STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION

		DATE	September 20, 2018
FROM	Glenn E. Roberts Geotechnical Section Chief	**AT (Office)**	NHDOT Bureau of Materials & Research Tel: (603) 271-3151
SUBJECT	Supplemental Geotechnical Data Report US Route 4 over Bunker Creek Durham 16236, A001(202)		
TO	Keith A. Cota Chief Project Manager		
	ATTN: John D. Butler, Highway Design		

This report summarizes our supplemental geotechnical exploration and testing program for the subject project. Information contained in this report is intended to supplement information provided in our *Preliminary Design Phase Geotechnical Report (Bridge and Roadway)* dated November 20, 2017.

Engineering units used herein refer to the U.S. Customary system with stations and elevations in feet. Stations refer to the US Route 4 construction line (100 series) as indicated on the February 2017 preliminary plan submittal, increasing in a general west-to-east bearing. Elevations are referenced to the 1929 National Geodetic Vertical Datum (NGVD). Northing and easting coordinates appearing on the logs reference the North American Datum of 1983/1986.

1. Supplemental Subsurface Exploration Program – The Geotechnical Section conducted a supplemental subsurface exploration program at the site during July and August, 2018. The program included four test borings, B301 through B304. As-drilled stations and offsets were determined referencing previously conducted borings in the field and converted to northing and easting coordinates by the Bureau of Highway Design. Supplemental test boring locations along with earlier, adjacent test borings are shown on Figure 1. Logs for the supplemental test borings are contained in Appendix A.

Test borings included sampling and in-situ testing in general accordance with the standards referenced below and are summarized as follows:

- *Split Spoon Sampling and SPT Tests (AASHTO T 206)* - Split spoon sampling was conducted at specific locations and depths to define the limits of previously classified strata and to collect samples for index testing of soils (Section 2.1). Standard Penetration Tests (SPT) were conducted using a 1-3/8 inch inside diameter sampler driven in 6-inch increments using a 140 pound hammer dropped 30 inches. As indicated on the logs, the split spoon sampler was advanced at some locations through the zone previously disturbed by a field vane shear test.

- *Field Vane Shear Tests (ASTM D2573)* - Field vane shear tests (VST) were conducted within test borings B302 and B303 at the depths indicated on the logs. VST data is contained in Appendix B. A summary is provided on Page 1 and Page 2 of Appendix B.

- *Thin-Walled Tube Sampling (AASHTO T 207)* - Undisturbed samples (Shelby tubes) were collected within test borings B301 and B303 at the depths indicated on the logs using a Gregory Undisturbed Sampler (GUS) and 3-inch OD galvanized thin-walled sample tubes. Tubes were sealed in the field and collected by Golder Associates for delivery to GeoTesting Express for testing as summarized in Section 2.2.

2. Laboratory Testing – Laboratory testing of samples collected during the supplemental exploration program was performed by the NHDOT Bureau of Materials & Research and GeoTesting Express of Acton, MA. A summary of the laboratory testing program is provided below.

2.1 NHDOT – Index testing of soils performed by the NHDOT included Atterberg Limits (AASHTO T 89/90), moisture content (AASHTO T 265), and organic content (AASHTO T 267). A summary of index test data is included in Table 1. Additional index tests were performed by GeoTesting Express on samples extracted from Shelby tubes as summarized in Section 2.2.

2.2 GeoTesting Express (GTX) – Undisturbed sample tubes were X-rayed by GTX in accordance with ASTM D4452 to determine suitable zone(s) for testing. Tests conducted by GTX include the following:

- *Moisture Content (ASTM D2974)*
- *Organic Content (ASTM D2974)*
- *Particle Size Analysis (ASTM D422)*
- *Atterberg Limits (ASTM D4318)*
- *Consolidated Undrained Direct Simple Shear (ASTM D6528)*
- *Consolidated Undrained Triaxial Strength (GTX S1020)*
- *Consolidation – Constant Rate of Strain (ASTM D4186)*
- *Consolidation – Incremental Loading (ASTM D2435, Method B)*

Laboratory test results provided by GTX are included in Appendix C. An index is provided on Page 1 of Appendix C summarizing which tests were performed on each sample.

Please contact us if you have any questions or if you require additional information related to the supplemental testing program.

Sincerely,

Glenn E. Roberts, PE
Geotechnical Section Chief

Charles R. Dusseault, PE
Bureau Administrator

encl: Figure 1 – Supplemental Subsurface Exploration Plan
Table 1 – Soil Index Test Data - NHDOT
Appendix A – Test Boring Logs B301 through B304
Appendix B – Field Vane Shear Test (VST) Data
Appendix C – Laboratory Test Data – GeoTesting Express

cc: Robert Landry, Bridge Design
Nickie Hunter, Construction
M&R File

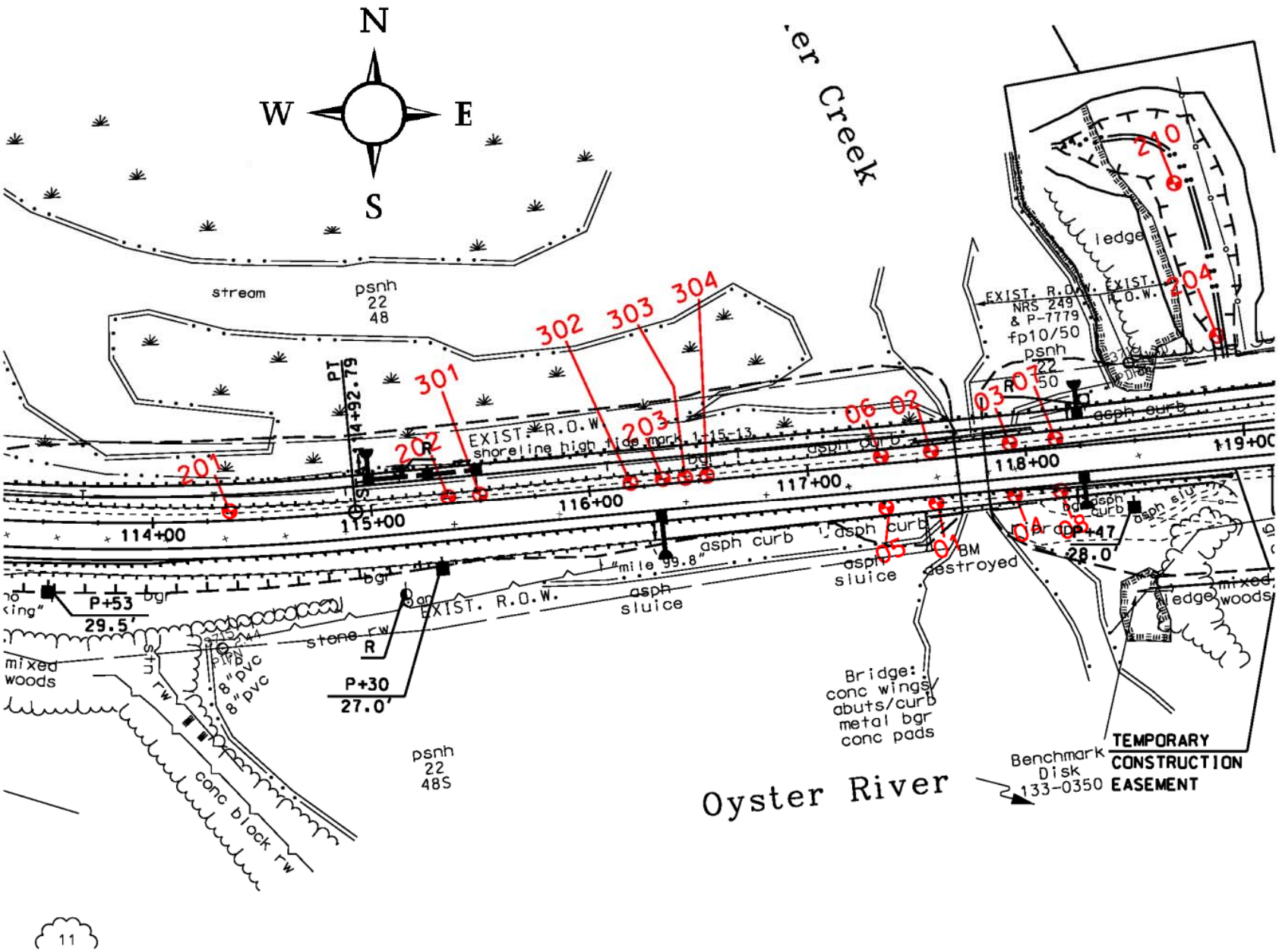


Figure 1 – Supplemental Subsurface Exploration Plan

TABLE 1
Soil Index Test Data - NHDOT

Test Boring #	Sample #	Depth	Date	Liquid Limit	Plastic Limit	Plasticity Index	Nat. Water Content (%)	Organic Content (%)
B201	S14	55.0 - 57.0	8/22/2017	36	23	13	41.8	
B203	S9	30.0 - 32.0	8/28/2017	35	23	12	32.1	
B301	U1	11.9 - 13.9	8/1/2018				24.9	4.1
B302	S2	16.5 - 18.5	7/24/2018				58.2	4.5
B303	U1	14.0 - 16.0	8/13/2018	37	27	10	53.2	5.0
	S1	18.3 - 20.3	8/15/2018	45	28	17	59.2	4.2
	S2	22.5 - 24.5	8/16/2018	53	34	19	78.3	6.8
	S3	25.5 - 27.5	8/16/2018	47	35	12	73.4	9.5
B304	S4	12.0 - 14.0	8/9/2018	37	24	13	49.4	3.2
	S5	14.0 - 16.0	8/9/2018	42	26	16	56.0	3.9
	S6	17.0 - 19.0	8/9/2018	45	30	15	62.9	4.5
	S7	19.0 - 21.0	8/9/2018	45	29	16	63.2	3.7
	S8	22.0 - 24.0	8/9/2018	62	40	22	92.7	5.8
	S9	24.0 - 26.0	8/9/2018	51	35	16	71.2	5.2
	S10	27.0 - 29.0	8/9/2018				94.8	13.6

Appendix A

Test Boring Logs

B301 through B304

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B301**
SHEET NO. 1 OF 3
STA. 115+50 OFF. LT 03
BASELINE US Route 4
ELEVATION (ft) 7.0
START/END 8/1/18 / 8/7/18
DRILLER R. Bennett (NHDOT)
INSPECTOR Rogers/Myers
CLASSIFIER DRR/SFM
EAST/NORTH (ft) 1192398/231950

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	HW	
						SIZE I.D. (in):	1.375	4	
		Tidal				HAMMER WT. (lb):	140	DRILL RIG	
						HAMMER FALL (in):	30	CME 45-B Truck	
						HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0							-BITUMINOUS ASPHALT PAVEMENT-	
	1.2	5.9					Advanced borehole utilizing 4" roller bit to a depth of 11.9'; 4" drill casing was driven to same and washed out prior to Undisturbed sample at 11.9'; miscellaneous fills were encountered to include sands, gravel, occasional small cobble, occasional wood fragment along with traces of organic material -FILL-	
5								
10	11.0	-4.0						
				U1	0.7 [35]	11.9 – 13.9	Dark grey-dark greenish grey, silty MUCK, trace medium-fine sand, trace fine gravel, occasional small sea shell fragment, trace organic Note: Due to poor recovery, sample was extracted from tube and submitted to NHDOT lab for moisture/organic analysis	
15							-MARINE DEPOSIT- (Tidal)	
				U2	0.9 [45]	15.5 – 17.5	Performed undisturbed sample test utilizing GUS sampler; sample was prepared in field by NHDOT personnel and collected by Golder Associates on 8/1/18 for lab testing	
	19.0	-12.0					Noted wash water color change from dark grey/greyish brown to grey at approximately 19.0'	
20				U3	1.7 [85]	20.6 – 22.6	Performed undisturbed sample test utilizing GUS sampler; sample was prepared in field by NHDOT personnel and collected by Golder Associates on 8/2/18 for lab testing	
25							-MARINE DEPOSIT-	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 S:\MATERIALS-RESEARCH\GINTW\PROJECTS\DURHAM\16236\16236-300 SERIES SUPPLEMENTAL BORINGS.GPJ 9/20/2018 7:19:52 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B301**
SHEET NO. 2 OF 3
STA. 115+50 OFF. LT 03
BASELINE US Route 4
ELEVATION (ft) 7.0

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
30								
35				U4	1.5 [75]	35.0 – 37.0	Performed undisturbed sample test utilizing GUS sampler; sample was prepared in field by NHDOT personnel and collected by Golder Associates on 8/2/18 for lab testing	
40							-MARINE DEPOSIT-	
45				U5	1.8 [90]	45.0 – 47.0	Performed undisturbed sample test utilizing GUS sampler; sample was prepared in field by NHDOT personnel and collected by Golder associates on 8/2/18 for lab testing Note: 20' of Nw drill rod attached to GUS sampler was inadvertently dropped into borehole and into soft clay prior to removing outer shelby tube. Driller was able to recover sample.	
50								
55				U6	1.8 [90]	55.0 – 57.0	Performed undisturbed sample test utilizing GUS sampler; sample was prepared by NHDOT personnel in field and collected by Golder Associates on 8/8/18 for lab testing	
60								
65						65.0		

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B301**
SHEET NO. 3 OF 3
STA. 115+50 OFF. LT 03
BASELINE US Route 4
ELEVATION (ft) 7.0

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
				U7	2.0 [100]	67.0	Performed undisturbed sample test utilizing GUS sampler; sample was prepared in field by NHDOT personnel and collected by Golder Associates on 8/8/18 for lab testing	
70							-MARINE DEPOSIT-	
75						75.5		
				U8	2.0 [100]	77.5	Performed undisturbed sample test utilizing GUS sampler; sample was prepared in field by NHDOT personnel and collected by Golder Associates on 8/8/18 for lab testing	
							Bottom of Exploration @ 77.5 ft (El. - 70.5)	
80								
85								
90								
95								
100								

TB-12 S:\MATERIALS-RESEARCH\GINTW\PROJECTS\DURHAM\16236\16236-300 SERIES SUPPLEMENTAL BORINGS.GPJ 9/20/2018 7:19:52 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B302**
SHEET NO. 1 OF 3
STA. 116+19 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.7
START/END 7/24/18 / 7/31/18
DRILLER R. Bennett (NHDOT)
INSPECTOR Rogers/Myers
CLASSIFIER DRR/SFM
EAST/NORTH (ft) 1192464/231929

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	HW	
						SIZE I.D. (in):	1.375	4	
		Tidal				HAMMER WT. (lb):	140	DRILL RIG	
						HAMMER FALL (in):	30	CME 45-B Truck	
						HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0	0.8	6.0					-BITUMINOUS ASPHALT PAVEMENT-	
5							Advanced borehole utilizing 4" roller bit to a depth of 14.5'; 4" drill casing was driven to same and washed out prior to SPT at 14.5'; misc fills were encountered to include sands, gravel, occasional small cobble, occasional wood fragment along with traces of organic material -FILL-	
10	10.5	-3.8					Noted wash water color change to greyish brown/dark grey/dark greenish grey at approximately 10.5' -MARINE DEPOSIT- (Tidal)	
15			WOH WOH WOH 3	S1	0.7 [35]	14.5 – 16.5	Very soft, recovered 0.7' of coarse-fine sand resulting from settling out of wash water; re-washed borehole and attempted to recover material from this depth with no success; drill casing then driven to 16.5' and washed out	
			1 0 1 1	S2	0.6 [30]	16.5 – 18.5	Very soft, dark grey-dark greenish grey, silty MUCK, occasional sea shell fragment, slight trace of medium-fine sand, slight trace of organic Note: sample submitted to NHDOT lab for moisture/organic analysis	
20							VST 1 performed with the green vane at 22.7' and with the vane extended to 24.3'	
25	25.0	-18.3					Noted abrupt color change in wash water from greyish brown/dark grey to grey at approximately 25.0' -MARINE DEPOSIT-	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B302**
SHEET NO. 2 OF 3
STA. 116+19 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.7

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
30								
35							-MARINE DEPOSIT-	
40								
45							VST 2 performed with the red vane at 45.5' and the vane extended to 47.1'	
50								
55							VST 3 performed with the red vane at 55.4' and with the vane extended to 57.0'	
60								
65							VST 4 performed with the red vane at 65.2' and with the vane extended to 66.8'	

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B302**
SHEET NO. 3 OF 3
STA. 116+19 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.7

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
70							-MARINE DEPOSIT-	
							VST 5 performed with the red vane at 75.0' and with the vane extended to 76.6'	
75							Bottom of Exploration @ 75.1 ft (El. - 68.4)	
80								
85								
90								
95								
100								

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B303**
SHEET NO. 1 OF 2
STA. 116+44 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.2
START/END 8/10/18 / 8/17/18
DRILLER J. Woodward (NHDOT)
INSPECTOR Scott Myers
CLASSIFIER SFM
EAST/NORTH (ft) 1192488/231922

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	HW	
						SIZE I.D. (in):	1.375	4	
		Tidal				HAMMER WT. (lb):	140	DRILL RIG	
						HAMMER FALL (in):	30	CME 45-C Trlr	
						HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0							-ASPHALT-	
	1.3	4.9					Advanced exploration to 12' through variable and often bony FILL soil	
5								
10								
	12.0	-5.8					Advanced exploration to 14' through top of TIDAL MARINE soil, carefully washing out in preparation for 1st undisturbed sample.	
	14.0	-7.8						
15				U1	0.8 [40]	14.0–16.0	Shelby tube taken using GUS sampler. Tidal soil recovery fell from tube as soon as it was extracted from the hole. The soil was picked up and placed as is in a plastic bag for any possible testing.	
				U2	0.0 [0]	16.0–18.0	Attempt another Shelby tube in the Tidal soil. No recovery.	
			WOR WOH WOH 1	S1	1.6 [80]	18.3–20.3	Advanced casing to 18.3', and then the vane borer shoe to 18.8' in preporation for VST 1 VST 1 performed with the green vane extended to 20.4'. This was followed by a split spoon sample in this disturbed zone. Soil is Tidal Marine. Classification is dark gray, SILT, little clay, trace organic matter including fibers	
20				U3	1.2 [59]	20.5–22.5	, 20.3' - 20.5', Shelby tube taken using GUS sampler. Prepared for Golder Associates, with both ends of the tube sealed with wax and select sand.	
			WOR WOH WOH WOH	S2	1.7 [85]	22.5–24.5	VST 2 performed with vane borer shoe at 22.5' with the 4" casing at 20.5, and the green vane extended to 24.1'. This was followed by a split spoon sample in this disturbed zone. Soil is Tidal Marine. Classification is dark gray, SILT, strong trace organic matter including fibers, trace clay, trace shell fragments.	
25								
			WOR WOH WOH 2	S3	1.6 [80]	25.5–27.5	VST3 performed with the vane borer shoe at 25.8' with the green vane extended to 27.4'. This was followed by a split spoon sample in this disturbed zone. Soil is Tidal Marine. Classification is dark gray, SILT, some organic matter including fibrous PEAT layers, trace clay, slight trace fine sand, w/ occasional coarse sand grain.	
	28.5	-22.3	2 4			28.0	Similar to tidal soil described above Medium stiff, greenish gray, SILT, little clay to silty CLAY	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 S:\MATERIALS-RESEARCH\GINTW\PROJECTS\DURHAM\16236\16236-300 SERIES SUPPLEMENTAL BORINGS.GPJ 9/20/2018 7:19:57 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B303**
SHEET NO. 2 OF 2
STA. 116+44 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.2

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
			4 5	S4	1.6 [80]	30.0	-MARINE DEPOSIT-	
30				U4	1.3 [67]	30.0 – 32.0	Shelby tube taken. Field prepared for Golder Associates, with both ends of the tube sealed with wax and select sand.	
							Bottom of Exploration @ 32.0 ft (El. - 25.8)	
35								
40								
45								
50								
55								
60								
65								

TB-12 S:\MATERIALS-RESEARCH\GINTW\PROJECTS\DURHAM\16236\16236-300 SERIES SUPPLEMENTAL BORINGS.GPJ 9/20/2018 7:19:58 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B304**
SHEET NO. 1 OF 2
STA. 116+54 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.1
START/END 8/9/18 / 8/9/18
DRILLER R. Bennett (NHDOT)
INSPECTOR Doug Rogers
CLASSIFIER DRR
EAST/NORTH (ft) 1192497/231919

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
		Tidal			

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	NW	
SIZE I.D. (in):	1.375	3	
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	CME 45-B Truck	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0							-BITUMINOUS ASPHALT PAVEMENT-	
	1.2	4.9					Advanced boring to 5.0' utilizing 4" roller bit; drove 3" drill casing to same Encountered miscellaneous fill materials including an occasional small cobble -FILL-	
5			9 8 7 8	S1	0.6 [30]	5.0 – 7.0	Medium dense, yellowish brown and greyish brown, MEDIUM-FINE SAND, little gravel, little coarse sand, little silt, over dark grey, angular ROCK FRAGMENTS w/ traces of grey medium-fine sand, some silt	
			7 3 3 1	S2	0.7 [35]	7.0 – 9.0	Loose, dark grey, angular ROCK FRAGMENTS, little coarse-medium sand, over greenish grey-dark greenish grey, fibrous MUCK, little organic, trace fine gravel, trace coarse-medium sand, strong organic decay odor	
10			3 10 7 14	S3	0.7 [35]	9.5 – 11.5	Medium dense, greenish grey-grey, silty COARSE-MEDIUM SAND, some gravel, trace clay, slight trace of organic	
	11.8	-5.7						
			2 1 1 1	S4	0.8 [40]	12.0 – 14.0	Very soft, grey-greenish grey, silty MUCK, occasional small sea shell fragment, trace clay, slight trace of organic, moderately strong organic decay odor present	
15			WOH WOH WOH WOH	S5	2.0 [100]	14.0 – 16.0	Very soft, greenish grey-dark greenish grey, silty MUCK, occasional small sea shell fragment, trace clay, slight trace of organic, strong organic decay odor present	
			WOH WOH WOH WOH	S6	2.0 [100]	17.0 – 19.0	Very soft, similar to S5, trace organic -MARINE DEPOSIT- (Tidal)	
20			WOH WOH WOH WOH	S7	1.7 [85]	19.0 – 21.0	Very soft, greenish grey-dark greenish grey, silty MUCK, little-trace clay, occasional small sea shell fragment, trace organic, slight organic decay odor present	
			WOR WOH WOH WOH	S8	2.0 [100]	22.0 – 24.0	Very soft, similar to S7	
25			WOR WOH WOH WOH	S9	2.0 [100]	24.0 – 26.0	Very soft, greenish grey-dark greenish grey, silty MUCK, little-trace organic, trace clay, moderate to strong organic decay odor present	
	26.5	-20.4						
	28.0	-21.9	WOH 1 6 6	S10	1.5 [75]	27.0 – 29.0	Dark greyish brown-brown, MUCK to Peaty MUCK -ORGANIC DEPOSIT- Grey, silty FINE SAND	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **DURHAM 16236** BRIDGE NO. N/A
DESCRIPTION Supplemental Sampling & Laboratory Testing for DB Team

BORING NO. **B304**
SHEET NO. 2 OF 2
STA. 116+54 OFF. LT 02
BASELINE US Route 4
ELEVATION (ft) 6.1

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
30			3 2 1 1	S11	1.4 [70]	29.0 – 31.0	-MARINE DEPOSIT- Very loose, grey, silty FINE SAND to fine sandy SILT	
							Bottom of Exploration @ 31.0 ft (El. - 24.9)	
35								
40								
45								
50								
55								
60								
65								

TB-12 S:\MATERIALS-RESEARCH\GINTW\PROJECTS\DURHAM\16236\16236-300 SERIES SUPPLEMENTAL BORINGS.GPJ 9/20/2018 7:20:00 AM TB-12

Appendix B

Field Vane Shear Test (VST) Data

SUMMARY OF VANE SHEAR TEST STRENGTH RESULTS

US Route 4 over Bunker Creek

Durham 16236, A001(202)

B302 Station 116+19 LT 02 Ground surface EL 6.7 ft				B303 Station 116+44 LT 02 Ground surface EL 6.2 ft			
Test	Dv(ft)	ELv (ft)	Su' (psf)	Test	Dv (ft)	ELv (ft)	Su' (psf)
VST1	24.3	-17.6	1,223	VST1	20.4	-14.2	309
VST2	47.1	-40.4	309	VST2	24.1	-17.9	390
~~VST3~~	~~57.0~~	~~-50.3~~	~~83~~	VST3	27.4	-21.2	1,031
VST4	66.8	-60.1	279				
VST5	76.6	-69.9	236				

NOTES: Dv= Depth to bottom of vane
ELv = elevation of the bottom of the vane
Su' = Shear strength using Chandler's correction method
B302 results @ 57 ft / EL -50.3 considered invalid

VANE SHEAR TEST DETAILS w/ CORRECTED SHEAR STRENGTHS

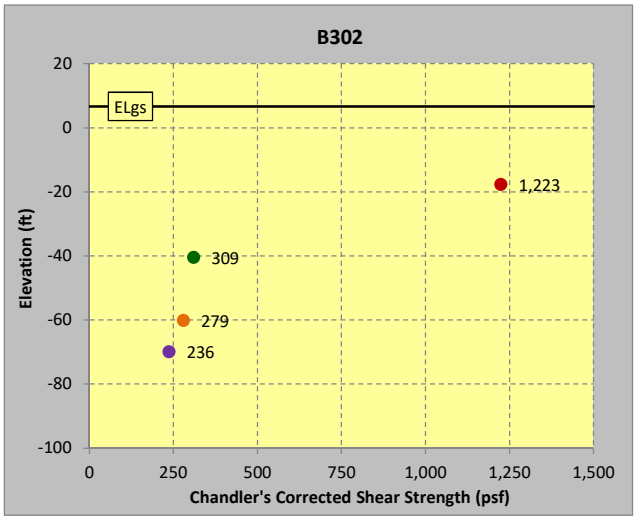
PROJECT: Durham 16236
BY: KRA
DATE: 09/18/18
CHK BY: ALS
CHK DATE: 09/18/18

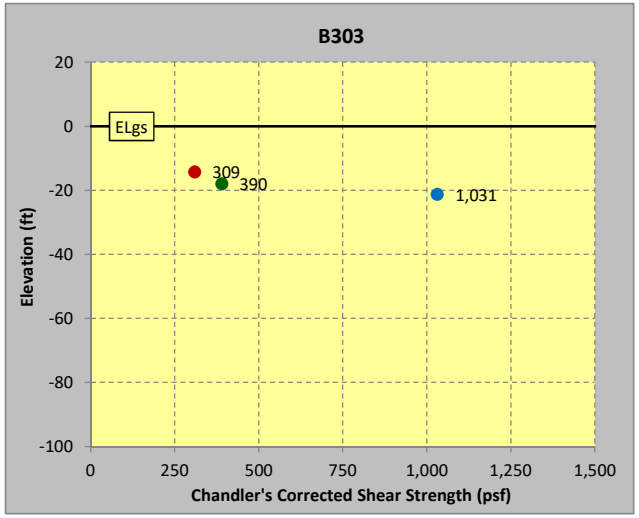
LOCATION: Station 116+19 LT 02 | Station 116+44 LT 02
BORING: B302 | B303

Chandler's Corrected Shear Strength (Su')

Valid?	Test	ELgs (ft)	Dv (ft)	ELv (ft)	w (%)	LL	PL	PI	Vane	Su (psf)	Sr (psf)	S	tf (min)	b	µR	Su' (psf)
Y	B302-VST1	6.7	24.3	-17.6				14.5	GREEN	1,273	159	8.0	13.0	0.023	0.961	1,223
Y	B302-VST2	6.7	47.1	-40.4				14.5	RED	325	102	3.2	29.5	0.026	0.951	309
N	B302-VST3	6.7	57.0	-50.3				14.5	RED	84	120	0.7	1.0	0.015	0.993	83
Y	B302-VST4	6.7	66.8	-60.1				14.5	RED	289	157	1.8	10.0	0.023	0.964	279
Y	B302-VST5	6.7	76.6	-69.9				14.5	RED	241	144	1.7	3.0	0.019	0.979	236
Y	B303-VST1	6.2	20.4	-14.2	59.20	45.0	28.0	17.0	GREEN	318.0	179.0	1.8	3.5	0.019	0.971	309
Y	B303-VST2	6.2	24.1	-17.9	78.30	53.0	34.0	19.0	GREEN	408.0	99.0	4.1	8.0	0.022	0.955	390
Y	B303-VST3	6.2	27.4	-21.2	73.40	47.0	35.0	12.0	GREEN	1,064.0	199.0	5.3	13.0	0.023	0.969	1,031

Elevation of the bottom of the vane	ELv
Depth to the bottom of the vane	Dv
water content	w
Atterberg Limits (liquid limit, plastic limit)	LL,PL
Plasiticity Index = LL - PL	PI
Undisturbed shear strength	Su
Remolded shear strength	Sr
Sensitivity = Su / Sr	S
Time to undisturbed failure	tf
b = 0.015 + 0.0075 log tf	b
µR = 1.05 - b PI^0.5	µR
Su' = µR Su	Su'





FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+19 LT 02
BORING:	B302
TEST:	VST1

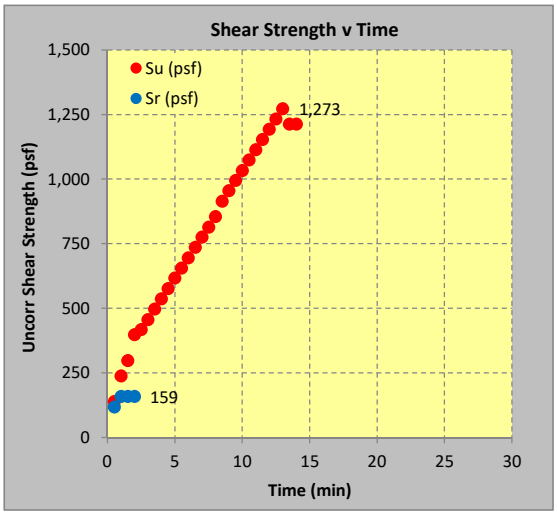
Vane Parameters

Color			GREEN	
Height	Hv		4.33	in
Diameter	Dv		2.17	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		19.89	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.7	ft
Depth to bottom of borer shoe	Db		22.7	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-16.0	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		24.3	ft
Elevation bottom of vane	ELv=ELgs-Dv		-17.6	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		1,273	psf
Maximum remolded	Sr		159	psf
Sensitivity	S = Su/Sr		8.0	
Time to undisturbed failure	tf		13.0	min



BORING: B302
TEST: VST1

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	7	139	6	119
01:00	12	3%	12	239	8	159
01:30	18	5%	15	298	8	159
02:00	24	7%	20	398	8	159
02:30	30	8%	21	418		0
03:00	36	10%	23	457		0
03:30	42	12%	25	497		0
04:00	48	13%	27	537		0
04:30	54	15%	29	577		0
05:00	60	17%	31	617		0
05:30	66	18%	33	656		0
06:00	72	20%	35	696		0
06:30	78	22%	37	736		0
07:00	84	23%	39	776		0
07:30	90	25%	41	815		0
08:00	96	27%	43	855		0
08:30	102	28%	46	915		0
09:00	108	30%	48	955		0
09:30	114	32%	50	995		0
10:00	120	33%	52	1034		0
10:30	126	35%	54	1074		0
11:00	132	37%	56	1114		0
11:30	138	38%	58	1154		0
12:00	144	40%	60	1193		0
12:30	150	42%	62	1233		0
13:00	156	43%	64	1273		0
13:30	162	45%	61	1213		0
14:00	168	47%	61	1213		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+19 LT 02
BORING:	B302
TEST:	VST2

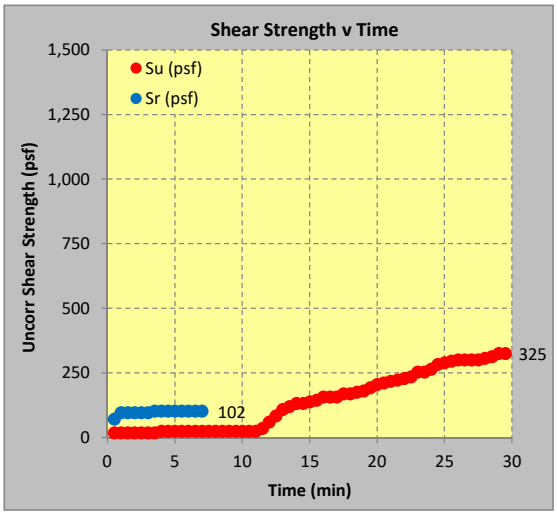
Vane Parameters

Color			RED	
Height	Hv		5.12	in
Diameter	Dv		2.56	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		12.04	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.7	ft
Depth to bottom of borer shoe	Db		45.5	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-38.8	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		47.1	ft
Elevation bottom of vane	ELv=ELgs-Dv		-40.4	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		325	psf
Maximum remolded	Sr		102	psf
Sensitivity	S = Su/Sr		3.2	
Time to undisturbed failure	tf		29.5	min



BORING: B302
TEST: VST2

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	1.5	18	6	72
01:00	12	3%	1.5	18	8	96
01:30	18	5%	1.5	18	8	96
02:00	24	7%	1.5	18	8	96
02:30	30	8%	1.5	18	8	96
03:00	36	10%	1.5	18	8	96
03:30	42	12%	1.5	18	8.5	102
04:00	48	13%	2	24	8.5	102
04:30	54	15%	2	24	8.5	102
05:00	60	17%	2	24	8.5	102
05:30	66	18%	2	24	8.5	102
06:00	72	20%	2	24	8.5	102
06:30	78	22%	2	24	8.5	102
07:00	84	23%	2	24	8.5	102
07:30	90	25%	2	24		0
08:00	96	27%	2	24		0
08:30	102	28%	2	24		0
09:00	108	30%	2	24		0
09:30	114	32%	2	24		0
10:00	120	33%	2	24		0
10:30	126	35%	2	24		0
11:00	132	37%	2	24		0
11:30	138	38%	3	36		0
12:00	144	40%	5	60		0
12:30	150	42%	7	84		0
13:00	156	43%	9	108		0
13:30	162	45%	10	120		0
14:00	168	47%	11	132		0
14:30	174	48%	11	132		0
15:00	180	50%	11.5	138		0
15:30	186	52%	12	144		0
16:00	192	53%	13	157		0
16:30	198	55%	13	157		0
17:00	204	57%	13	157		0
17:30	210	58%	14	169		0
18:00	216	60%	14	169		0
18:30	222	62%	14.5	175		0
19:00	228	63%	15	181		0
19:30	234	65%	16	193		0
20:00	240	67%	17	205		0
20:30	246	68%	17.5	211		0
21:00	252	70%	18	217		0
21:30	258	72%	18.5	223		0
22:00	264	73%	19	229		0
22:30	270	75%	19.5	235		0
23:00	276	77%	21	253		0
23:30	282	78%	21	253		0
24:00	288	80%	22	265		0
24:30	294	82%	23.5	283		0
25:00	300	83%	24	289		0
25:30	306	85%	24.5	295		0
26:00	312	87%	25	301		0
26:30	318	88%	25	301		0
27:00	324	90%	25	301		0
27:30	330	92%	25	301		0
28:00	336	93%	25.5	307		0
28:30	342	95%	26	313		0
29:00	348	97%	27	325		0
29:30	354	98%	27	325		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+19 LT 02
BORING:	B302
TEST:	VST3

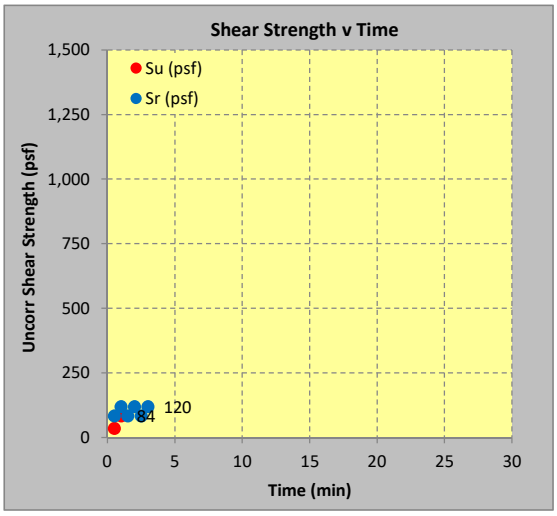
Vane Parameters

Color			RED	
Height	Hv		5.12	in
Diameter	Dv		2.56	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		12.04	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.7	ft
Depth to bottom of borer shoe	Db		55.4	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-48.7	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		57.0	ft
Elevation bottom of vane	ELv=ELgs-Dv		-50.3	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		84	psf
Maximum remolded	Sr		120	psf
Sensitivity	S = Su/Sr		0.7	
Time to undisturbed failure	tf		1.0	min



BORING: B302
TEST: VST3

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	3	36	7	84
01:00	12	3%	7	84	10	120
01:30	18	5%	0	0	7	84
02:00	24	7%	0	0	10	120
02:30	30	8%		0	7	84
03:00	36	10%		0	10	120
03:30	42	12%		0		0
04:00	48	13%		0		0
04:30	54	15%		0		0
05:00	60	17%		0		0
05:30	66	18%		0		0
06:00	72	20%		0		0
06:30	78	22%		0		0
07:00	84	23%		0		0
07:30	90	25%		0		0
08:00	96	27%		0		0
08:30	102	28%		0		0
09:00	108	30%		0		0
09:30	114	32%		0		0
10:00	120	33%		0		0
10:30	126	35%		0		0
11:00	132	37%		0		0
11:30	138	38%		0		0
12:00	144	40%		0		0
12:30	150	42%		0		0
13:00	156	43%		0		0
13:30	162	45%		0		0
14:00	168	47%		0		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+19 LT 02
BORING:	B302
TEST:	VST4

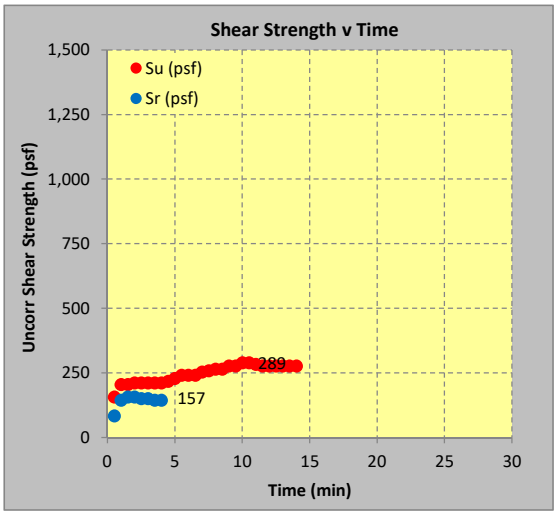
Vane Parameters

Color			RED	
Height	Hv		5.12	in
Diameter	Dv		2.56	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		12.04	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.7	ft
Depth to bottom of borer shoe	Db		65.2	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-58.5	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		66.8	ft
Elevation bottom of vane	ELv=ELgs-Dv		-60.1	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		289	psf
Maximum remolded	Sr		157	psf
Sensitivity	S = Su/Sr		1.8	
Time to undisturbed failure	tf		10.0	min



BORING: B302
TEST: VST4

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	13	157	7	84
01:00	12	3%	17	205	12	144
01:30	18	5%	17	205	13	157
02:00	24	7%	17.5	211	13	157
02:30	30	8%	17.5	211	12.5	151
03:00	36	10%	17.5	211	12.5	151
03:30	42	12%	17.5	211	12	144
04:00	48	13%	17.5	211	12	144
04:30	54	15%	18	217		0
05:00	60	17%	19	229		0
05:30	66	18%	20	241		0
06:00	72	20%	20	241		0
06:30	78	22%	20	241		0
07:00	84	23%	21	253		0
07:30	90	25%	21.5	259		0
08:00	96	27%	22	265		0
08:30	102	28%	22	265		0
09:00	108	30%	23	277		0
09:30	114	32%	23	277		0
10:00	120	33%	24	289		0
10:30	126	35%	24	289		0
11:00	132	37%	23.5	283		0
11:30	138	38%	23	277		0
12:00	144	40%	23	277		0
12:30	150	42%	23	277		0
13:00	156	43%	23	277		0
13:30	162	45%	23	277		0
14:00	168	47%	23	277		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+19 LT 02
BORING:	B302
TEST:	VST5

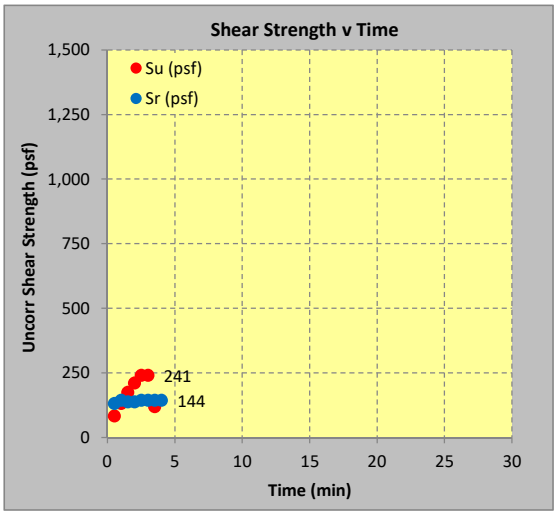
Vane Parameters

Color			RED	
Height	Hv		5.12	in
Diameter	Dv		2.56	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		12.04	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.7	ft
Depth to bottom of borer shoe	Db		75.0	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-68.3	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		76.6	ft
Elevation bottom of vane	ELv=ELgs-Dv		-69.9	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		241	psf
Maximum remolded	Sr		144	psf
Sensitivity	S = Su/Sr		1.7	
Time to undisturbed failure	tf		3.0	min



LOCATION: Station 116+19 LT 02

BORING: B302
TEST: VST5

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	7	84	11	132
01:00	12	3%	11	132	12	144
01:30	18	5%	14.5	175	11.5	138
02:00	24	7%	17.5	211	11.5	138
02:30	30	8%	20	241	12	144
03:00	36	10%	20	241	12	144
03:30	42	12%	10	120	12	144
04:00	48	13%		0	12	144
04:30	54	15%		0		0
05:00	60	17%		0		0
05:30	66	18%		0		0
06:00	72	20%		0		0
06:30	78	22%		0		0
07:00	84	23%		0		0
07:30	90	25%		0		0
08:00	96	27%		0		0
08:30	102	28%		0		0
09:00	108	30%		0		0
09:30	114	32%		0		0
10:00	120	33%		0		0
10:30	126	35%		0		0
11:00	132	37%		0		0
11:30	138	38%		0		0
12:00	144	40%		0		0
12:30	150	42%		0		0
13:00	156	43%		0		0
13:30	162	45%		0		0
14:00	168	47%		0		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+44 LT 02
BORING:	B303
TEST:	VST1

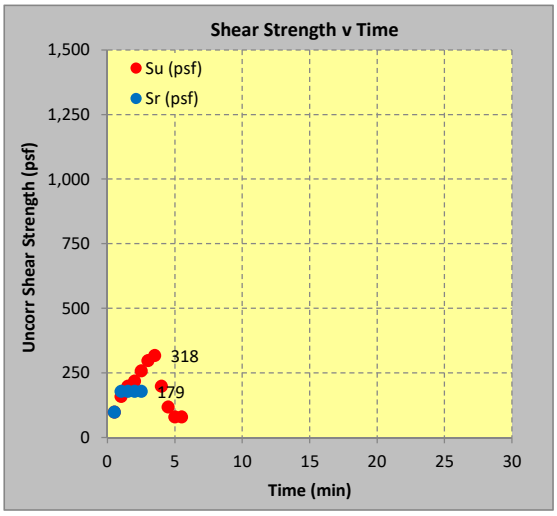
Vane Parameters

Color			GREEN	
Height	Hv		4.33	in
Diameter	Dv		2.17	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		19.89	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.2	ft
Depth to bottom of borer shoe	Db		18.8	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-12.6	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		20.4	ft
Elevation bottom of vane	ELv=ELgs-Dv		-14.2	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		318	psf
Maximum remolded	Sr		179	psf
Sensitivity	S = Su/Sr		1.8	
Time to undisturbed failure	tf		3.5	min



BORING: B303
TEST: VST1

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	5	99	5	99
01:00	12	3%	8	159	9	179
01:30	18	5%	10	199	9	179
02:00	24	7%	11	219	9	179
02:30	30	8%	13	259	9	179
03:00	36	10%	15	298		0
03:30	42	12%	16	318		0
04:00	48	13%	10	199		0
04:30	54	15%	6	119		0
05:00	60	17%	4	80		0
05:30	66	18%	4	80		0
06:00	72	20%		0		0
06:30	78	22%		0		0
07:00	84	23%		0		0
07:30	90	25%		0		0
08:00	96	27%		0		0
08:30	102	28%		0		0
09:00	108	30%		0		0
09:30	114	32%		0		0
10:00	120	33%		0		0
10:30	126	35%		0		0
11:00	132	37%		0		0
11:30	138	38%		0		0
12:00	144	40%		0		0
12:30	150	42%		0		0
13:00	156	43%		0		0
13:30	162	45%		0		0
14:00	168	47%		0		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+44 LT 02
BORING:	B303
TEST:	VST2

Vane Parameters

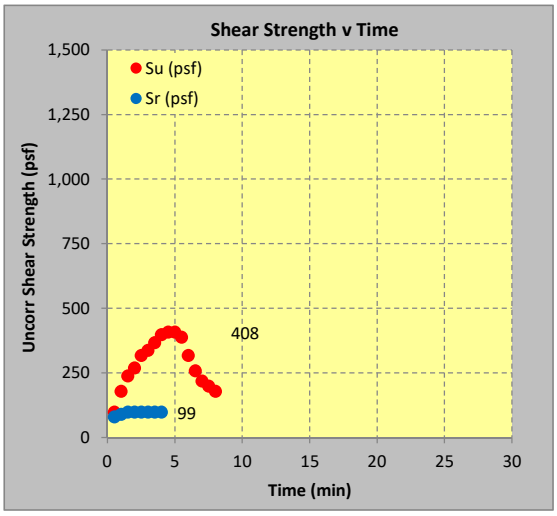
Color			GREEN	
Height	Hv		4.33	in
Diameter	Dv		2.17	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		19.89	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.2	ft
Depth to bottom of borer shoe	Db		22.5	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-16.3	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		24.1	ft
Elevation bottom of vane	ELv=ELgs-Dv		-17.9	ft
Vane rotation rate	Rot	0.2	0.2	deg/s

Uncorrected shear strength	Su,Sr = Read * CFv		
Maximum undisturbed	Su	408	psf
Maximum remolded	Sr	99	psf
Sensitivity	S = Su/Sr	4.1	
Time to undisturbed failure	tf	8.0	min



LOCATION: Station 116+44 LT 02

BORING: B303
TEST: VST2

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	5	99	4	80
01:00	12	3%	9	179	4.5	90
01:30	18	5%	12	239	5	99
02:00	24	7%	13.5	269	5	99
02:30	30	8%	16	318	5	99
03:00	36	10%	17	338	5	99
03:30	42	12%	18.5	368	5	99
04:00	48	13%	20	398	5	99
04:30	54	15%	20.5	408		0
05:00	60	17%	20.5	408		0
05:30	66	18%	19.5	388		0
06:00	72	20%	16	318		0
06:30	78	22%	13	259		0
07:00	84	23%	11	219		0
07:30	90	25%	10	199		0
08:00	96	27%	9	179		0
08:30	102	28%		0		0
09:00	108	30%		0		0
09:30	114	32%		0		0
10:00	120	33%		0		0
10:30	126	35%		0		0
11:00	132	37%		0		0
11:30	138	38%		0		0
12:00	144	40%		0		0
12:30	150	42%		0		0
13:00	156	43%		0		0
13:30	162	45%		0		0
14:00	168	47%		0		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

FIELD VANE SHEAR TESTING (ASTM D2573/D2573-15)

PROJECT:	Durham 16236
BY:	KRA
DATE:	09/18/18
CHK BY:	ALS
CHK DATE:	09/18/18

LOCATION:	Station 116+44 LT 02
BORING:	B303
TEST:	VST3

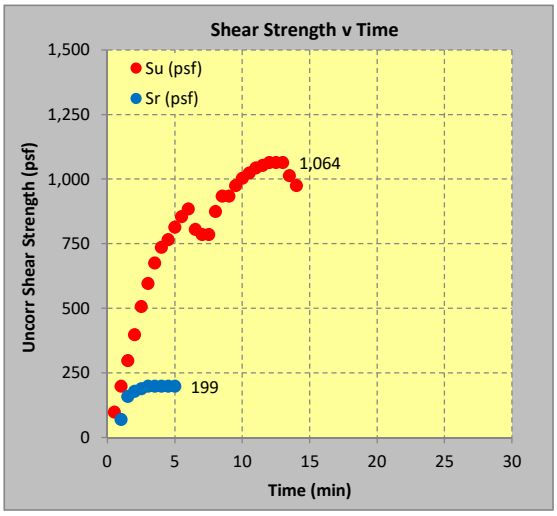
Vane Parameters

Color			GREEN	
Height	Hv		4.33	in
Diameter	Dv		2.17	in
Height/Diameter ratio	Hv/Dv	2	2	
Calibration factor	CFv		19.89	

	GREEN	RED
Hv	4.33	5.12
Dv	2.17	2.56
Hv/Dv	2	2
CFv	19.89	12.04

Test Parameters

Existing ground surface elevation	ELgs		6.2	ft
Depth to bottom of borer shoe	Db		25.8	ft
Elevation bottom of borer shoe	ELb = ELgs-Db		-19.6	ft
Vane extension below bottom of shoe	Lv	1.6	1.6	ft
Depth to bottom of vane	Dv=Db-Lv		27.4	ft
Elevation bottom of vane	ELv=ELgs-Dv		-21.2	ft
Vane rotation rate	Rot	0.2	0.2	deg/s
Uncorrected shear strength	Su,Sr = Read * CFv			
Maximum undisturbed	Su		1,064	psf
Maximum remolded	Sr		199	psf
Sensitivity	S = Su/Sr		5.3	
Time to undisturbed failure	tf		13.0	min



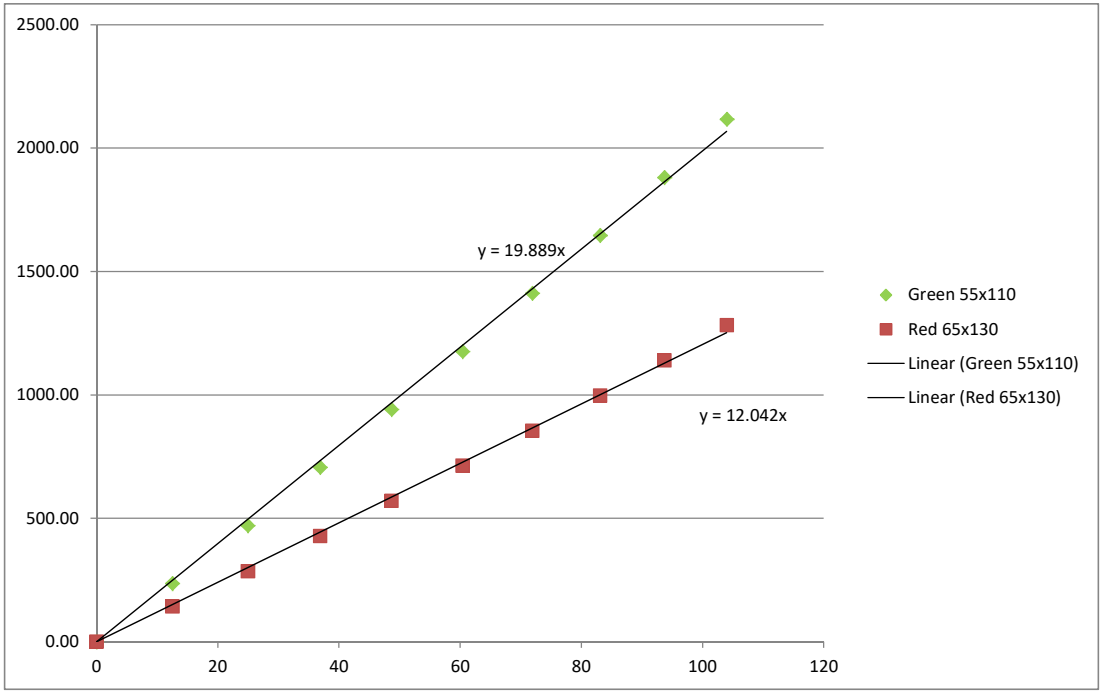
BORING: B303
TEST: VST3

Time	Rotation		Undisturbed		Remolded	
(min:sec)	(deg)	(%)	Read	Su (psf)	Read	Sr (psf)
00:00	0	0%	0	0	0	0
00:30	6	2%	5	99	0	0
01:00	12	3%	10	199	3.5	70
01:30	18	5%	15	298	8	159
02:00	24	7%	20	398	9	179
02:30	30	8%	25.5	507	9.5	189
03:00	36	10%	30	597	10	199
03:30	42	12%	34	676	10	199
04:00	48	13%	37	736	10	199
04:30	54	15%	38.5	766	10	199
05:00	60	17%	41	815	10	199
05:30	66	18%	43	855		0
06:00	72	20%	44.5	885		0
06:30	78	22%	40.5	806		0
07:00	84	23%	39.5	786		0
07:30	90	25%	39.5	786		0
08:00	96	27%	44	875		0
08:30	102	28%	47	935		0
09:00	108	30%	47	935		0
09:30	114	32%	49	975		0
10:00	120	33%	50.5	1004		0
10:30	126	35%	51.5	1024		0
11:00	132	37%	52.5	1044		0
11:30	138	38%	53	1054		0
12:00	144	40%	53.5	1064		0
12:30	150	42%	53.5	1064		0
13:00	156	43%	53.5	1064		0
13:30	162	45%	51	1014		0
14:00	168	47%	49	975		0
14:30	174	48%		0		0
15:00	180	50%		0		0
15:30	186	52%		0		0
16:00	192	53%		0		0
16:30	198	55%		0		0
17:00	204	57%		0		0
17:30	210	58%		0		0
18:00	216	60%		0		0
18:30	222	62%		0		0
19:00	228	63%		0		0
19:30	234	65%		0		0
20:00	240	67%		0		0
20:30	246	68%		0		0
21:00	252	70%		0		0
21:30	258	72%		0		0
22:00	264	73%		0		0
22:30	270	75%		0		0
23:00	276	77%		0		0
23:30	282	78%		0		0
24:00	288	80%		0		0
24:30	294	82%		0		0
25:00	300	83%		0		0
25:30	306	85%		0		0
26:00	312	87%		0		0
26:30	318	88%		0		0
27:00	324	90%		0		0
27:30	330	92%		0		0
28:00	336	93%		0		0
28:30	342	95%		0		0
29:00	348	97%		0		0
29:30	354	98%		0		0

Calibration by Geonor
Instrument # 2528
Date: 5/12/2003

Average Instrument Reading	Shear Stress 55x110 (Green) kN/m^2	lb/ft^2	65x130 (Red) kN/m^2	lb/ft^2
0	0	0.00	0	0.00
12.5	11.26	235.17	6.82	142.44
25	22.52	470.34	13.64	284.88
36.9	33.79	705.72	20.46	427.32
48.7	45.05	940.89	27.28	569.75
60.4	56.31	1176.06	34.09	711.98
71.9	67.57	1411.23	40.91	854.42
83.1	78.83	1646.40	47.73	996.86
93.7	90.04	1880.52	54.52	1138.67
104	101.36	2116.94	61.37	1281.74
FACTOR (LINEAR)		**19.89**		**12.04**

1 kN/m2 = 20.8854 psf



Appendix C

Laboratory Test Data – GeoTesting Express

Laboratory Test Data - GeoTesting Express (GTX)
INDEX

Test Boring	Sample ID	Depth (Ft)	Moisture Content *(ASTM D2974)*	Organic Content *(ASTM D2974)*	Particle Size *(ASTM D422)*	Atterberg Limits *(ASTM D4318)*	Consolidated Undrained Direct Simple Shear *(ASTM D6528)*	Consolidated Undrained Triaxial *(GTX S1020)*	Consolidation - Constant Rate of Strain *(ASTM D4186)*	Consolidation - Incremental Loading *(ASTM D2435, Method B)*
			Page Number(s):							
B301										
	U2	15.5 - 17.5	2	2	3	9	17-19			36-56
	U3	20.6 - 22.6			4			29-30		
	U4	35.0 - 37.0				10	20-22		33-35	
	U5	45.0 - 47.0			5	11				
	U6	55.0 - 57.0			6	12		31-32		57-77
	U7	65.0 - 67.0				13	23-25			78-98
	U8	75.5 - 77.5			7	14		120-121		
B303										
	U3	20.5 - 22.5	2	2		15	26-28			99-119
	U4	30.0 - 32.0			8	16				

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	---	Sample Type:	---	Tested By:	cam
Sample ID:	---	Test Date:	09/14/18	Checked By:	emm
Depth :	---	Test Id:	471019		

Moisture, Ash, and Organic Matter - ASTM D2974

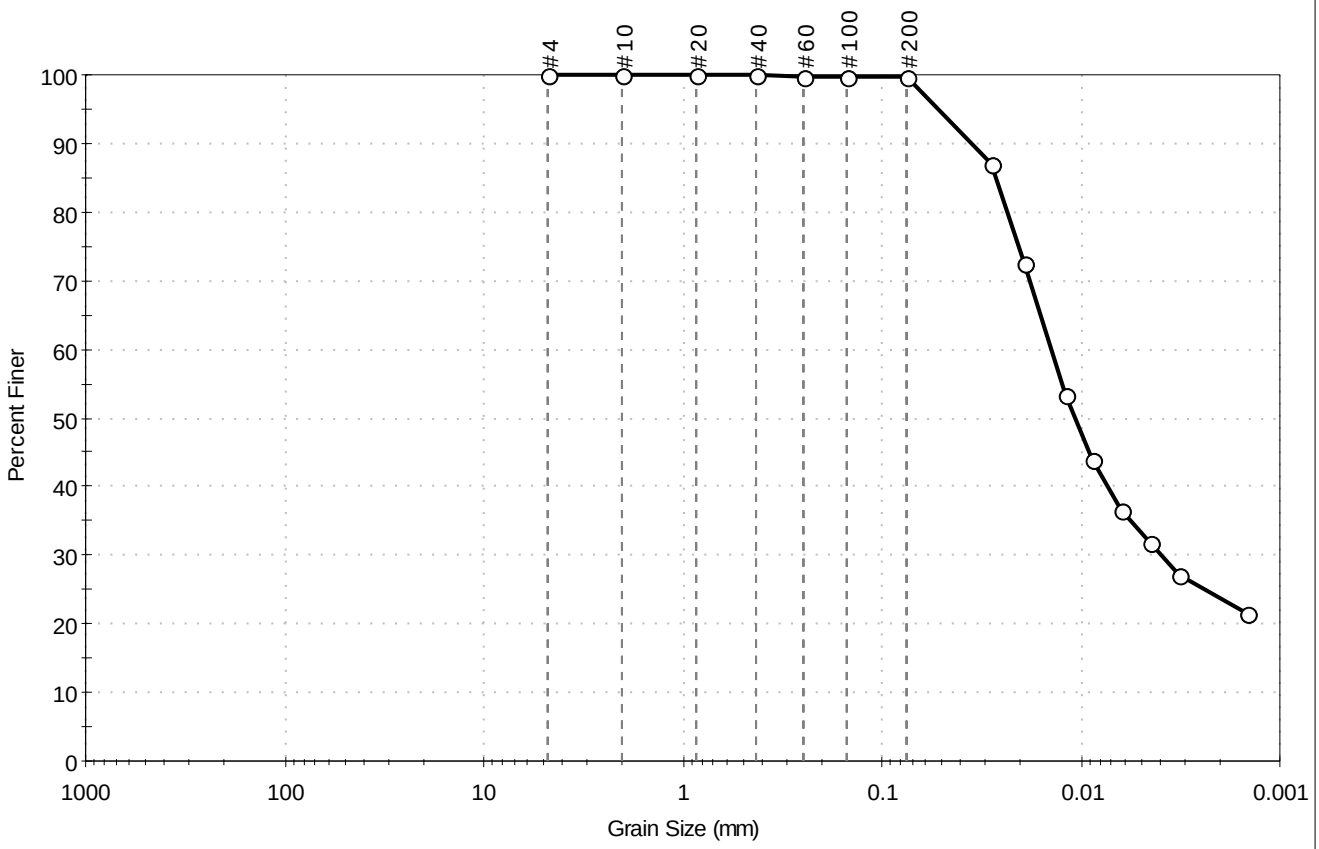
Boring ID	Sample ID	Depth	Description	Moisture Content, %	Ash Content, %	Organic Matter, %
B301	U-2	15.5-17.5 ft	Moist, dark gray silt	54	96.5	3.5
B303	U-3	20.5-22.5 ft	Moist, dark gray silt	74	95.6	4.4

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass; dried to a constant mass at temperature of 105º C
Ash content and organic matter determined by Method C; dried to constant mass at temperature 440º C

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	jbr
Sample ID:	U-2	Test Date:	09/14/18	Checked By:	emm
Depth :	15.5-17.5 ft	Test Id:	471012		

Test Comment: ---
Visual Description: Moist, dark gray silt
Sample Comment: ----

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	0.3	99.7

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		
#200	0.075	100		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0284	87		
---	0.0191	73		
---	0.0120	53		
---	0.0088	44		
---	0.0063	37		
---	0.0045	32		
---	0.0032	27		
---	0.0015	22		

Coefficients

D_{85} = 0.0269 mm D_{30} = 0.0039 mm
D_{60} = 0.0140 mm D_{15} = N/A
D_{50} = 0.0107 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM Elastic SILT (MH)

AASHTO Clayey Soils (A-7-5 (31))

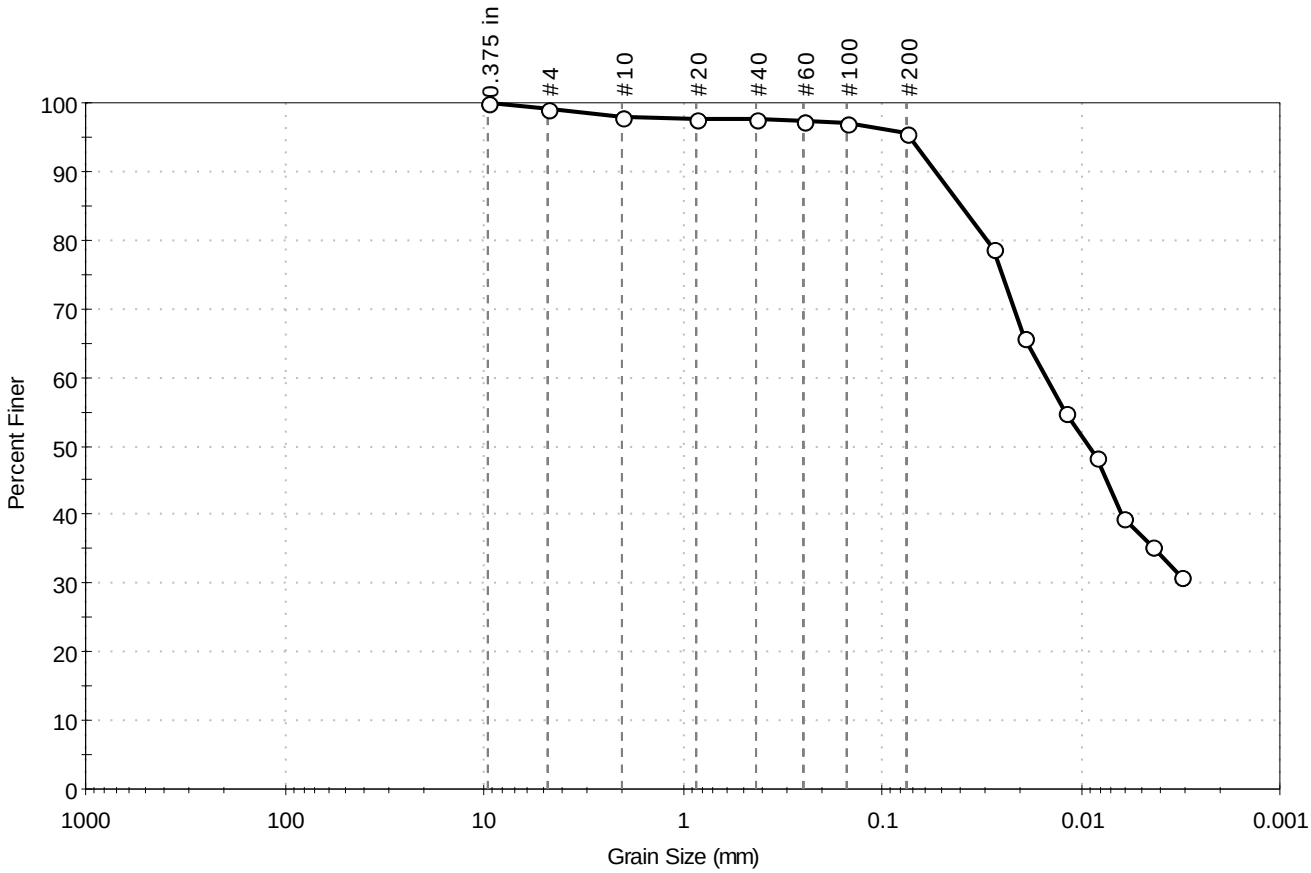
Sample/Test Description

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:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	jbr
Sample ID:	U-3	Test Date:	09/14/18	Checked By:	emm
Depth :	20.6-22.6 ft	Test Id:	471013		

Test Comment: ---
Visual Description: Moist, olive gray clay
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.8	3.5	95.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	98		
#40	0.42	98		
#60	0.25	97		
#100	0.15	97		
#200	0.075	96		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0273	79		
---	0.0192	66		
---	0.0118	55		
---	0.0085	48		
---	0.0062	40		
---	0.0044	35		
---	0.0032	31		

Coefficients

D_{85} = 0.0399 mm D_{30} = N/A
D_{60} = 0.0149 mm D_{15} = N/A
D_{50} = 0.0092 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

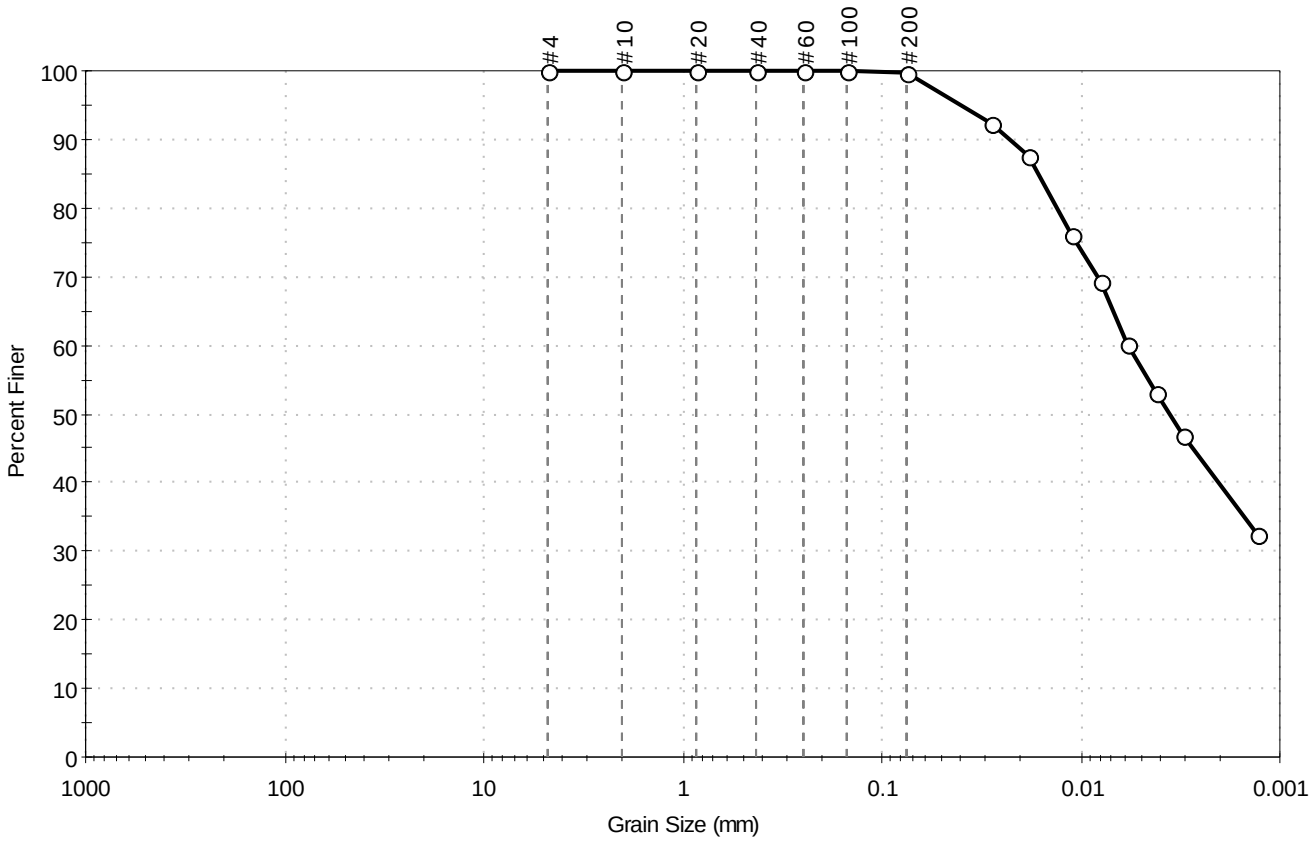
AASHTO Silty Soils (A-4 (0))

Sample/Test Description

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

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	jbr
Sample ID:	U-5	Test Date:	09/10/18	Checked By:	emm
Depth :	45-47 ft	Test Id:	471014		
Test Comment:	---				
Visual Description:	Wet, dark gray clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	0.3	99.7

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		
#200	0.075	100		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0286	92		
---	0.0183	88		
---	0.0112	76		
---	0.0079	69		
---	0.0058	60		
---	0.0042	53		
---	0.0030	47		
---	0.0013	32		

Coefficients

D_{85} = 0.0163 mm D_{30} = N/A
D_{60} = 0.0058 mm D_{15} = N/A
D_{50} = 0.0036 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM Lean CLAY (CL)

AASHTO Clayey Soils (A-6 (11))

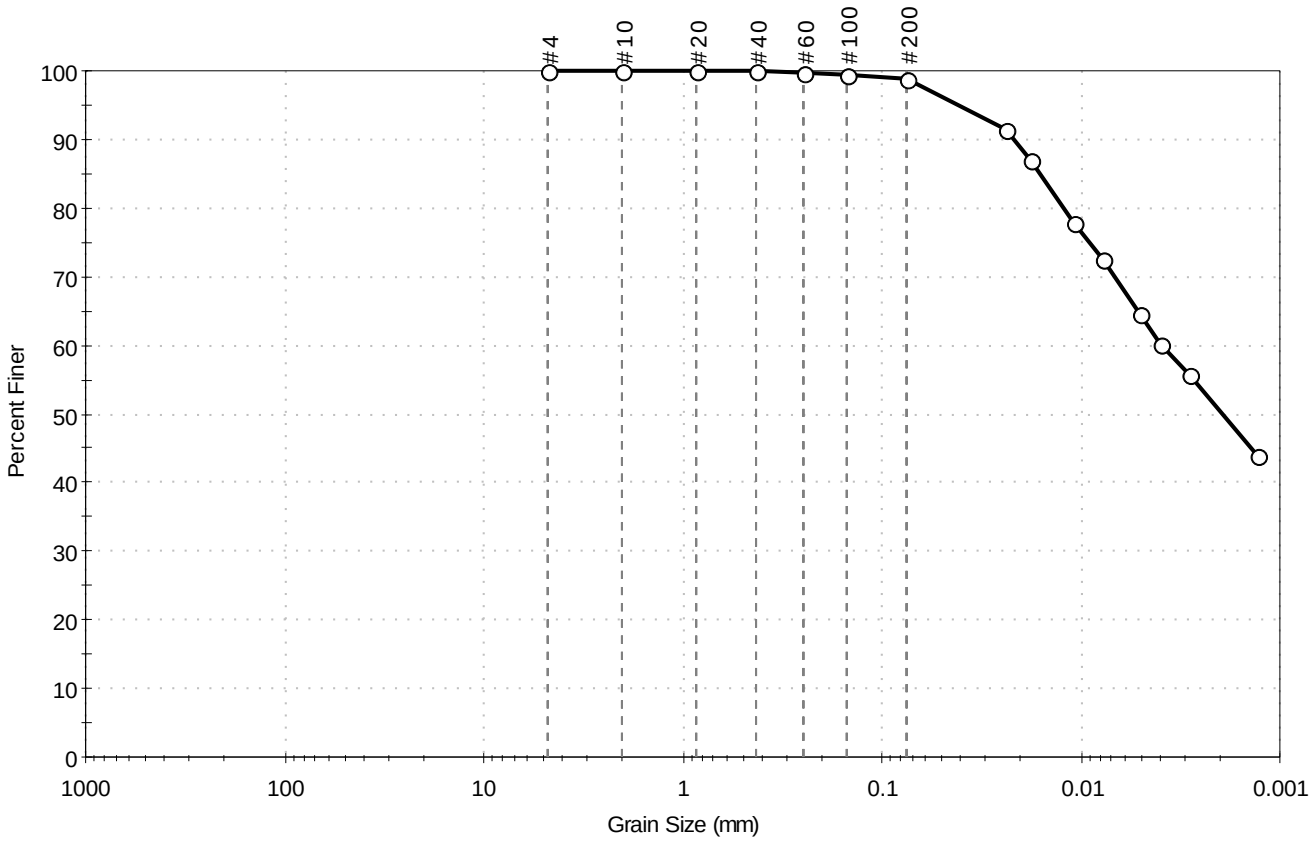
Sample / Test Description

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:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	jbr
Sample ID:	U-6	Test Date:	09/10/18	Checked By:	emm
Depth :	55-57 ft	Test Id:	471015		

Test Comment: ---
Visual Description: Wet, olive gray clay
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	1.2	98.8

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	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	99		
Hydrometer	**Particle Size (mm)**	**Percent Finer**	**Spec. Percent**	**Complies**
---	0.0239	91		
---	0.0181	87		
---	0.0109	78		
---	0.0077	72		
---	0.0051	65		
---	0.0040	60		
---	0.0029	56		
---	0.0013	44		

Coefficients

D_{85} = 0.0163 mm D_{30} = N/A
D_{60} = 0.0039 mm D_{15} = N/A
D_{50} = 0.0020 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM Lean CLAY (CL)

AASHTO Clayey Soils (A-6 (10))

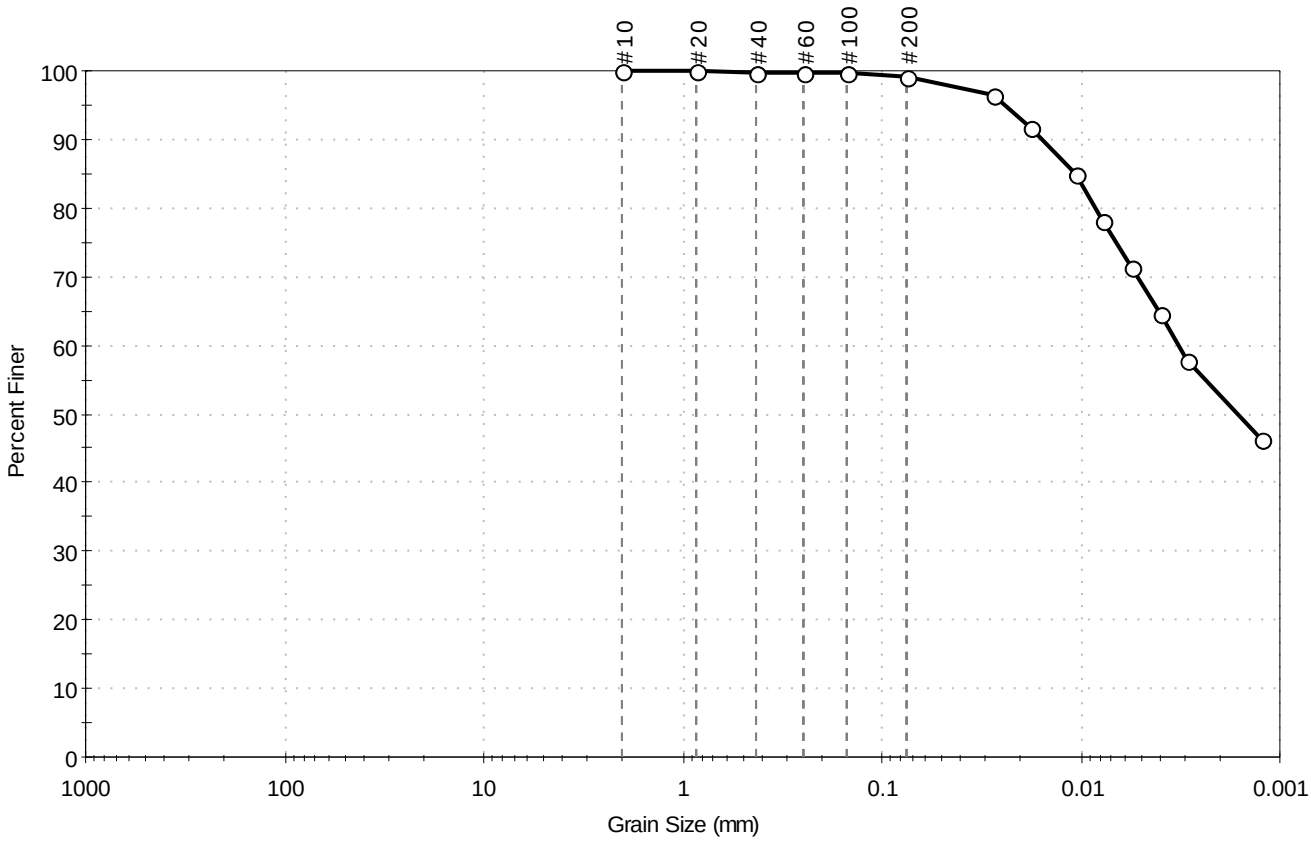
Sample / Test Description

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:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	jbr
Sample ID:	U-8	Test Date:	09/12/18	Checked By:	emm
Depth :	75.5-77.5 ft	Test Id:	471016		

Test Comment: ---
Visual Description: Wet, olive gray clay
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	0.8	99.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0277	96		
---	0.0178	92		
---	0.0107	85		
---	0.0078	78		
---	0.0056	71		
---	0.0040	65		
---	0.0029	58		
---	0.0012	46		

Coefficients

D_{85} = 0.0107 mm D_{30} = N/A
D_{60} = 0.0033 mm D_{15} = N/A
D_{50} = 0.0016 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM Lean CLAY (CL)

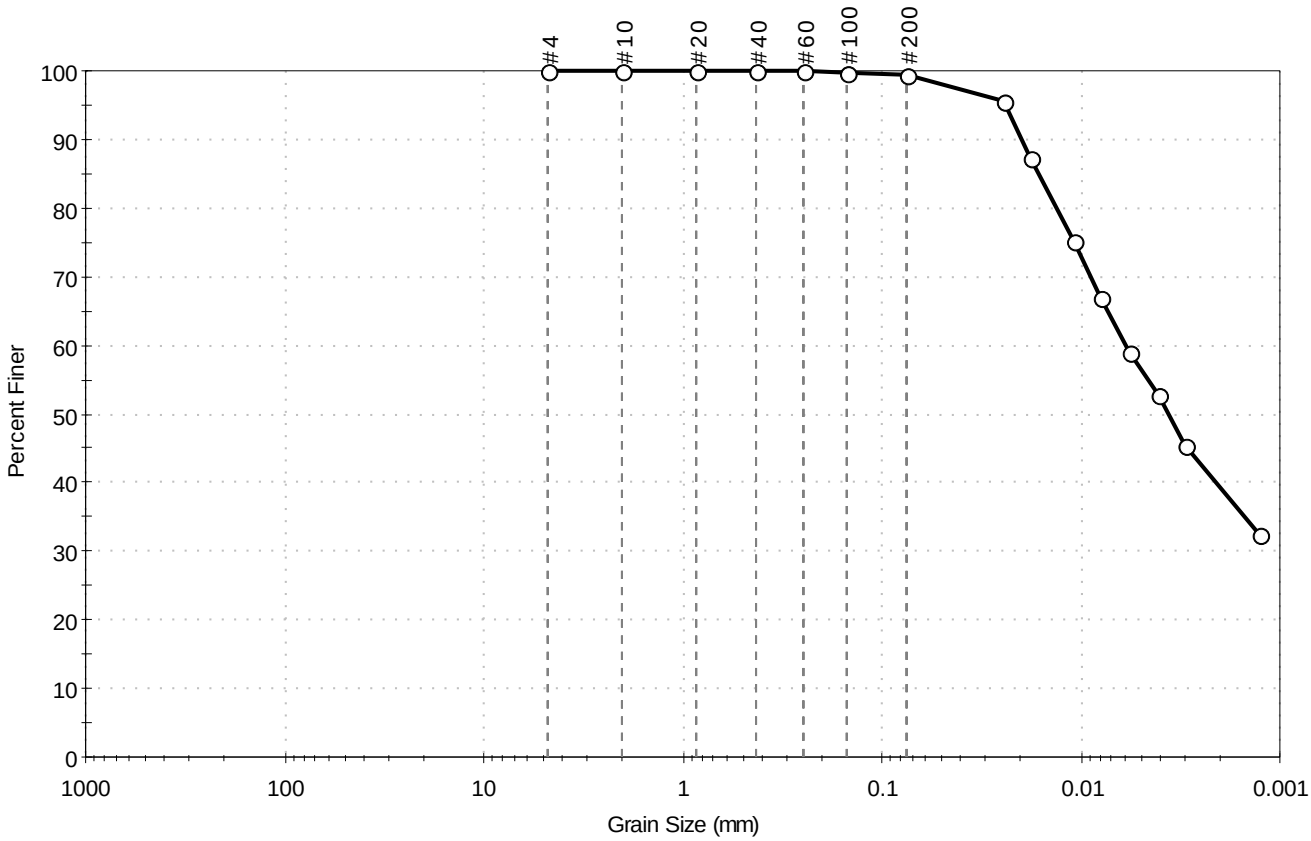
AASHTO Clayey Soils (A-6 (12))

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:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B303	Sample Type:	tube	Tested By:	jbr
Sample ID:	U-4	Test Date:	09/10/18	Checked By:	emm
Depth :	30-32 ft	Test Id:	471017		
Test Comment:	---				
Visual Description:	Moist, olive gray clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	0.5	99.5

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		
#200	0.075	100		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0242	96		
---	0.0178	87		
---	0.0108	75		
---	0.0079	67		
---	0.0058	59		
---	0.0041	53		
---	0.0030	45		
---	0.0013	33		

Coefficients

D_{85} = 0.0161 mm D_{30} = N/A
D_{60} = 0.0060 mm D_{15} = N/A
D_{50} = 0.0037 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM Lean CLAY (CL)

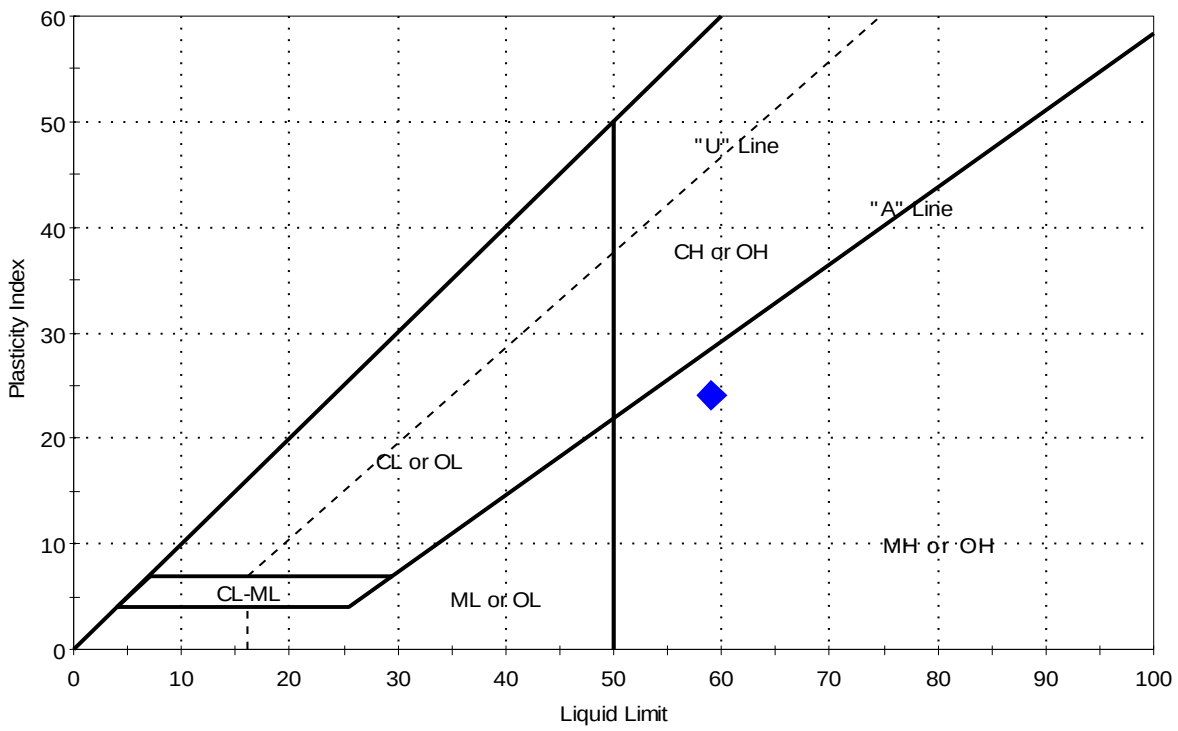
AASHTO Clayey Soils (A-6 (19))

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:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	cam
Sample ID:	U-2	Test Date:	09/13/18	Checked By:	emm
Depth :	15.5-17.5 ft	Test Id:	471004		
Test Comment:	---				
Visual Description:	Moist, dark gray silt				
Sample Comment:	----				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-2	B301	15.5-17.5 ft	50	59	35	24	0.6	Elastic SILT (MH)

