

REFERENCE: B-4484

PROJECT: 33723

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CRAVEN
PROJECT DESCRIPTION BRIDGE NOS. 138 AND 139 ON
SR 1470 (MAPLE CYPRESS RD.) OVER NEUSE RIVER
AND NEUSE RIVER OVERFLOW
SITE DESCRIPTION RETAINING WALLS 1-2

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17-22	TRIAxIAL TEST RESULTS
23-36	CONSOLIDATION TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4484	1	36

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

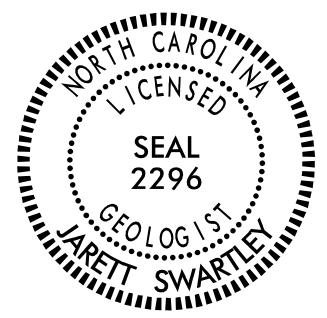
PERSONNEL

J.R. SWARTLEY
MID-ATLANTIC
DRILLING, INC.

INVESTIGATED BY S&ME, Inc.
DRAWN BY J.R. SWARTLEY
CHECKED BY S.S. LANEY
SUBMITTED BY J. DAILY
DATE JUNE 2019



3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660



DocuSigned by:
Jarett Swartley
919459487888 SIGNATURE DATE 1/31/2020

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

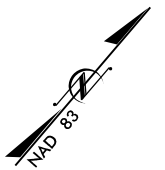
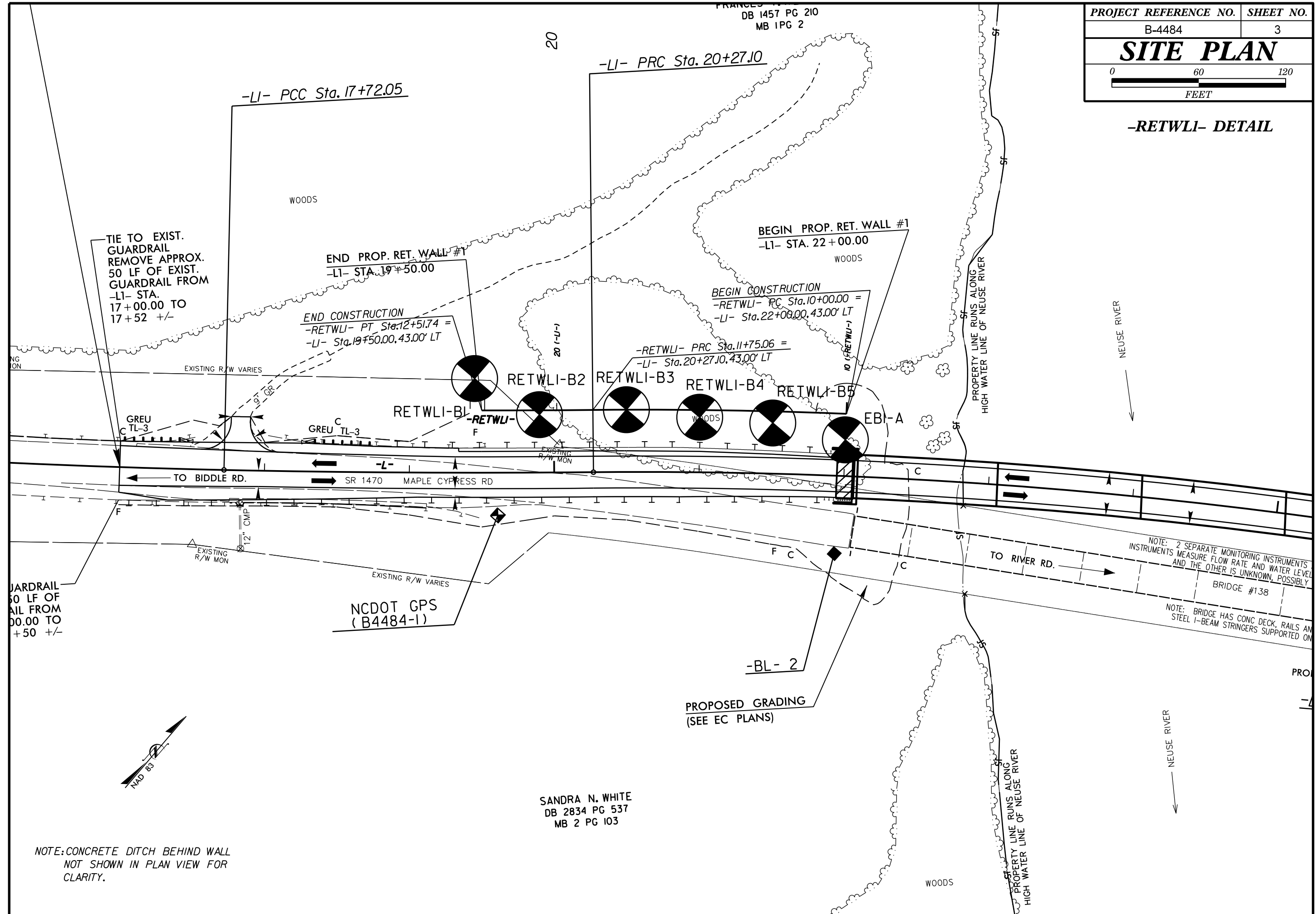
Table containing SOIL DESCRIPTION, SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, and COLOR.

Table containing GRADATION, MINERALOGICAL COMPOSITION, COMPRESSIBILITY, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, and EQUIPMENT USED ON SUBJECT PROJECT.

Table containing ROCK DESCRIPTION, WEATHERING, ROCK HARDNESS, FRACTION SPACING, and BEDDING.

Table containing TERMS AND DEFINITIONS and NOTES.

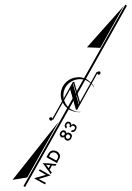
-RETWLI- DETAIL



SANDRA N. WHITE
DB 2834 PG 537
MB 2 PG 103

NOTE: CONCRETE DITCH BEHIND WALL NOT SHOWN IN PLAN VIEW FOR CLARITY.

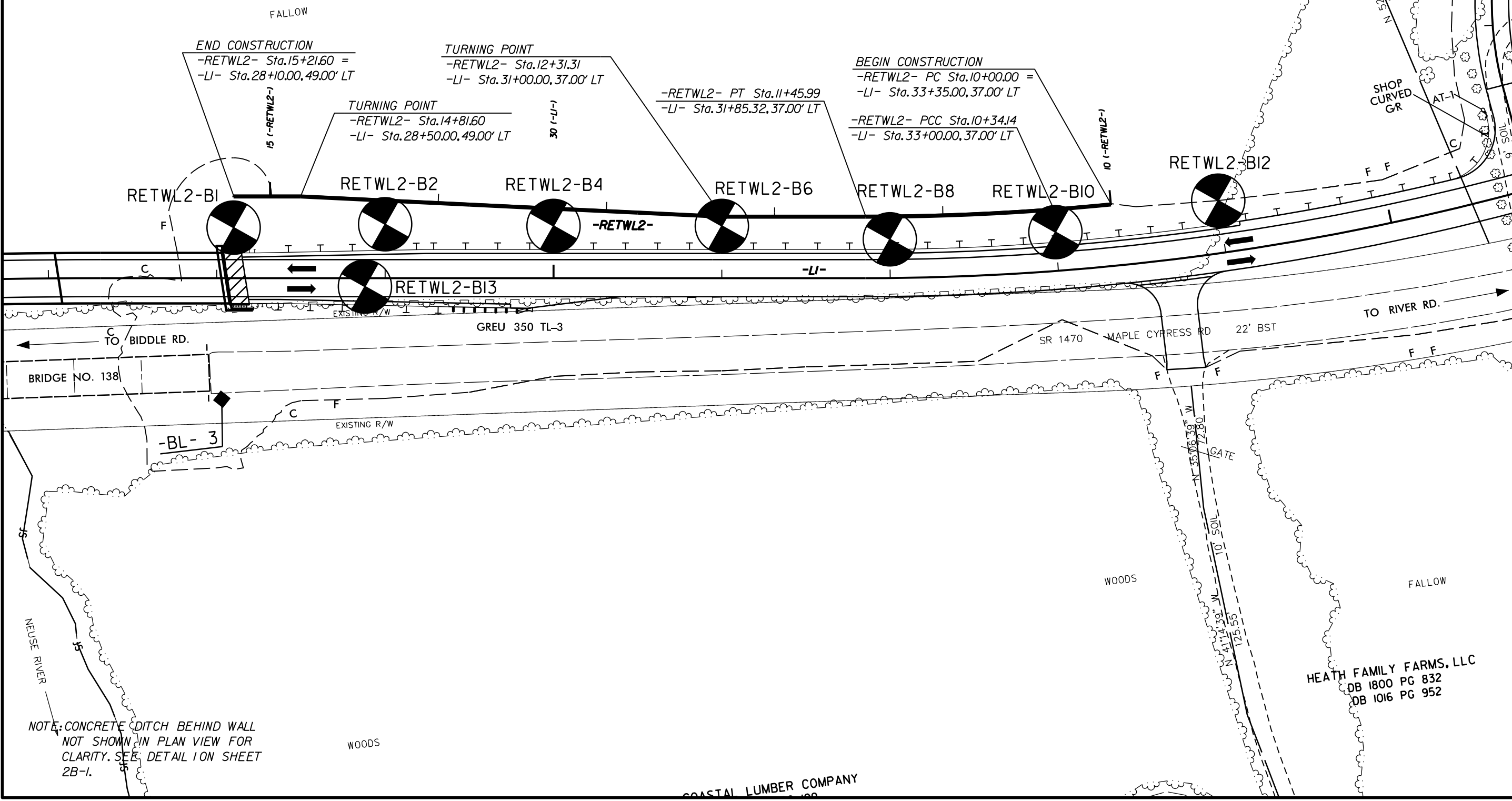
30



-RETWL2- CURVE DATA

PI Sta 10+90.09	PI Sta 10+17.07
$\Delta = 4^{\circ} 22' 50.1''$ (RT)	$\Delta = 1^{\circ} 20' 12.8''$ (RT)
D = 3' 54' 58.8"	D = 3' 54' 58.8"
L = 111.85'	L = 34.14'
T = 55.95'	T = 17.07'
R = 1,463.00'	R = 1,463.00'

-RETWL2- DETAIL



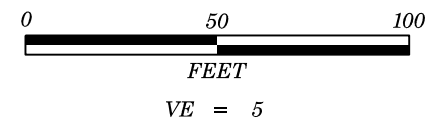
NOTE: CONCRETE DITCH BEHIND WALL NOT SHOWN IN PLAN VIEW FOR CLARITY. SEE DETAIL 1 ON SHEET 2B-1.

HEATH FAMILY FARMS, LLC
DB 1800 PG 832
DB 1016 PG 952

COASTAL LUMBER COMPANY

5/14/99

RETAINING WALL 1



PROJECT REFERENCE NO.	SHEET NO.
B-4484	5
PROFILE PROJECTED ALONG -RETWLI-	

40
30
20
10
0
-10
-20
-30
-40
-50

- (A) VERY LOOSE TO LOOSE, BROWN, ORANGE AND TAN, SILTY SAND AND SAND, MOIST TO SAT. (ALLUVIAL)
- (B) STIFF TO VERY STIFF, GRAY, SANDY SILT, WET (DUPLIN FORMATION)
- (C) DENSE TO VERY DENSE, GRAY SAND WITH MOD. INDURATED TO INDURATED SEAMS (0.1'-0.2'), SATURATED (CASTLE HAYNE FORMATION)
- (D) GRAY, DARK GRAY AND BLACK, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)
- (E) MED. DENSE, GRAY, SAND, SATURATED (CASTLE HAYNE FORMATION)
- (F) MED. DENSE, DARK GRAY, GREEN AND BLACK, SILTY SAND, SATURATED (CASTLE HAYNE FORMATION)
- (G) HARD, DARK GRAY AND BLACK, SANDY SILT WITH INDURATED SEAMS (0.1'), WET (CASTLE HAYNE FORMATION)

BEGIN CONSTRUCTION
-RETWLI- STA. 10+00.00
TOP OF WALL ELEV. = 22.92'
BOTTOM OF WALL ELEV. = 10.08'

END CONSTRUCTION
-RETWLI- STA. 12+51.74
TOP OF WALL ELEV. = 16.0'
BOTTOM OF WALL ELEV. = 12.98'

PROPOSED TOP OF WALL

RETWLI-B1 10+01 18' LT -RETWLI- SS-30 SS-31

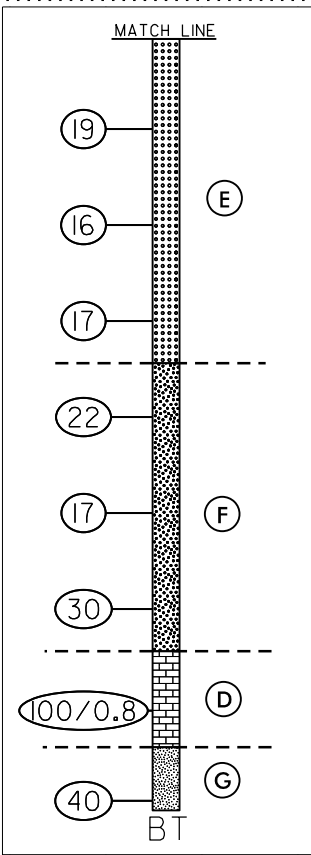
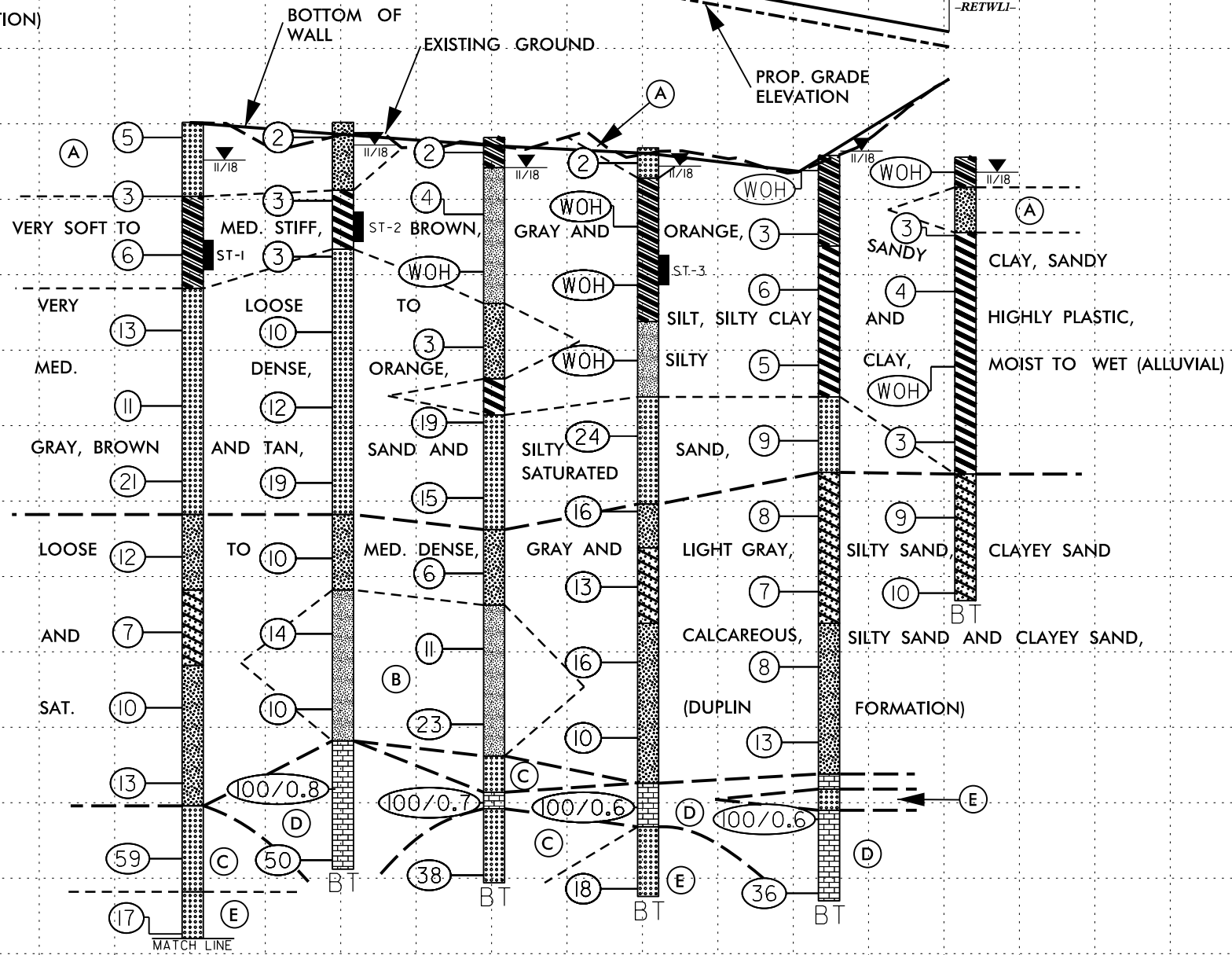
RETWLI-B5 10+51 8' LT -RETWLI- SS-32 SS-33

RETWLI-B4 11+01 5' LT -RETWLI- SS-34 SS-35

RETWLI-B3 11+52 3' LT -RETWLI- SS-36 SS-37

RETWLI-B2 12+12 3' LT -RETWLI- SS-38 SS-39

RETWLI-B1 12+57 22' RT -RETWLI-



GROUNDLINE PROFILE IS CONSTRUCTED ALONG FACE OF THE WALL. GROUNDLINE PROFILE IS FROM WALL ENVELOPE FILE 'B4484_SMU_RW_1.dgn' DATED 5/24/19 RECEIVED FROM NCDOT GEU. OFFSETS ARE FROM THE FACE OF THE WALL.

-50 -RETWLI-

10+00

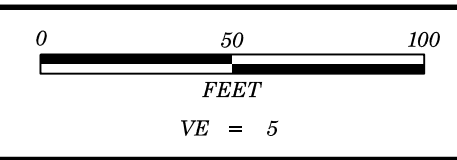
11+00

12+00

13+00

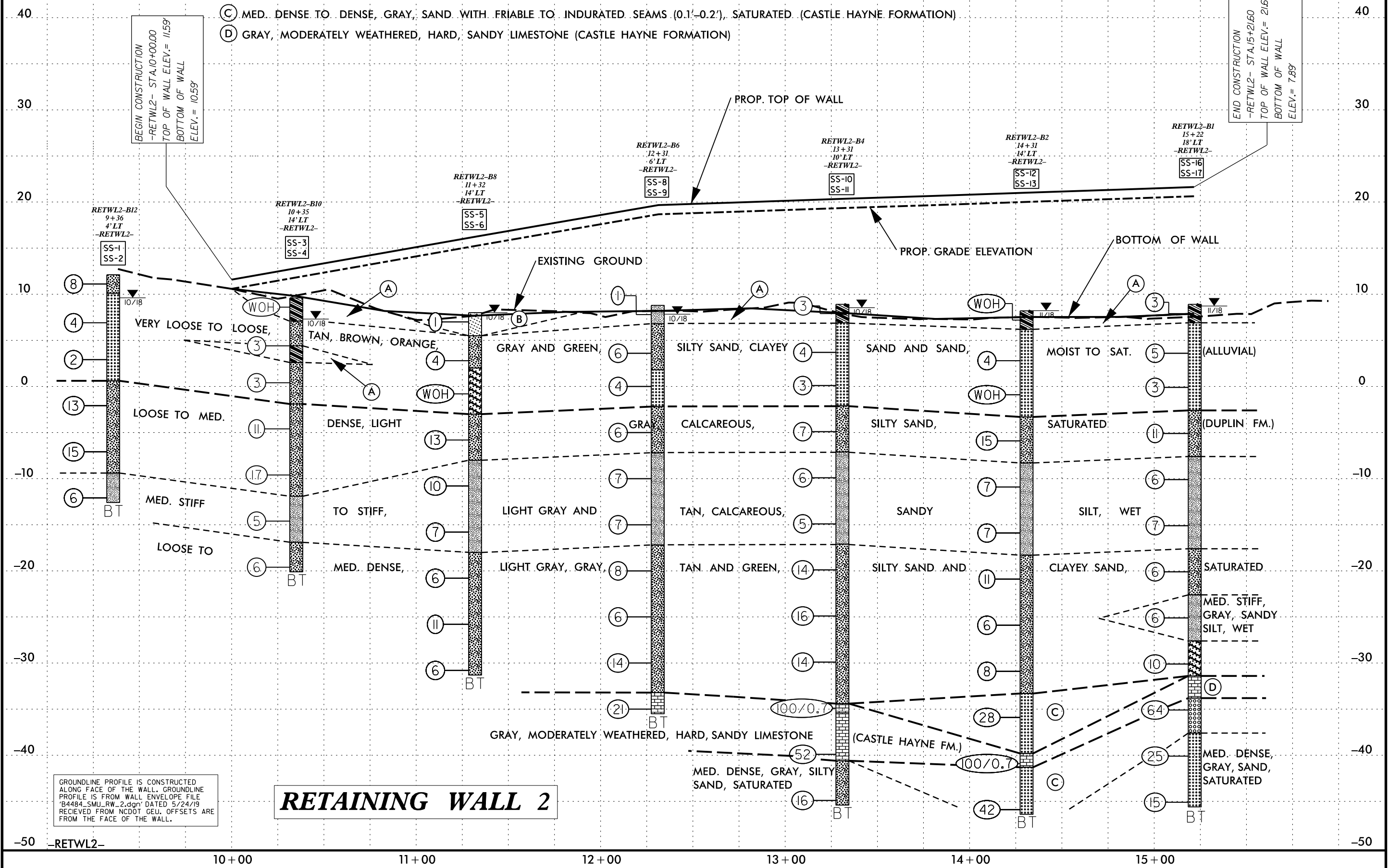
-50

5/14/99



PROJECT REFERENCE NO.	SHEET NO.
B-4484	6
PROFILE PROJECTED ALONG -RETWL2-	

- (A) VERY SOFT TO SOFT, BROWN, TAN AND ORANGE, SANDY CLAY AND SANDY SILT WITH TRACE ORGANIC MATTER, MOIST TO WET (ALLUVIAL)
- (B) VERY LOOSE, BROWN, SILTY SAND WITH LITTLE ORGANIC MATTER, SATURATED (ALLUVIAL)
- (C) MED. DENSE TO DENSE, GRAY, SAND WITH FRIABLE TO INDURATED SEAMS (0.1'-0.2'), SATURATED (CASTLE HAYNE FORMATION)
- (D) GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)



