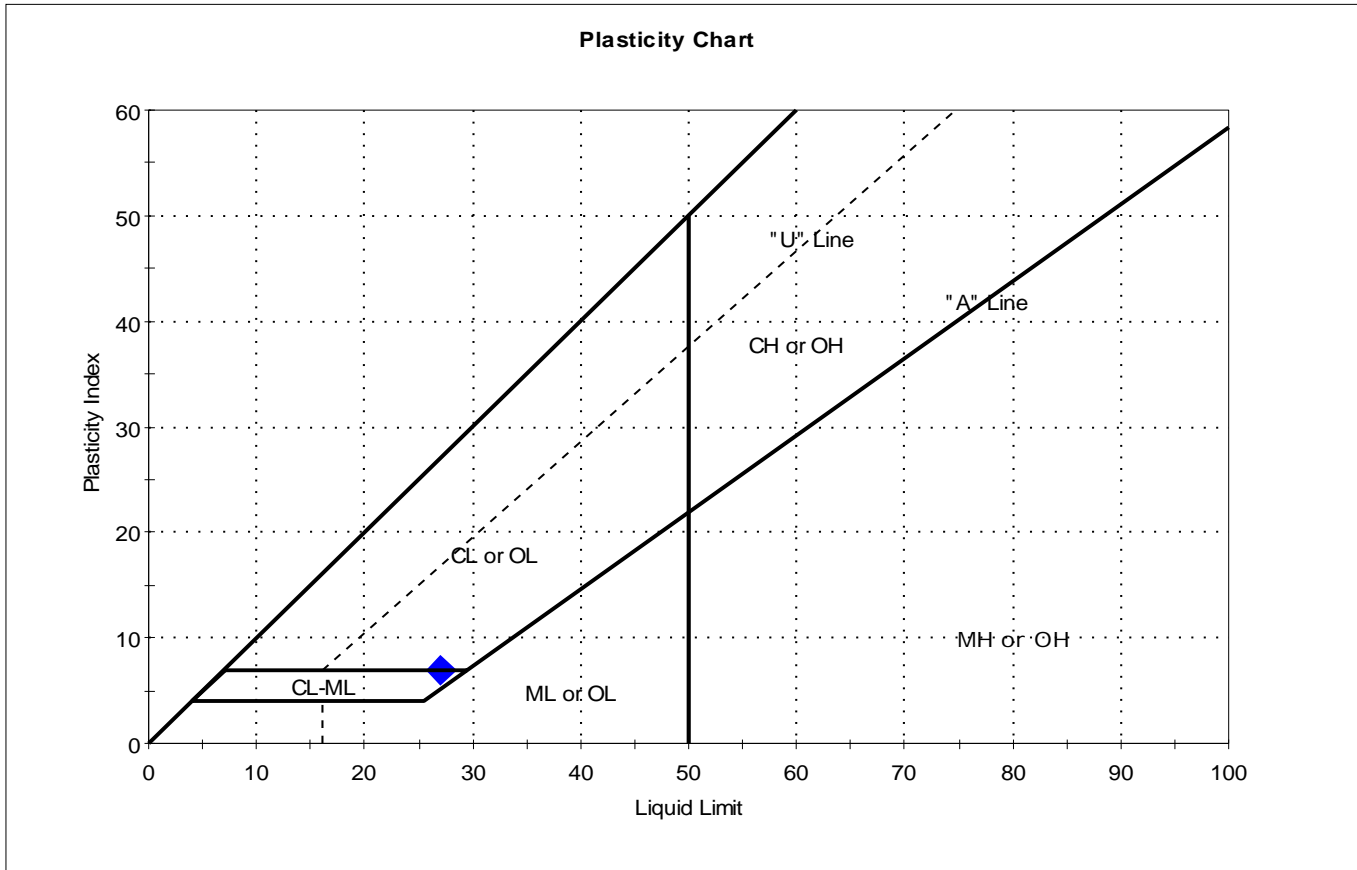
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 204	Sample Type:	jar
Sample ID:	2D	Test Date:	07/26/18
Depth :	5-7 ft	Test Id:	462261
Test Comment:	---		
Visual Description:	Moist, dark gray silty, clayey sand		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



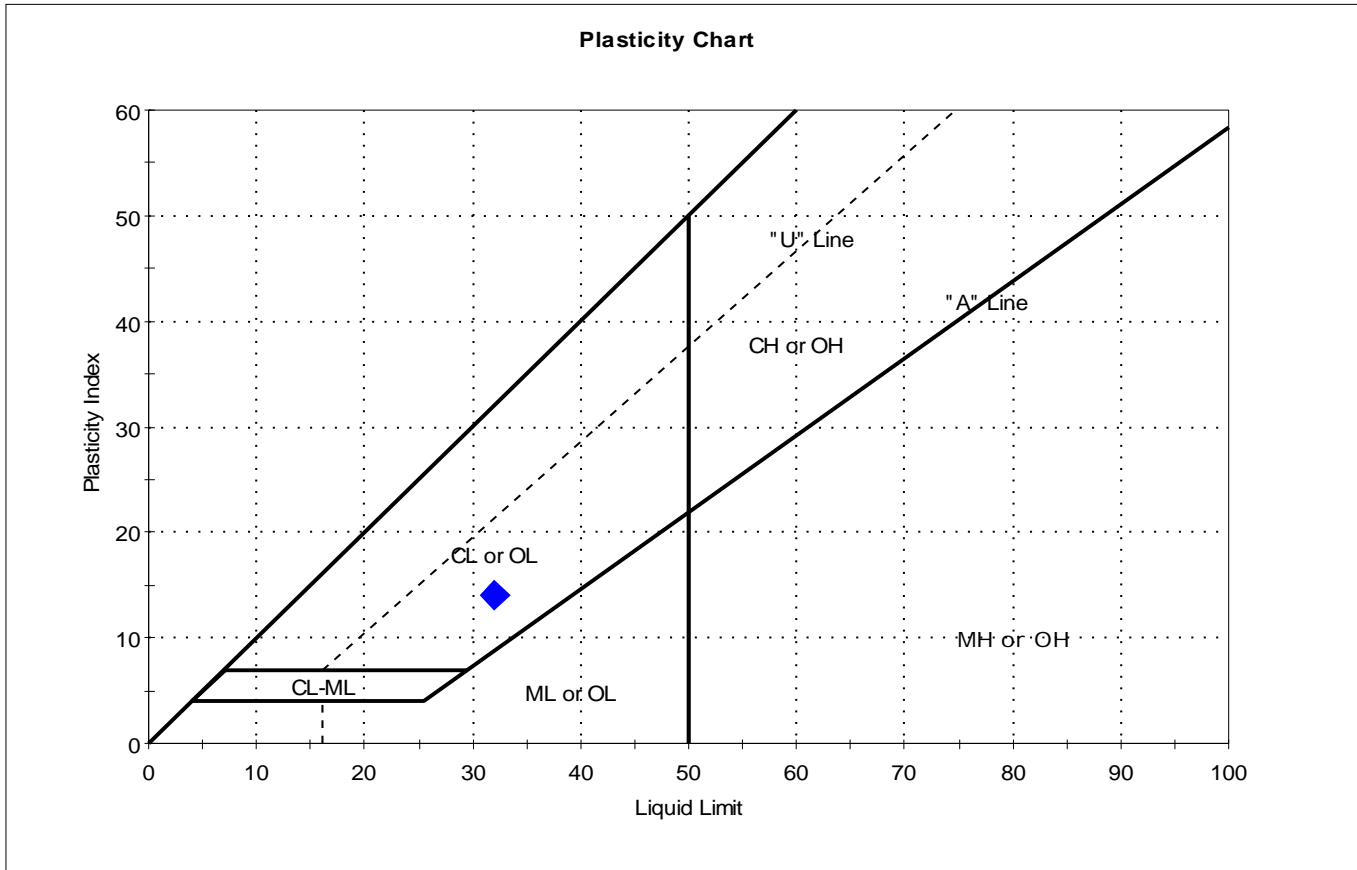
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	2D	B-EXIT45 204	5-7 ft	21	27	20	7	0.2	Silty, Clayey SAND (SC-SM)

Sample Prepared using the WET method  
 40% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 204	Sample Type:	jar
Sample ID:	3D	Test Date:	07/26/18
Depth :	10-12 ft	Test Id:	462262
Test Comment:	---		
Visual Description:	Moist, olive 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
◆	3D	B-EXIT45 204	10-12 ft	27	32	18	14	0.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

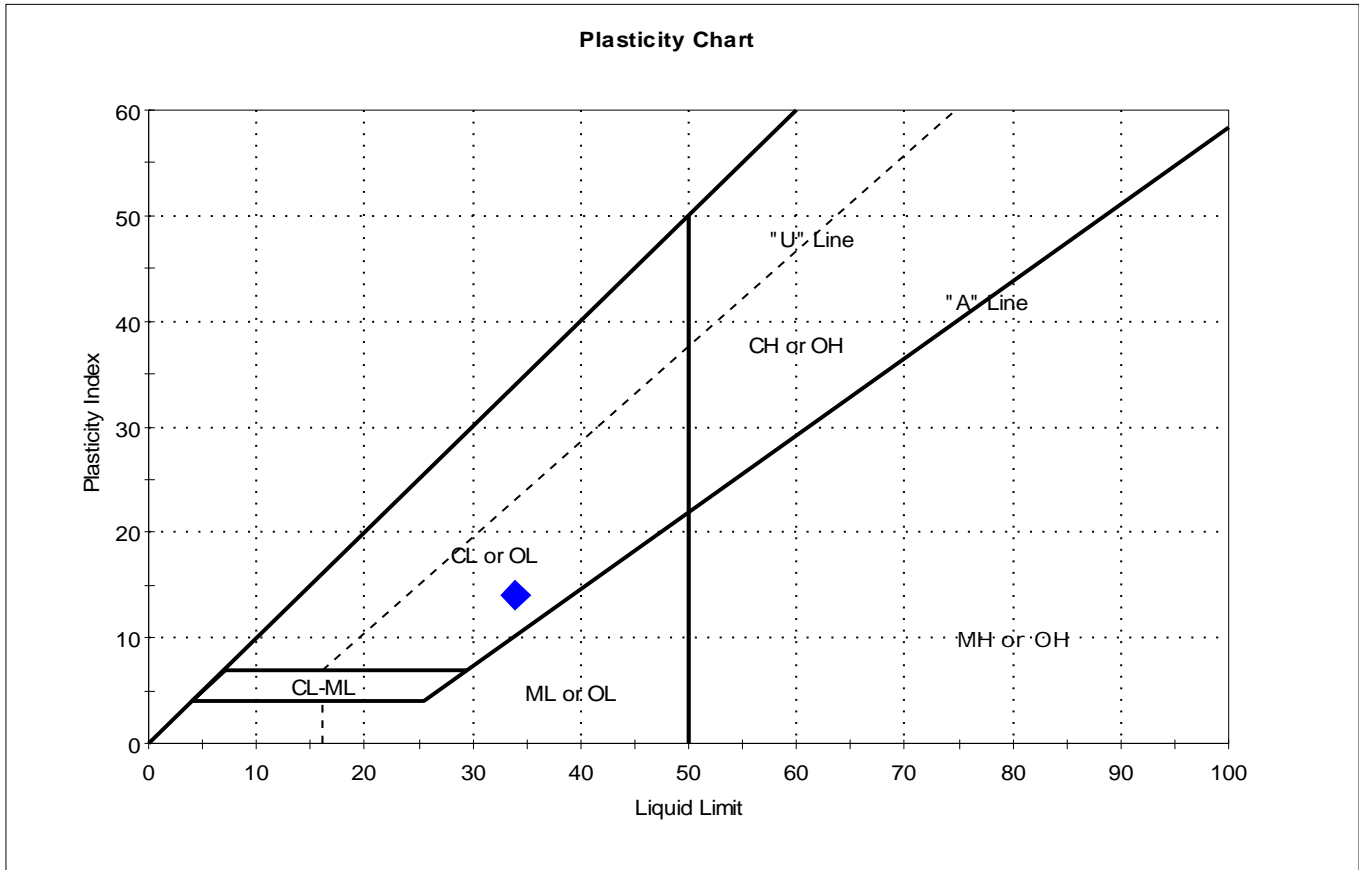
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 204	Sample Type:	jar
Sample ID:	5D	Test Date:	07/26/18
Depth :	20-22 ft	Test Id:	462263
Test Comment:	---		
Visual Description:	Wet, 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
◆	5D	B-EXIT45 204	20-22 ft	42	34	20	14	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

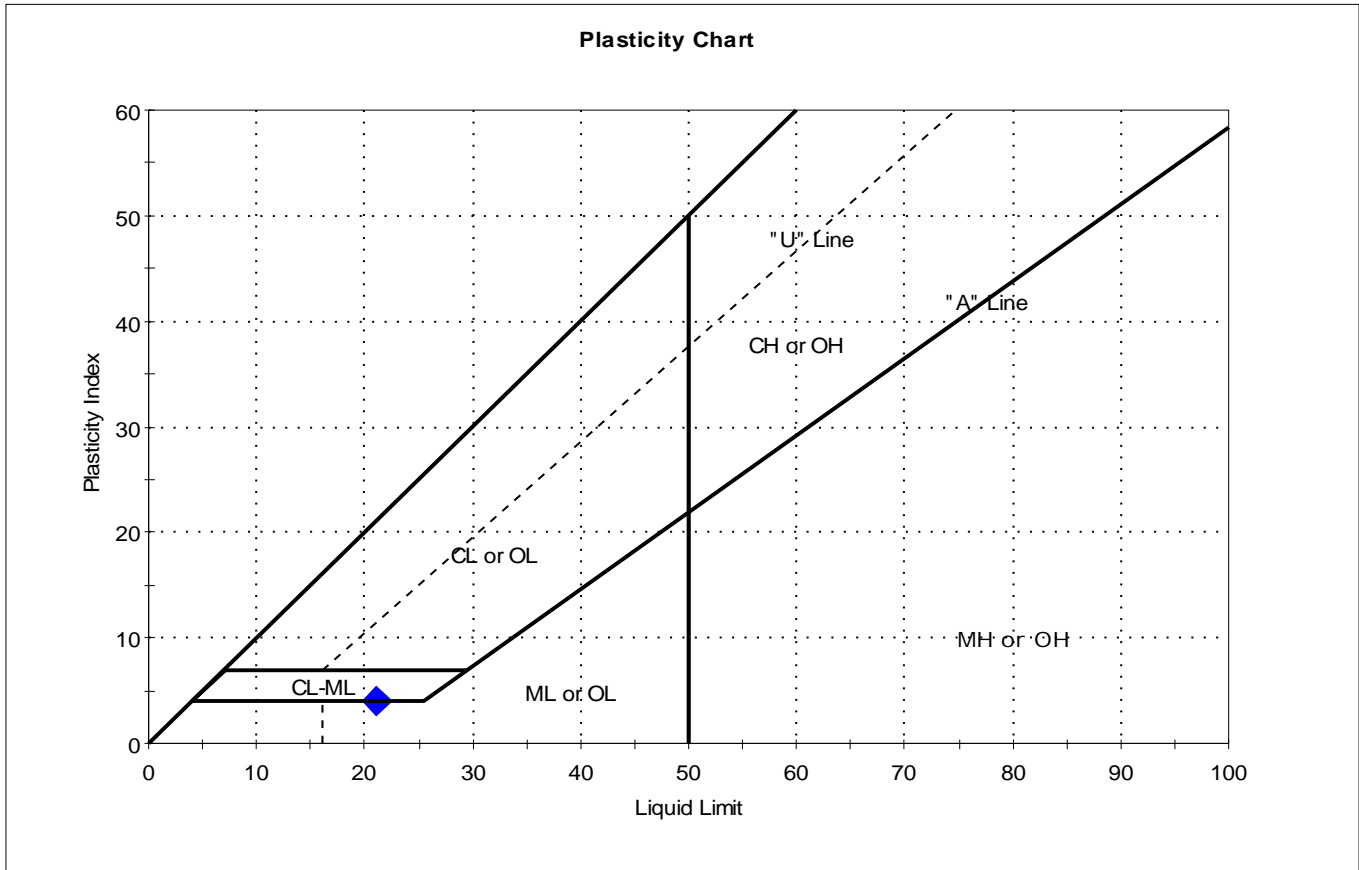
Toughness: MEDIUM





Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 205	Sample Type:	jar
Sample ID:	4D	Test Date:	07/26/18
Depth :	15-17 ft	Test Id:	462264
Test Comment:	---		
Visual Description:	Wet, dark gray silty 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
◆	4D	B-EXIT45 205	15-17 ft	31	21	17	4	3.5	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

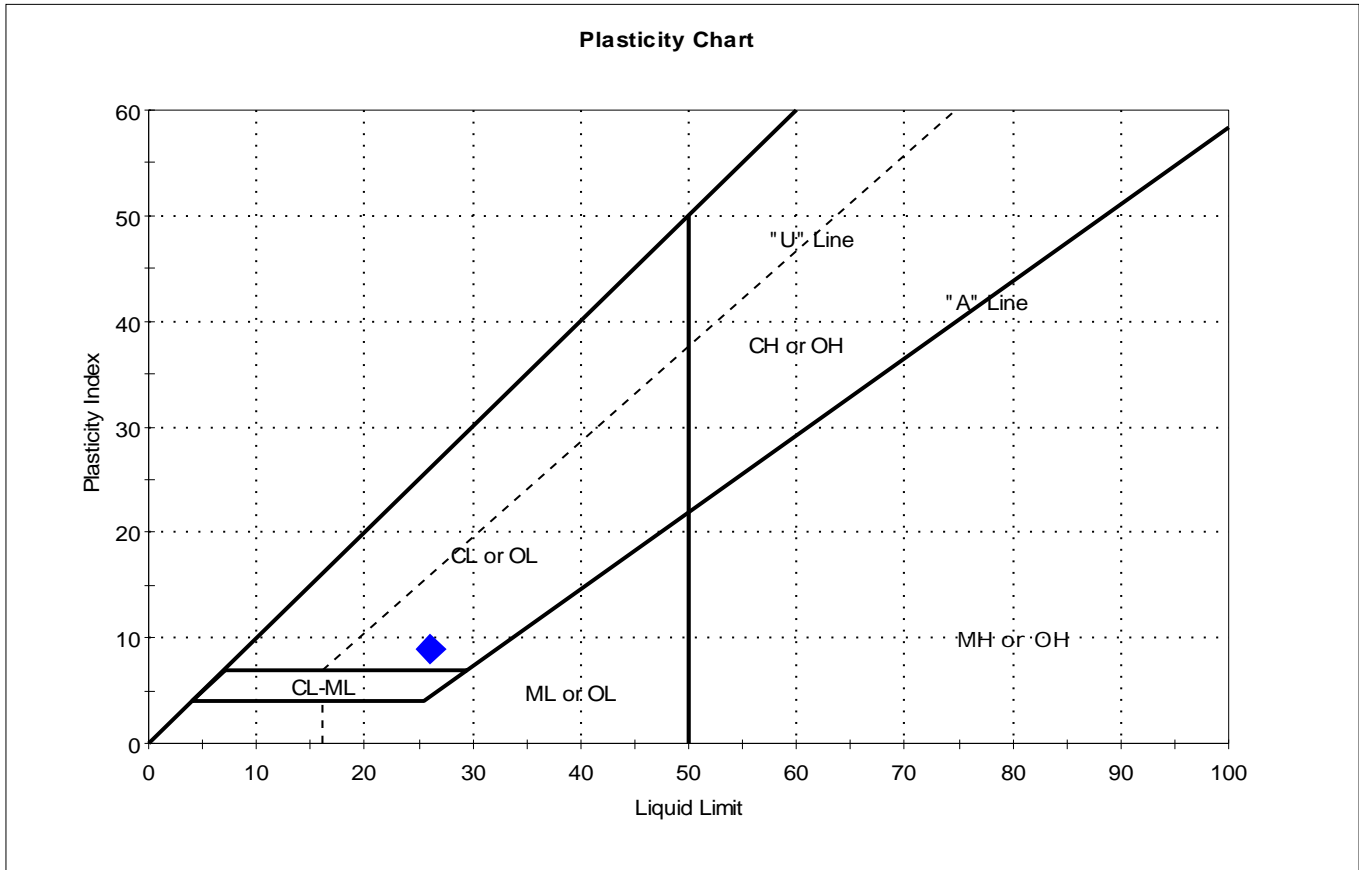
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 205	Sample Type:	jar
Sample ID:	5D	Test Date:	07/25/18
Depth :	20-22 ft	Test Id:	462265
Test Comment:	---		
Visual Description:	Wet, 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
◆	5D	B-EXIT45 205	20-22 ft	32	26	17	9	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

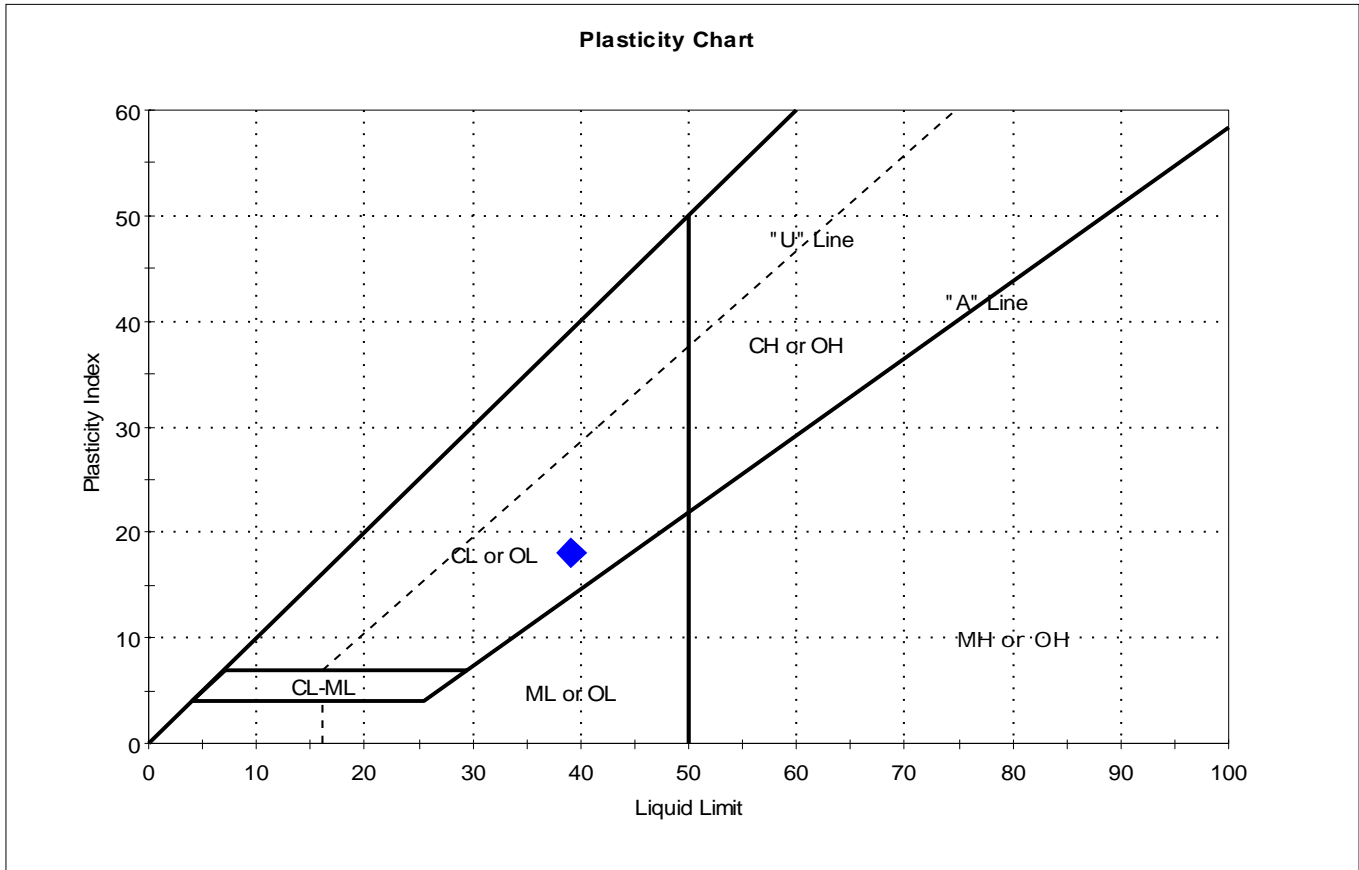
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-205	Sample Type:	tube
Sample ID:	U2	Test Date:	08/15/18
Depth:	35-37 ft	Test Id:	466570
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-2	35-37 ft	52	39	21	18	1.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

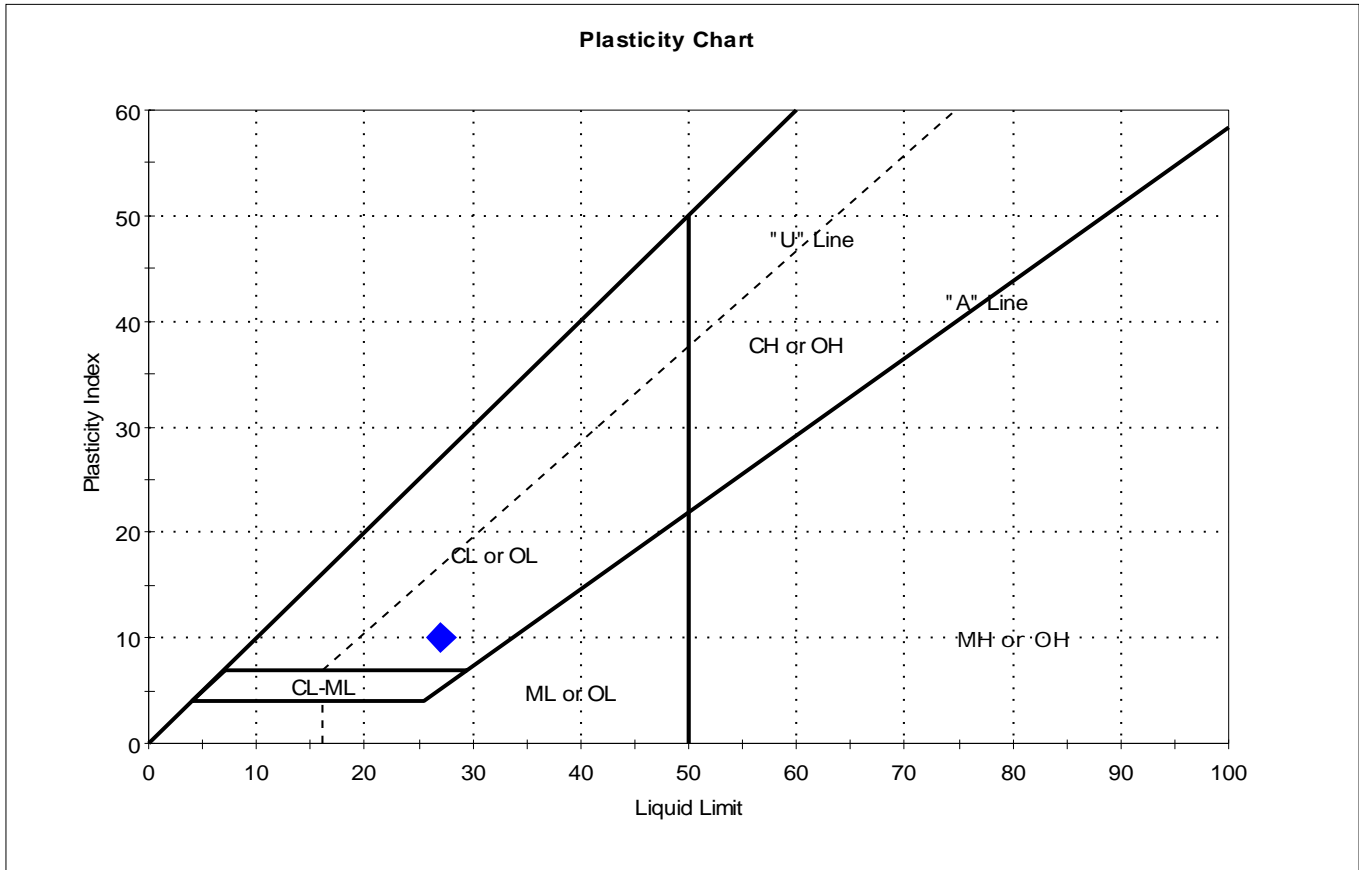
Dilatancy: SLOW

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 205	Sample Type:	jar
Sample ID:	7D	Test Date:	07/20/18
Depth :	40-42 ft	Test Id:	462266
Test Comment:	---		
Visual Description:	Wet, very 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
◆	7D	B-EXIT45 205	40-42 ft	34	27	17	10	1.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

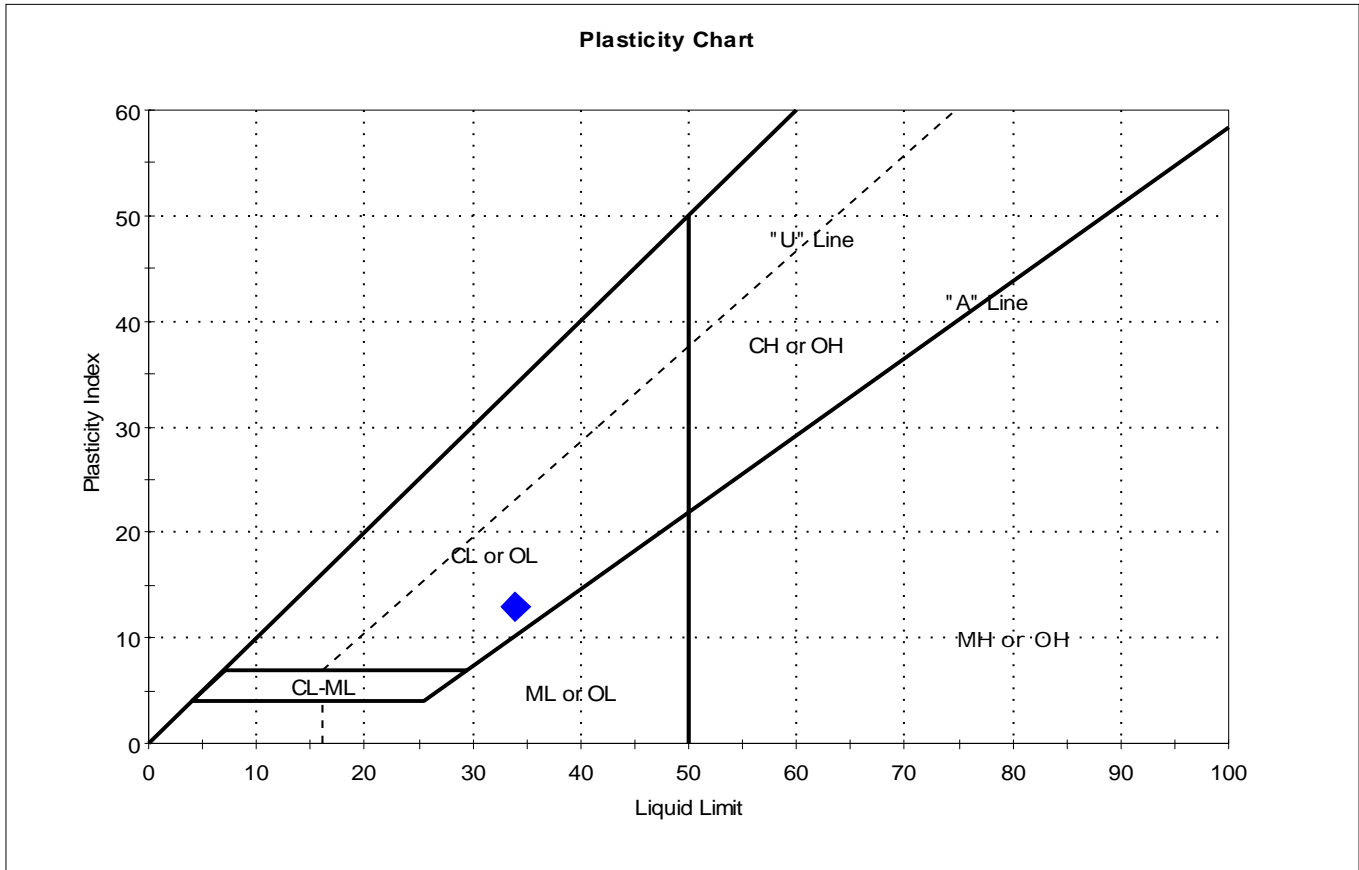
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 205	Sample Type:	jar
Sample ID:	8D	Test Date:	07/25/18
Depth :	50-52 ft	Test Id:	462267
Test Comment:	---		
Visual Description:	Wet, 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
◆	8D	B-EXIT45 205	50-52 ft	42	34	21	13	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

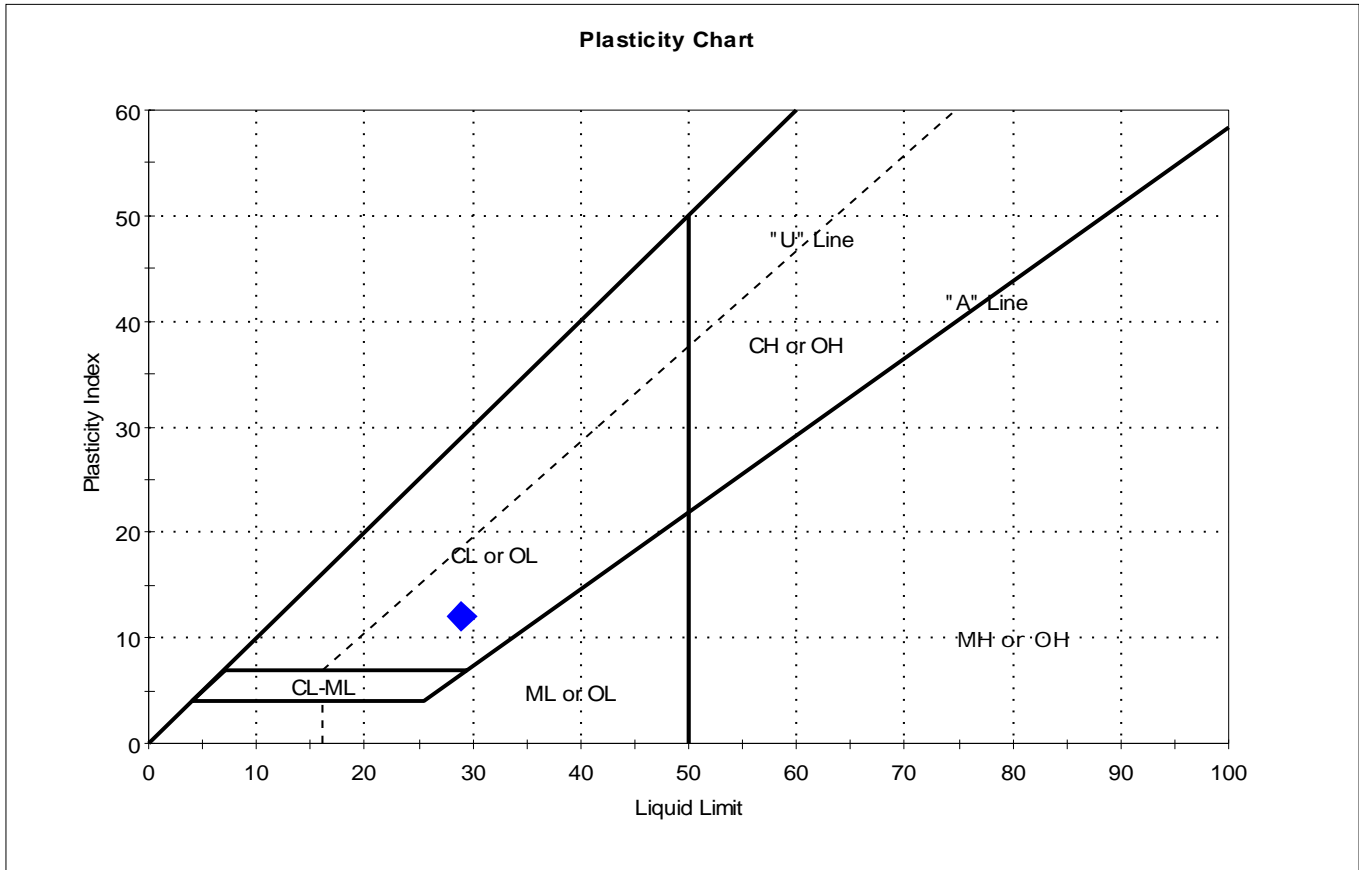
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 206	Sample Type:	jar
Sample ID:	4D	Test Date:	07/25/18
Depth :	15-17 ft	Test Id:	462268
Test Comment:	---		
Visual Description:	Wet, 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
◆	4D	B-EXIT45 206	15-17 ft	34	29	17	12	1.5	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

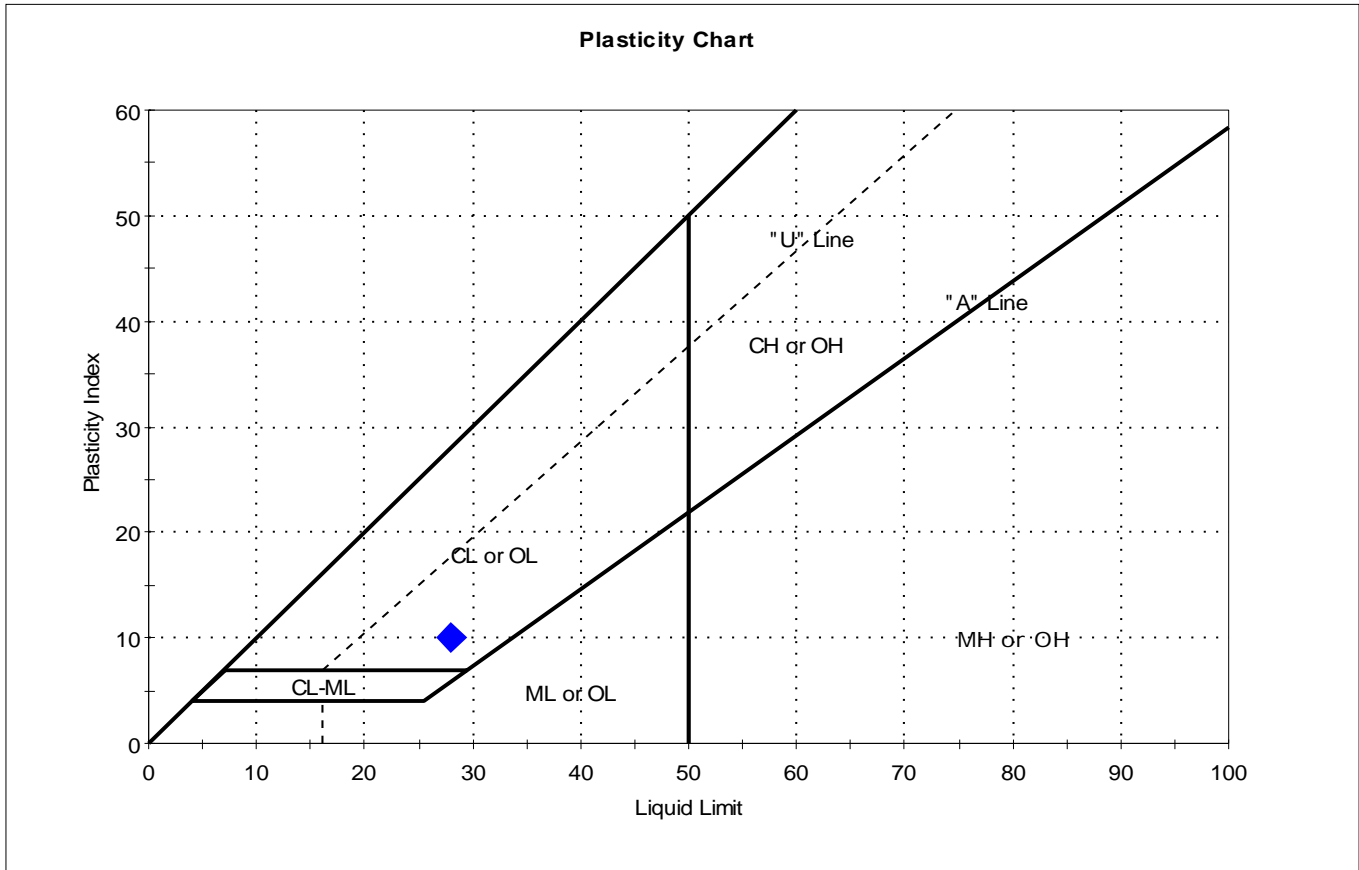
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 206	Sample Type:	jar
Sample ID:	6D	Test Date:	07/20/18
Depth :	25-27 ft	Test Id:	462269
Test Comment:	---		
Visual Description:	Wet, 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
◆	6D	B-EXIT45 206	25-27 ft	36	28	18	10	1.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

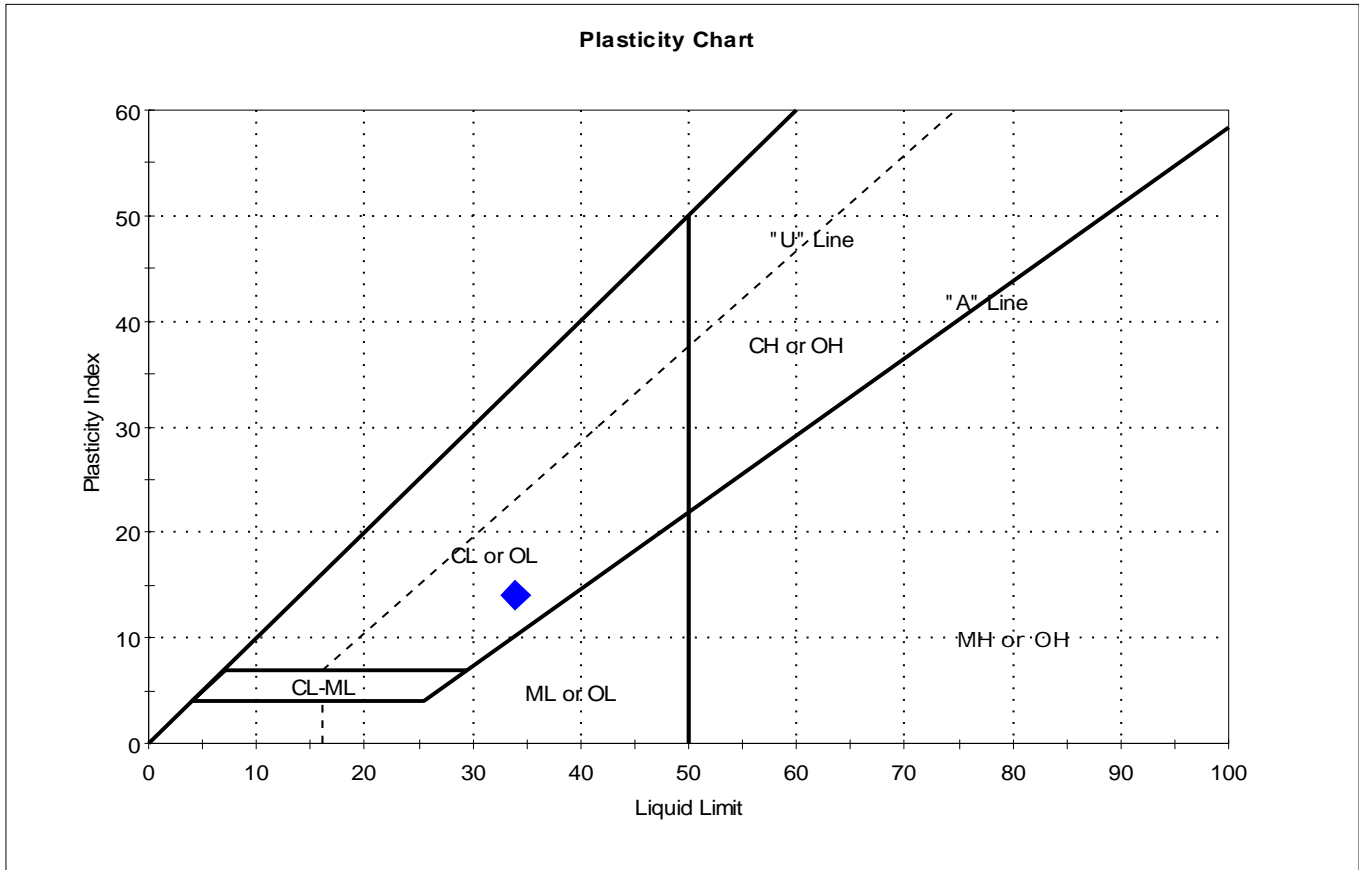
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 206	Sample Type:	jar
Sample ID:	12D	Test Date:	07/25/18
Depth :	55-57 ft	Test Id:	462270
Test Comment:	---		
Visual Description:	Wet, 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
◆	12D	B-EXIT45 206	55-57 ft	43	34	20	14	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

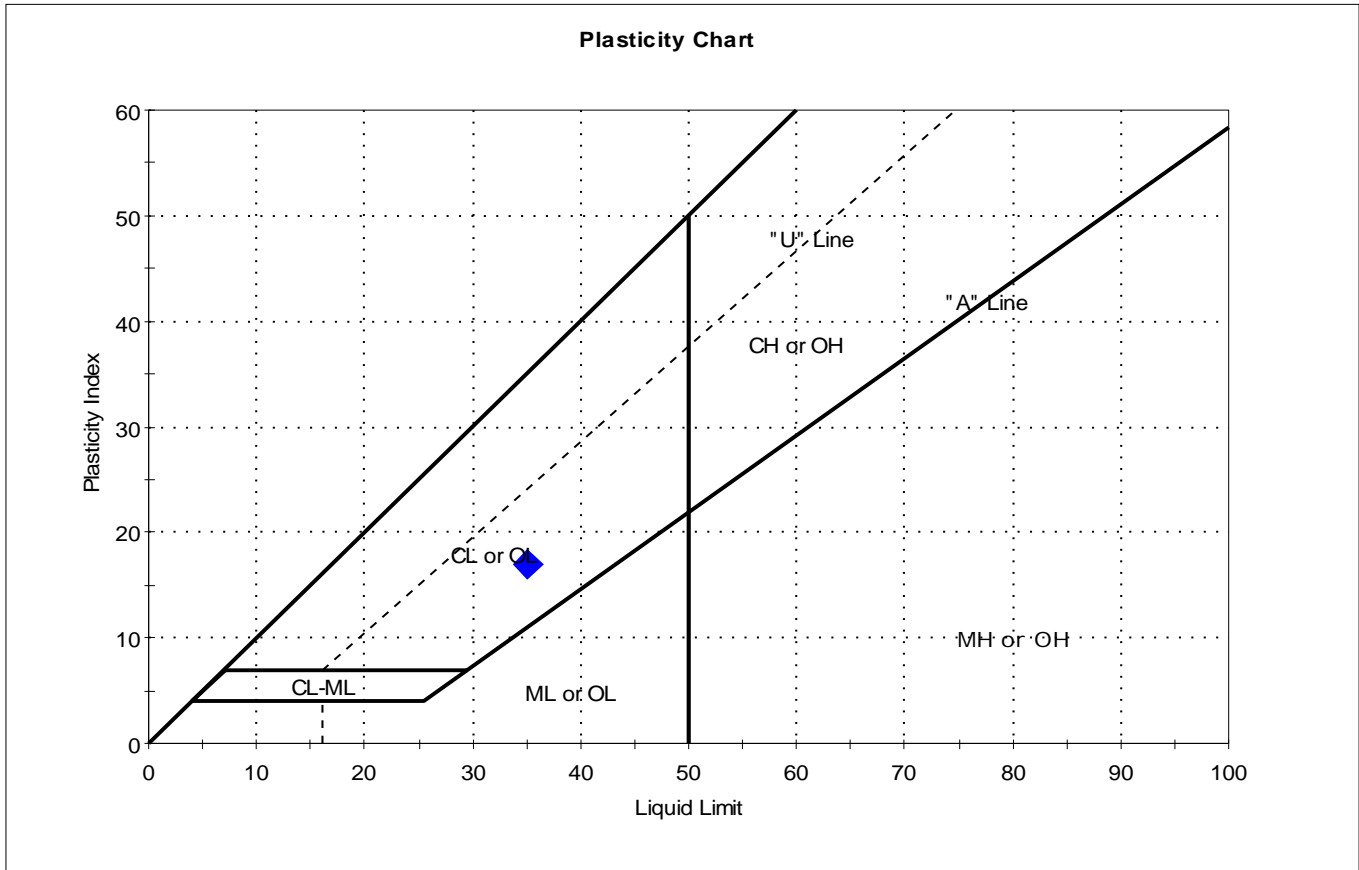
Toughness: MEDIUM





Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 207	Sample Type:	jar
Sample ID:	14D	Test Date:	07/19/18
Depth :	85-87 ft	Test Id:	462271
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
◆	14D	B-EXIT45 207	85-87 ft	35	35	18	17	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

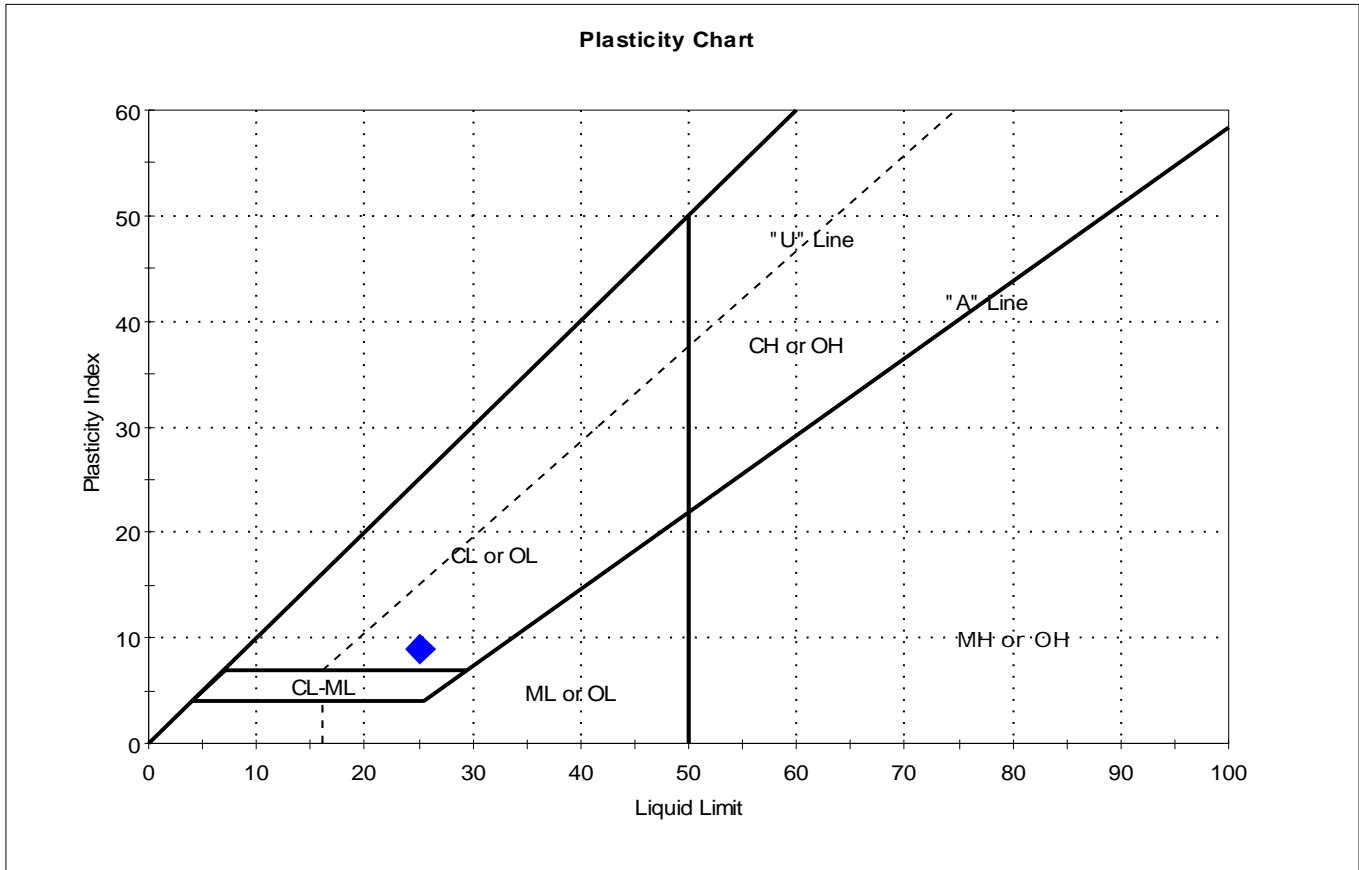
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 208	Sample Type:	jar
Sample ID:	5D	Test Date:	07/19/18
Depth :	20-22 ft	Test Id:	462272
Test Comment:	---		
Visual Description:	Wet, dark gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



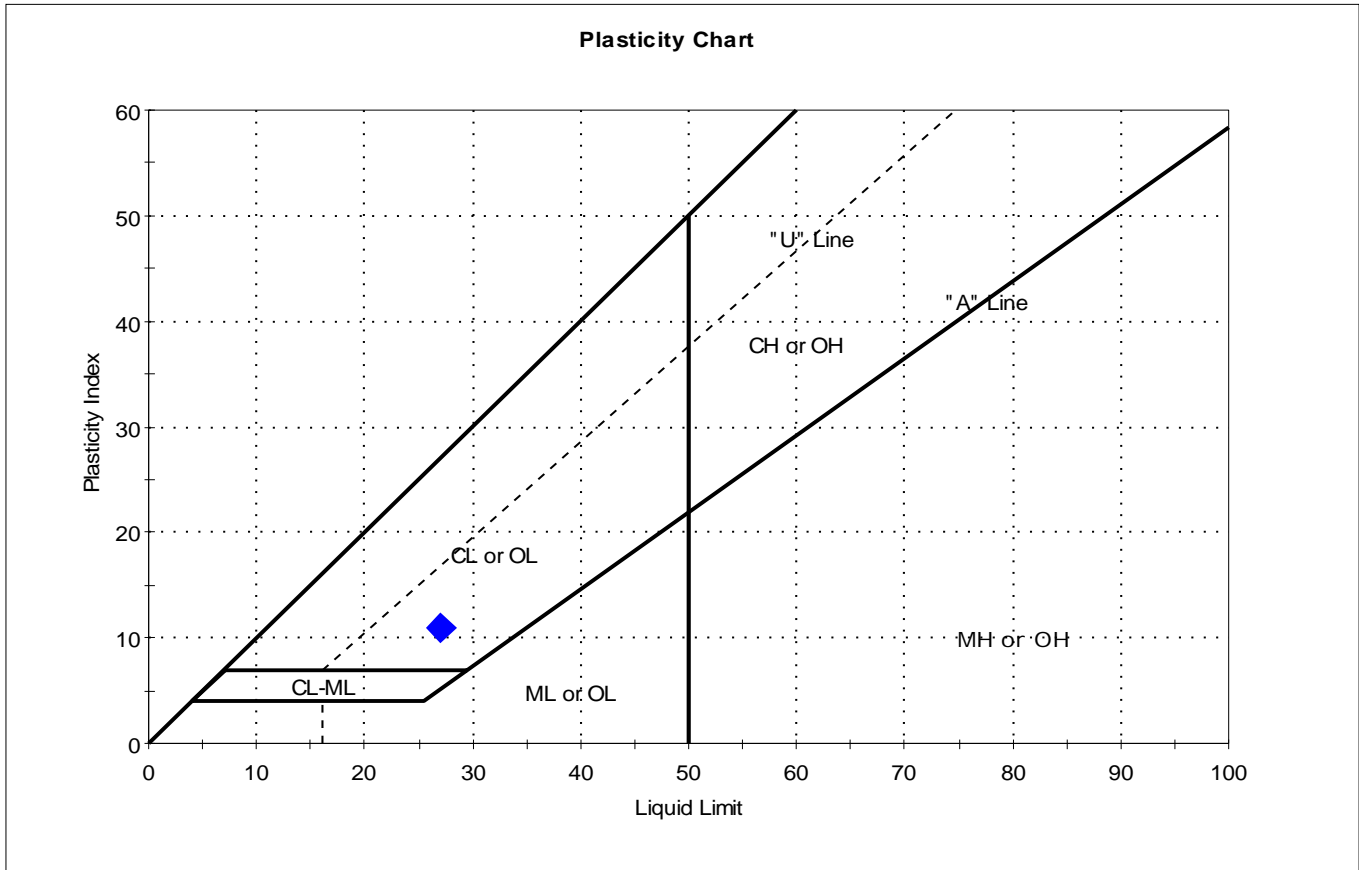
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	5D	B-EXIT45 208	20-22 ft	33	25	16	9	1.8	Lean CLAY (CL)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-208	Sample Type:	tube
Sample ID:	U2	Test Date:	08/02/18
Depth:	40-42 ft	Test Id:	462374
Tested By:	cam		
Checked By:	emm		
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-2	40-42 ft	40	27	16	11	2.2	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

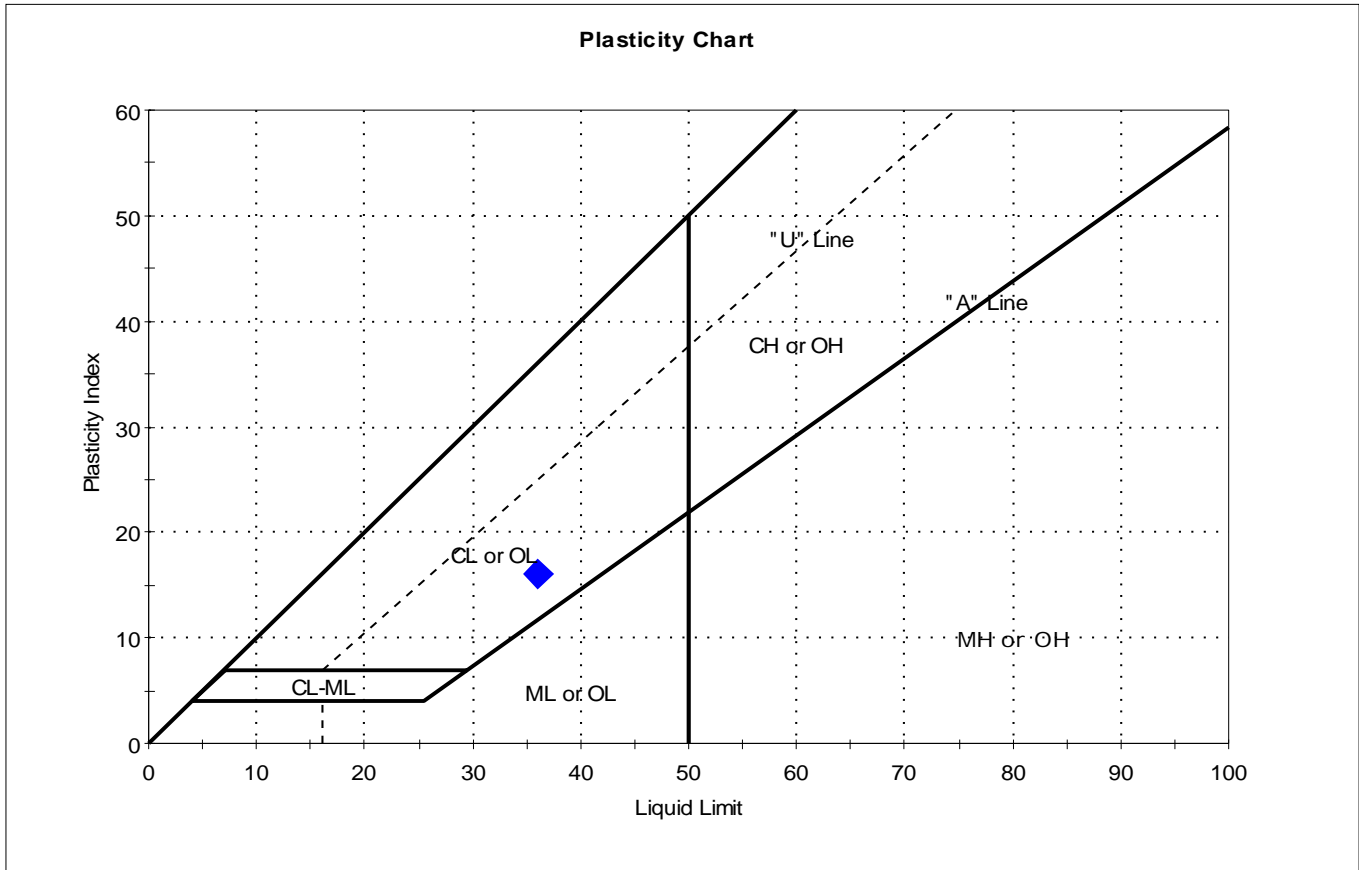
Dilatancy: SLOW

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 208	Sample Type:	jar
Sample ID:	8D	Test Date:	07/20/18
Depth :	45-47 ft	Test Id:	462273
Test Comment:	---		
Visual Description:	Wet, 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
◆	8D	B-EXIT45 208	45-47 ft	45	36	20	16	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

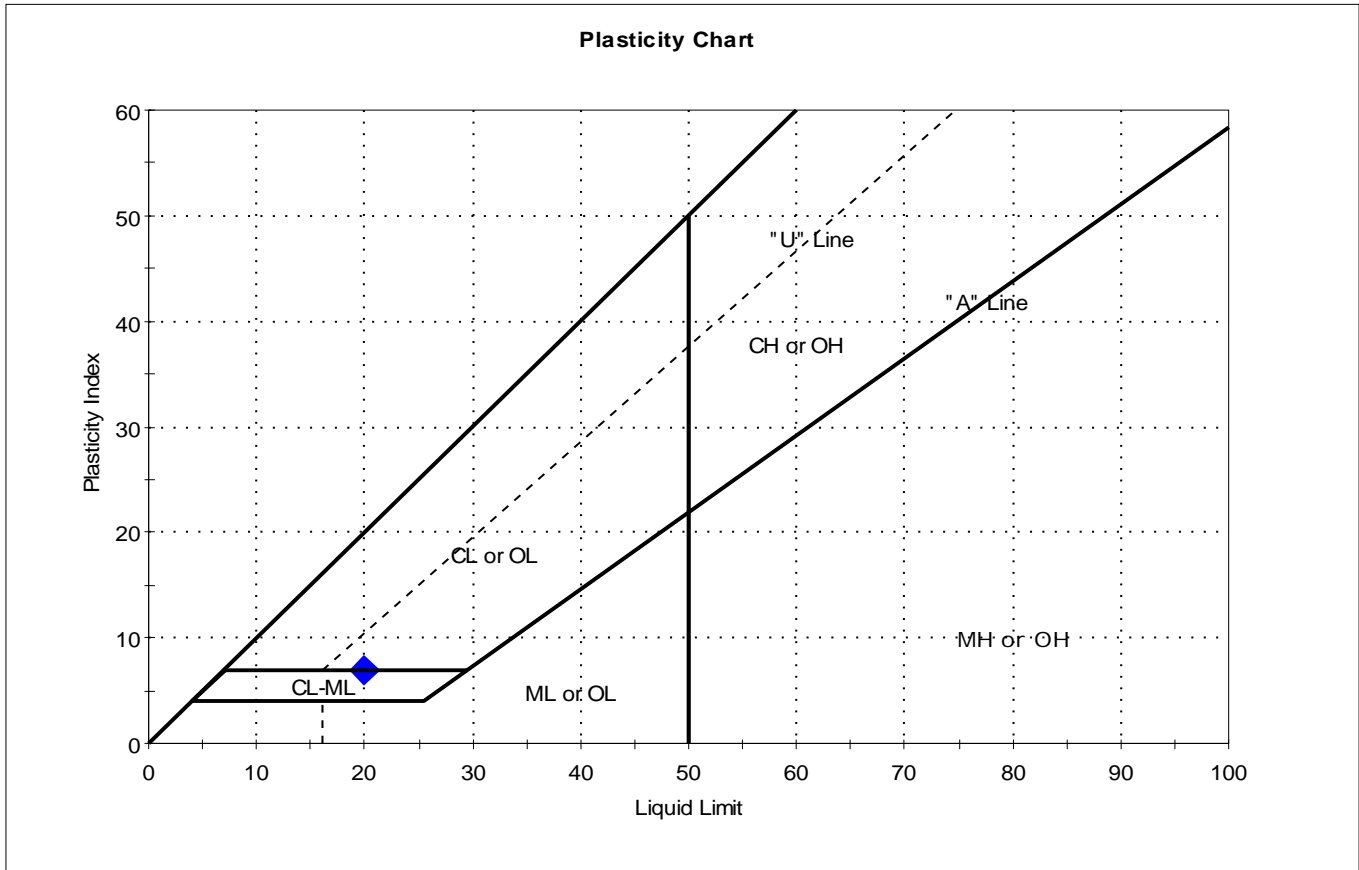
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 209	Sample Type:	jar
Sample ID:	3D	Test Date:	07/25/18
Depth :	10-12 ft	Test Id:	462274
Test Comment:	---		
Visual Description:	Wet, dark gray clay with sand		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	3D	B-EXIT45 209	10-12 ft	28	20	13	7	2.1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 209	Sample Type:	jar
Sample ID:	4D	Test Date:	07/25/18
Depth :	15-17 ft	Test Id:	462275
Test Comment:	---		
Visual Description:	Moist, dark gray silt		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

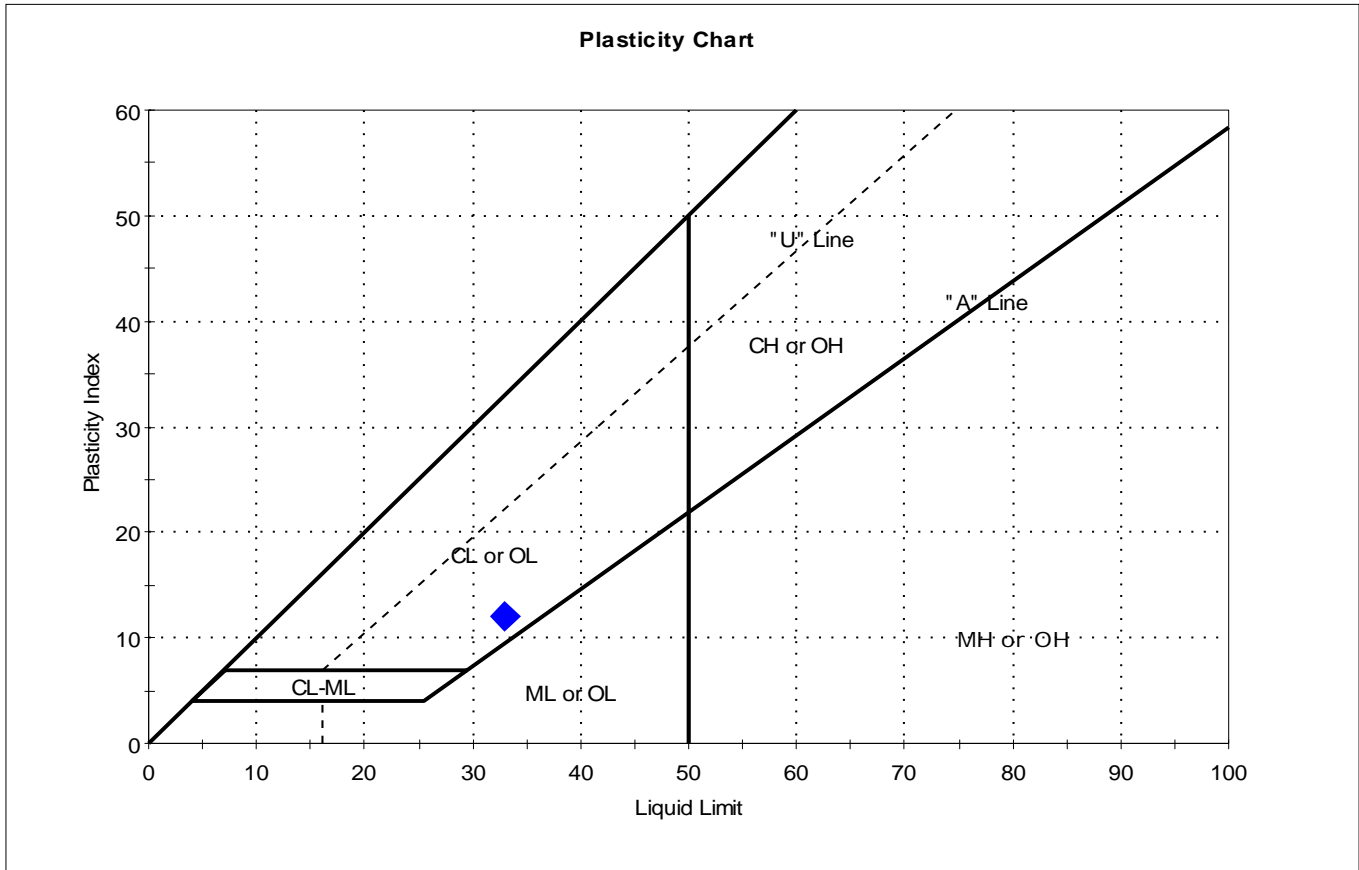
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	4D	B-EXIT45 209	15-17 ft	28	n/a	n/a	n/a	n/a	

Dry Strength: NONE  
 Dilatancy: RAPID  
 Toughness: n/a  
 The sample was determined to be Non-Plastic



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-209	Sample Type:	tube
Sample ID:	U2	Test Date:	08/02/18
Depth:	35-37 ft	Test Id:	462372
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-2	35-37 ft	41	33	21	12	1.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

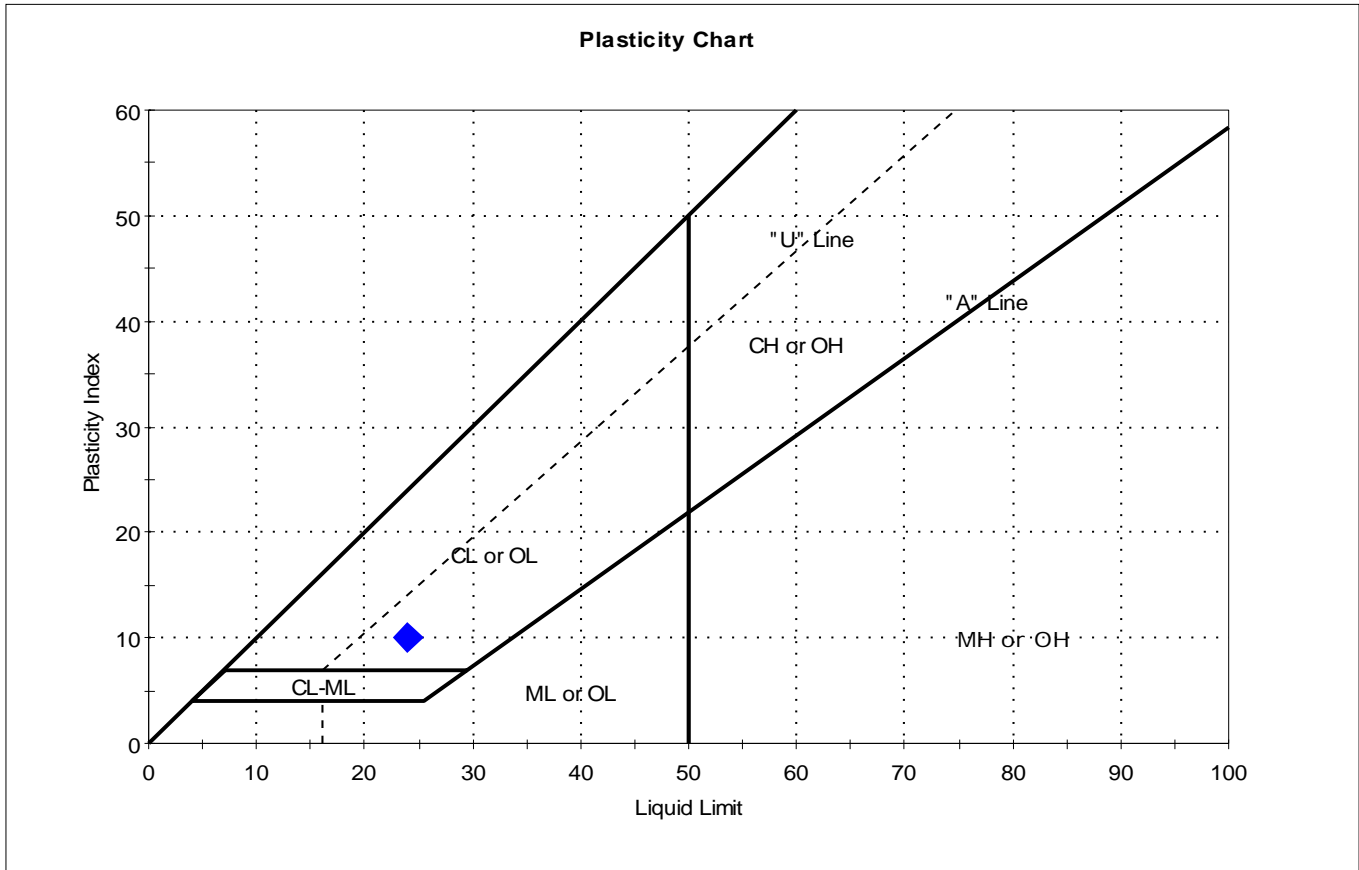
Dilatancy: SLOW

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 210	Sample Type:	jar
Sample ID:	4D	Test Date:	07/20/18
Depth :	15-17 ft	Test Id:	462276
Test Comment:	---		
Visual Description:	Wet, 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
◆	4D	B-EXIT45 210	15-17 ft	38	24	14	10	2.4	Lean CLAY (CL)

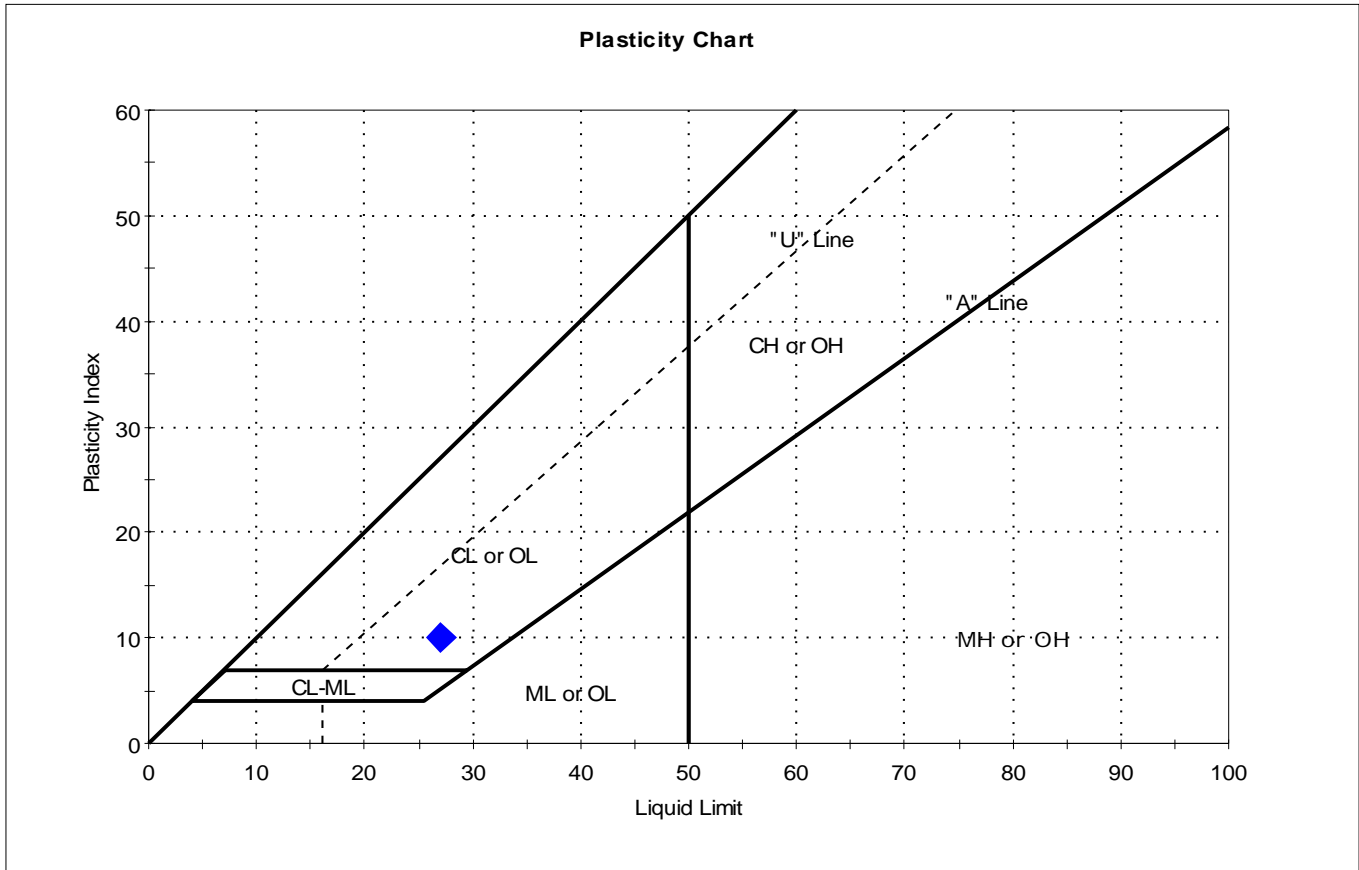
Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM





Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 210	Sample Type:	jar
Sample ID:	5D	Test Date:	07/26/18
Depth :	20-22 ft	Test Id:	462277
Test Comment:	---		
Visual Description:	Wet, 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
◆	5D	B-EXIT45 210	20-22 ft	35	27	17	10	1.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

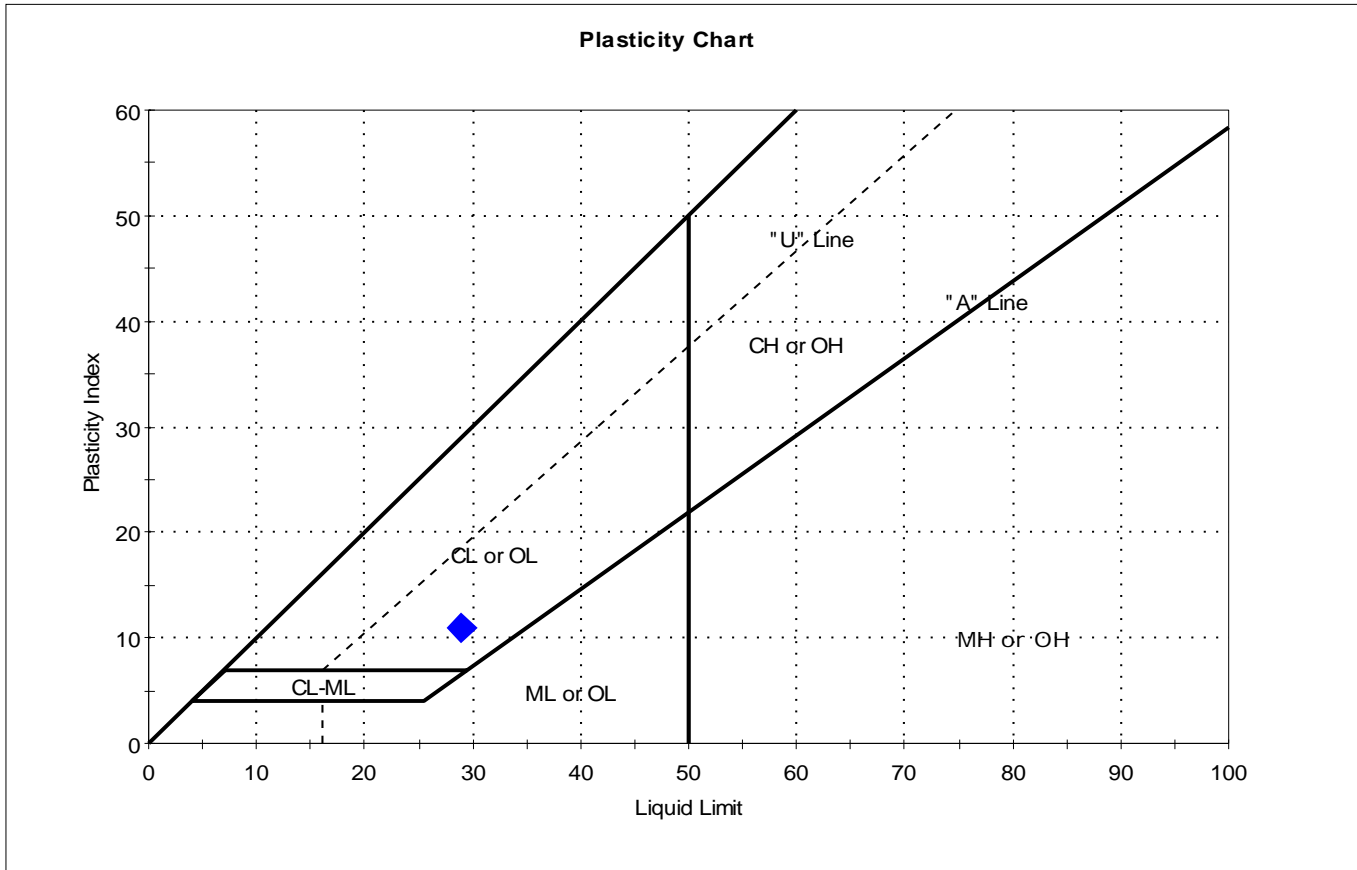
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-210	Sample Type:	tube
Sample ID:	U2	Test Date:	08/16/18
Depth:	40-42 ft	Test Id:	462373
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-2	40-42 ft	44	29	18	11	n/a	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

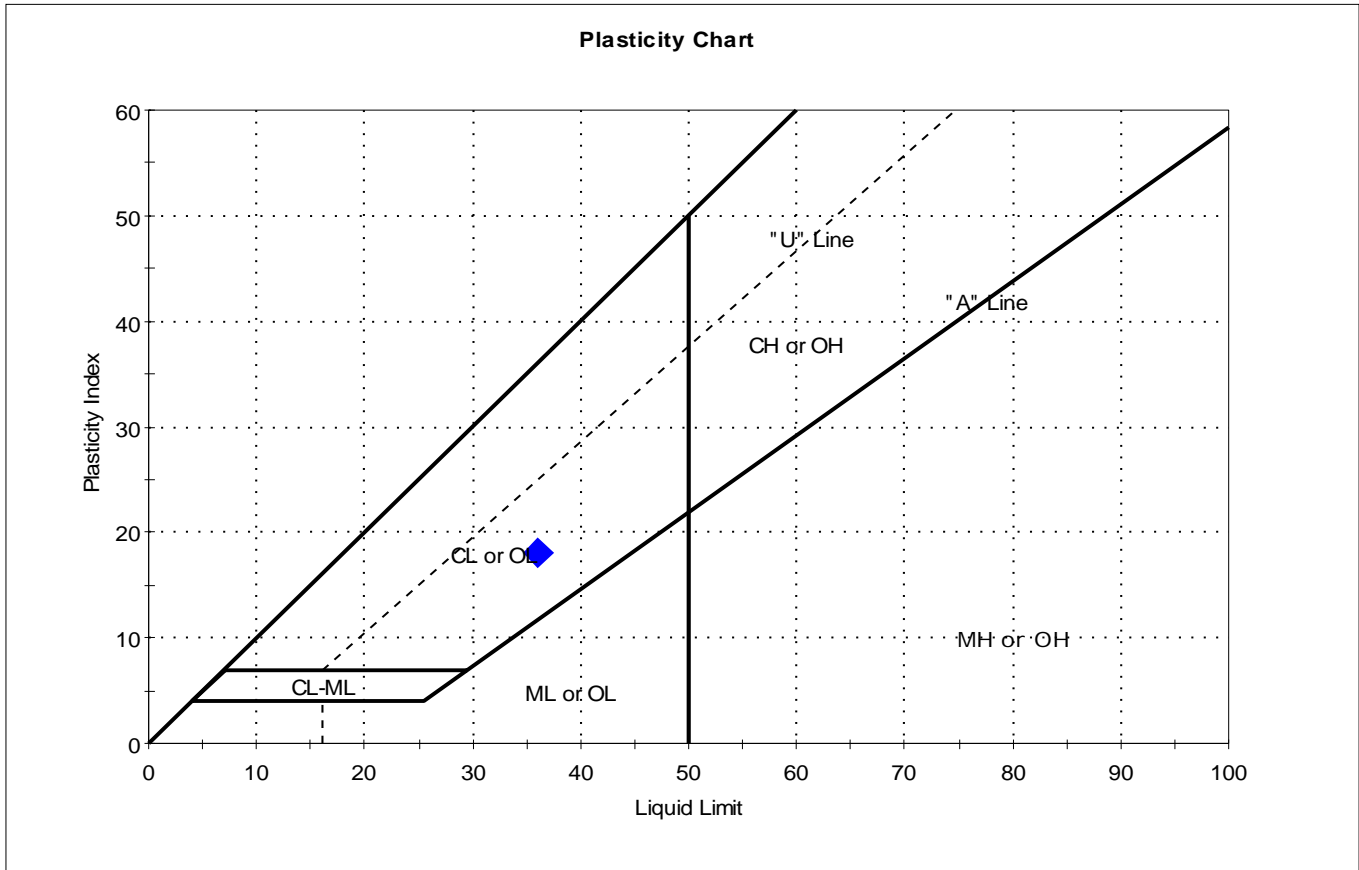
Dilatancy: SLOW

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 210	Sample Type:	jar
Sample ID:	10D	Test Date:	07/20/18
Depth :	65-67 ft	Test Id:	462278
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
◆	10D	B-EXIT45 210	65-67 ft	37	36	18	18	1.1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

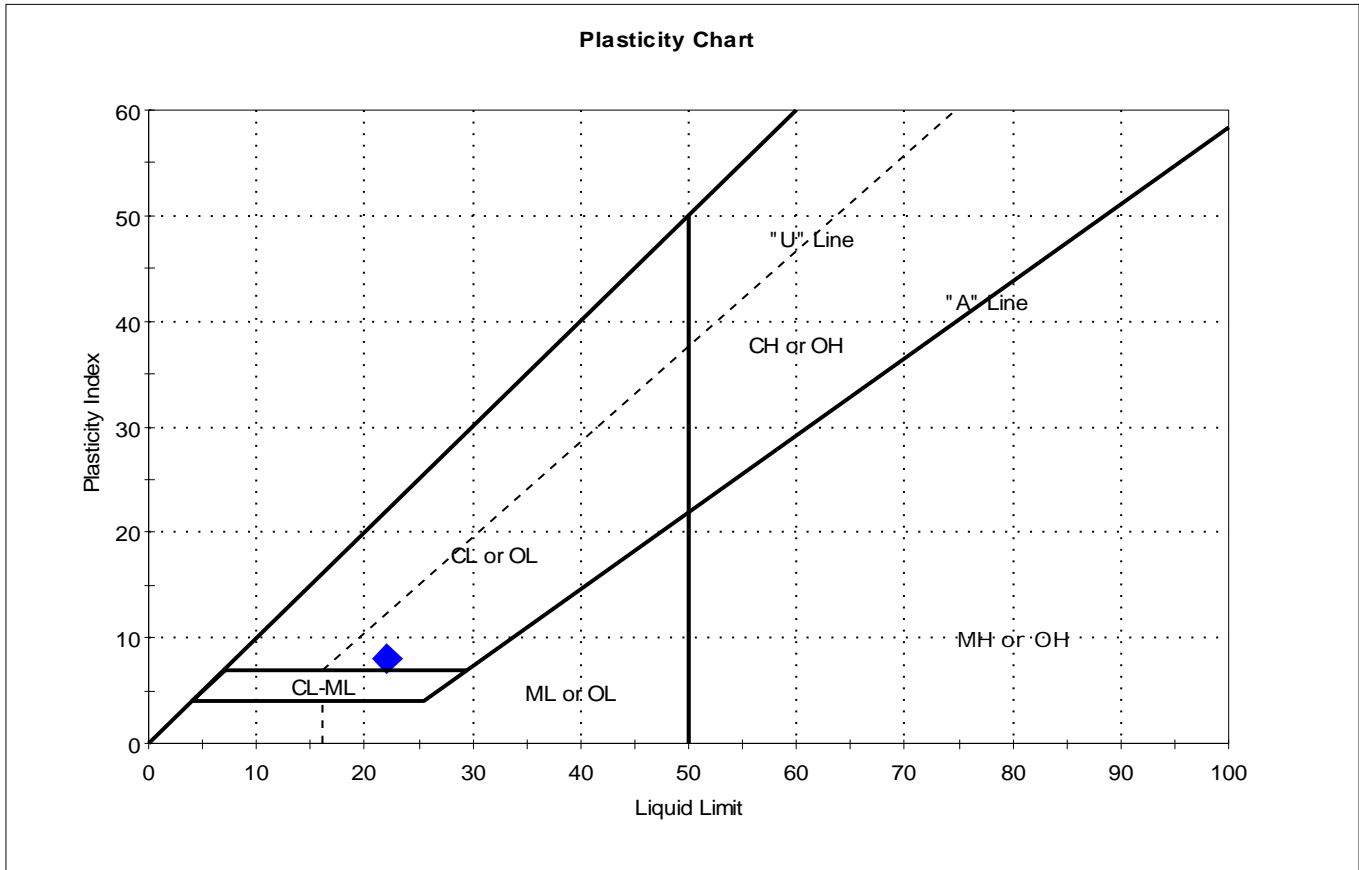
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 211	Sample Type:	jar
Sample ID:	3D	Test Date:	07/25/18
Depth :	10-12 ft	Test Id:	462279
Test Comment:	---		
Visual Description:	Wet, olive gray sandy 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
◆	3D	B-EXIT45 211	10-12 ft	26	22	14	8	1.5	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

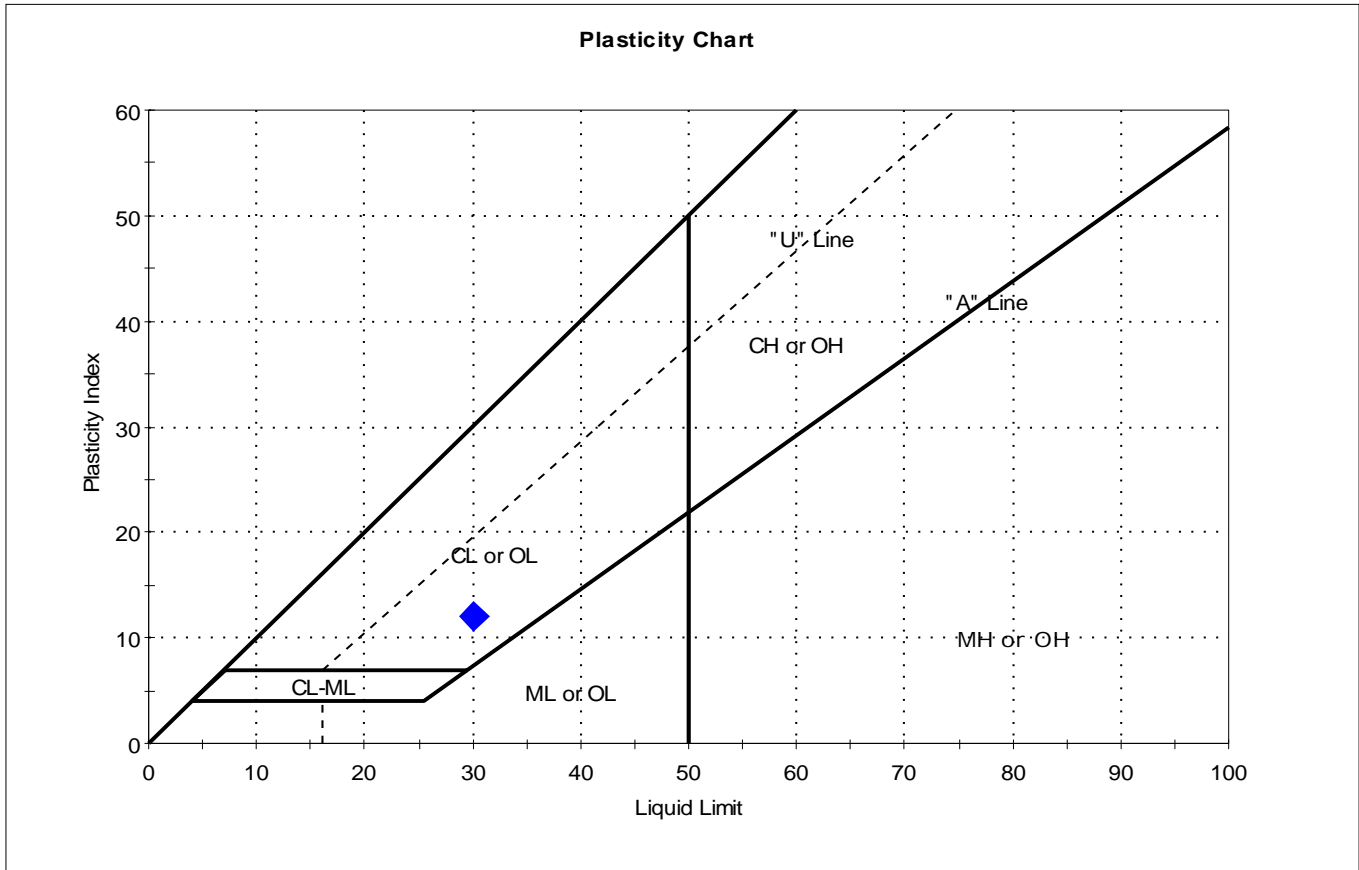
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 211	Sample Type:	jar
Sample ID:	5D	Test Date:	07/26/18
Depth :	20-22 ft	Test Id:	462280
Test Comment:	---		
Visual Description:	Wet, 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
◆	5D	B-EXIT45 211	20-22 ft	37	30	18	12	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

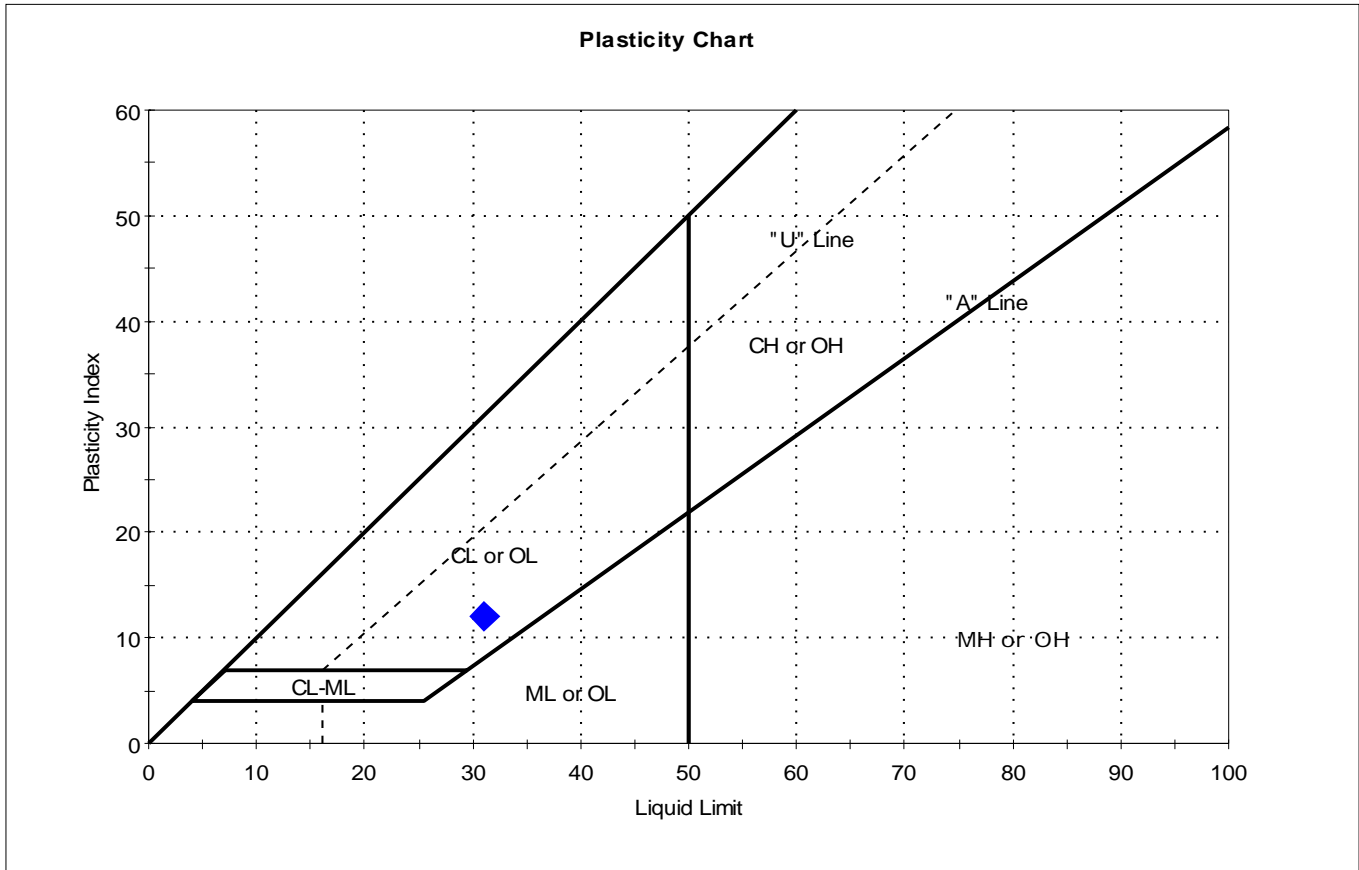
Dilatancy: NONE

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-211	Sample Type:	tube
Sample ID:	U1	Test Date:	08/03/18
Depth:	37-39 ft	Test Id:	466567
Test Comment:	---		
Visual Description:	Wet, 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
◆	U1	EXIT45-2	37-39 ft	42	31	19	12	1.9	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

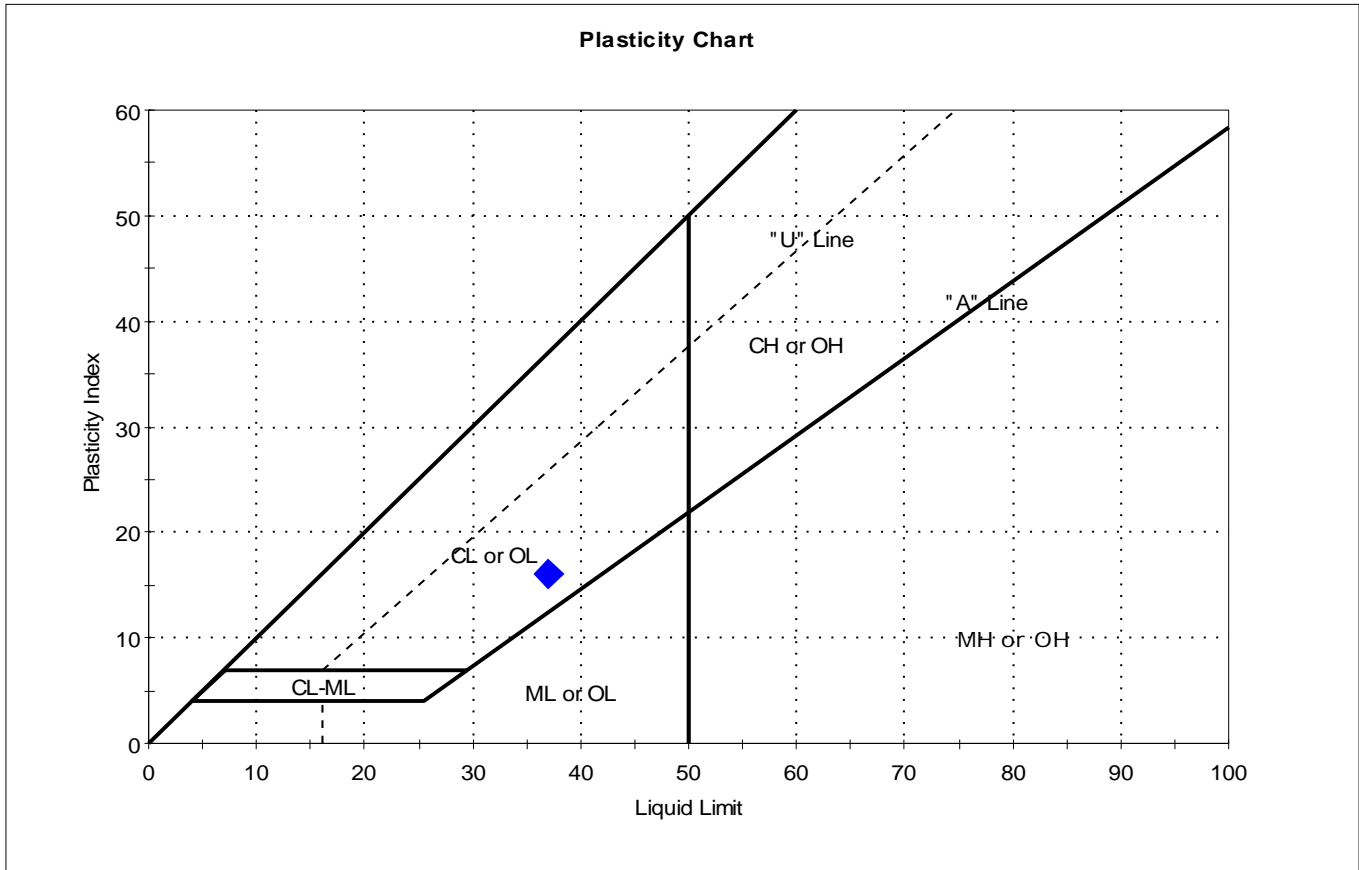
Dilatancy: SLOW

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-211	Sample Type:	tube
Sample ID:	U2	Test Date:	08/14/18
Depth:	45-47 ft	Test Id:	466568
Tested By:	cam		
Checked By:	emm		
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-2	45-47 ft	47	37	21	16	1.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

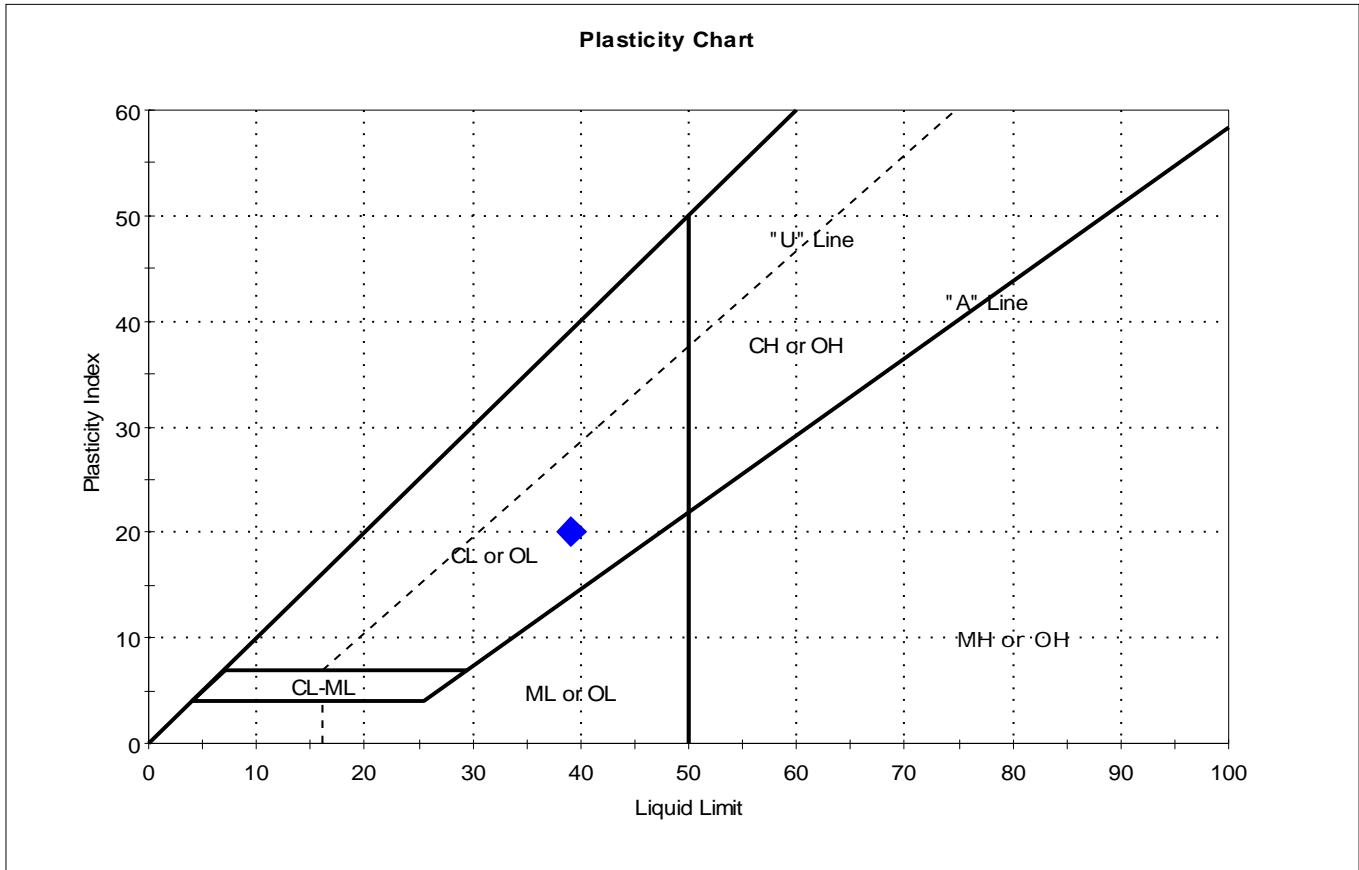
Dilatancy: RAPID

Toughness: LOW



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 211	Sample Type:	jar
Sample ID:	10D	Test Date:	07/26/18
Depth :	50-52 ft	Test Id:	462281
Test Comment:	---		
Visual Description:	Wet, very dark gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



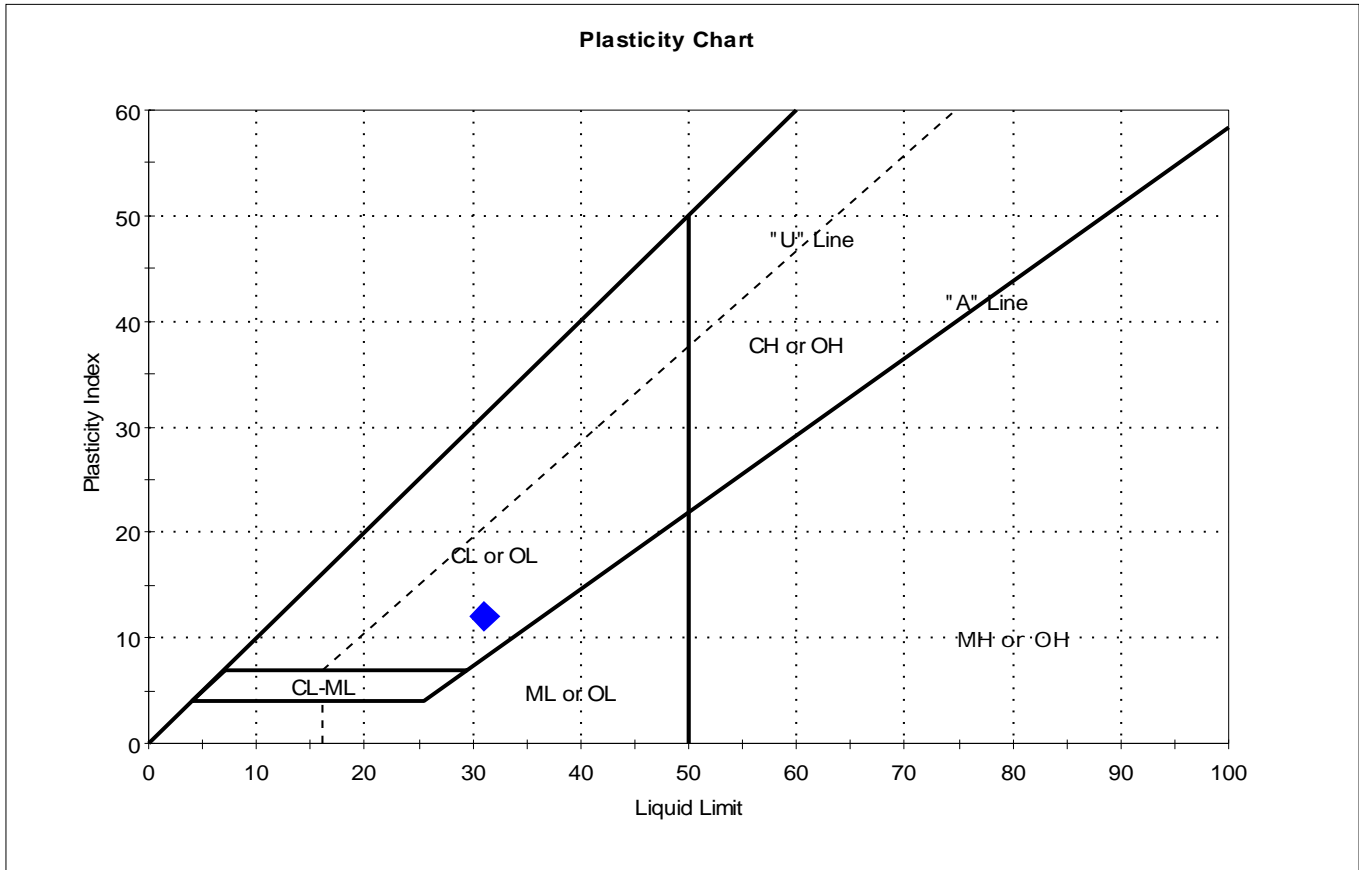
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	10D	B-EXIT45 211	50-52 ft	44	39	19	20	1.3	Lean CLAY (CL)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45-211	Sample Type:	tube
Sample ID:	U3	Test Date:	08/07/18
Depth:	55-57 ft	Test Id:	466569
Test Comment:	---		
Visual Description:	Wet, 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
◆	U3	EXIT45-2	55-57 ft	43	31	19	12	2	

Sample Prepared using the WET method

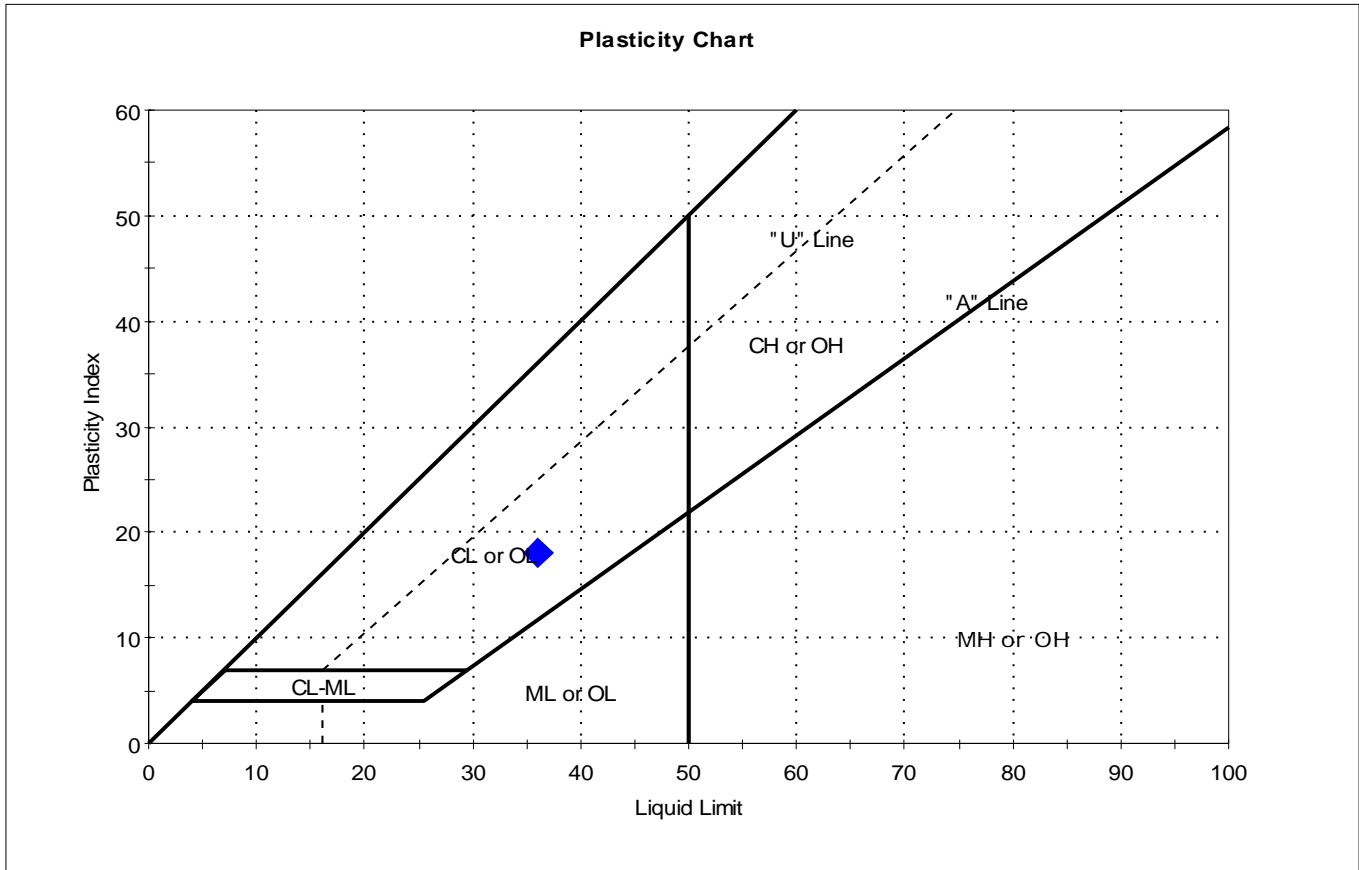
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 212	Sample Type:	jar
Sample ID:	1D	Test Date:	07/19/18
Depth :	2-4 ft	Test Id:	462282
Test Comment:	---		
Visual Description:	Moist, olive 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
◆	1D	B-EXIT45 212	2-4 ft	30	36	18	18	0.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

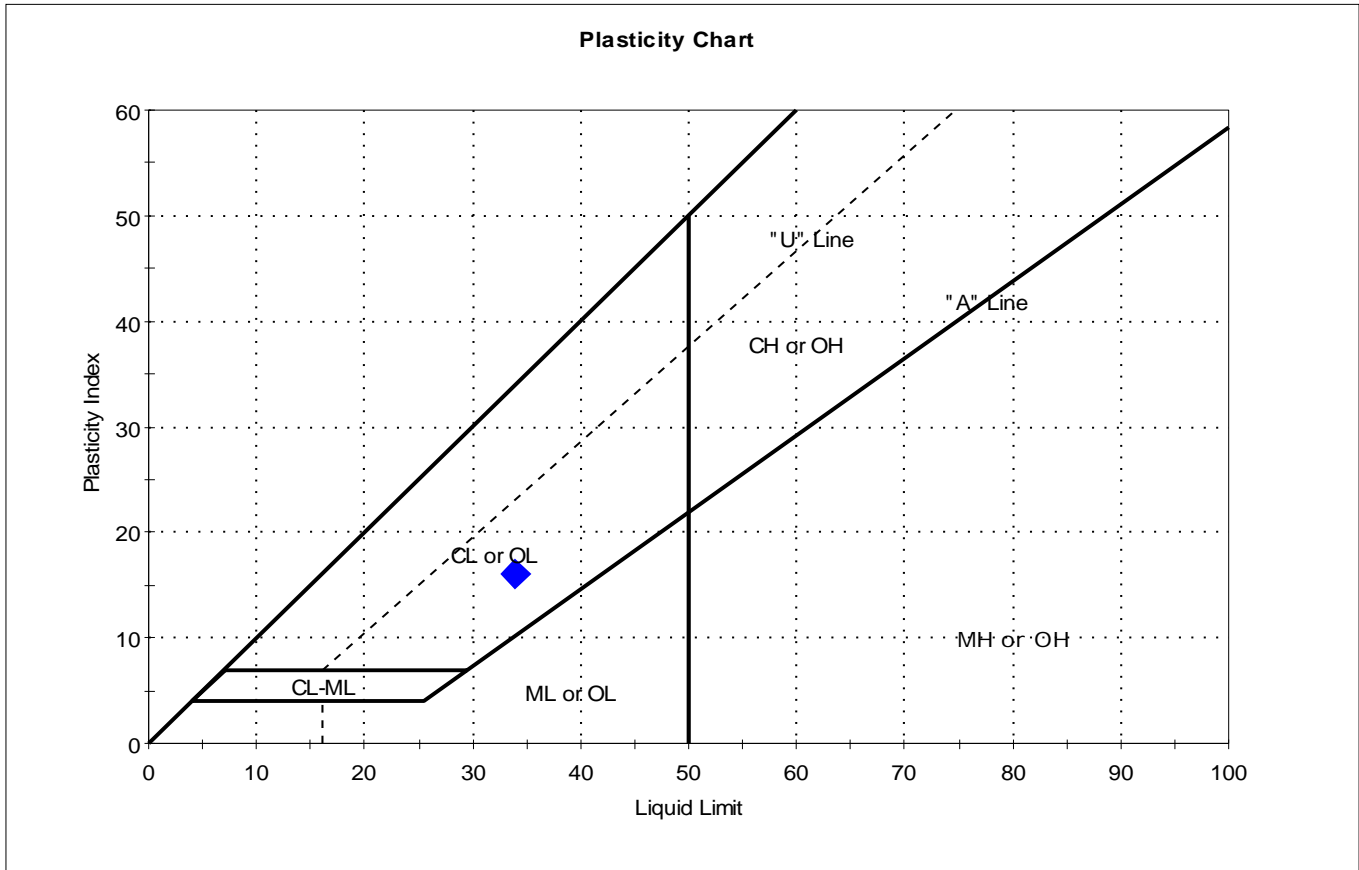
Dilatancy: NONE

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 212	Sample Type:	jar
Sample ID:	3D	Test Date:	07/20/18
Depth :	10-12 ft	Test Id:	462283
Test Comment:	---		
Visual Description:	Wet, 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
◆	3D	B-EXIT45 212	10-12 ft	40	34	18	16	1.4	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

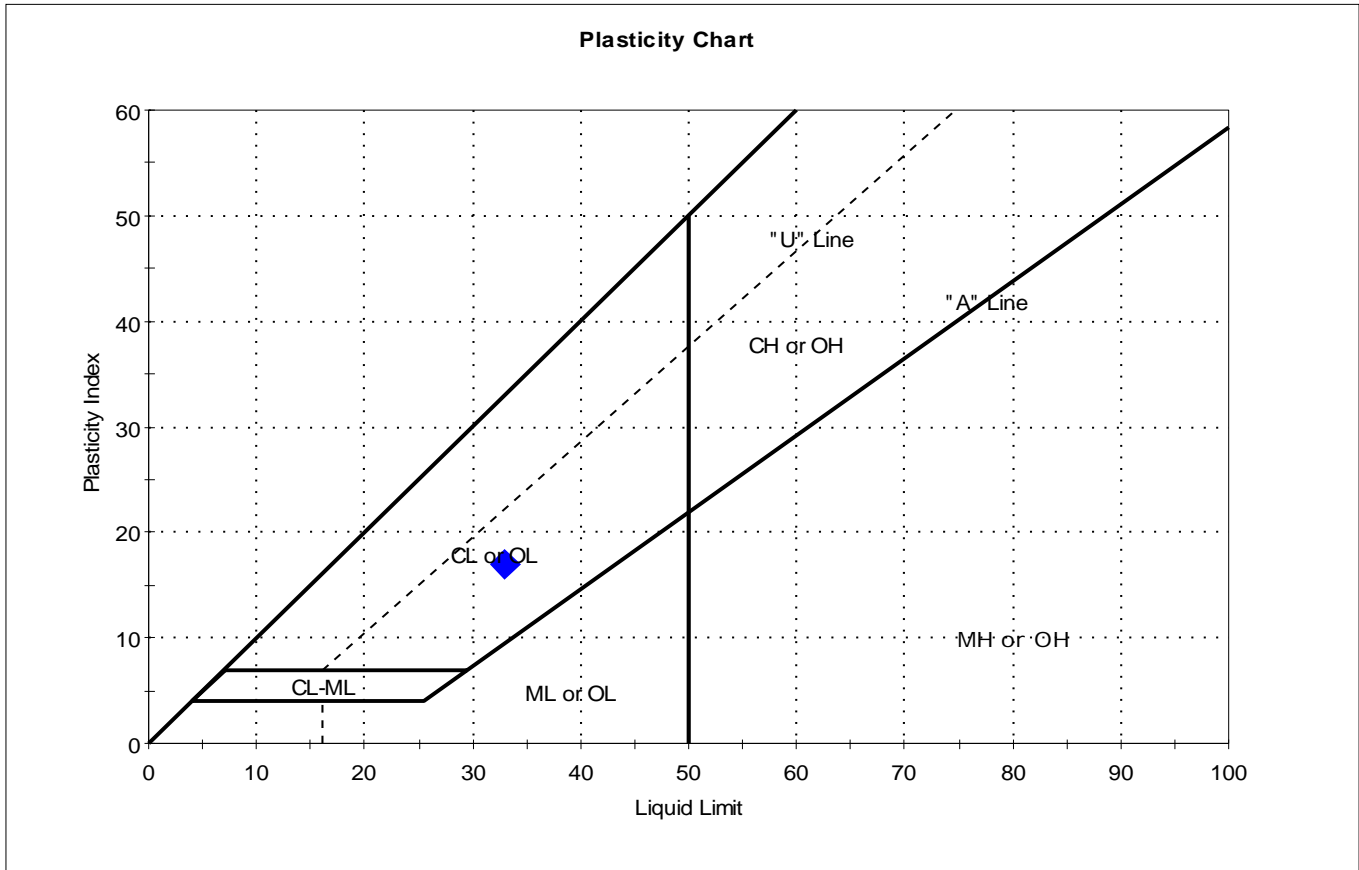
Dilatancy: SLOW

Toughness: MEDIUM



Client:	Schonewald Engineering Associates, Inc.		
Project:	MeTPK Exit 45 Reconfiguration		
Location:	Phs 2 South Portland, ME	Project No:	GTX-307957
Boring ID:	HB-EXIT45- 212	Sample Type:	jar
Sample ID:	9D	Test Date:	07/26/18
Depth :	70-72 ft	Test Id:	462284
Test Comment:	---		
Visual Description:	Moist, dark gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



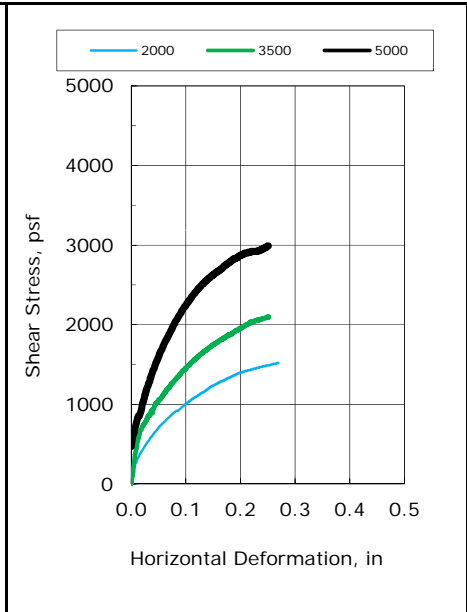
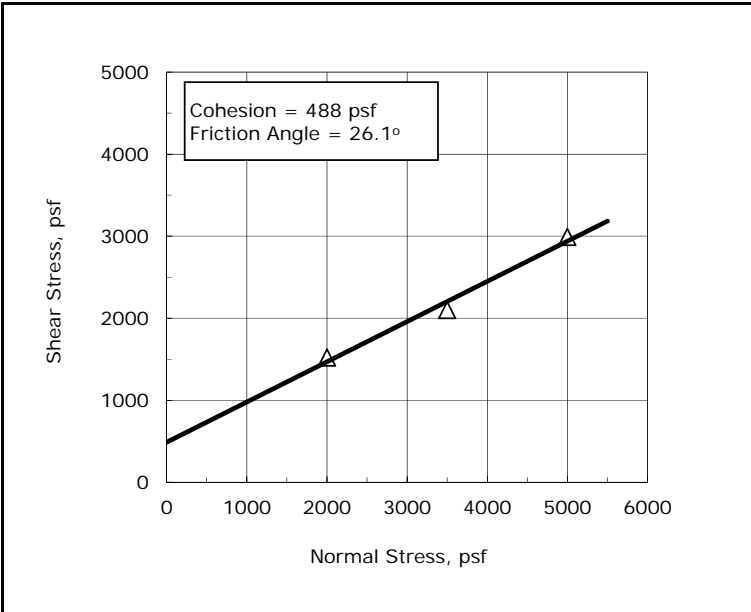
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	9D	B-EXIT45 212	70-72 ft	28	33	16	17	0.7	Lean CLAY (CL)

Sample Prepared using the WET method  
 1% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM

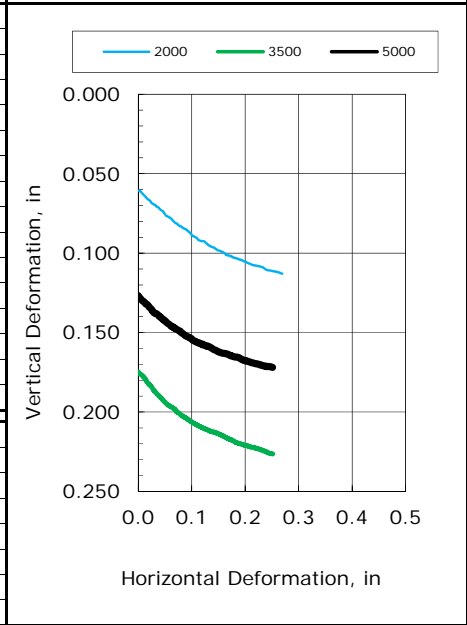


Client:	Schonewald Engineering Associates, Inc.
Project Name:	MeTPK Exit 45 Reconfiguration
Project Location:	Phs 2 South Portland, ME
GTX #:	307957
Test Date:	08/23/18
Tested By:	md
Checked By:	njh
Boring ID:	HB-EXIT 45-211
Sample ID:	U-2
Depth, ft:	45-47
Visual Description:	Wet, dark gray clay

## Direct Shear Test of Soils Under Consolidated Drained Conditions by ASTM D3080



Test No.:	DS-1	DS-2	DS-3
Initial Diameter, in:	2.5	2.5	2.5
Initial Height, in:	1.0	1.0	1.0
Initial Mass, grams:	134	140	137
Initial Dry Density, pcf:	69.8	74.4	75.1
Initial Moisture Content, %:	48.6	46.5	41.7
Initial Bulk Density, pcf:	103.6	108.9	106.4
Initial Degree of Saturation:	92.6	99.1	90.5
Initial Void Ratio:	1.42	1.27	1.24
Final Dry Density, pcf:	78.7	96.1	90.7
Final Moisture Content, %:	46.5	36.3	28.6
Final Bulk Density, pcf:	115.2	131.0	116.6
Normal Stress, psf:	2000	3500	5000
Maximum Shear Stress, psf:	1520	2100	2990
Shear Rate, in/min:	0.0003	0.0003	0.0003



Sample Type:	intact
Estimated Specific Gravity:	2.70
Liquid Limit:	37
Plastic Limit:	21
Plasticity Index:	16
% Passing #200 sieve:	---
Soil Classification:	---
Group Symbol:	---

Notes: Moisture content obtained before shear from sample trimmings  
 Moisture Content determined by ASTM D2216  
 Atterberg Limits determined by ASTM D4318  
 Extruded from tube, cut, trimmed and placed into apparatus at the as-received density and moisture content

Values for cohesion and friction angle determined from best-fit straight line to the data for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site-specific conditions.

"---" indicates testing required to determine these values was not requested.



## Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client: Schonewald Engineering Associates, Inc. GTX#: 307957  
 Project Name: MeTPK Exit 45 Reconfiguration Test Date: 8/23/18  
 Project Location: Phs 2 South Portland, ME

Boring ID: HB-EXIT 45-209  
 Sample ID: U-2  
 Depth, ft: 35-37

Visual Description: Wet, dark gray clay

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDT's connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in<sup>2</sup>, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: Extruded from tube, cut, trimmed and placed into apparatus at as-received density and moisture content.

Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-1	DSS-2			
Initial Moisture Content, %	37.2	30.3			
Initial Dry Density, pcf	81.0	81.2			
Nominal Rate of Shear Strain, %/hr	5.0	5.0			
Vertical Consolidation Stress, psf	2,200	2,845			
Vertical Consolidation Stress at Shear, psf	2,200	2,032			
Final Moisture Content, %	34.4	37.7			
Measured Peak Shear Stress, psf	248.7	430.5			
Shear Strain at Peak Shear Stress, %	6.3	4.4			
Membrane Correction, psf	50	33			
Corrected Peak Shear Stress, psf	198.7	397.5			
$S_u / \sigma'_{vc}$	0.09	0.20			

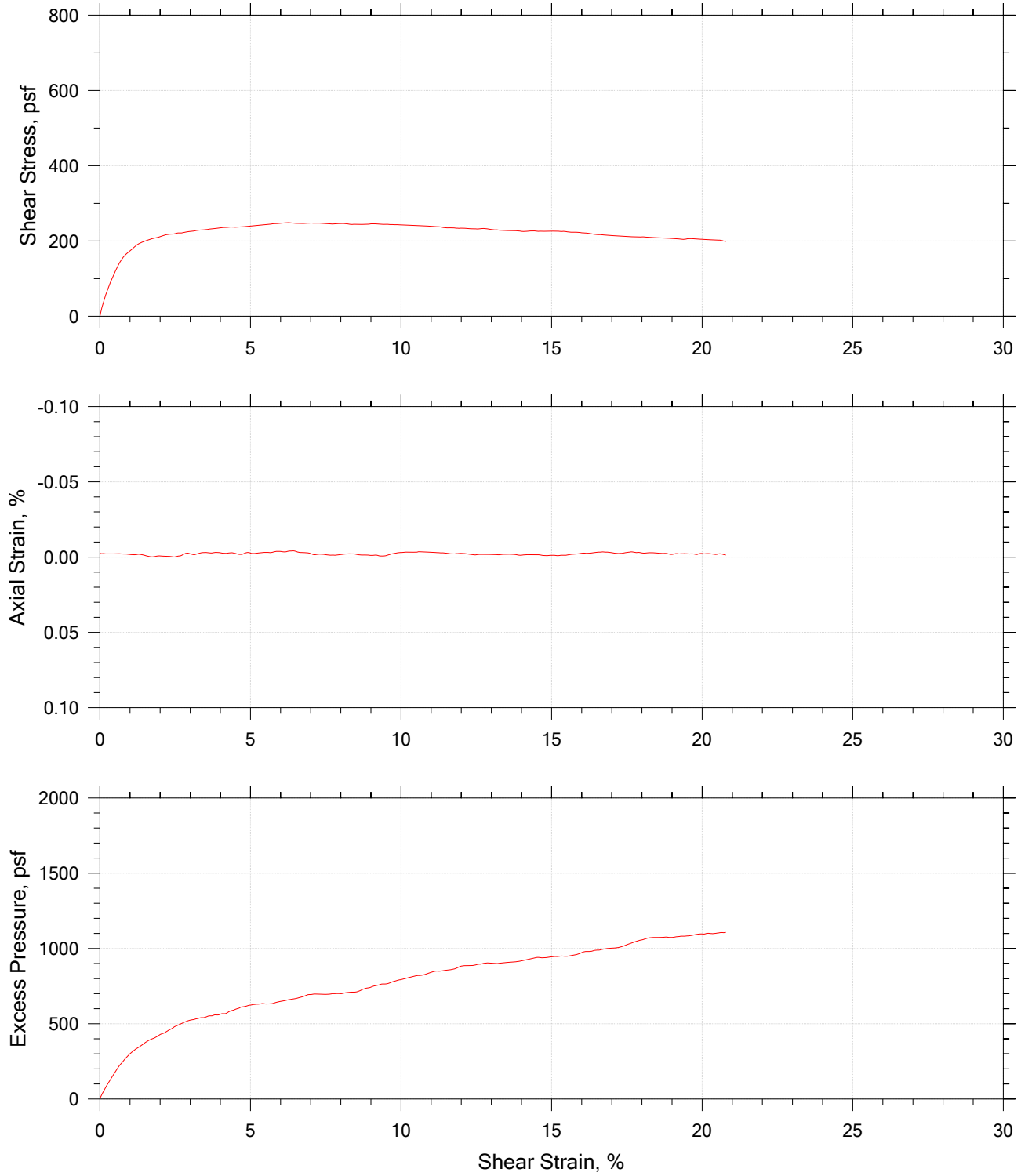
Comments:


Tested By: md

Checked By: njh

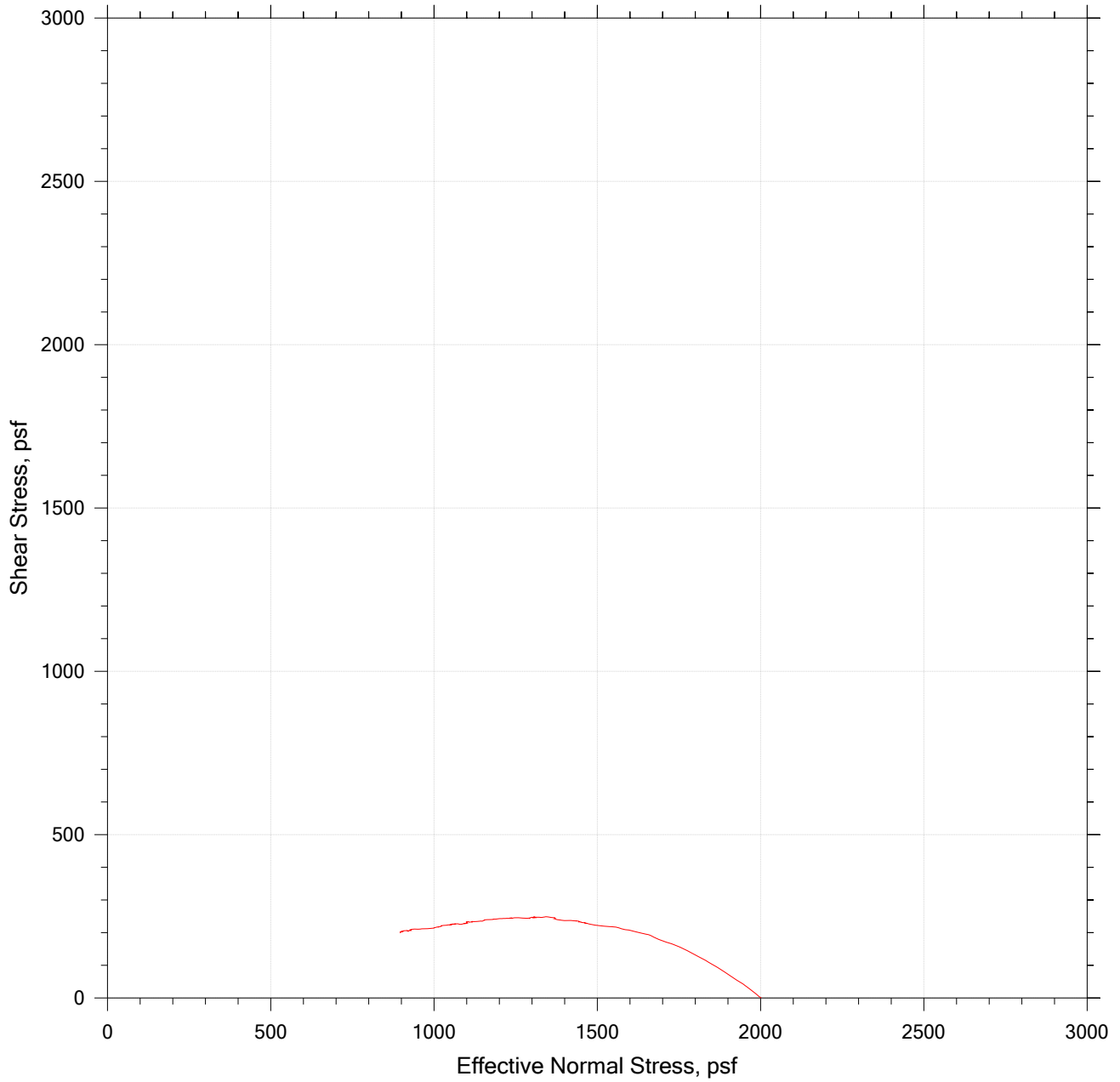
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.


# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-209	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/14/18	Depth: 35-37 ft
	Test No.: DSS-1	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System GG		

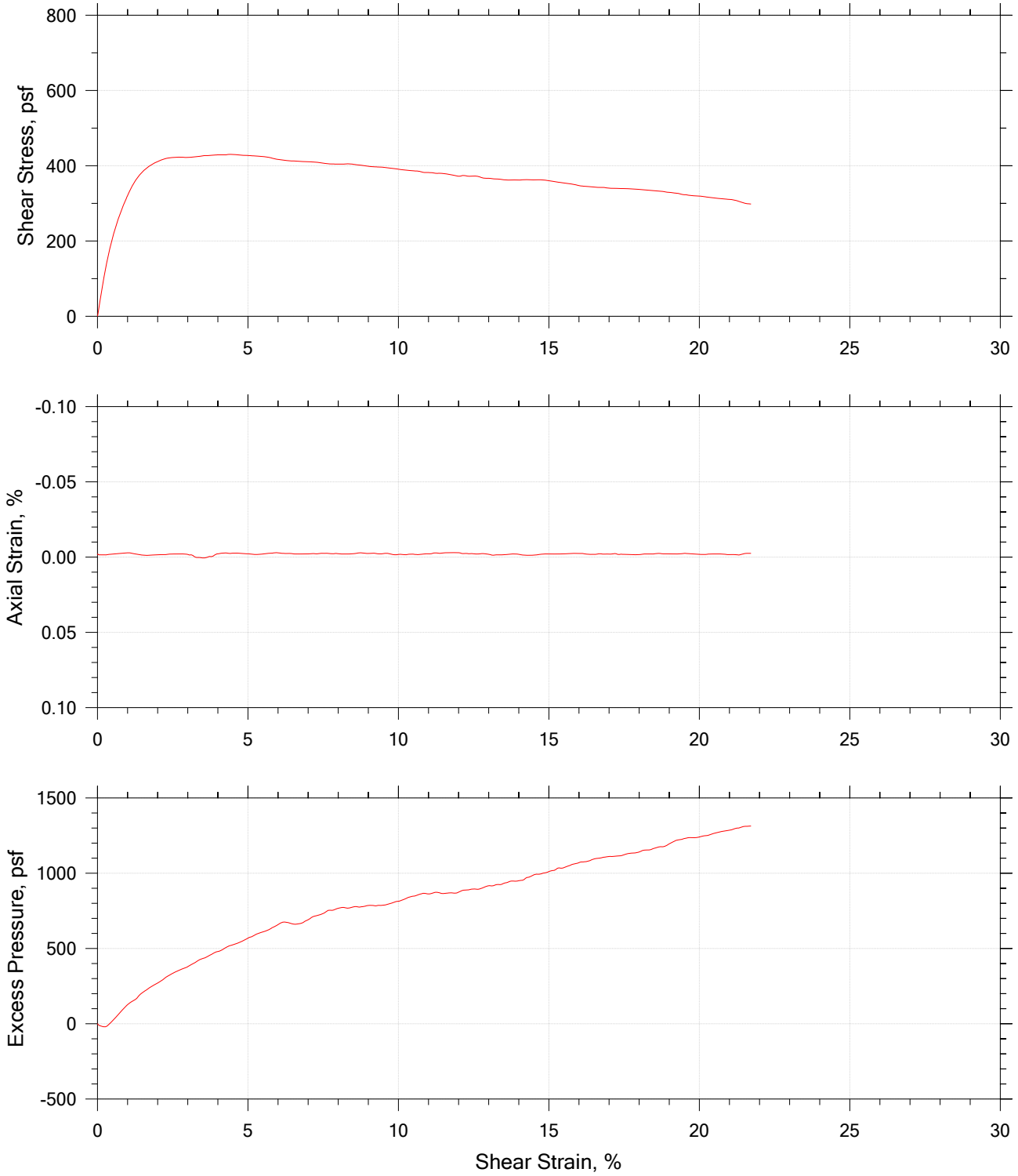
# DIRECT SIMPLE SHEAR TEST by ASTM D6528




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-209	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/14/18	Depth: 35-37 ft
	Test No.: DSS-1	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System GG		

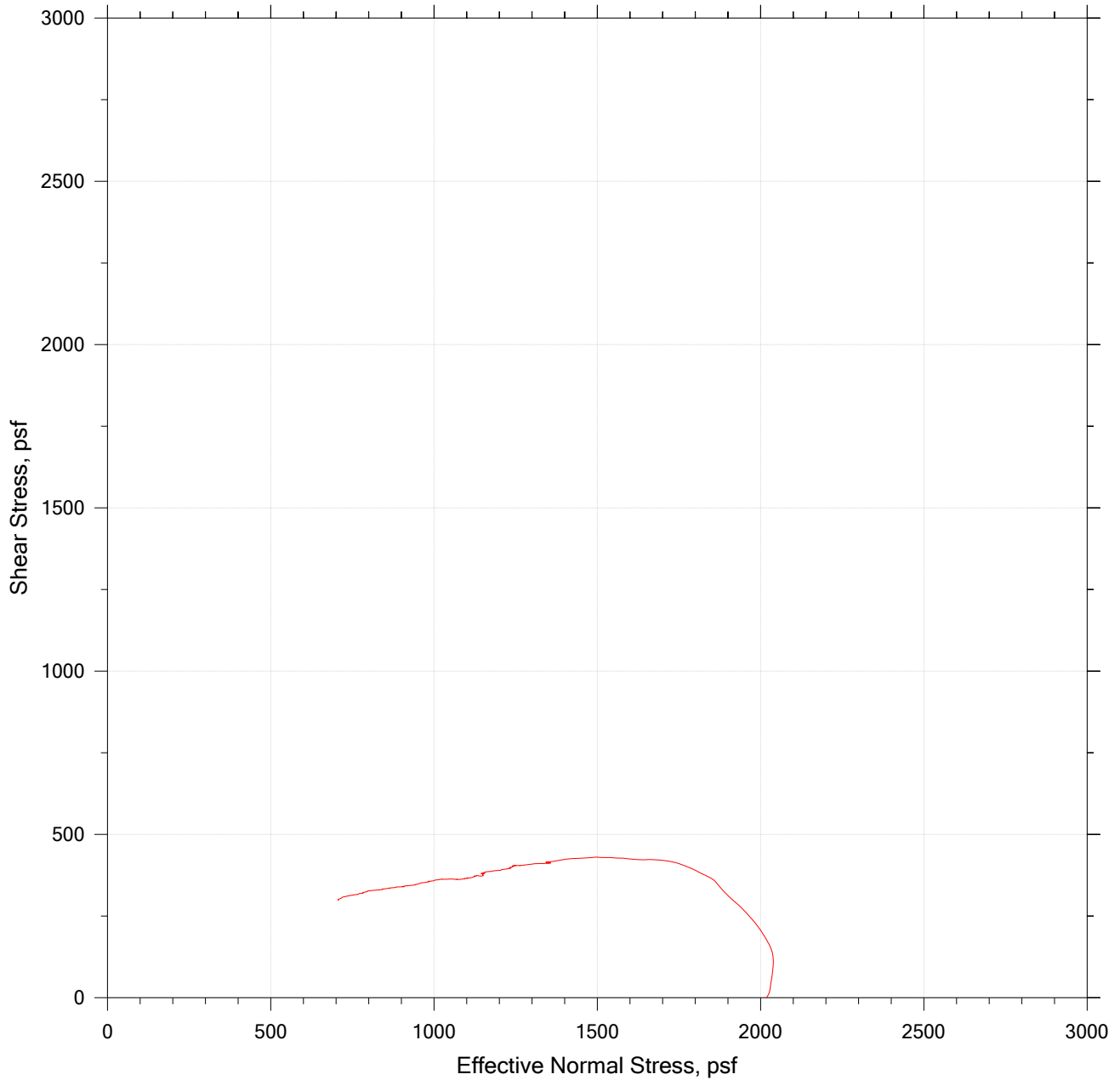



# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-209	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/14/18	Depth: 35-37 ft
	Test No.: DSS-2	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System HH		

# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-209	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/14/18	Depth: 35-37 ft
	Test No.: DSS-2	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System HH		



## Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client: Schonewald Engineering Associates, Inc. GTX#: 307957  
 Project Name: MeTPK Exit 45 Reconfiguration Test Date: 8/31/18  
 Project Location: Phs 2 South Portland, ME

Boring ID: HB-EXIT 45-209  
 Sample ID: U-2  
 Depth, ft: 35-37

Visual Description: Wet, dark gray clay

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDT's connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in<sup>2</sup>, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: Extruded from tube, cut, trimmed and placed into apparatus at as-received density and moisture content.

Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-5				
Initial Moisture Content, %	30.3				
Initial Dry Density, pcf	82.7				
Nominal Rate of Shear Strain, %/hr	5.0				
Vertical Consolidation Stress, psf	4,064				
Vertical Consolidation Stress at Shear, psf	2,032				
Final Moisture Content, %	38.5				
Measured Peak Shear Stress, psf	442				
Shear Strain at Peak Shear Stress, %	3.3				
Membrane Correction, psf	28				
Corrected Peak Shear Stress, psf	414				
$S_u / \sigma'_{vc}$	0.20				

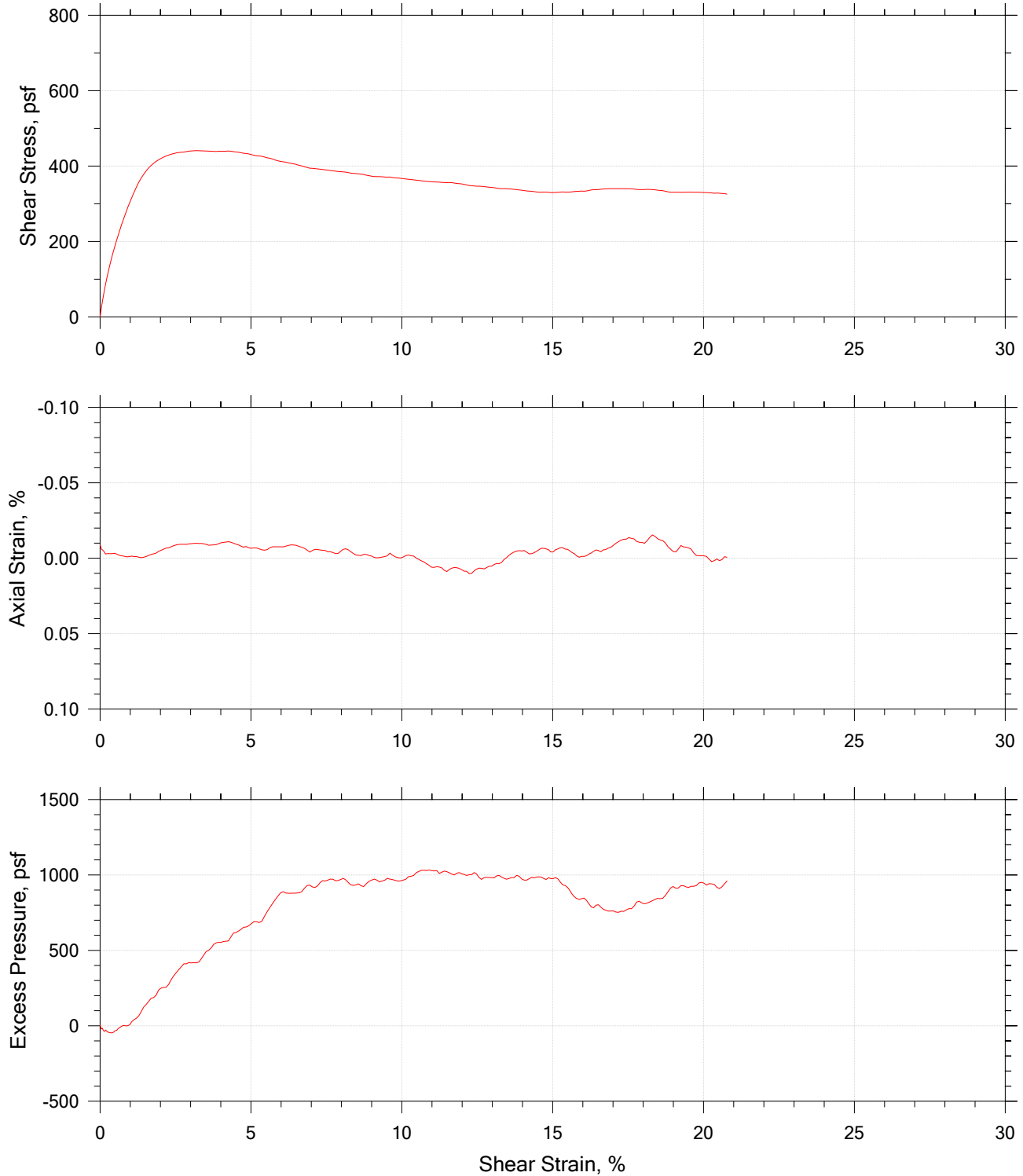
Comments:


Tested By: md

Checked By: njh

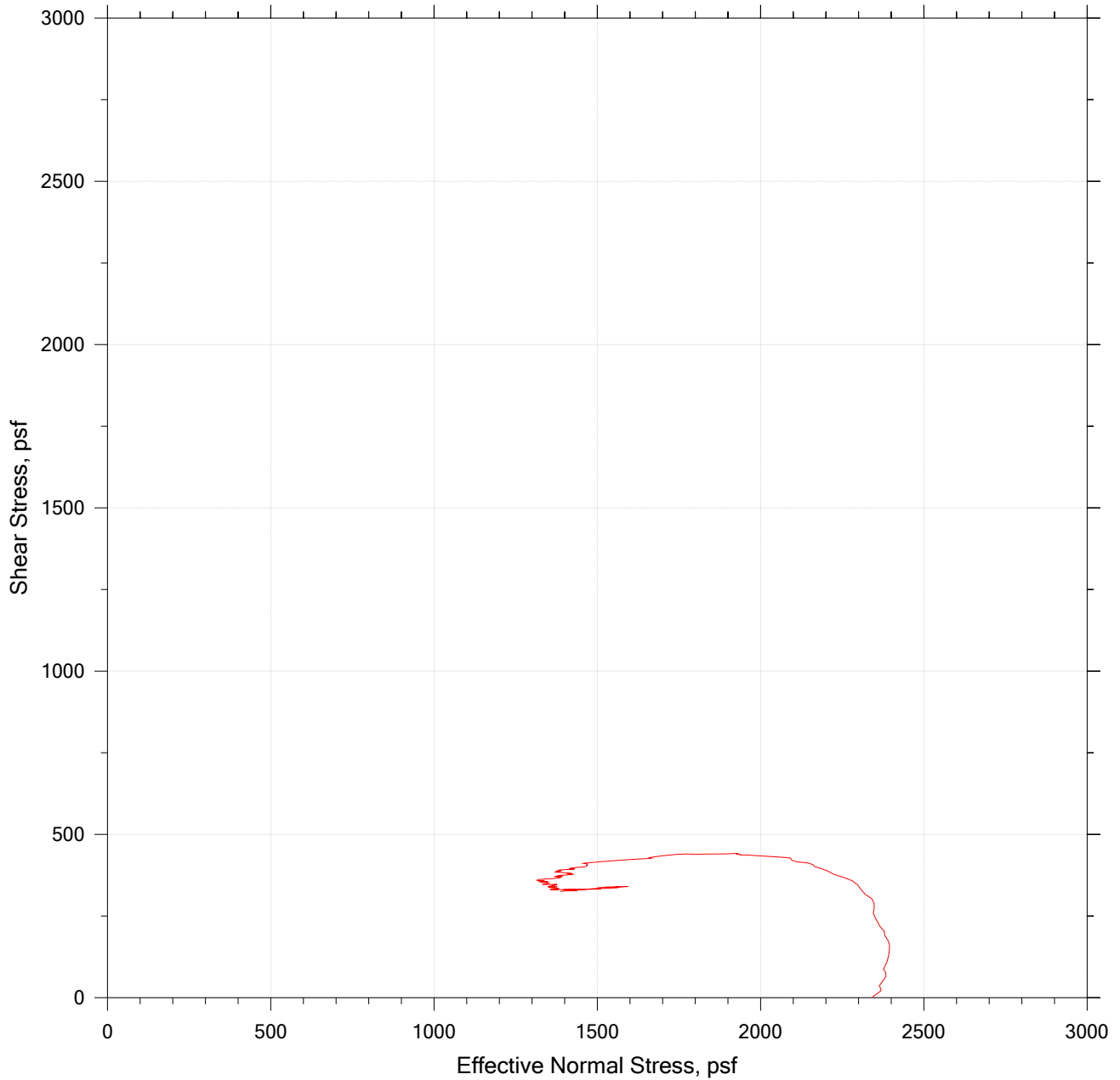
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.


# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-209	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/31/18	Depth: 35-37 ft
	Test No.: DSS-5	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System HH		

# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-209	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/31/18	Depth: 35-37 ft
	Test No.: DSS-5	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System HH		



## Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client: Schonewald Engineering Associates, Inc. GTX#: 307957  
 Project Name: MeTPK Exit 45 Reconfiguration Test Date: 8/15/18  
 Project Location: Phs 2 South Portland, ME

Boring ID: HB-EXIT 45-210  
 Sample ID: U-2  
 Depth, ft: 40-42

Visual Description: Wet, dark gray clay

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDT's connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in<sup>2</sup>, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: Extruded from tube, cut, trimmed and placed into apparatus at as-received density and moisture content.

Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-3	DSS-4			
Initial Moisture Content, %	36.3	44.3			
Initial Dry Density, pcf	85.3	73.1			
Nominal Rate of Shear Strain, %/hr	5.0	5.0			
Vertical Consolidation Stress, psf	2,500	3,150			
Vertical Consolidation Stress at Shear, psf	2,500	2,250			
Final Moisture Content, %	27.4	33.9			
Measured Peak Shear Stress, psf	605.9	510.1			
Shear Strain at Peak Shear Stress, %	15.0	9.5			
Membrane Correction, psf	59	60			
Corrected Peak Shear Stress, psf	546.9	450.1			
$S_u / \sigma'_{vc}$	0.22	0.20			

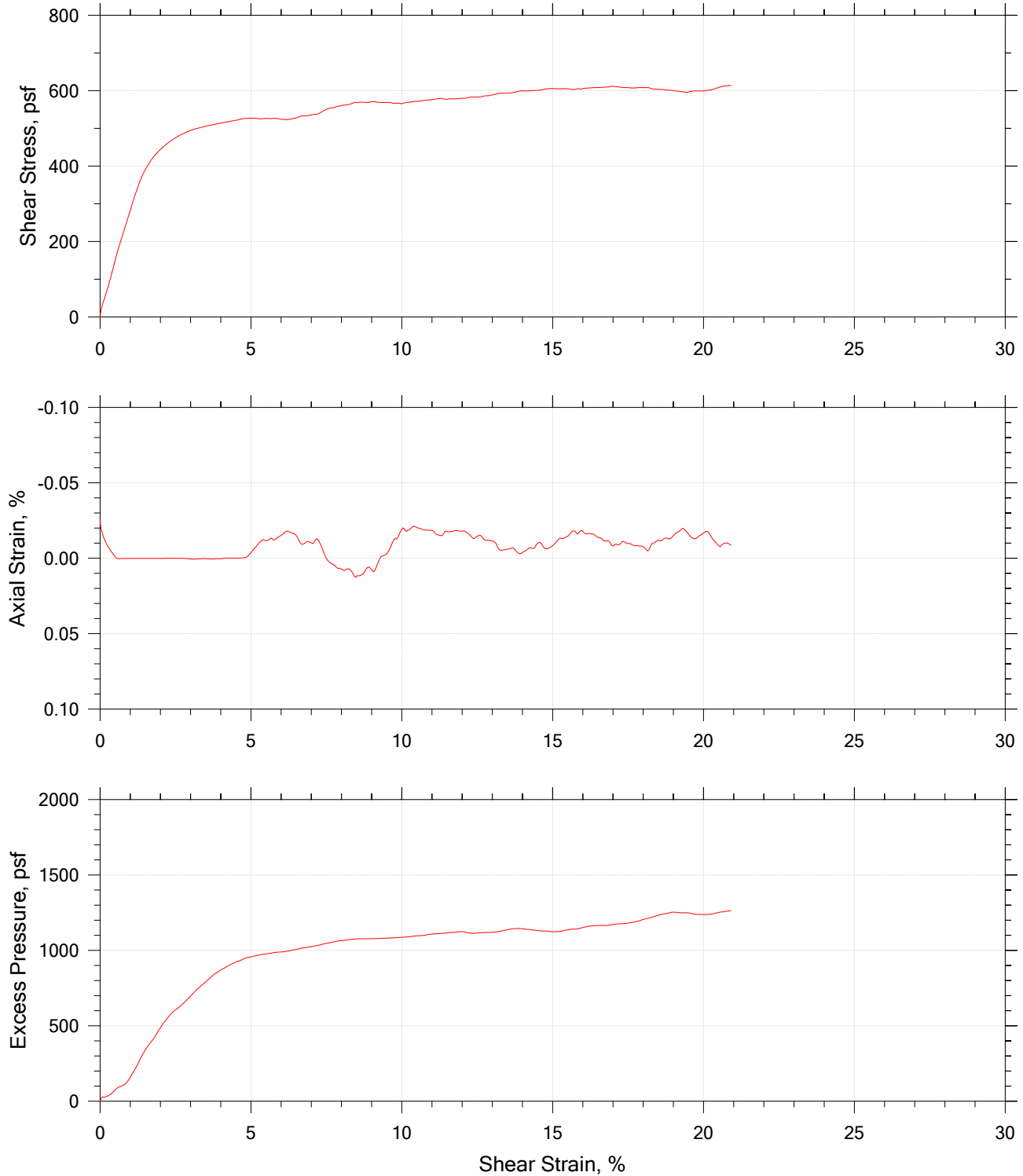
Comments:


Tested By: md

Checked By: njh

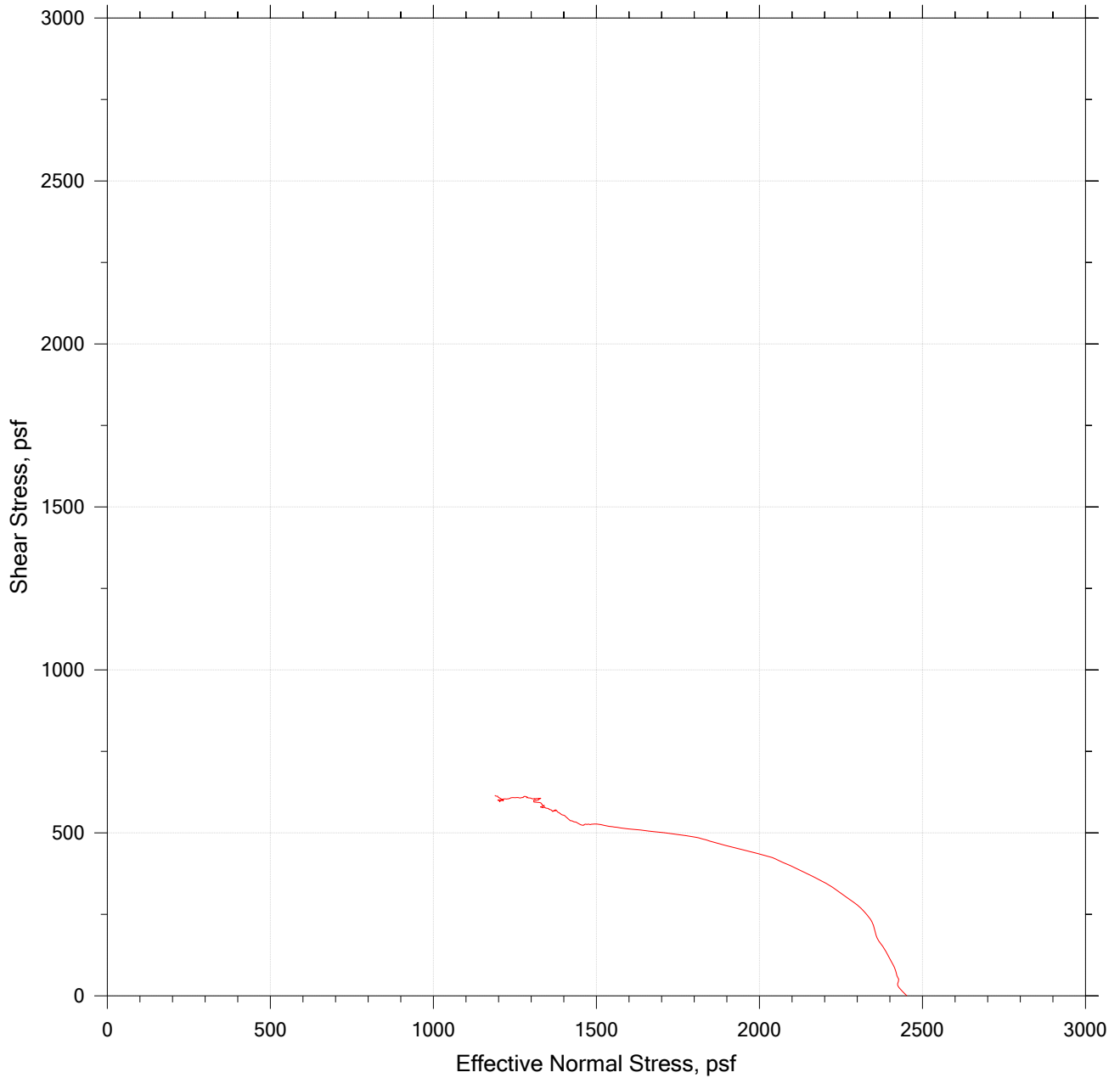
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.


# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-210	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/15/18	Depth: 40-42 ft
	Test No.: DSS-3	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System HH		

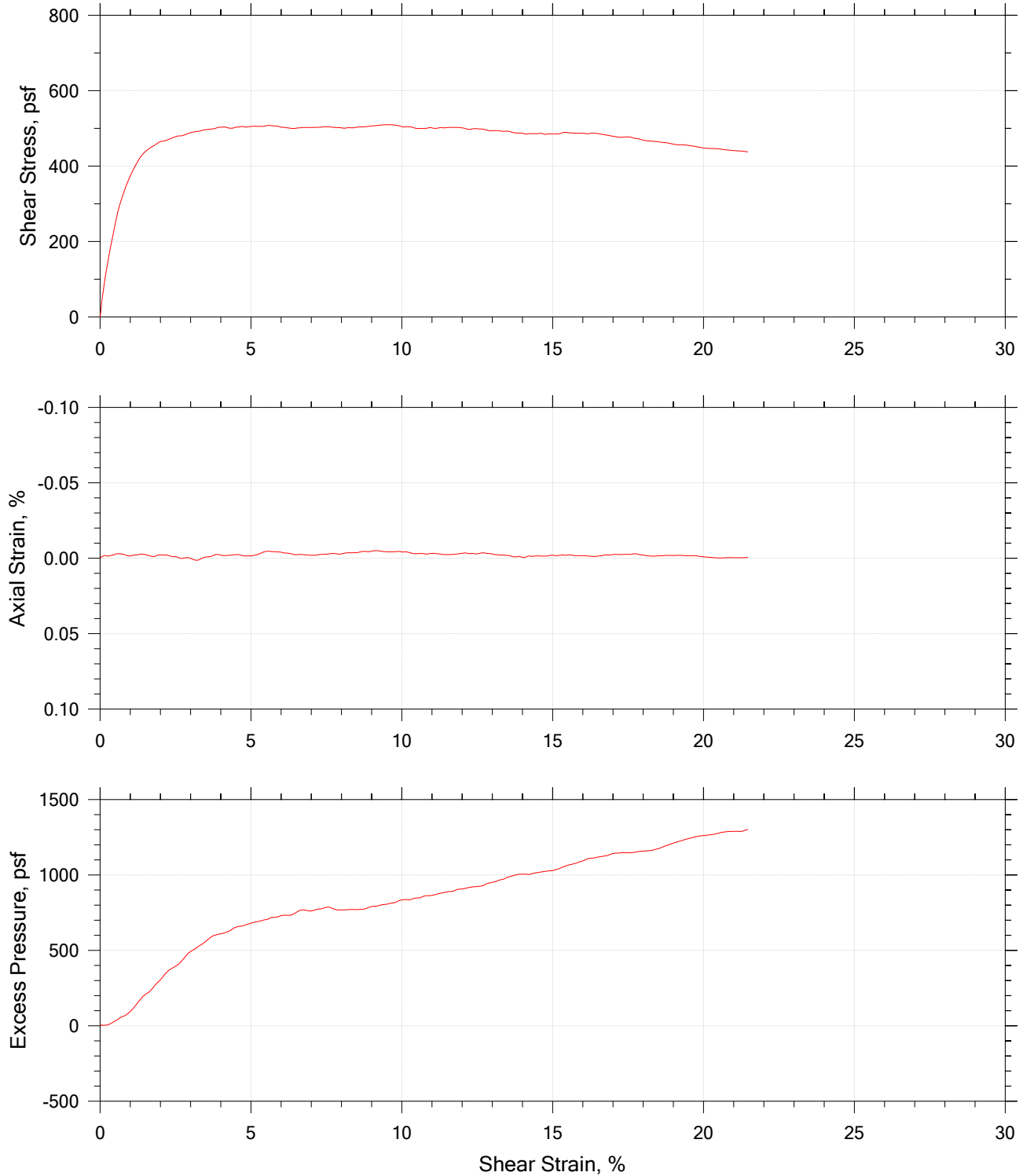
# DIRECT SIMPLE SHEAR TEST by ASTM D6528




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-210	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/15/18	Depth: 40-42 ft
	Test No.: DSS-3	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System HH		

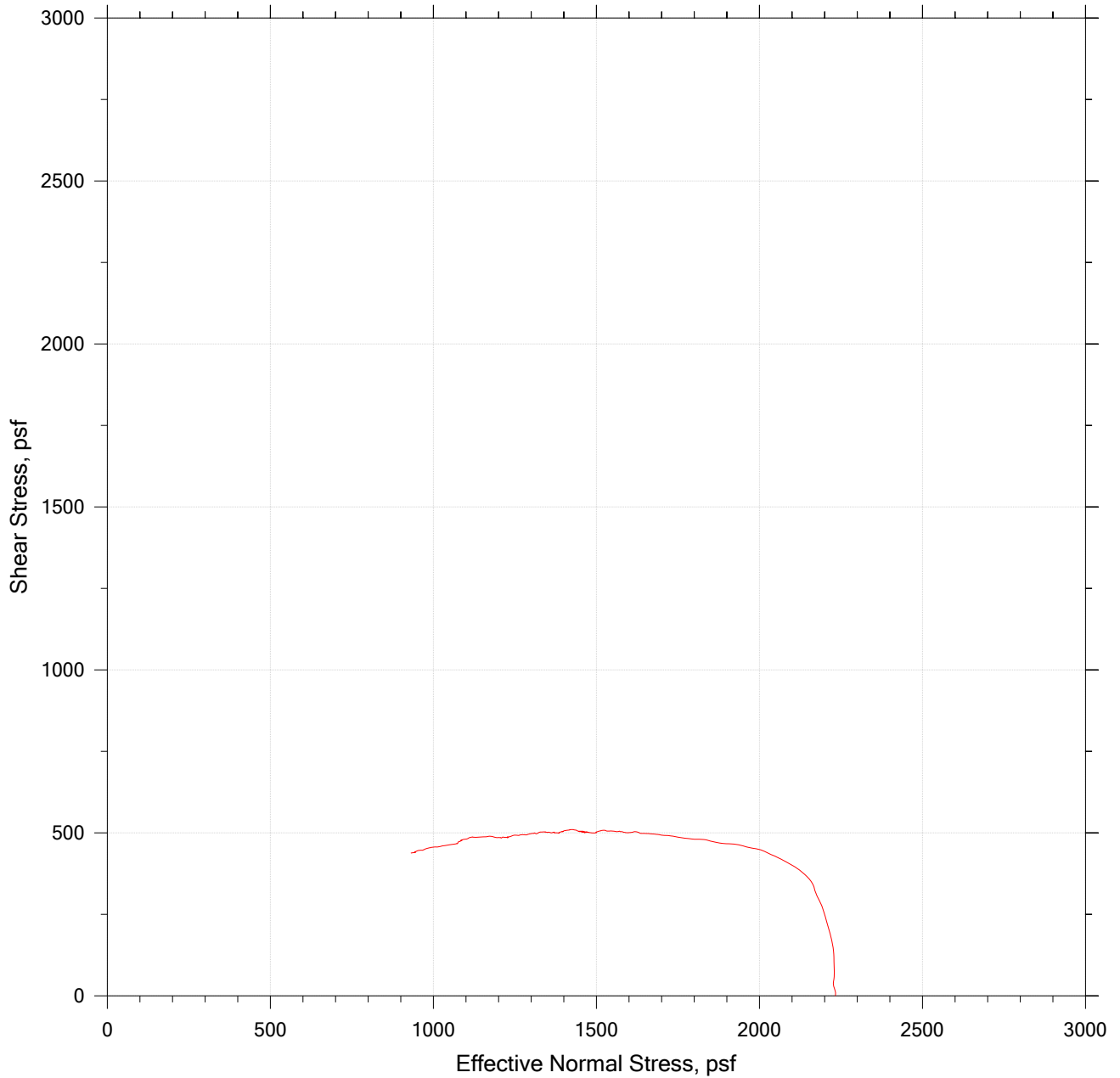



# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-210	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/15/18	Depth: 40-42 ft
	Test No.: DSS-4	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System GG		

# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-210	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 08/15/18	Depth: 40-42 ft
	Test No.: DSS-4	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System GG		



## Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client: Schonewald Engineering Associates, Inc. GTX#: 307957  
 Project Name: MeTPK Exit 45 Reconfiguration Test Date: 9/4/18  
 Project Location: Phs 2 South Portland, ME

Boring ID: HB-EXIT 45-210  
 Sample ID: U-2  
 Depth, ft: 40-42

Visual Description: Wet, dark gray clay

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDT's connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in<sup>2</sup>, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: Extruded from tube, cut, trimmed and placed into apparatus at as-received density and moisture content.

Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-7				
Initial Moisture Content, %	38.5				
Initial Dry Density, pcf	75.4				
Nominal Rate of Shear Strain, %/hr	5.0				
Vertical Consolidation Stress, psf	4,500				
Vertical Consolidation Stress at Shear, psf	2,250				
Final Moisture Content, %	36.3				
Measured Peak Shear Stress, psf	628				
Shear Strain at Peak Shear Stress, %	10.1				
Membrane Correction, psf	61				
Corrected Peak Shear Stress, psf	567				
$S_u / \sigma'_{vc}$	0.25				

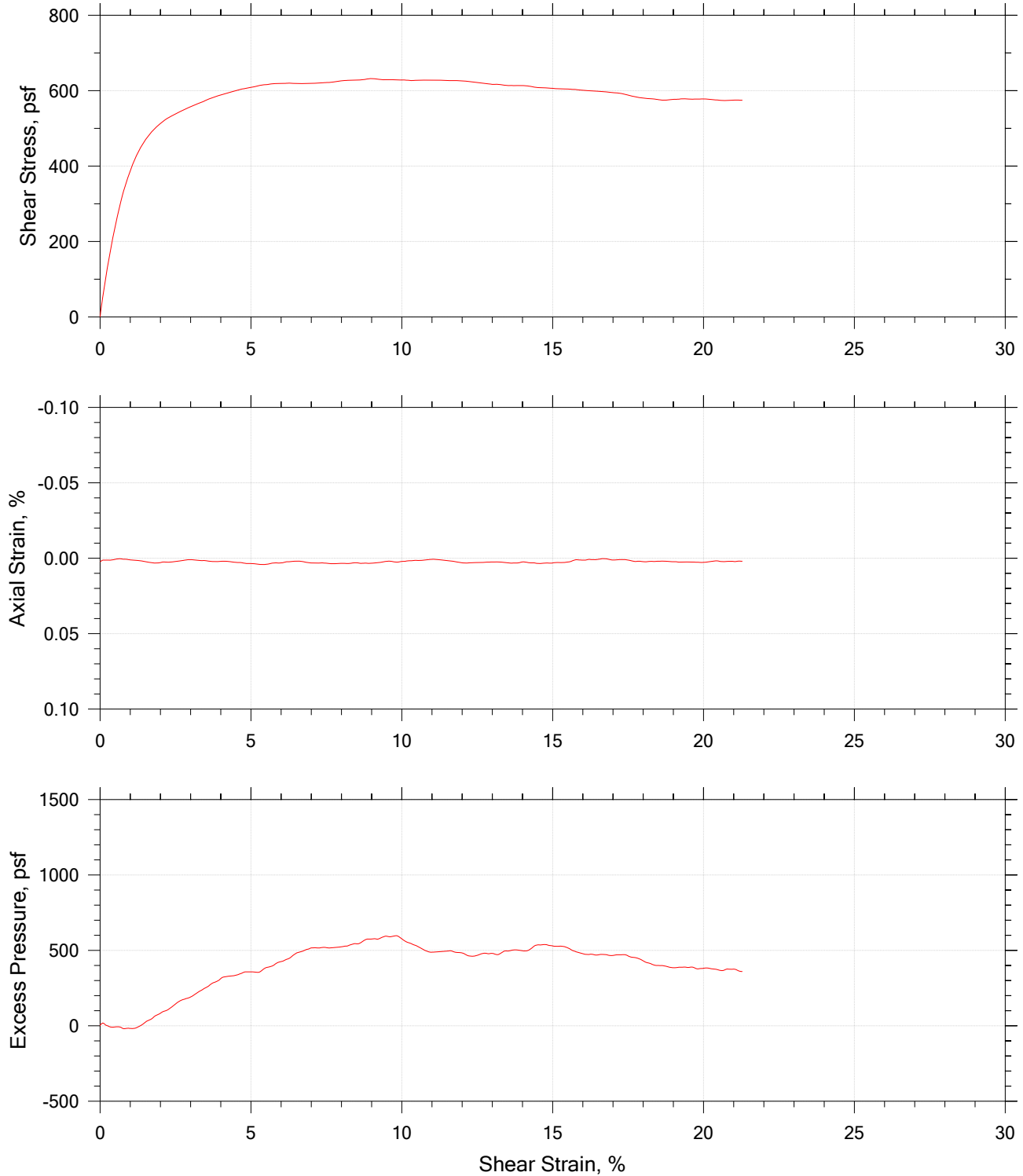
Comments:


Tested By: md

Checked By: njh

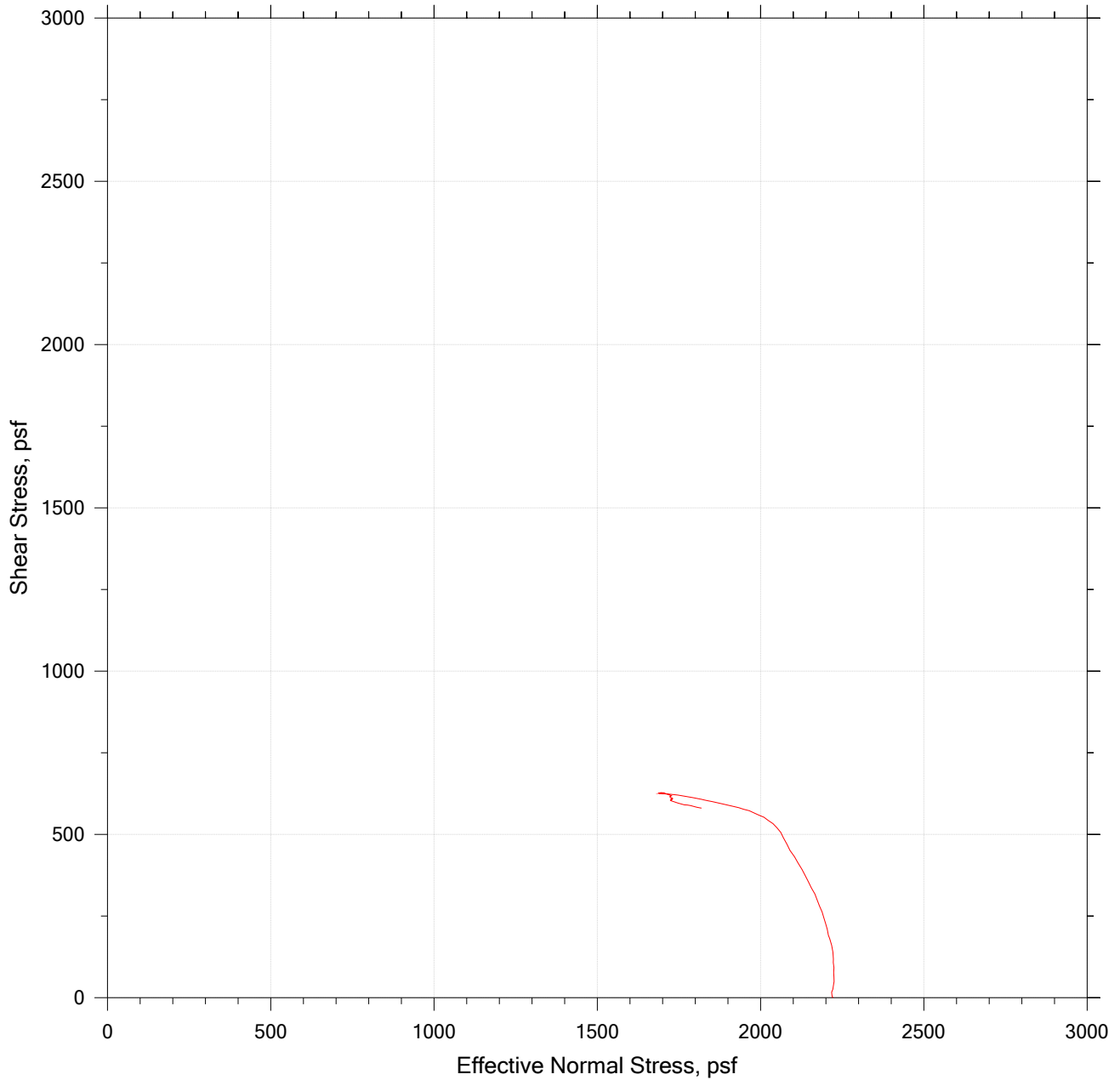
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.


# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-210	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/04/18	Depth: 40-42 ft
	Test No.: DSS-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System GG		

# DIRECT SIMPLE SHEAR TEST by ASTM D6528



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-210	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/04/18	Depth: 40-42 ft
	Test No.: DSS-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System GG		



Client: Schonewald Engineering Associates, Inc.

Project Name: MeTPK Exit 45 Reconfiguration

Project Location: Phs 2 South Portland, ME

Project Number: GTX-307957

Tested By: md

Checked By: njh

Boring ID: HB-EXIT 45-208

Preparation: intact

Description: Wet, gray clay

Classification: ---

Group Symbol: ---

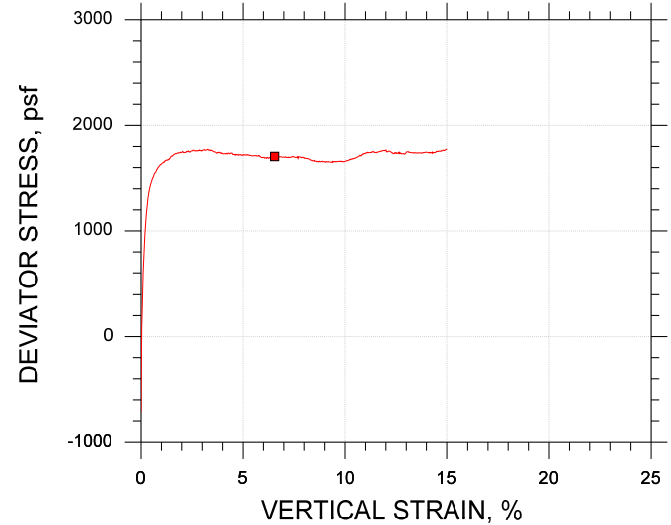
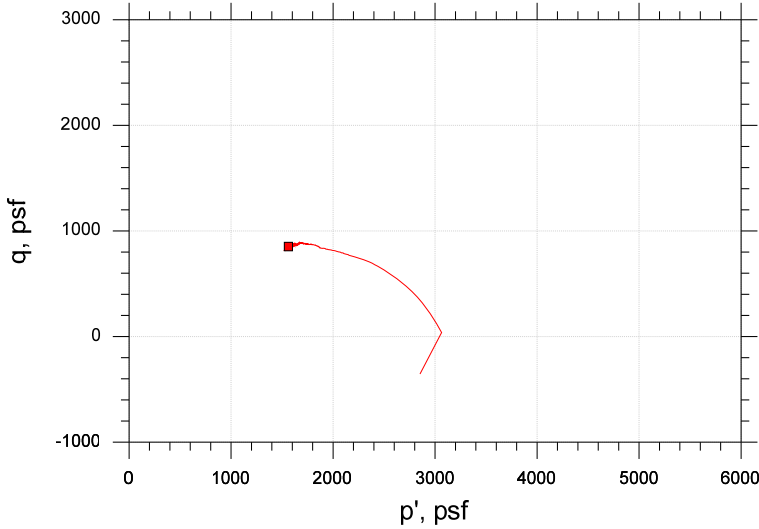
Liquid Limit: 27

Plastic Limit: 16

Plasticity Index: 11

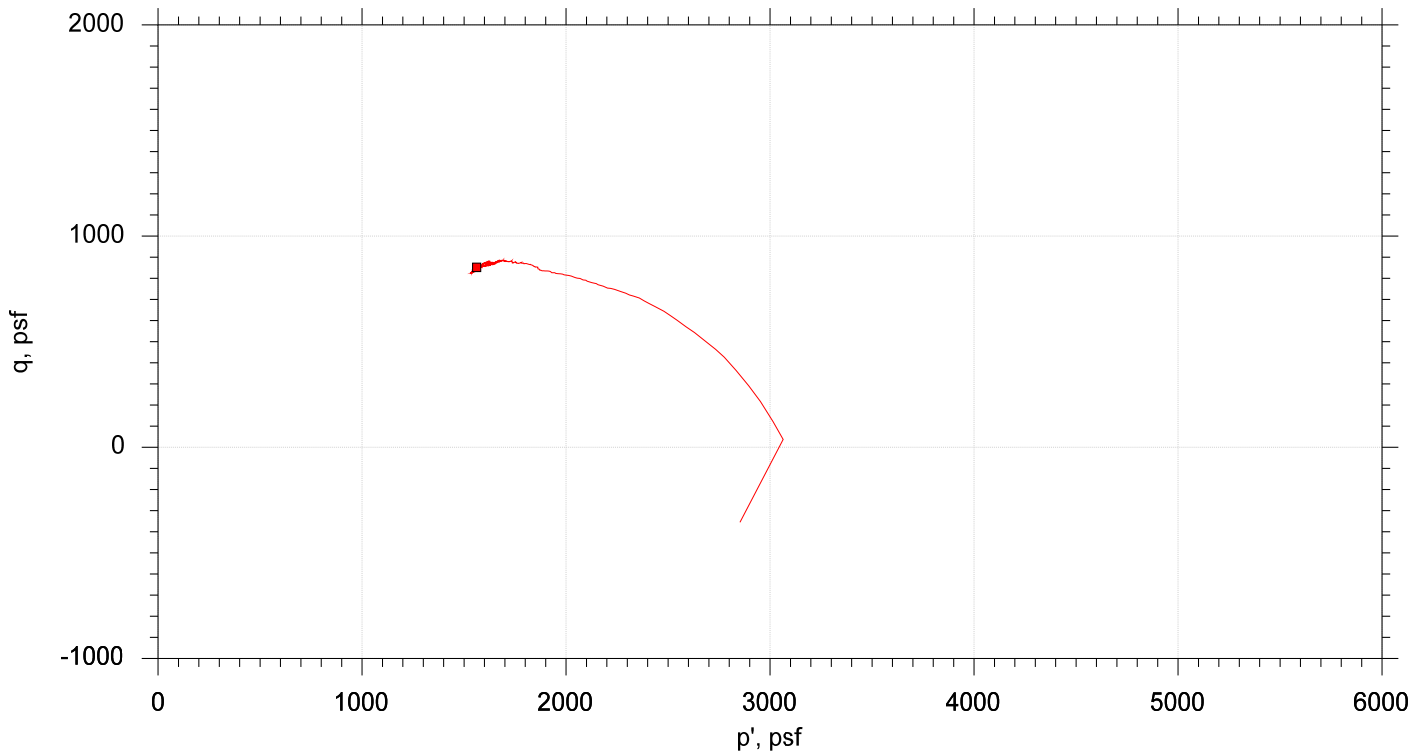
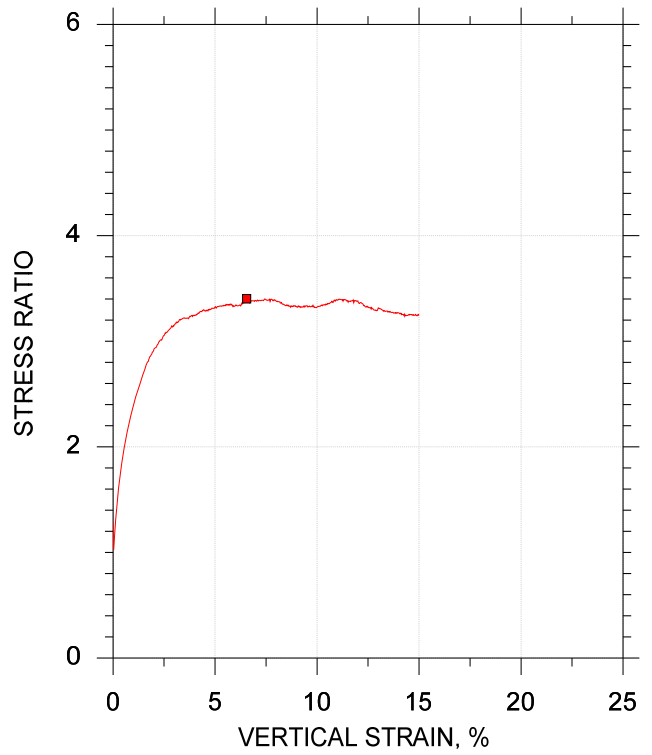
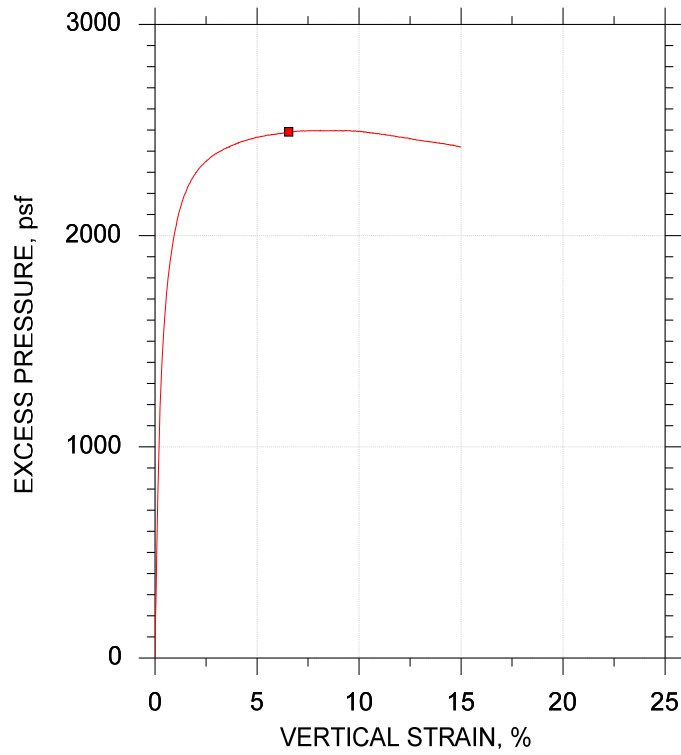
Estimated Specific Gravity: 2.7

### CONSOLIDATED UNDRAINED TRIAXIAL TEST



Symbol	■		
Sample ID	U2		
Depth, ft	40-42 ft		
Test Number	CKOU-2-1		
Initial	Height, in	4.470	
	Diameter, in	1.930	
	Moisture Content (from Cuttings), %	34.8	
	Dry Density, pcf	85.6	
	Saturation (Wet Method), %	97.1	
	Void Ratio	0.968	
Before Shear	Moisture Content, %	34.3	
	Dry Density, pcf	87.6	
	Cross-sectional Area (Method A), in <sup>2</sup>	2.930	
	Saturation, %	100.0	
	Void Ratio	0.925	
	Back Pressure, psf	2.200e+004	
Vertical Effective Consolidation Stress, psf	2467.		
Horizontal Effective Consolidation Stress, psf	3207.		
Vertical Strain after Consolidation, %	2.419		
Volumetric Strain after Consolidation, %	2.417		
Time to 50% Consolidation, min	---		
Shear Strength, psf	852.5		
Strain at Failure, %	6.55		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	1705.		
Effective Minor Principal Stress at Failure, psf	709.6		
Effective Major Principal Stress at Failure, psf	2415.		
B-Value	0.96		
Notes:	<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>		
Remarks:			

CONSOLIDATED UNDRAINED TRIAXIAL TEST

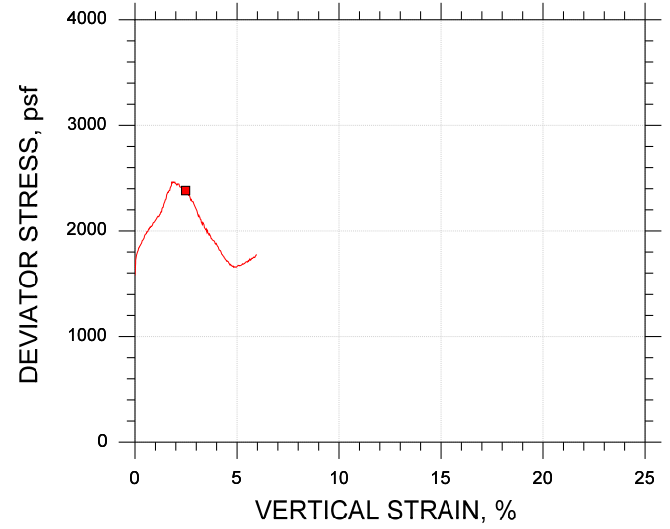
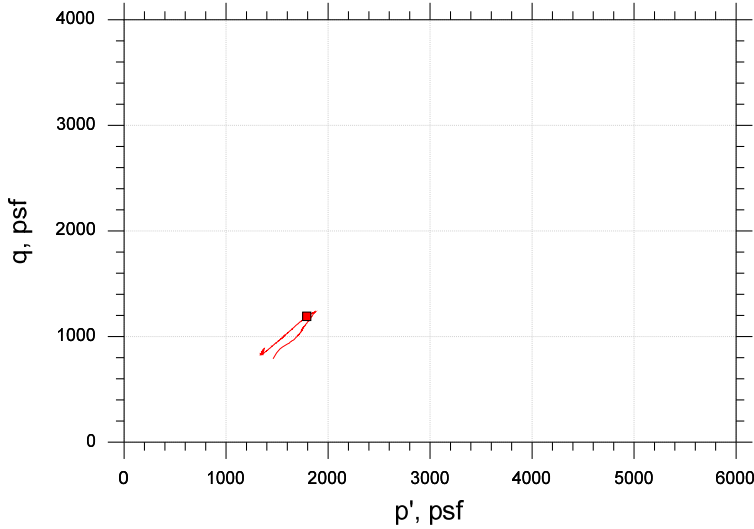


Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■ U2	CKOU-2-1	40-42 ft	md	07/31/18	njh	8/14/18	307957-CKOU-2-1n.dat



Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
Boring No.: HB-EXIT 45-208	Sample Type: intact	
Description: Wet, gray clay		
Remarks: System II, Ko = 1.28 prior to shear phase		

CONSOLIDATED UNDRAINED TRIAXIAL TEST

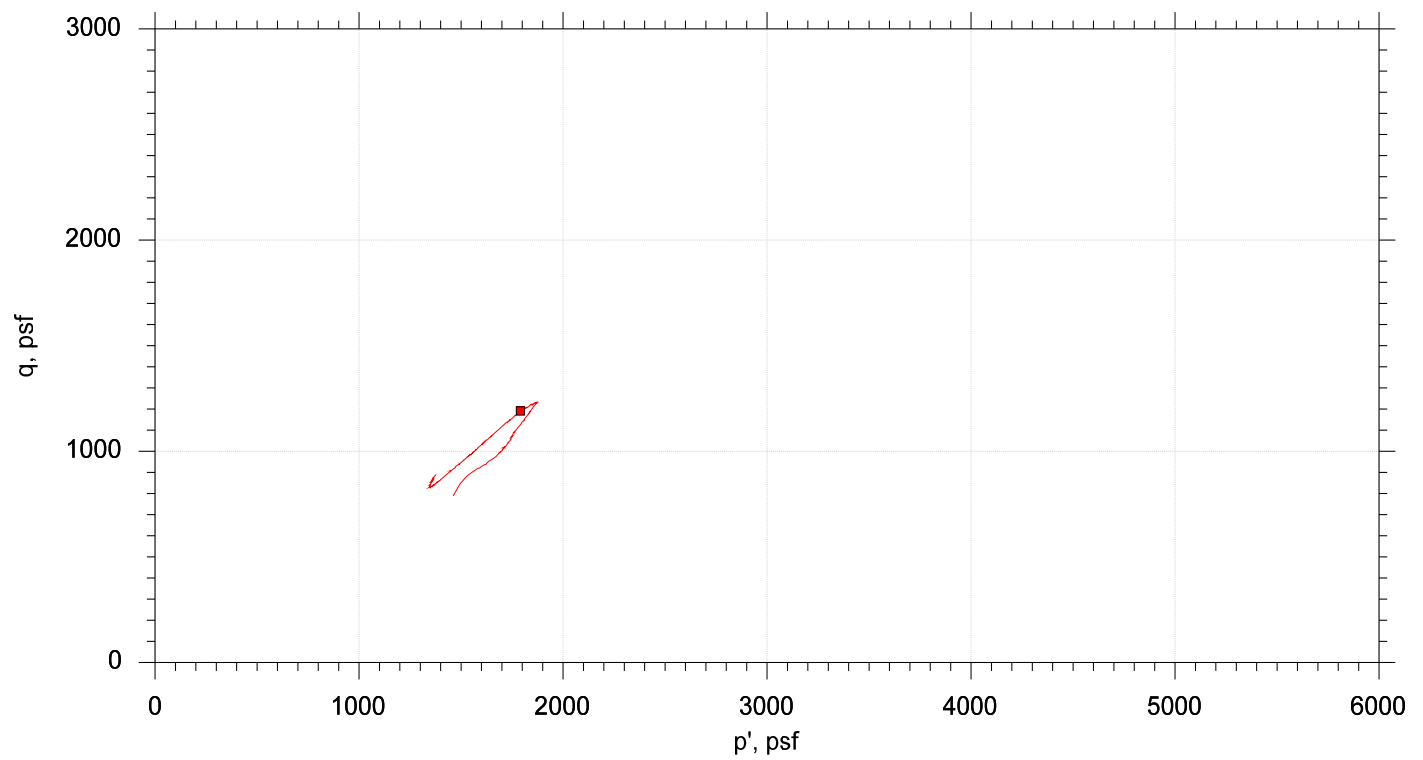
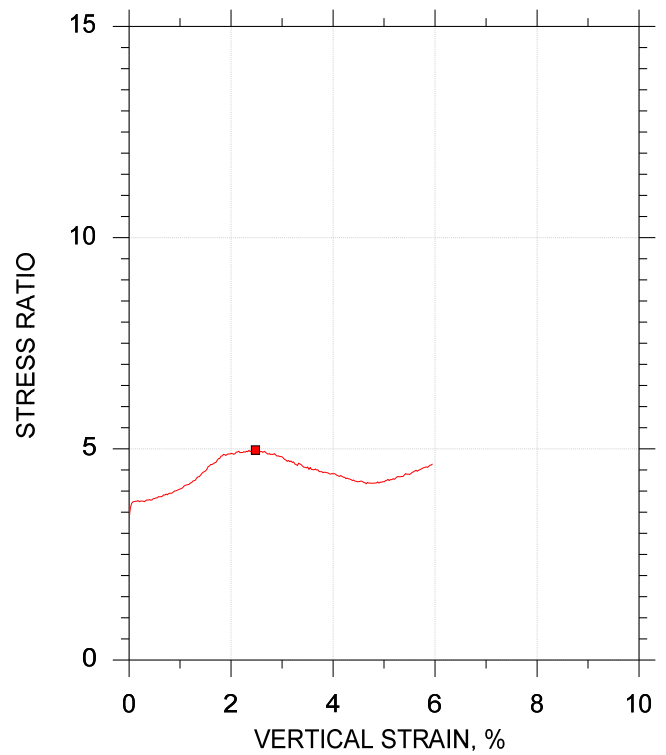
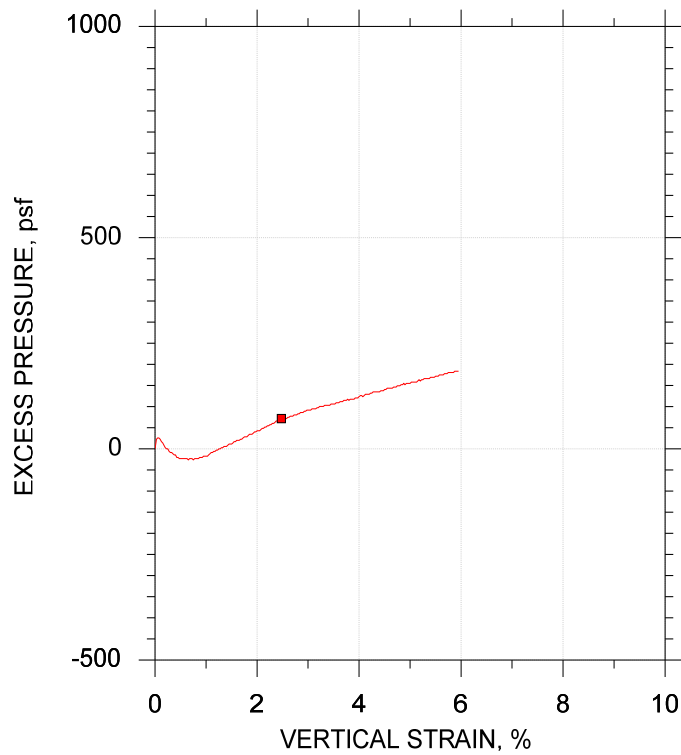


Symbol	■		
Sample ID	U2		
Depth, ft	40-42 ft		
Test Number	CKOU-2-2		
Initial	Height, in	4.480	
	Diameter, in	1.930	
	Moisture Content (from Cuttings), %	42.1	
	Dry Density, pcf	78.9	
	Saturation (Wet Method), %	100.0	
	Void Ratio	1.14	
Before Shear	Moisture Content, %	39.3	
	Dry Density, pcf	81.7	
	Cross-sectional Area (Method A), in <sup>2</sup>	2.932	
	Saturation, %	100.0	
	Void Ratio	1.06	
	Back Pressure, psf	2.198e+004	
Vertical Effective Consolidation Stress, psf	2202.		
Horizontal Effective Consolidation Stress, psf	671.6		
Vertical Strain after Consolidation, %	3.837		
Volumetric Strain after Consolidation, %	3.842		
Time to 50% Consolidation, min	---		
Shear Strength, psf	1191.		
Strain at Failure, %	2.48		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	2383.		
Effective Minor Principal Stress at Failure, psf	599.8		
Effective Major Principal Stress at Failure, psf	2982.		
B-Value	0.96		
Notes:			
<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:			






CONSOLIDATED UNDRAINED TRIAXIAL TEST

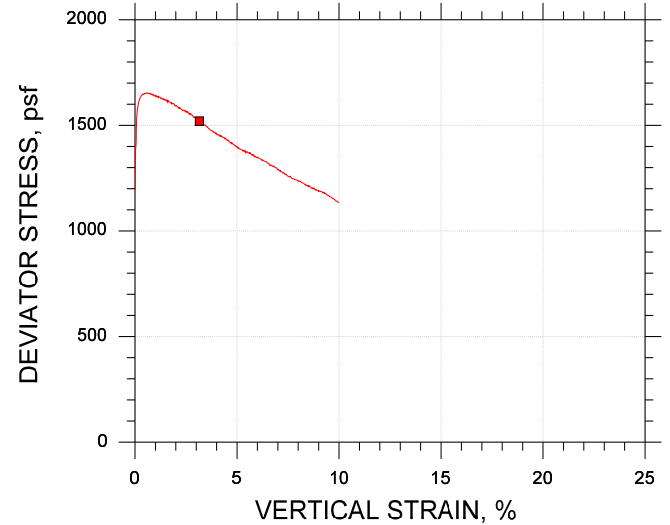
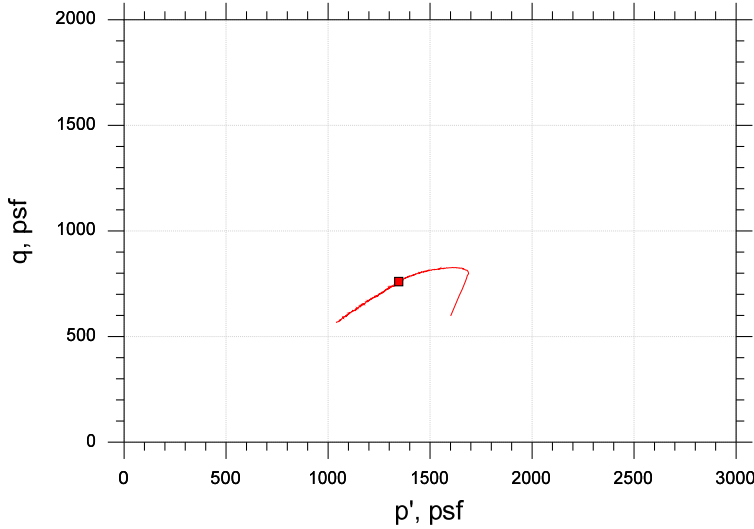


Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■ U2	CKOU-2-2	40-42 ft	md	07/31/18	njh	8/14/18	307957-CKOU-2-2n.dat

	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-208	Sample Type: intact	
	Description: Wet, gray clay		
	Remarks: System K, Ko = 0.30 prior to shear phase		

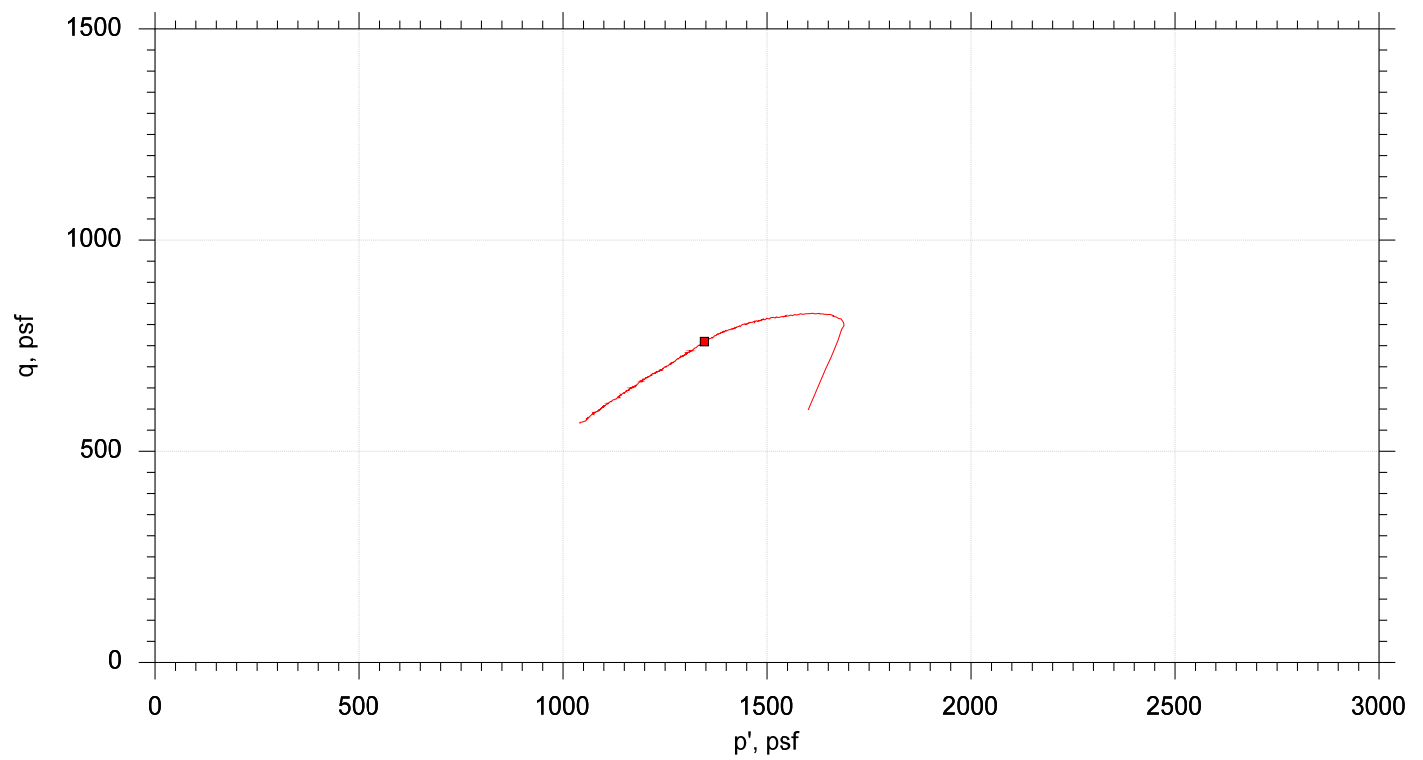
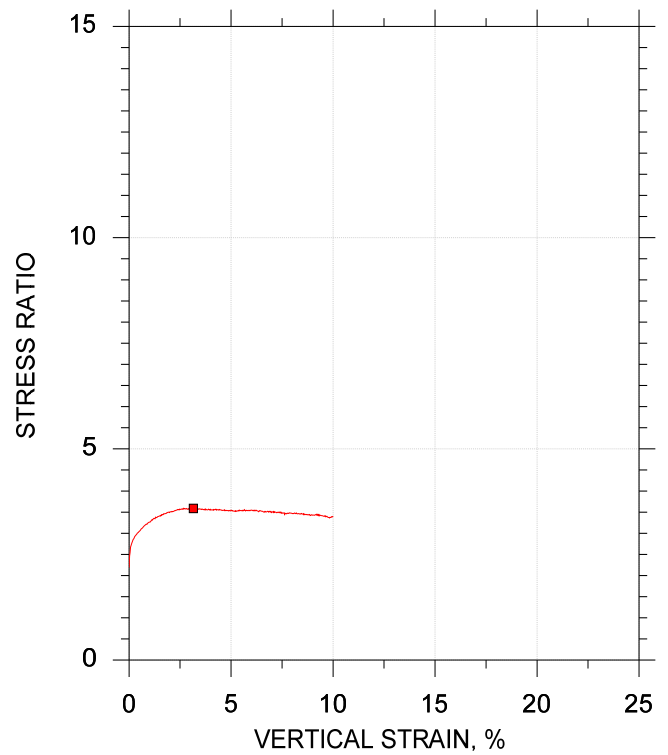
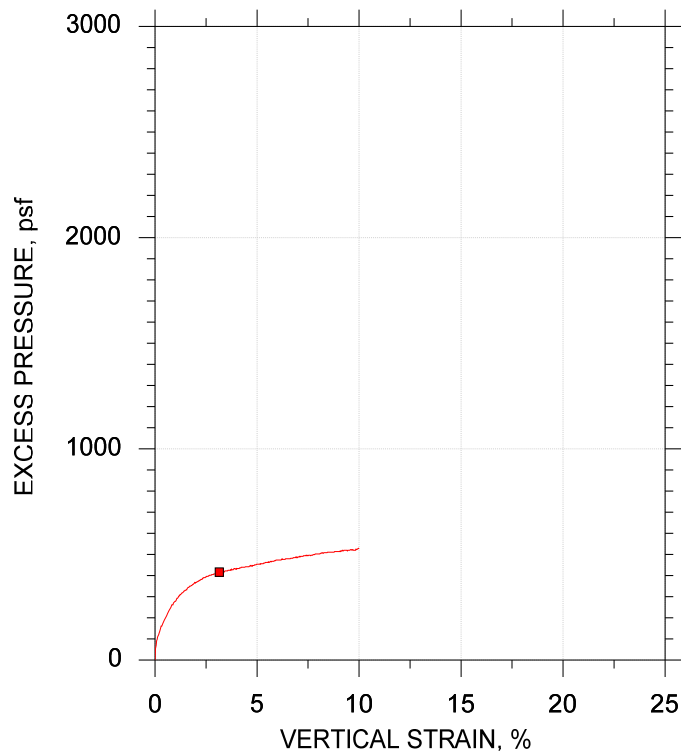


CONSOLIDATED UNDRAINED TRIAXIAL TEST




Symbol	■			
Sample ID	U2			
Depth, ft	35-37 ft			
Test Number	CKOU-1-1			
Initial	Height, in	4.480		
	Diameter, in	1.930		
	Moisture Content (from Cuttings), %	36.8		
	Dry Density, pcf	84.4		
	Saturation (Wet Method), %	99.6		
	Void Ratio	0.996		
Before Shear	Moisture Content, %	34.7		
	Dry Density, pcf	87.1		
	Cross-sectional Area (Method A), in <sup>2</sup>	2.931		
	Saturation, %	100.0		
	Void Ratio	0.936		
	Back Pressure, psf	2.170e+004		
Vertical Effective Consolidation Stress, psf	2157.			
Horizontal Effective Consolidation Stress, psf	1003.			
Vertical Strain after Consolidation, %	3.300			
Volumetric Strain after Consolidation, %	3.293			
Time to 50% Consolidation, min	---			
Shear Strength, psf	760.0			
Strain at Failure, %	3.15			
Strain Rate, %/min	0.01600			
Deviator Stress at Failure, psf	1520.			
Effective Minor Principal Stress at Failure, psf	586.5			
Effective Major Principal Stress at Failure, psf	2106.			
B-Value	0.96			
Notes:	<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:				

CONSOLIDATED UNDRAINED TRIAXIAL TEST



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U2	CKOU-1-1	35-37 ft	md	07/31/18	njh	8/14/18	307957-CKOU-1-1n.dat

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-209		Sample Type: intact			
	Description: Wet, dark gray clay					
	Remarks: System K, Ko = 0.46 prior to shear phase					



Client: Schonewald Engineering Associates, Inc.

Project Name: MeTPK Exit 45 Reconfiguration

Project Location: Phs 2 South Portland, ME

Project Number: GTX-307957

Tested By: md

Checked By: njh

Boring ID: HB-EXIT 45-209

Preparation: intact

Description: Wet, dark gray clay

Classification: ---

Group Symbol: ---

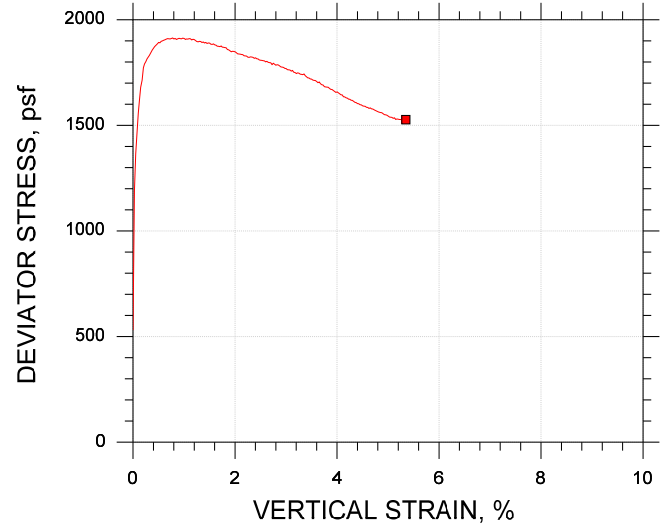
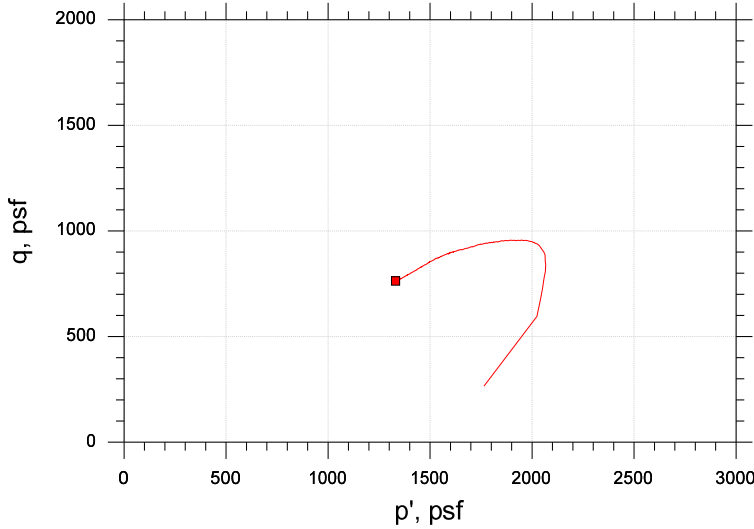
Liquid Limit: 33

Plastic Limit: 21

Plasticity Index: 12

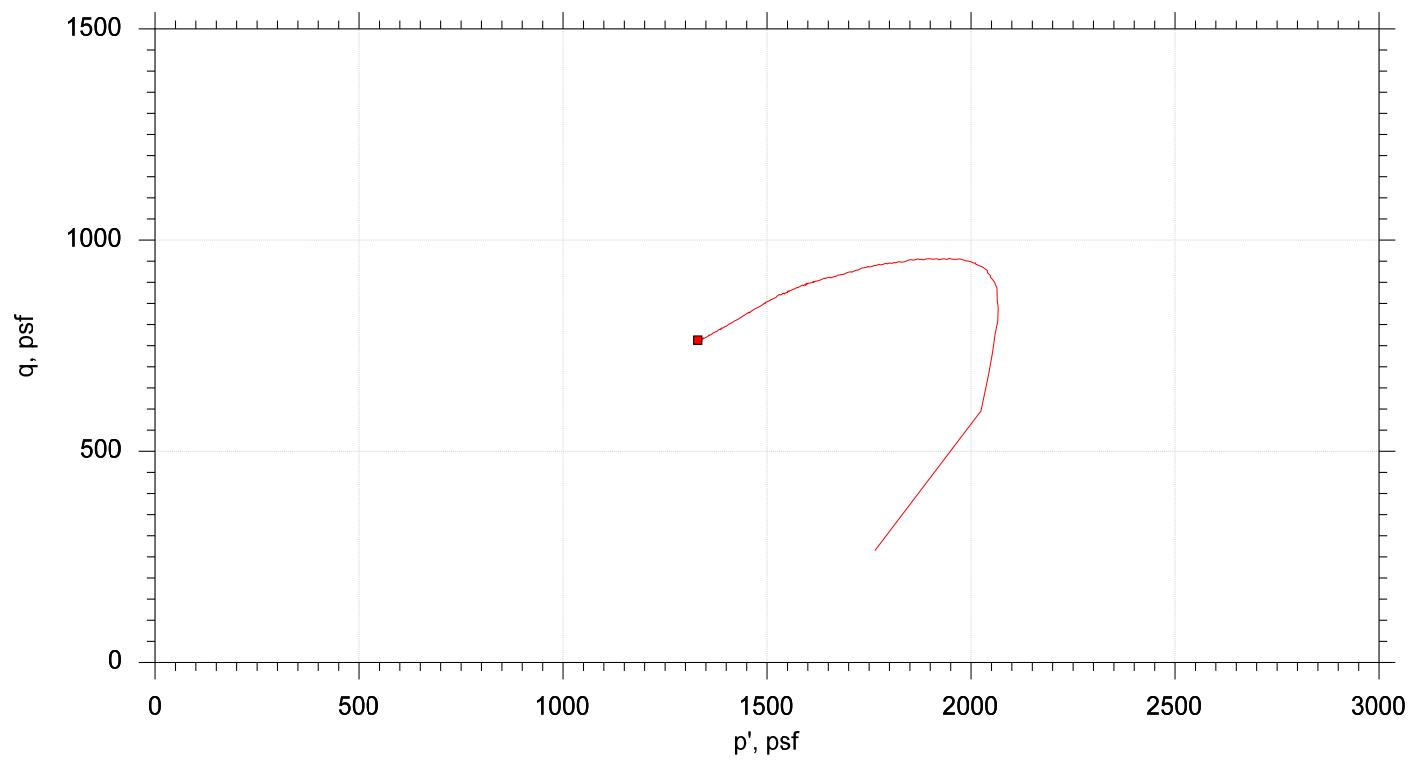
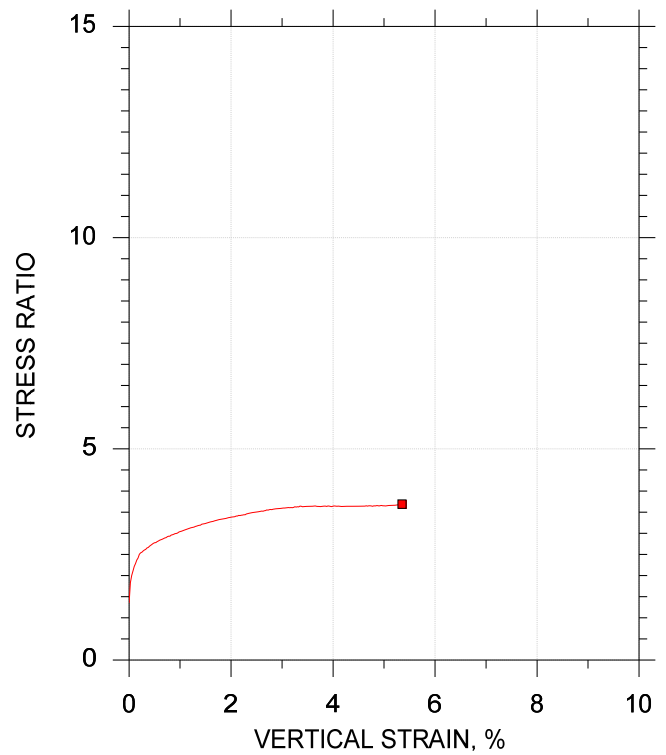
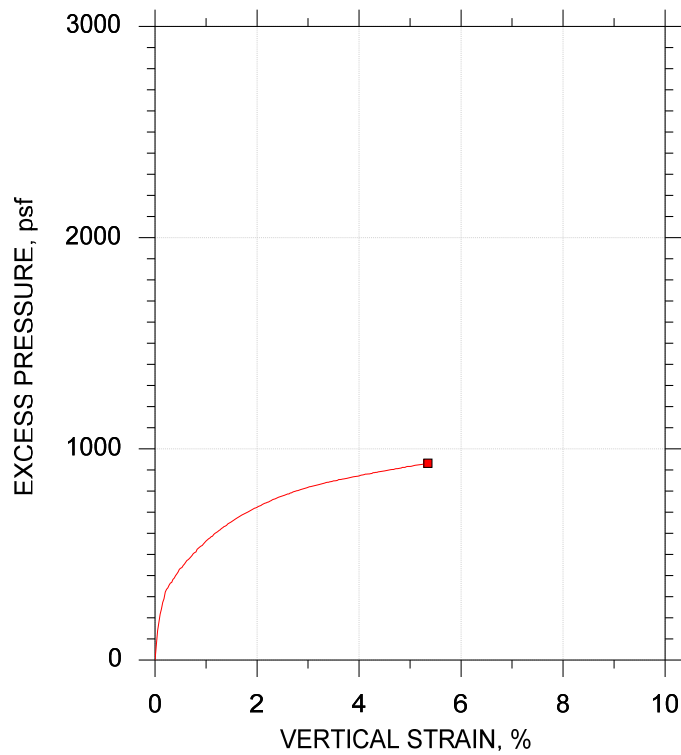
Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST




Symbol	■		
Sample ID	U2		
Depth, ft	35-37 ft		
Test Number	CKOU-1-2		
Initial	Height, in	4.40	
	Diameter, in	1.930	
	Moisture Content (from Cuttings), %	41.0	
	Dry Density, pcf	78.6	
	Saturation (Wet Method), %	96.8	
	Void Ratio	1.15	
Before Shear	Moisture Content, %	38.4	
	Dry Density, pcf	82.8	
	Cross-sectional Area (Method A), in <sup>2</sup>	2.929	
	Saturation, %	100.0	
	Void Ratio	1.04	
	Back Pressure, psf	1.980e+004	
Vertical Effective Consolidation Stress, psf	2026.		
Horizontal Effective Consolidation Stress, psf	1499.		
Vertical Strain after Consolidation, %	5.23		
Volumetric Strain after Consolidation, %	5.32		
Time to 50% Consolidation, min	---		
Shear Strength, psf	763.4		
Strain at Failure, %	5.35		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	1527.		
Effective Minor Principal Stress at Failure, psf	567.0		
Effective Major Principal Stress at Failure, psf	2094.		
B-Value	0.95		
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

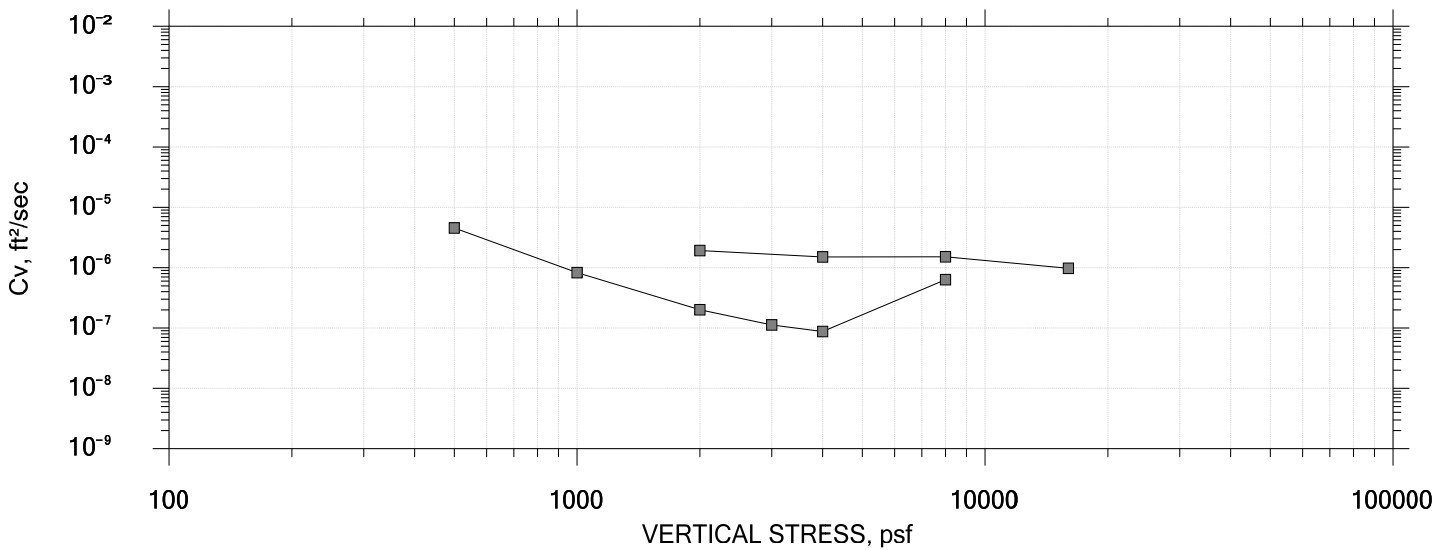
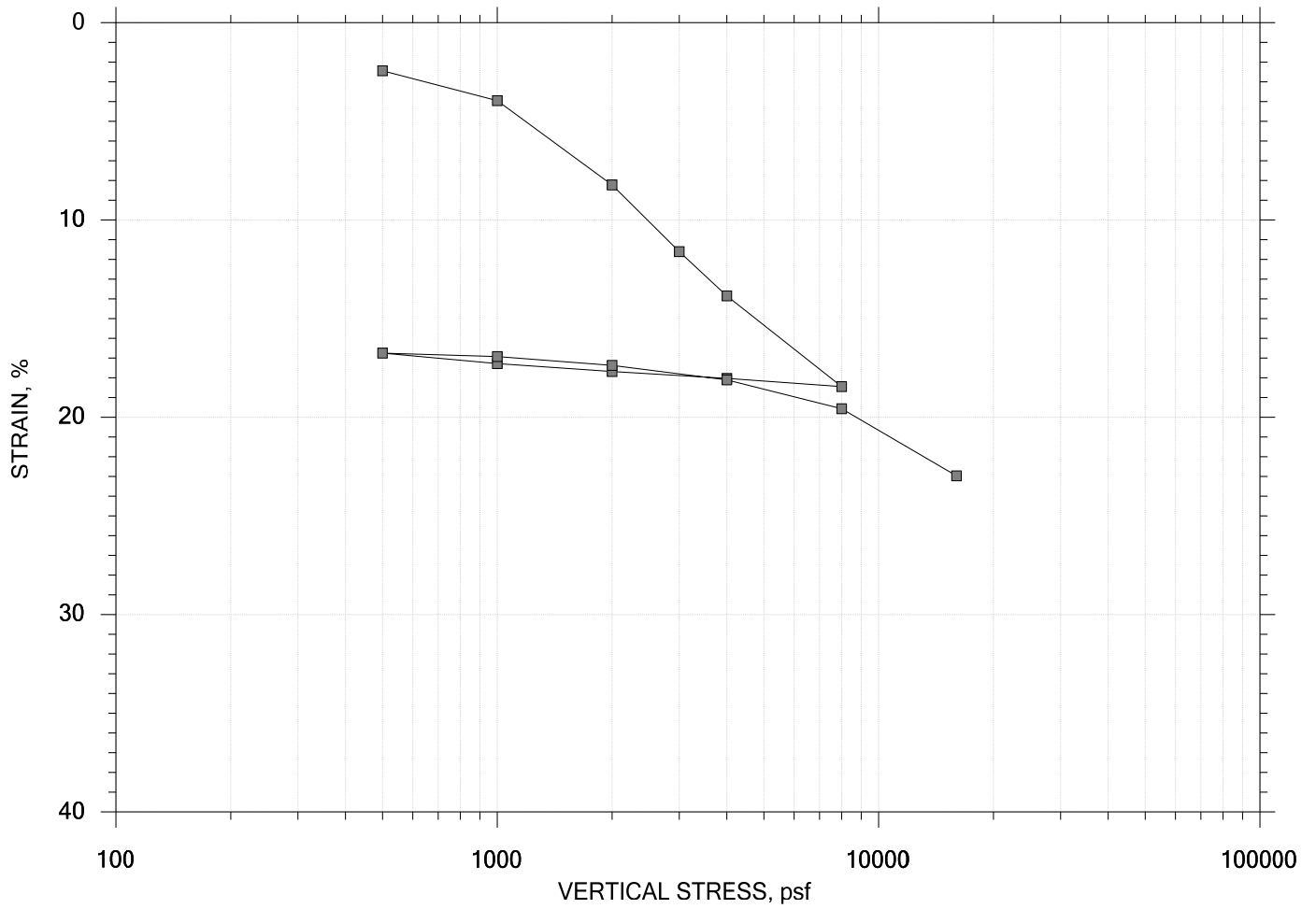



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U2	CKOU-1-2	35-37 ft	md	07/31/18	njh	8/14/18	307957-CKOU-1-2an.dat

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-209		Sample Type: intact			
	Description: Wet, dark gray clay					
	Remarks: System S, Ko = 0.74 prior to shear phase					

# One-Dimensional Consolidation by ASTM D2435 - Method B

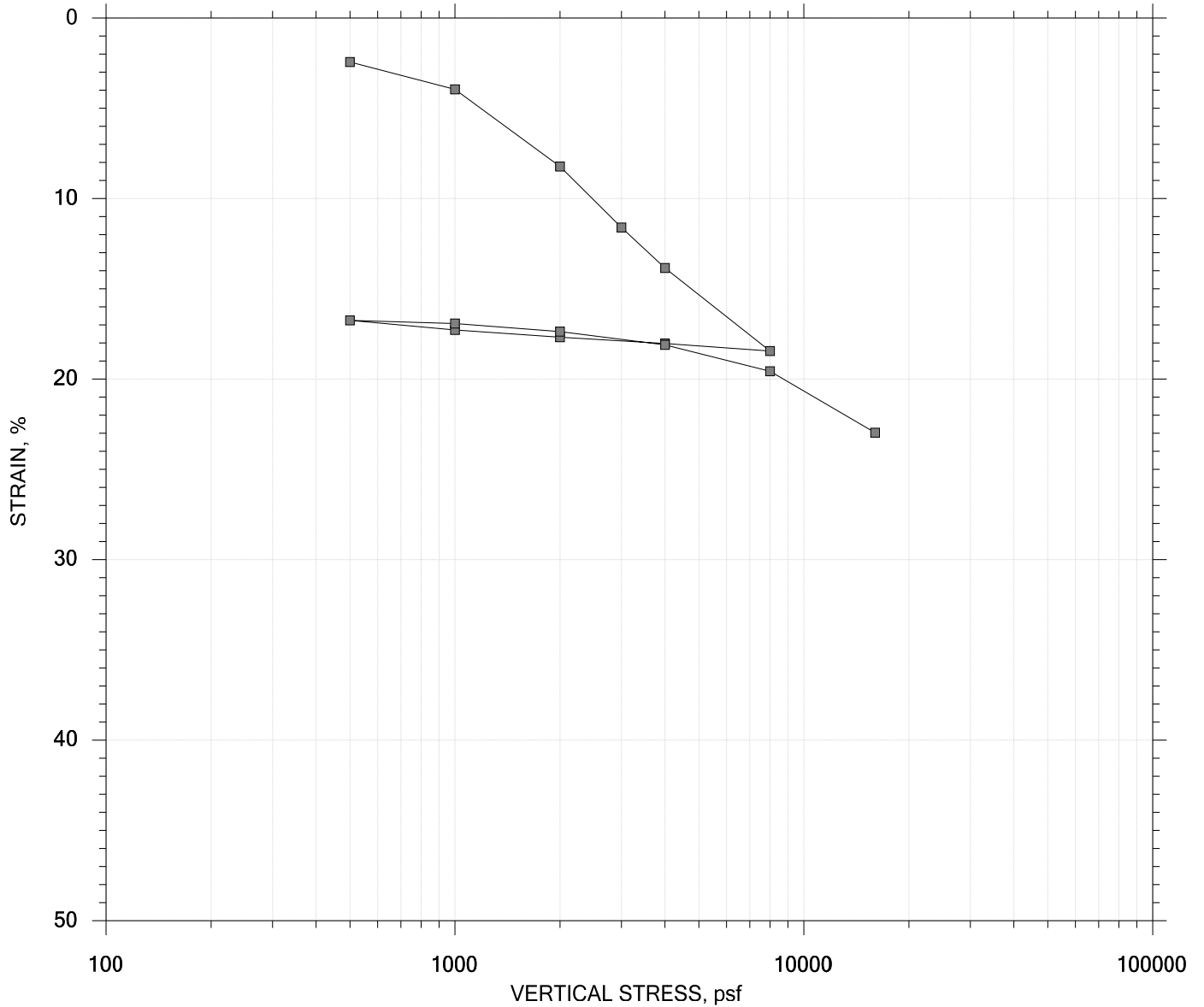
## SUMMARY REPORT




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

## SUMMARY REPORT



				Before Test	After Test	
Current Vertical Effective Stress: ---				Water Content, %	42.99	26.29
Preconsolidation Stress: ---				Dry Unit Weight, pcf	78.509	99.378
Compression Ratio: ---				Saturation, %	99.99	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.18	0.72
LL: 35	PL: 20	PI: 15	GS: 2.74			

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-201		Tested By: md		Checked By: njh	
	Sample No.: U2		Test Date: 07/26/18		Test No.: IP-1	
	Depth: 30-32 ft		Sample Type: intact		Elevation: ---	
	Description: Wet, dark gray clay					
	Remarks: System O					
	Displacement at End of Increment				Page 135 of 301	

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-201  
 Sample No.: U2  
 Test No.: IP-1

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/26/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 30-32 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System 0

Estimated Specific Gravity: 2.74  
 Initial Void Ratio: 1.18  
 Final Void Ratio: 0.720

Liquid Limit: 35  
 Plastic Limit: 20  
 Plasticity Index: 15

Specimen Diameter: 2.50 in  
 Initial Height: 1.00 in  
 Final Height: 0.79 in

Container ID	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
	C-209	RING		C-927
Wt. Container + Wet Soil, gm	99.960	254.64	237.75	136.38
Wt. Container + Dry Soil, gm	72.360	211.15	211.15	109.72
Wt. Container, gm	8.4500	109.99	109.99	8.3300
Wt. Dry Soil, gm	63.910	101.16	101.16	101.39
Water Content, %	43.19	42.99	26.29	26.29
Void Ratio	---	1.18	0.720	---
Degree of Saturation, %	---	99.99	100.00	---
Dry Unit Weight, pcf	---	78.509	99.378	---

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.



Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-201  
 Sample No.: U2  
 Test No.: IP-1

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/26/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 30-32 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System O

Displacement at End of Increment

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day
1	500.	0.02436	1.12	2.44	6.533	3.67e-006	4.87e-005	9.63e-004
2	1.00e+003	0.03947	1.09	3.95	32.074	7.17e-007	3.02e-005	1.17e-004
3	2.00e+003	0.08223	0.998	8.22	100.787	2.15e-007	4.28e-005	4.95e-005
4	3.00e+003	0.1160	0.925	11.6	140.450	1.42e-007	3.38e-005	2.59e-005
5	4.00e+003	0.1384	0.876	13.8	230.422	8.11e-008	2.24e-005	9.79e-006
6	8.00e+003	0.1845	0.776	18.4	26.705	6.46e-007	1.15e-005	4.01e-005
7	4.00e+003	0.1803	0.785	18.0	3.005	5.46e-006	1.04e-006	3.06e-005
8	2.00e+003	0.1768	0.792	17.7	6.894	2.40e-006	1.77e-006	2.30e-005
9	1.00e+003	0.1728	0.801	17.3	25.004	6.68e-007	3.95e-006	1.42e-005
10	500.	0.1675	0.812	16.7	55.598	3.04e-007	1.06e-005	1.74e-005
11	1.00e+003	0.1692	0.809	16.9	0.000	0.00e+000	3.44e-006	0.00e+000
12	2.00e+003	0.1737	0.799	17.4	12.962	1.30e-006	4.46e-006	3.13e-005
13	4.00e+003	0.1810	0.783	18.1	9.512	1.75e-006	3.67e-006	3.46e-005
14	8.00e+003	0.1957	0.751	19.6	14.855	1.09e-006	3.67e-006	2.15e-005
15	1.60e+004	0.2296	0.677	23.0	17.173	8.86e-007	4.25e-006	2.03e-005

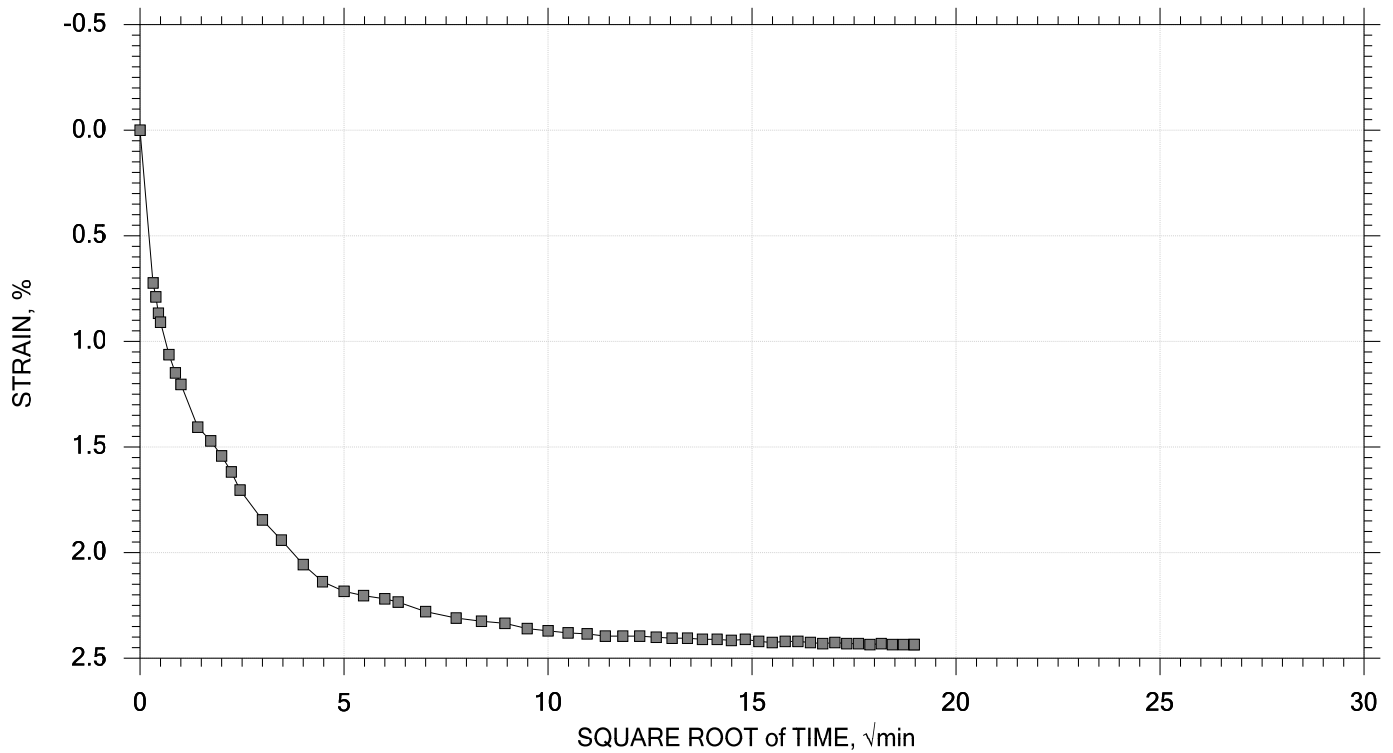
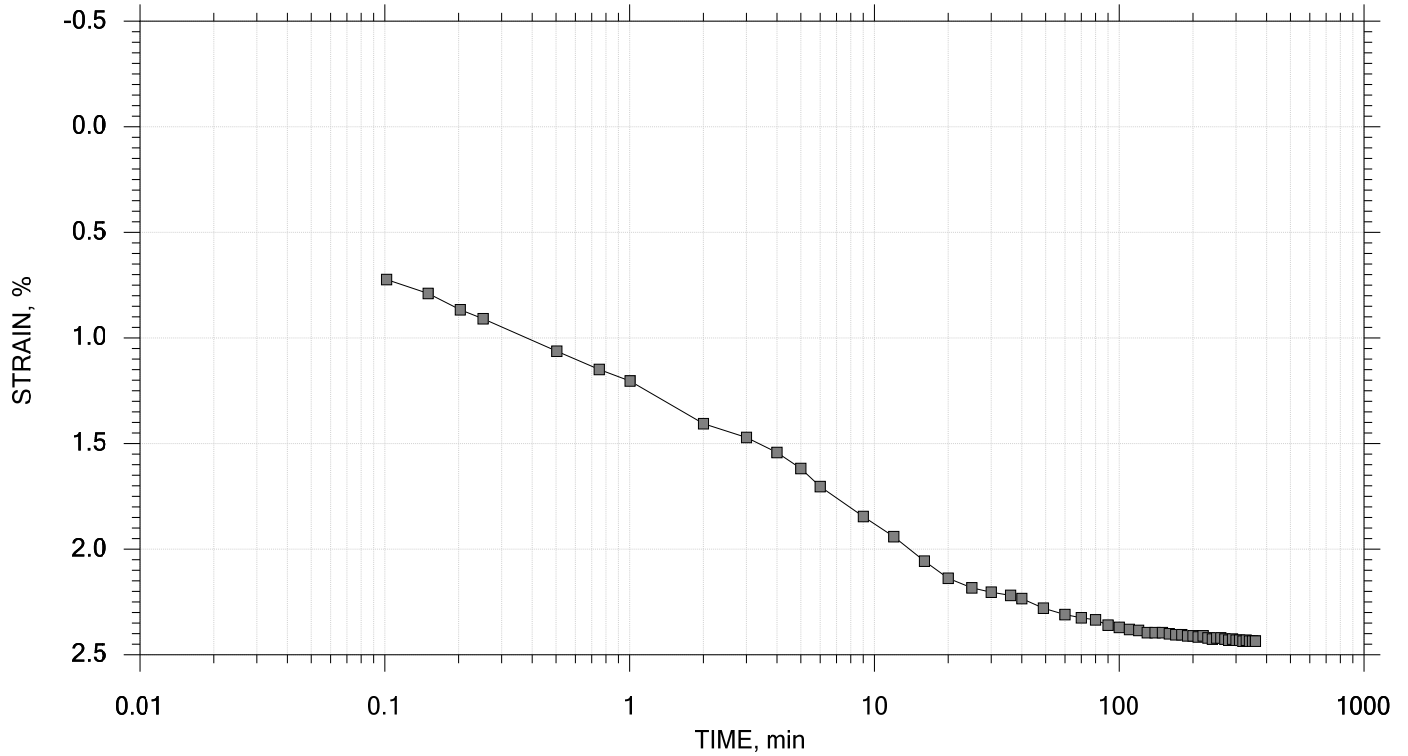
	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day	Ca %
1	500.	0.02436	1.12	2.44	0.000	0.00e+000	4.87e-005	0.00e+000	0.00e+000
2	1.00e+003	0.03947	1.09	3.95	6.022	8.87e-007	3.02e-005	1.45e-004	0.00e+000
3	2.00e+003	0.08223	0.998	8.22	32.005	1.57e-007	4.28e-005	3.62e-005	0.00e+000
4	3.00e+003	0.1160	0.925	11.6	51.914	8.91e-008	3.38e-005	1.62e-005	0.00e+000
5	4.00e+003	0.1384	0.876	13.8	0.000	0.00e+000	2.24e-005	0.00e+000	0.00e+000
6	8.00e+003	0.1845	0.776	18.4	6.832	5.87e-007	1.15e-005	3.64e-005	0.00e+000
7	4.00e+003	0.1803	0.785	18.0	0.000	0.00e+000	1.04e-006	0.00e+000	0.00e+000
8	2.00e+003	0.1768	0.792	17.7	0.000	0.00e+000	1.77e-006	0.00e+000	0.00e+000
9	1.00e+003	0.1728	0.801	17.3	0.000	0.00e+000	3.95e-006	0.00e+000	0.00e+000
10	500.	0.1675	0.812	16.7	0.000	0.00e+000	1.06e-005	0.00e+000	0.00e+000
11	1.00e+003	0.1692	0.809	16.9	0.000	0.00e+000	3.44e-006	0.00e+000	0.00e+000
12	2.00e+003	0.1737	0.799	17.4	0.000	0.00e+000	4.46e-006	0.00e+000	0.00e+000
13	4.00e+003	0.1810	0.783	18.1	2.679	1.44e-006	3.67e-006	2.85e-005	0.00e+000
14	8.00e+003	0.1957	0.751	19.6	0.000	0.00e+000	3.67e-006	0.00e+000	0.00e+000
15	1.60e+004	0.2296	0.677	23.0	3.652	9.67e-007	4.25e-006	2.22e-005	0.00e+000


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 15

Stress: 500 psf



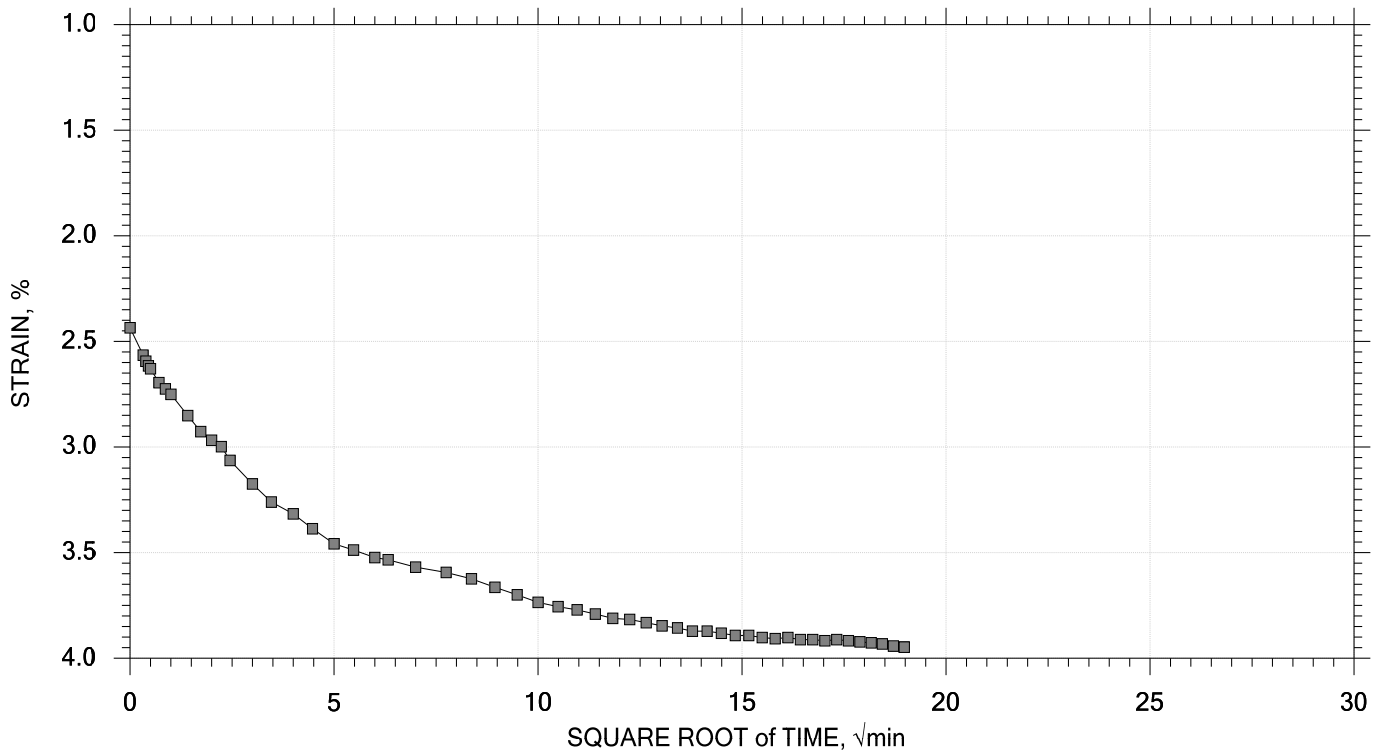
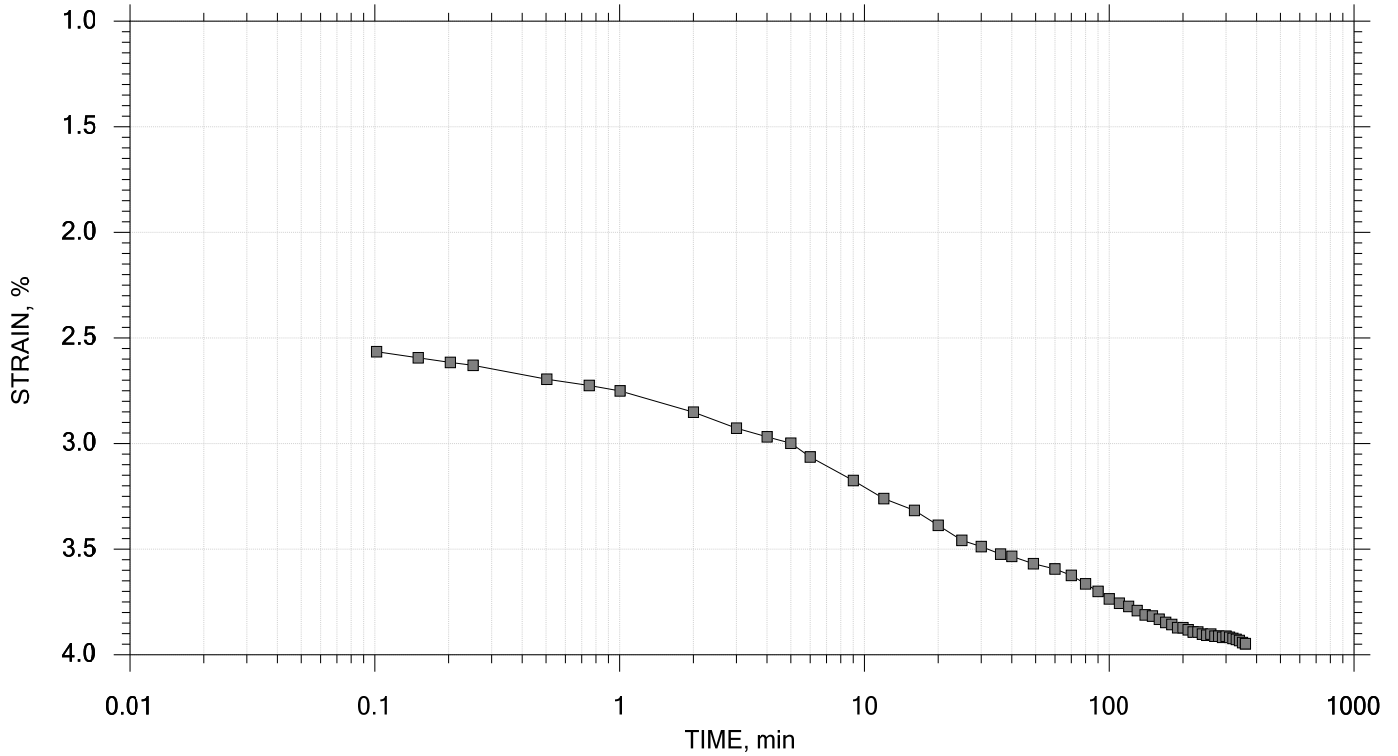
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 138 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 1000 psf



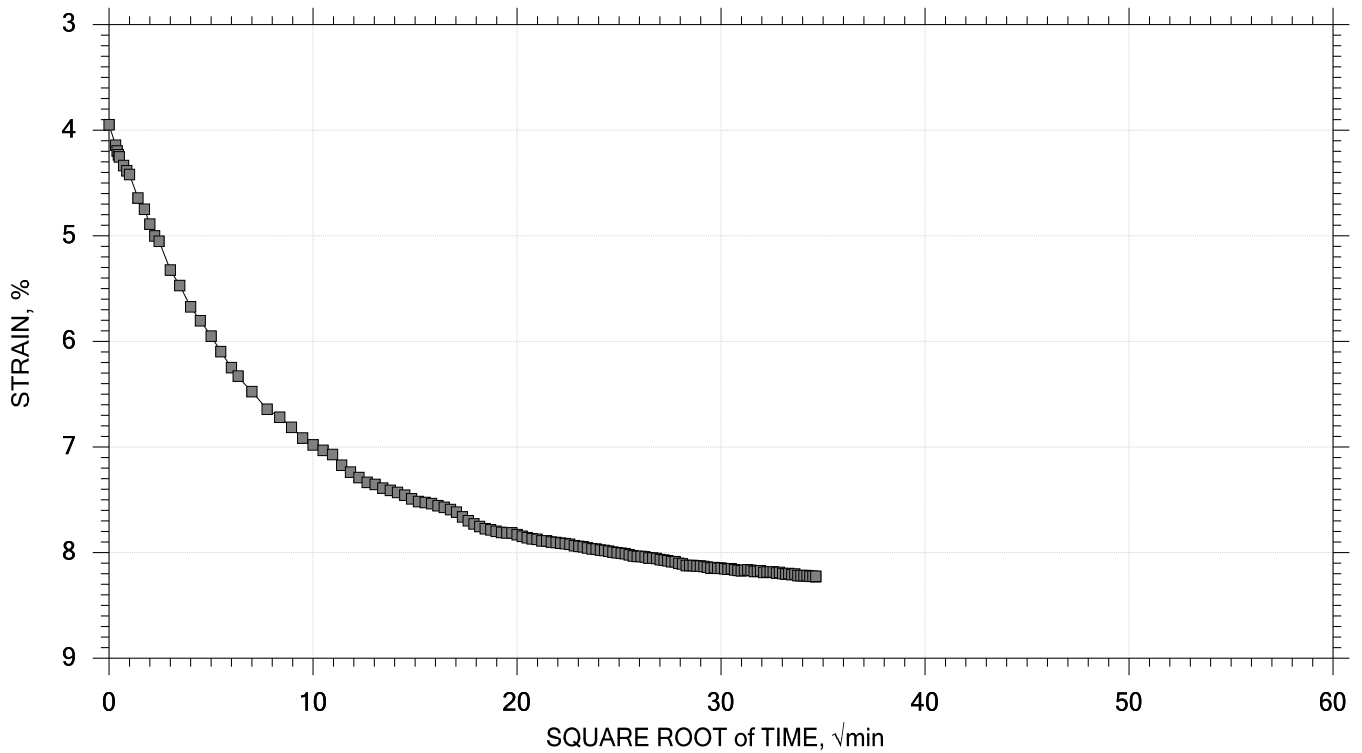
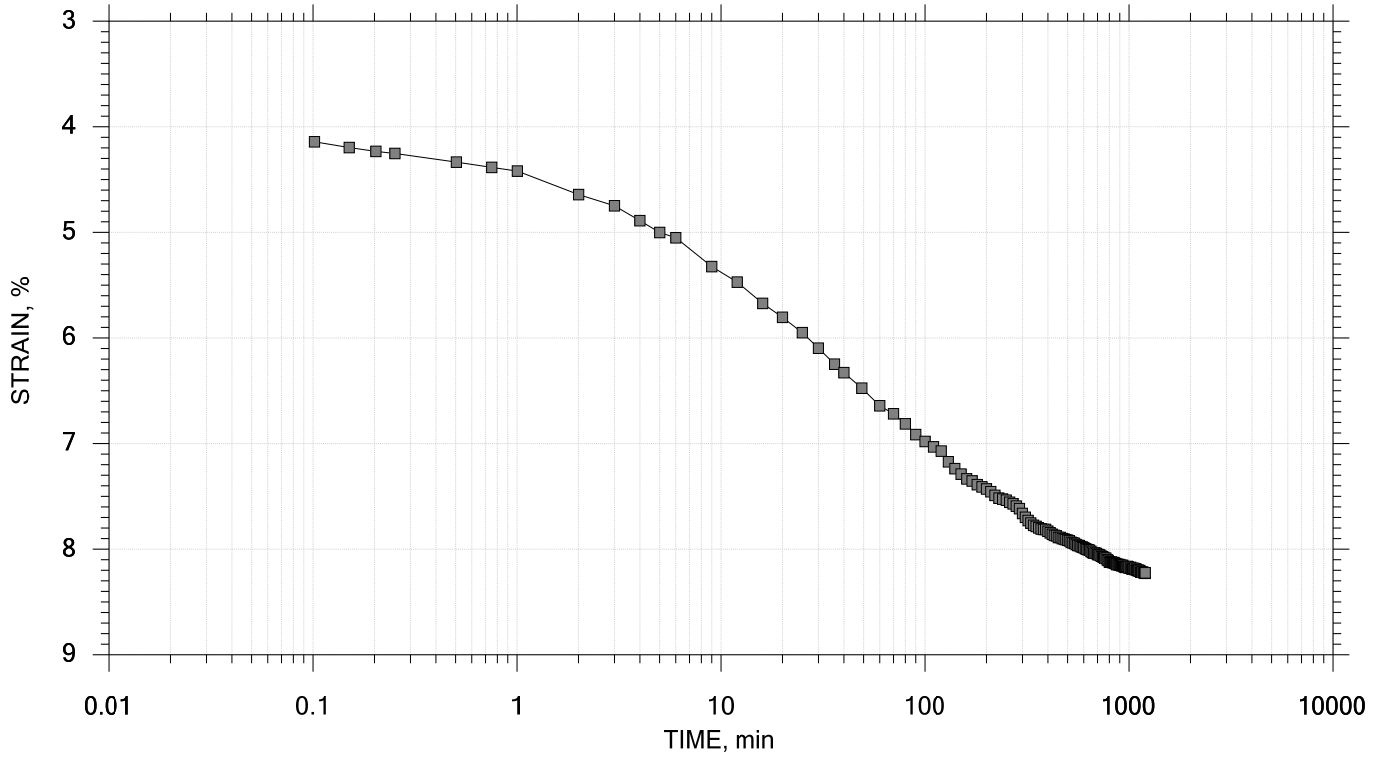
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 139 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 2000 psf



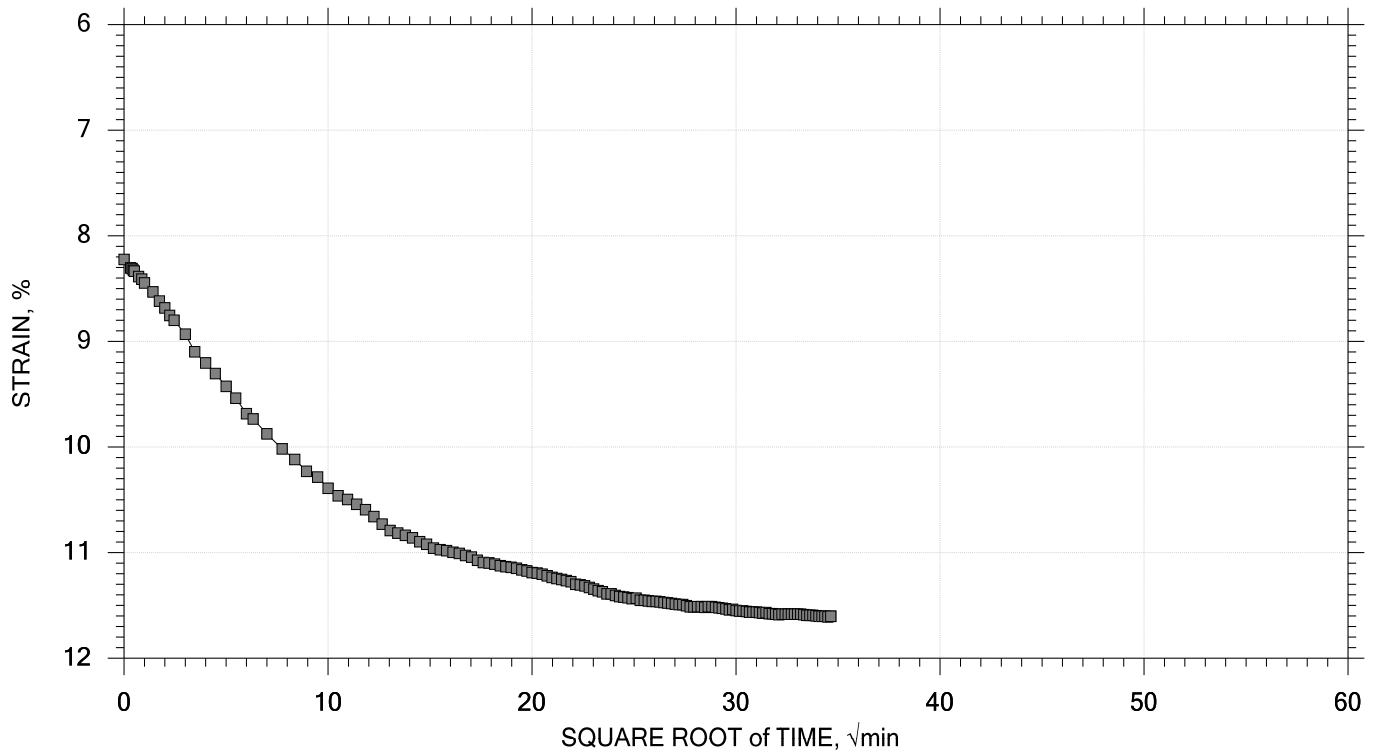
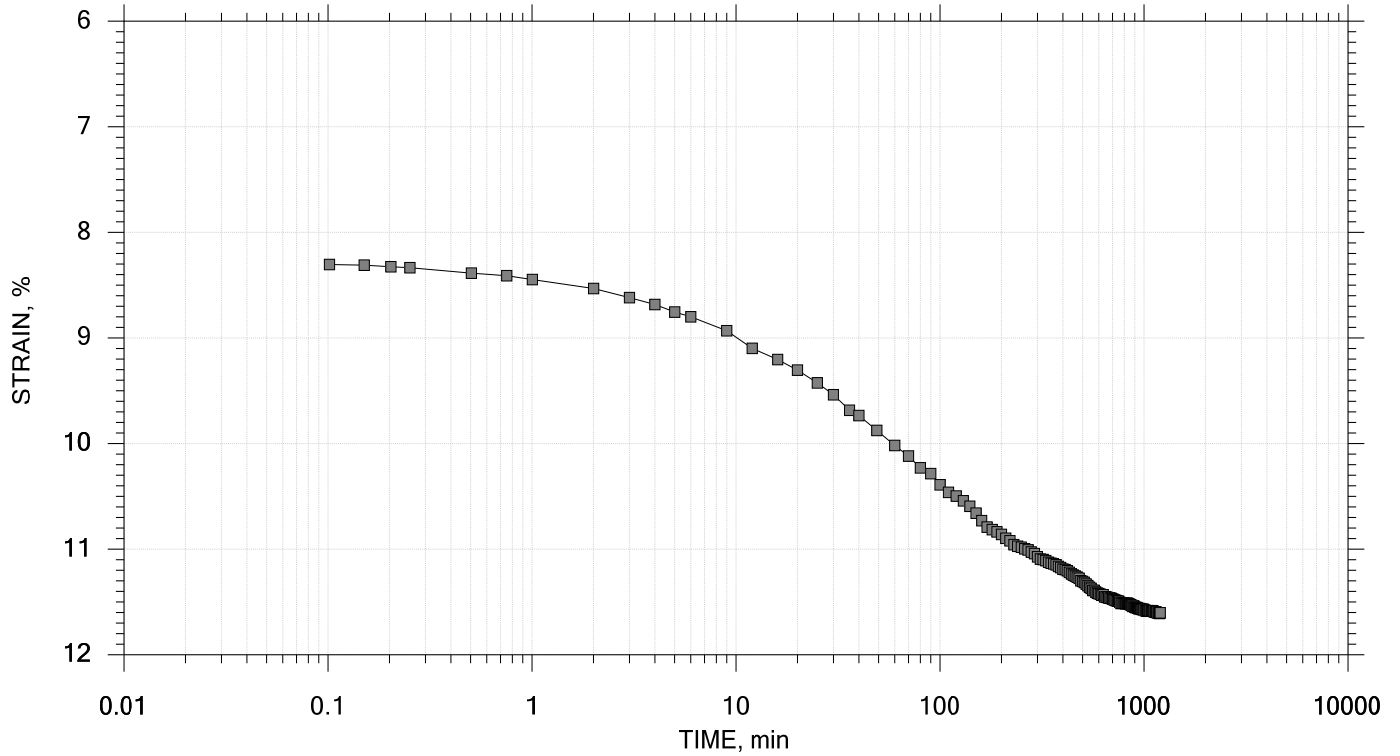
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 140 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 3000 psf



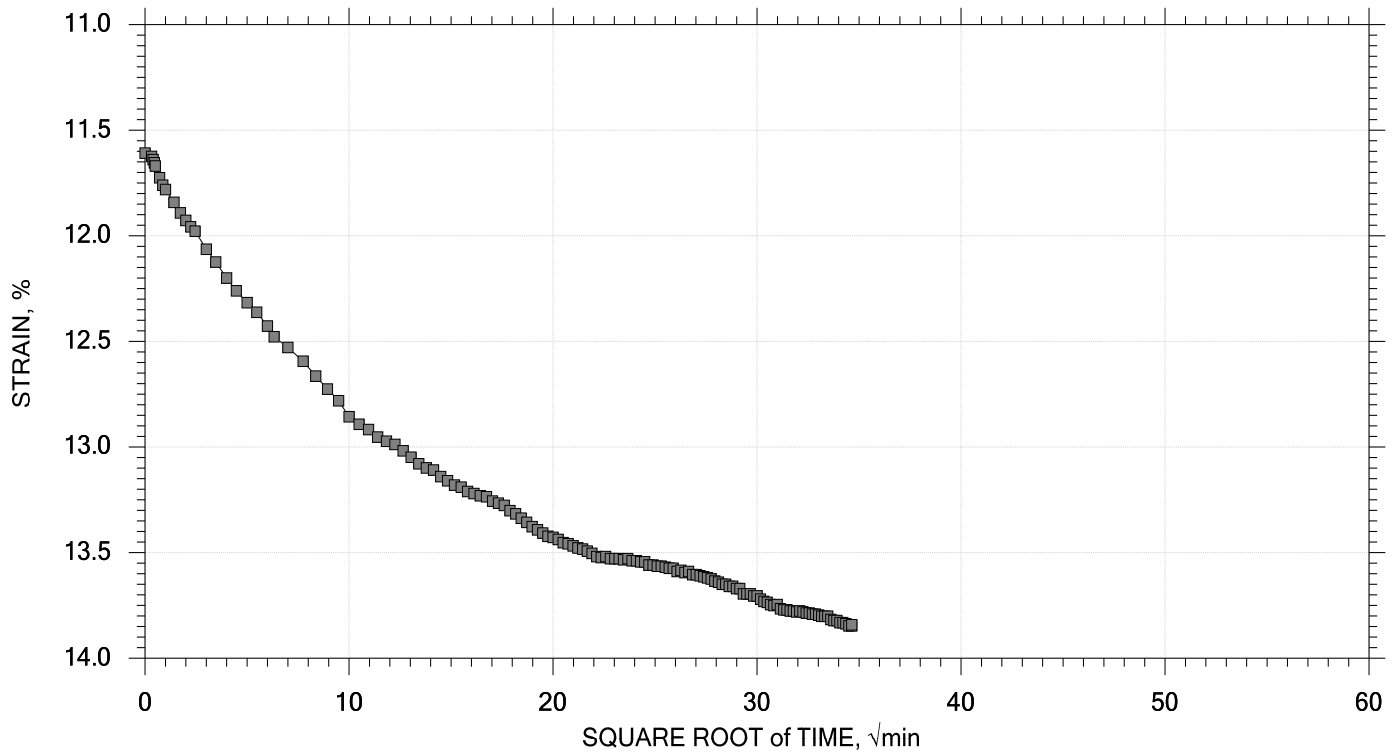
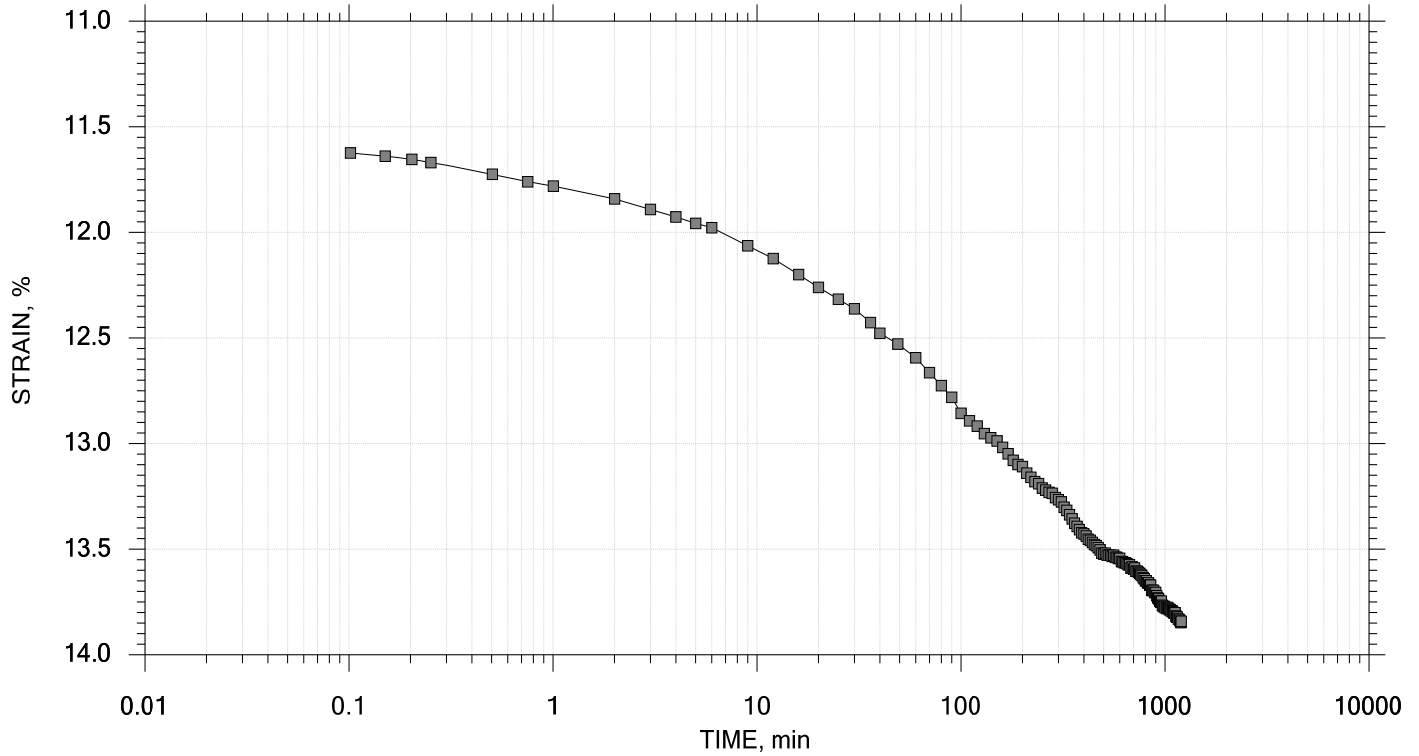
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 141 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 4000 psf



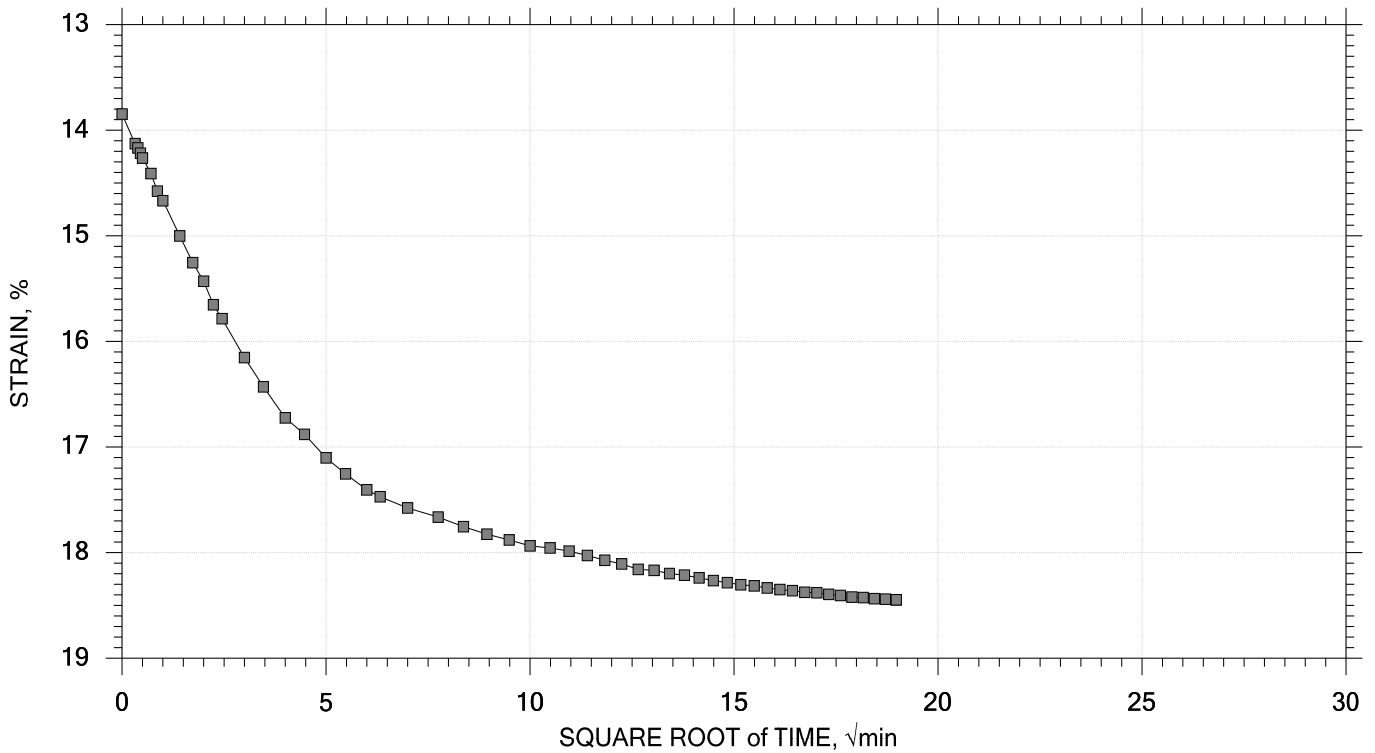
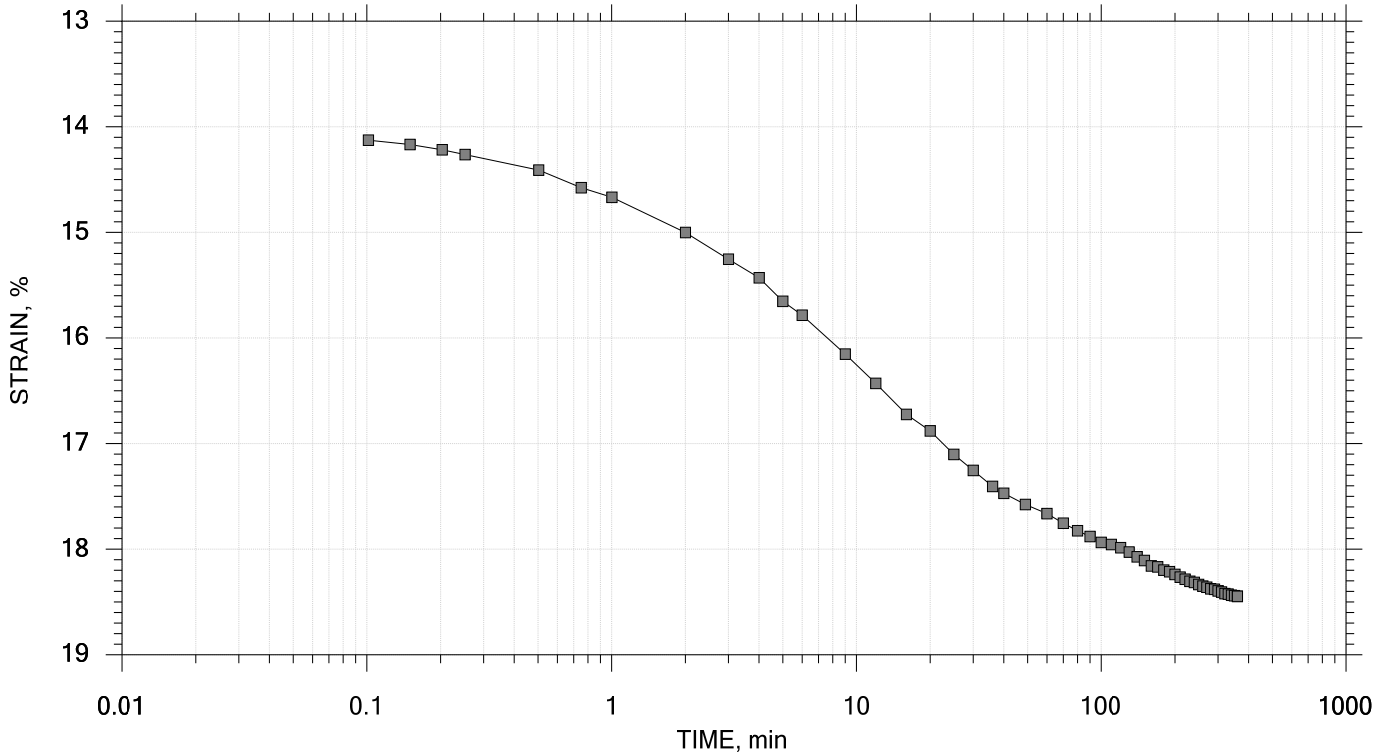
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 142 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 8000 psf



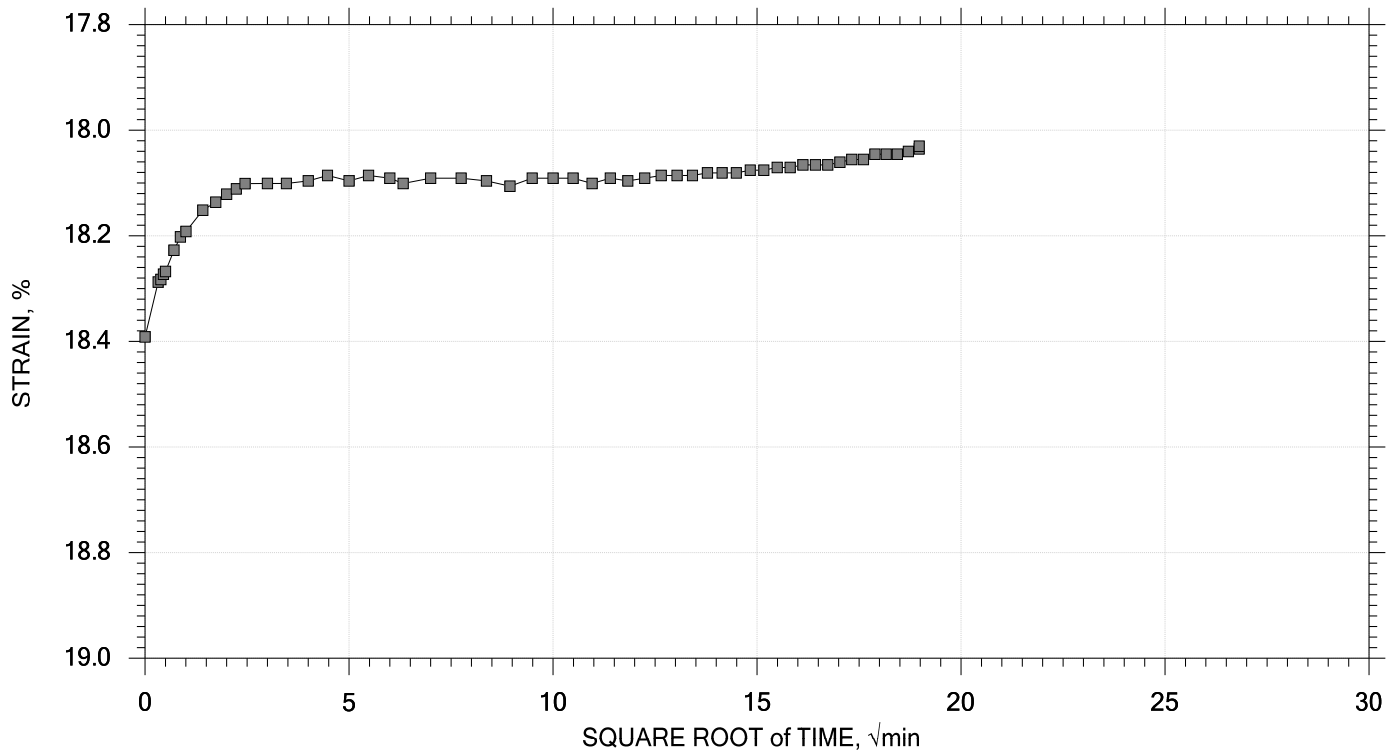
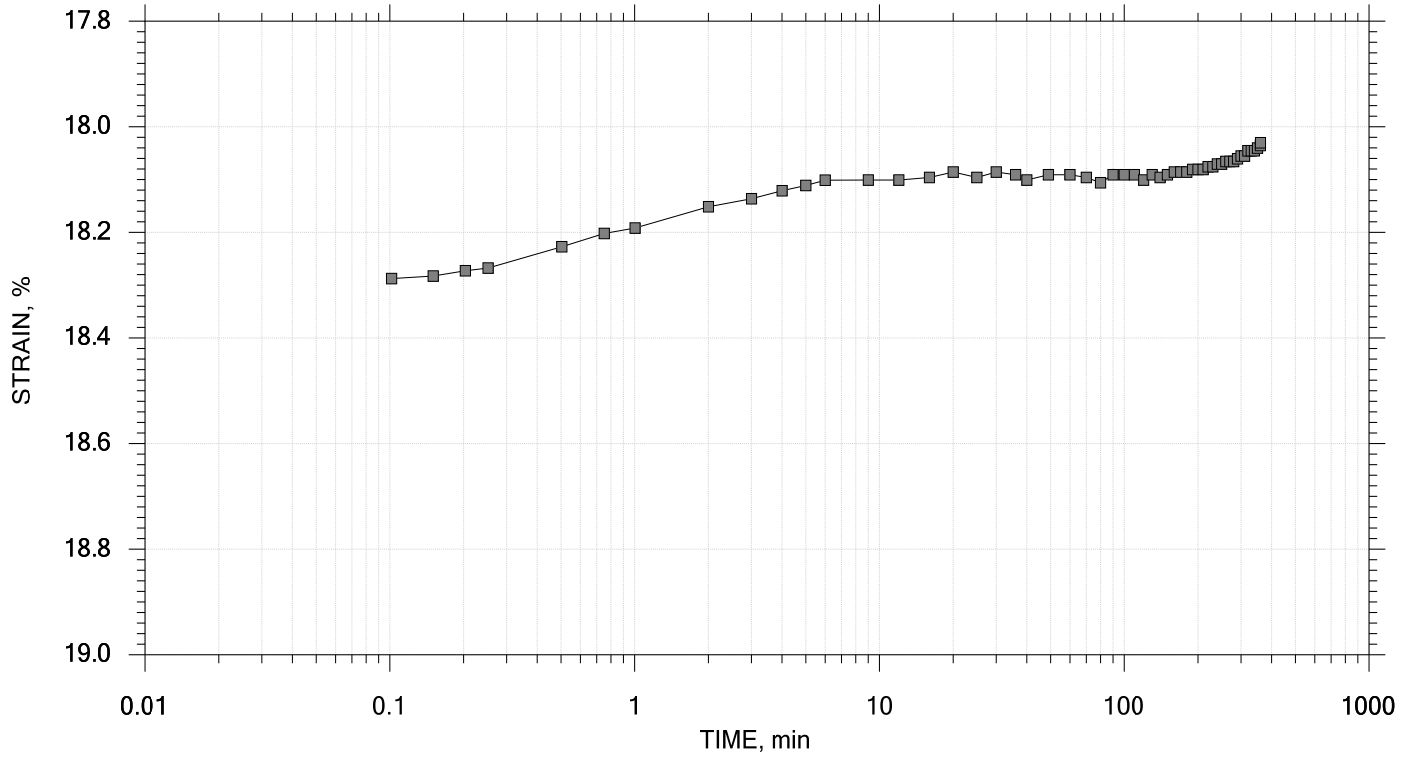
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 143 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 144 of 301		

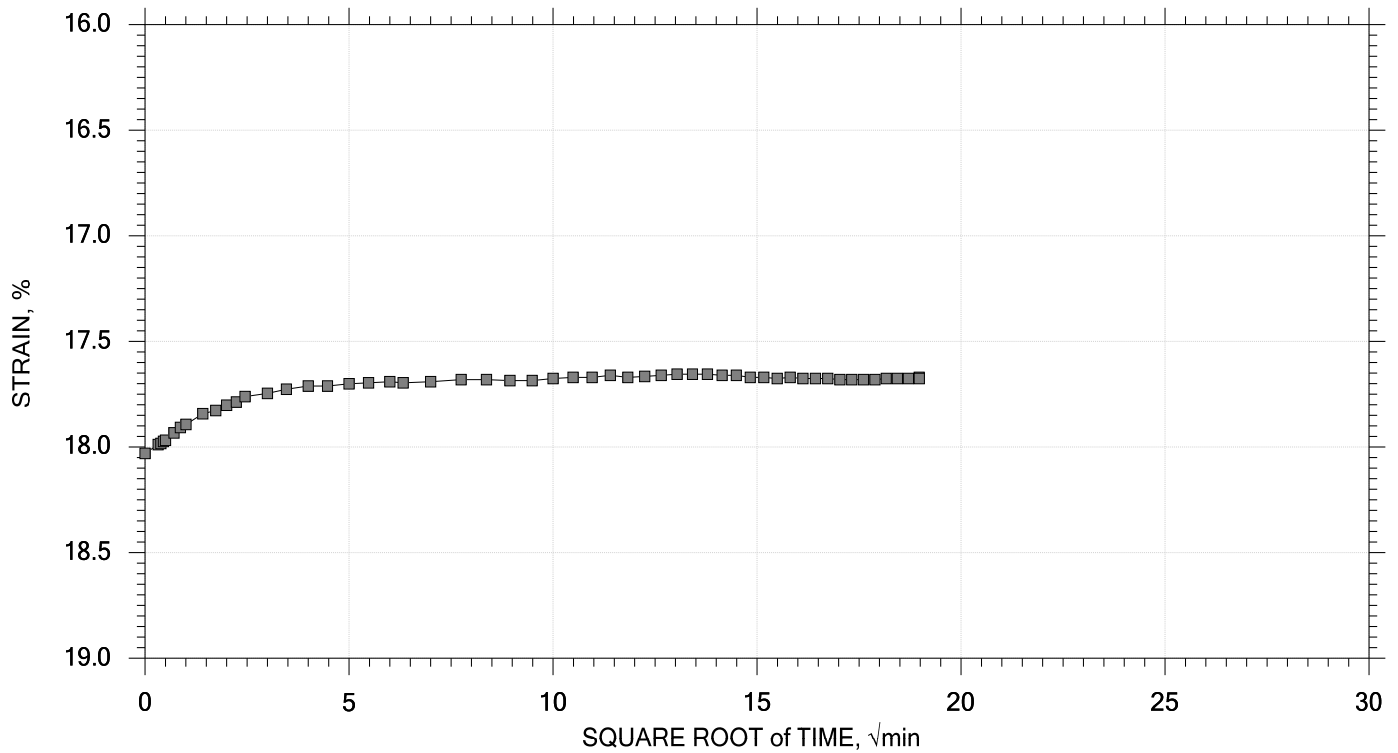
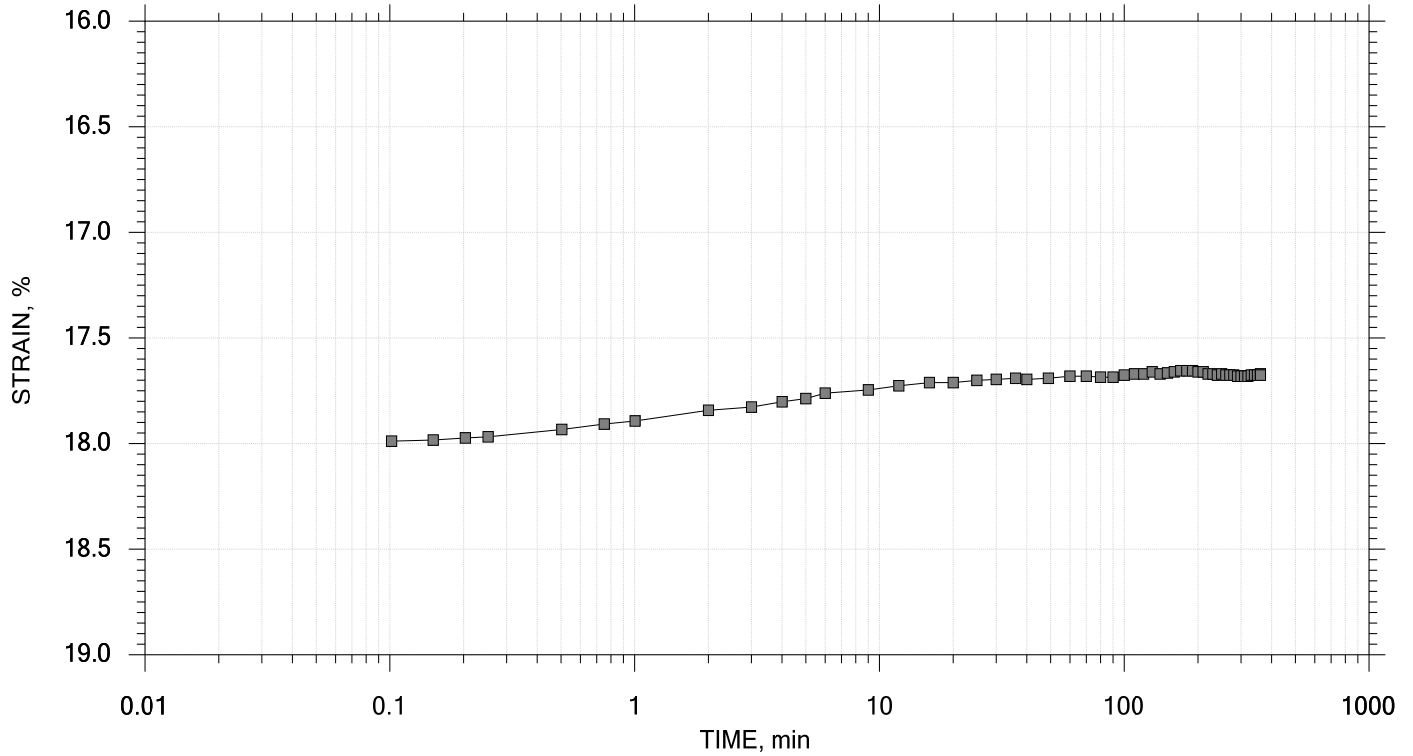



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 2000 psf



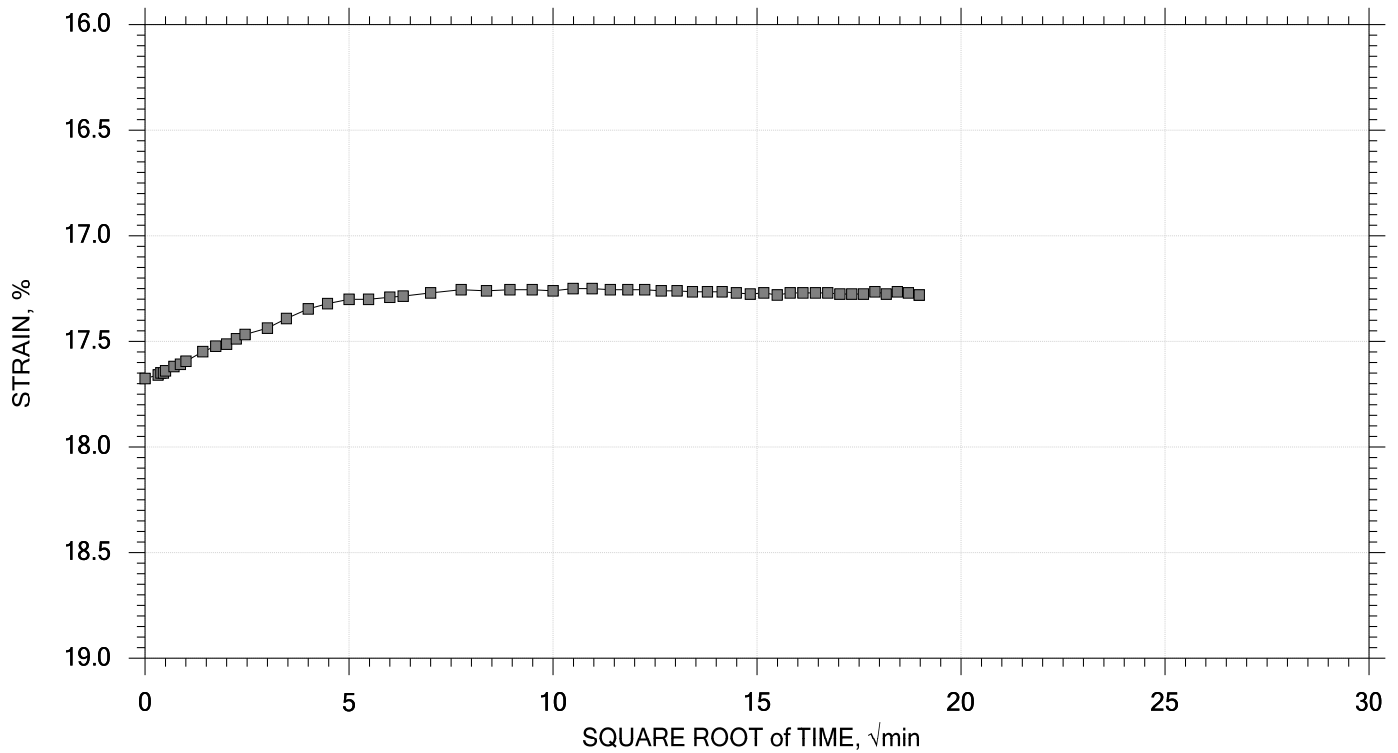
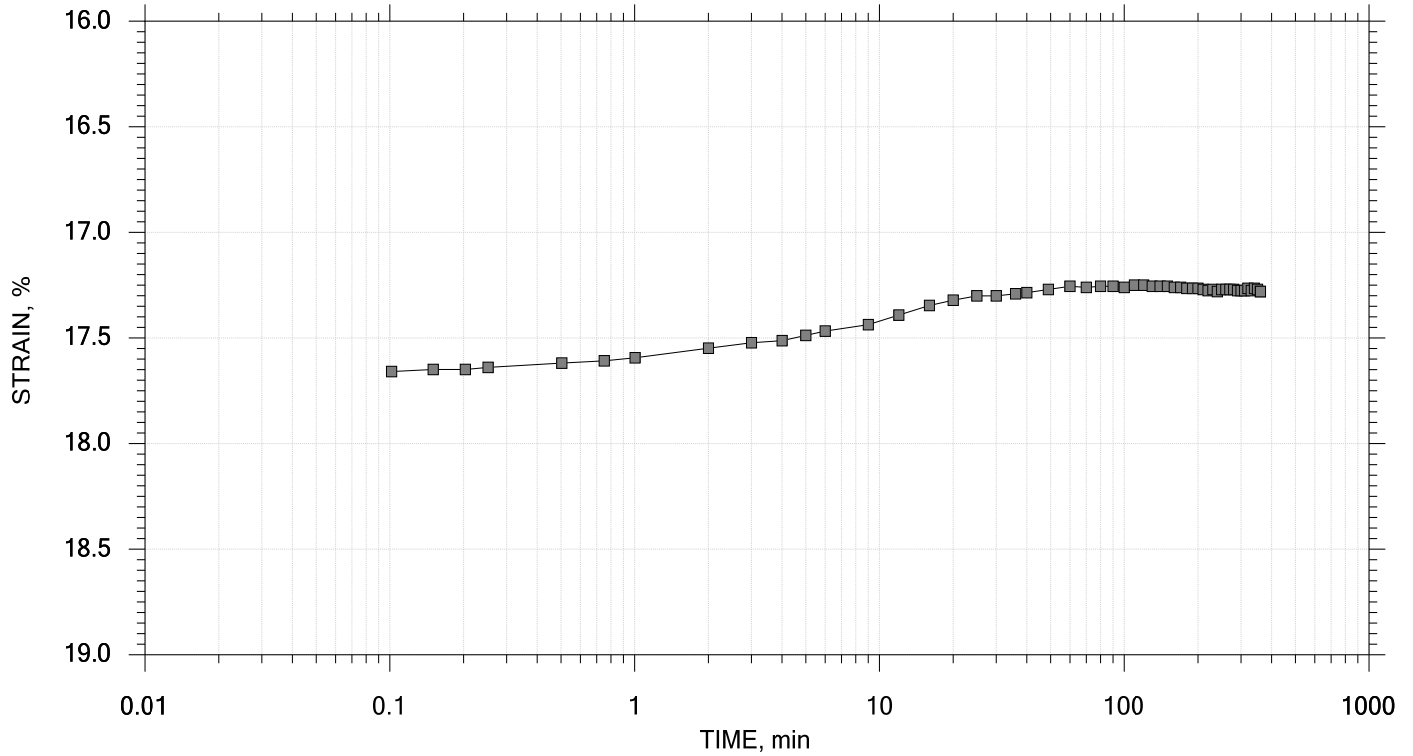
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 145 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 1000 psf



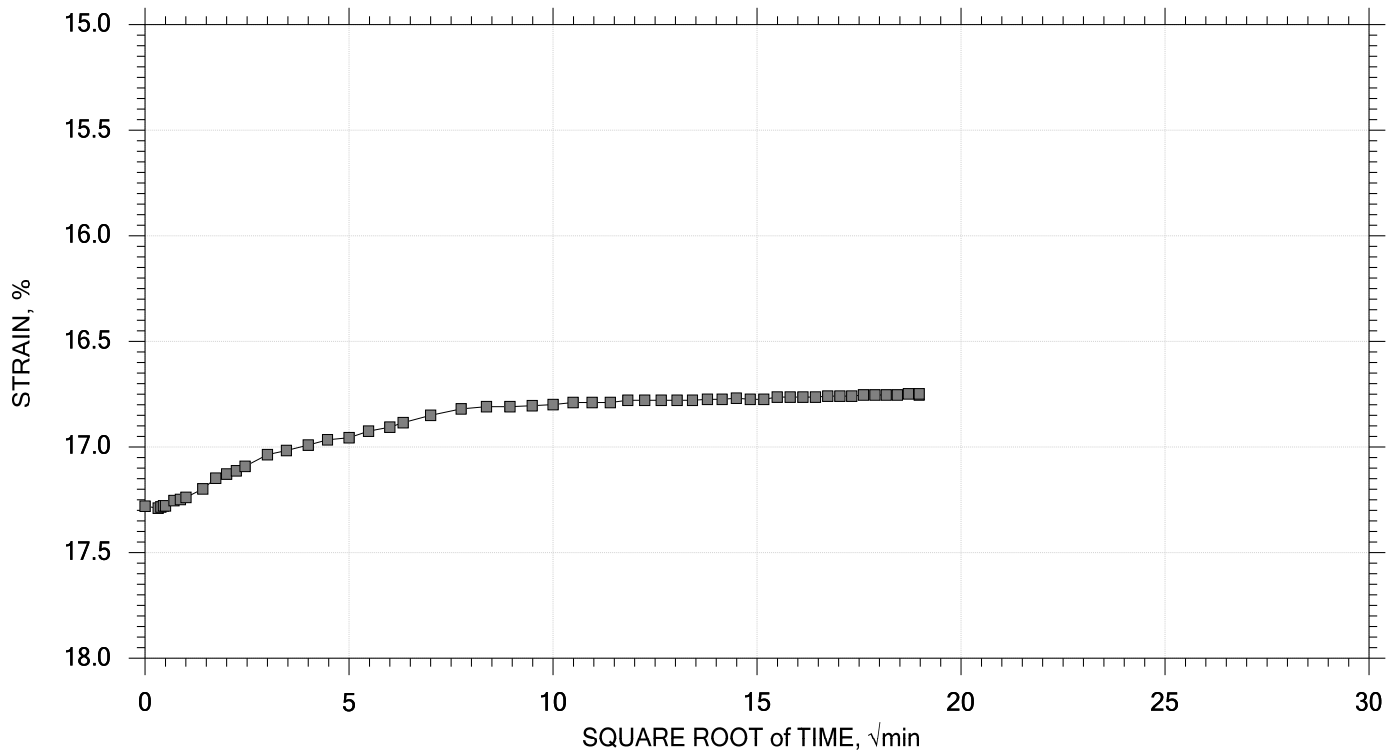
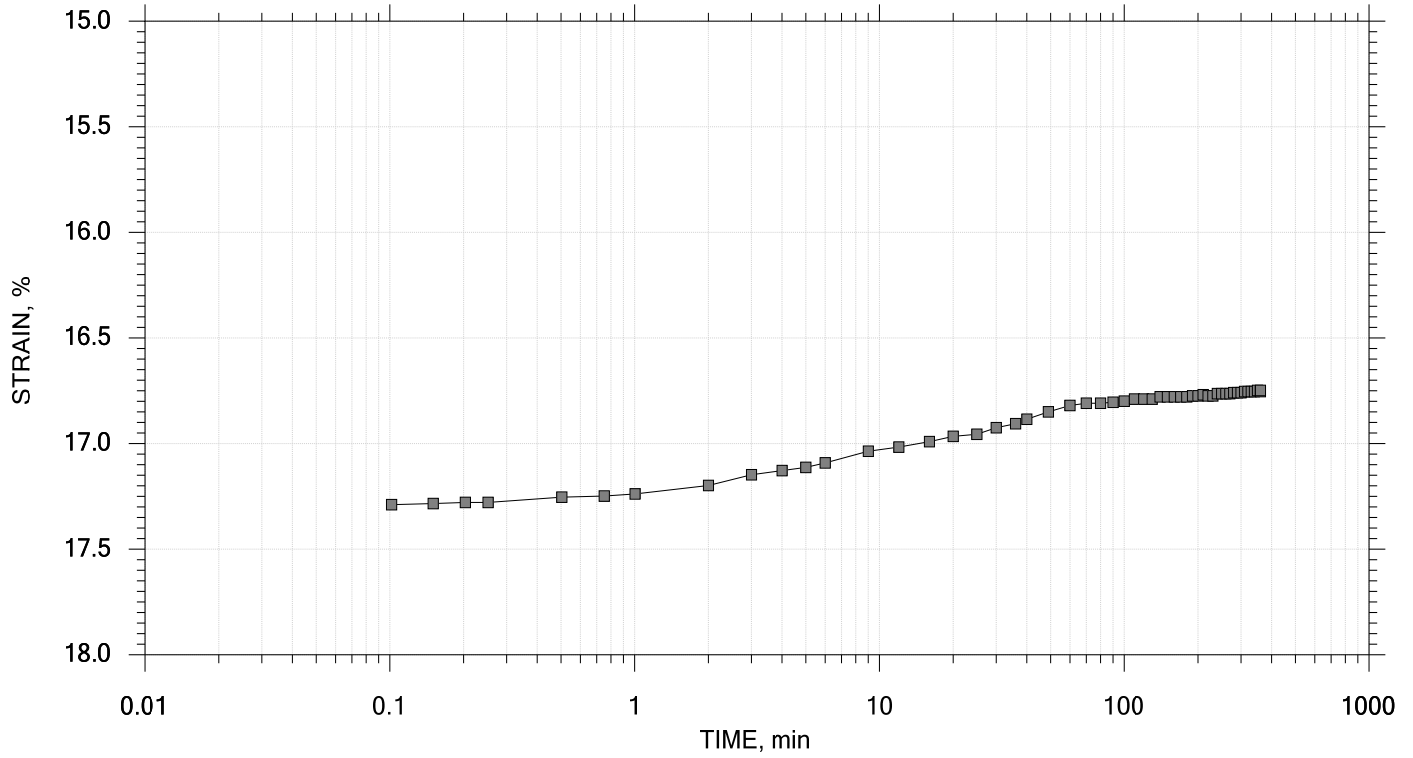
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 146 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 500 psf



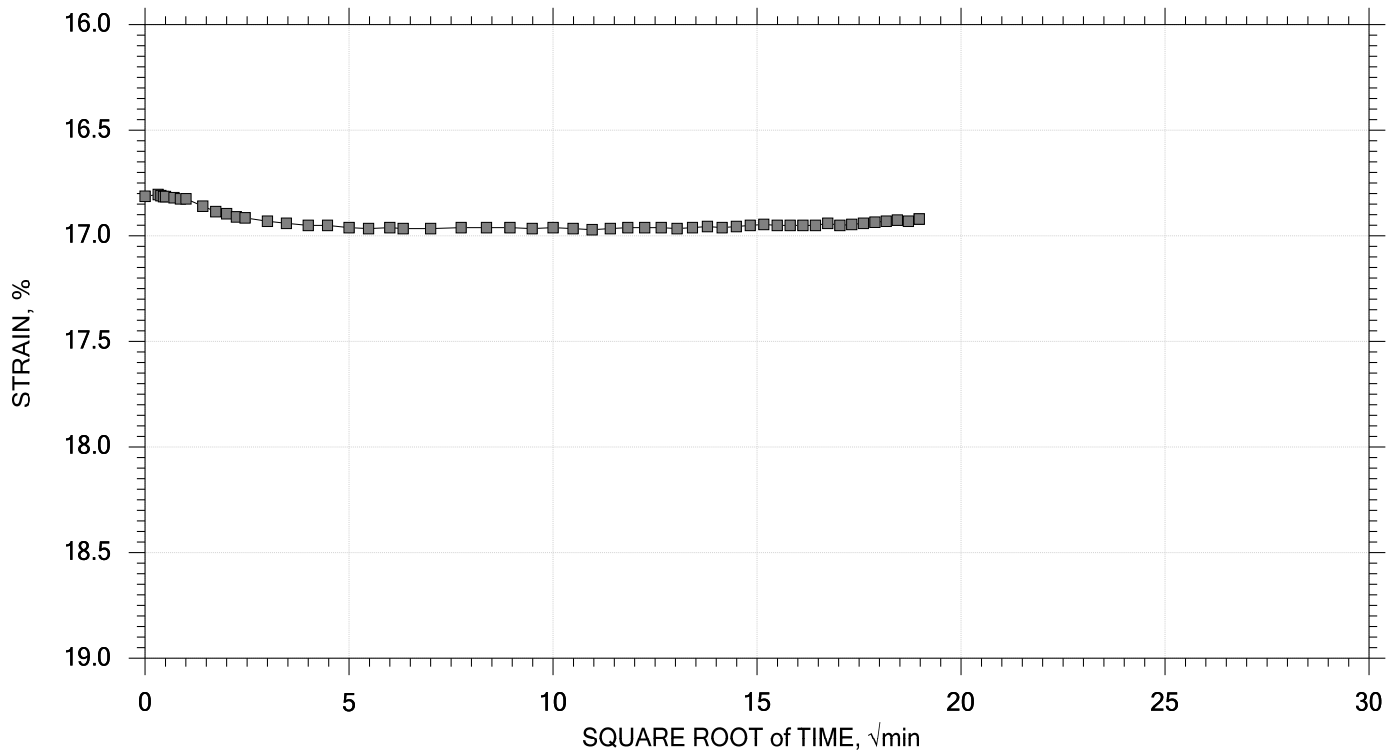
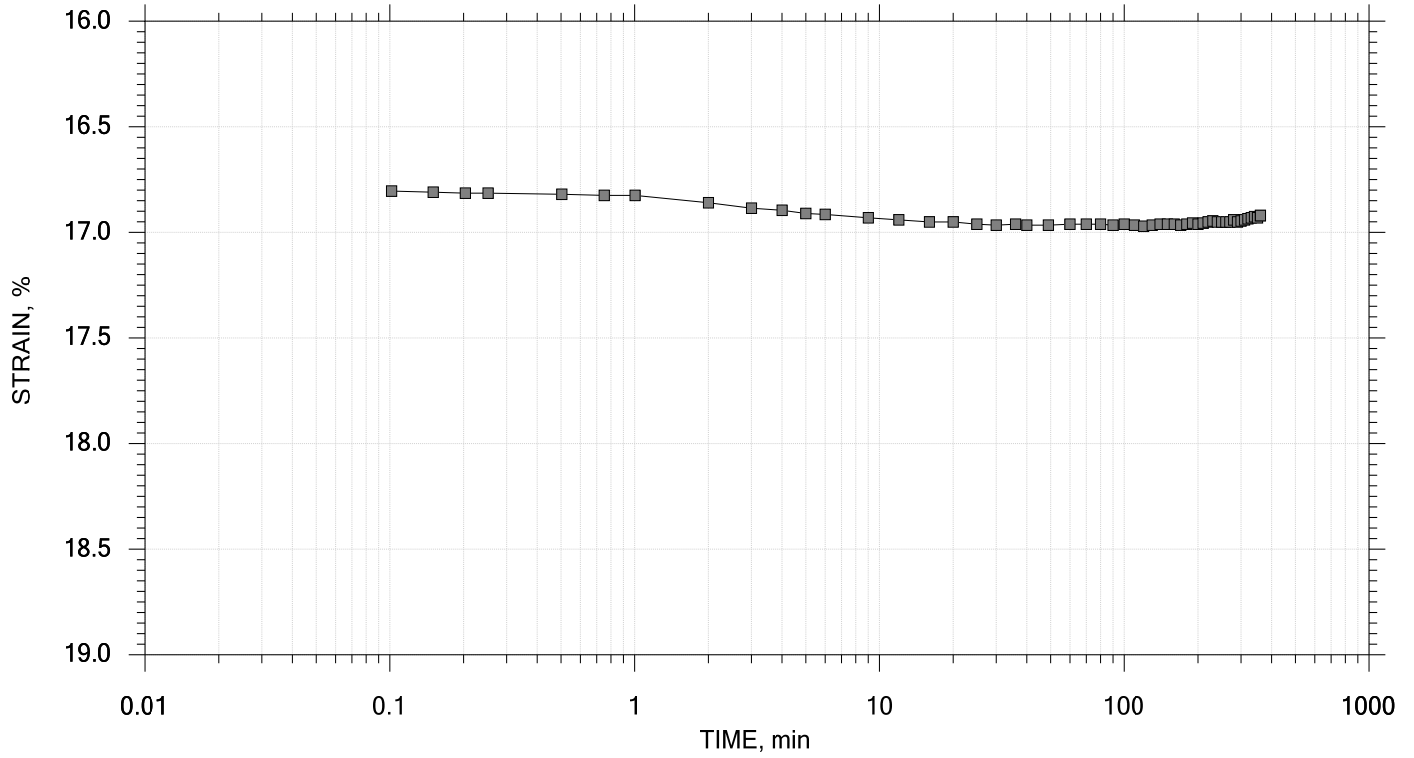
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 147 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 1000 psf



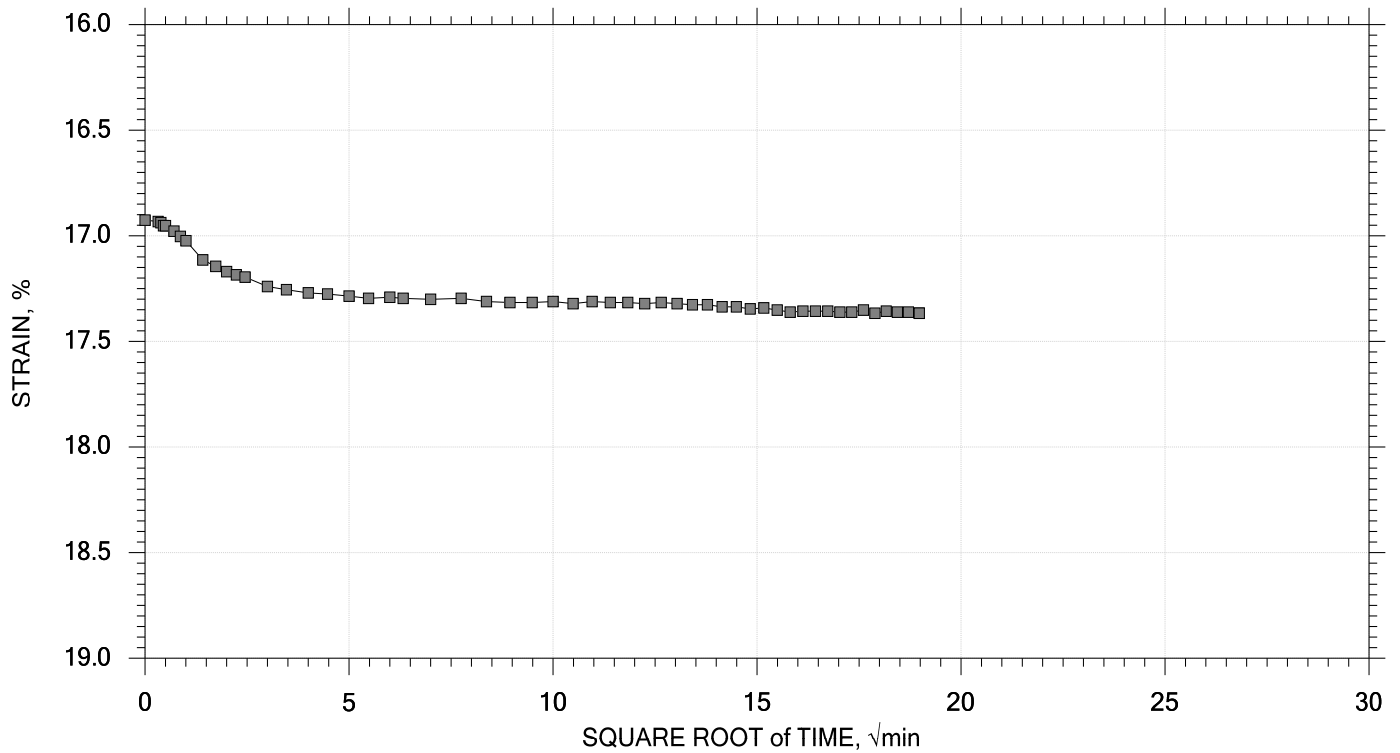
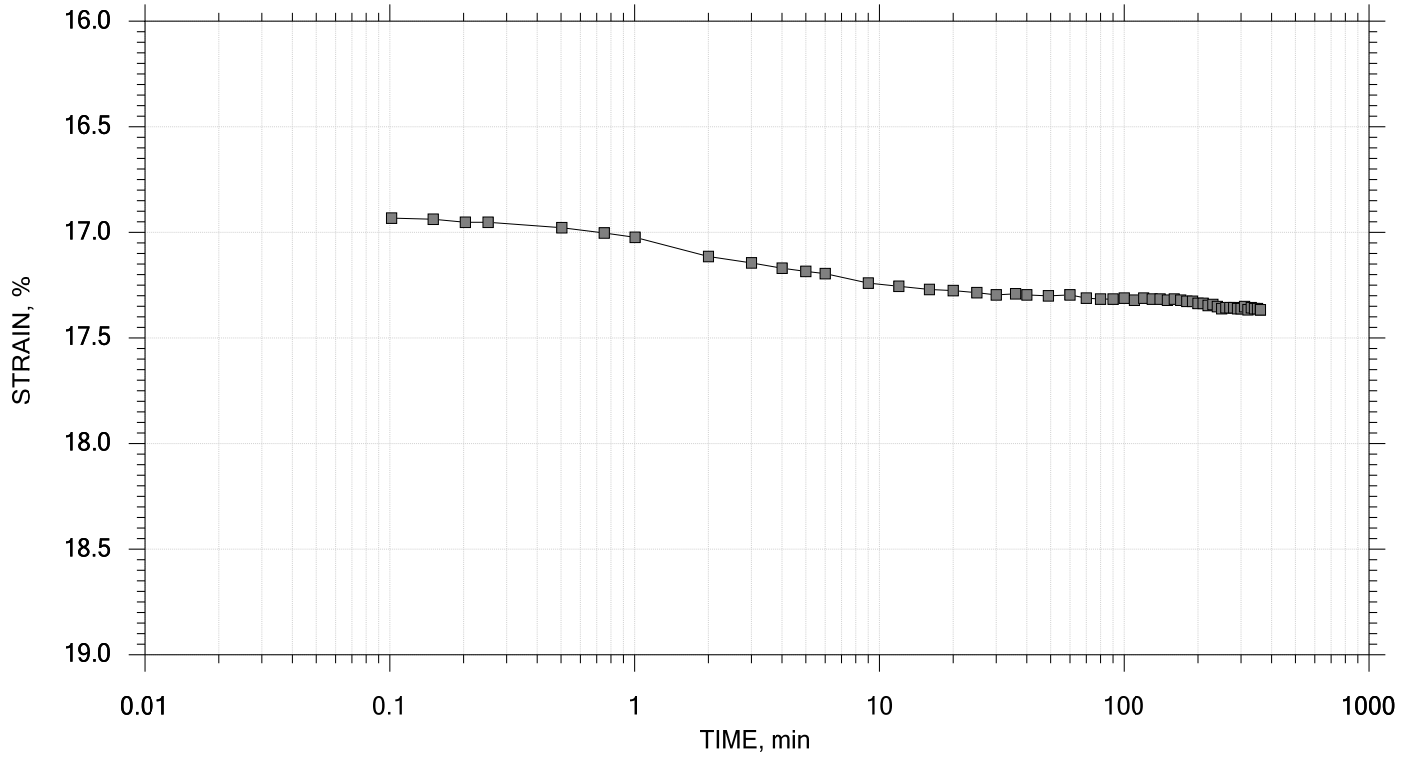
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 148 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2000 psf



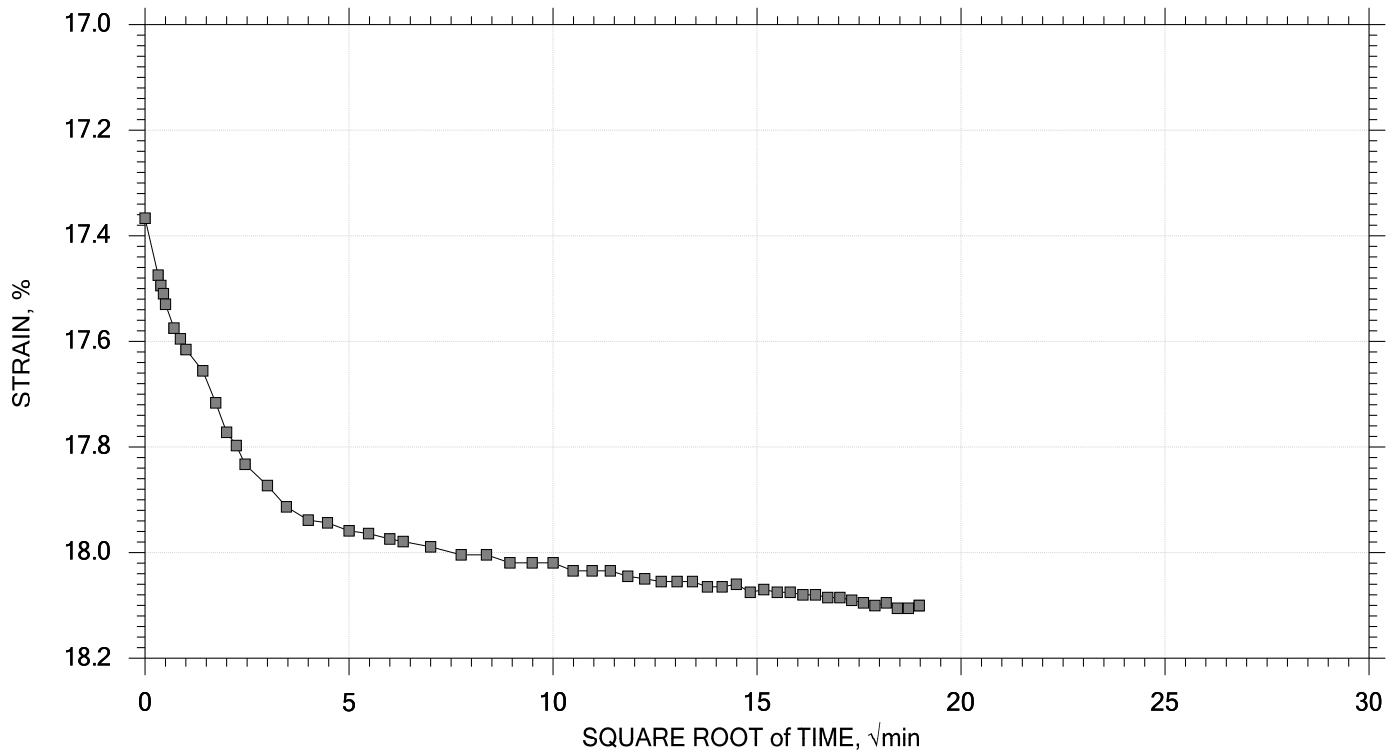
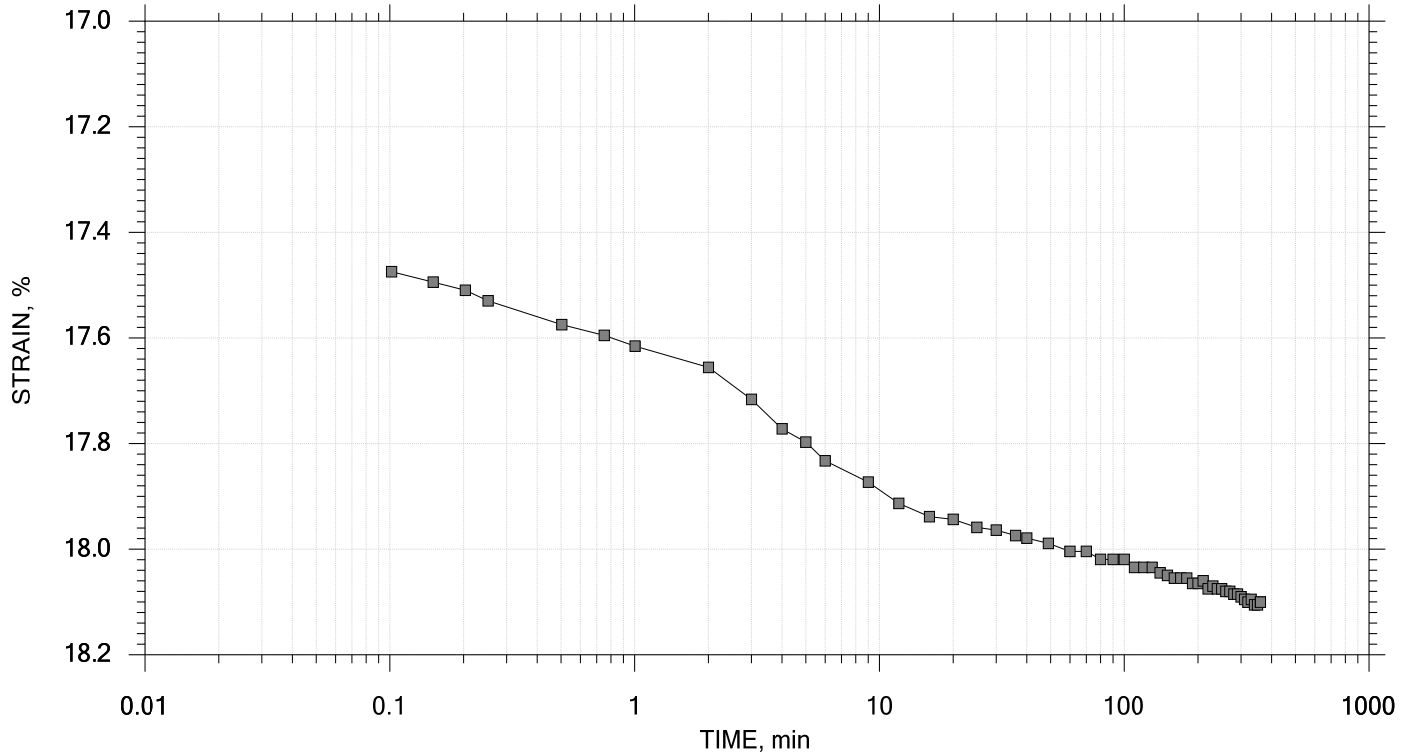
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 149 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 4000 psf



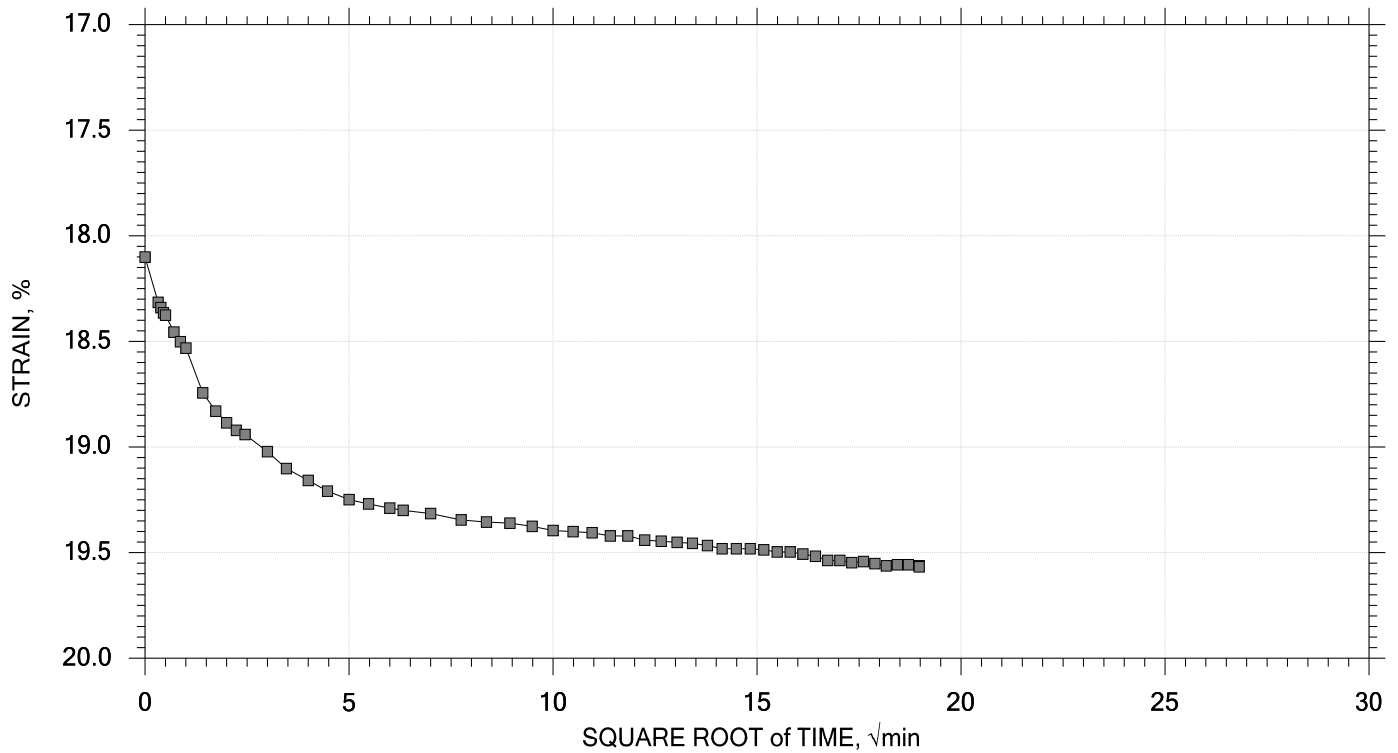
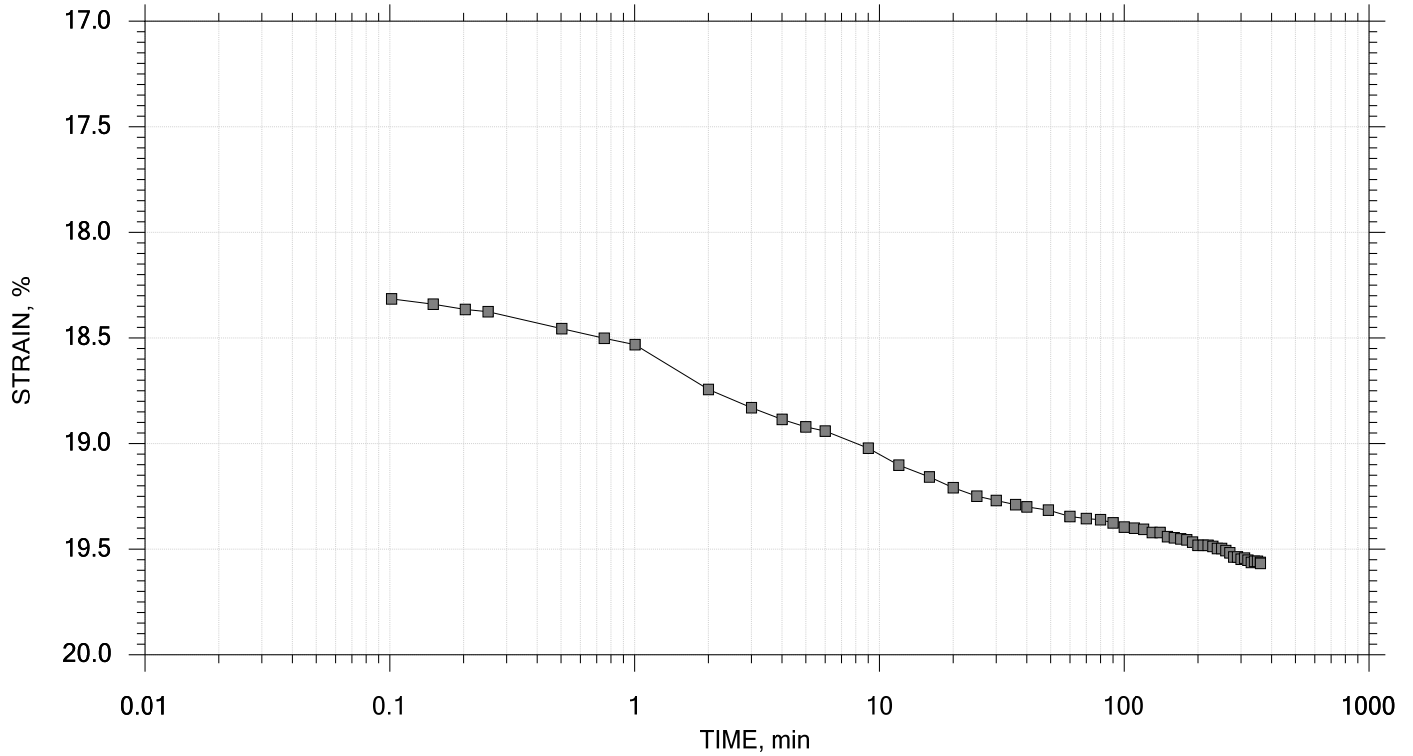
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 150 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 8000 psf



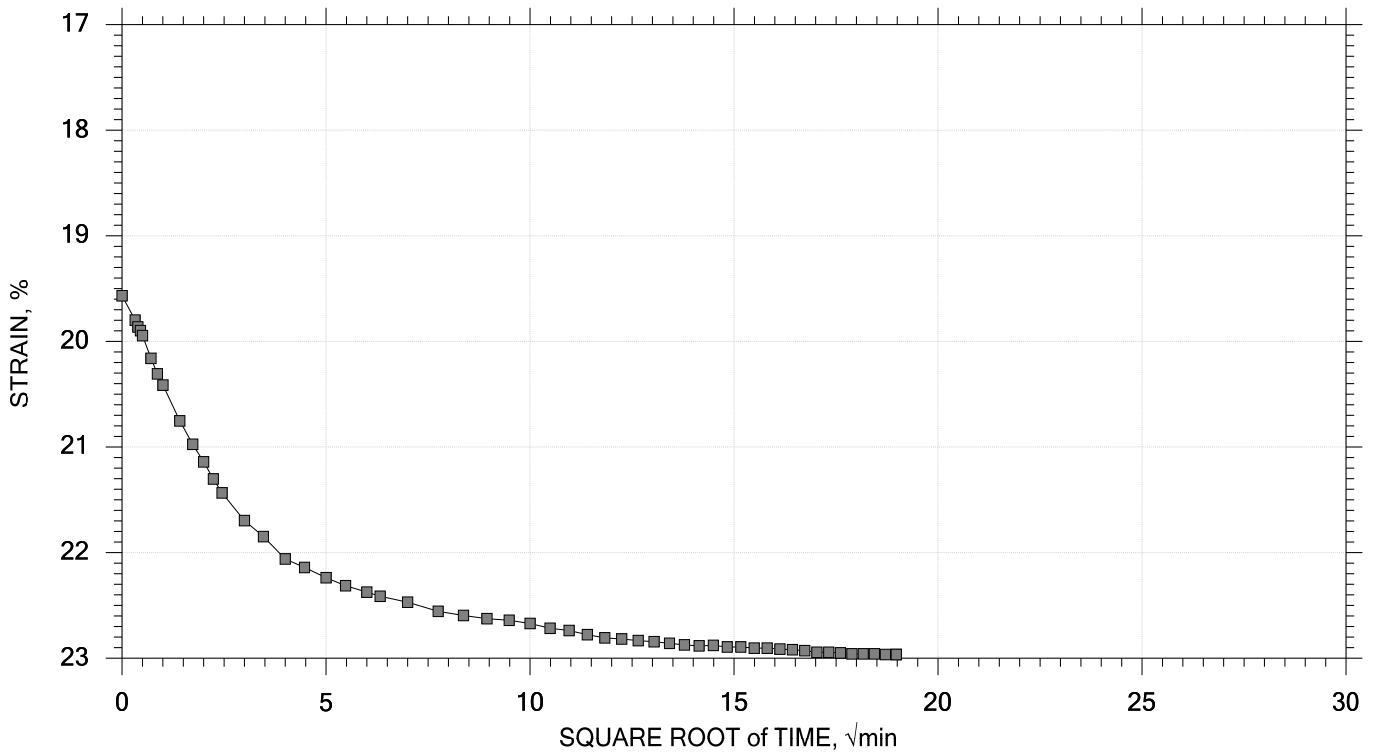
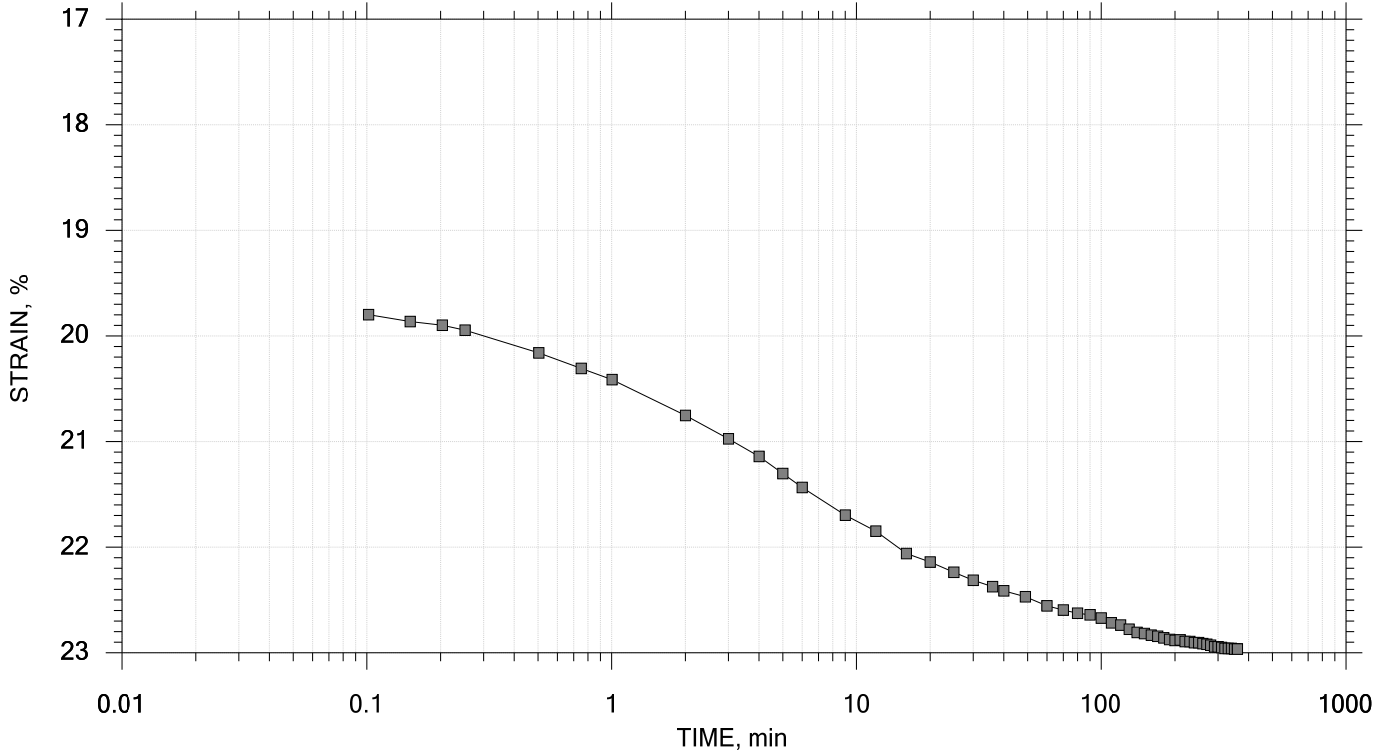
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 151 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

Stress: 16000 psf

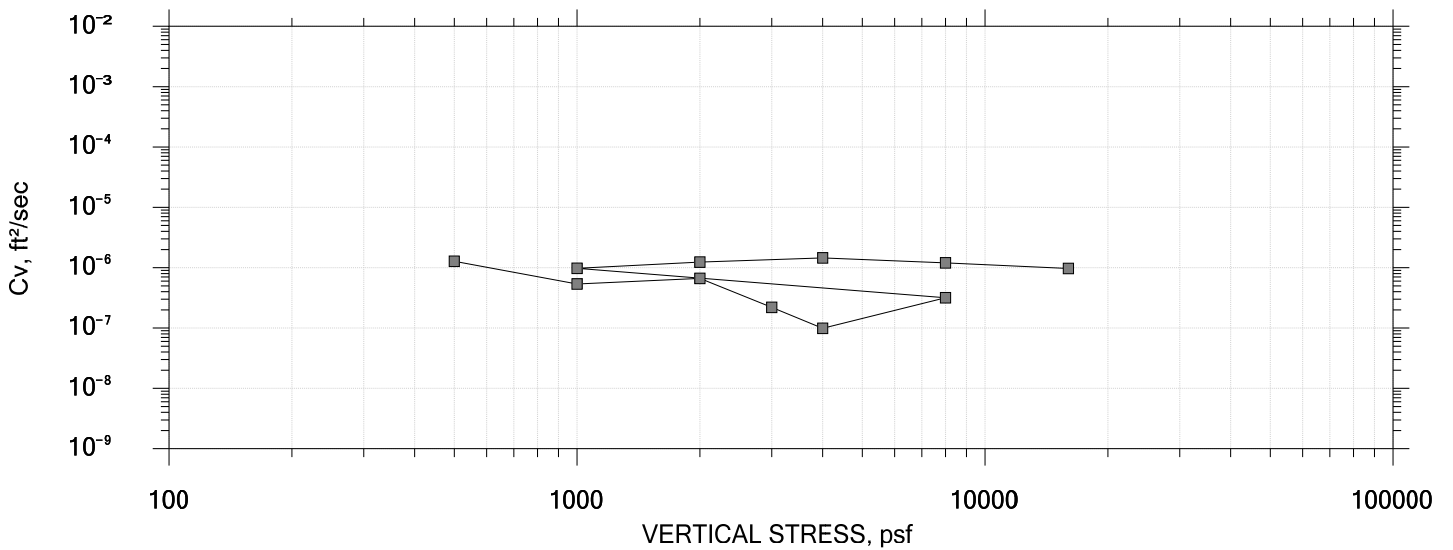
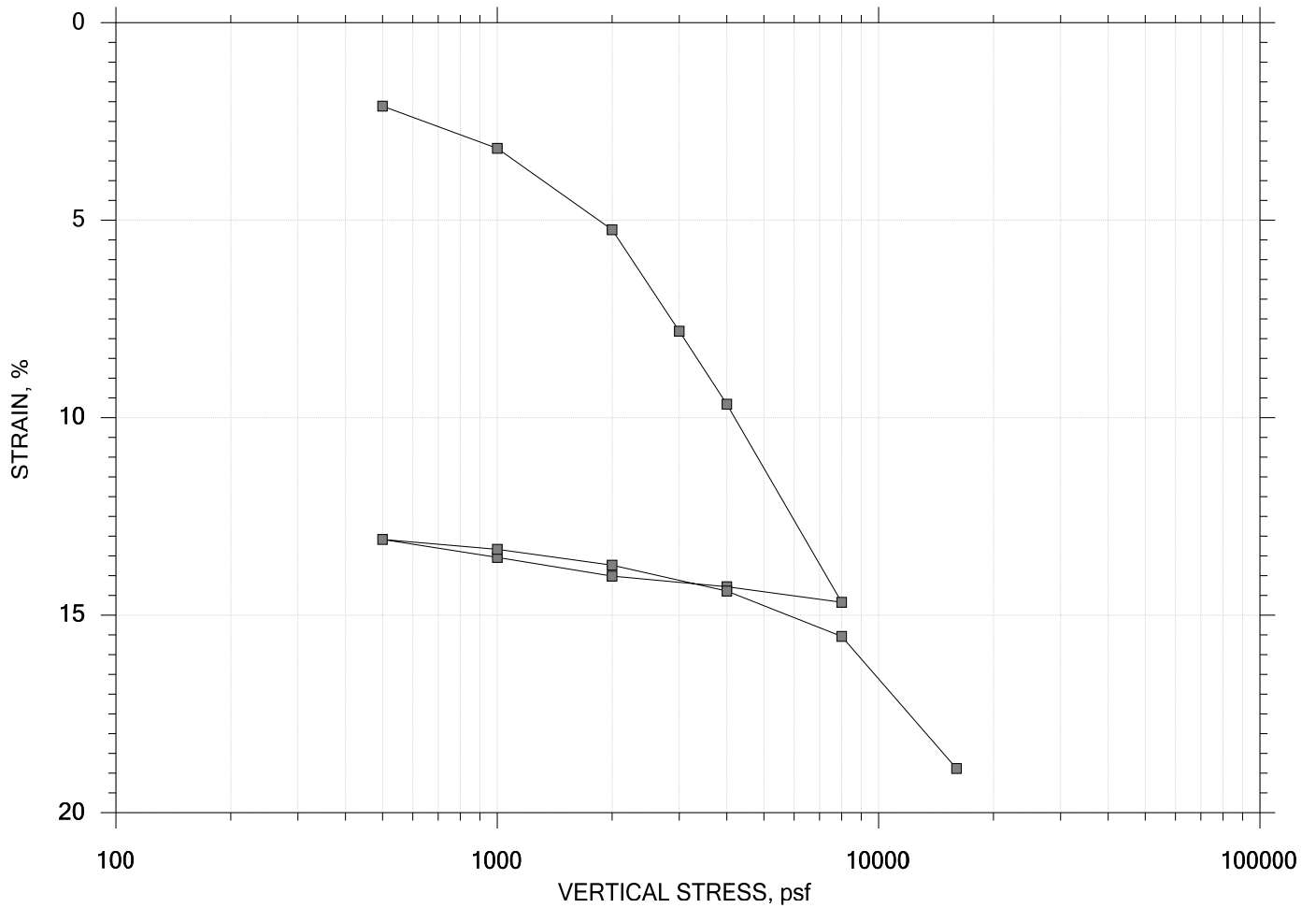



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 07/26/18	Test No.: IP-1
	Depth: 30-32 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 152 of 301		



# One-Dimensional Consolidation by ASTM D2435 - Method B

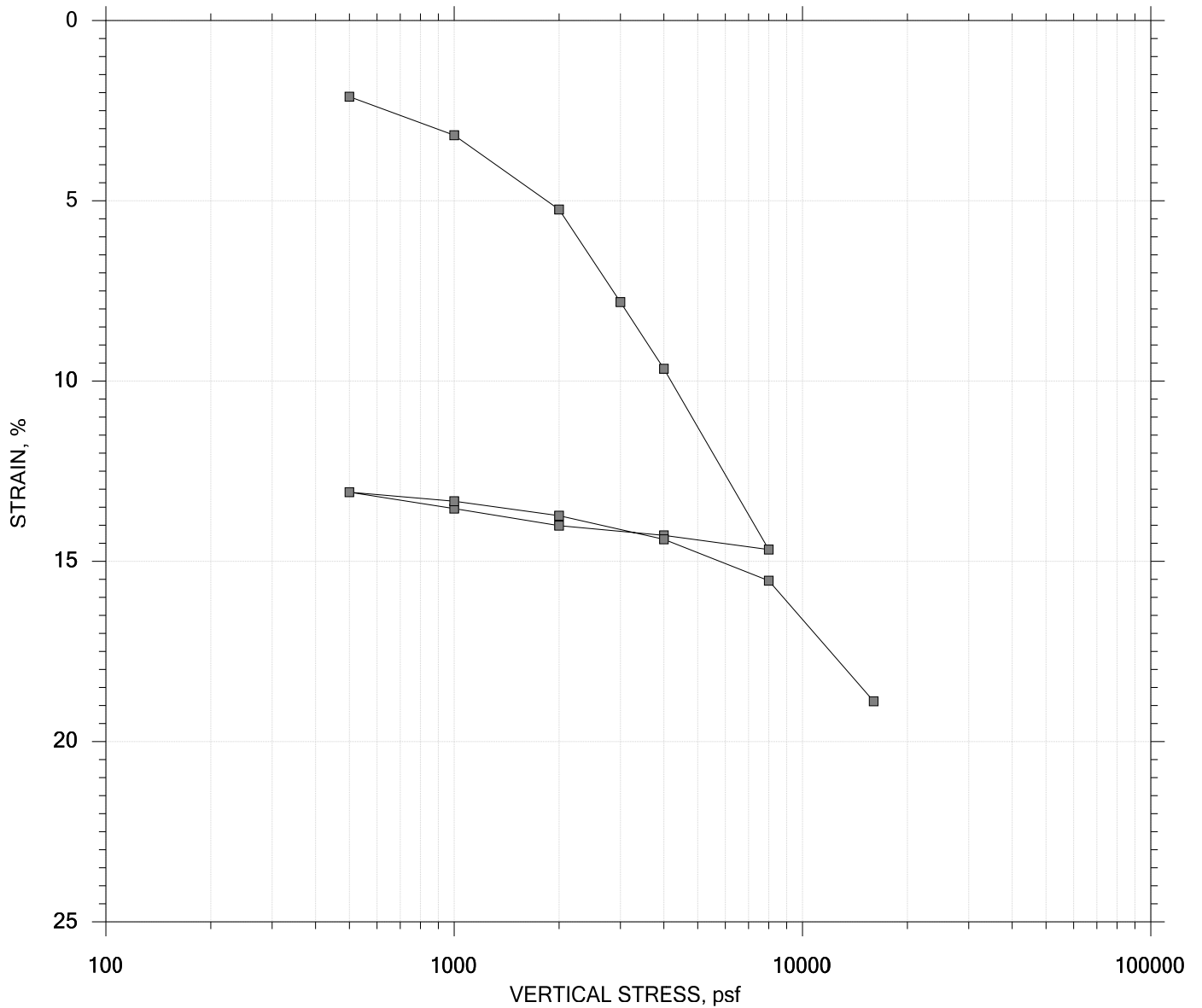
## SUMMARY REPORT



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Displacement at End of Increment		
	Page 153 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

## SUMMARY REPORT



				Before Test	After Test	
Current Vertical Effective Stress: ---				Water Content, %	37.32	24.72
Preconsolidation Stress: ---				Dry Unit Weight, pcf	84.221	101.47
Compression Ratio: ---				Saturation, %	99.99	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.01	0.67
LL: 27	PL: 18	PI: 9	GS: 2.72			

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-201		Tested By: md		Checked By: njh	
	Sample No.: U3		Test Date: 07/26/18		Test No.: IP-2	
	Depth: 40-42 ft		Sample Type: intact		Elevation: ---	
	Description: Wet, dark gray clay					
	Remarks: System T					
	Displacement at End of Increment				Page 154 of 301	

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-201  
 Sample No.: U3  
 Test No.: IP-2

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/26/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 40-42 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System T

Estimated Specific Gravity: 2.72  
 Initial Void Ratio: 1.01  
 Final Void Ratio: 0.672

Liquid Limit: 27  
 Plastic Limit: 18  
 Plasticity Index: 9

Specimen Diameter: 2.50 in  
 Initial Height: 1.00 in  
 Final Height: 0.83 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	C-1075	RING		D-1574
Wt. Container + Wet Soil, gm	110.00	259.90	246.23	144.18
Wt. Container + Dry Soil, gm	81.490	219.40	219.40	117.23
Wt. Container, gm	8.2800	110.88	110.88	8.2200
Wt. Dry Soil, gm	73.210	108.52	108.52	109.01
Water Content, %	38.94	37.32	24.72	24.72
Void Ratio	---	1.01	0.672	---
Degree of Saturation, %	---	99.99	100.00	---
Dry Unit Weight, pcf	---	84.221	101.47	---

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.

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-201  
 Sample No.: U3  
 Test No.: IP-2

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/26/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 40-42 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System T

Displacement at End of Increment

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day
1	500.	0.02112	0.972	2.11	17.209	1.40e-006	4.22e-005	3.18e-004
2	1.00e+003	0.03178	0.950	3.18	26.479	8.78e-007	2.13e-005	1.01e-004
3	2.00e+003	0.05239	0.909	5.24	36.493	6.17e-007	2.06e-005	6.86e-005
4	3.00e+003	0.07811	0.857	7.81	127.696	1.68e-007	2.57e-005	2.33e-005
5	4.00e+003	0.09658	0.820	9.66	232.423	8.79e-008	1.85e-005	8.76e-006
6	8.00e+003	0.1467	0.719	14.7	82.823	2.29e-007	1.25e-005	1.55e-005
7	4.00e+003	0.1428	0.727	14.3	368.055	4.88e-008	9.82e-007	2.58e-007
8	2.00e+003	0.1401	0.732	14.0	18.265	9.90e-007	1.35e-006	7.22e-006
9	1.00e+003	0.1354	0.742	13.5	18.528	9.85e-007	4.74e-006	2.52e-005
10	500.	0.1308	0.751	13.1	135.063	1.37e-007	9.08e-006	6.69e-006
11	1.00e+003	0.1333	0.746	13.3	11.129	1.66e-006	4.99e-006	4.47e-005
12	2.00e+003	0.1373	0.738	13.7	21.144	8.68e-007	4.03e-006	1.89e-005
13	4.00e+003	0.1439	0.724	14.4	17.741	1.02e-006	3.27e-006	1.80e-005
14	8.00e+003	0.1553	0.701	15.5	21.435	8.28e-007	2.87e-006	1.28e-005
15	1.60e+004	0.1888	0.634	18.9	17.604	9.55e-007	4.18e-006	2.16e-005

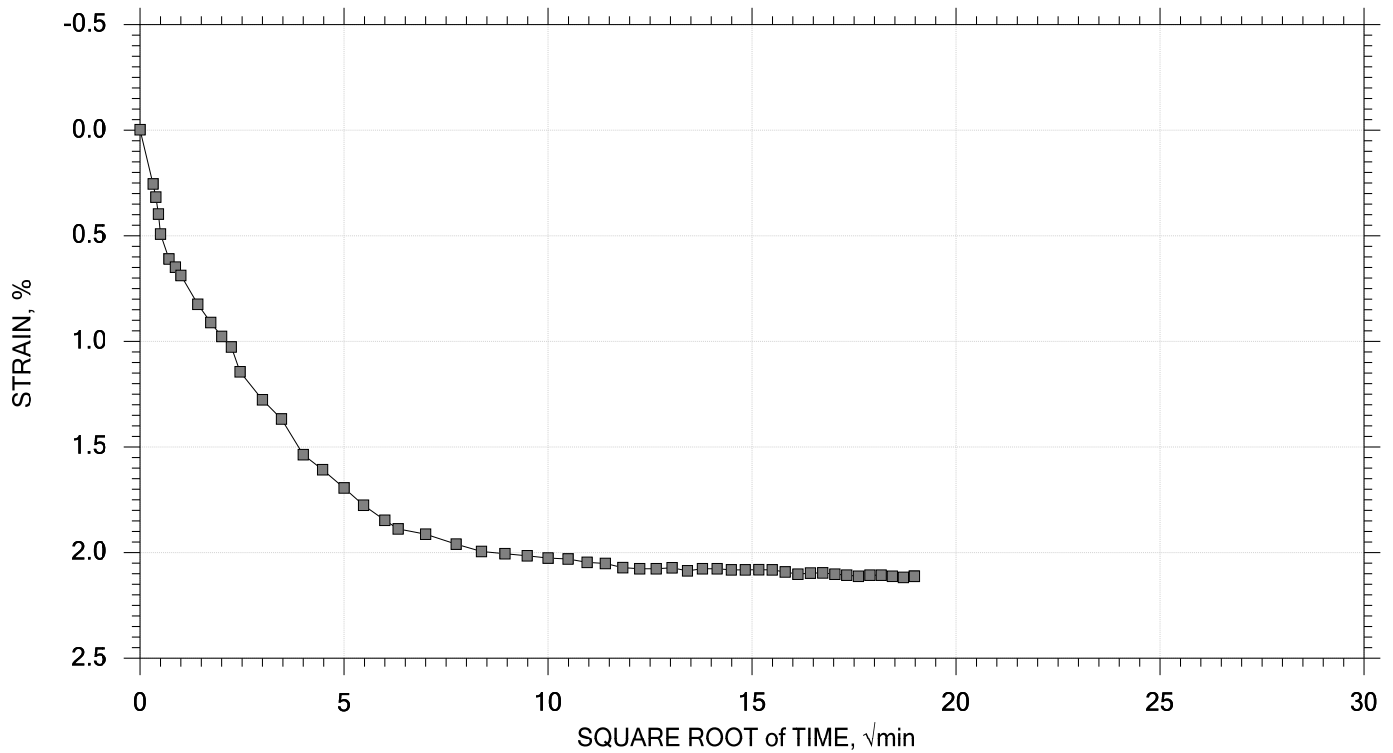
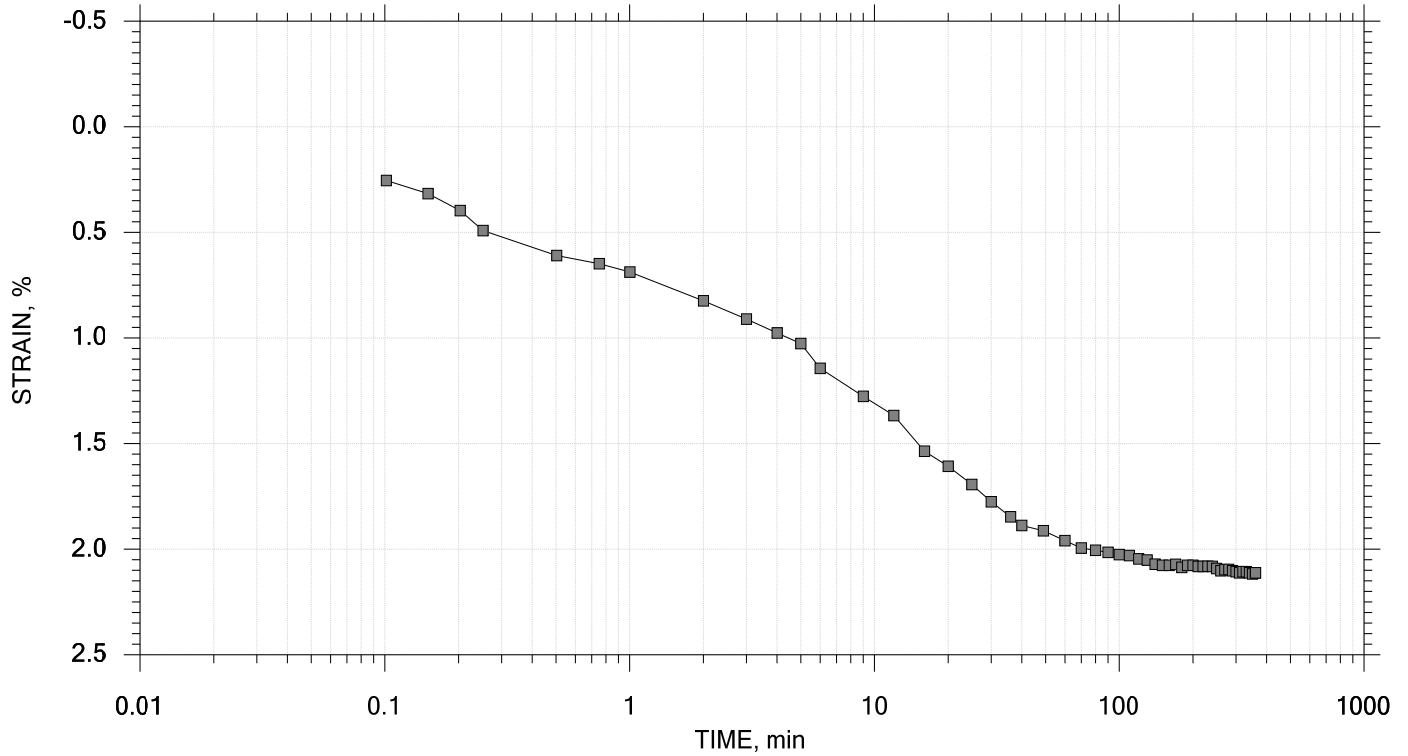
	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day	Ca %
1	500.	0.02112	0.972	2.11	0.000	0.00e+000	4.22e-005	0.00e+000	0.00e+000
2	1.00e+003	0.03178	0.950	3.18	12.360	4.37e-007	2.13e-005	5.03e-005	0.00e+000
3	2.00e+003	0.05239	0.909	5.24	8.055	6.49e-007	2.06e-005	7.22e-005	0.00e+000
4	3.00e+003	0.07811	0.857	7.81	0.000	0.00e+000	2.57e-005	0.00e+000	0.00e+000
5	4.00e+003	0.09658	0.820	9.66	0.000	0.00e+000	1.85e-005	0.00e+000	0.00e+000
6	8.00e+003	0.1467	0.719	14.7	15.404	2.85e-007	1.25e-005	1.93e-005	0.00e+000
7	4.00e+003	0.1428	0.727	14.3	0.000	0.00e+000	9.82e-007	0.00e+000	0.00e+000
8	2.00e+003	0.1401	0.732	14.0	0.000	0.00e+000	1.35e-006	0.00e+000	0.00e+000
9	1.00e+003	0.1354	0.742	13.5	0.000	0.00e+000	4.74e-006	0.00e+000	0.00e+000
10	500.	0.1308	0.751	13.1	27.115	1.58e-007	9.08e-006	7.74e-006	0.00e+000
11	1.00e+003	0.1333	0.746	13.3	0.000	0.00e+000	4.99e-006	0.00e+000	0.00e+000
12	2.00e+003	0.1373	0.738	13.7	0.000	0.00e+000	4.03e-006	0.00e+000	0.00e+000
13	4.00e+003	0.1439	0.724	14.4	2.896	1.45e-006	3.27e-006	2.56e-005	0.00e+000
14	8.00e+003	0.1553	0.701	15.5	2.966	1.39e-006	2.87e-006	2.15e-005	0.00e+000
15	1.60e+004	0.1888	0.634	18.9	4.236	9.22e-007	4.18e-006	2.08e-005	0.00e+000


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 15

Stress: 500 psf



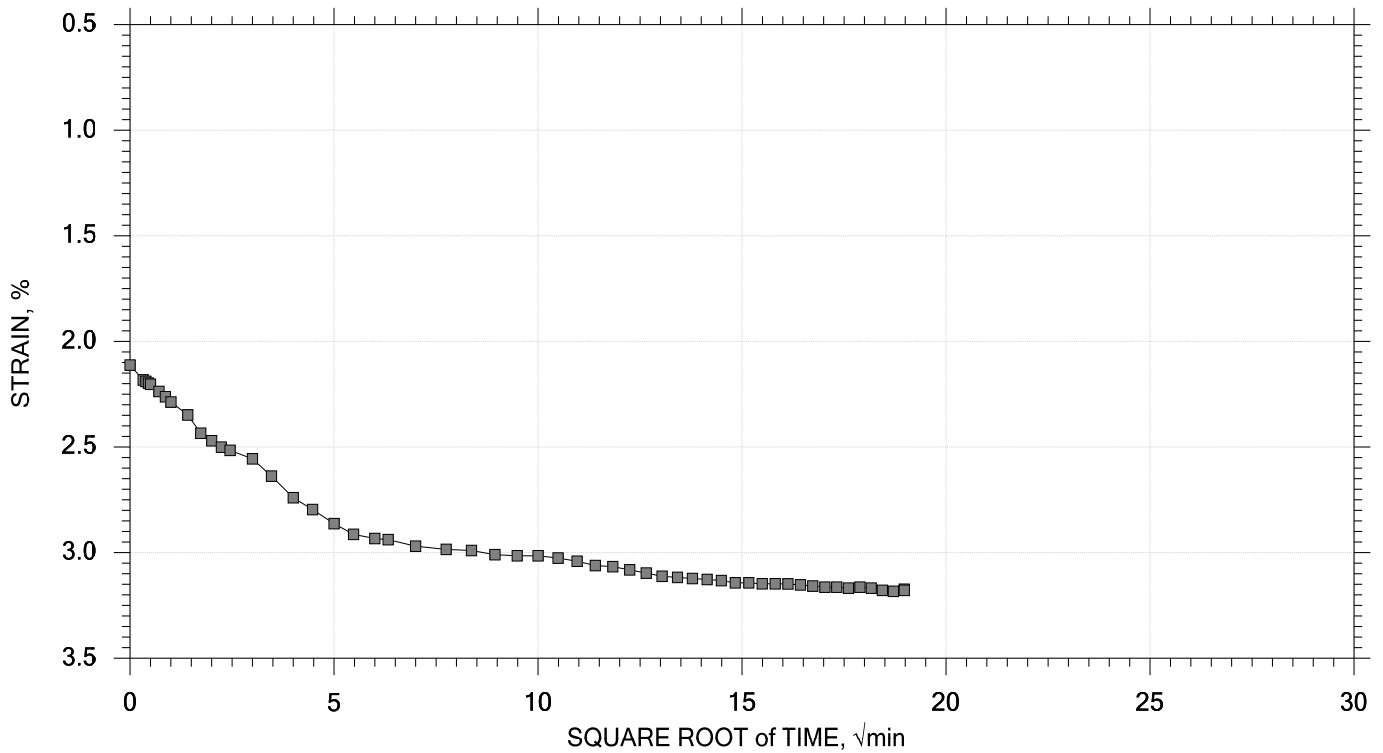
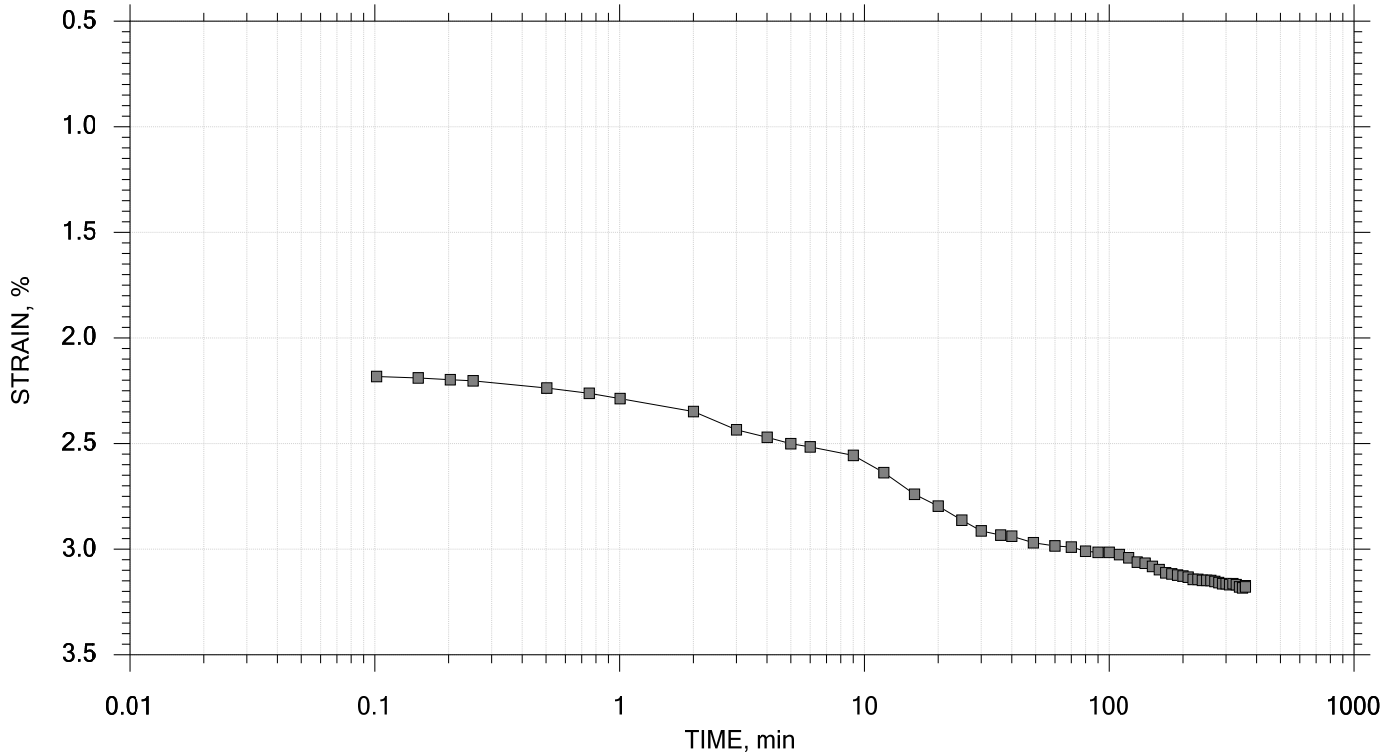
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
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# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 1000 psf



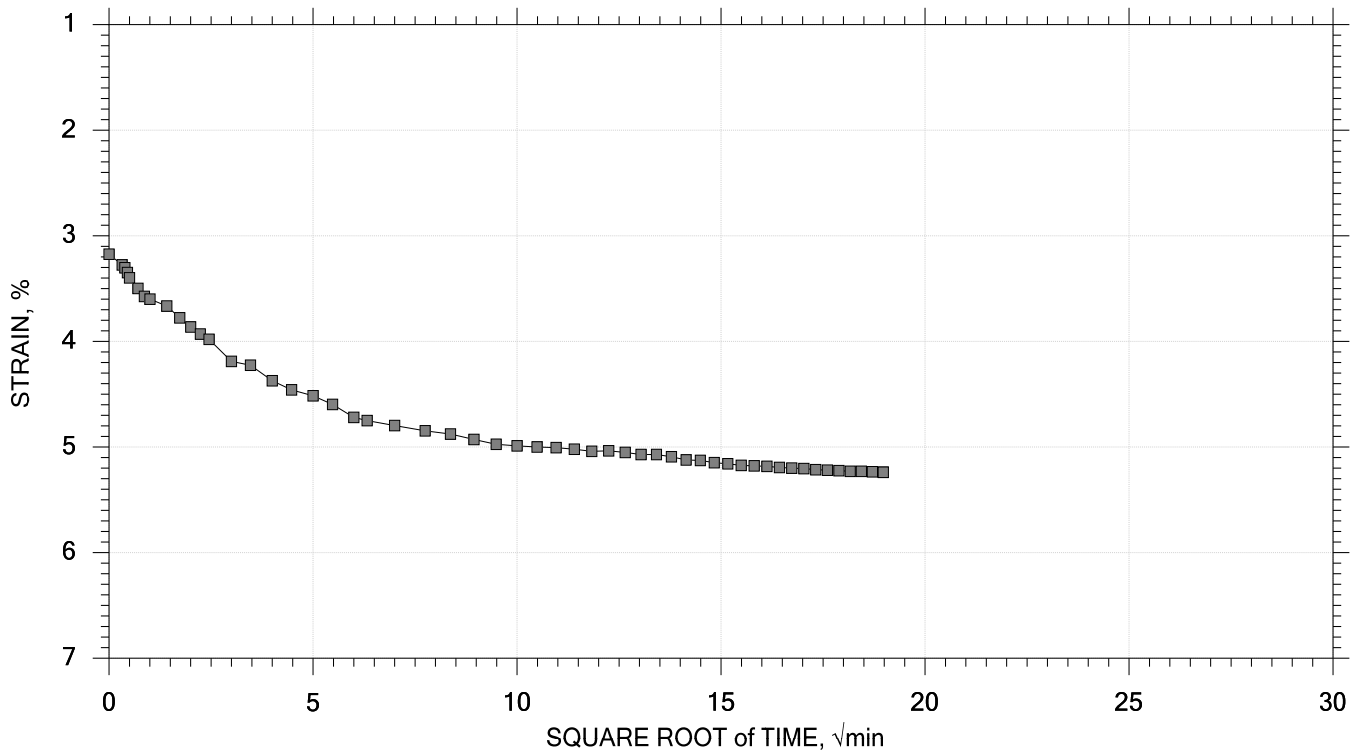
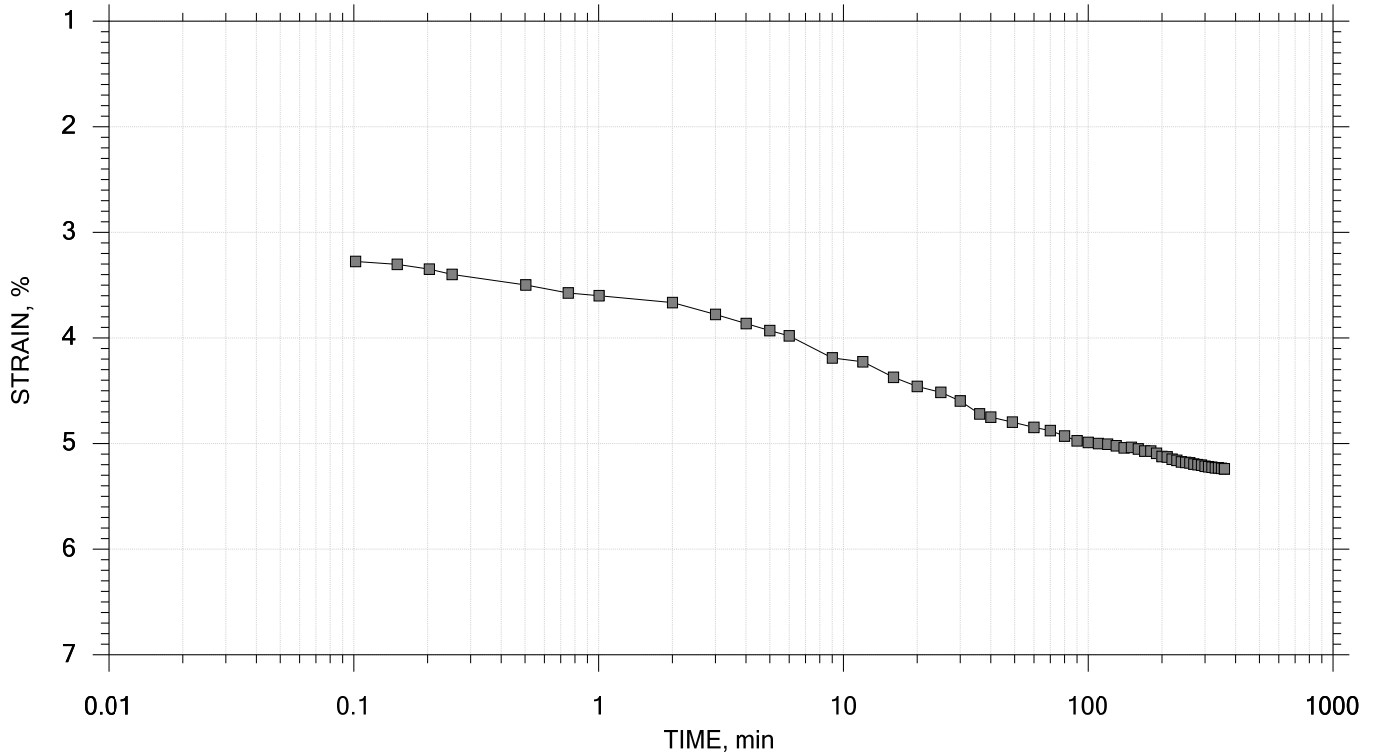
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 158 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 2000 psf



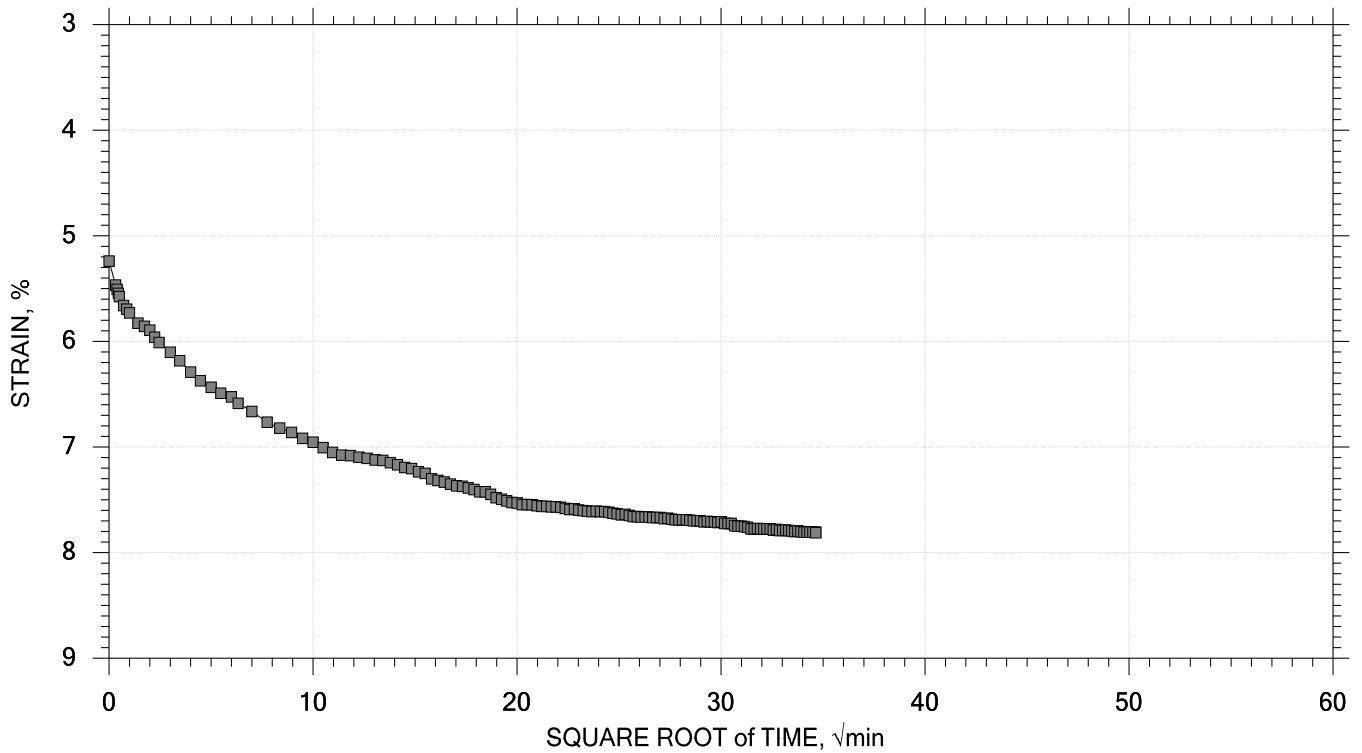
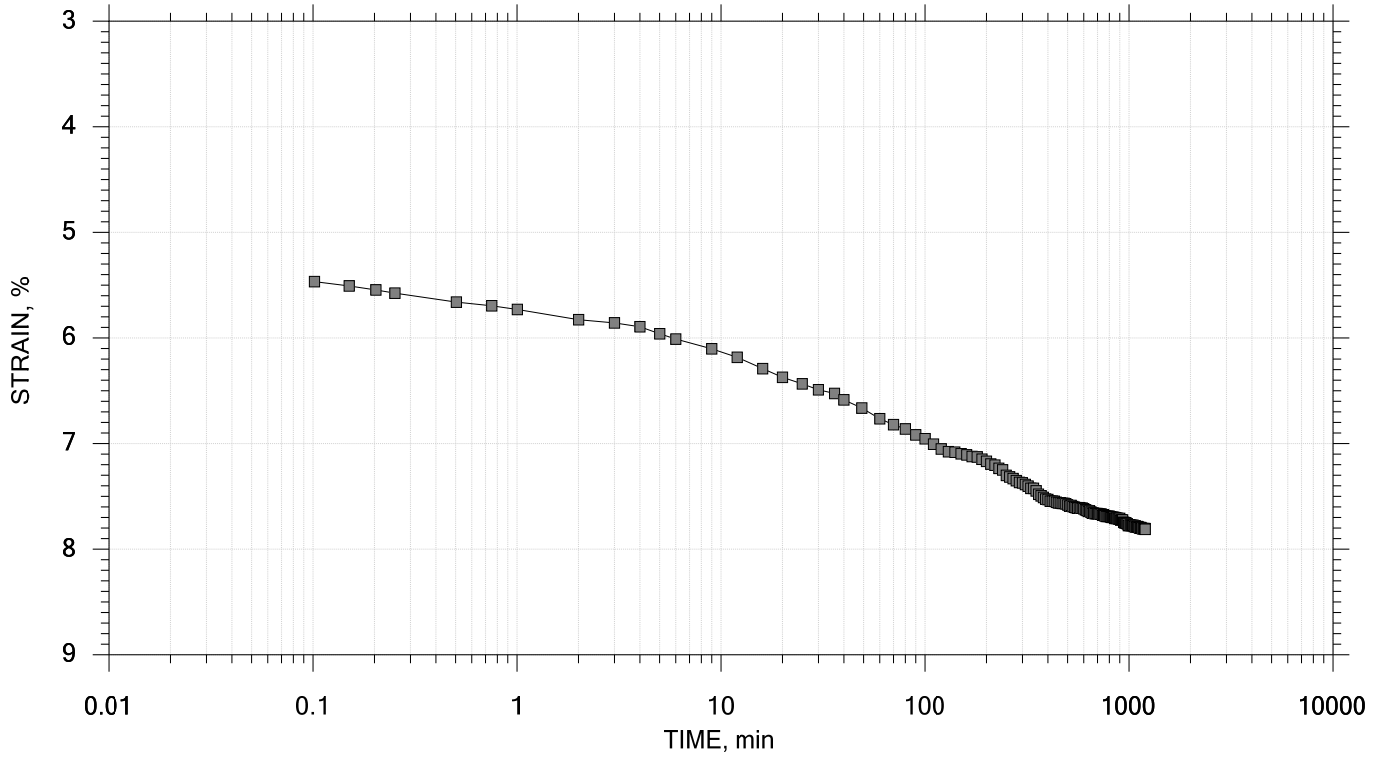
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 159 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 3000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 160 of 301		

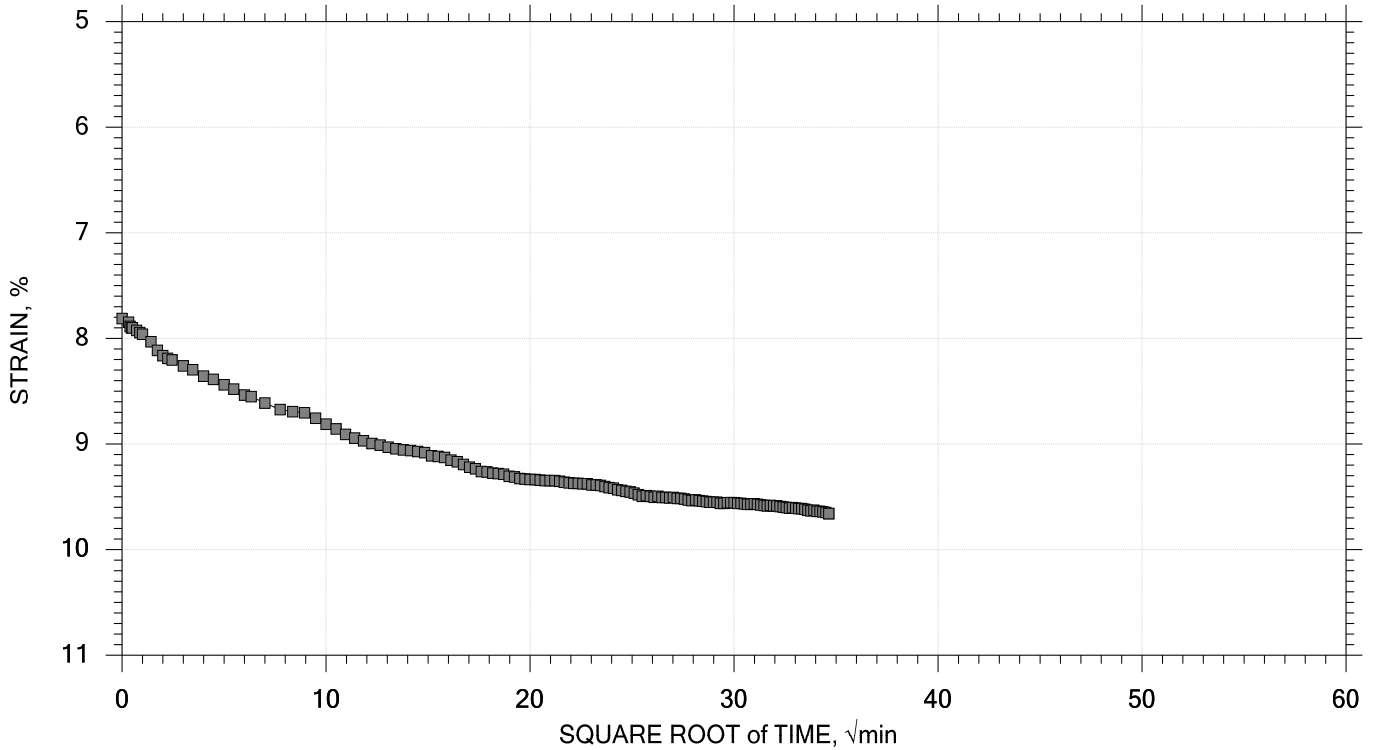
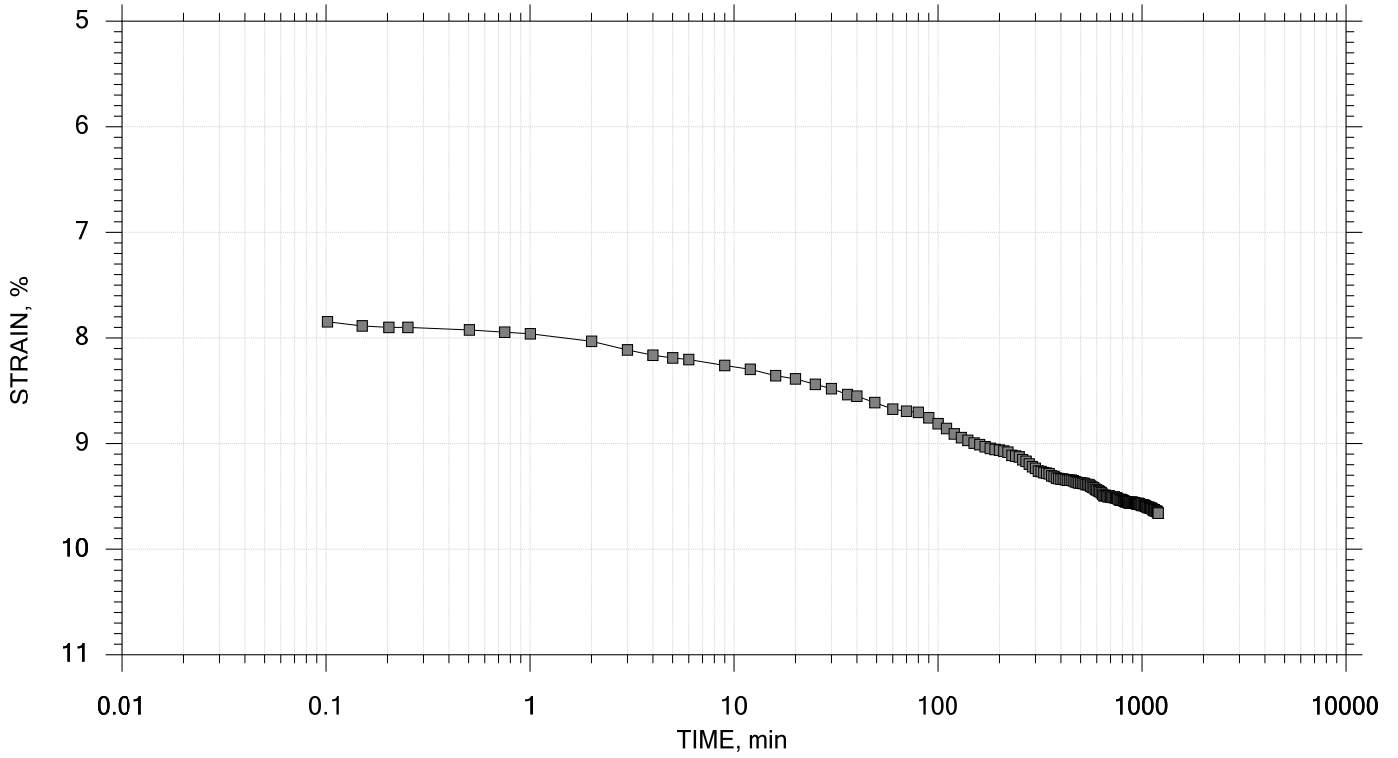



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 4000 psf



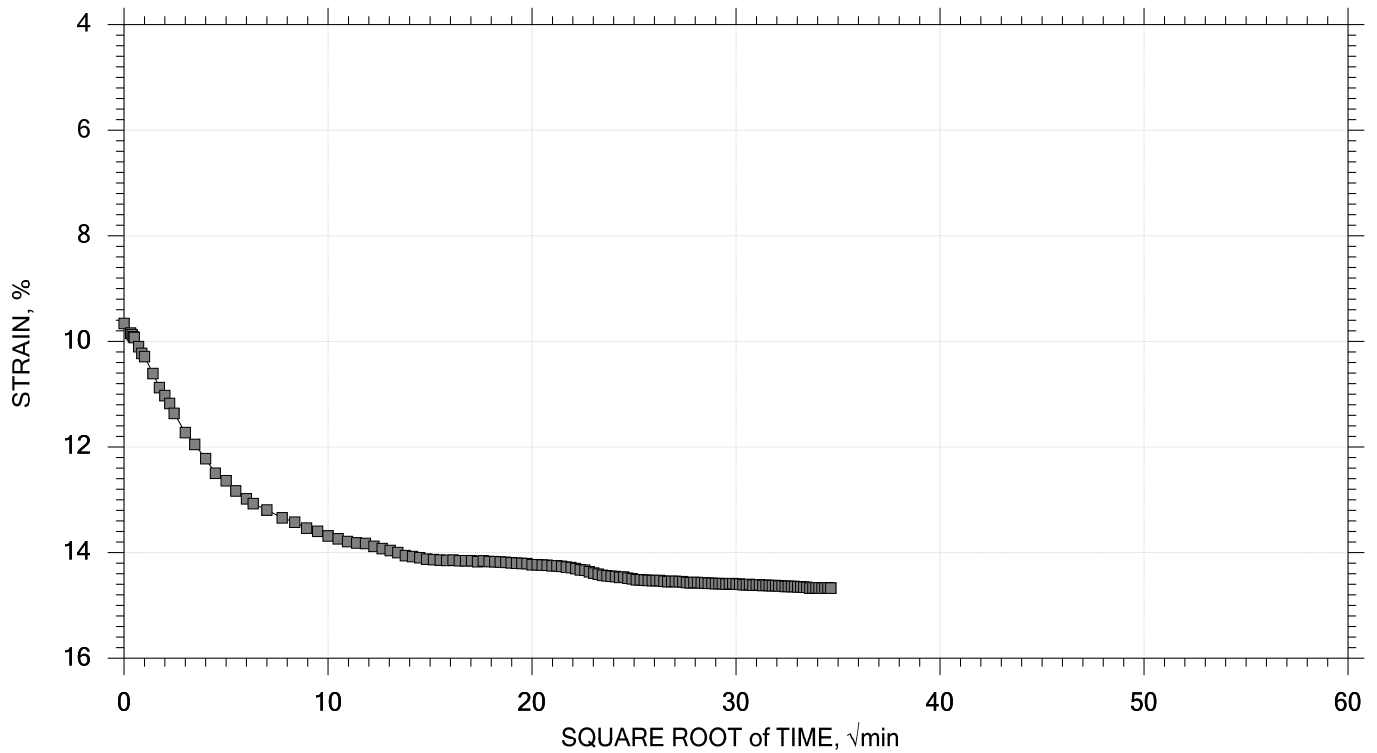
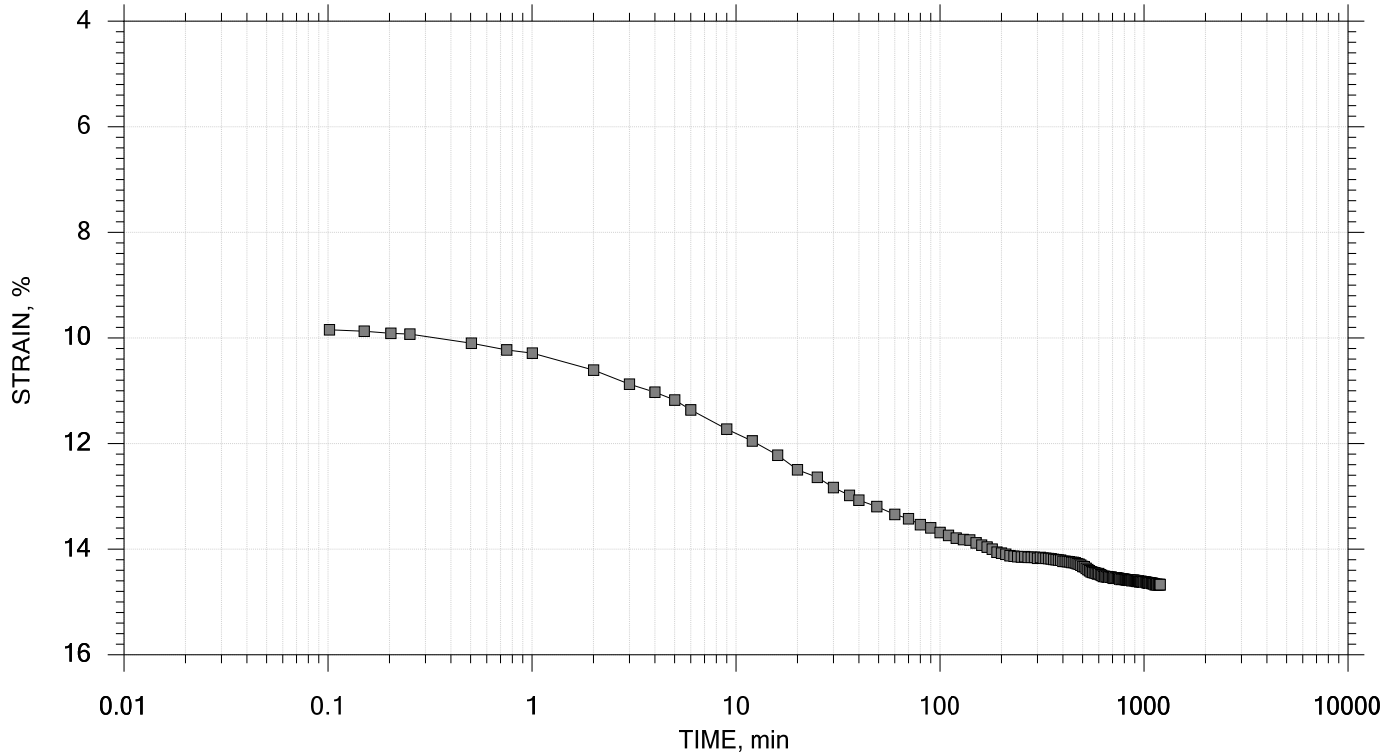
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 161 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 8000 psf



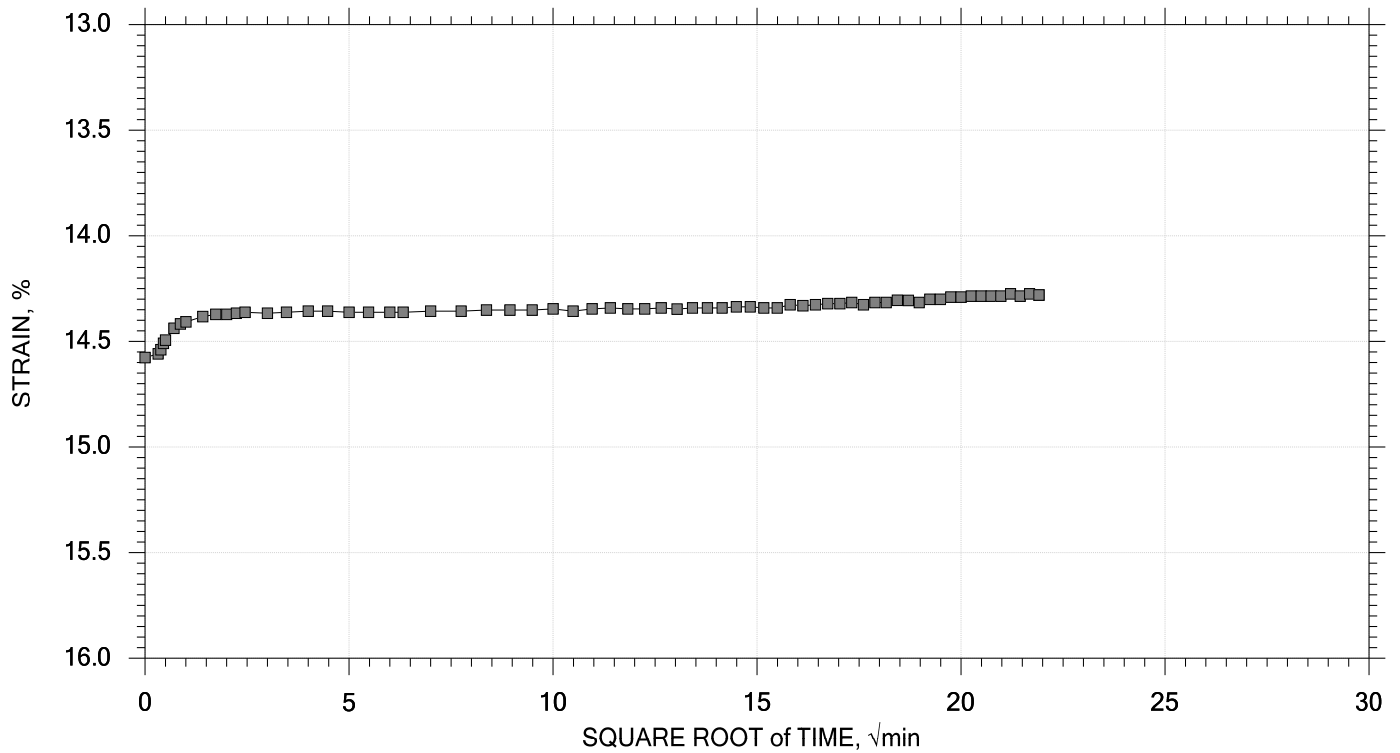
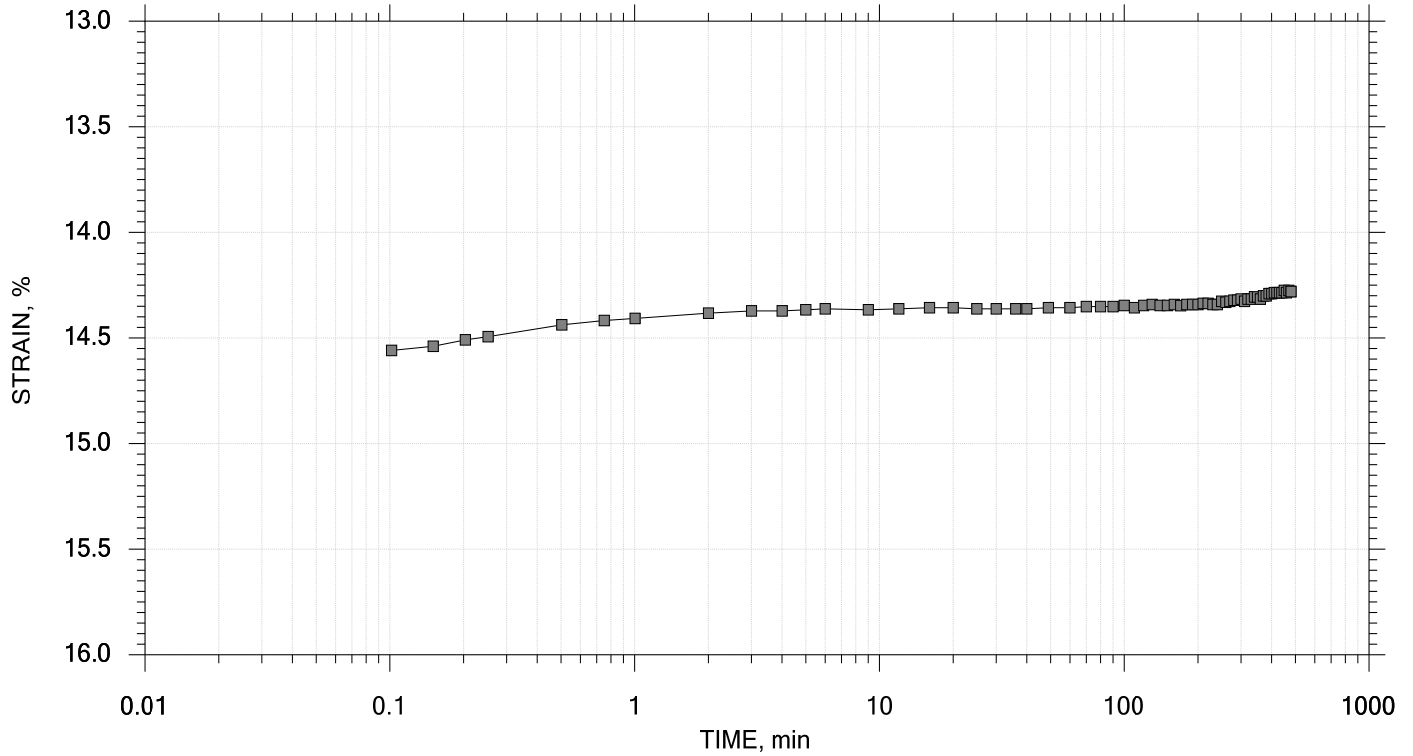
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	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 162 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4000 psf



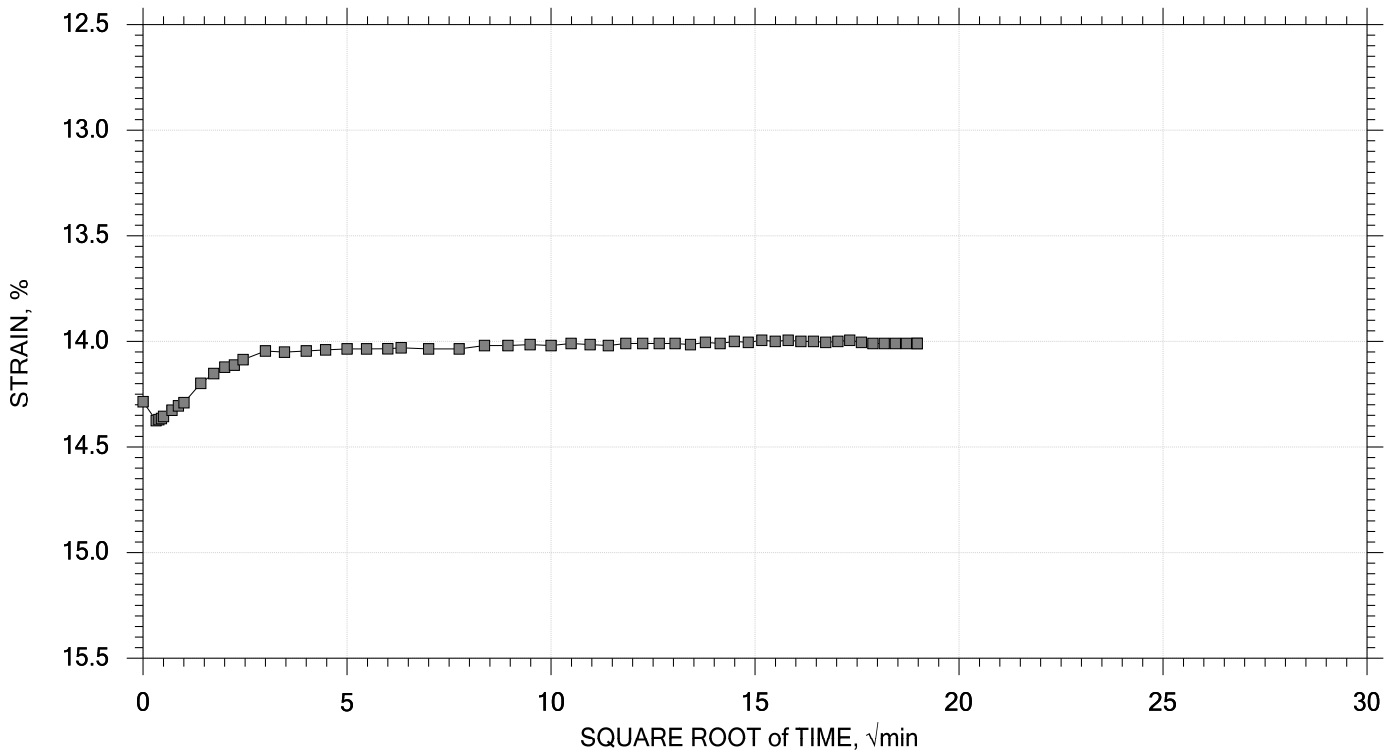
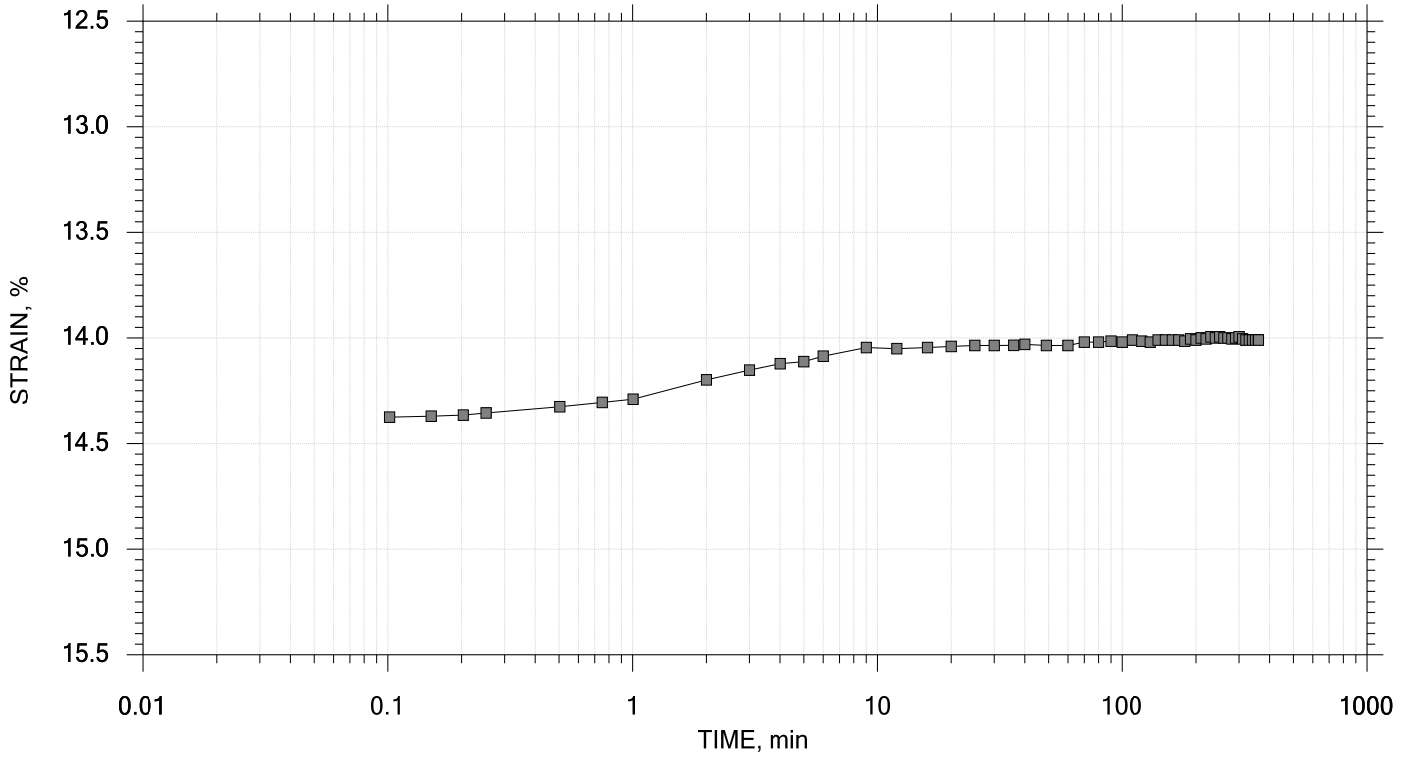
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 163 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 2000 psf



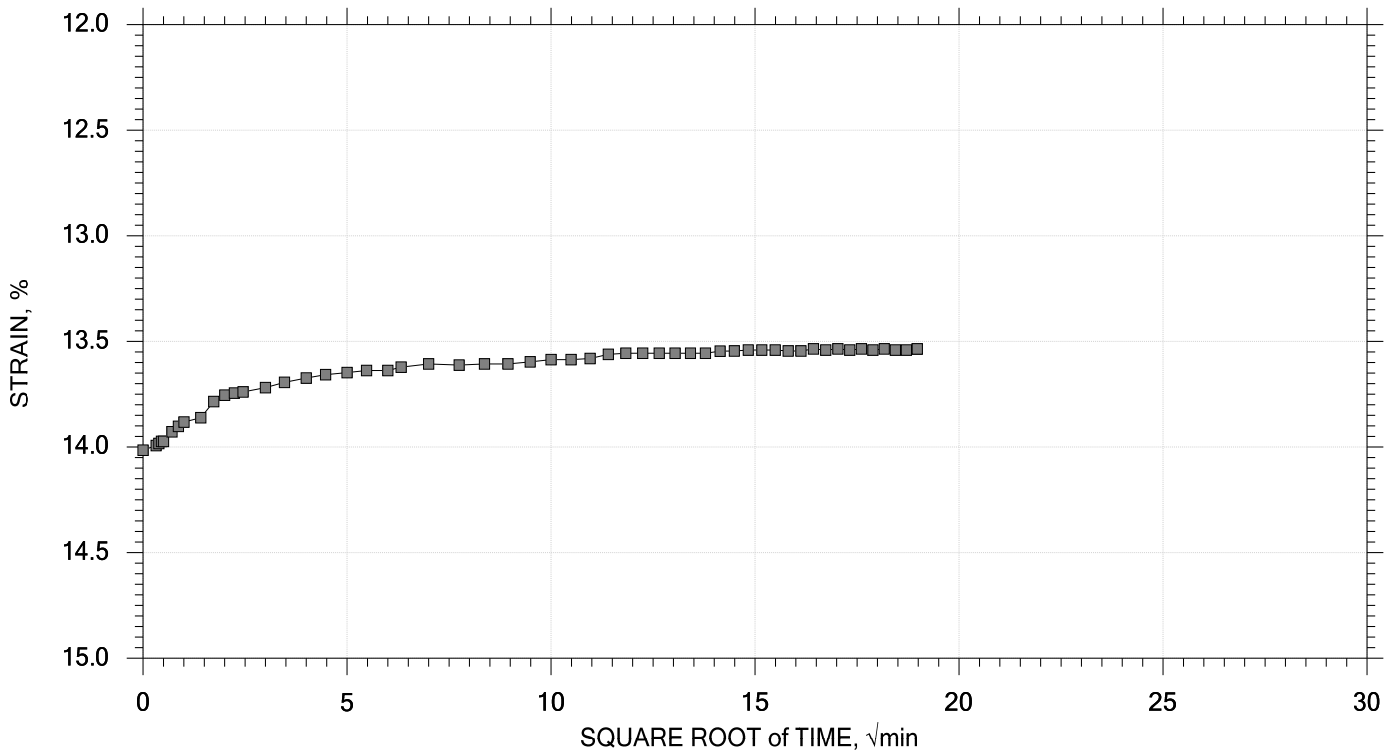
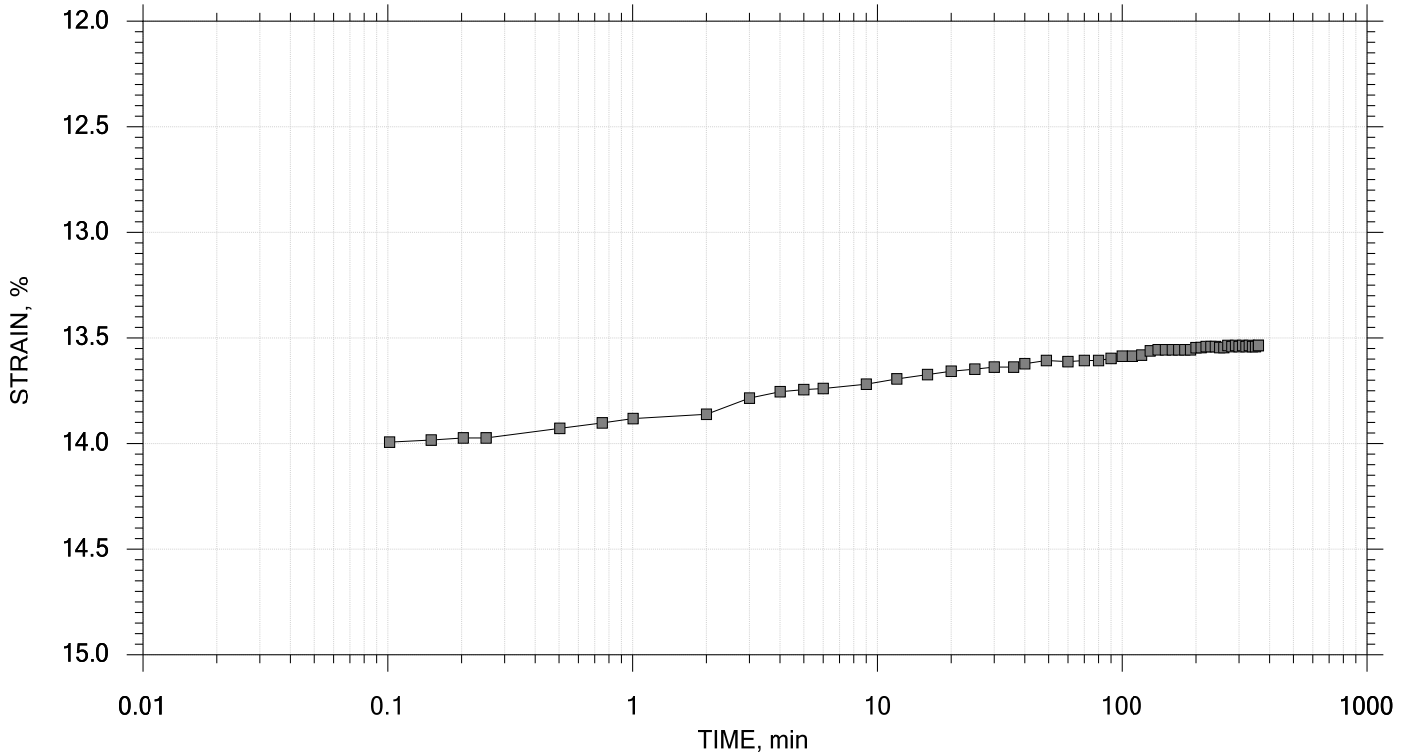
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 164 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 1000 psf



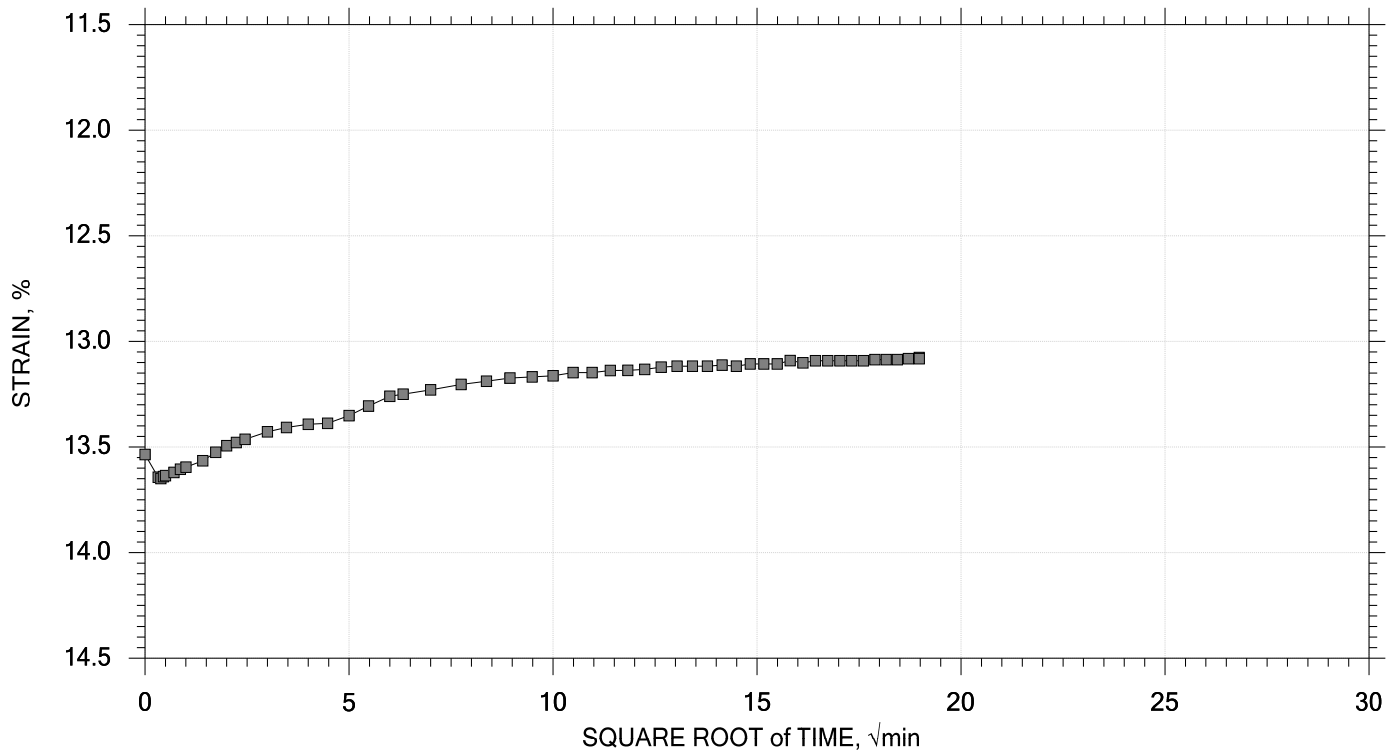
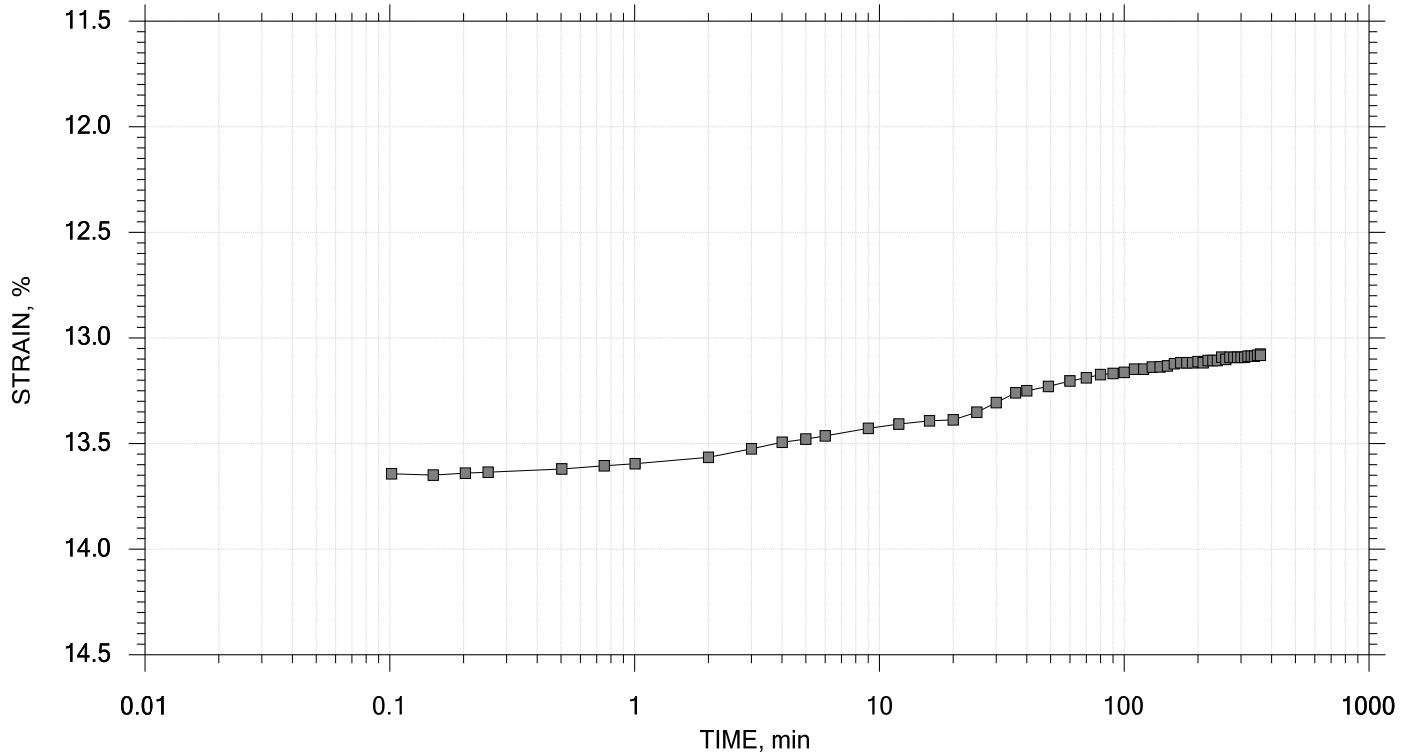
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 165 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 500 psf



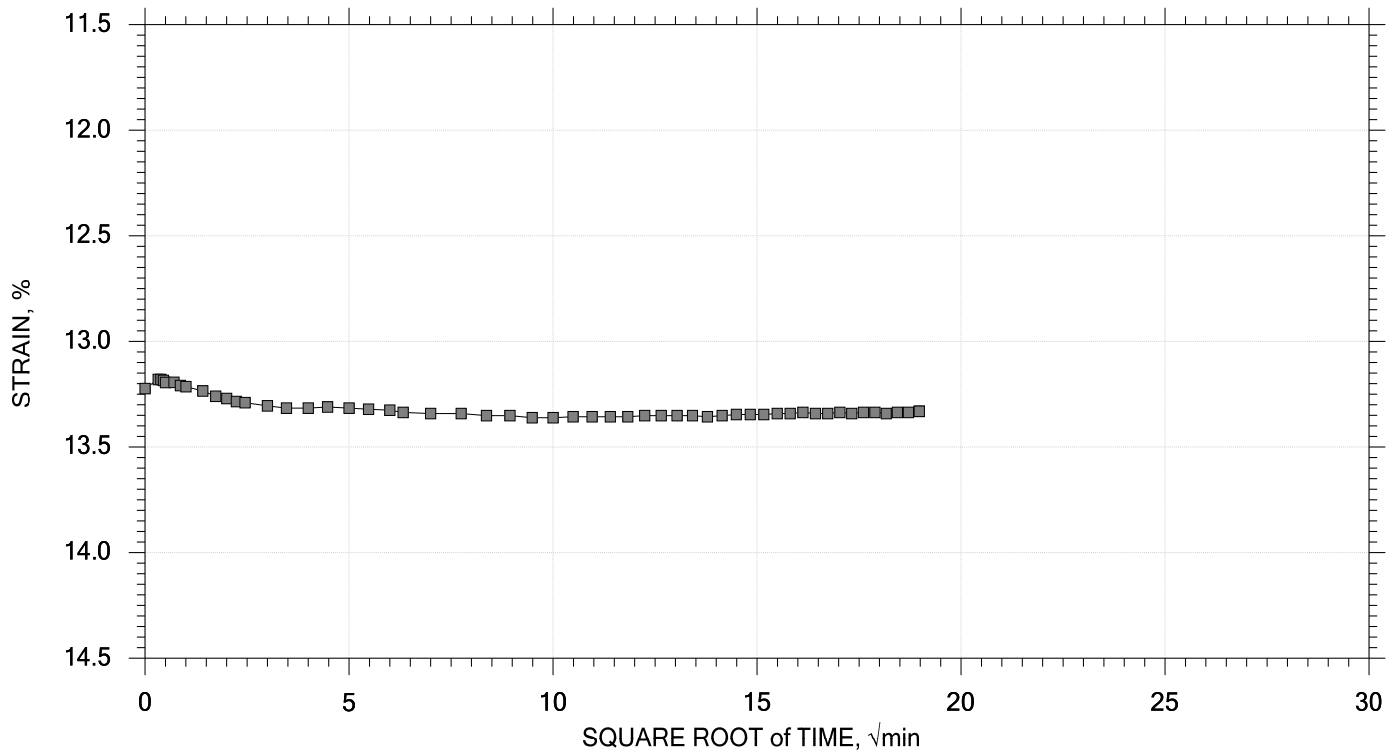
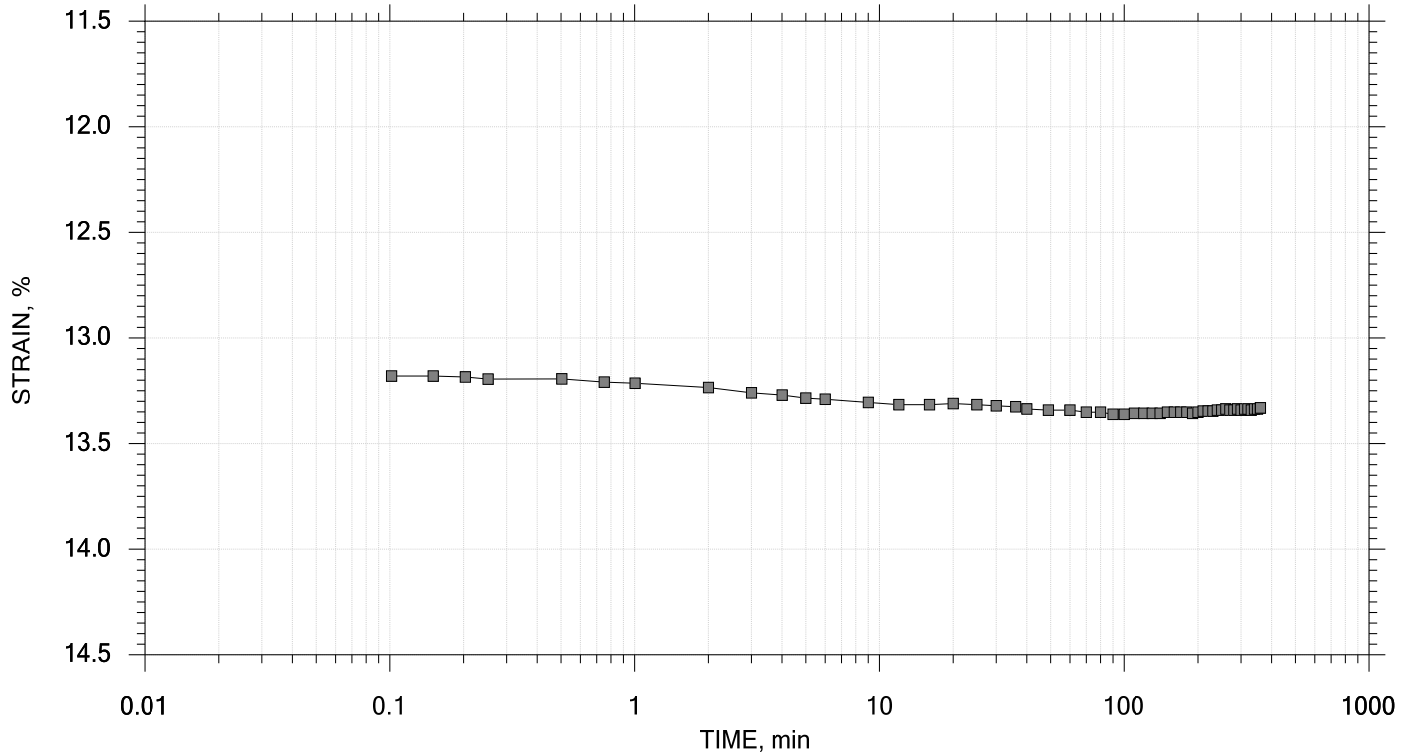
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 166 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 1000 psf



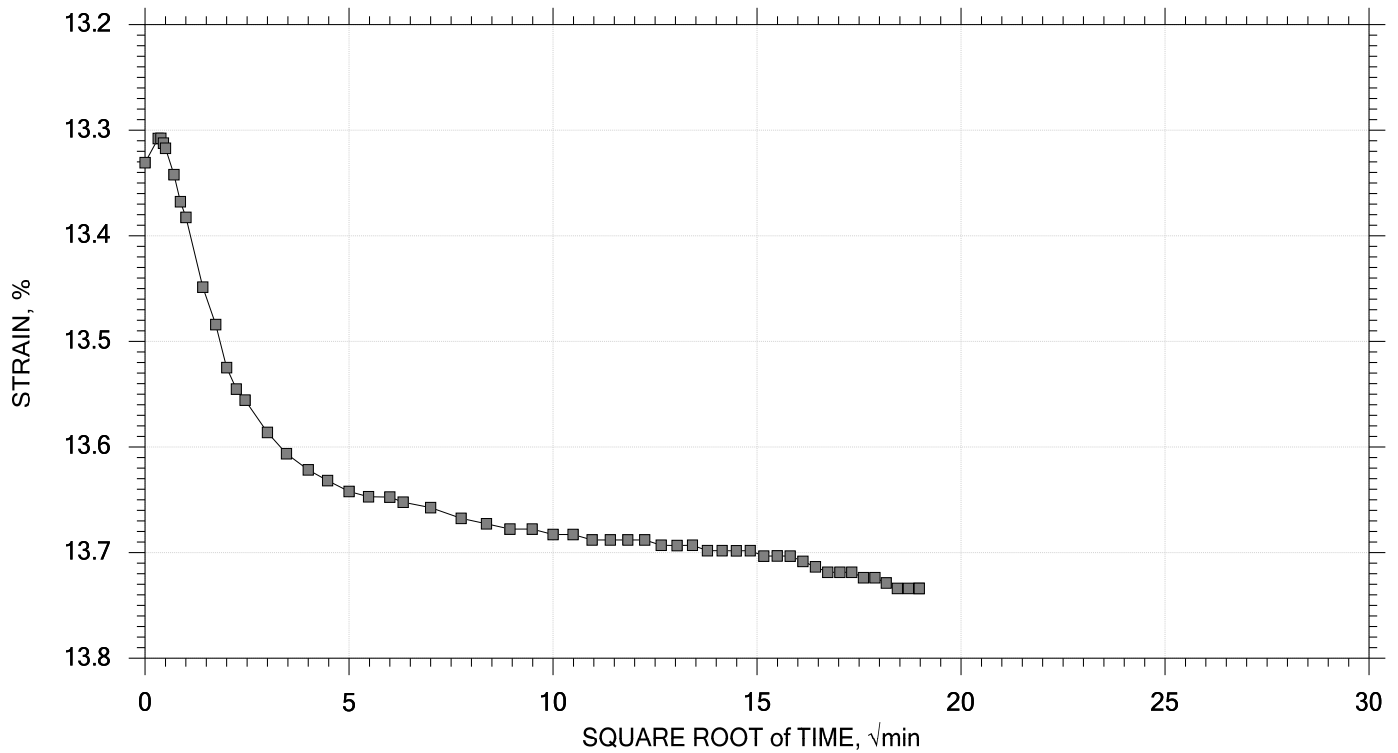
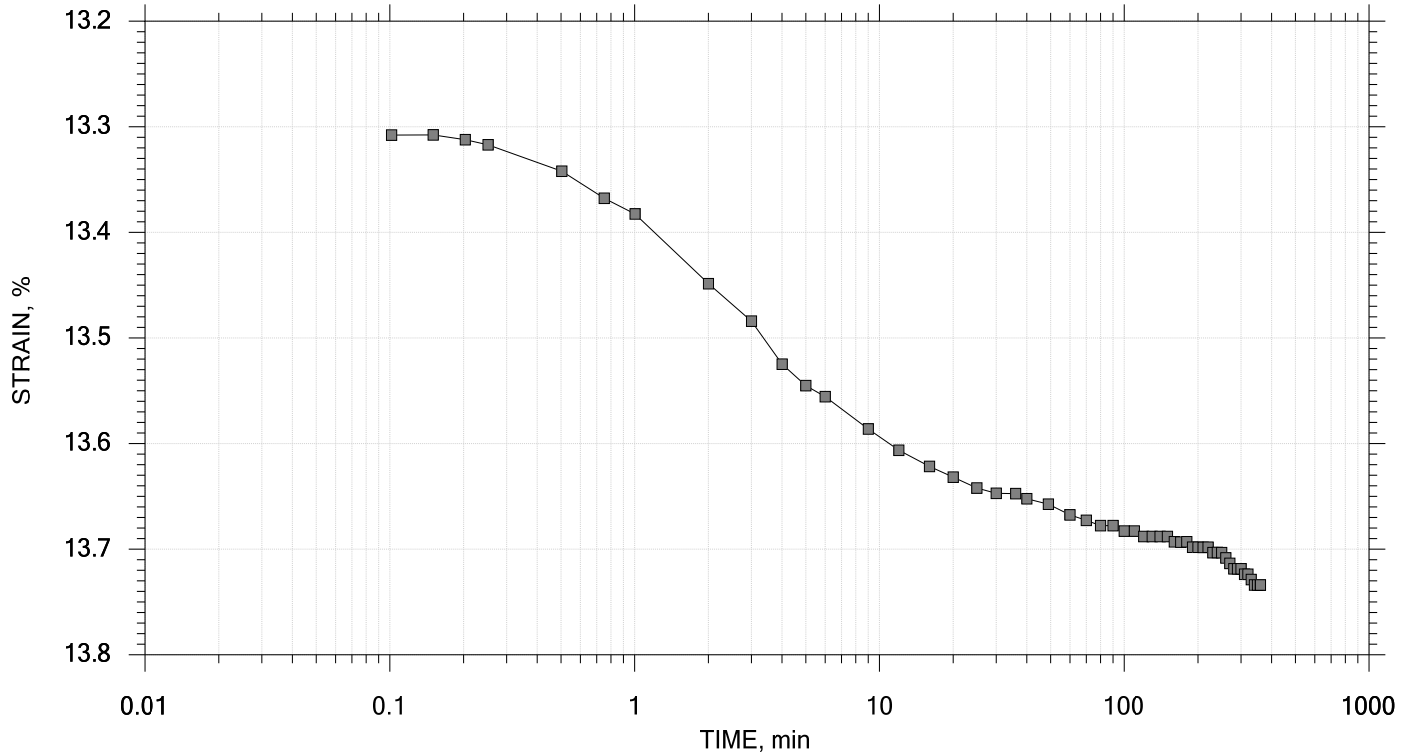
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 167 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 168 of 301		

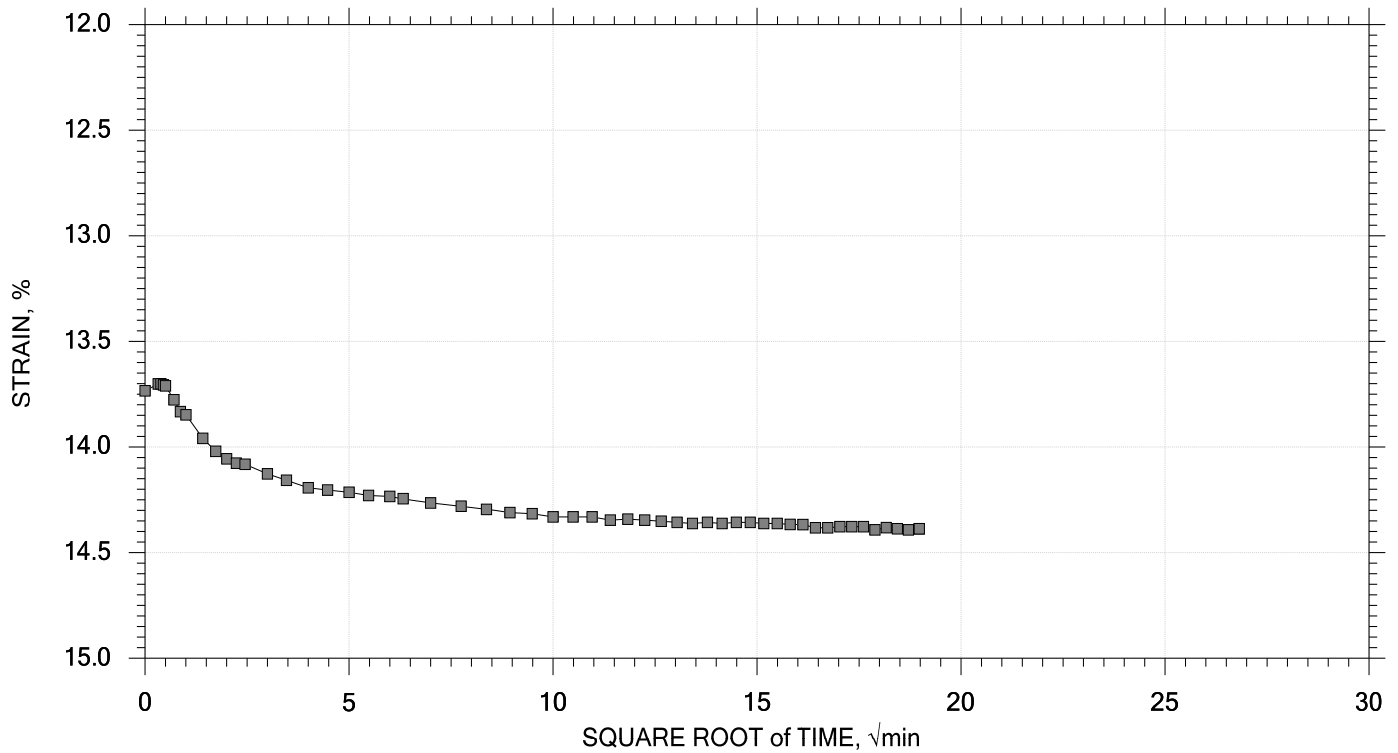
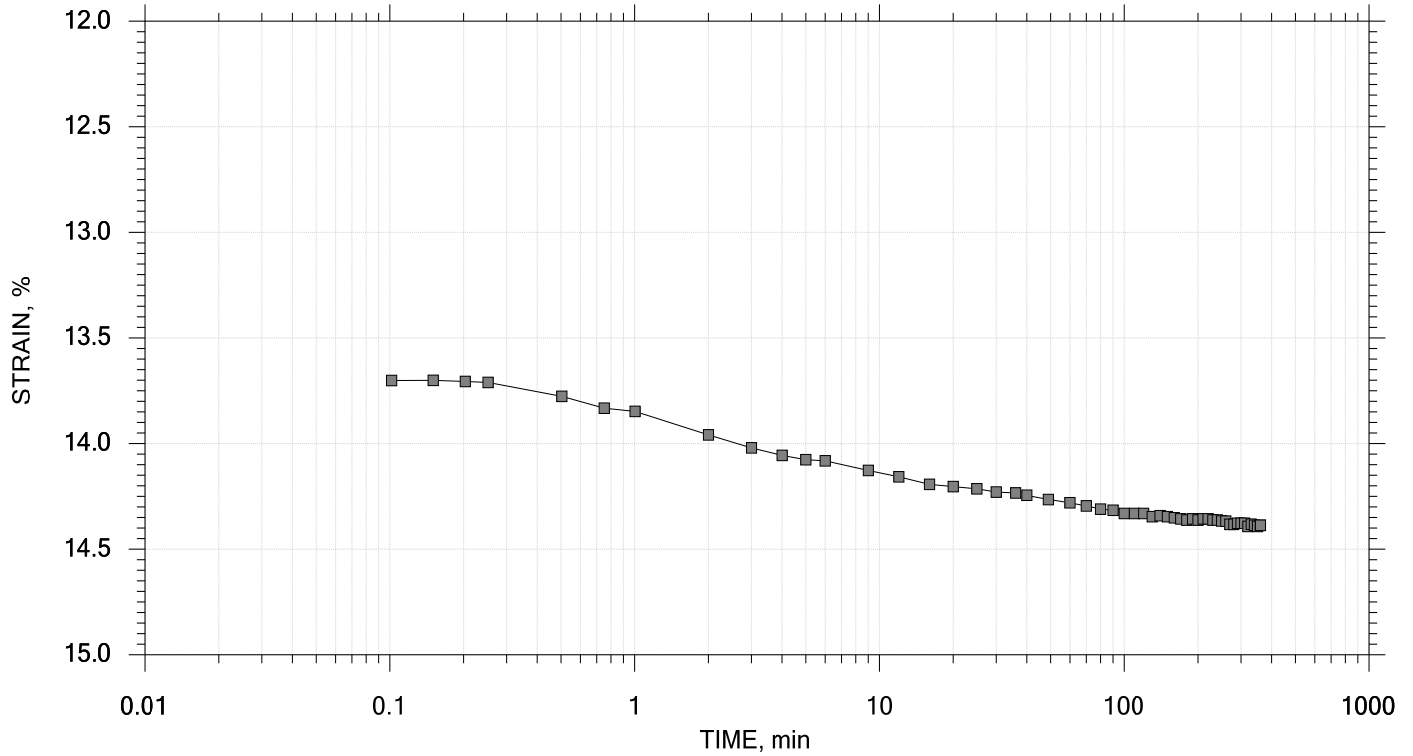



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 4000 psf



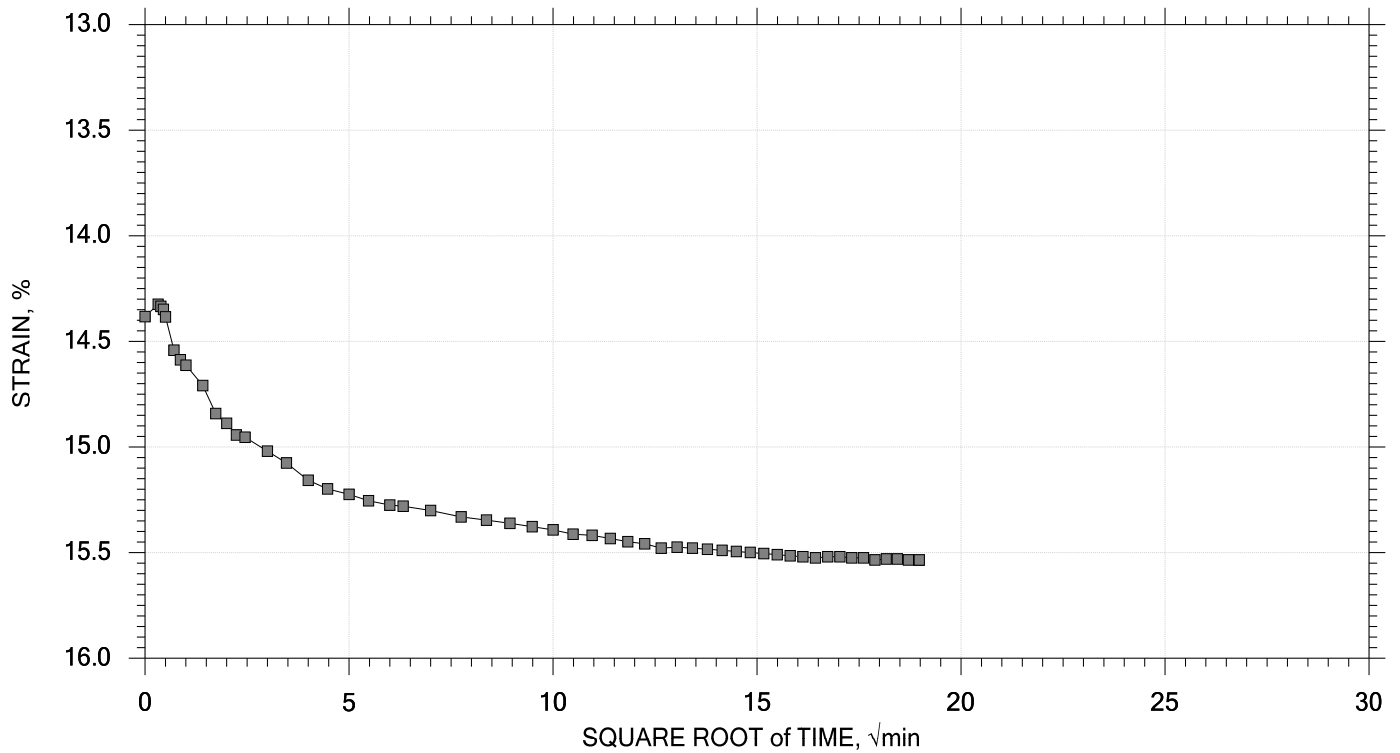
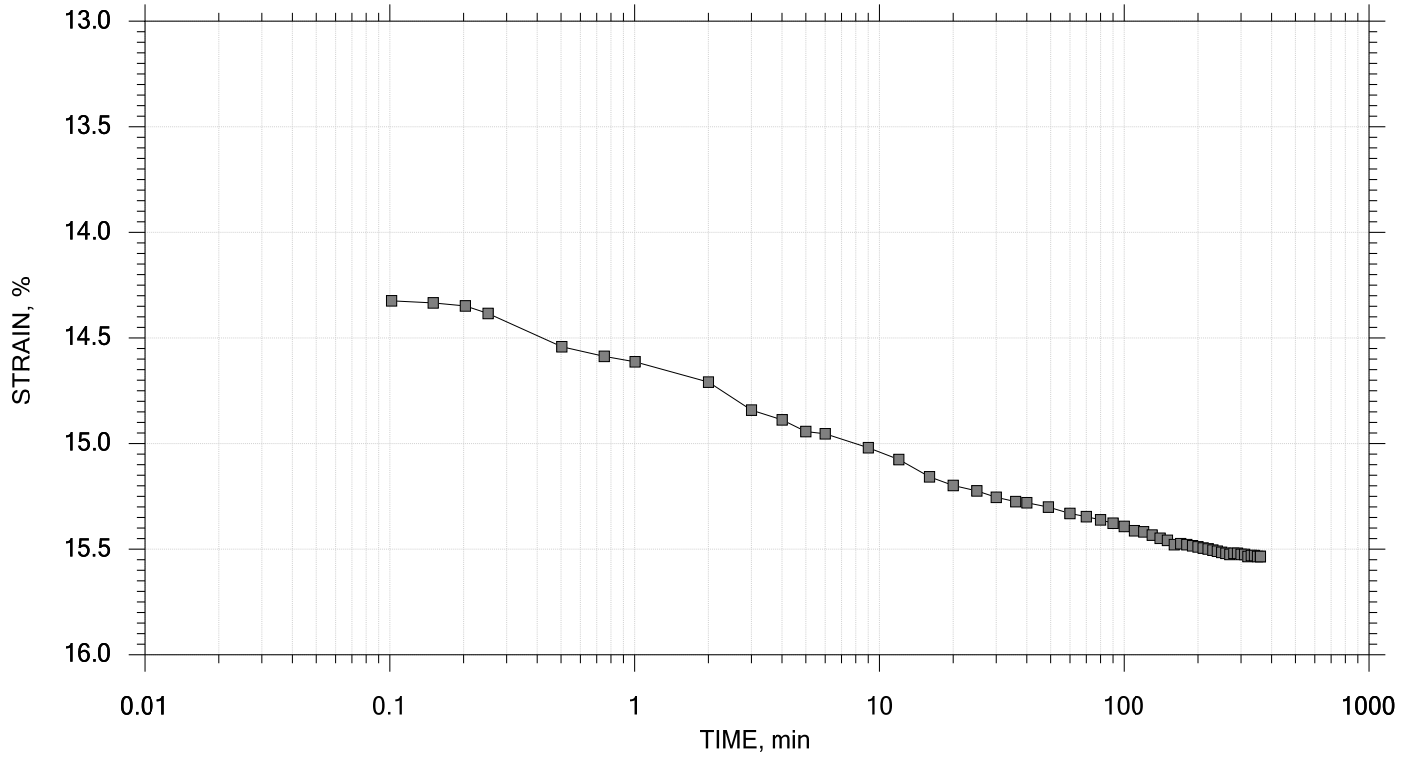
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 169 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 8000 psf



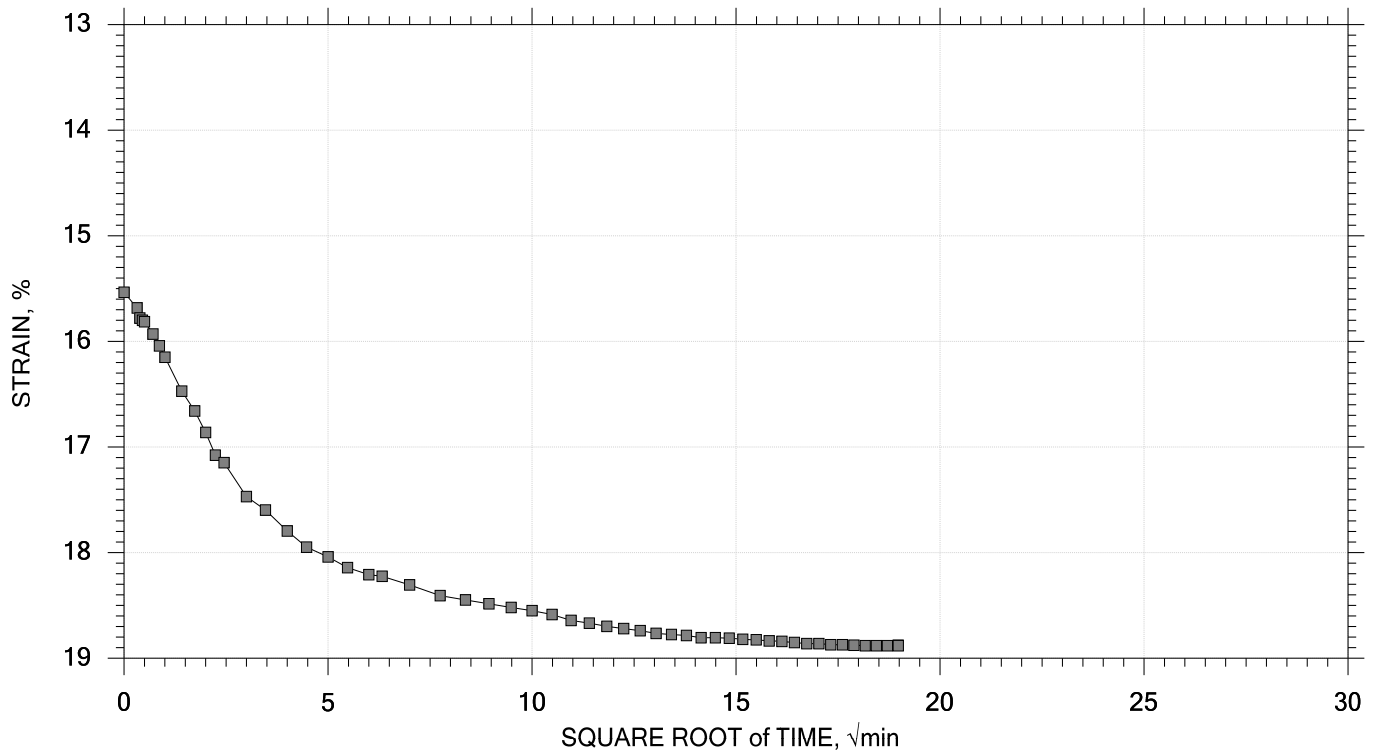
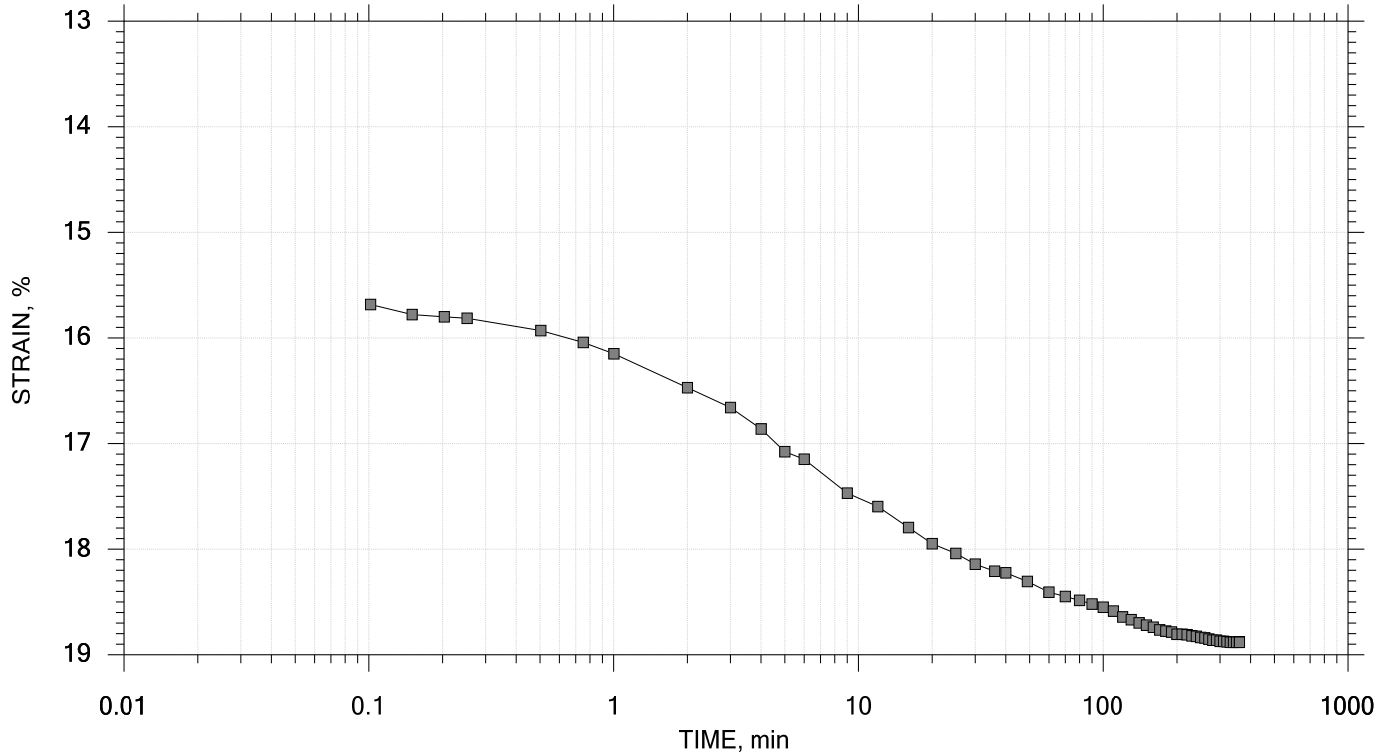
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 170 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

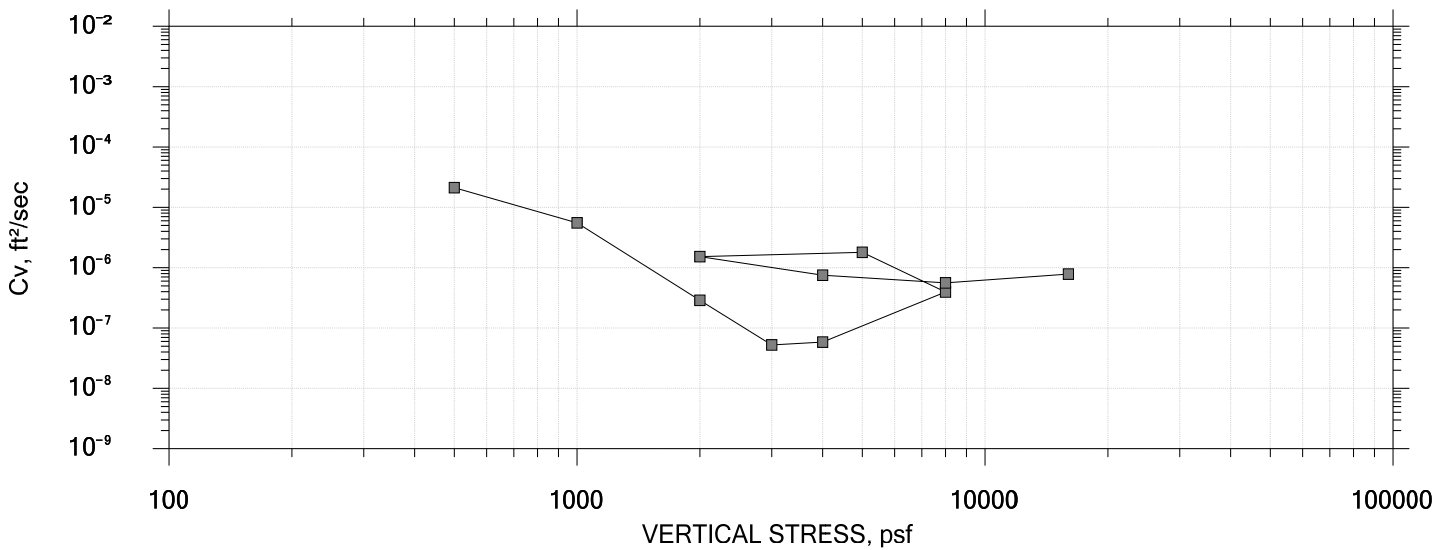
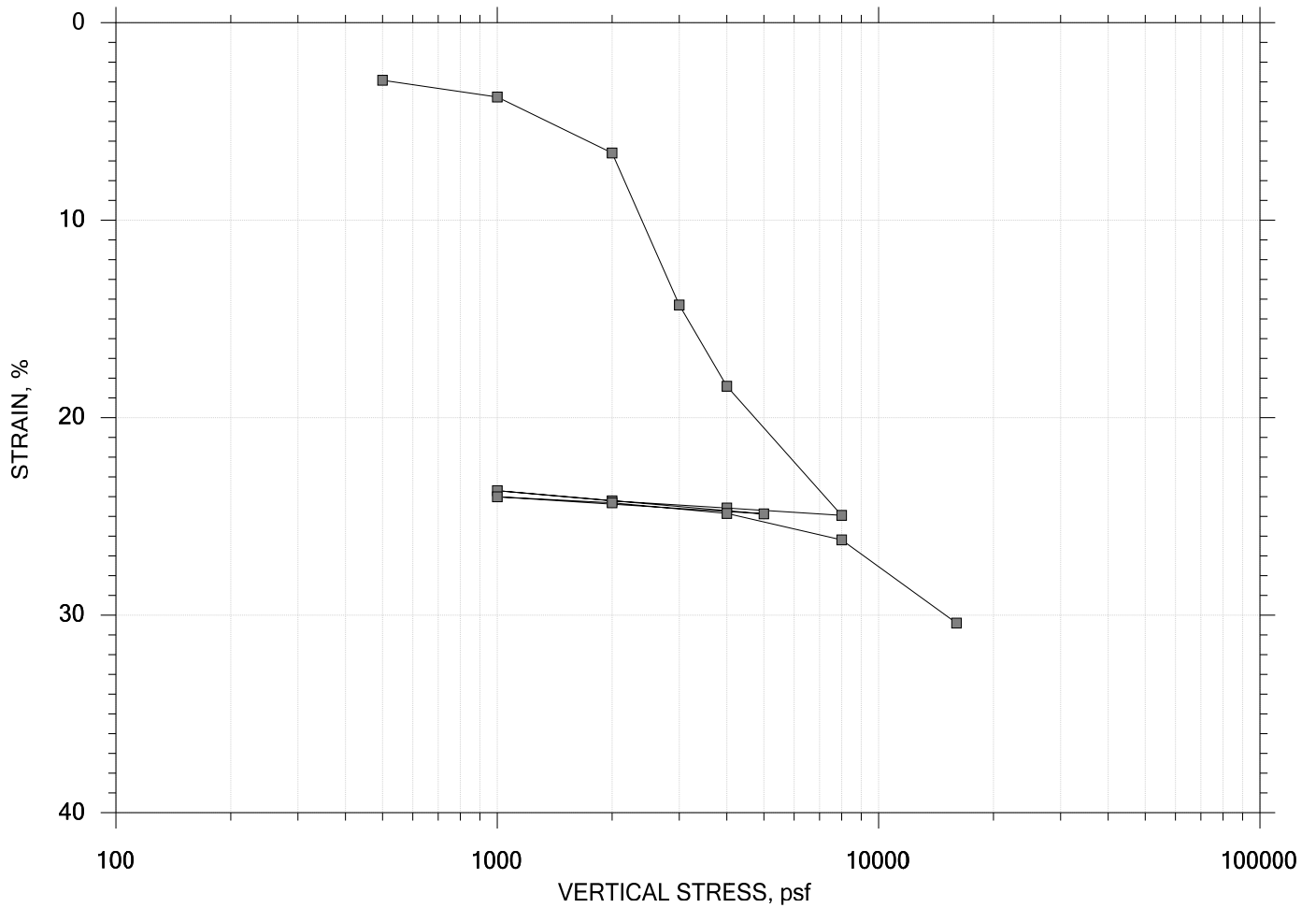
Stress: 16000 psf




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-201	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 07/26/18	Test No.: IP-2
	Depth: 40-42 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 171 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

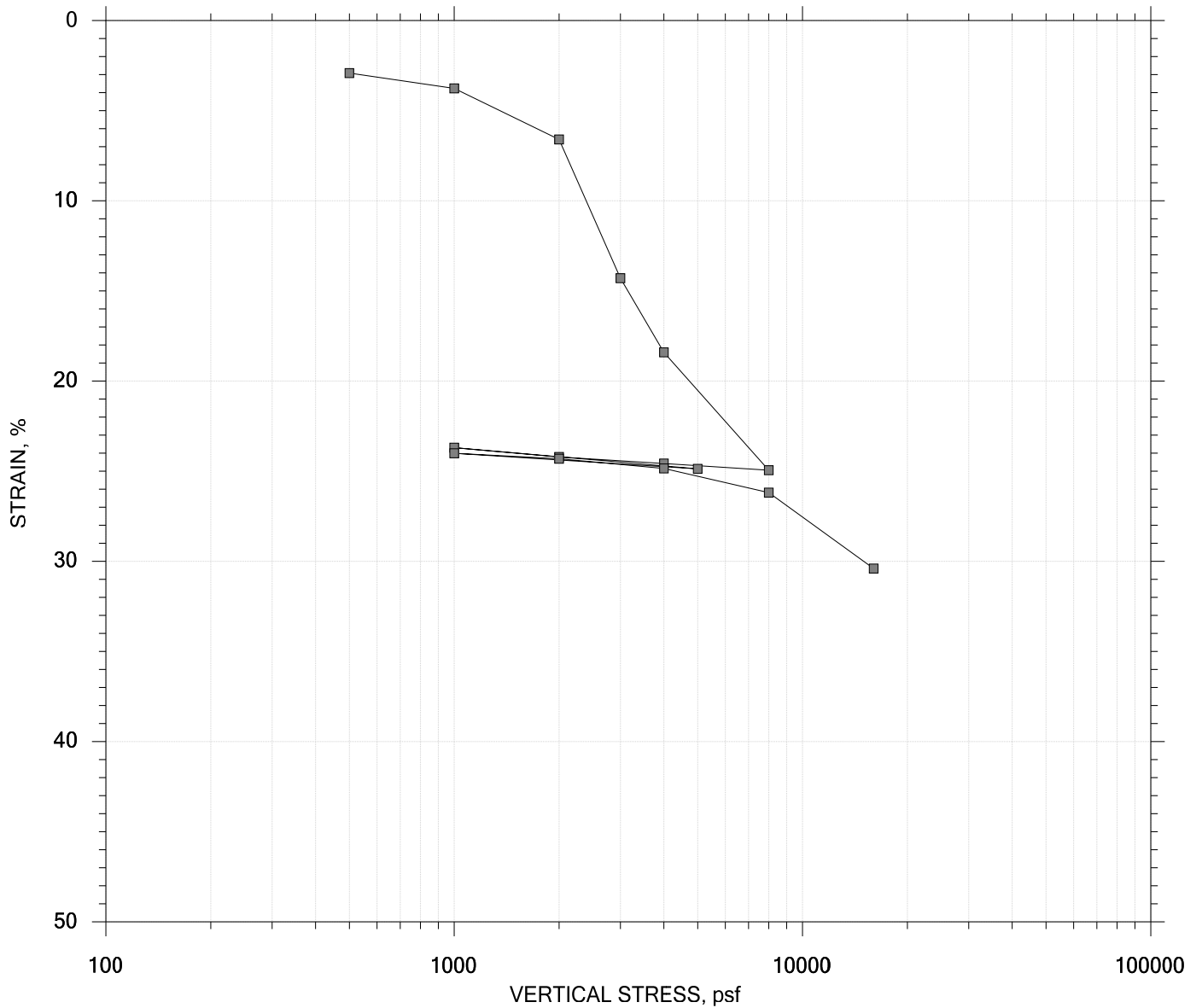
## SUMMARY REPORT




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Displacement at End of Increment		
	Page 172 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

## SUMMARY REPORT



				Before Test	After Test	
Current Vertical Effective Stress: ---				Water Content, %	51.34	25.19
Preconsolidation Stress: ---				Dry Unit Weight, pcf	71.158	101.65
Compression Ratio: ---				Saturation, %	99.66	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.42	0.70
LL: 39	PL: 21	PI: 18	GS: 2.76			

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-205		Tested By: md		Checked By: njh	
	Sample No.: U-2		Test Date: 07/31/18		Test No.: IP-3	
	Depth: 35-37 ft		Sample Type: intact		Elevation: ---	
	Description: Wet, dark gray clay					
	Remarks: System Y					
	Displacement at End of Increment					

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-205  
 Sample No.: U-2  
 Test No.: IP-3

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/31/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 35-37 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System Y

Estimated Specific Gravity: 2.76  
 Initial Void Ratio: 1.42  
 Final Void Ratio: 0.696

Liquid Limit: 39  
 Plastic Limit: 21  
 Plasticity Index: 18

Specimen Diameter: 2.50 in  
 Initial Height: 1.00 in  
 Final Height: 0.70 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-1374	RING		C-131
Wt. Container + Wet Soil, gm	142.91	248.16	224.19	124.09
Wt. Container + Dry Soil, gm	96.710	201.09	201.09	100.78
Wt. Container, gm	8.4000	109.40	109.40	8.2600
Wt. Dry Soil, gm	88.310	91.689	91.689	92.520
Water Content, %	52.32	51.34	25.19	25.19
Void Ratio	---	1.42	0.696	---
Degree of Saturation, %	---	99.66	100.00	---
Dry Unit Weight, pcf	---	71.158	101.65	---

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.