Sample Prepared using the WET method

0% Retained on #40 Sieve

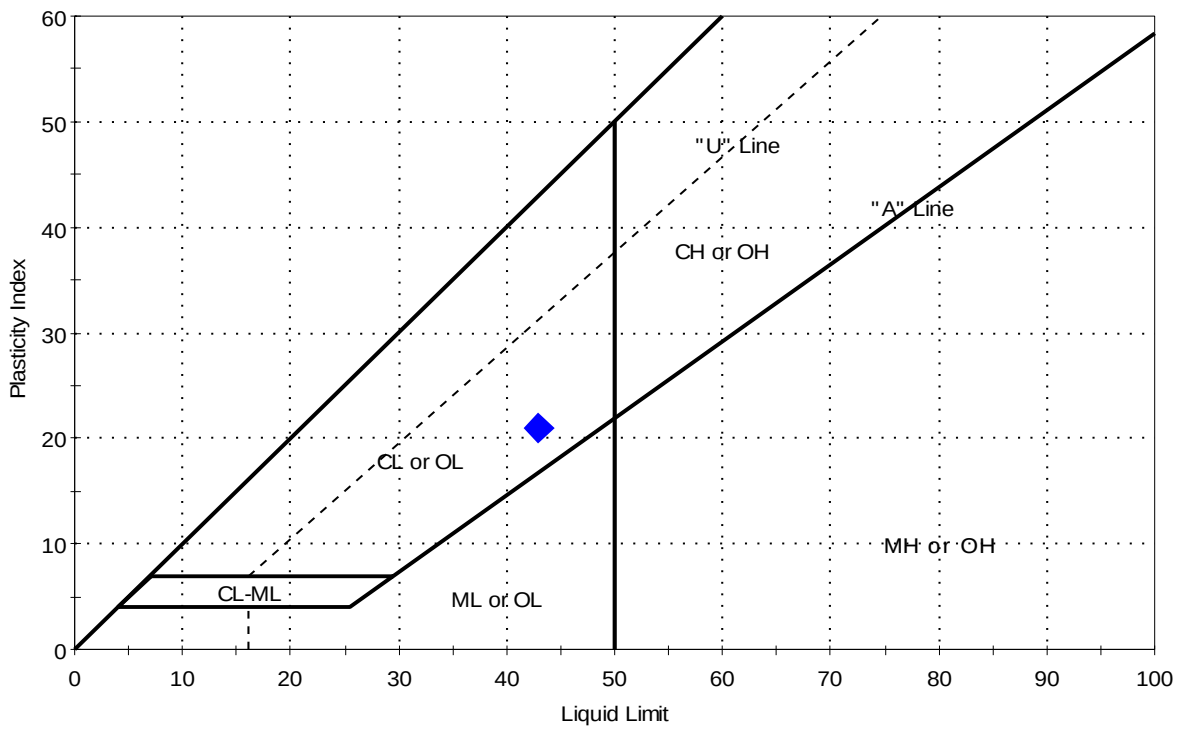
Dry Strength: HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	cam
Sample ID:	U-4	Test Date:	09/11/18	Checked By:	emm
Depth :	35-37 ft	Test Id:	471005		
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
◆	U-4	B301	35-37 ft	34	43	22	21	0.6	

Sample Prepared using the WET method

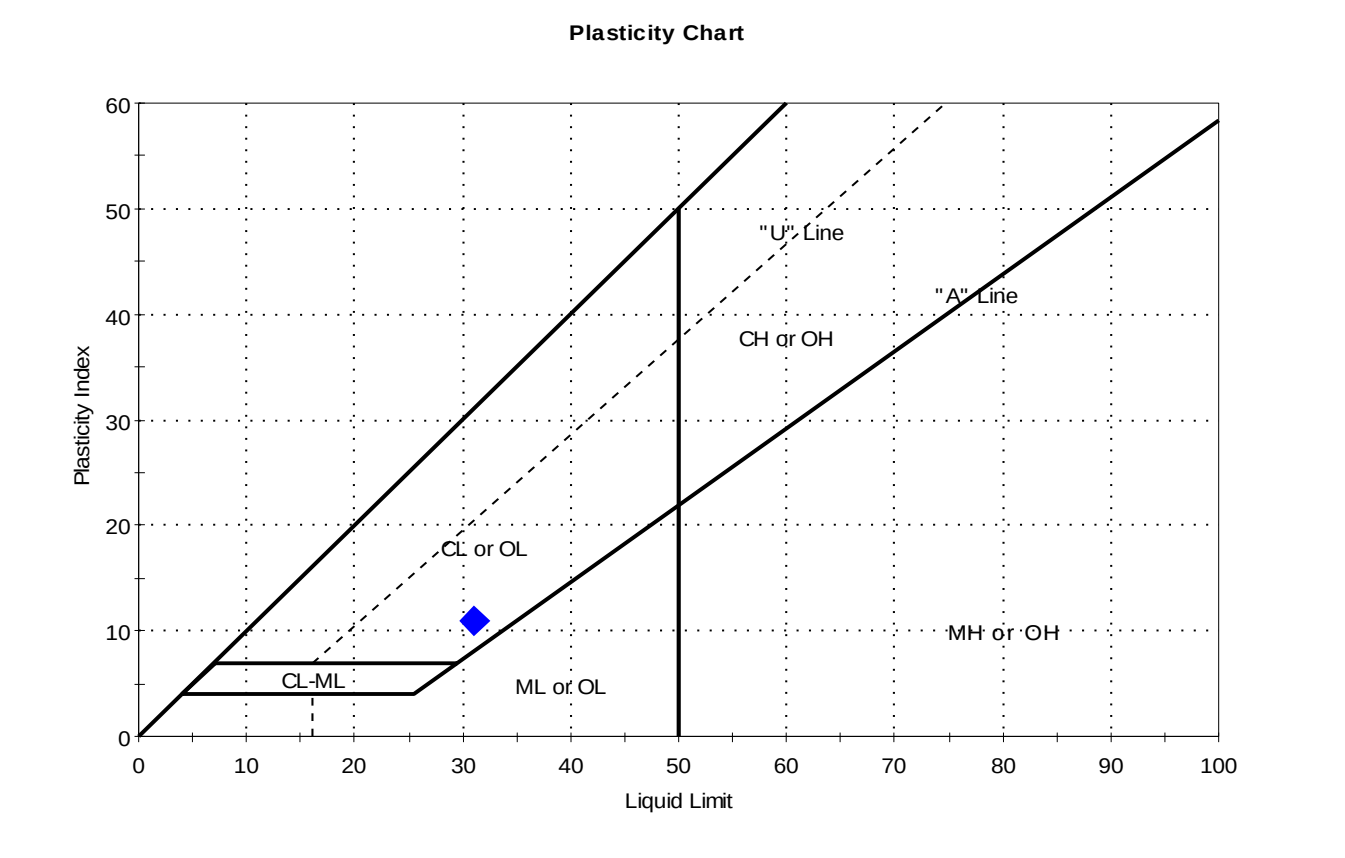
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	cam
Sample ID:	U-5	Test Date:	09/13/18	Checked By:	emm
Depth :	45-47 ft	Test Id:	471006		
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
◆	U-5	B301	45-47 ft	45	31	20	11	2.3	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

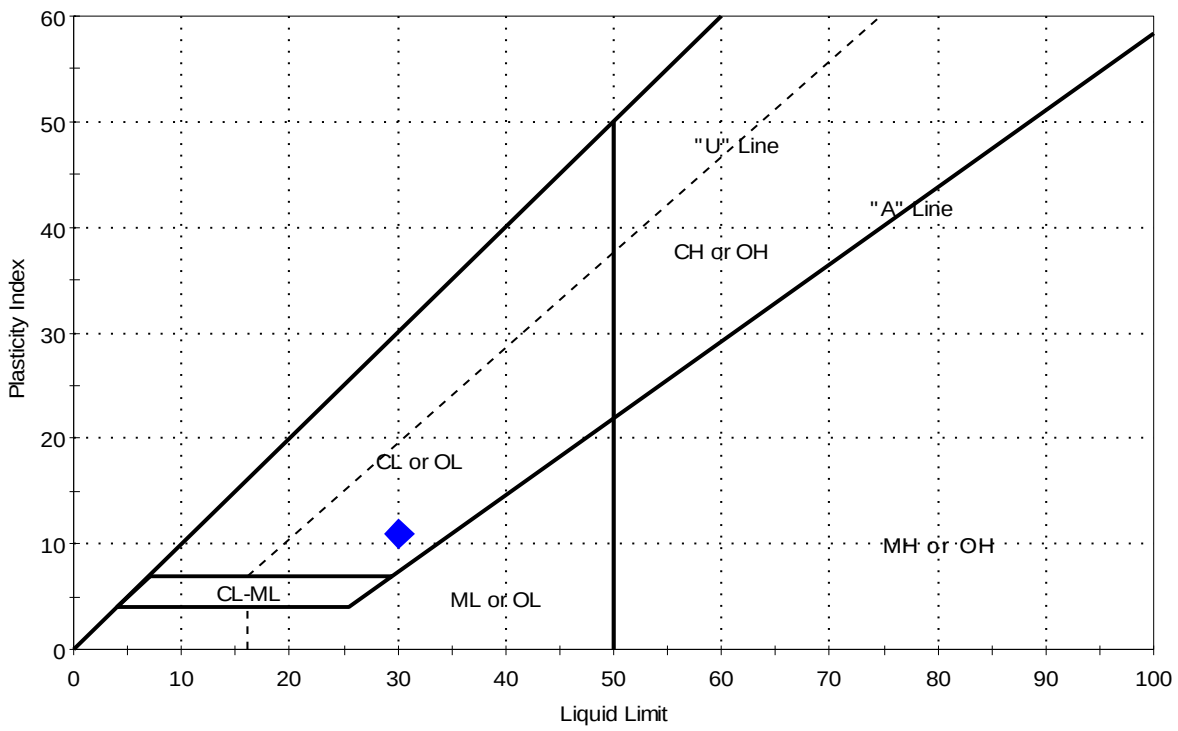
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	cam
Sample ID:	U-6	Test Date:	09/11/18	Checked By:	emm
Depth :	55-57 ft	Test Id:	471007		
Test Comment:	---				
Visual Description:	Wet, 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
◆	U-6	B301	55-57 ft	38	30	19	11	1.7	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

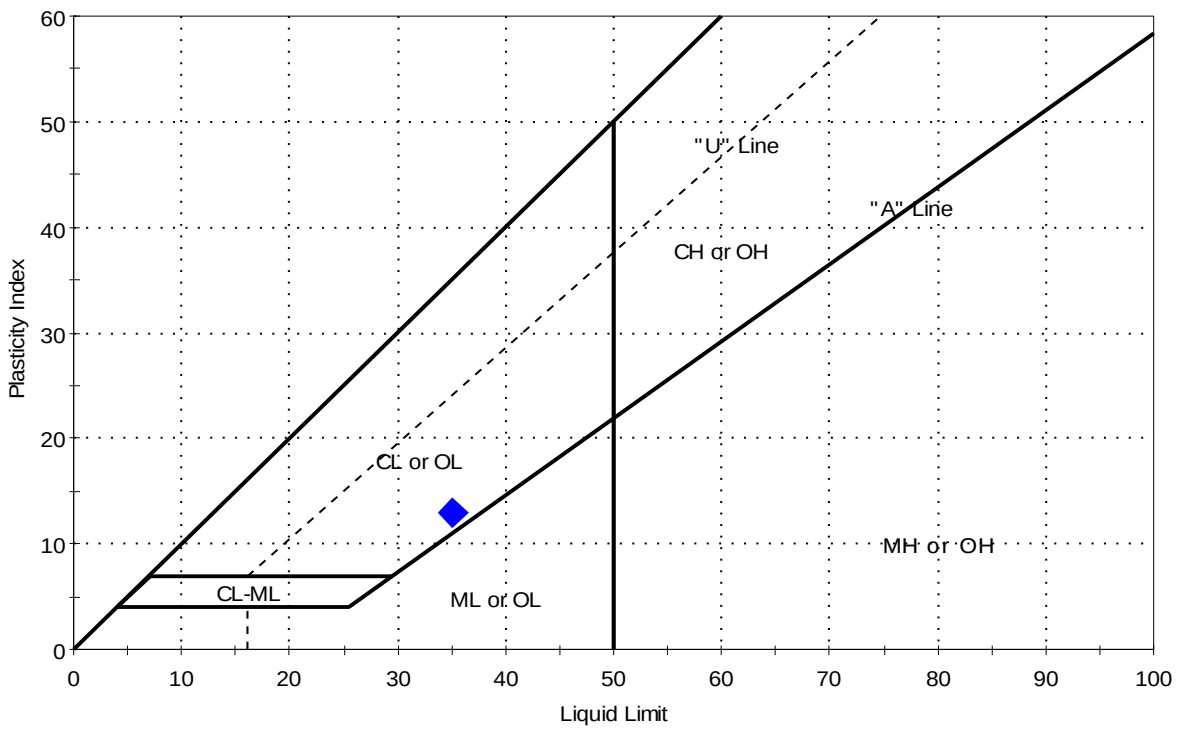
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	cam
Sample ID:	U-7	Test Date:	09/13/18	Checked By:	emm
Depth :	65-67 ft	Test Id:	471008		
Test Comment:	---				
Visual Description:	Wet, 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
◆	U-7	B301	65-67 ft	45	35	22	13	1.7	

Sample Prepared using the WET method

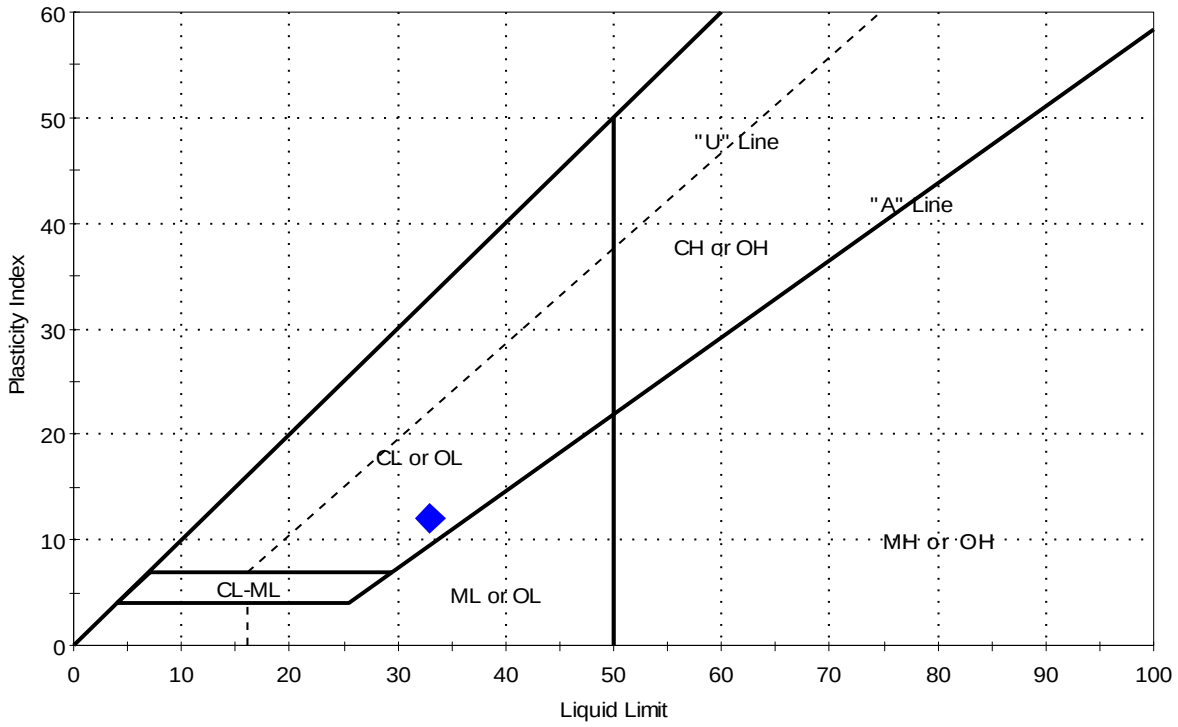
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B301	Sample Type:	tube	Tested By:	cam
Sample ID:	U-8	Test Date:	09/13/18	Checked By:	emm
Depth :	75.5-77.5 ft	Test Id:	471009		
Test Comment:	---				
Visual Description:	Wet, 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
◆	U-8	B301	75.5-77.5 ft	47	33	21	12	2.2	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

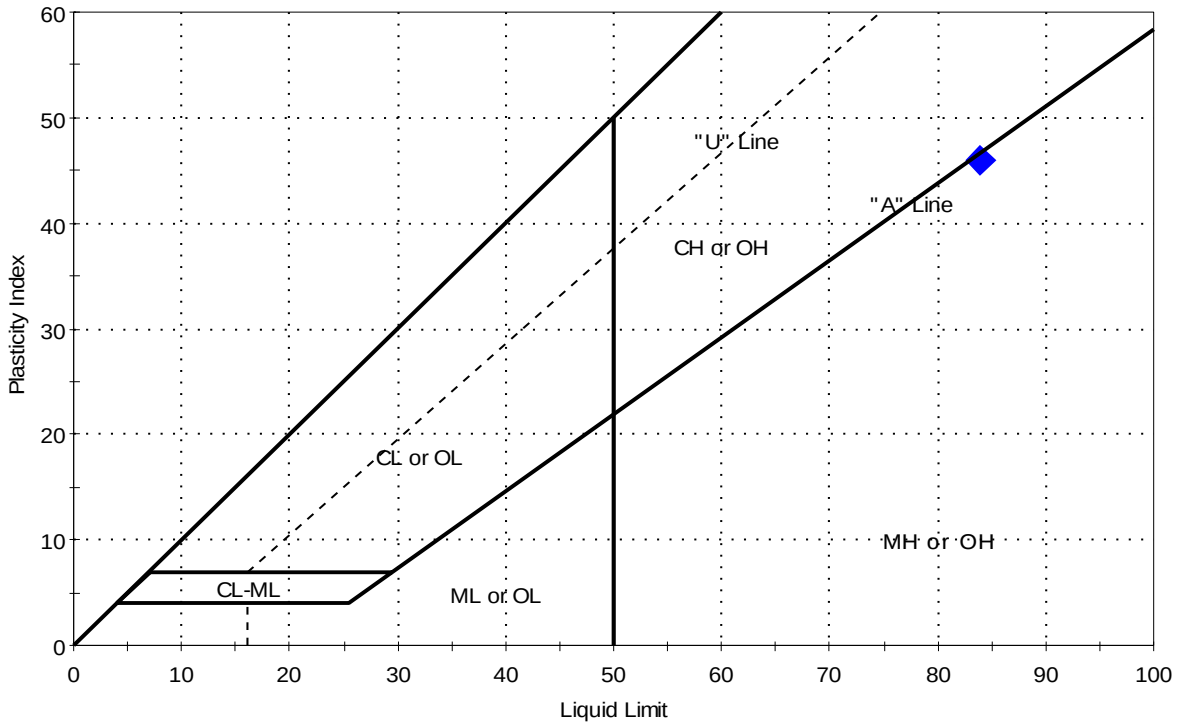
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B303	Sample Type:	tube	Tested By:	cam
Sample ID:	U-3	Test Date:	09/12/18	Checked By:	emm
Depth :	20.5-22.5 ft	Test Id:	471010		
Test Comment:	---				
Visual Description:	Moist, dark gray silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	U-3	B303	20.5-22.5 ft	74	84	38	46	0.8	

Sample Prepared using the WET method

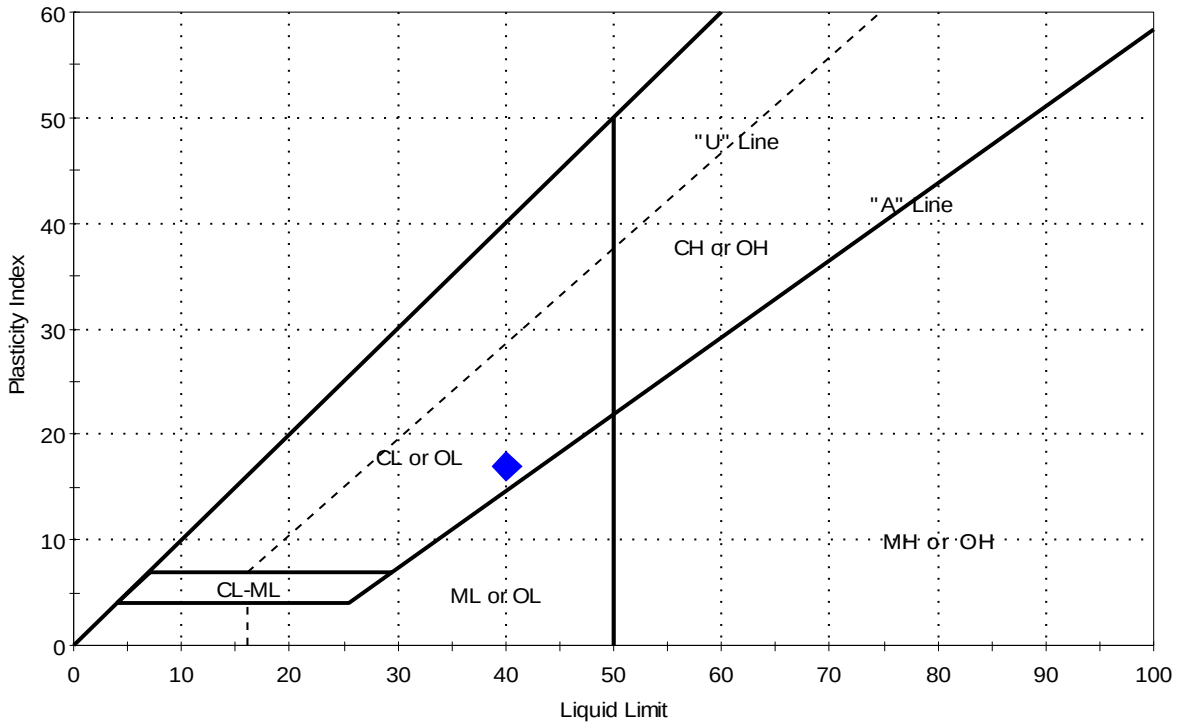
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Golder Associates				
Project:	NHDOT Durham				
Location:	Durham, NH			Project No:	GTX-308573
Boring ID:	B303	Sample Type:	tube	Tested By:	cam
Sample ID:	U-4	Test Date:	09/13/18	Checked By:	emm
Depth :	30-32 ft	Test Id:	471011		
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
◆	U-4	B303	30-32 ft	31	40	23	17	0.5	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

GeoTesting EXPRESS

Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client:	Golder Associates	GTX#:	308573
Project Name:	NHDOT Durham	Test Date:	9/7/18
Project Location:	Durham, NH		

Boring ID: B301
Sample ID: U-2
Depth, ft: 15.5-17.5

Visual Description: Moist, olive gray silt

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^2, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: density: Extruded from tube, cut, trimmed and placed into apparatus at as-received and moisture.

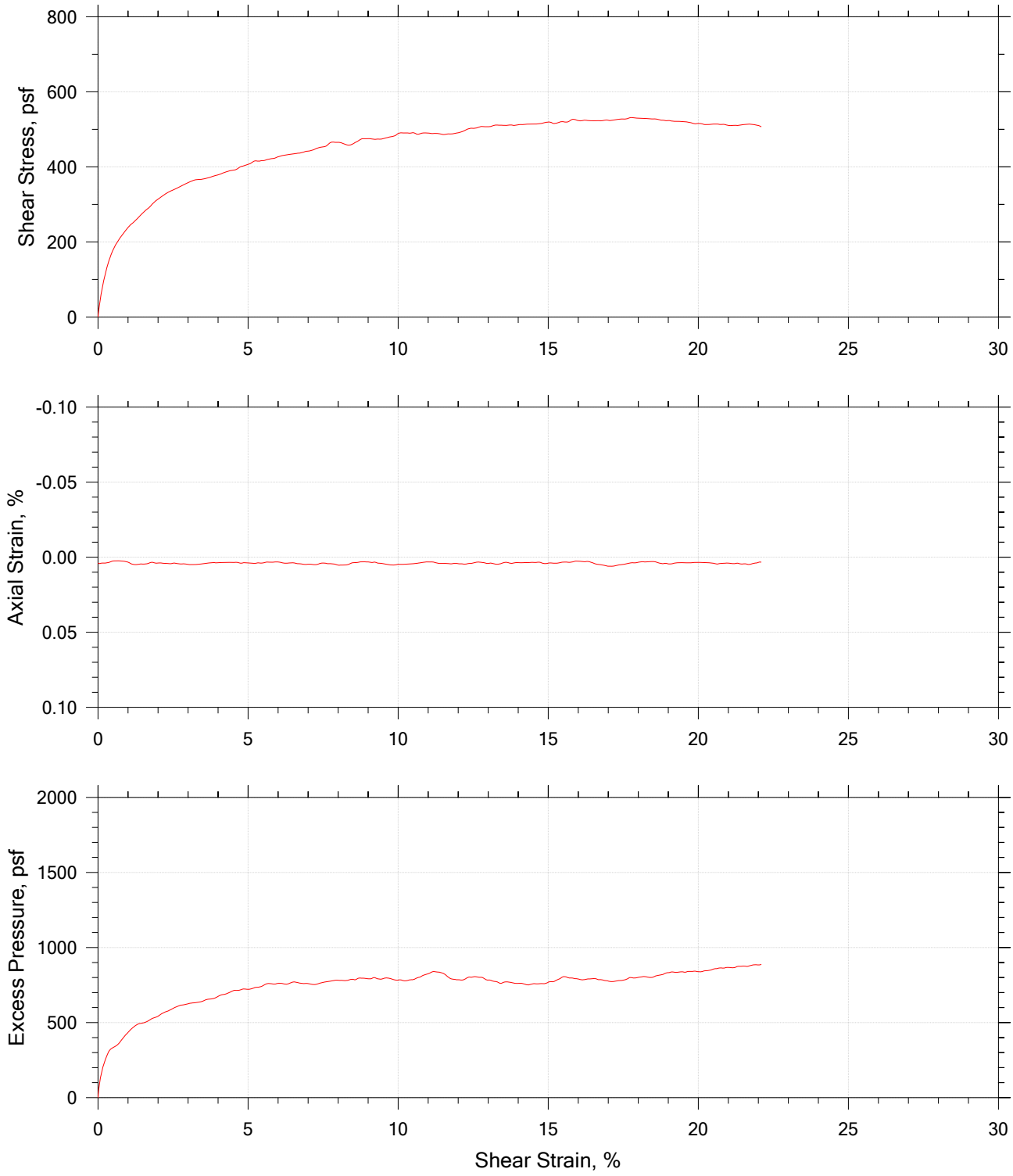
Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-2				
Initial Moisture Content, %	54.9				
Initial Dry Density, pcf	63.8				
Nominal Rate of Shear Strain, %/hr	5.0				
Vertical Consolidation Stress, psf	2,000				
Final Moisture Content, %	51.7				
Measured Peak Shear Stress, psf	529				
Shear Strain at Peak Shear Stress, %	18.2				
Membrane Correction, psf	52				
Corrected Peak Shear Stress, psf	477				
S_u / σ'_{vc}	0.24				

Comments:

Tested By: md Checked By: njh

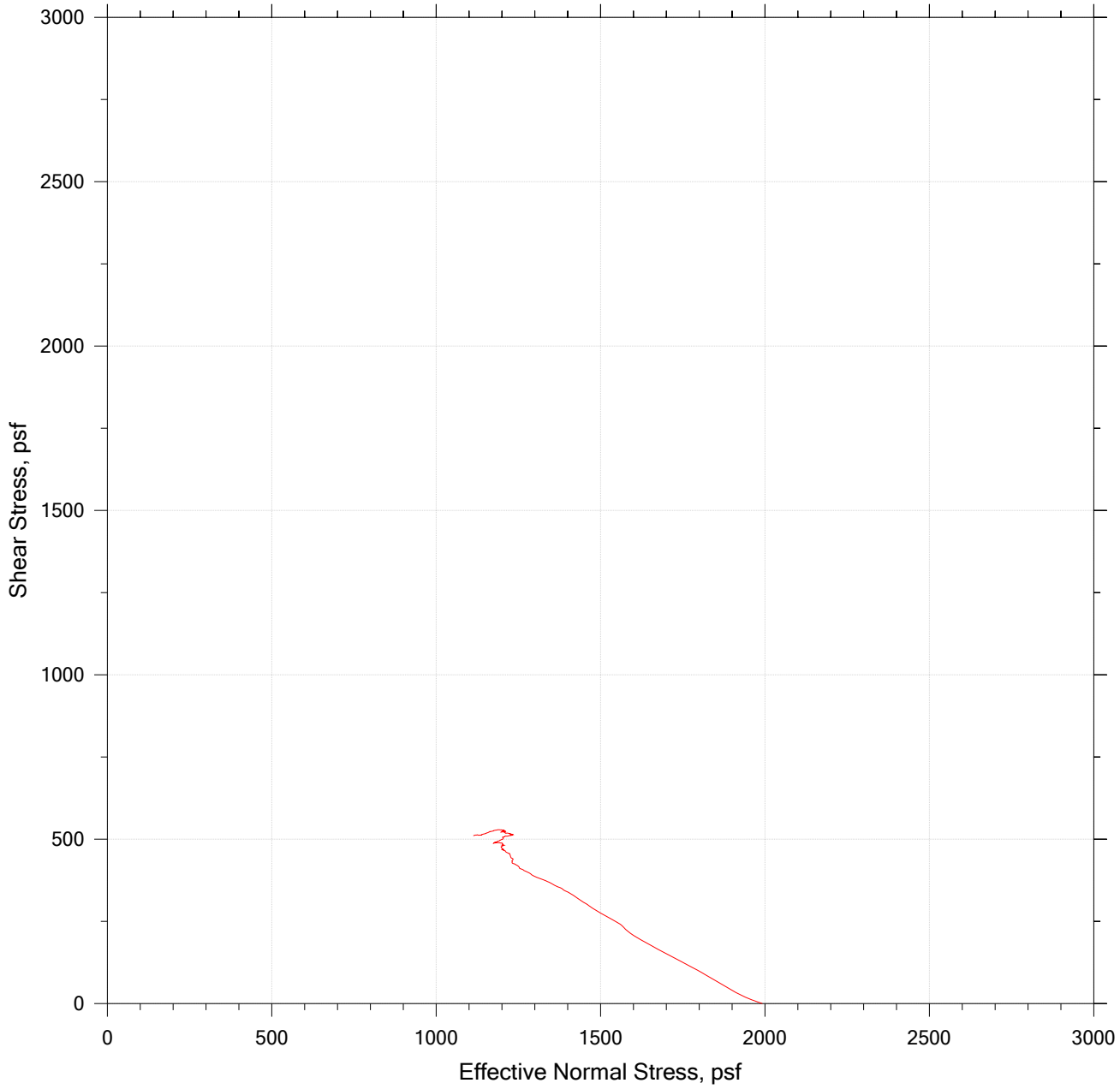
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

DIRECT SIMPLE SHEAR TEST



GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/07/18	Depth: 15.5-17.5 ft
	Test No.: DSS-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System GG		

DIRECT SIMPLE SHEAR TEST



GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/07/18	Depth: 15.5-17.5 ft
	Test No.: DSS-2	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System GG		

GeoTesting EXPRESS

Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client:	Golder Associates	GTX#:	308573
Project Name:	NHDOT Durham	Test Date:	9/6/18
Project Location:	Durham, NH		

Boring ID: B301
Sample ID: U-4
Depth, ft: 35-37

Visual Description: Moist, olive 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^2, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: density: Extruded from tube, cut, trimmed and placed into apparatus at as-received and moisture.

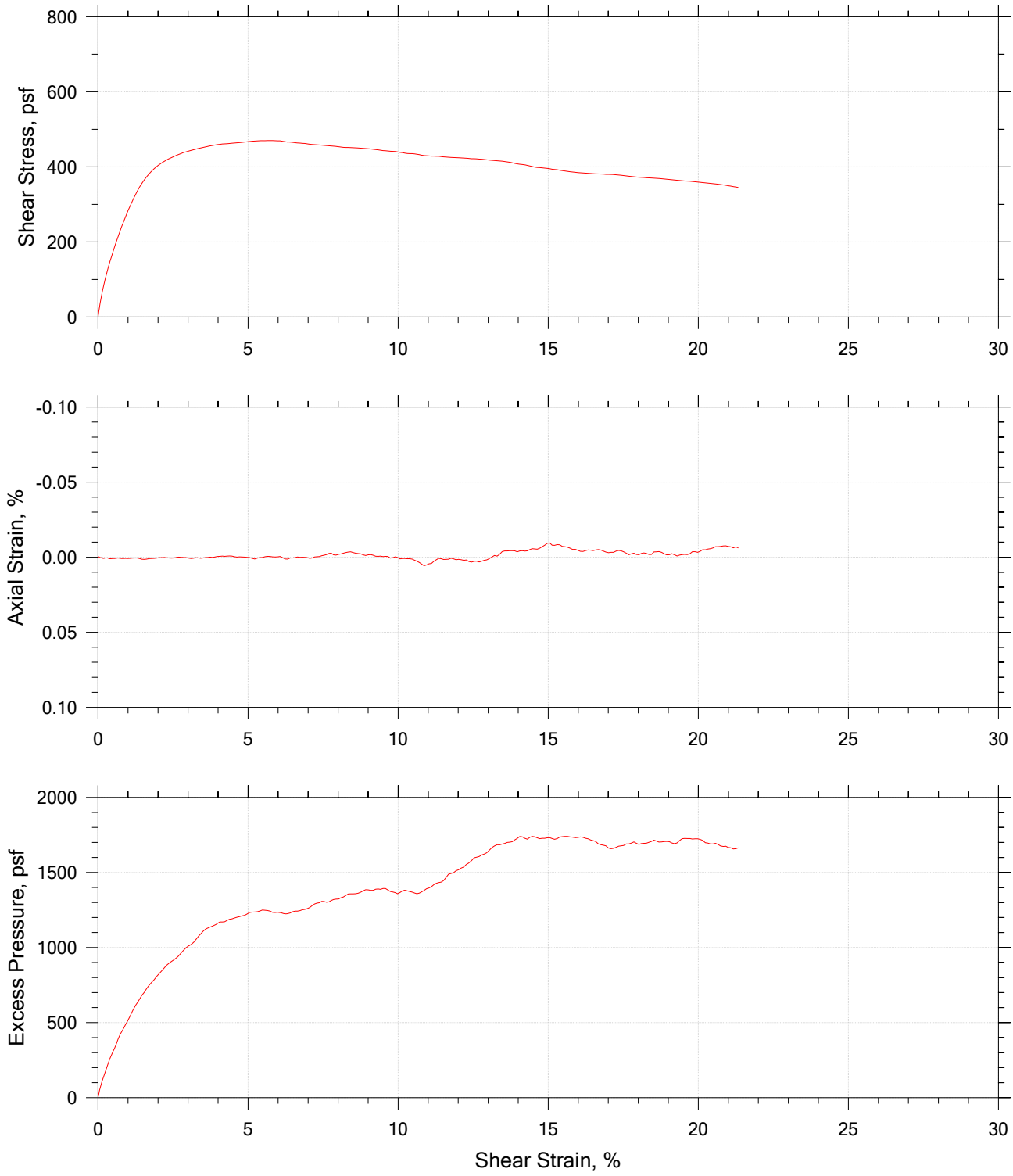
Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-1				
Initial Moisture Content, %	47.9				
Initial Dry Density, pcf	70.2				
Nominal Rate of Shear Strain, %/hr	5.0				
Vertical Consolidation Stress, psf	3,000				
Final Moisture Content, %	47.7				
Measured Peak Shear Stress, psf	463				
Shear Strain at Peak Shear Stress, %	6.5				
Membrane Correction, psf	50				
Corrected Peak Shear Stress, psf	413				
S_u / σ'_{vc}	0.14				

Comments:

Tested By: md Checked By: njh

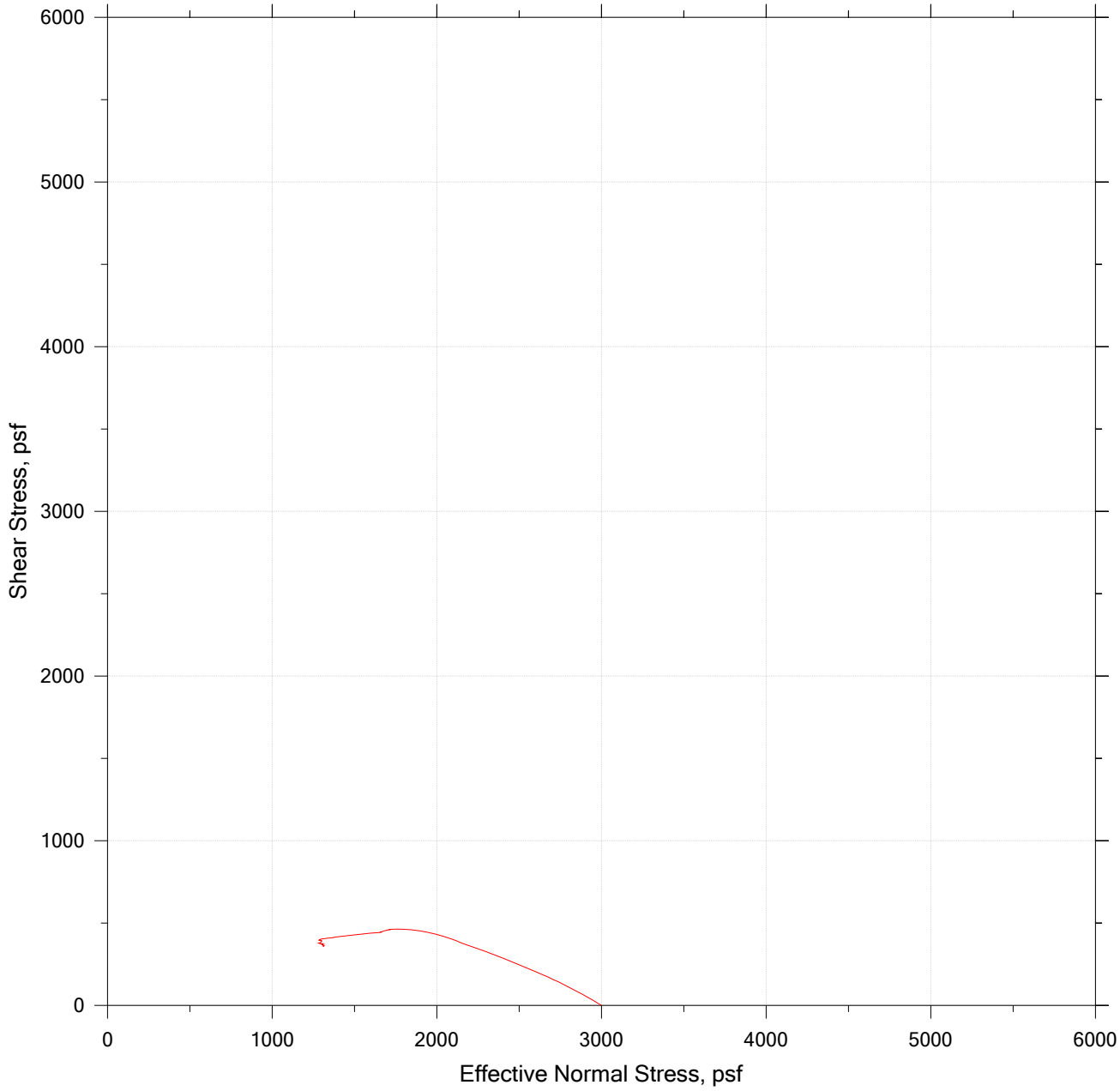
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

DIRECT SIMPLE SHEAR TEST



Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
Boring No.: B301	Tested By: md	Checked By: njh
Sample No.: U-4	Test Date: 09/06/18	Depth: 35-37 ft
Test No.: DSS-1	Sample Type: intact	Elevation: ---
Description: Moist, olive gray clay		
Remarks: System GG		

DIRECT SIMPLE SHEAR TEST



GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-4	Test Date: 09/06/18	Depth: 35-37 ft
	Test No.: DSS-1	Sample Type: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System GG		

GeoTesting EXPRESS

Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client:	Golder Associates	GTX#:	308573
Project Name:	NHDOT Durham	Test Date:	9/10/18
Project Location:	Durham, NH		

Boring ID: B301
Sample ID: U-7
Depth, ft: 65-67

Visual Description: Wet, olive 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^2, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: density: Extruded from tube, cut, trimmed and placed into apparatus at as-received and moisture.

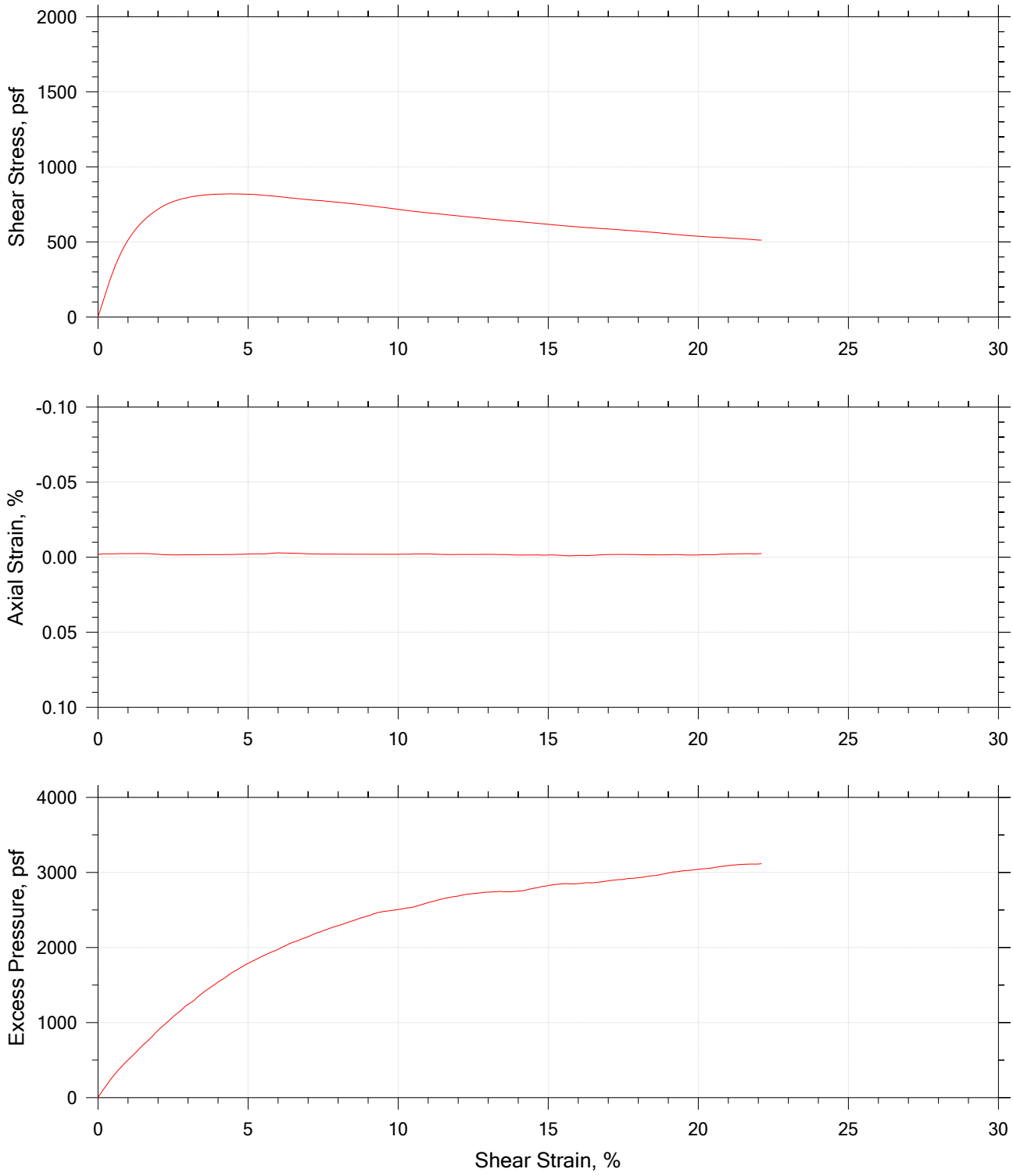
Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-4				
Initial Moisture Content, %	46.2				
Initial Dry Density, pcf	72.2				
Nominal Rate of Shear Strain, %/hr	5.0				
Vertical Consolidation Stress, psf	4,500				
Final Moisture Content, %	44.1				
Measured Peak Shear Stress, psf	820				
Shear Strain at Peak Shear Stress, %	4.2				
Membrane Correction, psf	30				
Corrected Peak Shear Stress, psf	790				
S_u / σ'_{vc}	0.18				

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.

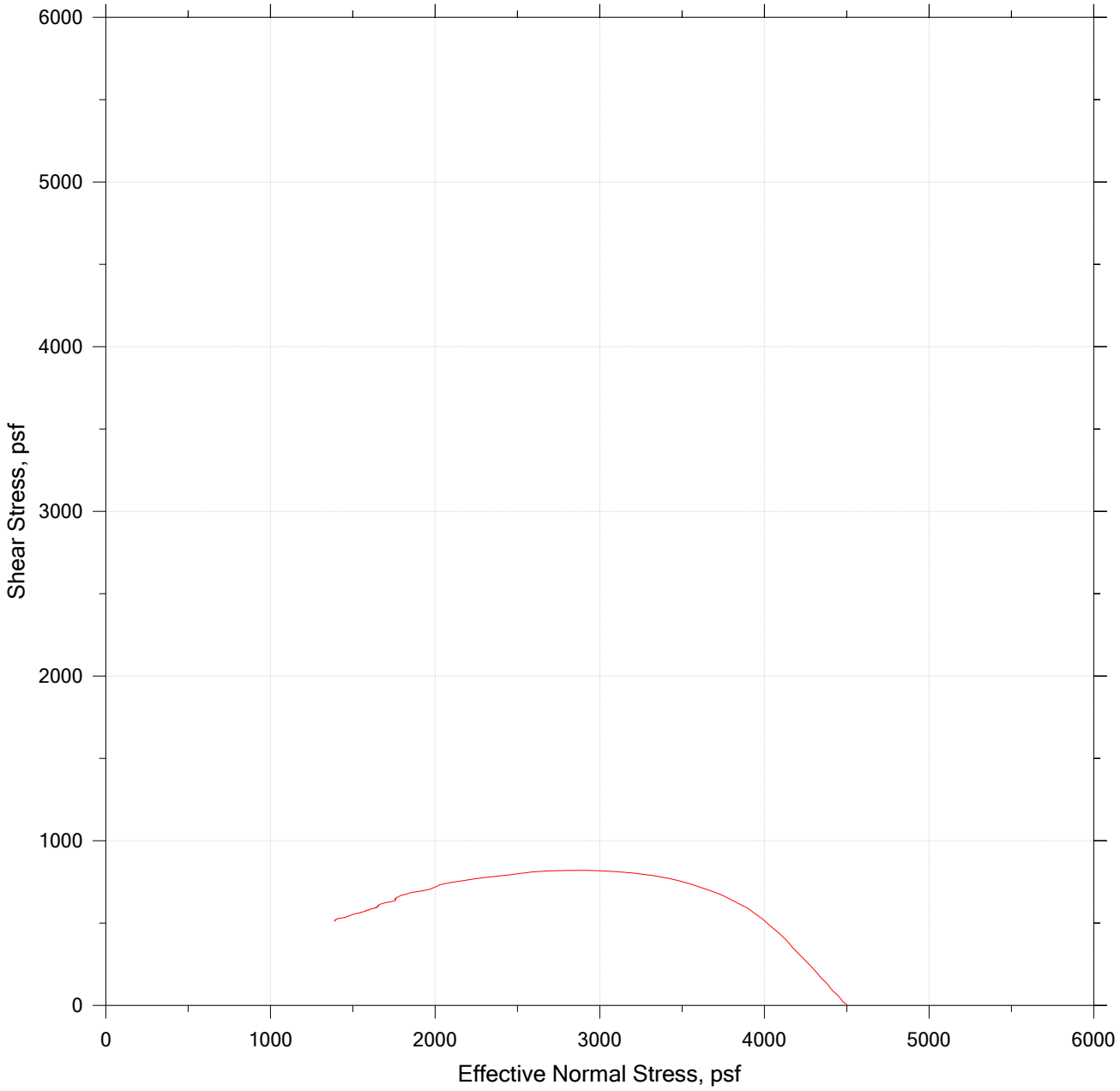
DIRECT SIMPLE SHEAR TEST



GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/10/18	Depth: 65-67 ft
	Test No.: DSS-4	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System HH		

Page 2 of 3

DIRECT SIMPLE SHEAR TEST



GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/10/18	Depth: 65-67 ft
	Test No.: DSS-4	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System HH		
			Page 3 of 3

GeoTesting EXPRESS

Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils by ASTM D6528

Client:	Golder Associates	GTX#:	308573
Project Name:	NHDOT Durham	Test Date:	9/10/18
Project Location:	Durham, NH		

Boring ID: B303
Sample ID: U-3
Depth, ft: 20.5-22.5

Visual Description: Moist, dark gray silt

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^2, soil height = 1 inch. Stacked rings used. Set up included porous stones with pins.

Test Condition: Inundated prior to consolidation

Sample Type and Preparation: density: Extruded from tube, cut, trimmed and placed into apparatus at as-received and moisture.

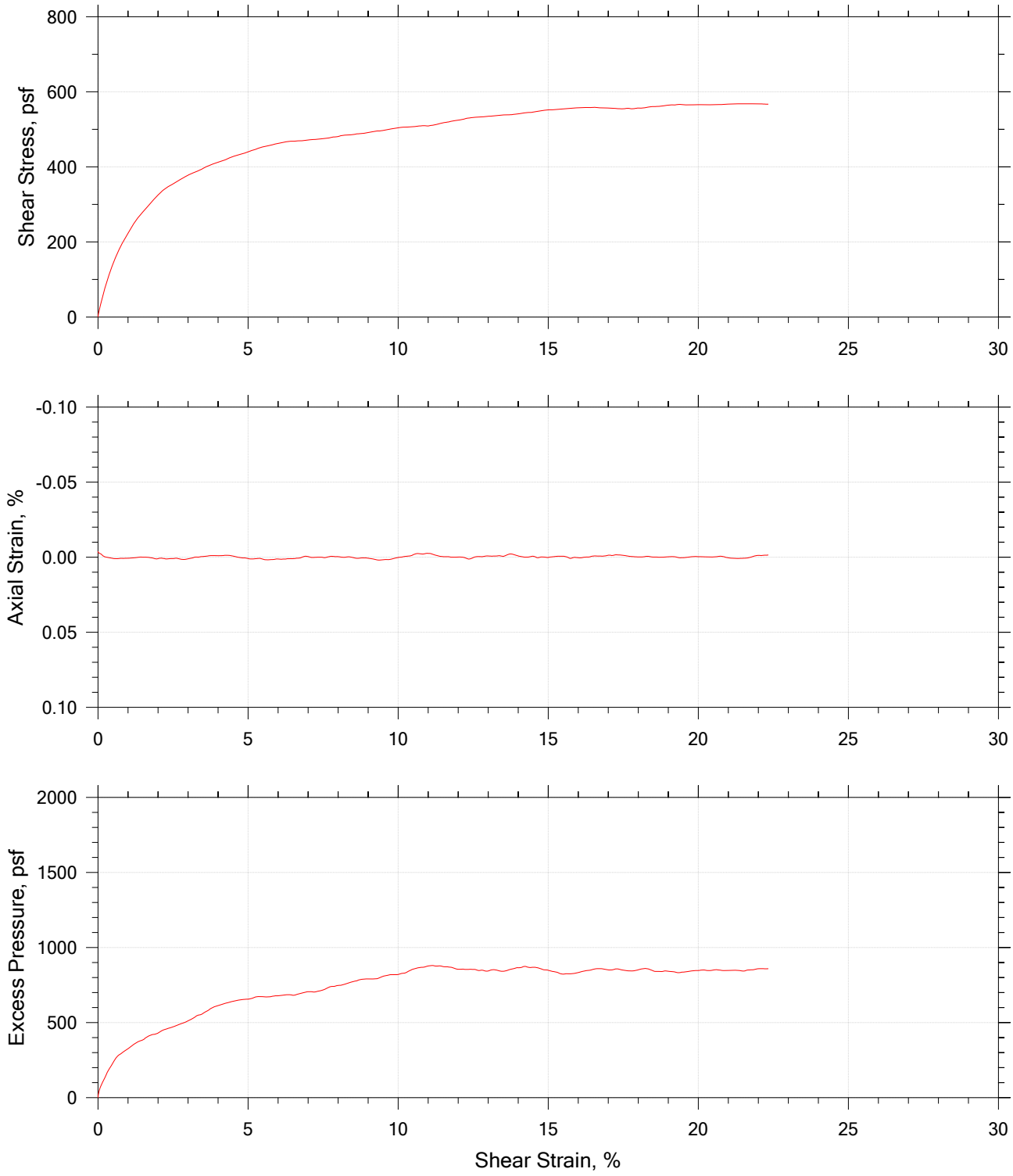
Parameter	Point 1	Point 2	Point 3	Point 4	Point 5
Test No.	DSS-3				
Initial Moisture Content, %	80.0				
Initial Dry Density, pcf	48.9				
Nominal Rate of Shear Strain, %/hr	5.0				
Vertical Consolidation Stress, psf	2,000				
Final Moisture Content, %	74.1				
Measured Peak Shear Stress, psf	566				
Shear Strain at Peak Shear Stress, %	20				
Membrane Correction, psf	49				
Corrected Peak Shear Stress, psf	517				
S_u / σ'_{vc}	0.26				

Comments:

Tested By: md Checked By: njh

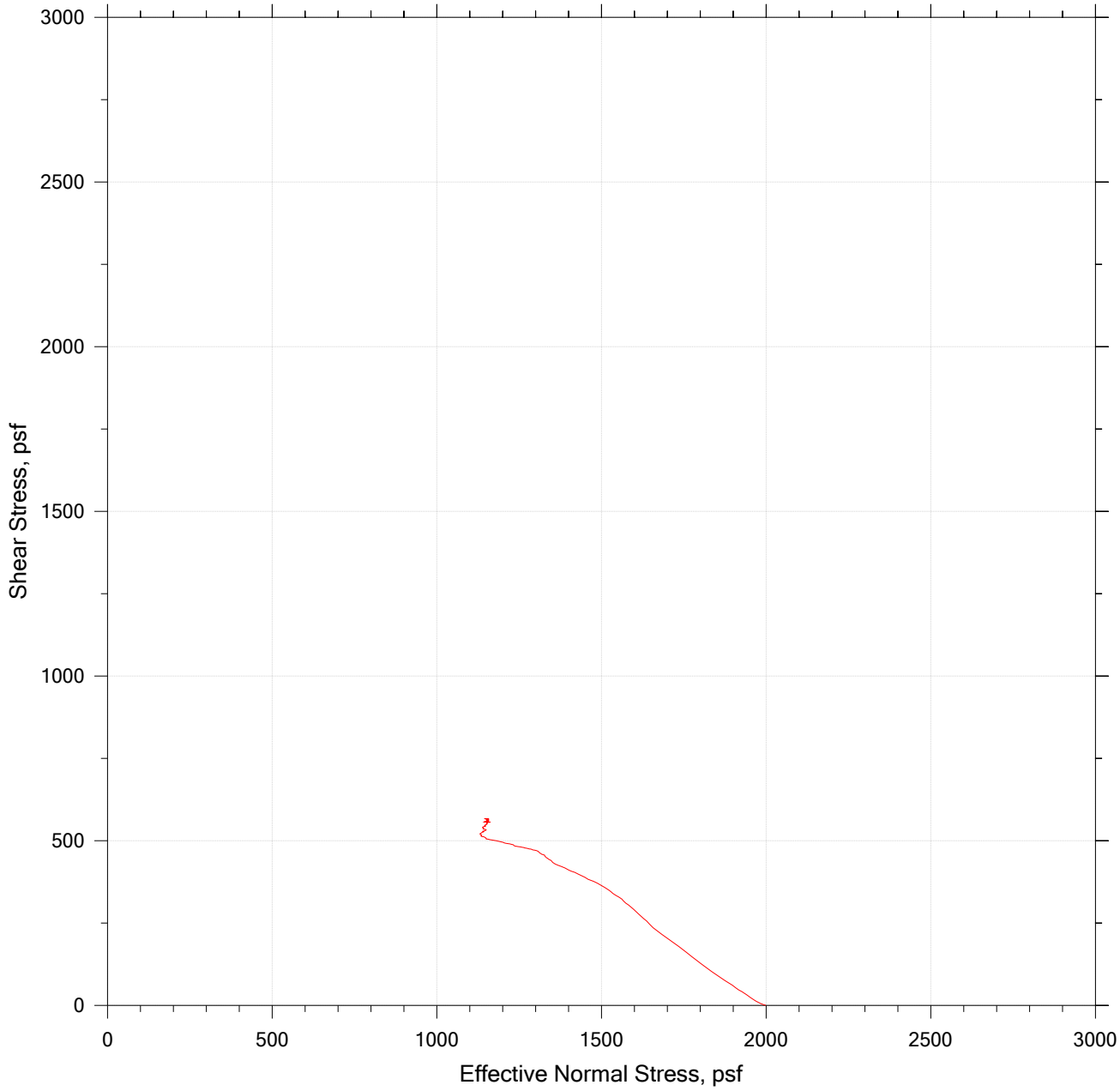
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

DIRECT SIMPLE SHEAR TEST



GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/10/18	Depth: 20.5-22.5 ft
	Test No.: DSS-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System GG		

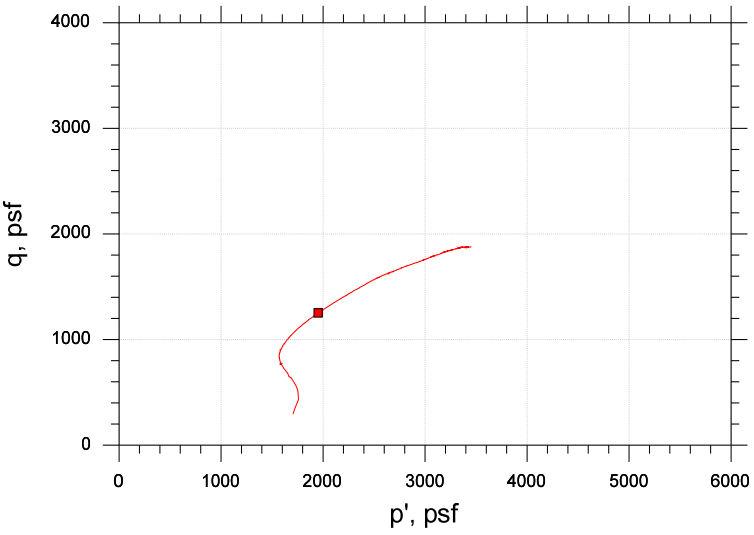
DIRECT SIMPLE SHEAR TEST

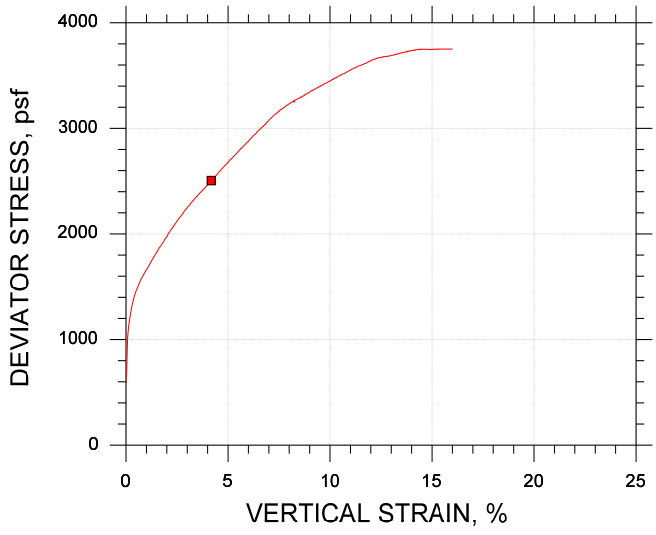


GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/10/18	Depth: 20.5-22.5 ft
	Test No.: DSS-3	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System GG		
			Page 3 of 3

Client: Golder Associates	
Project Name: NHDOT Durham	
Project Location: Durham, NH	
Project Number: GTX-308573	
Tested By: md	Checked By: njh
Boring ID: B301	
Preparation: intact	
Description: Moist, olive gray clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.75

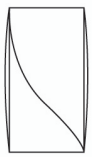
CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		■			
Sample ID		U-3			
Depth, ft		20.6-22.6 ft			
Test Number		CKOU-2-1			
Initial	Height, in	4.290			
	Diameter, in	1.930			
	Moisture Content (from Cuttings), %	28.1			
	Dry Density, pcf	96.8			
	Saturation (Wet Method), %	100.0			
	Void Ratio	0.773			
Before Shear	Moisture Content, %	27.1			
	Dry Density, pcf	98.4			
	Cross-sectional Area (Method A), in²	2.934			
	Saturation, %	100.0			
	Void Ratio	0.744			
	Back Pressure, psf	2.174e+004			
Vertical Effective Consolidation Stress, psf		1972.			
Horizontal Effective Consolidation Stress, psf		1412.			
Vertical Strain after Consolidation, %		2.084			
Volumetric Strain after Consolidation, %		2.078			
Time to 50% Consolidation, min		---			
Shear Strength, psf		1252.			
Strain at Failure, %		4.18			
Strain Rate, %/min		0.01600			
Deviator Stress at Failure, psf		2505.			
Effective Minor Principal Stress at Failure, psf		699.0			
Effective Major Principal Stress at Failure, psf		3204.			
B-Value		0.95			

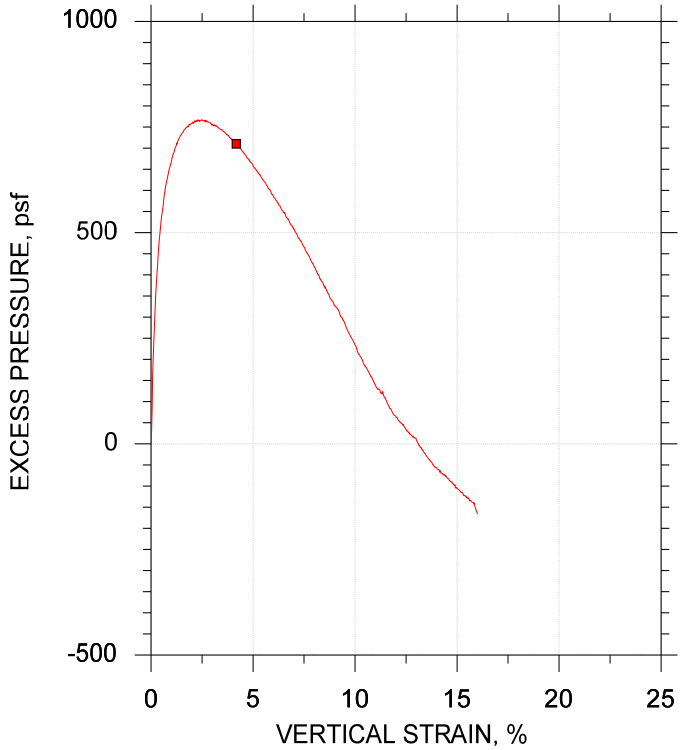
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

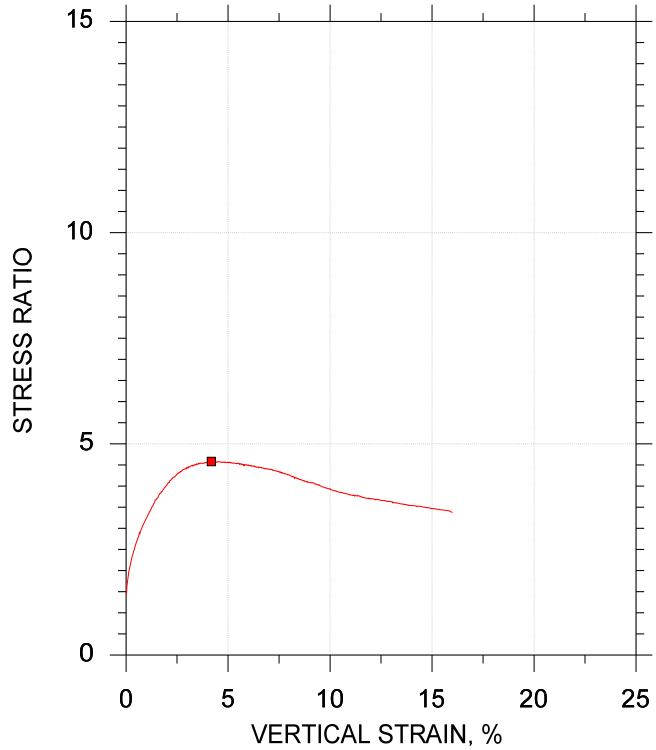


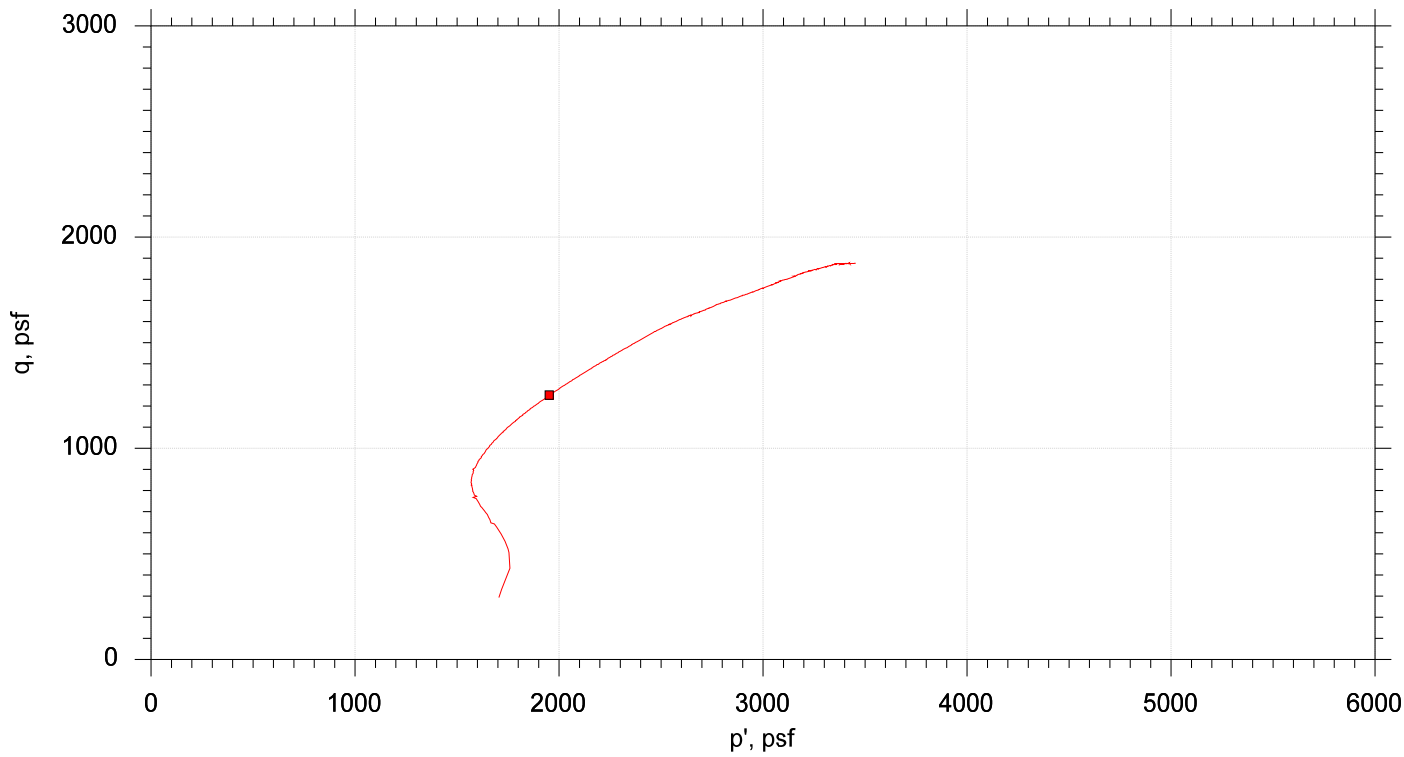
Remarks:

System Q, Ko = 0.72

CONSOLIDATED UNDRAINED TRIAXIAL TEST







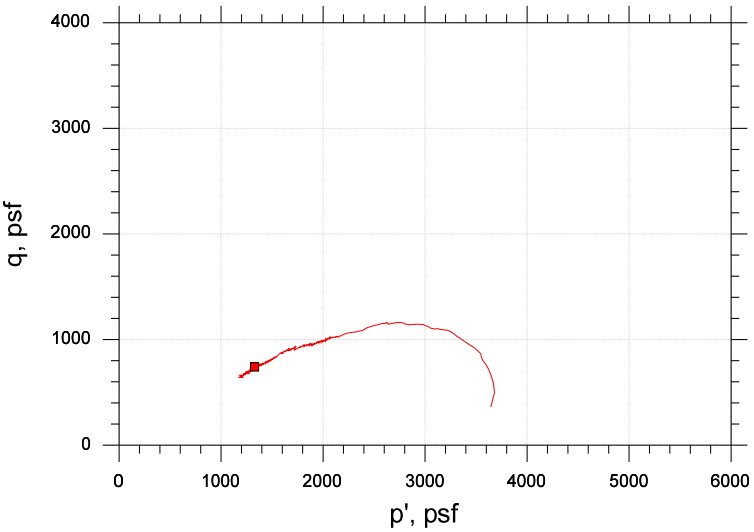
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U-3	CKOU-2-1	20.6-22.6 ft	md	09/07/18	njh	9/14/18	308573-CKOU-2-1n.dat

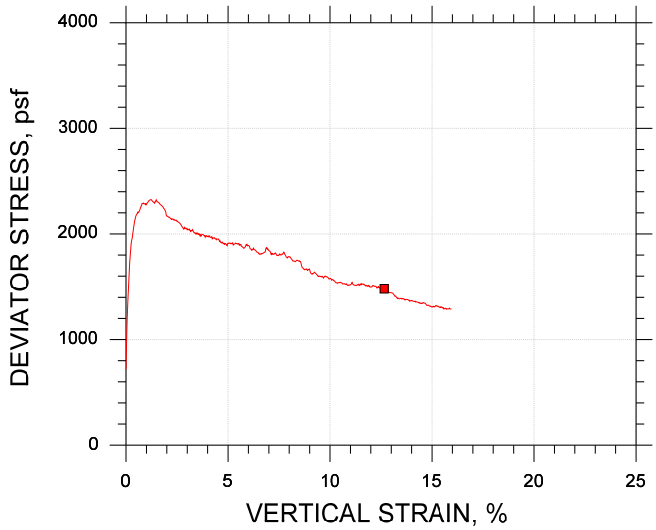
GeoTesting EXPRESS

Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
Boring No.: B301	Sample Type: intact	
Description: Moist, olive gray clay		
Remarks: System Q, Ko = 0.72		

Client: Golder Associates	
Project Name: NHDOT Durham	
Project Location: Durham, NH	
Project Number: GTX-308573	
Tested By: md	Checked By: njh
Boring ID: B301	
Preparation: intact	
Description: Wet, olive gray clay	
Classification: Lean CLAY	
Group Symbol: CL	
Liquid Limit: 30	Plastic Limit: 19
Plasticity Index: 11	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST





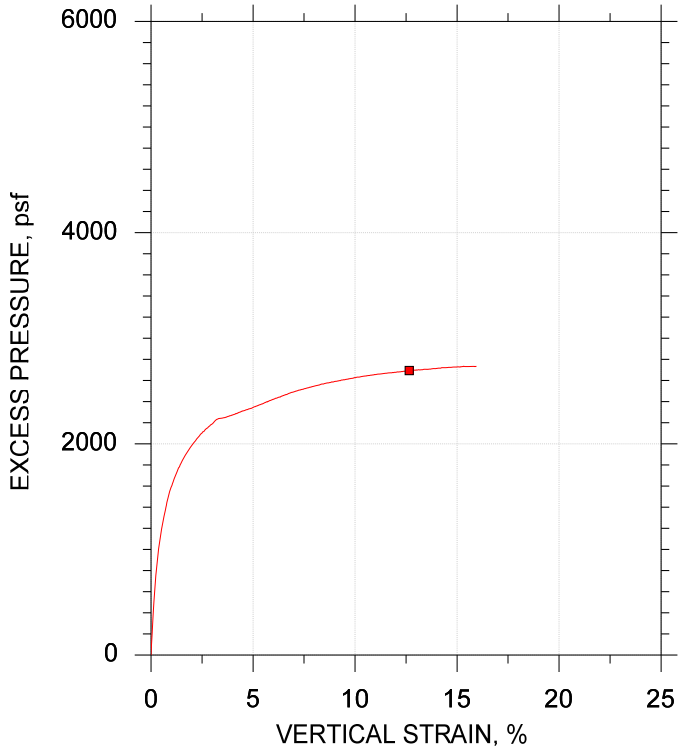
Symbol		■			
Sample ID		U-6			
Depth, ft		55-57 ft			
Test Number		CKOU-1-1			
Initial	Height, in	4.600			
	Diameter, in	2.040			
	Moisture Content (from Cuttings), %	39.4			
	Dry Density, pcf	80.2			
	Saturation (Wet Method), %	96.5			
	Void Ratio	1.10			
Before Shear	Moisture Content, %	39.0			
	Dry Density, pcf	82.0			
	Cross-sectional Area (Method A), in²	3.264			
	Saturation, %	100.0			
	Void Ratio	1.05			
	Back Pressure, psf	1.310e+004			
Vertical Effective Consolidation Stress, psf		3979.			
Horizontal Effective Consolidation Stress, psf		3284.			
Vertical Strain after Consolidation, %		2.104			
Volumetric Strain after Consolidation, %		2.107			
Time to 50% Consolidation, min		---			
Shear Strength, psf		740.7			
Strain at Failure, %		12.7			
Strain Rate, %/min		0.01600			
Deviator Stress at Failure, psf		1481.			
Effective Minor Principal Stress at Failure, psf		588.3			
Effective Major Principal Stress at Failure, psf		2070.			
B-Value		0.95			

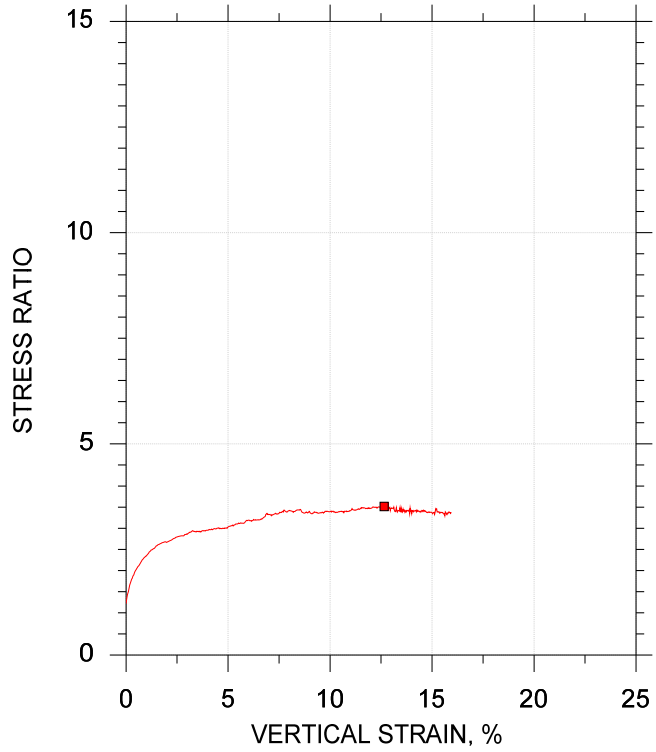
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Atterberg Limits determined by ASTM D4318.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

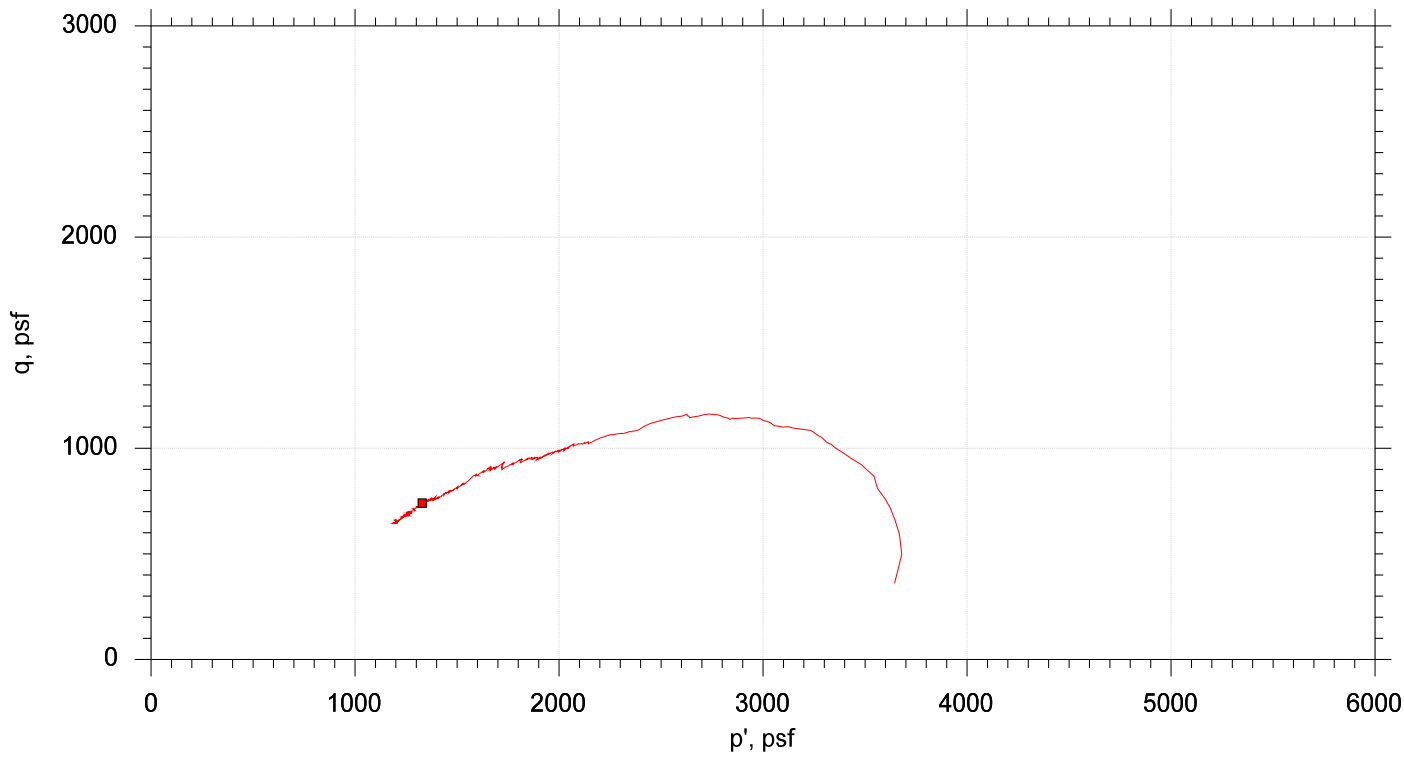
Remarks:

System Q, Ko = 0.82

CONSOLIDATED UNDRAINED TRIAXIAL TEST







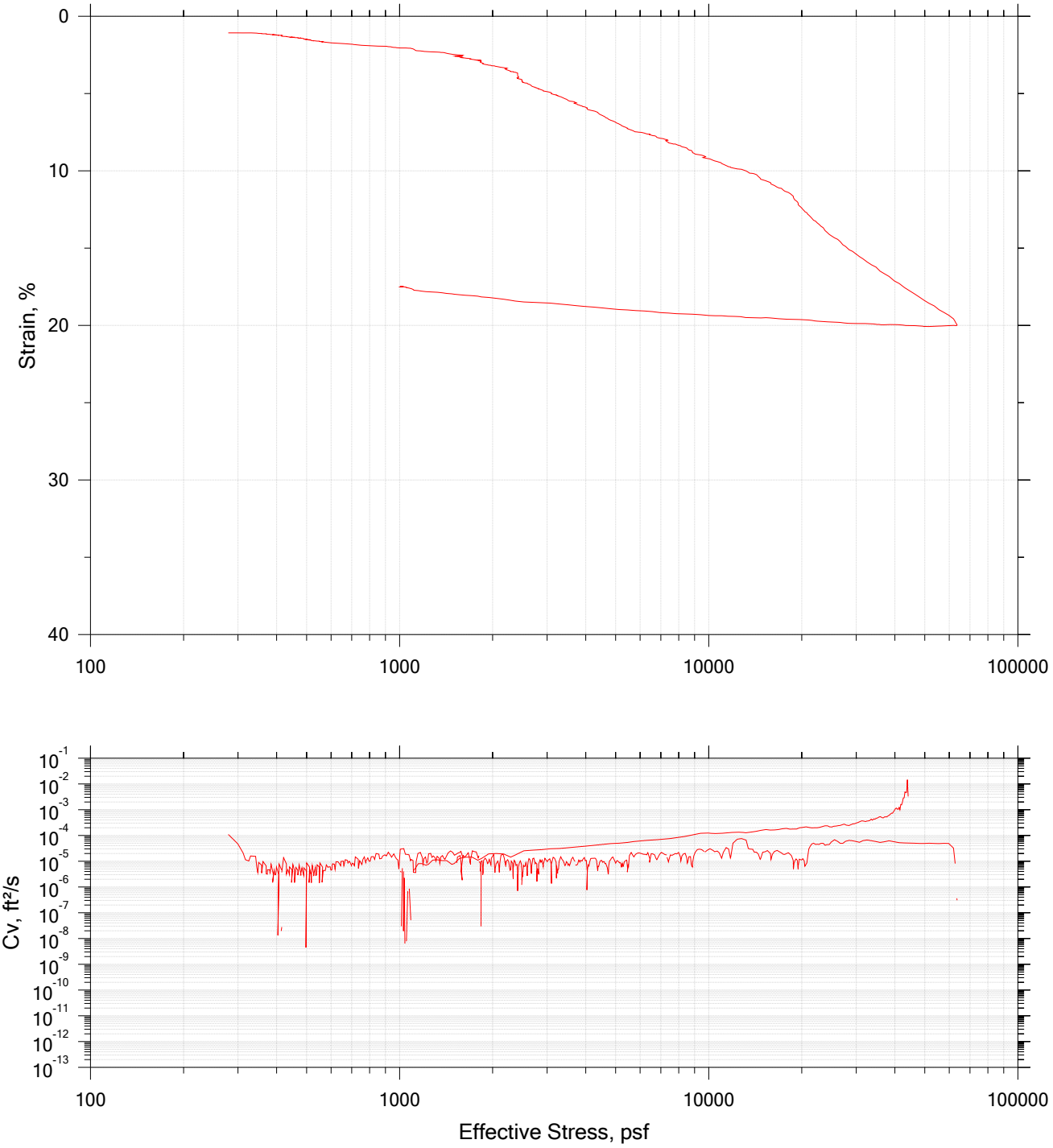
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U-6	CKOU-1-1	55-57 ft	md	9/4/18	njh	9/14/18	308573-CKOU-1-1n.dat

GeoTesting EXPRESS

Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
Boring No.: B301	Sample Type: intact	
Description: Wet, olive gray clay		
Remarks: System Q, Ko = 0.82		

CRC TEST

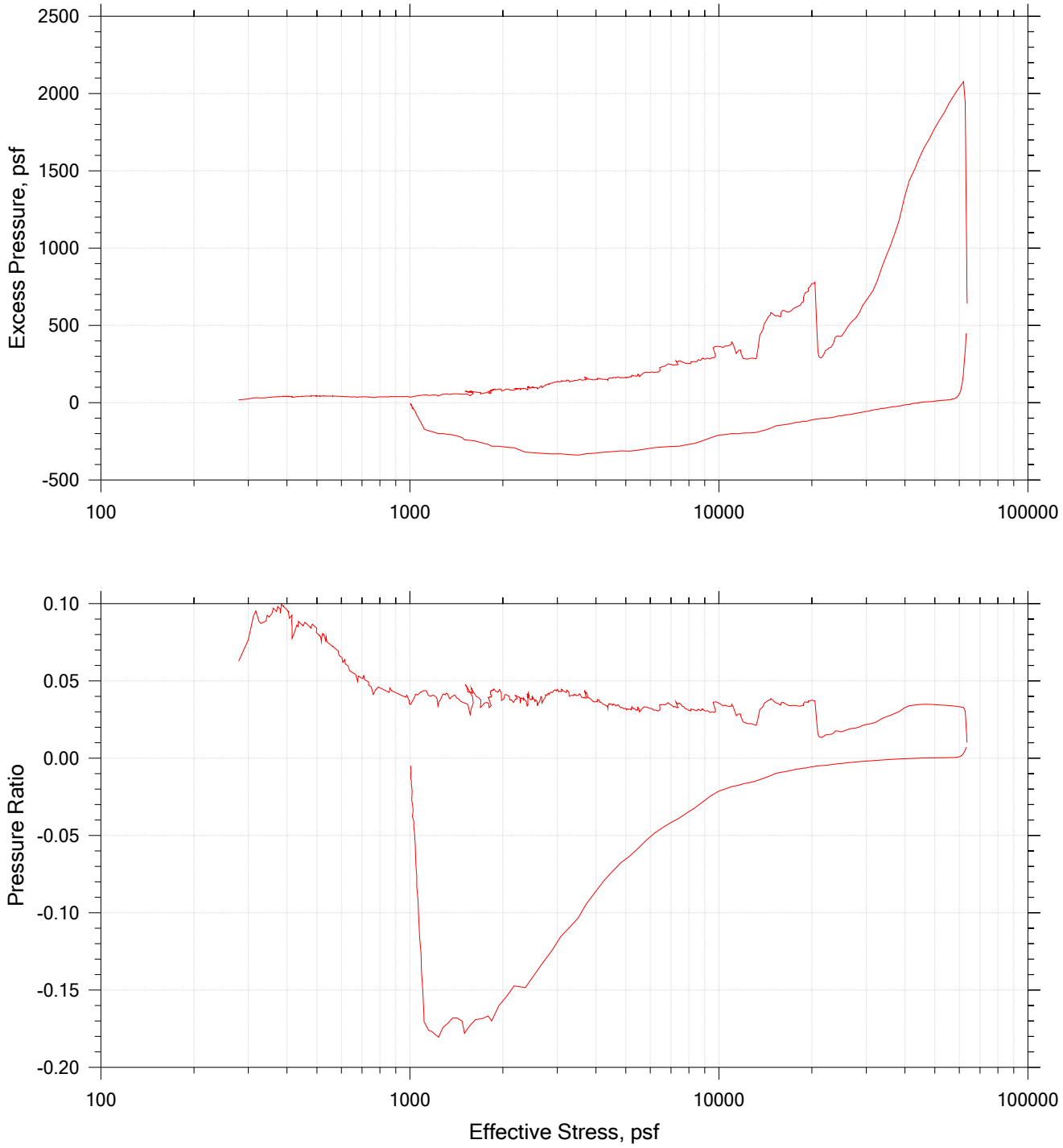
Summary Curves



GeoTesting EXPRESS	Project Name: NHDOT Durham	Location: Durham, NH	Project Number: GTX-308573
	Boring Number: B301	Tester: md	Checker: njh
	Sample Number: U-4	Test Date: 09/06/18	Depth: 35-37 ft
	Test Number: CRC-1	Preparation: intact	Elevation: ---
	Description: Moist, olive gray clay		
	Remarks: System W		
			Page 1 of 3

CRC TEST

Pressure Curves



Project Name: NHDOT Durham	Location: Durham, NH	Project Number: GTX-308573
Boring Number: B301	Tester: md	Checker: njh
Sample Number: U-4	Test Date: 09/06/18	Depth: 35-37 ft
Test Number: CRC-1	Preparation: intact	Elevation: ---
Description: Moist, olive gray clay		
Remarks: System W		

CRC TEST

Specimen Diameter: 2.50 in	Estimated: 2.73	Liquid Limit: Unknown
Initial Height: 1.00 in	Initial Void Ratio: 0.975	Plastic Limit: Unknown
Final Height: 0.85 in	Final Void Ratio: 0.678	Plasticity Index: Unknown

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	A-1539	RING		D-1292
Mass Container, gm	8.39	111.35	111.35	8.77
Mass Container + Wet Soil, gm	107.57	262.26	250.32	147.85
Mass Container + Dry Soil, gm	82.37	222.68	222.68	120.19
Mass Dry Soil, gm	73.98	111.33	111.33	111.42
Water Content, %	34.06	35.55	24.82	24.82
Void Ratio	---	0.97	0.68	---
Degree of Saturation, %	---	99.68	100.00	---
Dry Unit Weight, pcf	---	86.403	101.65	---

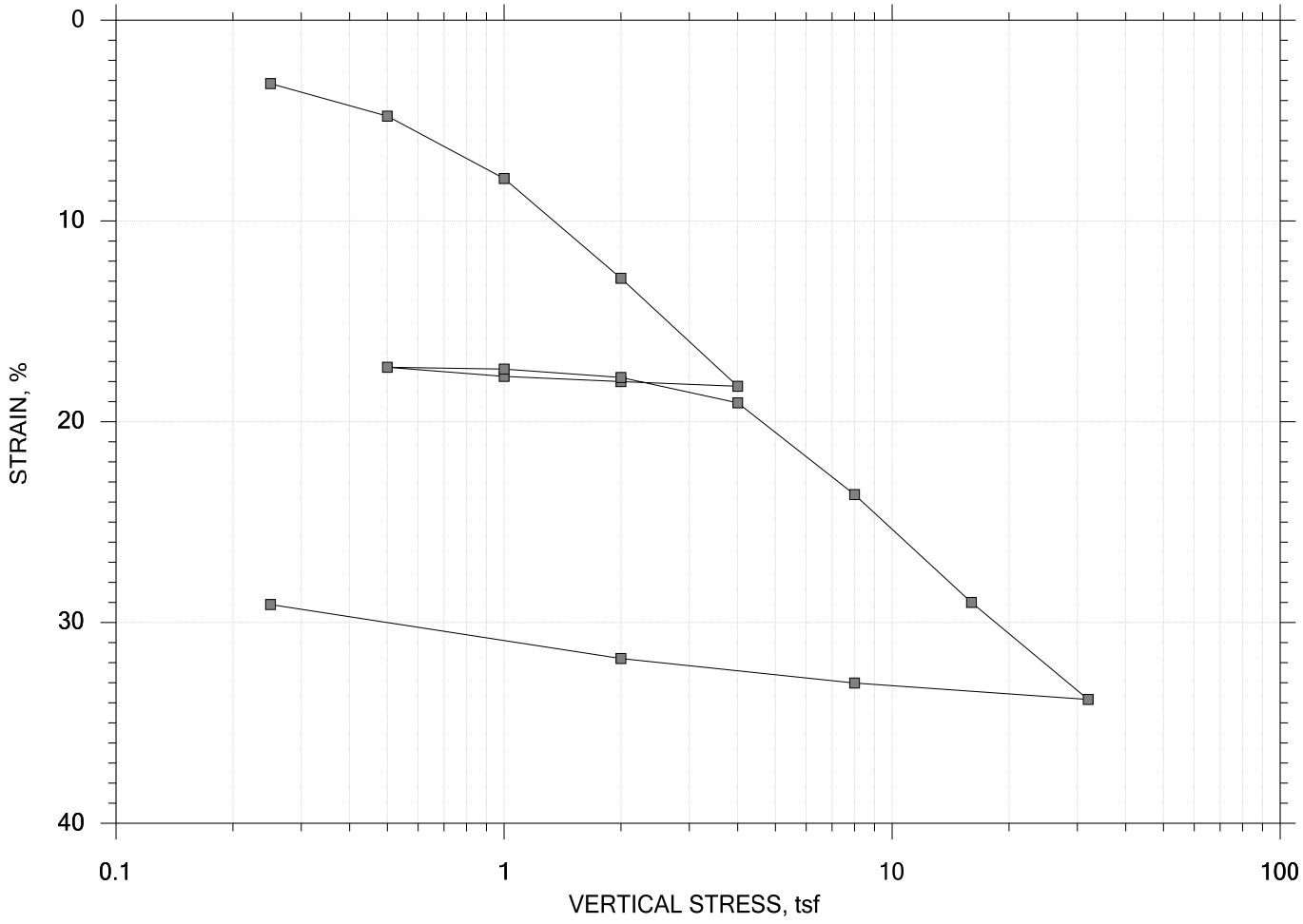
Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the spec.