BEGIN CONSTRUCTION
-RETWL2- STA. 10+00.00
TOP OF WALL ELEV. = 11.59'
BOTTOM OF WALL
ELEV. = 10.59'

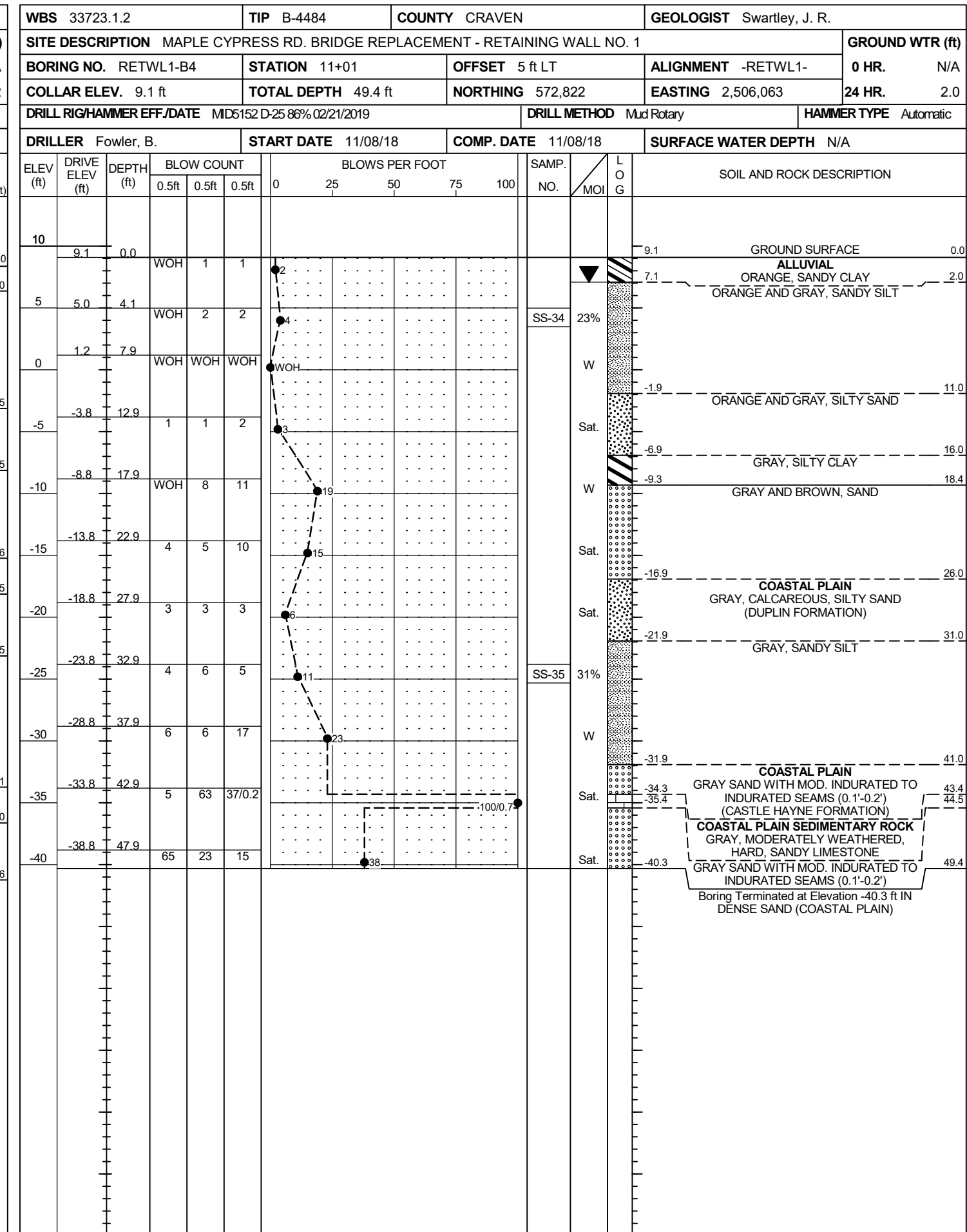
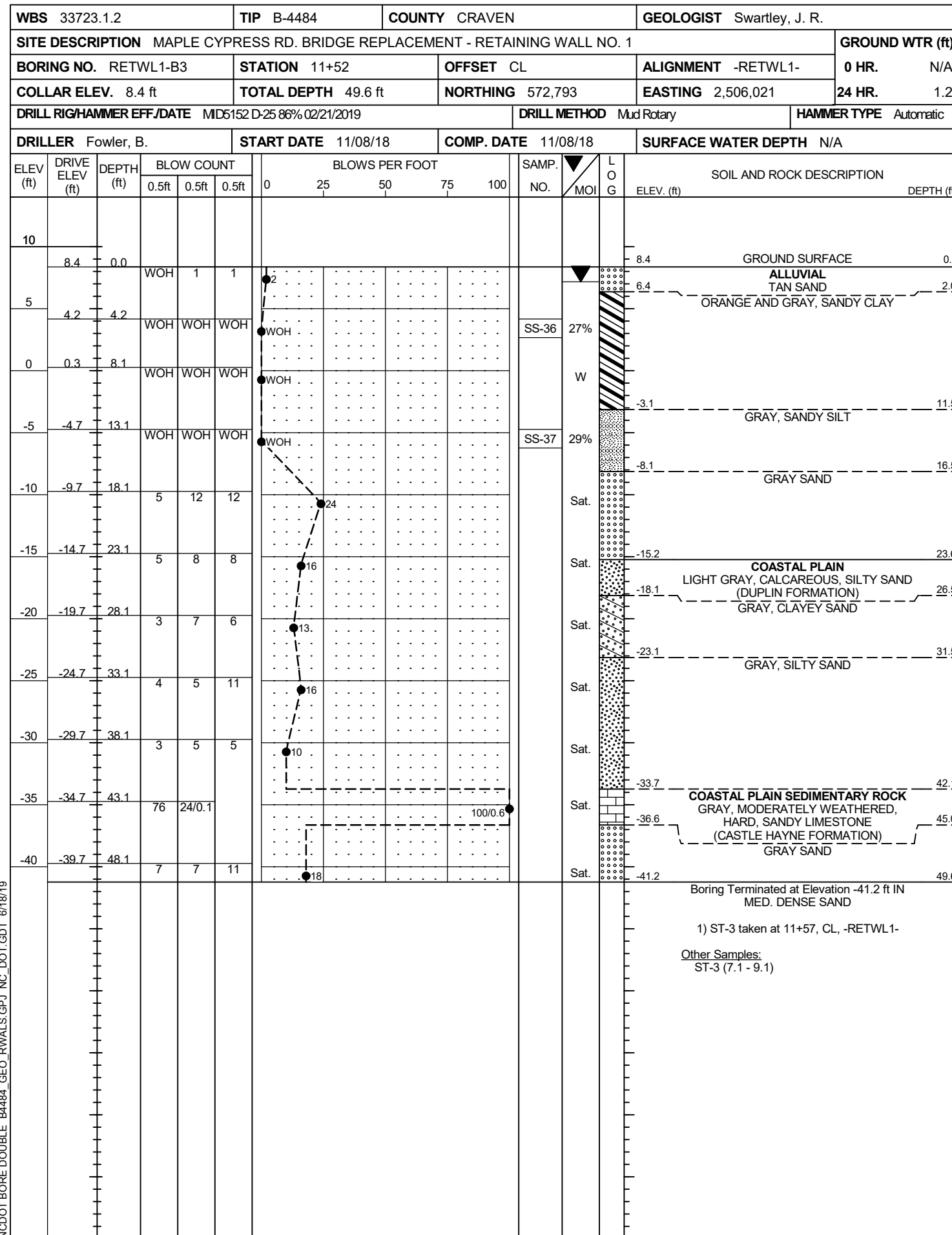
END CONSTRUCTION
-RETWL2- STA. 15+21.60
TOP OF WALL ELEV. = 21.63'
BOTTOM OF WALL
ELEV. = 7.89'

RETAINING WALL 2

GROUNDLINE PROFILE IS CONSTRUCTED ALONG FACE OF THE WALL. GROUNDLINE PROFILE IS FROM WALL ENVELOPE FILE 'B4484_SML_RW_2.dgn' DATED 5/24/19 RECEIVED FROM NCDOT GEU. OFFSETS ARE FROM THE FACE OF THE WALL.

GEOTECHNICAL BORING REPORT

BORE LOG



NCDOT BORE DOUBLE B4484_GEO_RWALS.GPJ NC_DOT.GDT 6/18/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 33723.1.2	TIP B-4484	COUNTY CRAVEN	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 1			GROUND WTR (ft)
BORING NO. RETWL1-B5	STATION 10+51	OFFSET 8 ft LT	ALIGNMENT -RETWL1-
COLLAR ELEV. 10.1 ft	TOTAL DEPTH 49.5 ft	NORTHING 572,852	EASTING 2,506,104
DRILL RIG/HAMMER EFF./DATE MID5152 D-25 86% 02/21/2019		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Fowler, B.	START DATE 11/08/18	COMP. DATE 11/08/18	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
15																	
10	10.1	0.0													10.1	GROUND SURFACE	
			WOH	1	1	2											ALLUVIAL TAN, SILTY SAND
5	5.9	4.2	1	2	1								W	5.6		GRAY, SILTY CLAY	
0	2.2	7.9	1	2	1								Sat.	1.7		GRAY SAND	
-5	-2.8	12.9	2	5	5								Sat.				
-10	-7.8	17.9	8	6	6								SS-32	24%			
-15	-12.8	22.9	6	8	11								Sat.				
-20	-17.8	27.9	3	3	7								Sat.		-15.9	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	
-25	-22.8	32.9	4	4	10								SS-33	31%	-20.9	GRAY, SANDY SILT	
-30	-27.8	37.9	3	3	7								W		-30.9	COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)	
-35	-32.8	42.9	6	25	75/0.3								Sat.				
	-37.8	47.9	34	32	18								Sat.				
																	Boring Terminated at Elevation -39.4 ft IN HARD SANDY LIMESTONE (COASTAL PLAIN SEDIMENTARY ROCK)
																	Other Samples: ST-2 (5.9 - 7.9)

NCDOT BORE DOUBLE B4484_GEO_RWALS.GPJ NC_DOT.GDT 6/18/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.									
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 1							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 10+01		OFFSET 18 ft LT		ALIGNMENT -RETWL1-									
COLLAR ELEV. 10.1 ft		TOTAL DEPTH 94.3 ft		NORTHING 572,875		EASTING 2,506,150									
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Fowler, B.		START DATE 11/07/18		COMP. DATE 11/07/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	10.1	0.0													
5	6.2	3.9	WOH	2	3										
0	2.3	7.8	WOH	2	4										
-5	-2.7	12.8		3	6	7									
-10	-7.7	17.8		4	5	6									
-15	-12.7	22.8		6	8	13									
-20	-17.7	27.8		6	6	6									
-25	-22.7	32.8		3	3	4									
-30	-27.7	37.8		3	5	5									
-35	-32.7	42.8		4	4	9									
-40	-37.7	47.8		60	21	38									
-45	-42.7	52.8		8	8	9									
-50	-47.7	57.8		8	9	10									
-55	-52.7	62.8		8	7	9									
-60	-57.7	67.8		6	8	9									
-65	-62.7	72.8		7	8	14									

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.									
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 1							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 10+01		OFFSET 18 ft LT		ALIGNMENT -RETWL1-									
COLLAR ELEV. 10.1 ft		TOTAL DEPTH 94.3 ft		NORTHING 572,875		EASTING 2,506,150									
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Fowler, B.		START DATE 11/07/18		COMP. DATE 11/07/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-65															
-70	-67.7	77.8		5	6	11									
-75	-72.7	82.8		19	12	18									
-80	-77.7	87.8		7	53	47/0.3									
	-82.7	92.8		4	26	14									

Match Line

SOIL AND ROCK DESCRIPTION

DARK GRAY, GREEN AND BLACK, SILTY SAND (continued)

SS-31 35%

Sat.

-75.9

COASTAL PLAIN SEDIMENTARY ROCK
DARK GRAY AND BLACK, MODERATELY WEATHERED, HARD, SANDY LIMESTONE

Sat.

-80.9

DARK GRAY AND BLACK, SANDY SILT

W

-84.2

Boring Terminated at Elevation -84.2 ft IN HARD SANDY SILT (COASTAL PLAIN)

1) ST-1 taken at 10+06, 18 LT, -RETWL1-

Other Samples:
ST-1 (7.8 - 9.8)

NCDOT BORE DOUBLE B4484_GEO_RWALS.GPJ NC_DOT.GDT 6/18/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.	
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 2						GROUND WTR (ft)	
BORING NO. RETWL2-B1		STATION 15+22		OFFSET 18 ft LT		ALIGNMENT -RETWL2-	
COLLAR ELEV. 8.9 ft		TOTAL DEPTH 54.5 ft		NORTHING 573,215		EASTING 2,506,661	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Fowler, B.		START DATE 10/31/18		COMP. DATE 10/31/18		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
10	8.9	0.0	WOH	1	2								W	GROUND SURFACE	0.0
5	4.6	4.3		1	3								Sat.	ALLUVIAL TAN, SANDY CLAY	2.0
0	0.9	8.0		2	1								Sat.	TAN SAND	
-5	-4.1	13.0		2	4								Sat.	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	11.5
-10	-9.1	18.0		3	3								W	LIGHT GRAY, CALCAREOUS, SANDY SILT	16.5
-15	-14.1	23.0		3	3								W		
-20	-19.1	28.0		3	3								Sat.	GRAY, SILTY SAND	26.5
-25	-24.1	33.0		3	3								Sat.	GRAY, SANDY SILT	31.5
-30	-29.1	38.0		8	5								Sat.	GRAY, CLAYEY SAND	36.5
-35	-34.1	43.0		13	22								Sat.	COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)	40.3
-40	-39.1	48.0		11	13								Sat.	GRAY SAND WITH MODERATELY INDURATED SEAMS (0.1'-0.2')	42.7
-45	-44.1	53.0		8	7								Sat.	GRAY SAND	46.5
													Sat.	Boring Terminated at Elevation -45.6 ft IN MED. DENSE SAND (COASTAL PLAIN)	54.5

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.	
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 2						GROUND WTR (ft)	
BORING NO. RETWL2-B2		STATION 14+31		OFFSET 14 ft LT		ALIGNMENT -RETWL2-	
COLLAR ELEV. 8.2 ft		TOTAL DEPTH 54.6 ft		NORTHING 573,261		EASTING 2,506,738	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Fowler, B.		START DATE 10/31/18		COMP. DATE 10/31/18		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
10	8.2	0.0	WOH	WOH	WOH								M	GROUND SURFACE	0.0
5	3.8	4.4	1	2	2								Sat.	ALLUVIAL BROWN, TAN AND ORANGE, SANDY CLAY	2.0
0	0.1	8.1	WOH	WOH	WOH								Sat.	TAN SAND	
-5	-4.9	13.1		13	7								Sat.	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	11.5
-10	-9.9	18.1		3	3								W	LIGHT GRAY, CALCAREOUS, SANDY SILT	16.5
-15	-14.9	23.1		3	4								W		
-20	-19.9	28.1		10	5								Sat.	GRAY, SILTY SAND	26.5
-25	-24.9	33.1		3	3								Sat.		
-30	-29.9	38.1		4	4								Sat.		
-35	-34.9	43.1		6	12								Sat.	COASTAL PLAIN GRAY SAND WITH FRIABLE TO INDURATED SEAMS (0.1') (CASTLE HAYNE FORMATION)	41.5
-40	-39.9	48.1		40	60/0.2								Sat.	GRAY SAND WITH MODERATELY INDURATED SEAMS (0.1'-0.2')	42.7
-45	-44.9	53.1		23	24								Sat.	GRAY SAND WITH FRIABLE TO INDURATED SEAMS (0.1')	46.5
													Sat.	Boring Terminated at Elevation -46.4 ft IN DENSE SAND (COASTAL PLAIN)	54.6

NCDOT BORE DOUBLE B4484_GEO_RWALS.GPJ NC_DOT.GDT 6/18/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.										
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 2							GROUND WTR (ft)									
BORING NO. RETWL2-B4		STATION 13+31		OFFSET 10 ft LT		ALIGNMENT -RETWL2-										
COLLAR ELEV. 8.9 ft		TOTAL DEPTH 54.3 ft		NORTHING 573,309		EASTING 2,506,826										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Fowler, B.		START DATE 10/30/18		COMP. DATE 10/30/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
10	8.9	0.0	WOH	1	2									8.9	GROUND SURFACE	0.0
														6.9	ALLUVIAL ORANGE, SANDY CLAY TAN AND BROWN, SAND	2.0
5	4.7	4.2		1	2											
0	1.1	7.8		2	2											
-5	-3.9	12.8		2	3									-2.1	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	11.0
-10	-8.9	17.8		3	3									-7.1	LIGHT GRAY, CALCAREOUS, SANDY SILT	16.0
-15	-13.9	22.8		2	3											
-20	-18.9	27.8		4	8									-17.1	GRAY, LIGHT GRAY AND GREEN, SILTY SAND	26.0
-25	-23.9	32.8		4	4											
-30	-28.9	37.8		5	10											
-35	-33.9	42.8		8	92/0.2									-34.4	COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)	43.3
														-35.4		44.3
-40	-38.9	47.8		31	25									-40.6	GRAY, SILTY SAND	49.5
-45	-43.9	52.8		7	7									-45.4	Boring Terminated at Elevation -45.4 ft IN MED. DENSE SILTY SAND (COASTAL PLAIN)	54.3

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.										
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 2							GROUND WTR (ft)									
BORING NO. RETWL2-B6		STATION 12+31		OFFSET 6 ft LT		ALIGNMENT -RETWL2-										
COLLAR ELEV. 8.8 ft		TOTAL DEPTH 44.3 ft		NORTHING 573,358		EASTING 2,506,913										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Fowler, B.		START DATE 10/30/18		COMP. DATE 10/30/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
10	8.8	0.0	WOH	WOH	1									8.8	GROUND SURFACE	0.0
														6.8	ALLUVIAL BROWN AND TAN, SANDY SILT WITH TRACE ORGANIC MATTER BROWN AND TAN, SILTY SAND AND SAND	2.0
5	4.6	4.2		3	3											
0	1.0	7.8		3	2											
-5	-4.0	12.8		2	2									-2.2	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	11.0
-10	-9.0	17.8		2	4									-7.2	LIGHT GRAY, CALCAREOUS, SANDY SILT	16.0
-15	-14.0	22.8		3	3											
-20	-19.0	27.8		5	4											
-25	-24.0	32.8		3	2											
-30	-29.0	37.8		4	7											
-35	-34.0	42.8		15	9									-33.2	COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)	42.0
														-35.5	Boring Terminated at Elevation -35.5 ft IN HARD SANDY LIMESTONE (COASTAL PLAIN SEDIMENTARY ROCK)	44.3

NCDOT BORE DOUBLE B4484_GEO_RWALS.GPJ NC_DOT.GDT 6/18/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.										
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 2							GROUND WTR (ft)									
BORING NO. RETWL2-B12		STATION 9+36		OFFSET 4 ft LT		ALIGNMENT -RETWL2-										
COLLAR ELEV. 12.1 ft		TOTAL DEPTH 24.7 ft		NORTHING 573,516		EASTING 2,507,163										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Fowler, B.		START DATE 10/29/18		COMP. DATE 10/29/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
15																
	12.1	0.0	2	4	4									12.1	GROUND SURFACE	0.0
10	7.9	4.2	2	2	2									10.1	ALLUVIAL TAN, SILTY SAND TAN SAND	2.9
5	3.9	8.2	2	0	2									0.6	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	11.5
0	-1.1	13.2	5	6	7									-9.4	LIGHT GRAY, CALCAREOUS, SANDY SILT	21.5
-5	-6.1	18.2	3	4	11									-12.6	Boring Terminated at Elevation -12.6 ft IN MED. STIFF SANDY SILT (COASTAL PLAIN)	24.7
-10	-11.1	23.2	4	3	3											