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-205  
 Sample No.: U-2  
 Test No.: IP-3

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/31/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 35-37 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System Y

Displacement at End of Increment

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day
1	500.	0.02912	1.35	2.91	2.267	1.05e-005	5.82e-005	3.30e-003
2	1.00e+003	0.03761	1.33	3.76	7.360	3.12e-006	1.70e-005	2.85e-004
3	2.00e+003	0.06592	1.26	6.59	133.255	1.66e-007	2.83e-005	2.53e-005
4	3.00e+003	0.1429	1.08	14.3	341.118	5.77e-008	7.70e-005	2.40e-005
5	4.00e+003	0.1841	0.976	18.4	318.386	5.39e-008	4.12e-005	1.20e-005
6	8.00e+003	0.2494	0.818	24.9	39.602	3.80e-007	1.63e-005	3.35e-005
7	4.00e+003	0.2457	0.827	24.6	7.743	1.79e-006	9.30e-007	9.00e-006
8	2.00e+003	0.2421	0.836	24.2	33.711	4.16e-007	1.82e-006	4.08e-006
9	1.00e+003	0.2369	0.849	23.7	50.042	2.84e-007	5.15e-006	7.88e-006
10	5.00e+003	0.2487	0.820	24.9	10.495	1.34e-006	2.94e-006	2.13e-005
11	1.00e+003	0.2401	0.841	24.0	13.283	1.05e-006	2.15e-006	1.23e-005
12	2.00e+003	0.2430	0.834	24.3	7.544	1.87e-006	2.99e-006	3.01e-005
13	4.00e+003	0.2484	0.821	24.8	14.765	9.45e-007	2.69e-006	1.37e-005
14	8.00e+003	0.2618	0.788	26.2	34.553	3.94e-007	3.36e-006	7.13e-006
15	1.60e+004	0.3040	0.686	30.4	17.270	7.31e-007	5.27e-006	2.08e-005

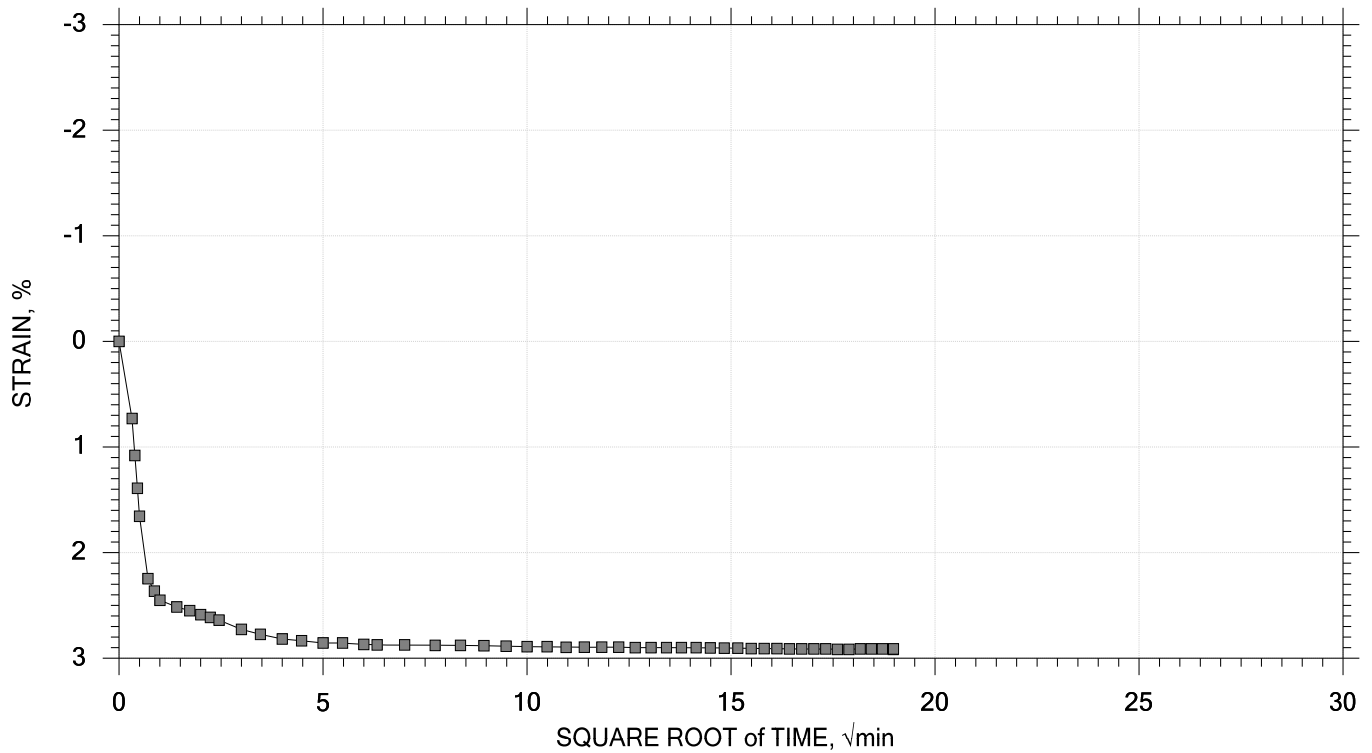
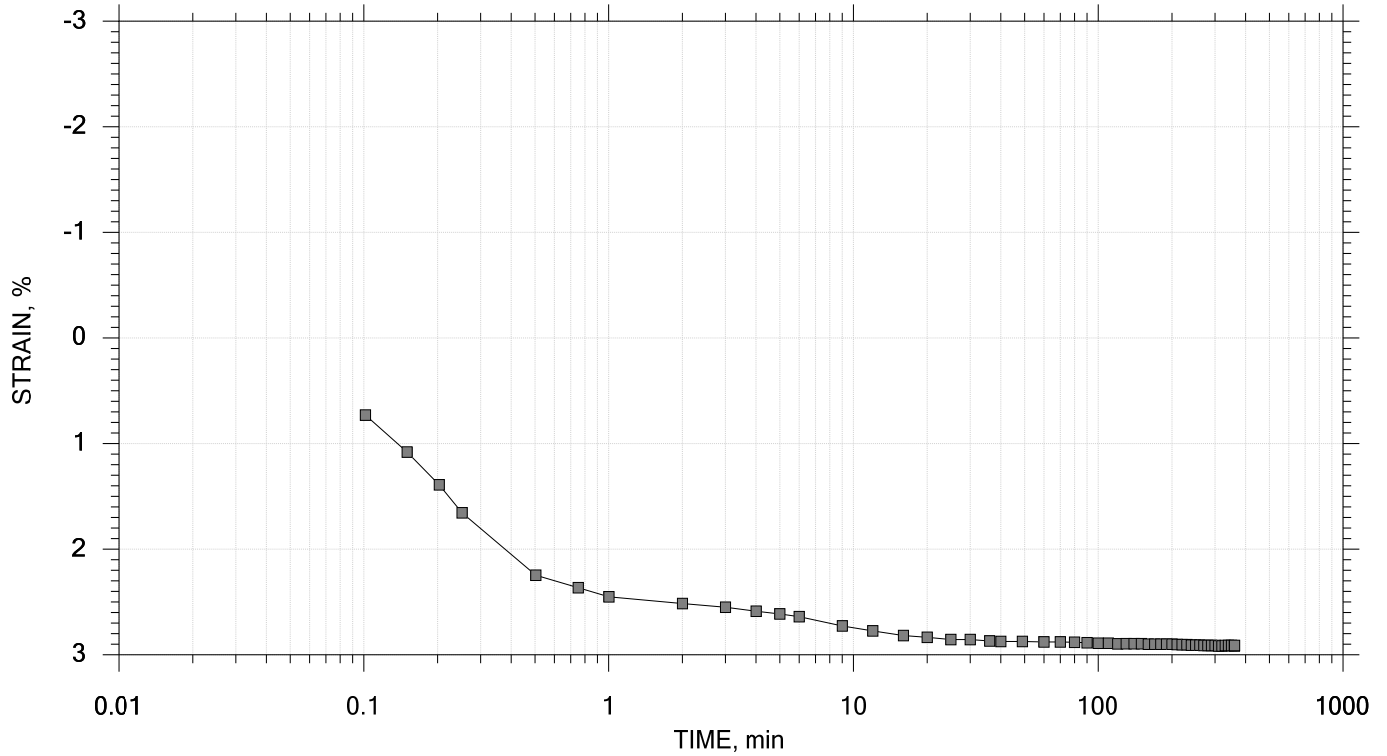
	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day	Ca %
1	500.	0.02912	1.35	2.91	0.000	0.00e+000	5.82e-005	0.00e+000	0.00e+000
2	1.00e+003	0.03761	1.33	3.76	0.501	1.06e-005	1.70e-005	9.73e-004	0.00e+000
3	2.00e+003	0.06592	1.26	6.59	0.000	0.00e+000	2.83e-005	0.00e+000	0.00e+000
4	3.00e+003	0.1429	1.08	14.3	98.888	4.62e-008	7.70e-005	1.92e-005	0.00e+000
5	4.00e+003	0.1841	0.976	18.4	69.136	5.77e-008	4.12e-005	1.28e-005	0.00e+000
6	8.00e+003	0.2494	0.818	24.9	9.197	3.80e-007	1.63e-005	3.35e-005	0.00e+000
7	4.00e+003	0.2457	0.827	24.6	1.372	2.35e-006	9.30e-007	1.18e-005	0.00e+000
8	2.00e+003	0.2421	0.836	24.2	5.439	5.99e-007	1.82e-006	5.87e-006	0.00e+000
9	1.00e+003	0.2369	0.849	23.7	8.744	3.77e-007	5.15e-006	1.05e-005	0.00e+000
10	5.00e+003	0.2487	0.820	24.9	1.757	1.86e-006	2.94e-006	2.96e-005	0.00e+000
11	1.00e+003	0.2401	0.841	24.0	4.241	7.67e-007	2.15e-006	8.92e-006	0.00e+000
12	2.00e+003	0.2430	0.834	24.3	2.501	1.31e-006	2.99e-006	2.11e-005	0.00e+000
13	4.00e+003	0.2484	0.821	24.8	0.000	0.00e+000	2.69e-006	0.00e+000	0.00e+000
14	8.00e+003	0.2618	0.788	26.2	0.000	0.00e+000	3.36e-006	0.00e+000	0.00e+000
15	1.60e+004	0.3040	0.686	30.4	3.831	7.65e-007	5.27e-006	2.17e-005	0.00e+000


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 15

Stress: 500 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 176 of 301		

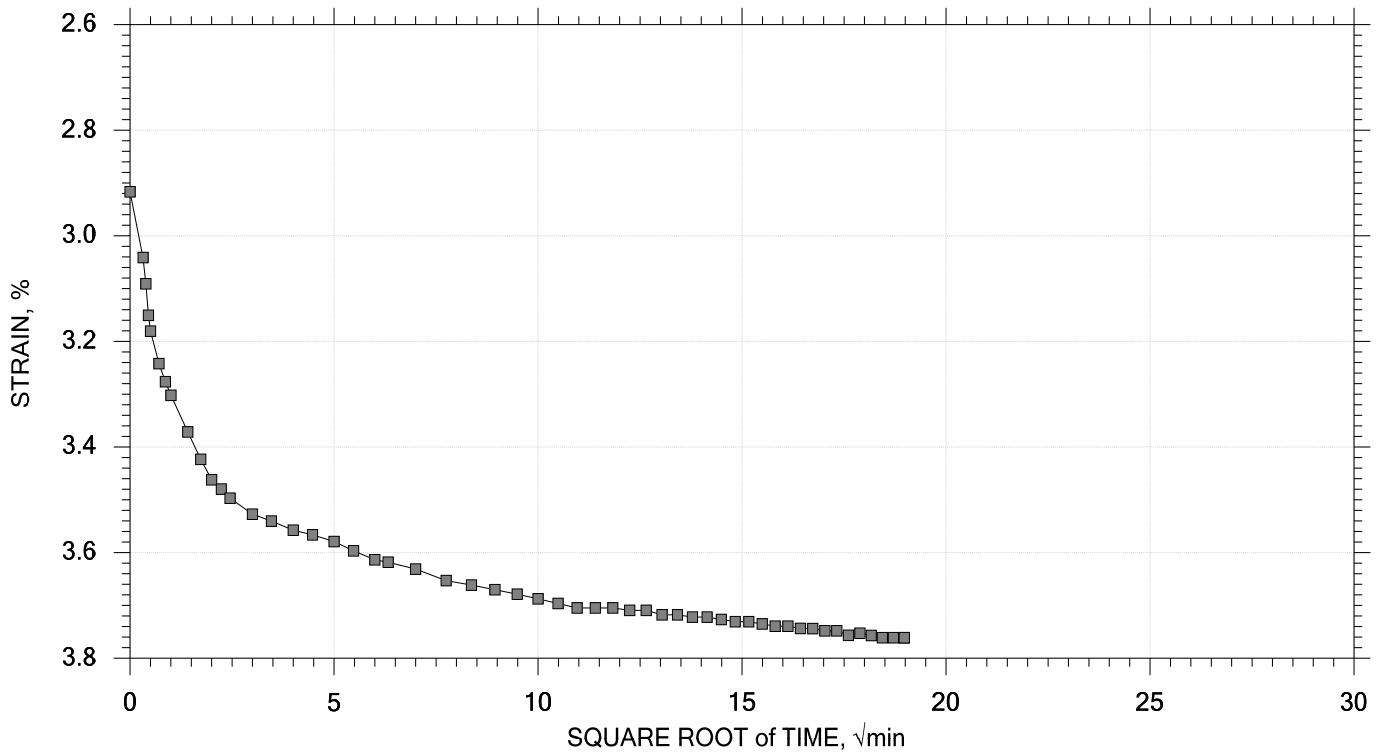
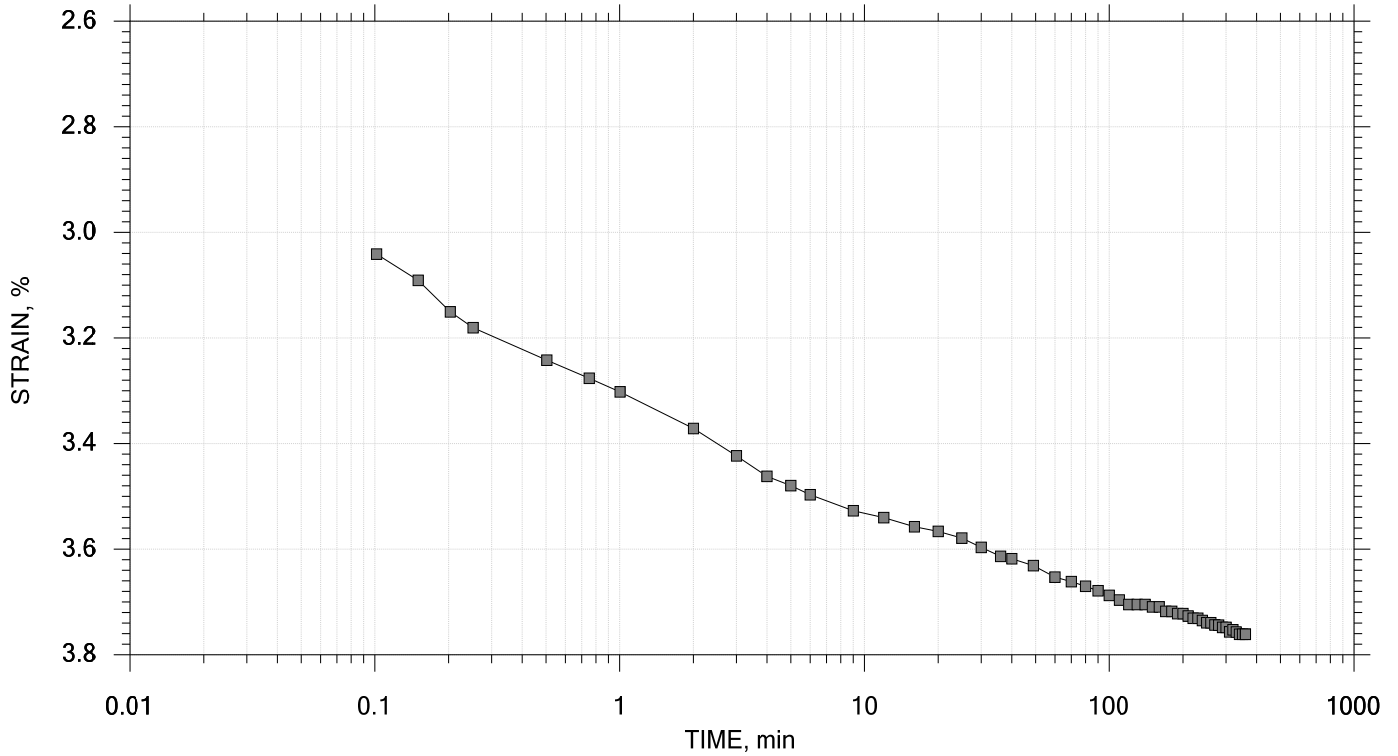



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 1000 psf



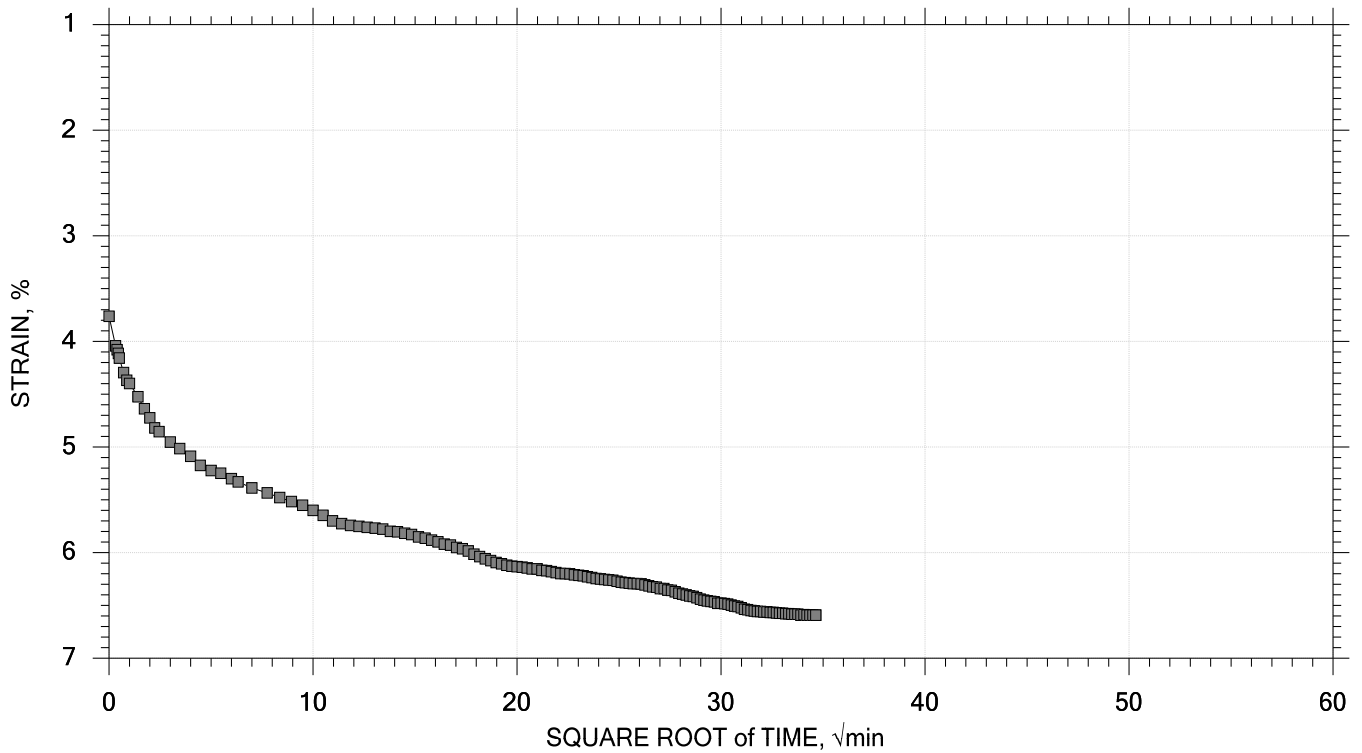
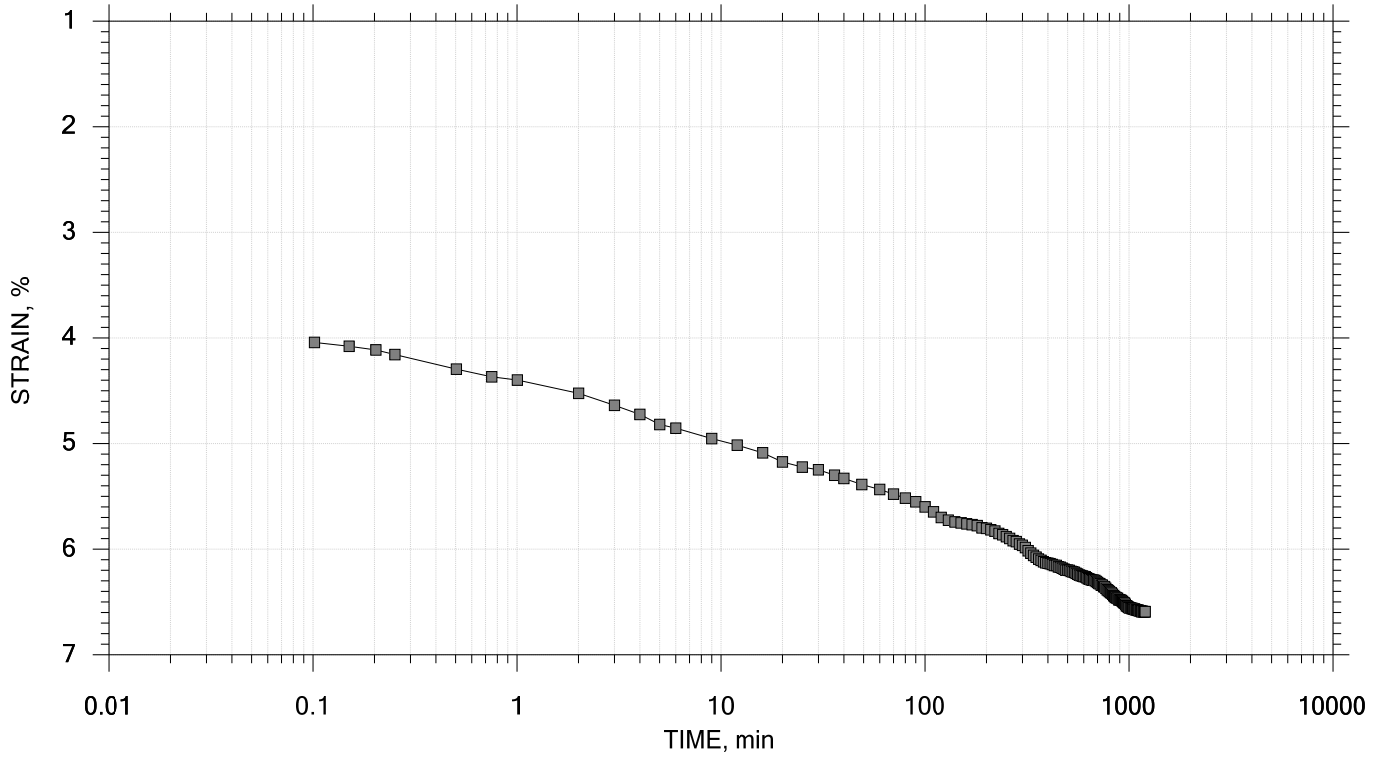
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 177 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 2000 psf



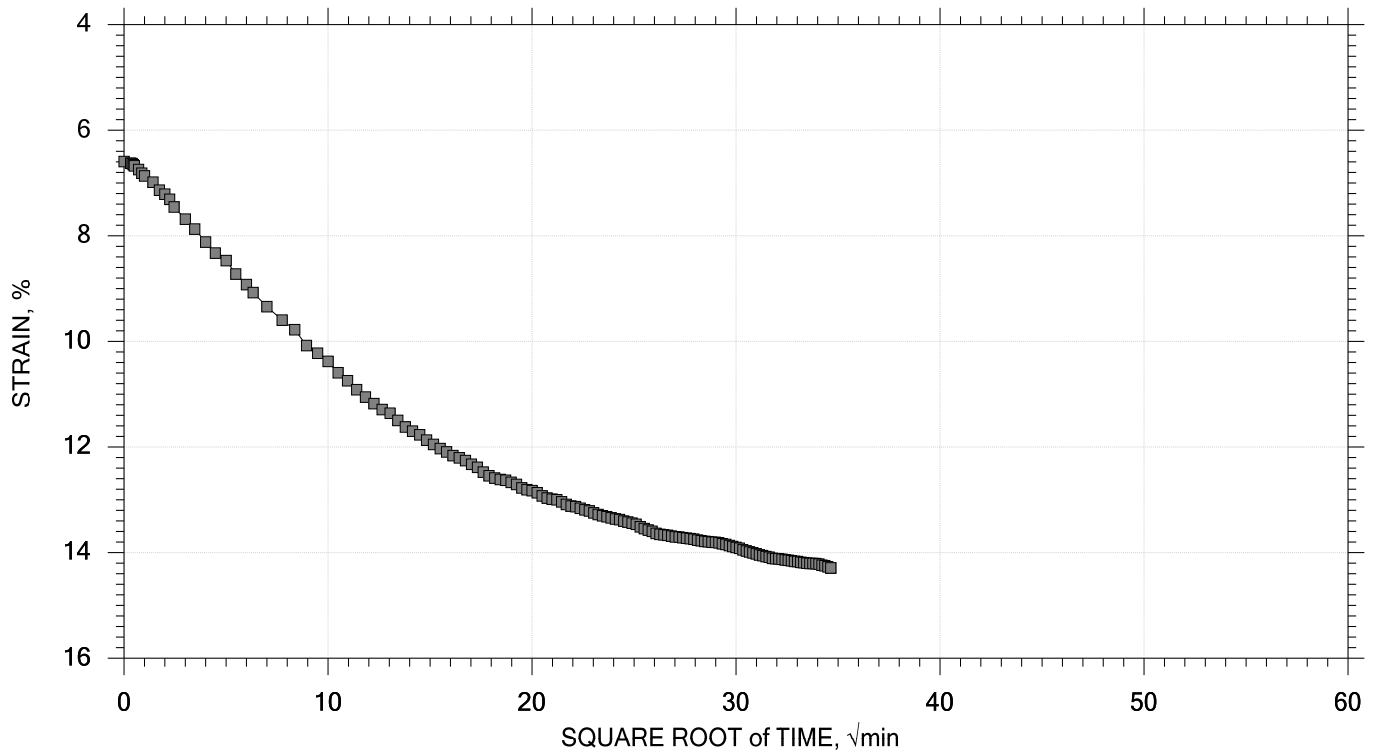
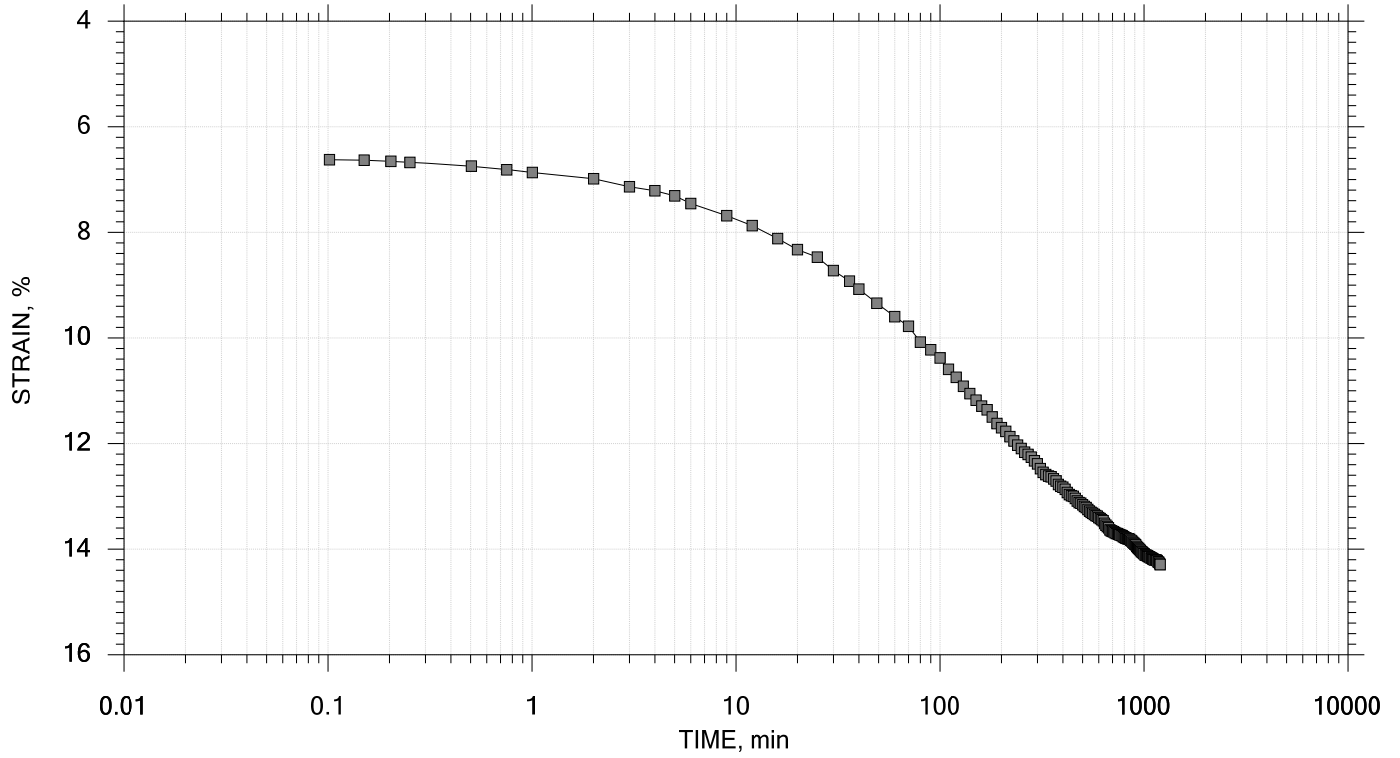
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 178 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 3000 psf



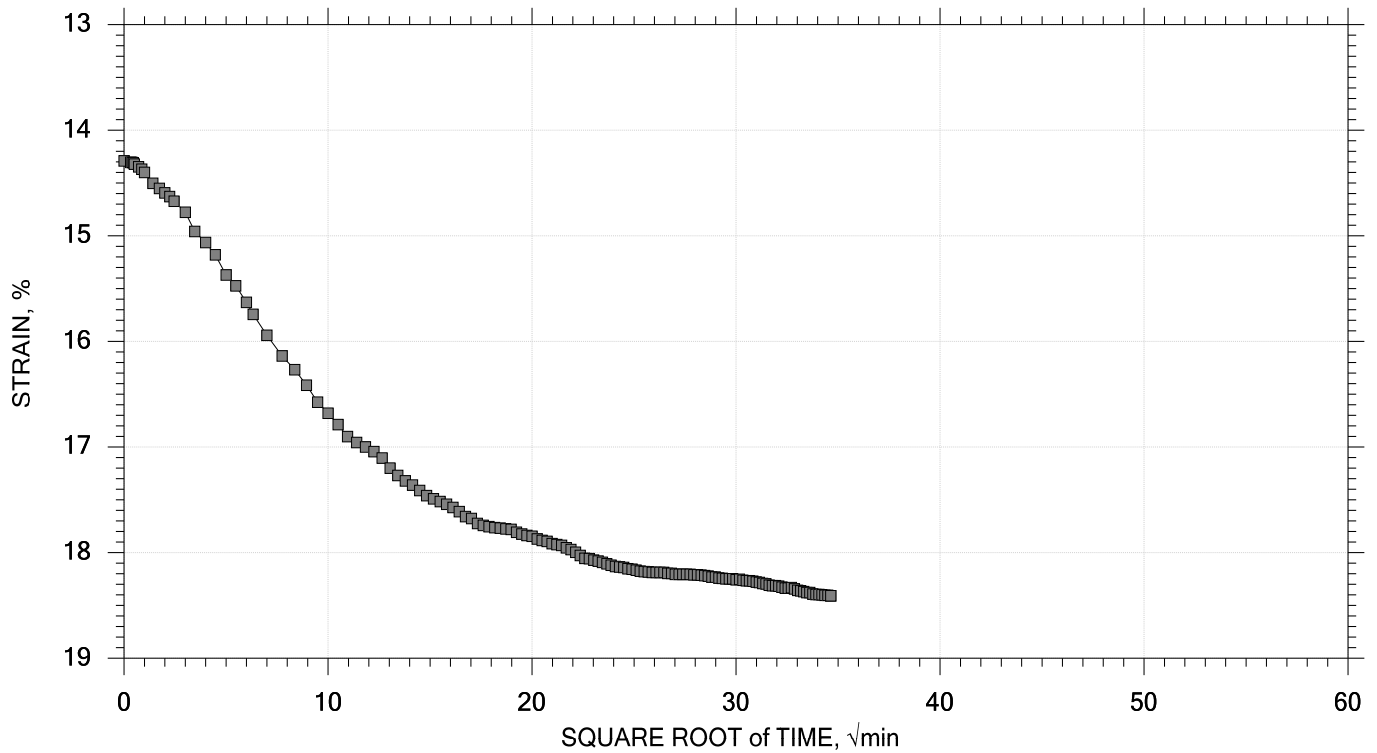
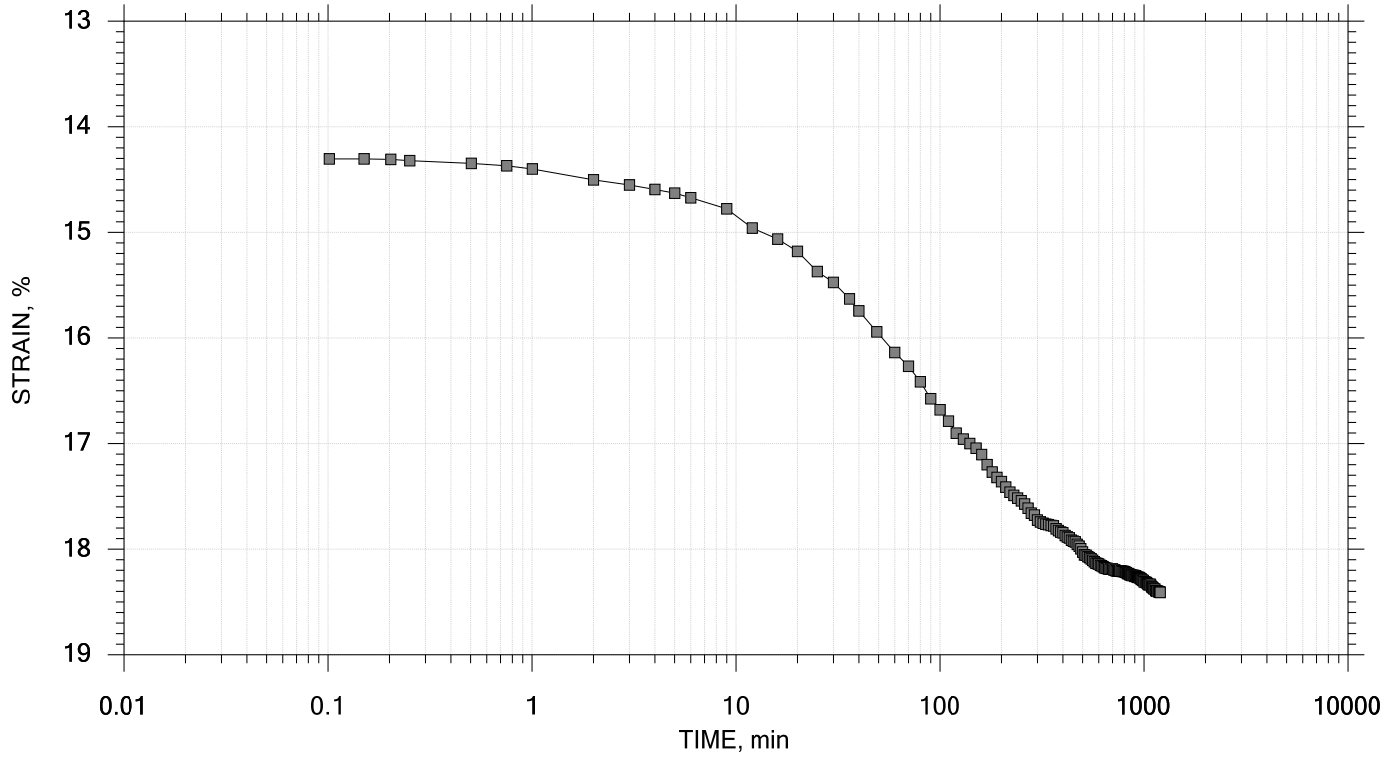
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 179 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 4000 psf



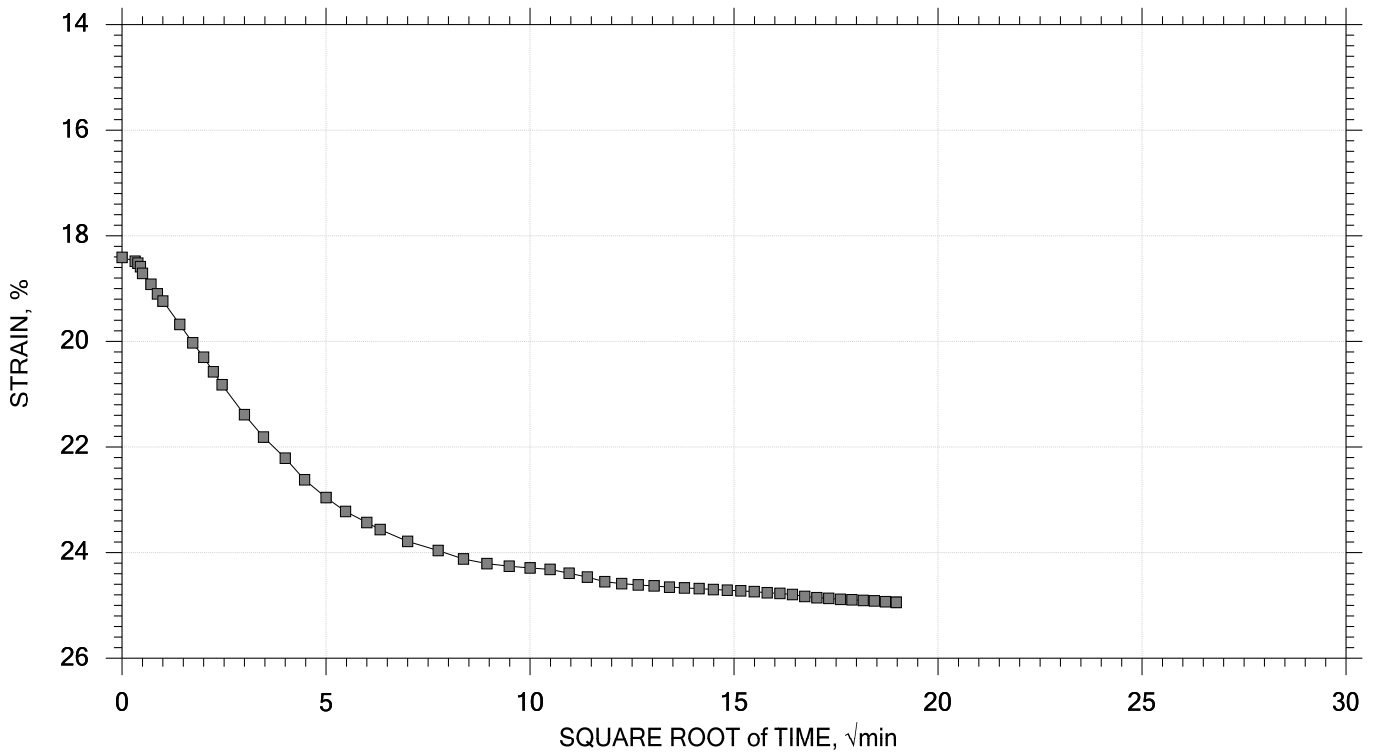
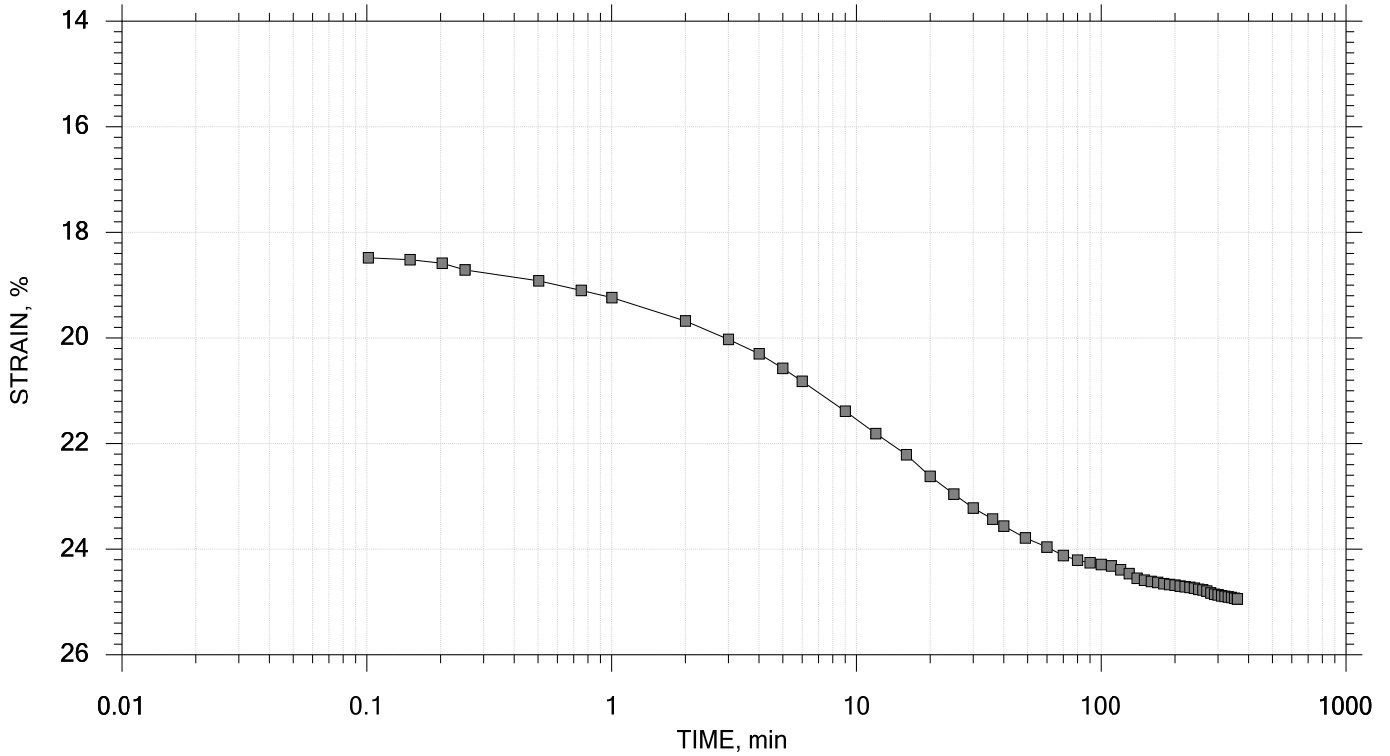
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 180 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 8000 psf



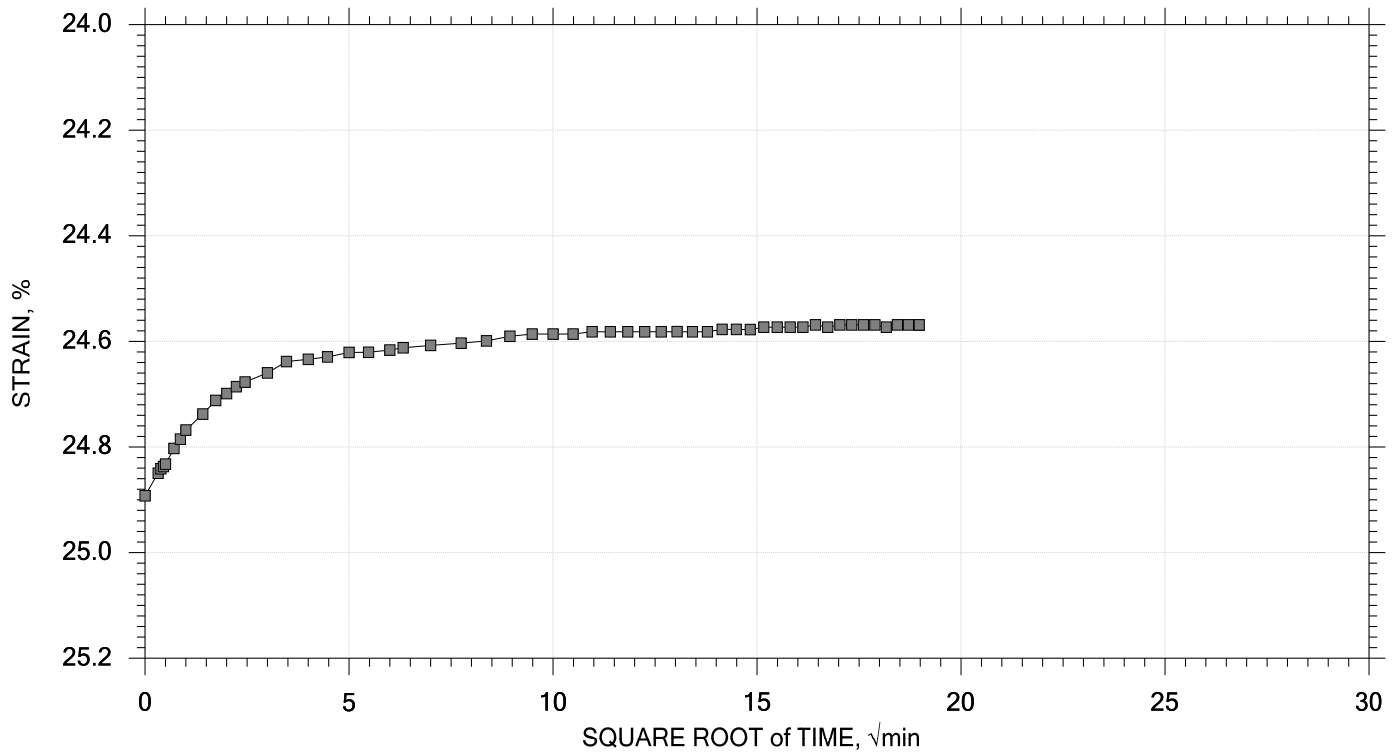
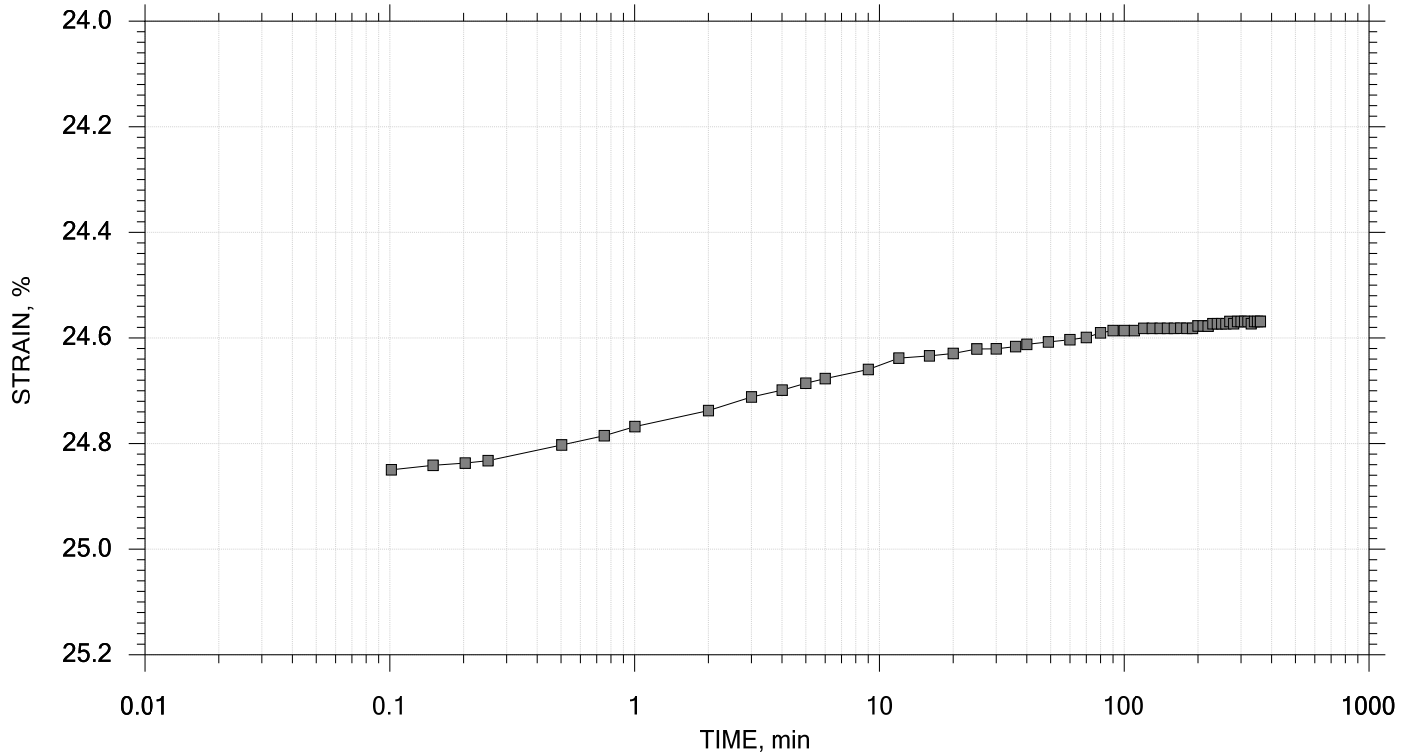
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 181 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4000 psf



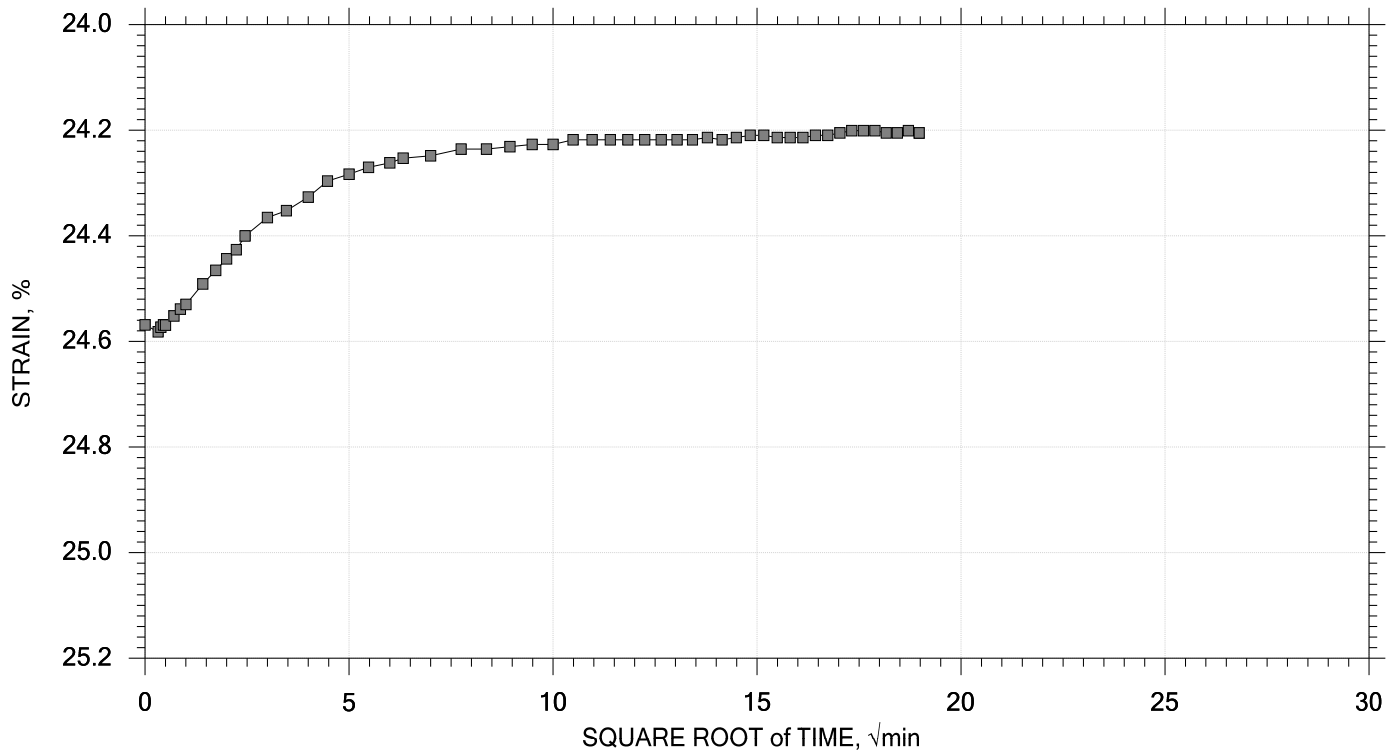
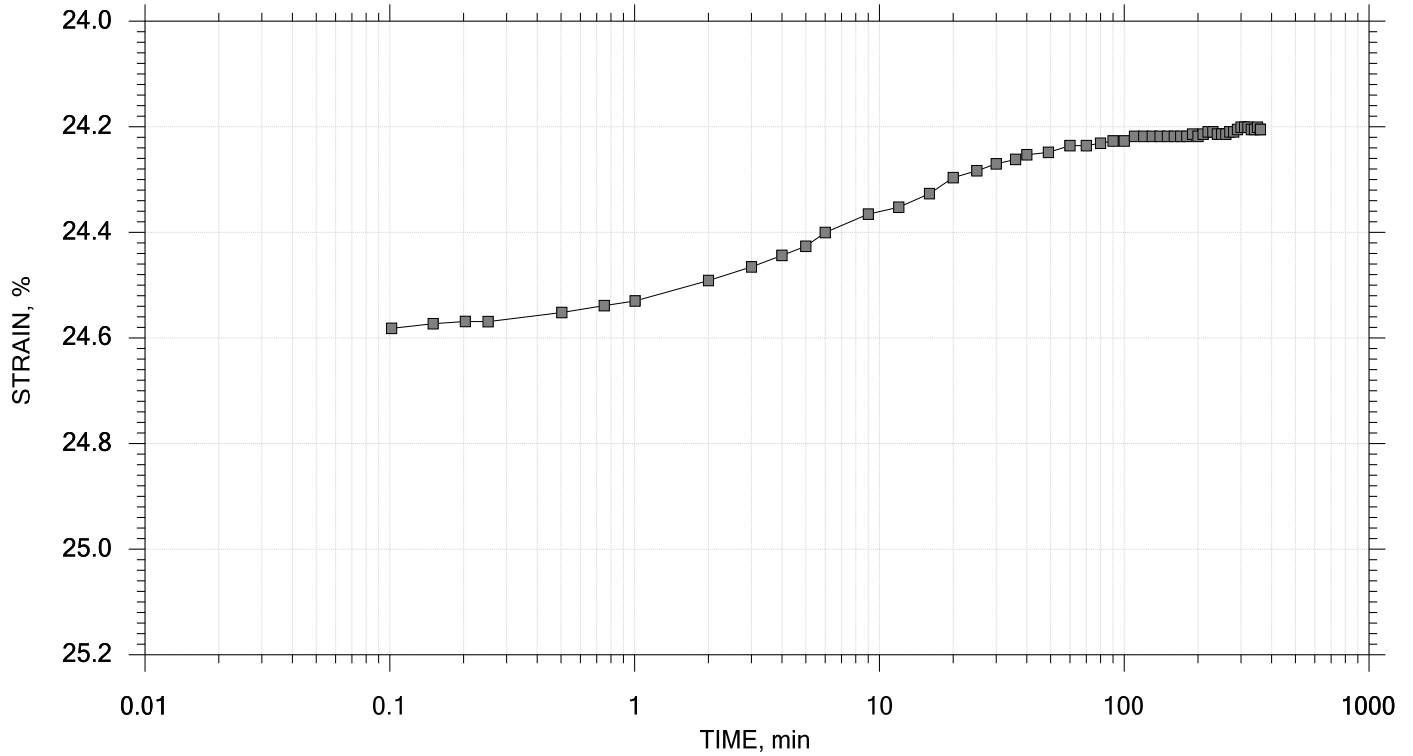
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 182 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 2000 psf



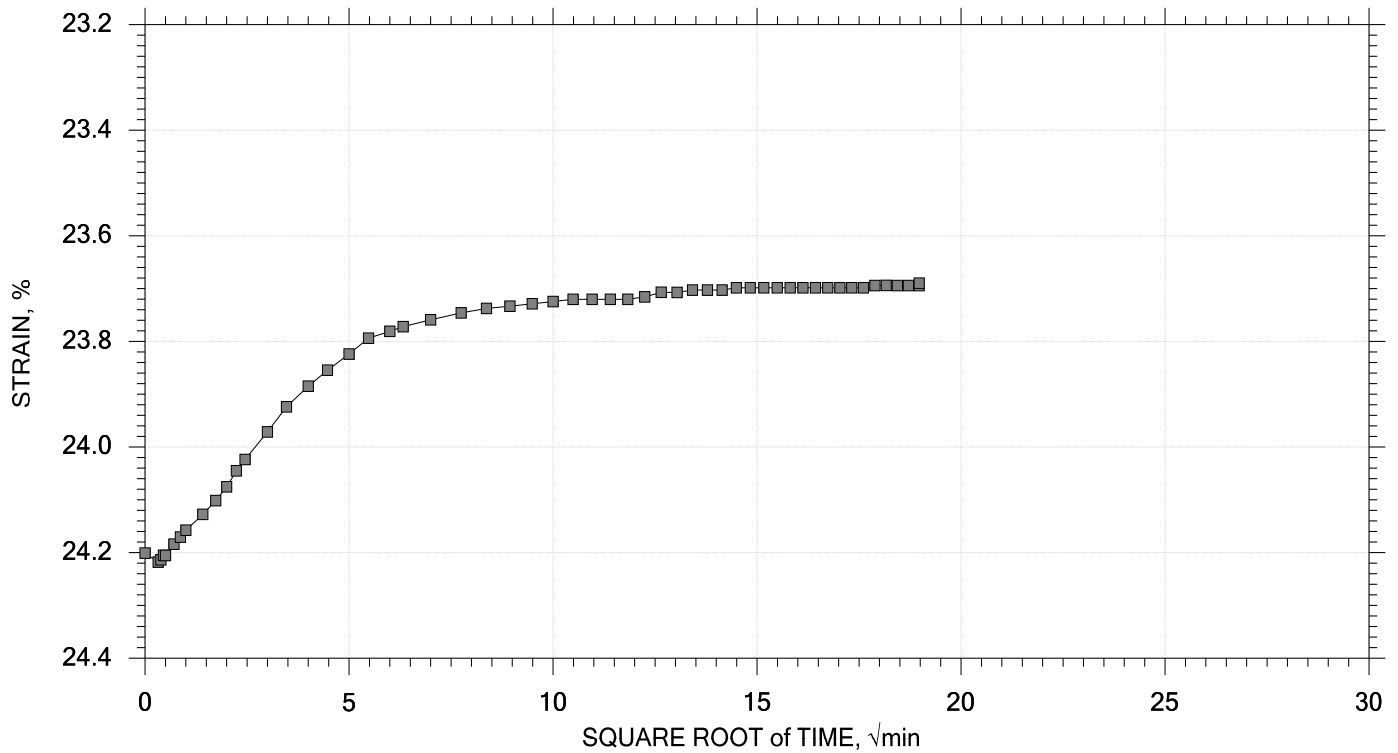
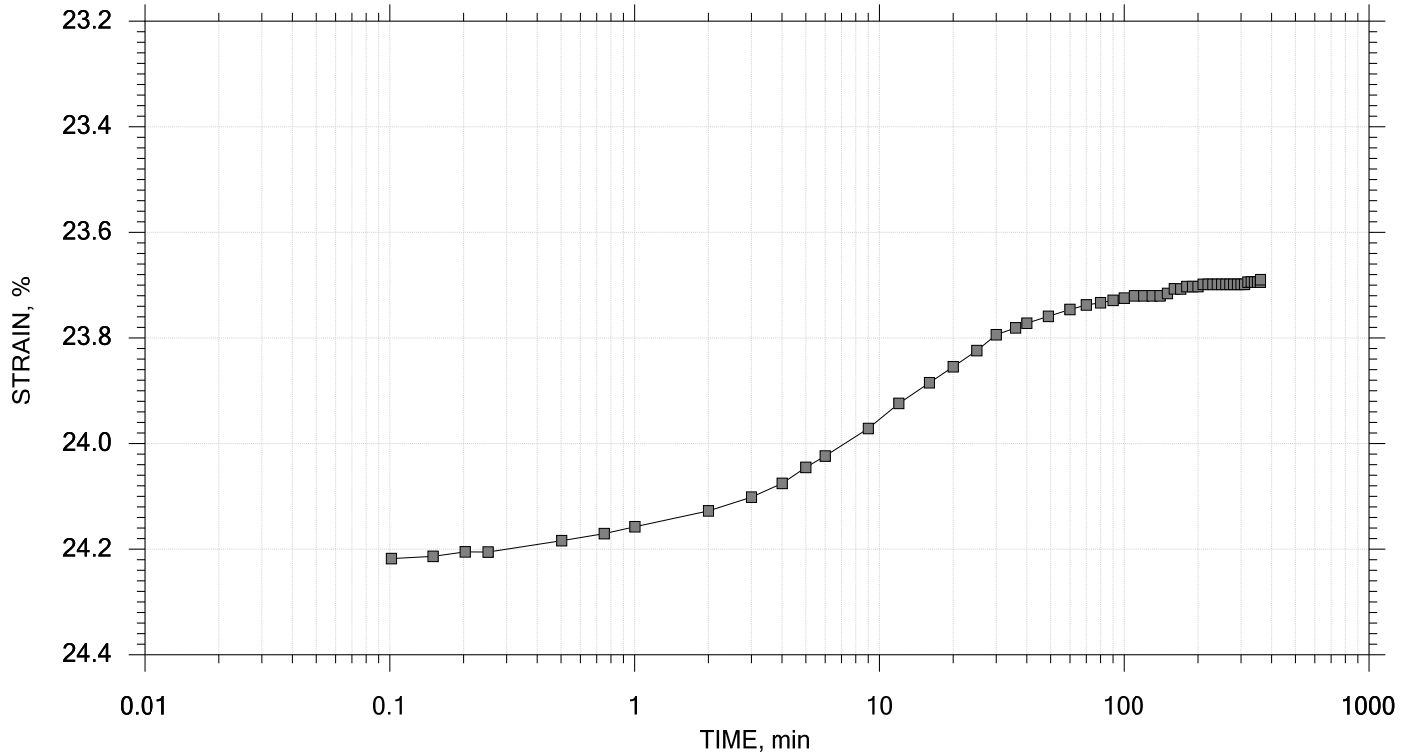
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 183 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 1000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 184 of 301		

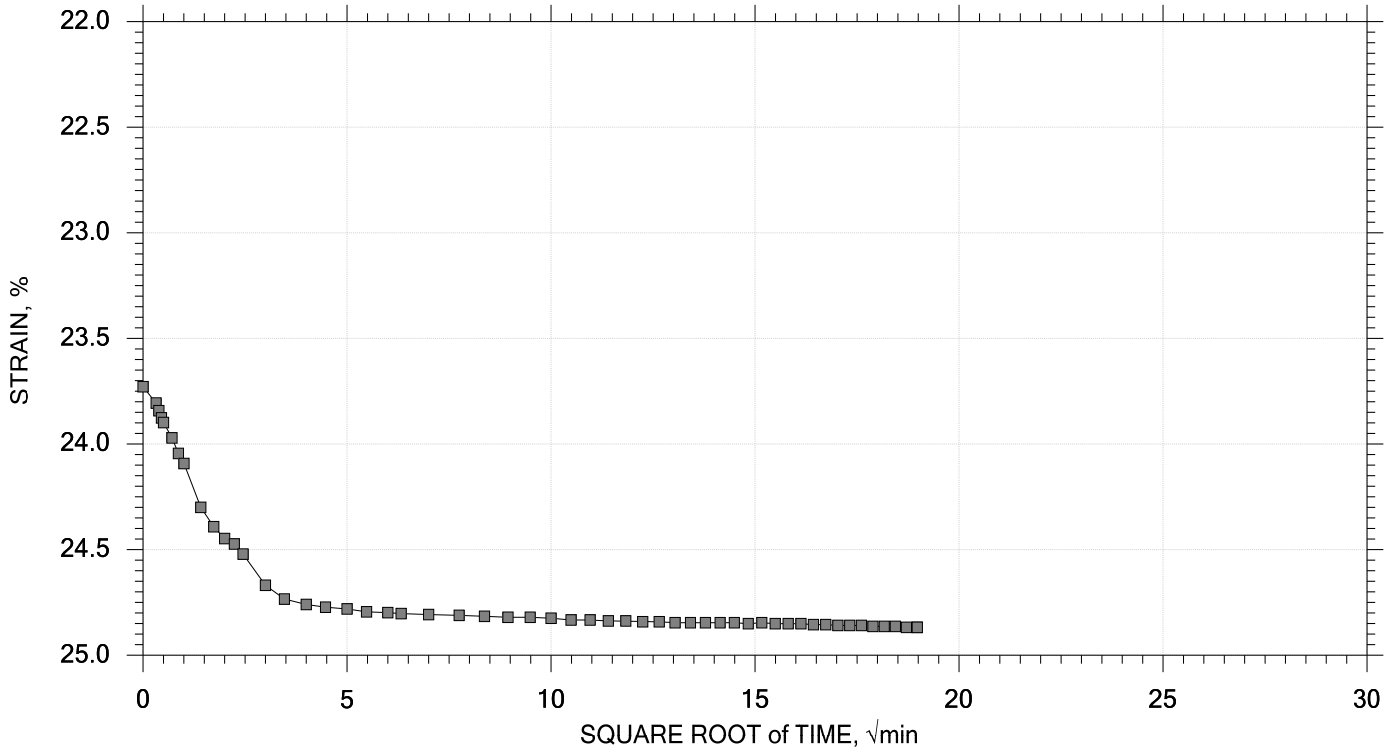
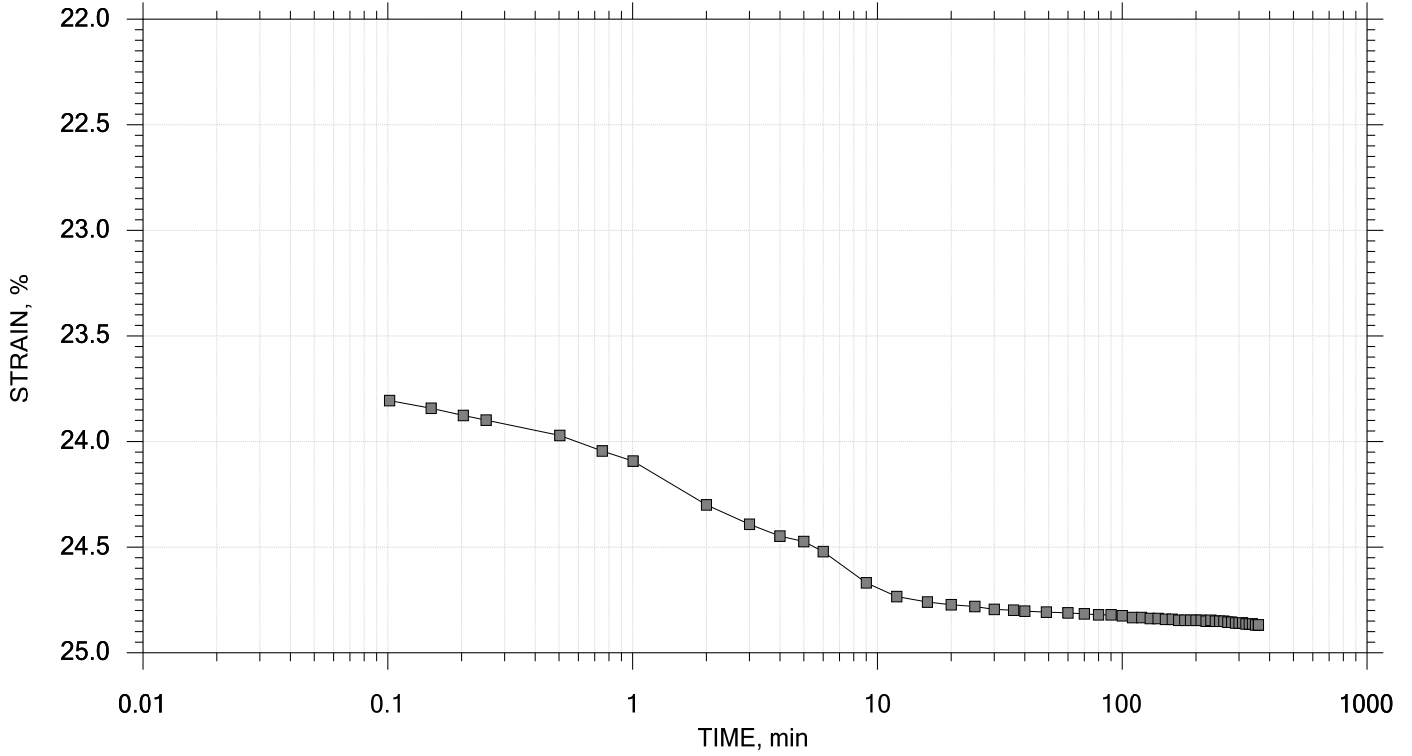



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 5000 psf



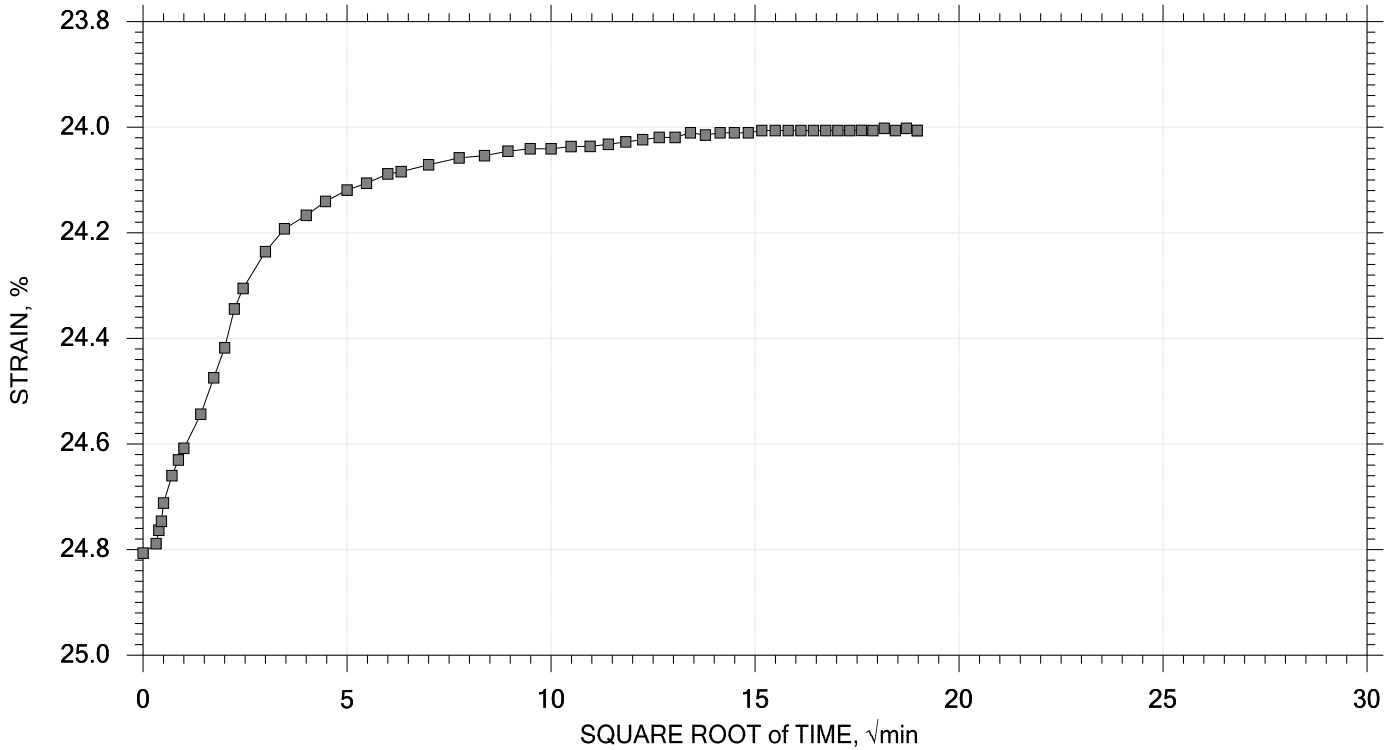
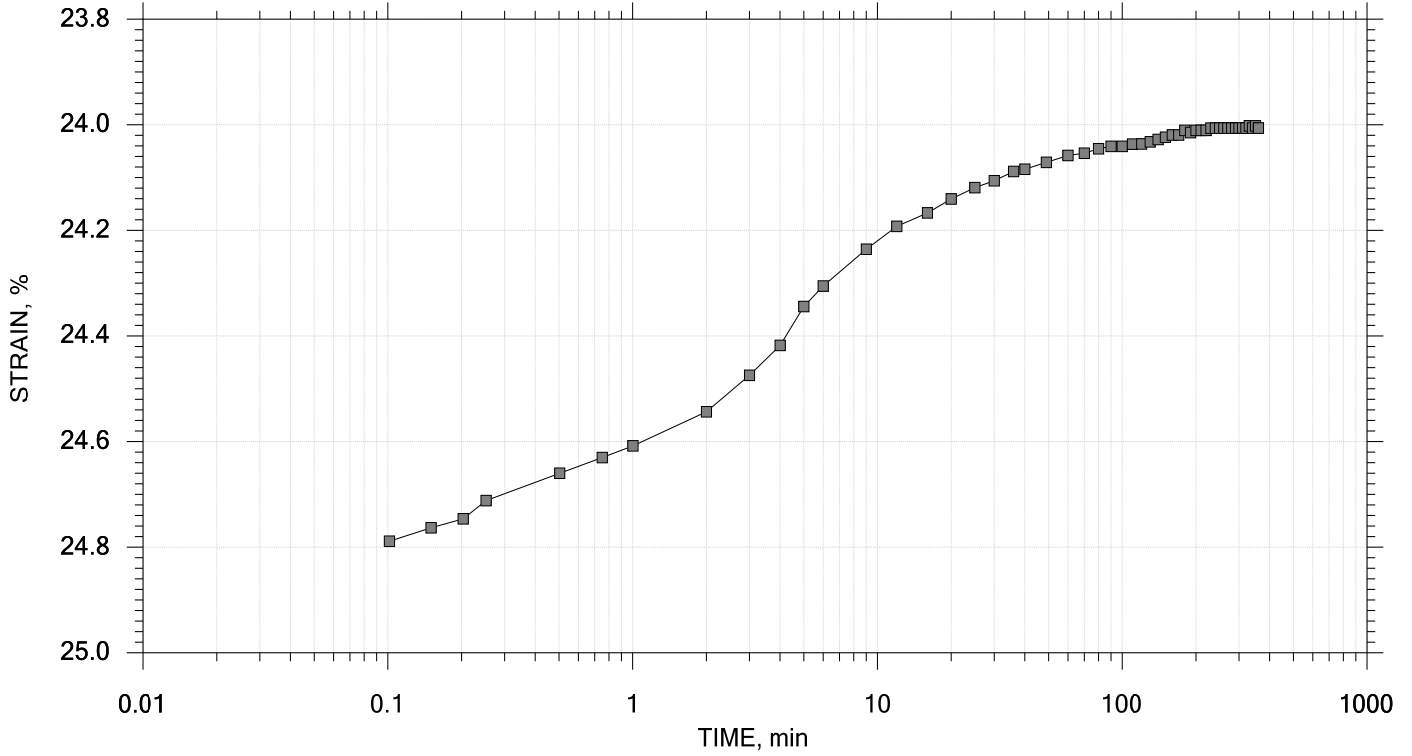
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 185 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 1000 psf



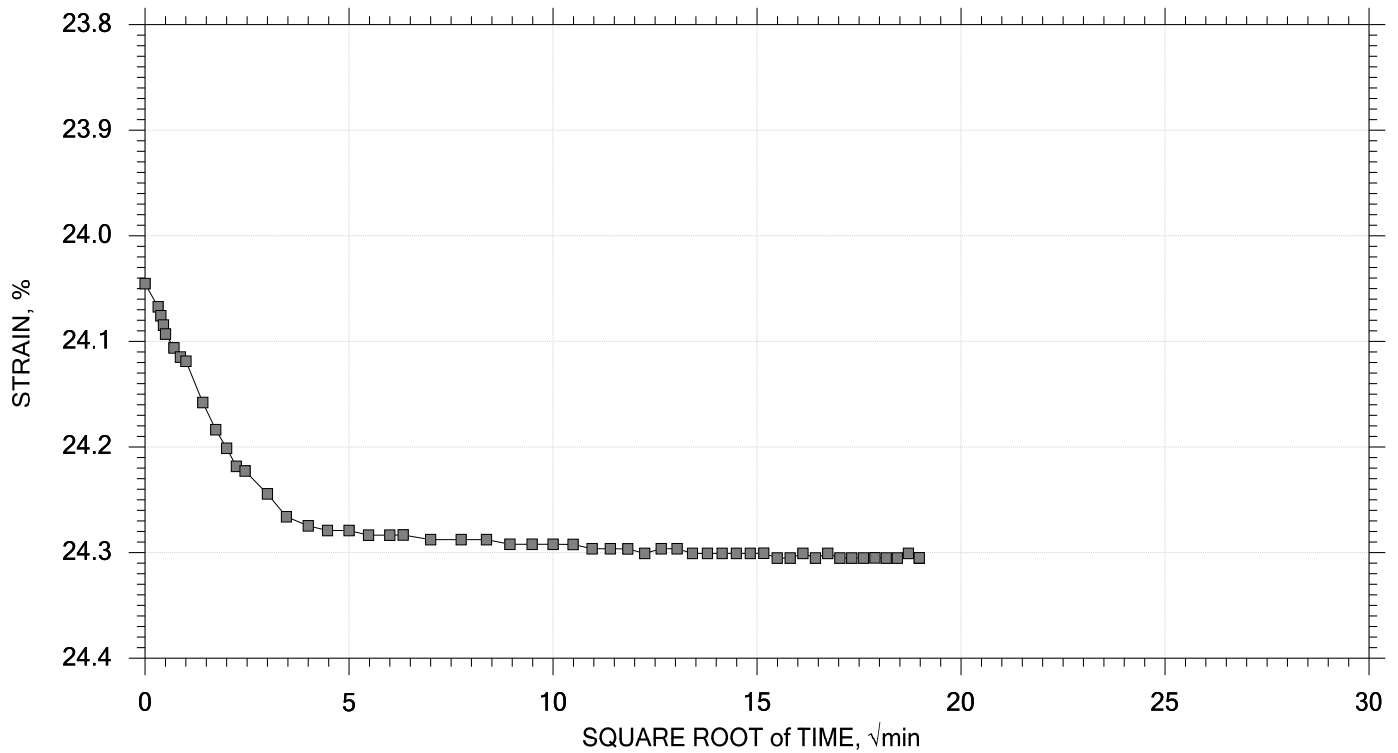
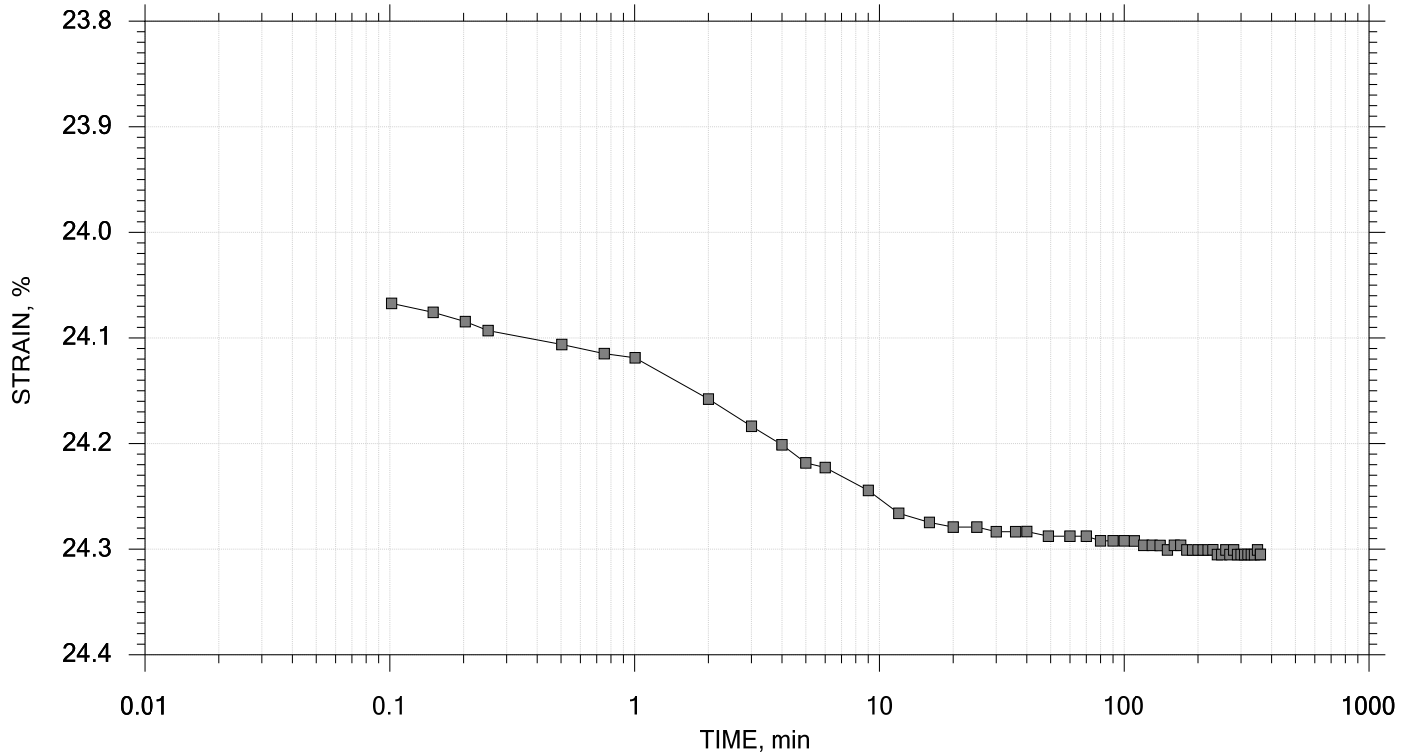
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 186 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2000 psf



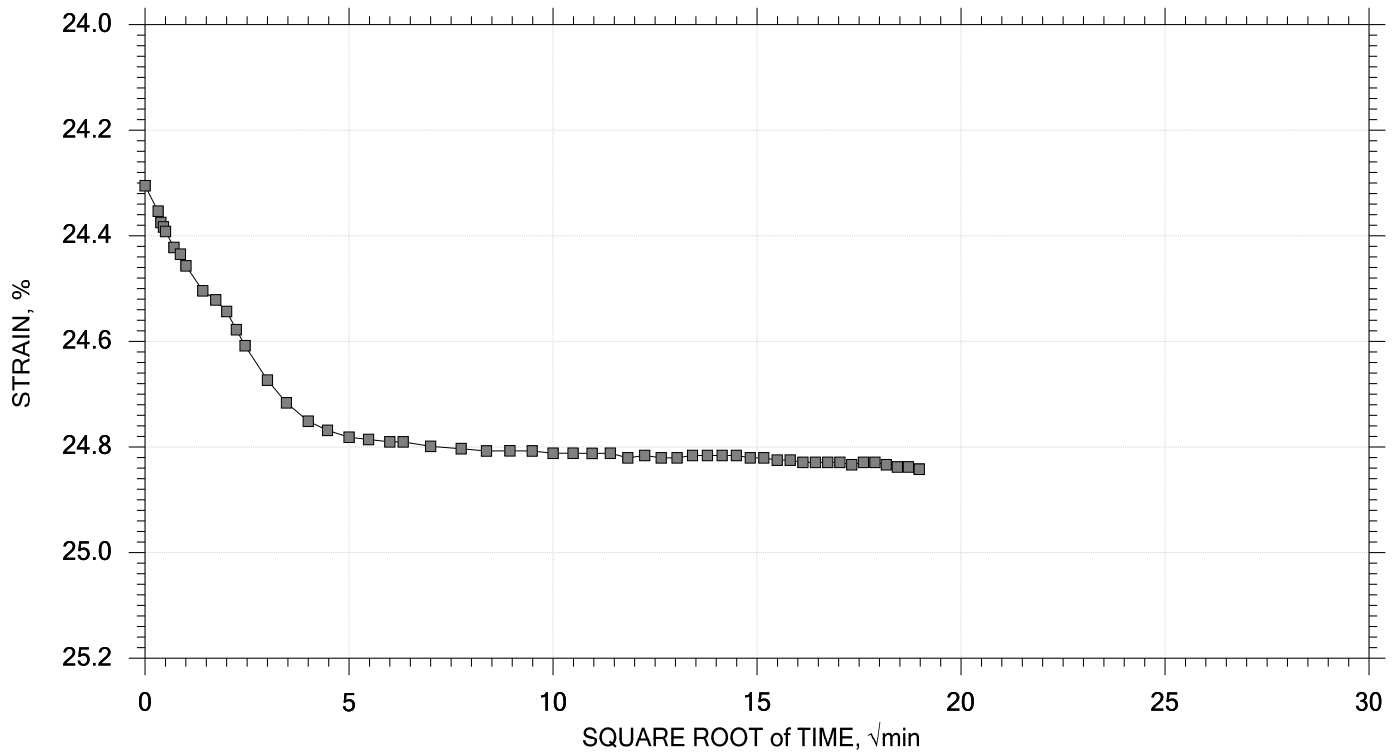
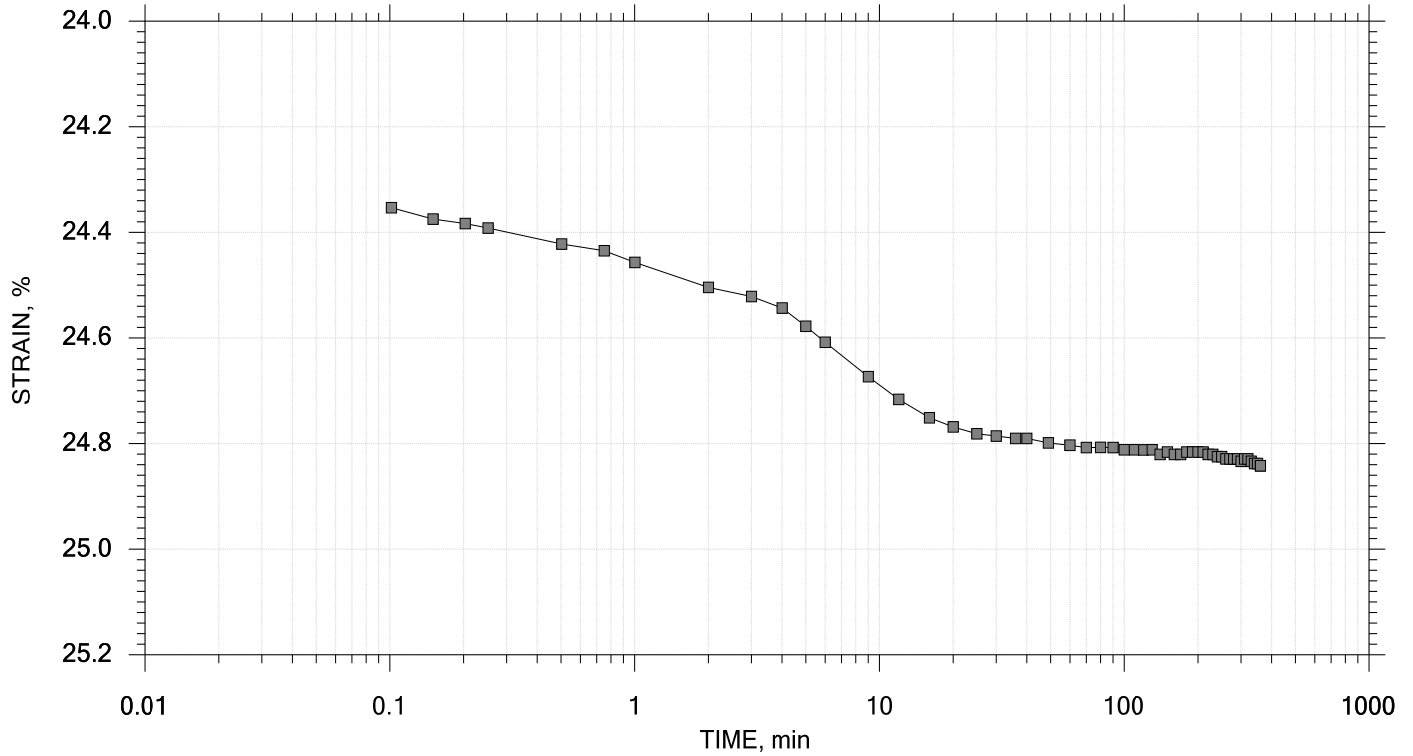
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 187 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 4000 psf



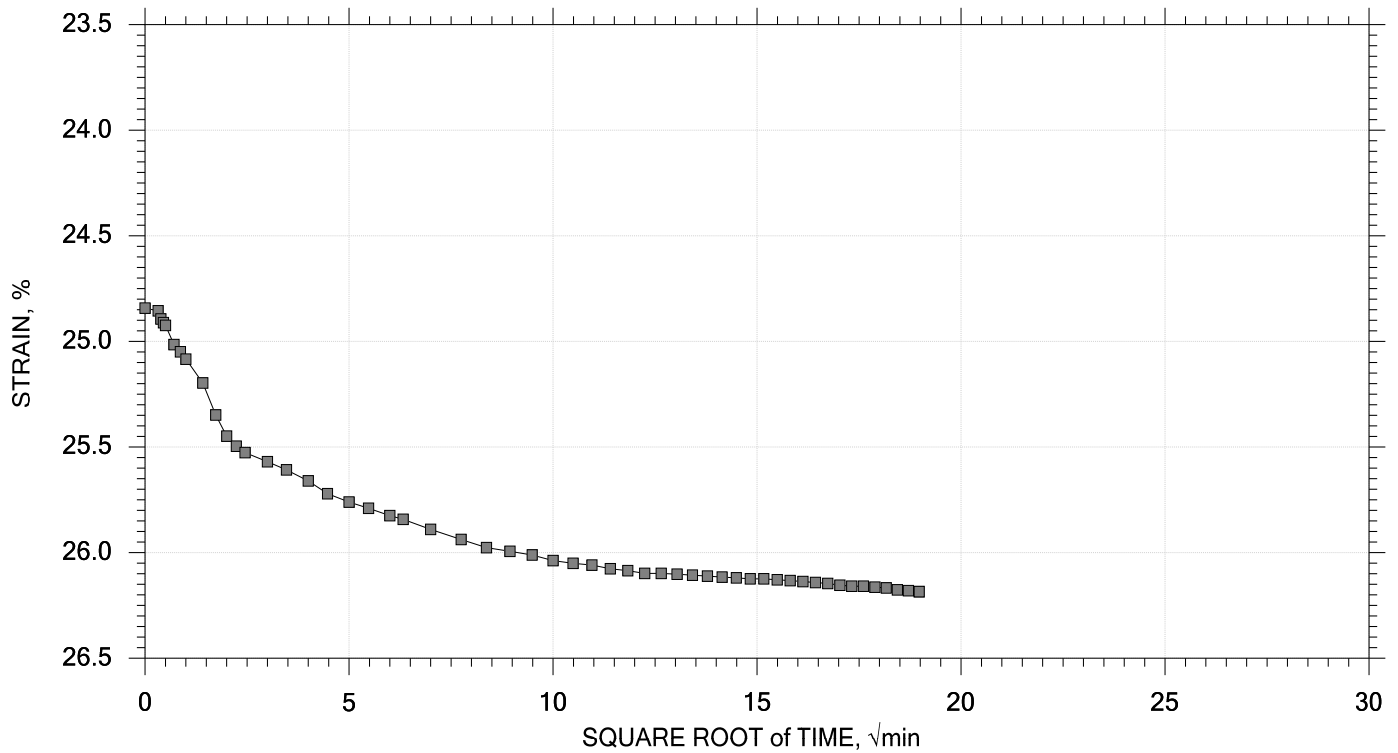
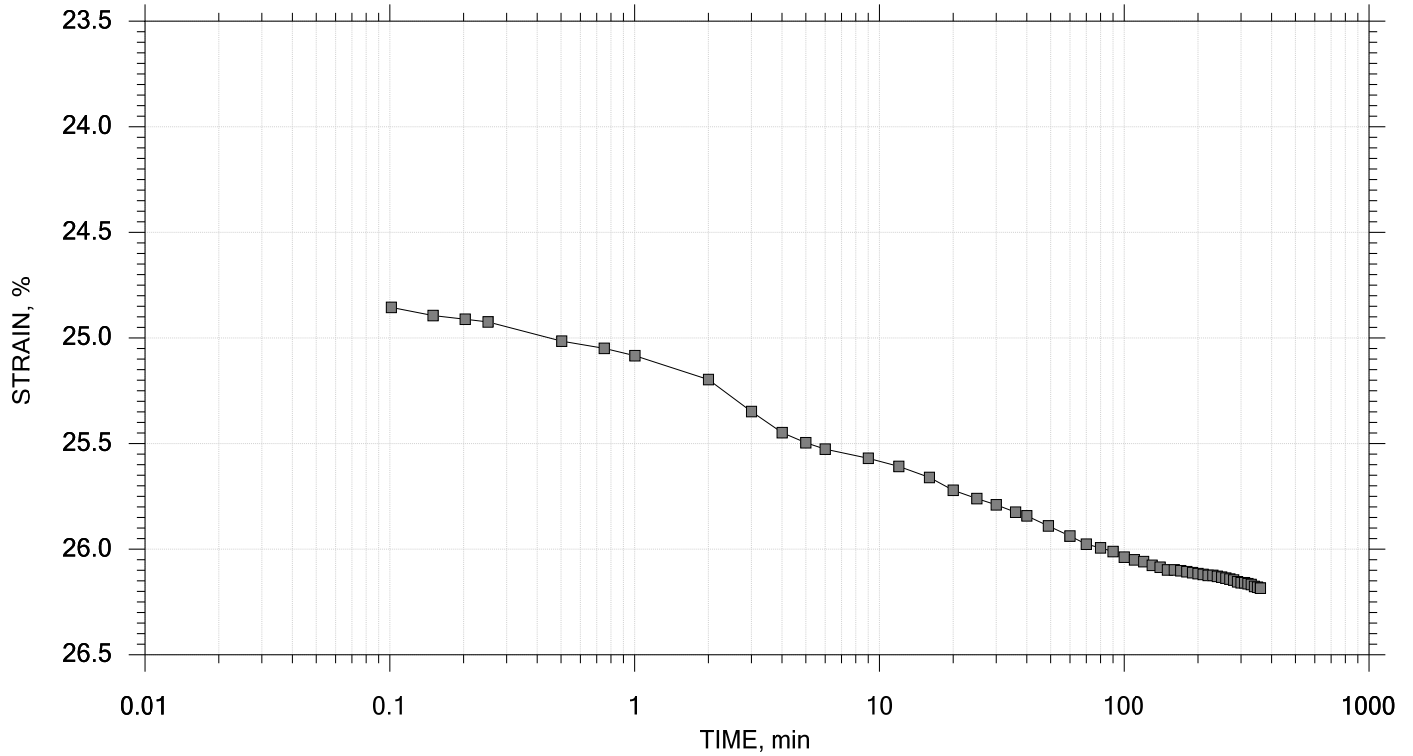
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	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 188 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 8000 psf



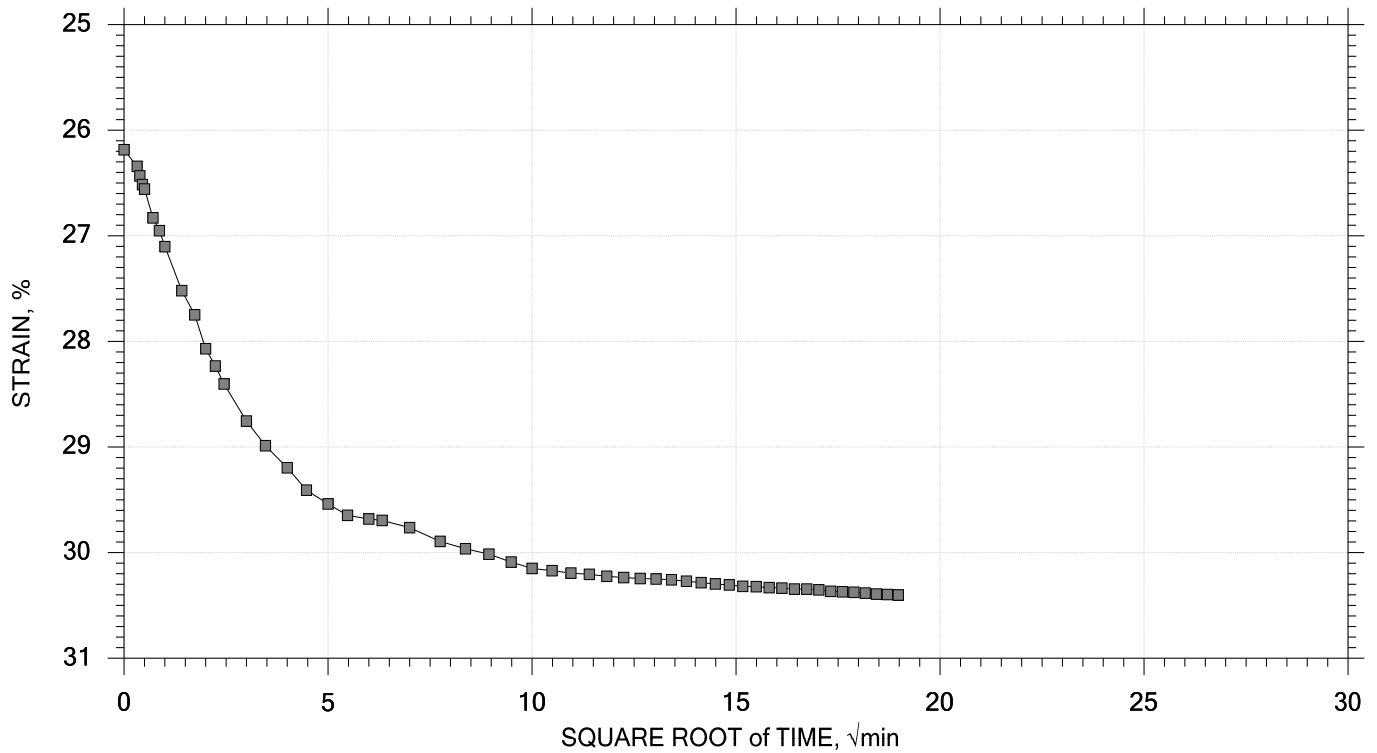
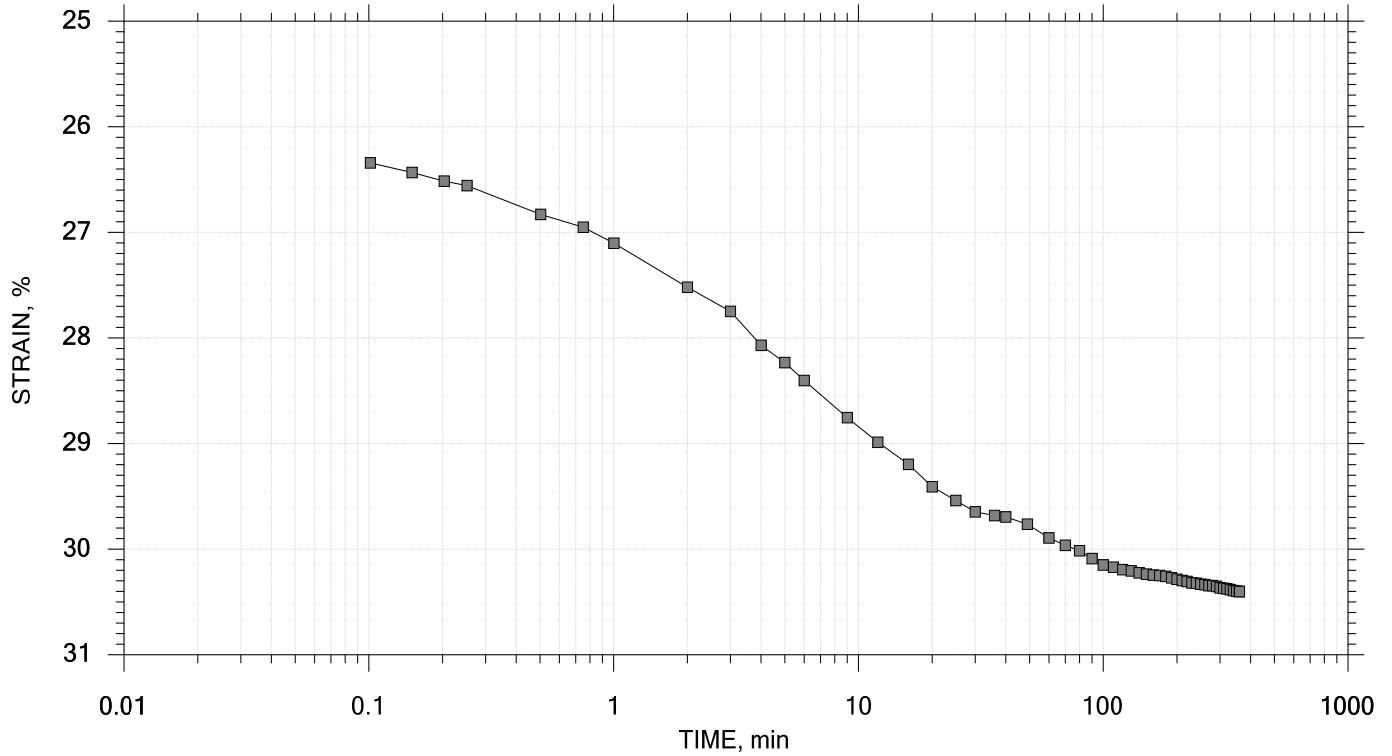
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 189 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

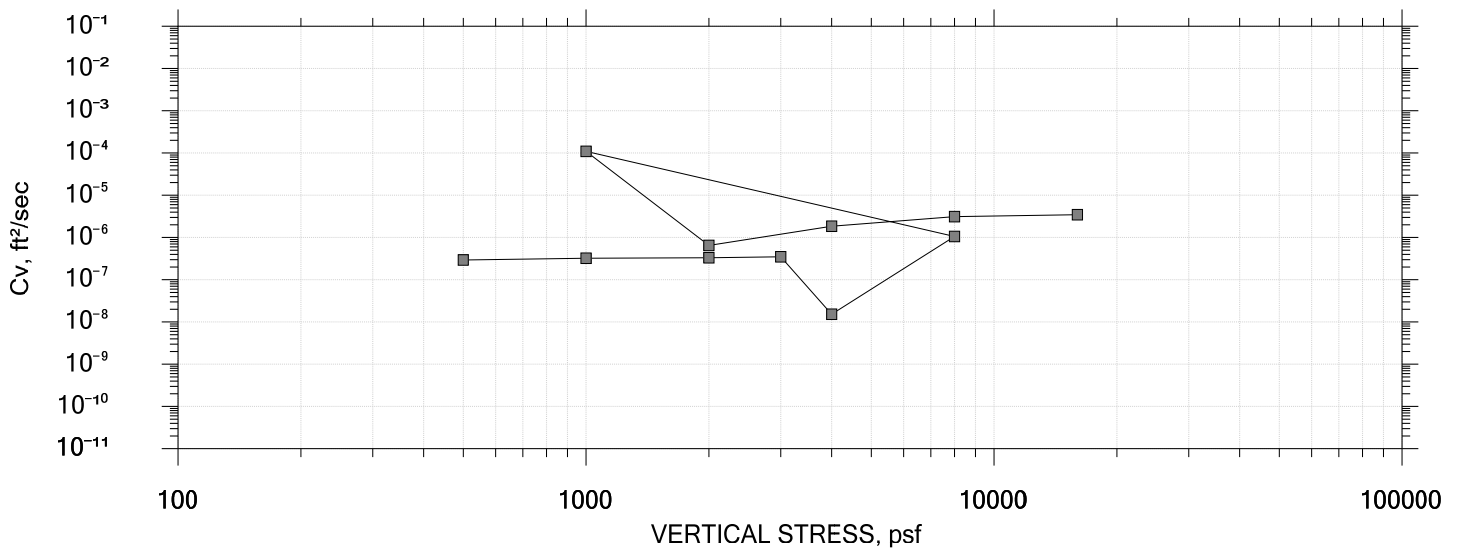
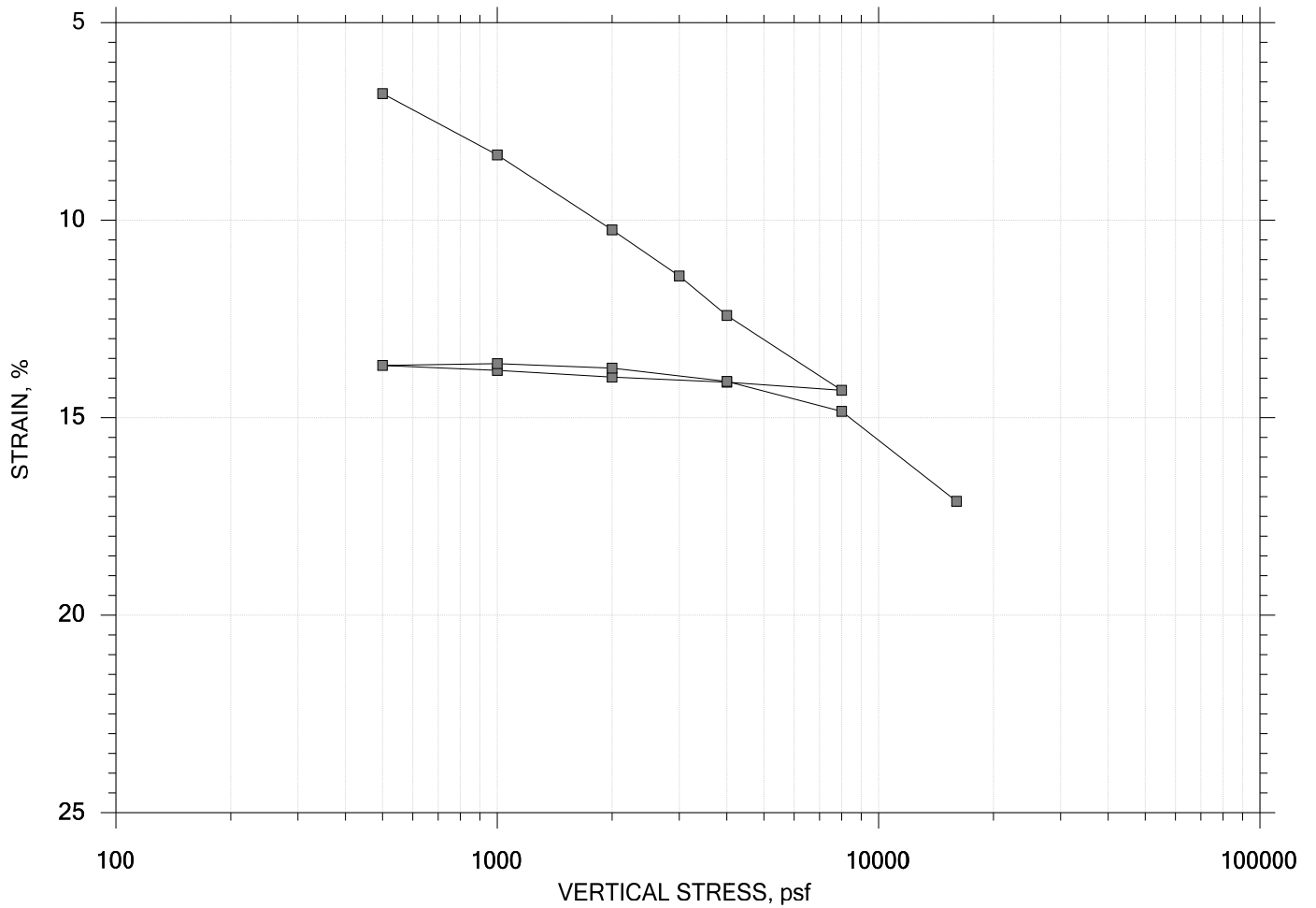
Stress: 16000 psf




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-205	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 07/31/18	Test No.: IP-3
	Depth: 35-37 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System Y		
	Page 190 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

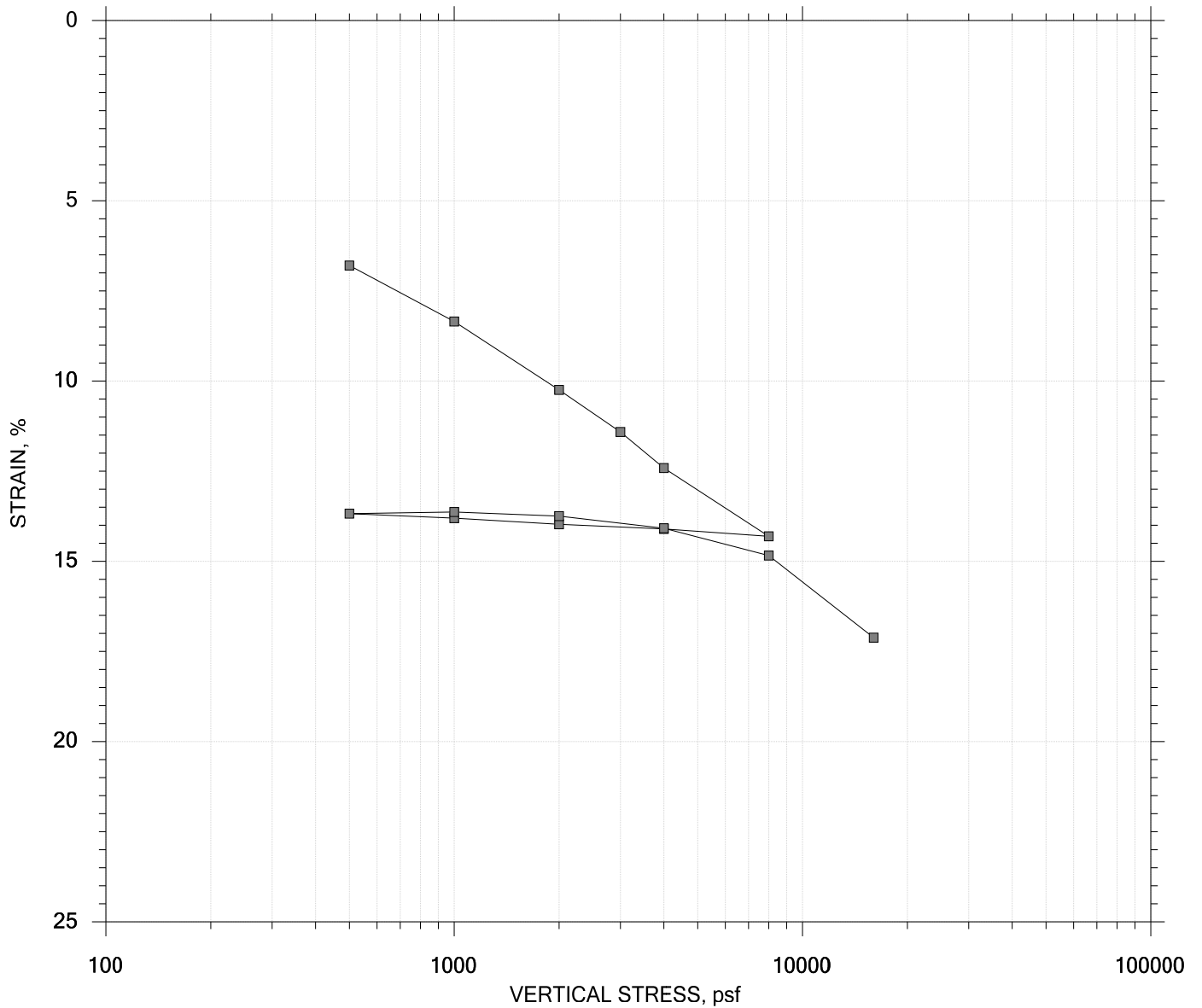
## SUMMARY REPORT



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

## SUMMARY REPORT



				Before Test	After Test	
Current Vertical Effective Stress: ---				Water Content, %	34.88	21.81
Preconsolidation Stress: ---				Dry Unit Weight, pcf	86.787	107.14
Compression Ratio: ---				Saturation, %	98.30	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.97	0.60
LL: 31	PL: 19	PI: 12	GS: 2.74			

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-211		Tested By: md		Checked By: njh	
	Sample No.: U1		Test Date: 07/31/18		Test No.: IP-4	
	Depth: 37-39 ft		Sample Type: intact		Elevation: ---	
	Description: Wet, dark gray clay					
	Remarks: System V					
	Displacement at End of Increment				Page 192 of 301	



One-Dimensional Consolidation by ASTM D2435 - Method B

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-211  
 Sample No.: U1  
 Test No.: IP-4

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/31/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 37-39 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System V

Estimated Specific Gravity: 2.74  
 Initial Void Ratio: 0.973  
 Final Void Ratio: 0.598

Liquid Limit: 31  
 Plastic Limit: 19  
 Plasticity Index: 12

Specimen Diameter: 2.50 in  
 Initial Height: 1.00 in  
 Final Height: 0.81 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-2433	RING		D-1776
Wt. Container + Wet Soil, gm	191.15	259.80	245.19	145.25
Wt. Container + Dry Soil, gm	141.14	220.80	220.80	120.75
Wt. Container, gm	8.1300	108.97	108.97	8.4300
Wt. Dry Soil, gm	133.01	111.83	111.83	112.32
Water Content, %	37.60	34.88	21.81	21.81
Void Ratio	---	0.973	0.598	---
Degree of Saturation, %	---	98.30	100.00	---
Dry Unit Weight, pcf	---	86.787	107.14	---

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.

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-211  
 Sample No.: U1  
 Test No.: IP-4

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 07/31/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 37-39 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System V

Displacement at End of Increment

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day
1	500.	0.06794	0.839	6.79	47.191	4.85e-007	1.36e-004	3.56e-004
2	1.00e+003	0.08346	0.809	8.35	73.140	2.87e-007	3.10e-005	4.80e-005
3	2.00e+003	0.1024	0.771	10.2	82.245	2.45e-007	1.90e-005	2.51e-005
4	3.00e+003	0.1141	0.748	11.4	115.384	1.69e-007	1.17e-005	1.06e-005
5	4.00e+003	0.1241	0.728	12.4	5362.690	3.55e-009	1.00e-005	1.92e-007
6	8.00e+003	0.1431	0.691	14.3	21.314	8.64e-007	4.73e-006	2.21e-005
7	4.00e+003	0.1410	0.695	14.1	12.000	1.51e-006	5.11e-007	4.15e-006
8	2.00e+003	0.1397	0.698	14.0	13.996	1.30e-006	6.48e-007	4.53e-006
9	1.00e+003	0.1380	0.701	13.8	36.001	5.05e-007	1.70e-006	4.63e-006
10	500.	0.1368	0.703	13.7	49.004	3.73e-007	2.53e-006	5.09e-006
11	1.00e+003	0.1363	0.704	13.6	0.049	3.73e-004	-8.59e-007	-1.73e-003
12	2.00e+003	0.1374	0.702	13.7	22.298	8.20e-007	1.12e-006	4.93e-006
13	4.00e+003	0.1408	0.695	14.1	11.550	1.57e-006	1.70e-006	1.44e-005
14	8.00e+003	0.1484	0.680	14.8	6.224	2.88e-006	1.89e-006	2.94e-005
15	1.60e+004	0.1711	0.636	17.1	6.073	2.85e-006	2.84e-006	4.37e-005

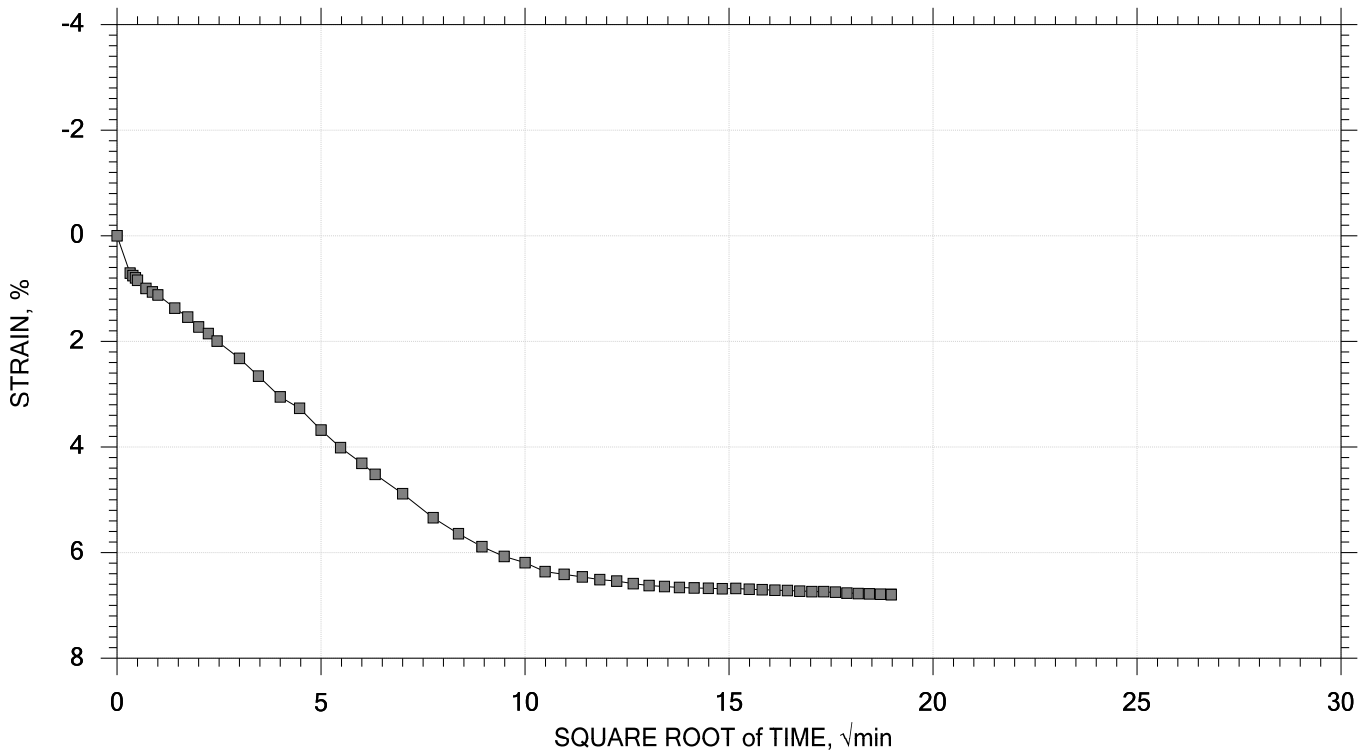
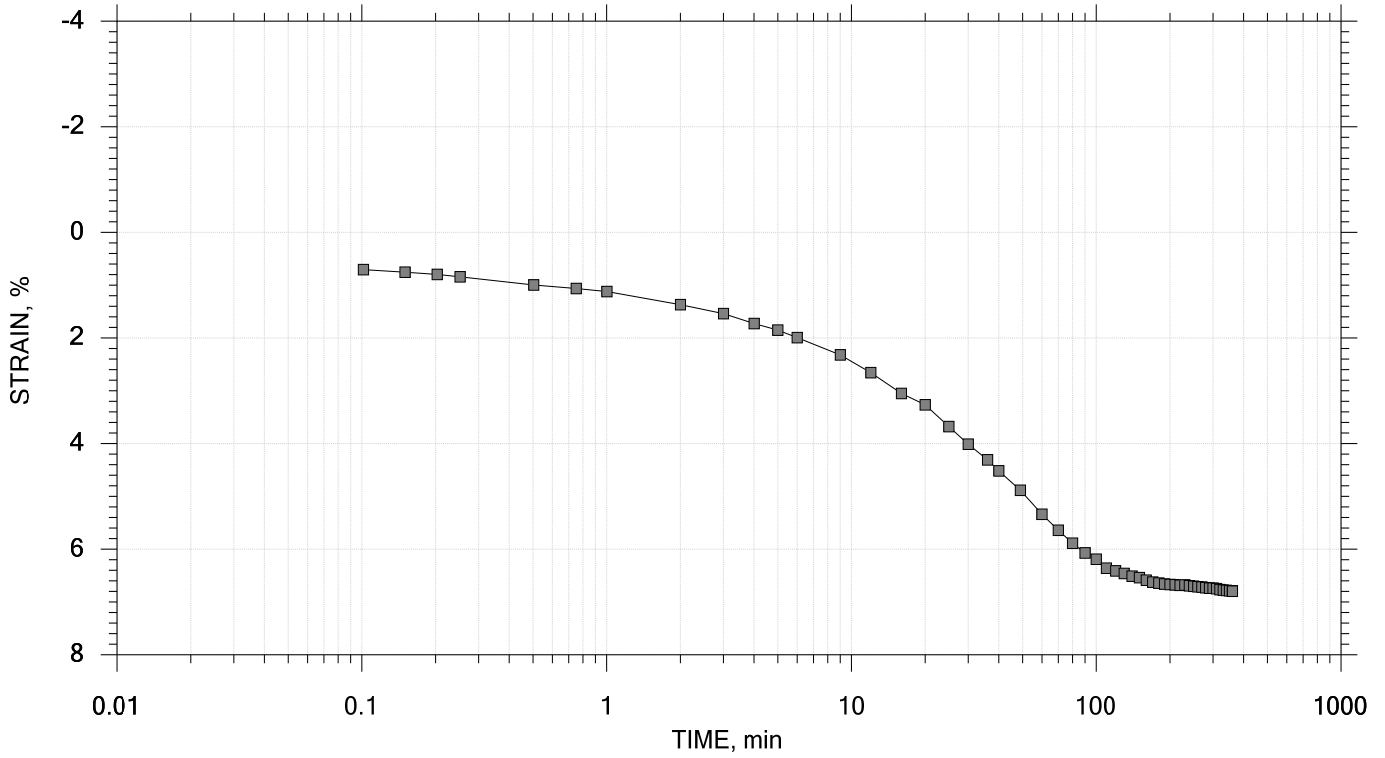
	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day	Ca %
1	500.	0.06794	0.839	6.79	22.561	2.36e-007	1.36e-004	1.73e-004	0.00e+000
2	1.00e+003	0.08346	0.809	8.35	14.913	3.27e-007	3.10e-005	5.46e-005	0.00e+000
3	2.00e+003	0.1024	0.771	10.2	17.224	2.72e-007	1.90e-005	2.79e-005	0.00e+000
4	3.00e+003	0.1141	0.748	11.4	0.000	0.00e+000	1.17e-005	0.00e+000	0.00e+000
5	4.00e+003	0.1241	0.728	12.4	0.000	0.00e+000	1.00e-005	0.00e+000	0.00e+000
6	8.00e+003	0.1431	0.691	14.3	3.814	1.12e-006	4.73e-006	2.86e-005	0.00e+000
7	4.00e+003	0.1410	0.695	14.1	0.000	0.00e+000	5.11e-007	0.00e+000	0.00e+000
8	2.00e+003	0.1397	0.698	14.0	0.000	0.00e+000	6.48e-007	0.00e+000	0.00e+000
9	1.00e+003	0.1380	0.701	13.8	0.000	0.00e+000	1.70e-006	0.00e+000	0.00e+000
10	500.	0.1368	0.703	13.7	0.000	0.00e+000	2.53e-006	0.00e+000	0.00e+000
11	1.00e+003	0.1363	0.704	13.6	0.000	0.00e+000	-8.59e-007	-0.00e+000	0.00e+000
12	2.00e+003	0.1374	0.702	13.7	0.000	0.00e+000	1.12e-006	0.00e+000	0.00e+000
13	4.00e+003	0.1408	0.695	14.1	2.282	1.85e-006	1.70e-006	1.69e-005	0.00e+000
14	8.00e+003	0.1484	0.680	14.8	0.000	0.00e+000	1.89e-006	0.00e+000	0.00e+000
15	1.60e+004	0.1711	0.636	17.1	1.164	3.46e-006	2.84e-006	5.30e-005	0.00e+000


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 15

Stress: 500 psf



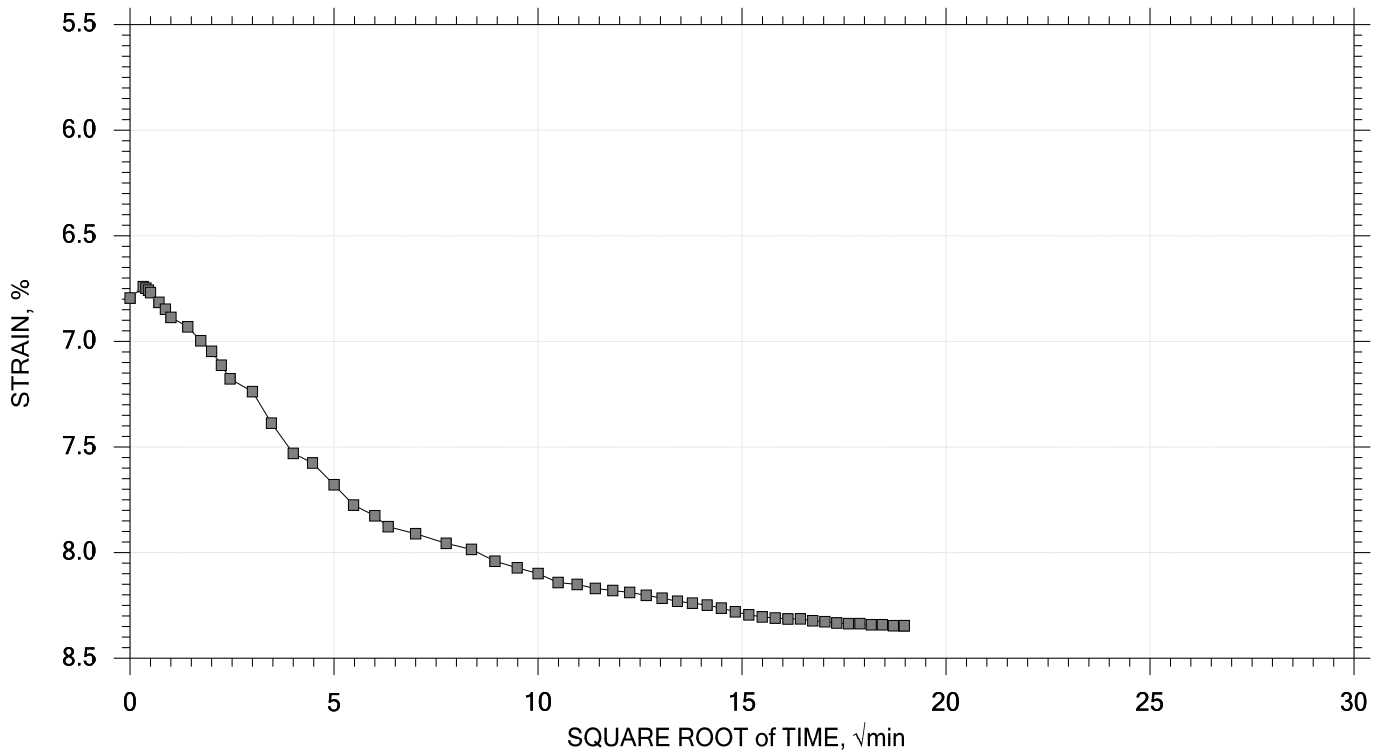
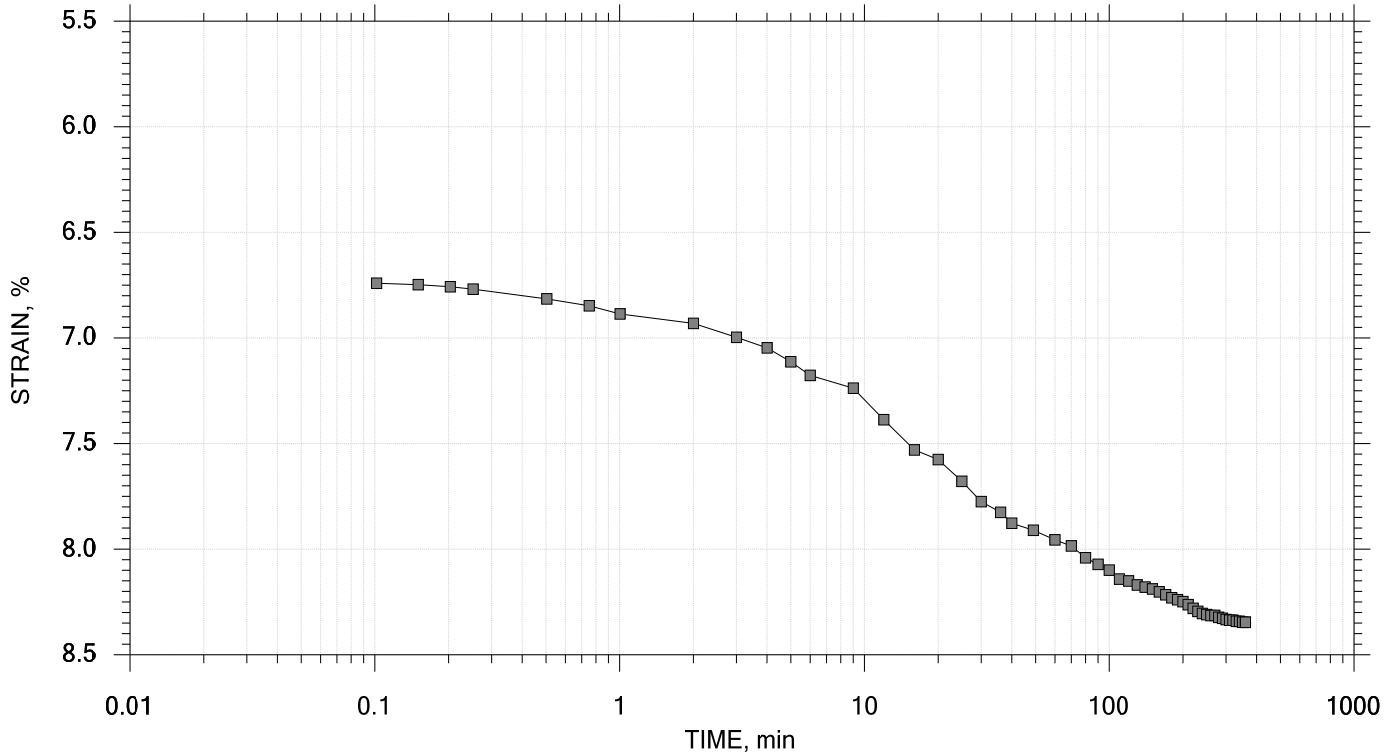
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
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# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 1000 psf



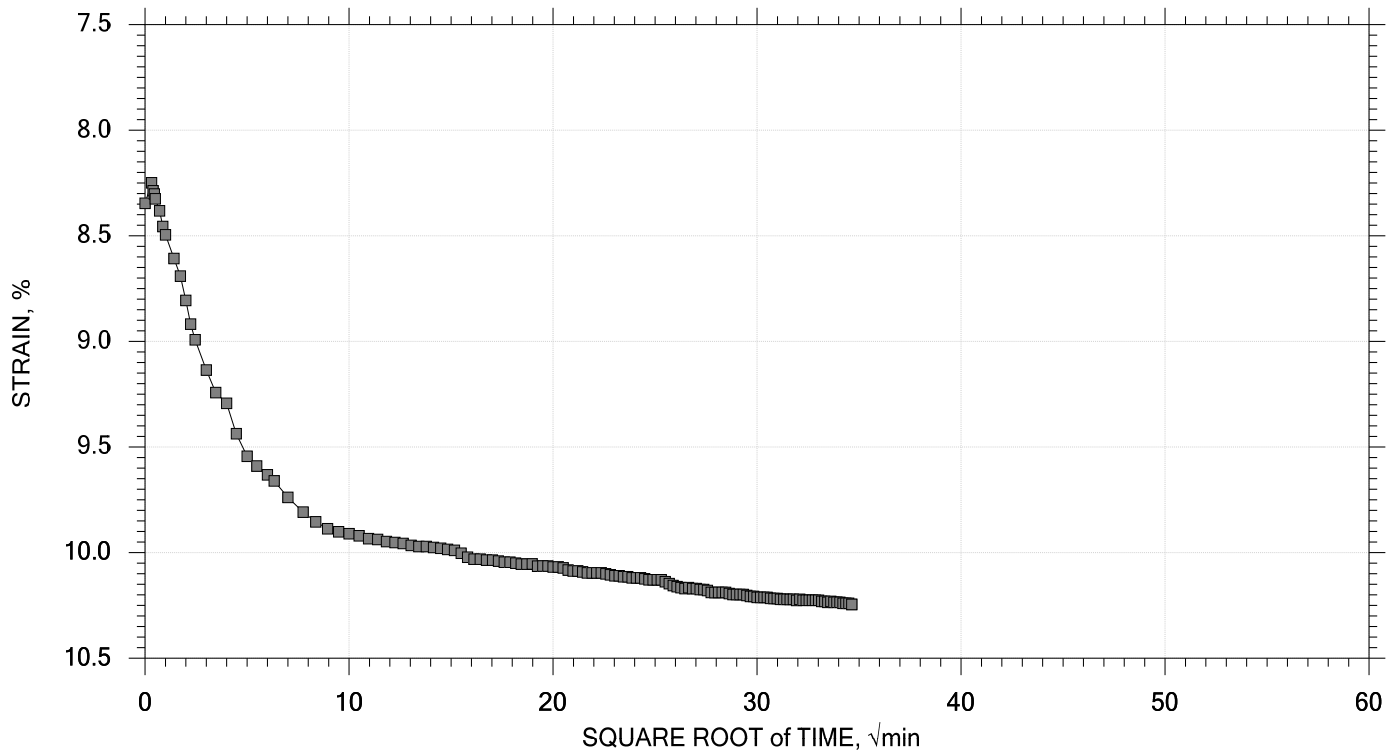
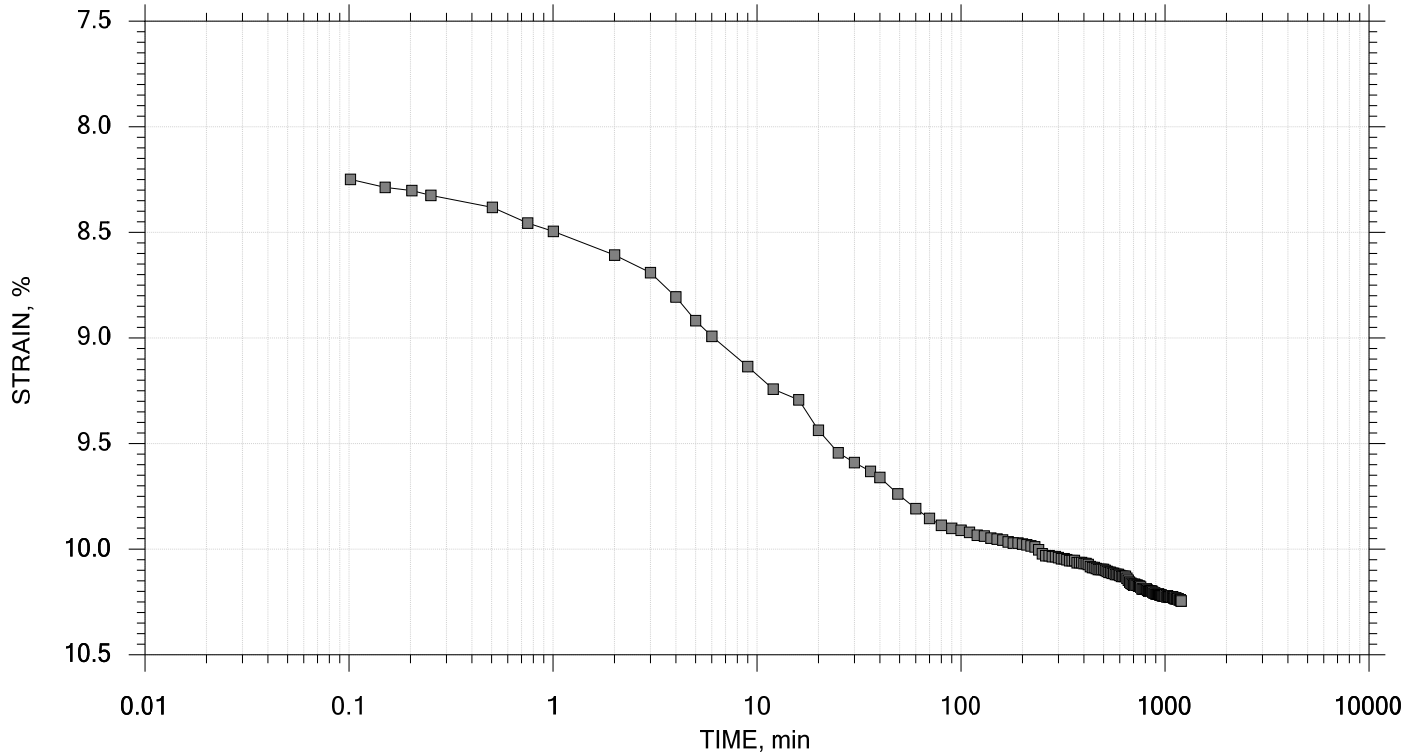
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 196 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 2000 psf



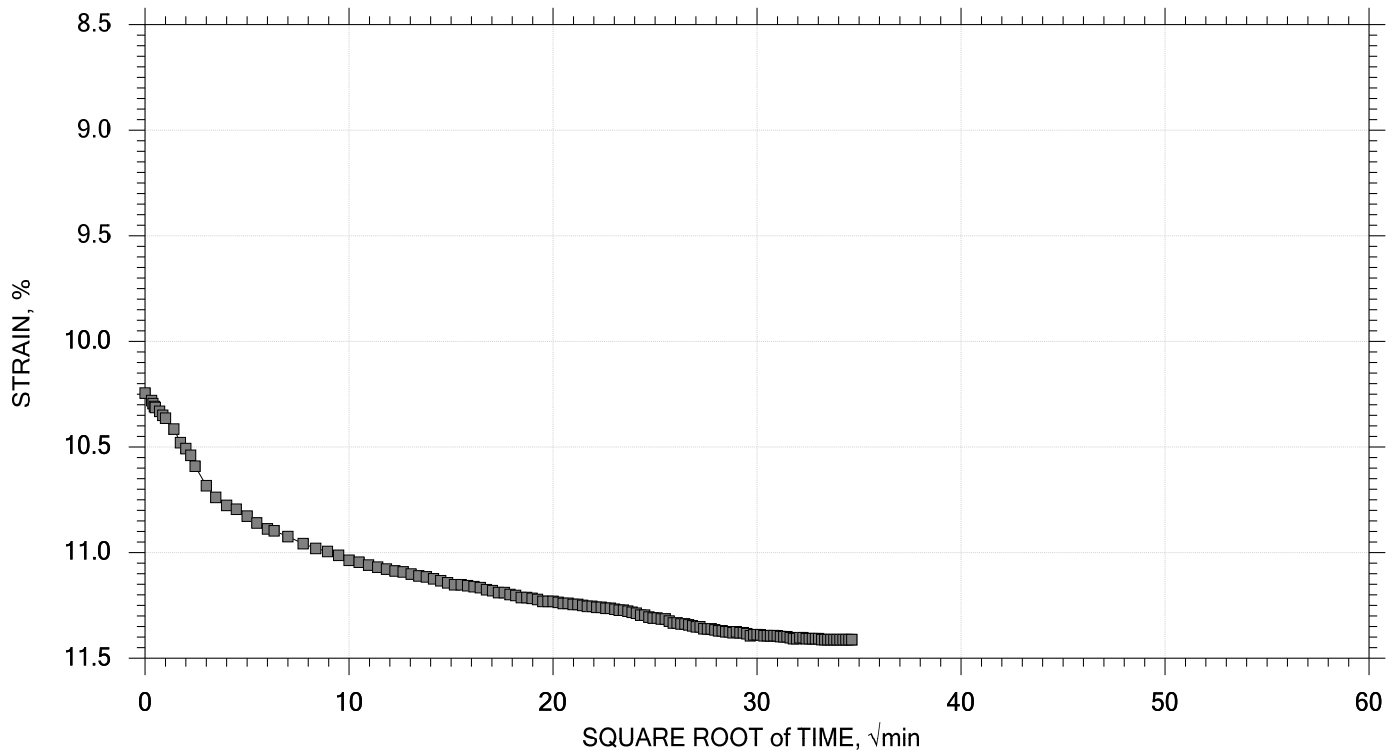
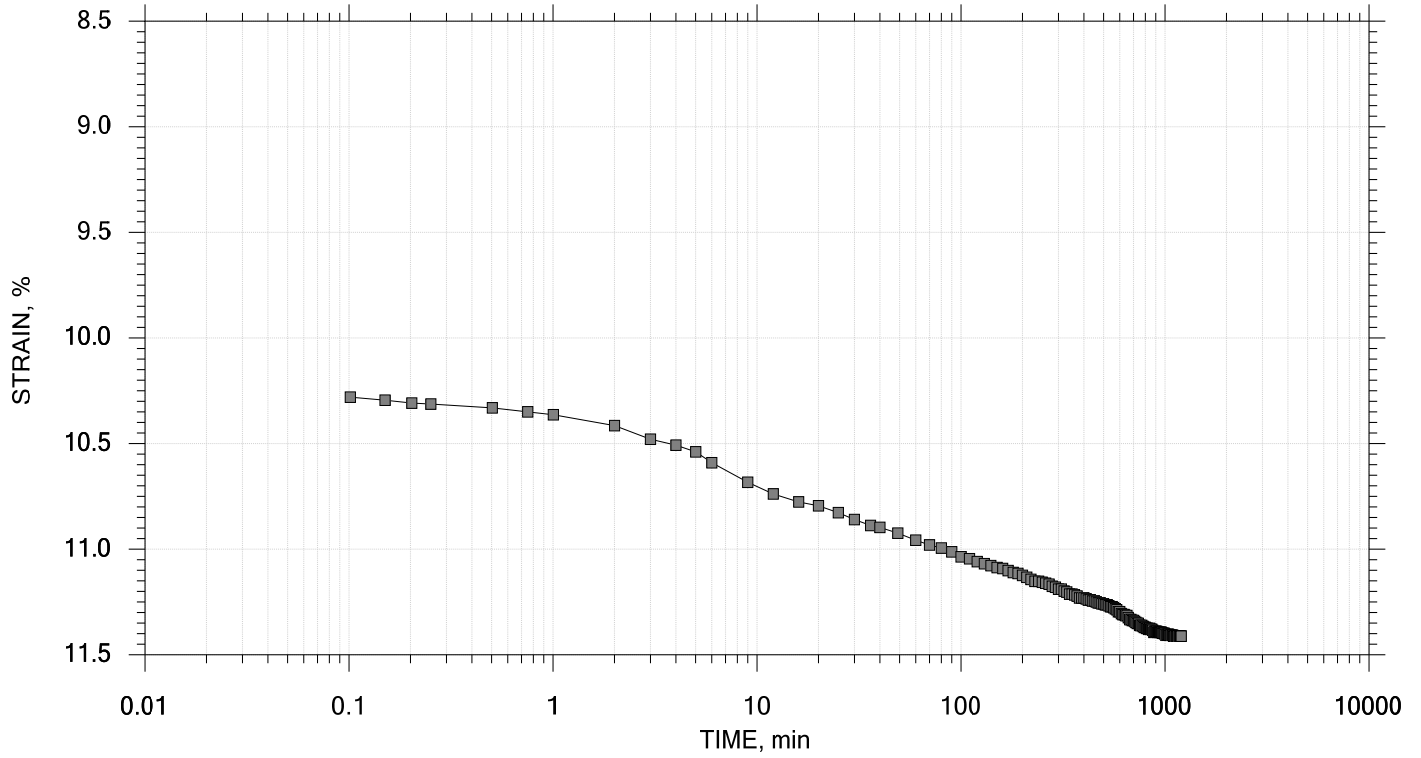
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 197 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 3000 psf



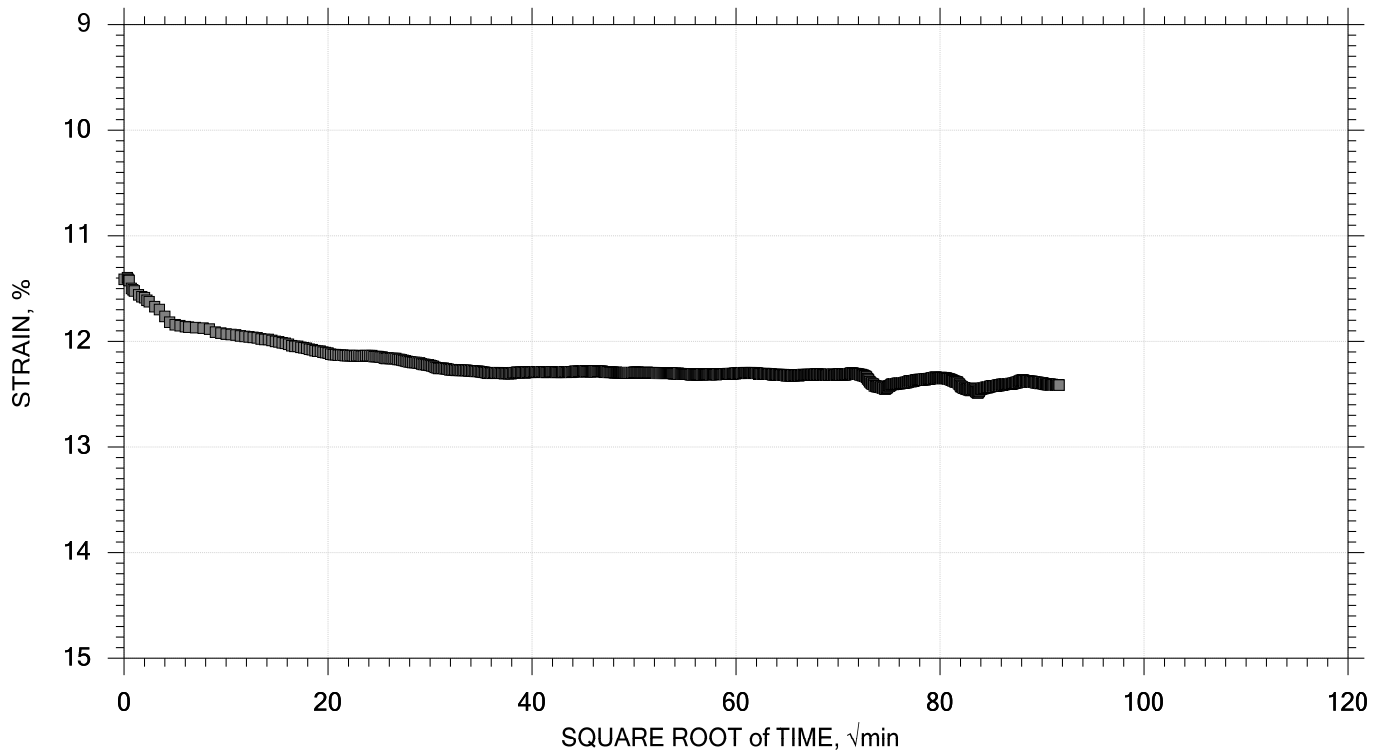
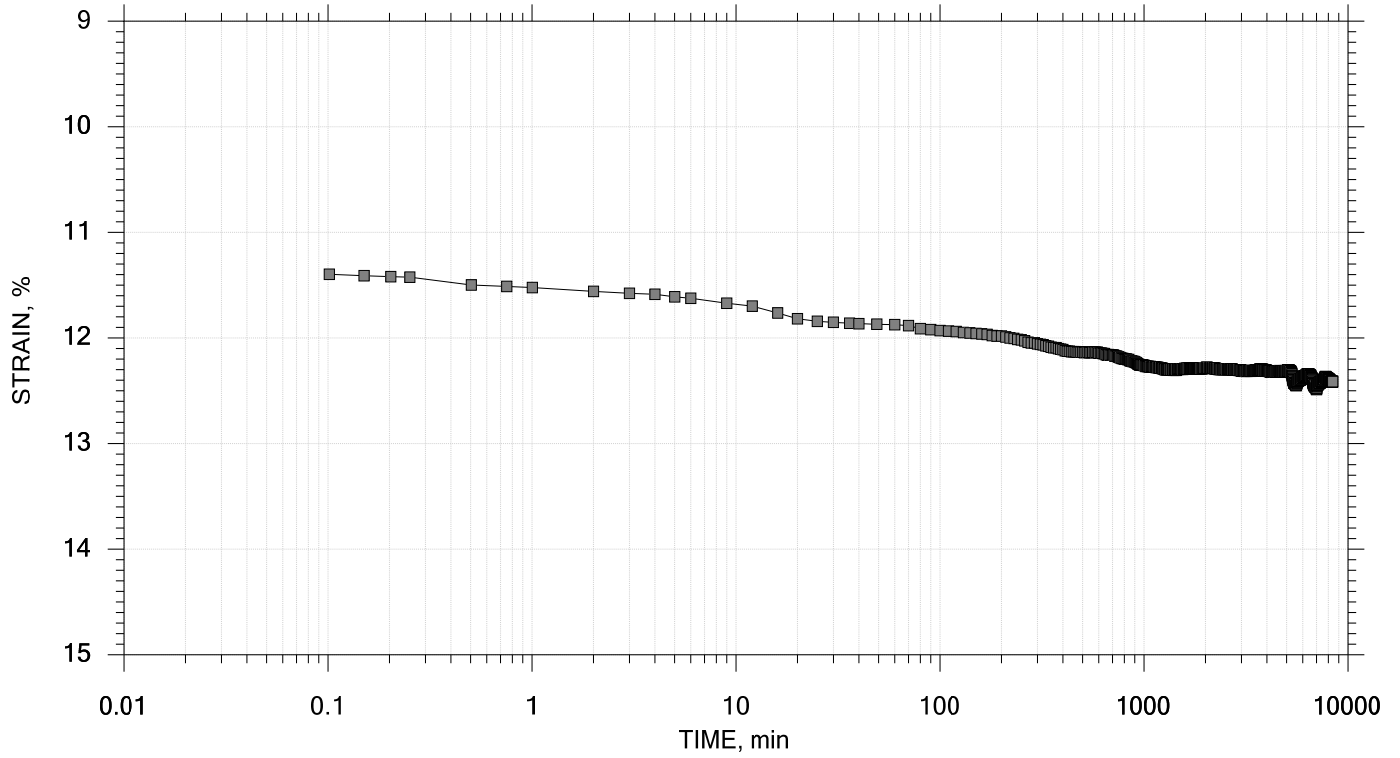
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 198 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 4000 psf



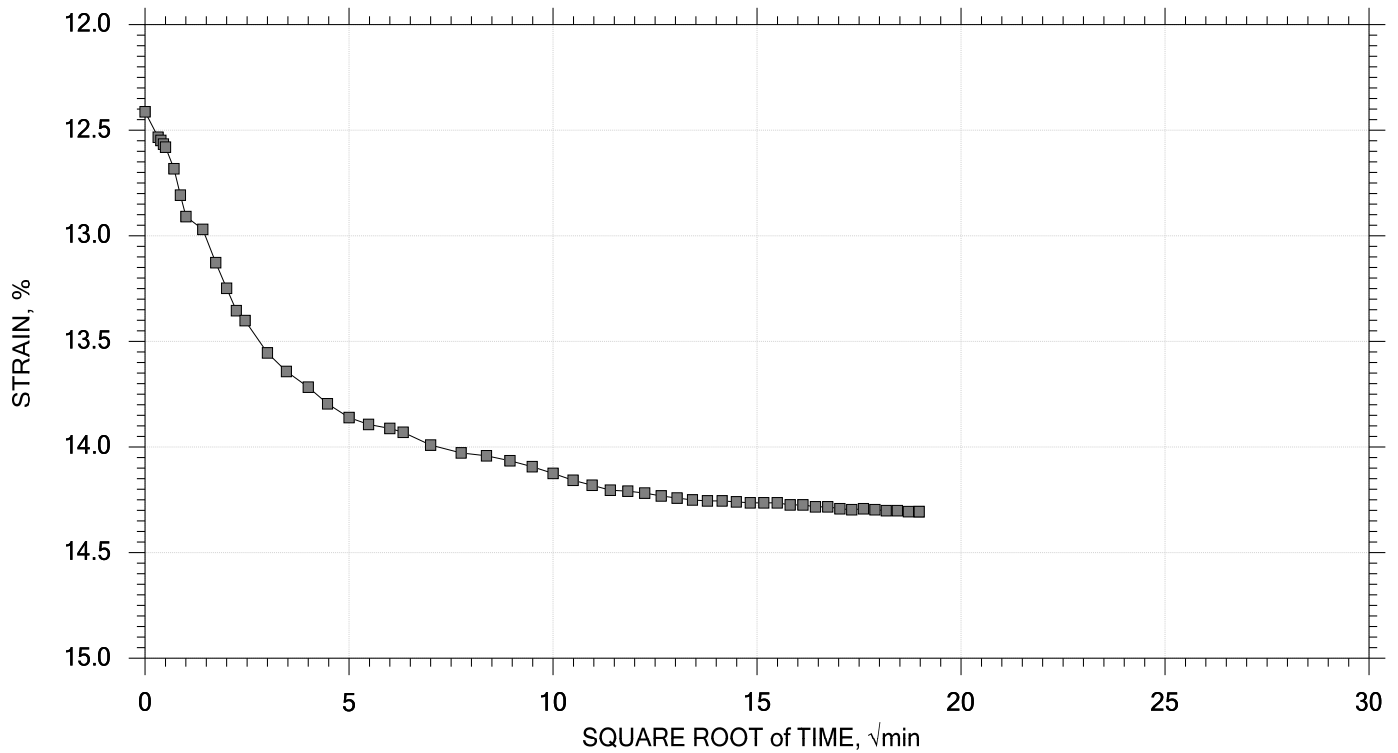
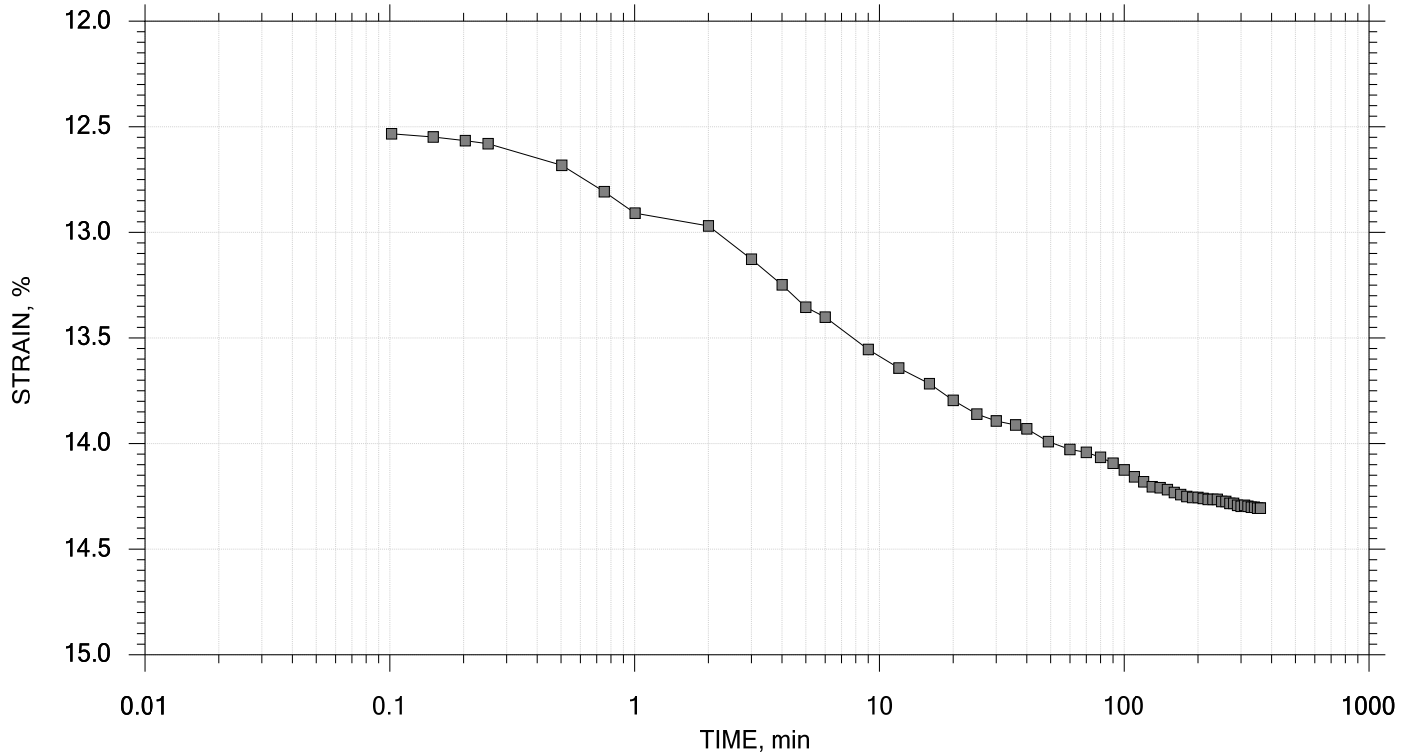
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 199 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 8000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 200 of 301		

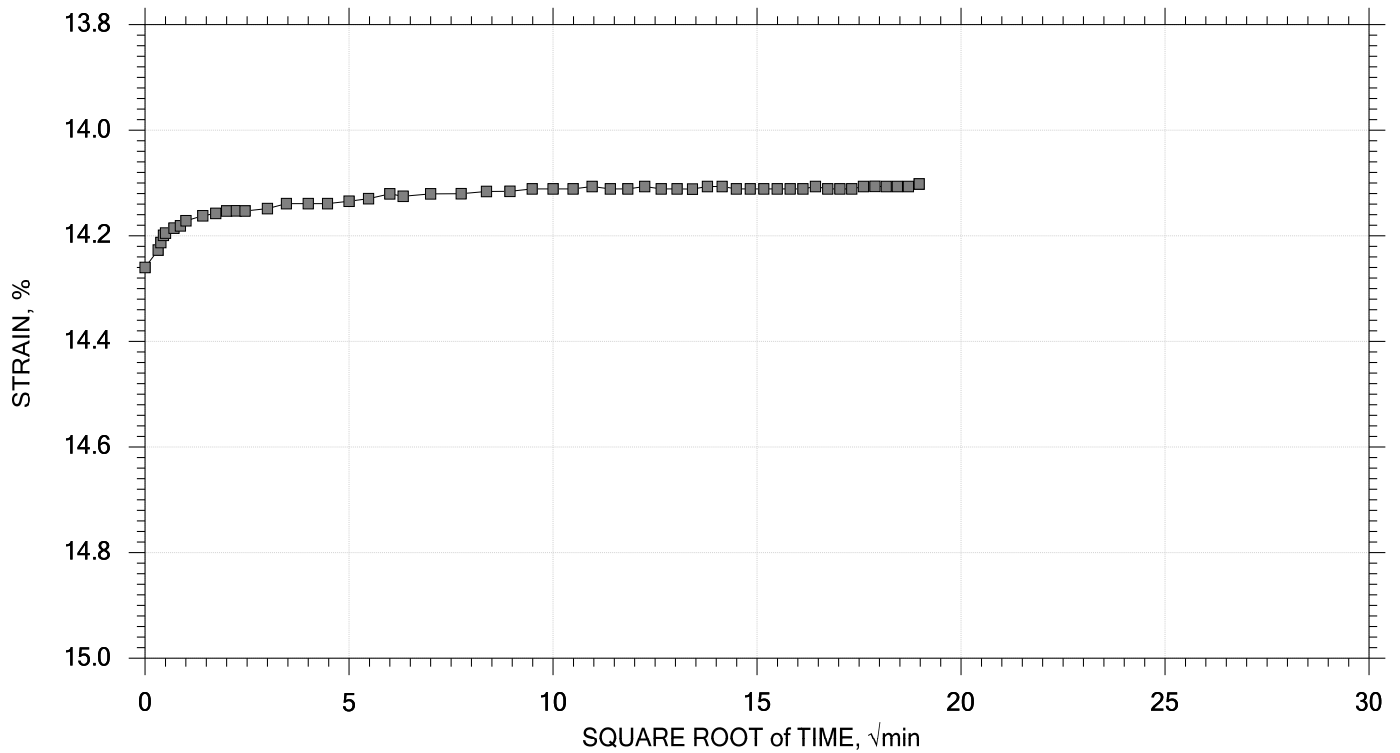
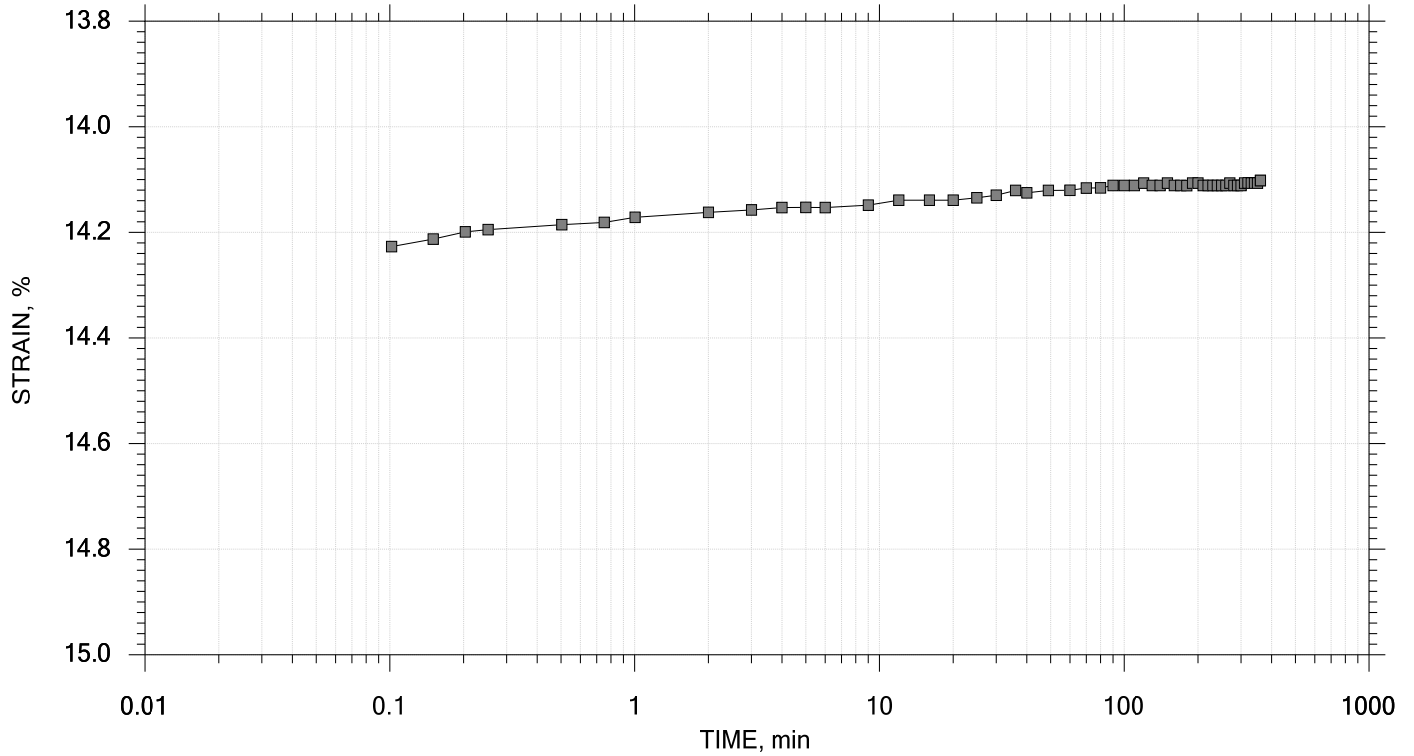



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4000 psf



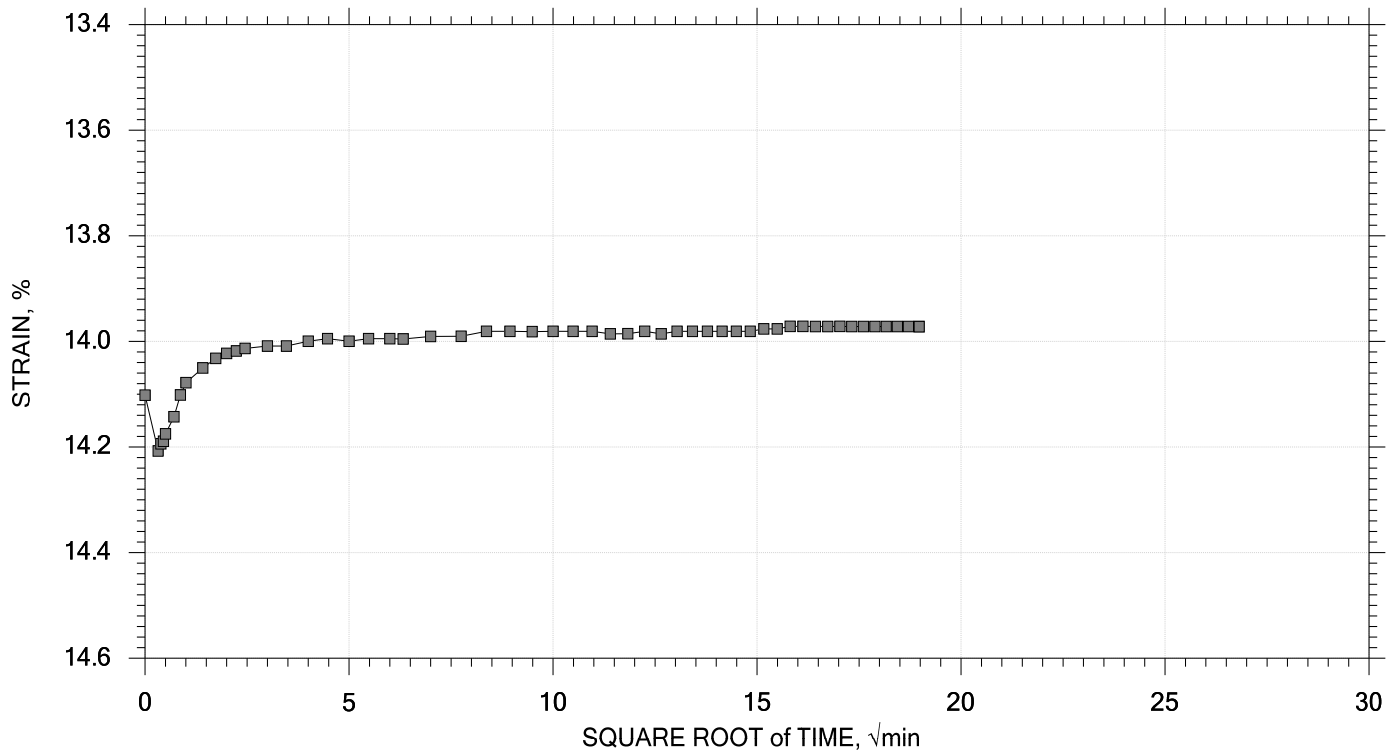
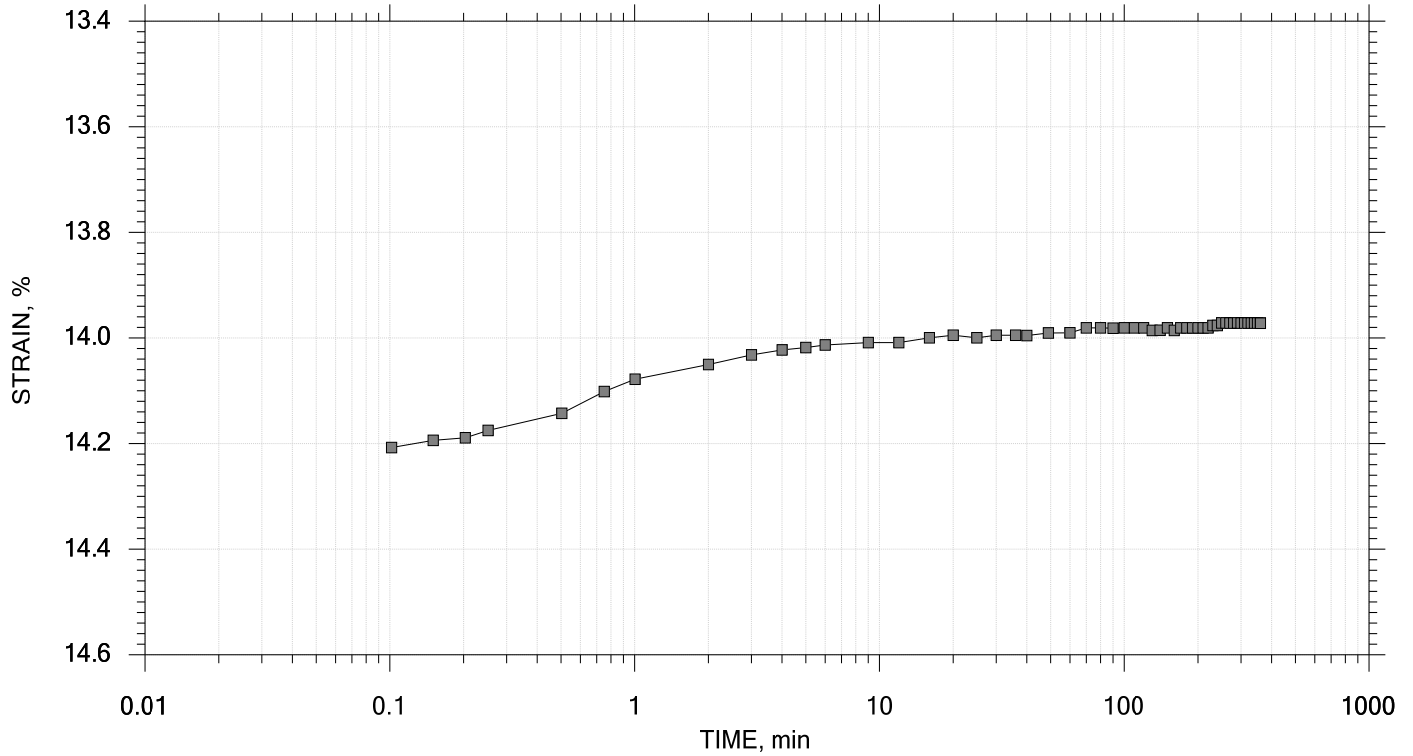
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 201 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 2000 psf



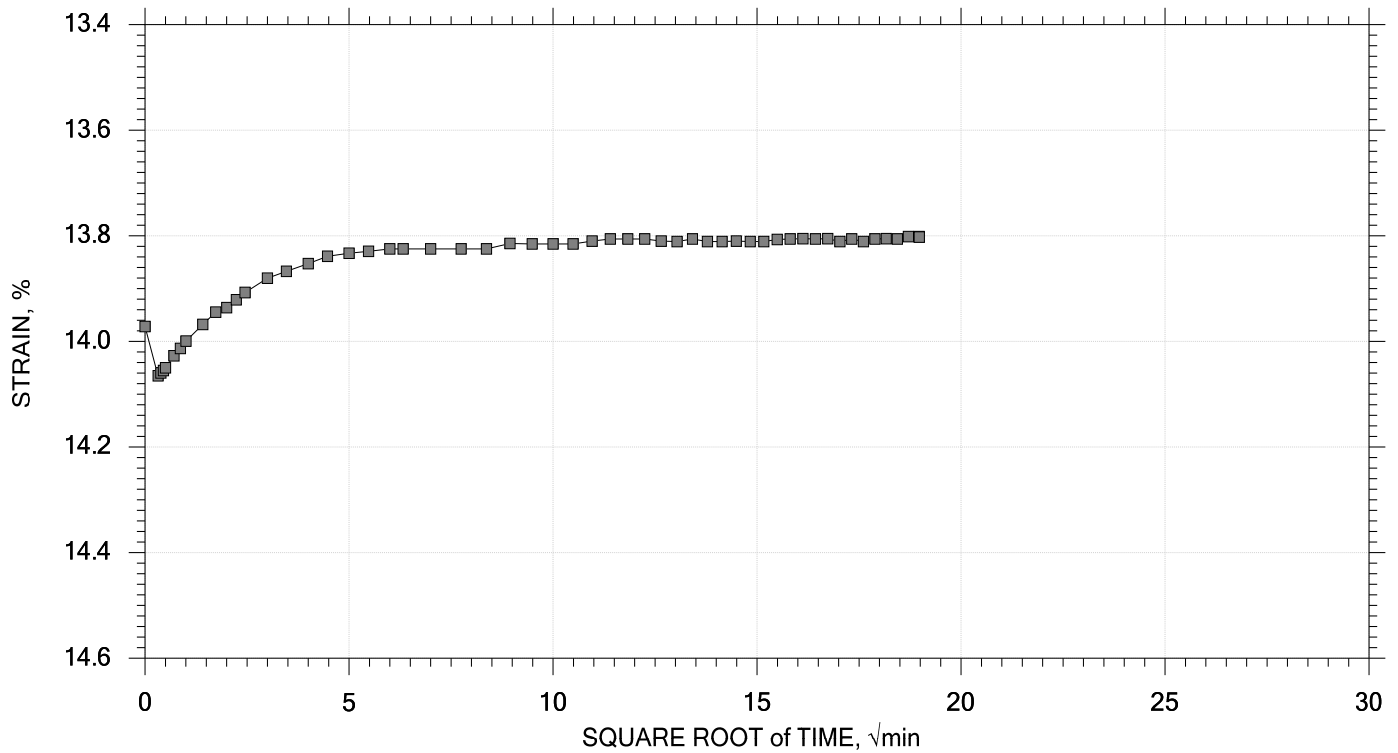
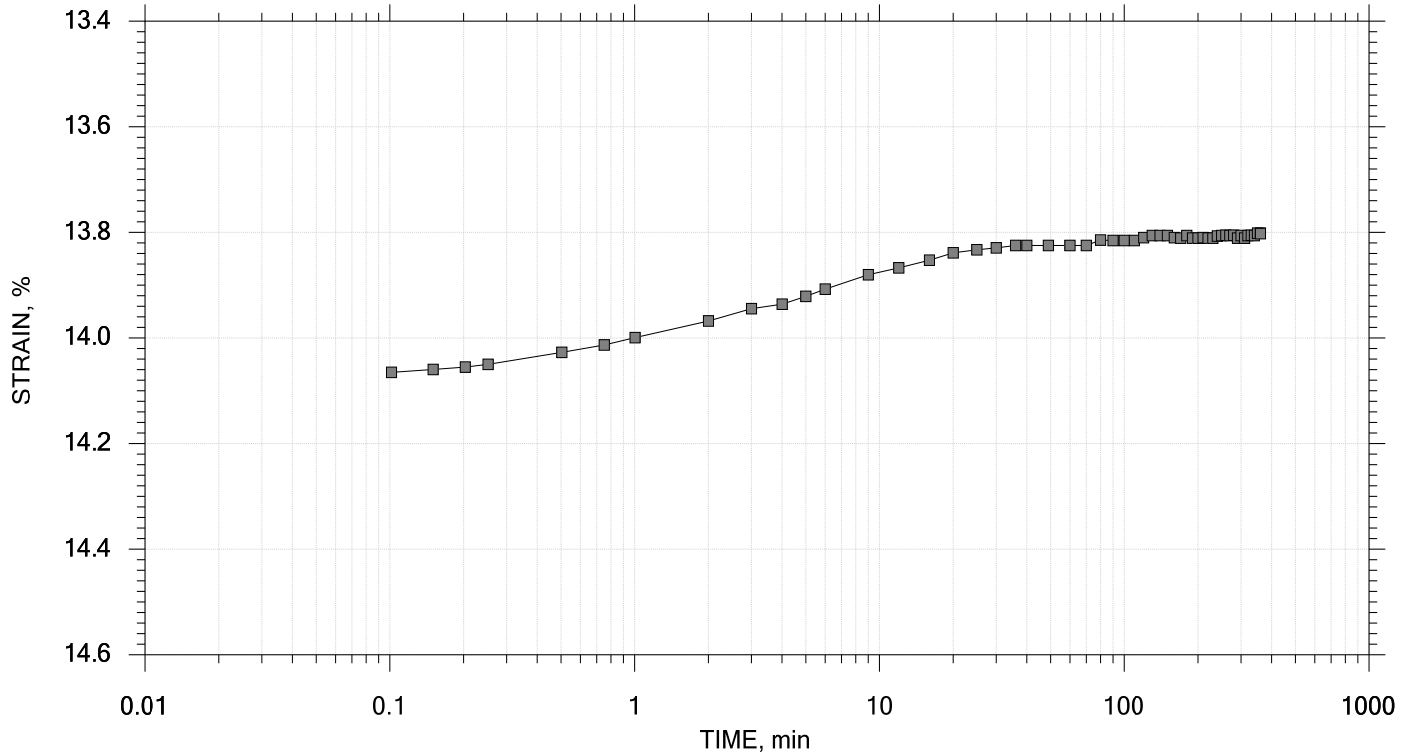
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 202 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 1000 psf



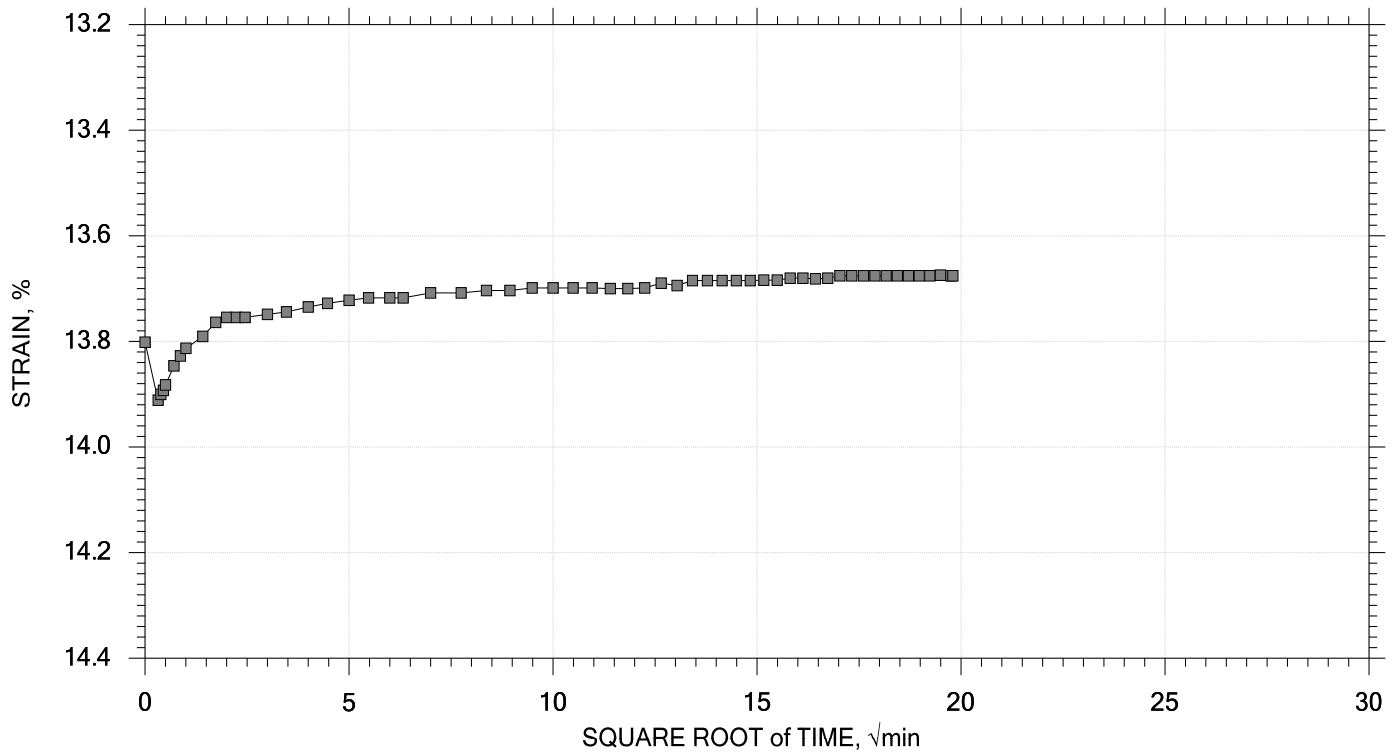
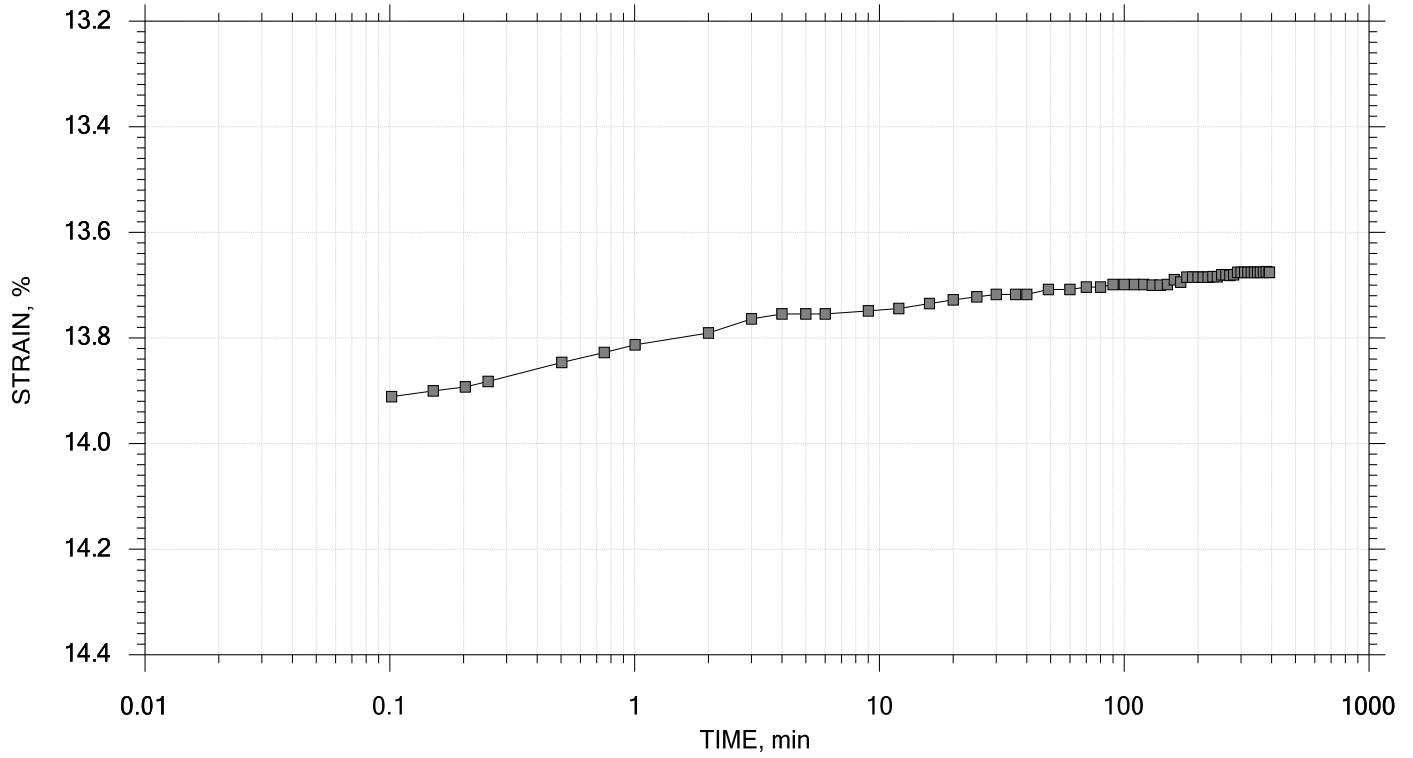
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 203 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

## TIME CURVES

Constant Load Step 10 of 15

Stress: 500 psf



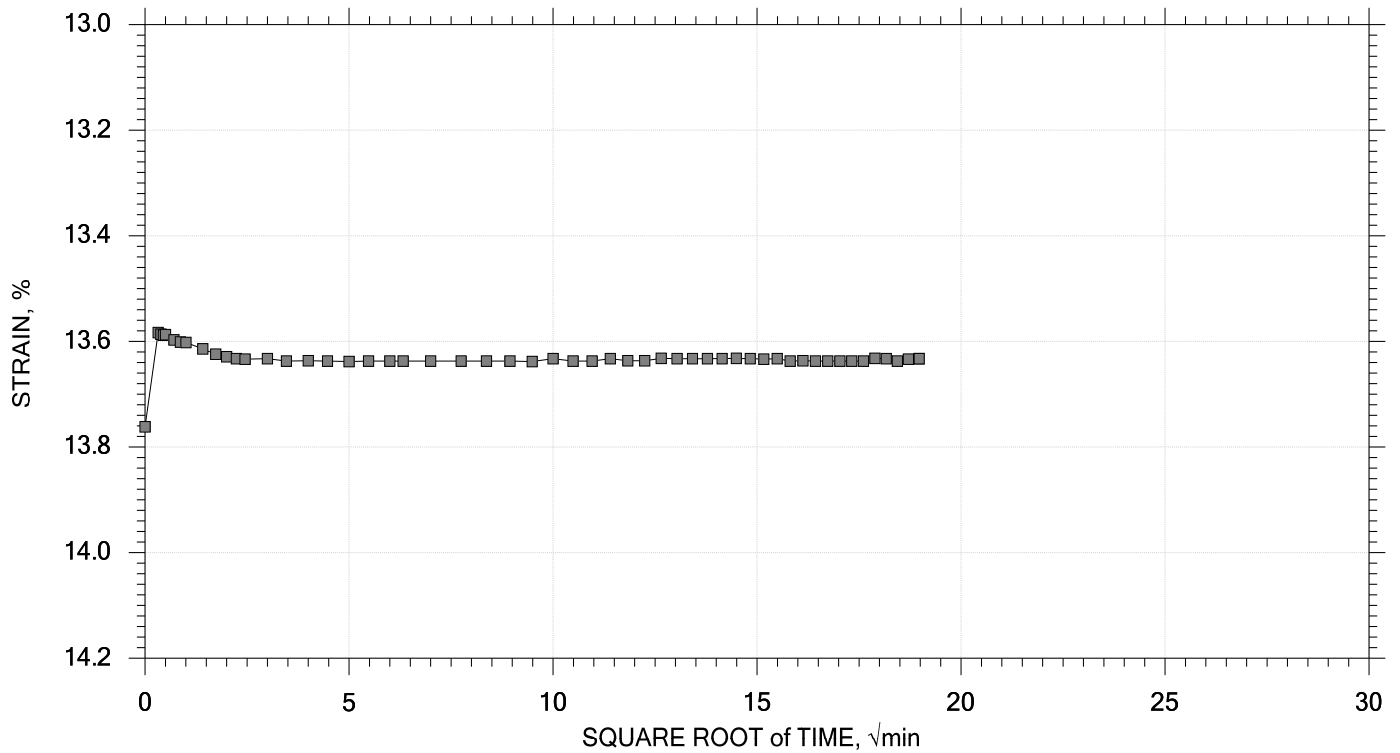
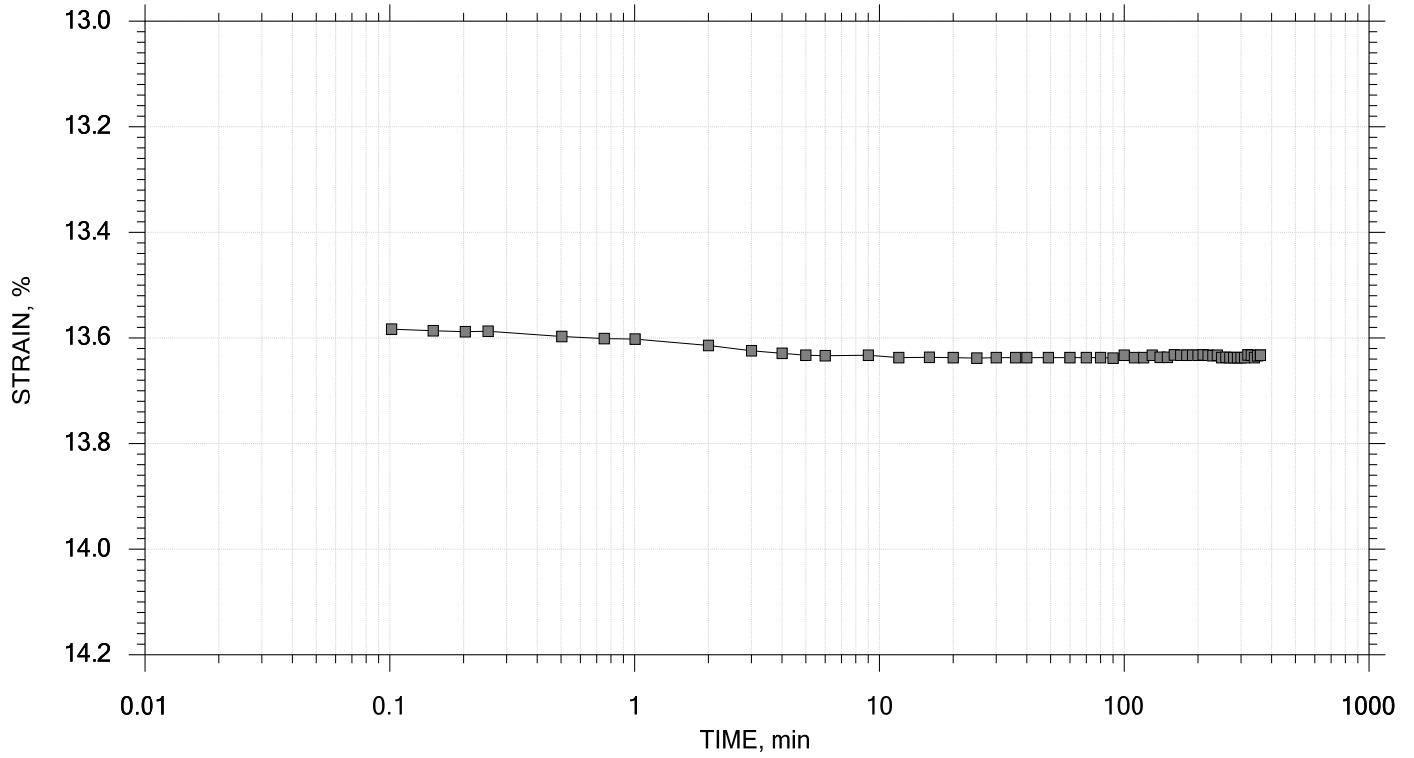
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 204 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 1000 psf



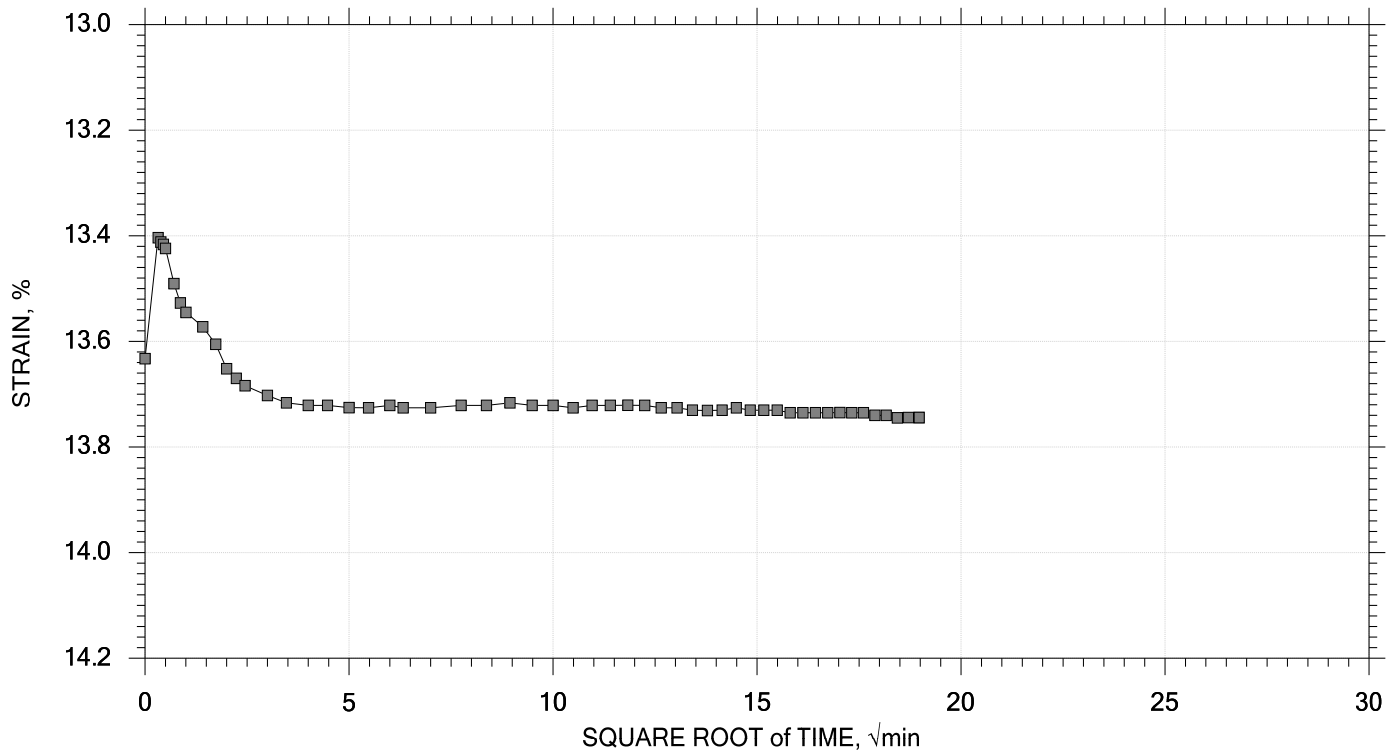
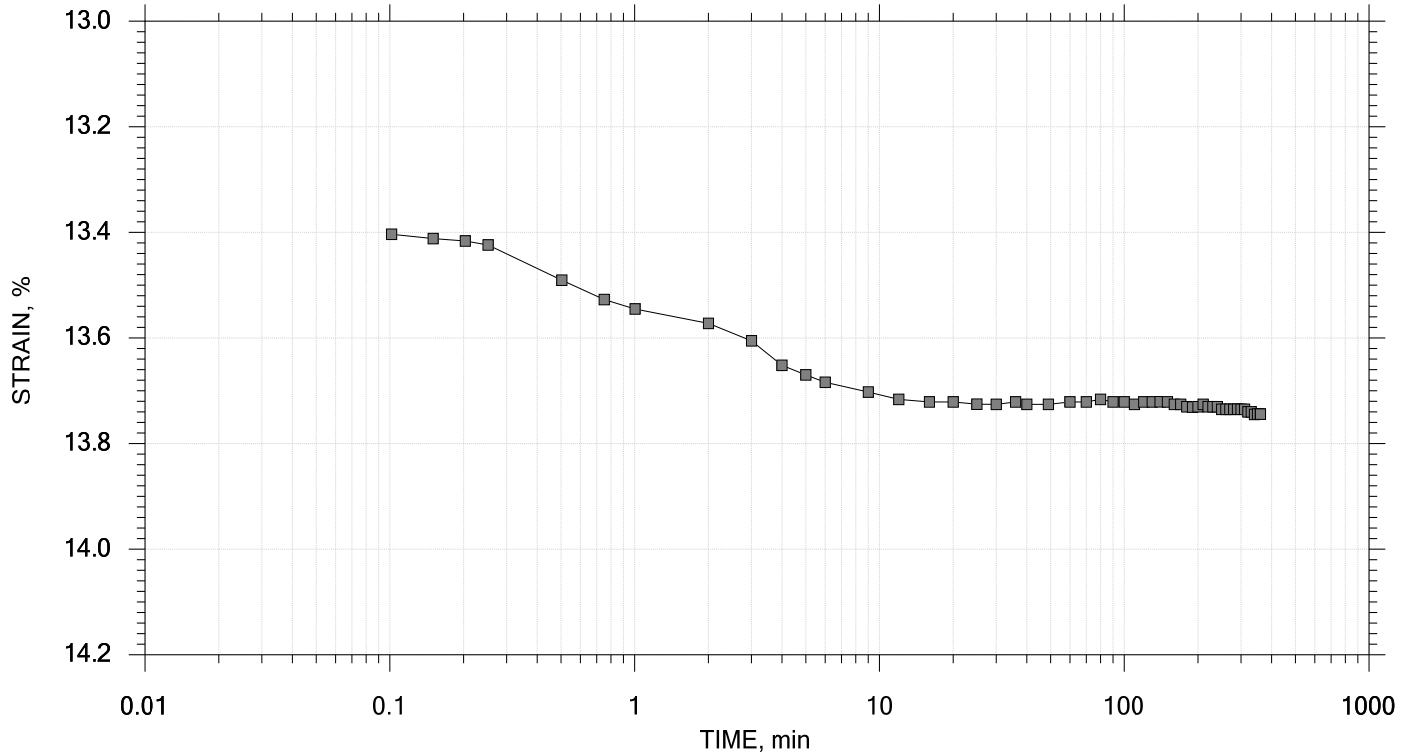
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 205 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2000 psf



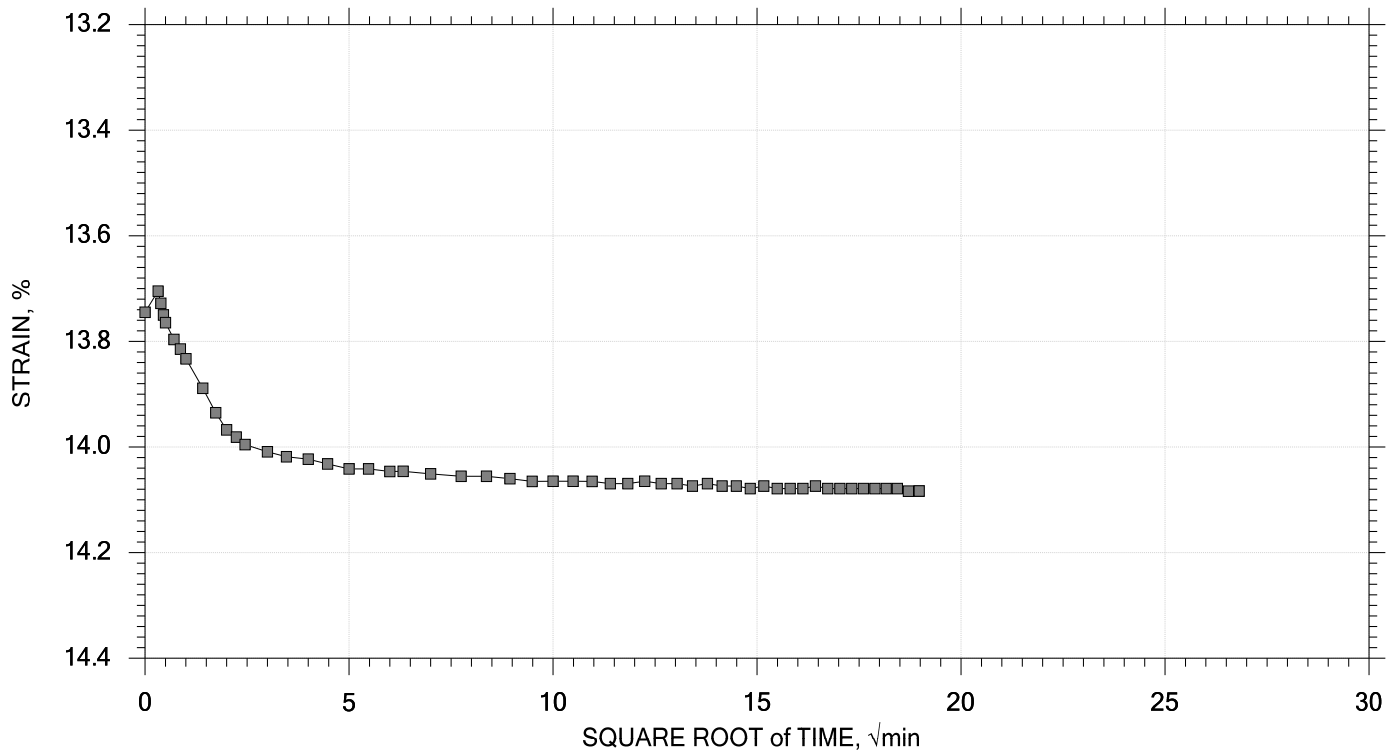
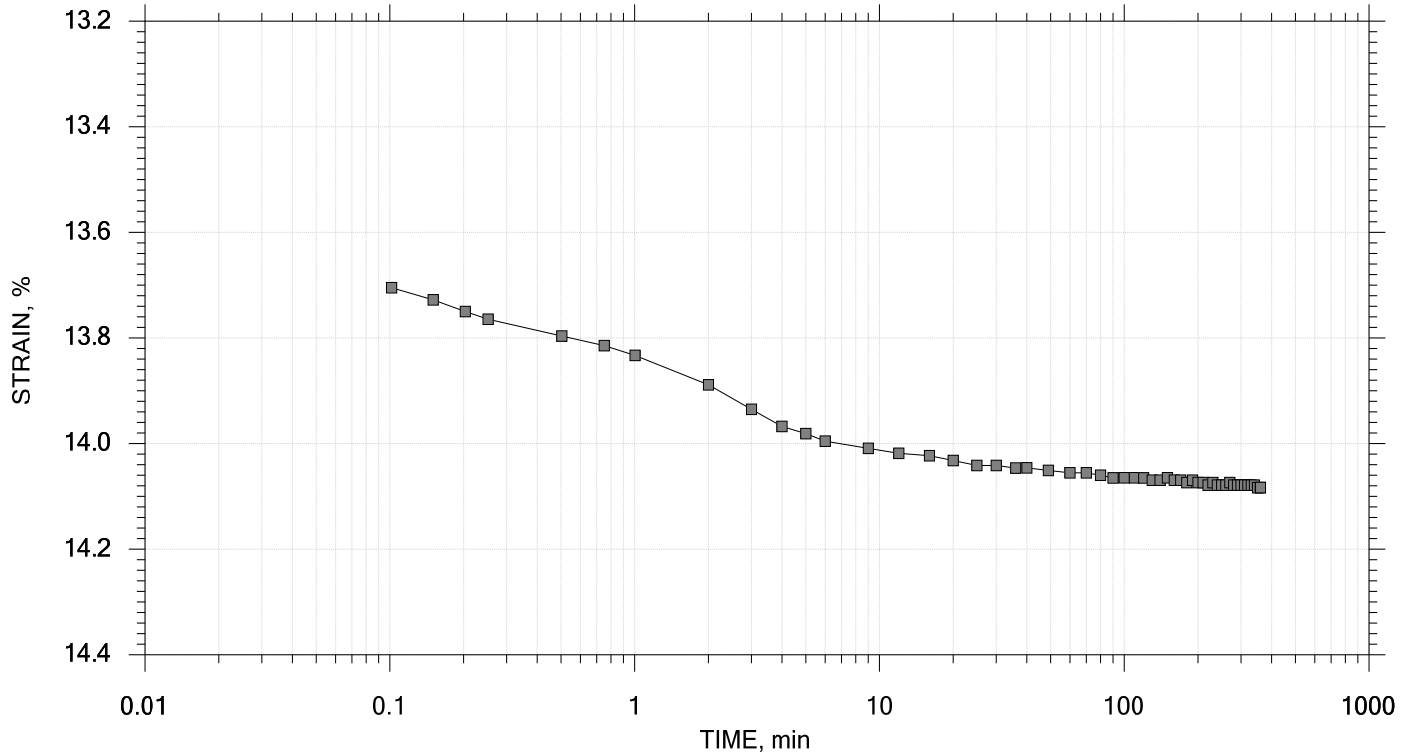
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 206 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 4000 psf



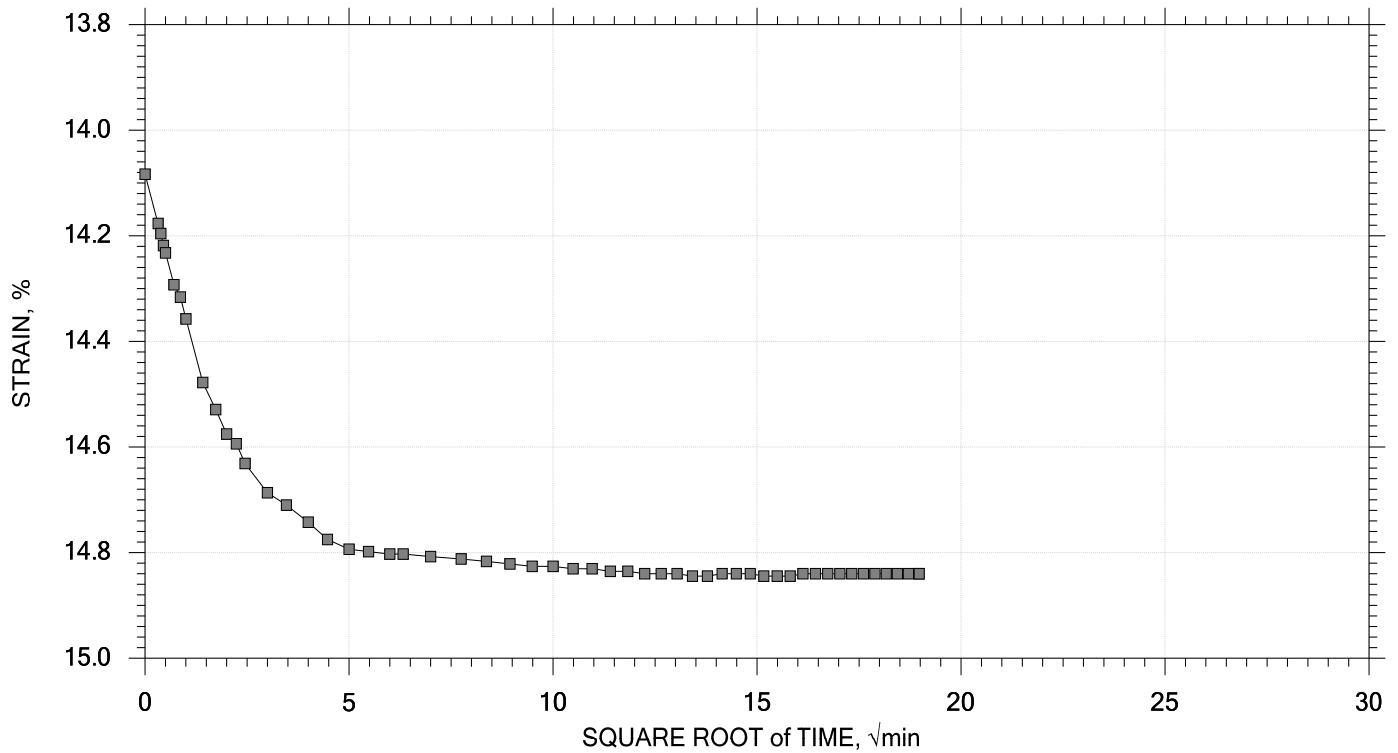
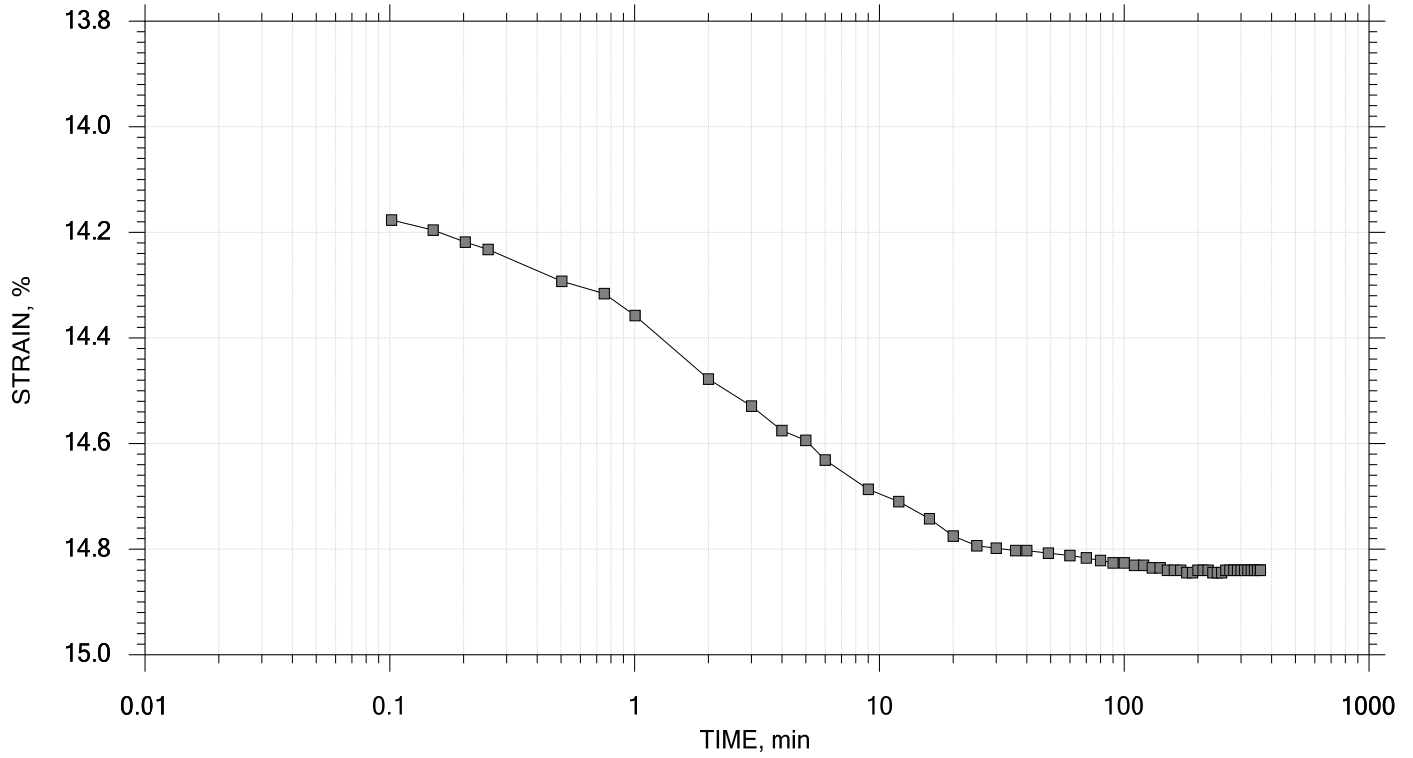
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 207 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 8000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 208 of 301		

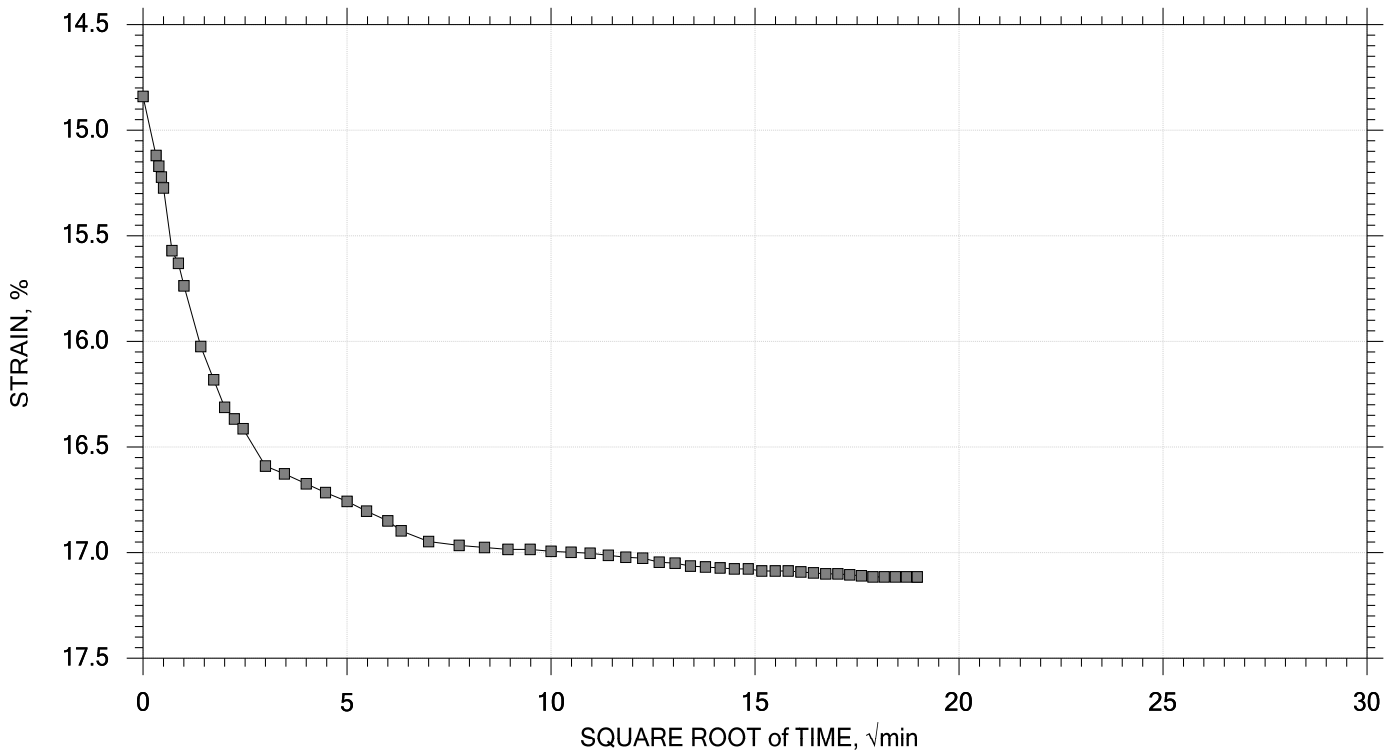
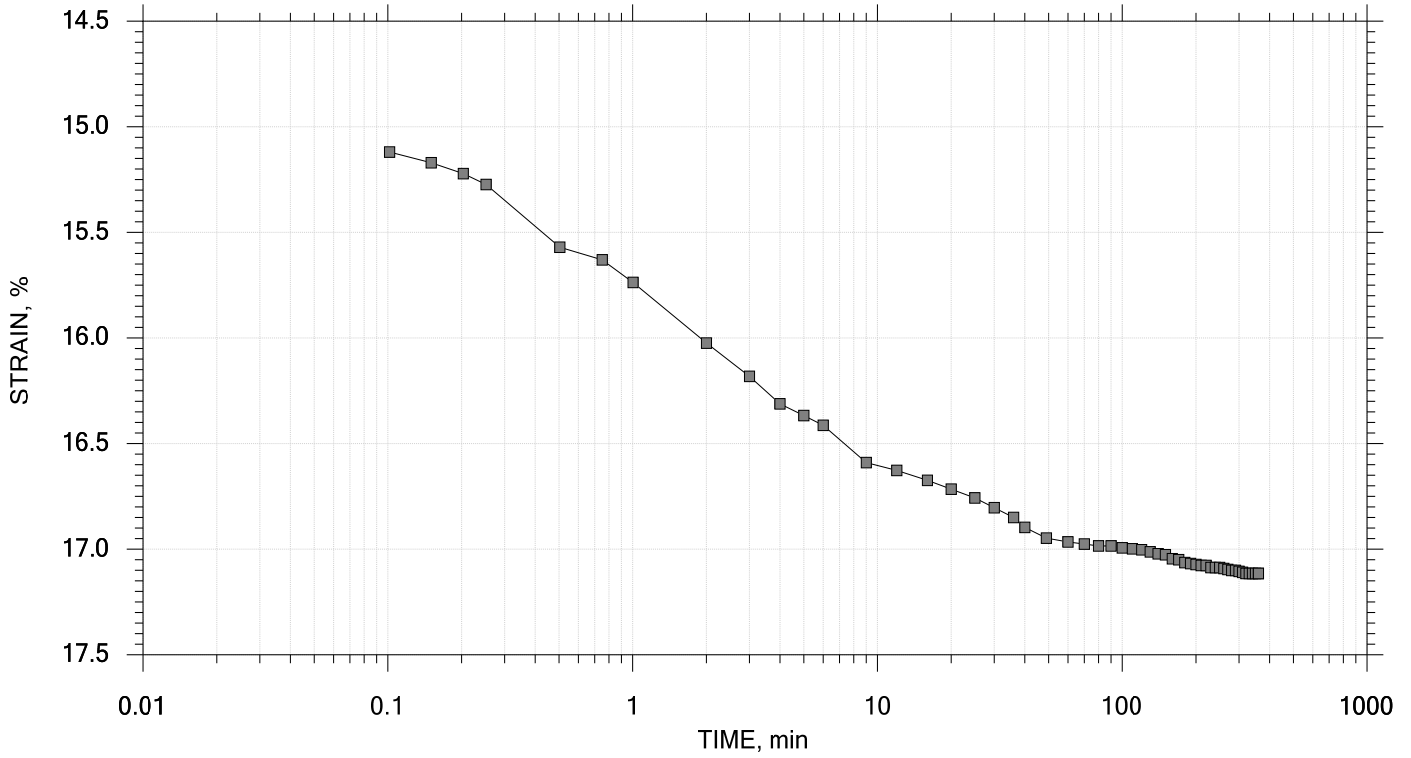



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

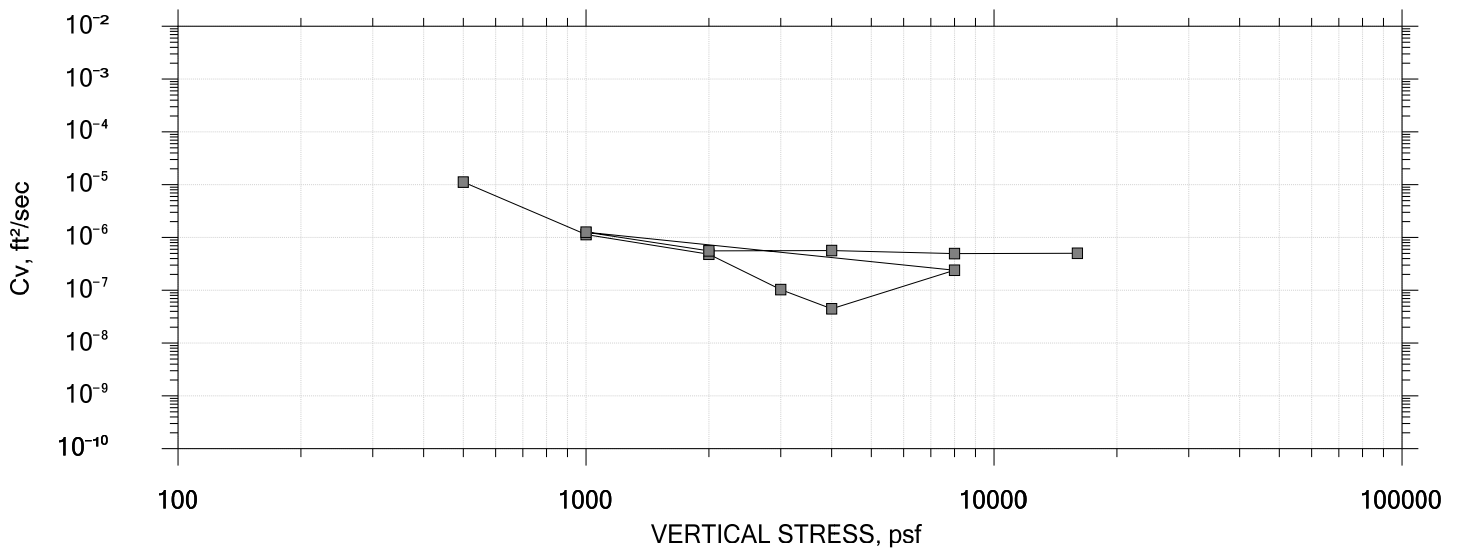
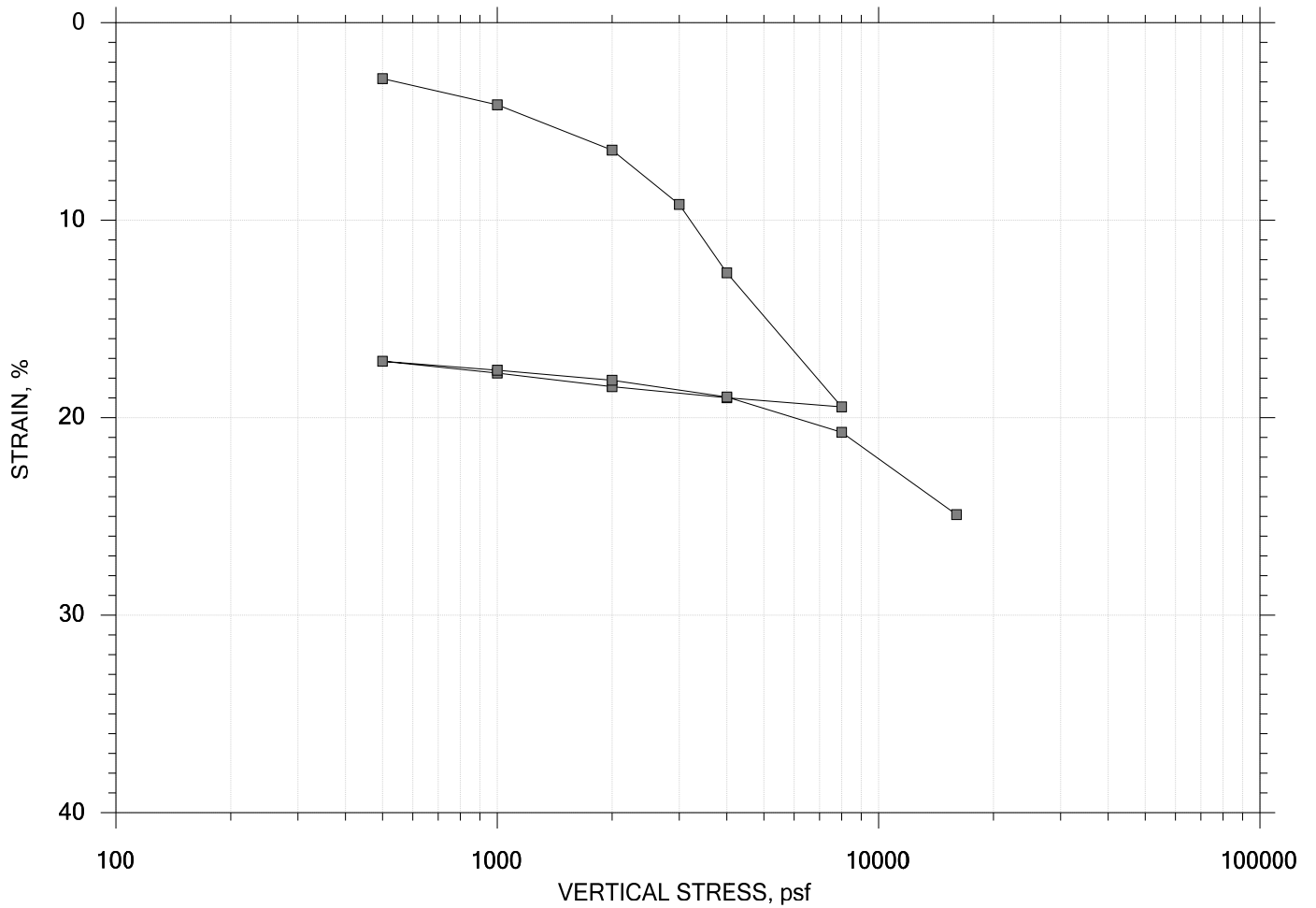
Stress: 16000 psf




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 07/31/18	Test No.: IP-4
	Depth: 37-39 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V		
	Page 209 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

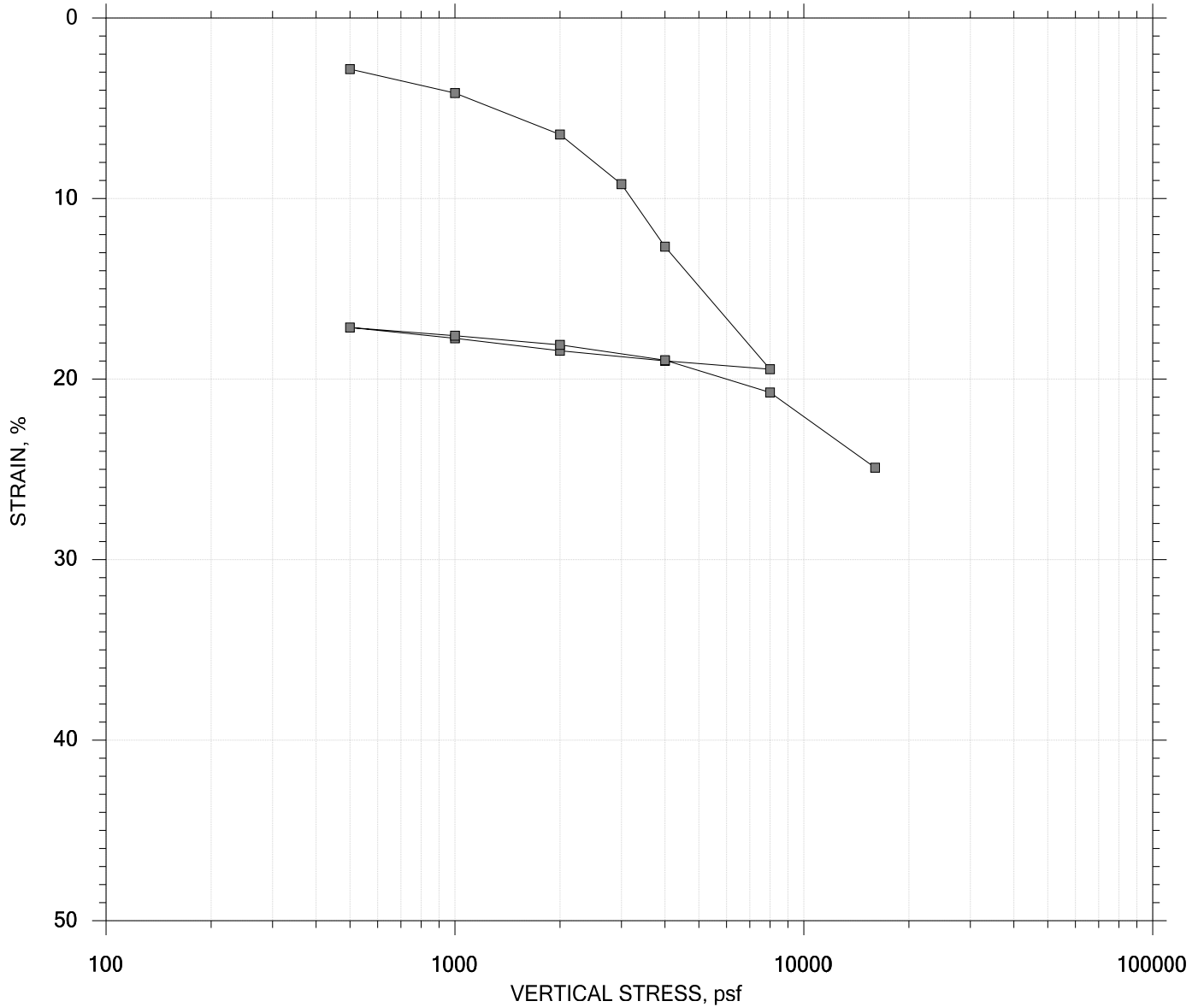
## SUMMARY REPORT




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Displacement at End of Increment		
	Page 210 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

## SUMMARY REPORT



				Before Test	After Test	
Current Vertical Effective Stress: ---				Water Content, %	53.11	30.75
Preconsolidation Stress: ---				Dry Unit Weight, pcf	69.453	92.604
Compression Ratio: ---				Saturation, %	99.79	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.45	0.84
LL: 37	PL: 21	PI: 16	GS: 2.73			

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-211		Tested By: md		Checked By: njh	
	Sample No.: U2		Test Date: 08/01/18		Test No.: IP-5	
	Depth: 45-47 ft		Sample Type: intact		Elevation: ---	
	Description: Wet, dark gray clay					
	Remarks: System T					
	Displacement at End of Increment				Page 211 of 301	

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-211  
 Sample No.: U2  
 Test No.: IP-5

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 08/01/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 45-47 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System T

Estimated Specific Gravity: 2.73  
 Initial Void Ratio: 1.45  
 Final Void Ratio: 0.839

Liquid Limit: 37  
 Plastic Limit: 21  
 Plasticity Index: 16

Specimen Diameter: 2.50 in  
 Initial Height: 1.00 in  
 Final Height: 0.75 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	B-1744	RING		A-2617
Wt. Container + Wet Soil, gm	119.05	248.04	228.03	128.70
Wt. Container + Dry Soil, gm	83.490	200.51	200.51	100.38
Wt. Container, gm	8.3300	111.02	111.02	8.2800
Wt. Dry Soil, gm	75.160	89.492	89.492	92.100
Water Content, %	47.31	53.11	30.75	30.75
Void Ratio	---	1.45	0.839	---
Degree of Saturation, %	---	99.79	100.00	---
Dry Unit Weight, pcf	---	69.453	92.604	---

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.

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-211  
 Sample No.: U2  
 Test No.: IP-5

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 08/01/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 45-47 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System T

Displacement at End of Increment

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day
1	500.	0.02826	1.38	2.83	3.049	7.82e-006	5.65e-005	2.38e-003
2	1.00e+003	0.04153	1.35	4.15	20.781	1.10e-006	2.65e-005	1.57e-004
3	2.00e+003	0.06454	1.29	6.45	81.002	2.72e-007	2.30e-005	3.37e-005
4	3.00e+003	0.09198	1.23	9.20	234.157	8.90e-008	2.74e-005	1.32e-005
5	4.00e+003	0.1266	1.14	12.7	419.007	4.65e-008	3.46e-005	8.68e-006
6	8.00e+003	0.1945	0.975	19.4	69.481	2.49e-007	1.70e-005	2.28e-005
7	4.00e+003	0.1899	0.986	19.0	3.799	4.21e-006	1.15e-006	2.61e-005
8	2.00e+003	0.1843	1.00	18.4	28.979	5.60e-007	2.81e-006	8.47e-006
9	1.00e+003	0.1774	1.02	17.7	58.481	2.82e-007	6.89e-006	1.05e-005
10	500.	0.1714	1.03	17.1	140.004	1.19e-007	1.20e-005	7.76e-006
11	1.00e+003	0.1760	1.02	17.6	16.001	1.05e-006	9.18e-006	5.18e-005
12	2.00e+003	0.1810	1.01	18.1	36.501	4.54e-007	5.05e-006	1.24e-005
13	4.00e+003	0.1895	0.987	18.9	35.437	4.60e-007	4.24e-006	1.05e-005
14	8.00e+003	0.2074	0.943	20.7	36.888	4.27e-007	4.48e-006	1.03e-005
15	1.60e+004	0.2491	0.841	24.9	25.045	5.84e-007	5.21e-006	1.64e-005

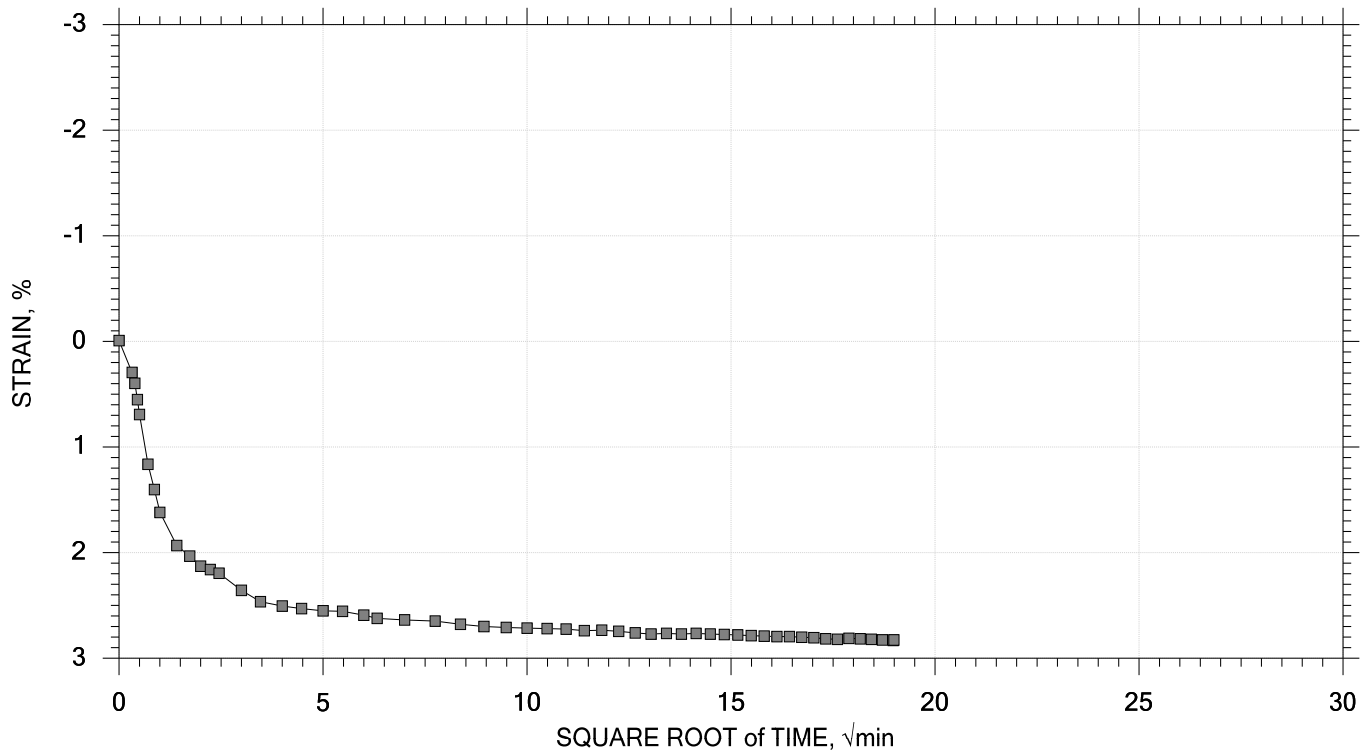
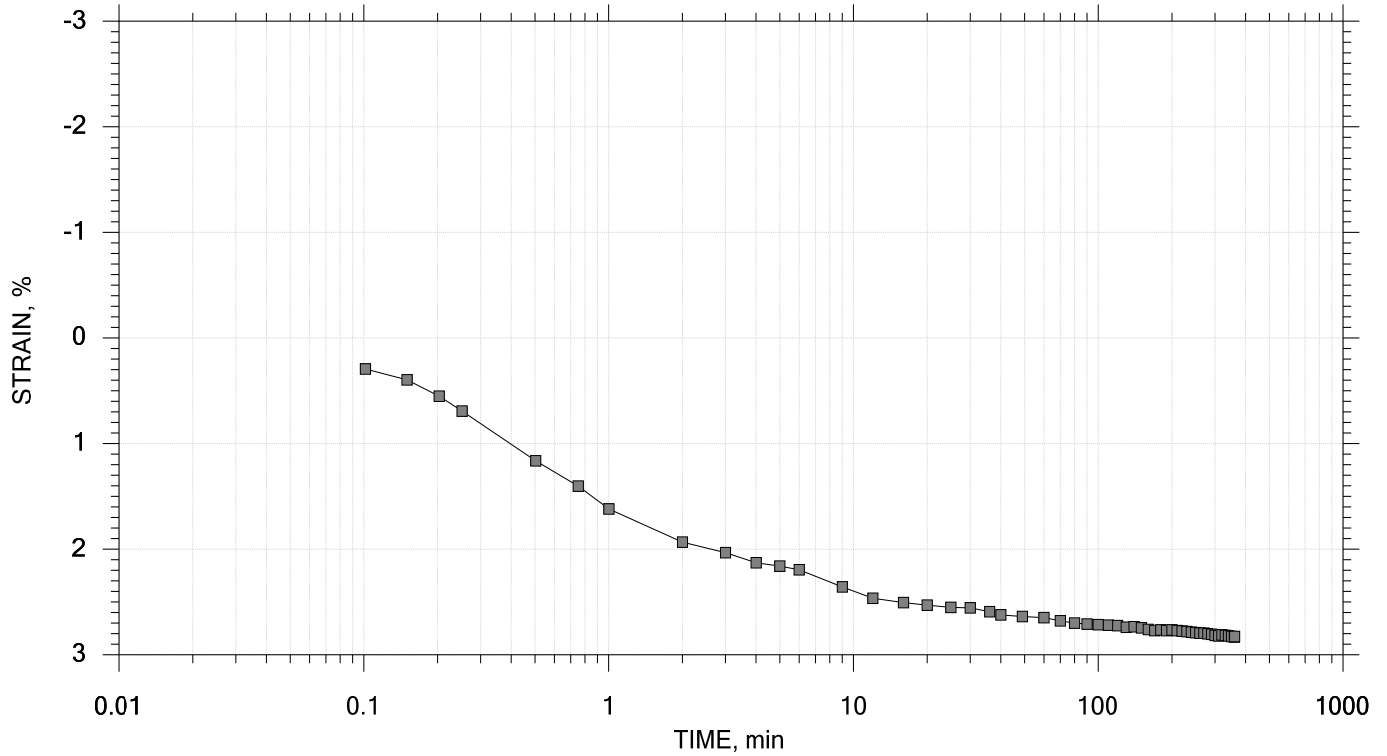
	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day	Ca %
1	500.	0.02826	1.38	2.83	0.497	1.11e-005	5.65e-005	3.40e-003	0.00e+000
2	1.00e+003	0.04153	1.35	4.15	4.711	1.13e-006	2.65e-005	1.61e-004	0.00e+000
3	2.00e+003	0.06454	1.29	6.45	0.000	0.00e+000	2.30e-005	0.00e+000	0.00e+000
4	3.00e+003	0.09198	1.23	9.20	0.000	0.00e+000	2.74e-005	0.00e+000	0.00e+000
5	4.00e+003	0.1266	1.14	12.7	112.465	4.02e-008	3.46e-005	7.51e-006	0.00e+000
6	8.00e+003	0.1945	0.975	19.4	17.391	2.31e-007	1.70e-005	2.11e-005	0.00e+000
7	4.00e+003	0.1899	0.986	19.0	0.000	0.00e+000	1.15e-006	0.00e+000	0.00e+000
8	2.00e+003	0.1843	1.00	18.4	4.693	8.03e-007	2.81e-006	1.21e-005	0.00e+000
9	1.00e+003	0.1774	1.02	17.7	0.000	0.00e+000	6.89e-006	0.00e+000	0.00e+000
10	500.	0.1714	1.03	17.1	25.362	1.53e-007	1.20e-005	9.95e-006	0.00e+000
11	1.00e+003	0.1760	1.02	17.6	3.204	1.21e-006	9.18e-006	6.01e-005	0.00e+000
12	2.00e+003	0.1810	1.01	18.1	0.000	0.00e+000	5.05e-006	0.00e+000	0.00e+000
13	4.00e+003	0.1895	0.987	18.9	6.141	6.16e-007	4.24e-006	1.41e-005	0.00e+000
14	8.00e+003	0.2074	0.943	20.7	0.000	0.00e+000	4.48e-006	0.00e+000	0.00e+000
15	1.60e+004	0.2491	0.841	24.9	7.955	4.27e-007	5.21e-006	1.20e-005	0.00e+000


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 15

Stress: 500 psf



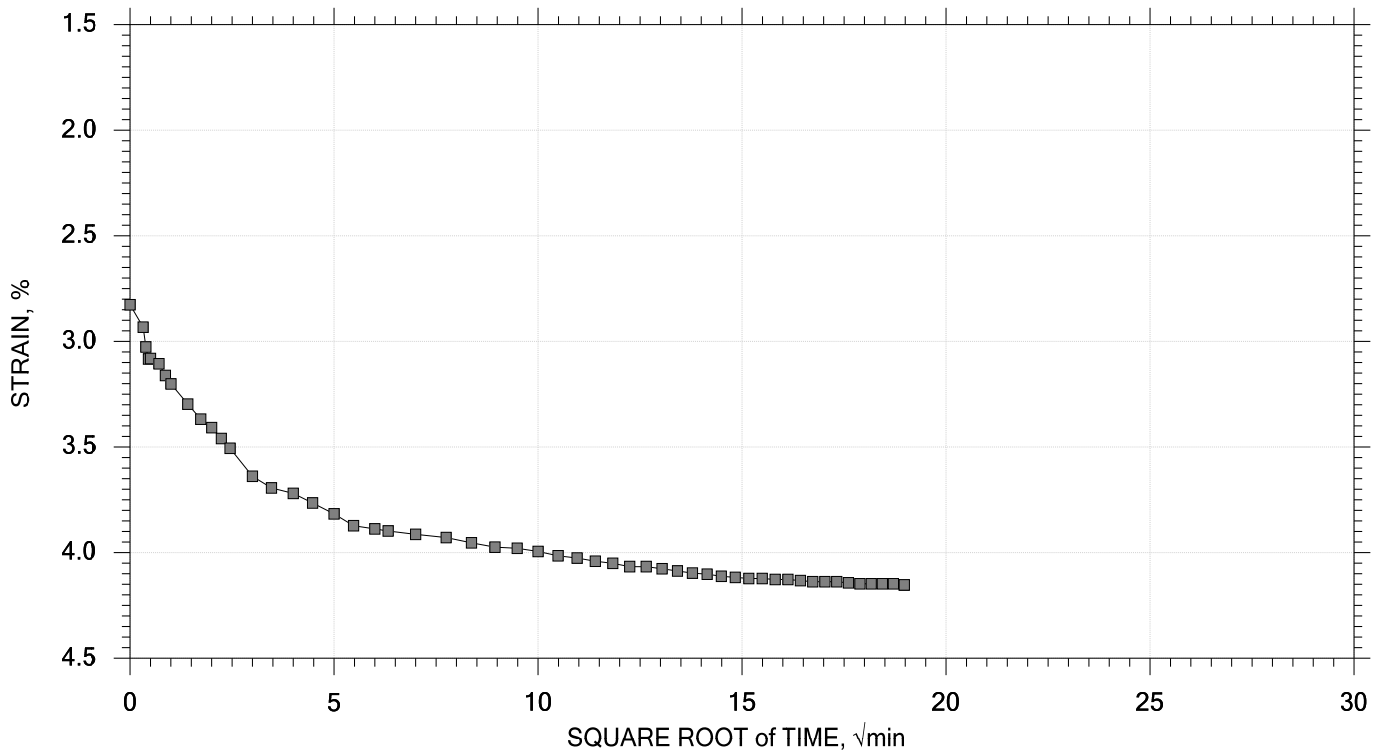
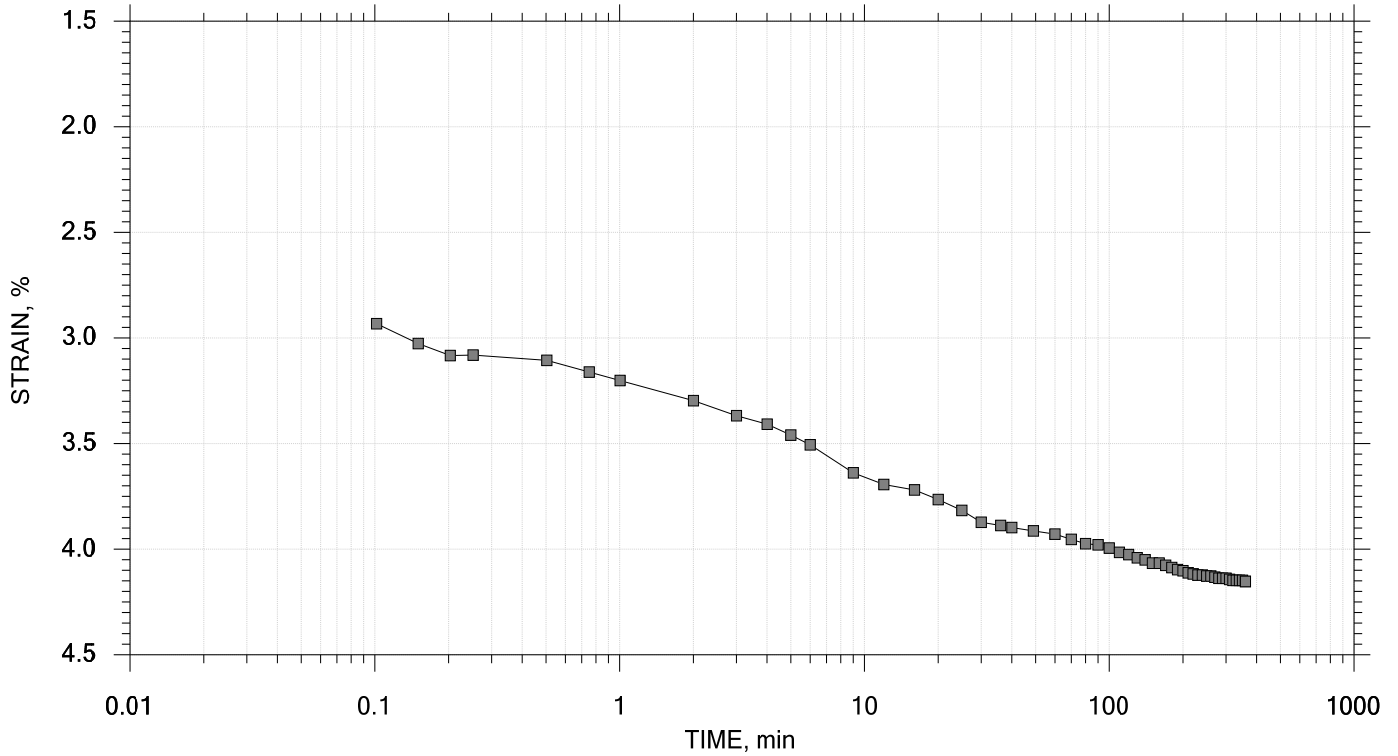
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 214 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 1000 psf



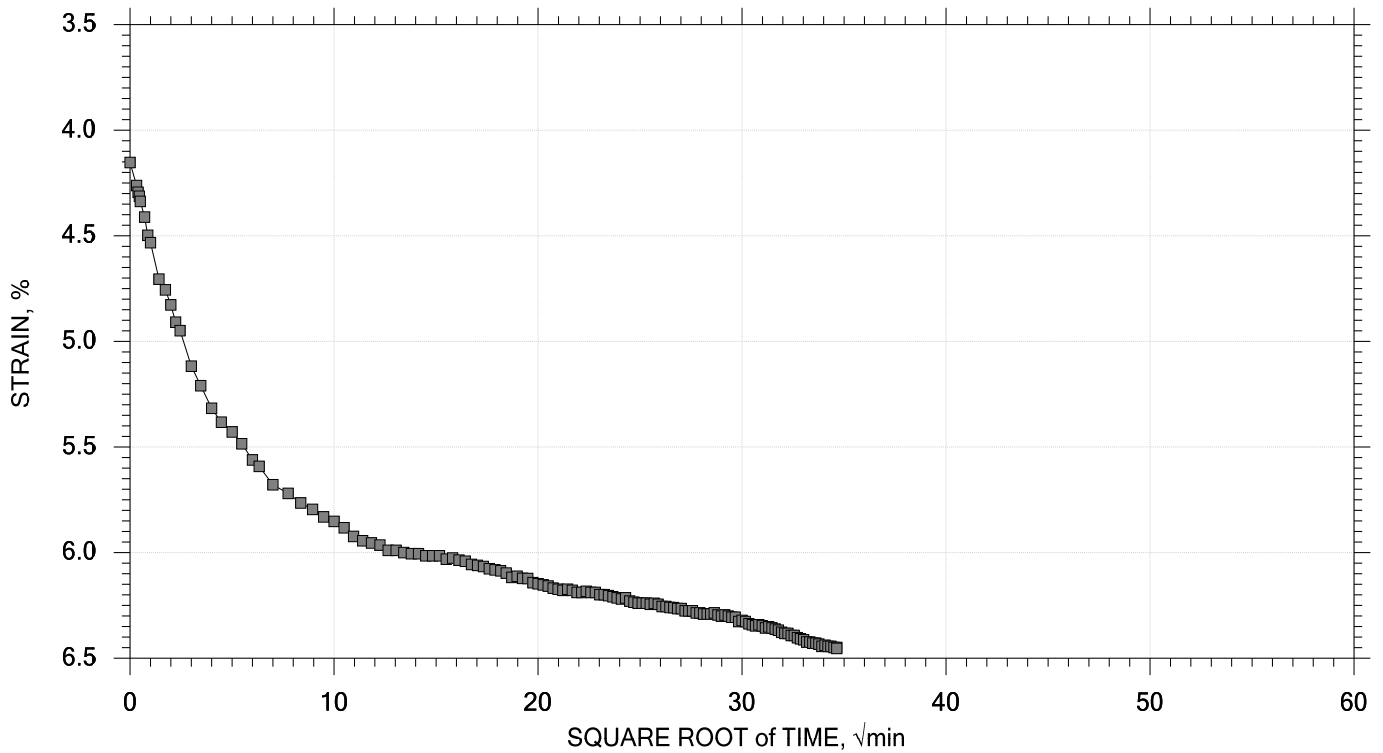
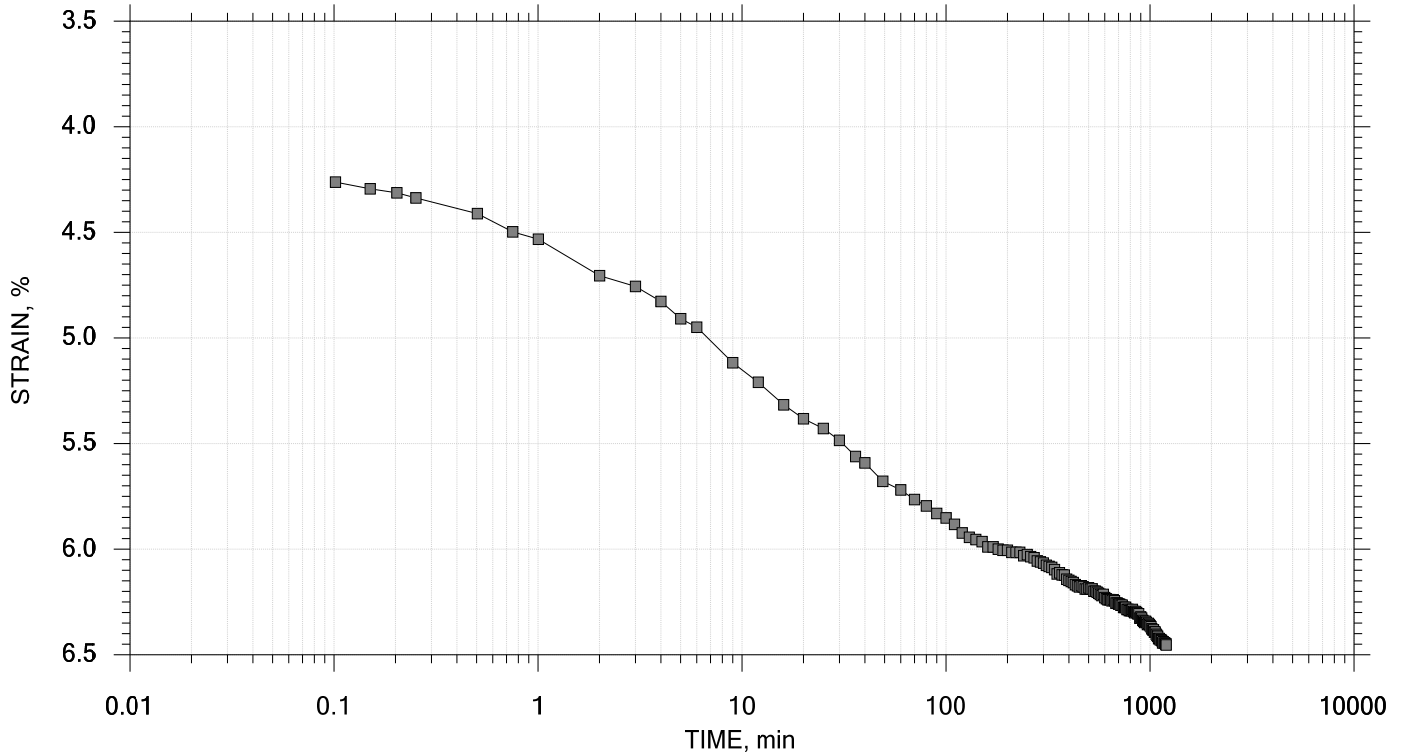
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
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# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 2000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 216 of 301		

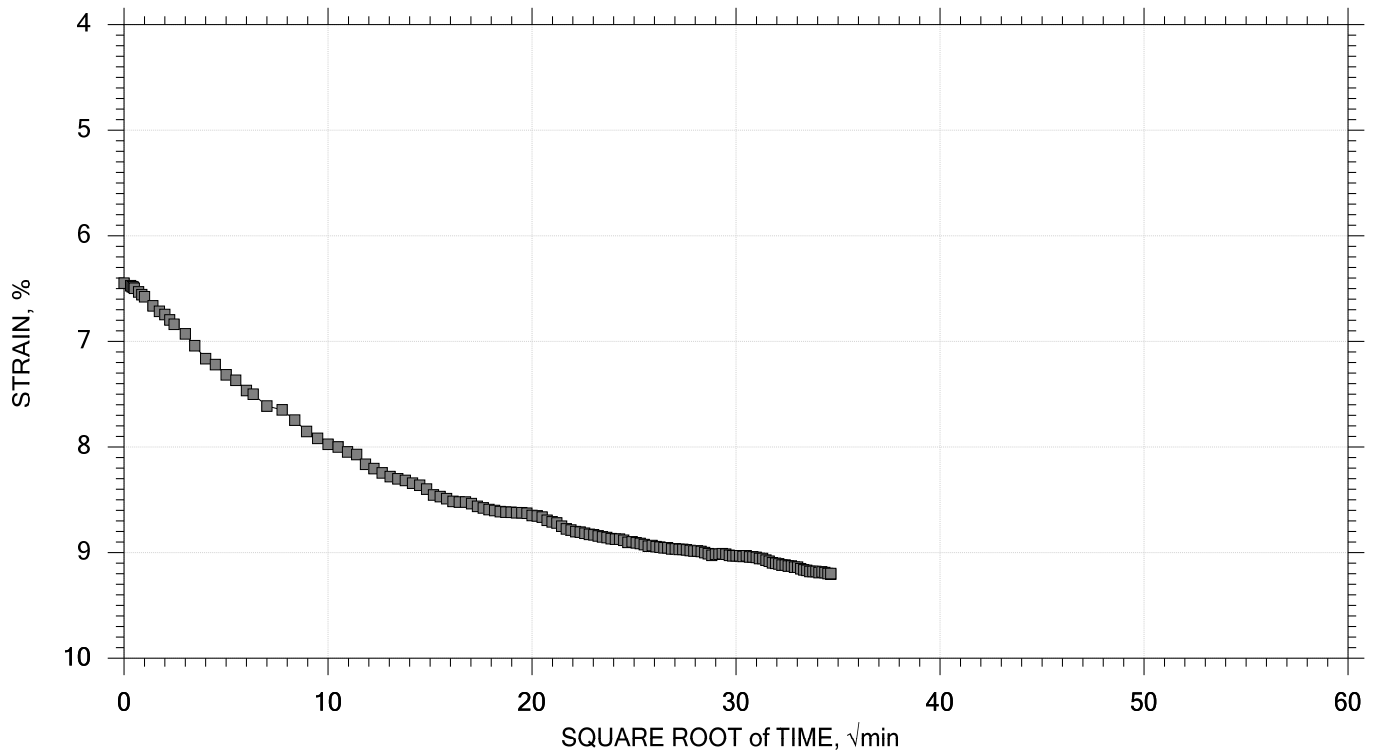
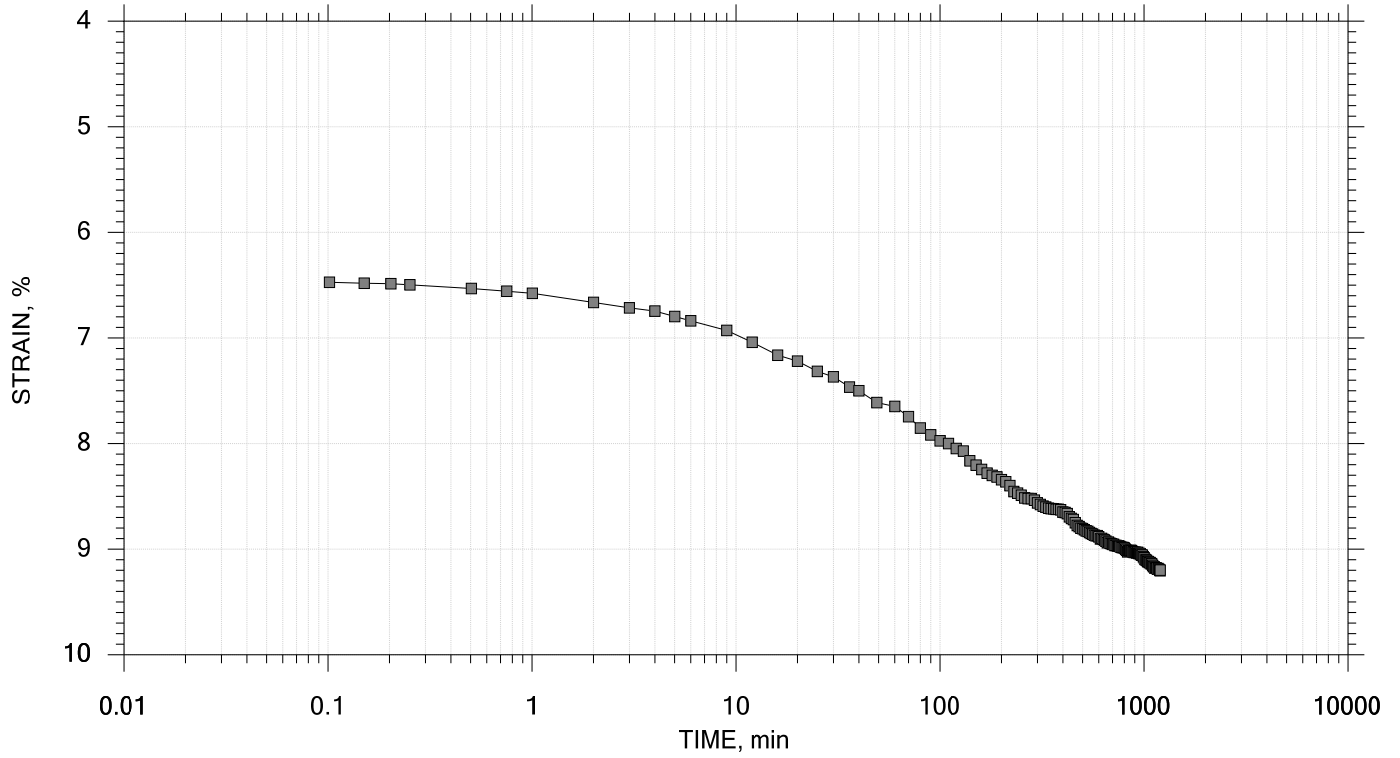



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 3000 psf



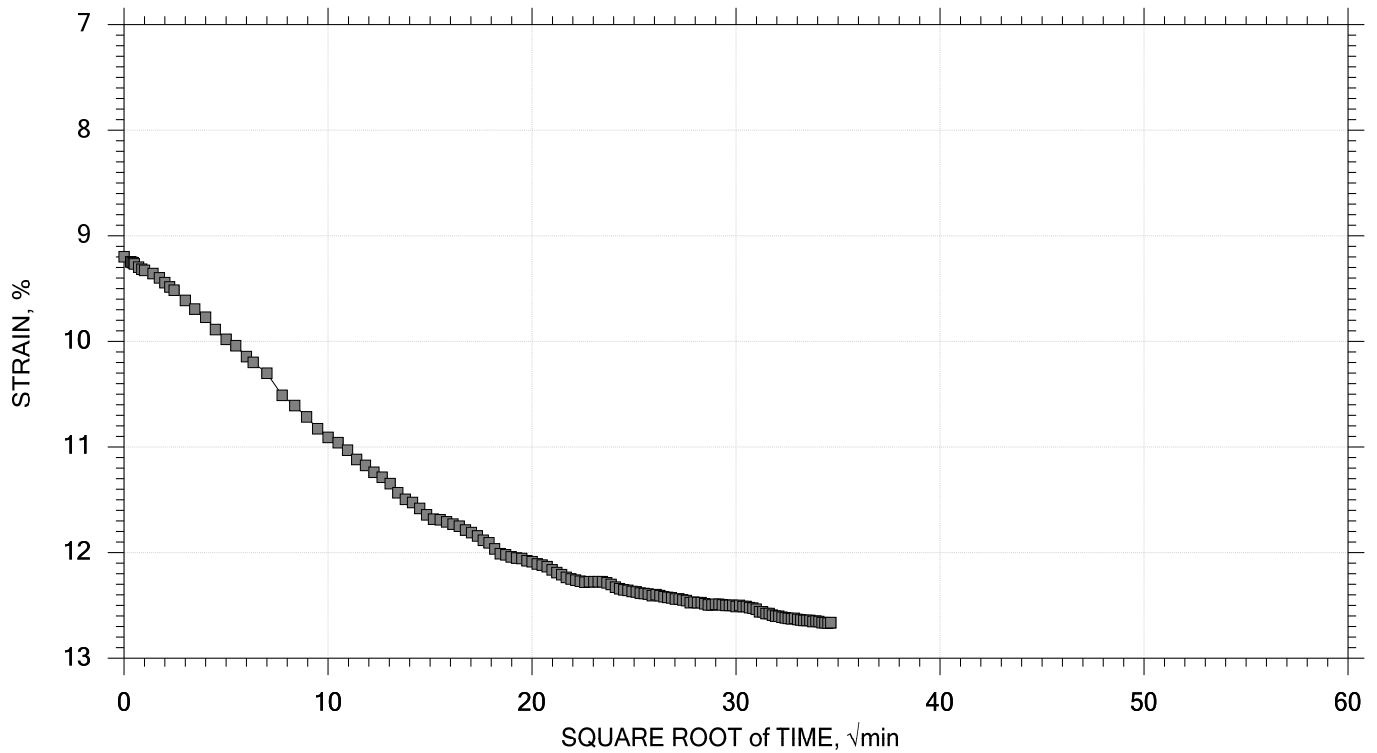
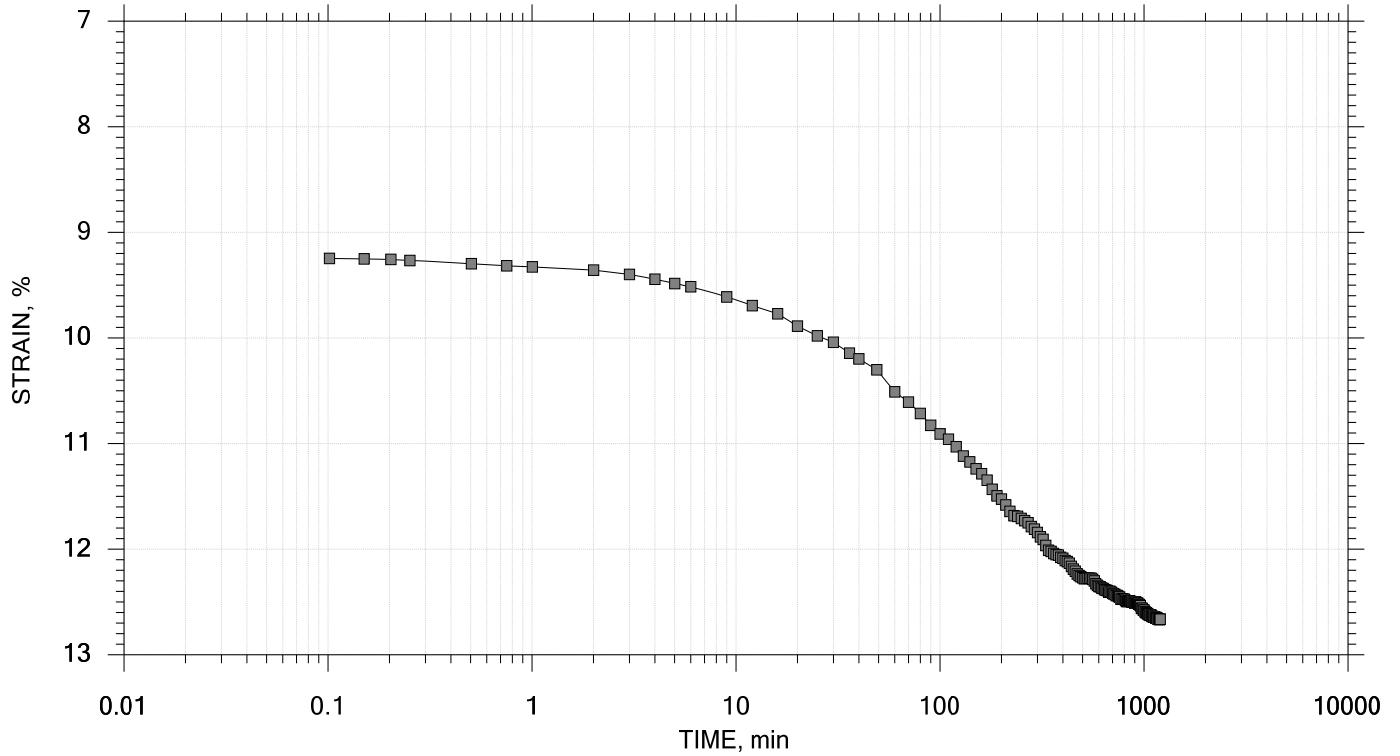
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 217 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 4000 psf



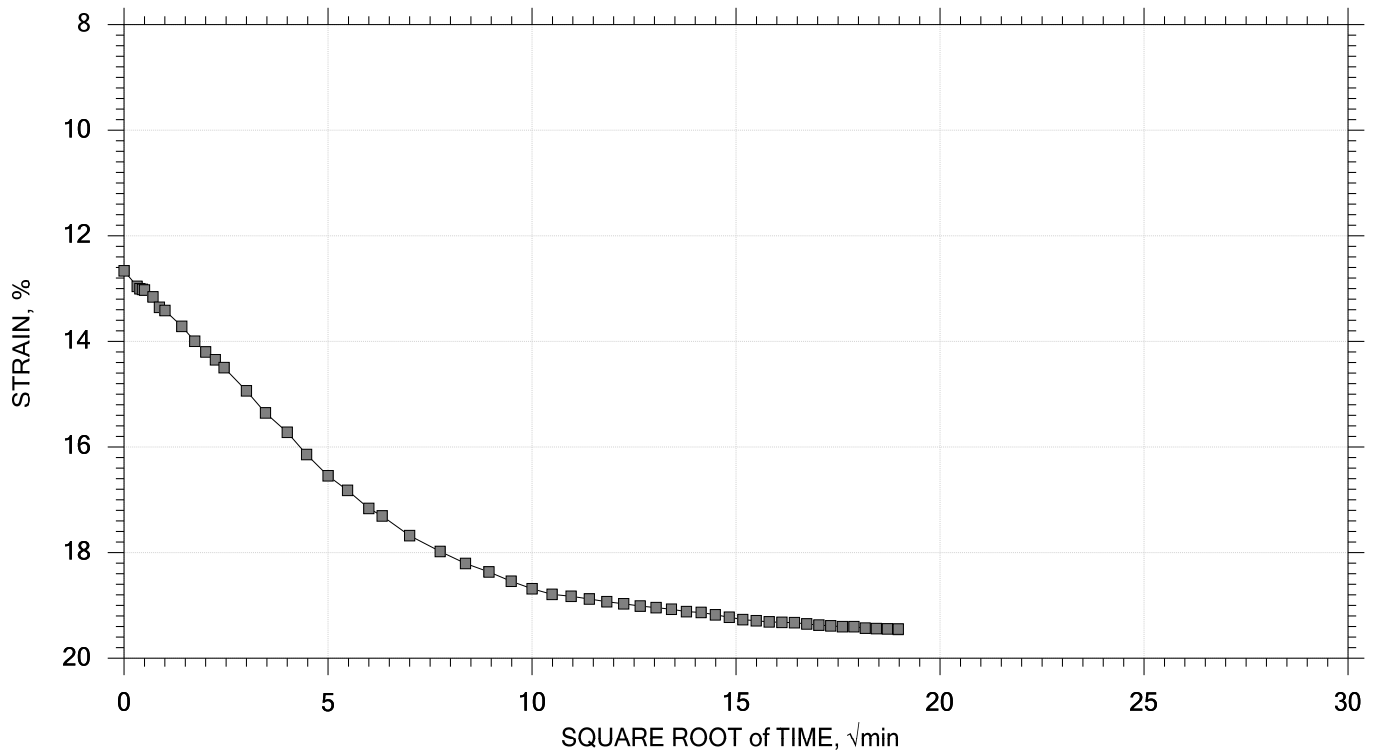
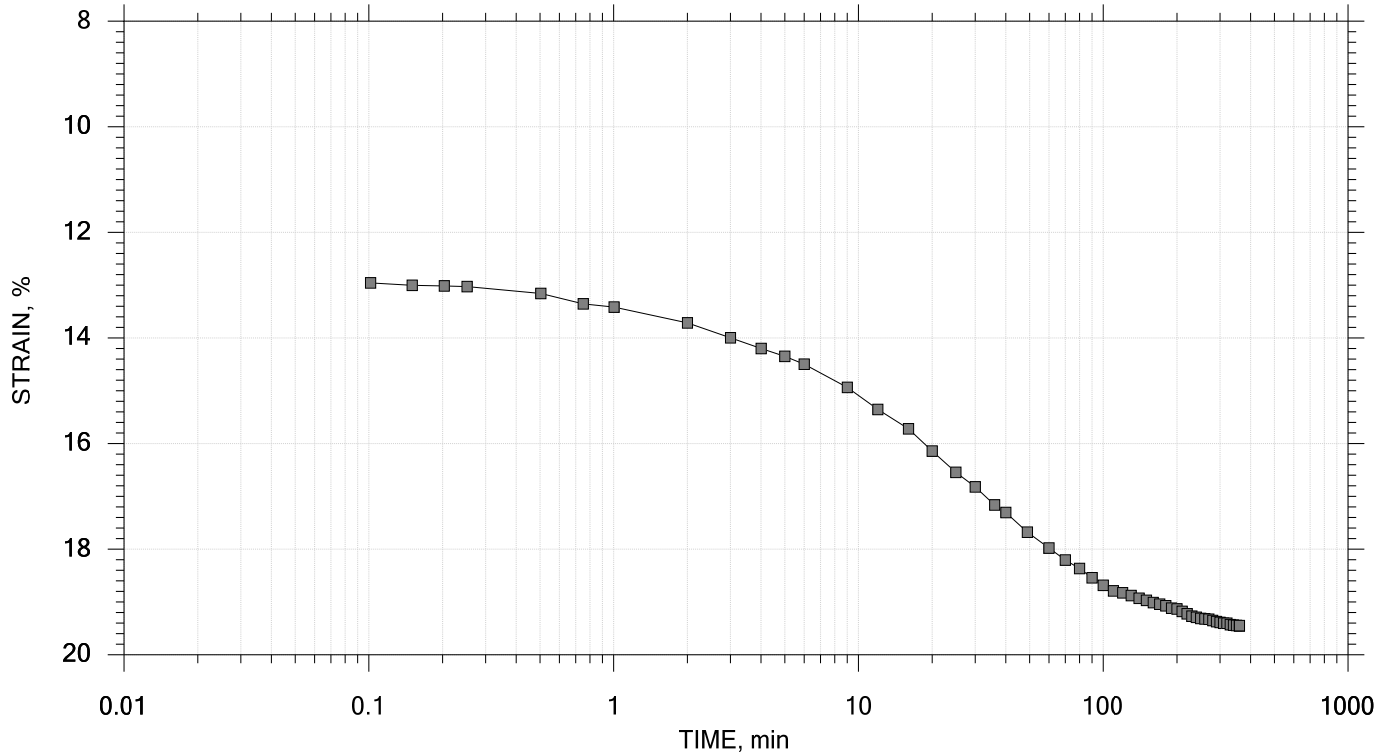
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 218 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 8000 psf



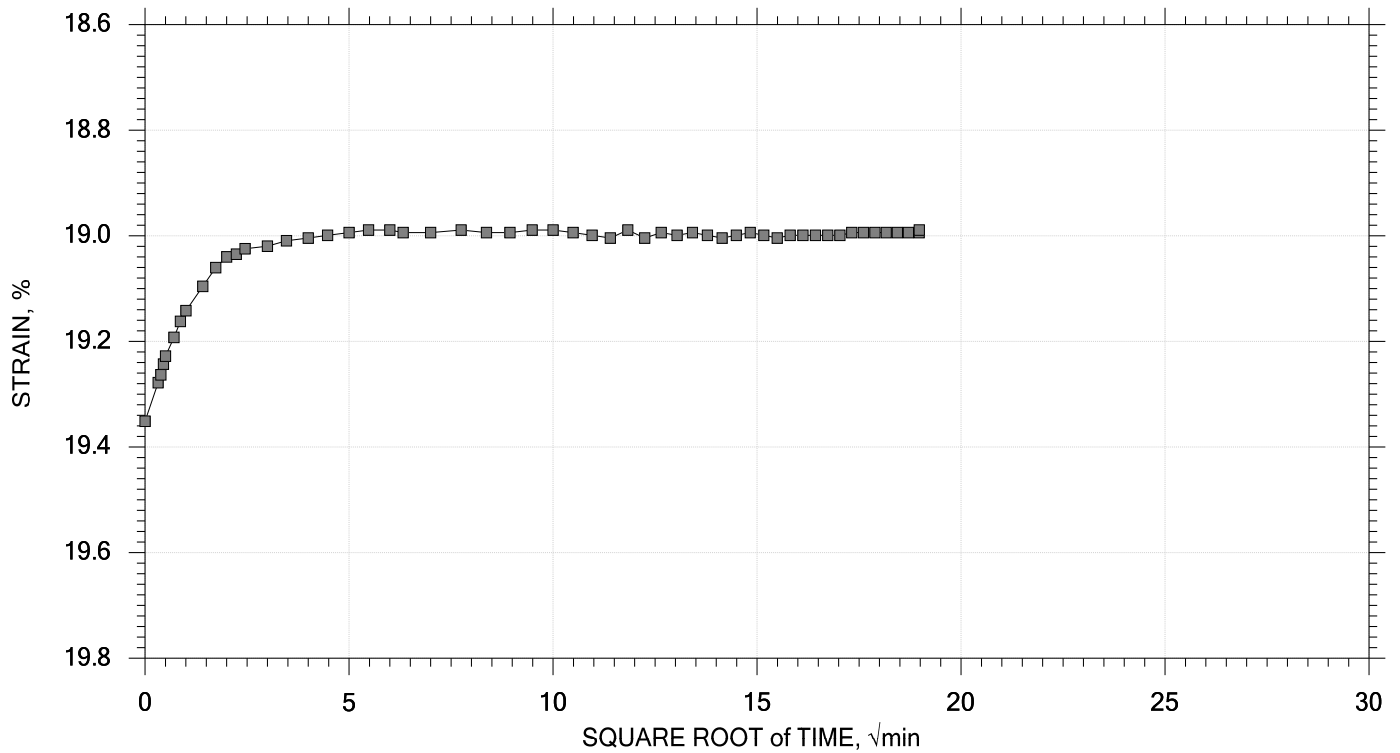
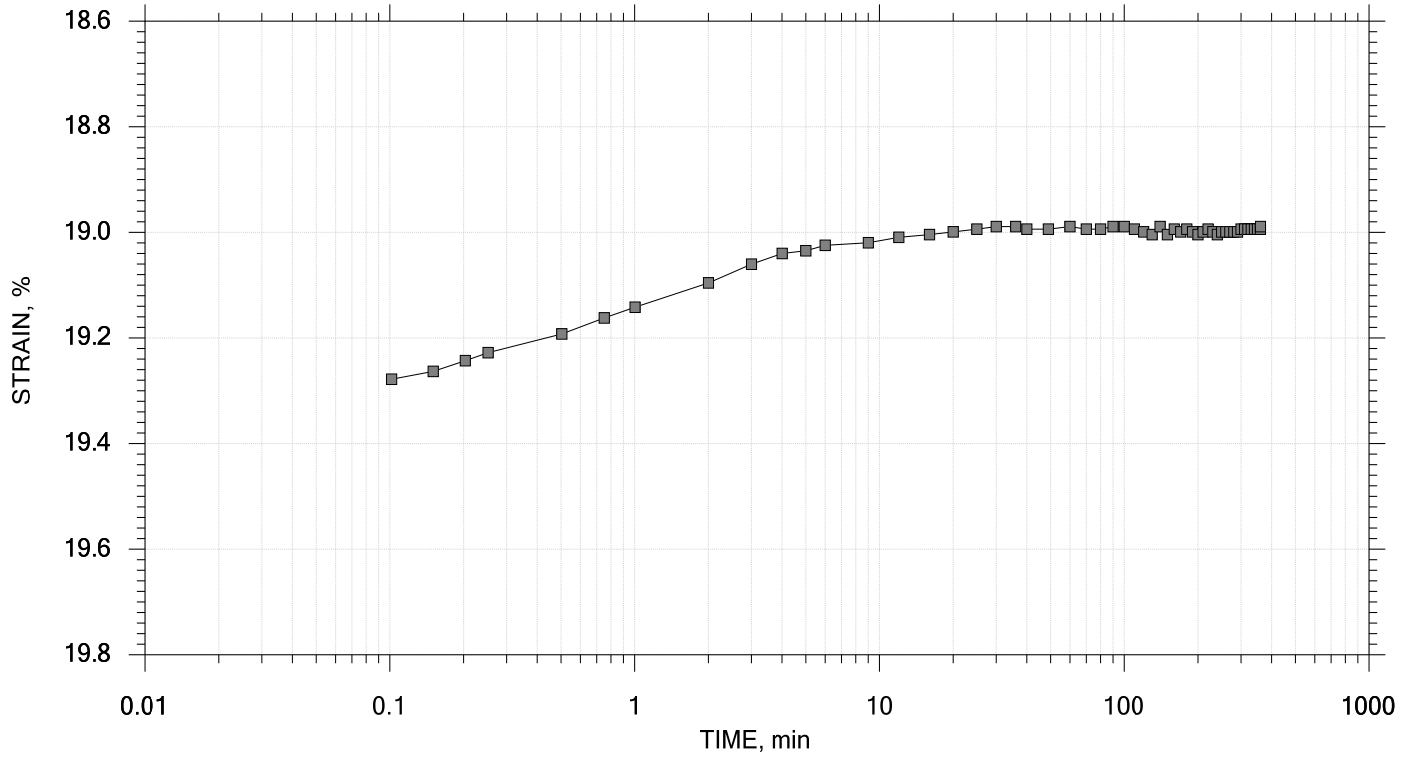
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 219 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4000 psf