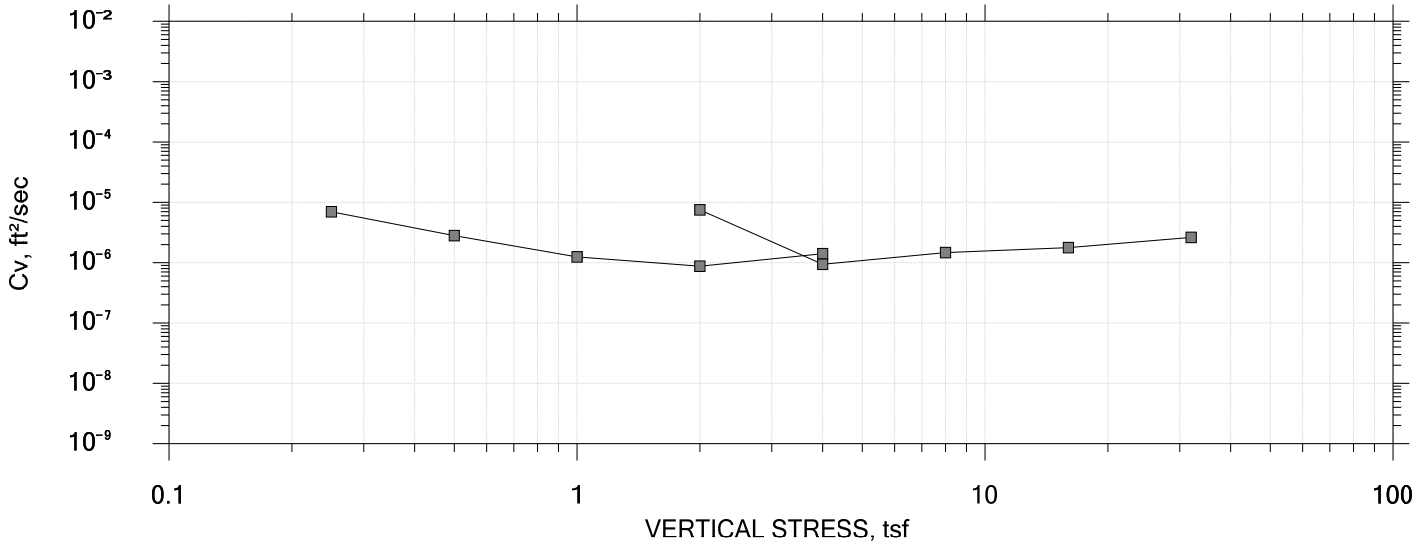
GeoTesting EXPRESS

Project Name: NHDOT Durham	Location: Durham, NH	Project Number: GTX-308573
Boring Number: B301	Tester: md	Checker: njh
Sample Number: U-4	Test Date: 09/06/18	Depth: 35-37 ft
Test Number: CRC-1	Preparation: intact	Elevation: ---
Description: Moist, olive gray clay		
Remarks: System W		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

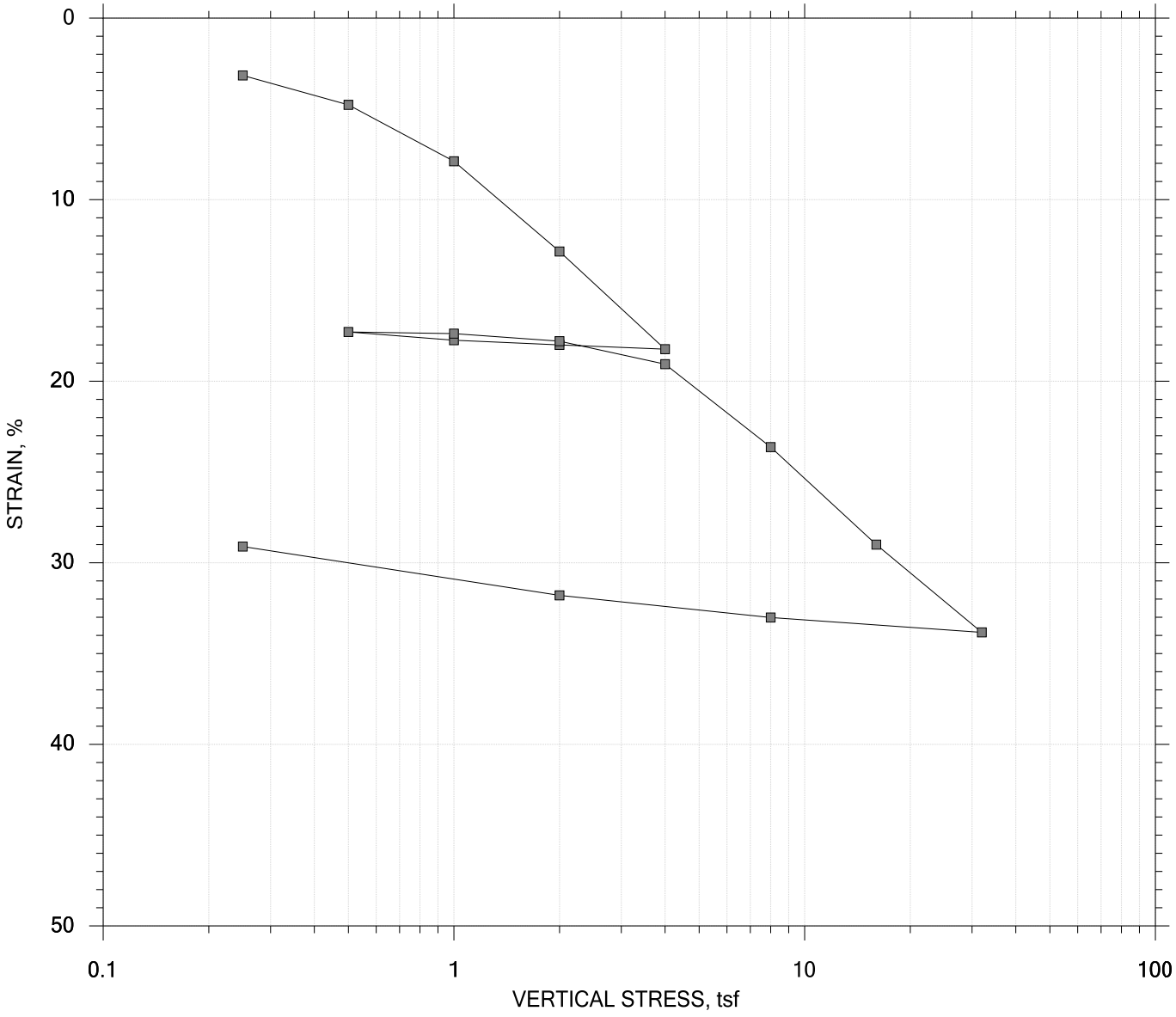




GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		
	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, %	56.49	30.12
Preconsolidation Stress: ---				Dry Unit Weight, pcf	66.033	93.004
Compression Ratio: ---				Saturation, %	98.19	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.55	0.81
LL: 59	PL: 35	PI: 24	GS: 2.70			

GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B301
Sample No.: U-2
Test No.: IP-2

Location: Durham, NH
Tested By: md
Test Date: 09/06/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 15.5-17.5 ft
Elevation: ---

Soil Description: Moist, dark gray silt
Remarks: System V

Estimated Specific Gravity: 2.70
Initial Void Ratio: 1.55
Final Void Ratio: 0.814

Liquid Limit: 59
Plastic Limit: 35
Plasticity Index: 24

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.71 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	D-1732	RING		C-318
Wt. Container + Wet Soil, gm	124.57	244.81	222.37	121.21
Wt. Container + Dry Soil, gm	85.970	196.75	196.75	95.150
Wt. Container, gm	8.6400	111.66	111.66	8.6200
Wt. Dry Soil, gm	77.330	85.085	85.085	86.530
Water Content, %	49.92	56.49	30.12	30.12
Void Ratio	---	1.55	0.814	---
Degree of Saturation, %	---	98.19	100.00	---
Dry Unit Weight, pcf	---	66.033	93.004	---

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.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B301
Sample No.: U-2
Test No.: IP-2

Location: Durham, NH
Tested By: md
Test Date: 09/06/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 15.5-17.5 ft
Elevation: ---

Soil Description: Moist, dark gray silt
Remarks: System V

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.250	0.03153	1.47	3.15	5.099	4.66e-006	1.26e-001	1.59e-003
2	0.500	0.04777	1.43	4.78	12.996	1.74e-006	6.50e-002	3.05e-004
3	1.00	0.07880	1.35	7.88	24.031	8.96e-007	6.21e-002	1.50e-004
4	2.00	0.1285	1.23	12.9	26.584	7.42e-007	4.97e-002	9.94e-005
5	4.00	0.1823	1.09	18.2	15.284	1.15e-006	2.69e-002	8.30e-005
6	2.00	0.1800	1.09	18.0	2.464	6.68e-006	1.14e-003	2.05e-005
7	1.00	0.1774	1.10	17.7	14.229	1.16e-006	2.61e-003	8.19e-006
8	0.500	0.1728	1.11	17.3	253.010	6.60e-008	9.09e-003	1.62e-006
9	1.00	0.1737	1.11	17.4	0.000	0.00e+000	1.74e-003	0.00e+000
10	2.00	0.1779	1.10	17.8	4.699	3.55e-006	4.19e-003	4.01e-005
11	4.00	0.1906	1.07	19.1	21.625	7.55e-007	6.33e-003	1.29e-005
12	8.00	0.2363	0.951	23.6	14.001	1.08e-006	1.14e-002	3.34e-005
13	16.0	0.2900	0.814	29.0	9.902	1.35e-006	6.71e-003	2.43e-005
14	32.0	0.3383	0.690	33.8	6.034	1.91e-006	3.02e-003	1.56e-005
15	8.00	0.3301	0.711	33.0	1.844	5.90e-006	3.40e-004	5.41e-006
16	2.00	0.3179	0.742	31.8	12.536	8.94e-007	2.03e-003	4.90e-006
17	0.250	0.2911	0.811	29.1	94.007	1.26e-007	1.54e-002	5.23e-006

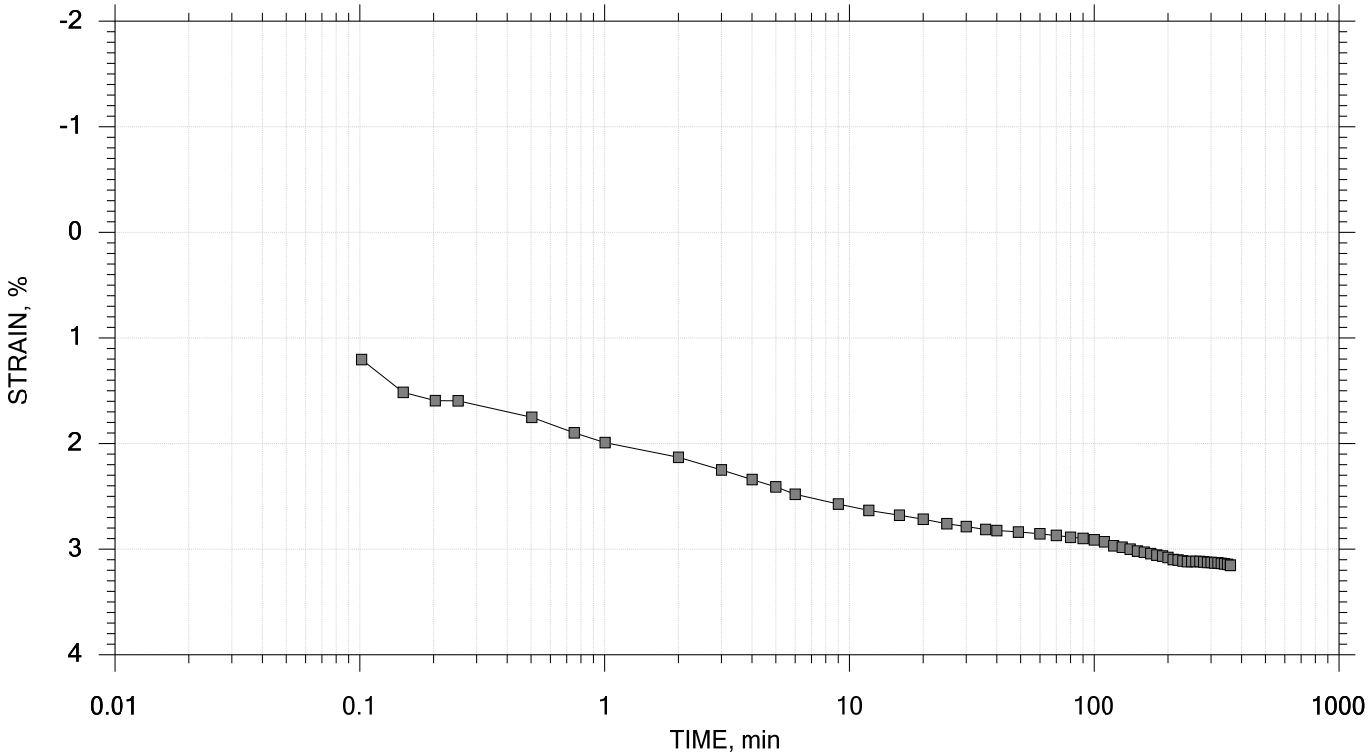
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.250	0.03153	1.47	3.15	0.000	0.00e+000	1.26e-001	0.00e+000	0.00e+000
2	0.500	0.04777	1.43	4.78	1.380	3.81e-006	6.50e-002	6.68e-004	0.00e+000
3	1.00	0.07880	1.35	7.88	3.043	1.64e-006	6.21e-002	2.75e-004	0.00e+000
4	2.00	0.1285	1.23	12.9	4.975	9.20e-007	4.97e-002	1.23e-004	0.00e+000
5	4.00	0.1823	1.09	18.2	2.647	1.54e-006	2.69e-002	1.11e-004	0.00e+000
6	2.00	0.1800	1.09	18.0	0.000	0.00e+000	1.14e-003	0.00e+000	0.00e+000
7	1.00	0.1774	1.10	17.7	1.846	2.08e-006	2.61e-003	1.47e-005	0.00e+000
8	0.500	0.1728	1.11	17.3	0.000	0.00e+000	9.09e-003	0.00e+000	0.00e+000
9	1.00	0.1737	1.11	17.4	0.000	0.00e+000	1.74e-003	0.00e+000	0.00e+000
10	2.00	0.1779	1.10	17.8	0.000	0.00e+000	4.19e-003	0.00e+000	0.00e+000
11	4.00	0.1906	1.07	19.1	0.000	0.00e+000	6.33e-003	0.00e+000	0.00e+000
12	8.00	0.2363	0.951	23.6	2.031	1.74e-006	1.14e-002	5.35e-005	0.00e+000
13	16.0	0.2900	0.814	29.0	1.658	1.87e-006	6.71e-003	3.38e-005	0.00e+000
14	32.0	0.3383	0.690	33.8	1.023	2.62e-006	3.02e-003	2.14e-005	0.00e+000
15	8.00	0.3301	0.711	33.0	0.000	0.00e+000	3.40e-004	0.00e+000	0.00e+000
16	2.00	0.3179	0.742	31.8	3.641	7.15e-007	2.03e-003	3.92e-006	0.00e+000
17	0.250	0.2911	0.811	29.1	21.636	1.27e-007	1.54e-002	5.28e-006	0.00e+000

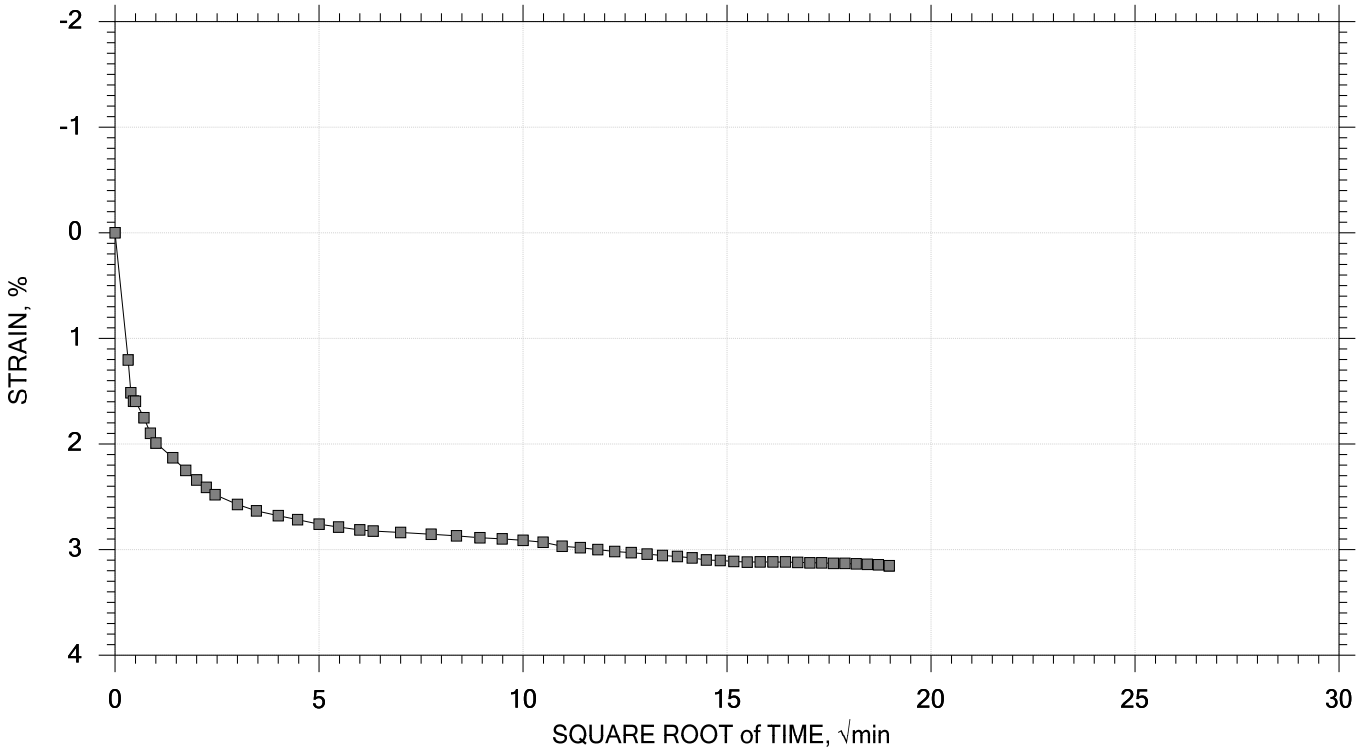
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 17

Stress: 0.25 tsf





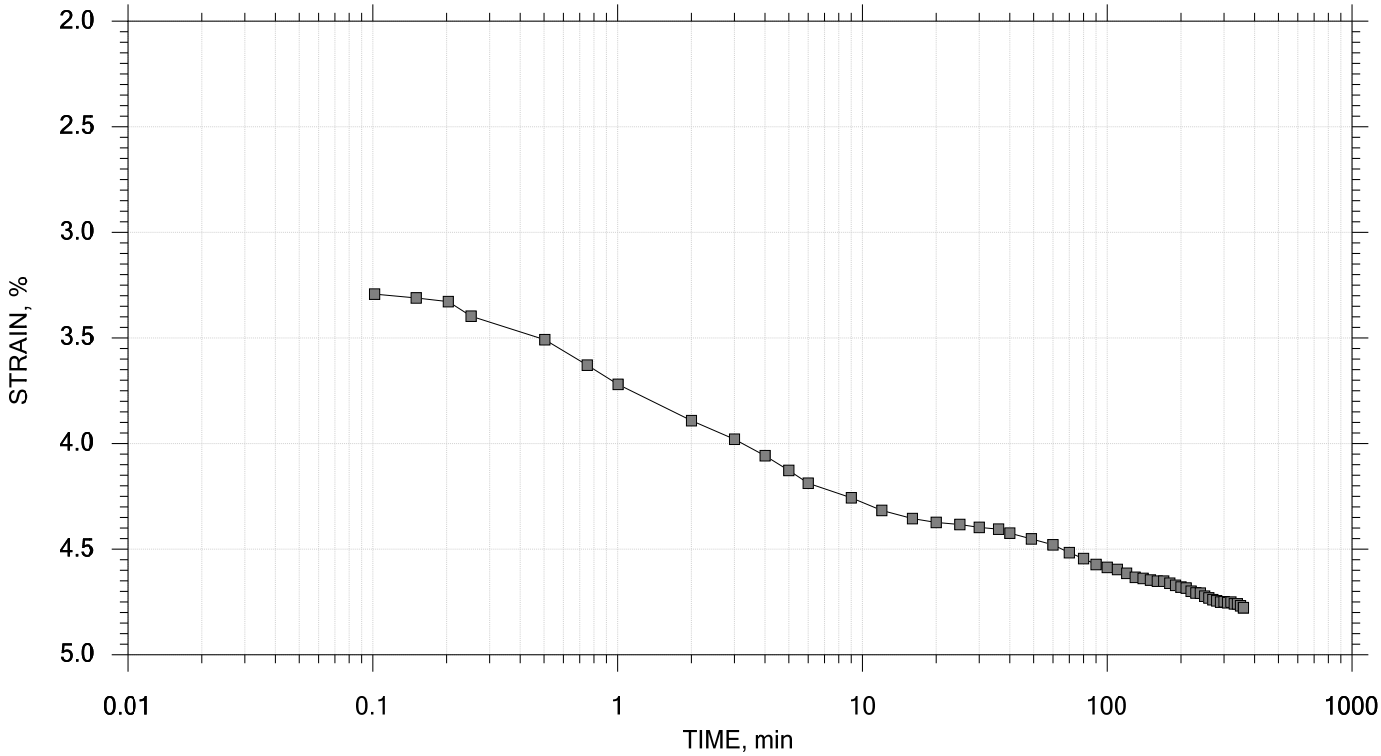
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

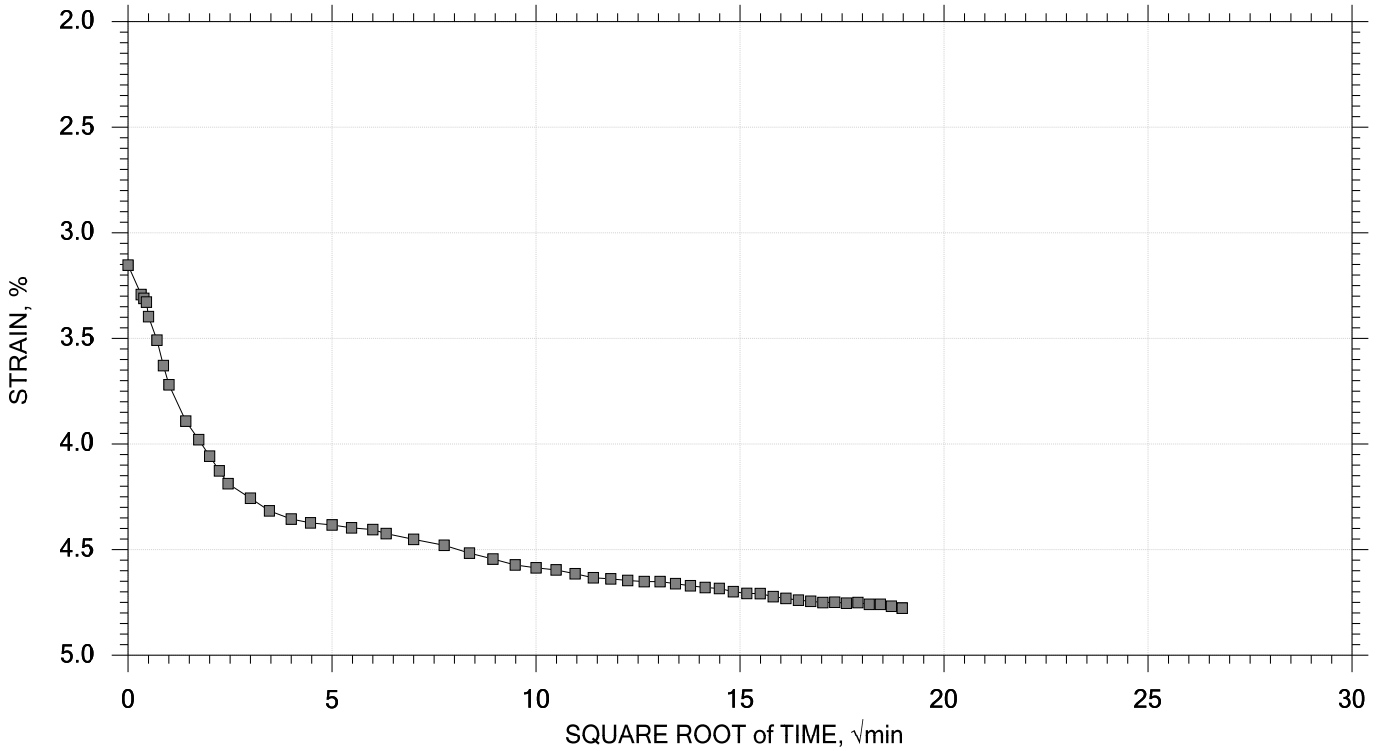
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 17

Stress: 0.5 tsf





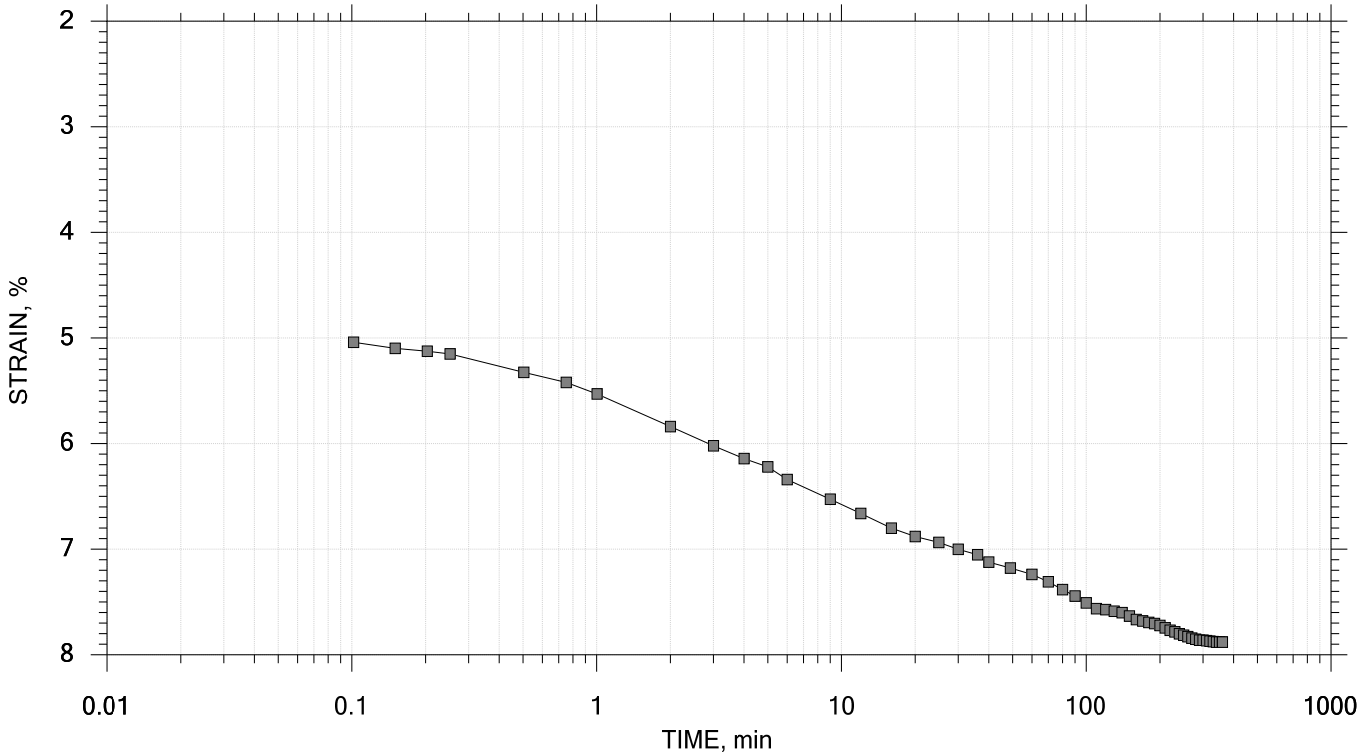
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

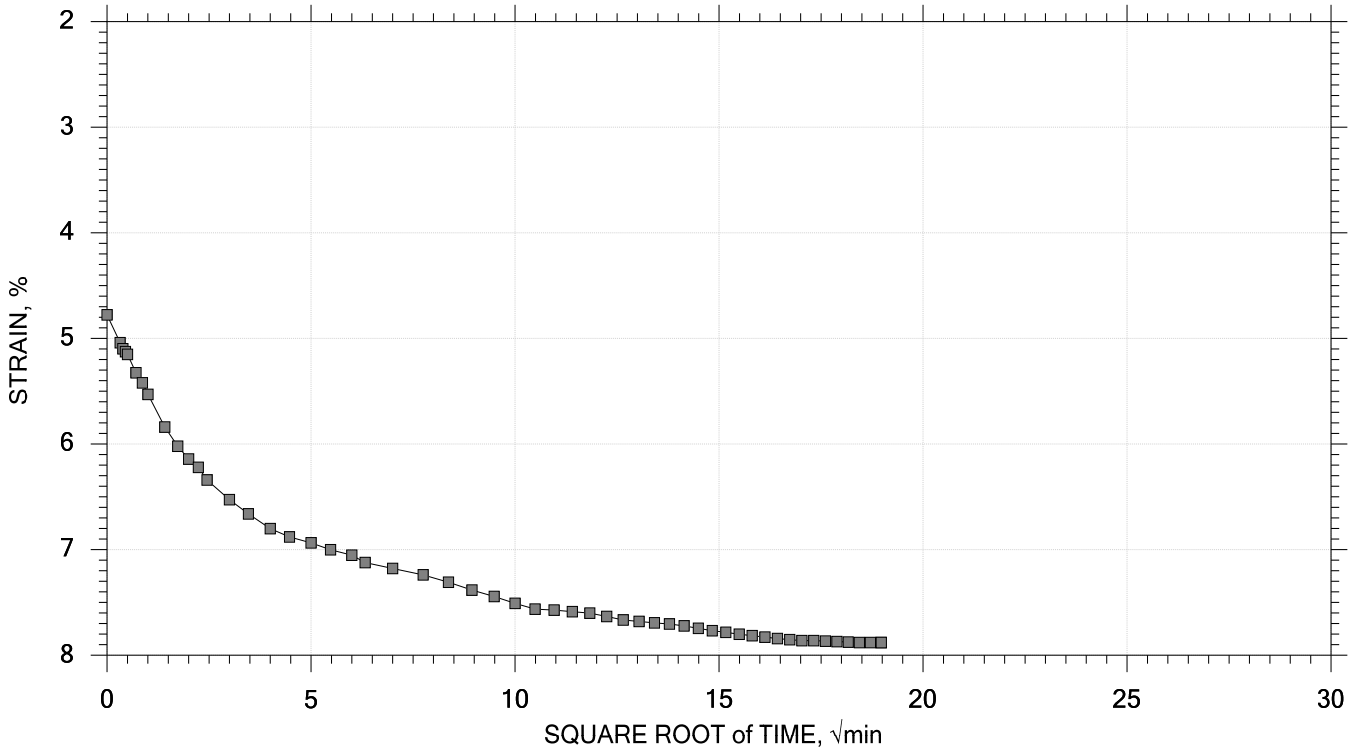
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 17

Stress: 1 tsf





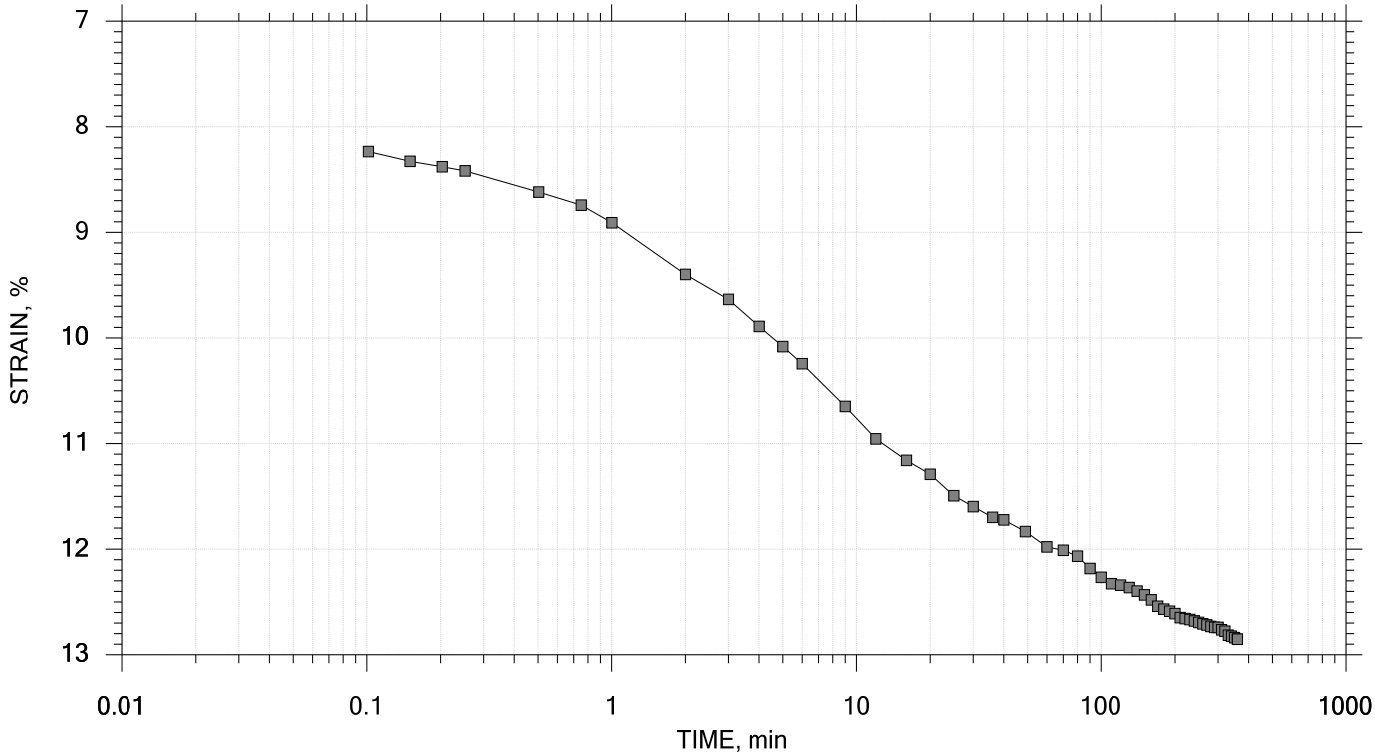
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

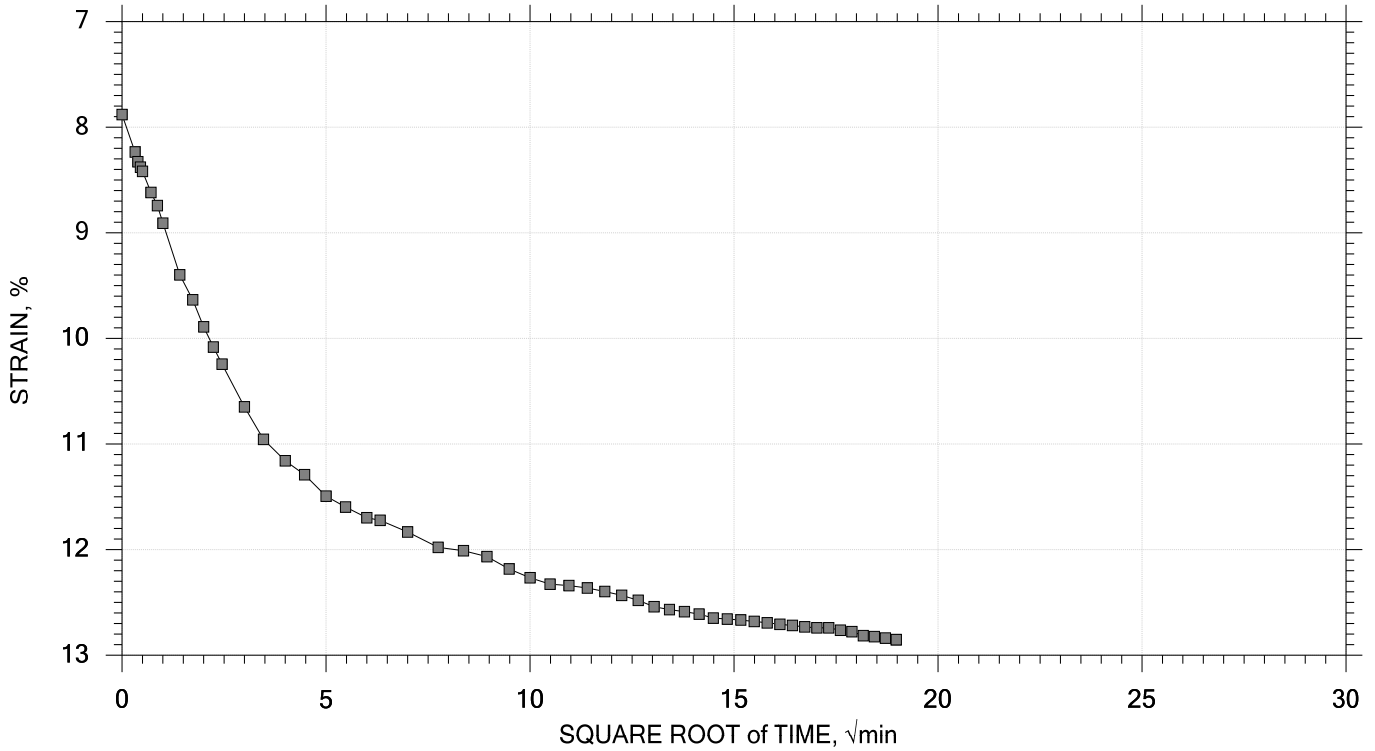
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 17

Stress: 2 tsf





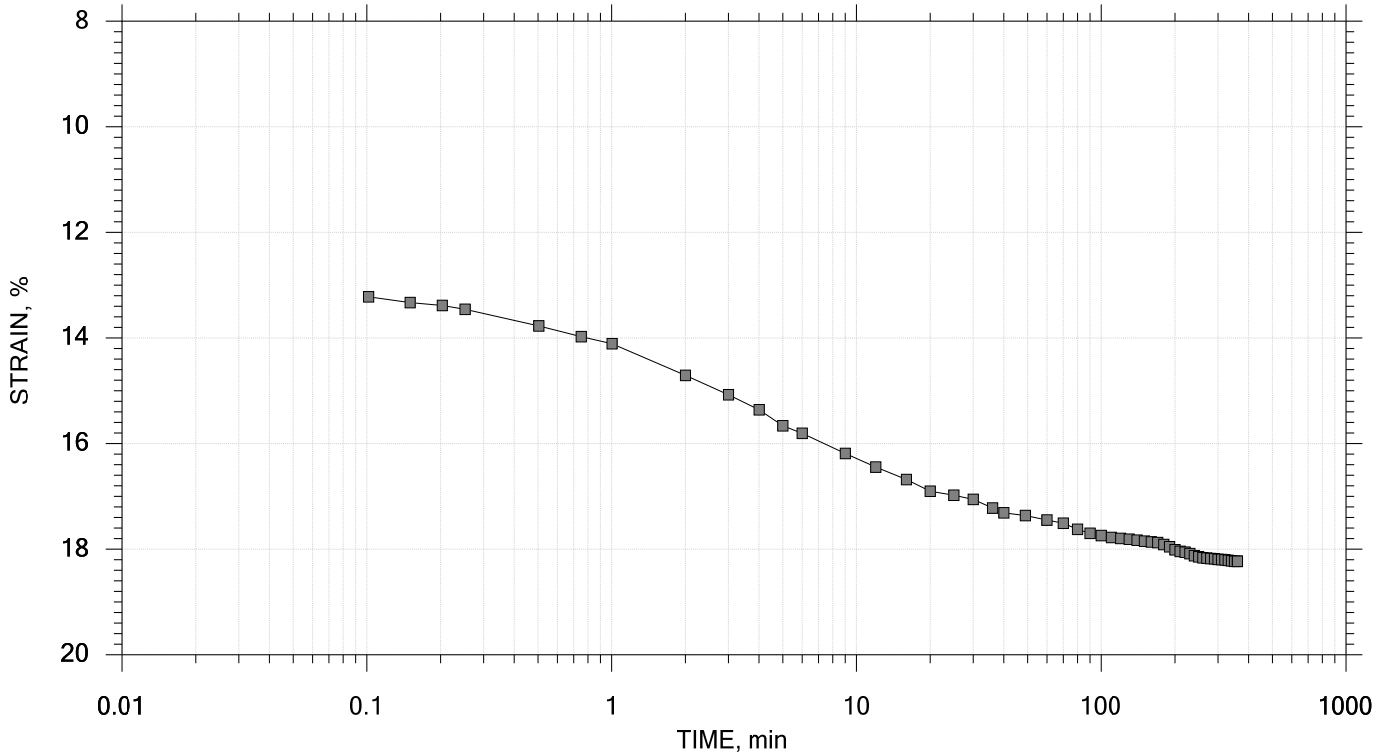
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

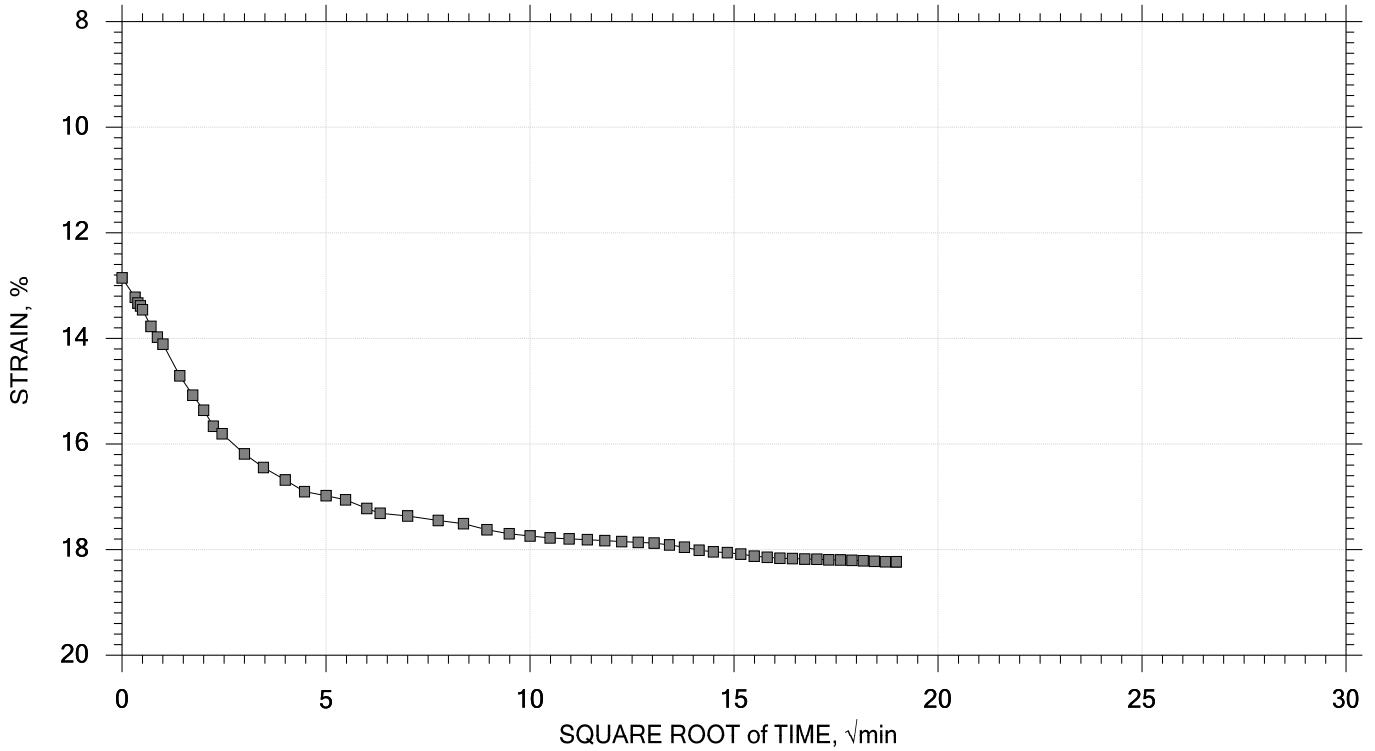
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 17

Stress: 4 tsf





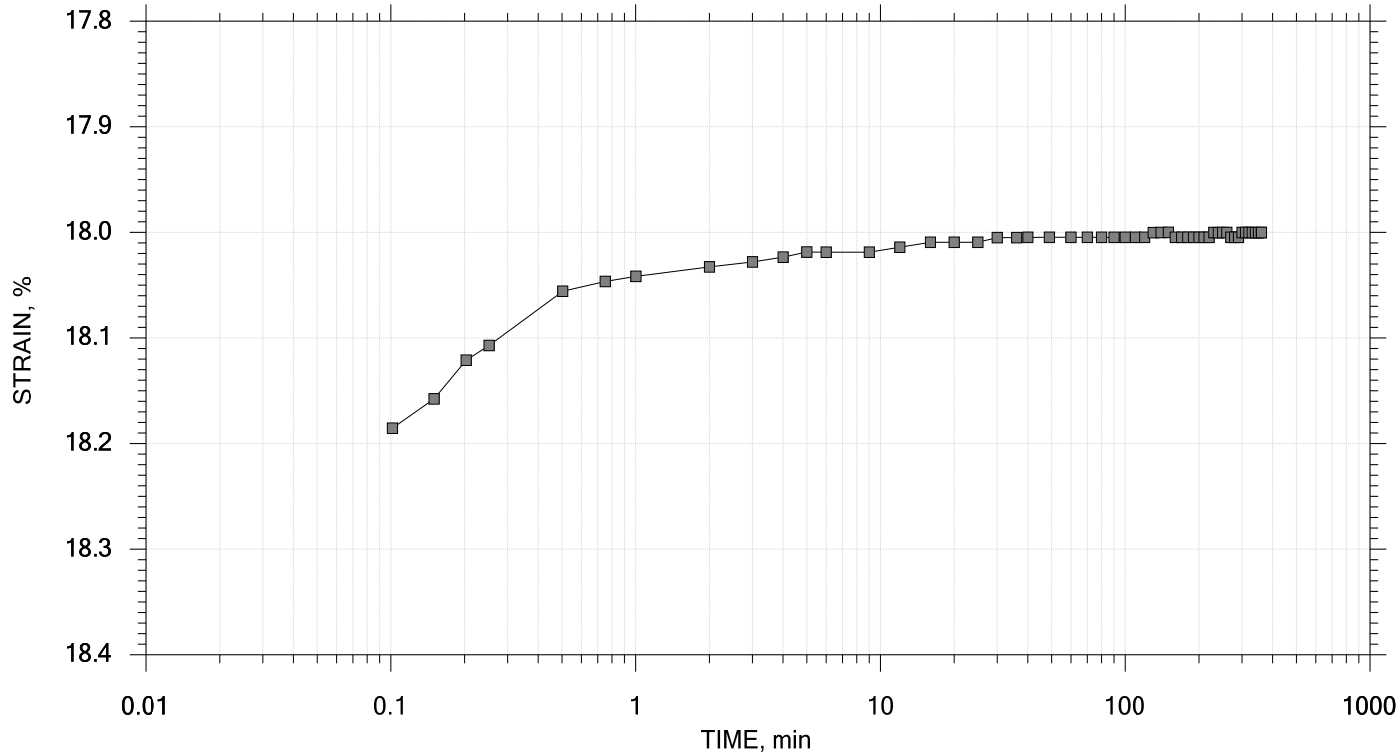
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

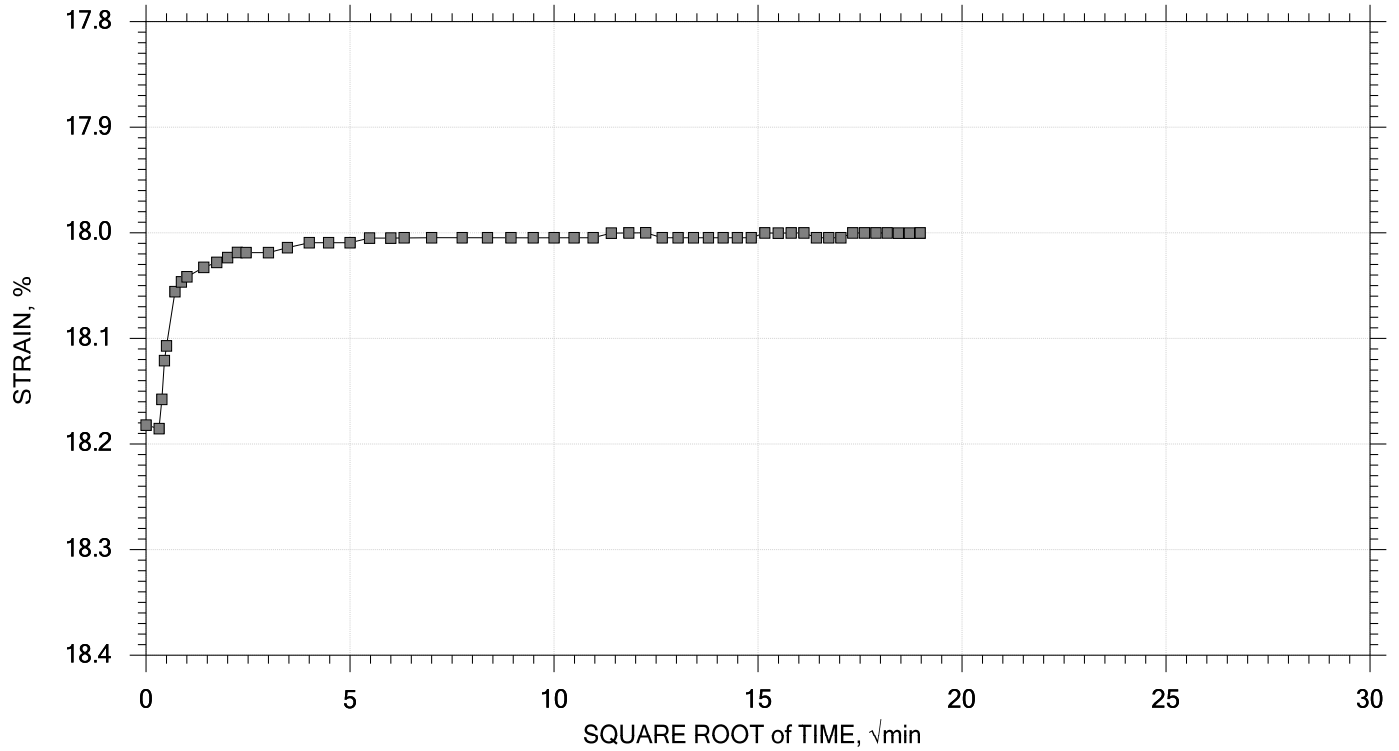
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 17

Stress: 2 tsf





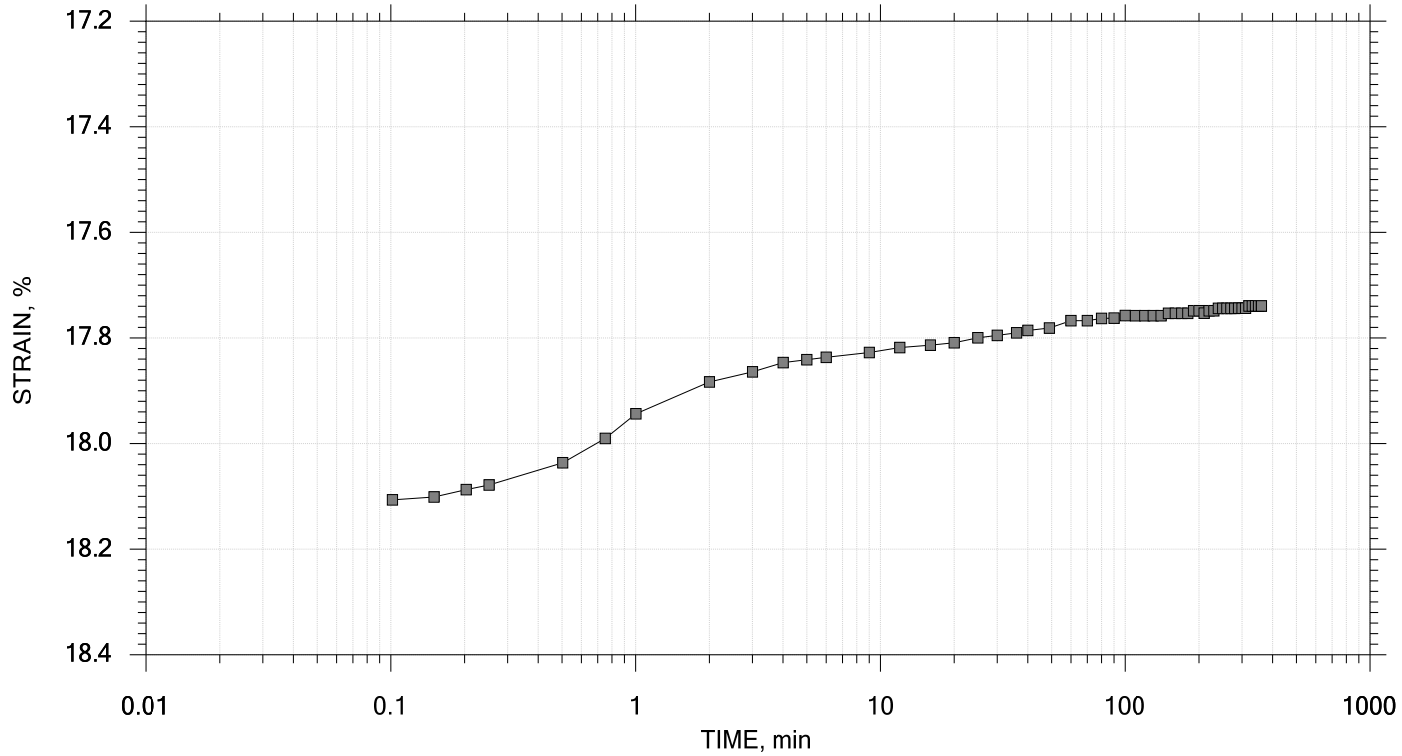
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

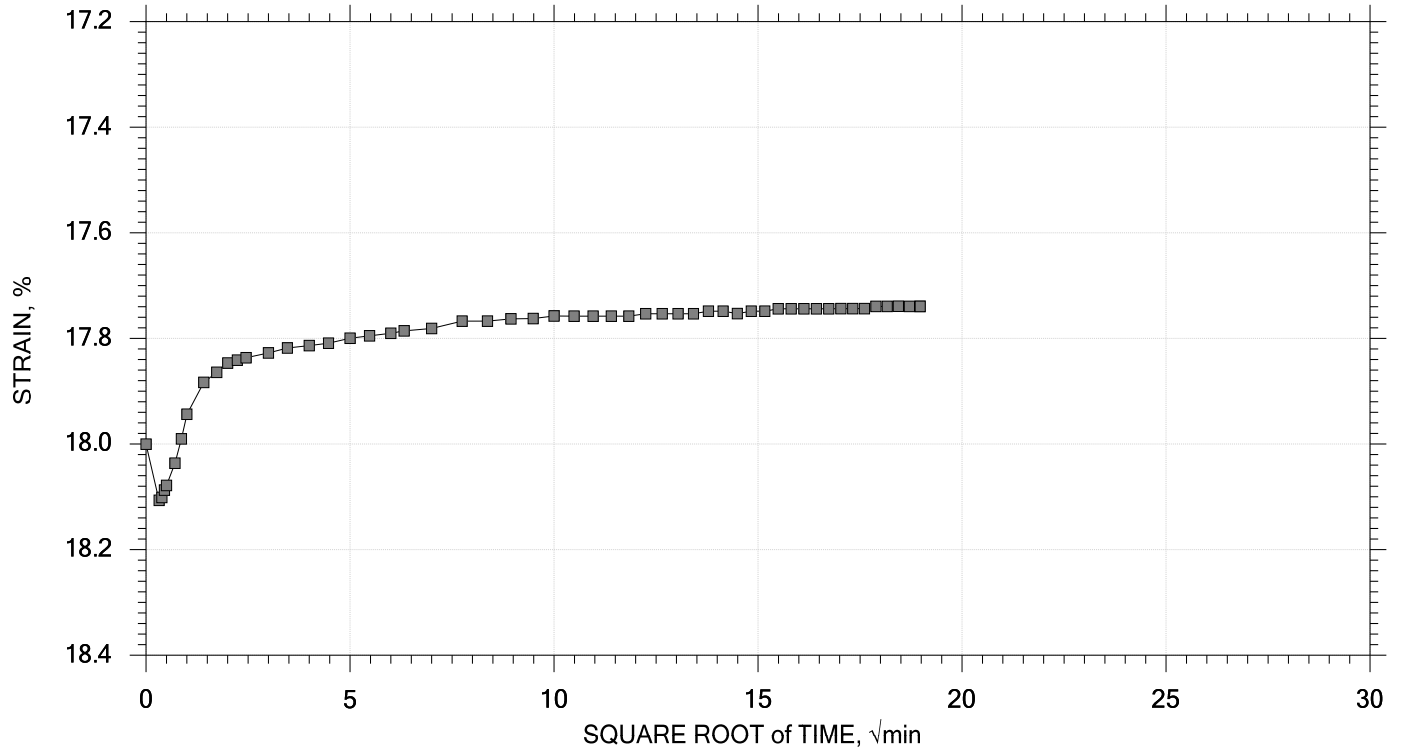
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 17

Stress: 1 tsf





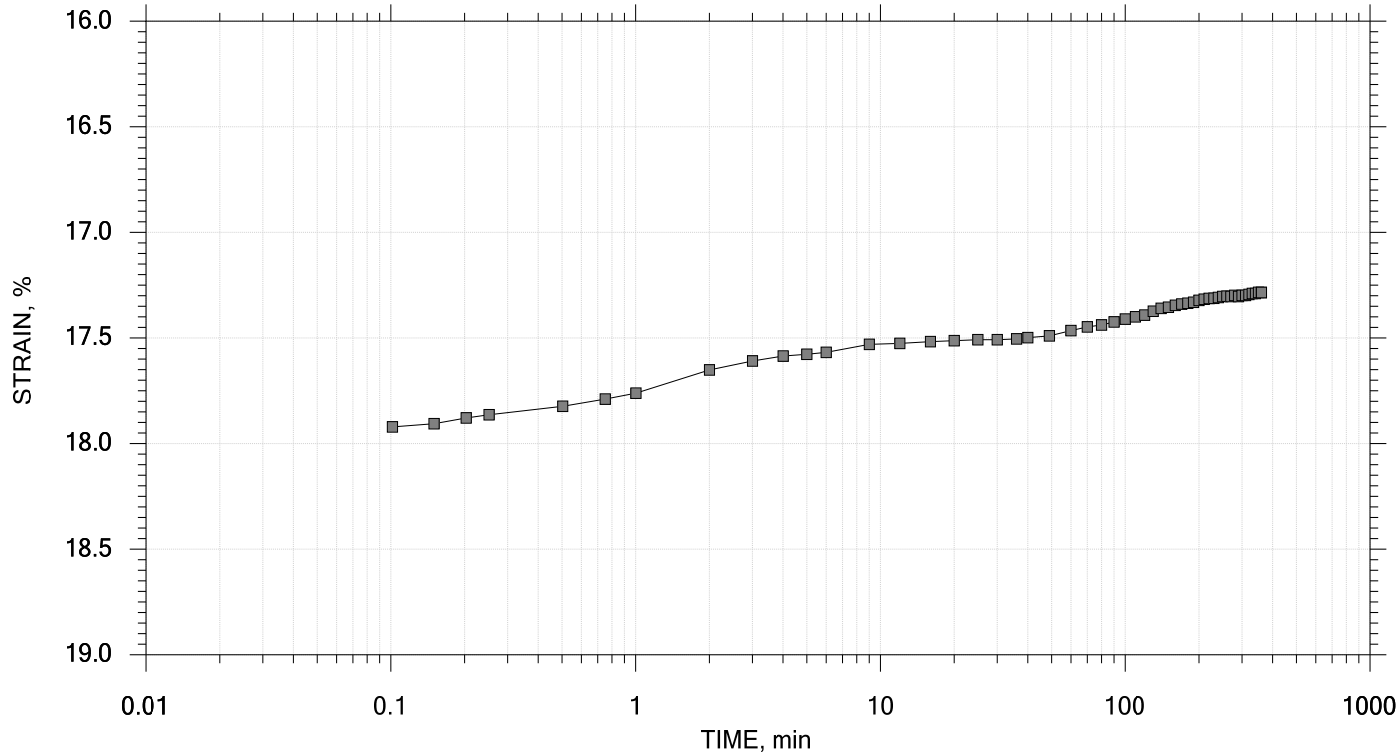
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

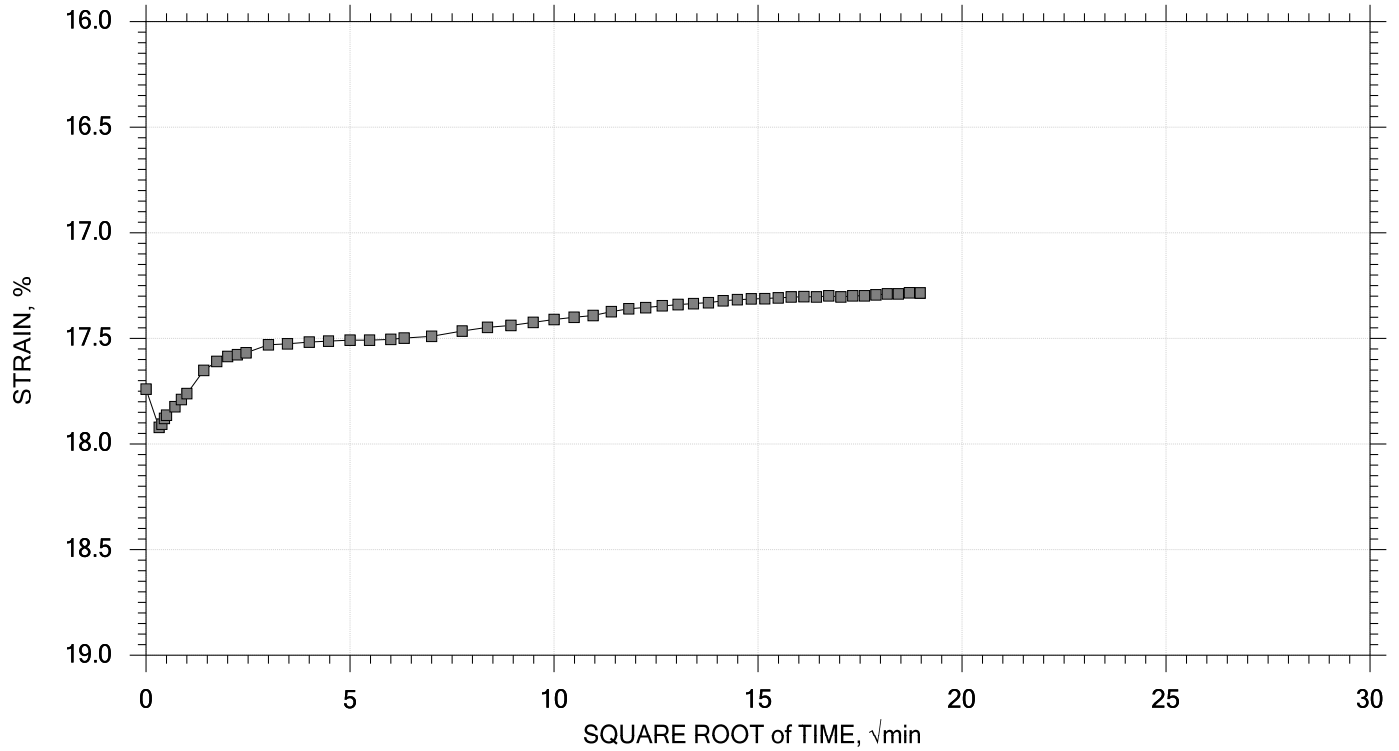
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 17

Stress: 0.5 tsf





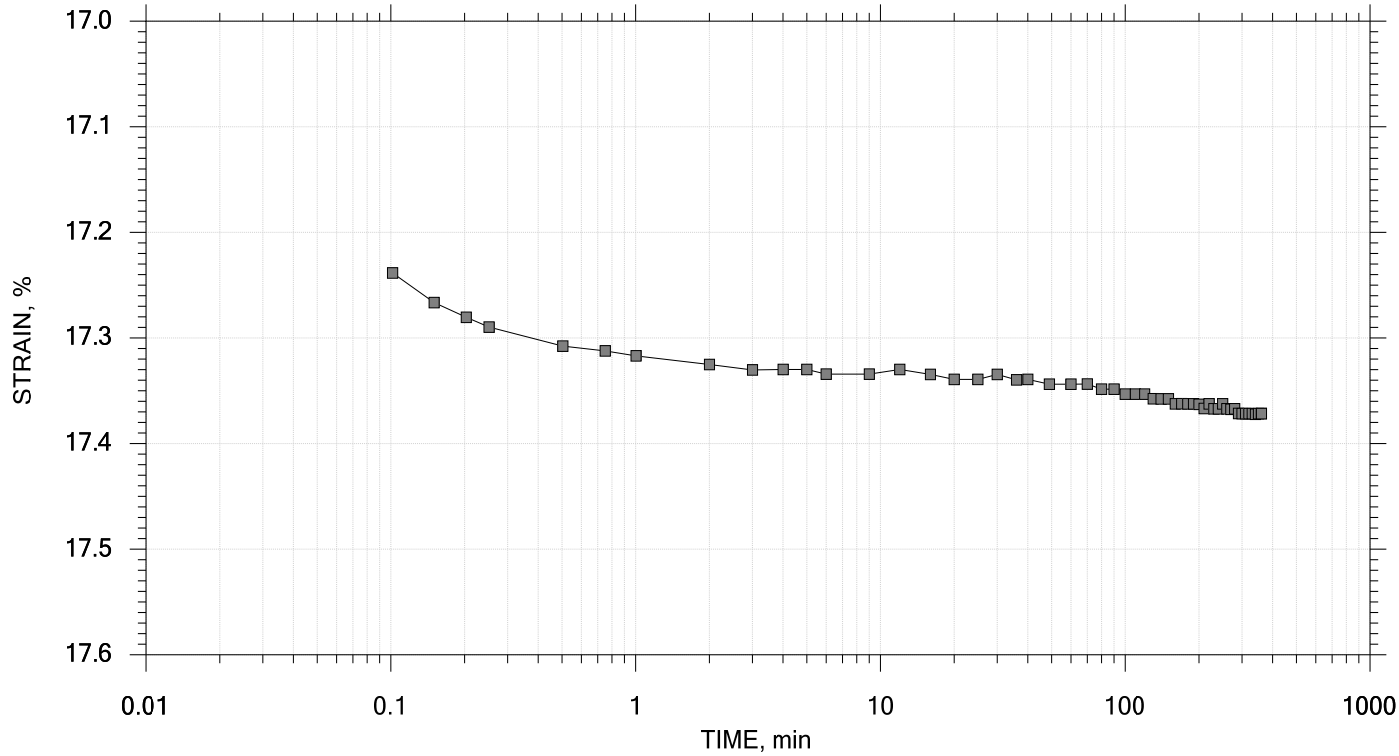
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

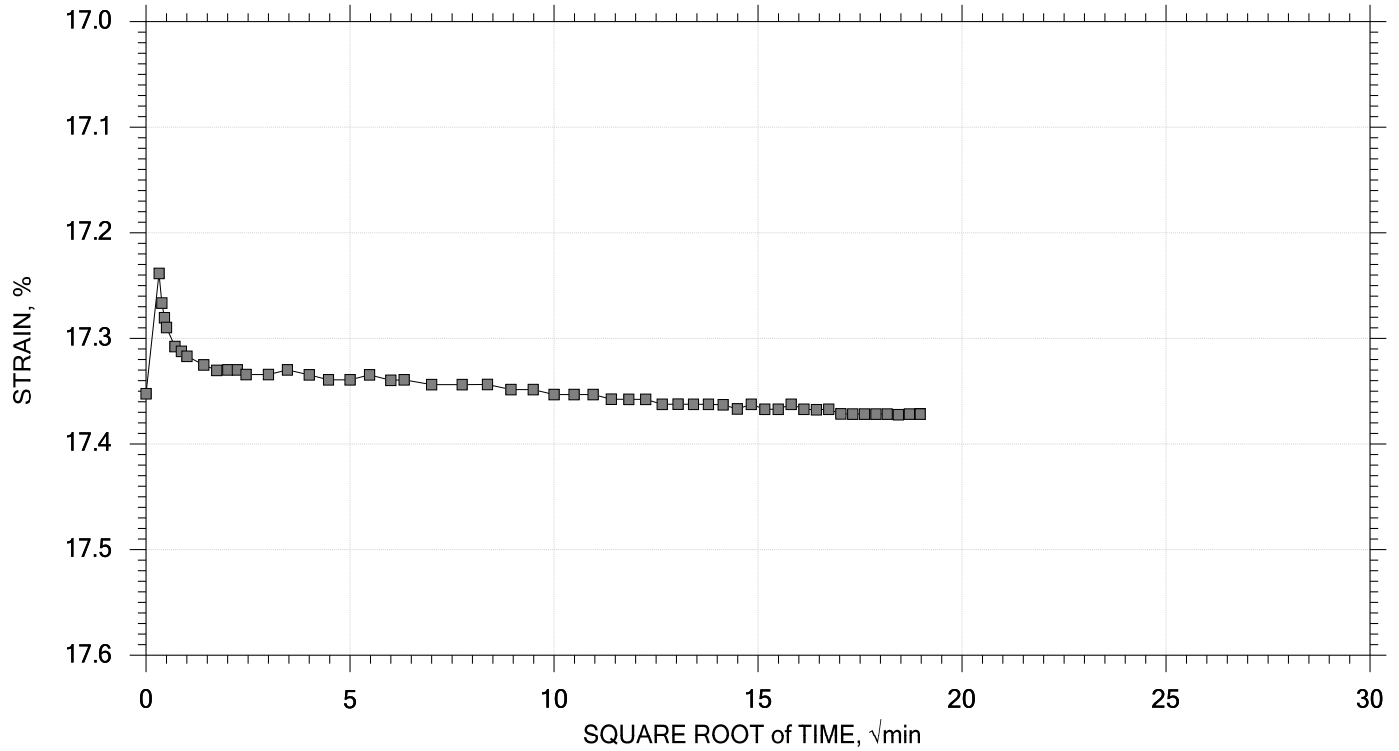
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 17

Stress: 1 tsf





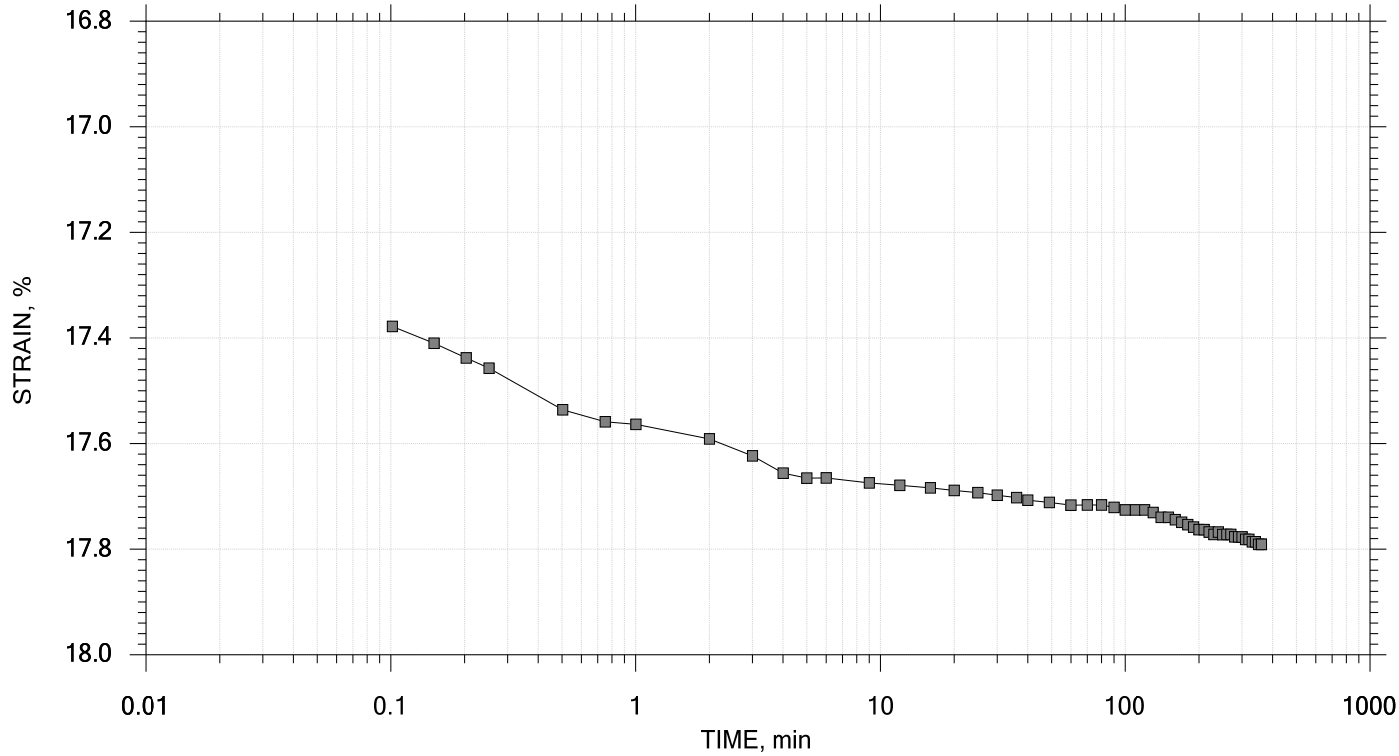
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

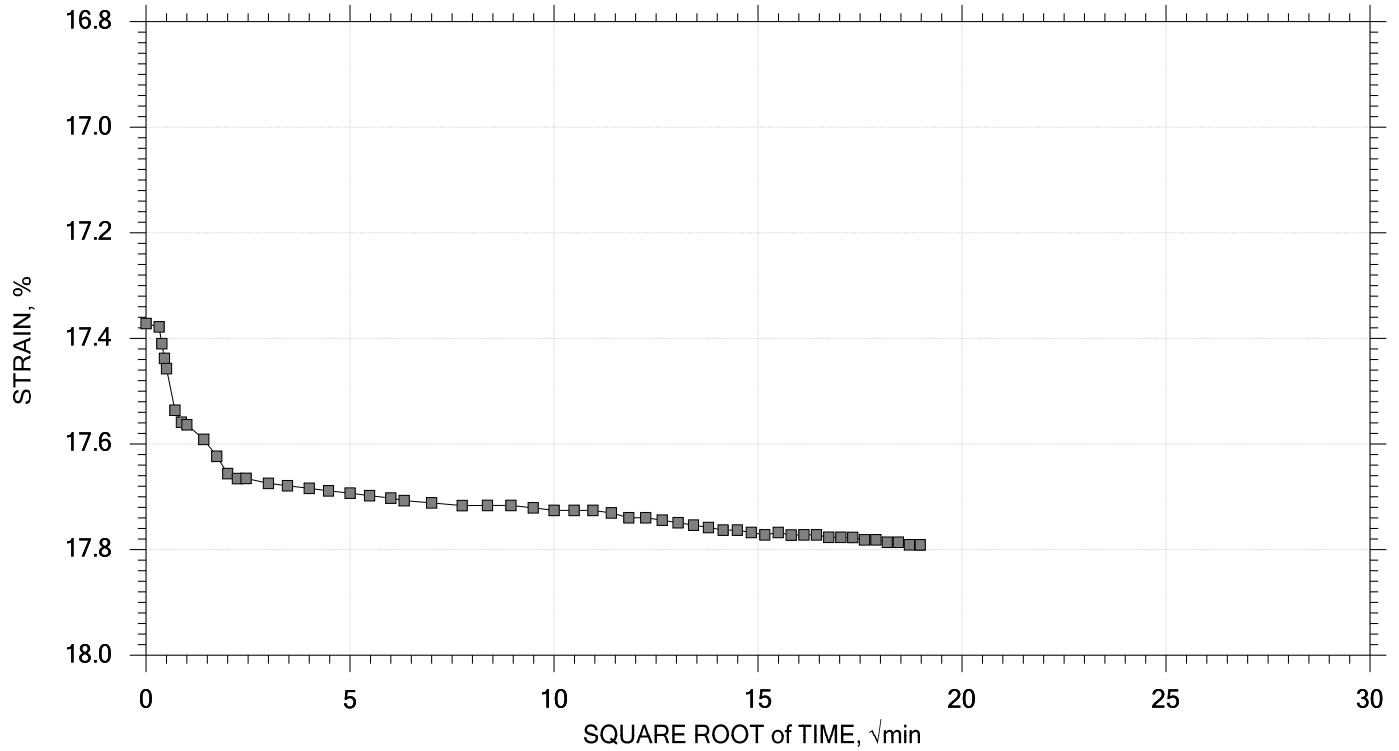
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 17

Stress: 2 tsf





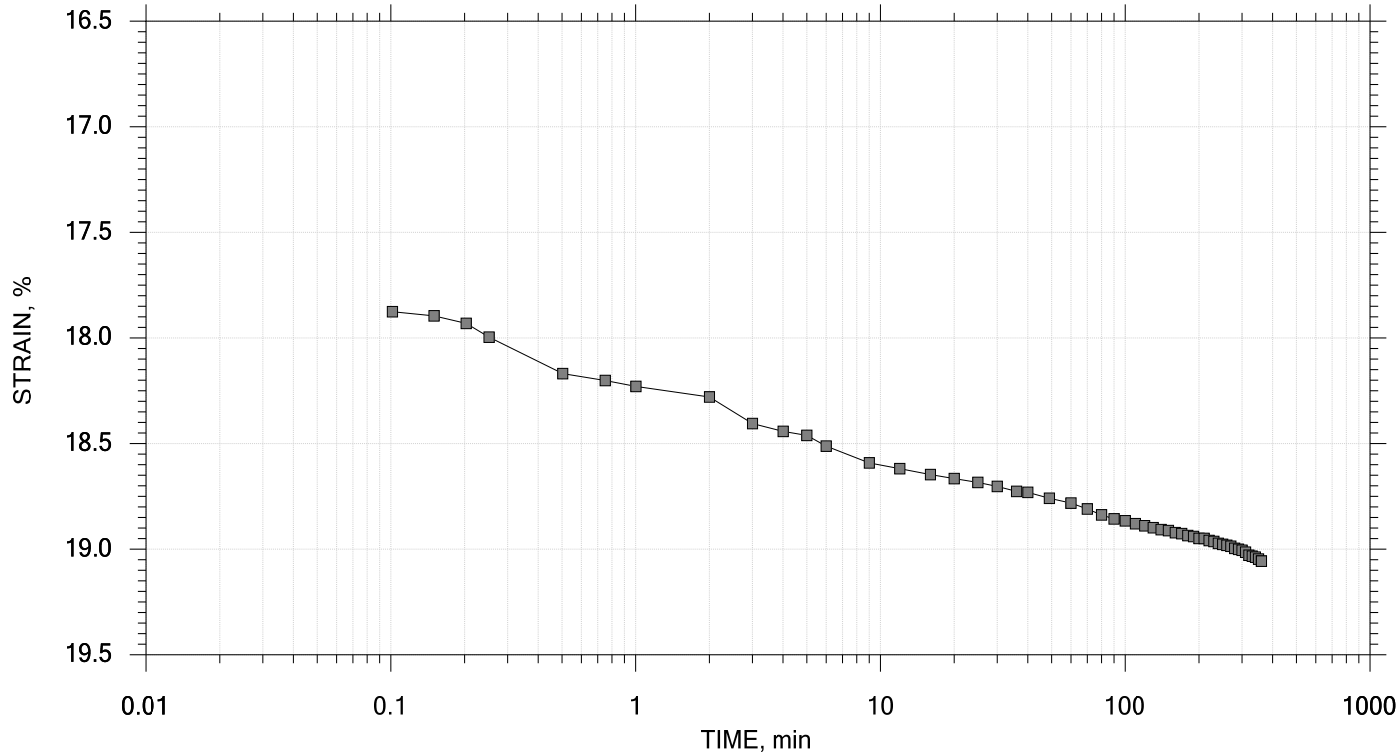
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