WBS 33723.1.2		TIP B-4484		COUNTY CRAVEN		GEOLOGIST Swartley, J. R.										
SITE DESCRIPTION MAPLE CYPRESS RD. BRIDGE REPLACEMENT - RETAINING WALL NO. 2							GROUND WTR (ft)									
BORING NO. RETWL2-B13		STATION 14+41		OFFSET 52 ft LT		ALIGNMENT -RETWL2-										
COLLAR ELEV. 11.9 ft		TOTAL DEPTH 39.6 ft		NORTHING 573,223		EASTING 250,676										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 86% 02/21/2019				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Fowler, B.		START DATE 10/31/18		COMP. DATE 10/31/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
15																
	11.9	0.0	WOH	WOH	3									11.9	GROUND SURFACE	0.0
10	7.5	4.4	WOH	WOH	WOH									6.5	ALLUVIAL BROWN AND TAN, SANDY CLAY	5.4
5	3.8	8.1	2	1	1									0.4	TAN SAND	11.5
0	-1.2	13.1	2	3	5									-4.6	COASTAL PLAIN LIGHT GRAY, CALCAREOUS, SILTY SAND (DUPLIN FORMATION)	16.5
-5	-6.2	18.1	4	2	3									-14.6	LIGHT GRAY, CALCAREOUS, SANDY SILT	26.5
-10	-11.2	23.1	3	3	4									-19.6	LIGHT GRAY, SILTY SAND	31.5
-15	-16.2	28.1	2	3	2									-27.7	GRAY, SANDY SILT	39.6
-20	-21.2	33.1	6	7	6											
-25	-26.2	38.1	8	13	6											

NCDOT BORE DOUBLE B4484_GEO_RWALS.GPJ NC_DOT.GDT 6/20/19

SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation



S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #: 6235-18-036 Date Report: 11/26/2018

State Project No.: 33723.1.2 County: Craven Date Tested: 11/16-11/26/18

Federal ID No.: N/A TIP No.: B-4484

Project Name: Maple Cypress Rd. Bridge Replacement, Retaining Walls 1-2

Client Name: NCDOT GEU Client Address: Raleigh, NC

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing					Total Mortar Fraction (%)				LL	PL	PI	Moist. %
						Sieve #					Coarse Sand	Fine Sand	Silt	Clay				
						10	40	60	200	270								
SS-1	9+36	4 LT	-RETWL2-	13.2-14.7	A-2-4 (0)	91	52	41	24	22	50	19	13	9	NP	NP	NP	28.2
SS-2	9+36	4 LT	-RETWL2-	23.2-24.7	A-4 (0)	100	97	93	47	40	7	54	19	21	25	22	3	34.0
SS-3	10+35	14 LT	-RETWL2-	8.2-9.7	A-2-4 (0)	98	78	61	22	17	37	44	8	9	NP	NP	NP	19.0
SS-4	10+35	14 LT	-RETWL2-	28.2-29.7	A-2-4 (0)	91	84	75	35	31	16	15	44	16	NP	NP	NP	28.3
SS-5	11+32	14 LT	-RETWL2-	0.0-1.5	A-2-4 (0)	100	95	87	35	30	13	57	14	6	28	26	2	80.1
SS-6	11+32	14 LT	-RETWL2-	7.8-9.3	A-2-6 (0)	91	80	66	33	30	27	40	15	18	30	18	12	38.6
SS-8	12+31	6 LT	-RETWL2-	4.2-5.7	A-2-4 (0)	100	86	57	17	13	43	44	5	8	NP	NP	NP	19.6
SS-9	12+31	6 LT	-RETWL2-	22.8-24.3	A-4 (0)	94	83	70	37	34	26	38	18	18	NP	NP	NP	26.8
SS-10	13+31	10 LT	-RETWL2-	47.8-49.3	A-2-4 (0)	86	60	40	17	14	54	29	10	7	NP	NP	NP	19.9
SS-11	13+31	10 LT	-RETWL2-	52.8-54.3	A-2-4 (0)	98	76	49	17	15	50	35	7	8	NP	NP	NP	31.9
SS-12	14+31	14 LT	-RETWL2-	13.1-14.6	A-2-4 (0)	90	65	52	29	27	43	28	15	14	NP	NP	NP	26.9
SS-13	14+31	14 LT	-RETWL2-	18.1-19.6	A-4 (1)	98	84	76	46	42	23	35	20	22	24	16	8	31.0
SS-14	14+41	52 LT	-RETWL2-	23.1-24.6	A-4 (0)	95	80	72	45	41	24	32	21	23	23	20	3	29.5
SS-15	14+41	52 LT	-RETWL2-	33.1-34.6	A-4 (0)	97	94	89	42	37	9	53	20	18	25	22	3	31.9
SS-16	15+22	18 LT	-RETWL2-	33.0-34.5	A-4 (0)	95	79	68	41	39	28	31	20	21	27	25	2	25.2
SS-17	15+22	18 LT	-RETWL2-	43.0-44.5	A-1-b (0)	63	33	23	12	11	63	20	8	9	NP	NP	NP	20.0
SS-30	10+01	18 LT	-RETWL1-	7.8-9.3	A-6 (11)	10	100	98	70	63	2	35	18	45	37	18	19	27.9
SS-31	10+01	18 LT	-RETWL1-	77.8-79.3	A-2-4 (0)	100	97	85	21	18	15	67	7	11	NP	NP	NP	34.9
SS-32	10+51	8 LT	-RETWL1-	17.9-19.4	A-3 (1)	100	80	33	4	3	67	30	1	2	NP	NP	NP	23.5
SS-33	10+51	8 LT	-RETWL1-	32.9-34.4	A-4 (0)	95	91	86	40	36	10	53	15	22	23	20	3	30.8
SS-34	11+01	5 LT	-RETWL1-	4.1-5.6	A-4 (0)	100	100	97	39	30	3	67	10	20	25	18	7	23.2
SS-35	11+01	5 LT	-RETWL1-	32.9-34.4	A-4 (0)	99	96	92	45	40	7	52	18	23	24	21	3	30.9
SS-36	11+52	CL	-RETWL1-	4.2-5.7	A-6 (12)	100	100	99	73	66	1	33	23	43	37	19	18	27.2
SS-37	11+52	CL	-RETWL1-	13.1-14.6	A-4 (0)	100	100	99	43	34	1	65	13	21	23	21	2	28.5
SS-38	12+12	3 LT	-RETWL1-	4.2-5.7	A-6 (6)	100	99	95	62	54	5	41	20	34	31	18	13	27.0
SS-39	12+12	3 LT	-RETWL1-	7.9-9.4	A-7-6 (31)	100	99	98	91	87	2	11	28	59	56	26	30	37.3
ST-1	10+06	18 LT	-RETWL1-	7.8-9.8	A-7-6 (17)	100	100	97	74	68	3	30	22	45	45	21	24	ND
ST-2	10+51	8 LT	-RETWL1-	5.9-7.9	A-7-6 (13)	100	96	89	67	61	12	27	22	39	42	20	22	ND
ST-3	11+57	CL	-RETWL1-	7.1-9.1	A-6 (4)	100	94	83	49	44	17	39	14	30	32	16	16	ND

References / Comments / Deviations: ND=Not Determined. NP=Non-Plastic.

SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation



S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #: 6235-18-036 Date Report: 11/26/2018

State Project No.: 33723.1.2 County: Craven Date Tested: 11/16-11/26/18

Federal ID No.: N/A TIP No.: B-4484

Project Name: Maple Cypress Rd. Bridge Replacement, Retaining Walls 1-2

Client Name: NCDOT GEU Client Address: Raleigh, NC

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing					Total Mortar Fraction (%)				LL	PL	PI	Moist. %
						Sieve #					Coarse Sand	Fine Sand	Silt	Clay				
						10	40	60	200	270								

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET

Technician Name:

Signature

104-01-0703

Certification #

Thomas J. Daily, PE

Technical Responsibility:

Project Manager

Position

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Effective Stress Triaxial Compression

Consolidated Undrained

Sample details

Sketch showing specimen location in original Sample



Depth: 7.8 - 9.8 ft.
Description: Gray Coarse to Fine Sandy Silty CLAY (A-7-6) (17)

	Specimen 1	Specimen 2
Type	Undisturbed	Undisturbed
Height H_0 (in)	6.029	5.919
Diameter D_0 (in)	2.868	2.865
Weight W_0 (gr)	1225.4	1216.2
Bulk Density ρ (PCF)	119.86	121.42
Particle Density ρ_s	2.668	2.668
	(measured)	(measured)

Initial Conditions

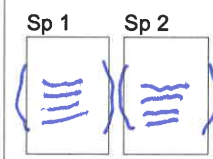
	Specimen 1	Specimen 2
Cell Pressure σ_3 (lbf/in ²)	2.5	10.0
Pore Pressure u (lbf/in ²)	5.0	5.0
Machine Speed d_r (in/min)	0.015	0.023
No. of Membranes	1	1
Total Thickness (in)	0.012	0.012
Strain Channel	1798	1798
Load Channel	1776	1776
Pore P. Channel	1779	1779
Volume Channel	Volume Chang	Volume Chang
Moisture Content w_0 %	28.4	29.4
Dry Density ρ_{d0} (PCF)	93.33	93.82
Voids Ratio e_0	0.78	0.77
Deg of Saturation S_0 %	96.75	100.00
Final B Value	0.98	0.97

Final Conditions

	Specimen 1	Specimen 2
Moisture Content w_f %	28.3	27.4
Dry Density ρ_d (PCF)	94.23	95.26
Voids Ratio e_f	0.77	0.75
Deg of Saturation S_f %	98.62	97.76
Failure Criteria	Mx Stress Ratio	Mx Stress Ratio
Axial Strain ϵ_f %	2.0	5.0
Corr Dev Stress $(\sigma_1 - \sigma_3)_f$ (lbf/in ²)	6.6	14.3
Minor Stress σ_{3f} (lbf/in ²)	0.5	5.4
Major Stress σ_{1f} (lbf/in ²)	7.1	19.7
Stress Ratio $(\sigma_1/\sigma_3)_f$	14.2	3.6

Notes:

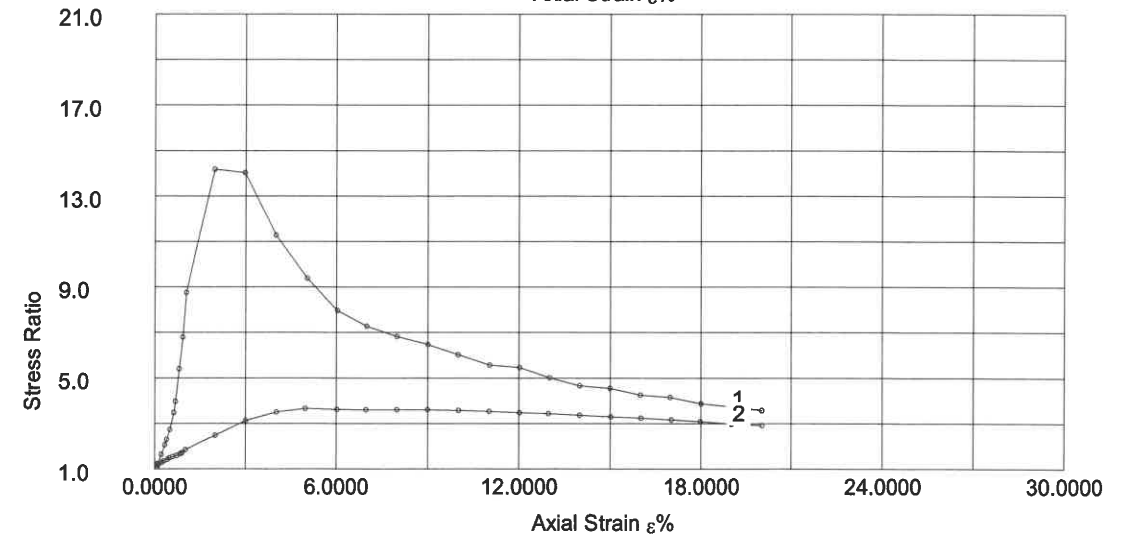
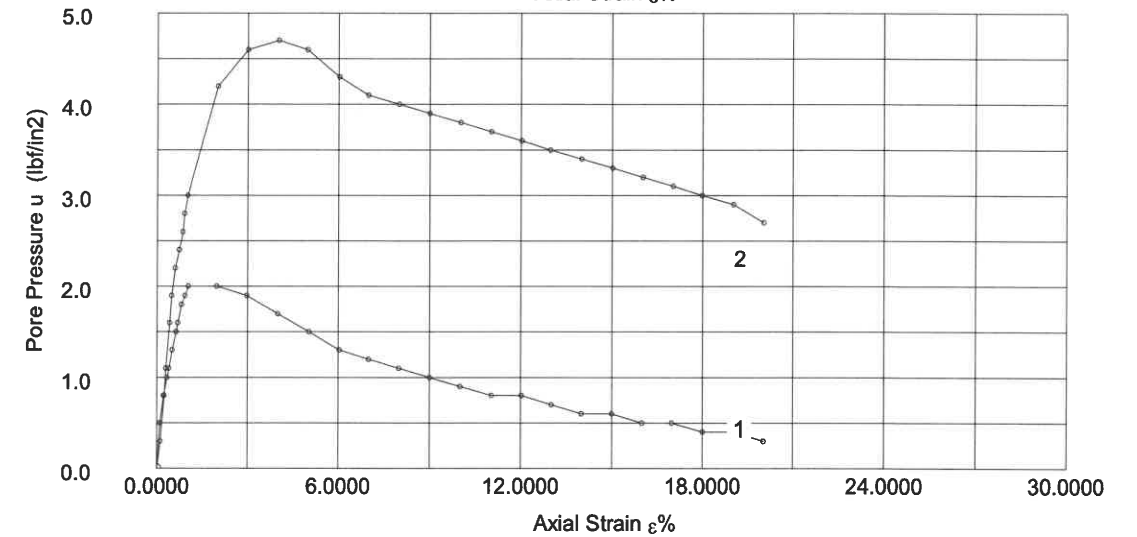
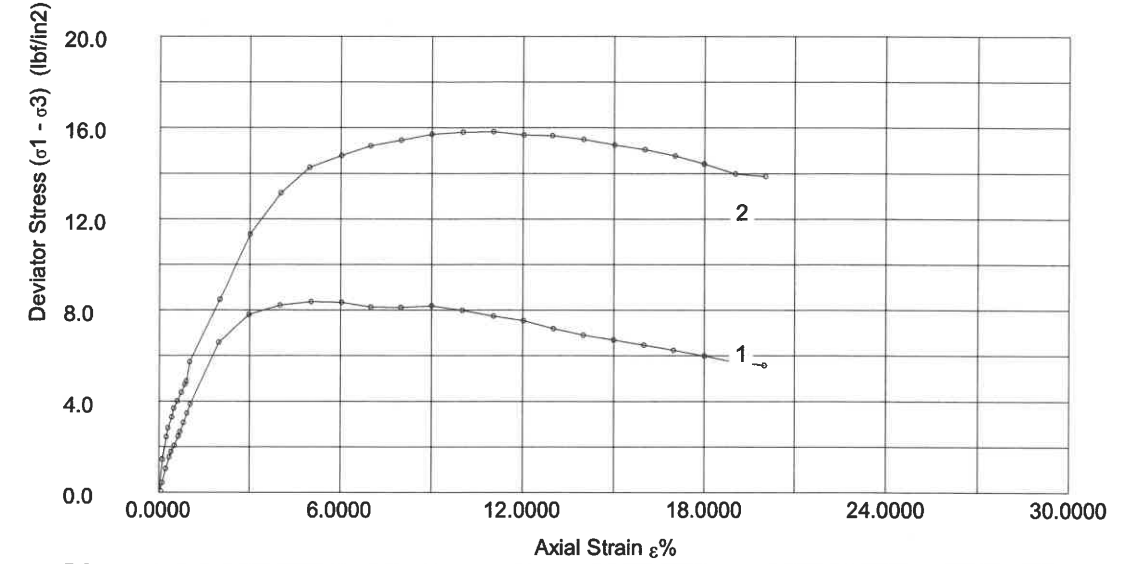
Failure Sketch



Surface Inclination

Effective Stress Triaxial Compression

Consolidated Undrained

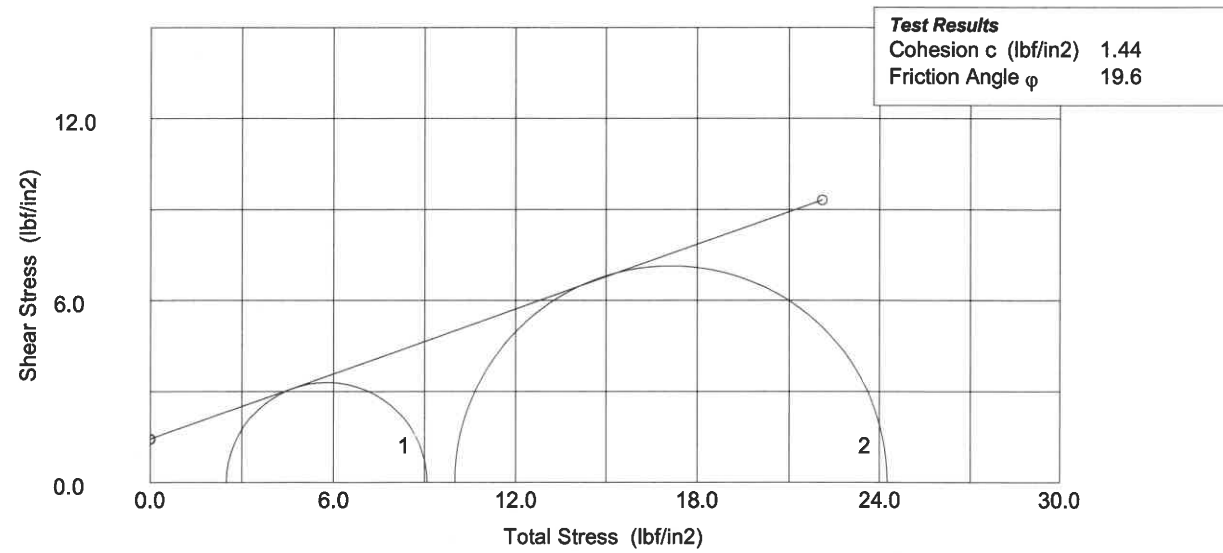
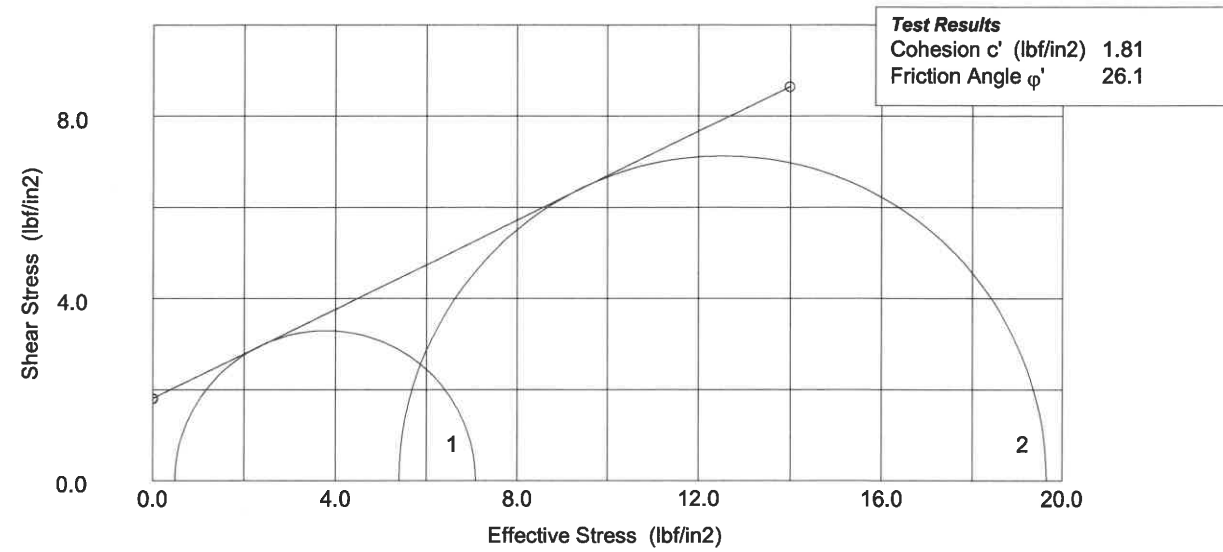


	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-1
	Operator: <i>nkc</i>	Borehole: ST-1
	Checked: <i>nkc</i>	Approved:

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-1
	Operator: <i>nkc</i>	Borehole: ST-1
	Checked: <i>nkc</i>	Approved:

Effective Stress Triaxial Compression

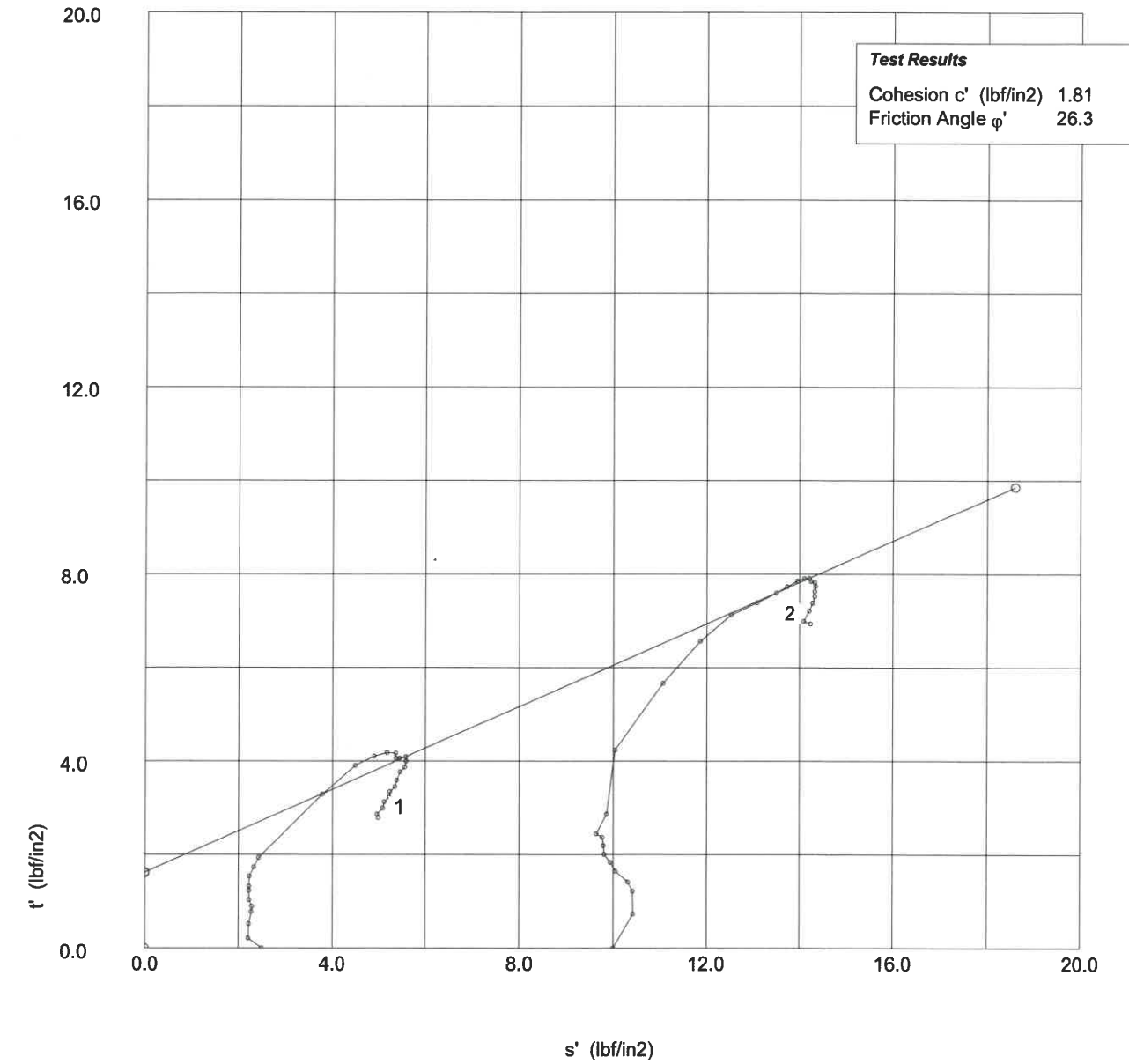
Consolidated Undrained



	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Date of Test: 12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample: ST-1 Borehole: ST-1
	Operator: <i>muc</i>	Checked: <i>muc</i>

Effective Stress Triaxial Compression

Consolidated Undrained



	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Date of Test: 12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample: ST-1 Borehole: ST-1
	Operator: <i>muc</i>	Checked: <i>muc</i>

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 1)

No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress (σ ₁ - σ ₃) _m (lbf/in2)	D. Stress (σ ₁ - σ ₃) _c (lbf/in2)	Minor Str σ ₃ ' (lbf/in2)	Major Str σ ₁ ' (lbf/in2)	Ratio σ ₁ '/σ ₃ '
1	92	0.00	563	0.0	0	0.0	0.0	0.0	2.50	2.50	1.00
2	157	0.11	590	2.7	5	0.5	0.4	0.4	2.00	2.42	1.21
3	226	0.22	630	6.7	8	0.8	1.0	1.0	1.70	2.74	1.61
4	295	0.34	663	10.0	10	1.0	1.6	1.6	1.50	3.05	2.04
5	334	0.40	678	11.5	11	1.1	1.8	1.8	1.40	3.18	2.27
6	399	0.51	706	14.3	13	1.3	2.2	2.1	1.20	3.26	2.71
7	470	0.63	732	16.9	15	1.5	2.6	2.5	1.00	3.46	3.46
8	505	0.69	745	18.2	16	1.6	2.8	2.7	0.90	3.56	3.95
9	575	0.80	772	20.9	18	1.8	3.2	3.1	0.70	3.77	5.39
10	643	0.92	798	23.5	19	1.9	3.6	3.5	0.60	4.07	6.78
11	715	1.04	824	26.1	20	2.0	4.0	3.9	0.50	4.37	8.73
12	1278	1.97	1012	44.9	20	2.0	6.9	6.6	0.50	7.08	14.16
13	1880	2.98	1103	54.0	19	1.9	8.2	7.8	0.60	8.41	14.01
14	2496	4.00	1144	58.1	17	1.7	8.7	8.2	0.80	9.01	11.27
15	3120	5.04	1166	60.3	15	1.5	8.9	8.4	1.00	9.36	9.36
16	3719	6.04	1176	61.3	13	1.3	9.0	8.3	1.20	9.54	7.95
17	4308	7.02	1174	61.1	12	1.2	8.9	8.1	1.30	9.44	7.26
18	4901	8.00	1185	62.2	11	1.1	8.9	8.1	1.40	9.52	6.80
19	5505	9.01	1202	63.9	10	1.0	9.1	8.2	1.50	9.68	6.46
20	6102	10.00	1201	63.8	9	0.9	8.9	8.0	1.60	9.59	6.00
21	6721	11.03	1196	63.3	8	0.8	8.8	7.7	1.70	9.44	5.55
22	7319	12.03	1194	63.1	8	0.8	8.6	7.5	1.70	9.24	5.43
23	7918	13.02	1180	61.7	7	0.7	8.4	7.2	1.80	8.98	4.99
24	8505	14.00	1172	60.9	6	0.6	8.2	6.9	1.90	8.80	4.63
25	9100	14.99	1167	60.4	6	0.6	8.0	6.7	1.90	8.59	4.52
26	9704	15.99	1162	59.9	5	0.5	7.8	6.5	2.00	8.46	4.23
27	10293	16.97	1158	59.5	5	0.5	7.7	6.2	2.00	8.25	4.12
28	10915	18.01	1150	58.7	4	0.4	7.5	6.0	2.10	8.09	3.85
29	11521	19.02	1140	57.7	4	0.4	7.3	5.7	2.10	7.83	3.73
30	12115	20.01	1138	57.5	3	0.3	7.2	5.6	2.20	7.78	3.53

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Shear (Specimen 1)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-1
Operator: <i>me</i>	Checked: <i>me</i>	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 2)

No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress (σ ₁ - σ ₃) _m (lbf/in2)	D. Stress (σ ₁ - σ ₃) _c (lbf/in2)	Minor Str σ ₃ ' (lbf/in2)	Major Str σ ₁ ' (lbf/in2)	Ratio σ ₁ '/σ ₃ '
1	0	0.00	620	0.0	0	0.0	0.0	0.0	10.00	10.00	1.00
2	71	0.12	713	9.3	3	0.3	1.5	1.5	9.70	11.16	1.15
3	140	0.24	776	15.6	8	0.8	2.4	2.4	9.20	11.64	1.27
4	176	0.30	801	18.1	11	1.1	2.8	2.8	8.90	11.73	1.32
5	248	0.42	832	21.2	16	1.6	3.3	3.3	8.40	11.71	1.39
6	283	0.48	856	23.6	19	1.9	3.7	3.7	8.10	11.78	1.45
7	355	0.60	888	26.8	22	2.2	4.2	4.0	7.80	11.81	1.51
8	427	0.73	912	29.2	24	2.4	4.5	4.4	7.60	11.98	1.58
9	495	0.84	935	31.5	26	2.6	4.9	4.7	7.40	12.14	1.64
10	530	0.90	945	32.5	28	2.8	5.0	4.9	7.20	12.09	1.68
11	599	1.02	999	37.9	30	3.0	5.9	5.7	7.00	12.72	1.82
12	1182	2.01	1190	57.0	42	4.2	8.8	8.5	5.80	14.27	2.46
13	1772	3.01	1389	76.9	46	4.6	11.7	11.3	5.40	16.73	3.10
14	2371	4.03	1525	90.5	47	4.7	13.6	13.1	5.30	18.43	3.48
15	2928	4.97	1615	99.5	46	4.6	14.8	14.3	5.40	19.66	3.64
16	3551	6.03	1667	104.7	43	4.3	15.4	14.8	5.70	20.48	3.59
17	4114	6.99	1712	109.2	41	4.1	15.9	15.2	5.90	21.10	3.58
18	4714	8.00	1748	112.8	40	4.0	16.3	15.5	6.00	21.46	3.58
19	5300	9.00	1783	116.3	39	3.9	16.6	15.7	6.10	21.81	3.57
20	5895	10.01	1809	118.9	38	3.8	16.8	15.8	6.20	22.01	3.55
21	6495	11.03	1829	120.9	37	3.7	16.9	15.8	6.30	22.12	3.51
22	7086	12.03	1839	121.9	36	3.6	16.8	15.7	6.40	22.09	3.45
23	7646	12.98	1854	123.4	35	3.5	16.8	15.6	6.50	22.15	3.41
24	8244	14.00	1862	124.2	34	3.4	16.7	15.5	6.60	22.08	3.35
25	8843	15.02	1864	124.4	33	3.3	16.6	15.3	6.70	21.95	3.28
26	9432	16.02	1868	124.8	32	3.2	16.4	15.0	6.80	21.85	3.21
27	10024	17.02	1867	124.7	31	3.1	16.2	14.8	6.90	21.66	3.14
28	10595	17.99	1860	124.0	30	3.0	15.9	14.4	7.00	21.42	3.06
29	11214	19.04	1844	122.4	29	2.9	15.5	14.0	7.10	21.07	2.97
30	11806	20.05	1854	123.4	27	2.7	15.5	13.9	7.30	21.17	2.90

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Shear (Specimen 2)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-1
Operator: <i>me</i>	Checked: <i>me</i>	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained

Sample details

Sketch showing specimen location in original Sample



Depth: 5.9 - 7.9 ft.
Description: Gray Coarse to Fine Sandy Silty CLAY (A-7-6) (13)

	Specimen 1	Specimen 2
Type	Undisturbed	Undisturbed
Height H_0 (in)	5.769	5.756
Diameter D_0 (in)	2.859	2.857
Weight W_0 (gr)	1165.6	1160.1
Bulk Density ρ (PCF)	119.90	119.77
Particle Density ρ_s	2.677	2.677
	(measured)	(measured)

Initial Conditions

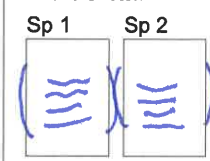
	Specimen 1	Specimen 2
Cell Pressure σ_3 (lb/in ²)	1.5	6.0
Pore Pressure u (lb/in ²)	0.0	0.0
Machine Speed d_r (in/min)	0.011	0.013
No. of Membranes	1	1
Total Thickness (in)	0.012	0.012
Strain Channel	1798	1798
Load Channel	1776	1776
Pore P. Channel	1779	1779
Volume Channel	Volume Chang	Volume Chang
Moisture Content w_0 %	28.4	27.5
Dry Density ρ_{d0} (PCF)	93.37	93.95
Voids Ratio e_0	0.79	0.78
Deg of Saturation S_0 %	96.39	94.55
Final B Value	0.96	0.96

Final Conditions

	Specimen 1	Specimen 2
Moisture Content w_f %	28.2	26.9
Dry Density ρ_d (PCF)	94.41	95.28
Voids Ratio e_f	0.77	0.75
Deg of Saturation S_f %	98.02	95.65
Failure Criteria	Mx Stress Ratio	Mx Stress Ratio
Axial Strain ϵ_f %	6.0	5.0
Corr Dev Stress $(\sigma_1 - \sigma_3)_f$ (lb/in ²)	4.0	6.1
Minor Stress σ_{3f} (lb/in ²)	0.7	2.8
Major Stress σ_{1f} (lb/in ²)	4.7	8.9
Stress Ratio $(\sigma_1/\sigma_3)_f$	6.7	3.2

Notes:

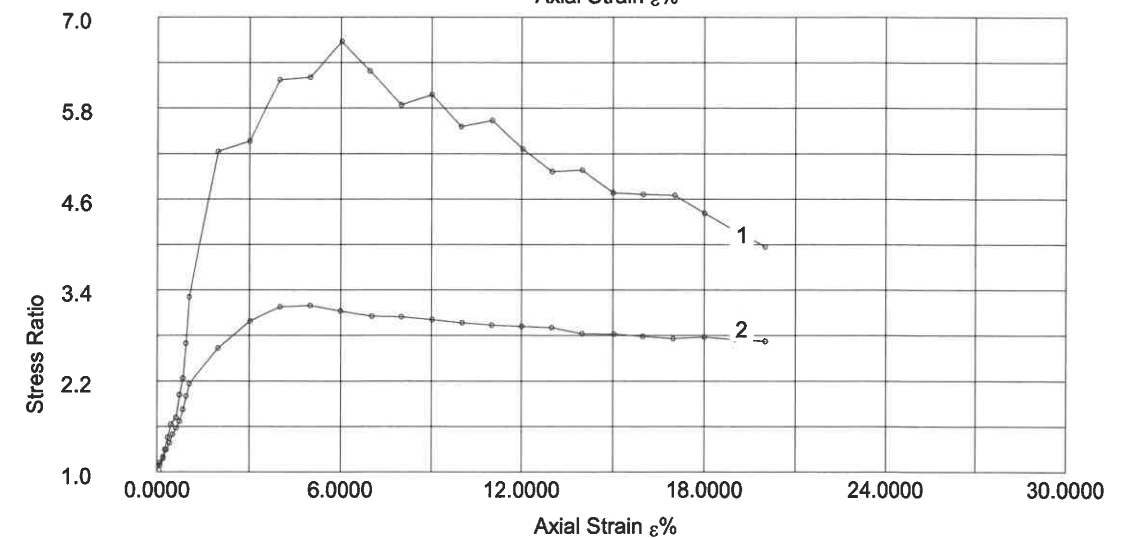
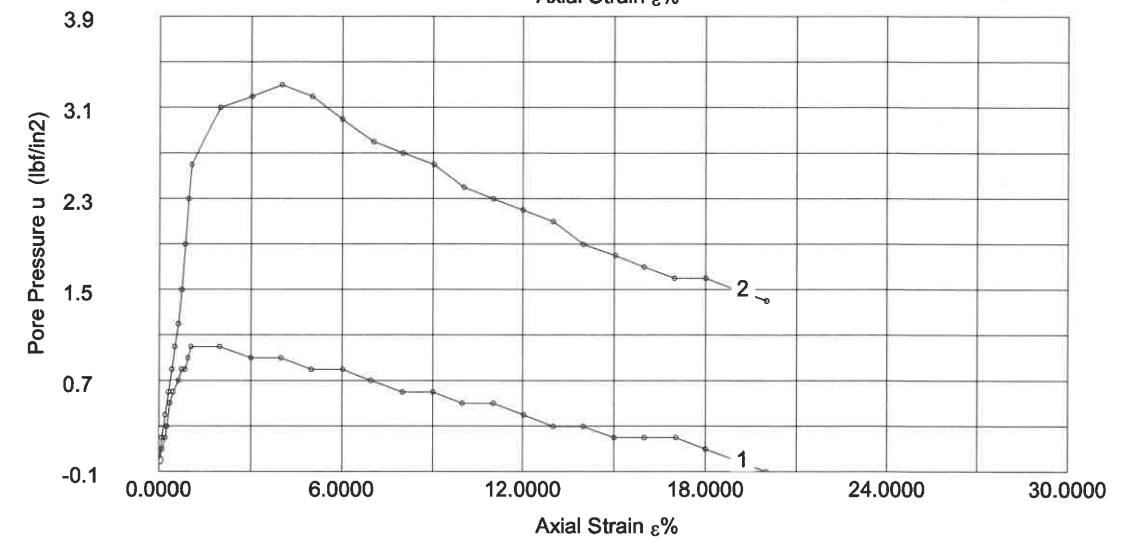
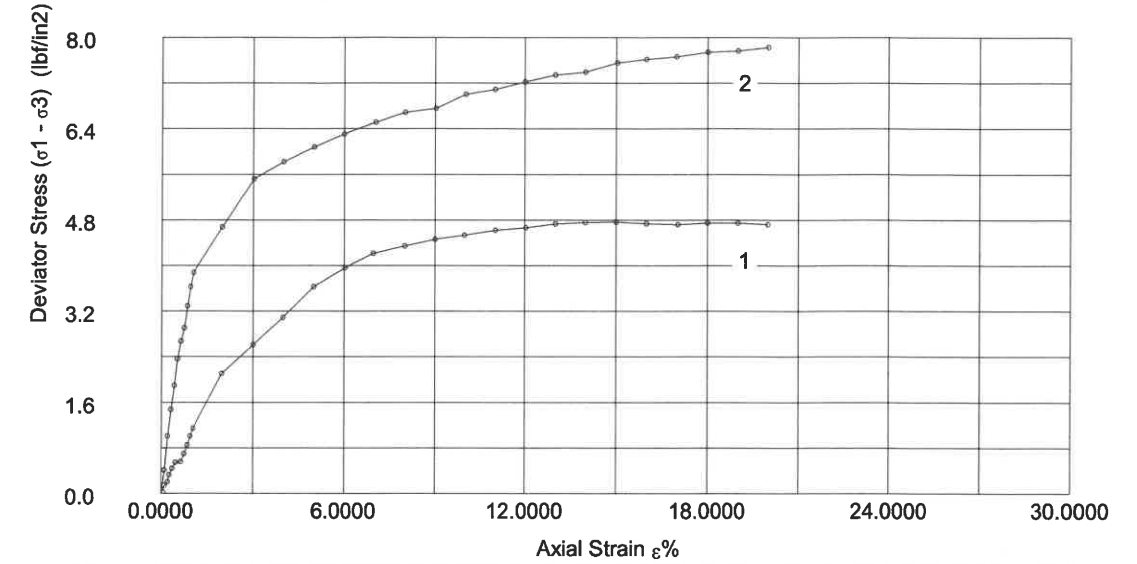
Failure Sketch



Surface Inclination

Effective Stress Triaxial Compression

Consolidated Undrained

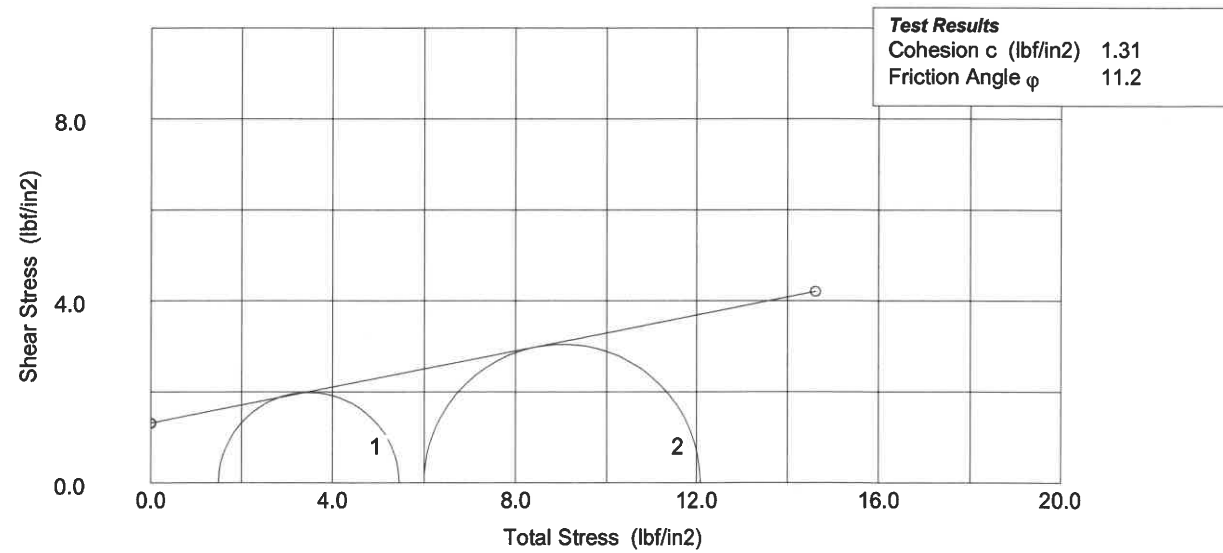
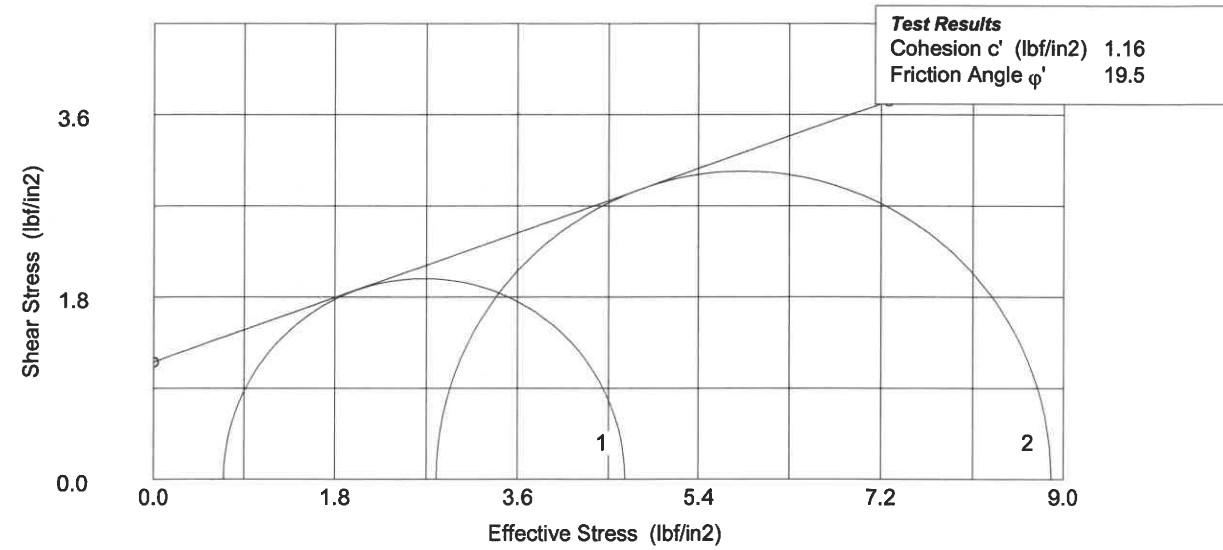