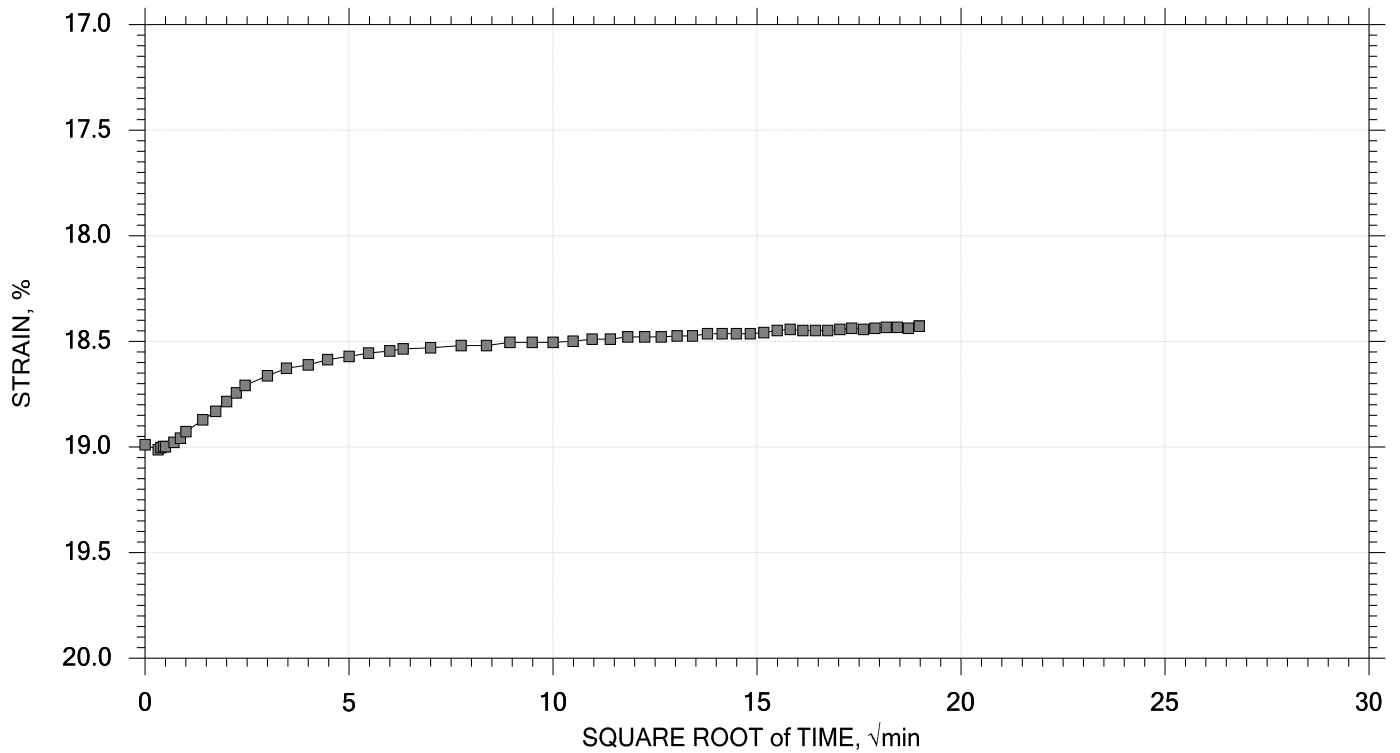
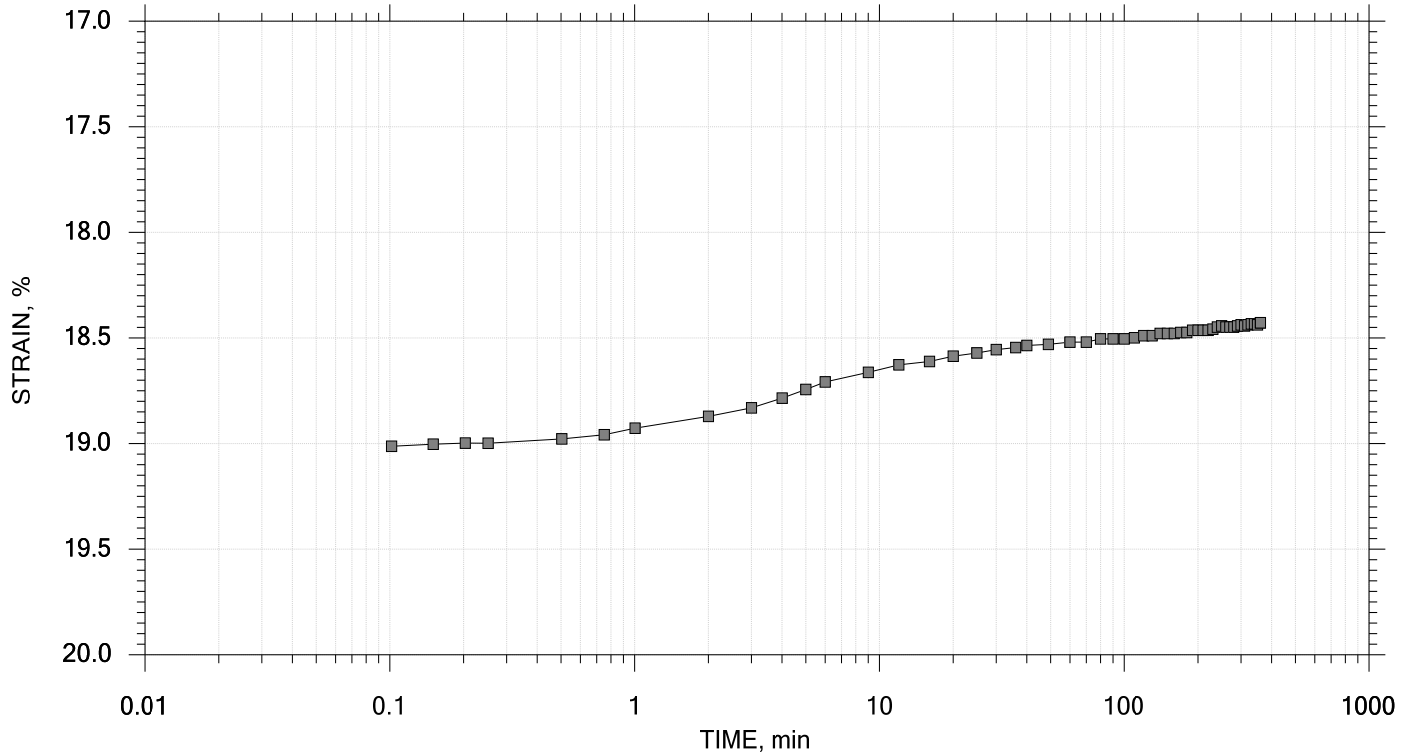
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 220 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 2000 psf



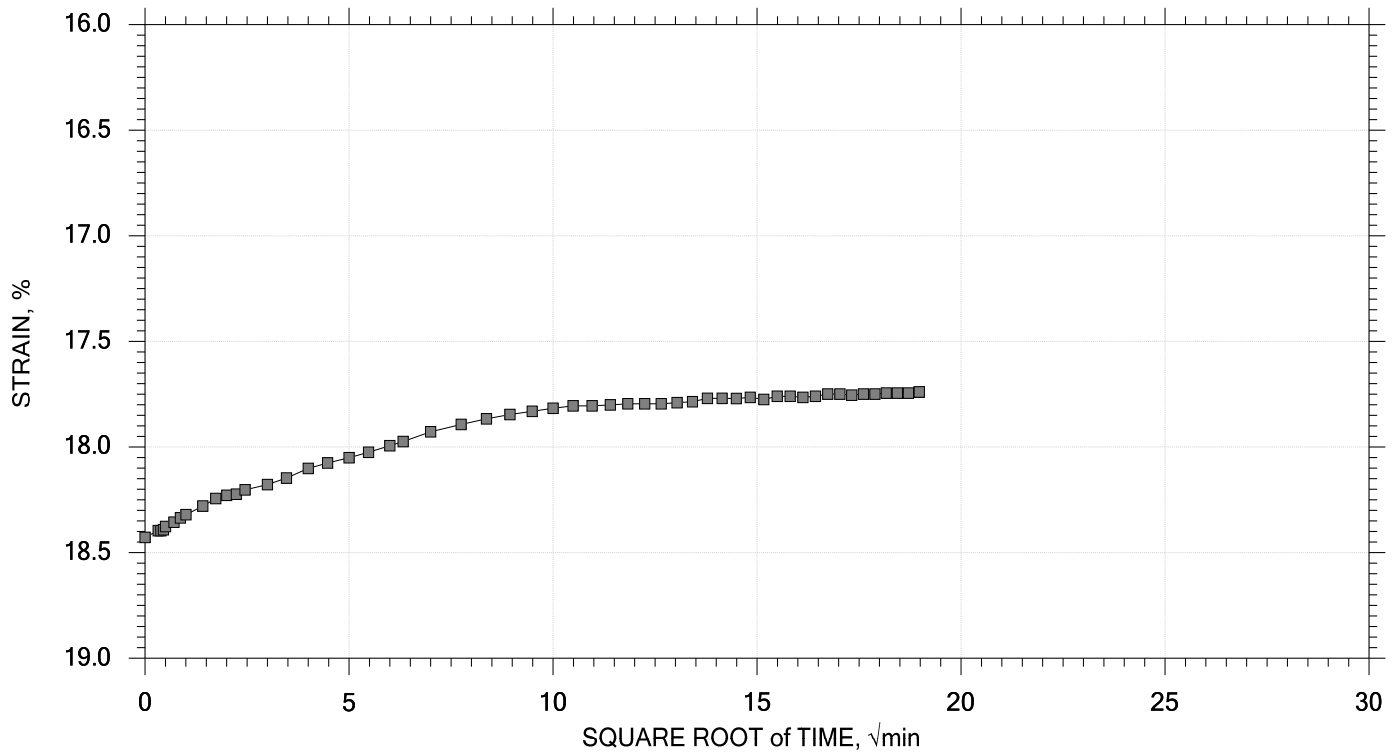
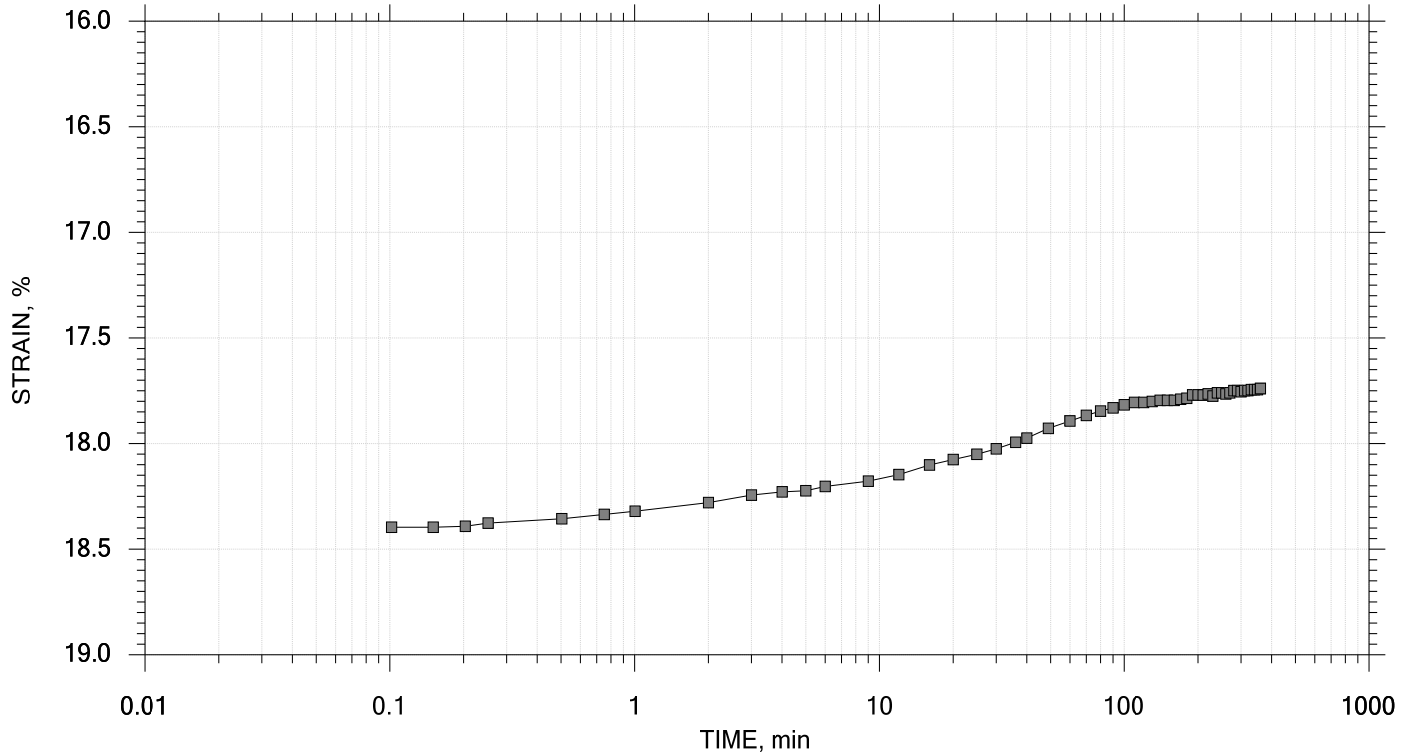
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 221 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 1000 psf



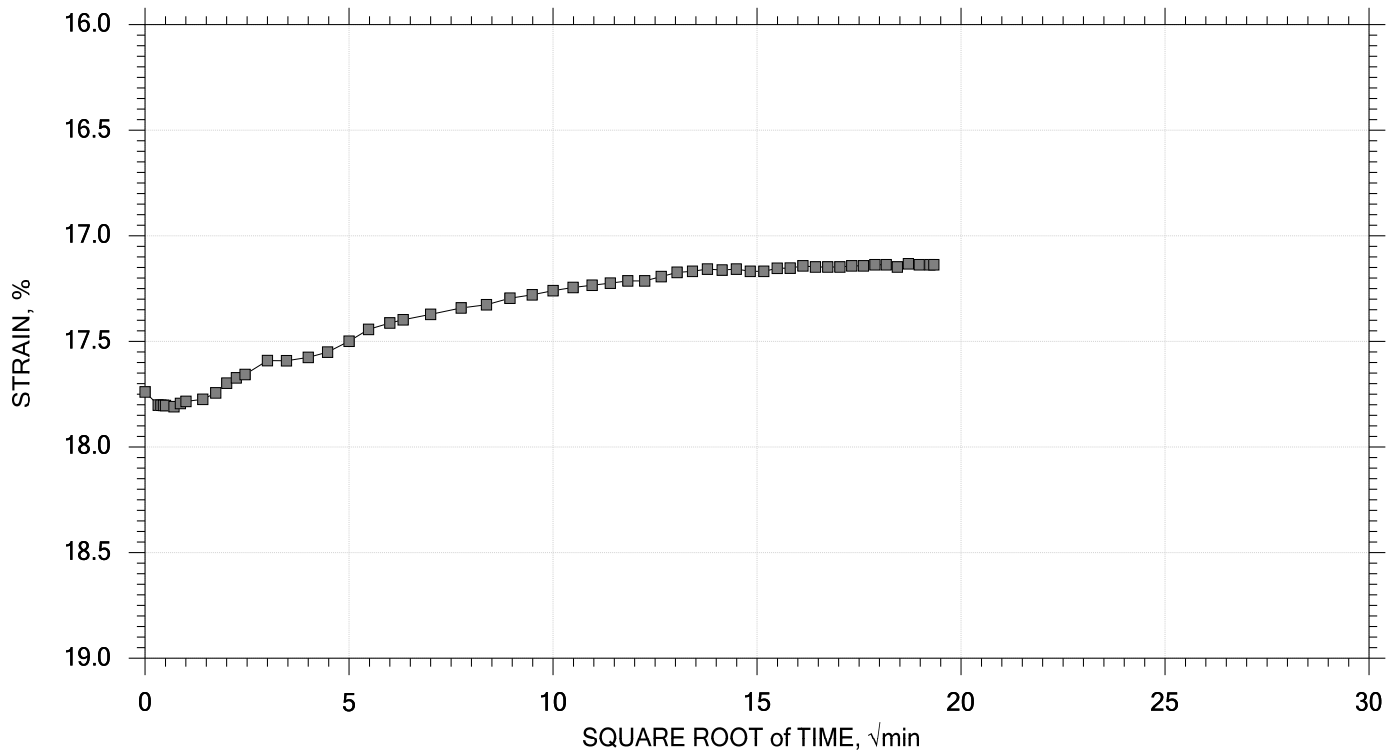
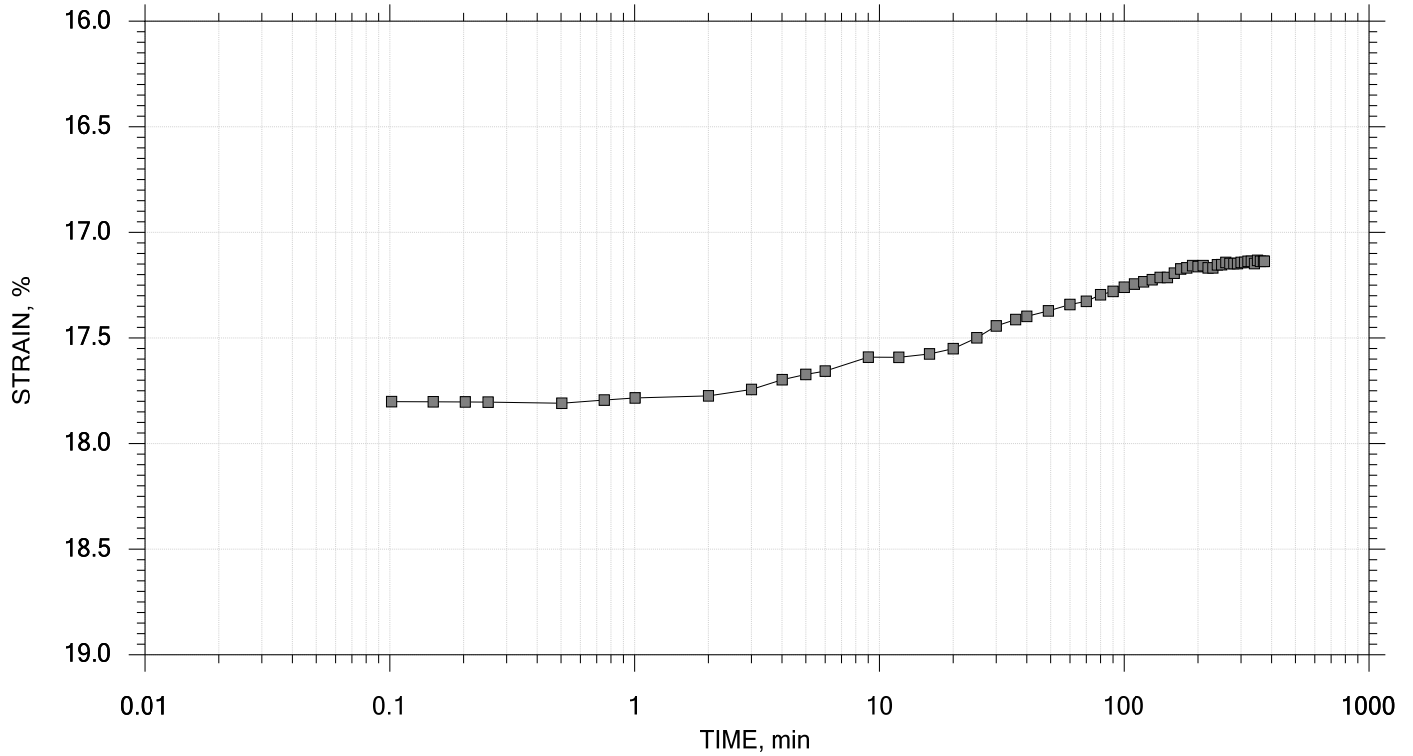
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 222 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 500 psf



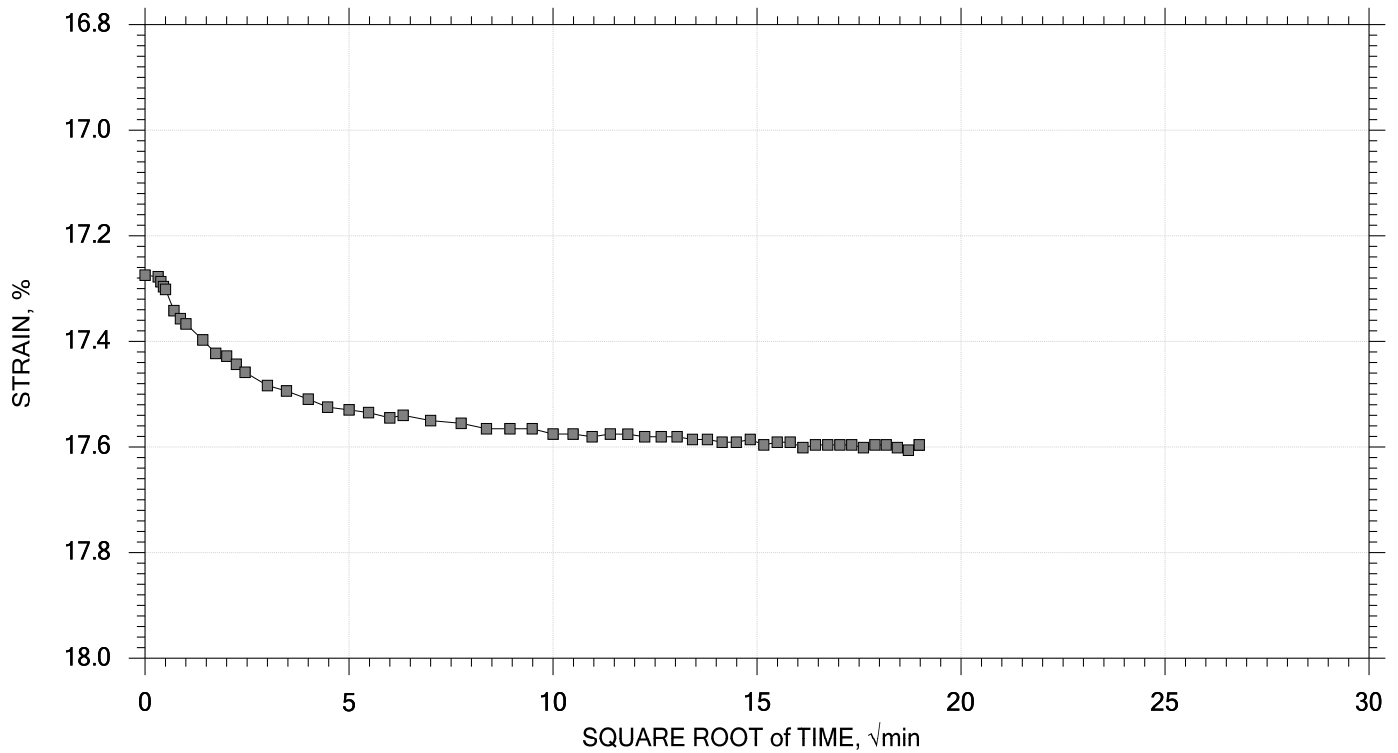
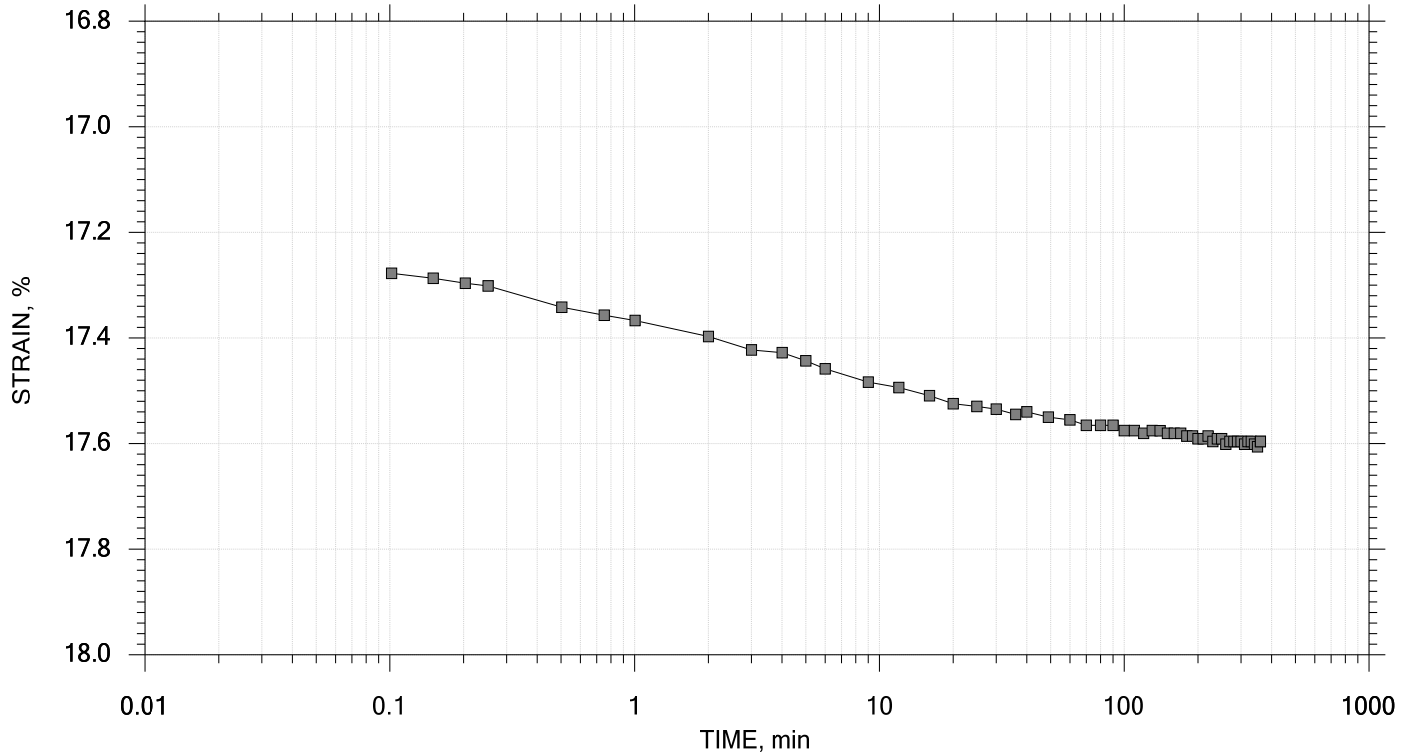
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 223 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 1000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
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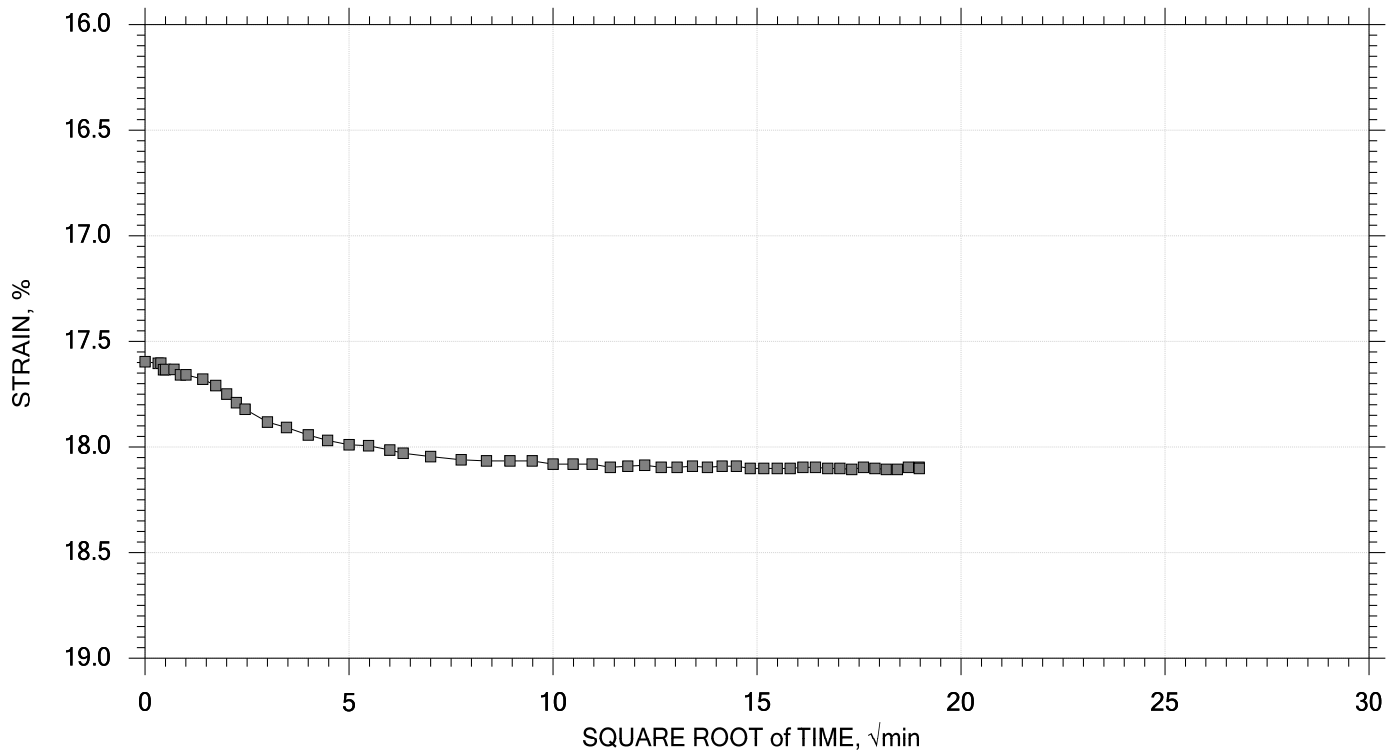
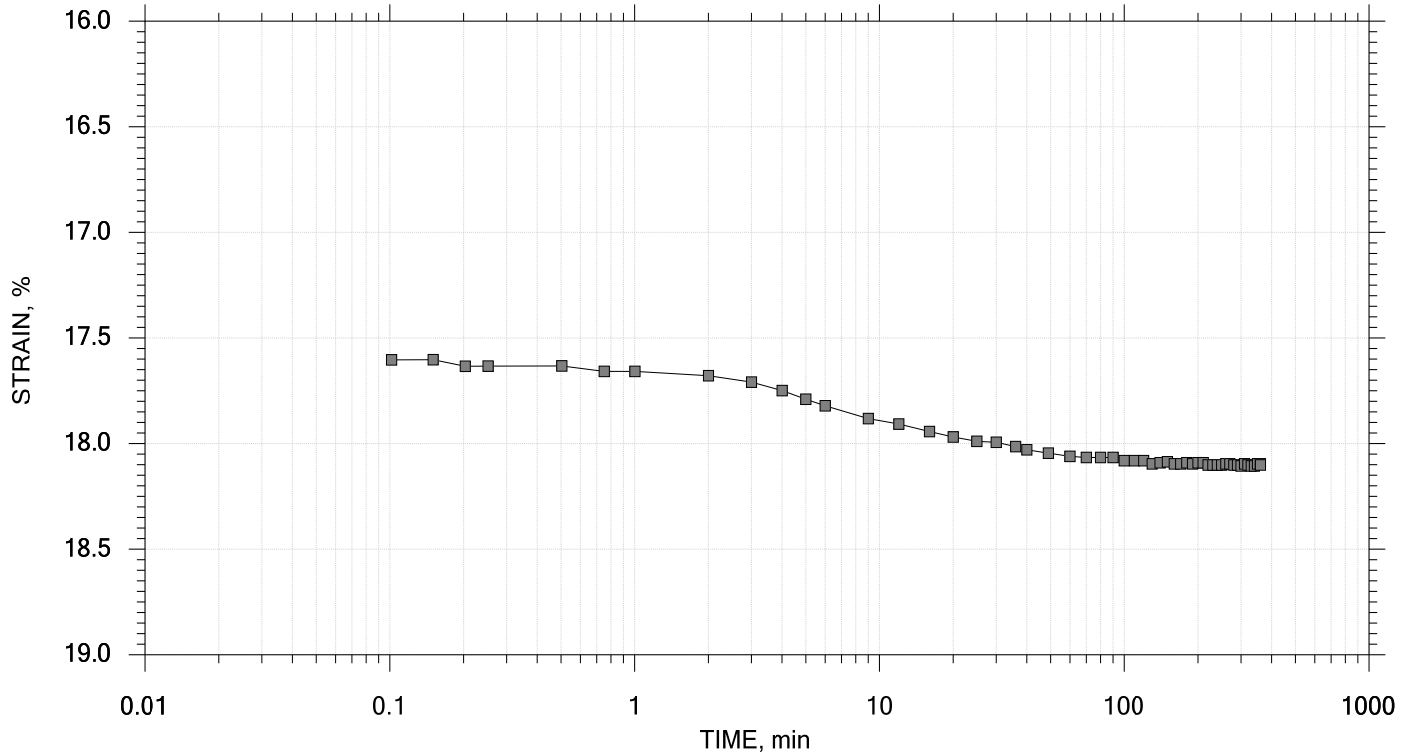



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2000 psf



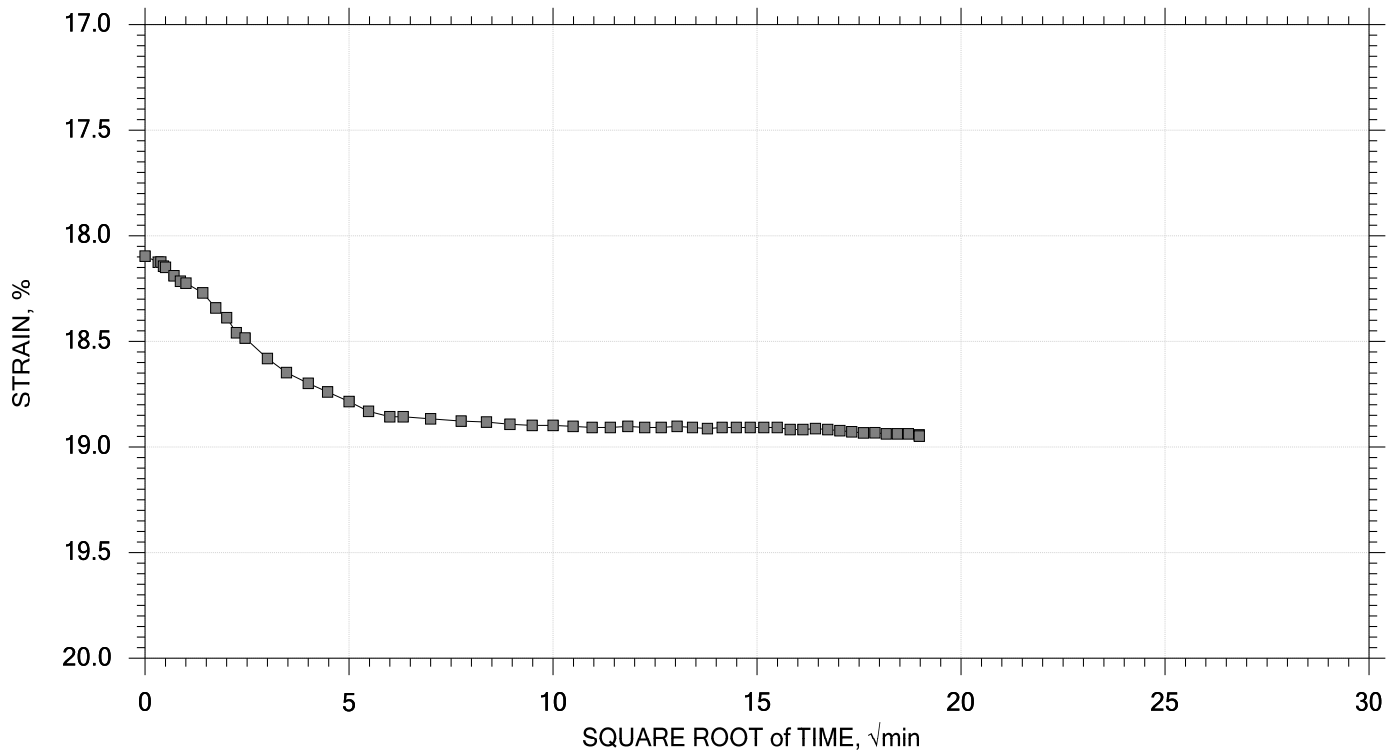
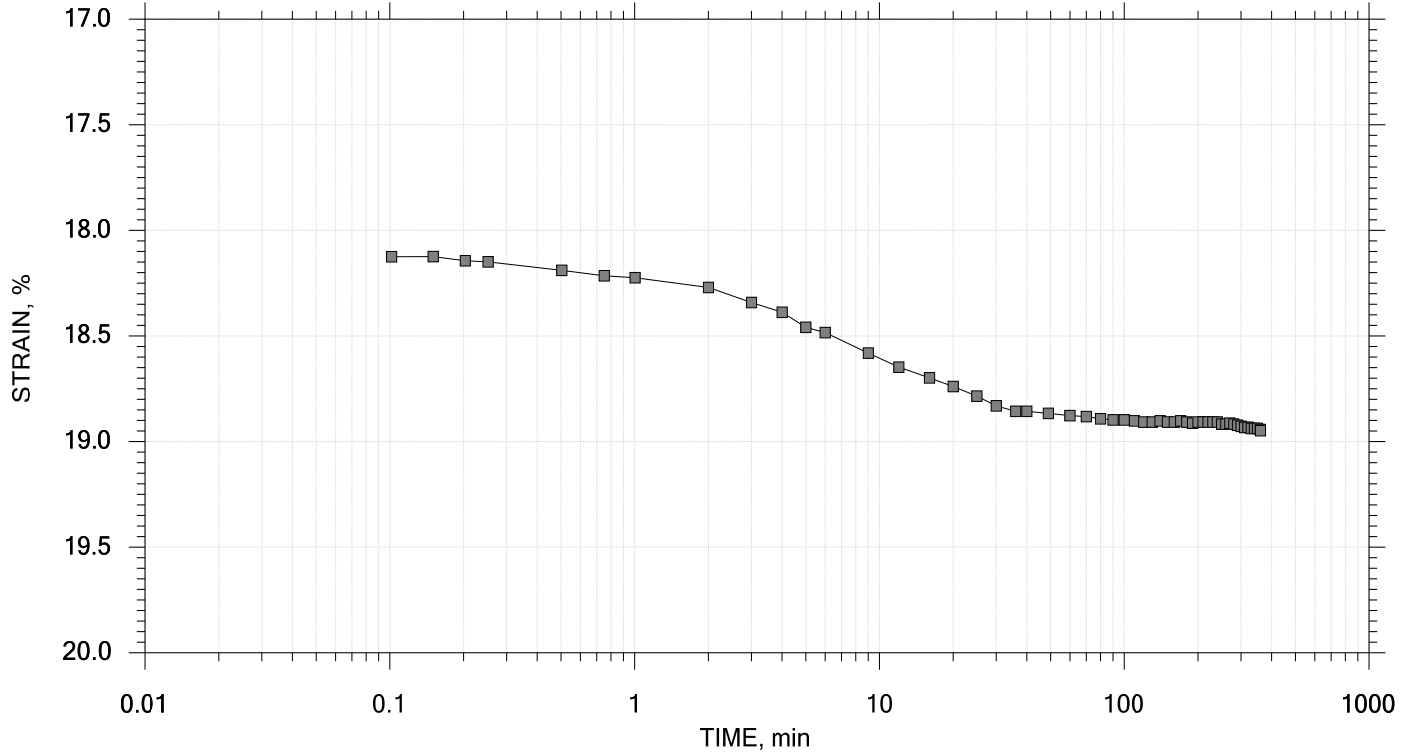
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 225 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 4000 psf



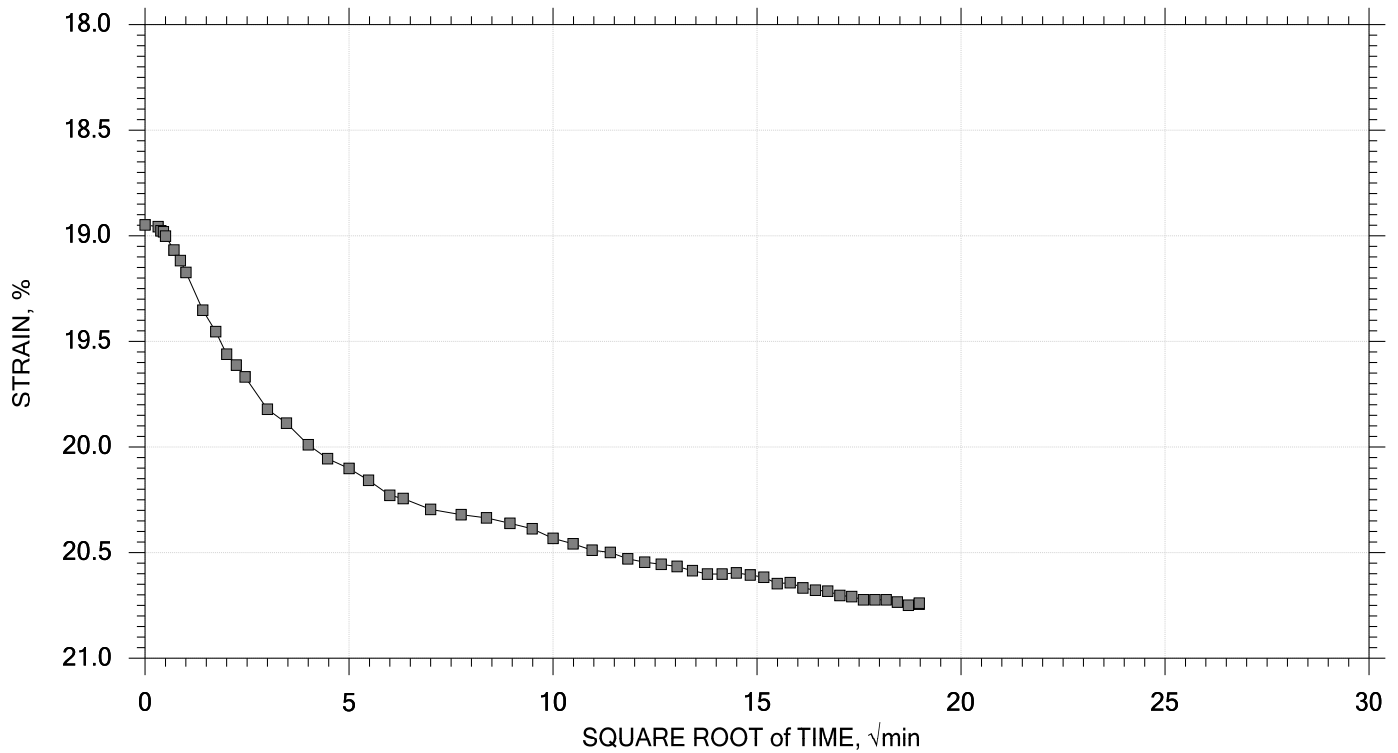
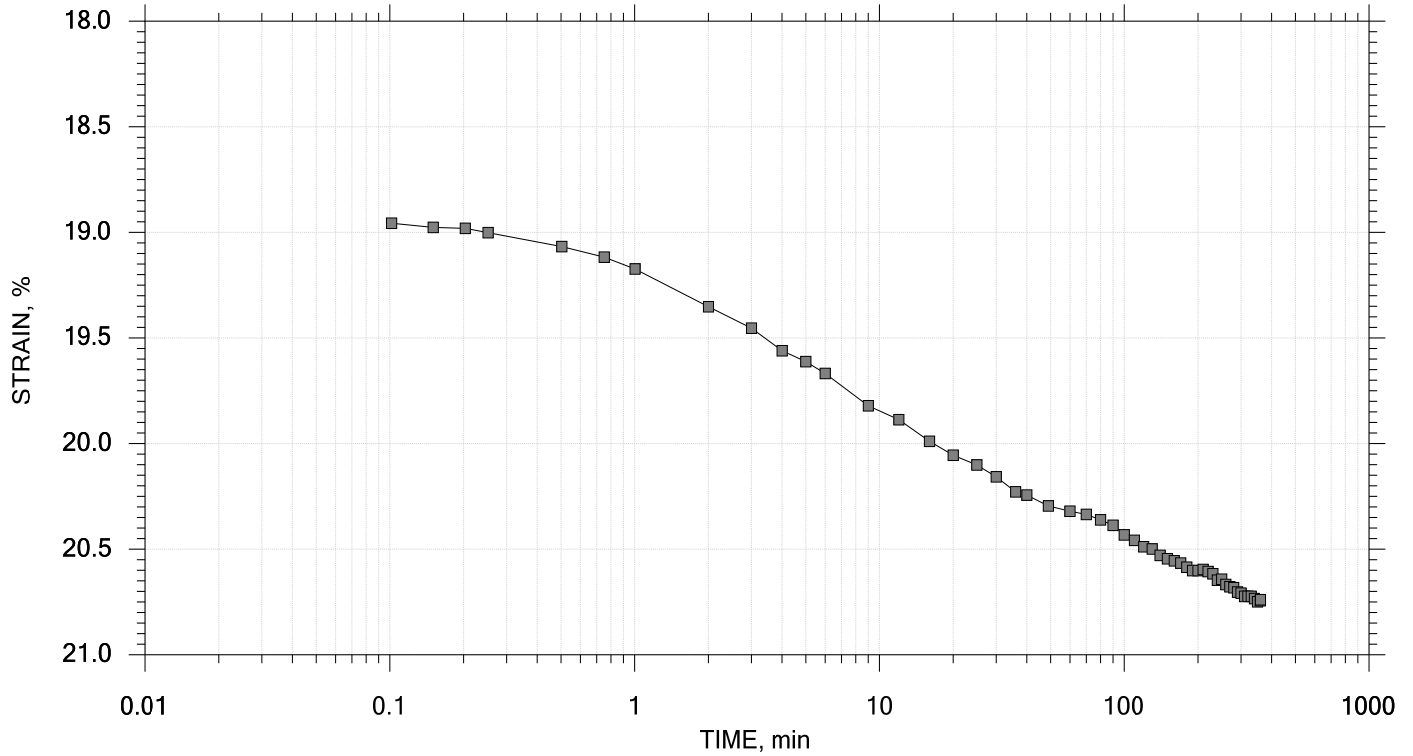
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 226 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 8000 psf



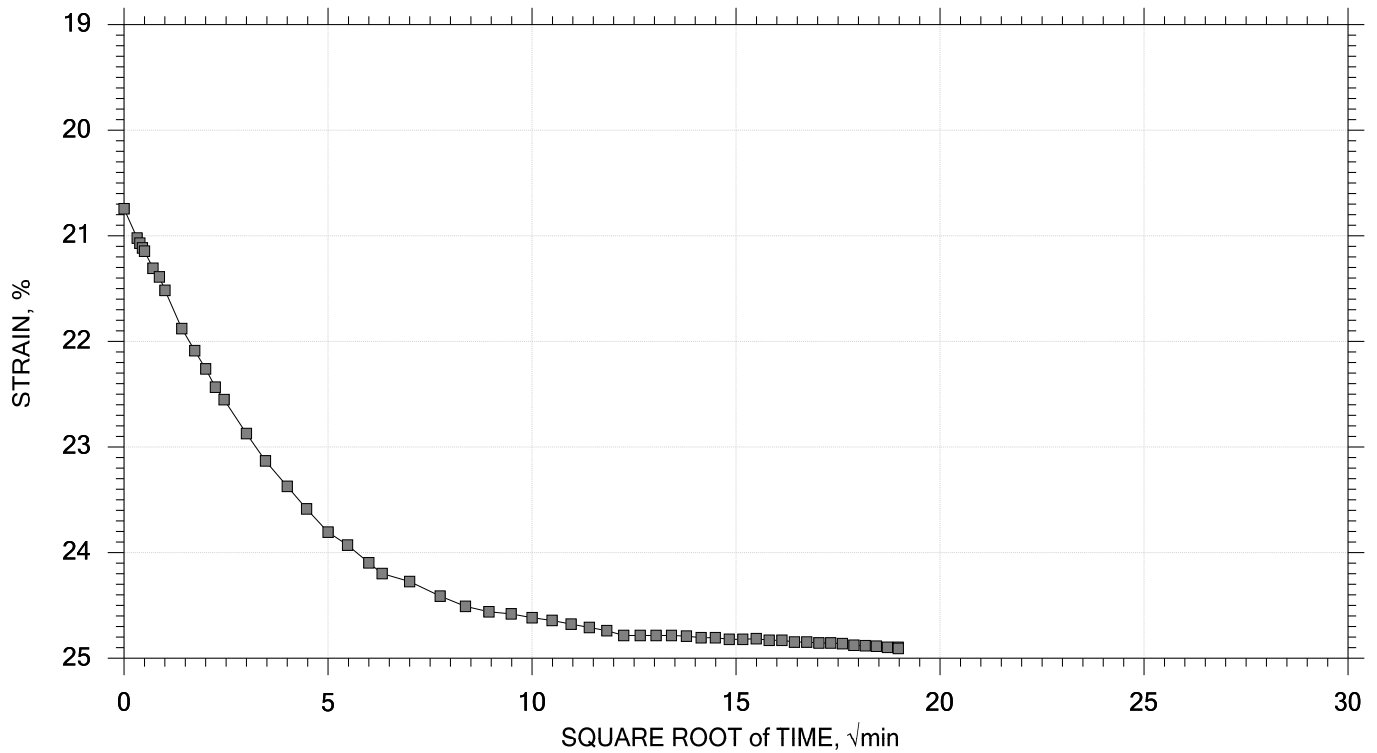
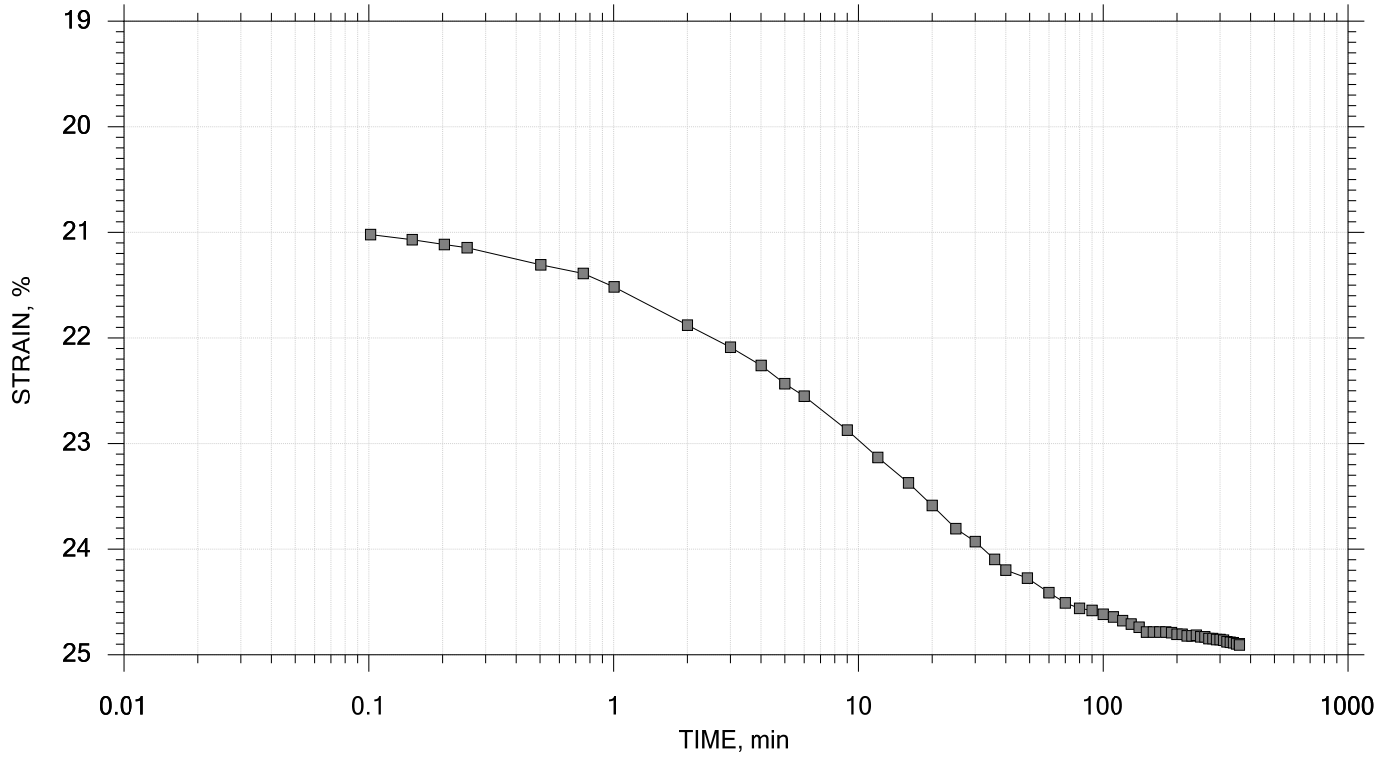
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 227 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

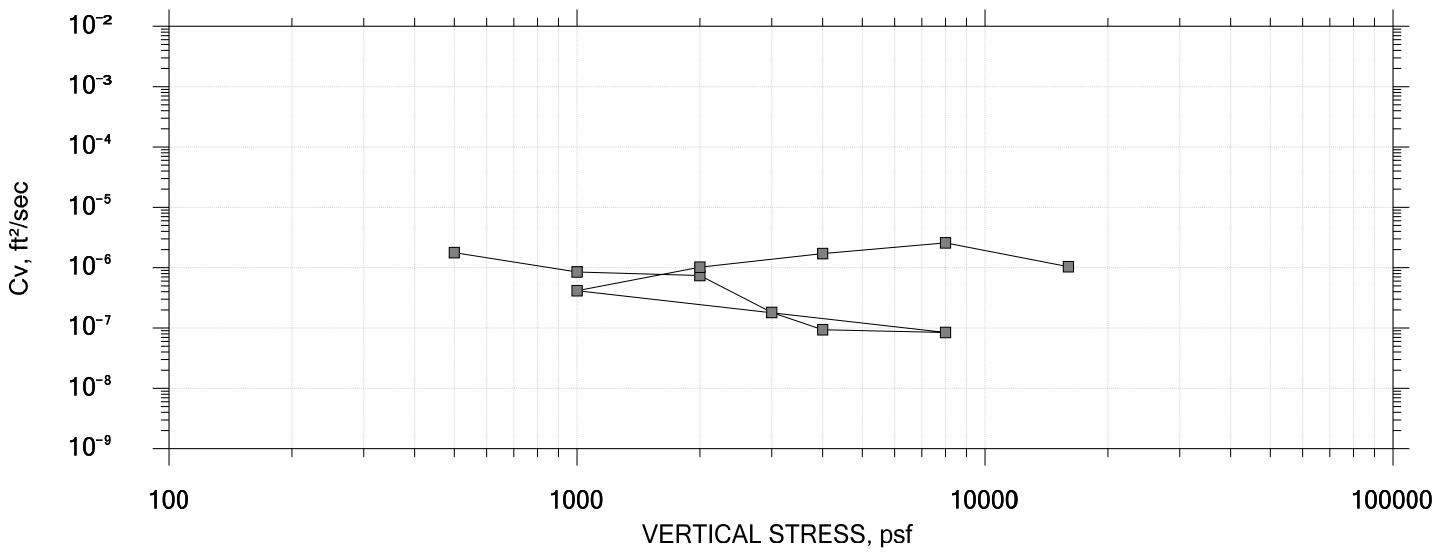
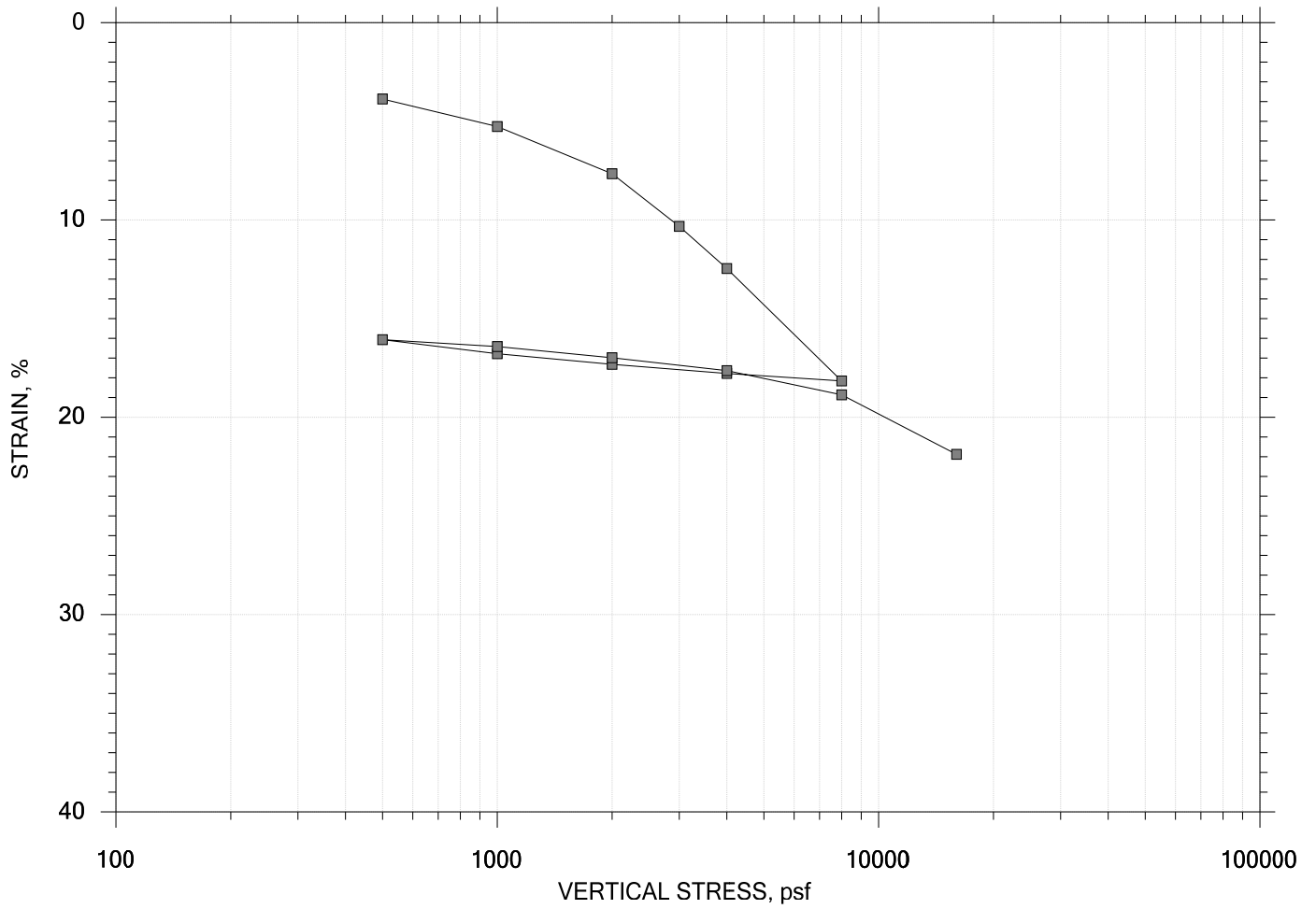
Stress: 16000 psf




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U2	Test Date: 08/01/18	Test No.: IP-5
	Depth: 45-47 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System T		
	Page 228 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

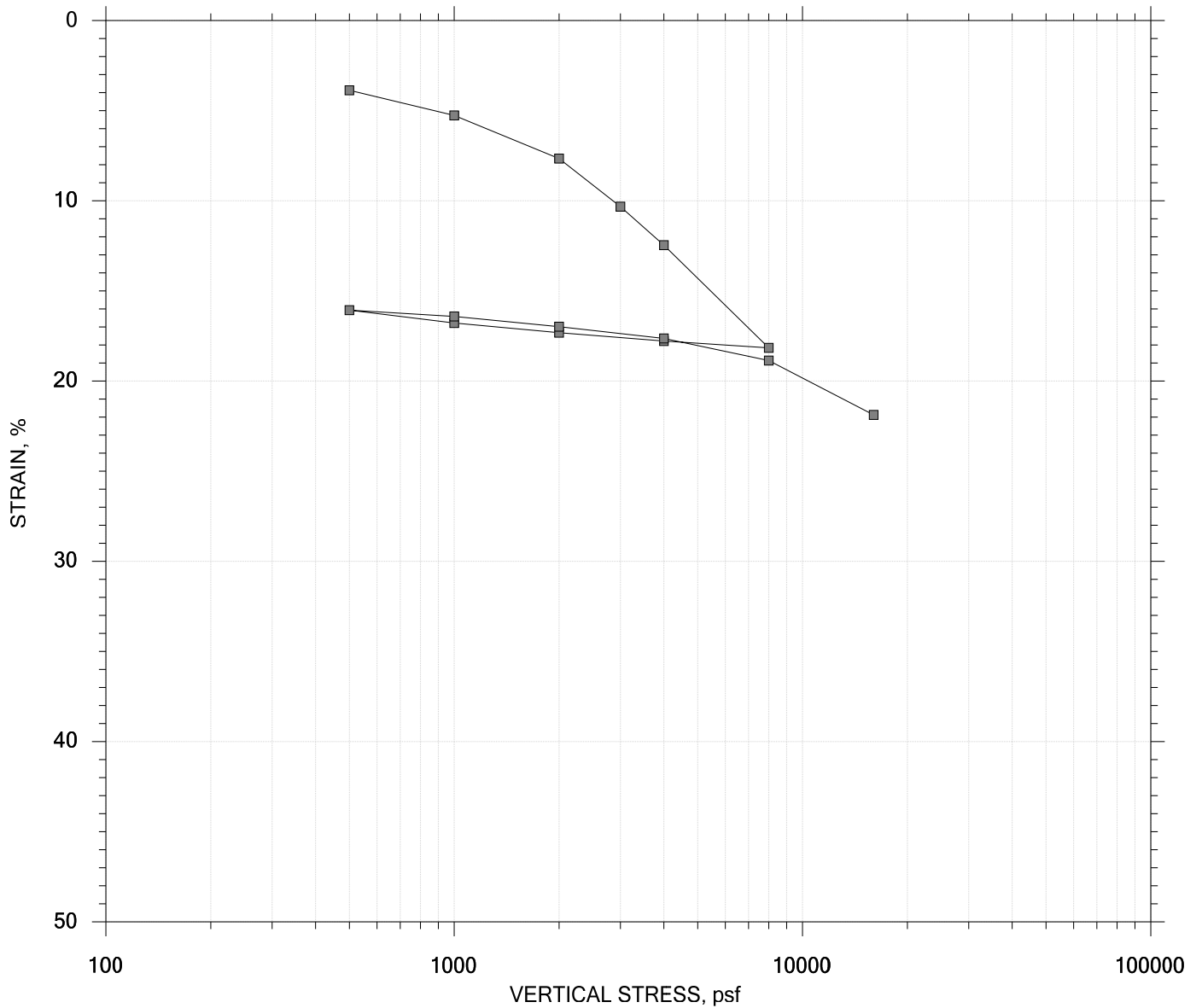
## SUMMARY REPORT




	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Displacement at End of Increment		
	Page 229 of 301		

# One-Dimensional Consolidation by ASTM D2435 - Method B

## SUMMARY REPORT



				Before Test	After Test
Current Vertical Effective Stress: ---				43.72	27.72
Preconsolidation Stress: ---				78.008	97.51
Compression Ratio: ---				99.98	100.00
Diameter: 2.5 in		Height: 1 in		1.20	0.76
LL: 31	PL: 19	PI: 12	GS: 2.75		

	Project: MeTPK Exit 45 Reconfiguration		Location: Phs 2 South Portland, ME		Project No.: GTX-307957	
	Boring No.: HB-EXIT 45-211		Tested By: md		Checked By: njh	
	Sample No.: U3		Test Date: 08/01/18		Test No.: IP-6	
	Depth: 55-57 ft		Sample Type: intact		Elevation: ---	
	Description: Wet, dark gray clay					
	Remarks: System O					
	Displacement at End of Increment				Page 230 of 301	

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-211  
 Sample No.: U3  
 Test No.: IP-6

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 08/01/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 55-57 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System 0

Estimated Specific Gravity: 2.75  
 Initial Void Ratio: 1.20  
 Final Void Ratio: 0.764

Liquid Limit: 31  
 Plastic Limit: 19  
 Plasticity Index: 12

Specimen Diameter: 2.50 in  
 Initial Height: 1.00 in  
 Final Height: 0.80 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-1354	RING		A-1464
Wt. Container + Wet Soil, gm	112.55	254.64	238.56	137.64
Wt. Container + Dry Soil, gm	81.120	210.70	210.70	109.63
Wt. Container, gm	8.4700	110.18	110.18	8.5900
Wt. Dry Soil, gm	72.650	100.52	100.52	101.04
Water Content, %	43.26	43.72	27.72	27.72
Void Ratio	---	1.20	0.764	---
Degree of Saturation, %	---	99.98	100.00	---
Dry Unit Weight, pcf	---	78.008	97.510	---

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.

Project: MeTPK Exit 45 Reconfiguration  
 Boring No.: HB-EXIT 45-211  
 Sample No.: U3  
 Test No.: IP-6

Location: Phs 2 South Portland, ME  
 Tested By: md  
 Test Date: 08/01/18  
 Sample Type: intact

Project No.: GTX-307957  
 Checked By: njh  
 Depth: 55-57 ft  
 Elevation: ---

Soil Description: Wet, dark gray clay  
 Remarks: System O

Displacement at End of Increment

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day
1	500.	0.03865	1.12	3.87	14.162	1.67e-006	7.73e-005	6.95e-004
2	1.00e+003	0.05261	1.09	5.26	22.567	9.90e-007	2.79e-005	1.49e-004
3	2.00e+003	0.07657	1.04	7.66	32.413	6.62e-007	2.40e-005	8.56e-005
4	3.00e+003	0.1032	0.977	10.3	145.674	1.40e-007	2.67e-005	2.01e-005
5	4.00e+003	0.1246	0.930	12.5	233.526	8.25e-008	2.13e-005	9.49e-006
6	8.00e+003	0.1815	0.804	18.2	1050.003	1.68e-008	1.42e-005	1.29e-006
7	4.00e+003	0.1778	0.813	17.8	2.687	6.15e-006	9.38e-007	3.11e-005
8	2.00e+003	0.1731	0.823	17.3	5.673	2.94e-006	2.33e-006	3.69e-005
9	1.00e+003	0.1678	0.835	16.8	24.902	6.78e-007	5.37e-006	1.96e-005
10	500.	0.1607	0.850	16.1	91.511	1.87e-007	1.42e-005	1.43e-005
11	1.00e+003	0.1642	0.843	16.4	60.001	2.87e-007	6.97e-006	1.08e-005
12	2.00e+003	0.1698	0.830	17.0	18.532	9.19e-007	5.67e-006	2.81e-005
13	4.00e+003	0.1763	0.816	17.6	9.786	1.71e-006	3.24e-006	3.00e-005
14	8.00e+003	0.1886	0.789	18.9	9.008	1.82e-006	3.07e-006	3.02e-005
15	1.60e+004	0.2188	0.722	21.9	16.293	9.55e-007	3.77e-006	1.94e-005

	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft <sup>2</sup> /sec	Mv 1/psf	k ft/day	Ca %
1	500.	0.03865	1.12	3.87	0.000	0.00e+000	7.73e-005	0.00e+000	0.00e+000
2	1.00e+003	0.05261	1.09	5.26	6.645	7.81e-007	2.79e-005	1.18e-004	0.00e+000
3	2.00e+003	0.07657	1.04	7.66	6.454	7.73e-007	2.40e-005	9.99e-005	0.00e+000
4	3.00e+003	0.1032	0.977	10.3	0.000	0.00e+000	2.67e-005	0.00e+000	0.00e+000
5	4.00e+003	0.1246	0.930	12.5	0.000	0.00e+000	2.13e-005	0.00e+000	0.00e+000
6	8.00e+003	0.1815	0.804	18.2	0.000	0.00e+000	1.42e-005	0.00e+000	0.00e+000
7	4.00e+003	0.1778	0.813	17.8	0.000	0.00e+000	9.38e-007	0.00e+000	0.00e+000
8	2.00e+003	0.1731	0.823	17.3	0.000	0.00e+000	2.33e-006	0.00e+000	0.00e+000
9	1.00e+003	0.1678	0.835	16.8	0.000	0.00e+000	5.37e-006	0.00e+000	0.00e+000
10	500.	0.1607	0.850	16.1	0.000	0.00e+000	1.42e-005	0.00e+000	0.00e+000
11	1.00e+003	0.1642	0.843	16.4	0.000	0.00e+000	6.97e-006	0.00e+000	0.00e+000
12	2.00e+003	0.1698	0.830	17.0	0.000	0.00e+000	5.67e-006	0.00e+000	0.00e+000
13	4.00e+003	0.1763	0.816	17.6	0.000	0.00e+000	3.24e-006	0.00e+000	0.00e+000
14	8.00e+003	0.1886	0.789	18.9	1.378	2.77e-006	3.07e-006	4.59e-005	0.00e+000
15	1.60e+004	0.2188	0.722	21.9	3.646	9.91e-007	3.77e-006	2.02e-005	0.00e+000

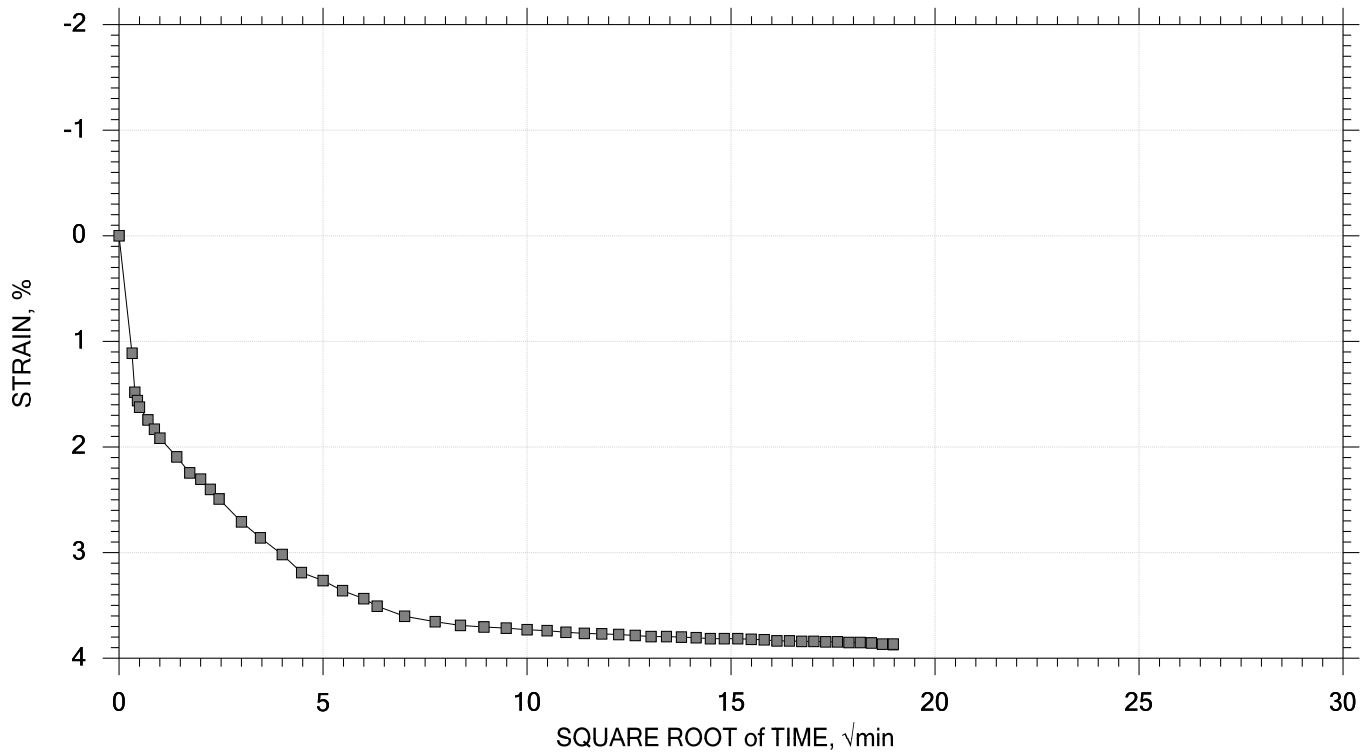
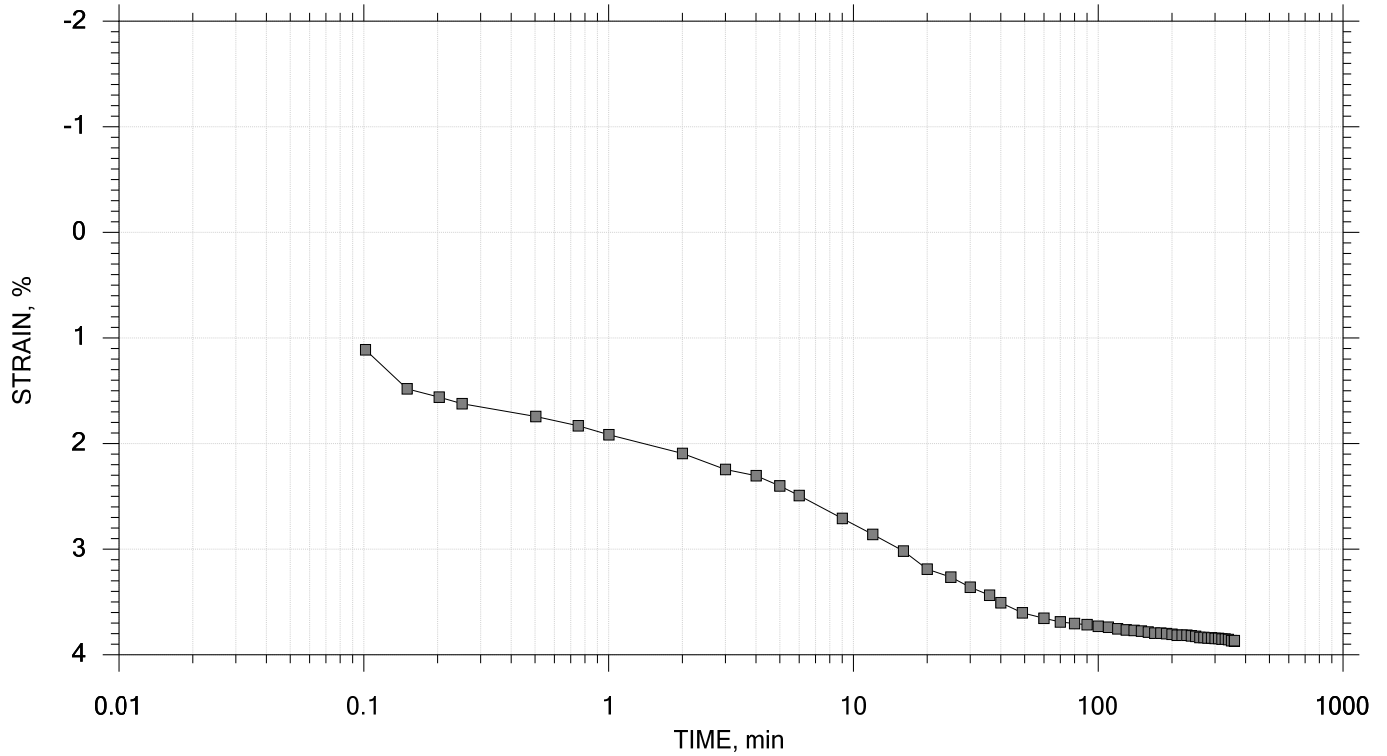



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 15

Stress: 500 psf



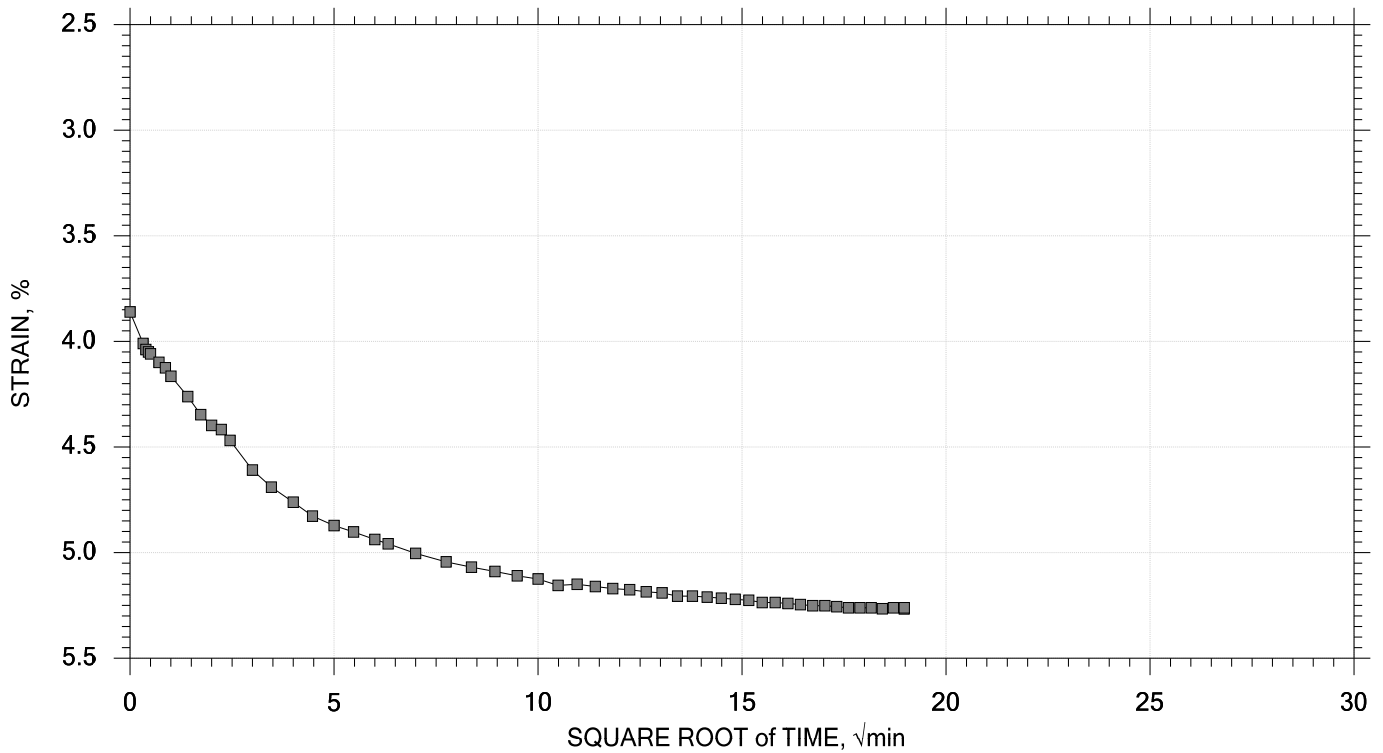
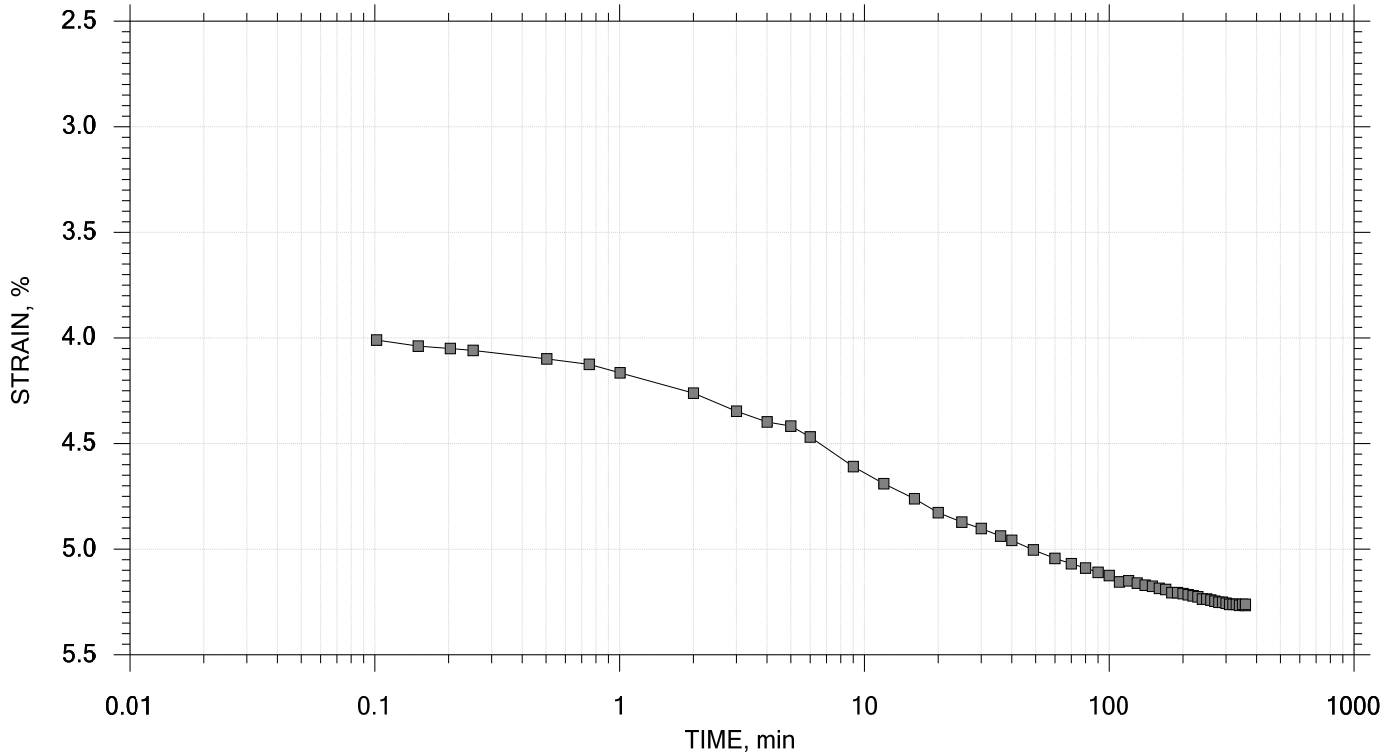
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
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# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 15

Stress: 1000 psf



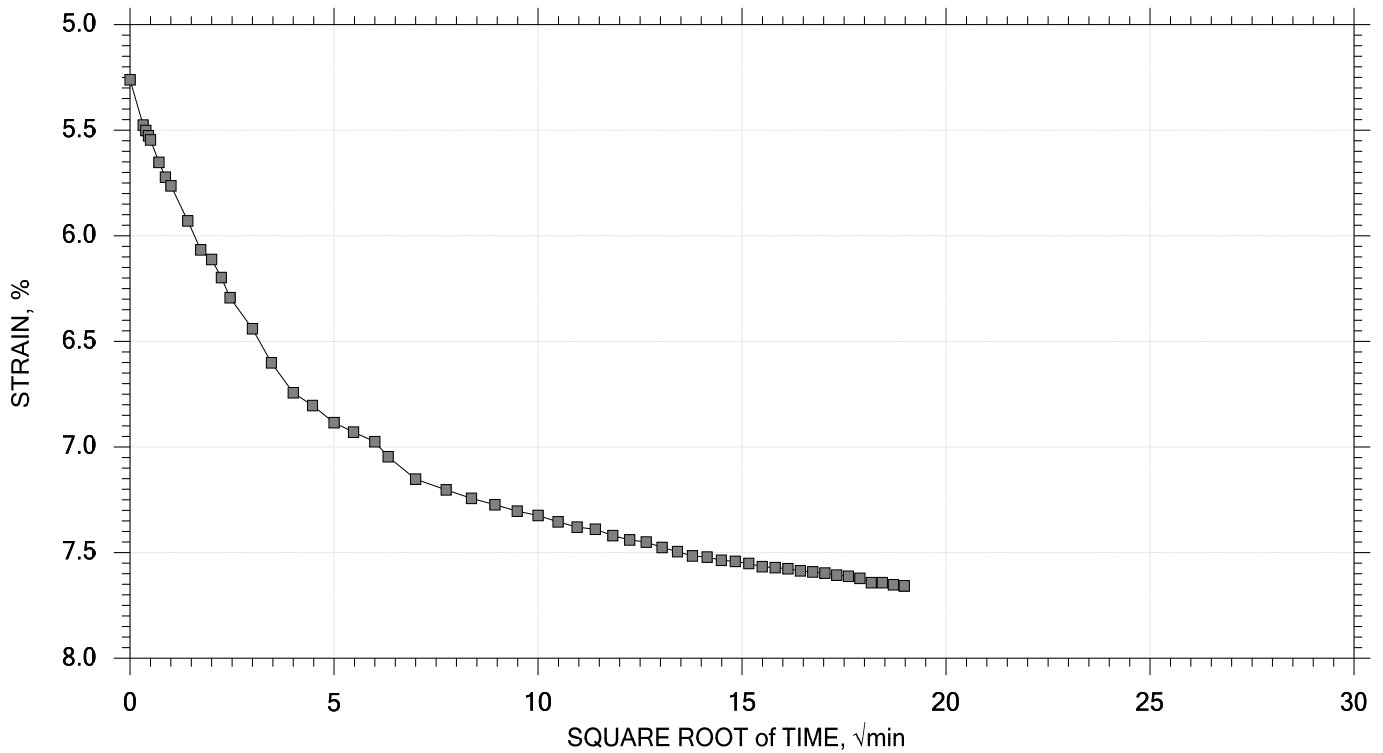
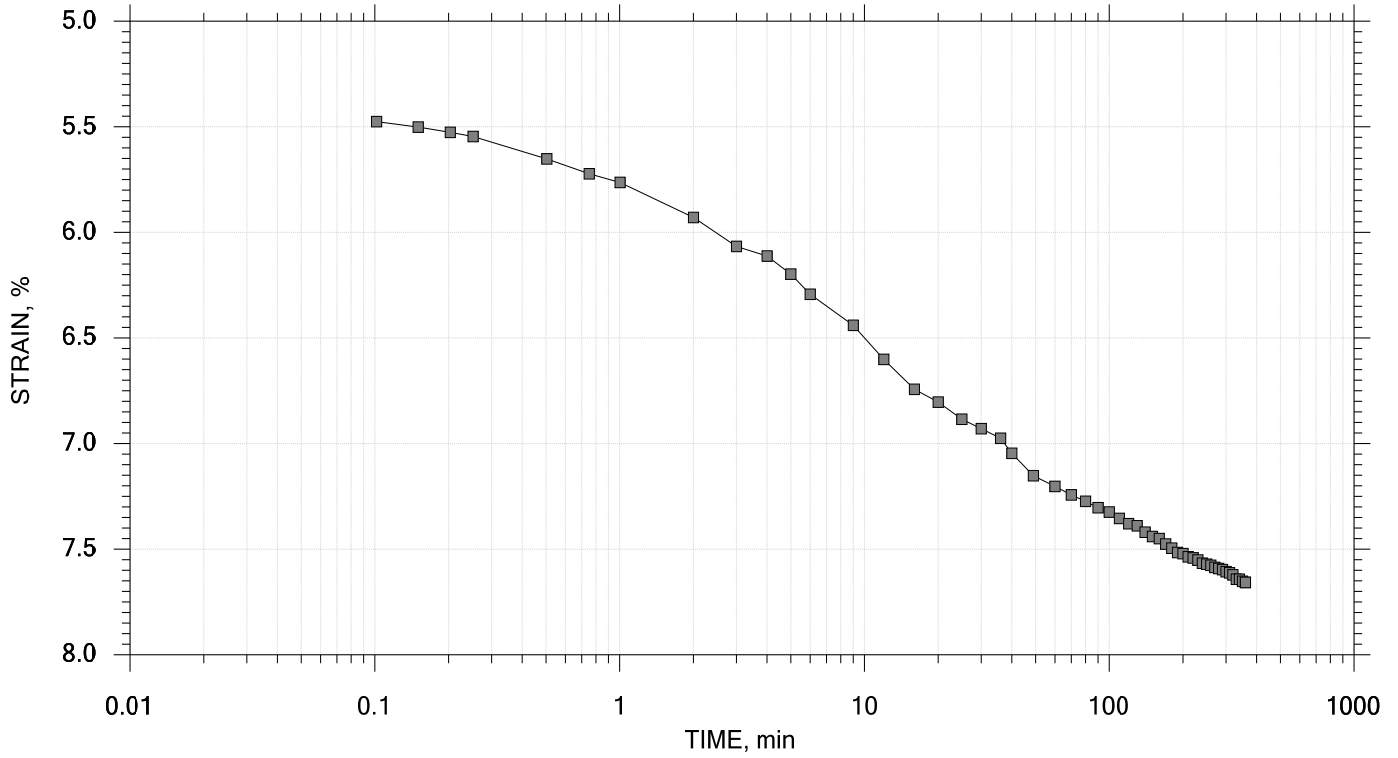
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 234 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 15

Stress: 2000 psf



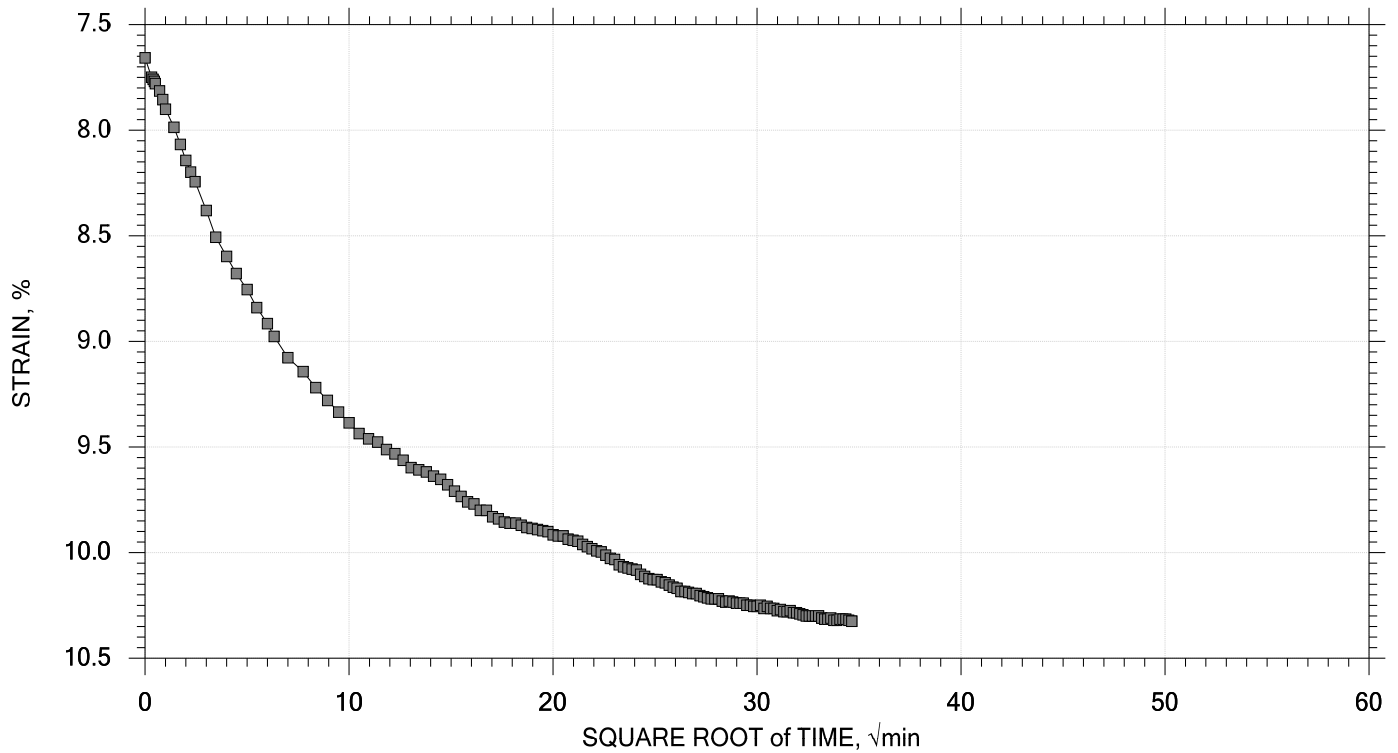
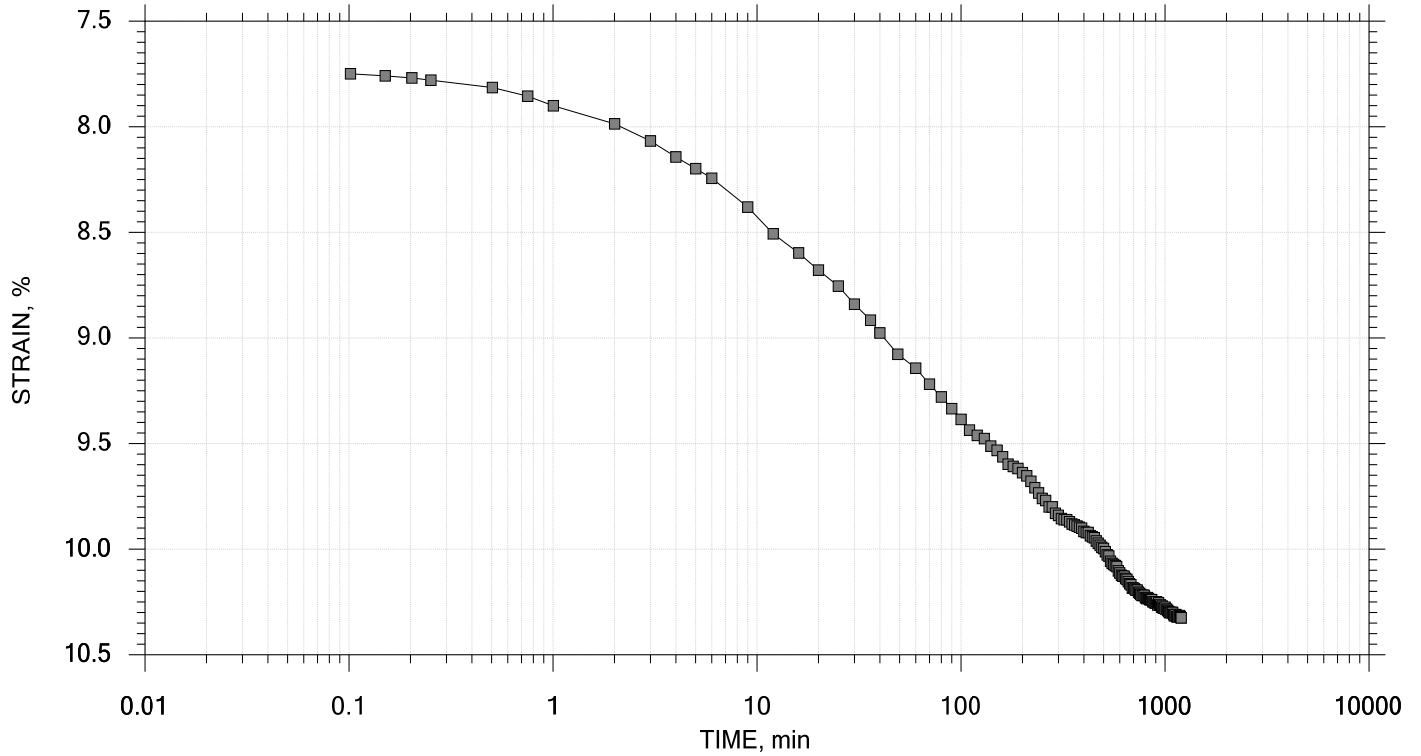
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 235 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 15

Stress: 3000 psf



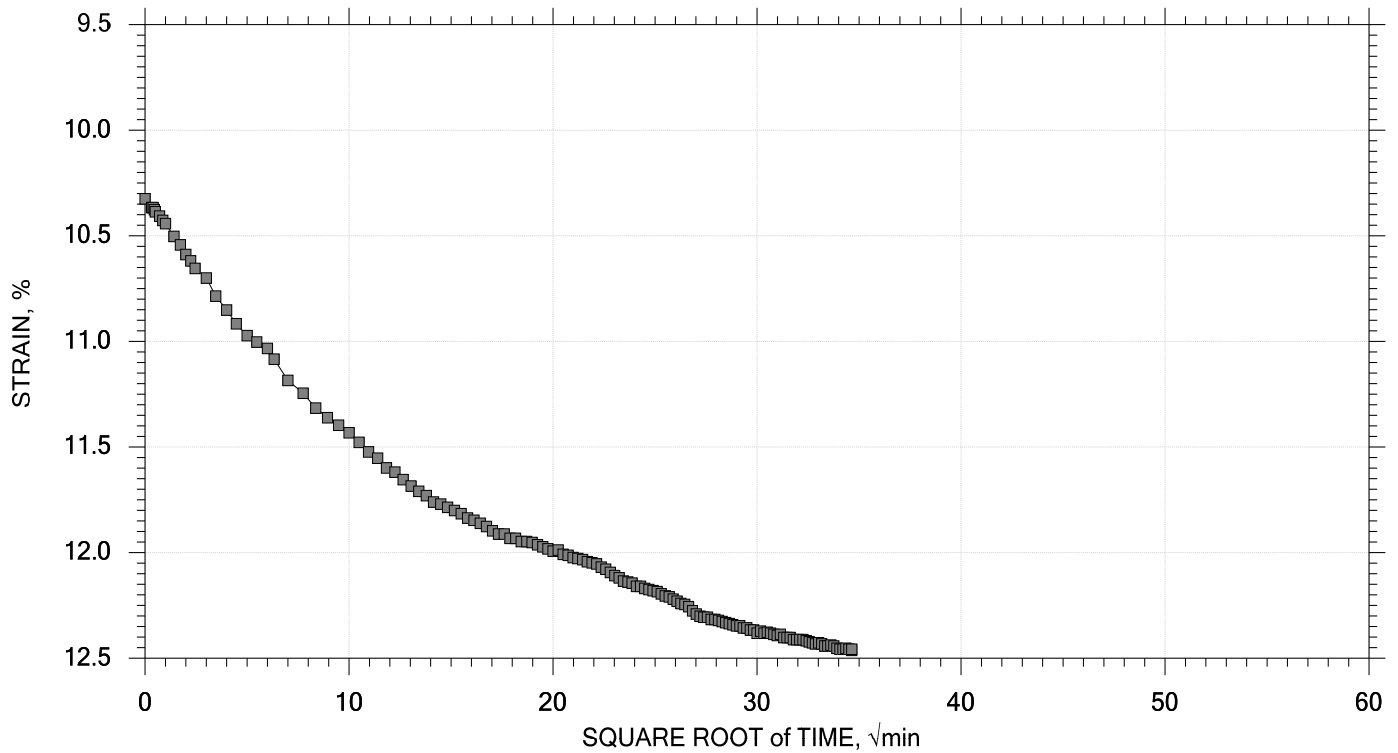
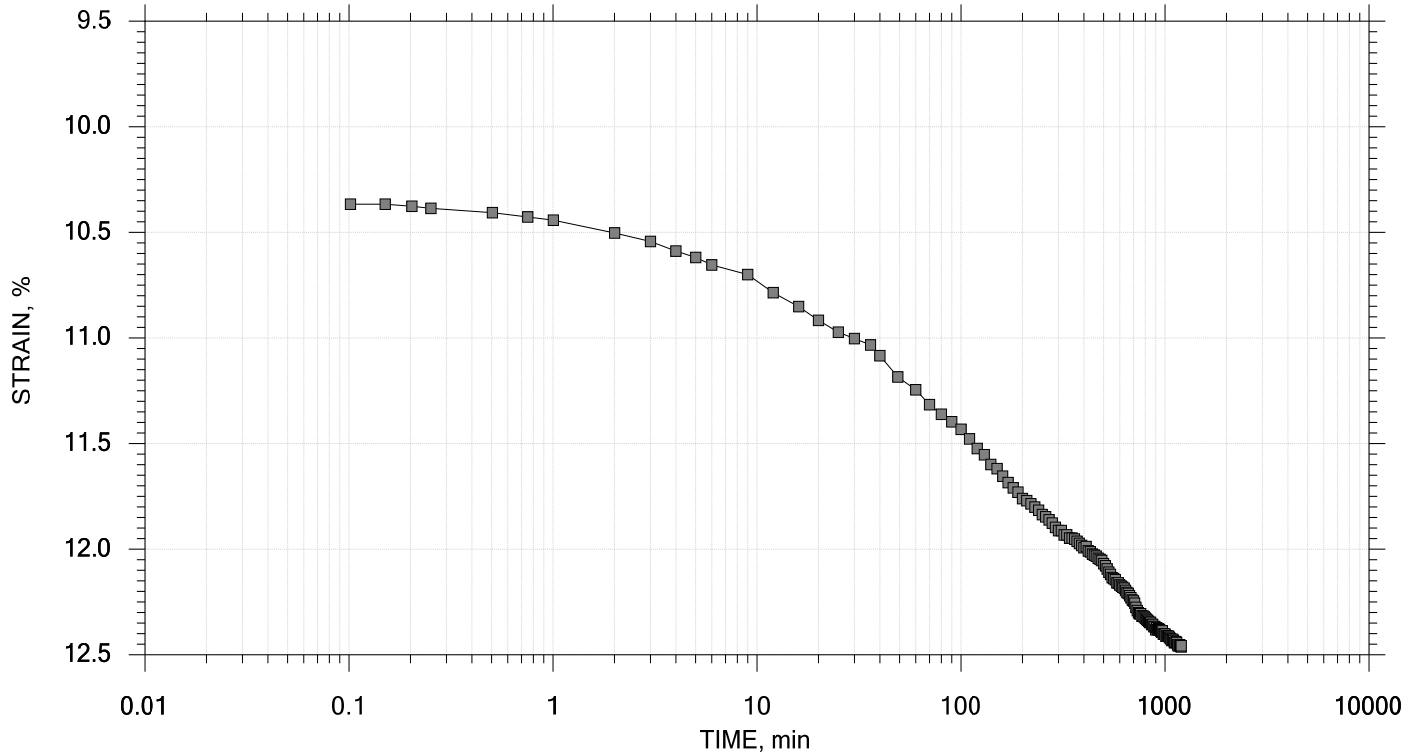
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 236 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 15

Stress: 4000 psf



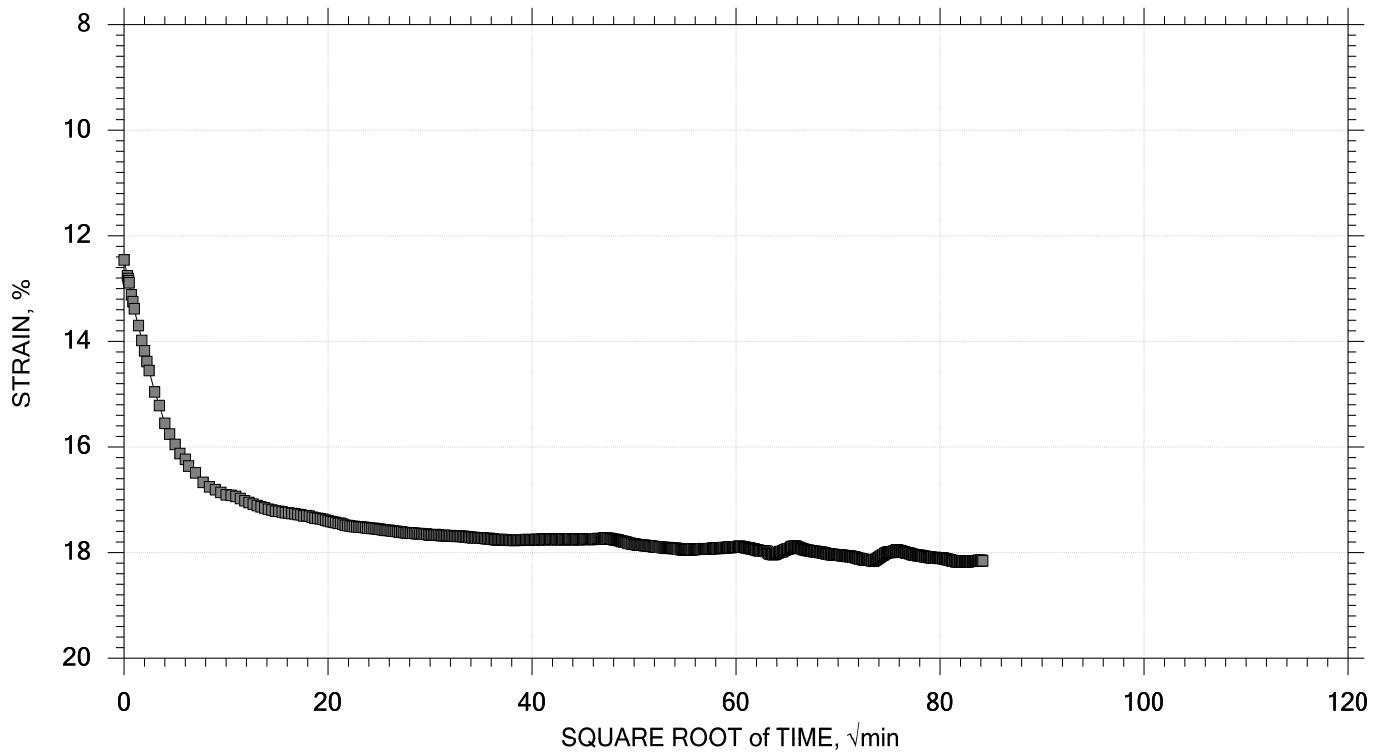
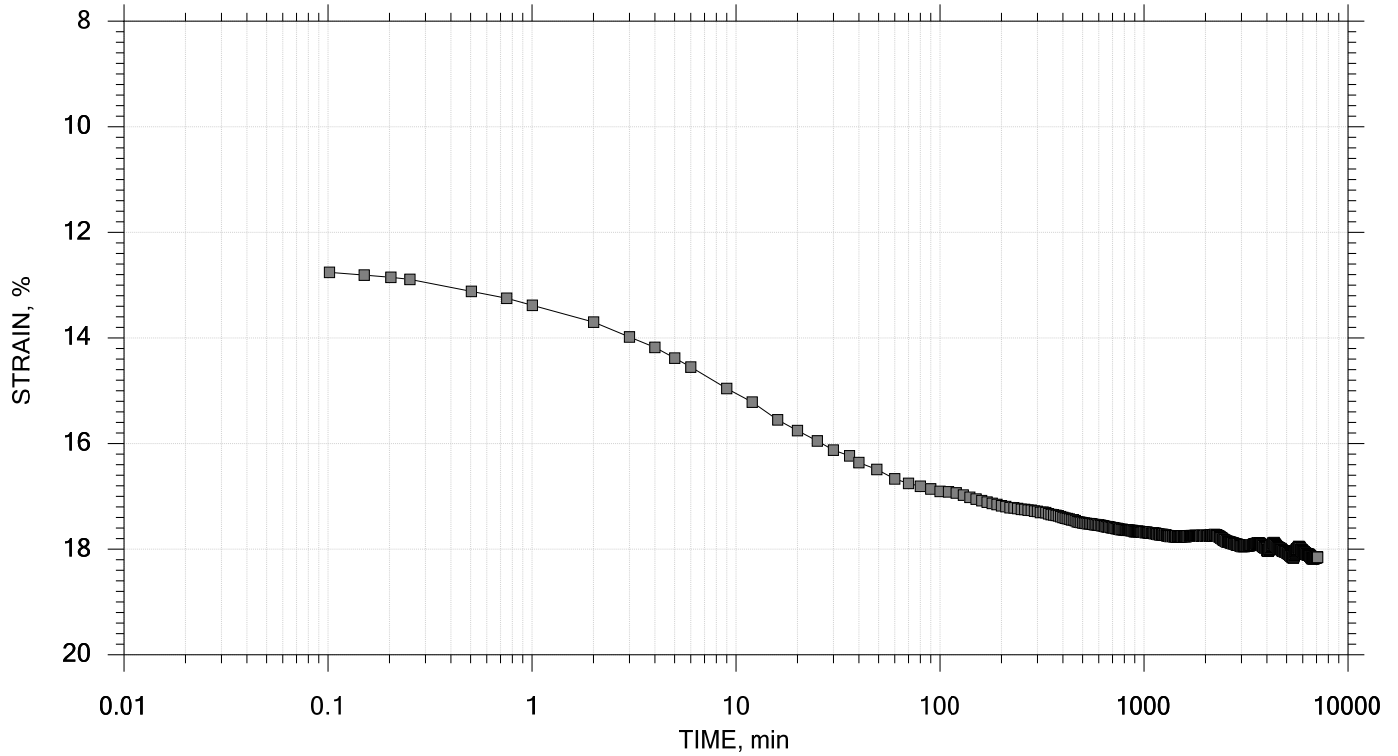
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 237 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 15

Stress: 8000 psf



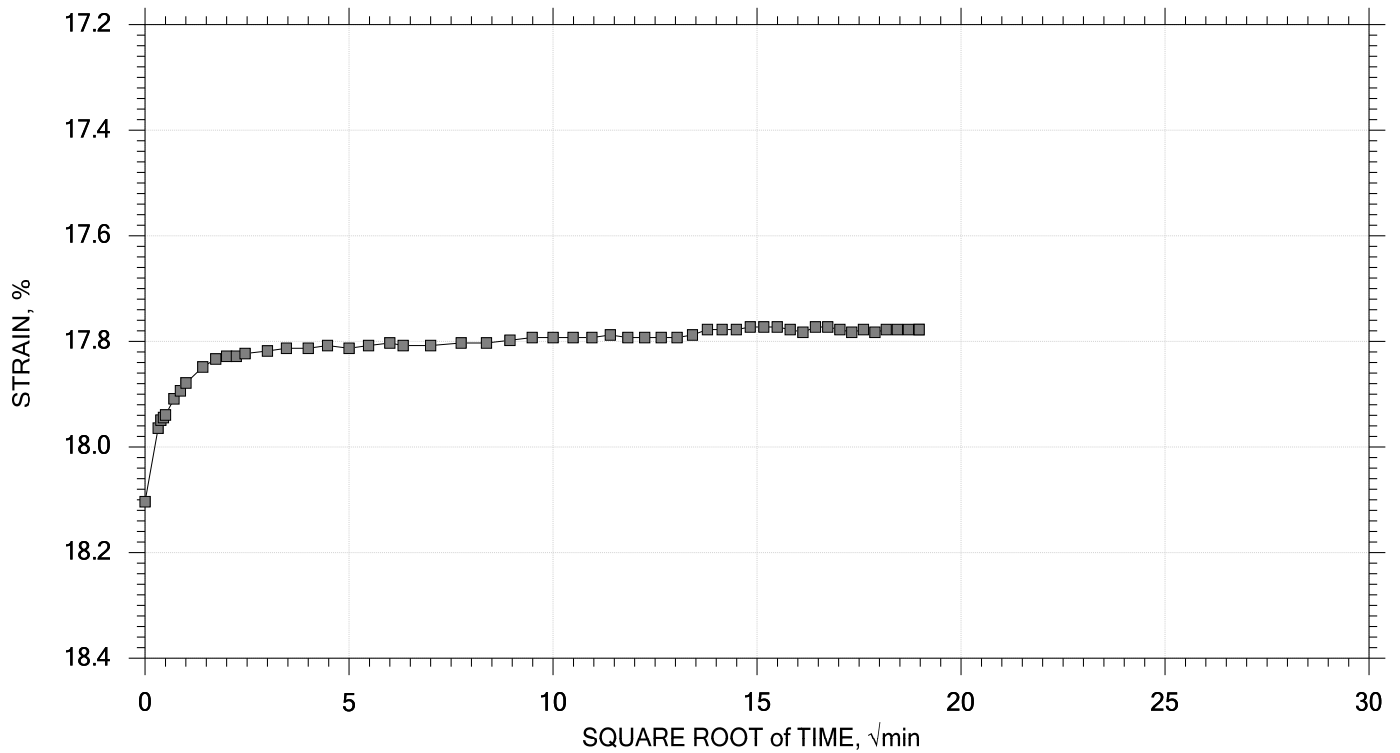
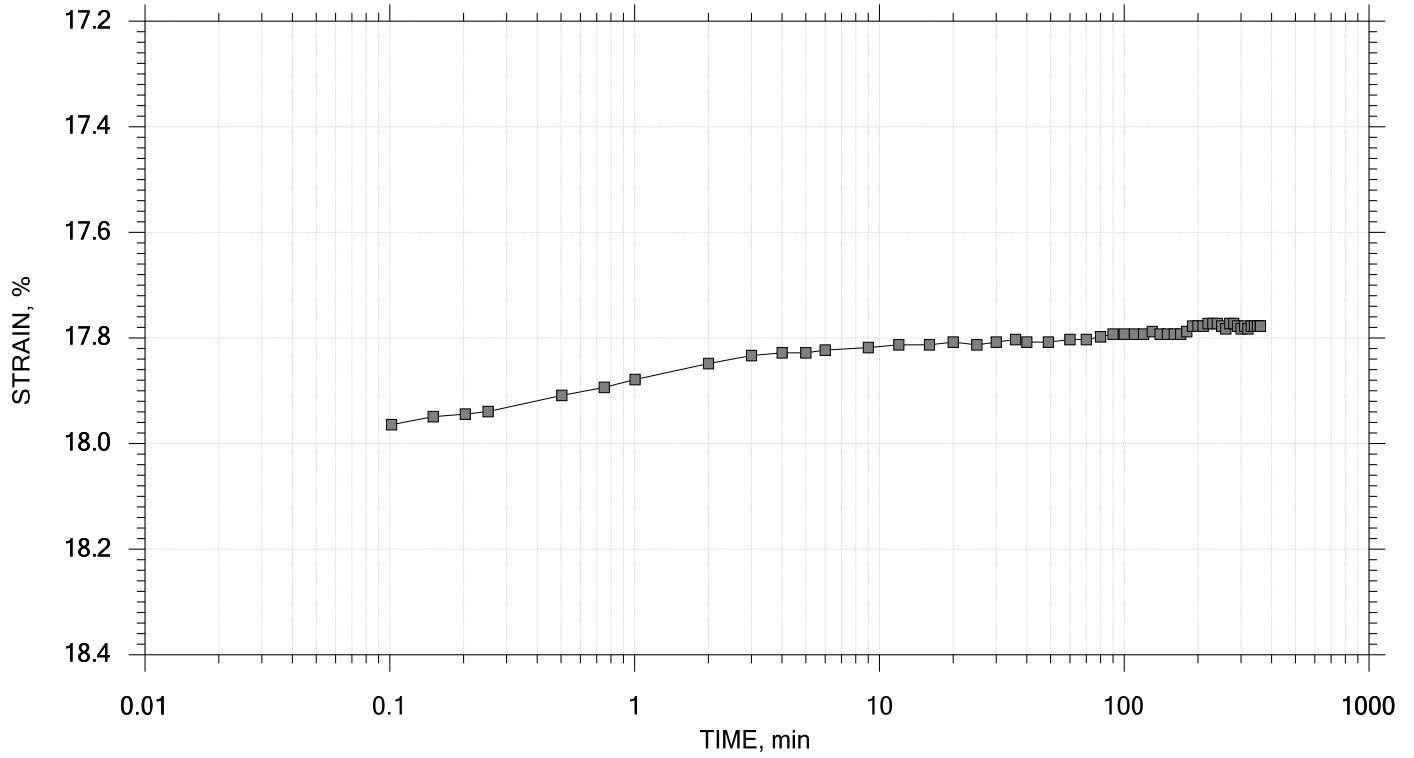
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 238 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 15

Stress: 4000 psf



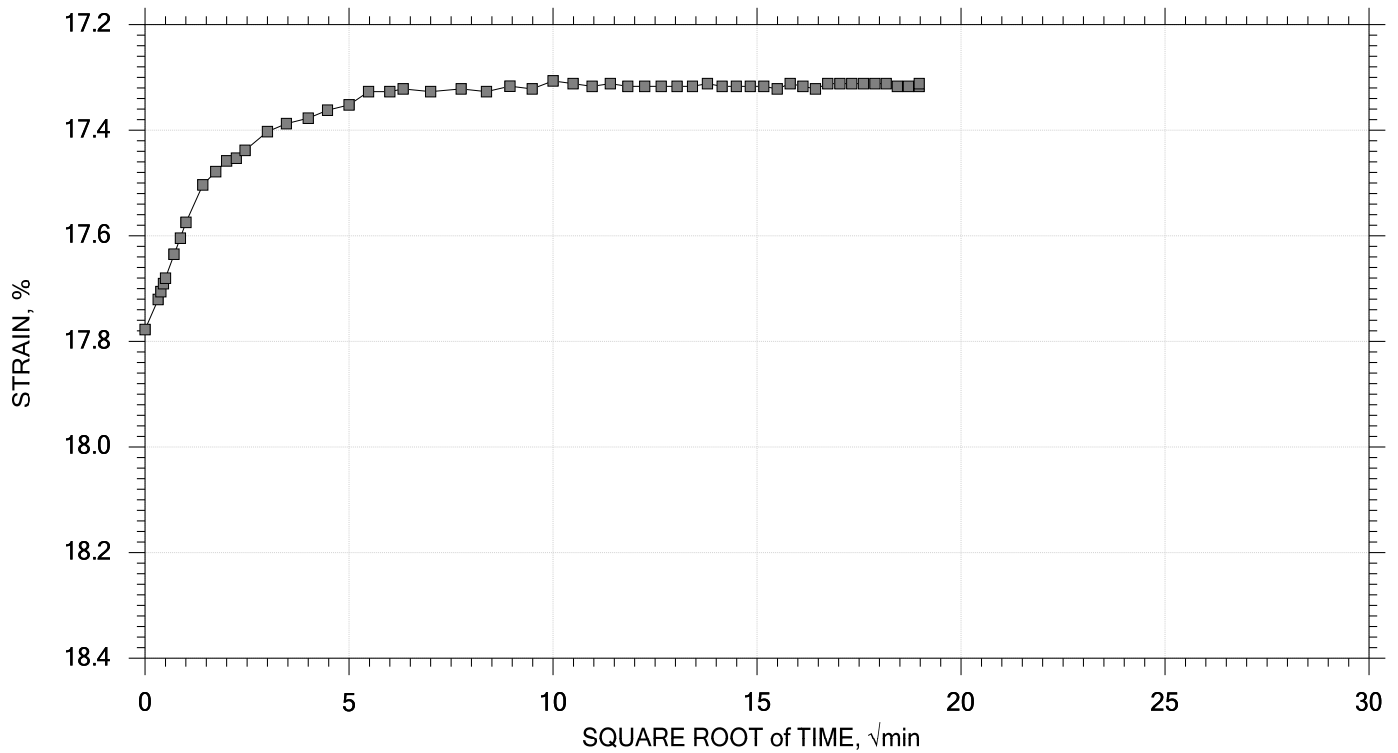
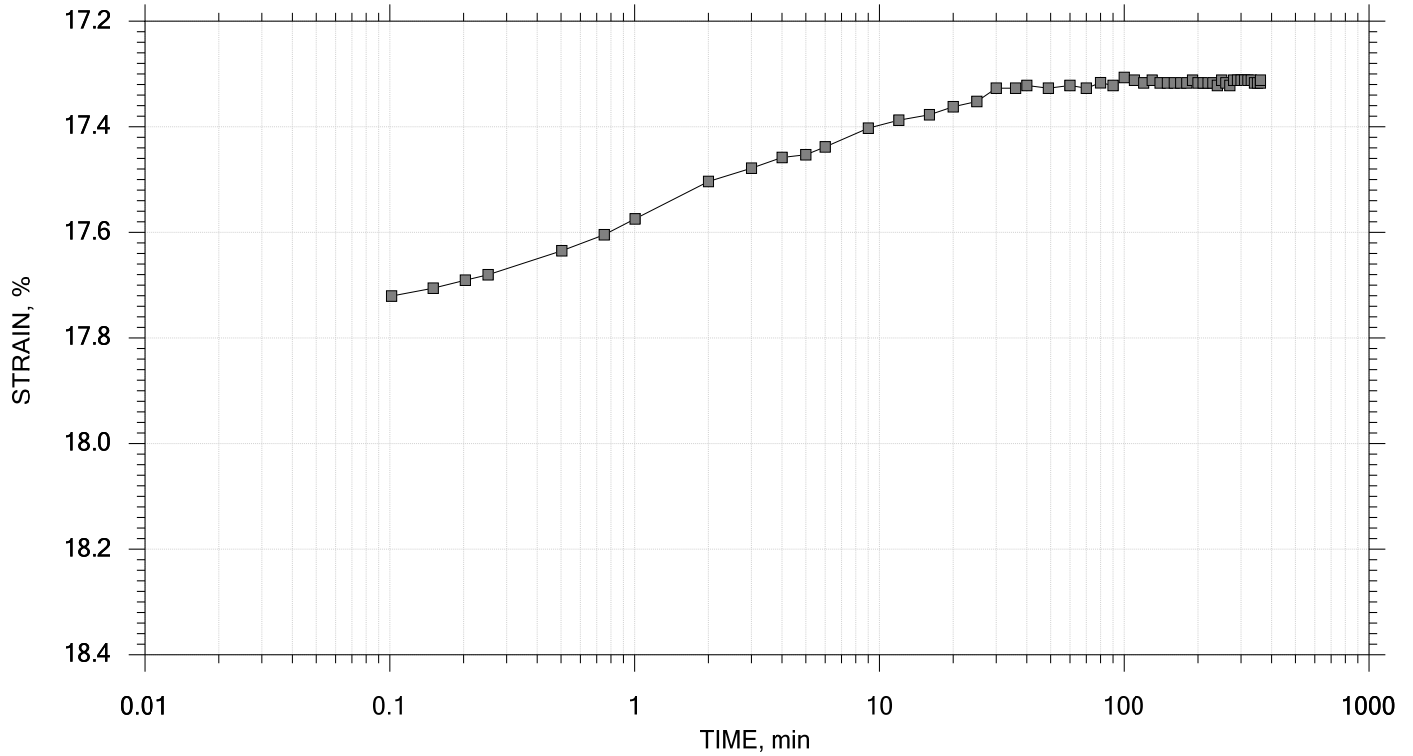
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 239 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 15

Stress: 2000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 240 of 301		

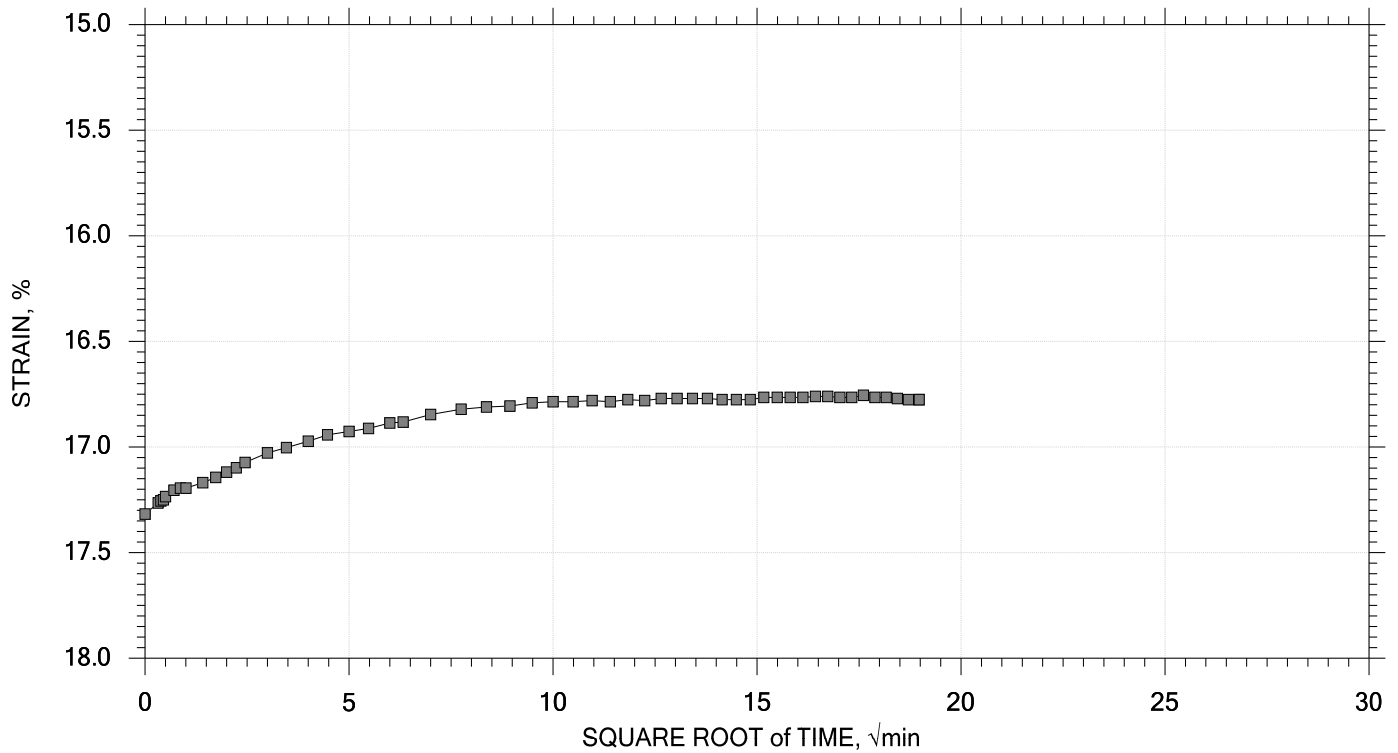
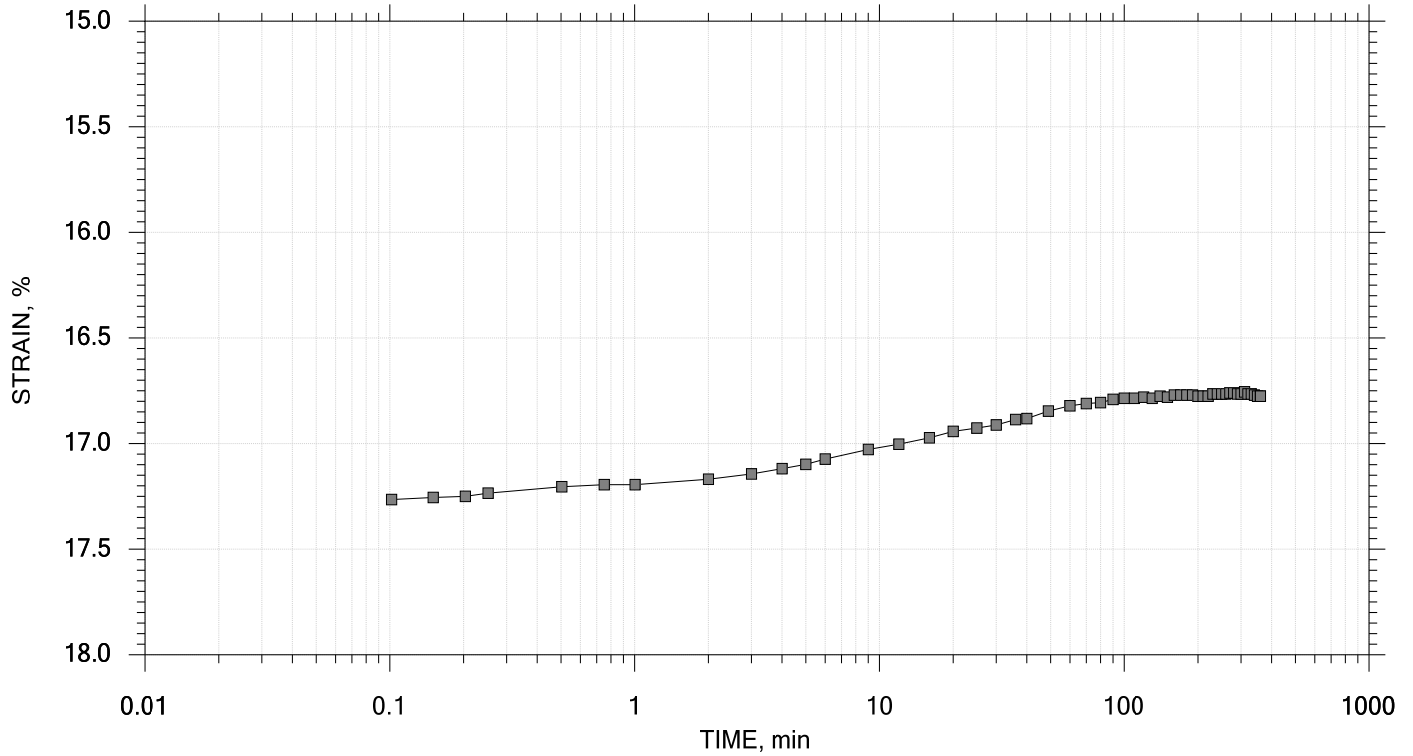



# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 15

Stress: 1000 psf



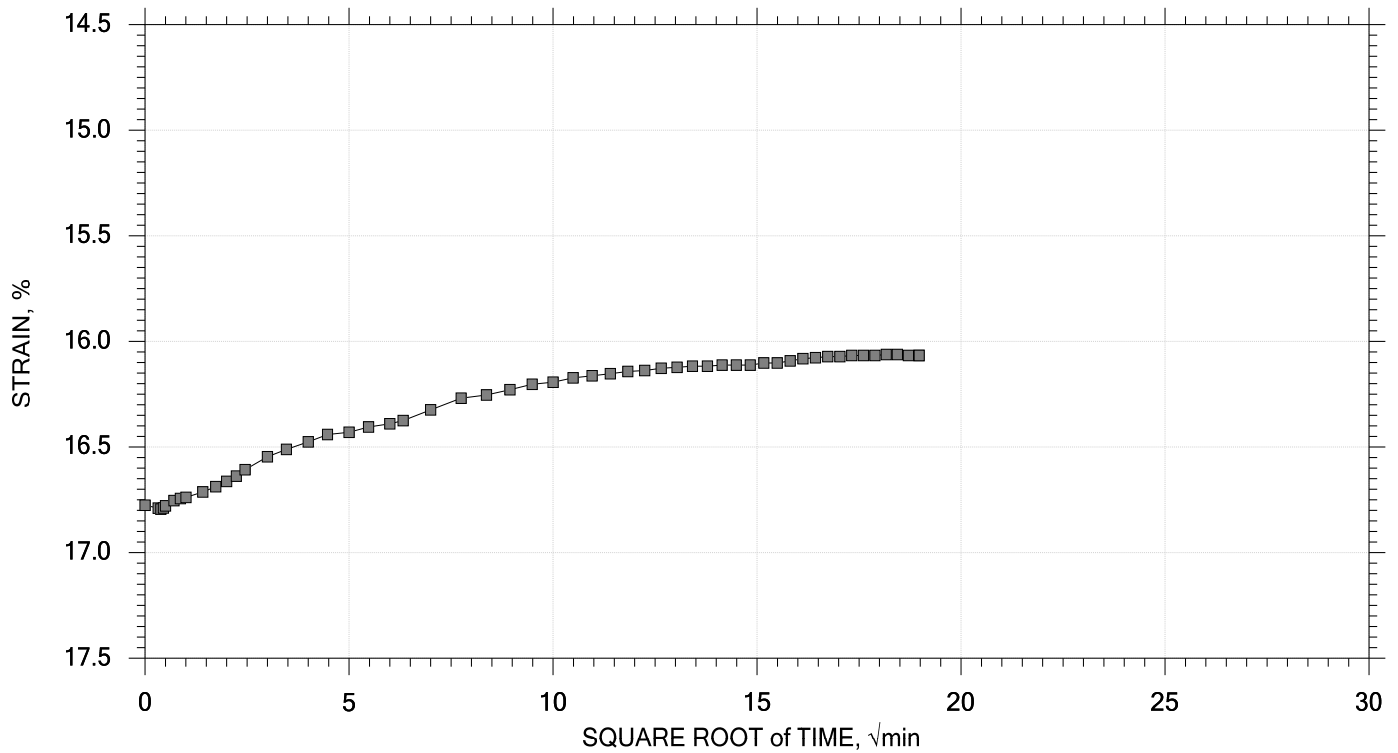
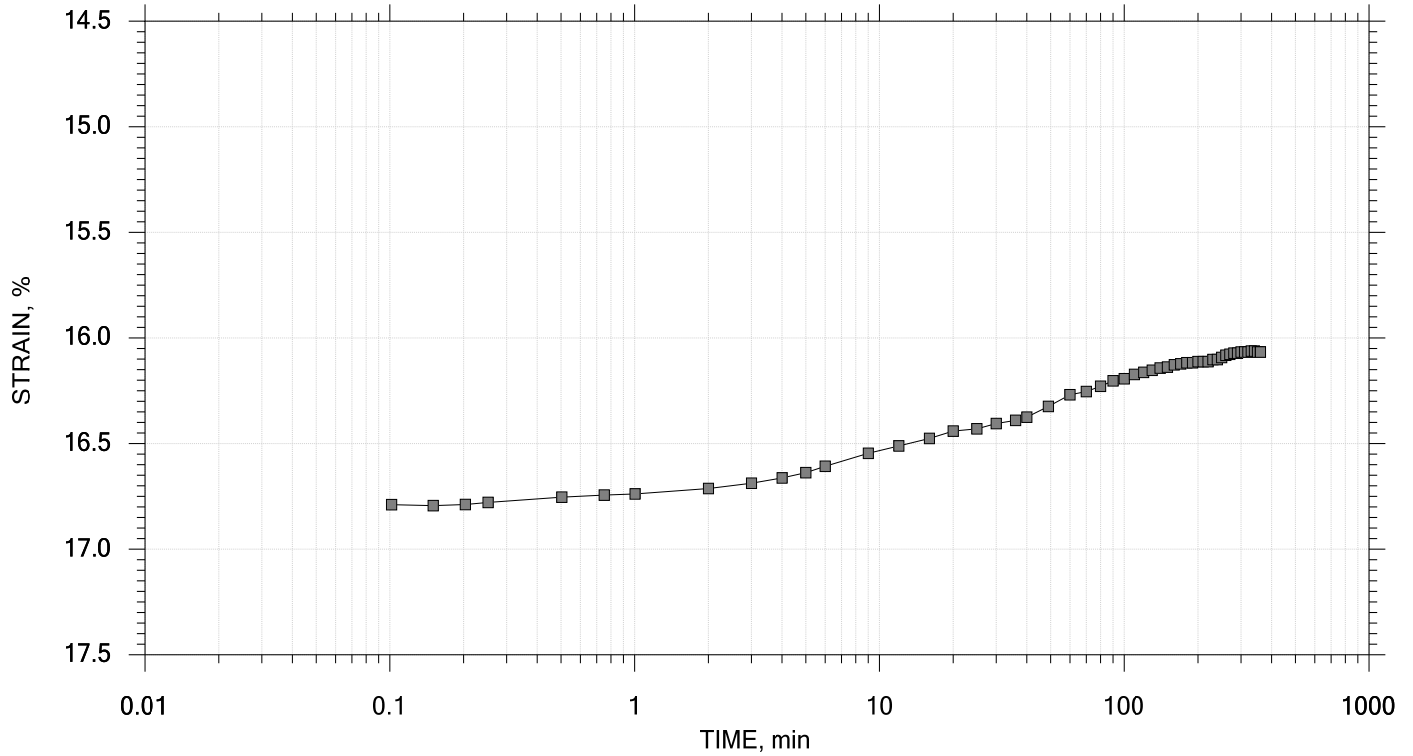
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 241 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 15

Stress: 500 psf



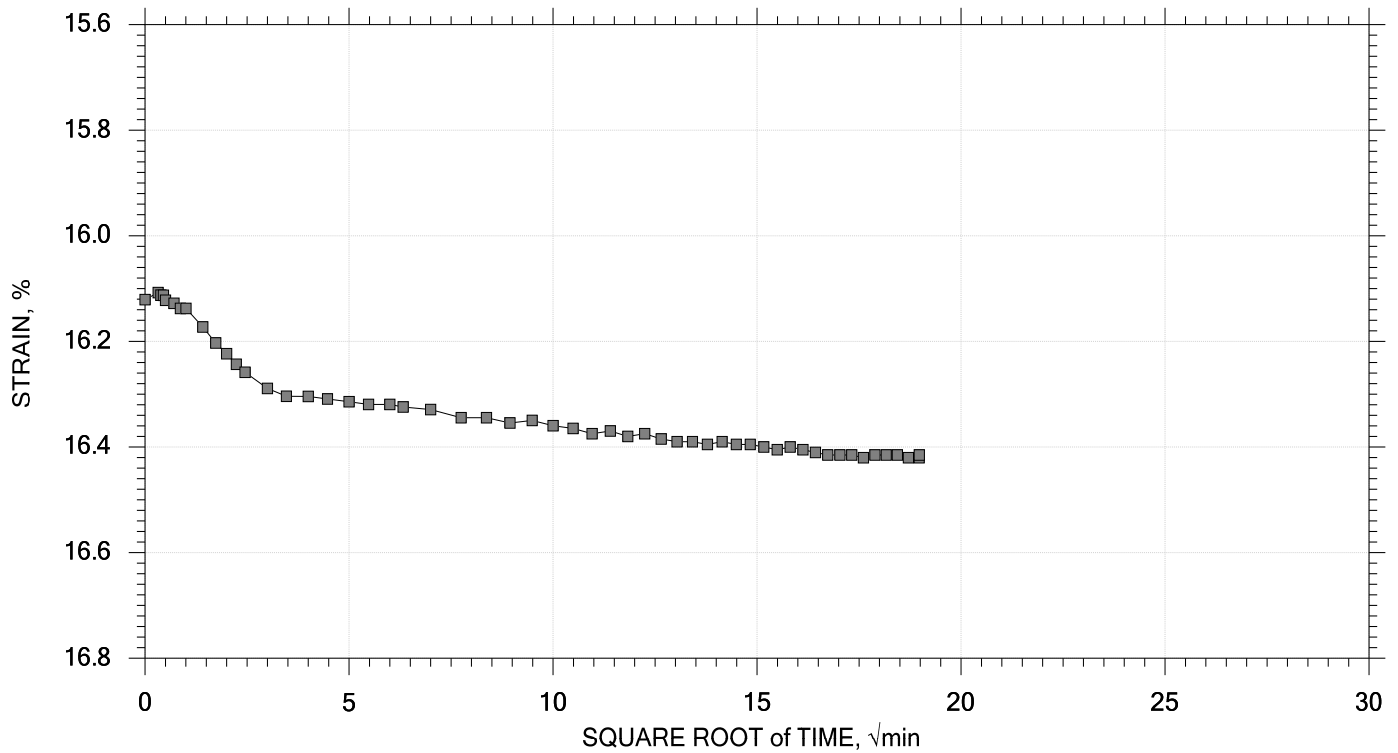
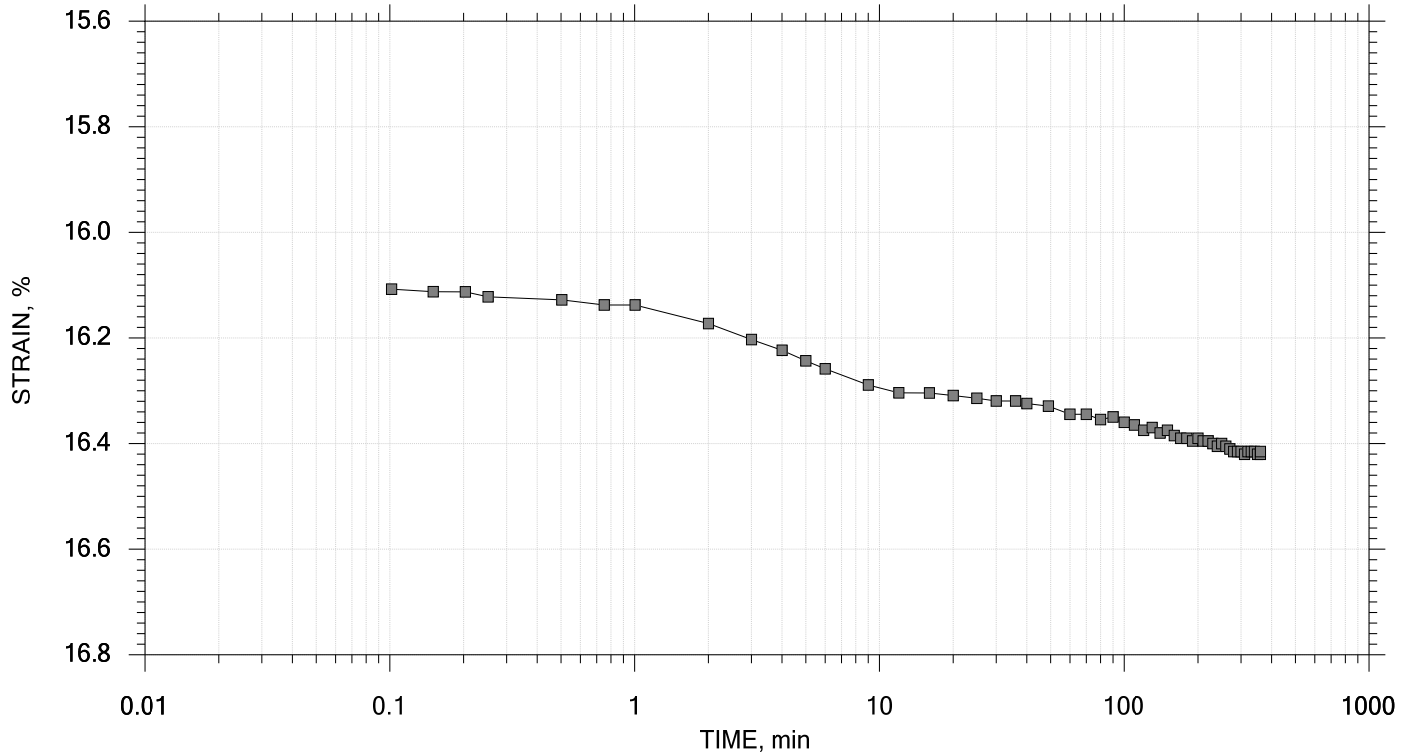
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 242 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 15

Stress: 1000 psf



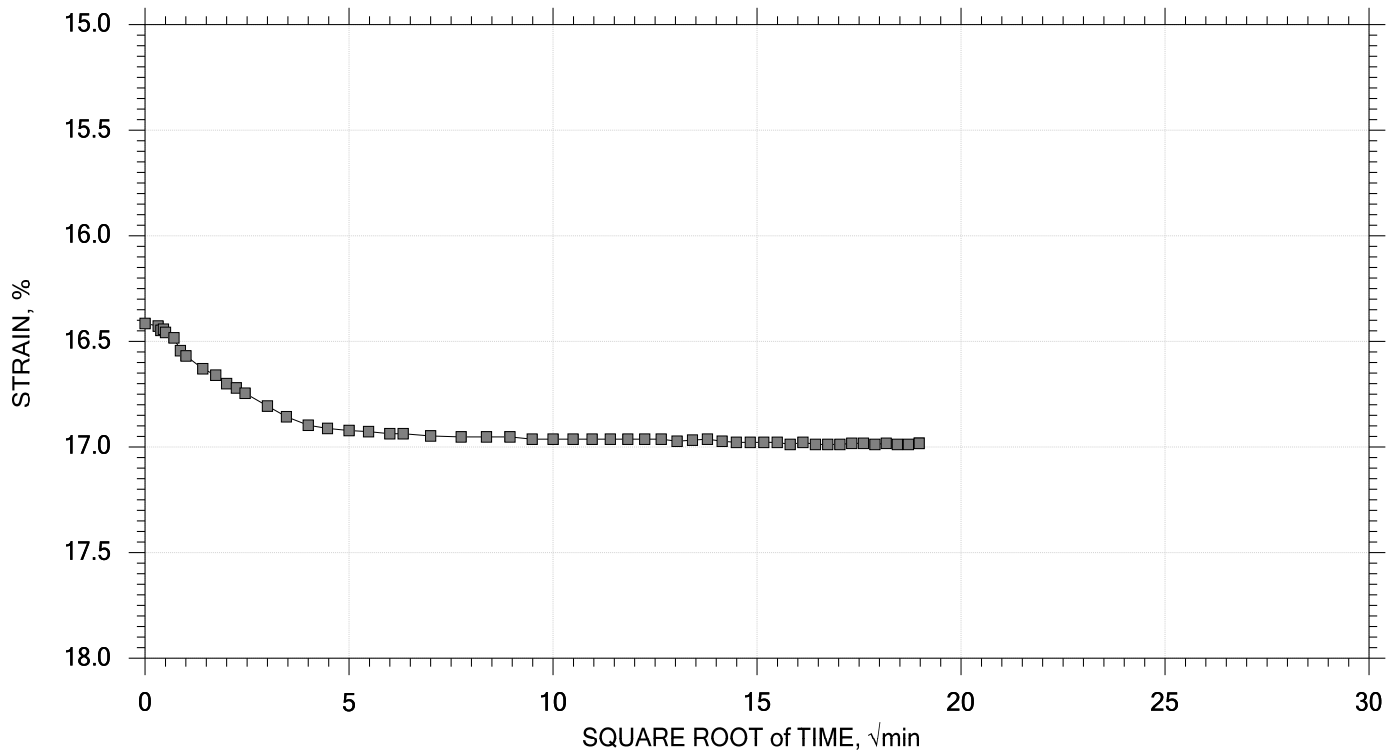
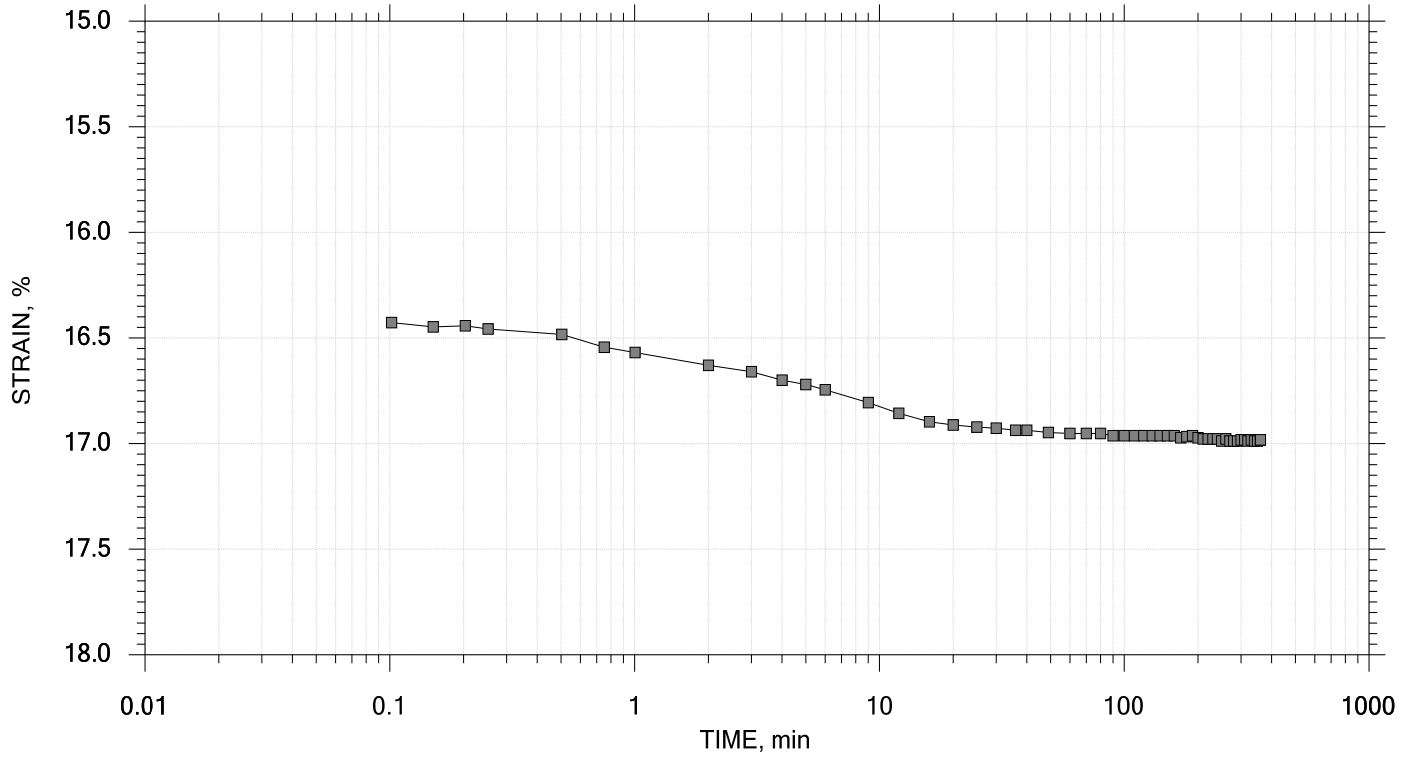
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 243 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 15

Stress: 2000 psf



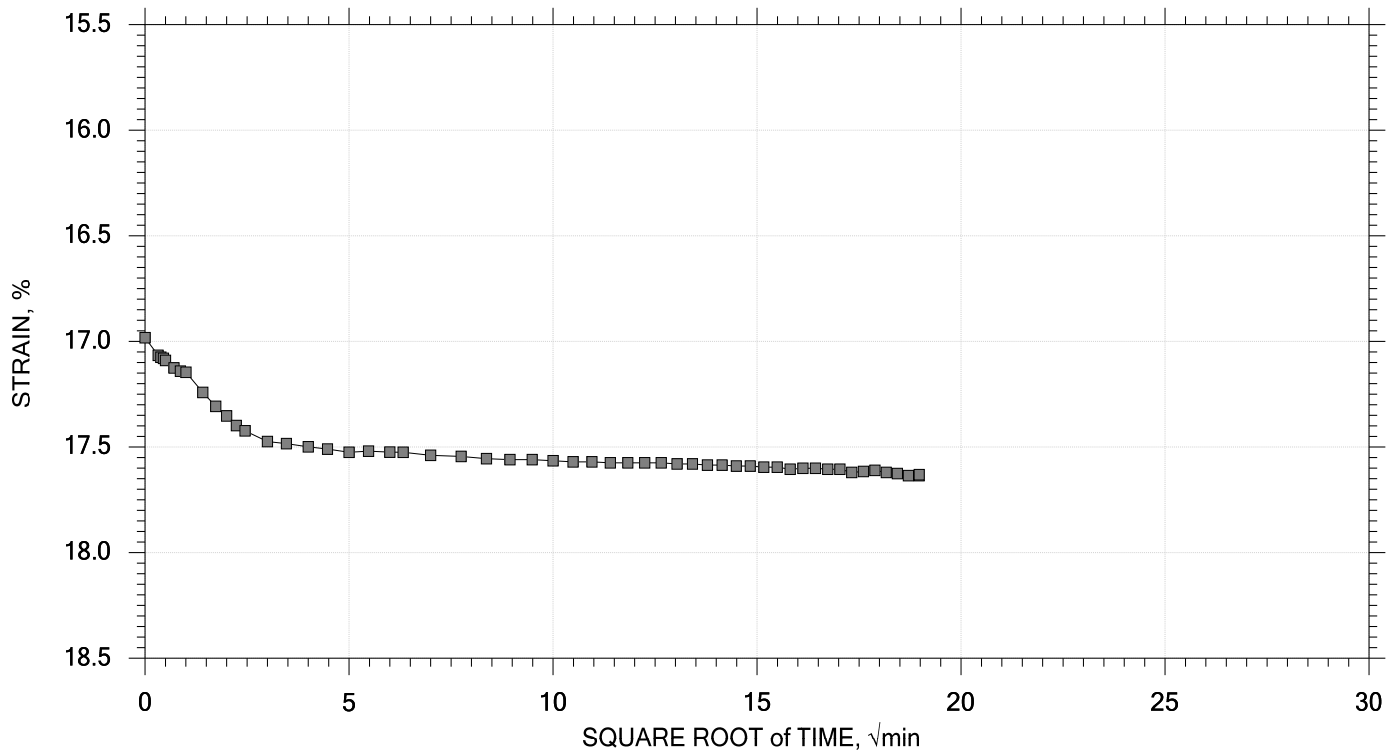
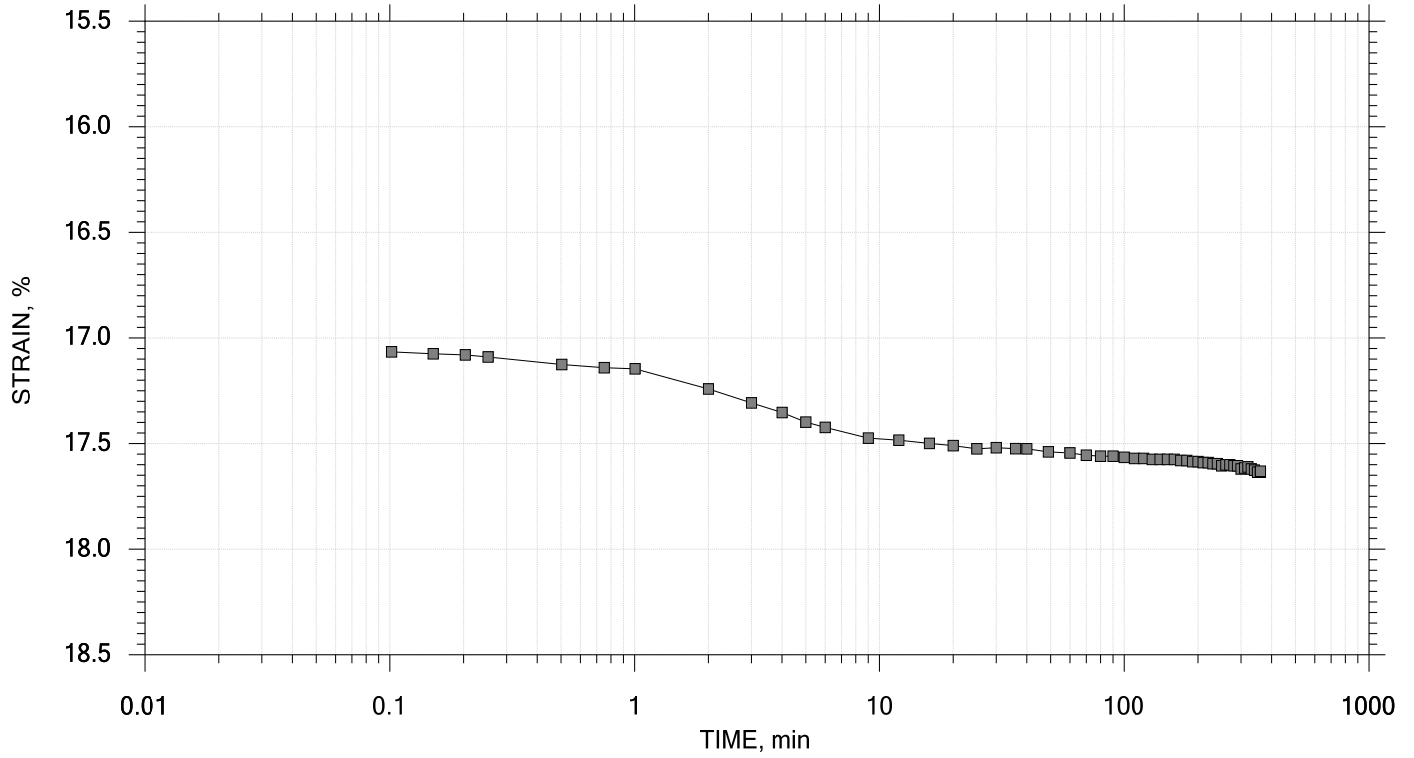
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 244 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 15

Stress: 4000 psf



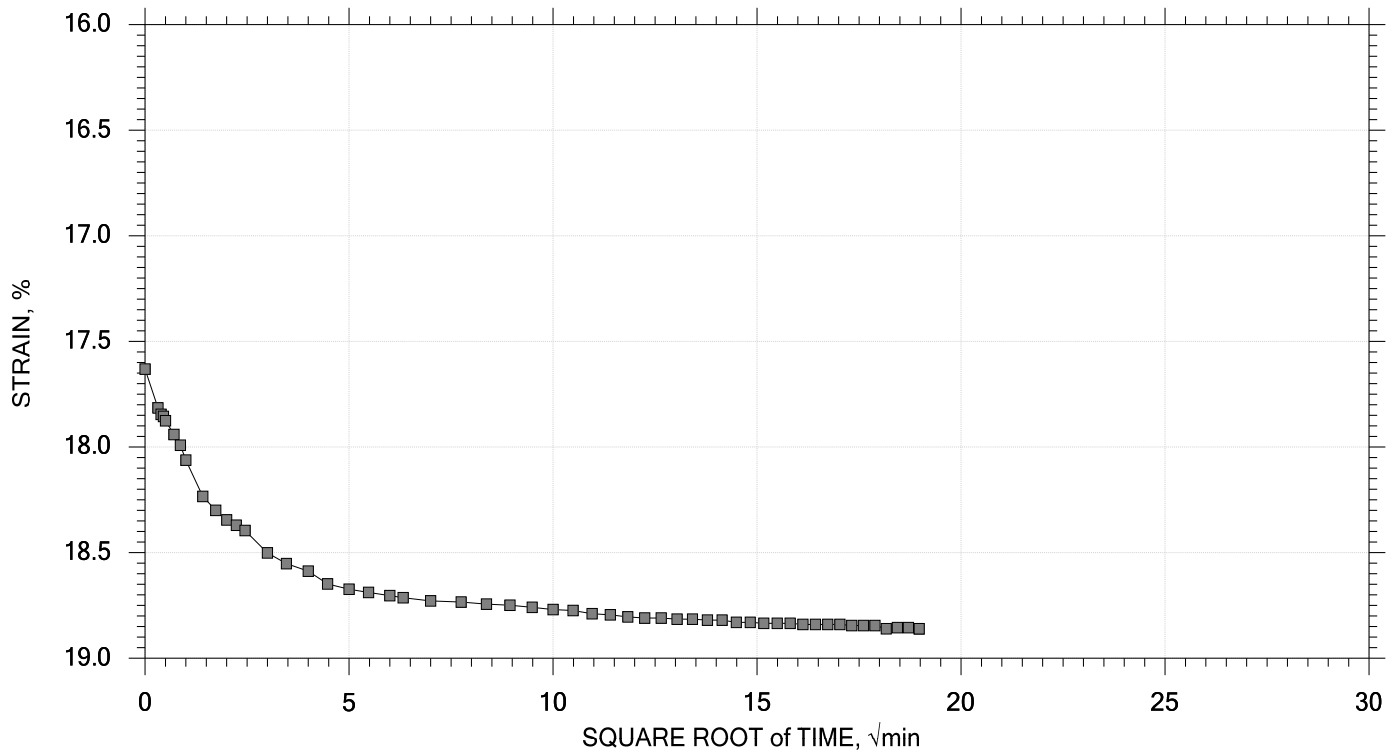
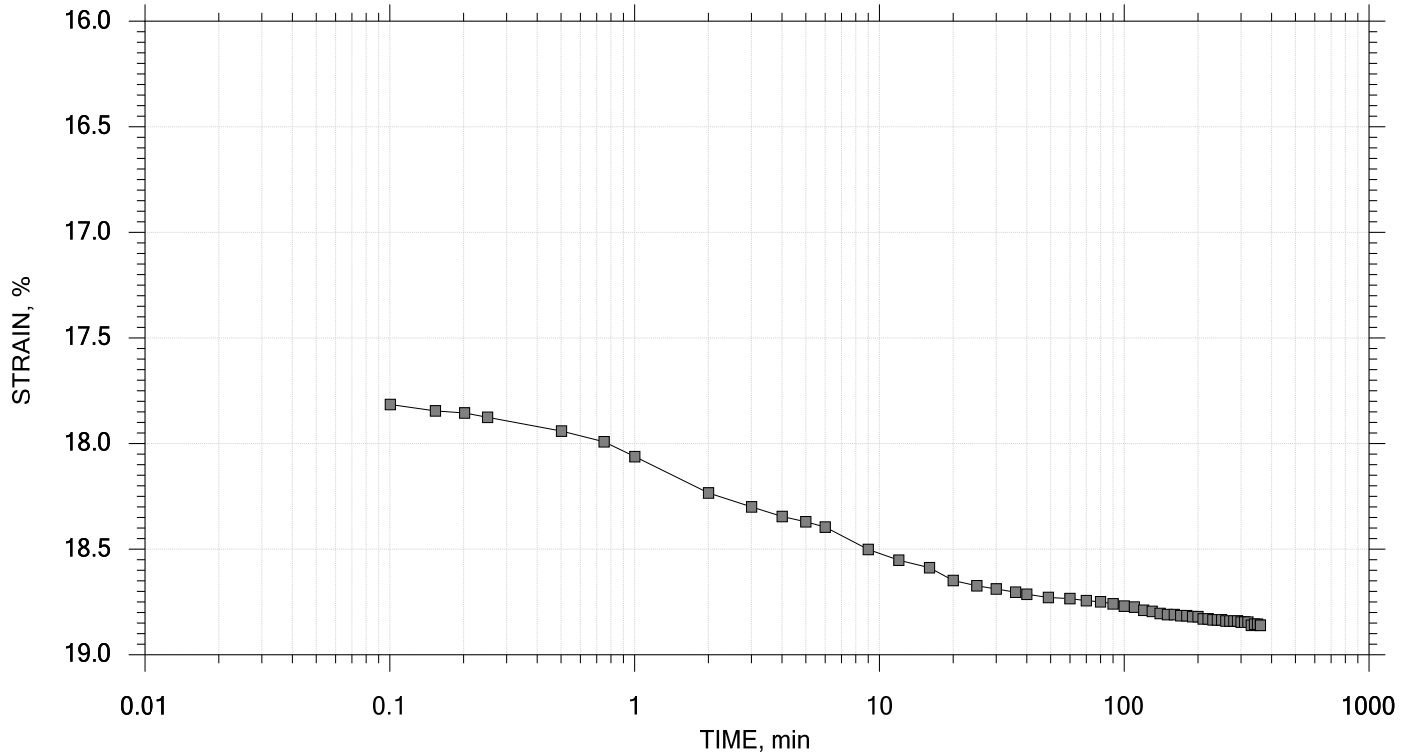
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	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 245 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 15

Stress: 8000 psf



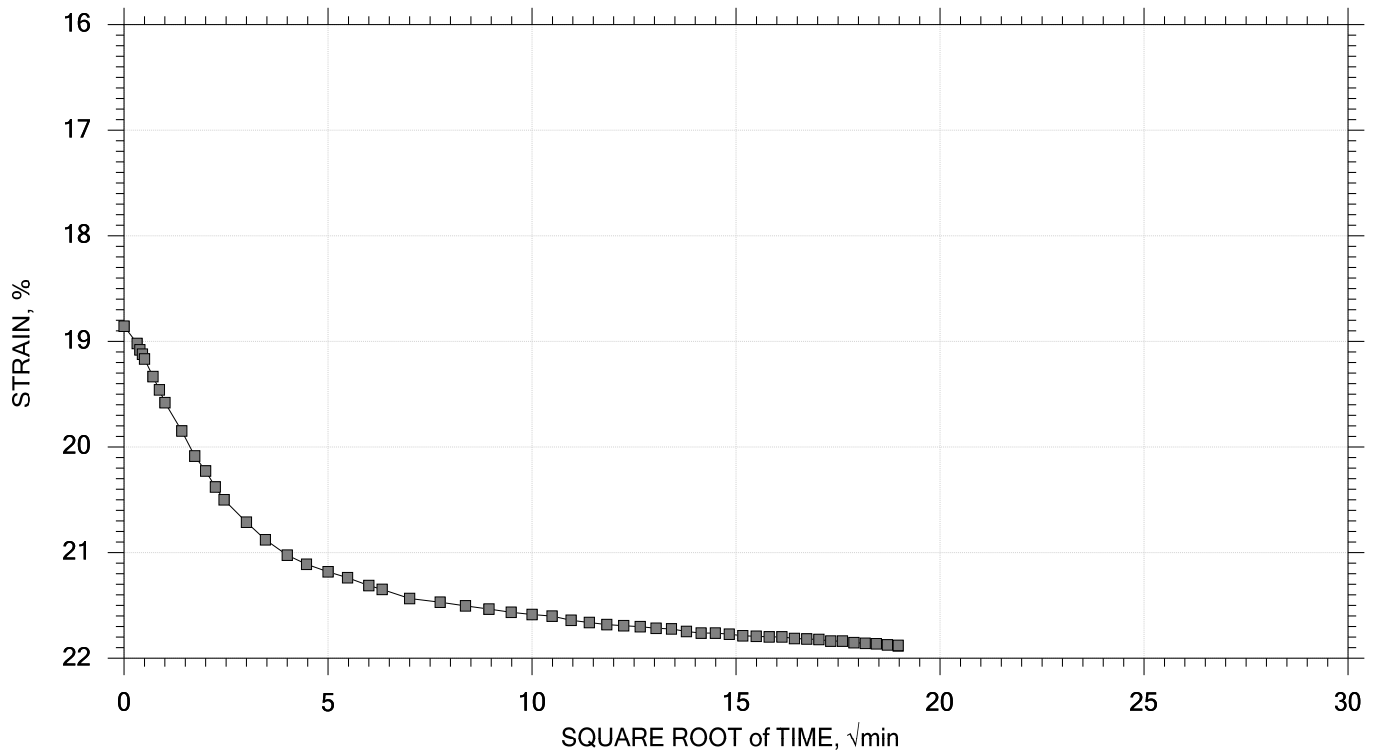
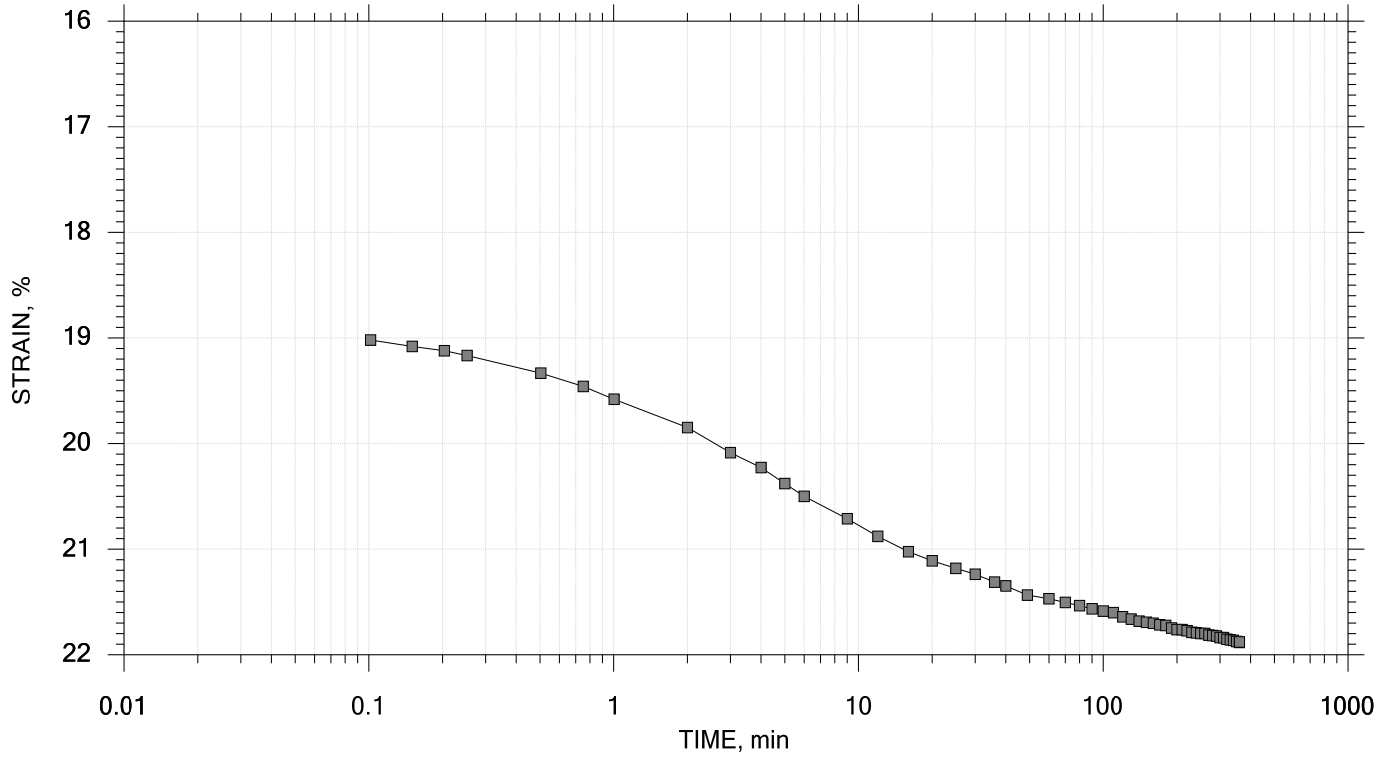
	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 246 of 301		


# One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 15

Stress: 16000 psf



	Project: MeTPK Exit 45 Reconfiguration	Location: Phs 2 South Portland, ME	Project No.: GTX-307957
	Boring No.: HB-EXIT 45-211	Tested By: md	Checked By: njh
	Sample No.: U3	Test Date: 08/01/18	Test No.: IP-6
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System O		
	Page 247 of 301		

**COPY OF CONETEC'S REPORT ON  
CONE PENETROMETER AND FLAT PLATE DILATOMETER TESTING**



## PRESENTATION OF SITE INVESTIGATION RESULTS

### Exit 45, Maine Turnpike Scarborough, Maine

*Prepared for:*

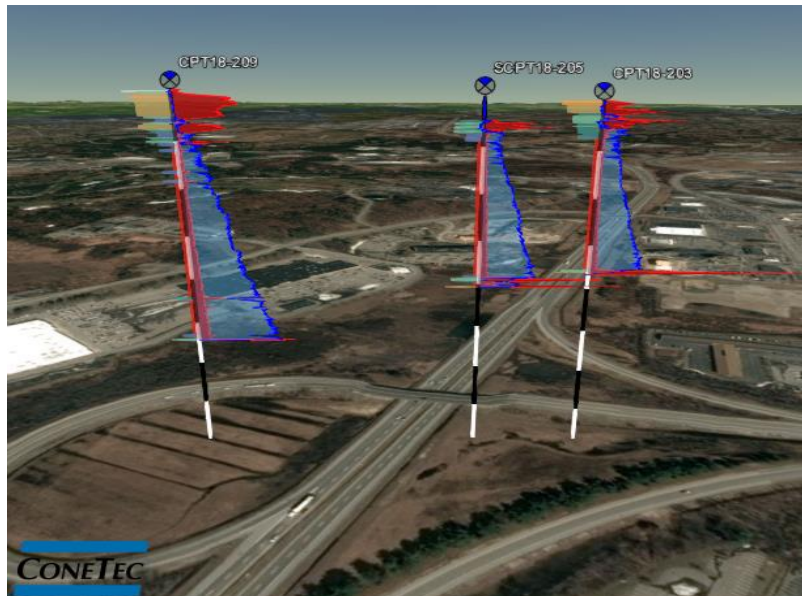
HNTB Corporation

ConeTec Job No: 18-53065

Project Start Date: 5-Jun-2018

Project End Date: 6-Jun-2018

Report Date: 11-Jun-2018



*Prepared by:*

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## Introduction

The enclosed report presents the results of a piezocone penetration testing (CPTu or CPT) and seismic piezocone penetration testing (SCPTu or SCPT) program and also a flat plate dilatometer test (DMT) carried out at the Exit 45, Maine Turnpike site located in Scarborough, Maine. The site investigation program was conducted by ConeTec Inc. (ConeTec), under contract to HNTB Corporation (HNTB) of Parsippany, New Jersey. Onsite engineering oversight was provided by Schonewald Engineering of Portland, Maine

A total of 2 cone penetration tests, 1 seismic cone penetration test and 3 flat plate dilatometer tests were completed at 3 locations. The CPT, SCPT and DMT program was performed to evaluate the subsurface soil conditions. CPT, SCPT & DMT sounding locations were selected and numbered under supervision of Schonewald personnel (Ms. Be Schonewald).

## Project Information

Project	
Client	HNTB Corporation
Project	Exit 45, Maine Turnpike, Scarborough, ME
ConeTec project number	18-53065

A map from CESIUM including the CPT test locations is presented below.



Rig Description	Deployment System	Test Type
CPT Track Rig	25 ton track mounted (twin cylinders)	CPT, SCPT and DMT

Coordinates		
Test Type	Collection Method	EPSG Number
CPT, SCPT and DMT	GPS (GlobalSat MR-350)	32619 (WGS 84 / UTM North)

Cone Penetration Test (CPT)	
Depth reference	Ground surface at the time of the investigation.
Tip and sleeve data offset	0.1 meter. This has been accounted for in the CPT data files.
Pore pressure dissipation (PPD) tests	Nine pore pressure dissipation tests were completed to determine the phreatic surface and consolidation characteristics.
Additional Comments	Shear wave velocity tests were conducted at five foot depth intervals at one location. DMT was also performed at all locations.

Cone Description	Cone Number	Cross Sectional Area (cm <sup>2</sup> )	Sleeve Area (cm <sup>2</sup> )	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
521:T1500F15U500	521	15	225	1500	15	500

#### Limitations

This report has been prepared for the exclusive use of HNTB Corporation (Client) for the project titled "Exit 45, Maine Turnpike, Scarborough, ME". The report's contents may not be relied upon by any other party without the express written permission of ConeTec. ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

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

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

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 a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

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

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

All 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<sub>2</sub>" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

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

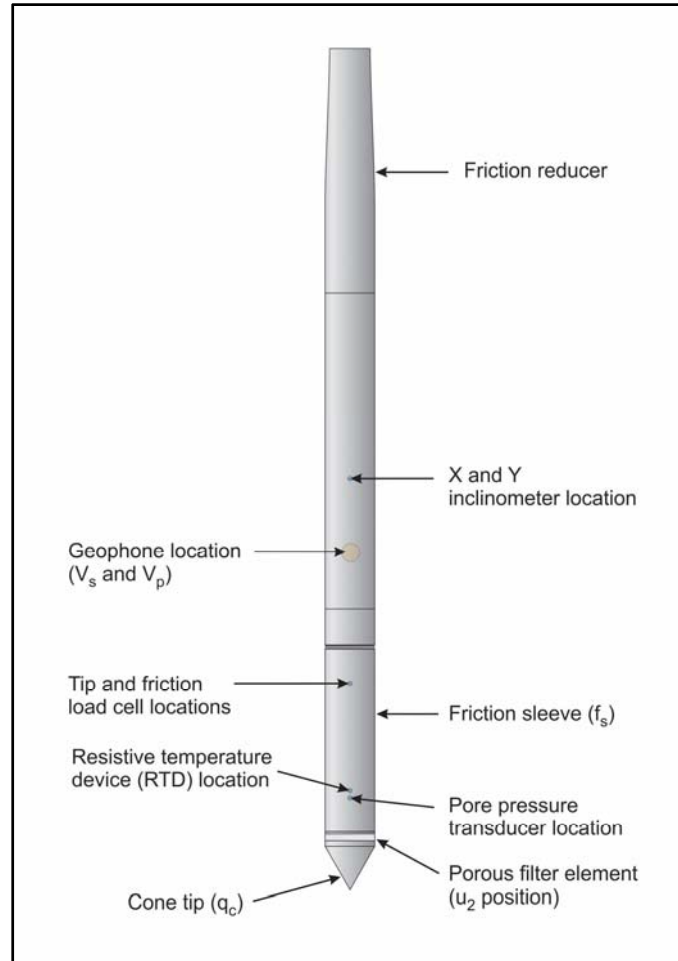


Figure CPTu. Piezocone Penetrometer (15 cm<sup>2</sup>)

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

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

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

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

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

Additional information pertaining to ConeTec's cone penetration testing procedures:

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

The interpretation of 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 (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

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

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

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 ( $R_f$ ) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high

friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

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

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

### References

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM, West Conshohocken, US.

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.

Mayne, P.W. and Peuchen, J., 2012, "Unit weight trends with cone resistance in soft to firm clays", Geotechnical and Geophysical Site Characterization 4, Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, "Interpretation of geotechnical parameters from seismic piezocone tests", CPT'14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27: 151-158.

Robertson, P.K., 2009, "Interpretation of cone penetration tests – a unified approach", Canadian Geotechnical Journal, Volume 46: 1337-1355.

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

ConeTec's piezocone penetrometers are manufactured with a horizontally active geophone (28 hertz) that is rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip.

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 maybe used for both shear waves and compression waves. The hammer and beam act as a contact trigger that triggers the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded using an up-hole integrated digital oscilloscope which is part of the SCPTu data acquisition system. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

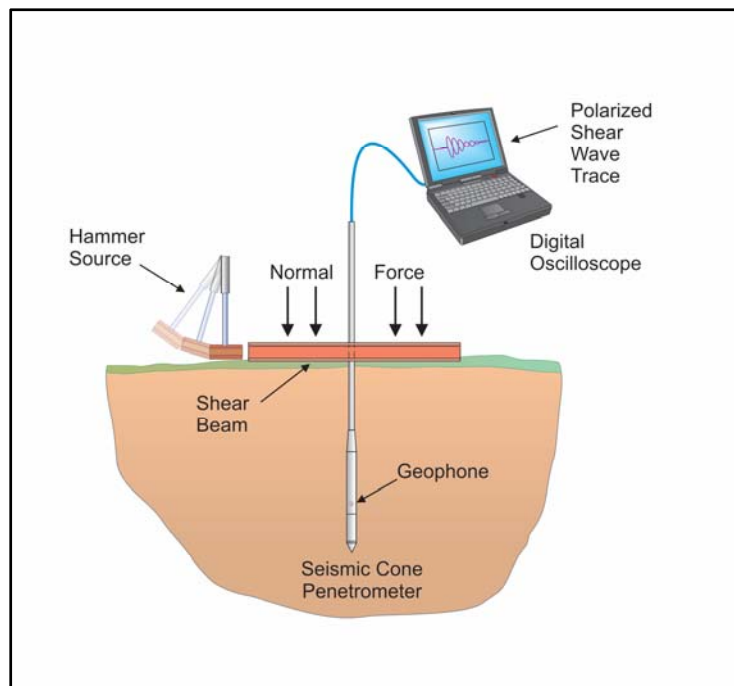


Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures.

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. Multiple wave traces are recorded for quality control 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).

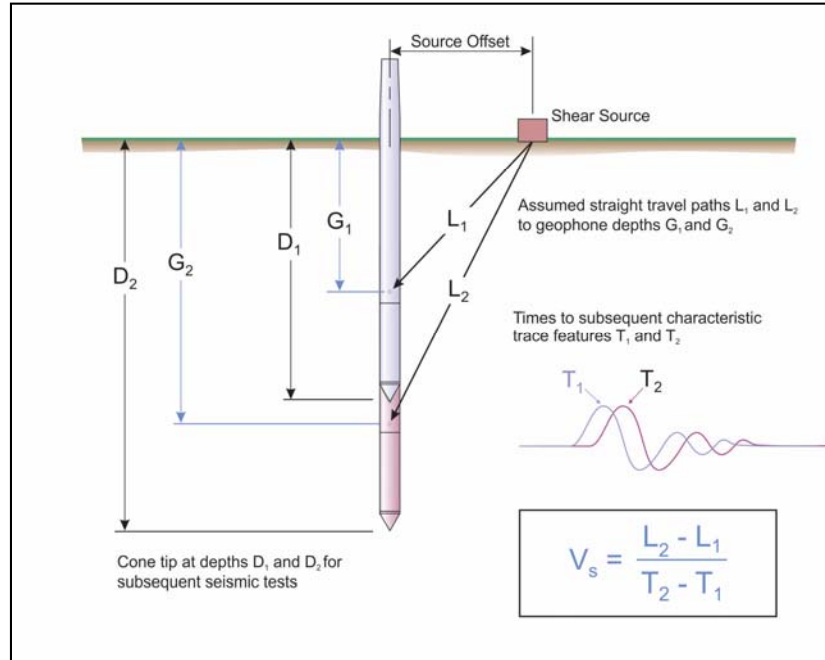


Figure SCPTu-2. Illustration of a seismic cone penetration test

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.

The average shear wave velocity to a depth of 100 feet (30 meters) ( $\bar{v}_s$ ) has been calculated and provided for all applicable soundings using the following equation presented in ASCE, 2010.

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

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)  
 $\sum_{i=1}^n d_i = 100 \text{ ft (30 m)}$

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.

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

References

American Society of Civil Engineers (ASCE), 2010, "Minimum Design Loads for Buildings and Other Structures", Standard ASCE/SEI 7-10, American Society of Civil Engineers, ISBN 978-0-7844-1085-1, Reston, Virginia.

Robertson, P.K., Campanella, R.G., Gillespie D and Rice, A., 1986, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8: 791-803.

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

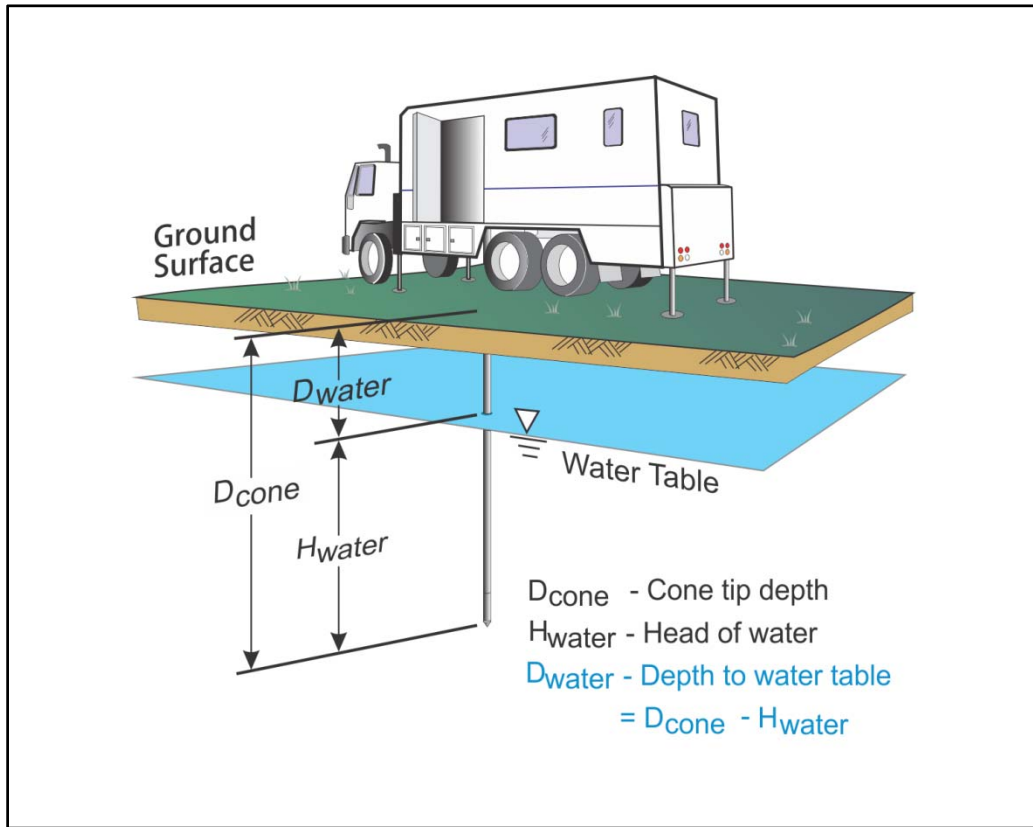


Figure PPD-1. Pore pressure dissipation test setup

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

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

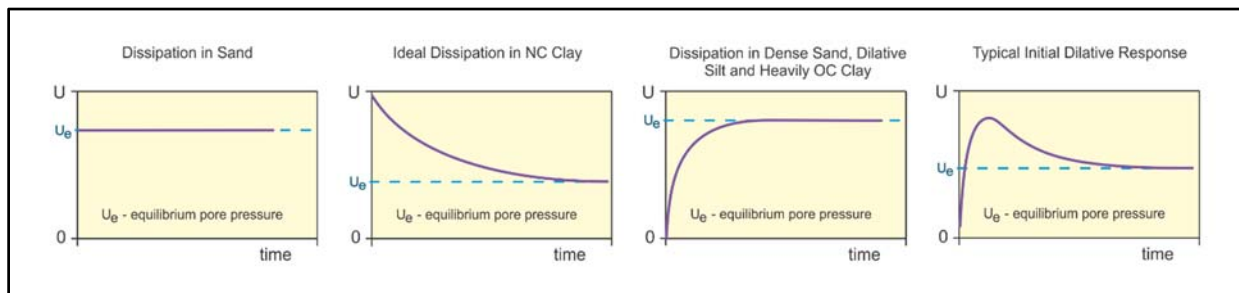


Figure PPD-2. Pore pressure dissipation curve examples

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

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

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

Where:

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

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

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

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

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

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

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

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

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

#### References

Burns, S.E. and Mayne, P.W., 1998, "Monotonic and dilatatory pore pressure decay during piezocone tests", Canadian Geotechnical Journal 26 (4): 1063-1073.

Burns, S.E. and Mayne, P.W., 2002, "Analytical cavity expansion-critical state model cone dissipation in fine-grained soils", Soils & Foundations, Vol. 42(2): 131-137.

Jones, G.A. and Van Zyl, D.J.A., 1981, "The piezometer probe: a useful investigation tool", Proceedings, 10<sup>th</sup> International Conference on Soil Mechanics and Foundation Engineering, Vol. 3, Stockholm: 489-495.

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

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, "An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils", Canadian Geotechnical Journal, 36(2): 369-381.

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

Flat plate dilatometer tests (DMT) are conducted using a flat steel blade with a thin, expandable, circular membrane mounted on one surface, a control unit and a compressed gas (typically nitrogen) supply. A photo of the system is presented in Figure DMT-1.

The dilatometer blade is connected to the up-hole control box by a pneumatic tube with an inner conductor wire. The tube is threaded through a set of steel push rods. The control unit has pressure gauges, an audio-visual signal, a gas flow control and vent valve. A syringe is used to quantify the stiffness of the blade membrane.



Figure DMT-1. Flat plate dilatometer system  
(Marchetti, <http://www.marchetti-dmt.it/pagespictures/blade&case.htm>)

Prior to conducting a DMT profile, the blade membrane stiffness is recorded according to the current ASTM D6635 specifications and the system is assembled and tested for any leaks.

The dilatometer blade is pushed into the ground to the desired depth from surface or through a cased hole using a CPT rig or a drill rig. The blade is inflated using compressed gas and up to three pressure readings are recorded, the A reading at zero deflection (lift-off) and the B reading when a deflection of 1.1 mm has been achieved. An optional C reading representing the closing pressure can be recorded by slowly deflating the membrane soon after B is reached. The blade is advanced to subsequent depths

and the test procedures are repeated at each test depth, up to the sounding termination depth. After the blade is retracted membrane stiffness values are recorded.

The dilatometer operating procedures are performed in general accordance with the current ASTM D6635 standard.

The interpretation of the dilatometer data is based on the pressure related parameters  $p_0$  and  $p_1$  that are derived from the recorded A and B pressure values corrected for membrane stiffness and the gauge zero offset. Figure DMT-2 shows  $p_0$  and  $p_1$ .

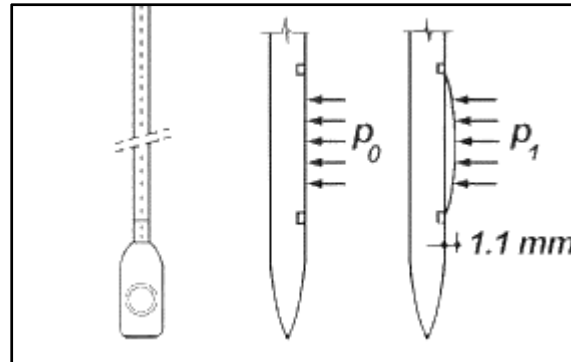


Figure DMT-2. Flat plate dilatometer  $p_0$  and  $p_1$   
(Marchetti, <http://www.marchetti-dmt.it/>)

The A reading is the pressure required to lift-off the membrane while the B reading is the pressure required to move the center of the membrane by 1.1 mm. The C pressure measurement is the pressure at which the membrane returns to the A position and is used to estimate equilibrium pore pressures in sand. The A and B pressure readings are corrected by the membrane stiffness values at the respective membrane deflections that are recorded before and after each test location.

The empirical correlations use the parameters  $p_0$ ,  $p_1$  and  $p_2$  derived from the A, B and C readings accounting for membrane stiffness and gauge offset. These parameters provide the basic values needed in the empirical correlations developed by Marchetti et al. (2001). The equations for these parameters are presented in the relevant appendix.

The  $p_0$ ,  $p_1$  and  $p_2$  parameters are used to calculate the DMT indices, material index ( $I_D$ ), horizontal stress index ( $K_D$ ), and dilatometer modulus ( $E_D$ ). Soil type is inferred from the material index. Clays generally have a material index of less than 0.6. The material index for silts is generally between 0.6 and 1.8, while sands generally exhibit a material index greater than 1.8. While  $K_D$  and  $E_D$  have limited direct use in geotechnical design, they are critical for determining parameters that are required for most design calculations such as earth pressure coefficient ( $K_0$ ), undrained shear strength ( $S_u$ ), and over consolidation ratio (OCR).

A summary of the tests including coordinates and estimated phreatic surface, along with plots and tabular results are provided in the relevant appendices. The calculated geotechnical parameters presented are based on published empirical correlations and are provided only as a first approximation. No warranty, expressed or implied, is made to the accuracy of these estimated geotechnical parameters.

References

ASTM D6635-01, Reapproved 2007, "Standard Test Method for Performing the Flat Plate Dilatometer ", ASTM, West Conshohocken, US.

Foti, D., Lancellotta, R., Marchetti, D., Monaco, P., and Totani, P., 2006, "Interpretation of SDMT tests in a transversely isotropic medium", Proceedings from the Second International Conference on the Flat Dilatometer, Washington, DC., April 2-5.

Marchetti, S., Monaco P., Totani G. and Calabrese M., 2001, "The Flat Dilatometer Test (DMT) in soil investigations", A Report by the ISSMEGE Committee TC16. Proc. IN SITU 2001, Intl. Conf. On In Situ Measurement of Soil Properties, Bali, Indonesia, May 2001, 41 pp.

Marchetti, S., n.d, [Photographs of DMT and SDMT system], Retrieved from <http://www.marchetti-dmt.it/pagespictures/blade&case.htm>.

Marchetti, S., n.d, [Illustration of DMT blade, po and p1], <http://www.marchetti-dmt.it/>.



The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Normalized Cone Penetration Test Plots
- Seismic Cone Penetration Test Plots
- Seismic Cone Penetration Test Tabular Results
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots
- Flat Plate Dilatometer Test Plots and Tabular Results

## Cone Penetration Test Summary and Standard Cone Penetration Test Plots



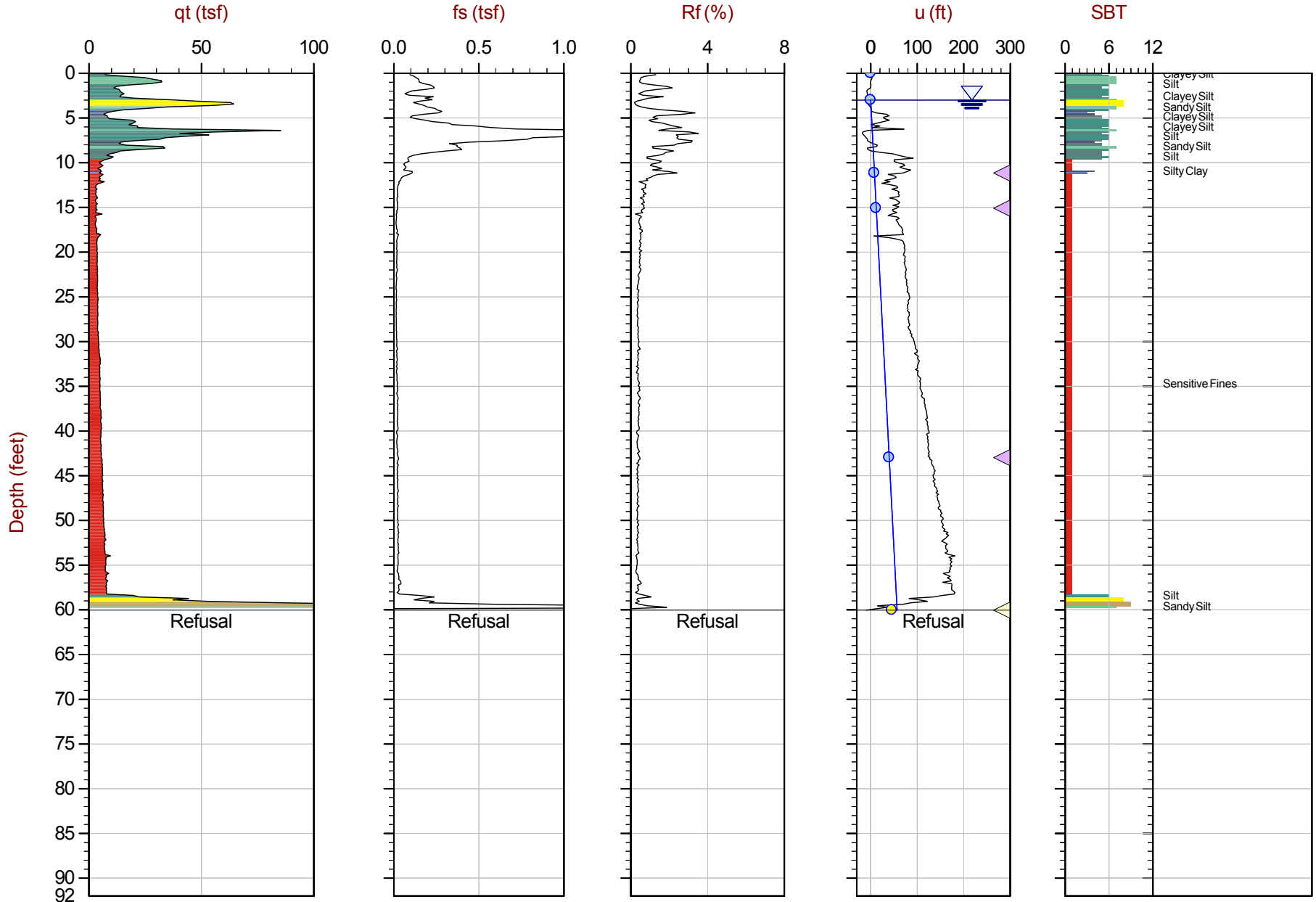


Job No: 18-53065  
Client: HNTB Corporation  
Project: Exit 45, Maine Turnpike, Scarborough, ME  
Start Date: 05-Jun-2018  
End Date: 06-Jun-2018

### CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface <sup>1</sup> (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing <sup>2</sup> (m)	Easting (m)	Refer to Notation Number
CPT18-203	18-53065_CP203	6-Jun-2018	521:T1500F15U500	3.0	60.04		4831814	391627	
SCPT18-205	18-53065_SP205	6-Jun-2018	521:T1500F15U500	3.0	66.76	13	4831828	391570	
CPT18-209	18-53065_CP209	5-Jun-2018	521:T1500F15U500	3.0	89.24		4831863	391420	
Totals	3 soundings				216.04	13			

1. Assumed phreatic surface depths were determined from the pore pressure data unless otherwise noted. Hydrostatic data were used for calculated parameters.
2. Coordinates are WGS 84 / UTM Zone 19 and were collected using a MR-350 GlobalSat GPS Receiver.
3. Assumed phreatic surface provided by the client
4. No phreatic surface detected

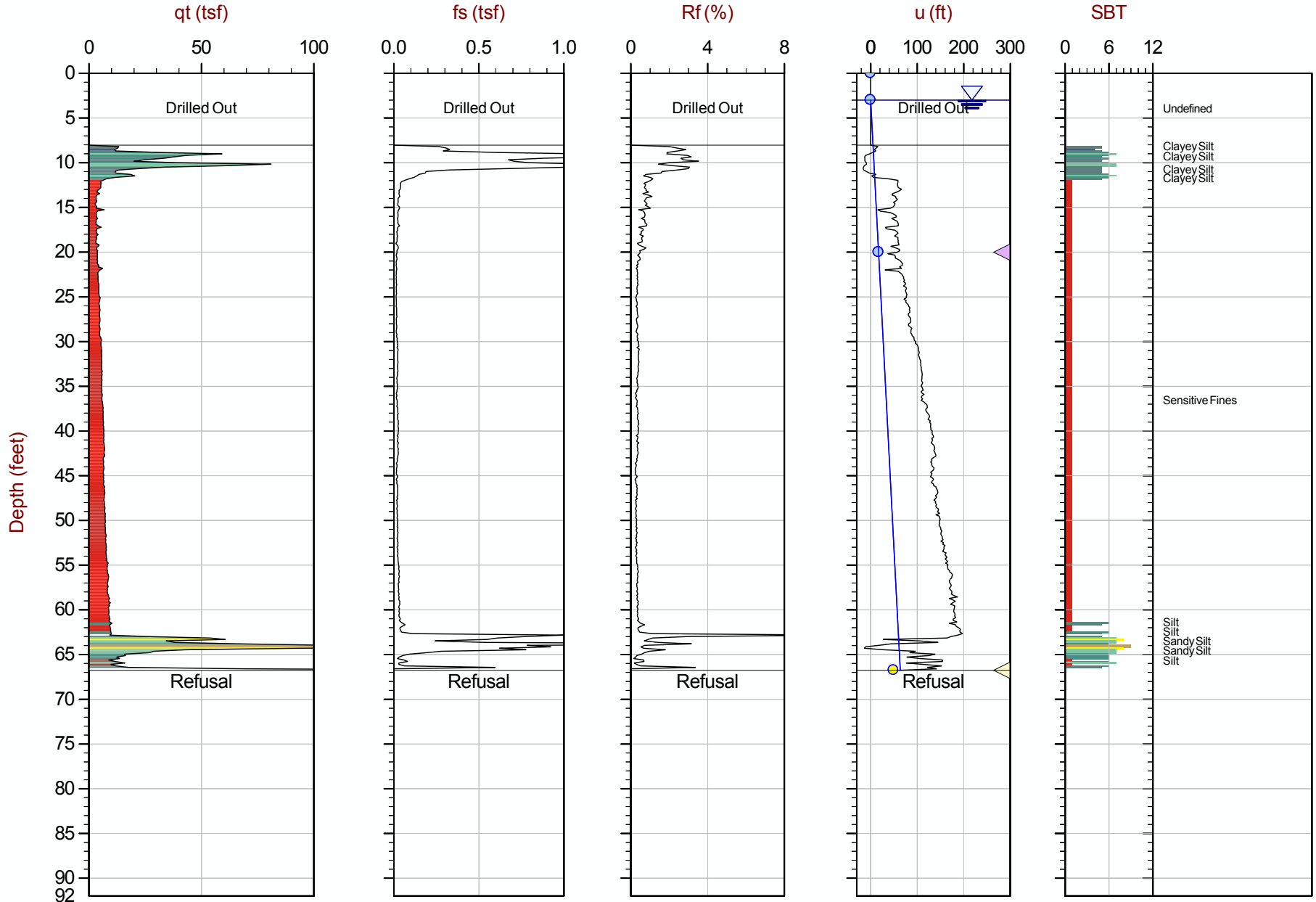


Max Depth: 18.300 m / 60.04 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

File: 18-53065\_CP203.COR

SBT: Robertson and Campanella, 1986  
 Coords: UTM Zone 19 N: 4831814m E: 391627m

— Hydrostatic Line   ● Ueq   ● Assumed Ueq   ◁ PPD, Ueq achieved   ◁ PPD, Ueq not achieved

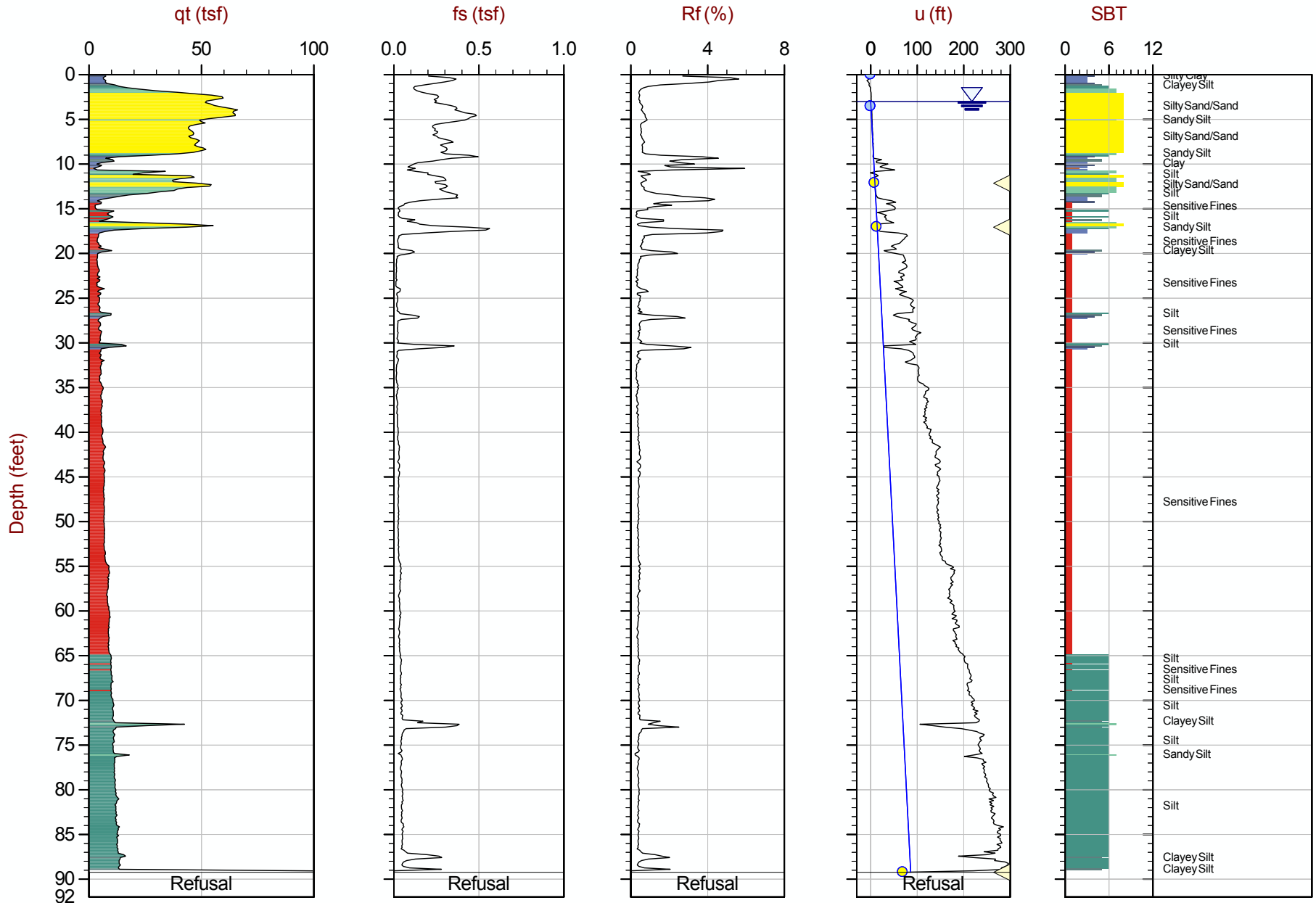


Max Depth: 20.350 m / 66.76 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

File: 18-53065\_SP205.COR

SBT: Robertson and Campanella, 1986  
 Coords: UTM Zone 19 N: 4831828m E: 391570m

— Hydrostatic Line    ● Ueq    ● Assumed Ueq    ◁ PPD, Ueq achieved    ◁ PPD, Ueq not achieved



Max Depth: 27.200 m / 89.24 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

File: 18-53065\_CP209.COR

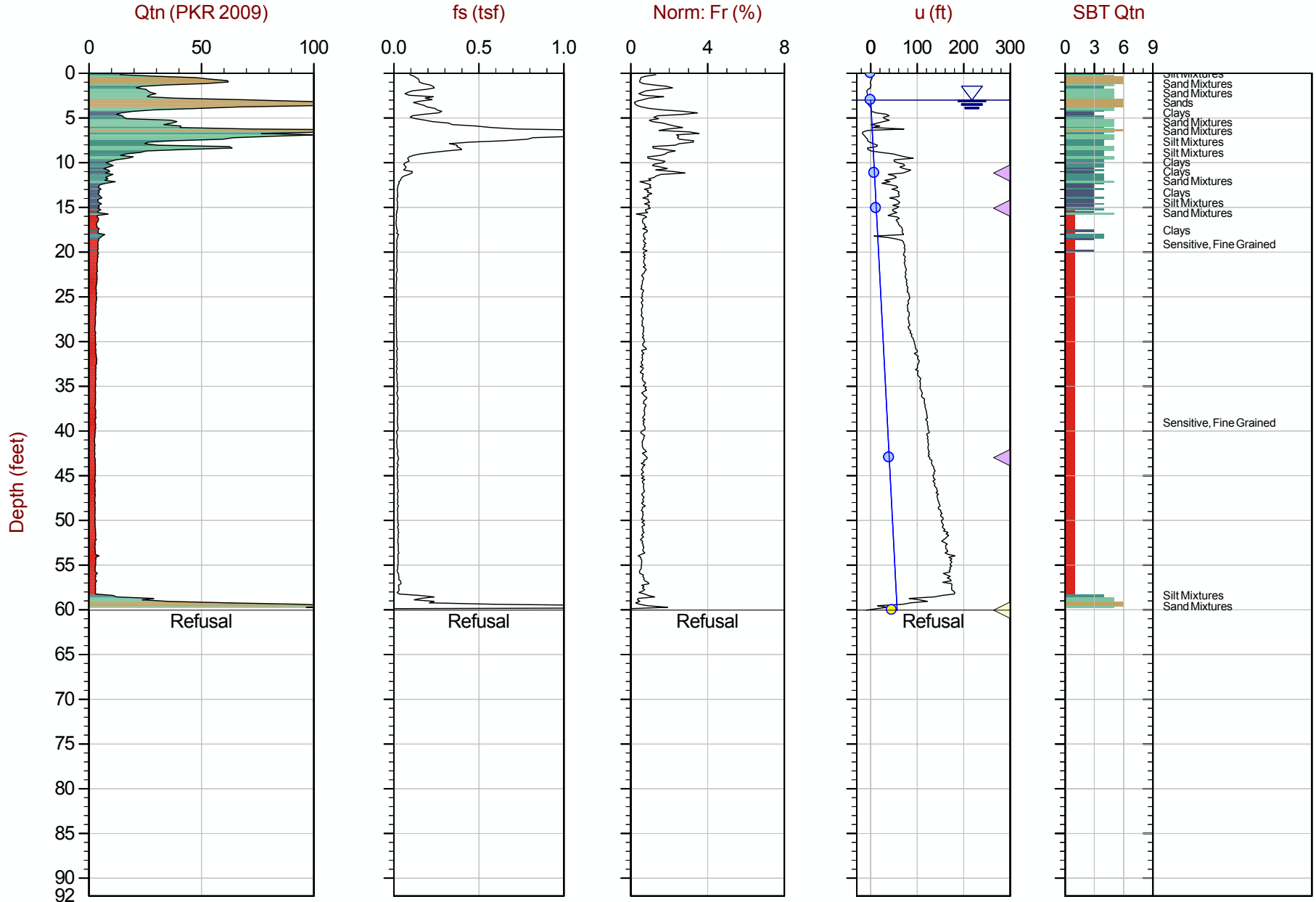
SBT: Robertson and Campanella, 1986

Coords: UTM Zone 19 N: 4831863m E: 391420m

— Hydrostatic Line    ● Ueq    ● Assumed Ueq    ◁ PPD, Ueq achieved    ◁ PPD, Ueq not achieved

## Normalized Cone Penetration Test Plots





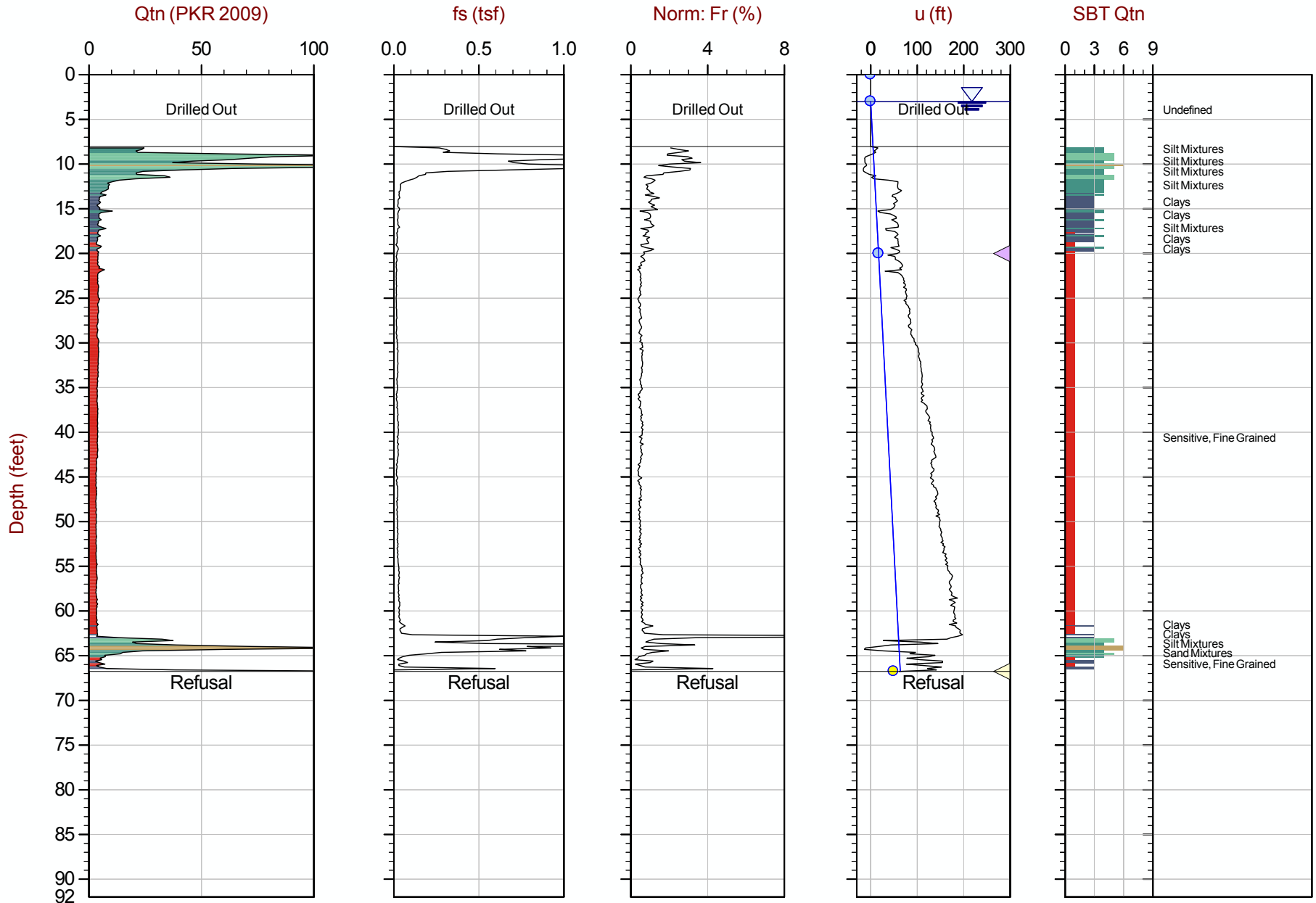
Max Depth: 18.300 m / 60.04 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

File: 18-53065\_CP203.COR

SBT: Robertson, 2009 and 2010  
 Coords: UTM Zone 19 N: 4831814m E: 391627m

— Hydrostatic Line   ● Ueq   ● Assumed Ueq   ◁ PPD, Ueq achieved   ◁ PPD, Ueq not achieved



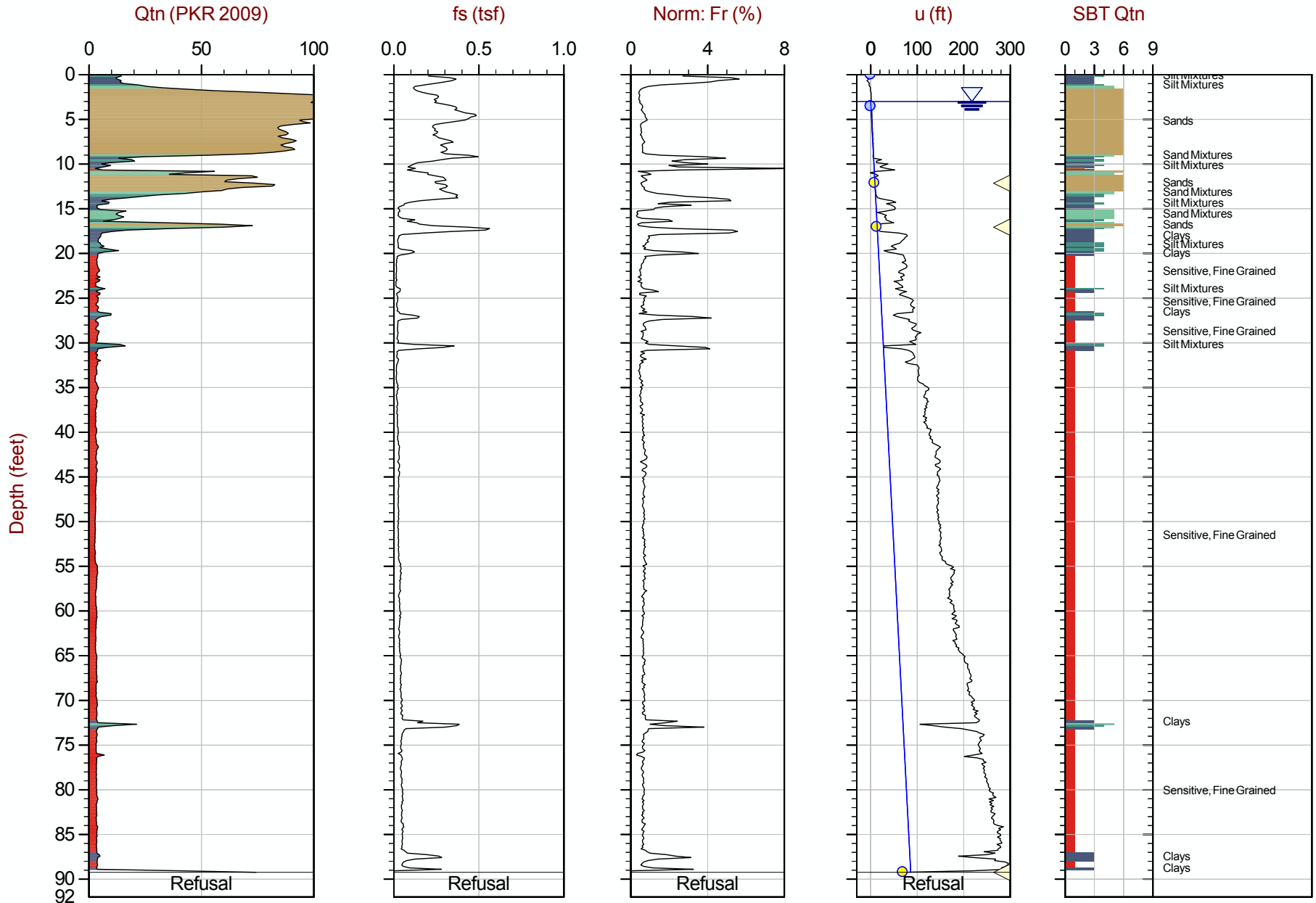


Max Depth: 20.350 m / 66.76 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

File: 18-53065\_SP205.COR

SBT: Robertson, 2009 and 2010  
 Coords: UTM Zone 19 N: 4831828m E: 391570m

— Hydrostatic Line    ● Ueq    ● Assumed Ueq    ◁ PPD, Ueq achieved    ◁ PPD, Ueq not achieved



Max Depth: 27.200 m / 89.24 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

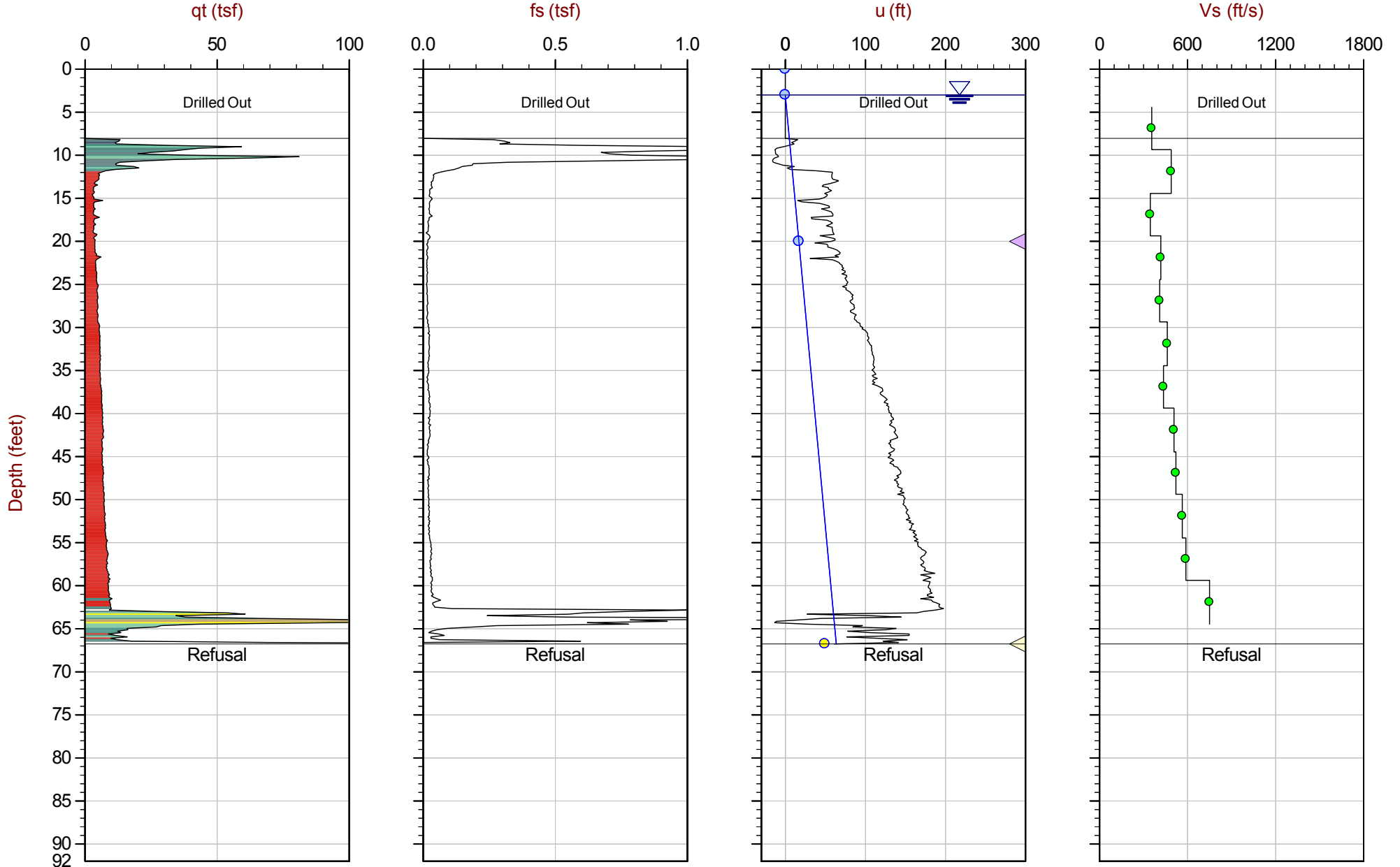
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SBT: Robertson, 2009 and 2010  
 Coords: UTM Zone 19 N: 4831863m E: 391420m

— Hydrostatic Line   ● Ueq   ● Assumed Ueq   ◁ PPD, Ueq achieved   ◁ PPD, Ueq not achieved

## Seismic Cone Penetration Test Plots





Max Depth: 20.350 m / 66.76 ft  
 Depth Inc: 0.050 m / 0.164 ft  
 Avg Int: EveryPoint

File: 18-53065\_SP205.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 19 N: 4831828m E: 391570m

— Hydrostatic Line   ● Ueq   ● Assumed Ueq   ◁ PPD, Ueq achieved   ◁ PPD, Ueq not achieved

## Seismic Cone Penetration Test Tabular Results (Vs)





Job No: 18-53065  
Client: HNTB Corporation  
Project: Exit 45, Maine Turnpike, Scarborough, ME  
Sounding ID: SCPT18-205  
Date: 06-Jun-2018

Seismic Source: Beam  
Source Offset (ft): 2.46  
Source Depth (ft): 0.00  
Geophone Offset (ft): 0.66

### SCPT<sub>u</sub> SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
5.08	4.43	5.07			
10.01	9.35	9.67	4.60	12.92	356
15.09	14.44	14.64	4.98	10.17	489
20.01	19.36	19.51	4.87	14.06	346
25.10	24.44	24.57	5.05	12.10	418
30.02	29.36	29.47	4.90	11.96	410
35.10	34.45	34.54	5.07	10.98	462
40.03	39.37	39.45	4.91	11.27	436
45.11	44.46	44.52	5.08	10.00	508
50.03	49.38	49.44	4.91	9.43	521
55.12	54.46	54.52	5.08	9.00	564
60.04	59.38	59.43	4.92	8.34	589
65.12	64.47	64.52	5.08	6.77	750

Pore Pressure Dissipation Summary and  
Pore Pressure Dissipation Plots





Job No: 18-53065  
 Client: HNTB Corporation  
 Project: Exit 45, Maine Turnpike, Scarborough, ME  
 Start Date: 05-Jun-2018  
 End Date: 06-Jun-2018

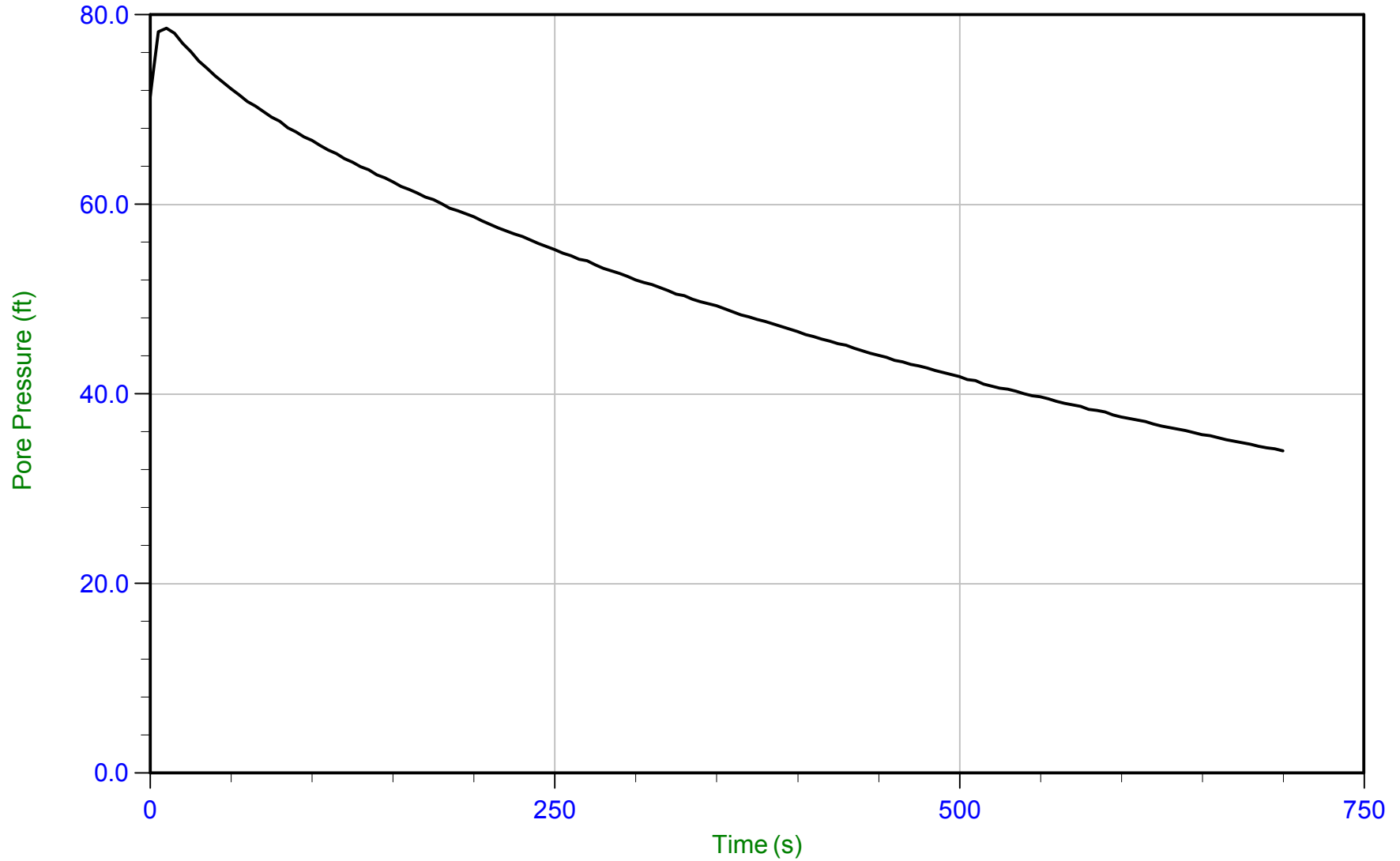
**CPT<sub>u</sub> PORE PRESSURE DISSIPATION SUMMARY**

Sounding ID	File Name	Cone Area (cm <sup>2</sup> )	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U <sub>eq</sub> (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t <sub>50</sub> <sup>a</sup> (s)	Assumed Rigidity Index (I <sub>r</sub> )	c <sub>h</sub> <sup>b</sup> (cm <sup>2</sup> /min)
CPT18-203	18-53065_CP203.PPD	15	700	11.15	8.15		3.00	455.54	100	1.54
CPT18-203	18-53065_CP203.PPD	15	1800	15.09	12.09		3.00	1526.7	100	0.46
CPT18-203	18-53065_CP203.PPD	15	2700	42.98	39.98		3.00	2471.7	100	0.28
CPT18-203	18-53065_CP203.PPD	15	200	60.04	45.67	14.37				
SCPT18-205	18-53065_SP205.PPD	15	900	20.01	17.01		3.00	475.91	100	1.47
SCPT18-205	18-53065_SP205.PPD	15	300	66.76	49.45	17.31				
CPT18-209	18-53065_CP209.PPD	15	200	12.14	8.58	3.56				
CPT18-209	18-53065_CP209.PPD	15	200	17.06	13.31	3.75				
CPT18-209	18-53065_CP209.PPD	15	350	89.24	69.53	19.71				
Totals	9 dissipations		122.5 min							

a. Time is relative to where umax occurred

b. Houlsby and Teh, 1991



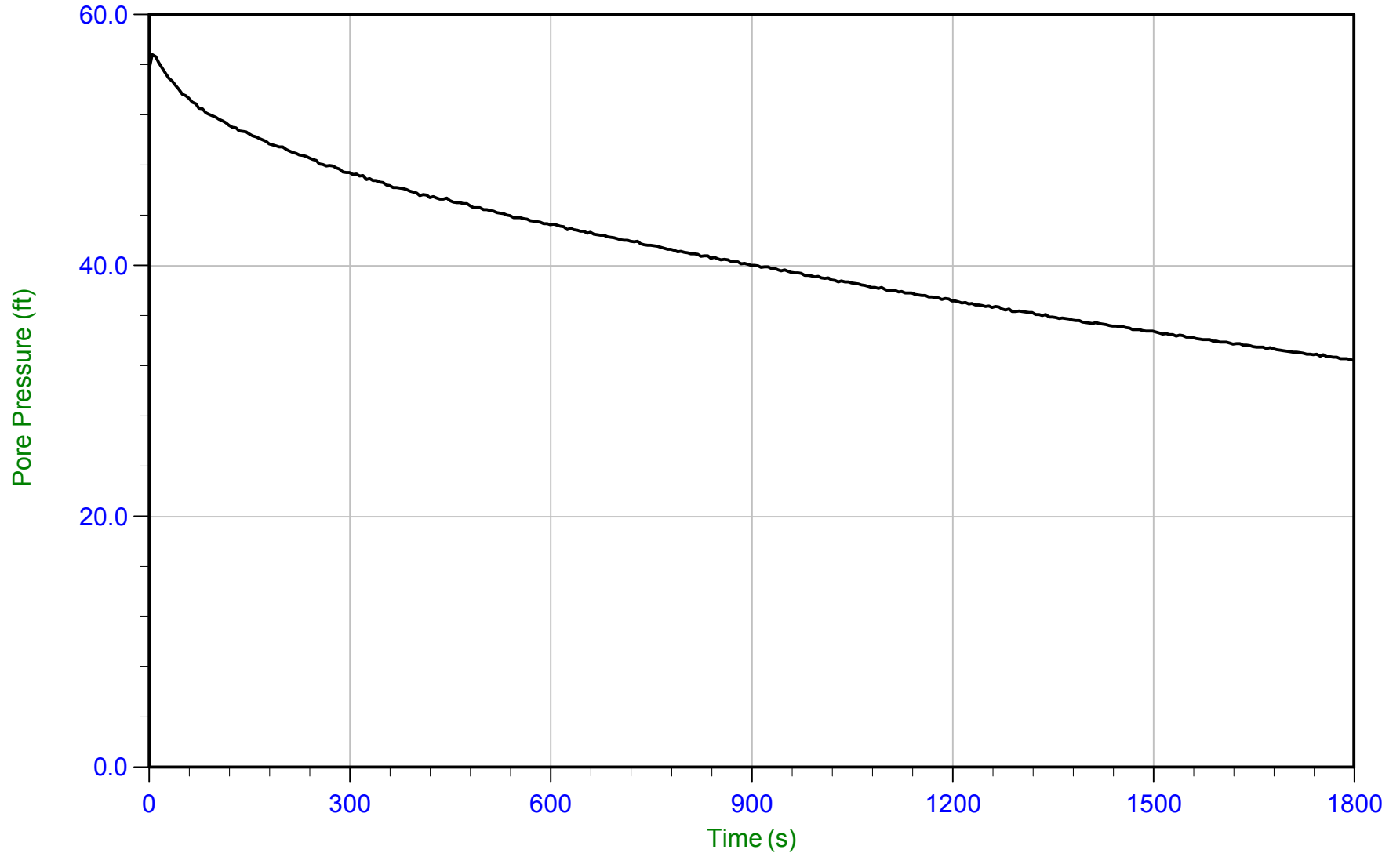


Trace Summary: Filename: 18-53065\_CP203.PPD  
 Depth: 3.400 m / 11.155 ft  
 Duration: 700.0 s

U Min: 34.0 ft  
 U Max: 78.6 ft

WT: 0.914 m / 3.000 ft  
 Ueq: 8.2 ft  
 U(50): 43.37 ft

T(50): 455.5 s  
 Ir: 100  
 Ch: 1.5 cm<sup>2</sup>/min



Trace Summary:	Filename: 18-53065_CP203.PPD	U Min: 32.5 ft	WT: 0.914 m / 3.000 ft	T(50): 1526.7 s
	Depth: 4.600 m / 15.092 ft	U Max: 56.8 ft	Ueq: 12.1 ft	Ir: 100
	Duration: 1800.0 s		U(50): 34.46 ft	Ch: 0.5 cm <sup>2</sup> /min



HNTB

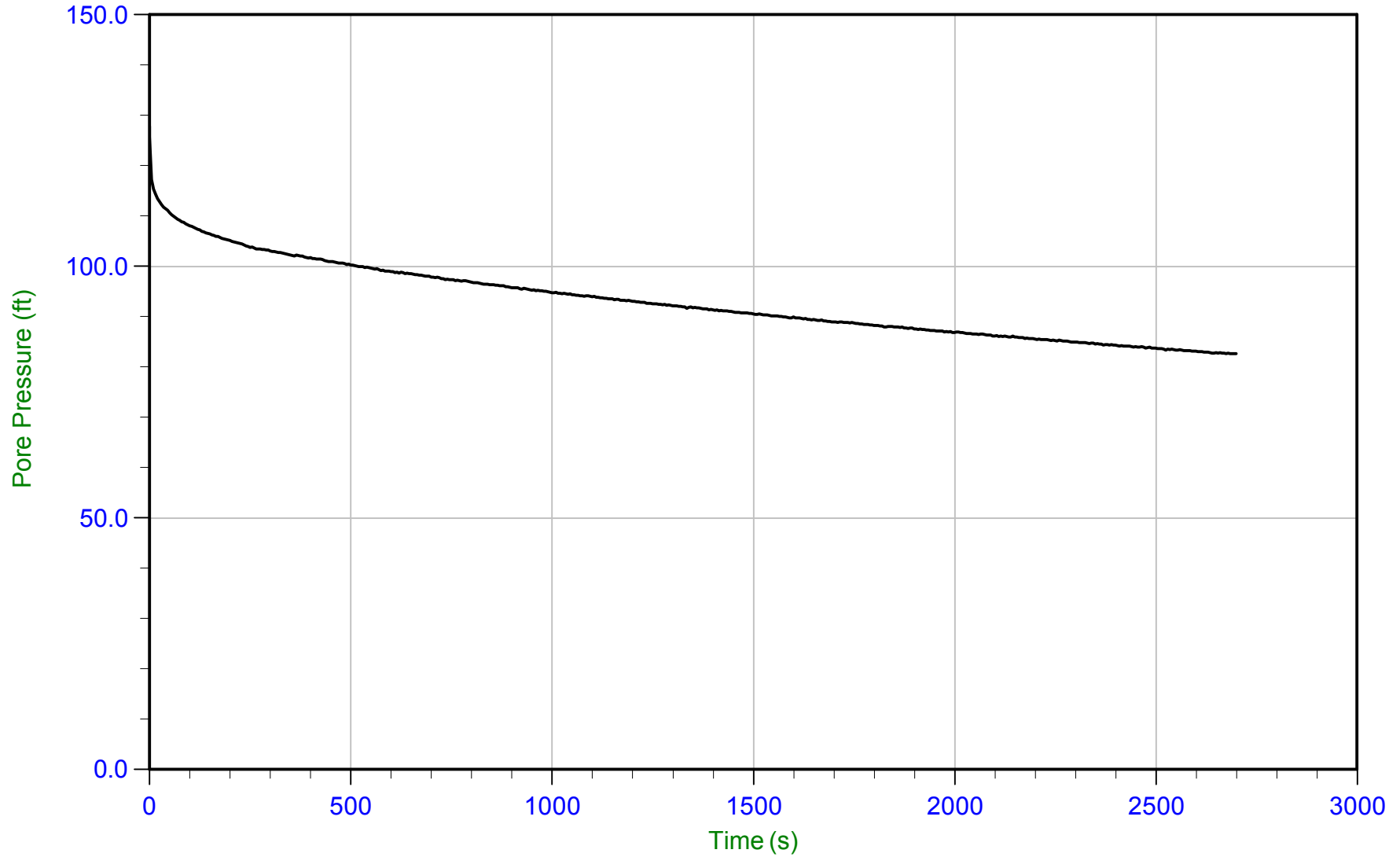
Job No: 18-53065

Date: 06-Jun-2018 12:05:00

Site: Exit 45, Maine Turnpike, Scarborough, ME

Sounding: CPT18-203

Cone: AD521 Area=15 cm<sup>2</sup>



Trace Summary: Filename: 18-53065\_CP203.PPD U Min: 82.6 ft WT: 0.914 m / 3.000 ft T(50): 2471.7 s  
Depth: 13.100 m / 42.978 ft U Max: 127.9 ft Ueq: 40.0 ft Ir: 100  
Duration: 2700.0 s U(50): 83.92 ft Ch: 0.3 cm<sup>2</sup>/min



HNTB

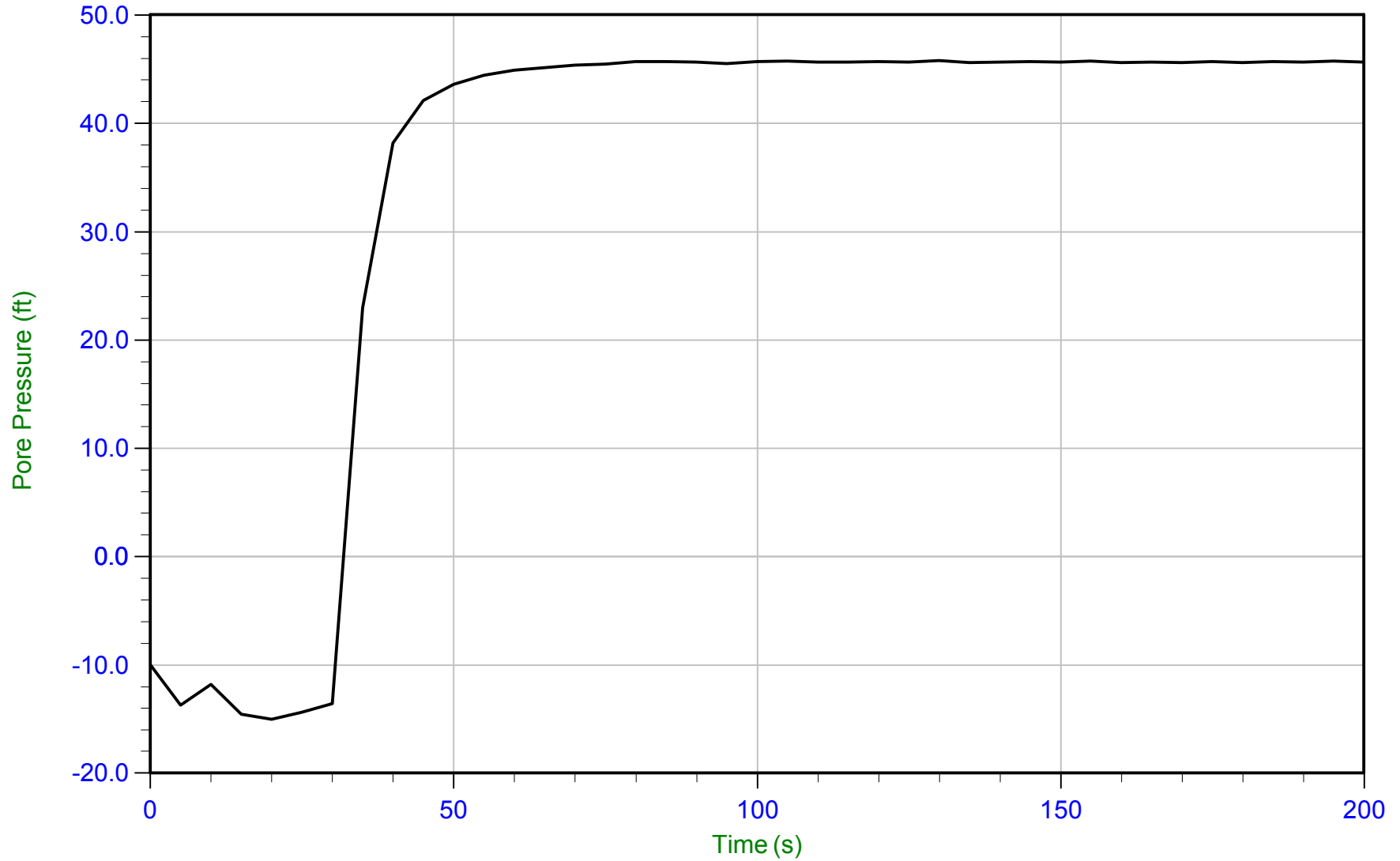
Job No: 18-53065

Date: 06-Jun-2018 12:05:00

Site: Exit 45, Maine Turnpike, Scarborough, ME

Sounding: CPT18-203

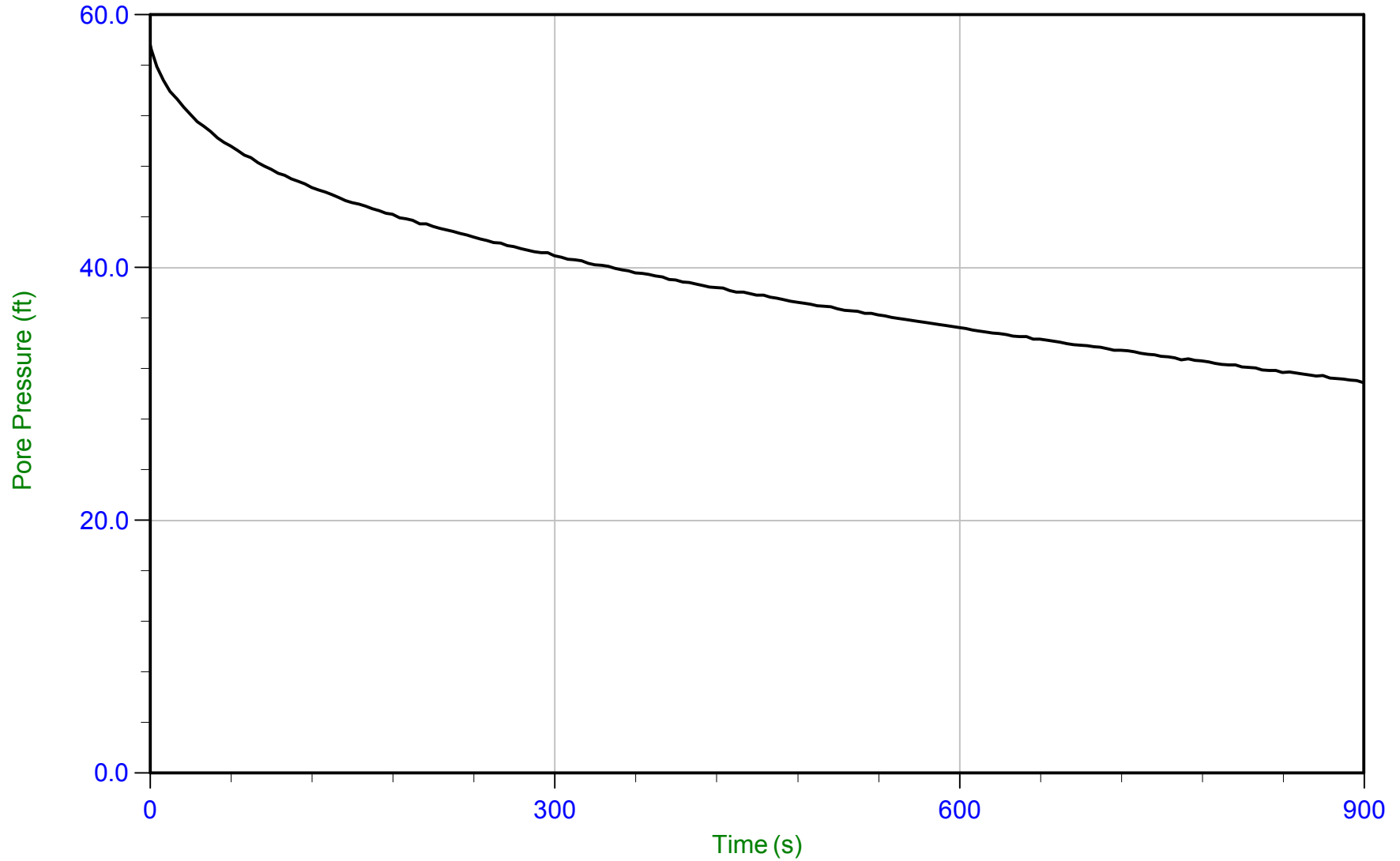
Cone: AD521 Area=15 cm<sup>2</sup>



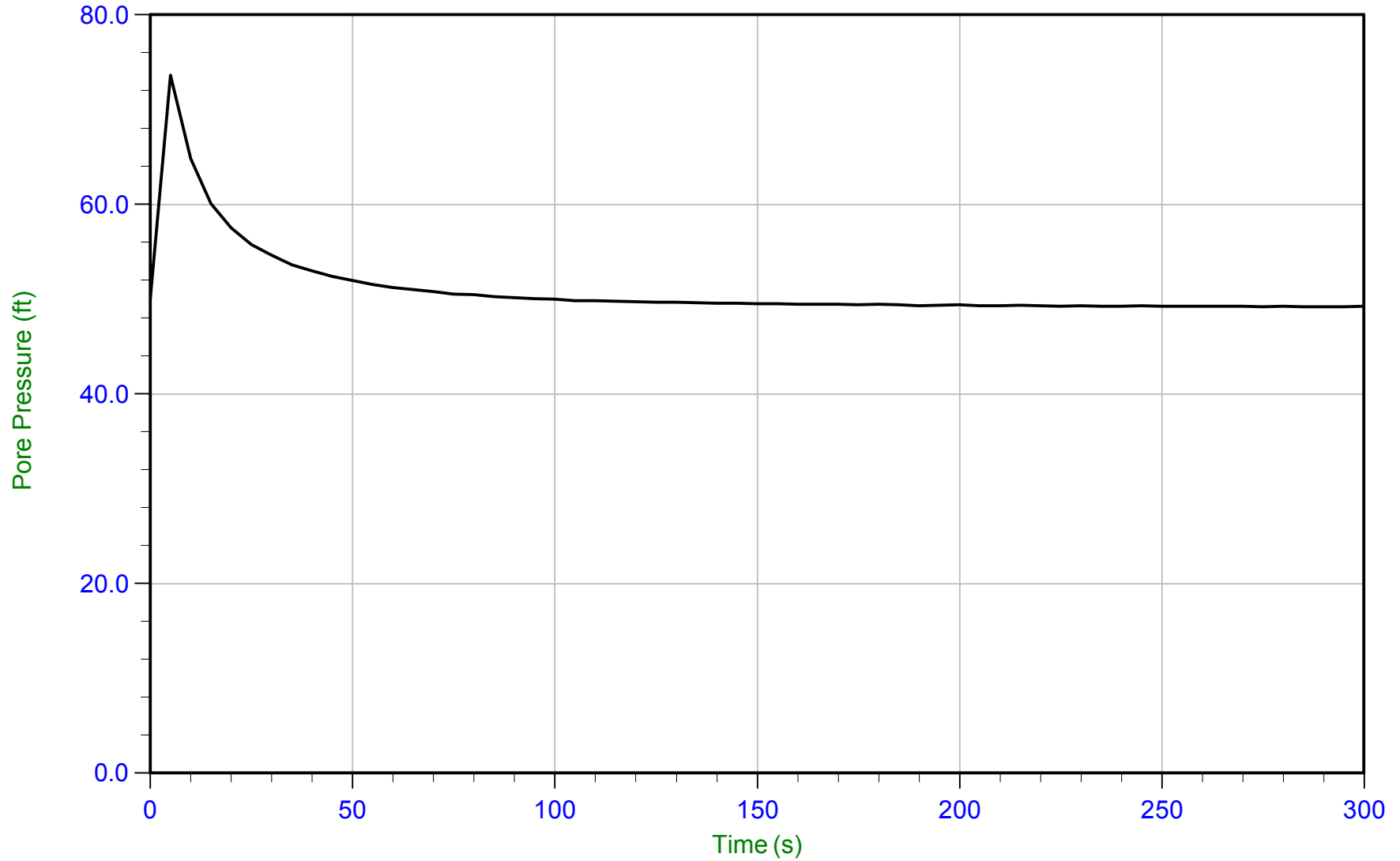
Trace Summary: Filename: 18-53065\_CP203.PPD  
Depth: 18.300 m / 60.039 ft  
Duration: 200.0 s

U Min: -15.0 ft  
U Max: 45.8 ft

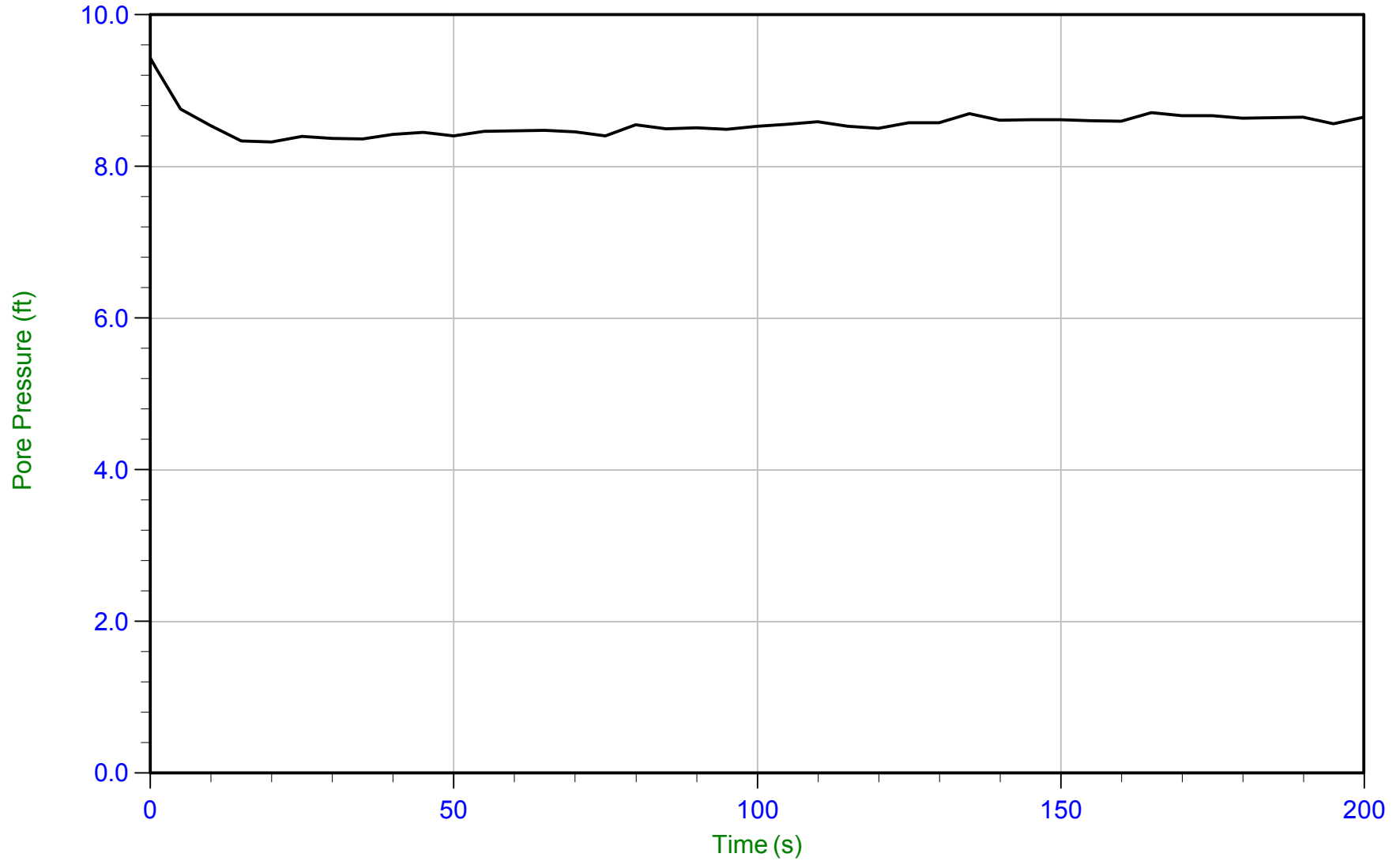
WT: 4.379 m / 14.367 ft  
Ueq: 45.7 ft



Trace Summary:	Filename: 18-53065_SP205.PPD	U Min: 30.9 ft	WT: 0.914 m / 3.000 ft	T(50): 475.9 s
	Depth: 6.100 m / 20.013 ft	U Max: 57.6 ft	Ueq: 17.0 ft	Ir: 100
	Duration: 900.0 s		U(50): 37.31 ft	Ch: 1.5 cm <sup>2</sup> /min