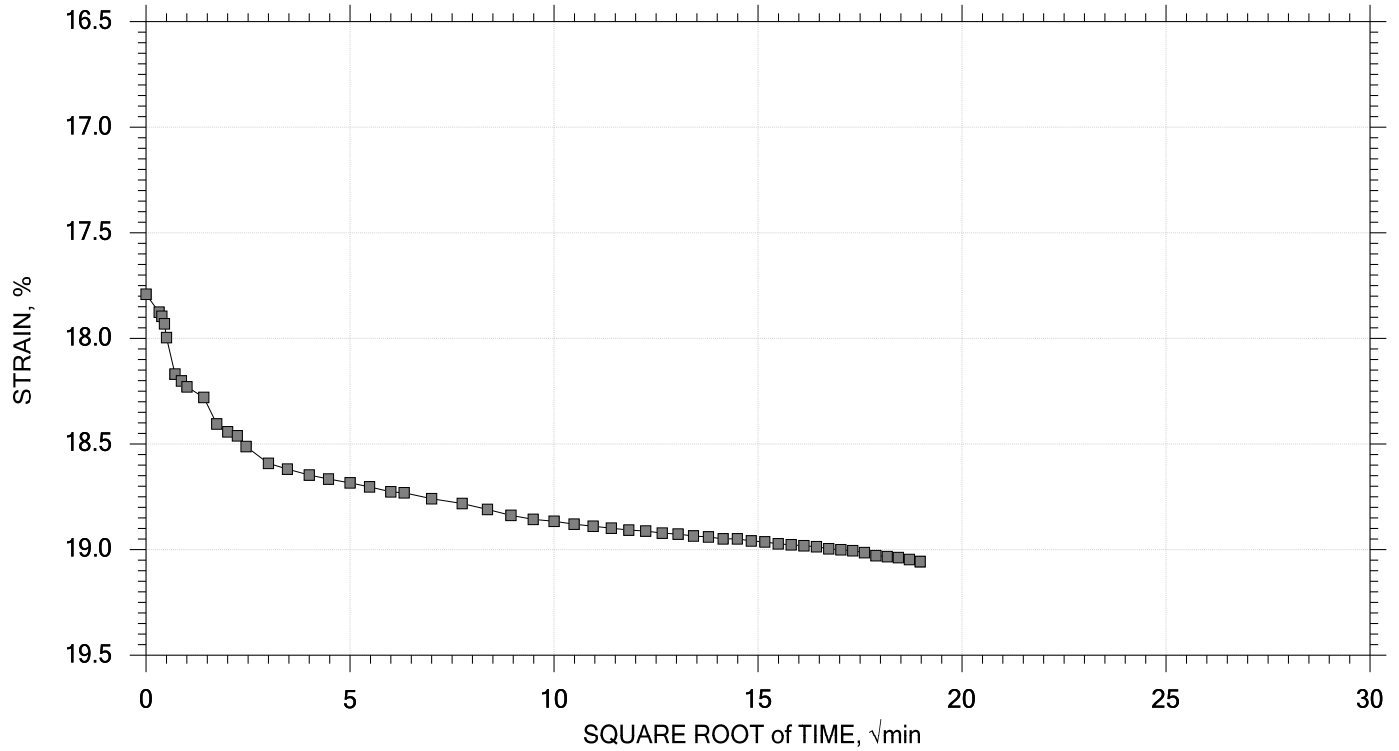
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 17

Stress: 4 tsf





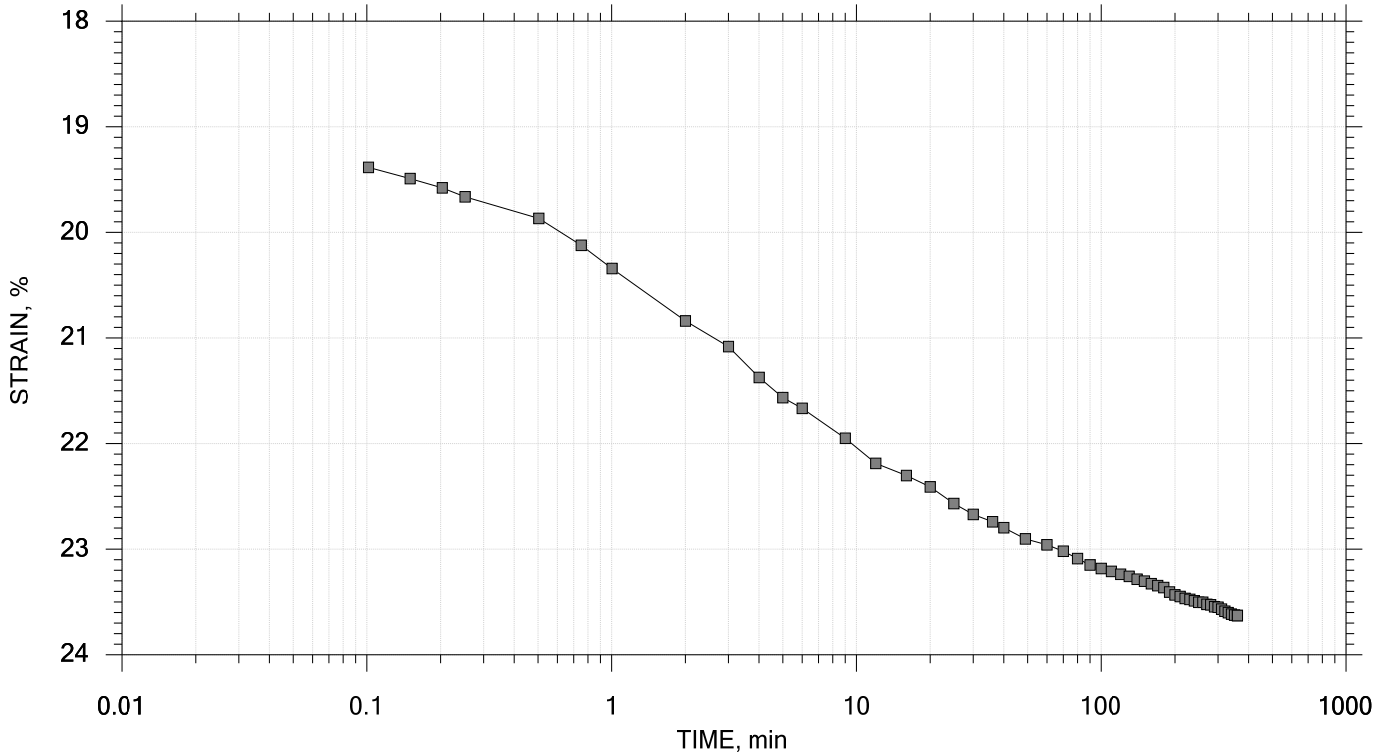
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

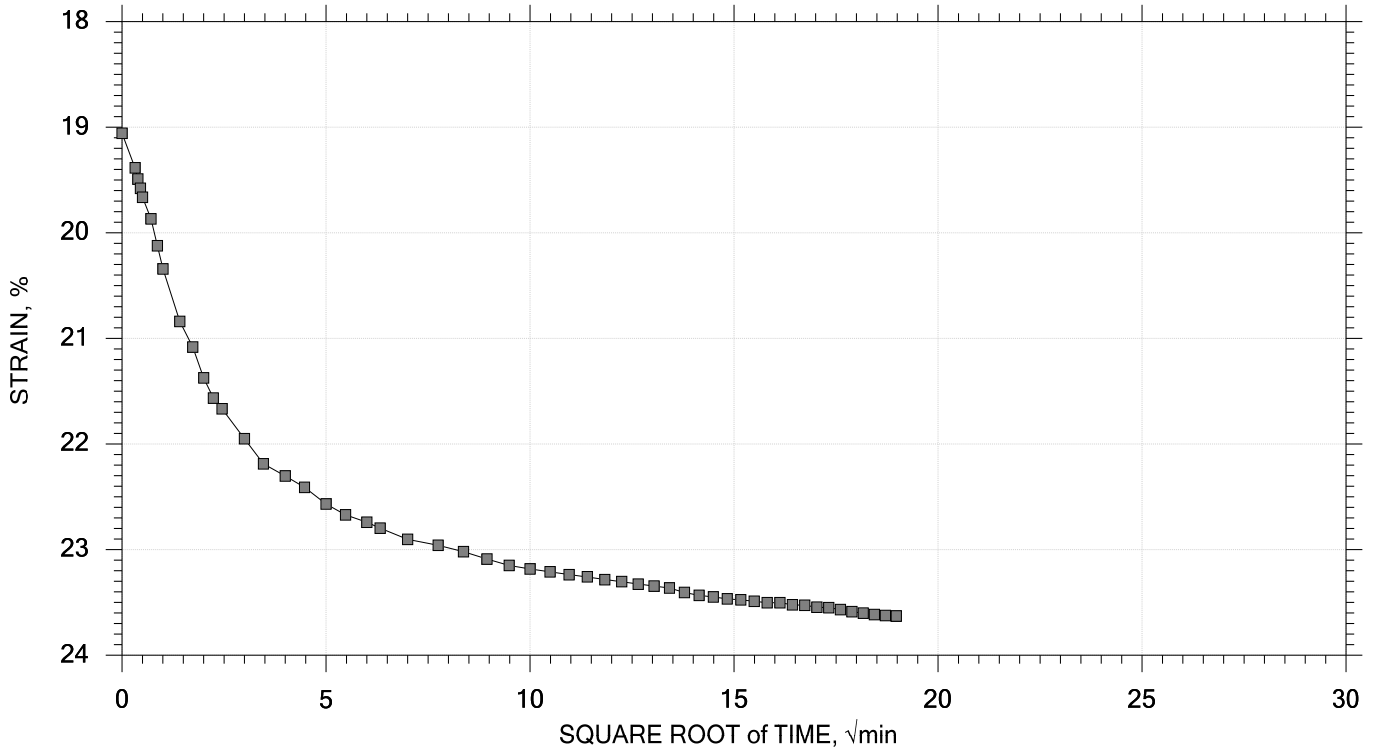
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 17

Stress: 8 tsf





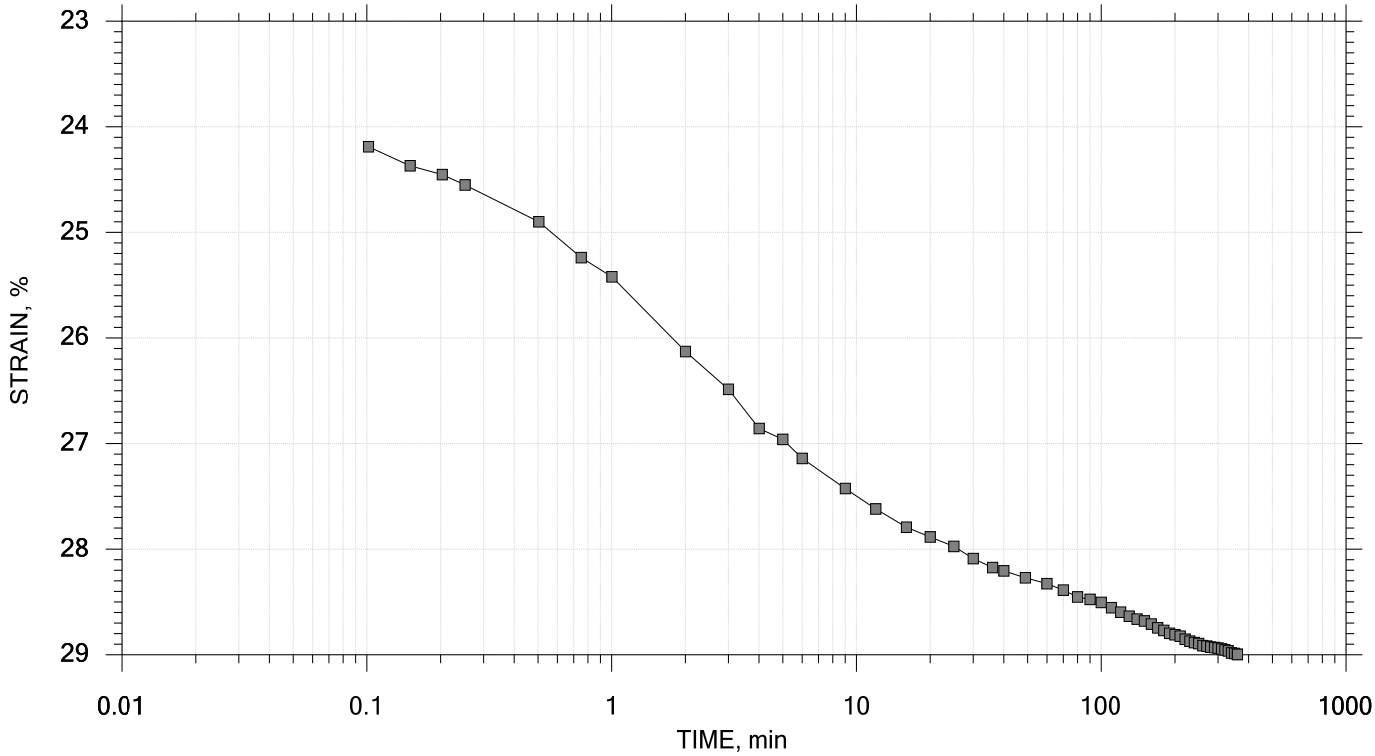
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

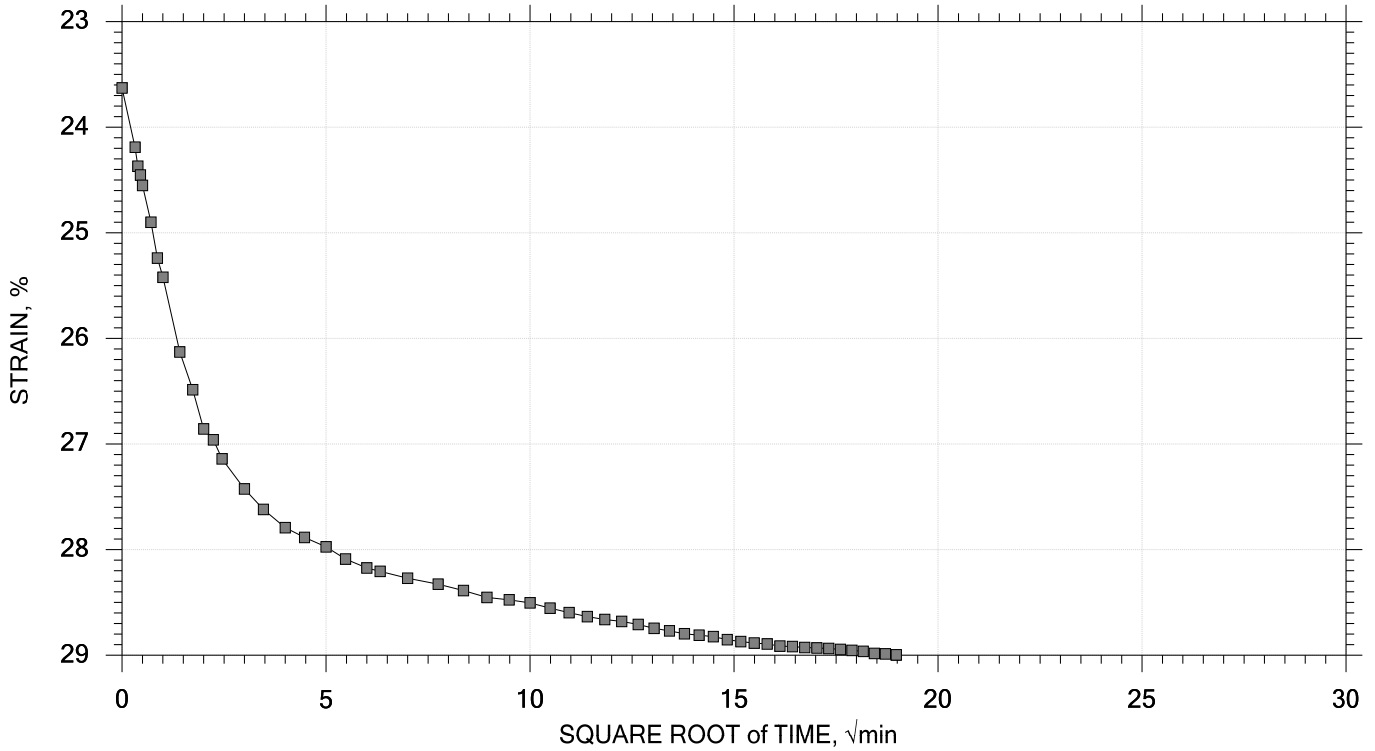
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 17

Stress: 16 tsf





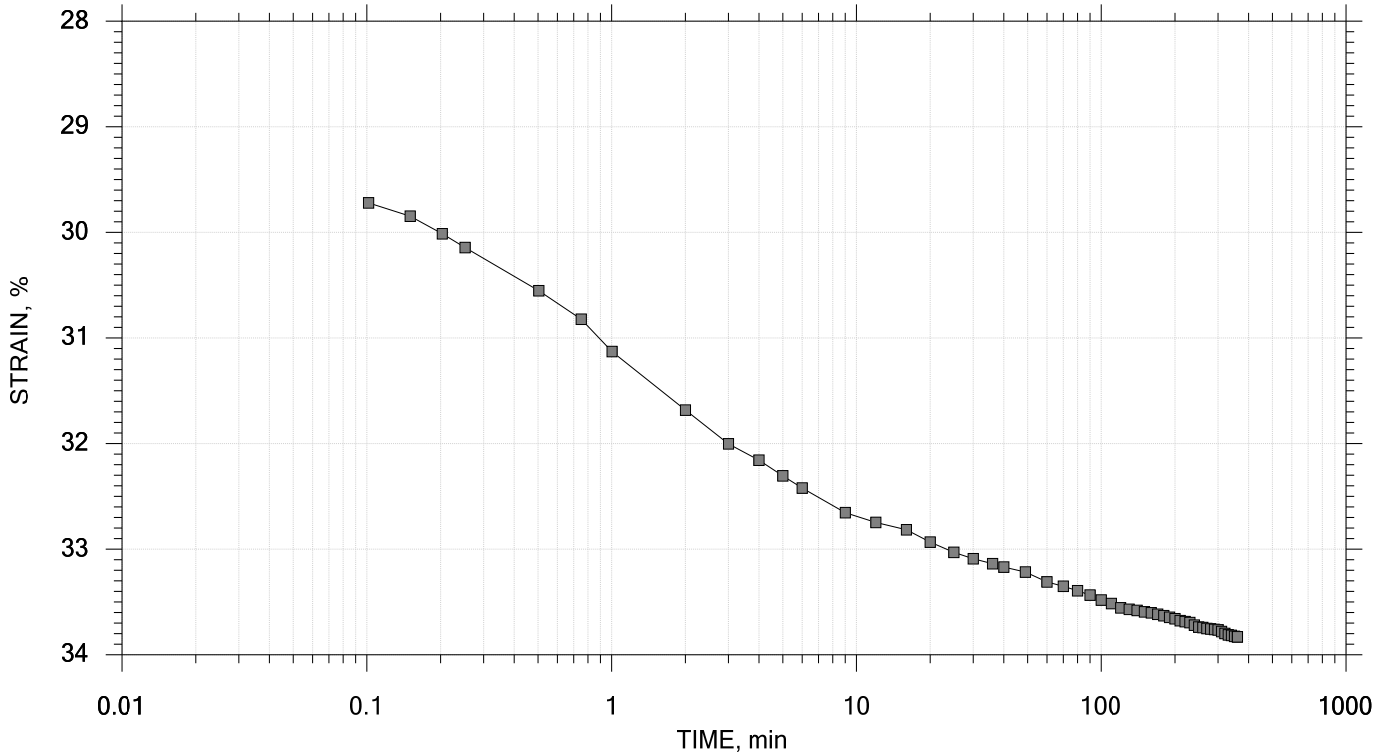
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

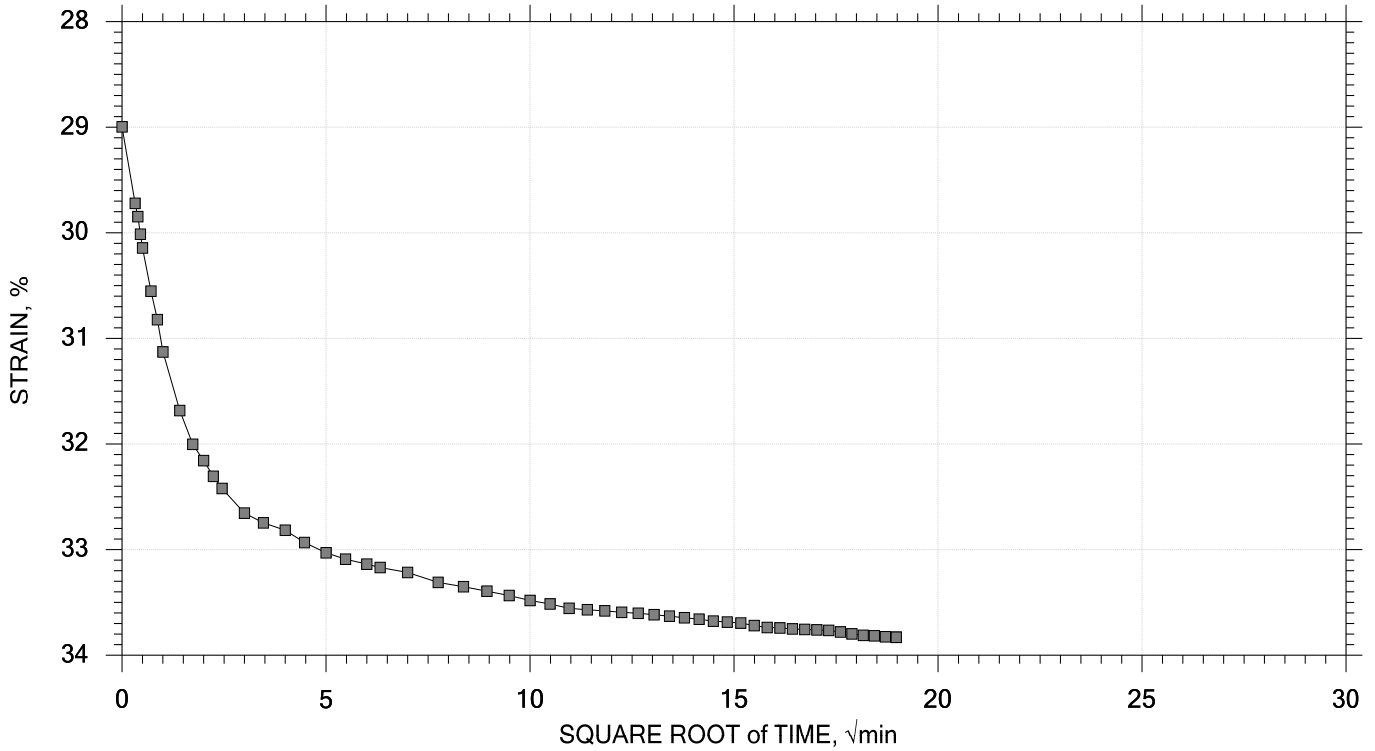
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 17

Stress: 32 tsf





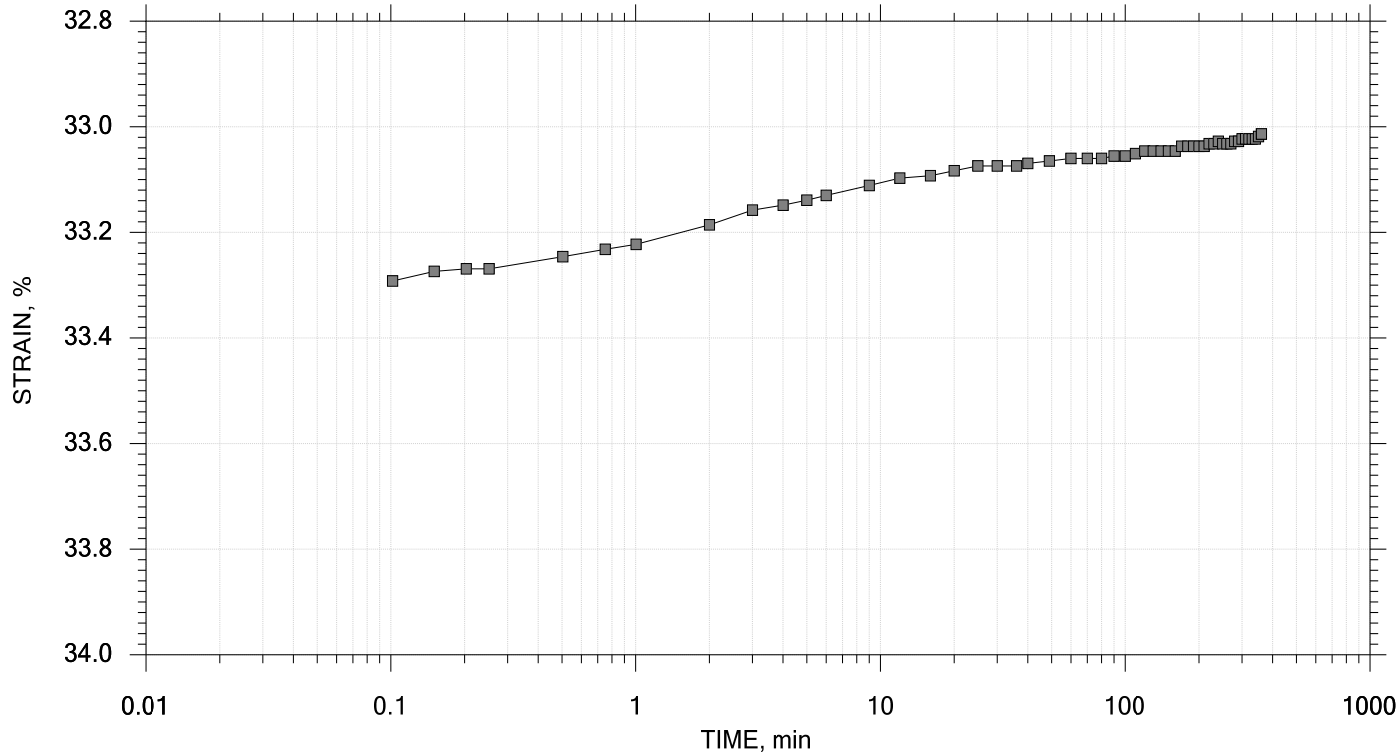
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

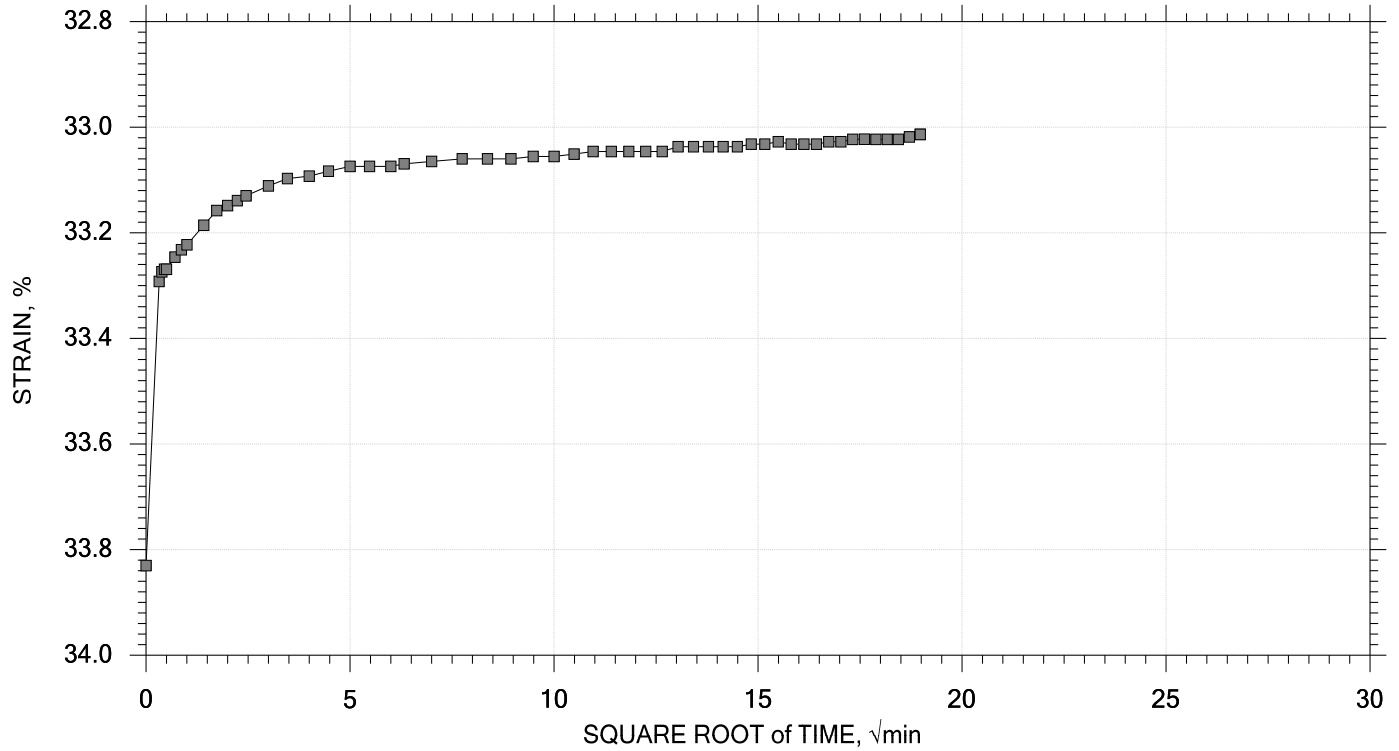
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 17

Stress: 8 tsf





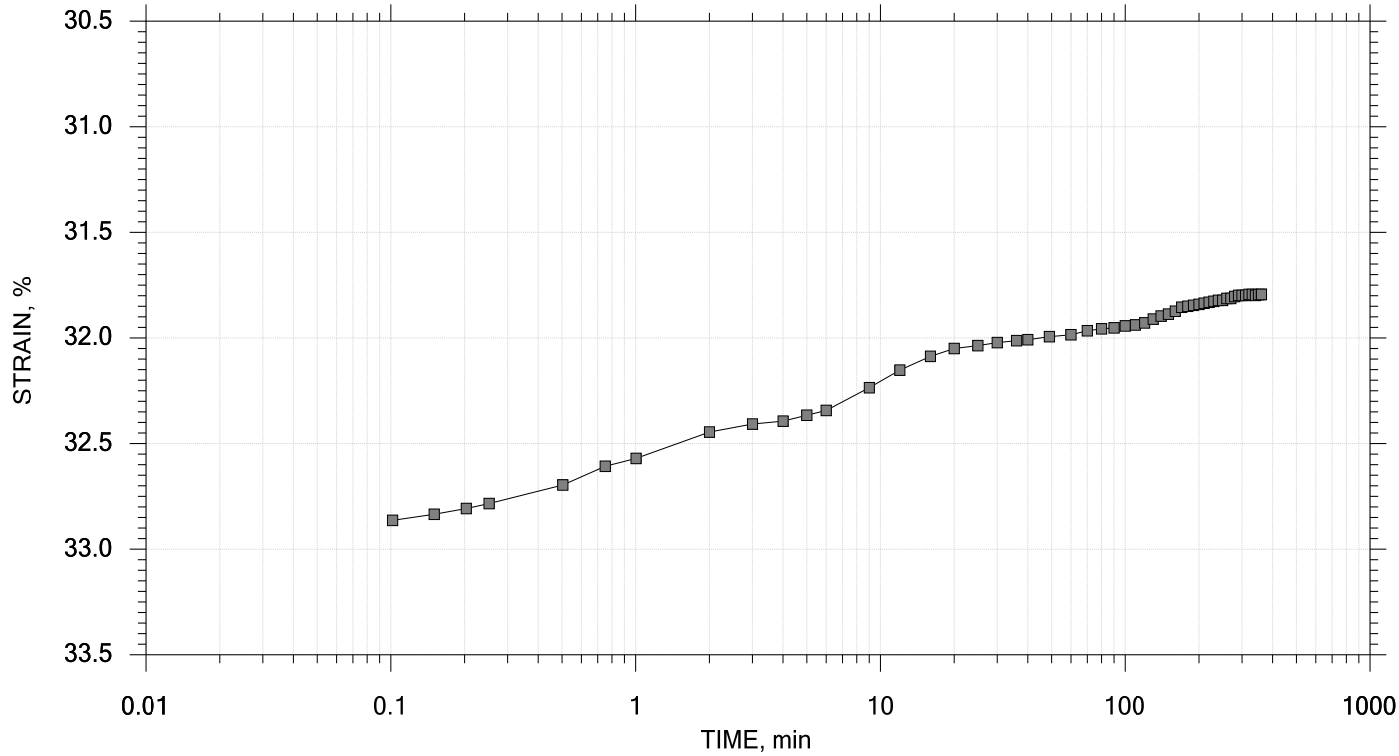
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

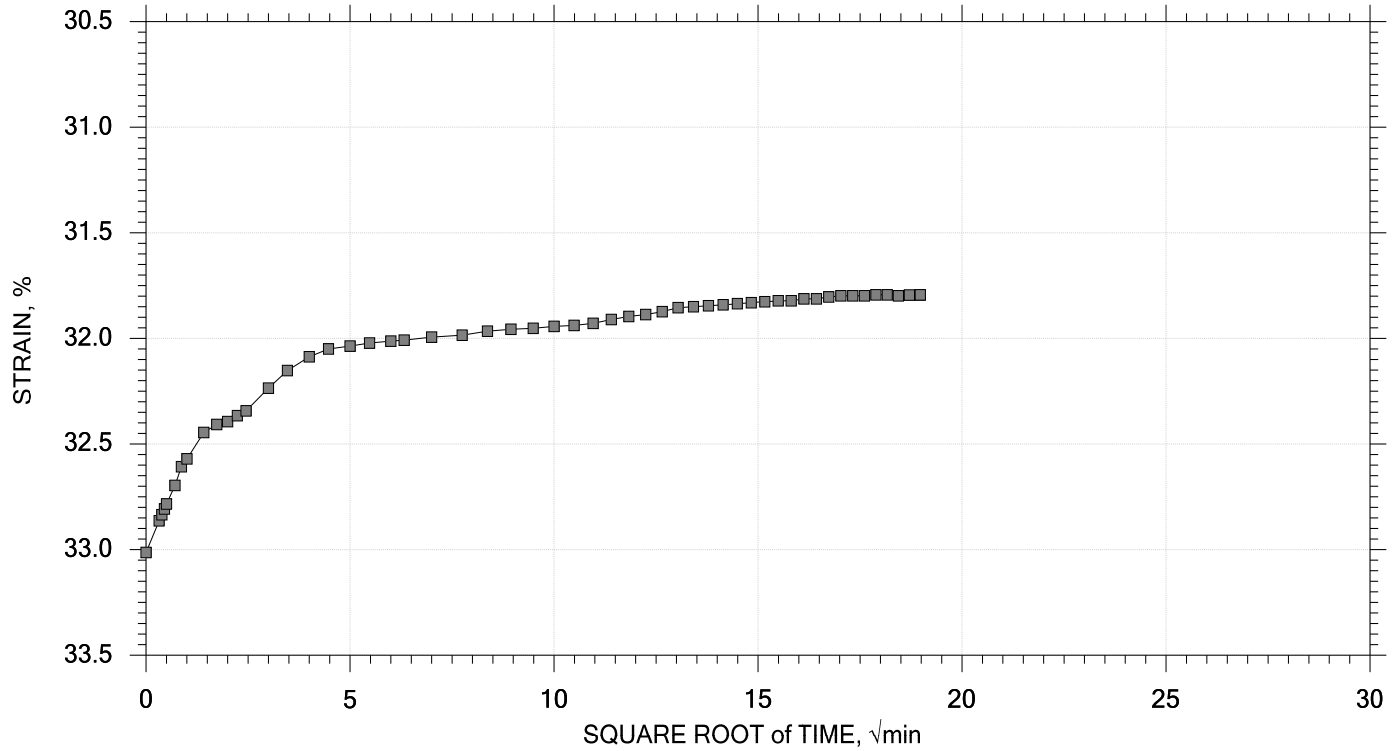
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 17

Stress: 2 tsf





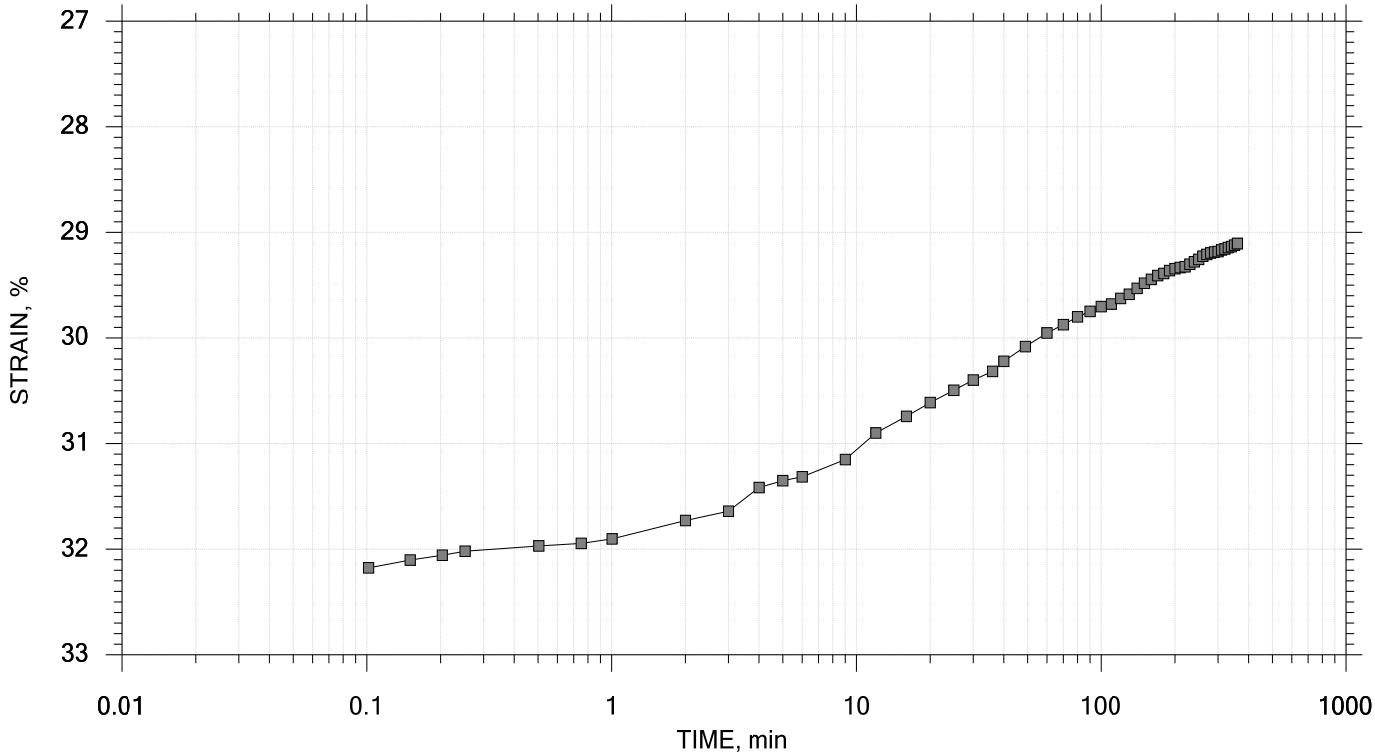
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

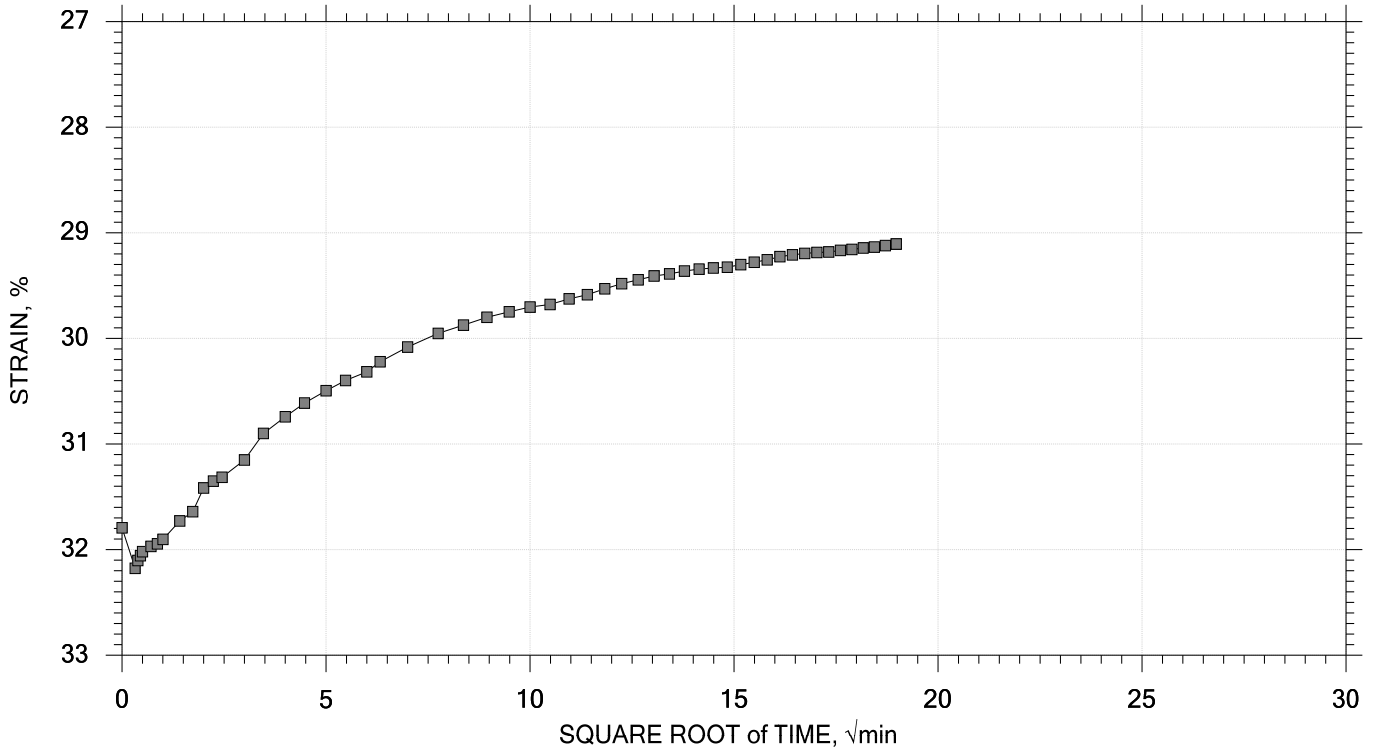
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 17

Stress: 0.25 tsf

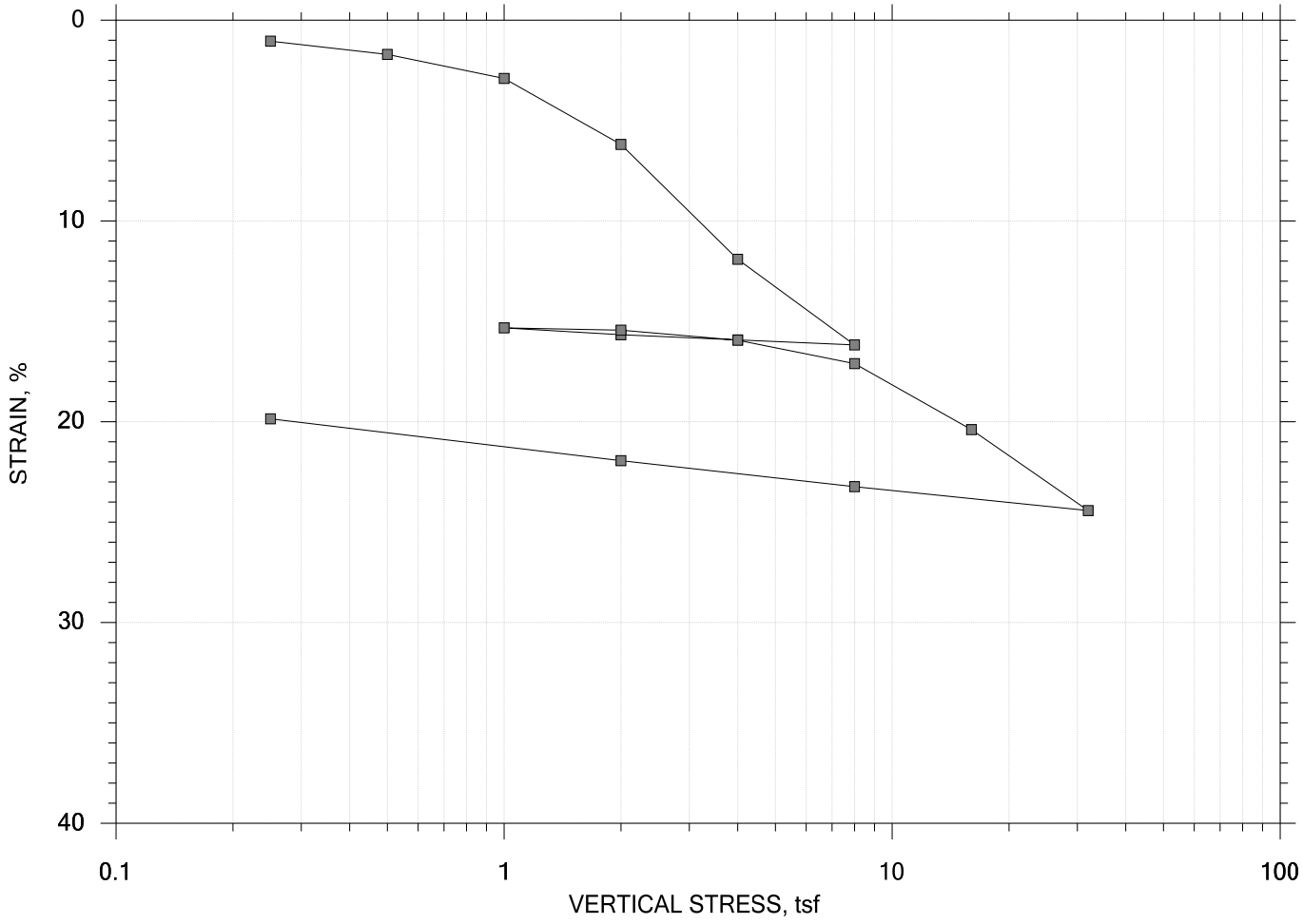


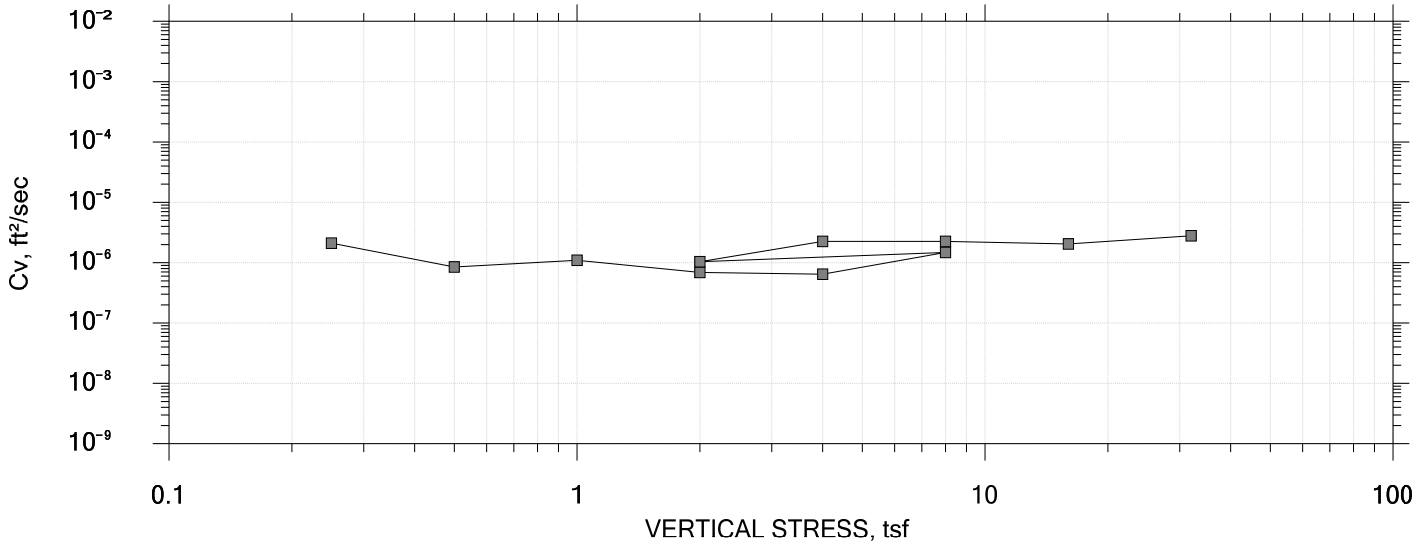


GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-2	Test Date: 09/06/18	Test No.: IP-2
	Depth: 15.5-17.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System V		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

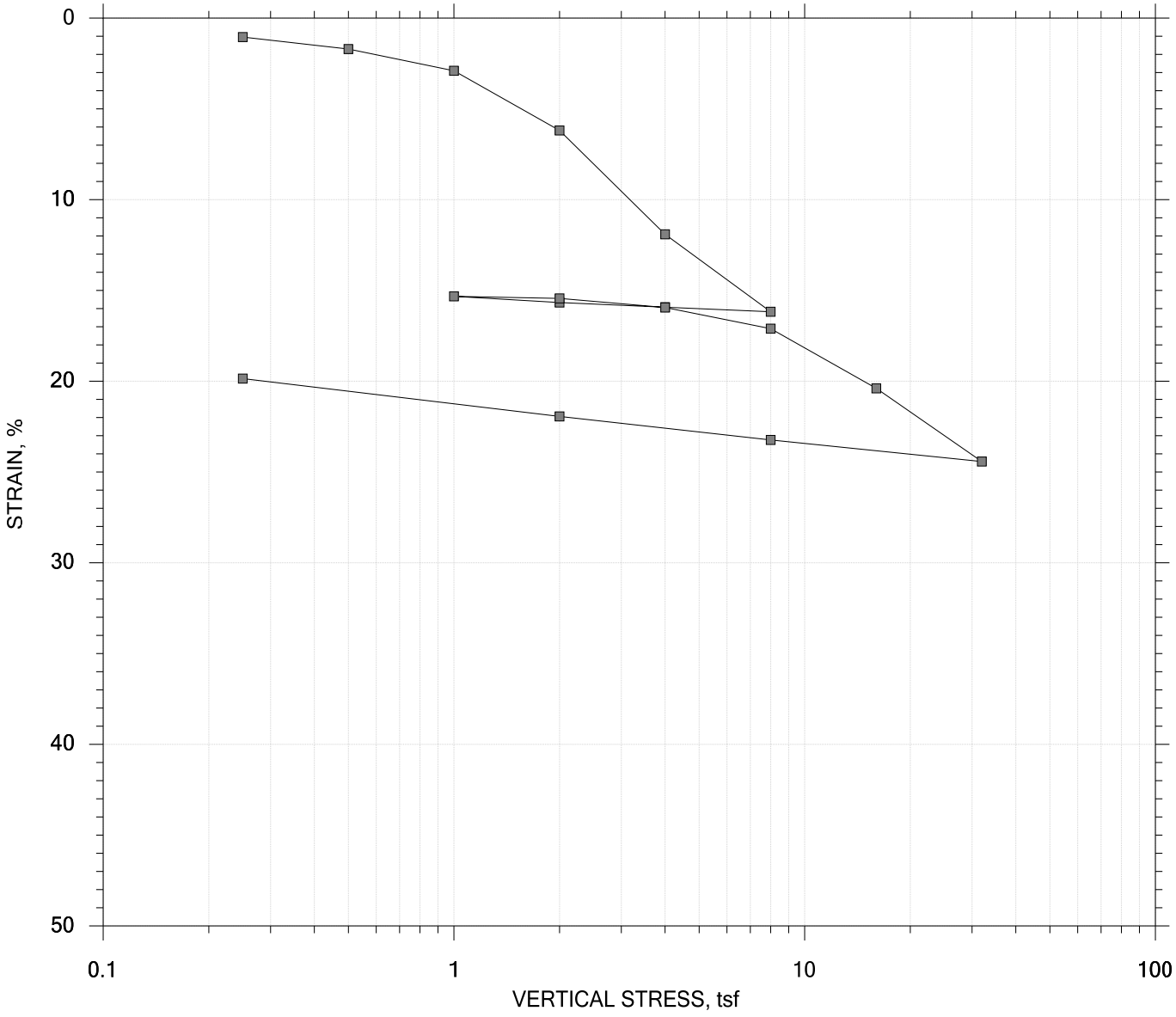




GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



				Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	38.13	24.72
Preconsolidation Stress: ---				Dry Unit Weight, pcf	83.793	102.19
Compression Ratio: ---				Saturation, %	100.00	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.05	0.68
LL: 30	PL: 19	PI: 11	GS: 2.75			

GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B301
Sample No.: U-6
Test No.: IP-1

Location: Durham, NH
Tested By: md
Test Date: 09/04/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 55-57 ft
Elevation: ---

Soil Description: Wet, olive gray clay
Remarks: System V

Estimated Specific Gravity: 2.75
Initial Void Ratio: 1.05
Final Void Ratio: 0.680

Liquid Limit: 30
Plastic Limit: 19
Plasticity Index: 11

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.82 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-1131	RING		D-2185
Wt. Container + Wet Soil, gm	114.25	258.24	243.76	141.37
Wt. Container + Dry Soil, gm	85.350	217.07	217.07	114.99
Wt. Container, gm	8.4400	109.10	109.10	8.2800
Wt. Dry Soil, gm	76.910	107.97	107.97	106.71
Water Content, %	37.58	38.13	24.72	24.72
Void Ratio	---	1.05	0.680	---
Degree of Saturation, %	---	100.00	100.00	---
Dry Unit Weight, pcf	---	83.793	102.19	---

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.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B301
Sample No.: U-6
Test No.: IP-1

Location: Durham, NH
Tested By: md
Test Date: 09/04/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 55-57 ft
Elevation: ---

Soil Description: Wet, olive gray clay
Remarks: System V

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.250	0.01042	1.03	1.04	11.849	2.05e-006	4.17e-002	2.30e-004
2	0.500	0.01698	1.01	1.70	28.414	8.40e-007	2.63e-002	5.95e-005
3	1.00	0.02899	0.989	2.90	22.203	1.05e-006	2.40e-002	6.83e-005
4	2.00	0.06183	0.922	6.18	26.714	8.37e-007	3.28e-002	7.41e-005
5	4.00	0.1190	0.805	11.9	31.545	6.44e-007	2.86e-002	4.96e-005
6	8.00	0.1617	0.717	16.2	10.813	1.68e-006	1.07e-002	4.83e-005
7	4.00	0.1592	0.722	15.9	0.485	3.57e-005	6.40e-004	6.16e-005
8	2.00	0.1566	0.728	15.7	3.406	5.11e-006	1.28e-003	1.77e-005
9	1.00	0.1533	0.734	15.3	15.120	1.16e-006	3.35e-003	1.05e-005
10	2.00	0.1543	0.732	15.4	15.998	1.10e-006	1.07e-003	3.18e-006
11	4.00	0.1594	0.722	15.9	7.416	2.35e-006	2.51e-003	1.59e-005
12	8.00	0.1710	0.698	17.1	9.154	1.87e-006	2.91e-003	1.47e-005
13	16.0	0.2039	0.631	20.4	6.662	2.43e-006	4.12e-003	2.70e-005
14	32.0	0.2442	0.548	24.4	5.436	2.72e-006	2.52e-003	1.85e-005
15	8.00	0.2323	0.572	23.2	0.410	3.47e-005	4.95e-004	4.64e-005
16	2.00	0.2193	0.599	21.9	9.327	1.58e-006	2.16e-003	9.20e-006
17	0.250	0.1985	0.642	19.9	93.392	1.64e-007	1.19e-002	5.28e-006

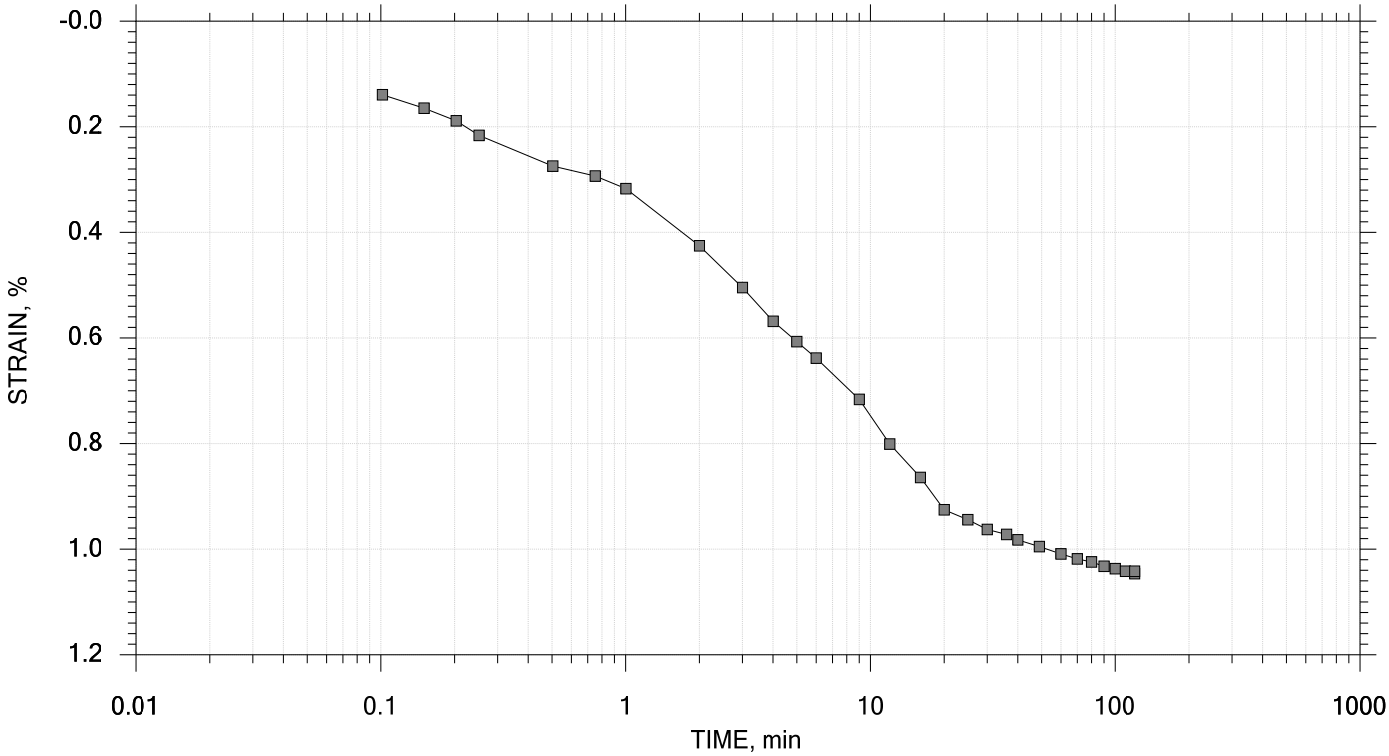
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.250	0.01042	1.03	1.04	0.000	0.00e+000	4.17e-002	0.00e+000	0.00e+000
2	0.500	0.01698	1.01	1.70	5.585	9.93e-007	2.63e-002	7.03e-005	0.00e+000
3	1.00	0.02899	0.989	2.90	0.000	0.00e+000	2.40e-002	0.00e+000	0.00e+000
4	2.00	0.06183	0.922	6.18	8.823	5.89e-007	3.28e-002	5.21e-005	0.00e+000
5	4.00	0.1190	0.805	11.9	7.542	6.25e-007	2.86e-002	4.82e-005	0.00e+000
6	8.00	0.1617	0.717	16.2	3.031	1.39e-006	1.07e-002	4.00e-005	0.00e+000
7	4.00	0.1592	0.722	15.9	0.000	0.00e+000	6.40e-004	0.00e+000	0.00e+000
8	2.00	0.1566	0.728	15.7	0.395	1.02e-005	1.28e-003	3.54e-005	0.00e+000
9	1.00	0.1533	0.734	15.3	0.000	0.00e+000	3.35e-003	0.00e+000	0.00e+000
10	2.00	0.1543	0.732	15.4	0.000	0.00e+000	1.07e-003	0.00e+000	0.00e+000
11	4.00	0.1594	0.722	15.9	0.000	0.00e+000	2.51e-003	0.00e+000	0.00e+000
12	8.00	0.1710	0.698	17.1	1.430	2.78e-006	2.91e-003	2.18e-005	0.00e+000
13	16.0	0.2039	0.631	20.4	2.107	1.79e-006	4.12e-003	1.98e-005	0.00e+000
14	32.0	0.2442	0.548	24.4	0.000	0.00e+000	2.52e-003	0.00e+000	0.00e+000
15	8.00	0.2323	0.572	23.2	0.000	0.00e+000	4.95e-004	0.00e+000	0.00e+000
16	2.00	0.2193	0.599	21.9	2.175	1.57e-006	2.16e-003	9.17e-006	0.00e+000
17	0.250	0.1985	0.642	19.9	16.451	2.17e-007	1.19e-002	6.96e-006	0.00e+000

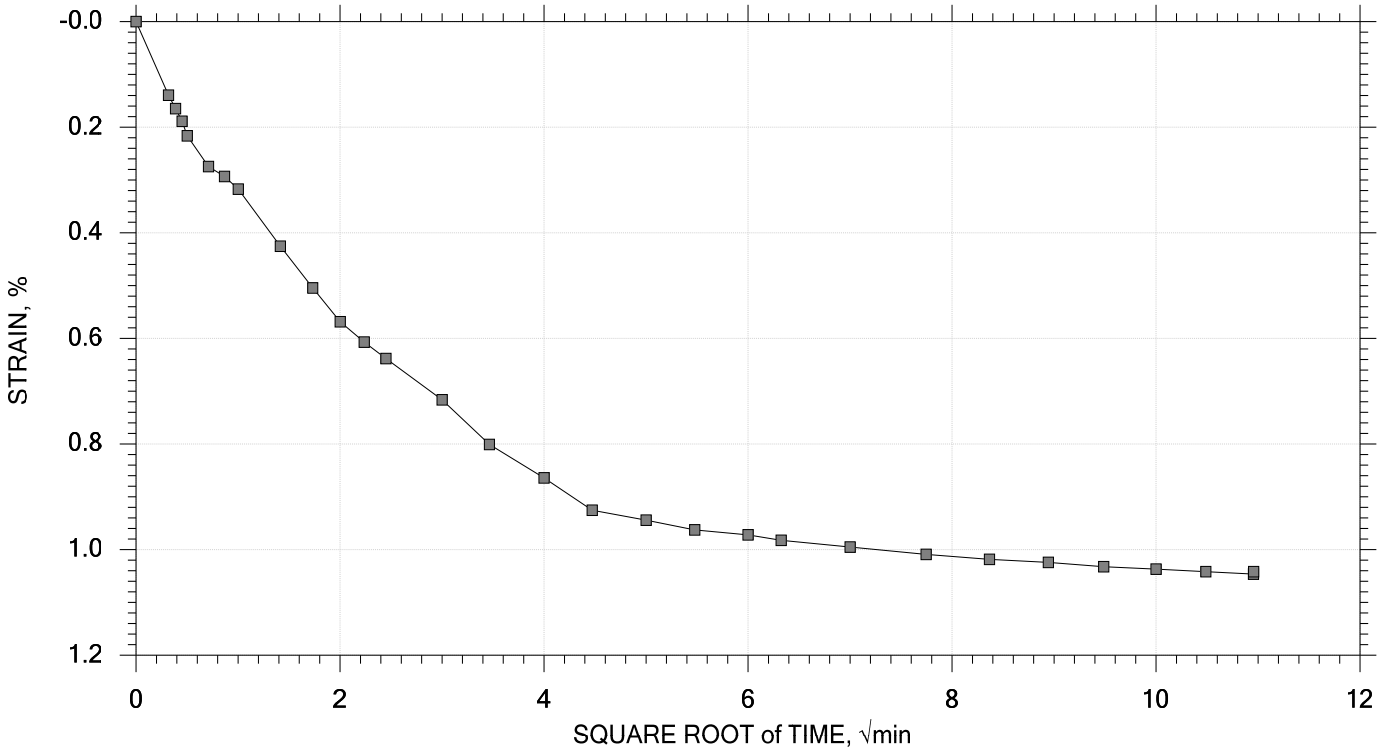
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 17

Stress: 0.25 tsf





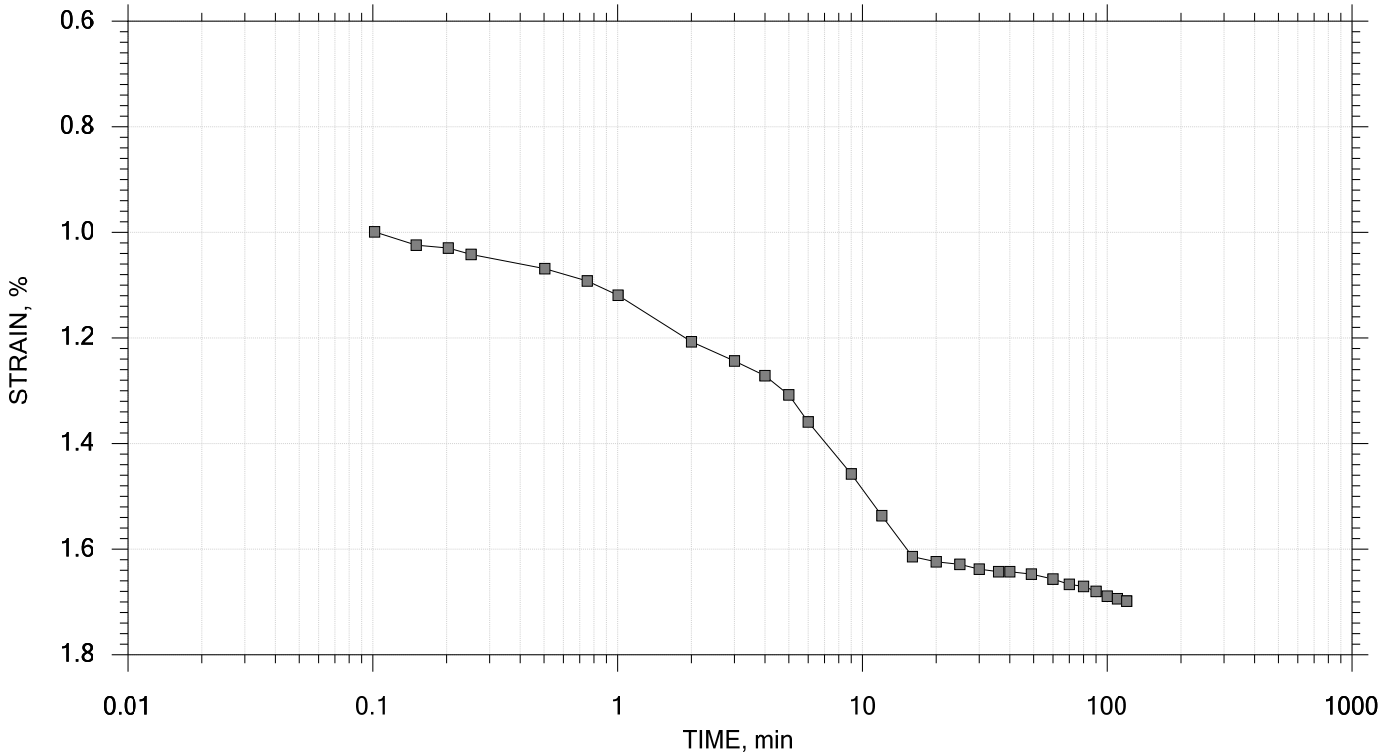
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

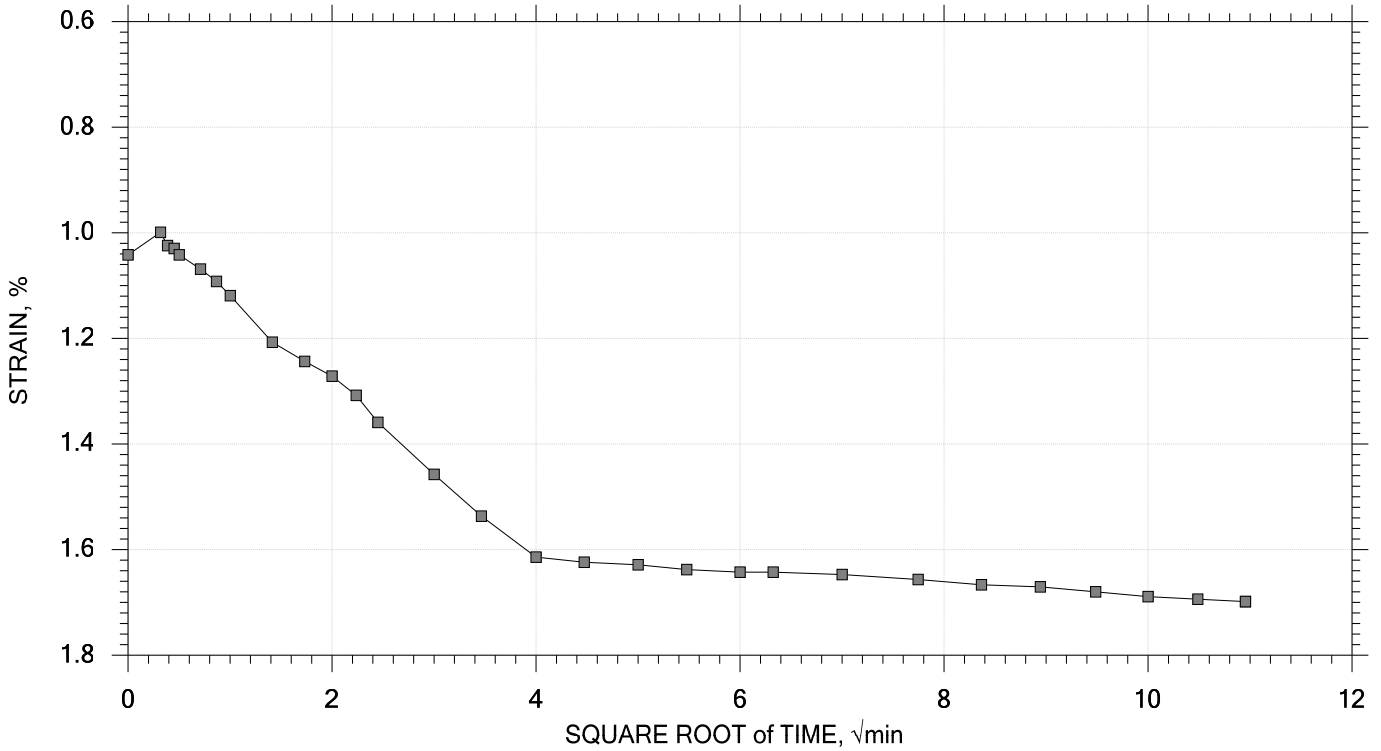
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 17

Stress: 0.5 tsf





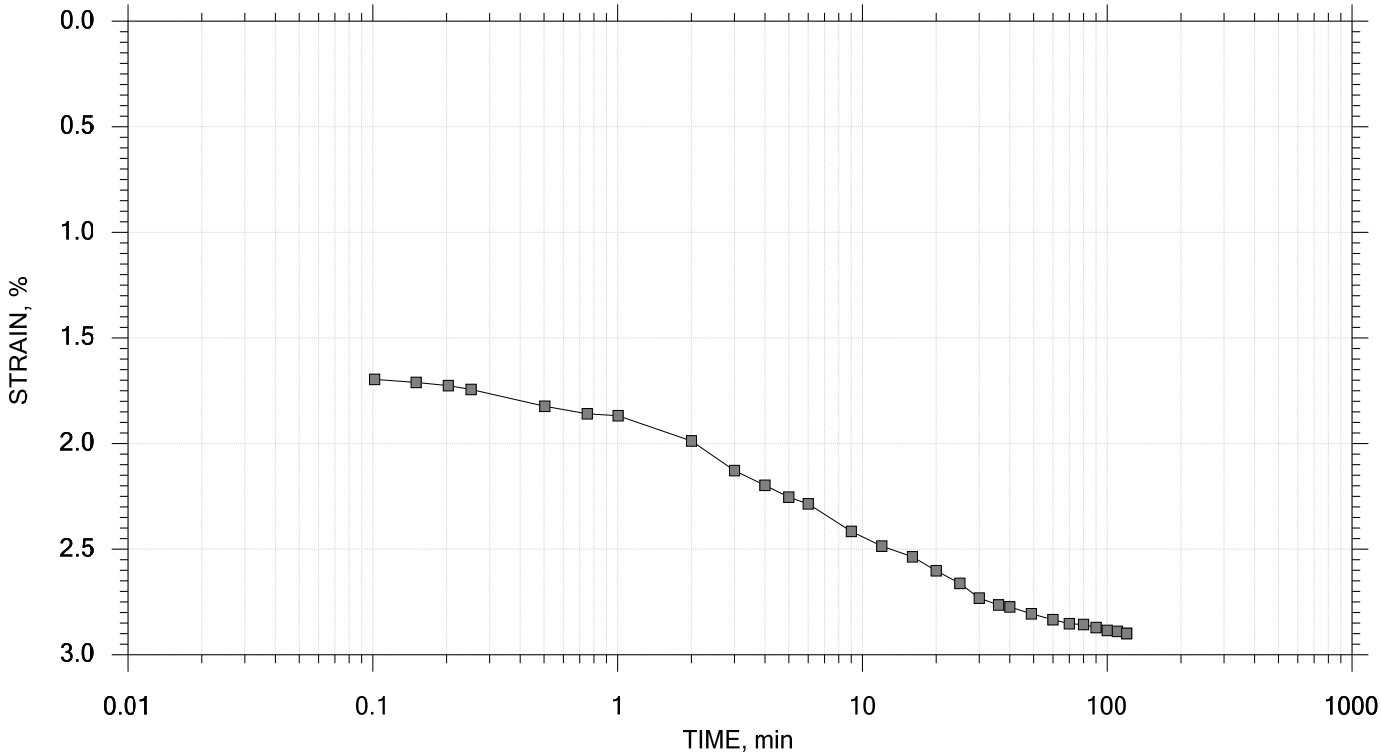
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

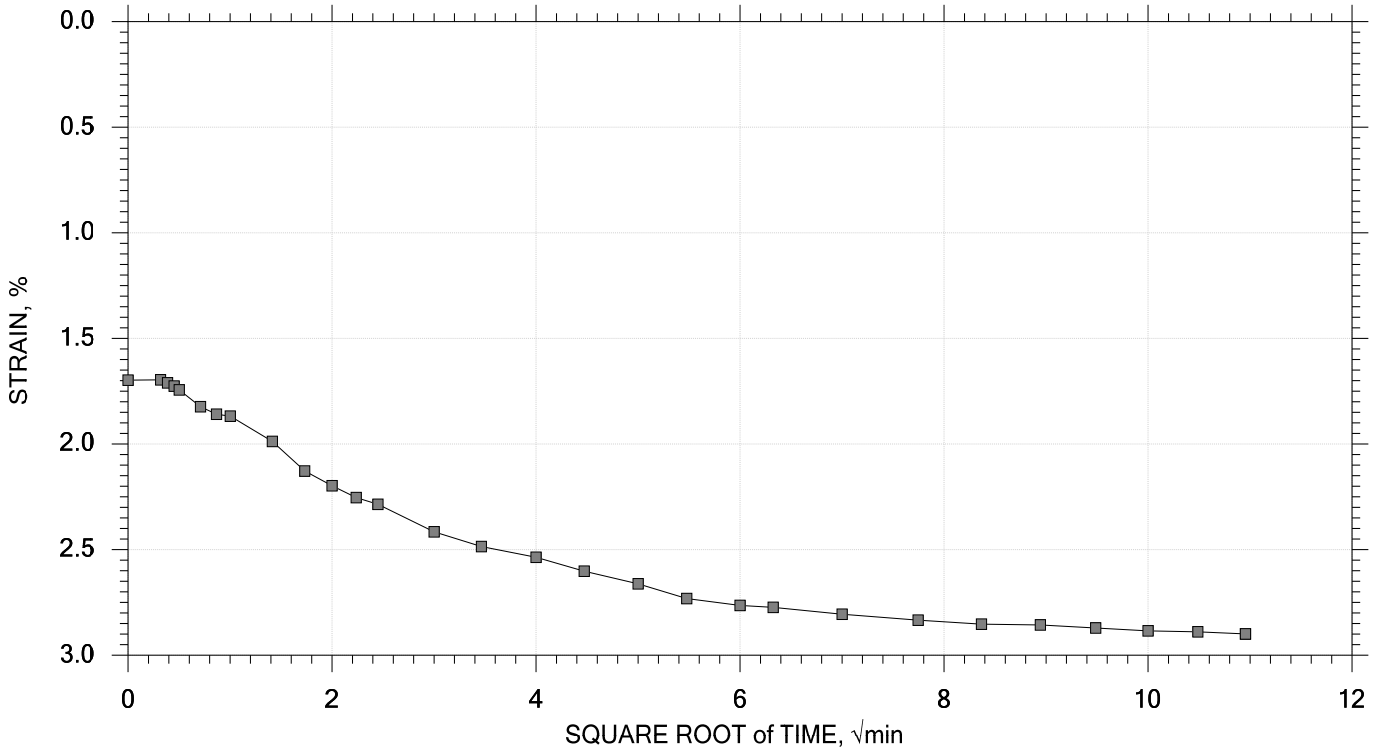
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 17

Stress: 1 tsf





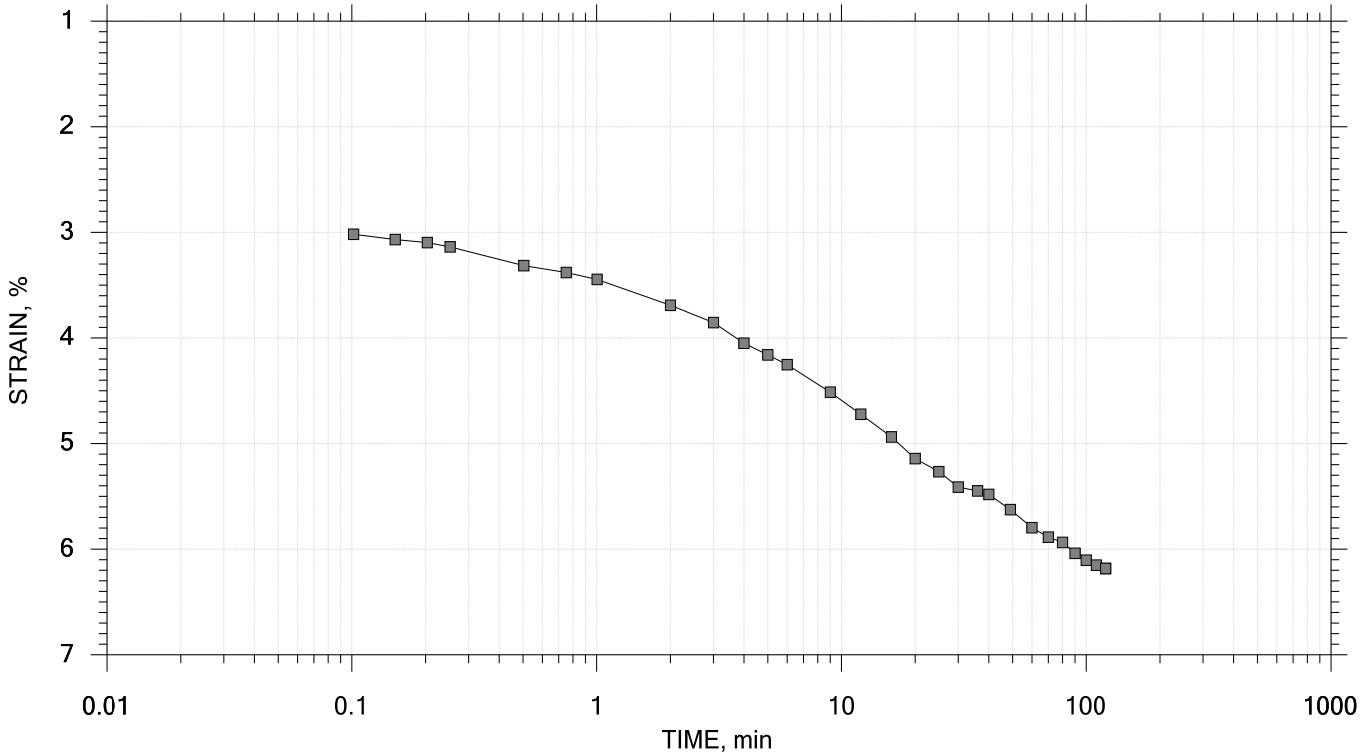
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

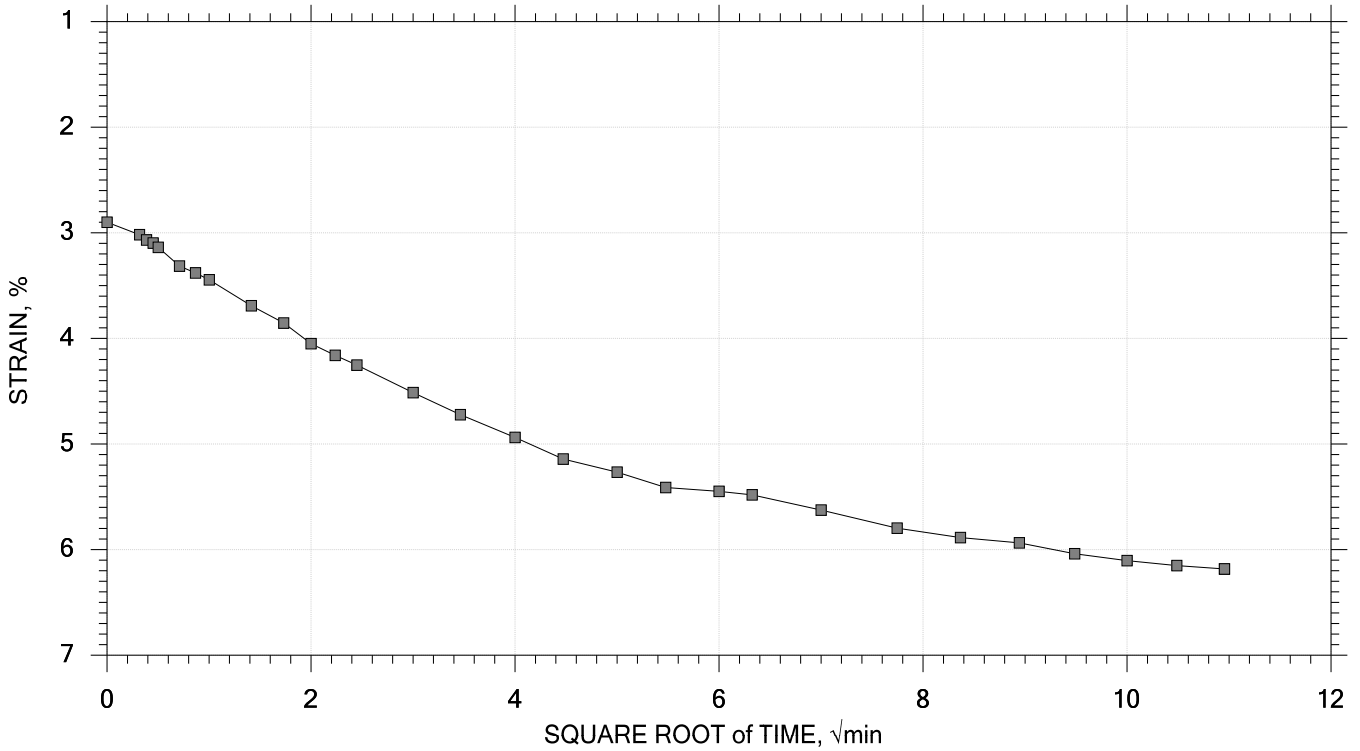
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 17

Stress: 2 tsf





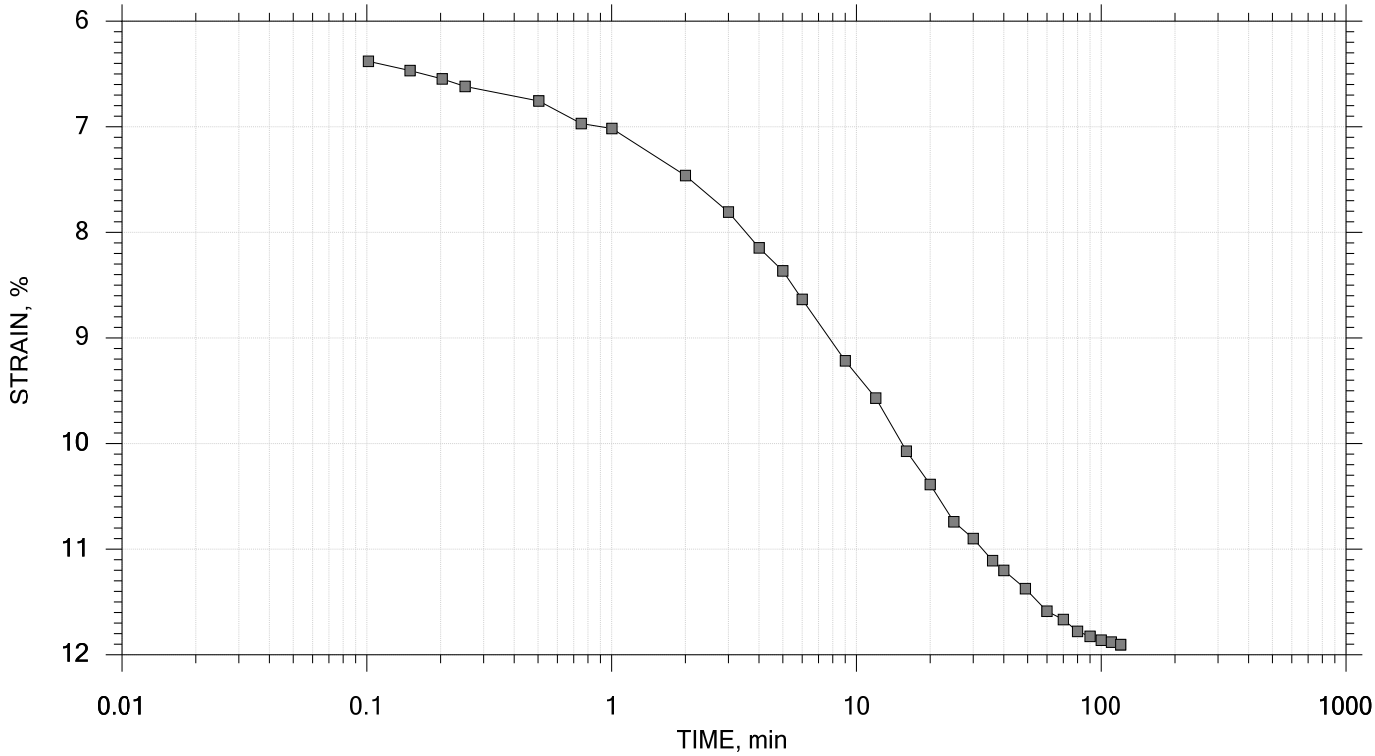
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

