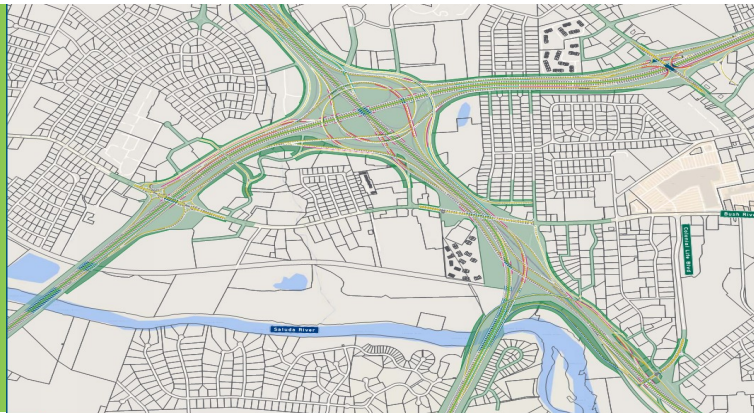


REVISION 2

GEOTECHNICAL SUBSURFACE DATA REPORT

Carolina Crossroads - Phase 1

Richland & Lexington County, South Carolina



PREPARED FOR

HDR, Inc.
1122 Lady Street, Suite 1100
Columbia, South Carolina 29201



PREPARED BY

F&ME Consultants, Inc.
1825 Blanding Street
Columbia, South Carolina 29201

SCDOT Project ID: P039718
F&ME Project #: G5662.01

OCTOBER 22, 2020

October 22, 2020

Ms. Erin Slayton, P.E.
HDR, Inc.
1122 Lady Street, Suite 1100
Columbia, South Carolina 29201

Re.: Geotechnical Subsurface Data Report - Revision 2
Carolina Crossroads – Phase 1
Richland & Lexington County, South Carolina
SCDOT Project ID: P039718
F&ME File No: G5662.01

Ms. Slayton:

Submitted herein is the second revision to the Geotechnical Subsurface Data Report (GSDR) for the Phase 1 portion of the Carolina Crossroads project. Revisions to our previously submitted report, dated July 28, 2020, include adding CPT-B34 and DMT-B34 testing logs and raw data. This report includes field test data and laboratory test results from geotechnical investigations performed by F&ME and S&ME in 2018. Only data associated with the Phase 1 portion of the project is provided. GSDR's for Phase 2 and Phase 3 are forthcoming.

Please notify us if there are any questions.

Respectfully Submitted,

F&ME CONSULTANTS



John F. Hamilton, P.E.
Geotechnical Design Manager



Attachments



Carolina Crossroads – Phase 1

Geotechnical Subsurface Data Report

APPENDIX

SECTION 1	SITE LOCATION PLANS
SECTION 2	GEOTECHNICAL INVESTIGATION SUMMARY
SECTION 3	BORING LOCATION PLANS
SECTION 4	FIELD TESTING LOGS
SECTION 5	LABORATORY TEST RESULTS
SECTION 6	GEOPHYSICAL TEST RESULTS
SECTION 7	ROCK CORE PHOTOS
SECTION 8	EXISTING PAVED SHOULDER DATA

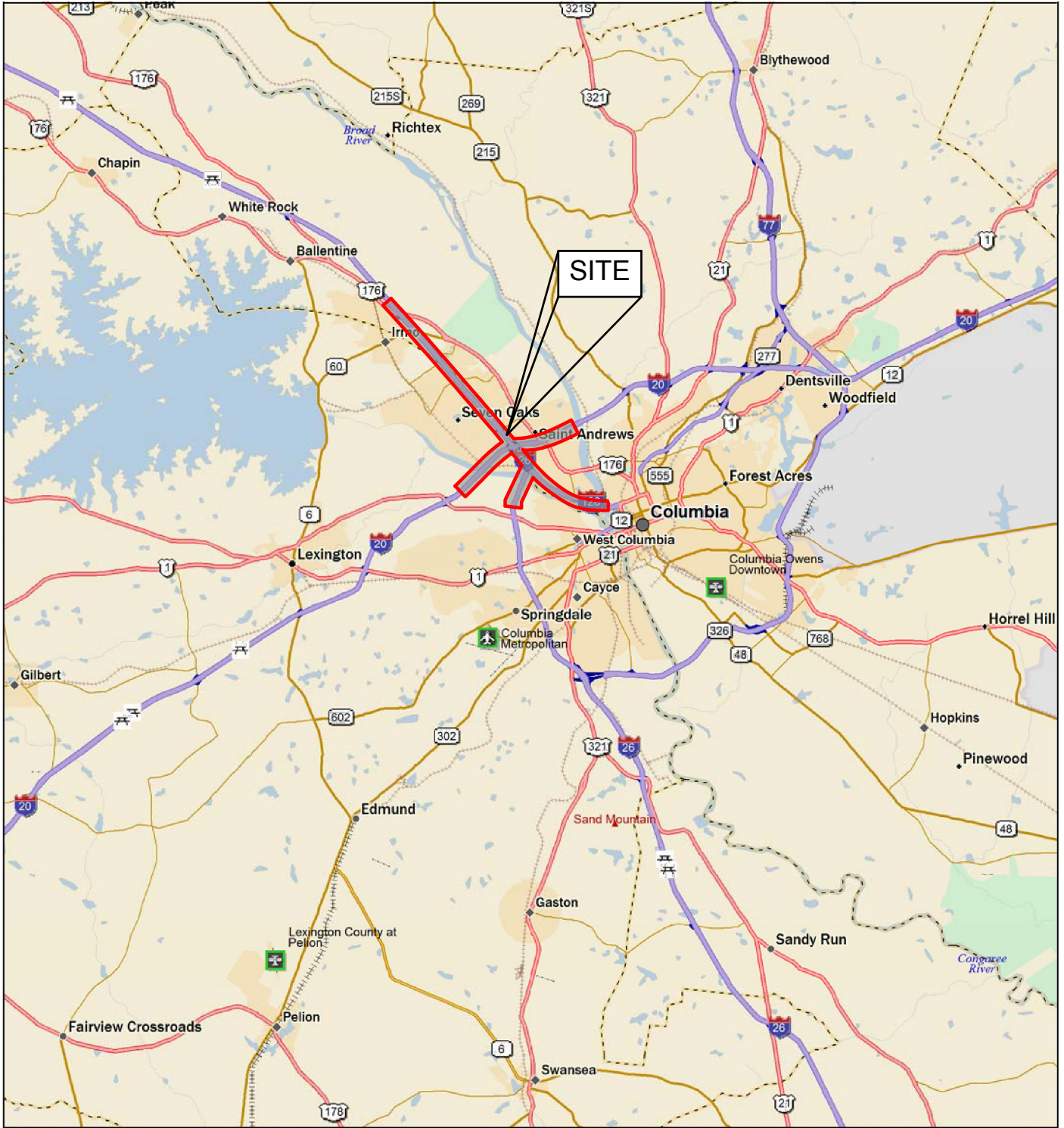
Carolina Crossroads – Phase 1

Geotechnical Subsurface Data Report

APPENDIX

SECTION 1 SITE LOCATION PLANS

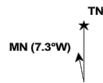
FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE No.	SHEET No.
3	SC	LEX/RICH		I-26/20/126	



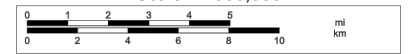
Data use subject to license.

© DeLorme. DeLorme Street Atlas USA© 2009.

www.delorme.com



Scale 1 : 300,000



1" = 4.73 mi

Data Zoom 9-4

F&ME
CONSULTANTS

GEOTECHNICAL – ENVIRONMENTAL – MATERIALS
COLUMBIA, SOUTH CAROLINA

CAROLINA CROSSROADS PHASE 2B
RICHLAND/LEXINGTON COUNTY, SOUTH CAROLINA

SITE LOCATION PLAN

SCALE: AS NOTED

FIGURE 1

4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	
TOPO.		DATE		
DWG.	CTC	DATE 7/20/2018	GROUP	-- --
R/W		DATE		

Carolina Crossroads – Phase 1

Geotechnical Subsurface Data Report

APPENDIX

SECTION 2 GEOTECHNICAL INVESTIGATION SUMMARY

	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
B-32	Bridge	I-126 C/D E	8382+97	19 R	798319	1968958	34.027484	-81.102468	194.7	85.7
B-33	Bridge	I-26	385+33	3 L	798082	1968924	34.026832	-81.102580	183.3	74.6
B-34	Bridge	I-26	389+21	14 L	797694	1968897	34.025765	-81.102667	196.8	74.6
B-35	Bridge	I-126 Ramp CA	7388+26	146 L	797943	1969288	34.026450	-81.101378	185.2	55.0
B-36	Bridge	I-126 Ramp CA	7387+14	11 L	798093	1969190	34.026863	-81.101700	216.5	77.2
B-36A	Bridge	I-126 Ramp CA	7387+06	9 L	798101	1969190	34.026884	-81.101700	217.2	78.6
B-37	Bridge	I-126 Ramp DB	6013+18	10 L	797642	1970075	34.025625	-81.098778	185.2	64.3
B-38	Bridge	Colonial Life Ramp A	3027+51	55 R	796497	1970910	34.022482	-81.096018	184.6	31.7
B-39	Bridge	I-26 Ramp C	5027+19	10 L	796309	1970609	34.021963	-81.097012	177.1	32.2
B-40	Bridge	Colonial Life	11+56	7 L	795908	1971184	34.020864	-81.095111	193.8	94.0
B-41	Bridge	Colonial Life	12+63	52 R	795928	1971304	34.020919	-81.094715	192.8	78.5
B-42	Bridge	Colonial Life	15+15	71 L	796181	1971424	34.021612	-81.094321	218.6	87.0
B-43	Bridge	I-26	395+13	35 R	797148	1968669	34.024263	-81.103418	181.0	73.0
B-44	Bridge	I-26	398+36	99 L	796798	1968667	34.023303	-81.103422	165.5	26.2
B-45	Bridge	I-26	401+11	76 L	796553	1968540	34.022629	-81.103841	183.3	47.0
B-46	Bridge	I-126 Ramp DB	5987+48	49 L	796524	1968194	34.022548	-81.104982	168.9	48.6
B-60	Bridge	I-26 Ramp C	5022+83	81 L	796684	1970397	34.022994	-81.097713	173.8	26.7
B-61	Bridge	I-26 Ramp C	5012+33	8 L	797478	1969704	34.025174	-81.100002	171.5	42.5
B-62	Bridge	I-126 Ramp DB	5996+62	83 L	797410	1968510	34.024985	-81.103943	167.2	45.7



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
W-22	Wall	I-26	407+19	77 L	795992	1968313	34.021085	-81.104590	185.9	79.1
W-23	Wall	I-126 Ramp DB	6022+73	53 L	796966	1970751	34.023770	-81.096544	185.6	28.6



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
RW-35	Embankment	I-26	375+95	182 L	799068	1968906	34.029541	-81.102643	210.8	49.3
RW-36	Embankment	I-126 Ramp CA	8389+86	0.3 R	797898	1969505	34.026327	-81.100660	188.5	30.1
RW-37	Embankment	I-126	45+98	85 R	794576	1972826	34.017205	-81.089689	191.1	32.3
RW-38	Embankment	I-126 Ramp DB	5985+51	74 L	796335	1968136	34.022027	-81.105175	169.5	16.6



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
DH-3	Downhole Seismic	I26RCA	5383+63	119 R	798494	1969146	34.027965	-81.101848	209.3	8.2
DH-3.1	Downhole Seismic	I26RCA	5383+53	113 R	798503	1969152	34.027991	-81.101829	208.7	120.7
DH-6	Downhole Seismic	I-26	438+20	100 R	793186	1966981	34.013371	-81.108977	241.1	120.6



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
P-37	Pavement	I-26	379+07	289 L	798778	1969120	34.028745	-81.101935	209.6	6.0
P-38	Pavement	I-126	5+99	47 R	797413	1970040	34.024996	-81.098892	184.0	10.8
P-39	Pavement	I-126	9+60	51 L	797185	1970337	34.024369	-81.097912	184.1	10.8
P-40	Pavement	I-126	19+02	46 R	796376	1970830	34.022148	-81.096282	186.3	10.9
P-41	Pavement	I-126	28+97	61 L	795664	1971526	34.020192	-81.093984	199.1	10.0
P-42	Pavement	I-126	38+95	46 R	794943	1972219	34.018214	-81.091694	212.0	10.8
P-43	Pavement	I-126	49+19	70 L	794574	1973182	34.017202	-81.088513	184.4	10.5



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
CPT-B41	Bridge	Colonial Life Pkwy.	12+59	55 R	795924	1971303	34.020907	81.094718	192.5	37.0
DMT-B41	Bridge	Colonial Life Pkwy.	12+29	50 R	795928	1971300	34.020917	81.094728	192.4	35.0



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
B-34UD	B-34	I-26	389+16	15 L	797699	1968899	34.02577797	-81.10266133	196.7	39.5
B-41UD	B-41	Colonial Life Blvd.	12+61	58 R	795923	1971307	34.02090368	-81.09470637	192.5	24.5
W-23UD	W-23	I-126 Ult. Flyover	6022+78	49 L	796960	1970751	34.02375235	-81.09654606	185.8	10.5



	Test Hole Locale	Alignment	Station	Offset from CL	Northing	Easting	Latitude	Longitude	Elevation	Depth
				<i>ft</i>	<i>ft</i>	<i>ft</i>			<i>ft-MSL</i>	<i>ft</i>
P-41BS	Ex. Embankment	I-126	28+97	61 L	795664	1971526	34.020192	-81.093984	199.1	10.0
P-42BS	Ex. Embankment	I-126	38+95	46 R	794943	1972219	34.018214	-81.091694	212.0	10.8
P-43BS	Ex. Embankment	I-126	49+19	70 L	794574	1973182	34.017202	-81.088513	184.4	10.5
RW-36BS	New Embankment	I-126 Ramp CA	8389+86	0.3 R	797898	1969505	34.026327	-81.100660	188.5	10.0
RW-37BS	Ex. Embankment	I-126	45+98	85 R	794576	1972826	34.017205	-81.089689	191.1	10.0

Carolina Crossroads – Phase 1

Geotechnical Subsurface Data Report

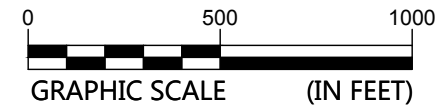
APPENDIX

SECTION 3 BORING LOCATION PLANS

T:\Projects\2016\GEO\1461-16-047_HDR_Carolina Crossroads Phase 2A_Columbia SC\CAD 1461-16-047 Carolina Crossroads\1461-16-047 Ph 2A_2B.dwg



- LEGEND**
- ◆ S&ME TEST LOCATIONS
 - ◆ F&ME TEST LOCATIONS

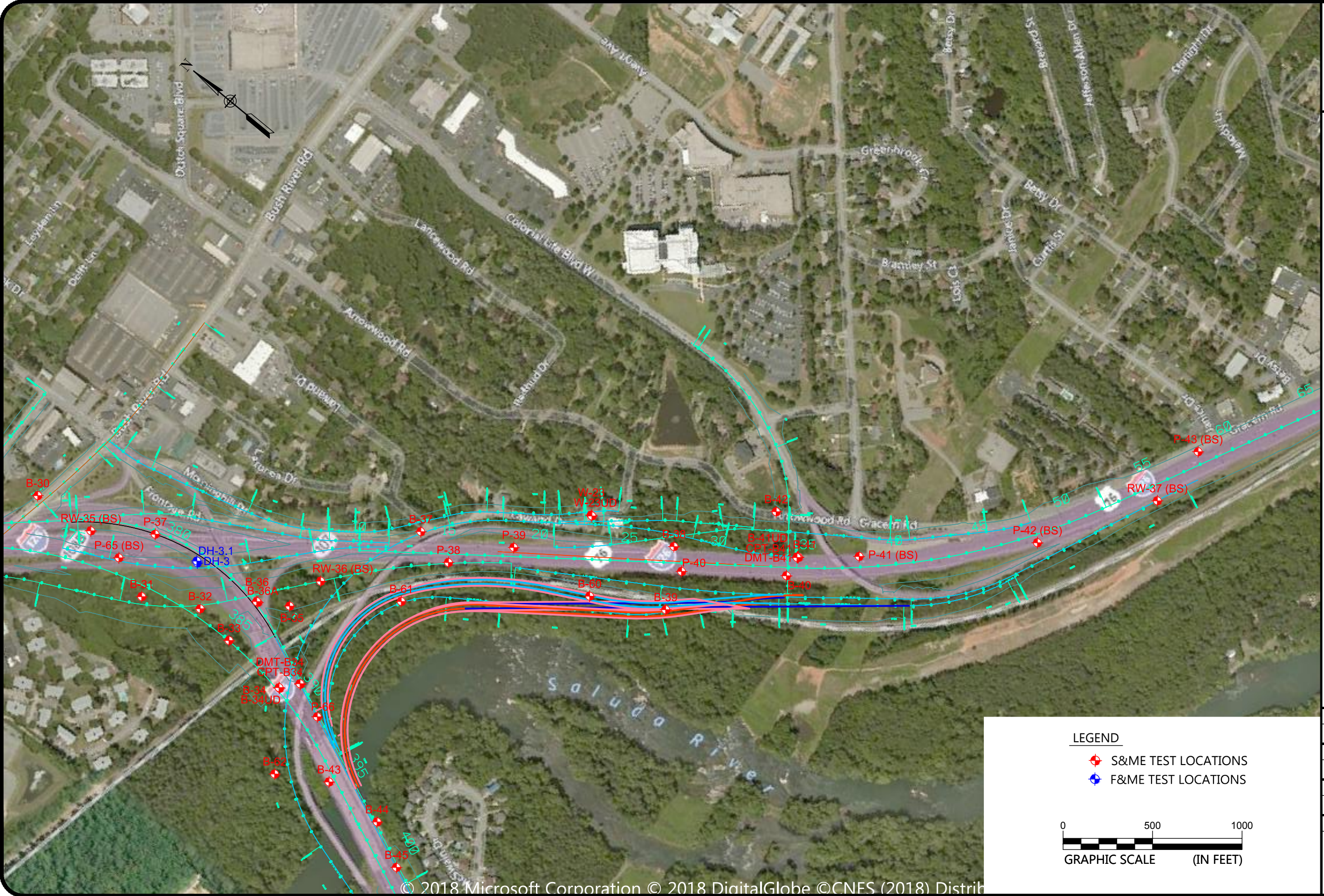


**TEST LOCATION PLAN
PHASE 2A & 2B**

I-26 STATION 405+00 TO STATION 465+00
I-20,26,126 CORRIDOR IMPROVEMENT PROJECT - PHASE 2A & 2B
COLUMBIA, SOUTH CAROLINA

SCALE: AS SHOWN
DATE: 8-03-2018
PROJECT NUMBER 1461-16-047
FIGURE NO.

T:\Projects\2018\GEO\1461-16-047_HDR_Columbia Crossroads Phase 2A_Columbia SC\CAD 1461-16-047 Carolina Crossroads\1461-16-047 Ph 2A_2B.dwg

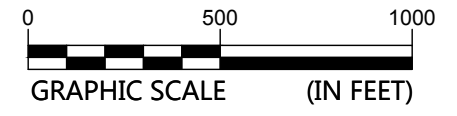


**TEST LOCATION PLAN
PHASE 2A & 2B**

I-126 STATION 0+00 TO STATION 65+00
I-20,26,126 CORRIDOR IMPROVEMENT PROJECT - PHASE 2A & 2B
COLUMBIA, SOUTH CAROLINA

SCALE:
AS SHOWN
DATE:
8-03-2018
PROJECT NUMBER
1461-16-047
FIGURE NO.

- LEGEND**
- ◆ S&ME TEST LOCATIONS
 - ◆ F&ME TEST LOCATIONS



Carolina Crossroads – Phase 1

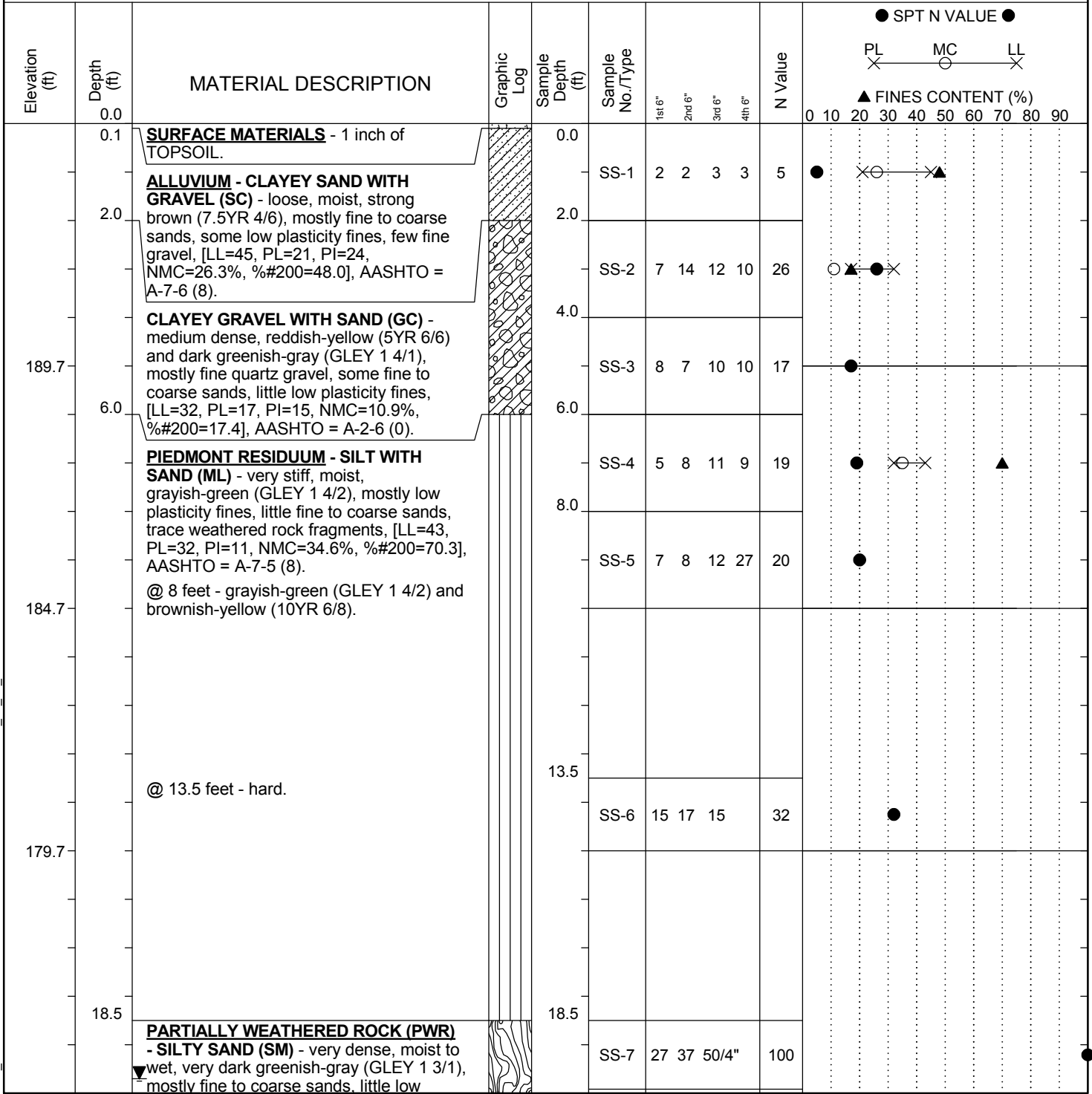
Geotechnical Subsurface Data Report

APPENDIX

SECTION 4 FIELD TESTING LOGS

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 27
Eng./Geo.: AKS	Boring Location: 8382+97.01	Offset: R:19.22'
Elev.: 194.7 ft	Latitude: 34.027484	Longitude: -81.102468
Total Depth: 85.7 ft	Soil Depth: 55.7 ft	Core Depth: 30 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A
		Energy Ratio: 86.5%
		24HR: 19.7 ft



LEGEND

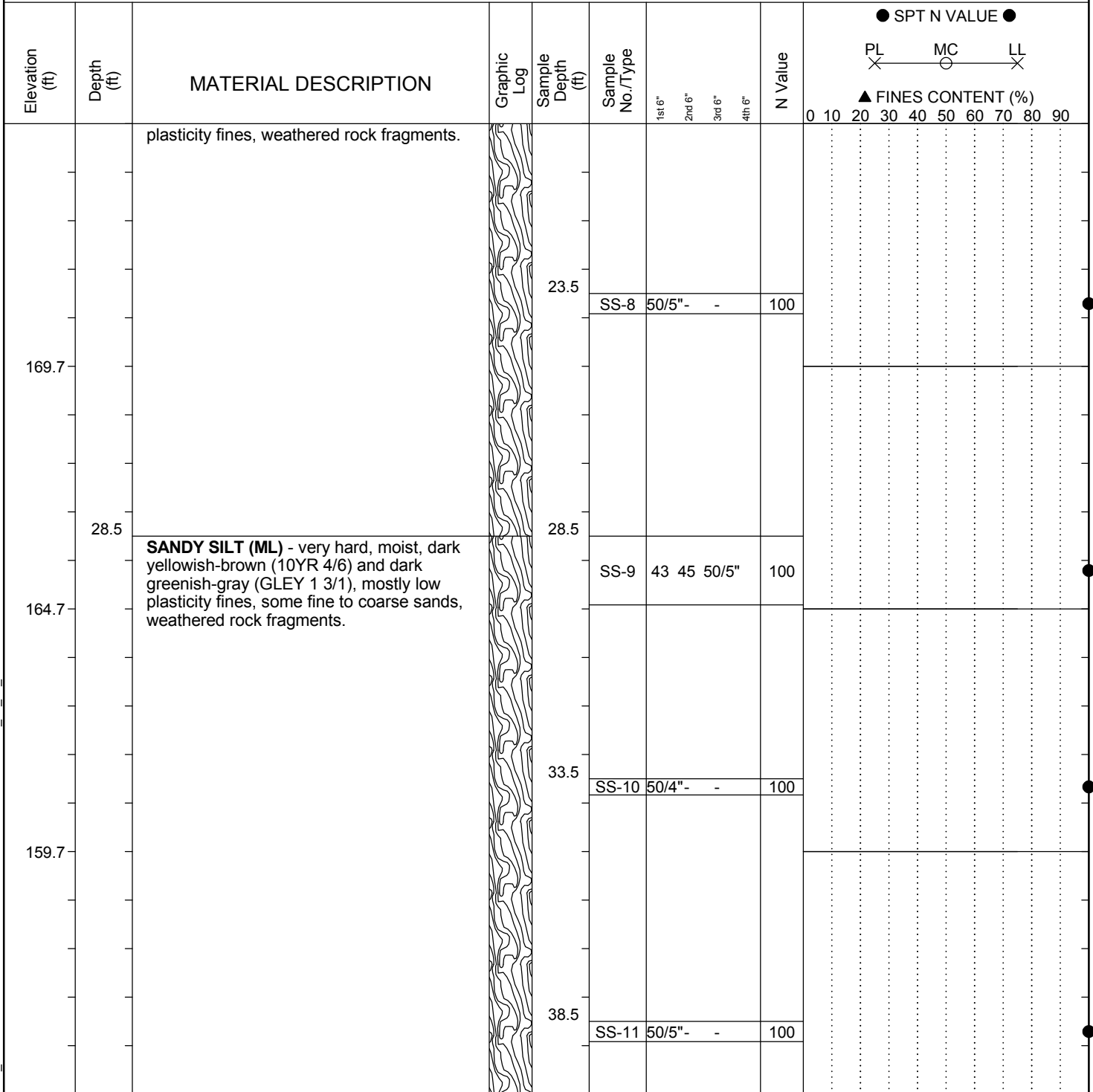
Continued Next Page

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 27	
Eng./Geo.: AKS	Boring Location: 8382+97.01		Offset: R:19.22'	Alignment: Proposed
Elev.: 194.7 ft	Latitude: 34.027484	Longitude: -81.102468	Date Started: 3/13/2018	
Total Depth: 85.7 ft	Soil Depth: 55.7 ft	Core Depth: 30 ft	Date Completed: 3/14/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A	24HR: 19.7 ft	



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 27
Eng./Geo.: AKS	Boring Location: 8382+97.01	Offset: R:19.22' Alignment: Proposed
Elev.: 194.7 ft	Latitude: 34.027484	Longitude: -81.102468 Date Started: 3/13/2018
Total Depth: 85.7 ft	Soil Depth: 55.7 ft	Core Depth: 30 ft Date Completed: 3/14/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A 24HR: 19.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0 10 20 30 40 50 60 70 80 90						
194.7	43.5	SILTY SAND (SM) - very dense, moist to wet, very dark greenish-gray (GLEY 1 3/2), mostly fine to coarse sands, little low plasticity fines, weathered rock fragments. @ 53.5 feet - no recovery. Tri-Cone Bit Refusal at 55.7 feet. Install NW Casing to 55.7 feet for NQ wireline coring. For discontinuity descriptors, see discontinuity worksheet. METAMORPHIC BEDROCK - SCHIST - gray (GLEY 1 4/), fine grained, foliated, moderately weathered, medium strong rock. @ 55.7 feet - 3-inch quartz epidote vein.		43.5	SS-12	50/3"-	-	-	-	100										
144.7	48.5			SS-13	50/5"-	-	-	-	-	100										
139.7	53.5			SS-14	50/1"-	-	-	-	-	100										
	55.7			55.7	RC-1															

LEGEND

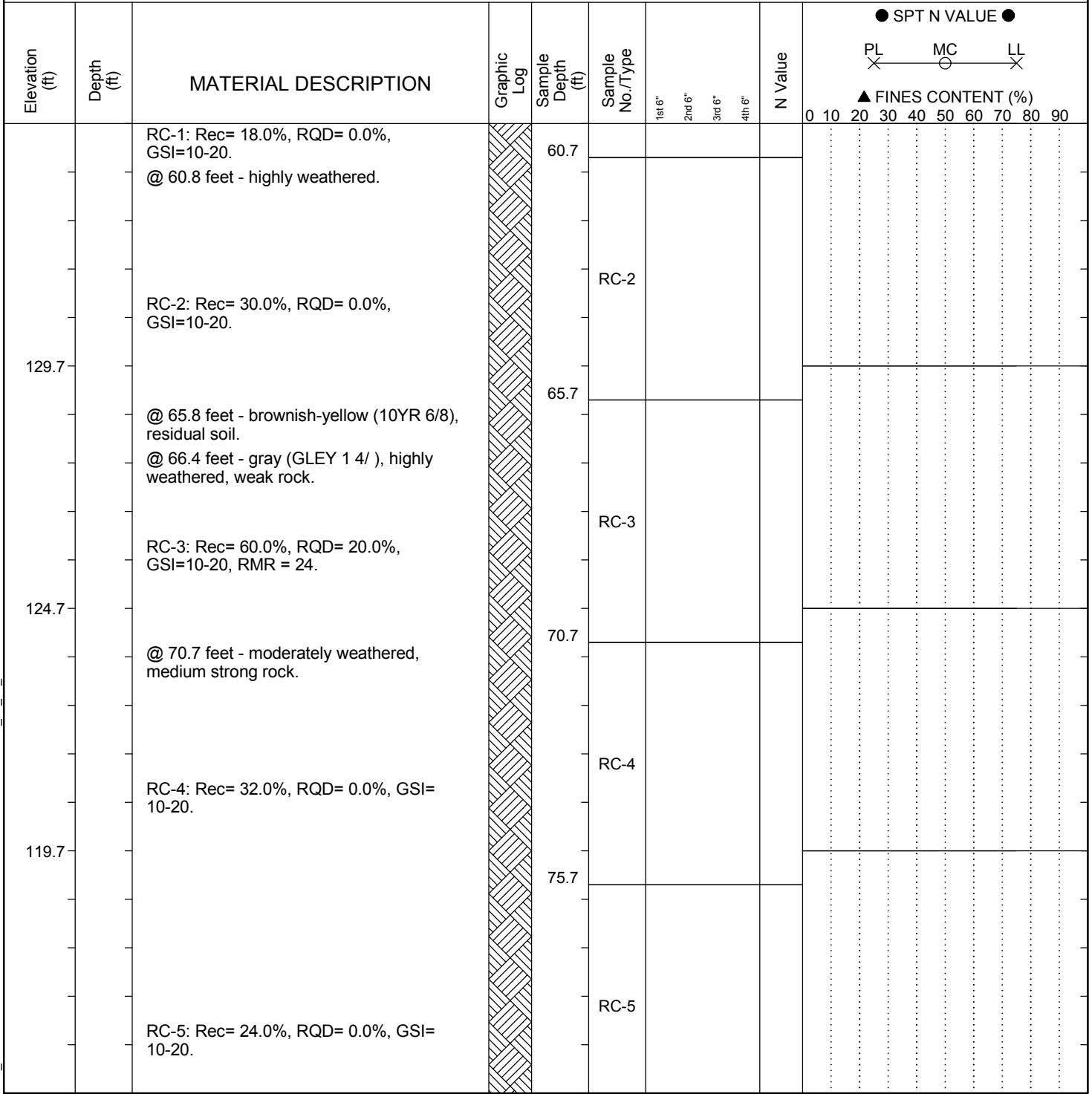
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 27
Eng./Geo.: AKS	Boring Location: 8382+97.01	Offset: R:19.22' Alignment: Proposed
Elev.: 194.7 ft	Latitude: 34.027484	Longitude: -81.102468 Date Started: 3/13/2018
Total Depth: 85.7 ft	Soil Depth: 55.7 ft	Core Depth: 30 ft Date Completed: 3/14/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A 24HR: 19.7 ft



LEGEND


Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-32
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 27
Eng./Geo.:	AKS	Boring Location:	8382+97.01	Offset:	R:19.22'	Alignment:	Proposed
Elev.:	194.7 ft	Latitude:	34.027484	Longitude:	-81.102468	Date Started:	3/13/2018
Total Depth:	85.7 ft	Soil Depth:	55.7 ft	Core Depth:	30 ft	Date Completed:	3/14/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB N/A	24HR	19.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	● SPT N VALUE ●									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL							
											▲ FINES CONTENT (%)									
											0	10	20	30	40	50	60	70	80	90
		@ 80.7 feet - highly weathered, weak rock. @ 81.3 feet - moderately weathered, medium strong rock.		80.7																
		RC-6: Rec= 16.0%, RQD= 0.0%, GSI= 10-20.			RC-6															
109.7	85.7	Boring Terminated at 85.7 feet.																		
104.7																				
99.7																				

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

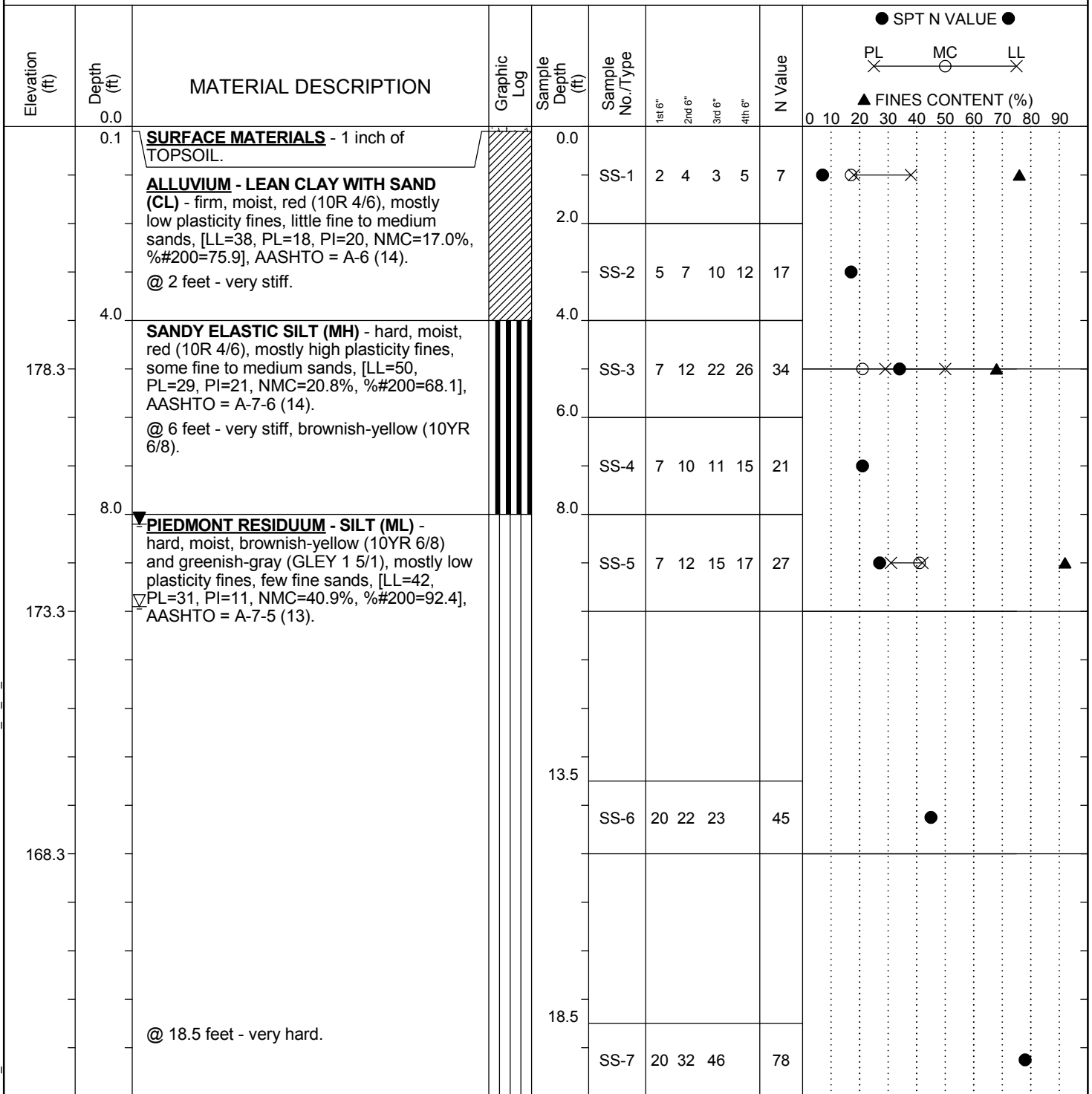
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 3/14/2018

Boring Number: B-32
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
55.7	1	J	N/A	N/A	Pa	Fe	Ir	SR	Fractured zone 55.7' - 56.1'
56.1	2	J	59	W	Pa	Fe	Pl	SR	
56.3	3	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 56.3' - 67.1'
67.1	4	J	38	W	No	N/A	Pl	SR	
68.1	5	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 68.1' - 76.5'
76.5	6	J	21	VN	Pa	Fe	Pl	SR	
76.9	7	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 76.9' - 95.7'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-33
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 30
Eng./Geo.: AKS	Boring Location: 385+33.31	Offset: L:2.608'
Elev.: 183.3 ft	Latitude: 34.026832	Longitude: -81.102580
Total Depth: 74.6 ft	Soil Depth: 45.9 ft	Core Depth: 28.7 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 9.9 ft
		Energy Ratio: 86.5%
		24HR: 8.2 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: B-33
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 30
Eng./Geo.: AKS	Boring Location: 385+33.31	Offset: L:2.608'	Alignment: Proposed
Elev.: 183.3 ft	Latitude: 34.026832	Longitude: -81.102580	Date Started: 3/8/2018
Total Depth: 74.6 ft	Soil Depth: 45.9 ft	Core Depth: 28.7 ft	Date Completed: 3/9/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 9.9 ft	24HR: 8.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)										
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	▲ FINES CONTENT (%)							
158.3	23.5	PARTIALLY WEATHERED ROCK (PWR) - SANDY SILT (ML) - very hard, moist, brownish-yellow (10YR 6/8) and greenish-gray (GLE Y 1 5/1), mostly low plasticity fines, some fine to medium sands, relict rock structure.		23.5	SS-8	50/5"-	-	-	-	100											
				28.5	SS-9	50/4"-	-	-	-	-	100										
				33.5	SS-10	50/4"-	-	-	-	-	100										
				38.5	SS-11	50/0"-	-	-	-	-	100										

LEGEND

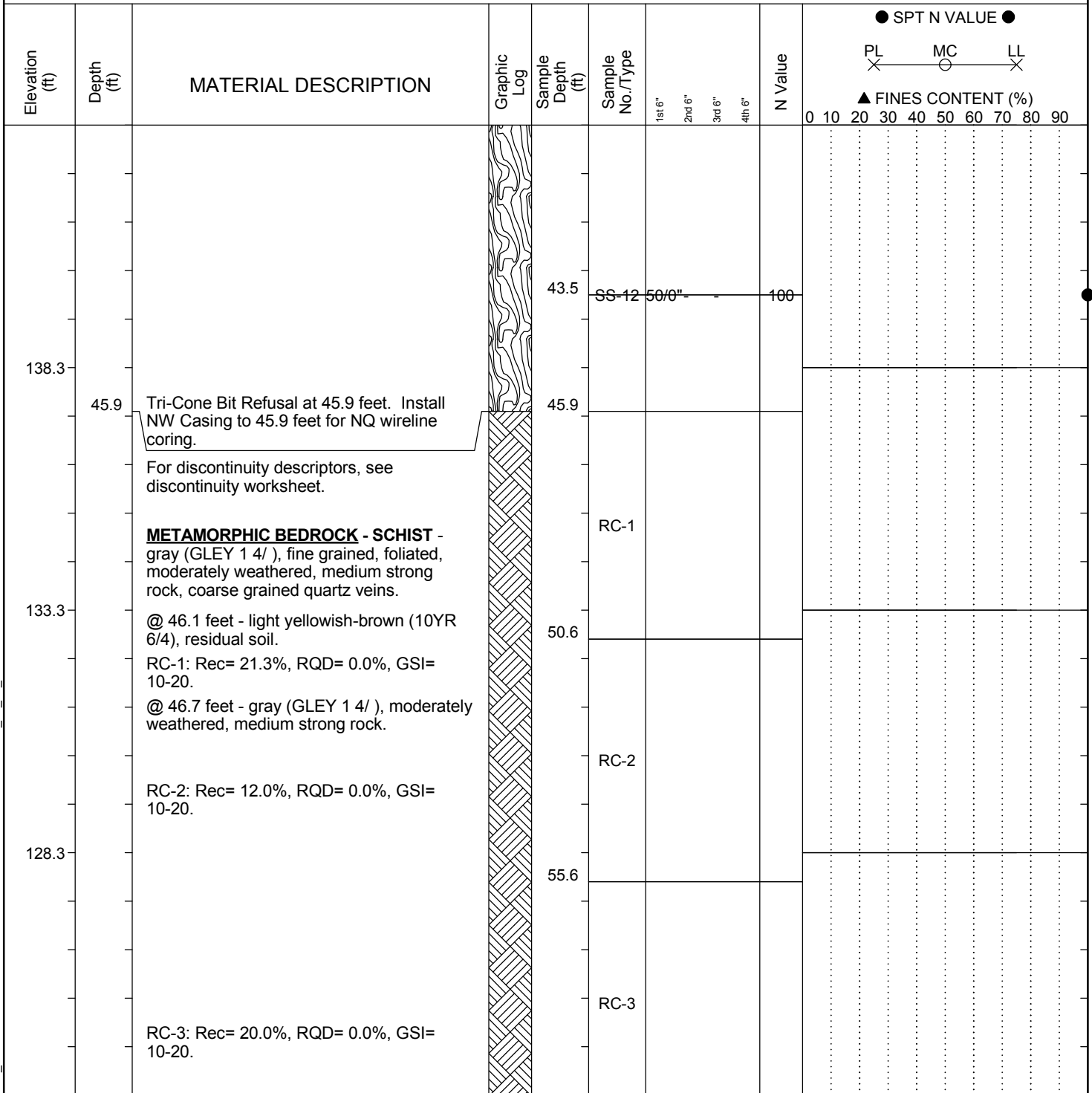
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-33
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 30
Eng./Geo.: AKS	Boring Location: 385+33.31	Offset: L:2.608'
Elev.: 183.3 ft	Latitude: 34.026832	Longitude: -81.102580
Total Depth: 74.6 ft	Soil Depth: 45.9 ft	Core Depth: 28.7 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 9.9 ft
		Energy Ratio: 86.5%
		24HR: 8.2 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662		County: Lexington/Richland		Boring No.: B-33	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 30	
Eng./Geo.: AKS		Boring Location: 385+33.31		Offset: L:2.608'	
Elev.: 183.3 ft		Latitude: 34.026832		Longitude: -81.102580	
Total Depth: 74.6 ft		Soil Depth: 45.9 ft		Core Depth: 28.7 ft	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N)	
Drill Machine: D-50		Drill Method: RW		Hammer Type: Automatic	
Core Size: NQ		Driller: J. Millwood		Energy Ratio: 86.5%	
		Groundwater: TOB		24HR: 9.9 ft	
				8.2 ft	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)	
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	LL
118.3		RC-4: Rec= 30.0%, RQD= 0.0%, GSI= 10-20.		60.6							
		@ 65.9 feet - dark yellowish-brown (10YR 4/6), residual soil.		65.6							
		@ 67.4 feet - gray (GLEYS 1 4/), highly weathered, weak rock. 68.3 feet - medium strong rock.									
113.3		RC-5: Rec= 80.0%, RQD= 0.0%, GSI= 10-20. @ 69 feet - moderately weathered, medium strong rock.		70.6							
		@ 72.2 feet - quartz vein.									
		RC-6: Rec= 100%, RQD= 18.8%, GSI= 30-40, RMR = 37.									
108.3	74.6	Boring Terminated at 74.6 feet.									

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

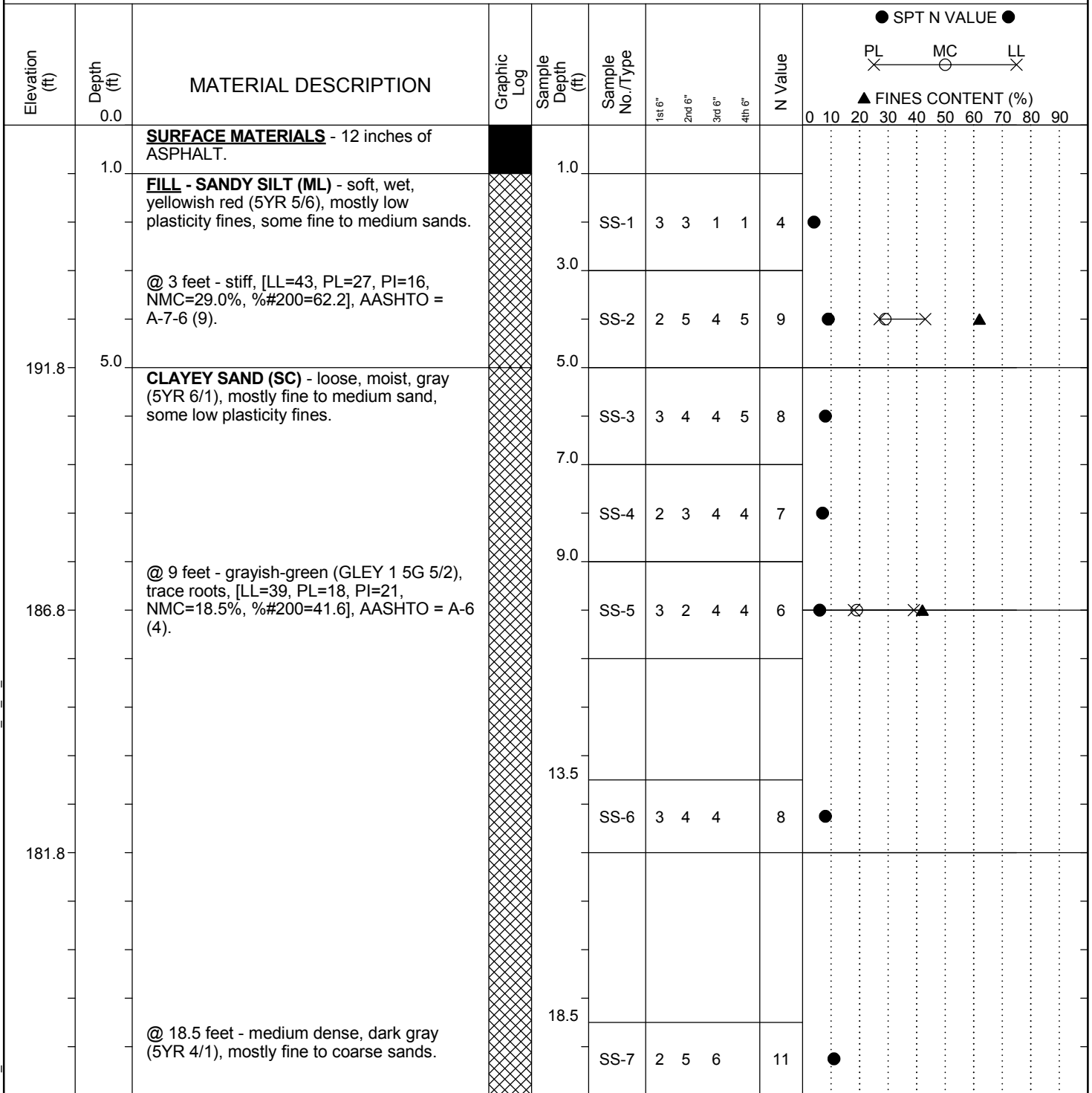
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 3/9/2018

Boring Number: B-33
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
45.9	1	J	N/A	N/A	No	N/A	PI	SR	Fractured zone 45.9' - 69'
69	2	J	55	N	No	N/A	PI	SR	
69.4	3	J	55	VN	No	N/A	PI	SR	
71	4	J	53	N	No	N/A	PI	SR	
71.3	5	J	69	VN	No	N/A	PI	SR	
71.5	6	J	72	VN	No	N/A	PI	SR	
71.6	7	J	N/A	N/A	Pa	Fe	Ir	SR	Fractured zone 71.6' - 771.8'
72	8	J	88	VN	Pa	Fe	PI	SR	
72.2	9	J	31	N	Pa	Fe	PI	SR	
72.3	10	J	N/A	N/A	Pa	Fe	Ir	SR	Fractured zone 72.3' - 72.7'
73	11	J	19	T	Pa	Fe	PI	SR	
73.2	12	J	79	T	Pa	Fe	Ir	SR	
73.4	13	J	31	T	Pa	Fe	PI	SR	
73.6	14	J	90	T	No	N/A	PI	SR	
73.7	15	J	90	T	No	N/A	PI	SR	
74.2	16	J	82	VN	No	N/A	PI	SR	
75.2	17	J	25	N	No	N/A	PI	SR	
75.4	18	J	5	N/A	No	N/A	Ir	SR	Fractured zone 75.4' - 75.6'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-34
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: ELF	Boring Location: 389+21.02	Offset: L:14.330'
Elev.: 196.8 ft	Latitude: 34.025765	Longitude: -81.102667
Total Depth: 74.6 ft	Soil Depth: 41.3 ft	Core Depth: 33.3 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: 25 ft



LEGEND

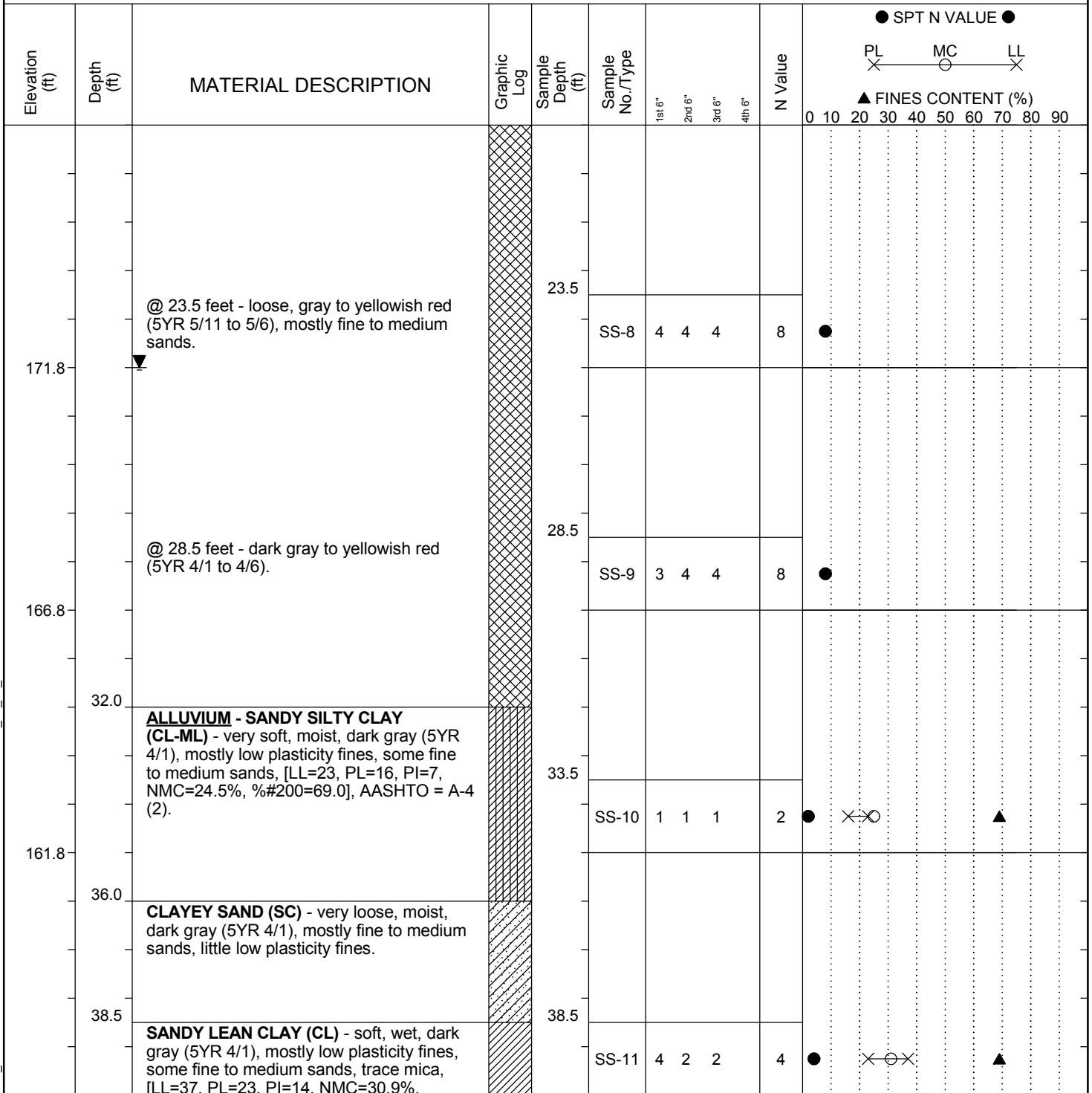
Continued Next Page

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-34
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: ELF	Boring Location: 389+21.02	Offset: L:14.330'
Elev.: 196.8 ft	Latitude: 34.025765	Longitude: -81.102667
Total Depth: 74.6 ft	Soil Depth: 41.3 ft	Core Depth: 33.3 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB	N/A	24HR: 25 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-34
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: ELF	Boring Location: 389+21.02	Offset: L:14.330' Alignment: Proposed
Elev.: 196.8 ft	Latitude: 34.025765	Longitude: -81.102667 Date Started: 2/5/18
Total Depth: 74.6 ft	Soil Depth: 41.3 ft	Core Depth: 33.3 ft Date Completed: 2/6/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB N/A 24HR: 25 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	MC	LL	▲ FINES CONTENT (%)						
	41.3	%#200=69.3], AASHTO = A-6 (8). Tri-Cone Bit Refusal at 41.3 feet. Install NW Casing to 41.3 feet for NQ wireline coring. For discontinuity descriptors, see discontinuity worksheet.		41.3															
		METAMORPHIC BEDROCK - SCHIST - dark greenish-gray (10GY 4/1), fine grained to very fine grained, subrounded, moderately weathered, medium strong rock, low core recovery 41.3 to 55 feet likely due to residual soil seams washed away by drilling process.		44.6	RC-1														
151.8		RC-1 : Rec= 9.1%, RQD= 0.0%, GSI= 10-20.																	
		RC-2 : Rec= 16.0%, RQD= 0.0%, GSI= 10-20.			RC-2														
		@ 49.6 feet - highly weathered zone, extremely weak rock.		49.6															
146.8		RC-3 : Rec= 20.0%, RQD= 0.0%, GSI= 10-20.			RC-3														
	54.6	PARTIALLY WEATHERED ROCK (PWR) - SILTY SAND (SM) - very dense, wet, gray (5YR 5/1), mostly fine to coarse sands, few non-plastic fines, gravel-sized rock fragments.		55.0	SS-12	50/5"	-	-	100										
141.8	56.0	Tri-Cone Bit Refusal at 56 feet. Advance NW Casing to 56 feet to continue NQ wireline coring.		56.0															
		METAMORPHIC BEDROCK - SCHIST - pinkish-gray (5YR 6/2), coarse grained to fine grained, foliated, moderately to highly weathered, medium strong to weak rock, quartz epidote.		59.6	RC-4														

LEGEND

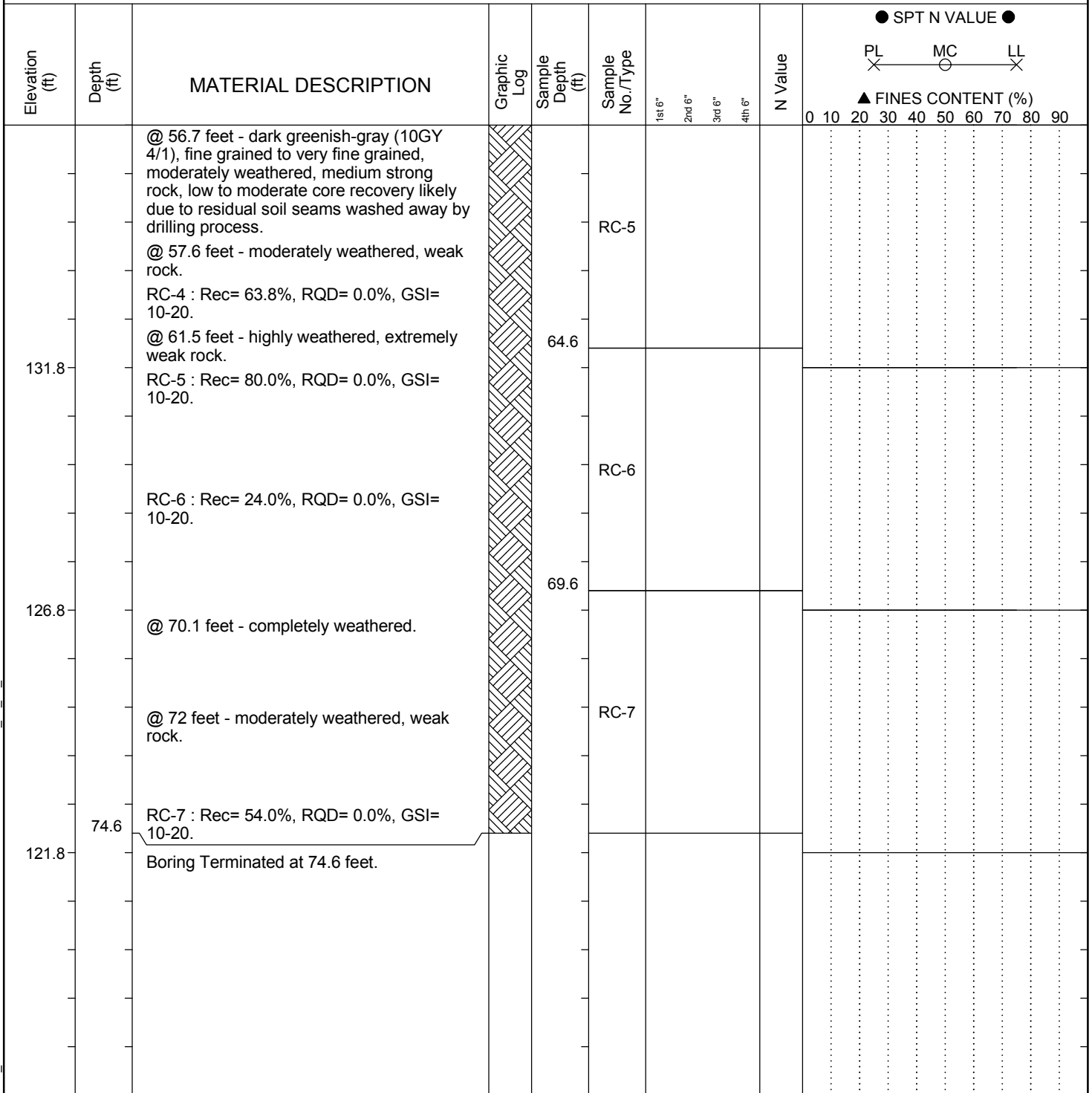
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-34
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 33
Eng./Geo.:	ELF	Boring Location:	389+21.02	Offset:	L:14.330'	Alignment:	Proposed
Elev.:	196.8 ft	Latitude:	34.025765	Longitude:	-81.102667	Date Started:	2/5/18
Total Depth:	74.6 ft	Soil Depth:	41.3 ft	Core Depth:	33.3 ft	Date Completed:	2/6/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	84.1%
Core Size:	NQ	Driller:	T. Miller	Groundwater:	TOB N/A	24HR	25 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

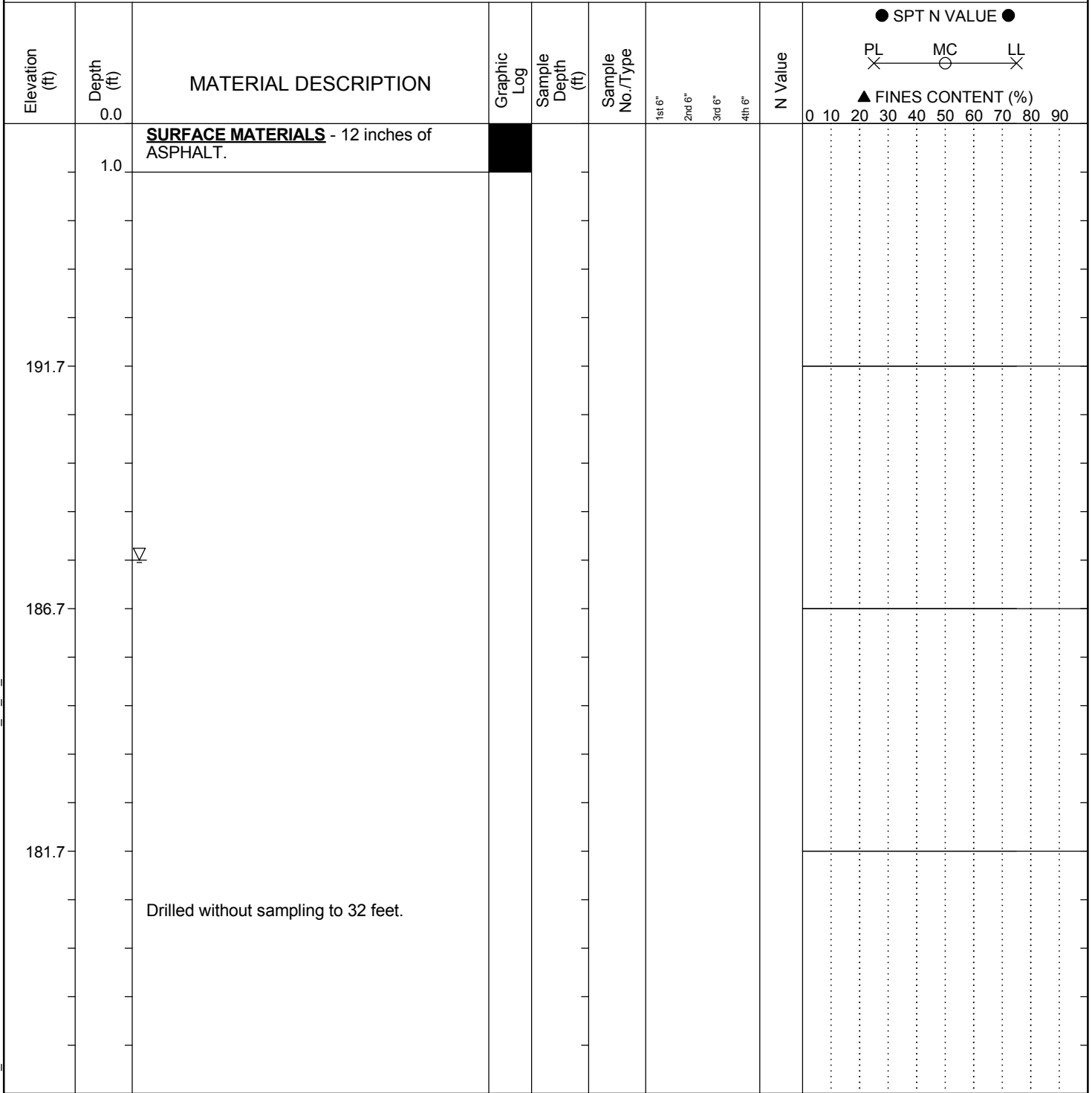
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Lehe Fender
 Date: 2/5/2018

Boring Number: B-34
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
56.2	1	J	31	W	No	N/A	Pl	SR	
56.4	2	J	26	N	No	N/A	Pl	SR	
56.7	3	J	N/A	W	Su	Fe	Ir	SR	Fractured zone 56.7' to 57.3'
57.6	4	J	N/A	W	Su	Cl	Ir	SR	Fractured zone 57.6' to 58.3'
59.6	5	J	N/A	W	Su	Fe	Ir	SR	Fractured zone 59.6' to 60.1'
60.3	6	J	N/A	W	Su	Fe	Pl	SR	
60.5	7	J	N/A	W	Su	Fe	Pl	SR	
60.8	8	J	N/A	W	Su	Sd/Cl	Ir	SR	Fractured zone 60.8' to 61.0'
61.2	9	J	31	W	Su	Sd/Cl	Pl	SR	
61.4	10	J	20	MW	Su	Sd/Cl	Pl	SR	
61.6	11	J	N/A	W	Su	Sd/Cl	Ir	SR	Fractured zone 61.6' to 64.6'
64.6	12	J	N/A	W	Su	Fe	Ir	SR	Fractured zone 64.6' to 69.6'
69.6	13	J	N/A	W	Su	Fe	Ir	SR	Fractured zone 69.6' to 70'
70.3	14	J	N/A	W	Su	Fe	Ir	SR	Fractured zone 70.3' to 74.6'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-34UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: NGS	Boring Location: 389+16.20	Offset: L:15.195' Alignment: Proposed
Elev.: 196.7 ft	Latitude: 34.025778	Longitude: -81.102661 Date Started: 3/29/2018
Total Depth: 39.5 ft	Soil Depth: 39.5 ft	Core Depth: 0 ft Date Completed: 3/29/2018
Bore Hole Diameter (in): 4.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB 9 ft 24HR: N/A



LEGEND

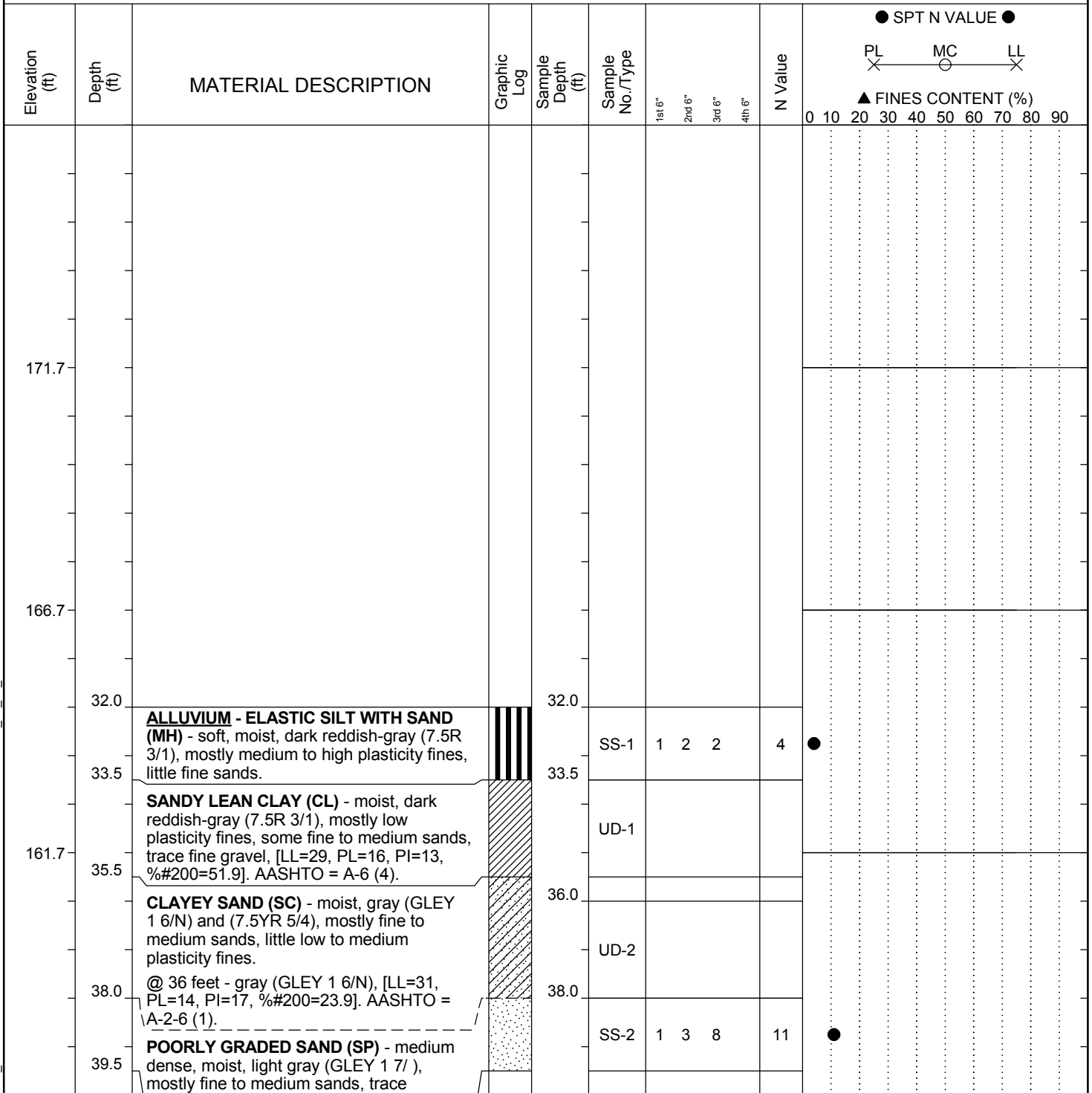
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-34UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: NGS	Boring Location: 389+16.20	Offset: L:15.195' Alignment: Proposed
Elev.: 196.7 ft	Latitude: 34.025778	Longitude: -81.102661 Date Started: 3/29/2018
Total Depth: 39.5 ft	Soil Depth: 39.5 ft	Core Depth: 0 ft Date Completed: 3/29/2018
Bore Hole Diameter (in): 4.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB 9 ft 24HR: N/A



LEGEND

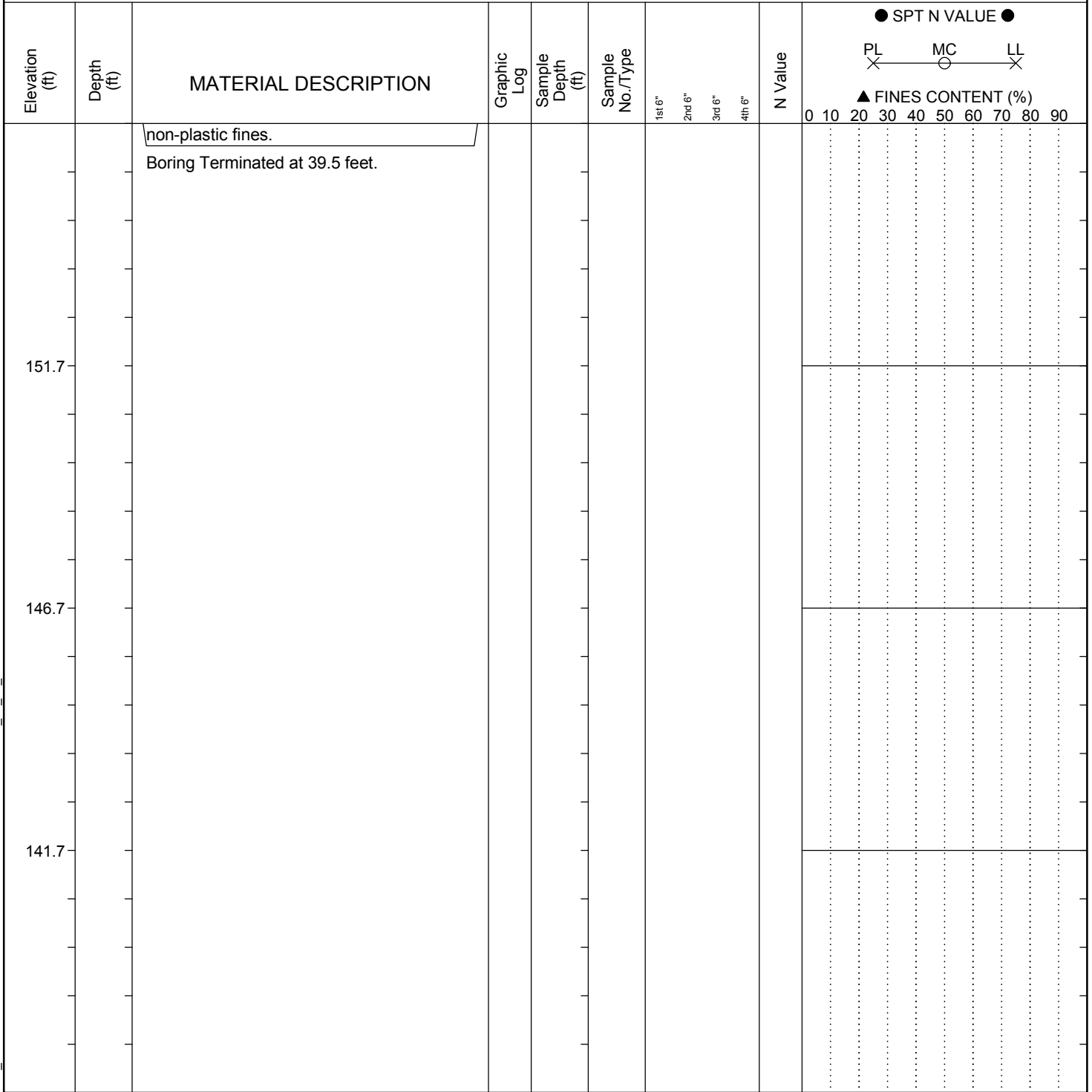
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-34UD	
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 33	
Eng./Geo.:	NGS	Boring Location:	389+16.20	Offset:	L:15.195'	Alignment:	Proposed	
Elev.:	196.7 ft	Latitude:	34.025778	Longitude:	-81.102661	Date Started:	3/29/2018	
Total Depth:	39.5 ft	Soil Depth:	39.5 ft	Core Depth:	0 ft	Date Completed:	3/29/2018	
Bore Hole Diameter (in):	4.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	84.1%	
Core Size:	N/A	Driller:	T. Miller	Groundwater:	TOB	9 ft	24HR	N/A



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

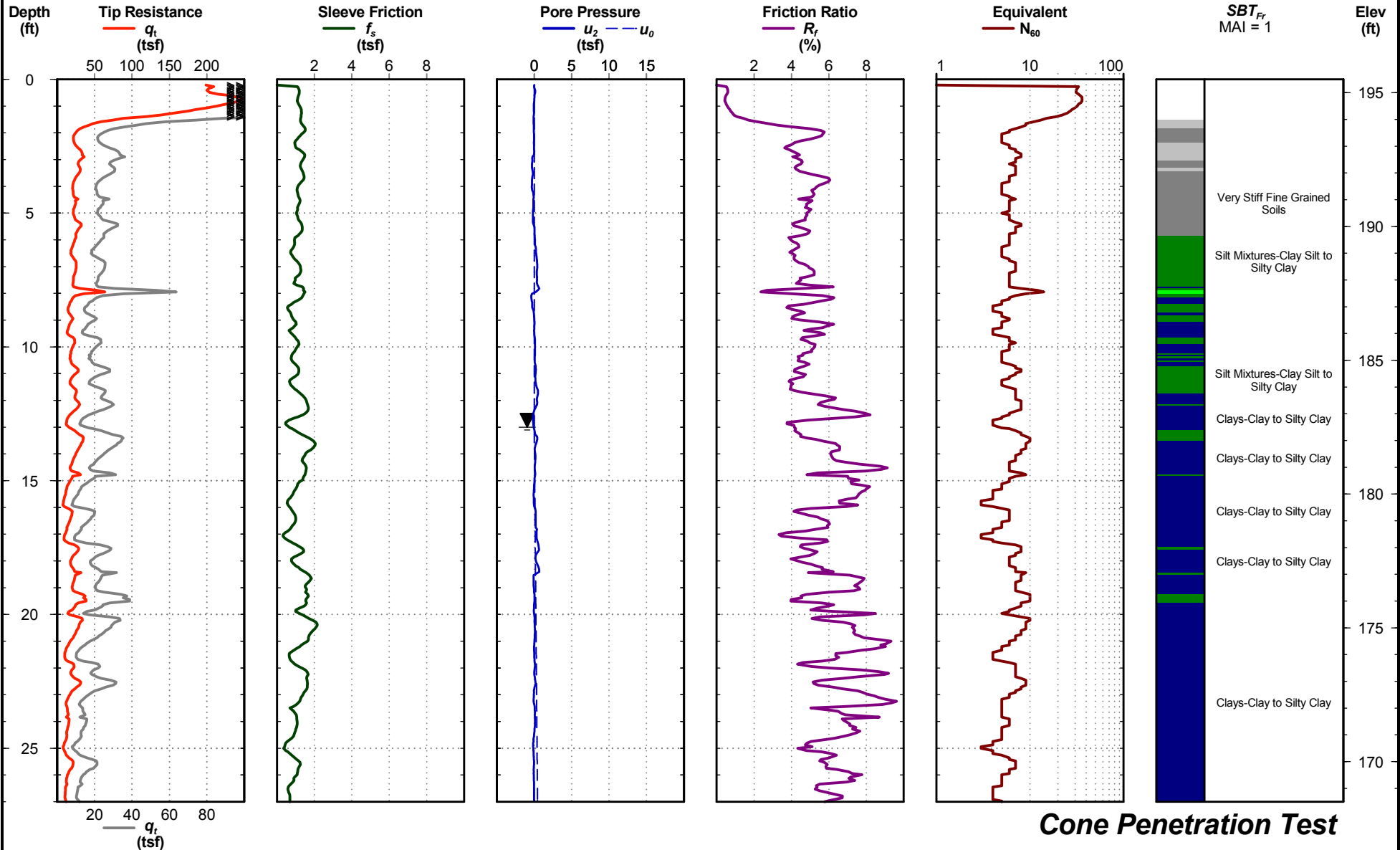


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.025558
Longitude: -81.102365
Elevation: 195.5 ft MSL
Date: Jun. 5, 2018
Estimated Water Depth: 13 ft
Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B34

Total Depth: 39.6 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



Cone Penetration Test

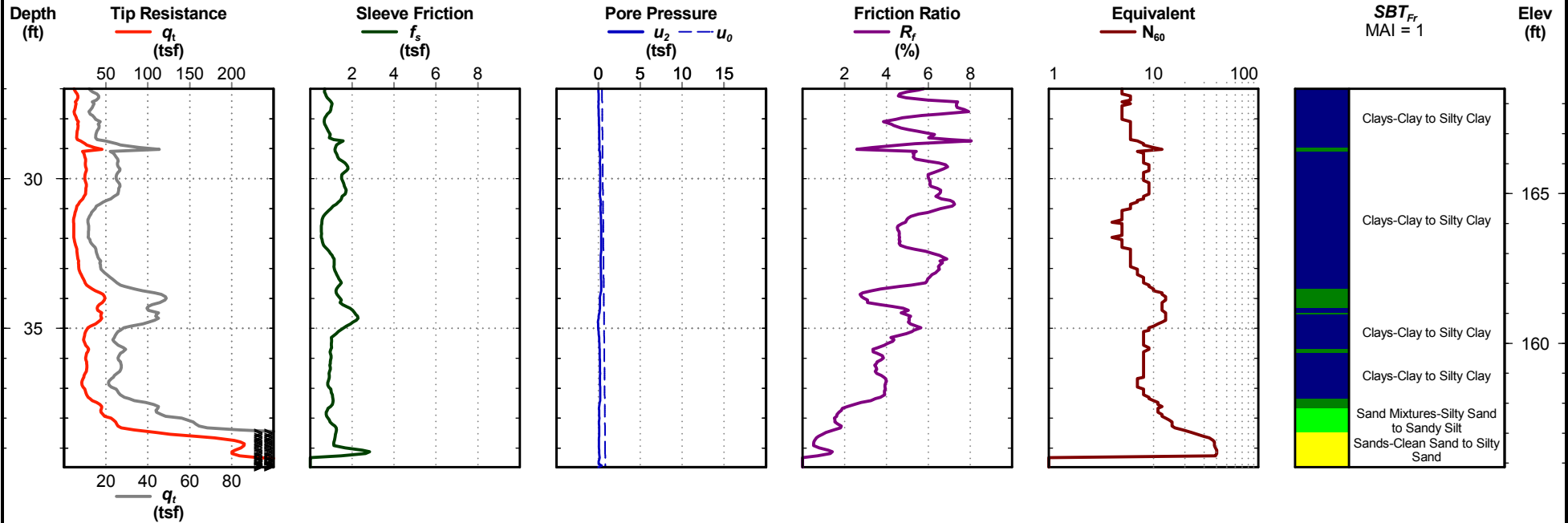


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.025558
Longitude: -81.102365
Elevation: 195.5 ft MSL
Date: Jun. 5, 2018
Estimated Water Depth: 13 ft
Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B34

Total Depth: 39.6 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



CPT REPORT - STANDARD - SBT FR \ 1461-16-047 CPT LOGS - HGM 7-16-18.GPJ \ S&ME.GDT \ 8/2/18

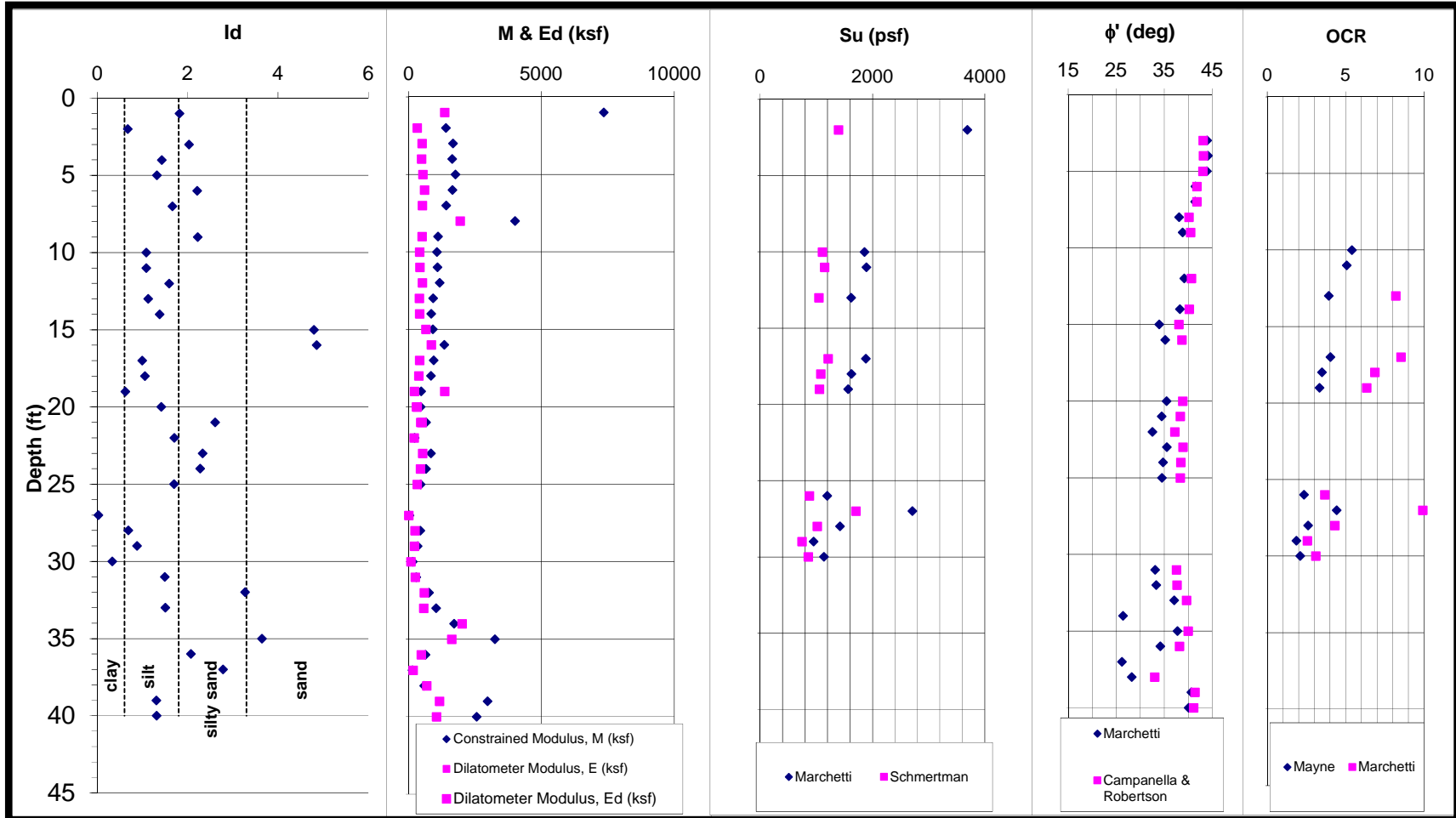
Cone Penetration Test

Electronic Filename: CPT-B34(001)_PD.ECP



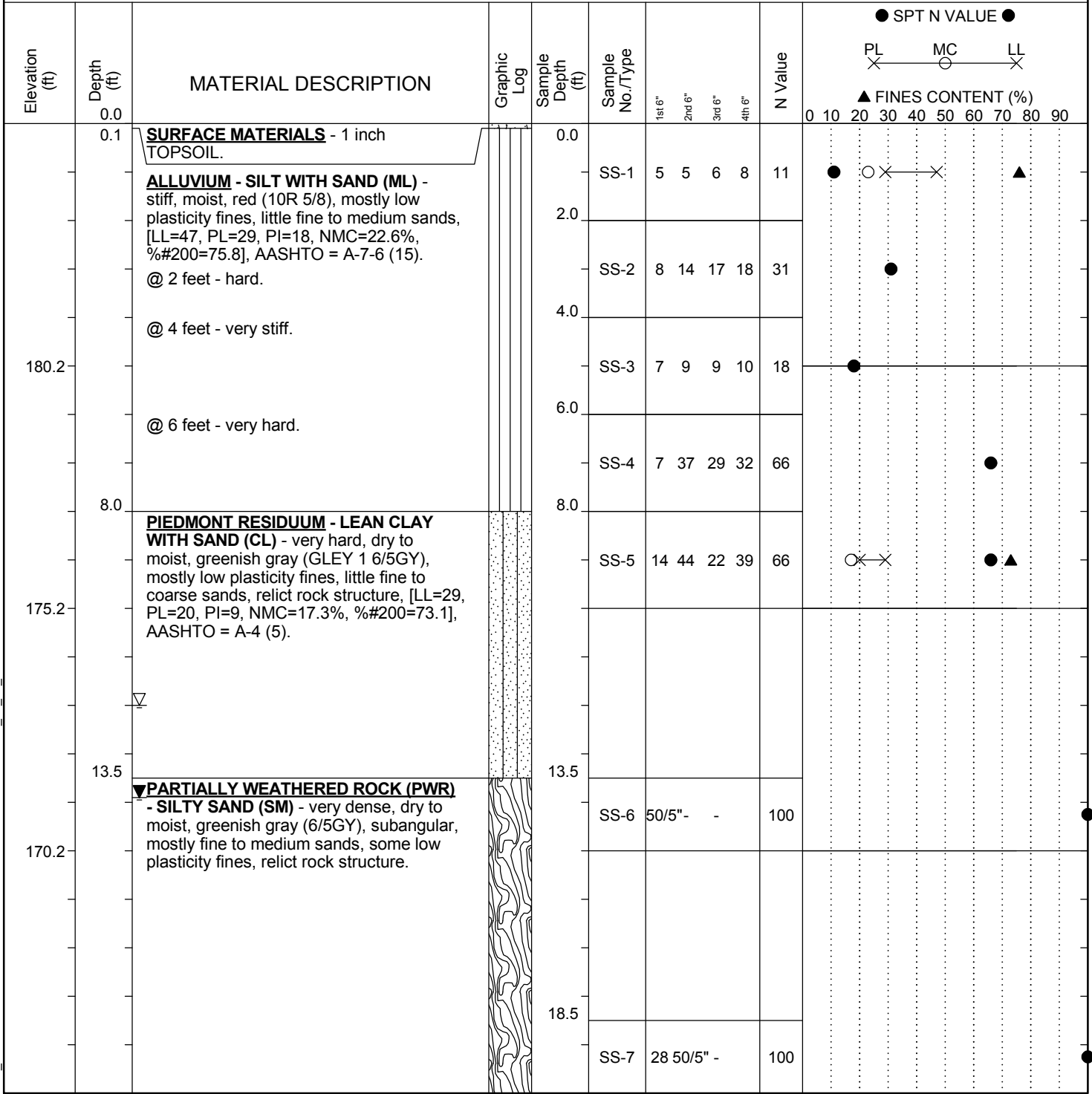
DILATOMETER TEST RESULTS

Test ID: DMT-B34
Site: Carolina Crossroads I-20/I-26/I-126 Improvement Project
Location: Lexington and Richland Counties, South Carolina
Project No.: 1461-16-047



SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-35
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 31
Eng./Geo.: AKS	Boring Location: 7388+25.51	Offset: L:145.51' Alignment: Proposed
Elev.: 185.2 ft	Latitude: 34.026450	Longitude: -81.101378 Date Started: 3/2/2018
Total Depth: 55 ft	Soil Depth: 33.0 ft	Core Depth: 22 ft Date Completed: 3/2/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 12.0 ft 24HR: 13.9 ft



LEGEND Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662		County: Lexington/Richland		Boring No.: B-35	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 31	
Eng./Geo.: AKS		Boring Location: 7388+25.51		Offset: L:145.51'	
Alignment: Proposed		Date Started: 3/2/2018		Date Completed: 3/2/2018	
Elev.: 185.2 ft		Latitude: 34.026450		Longitude: -81.101378	
Total Depth: 55 ft		Soil Depth: 33.0 ft		Core Depth: 22 ft	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N)	
Liner Used: Y (N)		Drill Machine: D-50		Drill Method: RW	
Hammer Type: Automatic		Energy Ratio: 86.5%		Core Size: NQ	
Driller: J. Millwood		Groundwater: TOB		12.0 ft	
24HR		13.9 ft			

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	MC	LL
160.2	23.5				SS-8	12	50/5" -					
155.2	28.5				SS-9	50/4" -	-					
33.0	33.0	Tri-Cone Bit Refusal at 33 feet. Install NW Casing to 33 feet for NQ wireline coring.										
150.2	35.3	For discontinuity descriptors, see discontinuity worksheet. METAMORPHIC - SCHIST - gray (GLEY 1 4/), fine grained, foliated, moderately weathered, strong rock, low to moderate recovery likely due to seams of completely weathered rock or residual soil washed away by drilling process. RC-1: Rec= 34.8%, RQD= 0.0%, GSI= 10-20, RMR = @ 35.7 feet - residual soil, weak. RC-2: Rec= 44.0%, RQD= 0.0%, GSI= 10-20.			RC-1							
					RC-2							

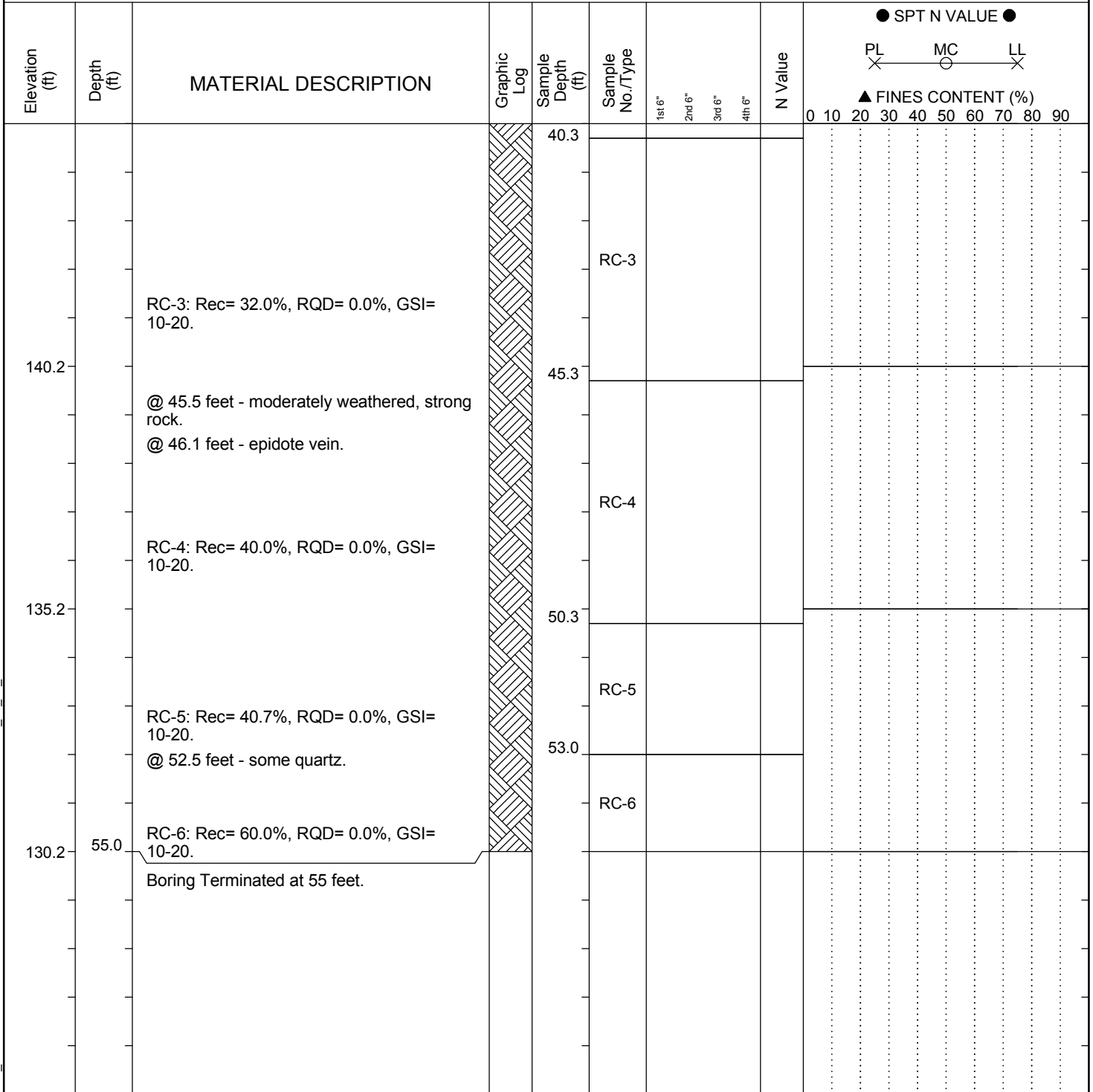
LEGEND Continued Next Page

SAMPLER TYPE SS - Split Spoon UD - Undisturbed Sample AWG - Rock Core, 1-1/8" NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing RW - Rotary Wash RC - Rock Core	
--	--	--	--

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: B-35
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 31
Eng./Geo.: AKS	Boring Location: 7388+25.51	Offset: L:145.51'	Alignment: Proposed
Elev.: 185.2 ft	Latitude: 34.026450	Longitude: -81.101378	Date Started: 3/2/2018
Total Depth: 55 ft	Soil Depth: 33.0 ft	Core Depth: 22 ft	Date Completed: 3/2/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 12.0 ft	24HR: 13.9 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

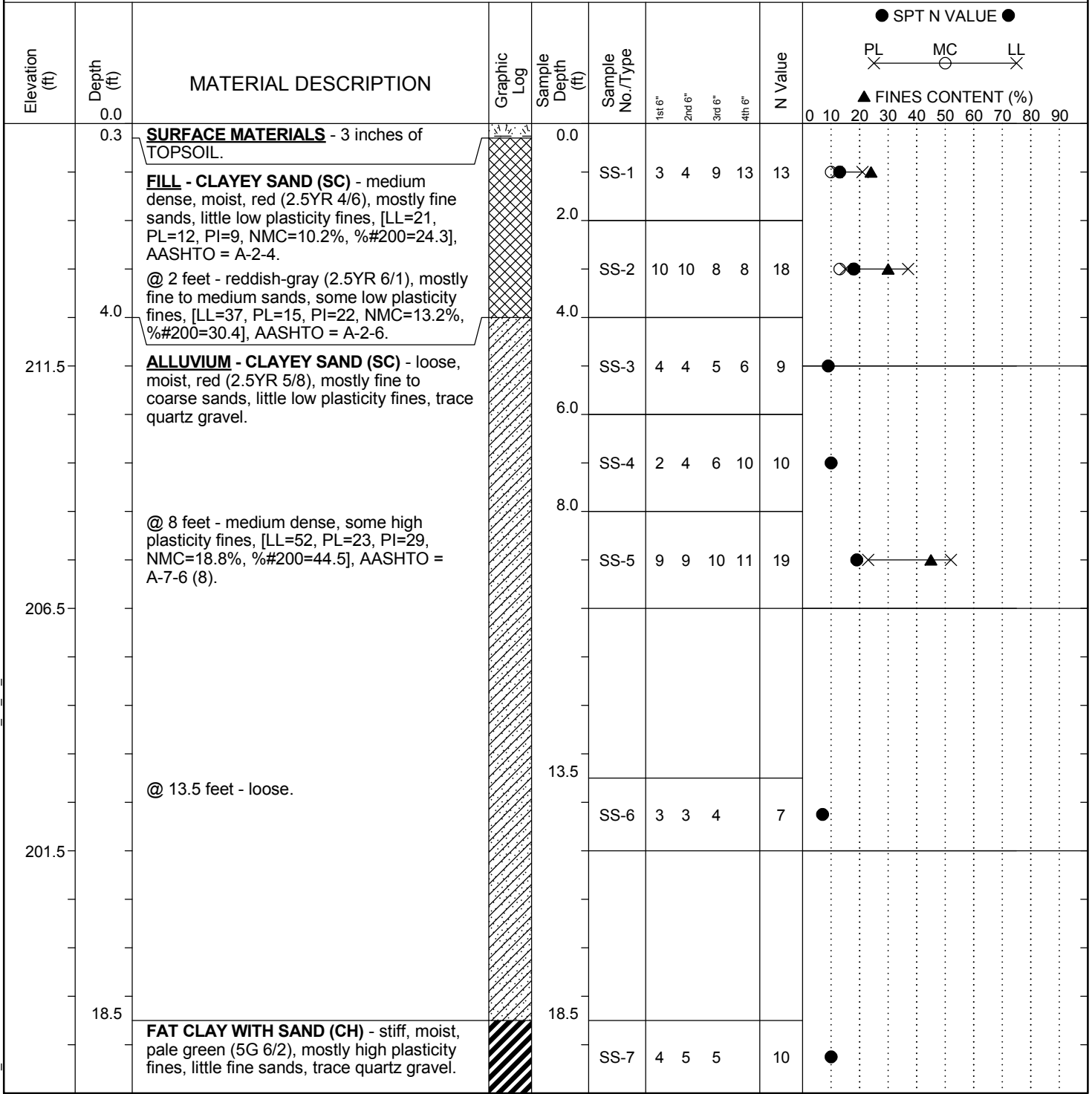
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 3/2/2018

Boring Number: B-35
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
33.1	1	J	0	N	No	No	Ir	SR	
33.3	2	J	90	N/A	No	No	N/A	SR	Fractured zone 33.3' - 45.8'
45.8	3	J	0	N	Pa	Fe	Pl	SR	
46.4	4	J	0	N	Pa	Fe	Pl	SR	
50.3	5	J	50	N	Pa	Fe	Pl	SR	
50.9	6	J	73	N	No	No	St	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-36
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 29
Eng./Geo.: ELF	Boring Location: 7387+13.79	Offset: L:11.09' Alignment: Proposed
Elev.: 216.5 ft	Latitude: 34.026863	Longitude: -81.101700 Date Started: 2/12/2018
Total Depth: 77.2 ft	Soil Depth: 66.0 ft	Core Depth: 11.2 ft Date Completed: 2/13/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB N/A 24HR: 44 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-36
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 29
Eng./Geo.: ELF	Boring Location: 7387+13.79	Offset: L:11.09' Alignment: Proposed
Elev.: 216.5 ft	Latitude: 34.026863	Longitude: -81.101700 Date Started: 2/12/2018
Total Depth: 77.2 ft	Soil Depth: 66.0 ft	Core Depth: 11.2 ft Date Completed: 2/13/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB N/A 24HR: 44 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				PL		MC		LL		FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"	0	10	20	30	40	50	60	70	80
191.5	23.5	@ 23.5 feet - very dark gray (5YR 3/1), [LL=87, PL=30, PI=57, NMC=38.06%, %200=82.8], AASHTO = A-7-5 (53).		23.5	SS-8	3	4	5										
186.5	28.5	PIEDMONT RESIDUUM - SILT WITH SAND (ML) - stiff, moist, very dark gray (5YR 3/1), mostly non-plastic fines, little fine sands.		28.5	SS-9	4	4	6										
181.5	33.5	@ 33.5 feet - very stiff, olive (5Y 4/3), [LL=NP, PL=NP, PI=NP, NMC=21.0%, %200=83.6], AASHTO = A-4 (0).		33.5	SS-10	7	10	12										
	38.5	@ 38.5 feet - olive (5Y 4/3) and yellowish-red (5YR 5/6), few gravel sized rock fragments.		38.5	SS-11	8	14	7										