Trace Summary: Filename: 18-53065\_SP205.PPD      U Min: 49.2 ft      WT: 5.276 m / 17.310 ft  
Depth: 20.350 m / 66.764 ft      U Max: 73.6 ft      Ueq: 49.5 ft  
Duration: 300.0 s



Trace Summary:      Filename: 18-53065\_CP209.PPD      U Min: 8.3 ft      WT: 1.084 m / 3.556 ft  
                         Depth: 3.700 m / 12.139 ft      U Max: 9.4 ft      Ueq: 8.6 ft  
                         Duration: 200.0 s



HNTB

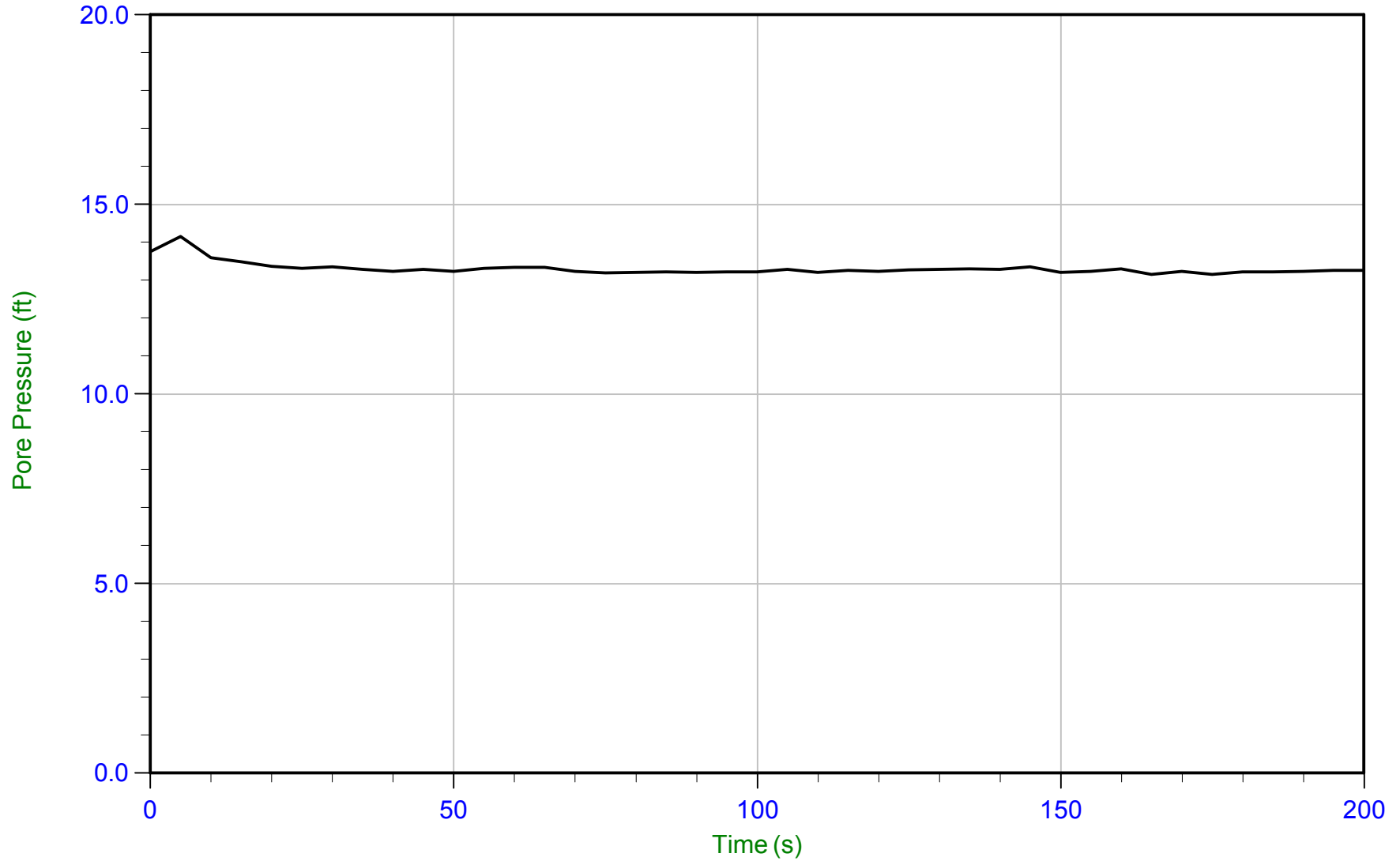
Job No: 18-53065

Date: 05-Jun-2018 11:15:21

Site: Exit 45, Maine Turnpike, Scarborough, ME

Sounding: CPT18-209

Cone: AD521 Area=15 cm<sup>2</sup>



Trace Summary: Filename: 18-53065\_CP209.PPD  
Depth: 5.200 m / 17.060 ft  
Duration: 200.0 s

U Min: 13.2 ft  
U Max: 14.2 ft

WT: 1.143 m / 3.750 ft  
Ueq: 13.3 ft





HNTB

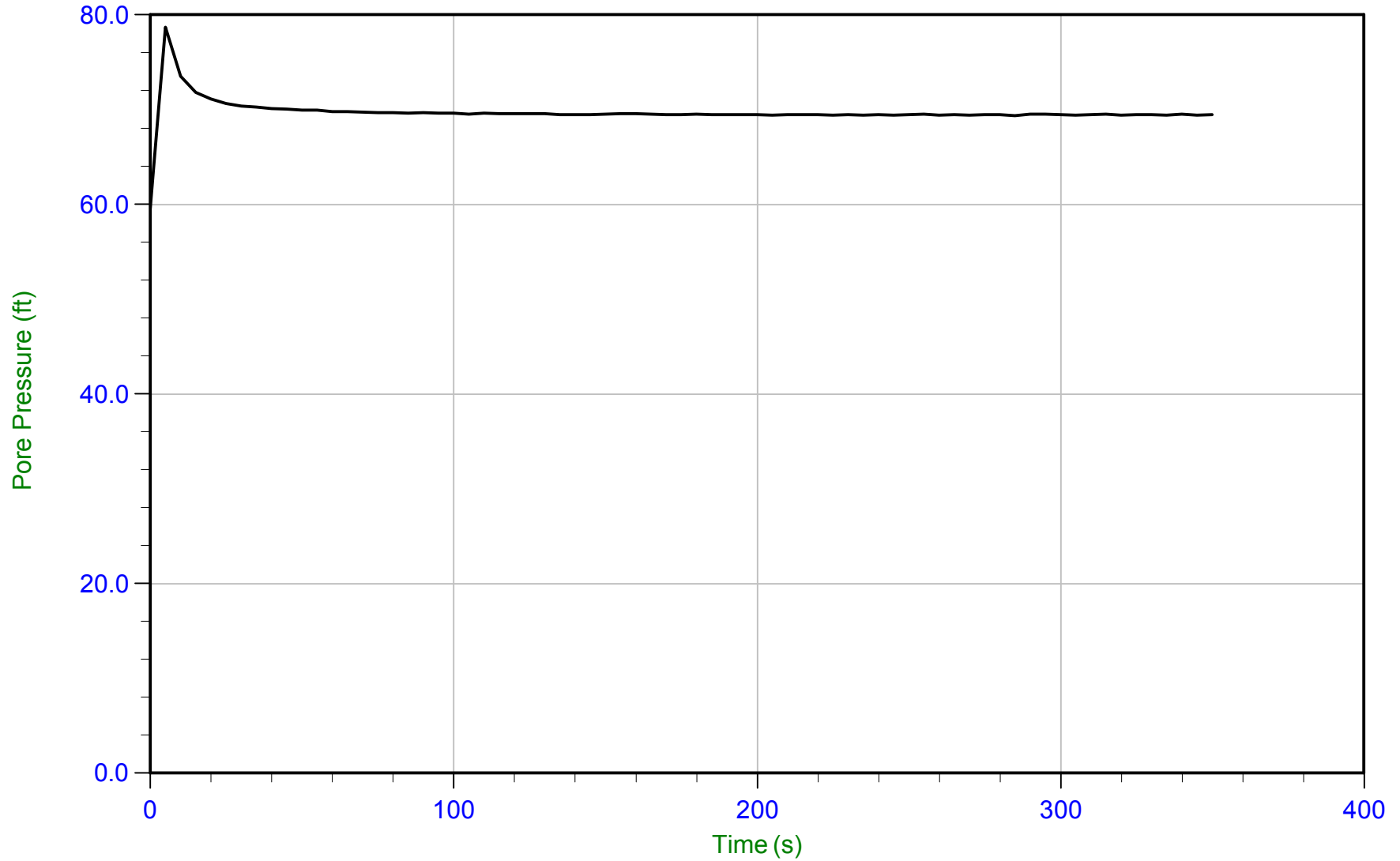
Job No: 18-53065

Date: 05-Jun-2018 11:15:21

Site: Exit 45, Maine Turnpike, Scarborough, ME

Sounding: CPT18-209

Cone: AD521 Area=15 cm<sup>2</sup>



Trace Summary: Filename: 18-53065\_CP209.PPD U Min: 59.6 ft WT: 6.008 m / 19.711 ft  
Depth: 27.200 m / 89.238 ft U Max: 78.7 ft Ueq: 69.5 ft  
Duration: 350.0 s

## Flat Plate Dilatometer Test Plots and Tabular Results



Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
 Sounding ID: DMT18-203  
 Date: 06-Jun-2018  
 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
 Northing (m): 4831813  
 Easting (m): 391624  
 Elevation (ft):  
 Ground Water Depth (ft): 14.3  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**

Depth <sup>1</sup> (ft)	A (bar)	B (bar)	C (bar)	ΔA (bar)	ΔB (bar)	p <sub>0</sub> (bar)	p <sub>1</sub> (bar)	p <sub>2</sub> (bar)	u <sub>0</sub> (psf)	V <sub>1</sub> <sup>2</sup> (pcf)	σ <sub>v0</sub> (psf)	σ <sub>v0</sub> <sup>4</sup> (psf)	I <sub>b</sub>	K <sub>D</sub>	E <sub>D</sub> (ksf)	K <sub>0</sub>	OCR <sup>3</sup>	OCR <sup>4</sup>	φ <sup>4</sup> (deg)	R <sub>M</sub>	S <sub>v</sub> <sup>4</sup> (psf)	S <sub>v</sub> <sup>5</sup> (psf)	M (ksf)
1.00	0.75	4.20		0.15	0.20	0.75	4.00		0.00	104.06	104.07	104.07	4.37	14.95	235.90				42.25	2.88			679.58
2.00	3.20	8.90		0.15	0.20	3.08	8.70		0.00	114.81	218.88	218.88	1.82	29.41	407.11				44.91	3.52			1433.62
3.00	1.75	5.60		0.15	0.20	1.73	5.40		0.00	109.18	328.07	328.07	2.13	10.98	266.34				40.92	2.59			689.45
4.00	2.65	7.65		0.15	0.20	2.57	7.45		0.00	112.97	441.04	441.04	1.90	12.16	353.85				41.37	2.69			950.09
5.00	5.15	15.60		0.15	0.20	4.80	15.40		0.00	121.16	562.21	562.21	2.21	17.81	768.57				42.98	3.05			2341.52
6.00	4.95	9.60		0.15	0.20	4.89	9.40		0.00	116.20	678.42	678.42	0.92	15.04	327.21	2.35	7.65	23.27	2.89	1858.42	1020.25		944.44
7.00	3.25	6.90		0.15	0.20	3.24	6.70		0.00	112.34	790.77	790.77	1.07	8.54	251.12	1.67	4.35	9.63	2.34	1068.49	675.64		588.51
8.00	3.40	5.30		0.15	0.20	3.47	5.10		0.00	108.55	899.33	899.33	0.47	8.06	117.95	1.60	4.10	8.80	2.28	1130.48	725.25		268.86
9.00	2.85	3.75		0.15	0.20	2.97	3.55		0.00	102.28	1001.62	1001.62	0.19	6.20	41.85	1.35	3.15	5.84	2.01	906.08	620.82		84.11
10.00	2.35	3.25		0.15	0.20	2.47	3.05		0.00	101.34	1102.96	1102.96	0.23	4.68	41.85	1.11	2.38	3.77	1.72	702.62	516.39		72.08
11.00	2.20	3.15		0.15	0.20	2.32	2.95		0.00	101.46	1204.43	1204.43	0.27	4.02	45.66	0.99	2.05	2.98	1.57	634.75	484.54		71.53
12.00	1.95	2.35		0.15	0.20	2.10	2.15		0.00	89.15	1293.59	1293.59	0.03	3.39	3.80	0.87	1.72	2.27	1.39	549.69	438.07		5.29
13.00	1.90	2.50		0.15	0.20	2.04	2.30		0.00	96.48	1390.08	1390.08	0.13	3.06	19.02	0.80	1.56	1.94	1.29	520.66	425.54		24.48
14.00	2.00	2.65		0.15	0.20	2.14	2.45		0.00	97.59	1487.68	1487.68	0.15	3.00	22.83	0.78	1.53	1.88	1.27	542.70	445.90		28.88
15.00	1.80	2.30		0.15	0.20	1.94	2.10		41.37	93.78	1581.46	1540.09	0.08	2.61	11.41	0.70	1.33	1.51	1.12	472.00	401.56		12.81
16.00	1.90	2.35		0.15	0.20	2.05	2.15		103.80	92.07	1673.54	1569.73	0.05	2.65	7.61	0.71	1.35	1.56	1.14	492.03	416.73		8.68
17.00	2.20	2.75		0.15	0.20	2.34	2.55		166.23	95.91	1769.45	1603.22	0.09	2.94	15.22	0.77	1.50	1.83	1.25	572.04	472.10		18.98
18.00	2.10	2.60		0.15	0.20	2.24	2.40		228.66	94.27	1863.73	1635.06	0.07	2.72	11.41	0.72	1.39	1.62	1.17	529.42	445.49		13.32
19.00	2.30	2.95		0.15	0.20	2.44	2.75		291.10	97.95	1961.68	1670.59	0.14	2.87	22.83	0.76	1.46	1.76	1.22	577.23	479.45		27.86
20.00	2.30	2.80		0.15	0.20	2.44	2.60		353.53	94.57	2056.26	1702.73	0.07	2.79	11.41	0.74	1.42	1.68	1.19	567.49	474.77		13.59
21.00	2.30	2.75		0.15	0.20	2.45	2.55		415.96	92.61	2148.88	1732.92	0.05	2.71	7.61	0.72	1.38	1.60	1.16	556.50	469.05		8.83
22.00	2.40	2.90		0.15	0.20	2.54	2.70		478.39	94.65	2243.53	1765.15	0.07	2.74	11.41	0.73	1.39	1.63	1.17	574.87	483.17		13.38
23.00	2.55	3.15		0.15	0.20	2.69	2.95		540.82	97.33	2340.87	1800.06	0.11	2.82	19.02	0.74	1.43	1.71	1.20	607.86	507.21		22.86
24.00	2.60	3.15		0.15	0.20	2.74	2.95		603.25	96.30	2437.18	1833.93	0.09	2.79	15.22	0.74	1.42	1.68	1.19	612.08	511.94		18.14
25.00	2.55	3.15		0.15	0.20	2.69	2.95		665.68	97.21	2534.40	1868.72	0.11	2.65	19.02	0.71	1.35	1.55	1.14	583.72	494.73		21.65
26.00	2.55	3.10		0.15	0.20	2.69	2.90		728.11	96.08	2630.49	1902.38	0.09	2.57	15.22	0.69	1.31	1.48	1.11	572.74	489.01		16.86
27.00	2.55	3.10		0.15	0.20	2.69	2.90		790.54	96.02	2726.51	1935.97	0.09	2.49	15.22	0.67	1.27	1.41	1.08	561.15	482.76		16.38
28.00	2.60	3.15		0.15	0.20	2.74	2.95		852.97	96.06	2822.58	1969.61	0.09	2.47	15.22	0.66	1.26	1.39	1.07	564.82	486.96		16.25
29.00	2.70	3.25		0.15	0.20	2.84	3.05		915.40	96.20	2918.78	2003.39	0.09	2.50	15.22	0.67	1.27	1.42	1.08	583.64	501.61		16.45
30.00	2.90	3.45		0.15	0.20	3.04	3.25		977.83	96.53	3015.32	2037.49	0.08	2.64	15.22	0.70	1.34	1.54	1.13	633.09	537.13		17.25
31.00	3.05	3.70		0.15	0.20	3.19	3.50		1040.26	98.72	3114.05	2073.80	0.12	2.71	22.83	0.72	1.38	1.60	1.16	665.76	561.18		26.49
32.00	3.40	4.15		0.15	0.20	3.53	3.95		1102.69	100.71	3214.77	2112.08	0.14	2.97	30.44	0.78	1.51	1.85	1.26	761.26	626.99		38.21
33.00	3.25	3.90		0.15	0.20	3.39	3.70		1165.12	98.97	3313.75	2148.64	0.11	2.75	22.83	0.73	1.40	1.64	1.18	703.21	590.46		26.85
34.00	3.45	4.05		0.15	0.20	3.59	3.85		1227.55	98.37	3412.13	2184.58	0.09	2.87	19.02	0.76	1.46	1.75	1.22	754.14	626.51		23.21
35.00	3.45	4.05		0.15	0.20	3.59	3.85		1289.98	98.32	3510.45	2220.48	0.09	2.79	19.02	0.74	1.42	1.68	1.19	741.73	620.27		22.69
36.00	3.50	4.15		0.15	0.20	3.64	3.95		1352.41	99.25	3609.71	2257.30	0.11	2.76	22.83	0.73	1.41	1.66	1.18	744.17	623.94		26.99
37.00	3.50	4.10		0.15	0.20	3.64	3.90		1414.84	98.30	3708.02	2293.18	0.09	2.70	19.02	0.72	1.37	1.59	1.16	732.75	618.22		22.00
38.00	3.70	4.35		0.15	0.20	3.84	4.15		1477.27	99.48	3807.50	2330.23	0.10	2.80	22.83	0.74	1.43	1.69	1.20	781.84	653.23		27.31
39.00	3.90	4.60		0.15	0.20	4.03	4.40		1539.70	100.51	3908.02	2368.32	0.11	2.91	26.63	0.76	1.48	1.79	1.23	831.18	688.24		32.85
40.00	3.85	4.50		0.15	0.20	3.99	4.30		1602.13	99.62	4007.64	2405.51	0.10	2.79	22.83	0.74	1.42	1.68	1.19	803.72	672.07		27.24
41.00	4.00	4.65		0.15	0.20	4.14	4.45		1664.56	99.80	4107.45	2442.89	0.09	2.85	22.83	0.75	1.45	1.74	1.21	838.15	697.16		27.73
42.00	3.90	4.50		0.15	0.20	4.04	4.30		1726.99	98.70	4206.16	2479.17	0.08	2.70	19.02	0.72	1.38	1.60	1.16	795.42	670.55		22.06
43.00	4.10	4.75		0.15	0.20	4.24	4.55		1789.42	99.86	4306.03	2516.61	0.09	2.80	22.83	0.74	1.43	1.69	1.20	844.49	705.56		27.32
44.00	4.20	4.95		0.15	0.20	4.33	4.75		1851.85	101.40	4407.44	2555.59	0.12	2.81	30.44	0.74	1.43	1.70	1.20	861.57	719.15		36.54
45.00	4.40	5.15		0.15	0.20	4.53	4.95		1914.28	101.65	4509.09	2594.81	0.12	2.91	30.44	0.77	1.48	1.79	1.23	911.62	754.68		37.57
46.00	4.45	5.15		0.15	0.20	4.58	4.95		1976.71	101.00	4610.10	2633.39	0.10	2.88	26.63	0.76	1.47	1.77	1.23	915.37	759.40		32.64
47.00	4.75	5.50		0.15	0.20	4.88	5.30		2039.14	102.04	4712.15	2673.01	0.11	3.05	30.44	0.80	1.55	1.93	1.28	996.62	815.30		39.05
48.00	4.70	5.40		0.15	0.20	4.83	5.20		2101.57	101.26	4813.42	2711.85	0.10	2.95	26.63	0.77	1.50	1.83	1.25	968.48	799.13		33.23
49.00	4.85	5.60		0.15	0.20	4.98	5.40		2164.00	102.09	4915.52	2751.52	0.11	2.99	30.44	0.78	1.52	1.88	1.26	1002.19	823.69		38.47
50.00	4.95	5.70		0.15	0.20	5.08	5.50		2226.43	102.18	5017.72	2791.28	0.10	3.00	30.44	0.79	1.53	1.89	1.27	1020.84	838.34		38.57

1. Depth is referenced below the existing ground surface at the time of testing.  
 2. Mayne et al., 2002



Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
 Sounding ID: DMT18-203  
 Date: 06-Jun-2018  
 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
 Northing (m): 4831813  
 Easting (m): 391624  
 Elevation (ft):  
 Ground Water Depth (ft): 14.3  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**

Depth <sup>1</sup> (ft)	A (bar)	B (bar)	C (bar)	$\Delta A$ (bar)	$\Delta B$ (bar)	$p_0$ (bar)	$p_1$ (bar)	$p_2$ (bar)	$u_0$ (psf)	$v_1^2$ (pcf)	$\sigma_{v0}$ (psf)	$\sigma_{v0}^*$ (psf)	$I_D$	$K_0$	$E_D$ (ksf)	$K_0$	OCR <sup>3</sup>	OCR <sup>4</sup>	$\phi^*$ (deg)	$R_M$	$s_v^4$ (psf)	$s_v^5$ (psf)	M (ksf)
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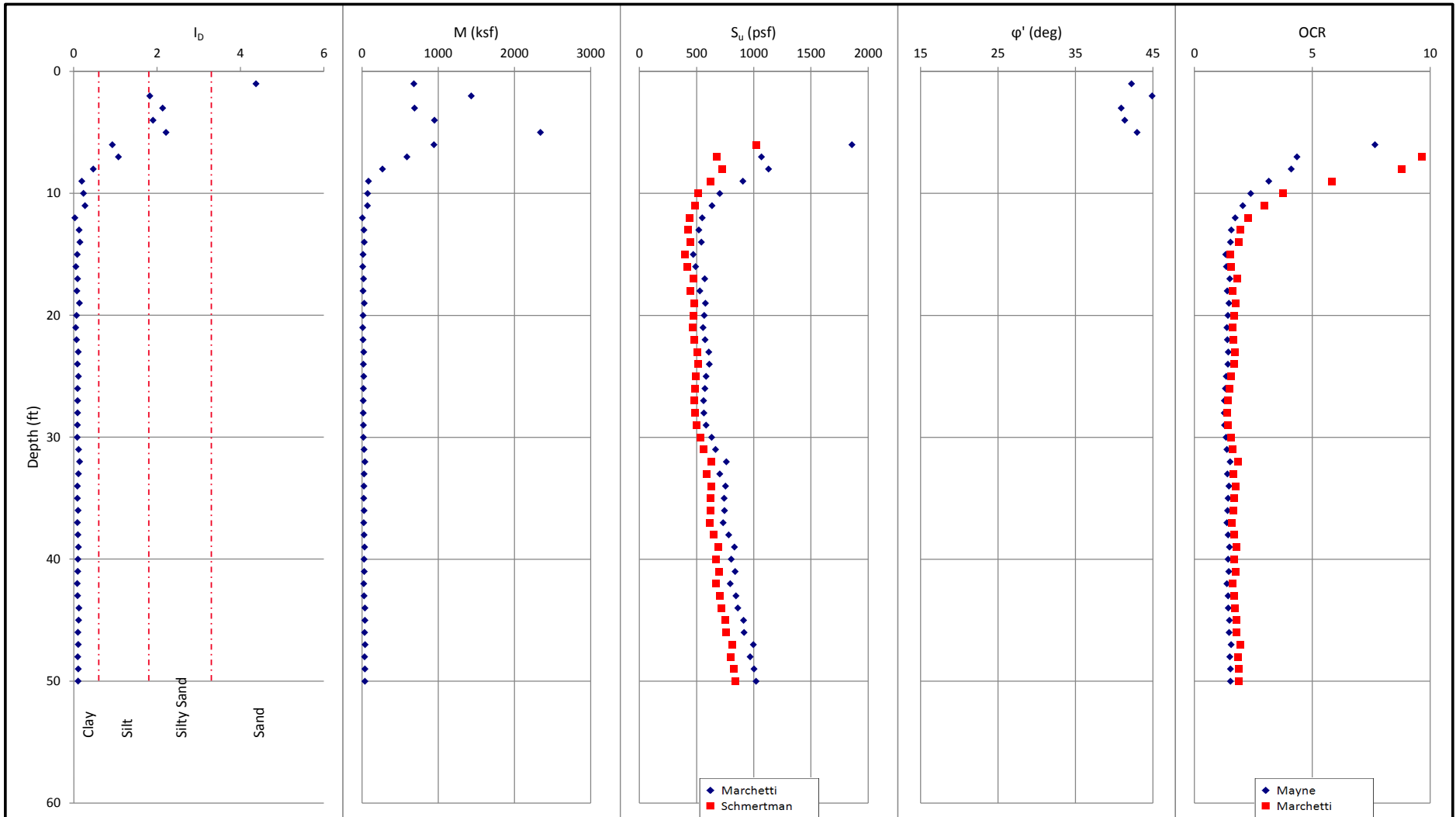
- 3. Mayne, 1995
- 4. Marchetti et al., 2001
- 5. Schmertman, 1991



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 Easting (m): 391624  
 Elevation (ft):  
 Ground Water Depth (ft): 14.3  
 Gauge Zero Offset (bar): 0

### FLAT PLATE DILATOMETER TEST RESULTS

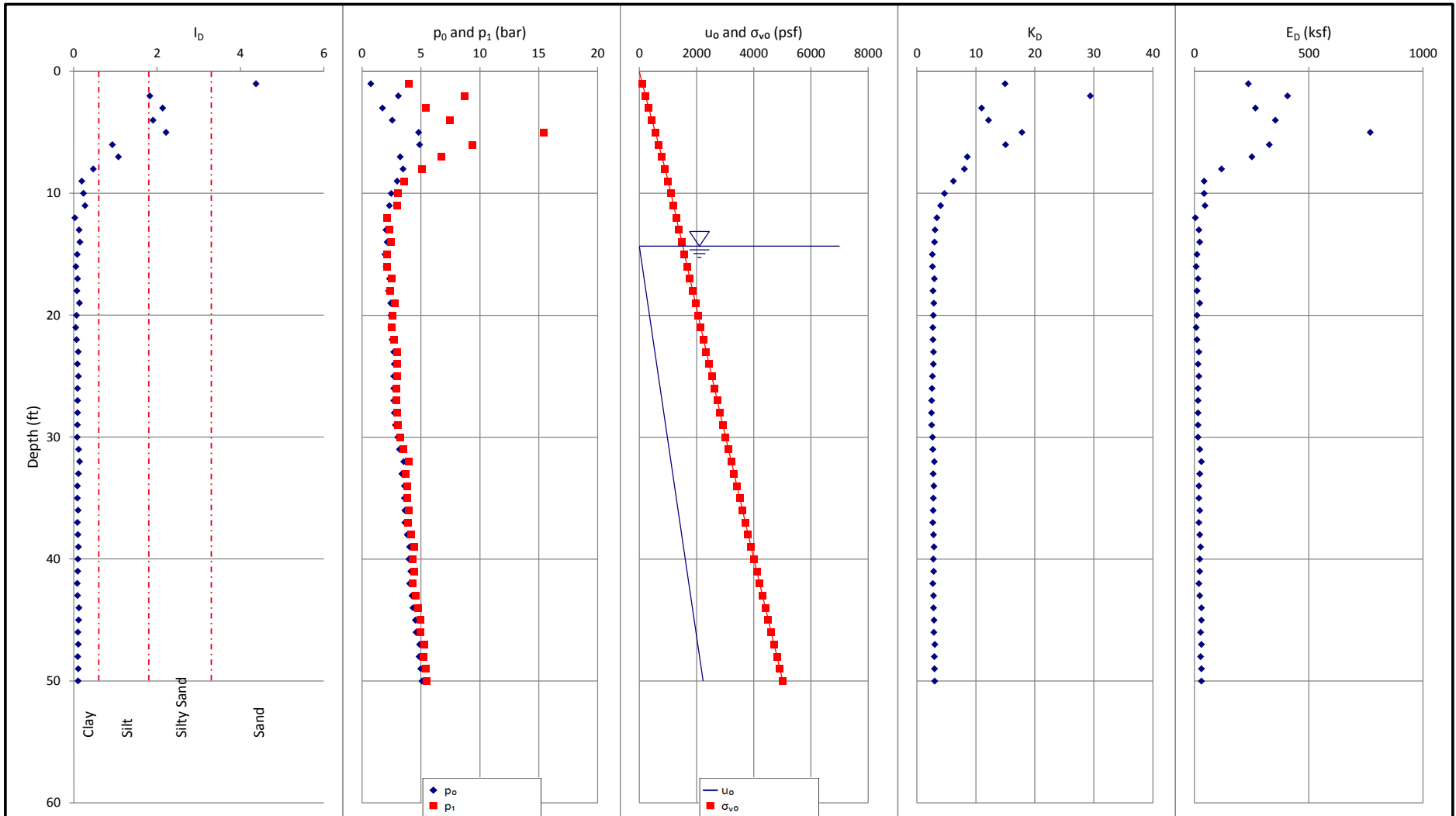




Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
 Sounding ID: DMT18-203  
 Date: 06-Jun-2018  
 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
 Northing (m): 4831813  
 Easting (m): 391624  
 Elevation (ft):  
 Ground Water Depth (ft): 14.3  
 Gauge Zero Offset (bar): 0

### FLAT PLATE DILATOMETER TEST RESULTS





Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
 Sounding ID: DMT18-205  
 Date: 06-Jun-2018  
 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
 Northing (m): 4831828  
 Easting (m): 391570  
 Elevation (ft):  
 Ground Water Depth (ft): 17.3  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**

Depth <sup>1</sup> (ft)	A (bar)	B (bar)	C (bar)	ΔA (bar)	ΔB (bar)	p <sub>0</sub> (bar)	p <sub>1</sub> (bar)	p <sub>2</sub> (bar)	u <sub>0</sub> (psf)	v <sub>1</sub> <sup>2</sup> (pcf)	σ <sub>v0</sub> (psf)	σ <sub>v0'</sub> (psf)	l <sub>b</sub>	K <sub>0</sub>	E <sub>d</sub> (ksf)	K <sub>0</sub>	OCR <sup>3</sup>	OCR <sup>4</sup>	φ <sup>4</sup> (deg)	R <sub>M</sub>	S <sub>v</sub> <sup>4</sup> (psf)	S <sub>v</sub> <sup>5</sup> (psf)	M (ksf)
8.00	1.05	1.80		0.15	0.20	1.18	1.60		0.00	96.12	768.99	768.99	0.36	3.20	30.44	0.83	1.63	2.09		1.33	305.01	246.45	40.60
9.00	1.40	2.00		0.15	0.20	1.54	1.80		0.00	95.13	864.13	864.13	0.17	3.72	19.02	0.93	1.89	2.63		1.49	412.40	321.11	28.26
10.00	3.30	8.10		0.15	0.20	3.23	7.90		0.00	114.01	978.16	978.16	1.45	6.89	338.63					2.14			724.31
11.00	3.55	5.40		0.15	0.20	3.63	5.20		0.00	108.61	1086.77	1086.77	0.43	6.97	114.14	1.46	3.55	7.01		2.13	1137.73	757.10	243.07
12.00	2.85	4.00		0.15	0.20	2.96	3.80		0.00	104.19	1190.97	1190.97	0.28	5.19	60.88	1.19	2.64	4.43		1.83	863.14	618.21	111.28
13.00	2.60	3.75		0.15	0.20	2.71	3.55		0.00	103.73	1294.71	1294.71	0.31	4.37	60.88	1.05	2.23	3.39		1.65	757.02	566.00	100.56
14.00	1.96	2.60		0.15	0.20	2.10	2.40		0.00	97.34	1392.05	1392.05	0.15	3.14	22.07	0.82	1.60	2.03		1.31	539.06	437.65	29.00
15.00	1.55	2.05		0.15	0.20	1.69	1.85		0.00	93.18	1485.24	1485.24	0.09	2.38	11.41	0.64	1.21	1.31		1.03	406.12	353.49	11.74
16.00	1.65	2.15		0.15	0.20	1.79	1.95		0.00	93.45	1578.70	1578.70	0.09	2.37	11.41	0.64	1.21	1.30		1.03	429.72	374.37	11.70
17.00	1.65	2.30		0.15	0.20	1.79	2.10		0.00	96.72	1675.43	1675.43	0.18	2.23	22.83	0.60	1.13	1.18		0.96	421.17	372.80	21.91
18.00	1.80	2.30		0.15	0.20	1.94	2.10		43.09	93.78	1769.21	1726.12	0.08	2.33	11.41	0.63	1.18	1.27		1.00	458.49	401.39	11.47
19.00	1.55	2.05		0.15	0.20	1.69	1.85		105.53	93.04	1862.26	1756.74	0.10	1.95	11.41	0.53	0.99	0.96		0.85	374.95	342.93	9.70
20.00	1.75	2.25		0.15	0.20	1.89	2.05		167.96	93.50	1955.77	1787.81	0.09	2.12	11.41	0.58	1.08	1.09		0.91	422.26	378.46	10.37
21.00	1.95	2.50		0.15	0.20	2.09	2.30		230.39	95.28	2051.05	1820.67	0.11	2.27	15.22	0.62	1.16	1.22		0.98	469.49	413.47	14.92
22.00	2.10	2.55		0.15	0.20	2.25	2.35		292.82	92.31	2143.37	1850.56	0.05	2.38	7.61	0.64	1.21	1.31		1.03	504.81	439.60	7.81
23.00	2.20	2.70		0.15	0.20	2.34	2.50		355.25	94.35	2237.73	1882.49	0.07	2.41	11.41	0.65	1.23	1.34		1.04	522.92	453.72	11.89
24.00	2.15	2.70		0.15	0.20	2.29	2.50		417.68	95.53	2333.27	1915.60	0.10	2.28	15.22	0.62	1.16	1.23		0.98	496.08	436.51	14.98
25.00	2.25	2.80		0.15	0.20	2.39	2.60		480.11	95.69	2428.97	1948.87	0.10	2.31	15.22	0.63	1.18	1.26		1.00	514.75	451.15	15.22
26.00	2.40	2.95		0.15	0.20	2.54	2.75		542.54	95.95	2524.93	1982.39	0.09	2.40	15.22	0.65	1.22	1.33		1.04	548.42	476.24	15.80
27.00	2.55	3.10		0.15	0.20	2.69	2.90		604.97	96.20	2621.14	2016.17	0.09	2.49	15.22	0.67	1.27	1.40		1.07	582.30	501.32	16.34
28.00	2.60	3.15		0.15	0.20	2.74	2.95		667.40	96.24	2717.38	2049.98	0.09	2.47	15.22	0.66	1.26	1.39		1.07	585.97	505.52	16.21
29.00	2.65	3.15		0.15	0.20	2.79	2.95		729.83	94.91	2812.30	2082.47	0.06	2.45	11.41	0.66	1.25	1.37		1.06	590.49	510.24	12.08
30.00	2.90	3.50		0.15	0.20	3.04	3.30		792.26	97.77	2910.08	2117.82	0.10	2.62	19.02	0.70	1.33	1.53		1.13	653.42	555.17	21.45
31.00	3.00	3.60		0.15	0.20	3.14	3.40		854.69	97.90	3007.99	2153.30	0.10	2.65	19.02	0.71	1.35	1.55		1.14	672.24	569.81	21.64
32.00	3.10	3.65		0.15	0.20	3.24	3.45		917.12	96.94	3104.94	2187.82	0.07	2.67	15.22	0.71	1.36	1.57		1.15	691.92	584.98	17.47
33.00	3.20	3.80		0.15	0.20	3.34	3.60		979.55	98.15	3203.09	2223.55	0.09	2.69	19.02	0.72	1.37	1.59		1.16	709.98	599.10	21.99
34.00	3.20	3.85		0.15	0.20	3.34	3.65		1041.98	98.99	3302.09	2260.11	0.11	2.62	22.83	0.70	1.33	1.52		1.13	697.12	592.33	25.74
35.00	3.40	4.05		0.15	0.20	3.54	3.85		1104.41	99.28	3401.38	2296.97	0.10	2.73	22.83	0.73	1.39	1.63		1.17	746.75	627.86	26.72
36.00	3.55	4.25		0.15	0.20	3.68	4.05		1166.84	100.24	3501.63	2334.79	0.12	2.79	26.63	0.74	1.42	1.68		1.19	780.25	652.42	31.78
37.00	3.75	4.45		0.15	0.20	3.88	4.25		1229.27	100.51	3602.14	2372.87	0.11	2.90	26.63	0.76	1.48	1.78		1.23	830.35	687.95	32.79
38.00	3.80	4.45		0.15	0.20	3.94	4.25		1291.70	99.77	3701.91	2410.21	0.09	2.87	22.83	0.76	1.46	1.76		1.22	834.22	692.67	27.90
39.00	3.90	4.60		0.15	0.20	4.03	4.40		1354.13	100.64	3802.56	2448.43	0.11	2.89	26.63	0.76	1.47	1.77		1.23	852.17	706.79	32.67
40.00	3.85	4.40		0.15	0.20	3.99	4.20		1416.56	97.76	3900.33	2483.77	0.06	2.78	15.22	0.74	1.42	1.68		1.19	826.48	691.67	18.11
41.00	3.90	4.55		0.15	0.20	4.04	4.35		1478.99	99.78	4000.12	2521.13	0.09	2.76	22.83	0.73	1.40	1.65		1.18	828.10	694.83	26.92
42.00	4.00	4.60		0.15	0.20	4.14	4.40		1541.42	98.98	4099.11	2557.69	0.08	2.78	19.02	0.74	1.41	1.67		1.19	847.70	709.99	22.57
43.00	3.95	4.60		0.15	0.20	4.09	4.40		1603.85	99.77	4198.89	2595.04	0.09	2.67	22.83	0.71	1.36	1.57		1.15	819.12	692.79	26.17
44.00	3.85	4.45		0.15	0.20	3.99	4.25		1666.28	98.67	4297.57	2631.29	0.08	2.53	19.02	0.68	1.29	1.44		1.09	777.29	666.18	20.78
45.00	4.00	4.60		0.15	0.20	4.14	4.40		1728.71	98.85	4396.43	2667.72	0.08	2.59	19.02	0.69	1.32	1.50		1.12	811.25	691.26	21.23
46.00	4.05	4.60		0.15	0.20	4.19	4.40		1791.14	97.79	4494.22	2703.08	0.06	2.57	15.22	0.69	1.31	1.48		1.11	815.49	695.99	16.88
47.00	4.25	4.90		0.15	0.20	4.39	4.70		1853.57	100.03	4594.26	2740.69	0.09	2.67	22.83	0.71	1.36	1.57		1.14	863.32	730.47	26.13
48.00	4.25	4.90		0.15	0.20	4.39	4.70		1916.00	99.99	4694.26	2778.26	0.09	2.61	22.83	0.70	1.33	1.51		1.12	851.21	724.23	25.61
49.00	4.30	5.00		0.15	0.20	4.43	4.80		1978.43	100.79	4795.06	2816.63	0.11	2.58	26.63	0.69	1.32	1.49		1.11	853.68	727.90	29.65
50.00	4.50	5.20		0.15	0.20	4.63	5.00		2040.86	101.03	4896.10	2855.23	0.10	2.67	26.63	0.71	1.36	1.57		1.15	903.00	763.43	30.58

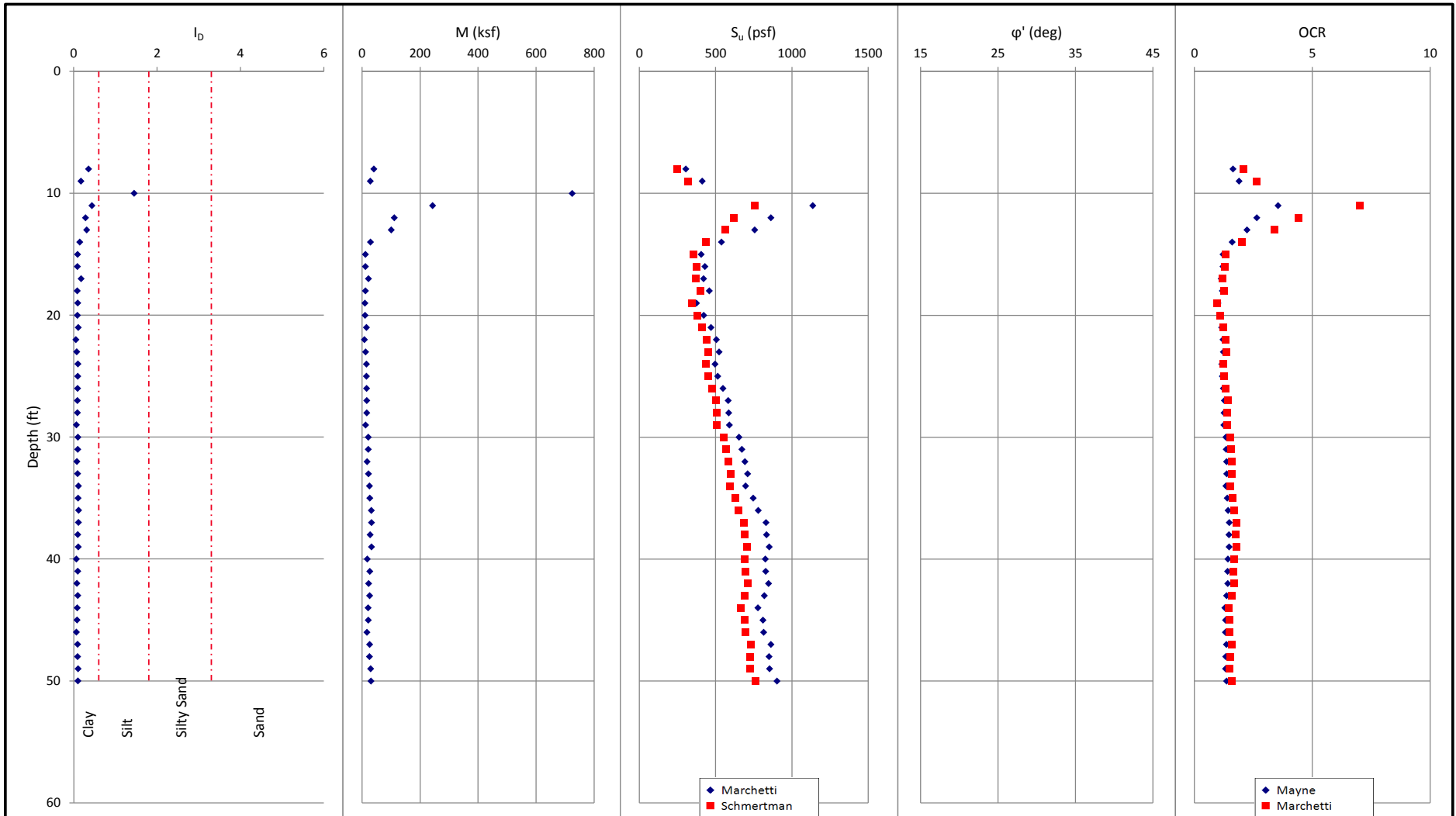
1. Depth is referenced below the existing ground surface at the time of testing.  
 2. Mayne et al., 2002  
 3. Mayne, 1995  
 4. Marchetti et al., 2001  
 5. Schmertman, 1991



Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
 Sounding ID: DMT18-205  
 Date: 06-Jun-2018  
 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
 Northing (m): 4831828  
 Easting (m): 391570  
 Elevation (ft):  
 Ground Water Depth (ft): 17.3  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**



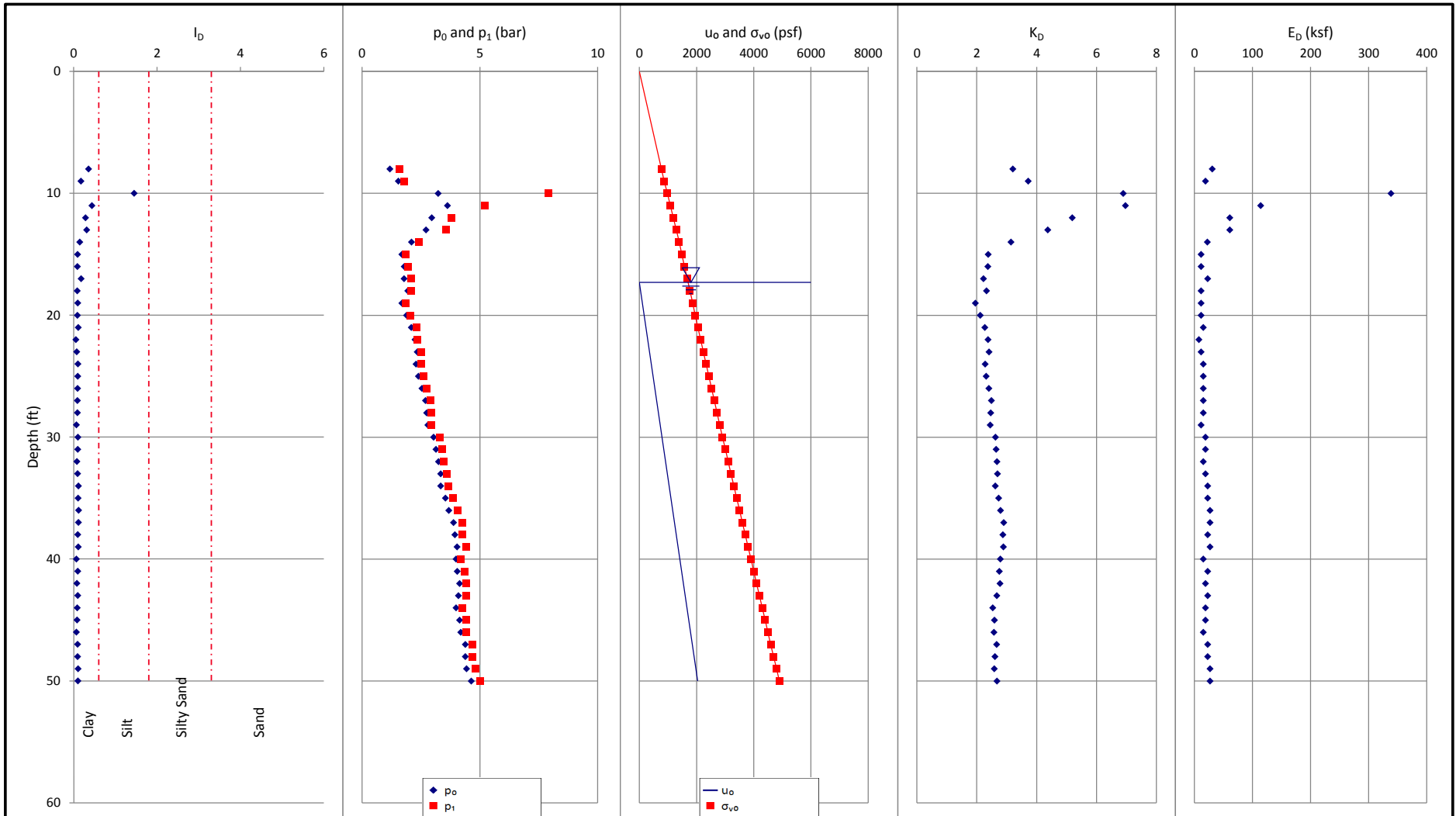




Job No: 18-53065  
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 Ground Water Depth (ft): 17.3  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**





Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
 Sounding ID: DMT18-209  
 Date: 07-Jun-2018  
 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
 Northing (m): 4831863  
 Easting (m): 391418  
 Elevation (ft):  
 Ground Water Depth (ft): 19.7  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**

Depth <sup>1</sup> (ft)	A (bar)	B (bar)	C (bar)	ΔA (bar)	ΔB (bar)	p <sub>0</sub> (bar)	p <sub>1</sub> (bar)	p <sub>2</sub> (bar)	u <sub>0</sub> (psf)	V <sub>1</sub> <sup>2</sup> (pcf)	σ <sub>v0</sub> (psf)	σ <sub>v0</sub> <sup>4</sup> (psf)	l <sub>0</sub>	K <sub>0</sub>	E <sub>0</sub> (ksf)	K <sub>0</sub>	OCR <sup>3</sup>	OCR <sup>4</sup>	φ <sup>4</sup> (deg)	R <sub>M</sub>	S <sub>v</sub> <sup>4</sup> (psf)	S <sub>v</sub> <sup>5</sup> (psf)	M (ksf)
1.00	0.40	1.80		0.15	0.20	0.50	1.60		0.00	96.60	96.61	96.61	2.22	10.75	79.90				40.83	2.57			205.26
4.00	3.45	11.80		0.15	0.20	3.20	11.60		0.00	117.36	448.71	448.71	2.63	14.89	608.77				42.24	2.88			1751.55
5.00	2.60	8.80		0.15	0.20	2.46	8.60		0.00	114.02	562.74	562.74	2.50	9.12	445.16				40.08	2.42			1075.98
6.00	1.85	6.35		0.15	0.20	1.79	6.15		0.00	110.33	673.08	673.08	2.43	5.56	315.80				37.71	1.97			621.72
7.00	2.30	7.60		0.15	0.20	2.20	7.40		0.00	112.45	785.54	785.54	2.36	5.86	376.68				37.97	2.01			758.20
8.00	3.20	9.60		0.15	0.20	3.05	9.40		0.00	115.45	901.00	901.00	2.08	7.06	460.38				38.88	2.18			1002.44
9.00	1.70	4.60		0.15	0.20	1.72	4.40		0.00	107.46	1008.46	1008.46	1.55	3.57	194.04				15.1	1.51			292.55
10.00	1.85	5.90		0.15	0.20	1.82	5.70		0.00	109.76	1118.23	1118.23	2.14	3.39	281.56				35.15	1.50			422.28
11.00	4.25	14.20		0.15	0.20	3.92	14.00		0.00	119.64	1237.88	1237.88	2.57	6.61	730.52				38.56	2.13			1555.54
12.00	1.70	4.45		0.15	0.20	1.73	4.25		0.00	107.15	1345.04	1345.04	1.46	2.69	182.63				12.3	1.23			223.93
13.00	1.75	3.40		0.15	0.20	1.84	3.20		0.00	104.23	1449.28	1449.28	0.74	2.64	98.92	0.71	1.35	1.55	1.15	452.06	383.25	113.68	
14.00	1.35	2.10		0.15	0.20	1.48	1.90		0.00	97.21	1546.50	1546.50	0.28	2.00	30.44	0.54	1.02	1.00	0.85	339.96	309.10	25.87	
15.00	1.15	1.70		0.15	0.20	1.29	1.50		0.00	93.26	1639.76	1639.76	0.16	1.64	15.22	0.44	0.84	0.74	0.85	282.15	269.42	12.94	
16.00	2.55	7.35		0.15	0.20	2.48	7.15		0.00	112.52	1752.29	1752.29	1.89	2.95	338.63				34.40	1.35			457.82
17.00	1.95	2.65		0.15	0.20	2.08	2.45		0.00	98.23	1850.52	1850.52	0.18	2.35	26.63	0.64	1.20	1.29	1.02	498.14	434.94	27.06	
18.00	1.45	2.45		0.15	0.20	1.57	2.25		0.00	99.89	1950.42	1950.42	0.44	1.68	49.46	0.45	0.85	0.76	0.85	344.68	327.38	42.04	
19.00	1.85	2.45		0.15	0.20	1.99	2.25		0.00	96.36	2046.79	2046.79	0.13	2.03	19.02	0.55	1.03	1.02	0.86	458.20	415.10	16.45	
20.00	2.20	2.60		0.15	0.20	2.35	2.40		18.02	89.64	2136.43	2136.43	0.02	2.31	3.80	0.62	1.17	1.25	1.00	556.79	488.48	3.79	
21.00	1.90	2.60		0.15	0.20	2.03	2.40		80.45	98.01	2234.46	2234.46	0.18	1.93	26.63	0.53	0.98	0.95	0.85	454.23	416.45	22.64	
22.00	2.05	2.60		0.15	0.20	2.19	2.40		142.88	95.61	2330.07	2330.07	0.10	2.03	15.22	0.55	1.03	1.02	0.86	488.98	443.10	13.14	
23.00	2.10	3.50		0.15	0.20	2.20	3.30		205.32	103.82	2433.89	2433.89	0.53	1.97	79.90	0.54	1.00	0.97	0.85	480.28	438.43	67.92	
24.00	2.65	3.30		0.15	0.20	2.79	3.10		267.75	98.67	2532.57	2532.57	0.12	2.45	22.83	0.66	1.25	1.37	1.06	642.14	554.88	24.16	
25.00	2.80	3.45		0.15	0.20	2.94	3.25		330.18	98.89	2631.46	2631.46	0.11	2.52	22.83	0.68	1.28	1.43	1.09	675.93	579.97	24.82	
26.00	2.15	4.45		0.15	0.20	2.20	4.25		392.61	106.86	2738.33	2738.33	1.02	1.79	148.39	0.49	0.91	0.84	0.85	450.39	420.74	126.13	
27.00	3.05	3.70		0.15	0.20	3.19	3.50		455.04	99.21	2837.55	2837.55	0.11	2.60	22.83	0.70	1.32	1.51	1.12	727.95	619.70	25.56	
28.00	3.30	4.10		0.15	0.20	3.43	3.90		517.47	101.60	2939.15	2939.15	0.15	2.74	34.24	0.73	1.40	1.64	1.17	790.49	664.10	40.20	
29.00	2.90	3.40		0.15	0.20	3.04	3.20		579.90	95.50	3034.66	3034.66	0.06	2.35	11.41	0.64	1.20	1.29	1.02	661.49	577.45	11.61	
30.00	2.45	3.00		0.15	0.20	2.59	2.80		642.33	95.96	3130.62	3130.62	0.09	1.92	15.22	0.52	0.98	0.94	0.85	518.76	476.70	12.94	
31.00	2.60	3.15		0.15	0.20	2.74	2.95		704.76	96.20	3226.83	3226.83	0.09	1.99	15.22	0.54	1.01	0.99	0.85	551.24	501.79	12.94	
32.00	2.95	3.45		0.15	0.20	3.09	3.25		767.19	95.43	3322.27	3322.27	0.06	2.23	11.41	0.60	1.13	1.18	0.96	643.18	569.16	10.97	
33.00	3.05	3.55		0.15	0.20	3.19	3.35		829.62	95.55	3417.82	3417.82	0.06	2.26	11.41	0.61	1.15	1.21	0.97	661.79	583.81	11.11	
34.00	3.40	3.95		0.15	0.20	3.54	3.75		892.05	97.46	3515.29	3515.29	0.07	2.48	15.22	0.67	1.26	1.40	1.07	754.54	650.14	16.29	
35.00	3.80	4.45		0.15	0.20	3.94	4.25		954.48	100.00	3615.30	3615.30	0.09	2.73	22.83	0.73	1.39	1.62	1.17	863.67	726.39	26.69	
36.00	3.85	4.45		0.15	0.20	3.99	4.25		1016.91	99.13	3714.44	3714.44	0.07	2.71	19.02	0.72	1.38	1.61	1.16	867.71	731.12	22.10	
37.00	3.65	4.20		0.15	0.20	3.79	4.00		1079.34	97.70	3812.15	3812.15	0.06	2.50	15.22	0.67	1.27	1.42	1.08	795.25	683.62	16.43	
38.00	3.70	4.30		0.15	0.20	3.84	4.10		1141.77	98.82	3910.98	3910.98	0.08	2.48	19.02	0.67	1.26	1.40	1.07	797.96	687.30	20.39	
39.00	4.00	4.65		0.15	0.20	4.14	4.45		1204.20	100.12	4011.10	4011.10	0.09	2.65	22.83	0.71	1.35	1.55	1.14	876.91	743.19	25.98	
40.00	4.00	4.50		0.15	0.20	4.14	4.30		1266.63	96.68	4107.79	4107.79	0.04	2.60	11.41	0.69	1.32	1.51	1.12	867.38	738.52	12.77	
41.00	4.50	5.05		0.15	0.20	4.64	4.85		1329.06	98.69	4206.49	4206.49	0.05	2.91	15.22	0.76	1.48	1.79	1.23	1009.85	836.18	18.77	
42.00	4.50	5.25		0.15	0.20	4.63	5.05		1391.49	102.12	4308.62	4308.62	0.11	2.84	30.44	0.75	1.44	1.73	1.21	993.88	827.85	36.80	
43.00	4.60	5.25		0.15	0.20	4.74	5.05		1453.92	100.76	4409.38	4409.38	0.08	2.85	22.83	0.75	1.45	1.74	1.21	1014.16	843.53	27.74	
44.00	4.60	5.35		0.15	0.20	4.73	5.15		1516.35	102.17	4511.56	4511.56	0.10	2.79	30.44	0.74	1.42	1.68	1.19	999.88	836.25	36.29	
45.00	4.60	5.20		0.15	0.20	4.74	5.00		1578.78	99.77	4611.33	4611.33	0.07	2.74	19.02	0.73	1.40	1.64	1.17	989.82	831.57	22.33	
46.00	4.60	5.30		0.15	0.20	4.73	5.10		1641.21	101.42	4712.76	4712.76	0.09	2.68	26.63	0.71	1.37	1.58	1.15	975.87	824.28	30.68	
47.00	4.60	5.30		0.15	0.20	4.73	5.10		1703.64	101.38	4814.15	4814.15	0.09	2.63	26.63	0.70	1.34	1.53	1.13	963.60	818.04	30.12	
48.00	4.60	5.35		0.15	0.20	4.73	5.15		1766.07	102.02	4916.17	4916.17	0.11	2.58	30.44	0.69	1.31	1.48	1.11	950.63	811.27	33.77	
49.00	4.65	5.40		0.15	0.20	4.78	5.20		1828.50	102.04	5018.22	5018.22	0.11	2.56	30.44	0.68	1.30	1.47	1.10	953.80	815.47	33.55	
50.00	4.70	5.35		0.15	0.20	4.84	5.15		1890.93	100.62	5118.85	5118.85	0.08	2.54	22.83	0.68	1.29	1.45	1.10	958.62	820.72	25.03	
51.00	4.75	5.50		0.15	0.20	4.88	5.30		1953.36	102.09	5220.95	5220.95	0.11	2.52	30.44	0.68	1.28	1.44	1.09	960.29	823.87	33.11	
52.00	4.80	5.55		0.15	0.20	4.93	5.35		2015.79	102.12	5323.08	5323.08	0.11	2.50	30.44	0.67	1.27	1.42	1.08	963.50	828.07	32.89	
53.00	4.85	5.50		0.15	0.20	4.99	5.30		2078.22	100.69	5423.78	5423.78	0.08	2.49	22.83	0.67	1.27	1.41	1.08	968.35	833.32	24.55	
54.00	4.85	5.60		0.15	0.20	4.98	5.40		2140.65	102.11	5525.90	5525.90	0.11	2.44	30.44	0.66	1.24	1.36	1.05	954.95	826.03	32.09	



Job No: 18-53065  
 Project: Exit 45, Maine Turnpike  
 Client: HNTB-Parsippany  
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 Job Location: Scarborough, ME

Coordinate System: WGS 84 / UTM zone 19N  
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 Easting (m): 391418  
 Elevation (ft):  
 Ground Water Depth (ft): 19.7  
 Gauge Zero Offset (bar): 0

**FLAT PLATE DILATOMETER TEST RESULTS**

Depth <sup>1</sup> (ft)	A (bar)	B (bar)	C (bar)	ΔA (bar)	ΔB (bar)	p <sub>0</sub> (bar)	p <sub>1</sub> (bar)	p <sub>2</sub> (bar)	u <sub>0</sub> (psf)	v <sub>1</sub> <sup>2</sup> (pcf)	σ <sub>v0</sub> (psf)	σ <sub>v0</sub> <sup>*</sup> (psf)	l <sub>0</sub>	K <sub>0</sub>	E <sub>0</sub> (ksf)	K <sub>0</sub>	OCR <sup>3</sup>	OCR <sup>4</sup>	φ <sup>4</sup> (deg)	R <sub>M</sub>	s <sub>v</sub> <sup>4</sup> (psf)	s <sub>v</sub> <sup>5</sup> (psf)	M (ksf)
55.00	5.10	5.95		0.15	0.20	5.23	5.75		2203.08	103.53	5629.43	3426.35	0.13	2.54	38.05	0.68	1.29	1.45		1.10	1017.24	870.96	41.71
56.00	6.05	7.20		0.15	0.20	6.16	7.00		2265.51	107.04	5736.48	3470.97	0.17	3.05	60.88	0.80	1.55	1.94		1.28	1296.14	1059.99	78.18
57.00	6.00	7.00		0.15	0.20	6.12	6.80		2327.94	105.85	5842.34	3514.40	0.14	2.97	49.46	0.78	1.51	1.86		1.26	1269.12	1044.87	62.16
58.00	6.00	7.30		0.15	0.20	6.10	7.10		2390.37	107.83	5950.18	3559.81	0.20	2.91	72.29	0.77	1.48	1.79		1.23	1250.88	1035.50	89.24
59.00	5.75	6.90		0.15	0.20	5.86	6.70		2452.80	106.61	6056.80	3603.99	0.18	2.72	60.88	0.72	1.38	1.61		1.16	1161.98	978.61	70.85
60.00	5.75	6.60		0.15	0.20	5.88	6.40		2515.23	104.12	6160.92	3645.69	0.11	2.68	38.05	0.71	1.36	1.57		1.15	1154.04	975.50	43.71

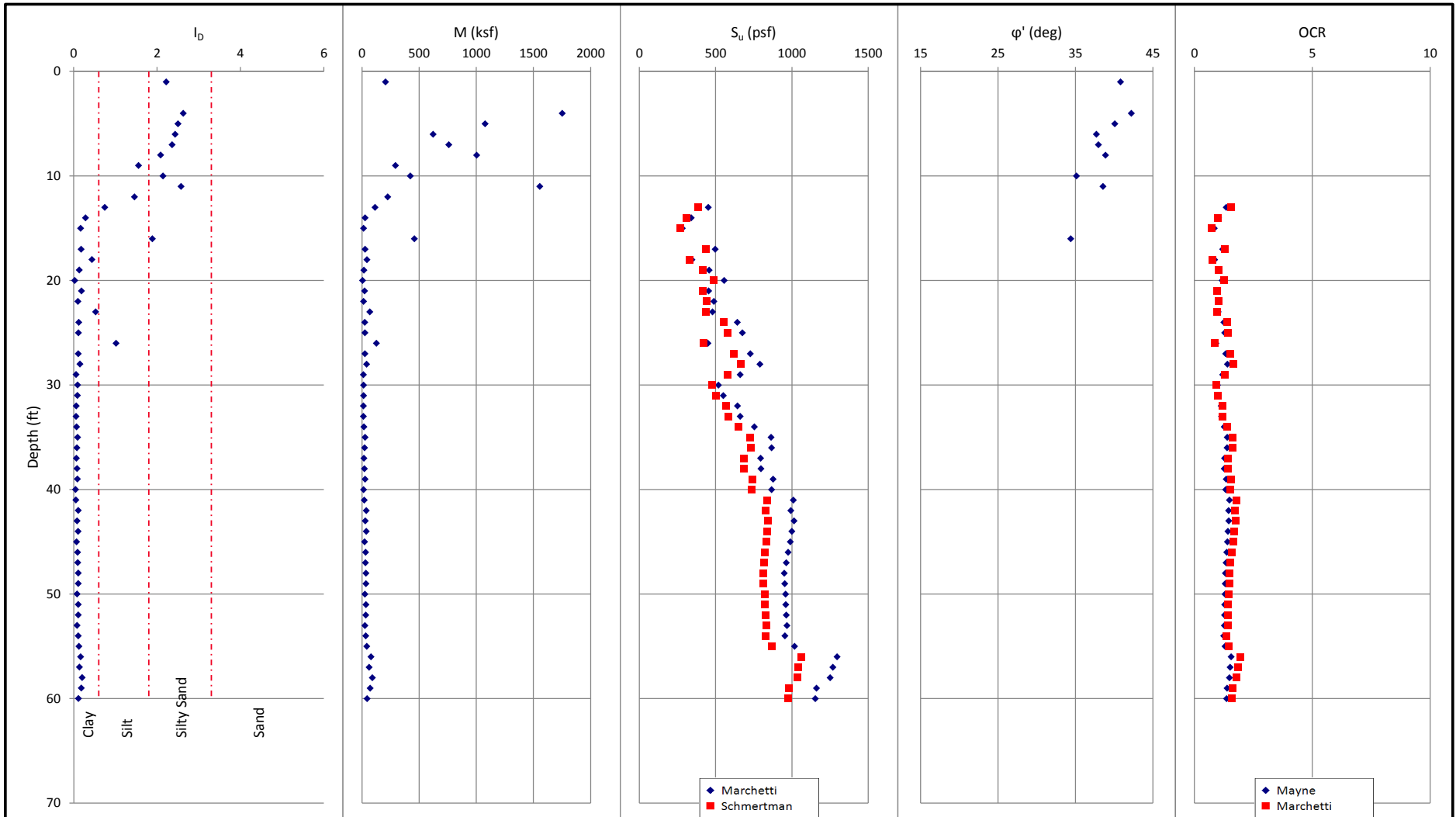
1. Depth is referenced below the existing ground surface at the time of testing.
2. Mayne et al., 2002
3. Mayne, 1995
4. Marchetti et al., 2001
5. Schmertman, 1991



Job No: 18-53065  
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 Gauge Zero Offset (bar): 0

### FLAT PLATE DILATOMETER TEST RESULTS

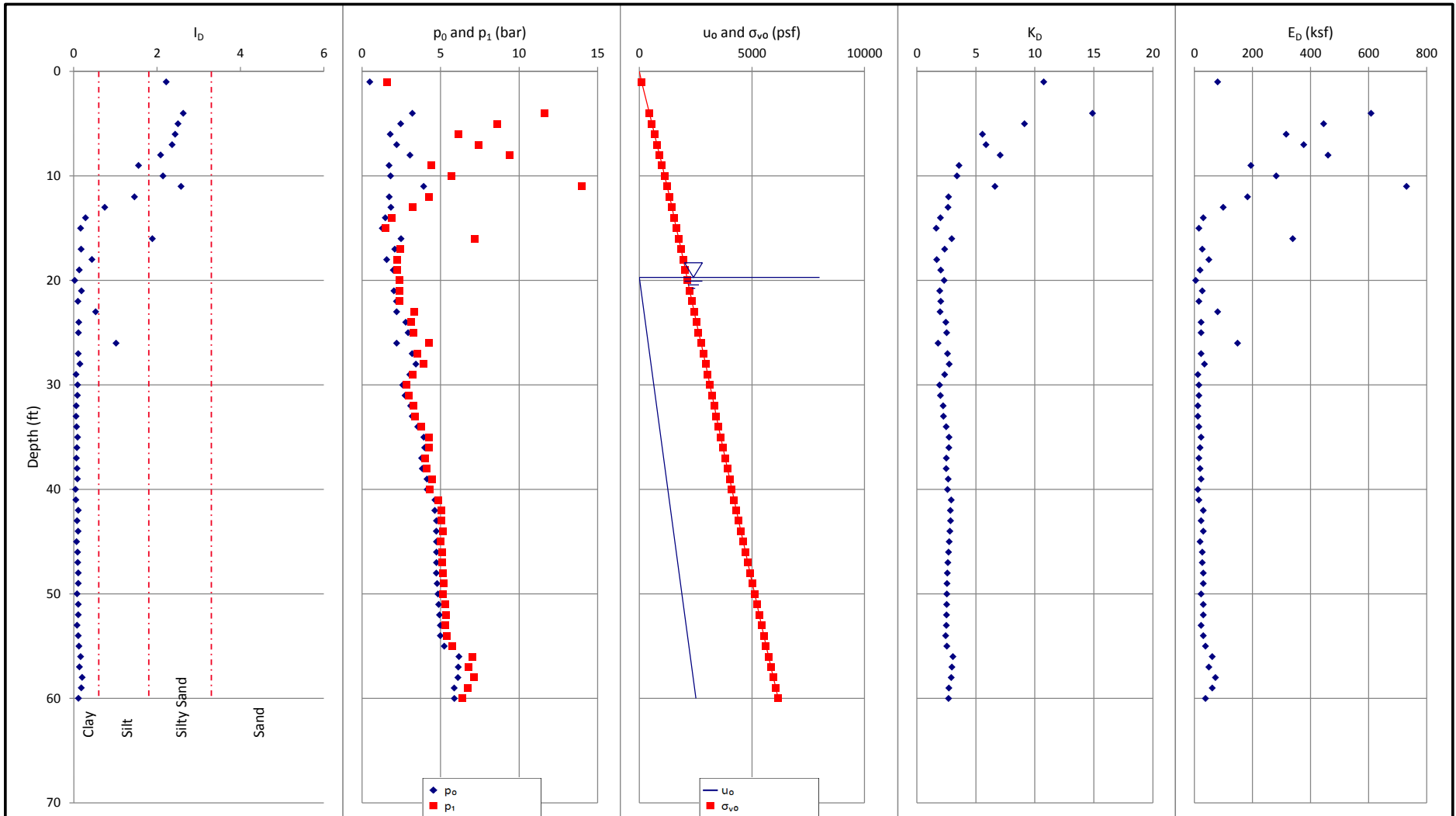




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 Gauge Zero Offset (bar): 0

### FLAT PLATE DILATOMETER TEST RESULTS



**ATTACHMENT 3**  
**GEOTECHNICAL DATA REPORT (SUPPLEMENTAL**  
**EXPLORATION)**

FINAL DESIGN PHASE GEOTECHNICAL DATA REPORT  
PROPOSED RECONSTRUCTION OF EXIT 45, MAINE TURNPIKE  
SOUTH PORTLAND, MAINE

by  
Haley & Aldrich, Inc.  
Portland, Maine

for  
HNTB Corporation  
Westbrook, Maine

File No. 132949-003  
March 2019





HALEY & ALDRICH, INC.  
75 Washington Avenue  
Suite 1A  
Portland, ME 04101  
207.482.4600

15 March 2019  
File No. 132949-003

HNTB Corporation  
340 County Road, Suite 6-C  
Westbrook, Maine 04092

Attention: Ray Hanf, P.E.

Subject: Final Design Phase Geotechnical Data Report  
Proposed Reconstruction of Exit 45 Interchange, Maine Turnpike  
South Portland, Maine

Ladies and Gentlemen:

This geotechnical data report (GDR) presents the results of the final design phase subsurface investigation and geotechnical laboratory testing programs (Phase 3) conducted in support of the subject project. This work has been completed in accordance with our proposal dated 21 December 2018 (specifically scope items 1 through 12), and your subsequent authorization.

## **Project Understanding**

It is our understanding that the Maine Turnpike Authority (MTA) has hired HNTB to lead the design effort for the reconstruction of the Exit 45 Interchange, including the reconfiguration of associated on and off ramps. The project generally consists of construction of a new bridge structure over I-95 at Exit 45 and construction of new bridge approach and ramp embankments up to 26 ft above existing site grades. The location of the site is shown on Figure 1.

The Phase 3 subsurface investigation and geotechnical laboratory testing programs were prepared based on the initial plan/program developed by HNTB (provided to Haley & Aldrich on 2 November 2018), the peer review comments provided by Haley & Aldrich on 5 November 2018, and the three additional toll plaza test borings (and drilling requirements) provided by HNTB on 19 December 2018.

The Phase 3 subsurface investigation was needed to fill in gaps in the available subsurface data, including: estimating the extents and properties of the organic deposit; defining the thickness and properties of the interbedded marine deposits; defining the thickness and properties of the marine clay crust; and determining the mid-stratum strength of the marine clay. In addition, three borings were included at proposed toll plaza locations to define the depth of rock for pile design.



## Horizontal Coordinate System and Elevation Datum

Test boring locations are reported in feet and reference the North American Datum of 1983 (NAD 83) Maine State Plane West 1802 coordinate system. Elevations are measured in feet and reference North American Vertical Datum of 1988 (NAVD 88).

Coordinates of Phase 3 as-drilled test boring locations are provided in Table I. Ground surface elevations at Phase 3 test boring locations are provided in Table II and on individual test boring logs included in Appendix A. As-drilled locations of the previous and recent test borings are shown on Figure 2.

## Subsurface Explorations

### PRELIMINARY DESIGN PHASE SUBSURFACE EXPLORATIONS BY SCHONEWALD ENGINEERING

Schonewald Engineering Associates, Inc. (SEA) of Cumberland, Maine conducted two phases of subsurface exploration programs at the site:

- The Phase 1 program was conducted in October 2017. A total of seven test borings (HB-EXIT45-101 through HB-EXIT45-107) were conducted at the site and laboratory testing was conducted on select soil samples from the test borings. The results were presented in a report dated 28 December 2017 prepared by SEA. Haley & Aldrich was not involved in the execution of this program.
- The Phase 2 program was conducted from April to June of 2018. A total of thirteen test borings (HB-EXIT45-201 through HB-EXIT45-212 and HB-EXIT45-211A), two cone penetrometer tests, one seismic cone penetrometer test, and three flat plate dilatometer tests were conducted at the site, and laboratory testing was conducted on select soil samples from the test borings. The results were presented in a report dated 8 October 2018 prepared by SEA. Haley & Aldrich was not involved in the execution of this program.

As-drilled locations of the subsurface explorations from both phases of drilling are shown on Figure 2. Refer to reports listed in the References section of this report for more information relative to the test boring logs, cone penetrometer results, dilatometer test results, and laboratory test results.

### FINAL DESIGN PHASE SUBSURFACE EXPLORATIONS BY HALEY & ALDRICH

Phase 3 subsurface explorations were conducted between 4 and 17 January 2018. Haley & Aldrich personnel were present during the exploration program and provided the following services:

- Ensuring that the program is completed safely per the project-specific Health and Safety Plan.
- Observing and documenting conditions encountered in test borings;
- Coordinating the depth of test borings and sampling methods; and
- Ensuring drilling contractor compliance with contract requirements and standard of care drilling/testing practices.

A total of eight test borings, designated HB-EXIT45-301 through HB-EXIT45-307 (including HB-EXIT45-303A and HB-EXIT45-304A) were drilled along the existing Maine Turnpike mainline, entrance/exit ramps and approach embankments. Test boring locations were laid out in the field by Haley & Aldrich using GPS survey equipment. "As-drilled" test boring locations were determined in the field by Haley & Aldrich using GPS survey equipment. Ground surface elevations at test boring locations were estimated by HNTB based on interpolation between ground surface contours. Subsurface conditions are summarized in Table II and logs of the Phase 3 test borings are included in Appendix A.

The following changes were made to the originally proposed program:

- Test boring HB-EXIT45-303A was added while executing the field program to obtain an additional tube in the interbedded marine deposits at a depth of 5 to 7 ft.
- Test boring HB-EXIT45-304A and HB-EXIT45-304B were proposed to obtain information on the marine clay crust and depth to bedrock. However, the desired location of these borings was not accessible due to the site conditions. Therefore, the location was moved closer to HB-EXIT45-305, since this was the closest available location, taking into account the potential impact of the existing mainline on the stress history. Since these three borings were in close proximity, HB-EXIT45-304B was eliminated and the desired data collected from HB-EXIT45-305.

Test borings were drilled using a Diedrich D50 track-mounted drill rig. Test borings were drilled to depths ranging from approximately 9 to 104 ft below ground surface (BGS) using 4.0 in. (HW-size) inside diameter (ID) steel casing using cased-wash drilling methods. Soil samples were generally collected continuously through the fill, interbedded marine deposits and clay crust, and at standard, 5-ft intervals thereafter, by driving a 1 3/8-in. ID split-spoon sampler with a 140-lb hammer dropped from a height of 30 in., as indicated on the test boring logs. The drill rig was equipped with an automatic hammer with a theoretical hammer efficiency factor of 0.907. All drilling and sampling was performed in accordance with ASTM standards.

The number of hammer blows required to advance the sampler through each 6 in. interval was recorded and is provided on the test boring logs. The uncorrected SPT N-value (N-uncorrected) is defined as the total number of blows required to advance the sampler through the middle 12 in. of the 24-in. sampling interval. The energy-corrected SPT N-value (N<sub>60</sub>) is equal to N-uncorrected multiplied by the hammer efficiency factor divided by 0.6 (i.e., 60 percent theoretical hammer efficiency).

In-situ vane shear tests were conducted in each of the test borings. In general, the first in-situ vane shear test was conducted in each test boring when soil was encountered that consisted primarily of silt and/or clay. In-situ vane shear tests were conducted with a 55 mm by 110 mm Geonor rectangular vane attached to a 2-ft long, 12-mm diameter rod extension, attached to a string of 5/8-in. outside diameter (OD) hollow chrome-moly rods. At each in-situ vane shear test location, the vane was pushed (by hand) until the bottom of the vane was approximately 1 to 2 ft below the bottom of the borehole. The vane was then rotated at a rate of about 90 degrees per minute using a torque wrench. Results of the vane shear testing, including raw torque values and calculated shear strengths, are summarized in Table III and are provided on the test boring logs in Appendix A.

Multiple relatively undisturbed samples of cohesive soils were obtained in test borings HB-EXIT45-301 through HB-EXIT45-304A. The samples were collected as close as possible to depths/elevations requested by HNTB and were obtained by advancing a 3-in. OD, thin-wall Shelby Tube into the silt/clay/interbedded soils using a piston sampler.

Bedrock core samples were obtained in test borings HB-EXIT45-305 through HB-EXIT45-307. The test borings were advanced approximately 5 to 10.4 ft into bedrock using a 2.0-in. (NQ-size) ID diamond-tipped core barrel.

All soil and bedrock samples were collected and preserved in glass jars and wooden boxes, respectively. The soil and rock samples that were not submitted for laboratory testing are available for review upon request and are currently being stored at the Haley & Aldrich laboratory facility in Portland, Maine. Photographs of the collected rock core samples are presented in Appendix A.

## Laboratory Testing Program

A laboratory testing program was undertaken to assist in soil classification and determination of engineering properties of representative soil samples collected during the field investigation. In general, laboratory testing was performed on disturbed soil samples collected during SPT sampling and Shelby tube samples of cohesive soils. Laboratory tests were performed by GeoTesting Express of Acton, Massachusetts. Geotechnical laboratory testing was performed in accordance with applicable American Society for Testing Materials (ASTM) testing procedures.

The following soil tests (type and number of tests) were conducted:

### Soil Identification Testing:

- Grain Size Analysis (combined sieve and hydrometer (ASTM D422)) – 8
- Grain Size Analysis (sieve only (ASTM D422)) – 1
- Moisture Content and Organic Matter (ASTM D2974) – 1
- Atterberg Limits (ASTM D 4318) – 15

### Shelby Tube Testing:

- Incremental Consolidation Test (ASTM D2435, Method B) – 7
- Consolidated Undrained Triaxial Shear Test, CIUC (ASTM D4767) – 10

In general, the laboratory testing was conducted at the depths/elevations requested by HNTB. A summary of the testing results is provided in Table IV and the detailed laboratory test output is provided in Appendix B of this report.

## **Limitations**

This report is prepared for the exclusive use of HNTB and MTA relative to the proposed reconstruction of the Maine Turnpike Exit 45 Interchange including the replacement bridge and the reconfiguration of the associated on and off ramps in South Portland, Maine. There are no intended beneficiaries other than of HNTB and MTA. Haley & Aldrich shall owe no duty whatsoever to any other person or entity on account of the Agreement or the report. Use of this report by any person or entity other than of HNTB and MTA for any purpose whatsoever is expressly forbidden unless such other person or entity obtains written authorization from of HNTB and MTA and from Haley & Aldrich. Use of this report by such other person or entity without the written authorization of HNTB and MTA and Haley & Aldrich shall be at such other person's or entities sole risk and shall be without legal exposure or liability to Haley & Aldrich.

Use of this report by any person or entity, including by of HNTB and MTA, for a purpose other than relative to the proposed reconstruction of the Maine Turnpike Exit 45 Interchange in South Portland Portland, Maine is expressly prohibited unless such person or entity obtains written authorization from Haley & Aldrich indicating that the report is adequate for such other use. Use of this report by any other person or entity for such other purpose without written authorization by Haley & Aldrich shall be at such person's or entities sole risk and shall be without legal exposure or liability to Haley & Aldrich.

The information provided herein is based, in part, upon the data obtained from the referenced subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations then appear, it may be necessary to reevaluate the recommendations of this report.

## **Closure**

Except for the change to the location of HB-EXIT45-304A and deletion of HB-EXIT45-304B, as described above, the data requested in the initial plan/program developed by HNTB (provided to Haley & Aldrich on 2 November 2018) was collected. Note that some changes were made to specific sample and test depths based on the actual subsurface conditions encountered.

We appreciate the opportunity to provide geotechnical engineering services on this project. Please do not hesitate to call if you have any questions or comments.

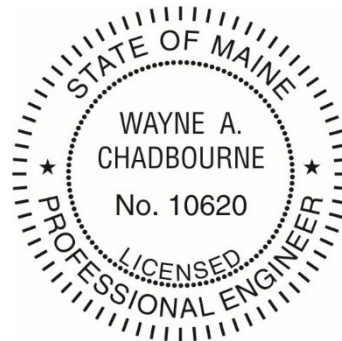
Sincerely yours,  
HALEY & ALDRICH, INC.



Erin A. Force, P.E.  
Senior Geotechnical Engineer



Wayne A. Chadbourne, P.E.  
Lead Geotechnical Engineer/Senior Associate



Enclosures:

- Table I – Summary of Subsurface Explorations – Location Data (1 sheet)
- Table II – Summary of Subsurface Explorations – Subsurface Data (1 sheet)
- Table III – Summary of In-Situ Vane Shear Test Results (1 sheet)
- Table IV – Summary of Laboratory Soil Test Results (3 sheets)
- Figure 1 – Project Locus
- Figure 2 – Subsurface Exploration Location Plan
- Appendix A – Test Boring Logs
- Appendix B – Laboratory Test Results

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## References

1. Schonewald Engineering Associates, Inc., *Field and Laboratory Data Report, Preliminary Geotechnical Program, Maine Turnpike Exit 45 Reconfiguration, South Portland, Maine*, 28 December 2017.
2. Schonewald Engineering Associates, Inc., *Field and Laboratory Data Report, Phase 2 Geotechnical Program, Maine Turnpike Exit 45 Reconfiguration, South Portland – Scarborough, Maine*, 8 October 2018.

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## **TABLES**

**TABLE I**

**Summary of Subsurface Explorations - Location Data**

Proposed Reconstruction of Exit 45 Interchange  
Maine Turnpike  
South Portland, Maine

Haley & Aldrich File No.: 132949-003

Test Boring No. <sup>1</sup>	Coordinates <sup>2</sup>	
	Easting	Northing
HB-EXIT45-301	2,906,089	291,170
HB-EXIT45-302	2,906,137	291,089
HB-EXIT45-303	2,905,426	291,048
HB-EXIT45-303A	2,905,423	291,052
HB-EXIT45-304A	2,905,931	291,660
HB-EXIT45-305	2,905,936	291,665
HB-EXIT45-306	2,906,295	291,566
HB-EXIT45-307	2,905,416	290,450

Notes:

<sup>1</sup> Test boring locations are shown on Figure 2, Subsurface Exploration Location Plan.

<sup>2</sup> As-drilled coordinates of test borings were determined by Haley & Aldrich, Inc. using GPS survey equipment and reference NAD 83, Maine State Plane West 1802 coordinate system.

	Individual	Date
Prepared By:	KAR	3/13/2019
Checked By:	EAF	3/14/2019
Reviewed By:	WAC	3/15/2019



**TABLE II**  
**Summary of Subsurface Explorations - Subsurface Data**

Proposed Reconstruction of Exit 45 Interchange  
 Maine Turnpike  
 South Portland, Maine

Haley & Aldrich File No.: 132949-003

Test Boring No. <sup>1</sup>	Approximate Ground Surface Elevation <sup>2,3</sup>	Approximate Strata Thickness <sup>4,5</sup> (ft)									Approximate Top of Bedrock Depth (ft) <sup>5</sup>	Approximate Elevation of Top of Bedrock <sup>2,3,5</sup>	Approximate Bottom of Exploration Depth (ft)	Approximate Elevation of Bottom of Exploration <sup>2,3</sup>
		Fill	Organic Deposit	Marine Deposits				Glacial Till	Weathered Bedrock					
				Sand	Interbedded	Clay Crust	Clay			Sand				
HB-EXIT45-301	60.3	6.9	0.4	--	4.7	2.2	>5.8	--	--	--	--	--	20.0	40.3
HB-EXIT45-302	60.0	3.1	NE	--	4.9	6.0	>6.0	--	--	--	--	--	20.0	40.0
HB-EXIT45-303	61.4	4.0	NE	--	8.9	NE	>41.1	--	--	--	--	--	54.0	7.4
HB-EXIT45-303A	61.3	NE	NE	--	>9.0	--	--	--	--	--	--	--	9.0	52.3
HB-EXIT45-304A	56.1	NE	2.0	--	--	8.0	>4.0	--	--	--	--	--	14.0	42.1
HB-EXIT45-305	56.1	NE	NE	--	NE	10.0	38.5	27.9	NE	NE	76.4	-20.3	83.0	-26.9
HB-EXIT45-306	58.1	NE	NE	--	NE	15.0	28.1	1.5	NE	NE	44.6	13.5	55.7	2.4
HB-EXIT45-307 <sup>6</sup>	63.9	5.0	NE	20.0	10.0	NE	39.7	NE	14.7	1.4	90.8	-26.9	103.6	-39.7

**Notes:**

- <sup>1</sup> Test boring locations are shown on Figure 2, Subsurface Exploration Location Plan.
- <sup>2</sup> Ground surface elevations at as-drilled test boring locations should be considered approximate and were estimated by HNTB based on interpolation between ground surface contours.
- <sup>3</sup> Elevations are measured in feet and reference the National Geodetic Vertical Datum of 1988 (NAVD 88).
- <sup>4</sup> "NE" indicates stratum was not encountered in test boring.
- <sup>5</sup> "--" indicates test boring was not drilled deep enough to determine presence of stratum.

	Individual	Date
Prepared By:	KAR	3/13/2019
Checked By:	EAF	3/14/2019
Reviewed By:	WAC	3/15/2019

**TABLE III**  
**Summary of In-Situ Vane Shear Test Results**  
Proposed Reconstruction of Exit 45 Interchange  
Maine Turnpike  
South Portland, Maine

Haley & Aldrich File No.: 132949-003

Test Boring No. <sup>1</sup>	Estimated Ground Surface Elevation <sup>2,3</sup>	Test No.	Depth below ground surface (ft)	Approx. Elevation <sup>2,3</sup> (ft)	V <sub>max</sub> (in-lbs)	V <sub>remolded</sub> (in-lbs)	S <sub>u</sub> (psf)	S <sub>u(remolded)</sub> (psf)	Sensitivity (S <sub>u</sub> /S <sub>u(remolded)</sub> )
HB-EXIT45-301	60.3	V <sub>1</sub>	10.1 - 10.5	50.2 - 49.8	430	60	1,670	235	7
		V <sub>2</sub>	14.0 - 14.4	46.3 - 45.9	605	110	2,350	425	6
		V <sub>3</sub>	18.6 - 19.0	41.7 - 41.3	130	10	505	40	13
		V <sub>4</sub>	19.6 - 20.0	40.7 - 40.3	130	20	505	80	6
HB-EXIT45-302	60.0	V <sub>1</sub>	14.6 - 15.0	45.4 - 45.0	410	70	1,590	270	6
		V <sub>2</sub>	15.6 - 16.0	44.4 - 44.0	410	65	1,590	250	6
		V <sub>3</sub>	18.6 - 19.0	41.4 - 41.0	120	15	465	60	8
		V <sub>4</sub>	19.6 - 20.0	40.4 - 40.0	120	10	465	40	12
HB-EXIT45-303	61.4	V <sub>1</sub>	12.6 - 13.0	48.8 - 48.4	125	15	485	60	8
		V <sub>2</sub>	13.6 - 14.0	47.8 - 47.4	115	25	445	95	5
		V <sub>3</sub>	14.6 - 15.0	46.8 - 46.4	100	10	390	40	10
		V <sub>4</sub>	15.6 - 16.0	45.8 - 45.4	95	10	370	40	9
		V <sub>5</sub>	18.6 - 19.0	42.8 - 42.4	160	10	620	40	16
		V <sub>6</sub>	19.6 - 20.0	41.8 - 41.4	80	5	310	20	16
		V <sub>7</sub>	20.6 - 21.0	40.8 - 40.4	110	10	425	40	11
		V <sub>8</sub>	21.6 - 22.0	39.8 - 39.4	80	5	310	20	16
		V <sub>9</sub>	24.6 - 25.0	36.8 - 36.4	105	5	405	20	20
		V <sub>10</sub>	25.6 - 26.0	35.8 - 35.4	70	5	270	20	14
		V <sub>11</sub>	26.6 - 27.0	34.8 - 34.4	80	10	310	40	8
		V <sub>12</sub>	27.6 - 28.0	33.8 - 33.4	90	10	350	40	9
		V <sub>13</sub>	28.6 - 29.0	32.8 - 32.4	120	5	465	20	23
		V <sub>14</sub>	29.6 - 30.0	31.8 - 31.4	80	5	310	20	16
		V <sub>15</sub>	43.6 - 44.0	17.8 - 17.4	130	10	505	40	13
		V <sub>16</sub>	44.6 - 45.0	16.8 - 16.4	110	10	425	40	11
V <sub>17</sub>	47.6 - 48.0	13.8 - 13.4	180	10	700	40	18		
V <sub>18</sub>	48.6 - 49.0	12.8 - 12.4	110	5	425	20	21		
V <sub>19</sub>	52.6 - 53.0	8.8 - 8.4	170	10	660	40	17		
V <sub>20</sub>	53.6 - 54.0	7.8 - 7.4	150	5	580	20	29		
HB-EXIT45-303A	61.3	V <sub>1</sub>	7.1 - 7.5	54.2 - 53.8	190	30	735	115	6
HB-EXIT45-304A	56.1	V <sub>1</sub>	8.1 - 8.5	48.0 - 47.6	760	130	2,950	505	6
		V <sub>2</sub>	10.6 - 11.0	45.5 - 45.1	130	5	505	20	25
		V <sub>3</sub>	11.6 - 12.0	44.5 - 44.1	120	5	465	20	23
		V <sub>4</sub>	12.6 - 13.0	43.5 - 43.1	120	5	465	20	23
		V <sub>5</sub>	13.6 - 14.0	42.5 - 42.1	110	5	425	20	21
HB-EXIT45-305	56.1	V <sub>1</sub>	10.6 - 11.0	45.5 - 45.1	210	40	815	155	5
		V <sub>2</sub>	11.6 - 12.0	44.5 - 44.1	130	25	505	95	5
		V <sub>3</sub>	20.6 - 21.0	35.5 - 35.1	110	5	425	20	21
		V <sub>4</sub>	21.6 - 22.0	34.5 - 34.1	90	5	350	20	18
		V <sub>5</sub>	30.6 - 31.0	25.5 - 25.1	110	0	425	0	--
		V <sub>6</sub>	31.6 - 32.0	24.5 - 24.1	110	5	425	20	21
		V <sub>7</sub>	40.6 - 41.0	15.5 - 15.1	130	5	505	20	25
		V <sub>8</sub>	41.6 - 42.0	14.5 - 14.1	110	5	425	20	21
HB-EXIT45-306	58.1	V <sub>1</sub>	15.6 - 16.0	42.5 - 42.1	180	20	700	80	9
		V <sub>2</sub>	16.6 - 17.0	41.5 - 41.1	165	10	640	40	16
		V <sub>3</sub>	20.6 - 21.0	37.5 - 37.1	130	10	505	40	13
		V <sub>4</sub>	21.6 - 22.0	36.5 - 36.1	120	5	465	20	23
		V <sub>5</sub>	25.6 - 26.0	32.5 - 32.1	110	15	425	60	7
		V <sub>6</sub>	26.6 - 27.0	31.5 - 31.1	105	5	405	20	20
		V <sub>7</sub>	30.6 - 31.0	27.5 - 27.1	110	15	425	60	7
		V <sub>8</sub>	31.6 - 32.0	26.5 - 26.1	105	10	405	40	10
		V <sub>9</sub>	35.6 - 36.0	22.5 - 22.1	130	25	505	95	5
		V <sub>10</sub>	36.6 - 37.0	21.5 - 21.1	125	15	485	60	8
HB-EXIT45-307	63.9	V <sub>1</sub>	20.1 - 20.5	43.8 - 43.4	310	30	735	70	11
		V <sub>2</sub>	25.1 - 25.5	38.8 - 38.4	150	30	580	115	5
		V <sub>3</sub>	35.6 - 36.0	28.3 - 27.9	110	5	425	20	21
		V <sub>4</sub>	36.6 - 37.0	27.3 - 26.9	110	5	425	20	21
		V <sub>5</sub>	45.6 - 46.0	18.3 - 17.9	130	0	505	0	--
		V <sub>6</sub>	46.6 - 47.0	17.3 - 16.9	130	0	505	0	--
		V <sub>7</sub>	55.6 - 56.0	8.3 - 7.9	180	10	700	40	18
		V <sub>8</sub>	56.6 - 57.0	7.3 - 6.9	210	10	815	40	20
		V <sub>9</sub>	65.6 - 66.0	-1.7 - -2.1	190	5	735	20	37
		V <sub>10</sub>	66.6 - 67.0	-2.7 - -3.1	270	5	1,050	20	53

**Notes:**

<sup>1</sup> Test boring locations are shown on Figure 2, Subsurface Exploration Location Plan.

<sup>2</sup> Ground surface elevations at as-drilled test boring locations should be considered approximate and were estimated by HNTB based on interpolation between ground surface contours.

<sup>3</sup> Elevations are measured in feet and reference the National Geodetic Vertical Datum of 1988 (NAVD 88).

Prepared By:	NLK	1/22/2019
Checked By:	KAR	3/14/2019
Reviewed By:	EAF	3/15/2019
Reviewed By:	WAC	3/15/2019



**TABLE IV - SUMMARY OF LABORATORY SOIL TEST RESULTS**

Project: Proposed Reconstruction of Exit 45 Interchange, Maine Turnpike  
South Portland, Maine

Boring No. & Sample No.	Description	Depth (ft)	El. (ft)	Test No.	Percent Passing #200 Sieve (%)	Natural Water Content (%)	Atterberg Limits (%) <sup>1</sup>			Total Unit Weight (pcf) <sup>2</sup>	Stress History <sup>3</sup>			Triaxial Test			Remarks
							W <sub>L</sub>	W <sub>P</sub>	I <sub>P</sub>		σ' <sub>p</sub> (tsf)	CR	RR	Shear Strength (psf)	Strain (%)	σ' <sub>c</sub> (psf) <sup>3</sup>	
HB-EXIT45-301 S4B	Organic Deposit	6.9	53.4	490941	55.4											Organic Content: 5.5%	
		-7.3	-53.0	490950													
				490890		47.0	47	31	16								
U2	Marine Deposits (Clay Crust)	12.0	48.3	IP-1		34.3			118.1	5.8	0.168	0.020					
		-14.0	-46.3	490891		31.0	37	23	14								
				CU-6-1A		28.3				119.8				912.2	4.23		589
HB-EXIT45-302 U1	Marine Deposits (Clay Crust)	10.0	50.0	IP-3		27.8			122.6	6.6	0.132	0.012					
		-12.0	-48.0	490892		21.0	35	23	12								
				CU-7-1		29.2			120.5								
HB-EXIT45-303 S4	Interbedded Marine Deposits	6.0	55.4	490920	14.2												
		-8.0	-53.4														
S5	Interbedded Marine Deposits	8.0	53.4	490942	62.1												
		-10.0	-51.4	490893		26.0	22	14	8								
U1	Interbedded Marine Deposits	10.0	51.4	490947	71.4												
		-12.0	-49.4	490898		27.0	non-plastic										
				IP-2		20.4				128.9	See Note 4.						
				CU-2-1		25.8			120.1				496.9	2.08	520		



TABLE IV - SUMMARY OF LABORATORY SOIL TEST RESULTS

Project: Proposed Reconstruction of Exit 45 Interchange, Maine Turnpike  
South Portland, Maine

Boring No. & Sample No.	Description	Depth (ft)	El. (ft)	Test No.	Percent Passing #200 Sieve (%)	Natural Water Content (%)	Atterberg Limits (%) <sup>1</sup>			Total Unit Weight (pcf) <sup>2</sup>	Stress History <sup>3</sup>			Triaxial Test			Remarks
							W <sub>L</sub>	W <sub>P</sub>	I <sub>P</sub>		σ' <sub>p</sub> (tsf)	CR	RR	Shear Strength (psf)	Strain (%)	σ' <sub>c</sub> (psf) <sup>3</sup>	
HB-EXIT45-303 S6	Marine Deposits (Clay)	12.0	49.4	490943	95.9												
		-14.0	-47.4	490894		40.0	27	15	12								
S7	Marine Deposits (Clay)	14.0	47.4	490944	98.5												
		-16.0	-45.4	490895		45.0	36	20	16								
U2	Marine Deposits (Clay)	16.0	45.4	490948	95.4												
		-18.0	-43.4	IP-7		33.4				118.6	See Note 4.						
				490899		38.0	27	16	11				439.2	5.75	701		
				CU-5-1A		36.5			115.3								
S8	Marine Deposits (Clay)	18.0	43.4	490945	94.3												
		-20.0	-41.4	490896		37.0	26	17	9								
S11	Marine Deposits (Clay)	26.0	35.4	490946	94.6												
		-28.0	-33.4	490897		36.0	23	16	7								
U4	Marine Deposits (Clay)	30.0	31.4	IP-4		44.3				111.7	0.9	See Note 5.					
		-32.0	-29.4	490900		41.0	27	18	9								
U5	Marine Deposits (Clay)	45.0	16.4	490901		37.0	31	19	12								
		-47.0	-14.4	CU-1-1		32.5				119.0			594.7	8.18	1655		
				CU-1-2		39.3				113.1			858.1	5.90	2740		
				CU-1-3		40.8				112.1			2107.0	7.28	3866		



**TABLE IV - SUMMARY OF LABORATORY SOIL TEST RESULTS**

Project: Proposed Reconstruction of Exit 45 Interchange, Maine Turnpike  
South Portland, Maine

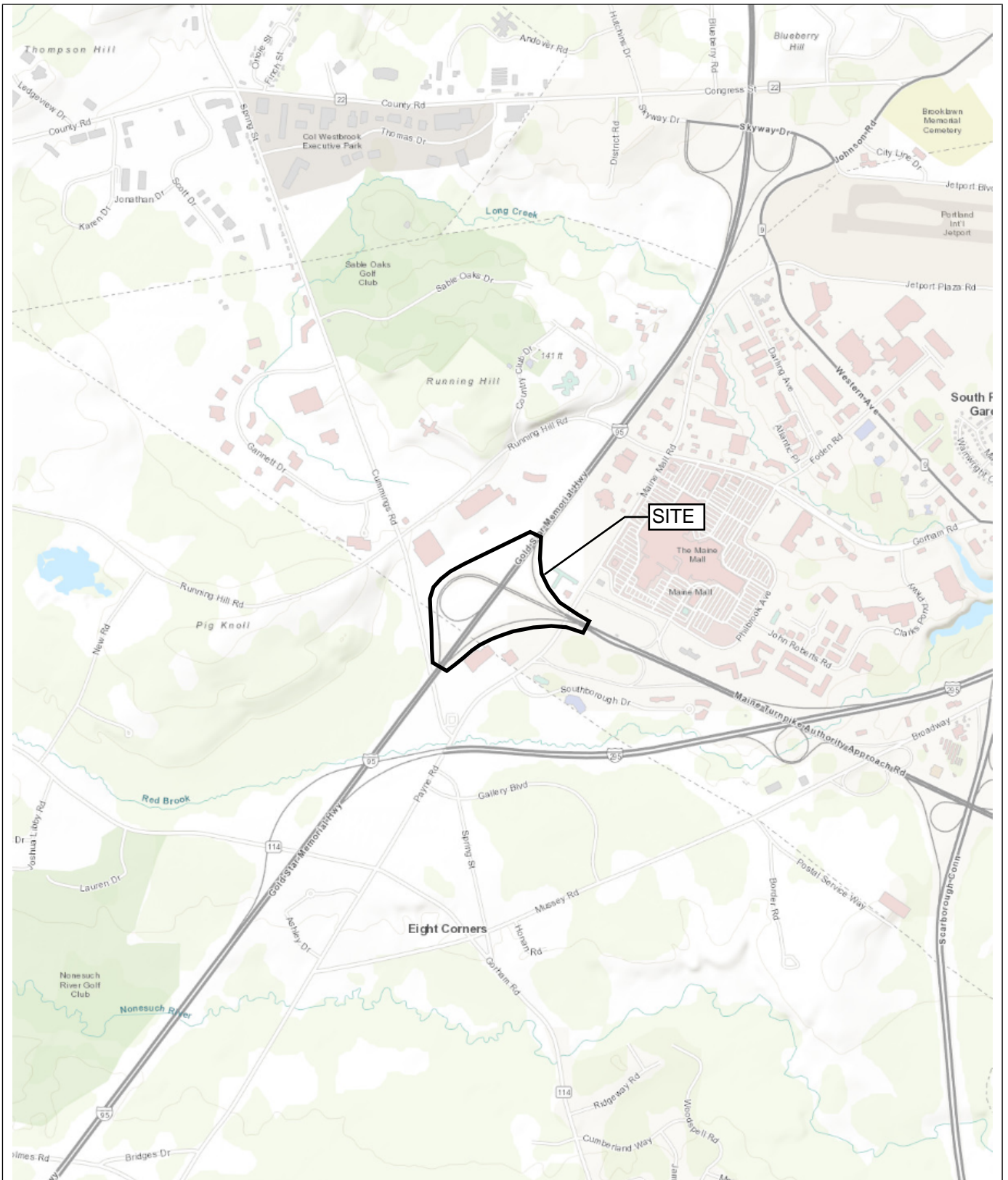
Boring No. & Sample No.	Description	Depth (ft)	El. (ft)	Test No.	Percent Passing #200 Sieve (%)	Natural Water Content (%)	Atterberg Limits (%) <sup>1</sup>			Total Unit Weight (pcf) <sup>2</sup>	Stress History <sup>3</sup>			Triaxial Test			Remarks
							W <sub>L</sub>	W <sub>P</sub>	I <sub>P</sub>		σ' <sub>p</sub> (tsf)	CR	RR	Shear Strength (psf)	Strain (%)	σ' <sub>c</sub> (psf) <sup>3</sup>	
HB-EXIT45-303 U6	Marine Deposits (Clay)	50.0	11.4	490902		35.0	34	20	14								
		-52.0	-9.4	CU-3-1		48.3							607.7	3.46	1812		
HB-EXIT45-304A U1	Marine Deposits (Clay Crust)	2.0	54.1	IP-5		27.9				122.2	4.6	0.106	0.013				
		-4.0	-52.1	490903		27.0	31	18	13								
				CU-4-1A		28.9					119.4				248.0	0.63	99
U2	Marine Deposits (Clay Crust)	6.0	50.1	IP-6		31.1				119.3	4.1	0.130	0.017				
		-8.0	-48.1	490904		29.0	31	20	11								
				CU-8-1		30.8				121.6				548.9	1.88	231	

**Notes:**

- W<sub>L</sub> = Liquid Limit  
W<sub>P</sub> = Plastic Limit  
I<sub>P</sub> = Plasticity Index
- Total unit weight = dry unit weight \* (1 + water content)
- σ'<sub>p</sub> = maximum past pressure  
CR = compression ratio = C<sub>c</sub> / (1+e<sub>0</sub>)  
RR = recompression ratio = C<sub>r</sub> / (1+e<sub>0</sub>)
- σ'<sub>c</sub> = effective consolidation stress = (σ'<sub>vc</sub> + 2\*σ'<sub>hc</sub>)/3, where σ'<sub>vc</sub> = effective vertical consolidation stress and σ'<sub>hc</sub> = effective horizontal consolidation stress.
- Consolidation properties could not be reliably determined from incremental consolidation test on HB-EXIT45-303 U1 and HB-EXIT45-U2 due to shape of curve.
- CR and RR could not be reliably determined from incremental consolidation test on HB-EXIT45-303 U4 due to shape of curve.
- Ground surface elevations at as-drilled test boring locations should be considered approximate and were estimated by HNTB based on interpolation between ground surface contours.
- Elevations are measured in feet and reference the National Geodetic Vertical Datum of 1988 (NAVD 88).

	Individual	Date
Prepared By:	NLK	3/12/2019
Checked By:	EAF	3/14/2019
Reviewed By:	WAC	3/15/2019

## FIGURES



MAP SOURCE: ESRI

SITE COORDINATES: 43°37'55"N, 70°20'39"W



**HALEY  
ALDRICH**

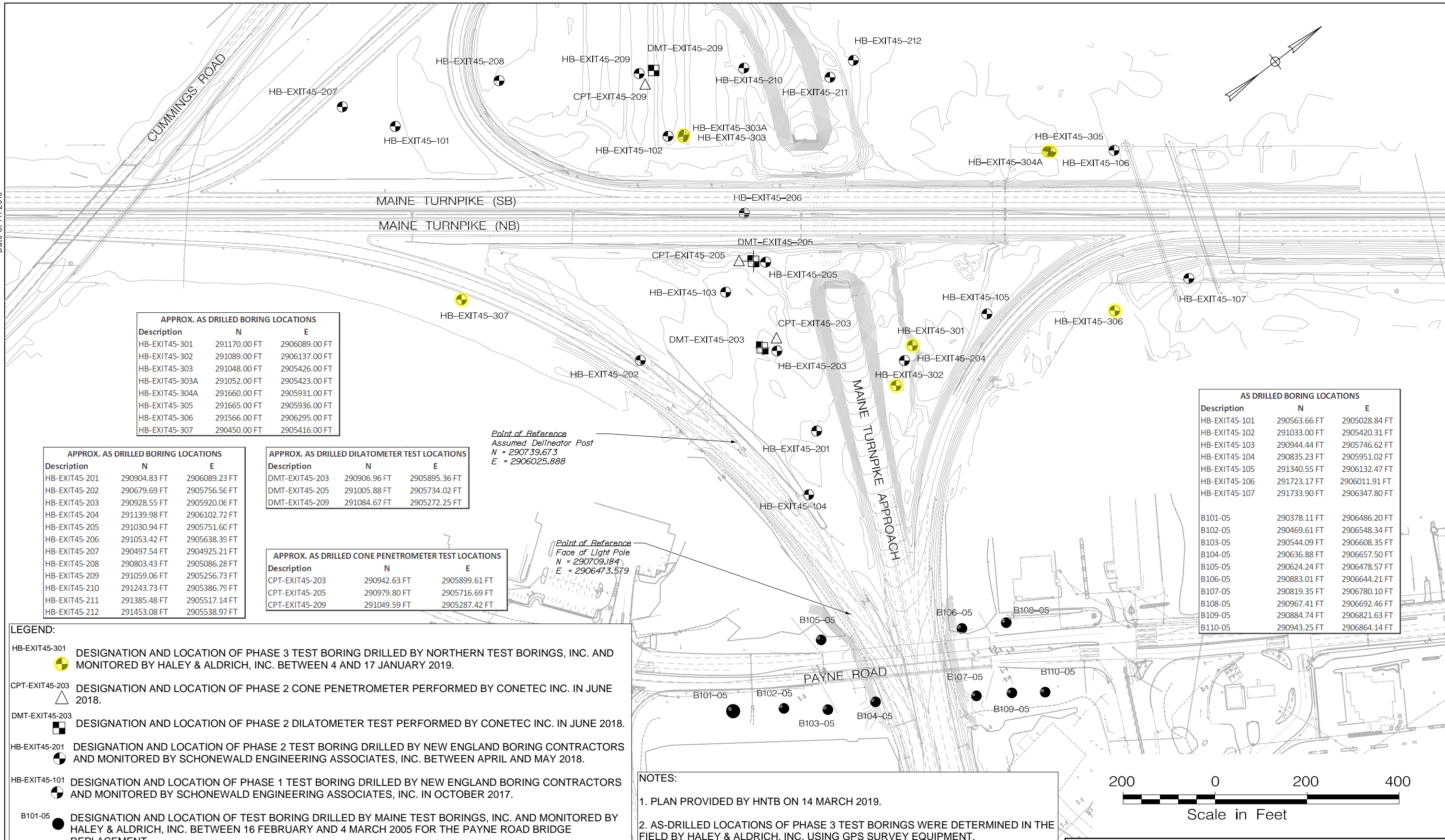
PROPOSED RECONSTRUCTION OF EXIT 45 INTERCHANGE  
MAINE TURNPIKE  
SOUTH PORTLAND, MAINE

**PROJECT LOCUS**

APPROXIMATE SCALE: 1 IN = 2000 FT  
MARCH 2019

**FIGURE 1**

Date: 3/14/2019



**APPROX. AS DRILLED BORING LOCATIONS**

Description	N	E
HB-EXIT45-301	291170.00 FT	2906089.00 FT
HB-EXIT45-302	291089.00 FT	2906137.00 FT
HB-EXIT45-303	291048.00 FT	2905426.00 FT
HB-EXIT45-303A	291052.00 FT	2905423.00 FT
HB-EXIT45-304A	291660.00 FT	2905931.00 FT
HB-EXIT45-305	291665.00 FT	2905936.00 FT
HB-EXIT45-306	291566.00 FT	2906295.00 FT
HB-EXIT45-307	290450.00 FT	2905416.00 FT

**APPROX. AS DRILLED BORING LOCATIONS**

Description	N	E
HB-EXIT45-201	290904.83 FT	2906089.23 FT
HB-EXIT45-202	290679.69 FT	2905756.56 FT
HB-EXIT45-203	290928.55 FT	2905920.06 FT
HB-EXIT45-204	291139.98 FT	2906102.72 FT
HB-EXIT45-205	291030.94 FT	2905751.60 FT
HB-EXIT45-206	291053.42 FT	2905638.39 FT
HB-EXIT45-207	290497.54 FT	2904925.21 FT
HB-EXIT45-208	290803.43 FT	2905086.28 FT
HB-EXIT45-209	291059.06 FT	2905256.73 FT
HB-EXIT45-210	291243.73 FT	2905386.79 FT
HB-EXIT45-211	291385.48 FT	2905517.14 FT
HB-EXIT45-212	291453.08 FT	2905538.97 FT

**APPROX. AS DRILLED DILATOMETER TEST LOCATIONS**

Description	N	E
DMT-EXIT45-203	290906.96 FT	2905895.36 FT
DMT-EXIT45-205	291005.88 FT	2905734.02 FT
DMT-EXIT45-209	291084.67 FT	2905272.25 FT

**APPROX. AS DRILLED CONE PENETROMETER TEST LOCATIONS**

Description	N	E
CPT-EXIT45-203	290942.63 FT	2905899.61 FT
CPT-EXIT45-205	290979.80 FT	2905716.69 FT
CPT-EXIT45-209	291049.59 FT	2905287.42 FT

Point of Reference  
Assumed Dellneator Post  
N = 290739.673  
E = 2906025.888

Point of Reference  
Face of Light Pole  
N = 290709.184  
E = 2906473.579

**AS DRILLED BORING LOCATIONS**

Description	N	E
HB-EXIT45-101	290563.66 FT	2905028.84 FT
HB-EXIT45-102	291033.00 FT	2905420.31 FT
HB-EXIT45-103	290944.44 FT	2905746.62 FT
HB-EXIT45-104	290835.23 FT	2905951.02 FT
HB-EXIT45-105	291340.55 FT	2906132.47 FT
HB-EXIT45-106	291723.17 FT	2906011.91 FT
HB-EXIT45-107	291733.90 FT	2906347.80 FT
B101-05	290378.11 FT	2906486.20 FT
B102-05	290469.61 FT	2906548.34 FT
B103-05	290544.09 FT	2906608.35 FT
B104-05	290636.88 FT	2906657.50 FT
B105-05	290624.24 FT	2906478.57 FT
B106-05	290883.01 FT	2906644.21 FT
B107-05	290819.35 FT	2906780.10 FT
B108-05	290967.41 FT	2906692.46 FT
B109-05	290884.74 FT	2906821.63 FT
B110-05	290943.25 FT	2906864.14 FT

- LEGEND:**
- HB-EXIT45-301 DESIGNATION AND LOCATION OF PHASE 3 TEST BORING DRILLED BY NORTHERN TEST BORINGS, INC. AND MONITORED BY HALEY & ALDRICH, INC. BETWEEN 4 AND 17 JANUARY 2019.
  - CPT-EXIT45-203 DESIGNATION AND LOCATION OF PHASE 2 CONE PENETROMETER PERFORMED BY CONETEC INC. IN JUNE 2018.
  - DMT-EXIT45-203 DESIGNATION AND LOCATION OF PHASE 2 DILATOMETER TEST PERFORMED BY CONETEC INC. IN JUNE 2018.
  - HB-EXIT45-201 DESIGNATION AND LOCATION OF PHASE 2 TEST BORING DRILLED BY NEW ENGLAND BORING CONTRACTORS AND MONITORED BY SCHONEWALD ENGINEERING ASSOCIATES, INC. BETWEEN APRIL AND MAY 2018.
  - HB-EXIT45-101 DESIGNATION AND LOCATION OF PHASE 1 TEST BORING DRILLED BY NEW ENGLAND BORING CONTRACTORS AND MONITORED BY SCHONEWALD ENGINEERING ASSOCIATES, INC. IN OCTOBER 2017.
  - B101-05 DESIGNATION AND LOCATION OF TEST BORING DRILLED BY MAINE TEST BORINGS, INC. AND MONITORED BY HALEY & ALDRICH, INC. BETWEEN 16 FEBRUARY AND 4 MARCH 2005 FOR THE PAYNE ROAD BRIDGE REPLACEMENT

- NOTES:**
- PLAN PROVIDED BY HNTB ON 14 MARCH 2019.
  - AS-DRILLED LOCATIONS OF PHASE 3 TEST BORINGS WERE DETERMINED IN THE FIELD BY HALEY & ALDRICH, INC. USING GPS SURVEY EQUIPMENT.



Scale:

No.	Revision	By	Date

Designed by:

**HNTB**

CONSULTANT PROJECT MANAGER: -----

	By	Date		By	Date
Designed	---	--/--	Checked	---	--/--
Drawn	---	--/--	In Charge of	RAL	--/--

HNTB CORPORATION  
340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909

**MAINE TURNPIKE**

**THE GOLD STAR MEMORIAL HIGHWAY**

MTA PROJECT MANAGER: -----

**HALEY ALDRICH**

PROPOSED RECONSTRUCTION OF EXIT 45 INTERCHANGE  
MAINE TURNPIKE  
SOUTH PORTLAND, MAINE

**SUBSURFACE EXPLORATION LOCATION PLAN**

SCALE: AS SHOWN  
MARCH 2019

**FIGURE 2**

Filename: BLPlan.dgn



## **APPENDIX A**

### **Test Boring Logs**

**IDENTIFICATION AND DESCRIPTION OF SUBSURFACE MATERIALS**

**SOIL**

Soil description on logs of subsurface explorations are based on Standard Penetration Test results, visual-manual examination of exposed soil and soil samples, and the results of laboratory tests on selected samples. The criteria, descriptive terms and definitions are as follows:

**DENSITY OR CONSISTENCY**

Density of Cohesionless Soils	Penetration Resistance (Blows per ft.)	Consistency of Cohesive Soils	Penetration Resistance (Blows per ft.)
Very Loose	0-4	Very Soft	0-2
Loose	5-10	Soft	3-4
Medium	11-30	Medium	5-8
Dense	31-50	Stiff	9-15
Very Dense	over 50	Very Stiff	16-30
		Hard	over 30

**PENETRATION RESISTANCE**

Standard Penetration Test (ASTM D-1586) – Number of blows required to drive a standard 2 in. O.D. split spoon sampler 1 ft. with a 140 lb. weight falling freely through 30 in.

**COLOR:** Basic colors and combinations: black, brown, gray, yellow-brown, etc.

**SUPPLEMENTAL SOIL TERMINOLOGY:**

- Lamina – 0 to 1/16 in. thick (cohesive)
- Parting – 0 to 1/16 in. thick (granular)
- Seam – 1/16 to 1/2 in. thick
- Layer – 1/2 to 12 in. thick
- Stratum – > 12 in. thick
- Pocket – Small, erratic deposit less than 12 in. size
- Lens – Lenticular deposit larger than a pocket
- Occasional – One or less per 12 in. of thickness
- Frequent – More than one per 12 in. of thickness
- Interbedded – Alternating soil layers of differing composition
- Varved – Alternating thin seams of silt and clay
- Mottled – Variation of color

**GEOLOGIC INTERPRETATION**

Deposit type – GLACIAL TILL, ALLUVIUM, FILL.....

The natural soils are identified by criteria of Unified Soil Classification System (USCS), with appropriate group symbol in parenthesis for each soil description. Fill materials may not be classified by USCS criteria.

**ROCK**

Rock descriptions noted on logs of subsurface explorations are based on visual-manual examination of exposed rock outcrops and core samples. The criteria, descriptive terms and definitions used are as follows:

**FIELD HARDNESS:**

- Very Hard** – Cannot be scratched with a knife point or sharp pick.
- Hard** – Can be scratched with a knife point or sharp pick, only with difficulty.
- Moderately Hard** – Can be readily scratched with a knife point or pick.
- Medium Hard** – Can be grooved or gouged 1/16 in. deep with firm pressure on a knife point or sharp pick.
- Soft** – Can be grooved or gouged easily with a knife point or pick.
- Very Soft** – Can be carved with a knife and excavated with a pick point.

**WEATHERING:**

The action of organic and inorganic and chemical and physical processes resulting in alteration of color, texture and composition.

**Weathering:**

- Fresh-FR** – No visible sign of alteration, except perhaps slight discoloration on major discontinuity surfaces.
- Slight-SL** – Discoloration of rock material and discontinuity surfaces.
- Moderate-MOD** – Less than half the rock material decomposed to soil. Some fresh rock; continuous "framework".
- High-HIGH** – More than half the rock material decomposed and/or disintegrated to soil. Fresh rock corestones or discontinuous "framework".
- Complete-COMP** – All rock material disintegrated to soil, but mass still intact.
- Residual Soil** – All rock material converted to soil. Volume of mass changed, but material has not been significantly transported.

**COLOR:** Basic colors and combinations: gray, light gray, brown, red-brown.

**TEXTURE:** Size, shape and arrangements of constituents.

- Aphanitic** – Individual grains invisible.
- Fine-grained** – Grains barely visible to the unaided eye, up to 1/16 in. diameter.
- Medium-grained** – Grains between 1/16 and 3/16 in. diameter
- Coarse-grained** – Grains between 3/16 and 1/4 in. diameter
- Very Coarse-grained** – Grains larger than 1/4 in.

**LITHOLOGY:** Rock classification and modifiers; accepted formation names.

**DISCONTINUITIES:**

Type	Definition
Joint	A natural fracture along which no displacement has occurred. May occur in parallel groups called sets.
Shear	A natural fracture along which displacement has occurred. Surface may be slickensided or striated.
Fault	A natural fracture along which displacement has occurred. Usually lined with gouge and slickensides.
Shear or Fault Zone	Zone of fractured rock and gouge bordering the displacement plane.

**ORIENTATION/ATTITUDE:**

Term	Angle (degrees)
Horizontal	0-5
Low Angle	6-35
Moderately Dipping	36-55
High Angle	56-85
Vertical	86-100

**SPACING:**

Term	Inches
Extremely Close	< 3/4
Very Close	3/4 - 2-1/2
Close	2-1/2 - 8
Moderate	8 - 24
Wide	24 - 80
Very Wide	80 - 20 ft.
Extremely Wide	> 20 ft.

**PERSISTENCE/CONTINUITY:**

Term	Feet
Very Low	0-3
Low	3-10
Medium	10-40
High	40-80
Very High	> 80

**SOLUTION CAVITIES:**

Term	Size
Pit	Barely visible - 1/4 in.
Vug	1/4 - 2 in.
Cavity	2 in. - 2 ft.
Cave	> 2 ft.

**APERTURE/GAP:**

Term	Inches
Very Tight	< 0.004
Tight	0.004 - 0.01
Partly Open	0.01 - 0.02
Open	0.02 - 0.1
Moderately Wide	0.1-0.4
Wide	> 0.4
Very Wide	0.4 - 4.0
Extremely Wide	4.0 - 40
Cavernous	> 40

**BEDDING:**

Term	Inches	Term
Very thin	< 2.5	Thick
Thin	2.5-8	Very thick
Medium	9-24	Massive

U.S. Standard Series Sieve				Clear Square Sieve Openings			
12"	3"	3/4"	4	10	40	200	
Boulders	Cobbles	Gravel		Sand			Silts and Clays
		Coarse	Fine	Coarse	Medium	Fine	
305 mm	76 mm	19 mm	4.75 mm	2.00 mm	0.43 mm	0.074 mm	

**UNIFIED SOIL CLASSIFICATION SYSTEM**

MAJOR DIVISIONS		Group Symbol	Graphic Symbol	TYPICAL NAMES
Coarse grained soils: more than half is larger than number 200 sieve	Gravels	Gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
			GM	Silty gravels, poorly graded gravel-sand-silt mixtures
	More than half of coarse fraction is larger than number 4 sieve	Gravels with over 12% fines	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures
			SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
	Sands	Sands with little or no fines	SM	Silty sands, poorly graded sand-silt mixtures
			SC	Clayey sands, poorly graded sand-clay mixtures
			More than half of coarse fraction is smaller than number 4 sieve	Sands with over 12% fines
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
OL	Organic clays and organic silty clays of low plasticity			
Fined-grained soils: more than half smaller than number 200 sieve	Silts and Clays	Liquid limit 50% or less	MH	Inorganic silty, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
	Silts and Clays	Liquid limit greater than 50%	PT	Peat and other highly organic soils
Highly organic soils				

**GENERAL NOTES**

- Logs of subsurface explorations depict soil, rock and groundwater conditions only at the locations specified on the dates indicated. Subsurface conditions may vary at other locations and at other times.
- Water levels noted on the logs were measured at the times and under the conditions indicated. During test borings, these water levels could have been affected by the introduction of water into the borehole, extraction of tools on other procedures and thus may not reflect actual groundwater level at the test boring location. Groundwater level fluctuations may also occur as a result of variations in precipitation, temperature, season, tides, adjacent construction activities and pumping of water supply wells and construction dewatering systems.



**SUBSURFACE EXPLORATION KEY**

SCALE: AS SHOWN





# TEST BORING REPORT

**Boring No. HB-Exit 45-301**

File No. 132949-003  
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
10	3 3 3 4	S5 24	10.0 12.0	12.0	CL	V1 (10.1-10.5'): 430/60 in-lbs; Su=1,670/235 psf Note: Could only push vane 6 in. below bottom of borehole; refusal. Stiff olive-brown to brown lean CLAY with sand (CL), mps 0.42 mm, infrequent 1.0 in. layers of fine sand, no odor, wet -INTERBEDDED MARINE DEPOSITS-					15	85				
		U2 24	12.0 14.0		CL	U2: Olive-brown lean CLAY (CL)  -MARINE DEPOSITS- (CLAY CRUST)  55x110 mm vane raw torque readings: V2 (14-14.4'): 605/110 in-lbs; Su=2,350/425 psf Note: Vane refusal at 14.4 ft.										
	2 1 2 2	S6 24	14.0 16.0	14.2	CL	Very stiff olive-brown grading to olive-gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet  -MARINE DEPOSITS- (CLAY)  U3: Olive-gray lean CLAY (CL)						100				
		U3 24	16.0 18.0													
		S7 24	18.0 20.0		CL	Medium stiff olive-gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet 55x110 mm vane raw torque readings: V3 (18.6-19'): 130/10 in-lbs; Su=505/40 psf  55x110 mm vane raw torque readings: V4 (19.6-20'): 130/20 in-lbs; Su=505/80 psf							100			
20				20.0		BOTTOM OF EXPLORATION 20.0 FT (No Refusal)										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-301**

# TEST BORING REPORT

**Boring No.** HB-Exit 45-302

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 2  
 Start 11 January 2019  
 Finish 11 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 60  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel						Sand				Field Test							
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength								
0	1	S1	0.0		SW	Note: Frozen soils at ground surface.																		
	2	14	2.0			Loose brown well-graded SAND (SW), mps 0.5 in., no structure, no odor, moist, roots and wood		5	10	40	40	5												
	4	S2	2.0			-FILL-																		
	4	S2	2.0		SM	Loose brown silty SAND (SM), mps 0.25 in., no structure, no odor, moist		5	10	25	40	20												
	4	18	4.0			-FILL-																		
	8	S3	4.0		SW	Red-brown well-graded SAND (SW), mps 0.2 in., no structure, no odor, moist				15	35	45	5											
	9	17	6.0		SP	Medium dense gray-brown poorly-graded SAND (SP), mps 2.0 mm, no structure, no odor, moist				25	70	5												
	8	S3	4.0			-INTERBEDDED MARINE DEPOSITS-																		
	9	17	6.0			Medium dense gray-brown poorly-graded SAND (SP), mps 2.0 mm, no structure, no odor, moist				25	70	5												
	8	S4	6.0		ML	Very stiff gray-brown sandy SILT (ML), mps 0.25 in., mottled, no odor, moist				5	5	20	70											
	10	14	8.0			-INTERBEDDED MARINE DEPOSITS-																		
	10	S4	6.0		SM	Medium dense light brown to gray-brown silty SAND (SM), mps 0.25 in., mottled, no odor, moist					25	55	20											
	10	14	8.0			-INTERBEDDED MARINE DEPOSITS-																		
	3	S5	8.0		CL/SM	Very stiff gray-brown to dark gray lean CLAY (CL) and silty SAND (SM), mps 4.75 mm, interlayered and mottled, no odor, moist				5	25	45	25											
	4	24	10.0			-INTERBEDDED MARINE DEPOSITS-																		
	5	24	10.0		CL	Stiff gray-brown to yellow-brown lean CLAY (CL), mps 0.42 mm, mottled, no odor, moist						5	95											
	7					-MARINE DEPOSITS- (CLAY CRUST)																		

Water Level Data						Sample ID		Well Diagram				Summary						
Date	Time	Elapsed Time (hr.)	Depth (ft) to:			O - Open End Rod	T - Thin Wall Tube	Riser Pipe	Screen	Filter Sand	Cuttings	Grout	Concrete	Bentonite Seal	Overburden (ft)	Rock Cored (ft)	Samples	7S, 2U
			Bottom of Casing	Bottom of Hole	Water													
1/11/19	2:00	-	10.0	20.0	3.3													

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High

\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.  
 Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.



# TEST BORING REPORT

**Boring No. HB-Exit 45-302**

File No. 132949-003

Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test							
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength			
10		U1 24	10.0 12.0		CL	U1: Medium stiff olive-gray lean CLAY (CL)  -MARINE DEPOSITS- (CLAY CRUST)													
	3 3 4 4	S6 24	12.0 14.0		ML/ CL	Medium stiff gray-brown SILT (ML) and CLAY (CL), mps 0.42 mm, mottled, no odor, moist  Note: Attempt vane shear test, refusal at 12.0 ft, no penetration.				5	95								
		S7 24	14.0 16.0		CL	Stiff gray-brown grading to gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet  55x110 mm vane raw torque readings: V1 (14.6-15'): 410/70 in-lbs; Su=1,590/270 psf  55x110 mm vane raw torque readings: V2 (15.6-16'): 410/65 in-lbs; Su=1,590/250 psf U2: Stiff olive-gray lean CLAY (CL)  -MARINE DEPOSITS- (CLAY CRUST)						100							
15		U2 24	16.0 18.0																
		S8 24	18.0 20.0	18.0	CL	Soft olive-gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet  -MARINE DEPOSITS- (CLAY)  55x110 mm vane raw torque readings: V3 (18.6-19'): 120/15 in-lbs; Su=465/60 psf  55x110 mm vane raw torque readings: V4 (19.6-20'): 120/10 in-lbs; Su=465/40 psf						100							
20				20.0		BOTTOM OF EXPLORATION 20.0 FT (No Refusal)													

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-302**



# TEST BORING REPORT

**Boring No. HB-Exit 45-303**

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 4  
 Start 16 January 2019  
 Finish 17 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 61.4  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel			Sand			Field Test						
							% Coarse	% Fine		% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength		
0	5	S1	0.0			Note: Frozen soils at ground surface.													
	3	17	2.0		SP-SM	Loose dark brown poorly-graded SAND with silt (SP-SM), mps 2.0 mm, no structure, no odor, moist, with organics (roots)				10	75	15							
				1.1		-FILL-													
				2.0	SP-SM	Loose gray poorly-graded SAND with silt (SP-SM), mps 0.42 mm, no structure, no odor, moist, with organics (roots)					90	10							
				2.0	SP	Medium dense brown poorly-graded SAND (SP), mps 2.0 mm, no structure, no odor, wet, trace organics (roots)				55	40	5							
				4.0		-FILL-													
				4.0	SC	Very loose olive-gray clayey SAND (SC), mps 0.42 mm, infrequent clay layers up to 2.0 in., slight organic odor, wet					60	40							
				6.0		-INTERBEDDED MARINE DEPOSITS-													
				6.0	SM	Loose gray-brown silty SAND (SM), mps 0.42 mm, no structure, no odor, wet				6	80	14							
				8.3		-INTERBEDDED MARINE DEPOSITS-													
				8.3	CL	Very loose olive-gray sandy lean CLAY (CL), mps 0.42 mm, frequent layers of lean clay up to 3.0 in., slight organic odor, wet				1	37	60							
				10.0		-INTERBEDDED MARINE DEPOSITS-													

Water Level Data				Sample ID		Well Diagram		Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft) to:		O - Open End Rod T - Thin Wall Tube U - Undisturbed Sample S - Split Spoon Sample		Riser Pipe Screen Filter Sand Cuttings Grout Concrete Bentonite Seal	Overburden (ft)	54
			Bottom of Casing	Bottom of Hole				Water	Rock Cored (ft)
		Not Observed						Samples	15S, 6U

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None  
 Toughness: L - Low M - Medium H - High  
 Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Dry Strength: N - None L - Low M - Medium H - High V - Very High

**\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**  
**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003\TBC\_DATABASE.GPJ 15 Mar 19



# TEST BORING REPORT

**Boring No. HB-Exit 45-303**

File No. 132949-003  
Sheet No. 2 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
10		U1 24	10.0 12.0		ML	U1: Olive-gray sandy SILT (ML)  -INTERBEDDED MARINE DEPOSITS-  55x110 mm vane raw torque readings: V1 (12.6-13'): 125/15 in-lbs; Su=485/60 psf					29	71				
		S6 24	12.0 14.0	12.9	CL	Soft olive-gray lean CLAY (CL), mps 0.42 mm, lean clay layer beginning at 12.9 ft to bottom of spoon sample (12.0 in. thick), no odor, wet  55x110 mm vane raw torque readings: V2 (13.6-14'): 115/25 in-lbs; Su=445/95 psf					4	96				
		S7 24	14.0 16.0		CL	Soft olive-gray lean CLAY (CL), mps 0.42 mm, no structure, no odor, wet  55x110 mm vane raw torque readings: V3 (14.6-15'): 100/10 in-lbs; Su=390/40 psf					1	99				
15		U2 13	16.0 18.0		CL	55x110 mm vane raw torque readings: V4 (15.6-16'): 95/10 in-lbs; Su=370/40 psf U2: Olive gray lean CLAY (CL)  -MARINE DEPOSITS- (CLAY)					5	95				
		S8 24	18.0 20.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), mps 0.42 mm, 1.5 in. sand layer from 18.0-18.2 ft, no odor, wet  55x110 mm vane raw torque readings: V5 (18.6-19'): 160/10 in-lbs; Su=620/40 psf					6	94				
20		S9 24	20.0 22.0		CL	55x110 mm vane raw torque readings: V6 (19.6-20'): 80/5 in-lbs; Su=310/20 psf Soft olive-gray lean CLAY (CL), mps 0.42 mm, no structure, no odor, wet  55x110 mm vane raw torque readings: V7 (20.6-21'): 110/10 in-lbs; Su=425/40 psf					5	95				
		U3 14	22.0 24.0			55x110 mm vane raw torque readings: V8 (21.6-22'): 80/5 in-lbs; Su=310/20 psf U3: Olive gray lean CLAY (CL)  -MARINE DEPOSITS- (CLAY)										
		S10 24	24.0 26.0		CL	Soft olive-gray lean CLAY (CL), mps 0.42 mm, no structure, no odor, wet, trace shells					5	95				

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-303**





# TEST BORING REPORT

**Boring No. HB-Exit 45-303**

File No. 132949-003  
 Sheet No. 3 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION  (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test							
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength			
25						55x110 mm vane raw torque readings: V9 (24.6-25'): 105/5 in-lbs; Su=405/20 psf													
		S11 24	26.0 28.0		CL	55x110 mm vane raw torque readings: V10 (25.6-26'): 70/5 in-lbs; Su=270/20 psf Soft olive-gray lean CLAY (CL), mps 0.42 mm, 6.0 in. layer of fine and from 27.6 ft to 28.0 ft, no odor, wet					25	75							
		S12 24	28.0 30.0		CL	55x110 mm vane raw torque readings: V11 (26.6-27'): 80/10 in-lbs; Su=310/40 psf  -MARINE DEPOSITS- (CLAY) 55x110 mm vane raw torque readings: V12 (27.6-28'): 90/10 in-lbs; Su=350/40 psf Soft olive-gray lean CLAY (CL), mps 0.42 mm, no structure, no odor, wet					5	95							
		U4 24	30.0 32.0		CL	55x110 mm vane raw torque readings: V13 (28.6-29'): 120/5 in-lbs; Su=465/20 psf  55x110 mm vane raw torque readings: V14 (29.6-30'): 80/5 in-lbs; Su=310/20 psf U4: Olive gray lean CLAY (CL)													
						-MARINE DEPOSITS- (CLAY)													
						Note: No sampling or in-situ testing between 32 and 43 ft.													
30																			
35																			

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DAT\BASE.GPJ 15 Mar 19

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-303**



# TEST BORING REPORT

**Boring No. HB-Exit 45-303**

File No. 132949-003  
Sheet No. 4 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test							
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength			
40						-MARINE DEPOSITS- (CLAY)													
		S13 24	43.0 45.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), mps 0.075 mm, frequent black organic streaking, organic odor, wet  55x110 mm vane raw torque readings: V15 (43.6-44'): 130/10 in-lbs; Su=505/40 psf  55x110 mm vane raw torque readings: V16 (44.6-45'): 110/10 in-lbs; Su=425/40 psf U5: Gray lean CLAY (CL)												100	
45		U5 24	45.0 47.0																
		S14 24	47.0 49.0		CL	Soft to medium stiff gray lean CLAY (CL), mps 0.075 mm, frequent black organic streaking, organic odor, wet  55x110 mm vane raw torque readings: V17 (47.6-48'): 180/10 in-lbs; Su=700/40 psf  55x110 mm vane raw torque readings: V18 (48.6-49'): 110/5 in-lbs; Su=425/20 psf												100	
50		U6 24	50.0 52.0		CL	U6: Gray lean CLAY (CL)													
		S15 24	52.0 54.0		CL	Medium stiff gray lean CLAY (CL), mps 0.075 mm, frequent black organic streaking, organic odor, wet  55x110 mm vane raw torque readings: V19 (52.6-53'): 170/10 in-lbs; Su=660/40 psf  55x110 mm vane raw torque readings: V20 (53.6-54'): 150/5 in-lbs; Su=580/20 psf												100	
				54.0		-MARINE DEPOSITS- (CLAY)													
						BOTTOM OF EXPLORATION 54.0 FT (No Refusal)													

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-303**



# TEST BORING REPORT

**Boring No.** HB-Exit 45-303A

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 1  
 Start 17 January 2019  
 Finish 17 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 61.3  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel			Sand			Field Test					
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength		
0						Note: Frozen soils at ground surface; no sampling or in-situ testing from 0 to 5 ft.												
5		U1 24	5.0 7.0		SC	U1: Clayey SAND/sandy CLAY (SC)												
		S1 4	7.0 9.0		SP-SM	Very loose gray-brown poorly-graded SAND with silt (SP-SM), mps 0.42 mm, no structure, slight organic odor, wet -INTERBEDDED MARINE DEPOSITS- 55x110 mm vane raw torque readings: V1 (7.1-7.5'): 190/30 in-lbs; Su=735/115 psf Note: Vane refusal at 7.5 ft.				90	10							
				9.0		BOTTOM OF EXPLORATION 9.0 FT (No Refusal)												

Water Level Data					Sample ID		Well Diagram			Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft) to:		O - Open End Rod T - Thin Wall Tube U - Undisturbed Sample S - Split Spoon Sample		Riser Pipe Screen Filter Sand Cuttings Grout Concrete Bentonite Seal	Overburden (ft)		Samples	
			Bottom of Casing	Bottom of Hole				Water	9	-	1S, 1U
		Not Observed									

**Boring No. HB-Exit 45-303A**

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High

**\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**  
**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DAT\BASE.GPJ 15 Mar 19



# TEST BORING REPORT

**Boring No.** HB-Exit 45-304A

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 2  
 Start 15 January 2019  
 Finish 16 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 56.1  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel			Sand			Field Test					
							% Coarse	% Fine		% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength	
0	1	S1	0.0	0.3	OL	Note: Frozen soils at ground surface.												
	1	12	2.0		CL/ML	Very soft dark olive-gray SILT with organics (OL), mps 0.42 mm, roots throughout, organics odor, moist -TOPSOIL- Very soft olive-gray lean CLAY (CL) and SILT (ML) with organics, mps 0.042 mm, mottled, slight organic odor, moist -ORGANIC DEPOSIT-						5	95					
				2.0	CL	U1: Dark gray lean CLAY (CL)  (CLAY CRUST) -MARINE DEPOSITS-												
	3	S2	4.0		ML/CL	Medium stiff light brown to olive-gray SILT (ML) and lean CLAY (CL), mps 0.42 mm, mottled, no odor, moist, trace organics  55x110 mm vane raw torque readings: MV1: Attempted vane shear test at 4.0 ft; refusal.						5	95					
	4	24	6.0		CL	U2: Gray-brown lean CLAY (CL)  -MARINE DEPOSITS- (CLAY CRUST)  55x110 mm vane raw torque readings: V1 (8-8.5'): 760/130 in-lbs; Su=2,950/505 psf												
	5				ML/CL	Medium stiff to stiff light brown to olive-gray SILT (ML) and lean CLAY (CL), mps 0.075 mm, no structure, no odor, wet, trace organics  55x110 mm vane raw torque readings: V2 (10.6-11'): 130/5 in-lbs; Su=505/20 psf								100				
	2	S3	8.0															
	2	24	10.0															
10				10.0														

Water Level Data						Sample ID		Well Diagram			Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft) to:			O - Open End Rod T - Thin Wall Tube U - Undisturbed Sample S - Split Spoon Sample		Riser Pipe Screen Filter Sand Cuttings Grout Concrete Bentonite Seal	Overburden (ft)	Rock Cored (ft)	Samples	5S, 2U
			Bottom of Casing	Bottom of Hole	Water							
1/16/19	10:00	-	12.0	14.0	0				14	-	5S, 2U	

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High

\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.  
 Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV/CLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003\TBC\_DATA\BASE.GPJ 15 Mar 19



# TEST BORING REPORT

**Boring No. HB-Exit 45-304A**

File No. 132949-003  
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
10		S4 24	10.0 12.0		CL	Soft olive-gray to light brown lean CLAY (CL), mps 0.075 mm, no structure, no odor, wet						100				
		S5 15	12.0 14.0		CL	<p style="text-align: center;">-MARINE DEPOSITS- (CLAY)</p> <p>55x110 mm vane raw torque readings: V3 (11.6-12'): 120/5 in-lbs; Su=465/20 psf</p> <p>Soft olive-gray lean CLAY (CL), mps 0.075 mm, no structure, no odor, wet</p> <p>55x110 mm vane raw torque readings: V4 (12.6-13'): 120/5 in-lbs; Su=465/20 psf</p>						100				
				14.0		<p>55x110 mm vane raw torque readings: V5 (13.6-14'): 110/5 in-lbs; Su=425/20 psf</p> <p style="text-align: center;">BOTTOM OF EXPLORATION 14.0 FT (No Refusal)</p>										

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19

**NOTE:** Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-304A**



# TEST BORING REPORT

**Boring No. HB-Exit 45-305**

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 7  
 Start 14 January 2019  
 Finish 15 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 56.1  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel			Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength	
0	4 1 WOH	S1 6	0.0 2.0			Note: Frozen soils at ground surface. Very soft olive-gray lean CLAY (CL), mps 0.42 mm, mottled, slight organic odor, moist, with organics						5	95				
						-MARINE DEPOSITS- (CLAY CRUST)											
	4 5 6 5	S2 21	2.0 4.0		CL/ ML	Stiff olive-gray to light brown lean CLAY (CL) and SILT (ML), mps 0.42 mm, mottled, slight organic odor, moist, with roots						10	90				
						-MARINE DEPOSITS- (CLAY CRUST)											
	3 4 4 4	S3 19	4.0 6.0		CL/ ML	Medium stiff olive-gray with some light brown lean CLAY (CL) and SILT (ML), mps 0.42 mm, mottled, slight organic odor, moist, trace roots						10	90				
						-MARINE DEPOSITS- (CLAY CRUST)											
	4 4 3 3	S4 16	6.0 8.0		CL/ ML	Medium stiff olive-gray to light brown lean CLAY (CL) and SILT (ML), mps 0.42 mm, mottled, no odor, moist, trace roots/plant debris						5	95				
						-MARINE DEPOSITS- (CLAY CRUST)											
	1 2 1 2	S5 24	8.0 10.0		CL/ ML	Soft olive-gray with trace light brown lean CLAY (CL) and SILT (ML), mps 0.42 mm, mottled, no odor, wet, trace roots/plant debris						5	95				
10				10.0													

Water Level Data						Sample ID		Well Diagram			Summary								
Date	Time	Elapsed Time (hr.)	Depth (ft) to:			O - Open End Rod	T - Thin Wall Tube	U - Undisturbed Sample	S - Split Spoon Sample	Riser Pipe	Screen	Filter Sand	Cuttings	Grout	Concrete	Bentonite Seal	Overburden (ft)	Rock Cored (ft)	Samples
			Bottom of Casing	Bottom of Hole	Water														
1/15/19	2:00	1 day	75.0	103.6	0												78	5	19S, 1C

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High

\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.  
 Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003\TBC\_DATA\BASE.GPJ 15 Mar 19



# TEST BORING REPORT

**Boring No. HB-Exit 45-305**

File No. 132949-003  
Sheet No. 2 of 7

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
10		S6 24	10.0 12.0		CL	Medium stiff gray lean CLAY (CL), mps 0.075 mm, no structure, no odor, wet 55x110 mm vane raw torque readings: V1 (10.6-11.0'): 210/40 in-lbs; Su=815/155 psf  -MARINE DEPOSITS- (CLAY) 55x110 mm vane raw torque readings: V2 (11.6-12'): 130/25 in-lbs; Su=505/95 psf						100				
15	WOR WOR WOR WOR	S7 24	15.0 17.0		CL	Soft to medium stiff gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet  -MARINE DEPOSITS- (CLAY)						100				
20		S8 24	20.0 22.0		CL	Soft gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet 55x110 mm vane raw torque readings: V3 (20.6-21'): 110/5 in-lbs; Su=425/20 psf  55x110 mm vane raw torque readings: V4 (21.6-22'): 90/5 in-lbs; Su=350/20 psf						100				

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-305**



# TEST BORING REPORT

**Boring No. HB-Exit 45-305**

File No. 132949-003  
Sheet No. 3 of 7

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DAT\BASE.GPJ 15 Mar 19

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
25	WOR WOR WOR WOR	S9 24	25.0 27.0		CL	Soft gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet  -MARINE DEPOSITS- (CLAY)						100				
30		S10 24	30.0 32.0		CL	Soft olive-gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, organic odor, wet  55x110 mm vane raw torque readings: V5 (30.6-31'): 110/0 in-lbs; Su=425/0 psf  55x110 mm vane raw torque readings: V6 (31.6-32'): 110/5 in-lbs; Su=425/20 psf						100				
35	WOR WOR WOR WOR	S11 24	35.0 37.0		CL	Soft olive-gray lean CLAY (CL), mps 0.075 mm, infrequent black organic streaking, no odor, wet  -MARINE DEPOSITS- (CLAY)						100				

**NOTE:** Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-305**





# TEST BORING REPORT

**Boring No. HB-Exit 45-305**

File No. 132949-003  
Sheet No. 4 of 7

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
40		S12 24	40.0 42.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), mps 0.075 mm, no structure, no odor, wet  55x110 mm vane raw torque readings: V7 (40.6-41'): 130/5 in-lbs; Su=505/20 psf  -MARINE DEPOSITS- (CLAY) 55x110 mm vane raw torque readings: V8 (41.6-42'): 110/5 in-lbs; Su=425/20 psf						100				
45	WOR WOR WOR WOR	S13 6	45.0 47.0		CL	Soft olive-gray lean CLAY (CL), mps 0.075 mm, no structure, no odor, wet						100				
				48.5		Note: Drill action began to indicate granular material starting at approximately 48.5 ft below ground surface.										
50	9 6 3 5	S14 11	50.0 52.0		SP	Loose gray poorly-graded SAND with gravel (SP), mps 0.5 in., no structure, no odor, wet  -MARINE DEPOSITS- (SAND)  Note: Drill action and wash continue to indicate granular material.	10	5	5	25	50	5				
				54.3												

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-305**

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19



# TEST BORING REPORT

**Boring No. HB-Exit 45-305**

File No. 132949-003  
Sheet No. 5 of 7

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
55	14 12 13 14	S15 3	55.0 57.0		SW-SM	Medium dense gray well-graded SAND with silt and gravel (SW-SM), mps 0.5 in., no structure, no odor, wet  -MARINE DEPOSITS- (SAND)	5	15	15	25	30	10				
60	17 19 20 33	S16 20	60.0 62.0		SW	Dense gray well-graded SAND with silt and gravel (SW), mps 1.0 in., no structure, no odor, wet  Note: Drill action and wash continue to indicate granular material.  -MARINE DEPOSITS- (SAND)	5	10	10	20	45	10				
65	23 18 17 18	S17 12	65.0 67.0	65.0	SP	Dense gray poorly-graded SAND (SP), mps 2.0 in., no structure, no odor, wet  Note: Drill action and wash continue to indicate granular material.	5		5	85	5					

**NOTE:** Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-305**



# TEST BORING REPORT

**Boring No. HB-Exit 45-305**

File No. 132949-003  
Sheet No. 6 of 7

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
70	17 18 19 18	S18 16	70.0 72.0		SP-SM	Dense gray poorly-graded SAND with silt (SP-SM), mps 0.5 in., moderately bonded (fluvial) nodules, no odor, wet  -MARINE DEPOSITS- (SAND)  Note: Drill action and wash continue to indicate granular material.			5	5	80	10				
75	39 50/5"	S19 11	75.0 75.9		SP	Dense to very dense gray poorly-graded SAND (SP), mps 0.5 in., moderately bonded (fluvial nodules), no odor, wet  -MARINE DEPOSITS- (SAND)	5	5	10	75	5					
				76.4		Note: Drill action and wash indicate top of bedrock at 76.4 ft below ground surface. Advanced roller bit to 78.0 ft. -BEDROCK-										
				78.0		SEE CORE BORING REPORT FOR ROCK DETAILS										

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-305**



# CORE BORING REPORT

**Boring No. HB-Exit 45-305**  
 File No. 132949-003  
 Sheet No. 7 of 7

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD		Weathering	Elev./Depth (ft)	Visual Description and Remarks
				in.	%			
								<i>SEE TEST BORING REPORT FOR OVERBURDEN DETAILS</i>
80	0:30 1:06 1:58 2:55 3:28	C1	78.0 83.0	23 0	38 0	Slightly-Highly		Hard to moderately hard, slightly weathered to highly weathered, gray, aphanitic, PHYLLITE. Joints dipping at low to high angles, extremely close to close, open, undulating, rough, some fine grained infilled coatings on joint surfaces, majority of run highly fractured. Some noticeable pitting found throughout, some quartz/calcite stringers found throughout the length of the run.
							83.0	BOTTOM OF EXPLORATION 83.0 FT
85								
90								
95								
100								
105								

H-A\_CORE+WELL07-1 132949\_HA-LIB09-POR-REV/GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949\_EXIT\_45\132949-003\BC\_DATA\BASE.GPJ 15 Mar 19

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 5  
 Start 08 January 2019  
 Finish 08 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 58.1  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel			Sand			Field Test							
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength				
0	3	S1	0.0		ML/CL	Note: Frozen soils at ground surface.														
	3	18	2.0		ML/CL	Soft olive-gray to tan SILT (ML) and lean CLAY (CL), mottled, mps 0.075 mm, no odor, moist, with roots								100						
						-MARINE DEPOSITS- (CLAY CRUST)														
	4	S2	2.0		ML/CL	Stiff olive-gray to tan SILT (ML) and lean CLAY (CL), mottled, mps 0.075 mm, no odor, moist, with roots								100						
	6	17	4.0																	
	7																			
	10																			
	5	S3	4.0		ML/CL	Very stiff olive-gray to tan SILT (ML) and lean CLAY (CL), mottled, mps 0.075 mm, no odor, moist, occasional roots								100						
	7	24	6.0																	
	9																			
	10																			
	10	S4	6.0		ML/CL	Very stiff olive-gray to tan SILT (ML) and lean CLAY (CL), mottled, mps 0.075 mm, no odor, moist, with roots								100						
	11	19	8.0																	
	12																			
						-MARINE DEPOSITS- (CLAY CRUST)														
	8	S5	8.0	8.0	CL	Medium stiff olive-gray to tan lean CLAY (CL), mottled, mps 0.075 mm, no odor, moist								100						
	4	24	10.0																	
	4																			
	4																			
	10																			
						-MARINE DEPOSITS- (CLAY CRUST)														

Water Level Data				Sample ID		Well Diagram		Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft) to:	O - Open End Rod		Riser Pipe	Overburden (ft)	46	<b>Boring No. HB-Exit 45-306</b>
			Bottom of Casing	T - Thin Wall Tube		Screen	Rock Cored (ft)	9.7	
			Bottom of Hole	U - Undisturbed Sample		Filter Sand	Samples	12S, 2C	
		Not Observed	Water	S - Split Spoon Sample		Cuttings			
						Grout			
						Concrete			
						Bentonite Seal			

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High

\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.  
 Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.



# TEST BORING REPORT

**Boring No. HB-Exit 45-306**

File No. 132949-003  
Sheet No. 2 of 5

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
10	2 2 2 3	S6 24	10.0 12.0		CL	Soft olive-gray to tan lean CLAY (CL), mottled, mps 0.075 mm, no odor, moist  -MARINE DEPOSITS- (CLAY CRUST)						100				
15		S7 24	15.0 17.0	15.0	CL	Medium stiff olive-gray lean CLAY (CL), frequent black organic streaking, mps 0.075 mm, slight organic odor, wet  55x110 mm vane raw torque readings: V1 (15.6-16'): 180/20 in-lbs; Su=700/80 psf  55x110 mm vane raw torque readings: V2 (16.6-17'): 165/10 in-lbs; Su=640/40 psf  -MARINE DEPOSITS- (CLAY)						100				
20		S8 24	20.0 22.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V3 (20.6-21'): 130/10 in-lbs; Su=505/40 psf  55x110 mm vane raw torque readings: V4 (21.6-22'): 120/5 in-lbs; Su=465/20 psf						100				

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-306**



# TEST BORING REPORT

**Boring No. HB-Exit 45-306**

File No. 132949-003  
Sheet No. 3 of 5

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
25		S9 24	25.0 27.0		CL	Soft olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V5 (25.6-26'): 110/15 in-lbs; Su=425/60 psf  -MARINE DEPOSITS-(CLAY)  55x110 mm vane raw torque readings: V6 (26.6-27'): 105/5 in-lbs; Su=405/20 psf						100				
30		S10 24	30.0 32.0		CL	Soft olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V7 (30.6-31'): 110/15 in-lbs; Su=425/60 psf  55x110 mm vane raw torque readings: V8 (31.6-32'): 105/10 in-lbs; Su=405/40 psf						100				
35		S11 24	35.0 37.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V9 (35.6-36'): 130/25 in-lbs; Su=505/95 psf  55x110 mm vane raw torque readings: V10 (36.6-37'): 125/15 in-lbs; Su=485/60 psf  -MARINE DEPOSITS-(CLAY)						100				

**NOTE:** Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-306**



# TEST BORING REPORT

**Boring No. HB-Exit 45-306**

File No. 132949-003  
Sheet No. 4 of 5

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
40	WOR 3 3 3	512 24	40.0 42.0		CL	Medium stiff olive gray lean CLAY with sand (CL), mps 2.0 mm, occasional 1 in. sand layers, no odor, wet  55x110 mm vane raw torque readings: Note: Attempted vane shear test at 40.0 ft; refusal.			5	15	80					
				43.1		-MARINE DEPOSITS- (CLAY)										
						Note: Drill action and wash began to indicate granular material at 43.1 ft below ground surface. -PROBABLE MARINE DEPOSITS- (SAND)										
				44.6		Note: Drill action and wash indicate top of bedrock at 44.6 ft below ground surface. Advanced roller bit to 46.0 ft below ground surface into bedrock. -BEDROCK-										
45				46.0		SEE CORE BORING REPORT FOR ROCK DETAILS										
50																

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-306**





# CORE BORING REPORT

**Boring No. HB-Exit 45-306**  
 File No. 132949-003  
 Sheet No. 5 of 5

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD		Weathering	Elev./Depth (ft)	Visual Description and Remarks
				in.	%			
								<i>SEE TEST BORING REPORT FOR OVERBURDEN DETAILS</i>
4:18		C1	46.0	42	70	Slight-Moderate		Hard to moderately hard, slightly weathered grading to moderately weathering, gray, aphanitic, PHYLLITE. Joints dipping at low to high angles, extremely close to close, undulating, rough, open. Frequent calcite/quartz stringers.
4:51			51.0	9	15			
1:09								
2:25								
50 6:31								
4:05		C2	51.0	49	87	Slight-Moderate	55.7	Hard, fresh to slightly weathered, gray, aphanitic PHYLLITE. Solid core stem with single joint at bottom of run dipping at high angle, wide, open, undulating, rough. Frequent calcite/quartz veins/intrusions up to 2.0 in. in width veins occur parallel to high angle foliation.
4:08			55.7	44	78			
4:06								
4:07								
55 4:10								
								BOTTOM OF EXPLORATION 55.7 FT
60								
65								
70								
75								

H-A\_CORE-WELL07-1 132949 HA-LIB09-POR-REV/GLB HA-TB-CORE-WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003\BC\_DATA\BASE.GPJ 15 Mar 19

Project Exit 45 Interchange, South Portland, Maine  
 Client HNTB Corporation  
 Contractor Nothern Test Borings, Inc.

File No. 132949-003  
 Sheet No. 1 of 8  
 Start 04 January 2019  
 Finish 10 January 2019  
 Driller M. Nadeau  
 H&A Rep. N. Klausmeyer

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: Diedrich D-50 Track
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: HW Driven
				Hoist/Hammer: Winch/ Automatic Hammer (0.907)
				PID Make & Model: None

Elevation 63.9  
 Datum NAVD88  
 Location See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION <small>(Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)</small>	Gravel						Sand				Field Test								
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength									
0	2	S1	0.0		SW	Note: Frozen soils at ground surface.																			
	1	15	2.0		SM	Very loose dark brown well-graded SAND with silt (SW-SM), mps 0.75 in., no structure, no odor, moist		5	10	25	50	10													
						-FILL-																			
				2.0																					
	2	S2	2.0		SM	Loose dark brown silty SAND (SM), with organics, roots, mps 0.5 in., no structure, no odor, wet		5	10	25	45	15													
	4	16	4.0																						
				4.0																					
	4	S3	4.0		SW	Medium dense brown well-graded SAND (SW), mps 4.75 mm, no structure, no odor, wet				15	40	40	5												
	6	24	6.0																						
				5.0																					
				5.3	SM	Medium dense gray silty SAND with gray sandy SILT layer (SM), mps 2.0 mm, no odor, wet					10	50	40												
					SP	Medium dense light brown poorly-graded SAND (SP), mps 4.75 mm, no structure, no odor, wet				5	45	45	5												
				6.0																					
	2	S4	6.0		SP	-MARINE DEPOSITS- (SAND) Loose light brown poorly-graded SAND (SP), mps 2.0 mm, no structure, no odor, wet					20	75	5												
	2	14	8.0																						
	2	S5	8.0		SP	Very loose light brown poorly-graded SAND (SP), mps 2.0 mm, no structure, no odor, wet					20	75	5												
	2	1	10.0																						

Water Level Data						Sample ID		Well Diagram				Summary											
Date	Time	Elapsed Time (hr.)	Depth (ft) to:			Water	O - Open End Rod	T - Thin Wall Tube	U - Undisturbed Sample	S - Split Spoon Sample	Riser Pipe	Screen	Filter Sand	Cuttings	Grout	Concrete	Bentonite Seal	Overburden (ft)	90.8	Rock Cored (ft)	10.4	Samples	21S, 4C
			Bottom of Casing	Bottom of Hole																			
1/10/19	12:00	~5 days	85 (HW)	103.6	2.5																		

**Field Tests:** Dilatancy: R - Rapid S - Slow N - None  
 Toughness: L - Low M - Medium H - High  
 Plasticity: N - Nonplastic L - Low M - Medium H - High  
 Dry Strength: N - None L - Low M - Medium H - High V - Very High

**\*Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**



# TEST BORING REPORT

**Boring No. HB-Exit 45-307**  
 File No. 132949-003  
 Sheet No. 2 of 8

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
10	1 2 2 2	S6 17	10.0 12.0		SP	Very loose light brown poorly-graded SAND (SP), mps 4.75 mm, no structure, no odor, wet			5	65	30					
						-MARINE DEPOSITS- (SAND)										
15	2 4 6 7	S7 0	15.0 17.0			No recovery.										
				17.5		Note: Drill wash indicates color change from light brown to gray at approximately 17.5 ft below ground surface.										
20	3 3 5 6	S8 10	20.0 22.0		SM	Loose gray silty SAND (SM), mps 0.42 mm, no structure, no odor, wet  65x130 mm vane raw torque readings: V1 (20.1-20.5'): 310/30 in-lbs; Su=735/70 psf Could only push 6.0 in., vane refusal at 20.5 ft.				85	15					
						-MARINE DEPOSITS- (SAND)										

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-307**



# TEST BORING REPORT

**Boring No. HB-Exit 45-307**

File No. 132949-003  
Sheet No. 3 of 8

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
25		S9 24	25.0 27.0	25.0	SM/SC	Medium stiff gray silty SAND (SM) and clayey SAND (SC), mps 0.42 mm, layered, no odor, wet  55x110 mm vane raw torque readings: V2 (25.1-25.5'): 150/30 in-lbs; Su=580/115 psf Could only push 6.0 in., vane refusal at 25.5 ft.  -INTERBEDDED MARINE DEPOSITS-					55	45				
				29.0		Note: Strata change based on drill wash.										
30	WOR WOR 1	S10 24	30.0 32.0		CL	Very soft olive-gray lean CLAY with sand (CL), frequent 1.0 in. sand layers, mps 0.42 mm, no odor, wet  Note: Attempted vane shear test; vane refusal at 30.0 ft.  -INTERBEDDED MARINE DEPOSITS-					20	80				
35		S11 24	35.0 37.0	35.0	CL	Soft olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V3 (35.6-36'): 110/5 in-lbs; Su=425/20 psf  55x110 mm vane raw torque readings: V4 (36.6-37'): 110/5 in-lbs; Su=425/20 psf  -MARINE DEPOSITS- (CLAY)						100				

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-307**



# TEST BORING REPORT

**Boring No. HB-Exit 45-307**

File No. 132949-003  
Sheet No. 4 of 8

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test					
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength	
40	WOR WOR WOR WOR	S12 14	40.0 42.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet						100					
						-MARINE DEPOSITS- (CLAY)											
45		S13 19	45.0 47.0		CL	Medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V5 (45.6-46'): 130/0 in-lbs; Su=505/0 psf  55x110 mm vane raw torque readings: V6 (46.6-47'): 130/0 in-lbs; Su=505/0 psf						100					
50	WOR WOR WOR	S14 14	50.0 52.0		CL	Soft to medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet						100					
						-MARINE DEPOSITS- (CLAY)											

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV/CLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DATABASE.GPJ 15 Mar 19

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-307**



# TEST BORING REPORT

**Boring No. HB-Exit 45-307**

File No. 132949-003  
Sheet No. 5 of 8

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test				
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
55		S15 24	55.0 57.0		CL	Medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V7 (55.6-56'): 180/10 in-lbs; Su=700/40 psf  55x110 mm vane raw torque readings: V8 (56.6-57'): 210/10 in-lbs; Su=815/40 psf  -MARINE DEPOSITS- (CLAY)						100				
60	WOR WOR WOR WOR	S16 24	60.0 62.0		CL	Medium stiff olive-gray lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet  -MARINE DEPOSITS- (CLAY)						100				
65		S17 24	65.0 67.0		CL	Medium stiff to stiff olive-gray lean CLAY (CL), occasinal black organic streaking, mps 0.075 mm, no odor, wet  55x110 mm vane raw torque readings: V9 (65.6-66'): 190/5 in-lbs; Su=735/20 psf  55x110 mm vane raw torque readings: V10 (66.6-67'): 270/5 in-lbs; Su=1,050/20 psf  Note: Drill action indicates possible sand layer at approximately 68.0 ft below ground surface.						100				

**NOTE:** Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-307**



# TEST BORING REPORT

**Boring No. HB-Exit 45-307**

File No. 132949-003  
Sheet No. 6 of 8

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test					
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength	
70	WOH WOH WOH WOH	S18 24	70.0 72.0		CL	Medium stiff to stiff olive-green lean CLAY (CL), occasional black organic streaking, mps 0.075 mm, no odor, wet						100					
				74.7		-MARINE DEPOSITS- (CLAY)											
75	8 10 14 16	S19 1	75.0 77.0			Low recovery-rock in spoon tip Note: Attempted vane shear test; refusal at 75.0 ft.											
						-GLACIAL TILL-											
80	12 15 20 21	S20 24	80.0 82.0		SM	Dense gray silty SAND with gravel (SM), mps 1.5 in., weakly bonded, no odor, moist	20	20	10	10	25	15					

**NOTE:** Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No. HB-Exit 45-307**



# TEST BORING REPORT

**Boring No. HB-Exit 45-307**

File No. 132949-003  
Sheet No. 7 of 8

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Test							
							% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength			
85				84.1		Note: Cored through boulder from 84.1 ft to 85.3 ft.													
						-GLACIAL TILL-													
						Note: Cored through boulder from 87.9 ft to 89.4 ft.													
				89.4															
90	22 35 50/3"	S21 13	90.0 91.3		GW-GM	Very dense gray well-graded GRAVEL with silt and sand (GW-GM), mps 1.5 in., moderately bonded, no odor, moist	40	20	10	10	10	10							
				90.8		-WEATHERED BEDROCK-													
						Note: Drill action and wash indicate top of bedrock at 90.8 ft below ground surface. Advanced roller bit to 93.2 below ground surface.													
						-BEDROCK-													
				93.2		SEE CORE BORING REPORT FOR ROCK DETAILS													

H&A-TEST BORING-07-1 132949\_HA-LIB09-POR-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003TBC\_DAT\BASE.GPJ 15 Mar 19

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No. HB-Exit 45-307**





# CORE BORING REPORT

**Boring No. HB-Exit 45-307**  
 File No. 132949-003  
 Sheet No. 8 of 8

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD		Weathering	Elev./Depth (ft)	Visual Description and Remarks
				in.	%			
<i>SEE TEST BORING REPORT FOR OVERBURDEN DETAILS</i>								
95	1:09	C1	93.2	23	46	Slight-Moderate	103.6	<p>C1: Hard, slightly to moderately weathered, gray, aphanitic, PHYLLITE. Joints dipping at low to high angles, extremely close to close, undulating, rough, open, pitting, frequent calcite/quartz stringers up to 1/8 in.</p> <p>Note: Core barrel jam and noticeable water loss at 97.4 ft.</p> <p>C2: Hard, slightly to moderately weathered, gray, aphanitic PHYLLITE. Joints dipping at low to high angles, extremely close to very close, undulating, rough, open. Noticeable pitting, calcite/quartz stringers up to 1/2 in. in width throughout core.</p> <p>C3: Gravel size pieces recovered only.</p> <p>C4: Hard, fresh to slightly weathered, gray, aphanitic, PHYLLITE. Joints dipping at low to moderate angles, close to wide, undulating to stepped, rough, partly open to open, frequent calcite/quartz veins up to 3/4 in. in width throughout the length of the run.</p>
			97.4	4	8			
	1:36							
	2:57							
	3:21							
	2:16							
	2:48	C2	97.4	4.8	100	Slight-Moderate		
	3:47	C3	97.8	0	0	Moderate		
			97.8	3	25	Slight-Moderate		
	100	2:17	C4	98.8	0	0		
98.8				55	95	Slight-Moderate		
103.6				48	83	Moderate		
2:05								
1:48								
2:02								
2:34								
103.6								BOTTOM OF EXPLORATION 103.6 FT
105								
110								
115								
120								

H-A\_CORE-WELL07-1 132949 HA-LIB09-POR-REV/GLB HA-TB-CORE-WELL-07-1.GDT G:\GINT\PORTLAND\132949 EXIT 45\132949-003\TBC\_DATA\BASE.GPJ 15 Mar 19

Proposed Reconstruction of Exit 45 Interchange, Maine Turnpike  
South Portland, Maine  
File No. 132949-003  
Date Photographs Taken: January 2019

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**Top Row:** HB-EXIT45-307, Run No. C1 93.2 (left) to 97.4 (middle-left); Run No. C2 97.4 (middle-left) to 97.8 (middle-right);  
Run No. C3 97.8 (middle-right) to 98.8 (right)

**Top Middle Row:** HB-EXIT45-307, Run No. C4 98.8 (left) to 103.6 (right)

**Bottom Middle Row:** HB-EXIT45-305, Run No. C1 78.0 (left) to 83.0 (right)

Proposed Reconstruction of Exit 45 Interchange, Maine Turnpike  
South Portland, Maine  
File No. 132949-003  
Date Photographs Taken: January 2019

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**Top Row:** HB-EXIT45-307, Boulders 84/1 (left) to 85.3 (middle), and 87.9 (middle) to 89.4 (right)

**Top Middle Row:** HB-EXIT45-306, Run No. C1 46.0 (left) to 51.0 (right)

**Bottom Middle Row:** HB-EXIT45-306, Run No. C2 51.0 (left) to 55.7 (right)

## **APPENDIX B**

### **Laboratory Test Results**



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-301	Sample Type:	jar
Sample ID:	S4B	Test Date:	02/13/19
Depth :	6.9-7.3 ft	Test Id:	490950
Test Comment:	---		
Visual Description:	Moist, dark brown sandy silt with organics		
Sample Comment:	---		

## Moisture, Ash, and Organic Matter - ASTM D2974

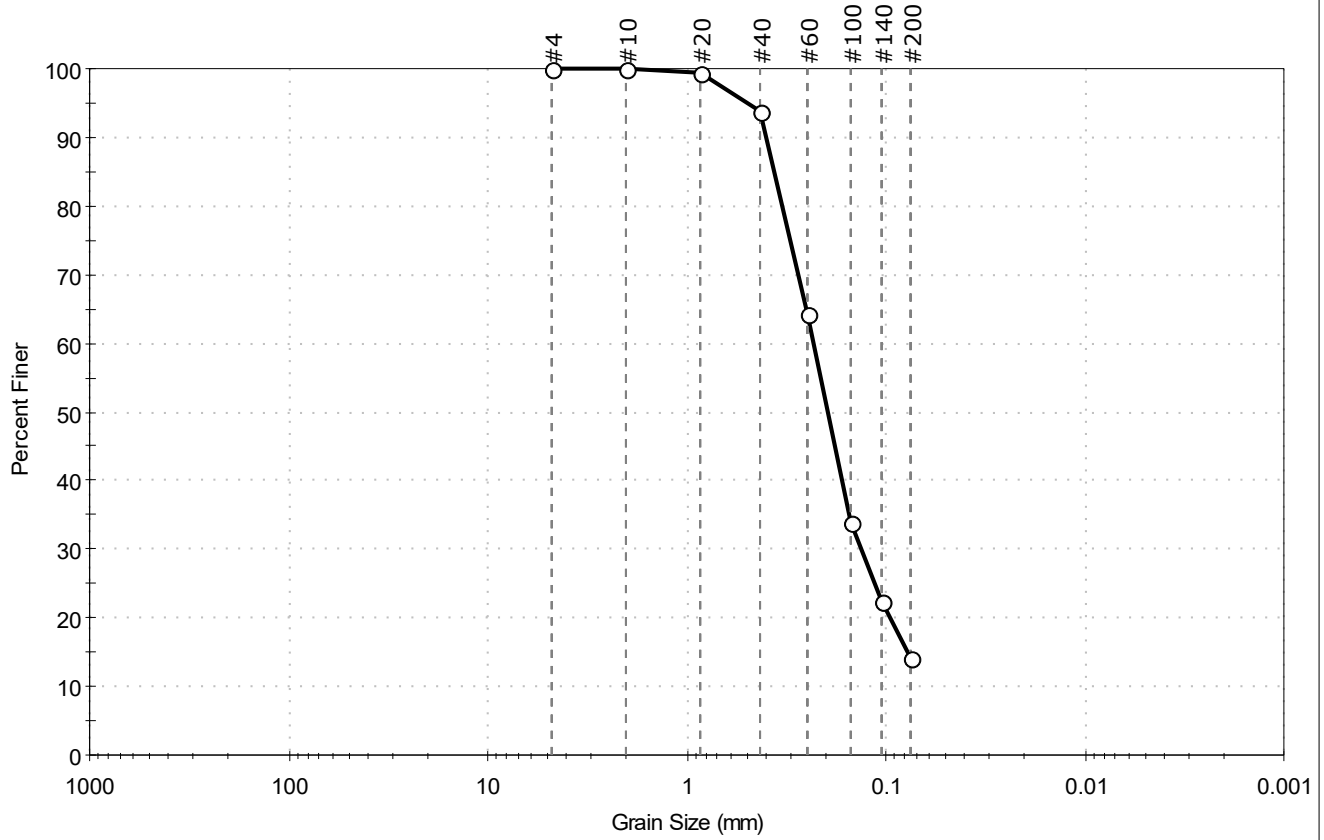
Boring ID	Sample ID	Depth	Description	Moisture Content, %	Ash Content, %	Organic Matter, %
HB-EXIT45-301	S4B	6.9-7.3 ft	Moist, dark brown sandy silt with organics	47	94.5	5.5

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass; dried to a constant mass at temperature of 105° C  
 Ash content and organic matter determined by Method C; dried to constant mass at temperature 440° C



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	jar
Sample ID:	S4	Test Date:	02/13/19
Depth :	6-8 ft	Test Id:	490920
Test Comment:	---		
Visual Description:	Moist, grayish brown silty sand		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	85.8	14.2

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	94		
#60	0.25	64		
#100	0.15	34		
#140	0.11	23		
#200	0.075	14		

<u>Coefficients</u>	
D <sub>85</sub> = 0.3630 mm	D <sub>30</sub> = 0.1334 mm
D <sub>60</sub> = 0.2330 mm	D <sub>15</sub> = 0.0774 mm
D <sub>50</sub> = 0.1969 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

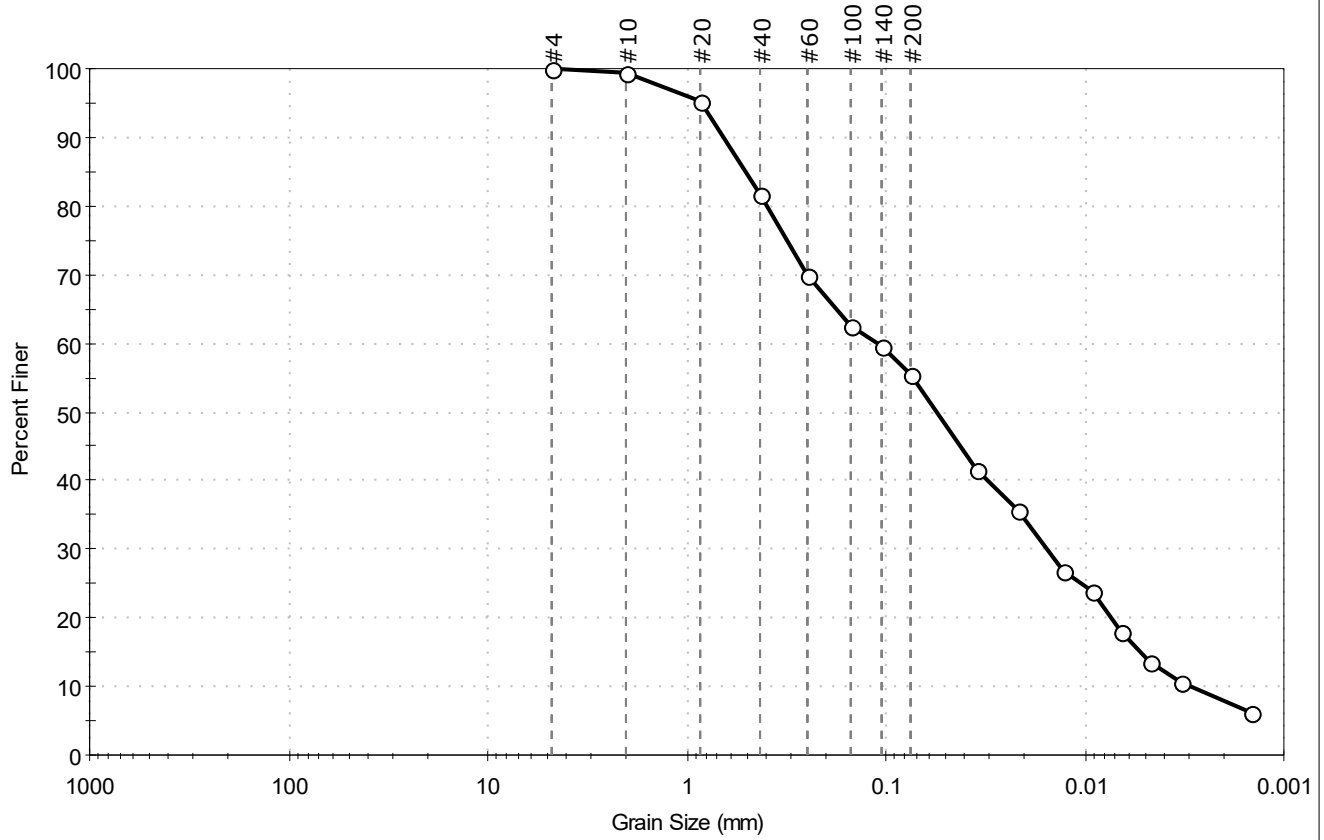
<u>Classification</u>	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-301	Sample Type:	jar
Sample ID:	S4B	Test Date:	02/13/19
Depth :	6.9-7.3 ft	Test Id:	490941
Test Comment:	---		
Visual Description:	Moist, dark brown sandy silt with organics		
Sample Comment:	---		

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	44.6	55.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	95		
#40	0.42	82		
#60	0.25	70		
#100	0.15	63		
#140	0.11	60		
#200	0.075	55		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0349	42		
---	0.0217	36		
---	0.0129	27		
---	0.0092	24		
---	0.0066	18		
---	0.0047	14		
---	0.0033	11		
---	0.0015	6		

<b>Coefficients</b>	
D <sub>85</sub> = 0.5005 mm	D <sub>30</sub> = 0.0155 mm
D <sub>60</sub> = 0.1119 mm	D <sub>15</sub> = 0.0052 mm
D <sub>50</sub> = 0.0554 mm	D <sub>10</sub> = 0.0029 mm
C <sub>u</sub> = 38.586	C <sub>c</sub> = 0.740

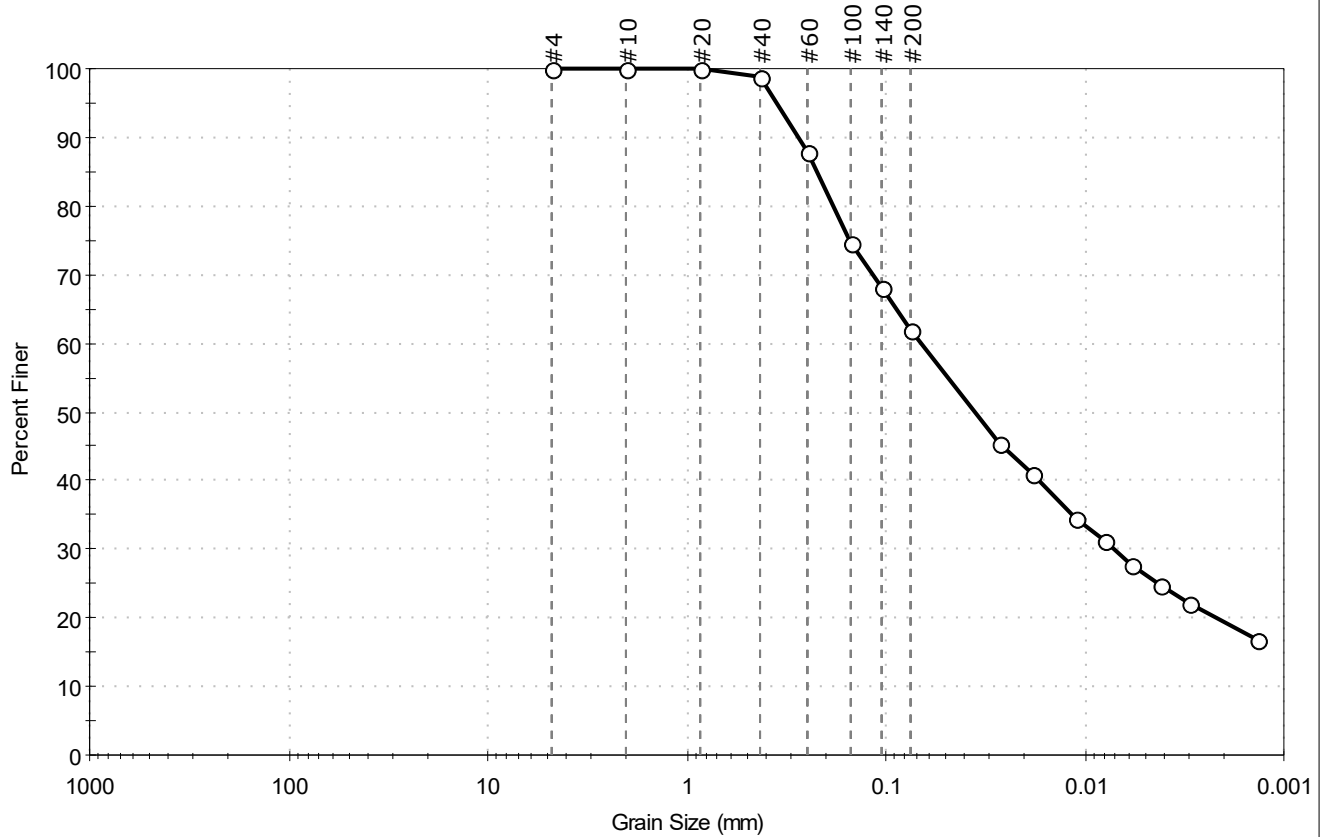
<b>Classification</b>	
<b>ASTM</b>	Sandy SILT (ML)
<b>AASHTO</b>	Clayey Soils (A-7-5 (7))

<b>Sample/Test Description</b>	
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	



Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: jar  
 Tested By: GA  
 Sample ID: S5  
 Test Date: 02/12/19  
 Checked By: bfs  
 Depth: 8-10 ft  
 Test Id: 490942  
 Test Comment: ---  
 Visual Description: Moist, dark gray sandy clay  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	37.9	62.1

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	99		
#60	0.25	88		
#100	0.15	75		
#140	0.11	68		
#200	0.075	62		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0270	46		
---	0.0184	41		
---	0.0111	35		
---	0.0080	31		
---	0.0058	28		
---	0.0042	25		
---	0.0030	22		
---	0.0014	17		

<b>Coefficients</b>	
D <sub>85</sub> = 0.2235 mm	D <sub>30</sub> = 0.0072 mm
D <sub>60</sub> = 0.0659 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.0355 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

<b>Classification</b>	
<b>ASTM</b>	Sandy Lean CLAY (CL)
<b>AASHTO</b>	Silty Soils (A-4 (2))

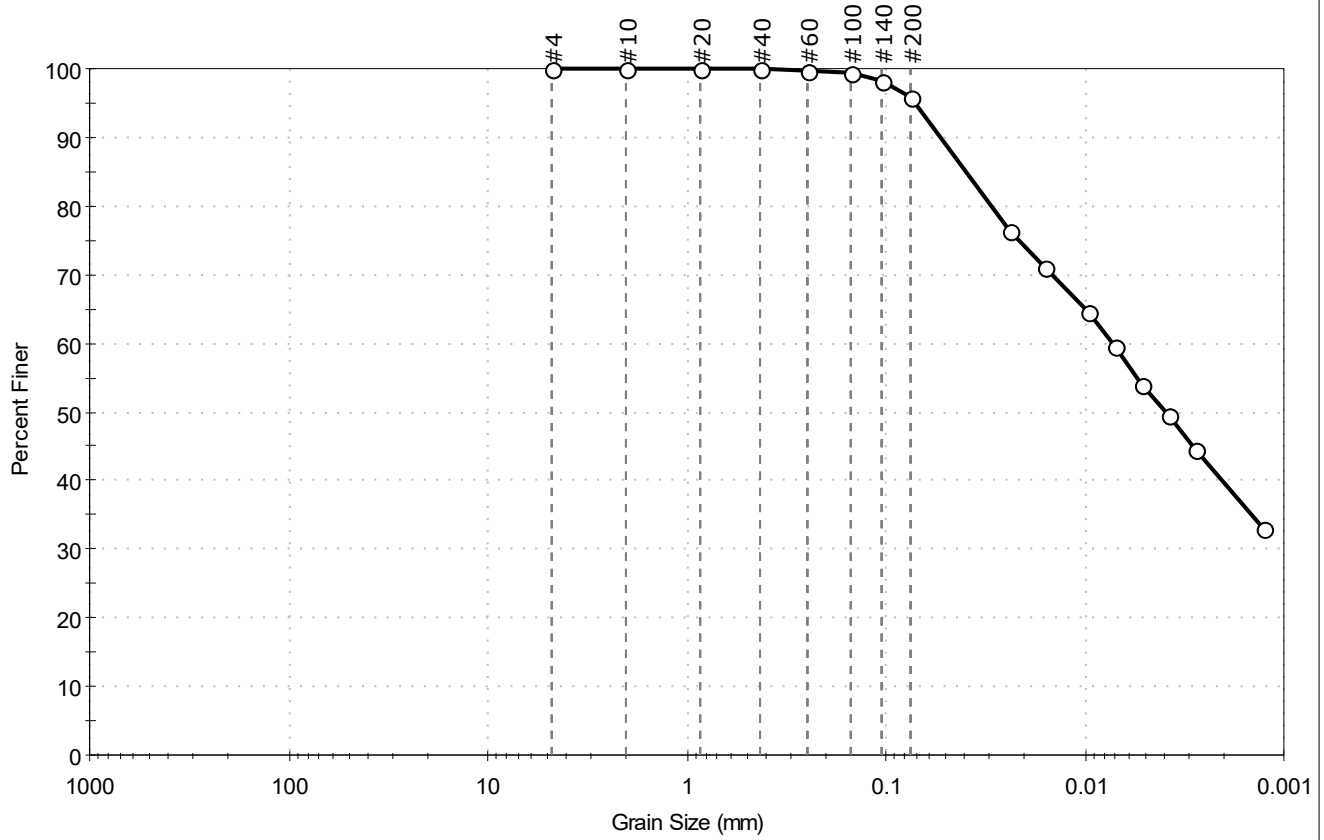
<b>Sample/Test Description</b>
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve





Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: jar  
 Tested By: GA  
 Sample ID: S6  
 Test Date: 02/13/19  
 Checked By: bfs  
 Depth: 12-14 ft  
 Test Id: 490943  
 Test Comment: ---  
 Visual Description: Moist, dark gray clay  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	4.1	95.9

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	99		
#140	0.11	98		
#200	0.075	96		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0237	77		
---	0.0159	71		
---	0.0097	65		
---	0.0071	60		
---	0.0052	54		
---	0.0038	50		
---	0.0028	45		
---	0.0013	33		

**Coefficients**

$D_{85} = 0.0392$  mm       $D_{30} = N/A$   
 $D_{60} = 0.0072$  mm       $D_{15} = N/A$   
 $D_{50} = 0.0039$  mm       $D_{10} = N/A$   
 $C_u = N/A$                    $C_c = N/A$

**Classification**

ASTM      Lean CLAY (CL)  
 AASHTO      Clayey Soils (A-6 (10))

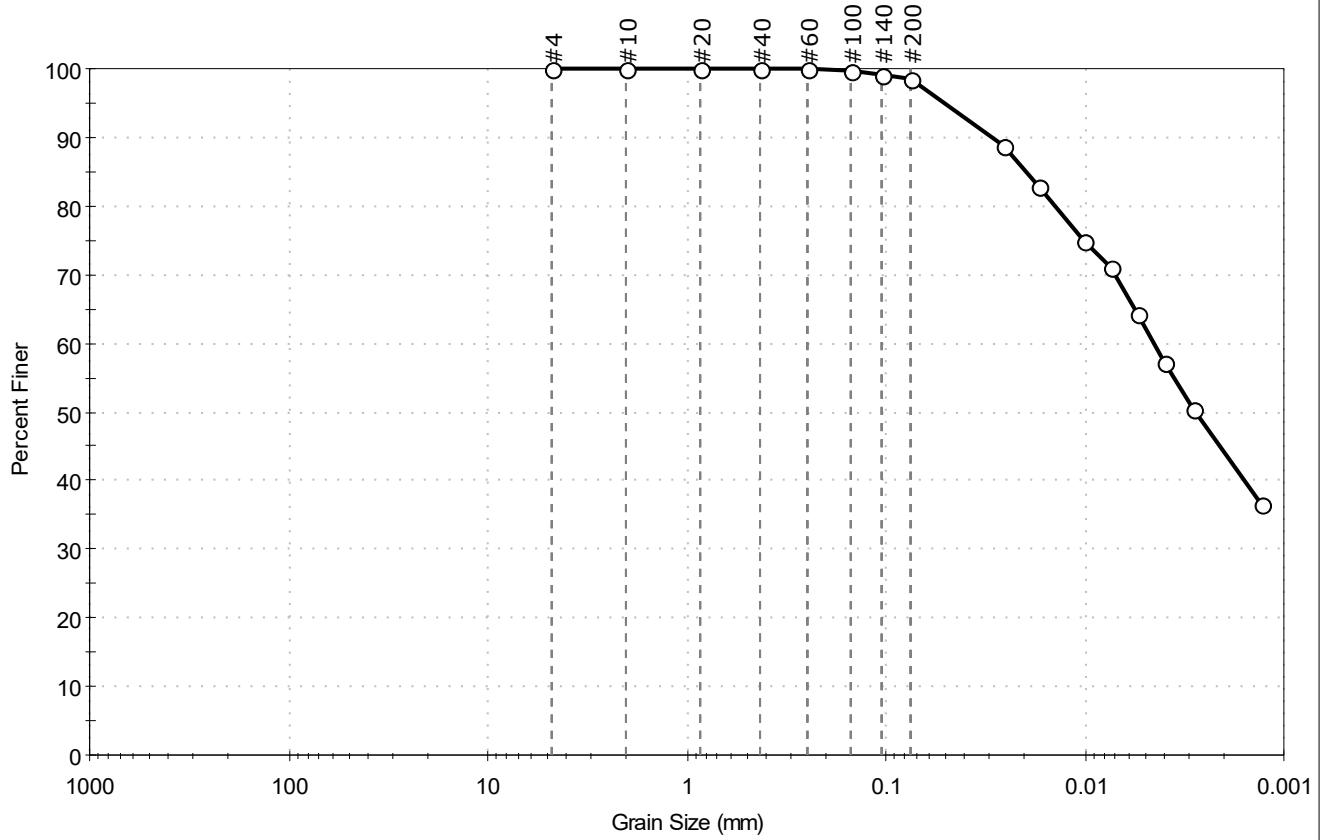
**Sample/Test Description**

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



Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: jar  
 Tested By: GA  
 Sample ID: S7  
 Test Date: 02/13/19  
 Checked By: bfs  
 Depth: 14-16 ft  
 Test Id: 490944  
 Test Comment: ---  
 Visual Description: Moist, dark gray clay  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	1.5	98.5

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	100		
#140	0.11	99		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0258	89		
---	0.0169	83		
---	0.0102	75		
---	0.0075	71		
---	0.0055	64		
---	0.0040	57		
---	0.0029	50		
---	0.0013	37		

<b>Coefficients</b>	
D <sub>85</sub> = 0.0197 mm	D <sub>30</sub> = N/A
D <sub>60</sub> = 0.0045 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.0028 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

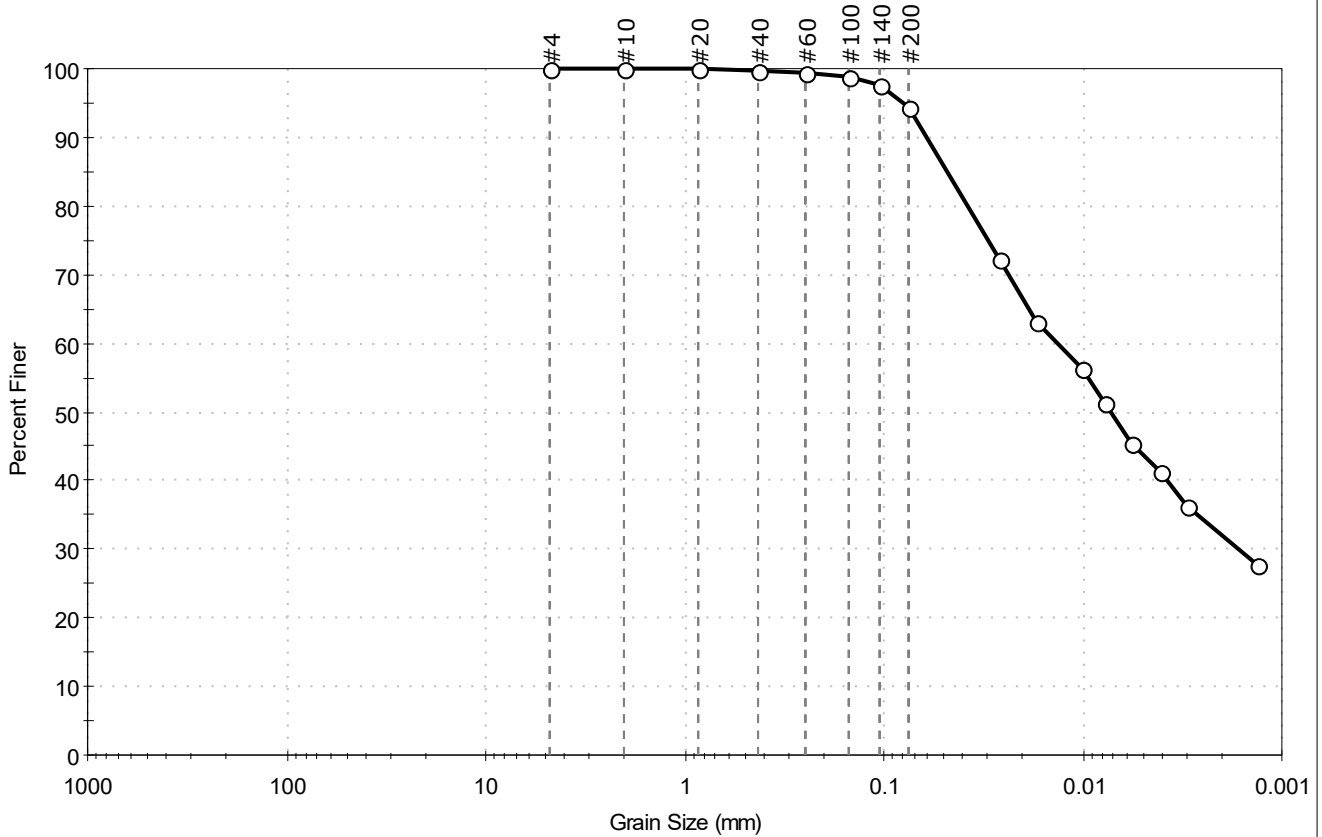
<b>Classification</b>	
<b>ASTM</b>	Lean CLAY (CL)
<b>AASHTO</b>	Clayey Soils (A-6 (16))

<b>Sample/Test Description</b>	
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	



Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: jar  
 Tested By: GA  
 Sample ID: S8  
 Test Date: 02/12/19  
 Checked By: bfs  
 Depth: 18-20 ft  
 Test Id: 490945  
 Test Comment: ---  
 Visual Description: Moist, dark gray clay  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	5.7	94.3

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	99		
#100	0.15	99		
#140	0.11	98		
#200	0.075	94		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0262	72		
---	0.0169	63		
---	0.0102	56		
---	0.0078	51		
---	0.0057	45		
---	0.0041	41		
---	0.0030	36		
---	0.0013	28		

<b>Coefficients</b>	
D <sub>85</sub> = 0.0481 mm	D <sub>30</sub> = 0.0016 mm
D <sub>60</sub> = 0.0135 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.0073 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

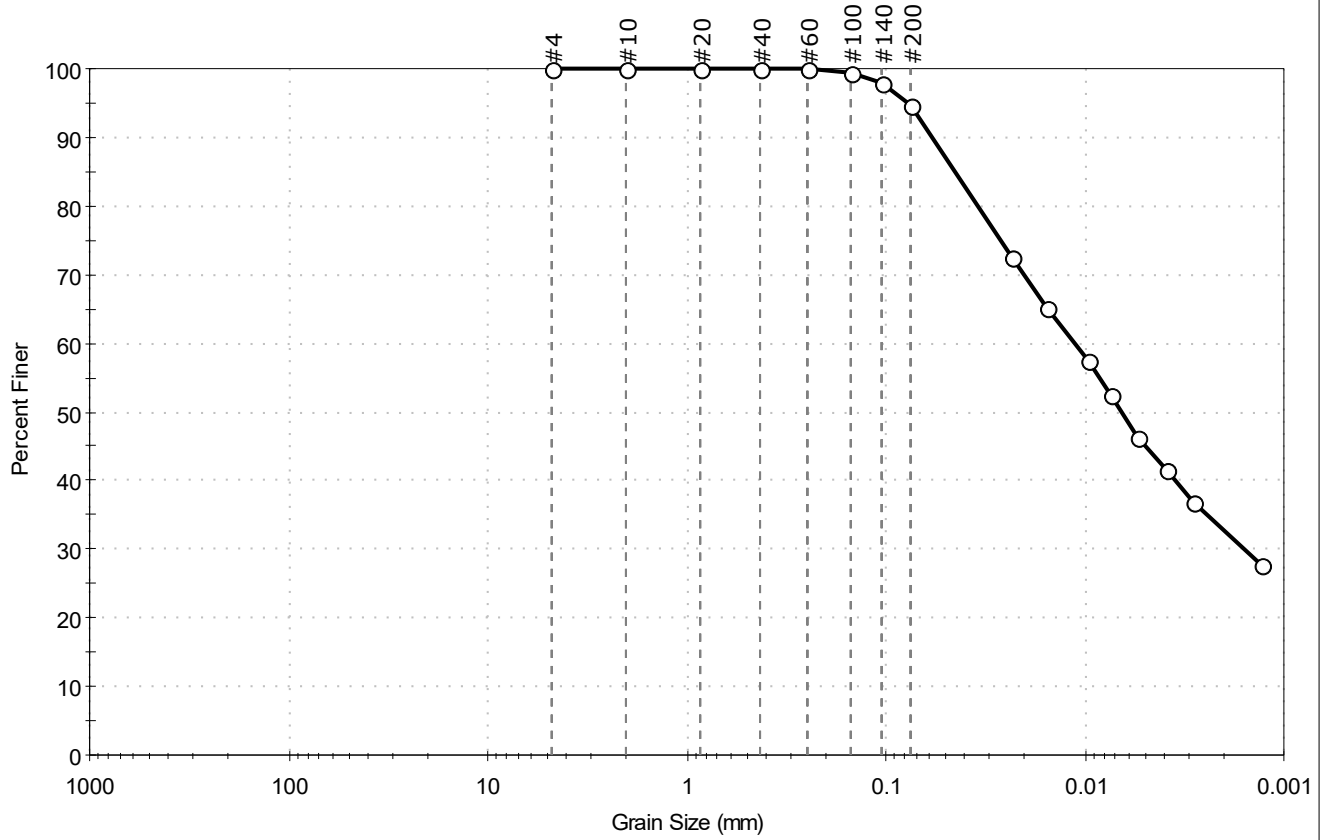
<b>Classification</b>	
<b>ASTM</b>	Lean CLAY (CL)
<b>AASHTO</b>	Silty Soils (A-4 (7))

<b>Sample/Test Description</b>	
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	



Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: tube  
 Tested By: GA  
 Sample ID: S11  
 Test Date: 02/13/19  
 Checked By: bfs  
 Depth: 26-28 ft  
 Test Id: 490946  
 Test Comment: ---  
 Visual Description: Moist, dark gray silty clay  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	5.4	94.6

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	99		
#140	0.11	98		
#200	0.075	95		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0236	73		
---	0.0157	65		
---	0.0097	57		
---	0.0073	53		
---	0.0054	46		
---	0.0039	42		
---	0.0029	37		
---	0.0013	28		

**Coefficients**

D <sub>85</sub> = 0.0453 mm	D <sub>30</sub> = 0.0016 mm
D <sub>60</sub> = 0.0114 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.0065 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

**Classification**

ASTM Silty CLAY (CL-ML)

AASHTO Silty Soils (A-4 (4))

**Sample/Test Description**

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

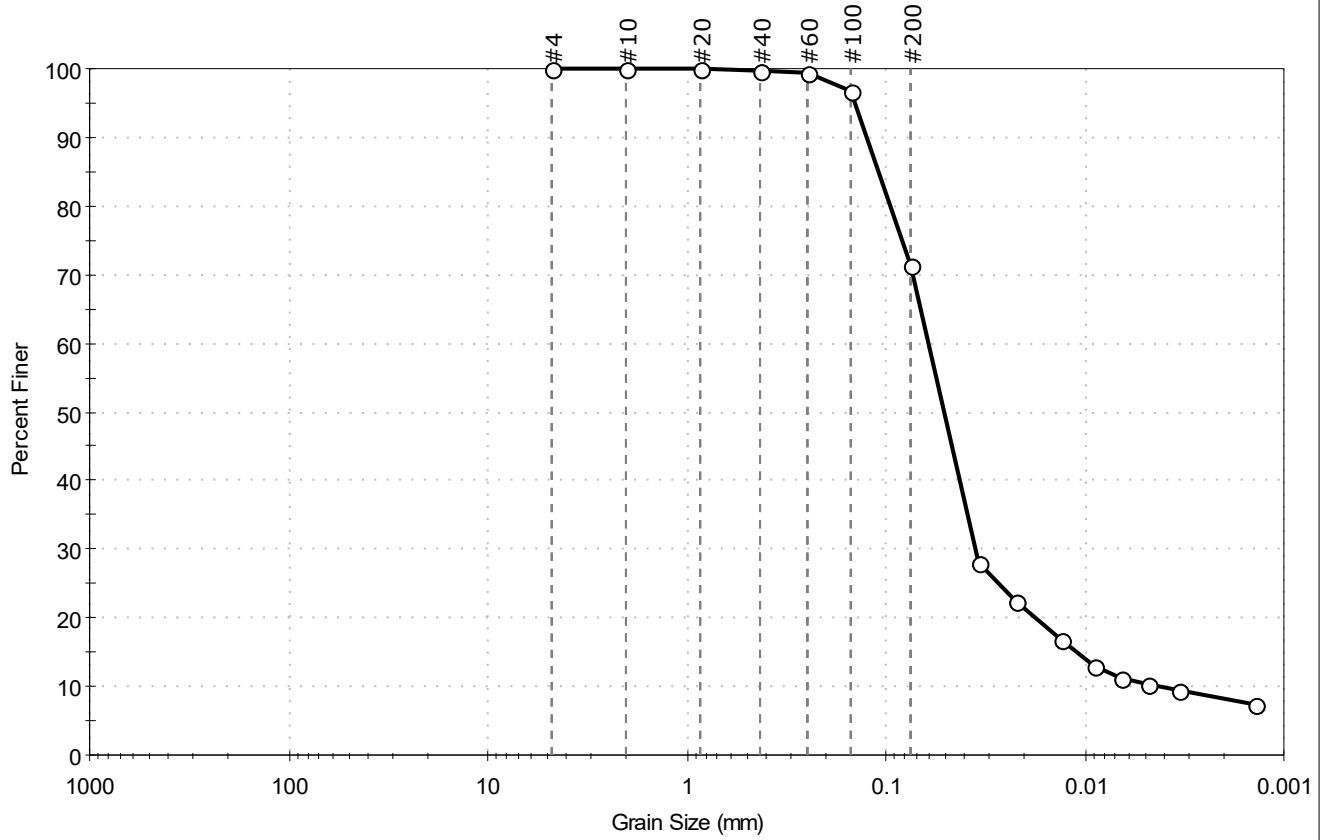
Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve



Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: tube  
 Tested By: ckg  
 Sample ID: U1  
 Test Date: 02/18/19  
 Checked By: bfs  
 Depth: 10-12 ft  
 Test Id: 490947  
 Test Comment: ---  
 Visual Description: Moist, dark gray silt with sand  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	28.6	71.4

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		
#200	0.075	71		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0343	28		
---	0.0224	22		
---	0.0133	17		
---	0.0090	13		
---	0.0066	11		
---	0.0048	10		
---	0.0034	9		
---	0.0014	7		

**Coefficients**

D <sub>85</sub> = 0.1087 mm	D <sub>30</sub> = 0.0356 mm
D <sub>60</sub> = 0.0612 mm	D <sub>15</sub> = 0.0110 mm
D <sub>50</sub> = 0.0511 mm	D <sub>10</sub> = 0.0044 mm
C <sub>u</sub> = 13.909	C <sub>c</sub> = 4.706

**Classification**

ASTM SILT with Sand (ML)

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

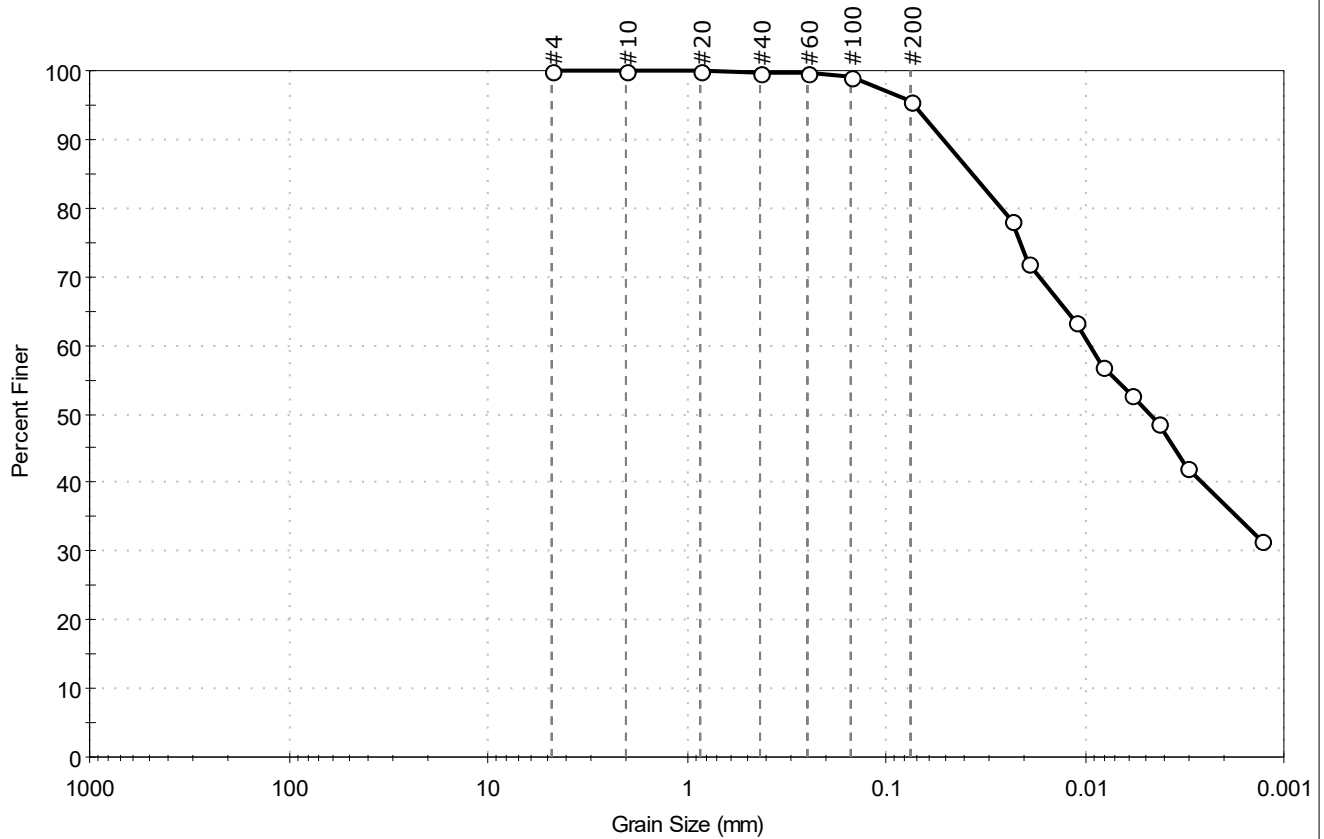
Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve



Client: Haley & Aldrich, Inc.  
 Project: Maine Turnpike Exit 45 Interchange  
 Location: South Portland, ME  
 Project No: GTX-309473  
 Boring ID: HB-EXIT45-303  
 Sample Type: tube  
 Tested By: ckg  
 Sample ID: U2  
 Test Date: 02/18/19  
 Checked By: bfs  
 Depth: 16-18 ft  
 Test Id: 490948  
 Test Comment: ---  
 Visual Description: Wet, dark gray clay  
 Sample Comment: ---

## Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	4.6	95.4

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	99		
#200	0.075	95		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0235	78		
---	0.0195	72		
---	0.0111	63		
---	0.0082	57		
---	0.0059	53		
---	0.0043	49		
---	0.0031	42		
---	0.0013	32		

**Coefficients**

D <sub>85</sub> = 0.0372 mm	D <sub>30</sub> = N/A
D <sub>60</sub> = 0.0094 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.0048 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

**Classification**

ASTM Lean CLAY (CL)

AASHTO Clayey Soils (A-6 (9))

**Sample/Test Description**

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

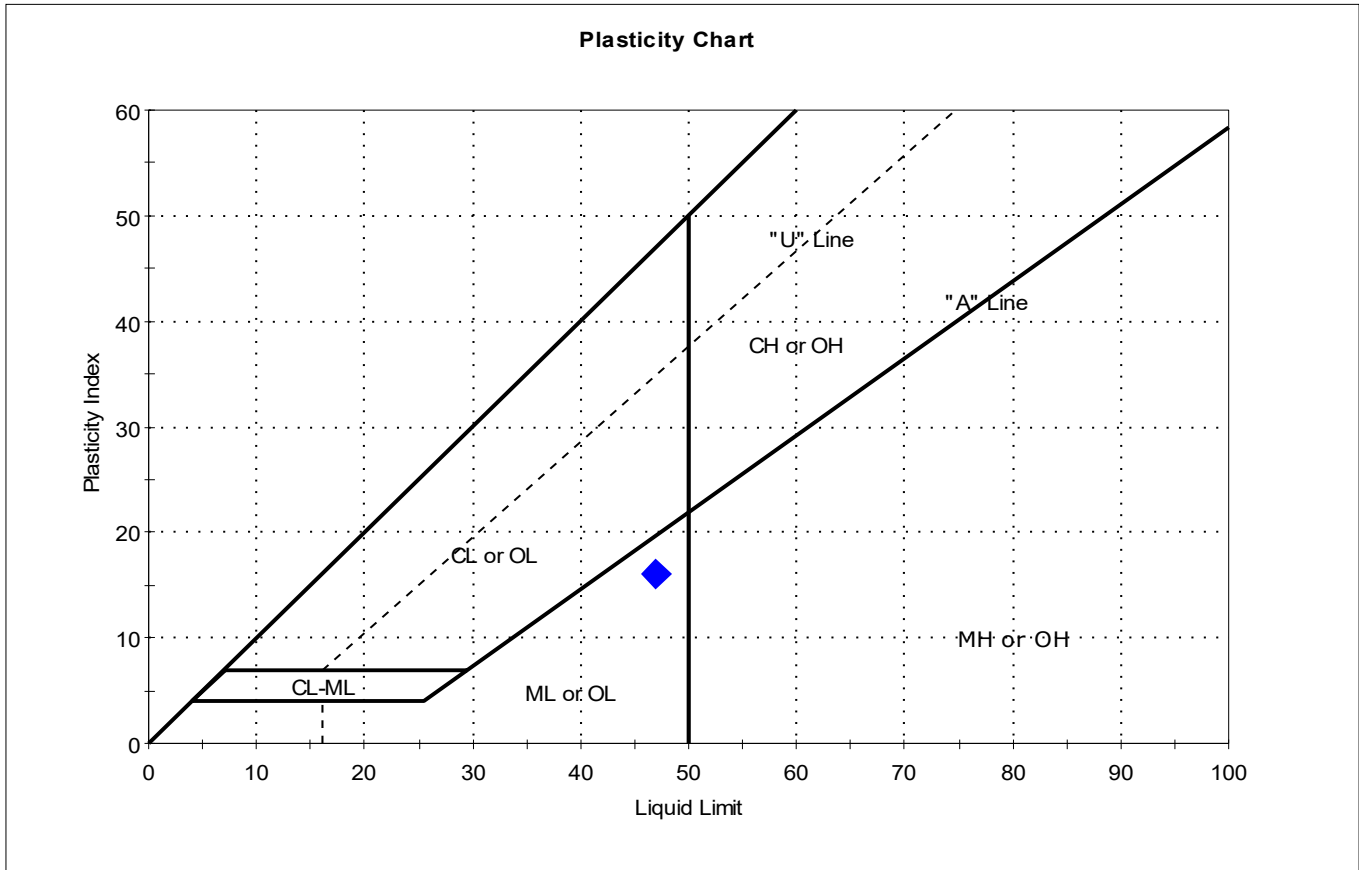
Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-301	Sample Type:	jar
Sample ID:	S4B	Test Date:	02/13/19
Depth :	6.9-7.3 ft	Test Id:	490890
Test Comment:	---		
Visual Description:	Moist, dark brown sandy silt with organics		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



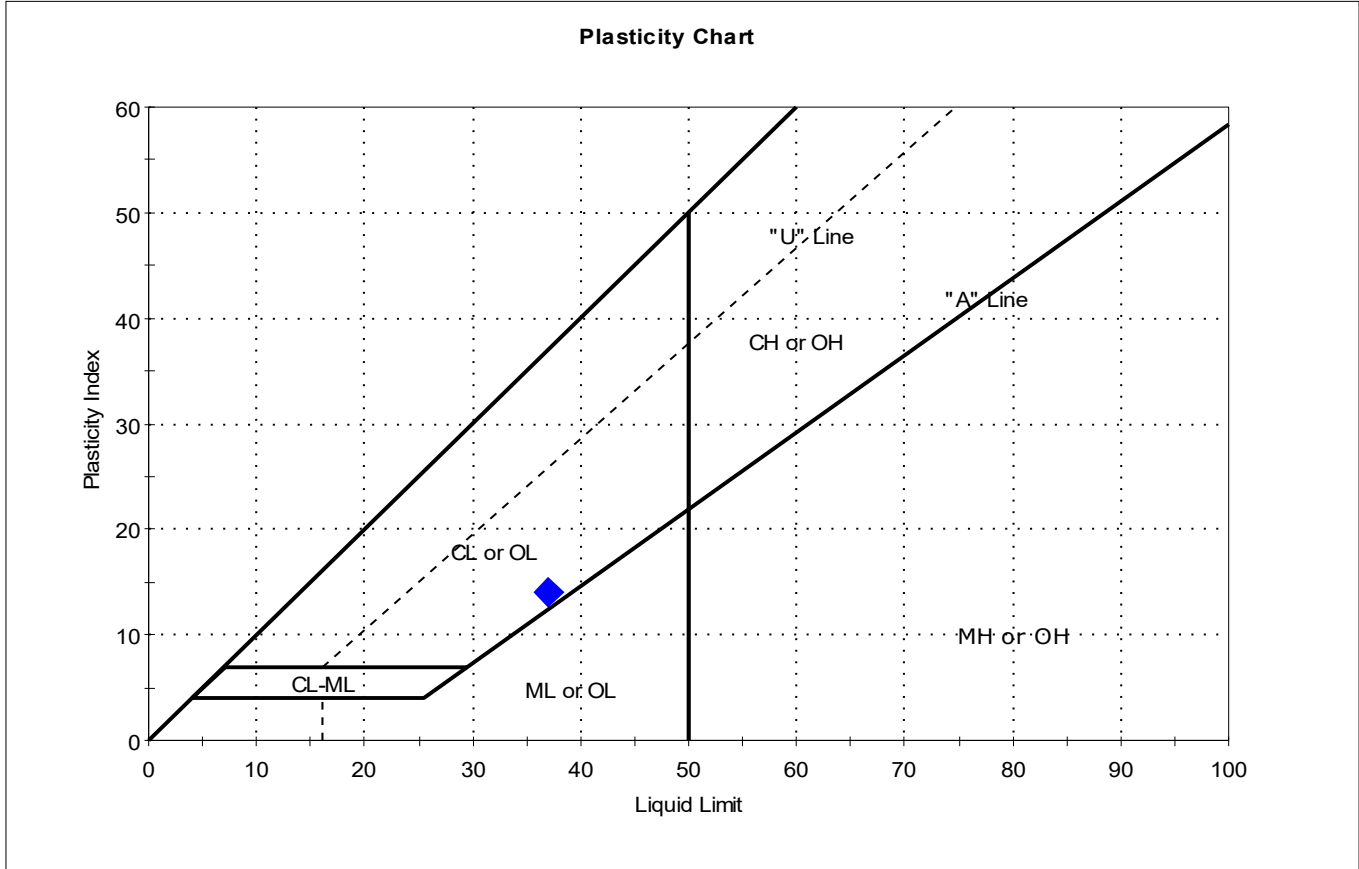
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4B	EXIT45-3	6.9-7.3 ft	47	47	31	16	1	Sandy SILT (ML)

Sample Prepared using the WET method  
 18% Retained on #40 Sieve  
 Dry Strength: HIGH  
 Dilatancy: NONE  
 Toughness: MEDIUM



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-301	Sample Type:	tube
Sample ID:	U2	Test Date:	02/20/19
Depth :	12-14 ft	Test Id:	490891
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
◆	U2	EXIT45-3	12-14 ft	31	37	23	14	0.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

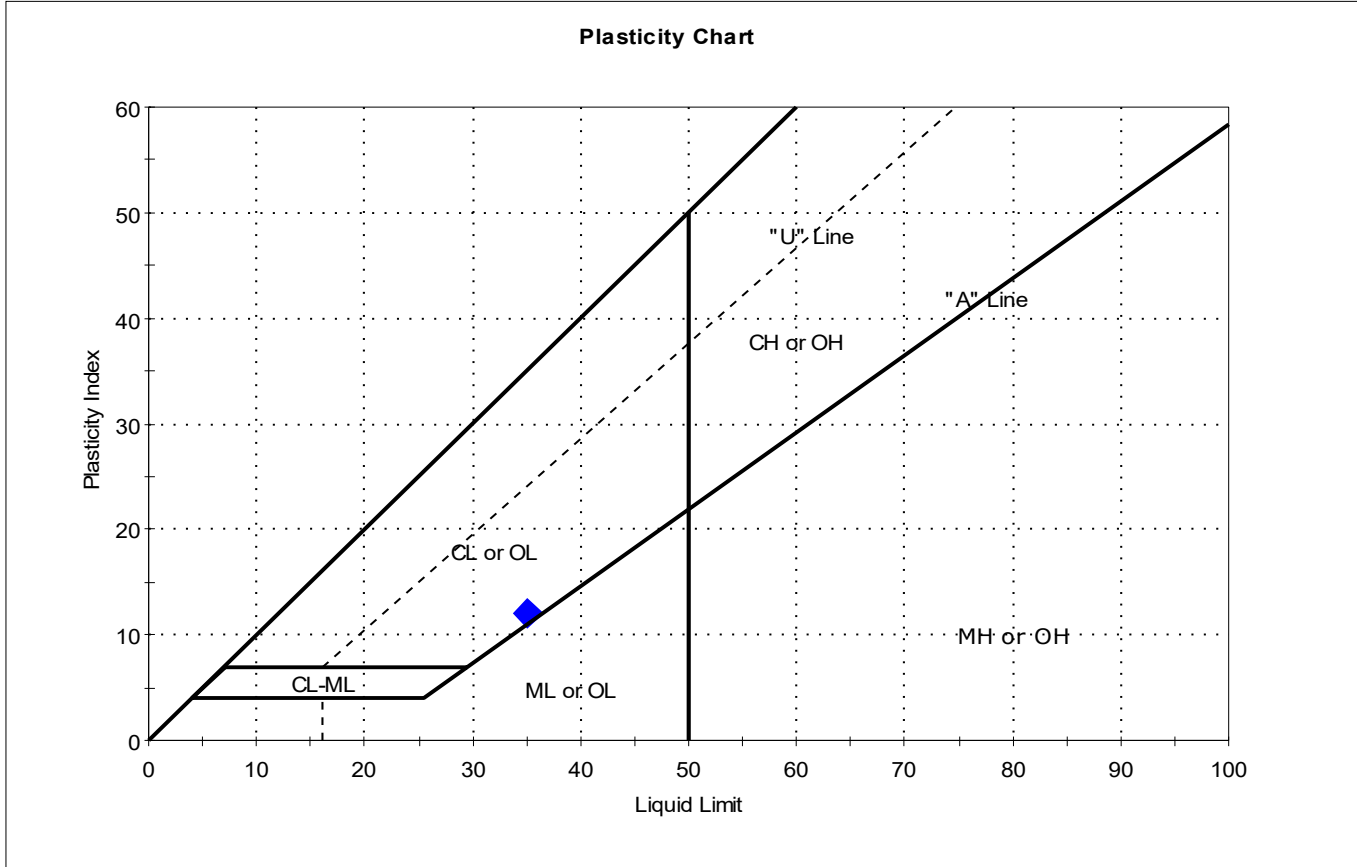
Toughness: LOW





Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-302	Sample Type:	tube
Sample ID:	U1	Test Date:	02/19/19
Depth :	10-12 ft	Test Id:	490892
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
◆	U1	EXIT45-3	10-12 ft	21	35	23	12	-0.2	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

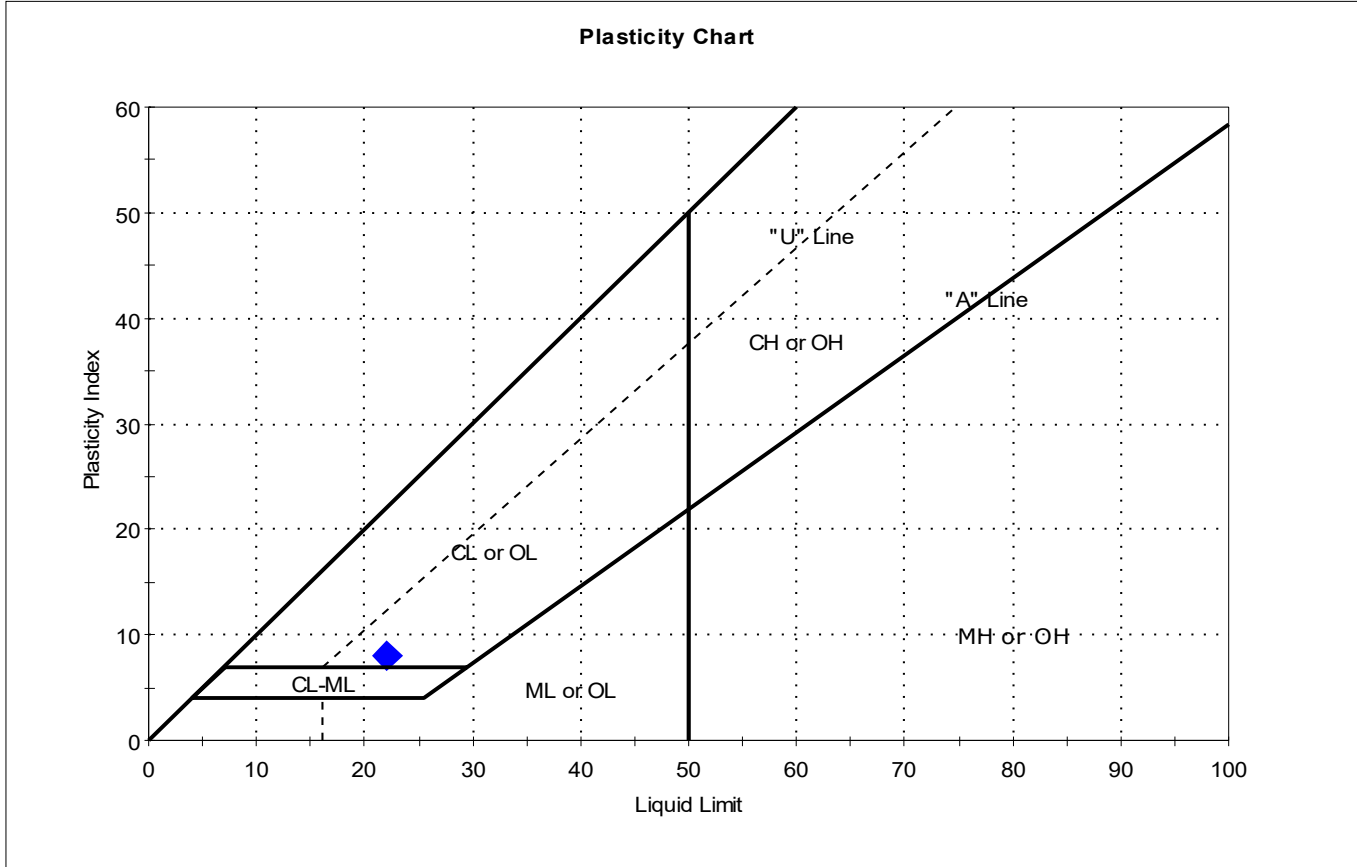
Dilatancy: SLOW

Toughness: LOW



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	jar
Sample ID:	S5	Test Date:	02/13/19
Depth:	8-10 ft	Test Id:	490893
Test Comment:	---		
Visual Description:	Moist, dark gray sandy clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



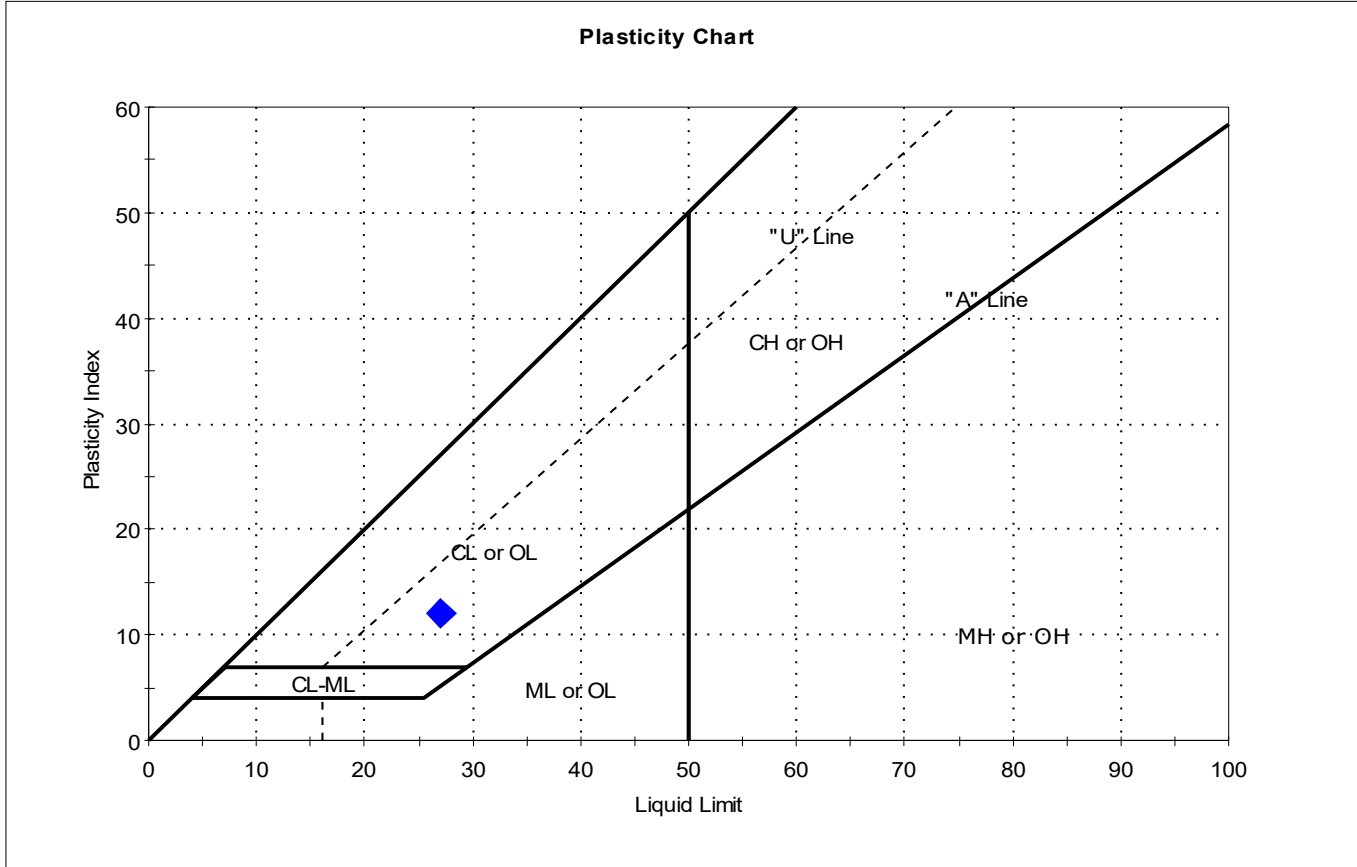
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S5	EXIT45-3	8-10 ft	26	22	14	8	1.5	Sandy Lean CLAY (CL)

Sample Prepared using the WET method  
 1% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	jar
Sample ID:	S6	Test Date:	02/12/19
Depth:	12-14 ft	Test Id:	490894
Test Comment:	---		
Visual Description:	Moist, dark gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



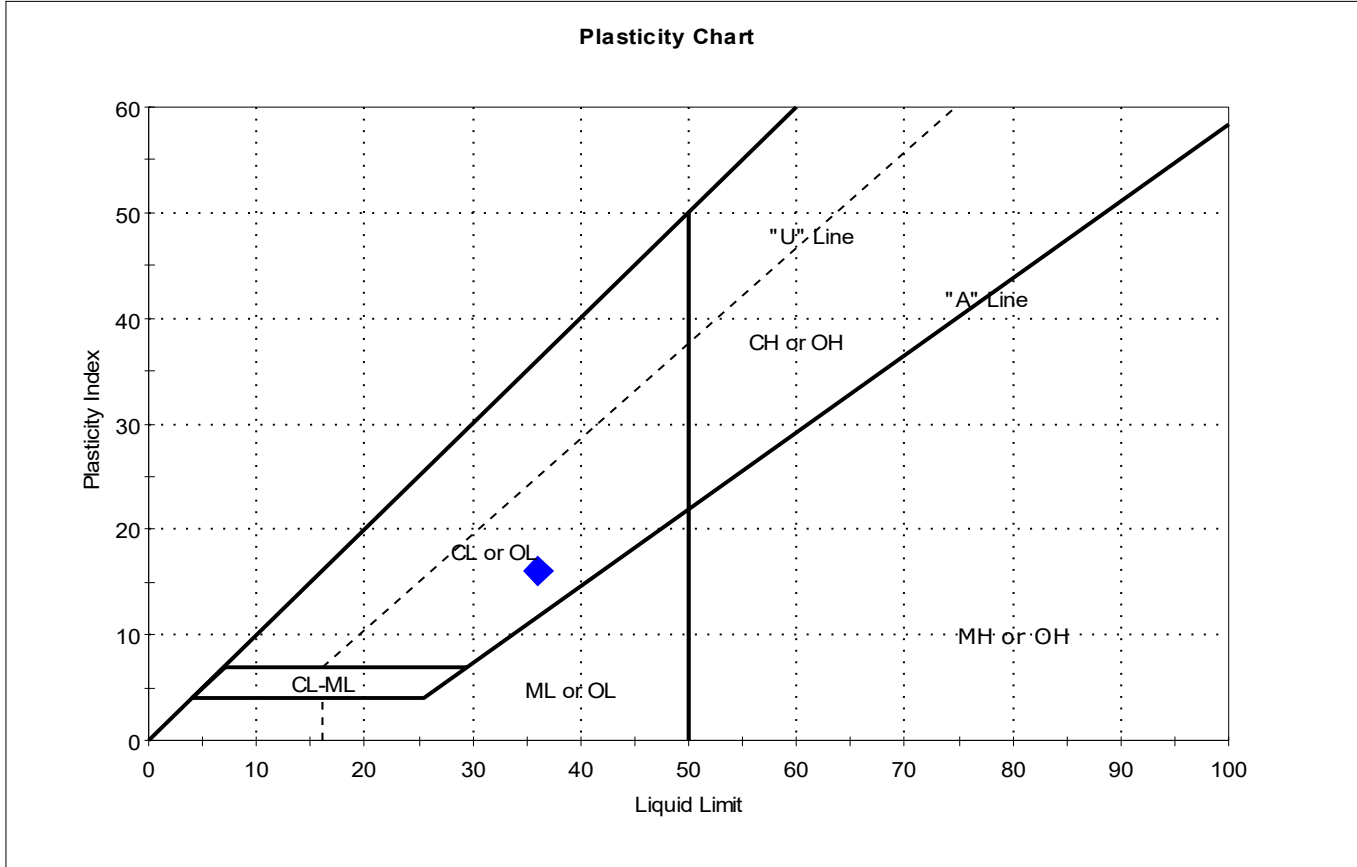
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S6	EXIT45-3	12-14 ft	40	27	15	12	2.1	Lean CLAY (CL)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	jar
Sample ID:	S7	Test Date:	02/12/19
Depth:	14-16 ft	Test Id:	490895
Test Comment:	---		
Visual Description:	Moist, dark gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



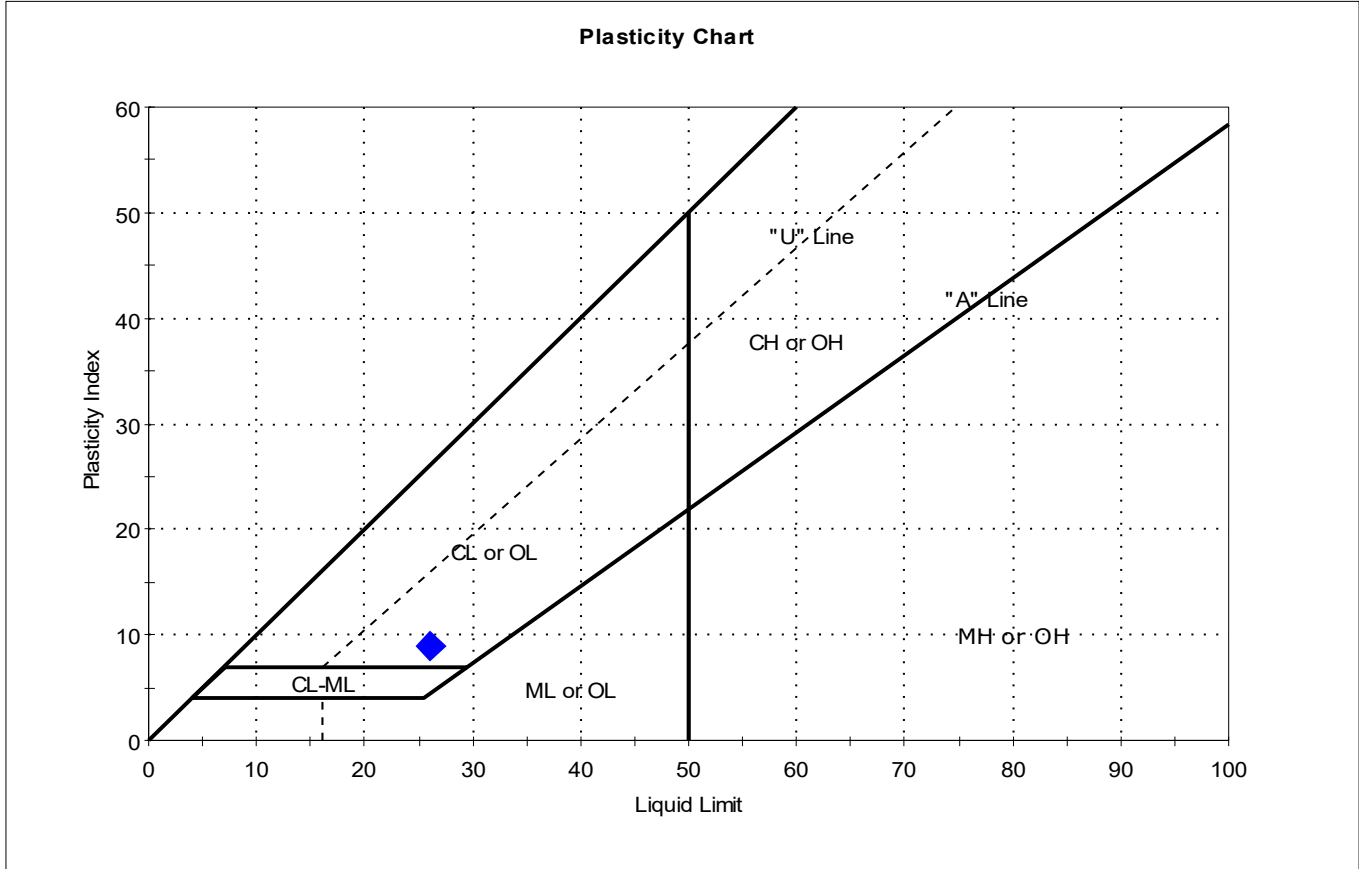
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S7	EXIT45-3	14-16 ft	45	36	20	16	1.6	Lean CLAY (CL)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	jar
Sample ID:	S8	Test Date:	02/13/19
Depth :	18-20 ft	Test Id:	490896
Test Comment:	---		
Visual Description:	Moist, dark gray clay		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



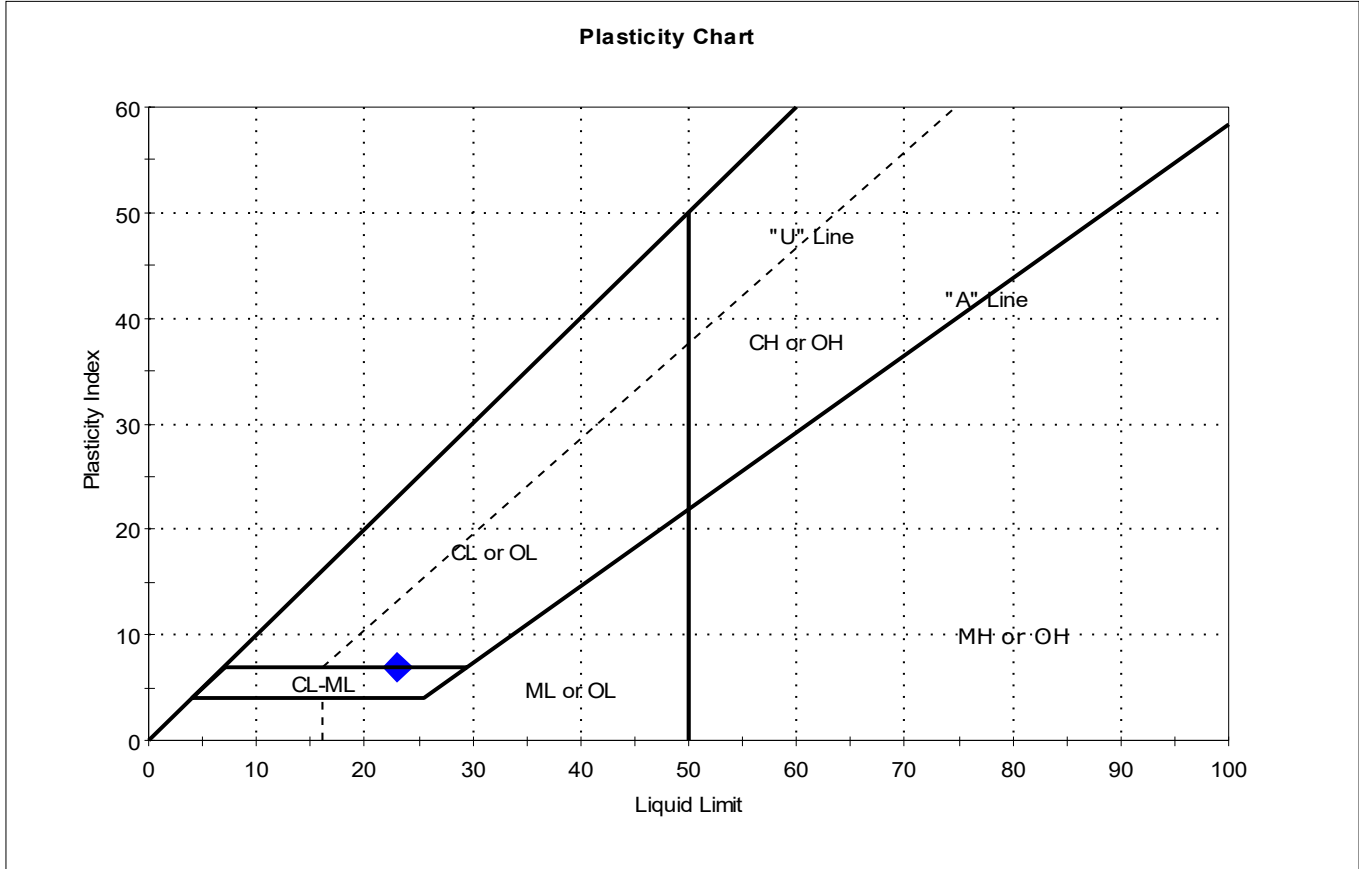
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S8	EXIT45-3	18-20 ft	37	26	17	9	2.2	Lean CLAY (CL)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	tube
Sample ID:	S11	Test Date:	02/13/19
Depth:	26-28 ft	Test Id:	490897
Test Comment:	---		
Visual Description:	Moist, dark gray silty 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
◆	S11	EXIT45-3	26-28 ft	36	23	16	7	2.9	Silty CLAY (CL-ML)

Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: MEDIUM



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	tube
Sample ID:	U1	Test Date:	02/20/19
Depth :	10-12 ft	Test Id:	490898
Test Comment:	---		
Visual Description:	Moist, dark gray silt with sand		
Sample Comment:	---		

## Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

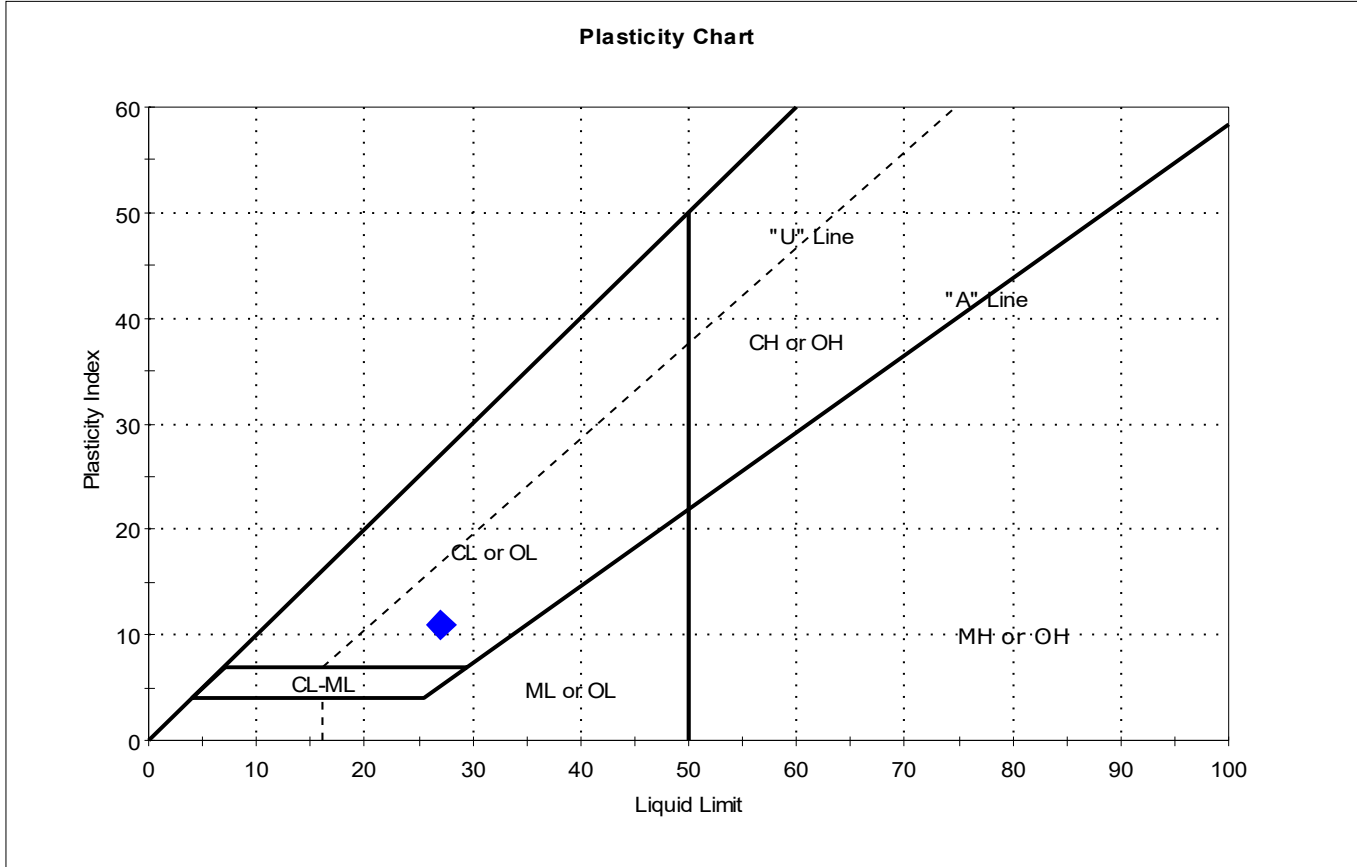
Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U1	EXIT45-3	10-12 ft	27	n/a	n/a	n/a	n/a	SILT with Sand (ML)

0% Retained on #40 Sieve  
 Dry Strength: MEDIUM  
 Dilatancy: RAPID  
 Toughness: MEDIUM  
 The sample was determined to be Non-Plastic



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	tube
Sample ID:	U2	Test Date:	02/19/19
Depth :	16-18 ft	Test Id:	490899
Test Comment:	---		
Visual Description:	Wet, 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
◆	U2	EXIT45-3	16-18 ft	38	27	16	11	2	Lean CLAY (CL)

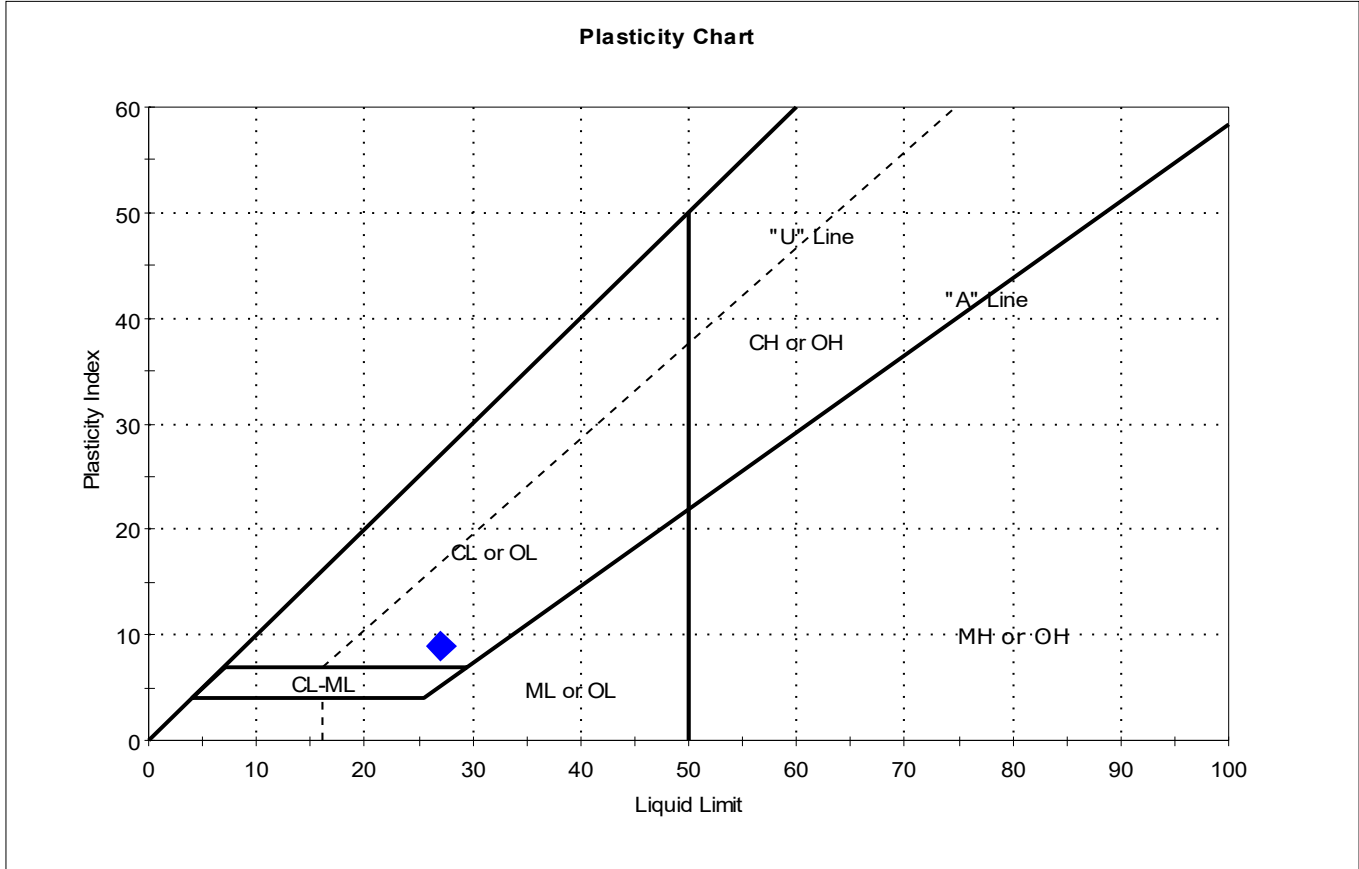
Sample Prepared using the WET method  
 0% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: LOW





Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	tube
Sample ID:	U4	Test Date:	02/19/19
Depth :	30-32 ft	Test Id:	490900
Test Comment:	---		
Visual Description:	Wet, 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
◆	U4	EXIT45-3	30-32 ft	41	27	18	9	2.5	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