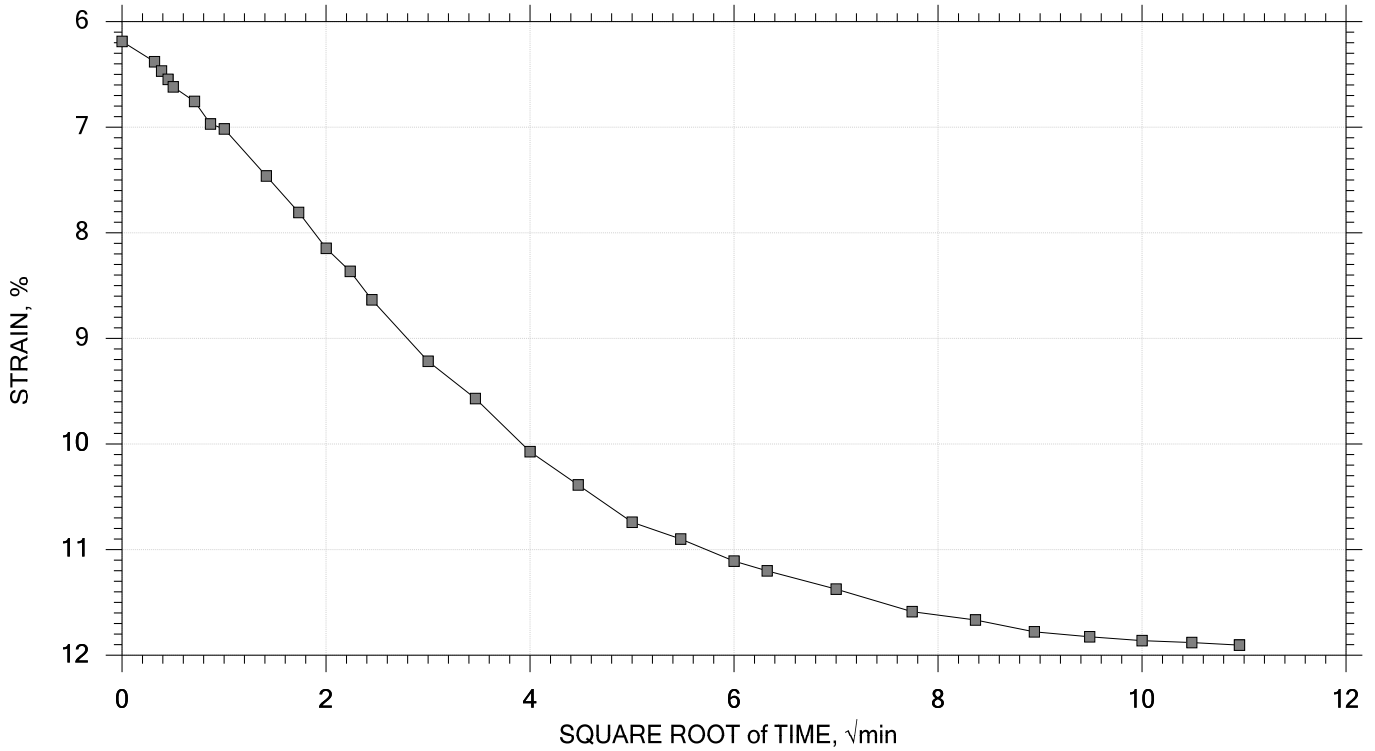
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 17

Stress: 4 tsf





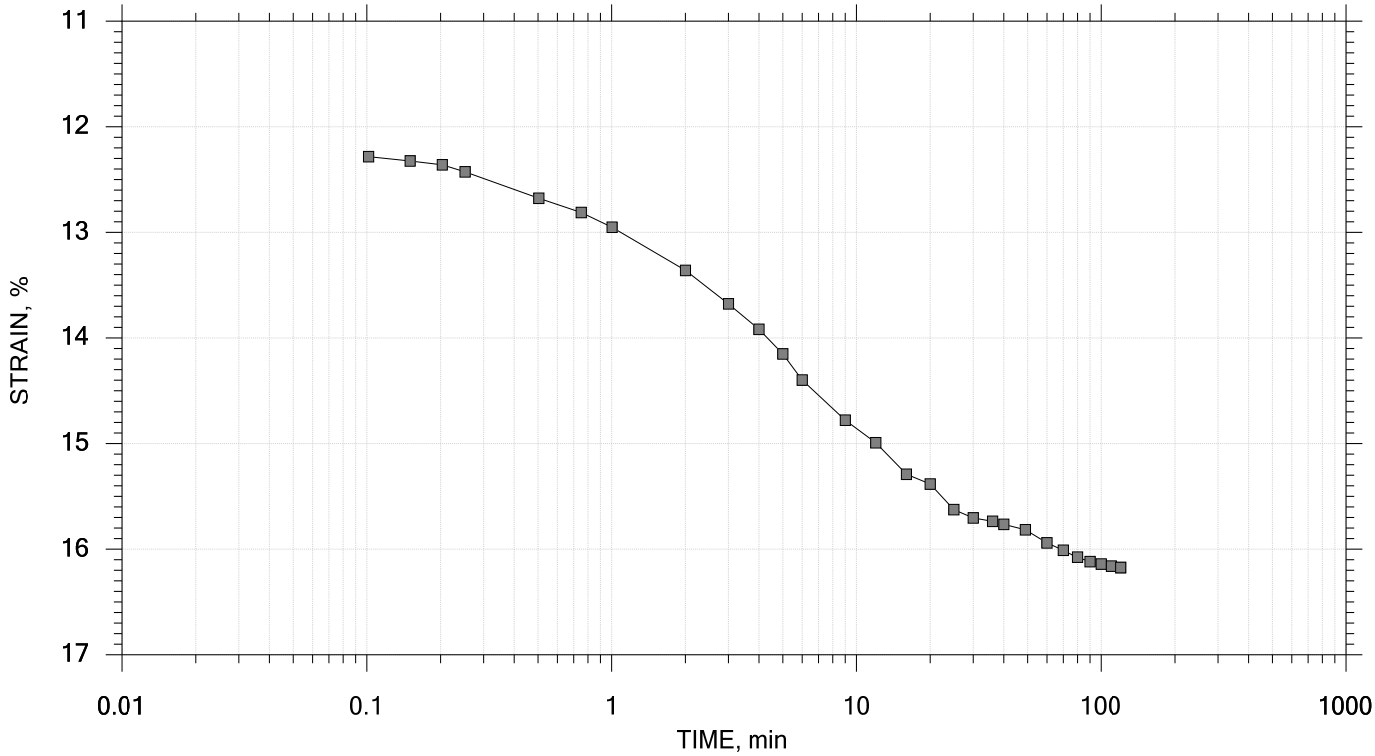
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

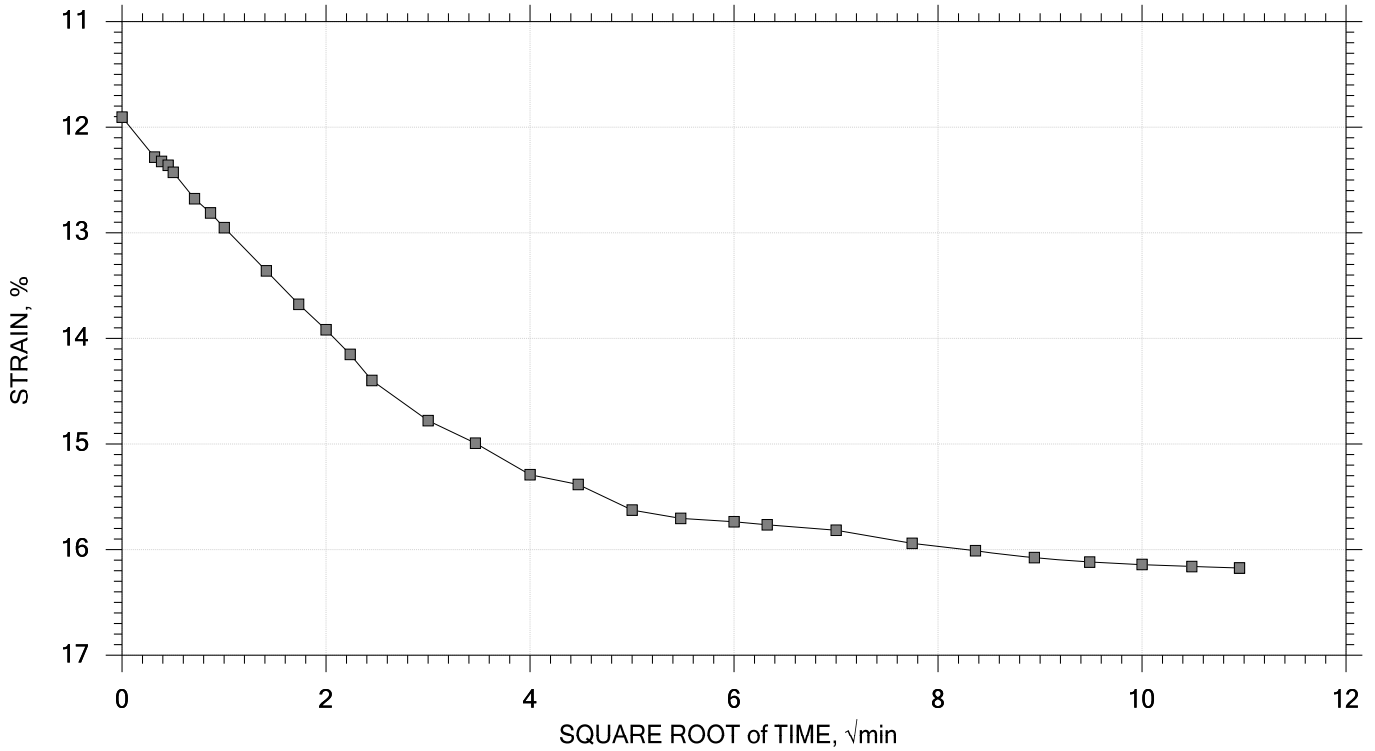
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 17

Stress: 8 tsf





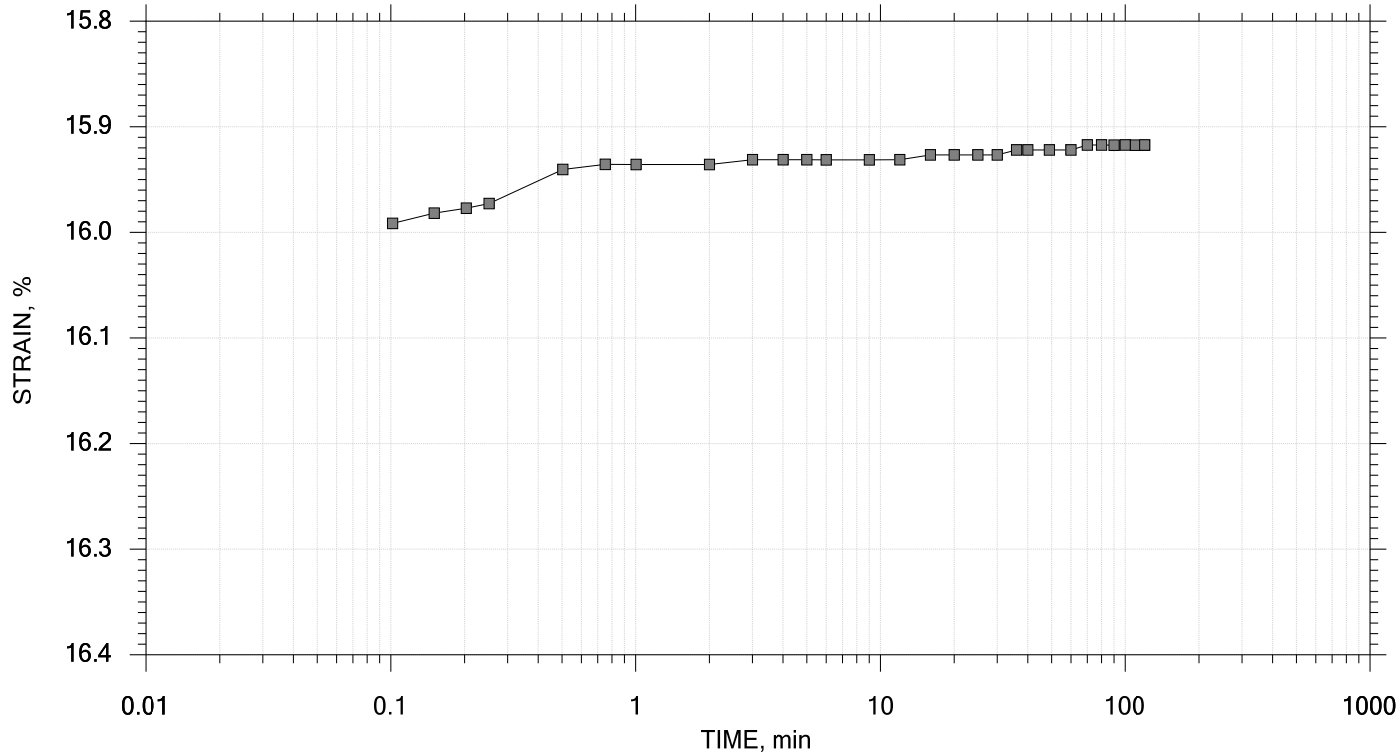
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

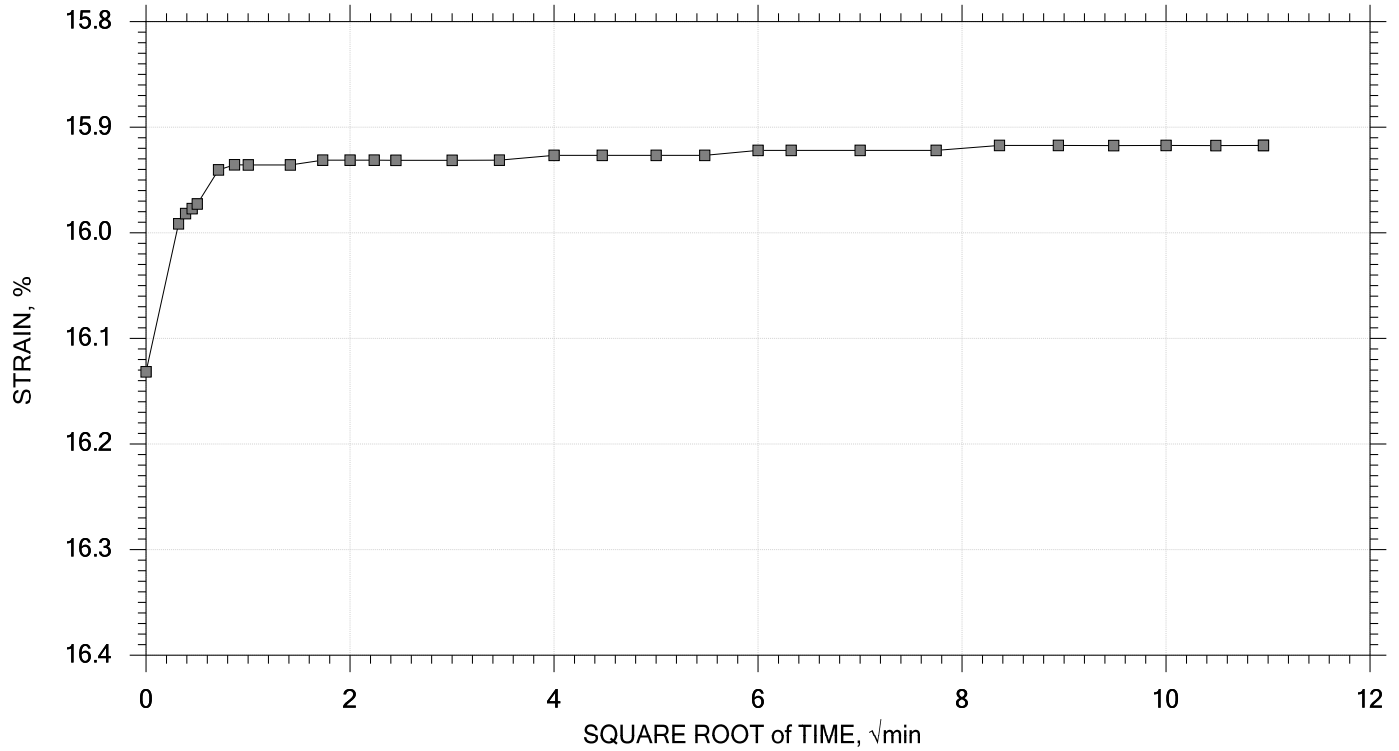
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 17

Stress: 4 tsf





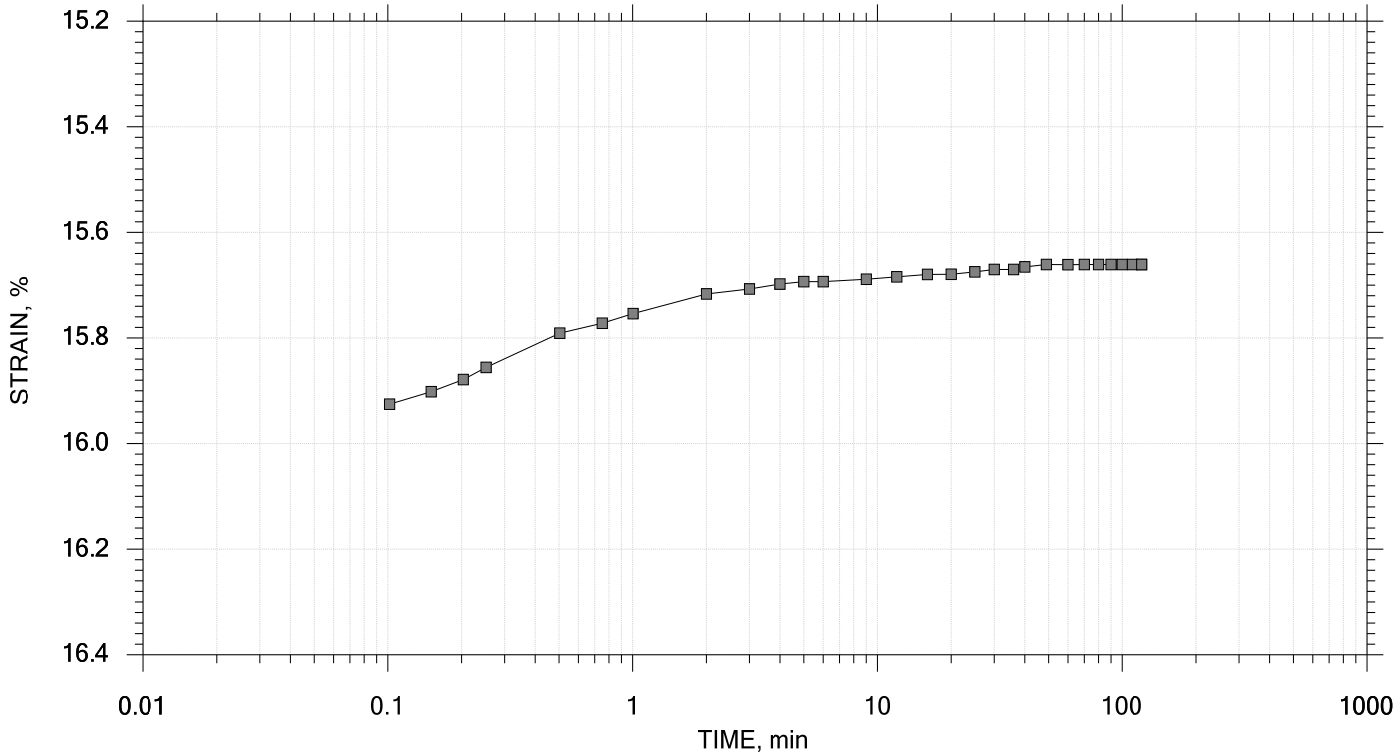
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

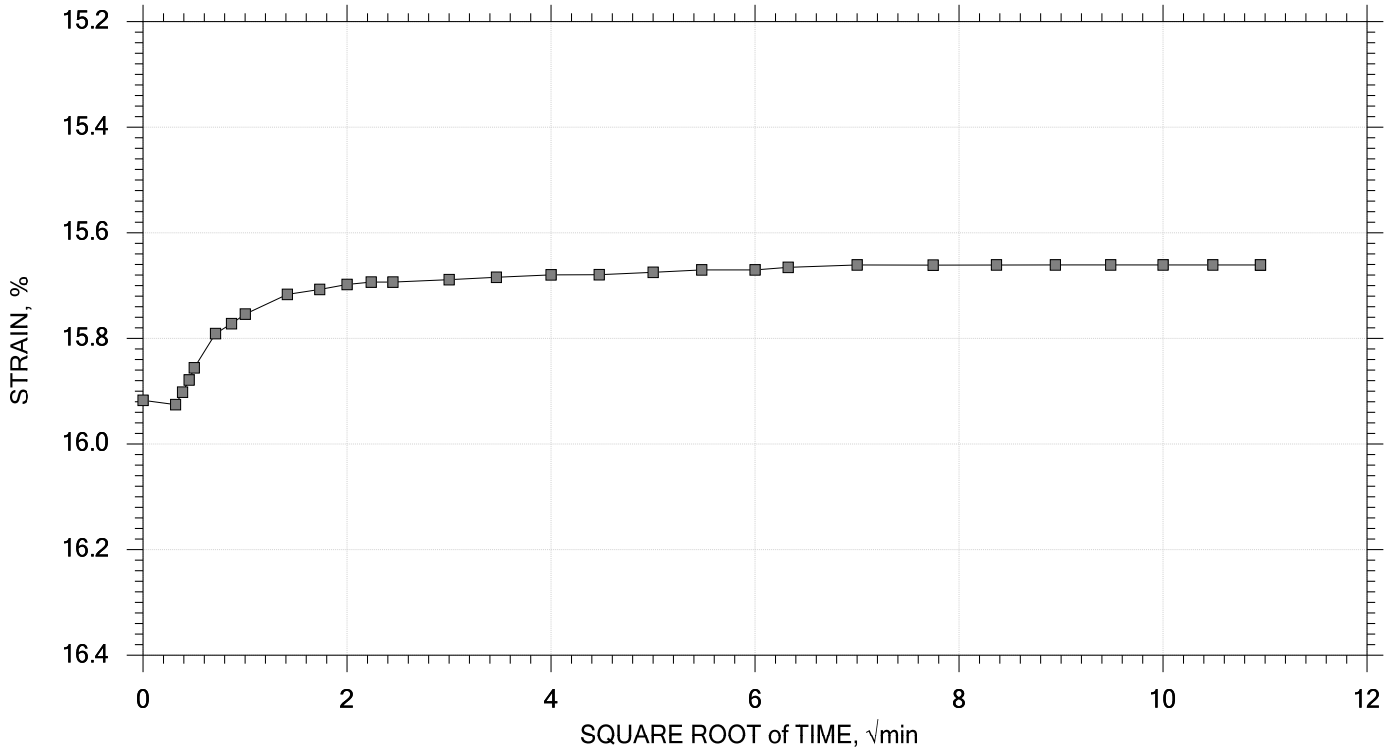
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 17

Stress: 2 tsf





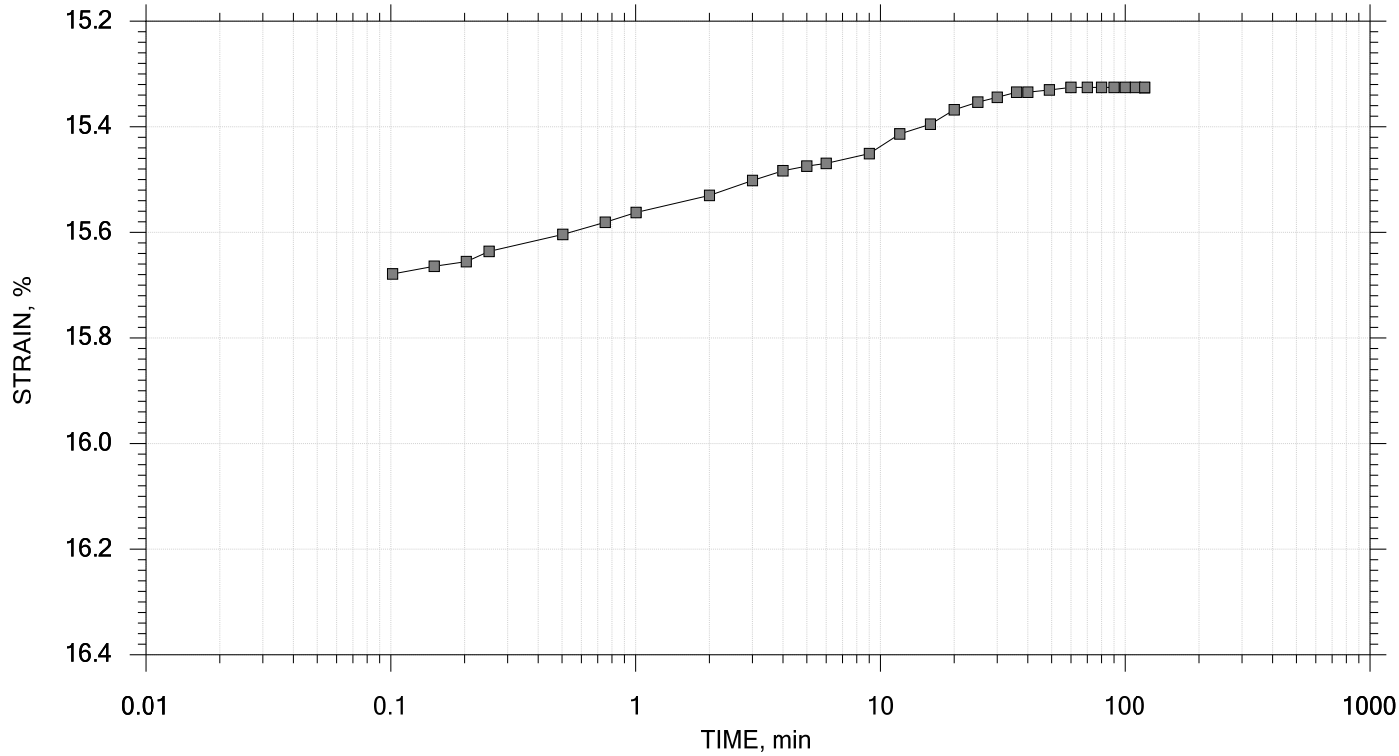
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

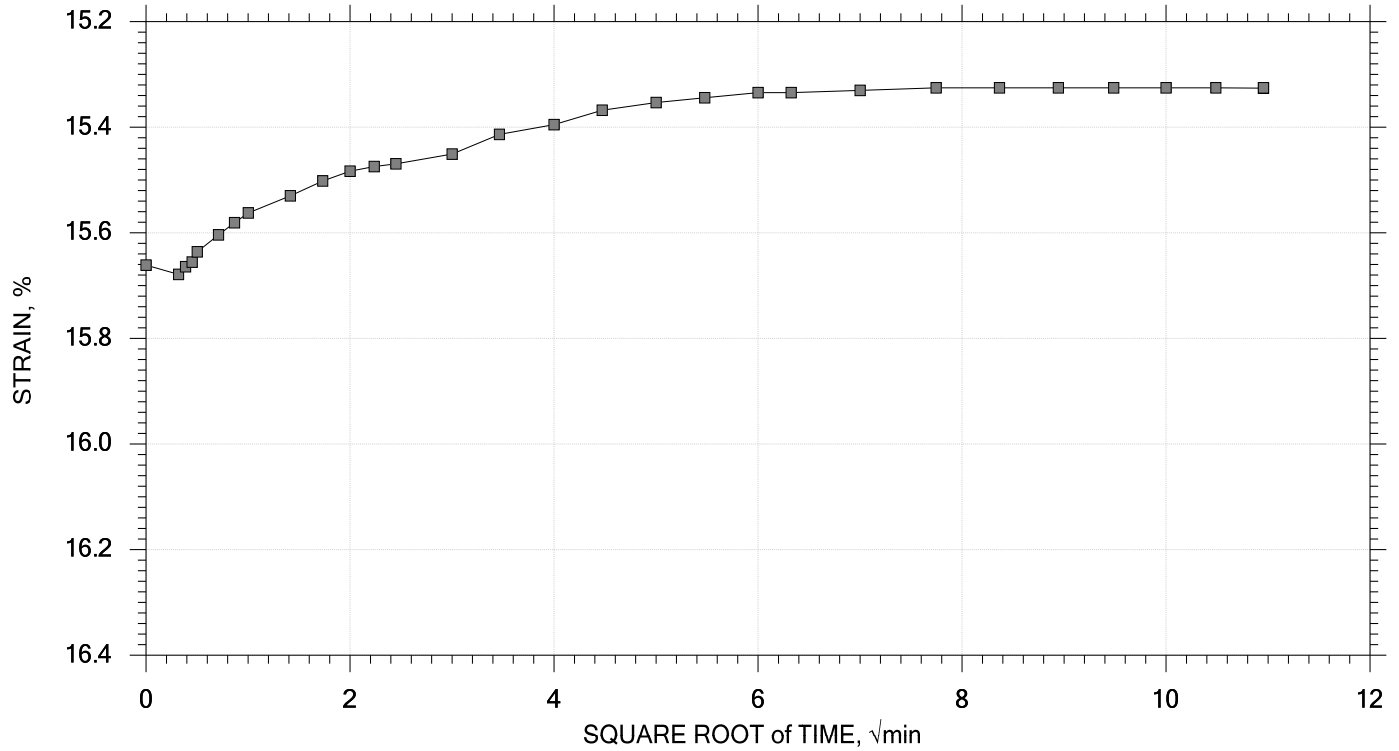
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 17

Stress: 1 tsf





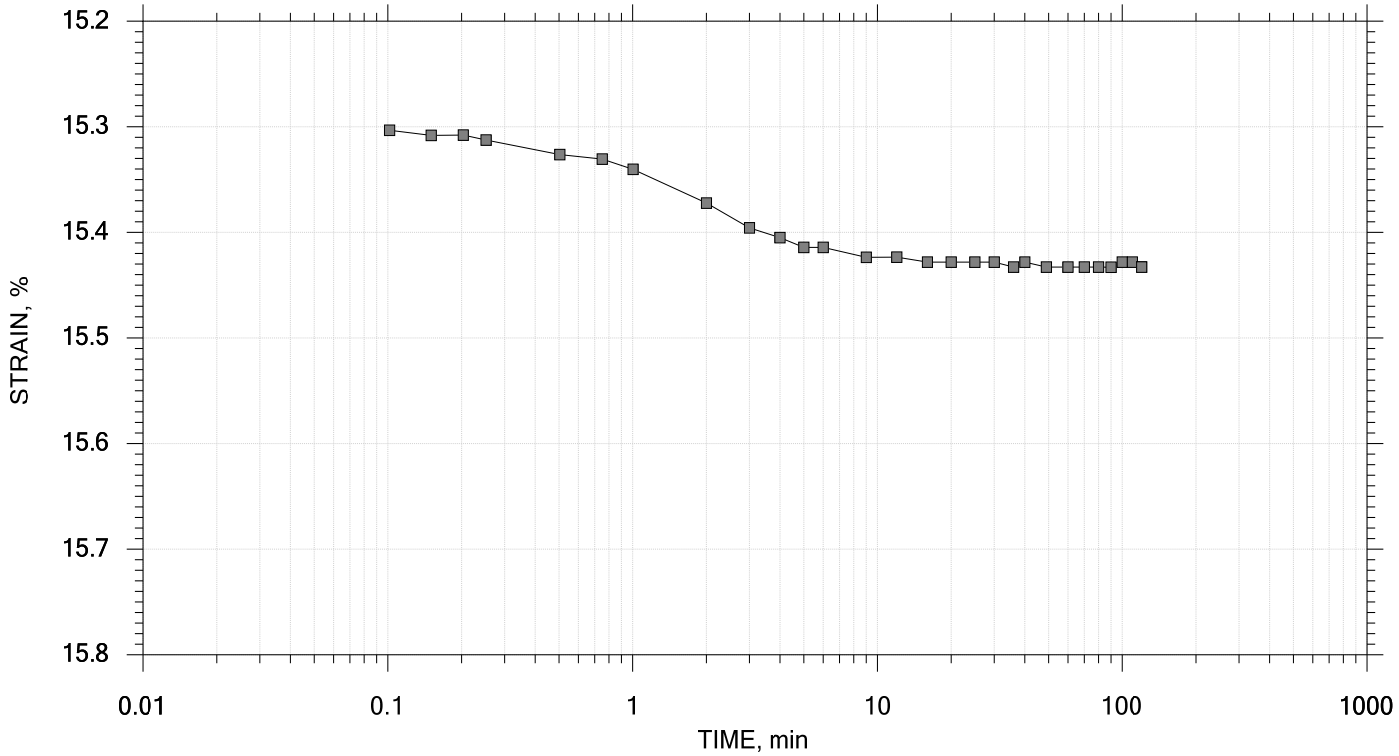
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

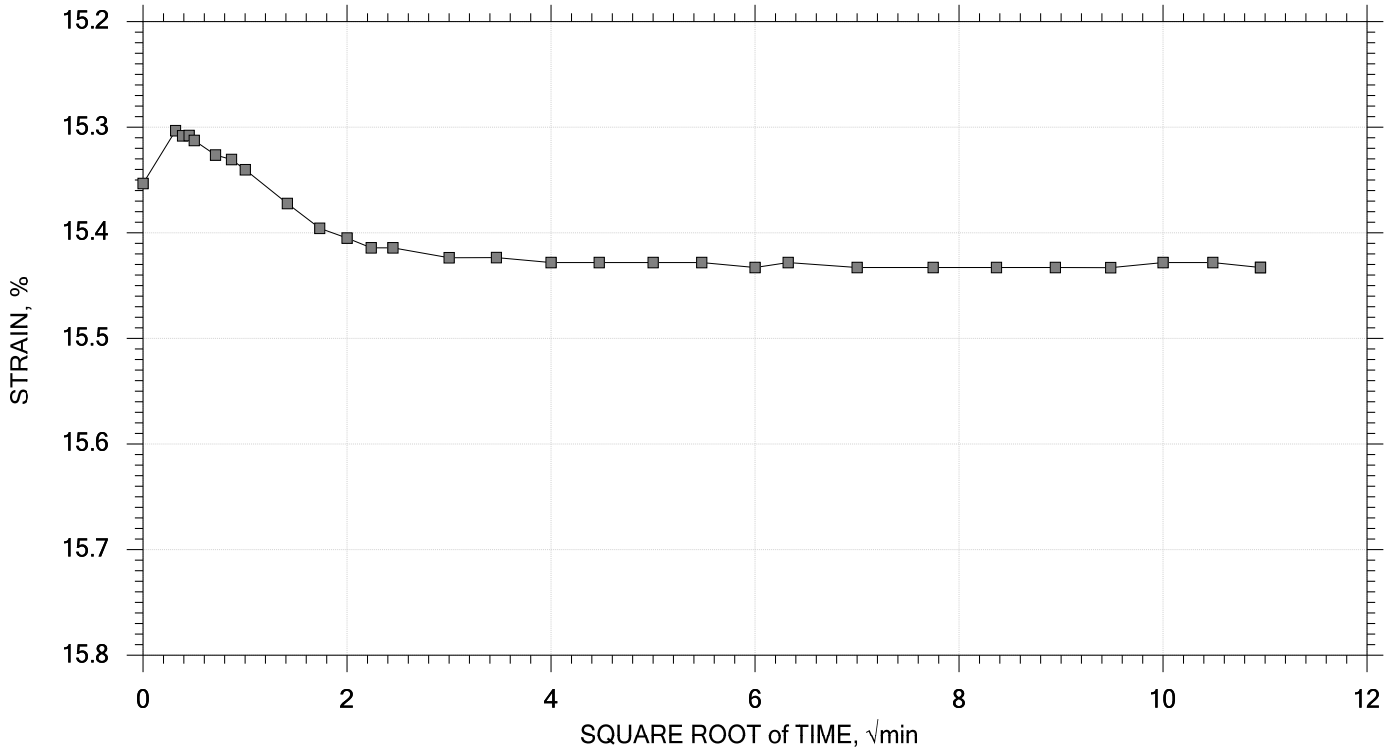
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 17

Stress: 2 tsf





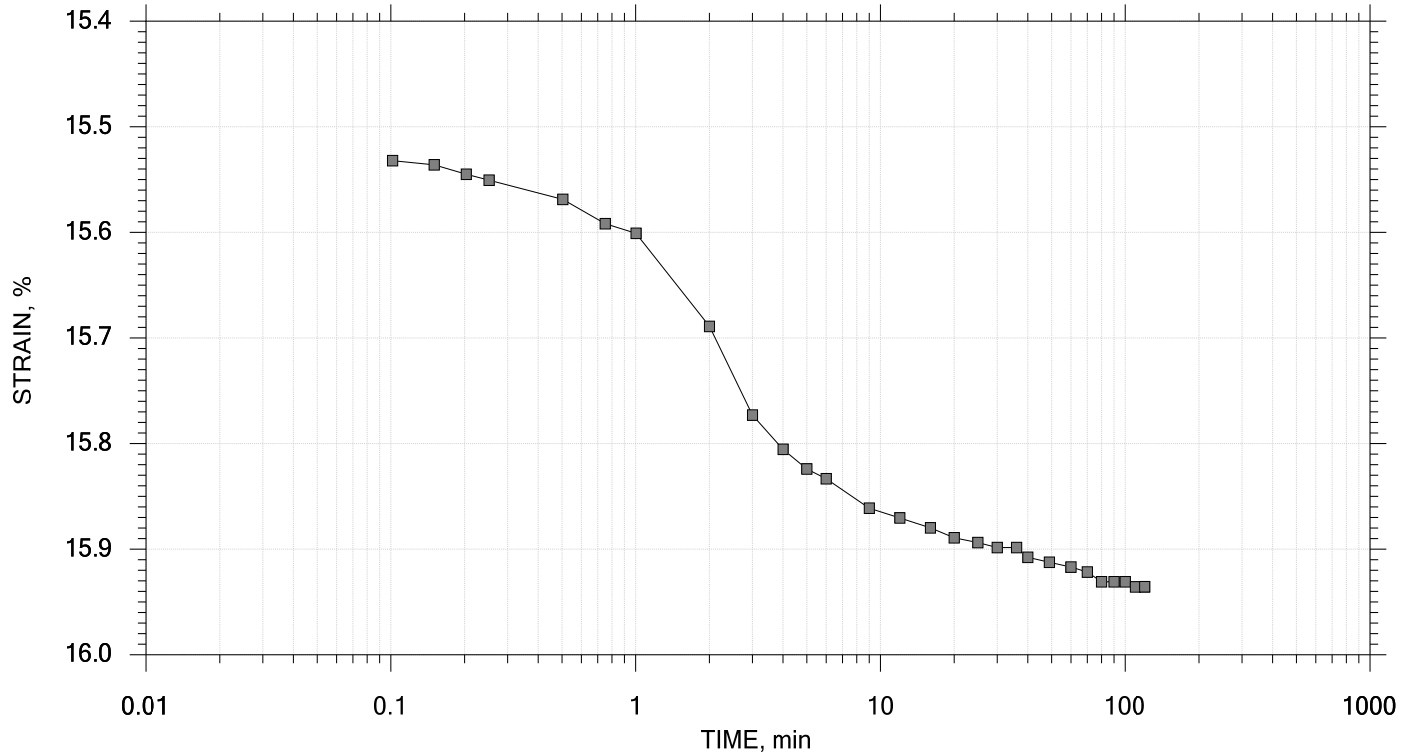
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

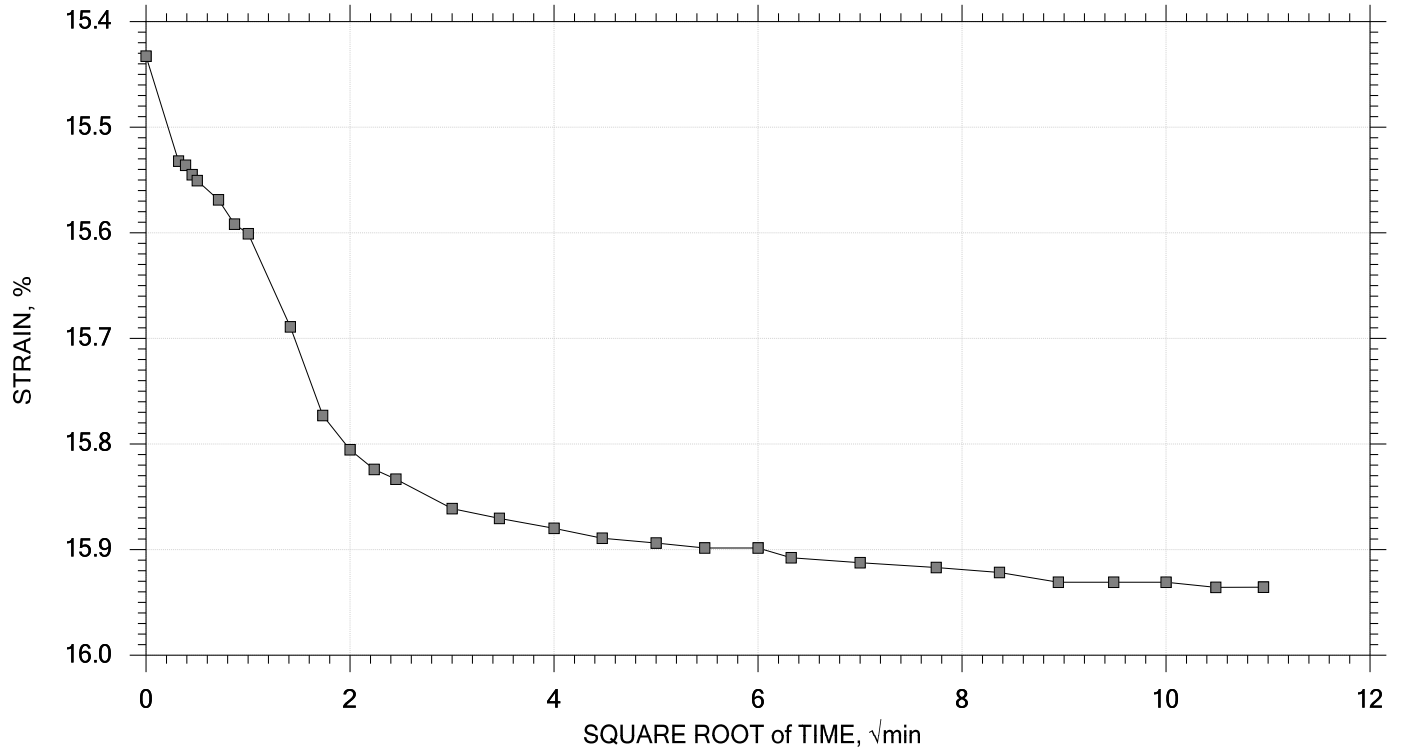
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 17

Stress: 4 tsf





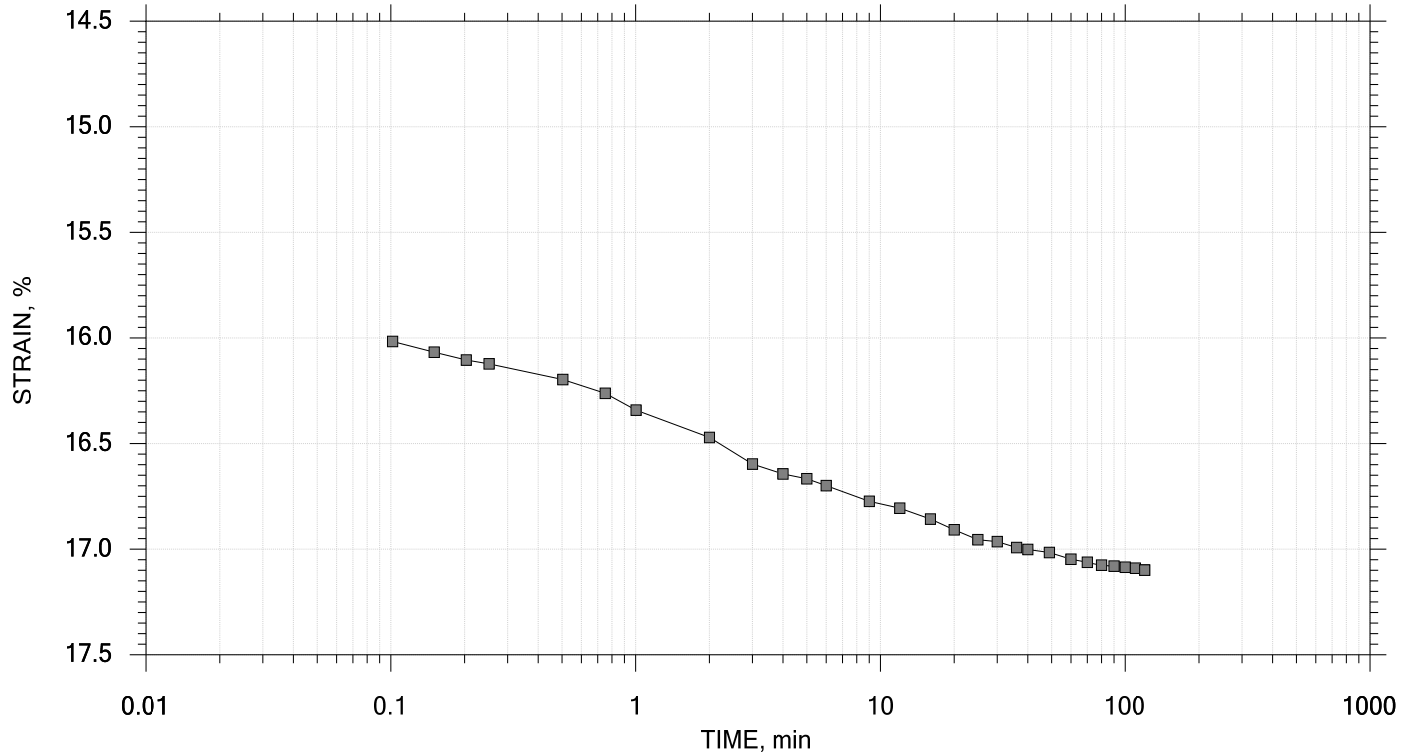
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

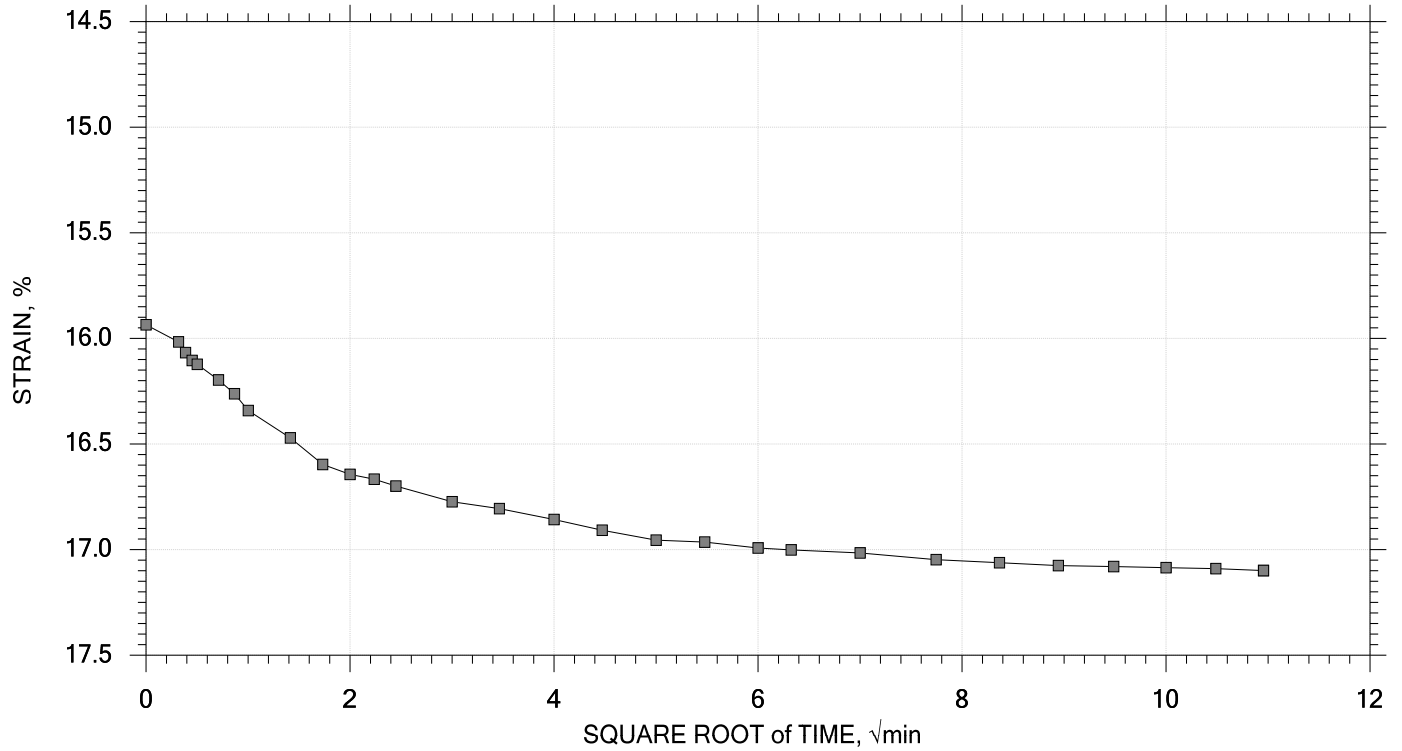
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 17

Stress: 8 tsf





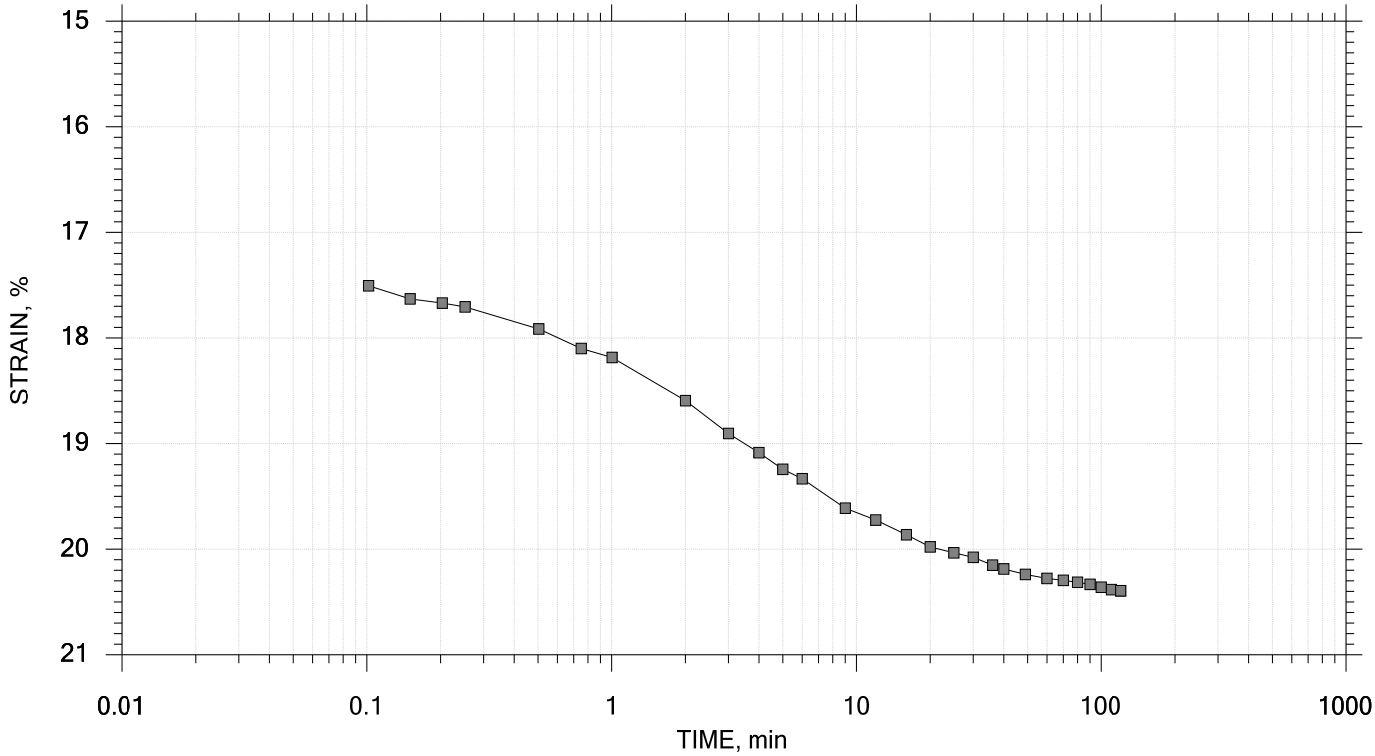
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

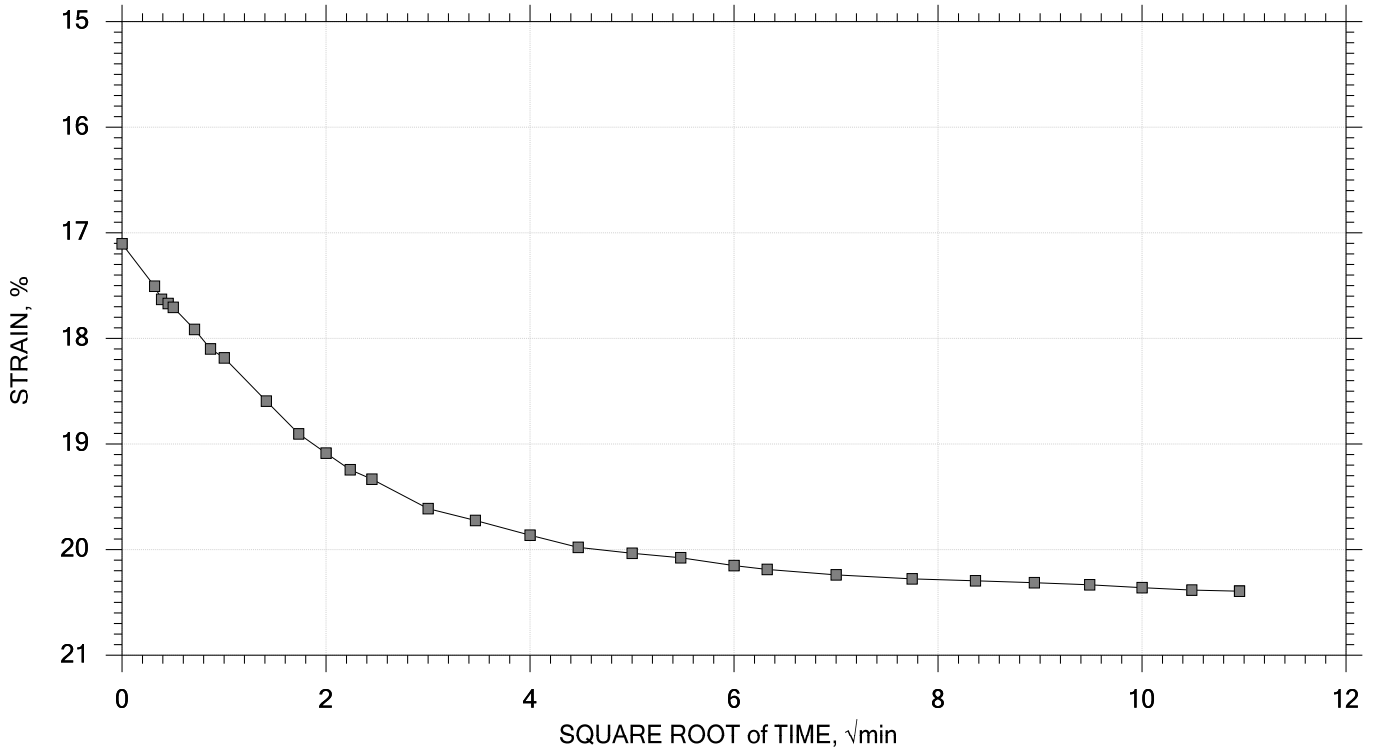
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 17

Stress: 16 tsf





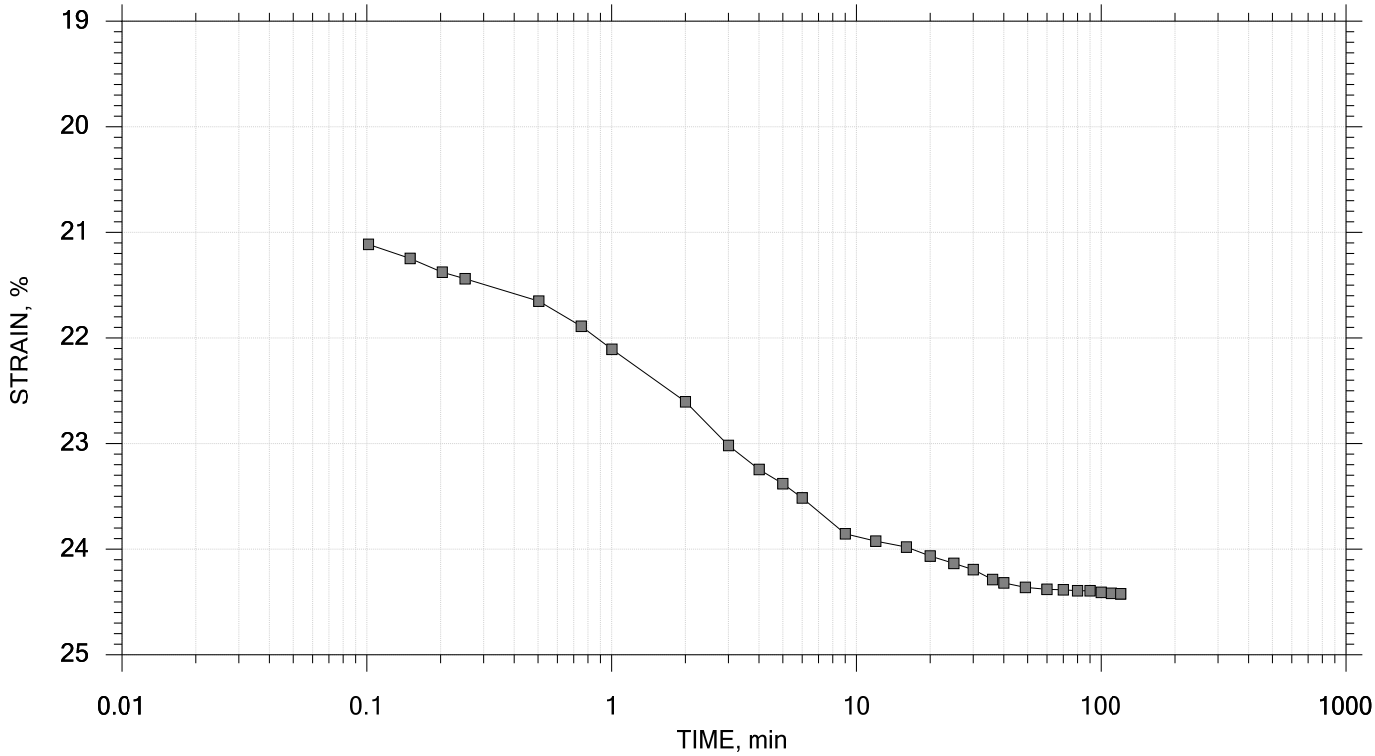
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

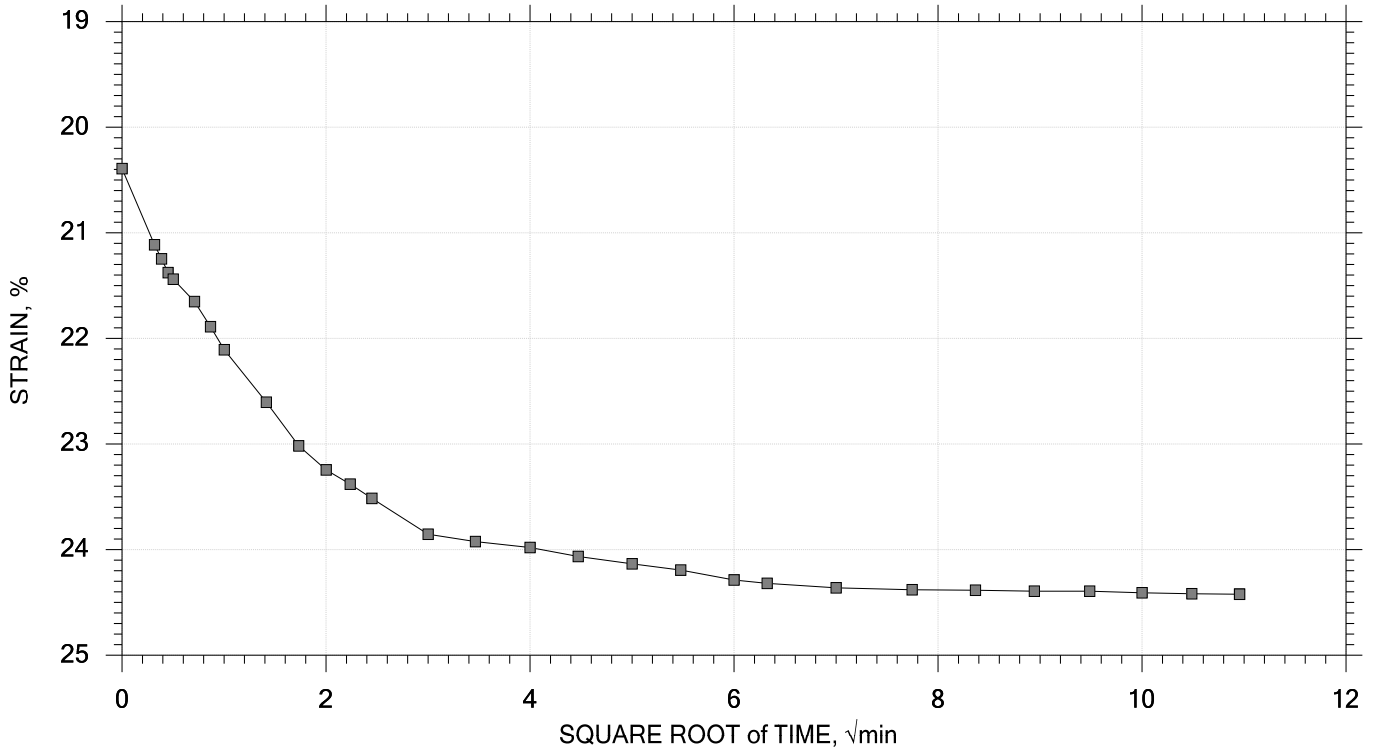
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 17

Stress: 32 tsf





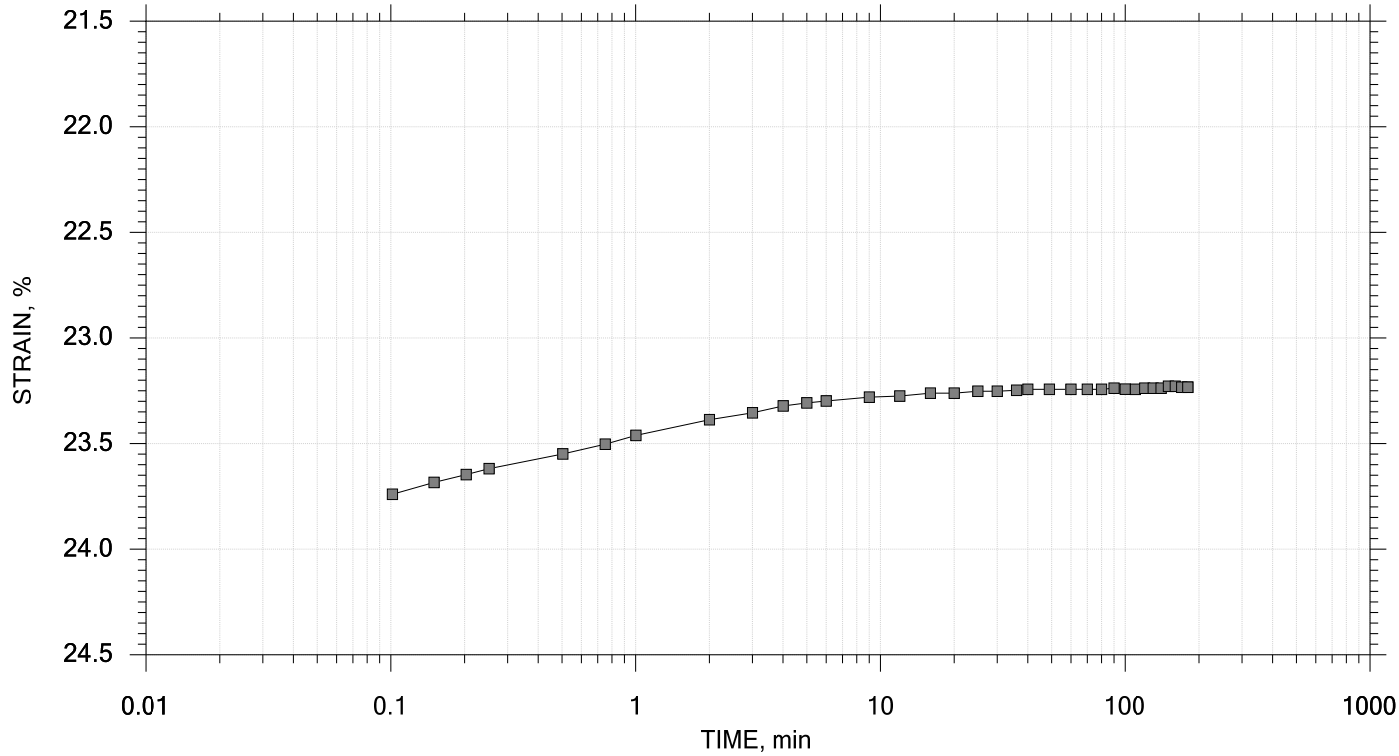
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

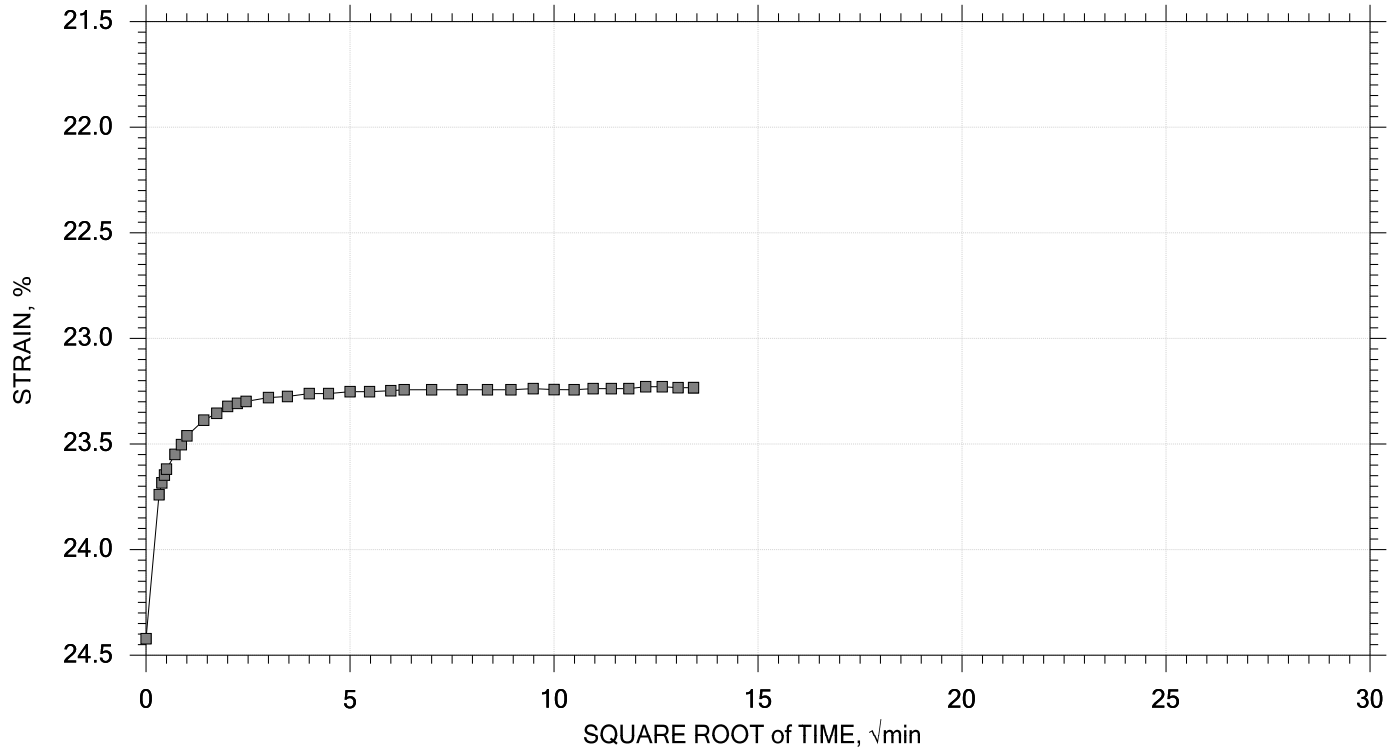
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 17

Stress: 8 tsf





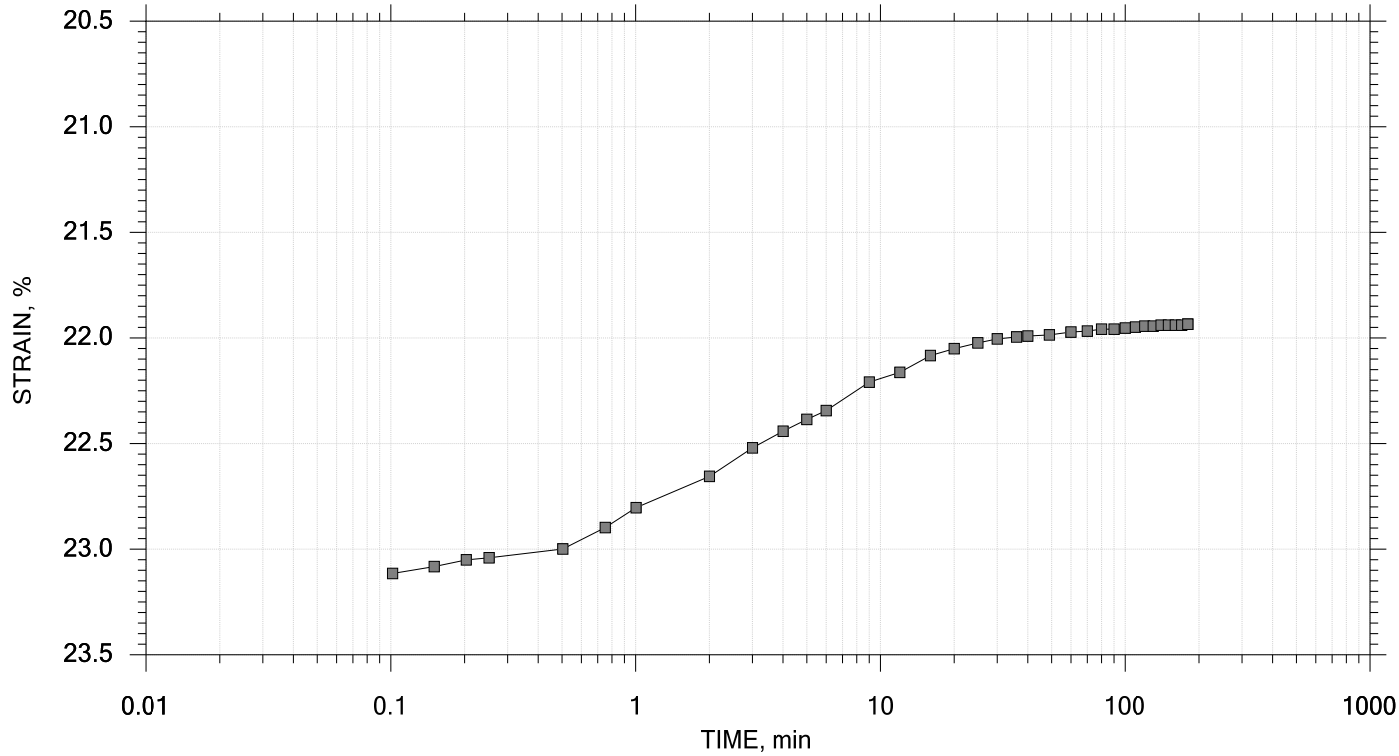
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

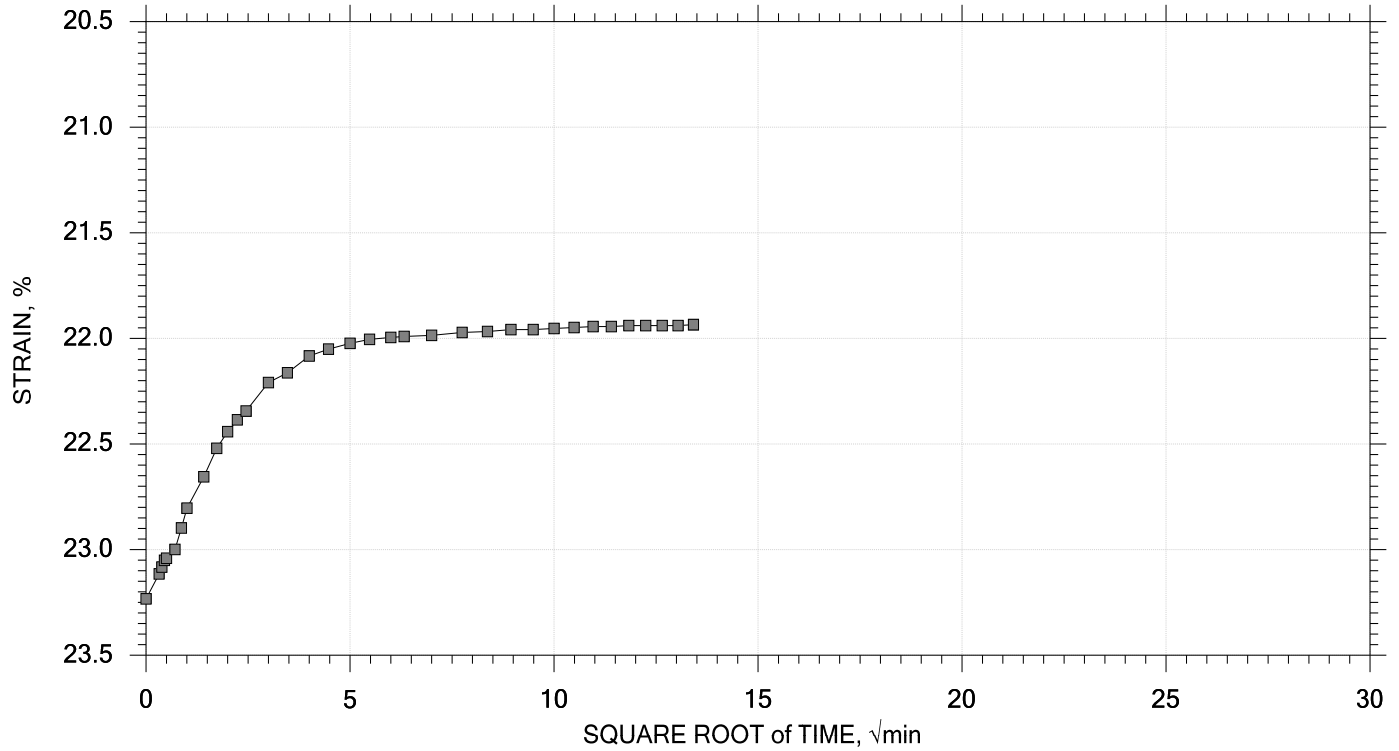
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 17

Stress: 2 tsf





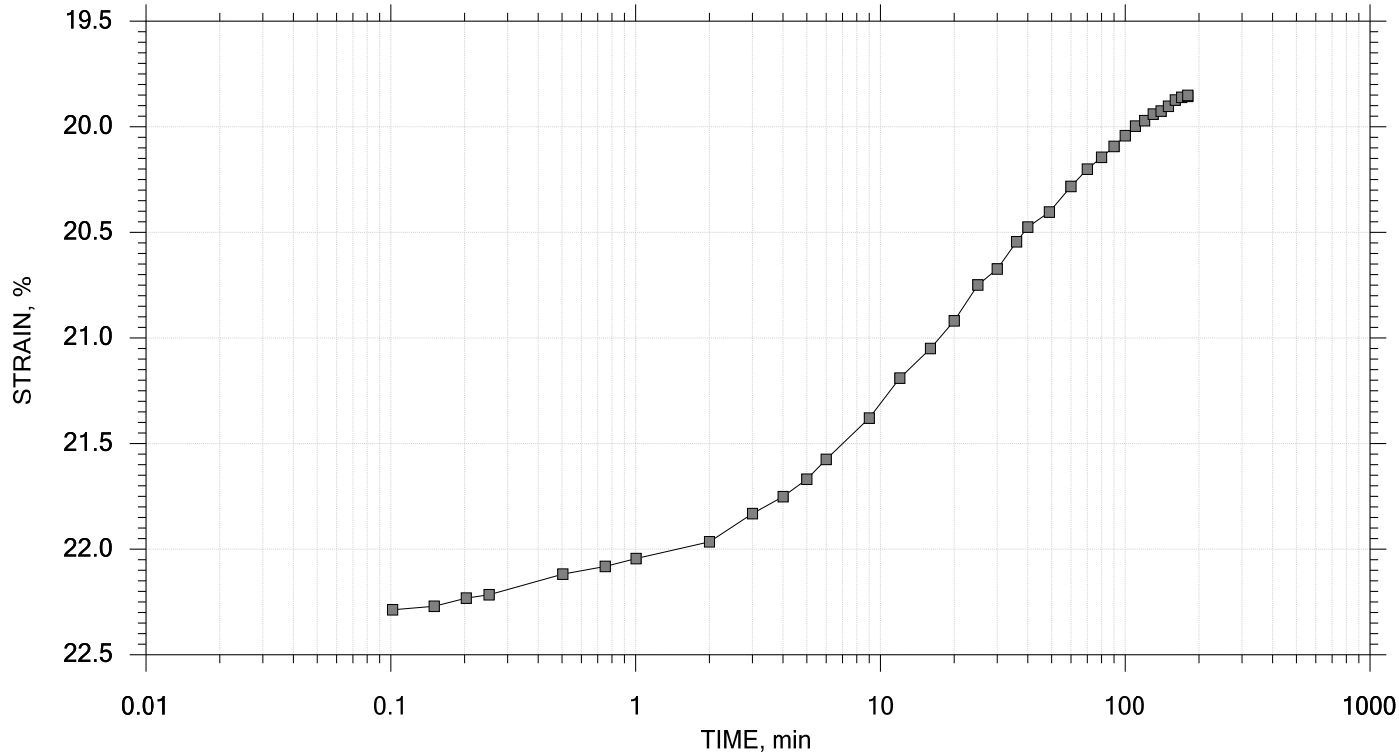
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

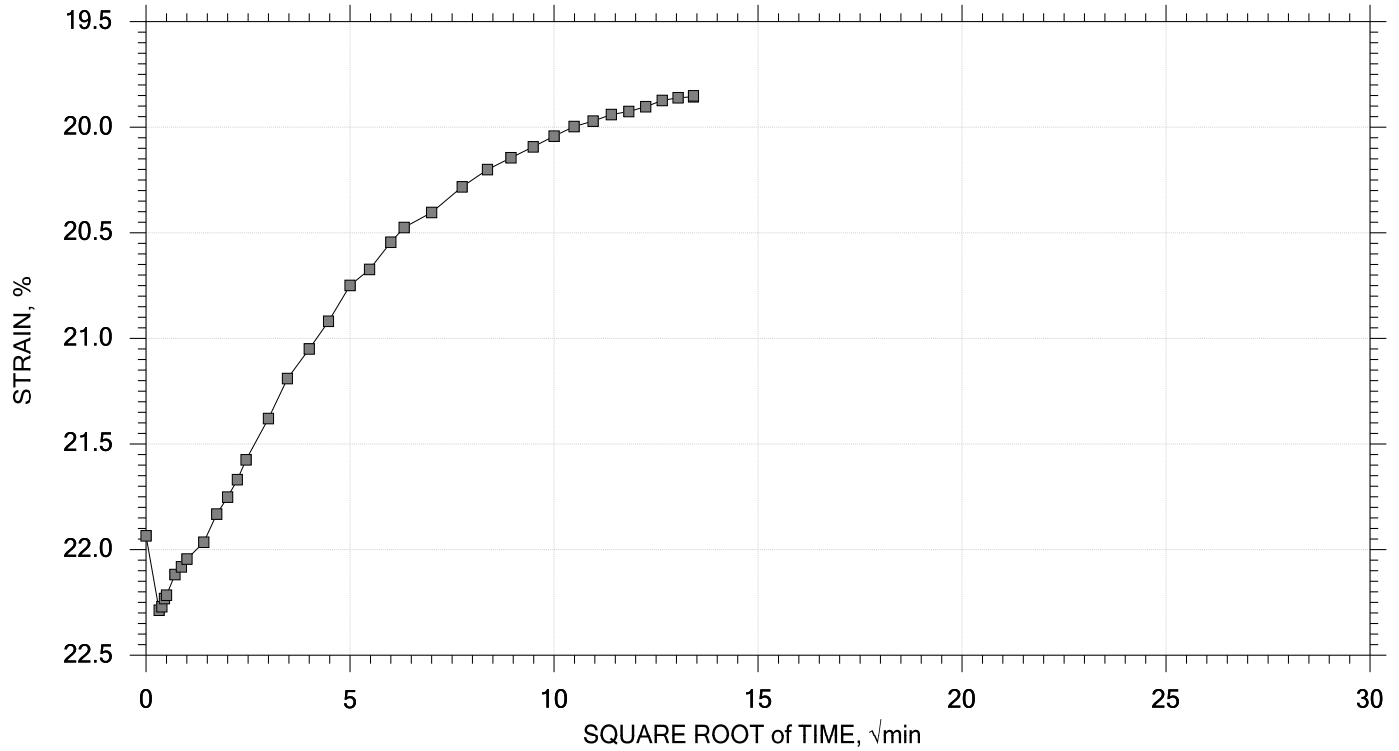
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 17

Stress: 0.25 tsf

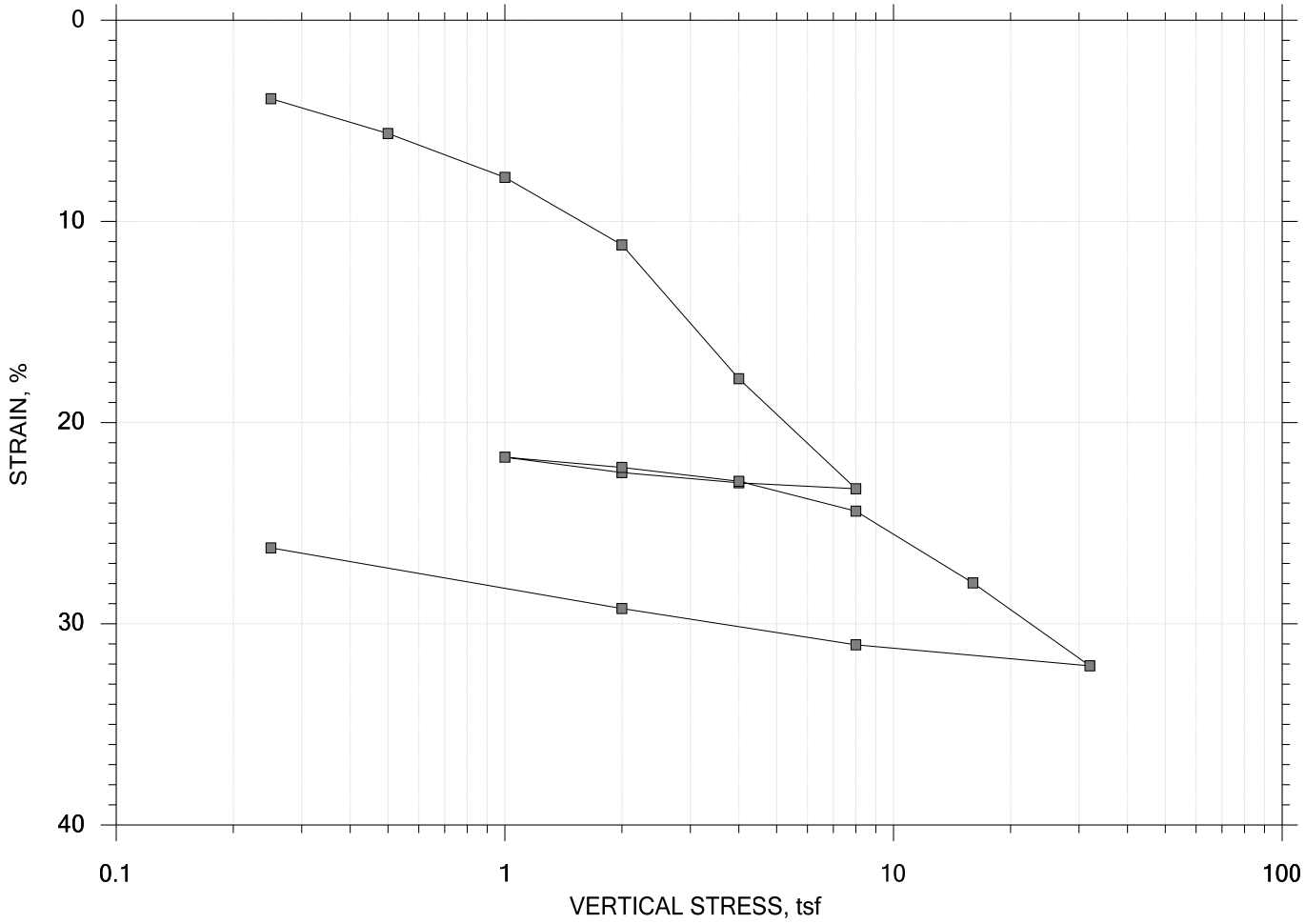


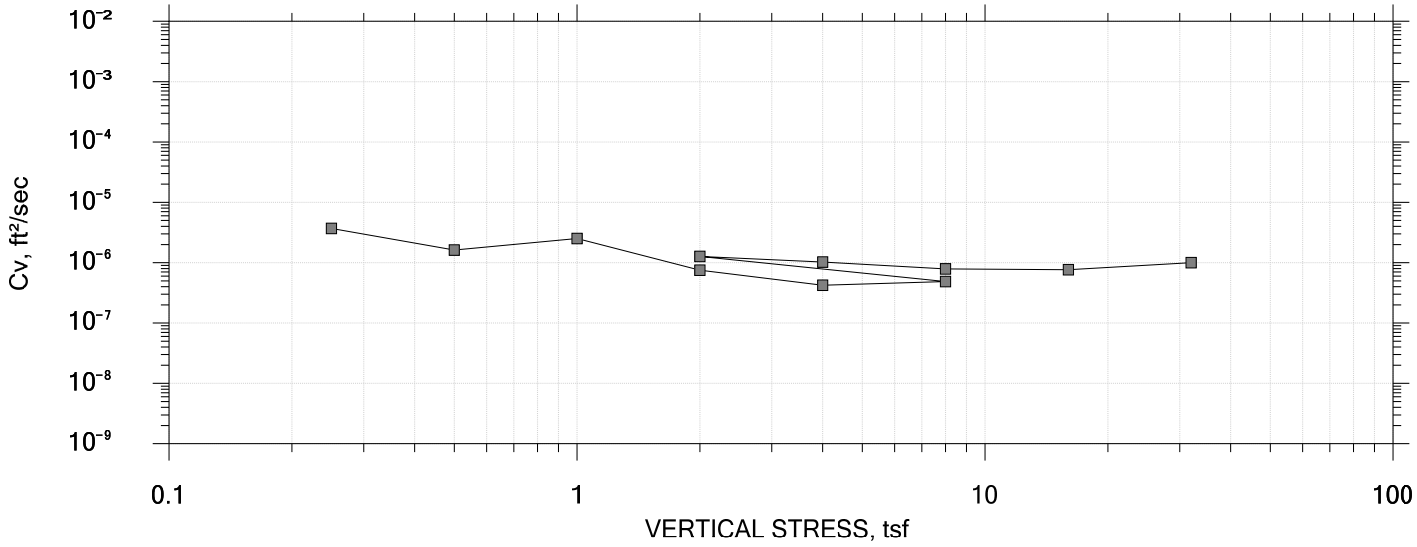


GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-6	Test Date: 09/04/18	Test No.: IP-1
	Depth: 55-57 ft	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System V		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