LEGEND

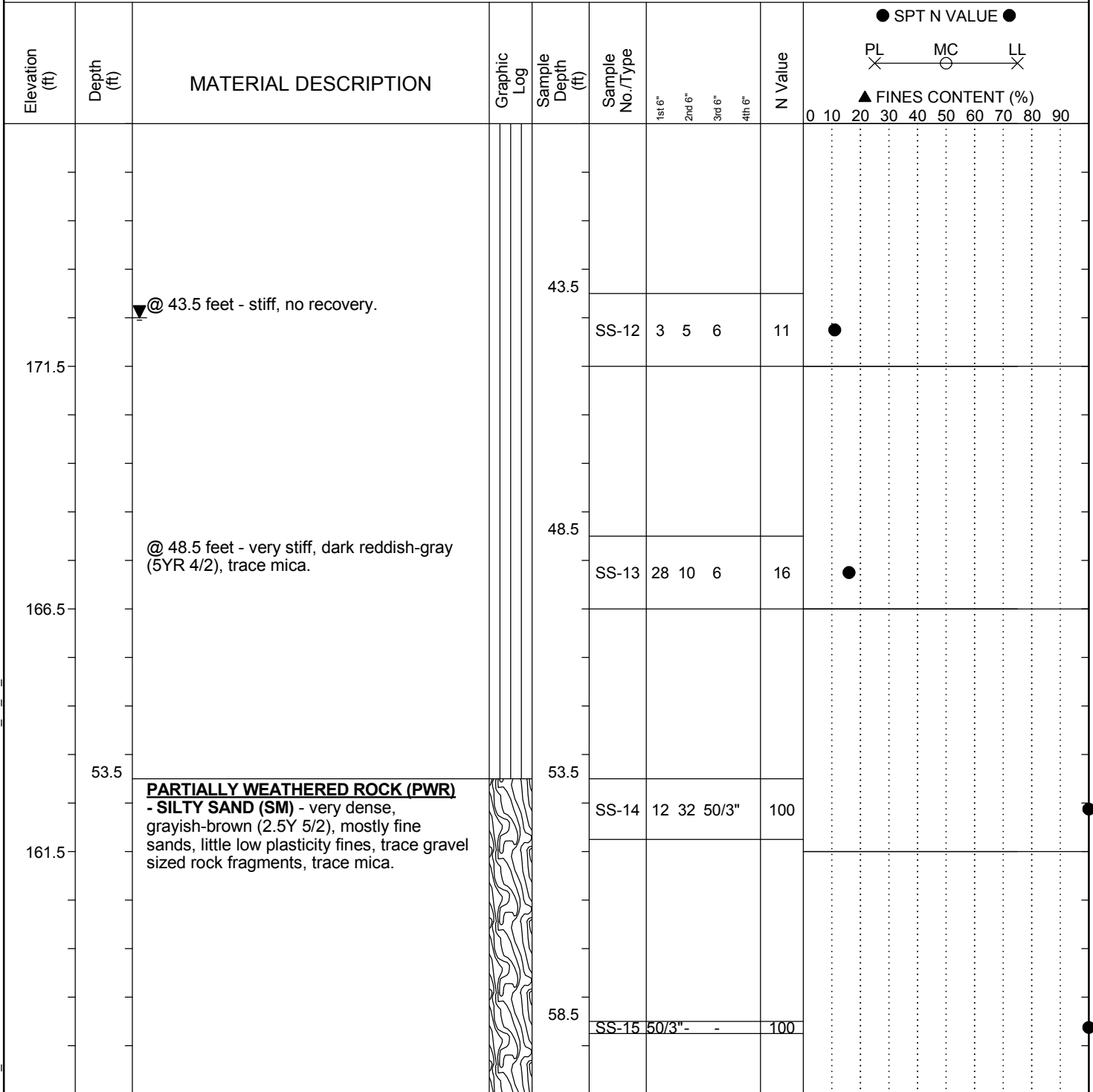
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-36
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 29
Eng./Geo.: ELF	Boring Location: 7387+13.79	Offset: L:11.09'
Elev.: 216.5 ft	Latitude: 34.026863	Longitude: -81.101700
Total Depth: 77.2 ft	Soil Depth: 66.0 ft	Core Depth: 11.2 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: 44 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-36
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 29
Eng./Geo.: ELF	Boring Location: 7387+13.79	Offset: L:11.09' Alignment: Proposed
Elev.: 216.5 ft	Latitude: 34.026863	Longitude: -81.101700
Total Depth: 77.2 ft	Soil Depth: 66.0 ft	Core Depth: 11.2 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB N/A 24HR: 44 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	LL	
151.5	63.5	@ 63.5 feet - dark yellowish-brown (10YR 3/4).		63.5	SS-16 34 50/1" -							
	66.0	Tri-Cone Bit Refusal at 66 feet. Install NW Casing to 66 feet for NQ wireline coring. For discontinuity descriptors, see discontinuity worksheet.		66.0								
		METAMORPHIC BEDROCK - SCHIST - greenish-gray (5GY 5/1), fine grained to very fine grained, foliated, moderately weathered, strong rock.		68.0	RC-1							
		RC-1: Rec= 75.0%, RQD= 0.0%, GSI= 10-20.		68.4	RC-2							
		RC-2: Rec= 100.0%, RQD= 0.0%, GSI= 10-20.		71.2	RC-3							
146.5		@ 70.7 feet - dark grayish-brown (10YR 4/2), highly weathered, extremely weak rock.			RC-4							
		@ 70.9 feet - residual soil.										
		RC-3: Rec= 100.0%, RQD= 34.2%, GSI= 10-20, RMR = 25.		73.4	RC-5							
141.5		@ 71.2 feet - very dark gray (10YR 3/1), moderately weathered, strong rock.										
		RC-4: Rec= 72.7%, RQD= 17.0%, GSI= 10-20.		76.6	RC-6							
	77.2	RC-5: Rec= 46.9%, RQD= 0.0%, GSI= 10-20. RC-6: Rec= 100.0%, RQD= 0.0%, GSI= 10-20. Boring Terminated at 77.2 feet.										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Lehe Fender
 Date: 2/13/2018

Boring Number: B-36
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
68.9	1	J	20	W	Su	Sd/Cl	Ir	N/A	
69.3	2	J	42	MW	Su	Fe	Pl	S	
70	3	J	90	N	Su	Fe	Pl	S	Fractured zone 70' to 70.4'
71.2	4	J	20	W	Su	Fe	Ir	SR	Fractured zone 71.2' to 71.9'
72.3	5	J	10	W	Su	Fe	Ir	R	
73.5	6	J	N/A	W	Pa	Sd/Cl	Ir	R	Fractured zone 73.5' to 74.5'
74.8	7	J	20	W	Pa/Su	Sd/Cl/Fe	Ir	R	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-36A	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 29	
Eng./Geo.: ELF		Boring Location: 7387+06.35		Offset: L:9.39'	
Elev.: 217.2 ft		Latitude: 34.026884		Longitude: -81.101700	
Total Depth: 78.6 ft		Soil Depth: 52.8 ft		Core Depth: 25.8 ft	
Bore Hole Diameter (in): 3.5				Sampler Configuration: Y (N)	
Drill Machine: CME 55		Drill Method: RW		Hammer Type: Automatic	
Core Size: NQ		Driller: T. Miller		Energy Ratio: 84.1%	
Groundwater: TOB		24HR: N/A		44 ft	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)																												
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	▲ FINES CONTENT (%)																									
212.2	0.0	Drilled without sampling to 42.4 feet. Tri-Cone Bit Refusal at 42.4 feet. Install NW Casing to 42.4 feet for NQ wireline coring.																																					
207.2																																							
202.2																																							

LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	P027662	County:	Lexington/Richland	Boring No.:	B-36A
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route:	Site 29
Eng./Geo.:	ELF	Boring Location:	7387+06.35	Offset:	L:9.39'
Alignment:	Proposed		Date Started:	2/14/2018	
Elev.:	217.2 ft	Latitude:	34.026884	Longitude:	-81.101700
Total Depth:	78.6 ft	Soil Depth:	52.8 ft	Core Depth:	25.8 ft
Date Completed:	2/14/2018				
Bore Hole Diameter (in):	3.5	Sampler Configuration	Liner Required:		Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	84.1%				
Core Size:	NQ	Driller:	T. Miller	Groundwater:	TOB N/A 24HR 44 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)																		
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	▲ FINES CONTENT (%)															
											0	10	20	30	40	50	60	70	80	90									
192.2		Drilled without sampling to 42.4 feet. Tri-Cone Bit Refusal at 42.4 feet. Install NW Casing to 42.4 feet for NQ wireline coring.																											
187.2																													
182.2																													

LEGEND Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662	County:	Lexington/Richland	Boring No.:	B-36A
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route:	Site 29
Eng./Geo.:	ELF	Boring Location:	7387+06.35	Offset:	L:9.39'
Alignment:	Proposed				
Elev.:	217.2 ft	Latitude:	34.026884	Longitude:	-81.101700
Date Started:	2/14/2018				
Total Depth:	78.6 ft	Soil Depth:	52.8 ft	Core Depth:	25.8 ft
Date Completed:	2/14/2018				
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	84.1%				
Core Size:	NQ	Driller:	T. Miller	Groundwater:	TOB N/A
24HR:	44 ft				

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"	0	10	20	30	40	50	60	70	80	90
42.4	42.4	For discontinuity descriptors, see attached worksheet.		42.4															
172.2	45.0	<p>METAMORPHIC BEDROCK - SCHIST - pinkish-white (5YR 8/2), very coarse grained, quartz epidote, massive, highly weathered, mostly extremely weak rock not recovered by coring process, recovered rock fragments were strong rock.</p> <p>RC-1: Rec= 3.8%, RQD= 0.0%, GSI= 10-20.</p> <p>Drilled without sampling to 55.4 feet. Tri-Cone Bit Refusal at 55.4 feet. Install NW Casing to 55.4 feet for NQ wireline coring.</p>			RC-1														
167.2																			
162.2	55.4	<p>For discontinuity descriptors, see discontinuity worksheet.</p> <p>METAMORPHIC BEDROCK - SCHIST - grayish-green (5GY 5/2), fine grained to very fine grained, foliated, highly weathered, strong rock.</p>		55.4															
					RC-2														

LEGEND

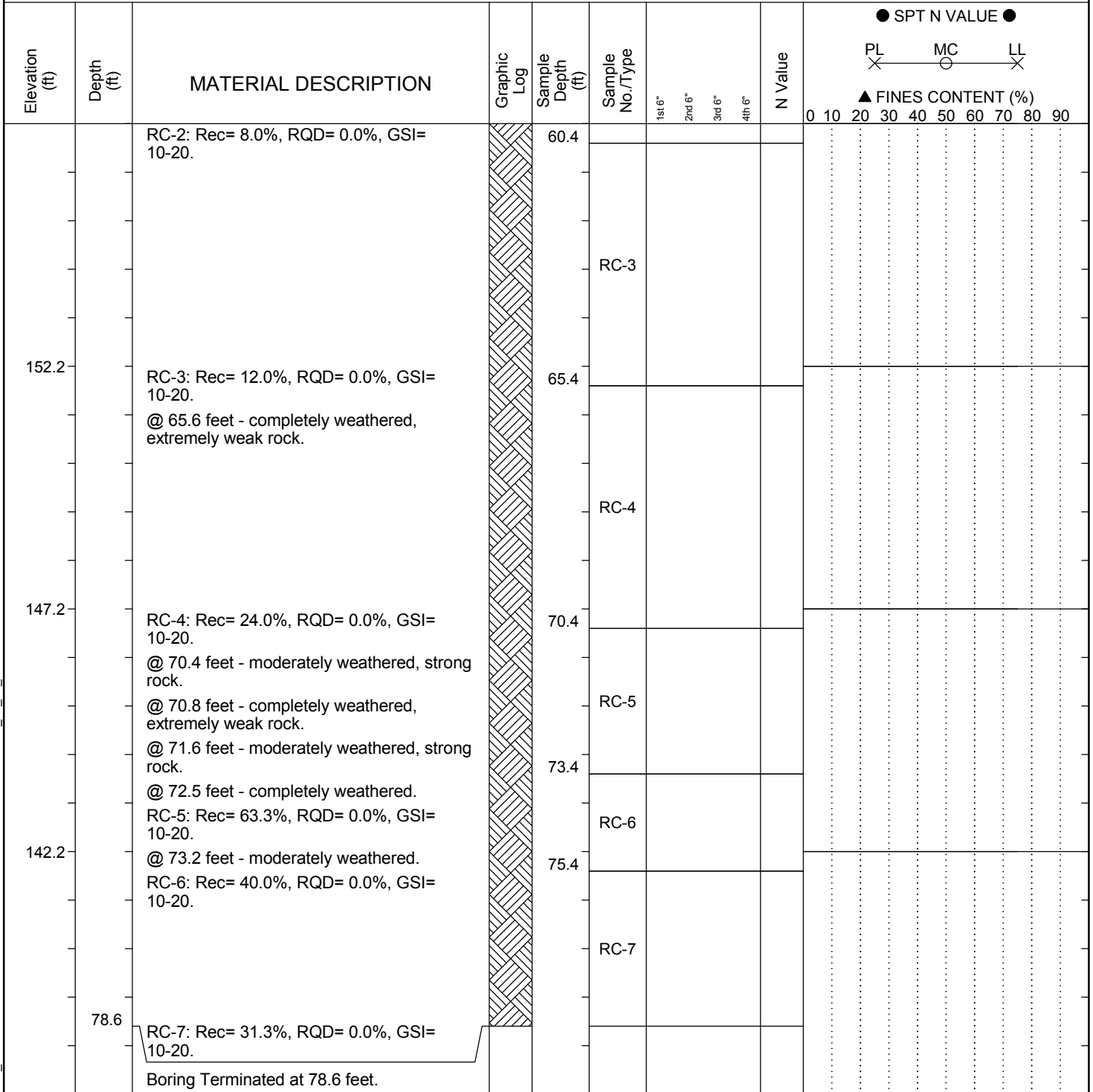
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-36A
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 29
Eng./Geo.: ELF	Boring Location: 7387+06.35	Offset: L:9.39'
Alignment: Proposed	Date Started: 2/14/2018	Date Completed: 2/14/2018
Elev.: 217.2 ft	Latitude: 34.026884	Longitude: -81.101700
Total Depth: 78.6 ft	Soil Depth: 52.8 ft	Core Depth: 25.8 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 84.1%	Groundwater: TOB N/A
Core Size: NQ	Driller: T. Miller	24HR: 44 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

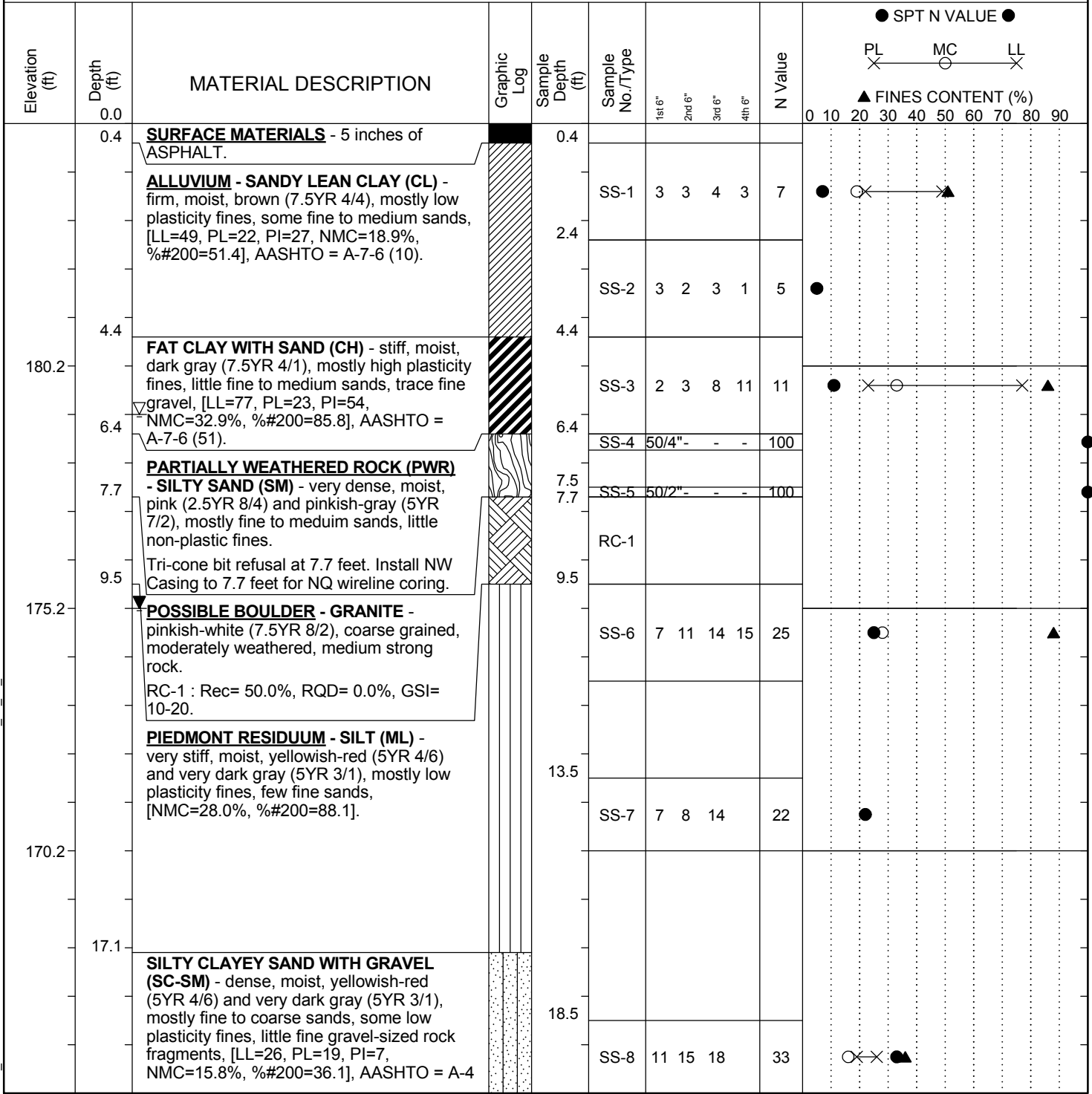
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Lehe Fender
 Date: 2/14/2018

Boring Number: B-36A
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
73.7	1	J	5	W	Pa	Sd/Cl	lr	R	Fractured zone 73.7' to 74'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-37
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 32	
Eng./Geo.: NGS	Boring Location: 6013+18.37		Offset: L:9.63'	Alignment: Proposed
Elev.: 185.2 ft	Latitude: 34.025625	Longitude: -81.098778	Date Started: 3/7/2018	
Total Depth: 64.3 ft	Soil Depth: 39.7 ft	Core Depth: 24.6 ft	Date Completed: 3/7/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 6 ft	24HR 10 ft	



LEGEND

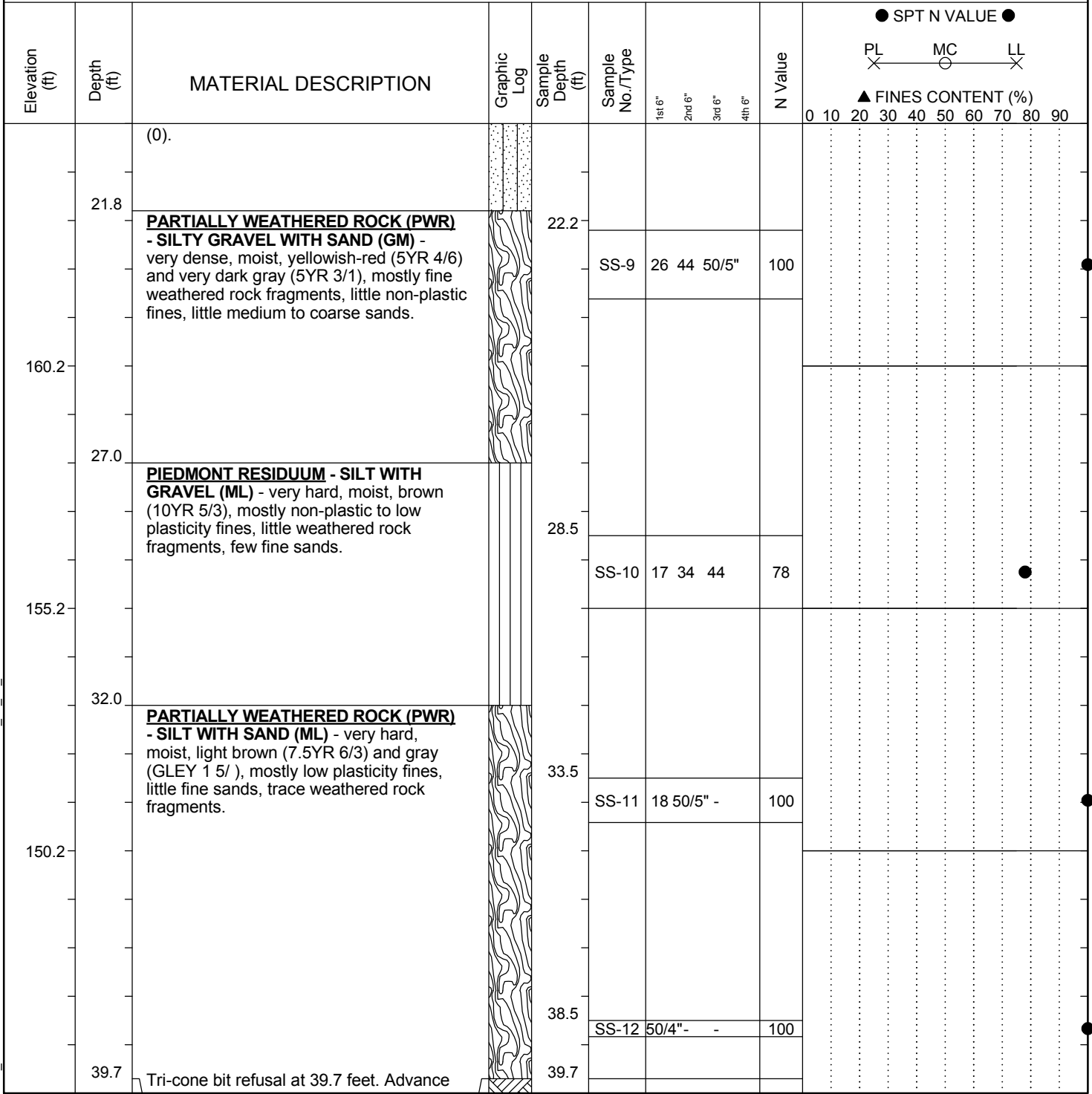
Continued Next Page

SAMPLER TYPE SS - Split Spoon UD - Undisturbed Sample AWG - Rock Core, 1-1/8" NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing RW - Rotary Wash RC - Rock Core	
--	--	--	--

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-37
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: NGS	Boring Location: 6013+18.37	Offset: L:9.63'
Elev.: 185.2 ft	Latitude: 34.025625	Longitude: -81.098778
Total Depth: 64.3 ft	Soil Depth: 39.7 ft	Core Depth: 24.6 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: 6 ft
		10 ft: 10 ft



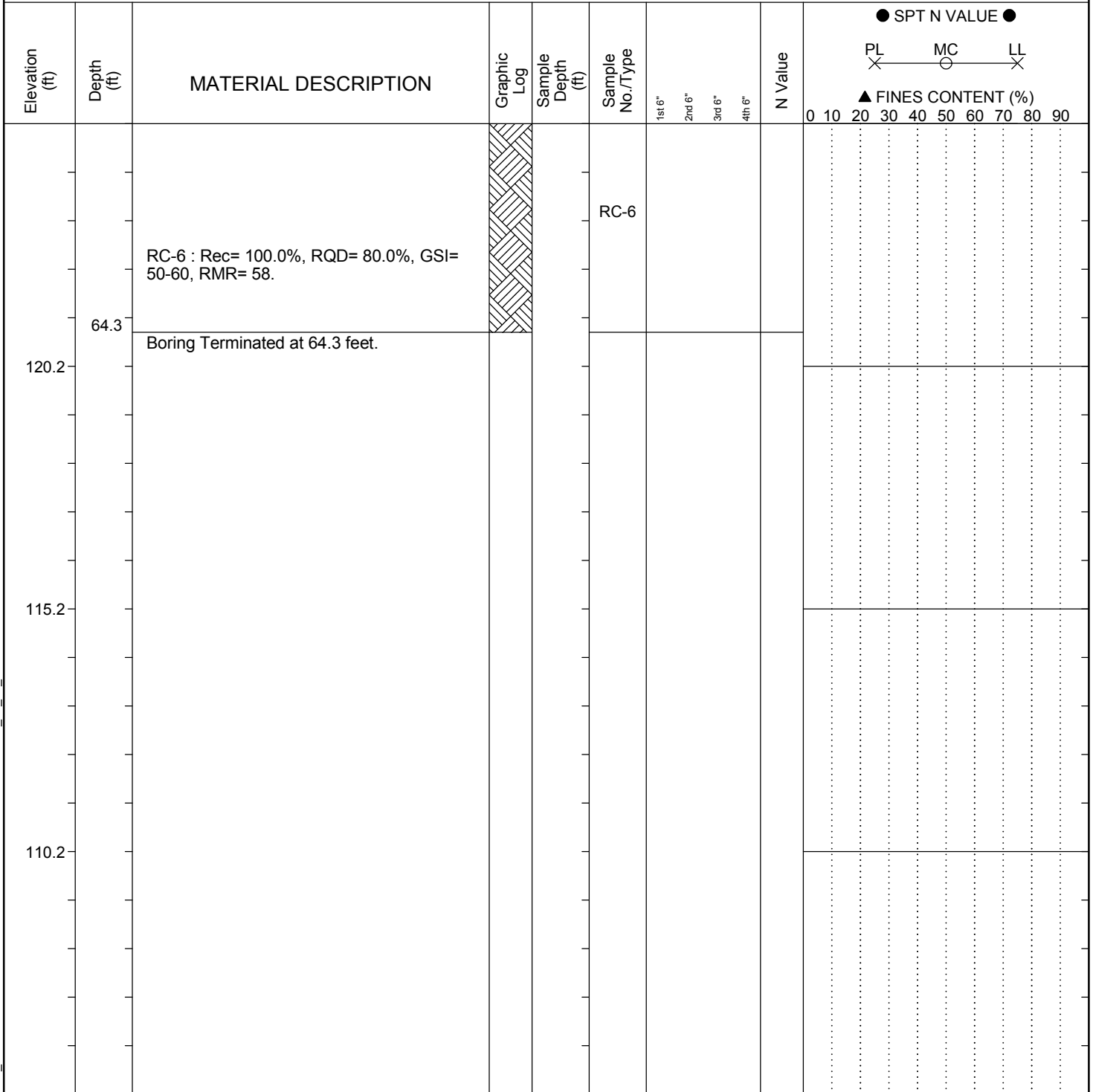
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-37
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 32
Eng./Geo.:	NGS	Boring Location:	6013+18.37	Offset:	L:9.63'	Alignment:	Proposed
Elev.:	185.2 ft	Latitude:	34.025625	Longitude:	-81.098778	Date Started:	3/7/2018
Total Depth:	64.3 ft	Soil Depth:	39.7 ft	Core Depth:	24.6 ft	Date Completed:	3/7/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	84.1%
Core Size:	NQ	Driller:	T. Miller	Groundwater:	TOB 6 ft	24HR	10 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

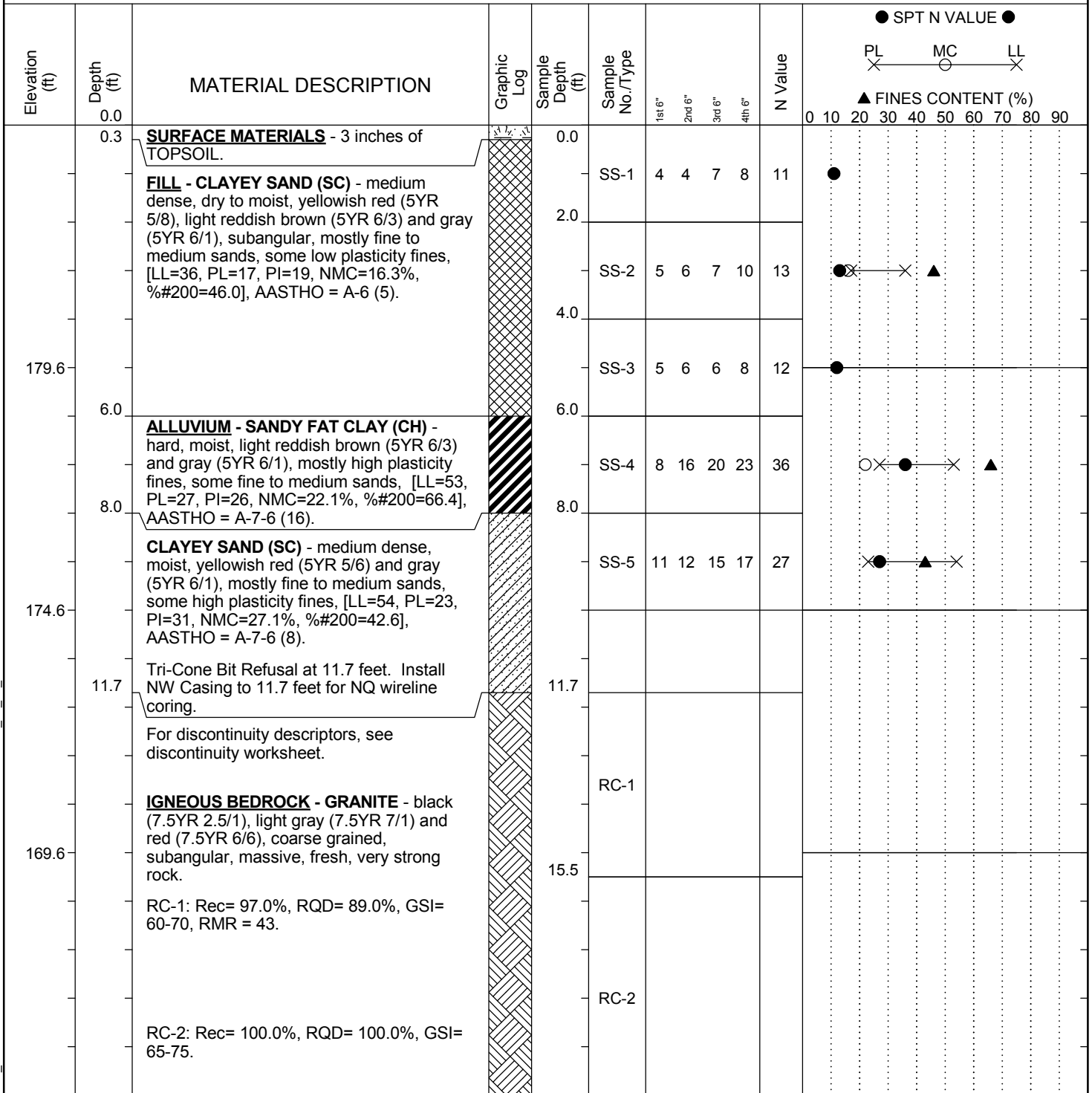
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Nathaniel Shuff
 Date: 3/7/2018

Boring Number: B-37
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
39.4	1	N/A	N/A	W	Pa	Sd/Cl	Ir	R	Fractured zone 39.4' - 40.3'
40.6	2	J	50	VN	Pa	Sd	Pl	SR	
40.8	3	N/A	N/A	N/A	Sp	Fe	Pl	SR	Fractured zone 40.8' - 46.3'
46.8	4	J	50	VN	Sp	Fe	Pl	SR	
47	5	J	50	VN	Sp	Fe	Pl	SR	
47.2	6	J	50	VN	Sp	Fe	Ir	SR	
48.4	7	J	50	VN	Sp	Fe/Sd	Ir	SR	
48.6	8	J	50	N/A	Sp	Fe/Sd	Ir	SR	
49.5	9	J	0	N	Sp	Fe	Ir	SR	
50.2	10	J	0	N	Su	Fe	Ir	R	
50.4	11	J	20	N	Pa	Sd	Ir	R	
50.9	12	J	90	T	Fi	Fe	Pl	SR	
51.9	13	J	10	VN	Pa	Qz/Fe	Pl	SR	
52.3	14	J	60	VN	No	N/A	Pl	SR	
52.6	15	J	10	VN	Su	Fe	Pl	SR	
53.3	16	J	60	VN	Pa	Qz/Fe	Pl	SR	
53.8	17	J	0	VN	Su	Fe	Ir	R	
53.9	18	J	0	VN	Su	Fe	Ir	R	
54.8	19	N/A	N/A	N	Su	Fe	Ir	R	Fractured zone 54.8' - 55.7'
56.2	20	J	60	VN	Pa	Cl/Ca	Pl	SR	
56.7	21	J	60	N	Pa	N/A	Pl	SR	
56.9	22	J	60	VN	Pa	Sd/Cl	Pl	SR	
59.7	23	J	20	N	No	N/A	Pl	R	
59.8	24	J	0	N	Su	Fe	Ir	R	
59.9	25	J	0	N	Su	Fe	Ir	R	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: B-38
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 34
Eng./Geo.: AKS	Boring Location: 3027+51.37	Offset: R:55.40'	Alignment: Proposed
Elev.: 184.6 ft	Latitude: 34.022482	Longitude: -81.096018	Date Started: 1/23/2018
Total Depth: 31.7 ft	Soil Depth: 11.7 ft	Core Depth: 20 ft	Date Completed: 1/23/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A	24HR



LEGEND

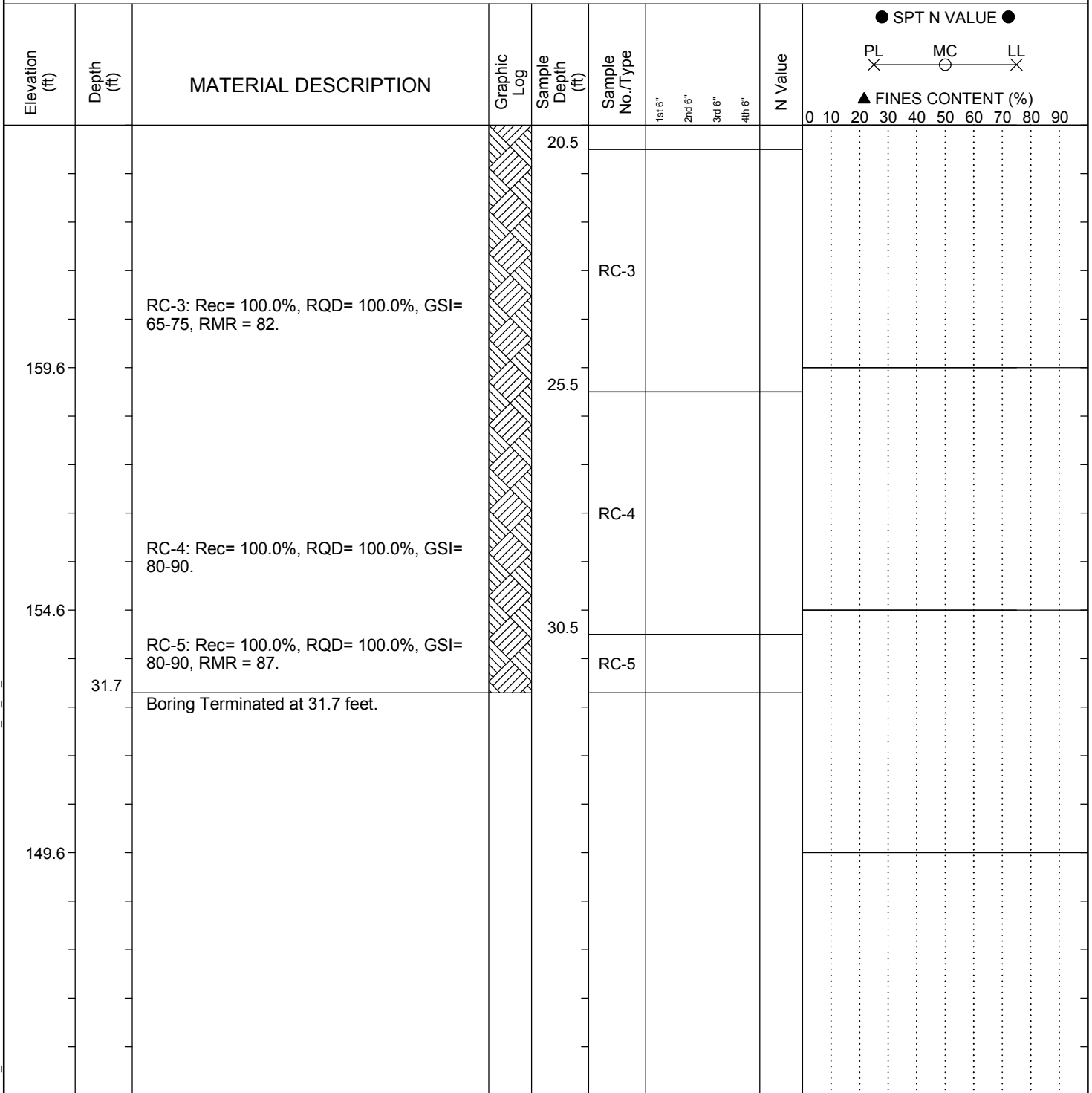
Continued Next Page

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-38
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 34
Eng./Geo.: AKS	Boring Location: 3027+51.37	Offset: R:55.40' Alignment: Proposed
Elev.: 184.6 ft	Latitude: 34.022482	Longitude: -81.096018
Total Depth: 31.7 ft	Soil Depth: 11.7 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A 24HR



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

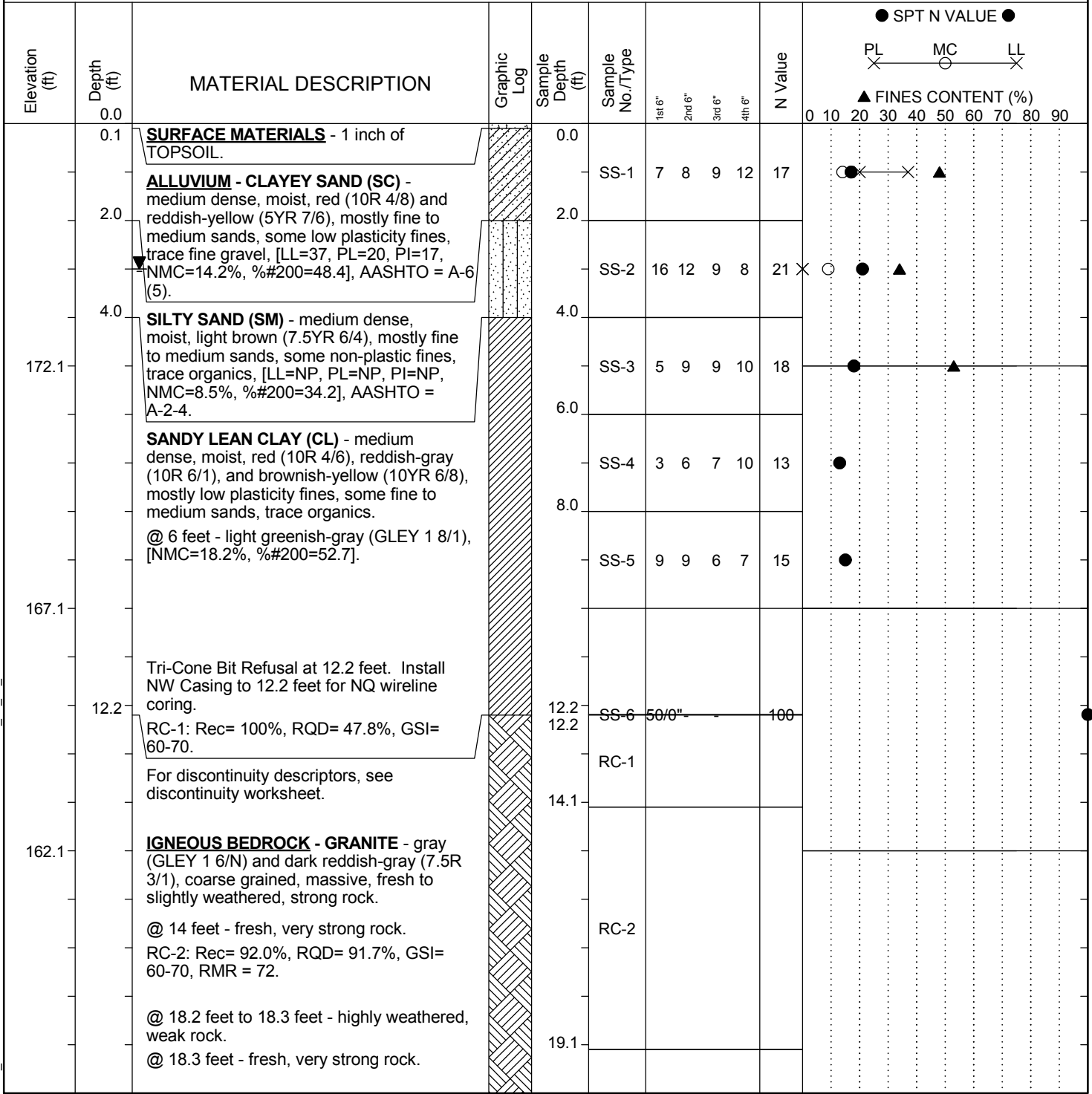
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 1/23/2018

Boring Number: B-38
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
11.8	1	J	0	N	Su	Fe	PI	SR	
11.9	2	J	0	N	Su	Fe	PI	SR	
13.1	3	J	4	N/A	No	N/A	PI	SR	
14.5	4	J	2	N/A	No	N/A	PI	SR	
16	5	J	0	N/A	No	N/A	W	SR	
17	6	J	0	N/A	No	N/A	PI	SR	
23	7	J	77	N/A	Fi	Qz	PI	N/A	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-39
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 35
Eng./Geo.: NGS/HGM	Boring Location: 5027+19.37	Offset: L:9.50'
Elev.: 177.1 ft	Latitude: 34.021963	Longitude: -81.097012
Total Depth: 32.2 ft	Soil Depth: 12.2 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: 3 ft



LEGEND

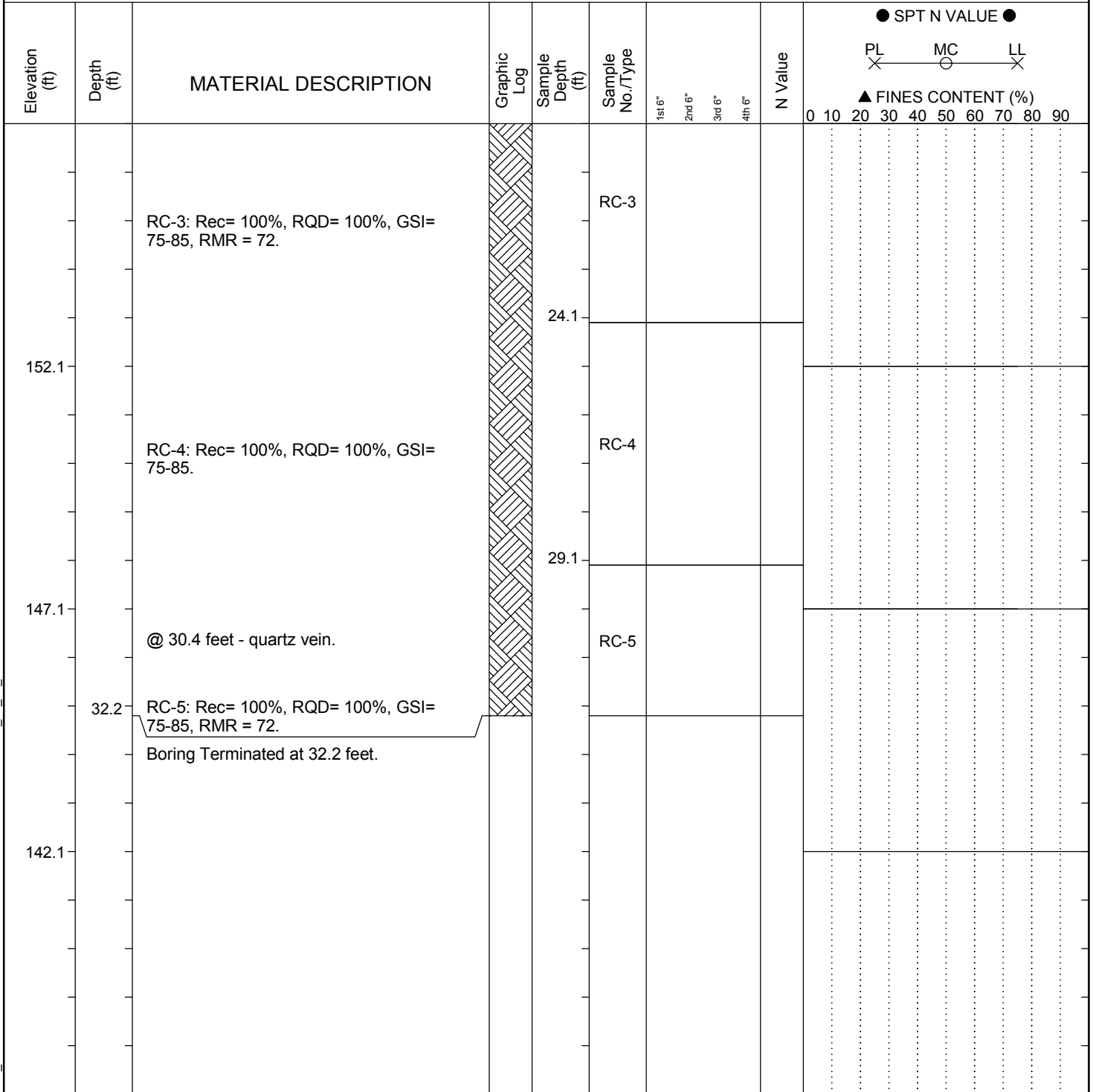
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: B-39	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 35	
Eng./Geo.: NGS/HGM	Boring Location: 5027+19.37		Offset:	L:9.50' Alignment: Proposed
Elev.: 177.1 ft	Latitude: 34.021963	Longitude: -81.097012	Date Started: 4/9/2018	
Total Depth: 32.2 ft	Soil Depth: 12.2 ft	Core Depth: 20 ft	Date Completed: 4/10/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB	3 ft	24HR 3 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

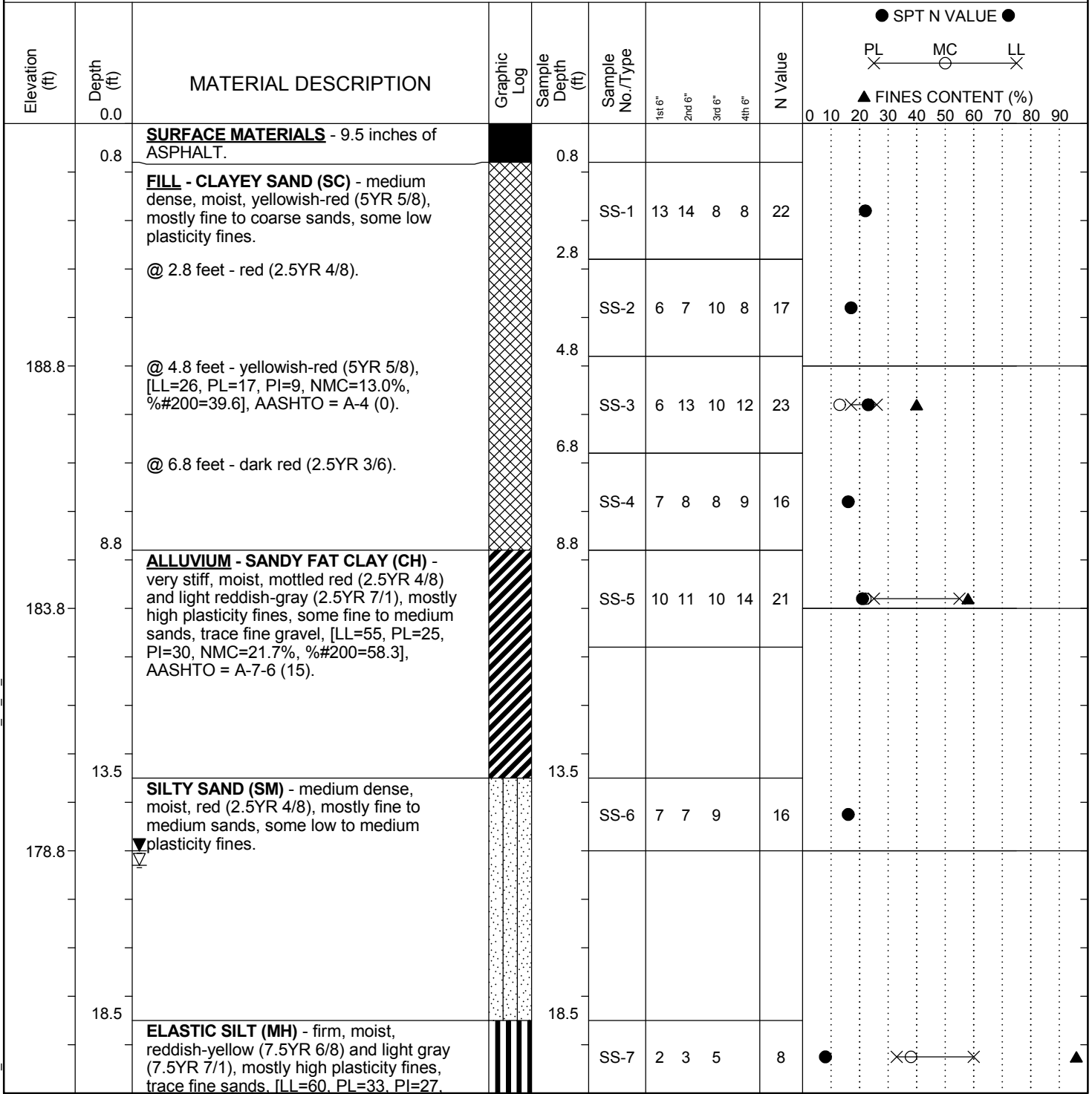
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Nat Shuff/Hunter McKenzie
 Date: 4/9/2018

Boring Number: B-39
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
13.3	1	J	70	VN	No	N/A	Wa	R	
13.8	2	J	70	VN	No	N/A	Wa	R	
14.6	3	J	0	N	No	N/A	Ir	R	
17.1	4	J	50	VN	No	N/A	Wa	SR	
26	5	J	55	N	No	N/A	Pl	R	
26.3	6	J	10	N	No	N/A	Pl	R	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 41
Eng./Geo.: HGM	Boring Location: 11+56.38		Offset: L:7.30'	Alignment: Proposed
Elev.: 193.8 ft	Latitude: 34.020864	Longitude: -81.095111	Date Started: 1/29/2018	
Total Depth: 94 ft	Soil Depth: 76.5 ft	Core Depth: 17.5 ft	Date Completed: 1/30/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB	15.3 ft	24HR: 15 ft



LEGEND

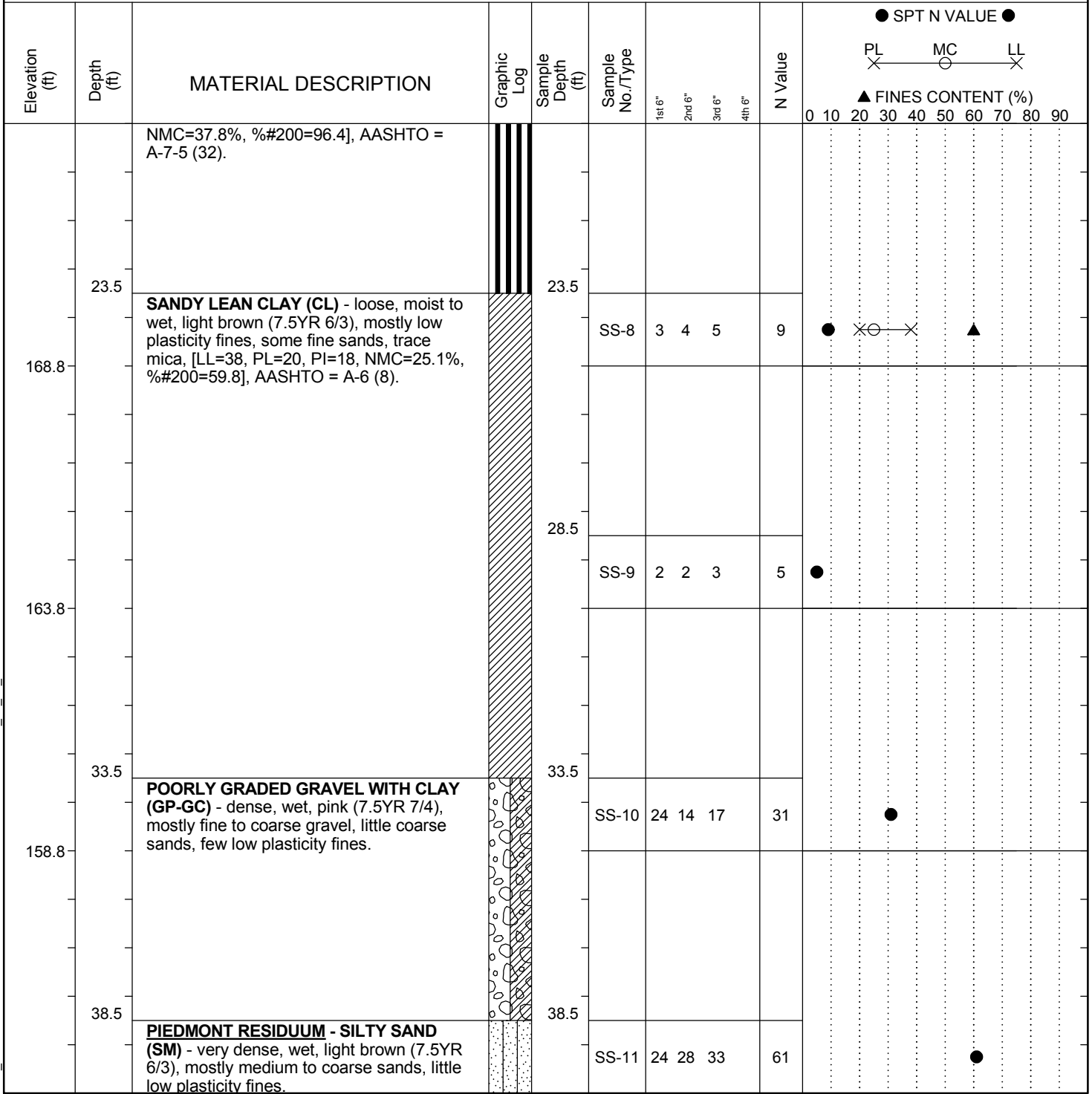
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 41
Eng./Geo.: HGM	Boring Location: 11+56.38		Offset: L:7.30'	Alignment: Proposed
Elev.: 193.8 ft	Latitude: 34.020864	Longitude: -81.095111	Date Started: 1/29/2018	
Total Depth: 94 ft	Soil Depth: 76.5 ft	Core Depth: 17.5 ft	Date Completed: 1/30/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB	15.3 ft	24HR: 15 ft



LEGEND

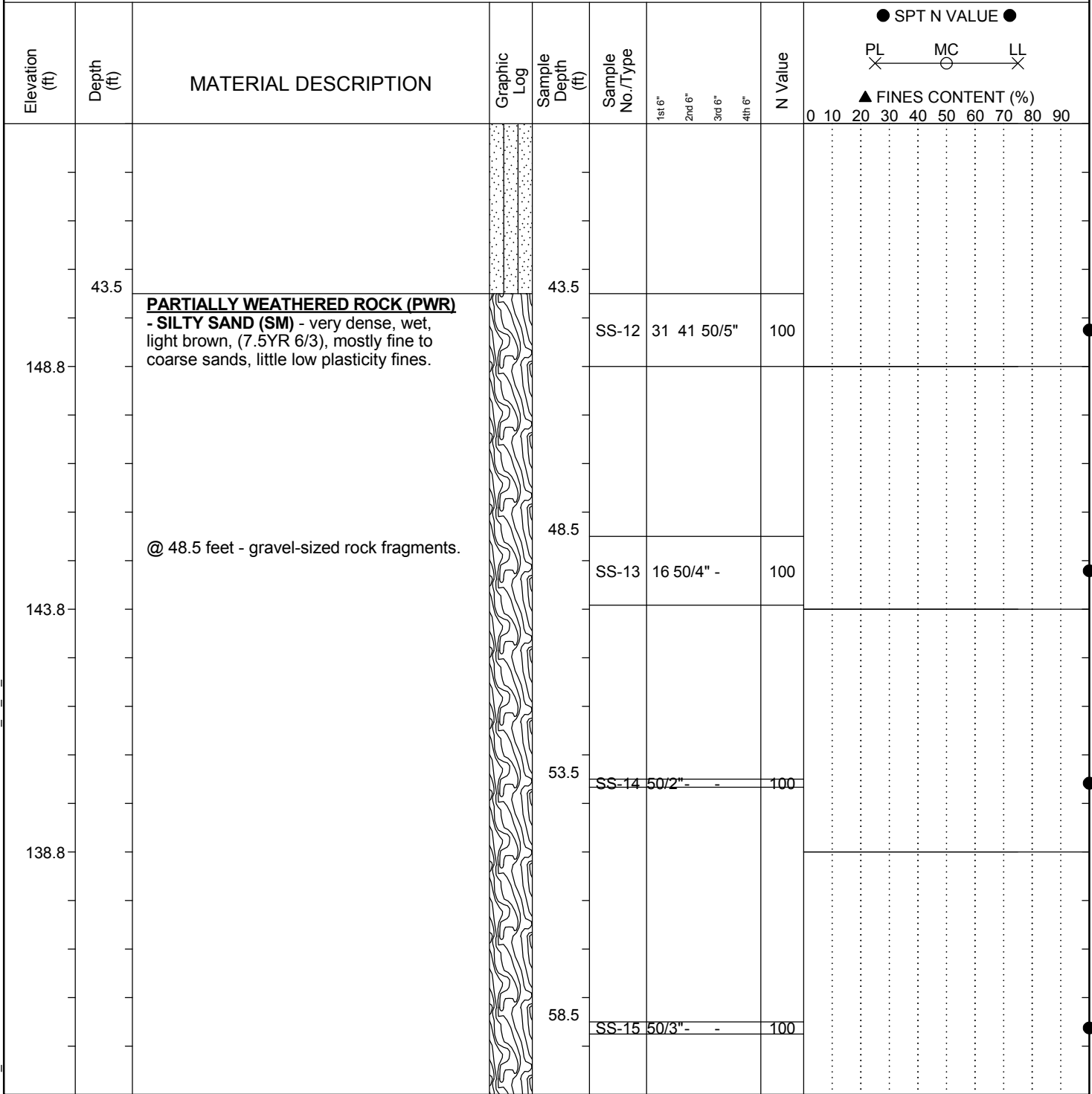
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 41	
Eng./Geo.: HGM	Boring Location: 11+56.38		Offset: L:7.30'	Alignment: Proposed
Elev.: 193.8 ft	Latitude: 34.020864	Longitude: -81.095111	Date Started: 1/29/2018	
Total Depth: 94 ft	Soil Depth: 76.5 ft	Core Depth: 17.5 ft	Date Completed: 1/30/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N)
Drill Machine: CME 55	Drill Method: RW		Hammer Type: Automatic	Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB	15.3 ft	24HR 15 ft



LEGEND

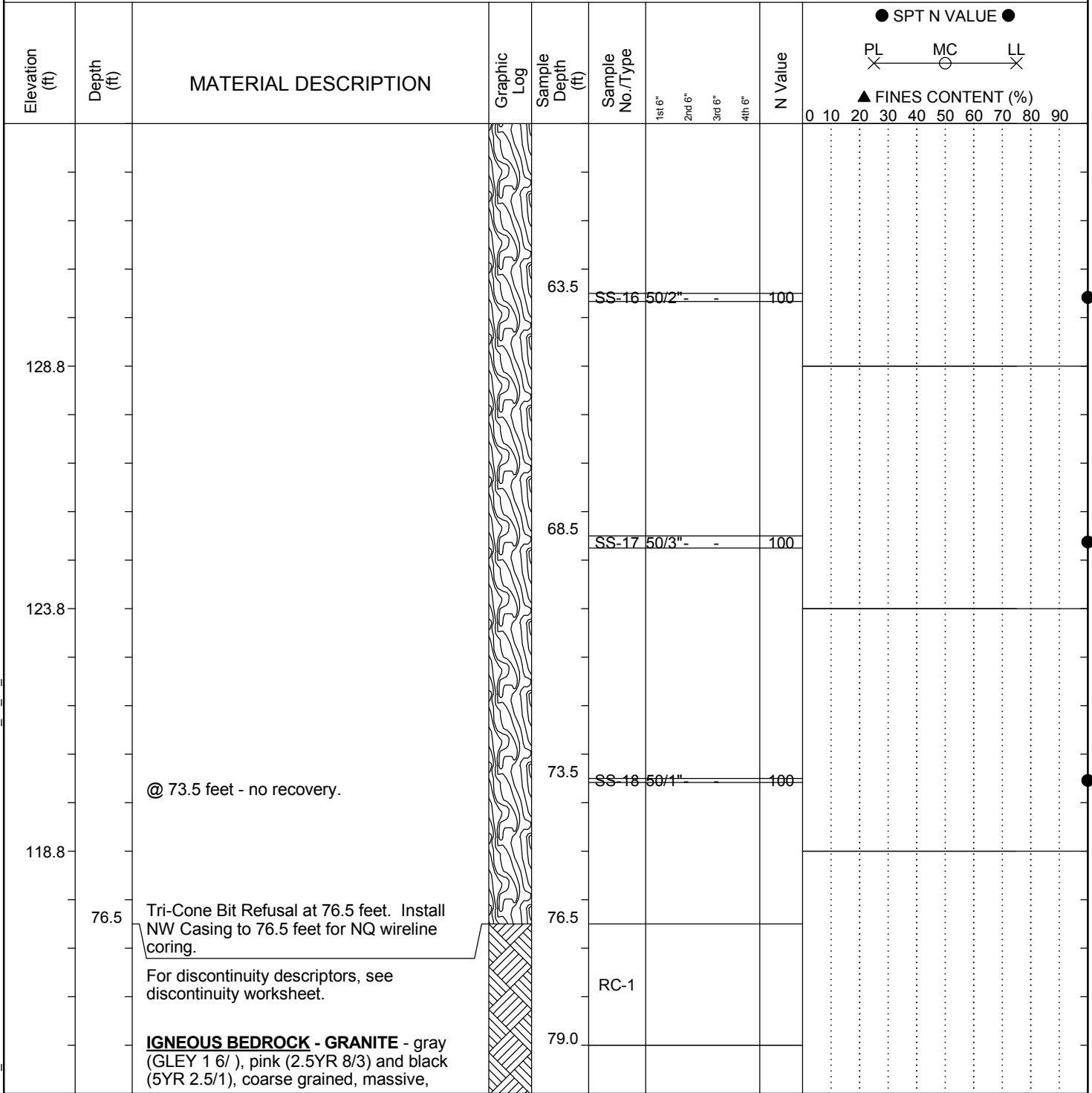
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 41
Eng./Geo.: HGM	Boring Location: 11+56.38		Offset: L:7.30'	Alignment: Proposed
Elev.: 193.8 ft	Latitude: 34.020864	Longitude: -81.095111	Date Started: 1/29/2018	
Total Depth: 94 ft	Soil Depth: 76.5 ft	Core Depth: 17.5 ft	Date Completed: 1/30/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB	15.3 ft	24HR: 15 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 41	
Eng./Geo.: HGM	Boring Location: 11+56.38	Offset: L:7.30'	Alignment: Proposed	
Elev.: 193.8 ft	Latitude: 34.020864	Longitude: -81.095111	Date Started: 1/29/2018	
Total Depth: 94 ft	Soil Depth: 76.5 ft	Core Depth: 17.5 ft	Date Completed: 1/30/2018	
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 15.3 ft	24HR 15 ft	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	LL	
108.8		slightly weathered, medium strong rock. RC-1 : Rec= 96.0%, RQD= 50.0%, GSI= 50-60, RMR= 46. @ 80 feet - fresh, very strong rock. RC-2 : Rec= 92.0%, RQD= 68.0%, GSI= 50-60.			RC-2							
		@ 83.5 feet - slightly weathered, strong rock. @ 84 feet - very coarse grained pegmatitic zone from 84 feet to 89 feet.		84.0								
		@ 85.5 feet - moderately weathered, medium strong rock.			RC-3							
		RC-3 : Rec= 100%, RQD= 70.0%, GSI= 50-60, RMR= 47. @ 88 feet slightly weathered, strong rock.		89.0								
103.8		@ 89 feet - slightly foliated texture from 89 feet to 94 feet.		RC-4								
		RC-4 : Rec= 100%, RQD= 84.0%, GSI= 40-50.										
98.8		Boring Terminated at 94 feet.										

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

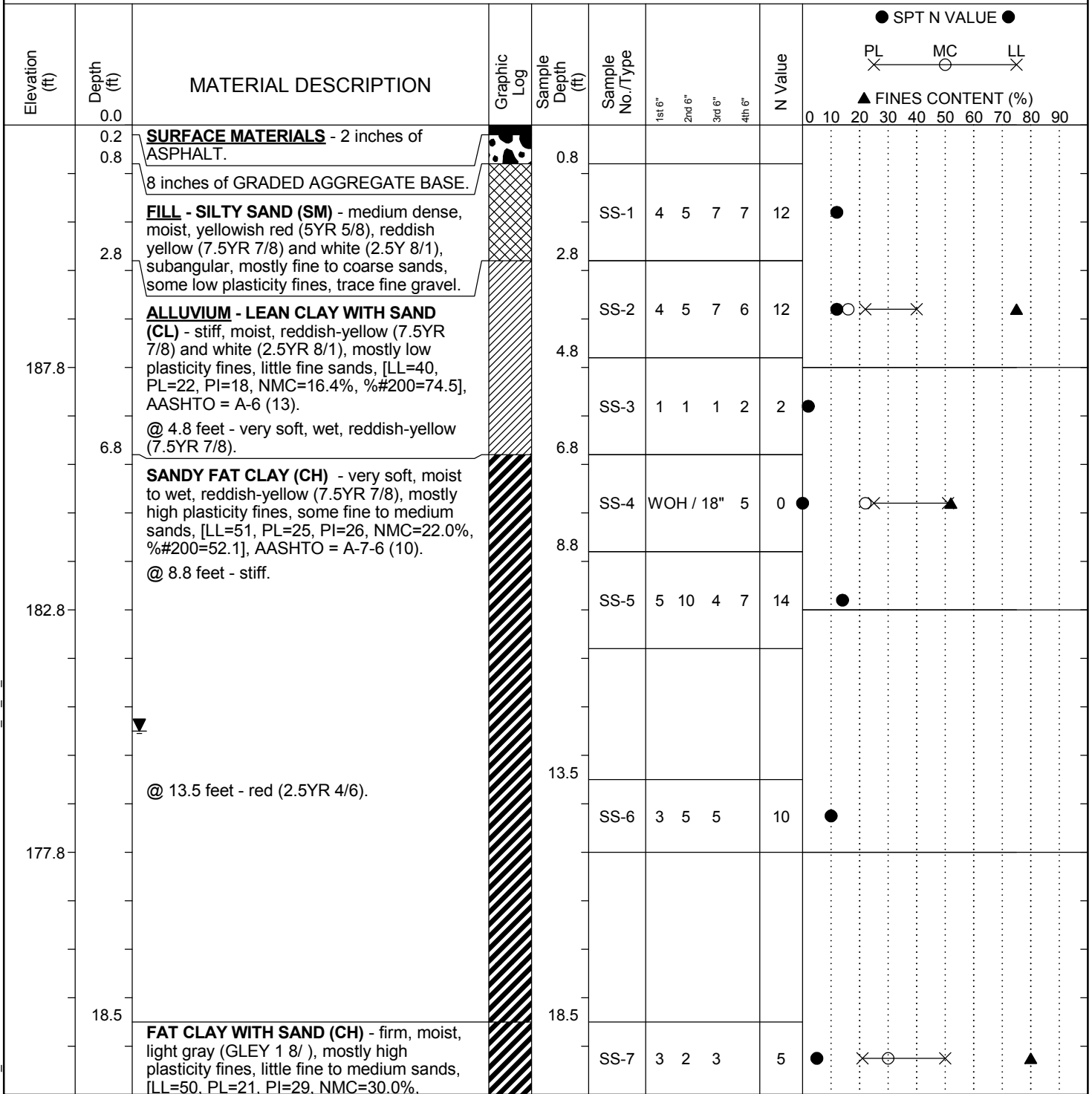
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Hunter McKenzie
 Date: 1/30/2018

Boring Number: B-40
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
76.6	1	J	N/A	N/A	No	N/A	Ir	R	Fractured zone 76.6' to 76.9'
77	2	J	15	VN	Su	Fe	Pl	R	
77.3	3	J	5	N	Su	Fe	Pl	R	
77.4	4	J	5	N	Su	Fe	Pl	R	
77.5	5	J	5	N	Su	Fe	Pl	R	
77.7	6	J	5	N	Su	Fe	Pl	R	
78.5	7	J	20	N	No	N/A	Pl	R	
79.5	8	J	N/A	N/A	No	N/A	Ir	R	Fractured zone 79.5' to 80'
82	9	J	30	N	No	N/A	Pl	R	
83.1	10	J	10	VN	No	N/A	Ir	R	
83.3	11	J	N/A	N/A	No	N/A	Ir	R	Fractured zone 83.3' to 84'
85.1	12	J	65	W	No	N/A	St	R	
85.9	13	J	50	N/A	Fi	Mn	Ir	R	Fractured zone 85.9' to 86.2'
86.5	14	J	65	T	Fi	Mn	St	R	
86.9	15	J	N/A	N/A	Fi	Mn	Ir	R	Fractured zone 86.9' to 87.4'
87.8	16	J	N/A	N/A	No	N/A	Ir	R	Fractured zone 87.8' to 89'
89.5	17	J	25	N	No	N/A	Pl	R	
89.7	18	J	25	N	No	N/A	Pl	R	
89.9	19	J	25	N	No	N/A	Pl	R	
90.7	20	J	25	N	No	N/A	Pl	R	
91.2	21	J	30	N	No	N/A	Wa	R	
91.7	22	J	15	N	No	N/A	Pl	R	
92.6	23	J	25	N	No	N/A	Pl	R	
93.5	24	J	N/A	N/A	No	N/A	Ir	R	Fractured zone 93.5' to 94'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: B-41
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 41
Eng./Geo.: AKS	Boring Location: 12+62.91	Offset: R:51.93'	Alignment: Proposed
Elev.: 192.8 ft	Latitude: 34.020919	Longitude: -81.094715	Date Started: 1/21/2018
Total Depth: 78.5 ft	Soil Depth: 58.5 ft	Core Depth: 20 ft	Date Completed: 1/21/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A	24HR: 12.5 ft



LEGEND

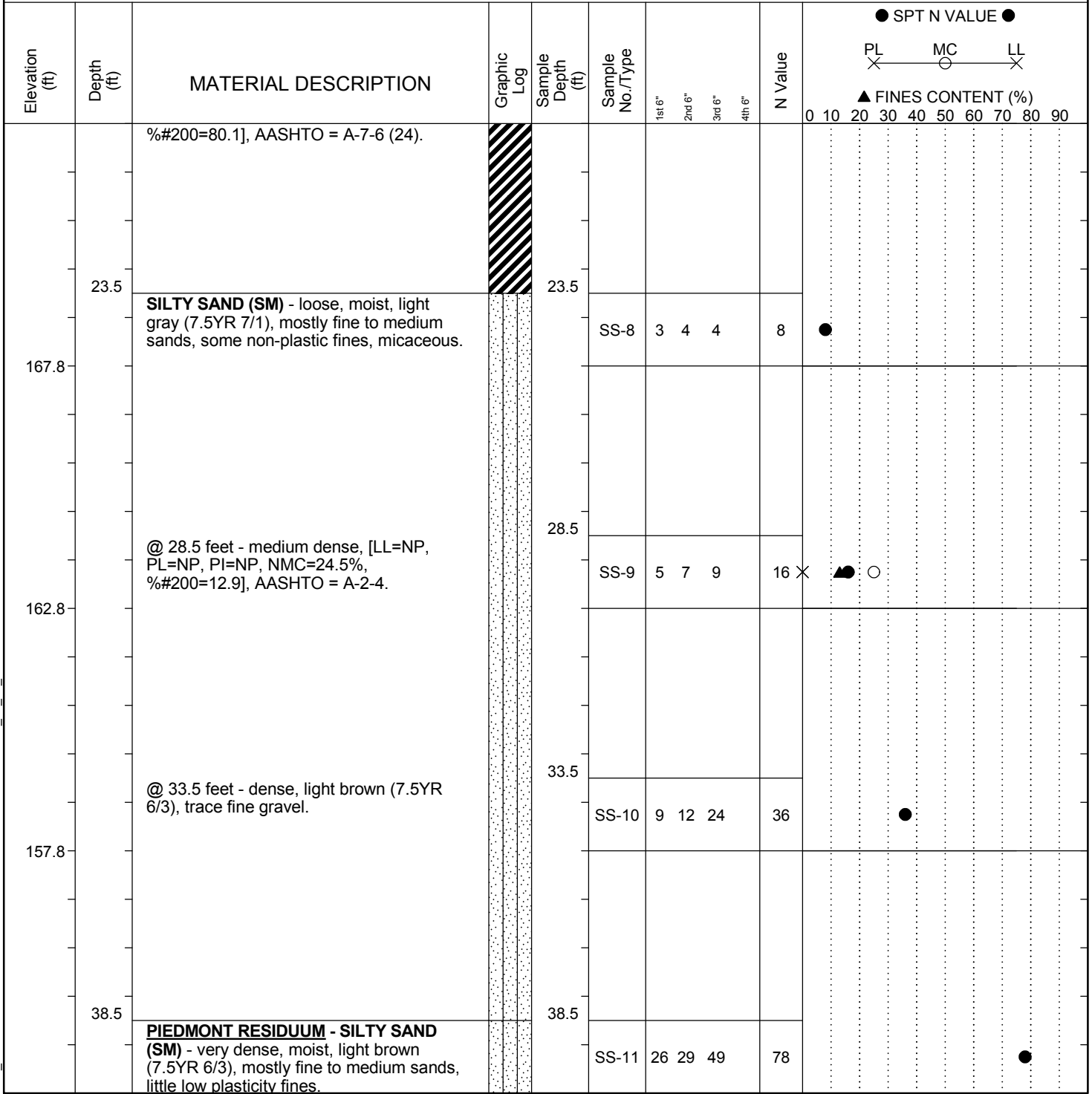
Continued Next Page

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-41
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 41
Eng./Geo.: AKS	Boring Location: 12+62.91	Offset: R:51.93' Alignment: Proposed
Elev.: 192.8 ft	Latitude: 34.020919	Longitude: -81.094715 Date Started: 1/21/2018
Total Depth: 78.5 ft	Soil Depth: 58.5 ft	Core Depth: 20 ft Date Completed: 1/21/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB N/A 24HR: 12.5 ft



LEGEND

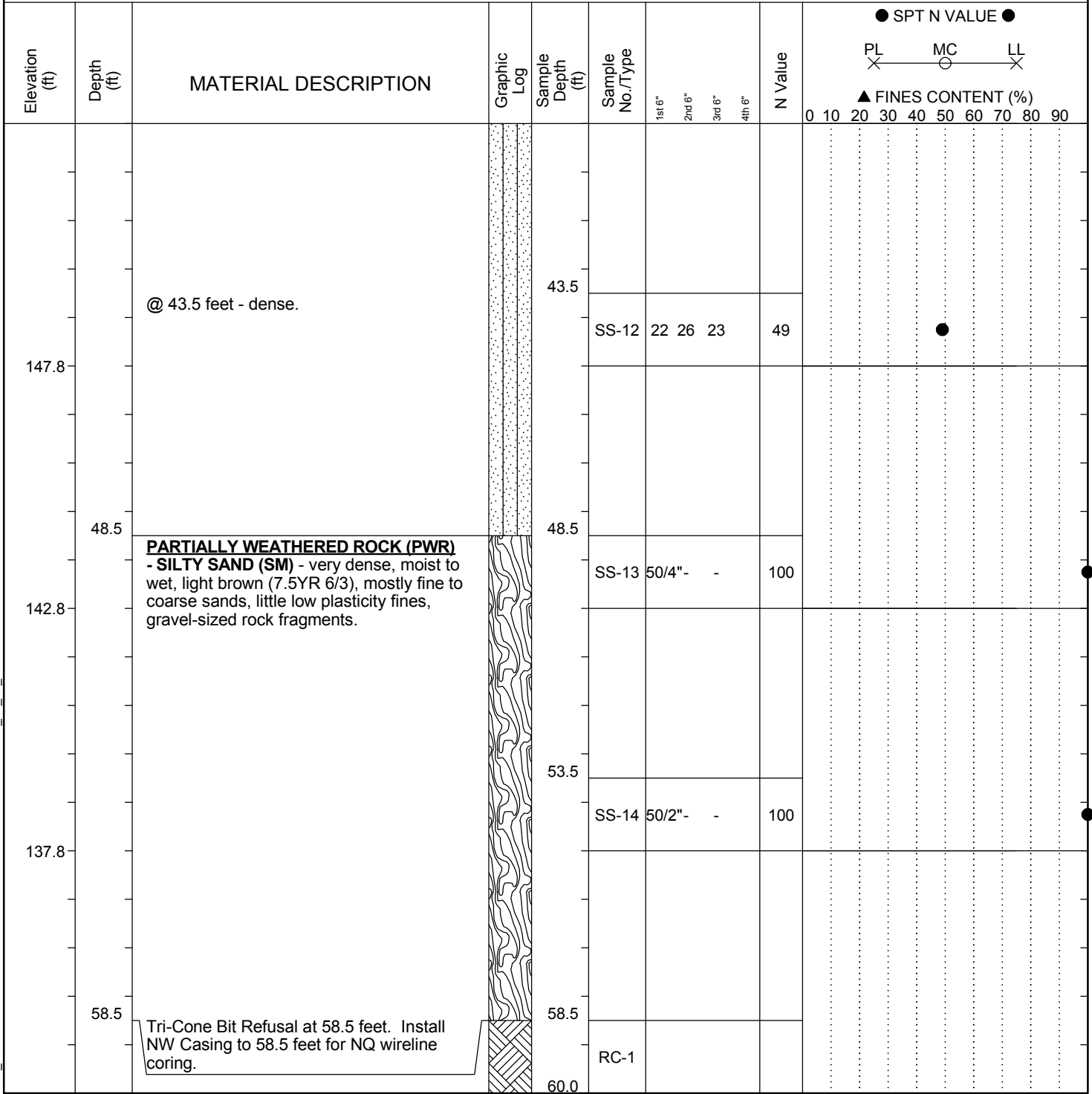
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662				County: Lexington/Richland		Boring No.: B-41	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route: Site 41	
Eng./Geo.: AKS		Boring Location: 12+62.91		Offset: R:51.93'		Alignment: Proposed	
Elev.: 192.8 ft		Latitude: 34.020919		Longitude: -81.094715		Date Started: 1/21/2018	
Total Depth: 78.5 ft		Soil Depth: 58.5 ft		Core Depth: 20 ft		Date Completed: 1/21/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: D-50		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 86.5%	
Core Size: NQ		Driller: J. Millwood		Groundwater: TOB N/A		24HR 12.5 ft	



LEGEND

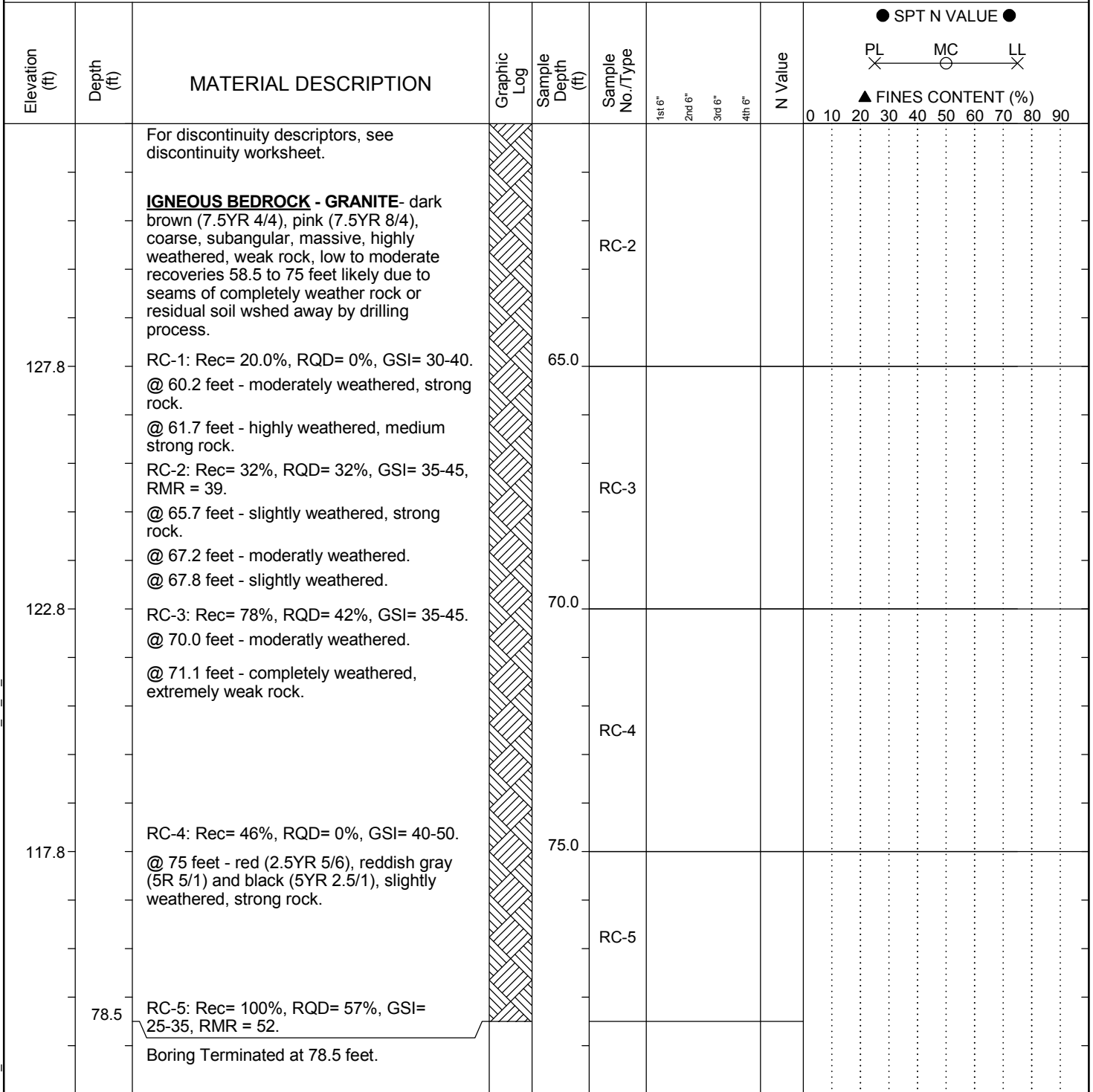
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662	County:	Lexington/Richland	Boring No.:	B-41
Site Description:			Carolina Crossroads I-20/26/126 Corridor Improvement Project	Route:	Site 41
Eng./Geo.:	AKS	Boring Location:	12+62.91	Offset:	R:51.93' Alignment: Proposed
Elev.:	192.8 ft	Latitude:	34.020919	Longitude:	-81.094715
Total Depth:	78.5 ft	Soil Depth:	58.5 ft	Core Depth:	20 ft
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic
Core Size:	NQ	Driller:	J. Millwood	Energy Ratio:	86.5%
Groundwater:	TOB	24HR:	N/A	12.5 ft	



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	



Rock Core Discontinuity Worksheet

Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 1/21/2018

Boring Number: B-41
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
60.1	1	J	N/A	N/A	No	N/A	lr	SR	
61.7	2	J	N/A	N/A	No	N/A	lr	SR	
65.2	3	J	0	N/A	No	N/A	Pl	SR	
66	4	J	79	N/A	No	N/A	Pl	SR	
67.3	5	J	N/A	N/A	No	N/A	lr	SR	
68.9	6	J	N/A	N/A	No	N/A	lr	SR	
75.4	7	J	4	N/A	No	N/A	Pl	SR	
76.7	8	J	N/A	N/A	No	N/A	lr	SR	
77.5	9	J	21	N/A	No	N/A	Pl	SR	

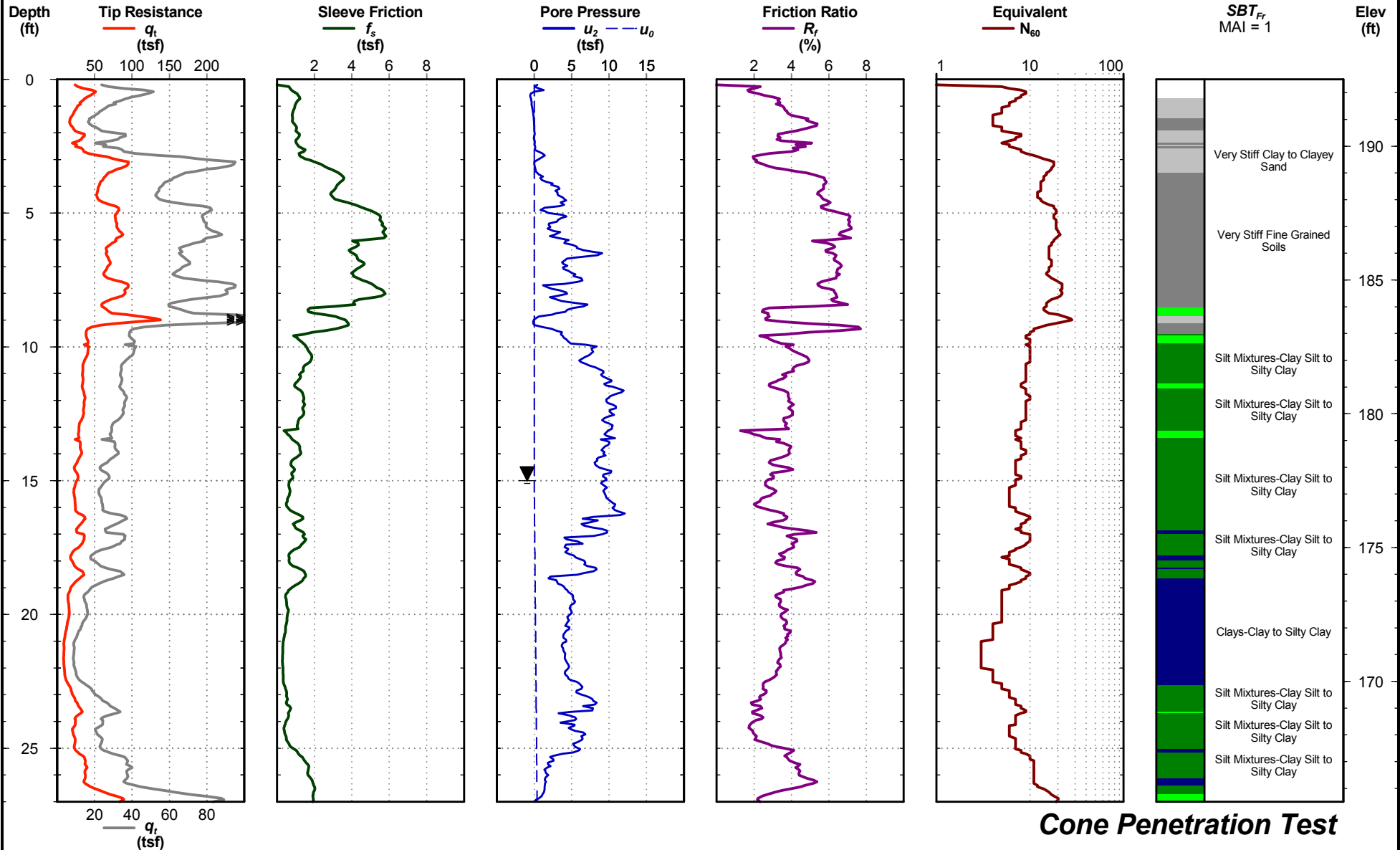


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.020917
 Longitude: -81.094728
 Elevation: 192.5 ft MSL
 Date: Jun. 4, 2018
 Estimated Water Depth: 15 ft
 Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B41

Total Depth: 37.0 ft
 Termination Criteria: Maximum Reaction Force
 Cone Size: 1.75



CPT REPORT - STANDARD - SBT FR \ 1461-16-047 CPT LOGS - HGM 7-16-18.GPJ \ S&ME.GDT \ 8/2/18

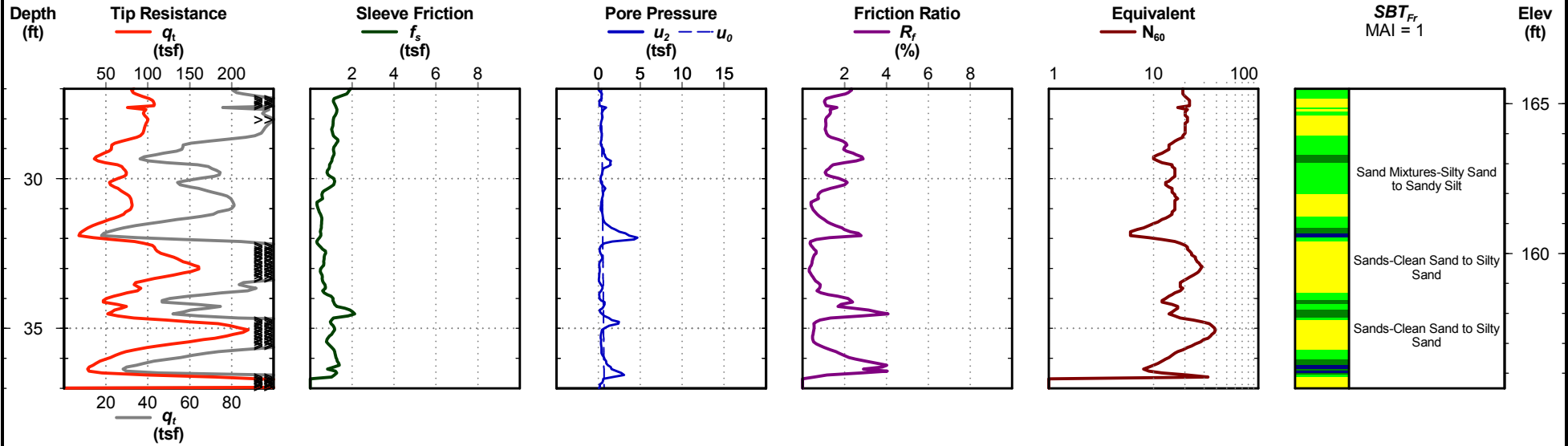


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.020917
Longitude: -81.094728
Elevation: 192.5 ft MSL
Date: Jun. 4, 2018
Estimated Water Depth: 15 ft
Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B41

Total Depth: 37.0 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



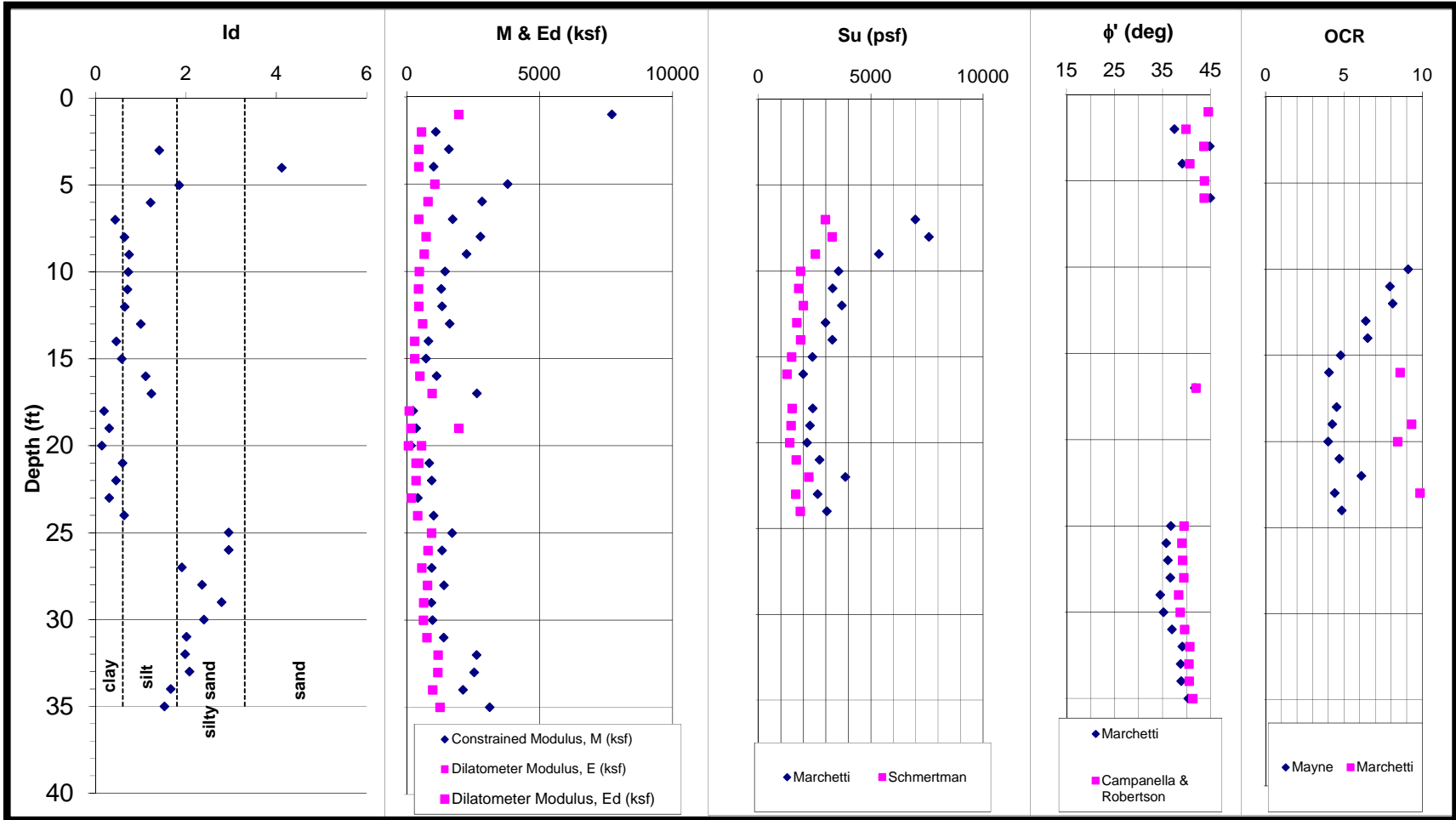
CPT REPORT - STANDARD - SBT FR \ 1461-16-047 CPT LOGS - HGM 7-16-18.GPJ \ S&ME.GDT \ 8/2/18

Cone Penetration Test



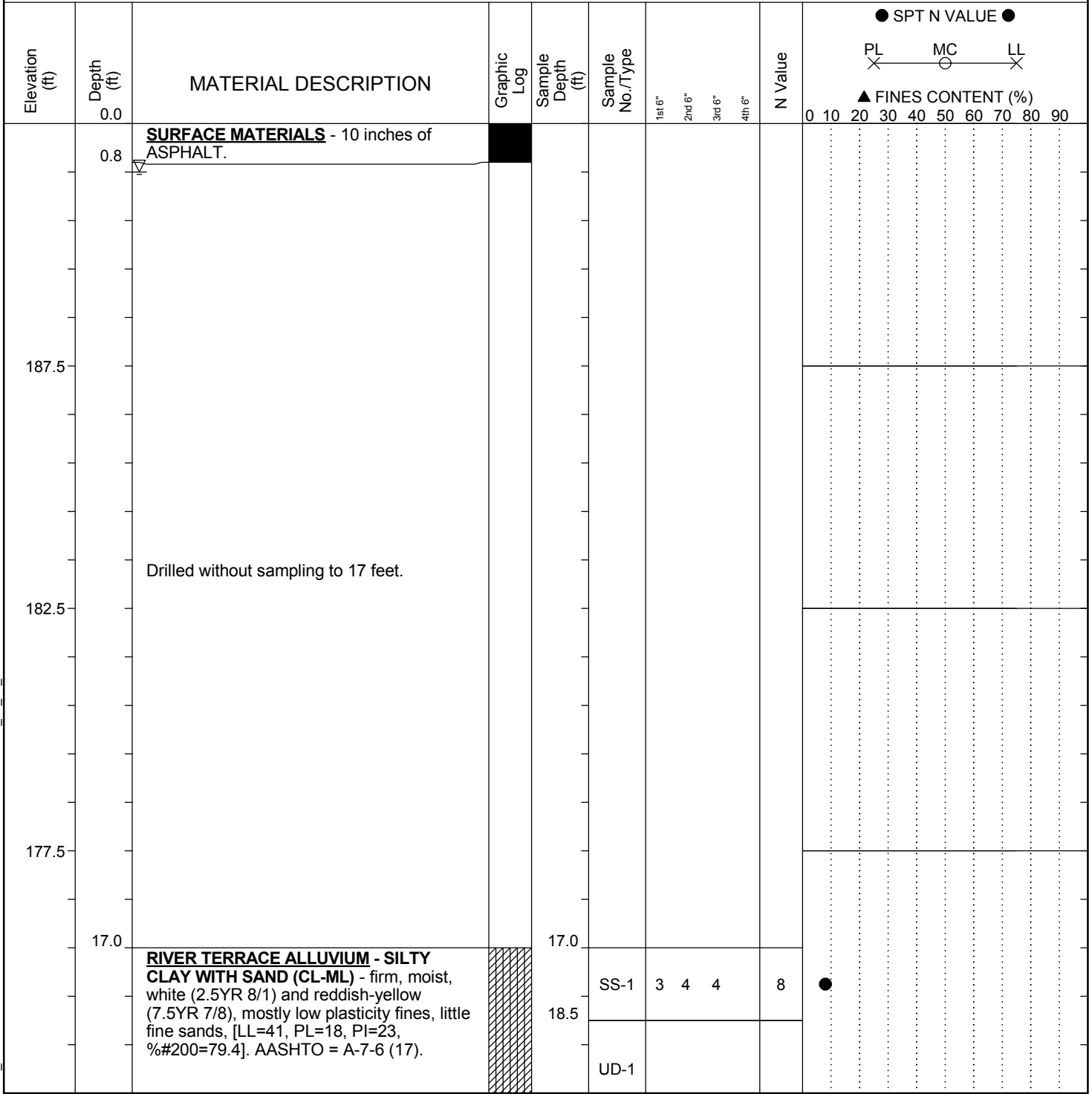
DILATOMETER TEST RESULTS

Test ID: DMT-B41
Site: Carolina Crossroads I-20/I-26/I-126 Improvement Project
Location: Lexington and Richland Counties, South Carolina
Project No.: 1461-16-047



SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-41UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 41
Eng./Geo.: NGS	Boring Location: 12+61.44	Offset: R:57.82
Elev.: 192.5 ft	Latitude: 34.020904	Longitude: -81.094706
Total Depth: 24.5 ft	Soil Depth: 24.5 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 4.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: N/A	Driller: T. Miller	Groundwater: TOB 1 ft
		Energy Ratio: 84.1%
		24HR: N/A
		Date Started: 3/26/2018
		Date Completed: 3/26/2018
		Liner Used: Y (N)



LEGEND

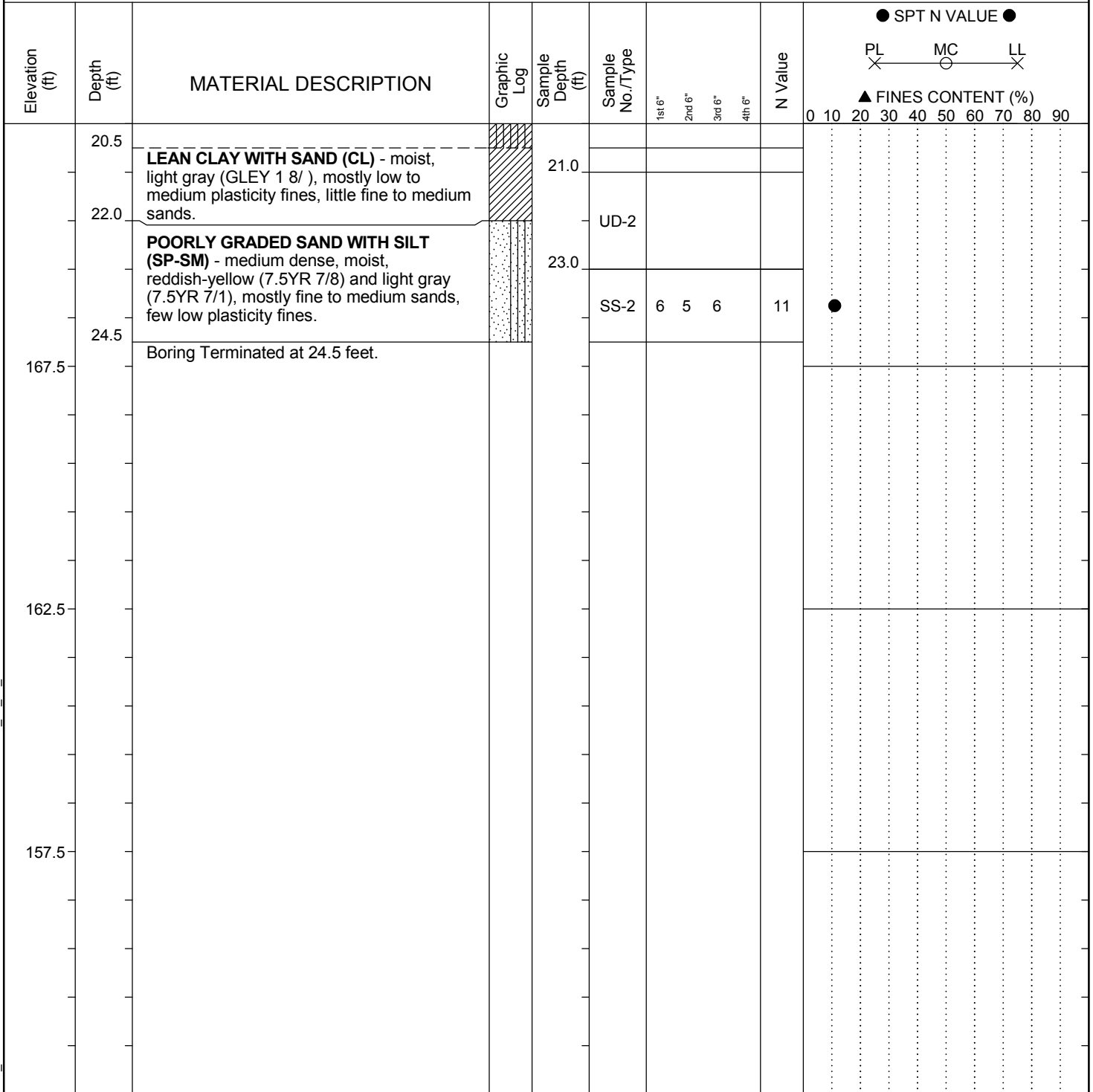
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-41UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 41
Eng./Geo.: NGS	Boring Location: 12+61.44	Offset: R:57.82
Elev.: 192.5 ft	Latitude: 34.020904	Longitude: -81.094706
Total Depth: 24.5 ft	Soil Depth: 24.5 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 4.5		Sampler Configuration: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: N/A	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: N/A



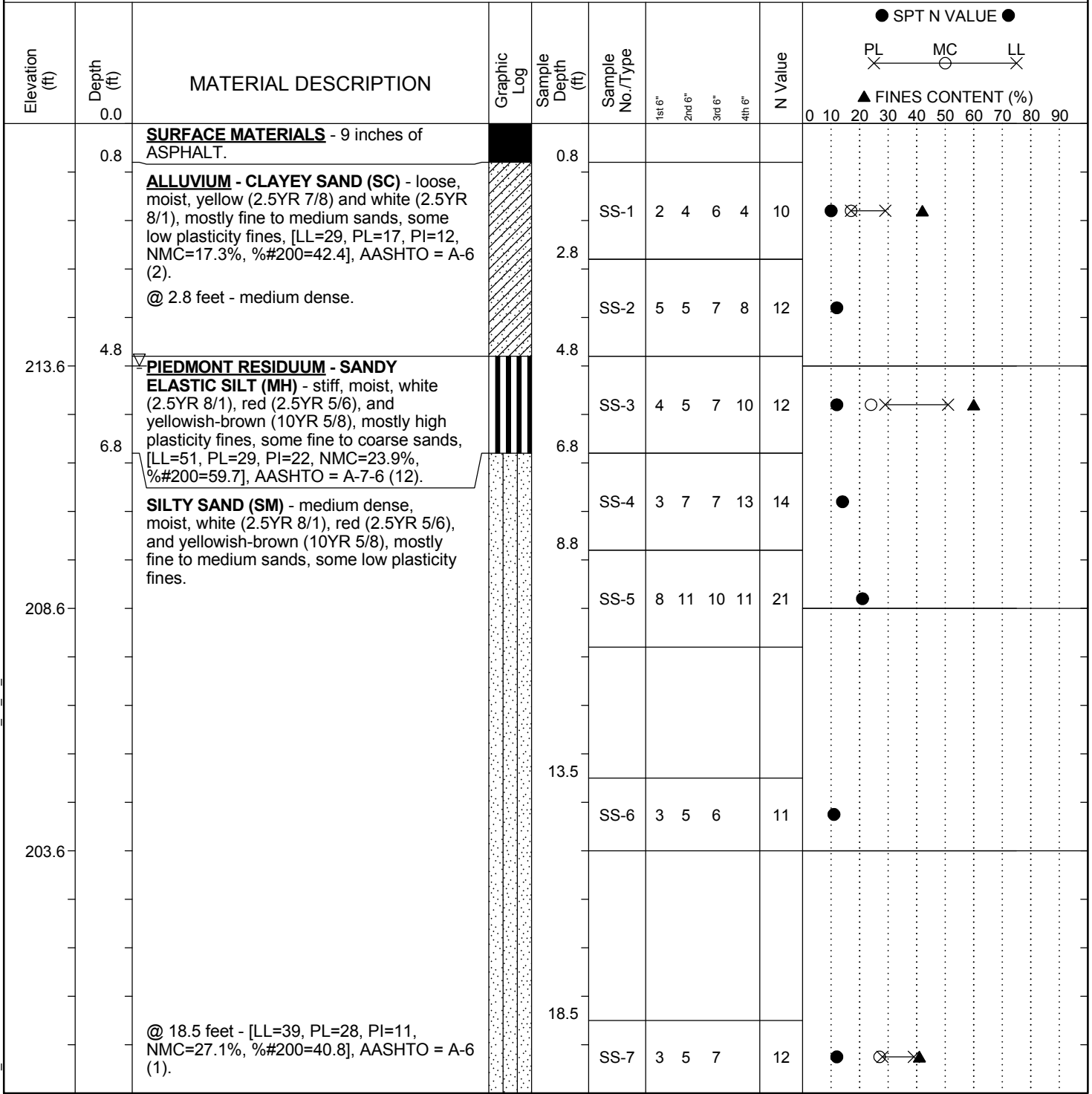
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 42
Eng./Geo.: NGS	Boring Location: 15+14.99	Offset: L:70.78' Alignment: Proposed
Elev.: 218.6 ft	Latitude: 34.021612	Longitude: -81.094321
Total Depth: 87 ft	Soil Depth: 66.5 ft	Core Depth: 20.5 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 5 ft 24HR 21 ft