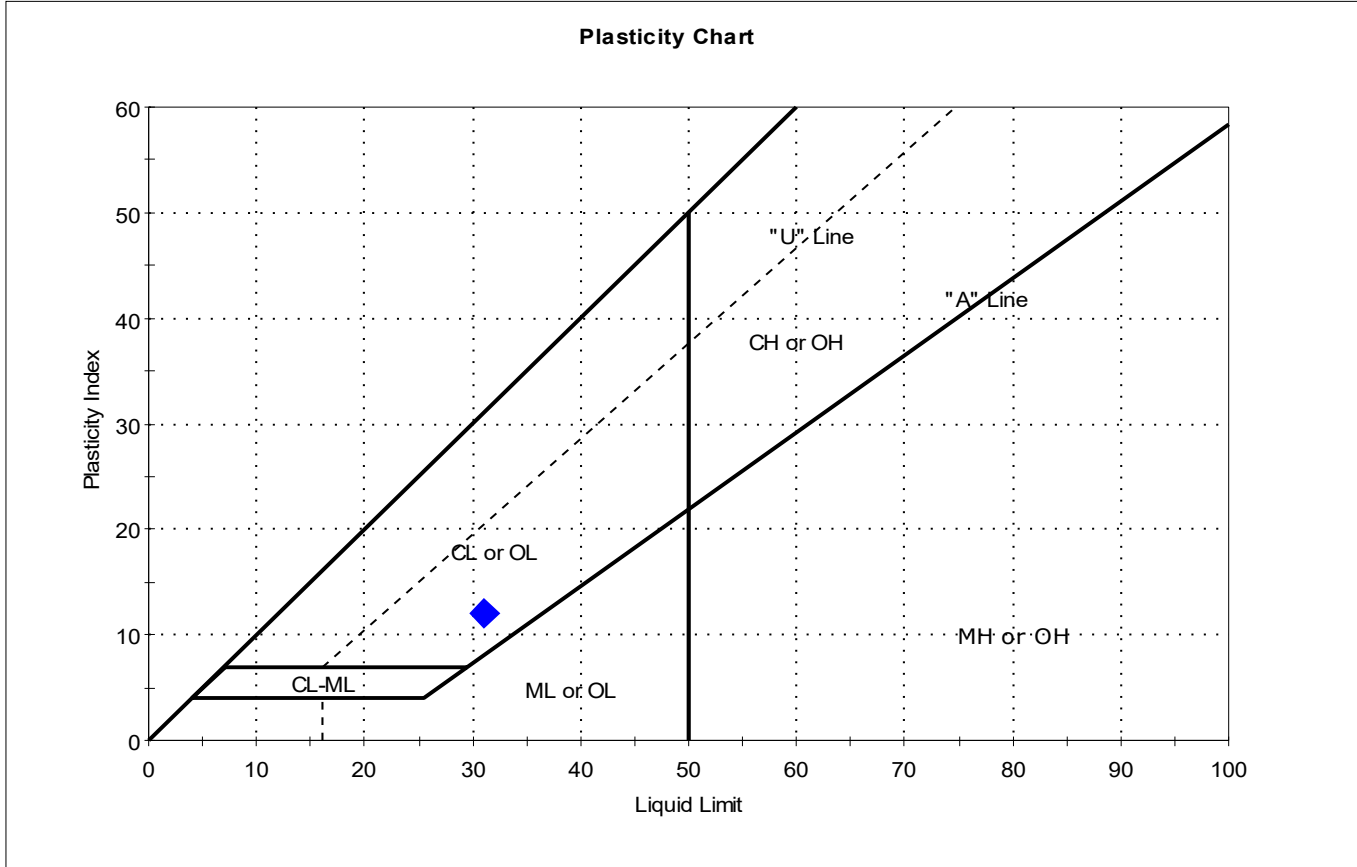
Dilatancy: SLOW

Toughness: LOW



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	tube
Sample ID:	U5	Test Date:	02/22/19
Depth :	45-47 ft	Test Id:	490901
Test Comment:	---		
Visual Description:	Wet, 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
◆	U5	EXIT45-3	45-47 ft	37	31	19	12	1.5	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

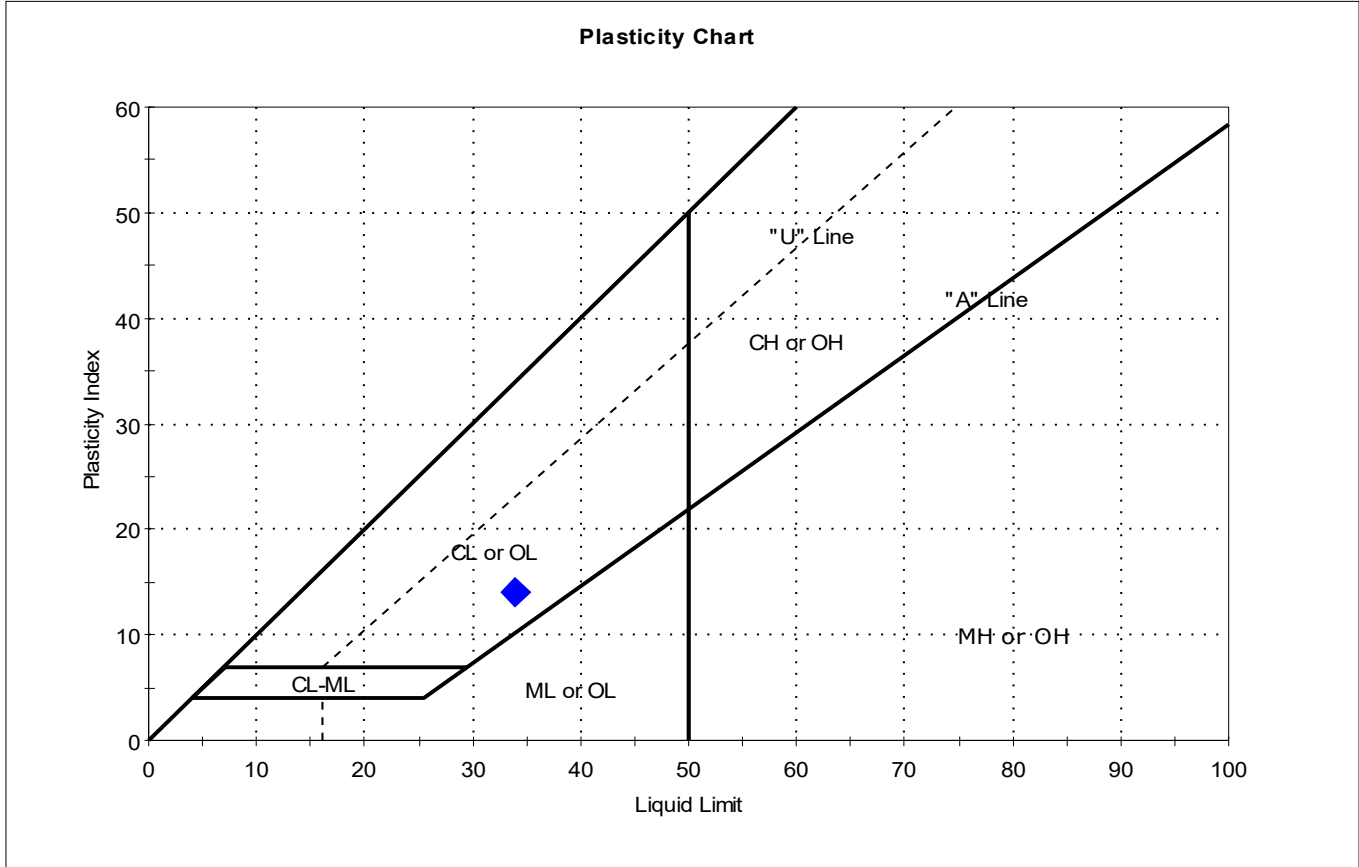
Dilatancy: SLOW

Toughness: LOW



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-303	Sample Type:	tube
Sample ID:	U6	Test Date:	02/22/19
Depth :	50-52 ft	Test Id:	490902
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
◆	U6	EXIT45-3	50-52 ft	35	34	20	14	1.1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

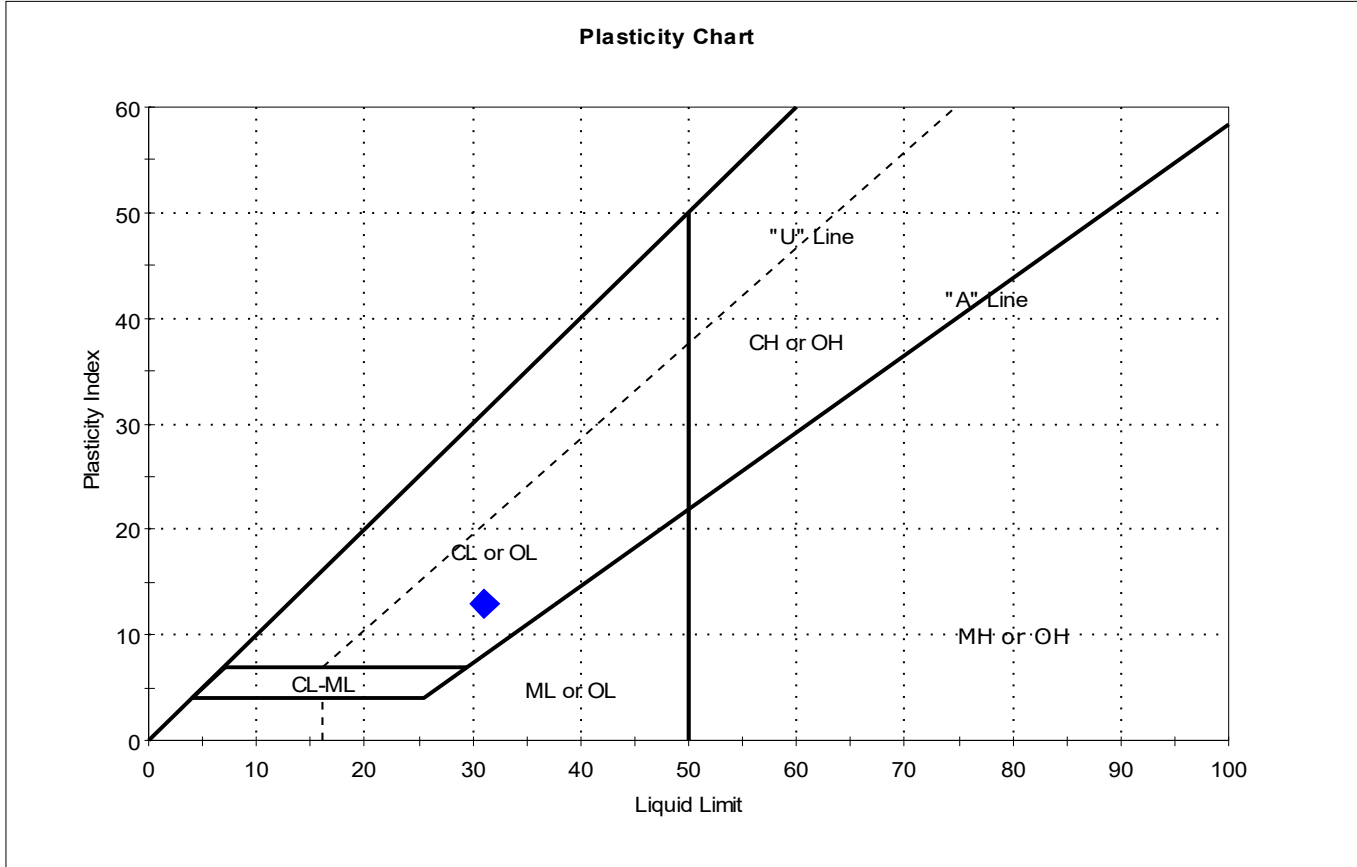
Dilatancy: SLOW

Toughness: LOW



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-304A	Sample Type:	tube
Sample ID:	U1	Test Date:	02/19/19
Depth :	2-4 ft	Checked By:	bfs
		Test Id:	490903
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
◆	U1	EXIT45-3	2-4 ft	27	31	18	13	0.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

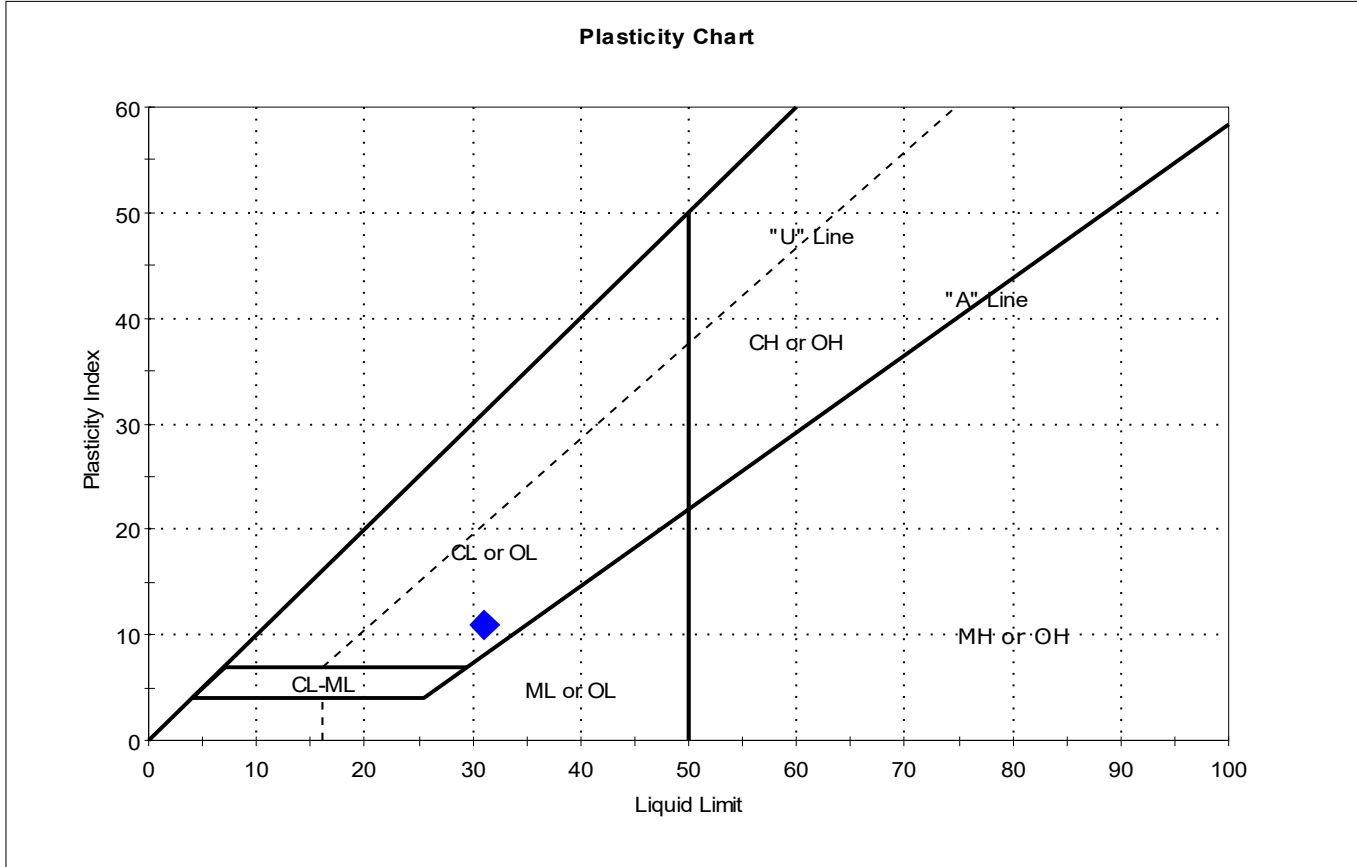
Dilatancy: SLOW

Toughness: LOW



Client:	Haley & Aldrich, Inc.		
Project:	Maine Turnpike Exit 45 Interchange		
Location:	South Portland, ME	Project No:	GTX-309473
Boring ID:	HB-EXIT45-304A	Sample Type:	tube
Sample ID:	U2	Test Date:	02/19/19
Depth :	6-8 ft	Test Id:	490904
Test Comment:	---		
Visual Description:	Moist, dark grayish brown 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
◆	U2	EXIT45-3	6-8 ft	29	31	20	11	0.8	

Sample Prepared using the WET method

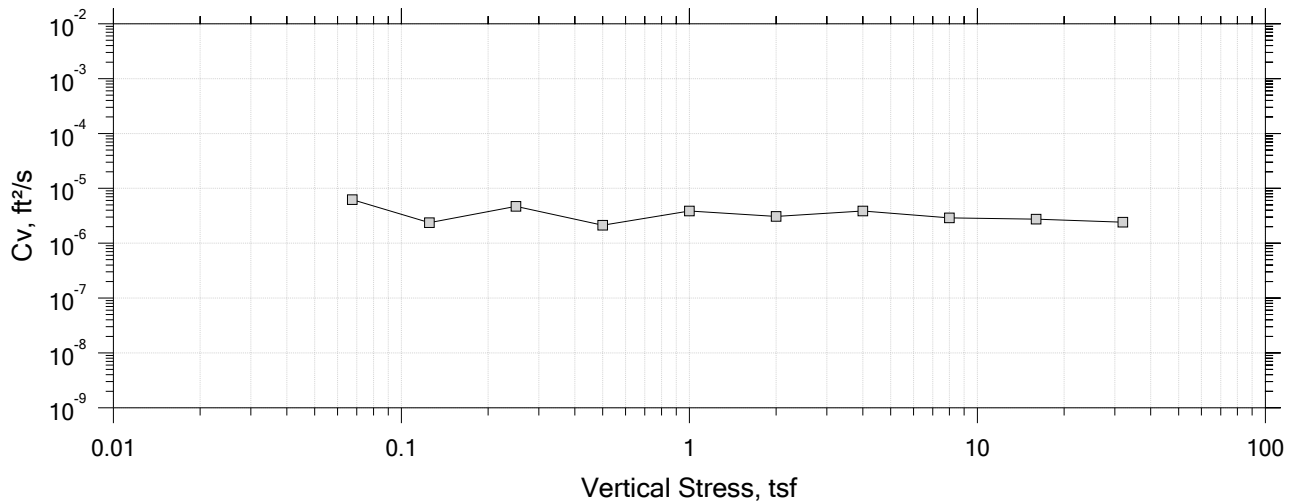
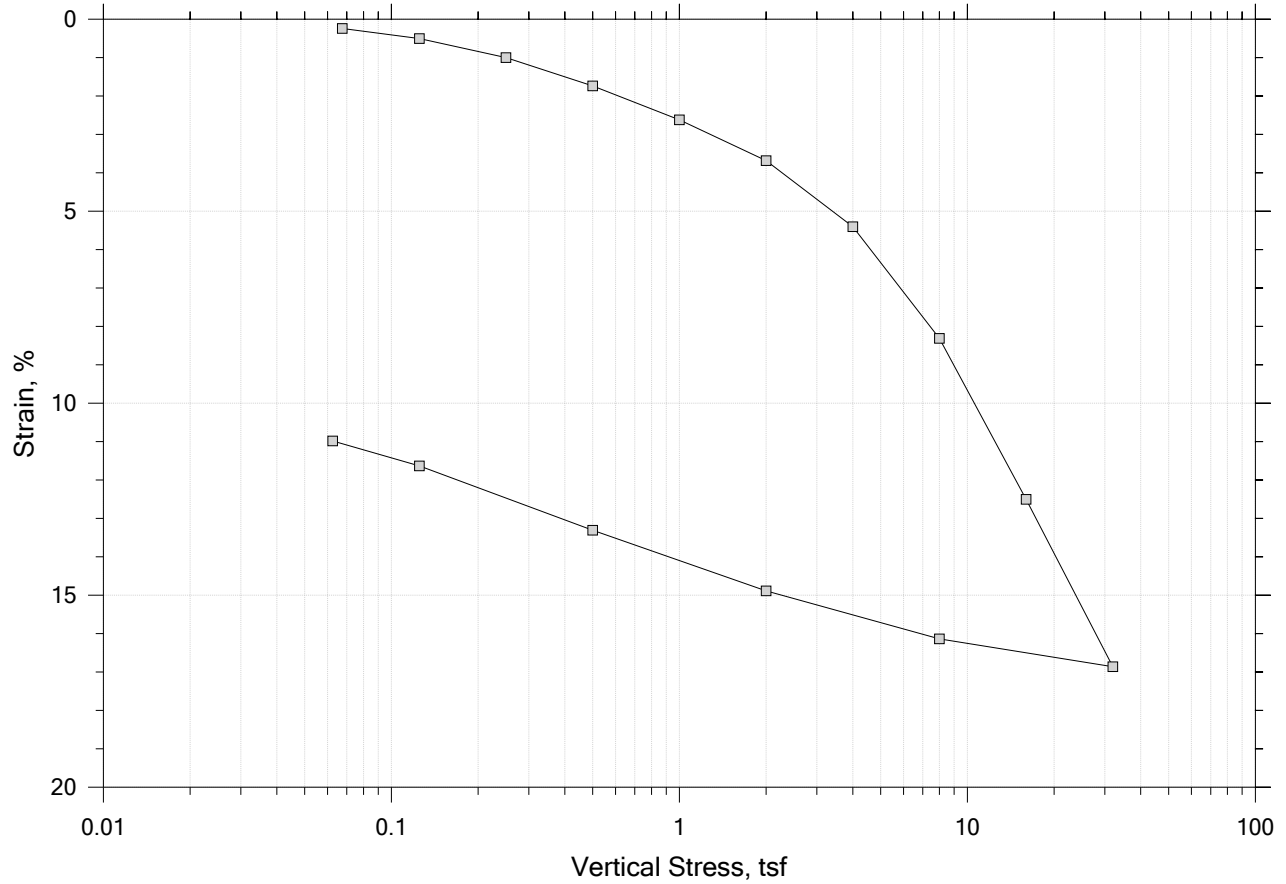
Dry Strength: VERY HIGH


Dilatancy: SLOW

Toughness: LOW

# One-Dimensional Consolidation by ASTM D2435 - Method B

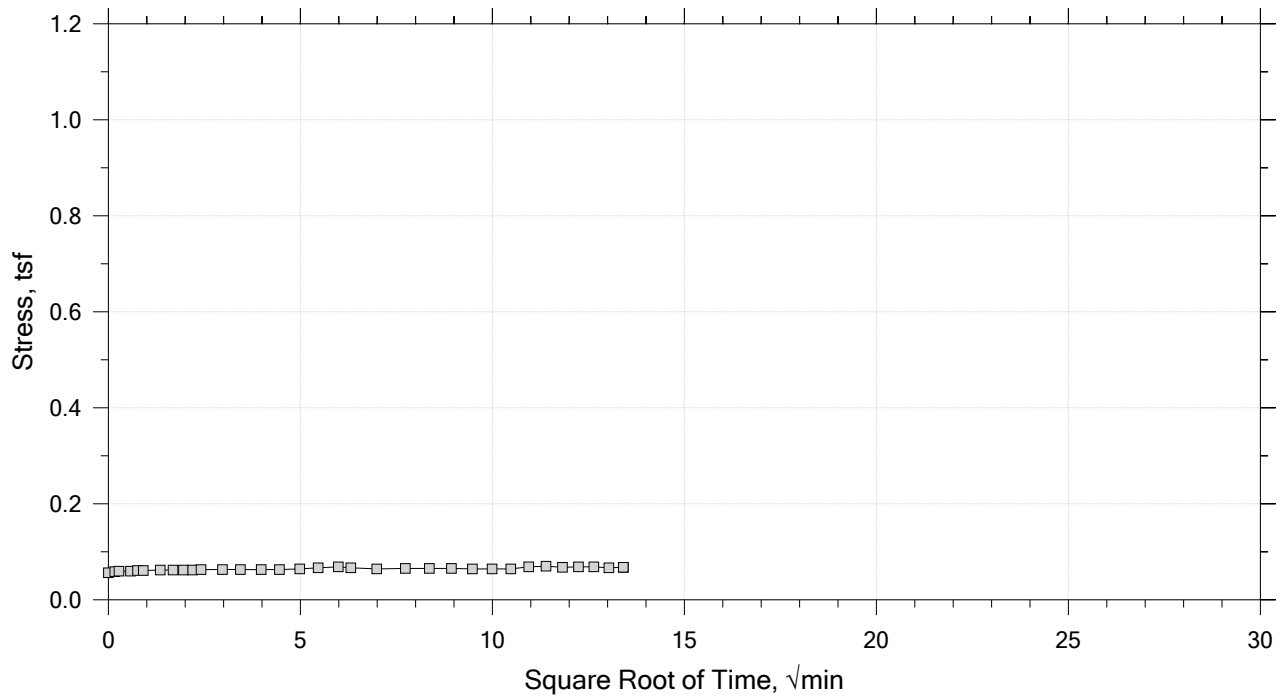
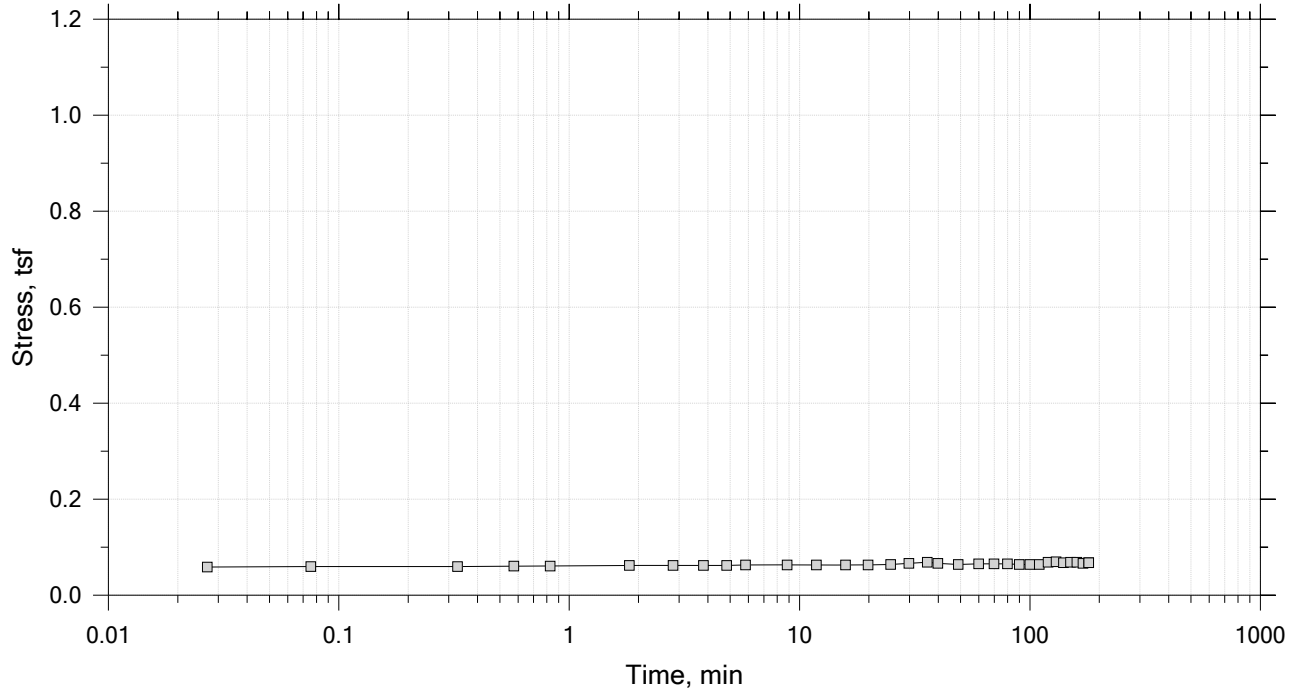
## Summary Report




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

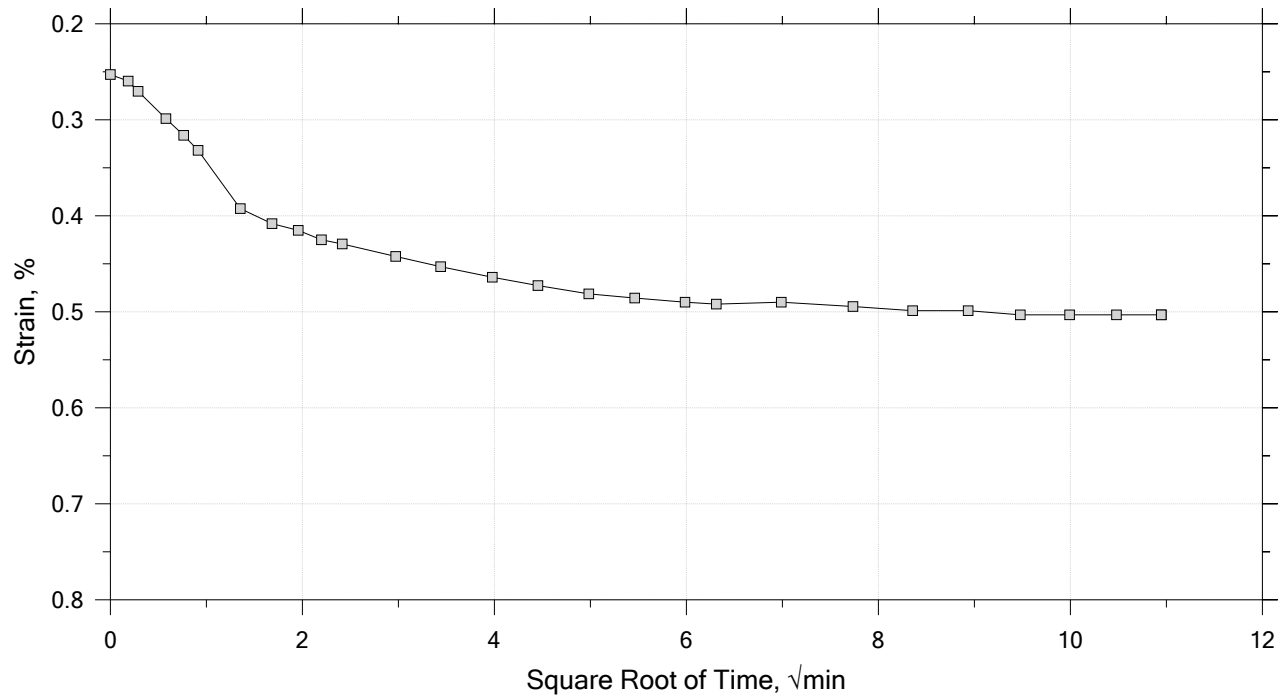
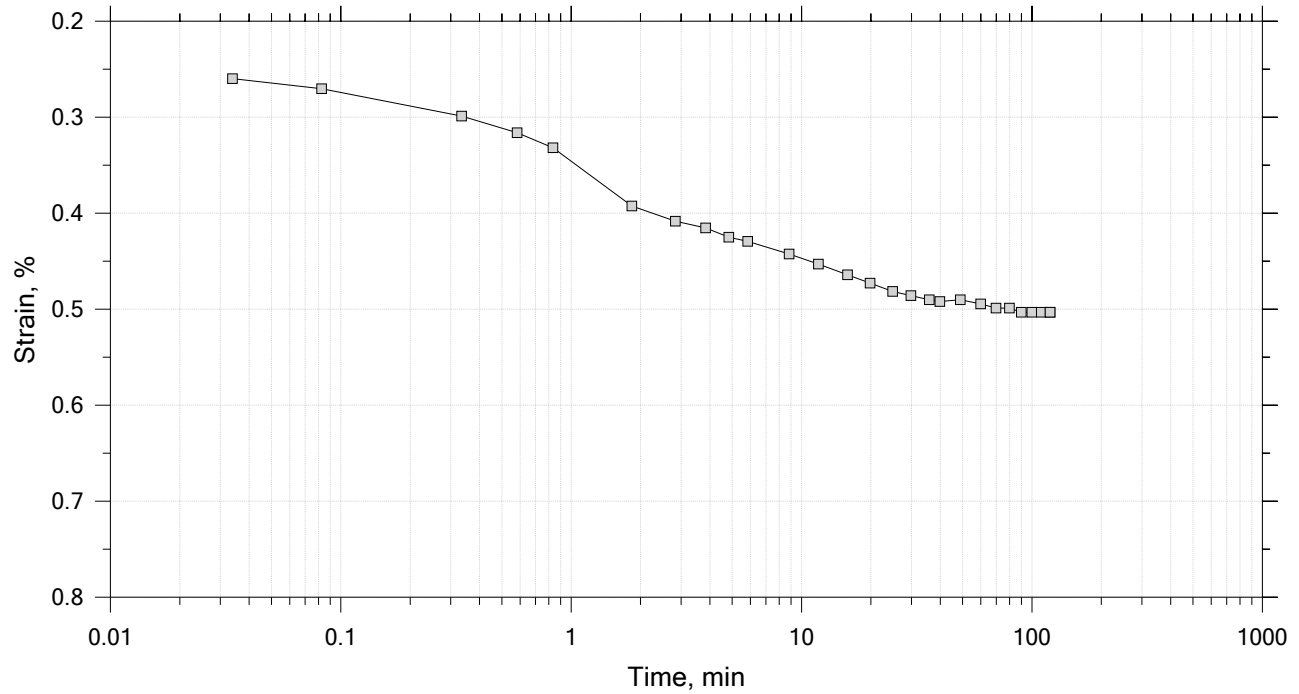
Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.0675 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf

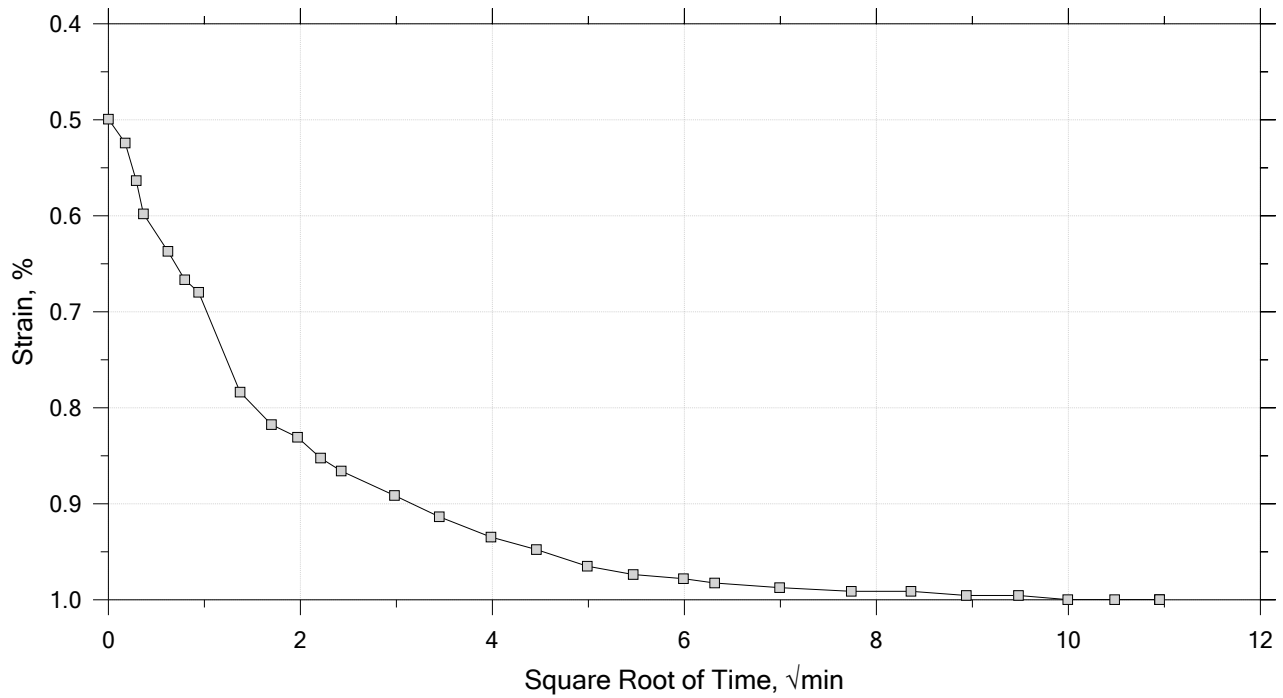
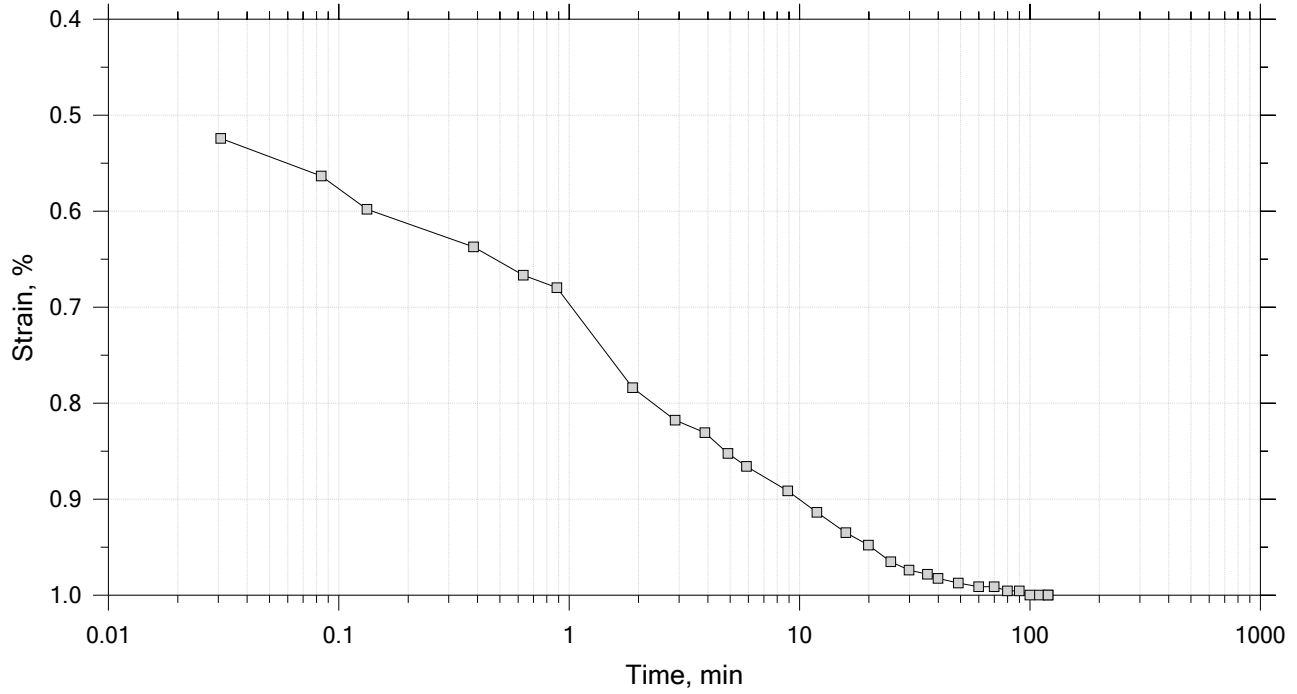



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		



# One-Dimensional Consolidation by ASTM D2435 - Method B

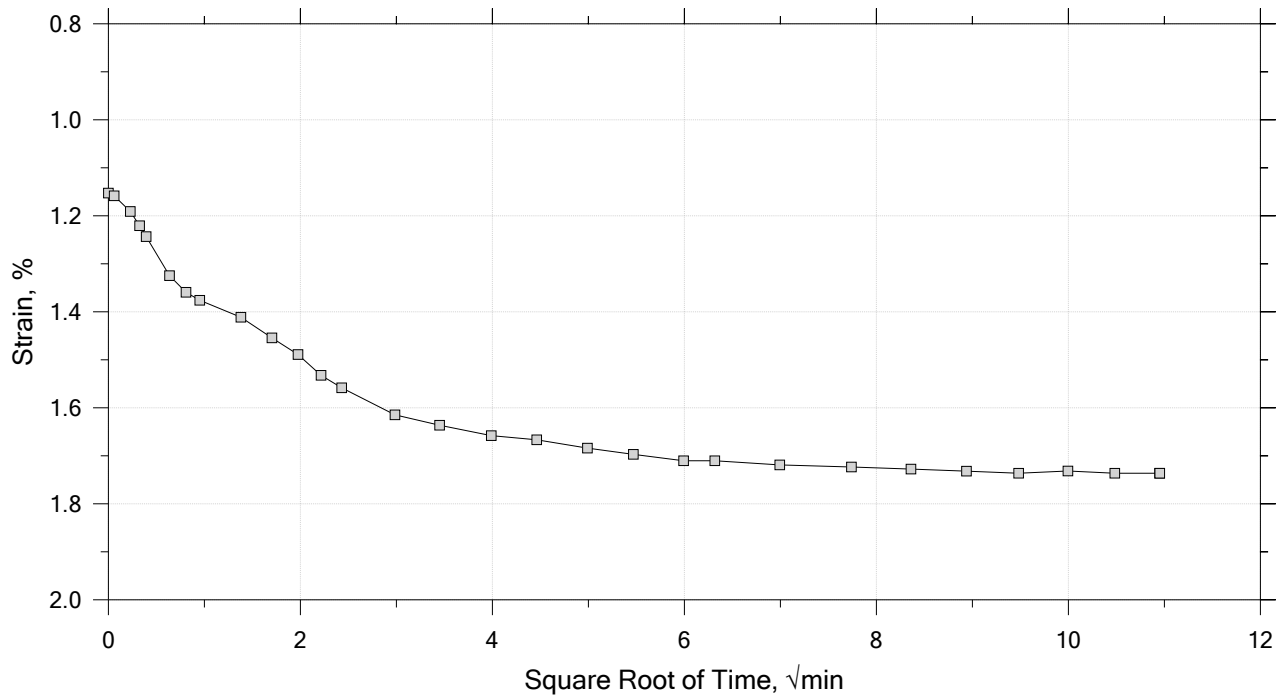
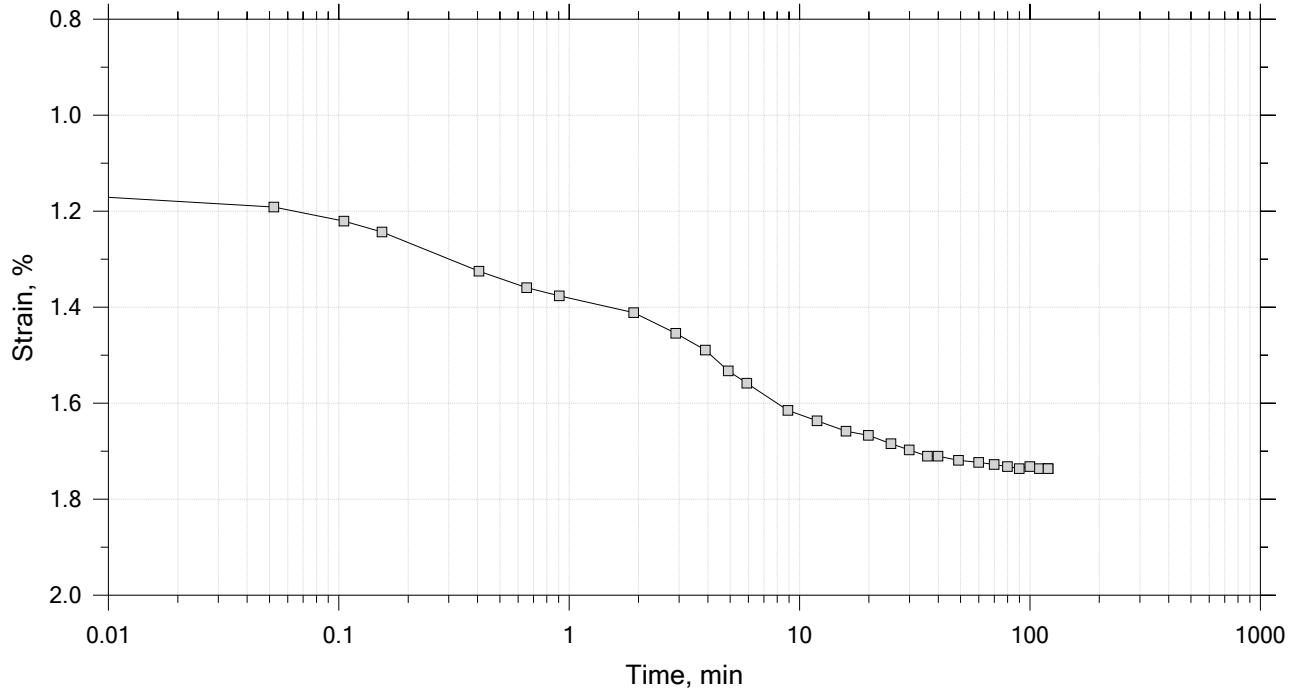
Time Curve 3 of 15  
 Constant Load Step  
 Stress: 0.25 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 15  
 Constant Load Step  
 Stress: 0.5 tsf



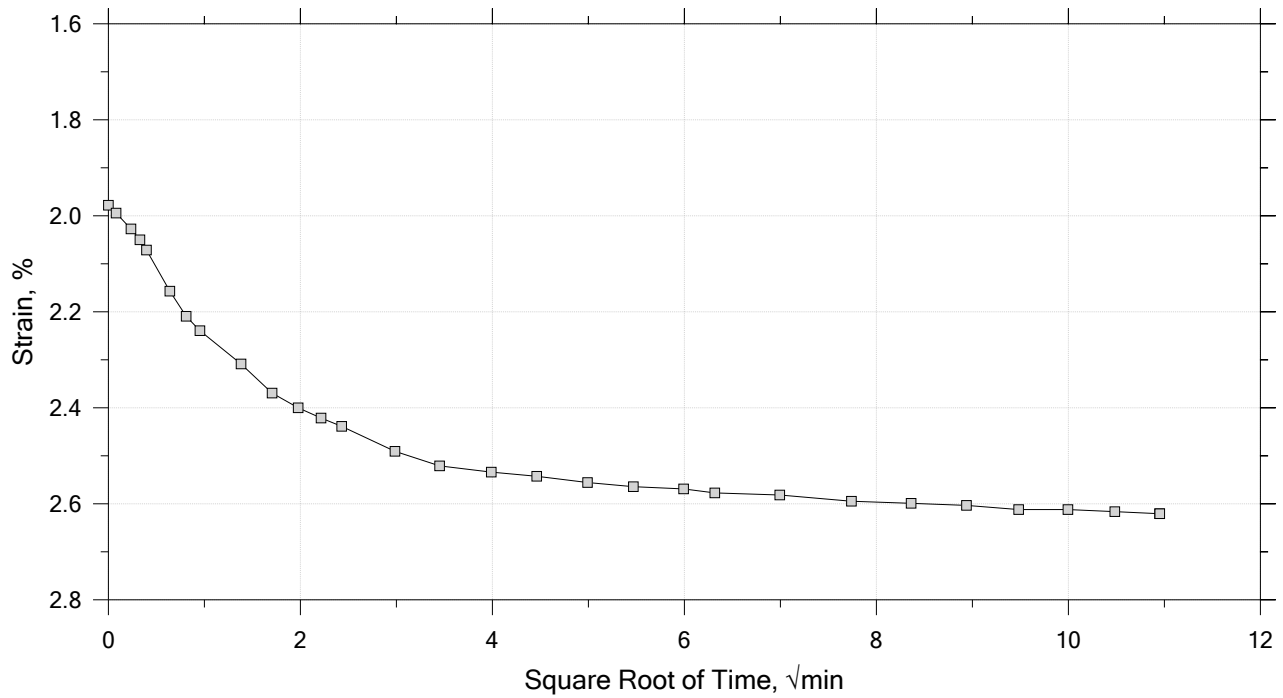
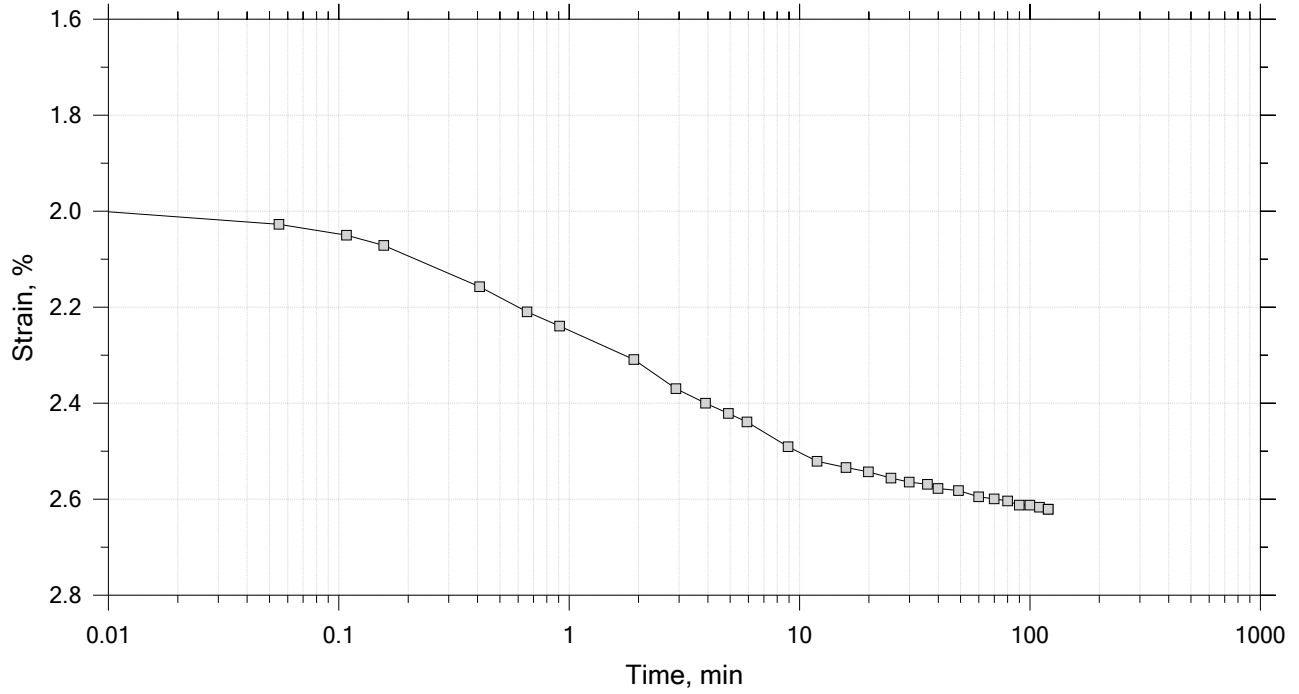
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 15

Constant Load Step

Stress: 1 tsf



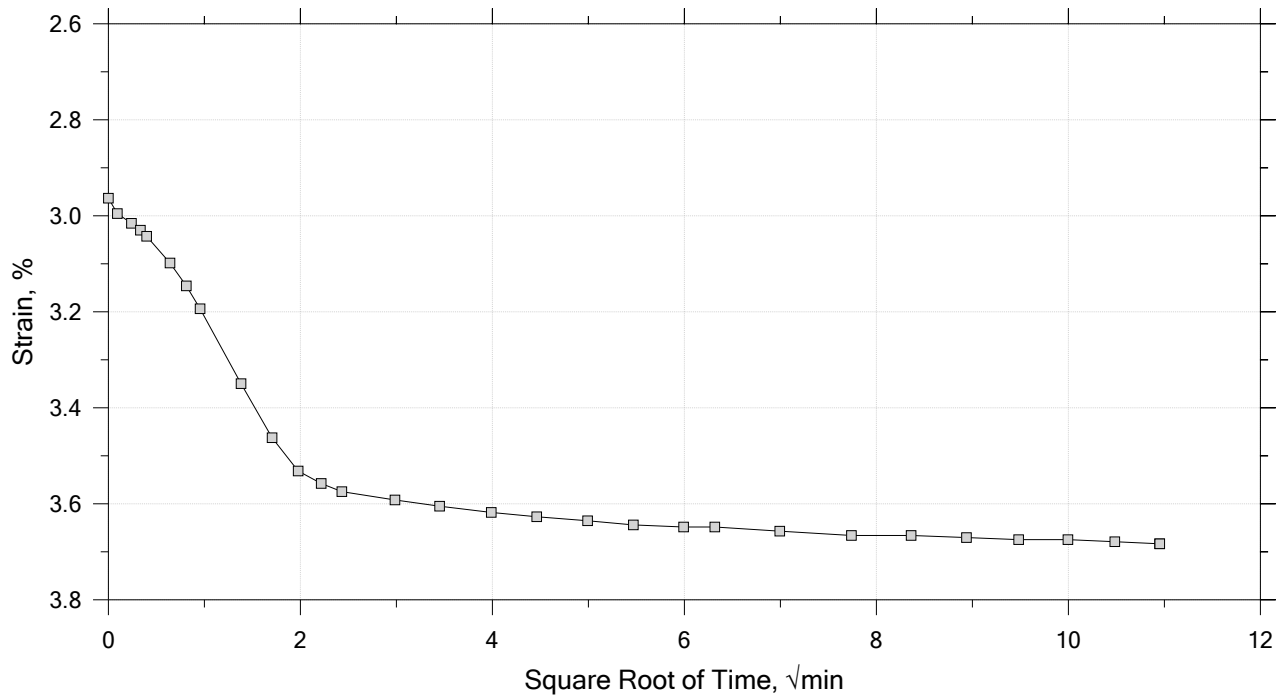
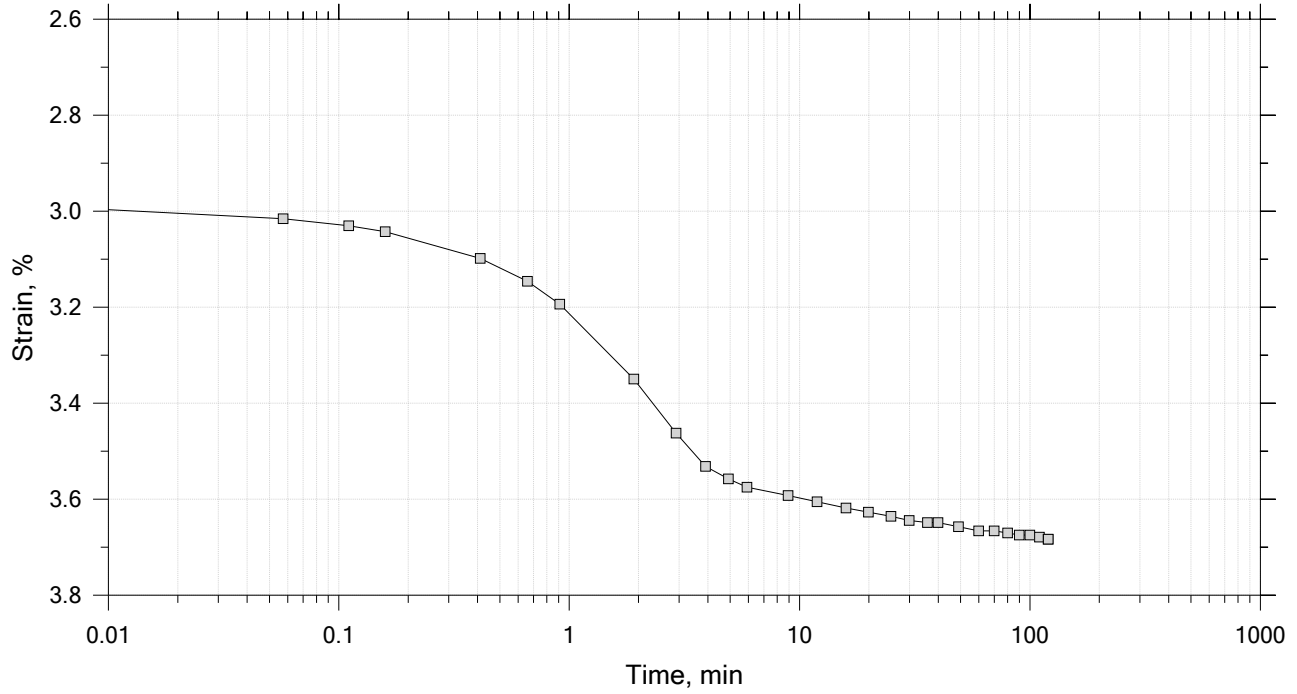
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 15

Constant Load Step

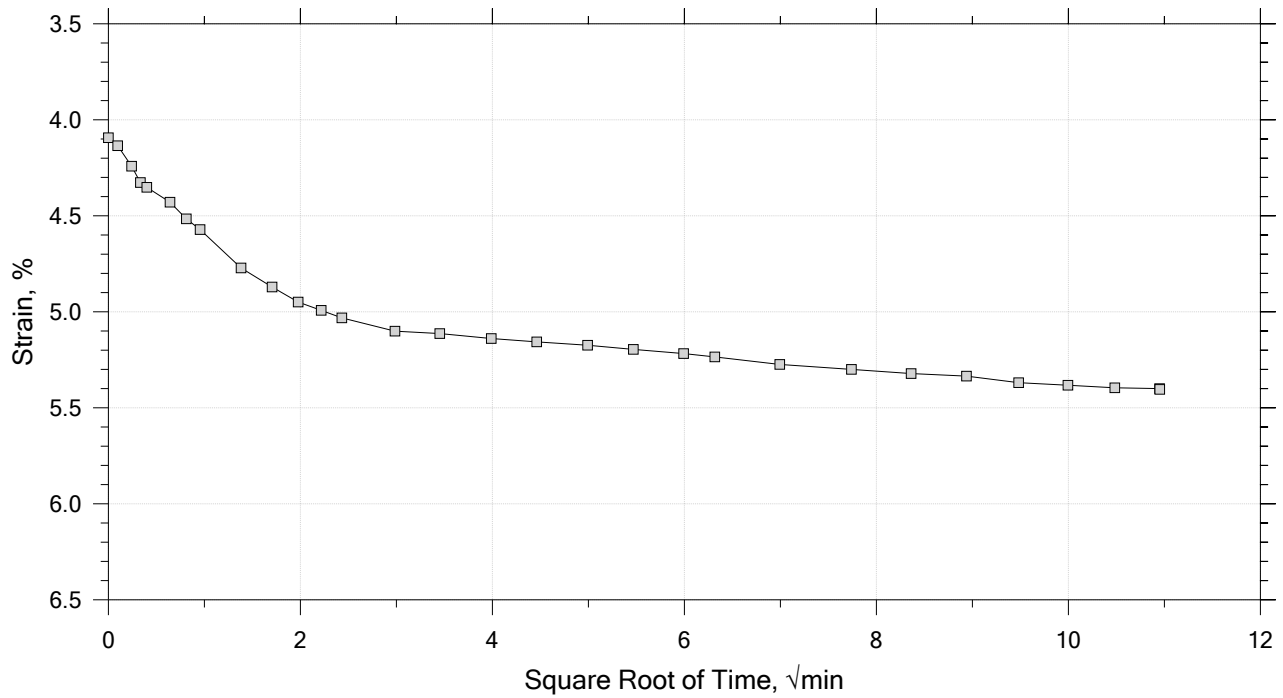
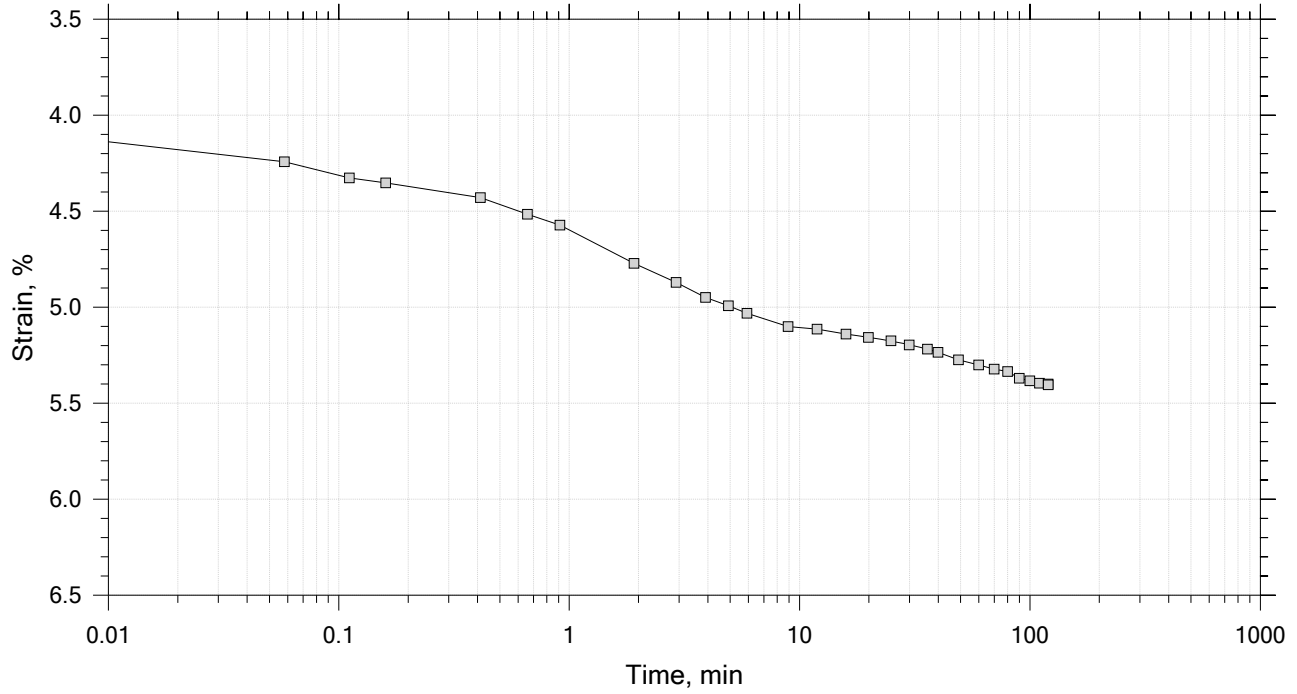
Stress: 2 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15  
 Constant Load Step  
 Stress: 4 tsf



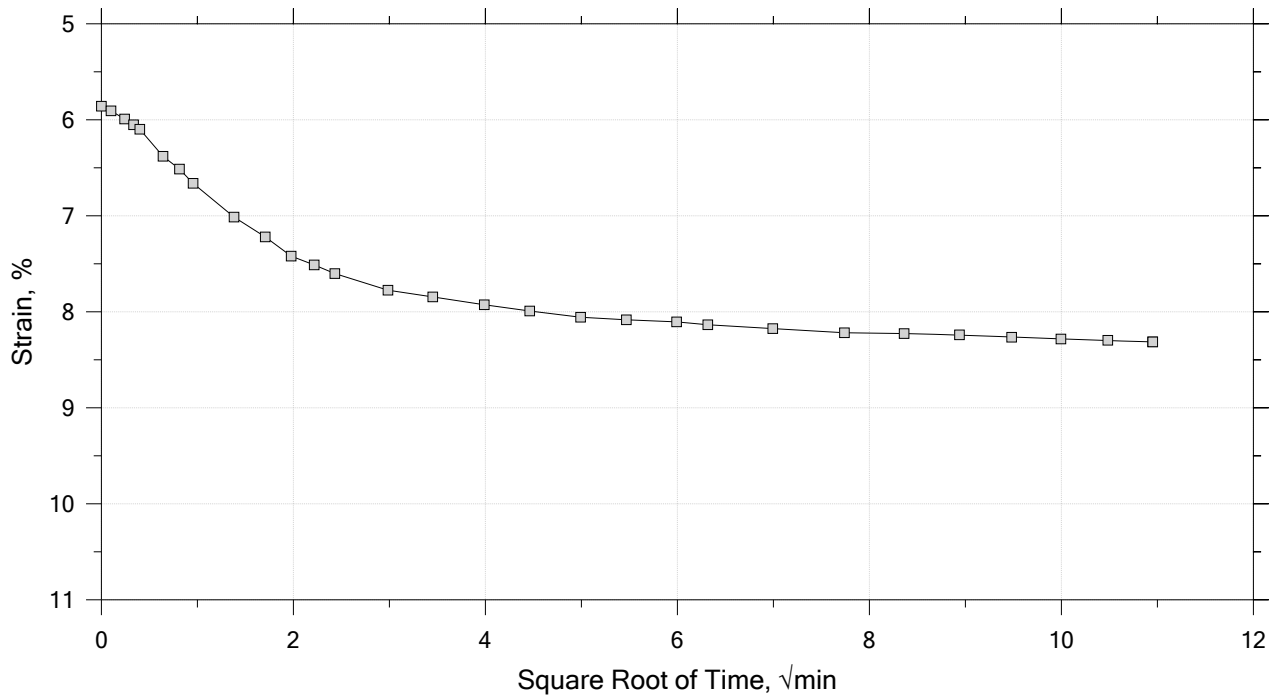
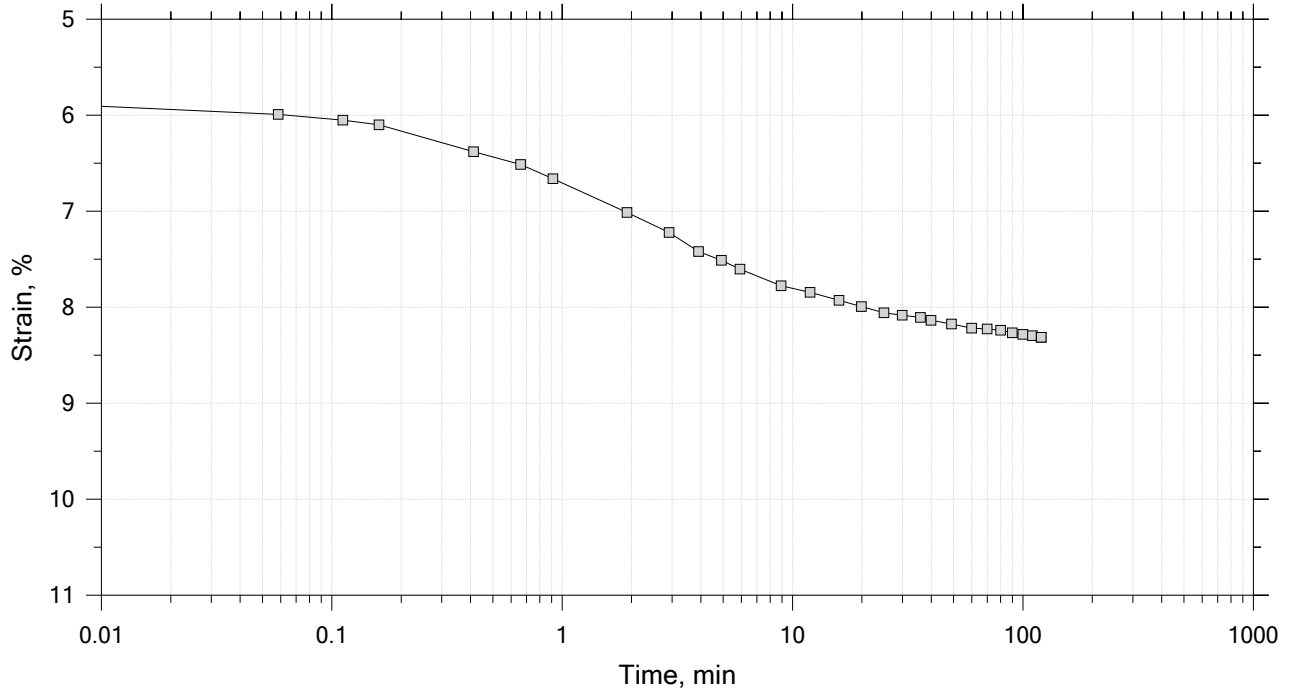
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 15

Constant Load Step

Stress: 8 tsf



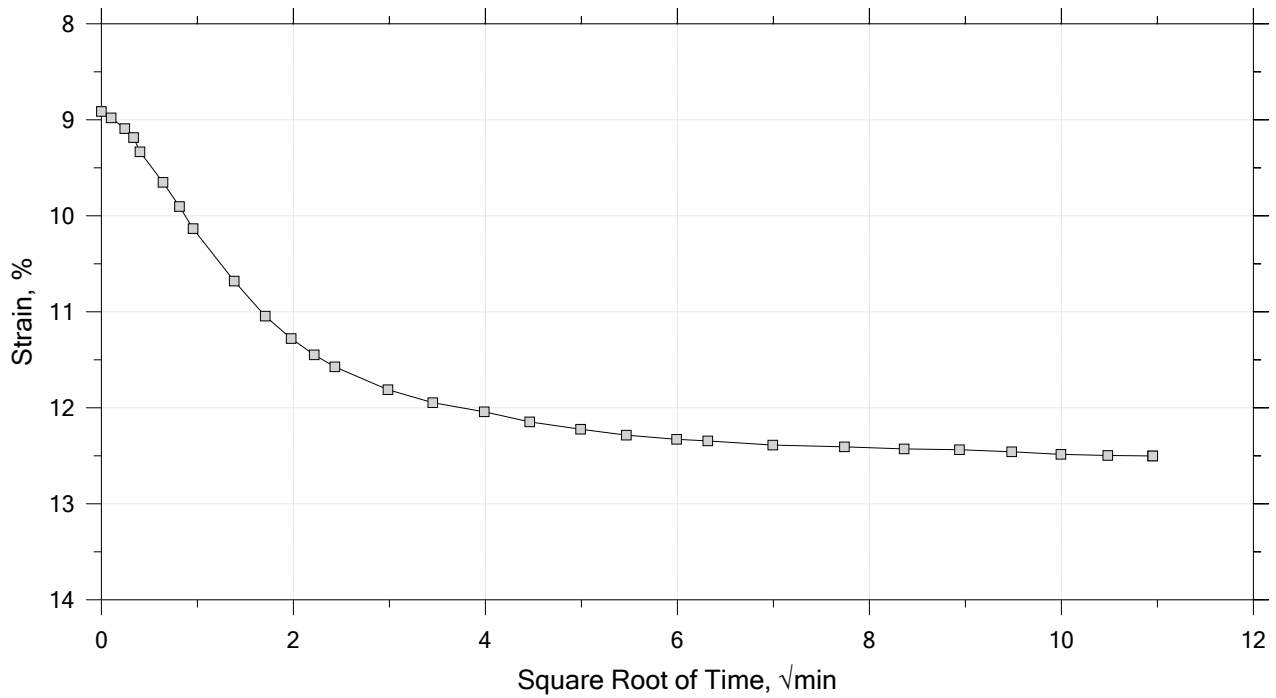
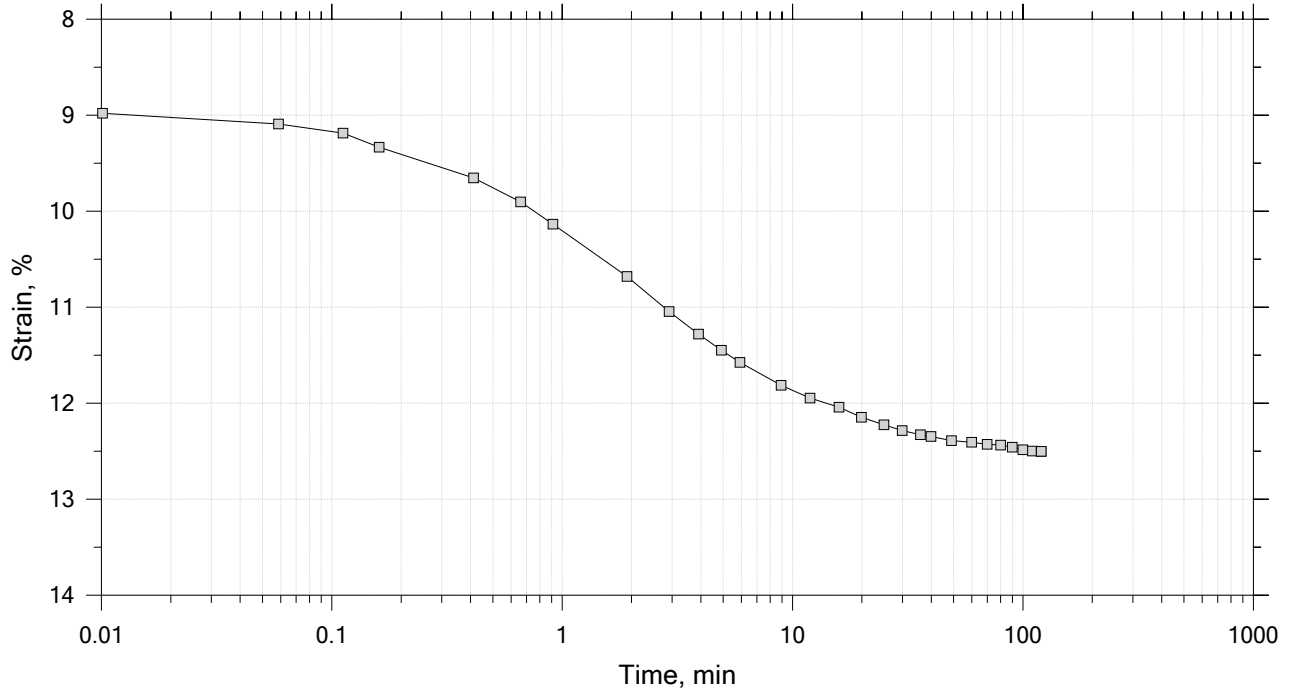
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15

Constant Load Step

Stress: 16 tsf



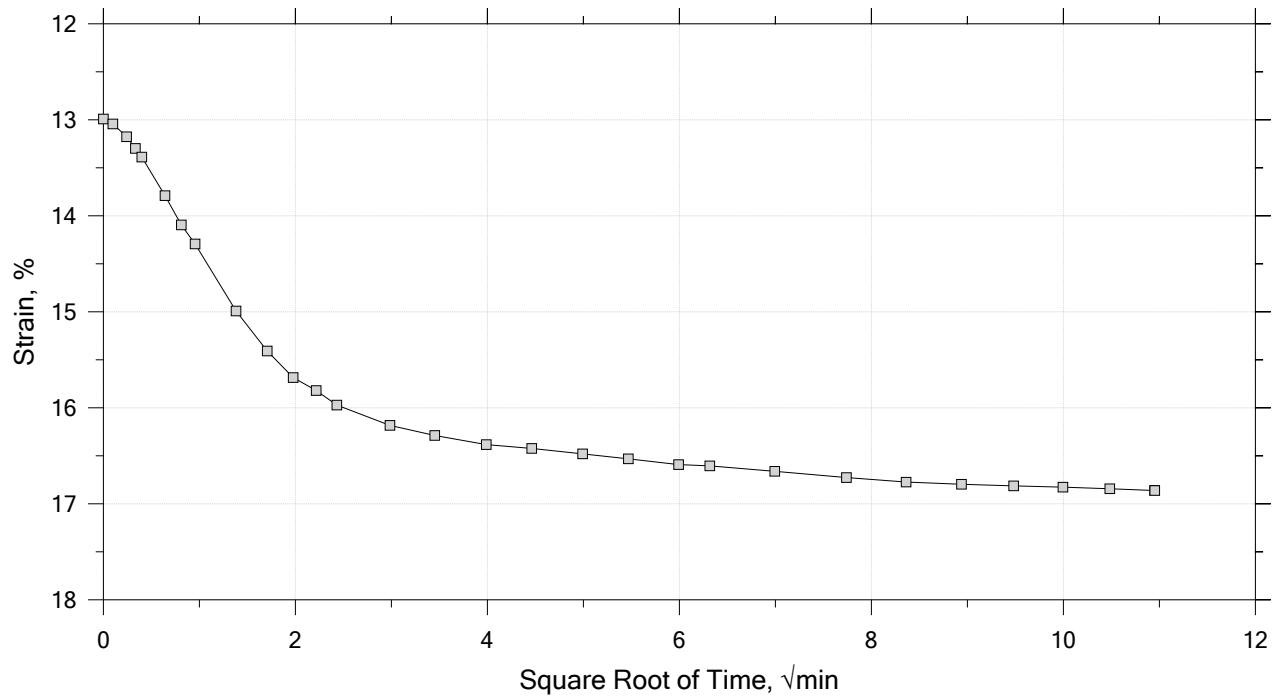
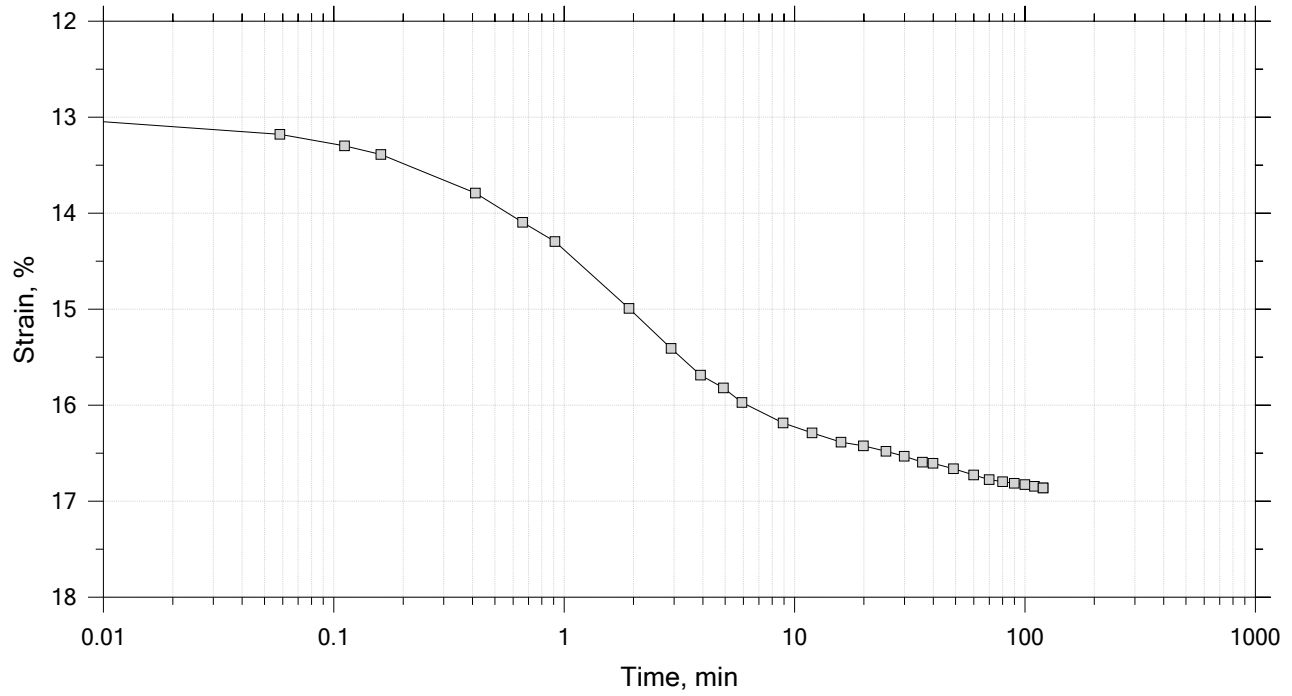
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		

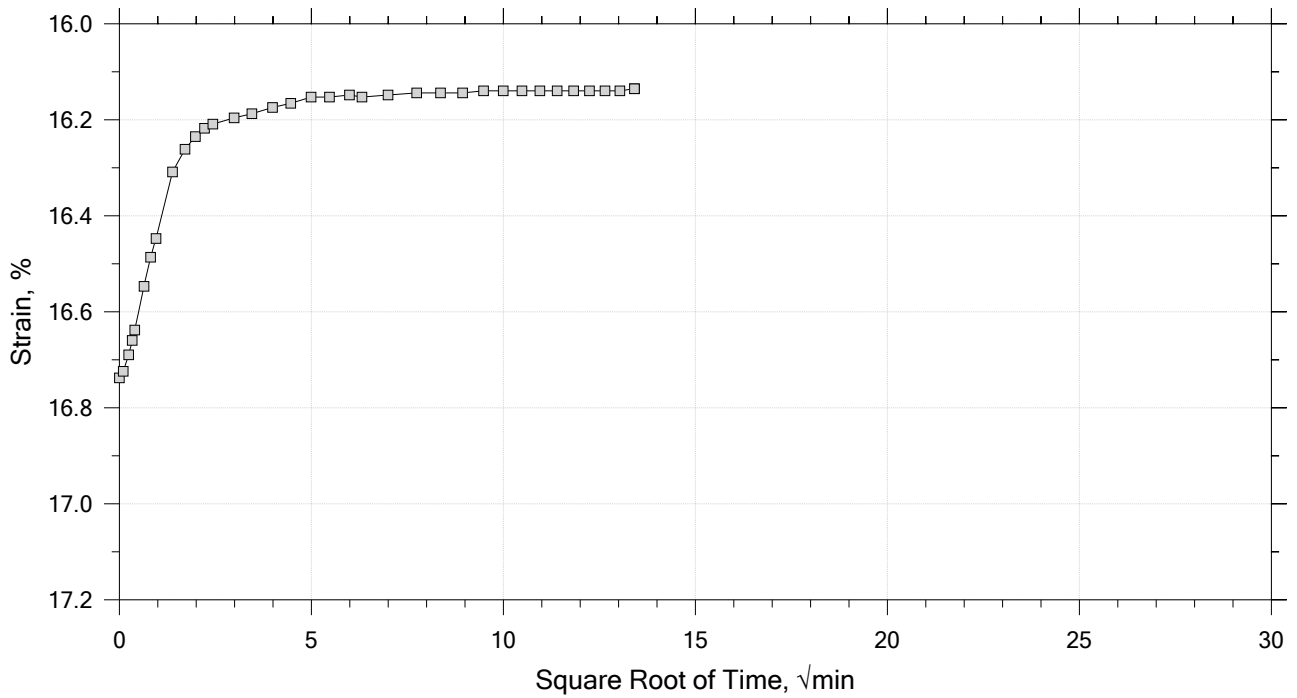
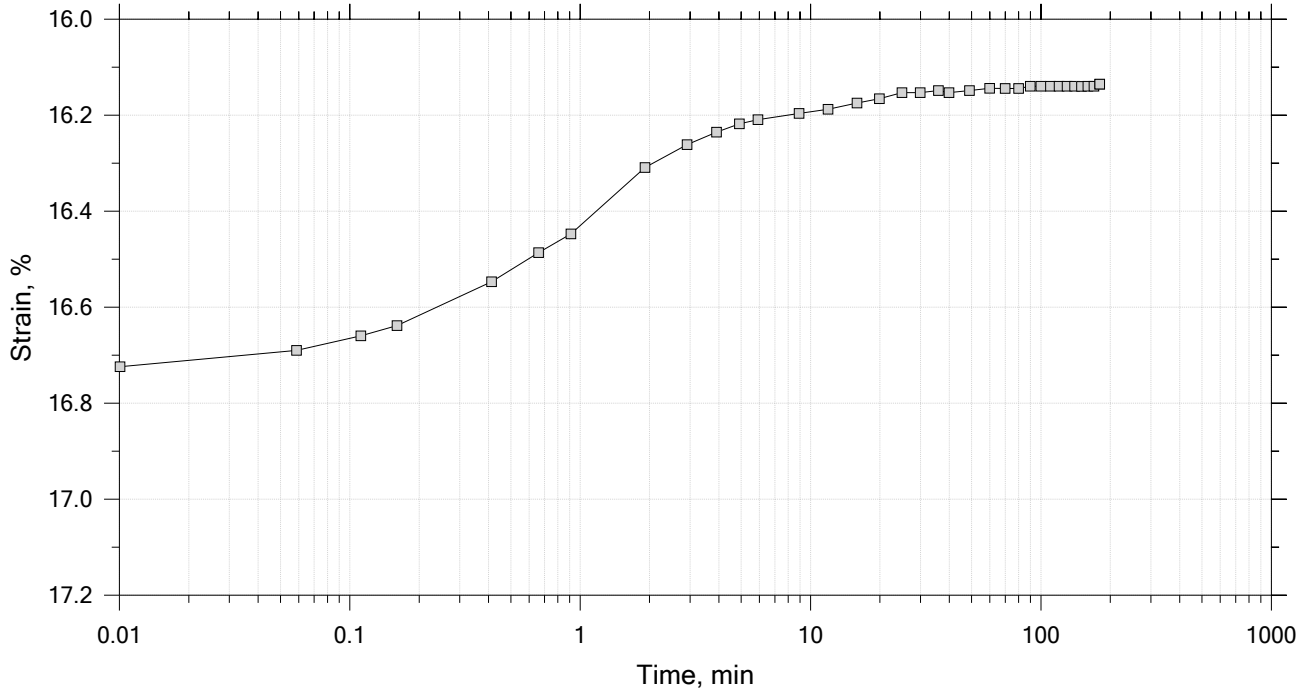



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



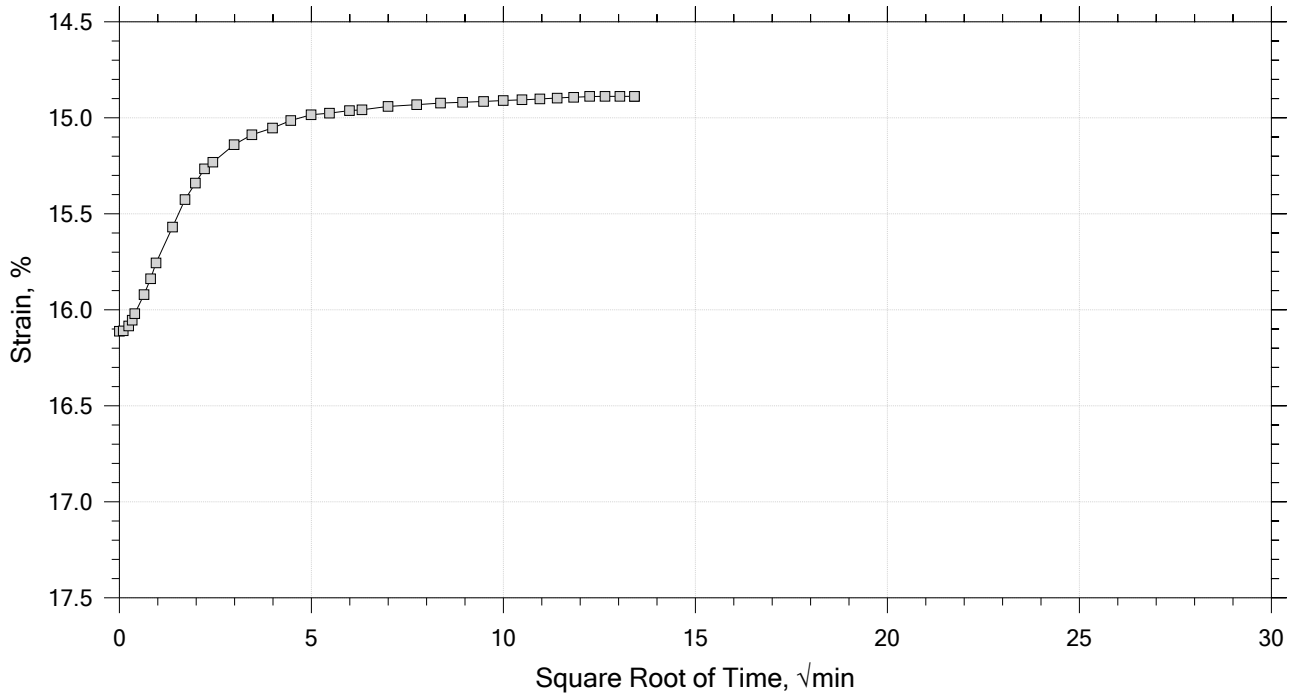
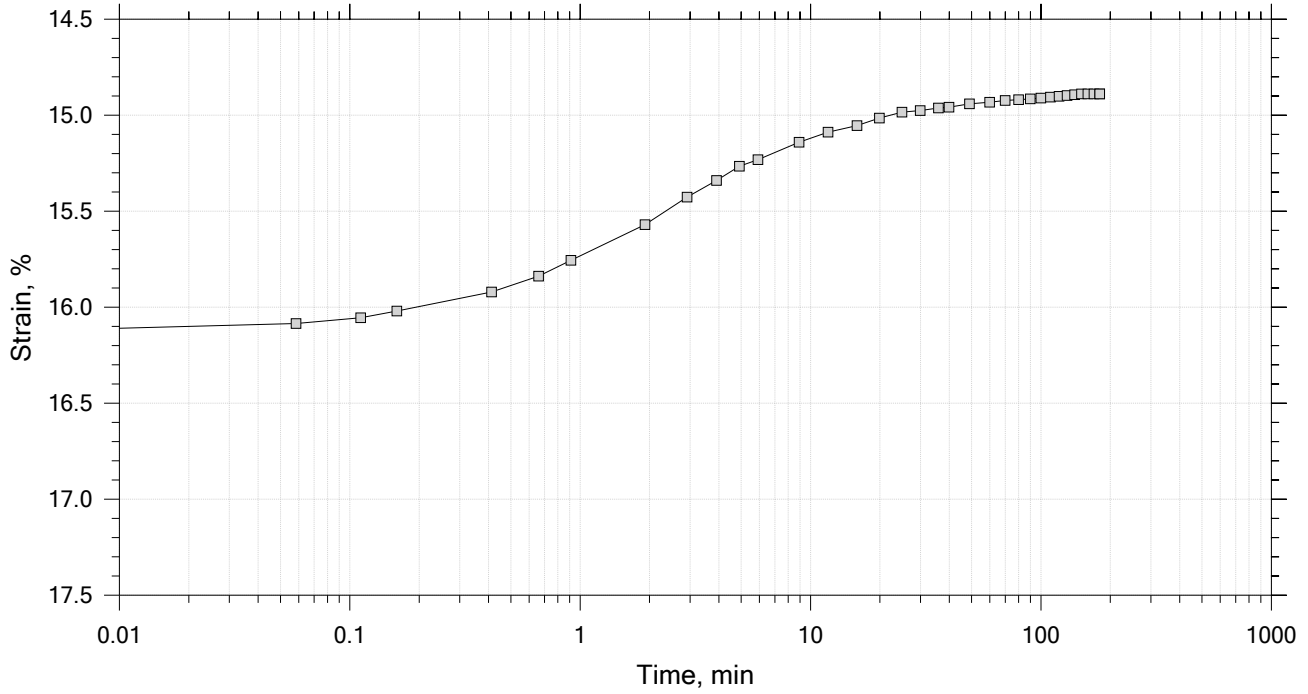
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



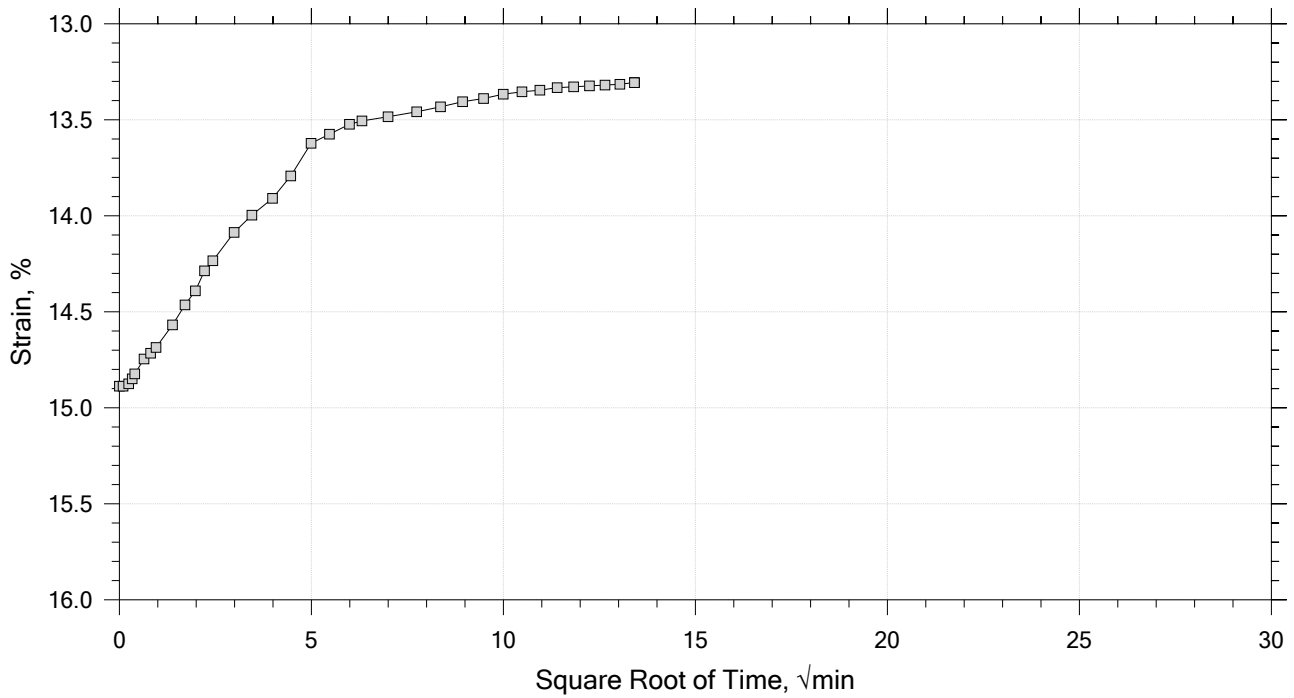
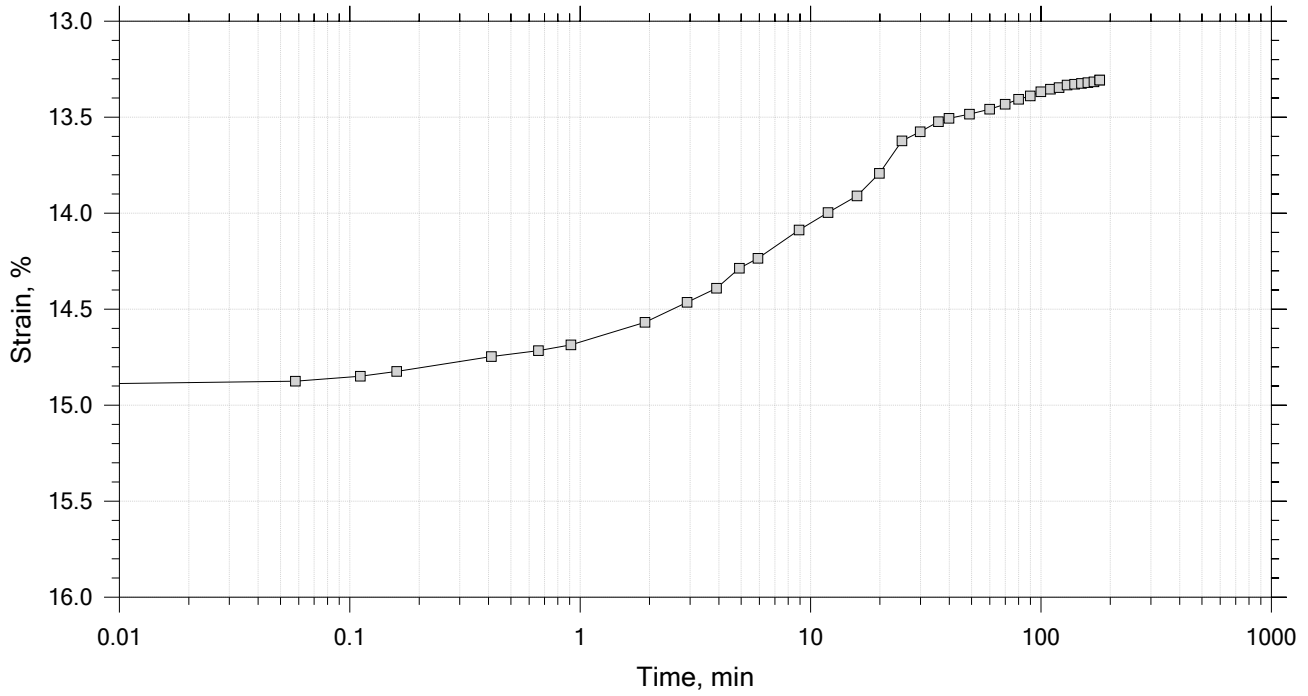
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



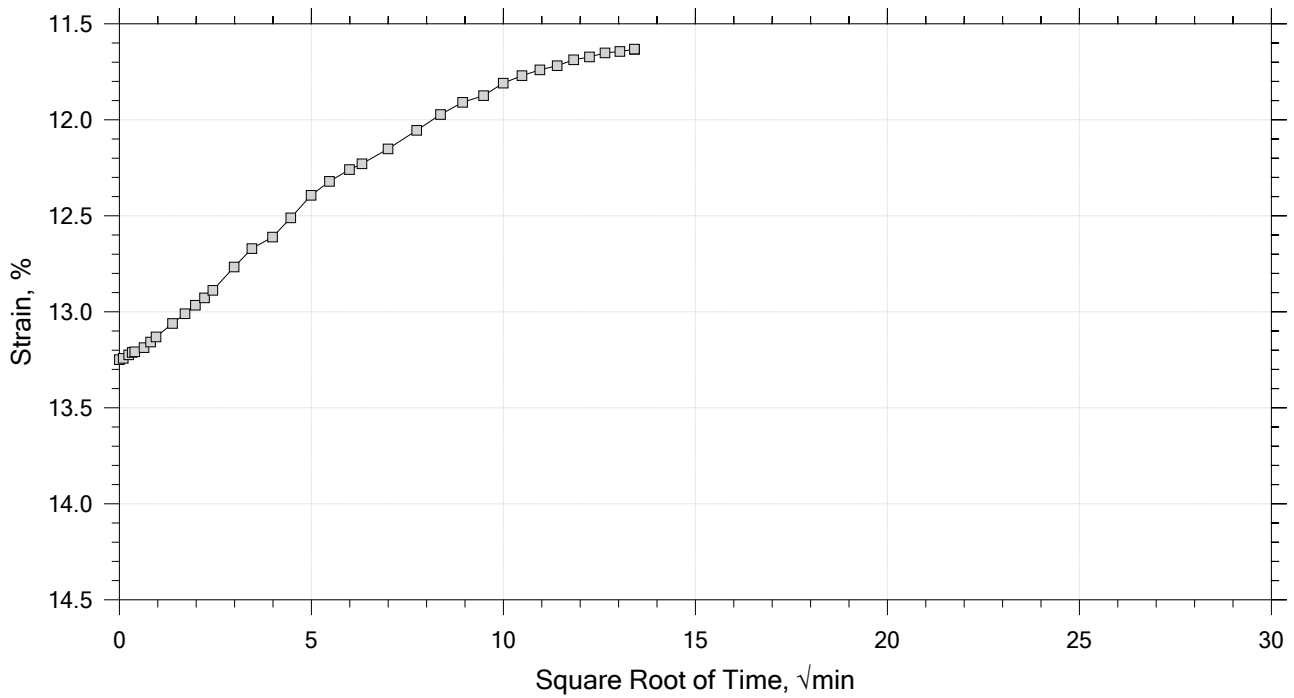
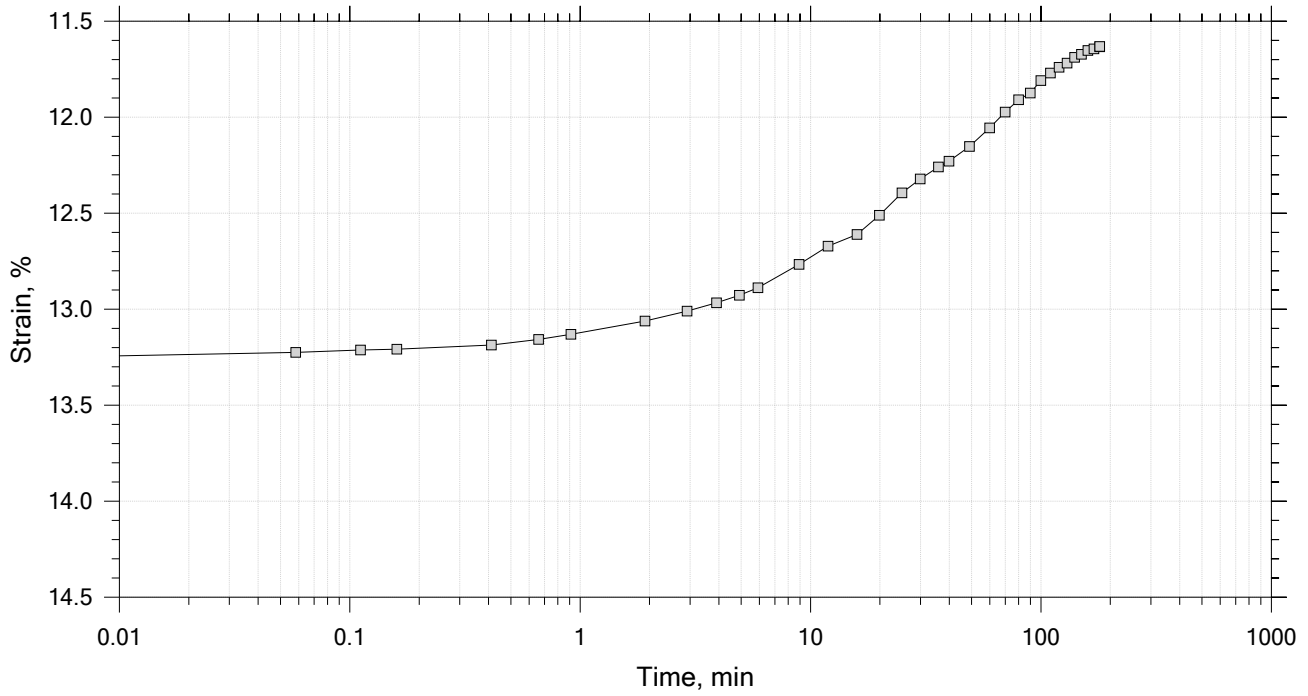
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



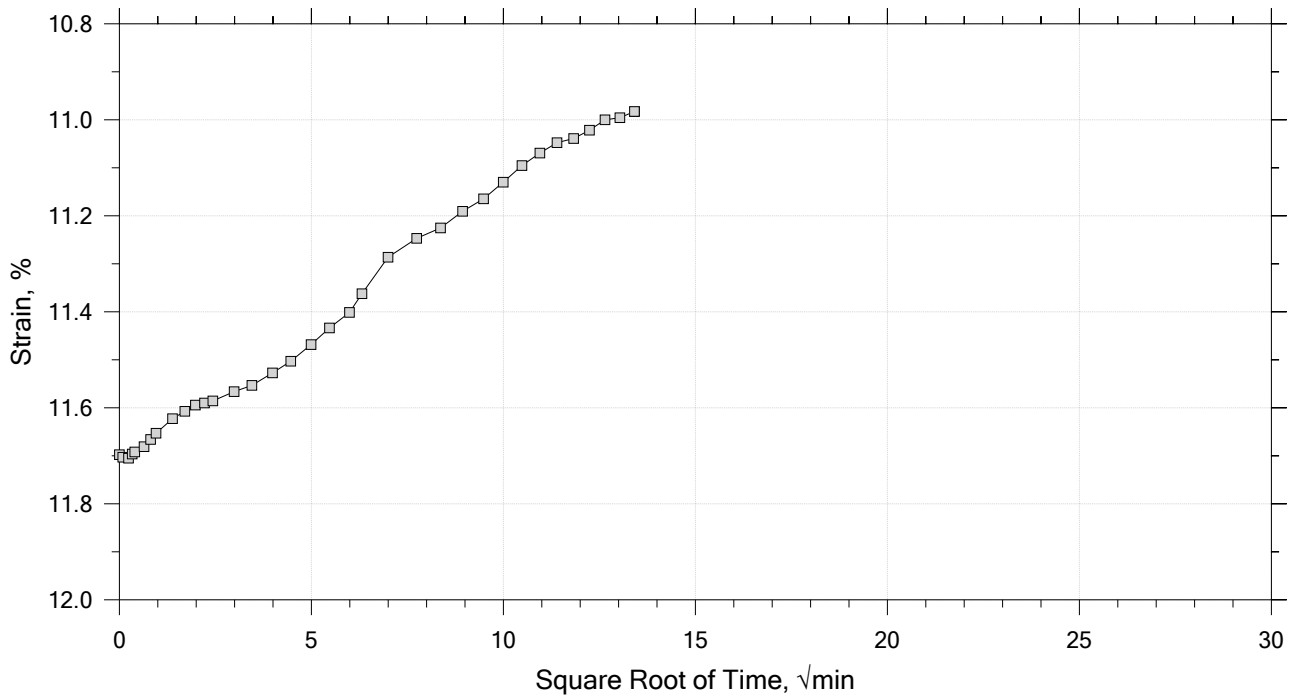
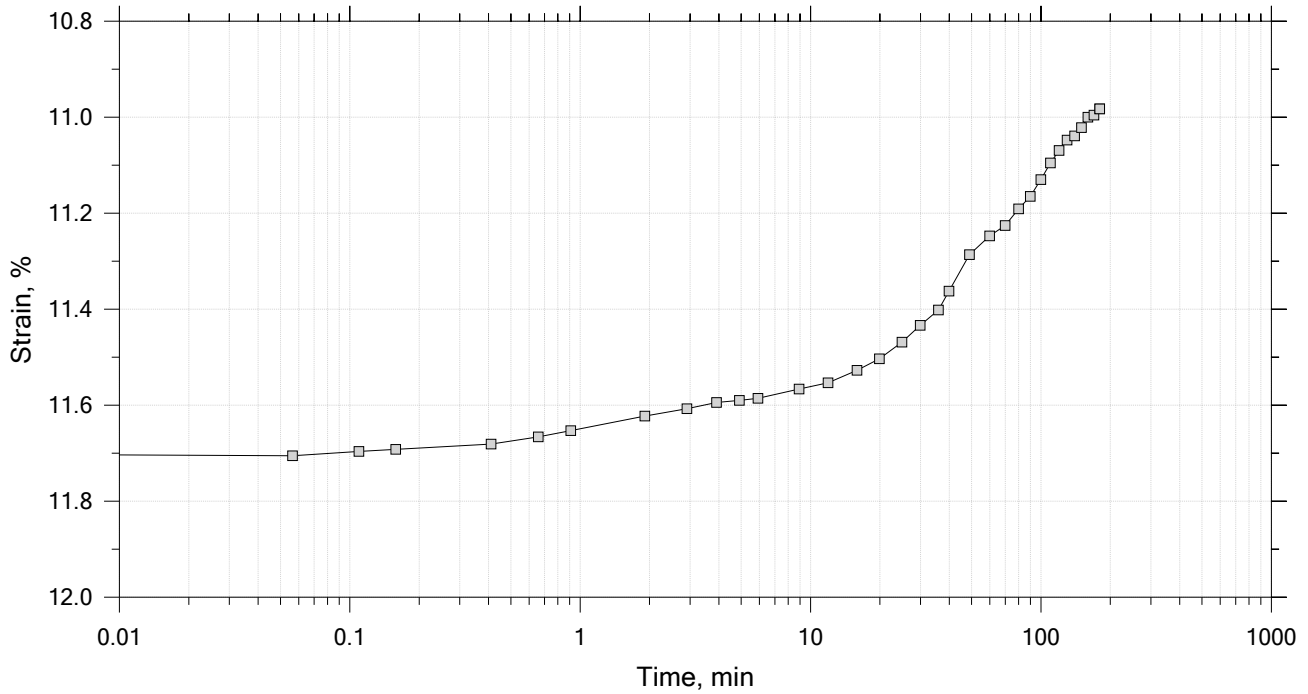
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.75	Liquid Limit: 37
Initial Height: 1.00 in	Initial Void Ratio: 0.952	Plastic Limit: 23
Final Height: 0.91 in	Final Void Ratio: 0.776	Plasticity Index: 14

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	A2912	RING		A-2457
Mass Container, gm	8.28	109	109	8.26
Mass Container + Wet Soil, gm	108.78	261.16	254.28	153.38
Mass Container + Dry Soil, gm	84.86	222.29	222.29	121.43
Mass Dry Soil, gm	76.58	113.29	113.29	113.17
Water Content, %	31.24	34.30	28.23	28.23
Void Ratio	---	0.95	0.78	---
Degree of Saturation, %	---	99.08	100.00	---
Dry Unit Weight, pcf	---	87.926	96.622	---

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.

	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-301	Tested By: md	Checked By: nh
	Sample No.: U2	Test Date: 2/8/19	Depth: 12-14 ft
	Test No.: IP-1	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System Y, Swell Pressure = 0.0675 tsf		

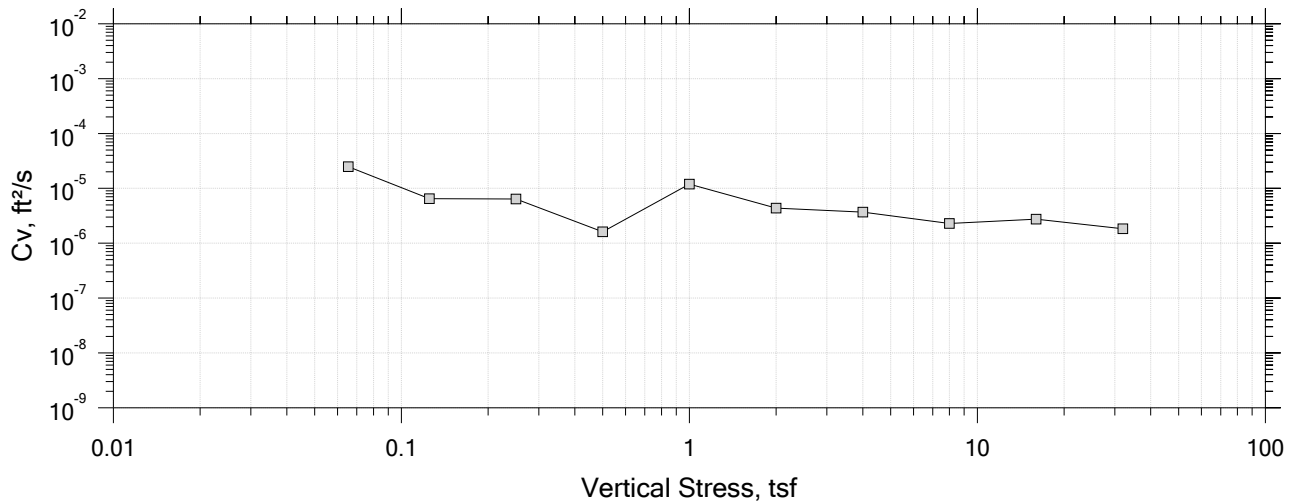
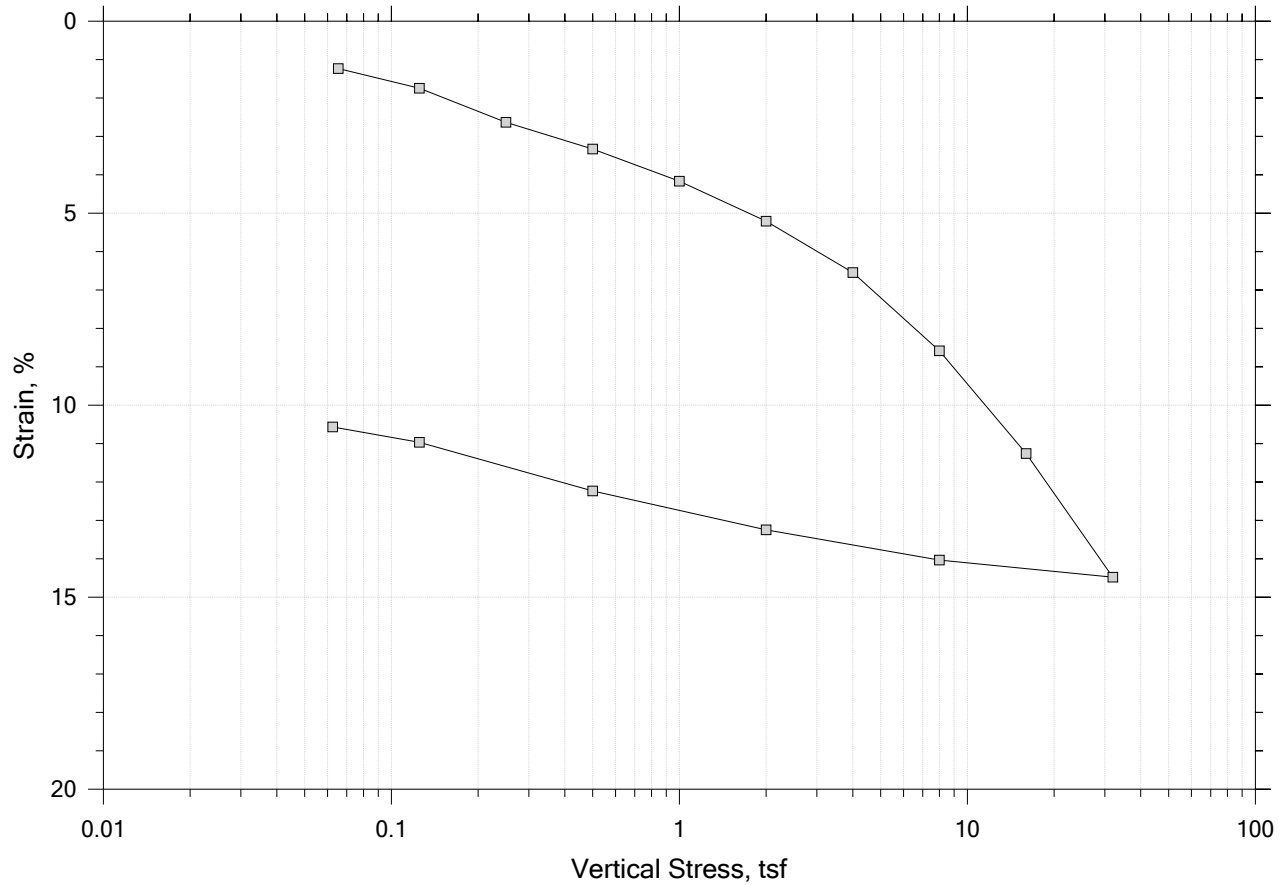







# One-Dimensional Consolidation by ASTM D2435 - Method B

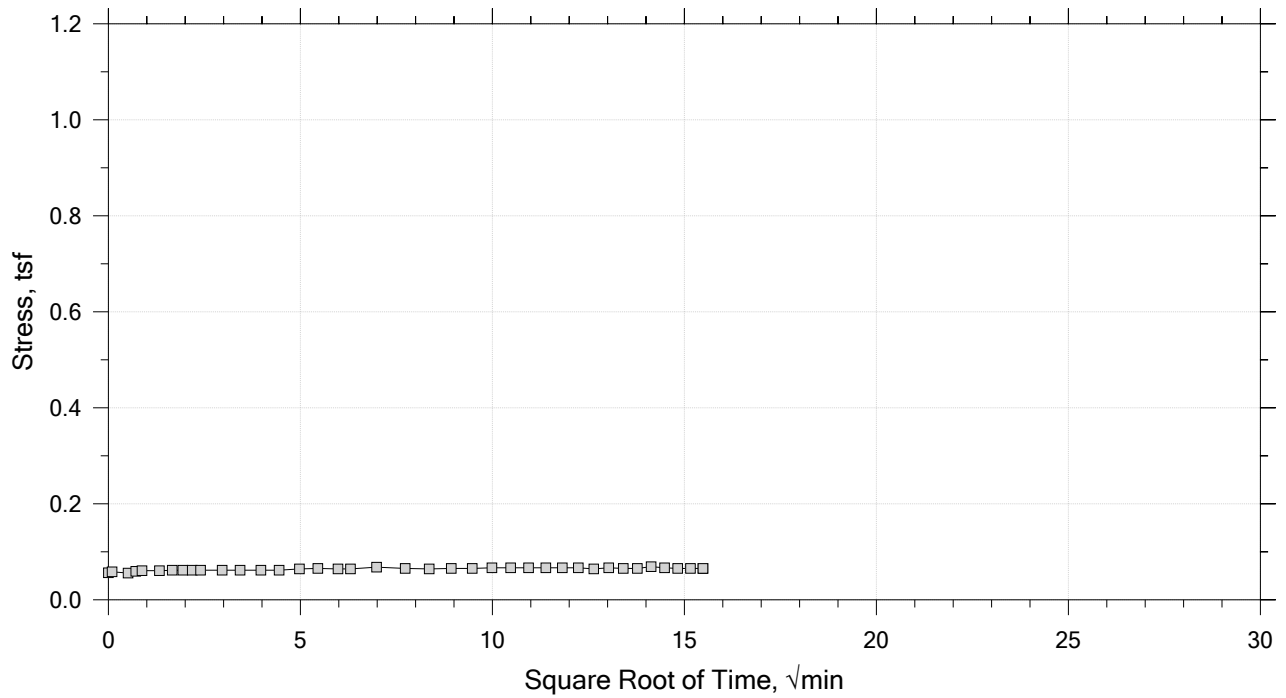
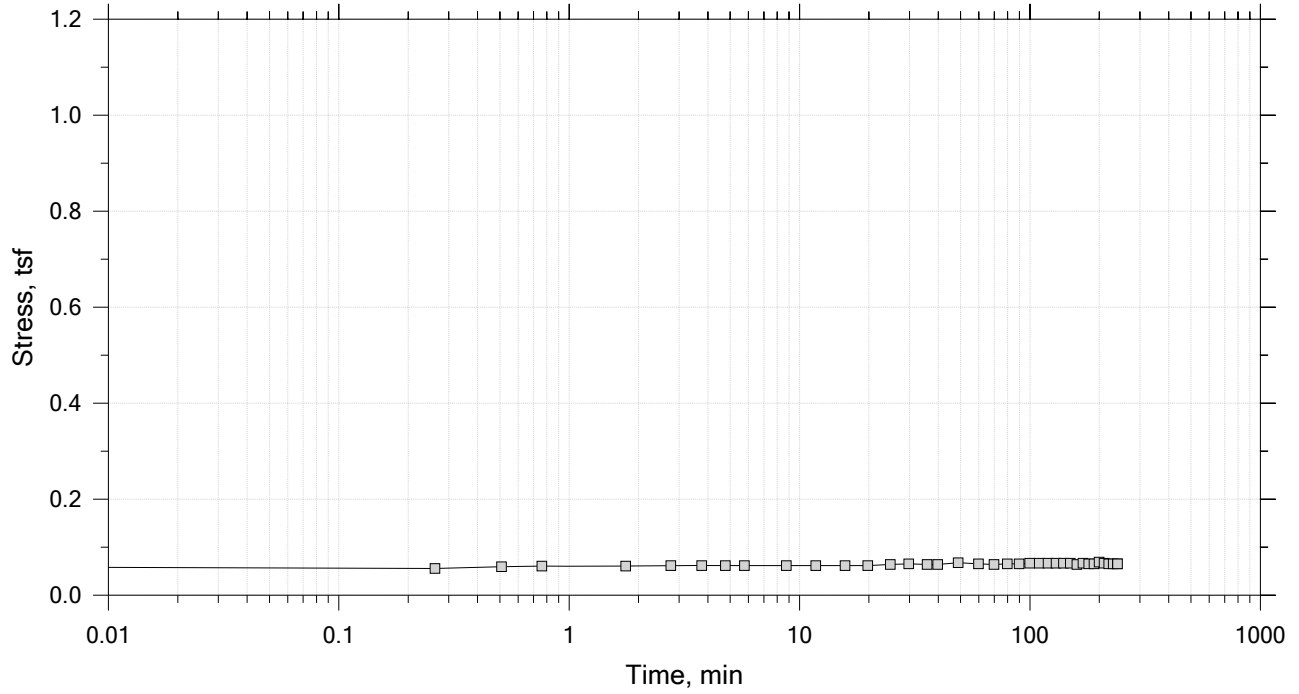
## Summary Report




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

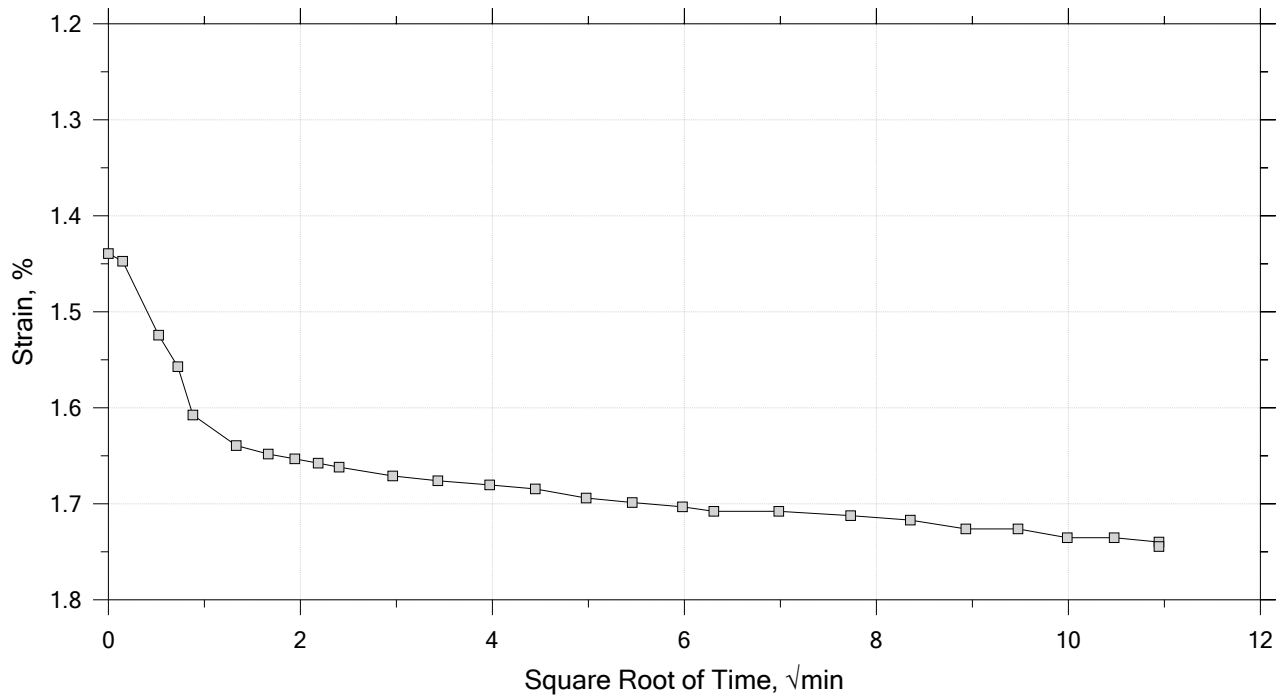
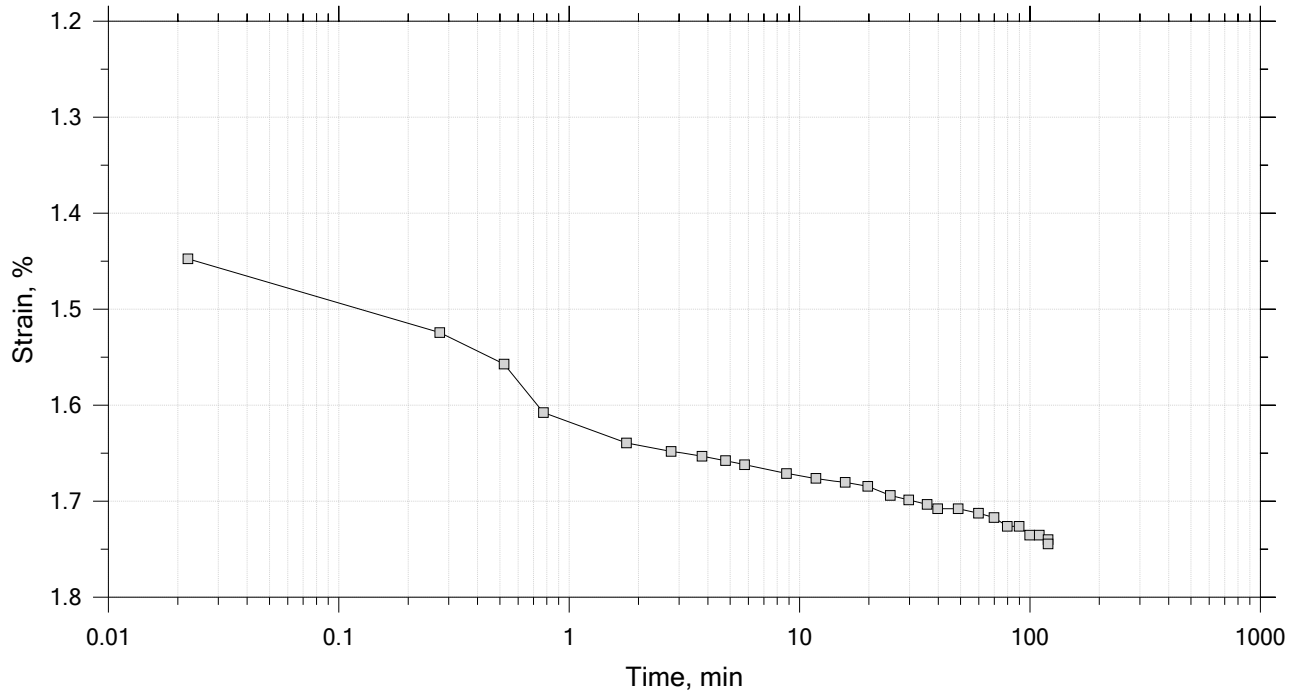
Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.0654 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

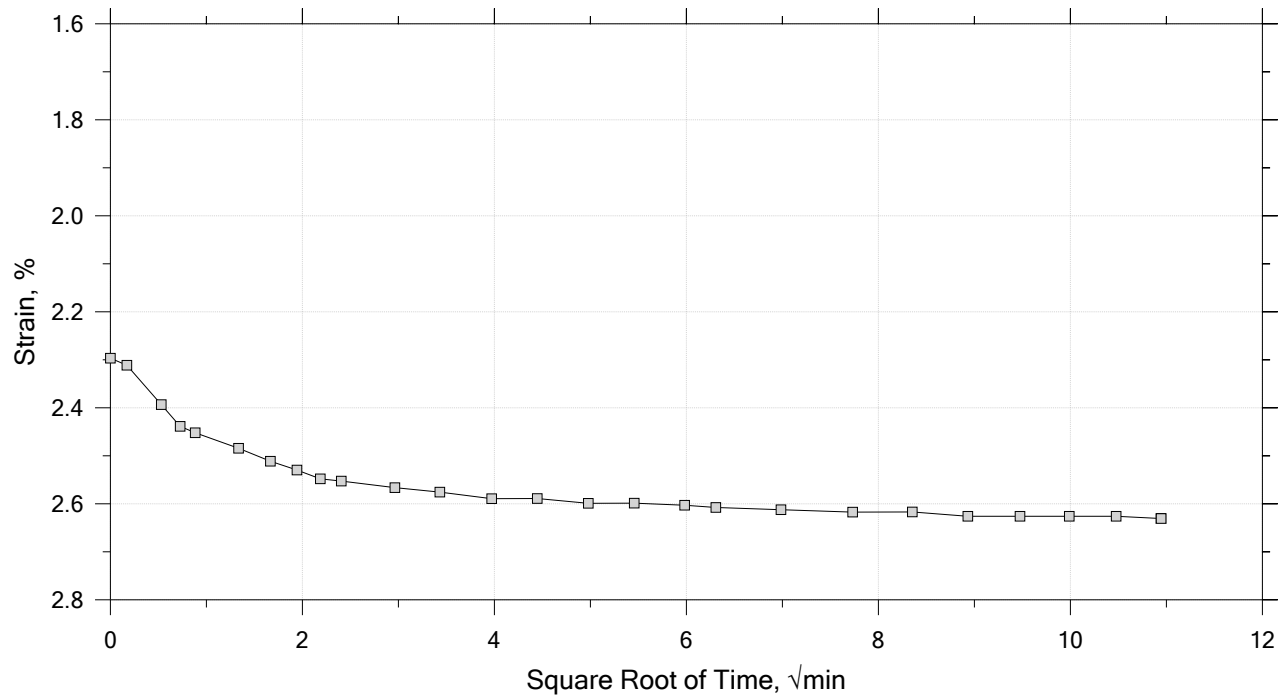
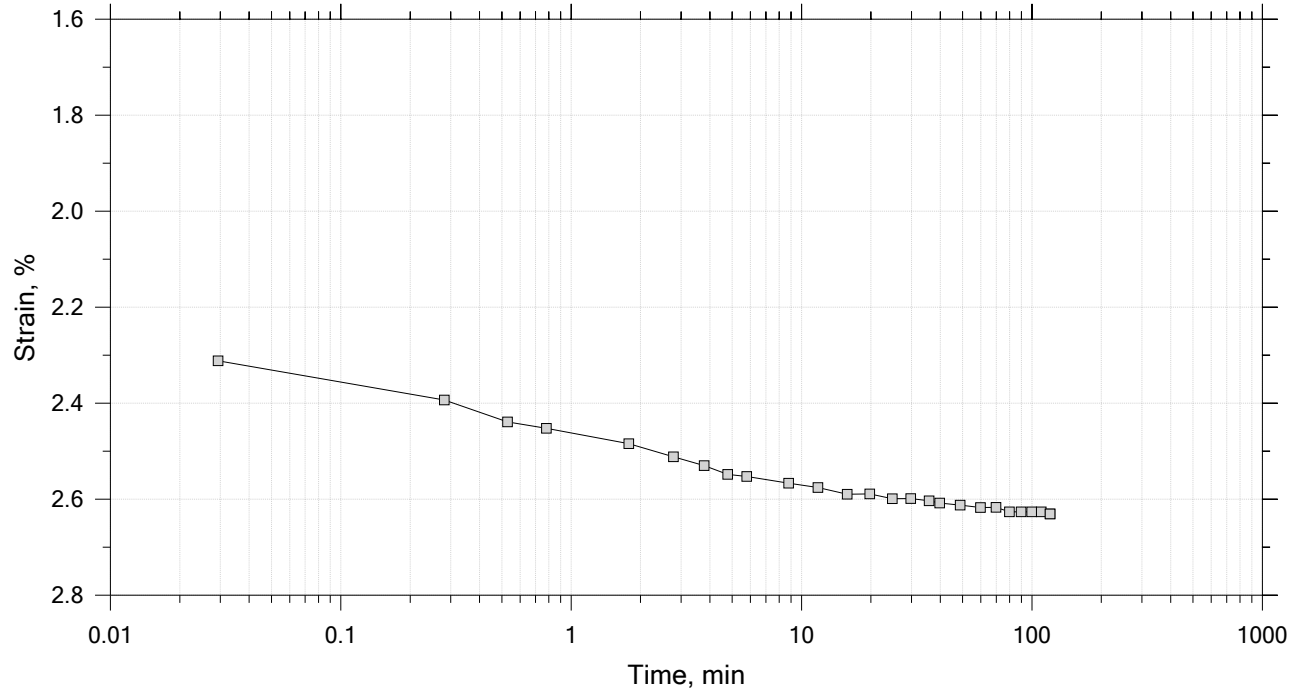
Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

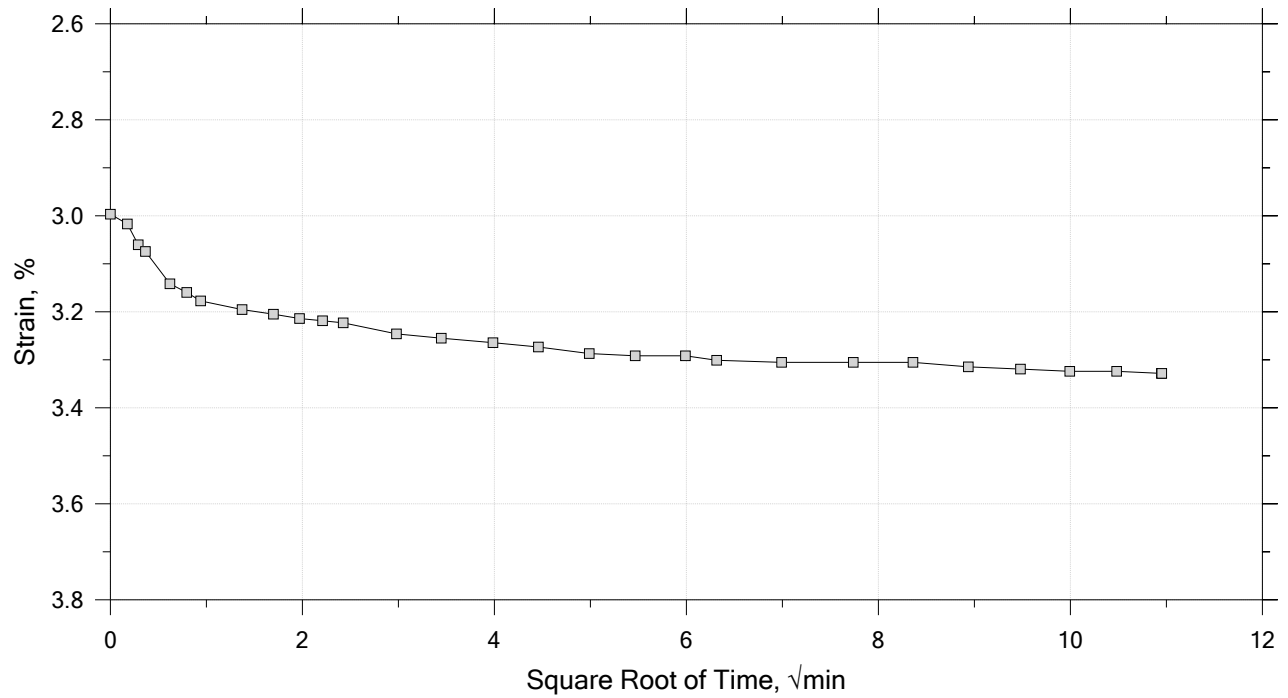
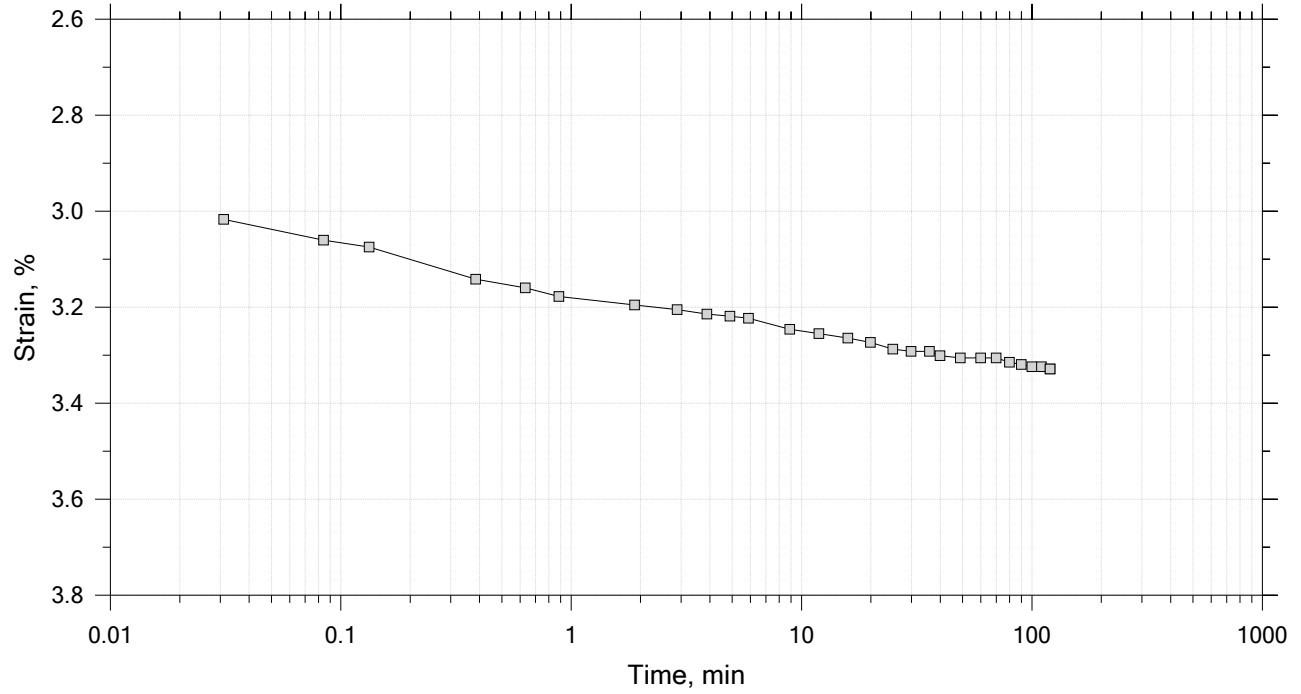
Time Curve 3 of 15  
 Constant Load Step  
 Stress: 0.25 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 15  
 Constant Load Step  
 Stress: 0.5 tsf



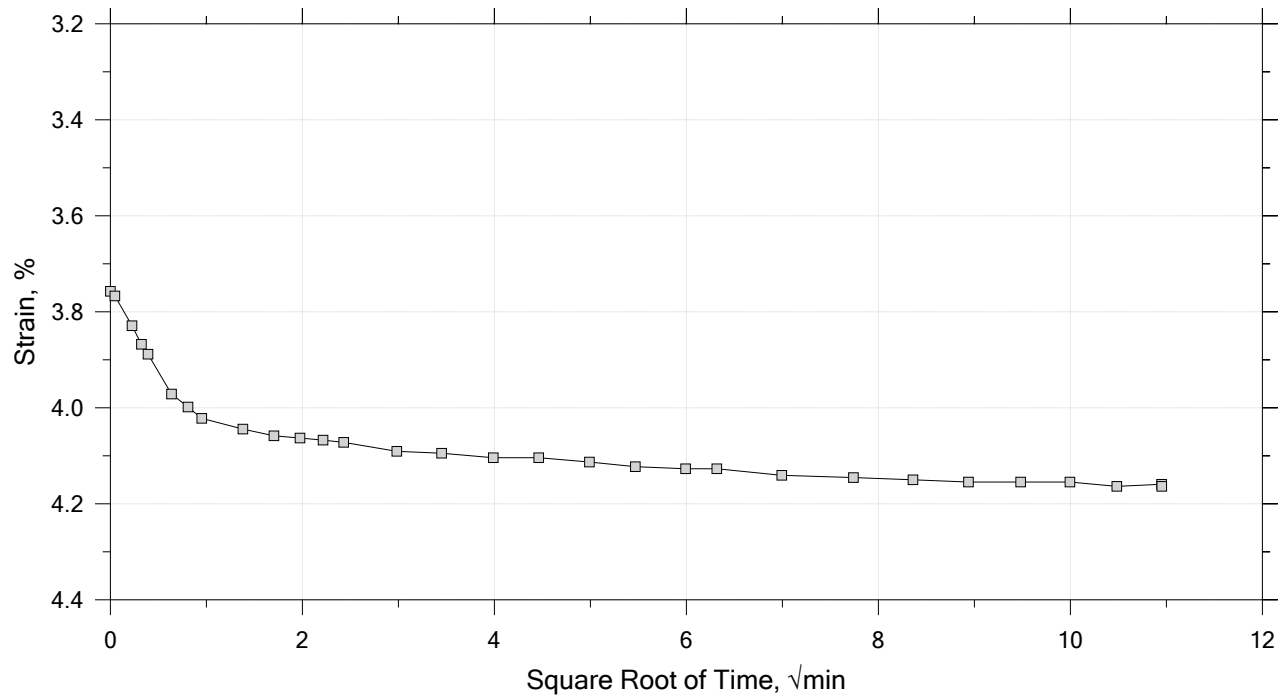
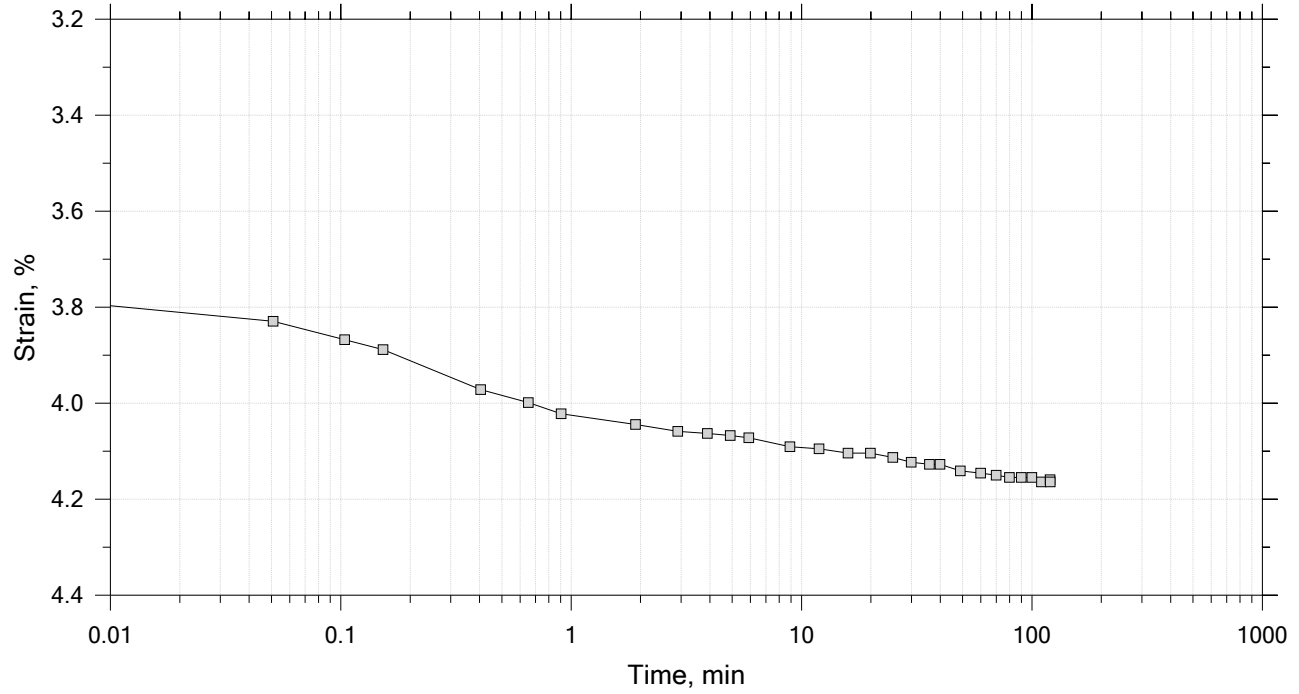
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 15

Constant Load Step

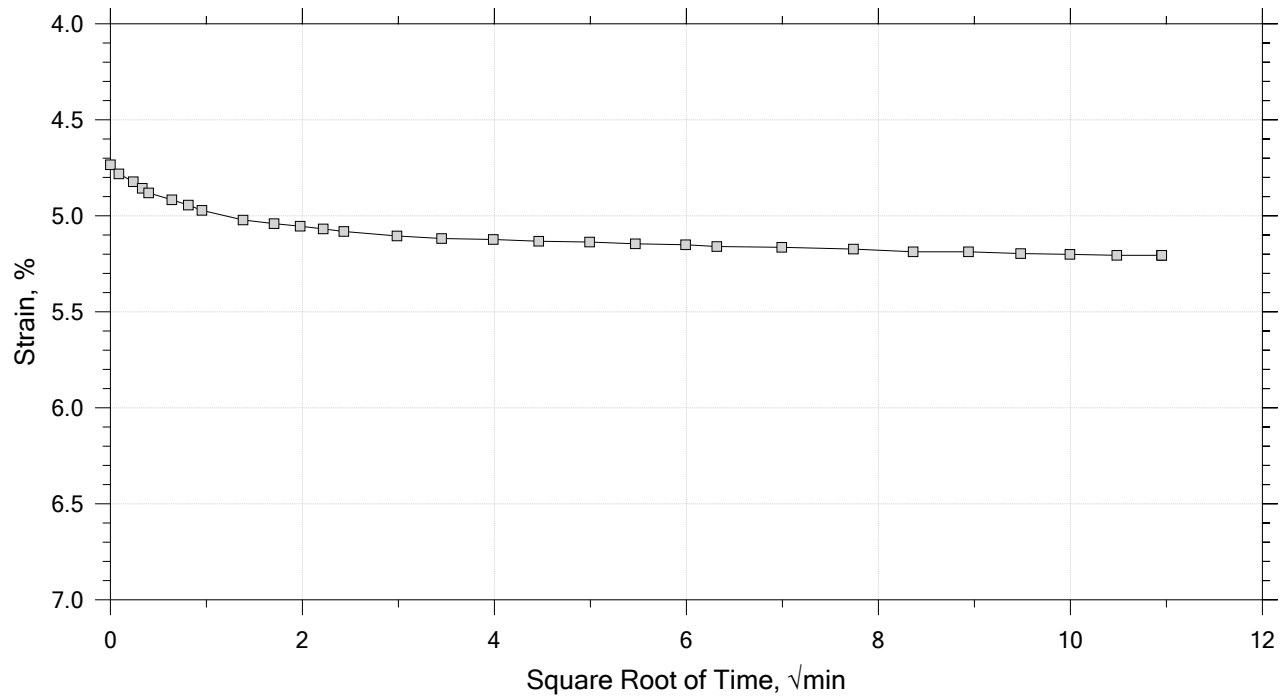
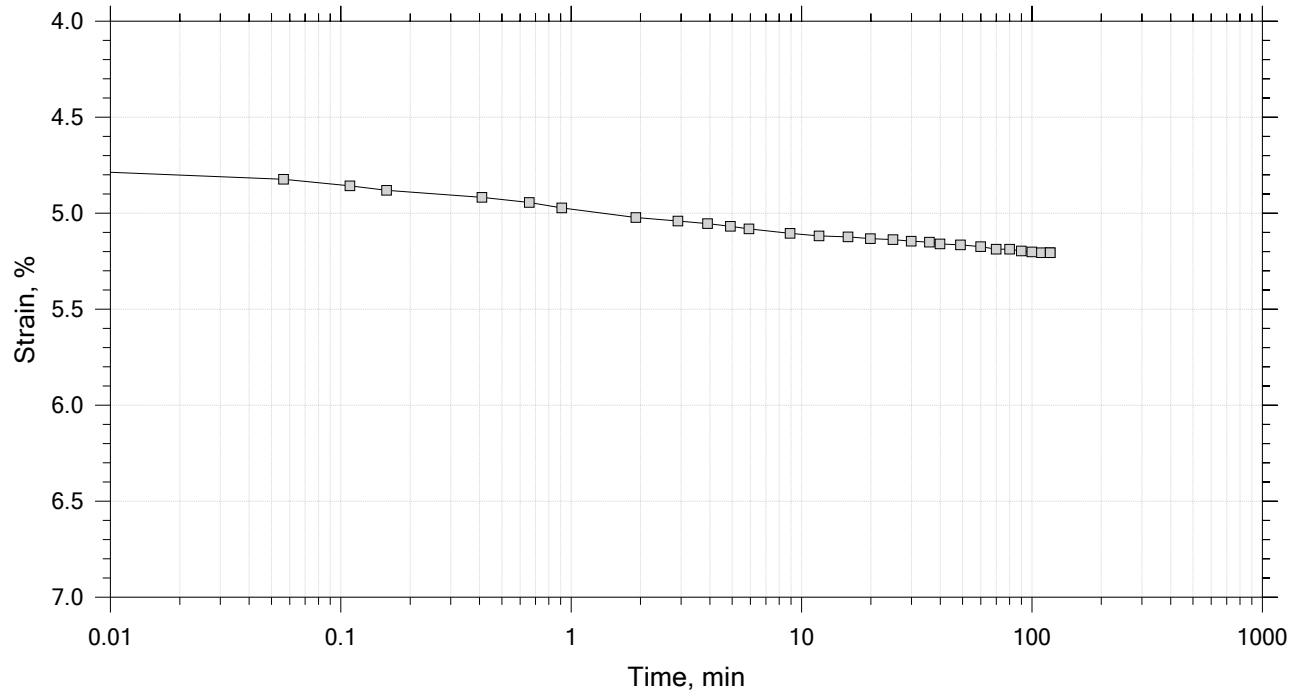
Stress: 1 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 15  
 Constant Load Step  
 Stress: 2 tsf



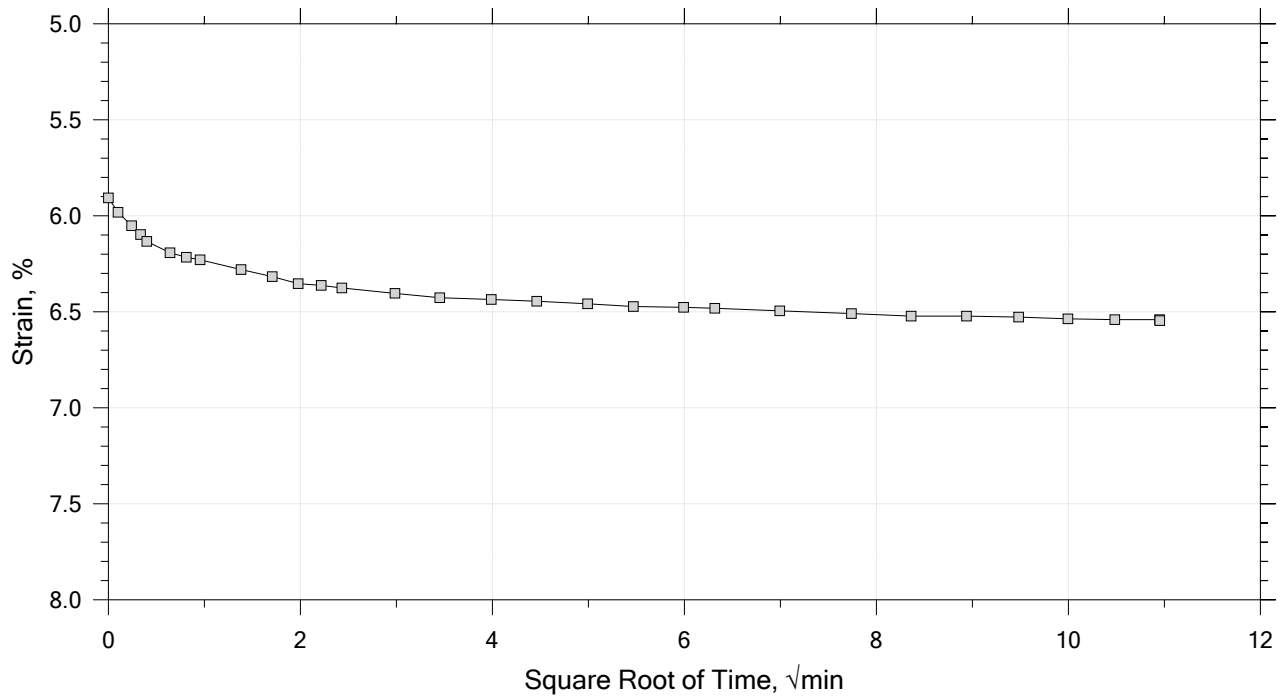
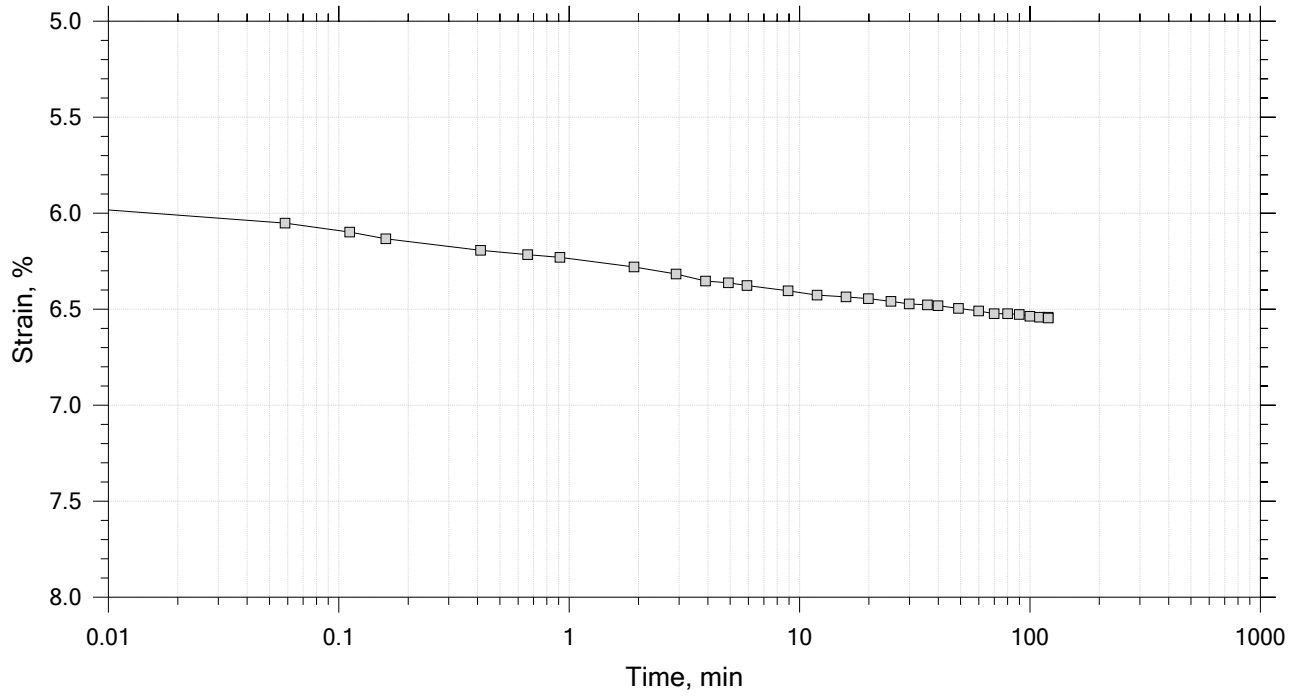
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15

Constant Load Step

Stress: 4 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		

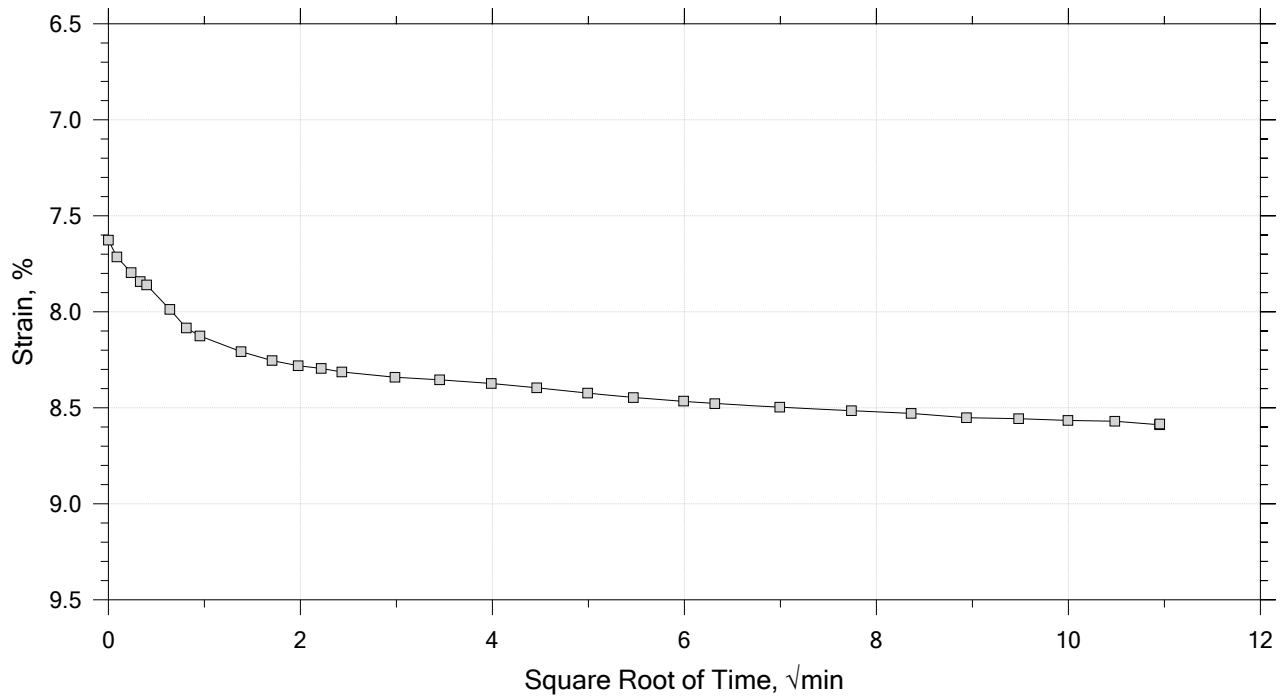
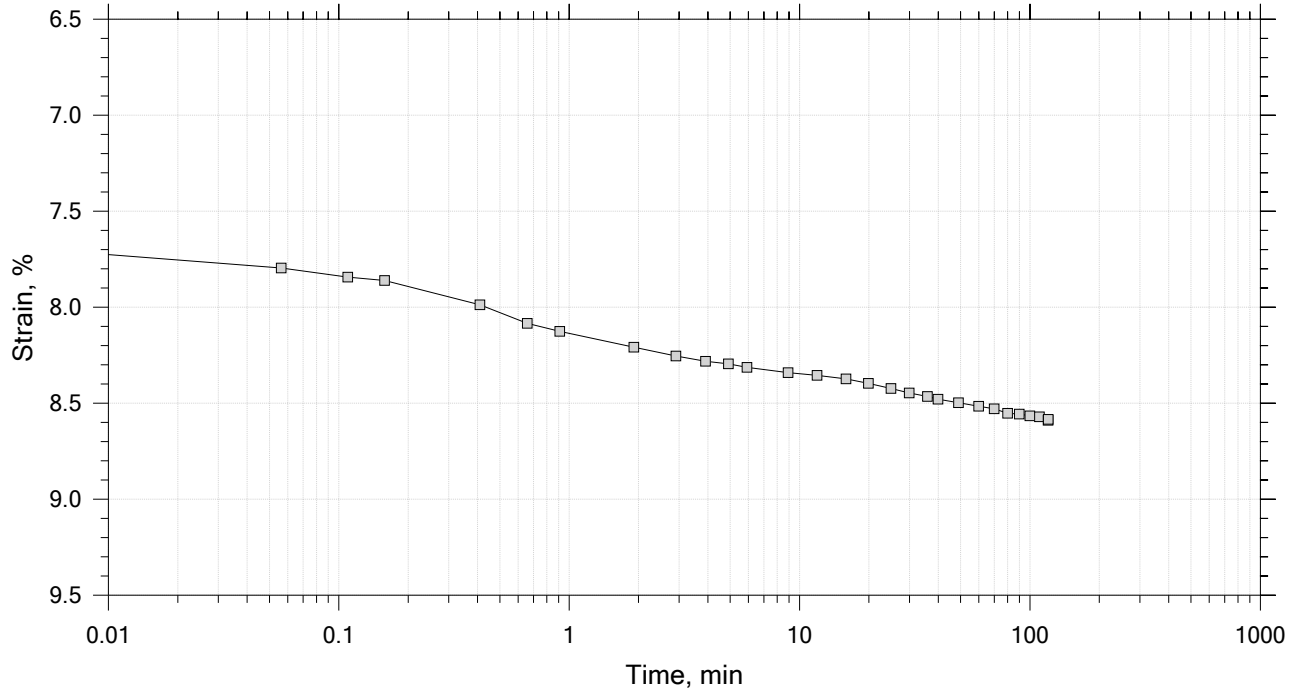



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 15

Constant Load Step

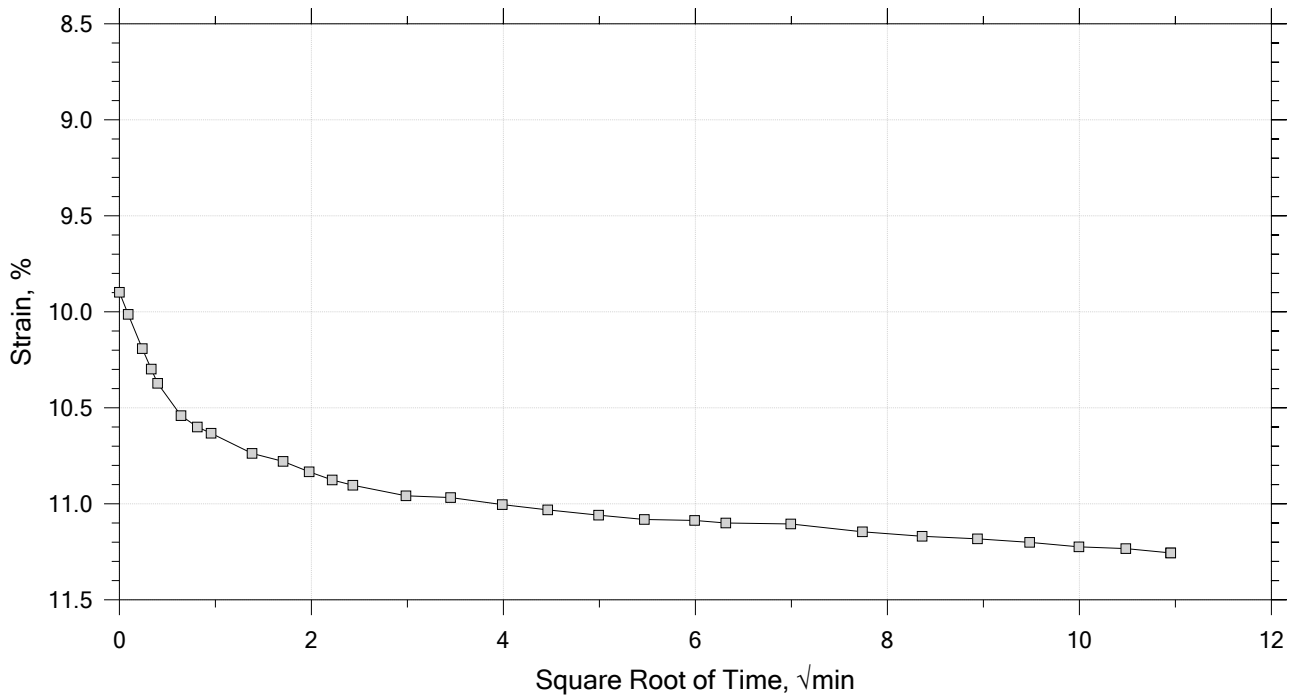
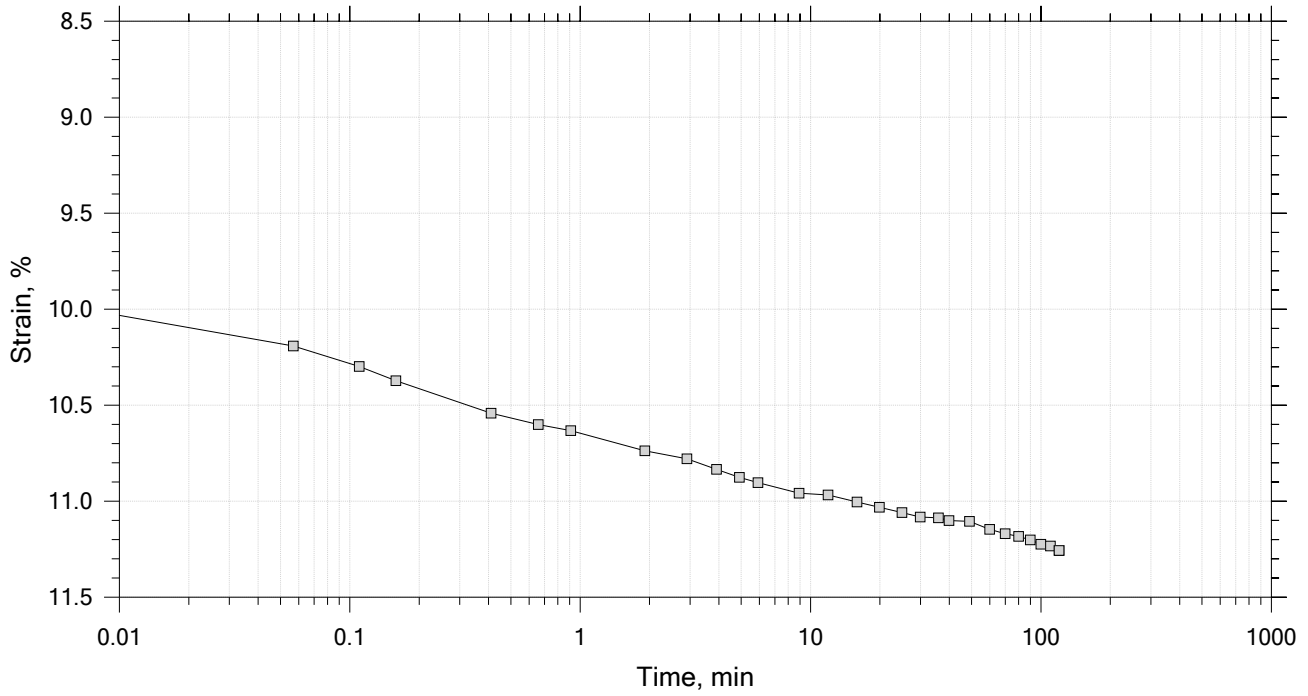
Stress: 8 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15  
 Constant Load Step  
 Stress: 16 tsf



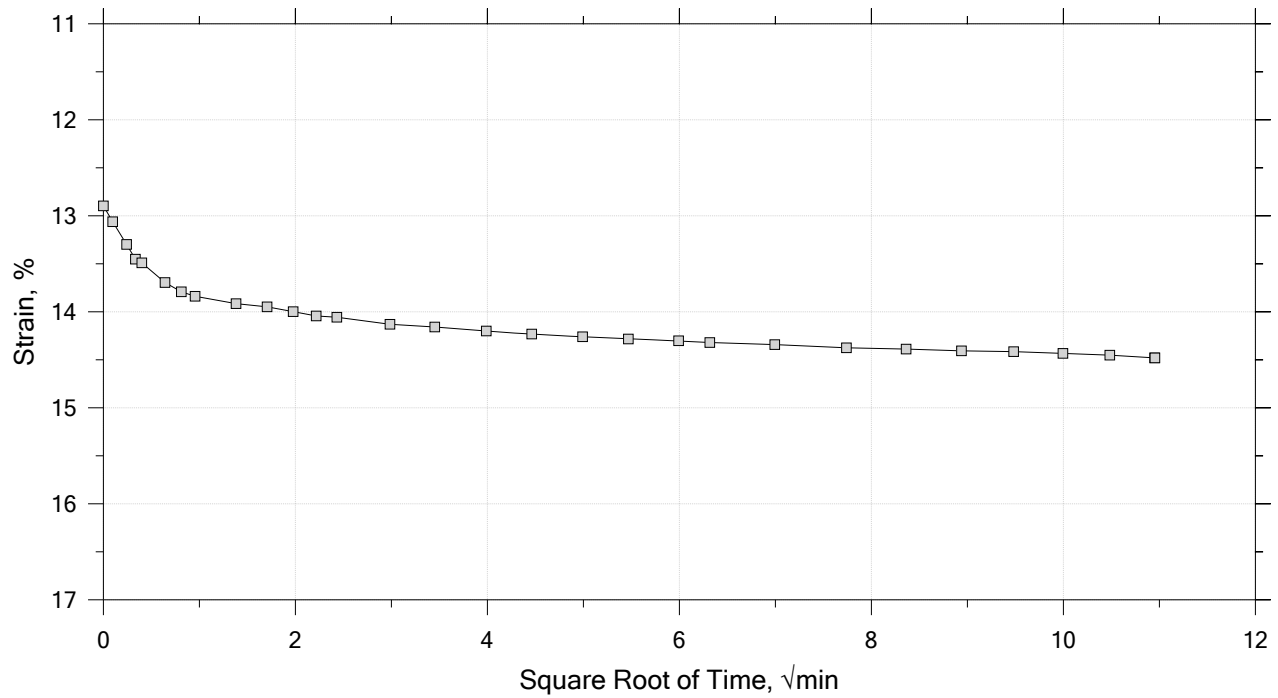
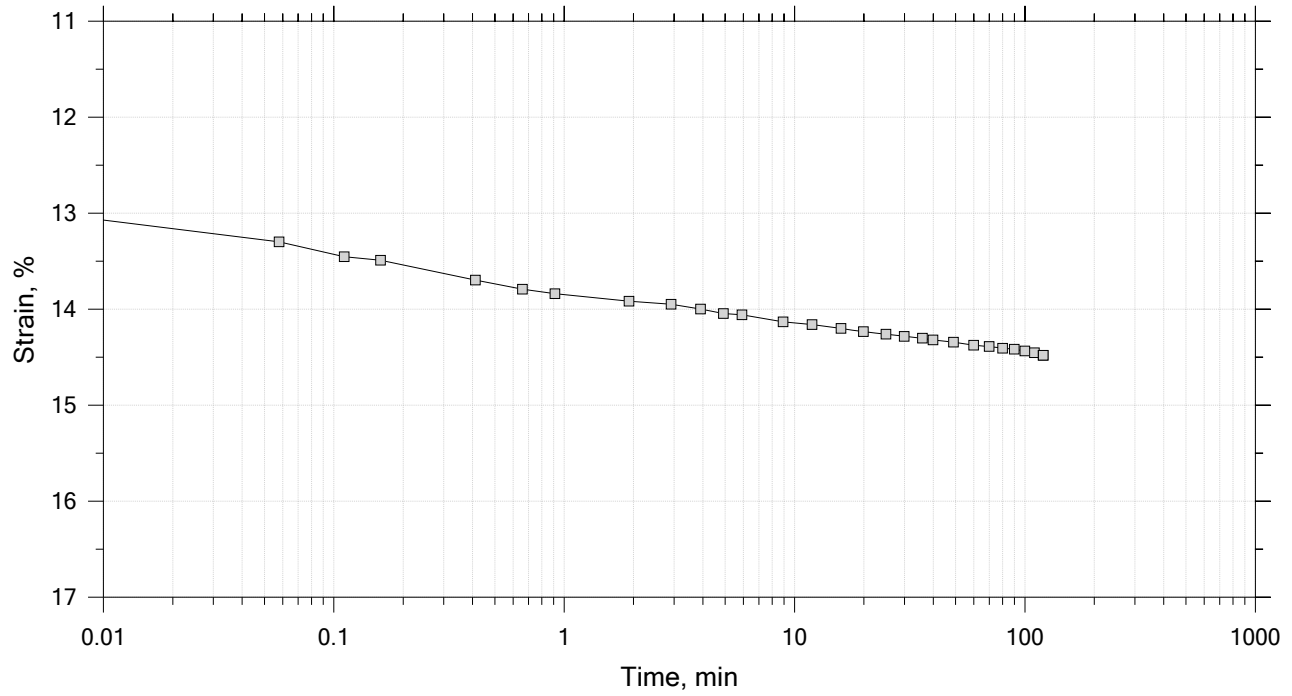
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



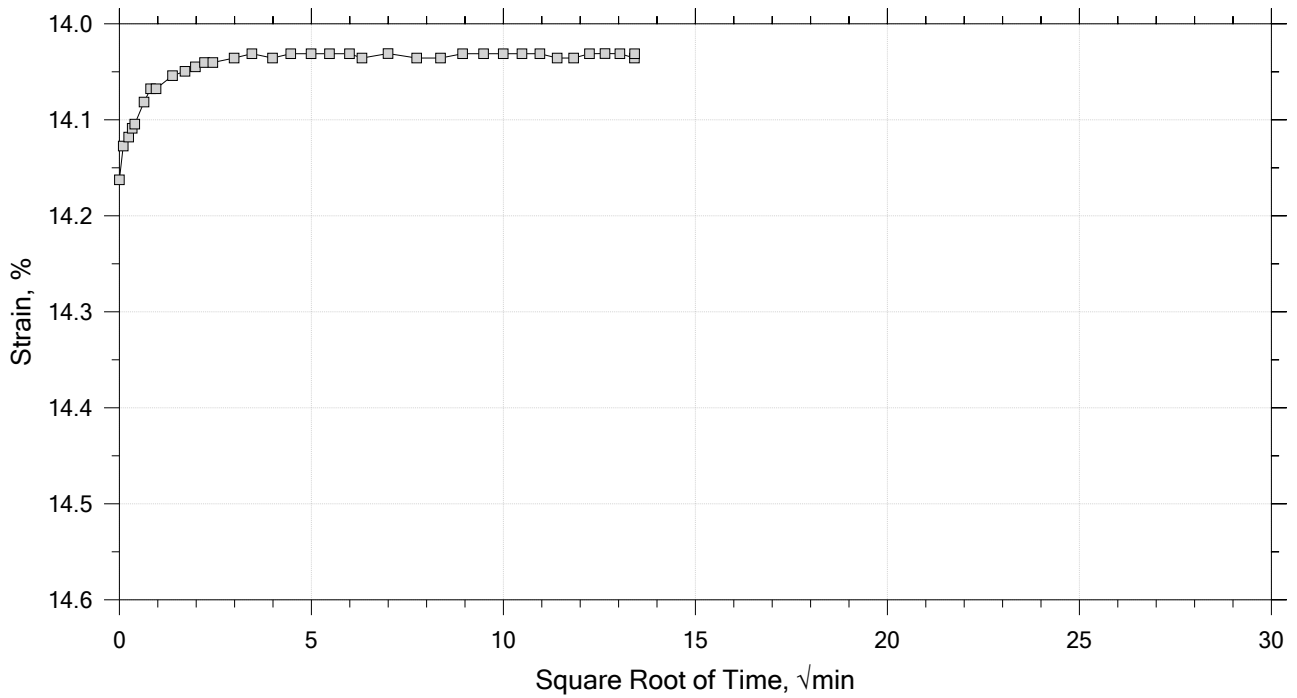
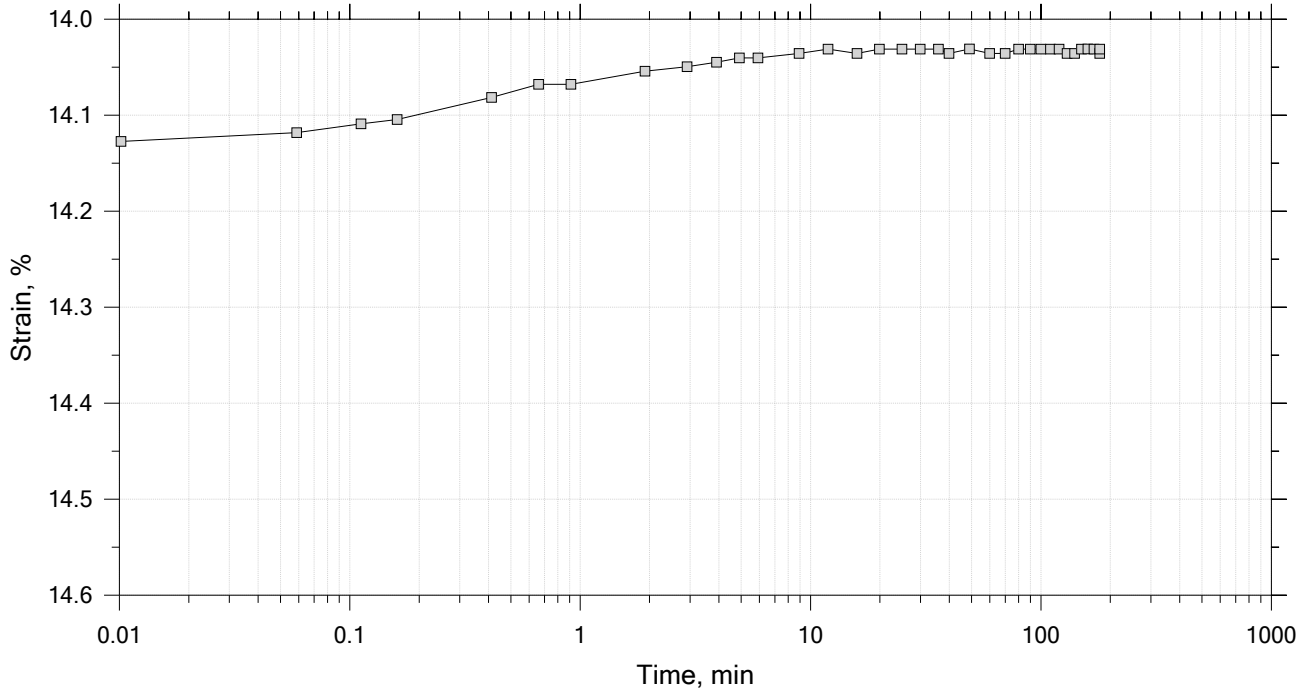
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



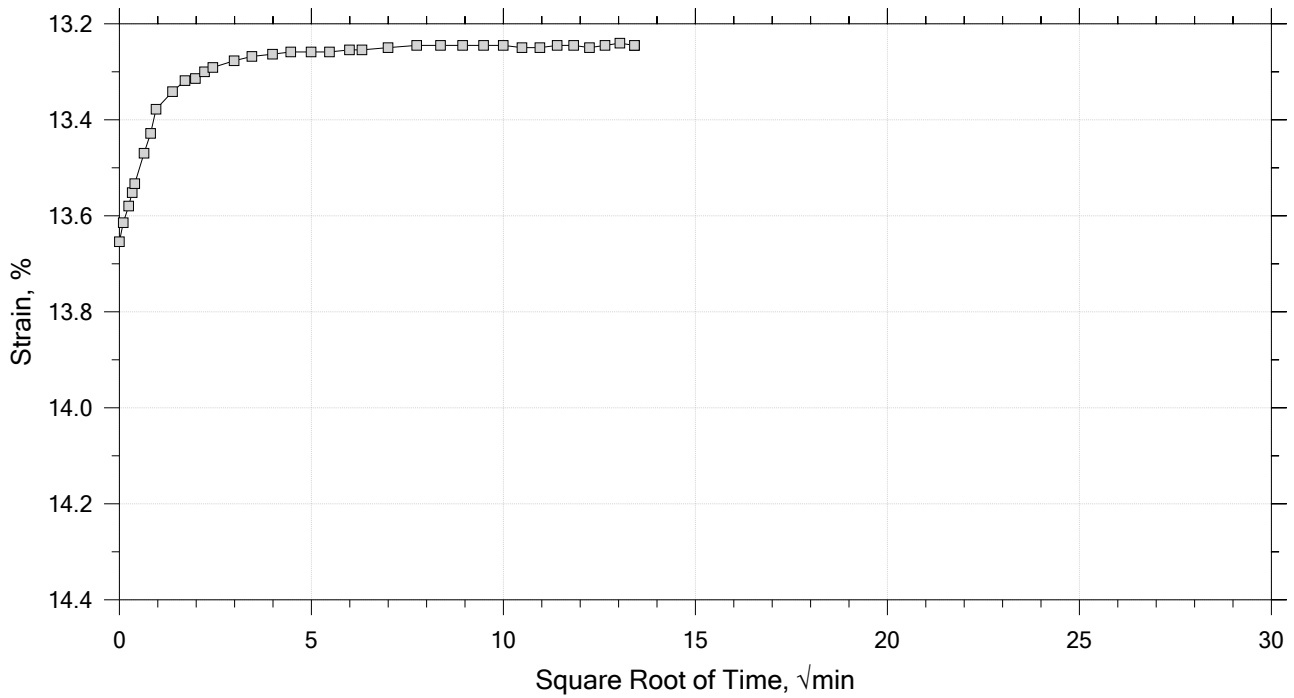
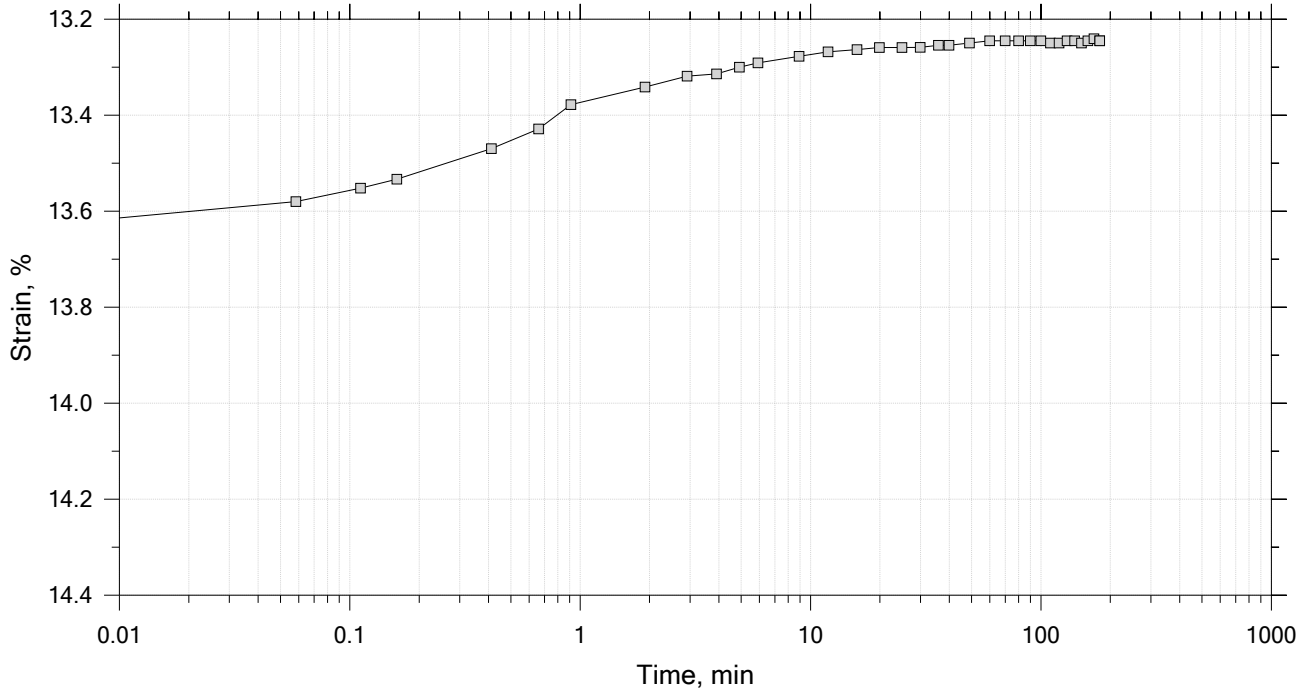
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



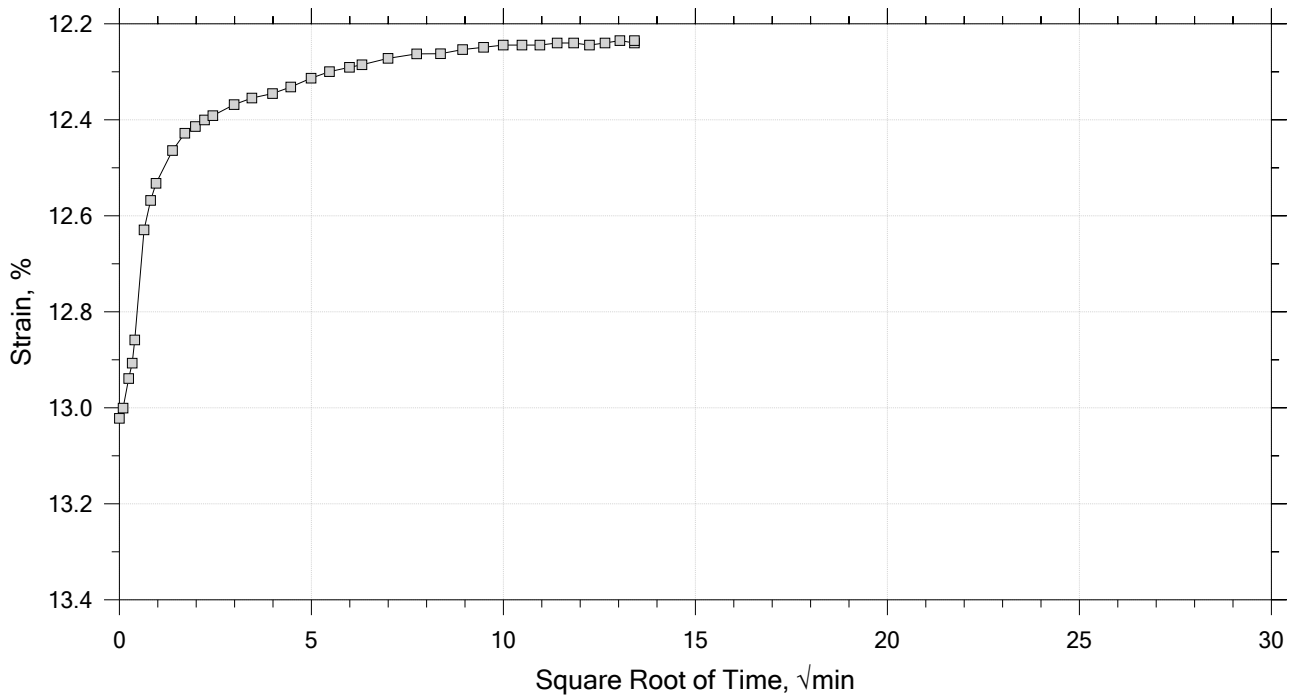
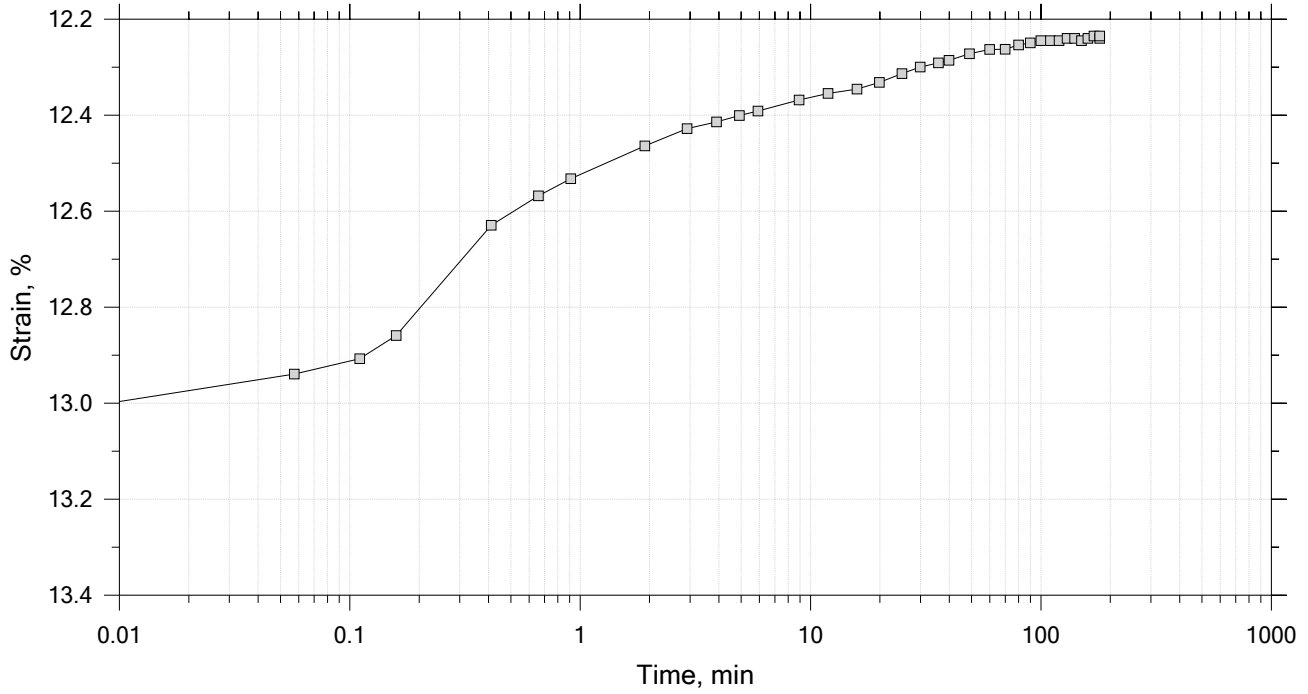
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



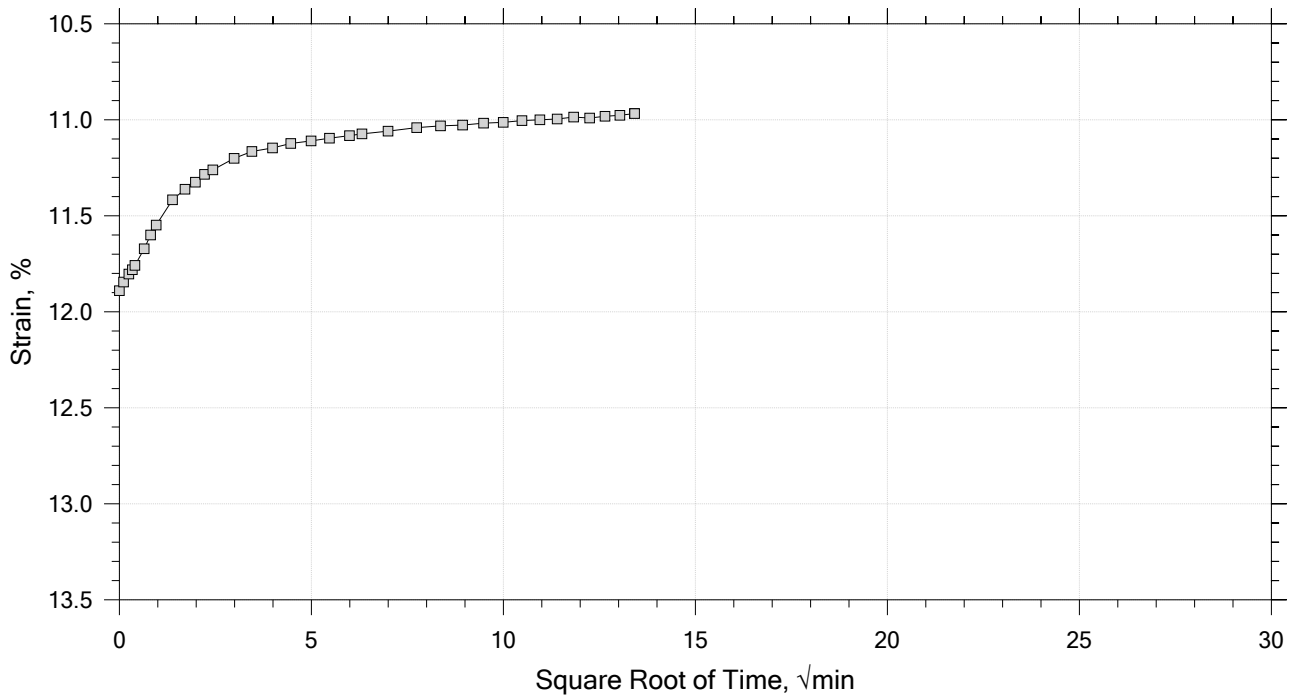
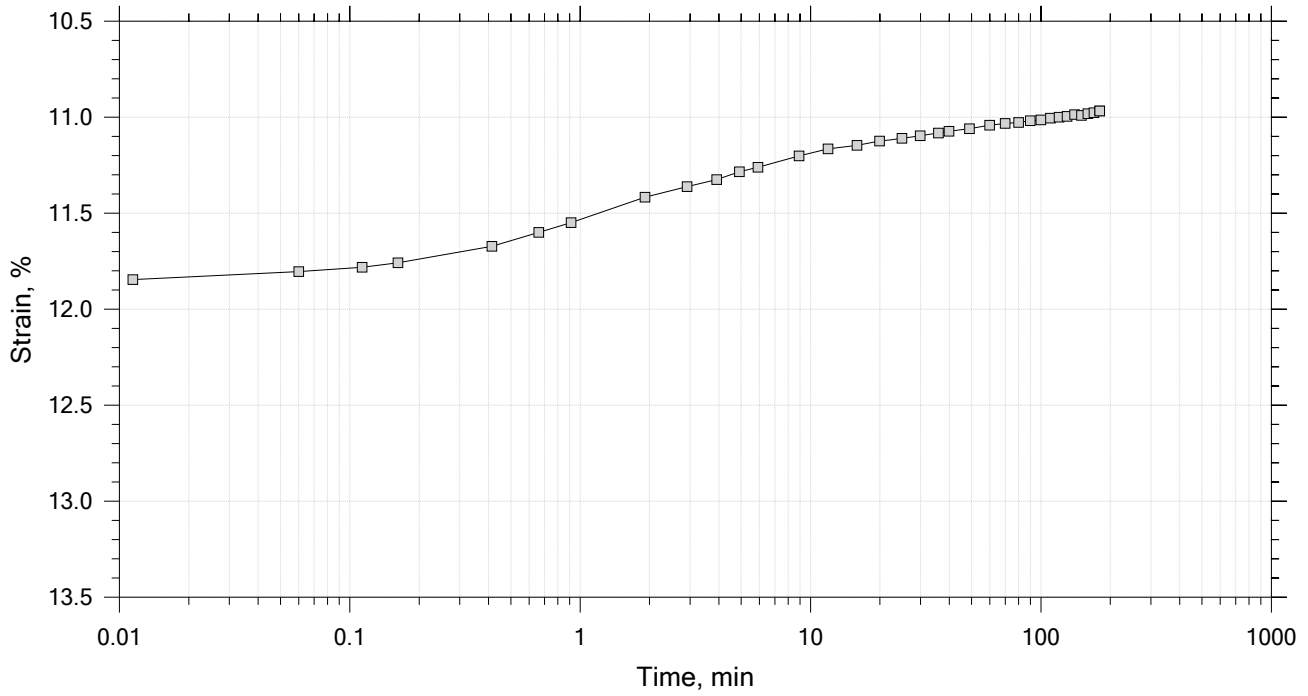
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



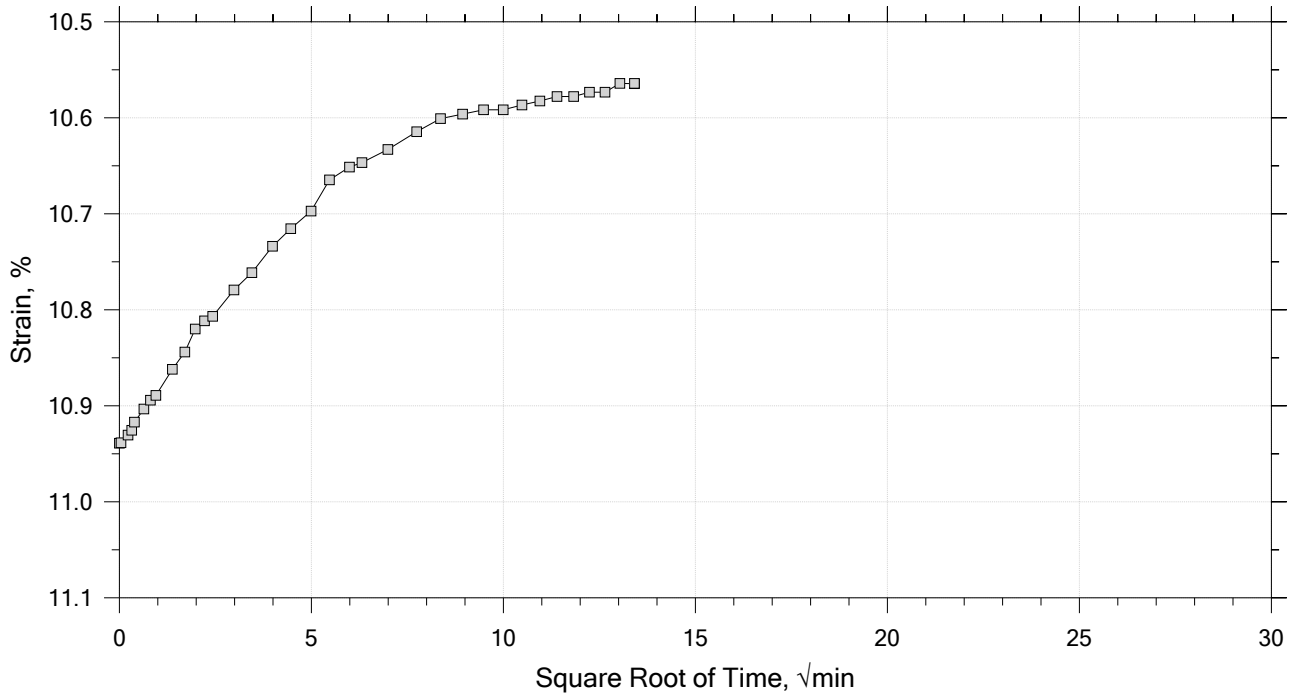
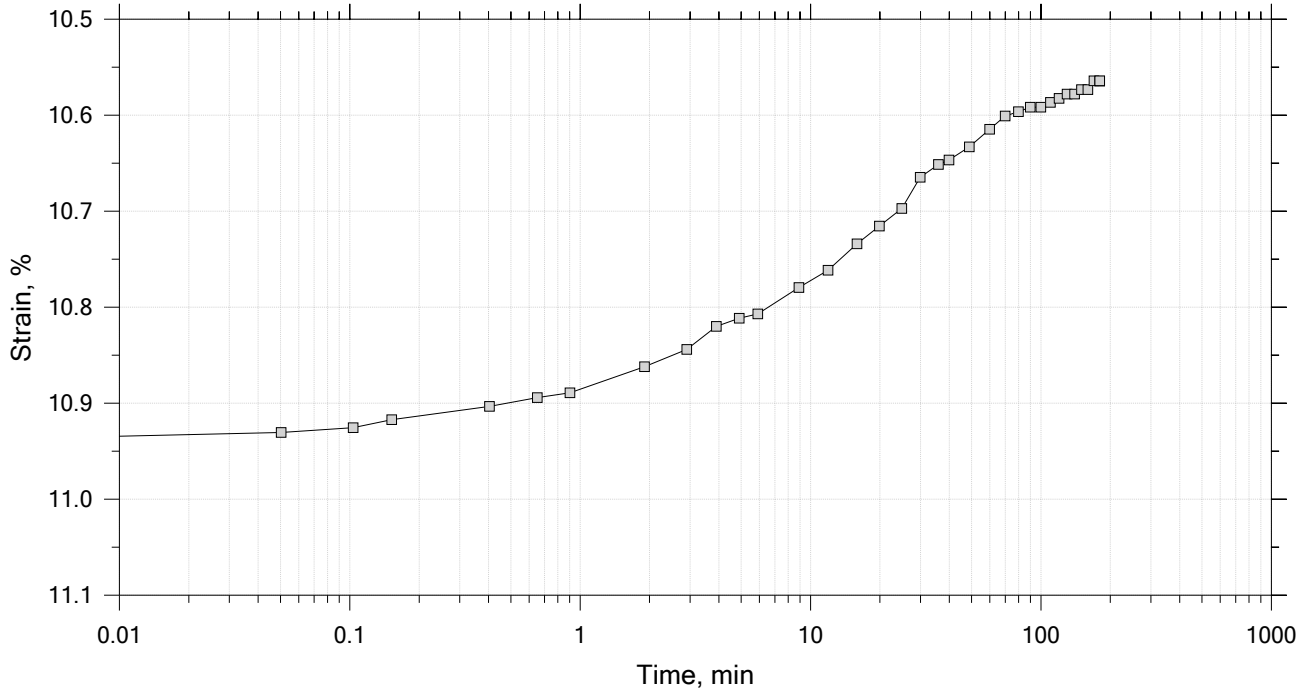
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		




# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.41 in	Estimated Specific Gravity: 2.74	Liquid Limit: 35
Initial Height: 1.00 in	Initial Void Ratio: 0.786	Plastic Limit: 23
Final Height: 0.92 in	Final Void Ratio: 0.643	Plasticity Index: 12

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	D-2474	RING		B-1881
Mass Container, gm	8.67	107.65	107.65	8.44
Mass Container + Wet Soil, gm	81.53	254.49	249.43	149.91
Mass Container + Dry Soil, gm	66.17	222.52	222.52	123.06
Mass Dry Soil, gm	57.5	114.87	114.87	114.62
Water Content, %	26.71	27.83	23.43	23.43
Void Ratio	---	0.79	0.64	---
Degree of Saturation, %	---	97.20	100.00	---
Dry Unit Weight, pcf	---	95.932	104.27	---

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.

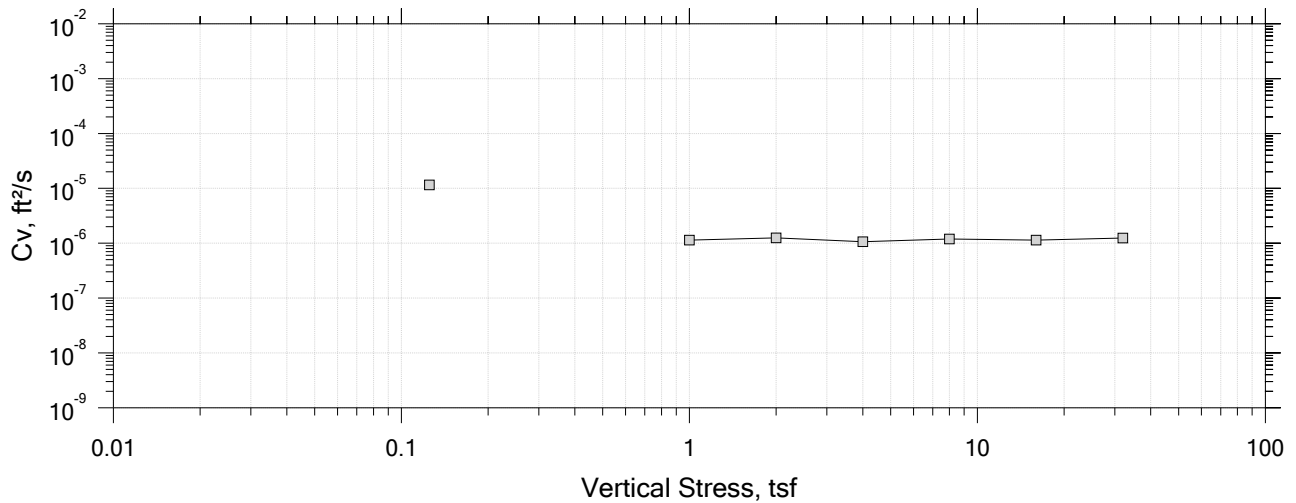
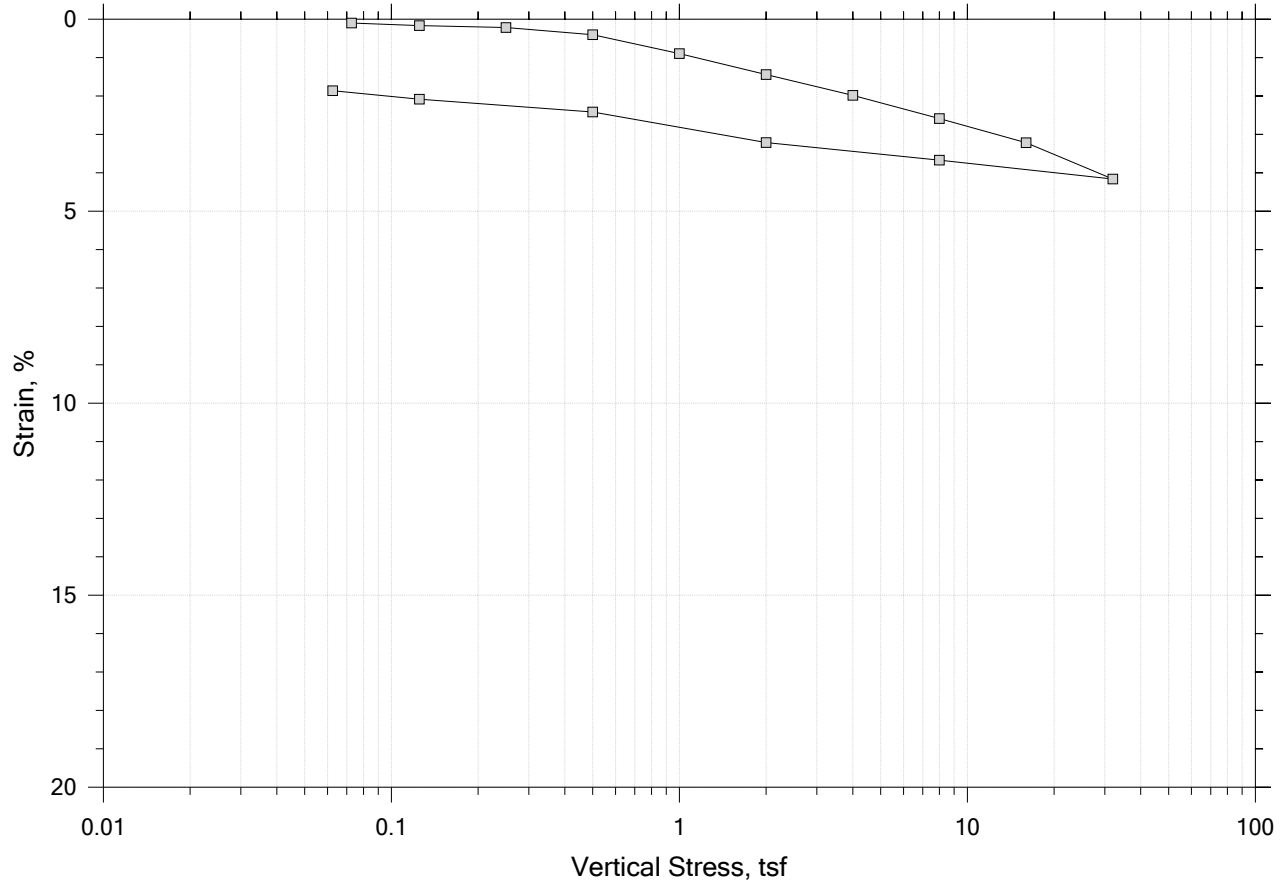
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-302	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0654 tsf		






# One-Dimensional Consolidation by ASTM D2435 - Method B

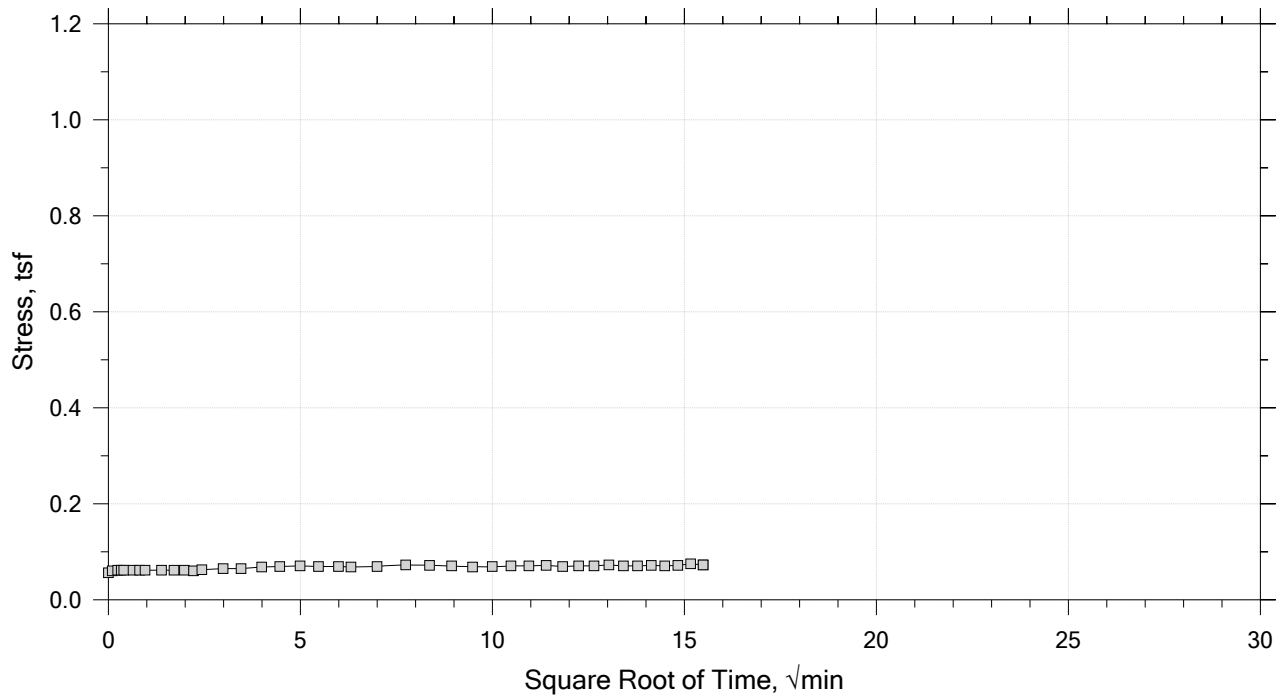
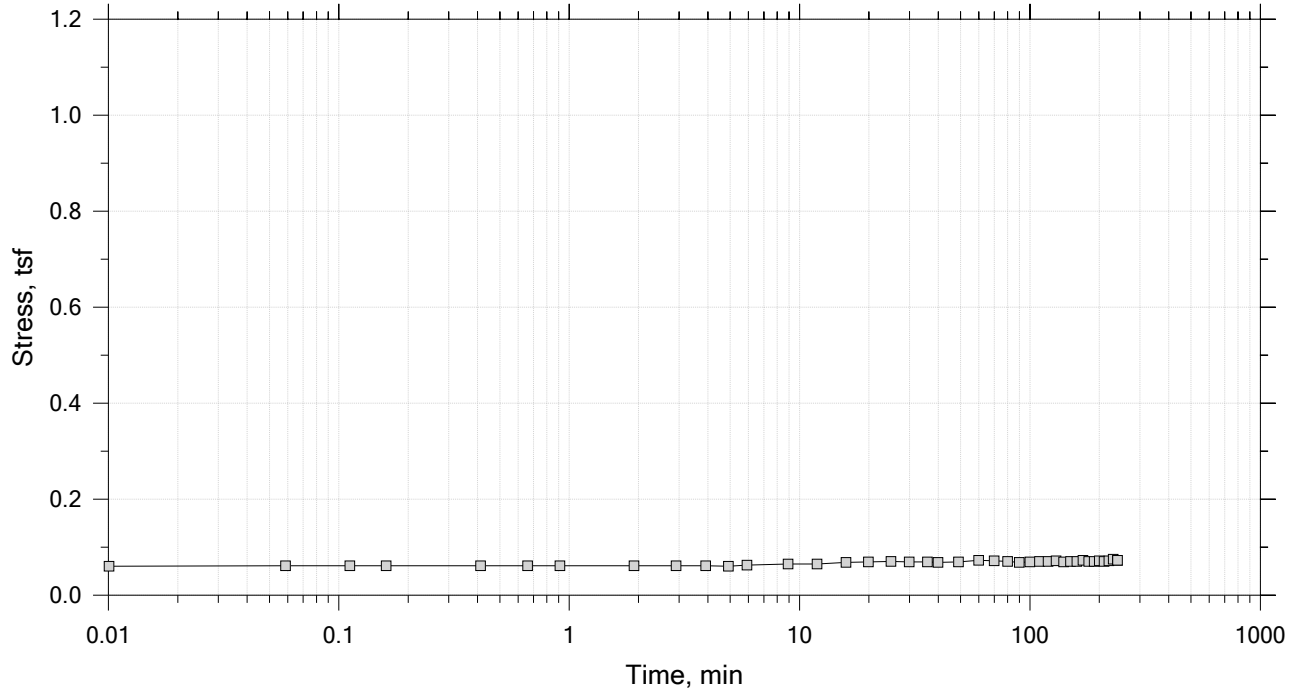
## Summary Report




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

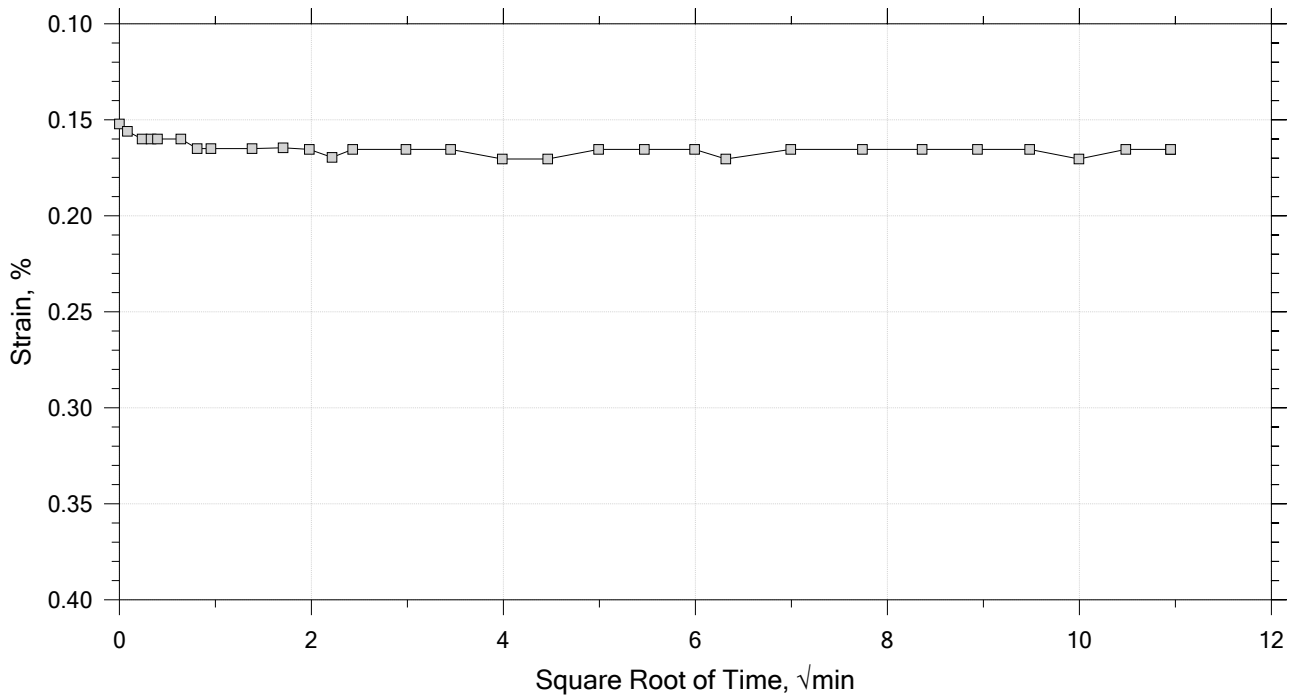
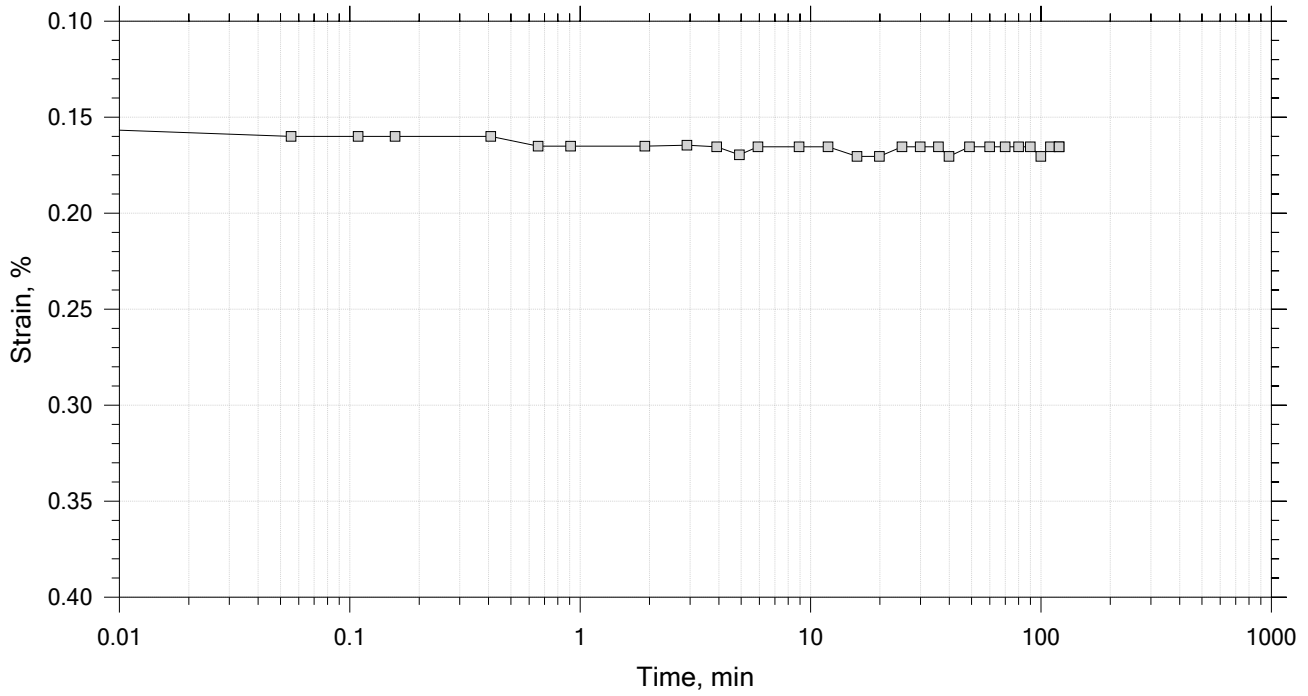
Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.0727 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf



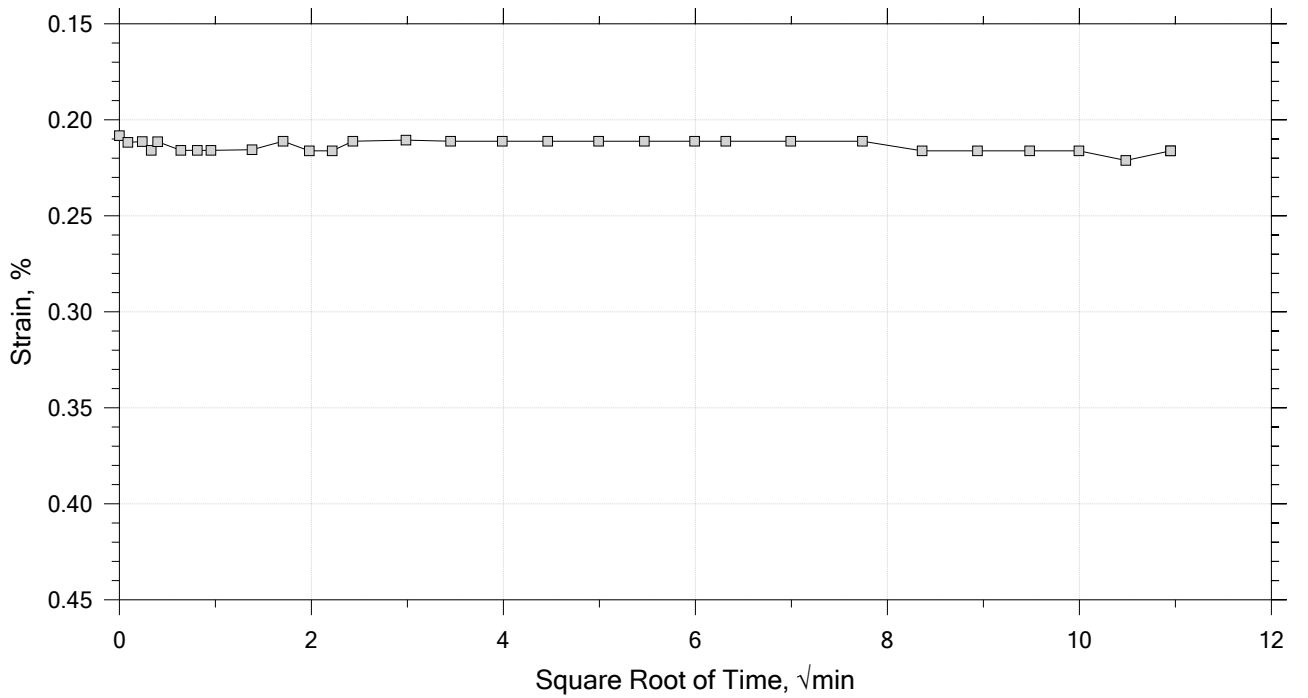
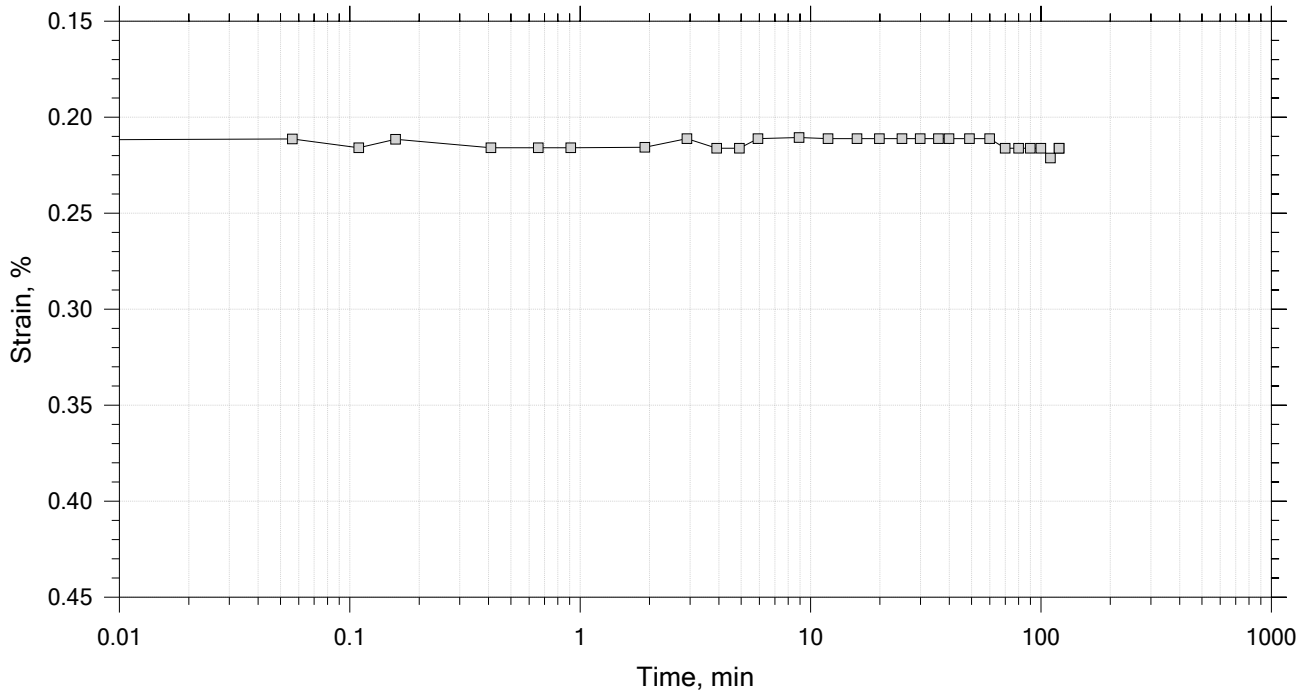
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 15

Constant Load Step

Stress: 0.25 tsf



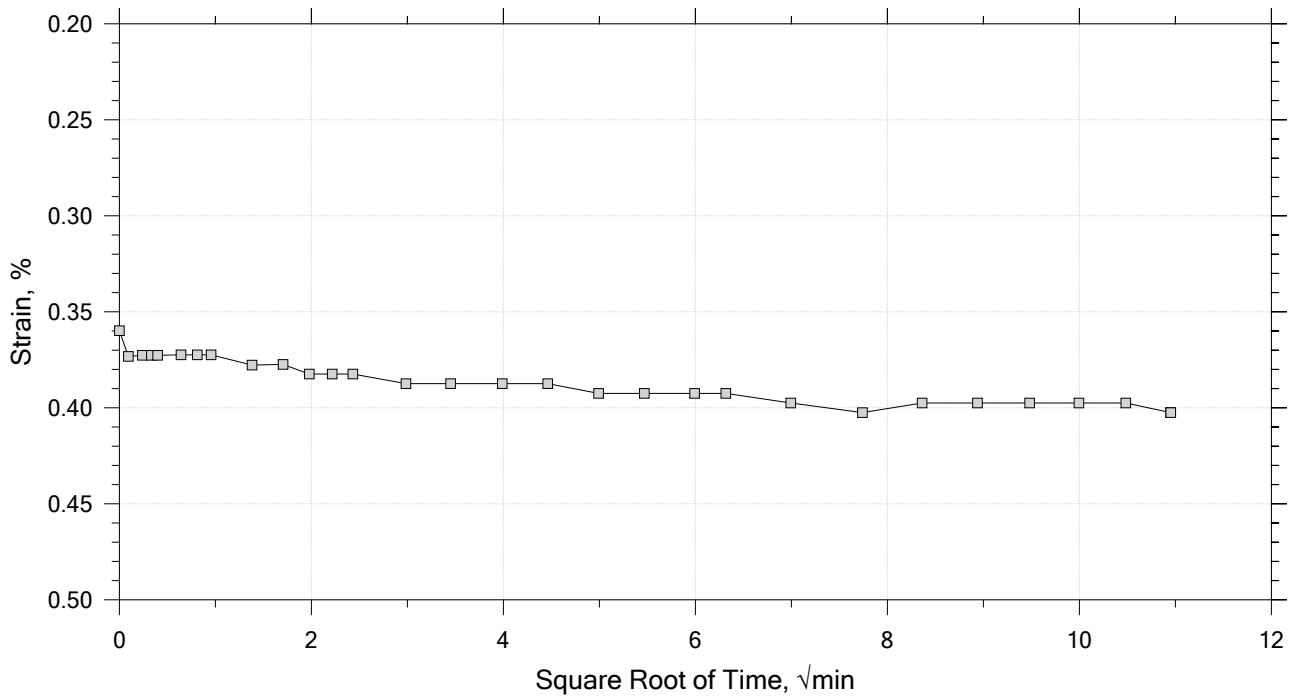
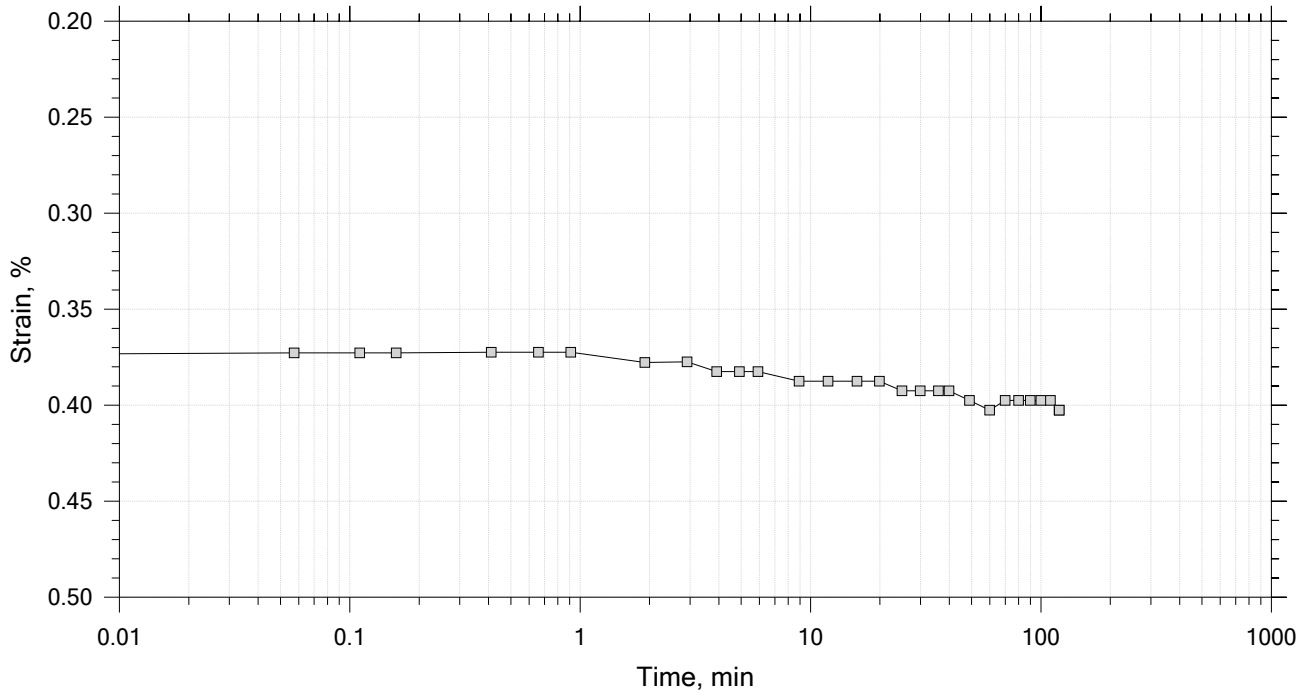
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 15

Constant Load Step

Stress: 0.5 tsf

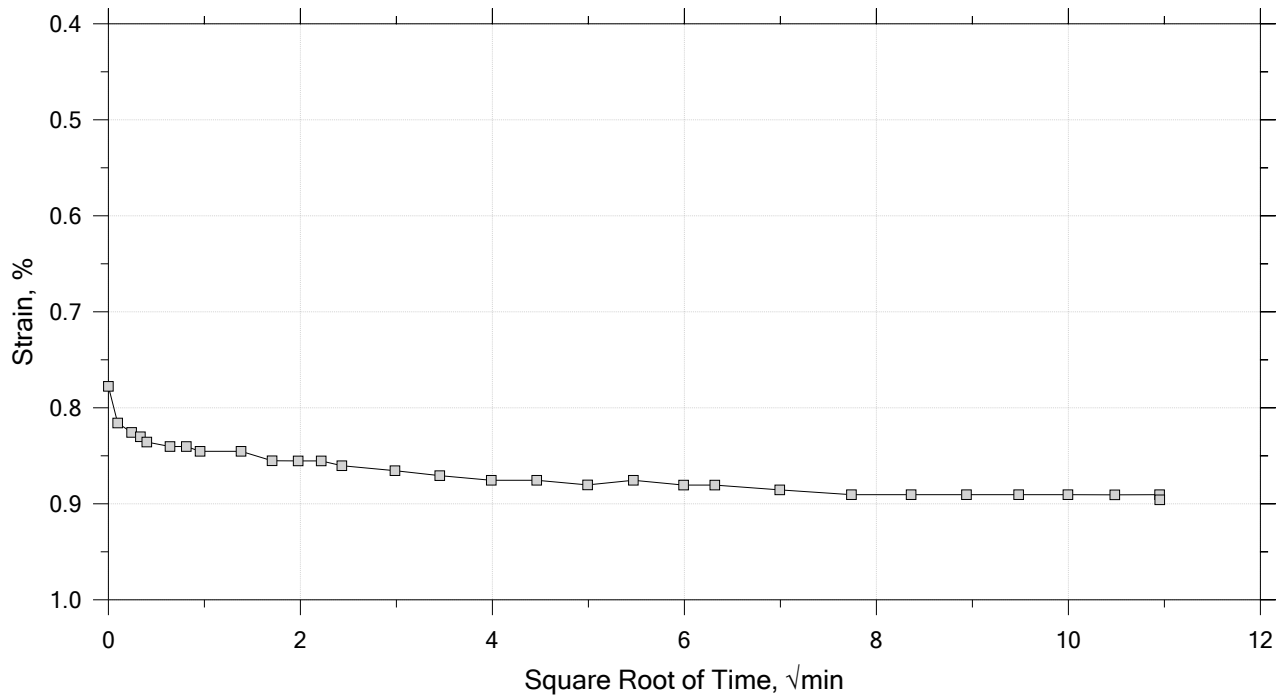
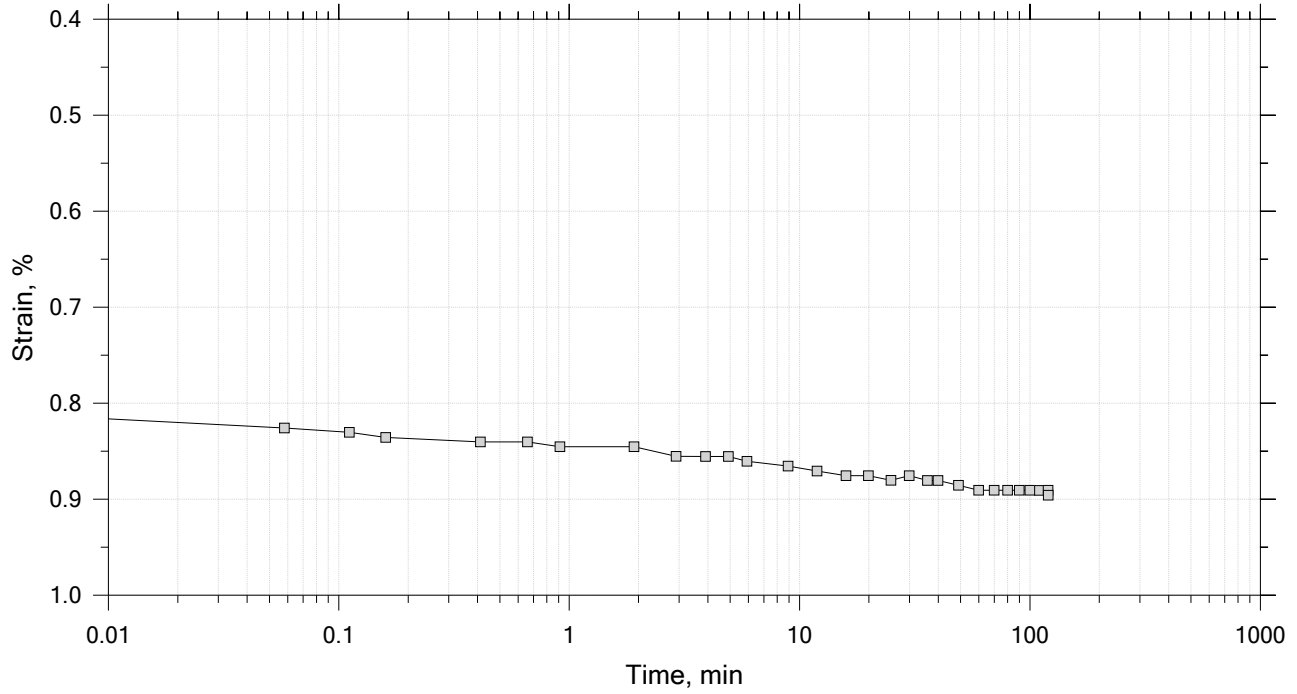



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 15  
 Constant Load Step  
 Stress: 1 tsf



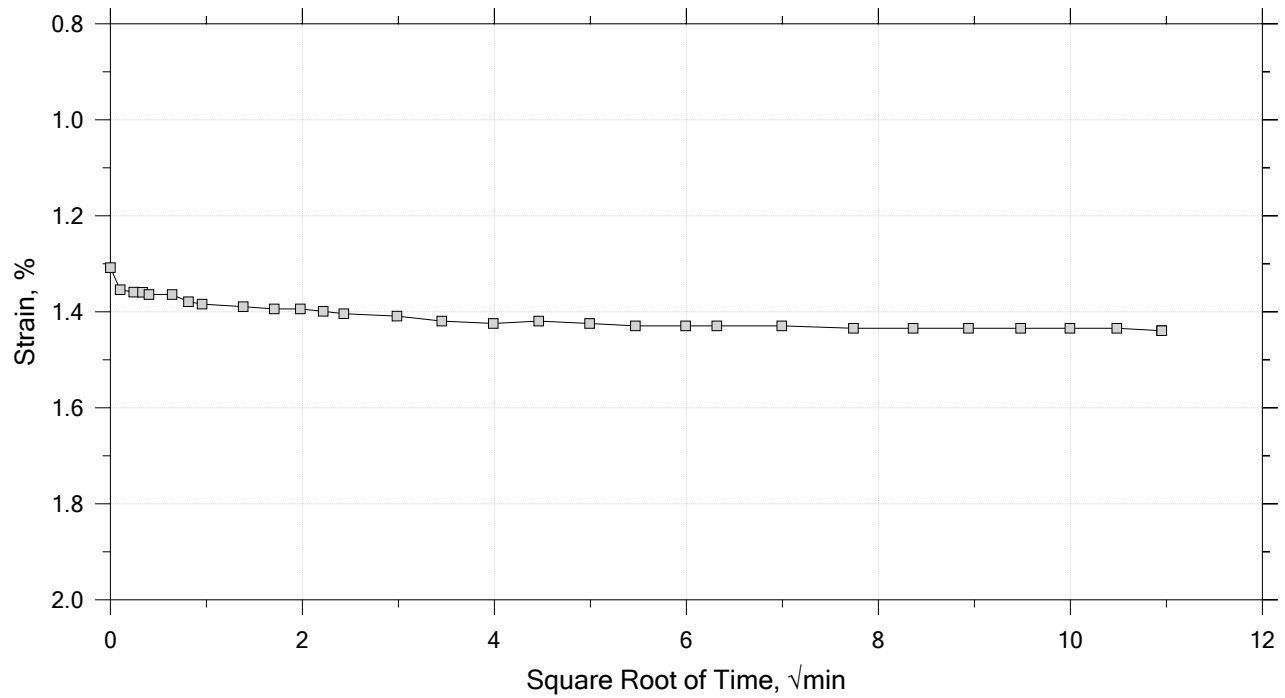
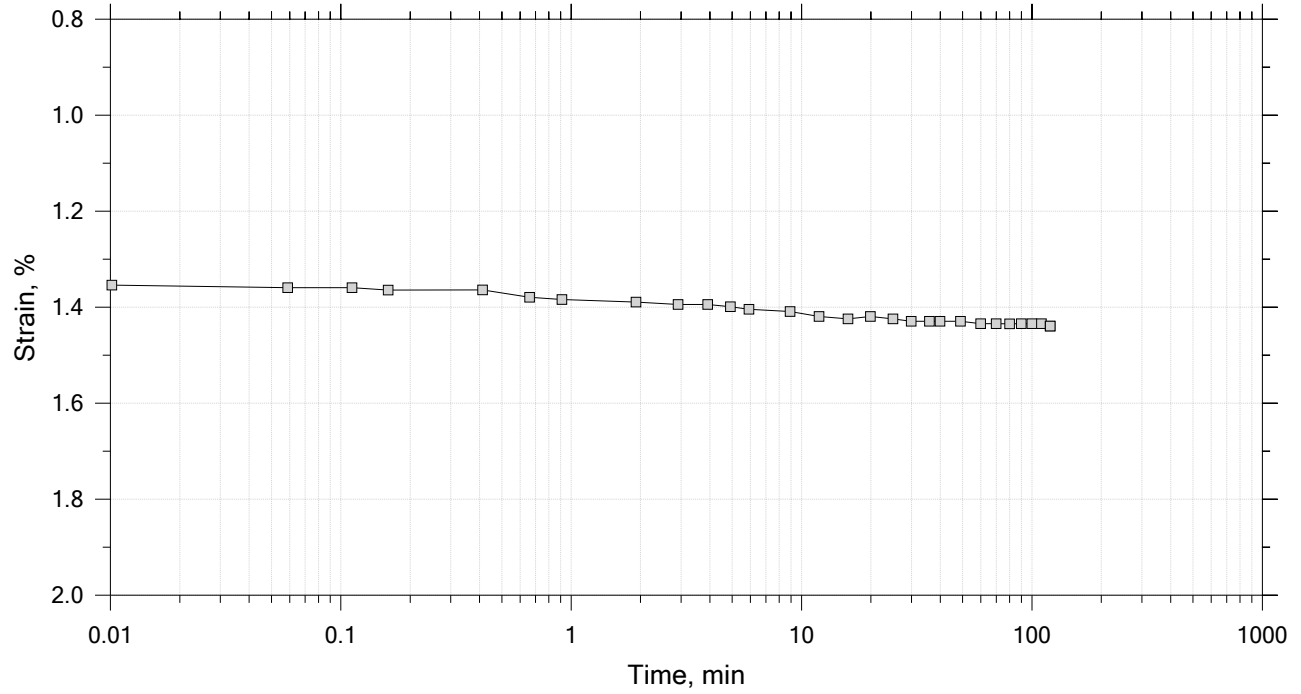
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 15

Constant Load Step

Stress: 2 tsf



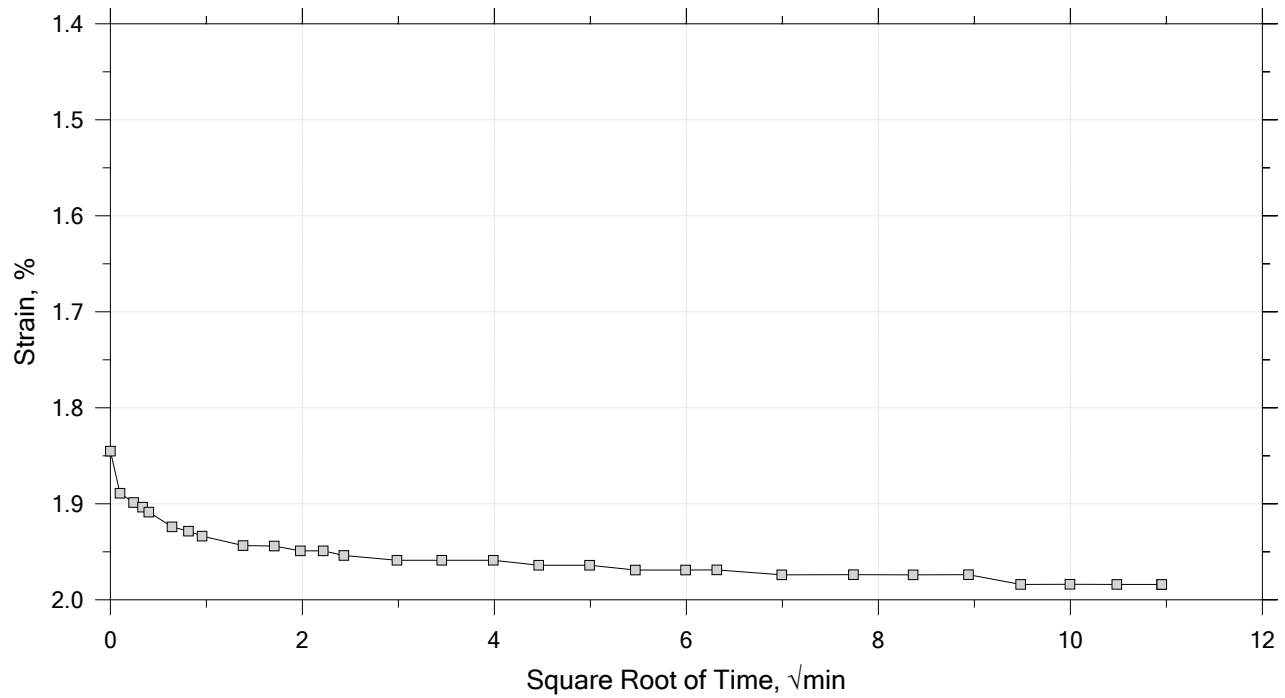
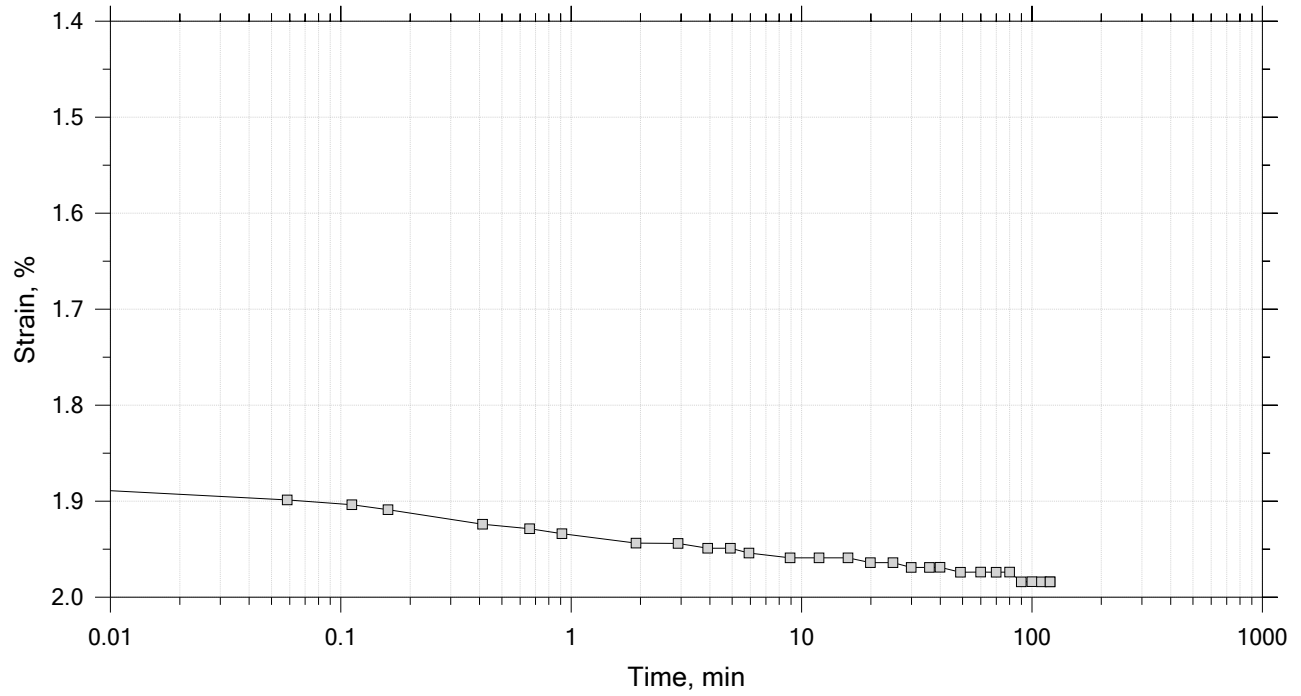
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15

Constant Load Step

Stress: 4 tsf



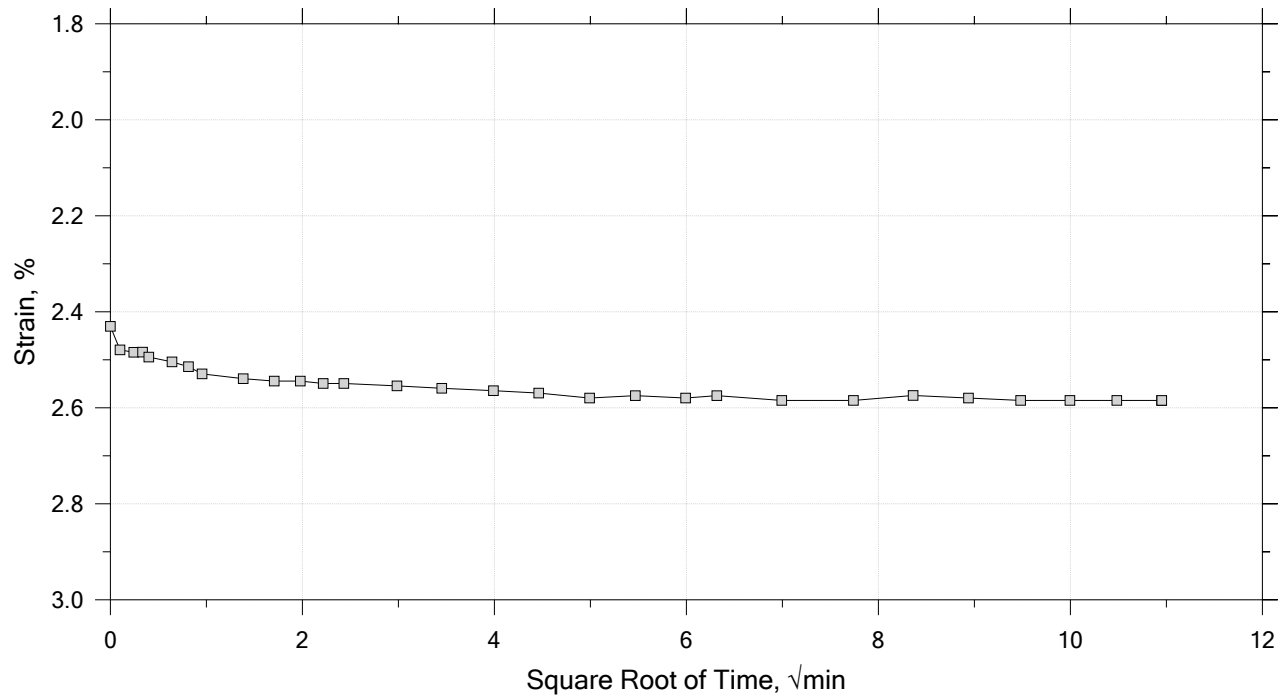
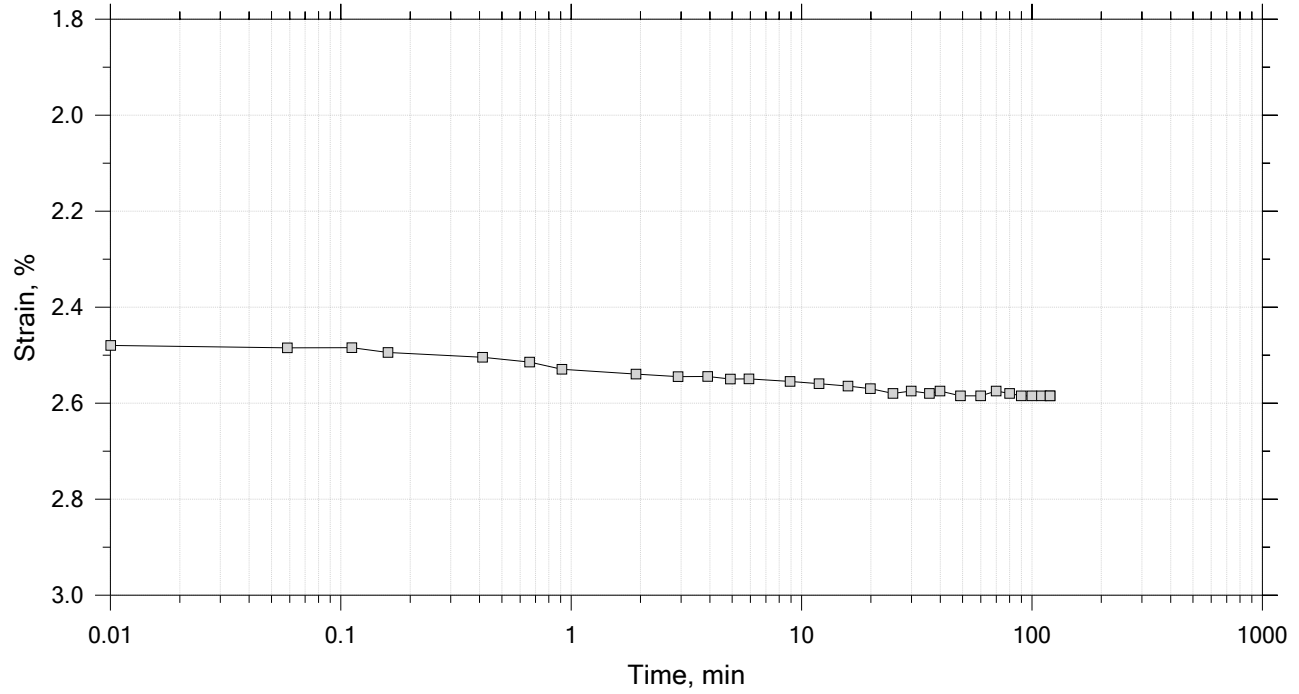
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 15