	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-2
Operator: <i>ML</i>	Checked: <i>ML</i>	Approved:

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-2
Operator: <i>ML</i>	Checked: <i>ML</i>	Approved:

Effective Stress Triaxial Compression

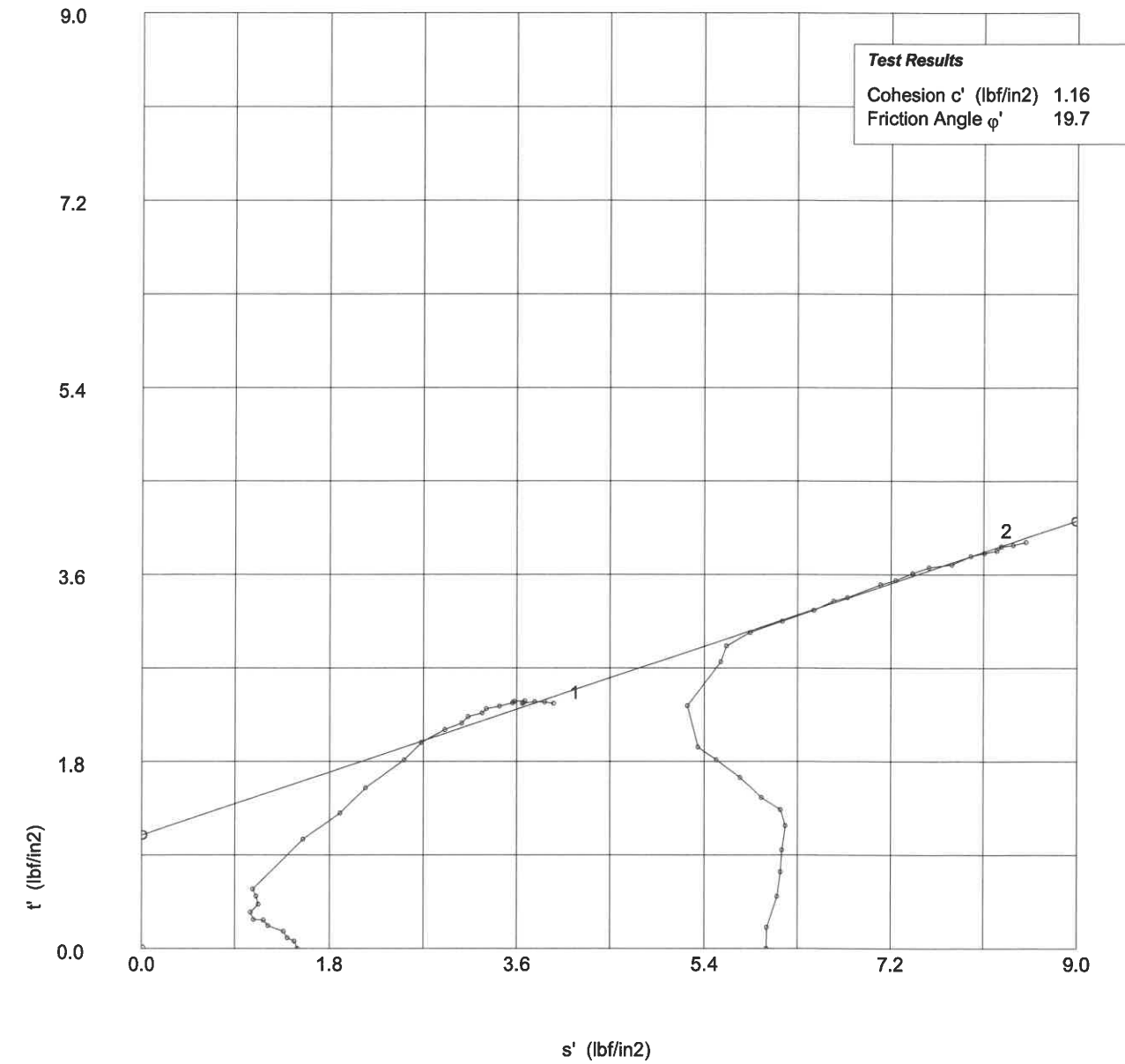
Consolidated Undrained



	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Date of Test: 12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample: ST-2 Borehole: ST-2
	Operator: <i>mlk</i>	Checked: <i>mlk</i>

Effective Stress Triaxial Compression

Consolidated Undrained



	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Date of Test: 12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample: ST-2 Borehole: ST-2
	Operator: <i>mlk</i>	Checked: <i>mlk</i>

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 1)

No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress (σ ₁ - σ ₃) _m (lbf/in2)	D. Stress (σ ₁ - σ ₃) _c (lbf/in2)	Minor Str σ ₃ ' (lbf/in2)	Major Str σ ₁ (lbf/in2)	Ratio σ ₁ '/σ ₃ '
1	0	0.00	510	0.0	0	0.0	0.0	0.0	1.50	1.50	1.00
2	60	0.10	519	0.9	1	0.1	0.1	0.1	1.40	1.54	1.10
3	120	0.21	523	1.3	2	0.2	0.2	0.2	1.30	1.50	1.16
4	151	0.26	531	2.1	3	0.3	0.3	0.3	1.20	1.53	1.27
5	209	0.36	538	2.8	5	0.5	0.4	0.4	1.00	1.44	1.44
6	270	0.47	545	3.5	6	0.6	0.5	0.5	0.90	1.45	1.61
7	358	0.62	556	4.6	7	0.7	0.7	0.6	0.80	1.36	1.70
8	417	0.73	565	5.5	8	0.8	0.9	0.7	0.70	1.40	2.00
9	477	0.83	575	6.5	8	0.8	1.0	0.9	0.70	1.55	2.22
10	537	0.93	585	7.5	9	0.9	1.2	1.0	0.60	1.61	2.68
11	596	1.04	594	8.4	10	1.0	1.3	1.1	0.50	1.64	3.29
12	1136	1.98	665	15.5	10	1.0	2.4	2.1	0.50	2.60	5.21
13	1731	3.01	705	19.5	9	0.9	3.0	2.6	0.60	3.21	5.35
14	2295	3.99	747	23.7	9	0.9	3.6	3.1	0.60	3.69	6.15
15	2869	4.99	791	28.1	8	0.8	4.2	3.6	0.70	4.33	6.19
16	3465	6.03	822	31.2	8	0.8	4.6	4.0	0.70	4.66	6.66
17	4003	6.96	848	33.8	7	0.7	4.9	4.2	0.80	5.02	6.27
18	4604	8.01	866	35.6	6	0.6	5.1	4.3	0.90	5.24	5.82
19	5176	9.00	884	37.4	6	0.6	5.3	4.5	0.90	5.36	5.96
20	5740	9.99	899	38.9	5	0.5	5.5	4.5	1.00	5.54	5.54
21	6337	11.02	915	40.5	5	0.5	5.7	4.6	1.00	5.62	5.62
22	6917	12.03	929	41.9	4	0.4	5.8	4.7	1.10	5.77	5.24
23	7484	13.02	943	43.3	3	0.3	5.9	4.7	1.20	5.93	4.94
24	8052	14.01	956	44.6	3	0.3	6.0	4.8	1.20	5.96	4.96
25	8623	15.00	966	45.6	2	0.2	6.1	4.8	1.30	6.07	4.67
26	9198	16.00	974	46.4	2	0.2	6.1	4.7	1.30	6.04	4.64
27	9790	17.03	984	47.4	2	0.2	6.2	4.7	1.30	6.02	4.63
28	10358	18.02	997	48.7	1	0.1	6.3	4.7	1.40	6.15	4.39
29	10933	19.02	1006	49.6	0	0.0	6.3	4.7	1.50	6.25	4.16
30	11500	20.01	1013	50.3	-1	-0.1	6.3	4.7	1.60	6.32	3.95

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Shear (Specimen 1)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-2
	Operator: <i>MLK</i>	Checked: <i>MLK</i>

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 2)

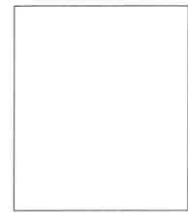
No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress (σ ₁ - σ ₃) _m (lbf/in2)	D. Stress (σ ₁ - σ ₃) _c (lbf/in2)	Minor Str σ ₃ ' (lbf/in2)	Major Str σ ₁ (lbf/in2)	Ratio σ ₁ '/σ ₃ '
1	137	0.00	619	0.0	0	0.0	0.0	0.0	6.00	6.00	1.00
2	197	0.10	645	2.6	2	0.2	0.4	0.4	5.80	6.21	1.07
3	256	0.21	683	6.4	4	0.4	1.0	1.0	5.60	6.61	1.18
4	317	0.31	713	9.4	6	0.6	1.5	1.5	5.40	6.88	1.27
5	376	0.42	740	12.1	8	0.8	1.9	1.9	5.20	7.10	1.36
6	435	0.52	780	16.1	10	1.0	2.5	2.4	5.00	7.36	1.47
7	496	0.63	800	18.1	12	1.2	2.8	2.7	4.80	7.47	1.56
8	554	0.73	815	19.6	15	1.5	3.1	2.9	4.50	7.40	1.65
9	613	0.83	840	22.1	19	1.9	3.5	3.3	4.10	7.39	1.80
10	674	0.94	862	24.3	23	2.3	3.8	3.6	3.70	7.33	1.98
11	734	1.04	878	25.9	26	2.6	4.0	3.9	3.40	7.28	2.14
12	1277	1.99	940	32.1	31	3.1	5.0	4.7	2.90	7.58	2.61
13	1874	3.03	1004	38.5	32	3.2	5.9	5.5	2.80	8.32	2.97
14	2438	4.02	1036	41.7	33	3.3	6.3	5.8	2.70	8.52	3.16
15	3003	5.00	1063	44.4	32	3.2	6.6	6.1	2.80	8.88	3.17
16	3573	6.00	1088	46.9	30	3.0	6.9	6.3	3.00	9.30	3.10
17	4166	7.03	1113	49.4	28	2.8	7.2	6.5	3.20	9.71	3.04
18	4731	8.02	1136	51.7	27	2.7	7.5	6.7	3.30	9.99	3.03
19	5311	9.03	1152	53.3	26	2.6	7.6	6.8	3.40	10.16	2.99
20	5881	10.03	1181	56.2	24	2.4	8.0	7.0	3.60	10.61	2.95
21	6446	11.01	1199	58.0	23	2.3	8.1	7.1	3.70	10.79	2.92
22	7017	12.01	1221	60.2	22	2.2	8.3	7.2	3.80	11.02	2.90
23	7592	13.01	1241	62.2	21	2.1	8.5	7.3	3.90	11.24	2.88
24	8159	14.00	1258	63.9	19	1.9	8.7	7.4	4.10	11.49	2.80
25	8750	15.03	1282	66.3	18	1.8	8.9	7.6	4.20	11.75	2.80
26	9297	15.99	1299	68.0	17	1.7	9.0	7.6	4.30	11.92	2.77
27	9866	16.98	1316	69.7	16	1.6	9.1	7.7	4.40	12.06	2.74
28	10458	18.02	1336	71.7	16	1.6	9.3	7.7	4.40	12.14	2.76
29	11031	19.02	1350	73.1	15	1.5	9.3	7.8	4.50	12.27	2.73
30	11608	20.02	1367	74.8	14	1.4	9.4	7.8	4.60	12.42	2.70

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Shear (Specimen 2)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-2
	Operator: <i>MLK</i>	Checked: <i>MLK</i>

Oedometer Settlement Tests

Sample details

Sketch showing specimen location in original Sample



Depth: 7.1 - 9.1 ft.
Description: Gray Coarse to Fine Sandy Silty CLAY (A-6) (4)

Type: Undisturbed
Height H_0 (in): 0.999
Diameter D_0 (in): 2.501
Weight W_0 (gr): 158.56
Bulk Density ρ (PCF): 123.08
Particle Density ρ_s : 2.688 (measured)

Initial Conditions

Settlement Channel: 1001
Moisture Content w_0 %: 27.1
Dry Density ρ_d (PCF): 96.83
Voids Ratio e_0 : 0.7321
Deg of Saturation S_0 %: 99.5
Swelling Pressure S_s (TSF): 0.000

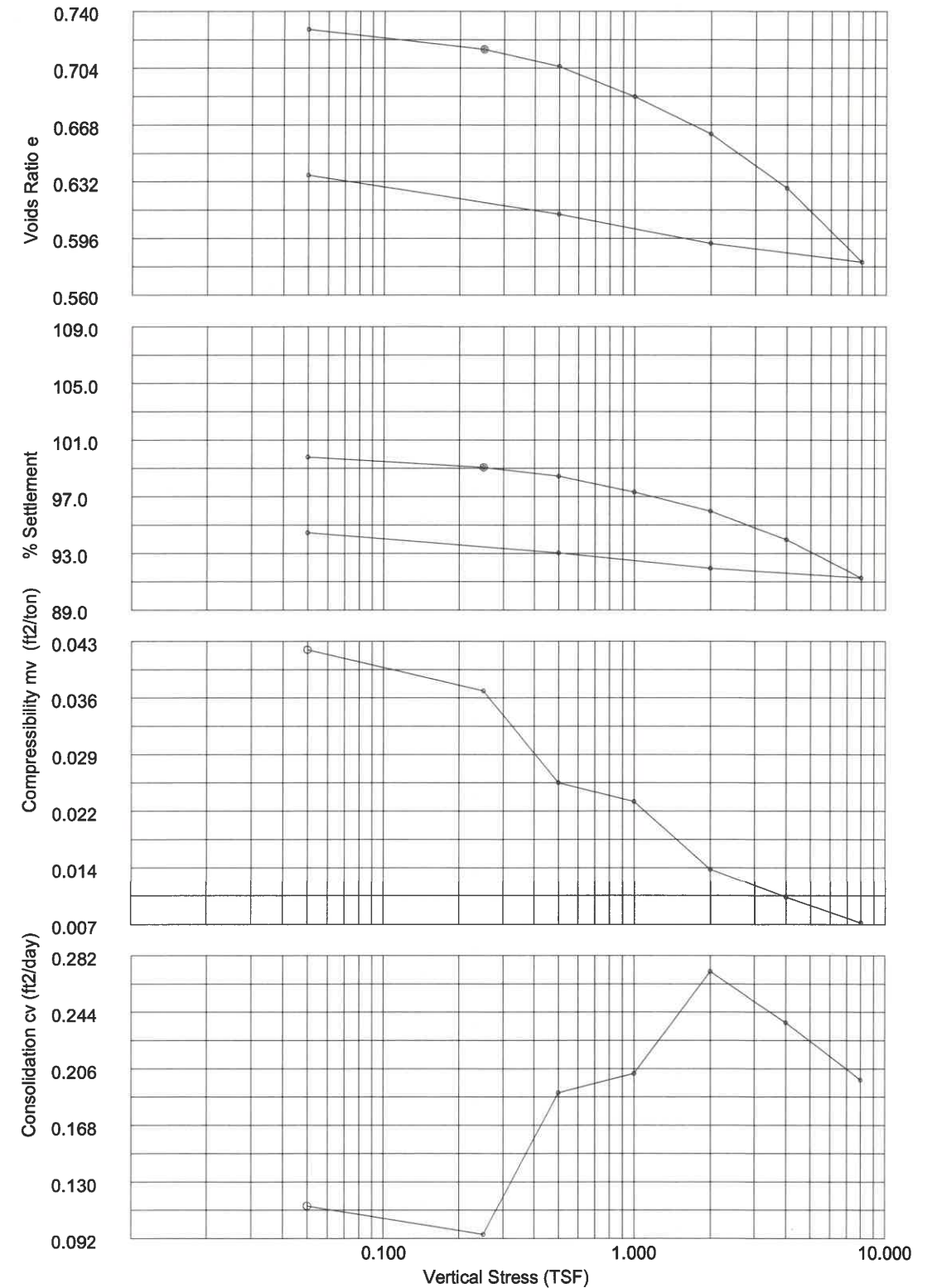
Final Conditions

Moisture Content w_f %: 24.5
Dry Density ρ_d (PCF): 102.52
Voids Ratio e_f : 0.6361
Deg of Saturation S_f %: 100.00
Settlement: (in): 0.055
Compression Index C_c : 0.158

Notes: Test specimen taken from the middle portion of UD tube.

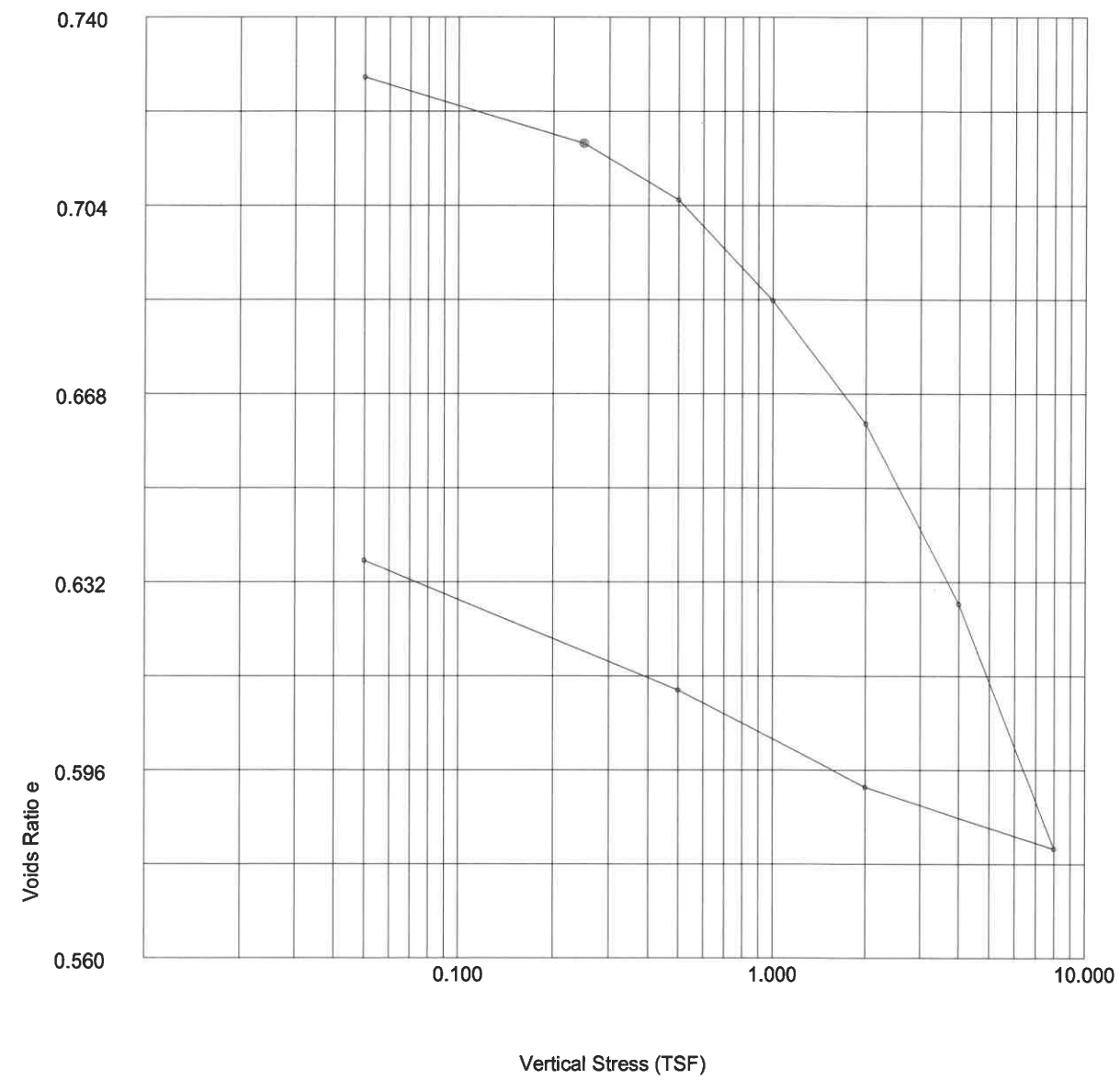
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test: 12-26-18
	Operator: <i>MK</i>	Checked: <i>MK</i>
		Sample: ST-3 Borehole: ST-3
		Approved:

Oedometer Settlement Tests



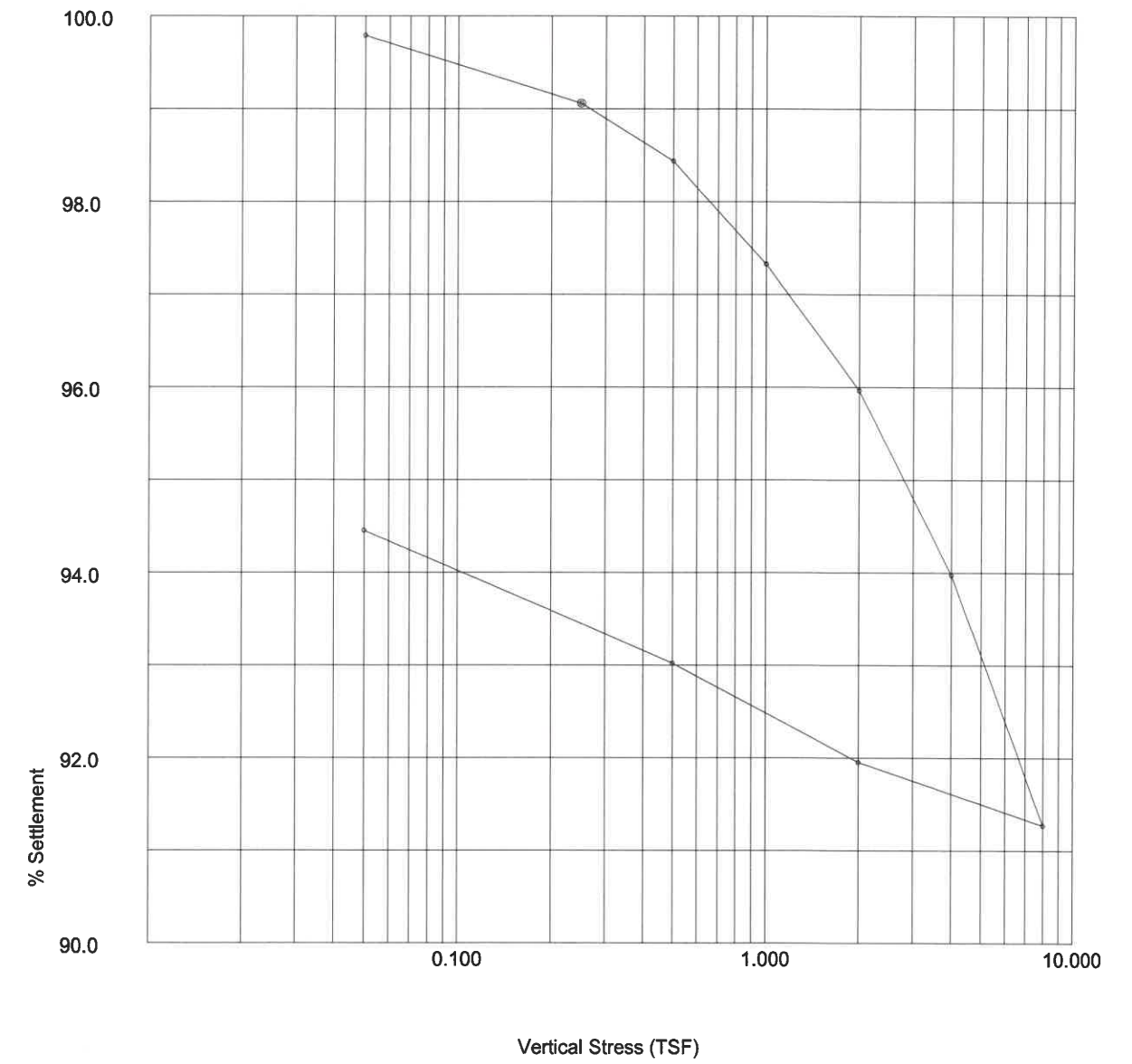
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test: 12-26-18
	Operator: <i>MK</i>	Checked: <i>MK</i>
		Sample: ST-3 Borehole: ST-3
		Approved:

Oedometer Settlement Tests



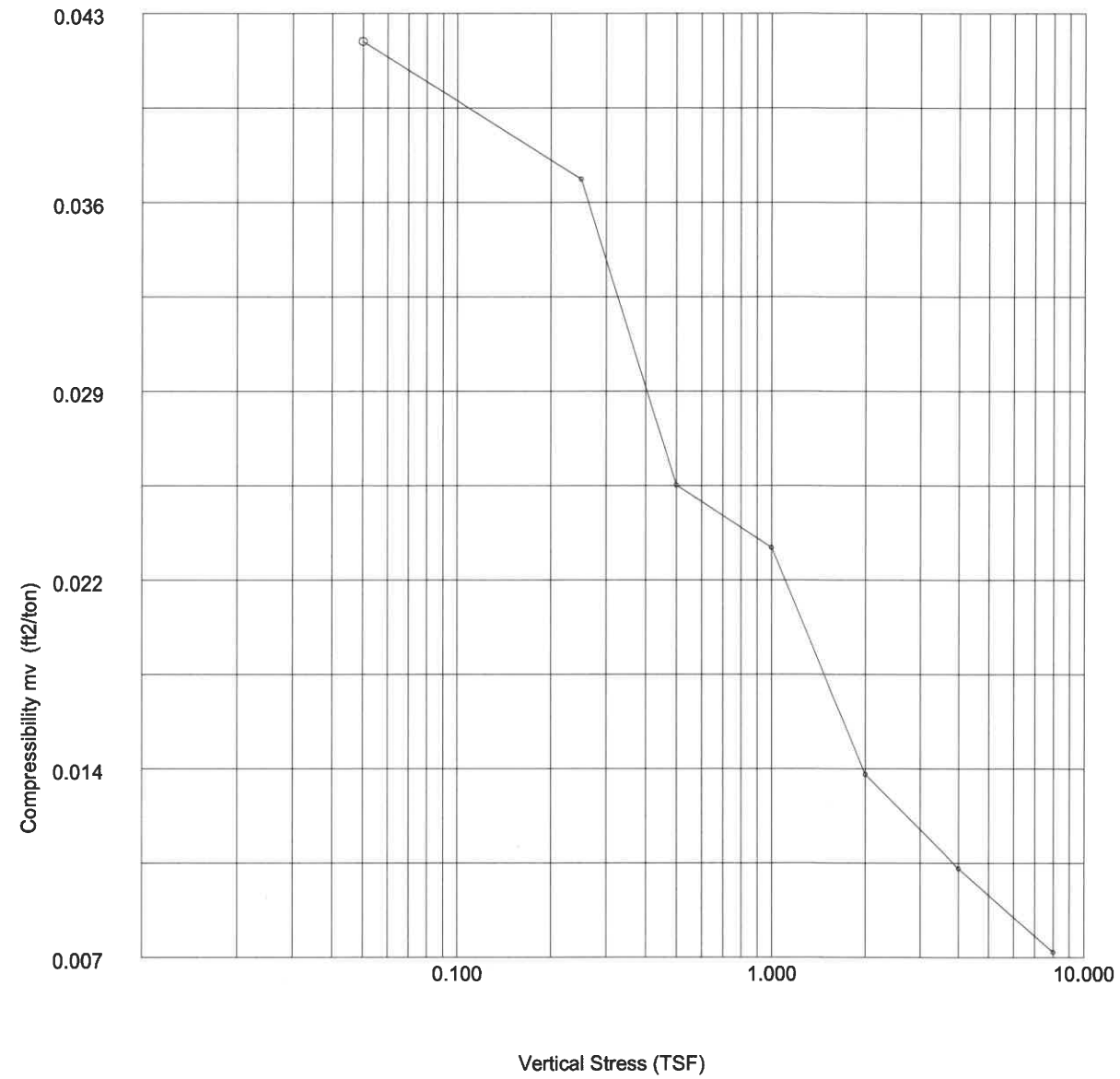
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			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:		MK	Checked:	MK
			Approved:	

Oedometer Settlement Tests



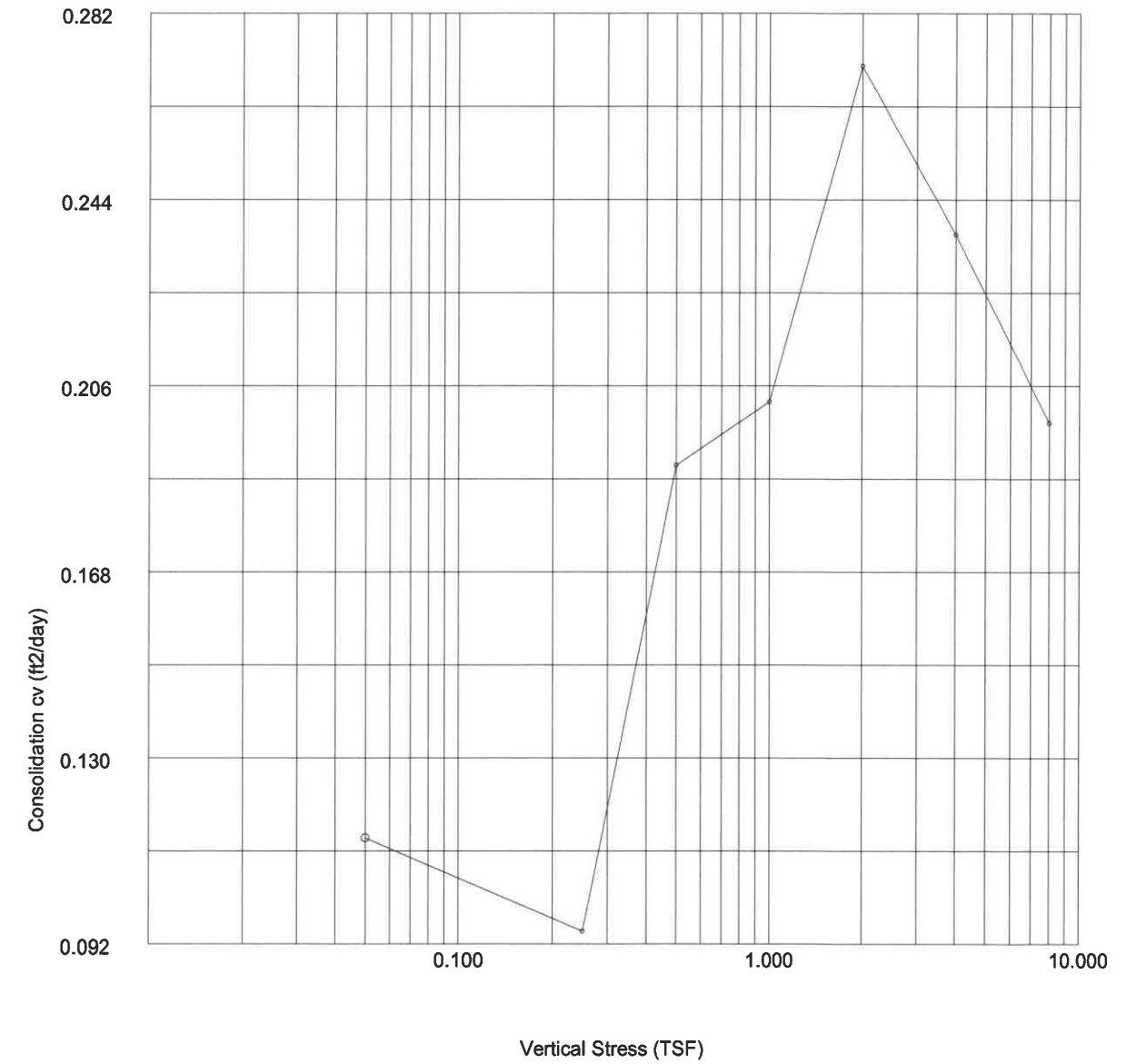
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			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:		MK	Checked:	MK
			Approved:	

Oedometer Settlement Tests



	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator: MK		Checked: MK		Approved:

Oedometer Settlement Tests




	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator: MK		Checked: MK		Approved:


Oedometer Settlement Tests

Stress (TSF)	Initial Temp. oC	Settlement Total (in)	Cal Corr. (in)	Final Temp. oC	Voids Ratio e_f	t_{50} (mins)	Secondary Compr C_{sec}	c_v (ft ² /day)	m_v (ft ² /ton)
0.050	20.0	0.0021	0.0	21.7	0.7285	4.315	0.0003	0.115	0.042
0.250	20.0	0.0094	0.0	21.7	0.7158	5.213	0.0005	0.095	0.037
0.500	20.0	0.0156	0.0	21.7	0.7051	2.564	0.001	0.190	0.025
1.000	20.0	0.0267	0.0	21.7	0.6858	2.358	0.0006	0.203	0.023
2.000	20.0	0.0403	0.0	21.7	0.6623	1.718	0.0009	0.271	0.014
4.000	20.0	0.0602	0.0	21.7	0.6278	1.900	0.0012	0.237	0.011
8.000	20.0	0.0872	0.0	21.7	0.5809	2.157	0.0126	0.198	0.007
2.000	20.0	0.0804	0.0	21.7	0.5927				0.001
0.500	20.0	0.0697	0.0	21.7	0.6113				0.008
0.050	20.0	0.0554	0.0	21.7	0.6361				0.034

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	0	0.0000	0.0000
2	0.017	2	0.0002	0.0002
3	0.033	2	0.0002	0.0002
4	0.050	3	0.0003	0.0003
5	0.067	3	0.0003	0.0003
6	0.083	3	0.0003	0.0003
7	0.100	3	0.0003	0.0003
8	0.200	4	0.0004	0.0004
9	0.400	5	0.0005	0.0005
10	0.800	6	0.0006	0.0006
11	1.000	6	0.0006	0.0006
12	2.000	8	0.0008	0.0008
13	4.000	11	0.0011	0.0011
14	8.000	14	0.0014	0.0014
15	10.000	15	0.0015	0.0015
16	20.000	18	0.0018	0.0018
17	40.000	20	0.0020	0.0020
18	80.000	21	0.0021	0.0021
19	86.183	21	0.0021	0.0021

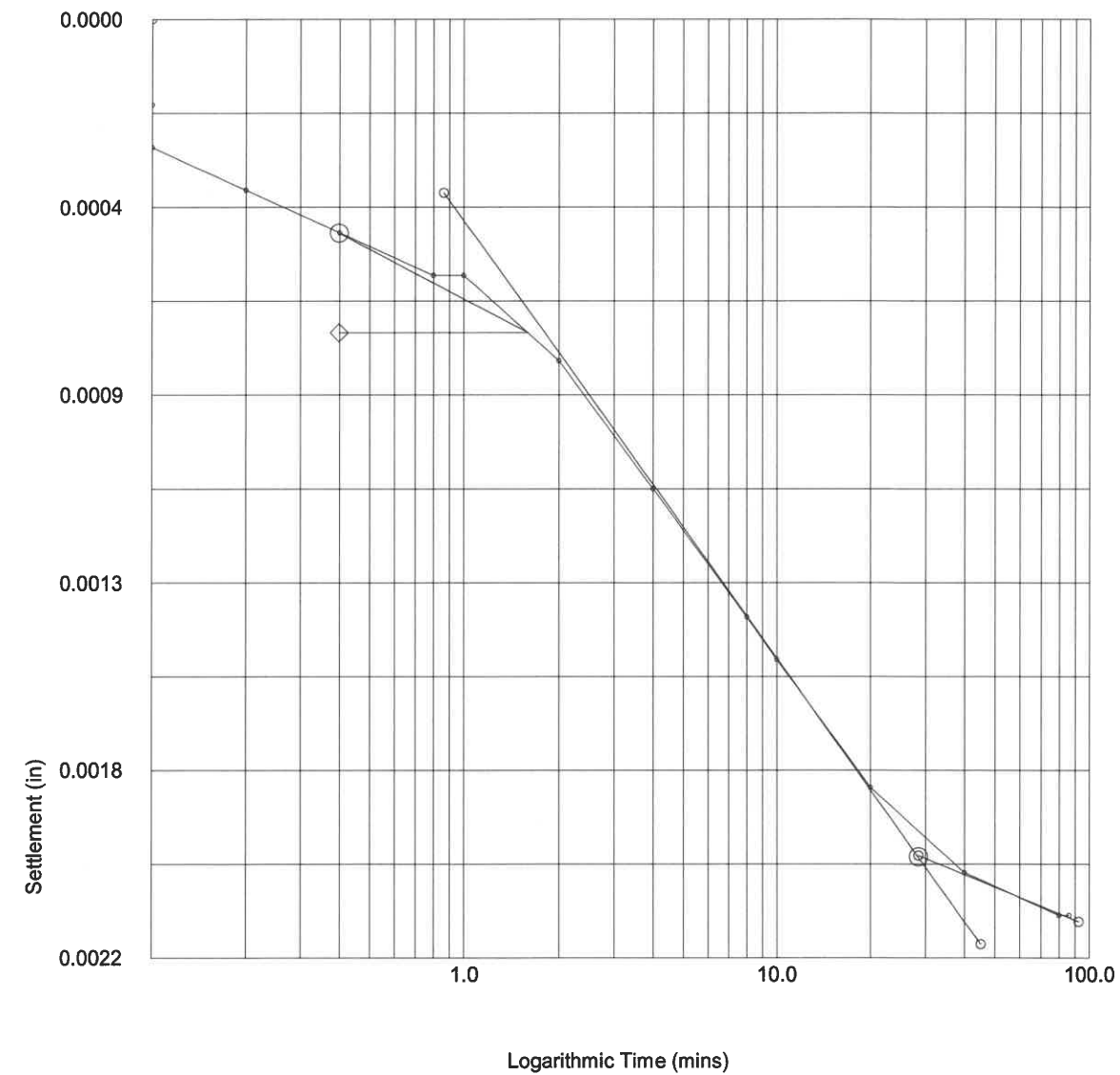
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test:	12-26-18
	Operator: MK	Sample: ST-3 Borehole: ST-3	Checked: MK

	ASTM D2435-96	Test name	Consolidation Load: 0.050 (TSF)
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test:	12-26-18
	Operator: MK	Sample: ST-3 Borehole: ST-3	Checked: MK

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0021
Voids Ratio e	0.7285
Final Temp oC	0.0
t ₅₀ (mins)	4.32
c _v (ft ² /day)	0.115
m _v (ft ² /ton)	0.042
Sec Compression C _{sec}	0.0003



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	21	0.0021	0.0021
2	0.017	26	0.0026	0.0026
3	0.033	30	0.0030	0.0030
4	0.050	31	0.0031	0.0031
5	0.067	32	0.0032	0.0032
6	0.083	33	0.0033	0.0033
7	0.100	33	0.0033	0.0033
8	0.200	36	0.0036	0.0036
9	0.400	38	0.0038	0.0038
10	0.800	41	0.0041	0.0041
11	1.000	42	0.0042	0.0042
12	2.000	47	0.0047	0.0047
13	4.000	55	0.0055	0.0055
14	8.000	65	0.0065	0.0065
15	10.000	68	0.0068	0.0068
16	20.000	78	0.0078	0.0078
17	40.000	84	0.0084	0.0084
18	80.000	87	0.0087	0.0087
19	100.000	88	0.0088	0.0088
20	200.000	90	0.0090	0.0090
21	400.000	91	0.0091	0.0091
22	800.000	93	0.0093	0.0093
23	1200.000	94	0.0094	0.0094
24	1393.500	94	0.0094	0.0094



ASTM D2435-96
 Site Reference: Br. Nos. 138 & 139
 Jobfile: E:\18-036.JOB
 Operator: MKC

Test name: Consolidation
 Date of Test: 12-26-18
 Sample: ST-3
 Borehole: ST-3
 Checked: MKC
 Approved:



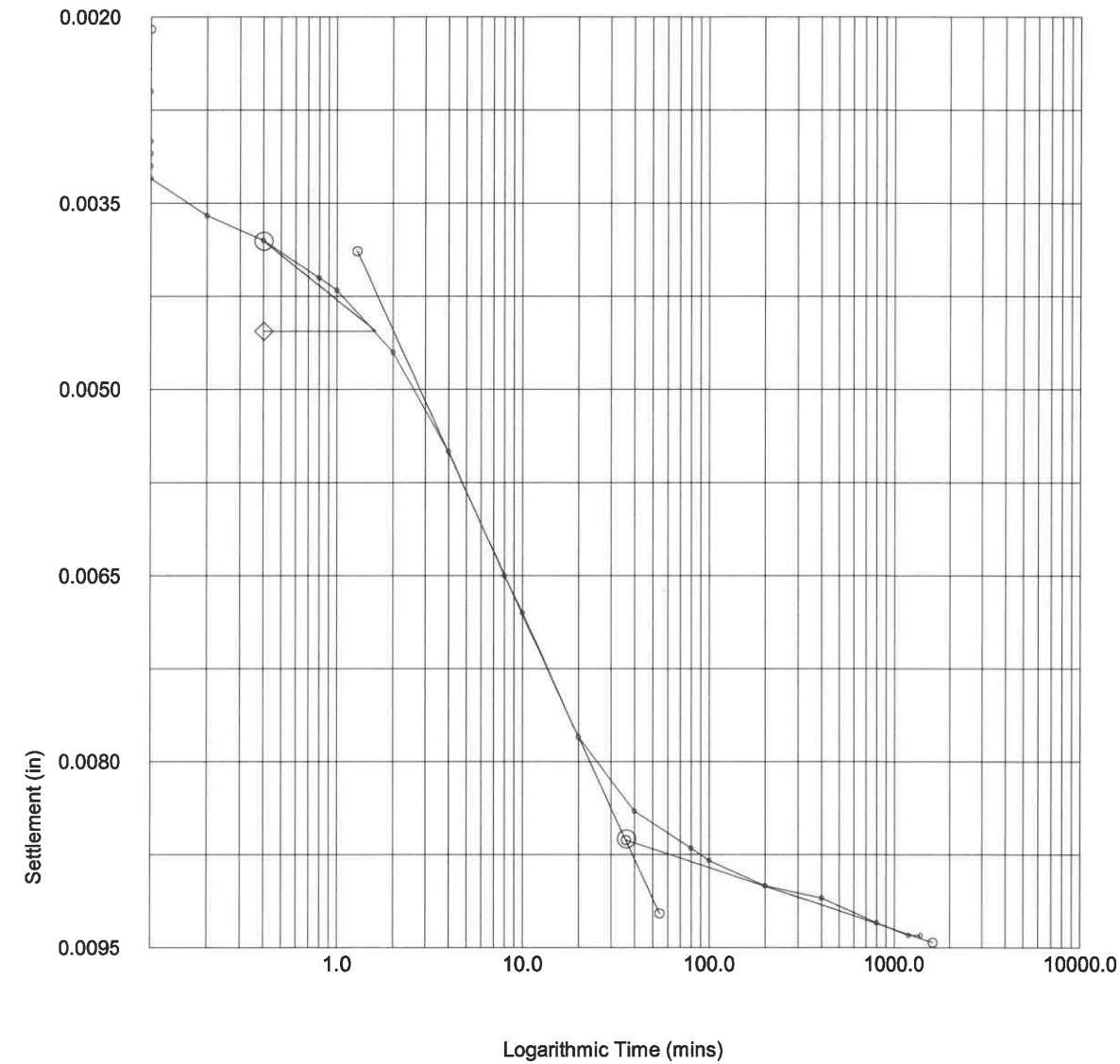
ASTM D2435-96
 Site Reference: Br. Nos. 138 & 139
 Jobfile: E:\18-036.JOB
 Operator: MKC