LEGEND

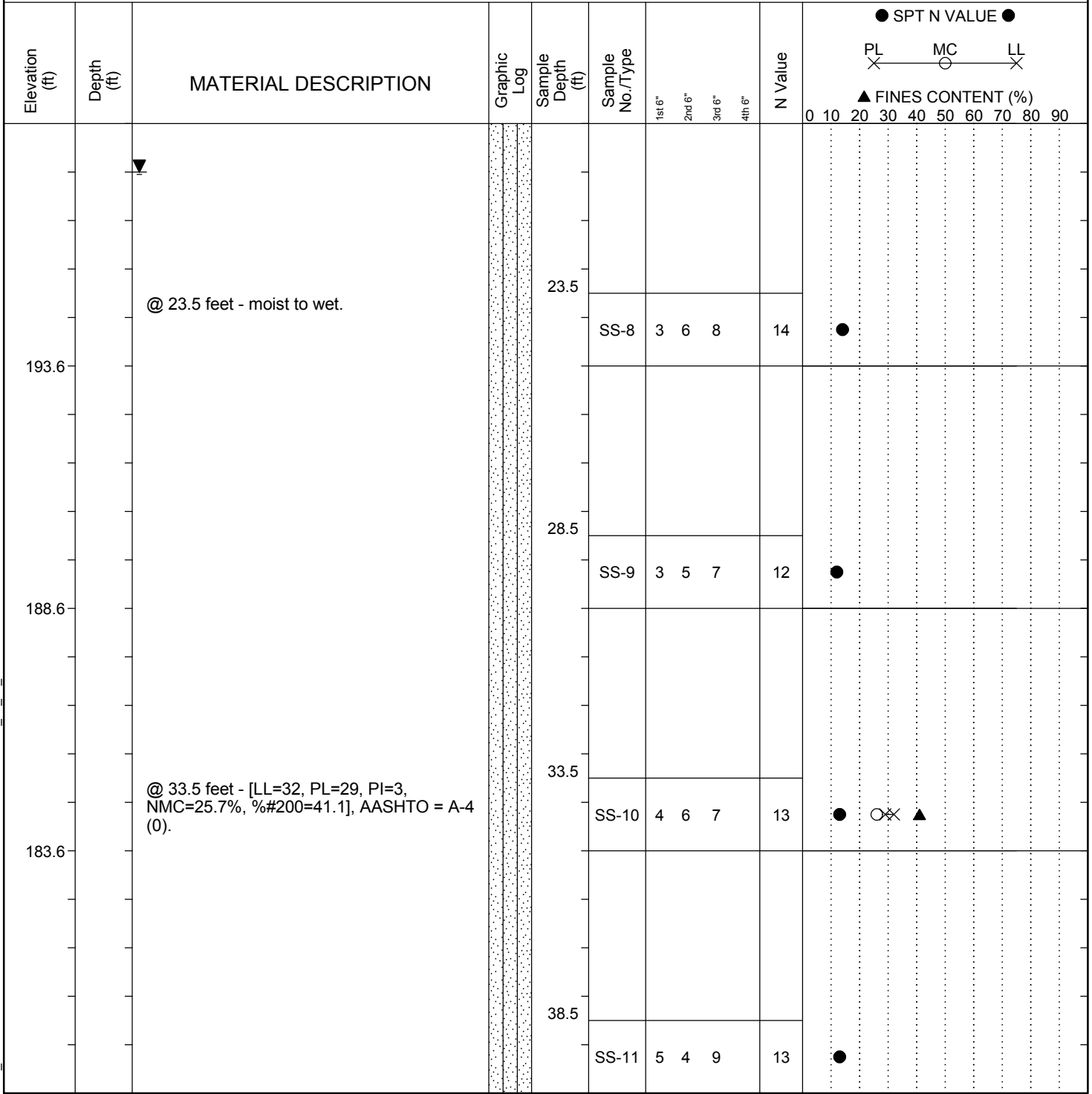
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 42
Eng./Geo.: NGS	Boring Location: 15+14.99	Offset: L:70.78' Alignment: Proposed
Elev.: 218.6 ft	Latitude: 34.021612	Longitude: -81.094321 Date Started: 3/1/2018
Total Depth: 87 ft	Soil Depth: 66.5 ft	Core Depth: 20.5 ft Date Completed: 3/2/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 5 ft 24HR 21 ft



LEGEND

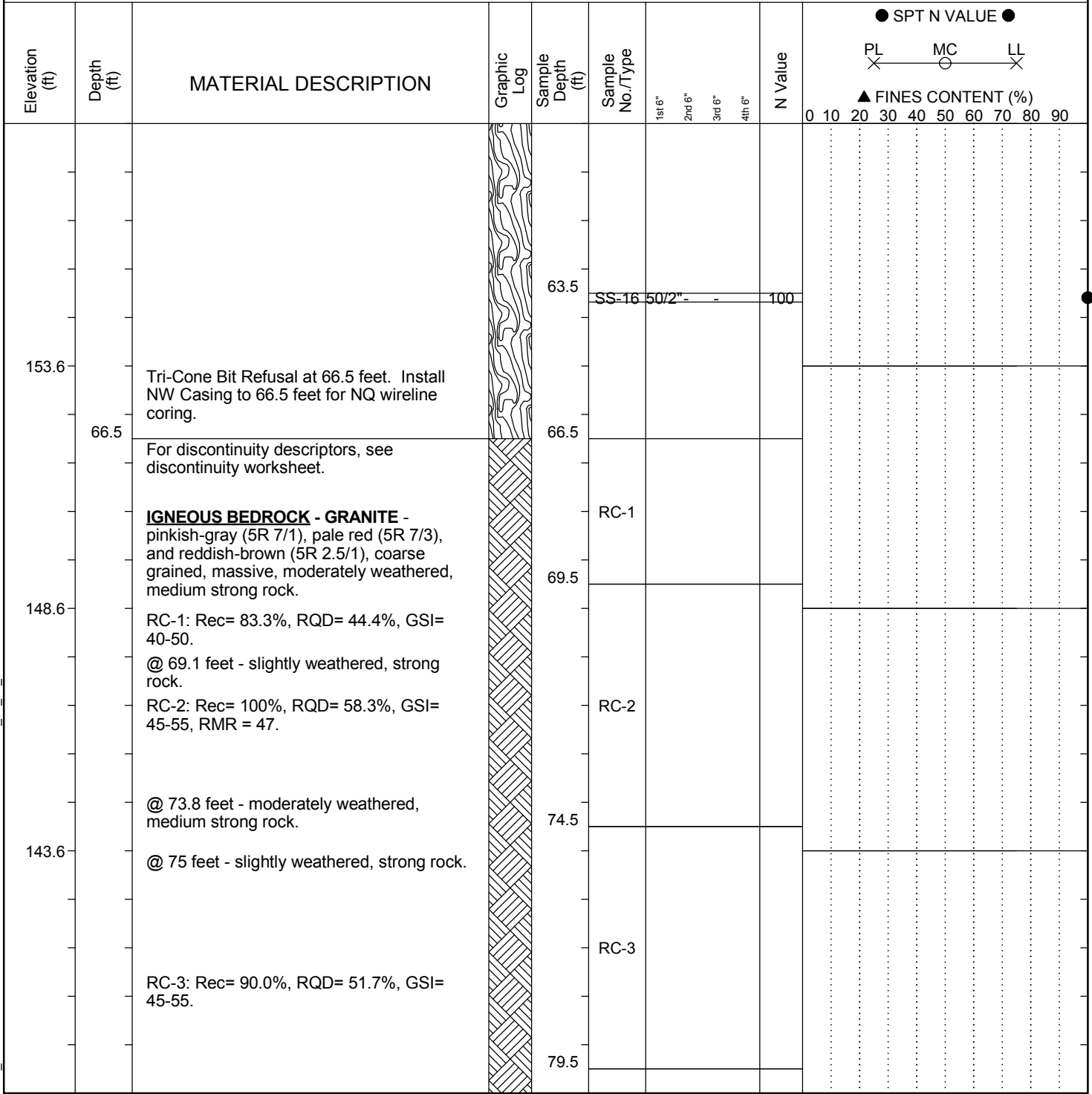
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 42
Eng./Geo.: NGS	Boring Location: 15+14.99	Offset: L:70.78' Alignment: Proposed
Elev.: 218.6 ft	Latitude: 34.021612	Longitude: -81.094321 Date Started: 3/1/2018
Total Depth: 87 ft	Soil Depth: 66.5 ft	Core Depth: 20.5 ft Date Completed: 3/2/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 5 ft 24HR 21 ft



LEGEND Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 42	
Eng./Geo.: NGS	Boring Location: 15+14.99		Offset: L:70.78'	Alignment: Proposed
Elev.: 218.6 ft	Latitude: 34.021612	Longitude: -81.094321	Date Started: 3/1/2018	
Total Depth: 87 ft	Soil Depth: 66.5 ft	Core Depth: 20.5 ft	Date Completed: 3/2/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: NQ	Driller: T. Miller	Groundwater: TOB	5 ft 24HR 21 ft	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	MC	LL	▲ FINES CONTENT (%)						
133.6		RC-4: Rec= 100%, RQD= 65.0%, GSI= 35-45, RMR = 52.		84.5	RC-4														
87.0		RC-5: Rec= 100%, RQD= 83.3%, GSI= 35-45. Boring Terminated at 87 feet.				RC-5													
128.6																			
123.6																			

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

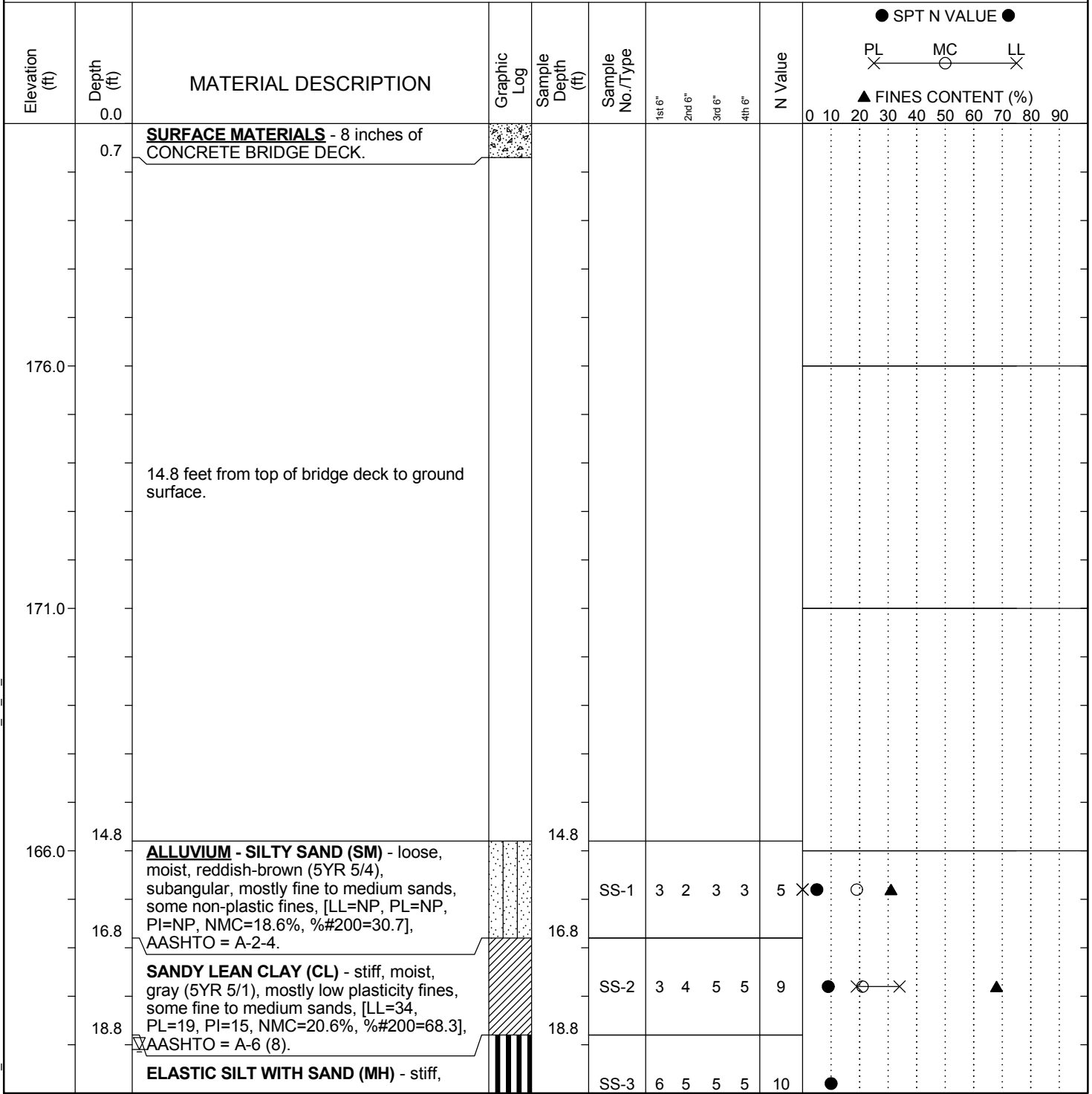
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Nat Shuff
 Date: 3/1/2018

Boring Number: B-42
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
66.5	1	J	N/A	N/A	Pa	Cl/Sd	N/A	R	Fractured zone 66.5' - 68'
68	2	J	70	VN	Sp	Cl/Sd	Ir	R	
68.3	3	J	40	VN	Sp	Cl/Sd	Ir	SR	
68.5	4	J	40	N	Sp	Sd	Ir	R	
69	5	J	50	N	Sp	Sd	St	VR	
70.5	6	J	60	VN	Su	Fe	Pl	SR	
71.5	7	J	30	VN	No	N/A	Pl	R	
72	8	J	40	N	No	N/A	Ir	R	
72.5	9	J	30	VN	Pa	Sd	Ir	R	
72.7	10	J	60	VN	Pa	Sd	Ir	R	
73	11	J	15	N	Pa	Sd	Ir	R	
73.2	12	J	30	VN	Pa	Sd	Ir	R	
73.7	13	J	N/A	N/A	Pa	Sd	Ir	R	Fractured zone 73.7' - 74.5'
74.5	14	J	90	VN	Pa	Sd	Ir	R	
74.7	15	J	15	VN	No	N/A	Ir	R	
74.9	16	J	40	VN	Pa	Cl/Sd	Ir	R	
75.6	17	J	15	N	No	N/A	Ir	R	
75.8	18	J	20	VN	No	N/A	Ir	R	
76	19	J	50	VN	No	N/A	Ir	R	
76.5	20	J	40	VN	Pa	Cl/Sd	Ir	SR	
77.1	21	J	35	N	No	N/A	Ir	R	
77.3	22	J	40	VN	No	N/A	Ir	R	
77.5	23	J	75	VN	Pa	Cl	Ir	SR	
78.5	24	J	15	N	Pa	Sd	Ir	R	
78.6	25	J	40	N	Pa	Sd	Ir	R	
80.5	26	J	40	VN	No	N/A	Pl	SR	
80.8	27	J	30	VN	Pa	Sd	Ir	SR	
81.5	28	J	40	VN	No	N/A	Pl	SR	
81.7	29	J	N/A	N/A	Pa	Sd	Ir	R	Fractured zone 81.7' - 82.5'
82	30	J	40	N	No	N/A	Ir	R	
83.1	31	J	55	N	Su	Fe	Pl	SR	
83.6	32	J	55	N	Pa	Sd	St	R	
84.3	33	J	N/A	N/A	Pa	Sd	Ir	R	Fractured zone 84.3' - 84.5'
84.6	34	J	40	N/A	Pa	Cl/Sd/Fe	Pl	SR	
85.7	35	J	5	VN	No	N/A	Ir	R	
86.3	36	J	40	VN	Su	Fe	Pl	SR	
86.4	37	J	45	N/A	Su	Fe	Ir	R	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-43
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: AKS	Boring Location: 395+13.46	Offset: R:34.908'
Alignment: Proposed	Date Started: 2/26/2018	Date Completed: 2/26/2018
Elev.: 181.0 ft	Latitude: 34.024263	Longitude: -81.103418
Total Depth: 73 ft	Soil Depth: 53 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: D-50	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.5%	Core Size: NQ
Driller: J. Millwood	Groundwater: TOB	19.1 ft
24HR: N/A		



LEGEND

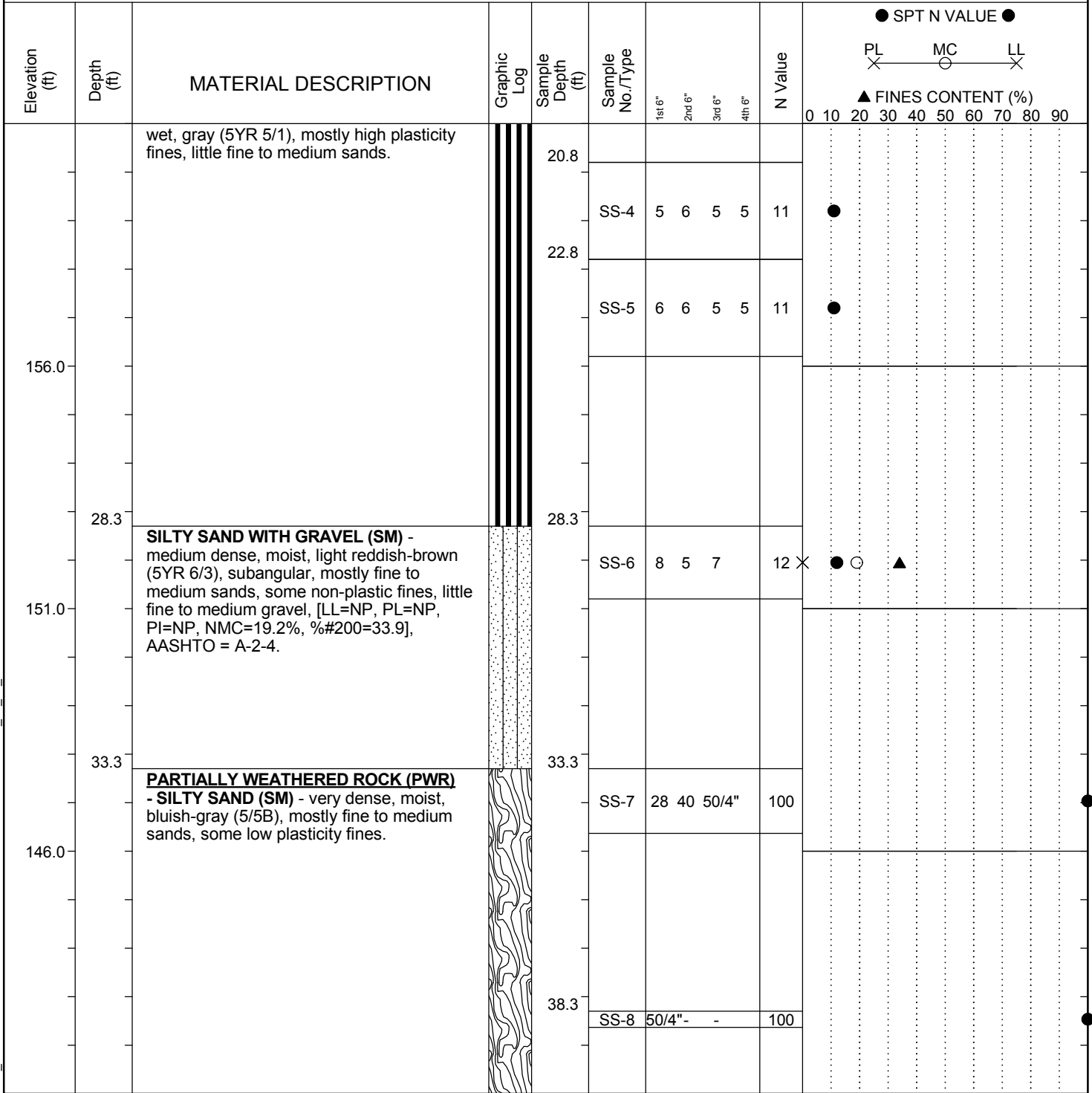
Continued Next Page

SAMPLER TYPE	DRILLING METHOD
SS - Split Spoon	HSA - Hollow Stem Auger
UD - Undisturbed Sample	RW - Rotary Wash
AWG - Rock Core, 1-1/8"	CFA - Continuous Flight Augers
NQ - Rock Core, 1-7/8"	DC - Driving Casing
CU - Cuttings	RW - Rotary Wash
CT - Continuous Tube	RC - Rock Core

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-43
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 33	
Eng./Geo.: AKS	Boring Location: 395+13.46		Offset: R:34.908'	Alignment: Proposed
Elev.: 181.0 ft	Latitude: 34.024263	Longitude: -81.103418	Date Started: 2/26/2018	
Total Depth: 73 ft	Soil Depth: 53 ft	Core Depth: 20 ft	Date Completed: 2/26/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB	19.1 ft 24HR: N/A	



LEGEND

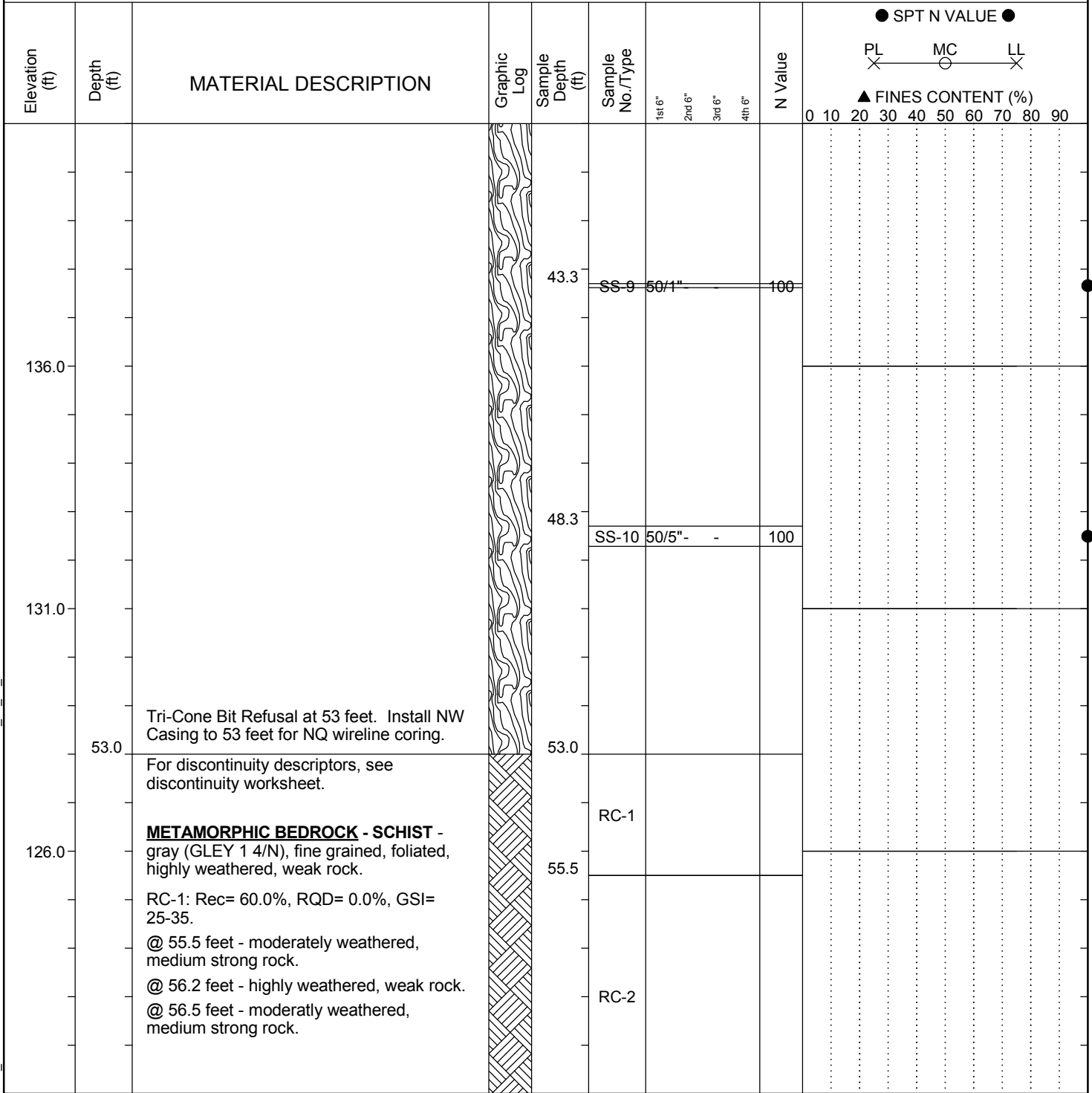
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-43
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: AKS	Boring Location: 395+13.46	Offset: R:34.908'
Alignment: Proposed	Date Started: 2/26/2018	Date Completed: 2/26/2018
Elev.: 181.0 ft	Latitude: 34.024263	Longitude: -81.103418
Total Depth: 73 ft	Soil Depth: 53 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: D-50	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.5%	Groundwater: TOB 19.1 ft
Core Size: NQ	Driller: J. Millwood	24HR: N/A



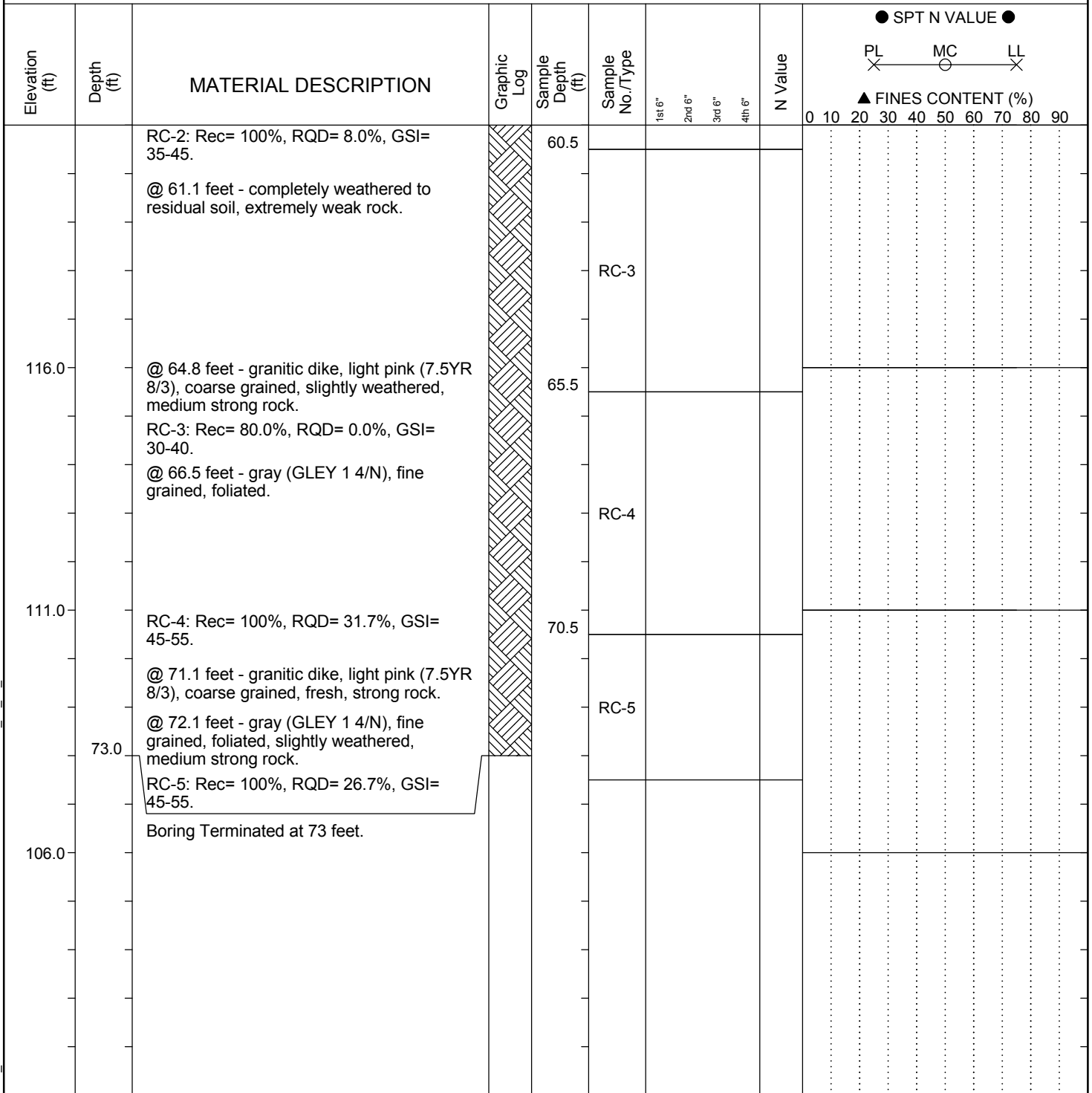
LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID:	P027662		County:	Lexington/Richland	Boring No.:	B-43		
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route:	Site 33		
Eng./Geo.:	AKS	Boring Location:	395+13.46	Offset:	R:34.908'	Alignment:	Proposed	
Elev.:	181.0 ft	Latitude:	34.024263	Longitude:	-81.103418	Date Started:	2/26/2018	
Total Depth:	73 ft	Soil Depth:	53 ft	Core Depth:	20 ft	Date Completed:	2/26/2018	
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%	
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB	19.1 ft	24HR	N/A



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

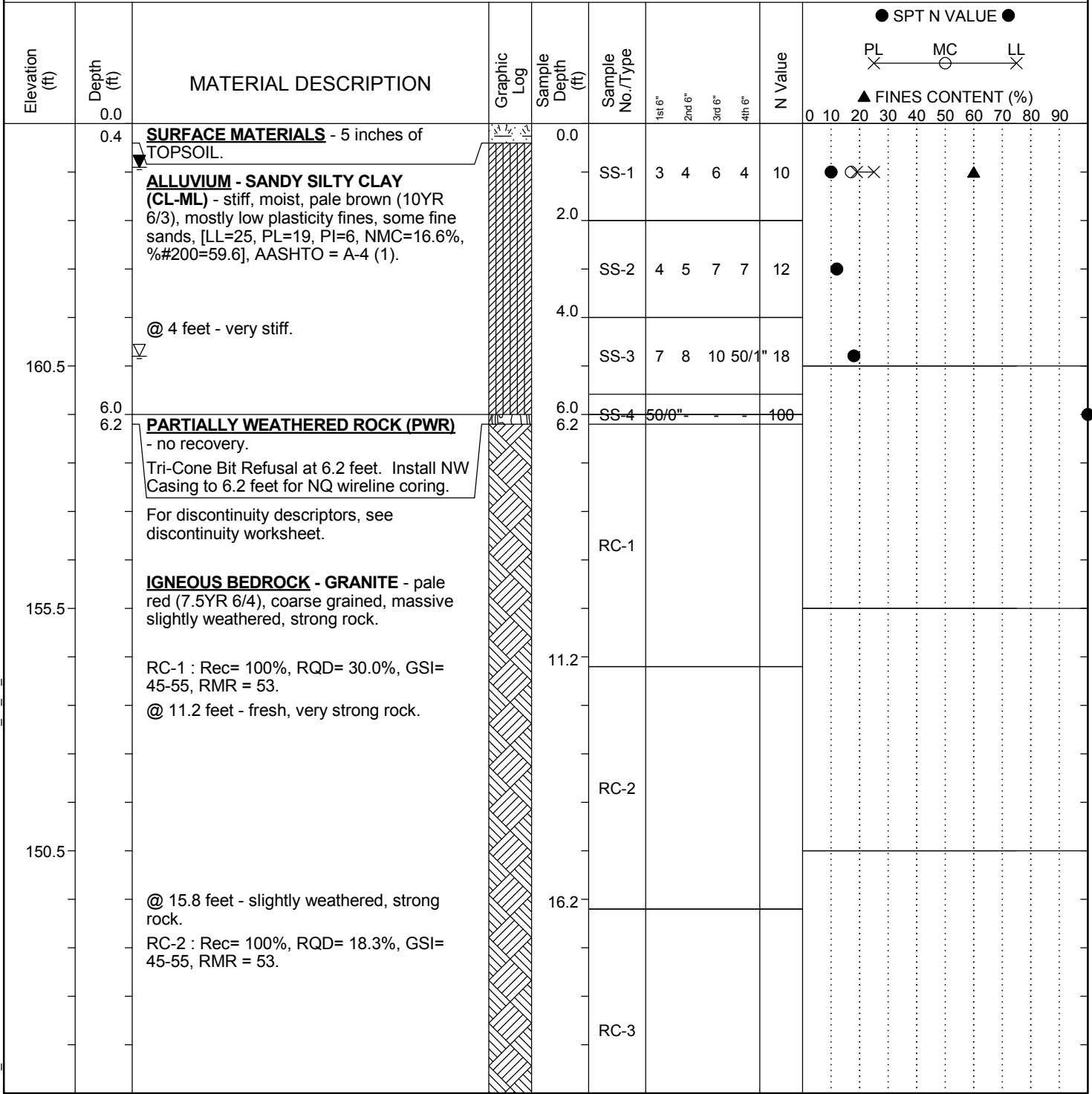
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 2/26/2018

Boring Number: B-43
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
53	1	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 53' - 55.5'
55.9	2	J	15	W	No	N/A	Ir	SR	
56.2	3	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 56.2' - 56.5'
26.6	4	J	15	MW	No	N/A	Ir	SR	
26.9	5	J	10	W	No	N/A	Pl	SR	
57.3	6	J	10	VN	No	N/A	Ir	SR	
57.5	7	J	N/A	N/A	No	N/A	Pl	SR	Fractured zone 57.5' - 58'
58.1	8	J	0	N/A	No	N/A	Ir	SR	
58.5	9	J	15	N/A	No	N/A	Pl	SR	
59	10	J	25	N/A	No	N/A	Pl	SR	
59.1	11	J	0	N/A	No	N/A	N/A	SR	
59.5	12	J	N/A	N/A	No	N/A	St	SR	Fractured zone 59.5' - 64.8'
65	13	J	20	VN	No	N/A	Pl	SR	
65.2	14	J	45	VN	No	N/A	Ir	SR	
65.7	15	J	40	N	No	N/A	Ir	SR	
66.5	16	J	10	N/A	No	N/A	Ir	SR	Fractured zone 66.5' - 67.5'
67.8	17	J	20	W	No	N/A	Pl	SR	
69	18	J	10	MW	No	N/A	Pl	SR	
69.6	19	J	15	N	No	N/A	Pl	SR	
69.7	20	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 69.7' - 71'
72	21	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 72' - 73'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-44
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: AKS	Boring Location: 398+36.32	Offset: L:98.897'
Elev.: 165.5 ft	Latitude: 34.023303	Longitude: -81.103422
Total Depth: 26.2 ft	Soil Depth: 6.2 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 4.8 ft
		Energy Ratio: 86.5%
		24HR: 0.9 ft



LEGEND

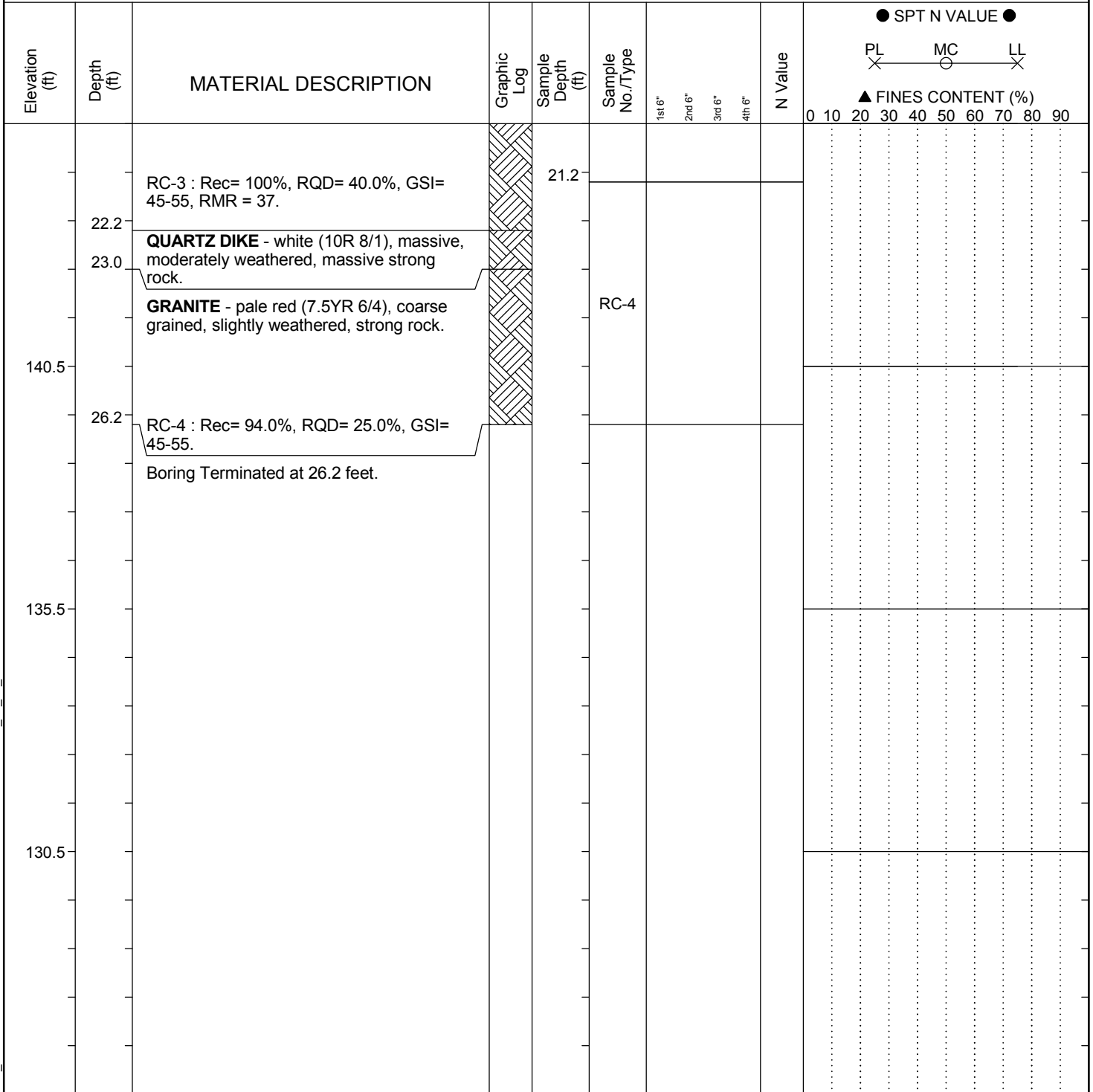
Continued Next Page

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-44
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 33	
Eng./Geo.: AKS	Boring Location: 398+36.32		Offset: L:98.897'	Alignment: Proposed
Elev.: 165.5 ft	Latitude: 34.023303	Longitude: -81.103422	Date Started: 3/21/2018	
Total Depth: 26.2 ft	Soil Depth: 6.2 ft	Core Depth: 20 ft	Date Completed: 3/22/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB	4.8 ft 24HR 0.9 ft	



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

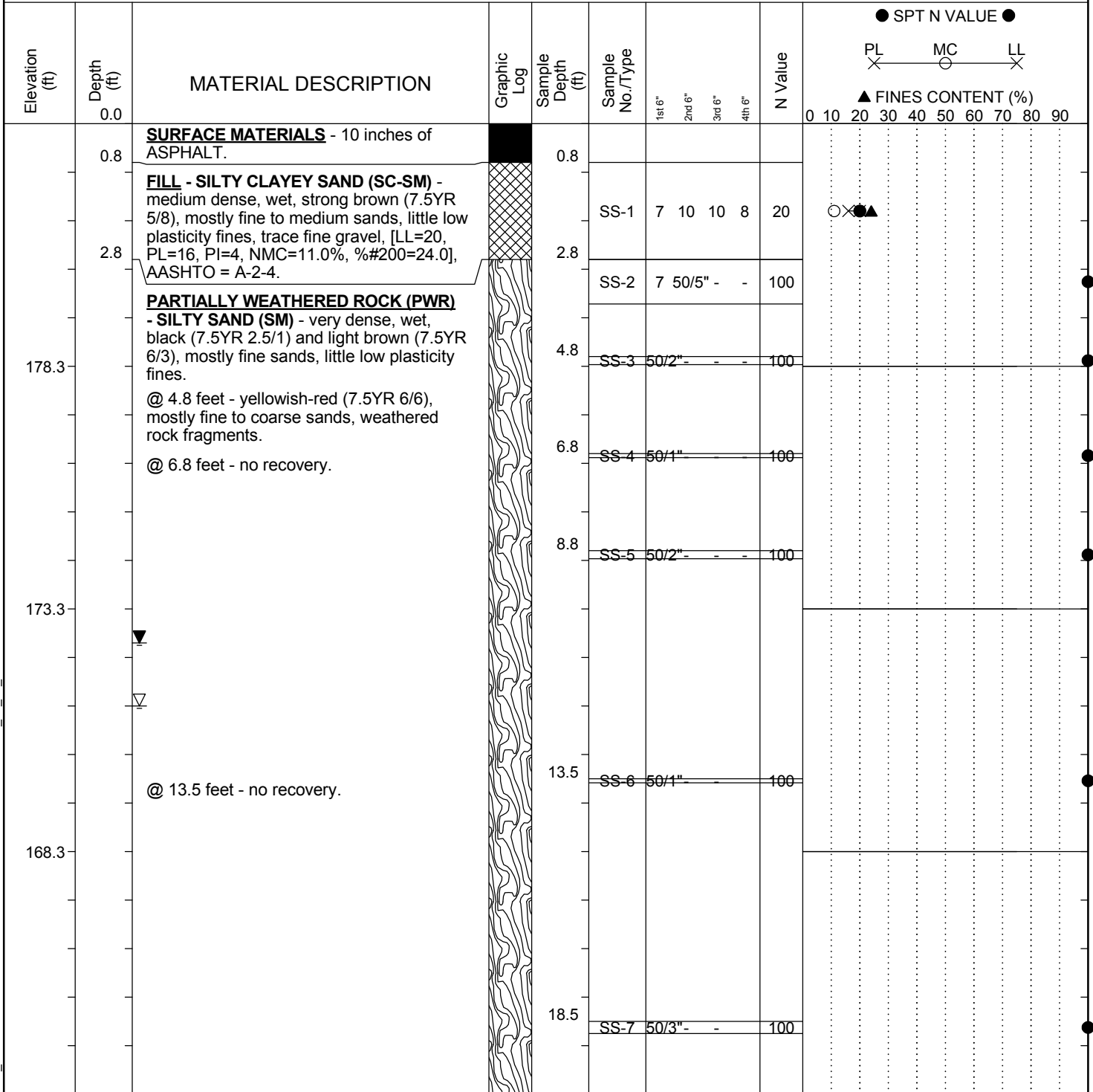
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 3/21/2018

Boring Number: B-44
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
6.3	1	J	71	N	Pa	Sd	Pl	SR	
6.7	2	J	44	VN	Pa	Sd	Pl	SR	
7	3	J	40	N	Pa	Sd	Pl	SR	
7.4	4	J	86	VN	Pa	Sd	Pl	SR	
7.7	5	J	63	T	Pa	Sd	Pl	SR	
8	6	J	48	W	Pa	Sd	Pl	SR	
8.5	7	J	20	VN	Pa	Sd	Pl	SR	
9.1	8	J	45	T	No	N/A	St	SR	
9.7	9	J	40	VN	Pa	Sd	St	SR	
9.9	10	J	54	T	No	N/A	Pl	SR	
10.1	11	J	53	VN	Pa	Sd	Pl	SR	
10.8	12	J	24	N	Pa	Sd	Pl	SR	
11.2	13	J	84	T	No	N/A	Wa	SR	
11.6	14	J	39	T	Pa	Sd	Pl	SR	
12.3	15	J	45	T	No	N/A	Pl	SR	
12.7	16	J	37	T	No	N/A	Pl	R	
13.4	17	J	88	T	No	N/A	Pl	SR	
13.6	18	J	29	T	Pa	Sd	Pl	SR	
13.8	19	J	26	VN	Pa	Sd	Pl	SR	
15	20	J	9	N	Pa	Sd	Pl	SR	
17	21	J	41	T	No	N/A	Pl	SR	
18	22	J	40	VN	Pa	Sd	Pl	SR	
18.1	23	J	39	T	No	N/A	Pl	R	
18.8	24	J	14	VN	Pa	Sd	Pl	SR	
20	25	J	35	T	Pa	Sd	Pl	SR	
20.2	26	J	22	VN	Pa	Sd	Pl	SR	
20.7	27	J	10	VN	Pa	Sd	Pl	SR	
22.7	28	J	32	T	No	N/A	Pl	SR	
23.1	29	J	17	T	No	N/A	Pl	R	
23.2	30	J	N/A	N/A	No	N/A	lr	SR	Fractured zone 23.2' - 24.2'
24.9	31	J	50	VN	No	N/A	Pl	SR	
25.2	32	J	36	N	Pa	Sd	Pl	SR	
25.5	33	J	31	N	No	N/A	Pl	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-45
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: ELF	Boring Location: 401+11.44	Offset: L:76.366'
Elev.: 183.3 ft	Latitude: 34.022629	Longitude: -81.103841
Total Depth: 47 ft	Soil Depth: 27 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration:	Liner Required: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB	12 ft	24HR: 10.7 ft



LEGEND

Continued Next Page

SAMPLER TYPE

DRILLING METHOD

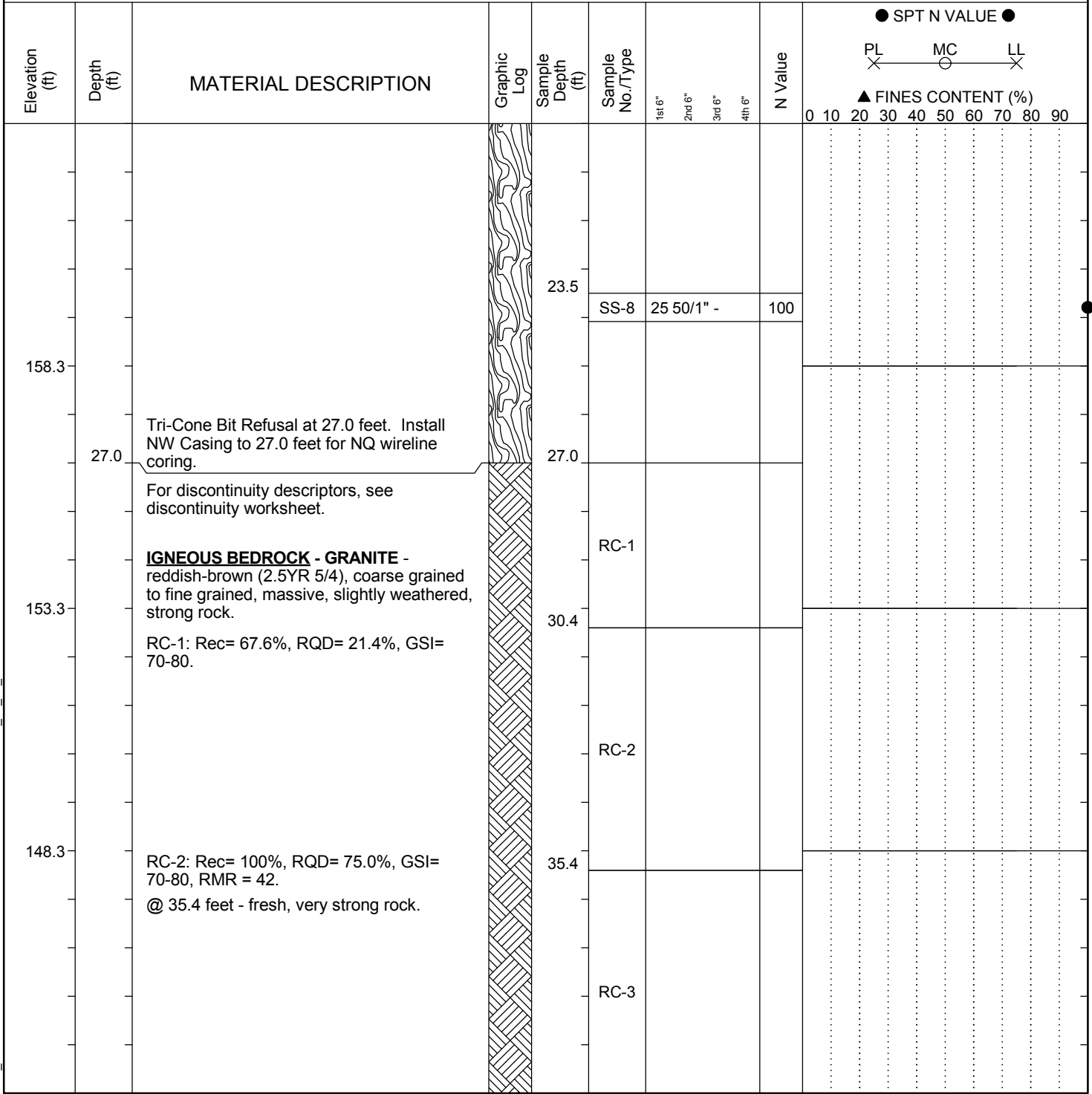
SS - Split Spoon
 UD - Undisturbed Sample
 AWG - Rock Core, 1-1/8"
 NQ - Rock Core, 1-7/8"
 CU - Cuttings
 CT - Continuous Tube

HSA - Hollow Stem Auger
 CFA - Continuous Flight Augers
 DC - Driving Casing
 RW - Rotary Wash
 RC - Rock Core

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-45
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 33
Eng./Geo.: ELF	Boring Location: 401+11.44	Offset: L:76.366' Alignment: Proposed
Elev.: 183.3 ft	Latitude: 34.022629	Longitude: -81.103841
Total Depth: 47 ft	Soil Depth: 27 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 12 ft 24HR 10.7 ft



LEGEND

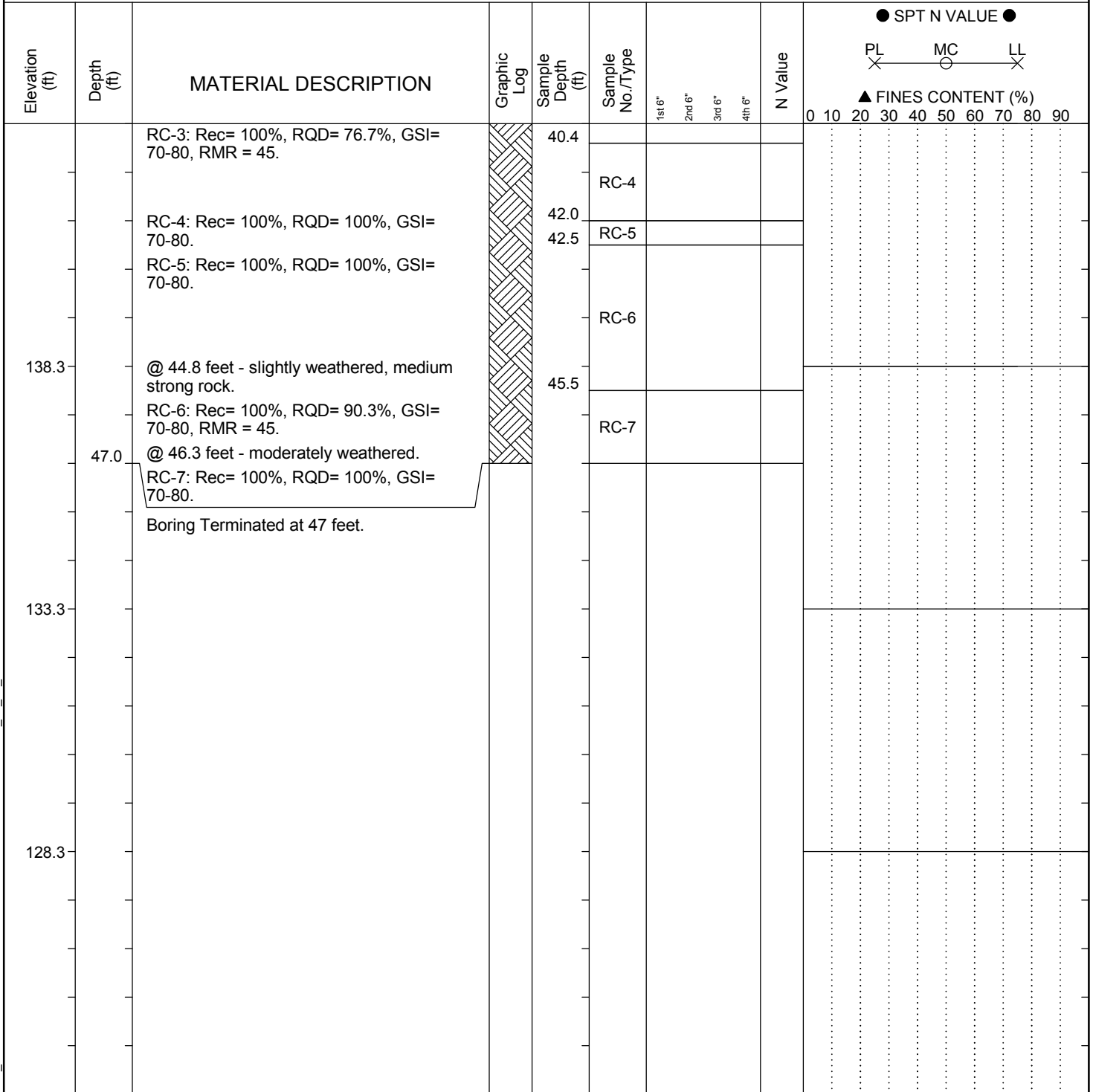
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-45
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 33
Eng./Geo.:	ELF	Boring Location:	401+11.44	Offset:	L:76.366'	Alignment:	Proposed
Elev.:	183.3 ft	Latitude:	34.022629	Longitude:	-81.103841	Date Started:	2/8/2018
Total Depth:	47 ft	Soil Depth:	27 ft	Core Depth:	20 ft	Date Completed:	2/8/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	84.1%
Core Size:	NQ	Driller:	T. Miller	Groundwater:	TOB 12 ft	24HR	10.7 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

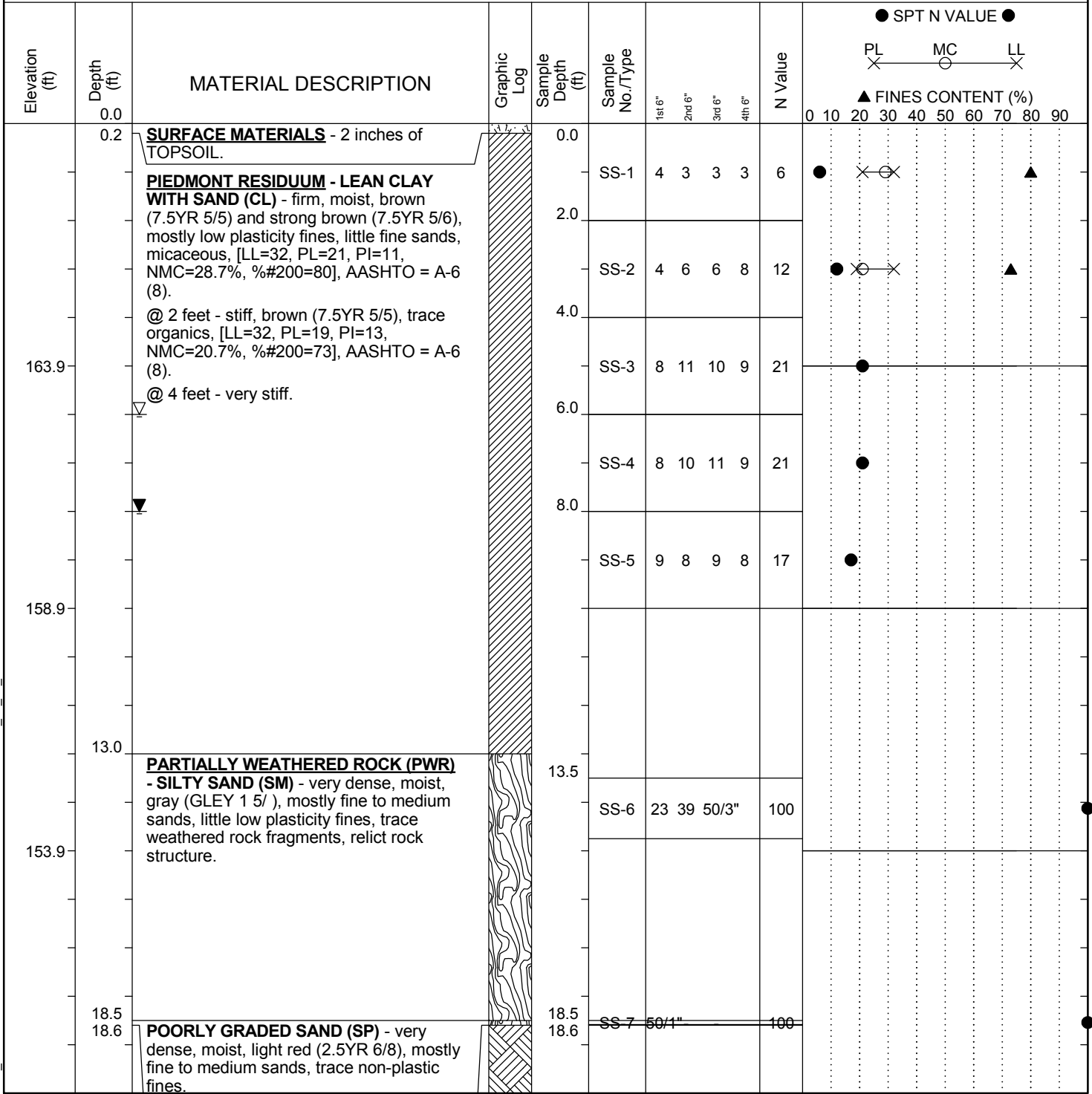
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Lehe Fender
 Date: 2/8/2018

Boring Number: B-45
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
27.1	1	J	17	MW	Su	Fe	PI	SR	
27.3	2	J	15	MW	Su	Fe	PI	SR	
27.4	3	J	38	MW	No	N/A	PI	S	
27.9	4	J	90	MW	Su	Fe	PI	SR	Fractured zone 27.9' to 29.2'
31.9	5	J	61	N	Su	Fe	PI	S	
32.9	6	J	18	MW	No	N/A	PI	SR	
33.7	7	J	N/A	W	Su	Fe	PI	N/A	Fractured zone 33.7' to 34.2'
34.9	8	J	40	W	Su	Fe	PI	SR	Fractured zone 34.9' to 35.3'
35.3	9	J	5	MW	Su	Fe	PI	SR	
35.9	10	J	12	N	No	N/A	Ir	SR	
36.2	11	V	67	W	Fi	Qz	PI	N/A	
37.2	12	J	50	N	No	N/A	PI	SR	Fractured zone 37.2' to 37.5'
38.6	13	J	5	MW	No	N/A	PI	SR	
38.7	14	J	83	N	No	N/A	PI	SR	Fractured zone 38.7' to 39.6'
40	15	J	5	N	No	N/A	PI	SR	
40.8	16	V	40	W	Fi	Qz	PI	N/A	
41.9	17	J	5	W	No	N/A	Ir	R	Fractured zone 41.9' to 42'
43.4	18	J	N/A	MW	No	N/A	PI	SR	
43.7	19	J	64	VN	Su	Fe	PI	S	
44.4	20	J	11	N	No	N/A	Ir	SR	Fractured zone 44.4' to 44.8'
46.3	21	J	N/A	W	Su	Fe	Ir	R	Fractured zone 46.3' to 46.4'
46.7	22	J	N/A	N	No	N/A	PI	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-46
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: NGS	Boring Location: 5987+47.92	Offset: L:48.77' Alignment: Proposed
Elev.: 168.9 ft	Latitude: 34.022548	Longitude: -81.104982 Date Started: 4/2/2018
Total Depth: 48.6 ft	Soil Depth: 23.6 ft	Core Depth: 25 ft Date Completed: 4/3/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 6 ft 24HR 8 ft



LEGEND

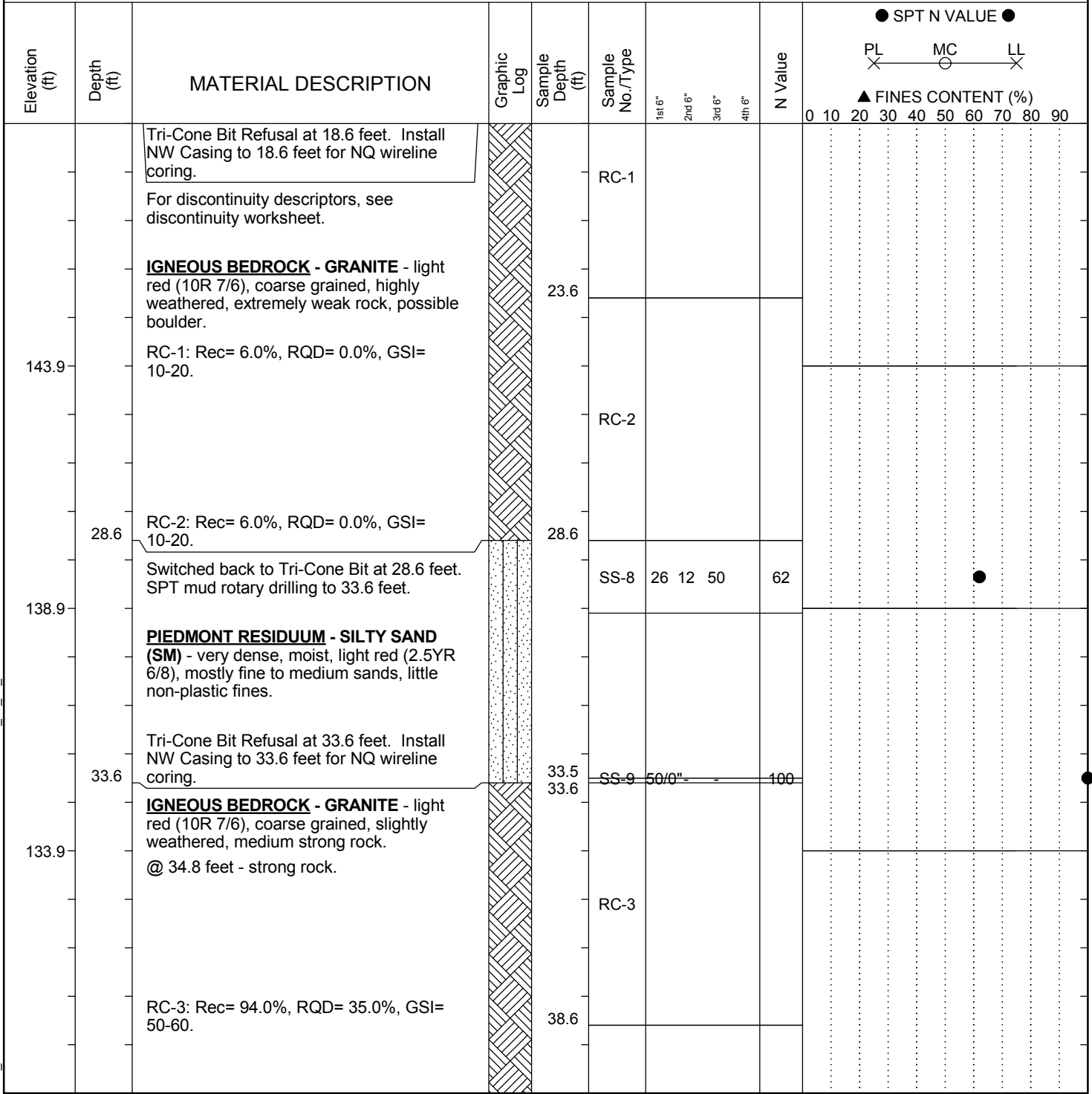
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-46
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: NGS	Boring Location: 5987+47.92	Offset: L:48.77' Alignment: Proposed
Elev.: 168.9 ft	Latitude: 34.022548	Longitude: -81.104982
Total Depth: 48.6 ft	Soil Depth: 23.6 ft	Core Depth: 25 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 6 ft 24HR: 8 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

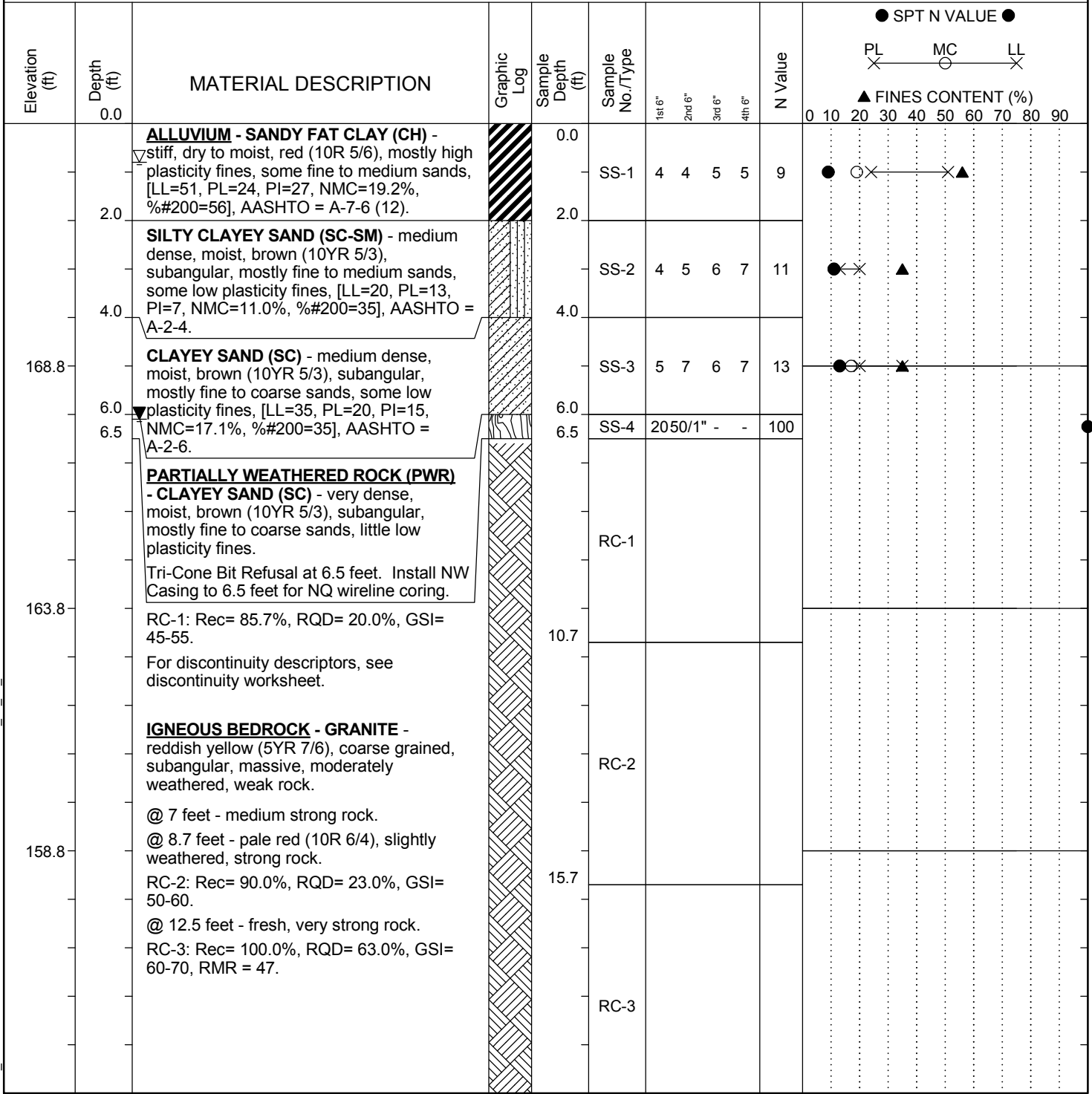
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Nat Shuff
 Date: 4/3/2018

Boring Number: B-46
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
18.6	1	N/A	N/A	W	Pa/Fi	Sd	Ir	SR	Fractured zone 18.6' - 28.6'
35.2	2	J	30	VN	No	N/A	Ir	SR	
35.6	3	J	20	T	Su	Cl	Wa	SR	
36.6	4	J	40	MW	Pa	Cl/Sd	Ir	R	
37.9	5	J	0	VN	Pa	Sd	Ir	R	
38.2	6	J	0	VN	Pa	Sd	Ir	R	
38.4	7	J	0	VN	No	N/A	Ir	R	
38.8	8	J	70	VN	Su	Fe	Wa	SR	
40	9	J	55	VN	Su	Fe	Wa	SR	
40.3	10	J	90	VN	Su	Fe	Wa	SR	
40.4	11	J	0	N	No	N/A	Ir	R	
41.4	12	N/A	N/A	W	Pa	Sd	Ir	R	Fractured zone 41.4' - 42'
42.4	13	J	50	VN	Su	Fe/Cl	Wa	SR	
43.6	14	J	0	N	Su	Fe	Wa	SR	
44.1	15	J	20	N	Su	Fe	Wa	SR	
44.6	16	J	40	N	Su	Fe	Wa	SR	
44.9	17	J	0	VN	Su	Fe	Ir	R	
45	18	N/A	N/A	N/A	No	N/A	Ir	R	Fractured zone 45' - 46.5'
46.6	19	J	0	VN	Su	Fe	Ir	R	
47.1	20	J	70	VN	Su	Fe	Ir	R	
47.9	21	J	0	VN	No	N/A	Ir	SR	
48.2	22	J	0	VN	No	N/A	Ir	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-60
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 35
Eng./Geo.: AKS	Boring Location: 5022+82.85	Offset: L:80.55' Alignment: Proposed
Elev.: 173.8 ft	Latitude: 34.022994	Longitude: -81.097713
Total Depth: 26.7 ft	Soil Depth: 6.5 ft	Core Depth: 20.2 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 0.8 ft 24HR: 6.1 ft



LEGEND Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-60
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 35
Eng./Geo.:	AKS	Boring Location:	5022+82.85	Offset:	L:80.55'	Alignment:	Proposed
Elev.:	173.8 ft	Latitude:	34.022994	Longitude:	-81.097713	Date Started:	4/11/2018
Total Depth:	26.7 ft	Soil Depth:	6.5 ft	Core Depth:	20.2 ft	Date Completed:	4/12/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB 0.8 ft	24HR	6.1 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)	
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	LL
148.8	26.7	RC-4: Rec= 100.0%, RQD= 78.0%, GSI= 65-75, RMR = 69.		20.7							
		RC-5: Rec= 100.0%, RQD= 100.0%, GSI= 65-75, RMR = 82.		25.7							
143.8		Boring Terminated at 26.7 feet.									
138.8											

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

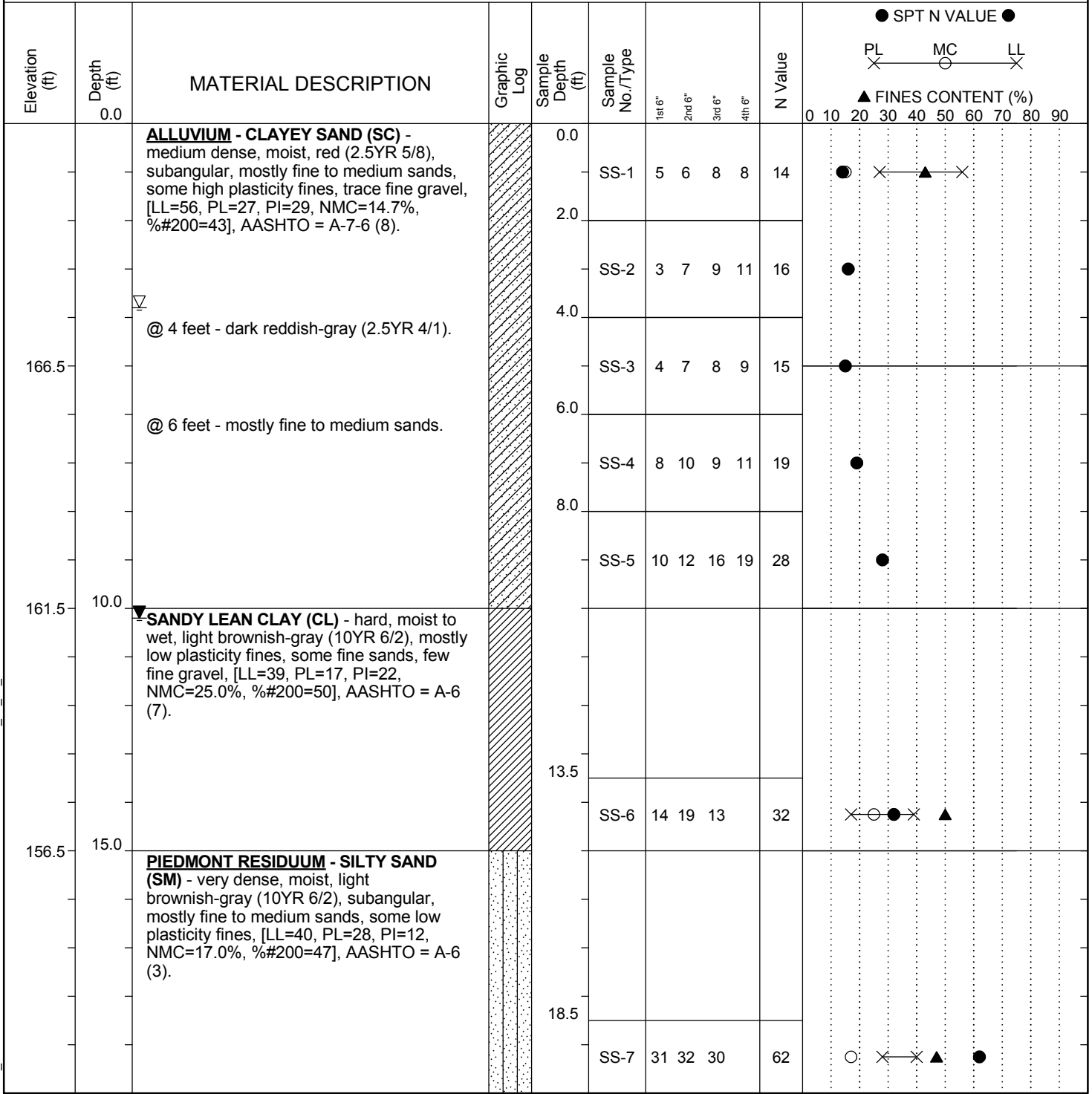
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 4/2/2018

Boring Number: B-60
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
65	1	J	N/A	N/A	Pa	Sa	Ir	R	Fractured zone 6.5' - 7'
7.8	2	J	16	VN	Fi	Fe	Pl	SR	
8	3	J	N/A	N/A	Pa	Fe/Sa	Ir	SR	Fractured zone 8' - 8.3'
8.7	4	J	N/A	N/A	Pa	Fe/Sa	Ir	SR	Fractured zone 8.7' - 9.2'
9.8	5	J	27	VN	Pa	Cl	Pl	SR	
11	6	J	34	T	Pa	Cl	Pl	SR	
11.2	7	J	38	T	No	N/A	Pl	SR	
11.8	8	J	39	T	Pa	Sa	Pl	SR	
12	9	J	40	N	Pa	Sa	Pl	SR	
12.2	10	J	31	VN	Pa	Sa	W	R	
12.4	11	J	8	VN	Pa	Sa	W	SR	
12.7	12	J	61	N	Pa	Sa	Pl	SR	
13.2	13	J	28	VN	Fi	Fe/Sa	Pl	SR	
13.4	14	J	21	VN	Fi	Fe/Sa	Pl	SR	
14.3	15	J	22	VN	Pa	Cl	Pl	SR	
15.3	16	J	N/A	N/A	Pa	Sa	Ir	SR	Fractured zone 15.3' - 15.6'
15.7	17	J	78	N	No	N/A	Pl	SR	
15.9	18	J	79	N	Pa	Fe	Pl	SR	
16.2	19	J	78	N	Pa	Cl	Ir	SR	
17.3	20	J	73	T	No	N/A	Pl	SR	
18.1	21	J	28	T	Pa	Sa	Pl	SR	
18.8	22	J	21	T	No	N/A	St	SR	
19.9	23	J	90	N	Pa	Sa	Pl	R	
20.5	24	J	27	T	No	N/A	Pl	SR	
20.7	25	J	36	T	No	N/A	Pl	SR	
21	26	J	29	N	Fi	Qz	Pl	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-61
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 35
Eng./Geo.: AKS	Boring Location: 5012+32.75	Offset: L:7.70'
Elev.: 171.5 ft	Latitude: 34.025174	Longitude: -81.100002
Total Depth: 42.5 ft	Soil Depth: 22.5 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 3.8 ft
		Energy Ratio: 86.5%
		24HR: 10.2 ft



LEGEND

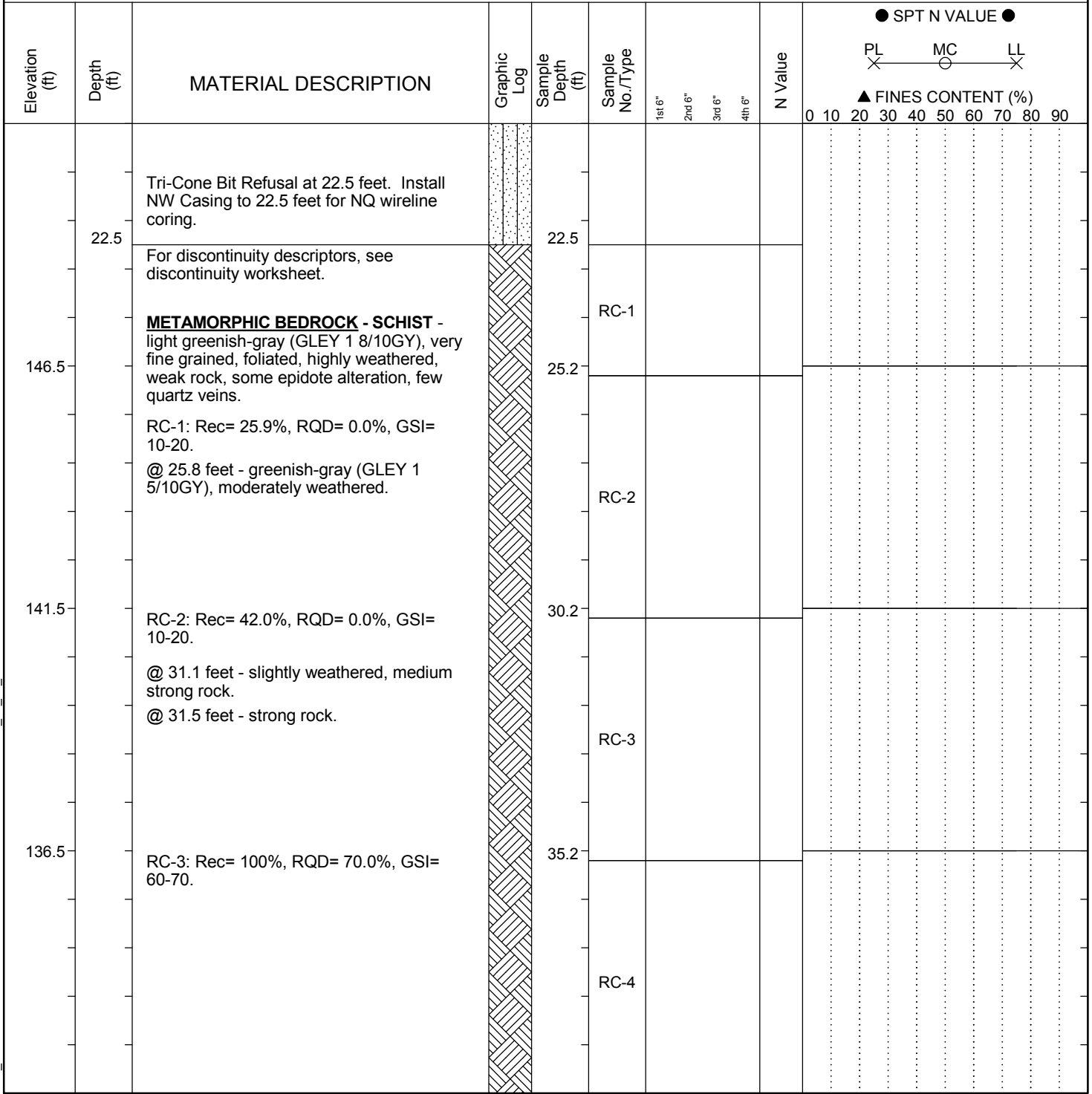
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662	County:	Lexington/Richland	Boring No.:	B-61
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route:	Site 35
Eng./Geo.:	AKS	Boring Location:	5012+32.75	Offset:	L:7.70'
Elev.:	171.5 ft	Latitude:	34.025174	Longitude:	-81.100002
Total Depth:	42.5 ft	Soil Depth:	22.5 ft	Core Depth:	20 ft
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB 3.8 ft
				Energy Ratio:	86.5%
				24HR	10.2 ft



LEGEND

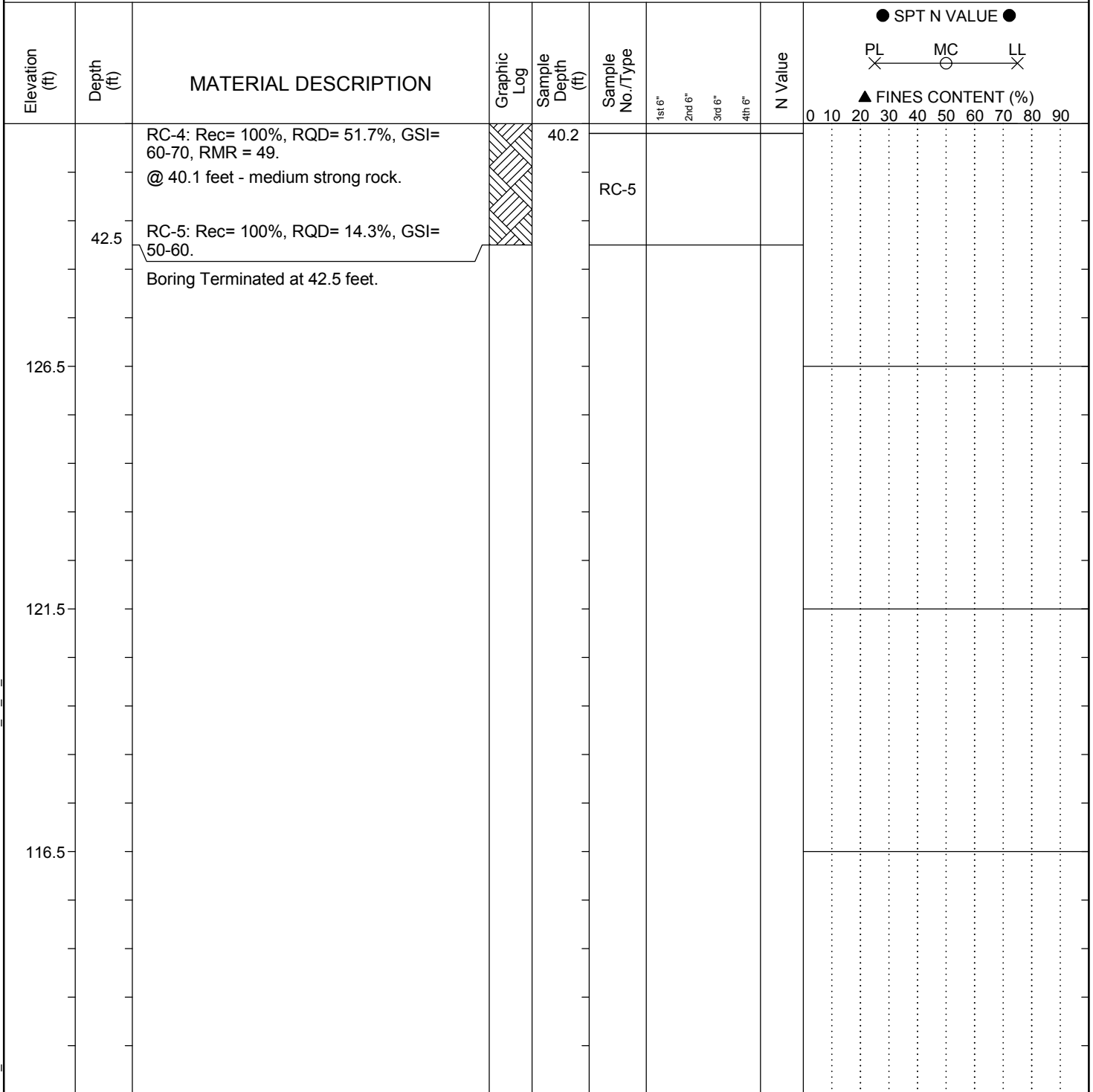
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-61
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 35
Eng./Geo.:	AKS	Boring Location:	5012+32.75	Offset:	L:7.70'	Alignment:	Proposed
Elev.:	171.5 ft	Latitude:	34.025174	Longitude:	-81.100002	Date Started:	4/12/2018
Total Depth:	42.5 ft	Soil Depth:	22.5 ft	Core Depth:	20 ft	Date Completed:	4/13/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB	3.8 ft	24HR 10.2 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

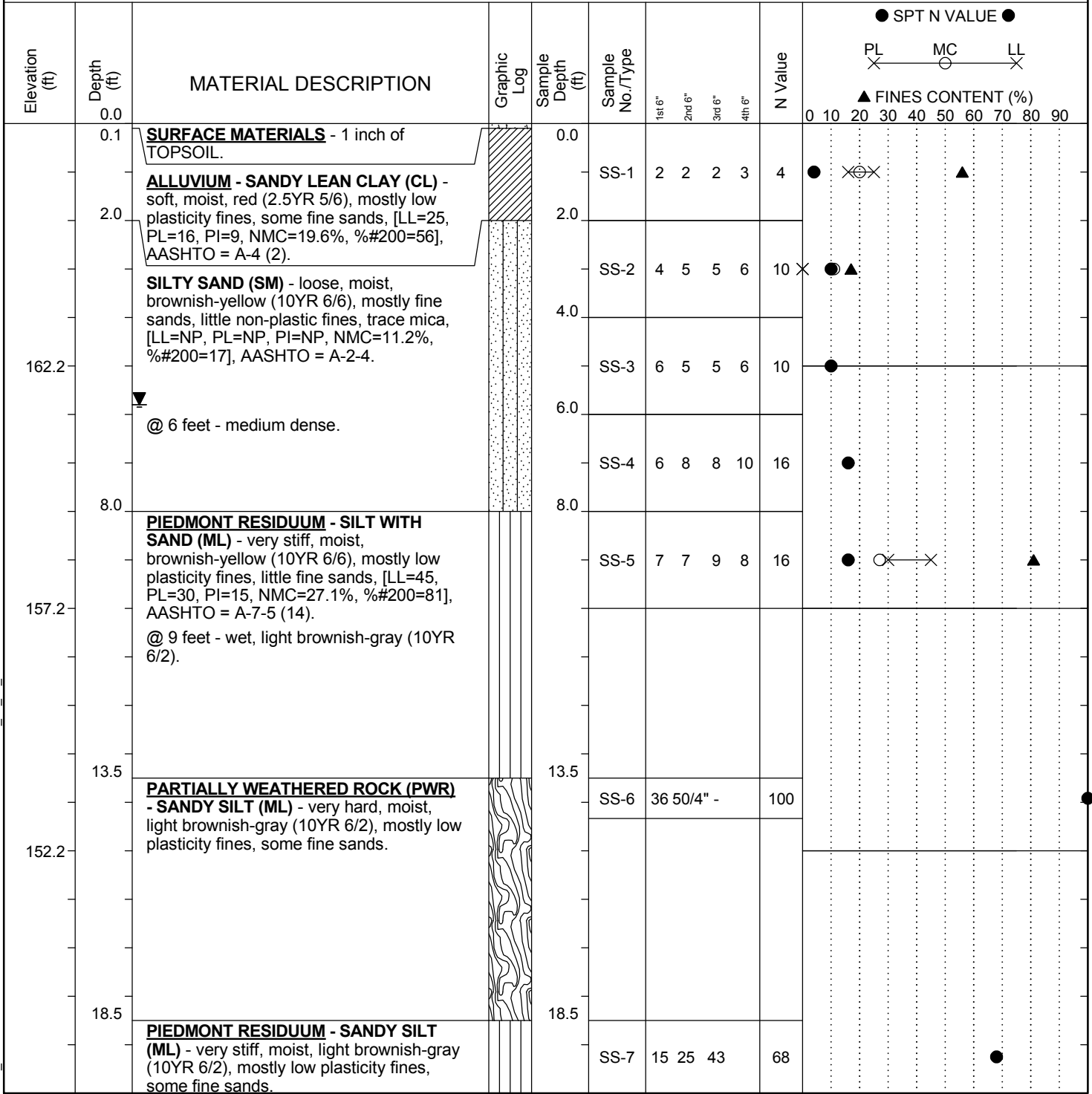
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 4/13/2018

Boring Number: B-61
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
22.5	1	J	N/A	N/A	Pa	Fe	Ir	SR	Fractured zone 22.5' - 31.2'
31.7	2	J	66	N	Fi	Cl	Pl	SR	
32.8	3	J	58	T	No	N/A	Wa	SR	
33.5	4	J	71	T	No	N/A	St	SR	
33.7	5	J	53	N	No	N/A	Ir	SR	
33.8	6	J	64	VN	No	N/A	Pl	SR	
34.4	7	J	55	T	Pa	Cl	St	SR	
35	8	J	64	T	Pa	Sa	Pl	SR	
36.3	9	J	52	VN	Pa	Cl	Ir	SR	
36.7	10	J	84	N	Pa	Sa	Pl	SR	
37.2	11	J	77	VN	Pa	Sa	Pl	SR	
37.7	12	J	85	N	Pa	Sa	Pl	SR	
38	13	J	77	N	Pa	Cl	Pl	SR	
38.3	14	J	32	T	Pa	Cl	Pl	SR	
38.7	15	J	39	T	Pa	Cl	Pl	SR	
39.9	16	J	N/A	N/A	Pa	Cl/Sa	Ir	SR	Fractured zone 39.9' - 41'
41.3	17	J	85	N	No	N/A	Pl	SR	
41.6	18	J	89	VN	No	N/A	Pl	SR	
42	19	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 42' - 42.5'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-62
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: AKS	Boring Location: 5996+61.92	Offset: L:82.84'
Elev.: 167.2 ft	Latitude: 34.024985	Longitude: -81.103943
Total Depth: 45.7 ft	Soil Depth: 23.7 ft	Core Depth: 22 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 5.8 ft
		Energy Ratio: 86.5%
		24HR: 5.8 ft



LEGEND

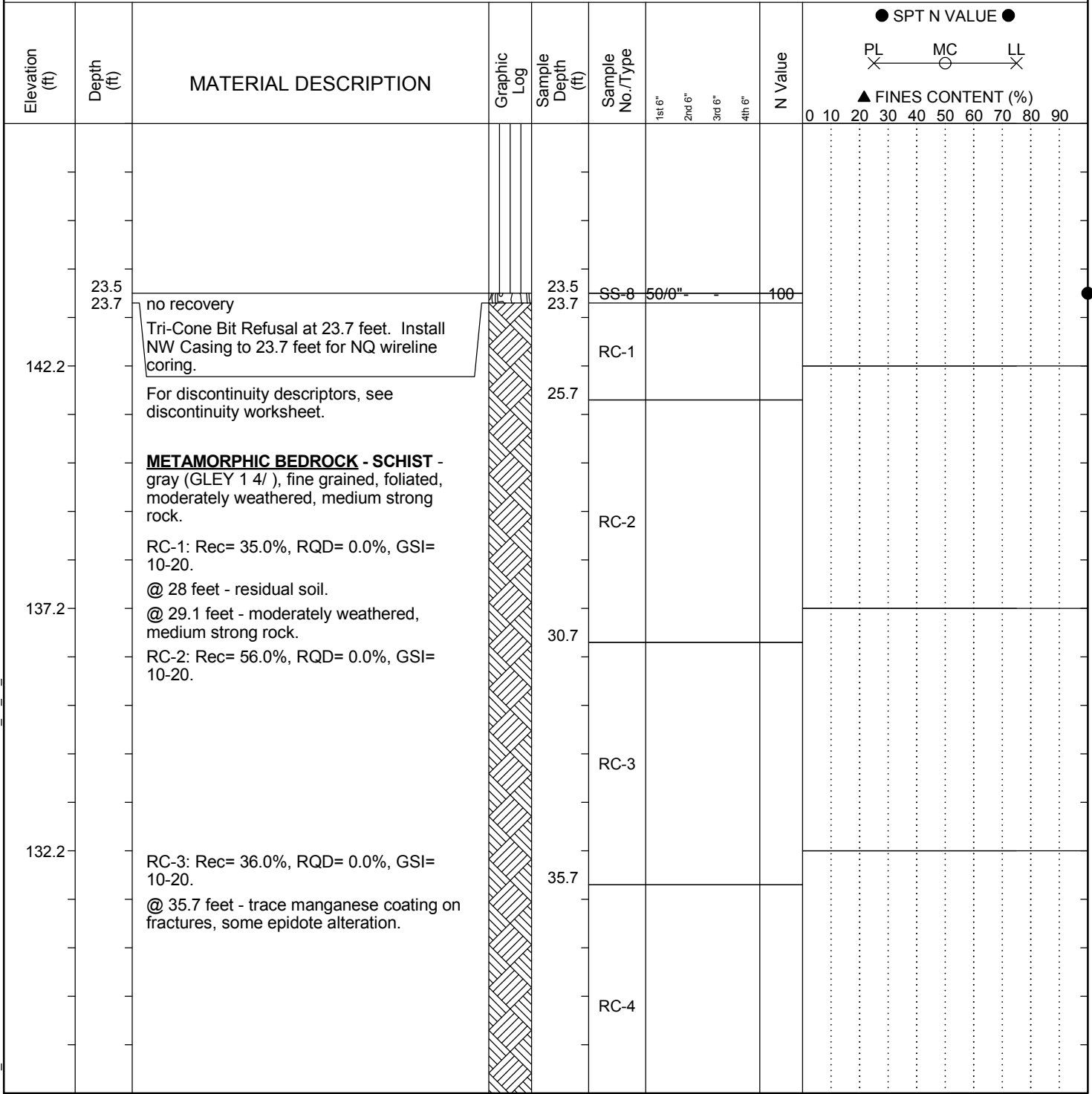
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-62
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: AKS	Boring Location: 5996+61.92	Offset: L:82.84'
Elev.: 167.2 ft	Latitude: 34.024985	Longitude: -81.103943
Total Depth: 45.7 ft	Soil Depth: 23.7 ft	Core Depth: 22 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 5.8 ft
		Energy Ratio: 86.5%
		24HR 5.8 ft



LEGEND

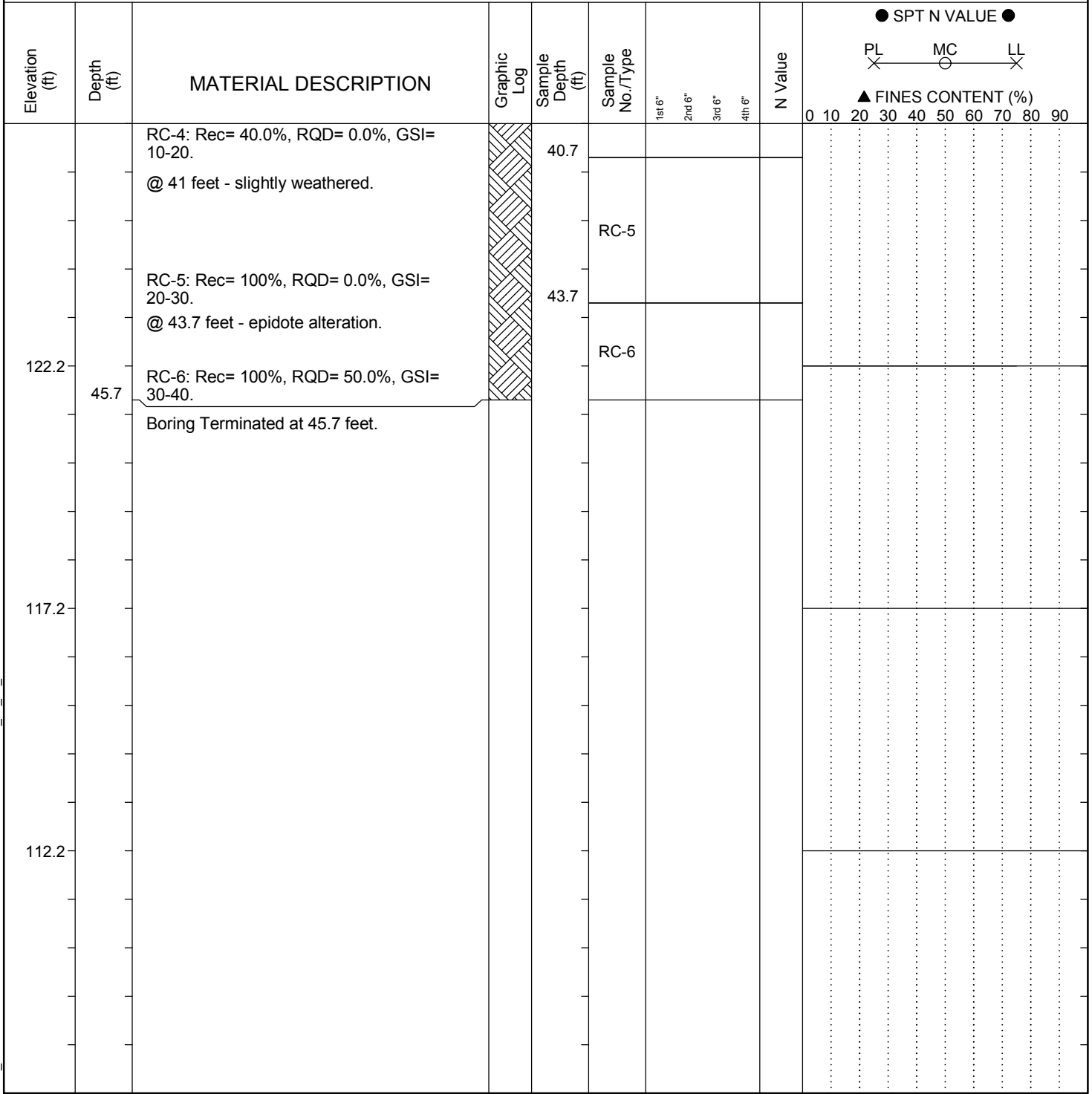
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-62
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 32
Eng./Geo.:	AKS	Boring Location:	5996+61.92	Offset:	L:82.84'	Alignment:	Proposed
Elev.:	167.2 ft	Latitude:	34.024985	Longitude:	-81.103943	Date Started:	4/10/2018
Total Depth:	45.7 ft	Soil Depth:	23.7 ft	Core Depth:	22 ft	Date Completed:	4/12/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB 5.8 ft	24HR	5.8 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

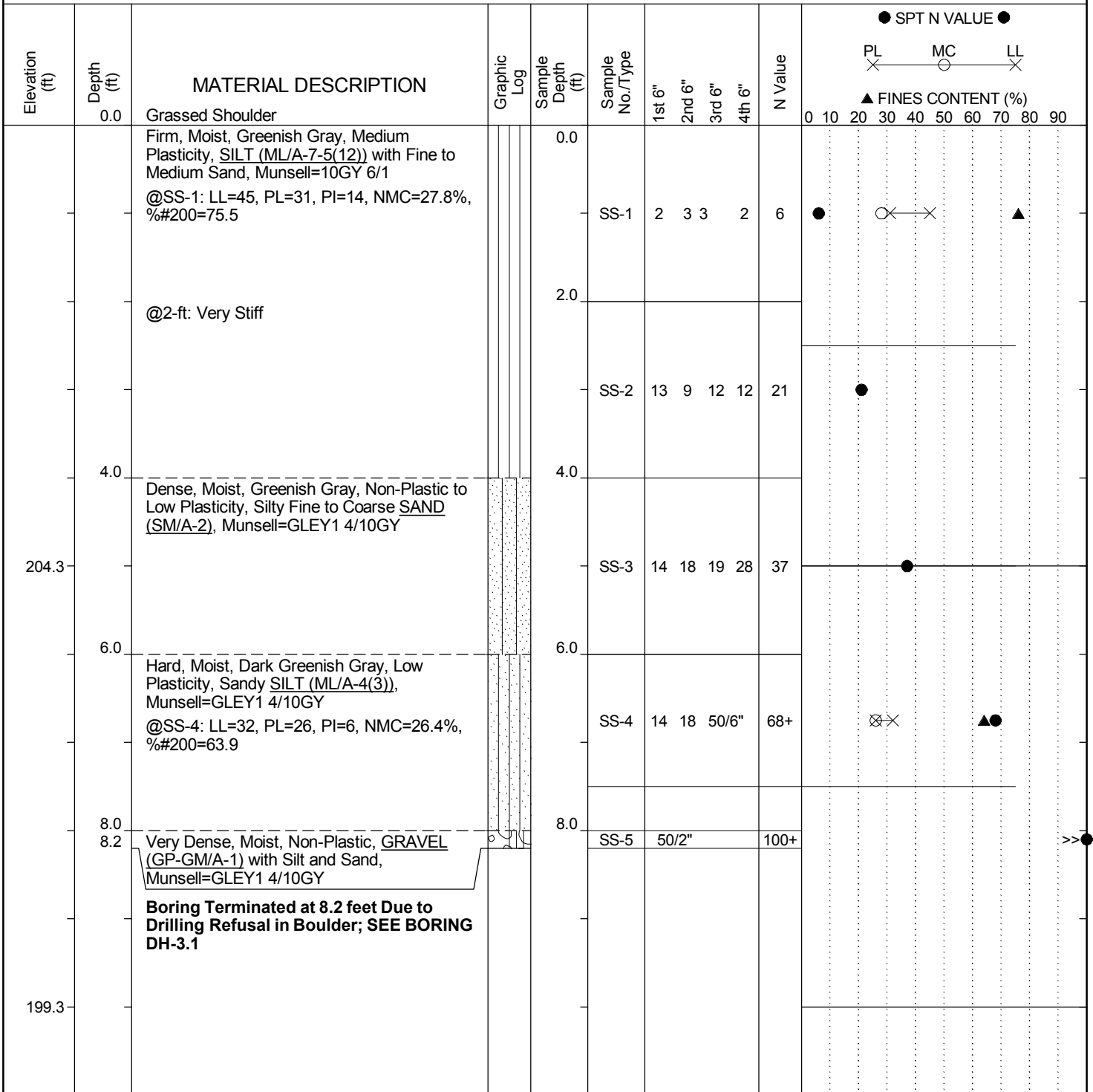
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 4/10/2018