Constant Load Step

Stress: 8 tsf



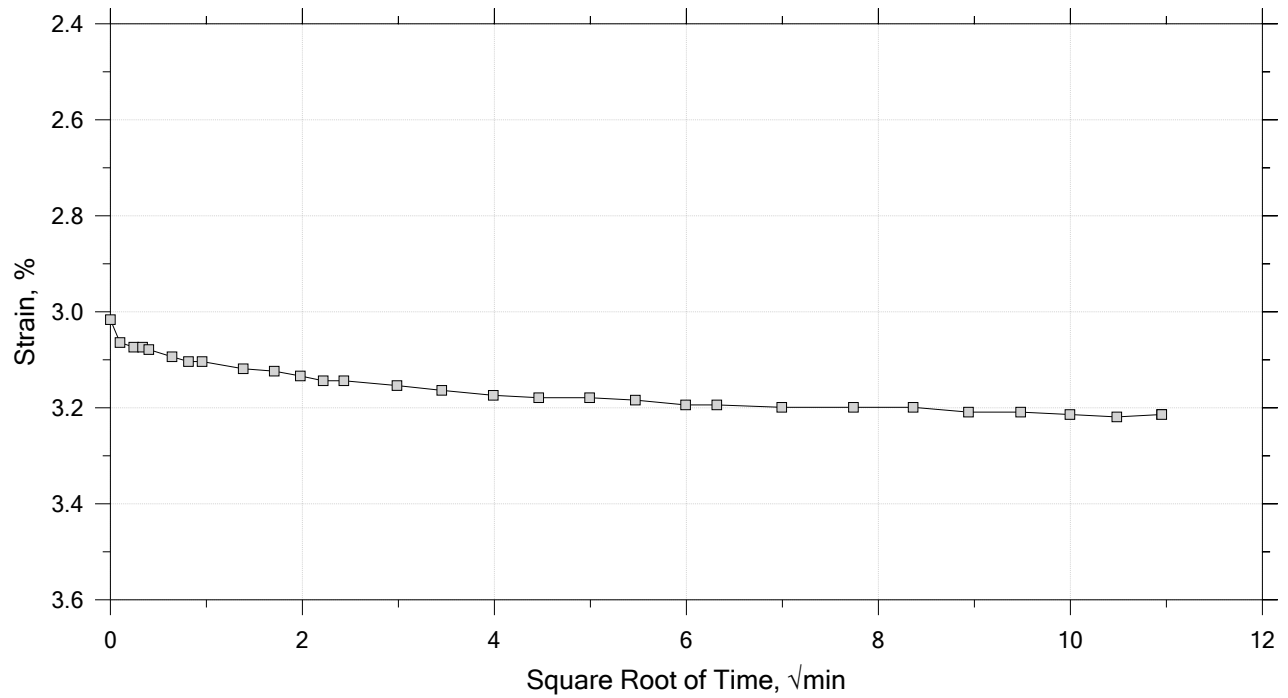
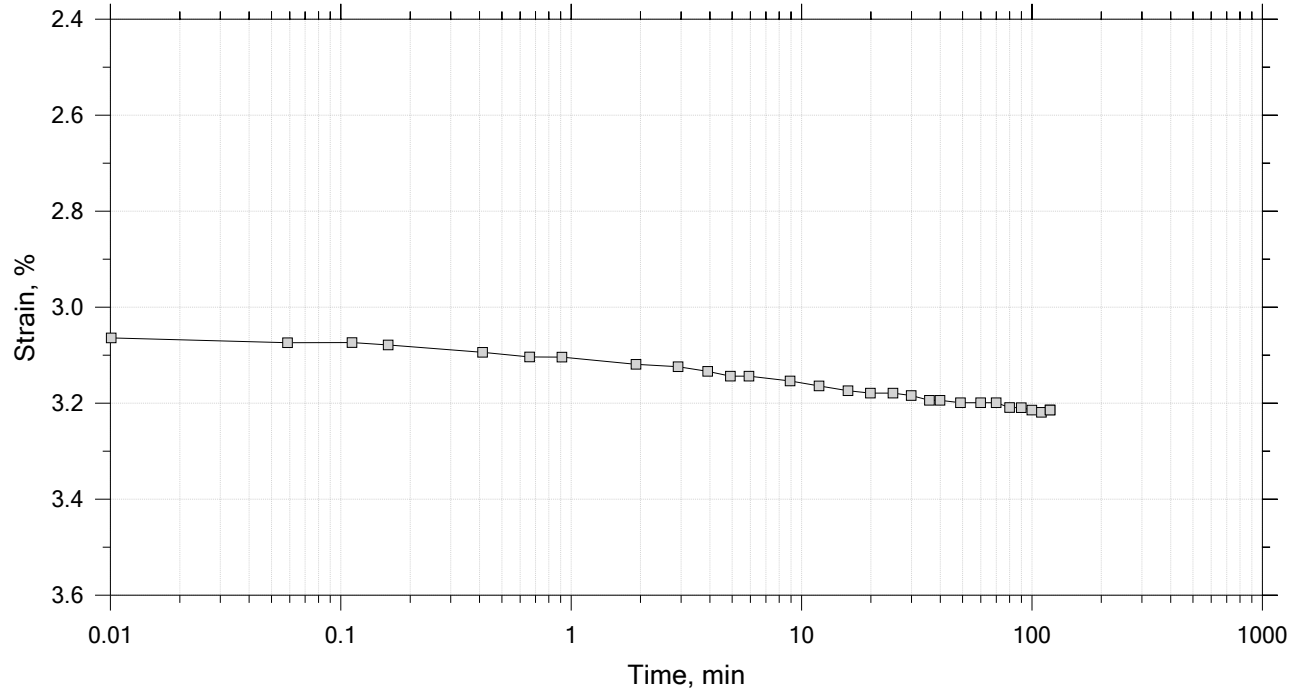
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15

Constant Load Step

Stress: 16 tsf



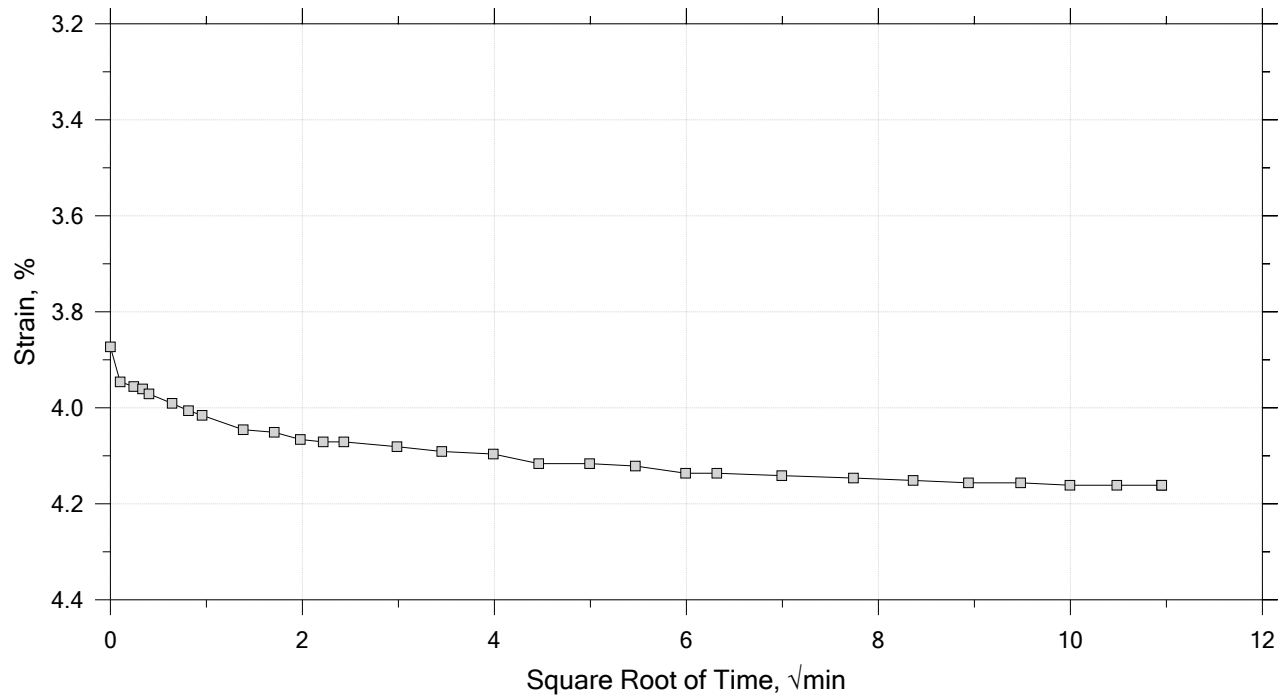
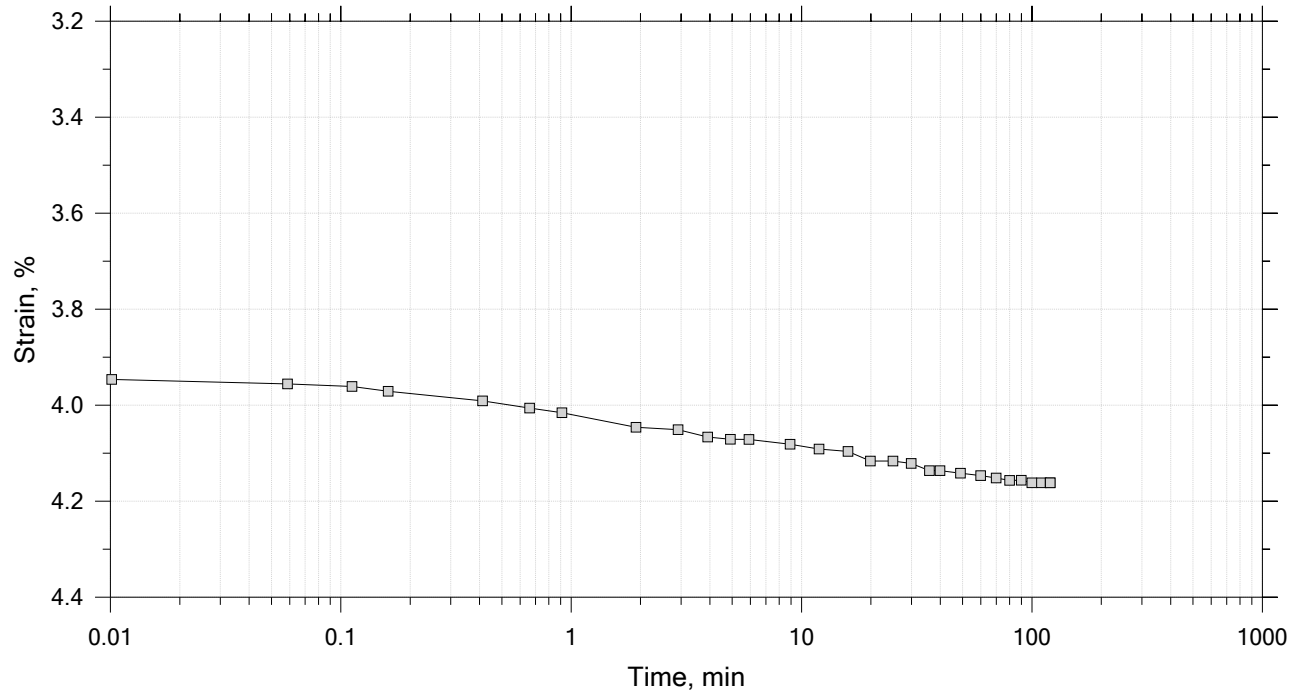
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



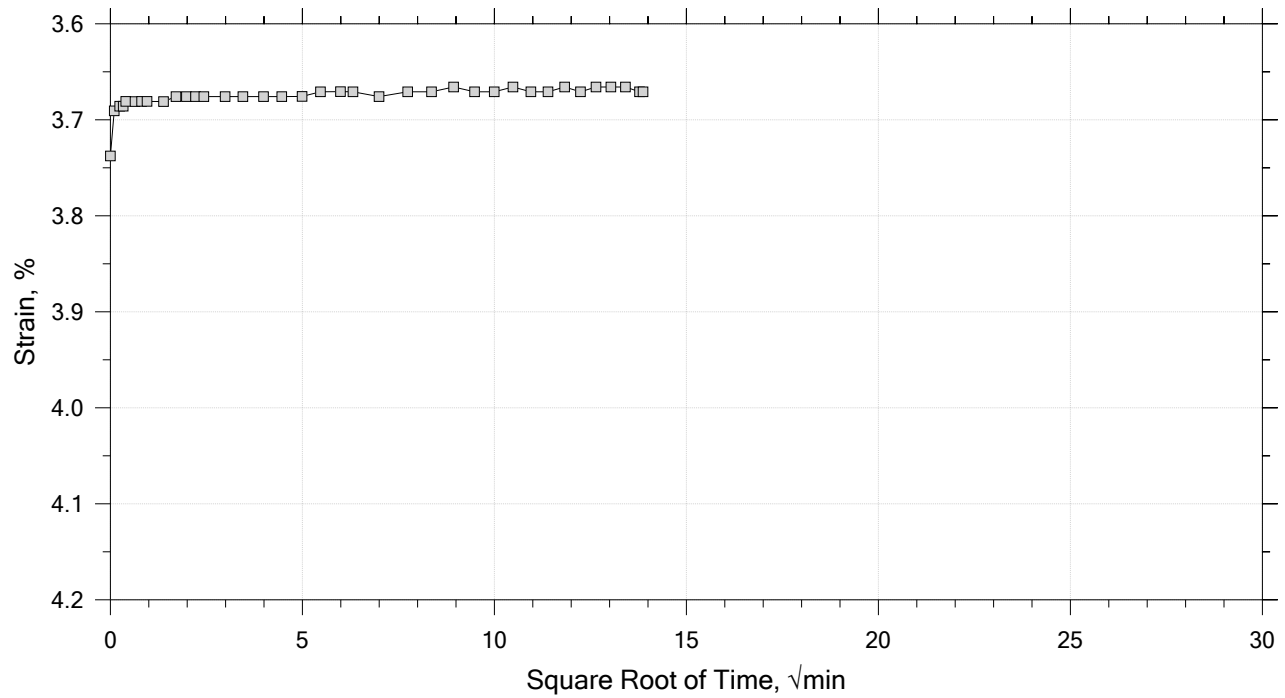
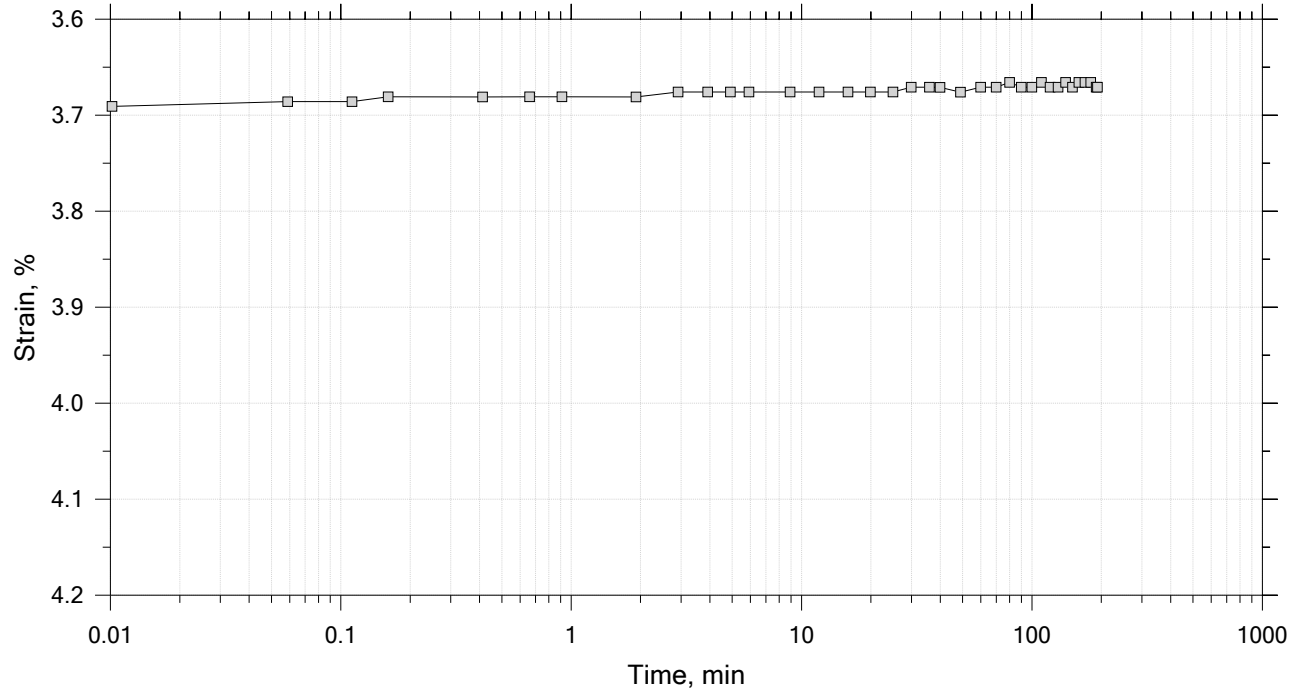
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



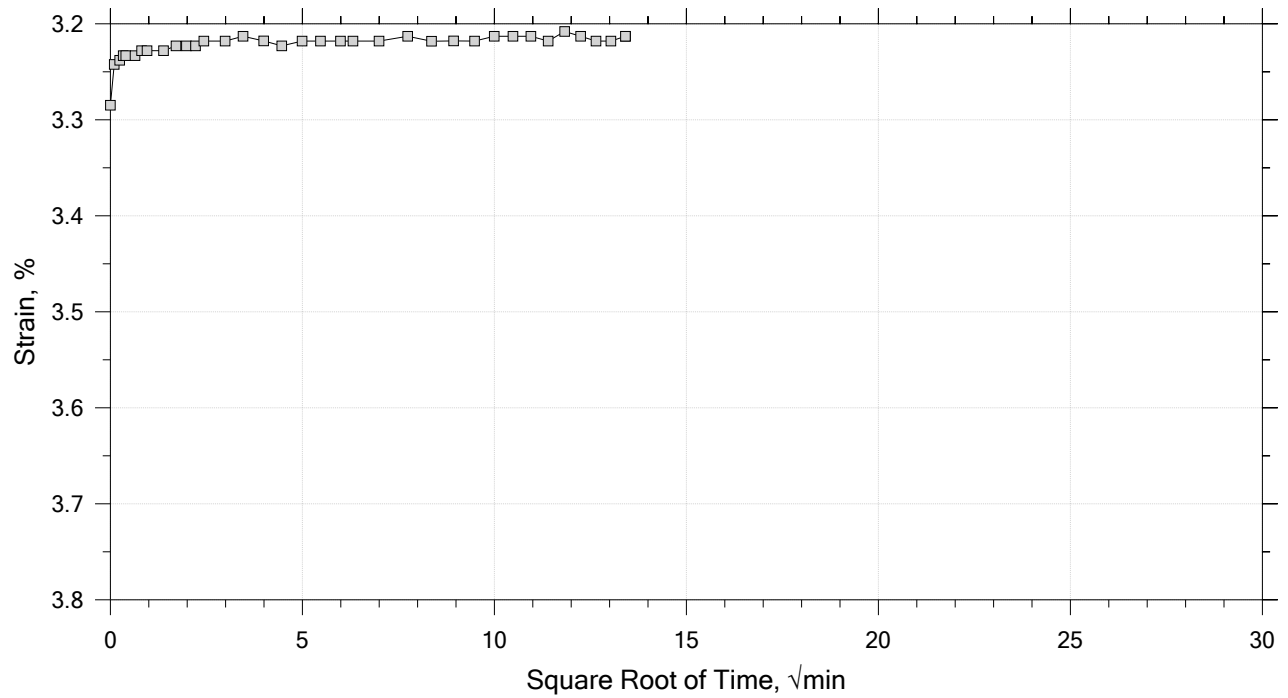
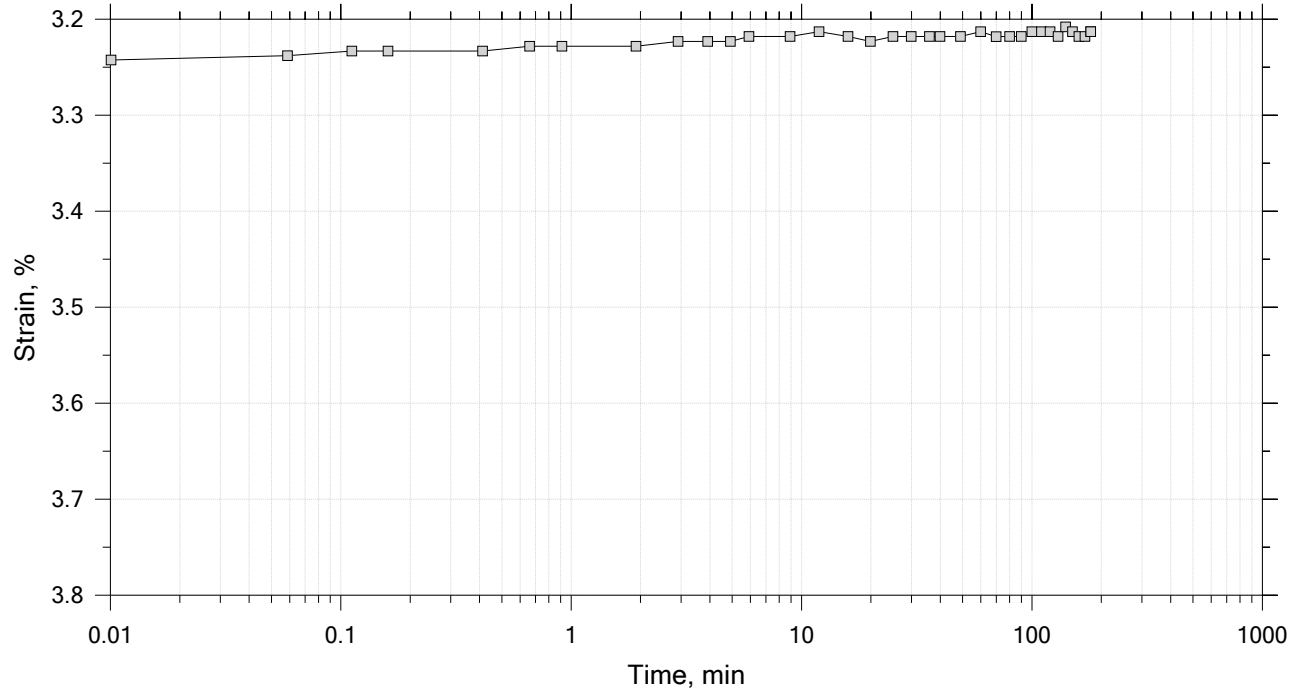
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		

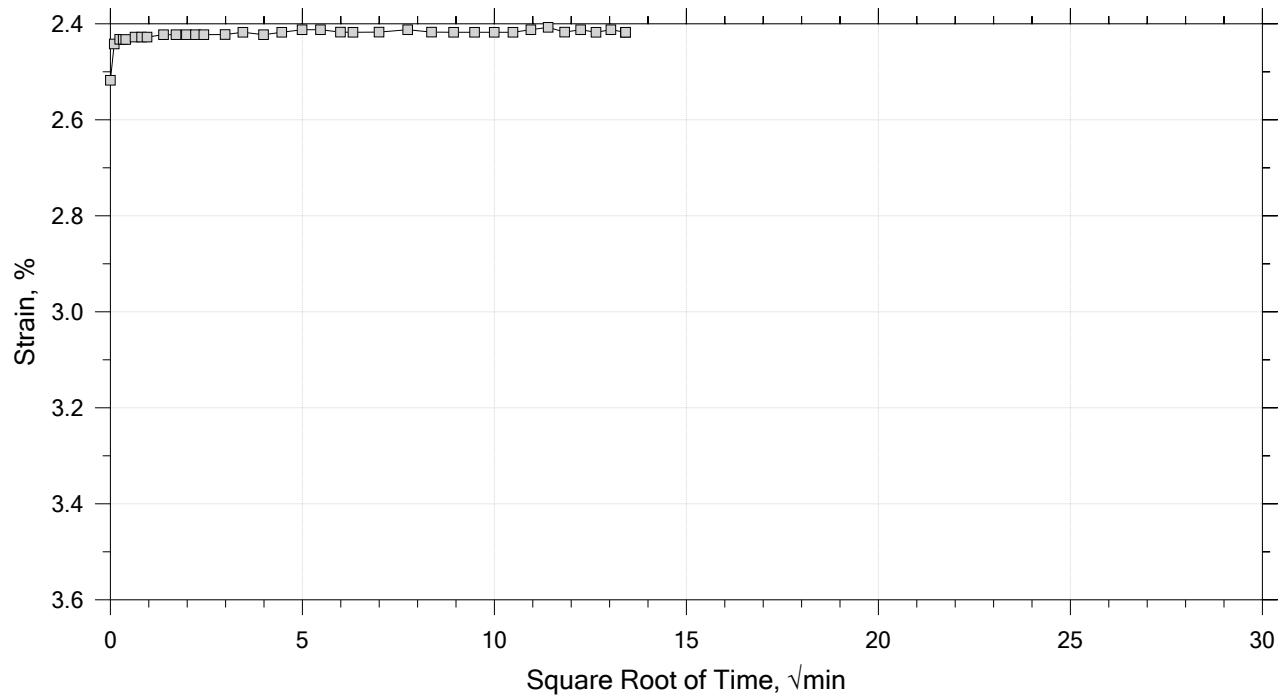
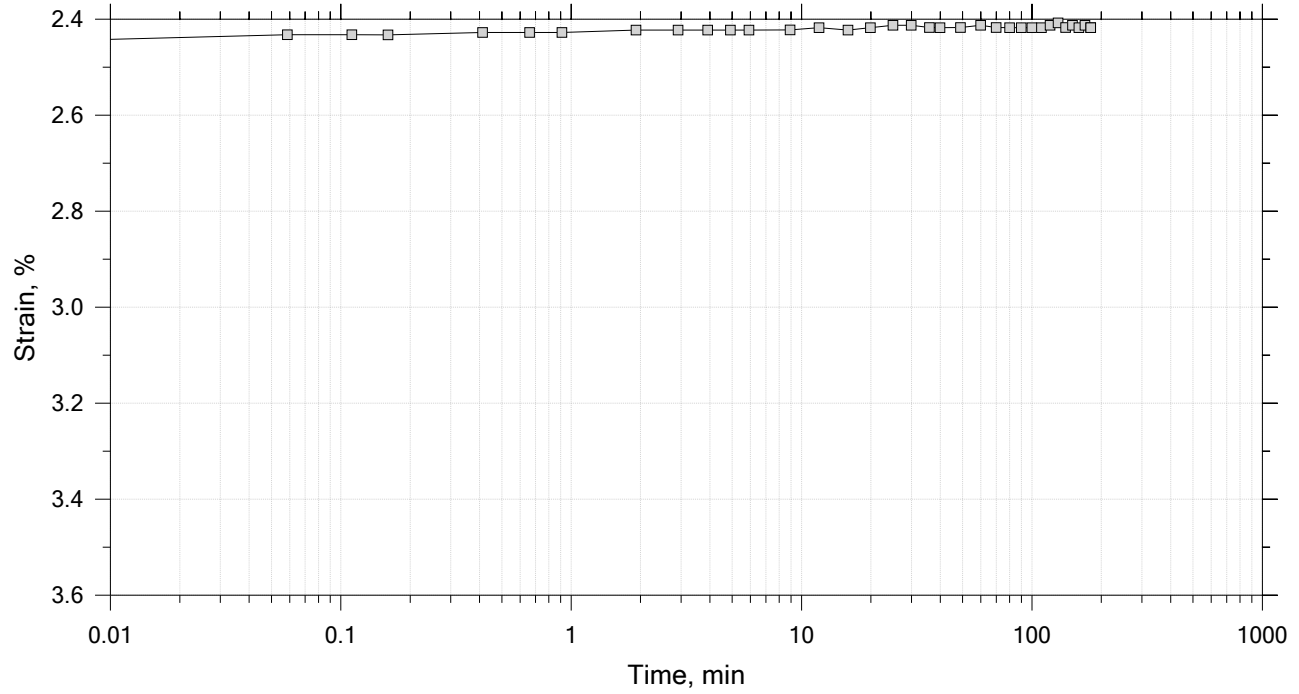



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



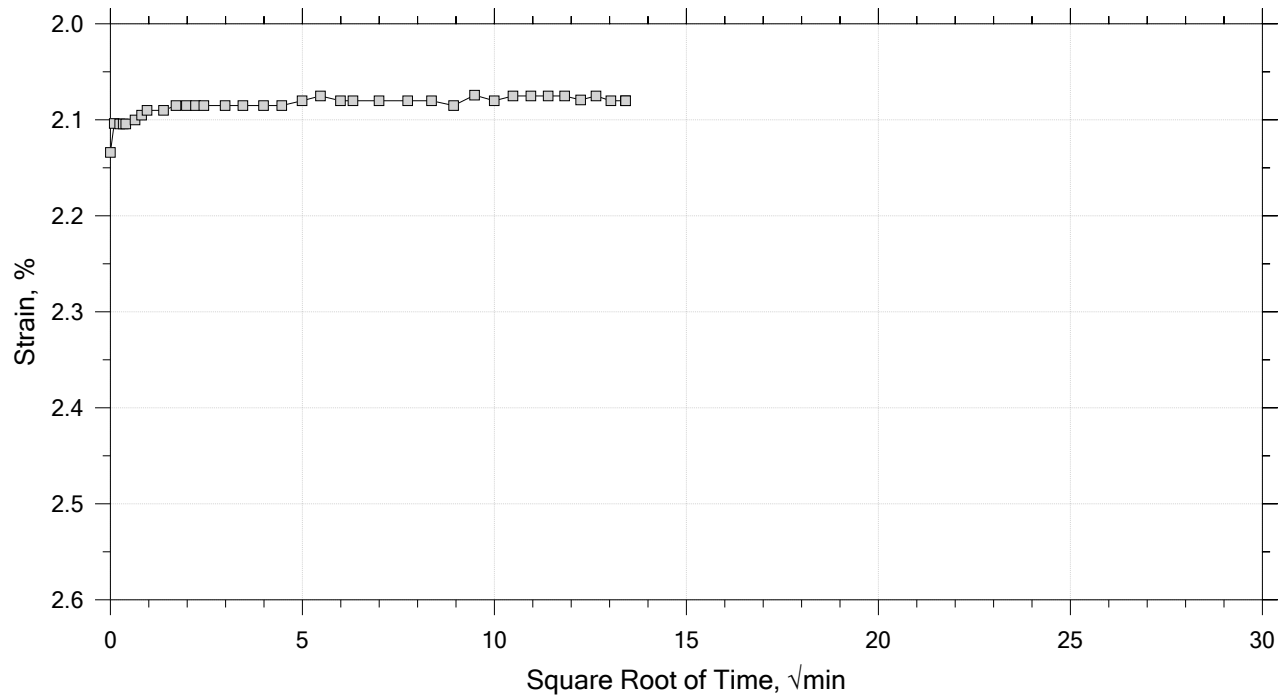
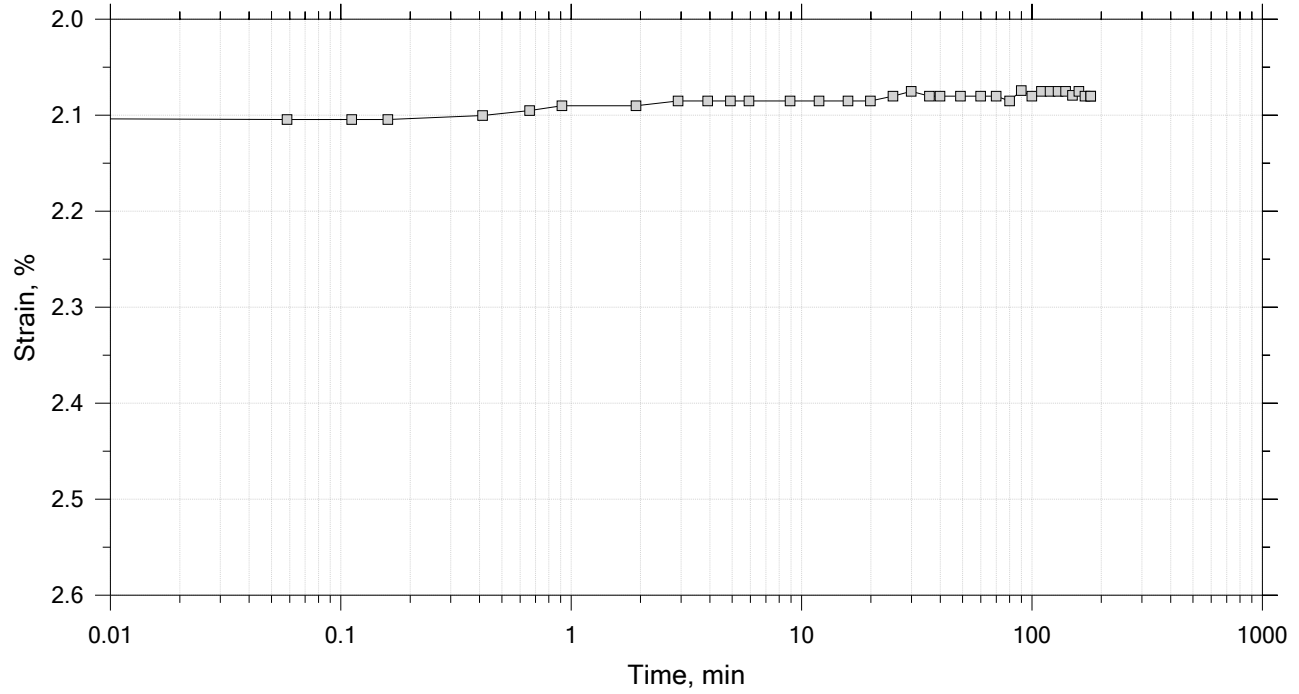
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



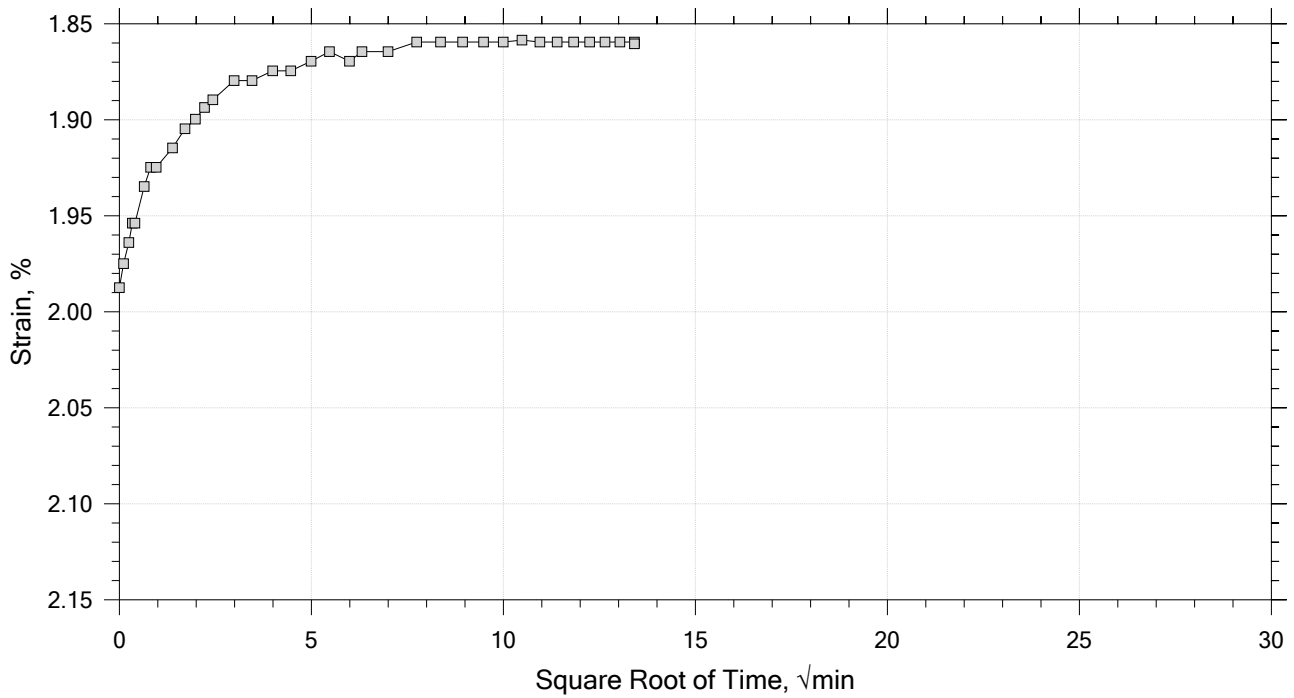
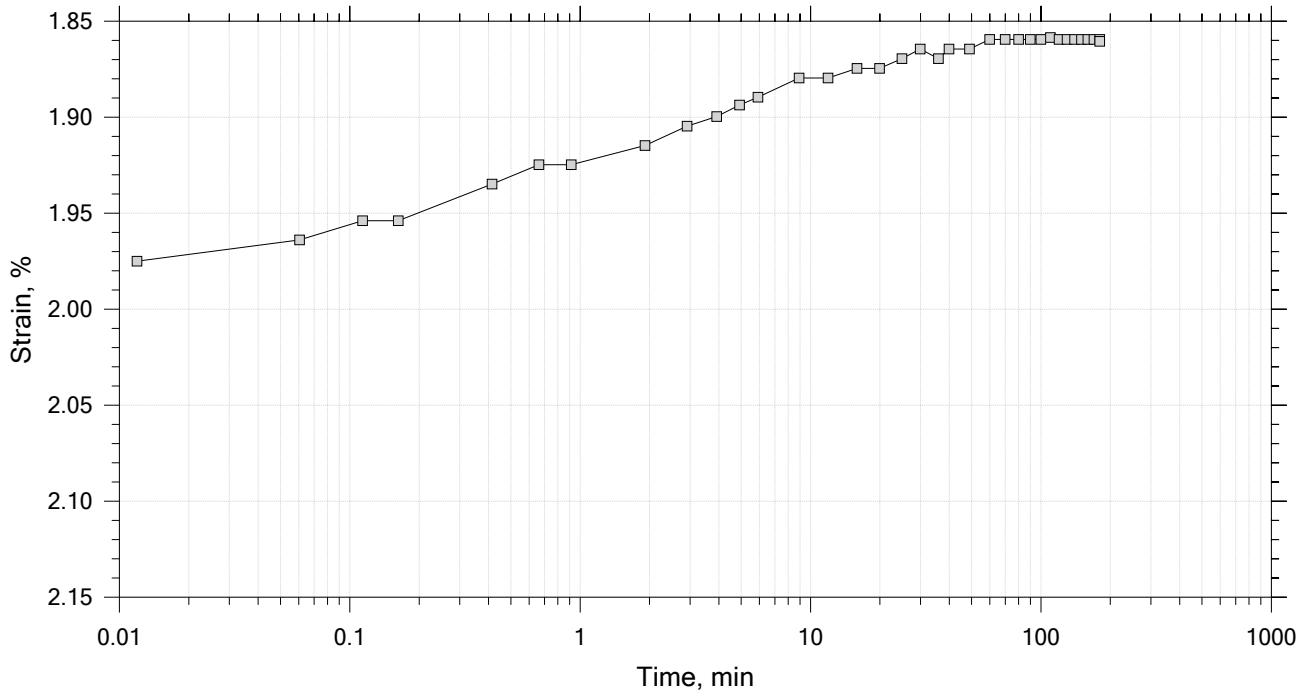
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.64	Liquid Limit: NP
Initial Height: 1.00 in	Initial Void Ratio: 0.539	Plastic Limit: NP
Final Height: 0.98 in	Final Void Ratio: 0.508	Plasticity Index: NP

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	D-1596	RING		D-2312
Mass Container, gm	8.22	109.13	109.13	8.42
Mass Container + Wet Soil, gm	88.52	275.2	273.59	171.56
Mass Container + Dry Soil, gm	74.79	247.04	247.04	145.22
Mass Dry Soil, gm	66.57	137.91	137.91	136.8
Water Content, %	20.62	20.42	19.25	19.25
Void Ratio	---	0.54	0.51	---
Degree of Saturation, %	---	100.00	100.00	---
Dry Unit Weight, pcf	---	107.03	109.21	---

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.

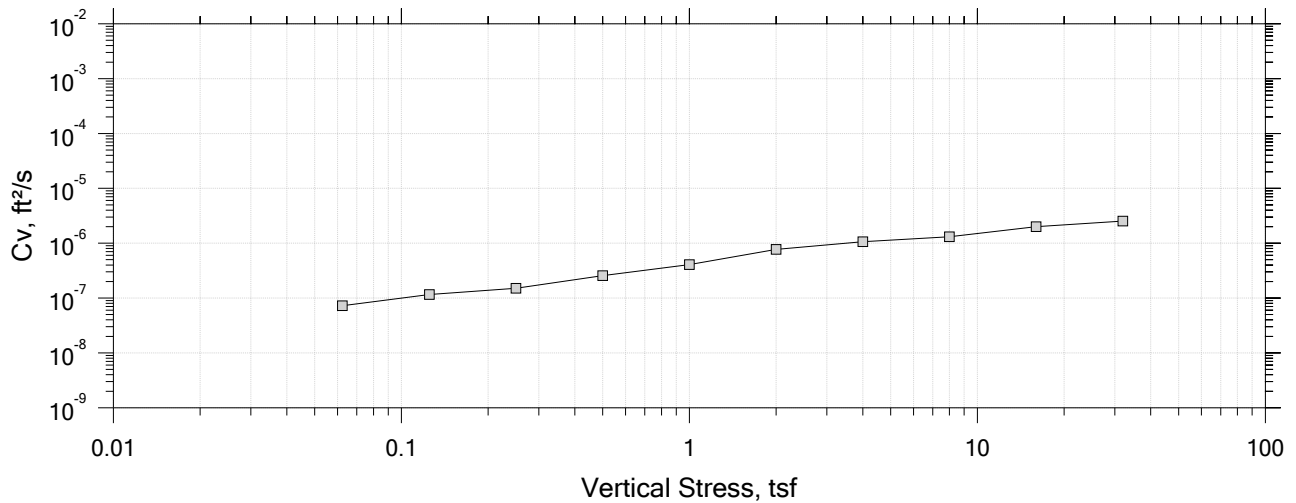
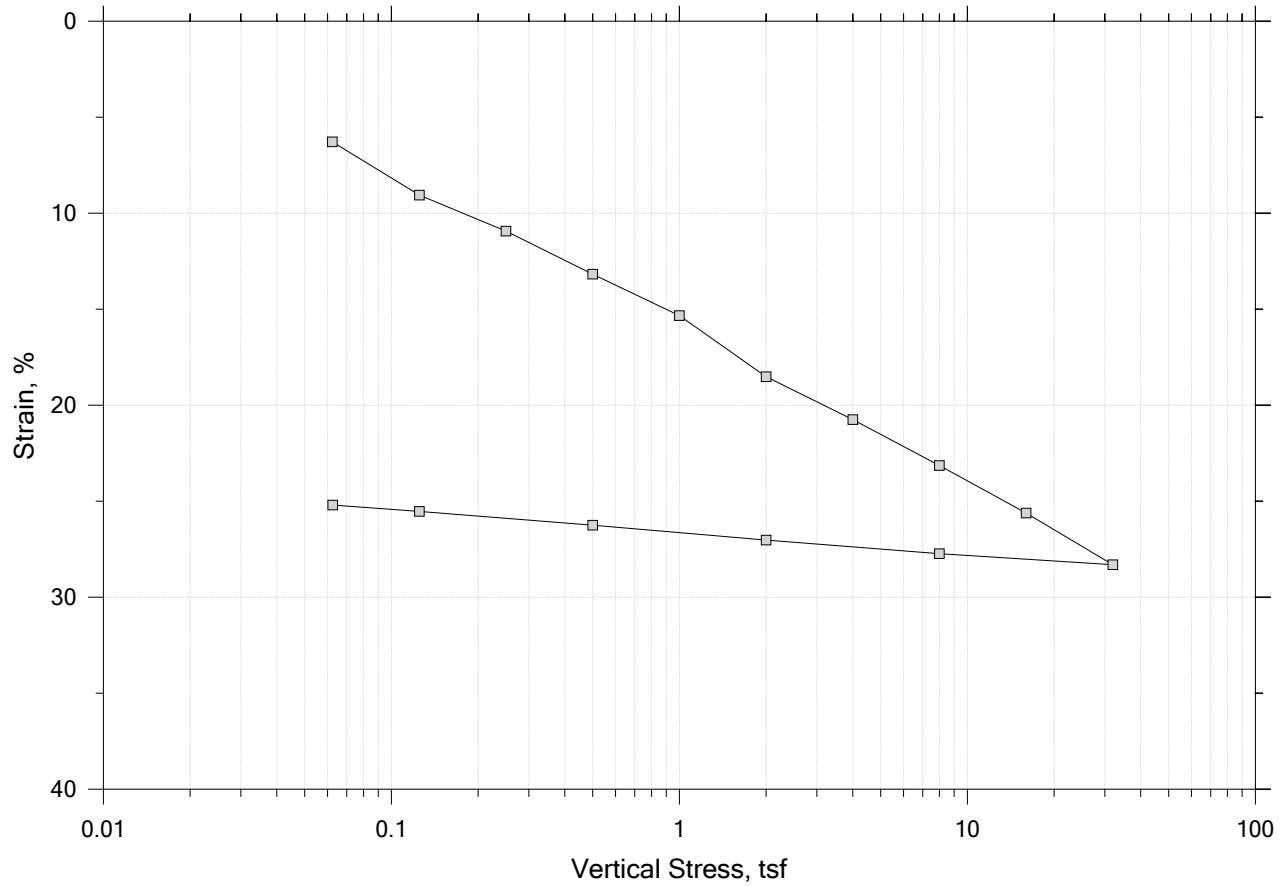
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U1	Test Date: 02/09/19	Depth: 10-12 ft
	Test No.: IP-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand		
	Remarks: System Q, Swell Pressure = 0.0727 tsf		






# One-Dimensional Consolidation by ASTM D2435 - Method B

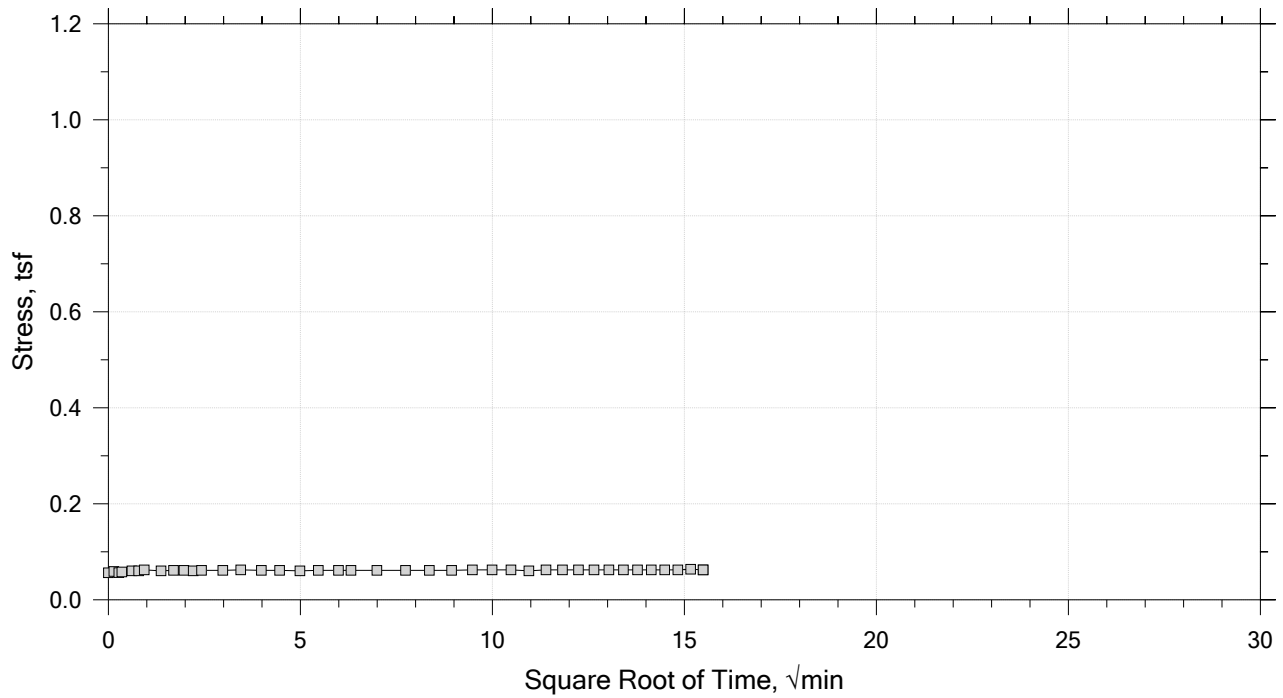
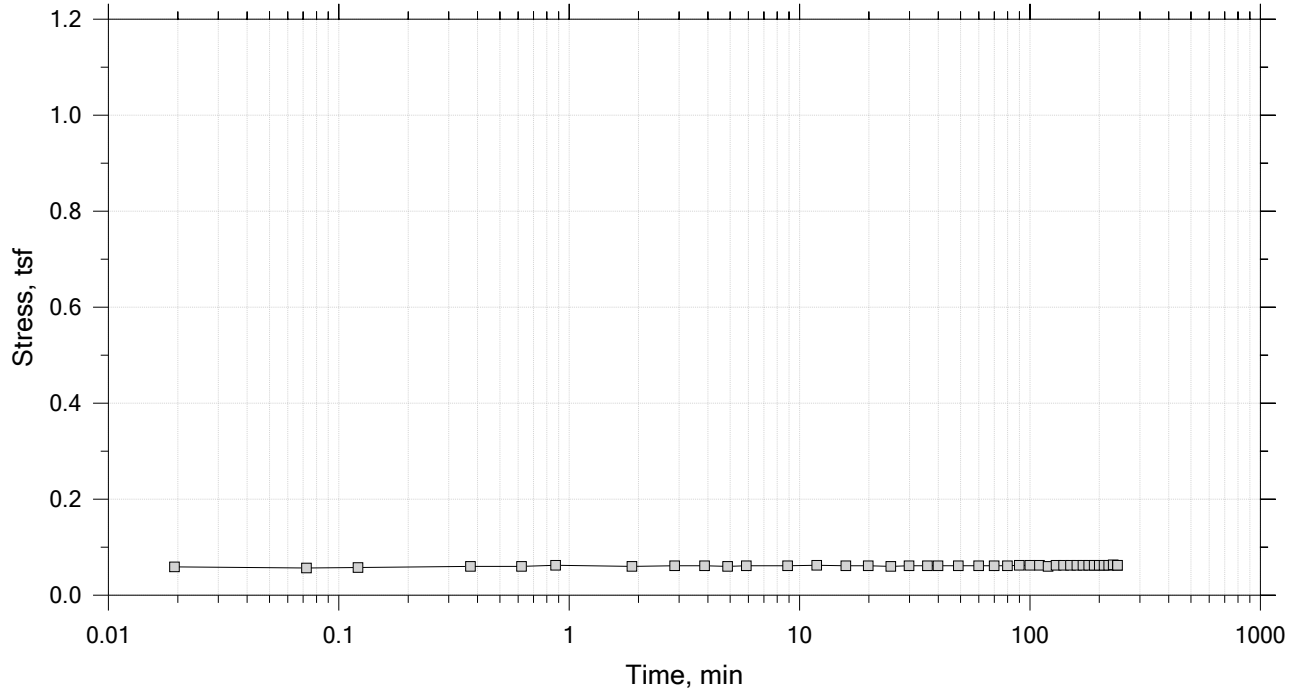
## Summary Report




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.0624 tsf

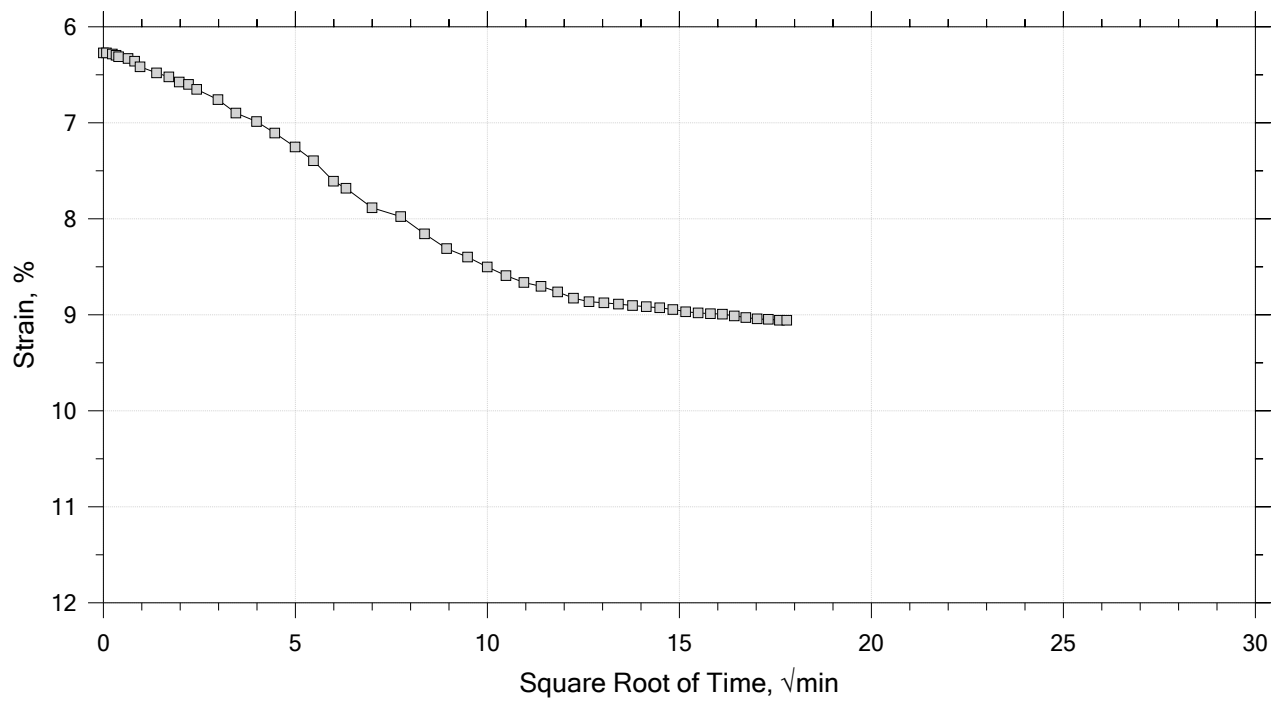
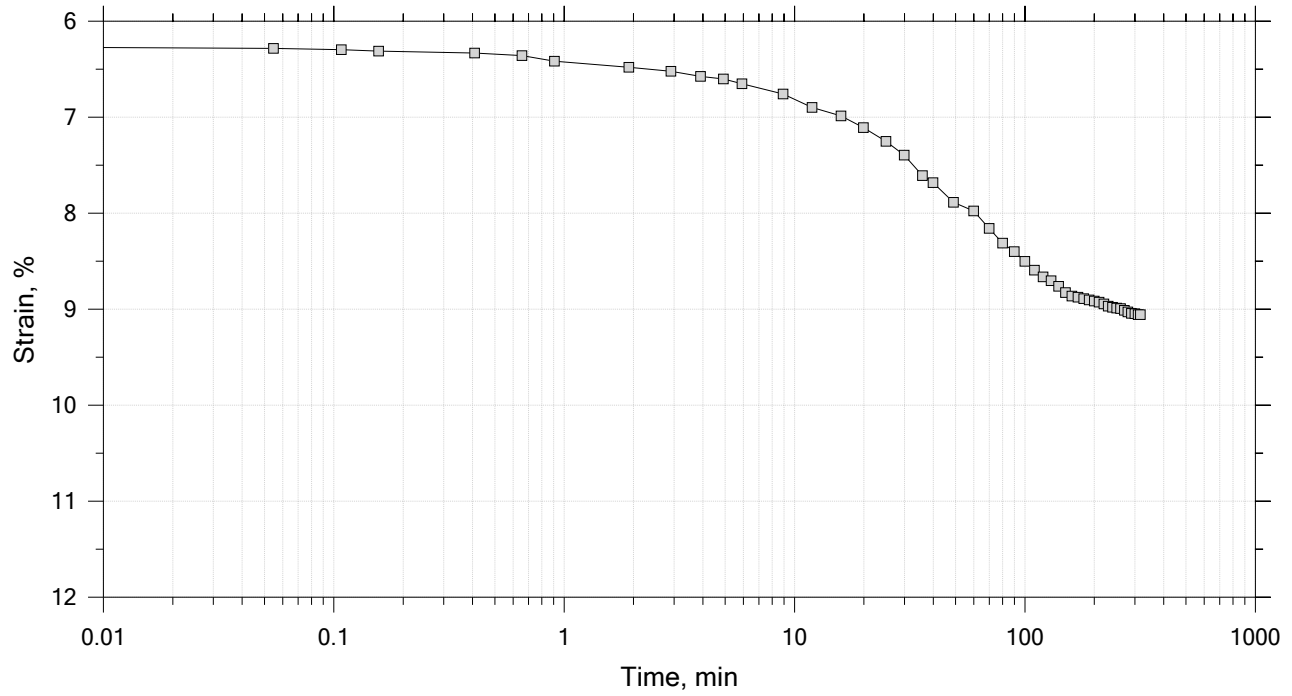



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		



# One-Dimensional Consolidation by ASTM D2435 - Method B

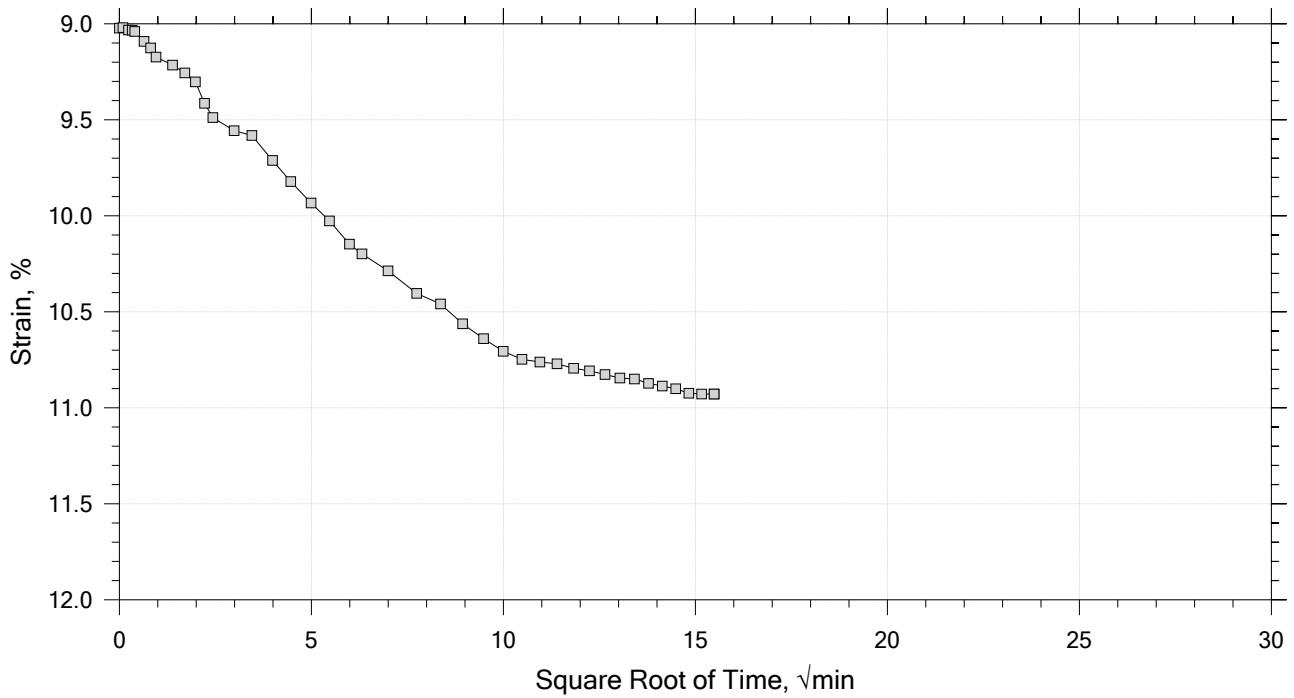
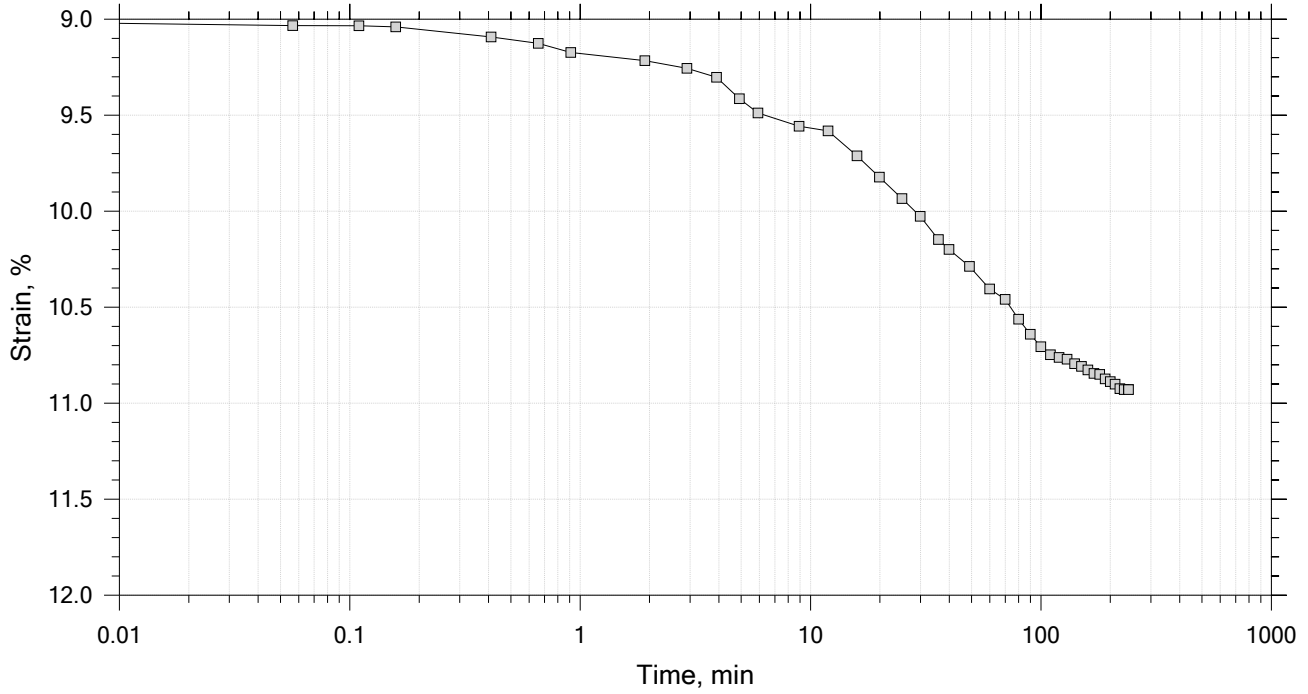
Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

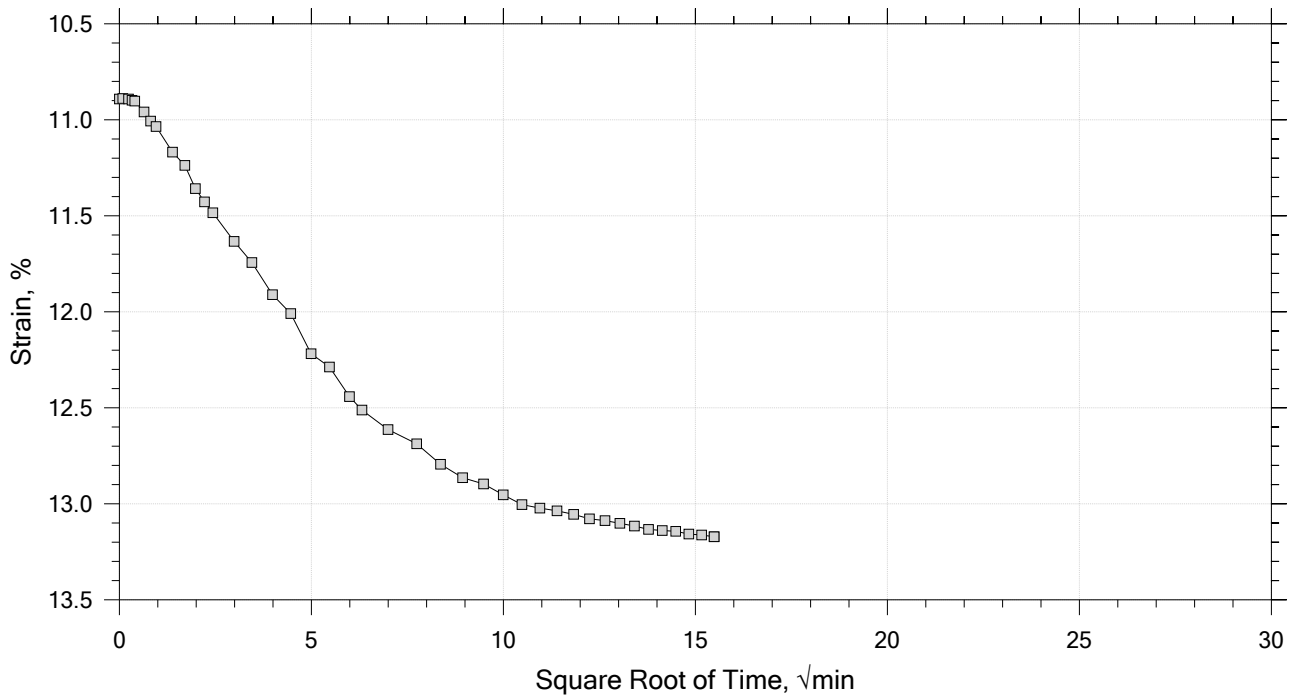
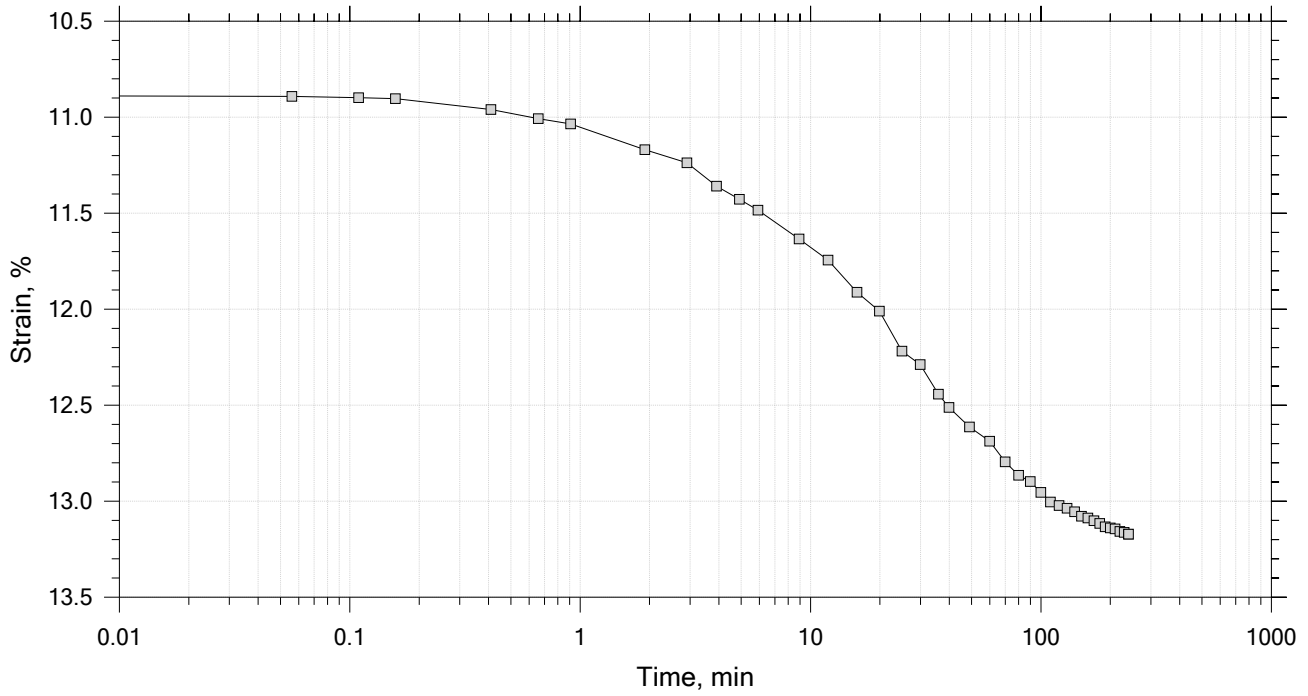
Time Curve 3 of 15  
 Constant Load Step  
 Stress: 0.25 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

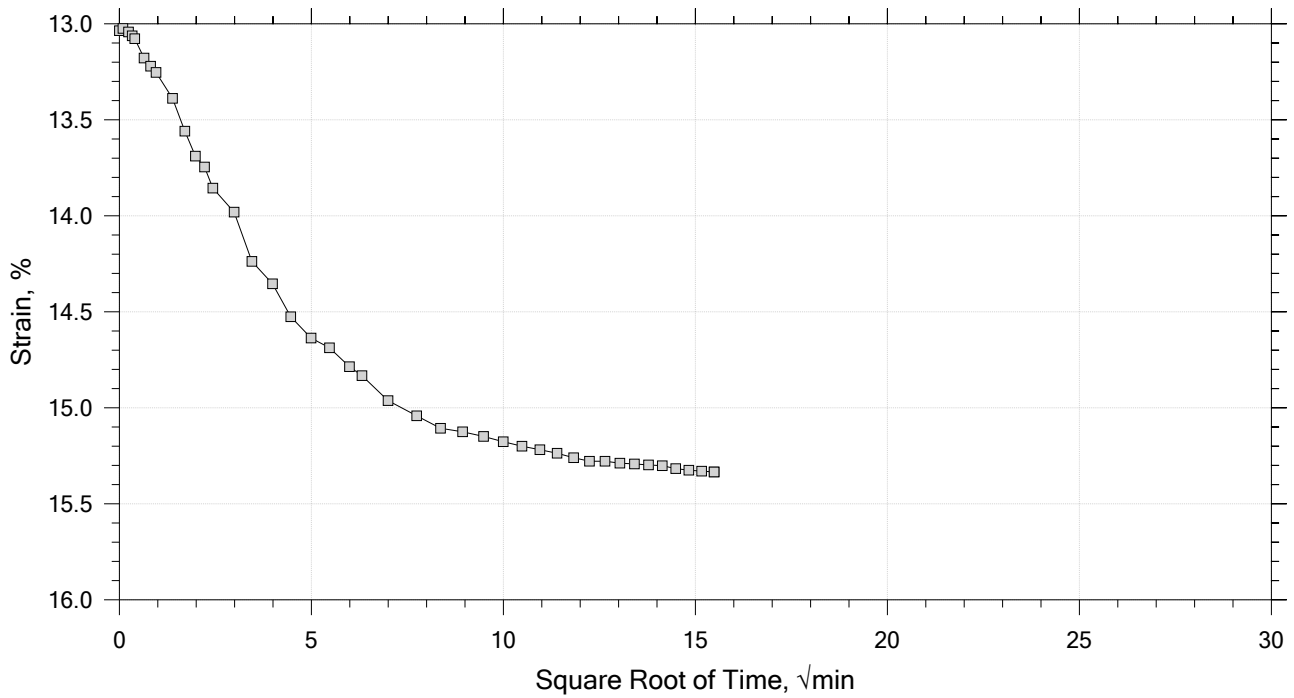
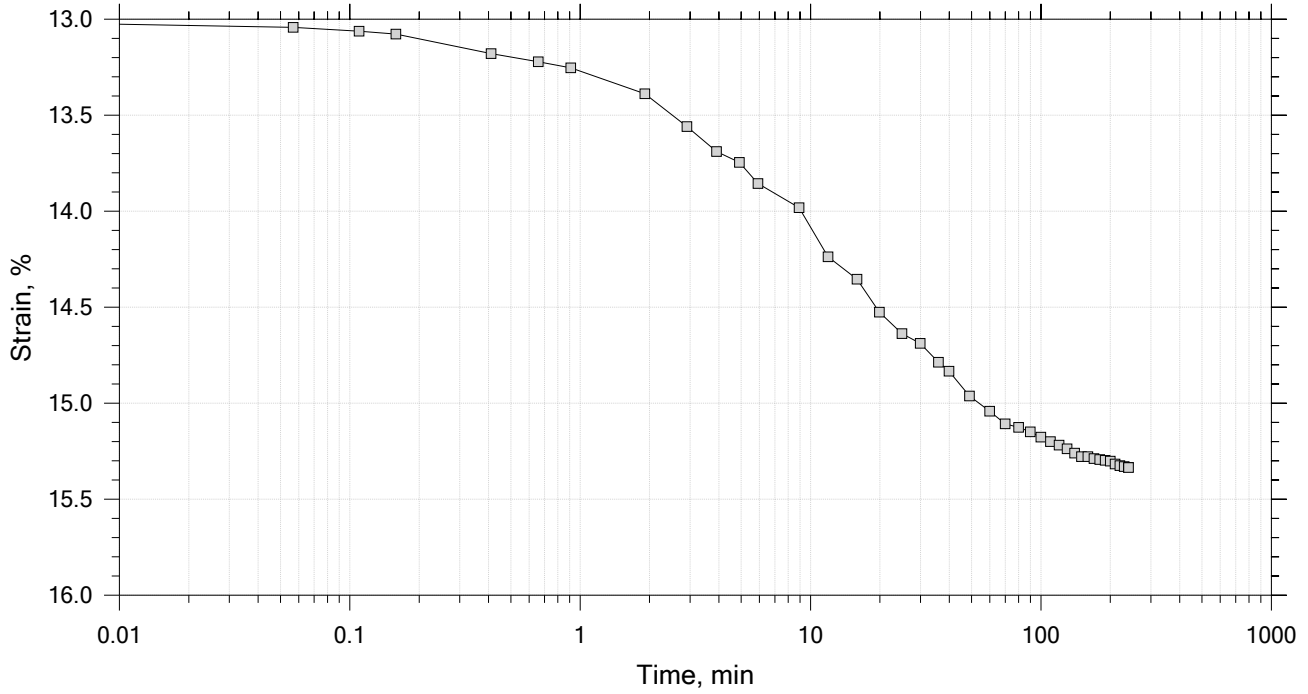
Time Curve 4 of 15  
 Constant Load Step  
 Stress: 0.5 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

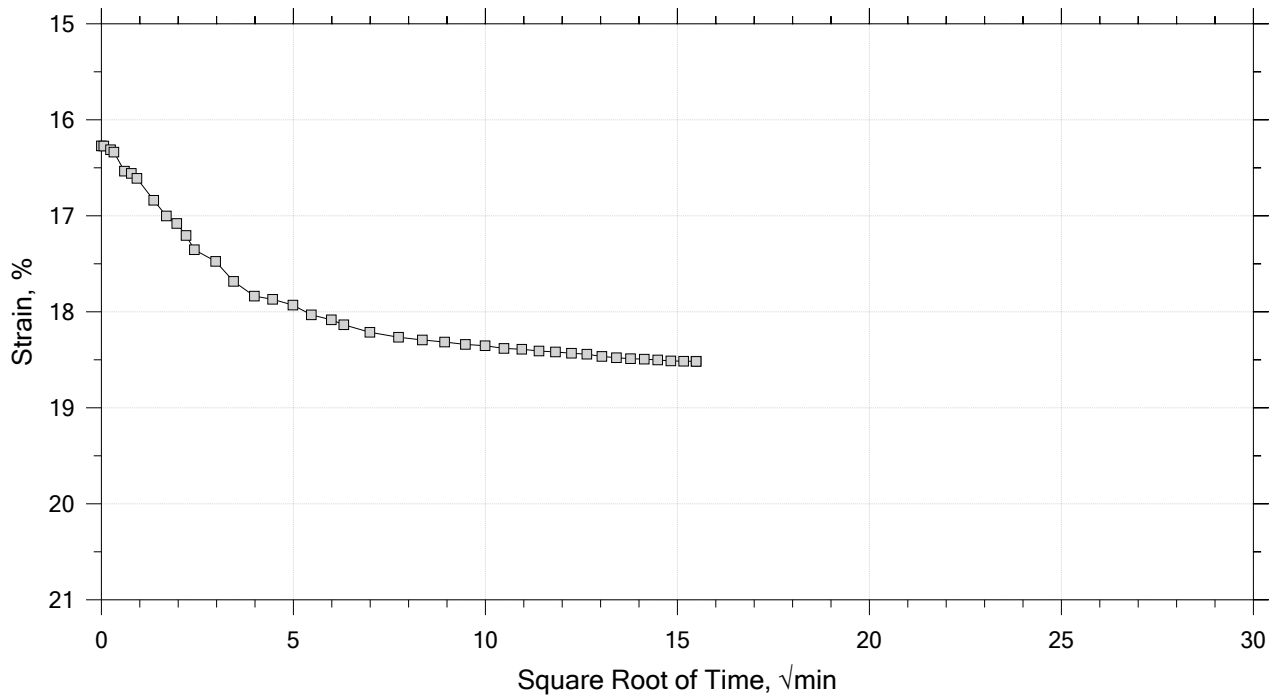
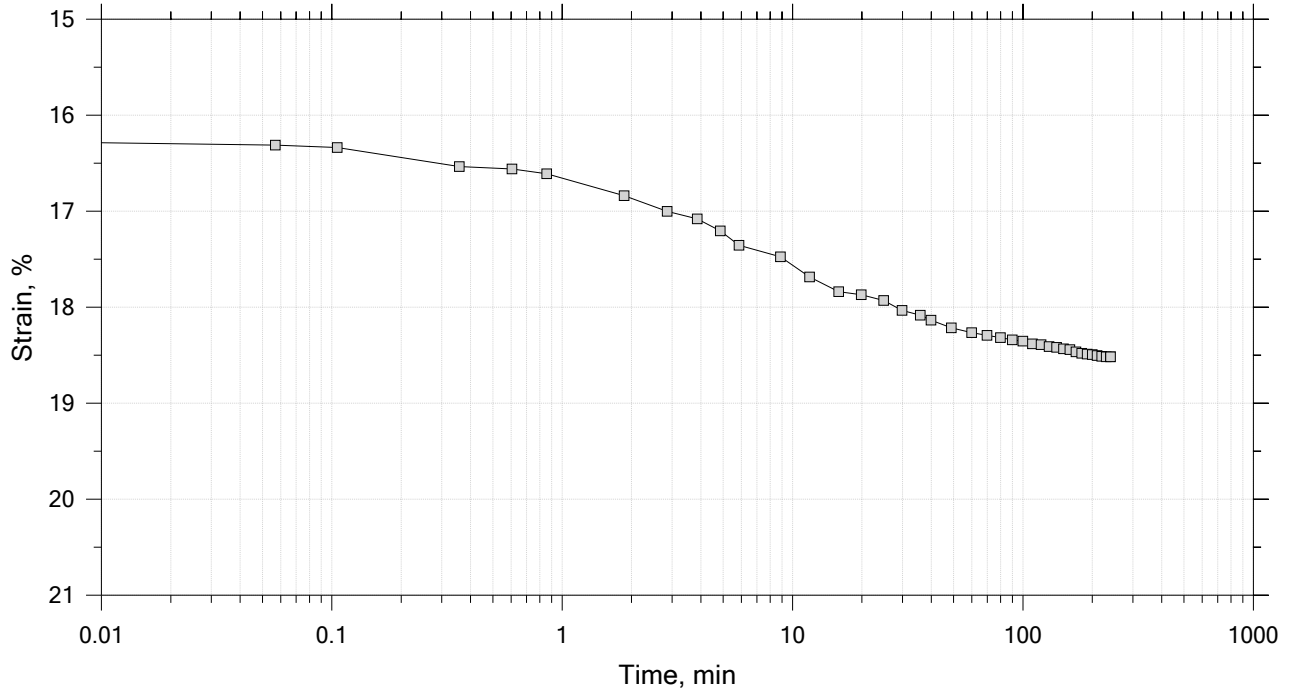
Time Curve 5 of 15  
 Constant Load Step  
 Stress: 1 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

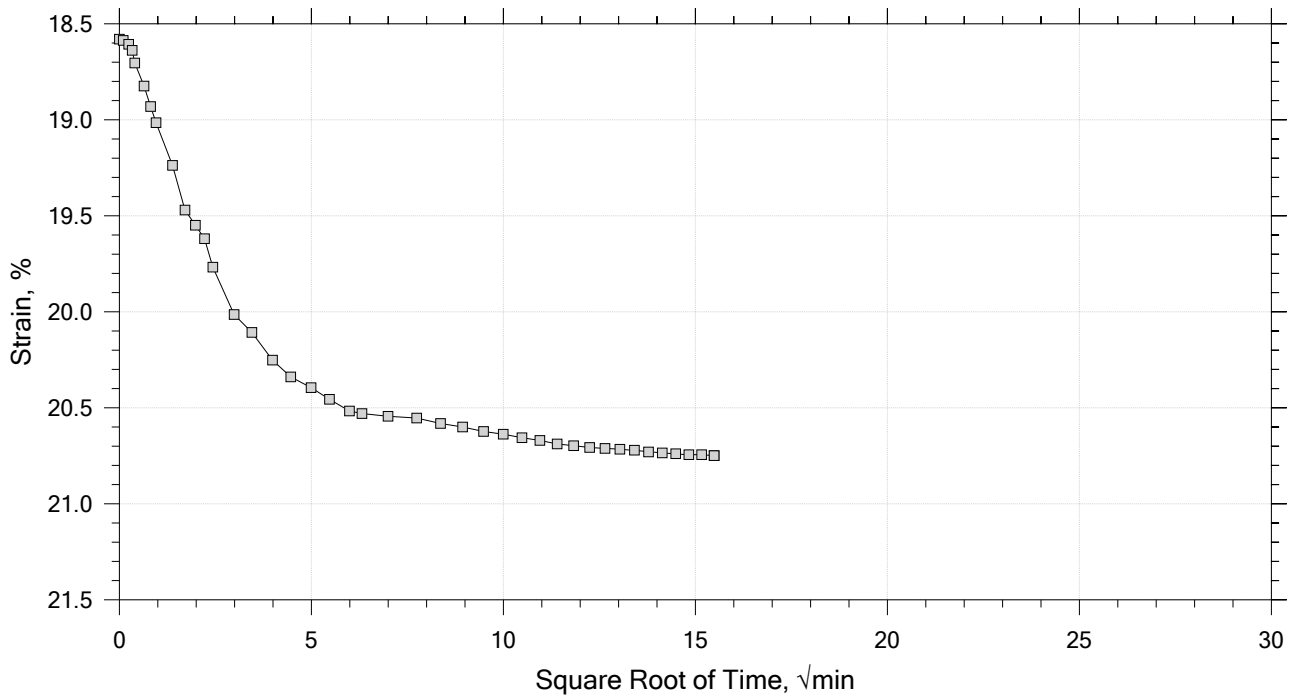
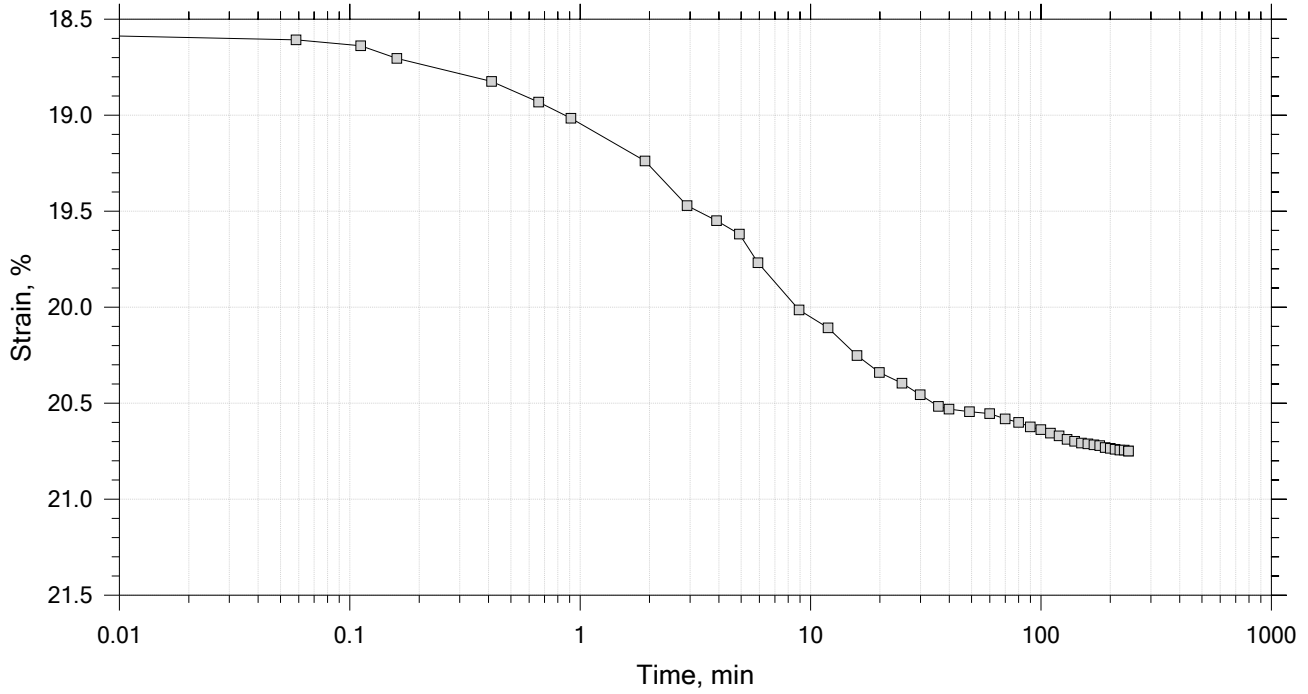
Time Curve 6 of 15  
 Constant Load Step  
 Stress: 2 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15  
 Constant Load Step  
 Stress: 4 tsf



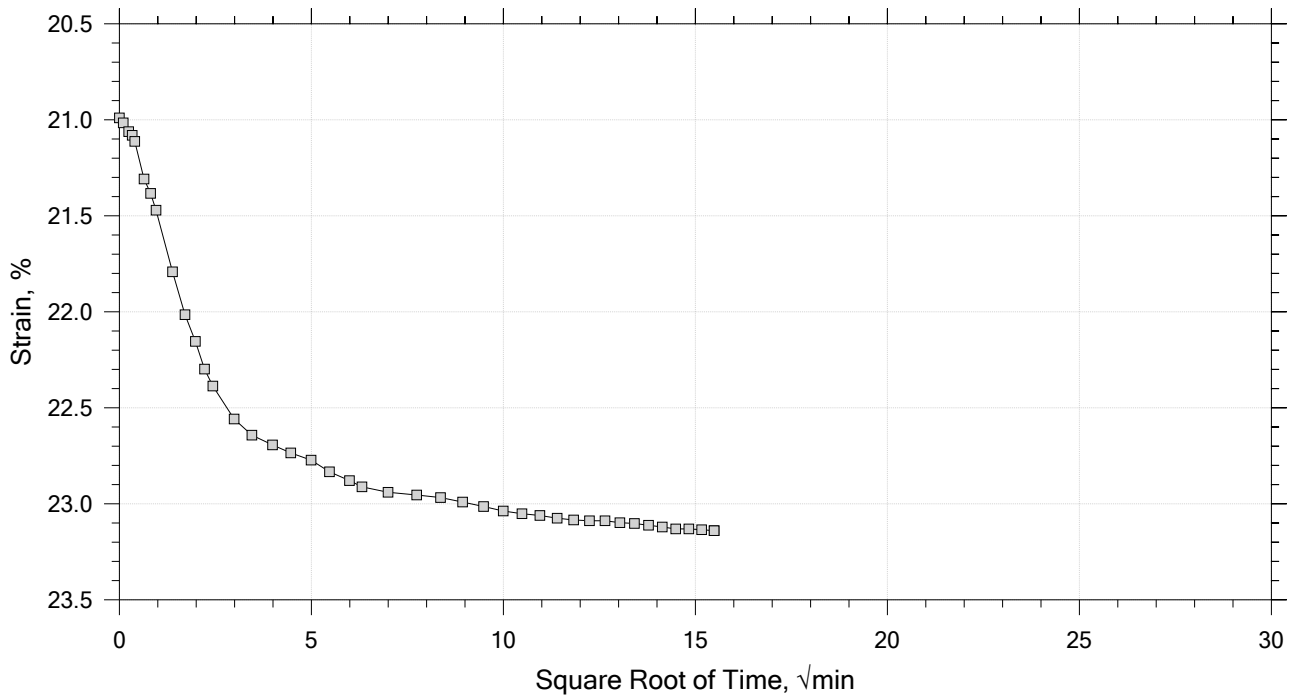
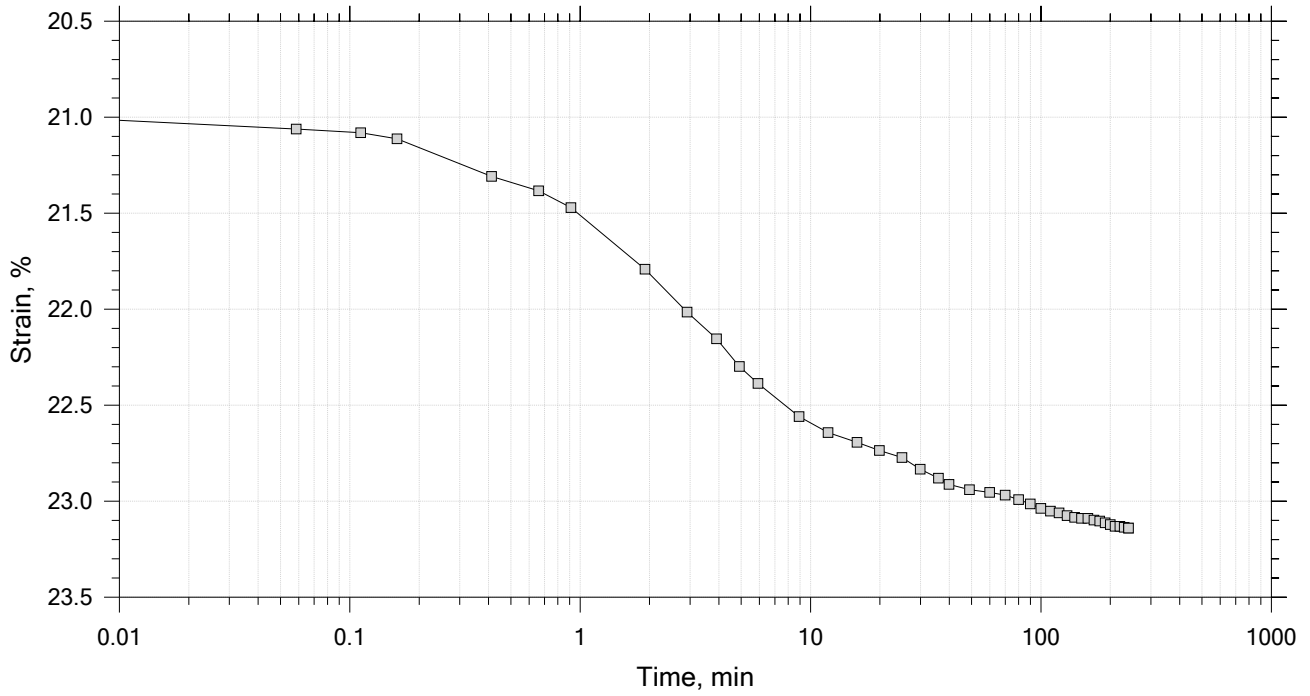
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 15

Constant Load Step

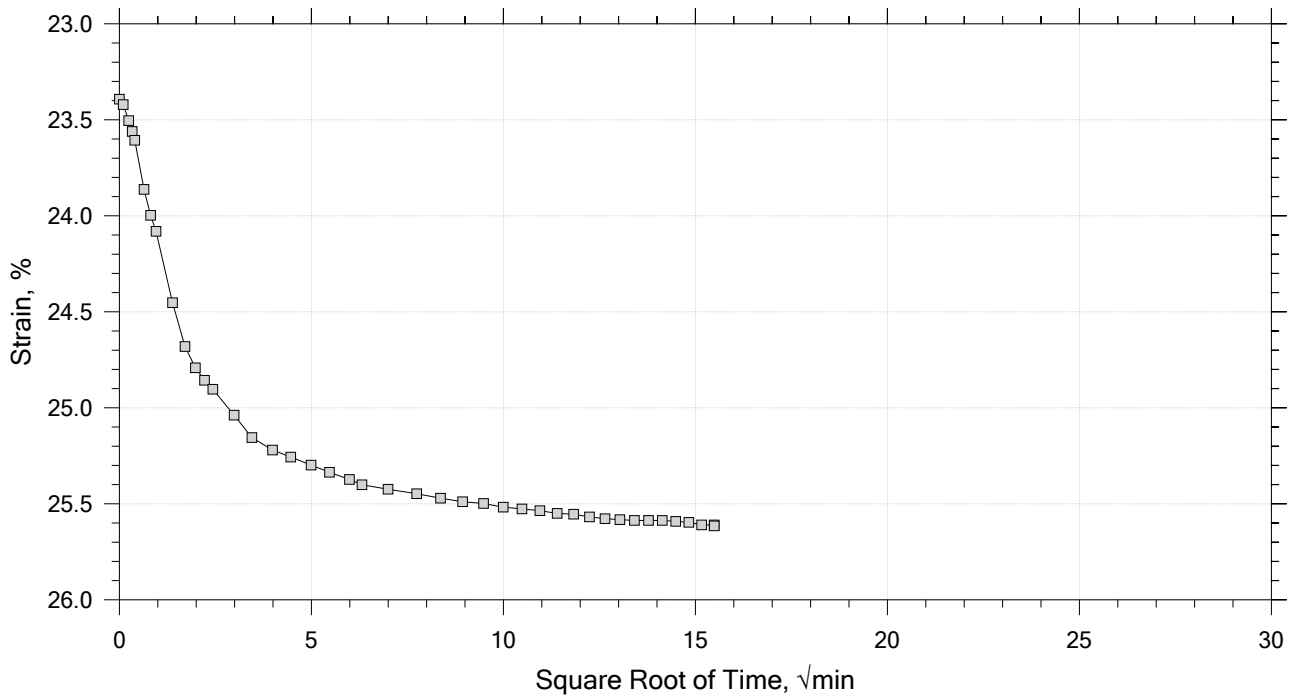
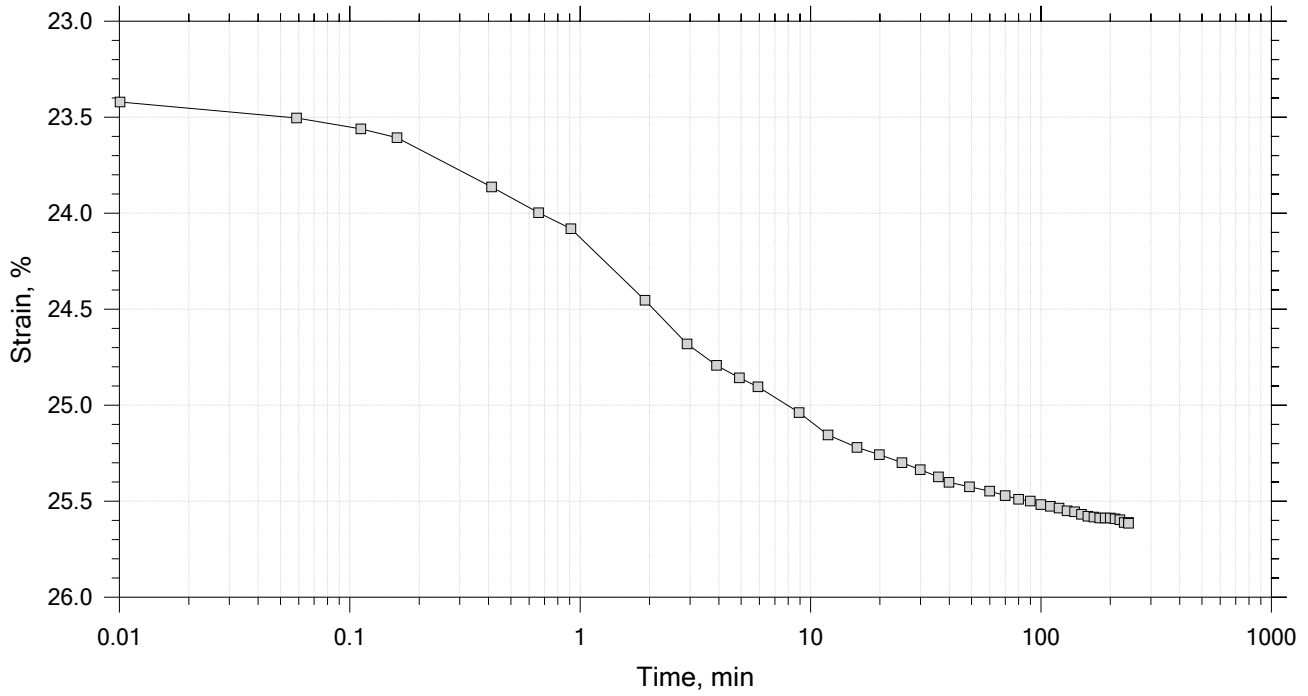
Stress: 8 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15  
 Constant Load Step  
 Stress: 16 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

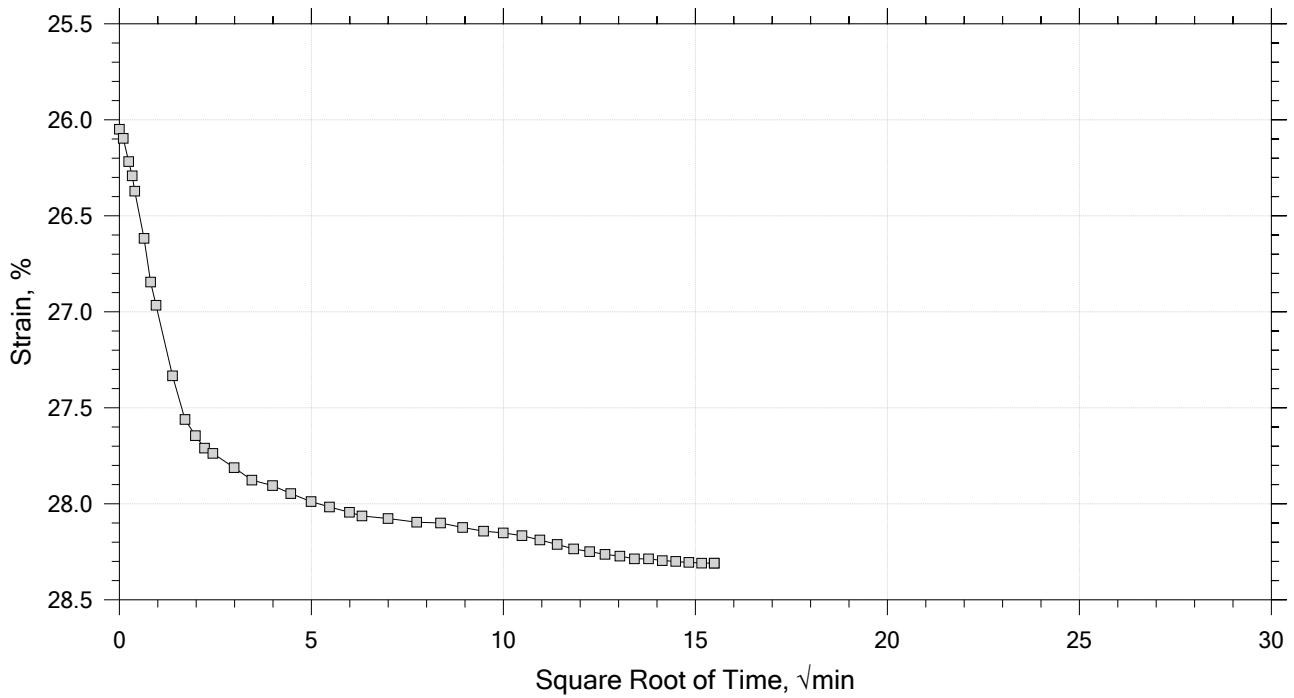
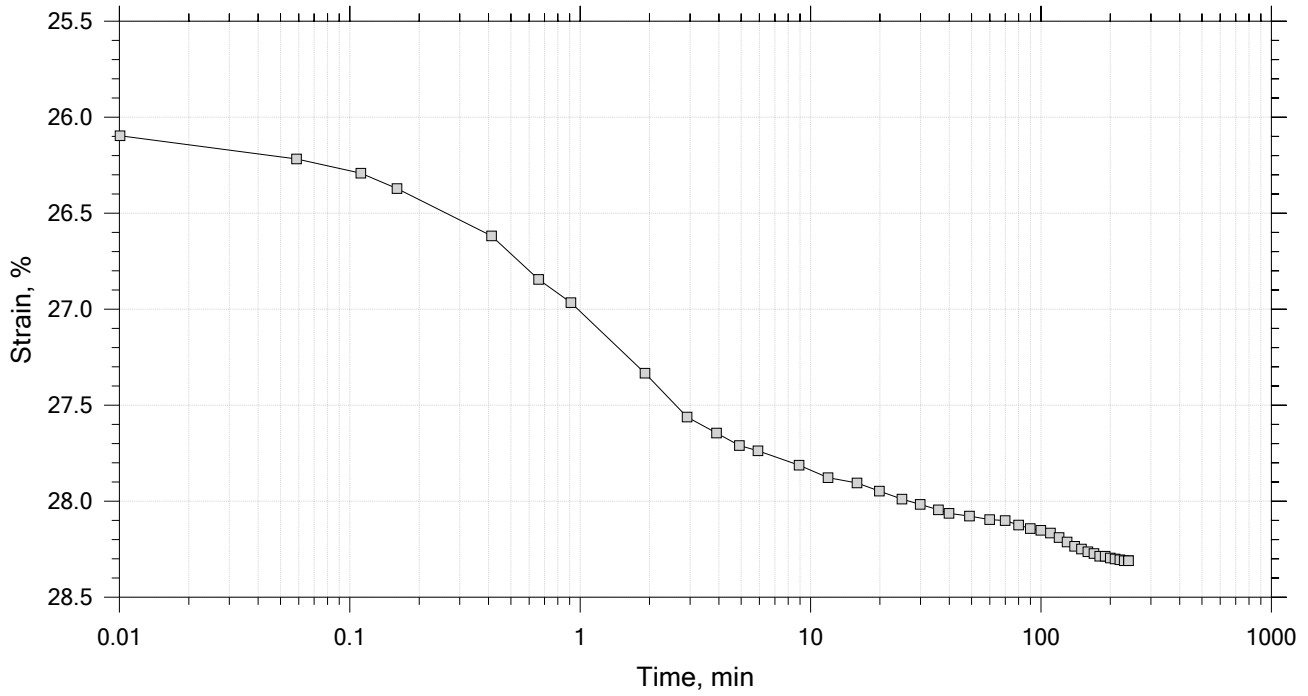



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



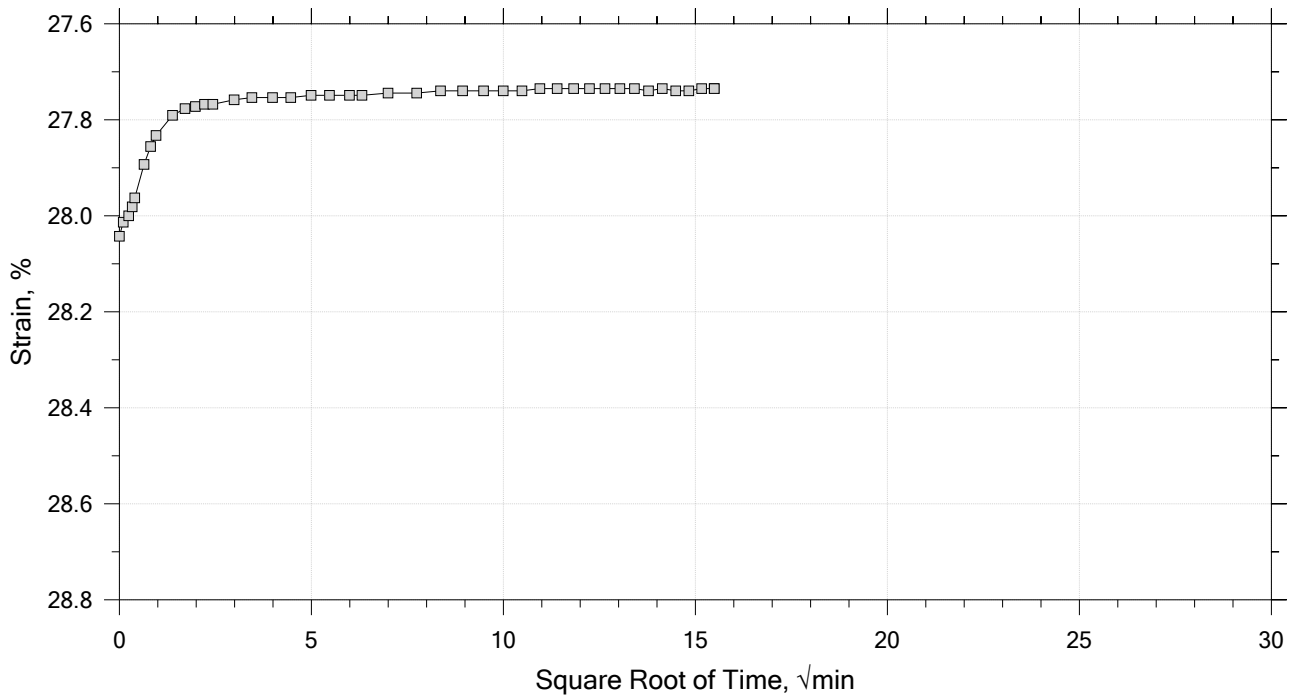
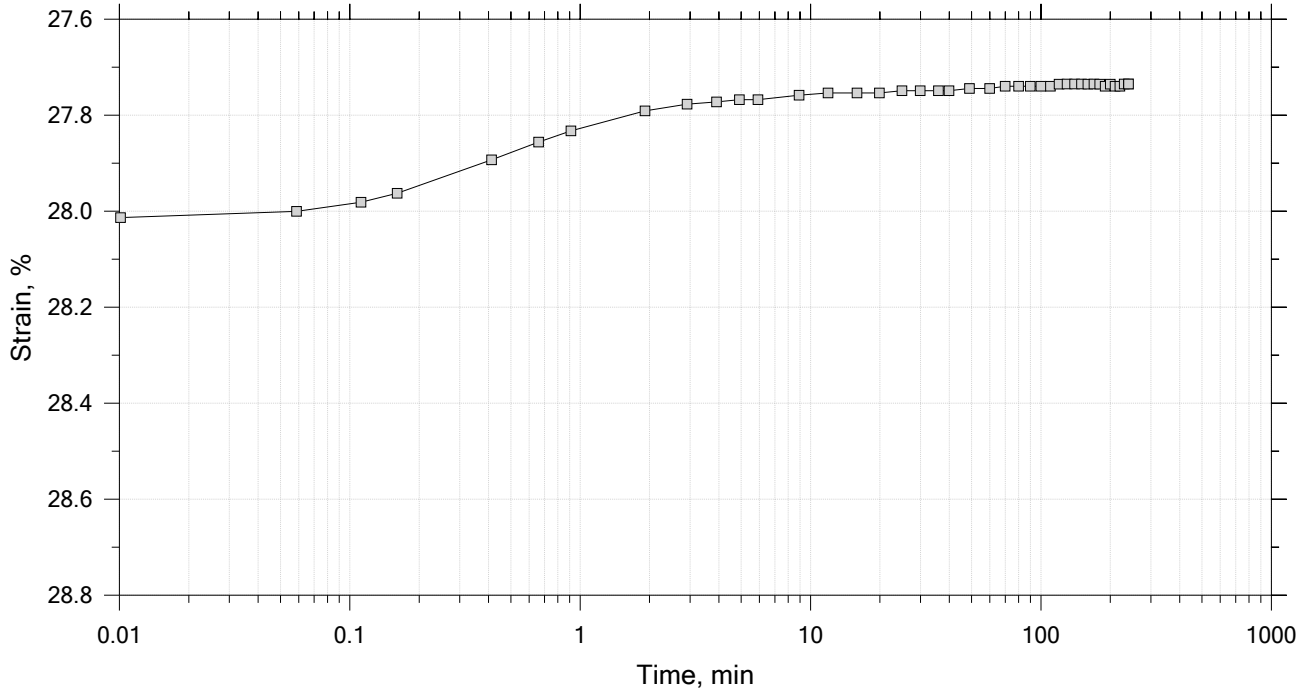
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



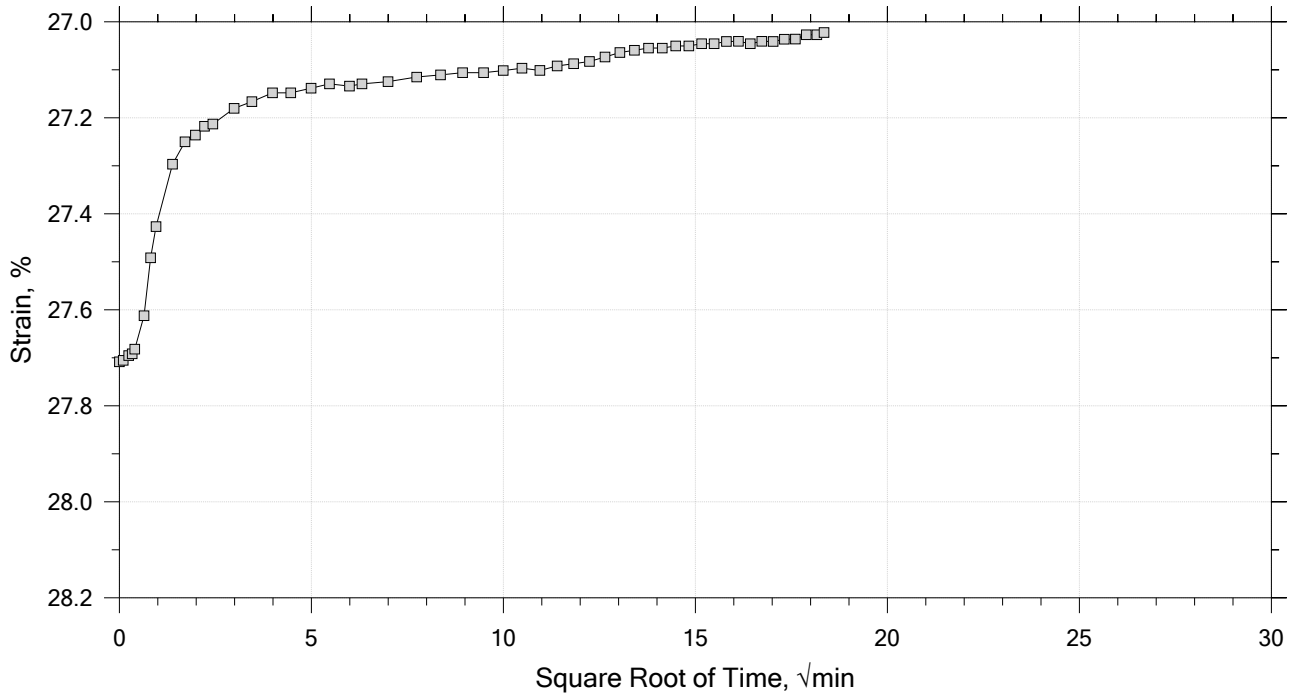
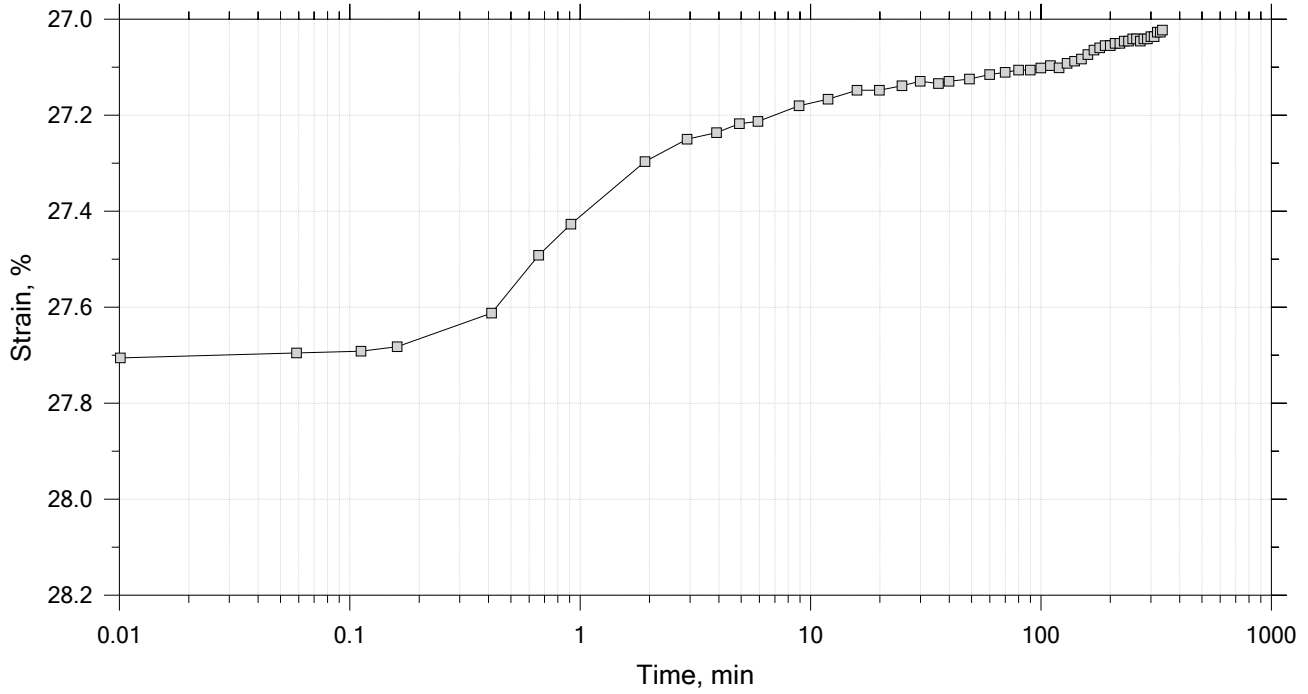
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



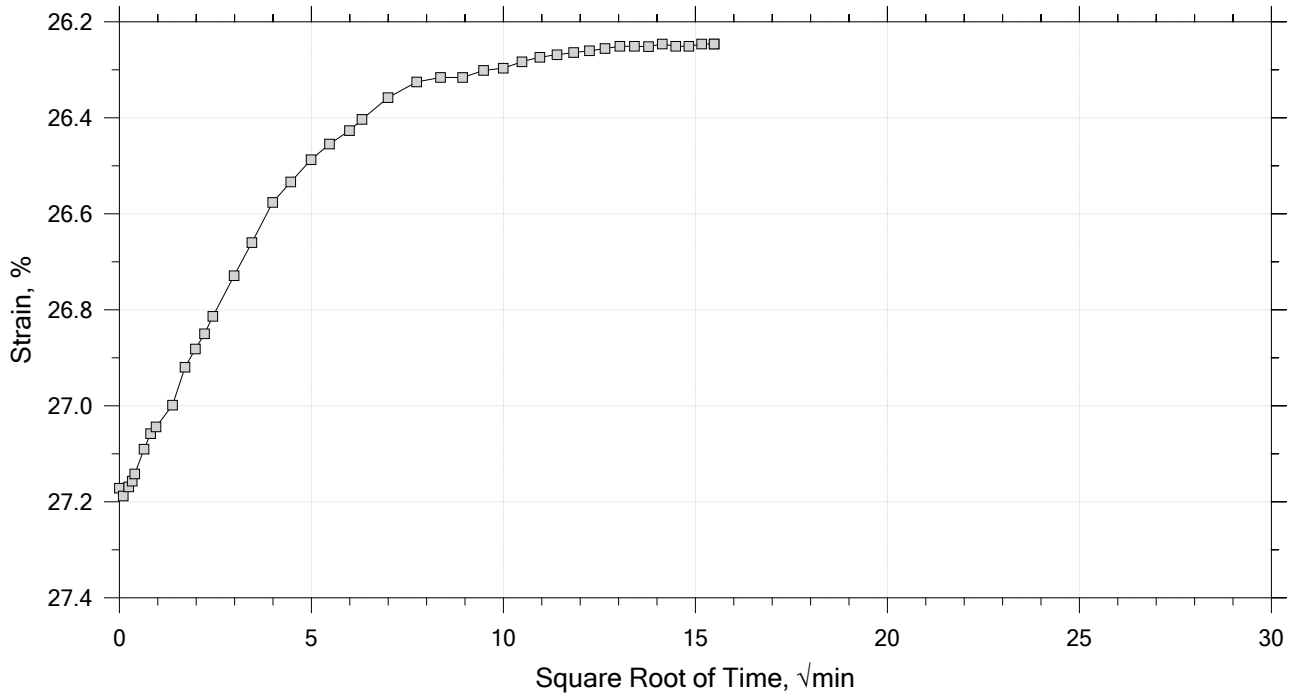
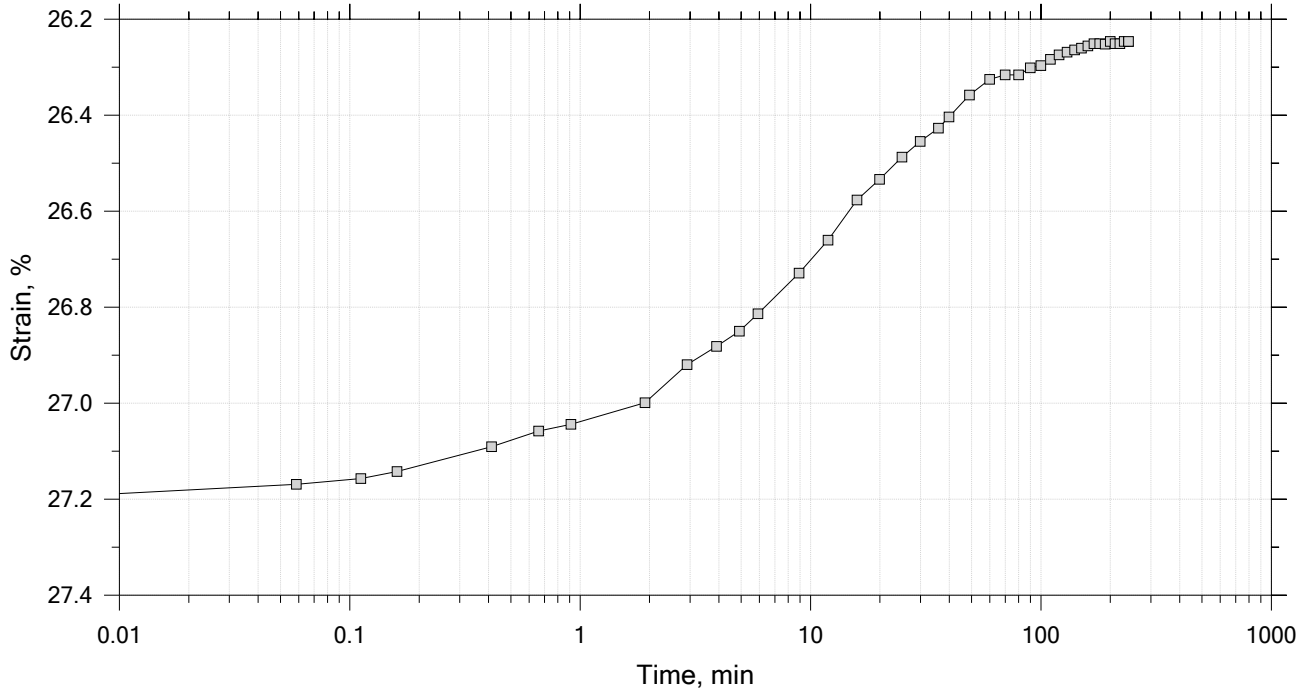
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



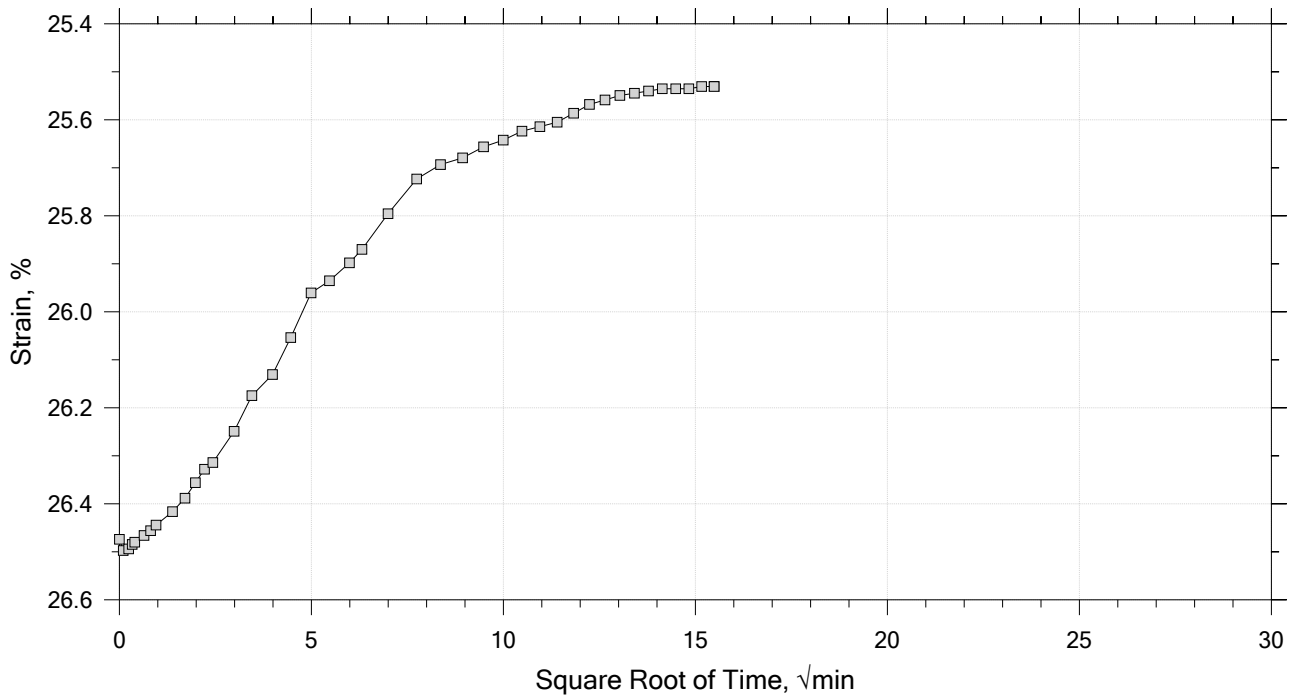
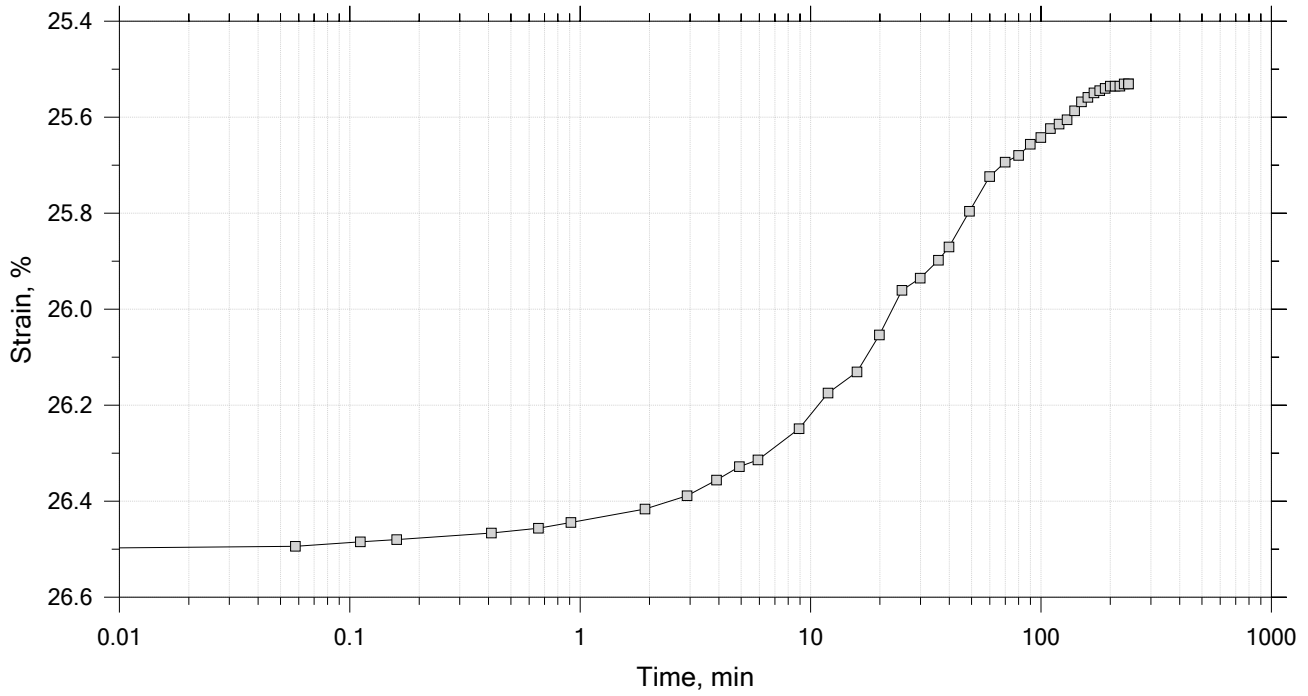
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



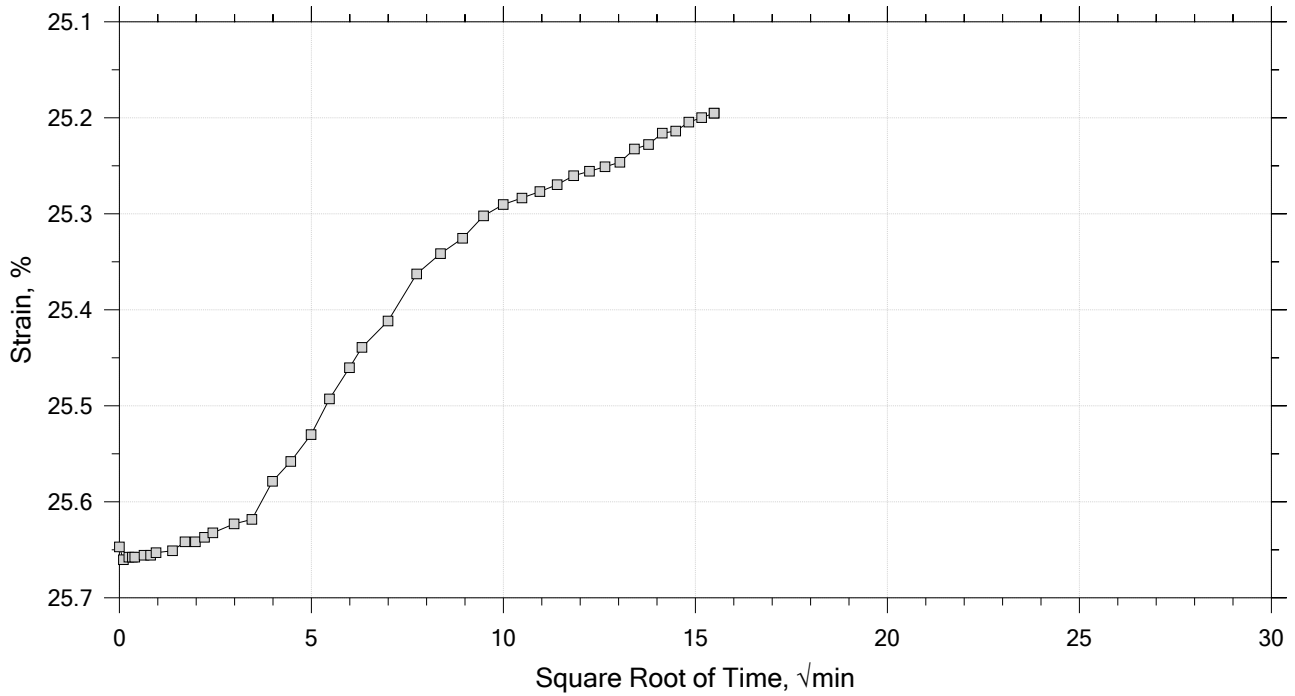
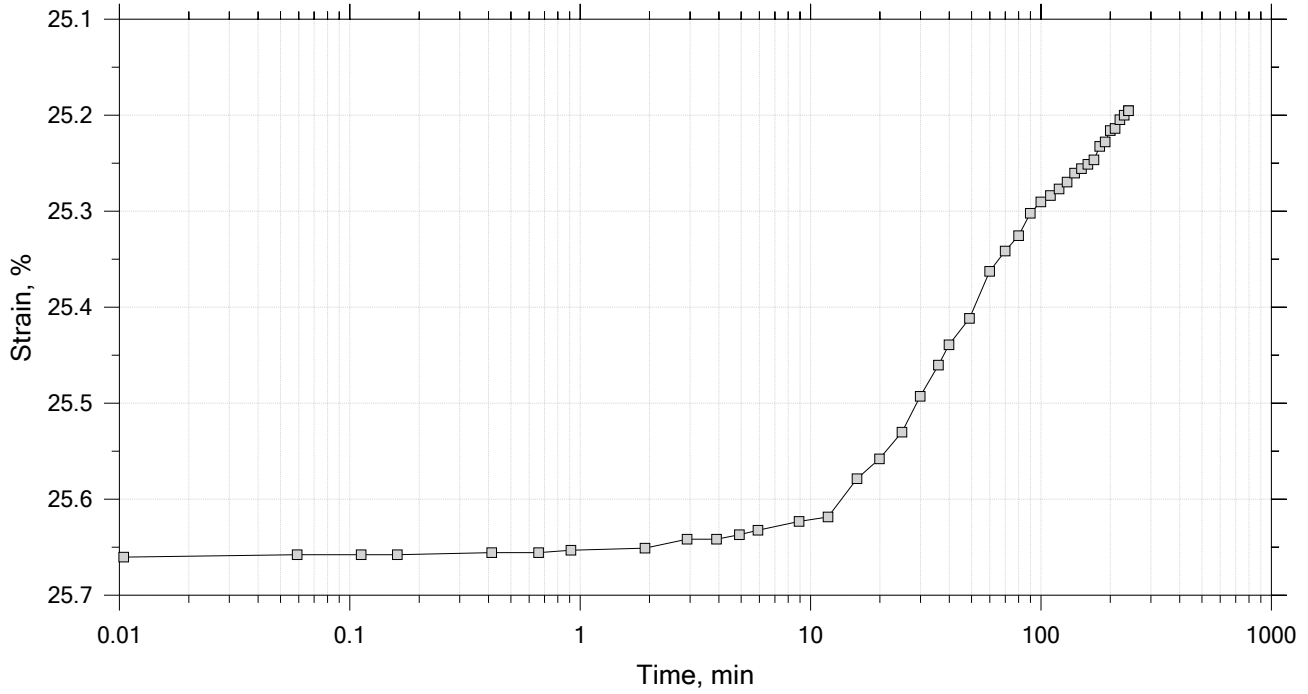
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.72	Liquid Limit: 27
Initial Height: 1.00 in	Initial Void Ratio: 0.914	Plastic Limit: 16
Final Height: 0.77 in	Final Void Ratio: 0.474	Plasticity Index: 11

	Before Test Trimblings	Before Test Specimen	After Test Specimen	After Test Trimblings
Container ID	D2441	RING		D1581
Mass Container, gm	8.37	112.41	112.41	8.72
Mass Container + Wet Soil, gm	150.77	265.2	246.84	139.34
Mass Container + Dry Soil, gm	111.43	226.94	226.94	120
Mass Dry Soil, gm	103.06	114.53	114.53	111.28
Water Content, %	38.17	33.41	17.38	17.38
Void Ratio	---	0.91	0.47	---
Degree of Saturation, %	---	99.63	100.00	---
Dry Unit Weight, pcf	---	88.882	115.43	---

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.

	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 16-18 ft
	Test No.: IP-7	Sample Type: intact	Elevation: ---
	Description: Wet, dark gray clay		
	Remarks: System V, Swell Pressure = 0.0624 tsf		

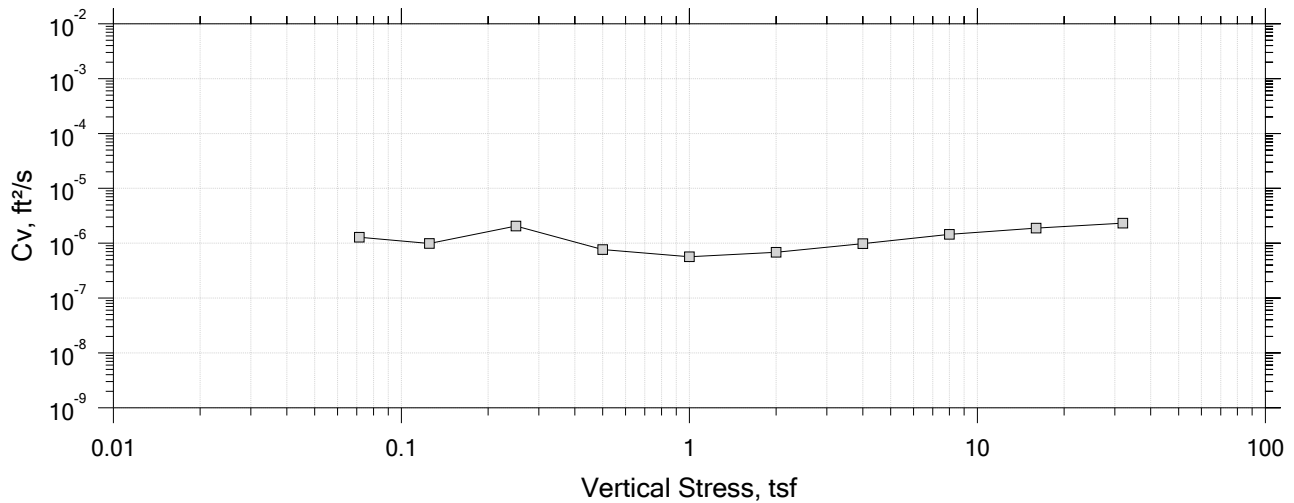
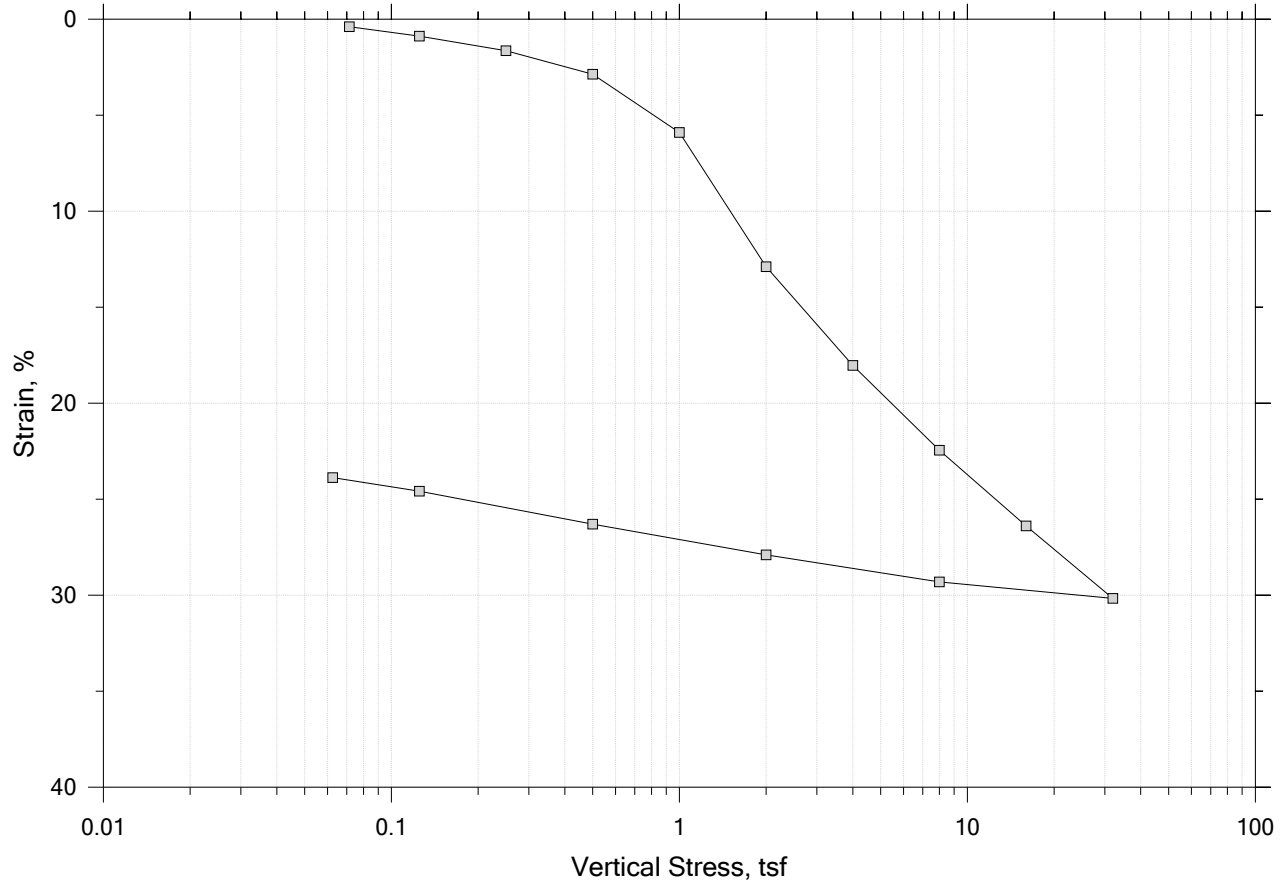







# One-Dimensional Consolidation by ASTM D2435 - Method B

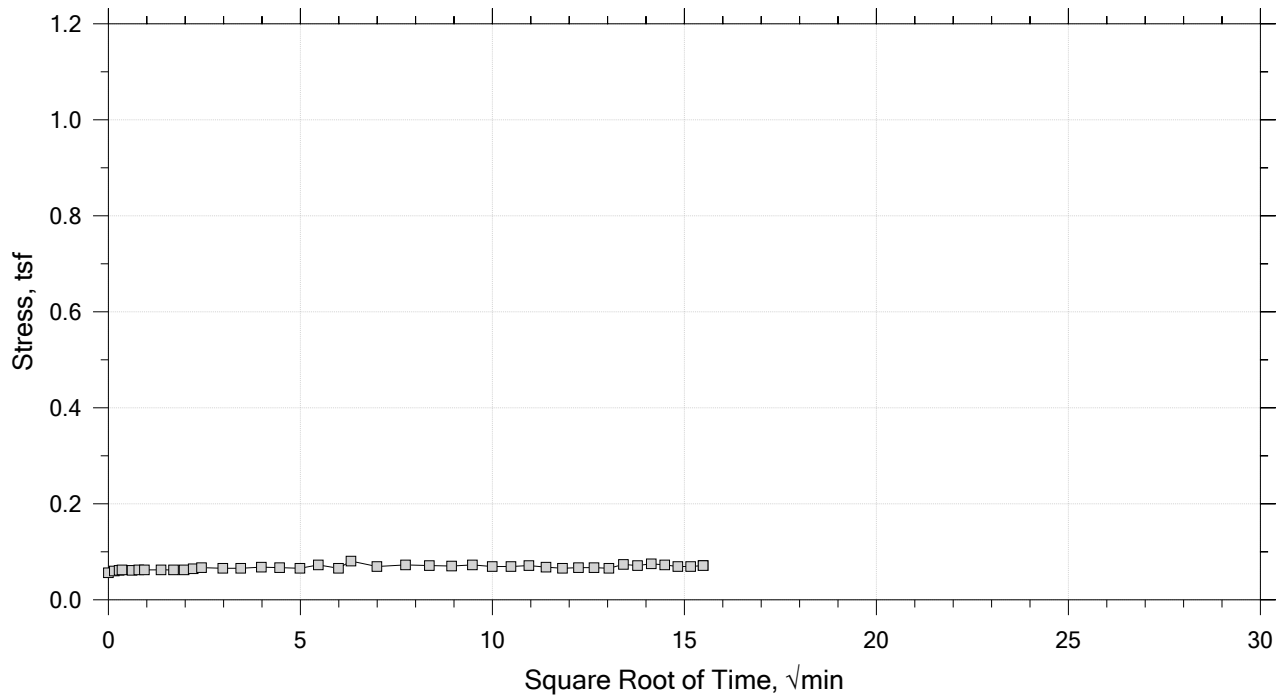
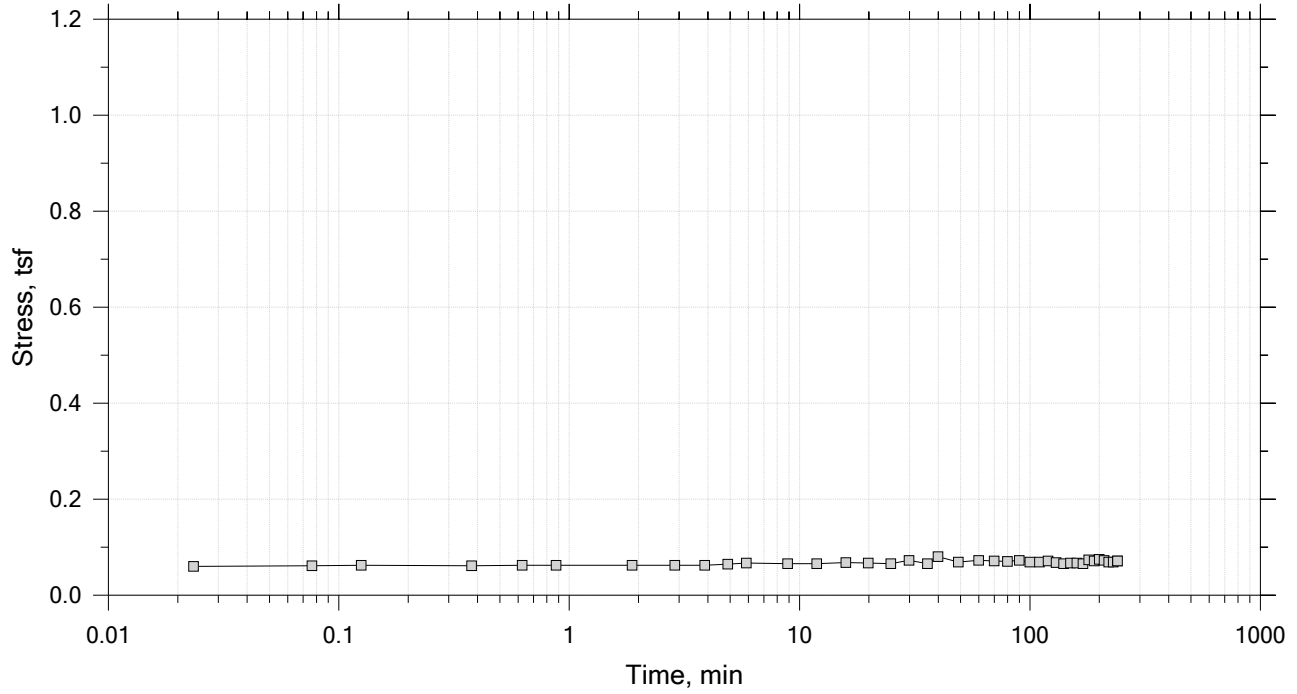
## Summary Report




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

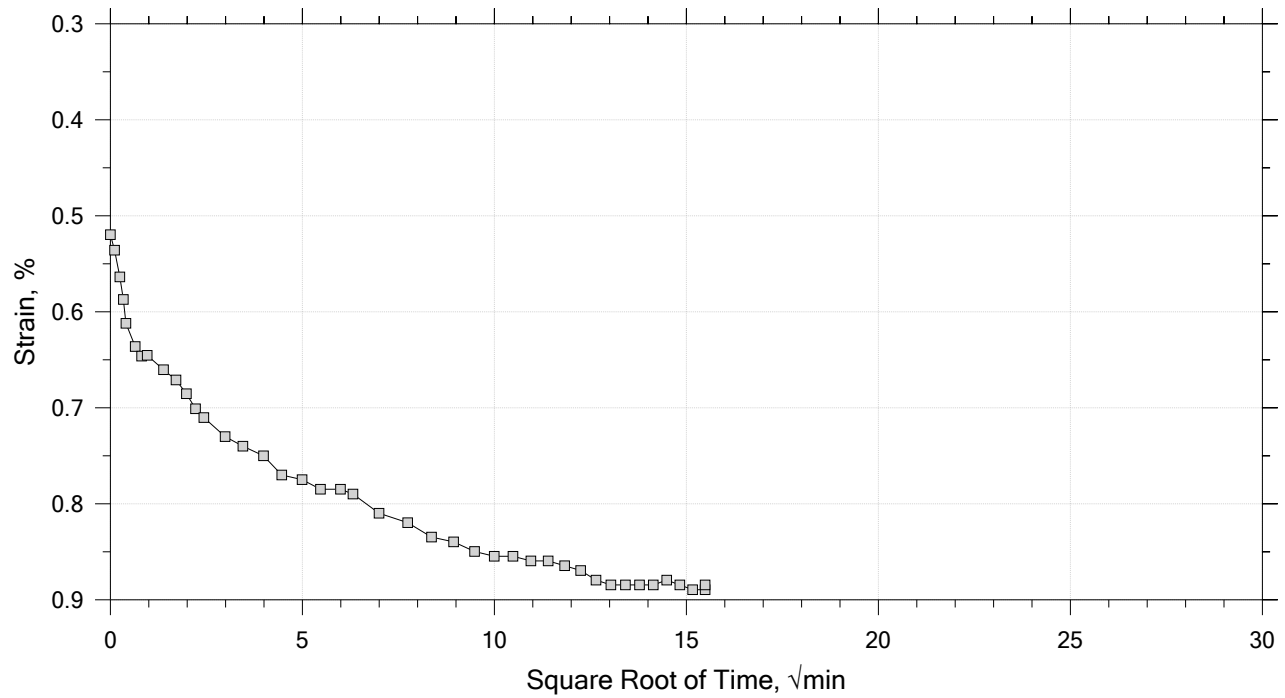
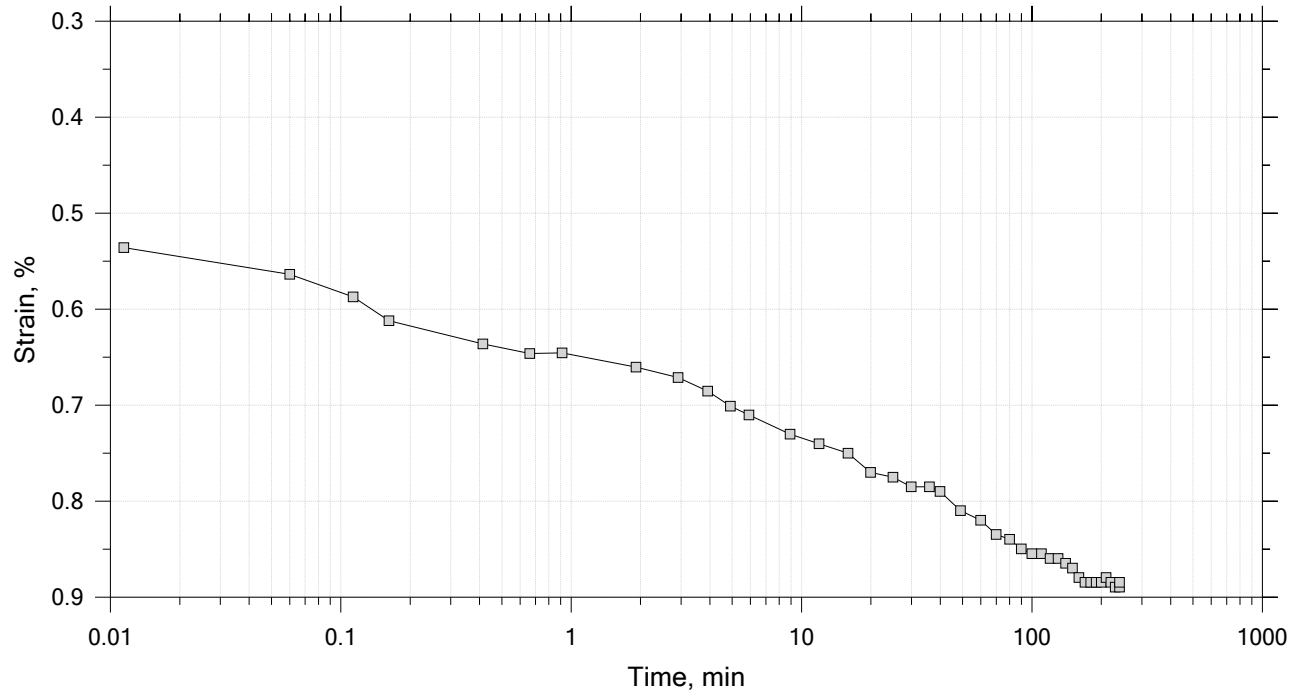
Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.0714 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf



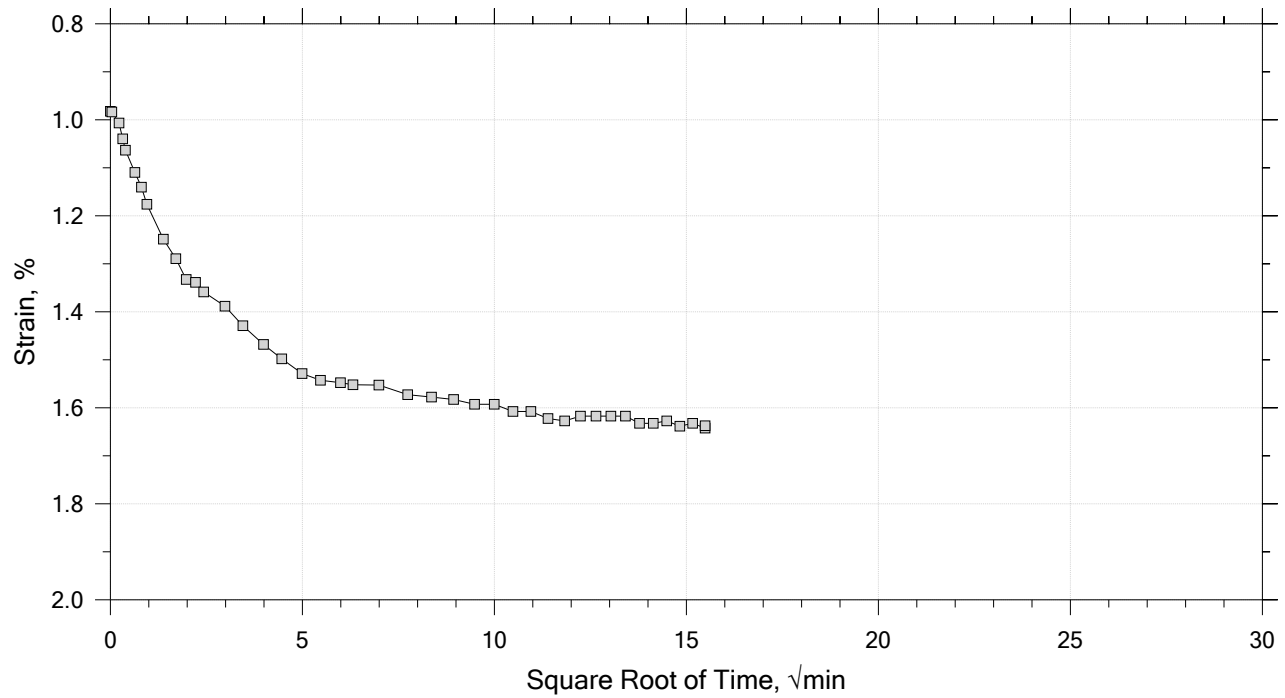
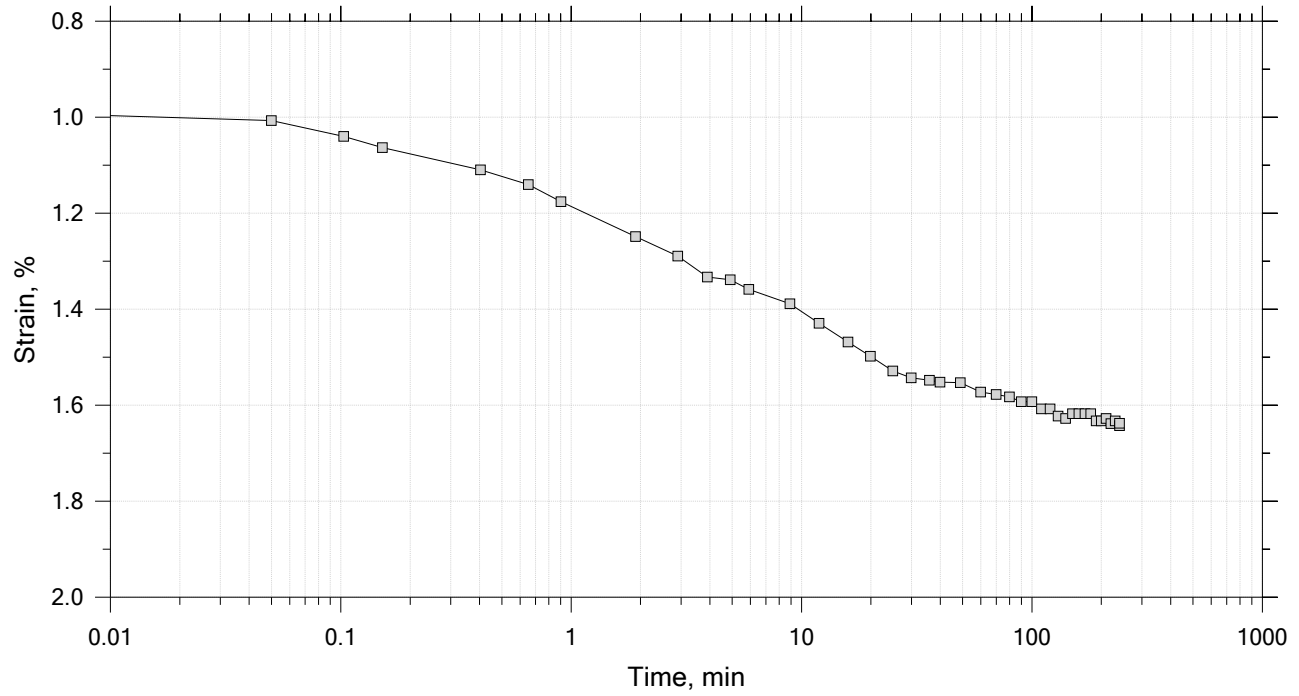
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 15

Constant Load Step

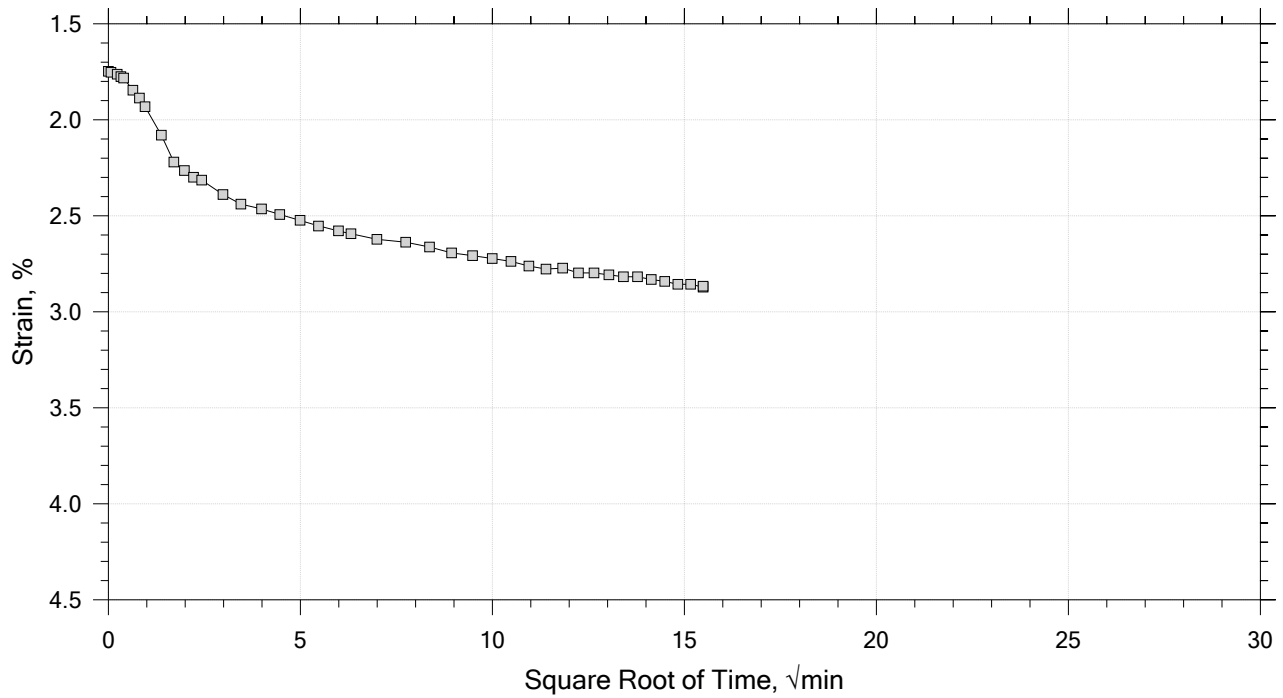
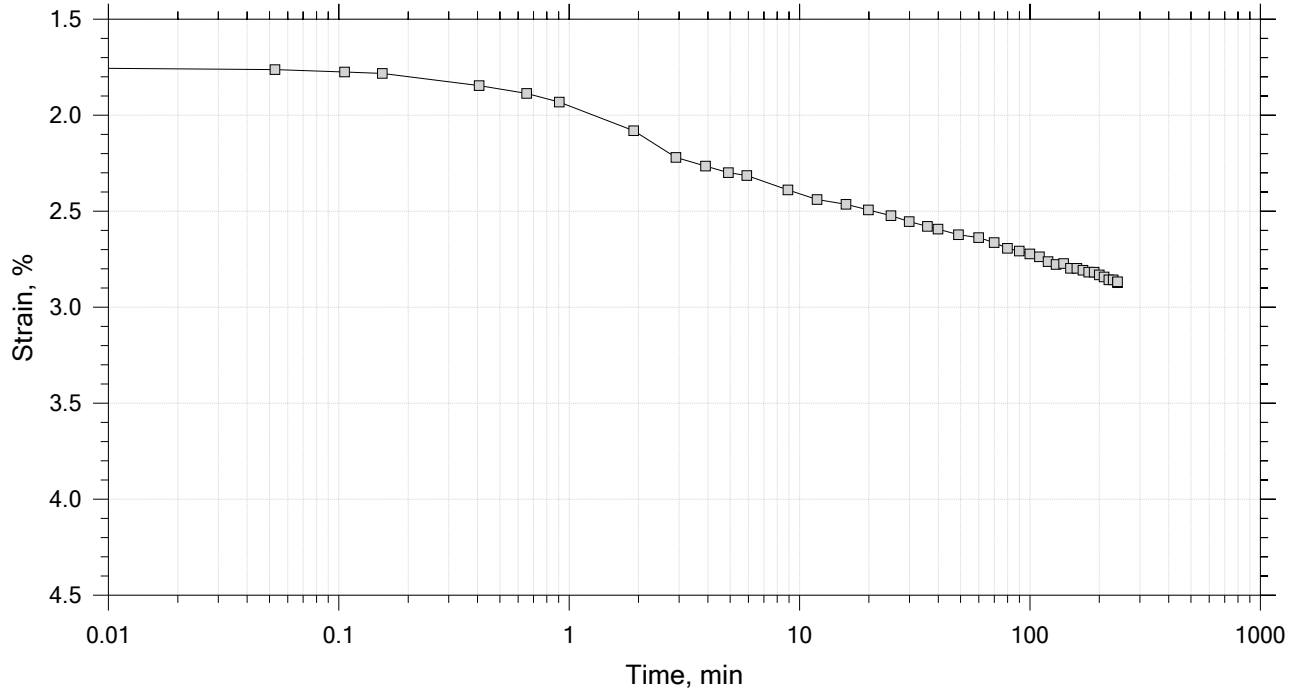
Stress: 0.25 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 15  
 Constant Load Step  
 Stress: 0.5 tsf



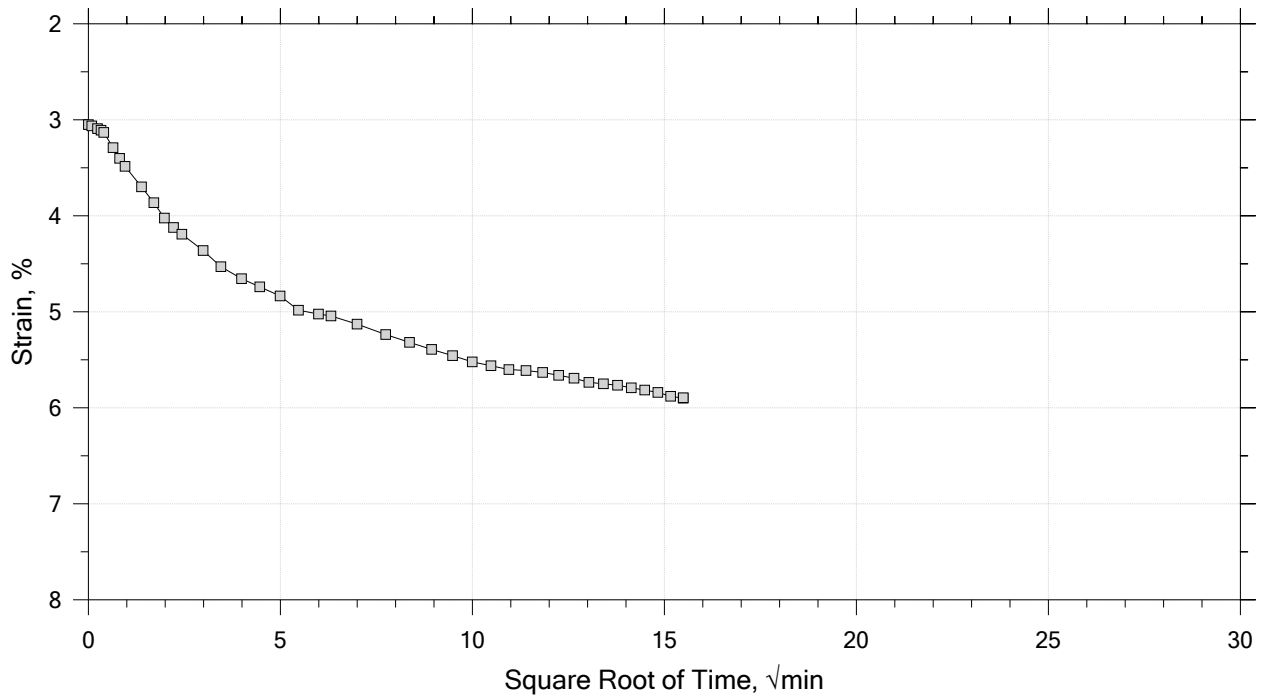
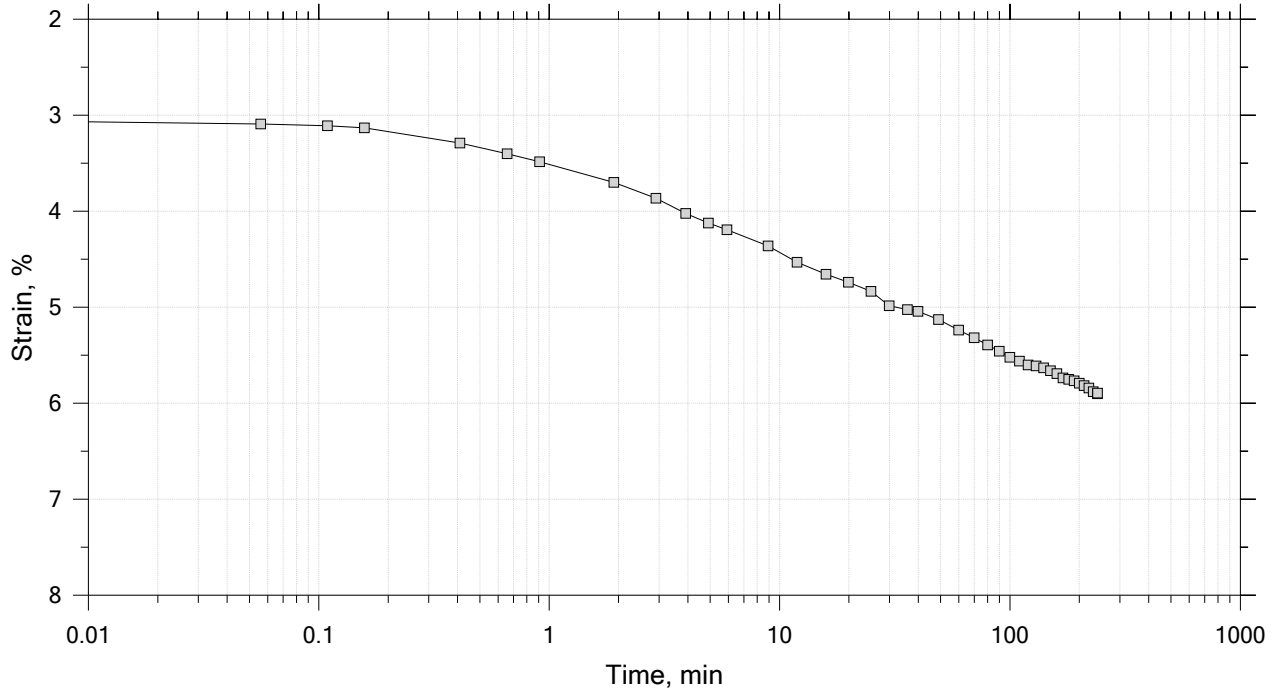
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	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 15

Constant Load Step

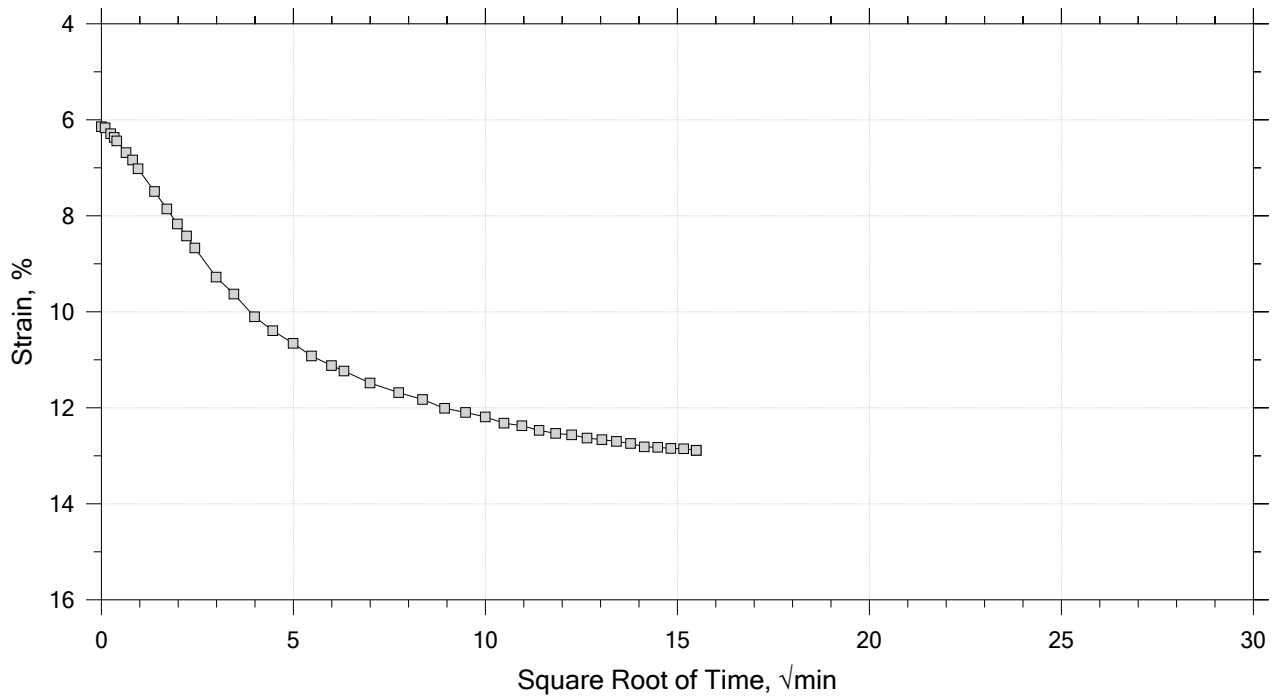
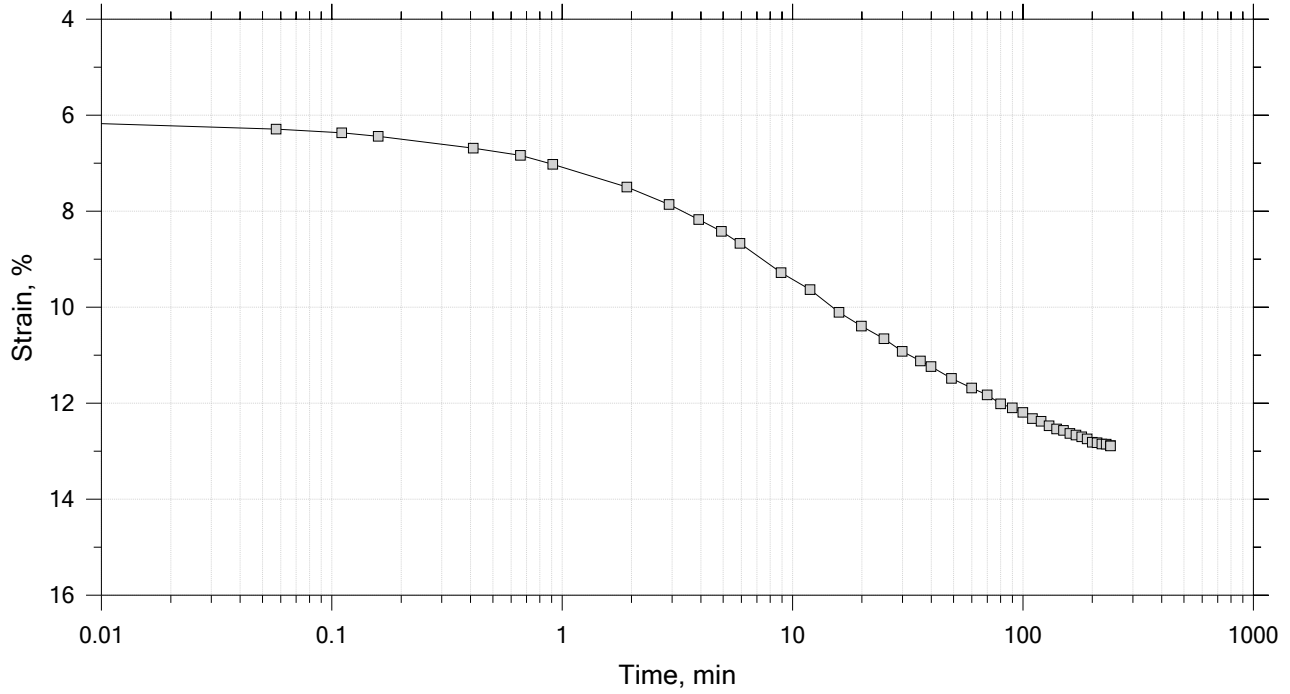
Stress: 1 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 15  
 Constant Load Step  
 Stress: 2 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

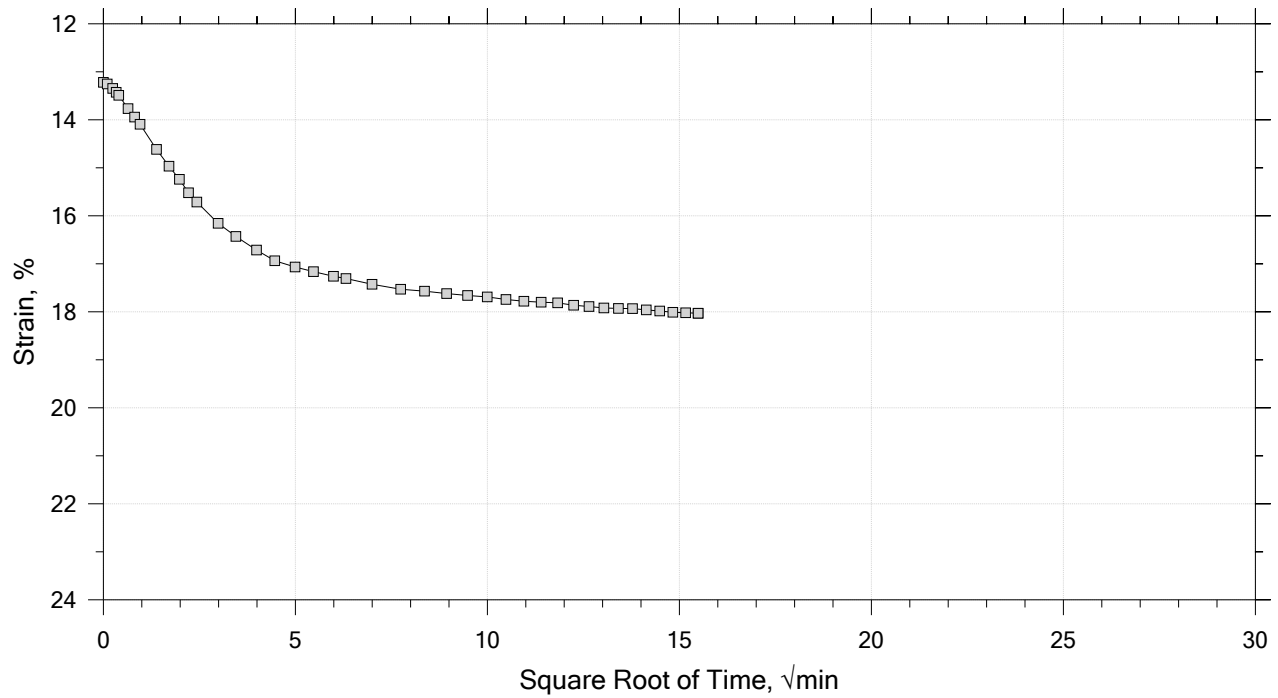
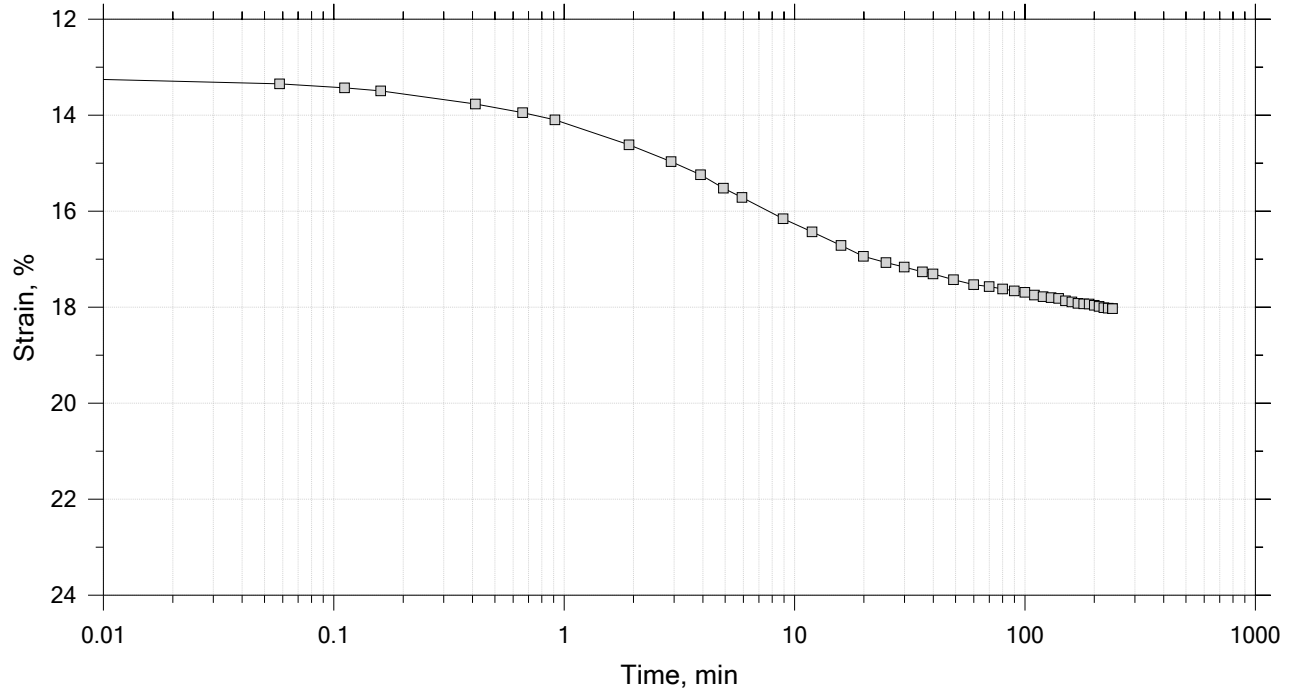



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15

Constant Load Step

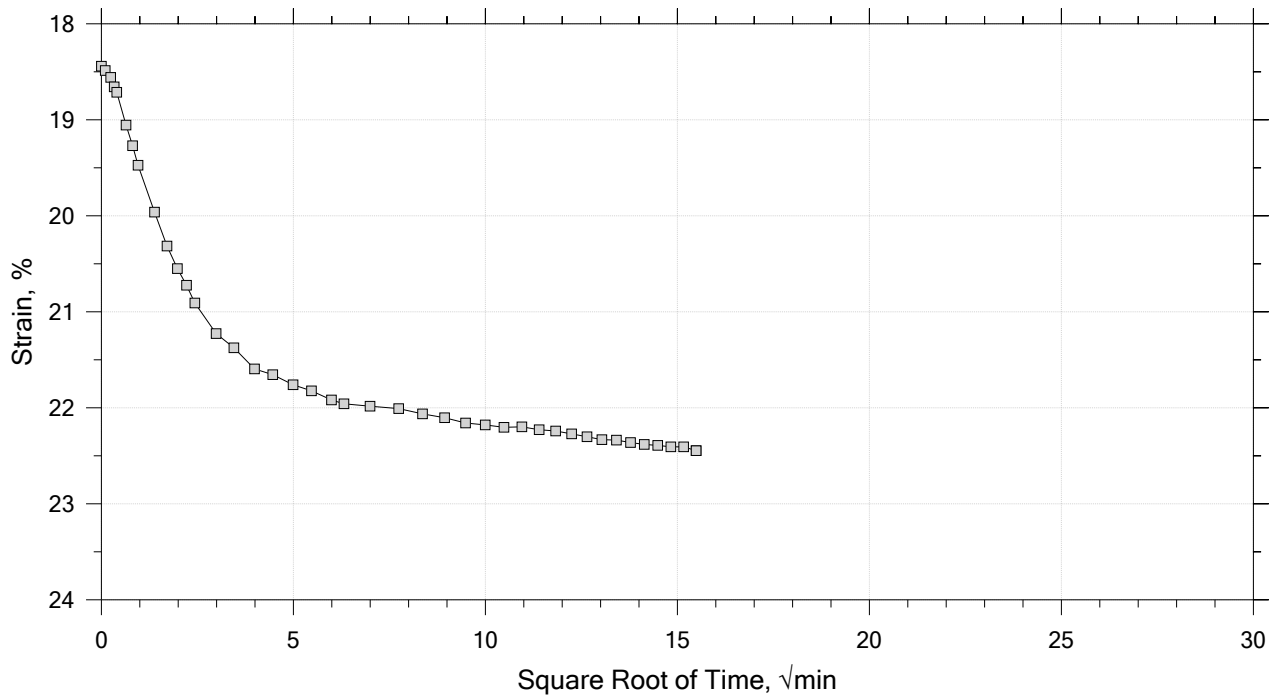
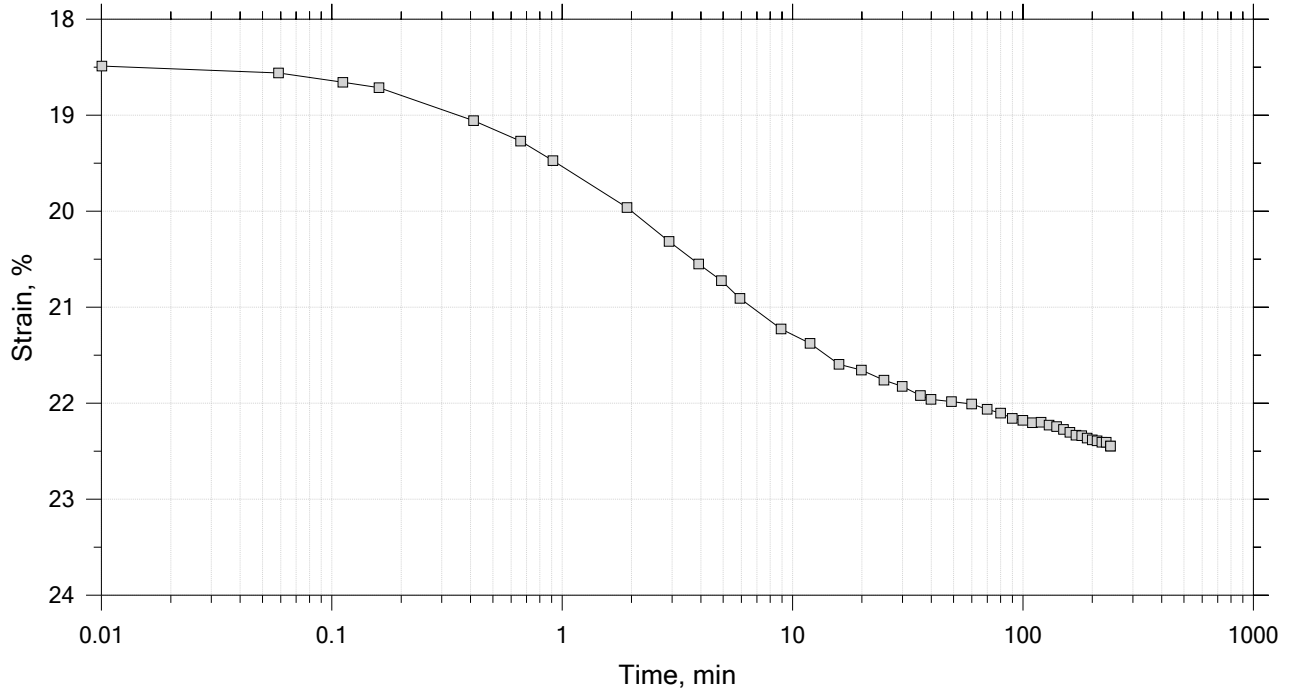
Stress: 4 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

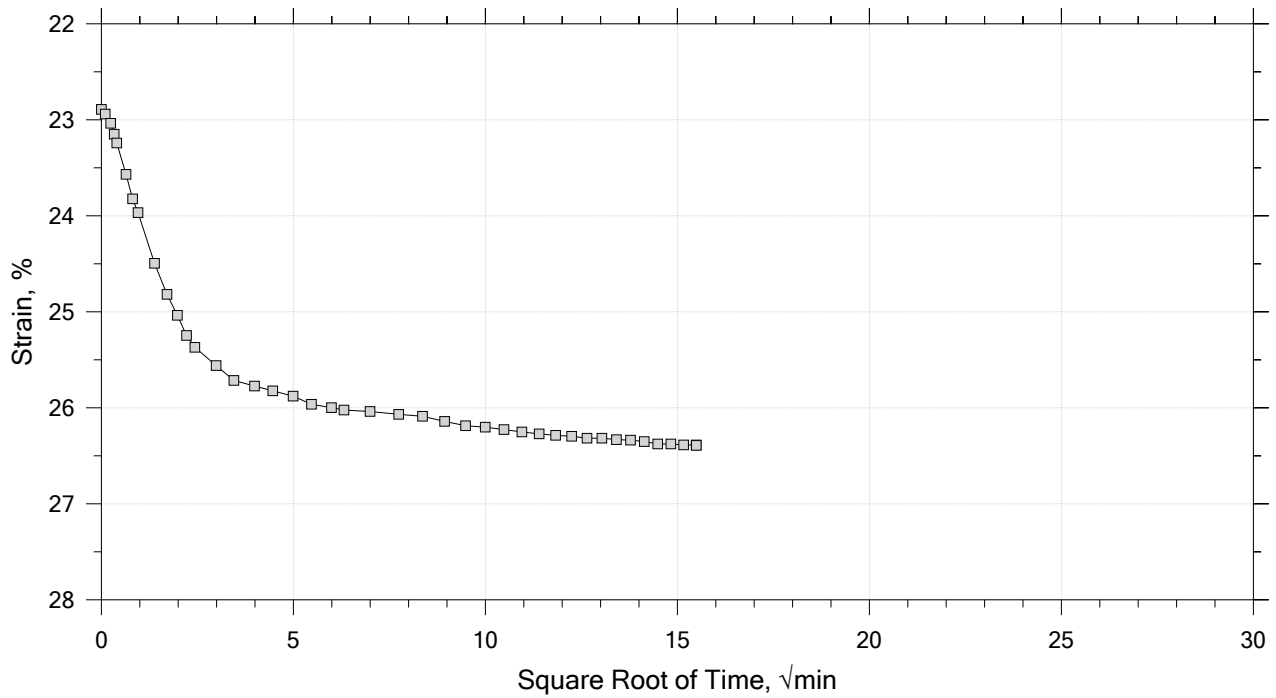
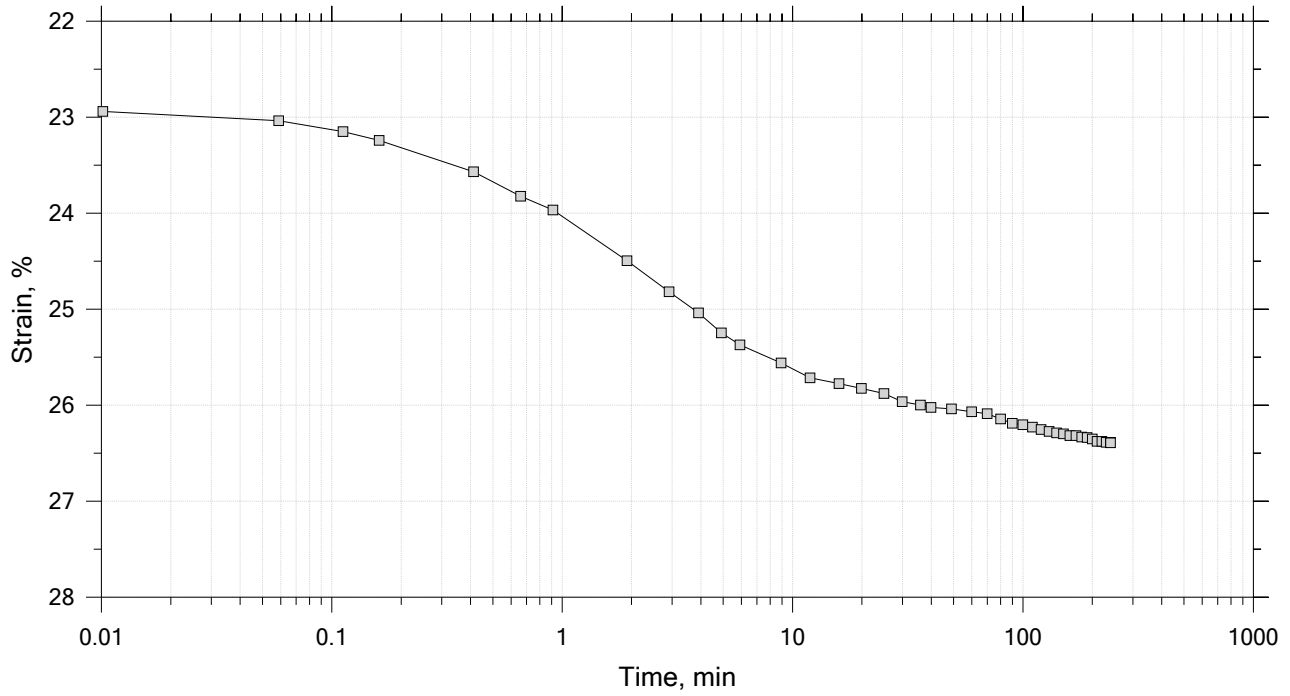
Time Curve 8 of 15  
 Constant Load Step  
 Stress: 8 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15  
 Constant Load Step  
 Stress: 16 tsf



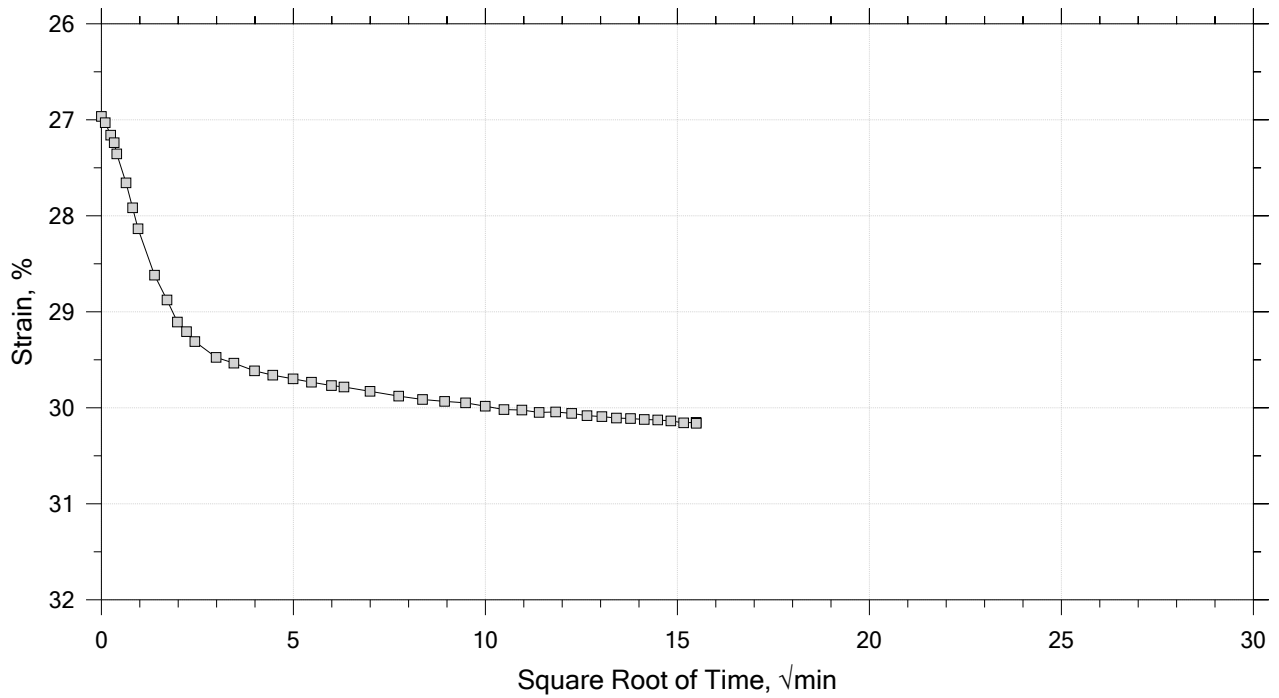
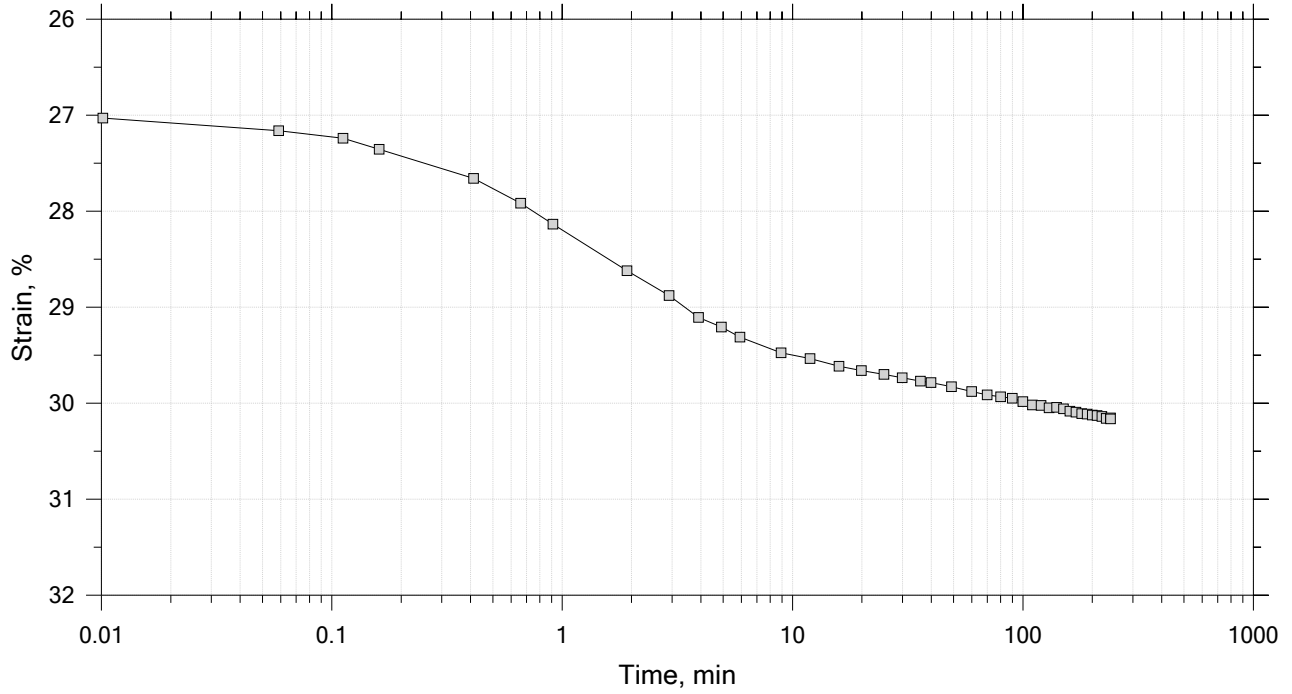
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	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



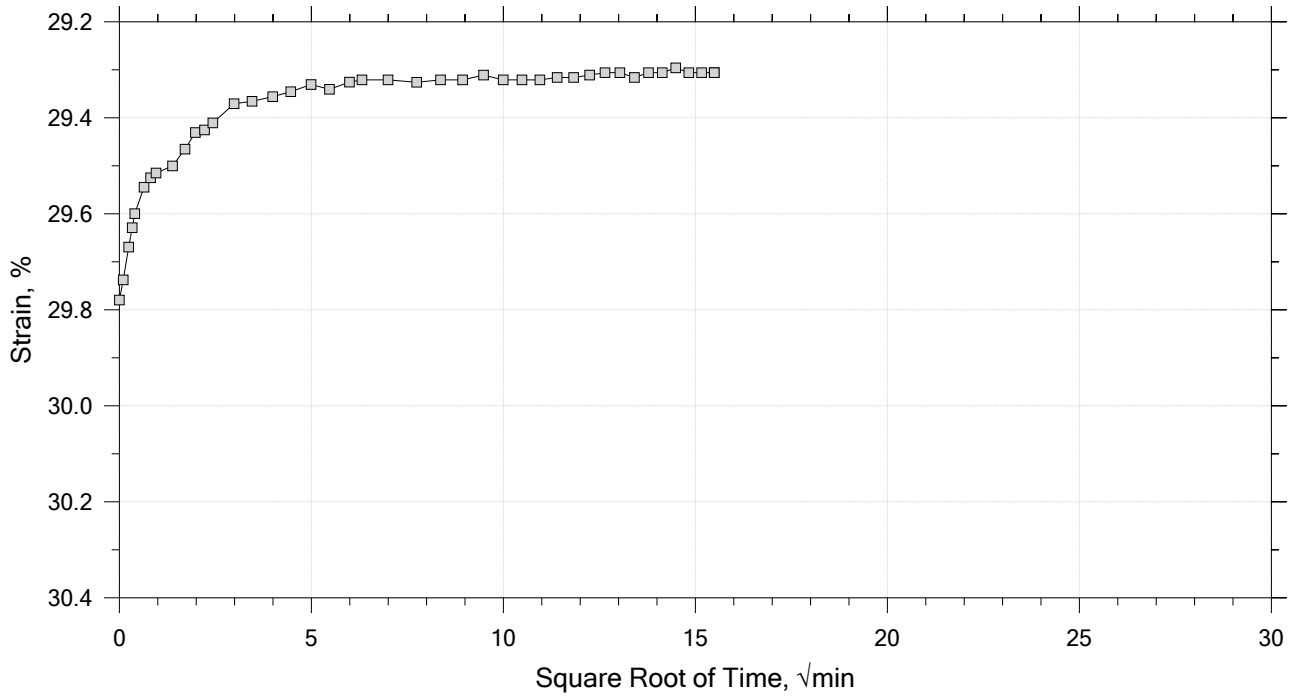
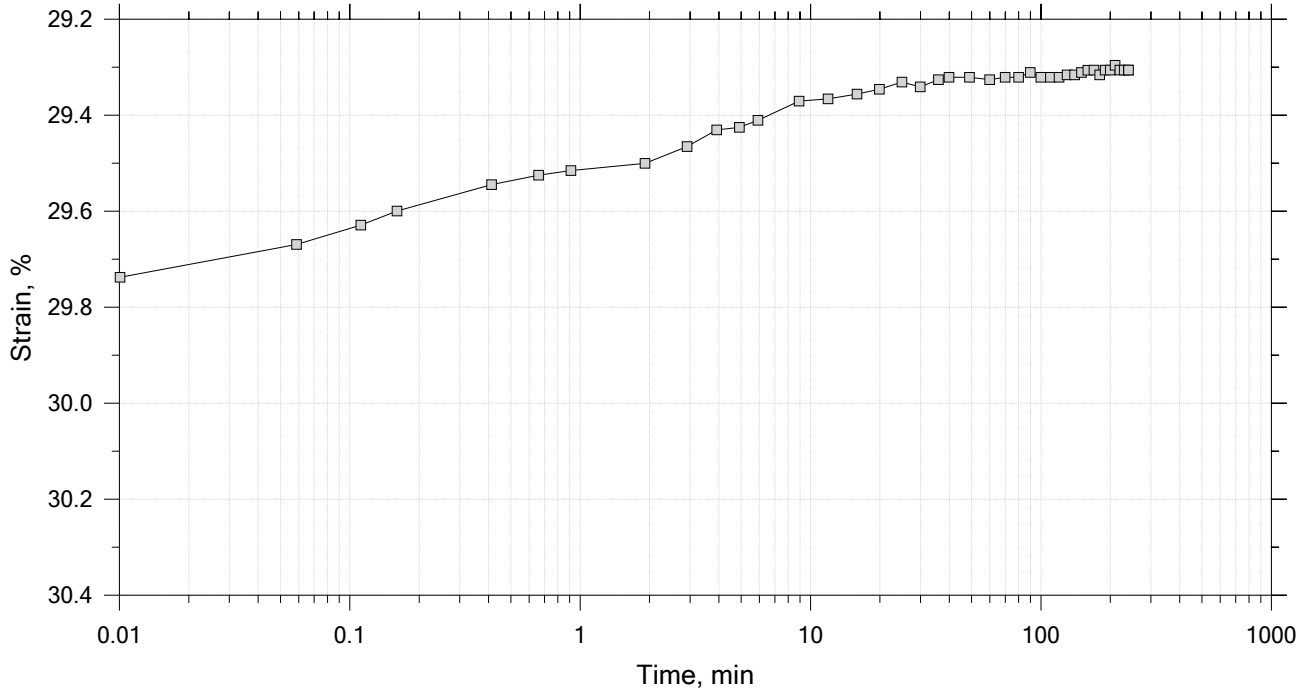
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	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



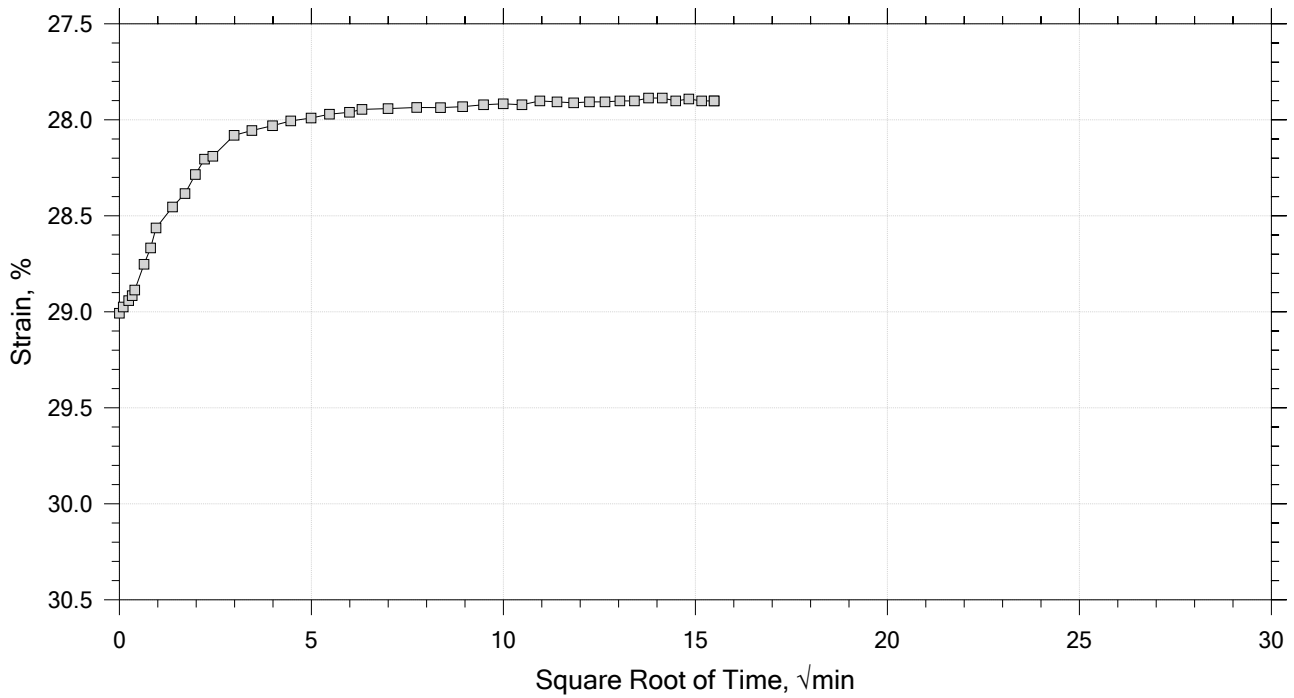
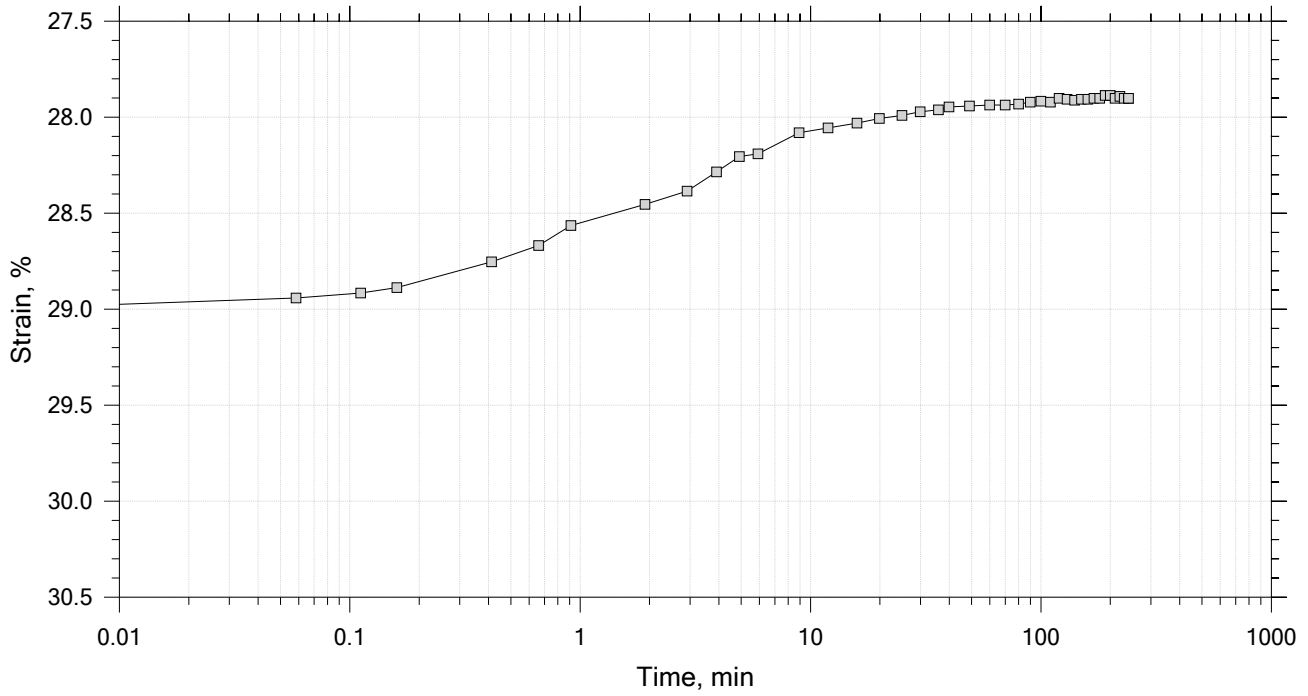
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



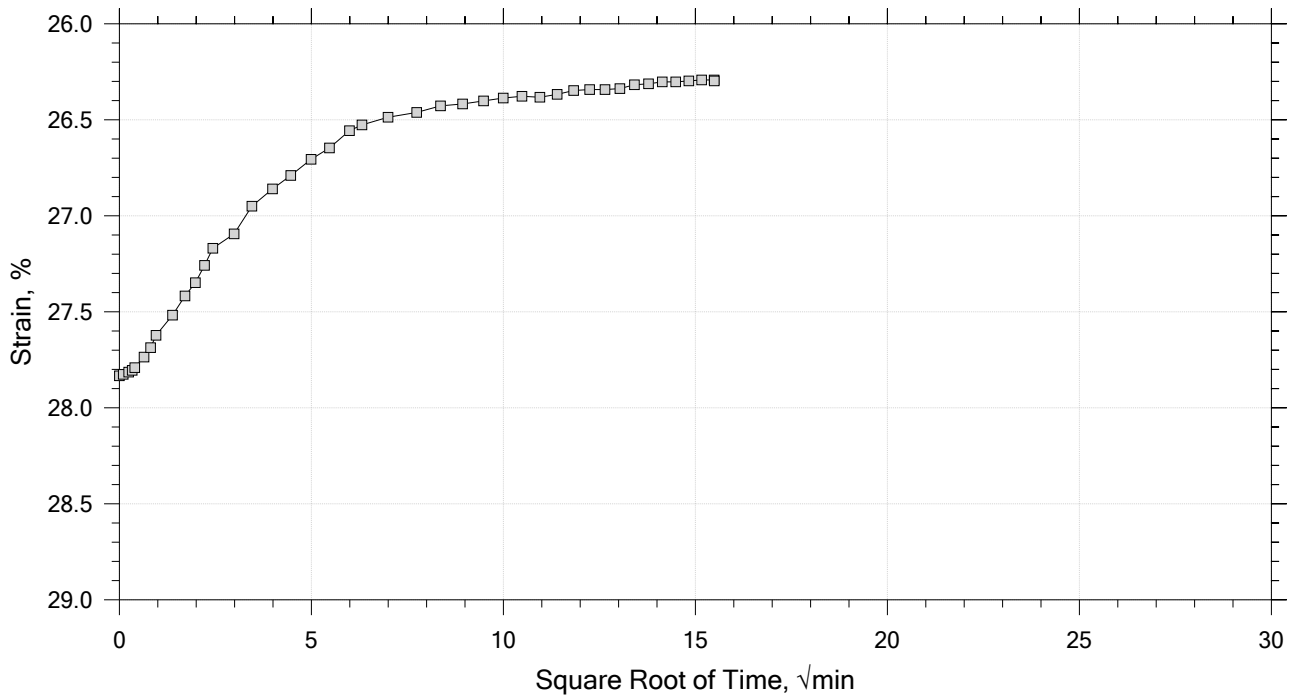
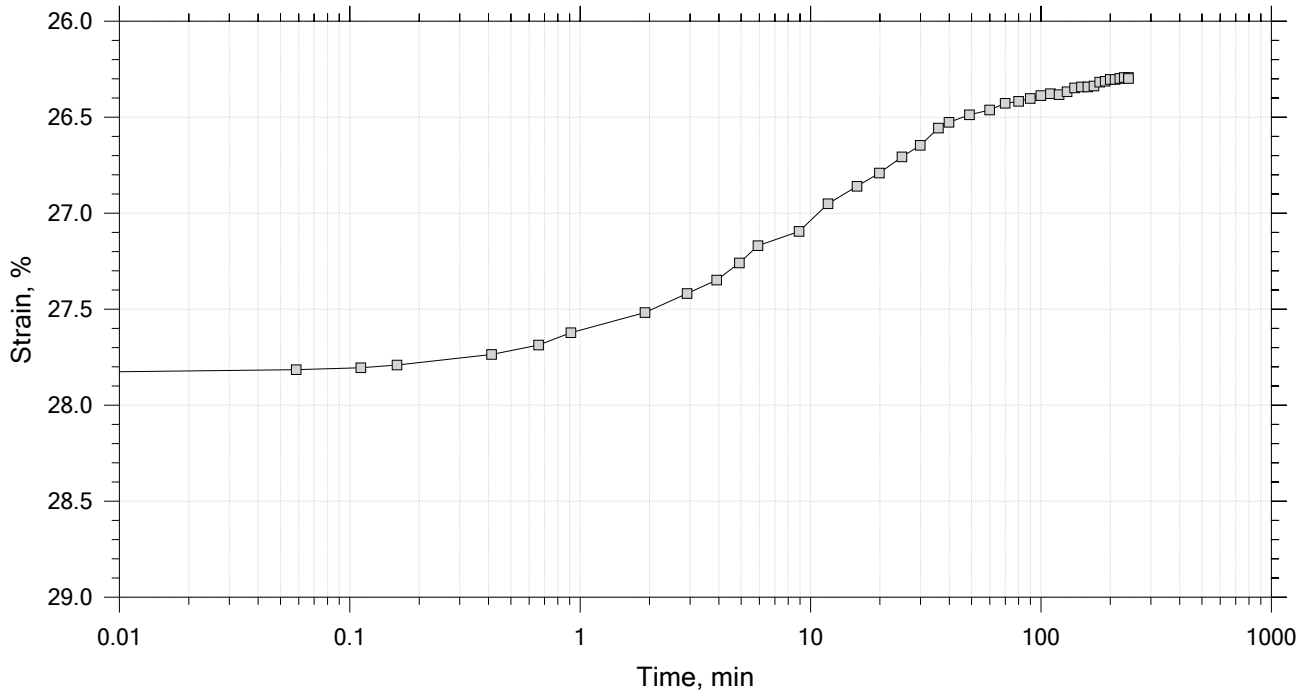
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



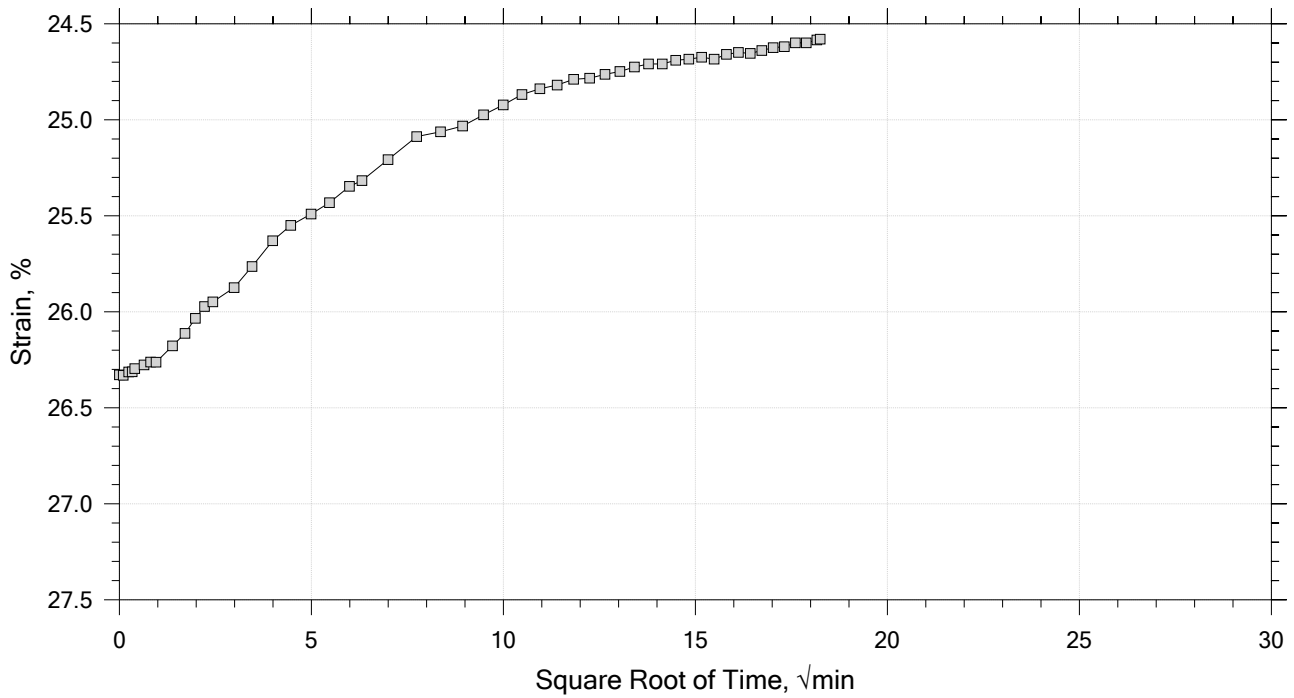
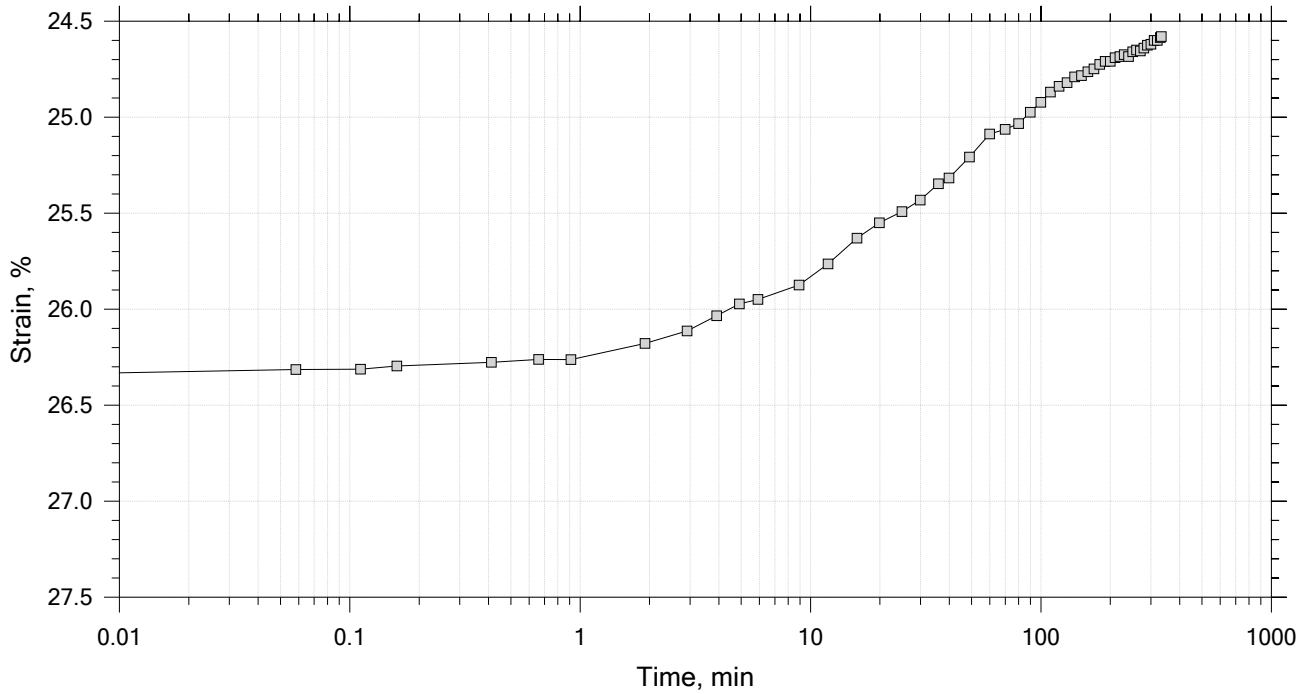
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

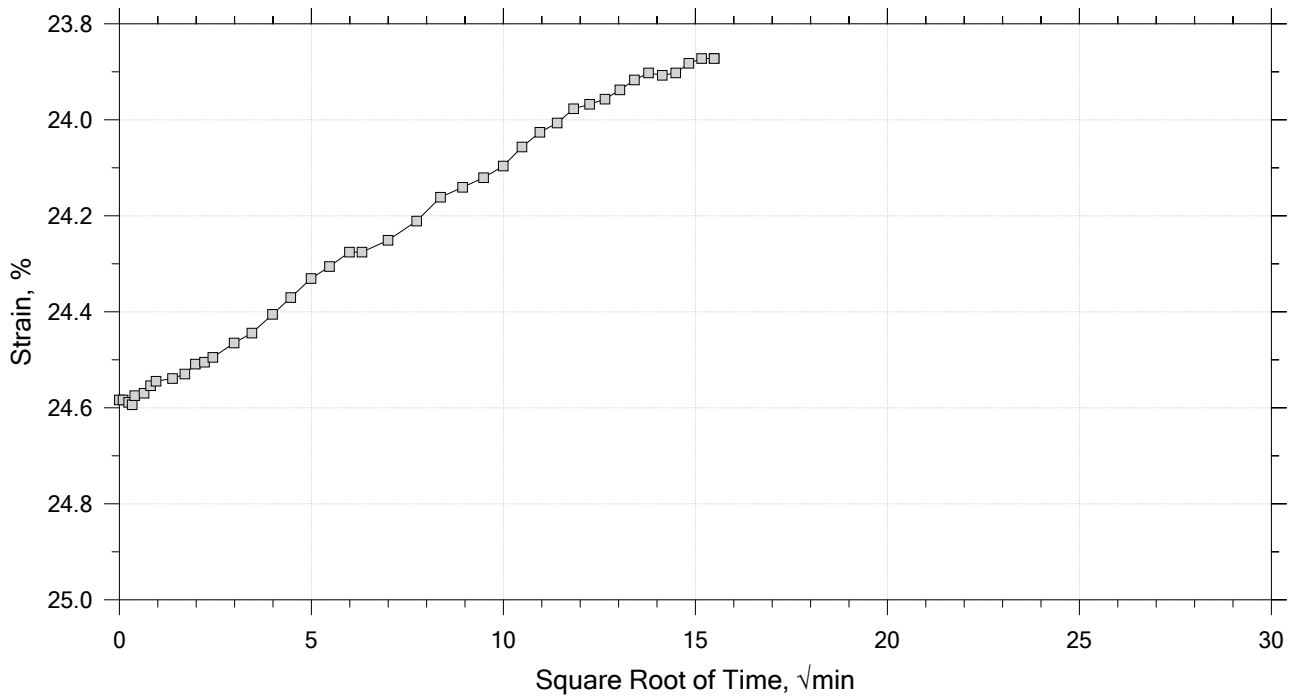
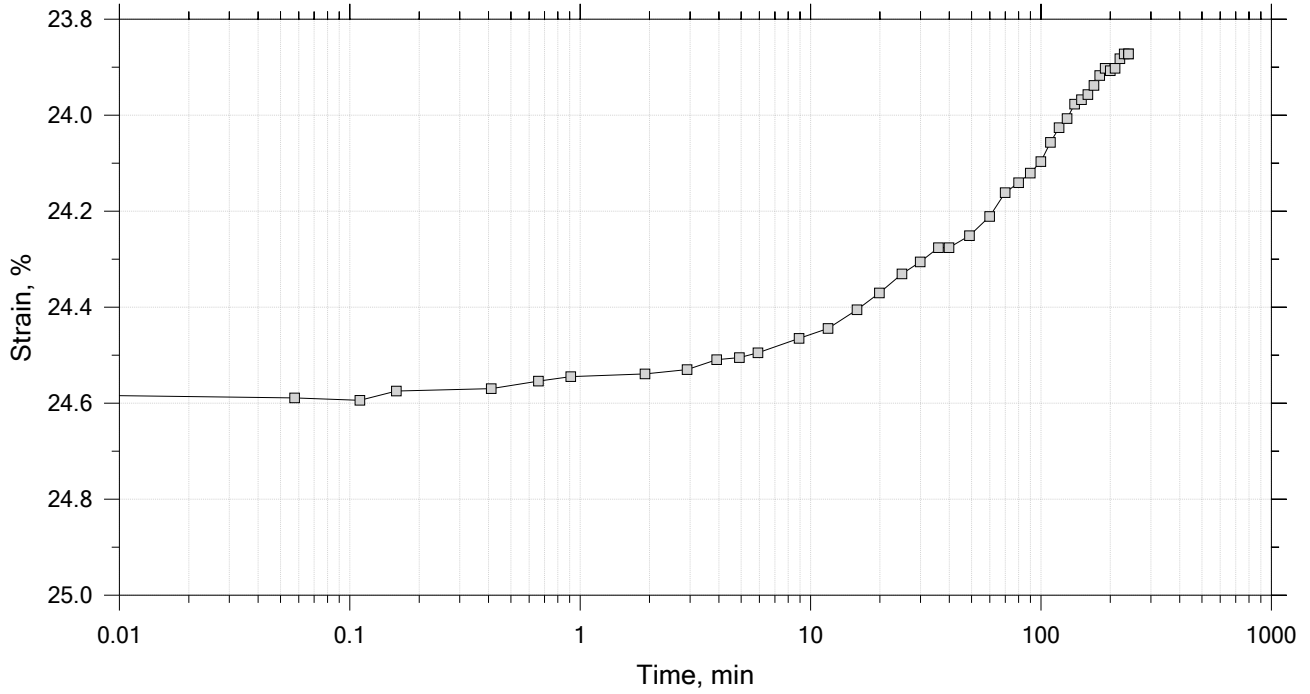



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.77	Liquid Limit: 28
Initial Height: 1.00 in	Initial Void Ratio: 1.23	Plastic Limit: 18
Final Height: 0.79 in	Final Void Ratio: 0.762	Plasticity Index: 10

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	D-2683	RING		B-2005
Mass Container, gm	8.4	109.48	109.48	8.23
Mass Container + Wet Soil, gm	112.2	253.39	236.72	132.86
Mass Container + Dry Soil, gm	82.15	209.25	209.25	105.95
Mass Dry Soil, gm	73.75	99.766	99.766	97.72
Water Content, %	40.75	44.25	27.54	27.54
Void Ratio	---	1.23	0.76	---
Degree of Saturation, %	---	99.50	100.00	---
Dry Unit Weight, pcf	---	77.427	98.009	---

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.