Test name: Consolidation Load: 0.250 (TSF)
 Date of Test: 12-26-18
 Sample: ST-3
 Borehole: ST-3
 Checked: MKC
 Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.250
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0073
Voids Ratio e	0.7158
Final Temp oC	0.0
t ₅₀ (mins)	5.21
c _v (ft ² /day)	0.095
m _v (ft ² /ton)	0.037
Sec Compression C _{sec}	0.0005



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	94	0.0094	0.0094
2	0.017	95	0.0095	0.0095
3	0.033	101	0.0101	0.0101
4	0.050	102	0.0102	0.0102
5	0.067	102	0.0102	0.0102
6	0.083	103	0.0103	0.0103
7	0.100	103	0.0103	0.0103
8	0.200	106	0.0106	0.0106
9	0.400	109	0.0109	0.0109
10	0.800	113	0.0113	0.0113
11	1.000	115	0.0115	0.0115
12	2.000	121	0.0121	0.0121
13	4.000	128	0.0128	0.0128
14	8.000	137	0.0137	0.0137
15	10.000	140	0.0140	0.0140
16	20.000	147	0.0147	0.0147
17	40.000	151	0.0151	0.0151
18	80.000	154	0.0154	0.0154
19	100.000	155	0.0155	0.0155
20	122.450	156	0.0156	0.0156

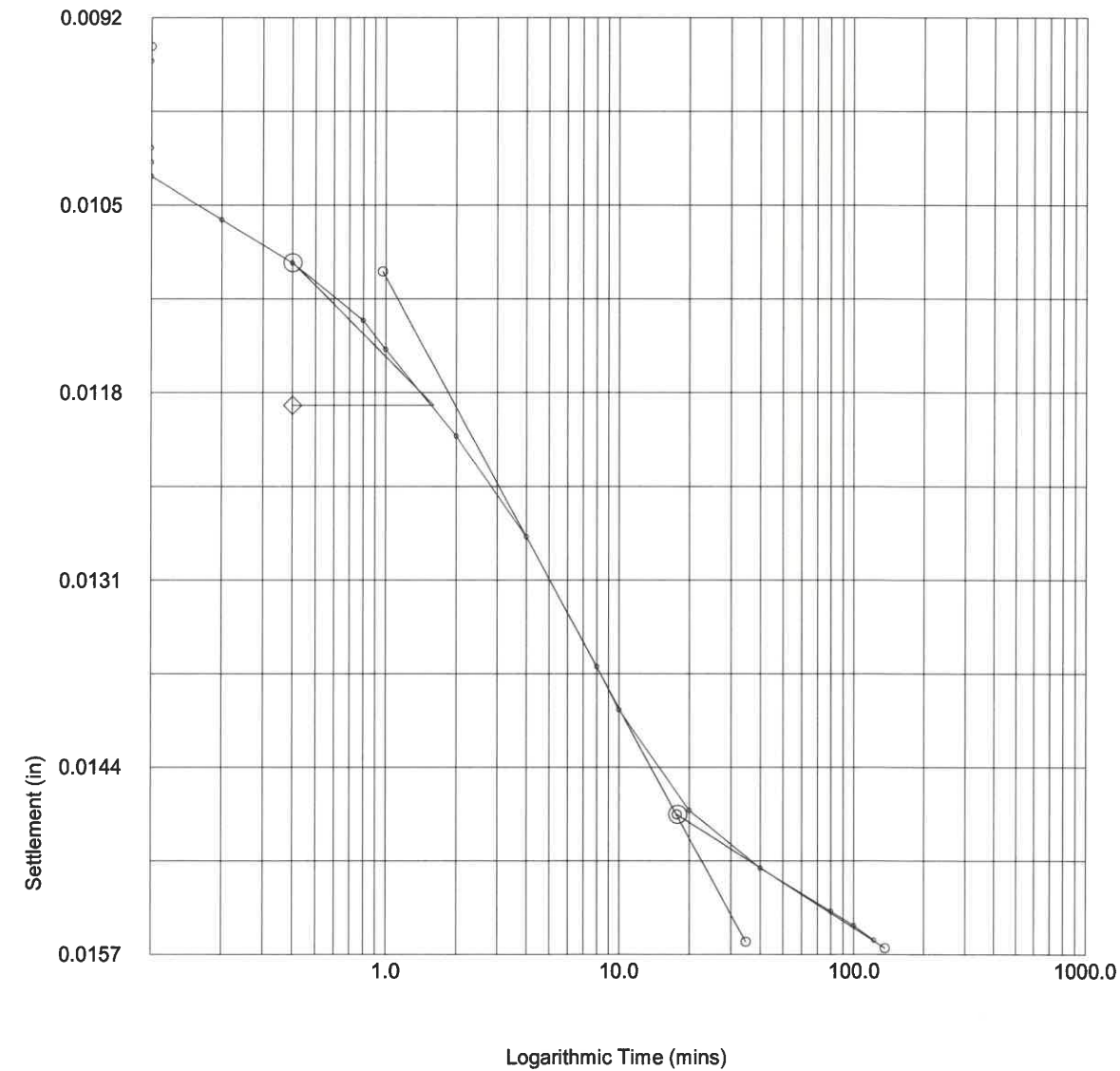
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		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>ME</i>	Checked: <i>ME</i>	Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 0.500 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>ME</i>	Checked: <i>ME</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0062
Voids Ratio e	0.7051
Final Temp oC	0.0
t ₅₀ (mins)	2.56
c _v (ft ² /day)	0.19
m _v (ft ² /ton)	0.025
Sec Compression C _{sec}	0.001



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	<i>MJC</i>	Checked:	<i>MJC</i>
		Approved:	

Oedometer Settlement Tests

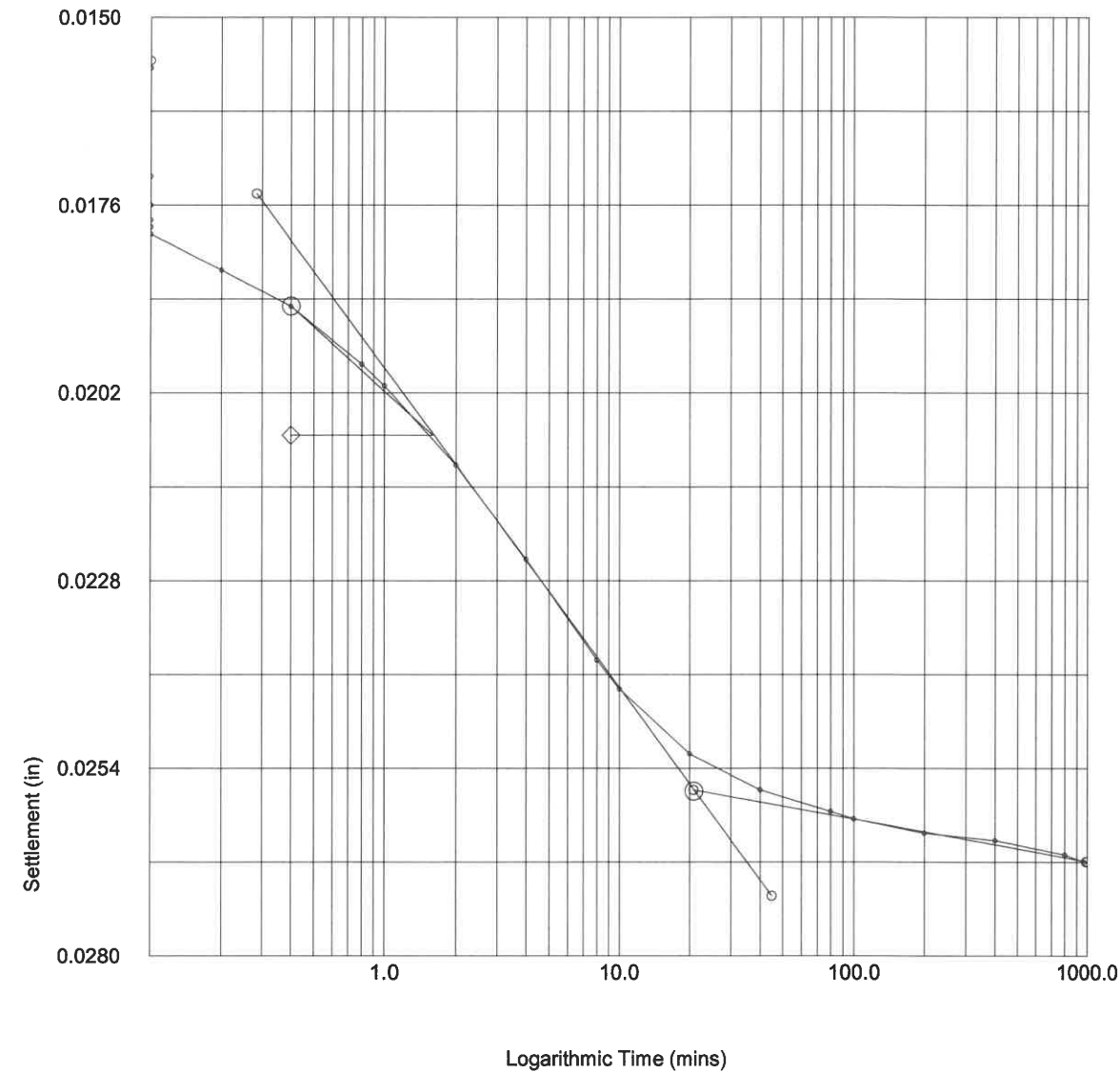
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	156	0.0156	0.0156
2	0.017	157	0.0157	0.0157
3	0.033	172	0.0172	0.0172
4	0.050	176	0.0176	0.0176
5	0.067	178	0.0178	0.0178
6	0.083	179	0.0179	0.0179
7	0.100	180	0.0180	0.0180
8	0.200	185	0.0185	0.0185
9	0.400	190	0.0190	0.0190
10	0.800	198	0.0198	0.0198
11	1.000	201	0.0201	0.0201
12	2.000	212	0.0212	0.0212
13	4.000	225	0.0225	0.0225
14	8.000	239	0.0239	0.0239
15	10.000	243	0.0243	0.0243
16	20.000	252	0.0252	0.0252
17	40.000	257	0.0257	0.0257
18	80.000	260	0.0260	0.0260
19	100.000	261	0.0261	0.0261
20	200.000	263	0.0263	0.0263
21	400.000	264	0.0264	0.0264
22	800.000	266	0.0266	0.0266
23	970.000	267	0.0267	0.0267

	ASTM D2435-96	Test name	Consolidation Load: 1.000 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	<i>MJC</i>	Checked:	<i>MJC</i>
		Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	1.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0111
Voids Ratio e	0.6858
Final Temp oC	0.0
t ₅₀ (mins)	2.36
c _v (ft ² /day)	0.203
m _v (ft ² /ton)	0.023
Sec Compression C _{sec}	0.0006



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	267	0.0267	0.0267
2	0.017	276	0.0276	0.0276
3	0.033	289	0.0289	0.0289
4	0.050	295	0.0295	0.0295
5	0.067	296	0.0296	0.0296
6	0.083	298	0.0298	0.0298
7	0.100	300	0.0300	0.0300
8	0.200	306	0.0306	0.0306
9	0.400	315	0.0315	0.0315
10	0.800	326	0.0326	0.0326
11	1.000	330	0.0330	0.0330
12	2.000	345	0.0345	0.0345
13	4.000	362	0.0362	0.0362
14	8.000	379	0.0379	0.0379
15	10.000	383	0.0383	0.0383
16	20.000	392	0.0392	0.0392
17	40.000	397	0.0397	0.0397
18	80.000	400	0.0400	0.0400
19	100.000	401	0.0401	0.0401
20	168.817	403	0.0403	0.0403

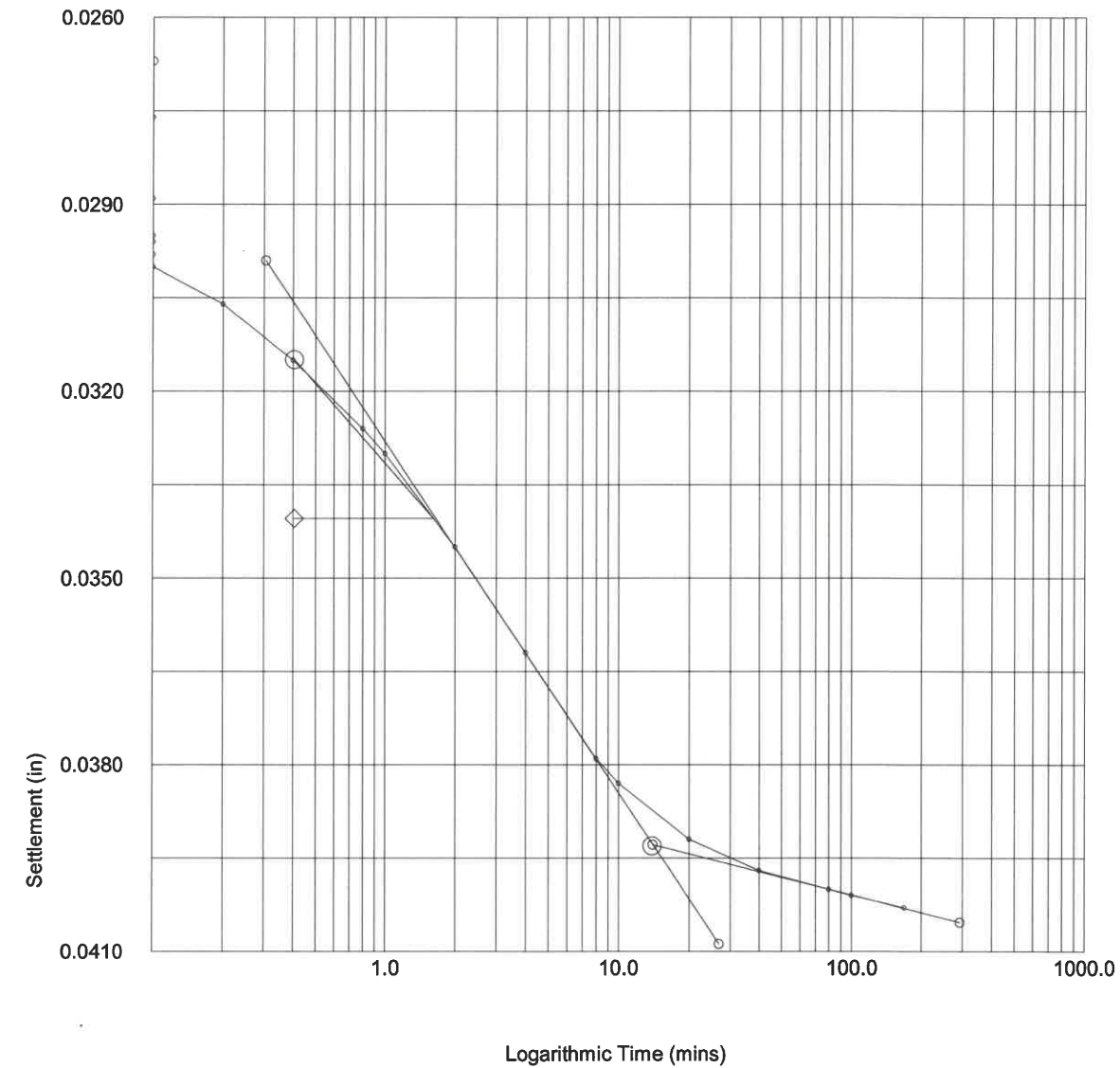
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test:	12-26-18
	Operator: <i>MK</i>	Sample:	ST-3
	Checked: <i>MK</i>	Borehole:	ST-3
		Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 2.000 (TSF)
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test:	12-26-18
	Operator: <i>MK</i>	Sample:	ST-3
	Checked: <i>MK</i>	Borehole:	ST-3
		Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0136
Voids Ratio e	0.6623
Final Temp oC	0.0
t ₅₀ (mins)	1.72
c _v (ft ² /day)	0.271
m _v (ft ² /ton)	0.014
Sec Compression C _{sec}	0.0009



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	403	0.0403	0.0403
2	0.017	404	0.0404	0.0404
3	0.033	404	0.0404	0.0404
4	0.050	433	0.0433	0.0433
5	0.067	438	0.0438	0.0438
6	0.083	444	0.0444	0.0444
7	0.100	446	0.0446	0.0446
8	0.200	457	0.0457	0.0457
9	0.400	470	0.0470	0.0470
10	0.800	486	0.0486	0.0486
11	1.000	492	0.0492	0.0492
12	2.000	513	0.0513	0.0513
13	4.000	540	0.0540	0.0540
14	8.000	565	0.0565	0.0565
15	10.000	572	0.0572	0.0572
16	20.000	586	0.0586	0.0586
17	40.000	593	0.0593	0.0593
18	80.000	597	0.0597	0.0597
19	100.000	598	0.0598	0.0598
20	200.000	601	0.0601	0.0601
21	207.150	602	0.0602	0.0602

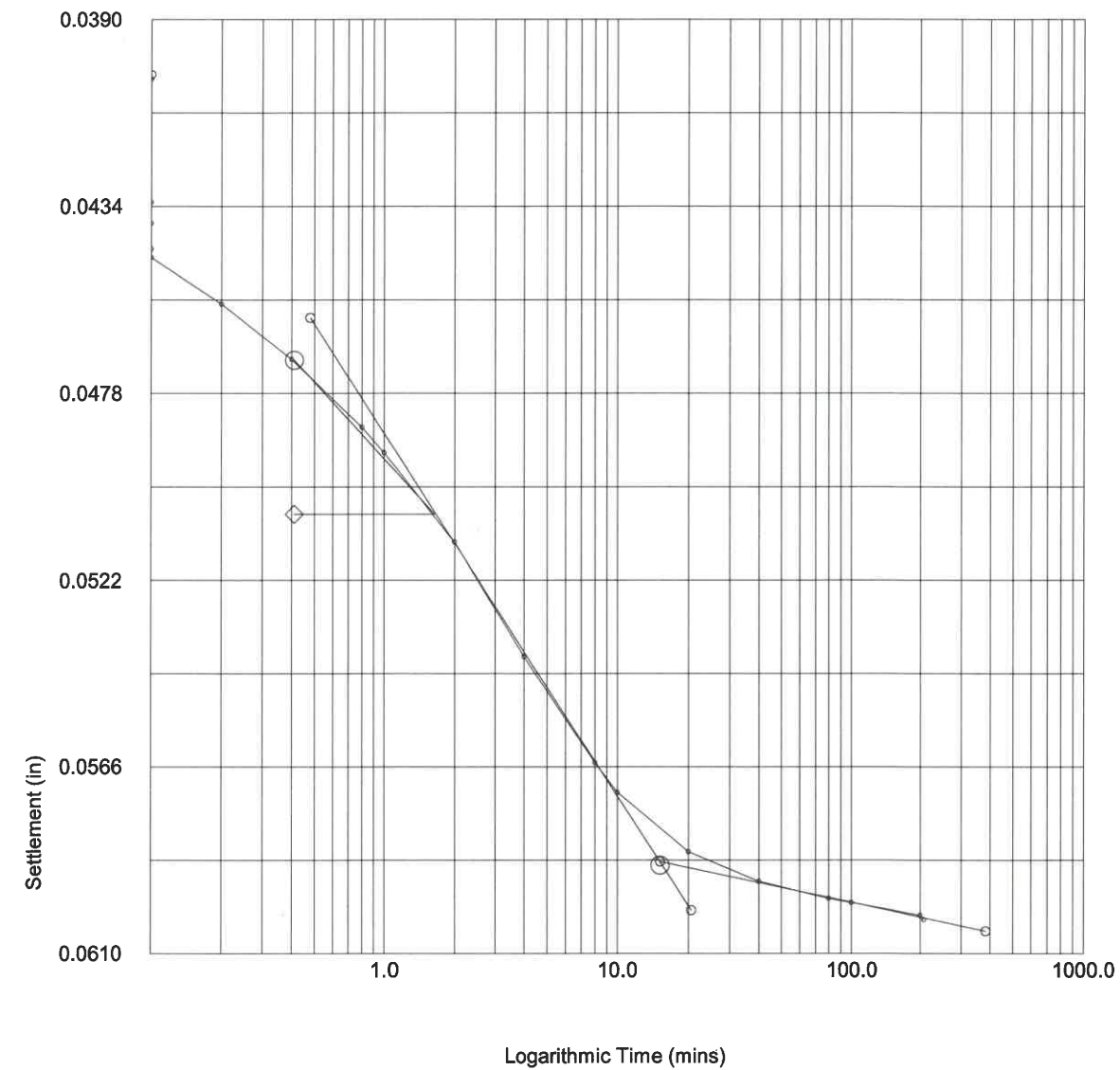
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		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MLK</i>	Checked: <i>MLK</i>	Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 4.000 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MLK</i>	Checked: <i>MLK</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	4.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0199
Voids Ratio e	0.6278
Final Temp oC	0.0
t ₅₀ (mins)	1.90
c _v (ft ² /day)	0.237
m _v (ft ² /ton)	0.011
Sec Compression C _{sec}	0.0012