Boring Number: B-62
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
23.7	1	N/A	N/A	N/A	Pa	Fe	Ir	SR	Fractured zone 23.7' - 26.3'
26.5	2	J	44	T	Pa	Fe	St	SR	
26.6	3	N/A	N/A	N/A	Pa	Cl/Fe	Ir	SR	Fractured zone 26.6' - 29.3'
29.3	4	J	56	VN	Pa	Fe	Pl	SR	
29.5	5	N/A	N/A	N/A	No	N/A	Ir	SR	Fractured zone 29.5' - 30'
30.6	6	N/A	N/A	N/A	No	N/A	Ir	SR	Fractured zone 30.6' - 31'
31.4	7	N/A	N/A	N/A	Pa	Fe	Ir	SR	Fractured zone 31.4' - 43'
43.1	8	J	18	VN	No	N/A	Ir	SR	
44.1	9	J	62	N	No	N/A	Pl	SR	
44.7	10	J	42	T	No	N/A	Pl	SR	

SCDOT Soil Test Log

Project ID: P027662		County: Richland/Lexington		Boring No.: DH-3	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements			Route: I26RCA		
Eng./Geo.: R. Wessinger		Boring Location: 5383+63		Offset: 119 R	
Alignment: Mainline		Elev.: 209.3 ft		Latitude: 34.027965	
Longitude: -81.101848		Date Started: 1/11/2018		Total Depth: 8.2 ft	
Soil Depth: 8.2 ft		Core Depth: 0 ft		Date Completed: 1/11/2018	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)	
Liner Used: Y (N)		Drill Machine: CME 45B		Drill Method: RW	
Hammer Type: Automatic		Energy Ratio: 90%		Core Size: N/A	
Driller: L. Guempel		Groundwater: TOB		24HR: Backfilled	

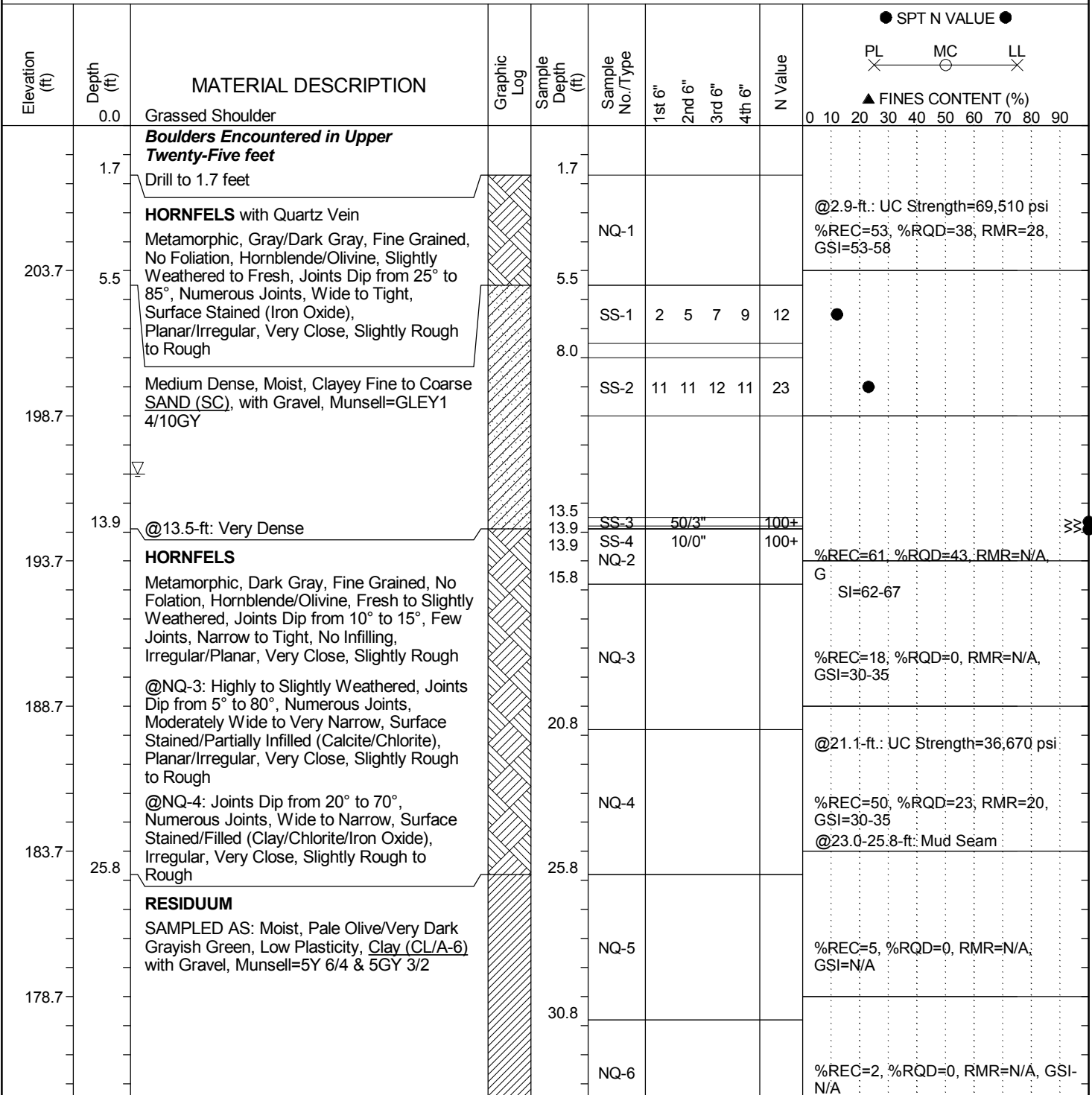


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Richland/Lexington	Boring No.: DH-3.1
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements		Route: I26RCA
Eng./Geo.: R. Wessinger	Boring Location: 5383+53	Offset: 113 R
Alignment: Mainline	Elev.: 208.7 ft	Latitude: 34.027991
Longitude: -81.101829	Date Started: 1/11/2018	
Total Depth: 120.7 ft	Soil Depth: 64.5 ft	Core Depth: 56.2 ft
Date Completed: 1/22/2018	Bore Hole Diameter (in): 4	Sampler Configuration:
Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME 45B	Drill Method: RW/RC	Hammer Type: Automatic
Energy Ratio: 90%	Core Size: NQ	Driller: L. Guempel
Groundwater: TOB 12.0 ft	24HR: 38.5 ft	



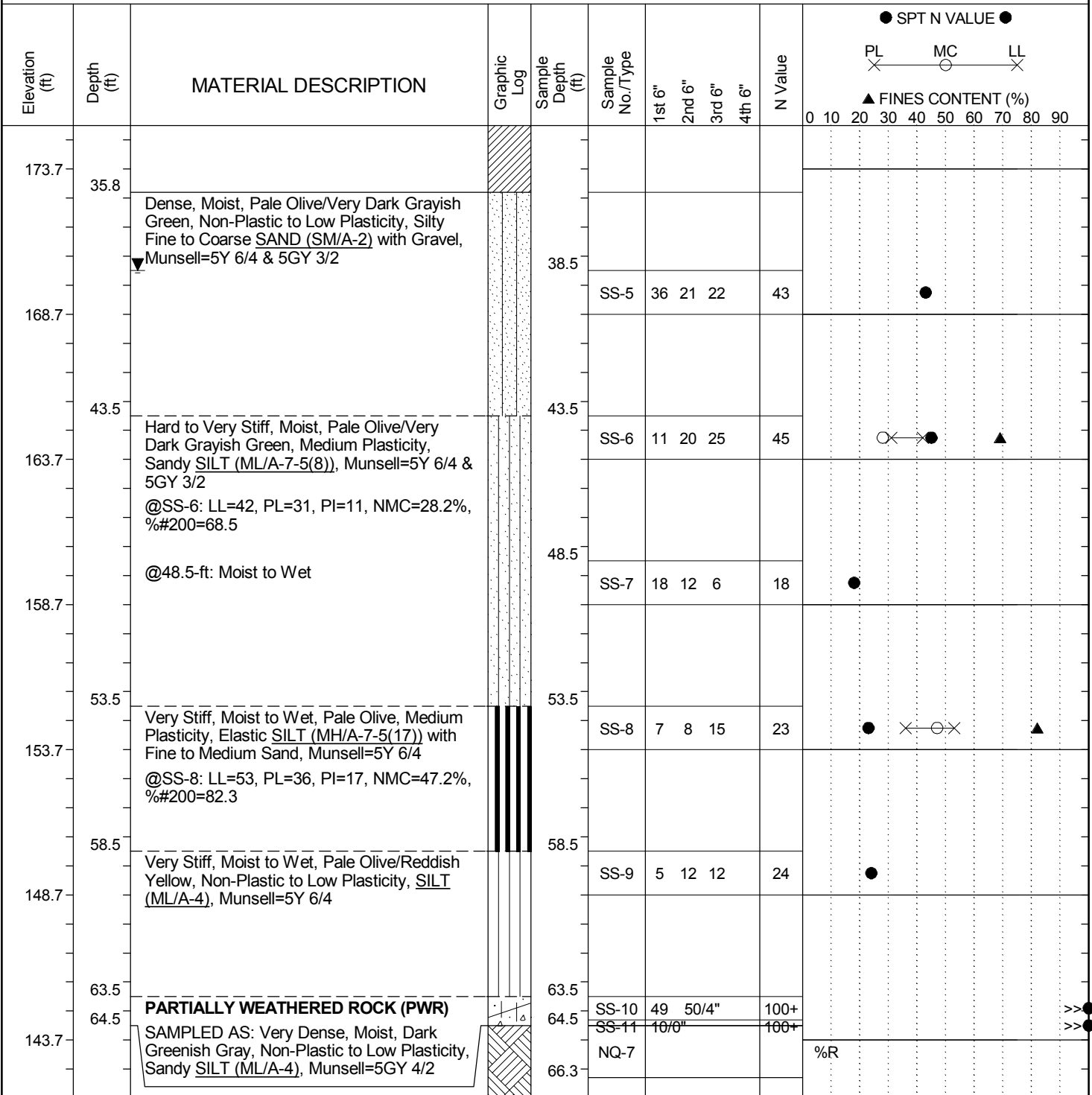
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

Continued Next Page

SCDOT Soil Test Log

Project ID: P027662	County: Richland/Lexington	Boring No.: DH-3.1
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements		Route: I26RCA
Eng./Geo.: R. Wessinger	Boring Location: 5383+53	Offset: 113 R
Alignment: Mainline	Date Started: 1/11/2018	Date Completed: 1/22/2018
Elev.: 208.7 ft	Latitude: 34.027991	Longitude: -81.101829
Total Depth: 120.7 ft	Soil Depth: 64.5 ft	Core Depth: 56.2 ft
Bore Hole Diameter (in): 4	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 45B	Drill Method: RW/RC
Hammer Type: Automatic	Energy Ratio: 90%	Groundwater: TOB 12.0 ft
Core Size: NQ	Driller: L. Guempel	24HR: 38.5 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

Continued Next Page

SC_DOT_G5662.01 - CAROLINA CROSSROADS.GPJ_FME2017.GDT_7/25/18

SCDOT Soil Test Log

Project ID: P027662	County: Richland/Lexington	Boring No.: DH-3.1
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements		Route: I26RCA
Eng./Geo.: R. Wessinger	Boring Location: 5383+53	Offset: 113 R
Alignment: Mainline	Elev.: 208.7 ft	Latitude: 34.027991
Longitude: -81.101829	Date Started: 1/11/2018	
Total Depth: 120.7 ft	Soil Depth: 64.5 ft	Core Depth: 56.2 ft
Date Completed: 1/22/2018	Bore Hole Diameter (in): 4	Sampler Configuration:
Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME 45B	Drill Method: RW/RC	Hammer Type: Automatic
Energy Ratio: 90%	Core Size: NQ	Driller: L. Guempel
Groundwater: TOB 12.0 ft	24HR: 38.5 ft	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	● SPT N VALUE ● PL — MC — LL ▲ FINES CONTENT (%) 0 10 20 30 40 50 60 70 80 90	
						1st 6"	2nd 6"	3rd 6"	4th 6"			
138.7		HORNFELS @NQ-7: Metamorphic, Dark Gray, Fine Grained, No Foliation, Hornblende/Olivine, Moderately Weathered to Fresh, Joints Dip from 10° to 50°, Occasional Joints, Wide to Very Narrow, Surface Stained (Chlorite), Planar/Irregular, Very Close, Smooth to Rough		71.3	NQ-8						%REC=32, %RQD=7, RMR=N/A, GSI=30-35	
133.7		@NQ-8: Highly to Slightly Weathered, Joints Dip from 3° to 85°, Numerous Joints, Moderately Wide to Very Narrow, Surface Stained (Chlorite/Iron Oxide), Planar/Irregular, Very Close, Smooth to Rough			76.3	NQ-9						@72.3-ft.: UC Strength=22,610 psi %REC=87, %RQD=62, RMR=26, GSI=30-35
128.7		@NQ-9: Joints Dip from 5° to 80°, Numerous Joints/Faults, Moderately Wide to Very Narrow, Surface Stained (Iron Oxide), Planar, Very Close, Smooth to Rough			81.3	NQ-10						@76.5-ft.: UC Strength=13,710 psi %REC=99, %RQD=95, RMR=41, GSI=30-40
123.7		@NQ-10: Slightly Weathered to Fresh, Joints Dip from 20° to 70°, Occasional Joints, Narrow to Very Narrow, Surface Stained (Chlorite/Iron Oxide)/Spotty (Calcite)/Filled (Healed), Planar/Irregular, Very Close, Smooth to Rough			86.3	NQ-11						@80.6-ft.: UC Strength=16,760 psi %REC=93, %RQD=85, RMR=43, GSI=30-40
118.7		@NQ-11: Joints Dip from 20° to 60°, Few Joints, Surface Stained/Partially Filled/Filled (Calcite/Chlorite/Iron Oxide), Planar/Irregular, Very Close, Slightly Rough to Rough			91.3	NQ-12						@84.6-ft.: UC Strength=28,600 psi %REC=98, %RQD=98, RMR=43, GSI=30-40
113.7		@NQ-12: Fresh, Joints Dip from 20° to 55°, Few Joints, Narrow to Tight, Surface Stained/Filled (Calcite/Chlorite/Iron Oxide/Healed), Planar/Irregular, Very Close, Slightly Rough to Rough			96.3	NQ-13						@89.6-ft.: UC Strength=37,260 psi %REC=99, %RQD=99, RMR=N/A, GSI=30-40
108.7		@NQ-13: Joints Dip from 15° to 70°, Few Joints, Narrow to Tight, Surface Stained/Spotty (Calcite/Chlorite/Healed), Planar, Very Close, Smooth/Rough				NQ-14						%REC=99, %RQD=99, RMR=N/A, GSI=30-40
		@NQ-14: Joints Dip from 10° to 85°, Few Joints, Narrow to Tight, Surface Stained/Filled (Calcite/Chlorite/Healed), Planar/Irregular, Very Close, Slightly Rough to Rough										%REC=98, %RQD=95, RMR=N/A, GSI=30-40

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

Continued Next Page

SCDOT Soil Test Log

Project ID: P027662	County: Richland/Lexington	Boring No.: DH-3.1
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements		Route: I26RCA
Eng./Geo.: R. Wessinger	Boring Location: 5383+53	Offset: 113 R
Alignment: Mainline	Elev.: 208.7 ft	Latitude: 34.027991
Longitude: -81.101829	Date Started: 1/11/2018	
Total Depth: 120.7 ft	Soil Depth: 64.5 ft	Core Depth: 56.2 ft
Date Completed: 1/22/2018	Bore Hole Diameter (in): 4	Sampler Configuration:
Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME 45B	Drill Method: RW/RC	Hammer Type: Automatic
Energy Ratio: 90%	Core Size: NQ	Driller: L. Guempel
Groundwater: TOB 12.0 ft	24HR: 38.5 ft	

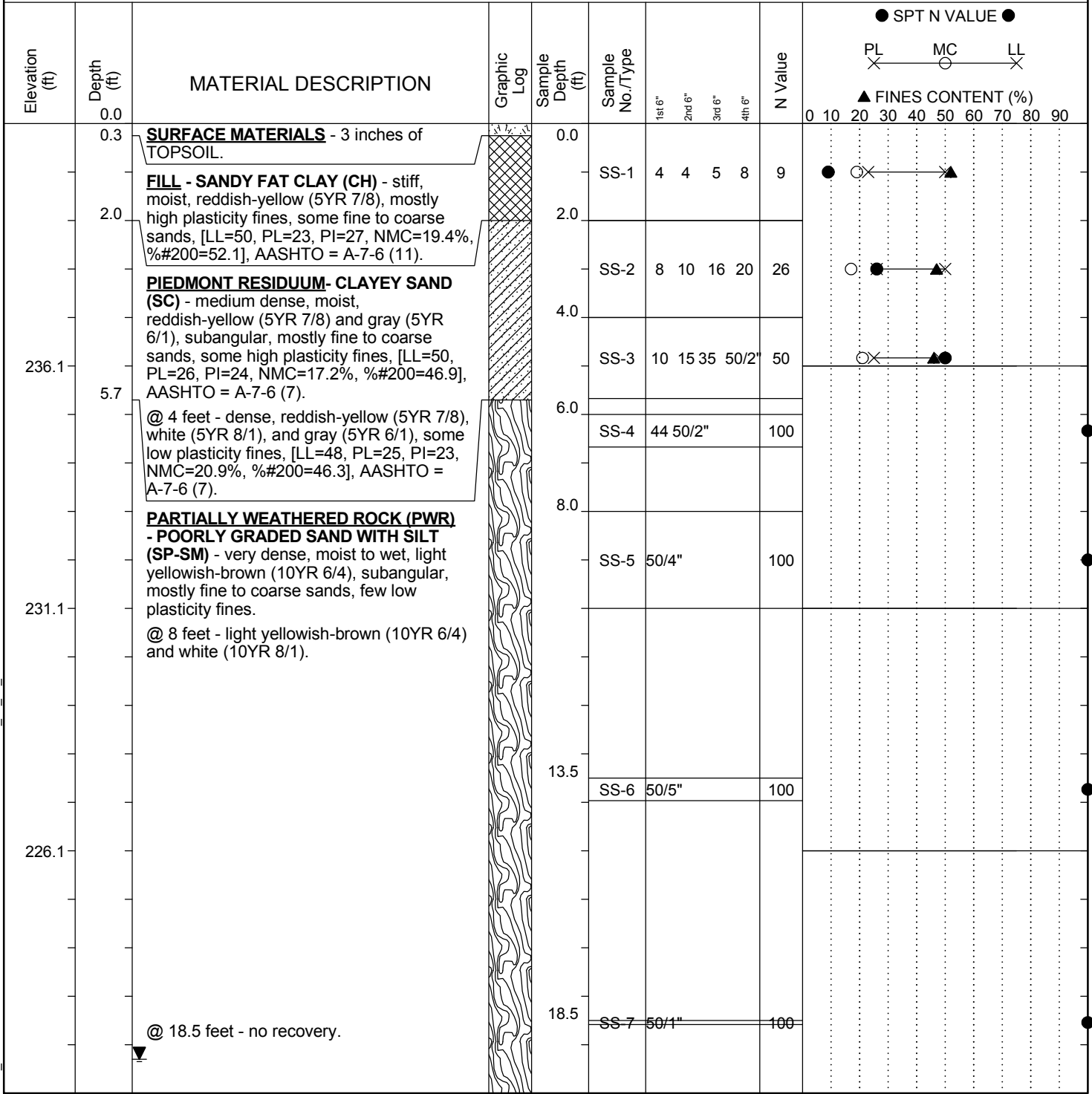
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0	10	20	30	40	50	60
103.7		@NQ-15: Joints Dip from 55° to 80°, Few Joints, Very Narrow, Filled (Calcite/Healed), Planar, Very Close, Slightly Rough		101.3	NQ-15						@103.3-ft.: UC Strength=29,080 psi %REC=98, %RQD=98, RMR=47, GSI=40-45									
98.7		@NQ-16: Joints Dip from 65° to 75°, Few Joints, Narrow to Very Narrow, Filled (Calcite/Healed), Planar, Very Close, Slightly Rough		106.3	NQ-16						%REC=98, %RQD=98, RMR=N/A, GSI=40-45									
93.7		@NQ-17: Joints Dip from 5° to 85°, Few Joints, Very Narrow to Tight, Filled (Calcite/Healed), Planar/Irregular, Rough		111.3	NQ-17						%REC=95, %RQD=98, RMR=N/A, GSI=40-50									
88.7	120.7	@NQ-18: No Joints		116.3	NQ-18						%REC=100, %RQD=100, RMR=N/A, GSI=80-90									
		Coring Terminated at 120.7 feet																		

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: DH-6
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: AKS/HGM	Boring Location: 438+20.13	Offset: R:100.215
Alignment: Proposed	Date Started: 1/10/2018	Date Completed: 1/16/2018
Elev.: 241.1 ft	Latitude: 34.013371	Longitude: -81.108977
Total Depth: 120.6 ft	Soil Depth: 25.6 ft	Core Depth: 95 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: D-50	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.5%	Groundwater: TOB N/A
Core Size: HQ/NQ	Driller: J. Millwood	24HR: 19.3 ft



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: DH-6
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: AKS/HGM	Boring Location: 438+20.13	Offset: R:100.215
Alignment: Proposed	Date Started: 1/10/2018	Date Completed: 1/16/2018
Elev.: 241.1 ft	Latitude: 34.013371	Longitude: -81.108977
Total Depth: 120.6 ft	Soil Depth: 25.6 ft	Core Depth: 95 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: D-50	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.5%	Core Size: HQ/NQ
Driller: J. Millwood	Groundwater: TOB	24HR: 19.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0 10 20 30 40 50 60 70 80 90						
216.1	25.6	<p>Tri-Cone Bit Refusal at 25.6 feet. Install HW Casing to 25.6 feet for HQ wireline coring.</p> <p>For discontinuity descriptors, see discontinuity worksheet.</p> <p>IGNEOUS BEDROCK - GRANITE - gray (GLEYS 1 6/) and light brown (7.5YR 6/3), coarse grained, massive, mostly fresh rock, some slight weathering near joints, strong to very strong rock.</p> <p>RC-1: Rec= 93.8%, RQD= 86.7%, GSI= 80-90, RMR = 64.</p> <p>RC-2: Rec= 100%, RQD= 100%, GSI= 80-90.</p> <p>RC-3: Rec= 100%, RQD= 100%, GSI= 75-85, RMR = 77.</p>		23.5	SS-8	6	50	1"		100										
211.1				30.4	RC-1															
206.1				35.4	RC-2															
					RC-3															

LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: DH-6
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-26
Eng./Geo.: AKS/HGM	Boring Location: 438+20.13	Offset:	R:100.215/ Alignment: Proposed
Elev.: 241.1 ft	Latitude: 34.013371	Longitude: -81.108977	Date Started: 1/10/2018
Total Depth: 120.6 ft	Soil Depth: 25.6 ft	Core Depth: 95 ft	Date Completed: 1/16/2018
Bore Hole Diameter (in): 7.5	Sampler Configuration		Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: HQ/NQ	Driller: J. Millwood	Groundwater: TOB N/A	24HR: 19.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL (X) — MC (O) — LL (X) 0 10 20 30 40 50 60 70 80 90									
		RC-4: Rec= 98%, RQD= 94.9%, GSI= 70-80.		40.4															
		@ 44.8 to 45.4 feet - slightly weathered.			RC-4														
196.1		@ 45.4 feet - gray (GLEY 1 6/N), light brown (7.5YR 6/3) and pink (5YR 8/4), fresh, very strong.		45.4															
		RC-5: Rec= 100%, RQD= 73.3%, GSI= 70-80, RMR = 57.			RC-5														
191.1		RC-6: Rec= 100%, RQD= 100%, GSI= 70-80.		50.4															
		@ 55.4 feet - gray (GLEY 1 6/N) and pink (5YR 8/4), slightly weathered, strong.			RC-6														
186.1		RC-7: Rec= 100%, RQD= 100%, GSI= 50-60, RMR = 67.		55.4															
		@ 55.7 feet - fresh.			RC-7														
		RC-8: Rec= 92.3%, RQD= 96.7%, GSI=		59.3															

LEGEND Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	DH-6
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-26
Eng./Geo.:	AKS/HGM	Boring Location:	438+20.13	Offset:	R:100.215	Alignment:	Proposed
Elev.:	241.1 ft	Latitude:	34.013371	Longitude:	-81.108977	Date Started:	1/10/2018
Total Depth:	120.6 ft	Soil Depth:	25.6 ft	Core Depth:	95 ft	Date Completed:	1/16/2018
Bore Hole Diameter (in):	7.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	HQ/NQ	Driller:	J. Millwood	Groundwater:	TOB N/A	24HR	19.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)										
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	▲ FINES CONTENT (%)							
		75-85. RC-9: Rec= 100%, RQD= 95.8%, GSI= 75-85, RMR = 77.		60.6	RC-8																
		@ 64.7 to 64.9 feet - slightly weathered.				RC-9															
176.1		RC-10: Rec= 100%, RQD= 96.7%, GSI= 75-85.			65.6	RC-10															
		@ 69.1 to 70.6 feet - slightly weathered.																			
171.1		RC-11: Rec= 100%, RQD= 100%, GSI= 75-85, RMR = 82.		70.6	RC-11																
166.1		RC-12: Rec= 100%, RQD= 90.8%, GSI= 75-85.		75.6	RC-12																

LEGEND

Continued Next Page

SAMPLER TYPE SS - Split Spoon UD - Undisturbed Sample AWG - Rock Core, 1-1/8"		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing		SAMPLER TYPE NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube		DRILLING METHOD RW - Rotary Wash RC - Rock Core	
---	--	--	--	--	--	--	--

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: DH-6
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-26	
Eng./Geo.: AKS/HGM	Boring Location: 438+20.13		Offset:	R:100.215/Alignment: Proposed
Elev.: 241.1 ft	Latitude: 34.013371	Longitude: -81.108977	Date Started: 1/10/2018	
Total Depth: 120.6 ft	Soil Depth: 25.6 ft	Core Depth: 95 ft	Date Completed: 1/16/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: Y (N)
Drill Machine: D-50		Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: HQ/NQ	Driller: J. Millwood	Groundwater: TOB	N/A	24HR: 19.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)										
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0 10 20 30 40 50 60 70 80 90							
156.1		RC-13: Rec= 100%, RQD= 100%, GSI= 80-90, RMR = 82.		80.6																	
						RC-13															
					85.6																
		RC-14: Rec= 100%, RQD= 98%, GSI= 80-90.				RC-14															
151.1		RC-15: Rec= 100%, RQD= 90%, GSI= 75-85, RMR = 82.		90.6																	
					RC-15																
146.1		RC-16: Rec= 100%, RQD= 100%, GSI= 75-85.		95.6																	
					RC-16																

LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: DH-6
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: AKS/HGM	Boring Location: 438+20.13	Offset: R:100.215
Alignment: Proposed		
Elev.: 241.1 ft	Latitude: 34.013371	Longitude: -81.108977
Date Started: 1/10/2018		
Total Depth: 120.6 ft	Soil Depth: 25.6 ft	Core Depth: 95 ft
Date Completed: 1/16/2018		
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 86.5%		
Core Size: HQ/NQ	Driller: J. Millwood	Groundwater: TOB N/A
24HR: 19.3 ft		

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0 10 20 30 40 50 60 70 80 90						
136.1		RC-17: Rec= 100%, RQD= 100%, GSI= 80-90.		100.6	RC-17															
		RC-18: Rec= 100%, RQD= 100%, GSI= 75-85.		105.6	RC-18															
131.1		RC-19: Rec= 100%, RQD= 100%, GSI= 70-80. @ 110.6 to 111 feet - slightly weathered. @ 111 feet - fresh.		110.6	RC-19															
126.1		RC-20: Rec= 100%, RQD= 100%, GSI= 75-85.		115.6	RC-20															

LEGEND

Continued Next Page

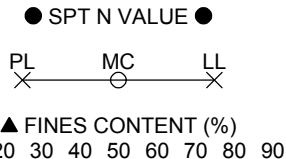
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662	County:	Lexington/Richland	Boring No.:	DH-6
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route:	I-26
Eng./Geo.:	AKS/HGM	Boring Location:	438+20.13	Offset:	R:100.215
Alignment:	Proposed				
Elev.:	241.1 ft	Latitude:	34.013371	Longitude:	-81.108977
Date Started:	1/10/2018				
Total Depth:	120.6 ft	Soil Depth:	25.6 ft	Core Depth:	95 ft
Date Completed:	1/16/2018				
Bore Hole Diameter (in):	7.5	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)				
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	86.5%				
Core Size:	HQ/NQ	Driller:	J. Millwood	Groundwater:	TOB N/A
24HR:	19.3 ft				

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	N Value				SPT N VALUE ●
						1st 6"	2nd 6"	3rd 6"	4th 6"	
	120.6	Boring Terminated at 120.6 feet.	▨							
116.1										
111.1										
106.1										



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Gowan
 Logged By: Austin Syms
 Date: 1/10/2018 - 1/16/2018

Boring Number: DH-6
 Core Barrel Type: HQ/NQ
 Core Barrel Length: 5 feet
 Coring Technique: Wireline
 Number of Core Boxes: 8

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
26.5	1	J	4	T	N/A	N/A	Ir	Sr	
26.9	2	J	11	T	N/A	N/A	Pl	Sr	
31.8	3	V	54	MW	Fi	Qz	Pl	N/A	
38.1	4	J	N/A	N/A	N/A	N/A	Ir	R	Fractured zone 38.1' - 38.9'
40.5	5	J	10	T	N/A	N/A	Pl	R	
41.2	6	J	0	T	N/A	N/A	Pl	R	
42.2	7	J	3	T	N/A	N/A	Pl	R	
43	8	J	76	T	Fi	Fe	Pl	Sr	
44.8	9	J	N/A	N/A	N/A	N/A	Ir	R	Fractured zone 44.8' - 44.9'
47.1	10	J	5	MW	N/A	N/A	Pl	R	
47.5	11	J	5	MW	N/A	N/A	Pl	R	
48.9	12	J	0	MW	Sp	Fe	Pl	R	
49.5	13	J	60	MW	N/A	N/A	St	Sr	
51.4	14	J	5	MW	N/A	N/A	Pl	Sr	
53.7	15	J	18	MW	Fi	Ca	Pl	R	
55.7	16	J	5	W	Su	Fe	Ir	Sr	
55.9	17	J	10	MW	N/A	N/A	Wa	Sr	
56.1	18	J	5	MW	Sp	Fe	Ir	Sr	
56.3	19	J	5	MW	N/A	N/A	Pl	R	
57.1	20	J	0	MW	N/A	N/A	Pl	Sr	
57.3	21	J	5	MW	N/A	N/A	Ir	R	
58	22	J	5	MW	N/A	N/A	Pl	Sr	
58.2	23	J	5	W	Sp	Fe	Pl	Sr	
62.6	24	J	8	T	N/A	N/A	Ir	Sr	
64.5	25	J	0	T	N/A	N/A	Wa	Sr	
64.7	26	J	0	T	N/A	N/A	Ir	Sr	
68.9	27	J	0	T	N/A	N/A	Pl	Sr	
69.1	28	J	0	T	N/A	N/A	Ir	R	
74.3	29	J	0	T	N/A	N/A	Pl	Sr	
76.4	30	J	0	T	N/A	N/A	Ir	Sr	



Rock Core Discontinuity Worksheet

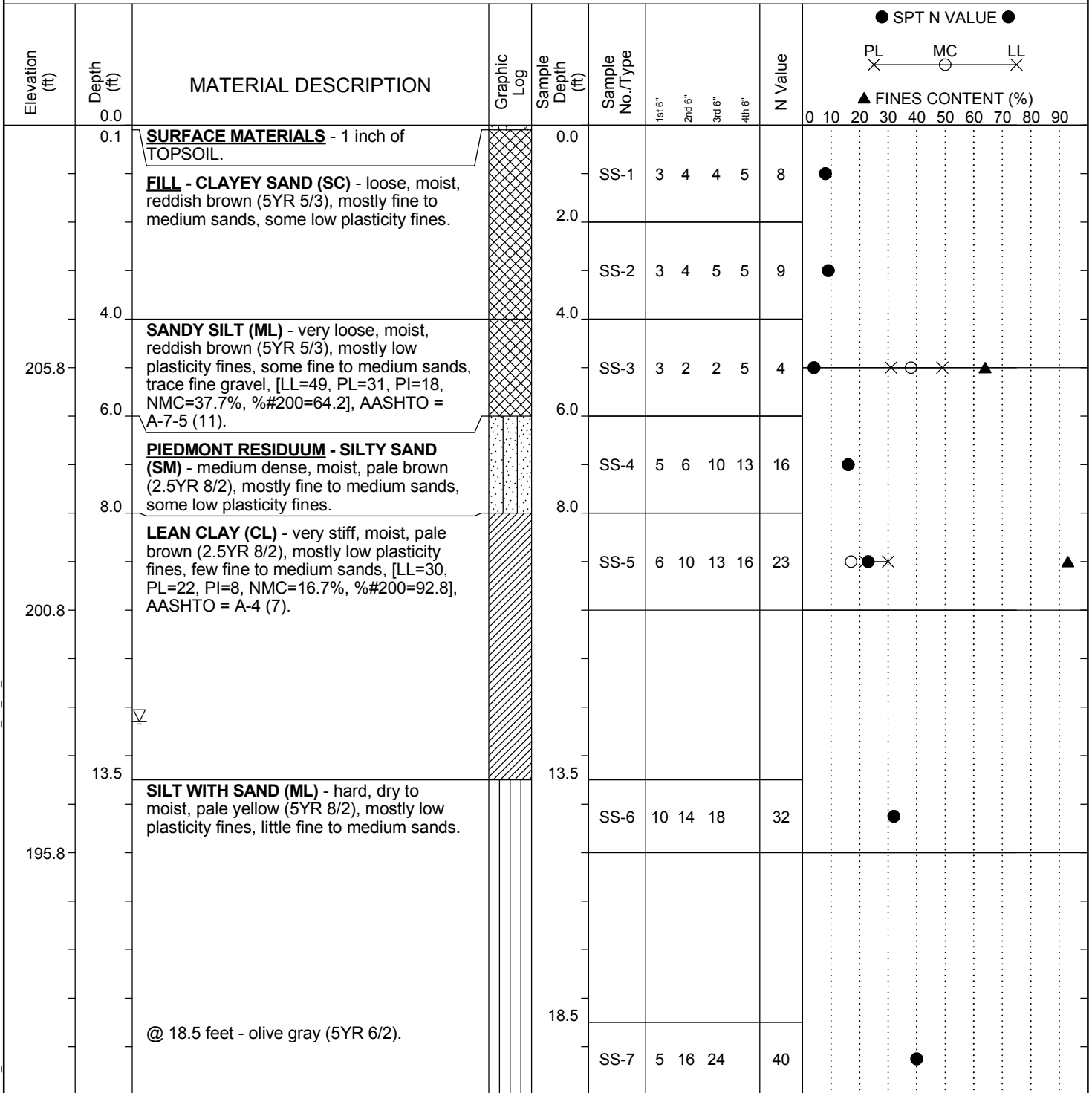
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Gowan
 Logged By: Austin Syms
 Date: 1/10/2018 - 1/16/2018

Boring Number: DH-6
 Core Barrel Type: HQ/NQ
 Core Barrel Length: 5 feet
 Coring Technique: Wireline
 Number of Core Boxes: 8

76.6	31	J	3	T	N/A	N/A	Pl	Sr	
76.9	32	J	0	T	N/A	N/A	Pl	Sr	
91.7	33	J	0	T	N/A	N/A	lr	Sr	
92.2	34	J	2	T	N/A	N/A	Wa	Sr	
97.4	35	J	6	T	N/A	N/A	Pl	Sr	
107.6	36	J	67	T	N/A	N/A	Pl	Sr	
108.1	37	J	13	T	N/A	N/A	Pl	Sr	
108.7	38	Sh	31	T	N/A	N/A	Pl	R	
110.7	39	J	N/A	N/A	N/A	N/A	lr	Sr	Fractured zone 110.7' - 111'
112.7	40	J	0	T	N/A	N/A	Pl	Sr	
113.6	41	J	62	T	N/A	N/A	Pl	Sr	
115	42	J	3	T	N/A	N/A	Pl	R	
118.8	43	J	0	T	N/A	N/A	Pl	Sr	
119.3	44	J	0	T	N/A	N/A	Pl	Sr	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: RW-35
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: AKS	Boring Location: 375+94.91	Offset: L:182.418' Alignment: Proposed
Elev.: 210.8 ft	Latitude: 34.029541	Longitude: -81.102643
Total Depth: 49.3 ft	Soil Depth: 49.3 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: H.S.A / RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB 12.3 ft 24HR: N/A



LEGEND

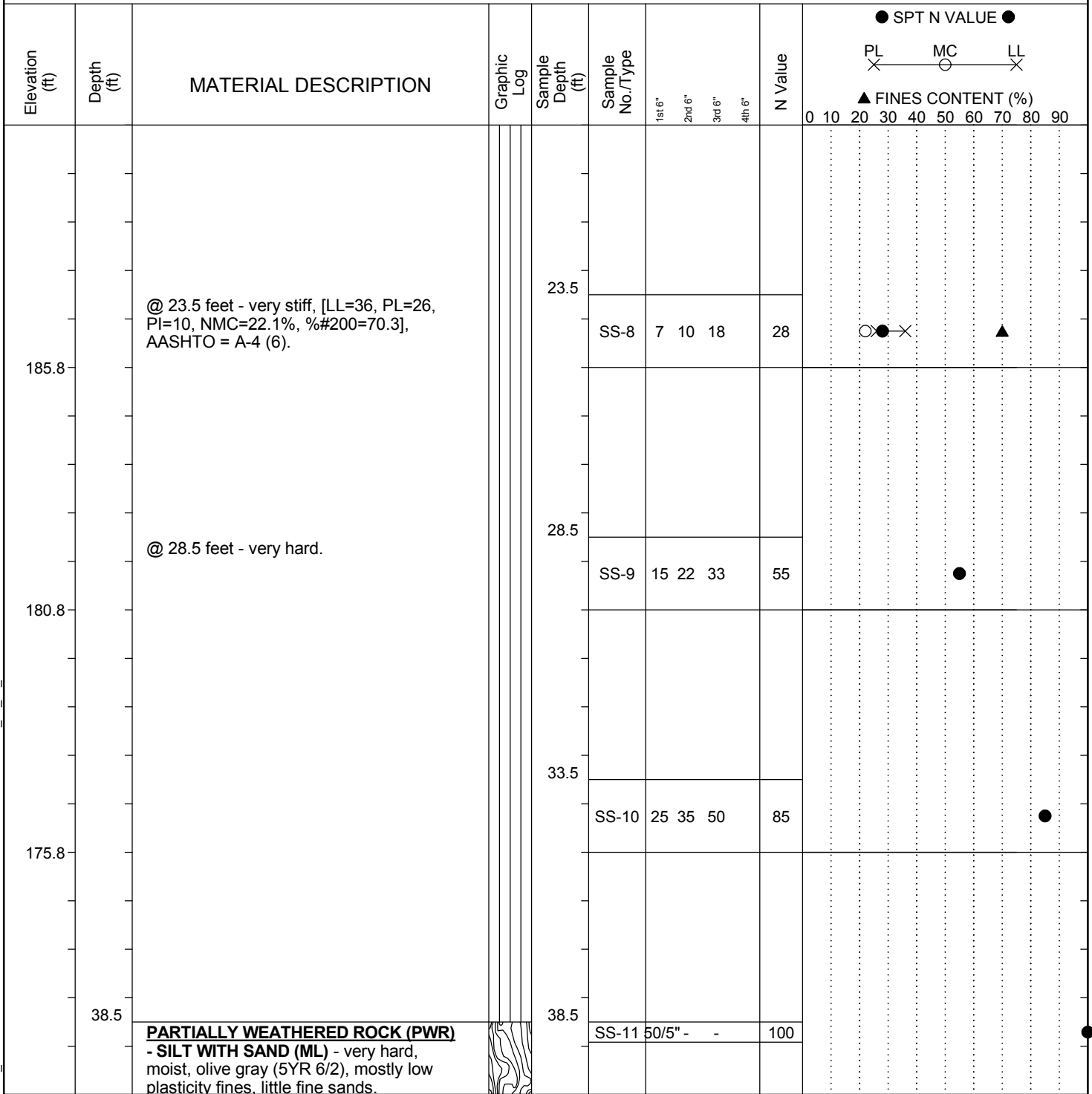
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: RW-35
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: AKS	Boring Location: 375+94.91	Offset: L:182.418
Elev.: 210.8 ft	Latitude: 34.029541	Longitude: -81.102643
Total Depth: 49.3 ft	Soil Depth: 49.3 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5		Sampler Configuration: Y (N)
Drill Machine: D-50	Drill Method: H.S.A / RW	Hammer Type: Automatic
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB 12.3 ft
		Energy Ratio: 86.5%
		24HR: N/A



LEGEND

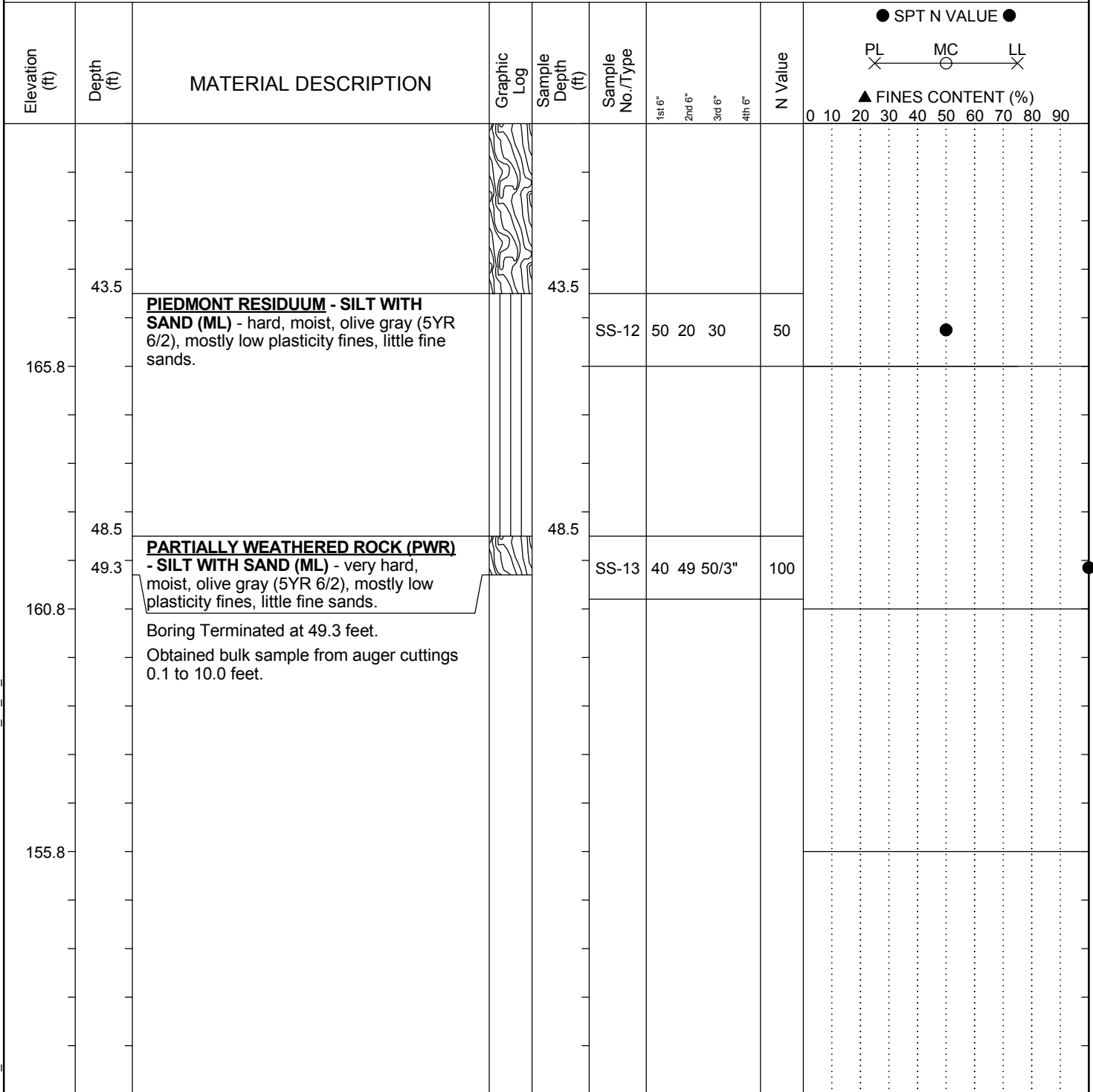
Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: RW-35
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-26	
Eng./Geo.: AKS	Boring Location: 375+94.91		Offset: L:182.418	Alignment: Proposed
Elev.: 210.8 ft	Latitude: 34.029541	Longitude: -81.102643	Date Started: 1/24/2018	
Total Depth: 49.3 ft	Soil Depth: 49.3 ft	Core Depth: 0 ft	Date Completed: 1/24/2018	
Bore Hole Diameter (in): 7.5	Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: H.S.A / RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB	12.3 ft	24HR: N/A



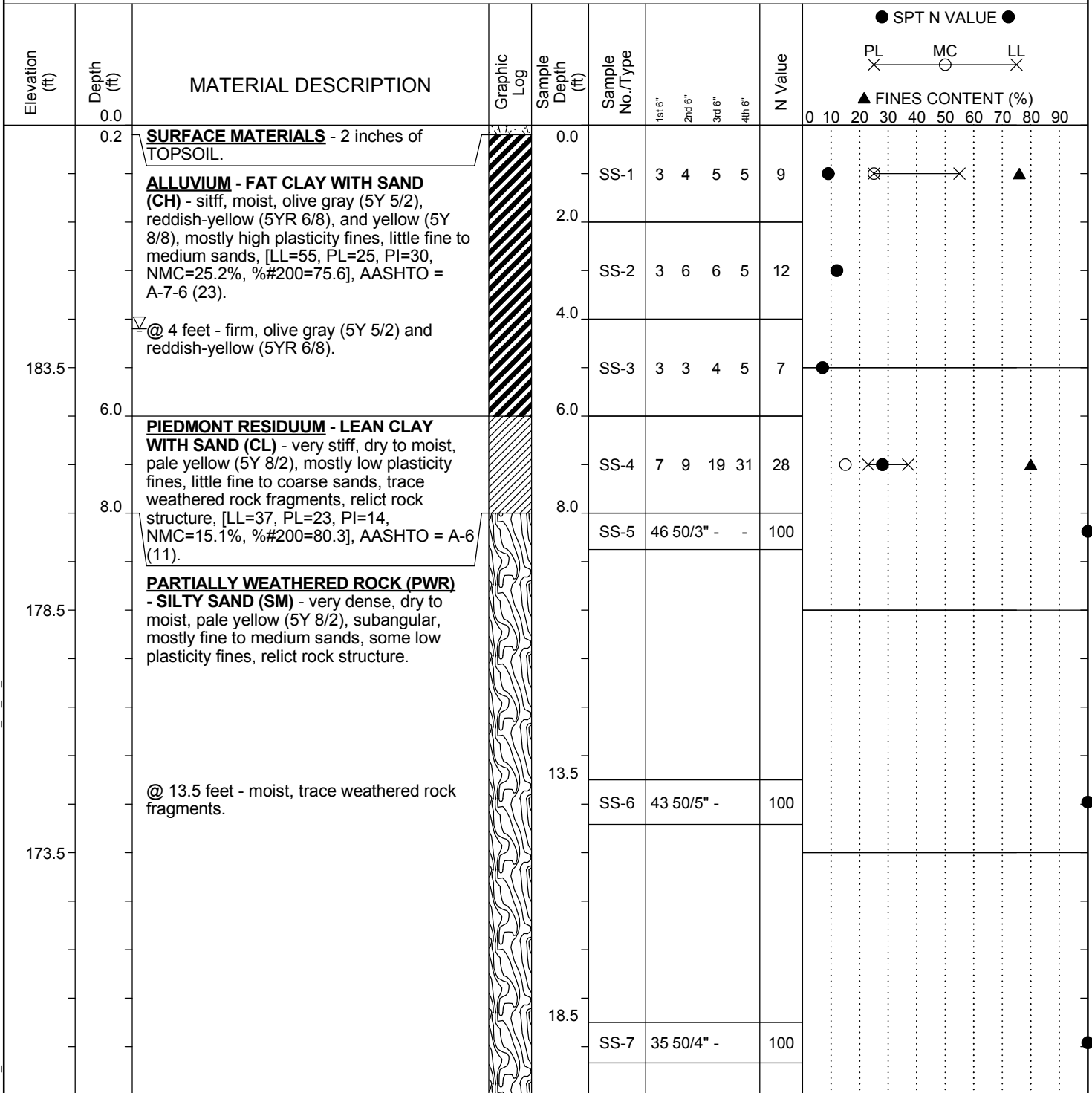
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: RW-36
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 29	
Eng./Geo.: AKS	Boring Location: 8389+85.83		Offset: R:0.33'	Alignment: Proposed
Elev.: 188.5 ft	Latitude: 34.026327	Longitude: -81.100660	Date Started: 3/1/2018	
Total Depth: 30.1 ft	Soil Depth: 30.1 ft	Core Depth: 0 ft	Date Completed: 3/1/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: H.S.A / RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB	4.2 ft 24HR N/A	



LEGEND

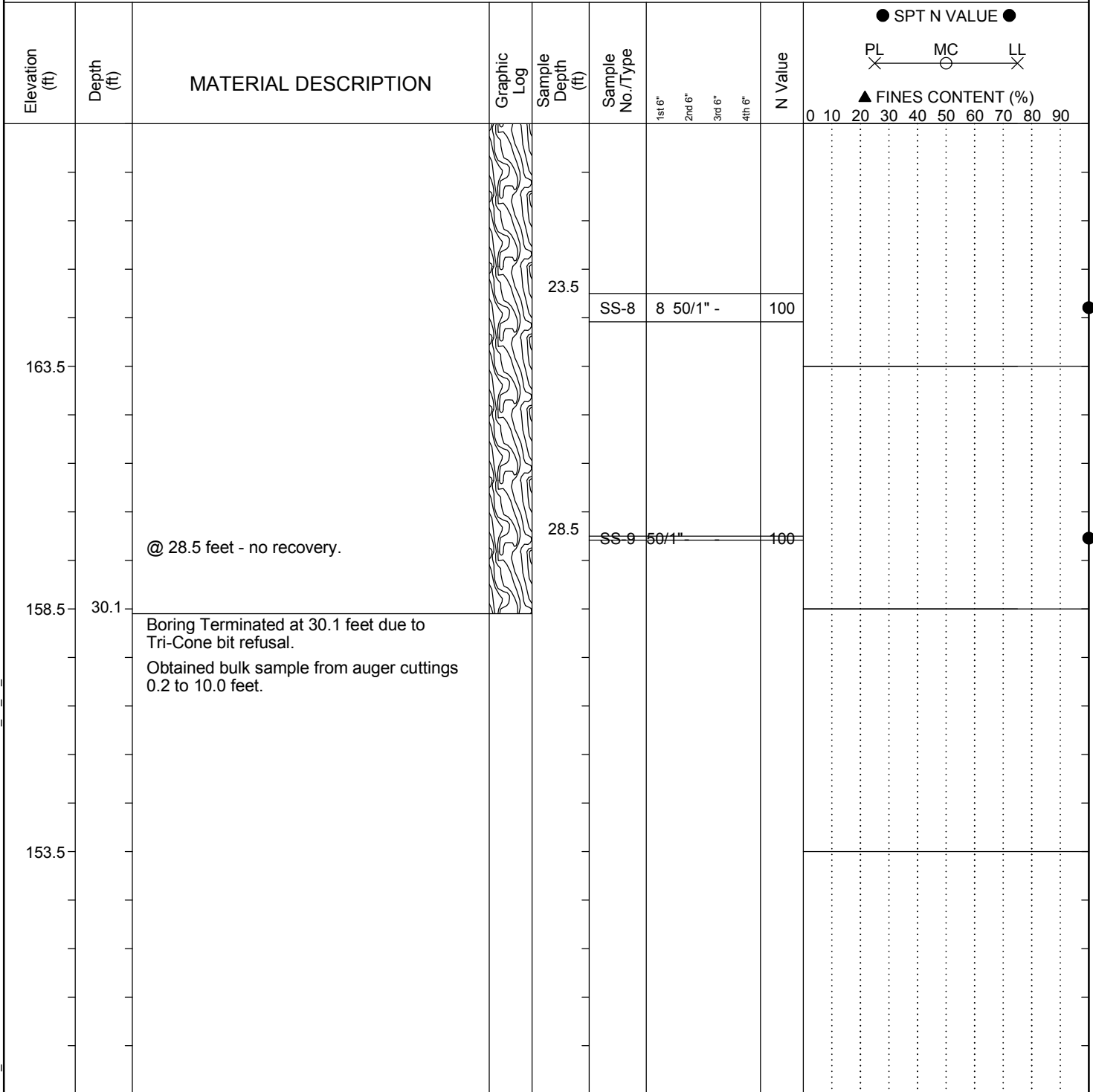
Continued Next Page

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: RW-36
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 29	
Eng./Geo.: AKS	Boring Location: 8389+85.83		Offset: R:0.33'	Alignment: Proposed
Elev.: 188.5 ft	Latitude: 34.026327	Longitude: -81.100660	Date Started: 3/1/2018	
Total Depth: 30.1 ft	Soil Depth: 30.1 ft	Core Depth: 0 ft	Date Completed: 3/1/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: H.S.A / RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB	4.2 ft 24HR N/A	



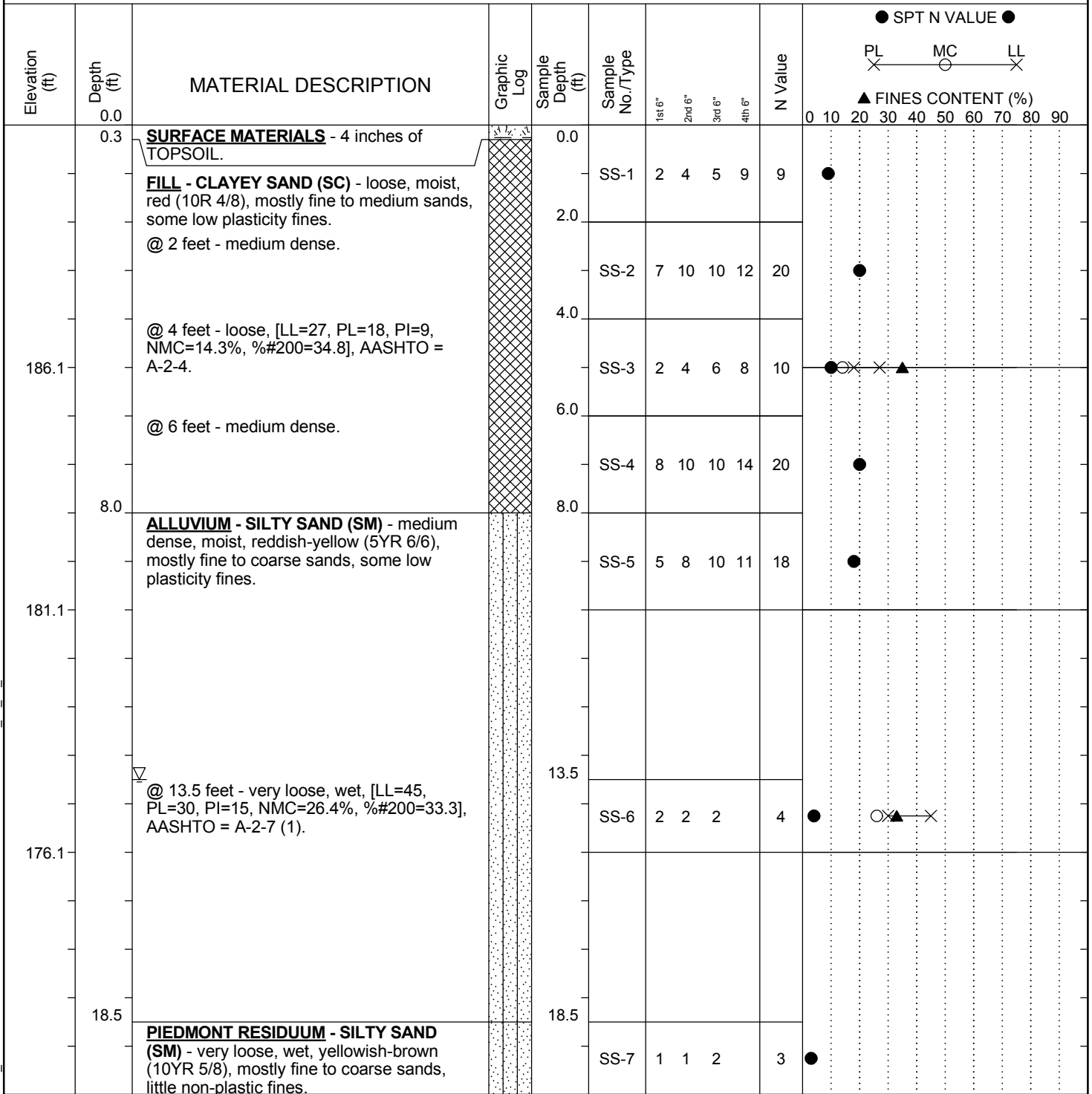
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: RW-37
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-126
Eng./Geo.: HGM	Boring Location: 45+97.78	Offset: R:85.435' Alignment: Proposed
Elev.: 191.1 ft	Latitude: 34.017205	Longitude: -81.089689
Total Depth: 32.3 ft	Soil Depth: 32.3 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: H.S.A / RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB 13.5 ft 24HR: N/A



LEGEND

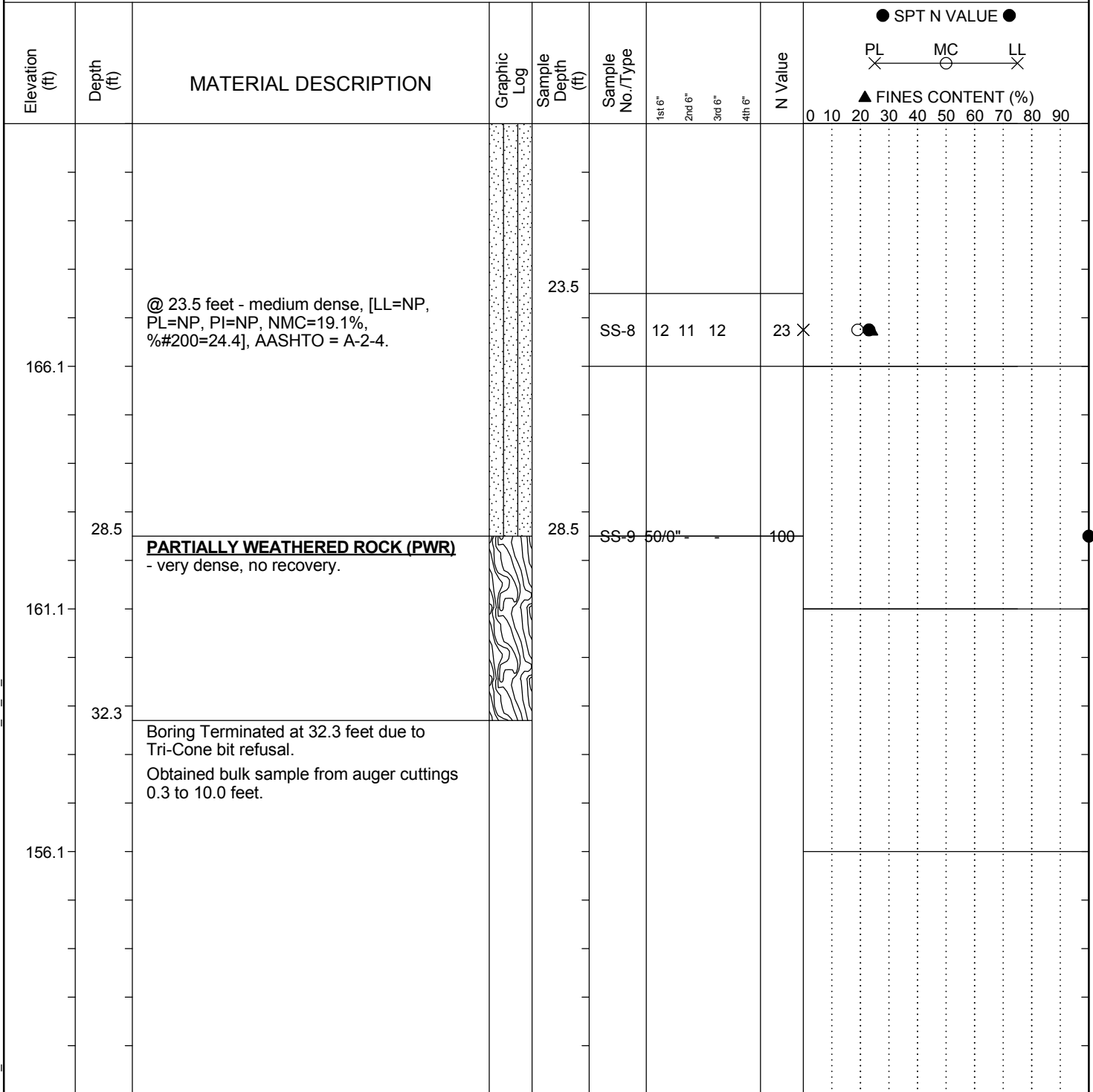
Continued Next Page

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: RW-37
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-126
Eng./Geo.: HGM	Boring Location: 45+97.78		Offset: R:85.435'	Alignment: Proposed
Elev.: 191.1 ft	Latitude: 34.017205	Longitude: -81.089689	Date Started: 1/25/2018	
Total Depth: 32.3 ft	Soil Depth: 32.3 ft	Core Depth: 0 ft	Date Completed: 1/25/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: H.S.A / RW	Hammer Type: Automatic	Energy Ratio: 84.1%	
Core Size: N/A	Driller: T. Miller	Groundwater: TOB	13.5 ft	24HR: N/A



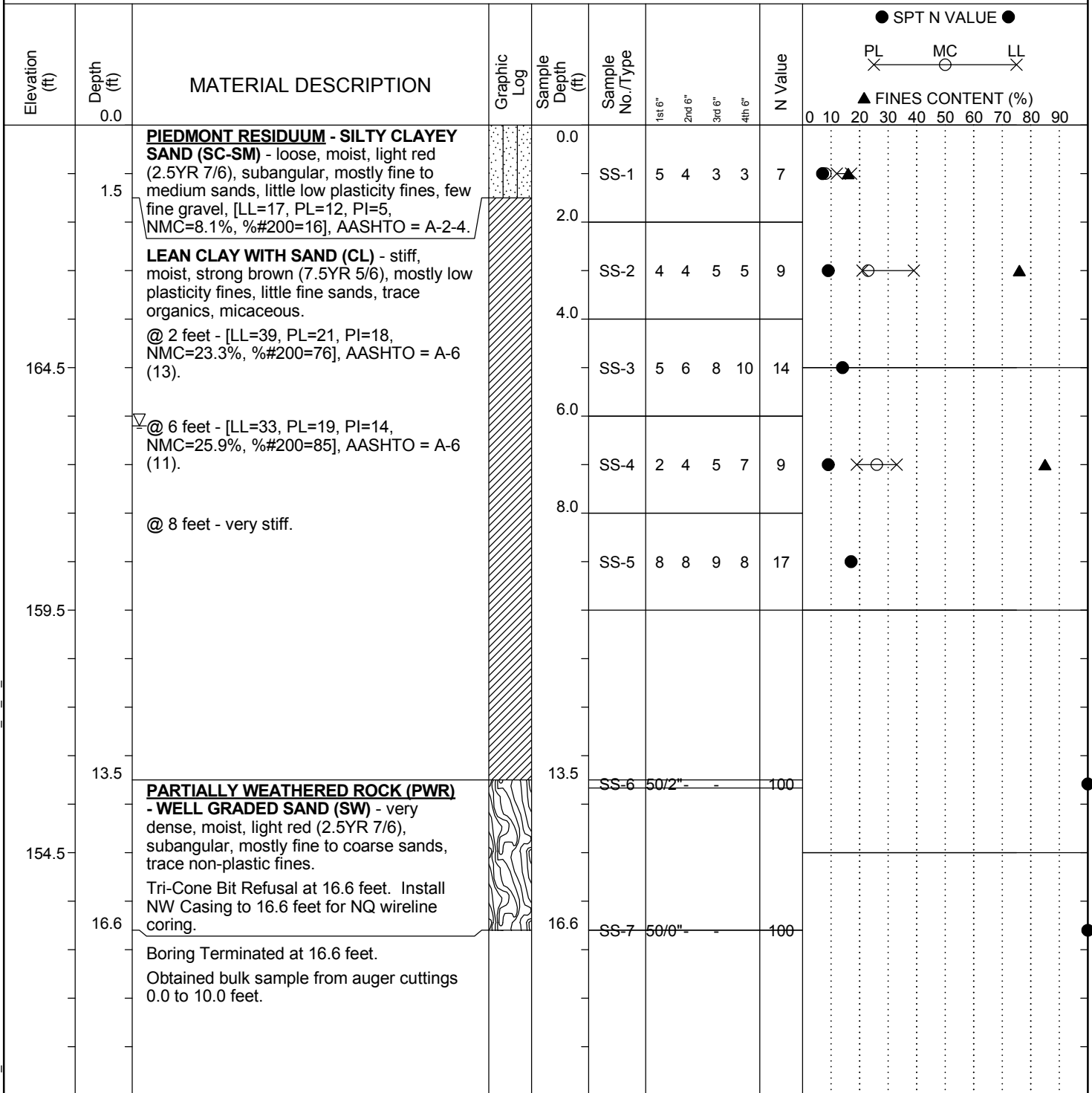
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: RW-38
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: NGS	Boring Location: 5985+51.15	Offset: L:73.93' Alignment: Proposed
Elev.: 169.5 ft	Latitude: 34.022027	Longitude: -81.105175 Date Started: 4/3/2018
Total Depth: 16.6 ft	Soil Depth: 16.6 ft	Core Depth: 0 ft Date Completed: 4/3/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: H.S.A / RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB 6.2 ft 24HR: N/A



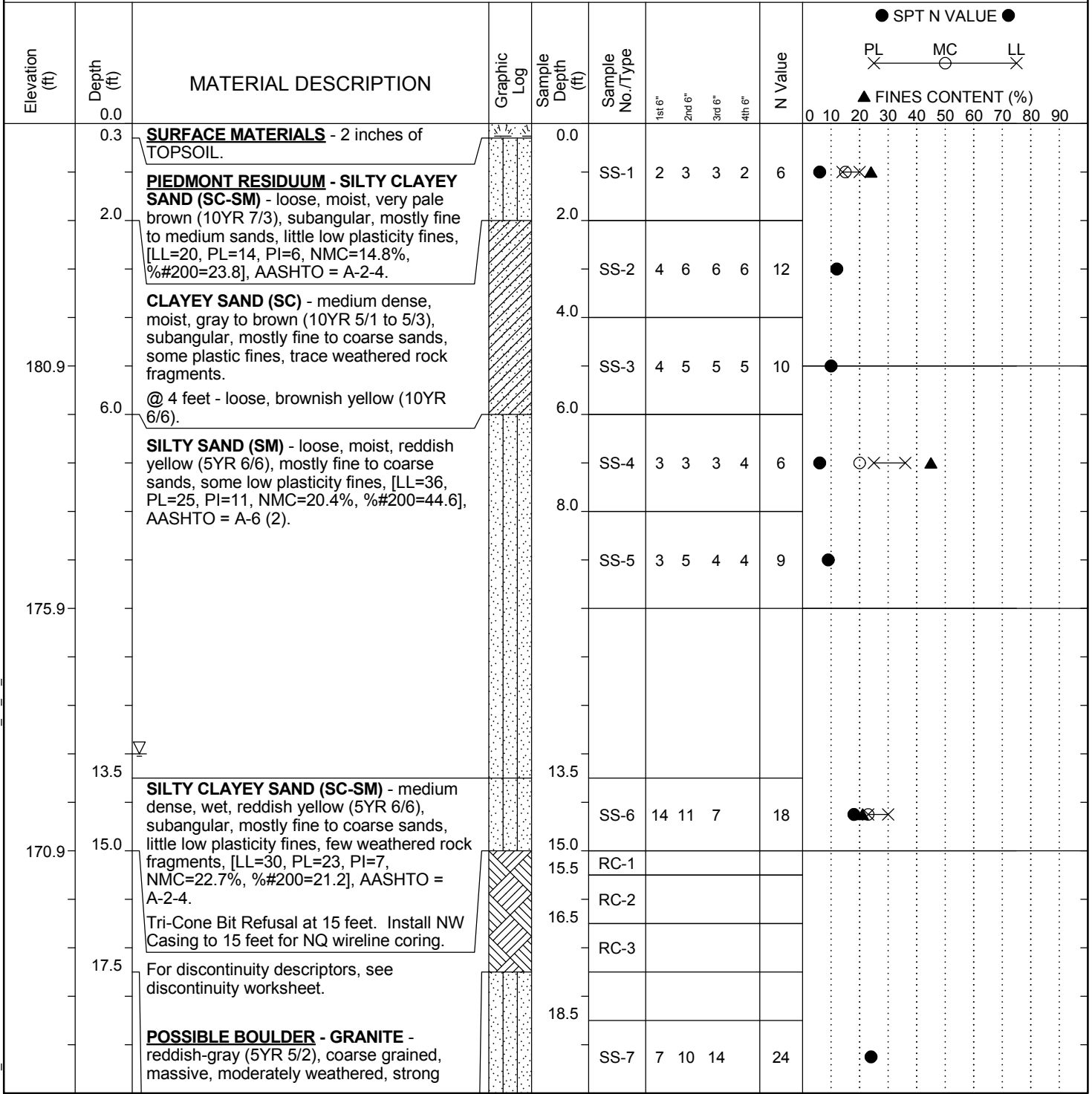
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	W-22
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-26
Eng./Geo.:	ELF	Boring Location:	407+18.51	Offset:	L:77.239'	Alignment:	Proposed
Elev.:	185.9 ft	Latitude:	34.021085	Longitude:	-81.104590	Date Started:	2/7/2018
Total Depth:	79.1 ft	Soil Depth:	79.1 ft	Core Depth:	0 ft	Date Completed:	2/7/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	84.1%
Core Size:	N/A	Driller:	T. Miller	Groundwater:	TOB	13 ft	24HR N/A

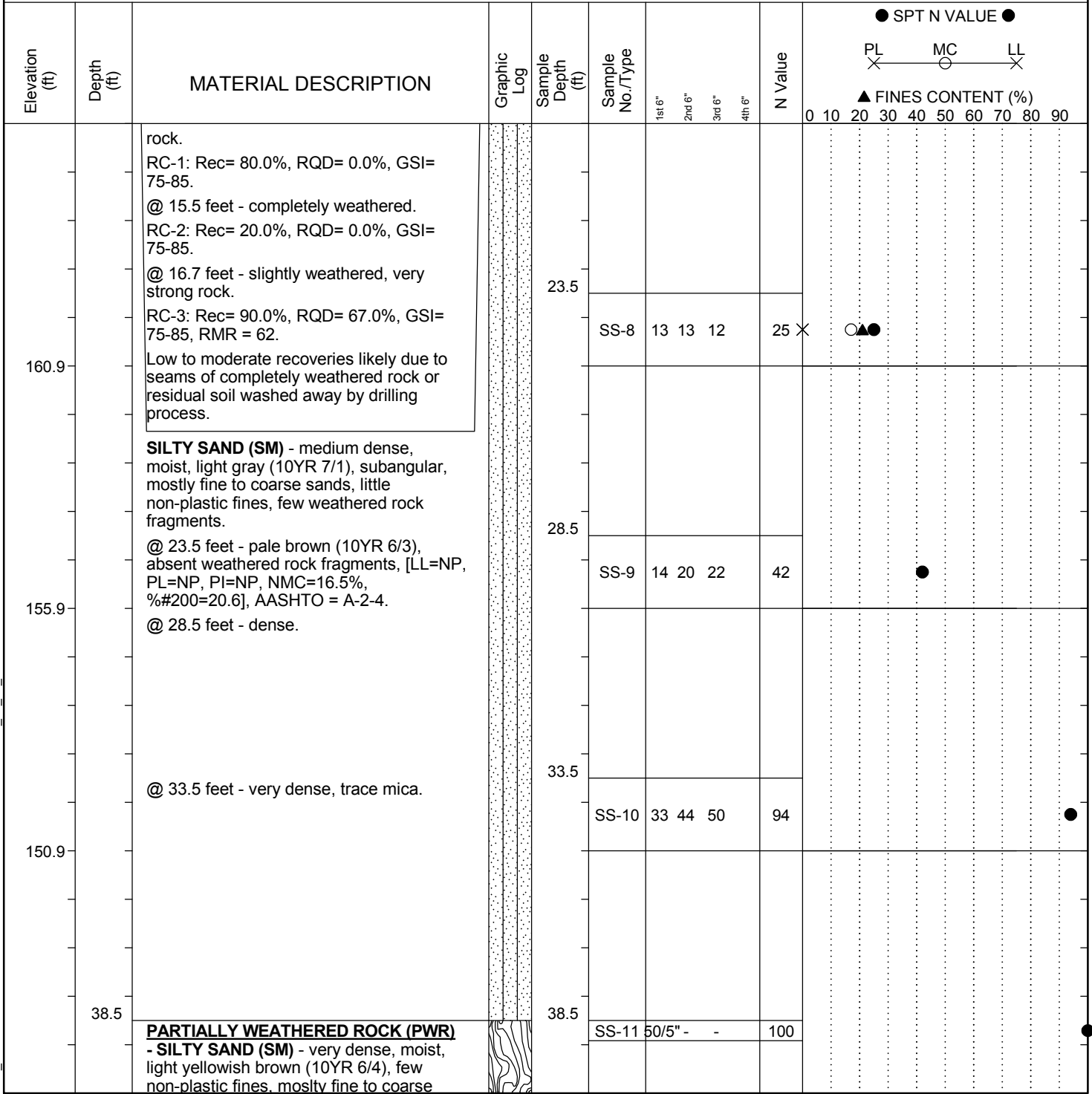


SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

Continued Next Page

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-22
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: ELF	Boring Location: 407+18.51	Offset: L:77.239'
Elev.: 185.9 ft	Latitude: 34.021085	Longitude: -81.104590
Total Depth: 79.1 ft	Soil Depth: 79.1 ft	Core Depth: 0 ft
Date Started: 2/7/2018	Date Completed: 2/7/2018	
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 84.1%	Groundwater: TOB 13 ft
Core Size: N/A	Driller: T. Miller	24HR: N/A



LEGEND

Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-22
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-26
Eng./Geo.: ELF	Boring Location: 407+18.51	Offset: L:77.239'
Elev.: 185.9 ft	Latitude: 34.021085	Longitude: -81.104590
Total Depth: 79.1 ft	Soil Depth: 79.1 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: N/A	Driller: T. Miller	Energy Ratio: 84.1%
	Groundwater: TOB	24HR: N/A

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0 10 20 30 40 50 60 70 80 90						
140.9		sands. @ 43.5 feet - yellowish brown (10YR 5/4).		43.5	SS-12 4750/2" -					100										
135.9		@ 48.5 feet - very pale brown to brown (10YR 7/3 to 5/3).		48.5	SS-13 3950/5" -					100										
130.9				53.5	SS-14 50/1"					100										
		@ 58.5 feet - no recovery.		58.5	SS-15 50/1"					100										

LEGEND

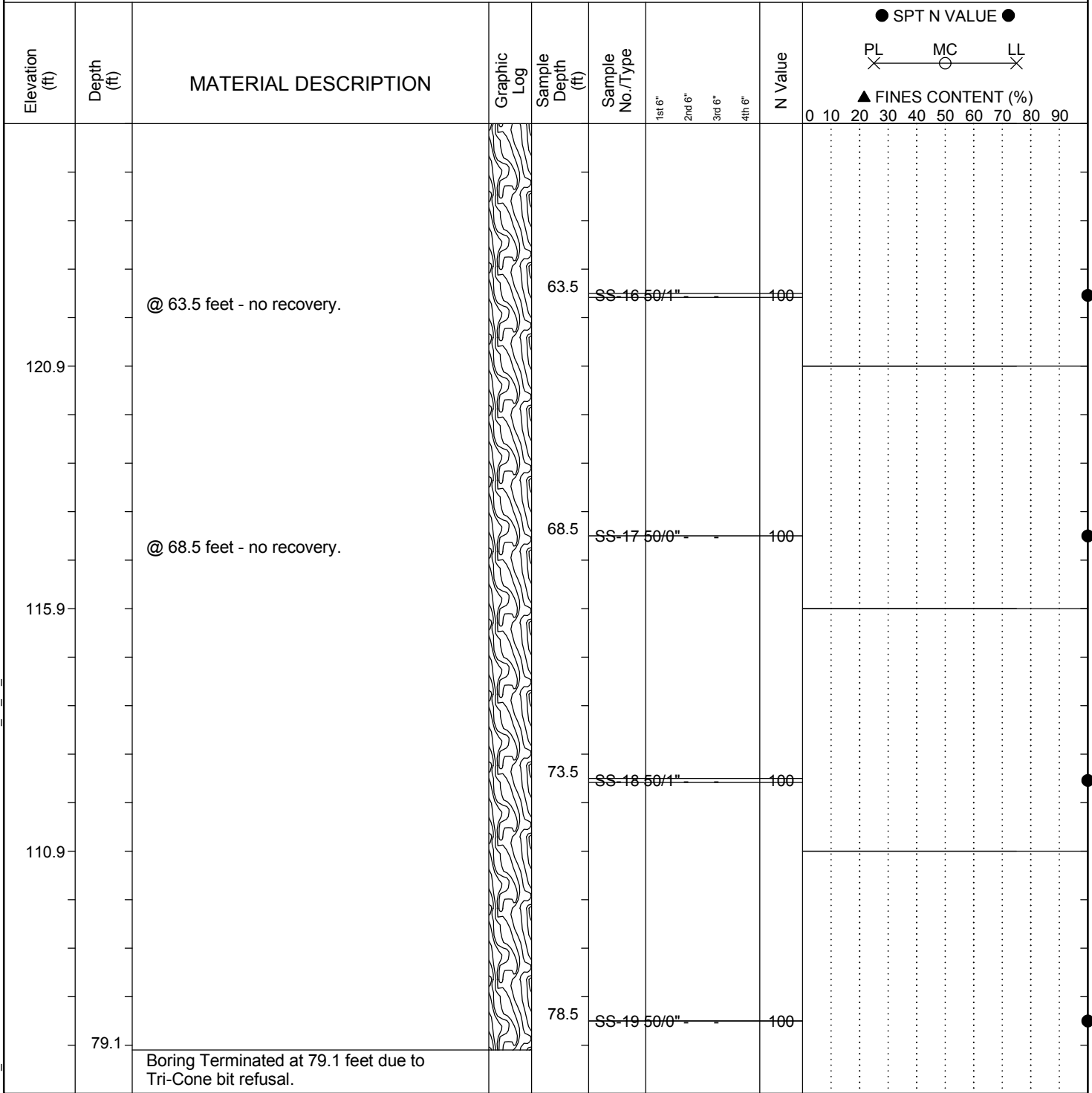
Continued Next Page

SAMPLER TYPE SS - Split Spoon UD - Undisturbed Sample AWG - Rock Core, 1-1/8"		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing		NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube		RW - Rotary Wash RC - Rock Core	
---	--	--	--	---	--	------------------------------------	--

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland		Boring No.: W-22	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-26	
Eng./Geo.: ELF	Boring Location: 407+18.51		Offset: L:77.239'	Alignment: Proposed
Elev.: 185.9 ft	Latitude: 34.021085	Longitude: -81.104590	Date Started: 2/7/2018	
Total Depth: 79.1 ft	Soil Depth: 79.1 ft	Core Depth: 0 ft	Date Completed: 2/7/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N)
Drill Machine: CME 55		Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB	13 ft	24HR: N/A



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

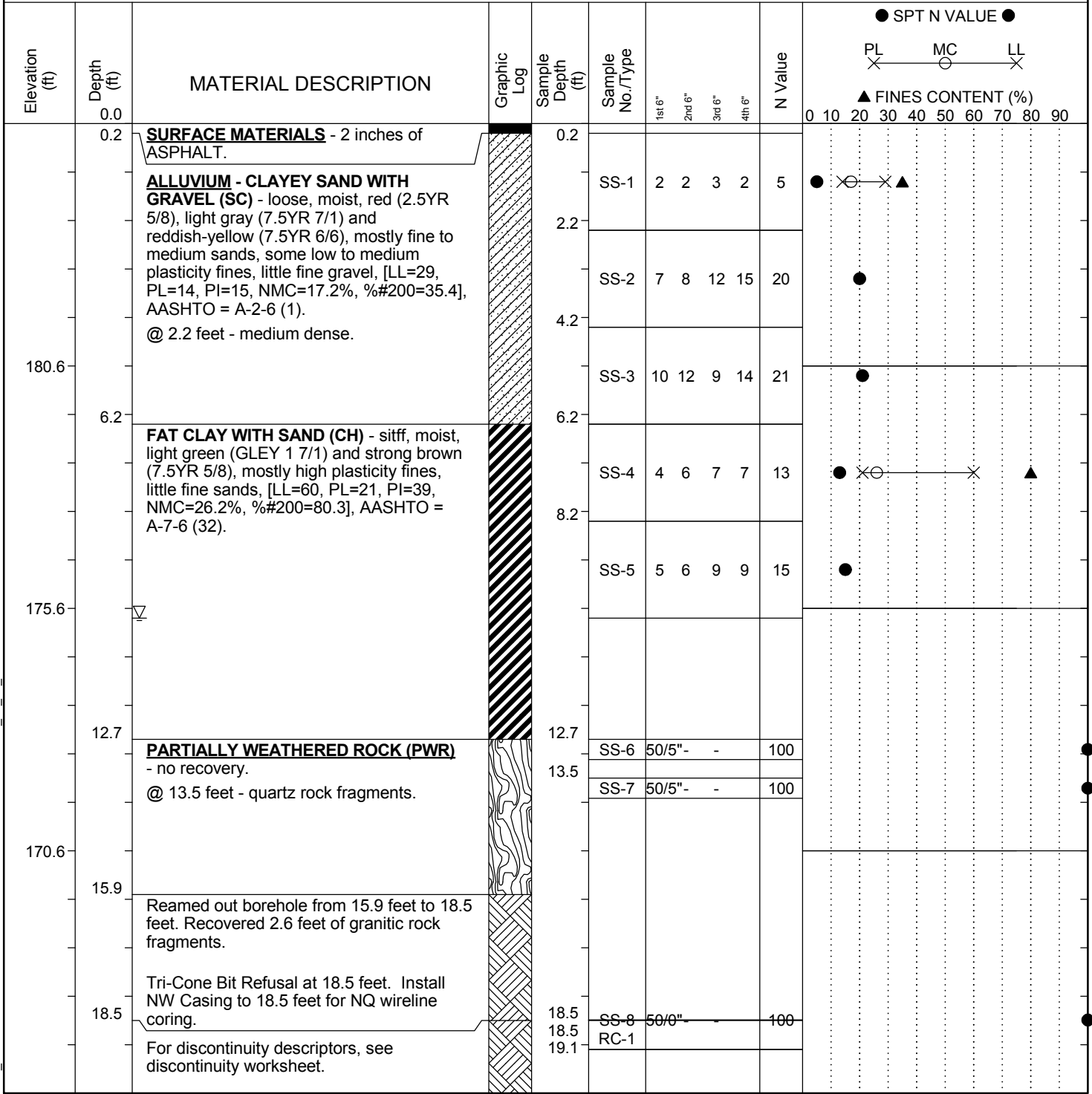
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Lehe Fender
 Date: 2/7/2018

Boring Number: W-22
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
14.6	1	J	5	W	No	N/A	Pl	SR	
16.2	2	J	20	W	No	N/A	Ir	SR	Fractured zone 16.2' to 16.3'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-23
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 32
Eng./Geo.: NGS	Boring Location: 6022+73.17	Offset: L:53.37' Alignment: Proposed
Elev.: 185.6 ft	Latitude: 34.023770	Longitude: -81.096544
Total Depth: 28.6 ft	Soil Depth: 15.9 ft	Core Depth: 10.1 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: NQ	Driller: T. Miller	Groundwater: TOB 10.2 ft 24HR: N/A



LEGEND Continued Next Page

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662		County:	Lexington/Richland	Boring No.:	W-23	
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route:	Site 32	
Eng./Geo.:	NGS	Boring Location:	6022+73.17	Offset:	L:53.37'	Alignment:	Proposed
Elev.:	185.6 ft	Latitude:	34.023770	Longitude:	-81.096544	Date Started:	3/5/2018
Total Depth:	28.6 ft	Soil Depth:	15.9 ft	Core Depth:	10.1 ft	Date Completed:	3/5/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 55	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	84.1%
Core Size:	NQ	Driller:	T. Miller	Groundwater:	TOB	10.2 ft	24HR N/A

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	LL	
160.6		IGNEOUS BEDROCK - GRANITE - pale red (7.5R), pinkish-gray (7.5R 7/1), and dark reddish-gray (7.5R 3/1), medium grained to coarse grained, slightly to moderately weathered, strong rock, trace pyrite. RC-1: Rec= 100%, RQD= 0%, GSI= 55-65. @ 19.1 feet - fresh, very strong rock. RC-2: Rec= 96.0%, RQD= 96.7%, GSI= 60-70, RMR = 34. RC-3: Rec= 100%, RQD= 100%, GSI= 70-80. Boring Terminated at 28.6 feet.		24.1	RC-2							
28.6												
155.6												
150.6												

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18



Rock Core Discontinuity Worksheet

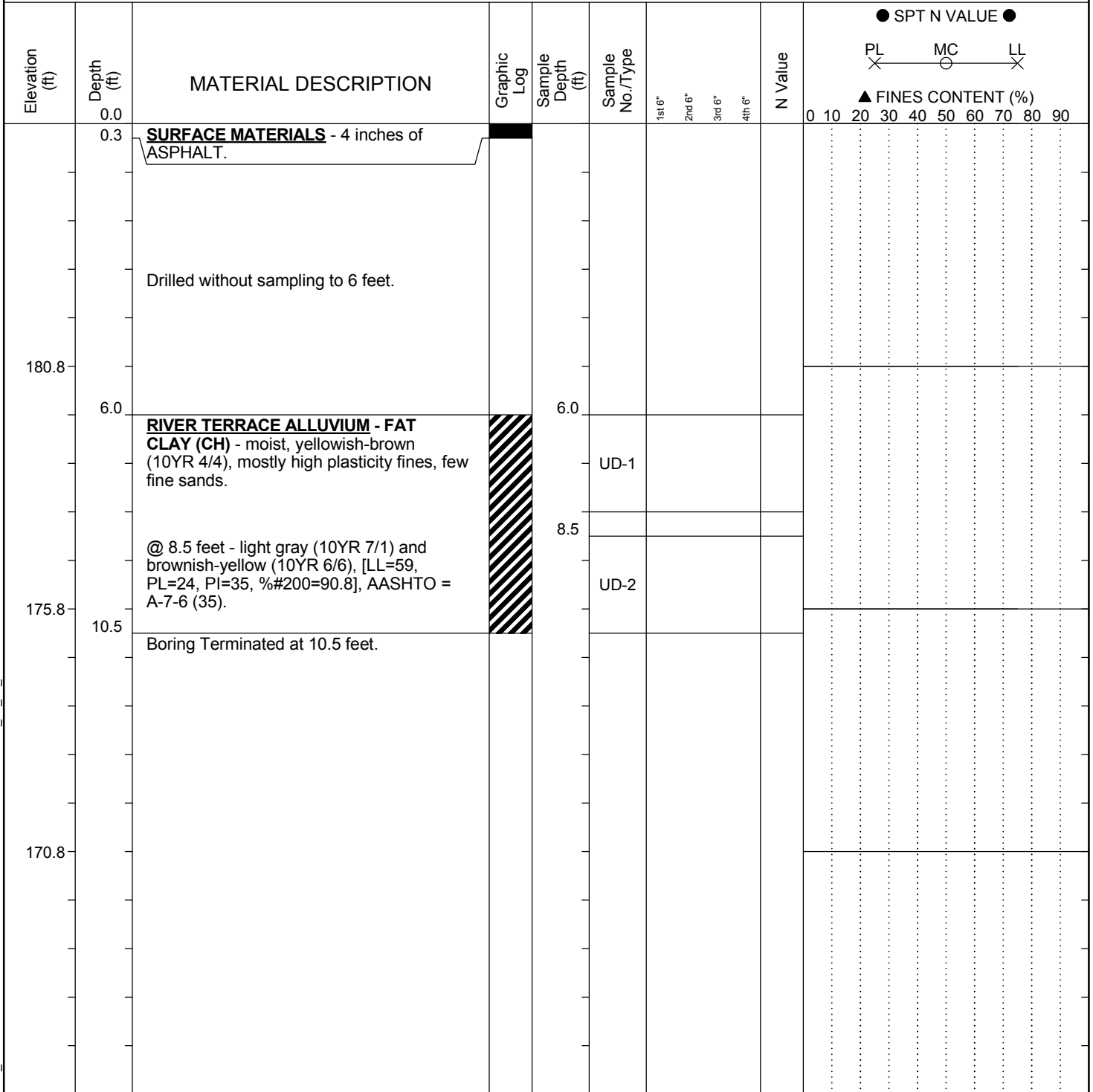
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Nat Shuff
 Date: 3/5/2018

Boring Number: W-23
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 1

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
16.9	1	J	30	N	Sp	Cl/Sd/Fe	Ir	R	
17.4	2	J	0	MW	Sp	Cl/Sd/Fe	Ir	R	
17.6	3	J	85	VN	Sp	Sd/Fe	Wa	SR	
18.7	4	N/A	N/A	MW	Sp	Sd	Ir	R	Fractured zone 17.7' - 19.1'
23.7	5	J	5	VN	Sp	Fe	Ir	R	
24.1	6	J	70	MW	Sp	Ca	Ir	SR	
24.2	7	J	0	VN	Sp	Fe	Pl	R	
24.8	8	J	0	N	Sp	Sd/Fe	Ir	SR	
26.1	9	J	30	N	Sp	Fe/Cl	Ir	SR	

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	W-23UD
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 32
Eng./Geo.:	AKS	Boring Location:	6022+77.81	Offset:	L:49.00'	Alignment:	Proposed
Elev.:	185.8 ft	Latitude:	34.023752	Longitude:	-81.096546	Date Started:	3/30/2018
Total Depth:	10.5 ft	Soil Depth:	10.5 ft	Core Depth:	0 ft	Date Completed:	3/30/2018
Bore Hole Diameter (in):	4.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	N/A	Driller:	T. Millwood	Groundwater:	TOB N/A	24HR	N/A



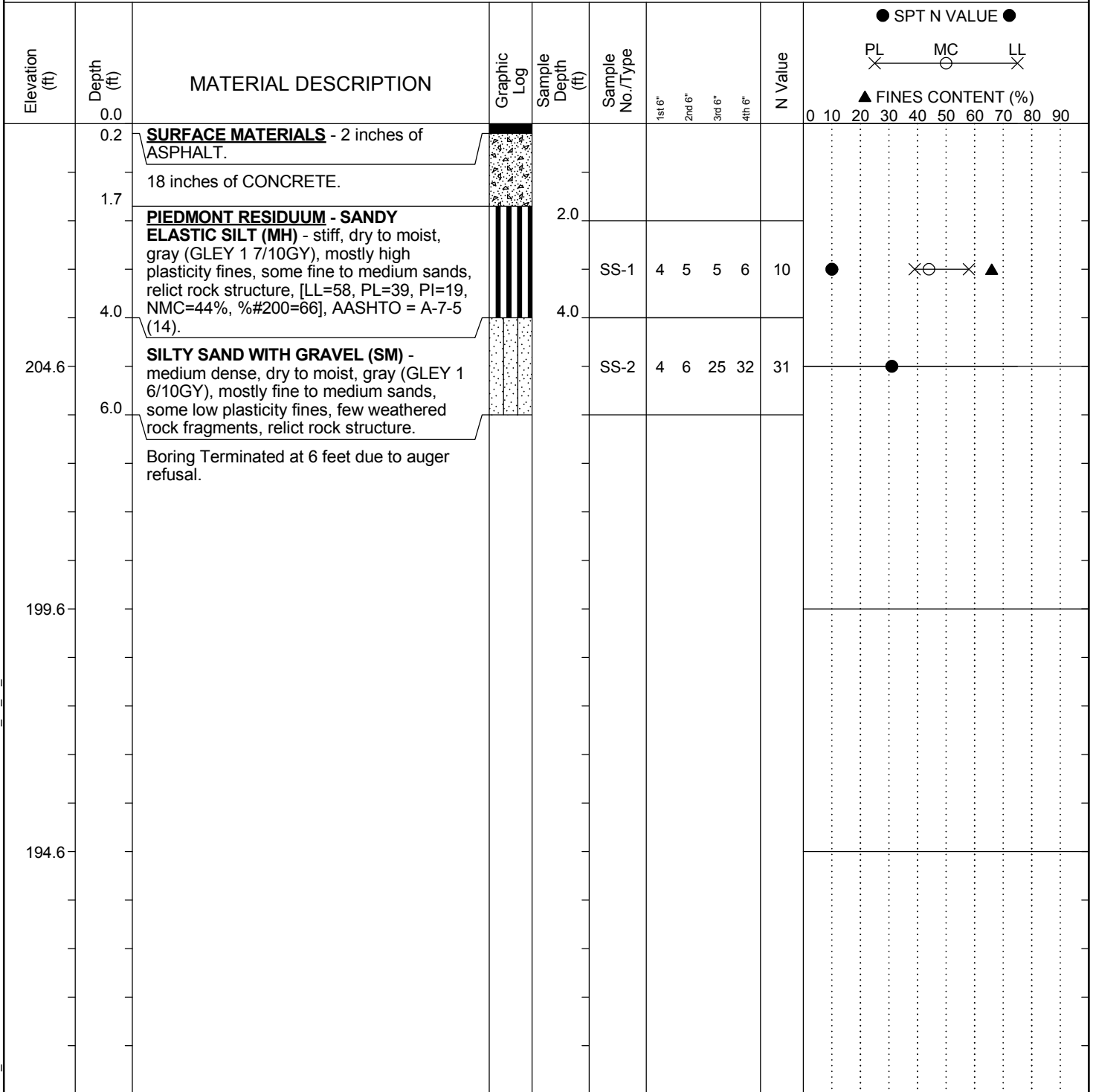
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662		County:	Lexington/Richland	Boring No.:	P-37	
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route:	I-26	
Eng./Geo.:	AKS	Boring Location:	379+06.59	Offset:	L:288.75'	Alignment:	Proposed
Elev.:	209.6 ft	Latitude:	34.028745	Longitude:	-81.101935	Date Started:	1/24/2018
Total Depth:	6 ft	Soil Depth:	6 ft	Core Depth:	0 ft	Date Completed:	1/24/2018
Bore Hole Diameter (in):	7.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	H.S.A.	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	N/A	Driller:	J. Millwood	Groundwater:	TOB	N/A	24HR



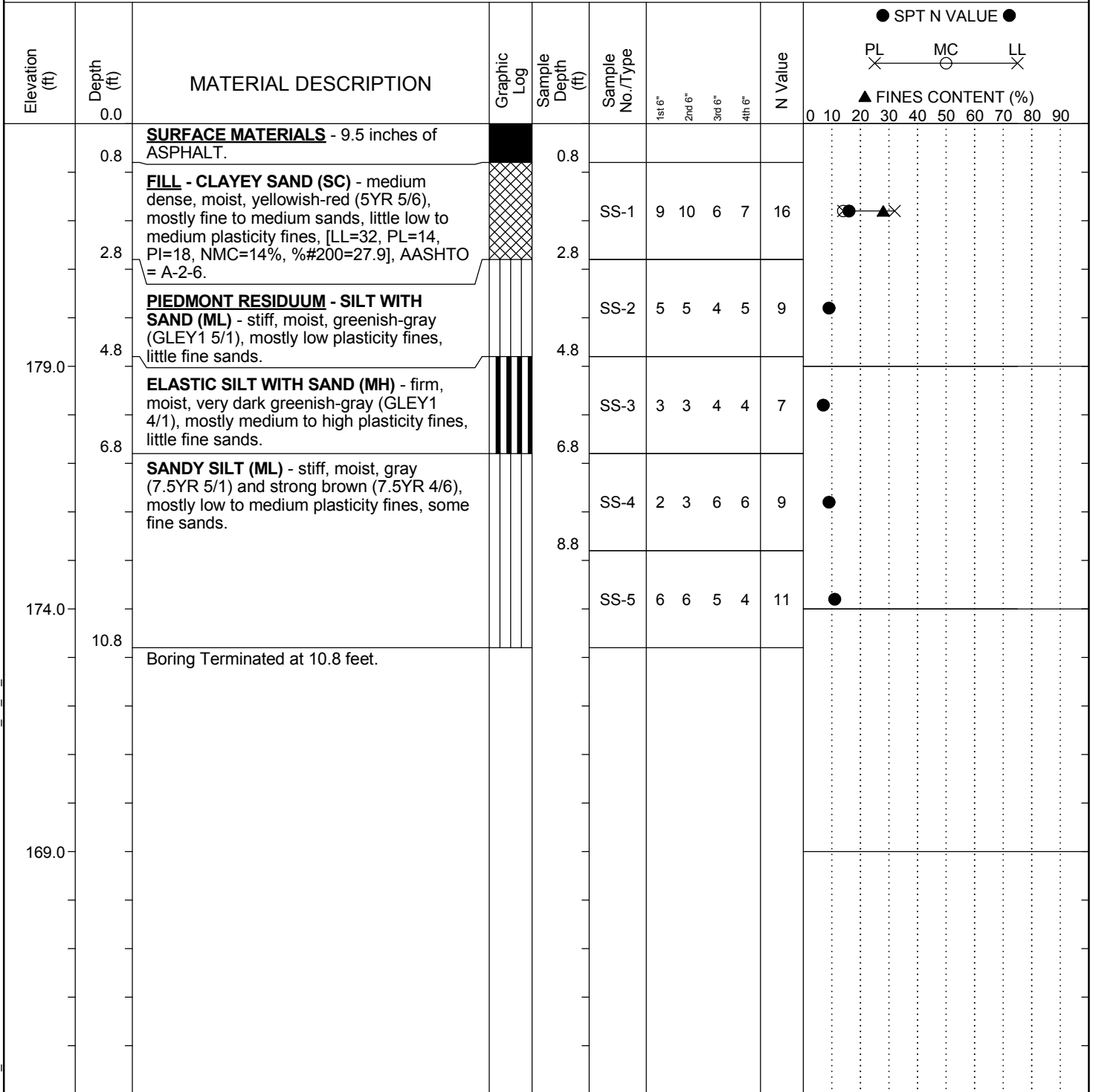
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: P-38
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-126	
Eng./Geo.: HGM	Boring Location: 5+98.81		Offset: R:47.194'	Alignment: Proposed
Elev.: 184.0 ft	Latitude: 34.024996	Longitude: -81.098892	Date Started: 1/29/2018	
Total Depth: 10.8 ft	Soil Depth: 10.8 ft	Core Depth: 0 ft	Date Completed: 1/29/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: Y (N)
Drill Machine: CME 55		Drill Method: H.S.A.	Hammer Type: Automatic	Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB	N/A	24HR N/A



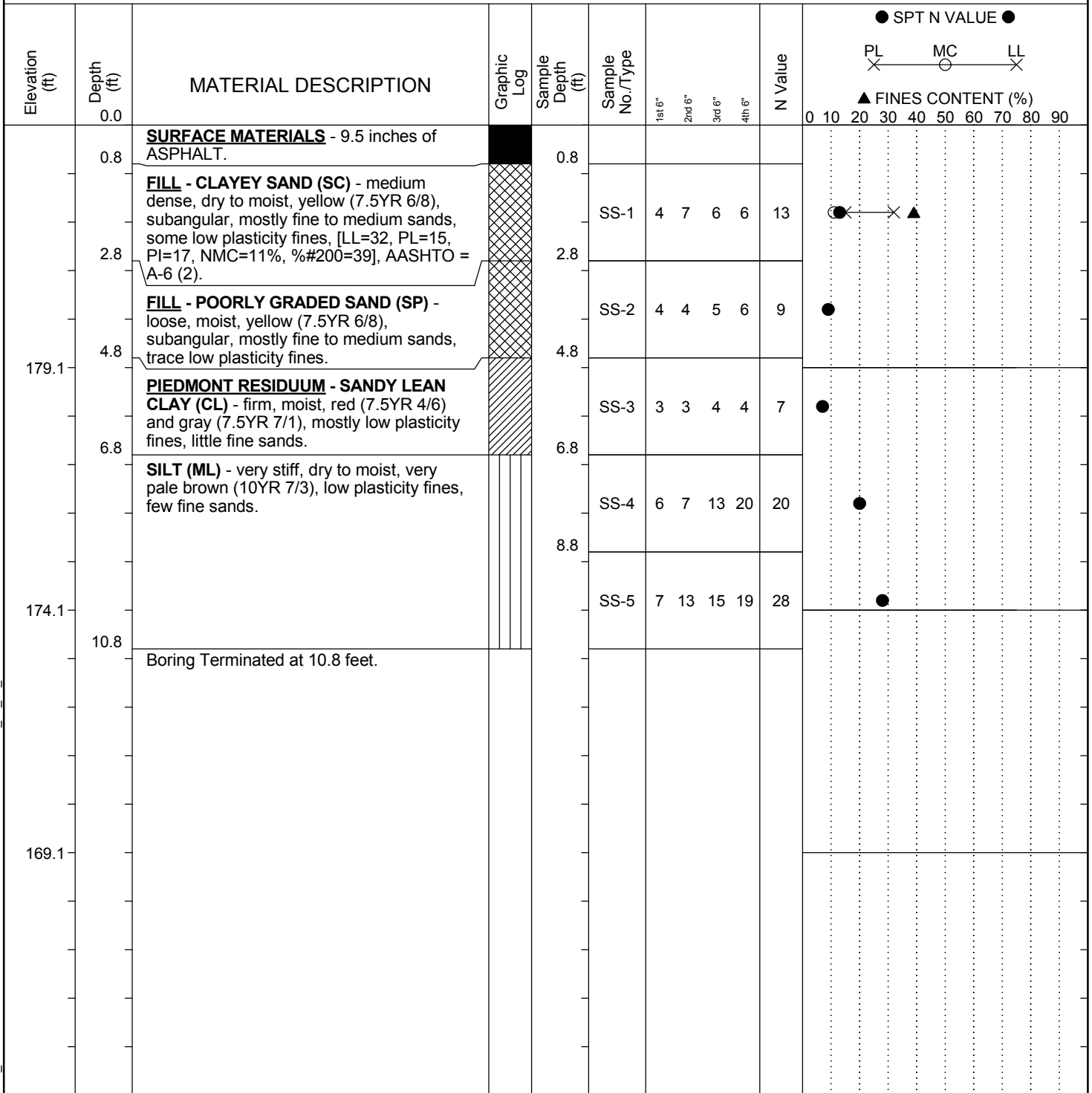
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	P-39
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-126
Eng./Geo.:	AKS	Boring Location:	9+60.12	Offset:	L:50.775'	Alignment:	Proposed
Elev.:	184.1 ft	Latitude:	34.024369	Longitude:	-81.097912	Date Started:	1/24/2018
Total Depth:	10.8 ft	Soil Depth:	10.8 ft	Core Depth:	0 ft	Date Completed:	1/24/2018
Bore Hole Diameter (in):	7.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	H.S.A.	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	N/A	Driller:	J. Millwood	Groundwater:	TOB N/A	24HR	N/A