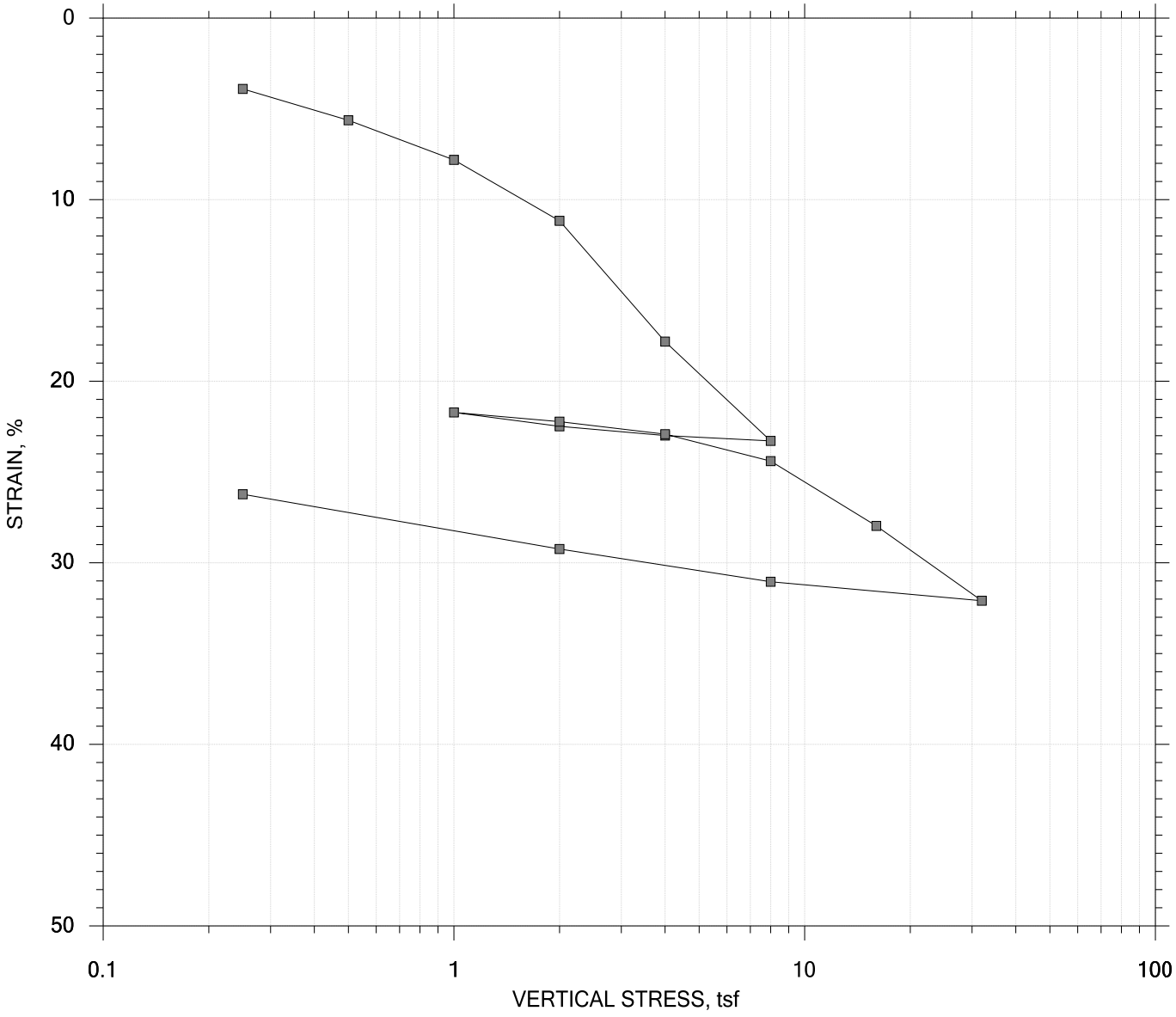




GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



				Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	46.48	26.14
Preconsolidation Stress: ---				Dry Unit Weight, pcf	75.779	101.04
Compression Ratio: ---				Saturation, %	99.45	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.31	0.73
LL: 35	PL: 22	PI: 13	GS: 2.81			

GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B301
Sample No.: U-7
Test No.: IP-3

Location: Durham, NH
Tested By: md
Test Date: 09/08/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 67-69
Elevation: ---

Soil Description: Wet, olive gray clay
Remarks: System E

Estimated Specific Gravity: 2.81
Initial Void Ratio: 1.31
Final Void Ratio: 0.733

Liquid Limit: 35
Plastic Limit: 22
Plasticity Index: 13

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-1988	RING		B-722
Wt. Container + Wet Soil, gm	97.930	254.33	234.47	132.27
Wt. Container + Dry Soil, gm	70.290	208.94	208.94	106.66
Wt. Container, gm	8.5200	111.30	111.30	8.7000
Wt. Dry Soil, gm	61.770	97.643	97.643	97.960
Water Content, %	44.75	46.48	26.14	26.14
Void Ratio	---	1.31	0.733	---
Degree of Saturation, %	---	99.45	100.00	---
Dry Unit Weight, pcf	---	75.779	101.04	---

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.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B301
Sample No.: U-7
Test No.: IP-3

Location: Durham, NH
Tested By: md
Test Date: 09/08/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 67-69
Elevation: ---

Soil Description: Wet, olive gray clay
Remarks: System E

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.250	0.03894	1.22	3.89	6.047	3.90e-006	1.56e-001	1.64e-003
2	0.500	0.05623	1.18	5.62	14.387	1.55e-006	6.92e-002	2.89e-004
3	1.00	0.07807	1.13	7.81	9.689	2.20e-006	4.37e-002	2.60e-004
4	2.00	0.1116	1.05	11.2	22.116	9.09e-007	3.35e-002	8.22e-005
5	4.00	0.1781	0.900	17.8	41.565	4.32e-007	3.33e-002	3.87e-005
6	8.00	0.2328	0.773	23.3	31.273	4.95e-007	1.37e-002	1.83e-005
7	4.00	0.2299	0.780	23.0	5.477	2.65e-006	7.28e-004	5.20e-006
8	2.00	0.2248	0.792	22.5	11.642	1.26e-006	2.53e-003	8.59e-006
9	1.00	0.2172	0.809	21.7	39.321	3.79e-007	7.70e-003	7.86e-006
10	2.00	0.2223	0.798	22.2	11.187	1.34e-006	5.11e-003	1.84e-005
11	4.00	0.2291	0.782	22.9	14.745	9.98e-007	3.42e-003	9.19e-006
12	8.00	0.2440	0.747	24.4	24.051	5.95e-007	3.73e-003	5.98e-006
13	16.0	0.2796	0.665	28.0	21.344	6.26e-007	4.46e-003	7.53e-006
14	32.0	0.3209	0.570	32.1	11.316	1.06e-006	2.58e-003	7.38e-006
15	8.00	0.3104	0.594	31.0	2.583	4.45e-006	4.36e-004	5.23e-006
16	2.00	0.2924	0.635	29.2	25.599	4.68e-007	3.00e-003	3.79e-006
17	0.250	0.2623	0.705	26.2	124.902	1.03e-007	1.72e-002	4.76e-006

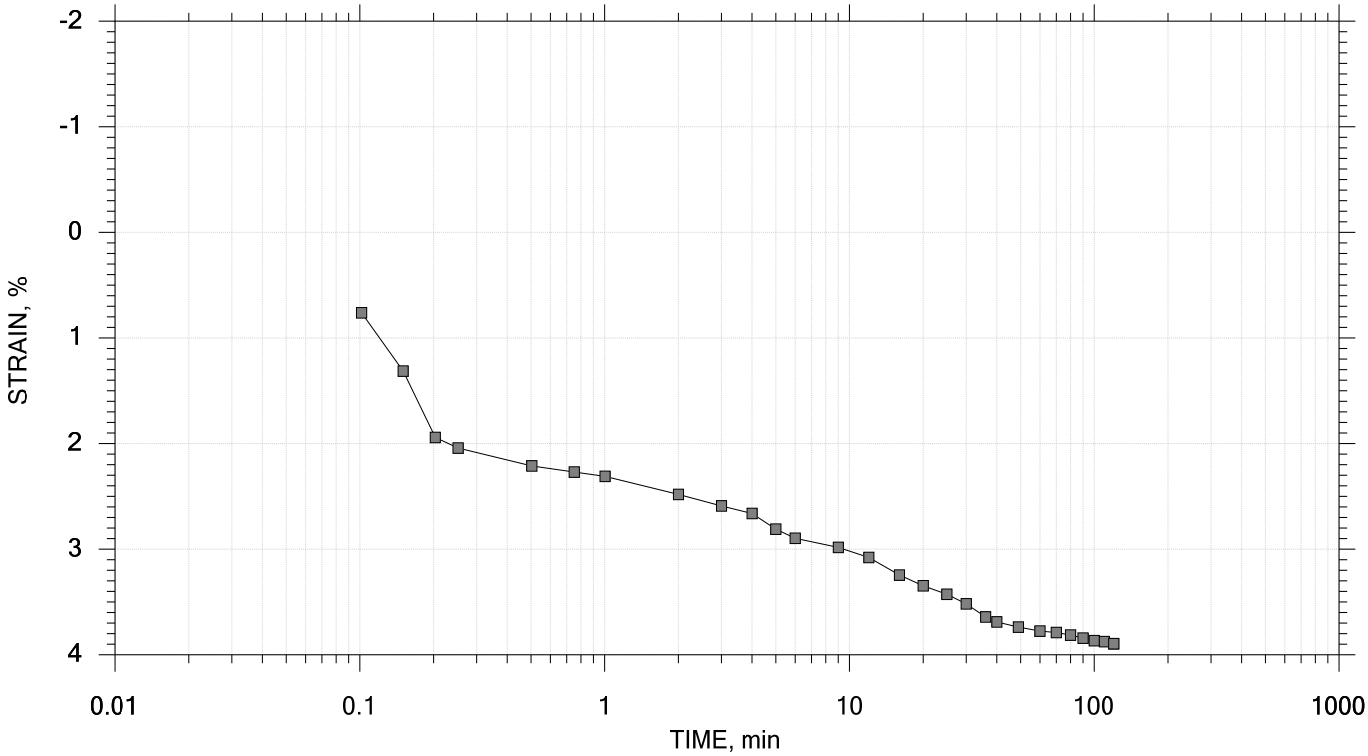
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.250	0.03894	1.22	3.89	0.000	0.00e+000	1.56e-001	0.00e+000	0.00e+000
2	0.500	0.05623	1.18	5.62	0.000	0.00e+000	6.92e-002	0.00e+000	0.00e+000
3	1.00	0.07807	1.13	7.81	1.414	3.51e-006	4.37e-002	4.13e-004	0.00e+000
4	2.00	0.1116	1.05	11.2	7.326	6.37e-007	3.35e-002	5.77e-005	0.00e+000
5	4.00	0.1781	0.900	17.8	0.000	0.00e+000	3.33e-002	0.00e+000	0.00e+000
6	8.00	0.2328	0.773	23.3	7.689	4.68e-007	1.37e-002	1.73e-005	0.00e+000
7	4.00	0.2299	0.780	23.0	0.000	0.00e+000	7.28e-004	0.00e+000	0.00e+000
8	2.00	0.2248	0.792	22.5	2.398	1.42e-006	2.53e-003	9.68e-006	0.00e+000
9	1.00	0.2172	0.809	21.7	6.581	5.26e-007	7.70e-003	1.09e-005	0.00e+000
10	2.00	0.2223	0.798	22.2	0.000	0.00e+000	5.11e-003	0.00e+000	0.00e+000
11	4.00	0.2291	0.782	22.9	2.916	1.17e-006	3.42e-003	1.08e-005	0.00e+000
12	8.00	0.2440	0.747	24.4	3.366	9.87e-007	3.73e-003	9.92e-006	0.00e+000
13	16.0	0.2796	0.665	28.0	3.279	9.47e-007	4.46e-003	1.14e-005	0.00e+000
14	32.0	0.3209	0.570	32.1	2.886	9.67e-007	2.58e-003	6.72e-006	0.00e+000
15	8.00	0.3104	0.594	31.0	0.000	0.00e+000	4.36e-004	0.00e+000	0.00e+000
16	2.00	0.2924	0.635	29.2	0.000	0.00e+000	3.00e-003	0.00e+000	0.00e+000
17	0.250	0.2623	0.705	26.2	25.271	1.18e-007	1.72e-002	5.47e-006	0.00e+000

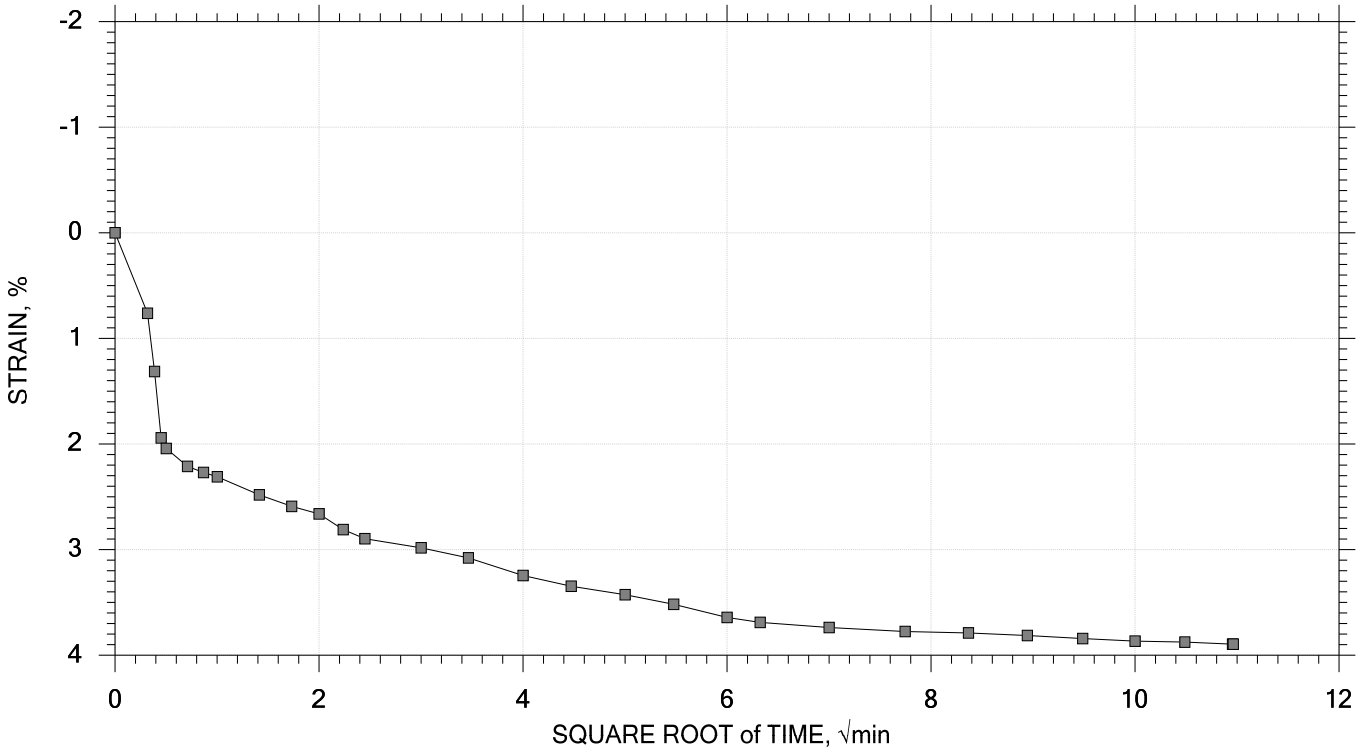
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 17

Stress: 0.25 tsf





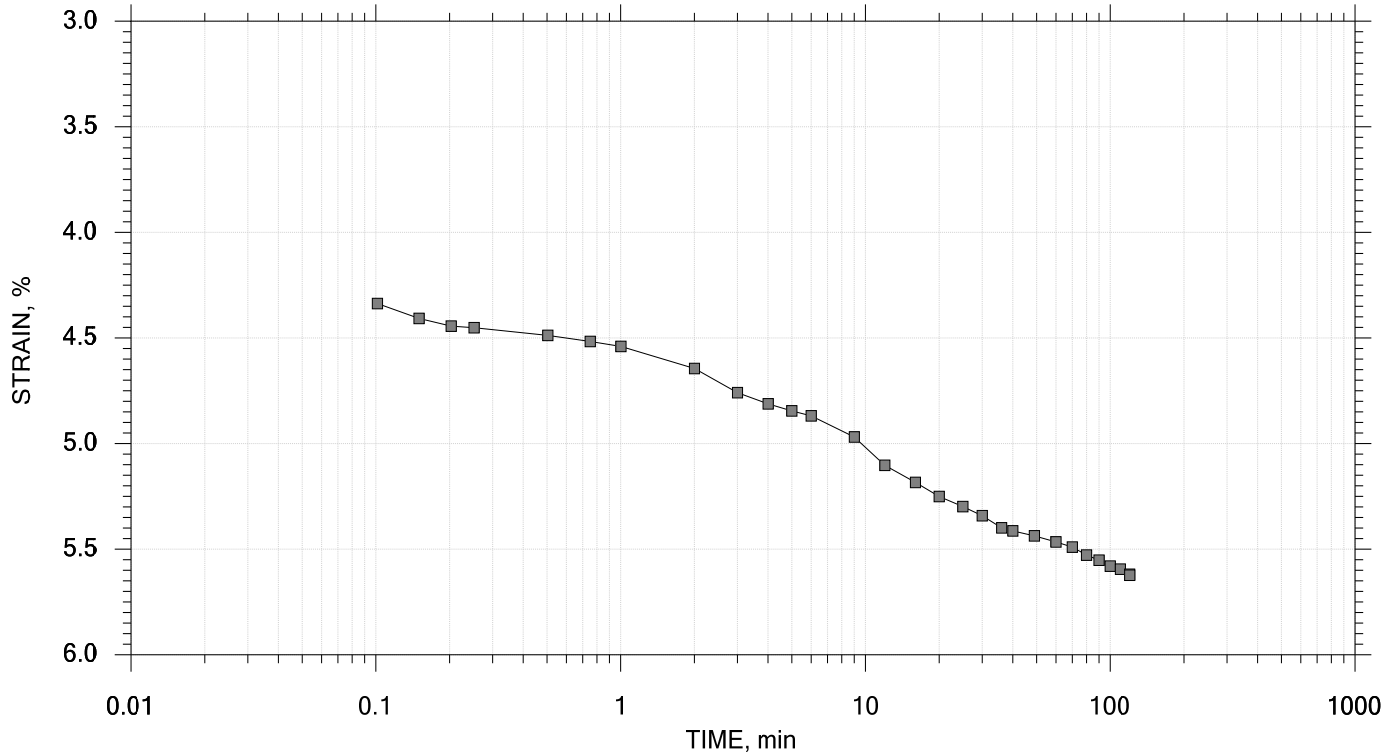
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

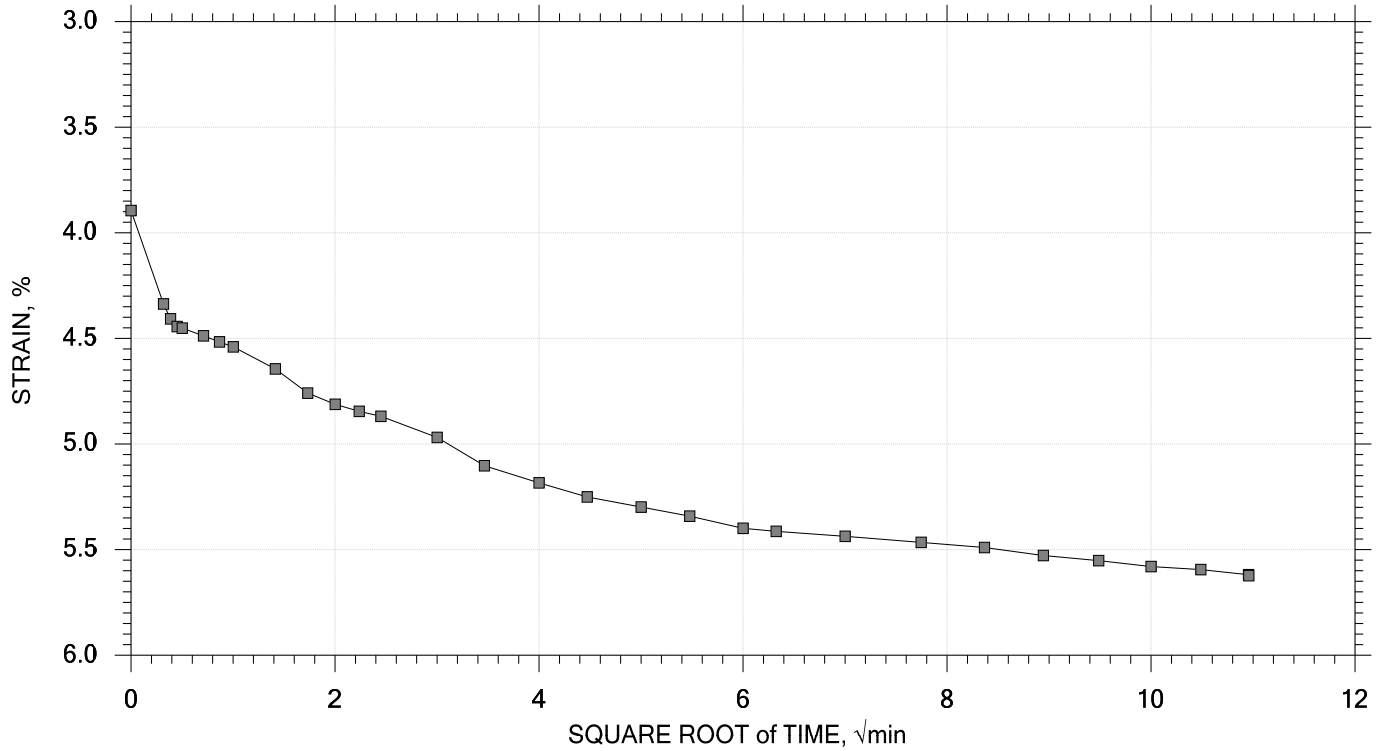
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 17

Stress: 0.5 tsf





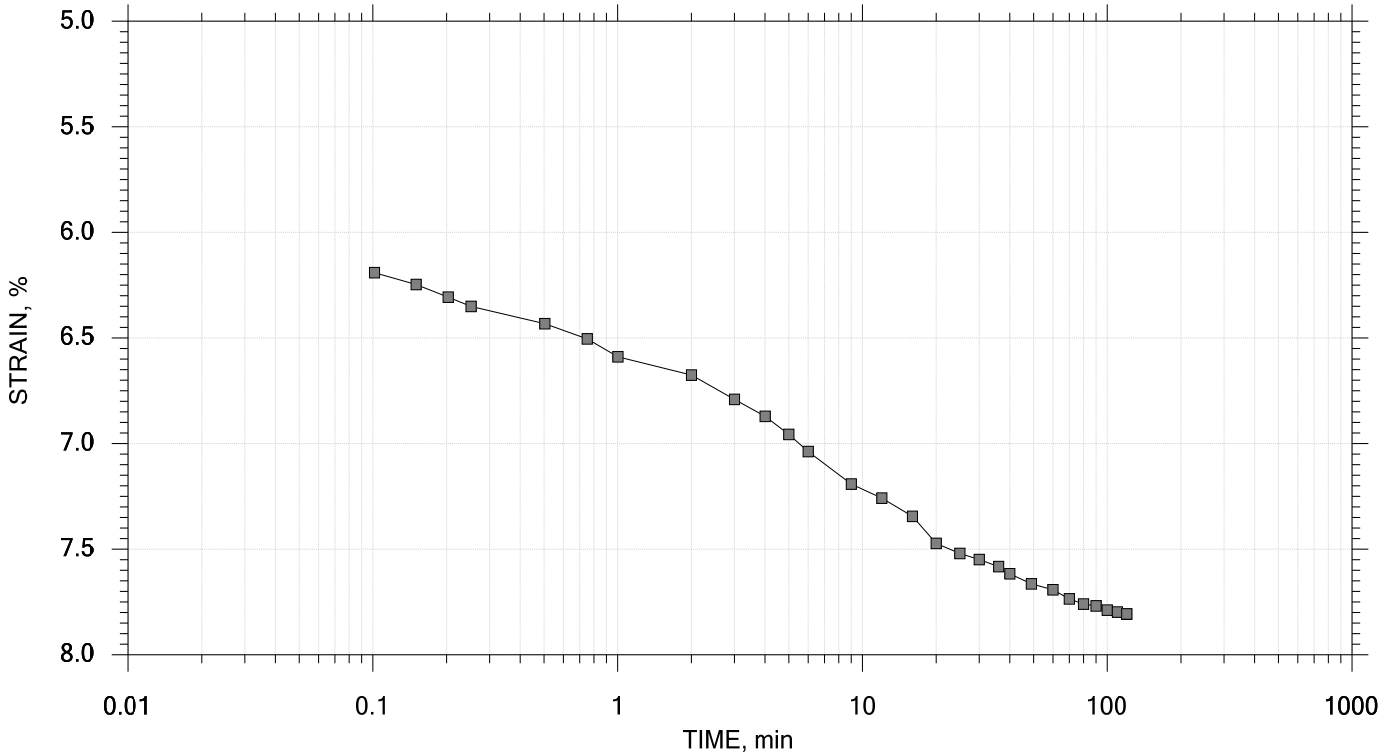
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

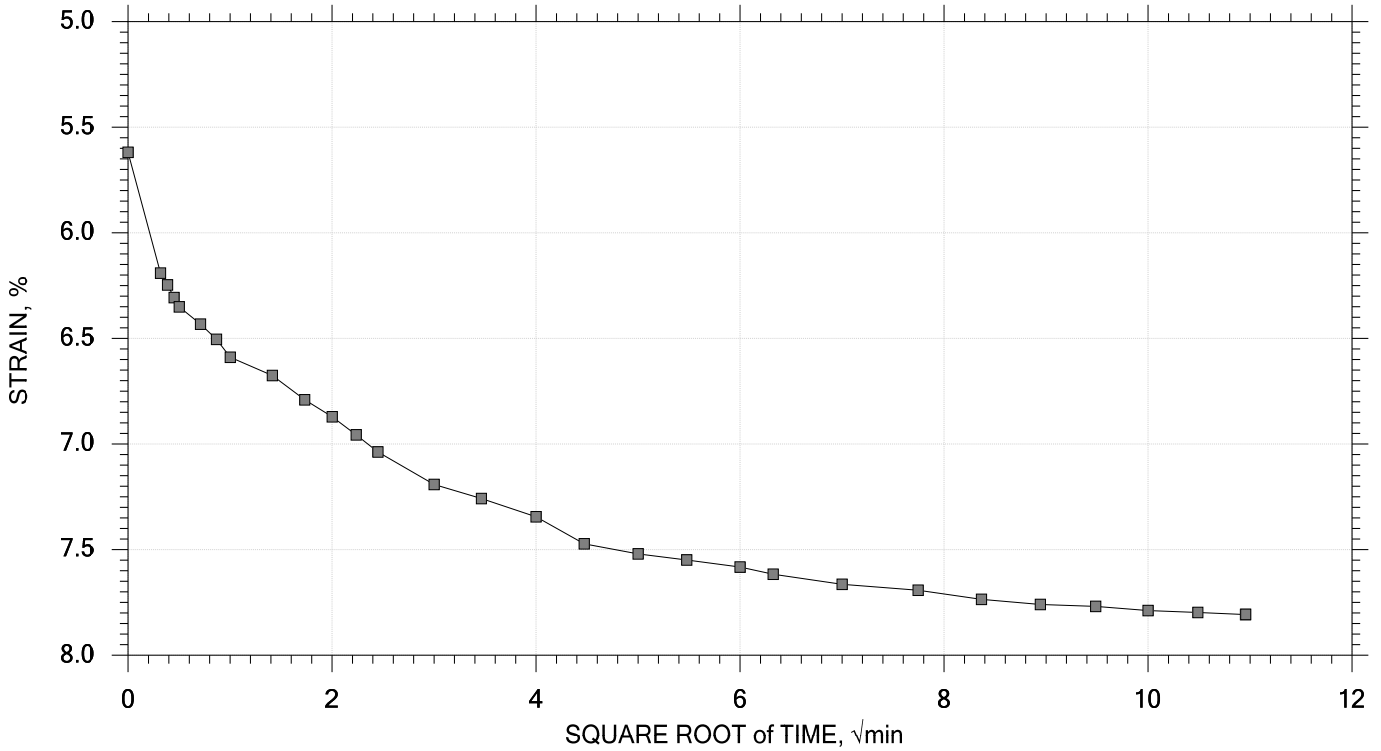
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 17

Stress: 1 tsf





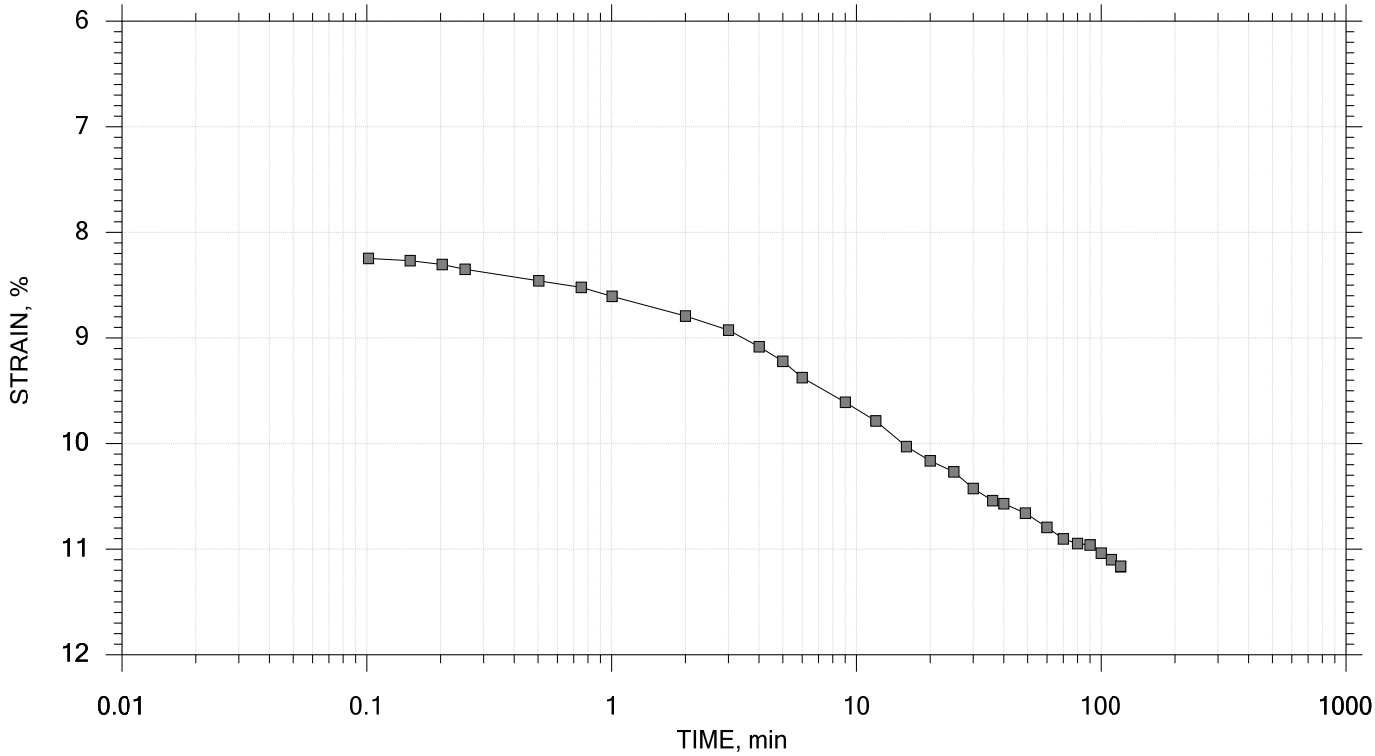
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

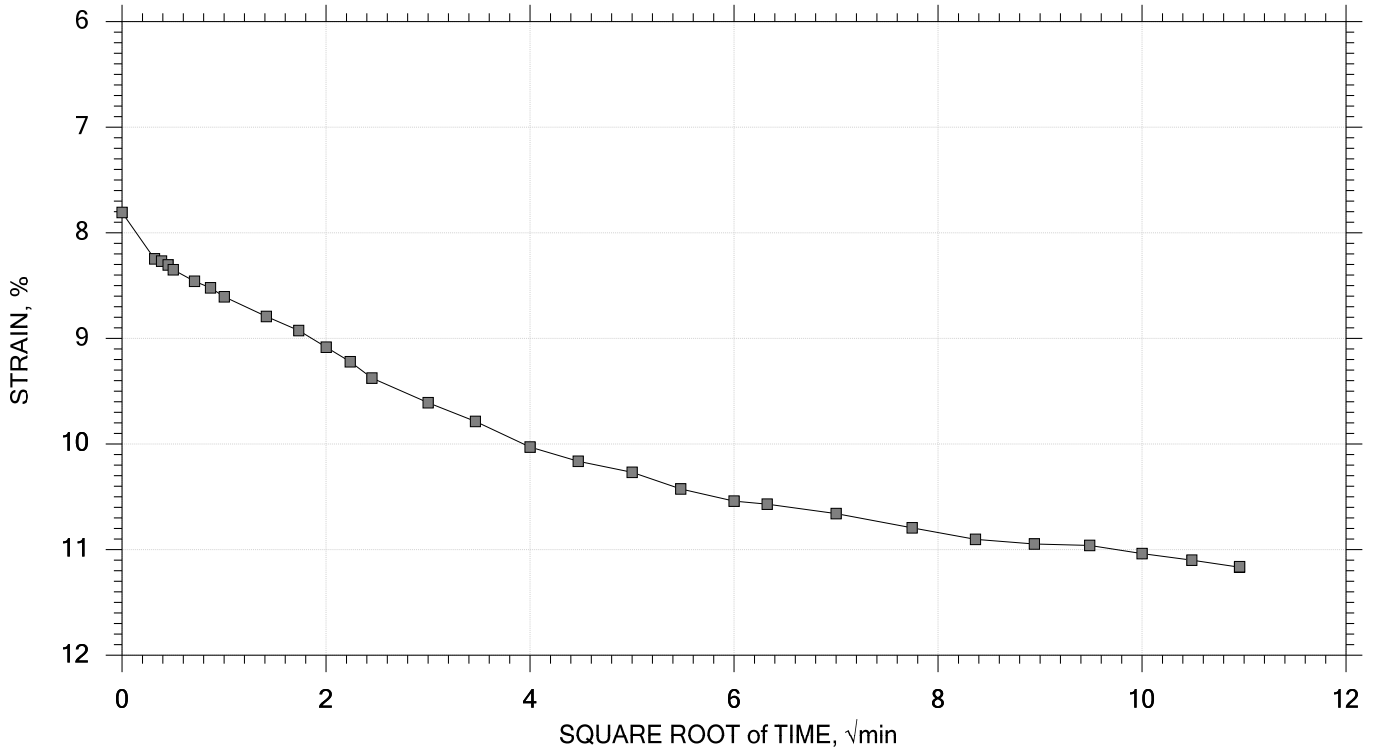
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 17

Stress: 2 tsf





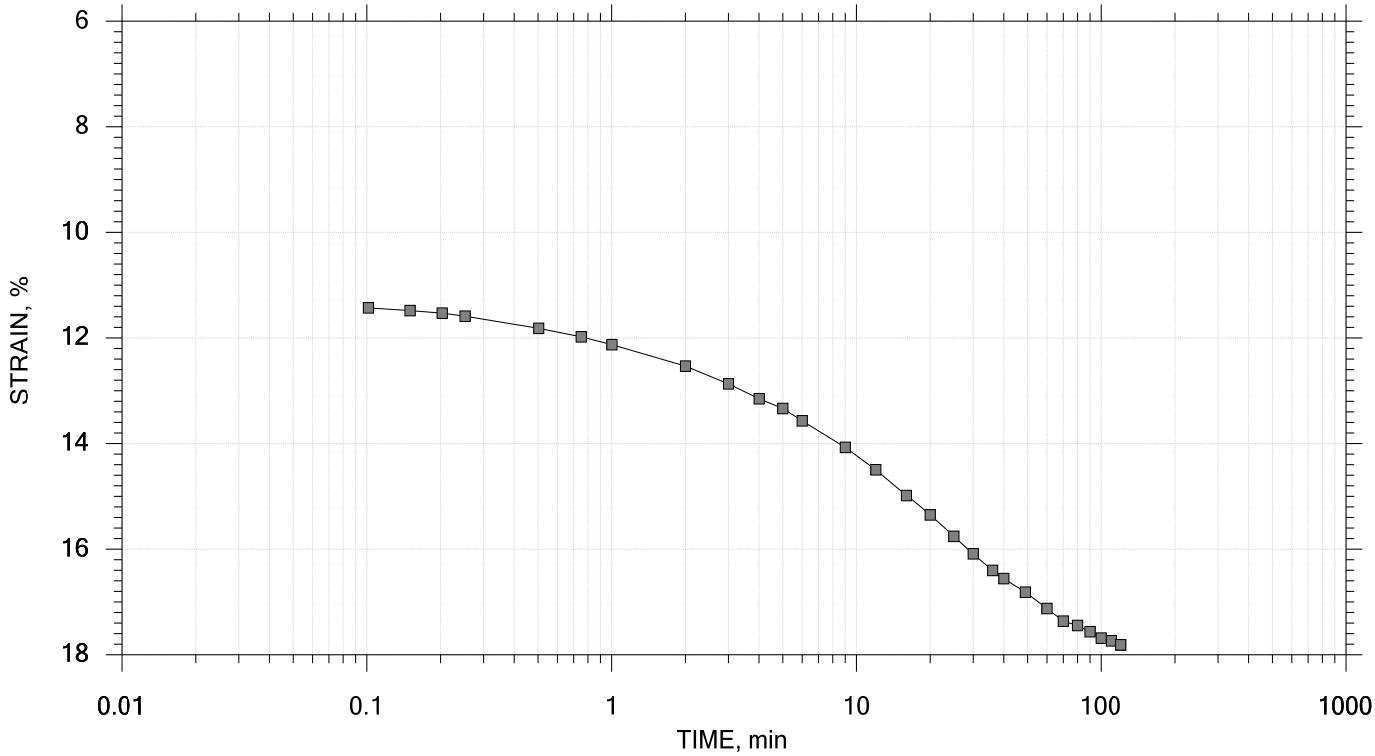
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

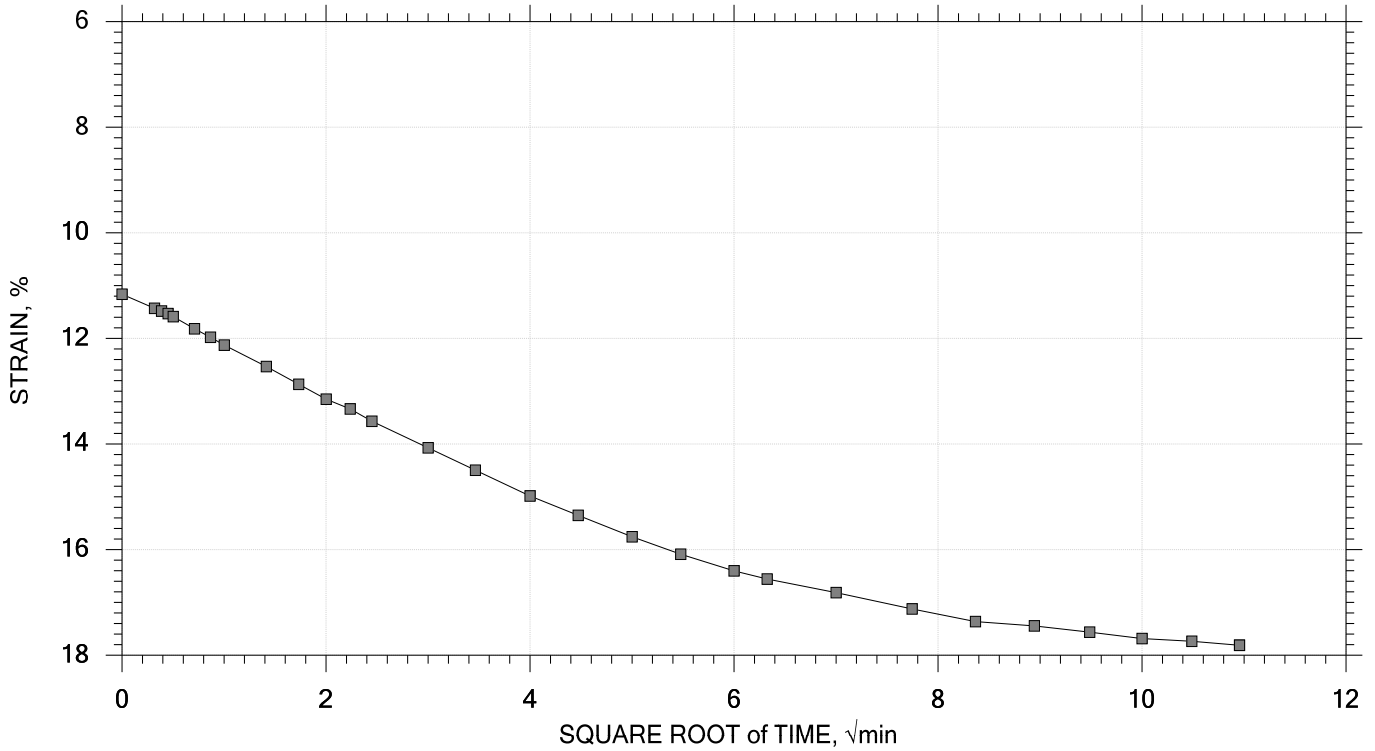
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 17

Stress: 4 tsf





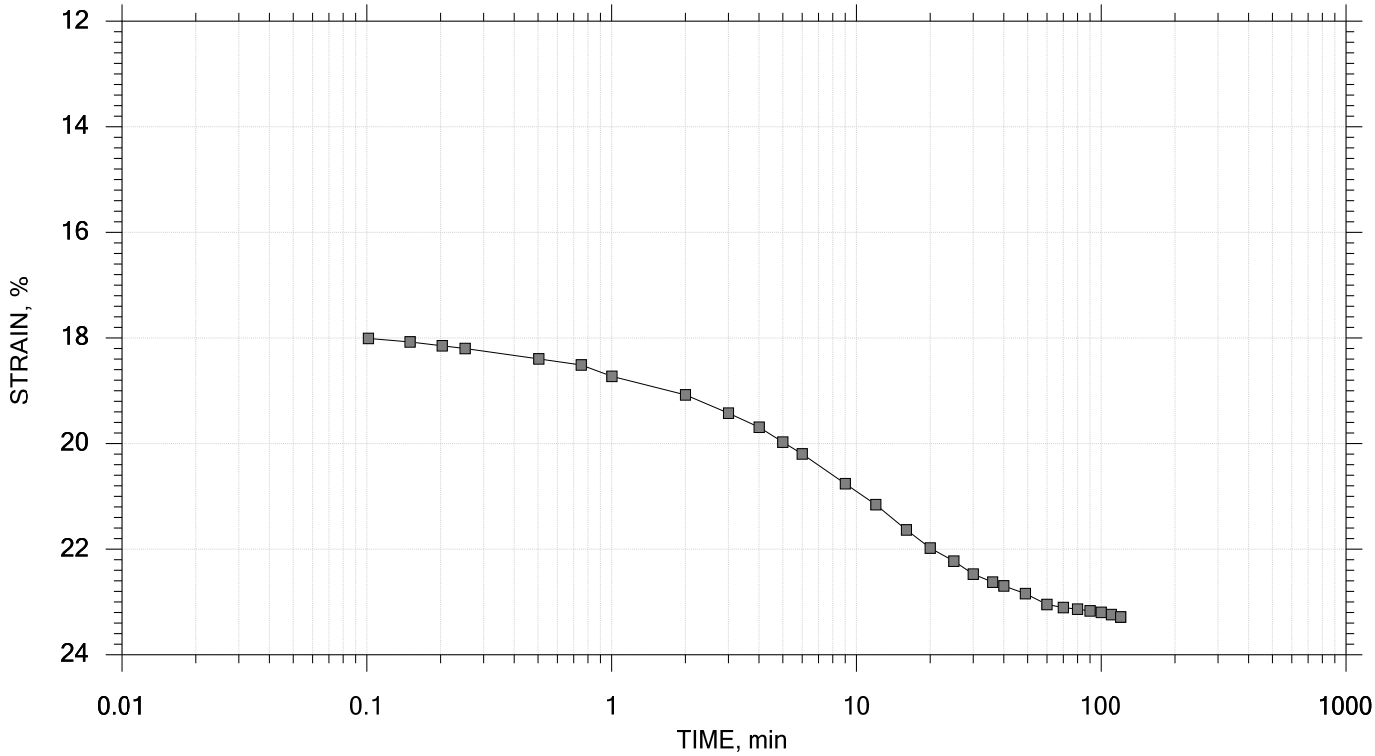
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

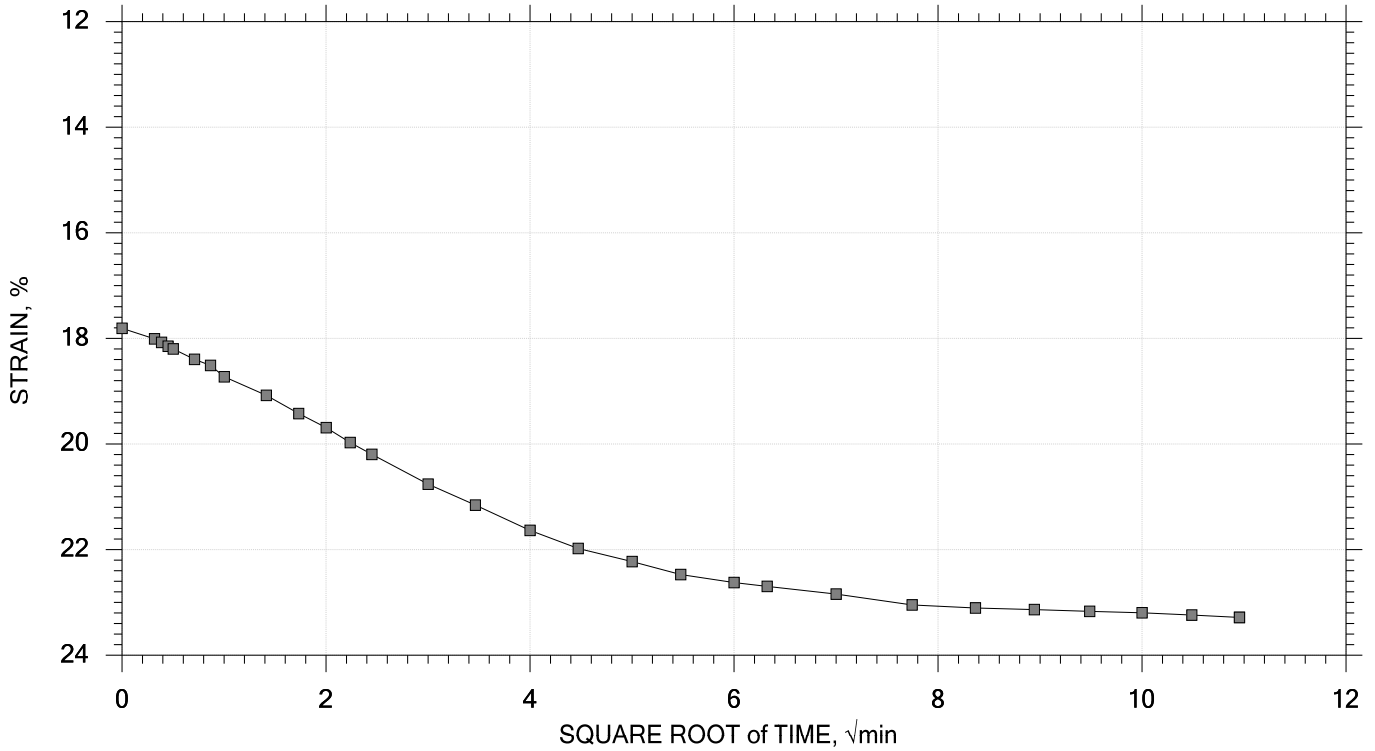
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 17

Stress: 8 tsf





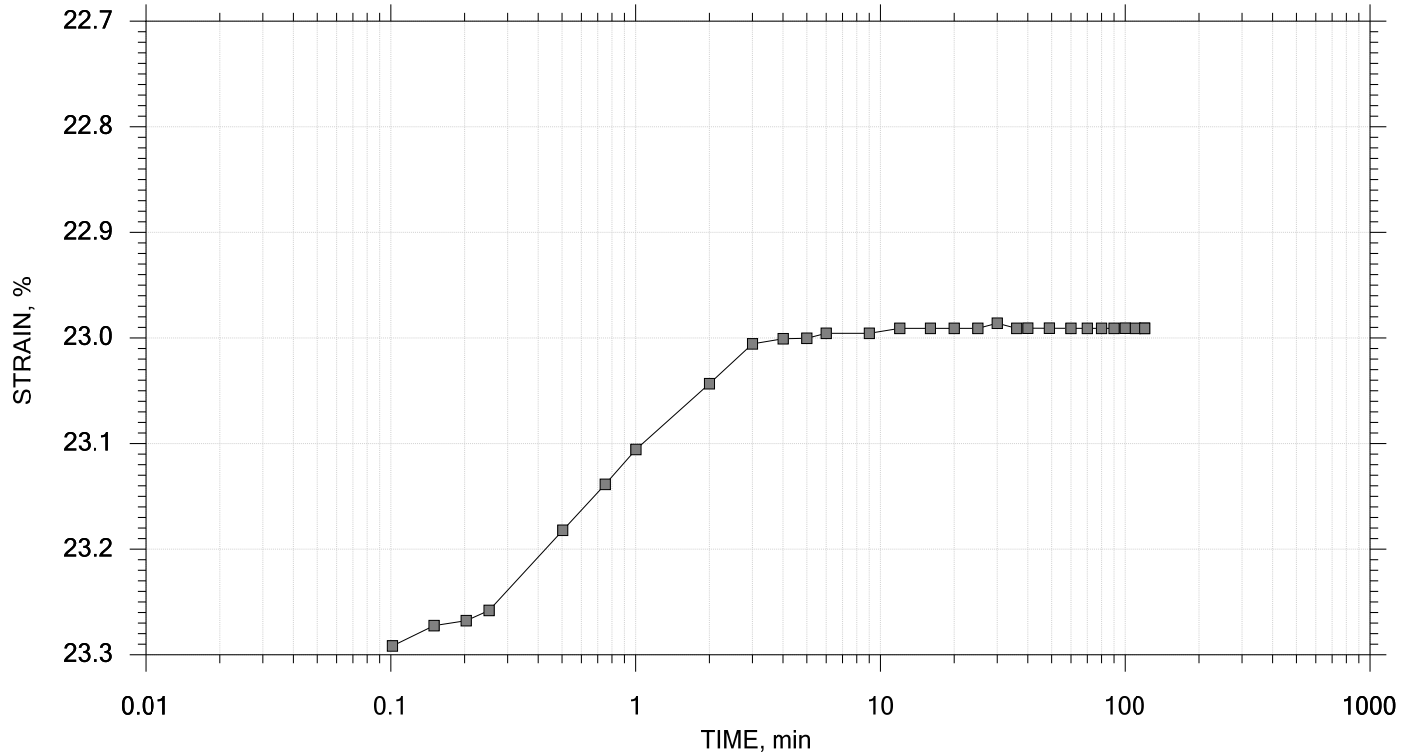
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

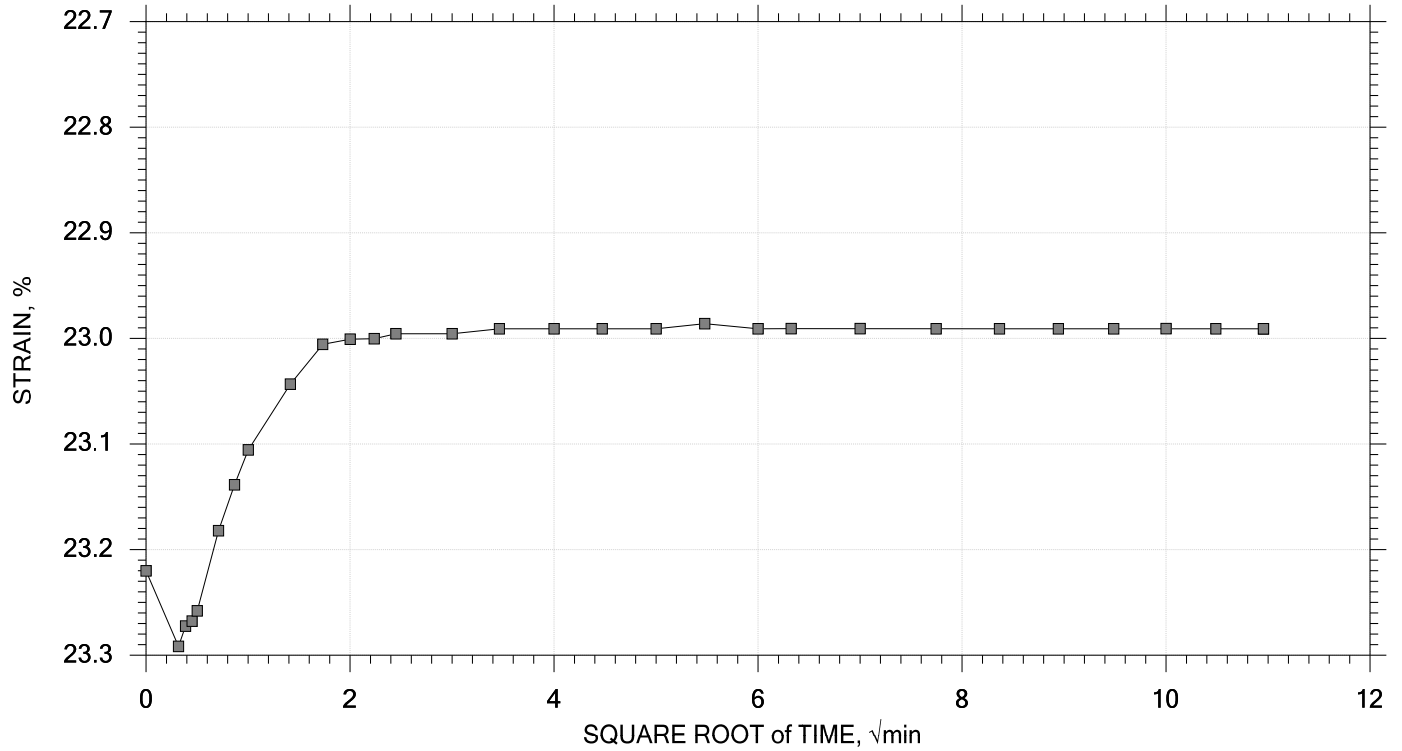
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 17

Stress: 4 tsf





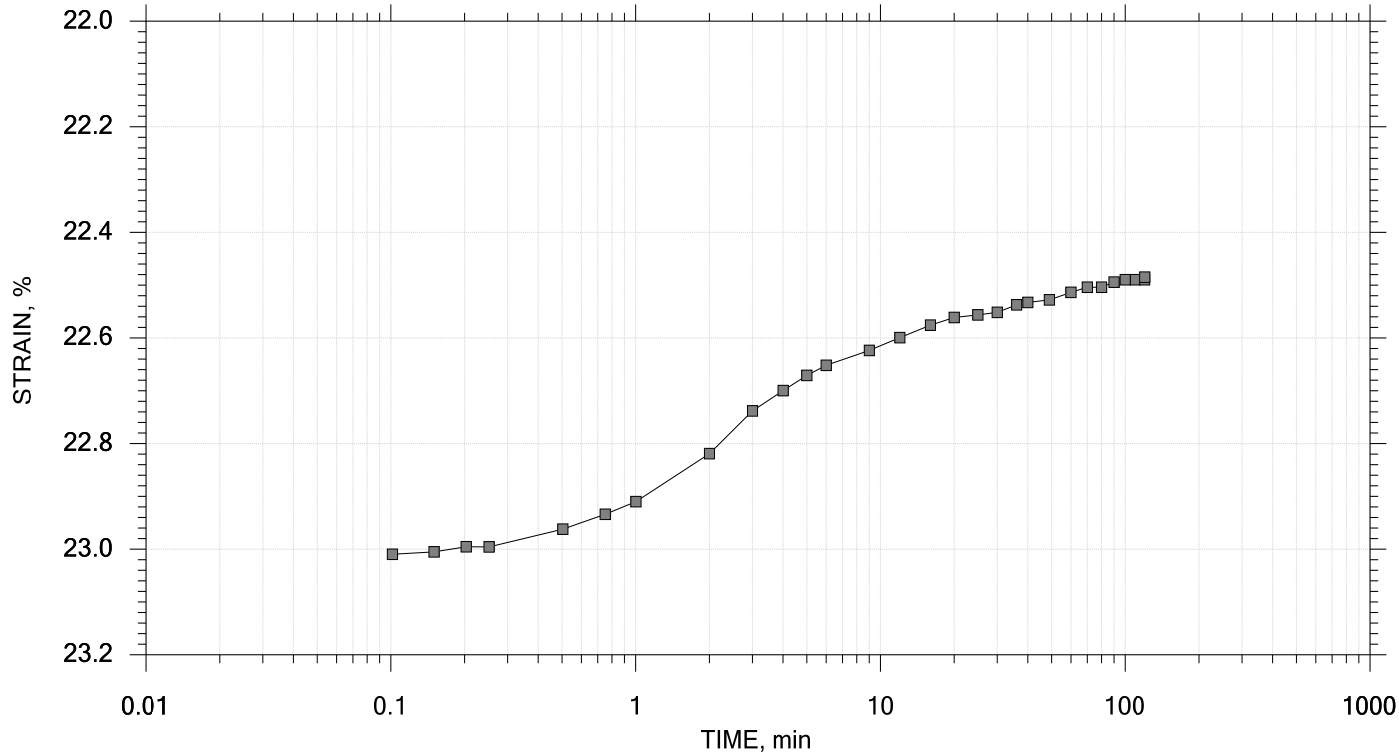
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

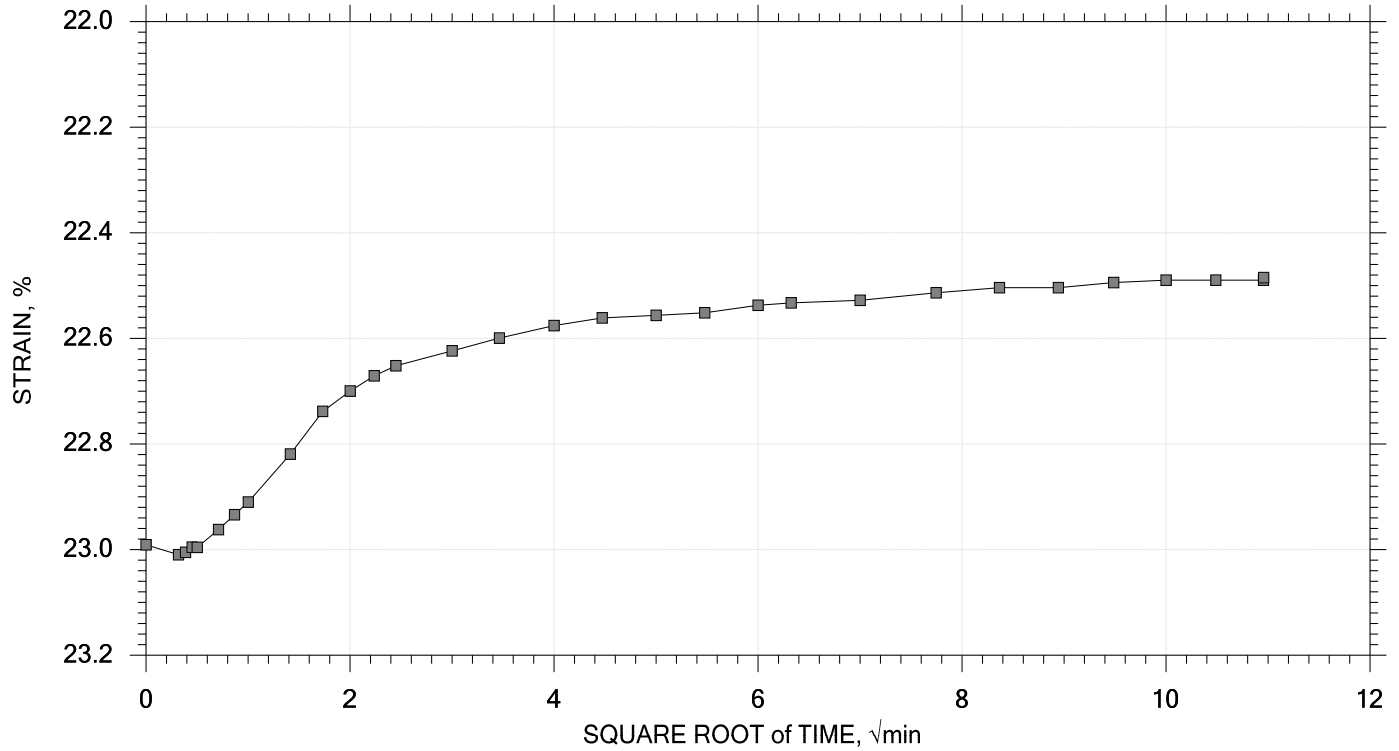
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 17

Stress: 2 tsf





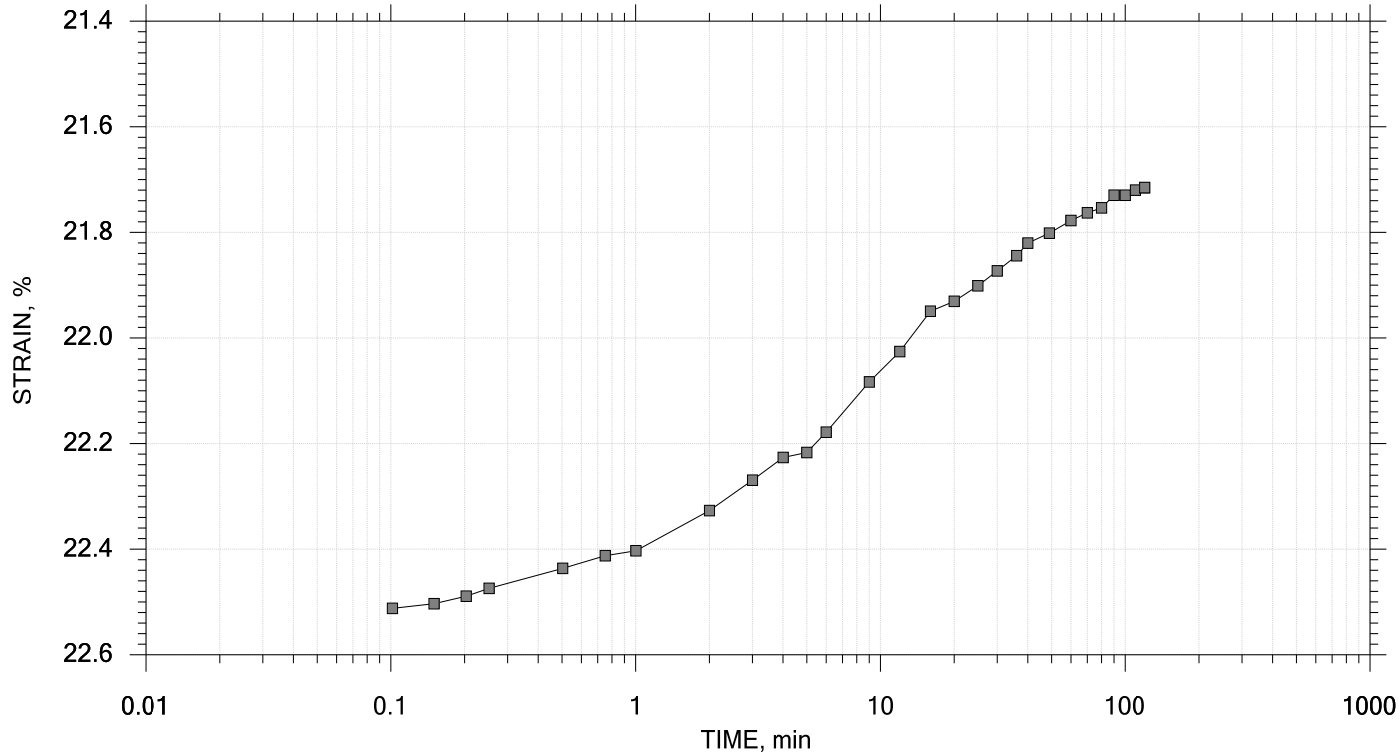
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

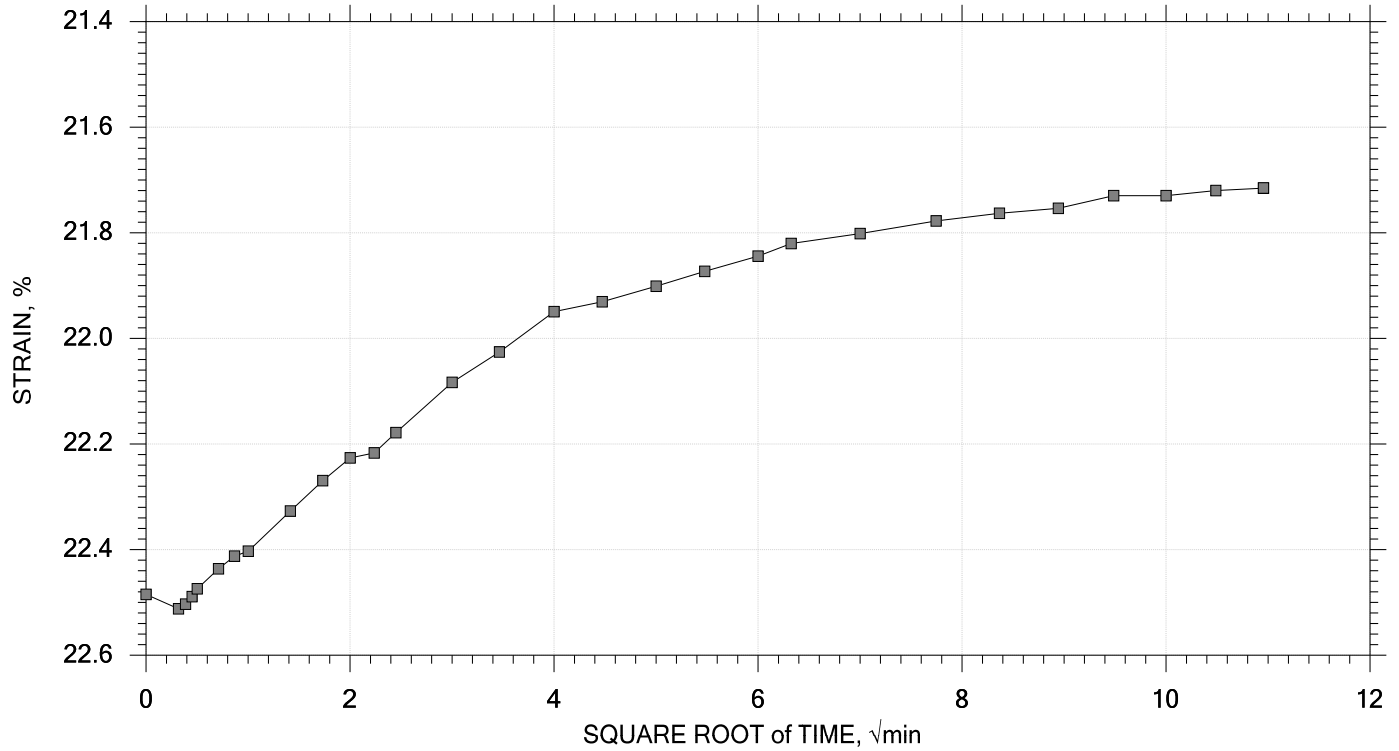
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 17

Stress: 1 tsf





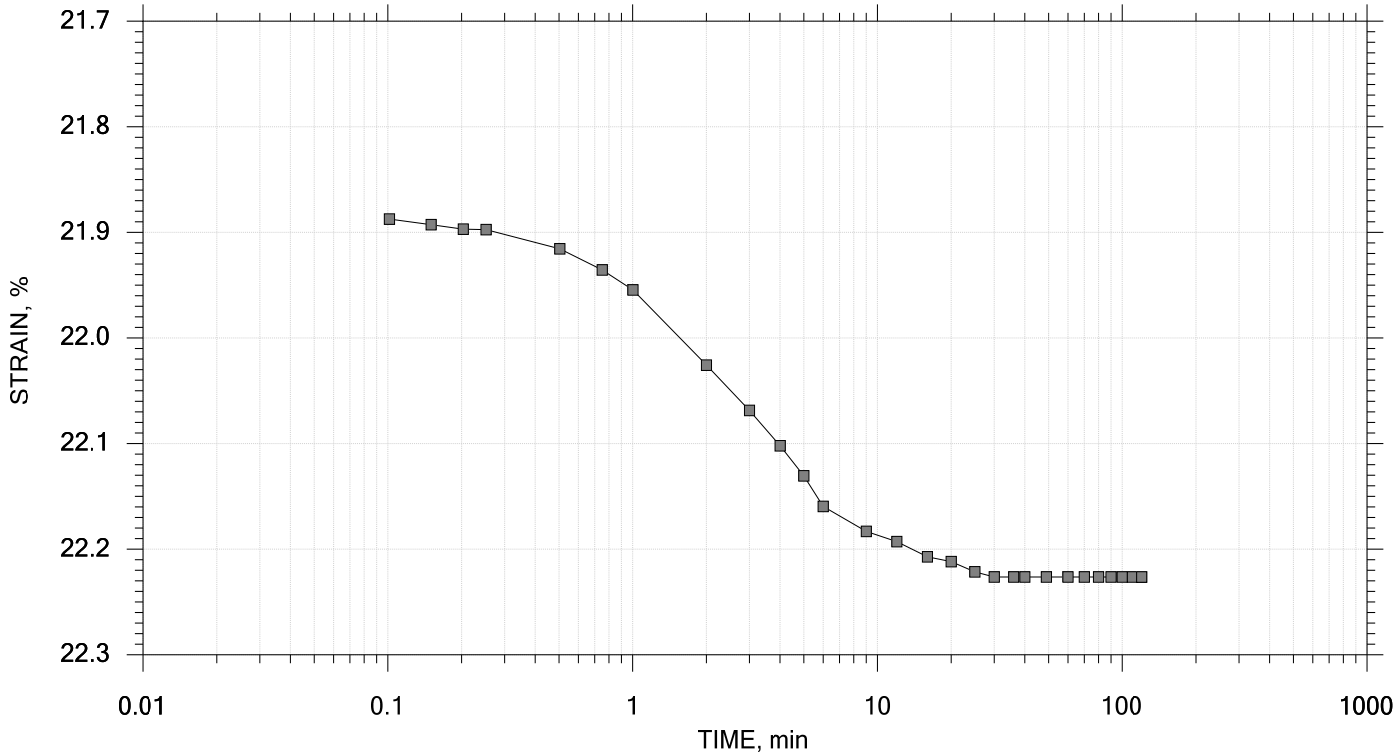
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

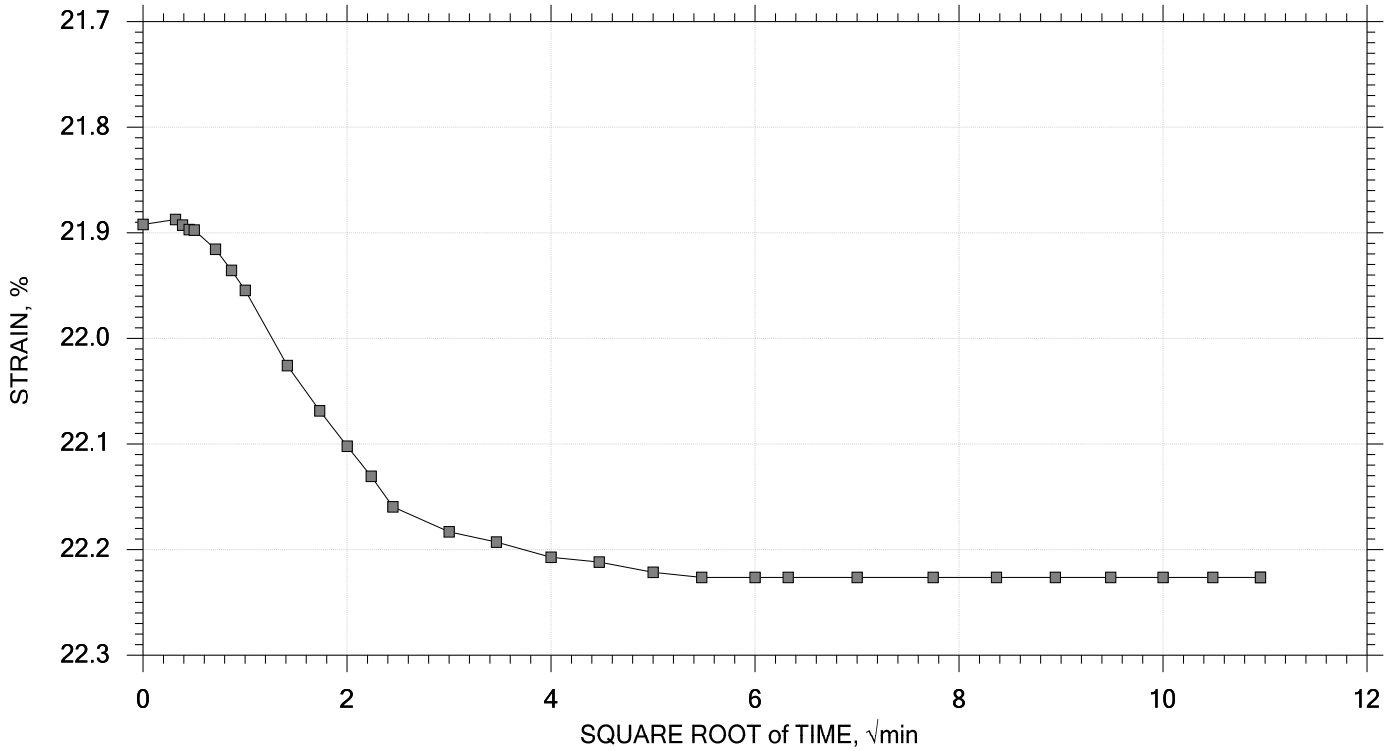
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 17

Stress: 2 tsf





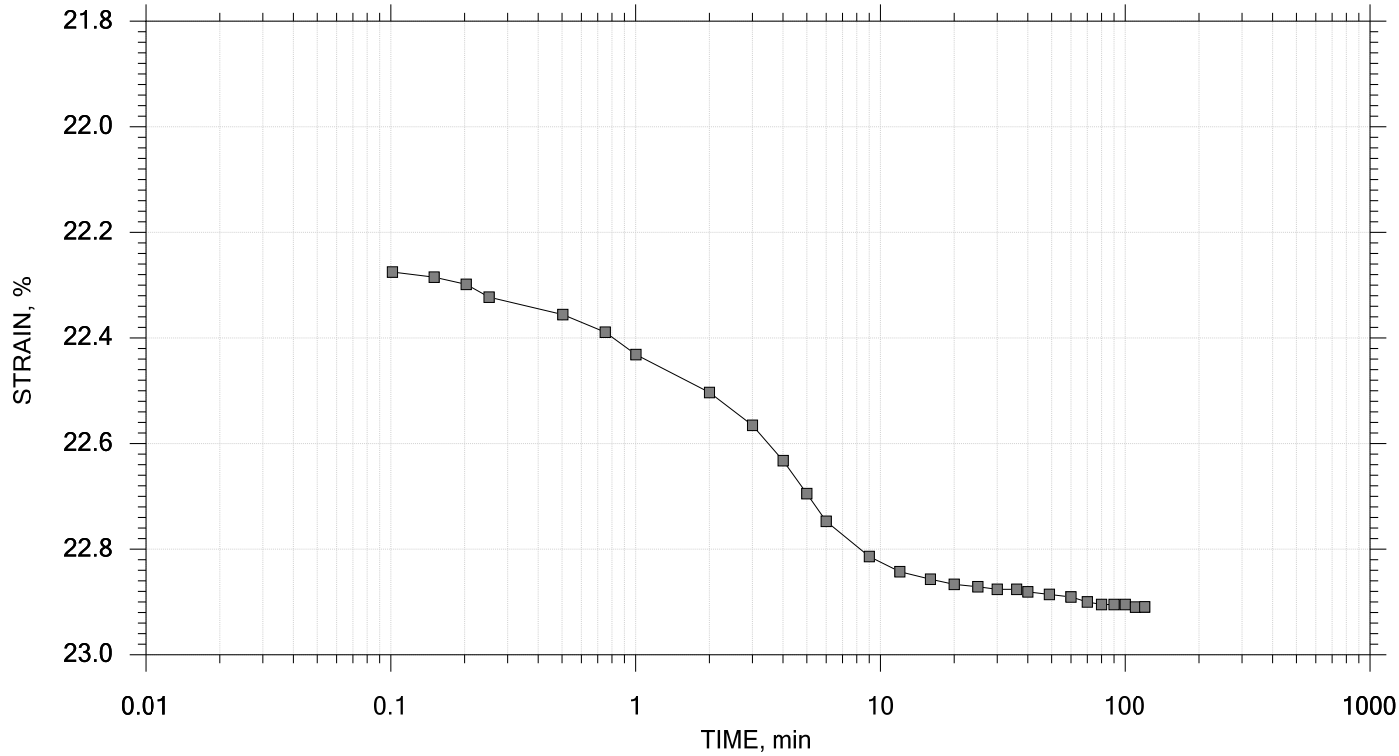
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

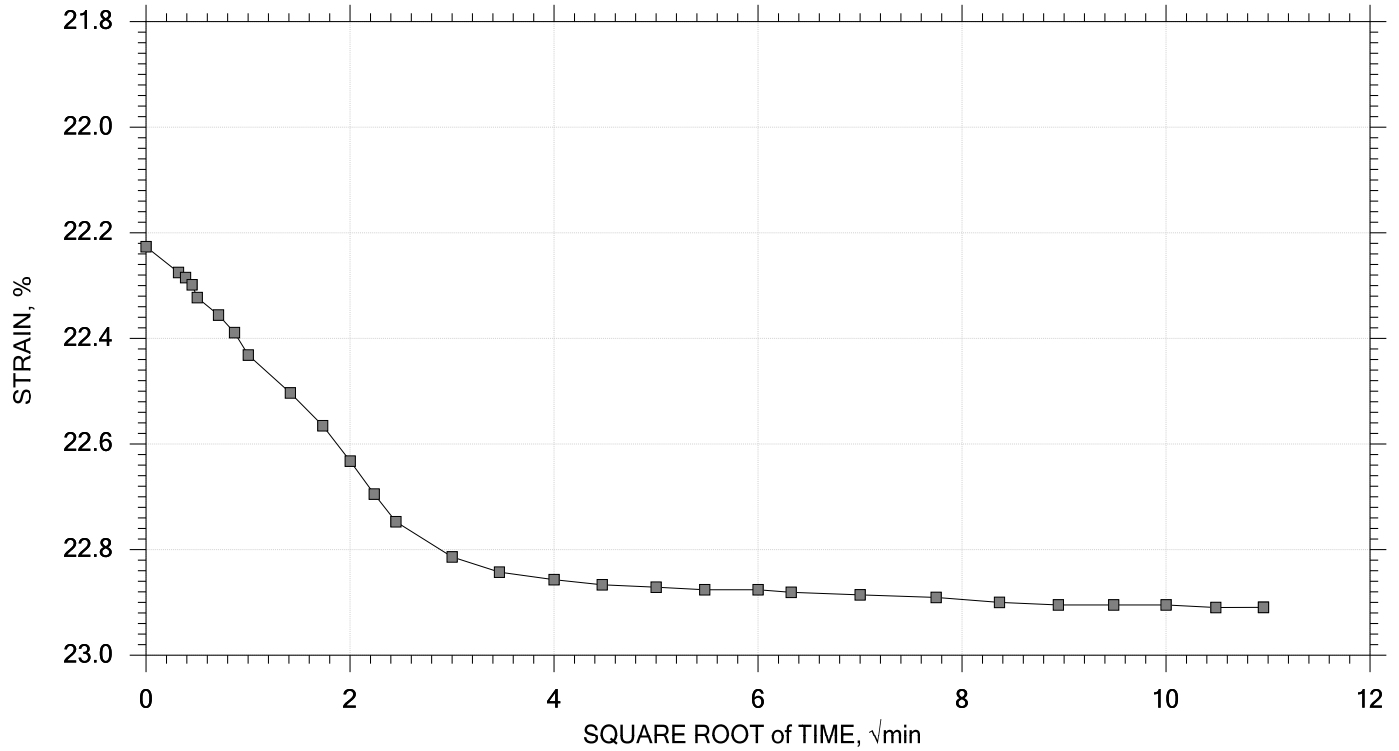
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 17

Stress: 4 tsf





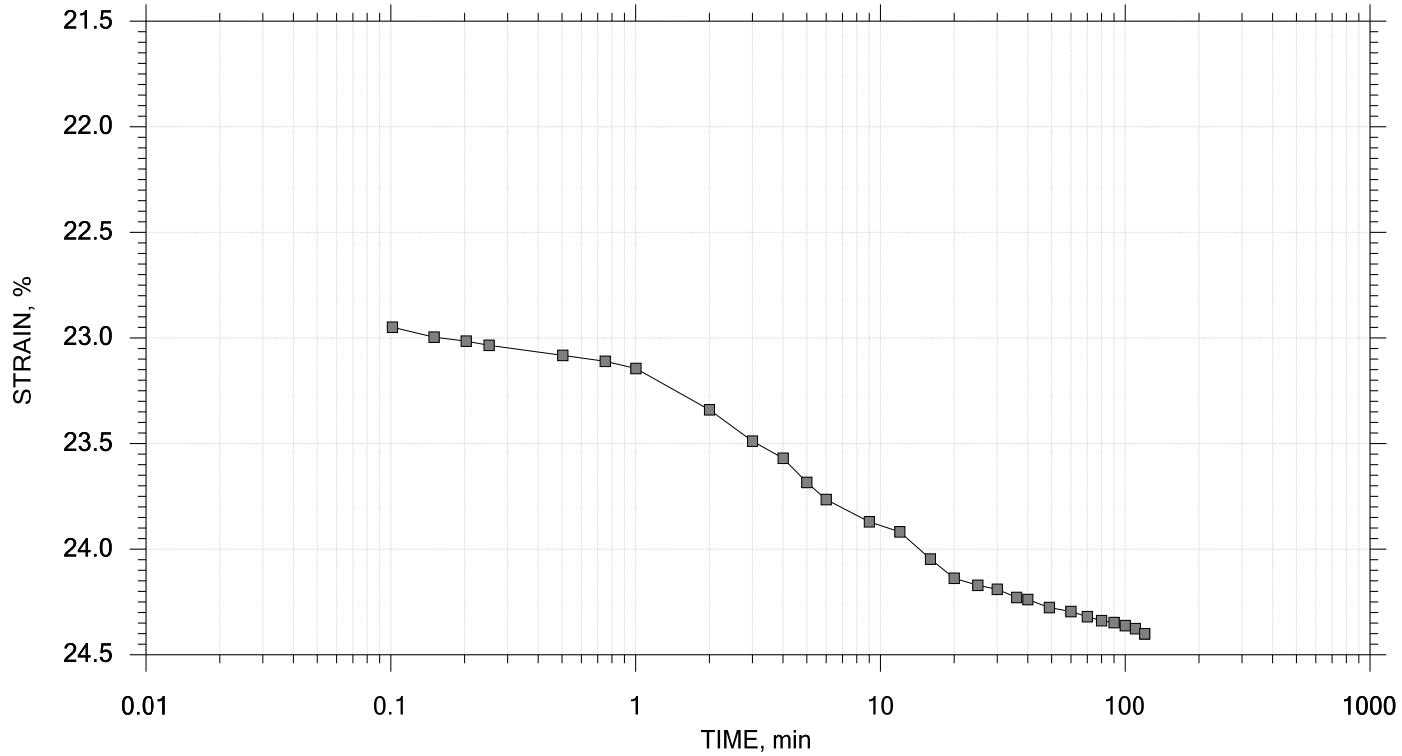
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