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	602	0.0602	0.0602
2	0.017	605	0.0605	0.0605
3	0.033	605	0.0605	0.0605
4	0.050	635	0.0635	0.0635
5	0.067	639	0.0639	0.0639
6	0.083	645	0.0645	0.0645
7	0.100	647	0.0647	0.0647
8	0.200	660	0.0660	0.0660
9	0.400	677	0.0677	0.0677
10	0.800	698	0.0698	0.0698
11	1.000	706	0.0706	0.0706
12	2.000	736	0.0736	0.0736
13	4.000	774	0.0774	0.0774
14	8.000	812	0.0812	0.0812
15	10.000	822	0.0822	0.0822
16	20.000	843	0.0843	0.0843
17	40.000	853	0.0853	0.0853
18	80.000	858	0.0858	0.0858
19	100.000	860	0.0860	0.0860
20	200.000	863	0.0863	0.0863
21	400.000	866	0.0866	0.0866
22	800.000	870	0.0870	0.0870
23	1200.000	871	0.0871	0.0871
24	1348.933	872	0.0872	0.0872

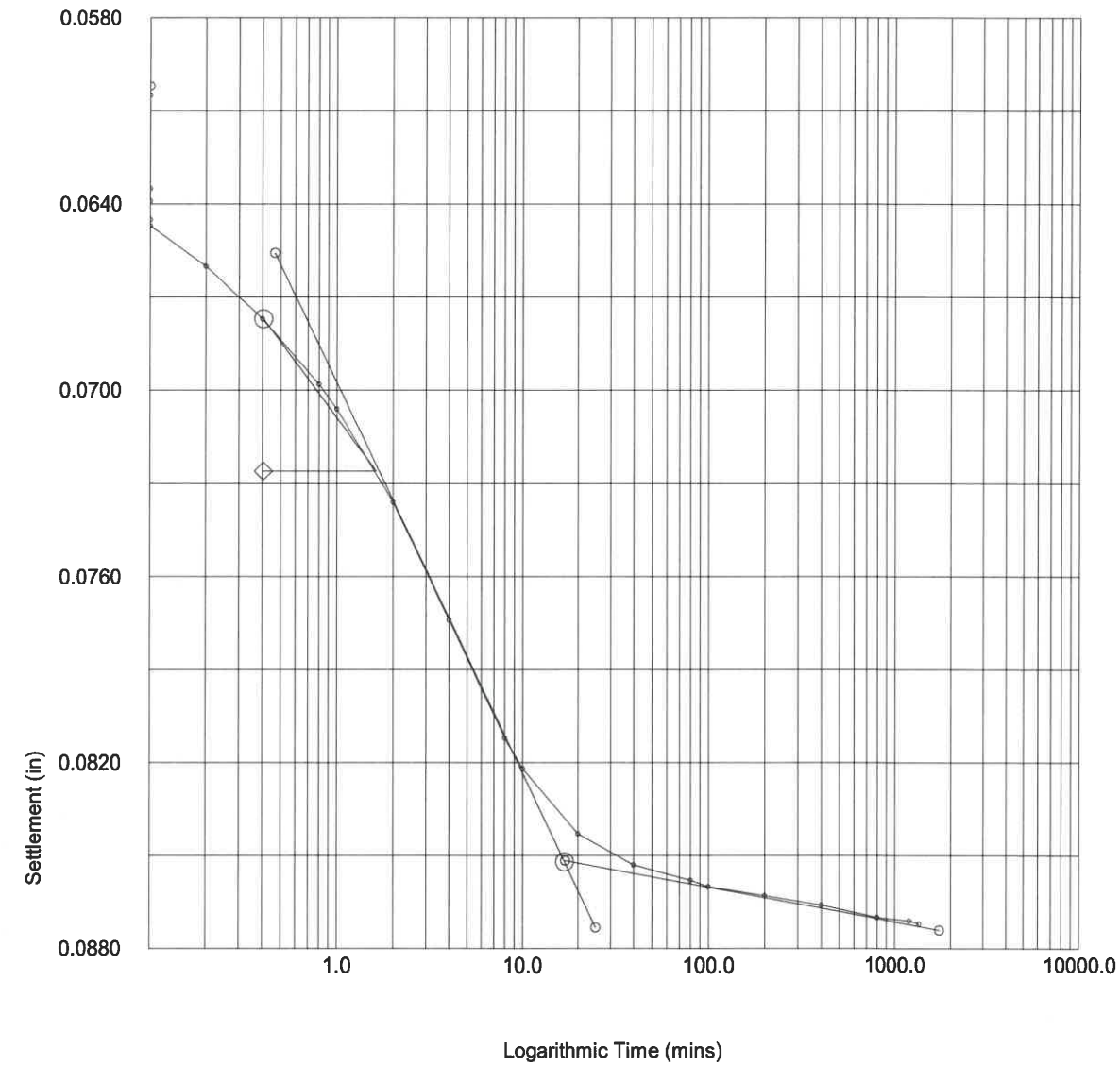
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	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	MIC	Checked:	MIC
		Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 8.000 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	MIC	Checked:	MIC
		Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	8.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.027
Voids Ratio e	0.5809
Final Temp oC	0.0
t ₅₀ (mins)	2.16
c _v (ft ² /day)	0.198
m _v (ft ² /ton)	0.007
Sec Compression C _{sec}	0.0126



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	872	0.0872	0.0872
2	0.017	867	0.0867	0.0867
3	0.033	861	0.0861	0.0861
4	0.050	860	0.0860	0.0860
5	0.067	859	0.0859	0.0859
6	0.083	847	0.0847	0.0847
7	0.100	846	0.0846	0.0846
8	0.200	841	0.0841	0.0841
9	0.400	837	0.0837	0.0837
10	0.800	832	0.0832	0.0832
11	1.000	830	0.0830	0.0830
12	2.000	825	0.0825	0.0825
13	4.000	820	0.0820	0.0820
14	8.000	814	0.0814	0.0814
15	10.000	813	0.0813	0.0813
16	20.000	811	0.0811	0.0811
17	40.000	809	0.0809	0.0809
18	80.000	807	0.0807	0.0807
19	100.000	807	0.0807	0.0807
20	200.000	806	0.0806	0.0806
21	400.000	805	0.0805	0.0805
22	800.000	804	0.0804	0.0804
23	1153.783	804	0.0804	0.0804

	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MUC</i>	Checked: <i>MUC</i>	Approved:	

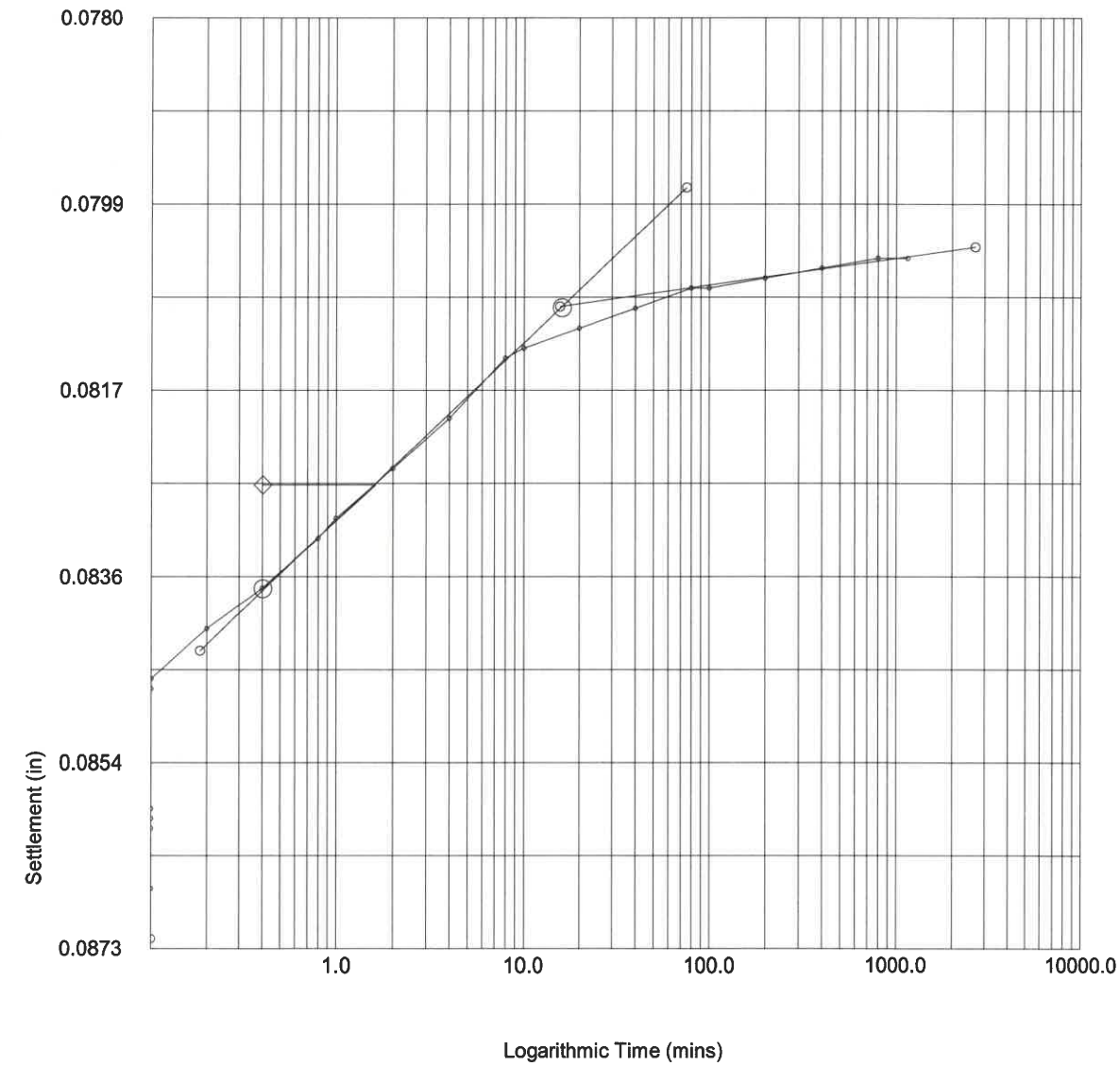
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		Date of Test:	12-26-18
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		Borehole:	ST-3
Operator: <i>MUC</i>	Checked: <i>MUC</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF) 2.000
 Initial Temp oC 20.0
 Correction (in) 0.0
 Settlement (in) 0.0068
 Voids Ratio e 0.5927

Final Temp oC
 t_{50} (mins)
 c_v (ft²/day)
 m_v (ft²/ton)
 Sec Compression C_{sec}



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	804	0.0804	0.0804
2	0.017	802	0.0802	0.0802
3	0.033	802	0.0802	0.0802
4	0.050	802	0.0802	0.0802
5	0.067	795	0.0795	0.0795
6	0.083	790	0.0790	0.0790
7	0.100	790	0.0790	0.0790
8	0.200	786	0.0786	0.0786
9	0.400	782	0.0782	0.0782
10	0.800	777	0.0777	0.0777
11	1.000	775	0.0775	0.0775
12	2.000	767	0.0767	0.0767
13	4.000	757	0.0757	0.0757
14	8.000	744	0.0744	0.0744
15	10.000	740	0.0740	0.0740
16	20.000	726	0.0726	0.0726
17	40.000	715	0.0715	0.0715
18	80.000	708	0.0708	0.0708
19	100.000	707	0.0707	0.0707
20	200.000	702	0.0702	0.0702
21	400.000	699	0.0699	0.0699
22	498.117	697	0.0697	0.0697

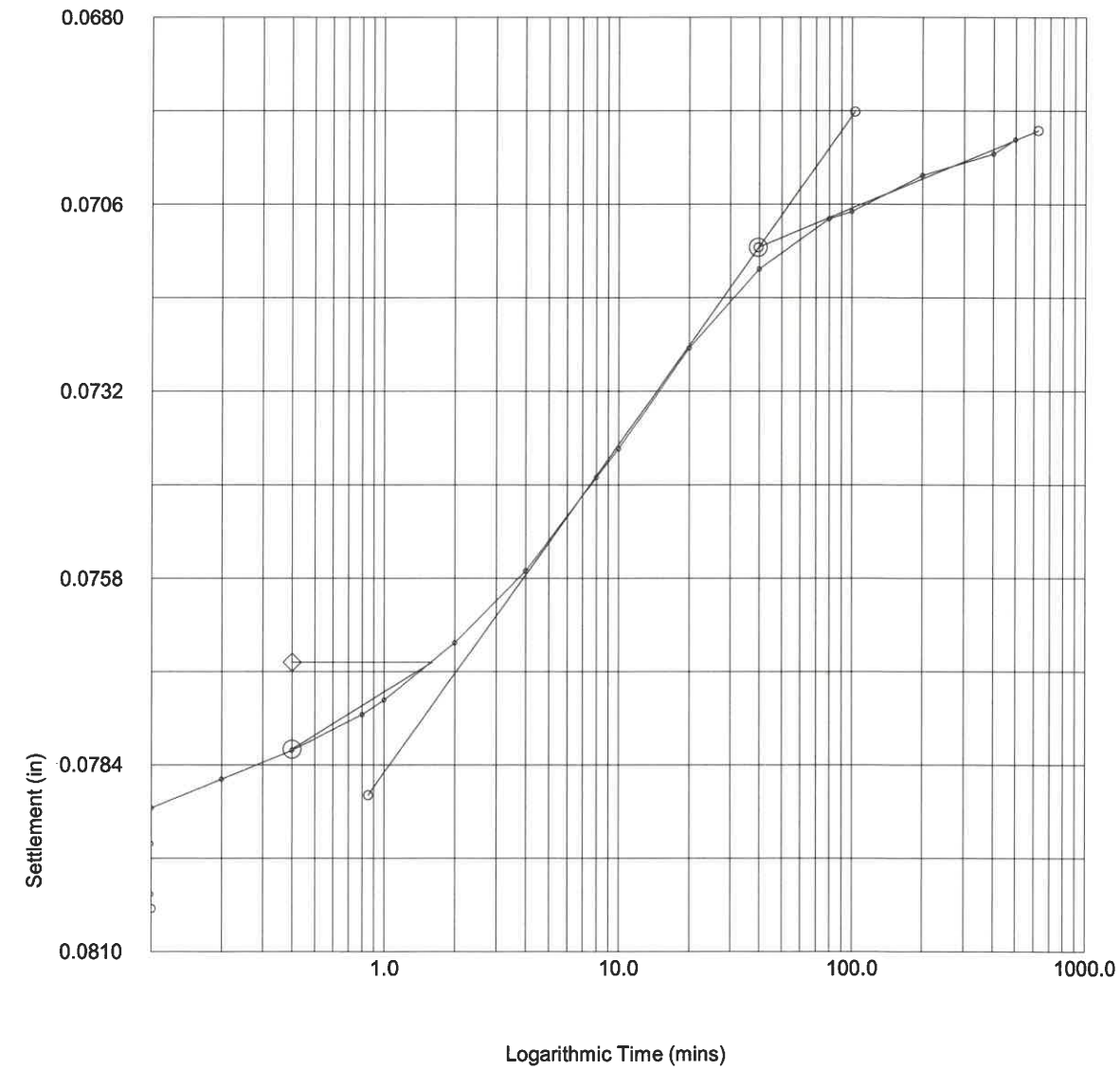
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test: 12-26-18
	Operator: <i>MLC</i>	Sample: ST-3 Borehole: ST-3
	Checked: <i>MLC</i>	Approved:

	ASTM D2435-96	Test name: Consolidation Load: 0.500 (TSF)
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test: 12-26-18
	Operator: <i>MLC</i>	Sample: ST-3 Borehole: ST-3
	Checked: <i>MLC</i>	Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0107
Voids Ratio e	0.6113
Final Temp oC	
t ₅₀ (mins)	
c _v (ft ² /day)	
m _v (ft ² /ton)	
Sec Compression C _{sec}	



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MJC</i>	Checked: <i>MJC</i>	Approved:	

Oedometer Settlement Tests

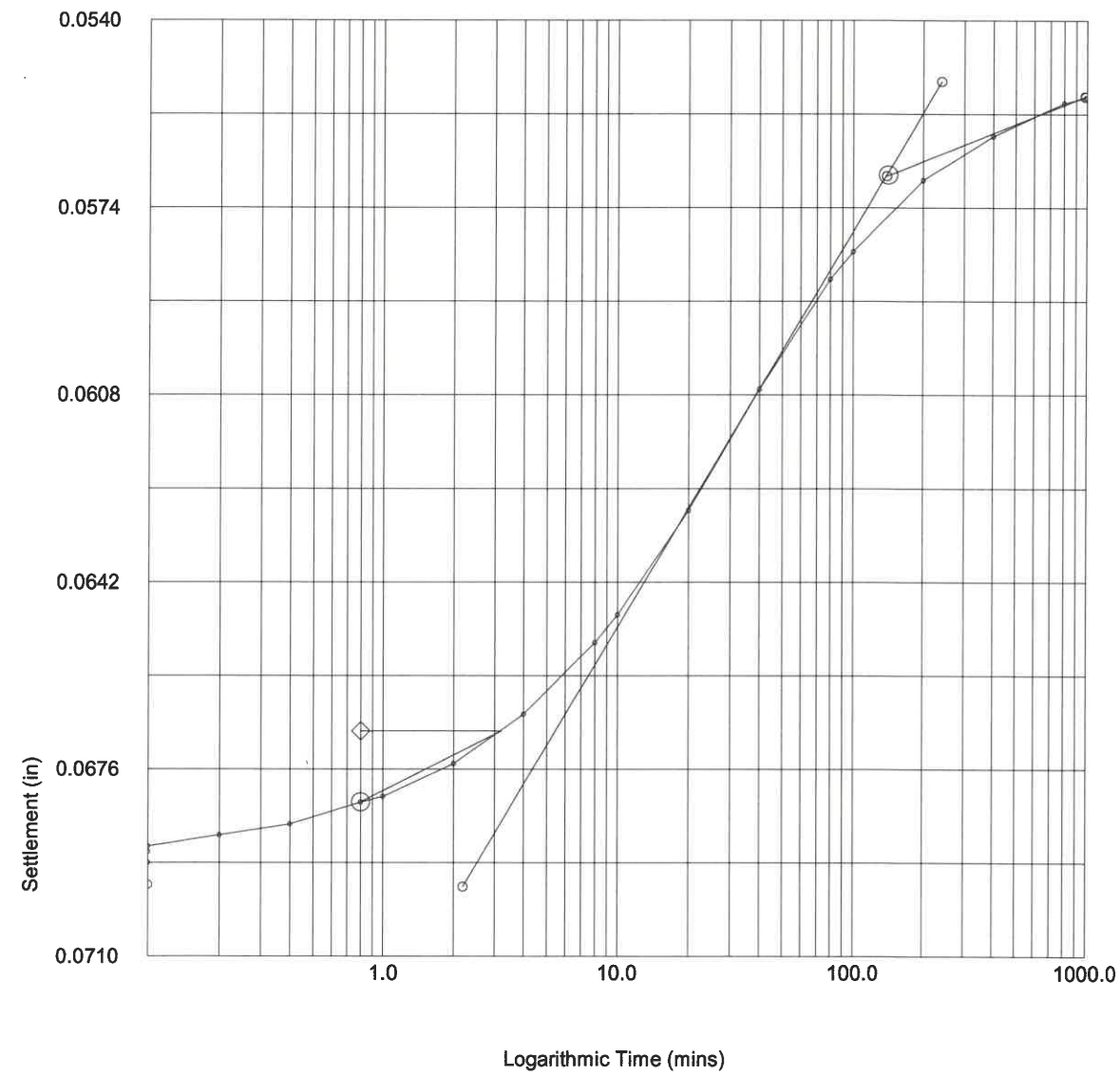
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	697	0.0697	0.0697
2	0.017	693	0.0693	0.0693
3	0.033	693	0.0693	0.0693
4	0.050	691	0.0691	0.0691
5	0.067	691	0.0691	0.0691
6	0.083	690	0.0690	0.0690
7	0.100	690	0.0690	0.0690
8	0.200	688	0.0688	0.0688
9	0.400	686	0.0686	0.0686
10	0.800	682	0.0682	0.0682
11	1.000	681	0.0681	0.0681
12	2.000	675	0.0675	0.0675
13	4.000	666	0.0666	0.0666
14	8.000	653	0.0653	0.0653
15	10.000	648	0.0648	0.0648
16	20.000	629	0.0629	0.0629
17	40.000	607	0.0607	0.0607
18	80.000	587	0.0587	0.0587
19	100.000	582	0.0582	0.0582
20	200.000	569	0.0569	0.0569
21	400.000	561	0.0561	0.0561
22	800.000	555	0.0555	0.0555
23	990.533	554	0.0554	0.0554

	ASTM D2435-96	Test name	Consolidation Load: 0.050 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MJC</i>	Checked: <i>MJC</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0143
Voids Ratio e	0.6361
Final Temp oC	
t ₅₀ (mins)	
c _v (ft ² /day)	
m _v (ft ² /ton)	
Sec Compression C _{sec}	



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MJC</i>	Checked: <i>MJC</i>	Approved:	