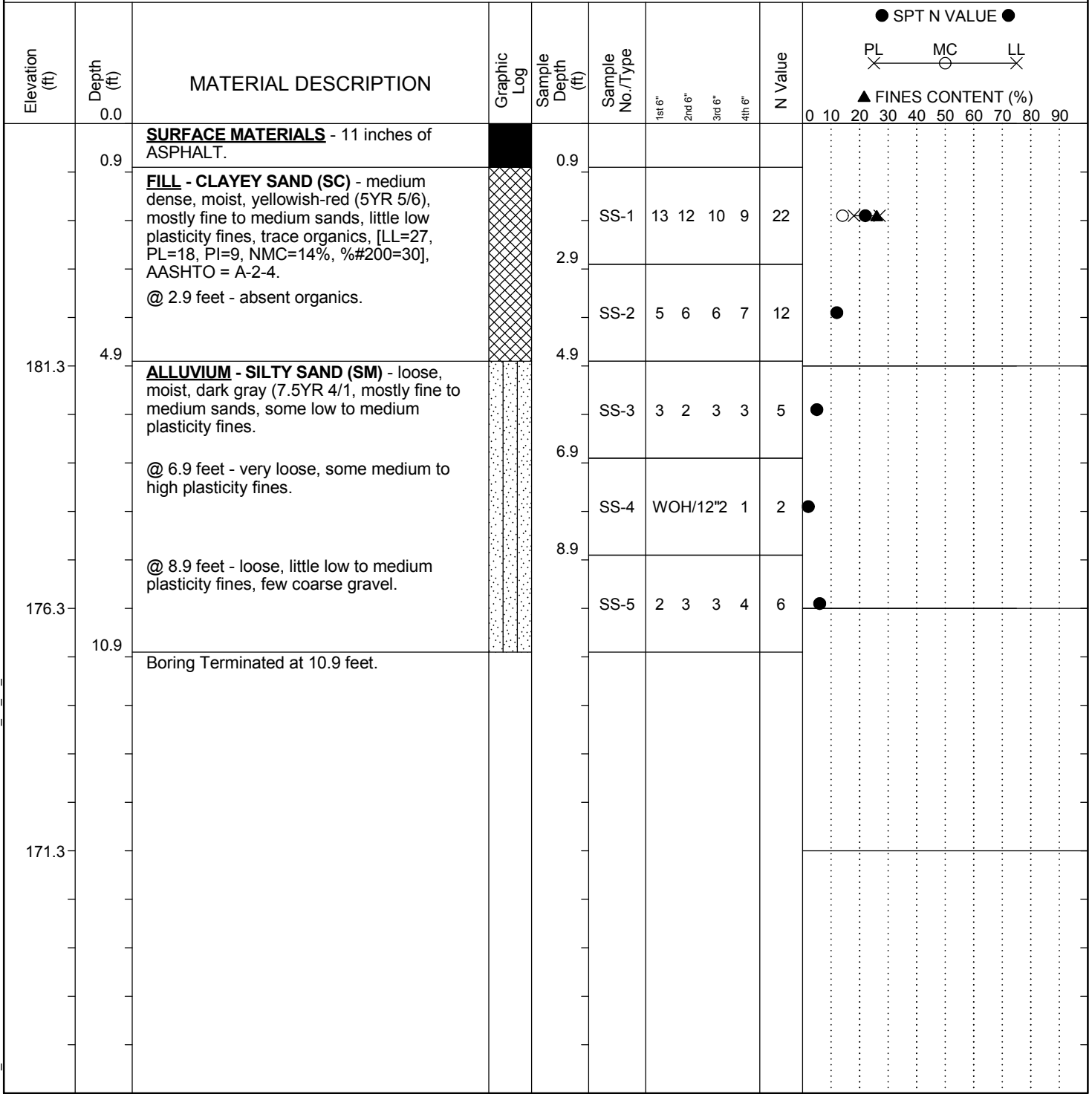
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: P-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-126
Eng./Geo.: HGM	Boring Location: 19+02.35	Offset: R:45.668'
Alignment: Proposed	Date Started: 1/25/2018	Date Completed: 1/25/2018
Elev.: 186.3 ft	Latitude: 34.022148	Longitude: -81.096282
Total Depth: 10.9 ft	Soil Depth: 10.9 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 55	Drill Method: H.S.A.
Hammer Type: Automatic	Energy Ratio: 84.1%	Core Size: N/A
Driller: T. Miller	Groundwater: TOB	24HR: N/A



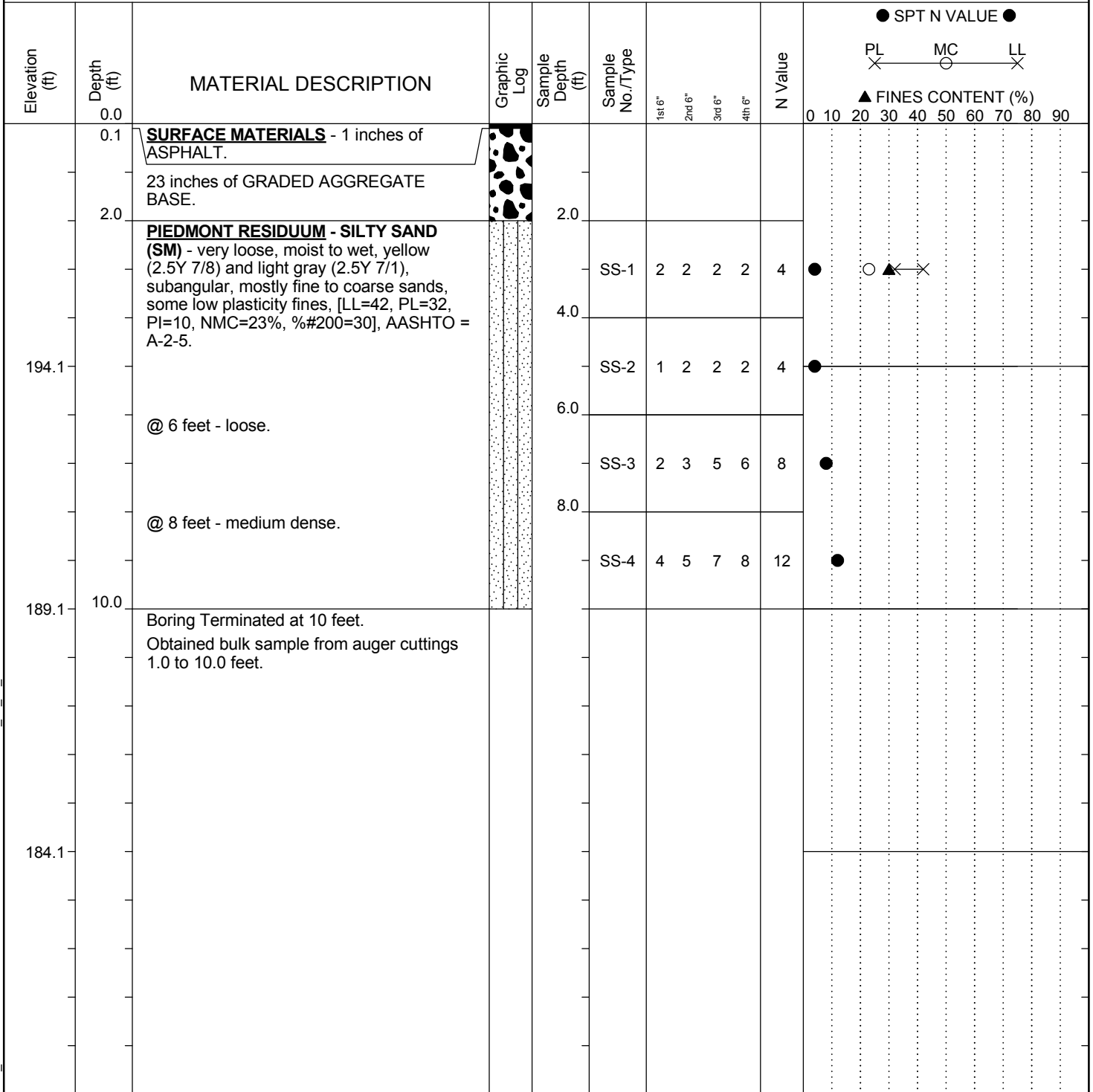
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: P-41
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-126
Eng./Geo.: AKS	Boring Location: 28+96.62	Offset: L:60.981' Alignment: Proposed
Elev.: 199.1 ft	Latitude: 34.020192	Longitude: -81.093984 Date Started: 1/24/2018
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: 0 ft Date Completed: 1/24/2018
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: H.S.A.	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB N/A 24HR: N/A



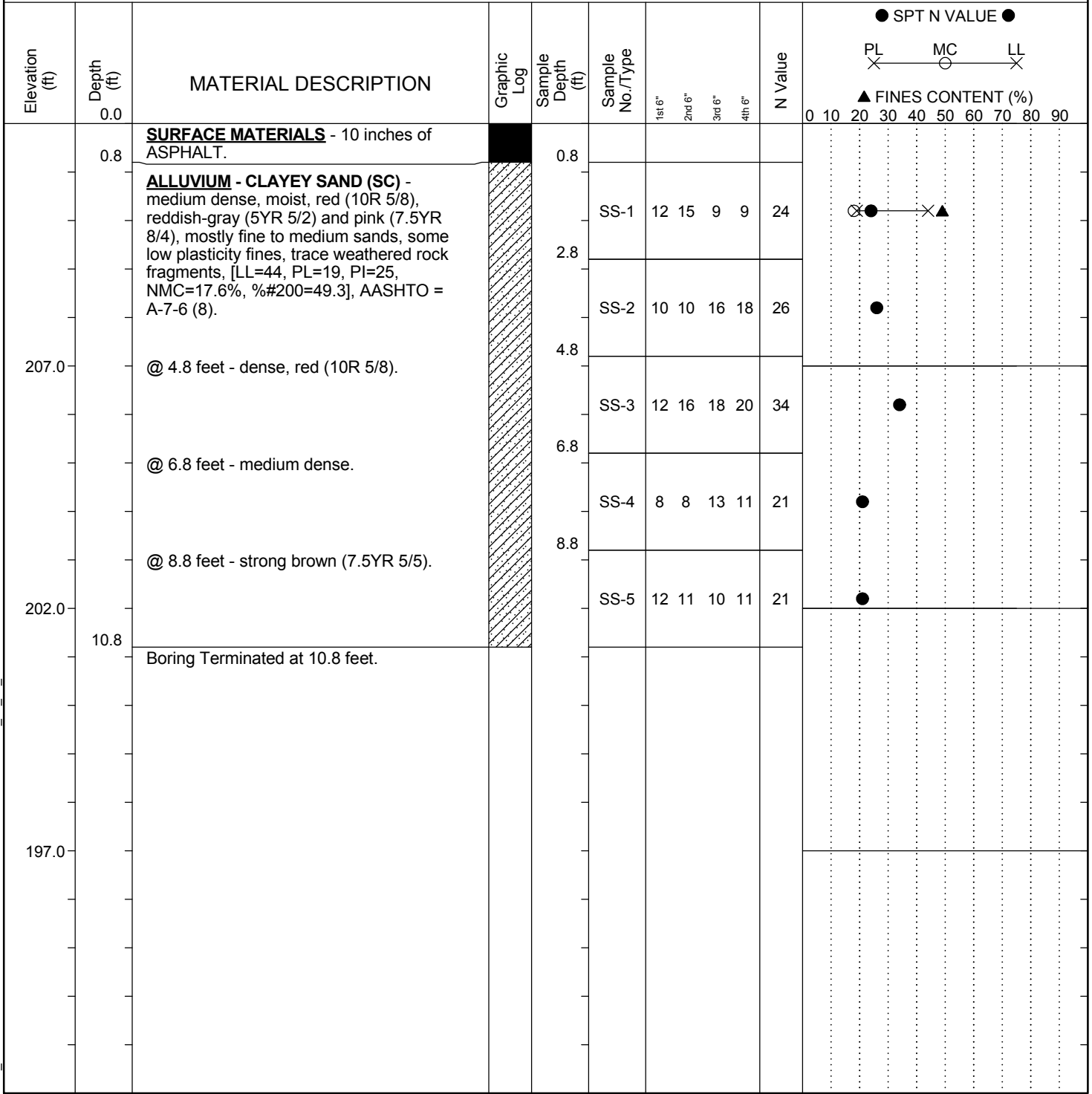
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: P-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-126
Eng./Geo.: HGM	Boring Location: 38+95.07	Offset: R:46.322' Alignment: Proposed
Elev.: 212.0 ft	Latitude: 34.018214	Longitude: -81.091694
Total Depth: 10.8 ft	Soil Depth: 10.8 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5		Sampler Configuration: Y (N) Liner Used: Y (N)
Drill Machine: CME 55	Drill Method: H.S.A.	Hammer Type: Automatic Energy Ratio: 84.1%
Core Size: N/A	Driller: T. Miller	Groundwater: TOB N/A 24HR: N/A



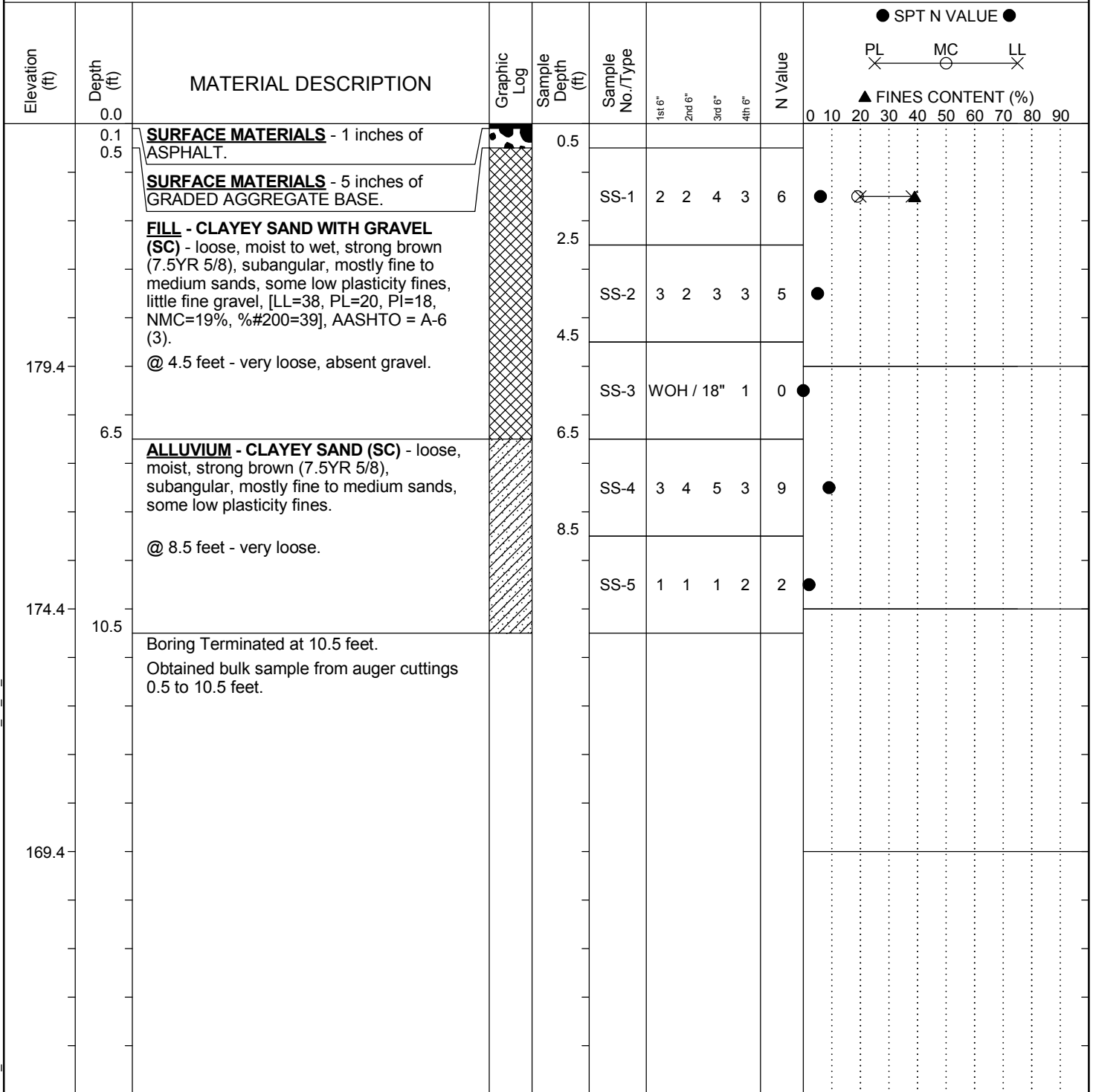
LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: P-43
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-126
Eng./Geo.: AKS	Boring Location: 49+18.58	Offset: L:70.173' Alignment: Proposed
Elev.: 184.4 ft	Latitude: 34.017202	Longitude: -81.088513
Total Depth: 10.5 ft	Soil Depth: 10.5 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: H.S.A.	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB N/A 24HR: N/A



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

Carolina Crossroads – Phase 1

Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 LABORATORY TEST RESULTS

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	2/22/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/20 - 2/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	1/29 - 2/14/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55/Diedrich D-50

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID. 7536	Calibration Date: 1/31/18
			Oven ID. 7621	Calibration Date: 7/28/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
B-29	SS-1	1.0 - 3.0	300	0.00	55.71	49.45	6.26	12.7%
B-29	SS-5	9.0 - 11.0	306	0.00	27.46	22.20	5.26	23.7%
B-29	SS-8	24.5 - 26.0	312	0.00	54.59	37.47	17.12	45.7%
B-29	SS-12	44.5 - 46.0	319	0.00	69.45	56.65	12.80	22.6%
B-34	SS-2	3.0 - 5.0	320	0.00	36.34	28.16	8.18	29.0%
B-34	SS-5	9.0 - 11.0	324	0.00	41.63	35.12	6.51	18.5%
B-34	SS-10	33.5 - 35.0	329	0.00	54.46	43.73	10.73	24.5%
B-34	SS-11	38.5 - 40.0	331	0.00	62.29	47.59	14.70	30.9%
B-40	SS-3	4.8 - 6.8	332	0.00	48.56	42.98	5.58	13.0%
B-40	SS-5	8.8 - 10.8	336	0.00	28.97	23.80	5.17	21.7%
B-40	SS-7	18.5 - 20.0	346	0.00	12.06	8.75	3.31	37.8%
B-40	SS-8	23.5 - 25.0	349	0.00	28.02	22.39	5.63	25.1%
B-45	SS-1	0.8 - 2.8	350	0.00	31.53	28.40	3.13	11.0%
B-47	SS-1	1.0 - 3.0	365	0.00	50.72	43.99	6.73	15.3%
B-47	SS-4	7.0 - 9.0	367	0.00	41.83	35.55	6.28	17.7%
B-47	SS-8	24.5 - 26.0	374	0.00	49.80	40.33	9.47	23.5%

Notes / Deviations / References Tare #'s were zeroed prior to recording Wet Weights

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Matt Jacobs
Technician Name

NICET Lab Level III / 118202
Certification Type / No.

2/22/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

2/22/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/11-4/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample by:	S&ME	Sample Date(s):	Various
Sampling Method:	Split Spoon	Drill Rig:	N/A

Method:	A (1%) <input checked="" type="checkbox"/>	B (0.1%) <input type="checkbox"/>	Balance ID. 25128	Calibration Date: 4/4/18
			Oven ID. 31332	Calibration Date: 2/21/18

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	N o t e
		ft. or m.		grams	grams	grams	grams	%	
W-28	SS-6	13.5'-15'	TD-1	105.07	251.75	228.93	22.82	18.4%	
W-28	SS-2	2'-4'	J13	97.13	230.76	213.84	16.92	14.5%	
W-28	SS-8	23.5'-25'	NP3	107.07	234.31	212.85	21.46	20.3%	
W-28	SS-10	33.5'-35'	J11	98.19	327.14	277.53	49.61	27.7%	
W-28	SS-12	43.5'-45'	J7	90.51	223.96	190.88	33.08	33.0%	
W-28	SS-16	63.5'-65'	J9	89.84	224.77	198.94	25.83	23.7%	
W-30	SS-1	1.7'-3.7'	M-4	93.80	202.43	167.35	35.08	47.7%	
W-30	SS-4	7.7'-9.7'	J3	90.01	190.02	159.32	30.70	44.3%	
W-30	SS-9	28.5'-30'	J17	89.07	224.54	188.92	35.62	35.7%	
W-30	SS-11	38.5'-40'	J5	97.55	181.56	161.41	20.15	31.6%	
P-42	SS-1	0.8'-2.8'	NP2	107.05	258.64	235.96	22.68	17.6%	
P-44	SS-1	1.1'-3.1'	J2	90.23	218.73	189.03	29.70	30.1%	
P-45	SS-1	1'-3'	J12	95.74	285.64	262.85	22.79	13.6%	
P-47	SS-1	1.4'-3.4'	NP4	106.11	249.17	231.46	17.71	14.1%	
P-49	SS-1	1'-3'	J14	98.13	232.57	209.43	23.14	20.8%	
P-54	SS-1	0.7'-2.7'	G7	96.59	254.09	230.74	23.35	17.4%	

Notes / Deviations / References

Jimmy Hanson
Technician Name

5/21/2018
Date

Nathan Price
Technical Responsibility

Nathan Price

Signature

Laboratory Manager
Position

5/21/2018
Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #: 1461-16-047.2B

Report Date: 5/21/18

Project Name: Carolina Crossroads Project

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
P-56	SS-1	0.9'-2.9'	J88	98.65	228.18	210.10	18.08	16.2%	
P-58	SS-1	1.1'-3.1'	J16	91.97	224.95	207.28	17.67	15.3%	
P-60	SS-1	1'-3'	P100	91.28	191.91	165.74	26.17	35.1%	
P-62	SS-1	1.1'-3.1'	J15	97.70	214.70	194.67	20.03	20.7%	
B-30	SS-3	4'-6'	J1	91.54	310.68	280.66	30.02	15.9%	
B-36	SS-1	0'-2'	J4	97.73	279.64	262.77	16.87	10.2%	
B-36	SS-2	2'-4'	TD2	106.22	252.22	235.22	17.00	13.2%	
B-43	SS-2	16.8'-18.8'	5050	92.31	253.75	226.16	27.59	20.6%	
B-43	SS-6	28.3'-29.8'	5024	92.74	338.71	299.08	39.63	19.2%	
B-52	SS-9	28.5'-30'	5064	98.00	309.42	270.61	38.81	22.5%	
B-36	SS-8	23.5'-25'	5047	90.81	217.00	182.26	34.74	38.0%	
B-36	SS-10	33.5'-35'	5030	96.19	271.99	241.53	30.46	21.0%	
P-51	SS-1	2.6'-3.6'	G-4	96.99	237.25	215.30	21.95	18.6%	
B-52	SS-1	0'-2'	5044	90.44	214.92	199.67	15.25	14.0%	
B-52	SS-2	2'-4'	5062	96.34	281.16	261.55	19.61	11.9%	
B-30	SS-8	23.5'-25'	M5	96.09	249.94	206.54	43.40	39.3%	
B-30	SS-19	78.5'-80'	J6	96.85	322.28	287.36	34.92	18.3%	
B-53	SS-1	0'-2'	5036	98.68	296.90	277.65	19.25	10.8%	
B-53	SS-5	8'-10'	5012	93.52	281.48	247.10	34.38	22.4%	
B-43	SS-1	14.8'-16.8'	5013	95.80	335.77	298.21	37.56	18.6%	
B-36	SS-5	8'-10'	5059	96.55	246.08	222.43	23.65	18.8%	
B-30	SS-16	63.5'-65'	J88	90.57	239.13	214.02	25.11	20.3%	
P-64	SS-1	1.1'-3.1'	J18	98.01	228.28	208.12	20.16	18.3%	
B-52	SS-6	13.5'-15'	5004	96.54	289.09	254.03	35.06	22.3%	

Notes / Deviations / References

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/28 - 3/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	3/01 - 3/08/18
Sampling Method:	Split-spoon		

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	13942	Calibration Date:	8/18/17 <th>Oven ID.</th> <td>13978</td> <th>Calibration Date:</th> <td>10/07/17</td>	Oven ID.	13978	Calibration Date:	10/07/17
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note		
		ft.		grams	grams	grams	grams	%			
B-31	SS-1	0.0 - 2.0	262	0.00	54.53	43.52	11.01	25.3%			
B-31	SS-5	8.0 - 10.0	FU-24	0.00	53.27	41.67	11.60	27.8%			
B-33	SS-1	0.0 - 2.0	BC	0.00	53.75	45.93	7.82	17.0%			
B-33	SS-3	4.0 - 6.0	CT	0.00	52.42	43.41	9.01	20.8%			
B-33	SS-5	8.0 - 10.0	CL-4	0.00	55.23	39.20	16.03	40.9%			
B-35	SS-1	0.0 - 2.0	CL-3	0.00	54.31	44.30	10.01	22.6%			
B-35	SS-5	8.0 - 10.0	CL-6	0.00	53.55	45.65	7.90	17.3%			
B-37	SS-1	0.4 - 2.4	CL-5	0.00	56.59	47.61	8.98	18.9%			
B-37	SS-3	4.4 - 6.4	CL-1	0.00	52.74	39.68	13.06	32.9%			
B-37	SS-6	9.5 - 11.5	BK-2	0.00	149.05	116.44	32.61	28.0%			
B-37	SS-8	18.5 - 20.0	PC-1	0.00	53.94	46.57	7.37	15.8%			
B-42	SS-1	0.8 - 2.8	BK-1	0.00	55.65	47.46	8.19	17.3%			
B-42	SS-3	4.8 - 6.8	BK-11	0.00	52.07	42.01	10.06	23.9%			
B-42	SS-7	18.5 - 20.0	BK-5	0.00	54.46	42.84	11.62	27.1%			
B-42	SS-10	33.5 - 35.0	BK-9	0.00	52.25	41.57	10.68	25.7%			

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Benjamin Kovaleski
Technician Name

Benjamin J. Kovaleski
Signature

NICET Lab Level III/117226
Certification Type / No.

4/27/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/18
Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/28 - 4/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	3/13, 3/16 & 3/21/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55/Diedrich D-50

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID. 13942	Calibration Date: 8/18/17
			Oven ID. 13978	Calibration Date: 10/07/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
B-32	SS-1	0.0 - 2.0	D-3	0.00	50.42	39.91	10.51	26.3%	
B-32	SS-2	2.0 - 4.0	FU-24	0.00	52.09	46.96	5.13	10.9%	
B-32	SS-4	6.0 - 8.0	B-141	0.00	52.87	39.27	13.60	34.6%	
B-44	SS-1	0.0 - 2.0	262	0.00	55.29	47.40	7.89	16.6%	
B-56	SS-1	0.0 - 2.0	P	0.00	51.47	42.54	8.93	21.0%	
B-56	SS-2	2.0 - 4.0	D-27	0.00	53.36	44.74	8.62	19.3%	
B-56	SS-10	33.5 - 35.0	H	0.00	50.66	36.55	14.11	38.6%	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

<u>Benjamin Kovaleski</u> Technician Name	 Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>5/04/18</u> Date
<u>Matthew F. Cooke, P.G.</u> Technical Responsibility		<u>Project Manager</u> Position	<u>5/04/18</u> Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/14/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/12 - 2/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	Varies
Sampling Method:	Split-spoon	Drill Rig:	CME 750/Diedrich D-50

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID. 13942	Calibration Date: 8/18/17
			Oven ID. 13978	Calibration Date: 10/07/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
B-38	SS-2	2.0 - 4.0	D-14	0.00	74.23	63.80	10.43	16.3%	
B-38	SS-4	6.0 - 8.0	YM-9	0.00	73.49	60.19	13.30	22.1%	
B-38	SS-5	8.0 - 10.0	YM-3	0.00	70.18	55.23	14.95	27.1%	
B-41	SS-2	2.0 - 4.0	YM-2	0.00	73.78	63.39	10.39	16.4%	
B-41	SS-4	6.0 - 8.0	YM-4	0.00	73.43	60.19	13.24	22.0%	
B-41	SS-7	18.5 - 20.0	D-10	0.00	71.03	54.64	16.39	30.0%	
B-41	SS-9	28.5 - 30.0	D-19	0.00	71.98	57.82	14.16	24.5%	
B-57	SS-1	0.0 - 2.0	D-13	0.00	50.73	43.28	7.45	17.2%	
B-57	SS-6	13.5 - 15.0	YM-8	0.00	52.03	43.40	8.63	19.9%	
B-57	SS-11	38.5 - 40.0	YM-1	0.00	71.28	51.23	20.05	39.1%	
B-57	SS-15	58.5 - 60.0	D-4	0.00	51.69	43.09	8.60	20.0%	
B-59	SS-3	4.0 - 6.0	WX-1	0.00	73.13	63.72	9.41	14.8%	
B-59	SS-7	18.5 - 20.0	D-20	0.00	72.97	57.66	15.31	26.6%	
B-59	SS-10	33.5 - 35.0	CL-2	0.00	70.03	48.15	21.88	45.4%	
B-59	SS-14	53.5 - 55.0	CL-5	0.00	73.40	57.72	15.68	27.2%	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Benjamin Kovaleski
Technician Name

Signature

NICET Lab Level III/117226
Certification Type / No.

2/14/18
Date

Brian Vaughan, P.E.
Technical Responsibility

Signature

Group Leader
Position

2/14/18
Date

**LABORATORY DETERMINATION OF
 WATER CONTENT**



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/01 - 5/02/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	4/09/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID. 13942	Calibration Date: 8/18/17
			Oven ID. 13978	Calibration Date: 10/07/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft.		grams	grams	grams	grams	%	
B-39	SS-1	0.0 - 2.0	JJ	0.00	71.48	62.57	8.91	14.2%	
B-39	SS-2	2.0 - 4.0	T-2	0.00	73.61	67.86	5.75	8.5%	
B-39	SS-3	6.0 - 8.0	D-15	0.00	267.15	226.02	41.13	18.2%	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

<u>Benjamin Kovaleski</u> <i>Technician Name</i>	 <i>Signature</i>	<u>NICET Lab Level III/117226</u> <i>Certification Type / No.</i>	<u>5/11/18</u> <i>Date</i>
<u>Matthew F. Cooke, P.G.</u> <i>Technical Responsibility</i>		<u>Project Manager</u> <i>Position</i>	<u>5/11/18</u> <i>Date</i>

Form No: TR-D2216-T265-1
 Revision No. 1
 Revision Date: 08/16/17

LABORATORY DETERMINATION OF WATER CONTENT



Quality Assurance ASTM D 2216 AASHTO T 265

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	4/24/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave. North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	Various
Sampling Method:	Split Spoon	Log # :	43-2321

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID. 18435	Calibration Date: 4/10/2018
			Oven ID. 12872	Calibration Date: 3/17/2018

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	N o t e
		ft		grams	grams	grams	grams	%	
B-46	SS-1	0.0 - 2.0	C-7	30.80	121.77	101.48	20.29	28.7%	
B-46	SS-2	2.0 - 4.0	C-11	30.37	120.71	105.22	15.49	20.7%	
B-48	SS-1	0.0 - 2.0	C-24	29.90	120.88	110.40	10.48	13.0%	
B-48	SS-2	2.0 - 4.0	C-51	31.32	120.76	100.47	20.29	29.3%	
B-48	SS-4	6.0 - 8.0	C-70	31.53	165.48	146.01	19.47	17.0%	
B-54	SS-1	0.4 - 2.4	C-8	30.37	121.74	105.07	16.67	22.3%	
B-54	SS-2	2.4 - 4.4	C-26	31.39	121.46	103.13	18.33	25.6%	
B-54	SS-10	33.9 - 35.4	C-37	31.01	122.65	99.40	23.25	34.0%	
B-58	SS-1	0.0 - 2.0	C-34	30.74	105.52	96.93	8.59	13.0%	
B-58	SS-6	13.5 - 15.0	C-30	31.29	116.75	102.01	14.74	20.8%	
B-58	SS-8	23.5 - 25.0	C-41	31.04	107.48	95.77	11.71	18.1%	
B-58	SS-10	33.5 - 35.0	C-72	31.97	110.24	96.06	14.18	22.1%	
B-58	SS-13	48.5 - 50.0	C-28	30.86	102.21	86.60	15.61	28.0%	
B-60	SS-1	0.0 - 2.0	C-69	30.75	103.91	92.11	11.80	19.2%	
B-60	SS-2	2.0 - 4.0	C-19	30.22	100.60	93.60	7.00	11.0%	
B-60	SS-3	4.0 - 6.0	C-35	30.86	102.05	91.63	10.42	17.1%	

Notes / Deviations / References

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Derek Baker
Technician Name

4/24/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No: TR-D2216-T265-1
 Revision No. 1
 Revision Date: 08/16/17

LABORATORY DETERMINATION OF WATER CONTENT



Quality Assurance

ASTM D 2216 AASHTO T 265

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B

Report Date: 43243

Project Name: Carolina Crossroads Project

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	N o t e
		ft		grams	grams	grams	grams	%	
B-61	SS-1	0.0 - 2.0	C-32	31.08	101.15	92.16	8.99	14.7%	1
B-61	SS-6	13.5 - 15.0	C-38	31.26	101.03	87.06	13.97	25.0%	2
B-61	SS-7	18.5 - 20.0	C-49	31.24	100.30	90.25	10.05	17.0%	
B-62	SS-1	0.0 - 2.0	C-60	31.22	103.55	91.71	11.84	19.6%	
B-62	SS-2	2.0 - 4.0	C-25	31.77	101.59	94.58	7.01	11.2%	
B-62	SS-5	8.0 - 10.0	C-46	31.31	101.11	86.21	14.90	27.1%	

Notes / Deviations / References

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date:	5/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-32	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/13/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Clayey Sand with Gravel (SC, A-7-6(8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.69	26.47	26.32				25.92	26.94	
B	Wet Soil Weight + A	40.60	39.16	38.92				32.09	33.16	
C	Dry Soil Weight + A	36.56	35.21	34.76				31.01	32.07	
D	Water Weight (B-C)	4.04	3.95	4.16				1.08	1.09	
E	Dry Soil Weight (C-A)	9.87	8.74	8.44				5.09	5.13	
F	% Moisture (D/E)*100	40.9%	45.2%	49.3%				21.2%	21.2%	
N	# OF DROPS	35	24	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							21.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	45
Plastic Limit	21
Plastic Index	24
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

5/04/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/04/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

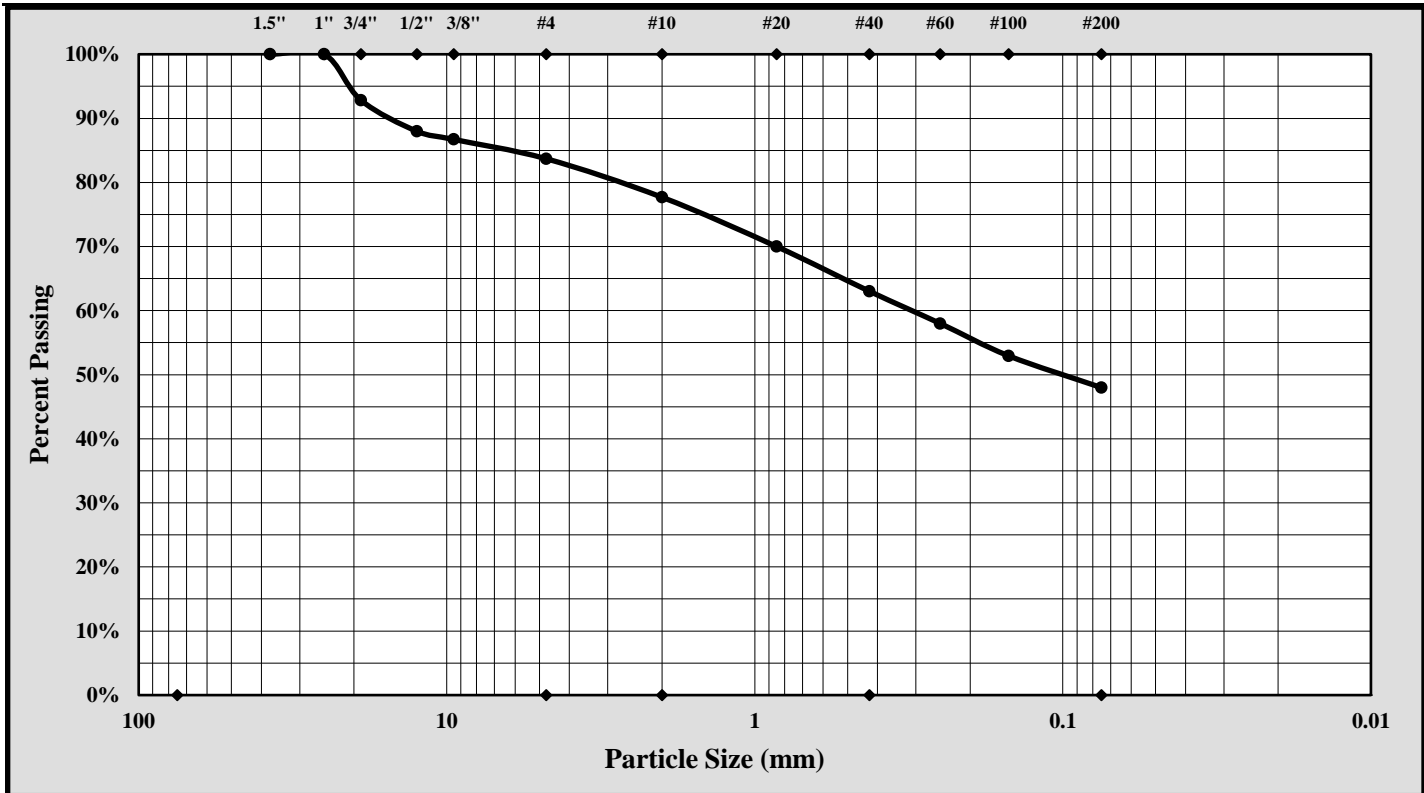


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/02 - 5/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-32	Sample #:	SS-1
		Sample Date:	3/13/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Clayey Sand with Gravel (SC, A-7-6(8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 25.0 mm Gravel: 16.3%
 Silt & Clay (% Passing #200): 48.0% Total Sand: 35.7%

Liquid Limit	45	Plastic Limit	21	Plastic Index	24
Coarse Sand:	6.0%	Medium Sand:	14.7%	Fine Sand:	15.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

5/04/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date:	5/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-32	Sample #:	SS-2
Location:	Bridge Boring	Sample Date:	3/13/18
Type:	Split-spoon	Depth:	2.0' - 4.0'

Sample Description: Clayey Gravel with Sand (GC, A-2-6(0))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	27.76	26.31	27.31				26.83	26.74	
B	Wet Soil Weight + A	40.11	37.53	40.52				33.57	33.21	
C	Dry Soil Weight + A	37.28	34.81	37.12				32.62	32.27	
D	Water Weight (B-C)	2.83	2.72	3.40				0.95	0.94	
E	Dry Soil Weight (C-A)	9.52	8.50	9.81				5.79	5.53	
F	% Moisture (D/E)*100	29.7%	32.0%	34.7%				16.4%	17.0%	
N	# OF DROPS	35	25	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							16.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	17
Plastic Index	15
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>5/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/04/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

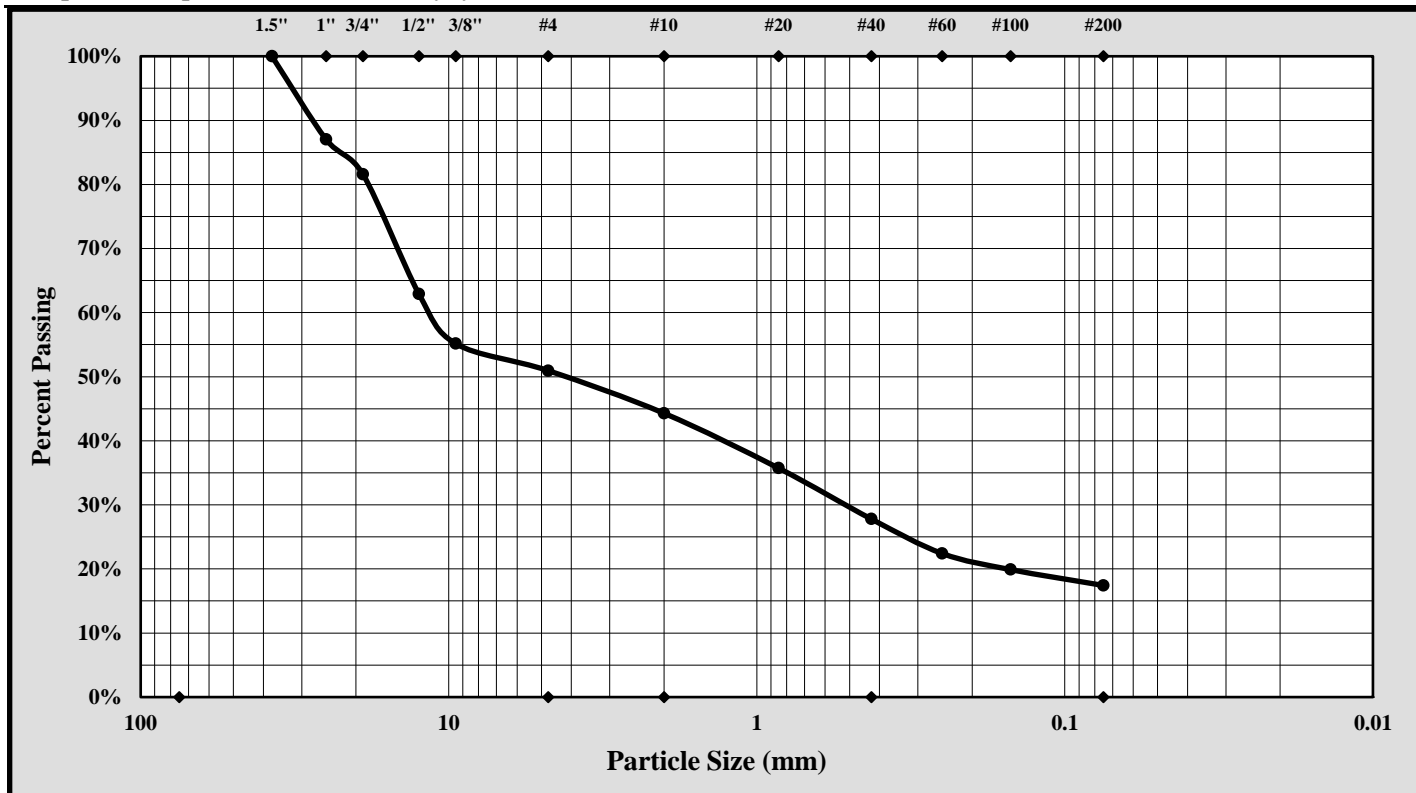


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/02 - 5/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-32	Sample #:	SS-2
		Sample Date:	3/13/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Clayey Gravel with Sand (GC, A-2-6(0))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 37.5 mm Gravel: 49.1%
 Silt & Clay (% Passing #200): 17.4% Total Sand: 33.5%

Liquid Limit	32	Plastic Limit	17	Plastic Index	15
Coarse Sand:	6.7%	Medium Sand:	16.5%	Fine Sand:	10.4%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/04/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date:	5/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-32	Sample #:	SS-4
Location:	Bridge Boring	Sample Date:	3/13/18
Type:	Split-spoon	Depth:	6.0' - 8.0'

Sample Description: Silt with Sand (ML, A-7-5(8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.68	26.65	26.77			26.65	27.59	
B	Wet Soil Weight + A	43.84	43.03	42.81			32.78	35.10	
C	Dry Soil Weight + A	38.88	38.11	37.73			31.29	33.30	
D	Water Weight (B-C)	4.96	4.92	5.08			1.49	1.80	
E	Dry Soil Weight (C-A)	12.20	11.46	10.96			4.64	5.71	
F	% Moisture (D/E)*100	40.7%	42.9%	46.4%			32.1%	31.5%	
N	# OF DROPS	35	25	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						31.8%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	43	
Plastic Limit	32	
Plastic Index	11	
Group Symbol	ML	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>5/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/04/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

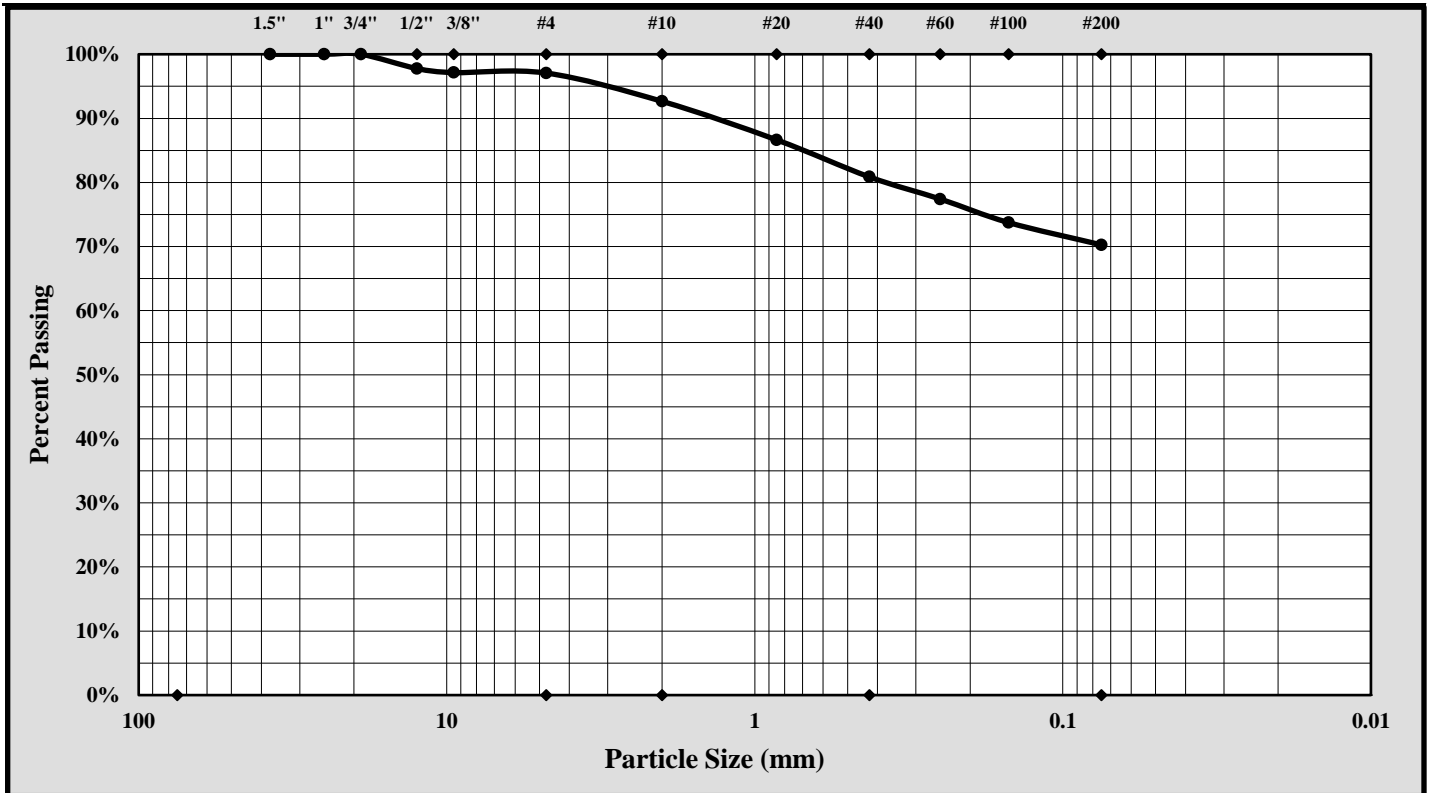


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/02 - 5/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-32	Sample #:	SS-4
		Sample Date:	3/13/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Silt with Sand (ML, A-7-5(8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.0 mm	Gravel: 2.9%
Silt & Clay (% Passing #200): 70.3%	Total Sand: 26.8%

Liquid Limit	43	Plastic Limit	32	Plastic Index	11
Coarse Sand:	4.4%	Medium Sand:	11.8%	Fine Sand:	10.6%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

5/04/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-33	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/08/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Lean Clay with Sand (CL, A-6(14))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		31	32	33			34	35	
A	Tare Weight	28.59	27.65	26.68			28.25	26.95	
B	Wet Soil Weight + A	41.38	43.63	42.22			34.37	34.44	
C	Dry Soil Weight + A	38.03	39.20	37.62			33.45	33.31	
D	Water Weight (B-C)	3.35	4.43	4.60			0.92	1.13	
E	Dry Soil Weight (C-A)	9.44	11.55	10.94			5.20	6.36	
F	% Moisture (D/E)*100	35.5%	38.4%	42.0%			17.7%	17.8%	
N	# OF DROPS	35	25	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						17.8%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	38	
Plastic Limit	18	
Plastic Index	20	
Group Symbol	CL	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> <i>Technician Name</i>	<u>4/27/18</u> <i>Date</i>	<u>Matthew F. Cooke, P.G.</u> <i>Technical Responsibility</i>	<u>4/27/18</u> <i>Date</i>
--	-------------------------------	--	-------------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

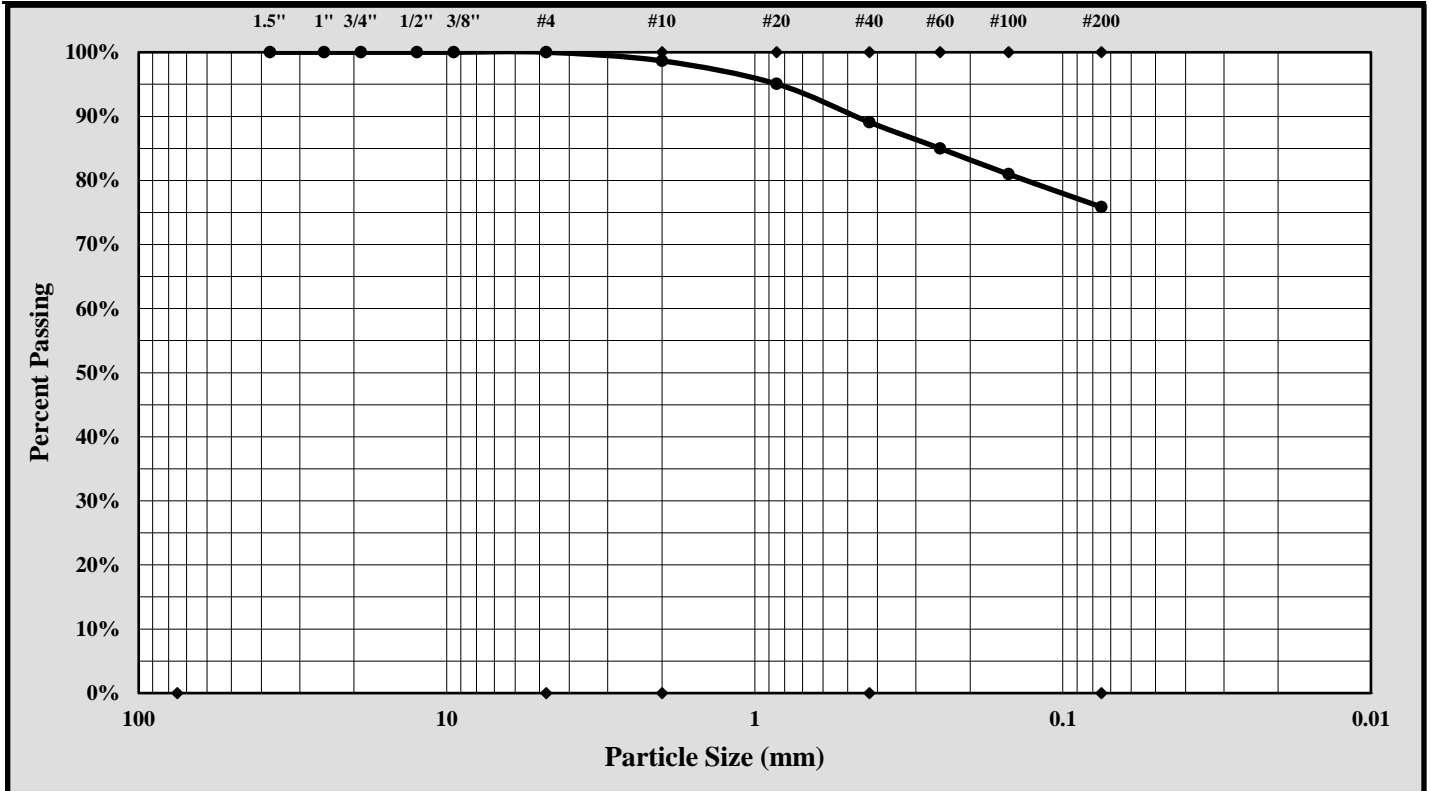


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/26/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-33	Sample #:	SS-1
		Sample Date:	3/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Lean Clay with Sand (CL, A-6(14))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 75.9% Total Sand: 24.1%

Liquid Limit	38	Plastic Limit	18	Plastic Index	20
Coarse Sand:	1.3%	Medium Sand:	9.6%	Fine Sand:	13.2%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/27/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-33	Sample #:	SS-3
Location:	Bridge Boring	Sample Date:	3/08/18
Type:	Split-spoon	Depth:	4.0' - 6.0'

Sample Description: Sandy Elastic Silt [MH, A-7-6(14)]					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		36	37	38			39	40	
A	Tare Weight	25.68	26.21	26.29			25.88	26.27	
B	Wet Soil Weight + A	40.39	42.19	41.52			32.33	33.02	
C	Dry Soil Weight + A	35.83	36.93	36.16			30.88	31.51	
D	Water Weight (B-C)	4.56	5.26	5.36			1.45	1.51	
E	Dry Soil Weight (C-A)	10.15	10.72	9.87			5.00	5.24	
F	% Moisture (D/E)*100	44.9%	49.1%	54.3%			29.0%	28.8%	
N	# OF DROPS	35	26	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.9%		



NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	50
Plastic Limit	29
Plastic Index	21
Group Symbol	MH
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/27/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/27/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

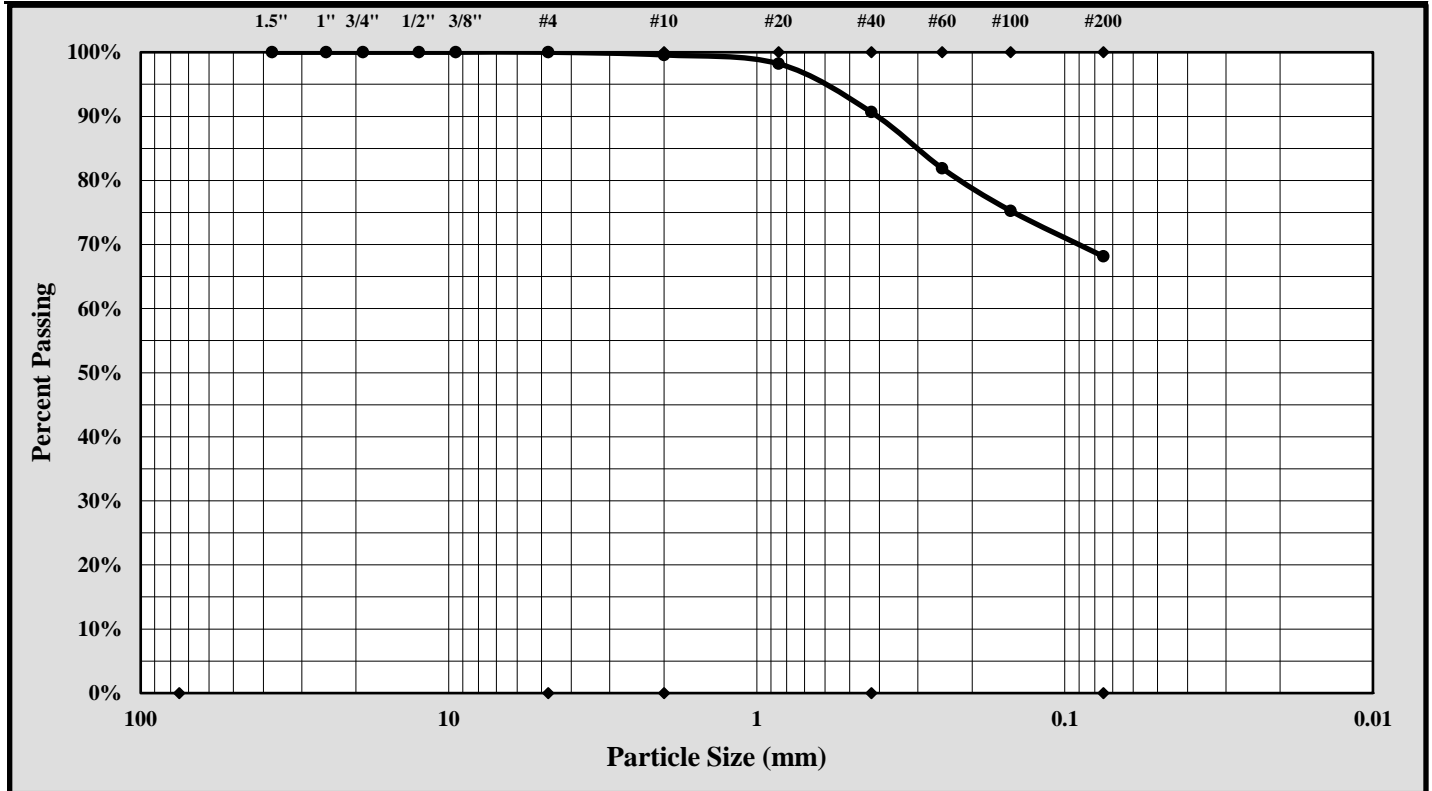


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/26/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-33	Sample #:	SS-3
		Sample Date:	3/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	4.0' - 6.0'
Sample Description:	Sandy Elastic Silt (MH, A-7-6(14))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#20)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 2.00 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 68.1% Total Sand: 31.9%

Liquid Limit	50	Plastic Limit	29	Plastic Index	21
Coarse Sand:	0.4%	Medium Sand:	8.9%	Fine Sand:	22.5%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/27/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



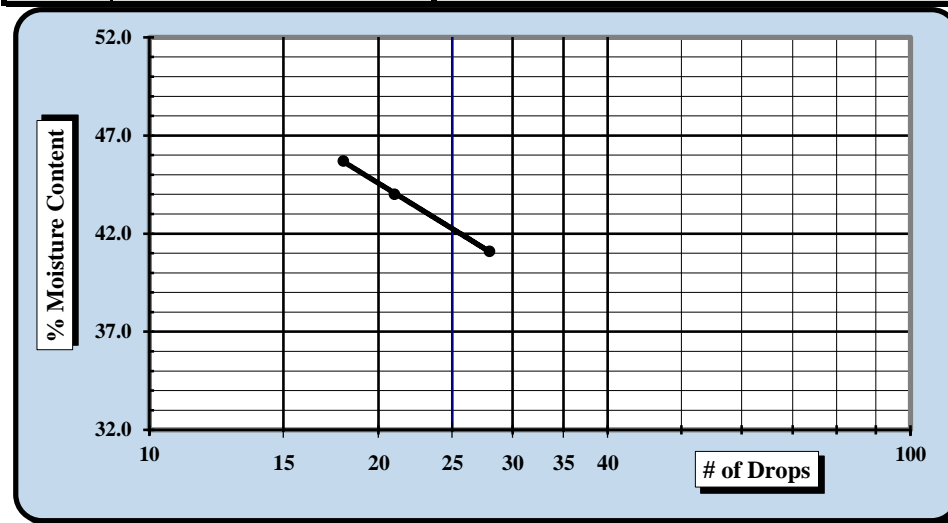
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-33	Sample #:	SS-5
		Sample Date:	3/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'

Sample Description: Silt (ML, A-7-5(13))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		41	42	43			44	45	
A	Tare Weight	28.76	28.63	28.37			25.77	25.09	
B	Wet Soil Weight + A	48.60	46.59	45.75			32.20	31.84	
C	Dry Soil Weight + A	42.82	41.10	40.30			30.68	30.22	
D	Water Weight (B-C)	5.78	5.49	5.45			1.52	1.62	
E	Dry Soil Weight (C-A)	14.06	12.47	11.93			4.91	5.13	
F	% Moisture (D/E)*100	41.1%	44.0%	45.7%			31.0%	31.6%	
N	# OF DROPS	28	21	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						31.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	42
Plastic Limit	31
Plastic Index	11
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/27/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/27/18
 Date

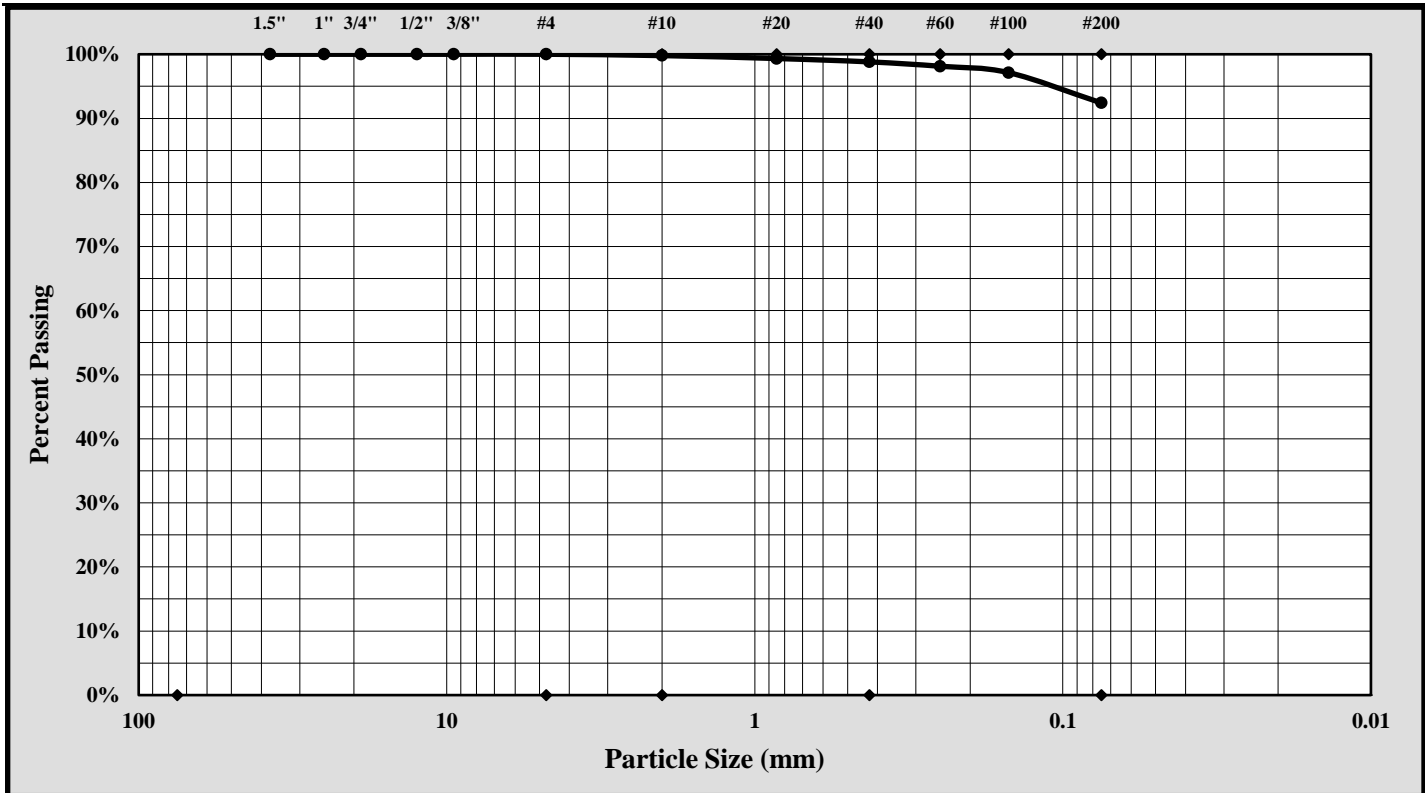
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-33	Sample #:	SS-5
		Sample Date:	3/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'
Sample Description:	Silt (ML, A-7-5(13))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 0.85 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 92.4% Total Sand: 7.6%

Liquid Limit	42	Plastic Limit	31	Plastic Index	11
Coarse Sand:	0.2%	Medium Sand:	1.0%	Fine Sand:	6.4%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

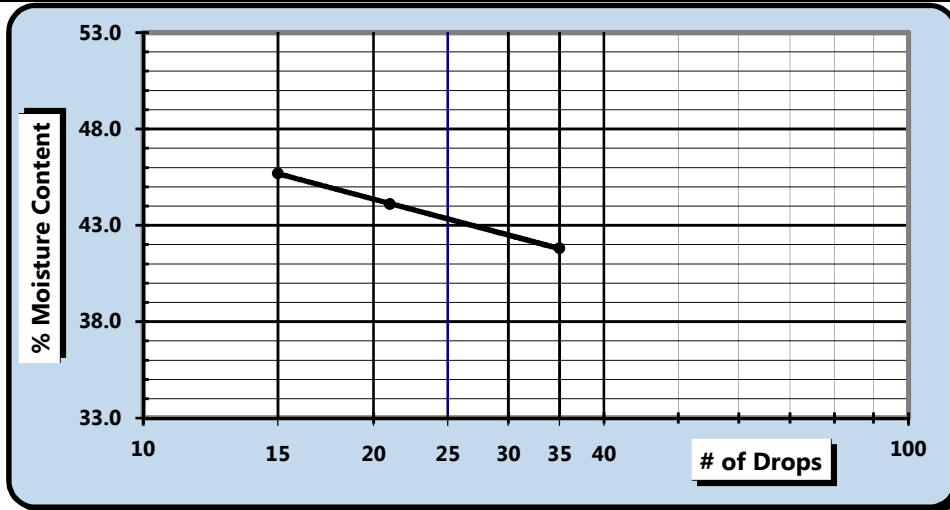
S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date:	3/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		

Boring #:	B-34	Sample #:	SS-2	Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon	Depth:	3.0' - 5.0'

Sample Description: Sandy Silt (ML, A-7-6(9))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit				Plastic Limit		
		P-4	P-5	P-6		12	13	
A	Tare Weight	16.62	16.61	15.97		11.16	12.11	
B	Wet Soil Weight + A	35.53	36.43	35.46		18.73	19.42	
C	Dry Soil Weight + A	29.96	30.36	29.35		17.11	17.87	
D	Water Weight (B-C)	5.57	6.07	6.11		1.62	1.55	
E	Dry Soil Weight (C-A)	13.34	13.75	13.38		5.95	5.76	
F	% Moisture (D/E)*100	41.8%	44.1%	45.7%		27.2%	26.9%	
N	# OF DROPS	35	21	15		Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR							
Ave.	Average					27.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	43
Plastic Limit	27
Plastic Index	16
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

3/15/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

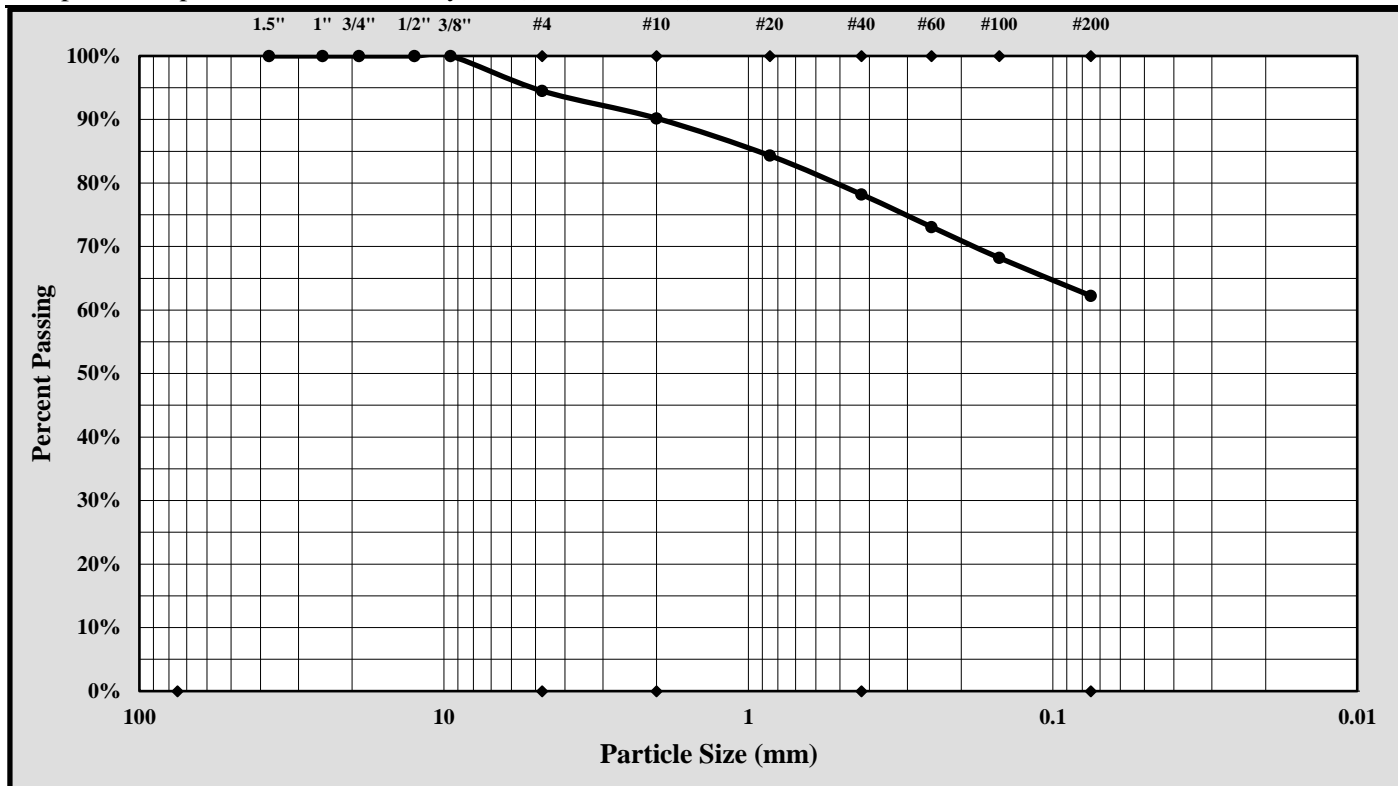


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/20 - 2/23/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-2
		Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	3.0' - 5.0'
Sample Description:	Sandy Silt (ML, A-7-6(9))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 9.50 mm Gravel: 5.5%
 Silt & Clay (% Passing #200): 62.2% Total Sand: 32.2%

Liquid Limit	43	Plastic Limit	27	Plastic Index	16
Coarse Sand:	4.3%	Medium Sand:	12.0%	Fine Sand:	16.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

3/15/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



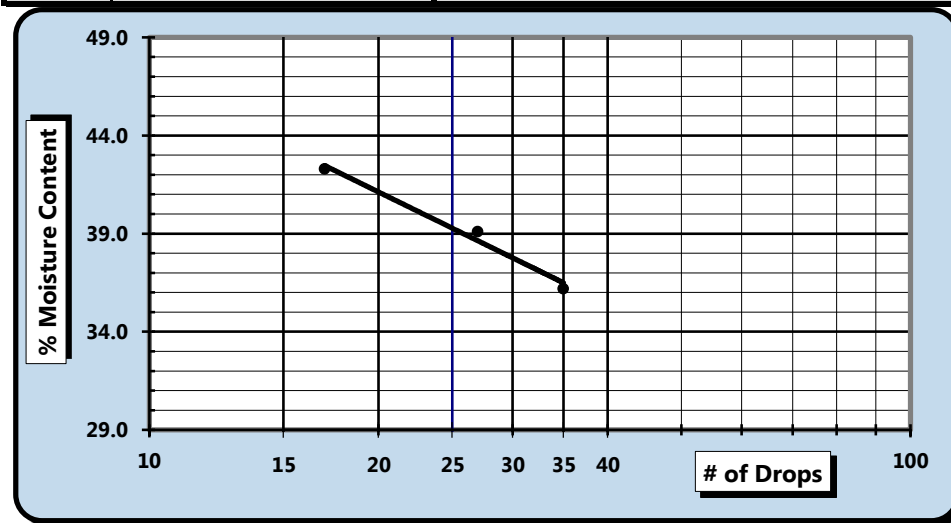
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date:	3/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-5
Location:	Bridge Boring	Sample Date:	2/5/18
Type:	Split-spoon	Depth:	9.0' - 11.0'

Sample Description: Clayey Sand (SC, A-6(4))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Q-4	Q-5	Q-6			17	18	
A	Tare Weight	16.69	16.84	16.81			12.11	12.12	
B	Wet Soil Weight + A	35.74	36.72	36.48			19.44	19.20	
C	Dry Soil Weight + A	30.68	31.13	30.63			18.31	18.10	
D	Water Weight (B-C)	5.06	5.59	5.85			1.13	1.10	
E	Dry Soil Weight (C-A)	13.99	14.29	13.82			6.20	5.98	
F	% Moisture (D/E)*100	36.2%	39.1%	42.3%			18.2%	18.4%	
N	# OF DROPS	35	27	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						18.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	39
Plastic Limit	18
Plastic Index	21
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

3/15/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

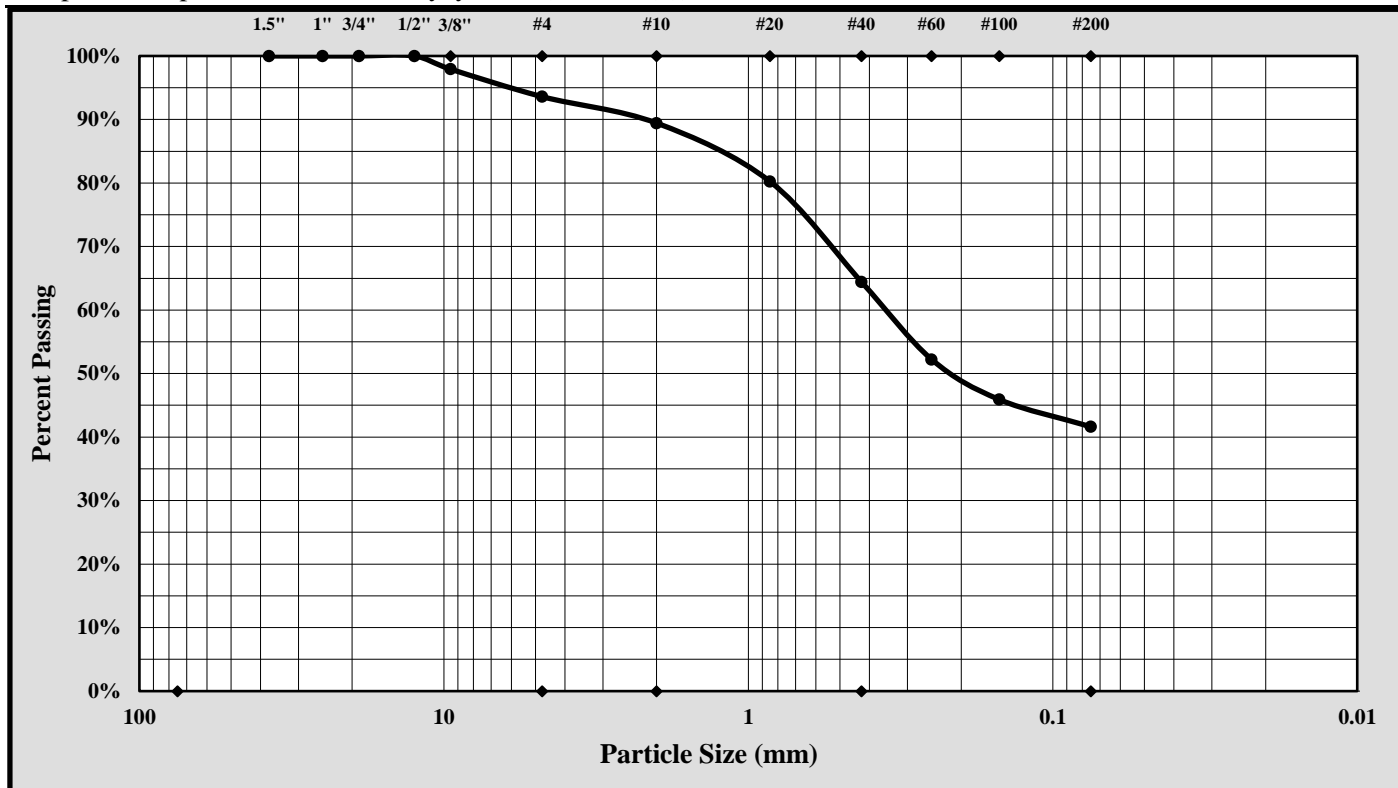
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/20 - 2/23/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-5
		Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	9.0' - 11.0'
Sample Description:	Clayey Sand (SC, A-6(4))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 12.50 mm Gravel: 6.4%
 Silt & Clay (% Passing #200): 41.6% Total Sand: 52.0%

Liquid Limit	39	Plastic Limit	18	Plastic Index	21
Coarse Sand:	4.2%	Medium Sand:	25.0%	Fine Sand:	22.8%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

3/15/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



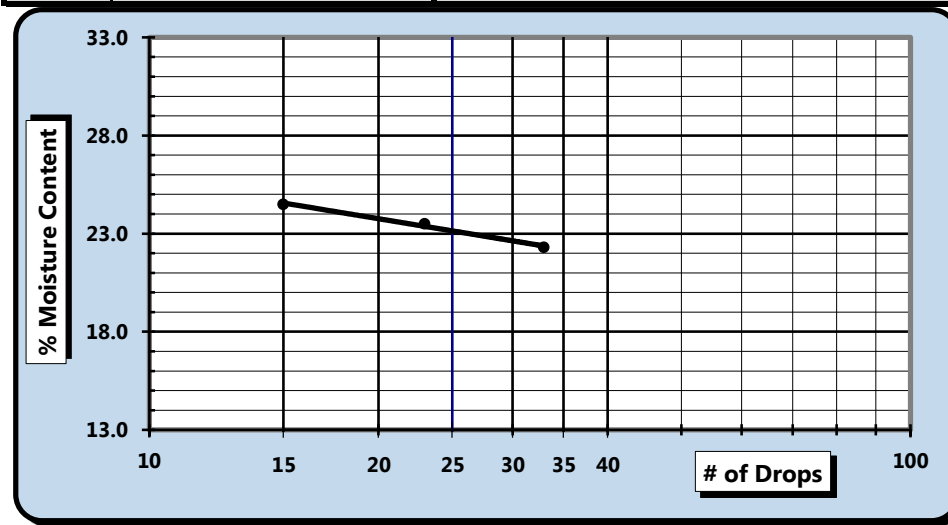
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date:	3/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-10
		Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	33.5' - 35.0'

Sample Description: Sandy Silty Clay (CL-ML, A-4(2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Y-4	Y-5	Y-6			20	21	
A	Tare Weight	16.82	16.74	15.92			12.12	12.07	
B	Wet Soil Weight + A	37.17	38.39	36.70			19.83	19.59	
C	Dry Soil Weight + A	33.46	34.27	32.61			18.76	18.57	
D	Water Weight (B-C)	3.71	4.12	4.09			1.07	1.02	
E	Dry Soil Weight (C-A)	16.64	17.53	16.69			6.64	6.50	
F	% Moisture (D/E)*100	22.3%	23.5%	24.5%			16.1%	15.7%	
N	# OF DROPS	33	23	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						15.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	23
Plastic Limit	16
Plastic Index	7
Group Symbol	CL-ML
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Matt Jacobs</u> Technician Name	<u>NICET 118202</u> Certification#	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility
		<u>3/15/18</u> Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

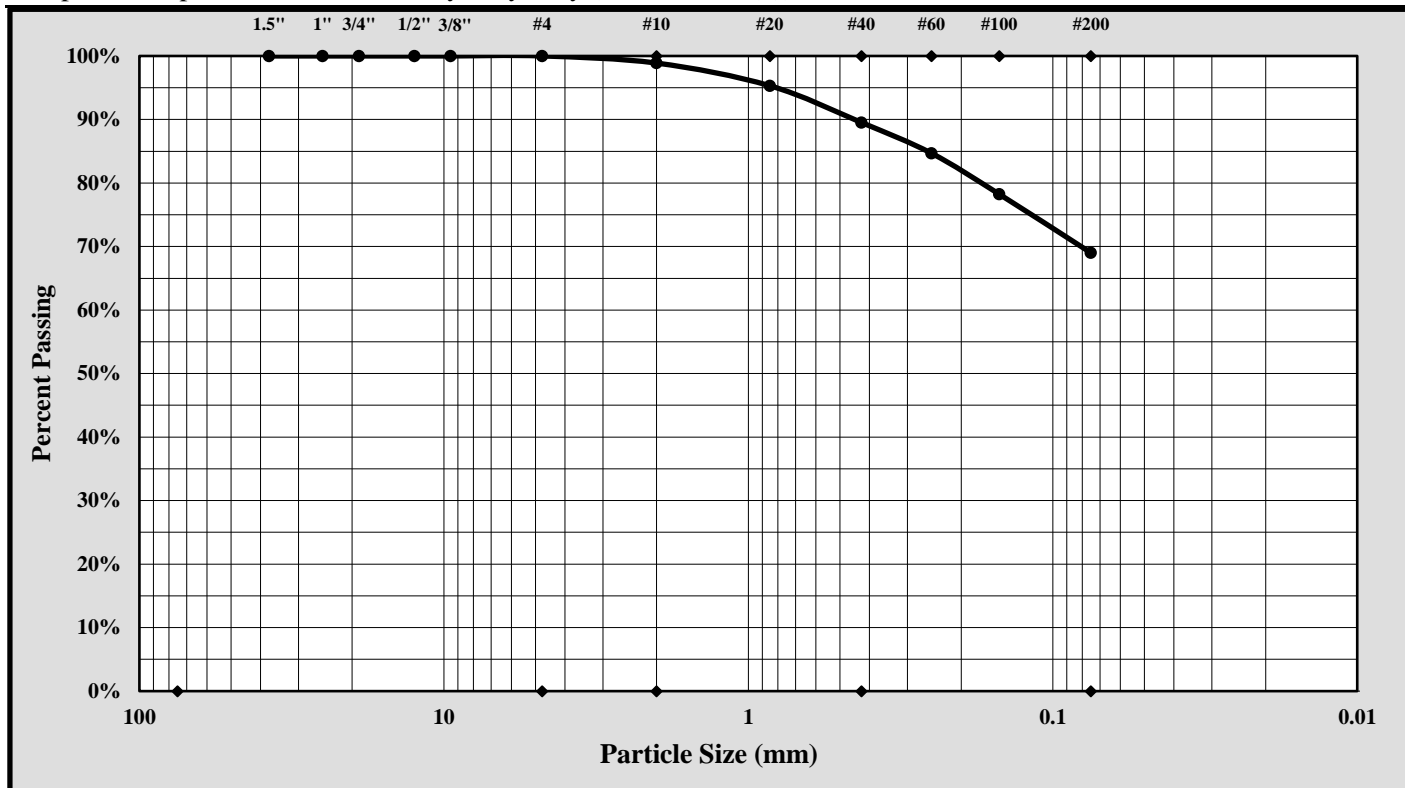


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/20 - 2/23/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-10
		Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	33.5' - 35.0'
Sample Description:	Sandy Silty Clay (CL-ML, A-4(2))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 69.0% Total Sand: 31.0%

Liquid Limit	23	Plastic Limit	16	Plastic Index	7
Coarse Sand:	1.1%	Medium Sand:	9.4%	Fine Sand:	20.5%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

3/15/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



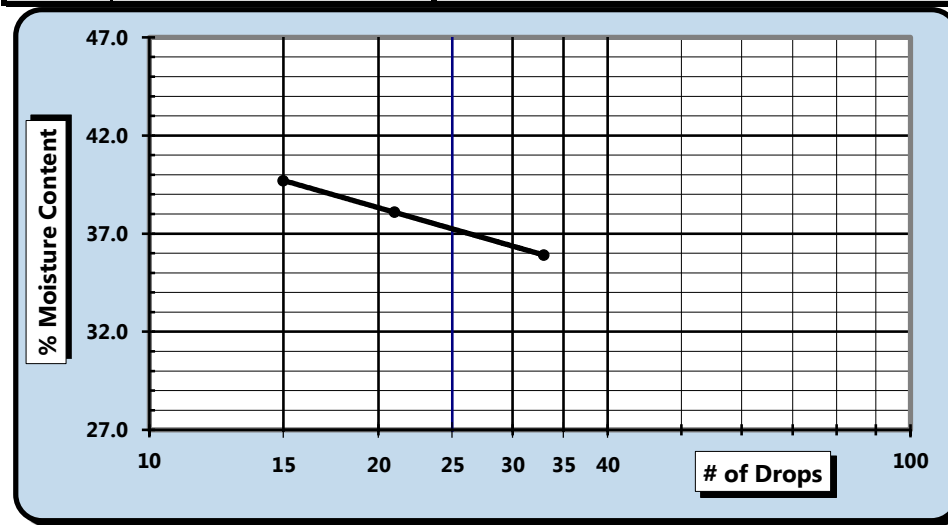
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	3/16/18
Project Name:	Carolina Crossroads Project	Test Date:	3/15/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-11
		Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	38.5' - 40.0'

Sample Description: Sandy Lean Clay (CL, A-6(8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Z-4	Z-5	Z-6			22	23	
A	Tare Weight	15.76	15.57	16.91			11.92	12.07	
B	Wet Soil Weight + A	34.46	34.87	36.12			19.00	19.31	
C	Dry Soil Weight + A	29.52	29.55	30.66			17.68	17.98	
D	Water Weight (B-C)	4.94	5.32	5.46			1.32	1.33	
E	Dry Soil Weight (C-A)	13.76	13.98	13.75			5.76	5.91	
F	% Moisture (D/E)*100	35.9%	38.1%	39.7%			22.9%	22.5%	
N	# OF DROPS	33	21	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						22.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	23
Plastic Index	14
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

3/16/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

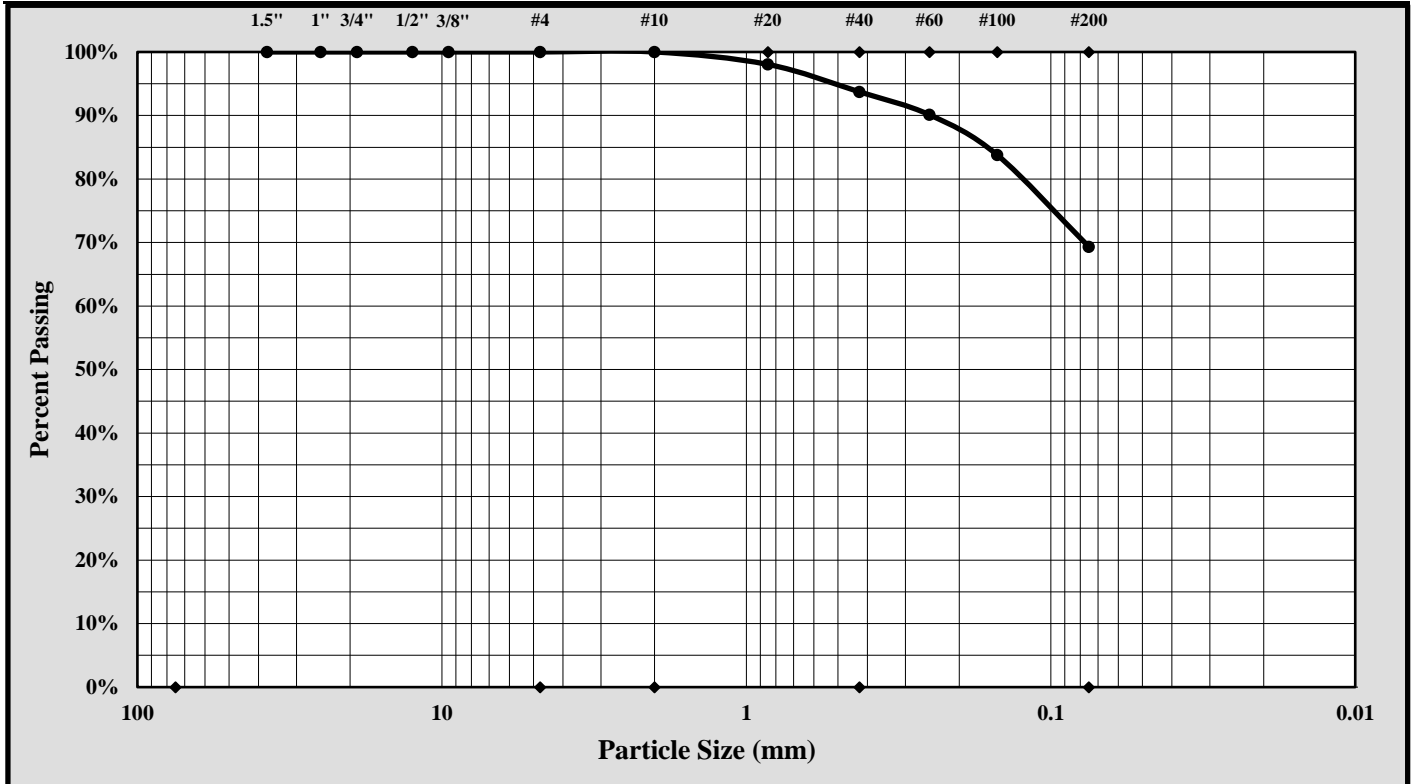


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	3/16/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/20 - 2/23/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	SS-11
		Sample Date:	2/5/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	38.5' - 40.0'
Sample Description:	Sandy Lean Clay (CL, A-6(8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	2.00 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	69.3%	Total Sand:	30.7%

Liquid Limit	37	Plastic Limit	23	Plastic Index	14
Coarse Sand:	0.0%	Medium Sand:	6.3%	Fine Sand:	24.4%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

3/16/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-35	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/02/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Silt with Sand (ML, A-7-6(15))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		46	47	48			49	50	
A	Tare Weight	27.57	25.82	26.38			28.62	28.88	
B	Wet Soil Weight + A	43.91	42.04	43.56			36.61	36.60	
C	Dry Soil Weight + A	39.02	36.78	37.64			34.84	34.88	
D	Water Weight (B-C)	4.89	5.26	5.92			1.77	1.72	
E	Dry Soil Weight (C-A)	11.45	10.96	11.26			6.22	6.00	
F	% Moisture (D/E)*100	42.7%	48.0%	52.6%			28.5%	28.7%	
N	# OF DROPS	35	23	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	47
Plastic Limit	29
Plastic Index	18
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/27/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/27/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

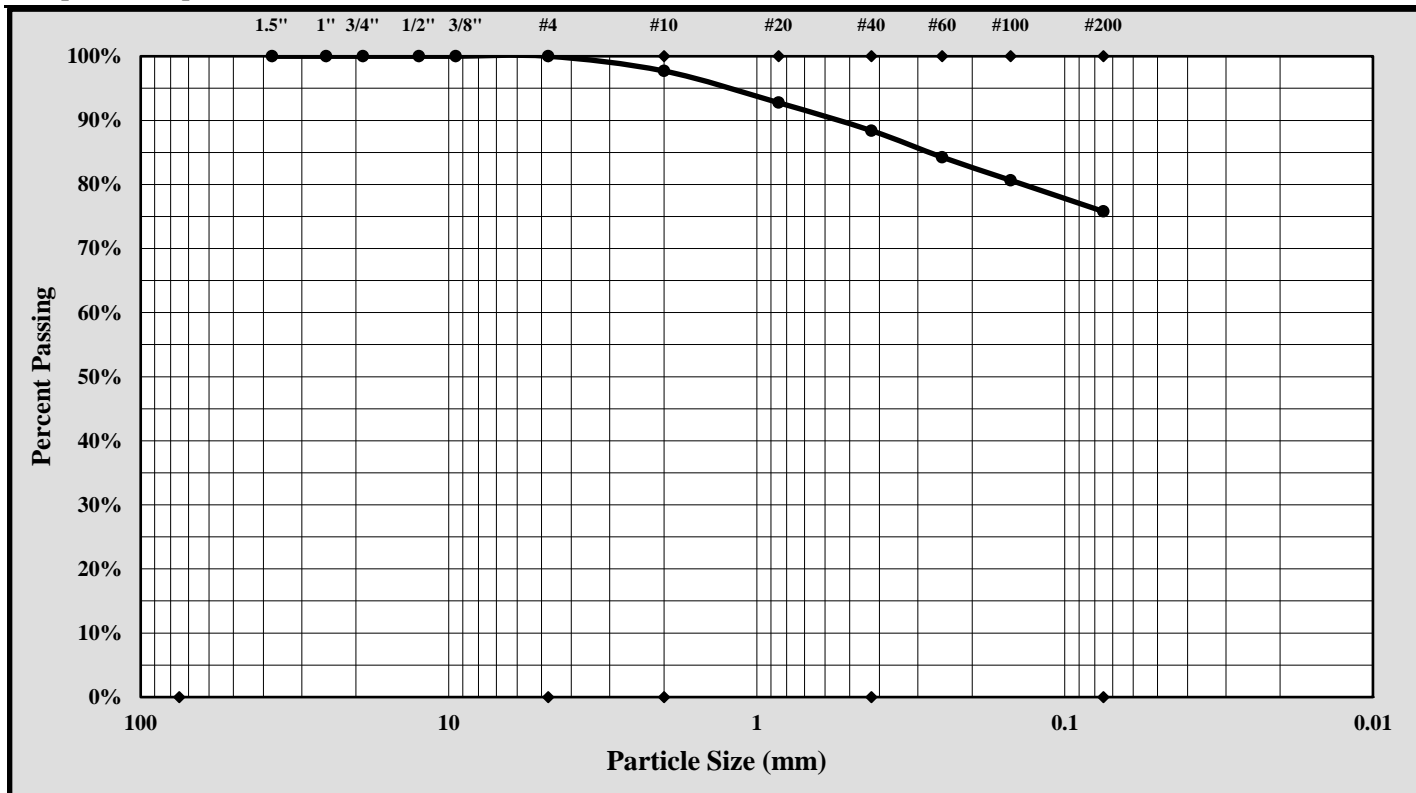


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-35	Sample #:	SS-1
		Sample Date:	3/02/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Silt with Sand (ML, A-7-6(15))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	4.75 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	75.8%	Total Sand:	24.2%

Liquid Limit	47	Plastic Limit	29	Plastic Index	18
Coarse Sand:	2.3%	Medium Sand:	9.3%	Fine Sand:	12.6%

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
--------------------------------	----------------------------------	---	--	-------------------------------	--

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



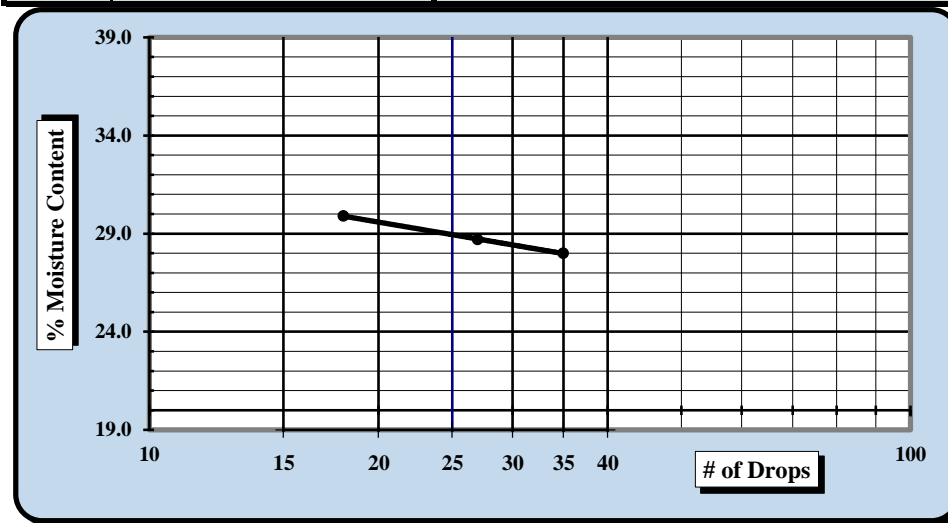
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-35	Sample #:	SS-5
Location:	Bridge Boring	Sample Date:	3/02/18
Type:	Split-spoon	Depth:	8.0' - 10.0'

Sample Description: Lean Clay with Sand (CL, A-4(5))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		51	52	53			54	55	
A	Tare Weight	28.44	24.97	28.37			27.58	26.02	
B	Wet Soil Weight + A	50.31	46.07	47.78			34.13	34.53	
C	Dry Soil Weight + A	45.52	41.36	43.31			33.05	33.09	
D	Water Weight (B-C)	4.79	4.71	4.47			1.08	1.44	
E	Dry Soil Weight (C-A)	17.08	16.39	14.94			5.47	7.07	
F	% Moisture (D/E)*100	28.0%	28.7%	29.9%			19.7%	20.4%	
N	# OF DROPS	35	27	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						20.1%		



NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	29
Plastic Limit	20
Plastic Index	9
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

4/27/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/27/18
Date

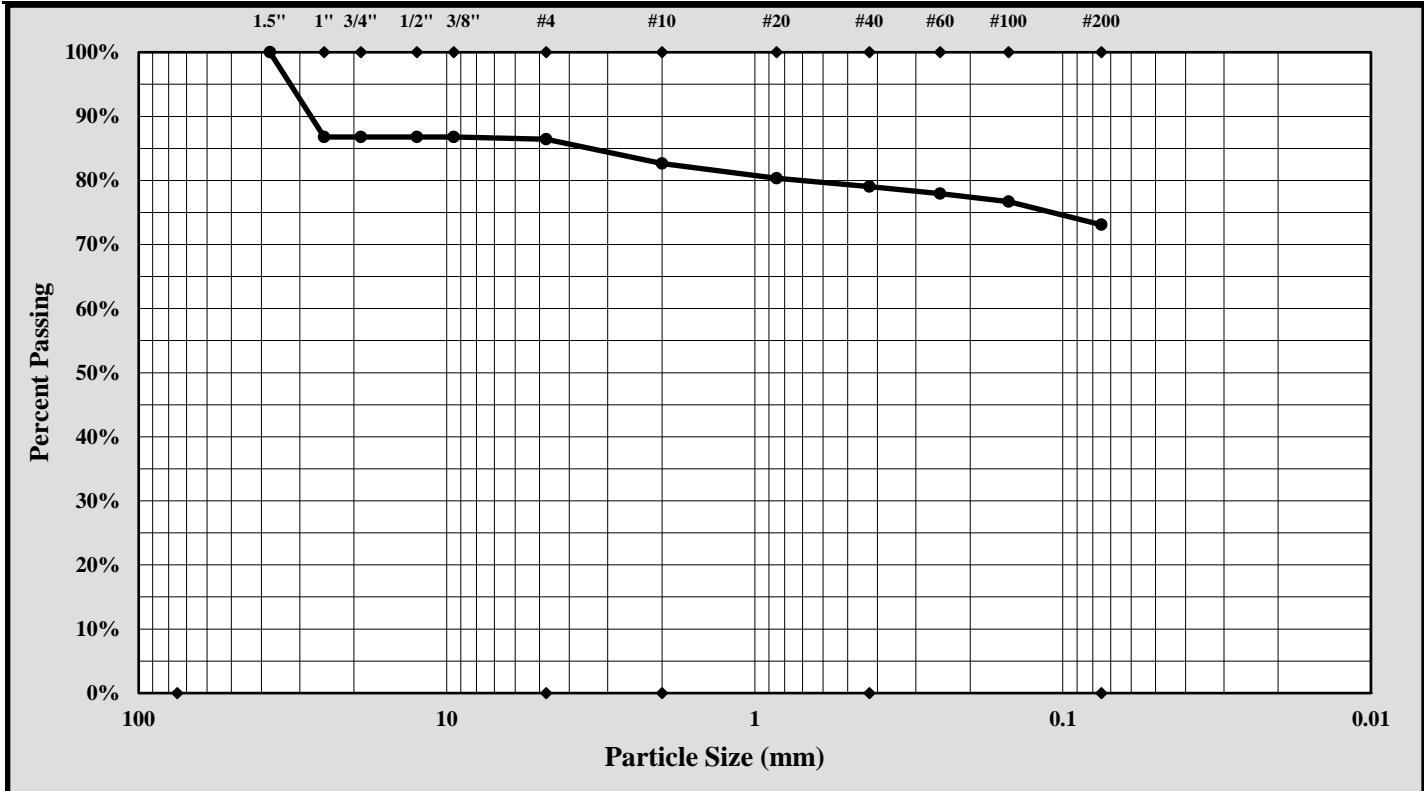
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-35	Sample #:	SS-5
		Sample Date:	3/02/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'
Sample Description:	Lean Clay with Sand (CL, A-4(5))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	37.5 mm	Gravel:	13.6%
Silt & Clay (% Passing #200):	73.1%	Total Sand:	13.4%

Liquid Limit	29	Plastic Limit	20	Plastic Index	9
Coarse Sand:	3.8%	Medium Sand:	3.6%	Fine Sand:	5.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



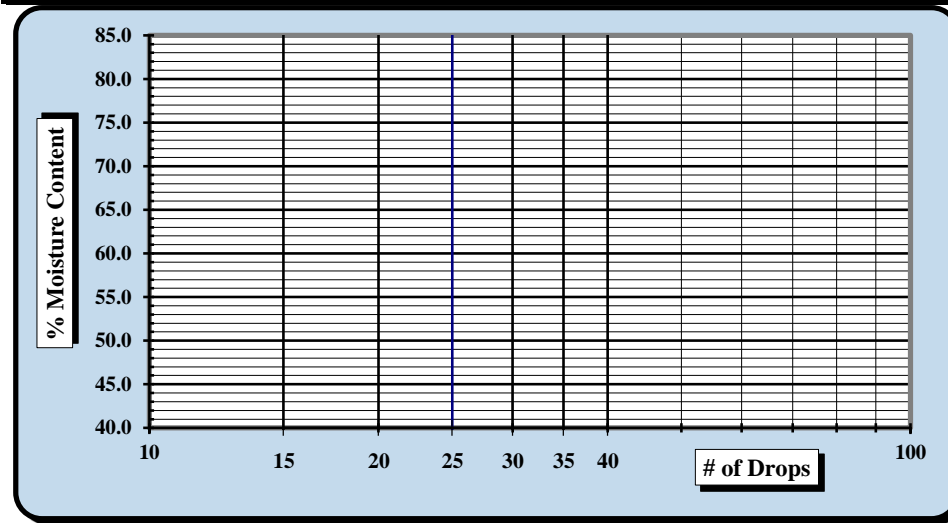
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-4-18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-36	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	Various
	Offset: N/A	Depth:	0.0' - 2.0'

Sample Description: Clayey Sand (SC, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	Tare #:	Liquid Limit				Plastic Limit		
		97				98	99	
A	Tare Weight	16.66				16.66	16.67	
B	Wet Soil Weight + A	29.29				25.07	25.00	
C	Dry Soil Weight + A	27.08				24.16	24.06	
D	Water Weight (B-C)	2.21				0.91	0.94	
E	Dry Soil Weight (C-A)	10.42				7.50	7.39	
F	% Moisture (D/E)*100	21.2%				12.1%	12.7%	
N	# OF DROPS	25				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR							
Ave.	Average					12.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	21
Plastic Limit	12
Plastic Index	9
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/4/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