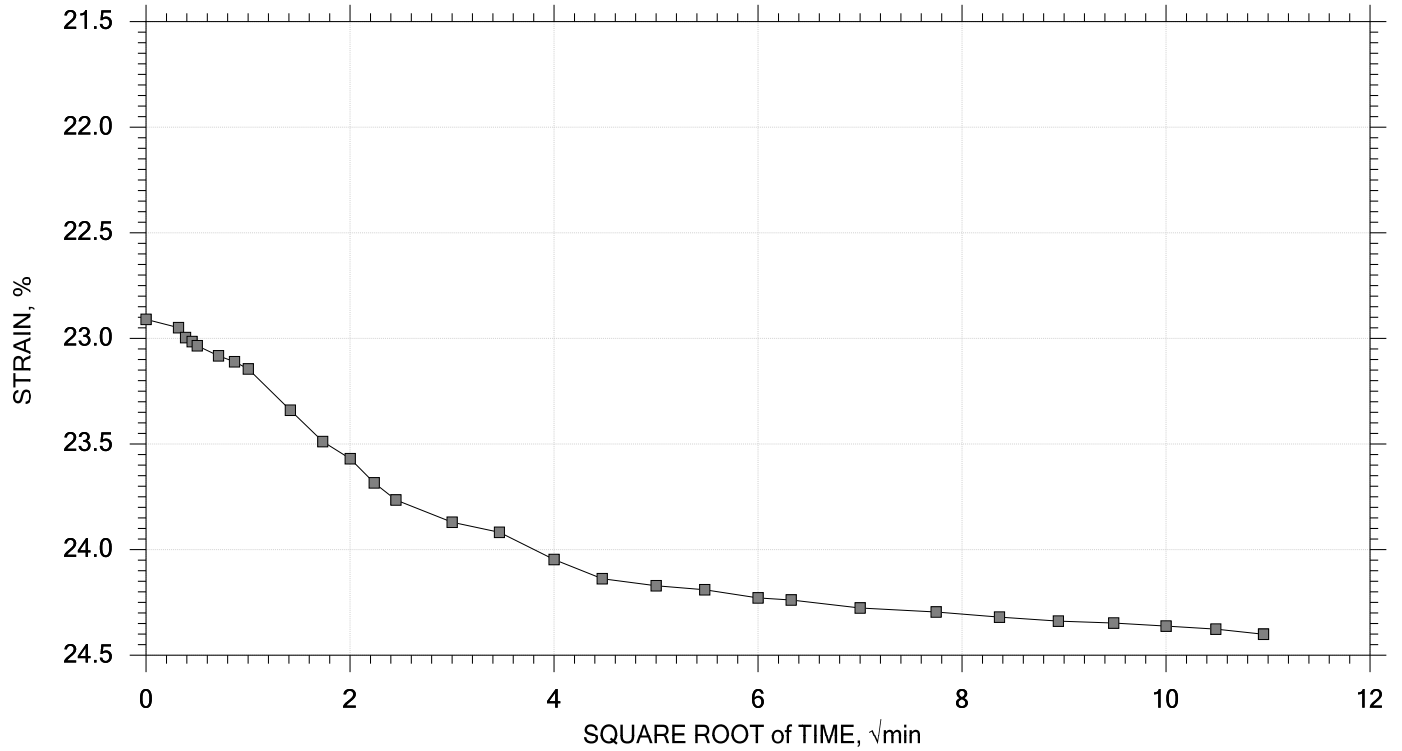
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 17

Stress: 8 tsf





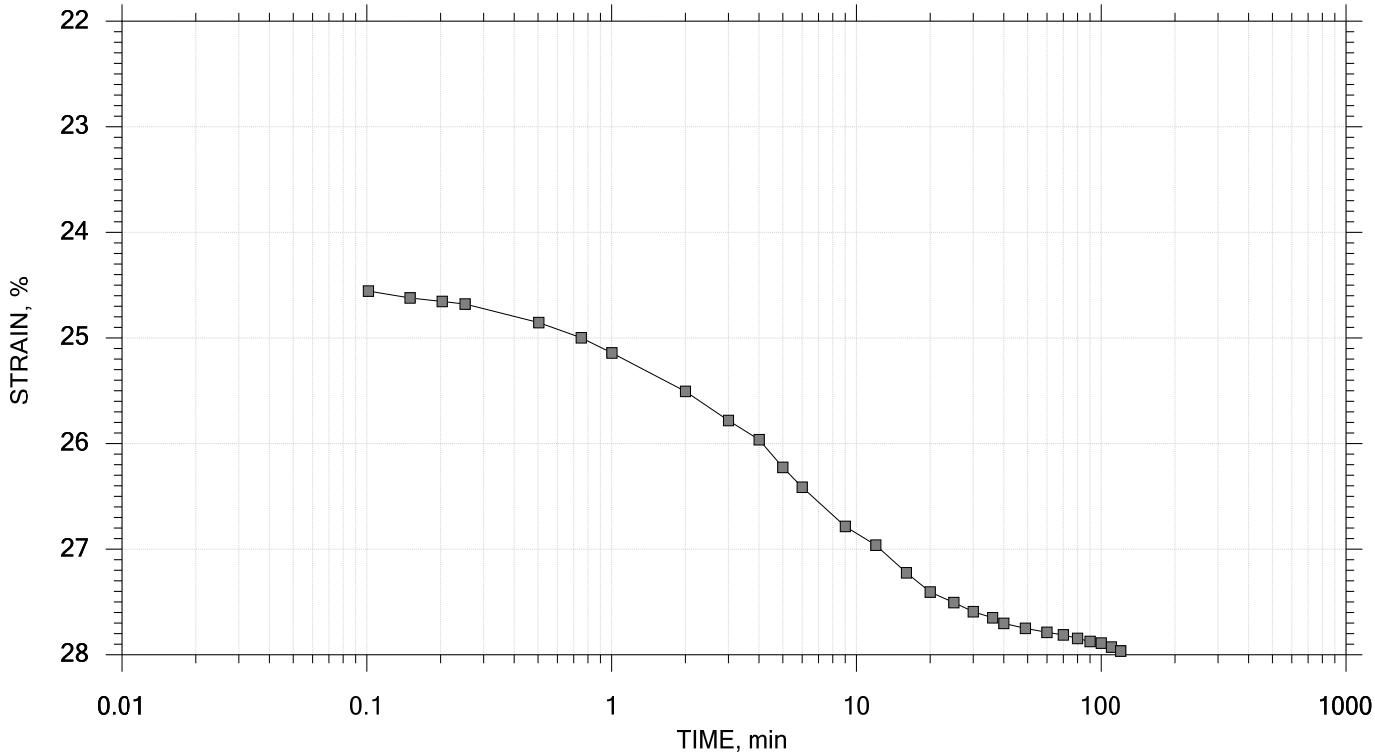
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

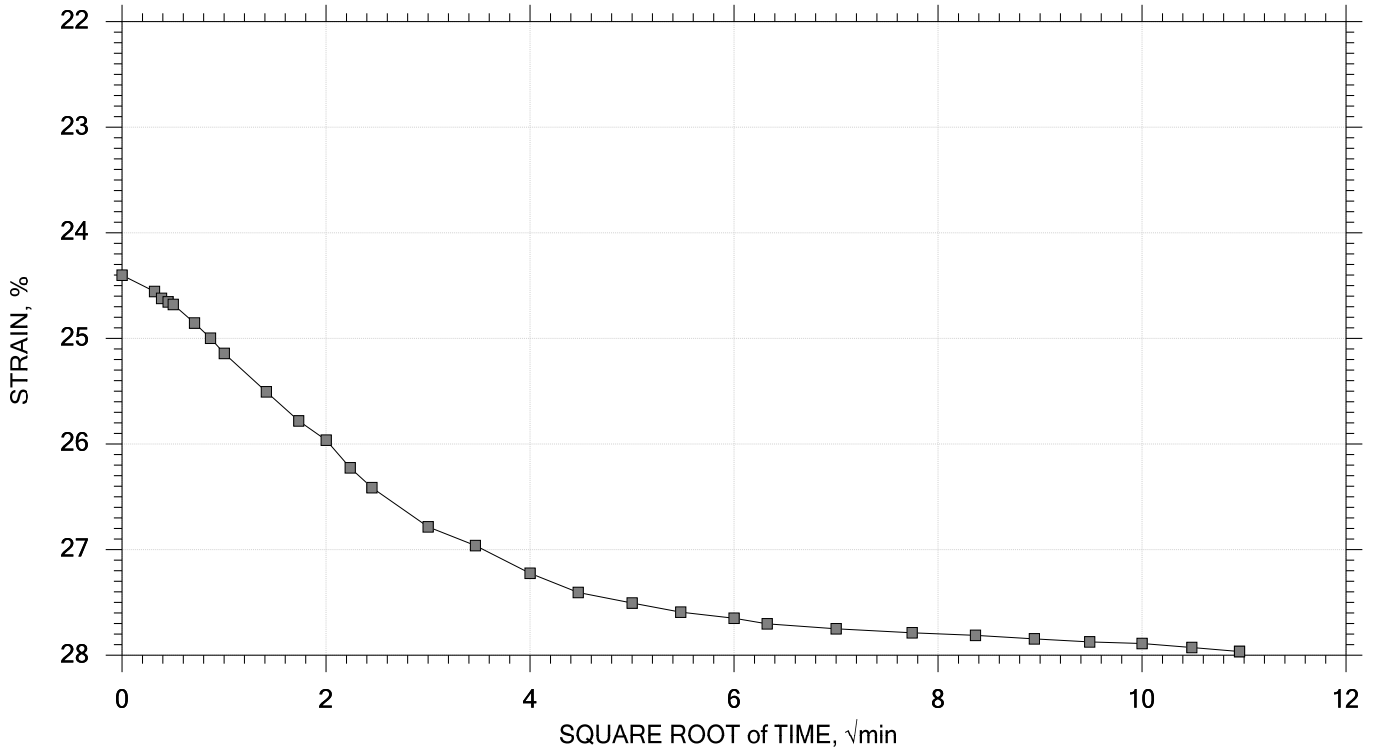
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 17

Stress: 16 tsf





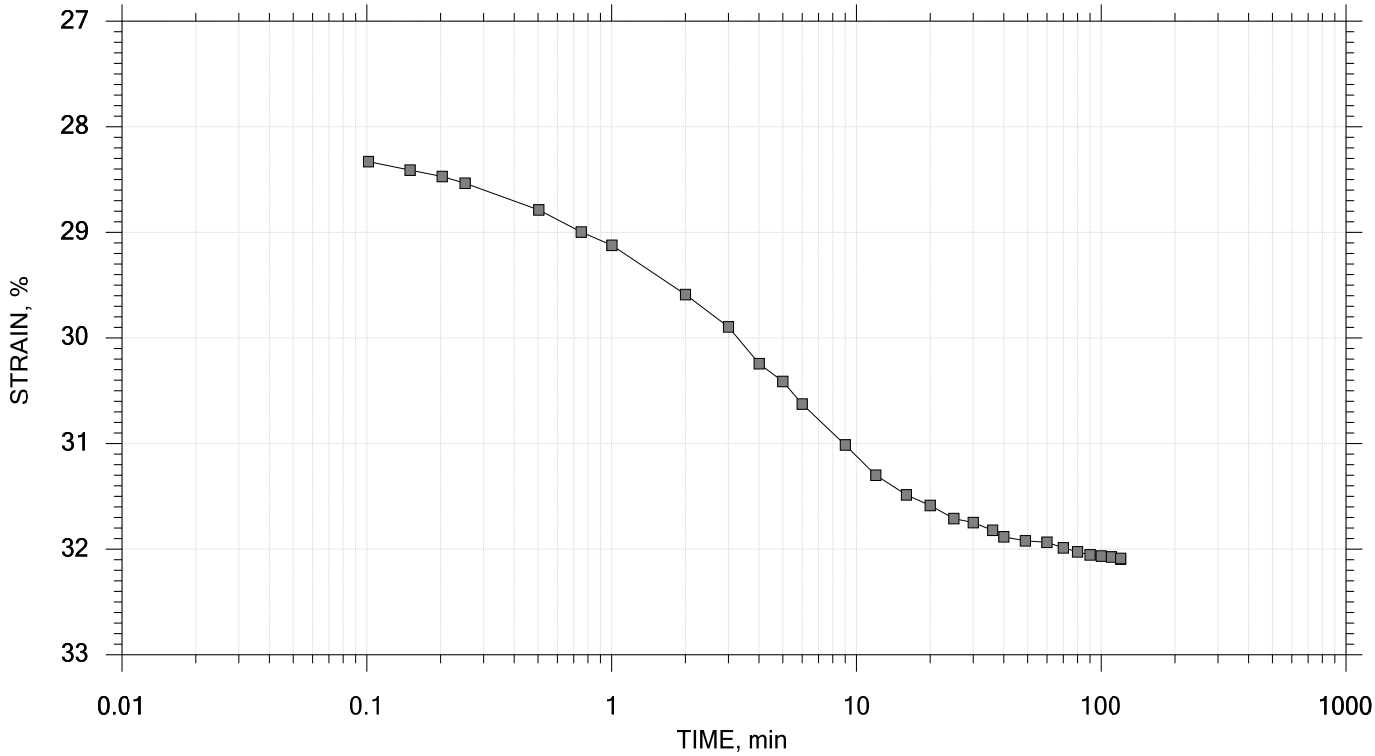
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

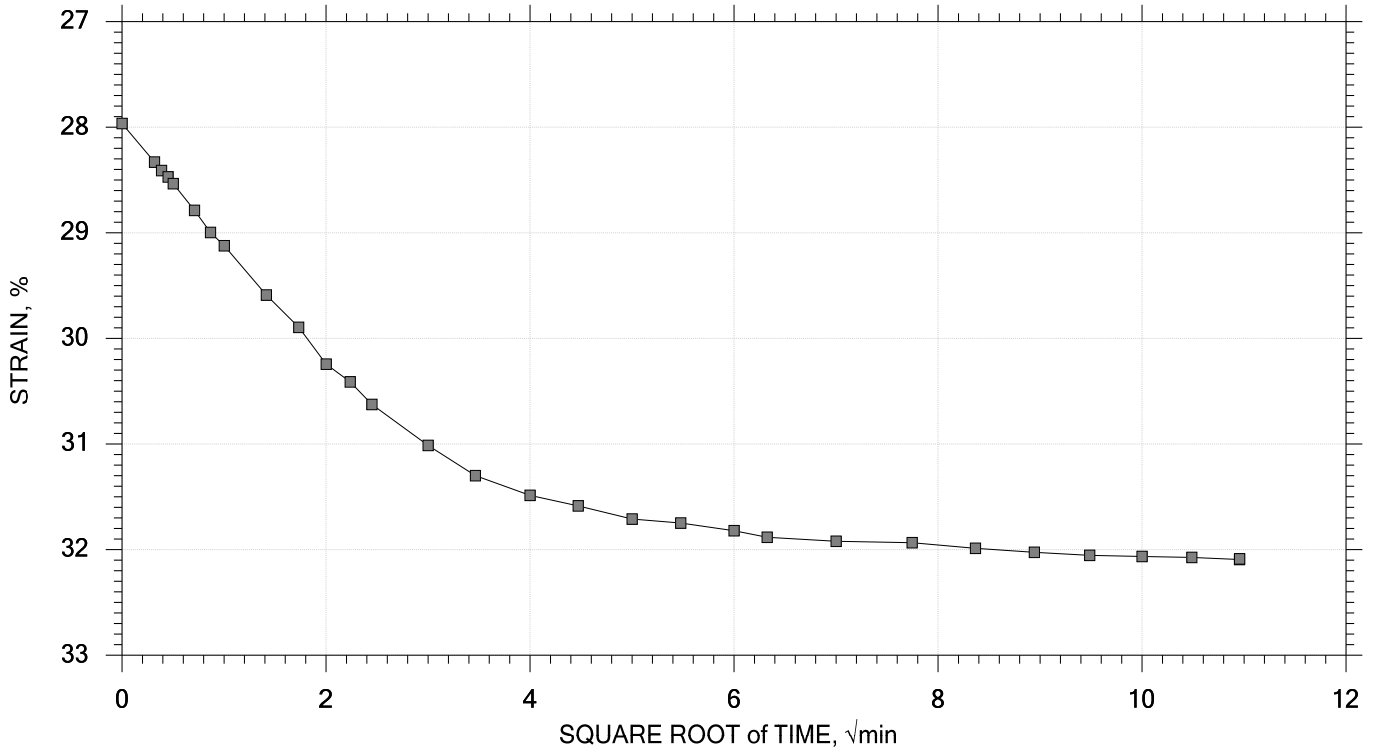
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 17

Stress: 32 tsf





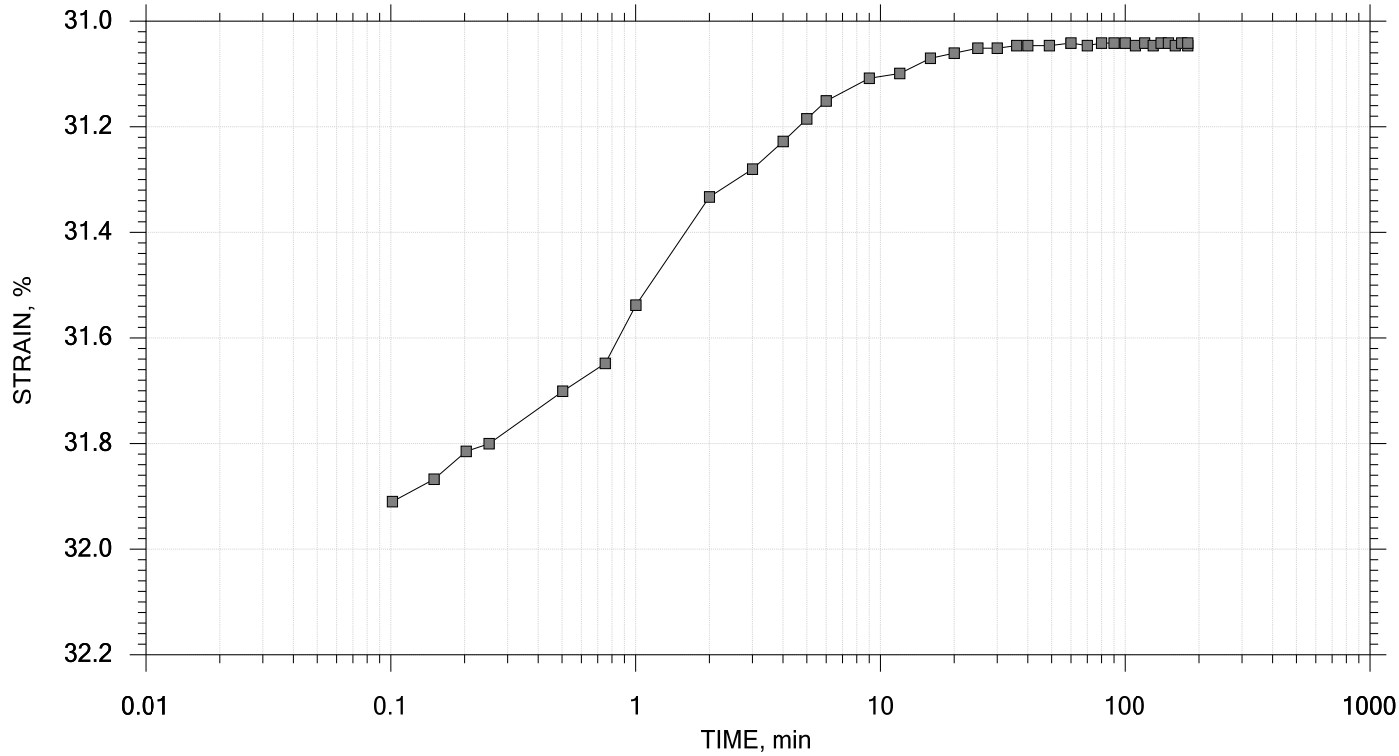
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

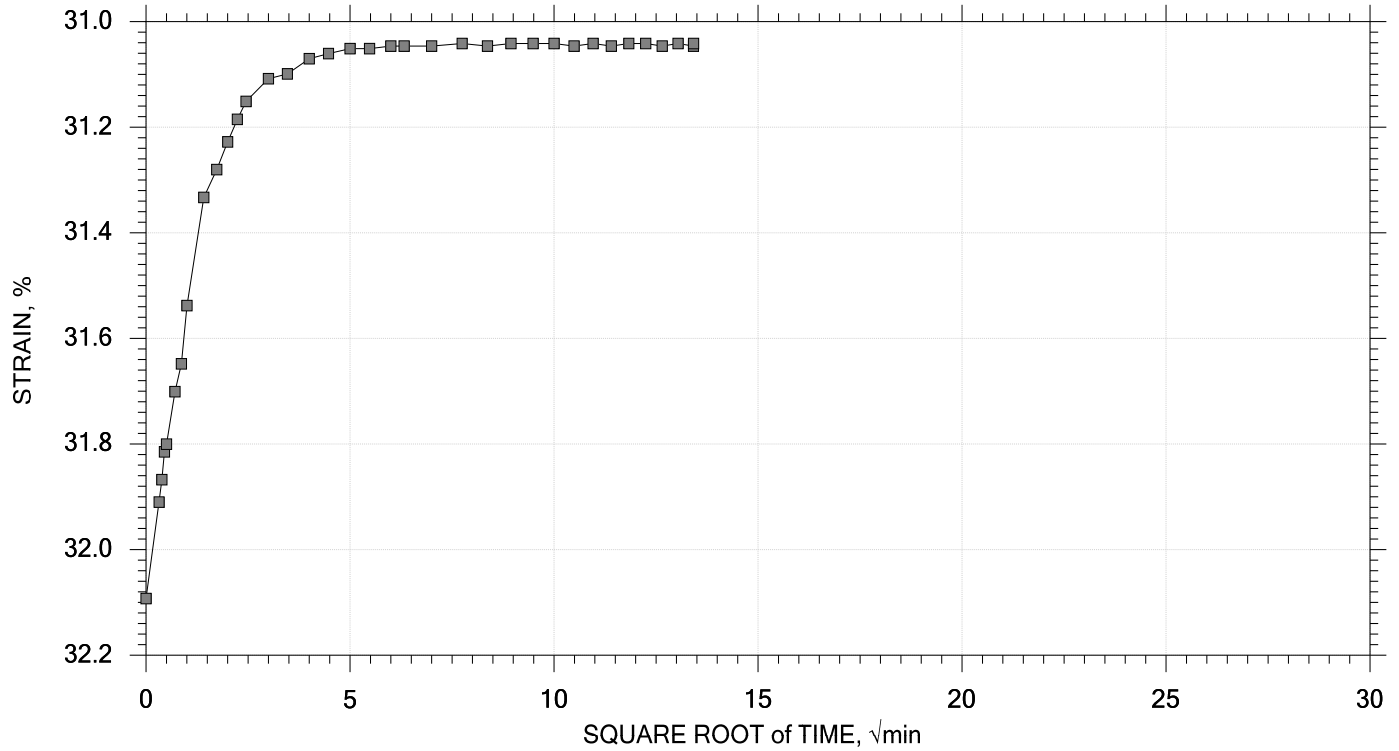
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 17

Stress: 8 tsf





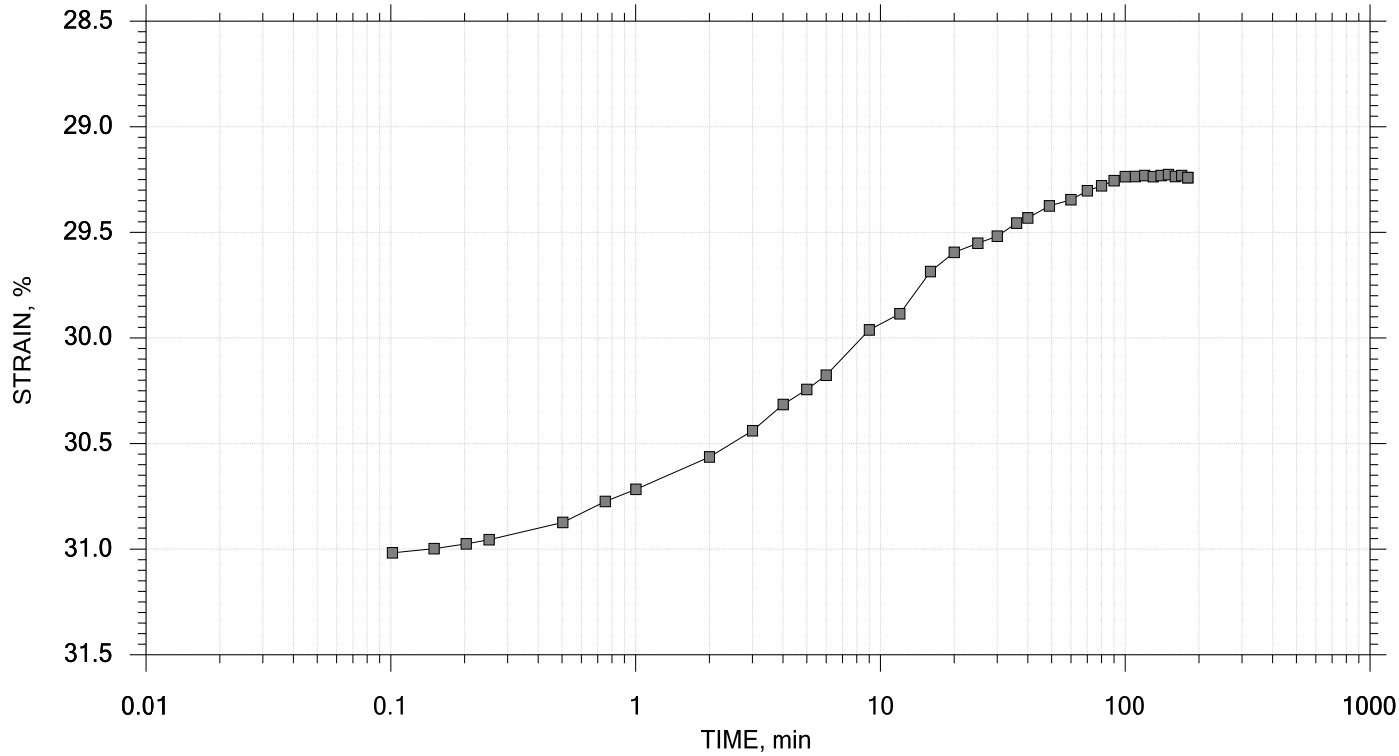
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

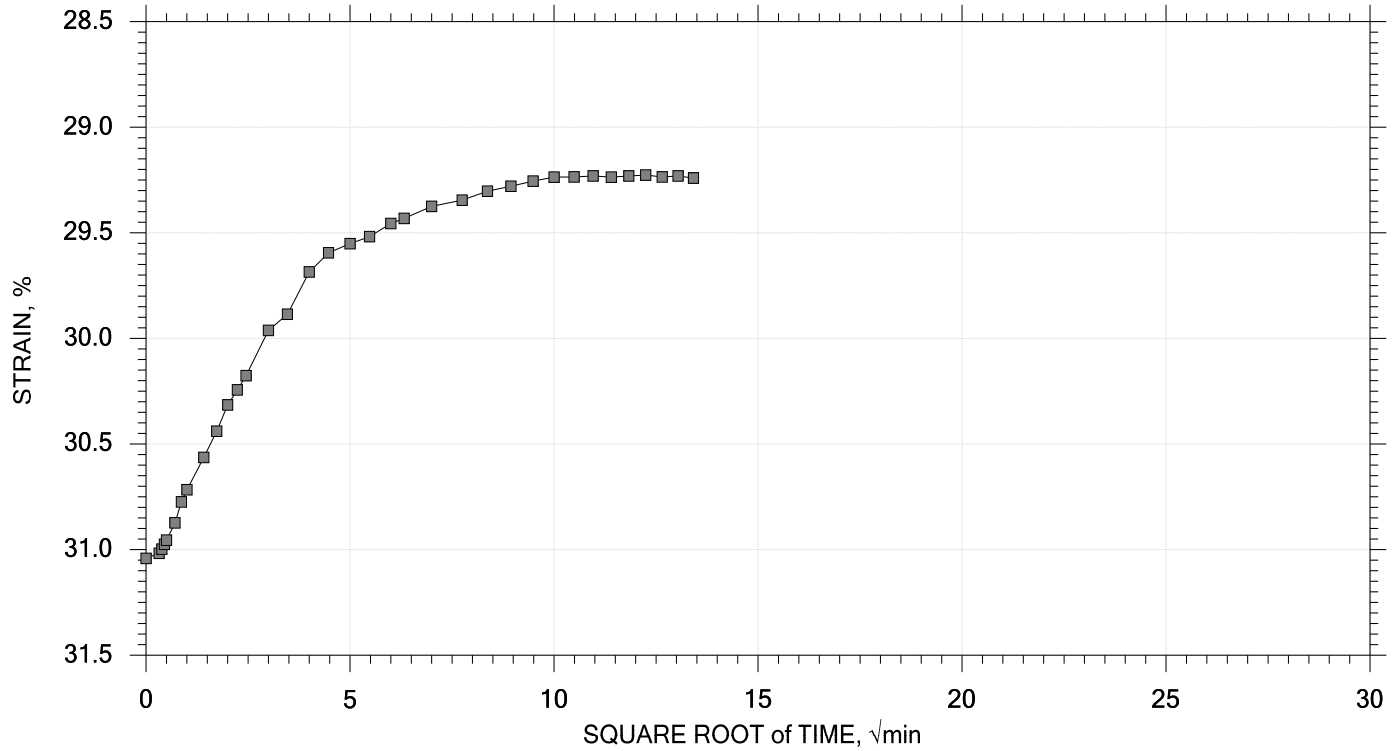
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 17

Stress: 2 tsf





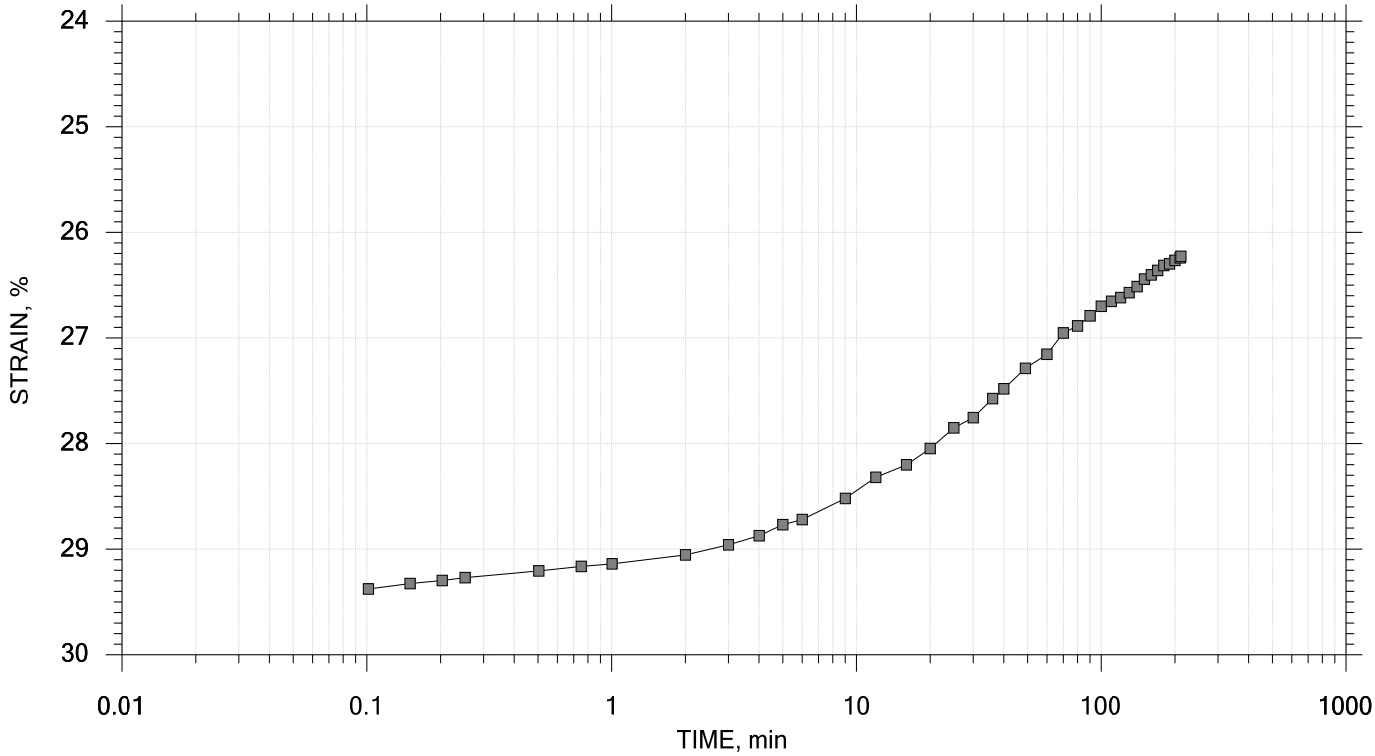
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

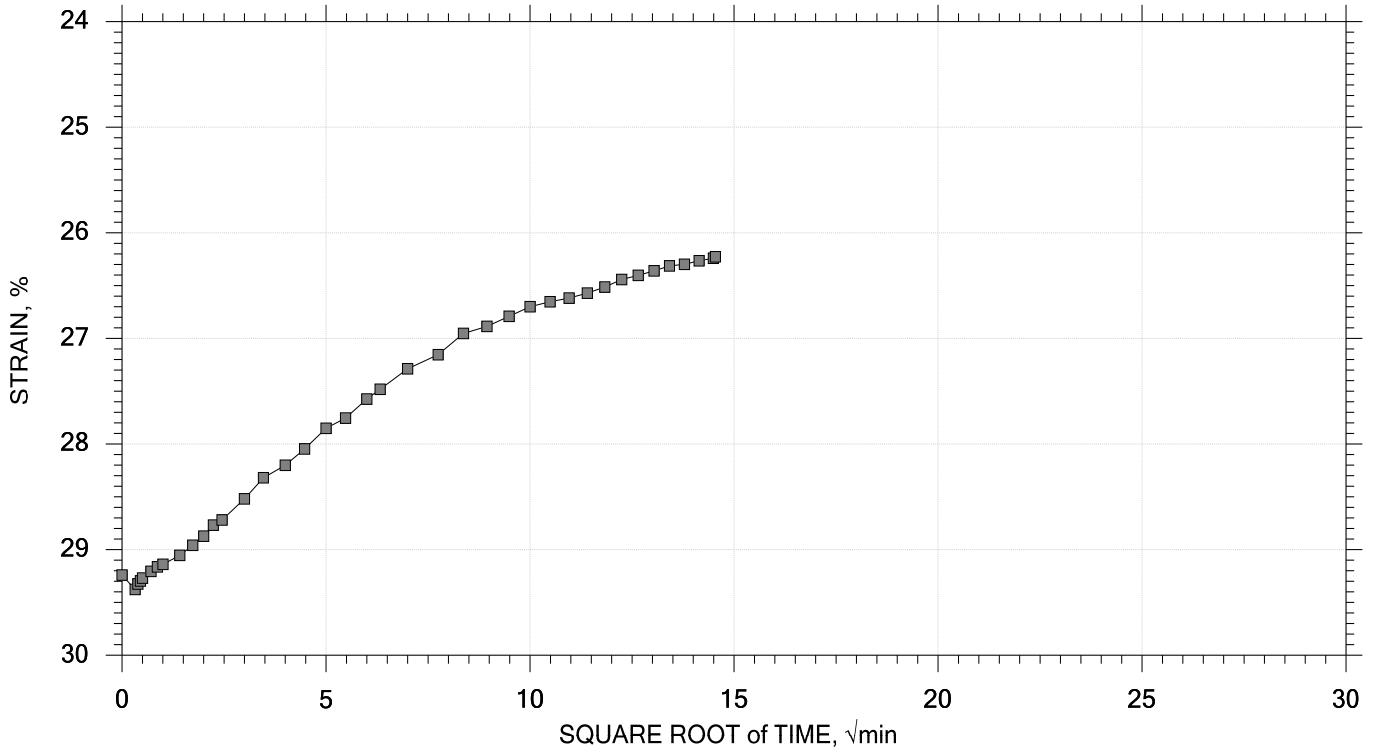
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 17

Stress: 0.25 tsf

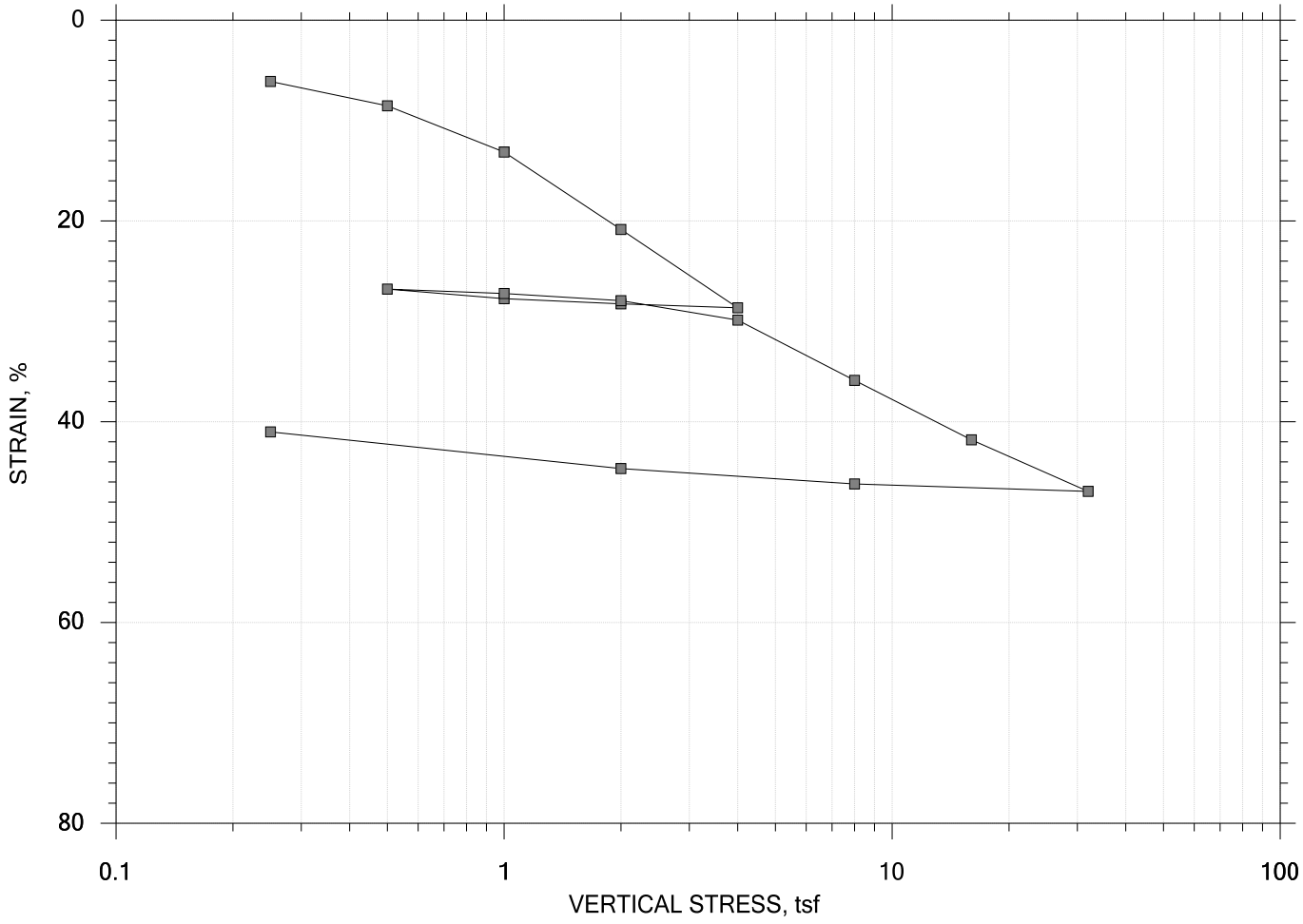


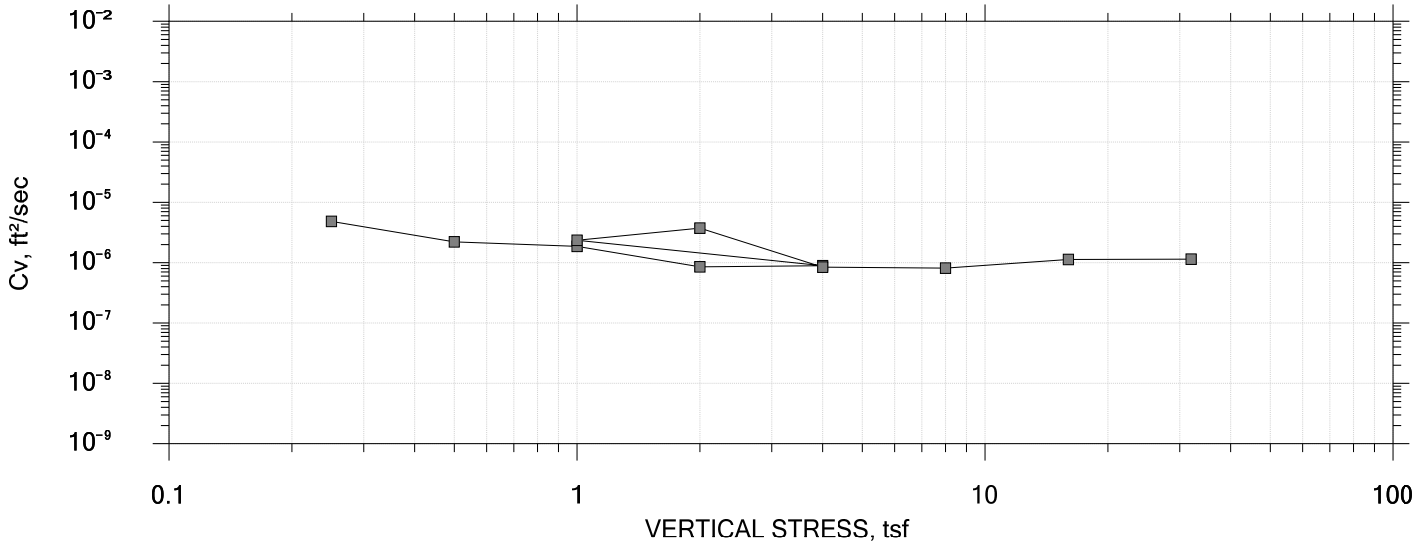


GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B301	Tested By: md	Checked By: njh
	Sample No.: U-7	Test Date: 09/08/18	Test No.: IP-3
	Depth: 67-69	Sample Type: intact	Elevation: ---
	Description: Wet, olive gray clay		
	Remarks: System E		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

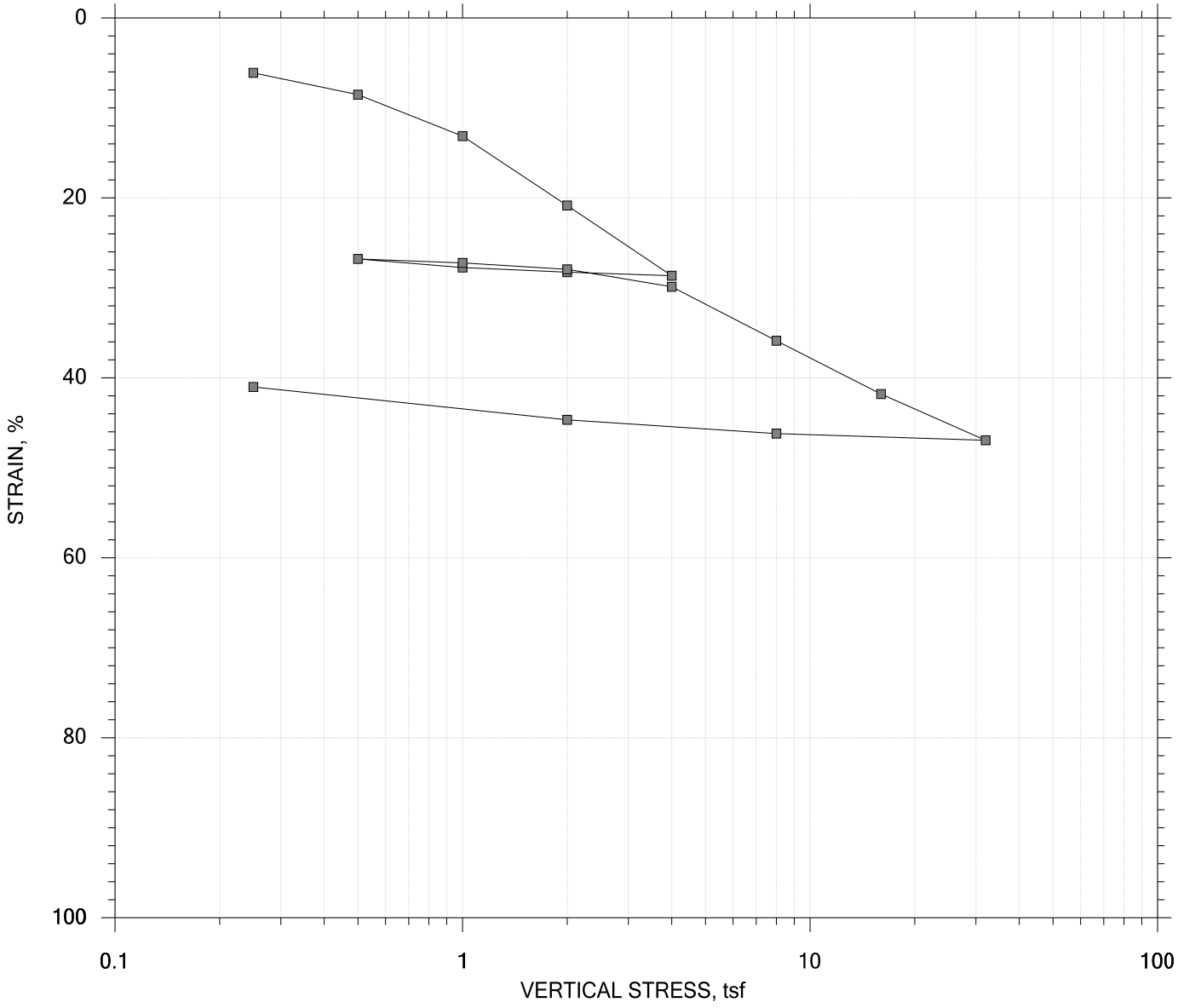




GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		
	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, %	81.83	41.47
Preconsolidation Stress: ---				Dry Unit Weight, pcf	50.688	77.981
Compression Ratio: ---				Saturation, %	96.75	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	2.19	1.08
LL: 84	PL: 38	PI: 46	GS: 2.59			

GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B303
Sample No.: U-3
Test No.: IP-4

Location: Durham, NH
Tested By: md
Test Date: 09/08/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 20.5-22.5 ft
Elevation: ---

Soil Description: Moist, dark gray silt
Remarks: System K

Estimated Specific Gravity: 2.59
Initial Void Ratio: 2.19
Final Void Ratio: 1.08

Liquid Limit: 84
Plastic Limit: 38
Plasticity Index: 46

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.65 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	A-1430	RING		A-1209
Wt. Container + Wet Soil, gm	110.43	227.90	201.54	100.71
Wt. Container + Dry Soil, gm	65.870	174.45	174.45	73.710
Wt. Container, gm	8.2900	109.14	109.14	8.6100
Wt. Dry Soil, gm	57.580	65.312	65.312	65.100
Water Content, %	77.39	81.83	41.47	41.47
Void Ratio	---	2.19	1.08	---
Degree of Saturation, %	---	96.75	100.00	---
Dry Unit Weight, pcf	---	50.688	77.981	---

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.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: NHDOT Durham
Boring No.: B303
Sample No.: U-3
Test No.: IP-4

Location: Durham, NH
Tested By: md
Test Date: 09/08/18
Sample Type: intact

Project No.: GTX-308573
Checked By: njh
Depth: 20.5-22.5 ft
Elevation: ---

Soil Description: Moist, dark gray silt
Remarks: System K

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day
1	0.250	0.06102	2.00	6.10	5.374	4.29e-006	2.44e-001	2.82e-003
2	0.500	0.08517	1.92	8.52	11.519	1.83e-006	9.66e-002	4.77e-004
3	1.00	0.1312	1.77	13.1	13.473	1.45e-006	9.21e-002	3.60e-004
4	2.00	0.2084	1.53	20.8	21.766	7.77e-007	7.71e-002	1.62e-004
5	4.00	0.2865	1.28	28.6	15.172	9.16e-007	3.91e-002	9.65e-005
6	2.00	0.2826	1.29	28.3	1.176	1.07e-005	1.94e-003	5.59e-005
7	1.00	0.2773	1.31	27.7	4.900	2.60e-006	5.28e-003	3.70e-005
8	0.500	0.2678	1.34	26.8	20.692	6.28e-007	1.90e-002	3.22e-005
9	1.00	0.2722	1.32	27.2	6.599	1.98e-006	8.86e-003	4.73e-005
10	2.00	0.2793	1.30	27.9	4.361	2.95e-006	7.12e-003	5.67e-005
11	4.00	0.2987	1.24	29.9	18.142	6.84e-007	9.66e-003	1.78e-005
12	8.00	0.3587	1.05	35.9	16.557	6.68e-007	1.50e-002	2.70e-005
13	16.0	0.4180	0.858	41.8	9.126	1.01e-006	7.42e-003	2.01e-005
14	32.0	0.4693	0.694	46.9	6.944	1.09e-006	3.20e-003	9.45e-006
15	8.00	0.4619	0.718	46.2	1.030	6.80e-006	3.05e-004	5.59e-006
16	2.00	0.4466	0.766	44.7	8.483	8.61e-007	2.55e-003	5.92e-006
17	0.250	0.4101	0.883	41.0	70.070	1.14e-007	2.09e-002	6.45e-006

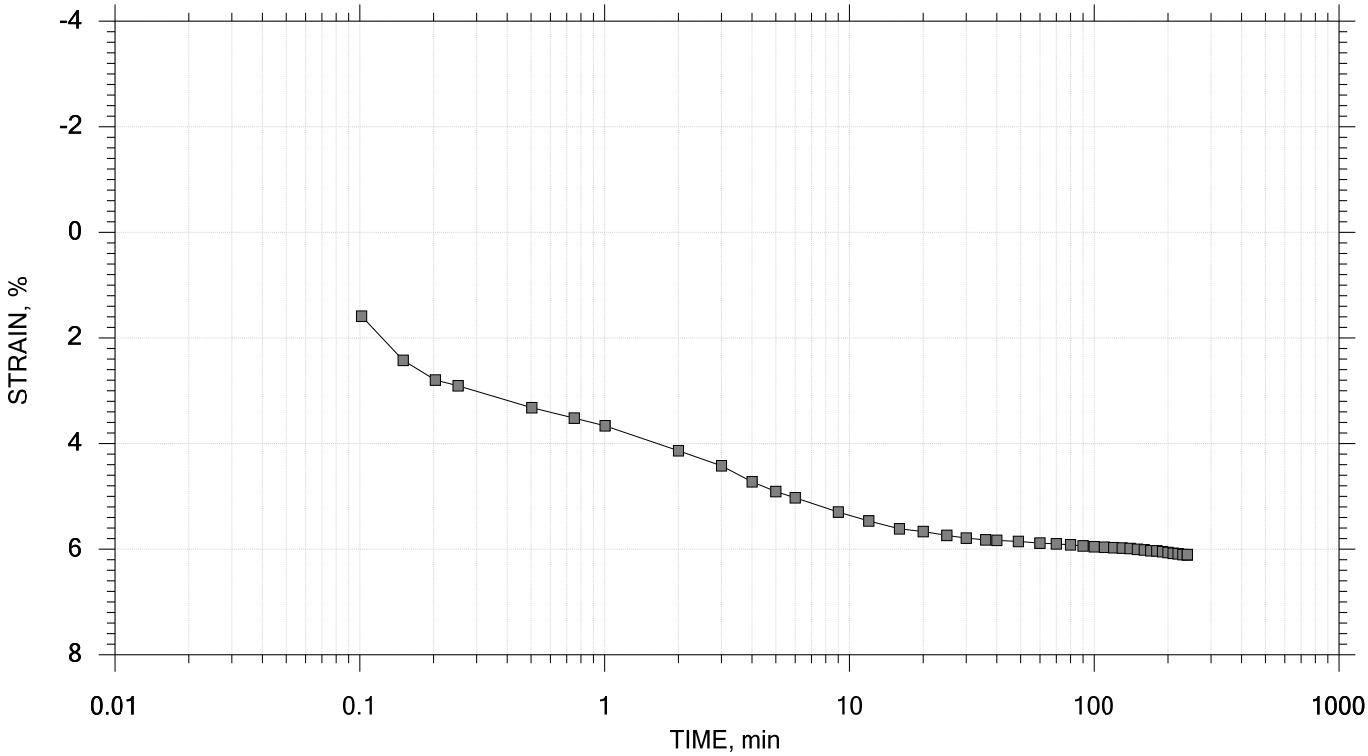
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1	0.250	0.06102	2.00	6.10	0.000	0.00e+000	2.44e-001	0.00e+000	0.00e+000
2	0.500	0.08517	1.92	8.52	1.933	2.53e-006	9.66e-002	6.60e-004	0.00e+000
3	1.00	0.1312	1.77	13.1	1.898	2.39e-006	9.21e-002	5.93e-004	0.00e+000
4	2.00	0.2084	1.53	20.8	4.348	9.04e-007	7.71e-002	1.88e-004	0.00e+000
5	4.00	0.2865	1.28	28.6	3.867	8.35e-007	3.91e-002	8.79e-005	0.00e+000
6	2.00	0.2826	1.29	28.3	0.000	0.00e+000	1.94e-003	0.00e+000	0.00e+000
7	1.00	0.2773	1.31	27.7	1.079	2.74e-006	5.28e-003	3.90e-005	0.00e+000
8	0.500	0.2678	1.34	26.8	6.244	4.83e-007	1.90e-002	2.48e-005	0.00e+000
9	1.00	0.2722	1.32	27.2	1.339	2.27e-006	8.86e-003	5.42e-005	0.00e+000
10	2.00	0.2793	1.30	27.9	0.870	3.44e-006	7.12e-003	6.60e-005	0.00e+000
11	4.00	0.2987	1.24	29.9	0.000	0.00e+000	9.66e-003	0.00e+000	0.00e+000
12	8.00	0.3587	1.05	35.9	2.763	9.30e-007	1.50e-002	3.76e-005	0.00e+000
13	16.0	0.4180	0.858	41.8	1.867	1.14e-006	7.42e-003	2.28e-005	0.00e+000
14	32.0	0.4693	0.694	46.9	1.672	1.06e-006	3.20e-003	9.12e-006	0.00e+000
15	8.00	0.4619	0.718	46.2	0.169	9.64e-006	3.05e-004	7.93e-006	0.00e+000
16	2.00	0.4466	0.766	44.7	0.000	0.00e+000	2.55e-003	0.00e+000	0.00e+000
17	0.250	0.4101	0.883	41.0	19.077	9.76e-008	2.09e-002	5.50e-006	0.00e+000

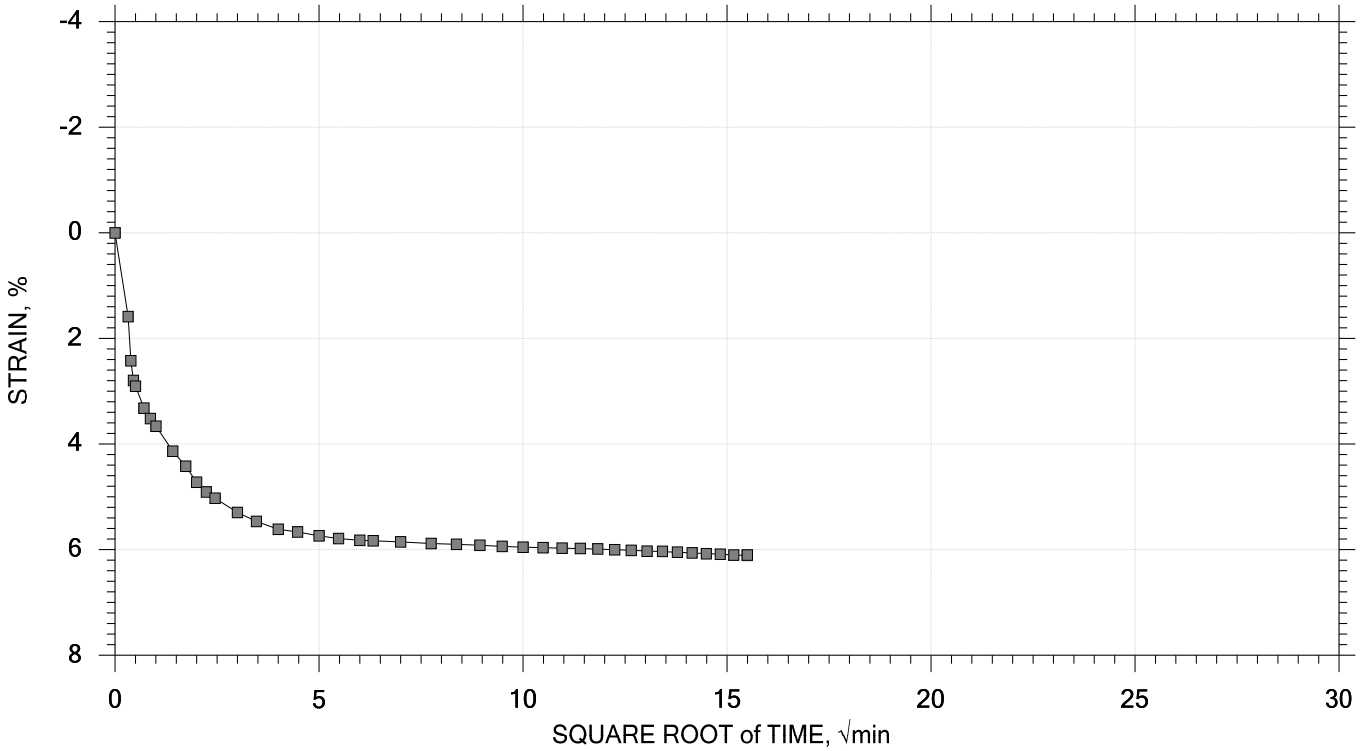
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 17

Stress: 0.25 tsf





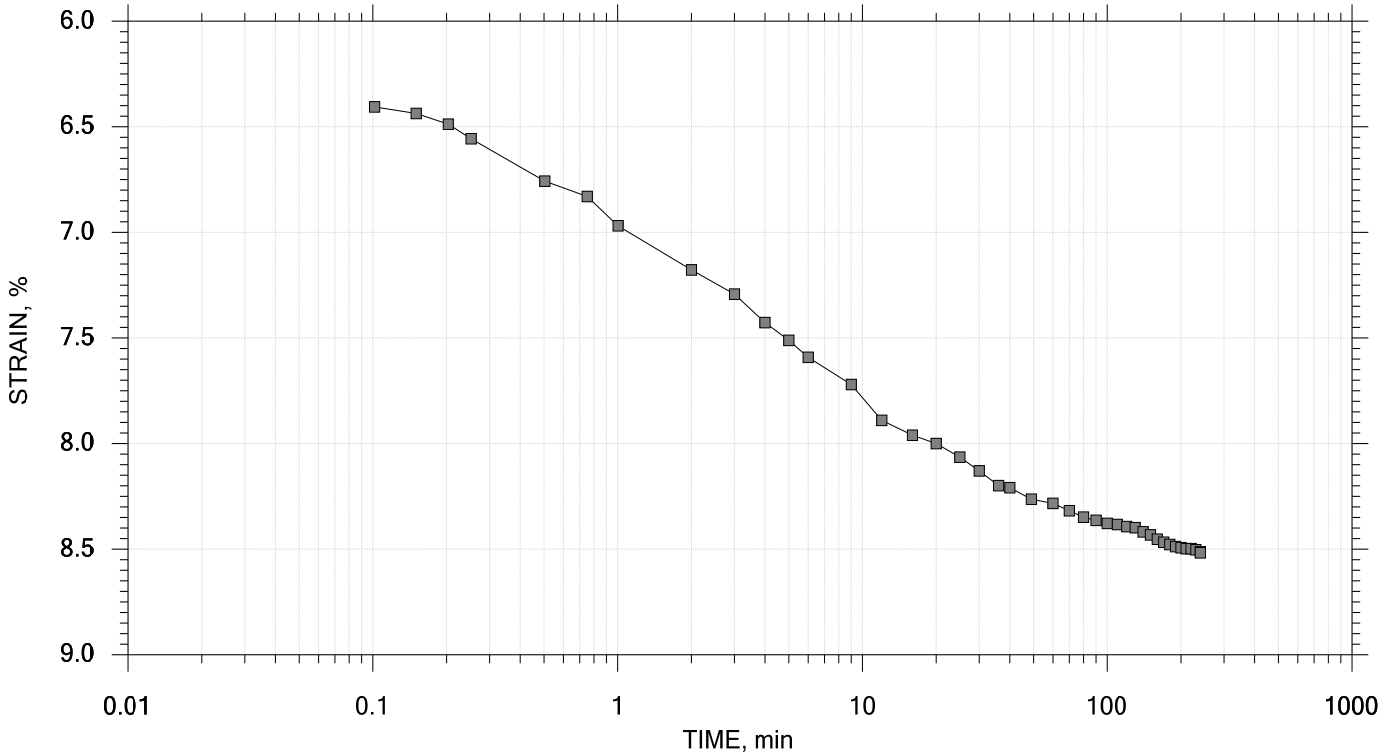
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

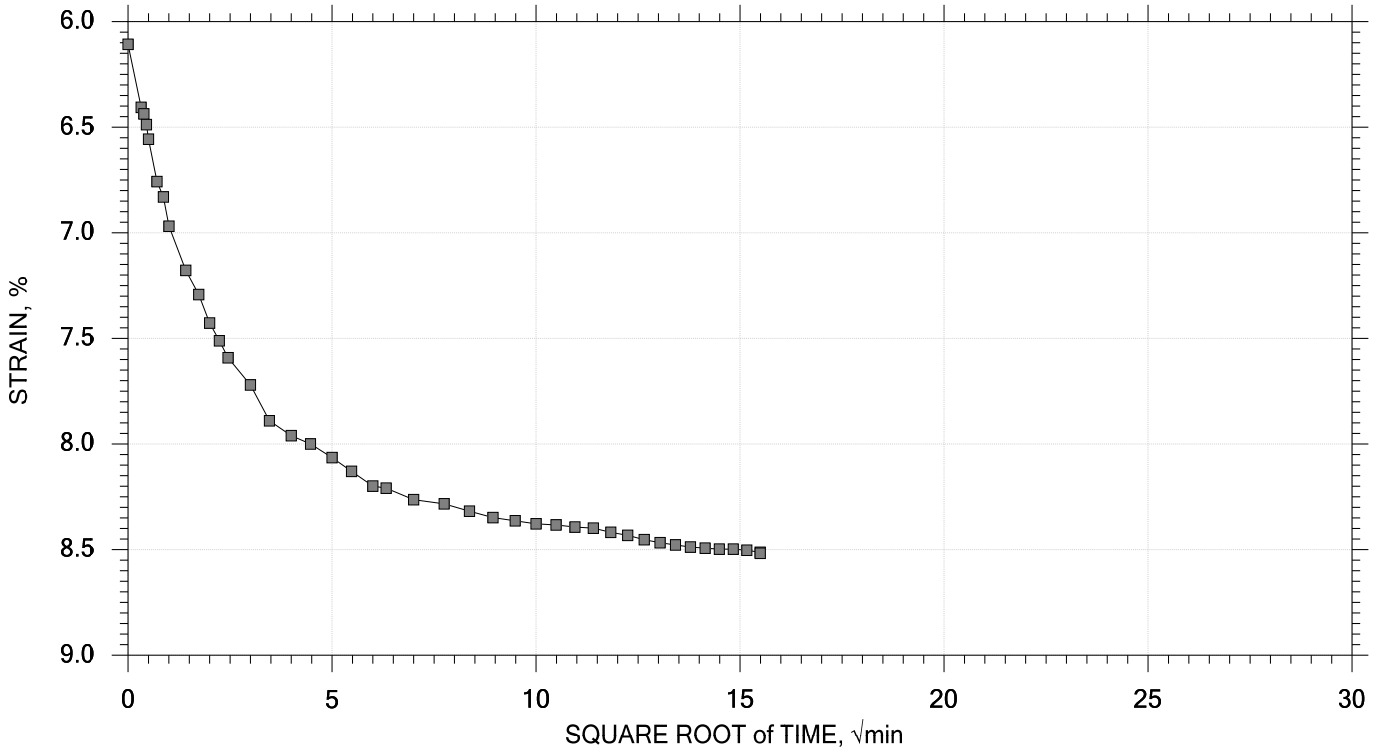
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 17

Stress: 0.5 tsf





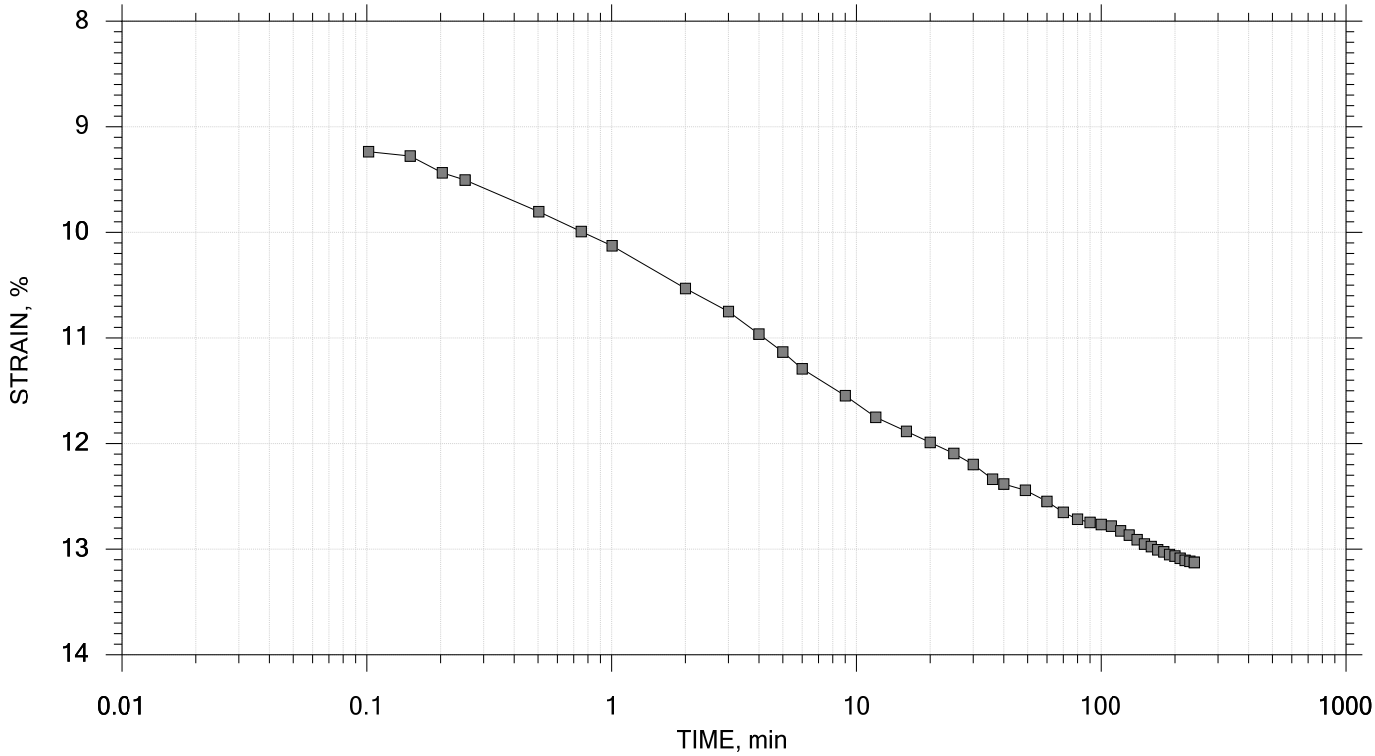
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

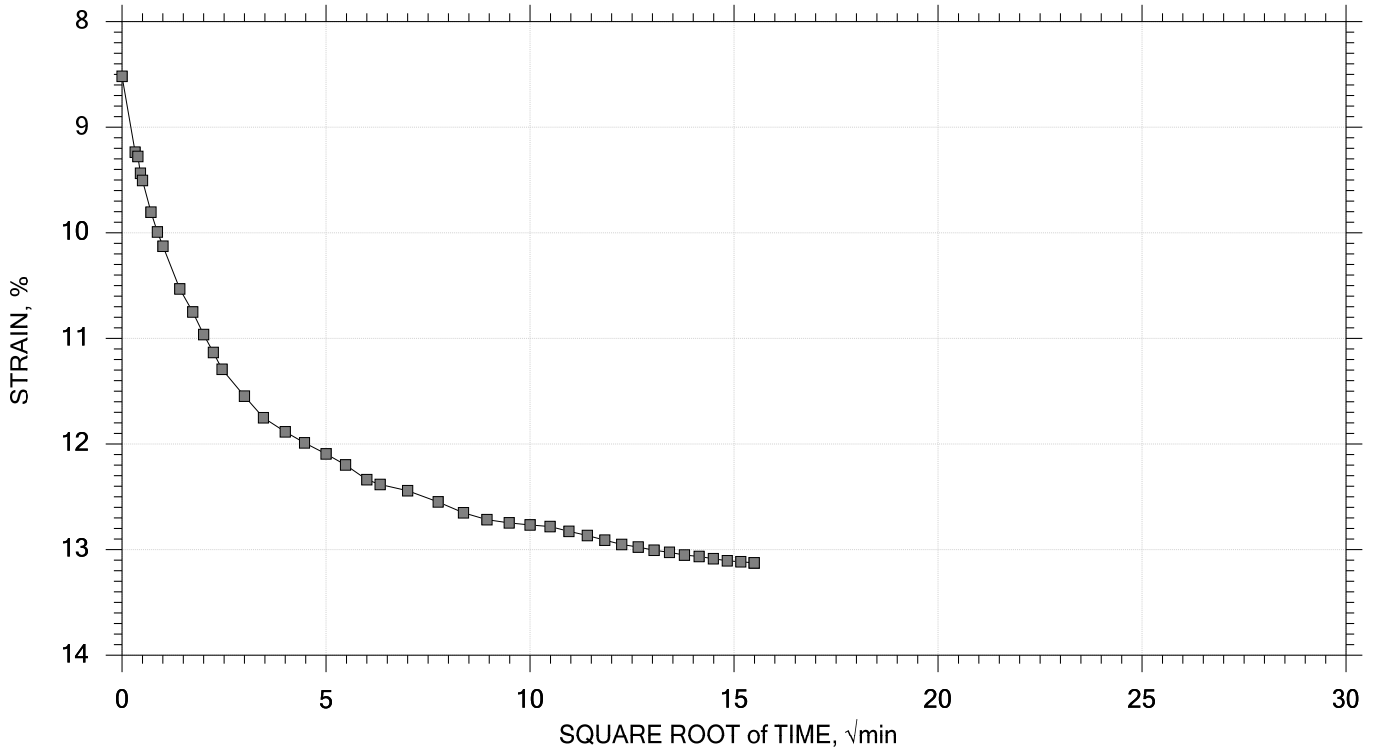
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 17

Stress: 1 tsf





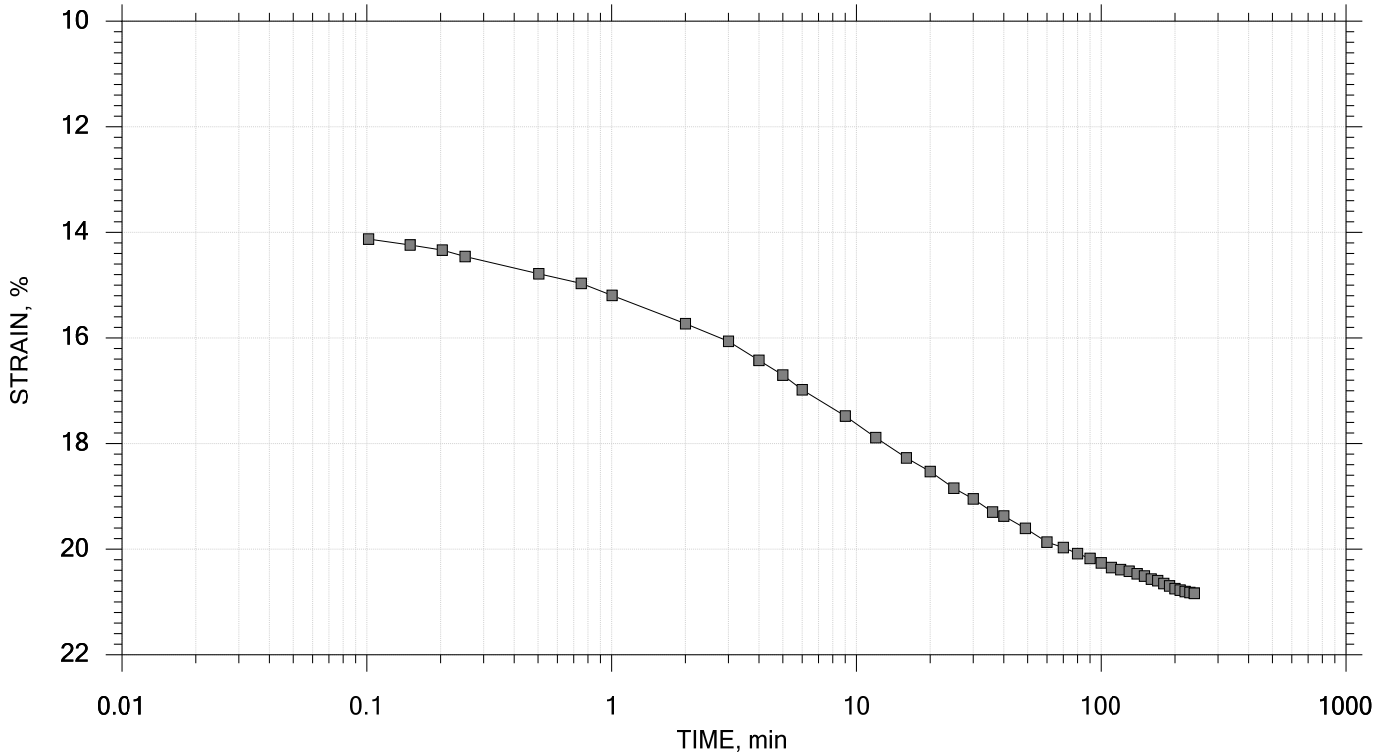
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

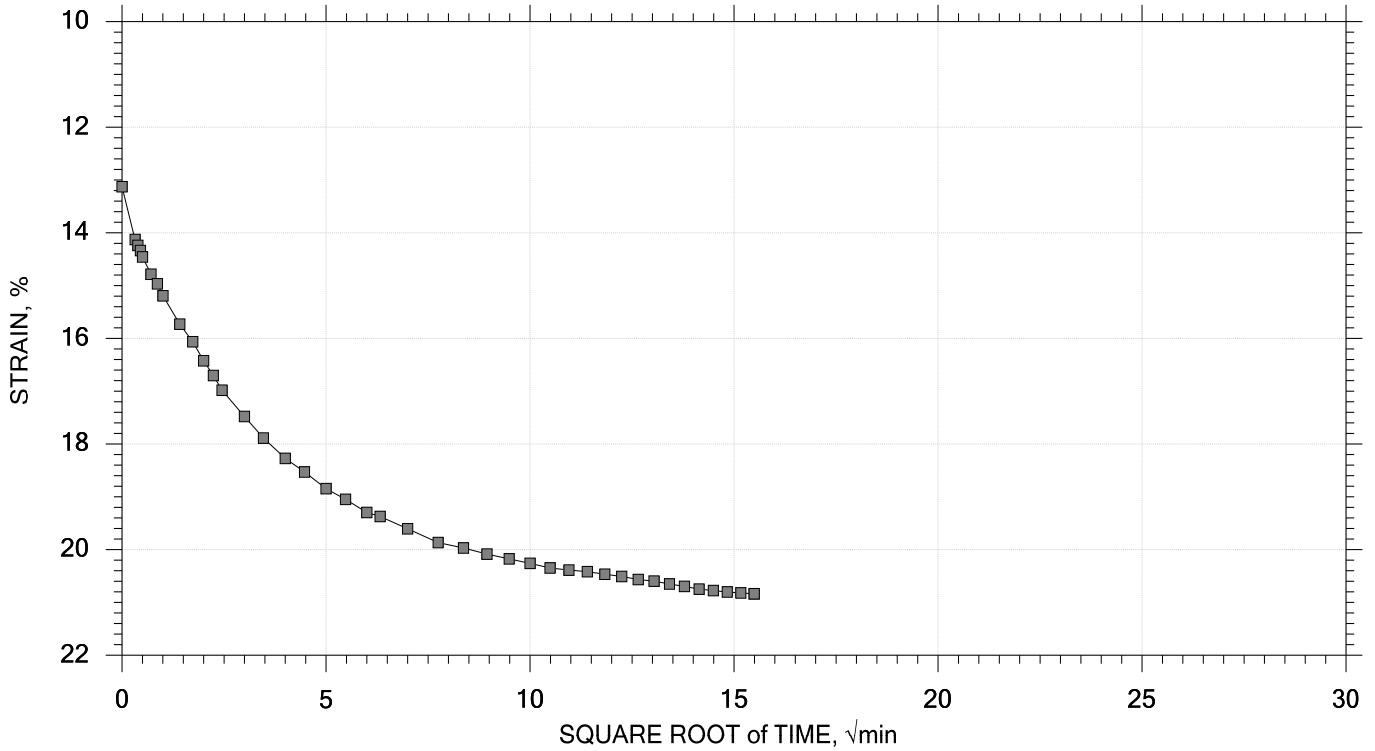
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 17

Stress: 2 tsf





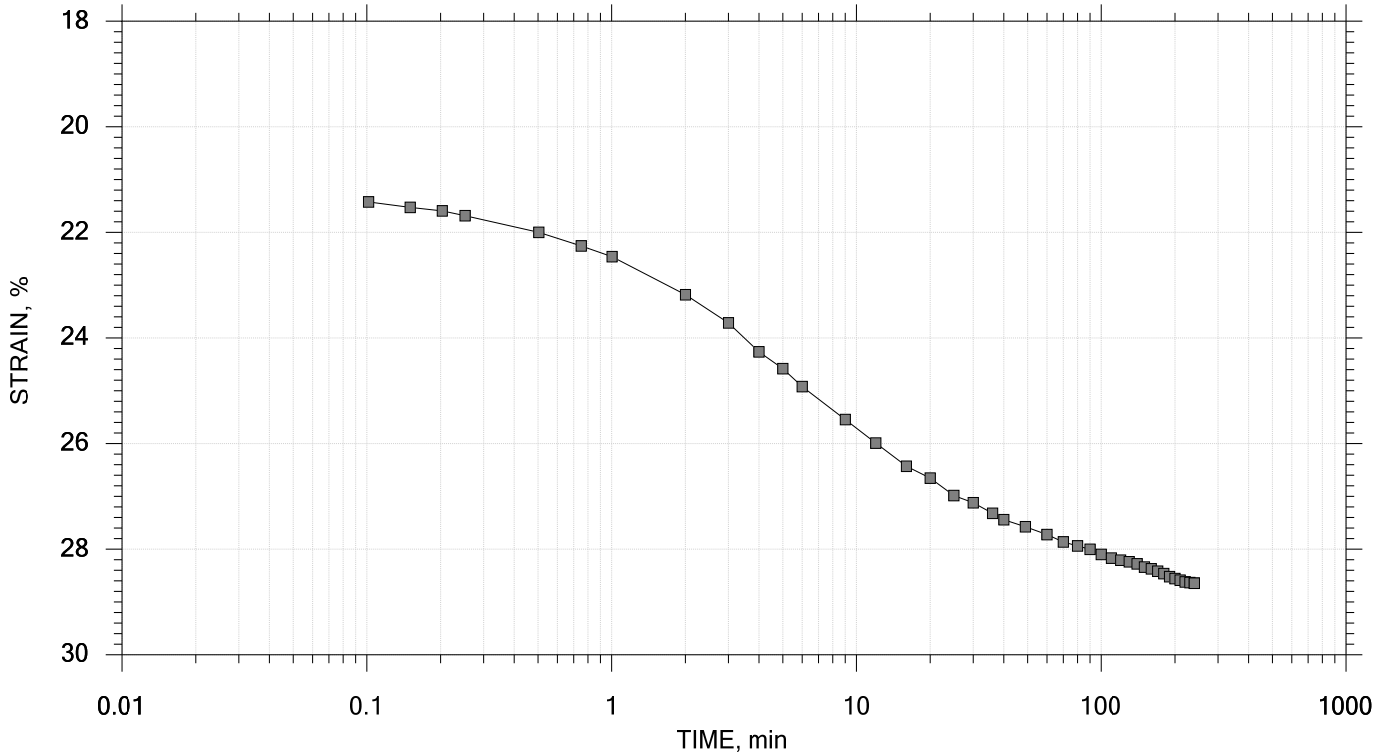
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

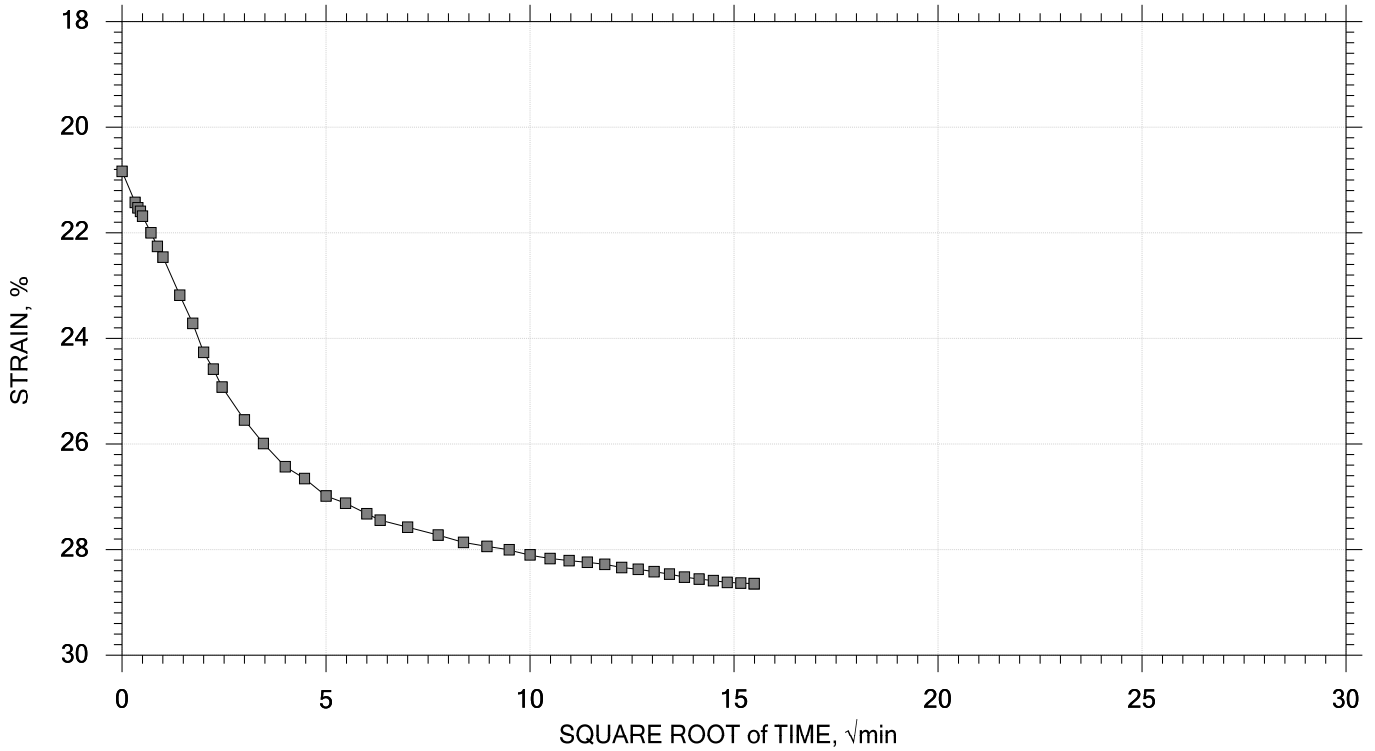
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 17

Stress: 4 tsf





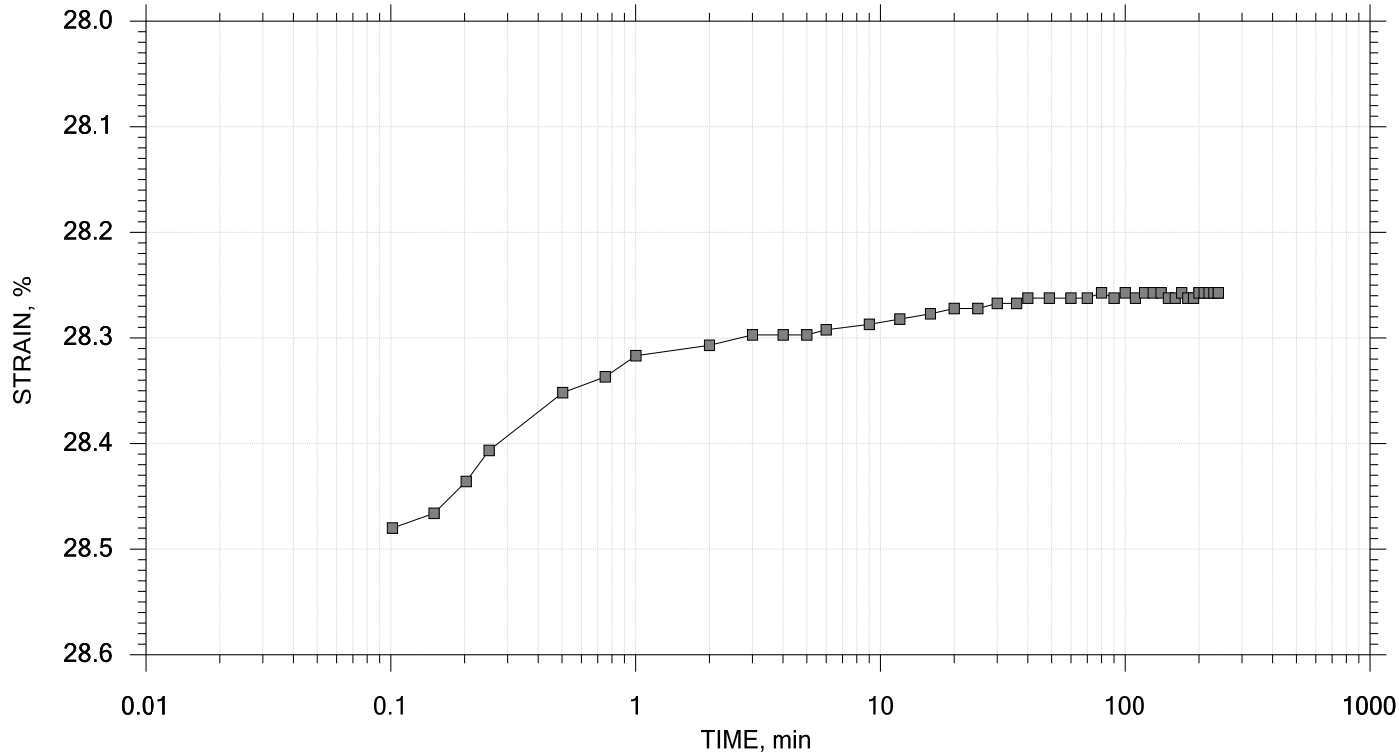
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