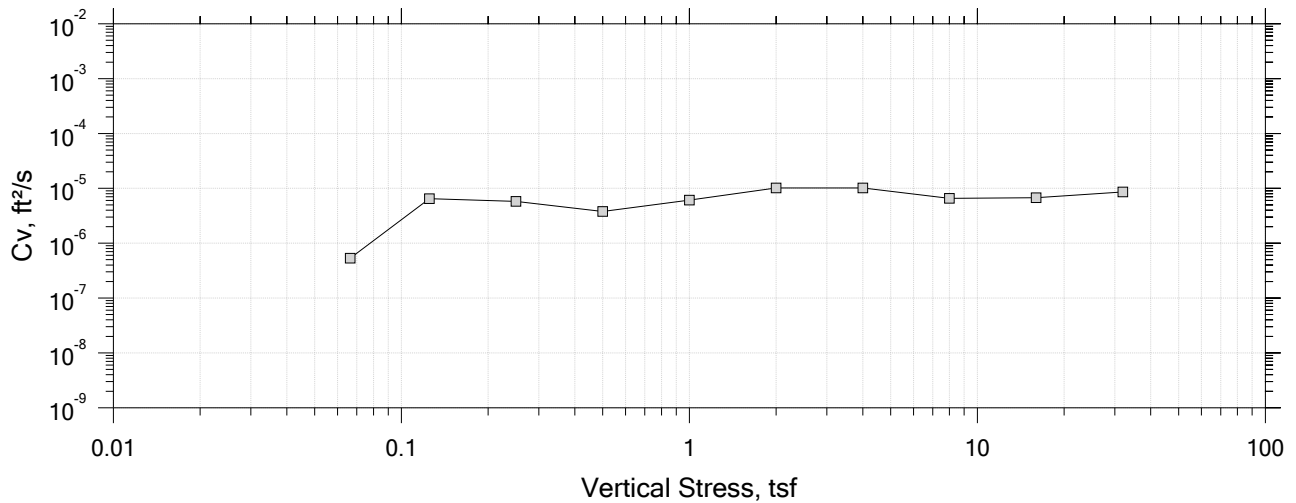
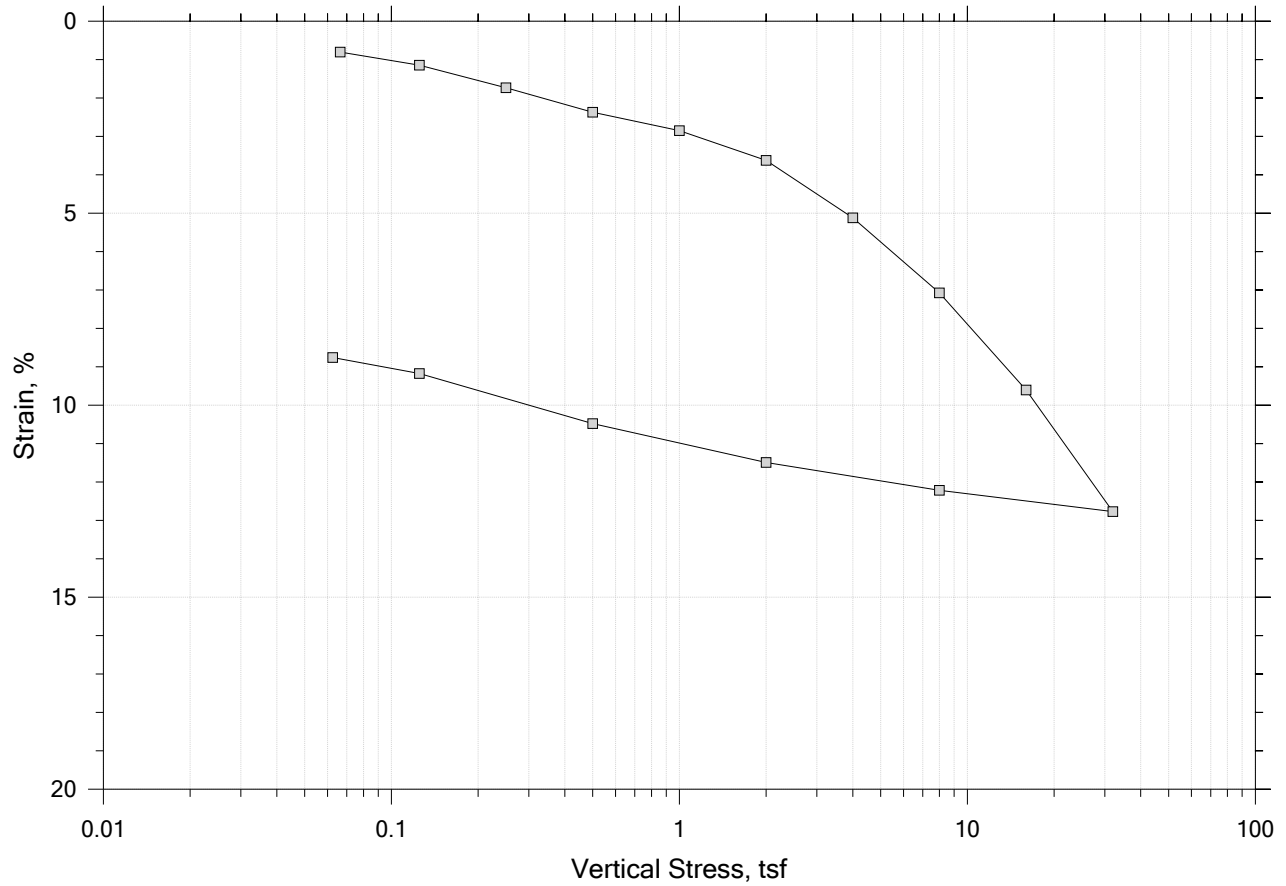
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Tested By: md	Checked By: njh
	Sample No.: U4	Test Date: 02/09/19	Depth: 30-32 ft
	Test No.: IP-4	Sample Type: intact	Elevation: ---
	Description: Wet grey clay and silt		
	Remarks: System K, Swell Pressure = 0.0714 tsf		






# One-Dimensional Consolidation by ASTM D2435 - Method B

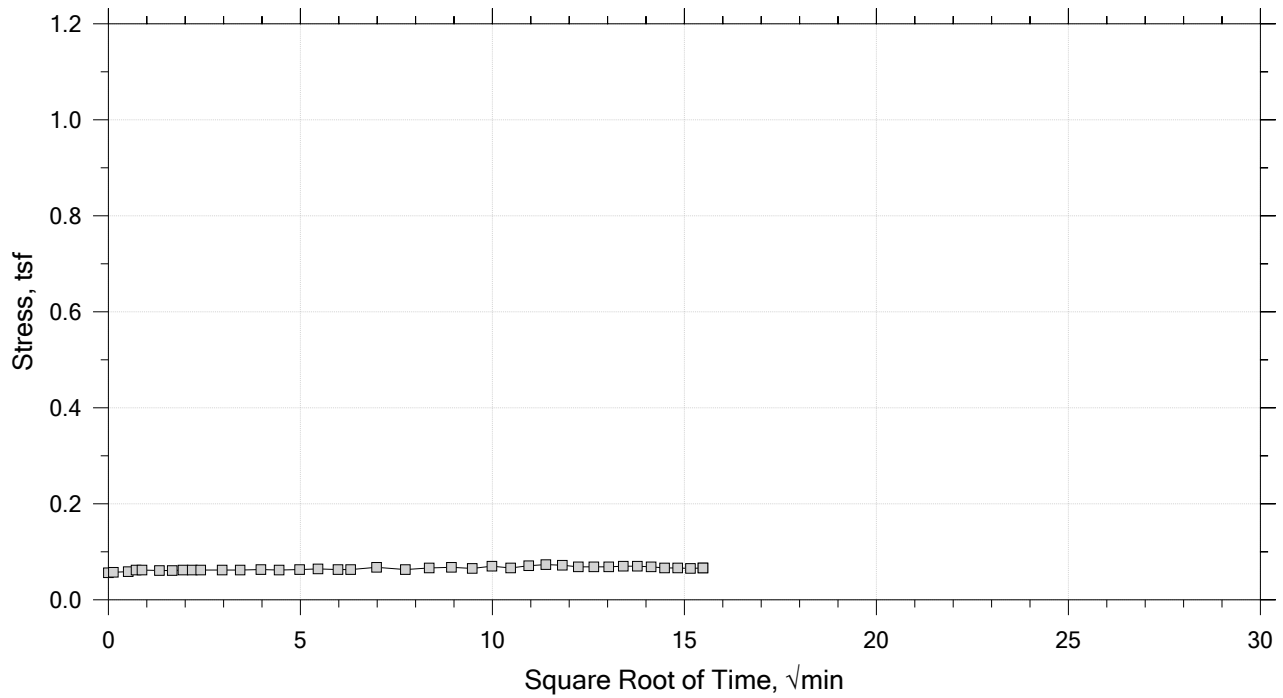
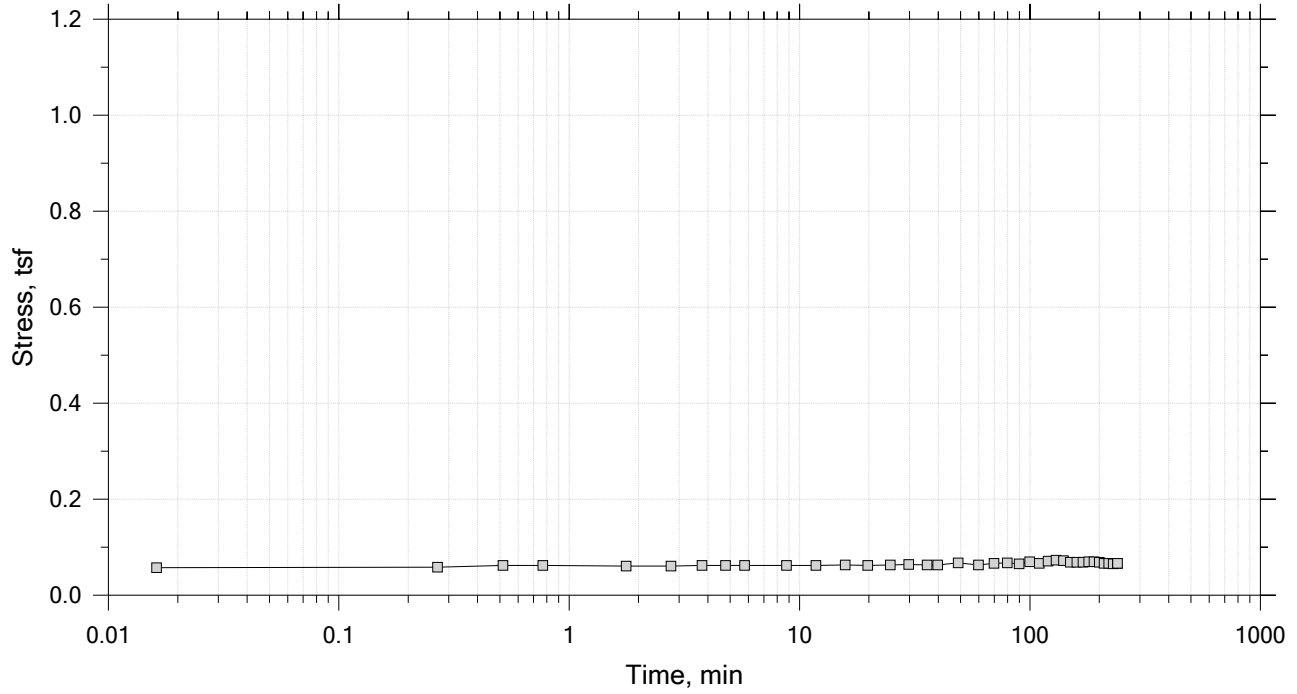
## Summary Report




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		
	Displacement at End of Increment		

# One-Dimensional Consolidation by ASTM D2435 - Method B

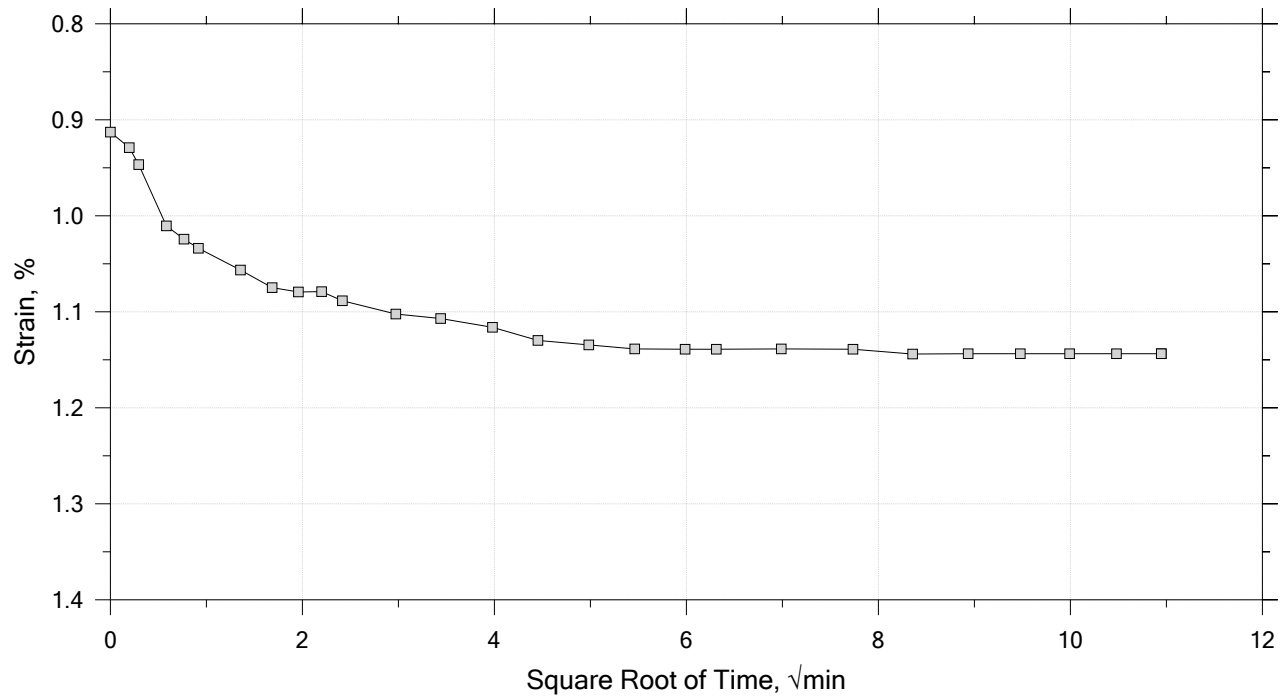
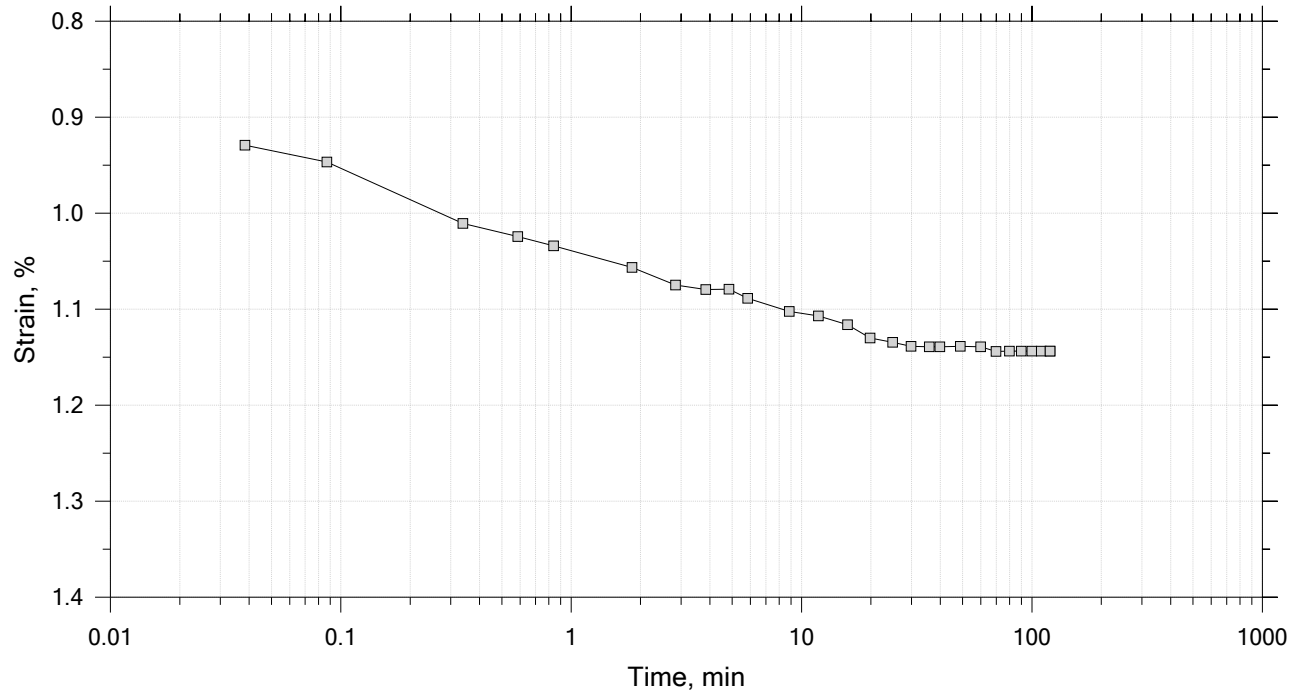
Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.0664 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf



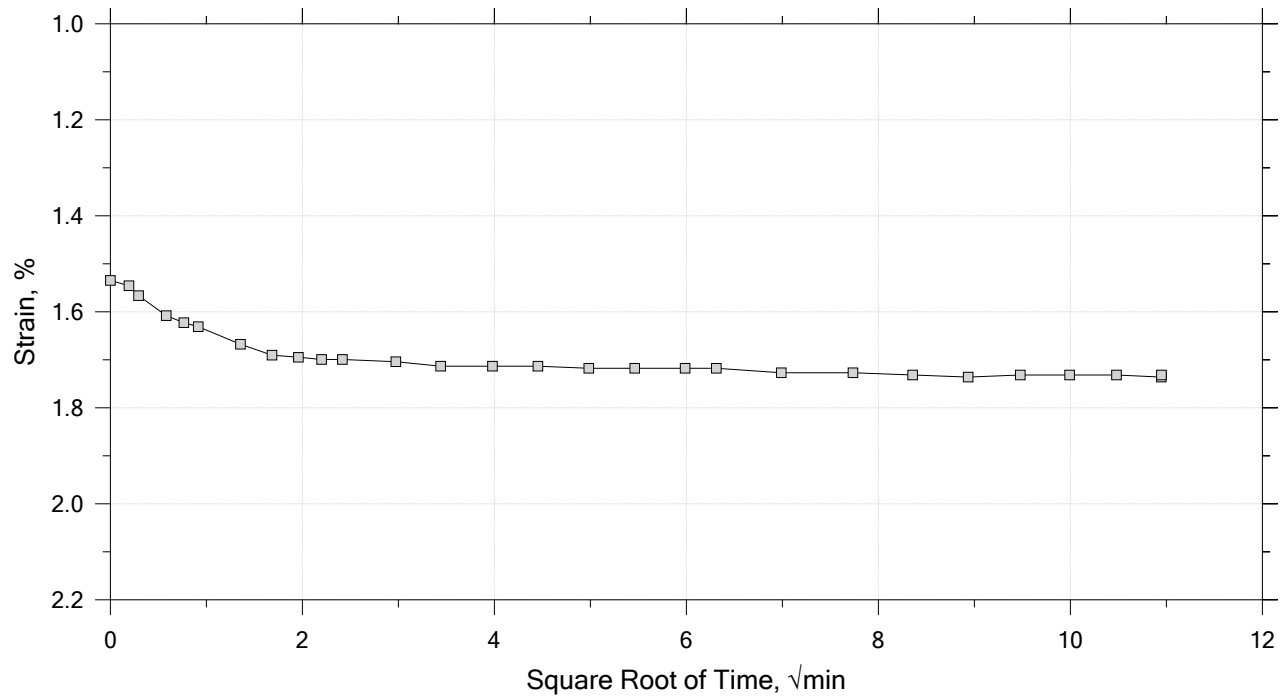
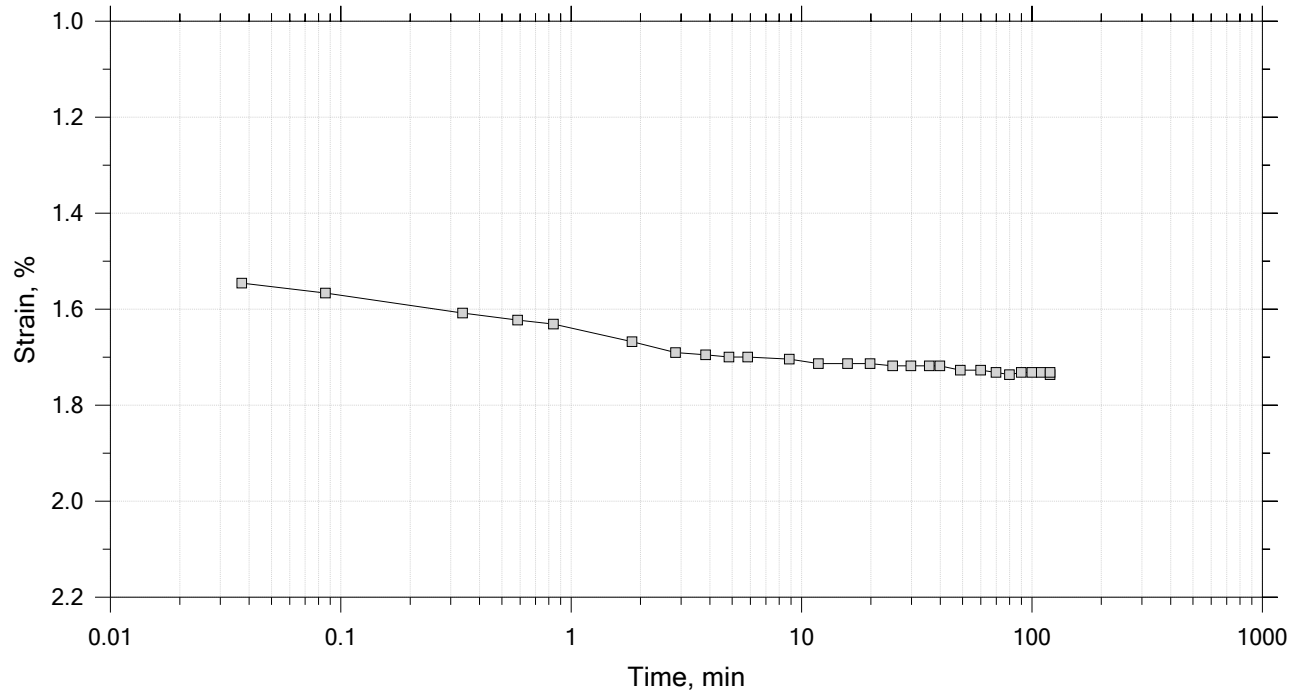
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 15

Constant Load Step

Stress: 0.25 tsf

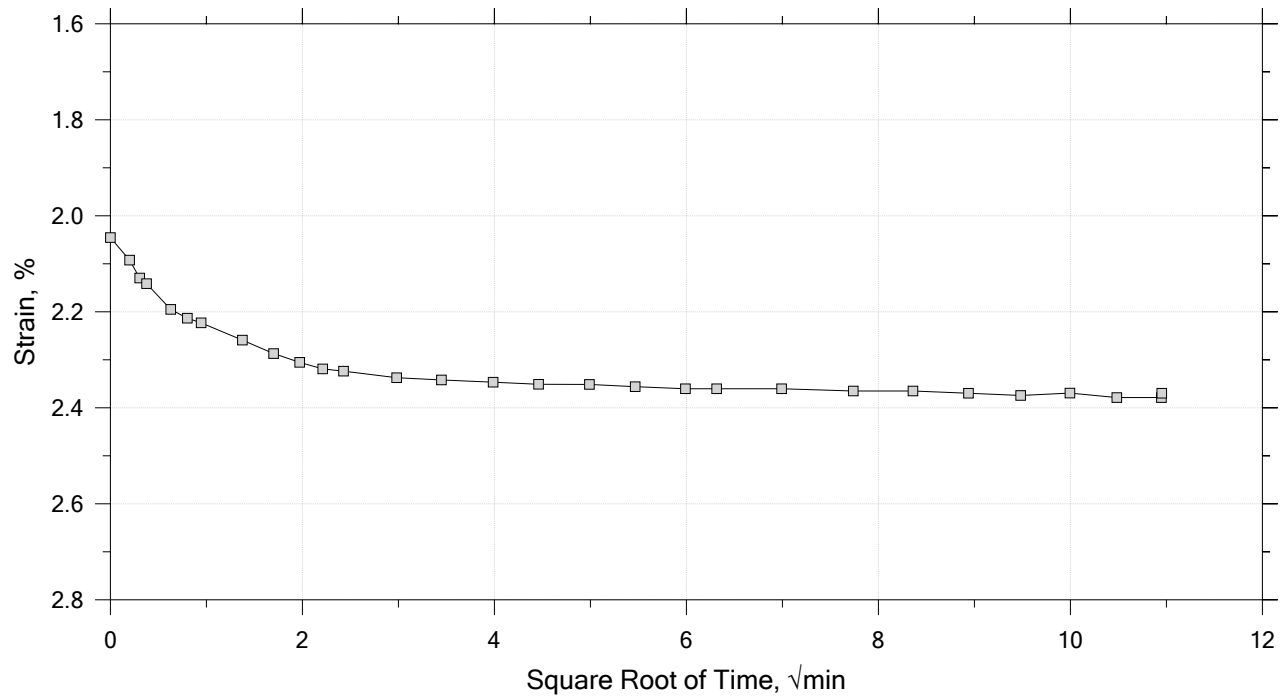
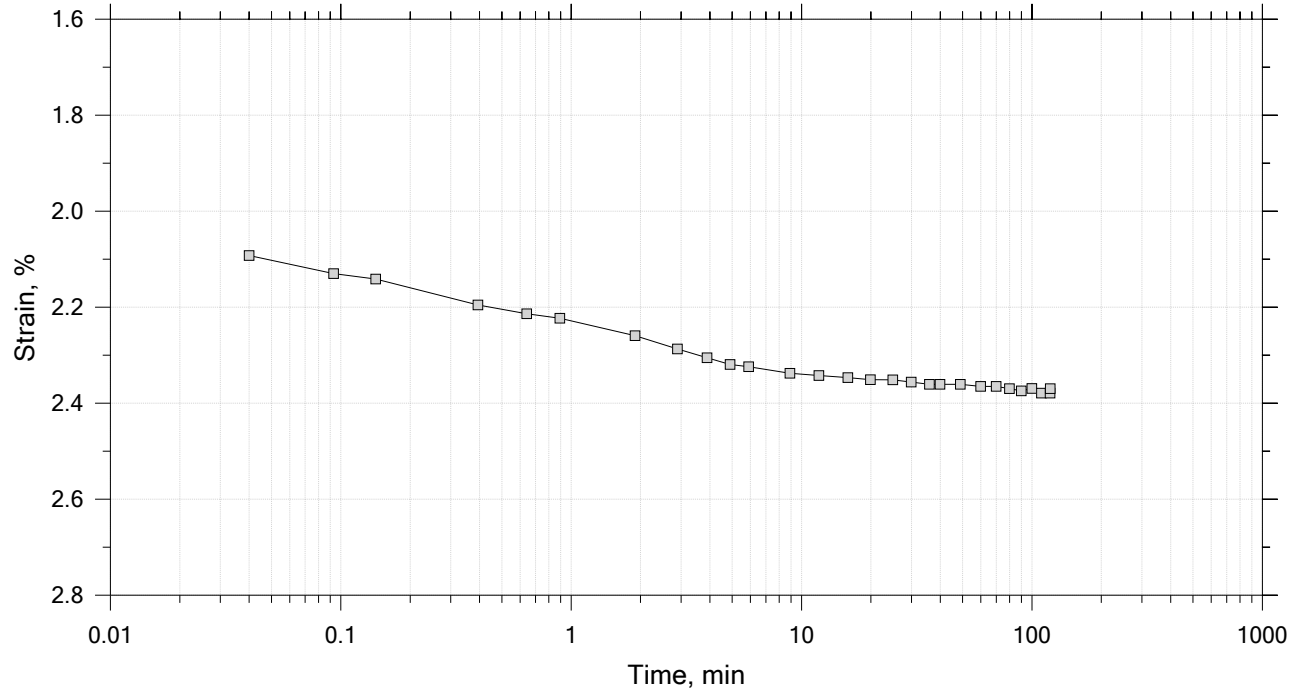



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 15  
 Constant Load Step  
 Stress: 0.5 tsf



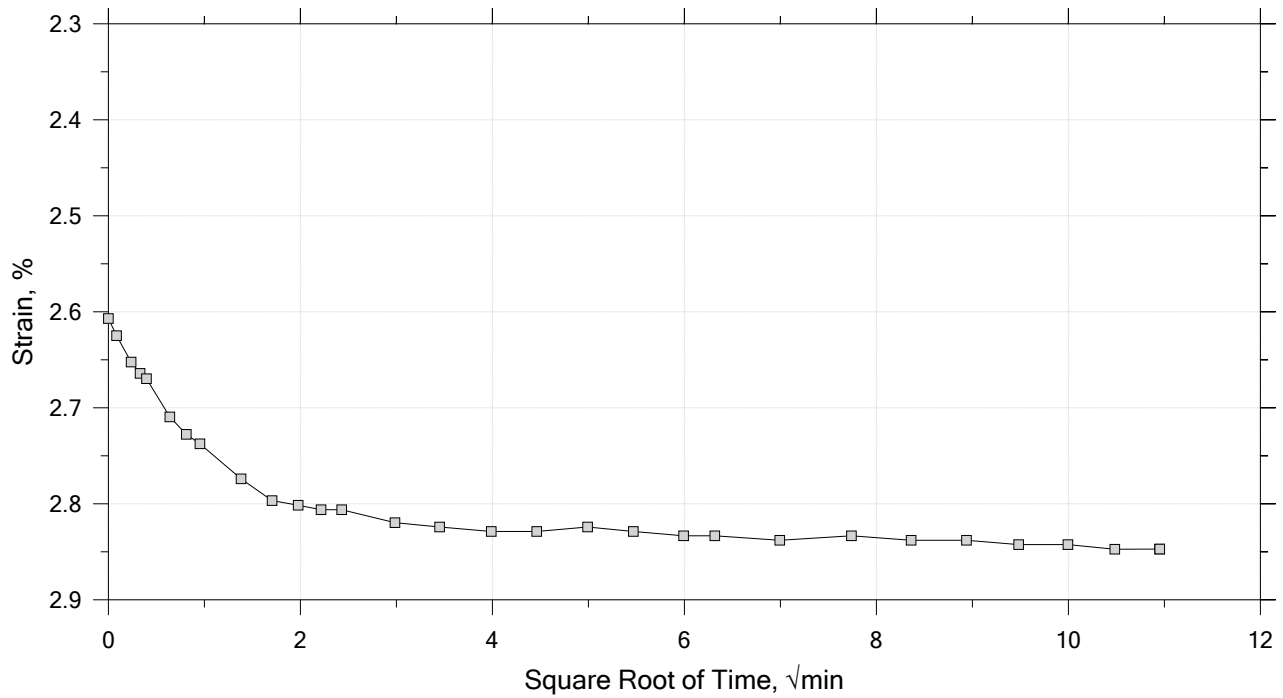
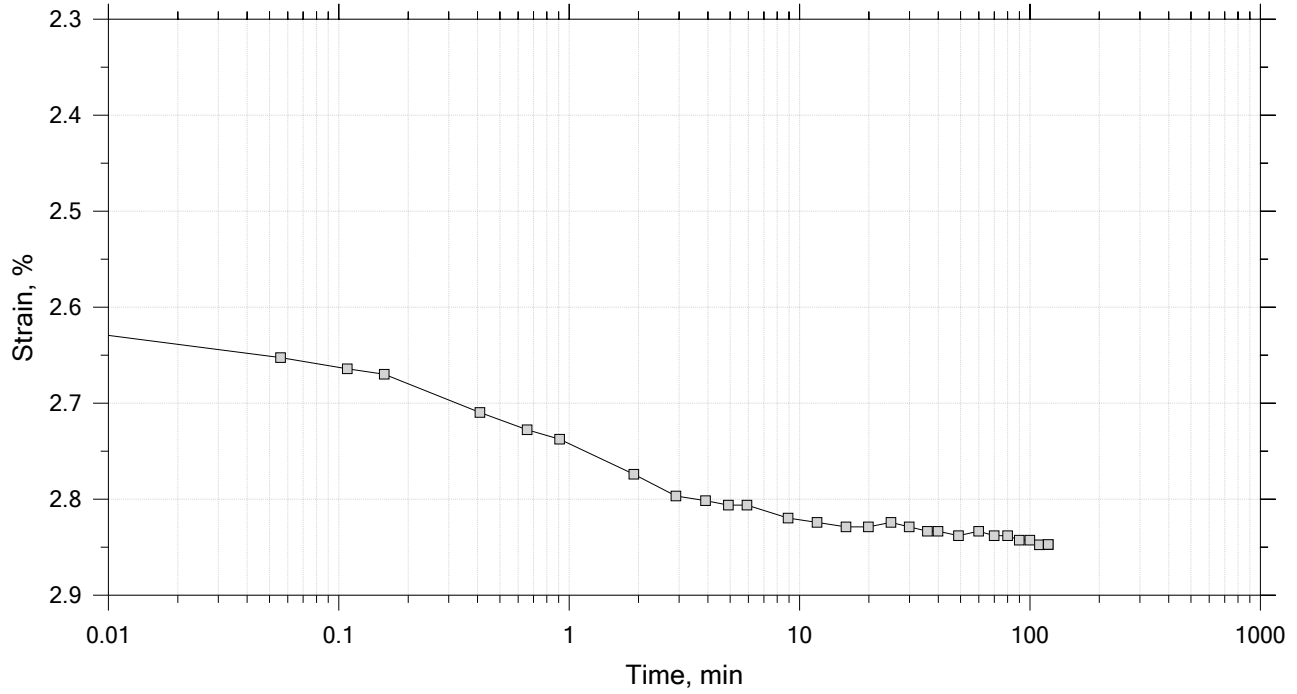
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 15

Constant Load Step

Stress: 1 tsf



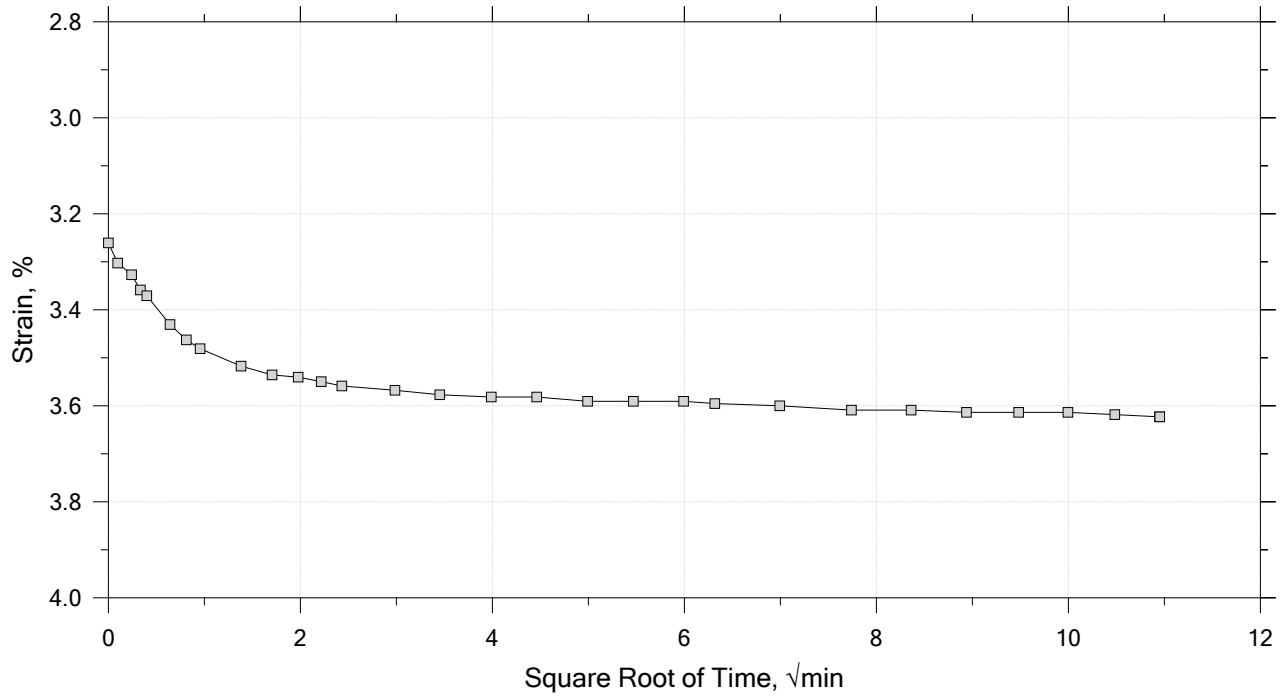
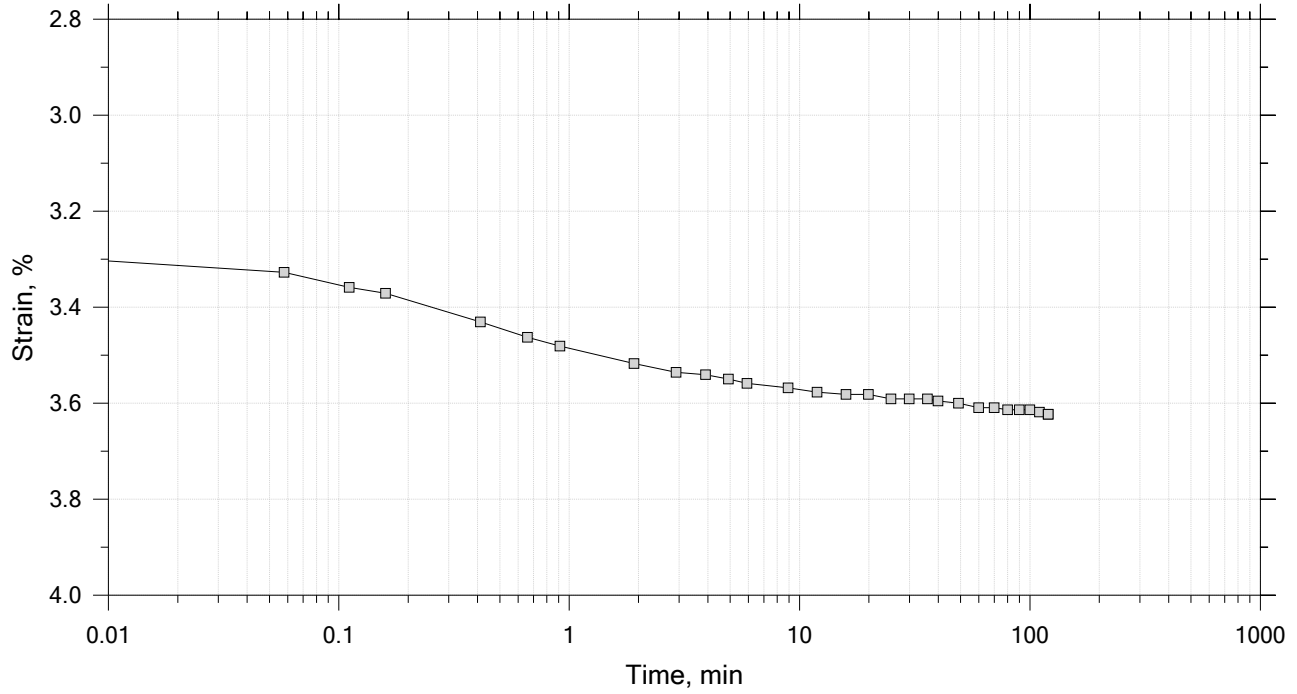
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 15

Constant Load Step

Stress: 2 tsf



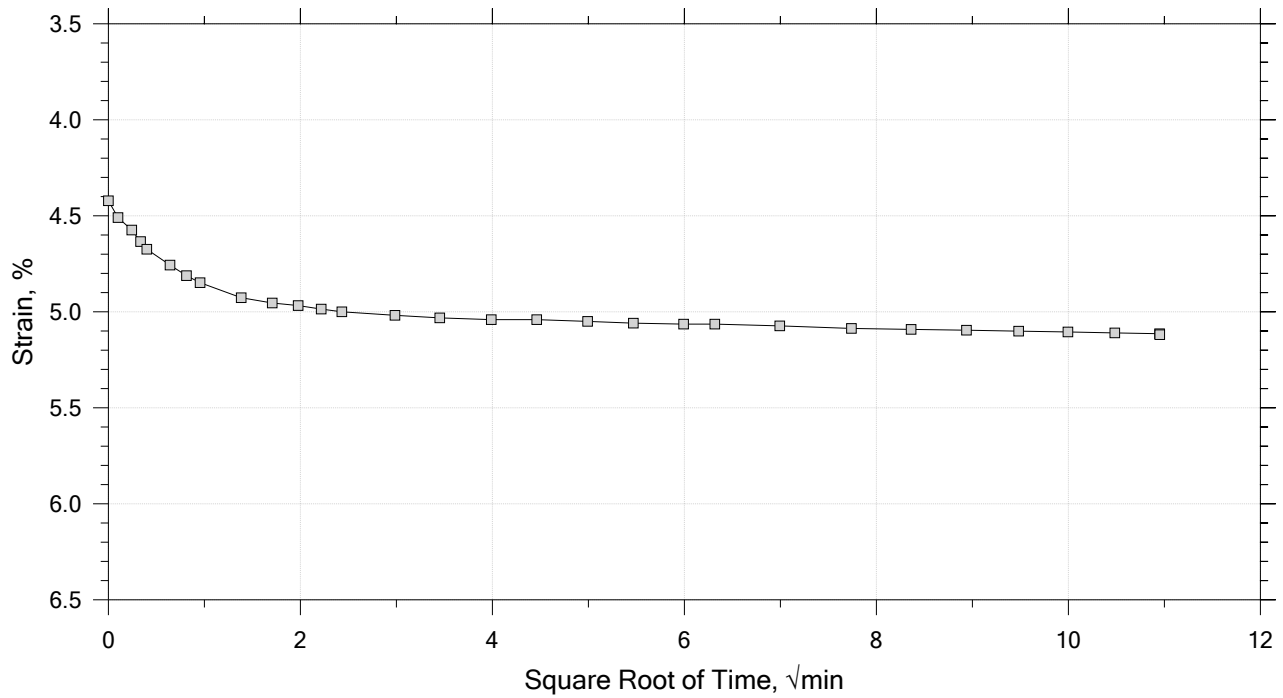
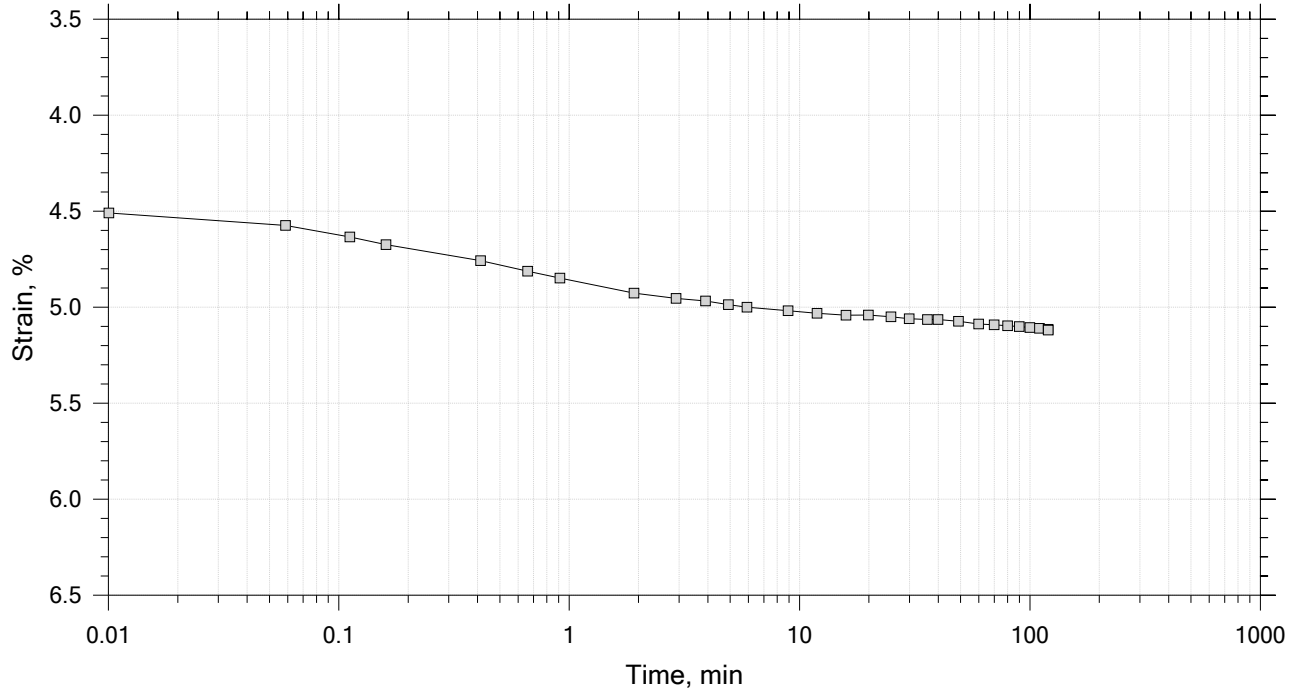
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15

Constant Load Step

Stress: 4 tsf



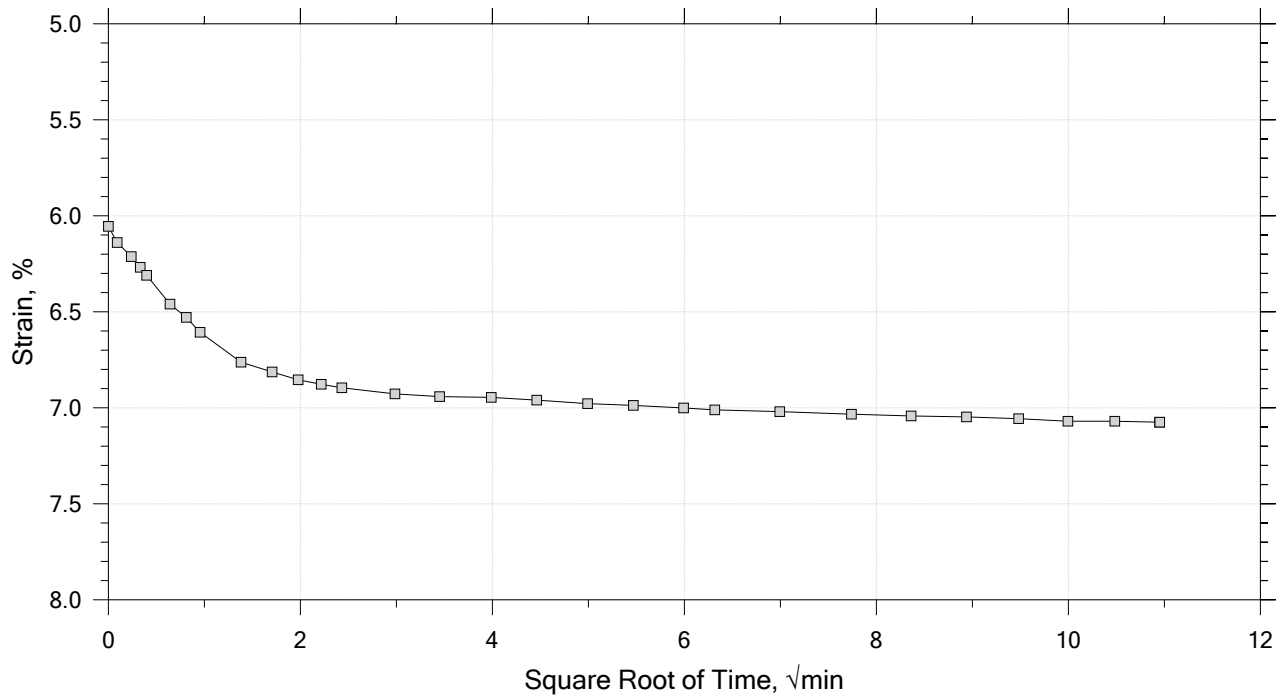
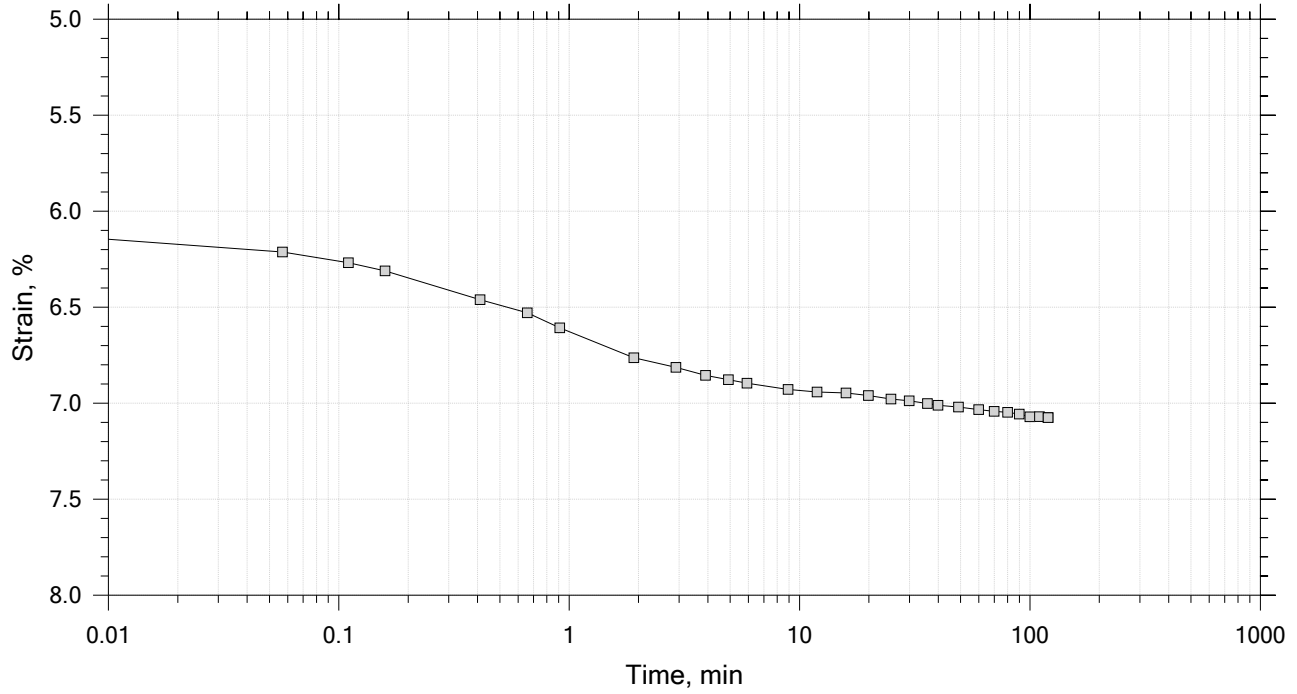
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 15

Constant Load Step

Stress: 8 tsf



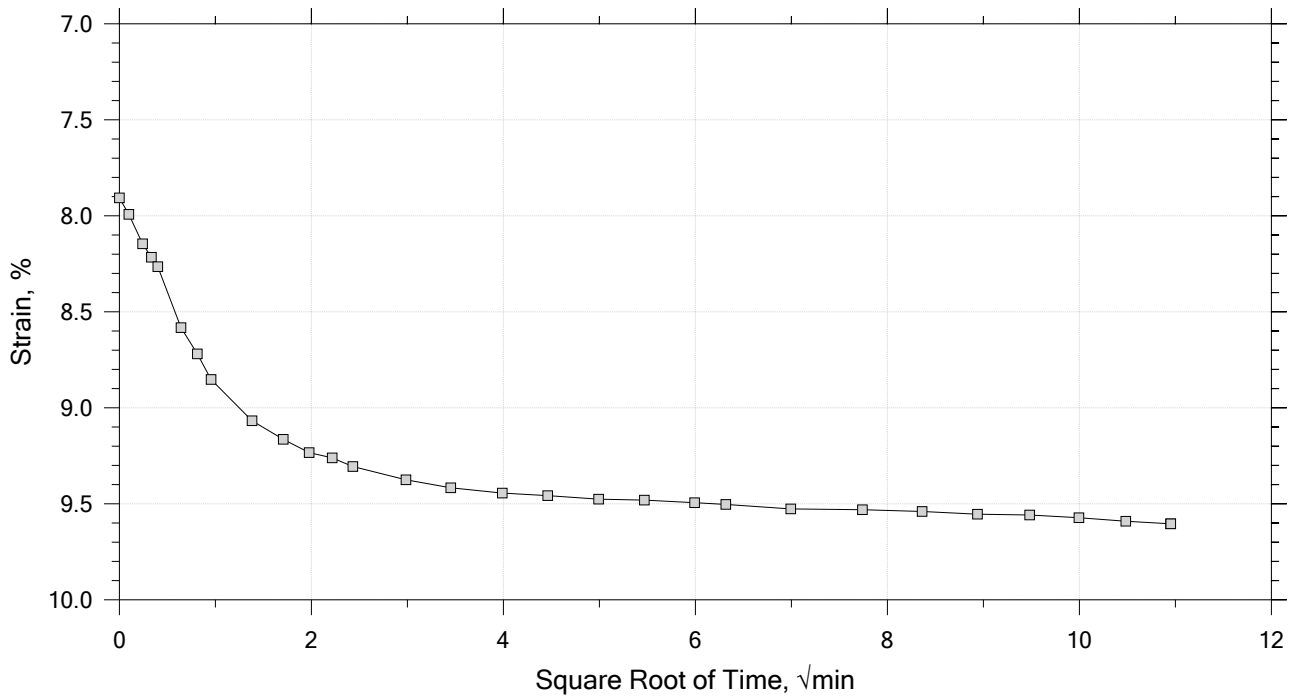
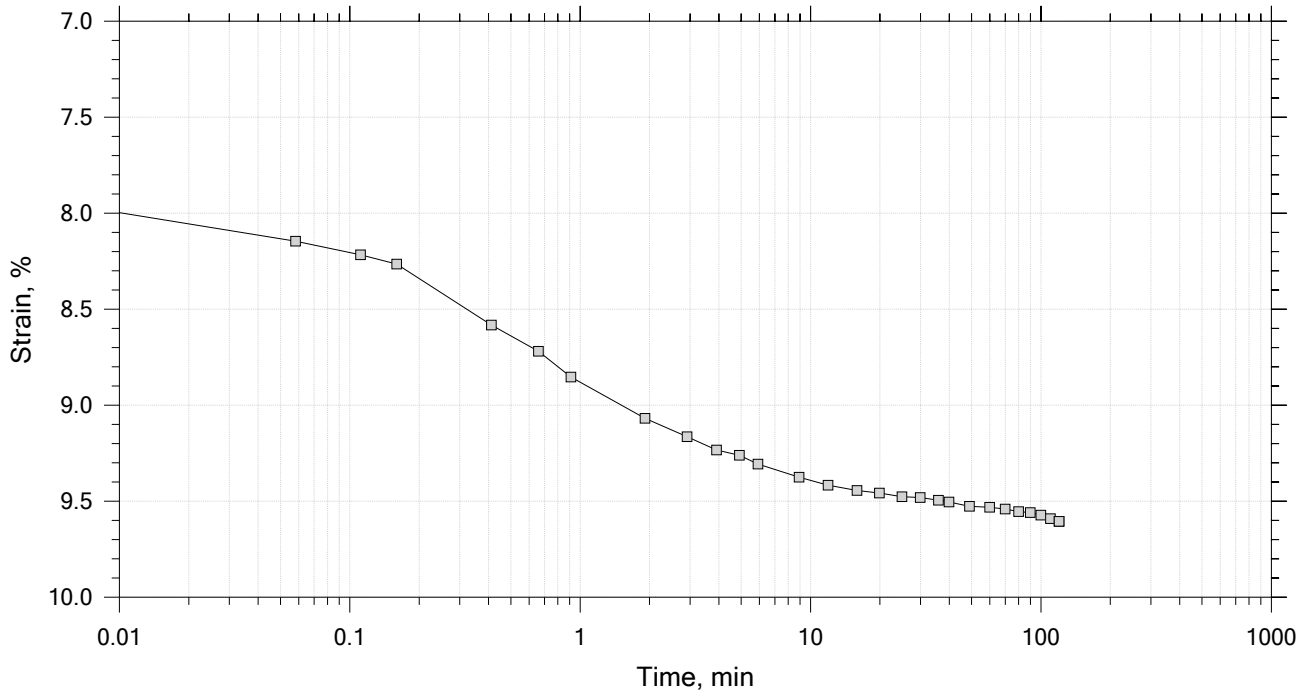
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	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15

Constant Load Step

Stress: 16 tsf



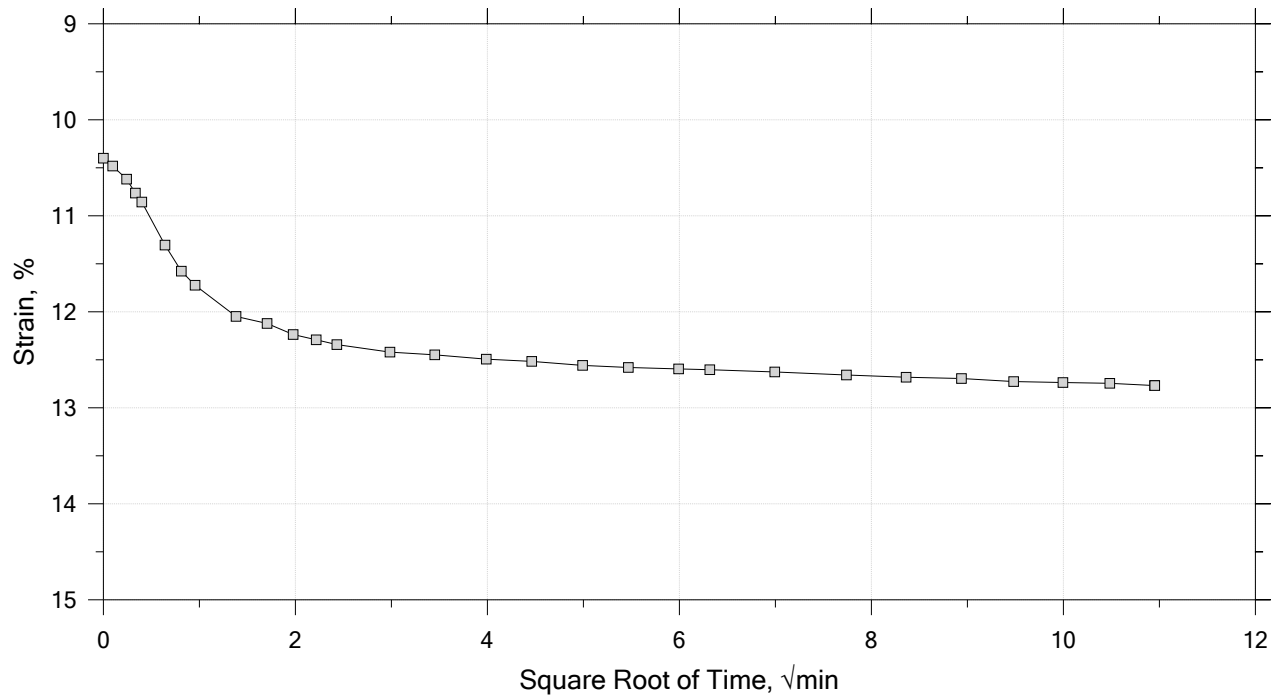
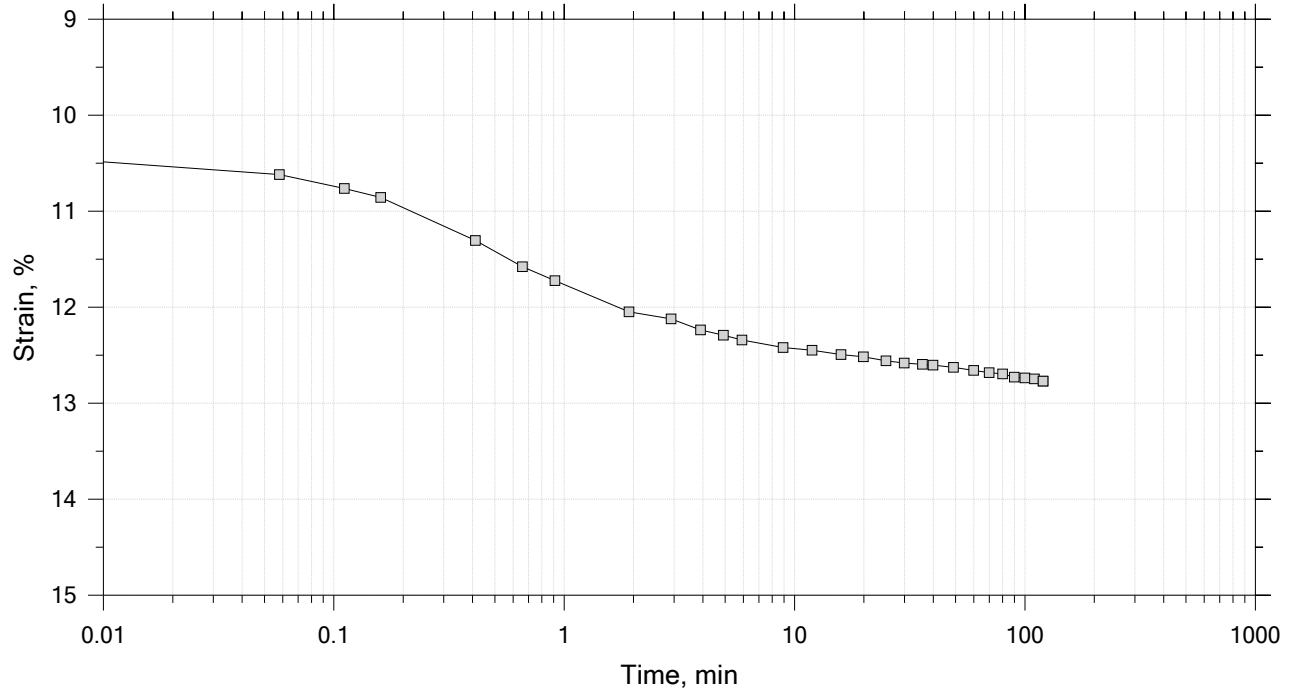
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	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



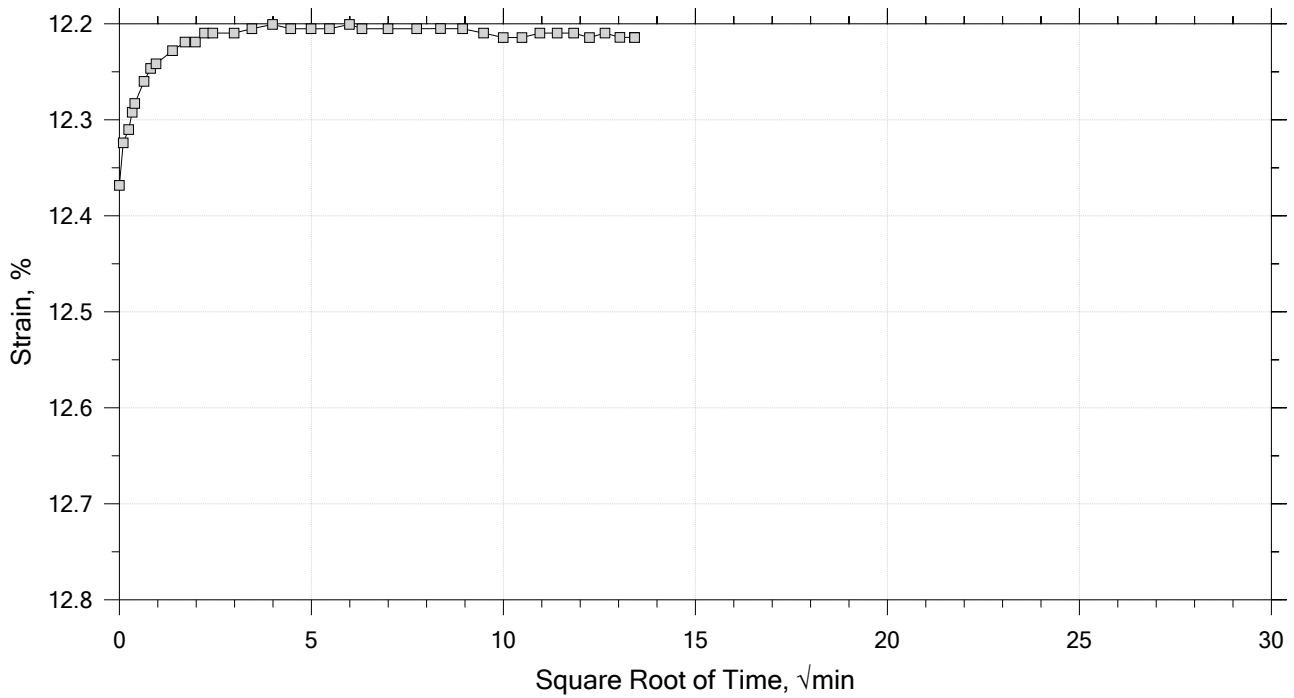
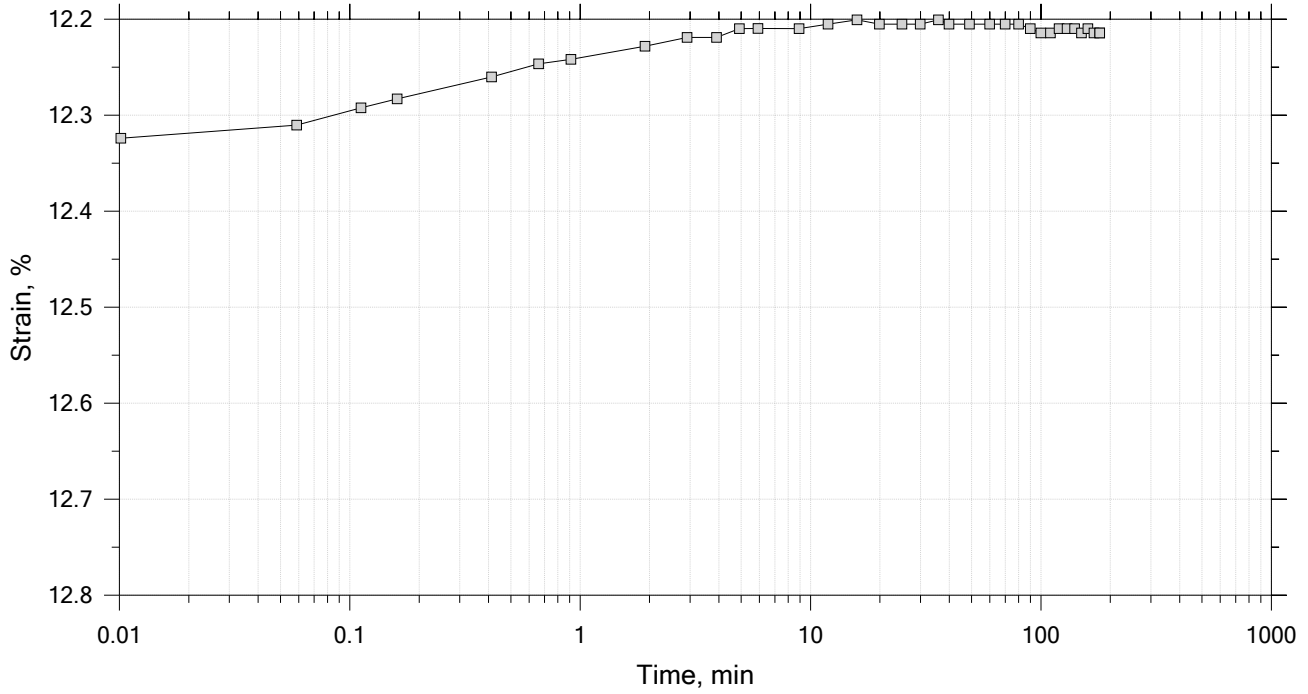
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		

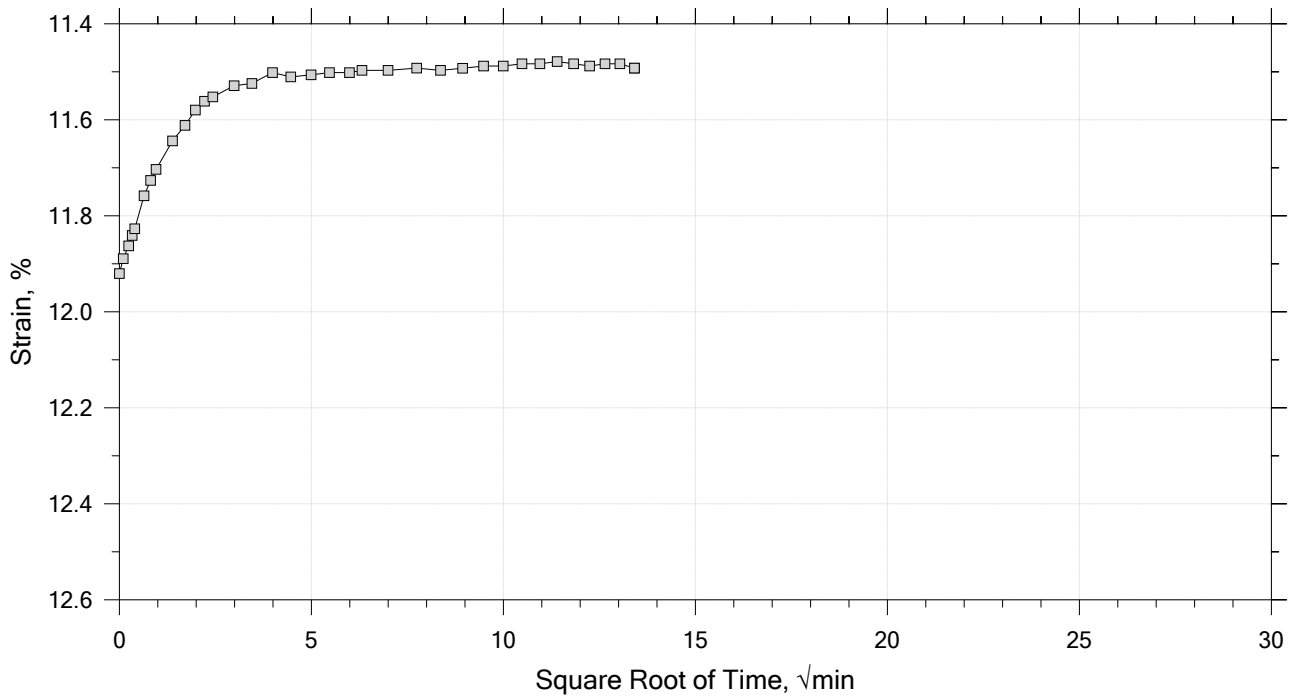
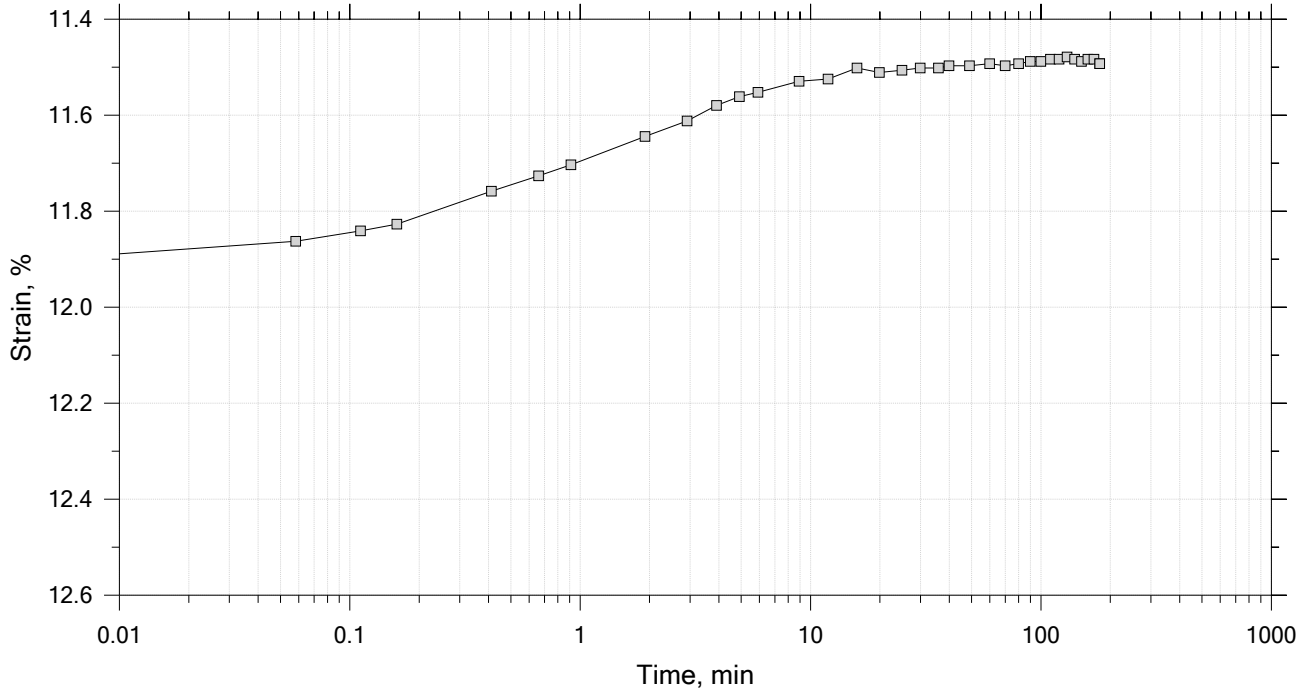



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



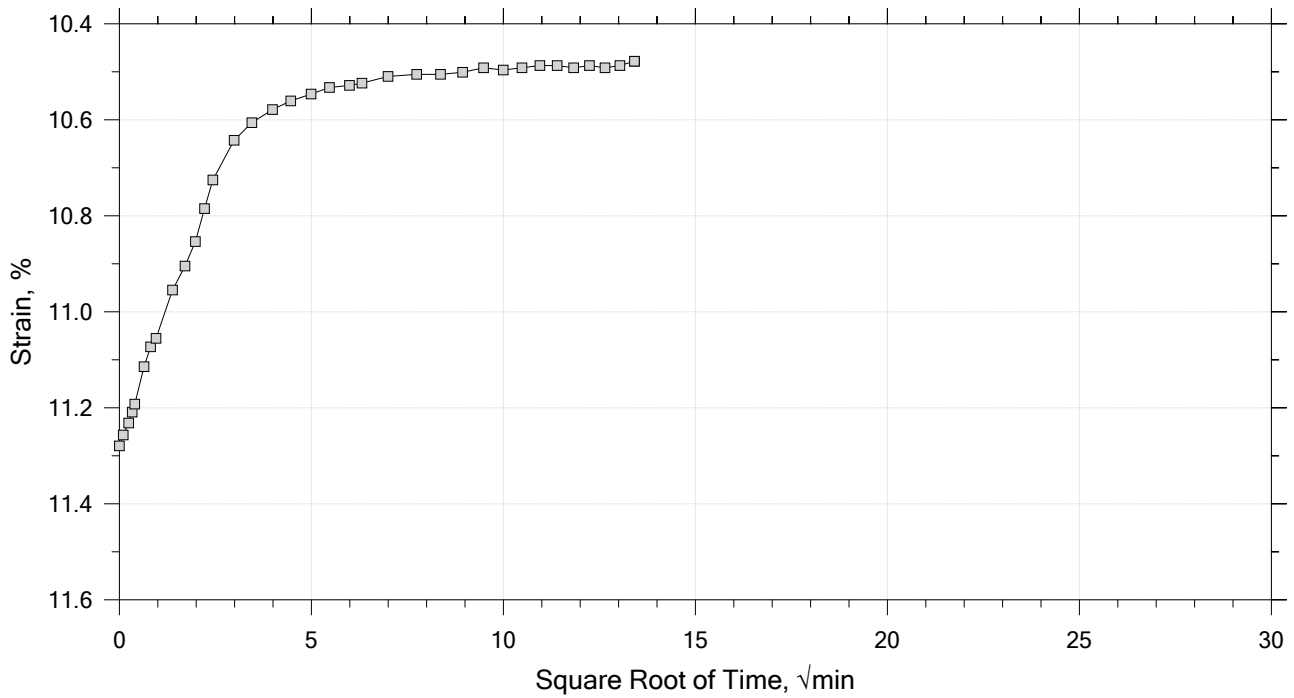
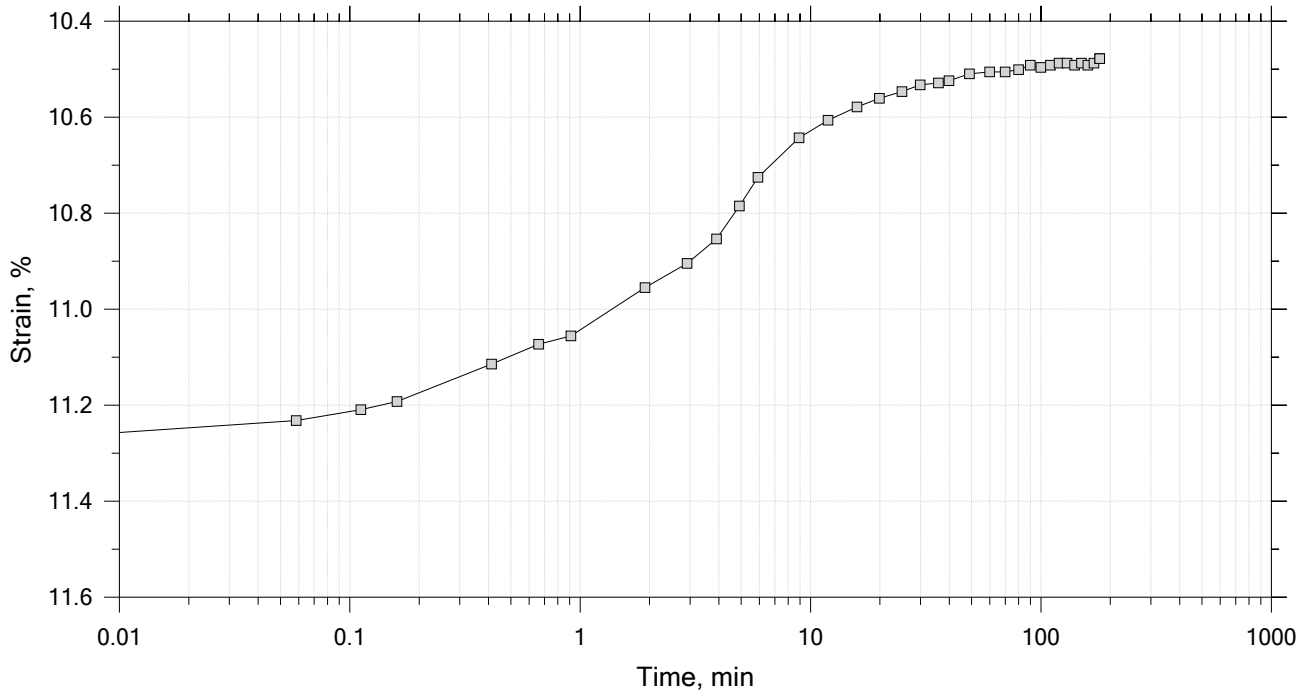
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	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



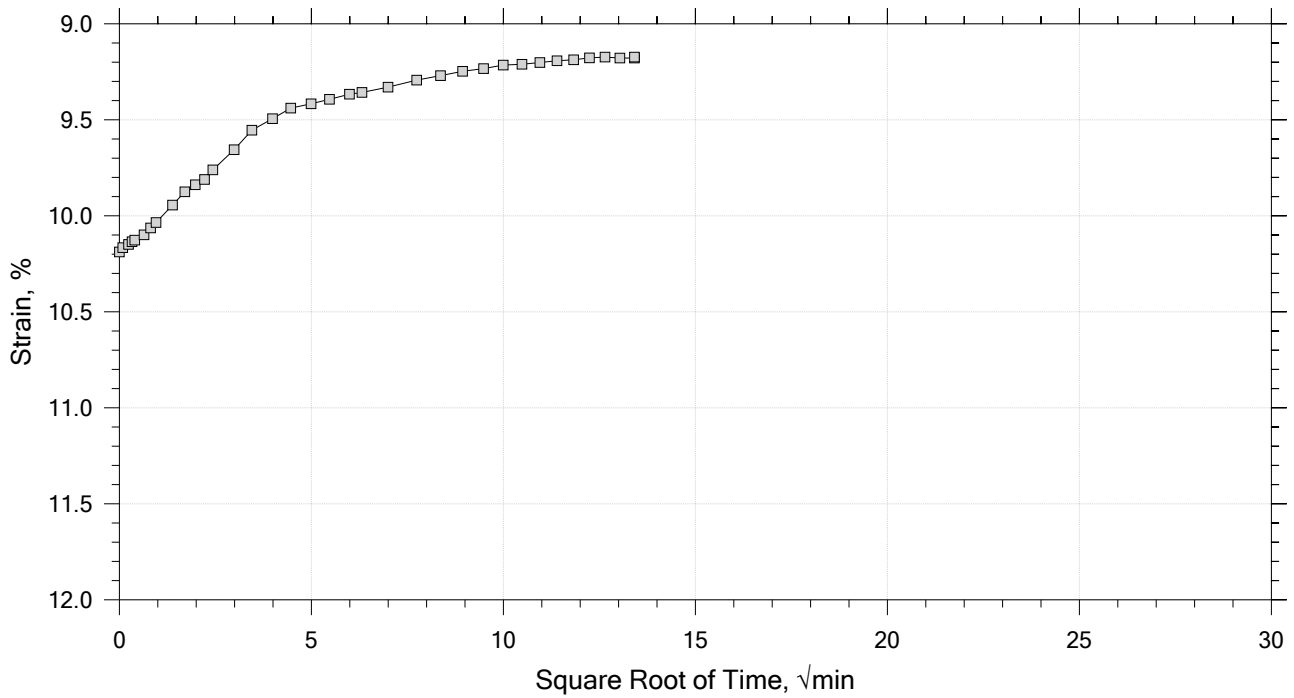
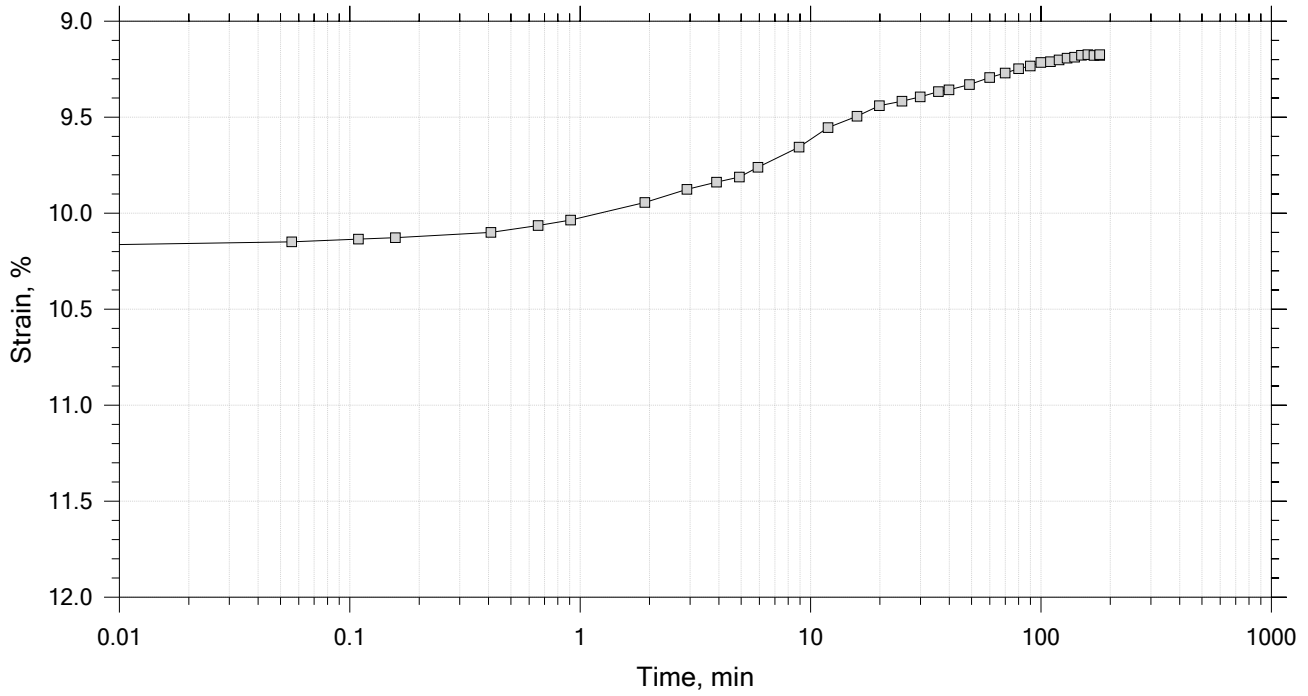
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



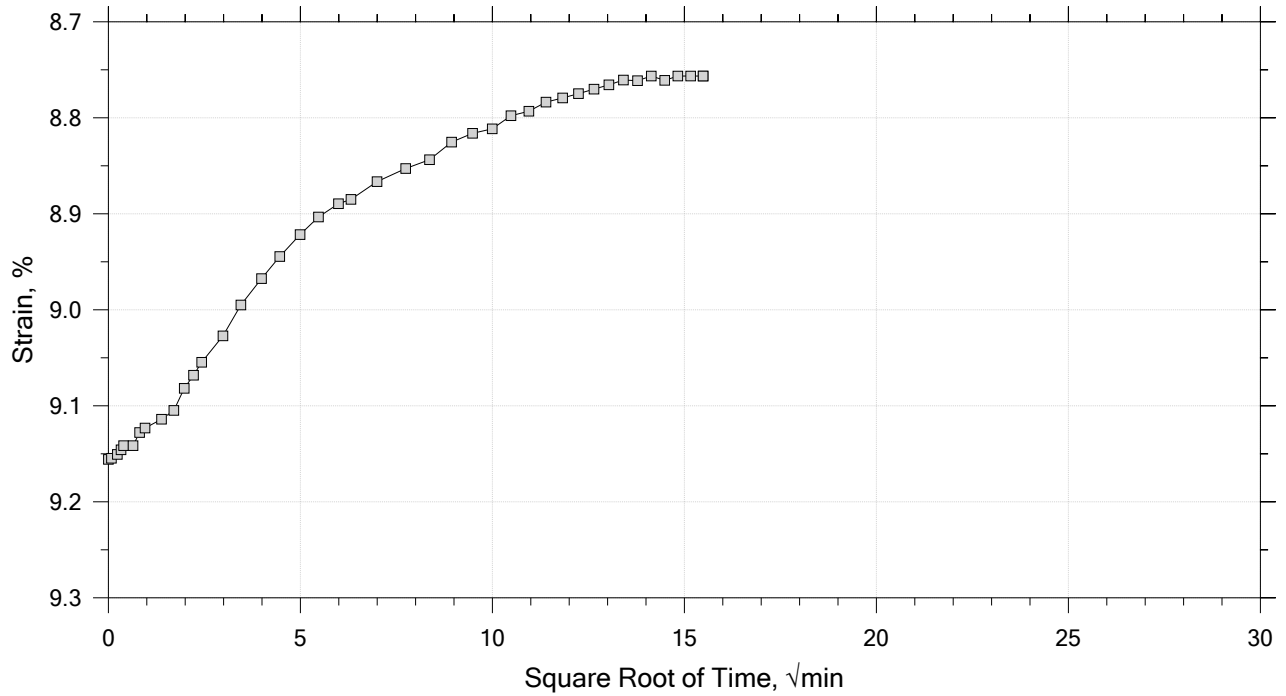
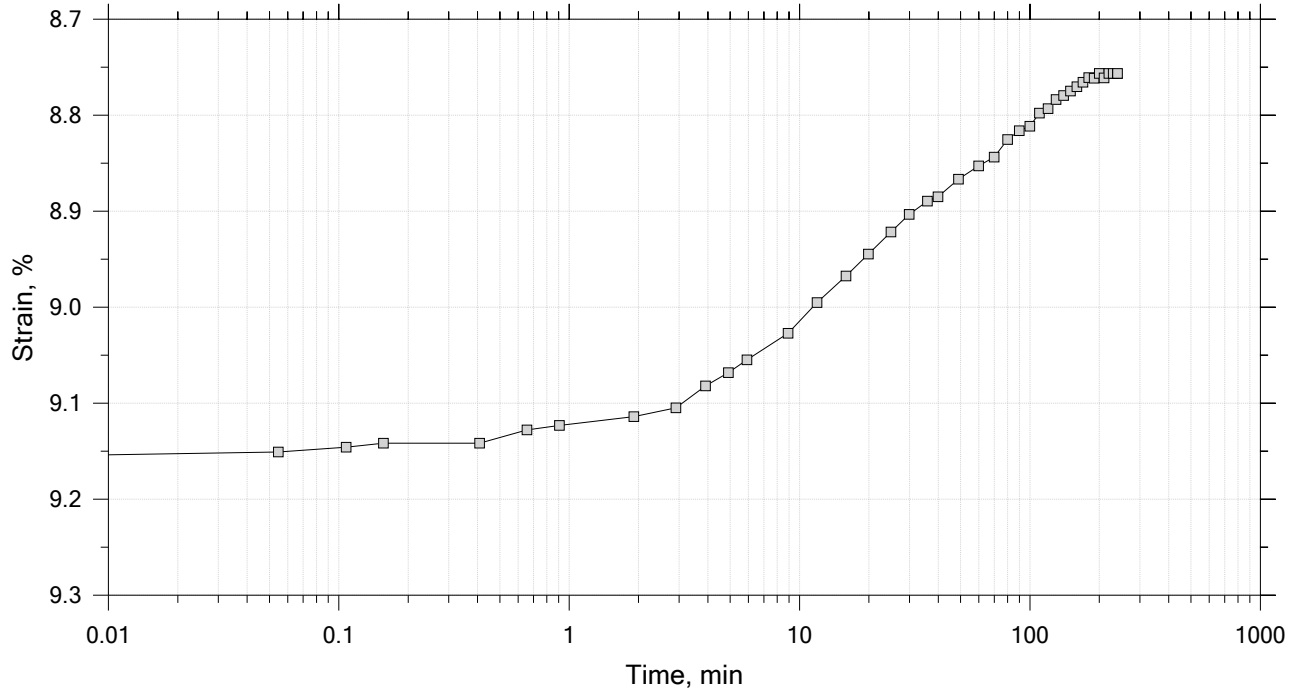
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.74	Liquid Limit: 31
Initial Height: 1.00 in	Initial Void Ratio: 0.788	Plastic Limit: 18
Final Height: 0.92 in	Final Void Ratio: 0.645	Plasticity Index: 13

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	D2470	RING		A-2519
Mass Container, gm	8.36	108.02	108.02	8.37
Mass Container + Wet Soil, gm	125.18	265.49	260.16	161.32
Mass Container + Dry Soil, gm	100.4	231.13	231.13	132.14
Mass Dry Soil, gm	92.04	123.11	123.11	123.77
Water Content, %	26.92	27.91	23.58	23.58
Void Ratio	---	0.79	0.65	---
Degree of Saturation, %	---	96.88	100.00	---
Dry Unit Weight, pcf	---	95.547	103.86	---

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.

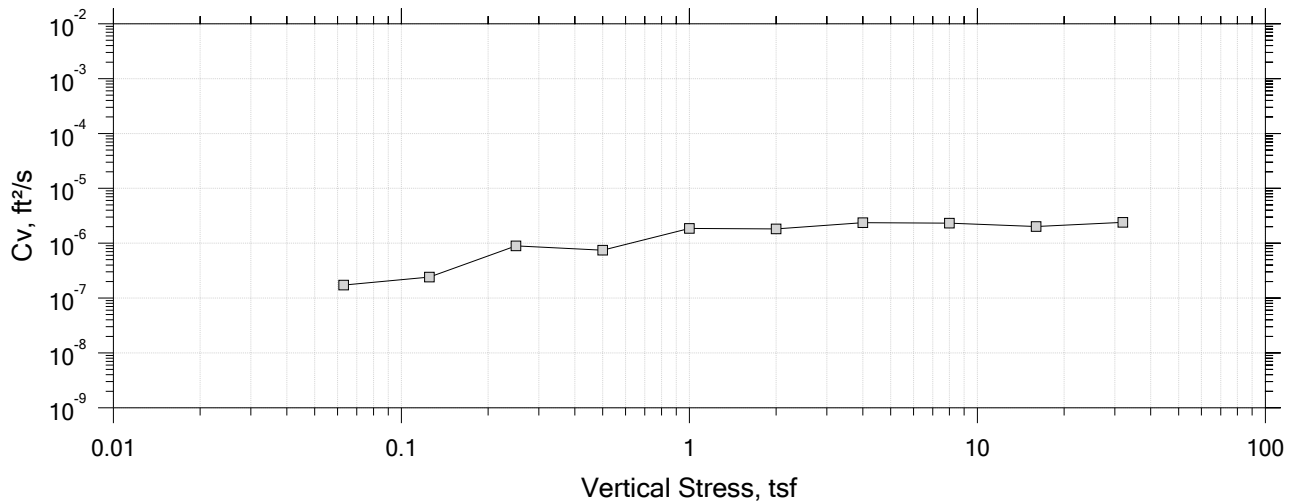
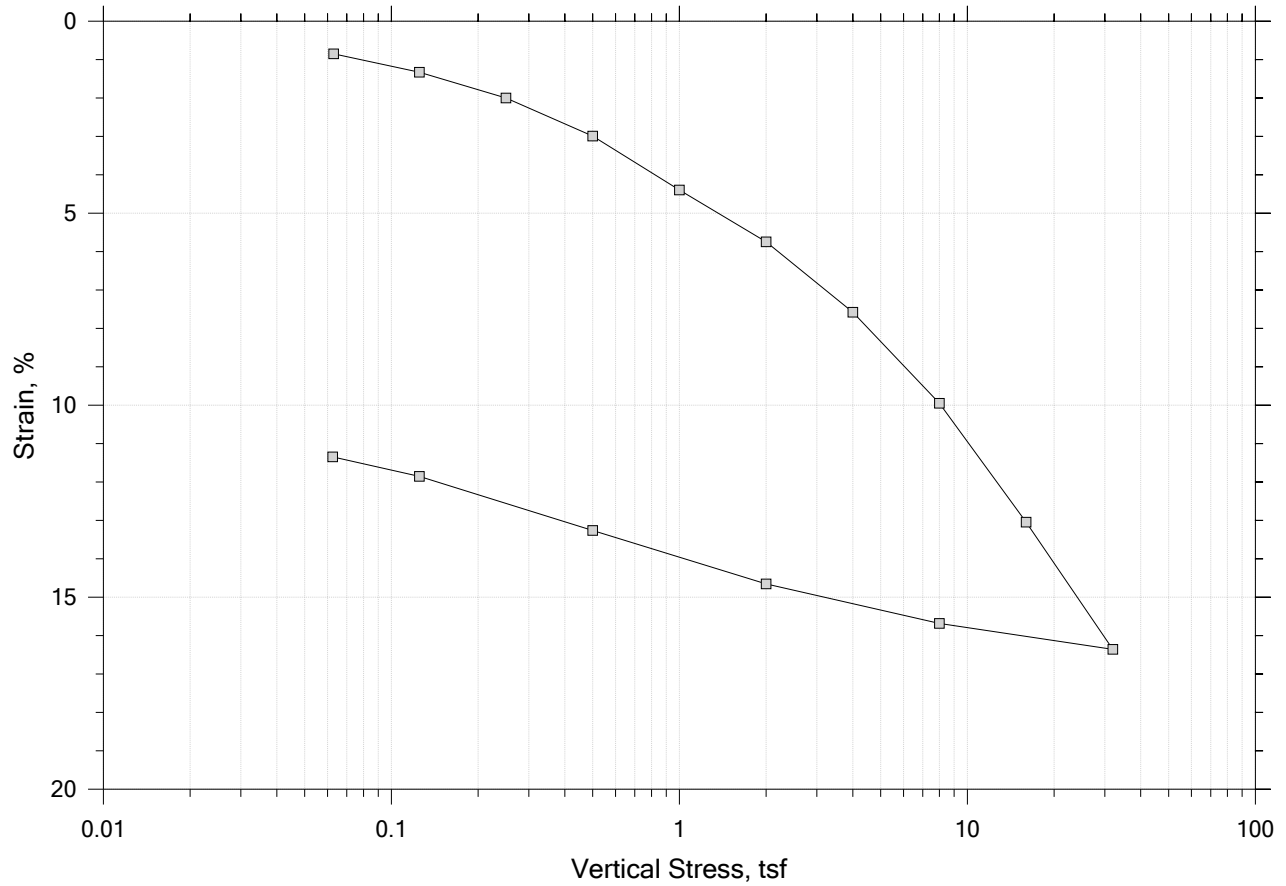
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U1	Test Date: 2/11/19	Depth: 2-4 ft
	Test No.: IP-5	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray clay		
	Remarks: System S, Swell Pressure = 0.0664 tsf		






# One-Dimensional Consolidation by ASTM D2435 - Method B

## Summary Report

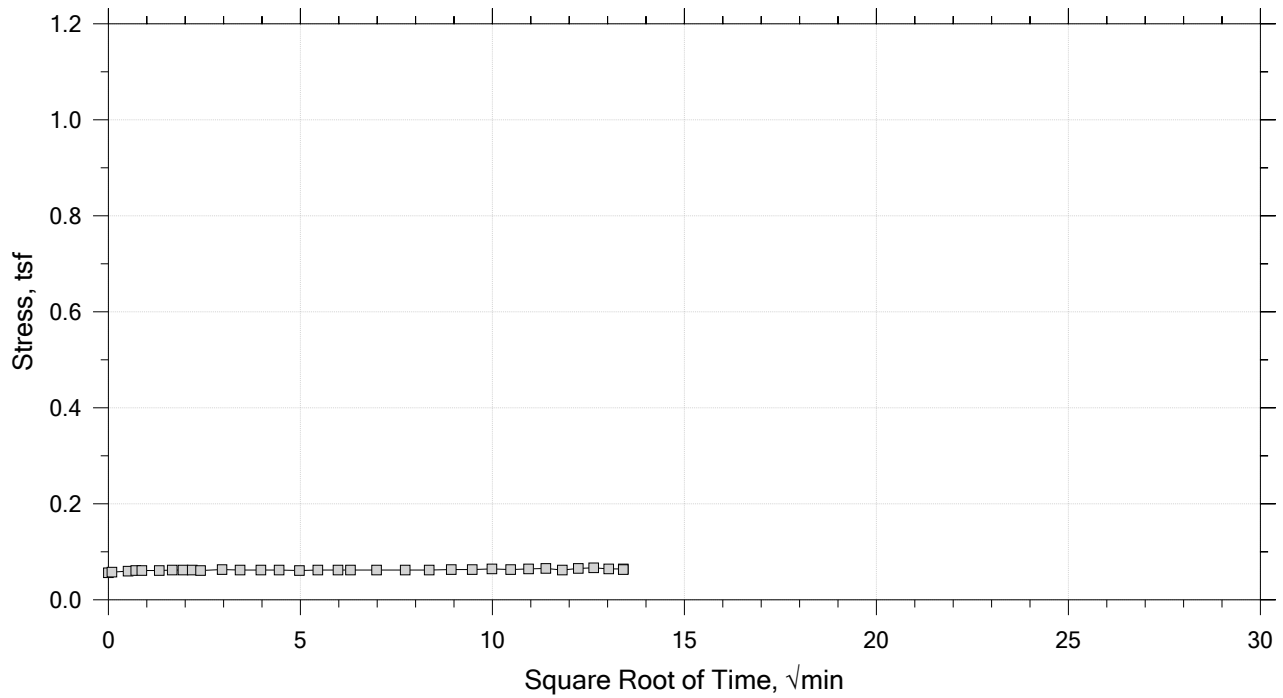
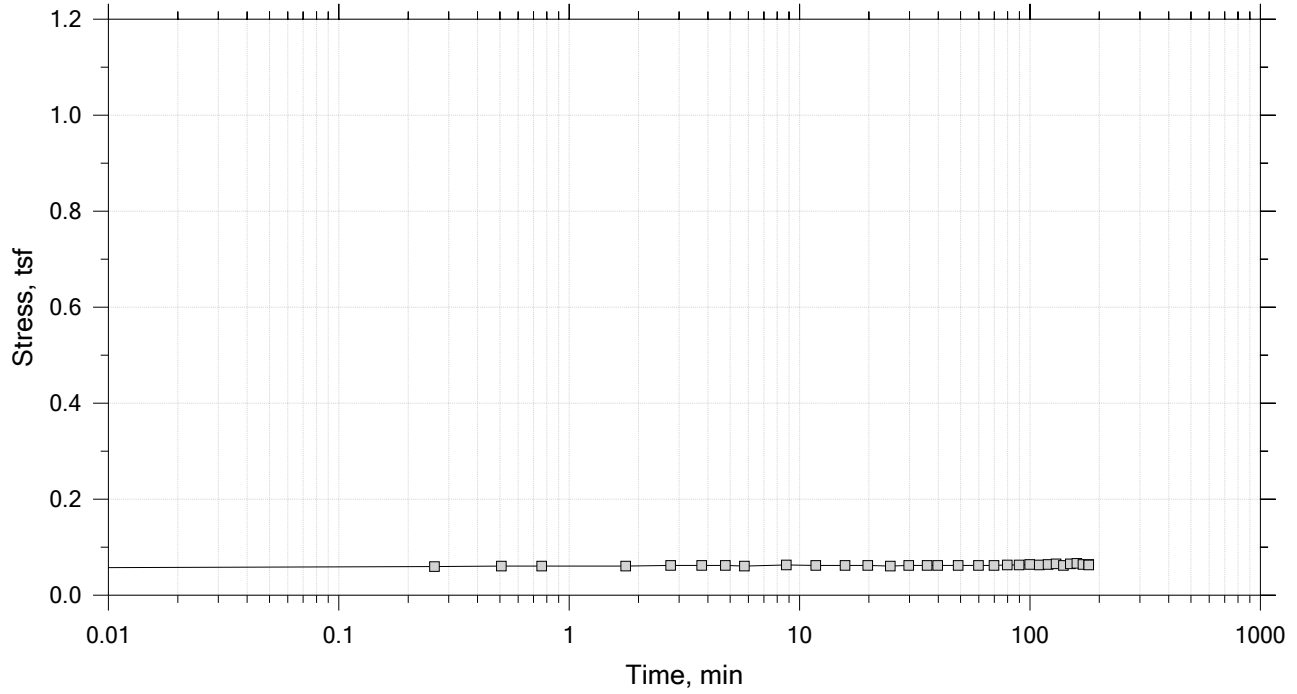



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		
	Displacement at End of Increment		



# One-Dimensional Consolidation by ASTM D2435 - Method B

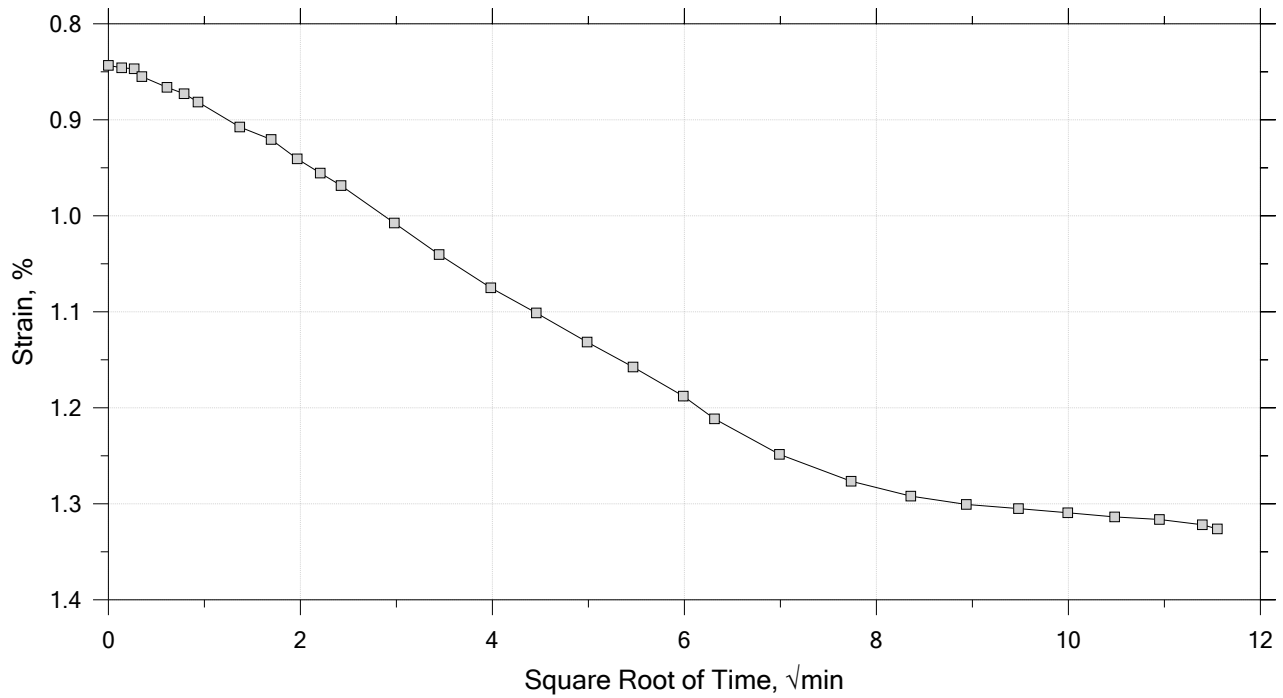
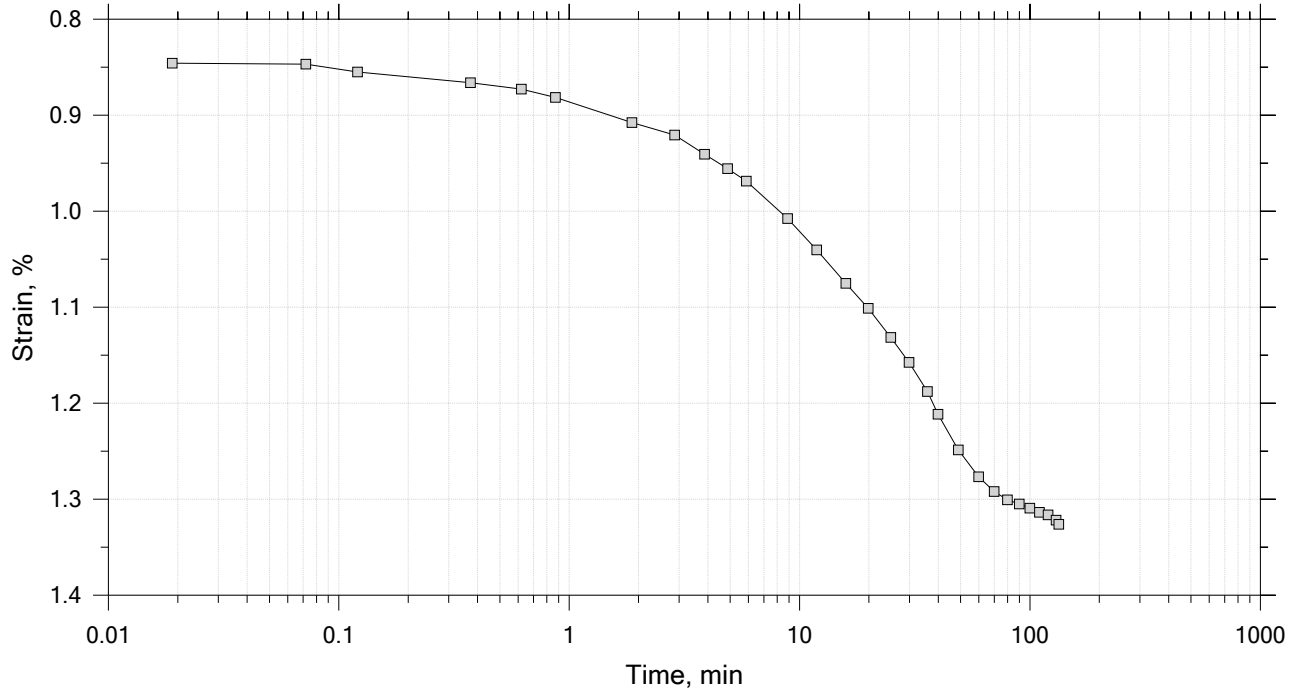
Time Curve 1 of 15  
 Constant Volume Step  
 Stress: 0.063 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

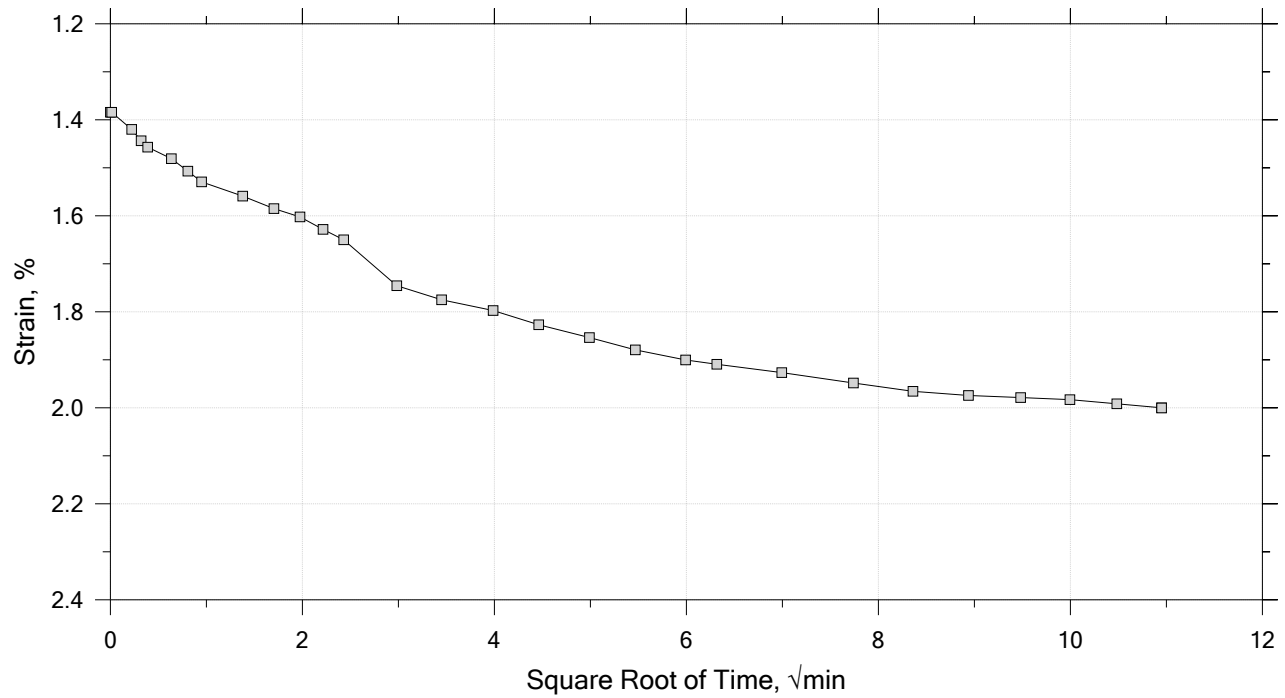
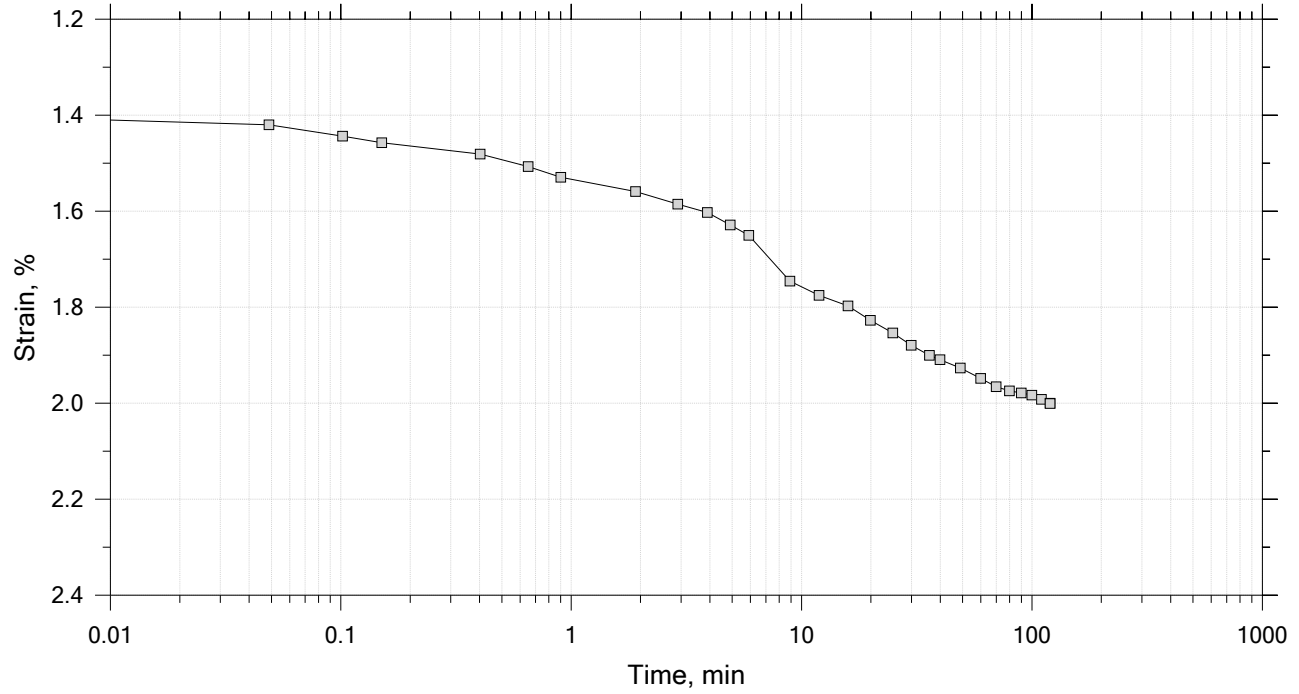
Time Curve 2 of 15  
 Constant Load Step  
 Stress: 0.125 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

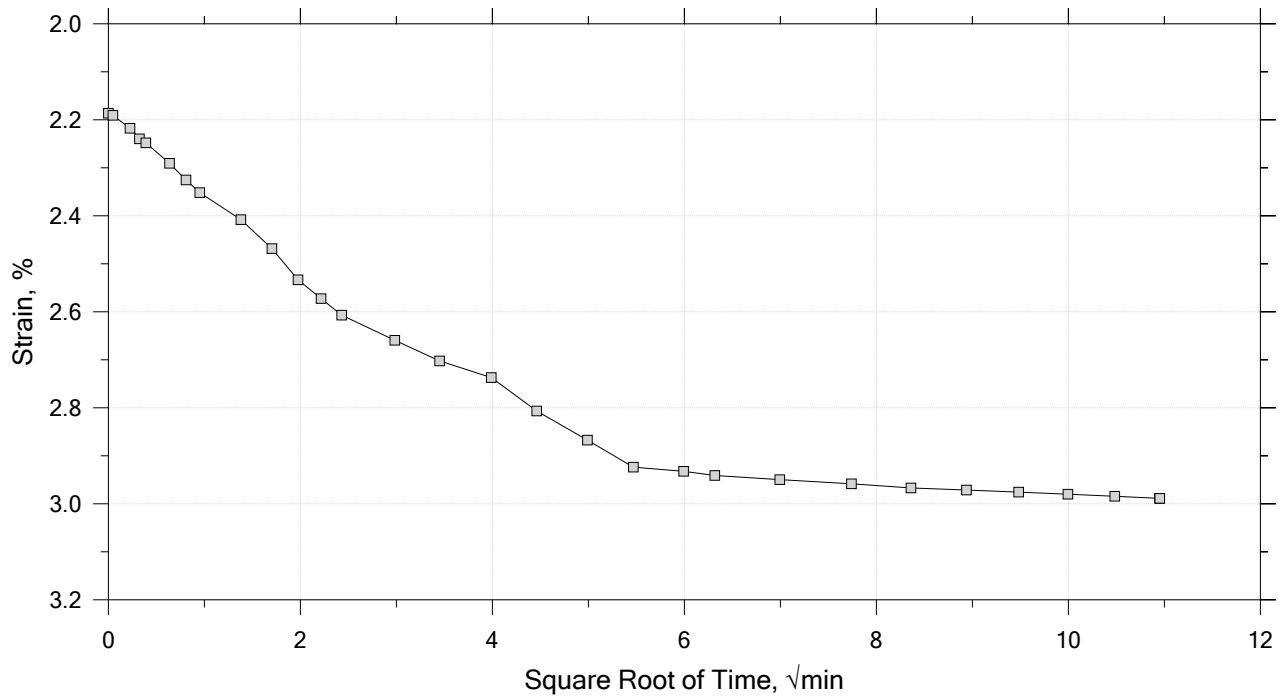
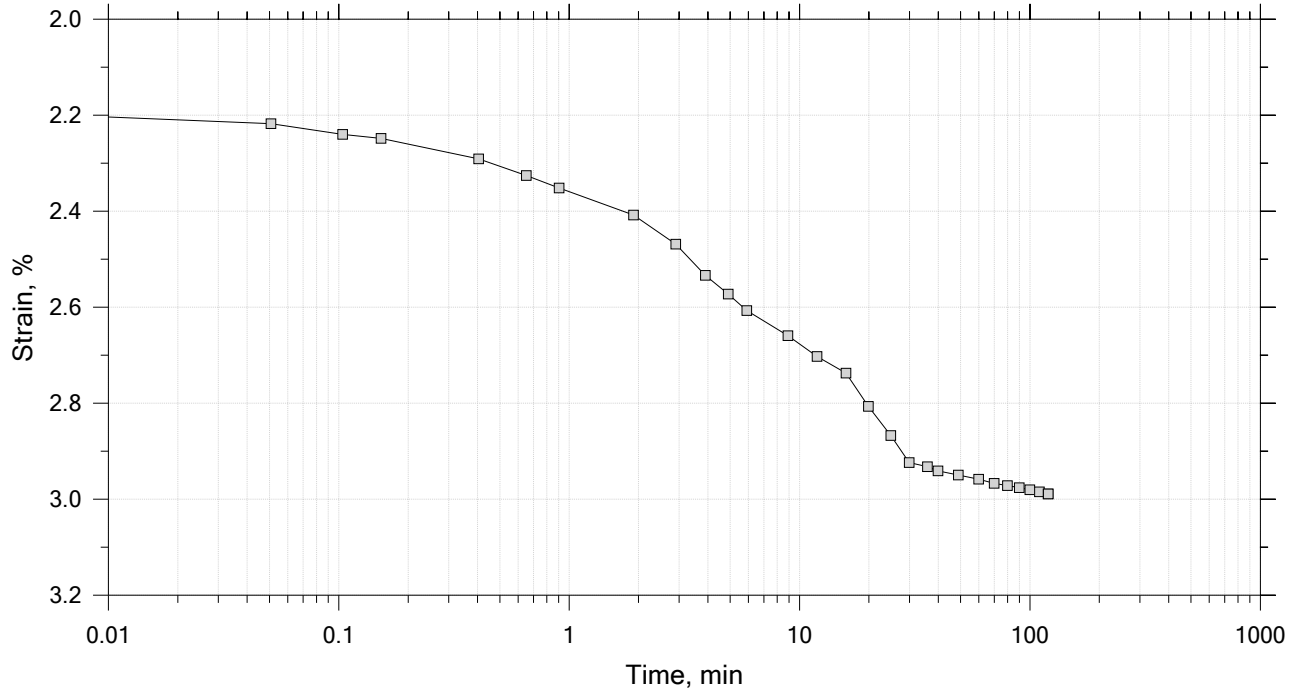
Time Curve 3 of 15  
 Constant Load Step  
 Stress: 0.25 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 15  
 Constant Load Step  
 Stress: 0.5 tsf



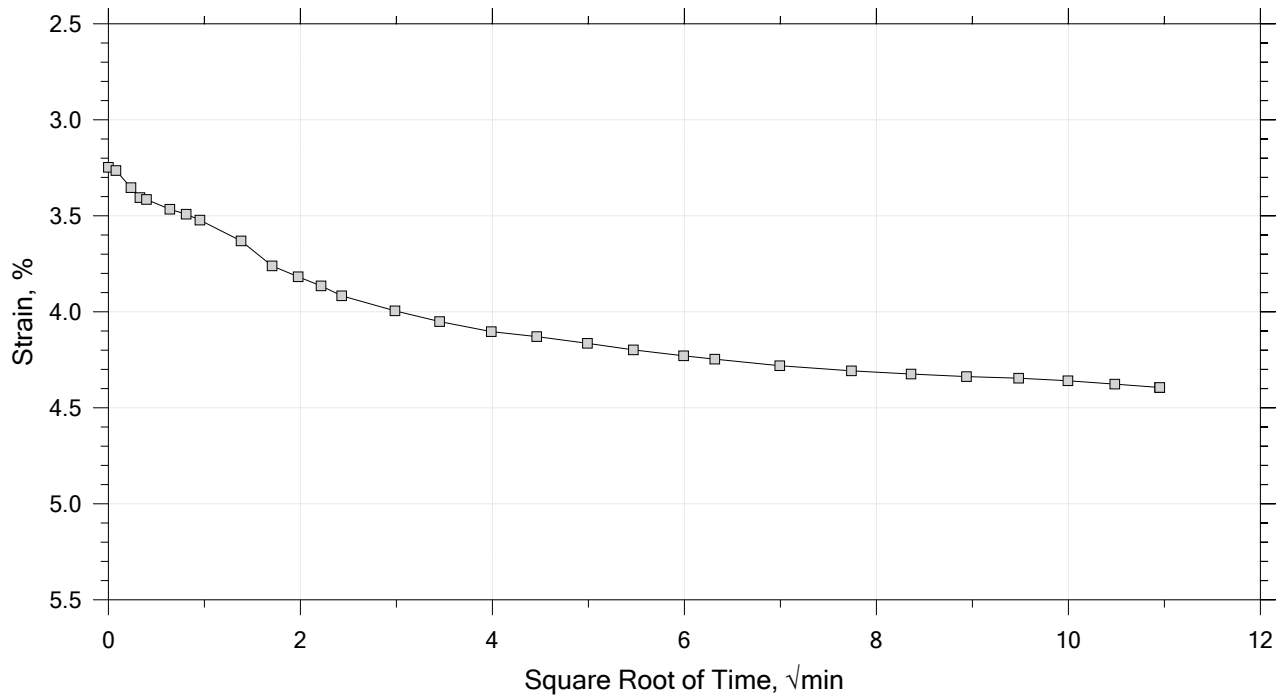
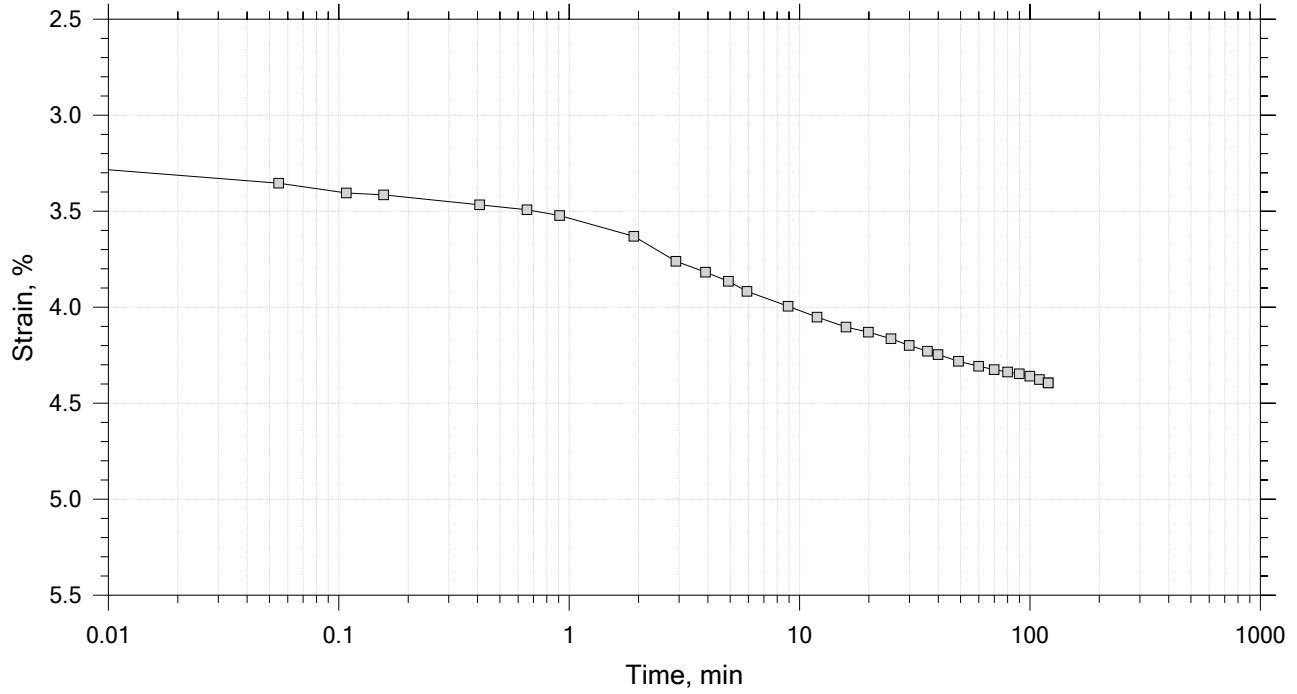
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 15

Constant Load Step

Stress: 1 tsf



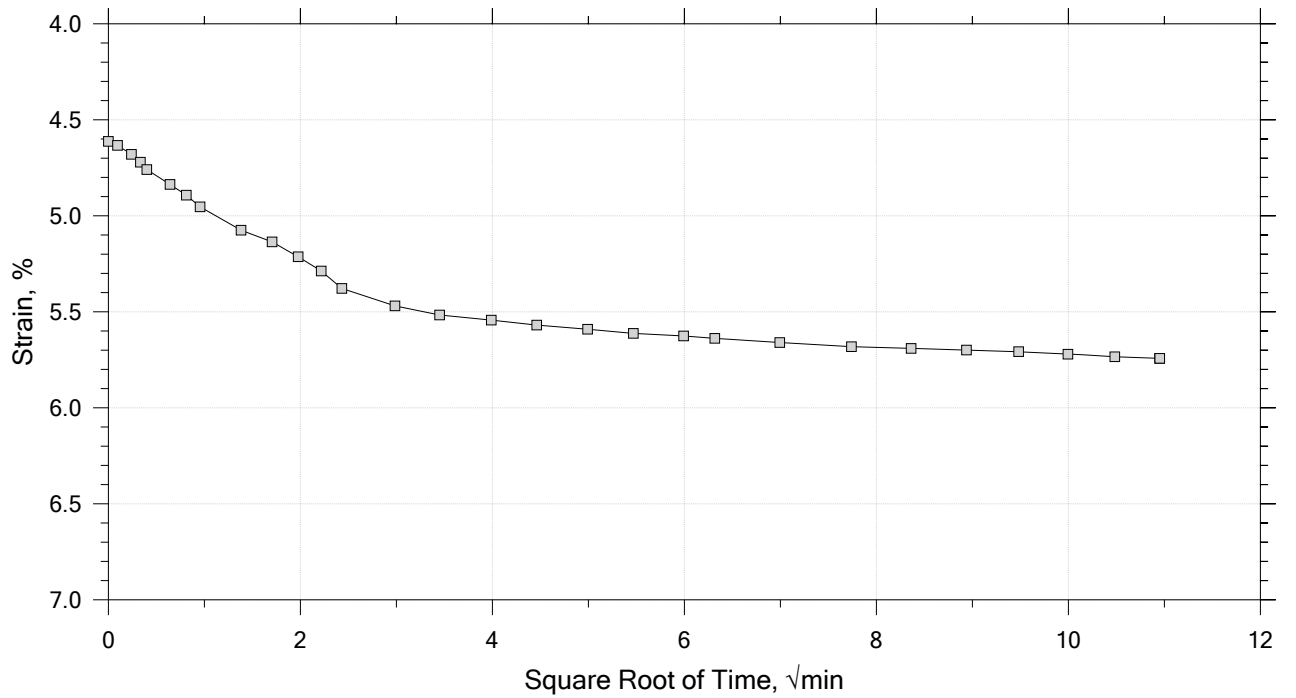
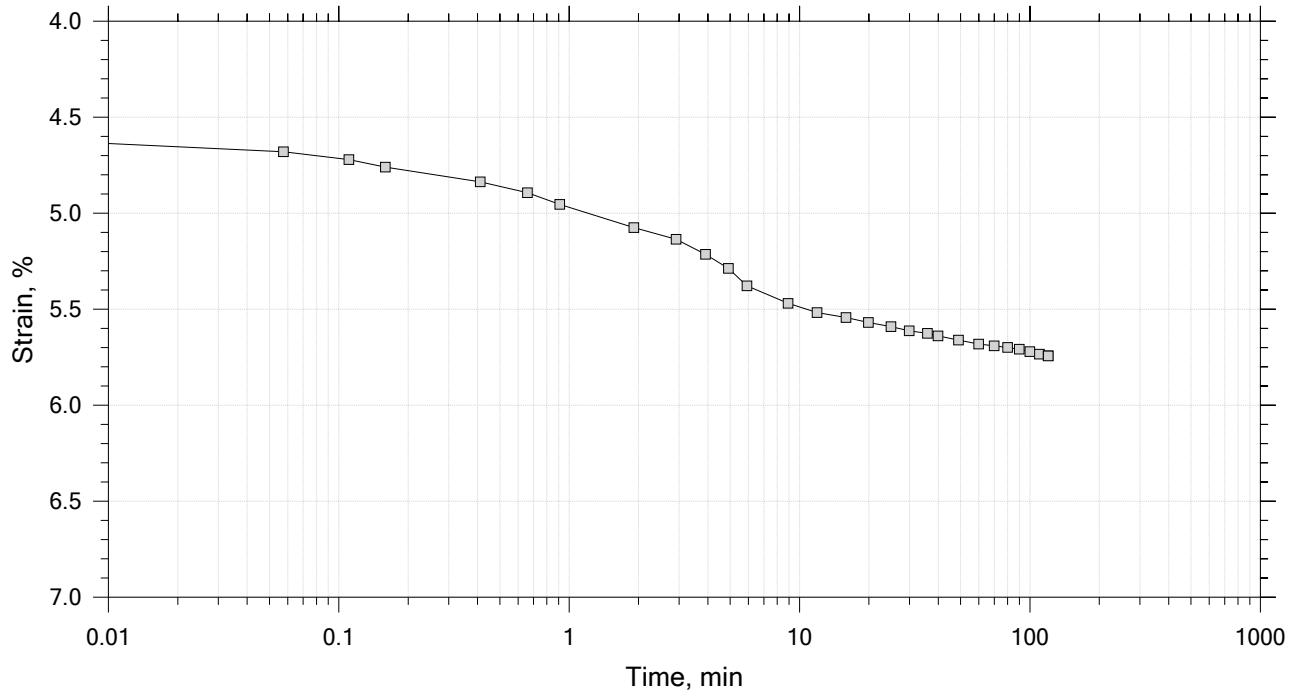
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 15

Constant Load Step

Stress: 2 tsf



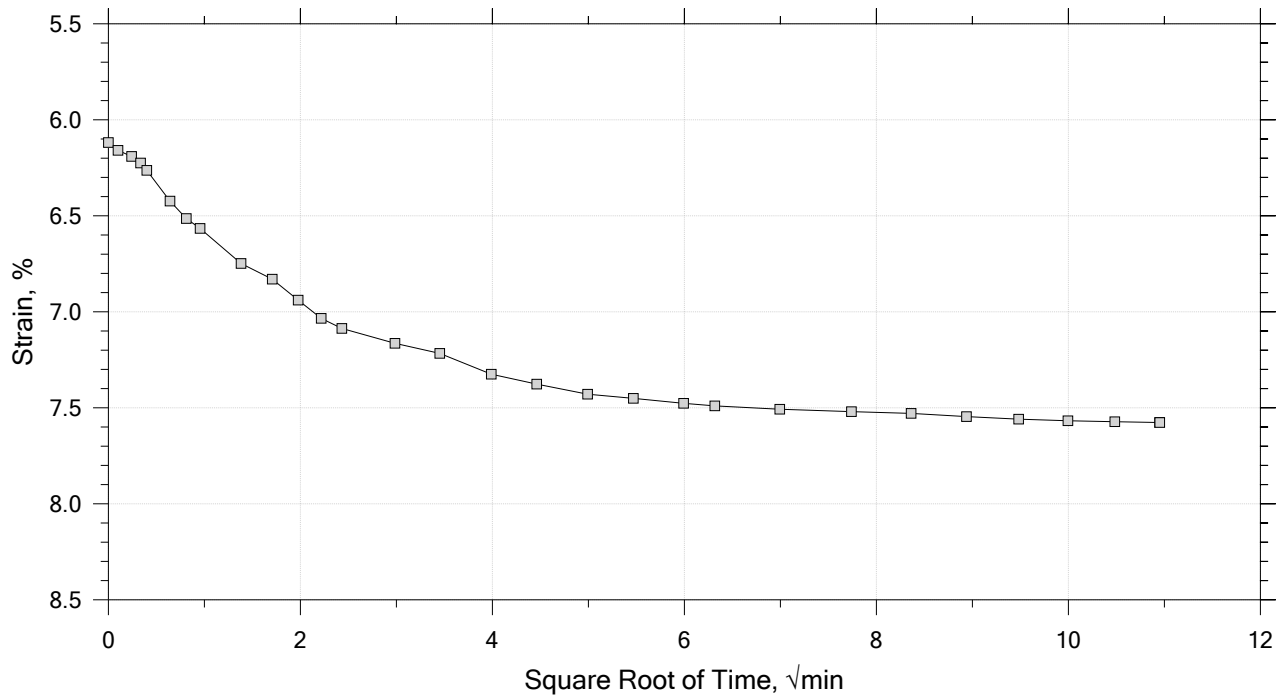
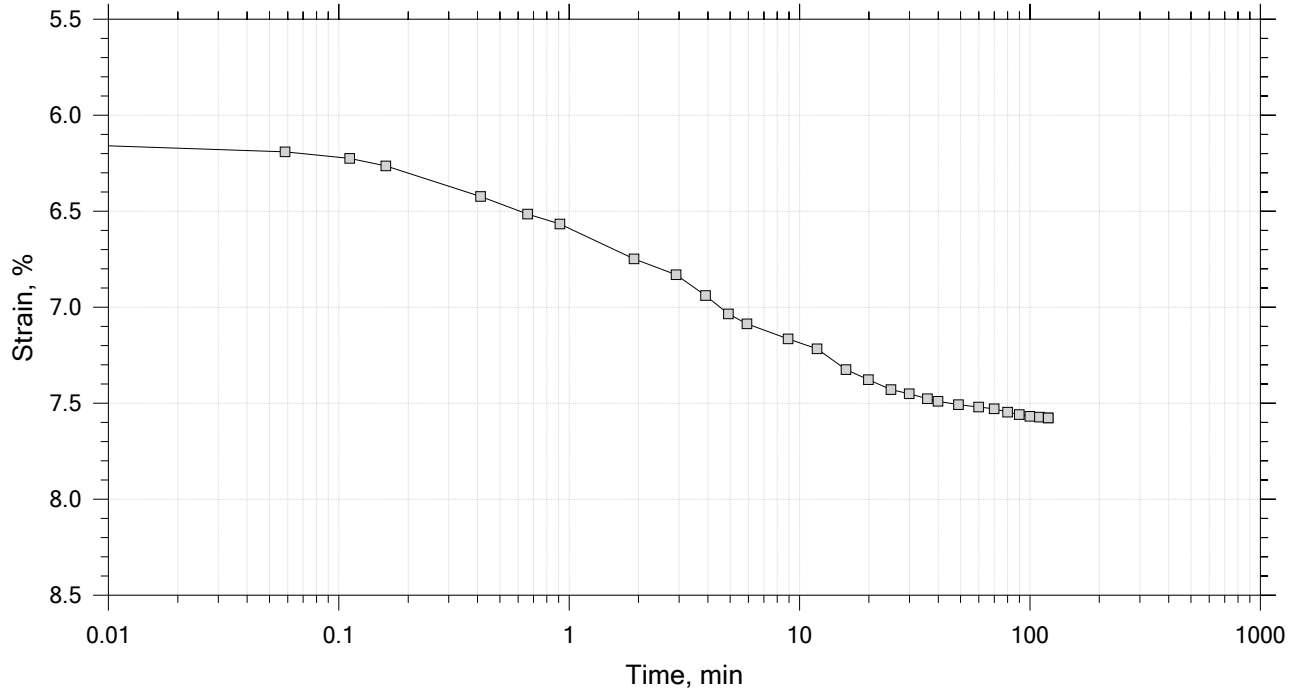
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 15

Constant Load Step

Stress: 4 tsf



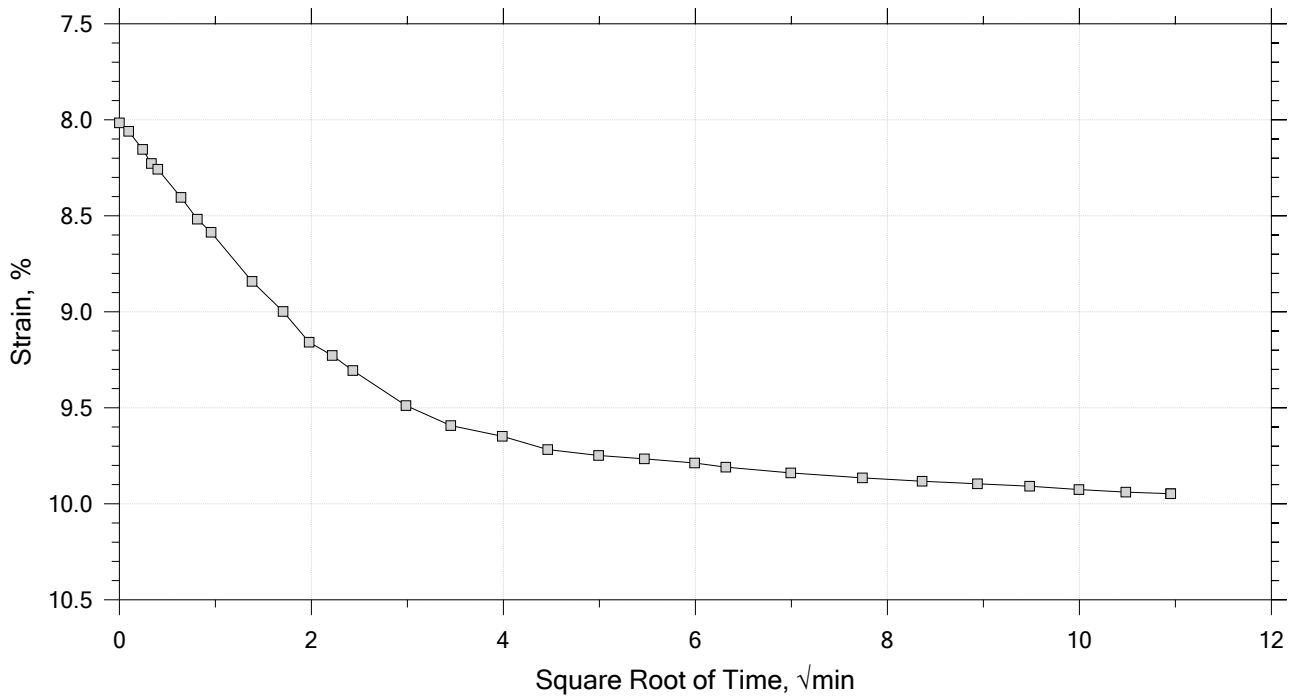
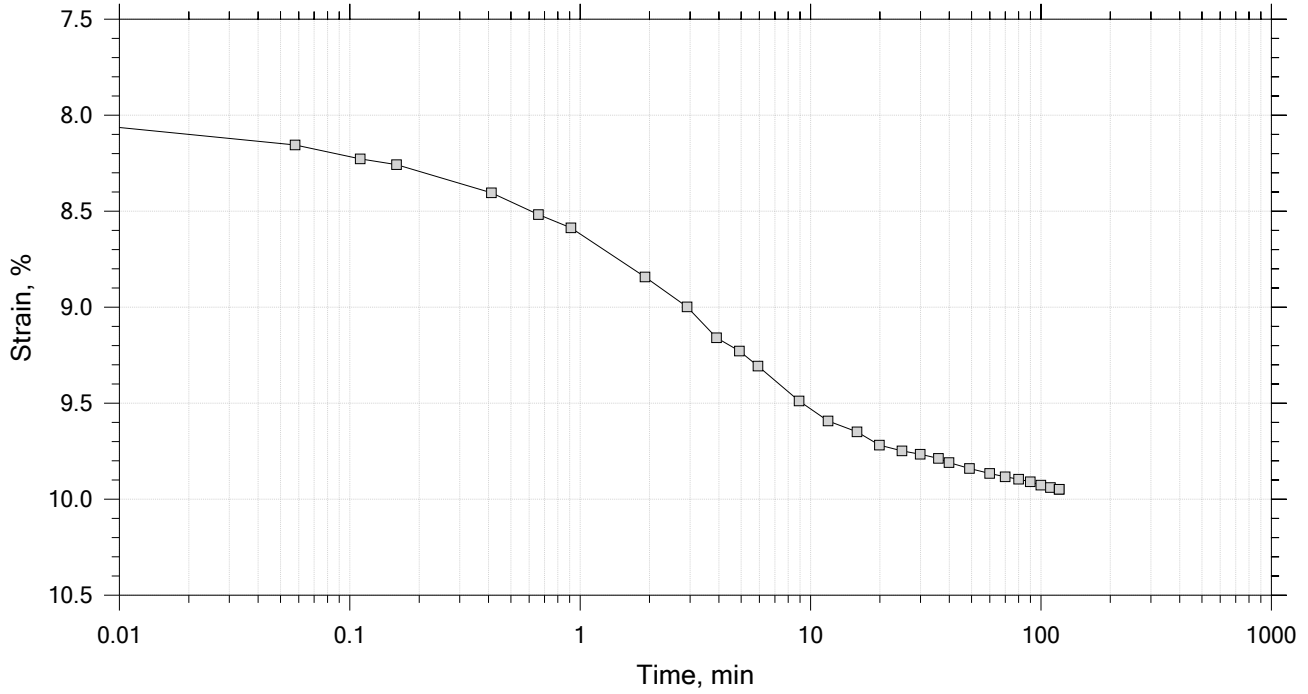
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 15

Constant Load Step

Stress: 8 tsf



	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		

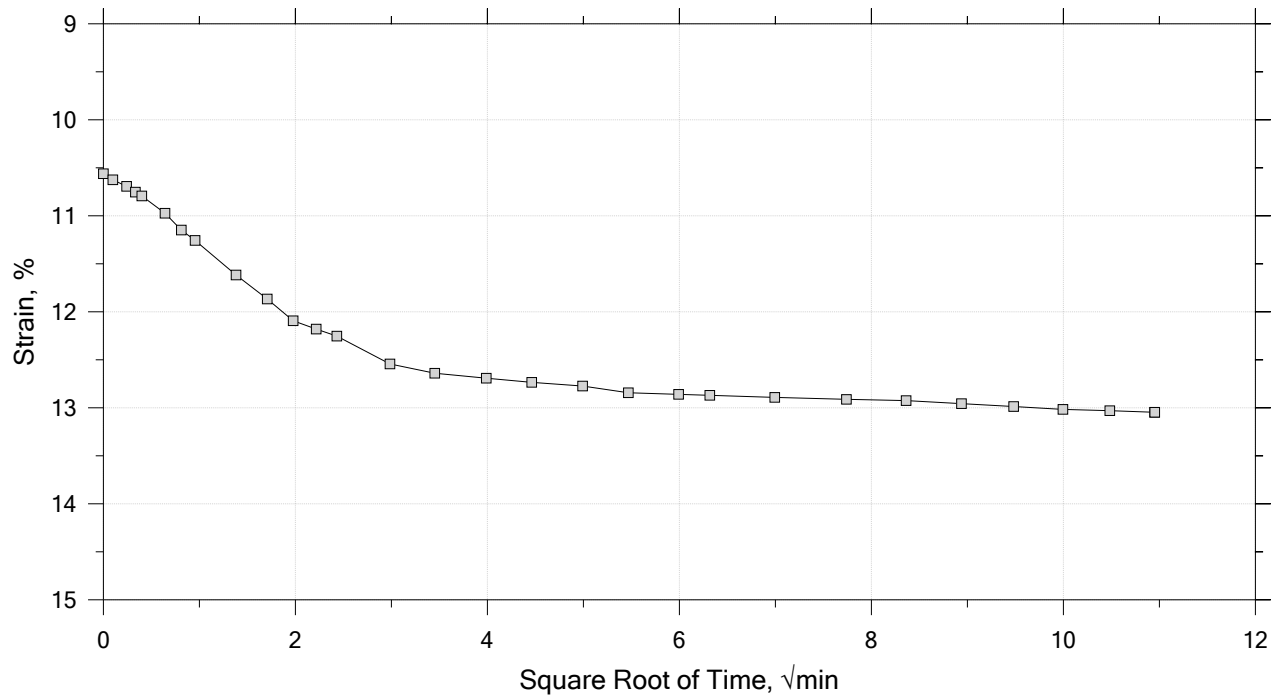
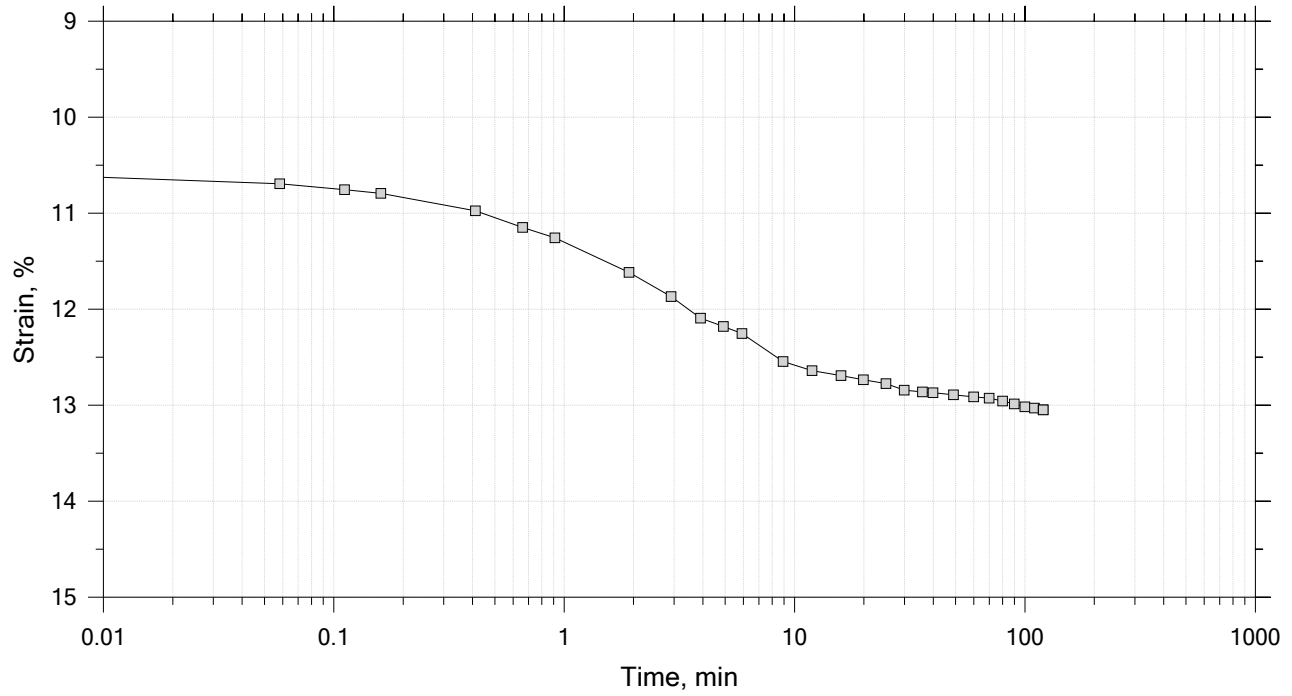



# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 15

Constant Load Step

Stress: 16 tsf



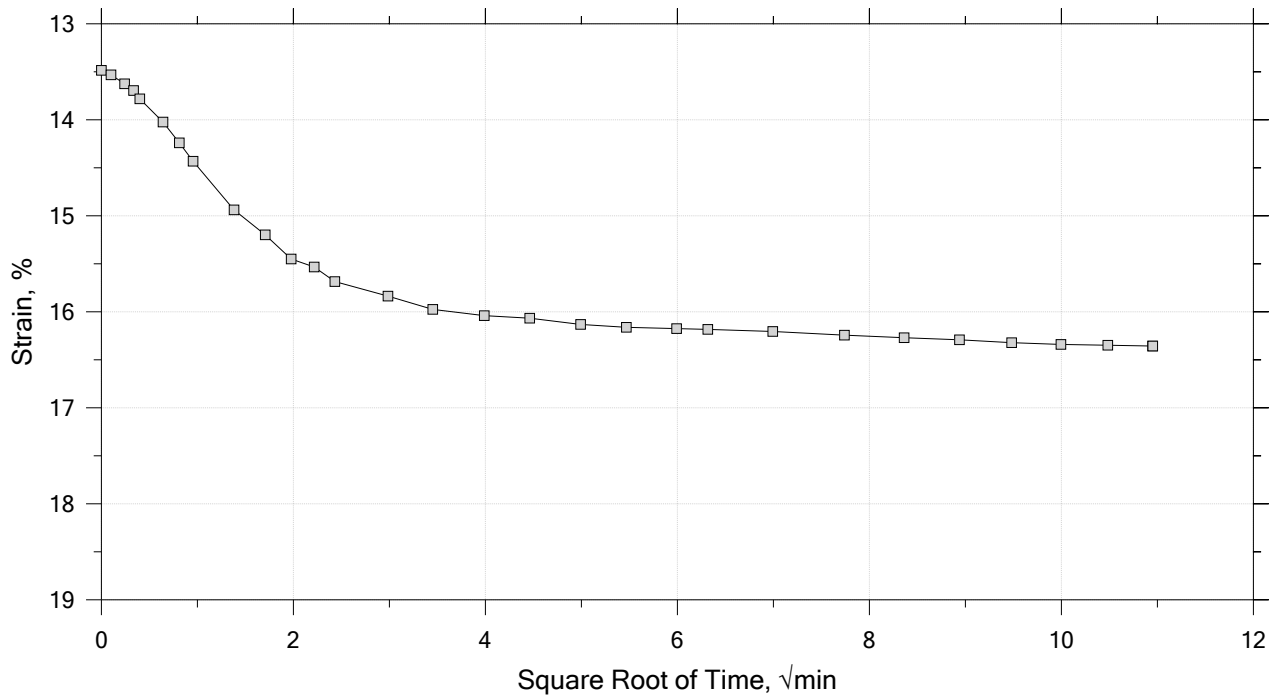
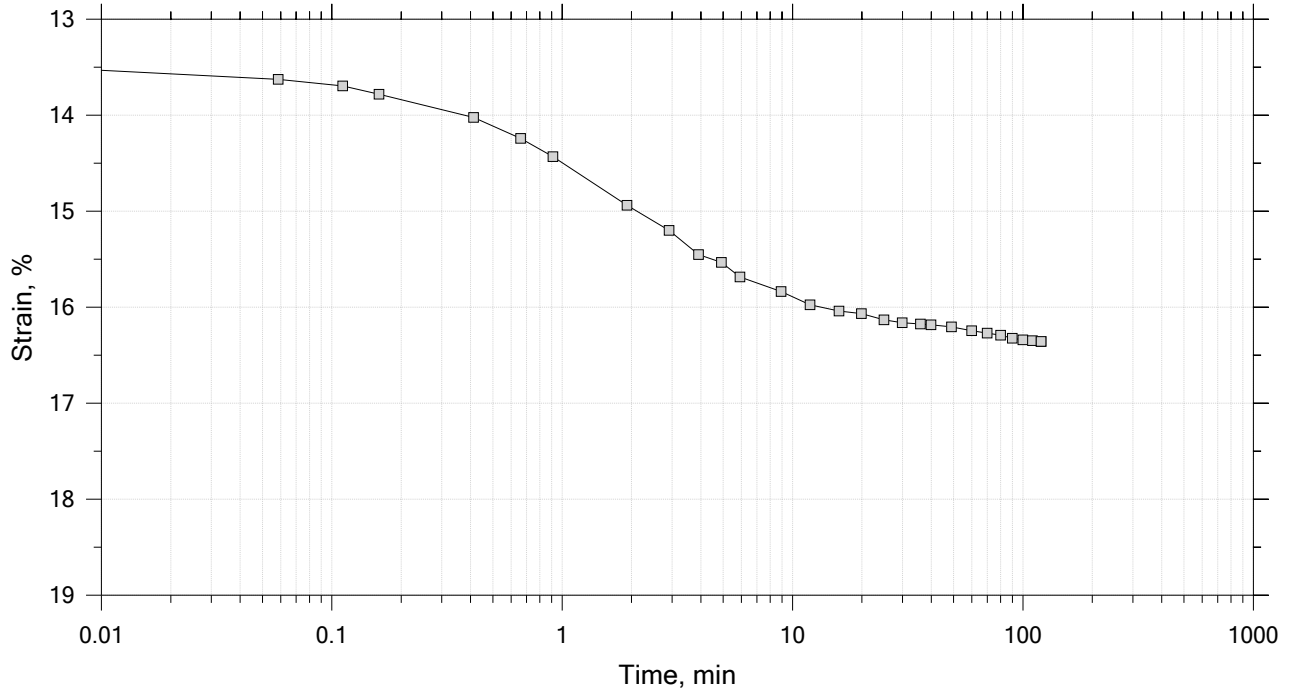
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	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 15

Constant Load Step

Stress: 32 tsf



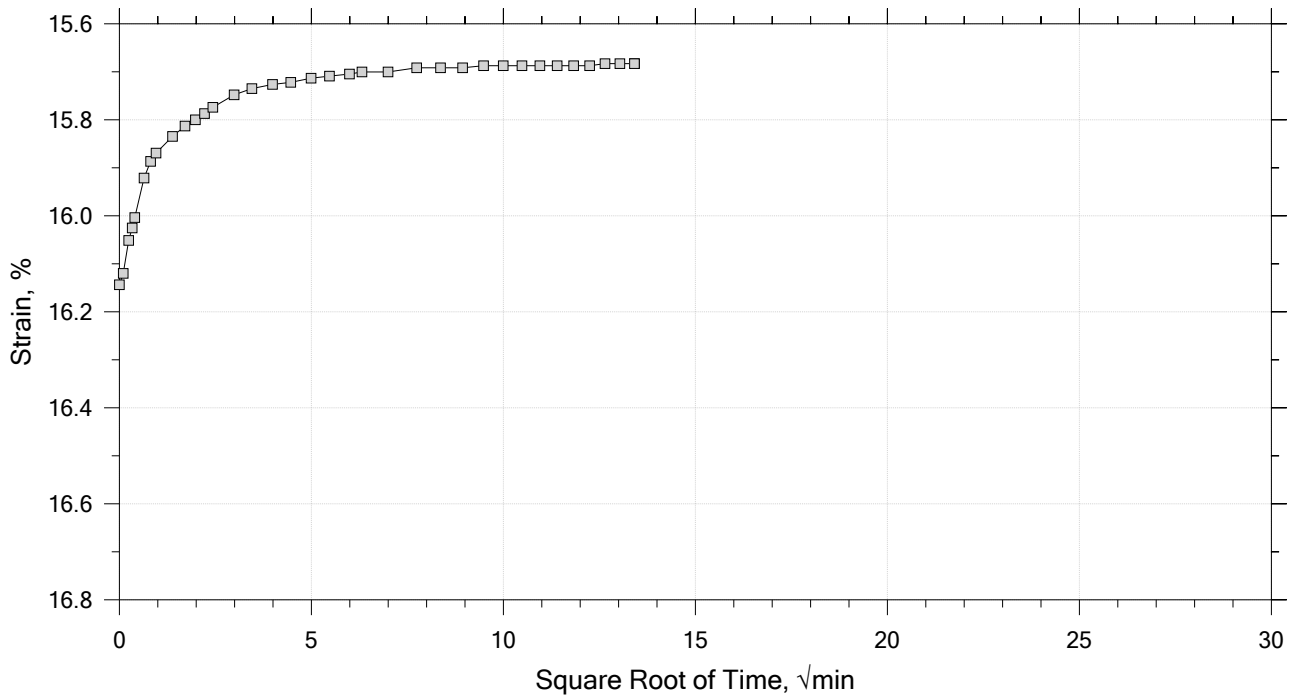
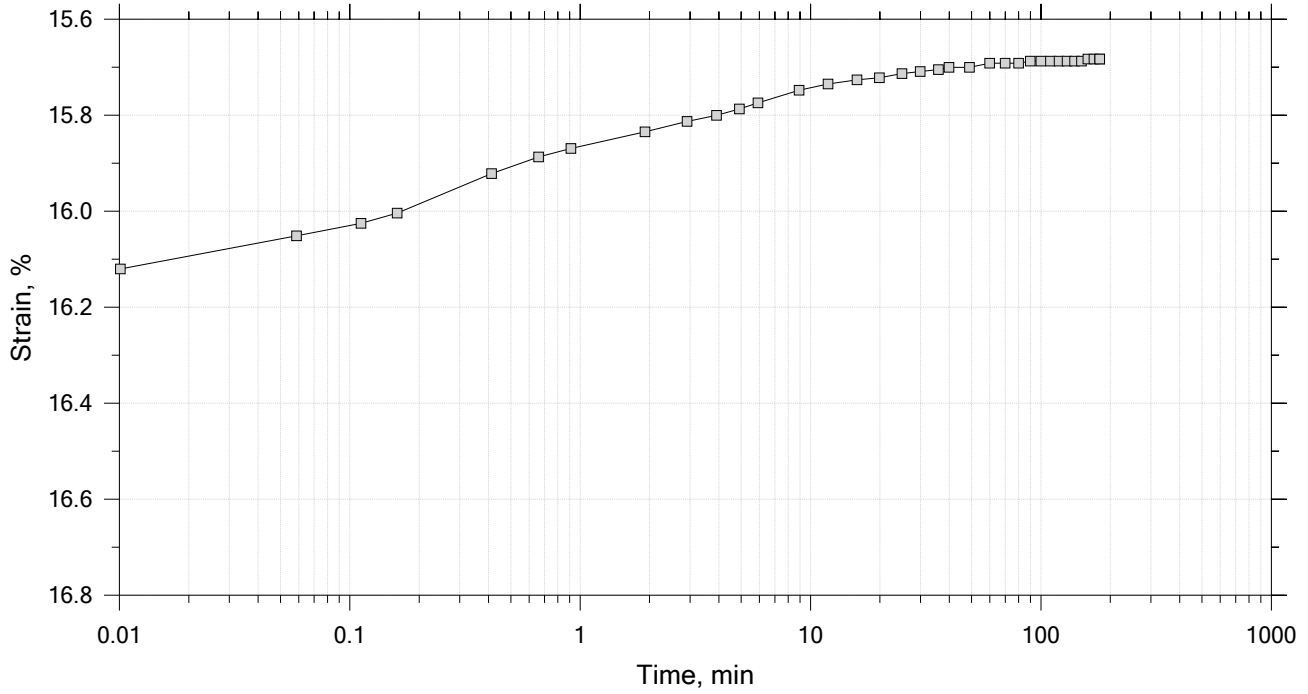
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 15

Constant Load Step

Stress: 8 tsf



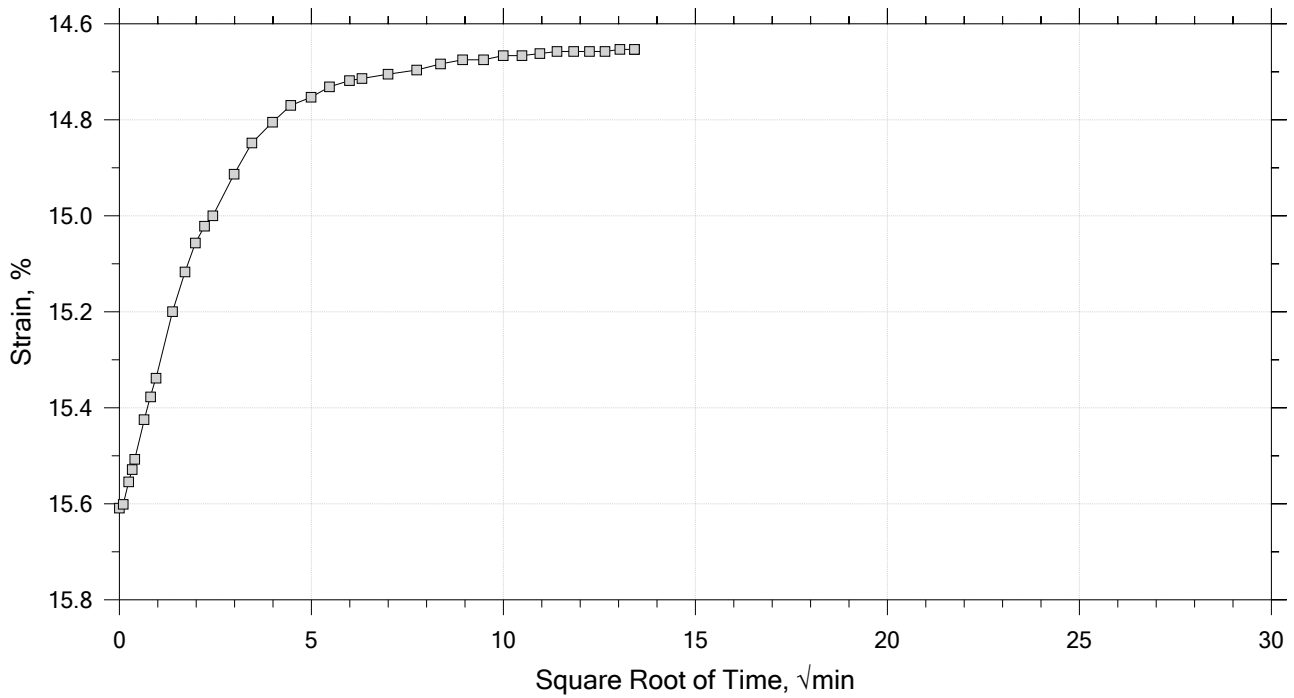
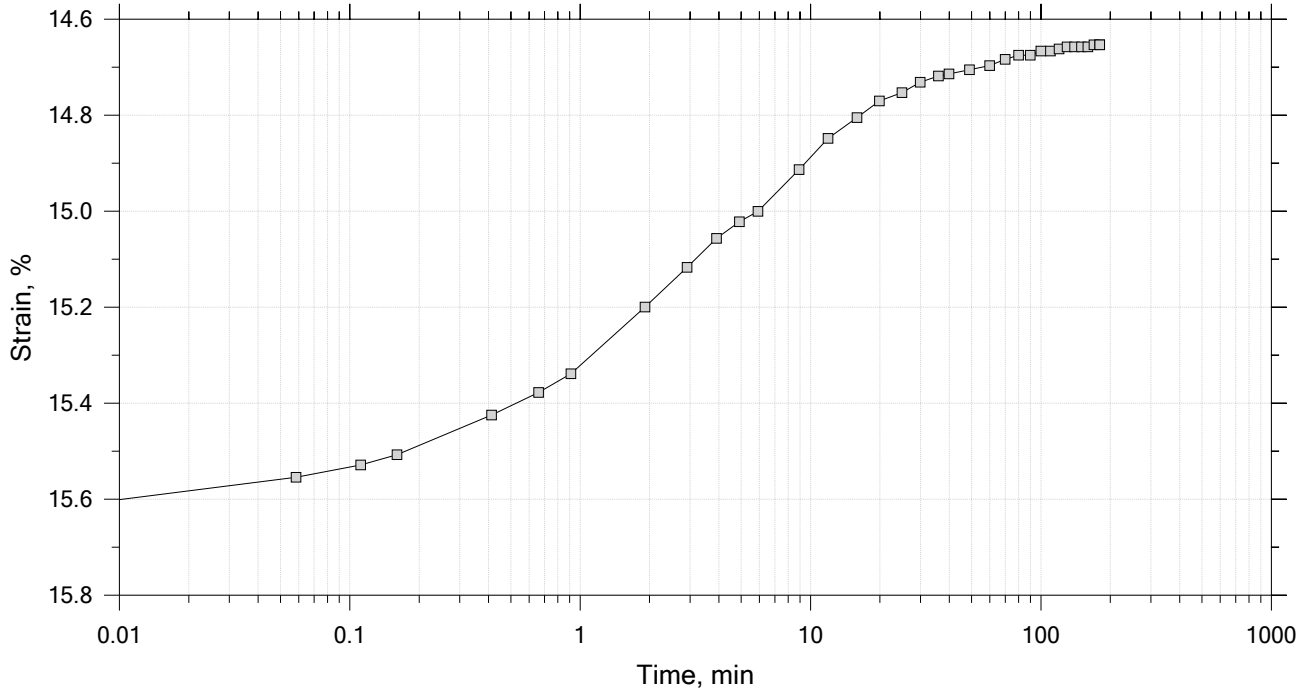
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 15

Constant Load Step

Stress: 2 tsf



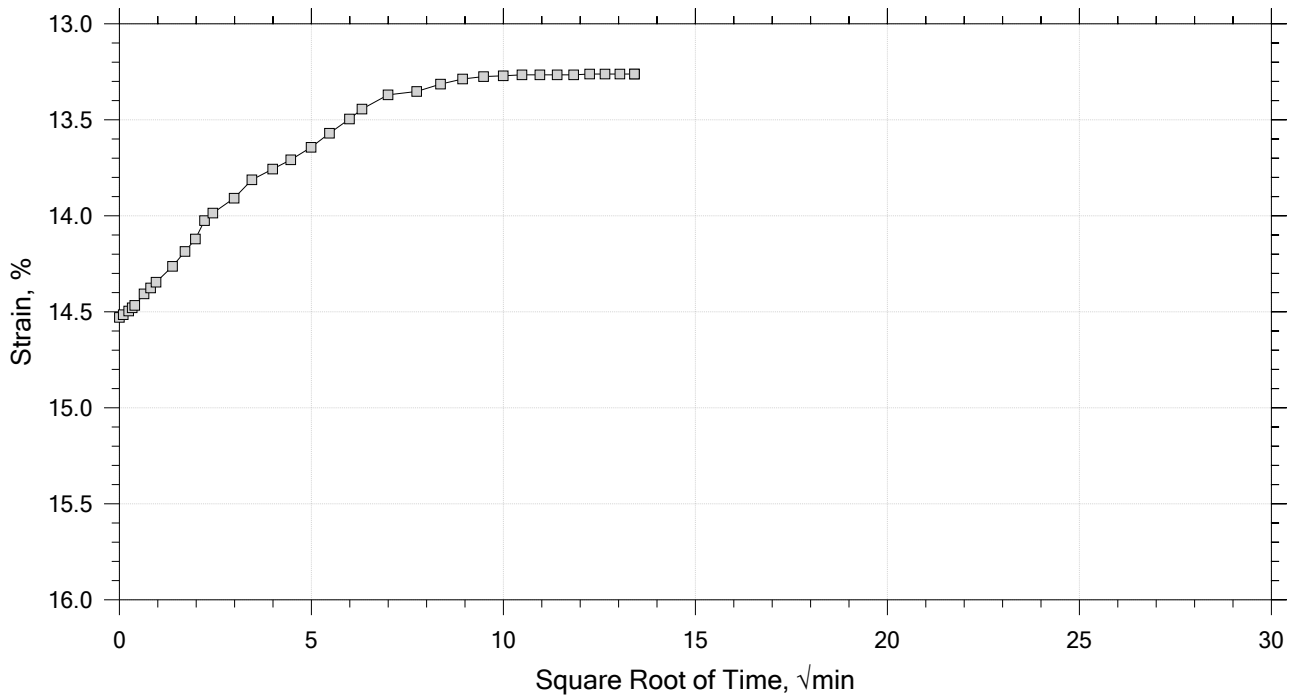
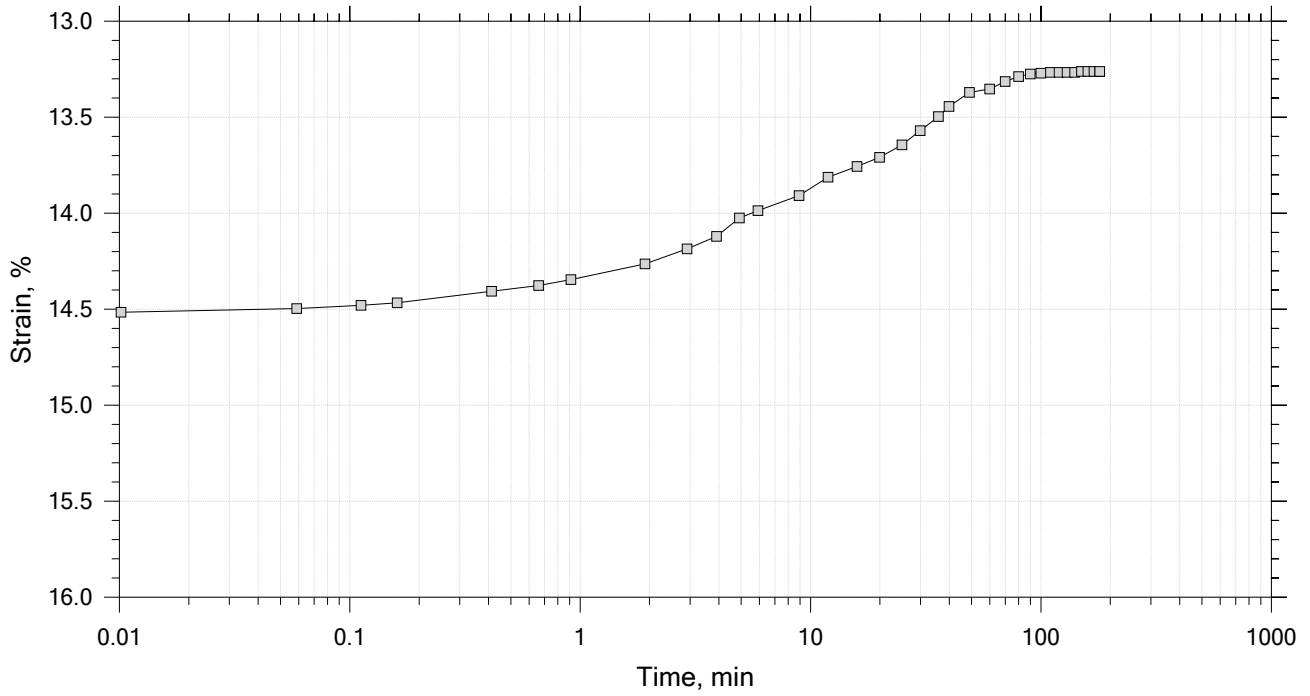
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 15

Constant Load Step

Stress: 0.5 tsf



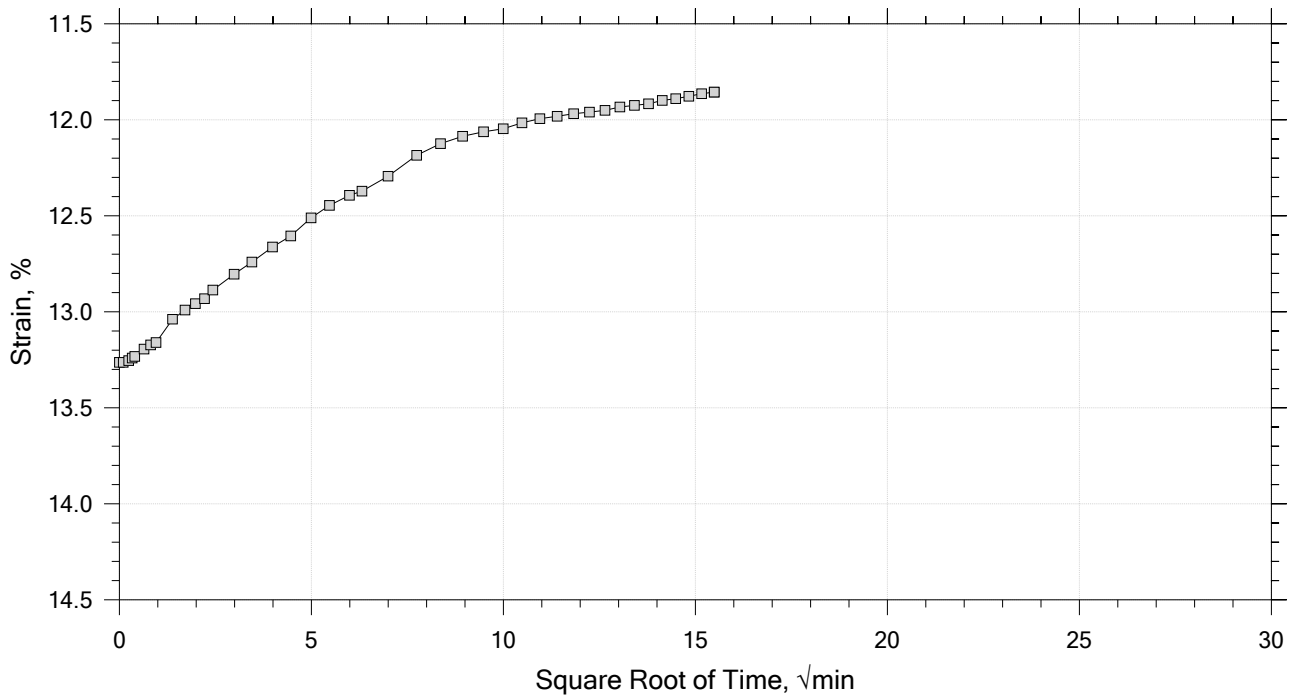
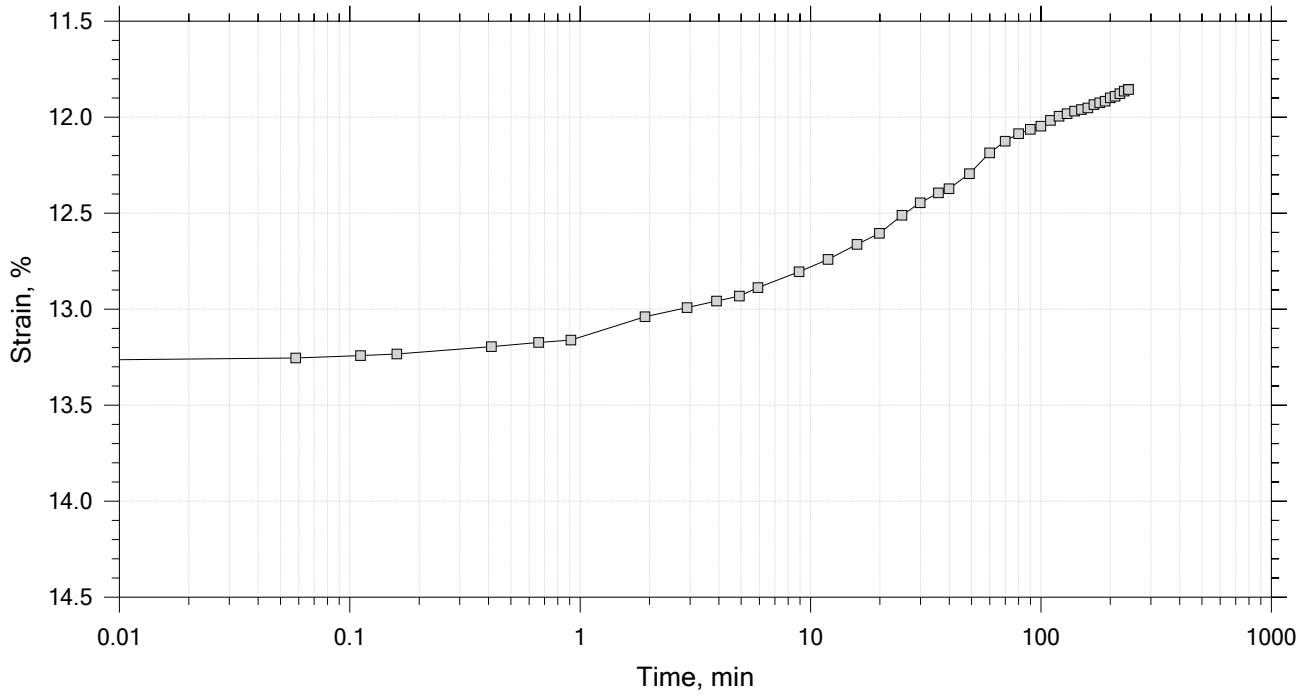
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 15

Constant Load Step

Stress: 0.125 tsf



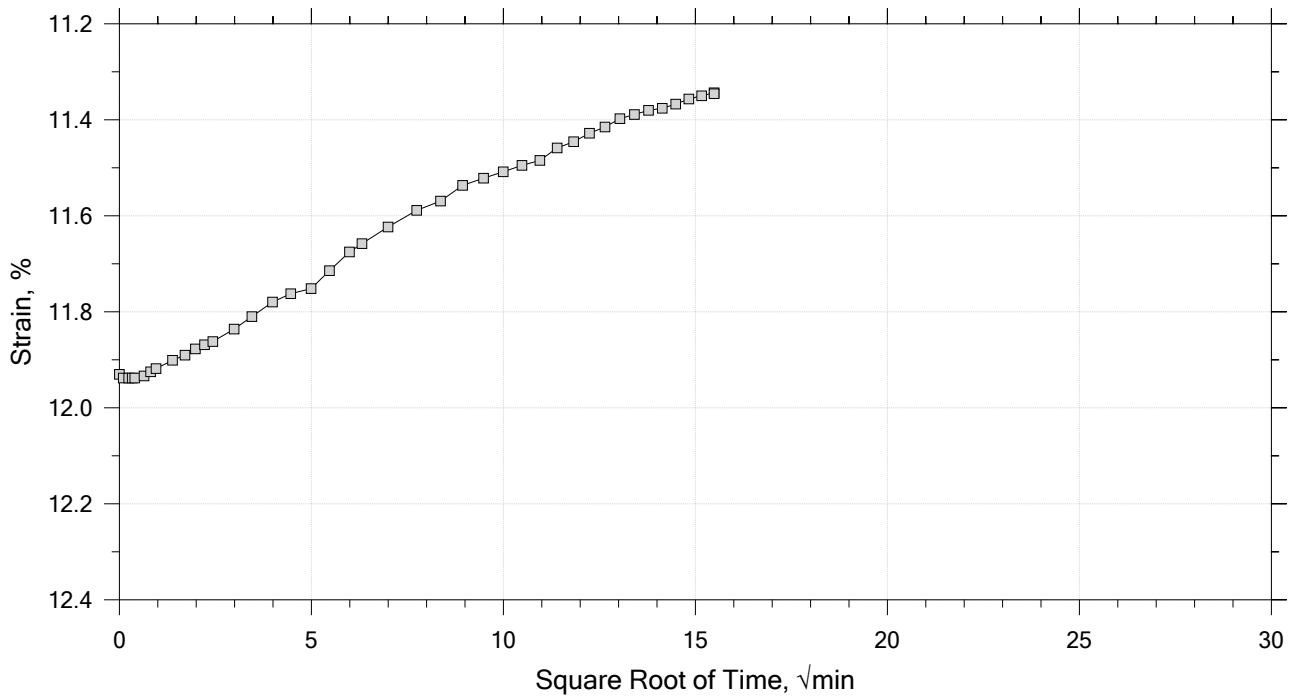
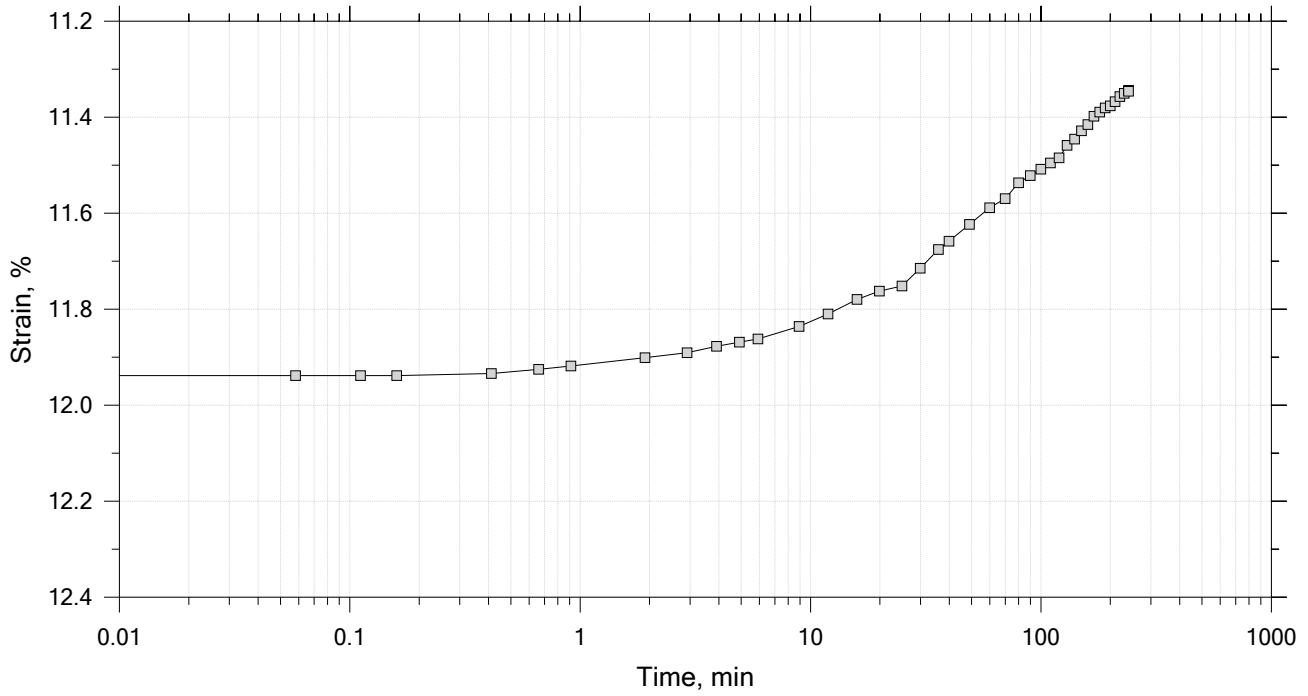
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		


# One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 15

Constant Load Step

Stress: 0.0625 tsf




	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		

# One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Estimated Specific Gravity: 2.74	Liquid Limit: 31
Initial Height: 1.00 in	Initial Void Ratio: 0.877	Plastic Limit: 20
Final Height: 0.89 in	Final Void Ratio: 0.671	Plasticity Index: 11

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	A1133	RING		D-1669
Mass Container, gm	8.78	109.82	109.82	8.4
Mass Container + Wet Soil, gm	122.89	263.53	255.81	155.12
Mass Container + Dry Soil, gm	97.08	227.07	227.07	126.24
Mass Dry Soil, gm	88.3	117.25	117.25	117.84
Water Content, %	29.23	31.09	24.51	24.51
Void Ratio	---	0.88	0.67	---
Degree of Saturation, %	---	97.00	100.00	---
Dry Unit Weight, pcf	---	90.999	102.25	---

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.

	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Tested By: trm	Checked By: njh
	Sample No.: U2	Test Date: 2/11/19	Depth: 6-8 ft
	Test No.: IP-6	Sample Type: intact	Elevation: ---
	Description: Moist, dark grayish brown clay		
	Remarks: System Y, Swell Pressure = 0.063 tsf		



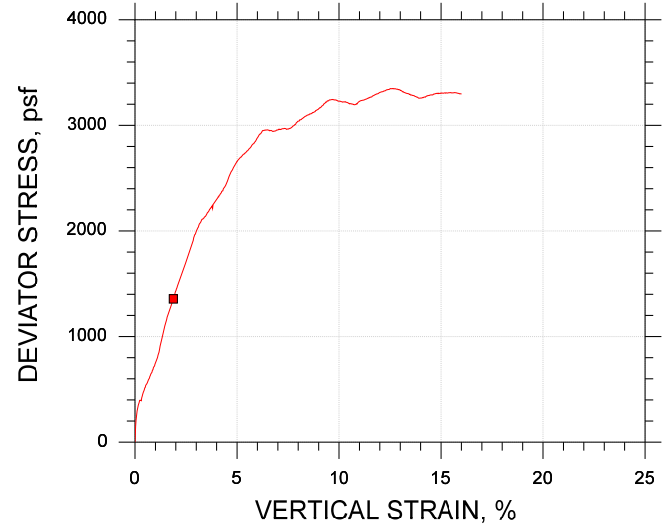
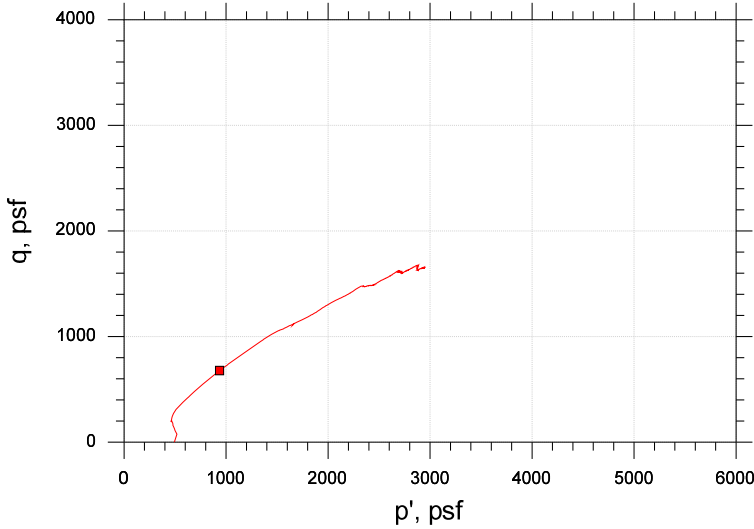






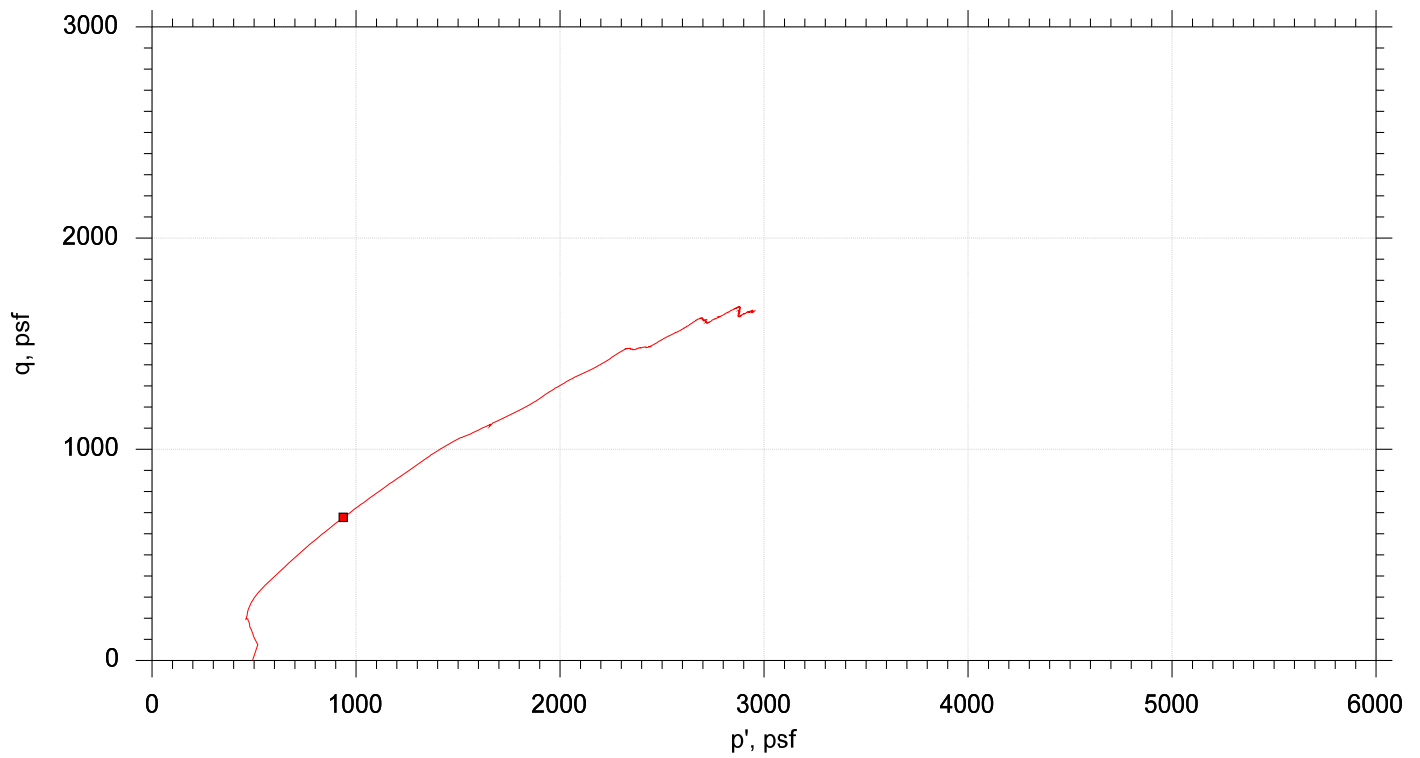
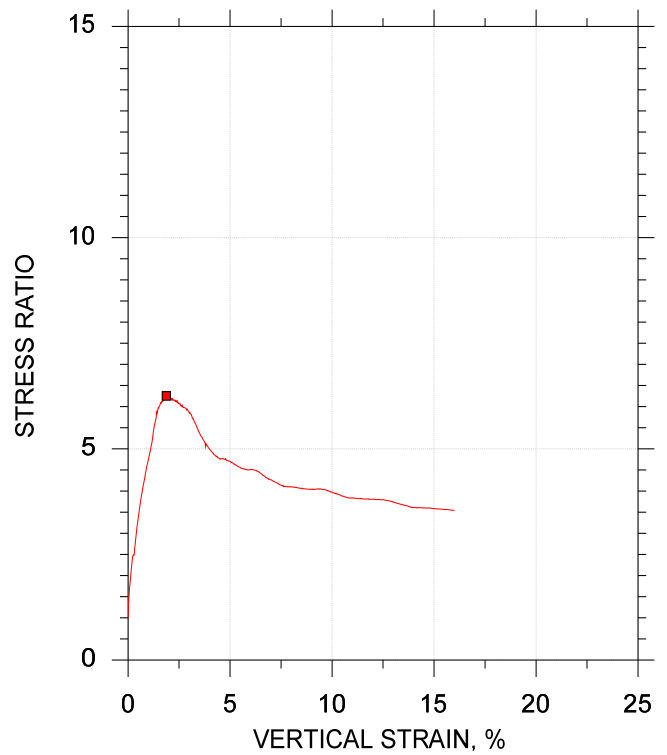
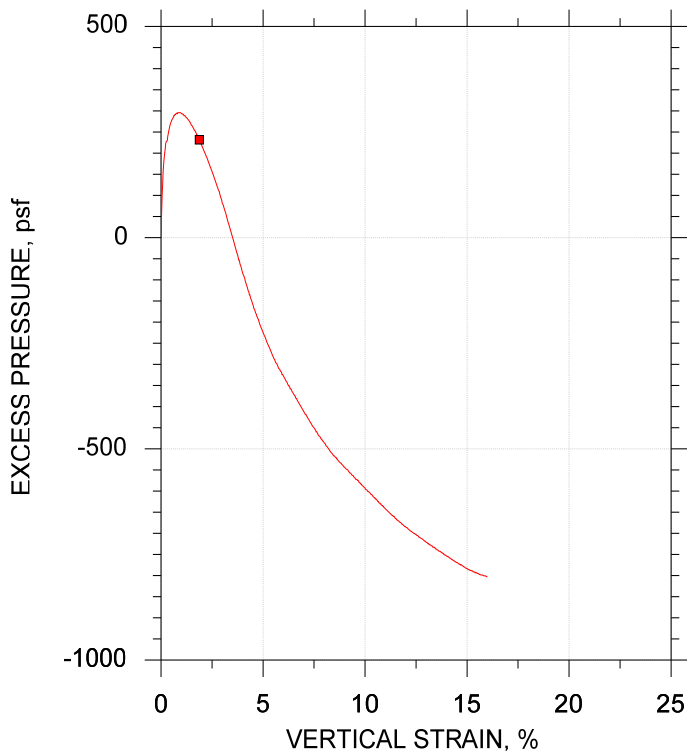
Client: Haley & Aldrich, Inc.	
Project Name: Maine Turnpike Exit 45	
Project Location: South Portland, ME	
Project Number: GTX-309473	
Tested By: trm	Checked By: njh
Boring ID: HB-EXIT 45-302	
Preparation: Intact	
Description: Moist, dark gray clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: 35	Plastic Limit: 23
Plasticity Index: 12	Estimated Specific Gravity: 2.7

**CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767**




Symbol	■		
Sample ID	U1		
Depth, ft	10-12		
Test Number	CU-7-1		
Initial	Height, in	6.170	
	Diameter, in	2.860	
	Moisture Content (from Cuttings), %	29.2	
	Dry Density, pcf	93.3	
	Saturation (Wet Method), %	97.7	
	Void Ratio	0.807	
Before Shear	Moisture Content, %	29.1	
	Dry Density, pcf	94.4	
	Cross-sectional Area (Method A), in <sup>2</sup>	6.360	
	Saturation, %	100.0	
	Void Ratio	0.785	
	Back Pressure, psf	2.462e+004	
Vertical Effective Consolidation Stress, psf	492.6		
Horizontal Effective Consolidation Stress, psf	492.4		
Vertical Strain after Consolidation, %	-0.003022		
Volumetric Strain after Consolidation, %	0.5228		
Time to 50% Consolidation, min	0.8100		
Shear Strength, psf	678.2		
Strain at Failure, %	1.88		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	1356.		
Effective Minor Principal Stress at Failure, psf	258.2		
Effective Major Principal Stress at Failure, psf	1615.		
B-Value	0.95		
Notes:			
Remarks:			

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



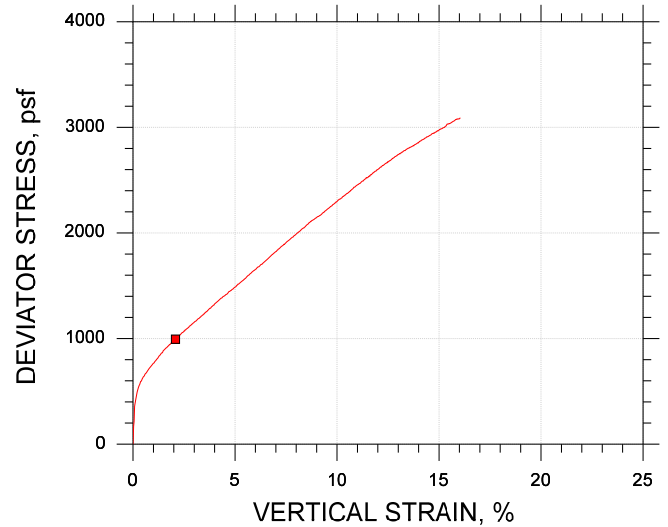
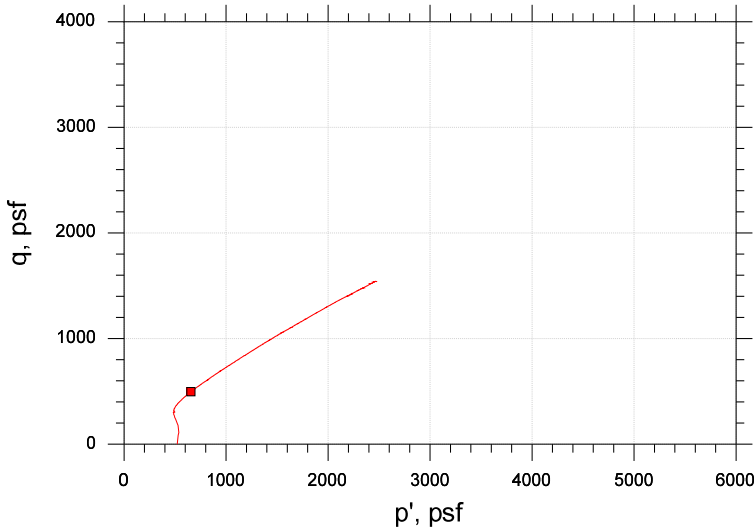
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■	U1	CU-7-1	10-12	trm	2/25/19	njh	3/1/19	309473-CU-7-1n.dat

	Project: Maine Turnpike Exit 45		Location: South Portland, ME		Project No.: GTX-309473	
	Boring No.: HB-EXIT 45-302		Sample Type: Intact			
	Description: Moist, dark gray clay					
	Remarks: System V					



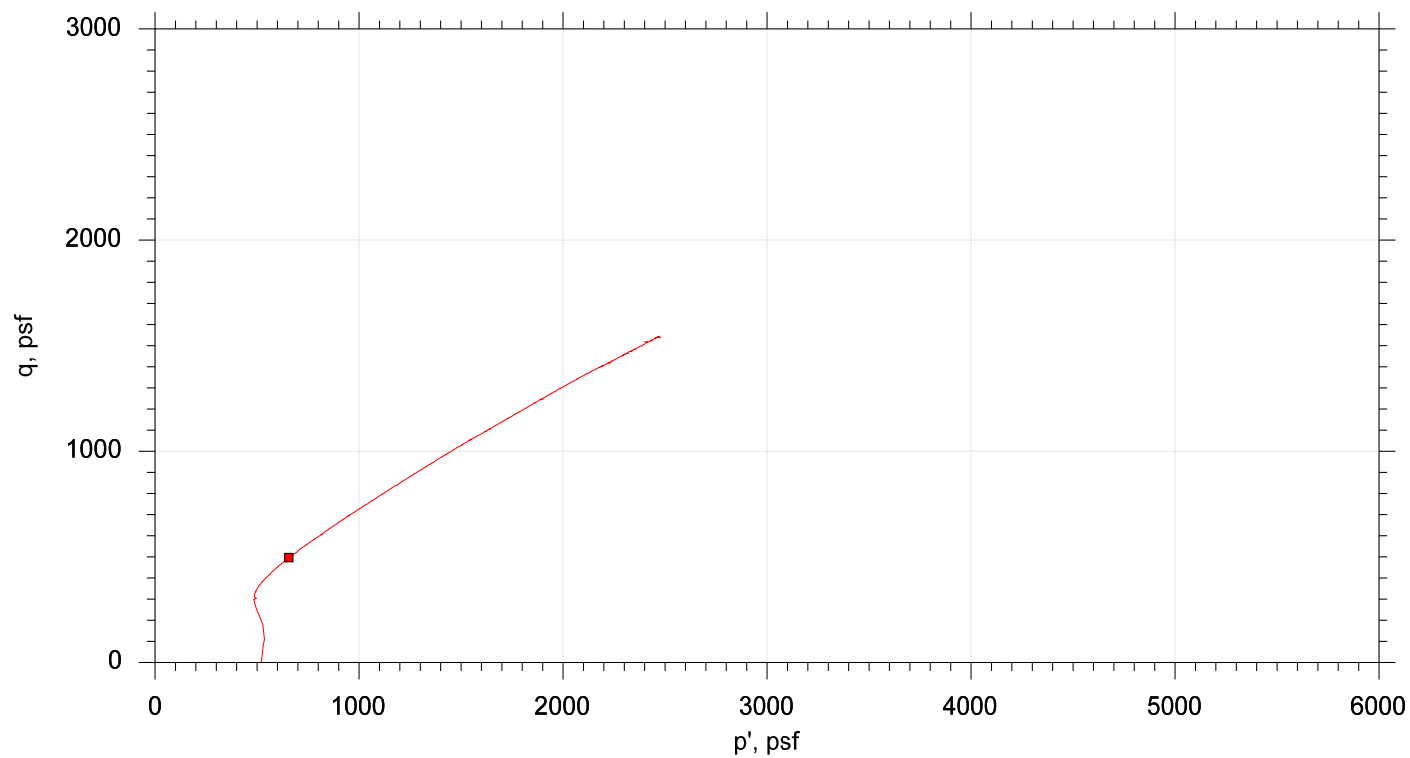
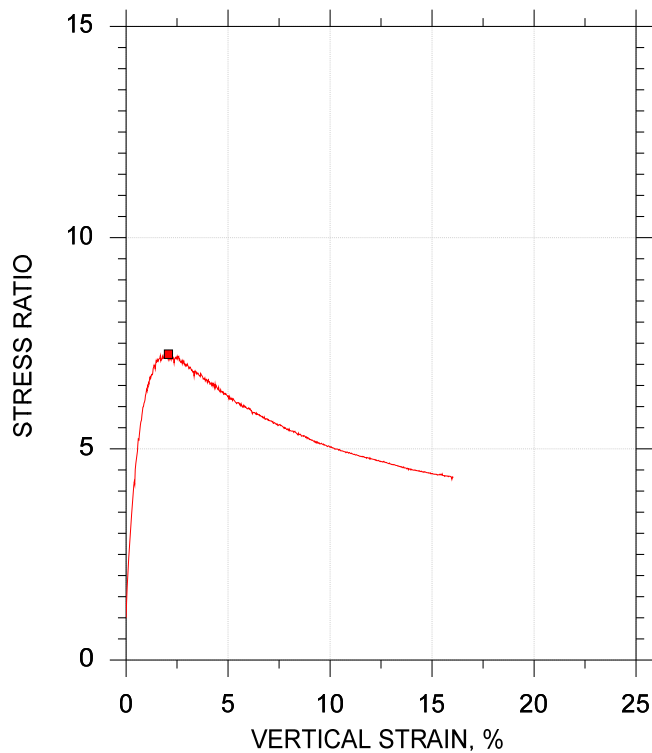
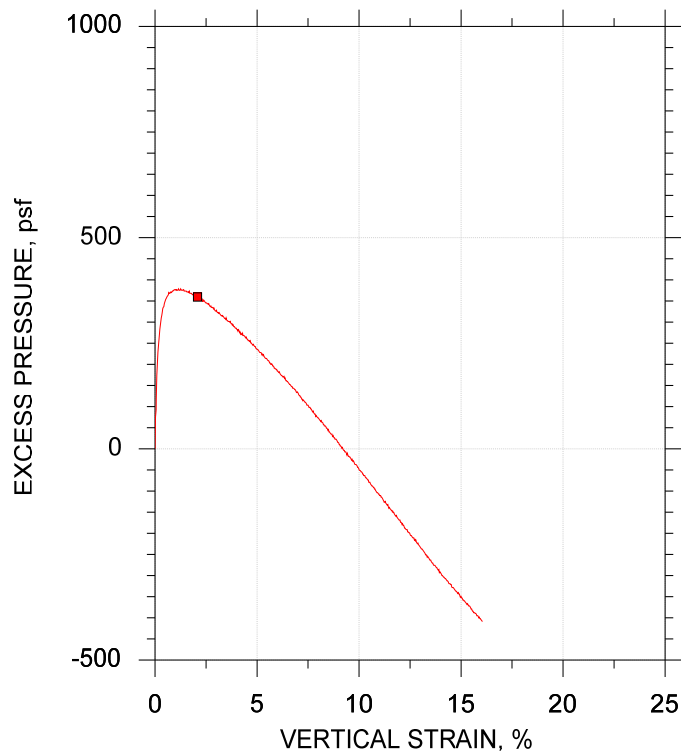
Client: Haley & Aldrich, Inc.	
Project Name: Maine Turnpike Exit 45	
Project Location: South Portland, ME	
Project Number: GTX-309473	
Tested By: md/ trm	Checked By: njh
Boring ID: HB-EXIT 45-303	
Preparation: Intact	
Description: Wet, dark gray silt with sand	
Classification: ---	
Group Symbol: ---	
Liquid Limit: NP	Plastic Limit: NP
Plasticity Index: NP	Estimated Specific Gravity: 2.65

**CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767**




Symbol	■		
Sample ID	U1		
Depth, ft	10-12		
Test Number	CU-2-1		
Initial	Height, in	4.320	
	Diameter, in	1.930	
	Moisture Content (from Cuttings), %	25.8	
	Dry Density, pcf	95.5	
	Saturation (Wet Method), %	93.4	
	Void Ratio	0.732	
Before Shear	Moisture Content, %	28.1	
	Dry Density, pcf	94.9	
	Cross-sectional Area (Method A), in <sup>2</sup>	2.946	
	Saturation, %	100.0	
	Void Ratio	0.744	
Back Pressure, psf	2.222e+004		
Vertical Effective Consolidation Stress, psf	517.6		
Horizontal Effective Consolidation Stress, psf	520.6		
Vertical Strain after Consolidation, %	0.2824		
Volumetric Strain after Consolidation, %	0.05579		
Time to 50% Consolidation, min	0.8100		
Shear Strength, psf	496.9		
Strain at Failure, %	2.08		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	993.9		
Effective Minor Principal Stress at Failure, psf	159.2		
Effective Major Principal Stress at Failure, psf	1153.		
B-Value	0.95		
Notes:			
<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:			

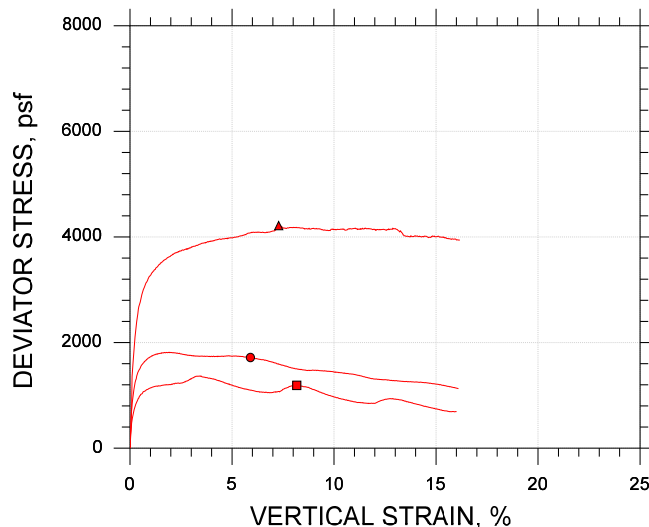
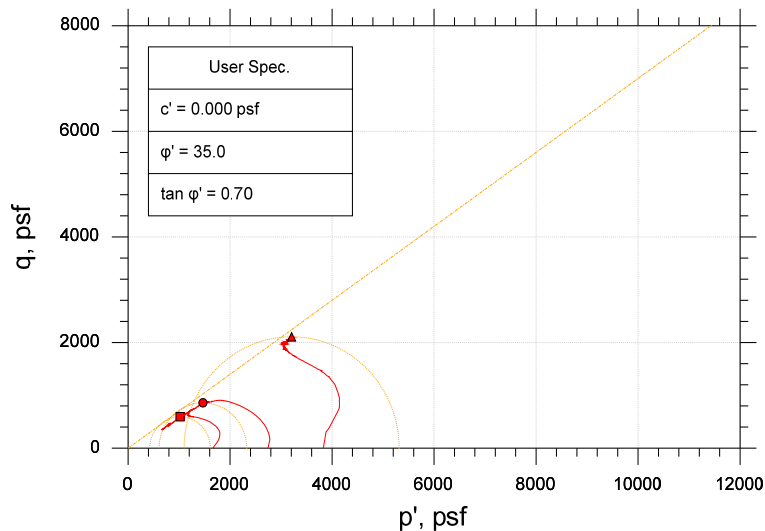
CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■ U1	CU-2-1	10-12	md/ trm	2/22/19	njh	3/1/19	309473-CU-2-1n.dat

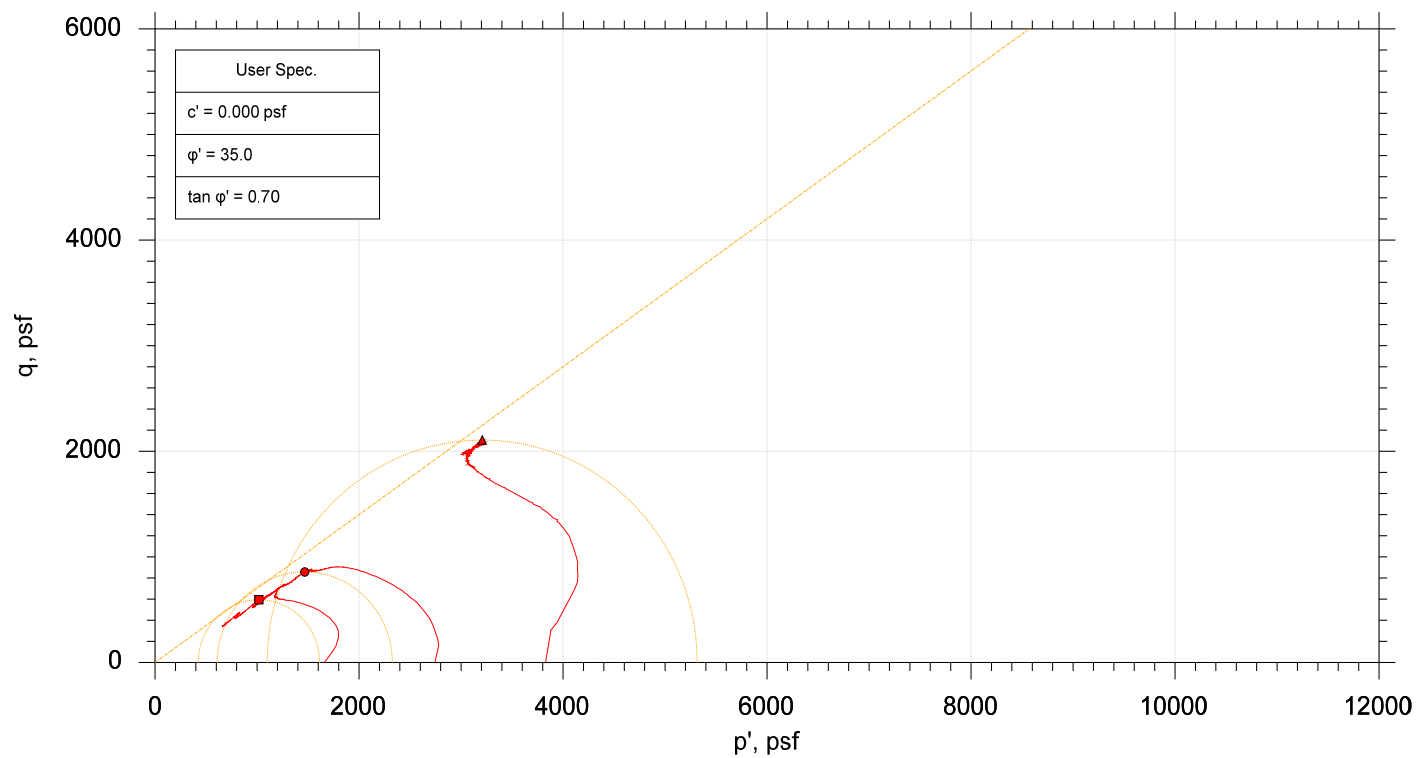
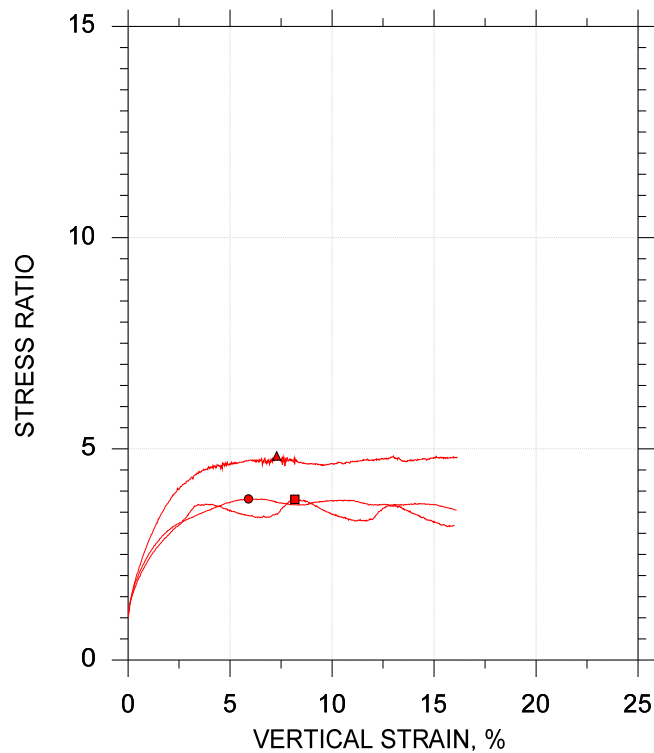
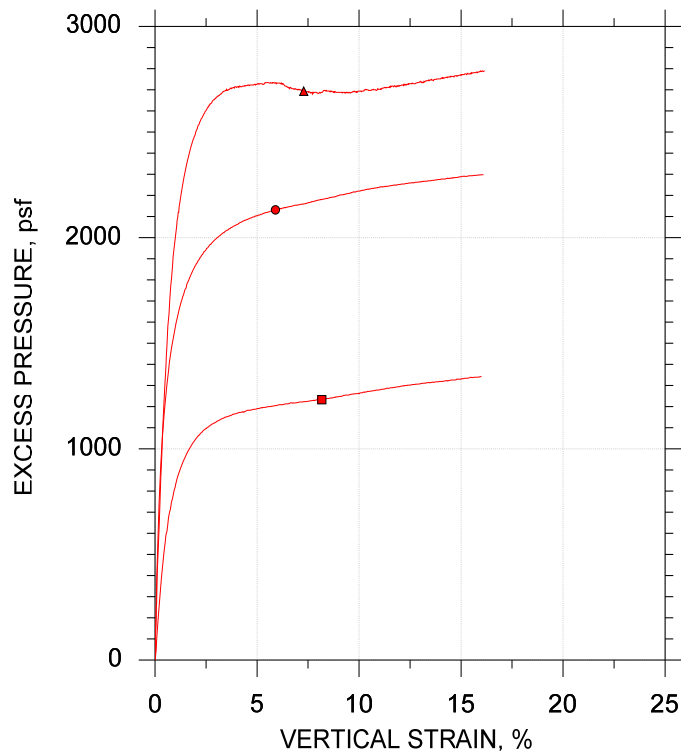
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Sample Type: Intact	
	Description: Wet, dark gray silt with sand		
	Remarks: System E		

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767




Symbol	■	●	▲	
Sample ID	U5	U5	U5	
Depth, ft	45-47	45-47	45-47	
Test Number	CU-1-1	CU-1-2	CU-1-3	
Initial	Height, in	4.400	4.600	4.300
	Diameter, in	1.930	1.930	1.930
	Moisture Content (from Cuttings), %	32.5	39.3	40.8
	Dry Density, pcf	89.8	81.2	79.6
	Saturation (Wet Method), %	100.0	98.4	98.5
	Void Ratio	0.876	1.08	1.12
Before Shear	Moisture Content, %	29.2	33.7	40.9
	Dry Density, pcf	94.2	88.3	80.2
	Cross-sectional Area (Method A), in <sup>2</sup>	2.822	2.705	2.648
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.789	0.909	1.10
	Back Pressure, psf	2.447e+004	2.203e+004	1.684e+004
Vertical Effective Consolidation Stress, psf	1646.	2735.	3942.	
Horizontal Effective Consolidation Stress, psf	1659.	2743.	3828.	
Vertical Strain after Consolidation, %	1.042	0.7392	-8.985	
Volumetric Strain after Consolidation, %	4.324	8.492	2.694	
Time to 50% Consolidation, min	0.0000	0.0000	256.0	
Shear Strength, psf	594.7	858.1	2107.	
Strain at Failure, %	8.18	5.90	7.28	
Strain Rate, %/min	0.01600	0.01600	0.01600	
Deviator Stress at Failure, psf	1189.	1716.	4215.	
Effective Minor Principal Stress at Failure, psf	423.6	609.5	1099.	
Effective Major Principal Stress at Failure, psf	1613.	2326.	5314.	
B-Value	0.96	0.97	0.96	
Notes:	<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- Values for c and <math>\phi</math> 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.</li> </ul>			
Remarks:				

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U5	CU-1-1	45-47	trm	2/21/19	njh	3/1/19	309473-CU-1-1n.dat
●	U5	CU-1-2	45-47	trm	2/21/19	njh	3/1/19	309473-CU-1-2n.dat
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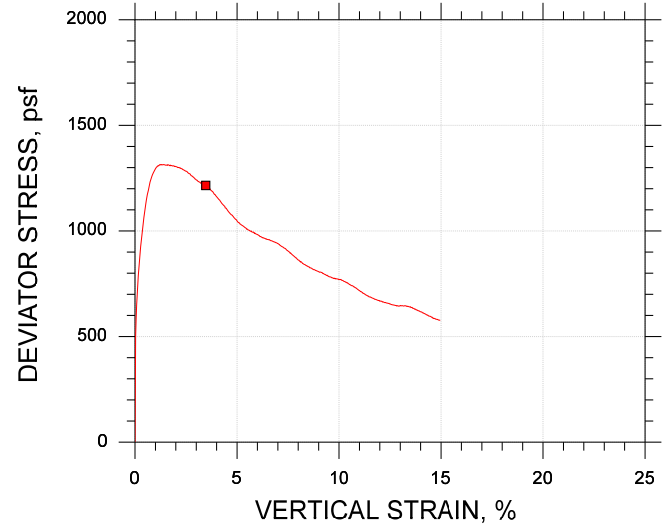
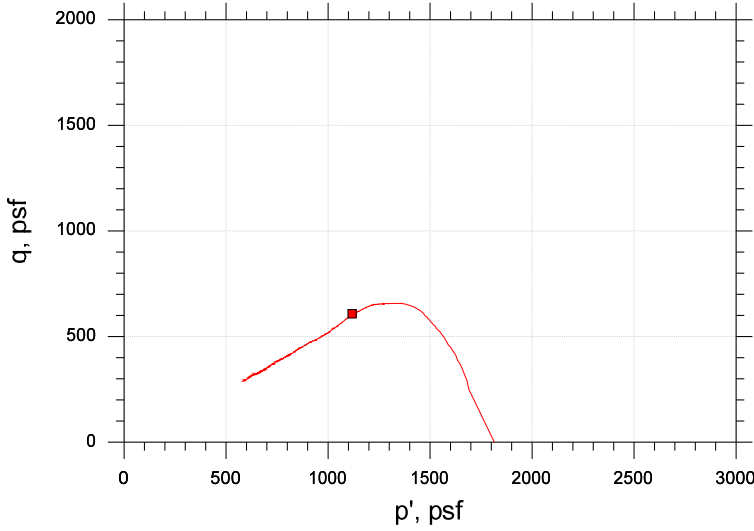
	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Sample Type: intact	
	Description: Wet, dark gray clay		
	Remarks: System V		





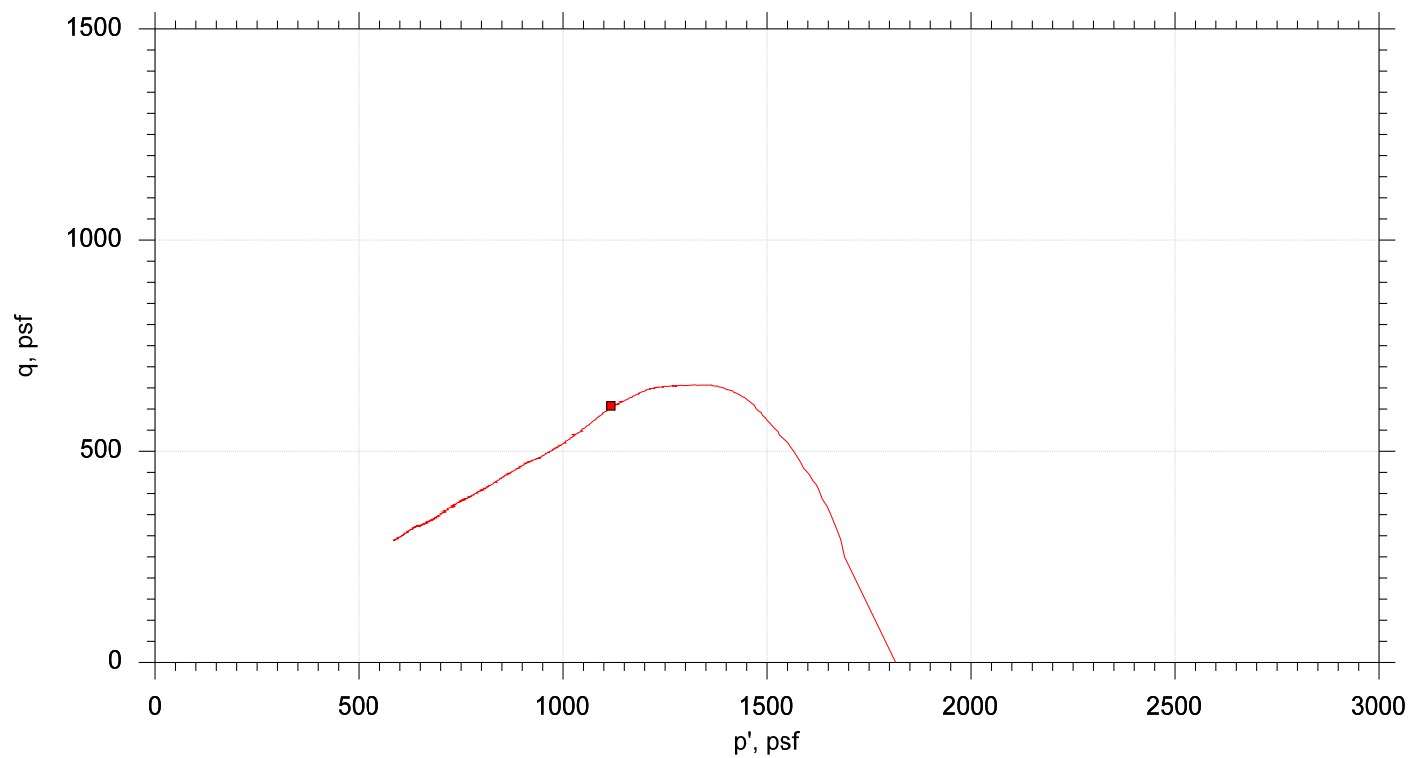
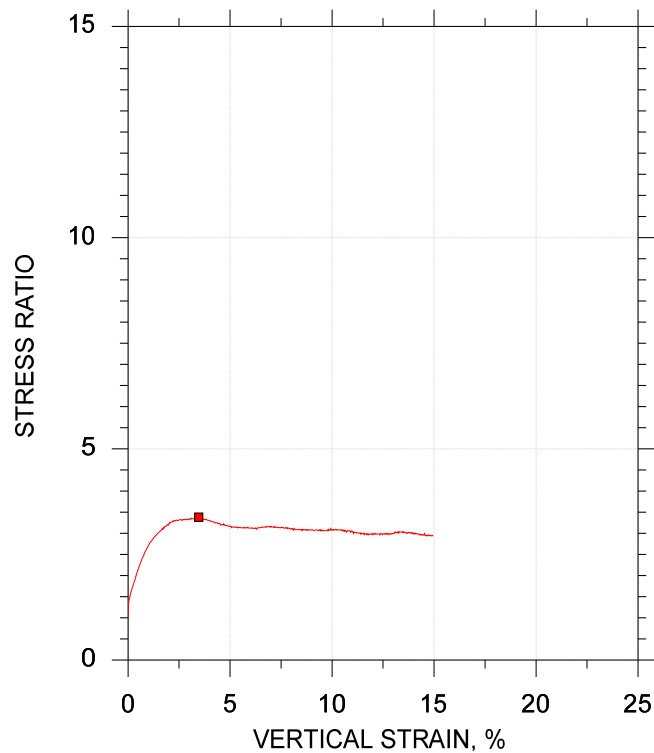
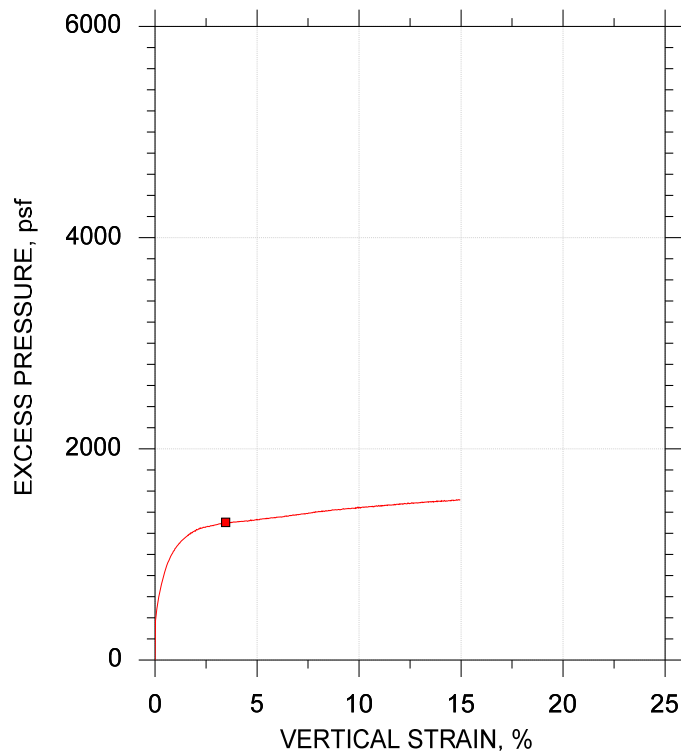
Client: Haley & Aldrich, Inc.	
Project Name: Maine Turnpike Exit 45	
Project Location: South Portland, ME	
Project Number: GTX-309473	
Tested By: md/trm	Checked By: njh
Boring ID: HB-EXIT 45-303	
Preparation: intact	
Description: Moist, dark gray clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: 34	Plastic Limit: 20
Plasticity Index: 14	Estimated Specific Gravity: 2.7

**CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767**




Symbol	■		
Sample ID	U-6		
Depth, ft	50-52		
Test Number	CU-3-1		
Initial	Height, in	6.280	
	Diameter, in	2.860	
	Moisture Content (from Cuttings), %	48.3	
	Dry Density, pcf	72.1	
	Saturation (Wet Method), %	97.6	
	Void Ratio	1.34	
Before Shear	Moisture Content, %	47.8	
	Dry Density, pcf	73.6	
	Cross-sectional Area (Method A), in <sup>2</sup>	6.370	
	Saturation, %	100.0	
	Void Ratio	1.29	
	Back Pressure, psf	2.373e+004	
Vertical Effective Consolidation Stress, psf	1807.		
Horizontal Effective Consolidation Stress, psf	1815.		
Vertical Strain after Consolidation, %	1.065		
Volumetric Strain after Consolidation, %	1.650		
Time to 50% Consolidation, min	240.0		
Shear Strength, psf	607.7		
Strain at Failure, %	3.46		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	1215.		
Effective Minor Principal Stress at Failure, psf	509.8		
Effective Major Principal Stress at Failure, psf	1725.		
B-Value	0.95		
Notes:			
<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:			

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



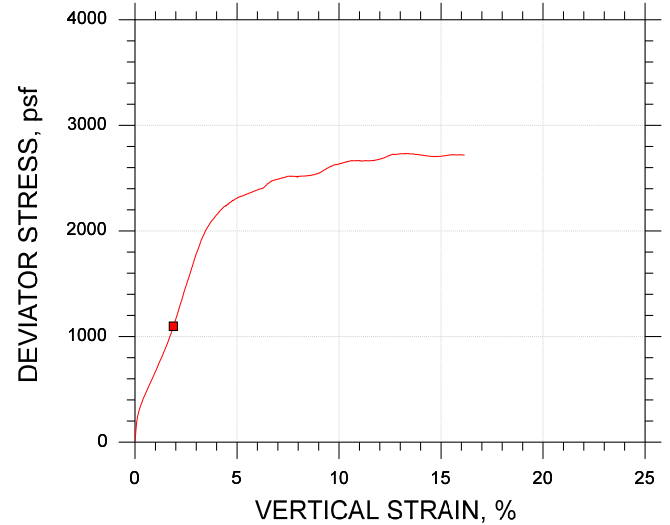
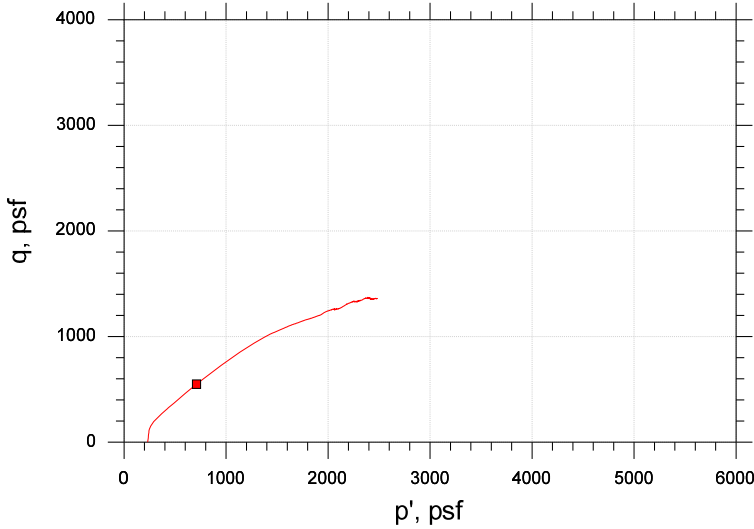
Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■ U-6	CU-3-1	50-52	md/trm	2/22/19	njh	3/1/19	309473-CU-3-1n.dat

	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-303	Sample Type: intact	
	Description: Moist, dark gray clay		
	Remarks: System JJ		



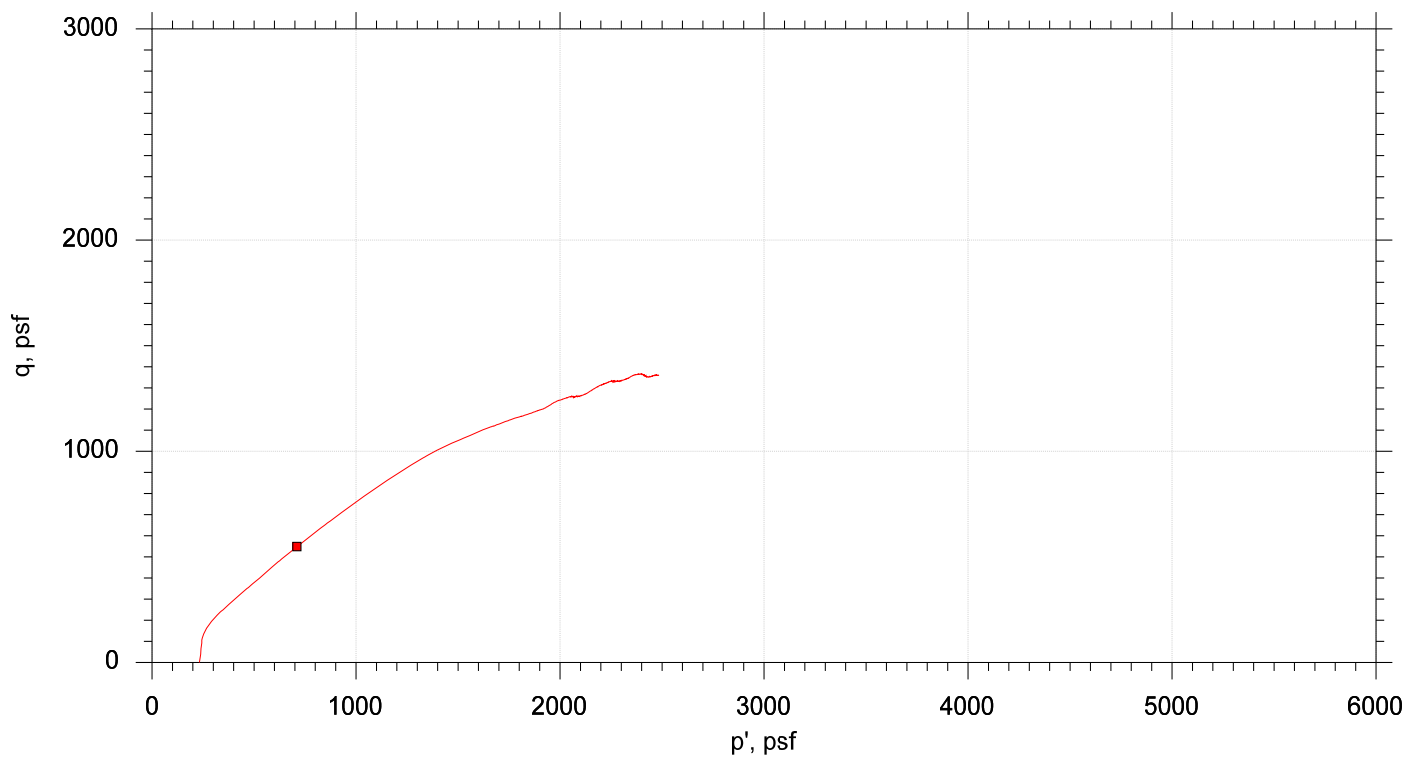
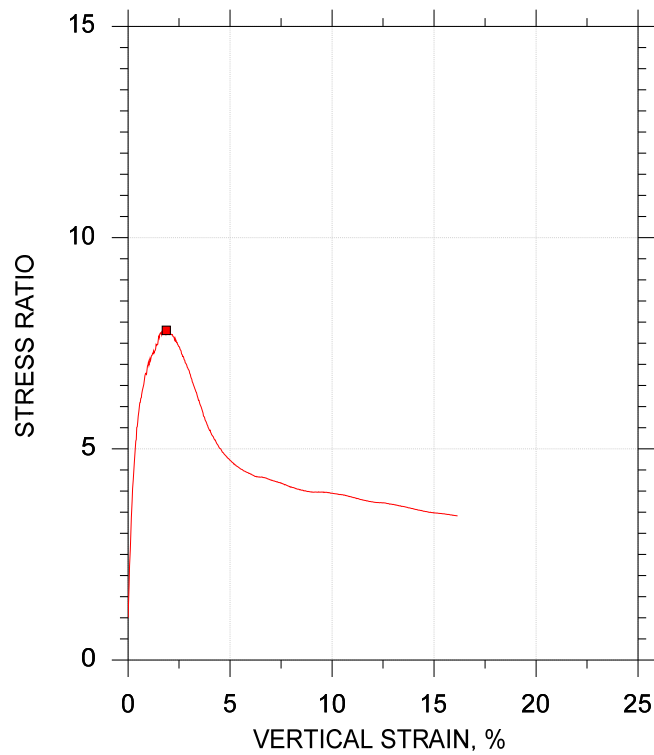
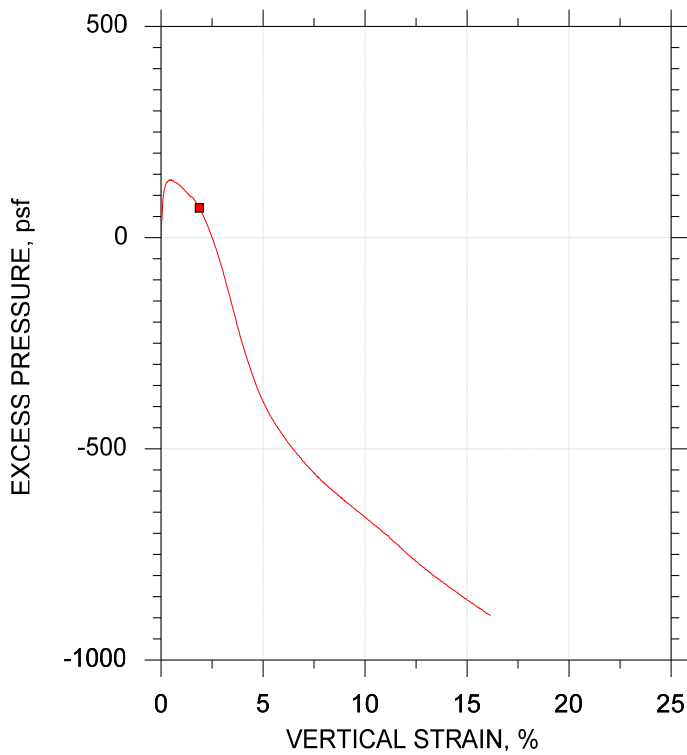
Client: Haley & Aldrich, Inc.	
Project Name: Maine Turnpike Exit 45	
Project Location: South Portland, ME	
Project Number: GTX-309473	
Tested By: md	Checked By: njh
Boring ID: HB-EXIT 45-304A	
Preparation: intact	
Description: Moist, dark grayish brown clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: 31	Plastic Limit: 20
Plasticity Index: 11	Estimated Specific Gravity: 2.7

**CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767**




Symbol	■		
Sample ID	U2		
Depth, ft	6-8		
Test Number	CU-8-1		
Initial	Height, in	6.580	
	Diameter, in	2.870	
	Moisture Content (from Cuttings), %	30.8	
	Dry Density, pcf	93.0	
	Saturation (Wet Method), %	102.2	
	Void Ratio	0.812	
Before Shear	Moisture Content, %	29.9	
	Dry Density, pcf	93.2	
	Cross-sectional Area (Method A), in <sup>2</sup>	6.460	
	Saturation, %	100.0	
	Void Ratio	0.808	
Back Pressure, psf	1.267e+004		
Vertical Effective Consolidation Stress, psf	230.9		
Horizontal Effective Consolidation Stress, psf	231.6		
Vertical Strain after Consolidation, %	0.1107		
Volumetric Strain after Consolidation, %	0.3215		
Time to 50% Consolidation, min	2.560		
Shear Strength, psf	548.9		
Strain at Failure, %	1.88		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	1098.		
Effective Minor Principal Stress at Failure, psf	161.3		
Effective Major Principal Stress at Failure, psf	1259.		
B-Value	0.95		
Notes:			
<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:			

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



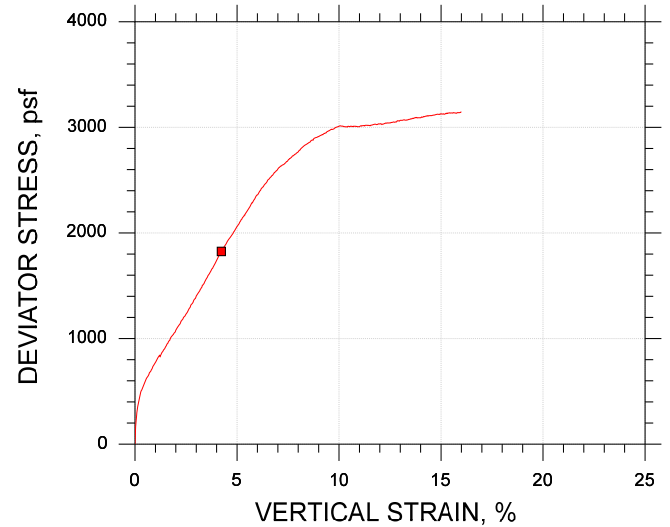
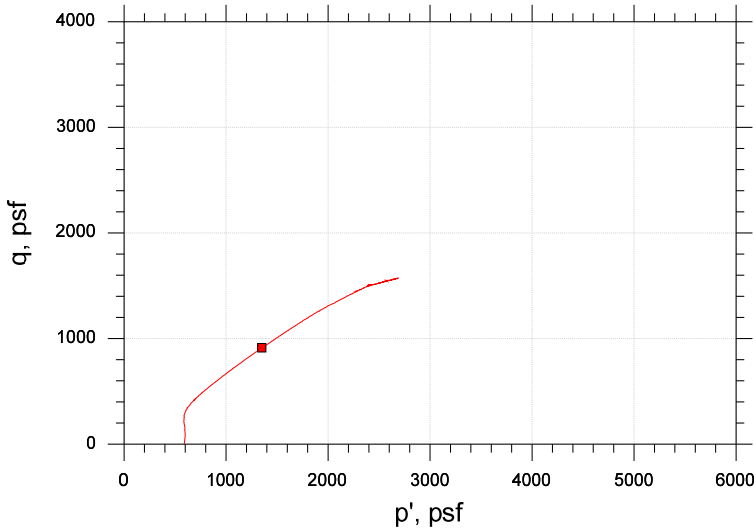
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■	U2	CU-8-1	6-8	md	2/25/19	njh	3/1/19	309473-CU-8-1n.dat


	Project: Maine Turnpike Exit 45		Location: South Portland, ME		Project No.: GTX-309473	
	Boring No.: HB-EXIT 45-304A		Sample Type: intact			
	Description: Moist, dark grayish brown clay					
	Remarks: System Y					



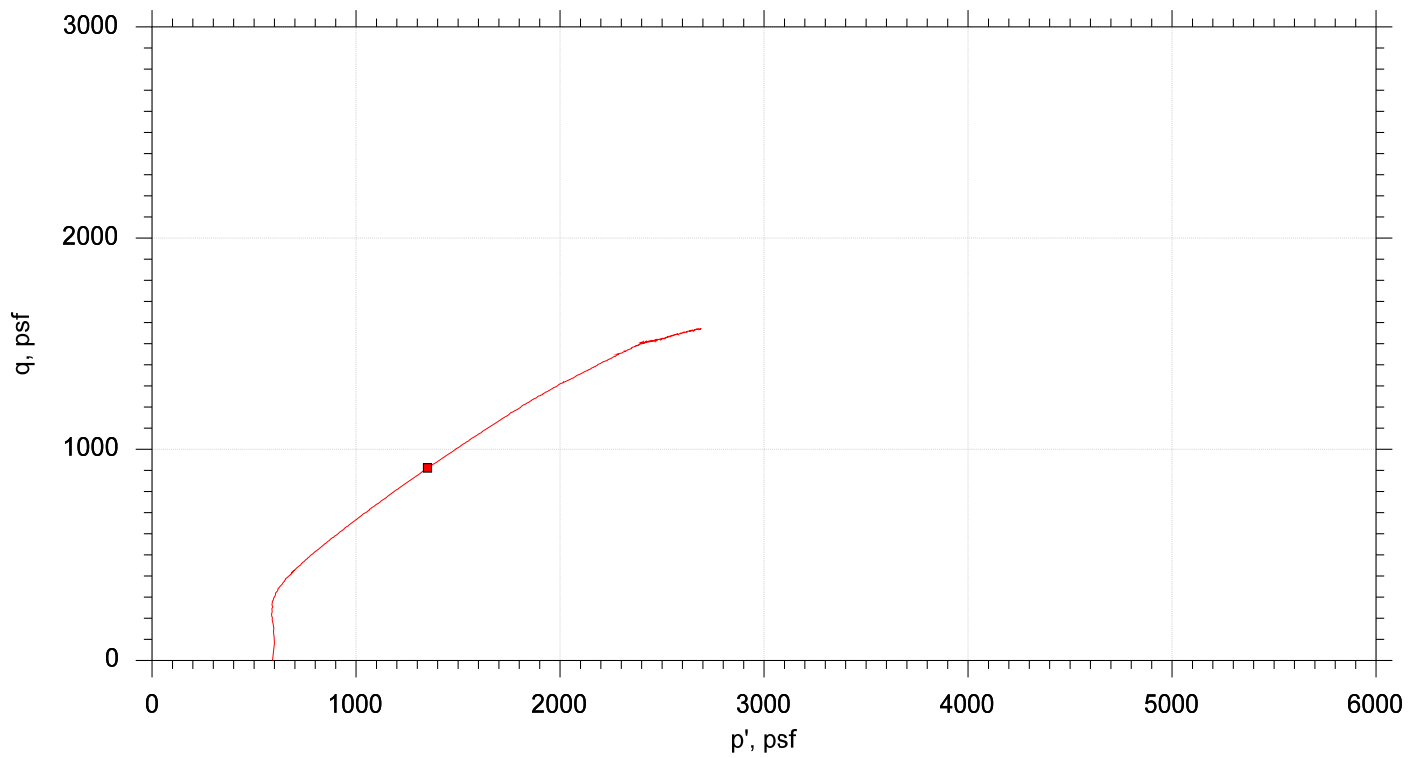
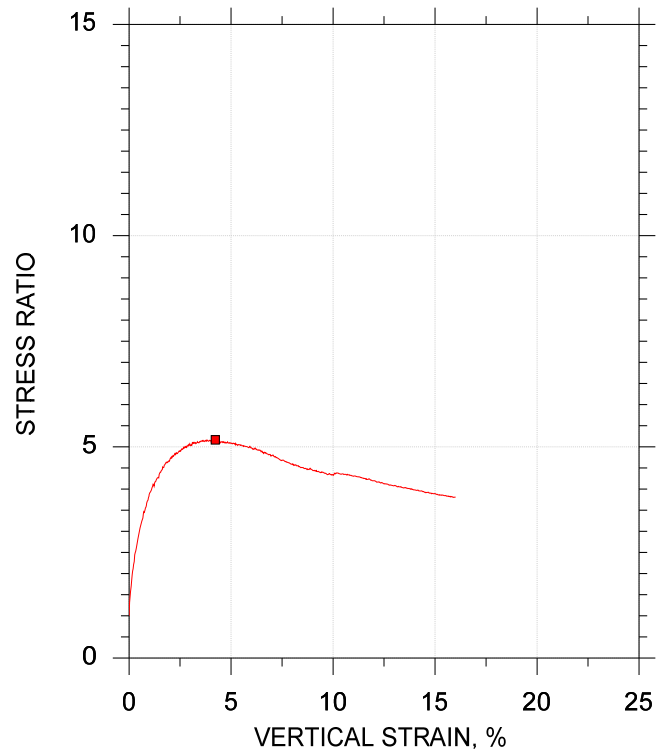
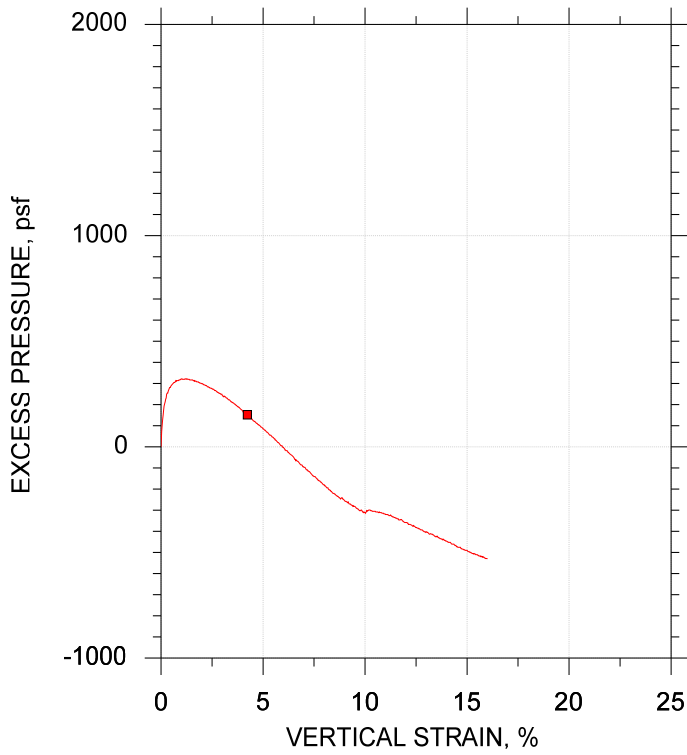
Client: -Haley & Aldrich, Inc.	
Project Name: Maine Turnpike Exit 45	
Project Location: South Portland, ME	
Project Number: GTX-309473	
Tested By: trm	Checked By: njh
Boring ID: HB-EXIT 45-301	
Preparation: intact	
Description: Moist, dark gray clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: 37	Plastic Limit: 23
Plasticity Index: 14	Estimated Specific Gravity: 2.7

**CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767**




Symbol	■		
Sample ID	U2		
Depth, ft	12-14		
Test Number	CU-6-1A		
Initial	Height, in	3.950	
	Diameter, in	1.930	
	Moisture Content (from Cuttings), %	28.3	
	Dry Density, pcf	93.4	
	Saturation (Wet Method), %	95.1	
	Void Ratio	0.804	
Before Shear	Moisture Content, %	28.8	
	Dry Density, pcf	94.8	
	Cross-sectional Area (Method A), in <sup>2</sup>	2.894	
	Saturation, %	100.0	
	Void Ratio	0.777	
	Back Pressure, psf	2.073e+004	
Vertical Effective Consolidation Stress, psf	587.1		
Horizontal Effective Consolidation Stress, psf	590.4		
Vertical Strain after Consolidation, %	0.3155		
Volumetric Strain after Consolidation, %	1.174		
Time to 50% Consolidation, min	12.25		
Shear Strength, psf	912.2		
Strain at Failure, %	4.23		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	1824.		
Effective Minor Principal Stress at Failure, psf	437.8		
Effective Major Principal Stress at Failure, psf	2262.		
B-Value	0.95		
Notes:			
<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:			
System T			

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



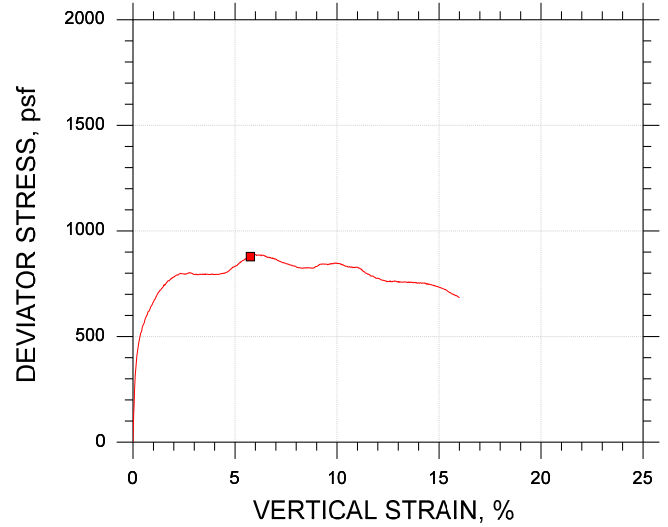
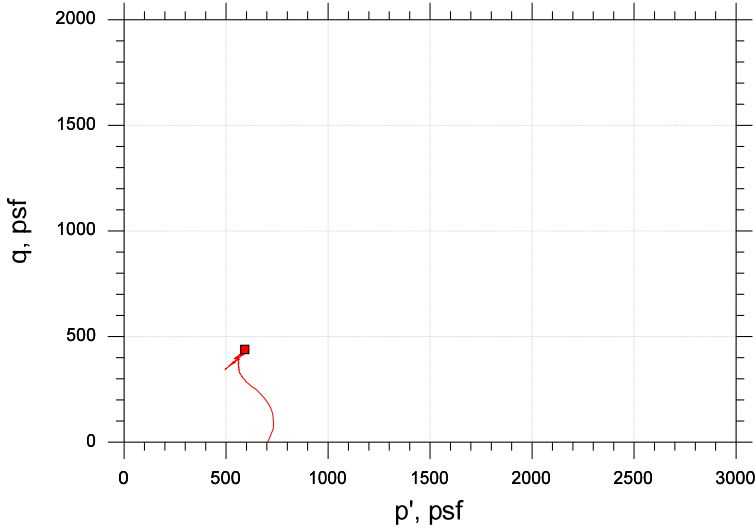
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■	U2	CU-6-1A	12-14	trm	3/4/19	njh	3/11/19	309473-CU-6-1-An.dat

	Project: Maine Turnpike Exit 45		Location: South Portland, ME		Project No.: GTX-309473	
	Boring No.: HB-EXIT 45-301		Sample Type: intact			
	Description: Moist, dark gray clay					
	Remarks: System T					



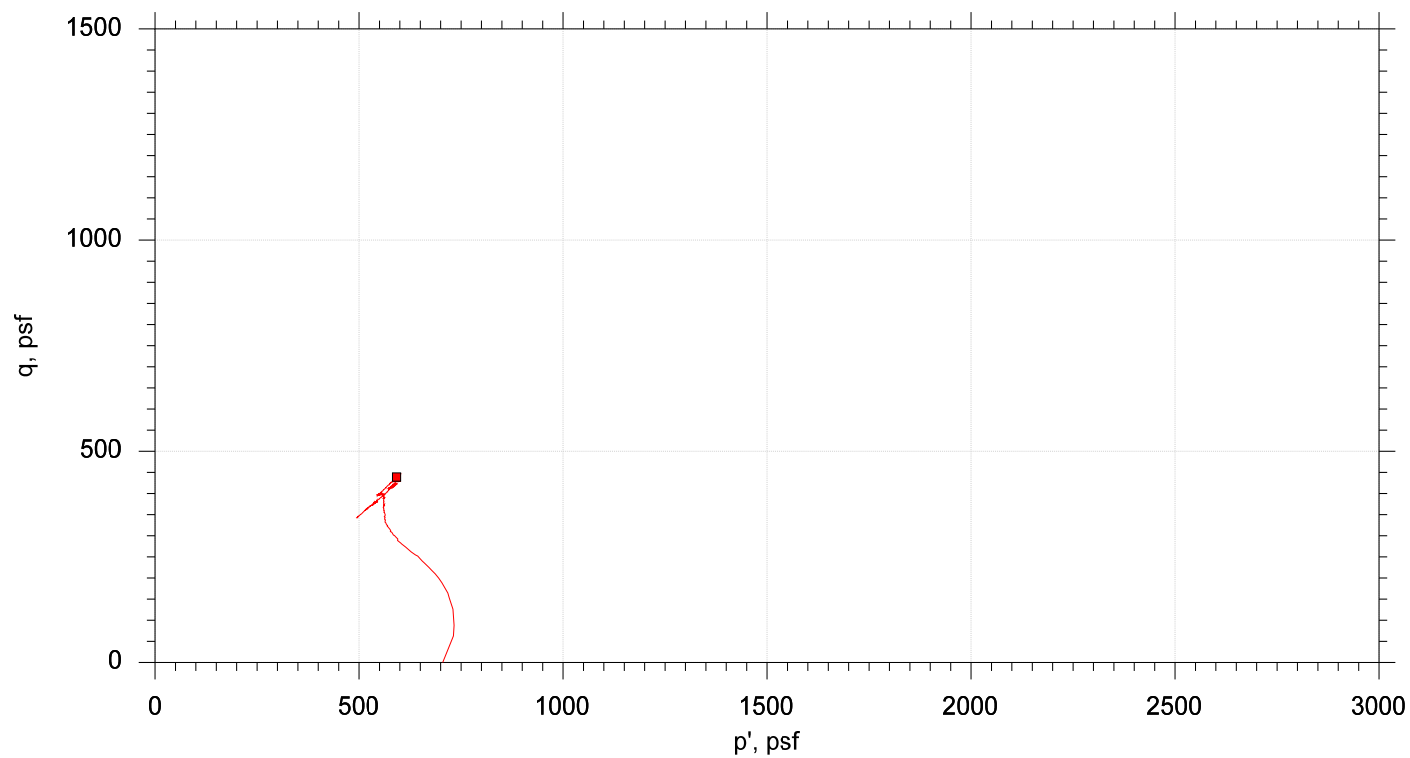
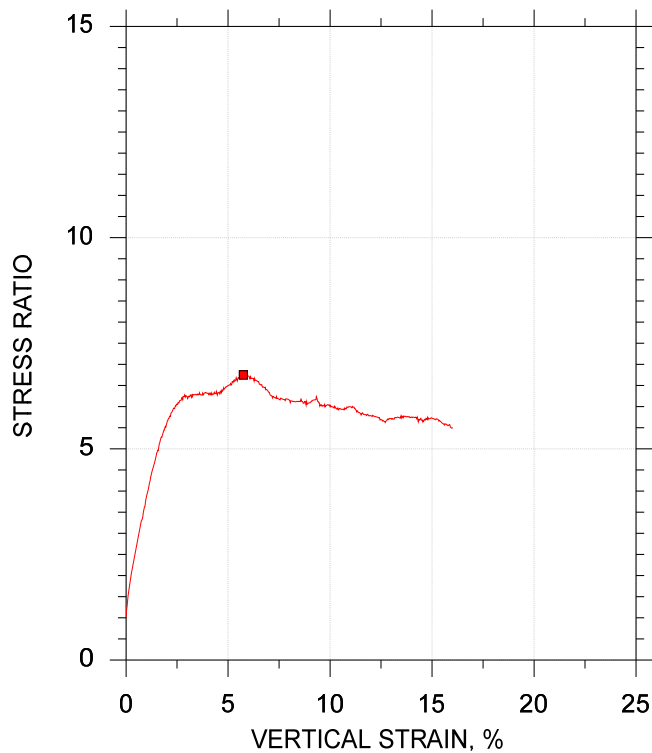
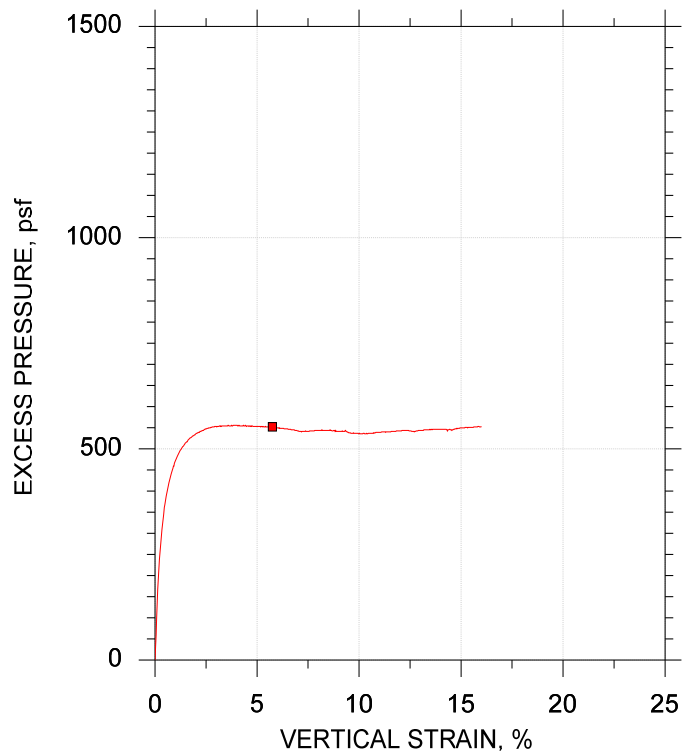
Client: Haley & Aldrich, Inc.	
Project Name: Maine Turnpike	
Project Location: South Portland, ME	
Project Number: GTX-309473	
Tested By: trm	Checked By: njh
Boring ID: HB-EXIT 45-303	
Preparation: intact	
Description: Wet, dark gray clay	
Classification: Lean CLAY	
Group Symbol: CL	
Liquid Limit: 27	Plastic Limit: 16
Plasticity Index: 11	Estimated Specific Gravity: 2.7

**CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767**




Symbol	■		
Sample ID	U2		
Depth, ft	16-18 ft		
Test Number	CU-5-1A		
Initial	Height, in	4.500	
	Diameter, in	1.930	
	Moisture Content (from Cuttings), %	36.5	
	Dry Density, pcf	84.5	
	Saturation (Wet Method), %	99.1	
	Void Ratio	0.995	
Before Shear	Moisture Content, %	34.1	
	Dry Density, pcf	87.8	
	Cross-sectional Area (Method A), in <sup>2</sup>	2.837	
	Saturation, %	100.0	
	Void Ratio	0.920	
	Back Pressure, psf	6767.	
Vertical Effective Consolidation Stress, psf	694.4		
Horizontal Effective Consolidation Stress, psf	704.9		
Vertical Strain after Consolidation, %	0.8412		
Volumetric Strain after Consolidation, %	3.971		
Time to 50% Consolidation, min	116.0		
Shear Strength, psf	439.2		
Strain at Failure, %	5.75		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	878.3		
Effective Minor Principal Stress at Failure, psf	152.8		
Effective Major Principal Stress at Failure, psf	1031.		
B-Value	0.95		
Notes:			
<ul style="list-style-type: none"> <li>- Before Shear Saturation set to 100% for phase calculation.</li> <li>- Moisture Content determined by ASTM D2216.</li> <li>- Atterberg Limits determined by ASTM D4318.</li> <li>- Deviator Stress includes membrane correction.</li> <li>- 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.</li> </ul>			
Remarks:			

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U2	CU-5-1A	16-18 ft	trm	3/4/19	njh	3/11/19	309473-CU-5-1-An.dat

	Project: Maine Turnpike		Location: South Portland, ME		Project No.: GTX-309473	
	Boring No.: HB-EXIT 45-303		Sample Type: intact			
	Description: Wet, dark gray clay					
	Remarks: System S					





Client: Haley & Aldrich, Inc.

Project Name: Maine Turnpike Exit 45

Project Location: South Portland, ME

Project Number: GTX-309473

Tested By: trm

Checked By: njh

Boring ID: HB-EXIT 45-304A

Preparation: Intact

Description: Moist, dark gray clay

Classification: ---

Group Symbol: ---

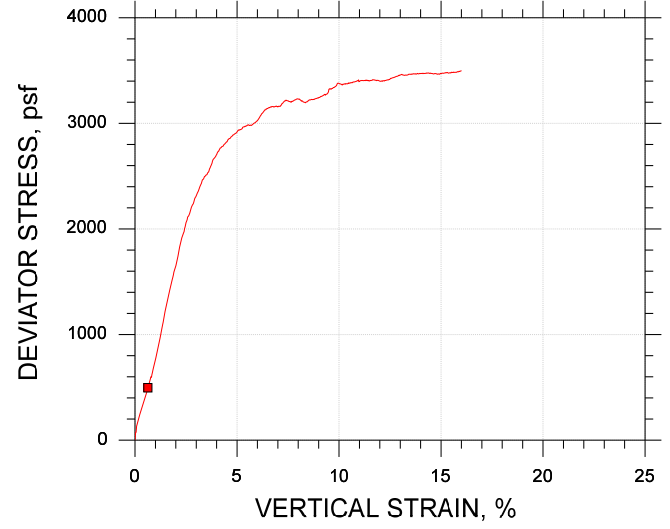
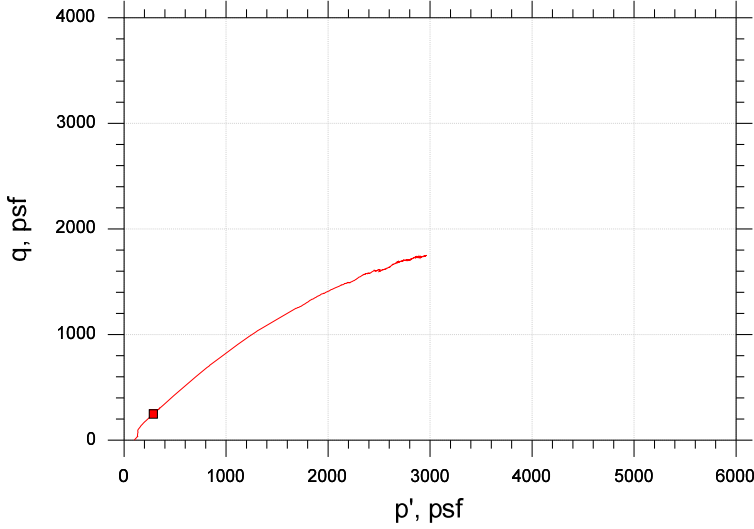
Liquid Limit: 31

Plastic Limit: 18

Plasticity Index: 13

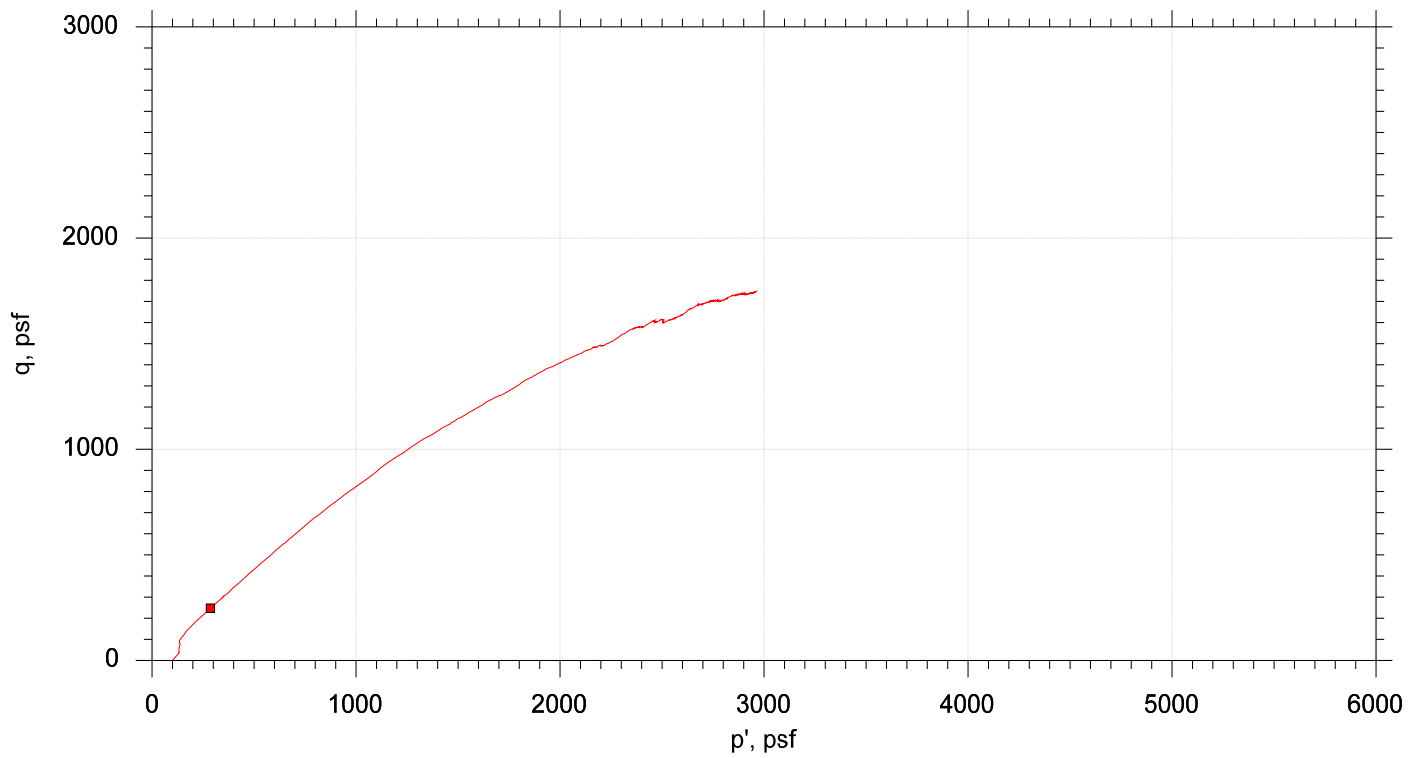
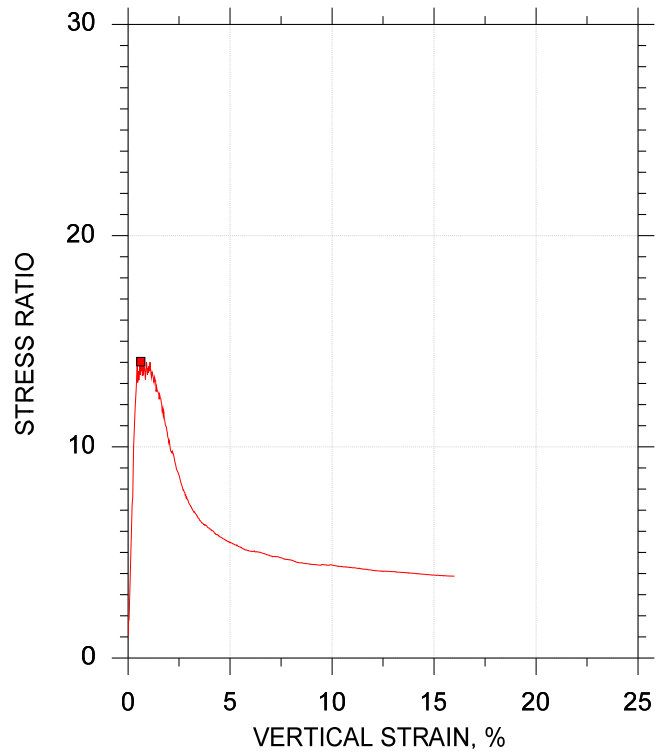
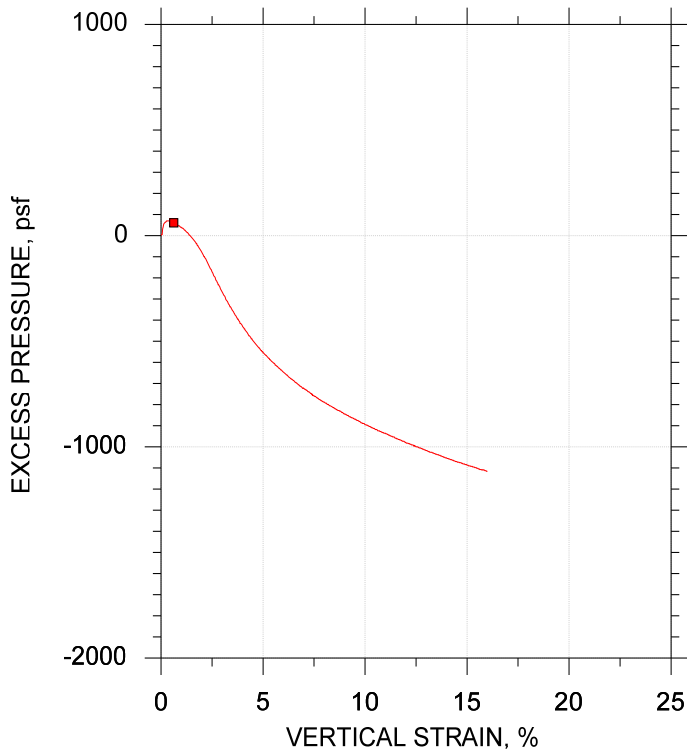
Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767




Symbol	■		
Sample ID	U1		
Depth, ft	2-4		
Test Number	CU-4-1A		
Initial	Height, in	6.050	
	Diameter, in	2.860	
	Moisture Content (from Cuttings), %	28.9	
	Dry Density, pcf	92.6	
	Saturation (Wet Method), %	95.2	
	Void Ratio	0.820	
Before Shear	Moisture Content, %	26.7	
	Dry Density, pcf	97.9	
	Cross-sectional Area (Method A), in <sup>2</sup>	6.186	
	Saturation, %	100.0	
	Void Ratio	0.721	
	Back Pressure, psf	9610.	
Vertical Effective Consolidation Stress, psf	99.27		
Horizontal Effective Consolidation Stress, psf	99.04		
Vertical Strain after Consolidation, %	-0.0008394		
Volumetric Strain after Consolidation, %	0.08398		
Time to 50% Consolidation, min	0.8100		
Shear Strength, psf	248.0		
Strain at Failure, %	0.625		
Strain Rate, %/min	0.01600		
Deviator Stress at Failure, psf	496.0		
Effective Minor Principal Stress at Failure, psf	38.03		
Effective Major Principal Stress at Failure, psf	534.0		
B-Value	0.95		
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
■ U1	CU-4-1A	2-4	trm	3/4/19	njh		309473-CU-4-1-An.dat

	Project: Maine Turnpike Exit 45	Location: South Portland, ME	Project No.: GTX-309473
	Boring No.: HB-EXIT 45-304A	Sample Type: Intact	
	Description: Moist, dark gray clay		
	Remarks: System K		