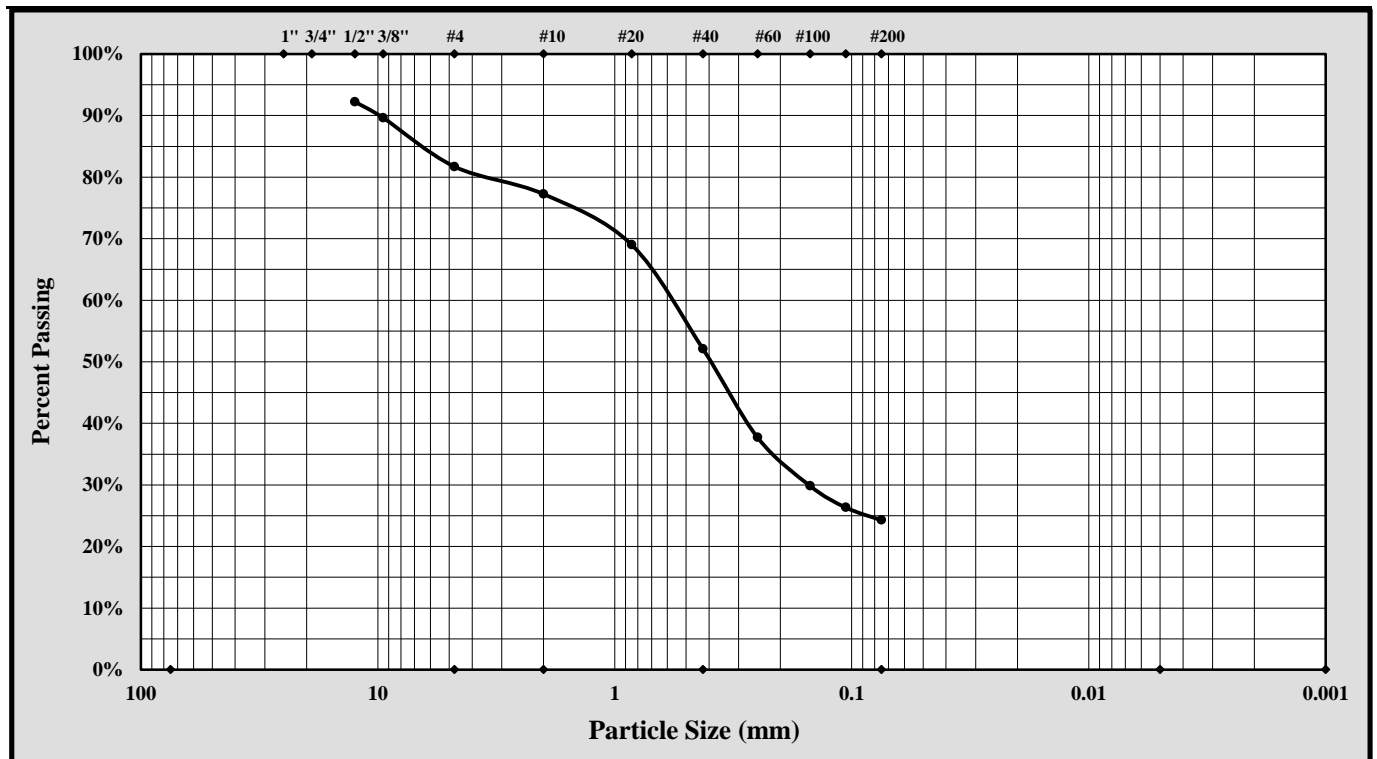
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-36	Type:	Split Spoon
		Sample Date:	Various
Location:	Bridge Boring	Sample No.:	SS-1
		Depth:	0.0' - 2.0'
Sample Description:	Clayey Sand (SC, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	18.3%
Silt & Clay (% Passing #200):	Total Sand:	57.4%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	21 12
	Plastic Index	9

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/7/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



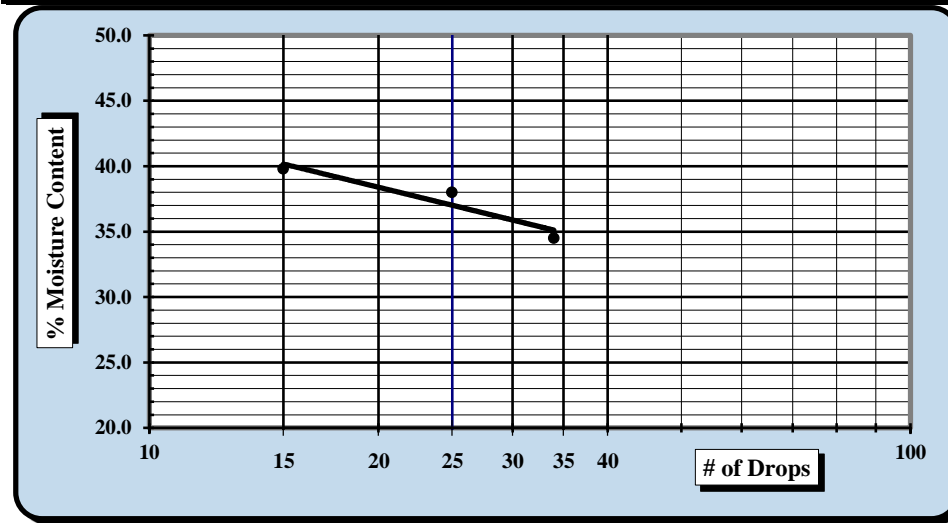
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-4-18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-36	Sample #:	SS-2
Location:	Bridge Boring	Sample Date:	Various
	Offset: N/A	Depth:	2.0' - 4.0'

Sample Description: Clayey Sand (SC, A-2-6)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		67	68	69			70	72	
A	Tare Weight	26.12	29.34	29.07			29.40	26.31	
B	Wet Soil Weight + A	39.31	42.56	42.97			36.64	35.68	
C	Dry Soil Weight + A	35.93	38.92	39.01			35.72	34.50	
D	Water Weight (B-C)	3.38	3.64	3.96			0.92	1.18	
E	Dry Soil Weight (C-A)	9.81	9.58	9.94			6.32	8.19	
F	% Moisture (D/E)*100	34.5%	38.0%	39.8%			14.6%	14.4%	
N	# OF DROPS	34	25	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						14.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	15
Plastic Index	22
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/4/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



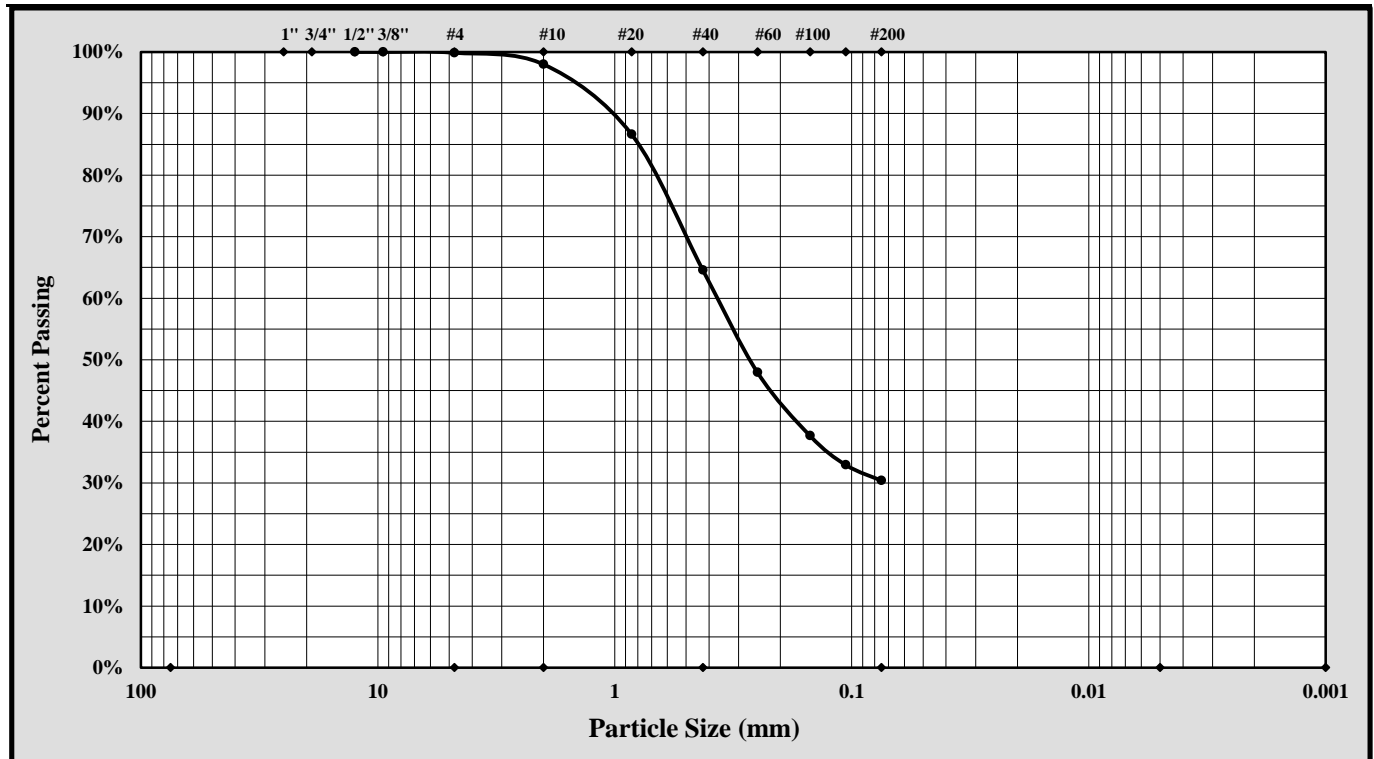
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-36	Type:	Split Spoon
		Sample Date:	Various
Location:	Bridge Boring	Sample No.:	SS-2
		Depth:	2.0' - 4.0'
Sample Description:	Clayey Sand (SC, A-2-6)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	0.1%
Silt & Clay (% Passing #200):	Total Sand:	69.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	15
	Plastic Index	22

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/7/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



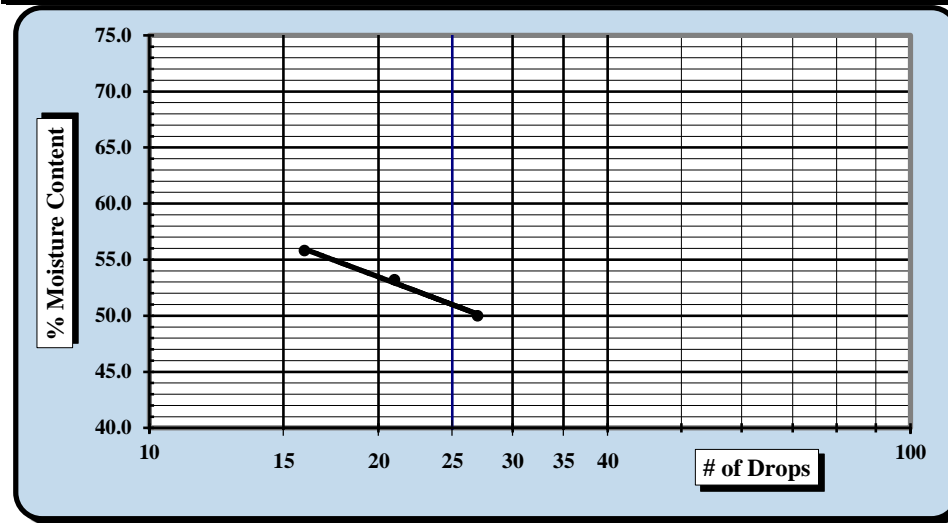
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-1-2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-36	Sample #:	SS-5
Location:	Bridge Boring	Sample Date:	Various
	Offset: N/A	Depth:	8.0' - 10.0'

Sample Description: Clayey Sand (SC, A-7-6 (8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		55	56	57			58	78	
A	Tare Weight	15.74	15.22	15.38			15.14	15.05	
B	Wet Soil Weight + A	25.85	26.79	26.32			22.72	21.57	
C	Dry Soil Weight + A	22.48	22.77	22.40			21.31	20.37	
D	Water Weight (B-C)	3.37	4.02	3.92			1.41	1.20	
E	Dry Soil Weight (C-A)	6.74	7.55	7.02			6.17	5.32	
F	% Moisture (D/E)*100	50.0%	53.2%	55.8%			22.9%	22.6%	
N	# OF DROPS	27	21	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						22.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	52
Plastic Limit	23
Plastic Index	29
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

<u>Jimmy Hanson</u> Technician Name	<u>4/28/2018</u> Date	 Technical Responsibility
		<u>4/30/2018</u> Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



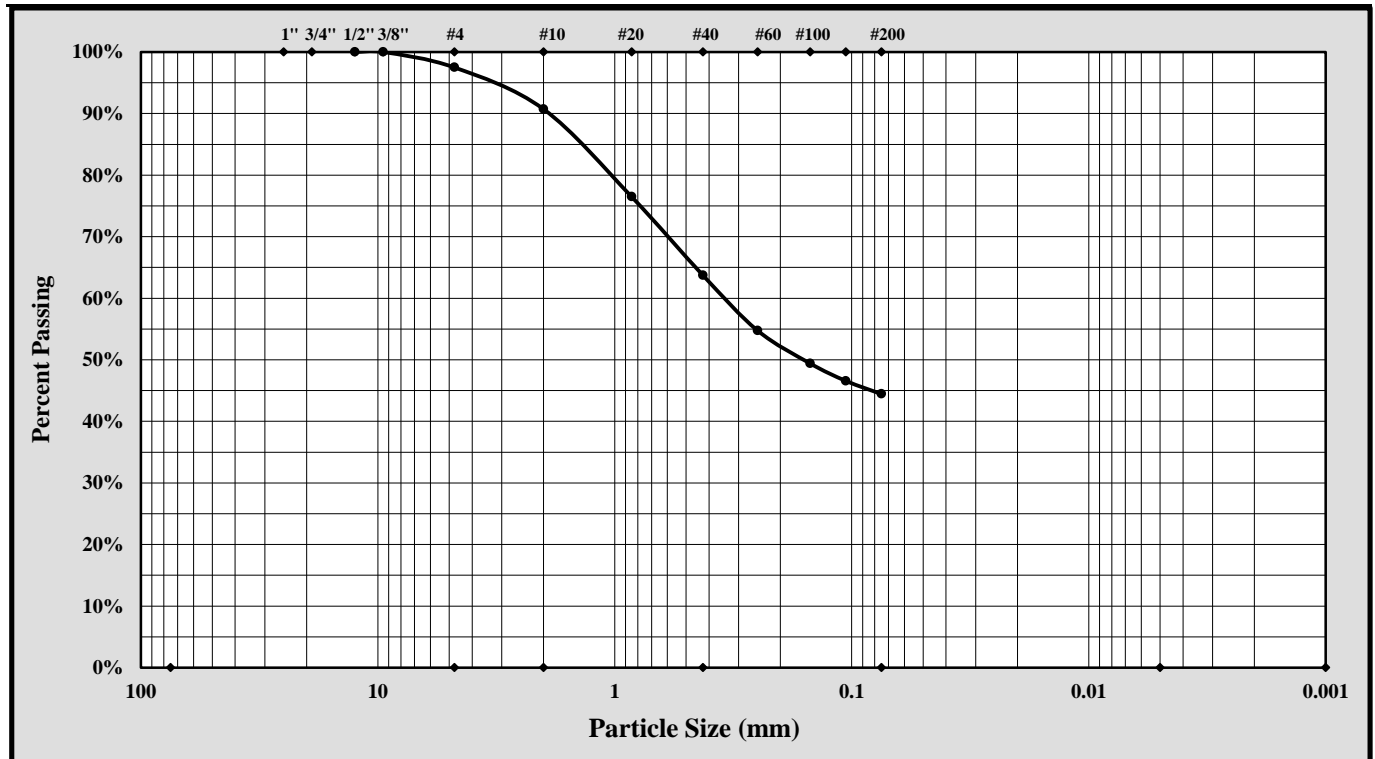
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-36	Type:	Split Spoon
Location:	Bridge Boring	Sample No.:	SS-5
		Depth:	8.0' - 10.0'
Sample Description:	Clayey Sand (SC, A-7-6 (8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	2.5%
Silt & Clay (% Passing #200):	Total Sand:	53.0%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	23
	Plastic Index	29

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	50 g./ Liter	

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/7/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



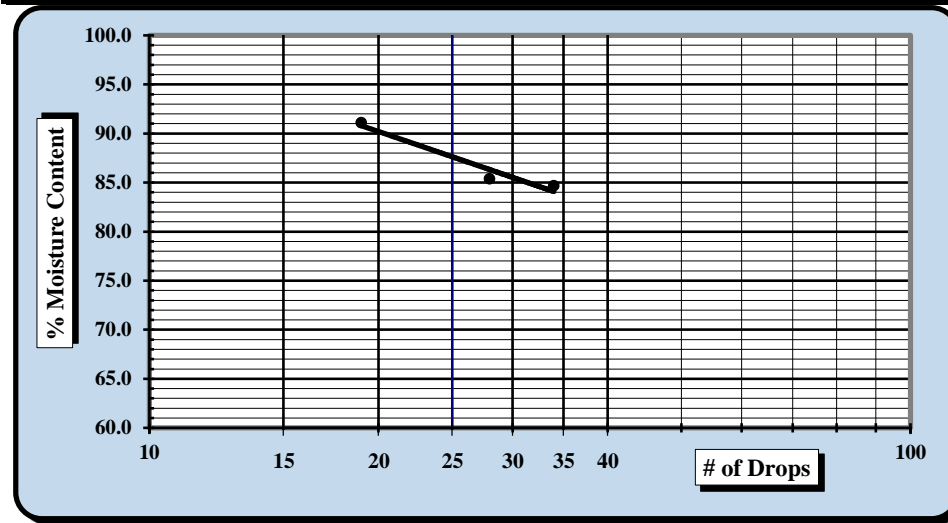
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-4-18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-36	Sample #:	SS-8
		Sample Date:	Various
Location:	Bridge Boring	Offset:	N/A
		Depth:	23.5' - 25.0'

Sample Description: Fat Clay with Sand (CH, A-7-5 (53))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	487	Tare #:	Liquid Limit				Plastic Limit				
			20	21	22		23	24			
A		Tare Weight	15.44	15.33	15.43				14.91	15.22	
B		Wet Soil Weight + A	26.32	27.27	27.66				22.02	22.08	
C		Dry Soil Weight + A	21.33	21.77	21.83				20.38	20.52	
D		Water Weight (B-C)	4.99	5.50	5.83				1.64	1.56	
E		Dry Soil Weight (C-A)	5.89	6.44	6.40				5.47	5.30	
F		% Moisture (D/E)*100	84.7%	85.4%	91.1%				30.0%	29.4%	
N		# OF DROPS	34	28	19				Moisture Contents determined by ASTM D 2216		
LL		LL = F * FACTOR									
Ave.		Average							29.7%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	87	
Plastic Limit	30	
Plastic Index	57	
Group Symbol	CH	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

<u>Jimmy Hanson</u> Technician Name	<u>4/28/2018</u> Date	 Technical Responsibility
		<u>5/4/2018</u> Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



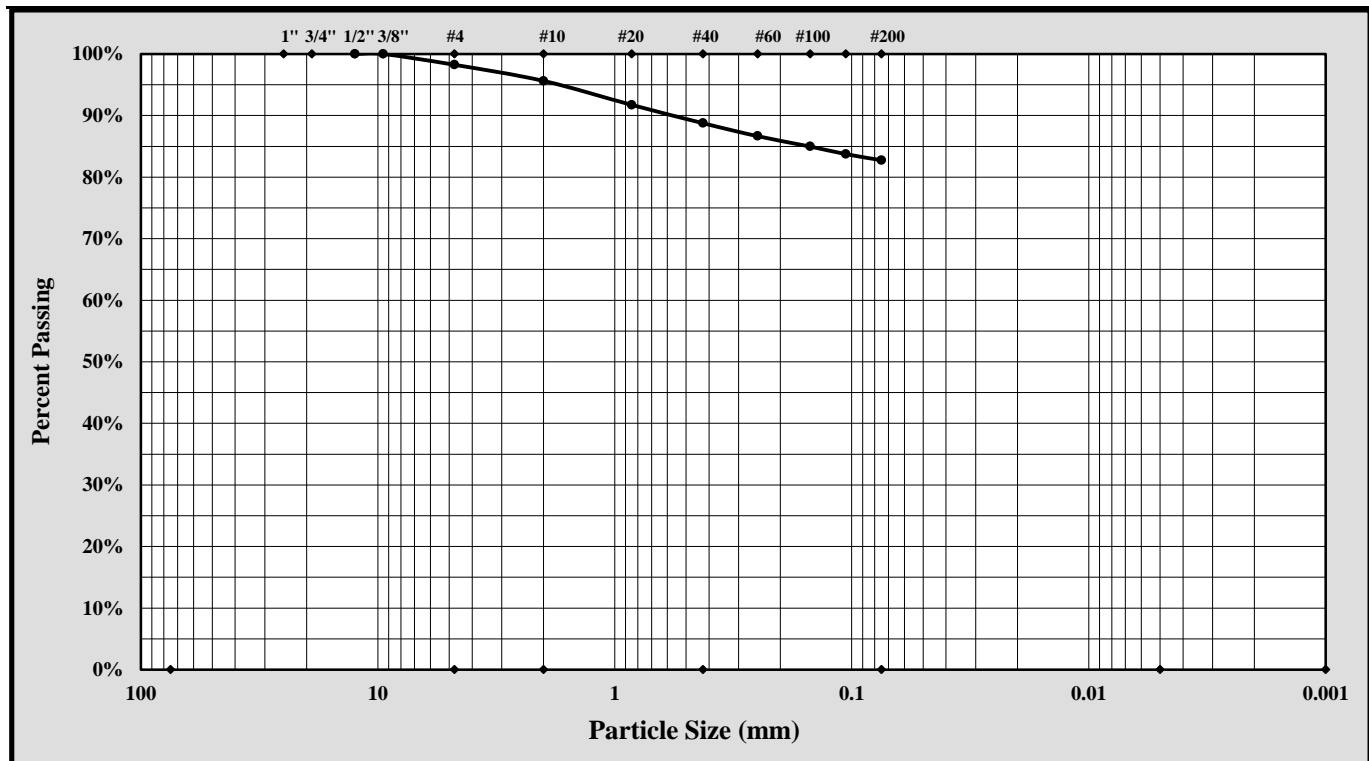
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-36	Type:	Split Spoon
Location:	Bridge Boring	Sample No.:	SS-8
		Depth:	23.5' - 25.0'
Sample Description:	Fat Clay with Sand (CH, A-7-5 (53))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	1.7%
Silt & Clay (% Passing #200):	Total Sand:	15.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	30
	Plastic Index	57

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

6/7/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



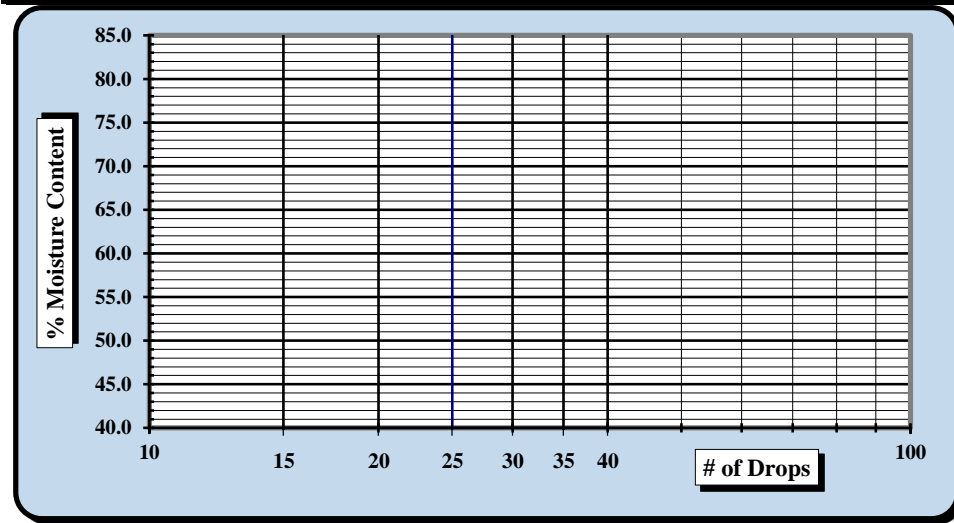
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-4-18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-36	Sample #:	SS-10
Location:	Bridge Boring	Sample Date:	Various
	Offset: N/A	Depth:	33.5' - 35.0'

Sample Description:		Silt with Sand (ML, A-4 (0))			
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	489	Tare #:	Liquid Limit				Plastic Limit			
			10	11	12			13	14	
A		Tare Weight								
B		Wet Soil Weight + A								
C		Dry Soil Weight + A								
D		Water Weight (B-C)								
E		Dry Soil Weight (C-A)								
F		% Moisture (D/E)*100								
N		# OF DROPS								
LL		LL = F * FACTOR								Moisture Contents determined by ASTM D 2216
Ave.		Average								



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **NP**

Plastic Limit **NP**

Plastic Index **NP**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/4/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



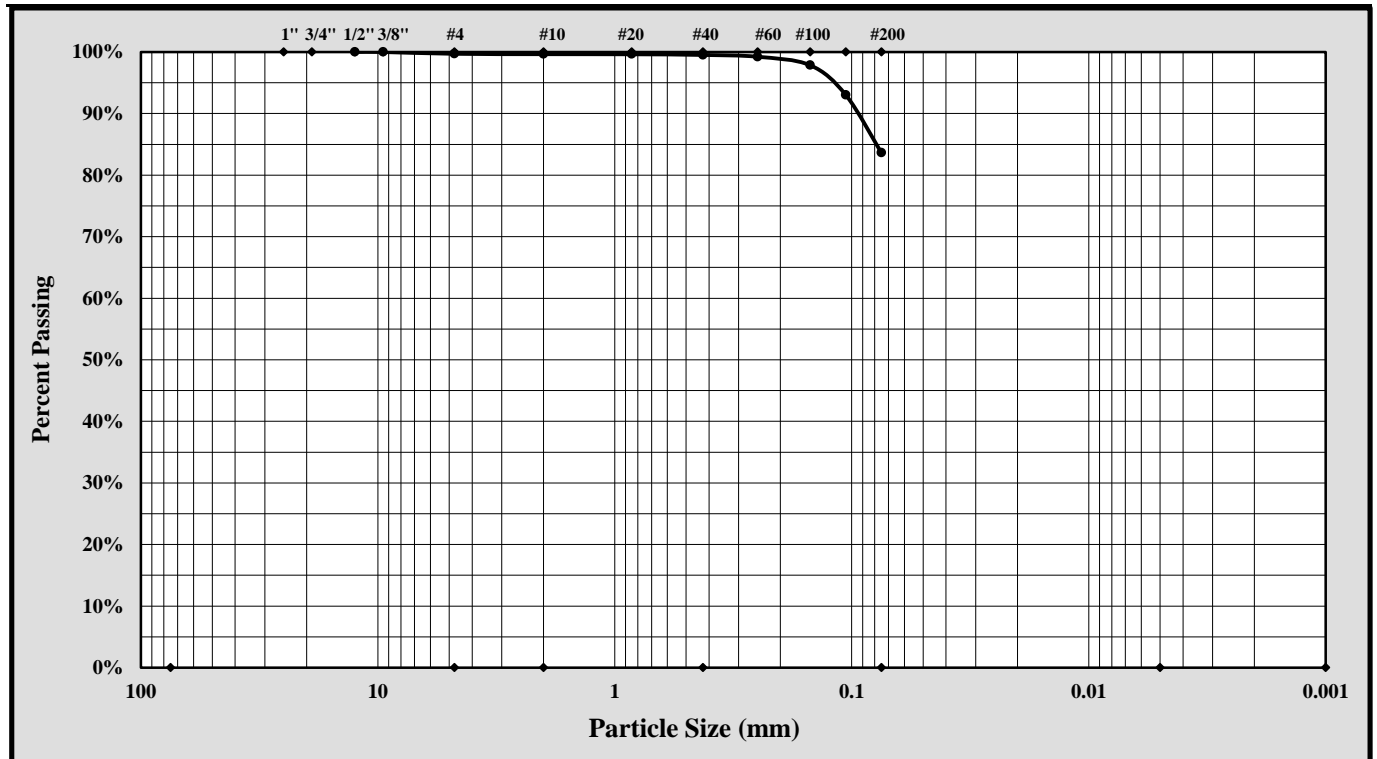
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-36	Type:	Split Spoon
		Sample Date:	Various
Location:	Bridge Boring	Sample No.:	SS-10
		Depth:	33.5' - 35.0'
Sample Description:	Silt with Sand (ML, A-4 (0))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	0.3%
Silt & Clay (% Passing #200):	Total Sand:	16.1%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	NP
	Plastic Index	NP

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Laboratory Group Leader
Position

5/10/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-37	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/07/18
Type:	Split-spoon	Depth:	0.4' - 2.4'

Sample Description: Sandy Lean Clay (CL, A-7-6(10))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		56	57	58			59	60		
A	Tare Weight	26.35	29.15	3.74				3.77	3.55	
B	Wet Soil Weight + A	38.88	44.51	19.23				10.95	9.92	
C	Dry Soil Weight + A	34.95	39.44	13.83				9.66	8.78	
D	Water Weight (B-C)	3.93	5.07	5.40				1.29	1.14	
E	Dry Soil Weight (C-A)	8.60	10.29	10.09				5.89	5.23	
F	% Moisture (D/E)*100	45.7%	49.3%	53.5%				21.9%	21.8%	
N	# OF DROPS	35	25	17				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							21.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	49
Plastic Limit	22
Plastic Index	27
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/27/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

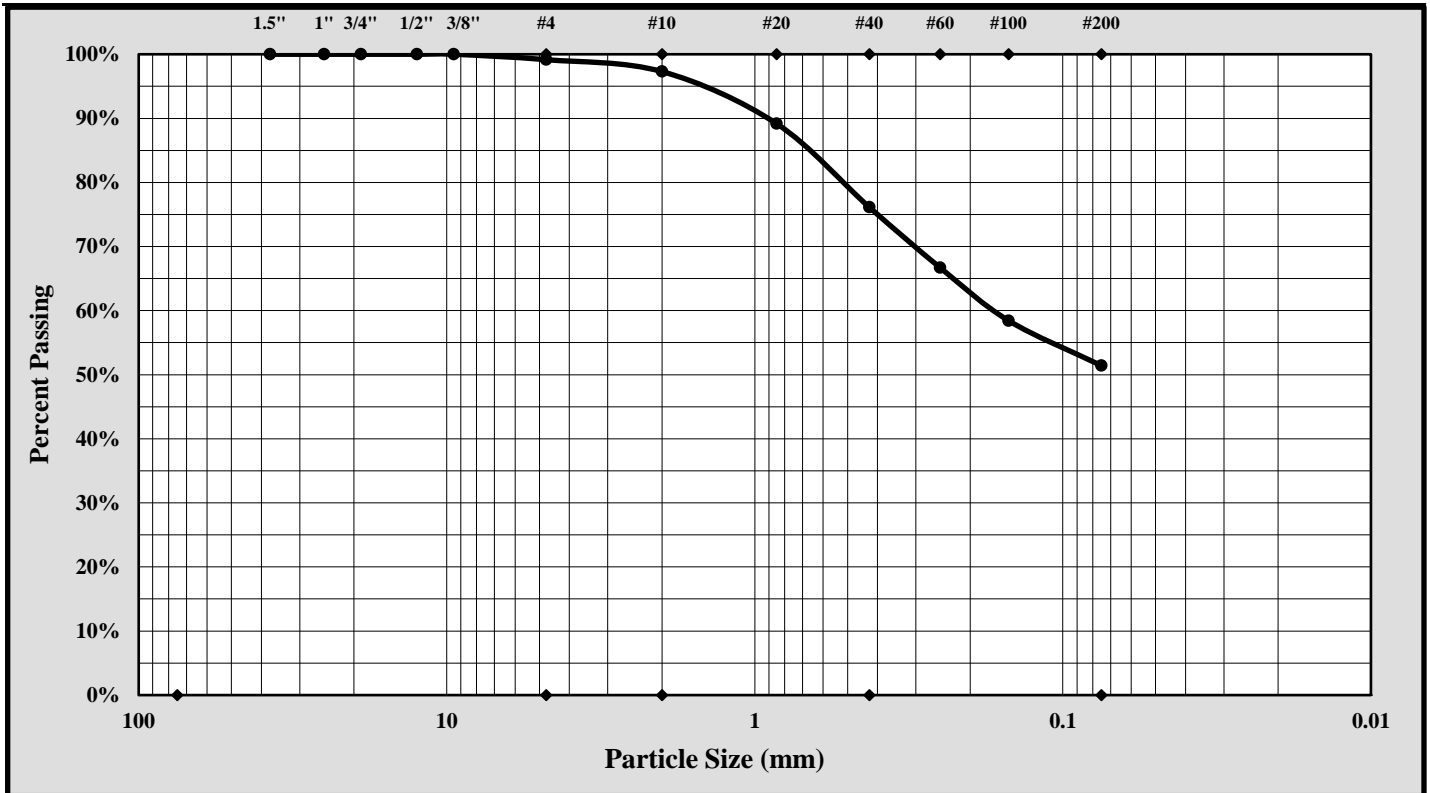


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-37	Sample #:	SS-1
		Sample Date:	3/07/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.4' - 2.4'
Sample Description:	Sandy Lean Clay (CL, A-7-6(10))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.8%
 Silt & Clay (% Passing #200): 51.4% Total Sand: 47.7%

Liquid Limit	49	Plastic Limit	22	Plastic Index	27
Coarse Sand:	1.9%	Medium Sand:	21.2%	Fine Sand:	24.7%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-37	Sample #:	SS-3
Location:	Bridge Boring	Sample Date:	3/07/18
Type:	Split-spoon	Depth:	4.4' - 6.4'

Sample Description: Fat Clay (CH, A-7-6(51))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.70	26.47	26.33				25.93	26.94	
B	Wet Soil Weight + A	41.71	40.46	39.84				34.42	34.60	
C	Dry Soil Weight + A	35.54	34.50	33.67				32.85	33.15	
D	Water Weight (B-C)	6.17	5.96	6.17				1.57	1.45	
E	Dry Soil Weight (C-A)	8.84	8.03	7.34				6.92	6.21	
F	% Moisture (D/E)*100	69.8%	74.2%	84.1%				22.7%	23.3%	
N	# OF DROPS	35	28	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							23.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	77
Plastic Limit	23
Plastic Index	54
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/27/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

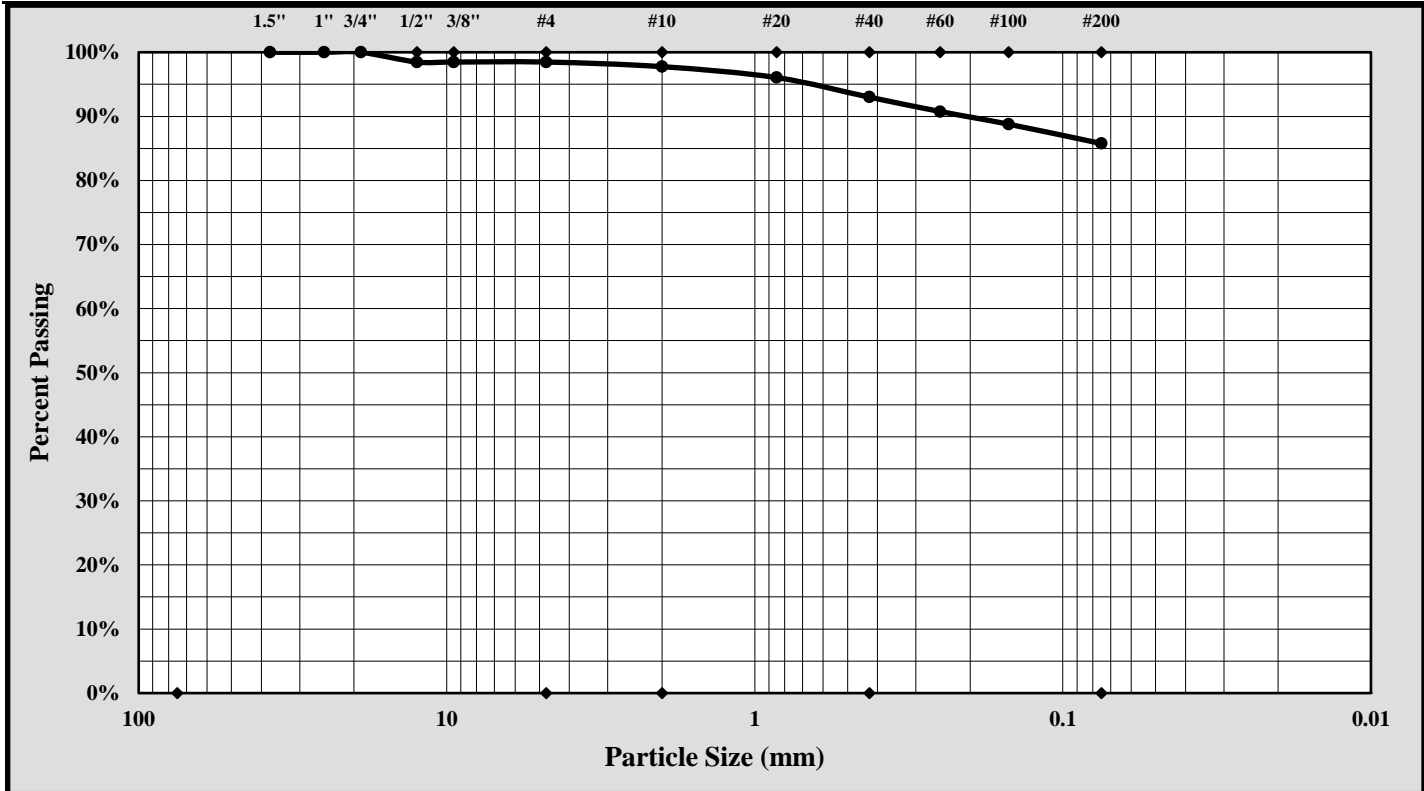


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-37	Sample #:	SS-3
		Sample Date:	3/07/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	4.4' - 6.4'
Sample Description:	Fat Clay (CH, A-7-6(51))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.0 mm Gravel: 1.5%
 Silt & Clay (% Passing #200): 85.8% Total Sand: 12.7%

Liquid Limit	77	Plastic Limit	23	Plastic Index	54
Coarse Sand:	0.7%	Medium Sand:	4.8%	Fine Sand:	7.2%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

MATERIAL FINER THAN THE #200 SIEVE



ASTM D1140

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #: 1461-16-047.2B Report Date: 4/27/18
 Project Name: Carolina Crossroads Project Test Date(s): 3/28 - 3/30/18
 Client Name: HDR Engineering, Inc.
 Client Address: 4400 Leeds Ave., North Charleston, South Carolina
 Sampled by: S&ME Sample Dates: 3/07/18
 Sampling Method: Split-spoon Drill Rig: CME 55


Method; A B Soaked Soak Time 16 hrs.

Boring #	Sample #	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Tare Wt. + Dry Wt. after Wash	% Passing #200
		ft.		grams	grams	grams	grams	%
B-37	SS-6	9.5 - 11.5	BK-2	0.00	149.05	116.43	13.85	88.1%

Balance ID.: 13942 Calibration Date: 8/18/17 #200 Sieve: 23239 Calibration Date: 2/19/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

Benjamin Kovaleski
Technician Name


Signature

NICET Lab Level III/117226
Certification Type/No.

4/27/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/18
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



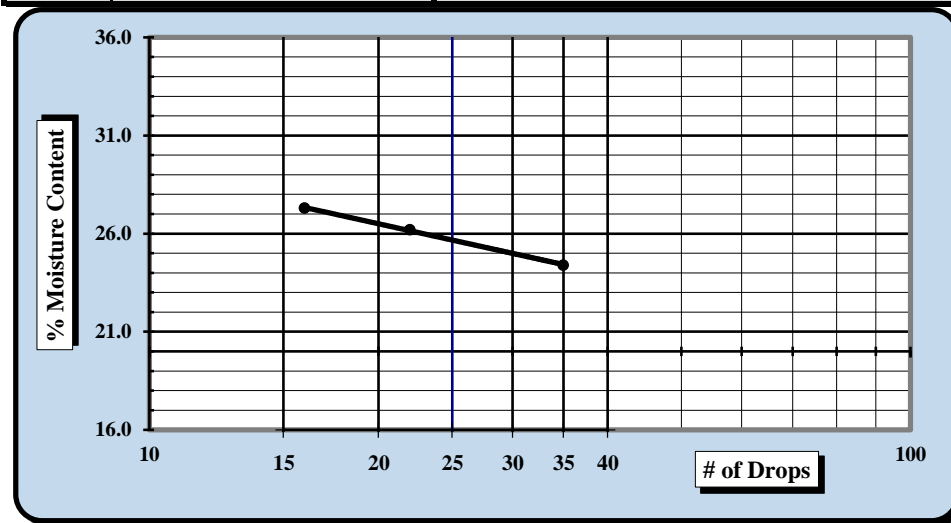
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-37	Sample #:	SS-8
		Sample Date:	3/07/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'

Sample Description: Silty Clayey Sand with Gravel (SC-SM, A-4(0))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	27.76	26.31	27.31				26.85	26.75	
B	Wet Soil Weight + A	45.91	43.32	42.36				32.08	34.16	
C	Dry Soil Weight + A	42.35	39.79	39.13				31.25	33.02	
D	Water Weight (B-C)	3.56	3.53	3.23				0.83	1.14	
E	Dry Soil Weight (C-A)	14.59	13.48	11.82				4.40	6.27	
F	% Moisture (D/E)*100	24.4%	26.2%	27.3%				18.9%	18.2%	
N	# OF DROPS	35	22	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							18.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	26
Plastic Limit	19
Plastic Index	7
Group Symbol	CL-ML
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

4/27/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/27/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

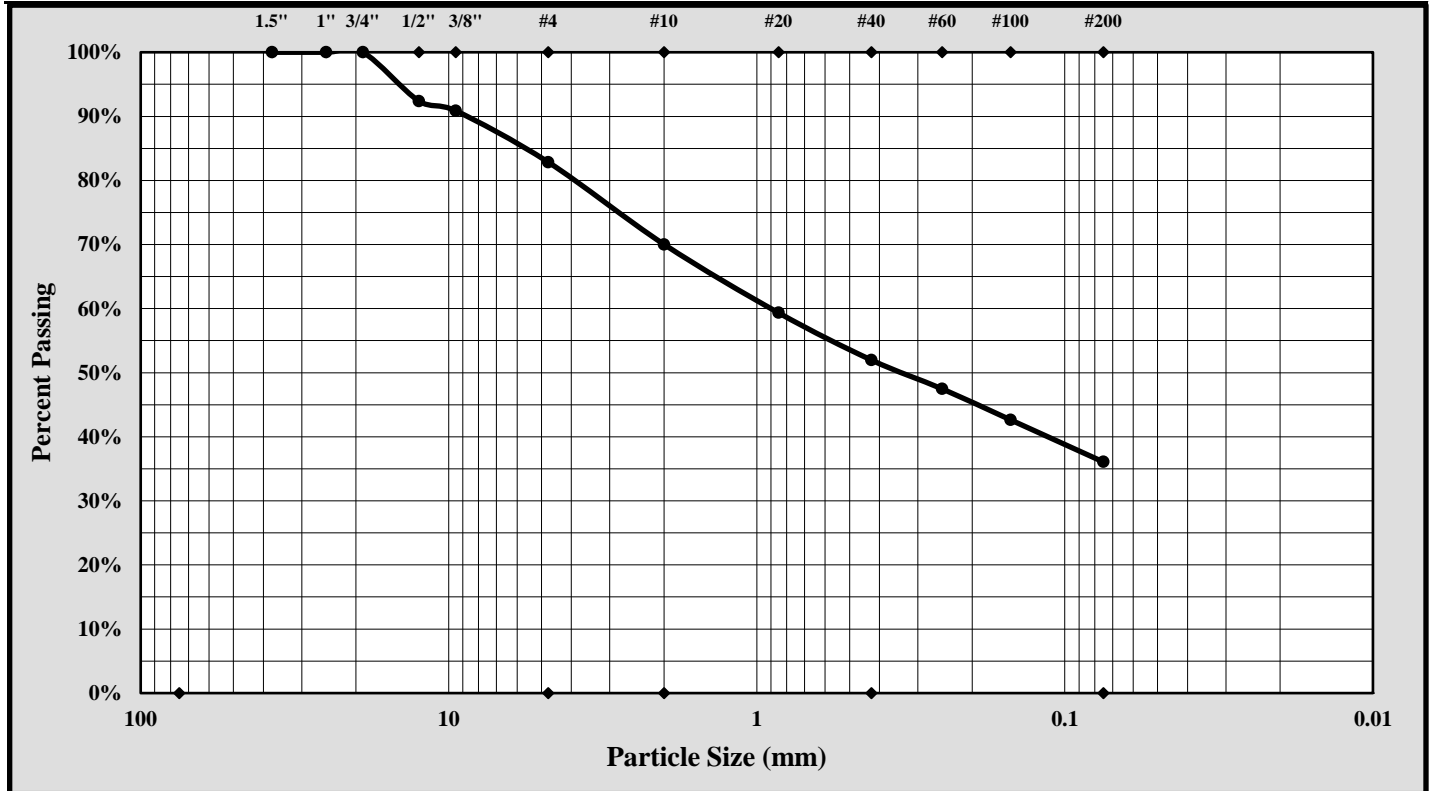
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/15 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-37	Sample #:	SS-8
		Sample Date:	3/07/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Silty Clayey Sand with Gravel (SC-SM, A-4(0))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.0 mm Gravel: 17.2%
 Silt & Clay (% Passing #200): 36.1% Total Sand: 46.8%

Liquid Limit	26	Plastic Limit	19	Plastic Index	7
Coarse Sand:	12.8%	Medium Sand:	18.0%	Fine Sand:	15.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position	<u>4/27/18</u> Date
---	------------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



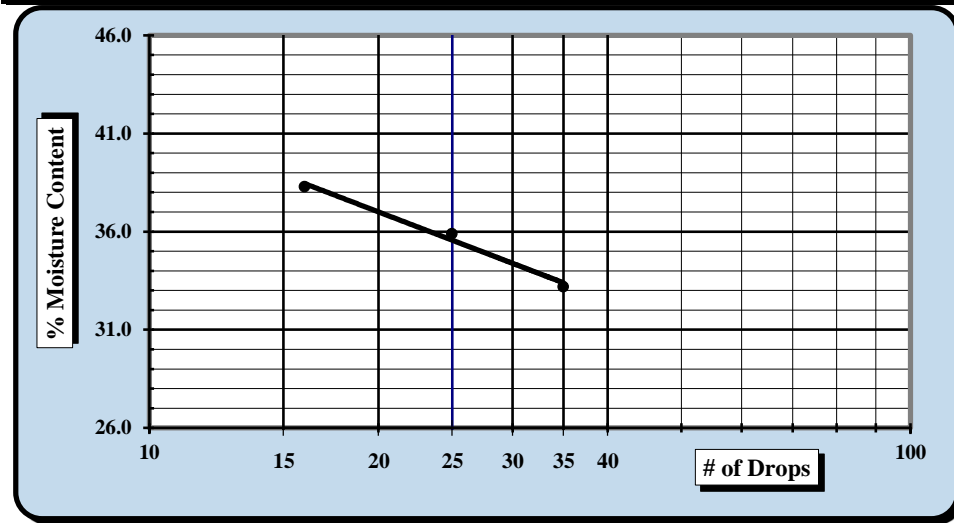
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-38	Sample #:	SS-2
Location:	Bridge Boring	Sample Date:	1/23/18
Type:	Split-spoon	Depth:	2.0' - 4.0'

Sample Description: Clayey Sand (SC, A-6(5))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.69	26.47	26.35				25.93	26.95	
B	Wet Soil Weight + A	42.06	42.55	43.20				32.02	33.68	
C	Dry Soil Weight + A	38.23	38.30	38.53				31.13	32.67	
D	Water Weight (B-C)	3.83	4.25	4.67				0.89	1.01	
E	Dry Soil Weight (C-A)	11.54	11.83	12.18				5.20	5.72	
F	% Moisture (D/E)*100	33.2%	35.9%	38.3%				17.1%	17.7%	
N	# OF DROPS	35	25	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							17.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	36
Plastic Limit	17
Plastic Index	19
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 46.0%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/21/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/21/18</u> Date
---	------------------------	--	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

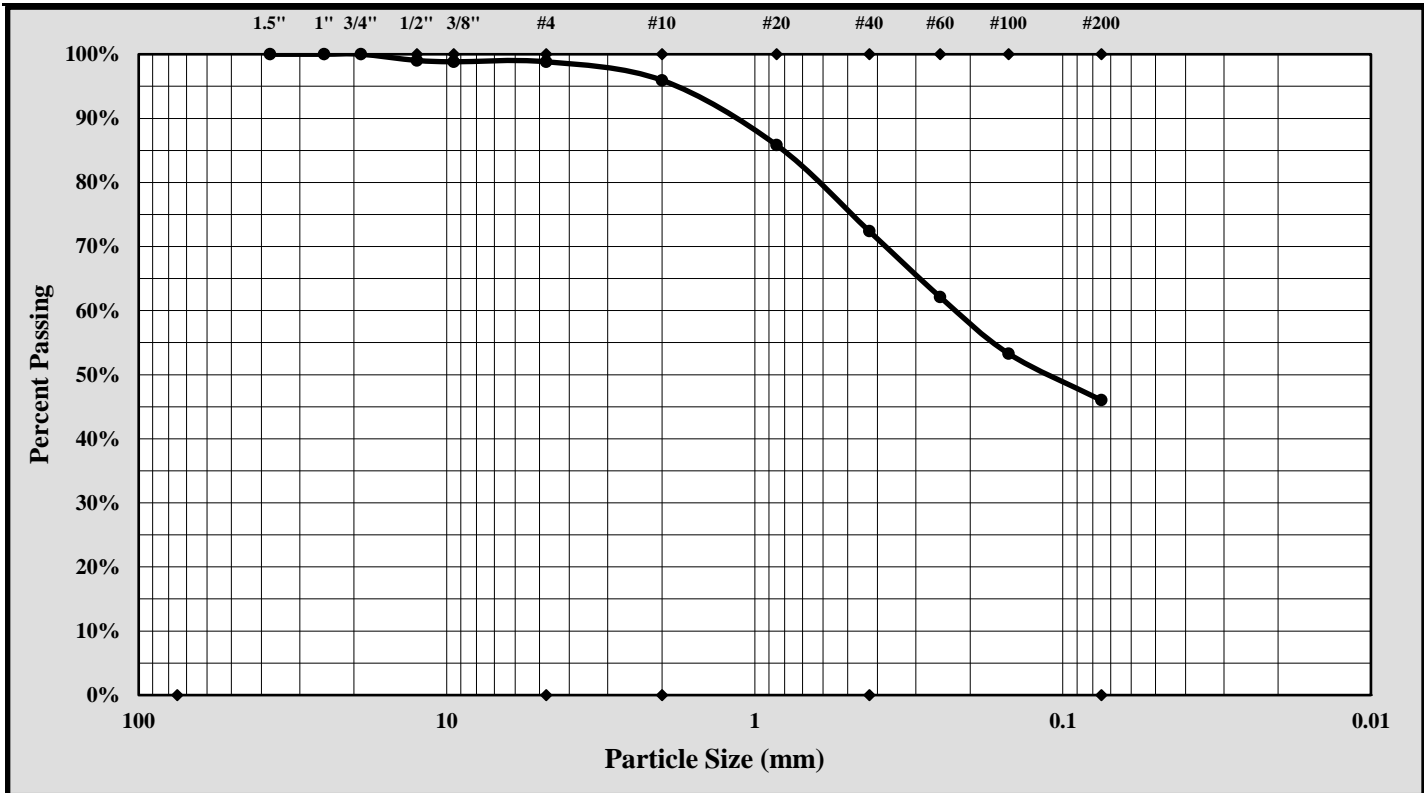


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/06 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-38	Sample #:	SS-2
		Sample Date:	1/23/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Clayey Sand (SC, A-6(5))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 12.5 mm Gravel: 1.2%
 Silt & Clay (% Passing #200): 46.0% Total Sand: 52.8%

Liquid Limit	36	Plastic Limit	17	Plastic Index	19
Coarse Sand:	2.9%	Medium Sand:	23.5%	Fine Sand:	26.4%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/21/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-38	Sample #:	SS-4
Location:	Bridge Boring	Sample Date:	1/23/18
Type:	Split-spoon	Depth:	6.0' - 8.0'

Sample Description: Sandy Fat Clay (CH, A-7-6(16))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	27.77	26.31	27.29				26.84	26.75	
B	Wet Soil Weight + A	42.99	41.70	43.80				33.81	33.93	
C	Dry Soil Weight + A	37.97	36.44	37.85				32.32	32.40	
D	Water Weight (B-C)	5.02	5.26	5.95				1.49	1.53	
E	Dry Soil Weight (C-A)	10.20	10.13	10.56				5.48	5.65	
F	% Moisture (D/E)*100	49.2%	51.9%	56.3%				27.2%	27.1%	
N	# OF DROPS	35	26	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							27.2%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	53	
Plastic Limit	27	
Plastic Index	26	
Group Symbol	CH	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 66.4%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/21/18</u> Date	 Technical Responsibility	<u>3/21/18</u> Date
---	------------------------	------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

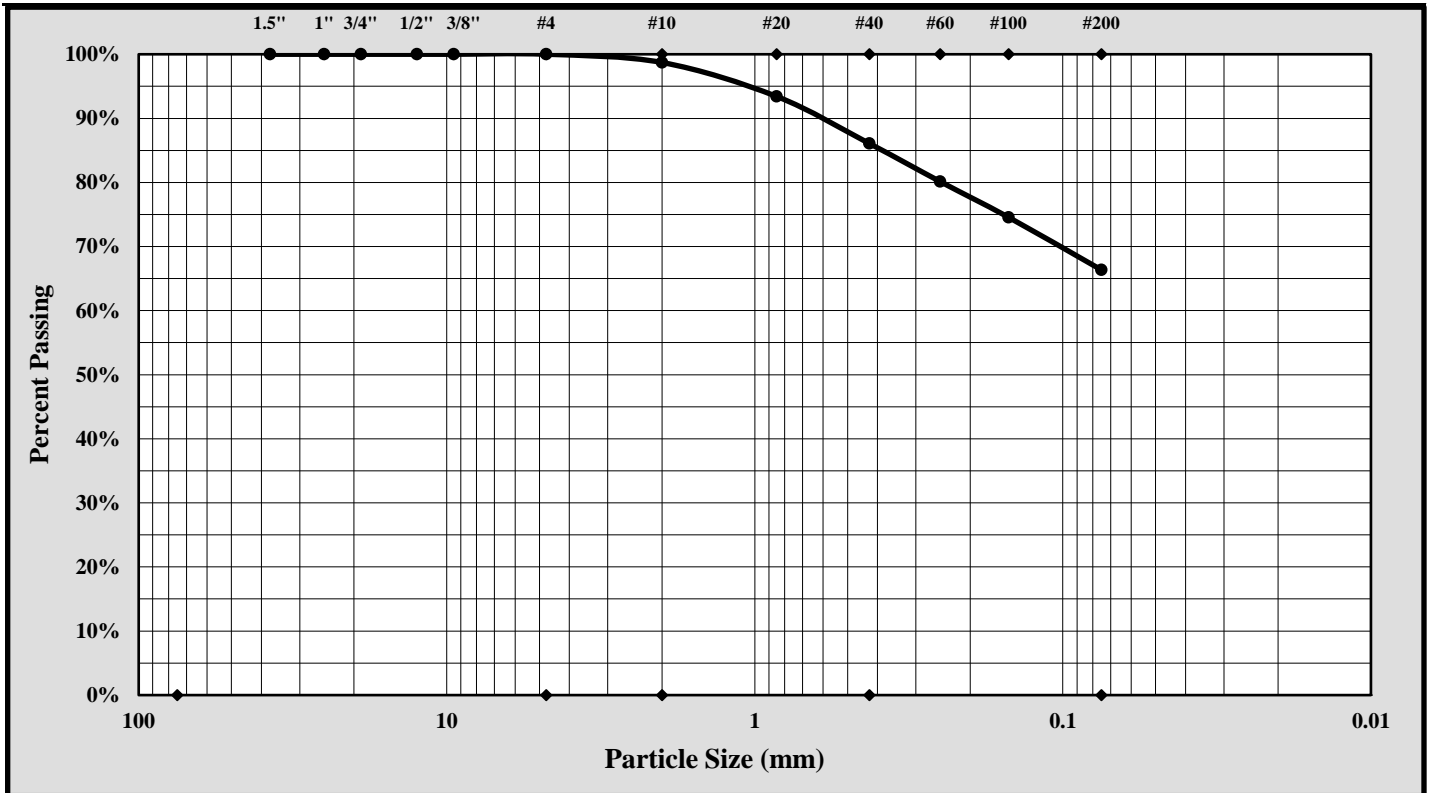


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/06 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-38	Sample #:	SS-4
		Sample Date:	1/23/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Sandy Fat Clay (CH, A-7-6(16))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 66.4% Total Sand: 33.6%

Liquid Limit	53	Plastic Limit	27	Plastic Index	26
Coarse Sand:	1.3%	Medium Sand:	12.6%	Fine Sand:	19.7%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/21/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-38	Sample #:	SS-5
Location:	Bridge Boring	Sample Date:	1/23/18
Type:	Split-spoon	Depth:	8.0' - 10.0'

Sample Description: Clayey Sand (SC, A-7-6(8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.64	26.67	26.78			26.66	27.60	
B	Wet Soil Weight + A	41.26	42.22	43.40			32.68	35.19	
C	Dry Soil Weight + A	36.41	36.90	37.34			31.54	33.76	
D	Water Weight (B-C)	4.85	5.32	6.06			1.14	1.43	
E	Dry Soil Weight (C-A)	9.77	10.23	10.56			4.88	6.16	
F	% Moisture (D/E)*100	49.6%	52.0%	57.4%			23.4%	23.2%	
N	# OF DROPS	35	28	19			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						23.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	54
Plastic Limit	23
Plastic Index	31
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 42.6%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/21/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/21/18</u> Date
---	------------------------	--	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

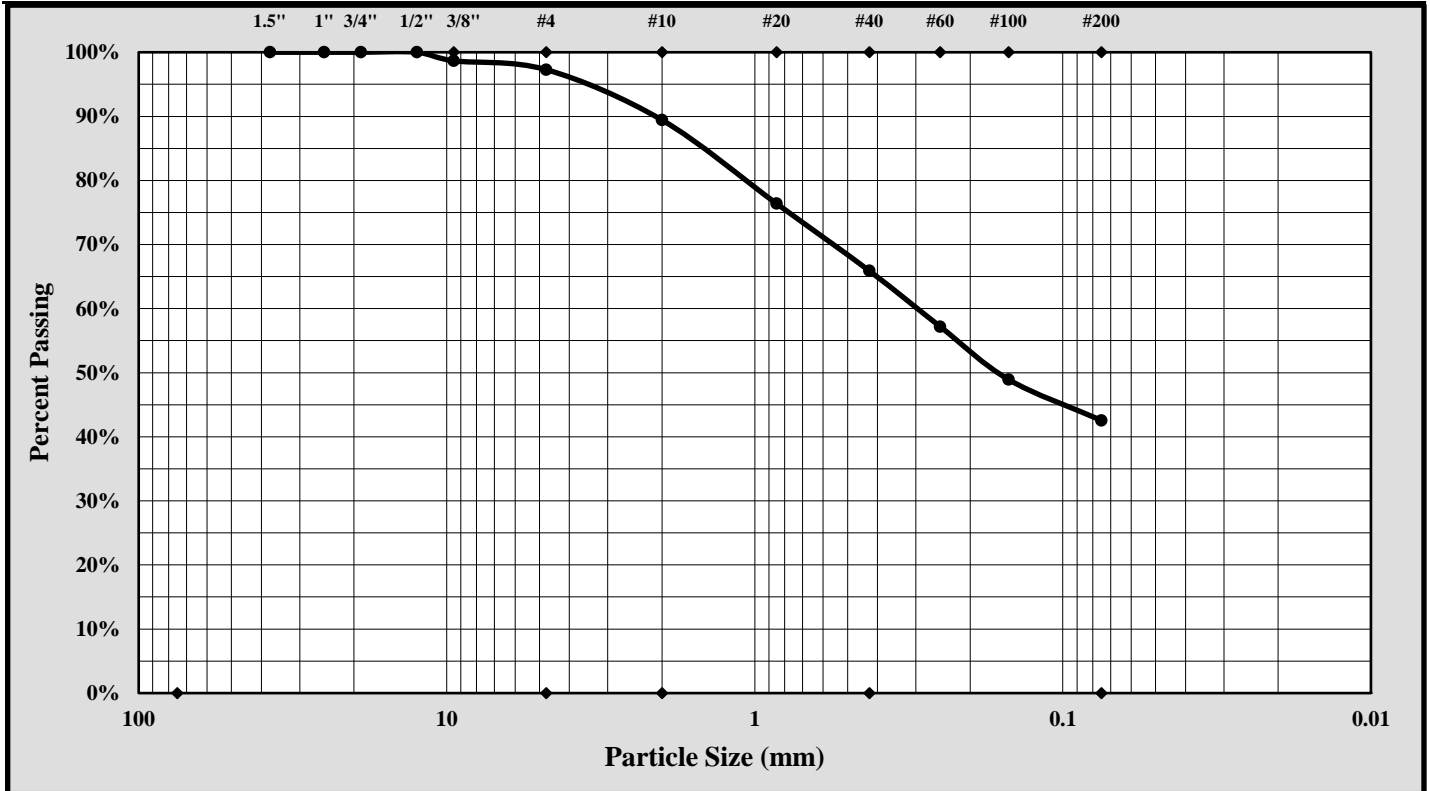
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/06 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-38	Sample #:	SS-5
		Sample Date:	1/23/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'
Sample Description:	Clayey Sand (SC, A-7-6(8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 12.5 mm Gravel: 2.7%
 Silt & Clay (% Passing #200): 42.6% Total Sand: 54.7%

Liquid Limit 54 Plastic Limit 23 Plastic Index 31

Coarse Sand: 7.9% Medium Sand: 23.5% Fine Sand: 23.3%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Brian Vaughan, P.E.

Technical Responsibility

Signature

Group Leader

Position

3/21/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



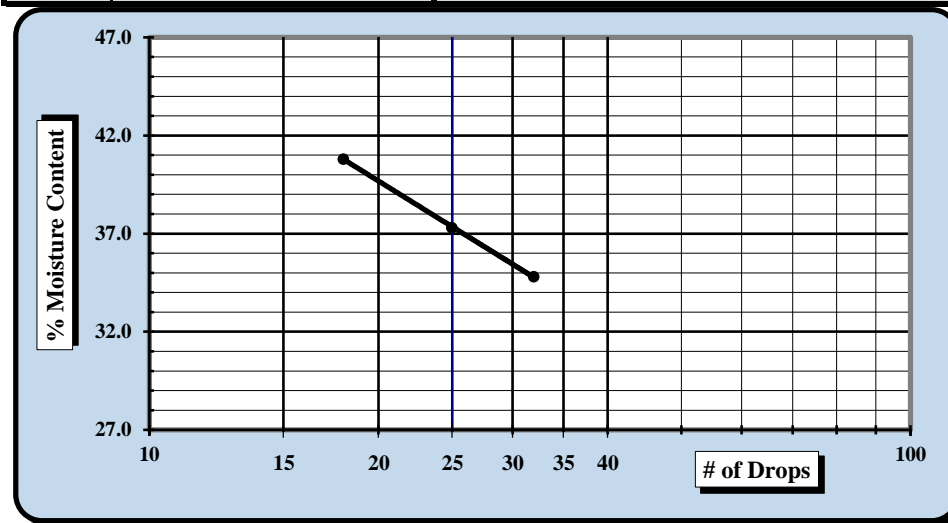
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-39	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	4/09/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Clayey Sand (SC, A-6(5))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		46	47	48			49	50	
A	Tare Weight	27.57	25.82	26.36			28.63	28.88	
B	Wet Soil Weight + A	41.17	43.79	41.67			36.67	36.62	
C	Dry Soil Weight + A	37.66	38.91	37.23			35.34	35.32	
D	Water Weight (B-C)	3.51	4.88	4.44			1.33	1.30	
E	Dry Soil Weight (C-A)	10.09	13.09	10.87			6.71	6.44	
F	% Moisture (D/E)*100	34.8%	37.3%	40.8%			19.8%	20.2%	
N	# OF DROPS	32	25	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						20.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	20
Plastic Index	17
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

5/11/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

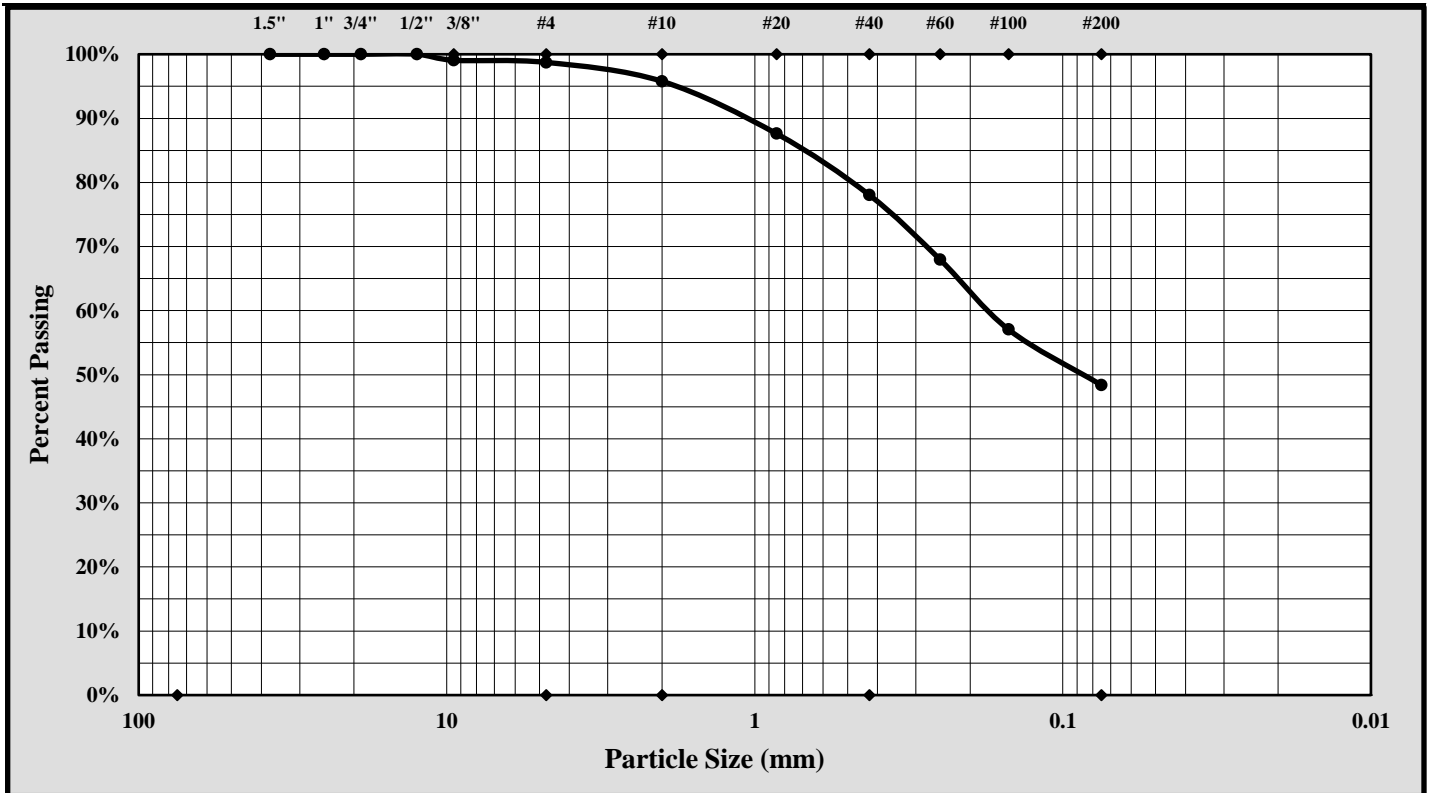


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/08 - 5/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-39	Sample #:	SS-1
		Sample Date:	4/09/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Clayey Sand (SC, A-6(5))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#20)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 9.50 mm Gravel: 1.3%
 Silt & Clay (% Passing #200): 48.4% Total Sand: 50.3%

Liquid Limit	37	Plastic Limit	20	Plastic Index	17
Coarse Sand:	3.0%	Medium Sand:	17.7%	Fine Sand:	29.7%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

5/11/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



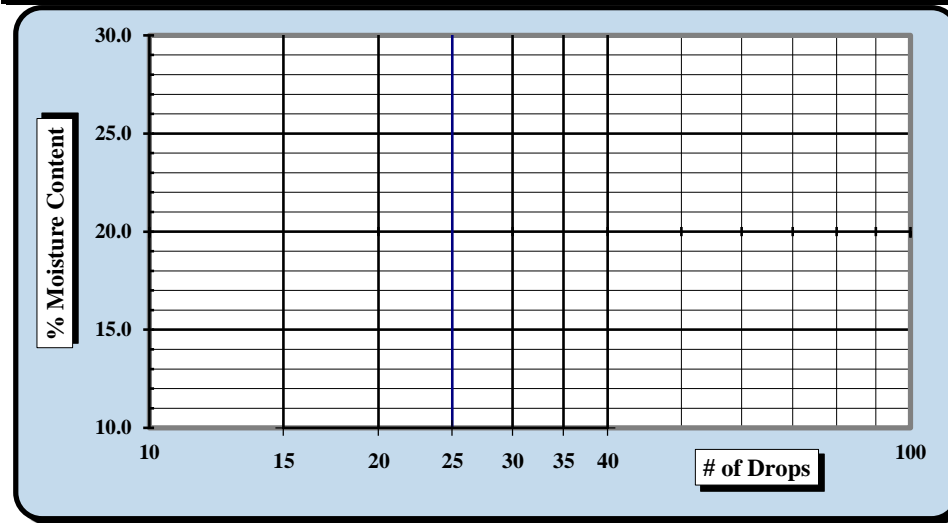
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-39	Sample #:	SS-2
		Sample Date:	4/09/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Silty Sand (SM, A-2-4)		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight						
B	Wet Soil Weight + A						
C	Dry Soil Weight + A						
D	Water Weight (B-C)						
E	Dry Soil Weight (C-A)						
F	% Moisture (D/E)*100						
N	# OF DROPS					Moisture Contents determined by ASTM D 2216	
LL	LL = F * FACTOR						
Ave.	Average						



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit

Plastic Limit

Plastic Index

Group Symbol

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

5/11/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

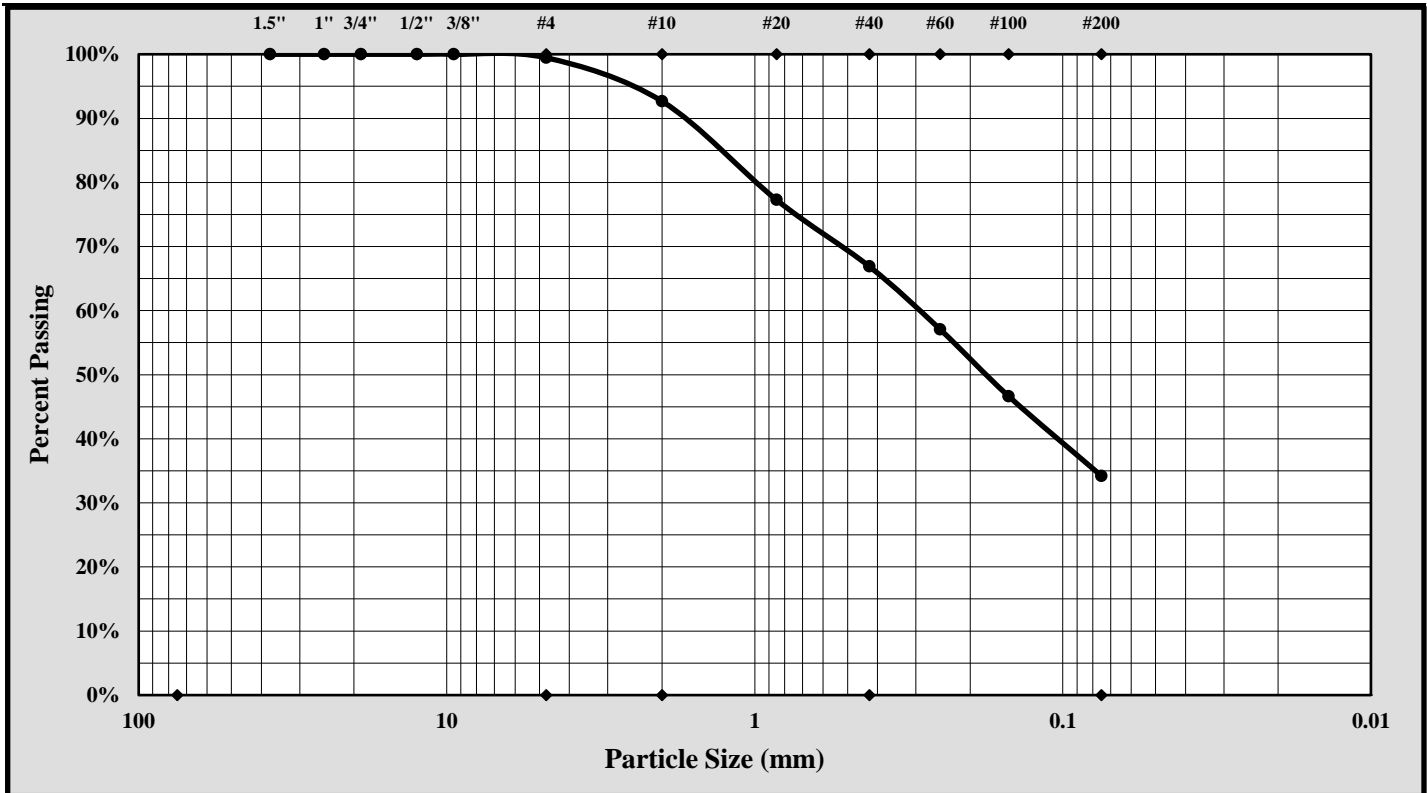
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/08 - 5/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-39	Sample #:	SS-2
		Sample Date:	4/09/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Silty Sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.5%
 Silt & Clay (% Passing #200): 34.2% Total Sand: 65.2%

Liquid Limit	---	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	6.8%	Medium Sand:	25.8%	Fine Sand:	32.7%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

<u>Matthew F. Cooke, P.G.</u>	<u>Project Manager</u>	<u>5/11/18</u>
<i>Technical Responsibility</i>	<i>Position</i>	<i>Date</i>

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

MATERIAL FINER THAN THE #200 SIEVE



ASTM D1140

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #: 1461-16-047.2B Report Date: 5/11/18
 Project Name: Carolina Crossroads Project Test Date(s): 5/01 - 5/03/18
 Client Name: HDR Engineering, Inc.
 Client Address: 4400 Leeds Ave., North Charleston, South Carolina
 Sampled by: S&ME Sample Dates: 4/09/18
 Sampling Method: Split-spoon

Method; A B Soaked Soak Time 16 hrs.

Boring #	Sample #	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Tare Wt. + Dry Wt. after Wash	% Passing #200
		ft.		grams	grams	grams	grams	%
B-39	SS-3	6.0 - 8.0	D-15	0.00	N/A	175.79	83.09	52.7%

Balance ID.: 13942 Calibration Date: 8/18/17 #200 Sieve: 23239 Calibration Date: 2/19/18

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

Benjamin Kovaleski <i>Technician Name</i>	 <i>Signature</i>	NICET Lab Level III/117226 <i>Certification Type/No.</i>	5/11/18 <i>Date</i>
Matthew F. Cooke, P.G. <i>Technical Responsibility</i>	Project Manager <i>Position</i>		5/11/18 <i>Date</i>

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

MOISTURE, ASH, AND ORGANIC MATTER



ASTM D-2974

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/05/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-39	Sample #:	SS-3
		Sample Date:	4/09/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Sandy Lean Clay (CL)		
Equipment:	Balance: 0.01 g. Readability, 500g. Minimum Capacity		
Balance:	S&ME ID #: 13942	Cal. Date: 8/19/17	Due: 8/19/18

Method A: Moisture Content Determination

Required Oven Temperature: 105 ± 5 °C

Oven Temperature: 105 °C		Tare #	
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	
a	Mass of As-Received Specimen + Tare Wt.	grams	
b	Mass of Oven Dry Specimen + Tare Wt.	grams	
w	Water Weight	(a-b)	
A	Mass of As-Received Specimen	(a-t)	
B	Mass of Oven Dry Specimen	(b-t)	
% Moisture Content as a % of As Received or Total Mass		(w/A)*100	
% Moisture Content as a % of Oven-dried Mass		(w/B)*100	

Oven	S&ME ID #:	Cal. Date:	Due:
------	------------	------------	------

Method C (440 °C) or D (750 °C): Ash Content and Organic Matter Determination

Muffle Furnace: 440 °C		Tare #	B
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	56.80
b	Mass of Oven Dry Specimen + Tare Wt.	grams	107.11
c	Ash Weight + Tare Wt.	grams	106.44
C	Ash Weight	c-t	49.64
B	Mass of Oven Dry Specimen	(b-t)	50.31
D	% Ash Content	(C/B)*100	98.7%
	% Organic Matter	100-D	1.3%

Muffle Furnace:	S&ME ID #: 23123	Cal. Date: N/A	Due: N/A
-----------------	------------------	----------------	----------

Notes / Deviations / References: ASTM D2974: Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

Benjamin Kovalski
 Technician Name

Benjamin J. Kovalski
 Signature

NICET Level III/117226
 Level/Certification

5/11/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/11/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



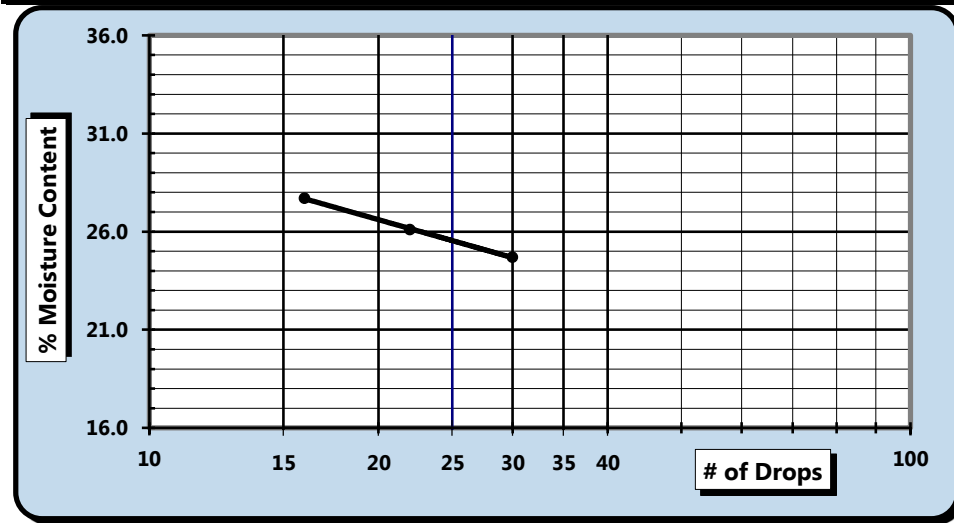
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	3/16/18
Project Name:	Carolina Crossroads Project	Test Date:	3/15/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-3
Location:	Bridge Boring	Sample Date:	1/29/18
Type:	Split-spoon	Depth:	4.8' - 6.8'

Sample Description: Clayey Sand (SC, A-4(0))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		P-7	P-8	P-9			25	26	
A	Tare Weight	15.79	15.66	15.94			11.67	11.53	
B	Wet Soil Weight + A	39.47	39.86	39.63			19.47	19.18	
C	Dry Soil Weight + A	34.78	34.85	34.49			18.36	18.08	
D	Water Weight (B-C)	4.69	5.01	5.14			1.11	1.10	
E	Dry Soil Weight (C-A)	18.99	19.19	18.55			6.69	6.55	
F	% Moisture (D/E)*100	24.7%	26.1%	27.7%			16.6%	16.8%	
N	# OF DROPS	30	22	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						16.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **26**

Plastic Limit **17**

Plastic Index **9**

Group Symbol **CL**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Matt Jacobs</u> Technician Name	<u>NICET 118202</u> Certification#	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>3/16/18</u> Date
---------------------------------------	---------------------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

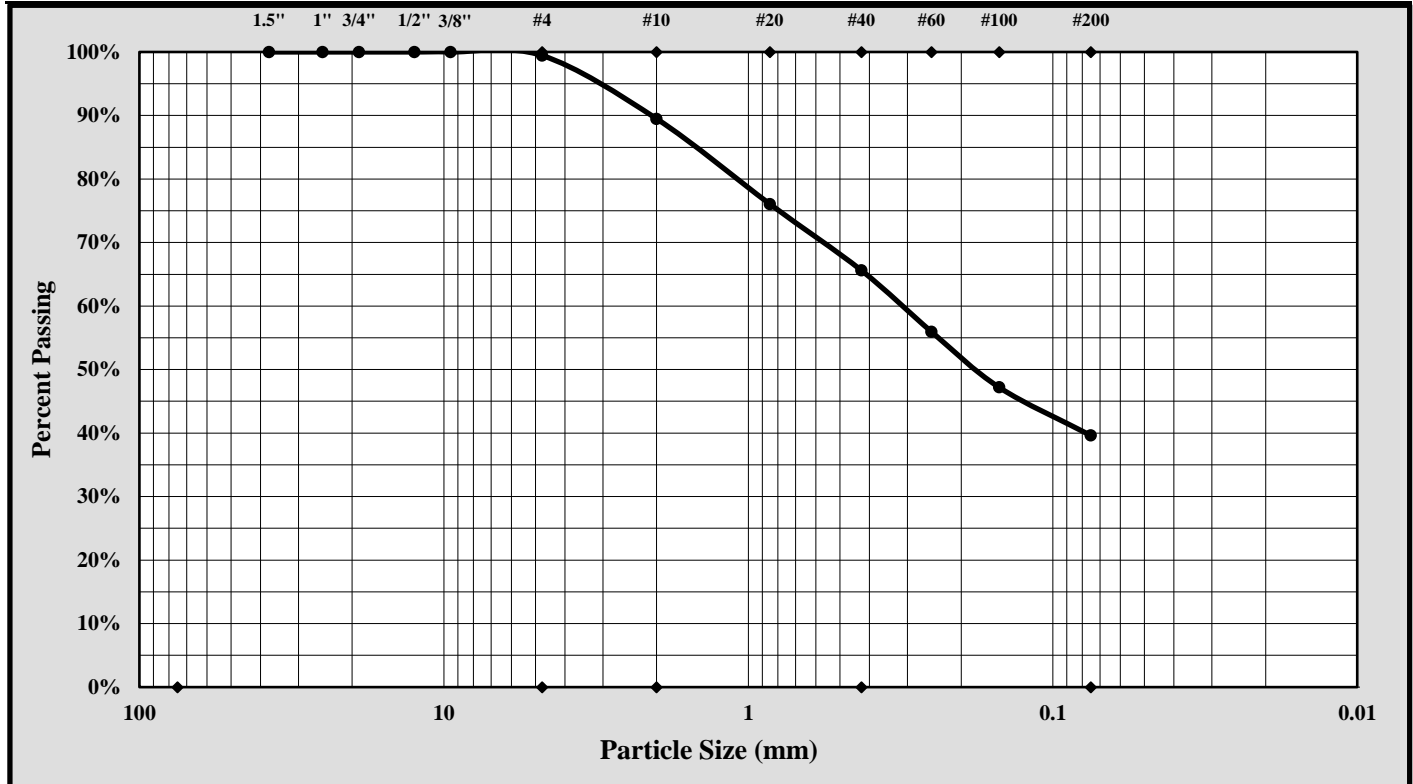


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	3/16/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/26/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-3
		Sample Date:	1/29/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	4.8' - 6.8'
Sample Description:	Clayey Sand (SC, A-4(0))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	4.75 mm	Gravel:	0.6%
Silt & Clay (% Passing #200):	39.6%	Total Sand:	59.8%

Liquid Limit	26	Plastic Limit	17	Plastic Index	9
Coarse Sand:	10.0%	Medium Sand:	23.9%	Fine Sand:	26.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

3/16/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



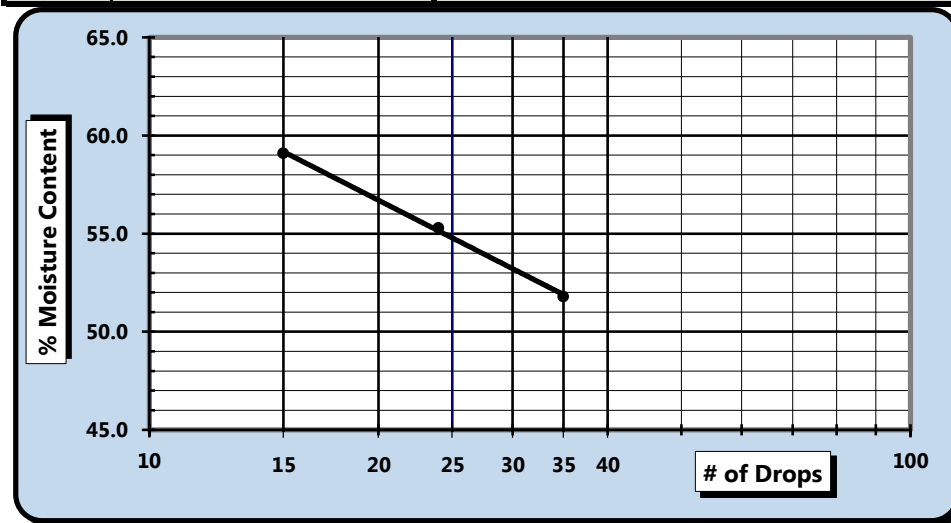
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	5/9/18
Project Name:	Carolina Crossroads Project	Test Date:	5/8/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-5
Location:	Bridge Boring	Sample Date:	1/29/18
Type:	Split-spoon	Depth:	8.8' - 10.8'

Sample Description: Sandy Fat Clay (CH, A-7-6(15))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Q-7	Q-8	Q-9			27	28	
A	Tare Weight	16.90	16.92	16.79			11.48	11.47	
B	Wet Soil Weight + A	36.80	35.51	35.88			18.57	18.73	
C	Dry Soil Weight + A	30.01	28.89	28.79			17.16	17.30	
D	Water Weight (B-C)	6.79	6.62	7.09			1.41	1.43	
E	Dry Soil Weight (C-A)	13.11	11.97	12.00			5.68	5.83	
F	% Moisture (D/E)*100	51.8%	55.3%	59.1%			24.8%	24.5%	
N	# OF DROPS	35	24	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	55
Plastic Limit	25
Plastic Index	30
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/9/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

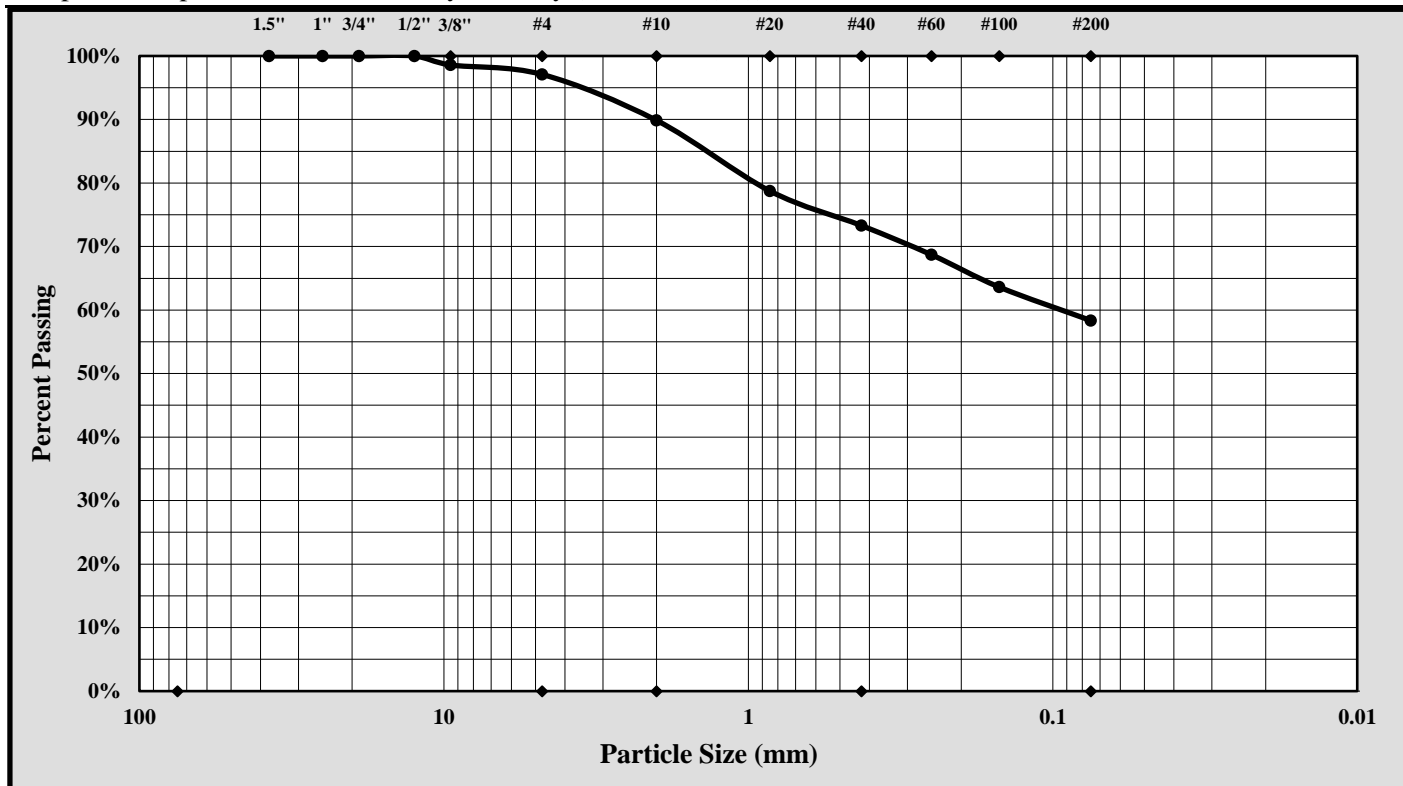


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	5/9/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/26/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-5
		Sample Date:	1/29/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	8.8' - 10.8'
Sample Description:	Sandy Fat Clay (CH, A-7-6(15))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 12.50 mm Gravel: 2.9%
 Silt & Clay (% Passing #200): 58.3% Total Sand: 38.7%

Liquid Limit	55	Plastic Limit	25	Plastic Index	30
Coarse Sand:	7.2%	Medium Sand:	16.5%	Fine Sand:	14.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/9/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



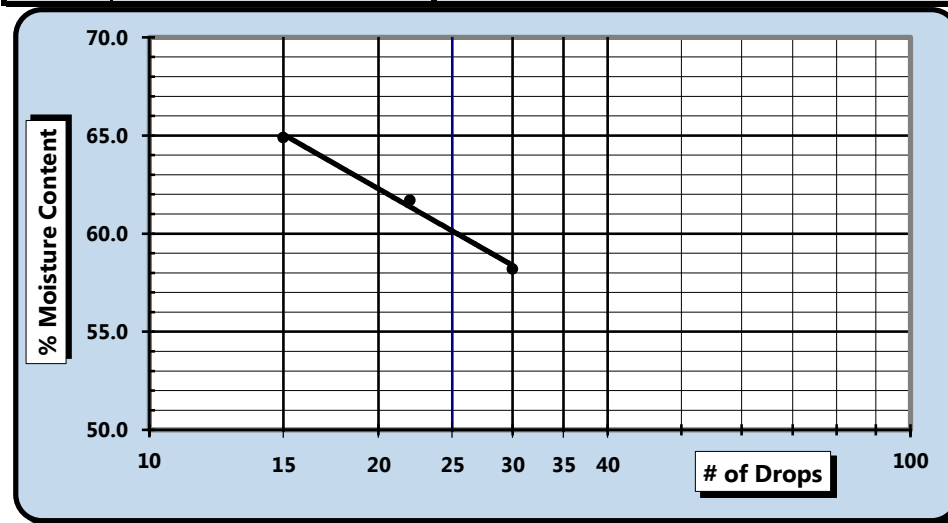
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	5/9/18
Project Name:	Carolina Crossroads Project	Test Date:	5/8/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-7
Location:	Bridge Boring	Sample Date:	1/29/18
Type:	Split-spoon	Depth:	18.5' - 20.0'

Sample Description: Elastic Silt (MH, A-7-5(32))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Z-7	Z-8	Z-9			29	31	
A	Tare Weight	16.74	15.72	16.71			11.59	11.54	
B	Wet Soil Weight + A	36.24	34.45	35.99			18.88	18.61	
C	Dry Soil Weight + A	29.07	27.30	28.40			17.07	16.87	
D	Water Weight (B-C)	7.17	7.15	7.59			1.81	1.74	
E	Dry Soil Weight (C-A)	12.33	11.58	11.69			5.48	5.33	
F	% Moisture (D/E)*100	58.2%	61.7%	64.9%			33.0%	32.6%	
N	# OF DROPS	30	22	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						32.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **60**

Plastic Limit **33**

Plastic Index **27**

Group Symbol **MH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/9/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

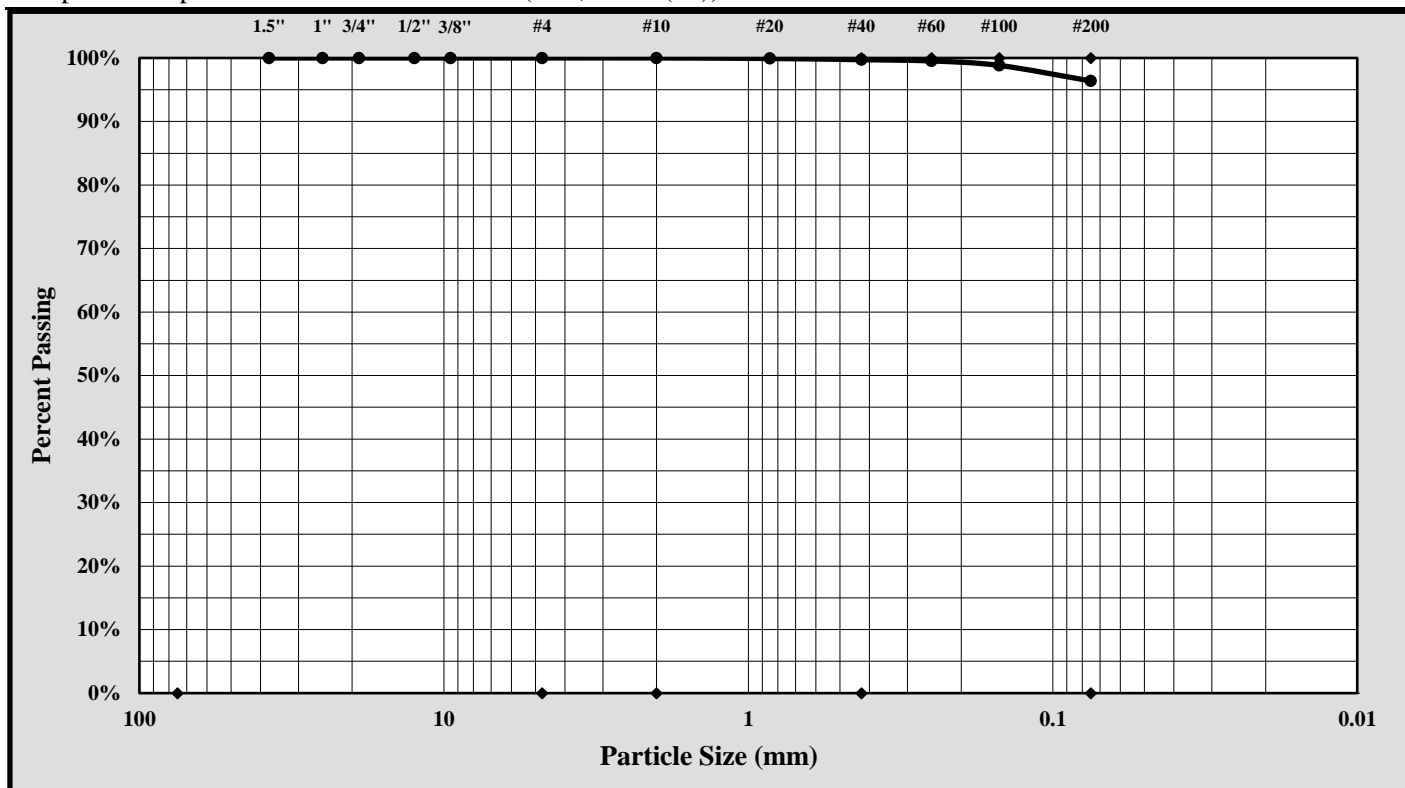
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	5/9/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/26/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-7
		Sample Date:	1/29/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Elastic Silt (MH, A-7-5(32))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 0.85 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 96.4% Total Sand: 3.6%

Liquid Limit	60	Plastic Limit	33	Plastic Index	27
Coarse Sand:	0.0%	Medium Sand:	0.3%	Fine Sand:	3.3%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/9/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



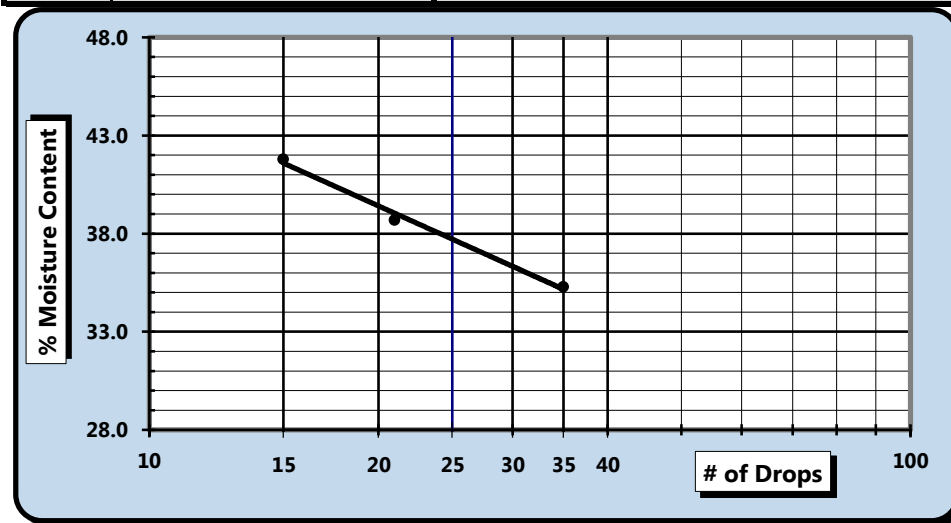
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-8
Location:	Bridge borings	Sample Date:	1/29/18
		Depth:	23.5 - 25.0'

Sample Description: Sandy Lean Clay (CL, A-6(8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		P-1	P-2	P-3			1	2		
A	Tare Weight	16.36	15.25	16.53				12.11	12.16	
B	Wet Soil Weight + A	34.56	36.26	35.81				19.91	19.68	
C	Dry Soil Weight + A	29.81	30.40	30.13				18.62	18.42	
D	Water Weight (B-C)	4.75	5.86	5.68				1.29	1.26	
E	Dry Soil Weight (C-A)	13.45	15.15	13.60				6.51	6.26	
F	% Moisture (D/E)*100	35.3%	38.7%	41.8%				19.8%	20.1%	
N	# OF DROPS	35	21	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							20.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	38
Plastic Limit	20
Plastic Index	18
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

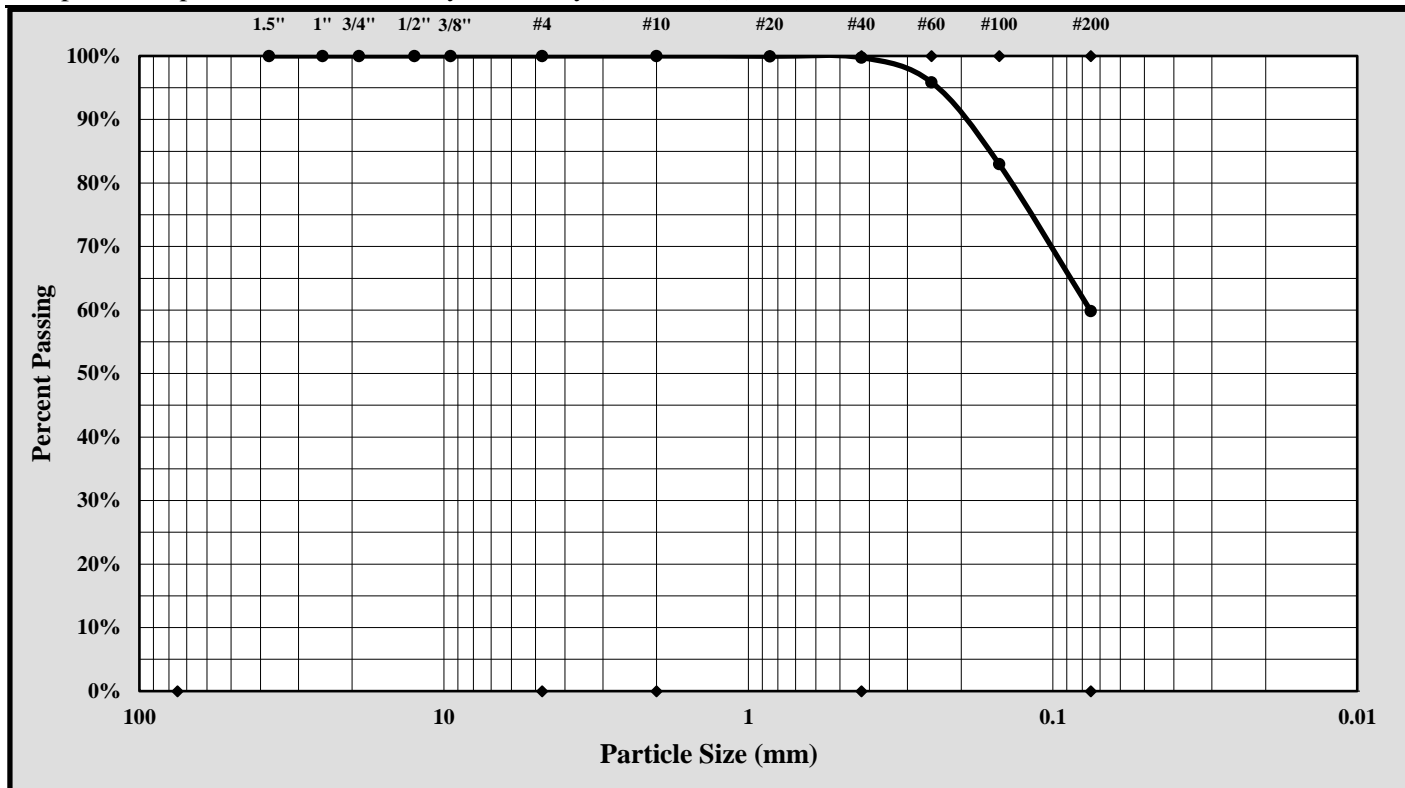


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-40	Sample #:	SS-8
		Sample Date:	1/29/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'
Sample Description:	Sandy Lean Clay (CL, A-6(8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 0.85 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 59.8% Total Sand: 40.2%

Liquid Limit	38	Plastic Limit	20	Plastic Index	18
Coarse Sand:	0.0%	Medium Sand:	0.3%	Fine Sand:	39.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/11/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



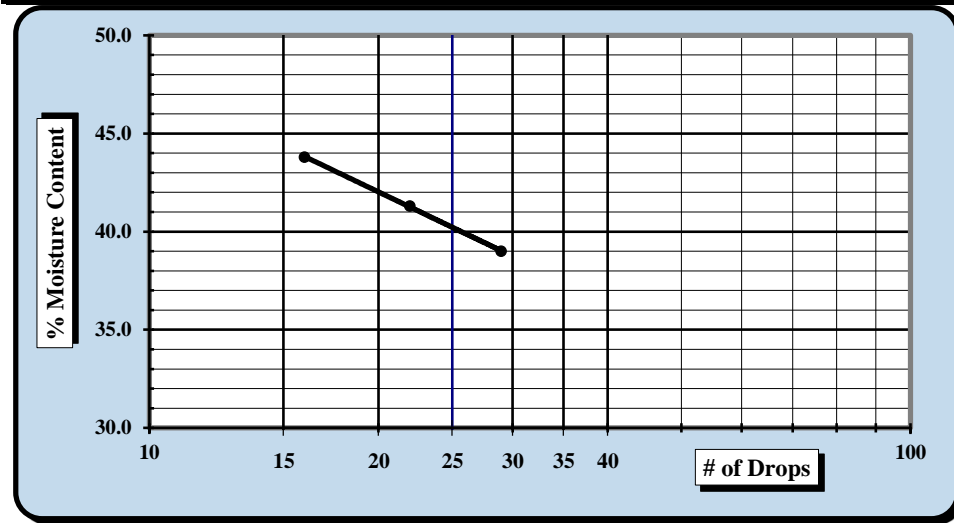
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-2
Location:	Bridge Boring	Sample Date:	1/21/18
Type:	Split-spoon	Depth:	2.8' - 4.8'