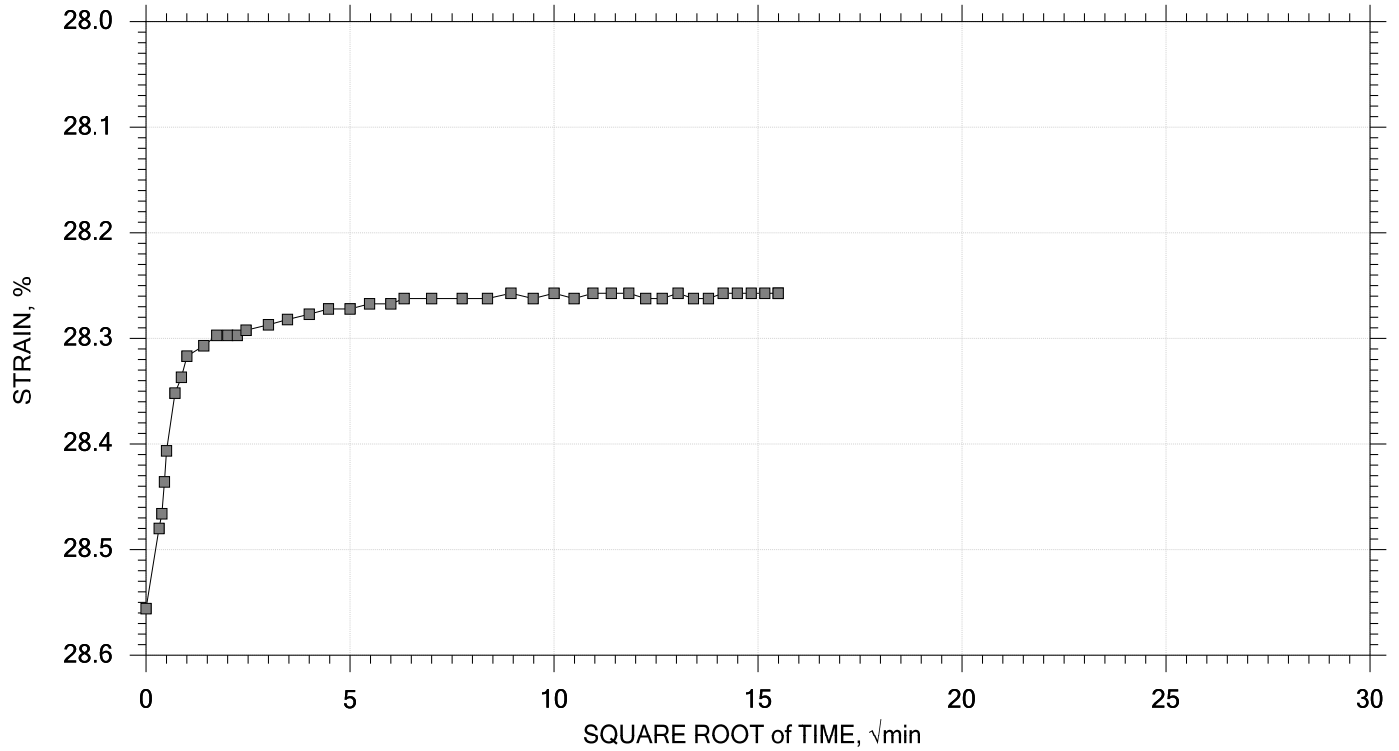
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 17

Stress: 2 tsf





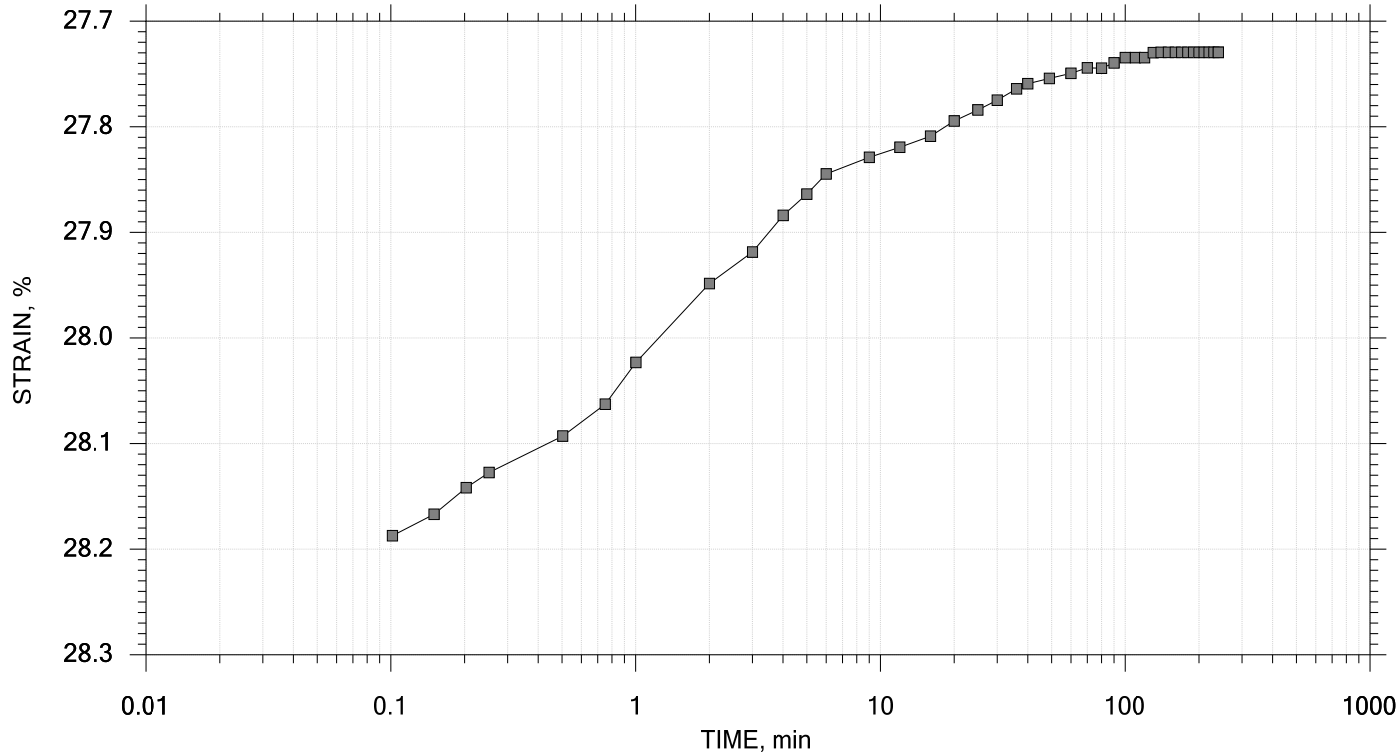
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

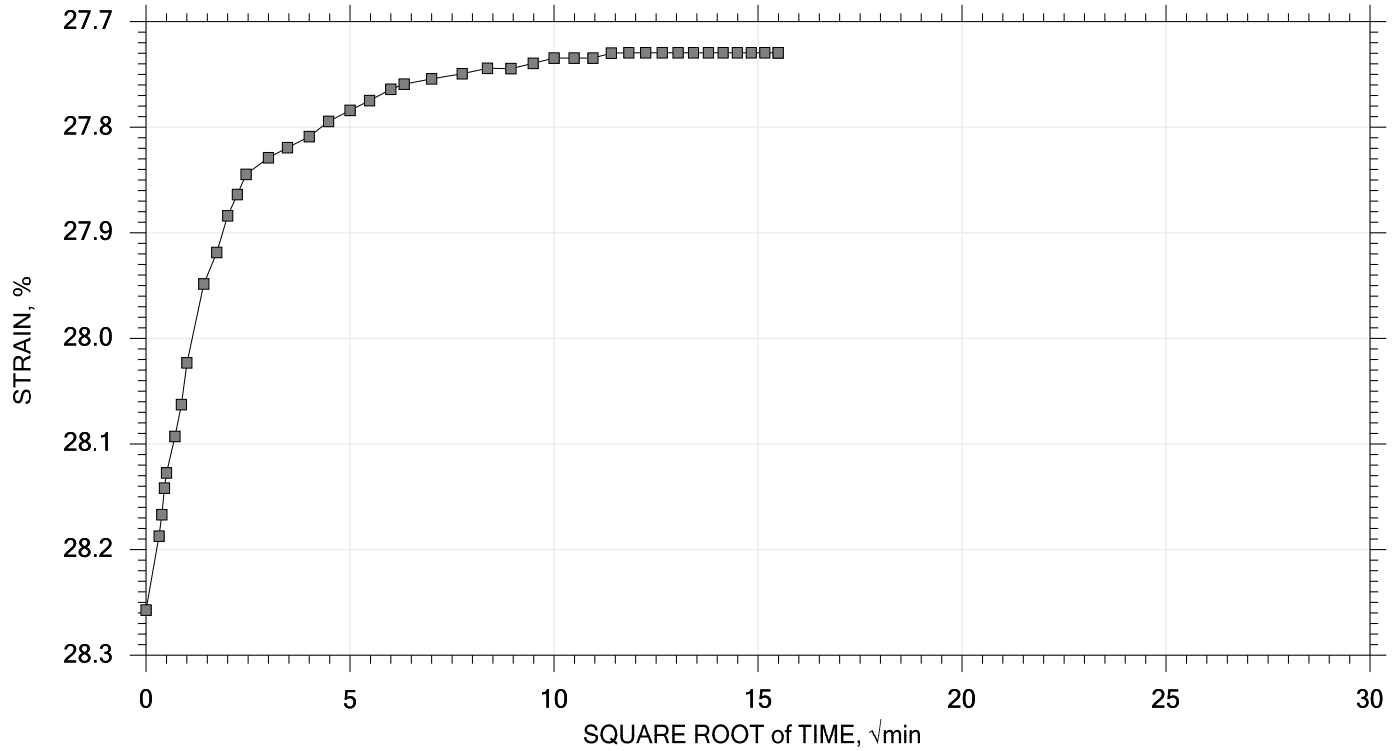
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 17

Stress: 1 tsf





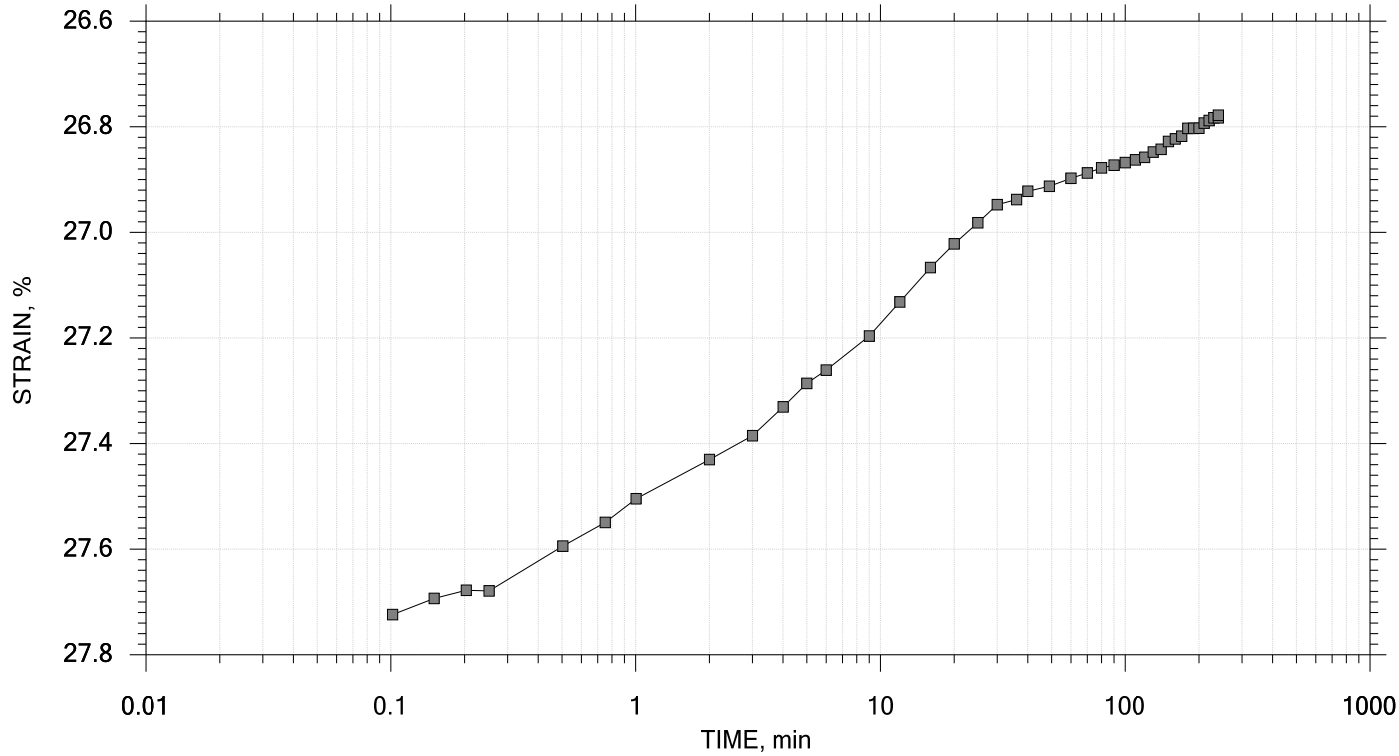
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

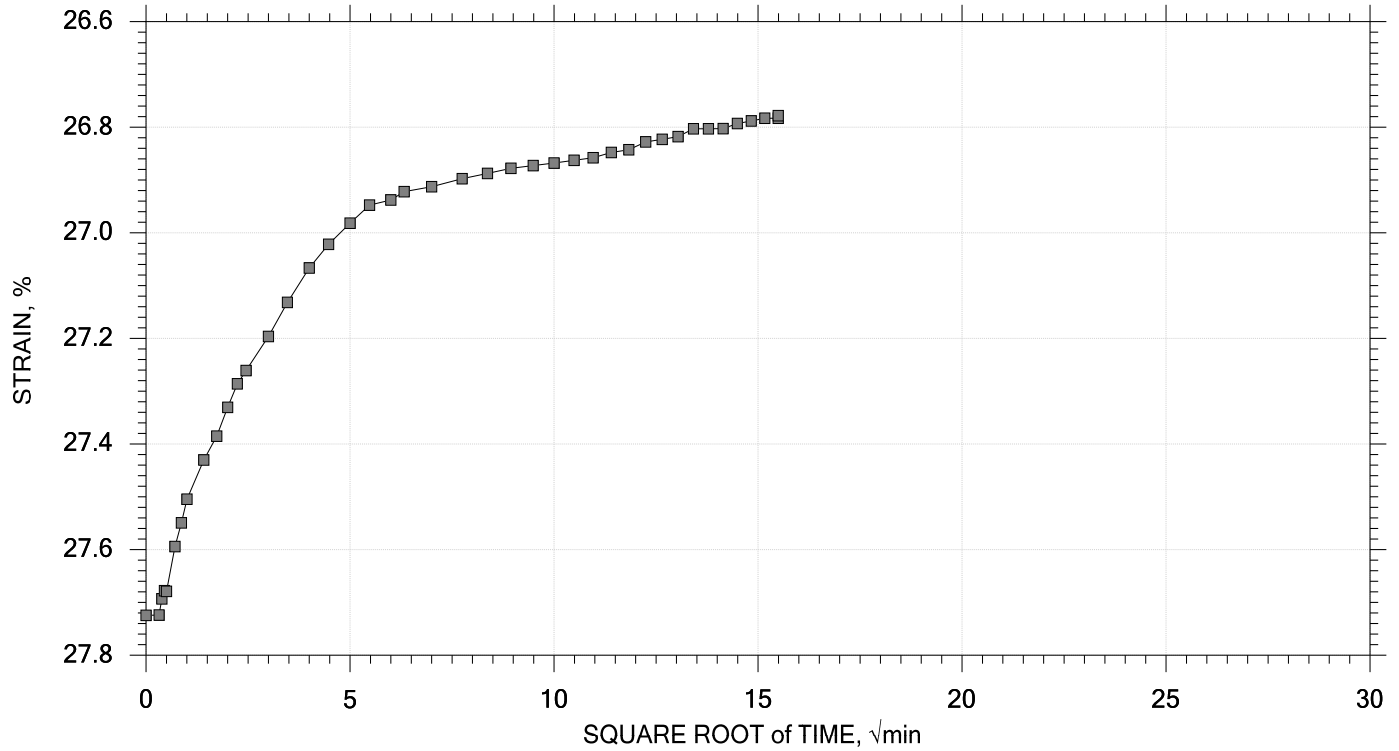
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 17

Stress: 0.5 tsf





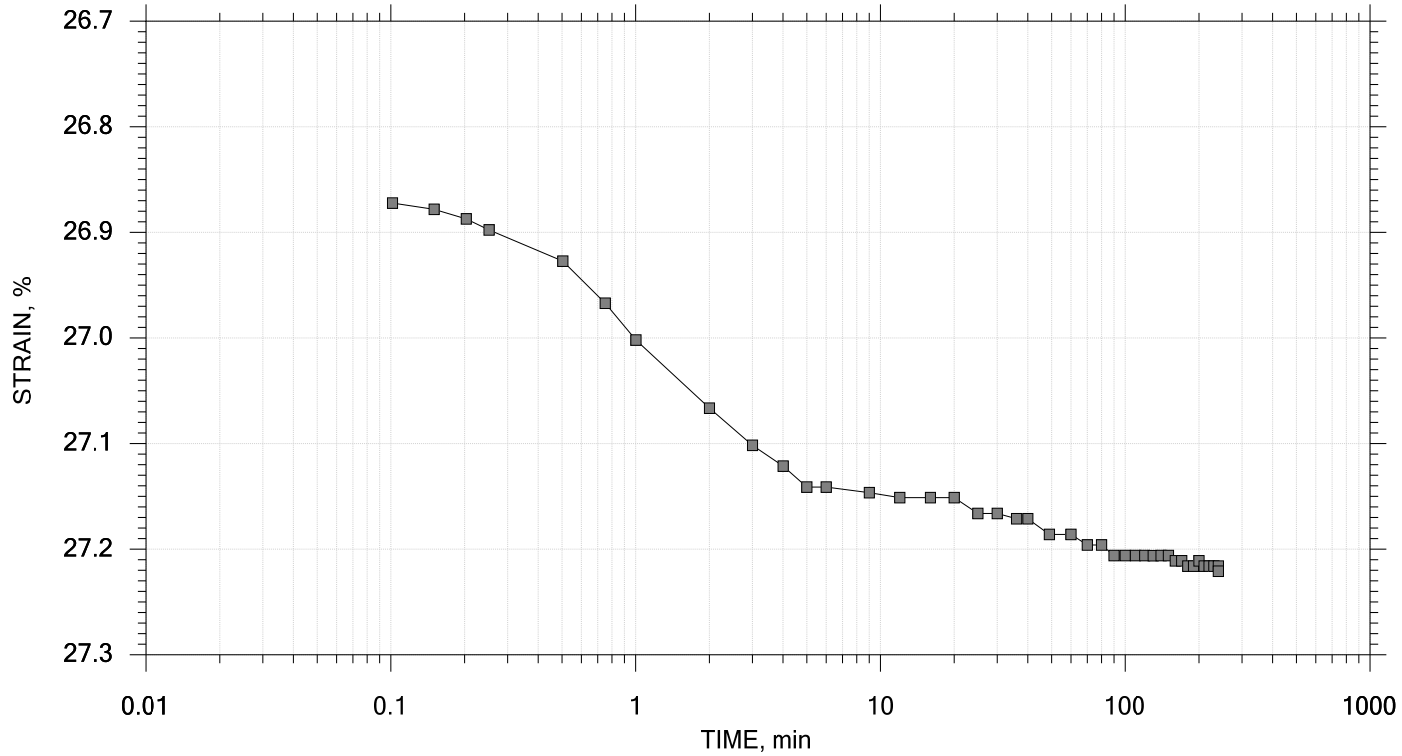
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

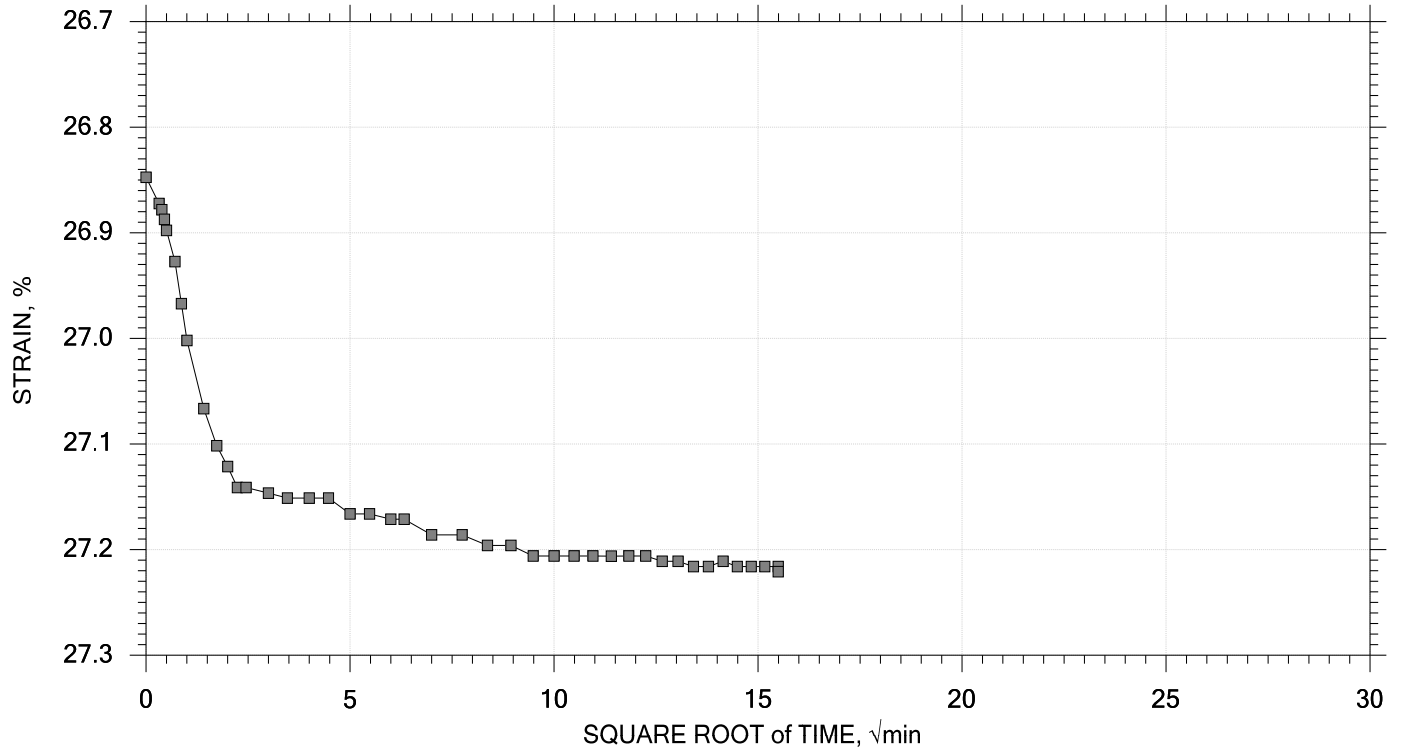
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 17

Stress: 1 tsf





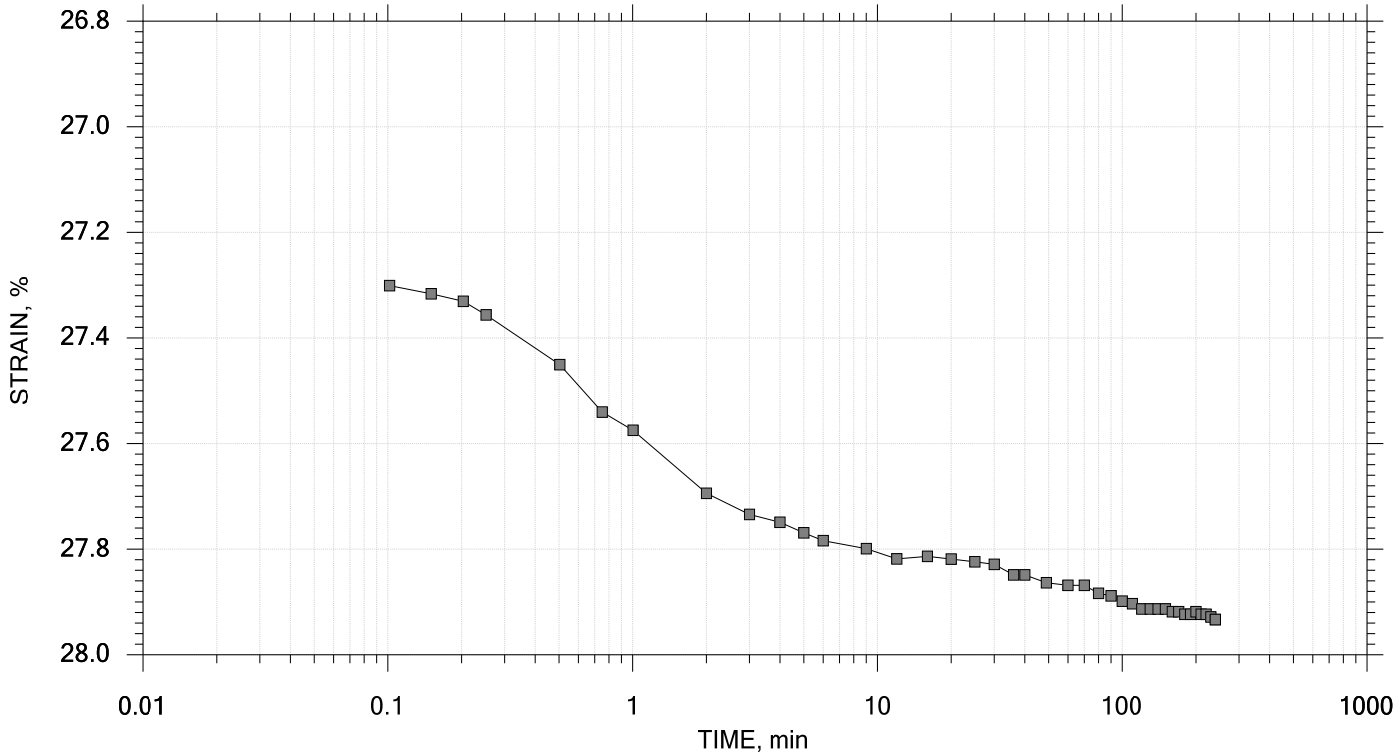
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

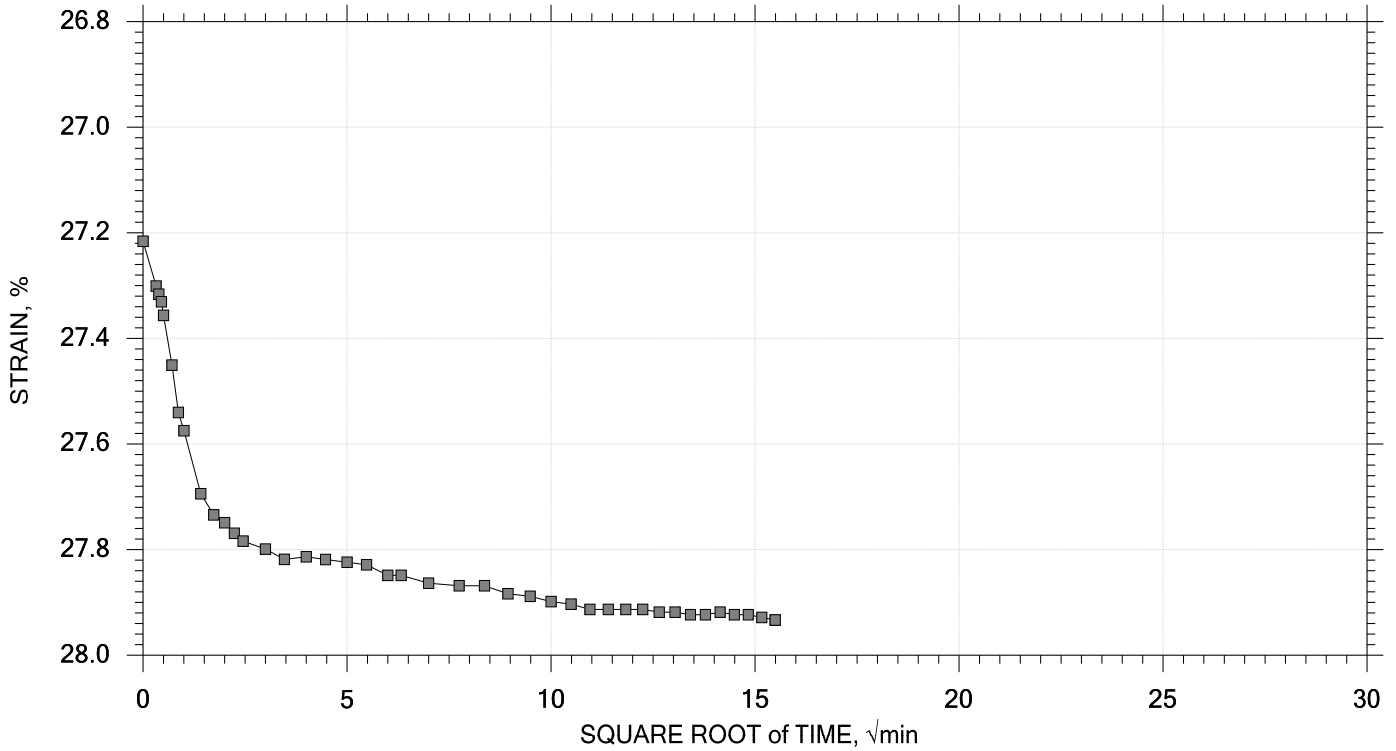
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 17

Stress: 2 tsf





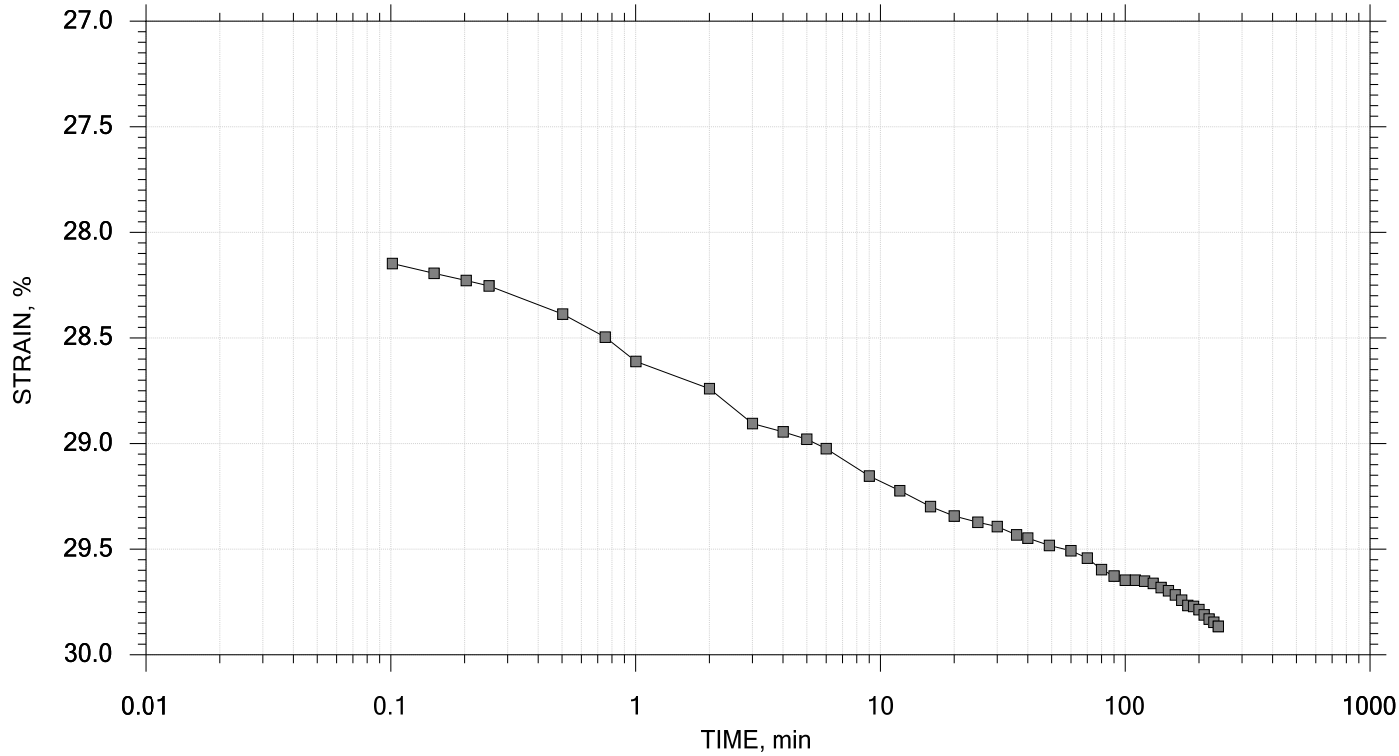
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

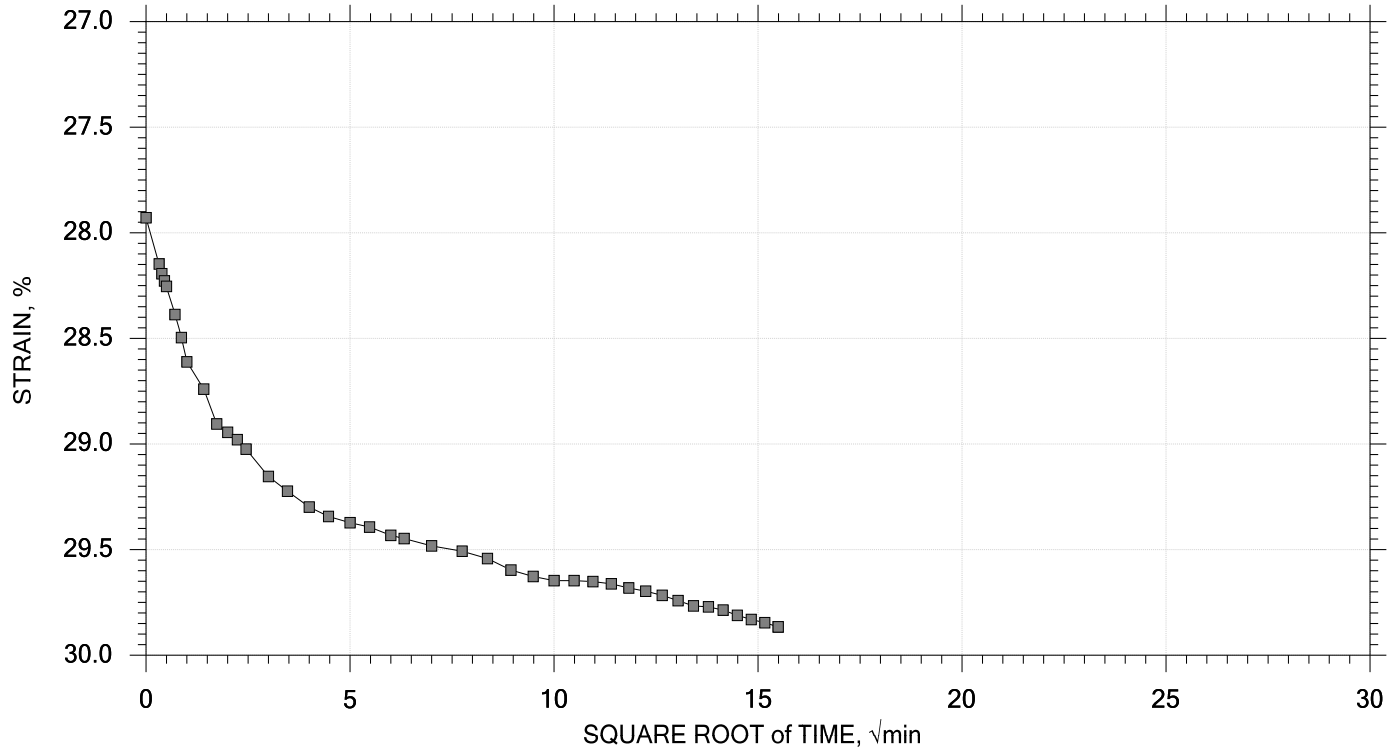
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 17

Stress: 4 tsf





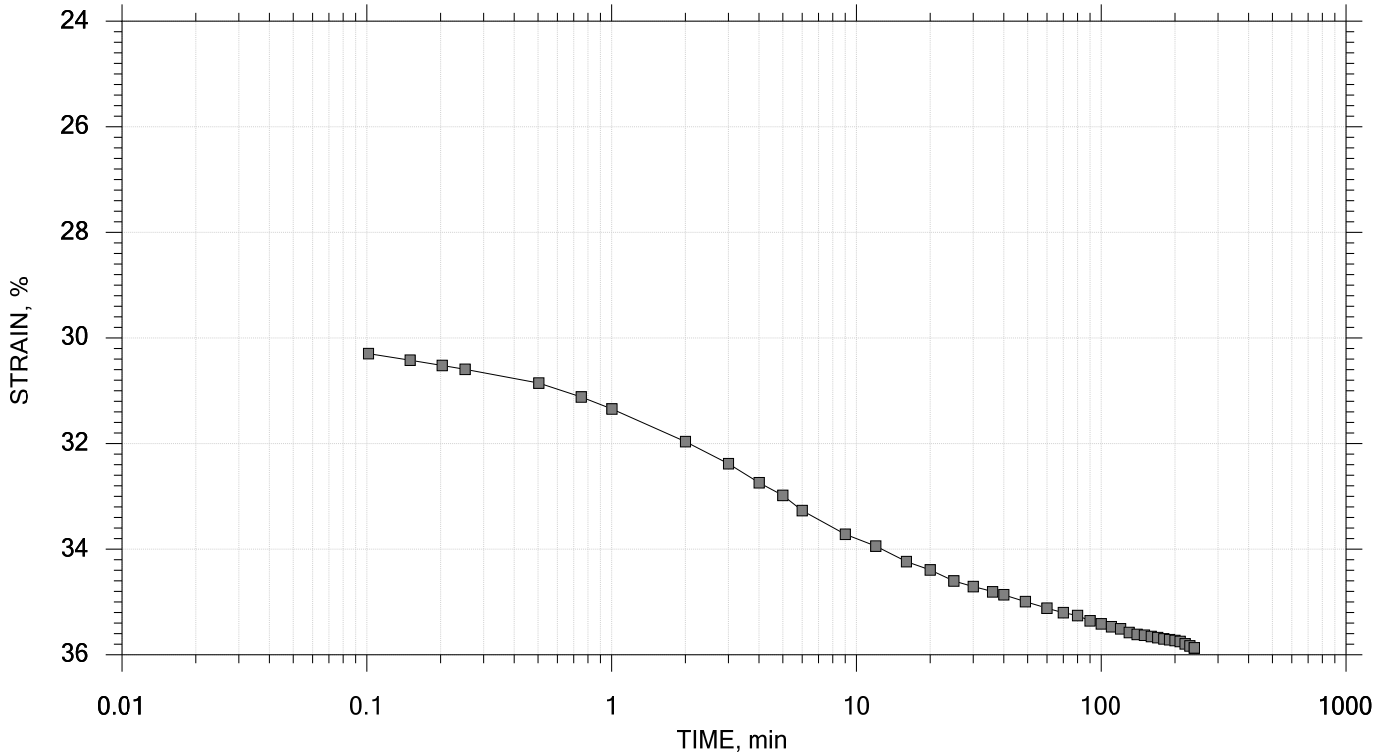
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

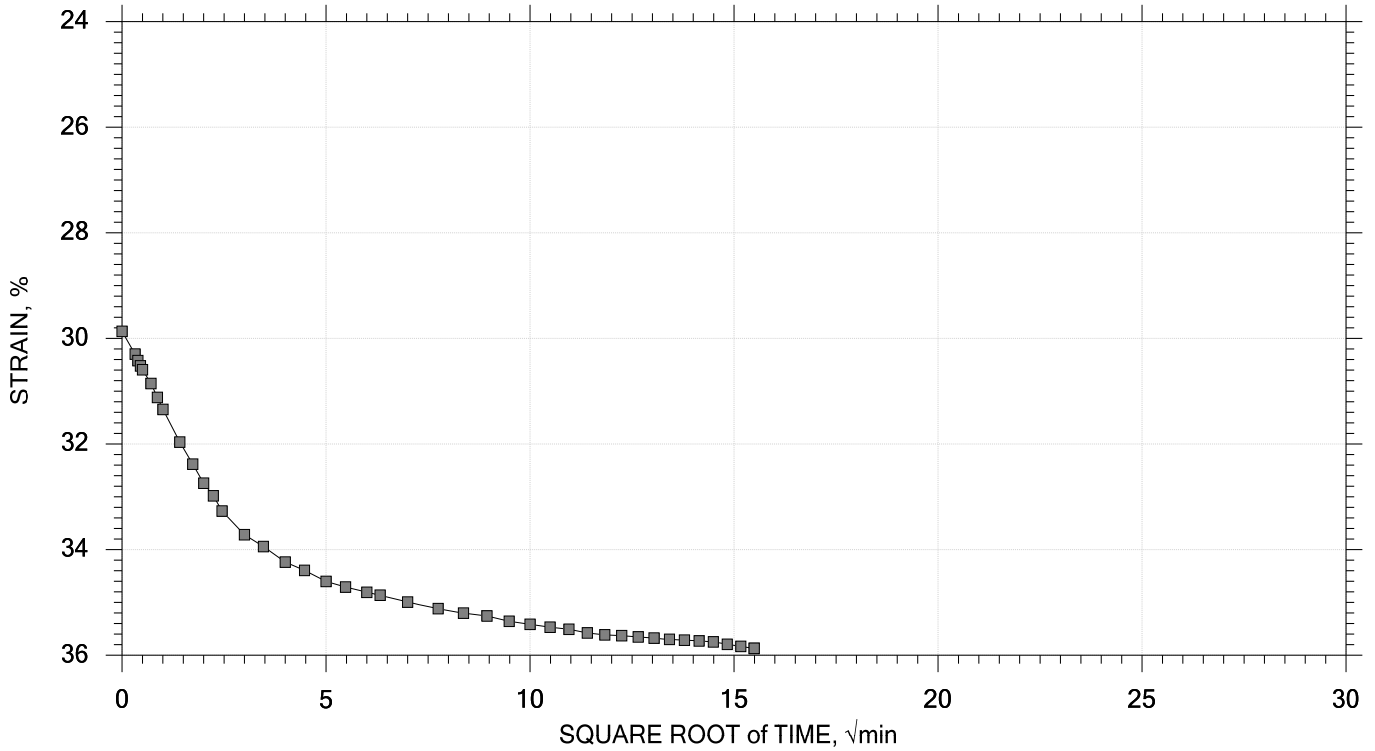
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 17

Stress: 8 tsf





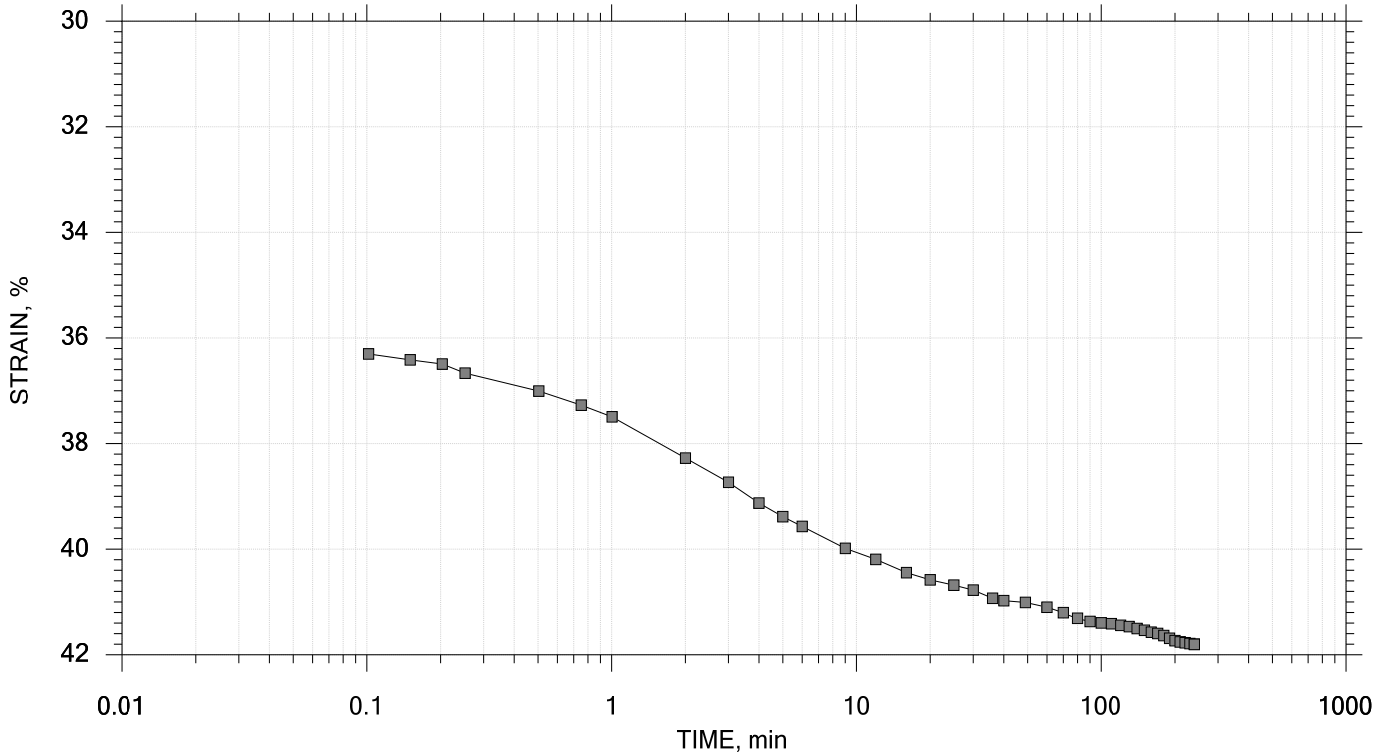
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

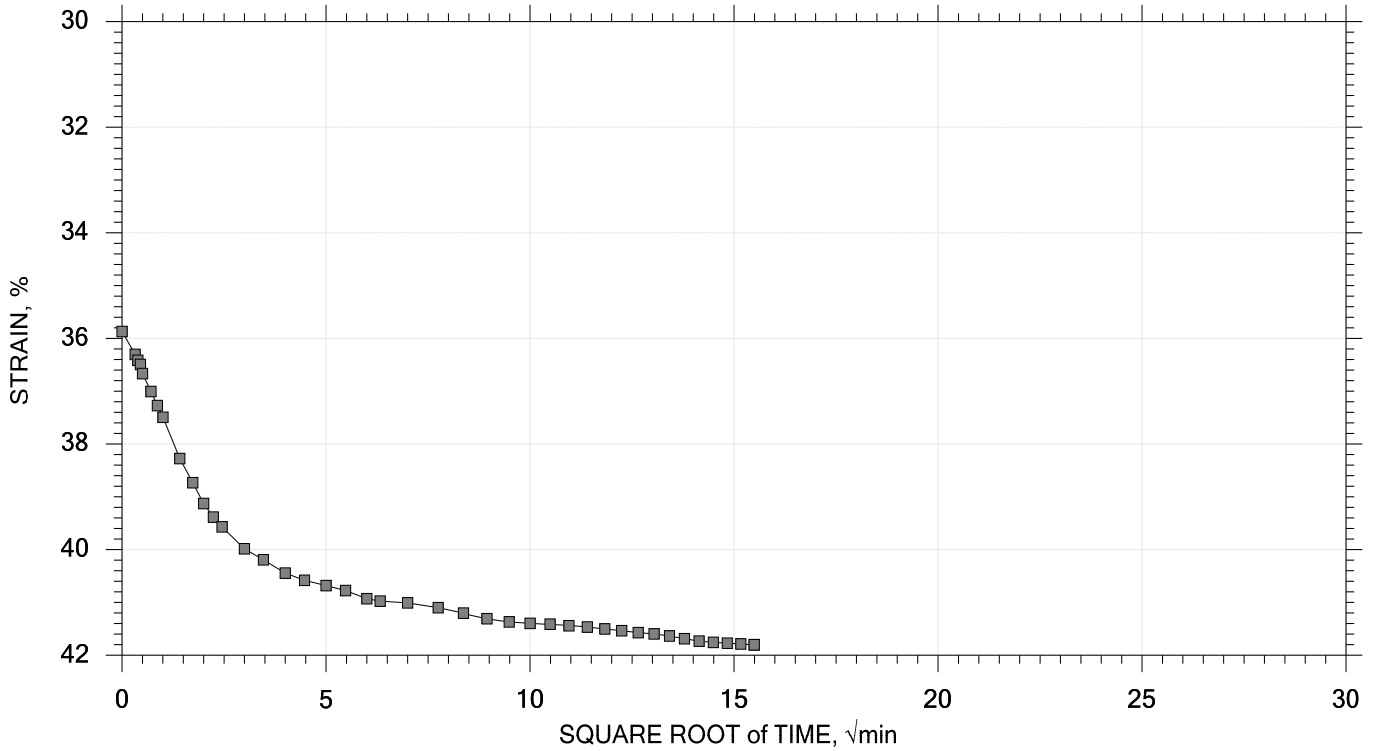
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 17

Stress: 16 tsf





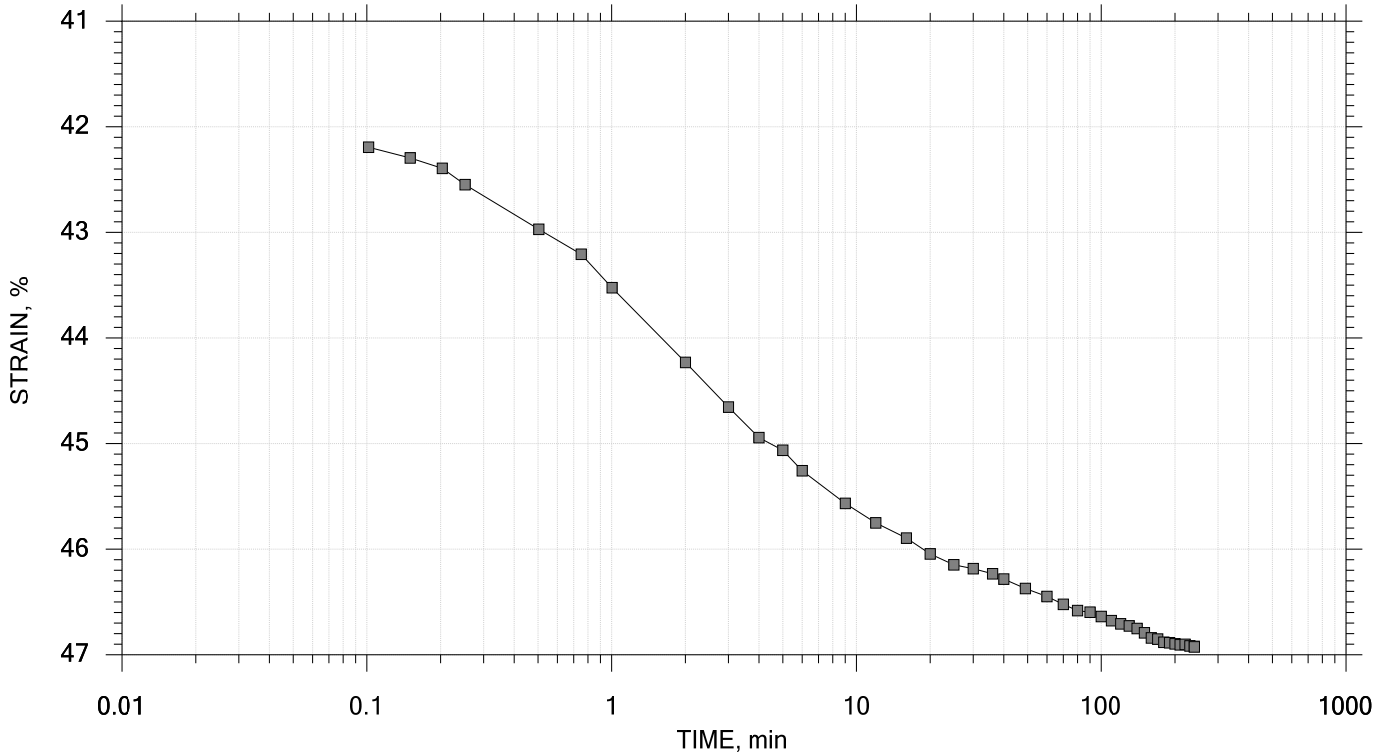
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

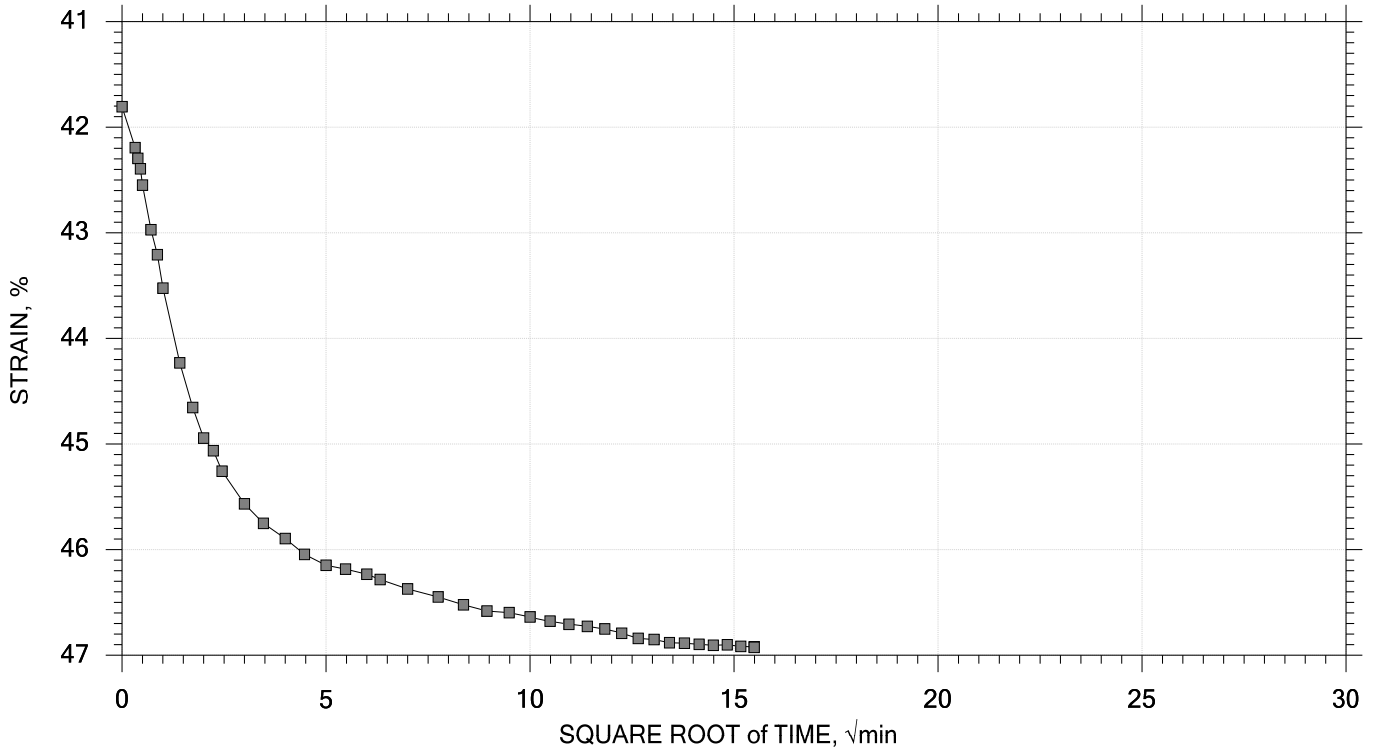
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 17

Stress: 32 tsf





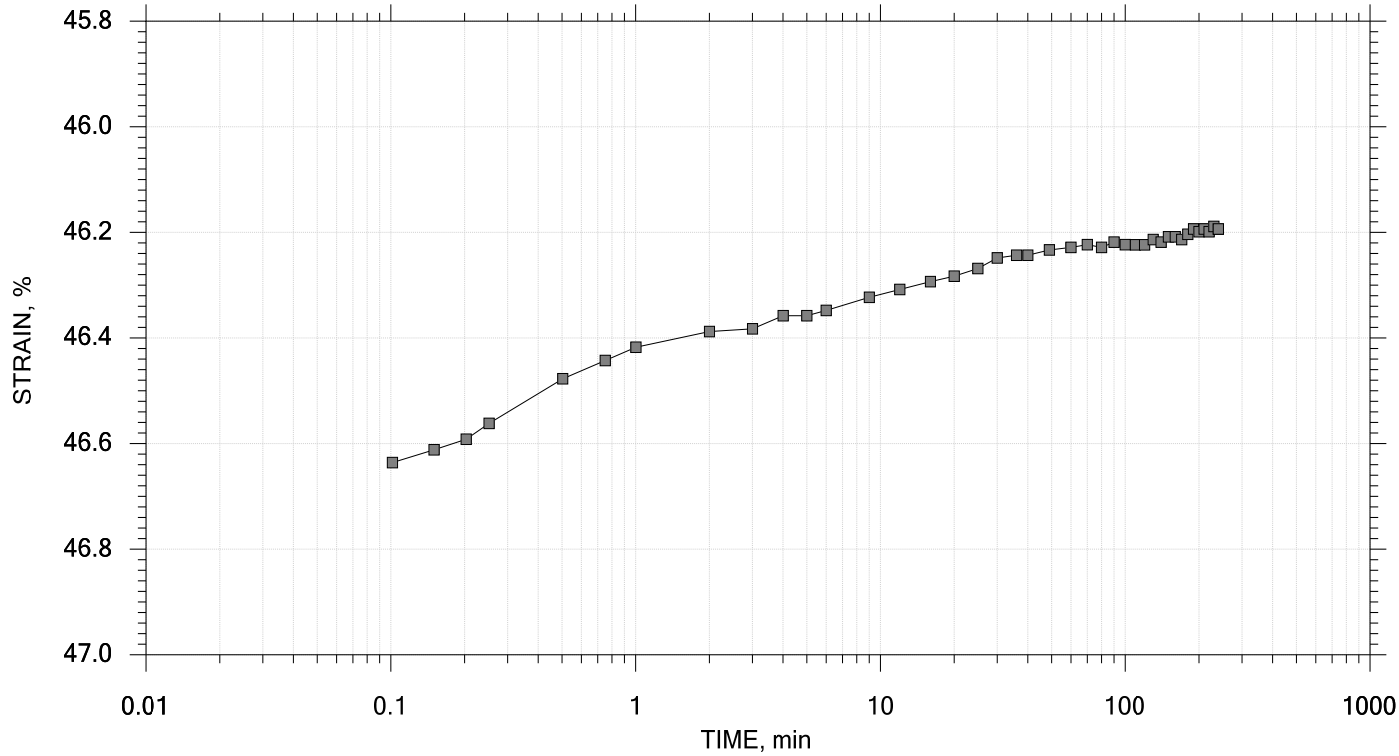
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

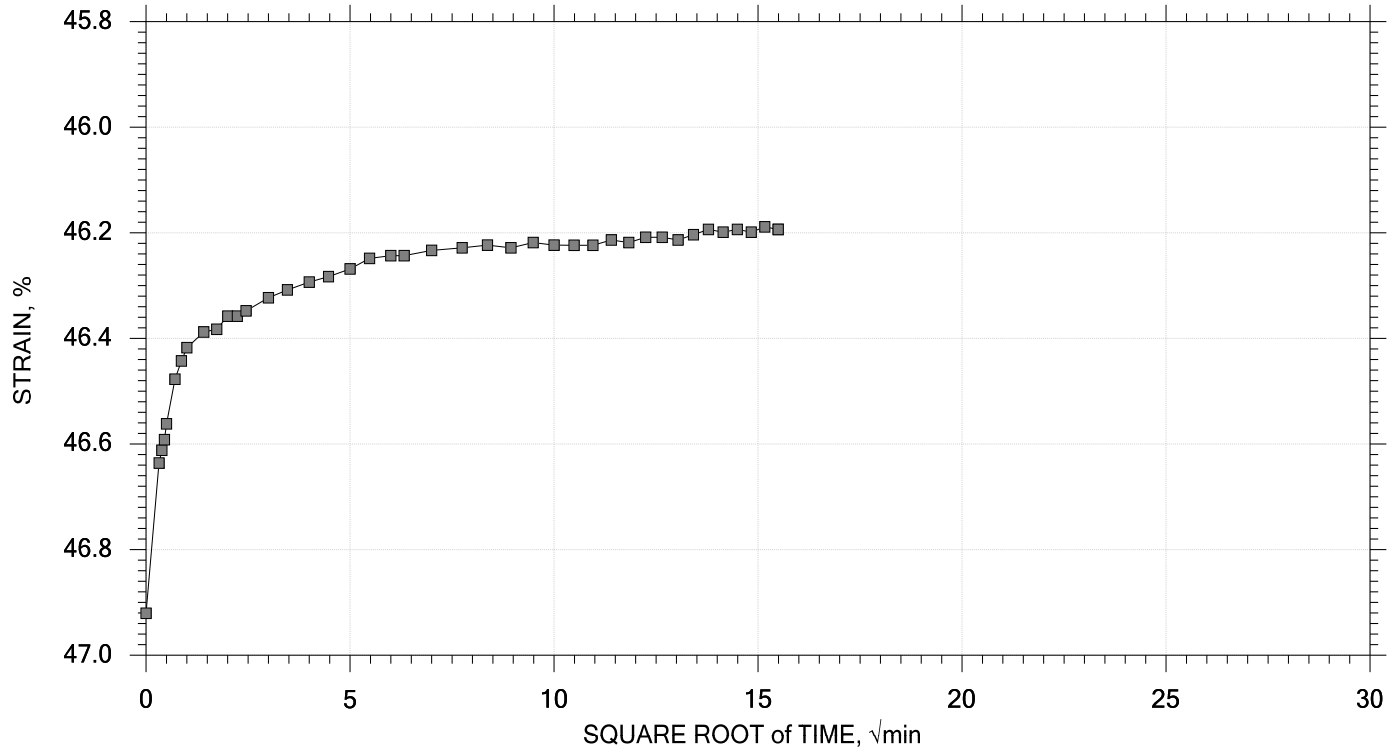
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 17

Stress: 8 tsf





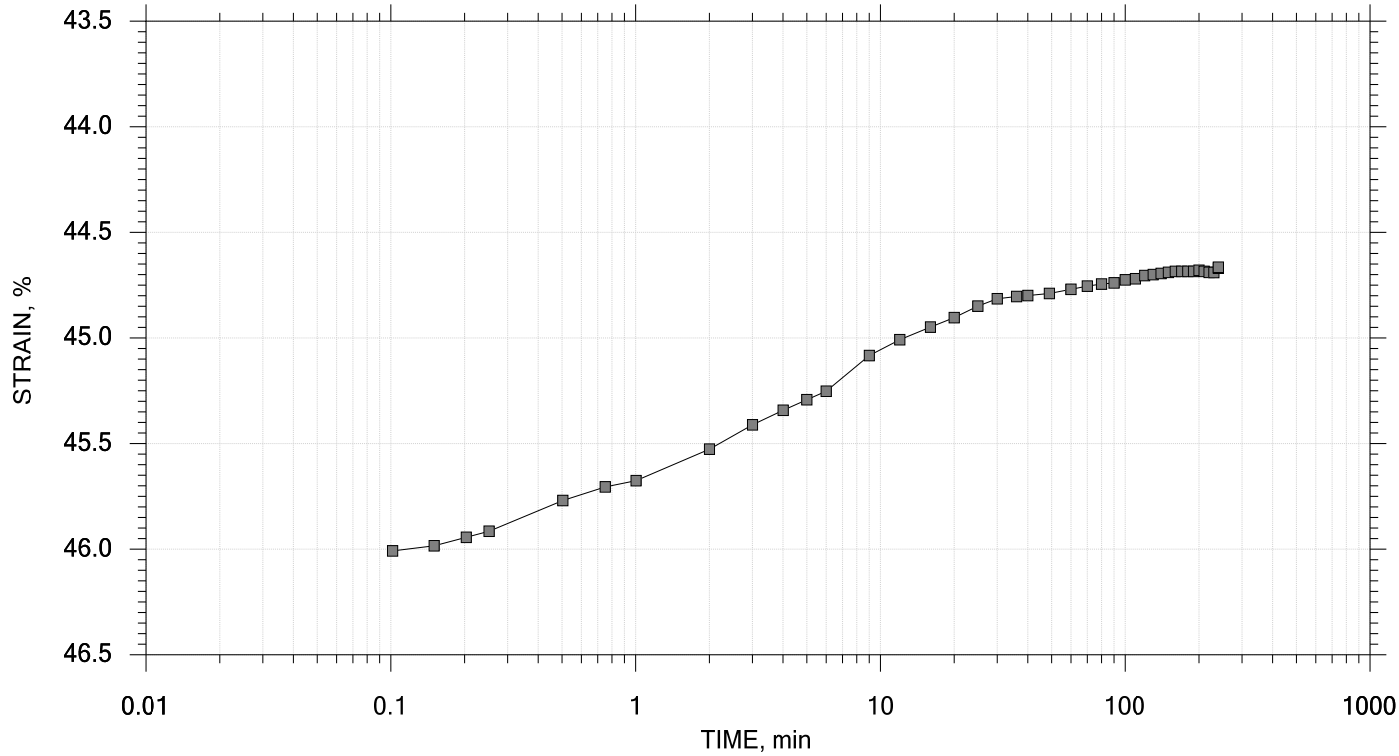
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

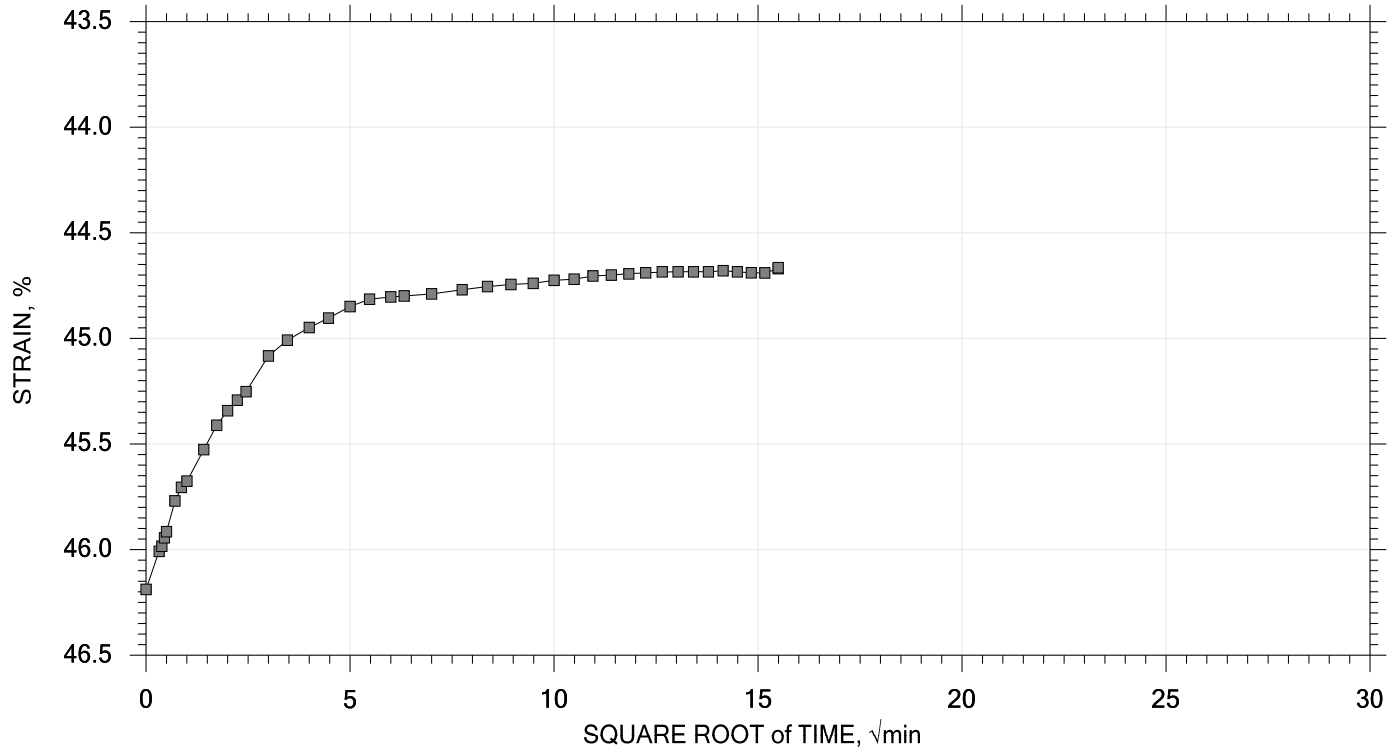
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 17

Stress: 2 tsf





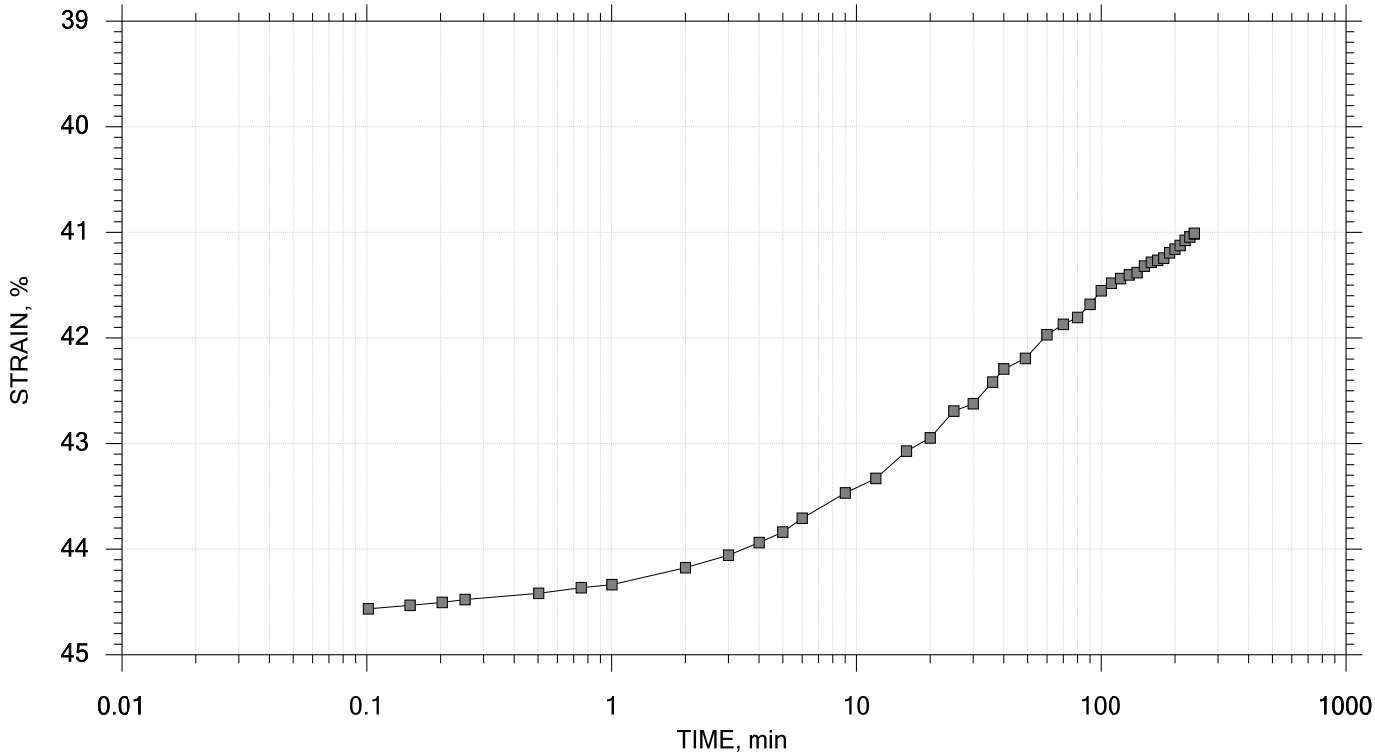
GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

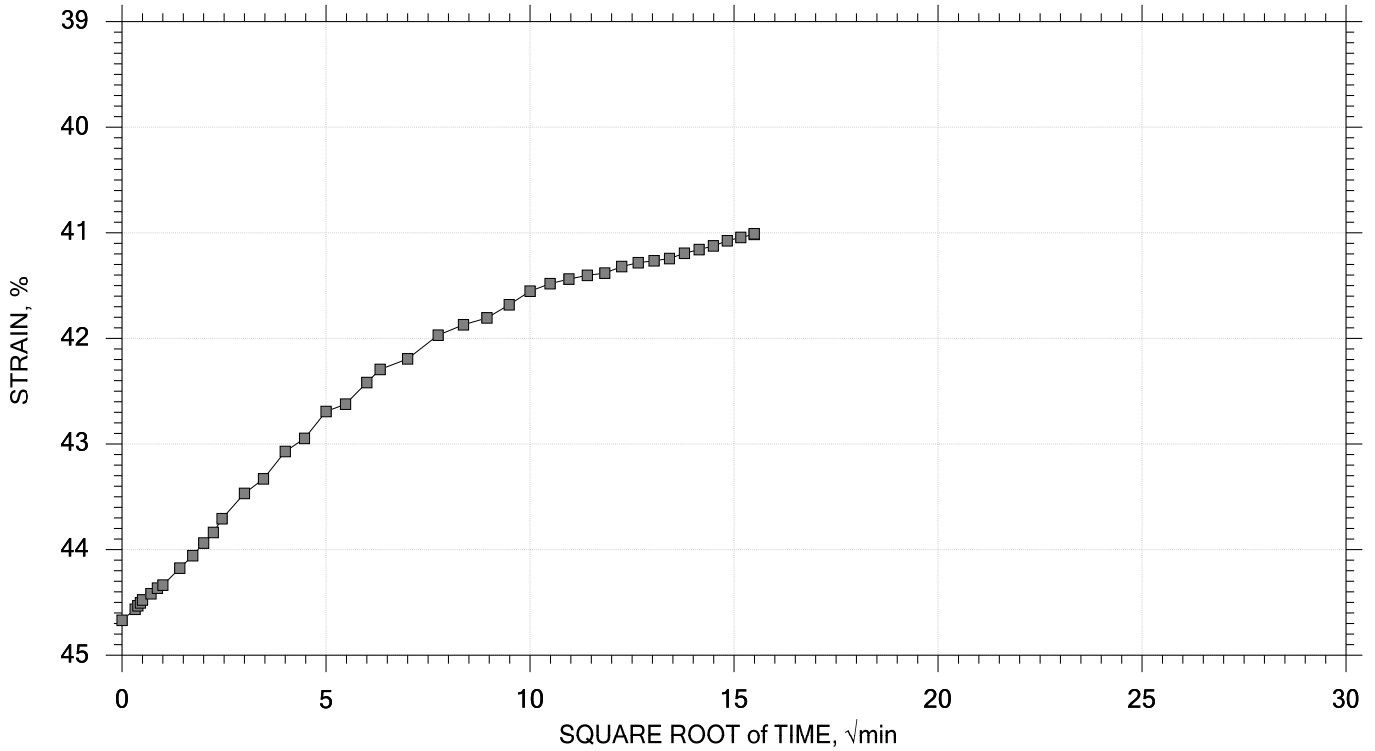
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 17

Stress: 0.25 tsf

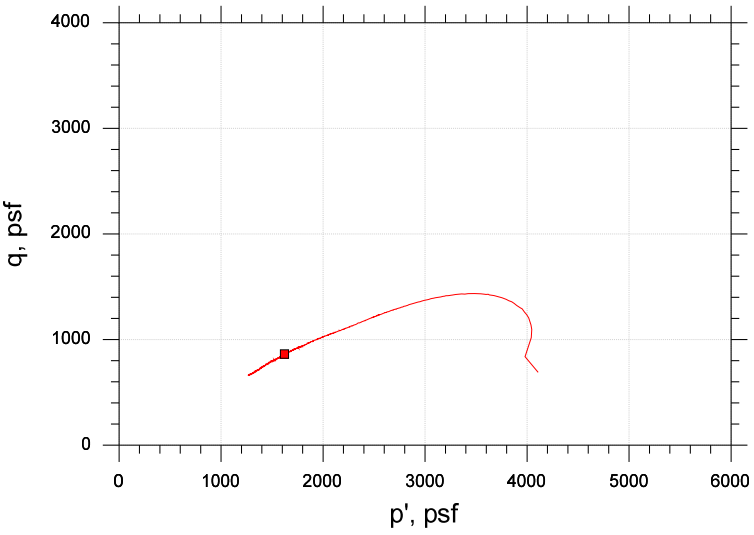


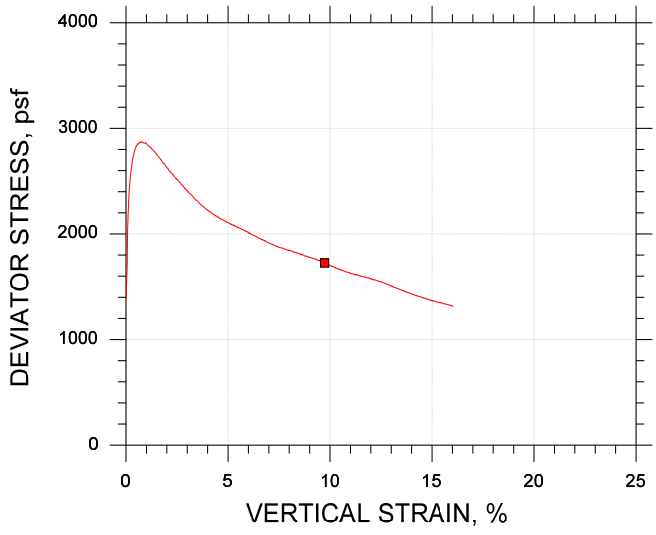


GeoTesting EXPRESS	Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
	Boring No.: B303	Tested By: md	Checked By: njh
	Sample No.: U-3	Test Date: 09/08/18	Test No.: IP-4
	Depth: 20.5-22.5 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt		
	Remarks: System K		

Client: Golder Associates	
Project Name: NHDOT Durham	
Project Location: Durham, NH	
Project Number: GTX-308573	
Tested By: md	Checked By: njh
Boring ID: B301	
Preparation: intact	
Description: Wet, olive gray clay	
Classification: Lean CLAY	
Group Symbol: CL	
Liquid Limit: 33	Plastic Limit: 21
Plasticity Index: 12	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST

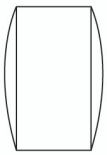




Symbol		■			
Sample ID		U-8			
Depth, ft		75.5-77.5			
Test Number		CKOU-4			
Initial	Height, in	6.030			
	Diameter, in	2.720			
	Moisture Content (from Cuttings), %	43.5			
	Dry Density, pcf	77.5			
	Saturation (Wet Method), %	100.0			
	Void Ratio	1.17			
Before Shear	Moisture Content, %	41.2			
	Dry Density, pcf	79.8			
	Cross-sectional Area (Method A), in²	5.822			
	Saturation, %	100.0			
	Void Ratio	1.11			
	Back Pressure, psf	2.228e+004			
Vertical Effective Consolidation Stress, psf		4771.			
Horizontal Effective Consolidation Stress, psf		3421.			
Vertical Strain after Consolidation, %		3.064			
Volumetric Strain after Consolidation, %		2.961			
Time to 50% Consolidation, min		0.0000			
Shear Strength, psf		862.6			
Strain at Failure, %		9.73			
Strain Rate, %/min		0.01600			
Deviator Stress at Failure, psf		1725.			
Effective Minor Principal Stress at Failure, psf		758.3			
Effective Major Principal Stress at Failure, psf		2484.			
B-Value		0.95			

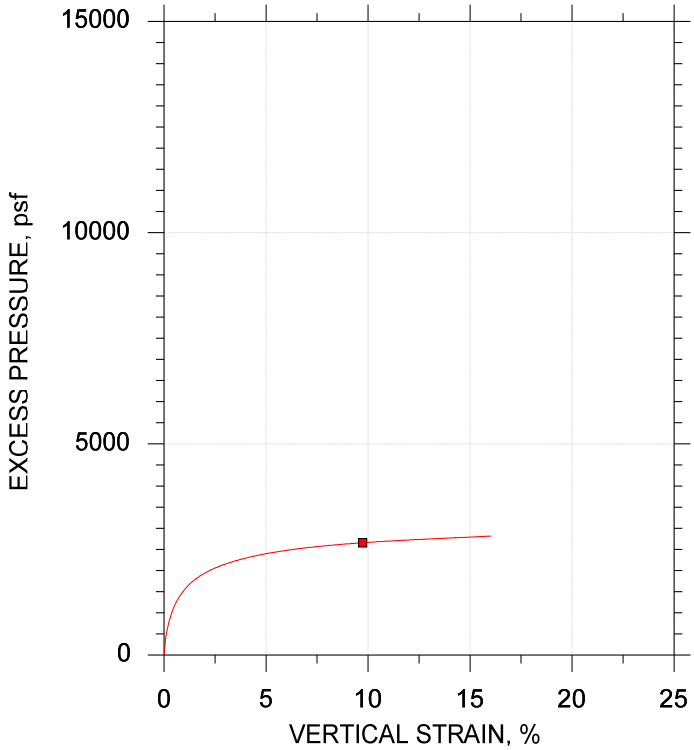
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Atterberg Limits determined by ASTM D4318.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

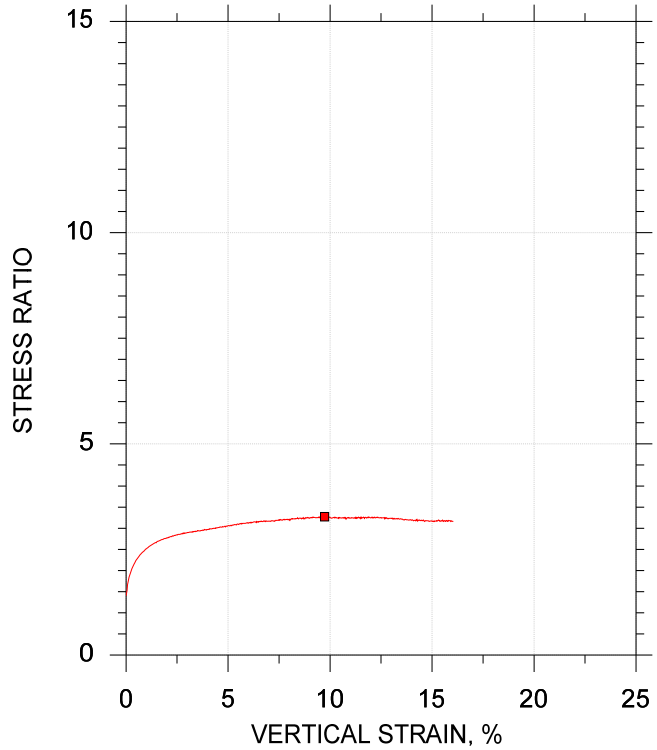
Remarks:

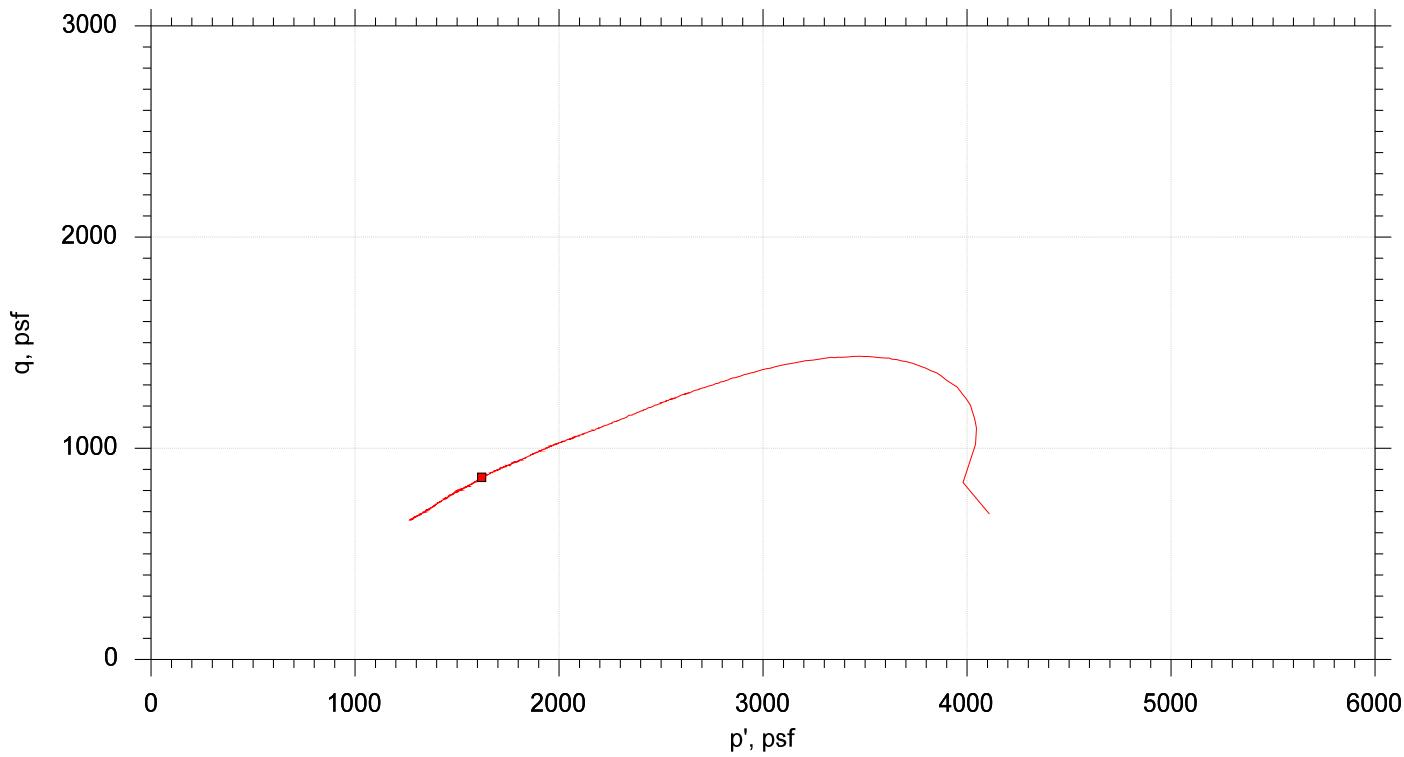


Ko = 0.71 (CKOU-4), Ko = 0.86 (CKOU-3)

CONSOLIDATED UNDRAINED TRIAXIAL TEST







	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	U-8	CKOU-4	75.5-77.5	md	09/10/18	njh	9/19/18	308573-CKOU-4-1n.dat

GeoTesting EXPRESS

Project: NHDOT Durham	Location: Durham, NH	Project No.: GTX-308573
Boring No.: B301	Sample Type: intact	
Description: Wet, olive gray clay		
Remarks: Ko = 0.71 (CKOU-4), Ko = 0.86 (CKOU-3)		