Sample Description: Lean Clay with Sand (CL, A-6(13))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		16	17	18			19	20		
A	Tare Weight	26.54	26.62	26.78				26.68	26.83	
B	Wet Soil Weight + A	41.94	44.45	45.19				34.21	34.40	
C	Dry Soil Weight + A	37.62	39.24	39.58				32.87	33.05	
D	Water Weight (B-C)	4.32	5.21	5.61				1.34	1.35	
E	Dry Soil Weight (C-A)	11.08	12.62	12.80				6.19	6.22	
F	% Moisture (D/E)*100	39.0%	41.3%	43.8%				21.6%	21.7%	
N	# OF DROPS	29	22	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							21.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	40
Plastic Limit	22
Plastic Index	18
Group Symbol	CL

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 74.5%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski	3/21/18	<i>Brian Vaughan</i>	3/21/18
Technician Name	Date	Technical Responsibility	Date

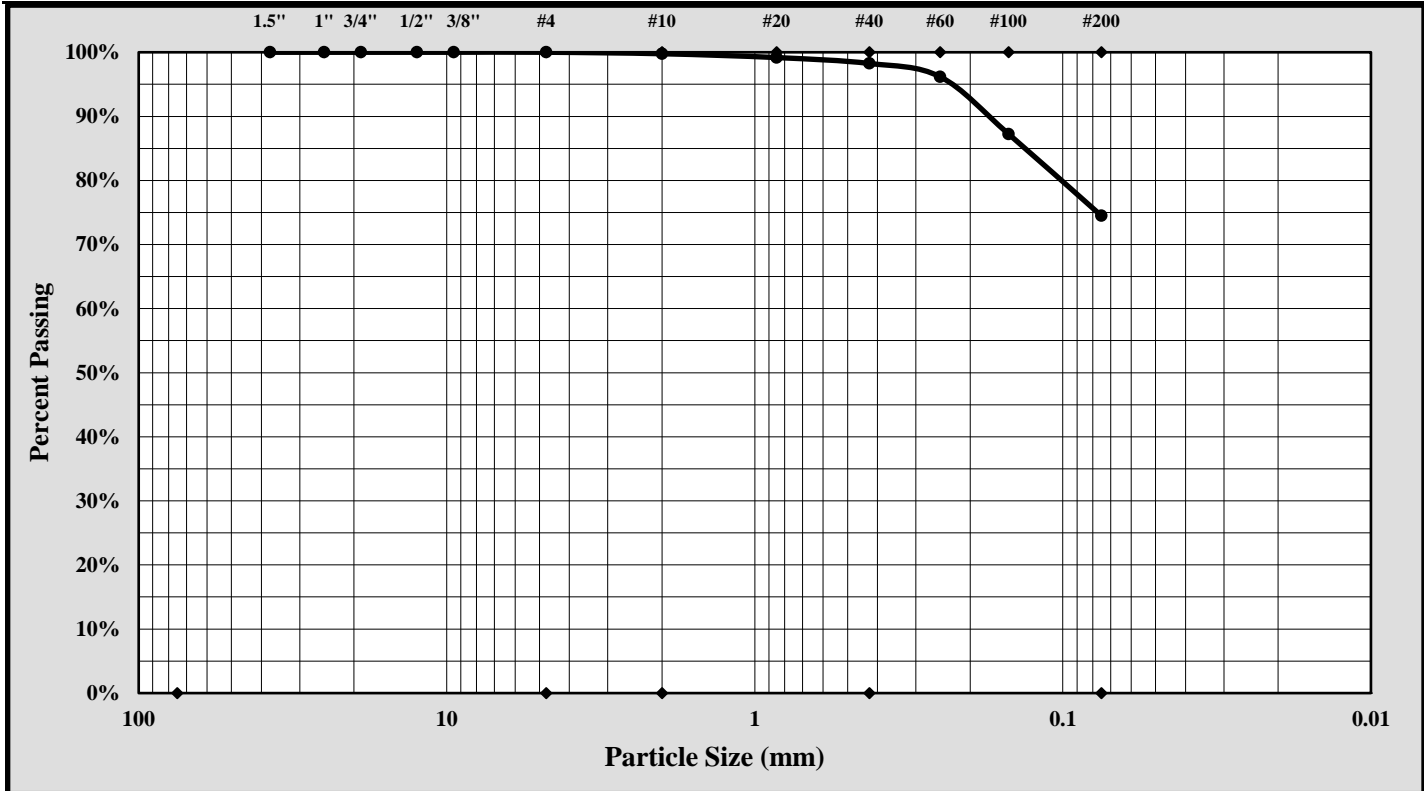
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/06 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-2
		Sample Date:	1/21/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	2.8' - 4.8'
Sample Description:	Lean Clay with Sand (CL, A-6(13))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	.85 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	74.5%	Total Sand:	25.5%

Liquid Limit	40	Plastic Limit	22	Plastic Index	18
Coarse Sand:	0.2%	Medium Sand:	1.5%	Fine Sand:	23.8%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

3/21/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



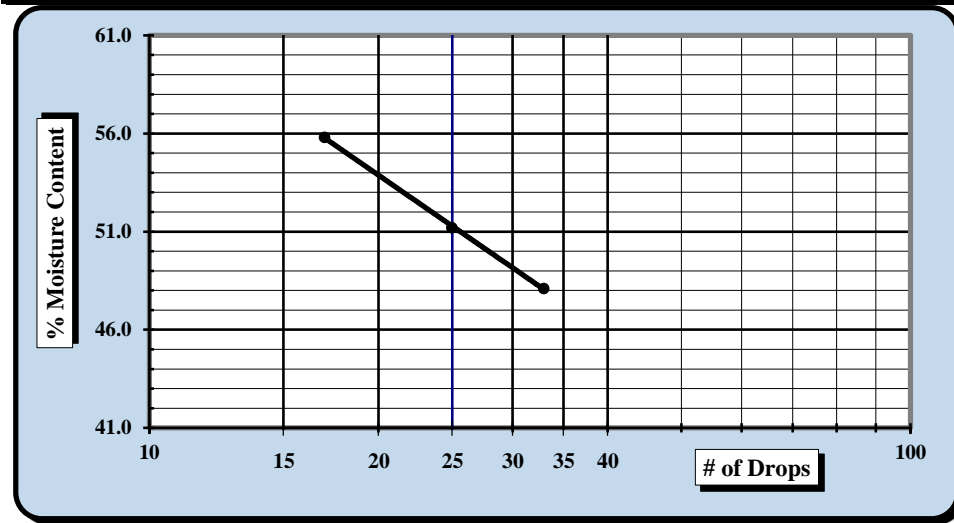
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/17/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-4
Location:	Bridge Boring	Sample Date:	1/21/18
	Type: Split-spoon	Depth:	6.8' - 8.8'

Sample Description: Sandy Fat Clay (CH, A-7-6(10))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		21	22	23			24	25	
A	Tare Weight	28.09	25.70	27.21			25.99	26.82	
B	Wet Soil Weight + A	43.18	42.36	43.34			33.49	33.88	
C	Dry Soil Weight + A	38.28	36.72	37.56			31.99	32.47	
D	Water Weight (B-C)	4.90	5.64	5.78			1.50	1.41	
E	Dry Soil Weight (C-A)	10.19	11.02	10.35			6.00	5.65	
F	% Moisture (D/E)*100	48.1%	51.2%	55.8%			25.0%	25.0%	
N	# OF DROPS	33	25	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						25.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	51
Plastic Limit	25
Plastic Index	26
Group Symbol	CH

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 52.1%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/21/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/21/18</u> Date
---	------------------------	--	------------------------

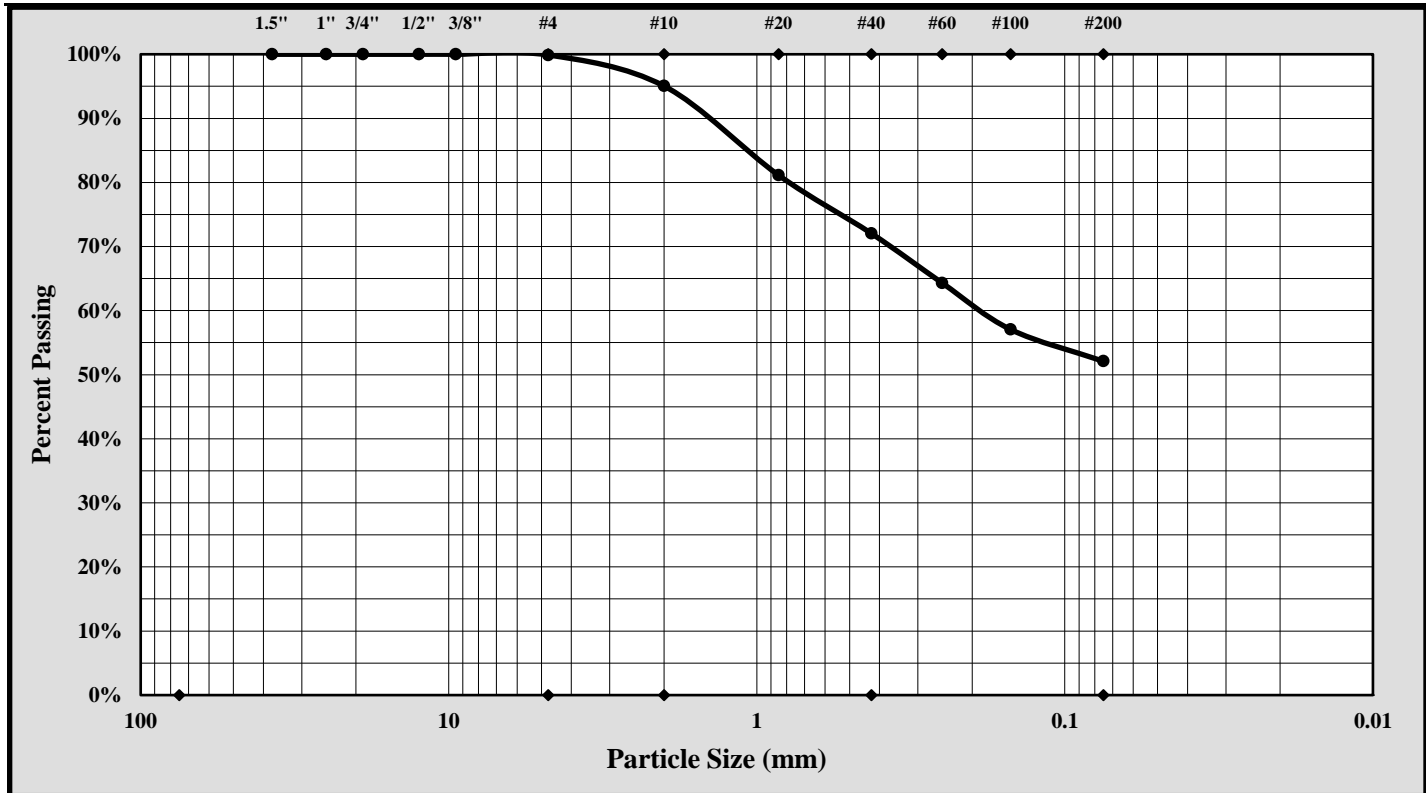
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/06 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-4
		Sample Date:	1/21/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	6.8' - 8.8'
Sample Description:	Sandy Fat Clay (CH, A-7-6(10))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.1%
 Silt & Clay (% Passing #200): 52.1% Total Sand: 47.8%

Liquid Limit	51	Plastic Limit	25	Plastic Index	26
Coarse Sand:	4.8%	Medium Sand:	23.0%	Fine Sand:	20.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/21/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



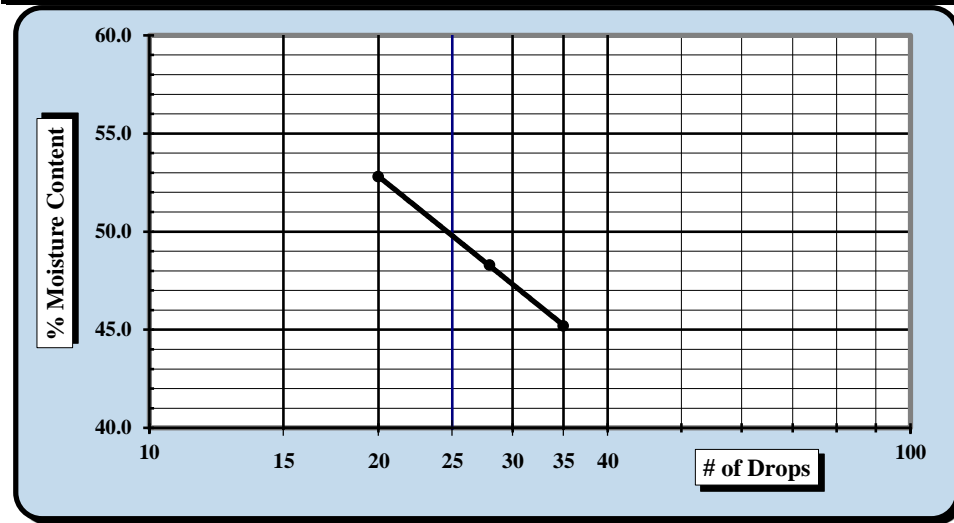
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/17/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-7
Location:	Bridge Boring	Sample Date:	1/21/18
Type:	Split-spoon	Depth:	18.5' - 20.0'

Sample Description: Fat Clay with Sand (CH, A-7-6(24))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		26	27	28			29	30		
A	Tare Weight	27.32	27.02	26.83				27.02	27.39	
B	Wet Soil Weight + A	46.02	44.91	42.57				33.99	35.70	
C	Dry Soil Weight + A	40.20	39.08	37.13				32.77	34.24	
D	Water Weight (B-C)	5.82	5.83	5.44				1.22	1.46	
E	Dry Soil Weight (C-A)	12.88	12.06	10.30				5.75	6.85	
F	% Moisture (D/E)*100	45.2%	48.3%	52.8%				21.2%	21.3%	
N	# OF DROPS	35	28	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							21.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	50
Plastic Limit	21
Plastic Index	29
Group Symbol	CH

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 80.1%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/21/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/21/18</u> Date
---	------------------------	--	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

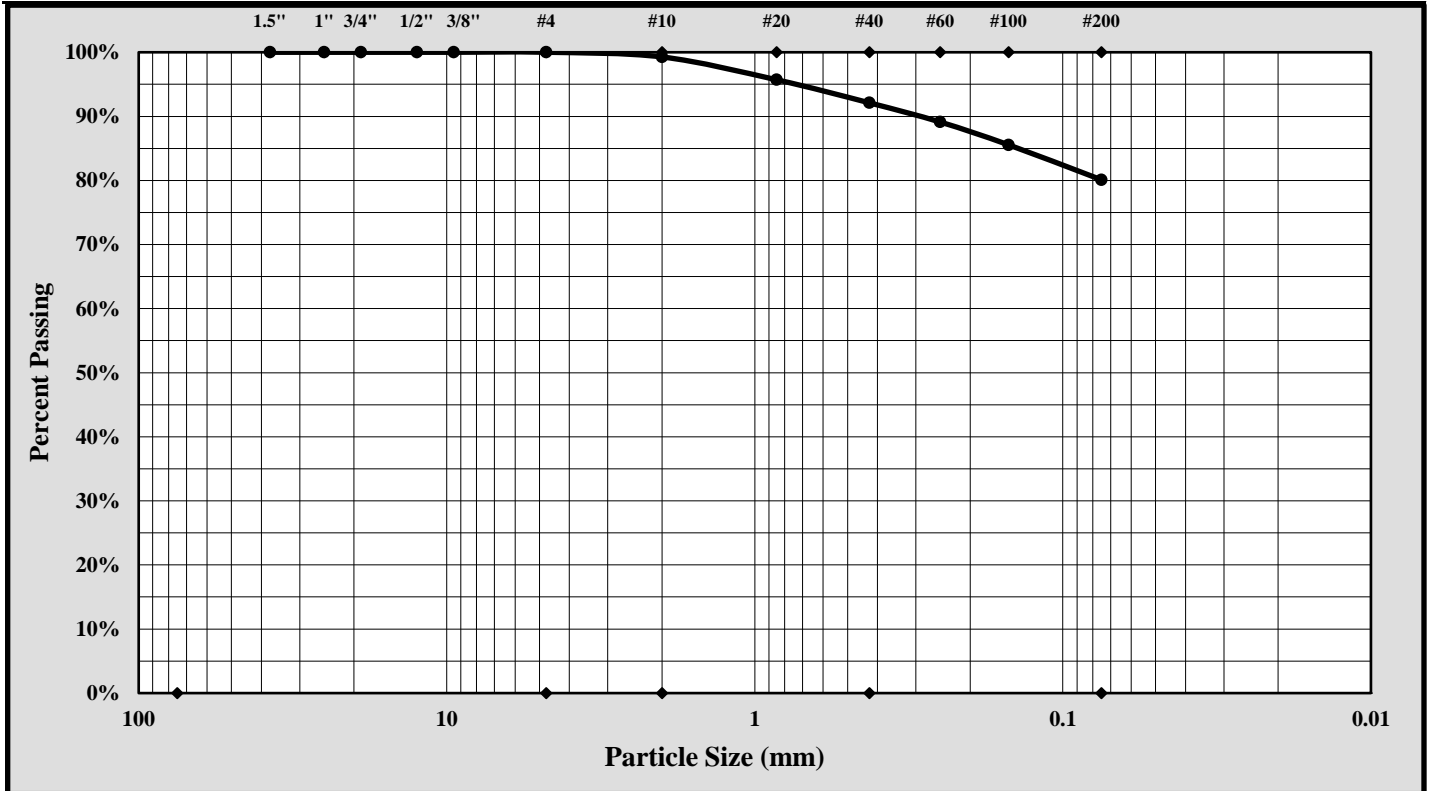


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/07 - 3/12/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-7
		Sample Date:	1/21/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Fat Clay with Sand (CH, A-7-6(24))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 2.00 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 80.1% Total Sand: 19.9%

Liquid Limit	50	Plastic Limit	21	Plastic Index	29
Coarse Sand:	0.7%	Medium Sand:	7.2%	Fine Sand:	12.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/21/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



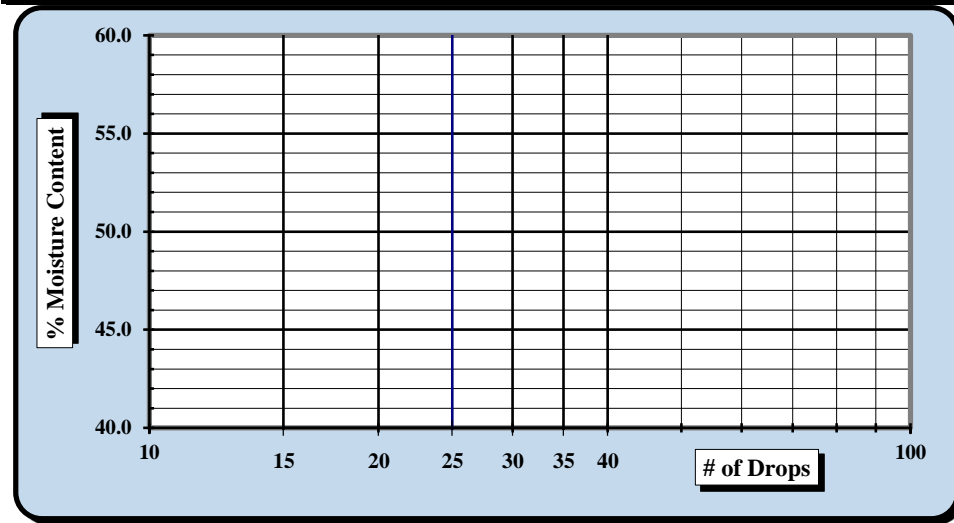
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date:	3/17/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-9
		Sample Date:	1/21/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	28.5' - 30.0'

Sample Description: Silty Sand (SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit				Plastic Limit			
A	Tare Weight								
B	Wet Soil Weight + A								
C	Dry Soil Weight + A								
D	Water Weight (B-C)								
E	Dry Soil Weight (C-A)								
F	% Moisture (D/E)*100								
N	# OF DROPS								
LL	LL = F * FACTOR					Moisture Contents determined by ASTM D 2216			
Ave.	Average								



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **NP**

Plastic Limit **NP**

Plastic Index **NP**

Group Symbol **ML**

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 12.9%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/21/18</u> Date	 Technical Responsibility	<u>3/21/18</u> Date
---	------------------------	------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

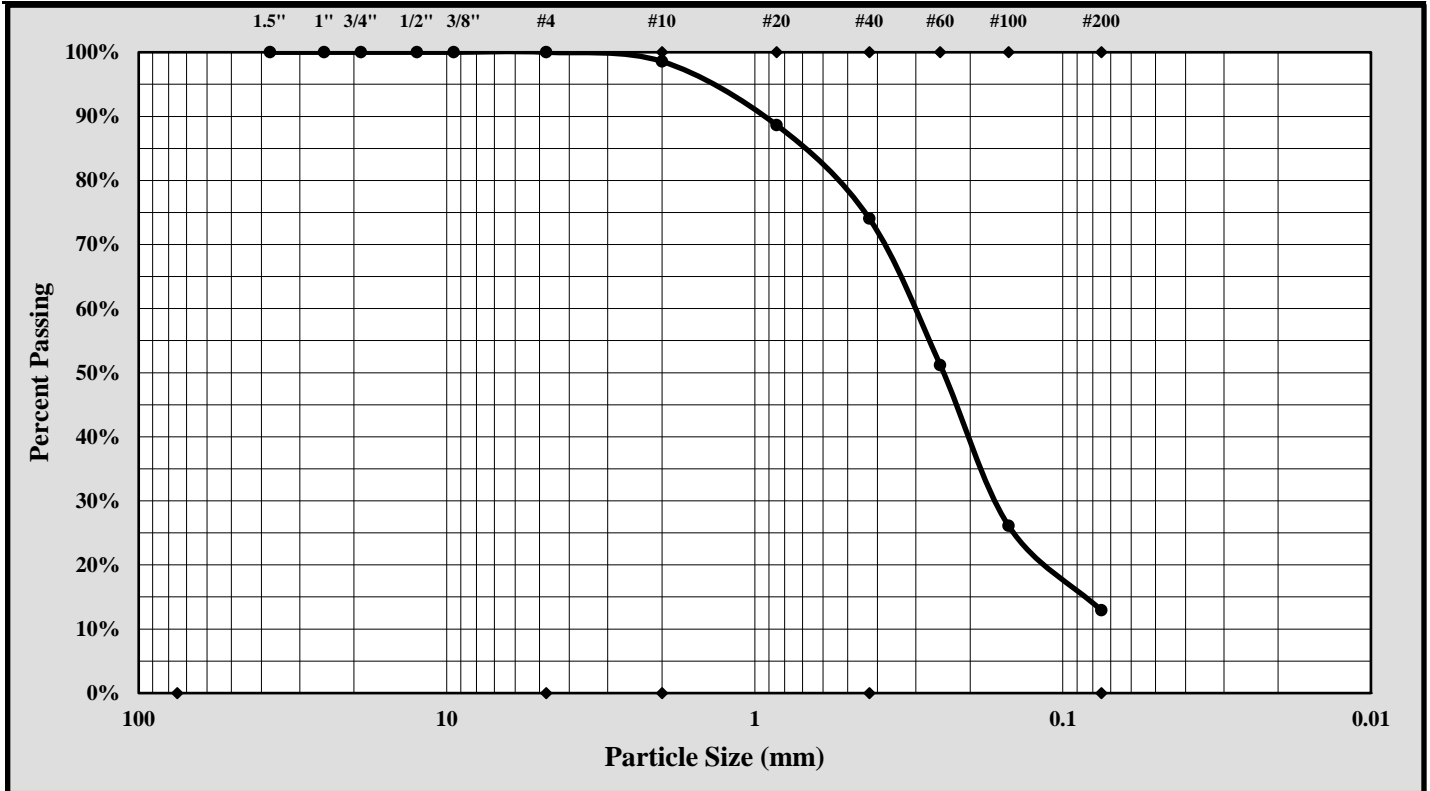
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/07 - 3/12/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-41	Sample #:	SS-9
		Sample Date:	1/21/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	28.5' - 30.0'
Sample Description:	Silty Sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 12.9% Total Sand: 87.1%

Liquid Limit	---	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	1.4%	Medium Sand:	24.5%	Fine Sand:	61.1%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Signature

Group Leader
 Position

3/21/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



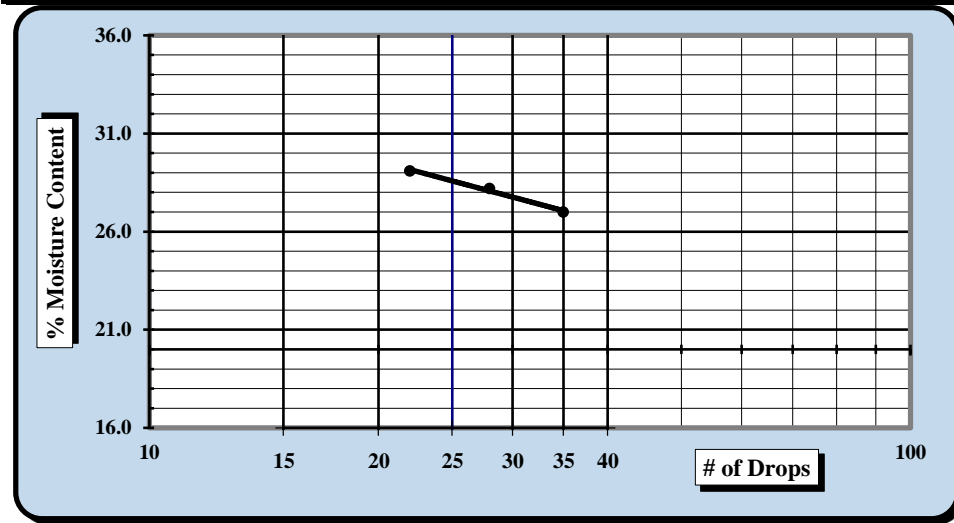
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/01/18
Type:	Split-spoon	Depth:	0.8' - 2.8'

Sample Description: Clayey Sand (SC, A-6(2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.67	26.66	26.76			26.65	27.60	
B	Wet Soil Weight + A	42.23	39.17	40.19			33.51	34.58	
C	Dry Soil Weight + A	38.92	36.42	37.16			32.53	33.60	
D	Water Weight (B-C)	3.31	2.75	3.03			0.98	0.98	
E	Dry Soil Weight (C-A)	12.25	9.76	10.40			5.88	6.00	
F	% Moisture (D/E)*100	27.0%	28.2%	29.1%			16.7%	16.3%	
N	# OF DROPS	35	28	22			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						16.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	29
Plastic Limit	17
Plastic Index	12
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/27/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

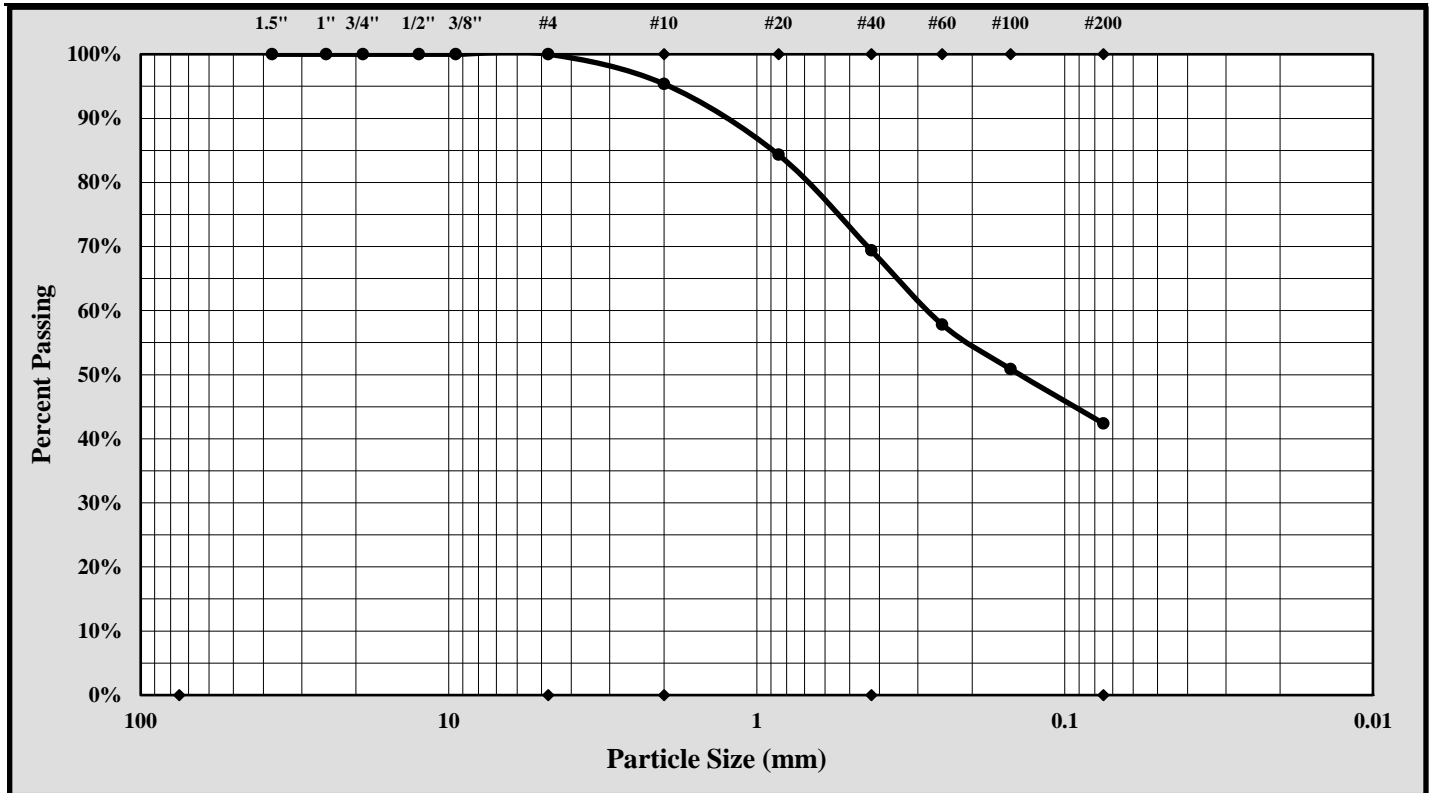


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/16 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-1
		Sample Date:	3/01/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.8' - 2.8'
Sample Description:	Clayey Sand (SC, A-6(2))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	4.75 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	42.4%	Total Sand:	57.6%

Liquid Limit	29	Plastic Limit	17	Plastic Index	12
Coarse Sand:	4.6%	Medium Sand:	26.0%	Fine Sand:	27.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



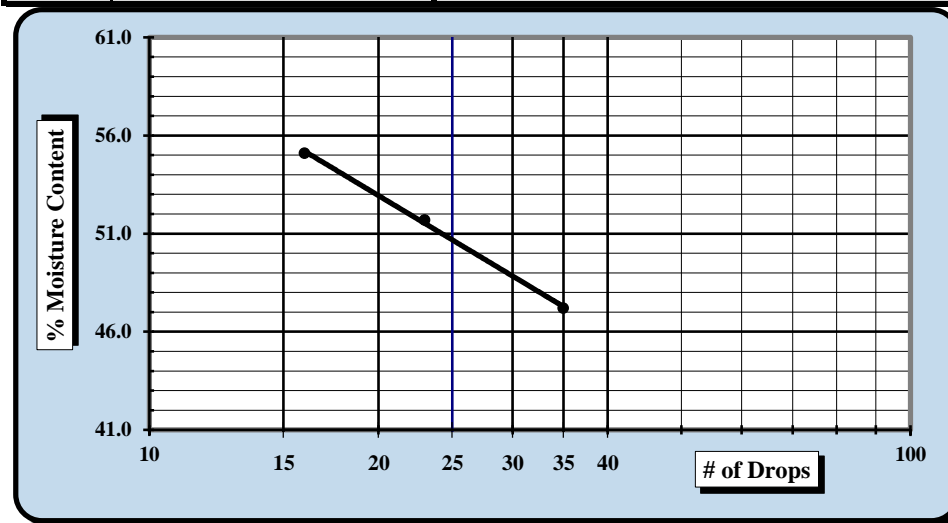
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-3
Location:	Bridge Boring	Type:	Split-spoon
		Sample Date:	3/01/18
		Depth:	4.8' - 6.8'

Sample Description: Sandy Elastic Silt (MH, A-7-6(12))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		16	17	18			19	20		
A	Tare Weight	26.57	26.63	26.78				26.66	26.83	
B	Wet Soil Weight + A	36.45	38.40	41.98				32.78	34.23	
C	Dry Soil Weight + A	33.28	34.39	36.58				31.40	32.57	
D	Water Weight (B-C)	3.17	4.01	5.40				1.38	1.66	
E	Dry Soil Weight (C-A)	6.71	7.76	9.80				4.74	5.74	
F	% Moisture (D/E)*100	47.2%	51.7%	55.1%				29.1%	28.9%	
N	# OF DROPS	35	23	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							29.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	51
Plastic Limit	29
Plastic Index	22
Group Symbol	MH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

4/27/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/27/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

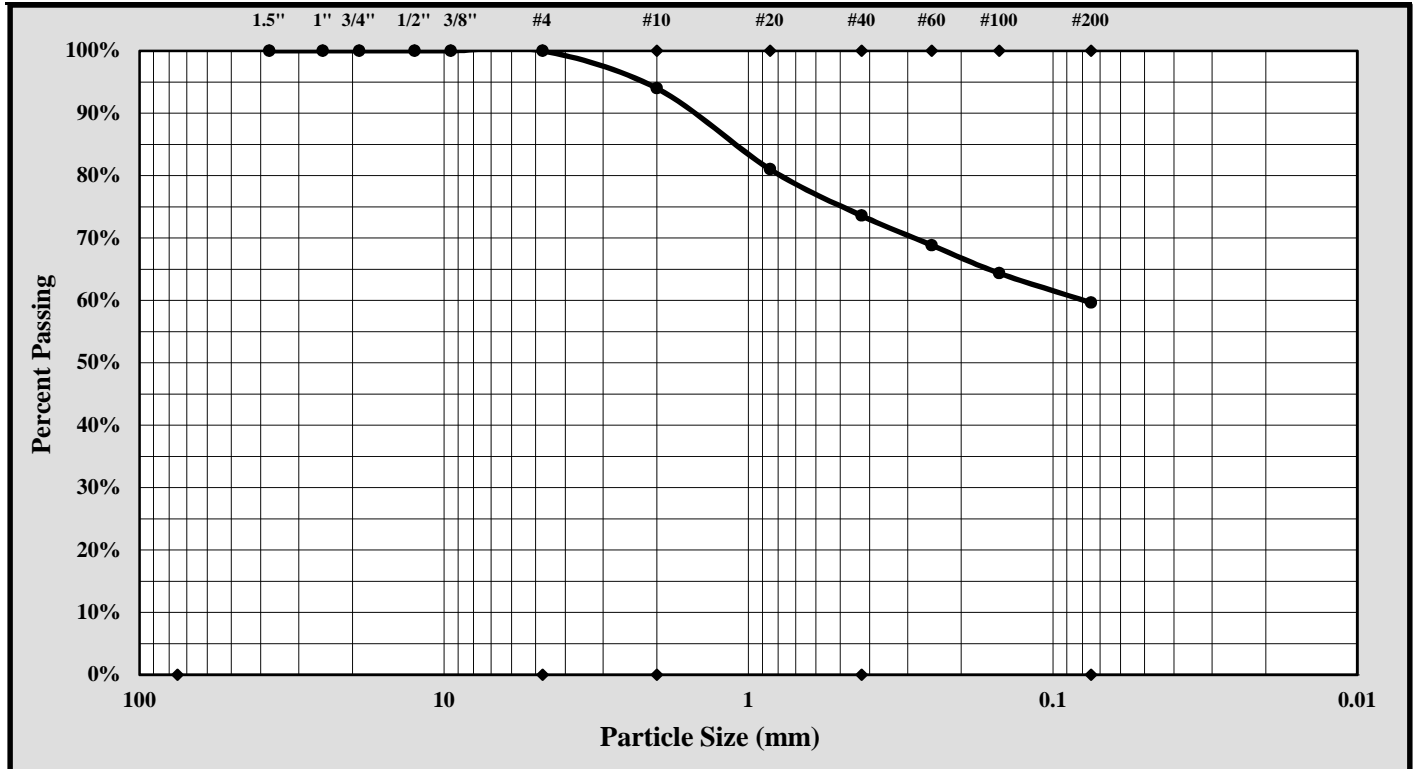


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/16 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-3
		Sample Date:	3/01/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	4.8' - 6.8'
Sample Description:	Sandy Elastic Silt (MH, A-7-6(12))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 mm and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 59.7% Total Sand: 40.3%

Liquid Limit	51	Plastic Limit	29	Plastic Index	22
Coarse Sand:	6.0%	Medium Sand:	20.4%	Fine Sand:	13.9%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position	<u>4/27/18</u> Date
---	------------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-7
Location:	Bridge Boring	Sample Date:	3/01/18
Type:	Split-spoon	Depth:	18.5' - 20.0'

Sample Description: Silty Sand (SM, A-6(1))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		21	22	23			24	25	
A	Tare Weight	28.08	25.67	27.29			25.98	26.79	
B	Wet Soil Weight + A	42.21	41.85	38.59			32.18	33.04	
C	Dry Soil Weight + A	38.39	37.15	35.18			30.83	31.66	
D	Water Weight (B-C)	3.82	4.70	3.41			1.35	1.38	
E	Dry Soil Weight (C-A)	10.31	11.48	7.89			4.85	4.87	
F	% Moisture (D/E)*100	37.1%	40.9%	43.2%			27.8%	28.3%	
N	# OF DROPS	29	20	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	39
Plastic Limit	28
Plastic Index	11
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/27/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

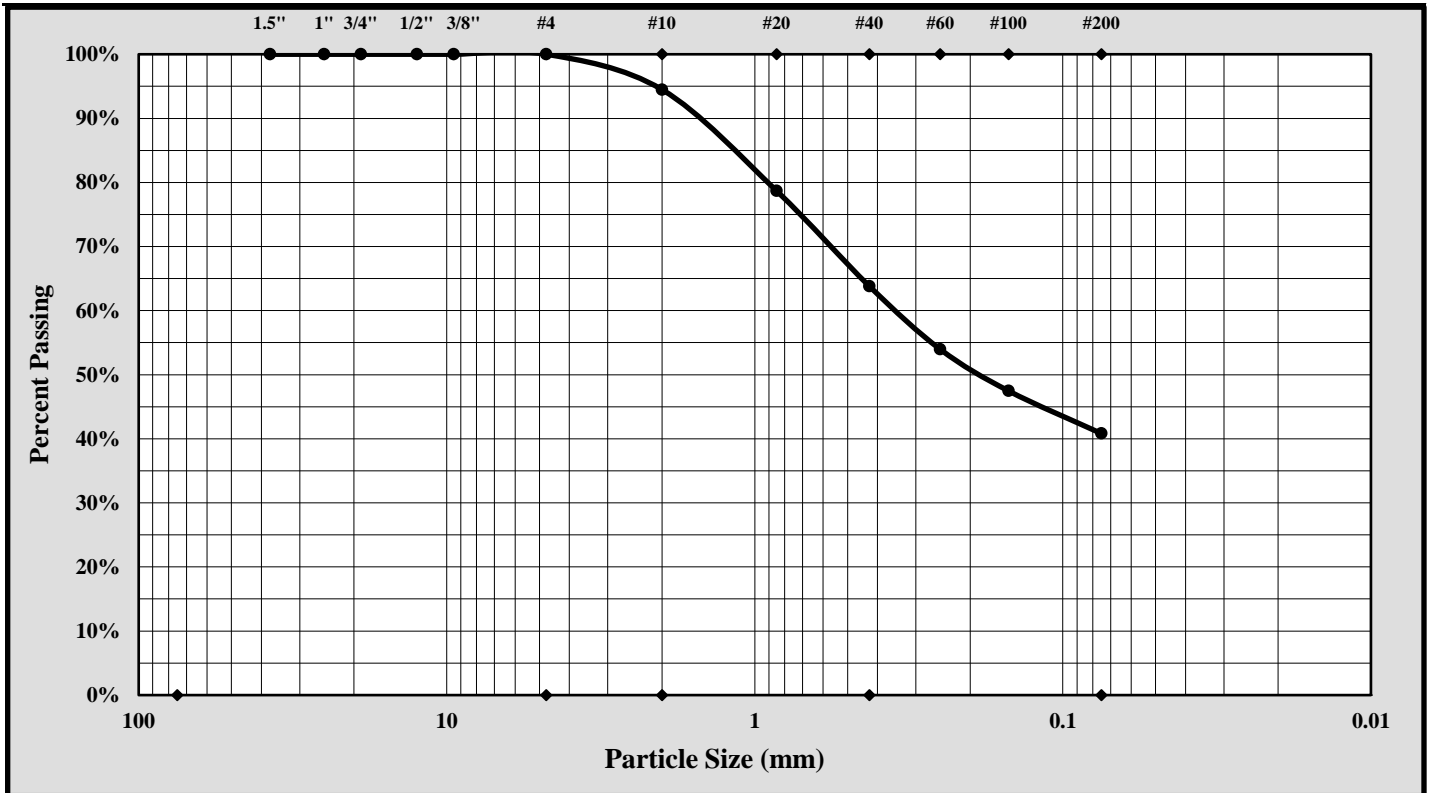


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/16 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-7
		Sample Date:	3/01/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Silty Sand (SM, A-6(1))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 40.8% Total Sand: 59.2%

Liquid Limit	39	Plastic Limit	28	Plastic Index	11
Coarse Sand:	5.5%	Medium Sand:	30.7%	Fine Sand:	23.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date:	4/25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-10
		Sample Date:	3/01/18
Location:	Bridge boring	Type:	Split-spoon
		Depth:	33.5 - 35.0'

Sample Description: Silty Sand [SM, A-4(0)]					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		26	27	28			29	30	
A	Tare Weight	27.33	27.00	26.83			26.99	27.36	
B	Wet Soil Weight + A	42.47	38.87	41.04			33.44	33.48	
C	Dry Soil Weight + A	38.96	35.99	37.47			32.00	32.13	
D	Water Weight (B-C)	3.51	2.88	3.57			1.44	1.35	
E	Dry Soil Weight (C-A)	11.63	8.99	10.64			5.01	4.77	
F	% Moisture (D/E)*100	30.2%	32.0%	33.6%			28.7%	28.3%	
N	# OF DROPS	35	26	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	29
Plastic Index	3
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/27/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/27/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

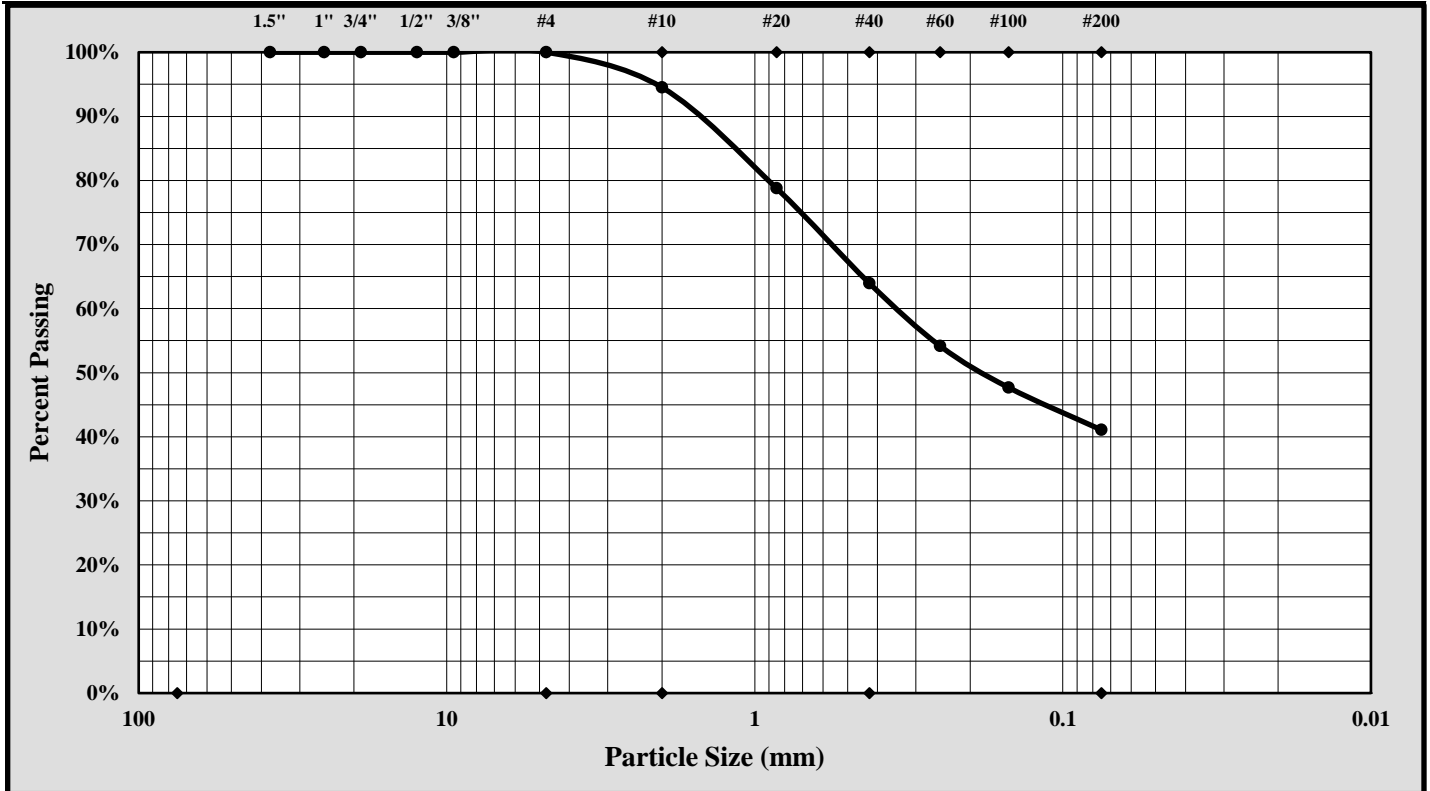


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/27/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/16 - 4/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-42	Sample #:	SS-10
		Sample Date:	3/01/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	33.5' - 35.0'
Sample Description:	Silty Sand (SM, A-4(0))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 41.1% Total Sand: 58.9%

Liquid Limit	32	Plastic Limit	29	Plastic Index	3
Coarse Sand:	5.5%	Medium Sand:	30.5%	Fine Sand:	22.9%

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
--------------------------------	----------------------------------	---	--	-------------------------------	--

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/27/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



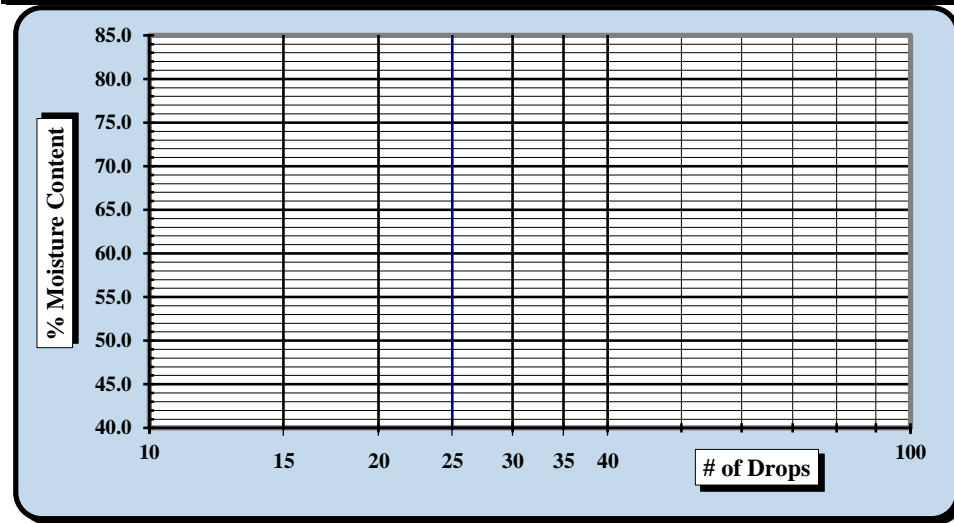
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-1-2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-43	Sample #:	SS-1
		Sample Date:	Various
Location:	Bridge Boring	Offset:	N/A
		Depth:	14.8' - 16.8'

Sample Description:		Silty Sand (SM, A-2-4)			
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #		Liquid Limit					Plastic Limit		
Tare #:									
A	Tare Weight								
B	Wet Soil Weight + A								
C	Dry Soil Weight + A								
D	Water Weight (B-C)								
E	Dry Soil Weight (C-A)								
F	% Moisture (D/E)*100								
N	# OF DROPS						Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average								



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input checked="" type="checkbox"/>
Liquid Limit	NP
Plastic Limit	NP
Plastic Index	NP
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/1/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



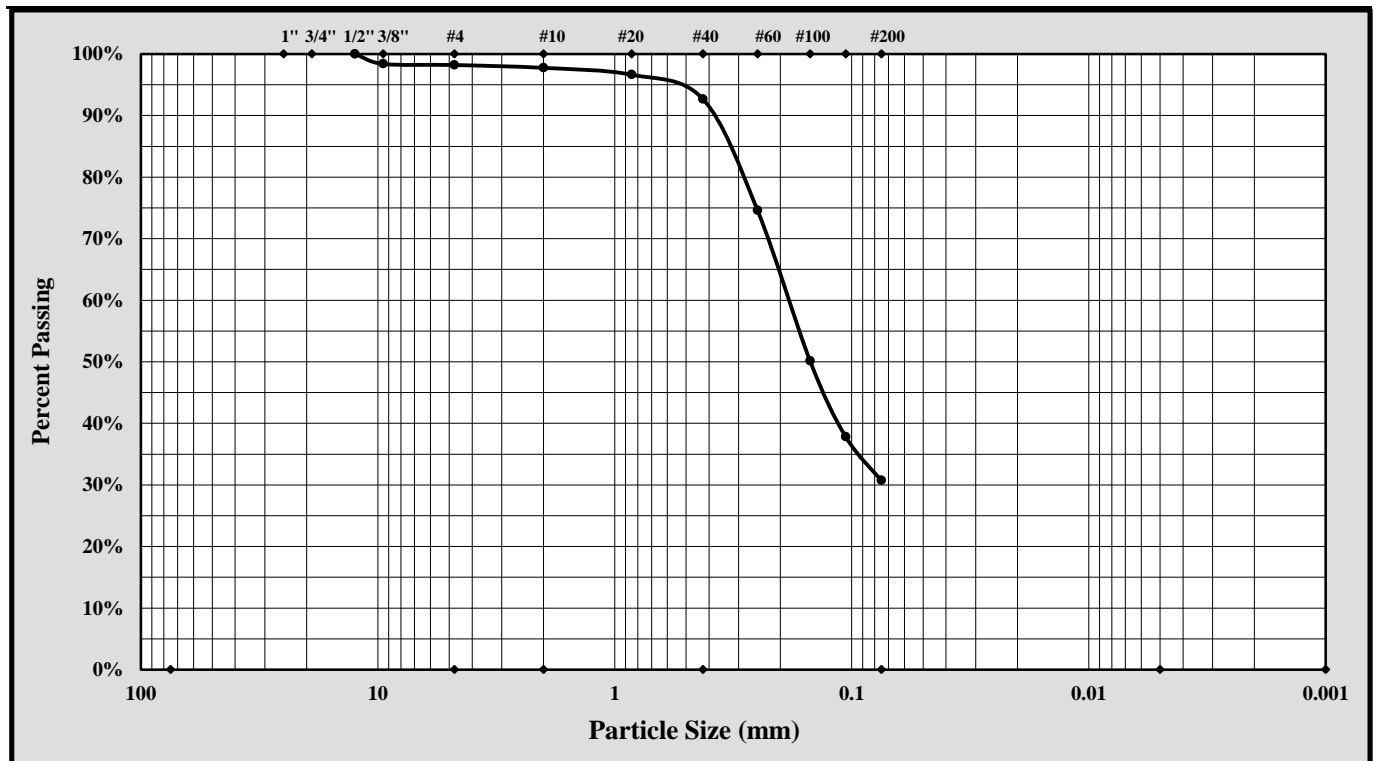
Quality Assurance

Sample Log No.:

ASTM D6913/D7928

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-43	Type:	Split Spoon
		Sample Date:	Various
Location:	Bridge Boring	Sample No.:	SS-1
		Depth:	14.8' - 16.8'
Sample Description:	Silty Sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	1.8%
Silt & Clay (% Passing #200):	Total Sand:	67.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	NP
	Plastic Index	NP

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/10/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



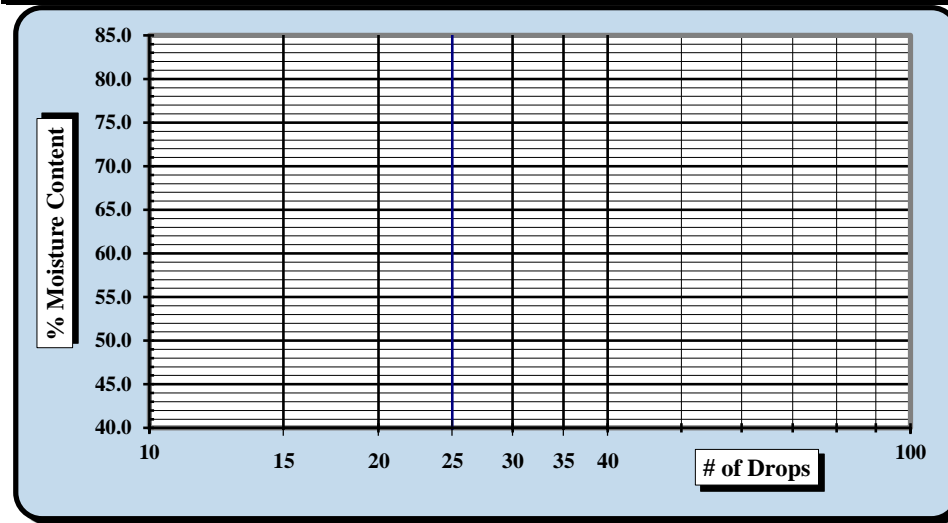
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	4/30/18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-43	Sample #:	SS-2
		Sample Date:	Various
Location:	Bridge Boring	Offset:	N/A
		Depth:	16.8' - 18.8'

Sample Description: Sandy Lean Clay (CL, A-6 (8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	423	Tare #:	Liquid Limit				Plastic Limit				
			60	61	62		63	64			
A		Tare Weight	16.00	15.05	15.54				15.09	15.86	
B		Wet Soil Weight + A	29.61	27.81	28.44				22.93	23.71	
C		Dry Soil Weight + A	26.25	24.61	25.14				21.69	22.46	
D		Water Weight (B-C)	3.36	3.20	3.30				1.24	1.25	
E		Dry Soil Weight (C-A)	10.25	9.56	9.60				6.60	6.60	
F		% Moisture (D/E)*100	32.8%	33.5%	34.4%				18.8%	18.9%	
N		# OF DROPS	30	25	16				Moisture Contents determined by ASTM D 2216		
LL		LL = F * FACTOR									
Ave.		Average							18.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **34**

Plastic Limit **19**

Plastic Index **15**

Group Symbol **CL**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

<u>Jimmy Hanson</u> Technician Name	<u>4/28/2018</u> Date	 Technical Responsibility	<u>4/30/2018</u> Date
--	--------------------------	------------------------------	--------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No: TR-D7928-3

Revision No.: 0

Revision Date: 02/21/17

Particle Size Analysis of Soils



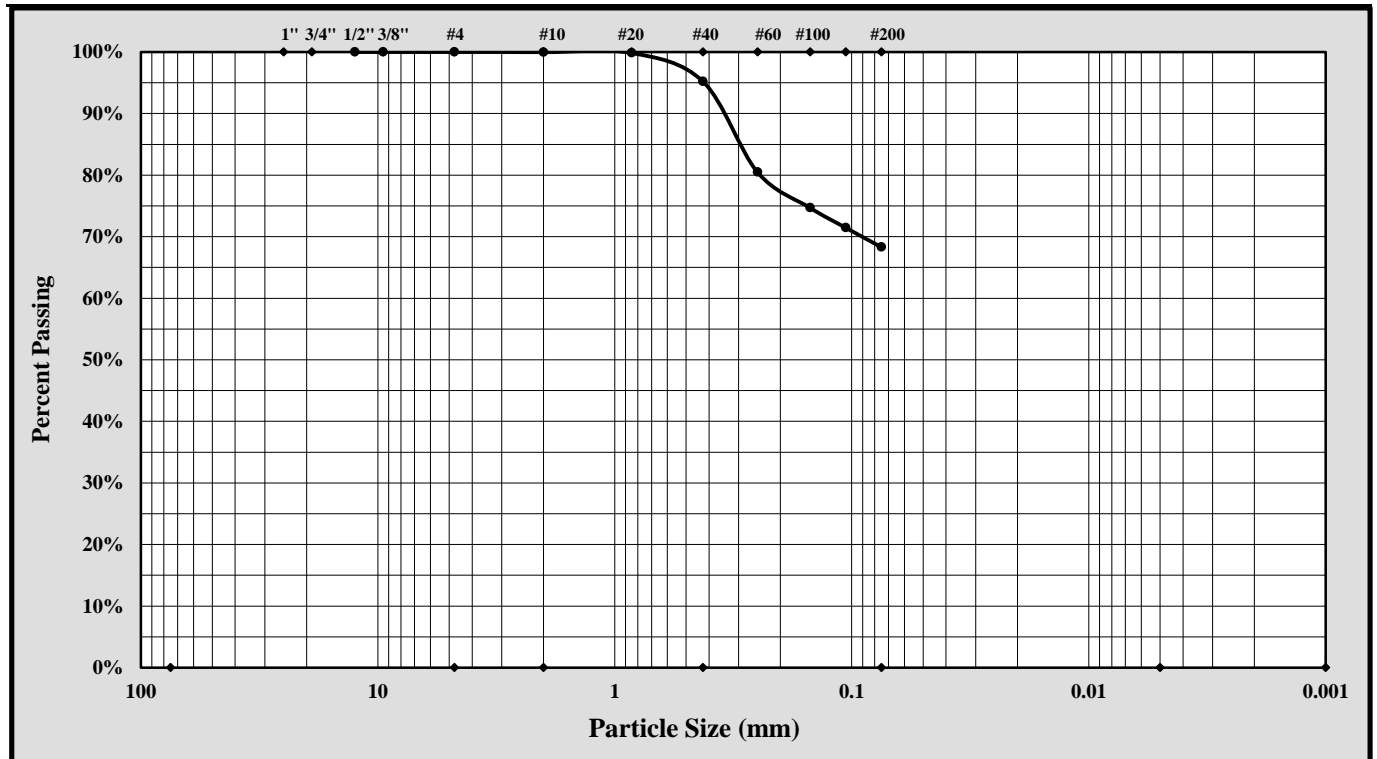
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-43	Type:	Split Spoon
		Sample Date:	Various
Location:	Bridge Boring	Sample No.:	SS-2
		Depth:	16.8' - 18.8'
Sample Description:	Sandy Lean Clay (CL, A-6 (8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	0.0%
Silt & Clay (% Passing #200):	Total Sand:	31.7%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	34 19 Plastic Index 15

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

6/7/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



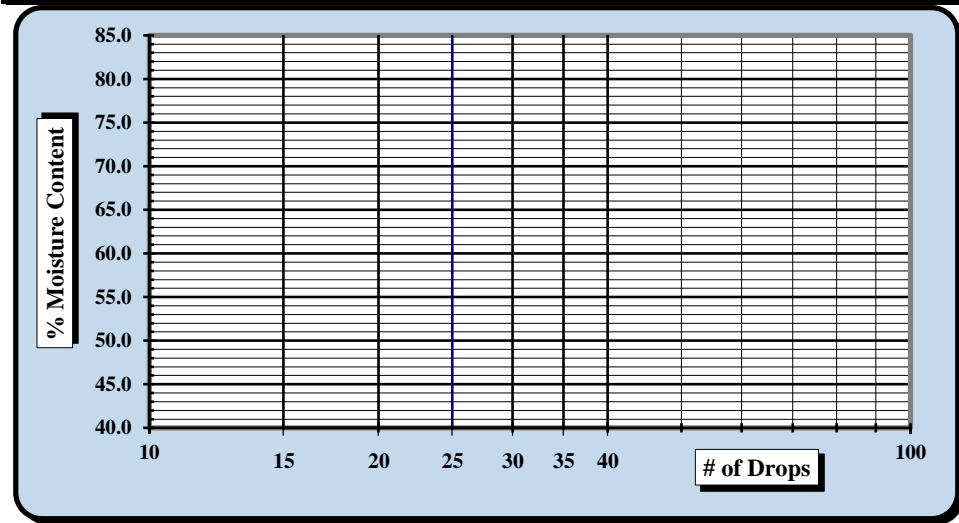
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-2-2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-43	Sample #:	SS-6
		Sample Date:	Various
Location:	Bridge Boring	Offset:	N/A
		Depth:	28.3' - 29.8'
Sample Description:	Silty Sand with Gravel (SM, A-2-4)		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		1	4	5			6	7	
A	Tare Weight								
B	Wet Soil Weight + A								
C	Dry Soil Weight + A								
D	Water Weight (B-C)								
E	Dry Soil Weight (C-A)								
F	% Moisture (D/E)*100								
N	# OF DROPS								
LL	LL = F * FACTOR								
Ave.	Average								



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **NP**

Plastic Limit **NP**

Plastic Index **NP**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/2/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



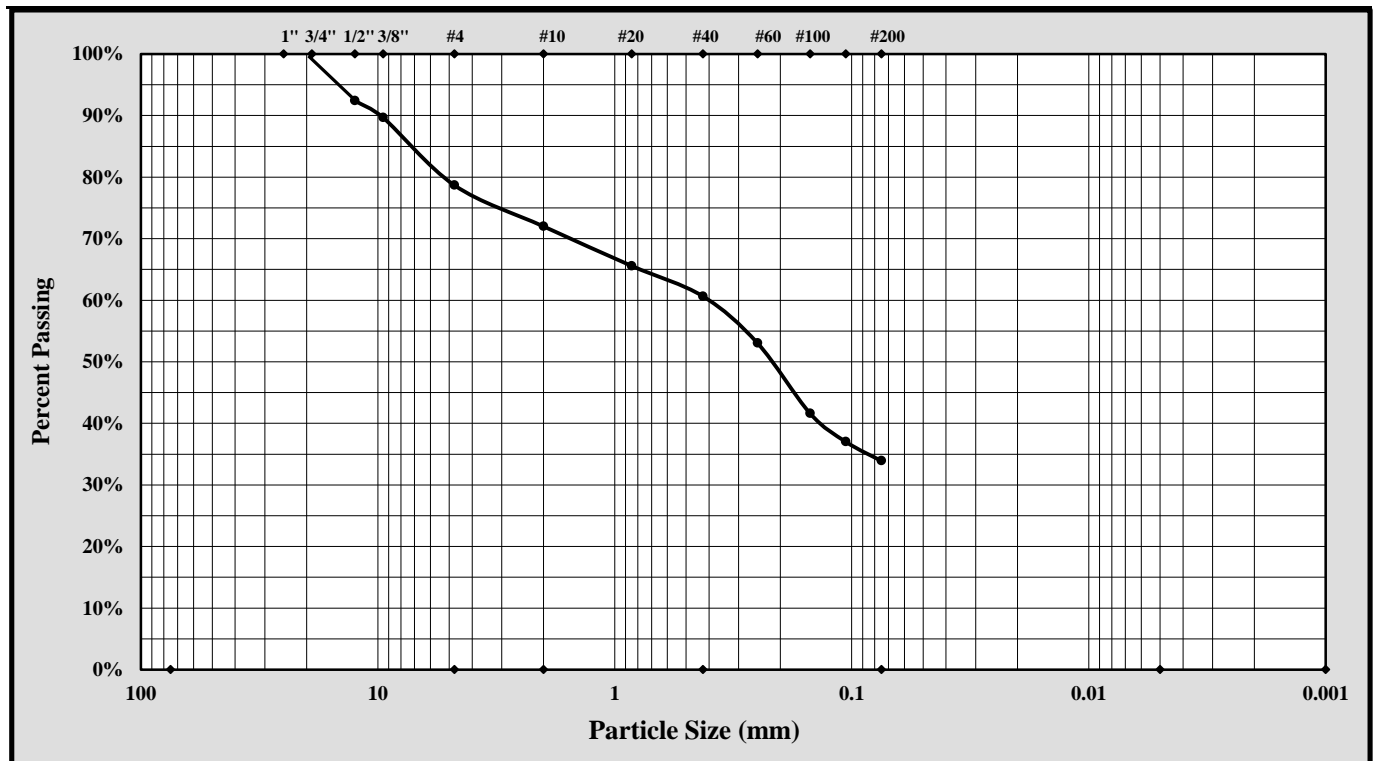
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-43	Type:	Split Spoon
		Sample Date:	Various
Location:	Bridge Boring	Sample No.:	SS-6
		Depth:	28.3' - 29.8'
Sample Description:	Silty Sand with Gravel (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	21.3%
Silt & Clay (% Passing #200):	Total Sand:	44.8%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	NP
	Plastic Index	NP

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/2/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



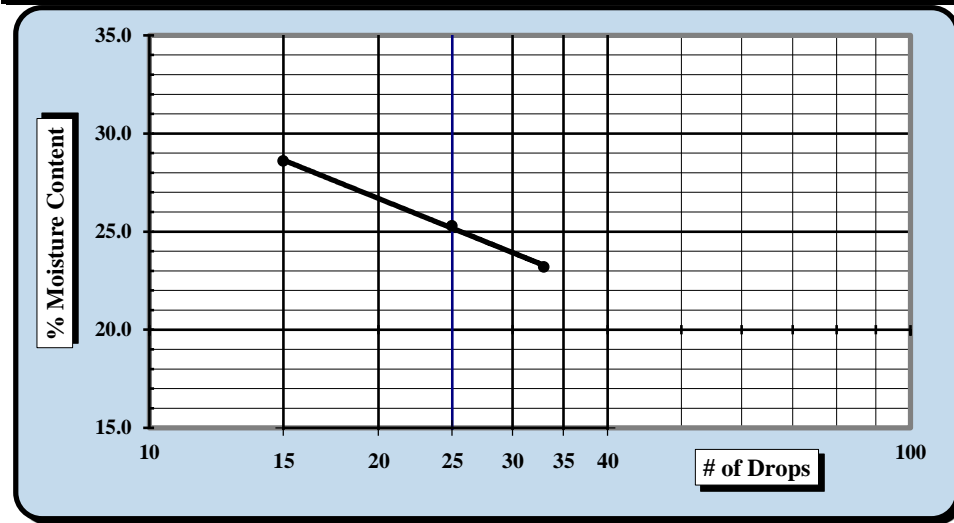
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date:	5/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-44	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/21/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Sandy Silty Clay (CL-ML, A-4(1))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		16	17	18			19	20	
A	Tare Weight	26.61	26.64	26.77			26.66	26.82	
B	Wet Soil Weight + A	47.31	43.28	42.09			33.18	33.89	
C	Dry Soil Weight + A	43.41	39.92	38.68			32.15	32.77	
D	Water Weight (B-C)	3.90	3.36	3.41			1.03	1.12	
E	Dry Soil Weight (C-A)	16.80	13.28	11.91			5.49	5.95	
F	% Moisture (D/E)*100	23.2%	25.3%	28.6%			18.8%	18.8%	
N	# OF DROPS	33	25	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						18.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	25
Plastic Limit	19
Plastic Index	6
Group Symbol	CL-ML
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>5/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/04/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

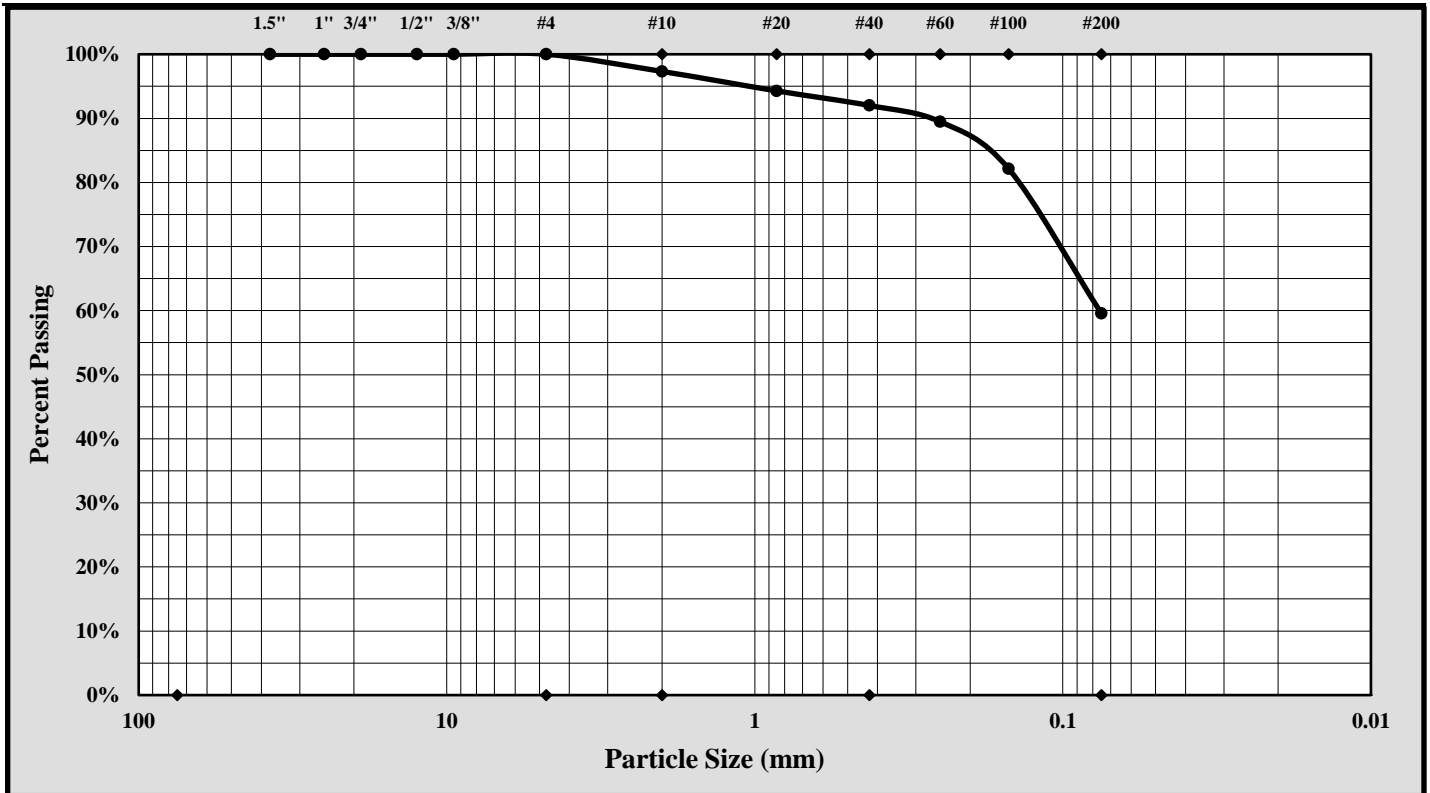


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	5/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/02 - 5/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-44	Sample #:	SS-1
		Sample Date:	3/21/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Sandy Silty Clay (CL-ML, A-4(1))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 59.6% Total Sand: 40.4%

Liquid Limit	25	Plastic Limit	19	Plastic Index	6
Coarse Sand:	2.7%	Medium Sand:	5.3%	Fine Sand:	32.5%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/04/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



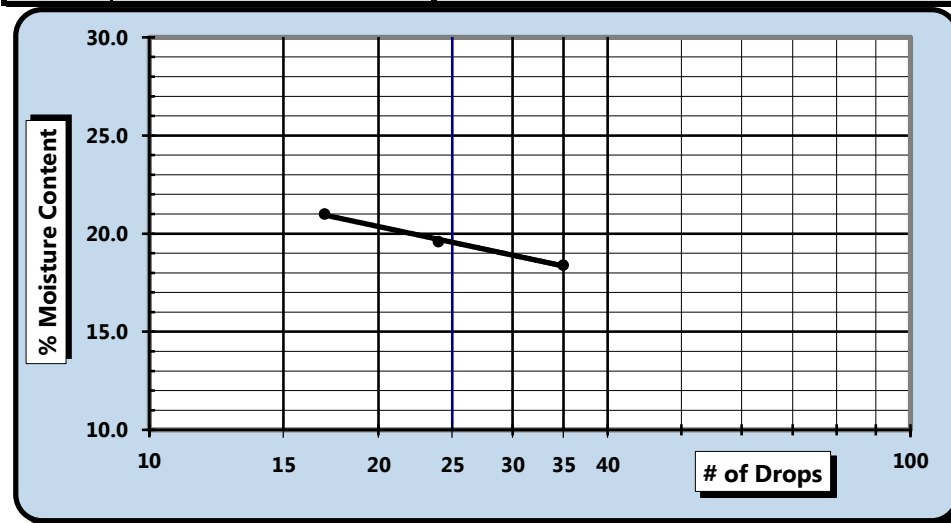
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Spartanburg: 301 Zima Park Drive, Spartanburg, SC 29301

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-45	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	2/8/18
Type:	Split-spoon	Depth:	0.8' - 2.8'

Sample Description: Silty Clayey Sand (SC-SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		Q-1	Q-2	Q-3			3	4		
A	Tare Weight	16.69	16.63	15.72				11.59	12.27	
B	Wet Soil Weight + A	38.29	39.44	38.50				18.97	19.49	
C	Dry Soil Weight + A	34.94	35.70	34.55				17.94	18.51	
D	Water Weight (B-C)	3.35	3.74	3.95				1.03	0.98	
E	Dry Soil Weight (C-A)	18.25	19.07	18.83				6.35	6.24	
F	% Moisture (D/E)*100	18.4%	19.6%	21.0%				16.2%	15.7%	
N	# OF DROPS	35	24	17				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							16.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	20
Plastic Limit	16
Plastic Index	4
Group Symbol	CL-ML
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

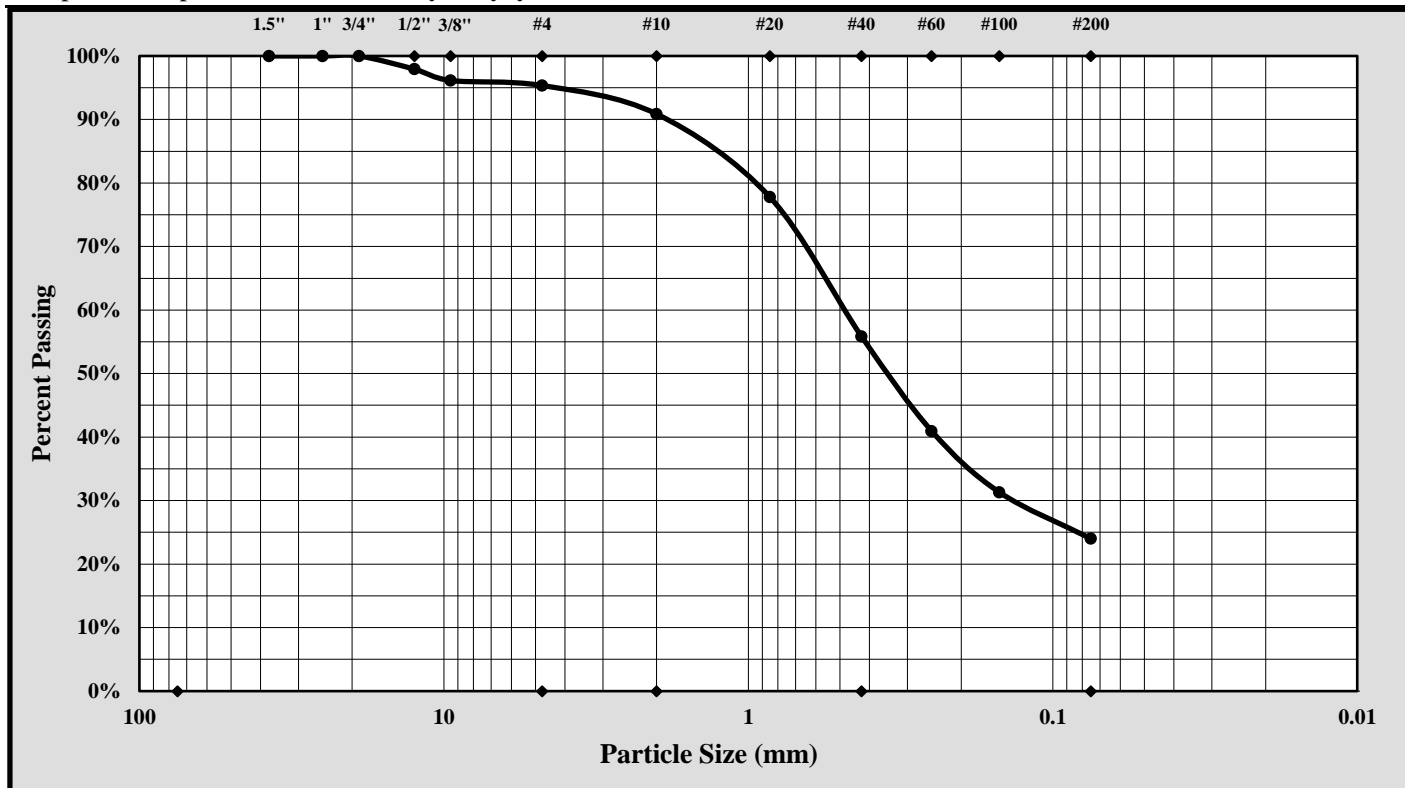


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. - Spartanburg 301 Zima Park Dr. Spartanburg, SC 29301

S&ME Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/27/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-45	Sample #:	SS-1
		Sample Date:	2/8/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.8' - 2.8'
Sample Description:	Silty Clayey Sand (SC-SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.00 mm Gravel: 4.7%
 Silt & Clay (% Passing #200): 24.0% Total Sand: 71.3%

Liquid Limit	20	Plastic Limit	16	Plastic Index	4
Coarse Sand:	4.5%	Medium Sand:	35.0%	Fine Sand:	31.8%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/11/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



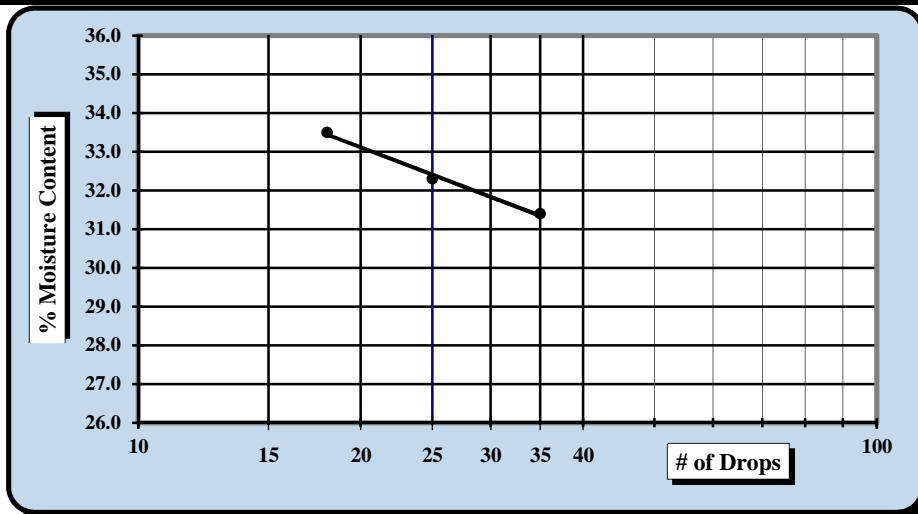
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-46	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 2.0'

Sample Description: Lean clay with sand (CL, A-6 (8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		17	12	10			14	19	
A	Tare Weight	15.49	15.57	15.41			15.46	15.42	
B	Wet Soil Weight + A	27.87	28.60	29.90			24.48	25.40	
C	Dry Soil Weight + A	24.76	25.42	26.44			22.91	23.66	
D	Water Weight (B-C)	3.11	3.18	3.46			1.57	1.74	
E	Dry Soil Weight (C-A)	9.27	9.85	11.03			7.45	8.24	
F	% Moisture (D/E)*100	33.5%	32.3%	31.4%			21.1%	21.1%	
N	# OF DROPS	18	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						21.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	21
Plastic Index	11
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

4/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

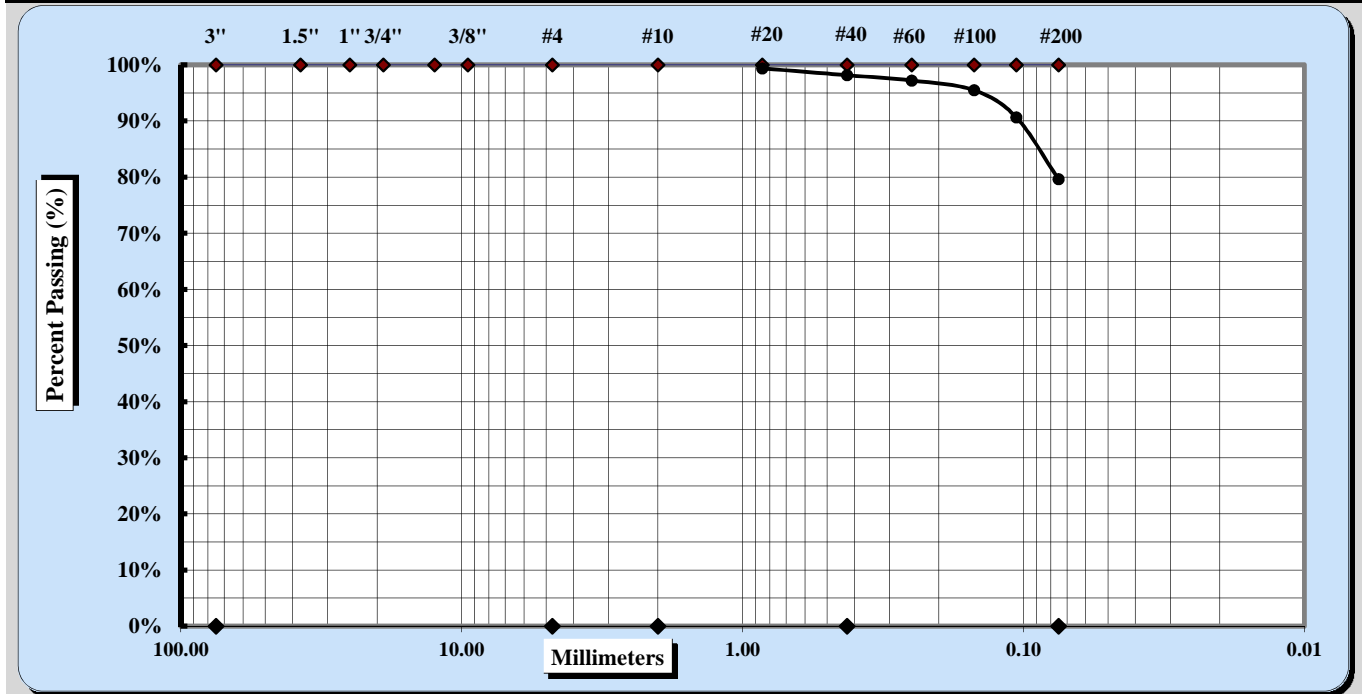


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-46	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	1
Sample Date:	Various		
Depth:	0.0' - 2.0'		
Sample Description:	Lean clay with sand (CL, A-6 (8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 20	Coarse Sand	0%	Fine Sand	19%
Gravel	0%	Medium Sand	2%	Silt & Clay	80%
Liquid Limit	32	Plastic Limit	21	Plastic Index	11

Coarse Sand	0%	Medium Sand	2%	Fine Sand	19%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-46	Sample #:	SS-2
Log #:	43-2321	Sample Date:	Various
		Depth:	2.0' - 4.0'

Sample Description: Lean clay with sand (CL, A-6 (8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	13	8			24	7	
A	Tare Weight	15.43	15.39	15.52			15.43	15.40	
B	Wet Soil Weight + A	27.62	28.38	29.88			24.67	24.81	
C	Dry Soil Weight + A	24.52	25.28	26.58			23.19	23.33	
D	Water Weight (B-C)	3.10	3.10	3.30			1.48	1.48	
E	Dry Soil Weight (C-A)	9.09	9.89	11.06			7.76	7.93	
F	% Moisture (D/E)*100	34.1%	31.3%	29.8%			19.1%	18.7%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						18.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	19
Plastic Index	13
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

4/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

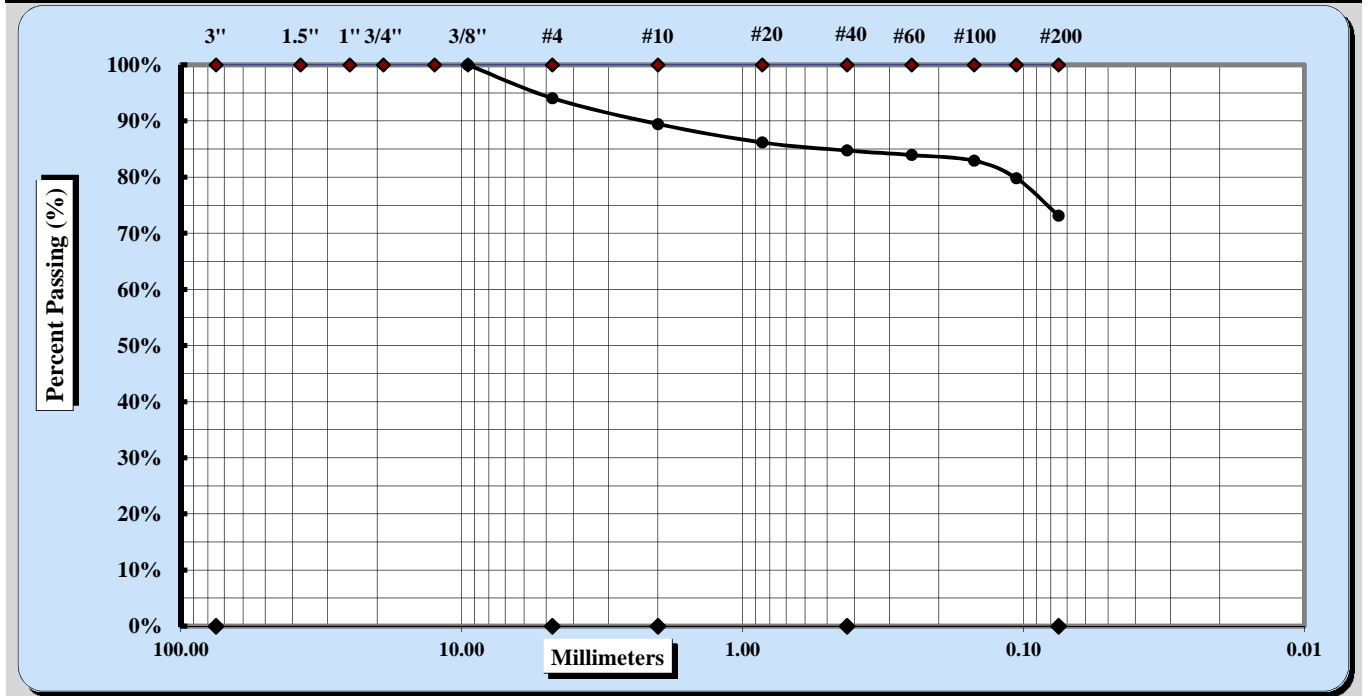


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B	Report Date:	5/23/2018
Project Name: Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name: HDR Engineering, Inc.		
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		
Sample ID: B-46	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 2	Depth: 2.0' - 4.0'
Sample Description: Lean clay with sand (CL, A-6 (8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	5%	Fine Sand	12%
Gravel	6%	Medium Sand	5%	Silt & Clay	73%
Liquid Limit	32	Plastic Limit	19	Plastic Index	13

Coarse Sand	5%	Medium Sand	5%	Fine Sand	12%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

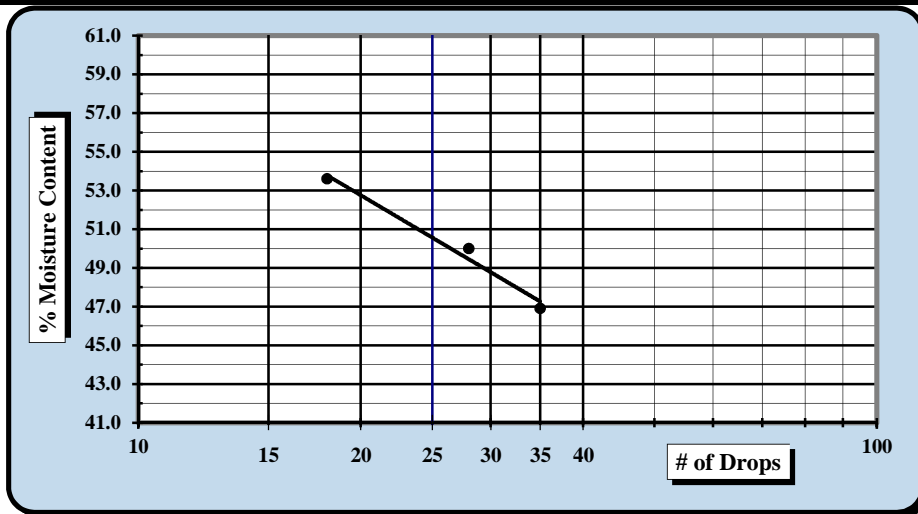
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/18/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-60	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 2.0'

Sample Description: Sandy fat clay (CH, A-7-6 (12))

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		16	22	10			23	17	
A	Tare Weight	15.63	15.38	15.41			15.44	15.50	
B	Wet Soil Weight + A	24.74	25.52	26.56			23.29	24.27	
C	Dry Soil Weight + A	21.56	22.14	23.00			21.75	22.58	
D	Water Weight (B-C)	3.18	3.38	3.56			1.54	1.69	
E	Dry Soil Weight (C-A)	5.93	6.76	7.59			6.31	7.08	
F	% Moisture (D/E)*100	53.6%	50.0%	46.9%			24.4%	23.9%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	51
Plastic Limit	24
Plastic Index	27
Group Symbol	CH
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/18/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

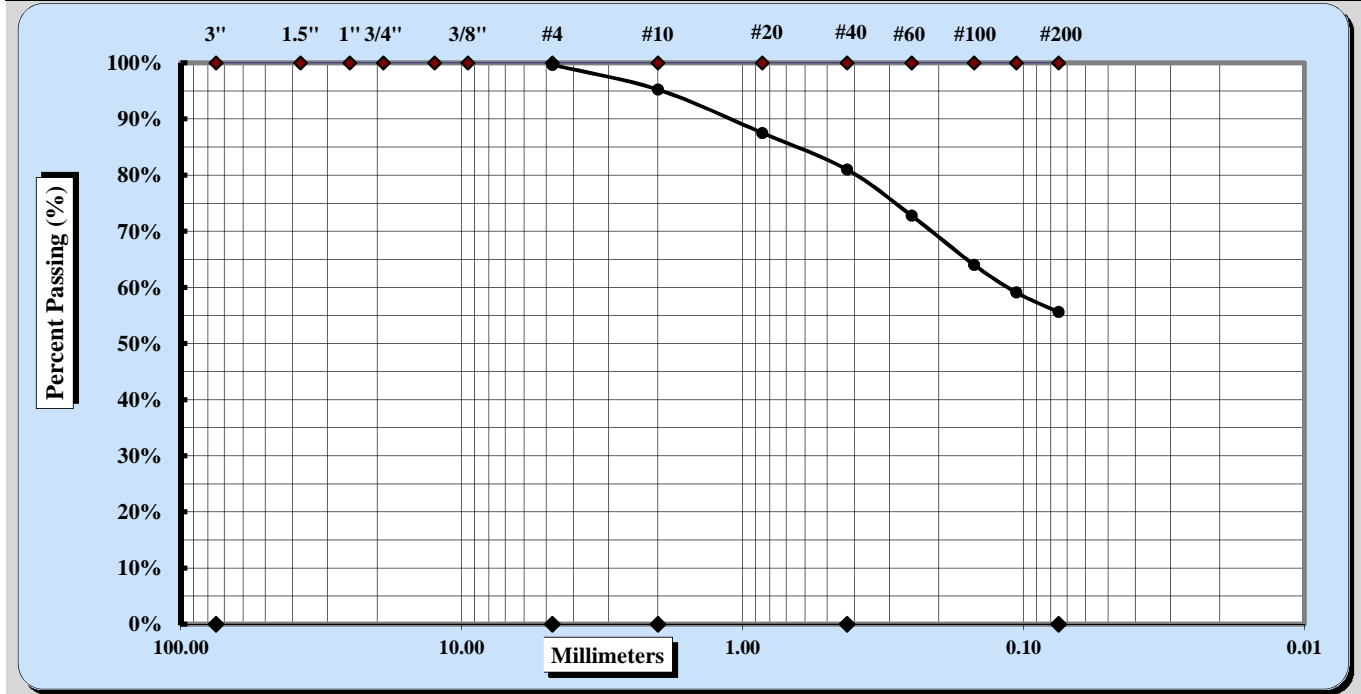


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/21/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-60	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	1
		Depth:	0.0' - 2.0'
Sample Description:	Sandy fat clay (CH, A-7-6 (12))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 4	Coarse Sand	4%	Fine Sand	25%
Gravel	0%	Medium Sand	14%	Silt & Clay	56%
Liquid Limit	51	Plastic Limit	24	Plastic Index	27

Coarse Sand	4%	Medium Sand	14%	Fine Sand	25%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

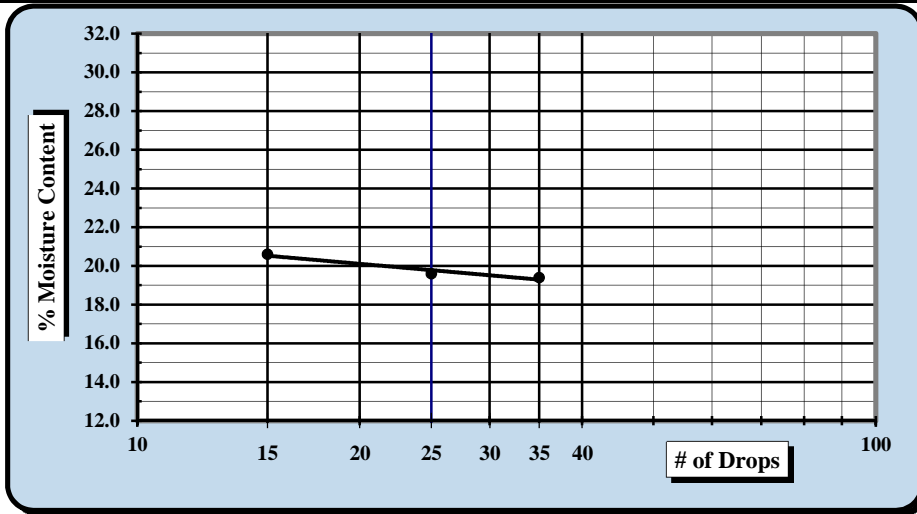
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/18/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-60	Sample #:	SS-2
		Sample Date:	Various
Log #:	43-2321	Depth:	2.0' - 4.0'

Sample Description: Silty, clayey sand (SC-SM, A-2-4)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		6	24	13			4	14	
A	Tare Weight	15.45	15.43	15.39			15.44	15.46	
B	Wet Soil Weight + A	28.54	29.52	30.18			25.27	25.06	
C	Dry Soil Weight + A	26.30	27.21	27.78			24.14	23.95	
D	Water Weight (B-C)	2.24	2.31	2.40			1.13	1.11	
E	Dry Soil Weight (C-A)	10.85	11.78	12.39			8.70	8.49	
F	% Moisture (D/E)*100	20.6%	19.6%	19.4%			13.0%	13.1%	
N	# OF DROPS	15	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						13.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **20**

Plastic Limit **13**

Plastic Index **7**

Group Symbol **CL-ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/18/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

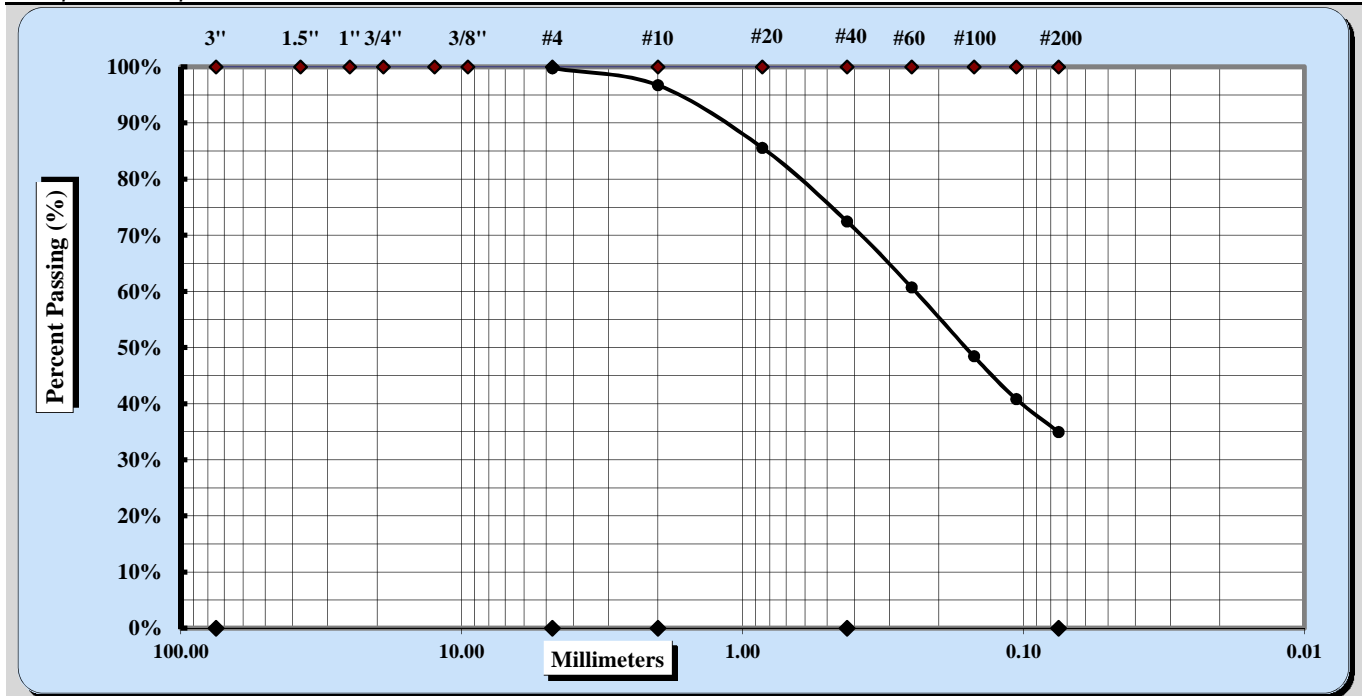


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B	Report Date:	5/23/2018
Project Name: Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name: HDR Engineering, Inc.		
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		
Sample ID: B-60	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 2	Depth: 2.0' - 4.0'
Sample Description: Silty, clayey sand (SC-SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 4	Coarse Sand	3%	Fine Sand	38%
Gravel	0%	Medium Sand	24%	Silt & Clay	35%
Liquid Limit	20	Plastic Limit	13	Plastic Index	7

Coarse Sand	3%	Medium Sand	24%	Fine Sand	38%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/18/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-60	Sample #:	SS-3
Log #:	43-2321	Sample Date:	Various
		Depth:	4.0' - 6.0'

Sample Description: Clayey sand (SC, A-2-6)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		1	8	15			3	12	
A	Tare Weight	15.34	15.52	15.32			15.48	15.56	
B	Wet Soil Weight + A	25.79	26.67	27.94			24.83	24.68	
C	Dry Soil Weight + A	22.98	23.78	24.83			23.27	23.16	
D	Water Weight (B-C)	2.81	2.89	3.11			1.56	1.52	
E	Dry Soil Weight (C-A)	7.64	8.26	9.51			7.79	7.60	
F	% Moisture (D/E)*100	36.8%	35.0%	32.7%			20.0%	20.0%	
N	# OF DROPS	18	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						20.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	35
Plastic Limit	20
Plastic Index	15
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/18/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

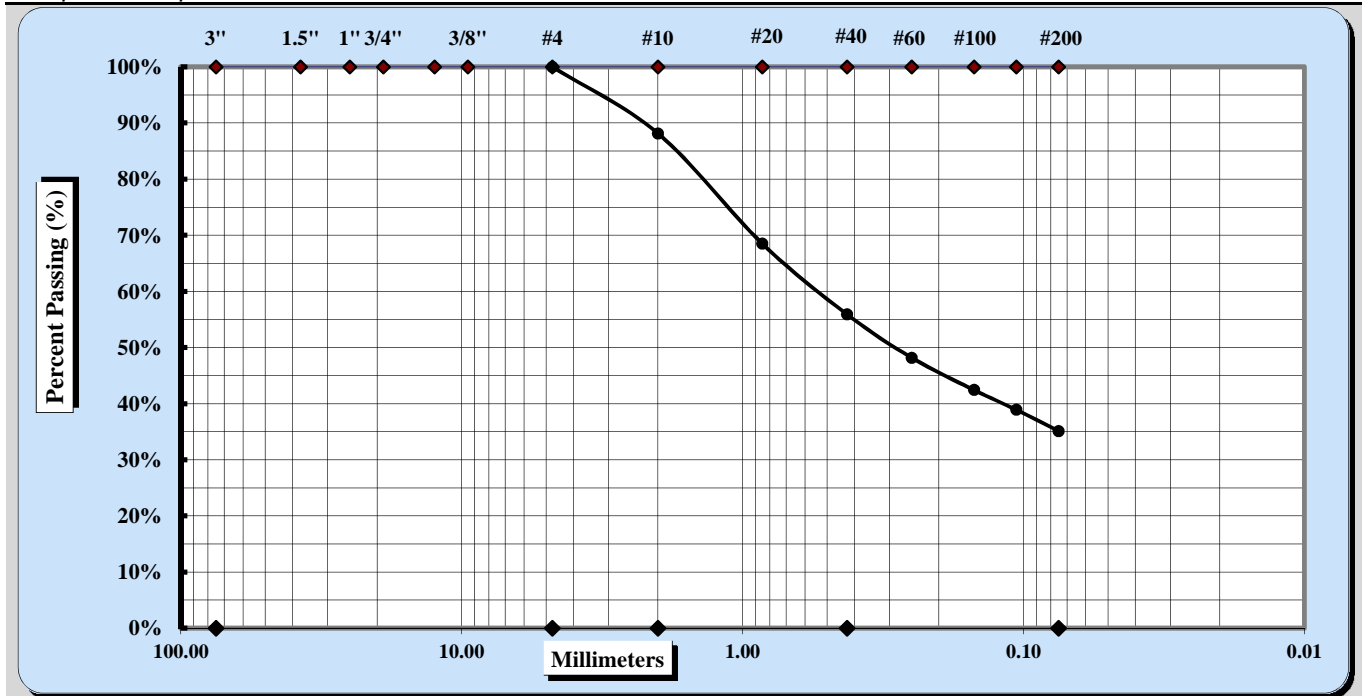


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-60	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	3
		Depth:	4.0' - 6.0'
Sample Description:	Clayey sand (SC, A-2-6)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 4	Coarse Sand	12%	Fine Sand	21%
Gravel	0%	Medium Sand	32%	Silt & Clay	35%
Liquid Limit	35	Plastic Limit	20	Plastic Index	15

Coarse Sand	12%	Medium Sand	32%	Fine Sand	21%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



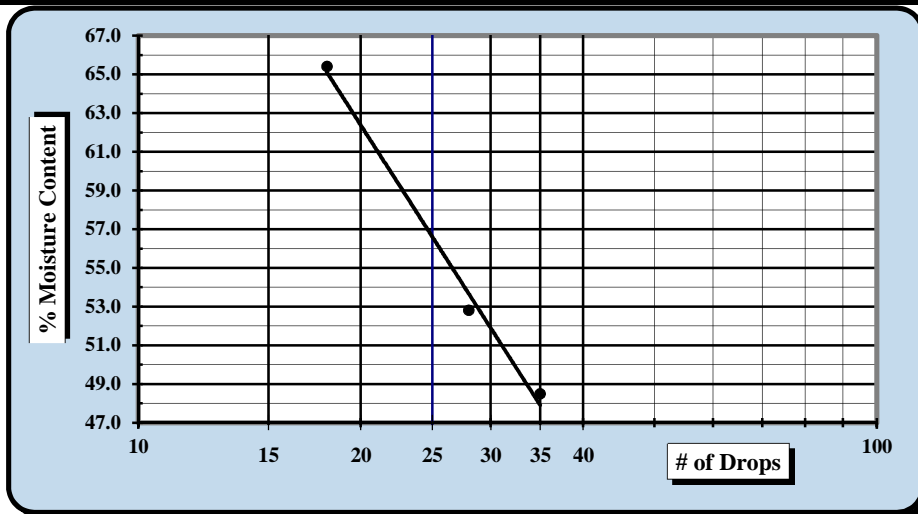
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/18/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-61	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 2.0'

Sample Description: Clayey sand (SC, A-7-6 (8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		21	5	9			19	30	
A	Tare Weight	15.51	15.39	15.43			15.42	17.81	
B	Wet Soil Weight + A	25.17	26.71	27.16			23.69	25.46	
C	Dry Soil Weight + A	21.35	22.80	23.33			21.92	23.83	
D	Water Weight (B-C)	3.82	3.91	3.83			1.77	1.63	
E	Dry Soil Weight (C-A)	5.84	7.41	7.90			6.50	6.02	
F	% Moisture (D/E)*100	65.4%	52.8%	48.5%			27.2%	27.1%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						27.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	56
Plastic Limit	27
Plastic Index	29
Group Symbol	CH
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/18/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

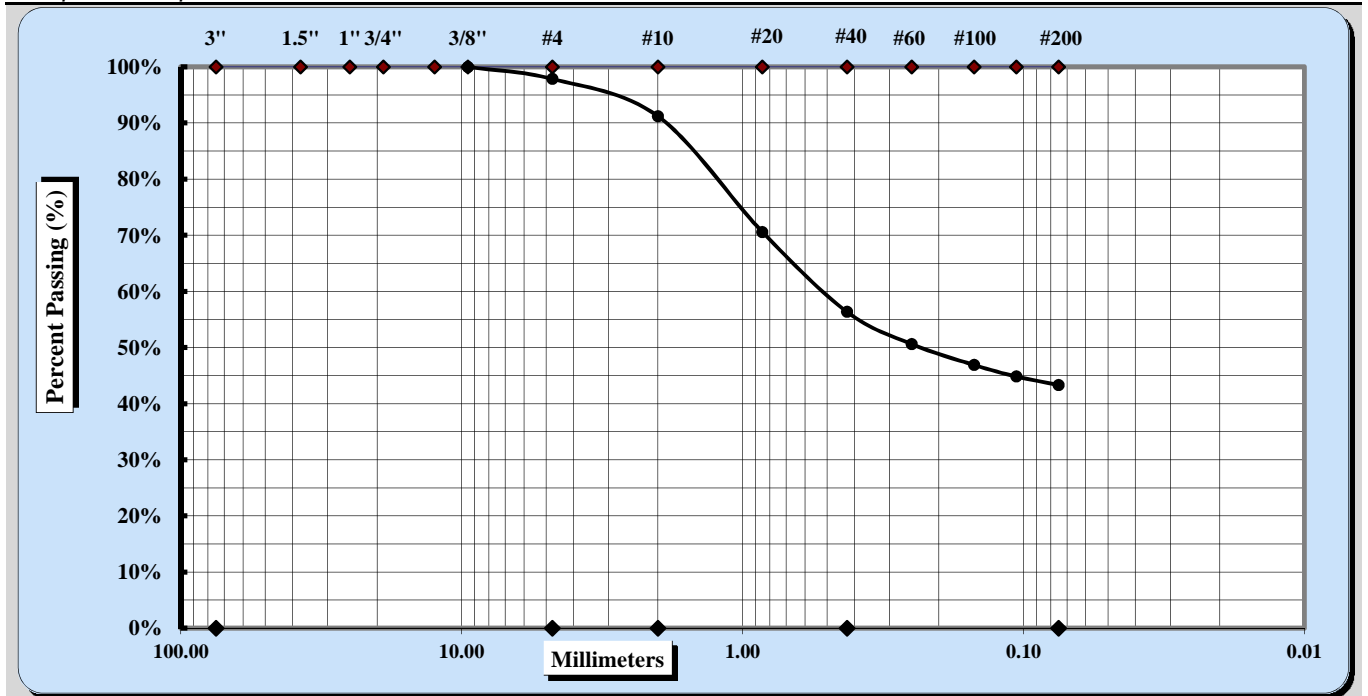


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B	Report Date:	5/23/2018
Project Name: Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name: HDR Engineering, Inc.		
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		
Sample ID: B-61	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 1	Depth: 0.0' - 2.0'
Sample Description: Clayey sand (SC, A-7-6 (8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	7%	Fine Sand	13%
Gravel	2%	Medium Sand	35%	Silt & Clay	43%
Liquid Limit	56	Plastic Limit	27	Plastic Index	29

Coarse Sand	7%	Medium Sand	35%	Fine Sand	13%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/18/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-61	Sample #:	SS-6
Log #:	43-2321	Sample Date:	Various
		Depth:	13.5' - 15.0'

Sample Description: Sandy lean clay (CL, A-6 (7))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		C-76	C-78	32-B			29	28-B	
A	Tare Weight	22.59	15.57	17.84			17.80	17.69	
B	Wet Soil Weight + A	26.12	25.73	26.39			25.82	26.78	
C	Dry Soil Weight + A	25.07	22.86	24.12			24.68	25.48	
D	Water Weight (B-C)	1.05	2.87	2.27			1.14	1.30	
E	Dry Soil Weight (C-A)	2.48	7.29	6.28			6.88	7.79	
F	% Moisture (D/E)*100	42.3%	39.4%	36.1%			16.6%	16.7%	
N	# OF DROPS	18	23	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						16.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	39
Plastic Limit	17
Plastic Index	22
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/18/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

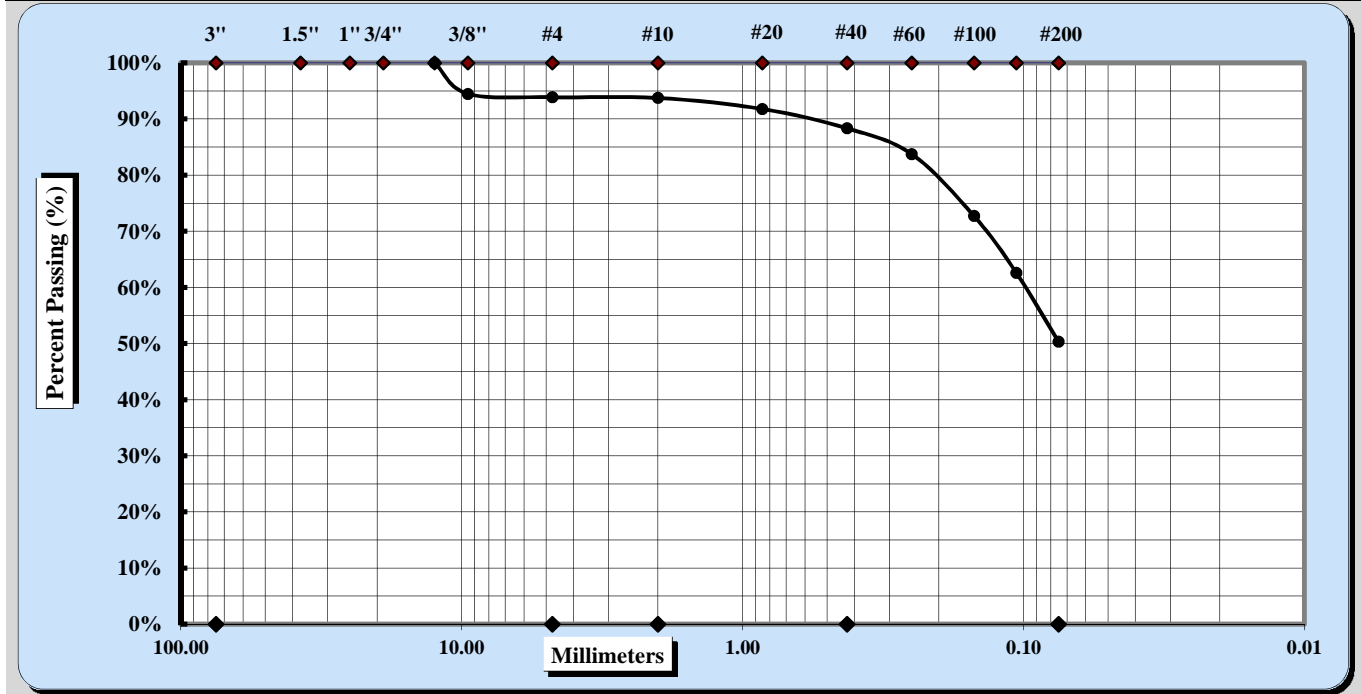


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-61	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	6
		Depth:	13.5' - 15.0'
Sample Description:	Sandy lean clay (CL, A-6 (7))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	0%	Fine Sand	38%
Gravel	6%	Medium Sand	5%	Silt & Clay	50%
Liquid Limit	39	Plastic Limit	17	Plastic Index	22

Coarse Sand	0%	Medium Sand	5%	Fine Sand	38%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/19/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-61	Sample #:	SS-7
Log #:	43-2321	Sample Date:	Various
		Depth:	18.5' - 20.0'

Sample Description: Silty sand (SM, A-6 (3))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		22	5	9			7	3	
A	Tare Weight	15.37	15.39	15.42			15.40	15.48	
B	Wet Soil Weight + A	23.46	24.61	25.29			25.66	23.74	
C	Dry Soil Weight + A	21.10	21.97	22.55			23.43	21.96	
D	Water Weight (B-C)	2.36	2.64	2.74			2.23	1.78	
E	Dry Soil Weight (C-A)	5.73	6.58	7.13			8.03	6.48	
F	% Moisture (D/E)*100	41.2%	40.1%	38.4%			27.8%	27.5%	
N	# OF DROPS	18	23	33			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						27.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **40**

Plastic Limit **28**

Plastic Index **12**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/19/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

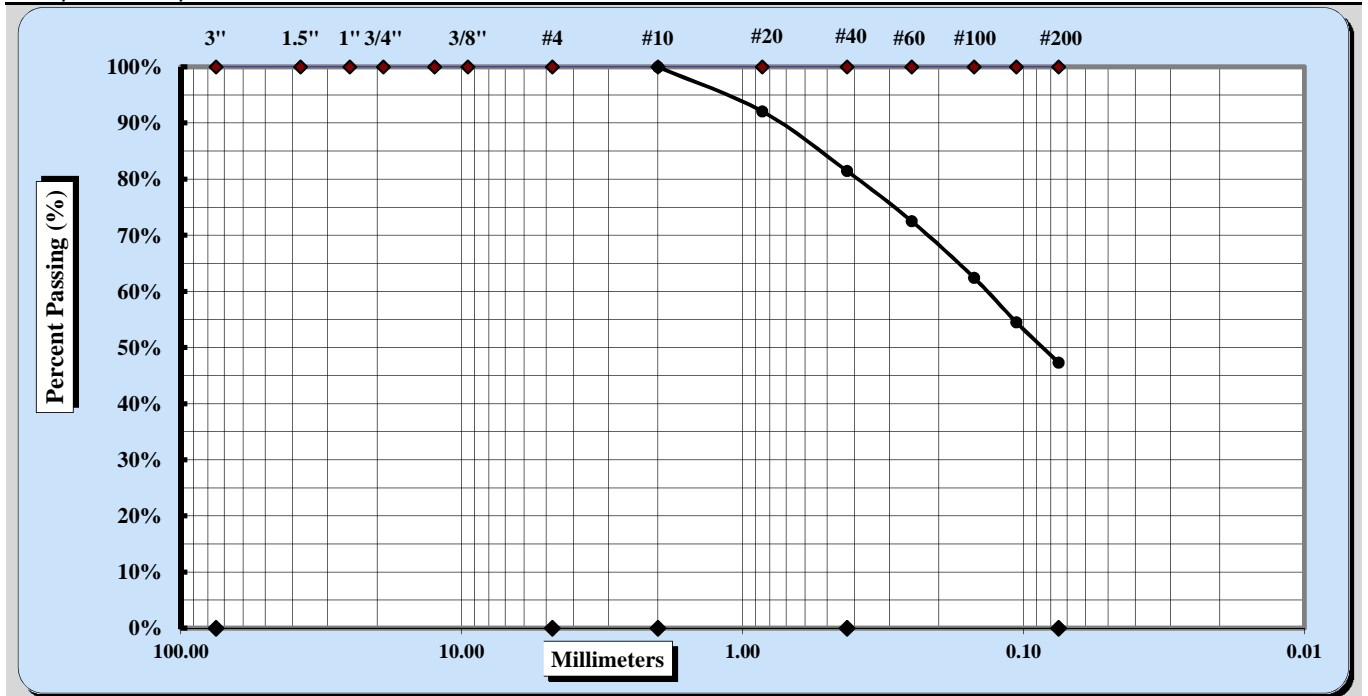


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B	Report Date:	5/23/2018
Project Name: Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name: HDR Engineering, Inc.		
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		
Sample ID: B-61	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 7	Depth: 18.5' - 20.0'
Sample Description: Silty sand (SM, A-6 (3))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 10	Coarse Sand	0%	Fine Sand	34%
Gravel	0%	Medium Sand	19%	Silt & Clay	47%
Liquid Limit	40	Plastic Limit	28	Plastic Index	12

Coarse Sand	0%	Medium Sand	19%	Fine Sand	34%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



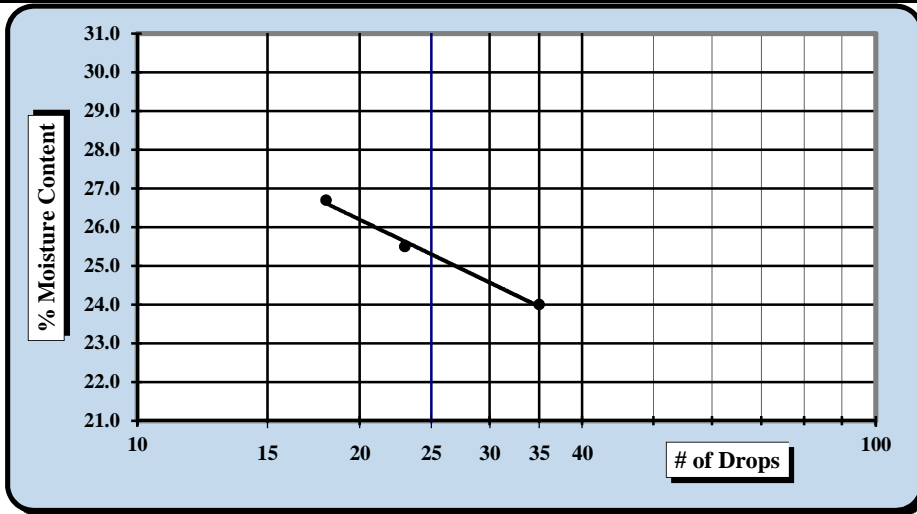
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/19/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-62	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Elevation:	0.0' - 2.0'

Sample Description: Sandy lean clay (CL, A-4 (2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		17	21	16			4	10	
A	Tare Weight	15.50	15.51	15.64			15.44	15.40	
B	Wet Soil Weight + A	25.46	26.47	27.05			24.47	25.07	
C	Dry Soil Weight + A	23.36	24.24	24.84			23.26	23.78	
D	Water Weight (B-C)	2.10	2.23	2.21			1.21	1.29	
E	Dry Soil Weight (C-A)	7.86	8.73	9.20			7.82	8.38	
F	% Moisture (D/E)*100	26.7%	25.5%	24.0%			15.5%	15.4%	
N	# OF DROPS	18	23	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						15.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	25
Plastic Limit	16
Plastic Index	9
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/19/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

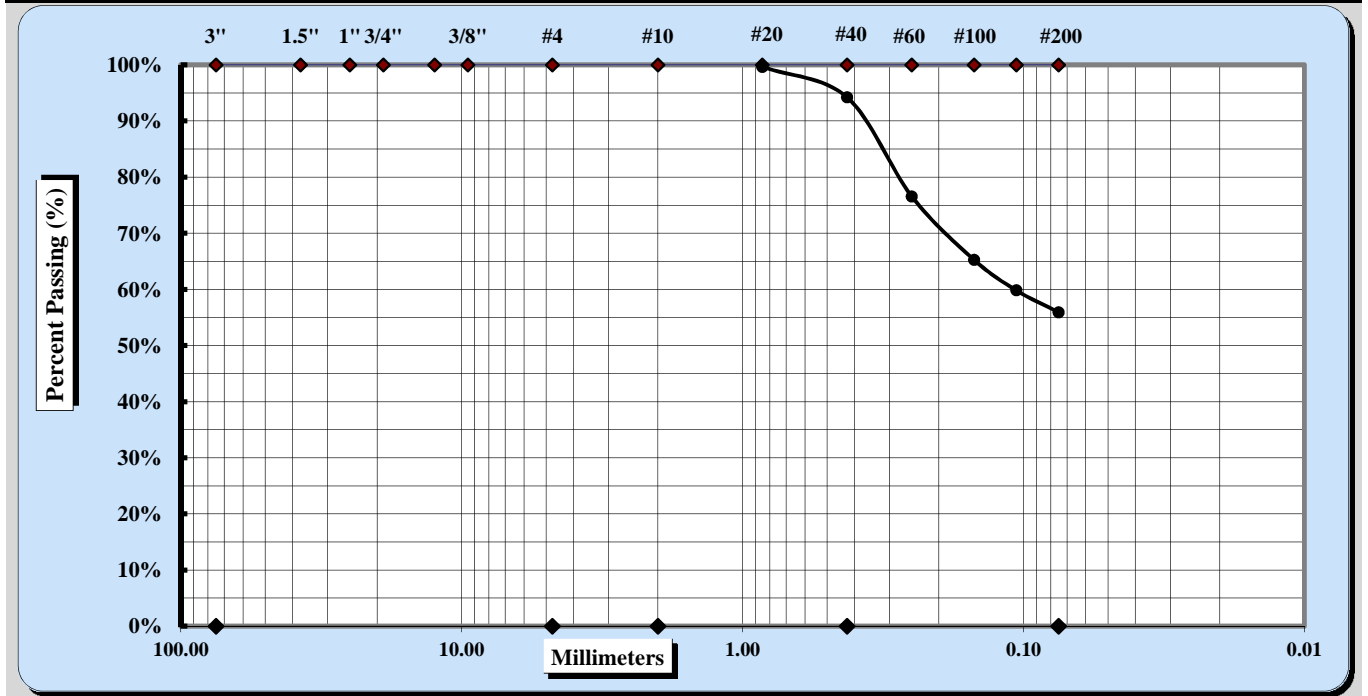


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-62	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	1
		Depth:	0.0' - 2.0'
Sample Description:	Sandy lean clay (CL, A-4 (2))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 20	Coarse Sand	0%	Fine Sand	38%
Gravel	0%	Medium Sand	6%	Silt & Clay	56%
Liquid Limit	25	Plastic Limit	16	Plastic Index	9

Coarse Sand	0%	Medium Sand	6%	Fine Sand	38%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

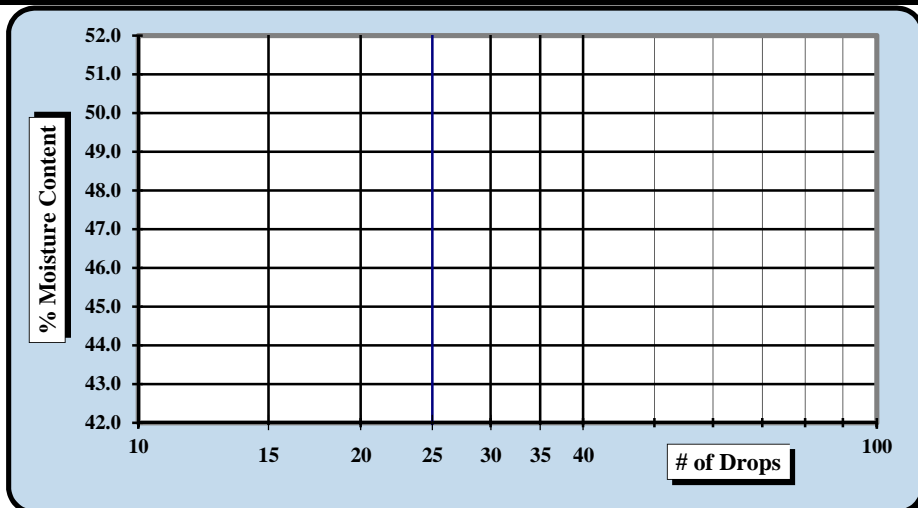
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/19/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-62	Sample #:	SS-2
Log #:	43-2321	Sample Date:	Various
		Depth:	2.0' - 4.0'

Sample Description: Silty sand (SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #		Liquid Limit				Plastic Limit		
		Tare #:						
A	Tare Weight							
B	Wet Soil Weight + A							
C	Dry Soil Weight + A							
D	Water Weight (B-C)							
E	Dry Soil Weight (C-A)							
F	% Moisture (D/E)*100							
N	# OF DROPS							
LL	LL = F * FACTOR							
Ave.	Average							

Moisture Contents determined by
ASTM D-2216



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit	NP
Plastic Limit	NP
Plastic Index	NP
Group Symbol	NP

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Derek Baker</u> Technician Name	<u>5/19/2018</u> Date	<u>Michael D. Kelso, E.I.</u> Technical Responsibility	<u>5/23/2018</u> Date
---------------------------------------	--------------------------	---	--------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

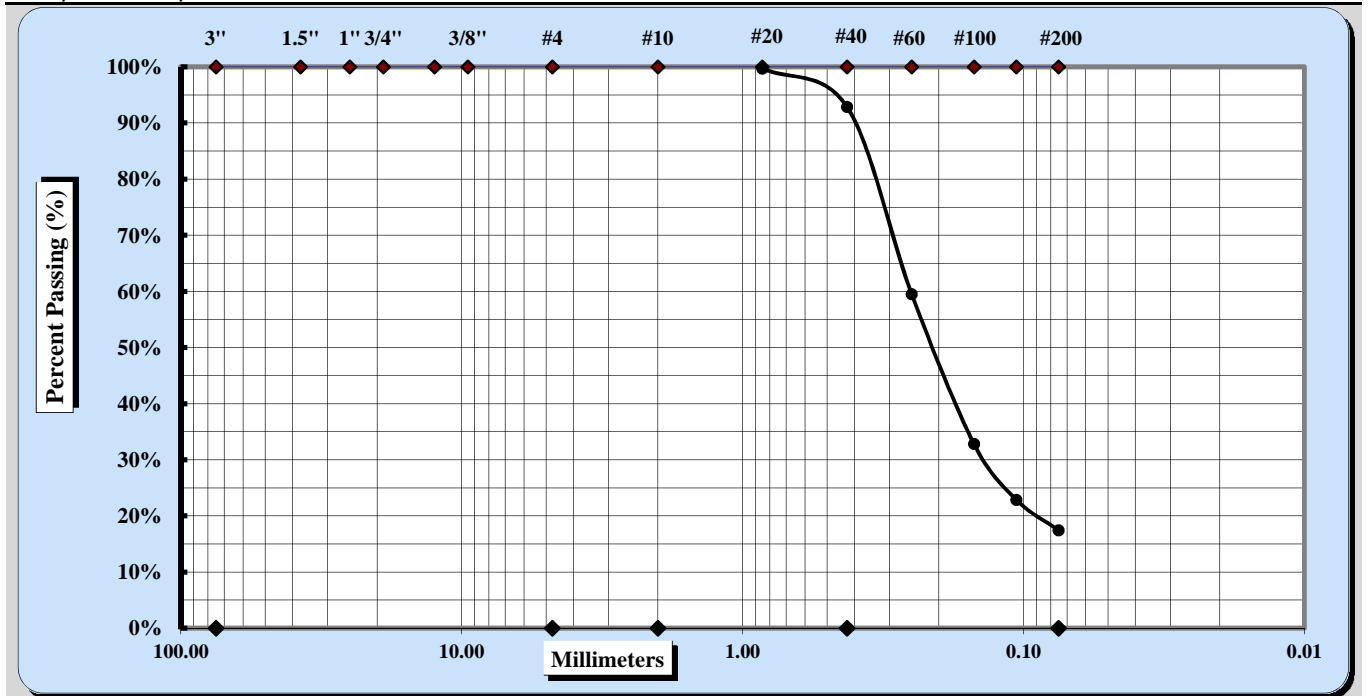


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B	Report Date:	5/23/2018
Project Name: Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name: HDR Engineering, Inc.		
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		
Sample ID: B-62	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 2	Depth: 2.0' - 4.0'
Sample Description: Silty sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 20	Coarse Sand	0%	Fine Sand	75%
Gravel	0%	Medium Sand	7%	Silt & Clay	17%

Coarse Sand	0%	Medium Sand	7%	Fine Sand	75%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/19/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-62	Sample #:	SS-5
Log #:	43-2321	Sample Date:	Various
		Depth:	8.0' - 10.0'

Sample Description: Silt with sand (ML, A-7-5 (14))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit				Plastic Limit		
		8	15	6		18	11	
A	Tare Weight	15.52	15.32	15.45		15.42	15.43	
B	Wet Soil Weight + A	23.62	24.49	25.49		23.89	24.71	
C	Dry Soil Weight + A	21.00	21.69	22.50		21.96	22.58	
D	Water Weight (B-C)	2.62	2.80	2.99		1.93	2.13	
E	Dry Soil Weight (C-A)	5.48	6.37	7.05		6.54	7.15	
F	% Moisture (D/E)*100	47.8%	44.0%	42.4%		29.5%	29.8%	
N	# OF DROPS	18	27	33		Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR							
Ave.	Average					29.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **45**

Plastic Limit **30**

Plastic Index **15**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/19/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

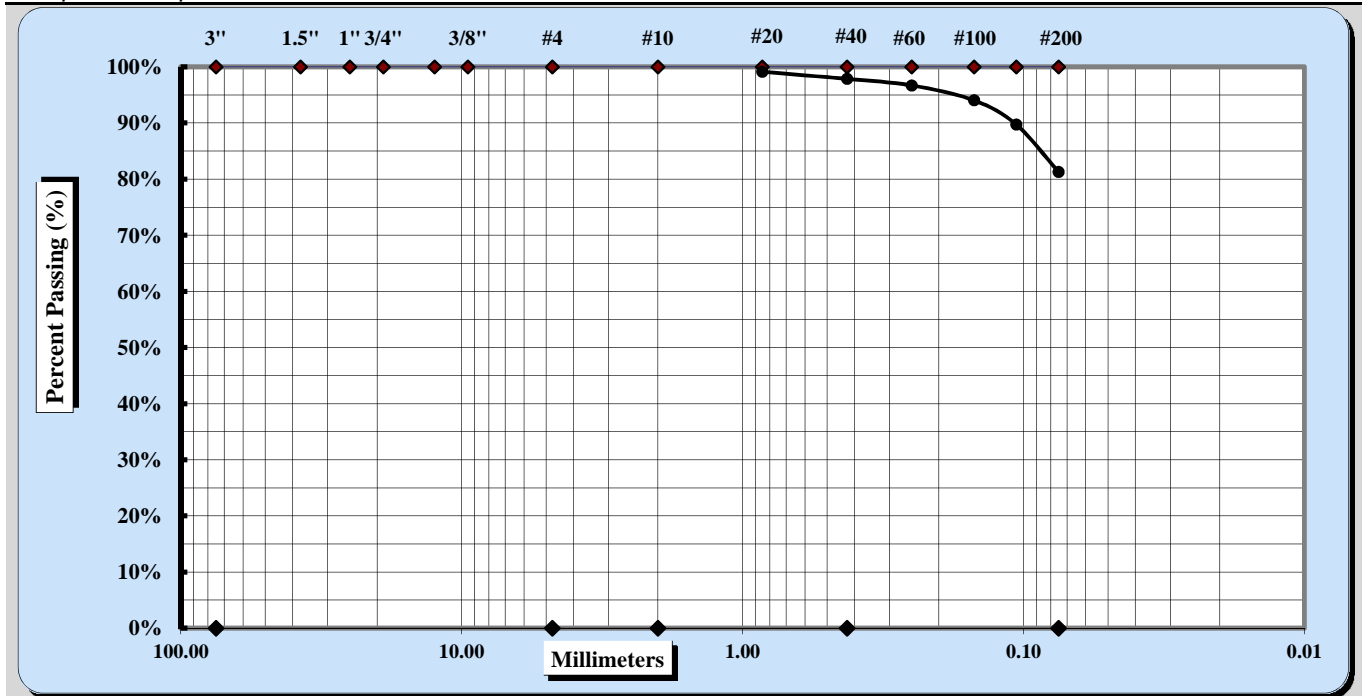


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/5/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-62	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	5
		Depth:	8.0' - 10.0'
Sample Description:	Silt with sand (ML, A-7-5 (14))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 20	Coarse Sand	0%	Fine Sand	17%
Gravel	0%	Medium Sand	2%	Silt & Clay	81%
Liquid Limit	45	Plastic Limit	30	Plastic Index	15

Coarse Sand	0%	Medium Sand	2%	Fine Sand	17%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

F&ME CONSULTANTS
3112 Devine Street
Columbia, South Carolina 29205

MOISTURE CONTENT DETERMINATION
(AASHTO T265)

PROJECT: I-20/26/126 Corridor Improvements **PROJECT NO.:** G5662.01
SAMPLE NUMBER: 18-0155 **DATE SAMPLE RECEIVED:** 1/26/2018
DESCRIPTION OF SOIL: VARIOUS
TESTED BY: MB **DATE OF TESTING:** 1/29/2018
DATE OF WEIGHING: 1/30/2018

BORING NO.	DH-3	DH-3			
SAMPLE NO.	18-0155C SS-1	18-0155F SS-4			
SAMPLE DEPTH	0.0-2.0'	6.0-8.0'			
WATER CONTENT, W%	27.8	26.4			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

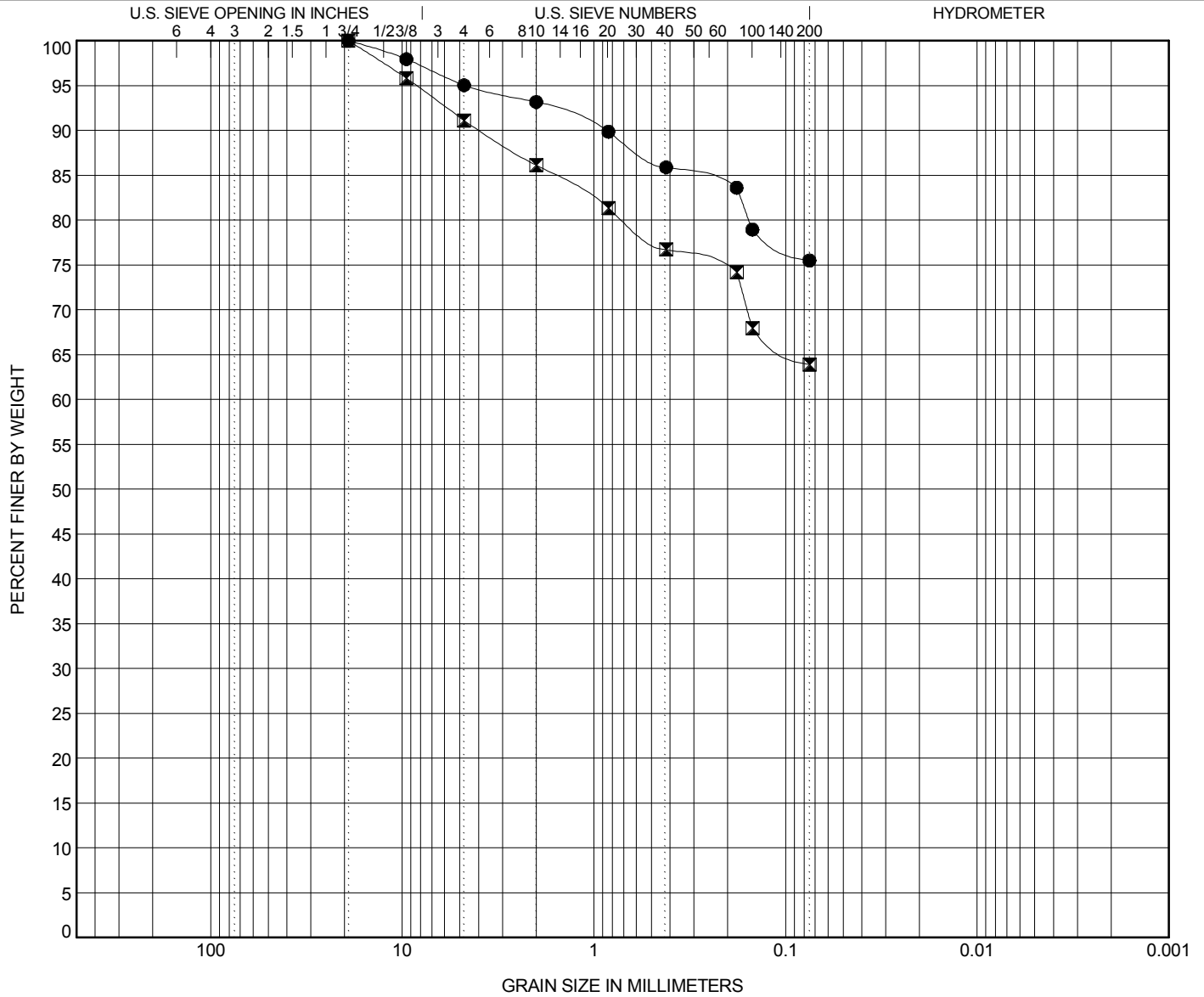


GRAIN SIZE DISTRIBUTION

PROJECT ID P027662

PROJECT NAME I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● DH-3	2.0	SILT (ML) with F/M Sand A-7-5(12)	45	31	14		
◻ DH-3	8.0	Sandy SILT (ML) A-4(3)	32	26	6		

BOREHOLE	DEPTH	D100	D95	D50	D10	%Gravel	%Sand	%Silt	%Clay
● DH-3	2.0	19.1	4.617			4.9	19.5	75.5	
◻ DH-3	8.0	19.1	8.407			8.9	27.2	63.9	

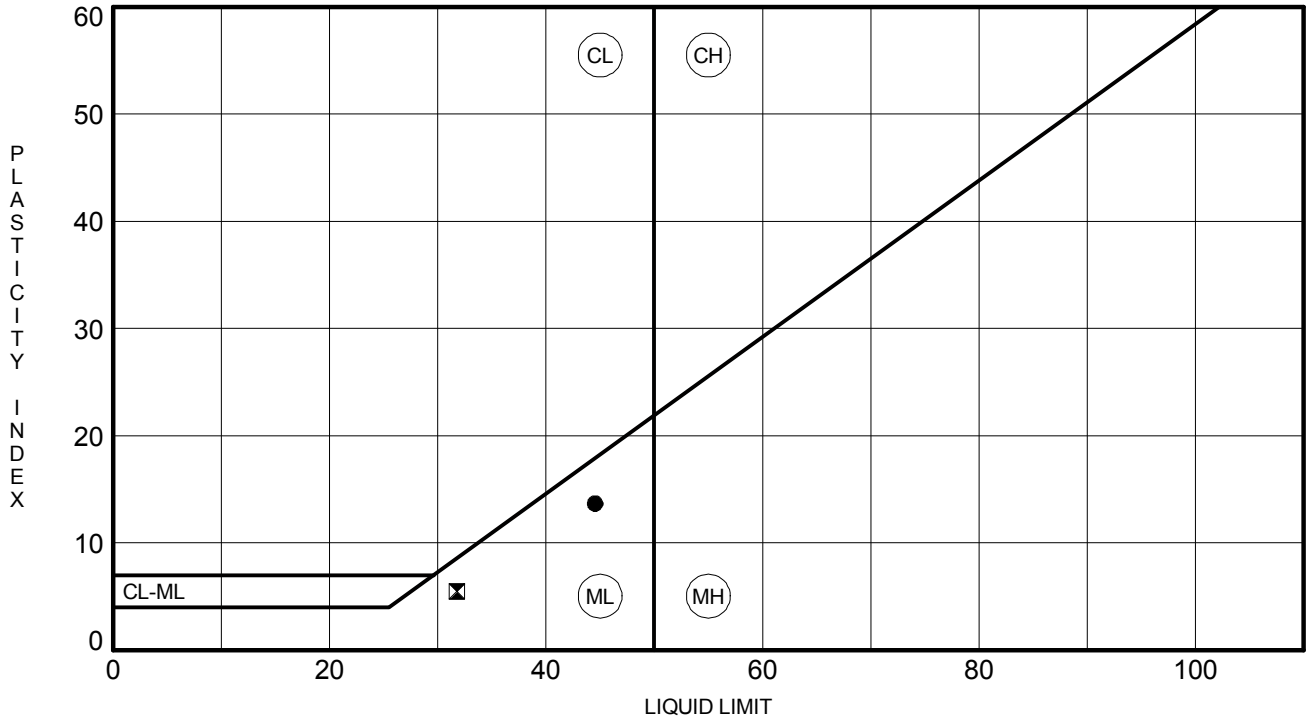


ATTERBERG LIMITS' RESULTS

PROJECT ID P027662

PROJECT NAME I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● DH-3	2.0	45	31	14	76	SILT (ML) with F/M Sand A-7-5(12)
■ DH-3	8.0	32	26	6	64	Sandy SILT (ML) A-4(3)

ATTERBERG LIMITS - SCDOT G5662.01 - CAROLINA CROSSROADS.GPJ FME2017.GDT 2/13/18

F&ME CONSULTANTS
3112 Devine Street
Columbia, South Carolina 29205

MOISTURE CONTENT DETERMINATION
(AASHTO T265)

PROJECT: I-20/26/126 Corridor Improvements **PROJECT NO.:** G5662.01
SAMPLE NUMBER: 18-0155 **DATE SAMPLE RECEIVED:** 1/26/2018
DESCRIPTION OF SOIL: VARIOUS
TESTED BY: MB **DATE OF TESTING:** 1/29/2018
DATE OF WEIGHING: 1/30/2018

BORING NO.	DH-3.1	DH-3.1			
SAMPLE NO.	18-0155I SS-6	18-0155L SS-8			
SAMPLE DEPTH	43.5-45.0'	53.5-55.0'			
WATER CONTENT, W%	28.2	47.2			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

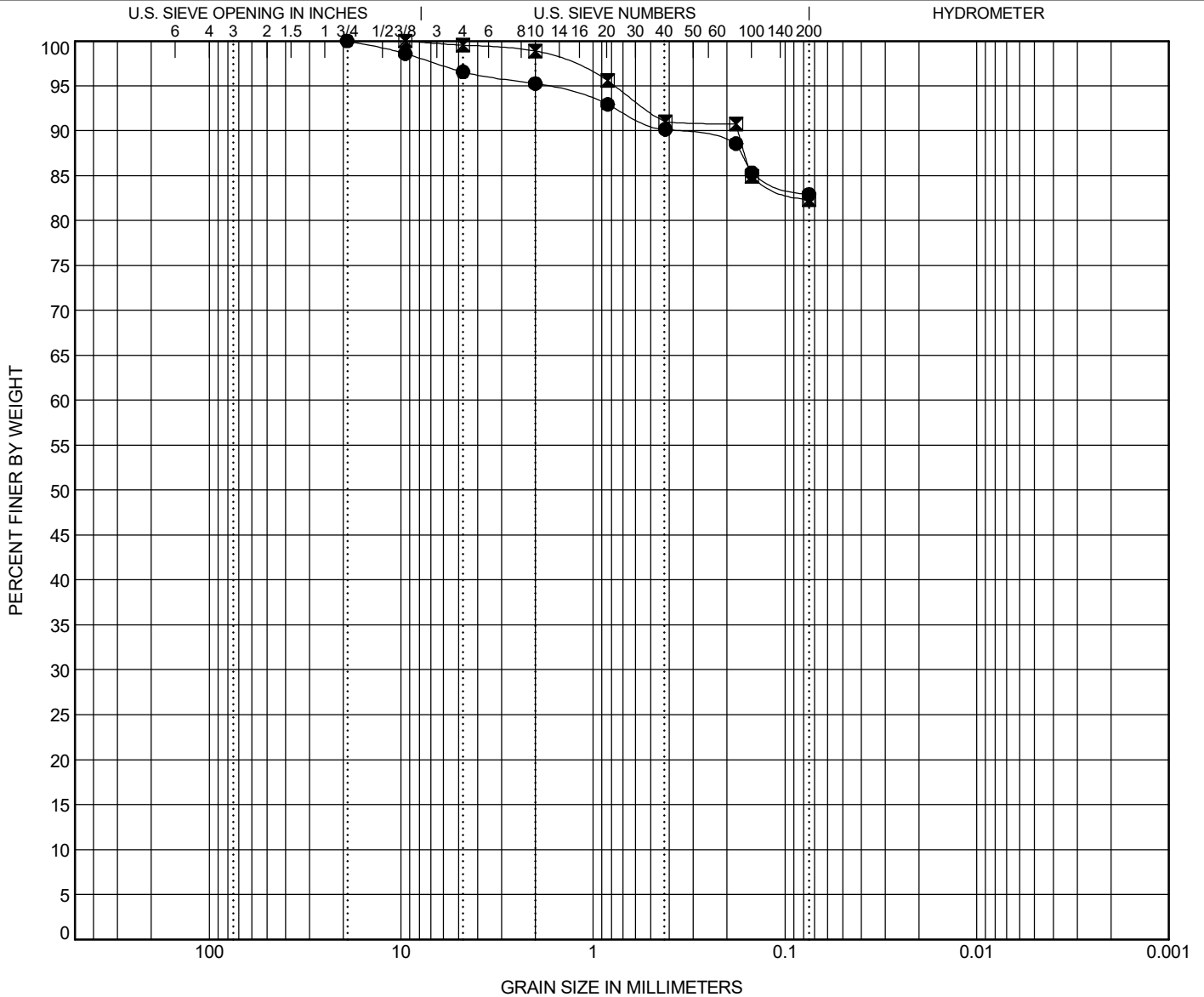


GRAIN SIZE DISTRIBUTION

PROJECT ID P027662

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● DH-3.1	45.0	Sandy SILT (ML) A-7-5(8)					42	31	11		
■ DH-3.1	55.0	Elastic SILT (MH) with F/M Sand A-7-5(17)					53	36	17		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● DH-3.1	45.0	19.1				3.4	13.6	82.9	
■ DH-3.1	55.0	9.52				0.5	17.2	82.3	

GRAIN SIZE G5662.01 - CAROLINA CROSSROADS.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/19/20

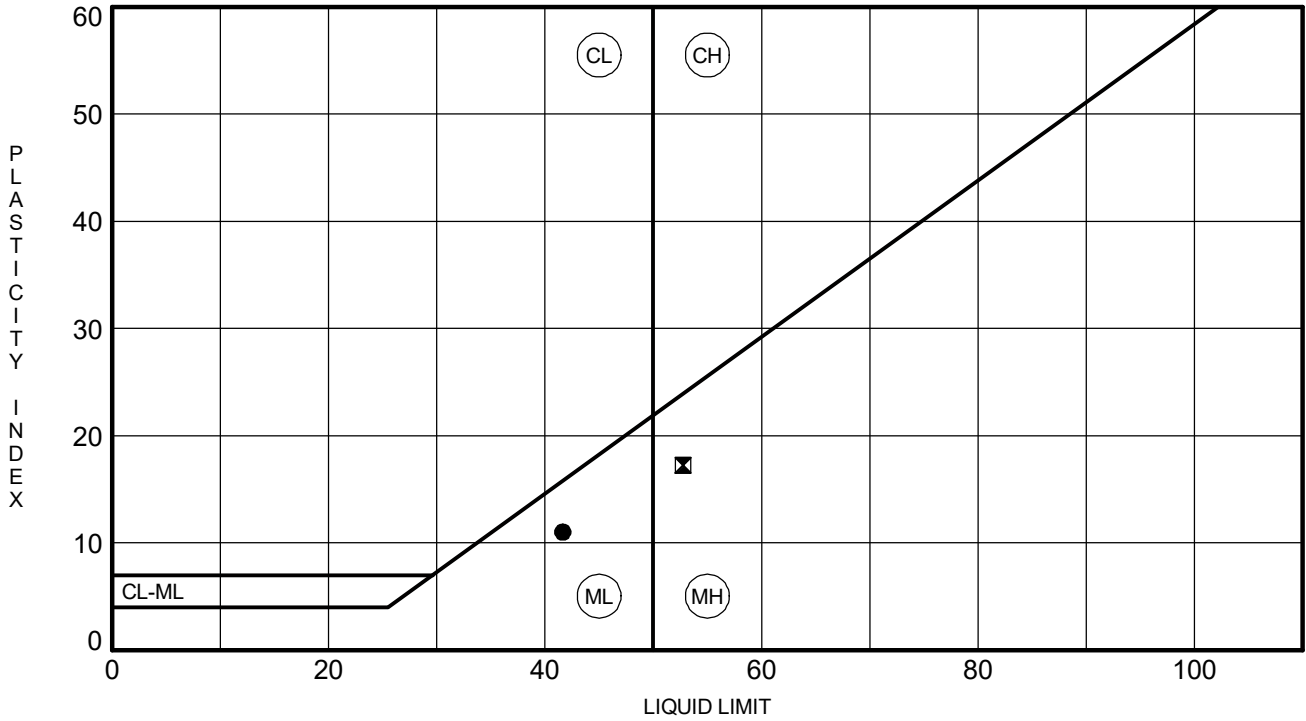


ATTERBERG LIMITS' RESULTS

PROJECT ID P027662

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● DH-3.1	45.0	42	31	11	83	Sandy SILT (ML) A-7-5(8)
☒ DH-3.1	55.0	53	36	17	82	Elastic SILT (MH) with F/M Sand A-7-5(17)

ATTERBERG LIMITS G5662.01 - CAROLINA CROSSROADS.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 5/19/20

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



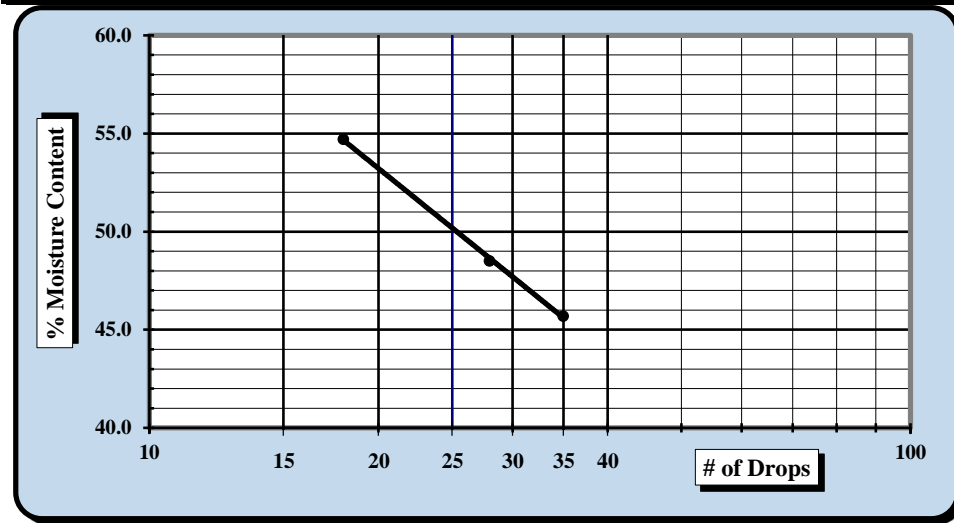
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date:	3/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-6	Sample #:	SS-1
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/10/18
		Depth:	0.0' - 2.0'

Sample Description: Sandy Fat Clay (CH, A-7-6(11))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.66	26.66	26.78			26.65	27.60	
B	Wet Soil Weight + A	39.16	42.36	39.85			33.51	35.23	
C	Dry Soil Weight + A	35.24	37.23	35.23			32.21	33.79	
D	Water Weight (B-C)	3.92	5.13	4.62			1.30	1.44	
E	Dry Soil Weight (C-A)	8.58	10.57	8.45			5.56	6.19	
F	% Moisture (D/E)*100	45.7%	48.5%	54.7%			23.4%	23.3%	
N	# OF DROPS	35	28	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						23.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	50
Plastic Limit	23
Plastic Index	27
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 52.1%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/15/18</u> Date	 Technical Responsibility	<u>3/15/18</u> Date
---	------------------------	------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

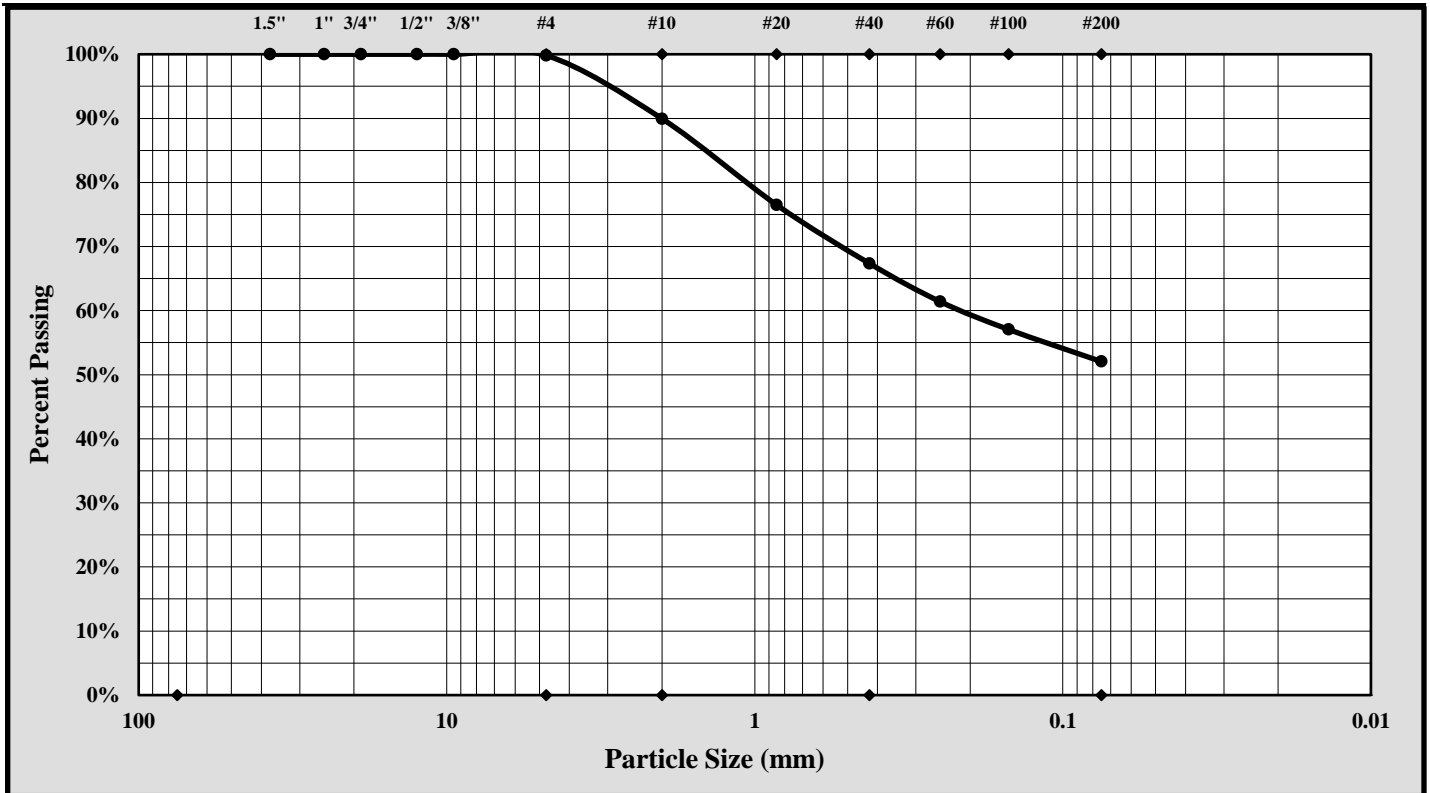


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/05 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-6	Sample #:	SS-1
		Sample Date:	1/10/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Sandy Fat Clay (CH, A-7-6(11))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	4.75 mm	Gravel:	0.2%
Silt & Clay (% Passing #200):	52.1%	Total Sand:	47.8%

Liquid Limit	50	Plastic Limit	23	Plastic Index	27
Coarse Sand:	9.9%	Medium Sand:	22.6%	Fine Sand:	15.3%

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
--------------------------------	----------------------------------	---	--	-------------------------------	--

References / Comments / Deviations:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

3/15/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



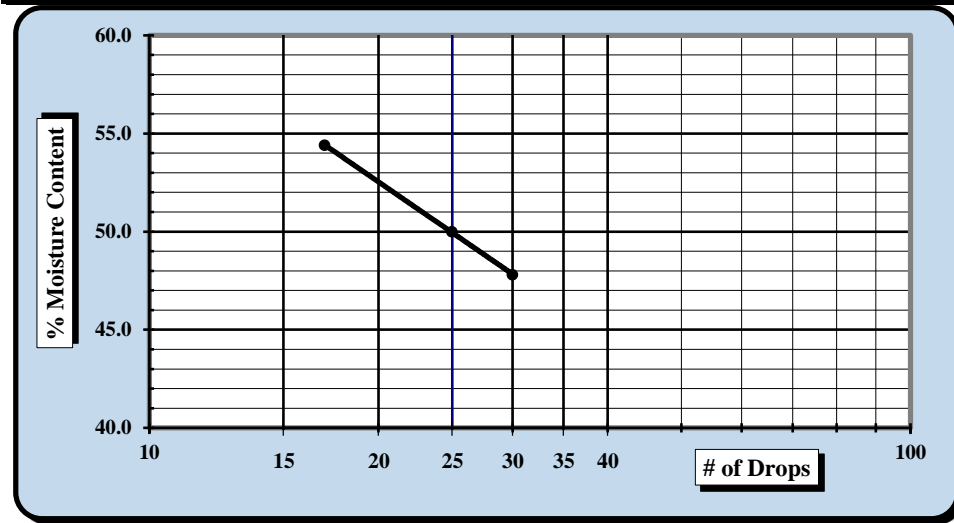
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date:	3/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-6	Sample #:	SS-2
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/10/18
		Depth:	2.0' - 4.0'

Sample Description: Clayey Sand (SC, A-7-6(7))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		16	17	18			19	20		
A	Tare Weight	26.57	26.62	26.81				26.67	26.83	
B	Wet Soil Weight + A	44.32	42.15	43.49				35.30	34.19	
C	Dry Soil Weight + A	38.58	36.97	37.61				33.52	32.63	
D	Water Weight (B-C)	5.74	5.18	5.88				1.78	1.56	
E	Dry Soil Weight (C-A)	12.01	10.35	10.80				6.85	5.80	
F	% Moisture (D/E)*100	47.8%	50.0%	54.4%				26.0%	26.9%	
N	# OF DROPS	30	25	17				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							26.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	50
Plastic Limit	26
Plastic Index	24
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 46.9%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/15/18</u> Date	 Technical Responsibility	<u>3/15/18</u> Date
---	------------------------	------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

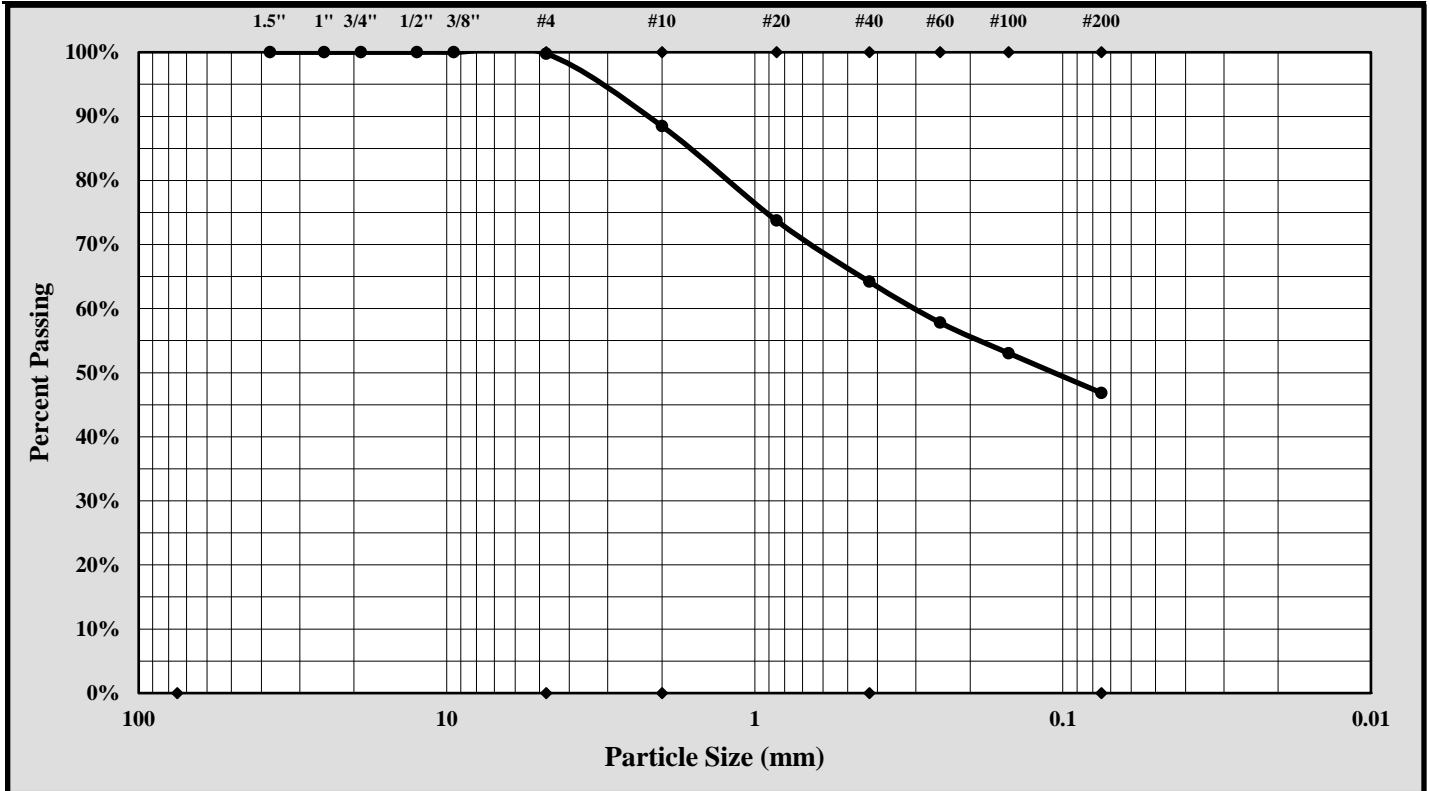


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/02 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-6	Sample #:	SS-2
		Sample Date:	1/10/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Clayey Sand (SC, A-7-6(7))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.2%
 Silt & Clay (% Passing #200): 46.9% Total Sand: 52.9%

Liquid Limit	50	Plastic Limit	26	Plastic Index	24
Coarse Sand:	11.3%	Medium Sand:	24.3%	Fine Sand:	17.3%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/15/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date:	3/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-6	Sample #:	SS-3
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/10/18
		Depth:	4.0' - 6.0'

Sample Description: Clayey Sand (SC, A-7-6(7))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		21	22	23			24	25	
A	Tare Weight	28.08	25.69	27.26			26.00	26.82	
B	Wet Soil Weight + A	45.10	42.44	44.19			33.92	34.44	
C	Dry Soil Weight + A	39.82	36.96	38.36			32.35	32.95	
D	Water Weight (B-C)	5.28	5.48	5.83			1.57	1.49	
E	Dry Soil Weight (C-A)	11.74	11.27	11.10			6.35	6.13	
F	% Moisture (D/E)*100	45.0%	48.6%	52.5%			24.7%	24.3%	
N	# OF DROPS	34	24	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.5%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	48	
Plastic Limit	25	
Plastic Index	23	
Group Symbol	CL	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 46.3%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/15/18</u> Date	 Technical Responsibility	<u>3/15/18</u> Date
---	------------------------	------------------------------	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

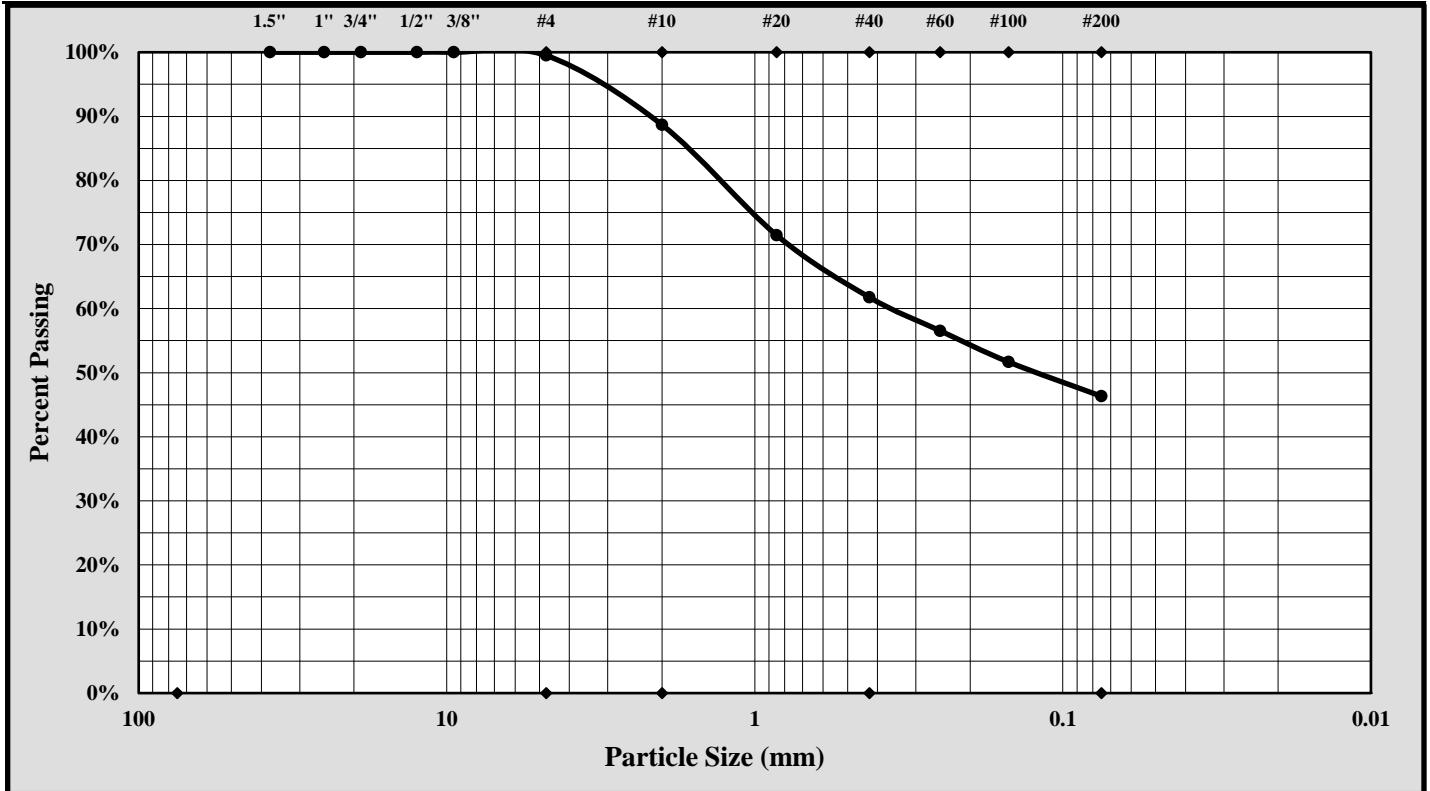


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/05 - 3/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-6	Sample #:	SS-3
		Sample Date:	1/10/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	4.0' - 6.0'
Sample Description:	Clayey Sand (SC, A-7-6(7))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.5%
 Silt & Clay (% Passing #200): 46.3% Total Sand: 53.2%

Liquid Limit 48 Plastic Limit 25 Plastic Index 23

Coarse Sand: 10.8% Medium Sand: 26.9% Fine Sand: 15.5%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Brian Vaughan, P.E.

Technical Responsibility

Signature

Group Leader

Position

3/15/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/14/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/12 - 2/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	1/24 - 1/25/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	13942	Calibration Date:	8/18/17
			Oven ID.	13978	Calibration Date:	10/07/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
RW-37	SS-3	4.0 - 6.0	D-16	0.00	70.96	62.07	8.89	14.3%	
RW-37	SS-6	13.5 - 15.0	D-17	0.00	70.92	56.09	14.83	26.4%	
RW-37	SS-8	23.5 - 25.0	D-18	0.00	73.37	61.58	11.79	19.1%	
RW-35	SS-3	4.0 - 6.0	D-8	0.00	73.49	53.36	20.13	37.7%	
RW-35	SS-5	8.0 - 10.0	D-6	0.00	70.63	60.51	10.12	16.7%	
RW-35	SS-8	23.5 - 25.0	D-15	0.00	73.81	60.45	13.36	22.1%	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

<u>Benjamin Kovalski</u> Technician Name	 Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>2/14/18</u> Date
<u>Brian Vaughan, P.E.</u> Technical Responsibility	 Signature	<u>Group Leader</u> Position	<u>2/14/18</u> Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/28 - 3/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	3/01/18
Sampling Method:	Split-spoon	Drill Rig:	Diedrich D-50

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	13942	Calibration Date:	8/18/17
			Oven ID.	13978	Calibration Date:	10/07/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. +	Tare Wt. +	Water Weight	Percent Moisture	Note
					Wet Wt	Dry Wt			
		ft.		grams	grams	grams	grams	%	
RW-36	SS-1	0.0 - 2.0	A-2	0.00	54.72	43.70	11.02	25.2%	
RW-36	SS-4	6.0 - 8.0	T-2	0.00	53.26	46.28	6.98	15.1%	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

<u>Benjamin Kovaleski</u> Technician Name	<i>Benjamin J. Kovaleski</i> Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>4/26/18</u> Date
<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position		<u>4/26/18</u> Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/28 - 4/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	3/14 - 3/15/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55/Diedrich D-50

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID. 13942	Calibration Date: 8/18/17
			Oven ID. 13978	Calibration Date: 10/07/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
RW-41	SS-1	0.0 - 2.0	26	0.00	52.83	47.97	4.86	10.1%	
RW-41	SS-2	2.0 - 4.0	F	0.00	55.65	48.83	6.82	14.0%	
RW-41	SS-4	6.0 - 8.0	R	0.00	51.54	41.71	9.83	23.6%	
RW-42	SS-1	0.0 - 2.0	E	0.00	50.50	45.71	4.79	10.5%	
RW-42	SS-4	6.0 - 8.0	D-13	0.00	51.18	41.31	9.87	23.9%	
RW-42	SS-7	18.5 - 20.0	D-117	0.00	53.14	44.50	8.64	19.4%	
RW-42	SS-10	33.5 - 35.0	D-1	0.00	54.65	42.12	12.53	29.7%	
RW-42	SS-12	43.5 - 45.0	A-2	0.00	54.98	42.86	12.12	28.3%	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

<u>Benjamin Kovaleski</u> Technician Name	 Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>5/08/18</u> Date
<u>Matthew F. Cooke, P.G.</u> Technical Responsibility		<u>Project Manager</u> Position	<u>5/08/18</u> Date

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



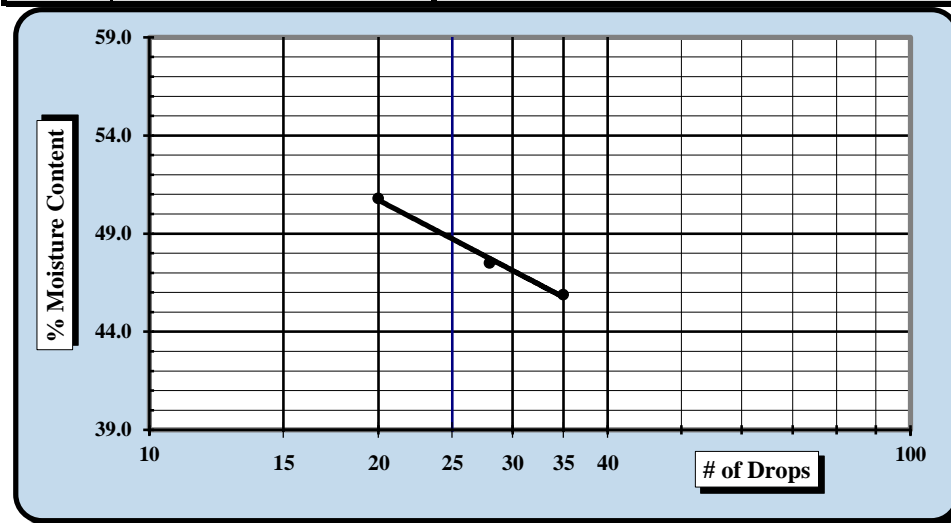
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-35	Sample #:	SS-3
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	1/24/18
		Depth:	4.0' - 6.0'

Sample Description: Sandy Silt (ML, A-7-5 (11))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.67	26.66	26.78			26.66	27.61	
B	Wet Soil Weight + A	44.06	41.88	42.03			34.26	34.53	
C	Dry Soil Weight + A	38.59	36.98	36.89			32.46	32.88	
D	Water Weight (B-C)	5.47	4.90	5.14			1.80	1.65	
E	Dry Soil Weight (C-A)	11.92	10.32	10.11			5.80	5.27	
F	% Moisture (D/E)*100	45.9%	47.5%	50.8%			31.0%	31.3%	
N	# OF DROPS	35	28	20			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						31.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	49
Plastic Limit	31
Plastic Index	18
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 64.2%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

3/09/18
 Date

Brian Vaughan
 Technical Responsibility

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

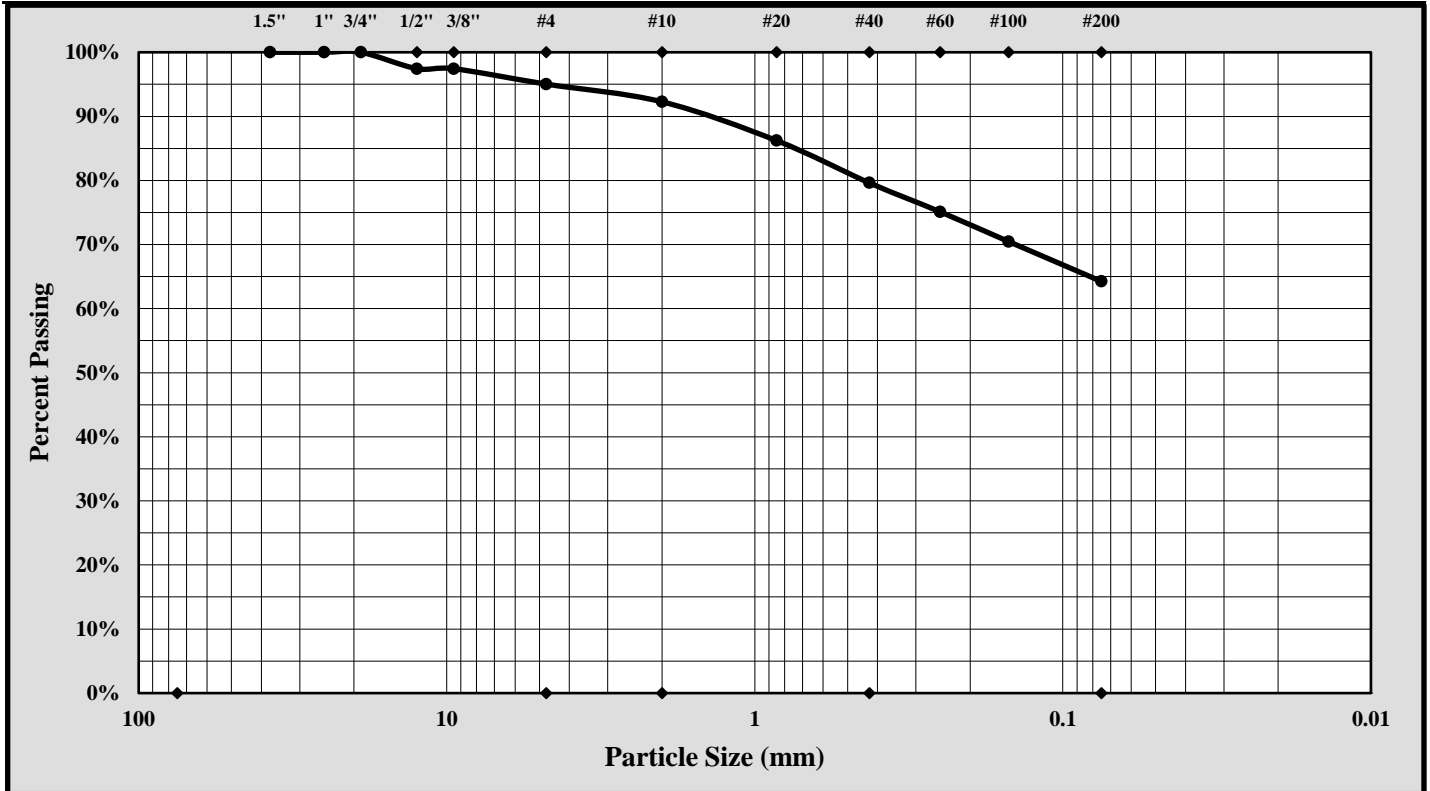


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #: 1461-16-047.2B		Report Date: 3/09/18	
Project Name: Carolina Crossroads Project		Test Date(s): 2/28 - 3/09/18	
Client Name: HDR Engineering, Inc.			
Address: 4400 Leeds Ave., North Charleston, South Carolina			
Boring #: RW-35	Sample #: SS-3	Sample Date: 1/24/18	
Location: Embankment Boring	Type: Split-spoon	Depth: 4.0' - 6.0'	
Sample Description: Sandy Silt (ML, A-7-5 (11))			



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	19.0 mm	Gravel:	5.0%
Silt & Clay (% Passing #200):	64.2%	Total Sand:	30.8%

Liquid Limit	49	Plastic Limit	31	Plastic Index	18
Coarse Sand:	2.8%	Medium Sand:	12.6%	Fine Sand:	15.4%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

3/09/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



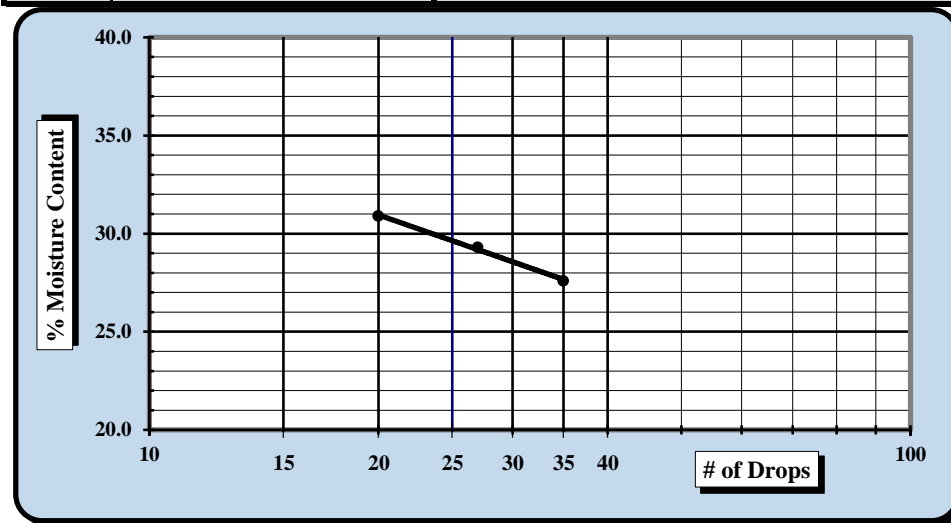
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-35	Sample #:	SS-5
Location:	Embankment Boring	Sample Date:	1/24/18
Type:	Split-spoon	Depth:	8.0' - 10.0'

Sample Description: Lean Clay (CL, A-4(7))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		16	17	18			19	20		
A	Tare Weight	26.57	26.63	26.77				26.68	26.83	
B	Wet Soil Weight + A	47.62	48.50	46.73				33.75	33.63	
C	Dry Soil Weight + A	43.07	43.55	42.02				32.45	32.39	
D	Water Weight (B-C)	4.55	4.95	4.71				1.30	1.24	
E	Dry Soil Weight (C-A)	16.50	16.92	15.25				5.77	5.56	
F	% Moisture (D/E)*100	27.6%	29.3%	30.9%				22.5%	22.3%	
N	# OF DROPS	35	27	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							22.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	30
Plastic Limit	22
Plastic Index	8
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 92.8%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

3/09/18
 Date

Brian Vaughan
 Technical Responsibility

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

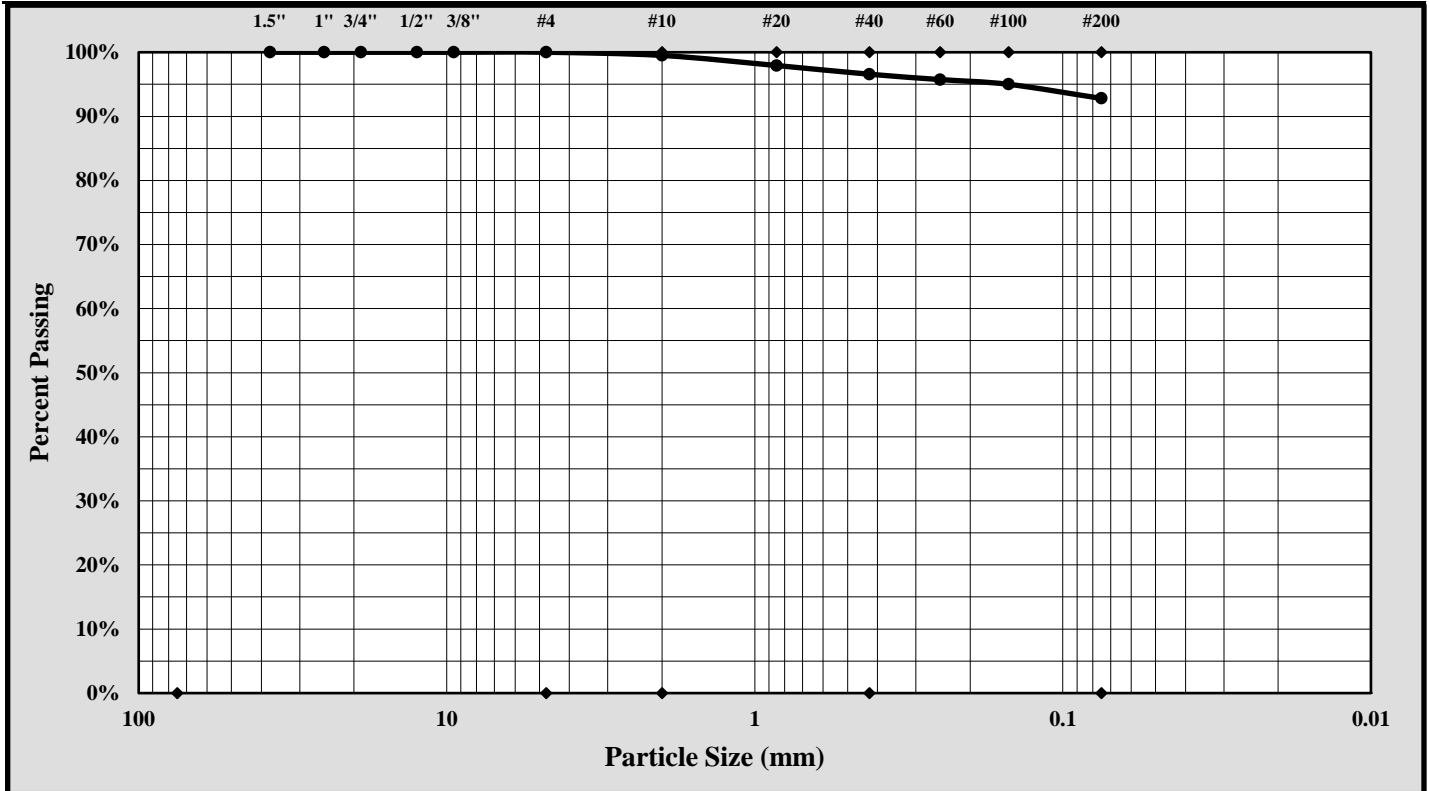
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/28 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-35	Sample #:	SS-5
		Sample Date:	1/24/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'
Sample Description:	Lean Clay (CL, A-4(7))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 2.00 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 92.8% Total Sand: 7.2%

Liquid Limit	30	Plastic Limit	22	Plastic Index	8
Coarse Sand:	0.5%	Medium Sand:	2.9%	Fine Sand:	3.8%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



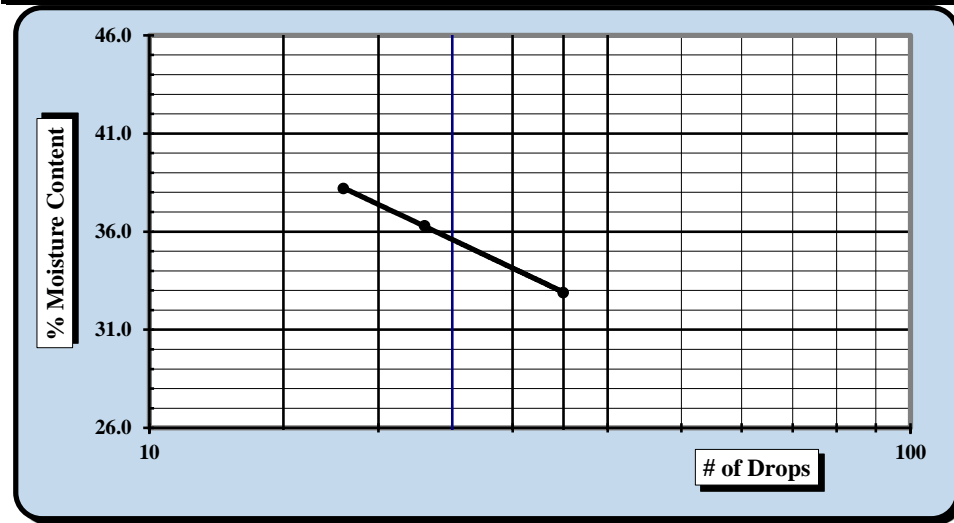
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-35	Sample #:	SS-8
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	1/24/18
		Depth:	23.5' - 25.0'

Sample Description: Silt with Sand (ML, A-4(6))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		21	22	23			24	25	
A	Tare Weight	28.09	25.69	27.22			26.00	26.83	
B	Wet Soil Weight + A	45.65	43.50	47.62			32.83	33.29	
C	Dry Soil Weight + A	41.30	38.76	41.98			31.42	31.94	
D	Water Weight (B-C)	4.35	4.74	5.64			1.41	1.35	
E	Dry Soil Weight (C-A)	13.21	13.07	14.76			5.42	5.11	
F	% Moisture (D/E)*100	32.9%	36.3%	38.2%			26.0%	26.4%	
N	# OF DROPS	35	23	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						26.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	36
Plastic Limit	26
Plastic Index	10
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 70.3%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/09/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/09/18</u> Date
---	------------------------	--	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

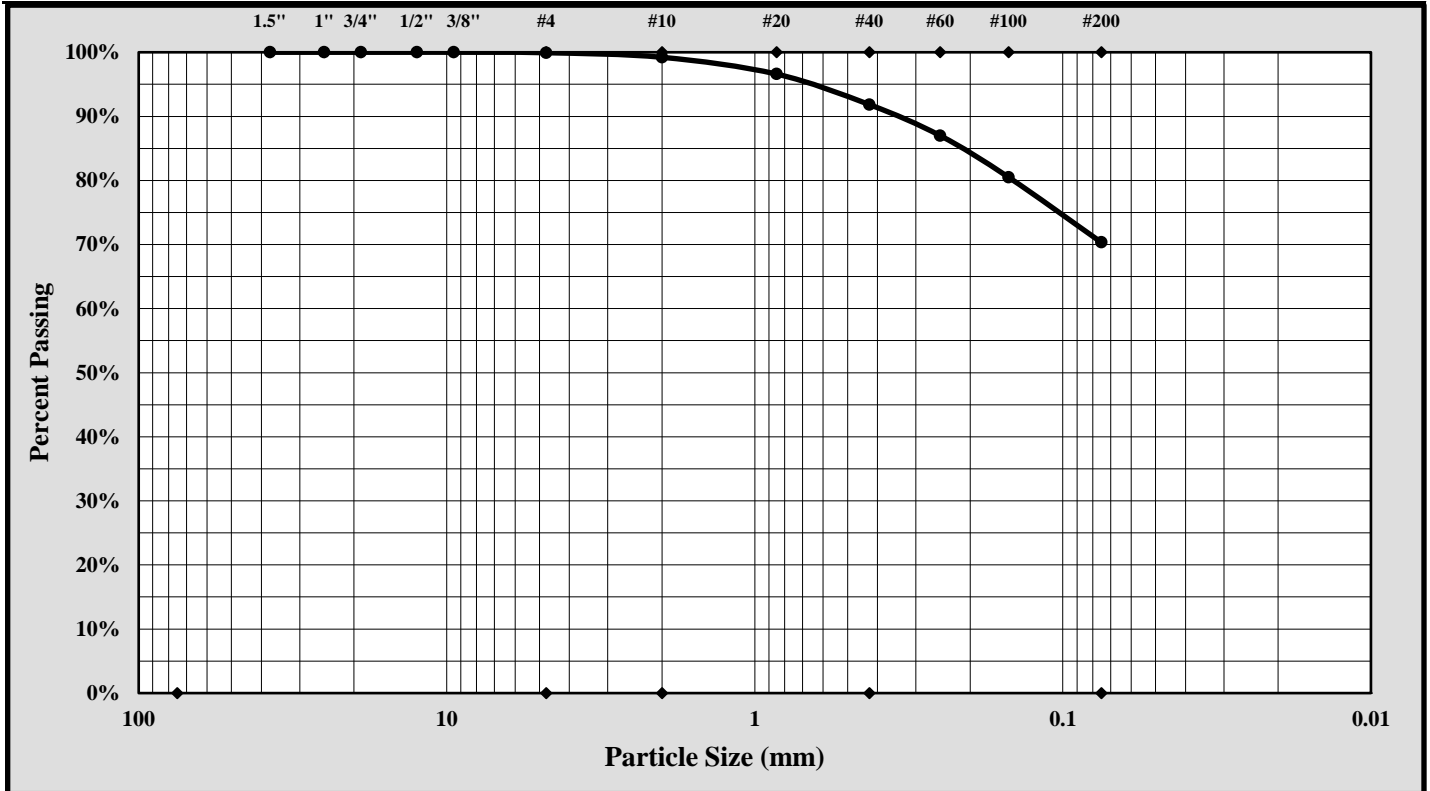
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/28 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-35	Sample #:	SS-8
		Sample Date:	1/24/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'
Sample Description:	Silt with Sand (ML, A-4(6))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 2.00 mm Gravel: 0.1%
 Silt & Clay (% Passing #200): 70.3% Total Sand: 29.6%

Liquid Limit	36	Plastic Limit	26	Plastic Index	10
Coarse Sand:	0.7%	Medium Sand:	7.4%	Fine Sand:	21.5%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



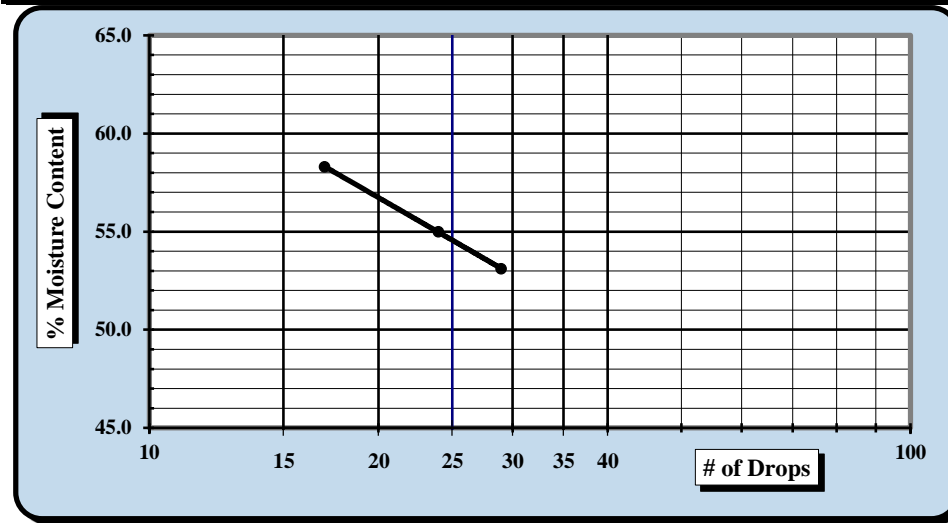
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date:	4/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-36	Sample #:	SS-1
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	3/01/18
		Depth:	0.0' - 2.0'

Sample Description: Fat Clay with Sand (CH, A-7-6(23))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.68	26.66	26.78			26.65	27.61	
B	Wet Soil Weight + A	43.69	39.73	41.72			33.48	34.88	
C	Dry Soil Weight + A	37.79	35.09	36.22			32.12	33.43	
D	Water Weight (B-C)	5.90	4.64	5.50			1.36	1.45	
E	Dry Soil Weight (C-A)	11.11	8.43	9.44			5.47	5.82	
F	% Moisture (D/E)*100	53.1%	55.0%	58.3%			24.9%	24.9%	
N	# OF DROPS	29	24	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.9%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	55	
Plastic Limit	25	
Plastic Index	30	
Group Symbol	CH	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/26/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/26/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

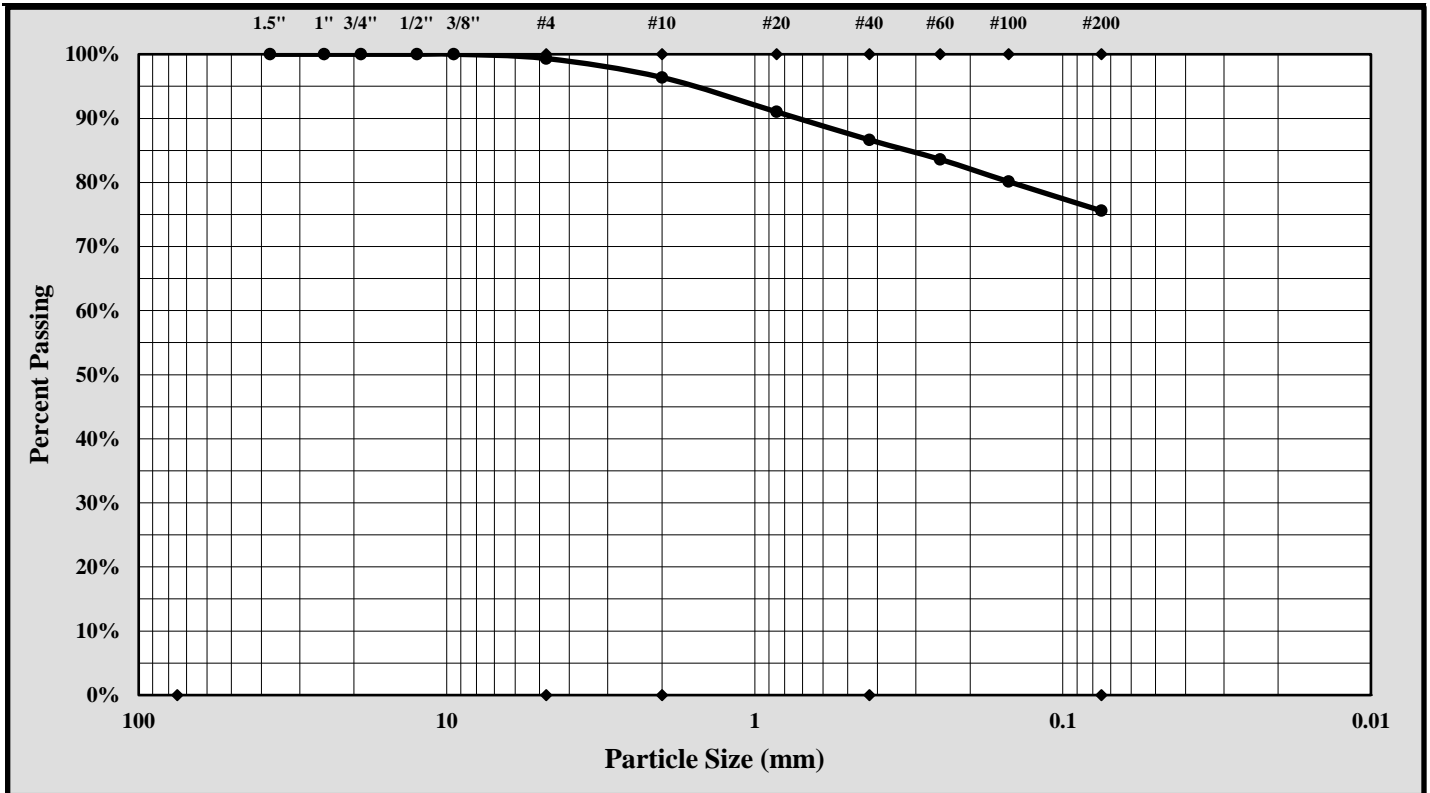


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #: 1461-16-047.2B		Report Date: 4/26/18	
Project Name: Carolina Crossroads Project		Test Date(s): 4/11 - 4/25/18	
Client Name: HDR Engineering, Inc.			
Address: 4400 Leeds Ave., North Charleston, South Carolina			
Boring #: RW-36	Sample #: SS-1	Sample Date: 3/01/18	
Location: Embankment Boring	Type: Split-spoon	Depth: 0.0' - 2.0'	
Sample Description: Fat Clay with Sand (CH, A-7-6(23))			



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	4.75 mm	Gravel:	0.7%
Silt & Clay (% Passing #200):	75.6%	Total Sand:	23.8%

Liquid Limit	55	Plastic Limit	25	Plastic Index	30
Coarse Sand:	3.0%	Medium Sand:	9.7%	Fine Sand:	11.1%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/26/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



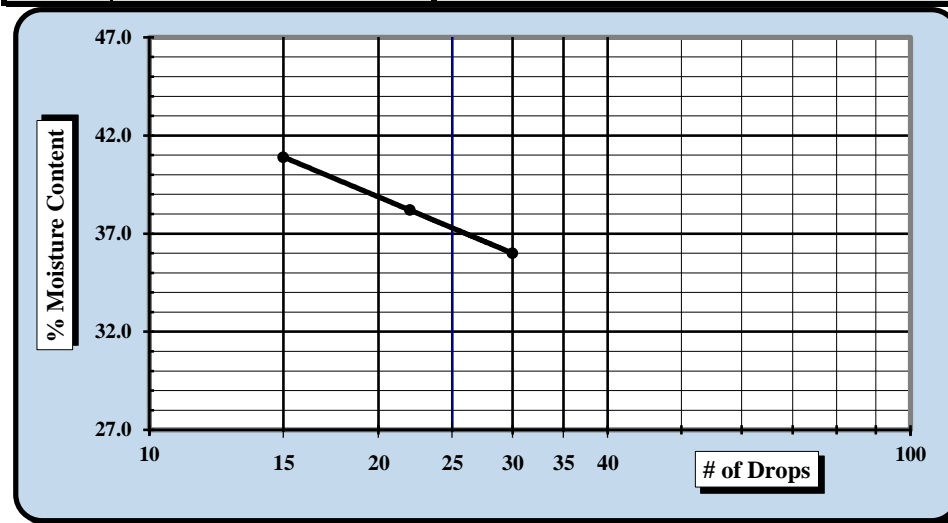
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date:	4/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-36	Sample #:	SS-4
Location:	Embankment Boring	Sample Date:	3/01/18
Type:	Split-spoon	Depth:	6.0' - 8.0'

Sample Description: Lean Clay with Sand (CL, A-6(11))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		16	17	18			19	20		
A	Tare Weight	26.57	26.63	26.84				26.66	26.85	
B	Wet Soil Weight + A	44.50	43.95	42.65				33.19	34.88	
C	Dry Soil Weight + A	39.75	39.16	38.06				31.97	33.35	
D	Water Weight (B-C)	4.75	4.79	4.59				1.22	1.53	
E	Dry Soil Weight (C-A)	13.18	12.53	11.22				5.31	6.50	
F	% Moisture (D/E)*100	36.0%	38.2%	40.9%				23.0%	23.5%	
N	# OF DROPS	30	22	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							23.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	23
Plastic Index	14
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/26/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/26/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

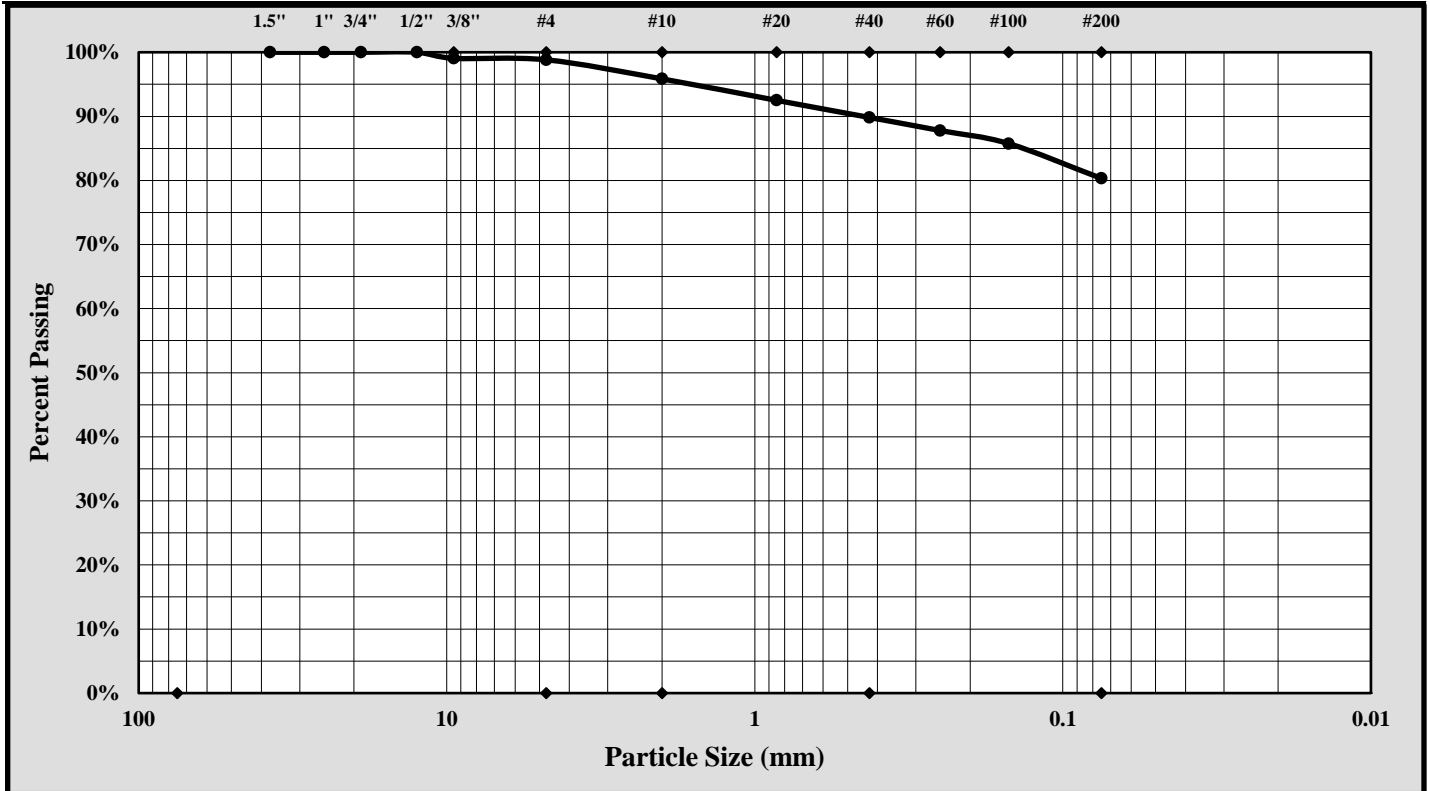


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/11 - 4/25/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-36	Sample #:	SS-4
		Sample Date:	3/01/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Lean Clay with Sand (CL, A-6(11))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 9.50 mm Gravel: 1.2%
 Silt & Clay (% Passing #200): 80.3% Total Sand: 18.5%

Liquid Limit 37 Plastic Limit 23 Plastic Index 14

Coarse Sand: 3.0% Medium Sand: 6.0% Fine Sand: 9.5%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/26/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



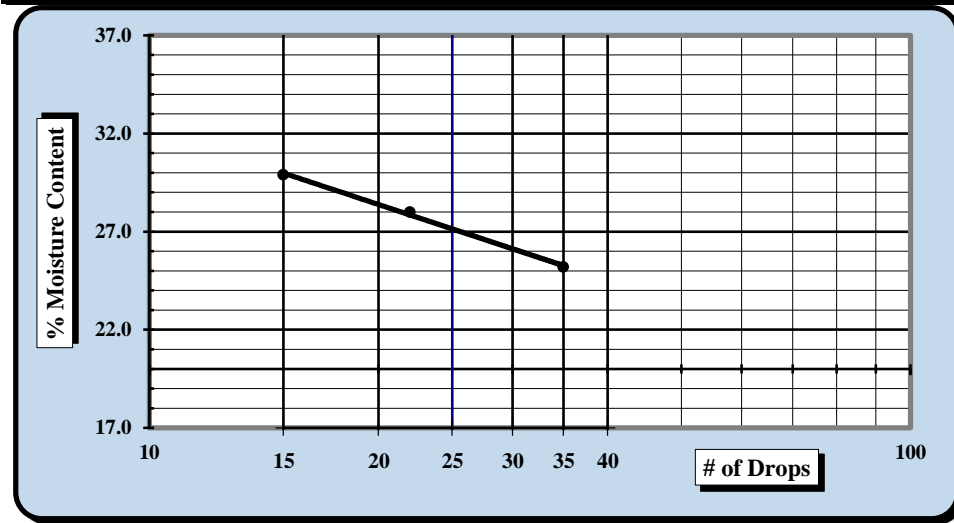
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	SS-3
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	1/25/18
		Depth:	4.0' - 6.0'

Sample Description: Clayey Sand (SC, A-2-4)					
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.69	26.47	26.36				25.94	26.95	
B	Wet Soil Weight + A	46.99	44.49	44.89				33.21	33.82	
C	Dry Soil Weight + A	42.90	40.55	40.63				32.13	32.79	
D	Water Weight (B-C)	4.09	3.94	4.26				1.08	1.03	
E	Dry Soil Weight (C-A)	16.21	14.08	14.27				6.19	5.84	
F	% Moisture (D/E)*100	25.2%	28.0%	29.9%				17.4%	17.6%	
N	# OF DROPS	35	22	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							17.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	27
Plastic Limit	18
Plastic Index	9
Group Symbol	SC

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 34.8%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

3/09/18
 Date

Brian Vaughan
 Technical Responsibility

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

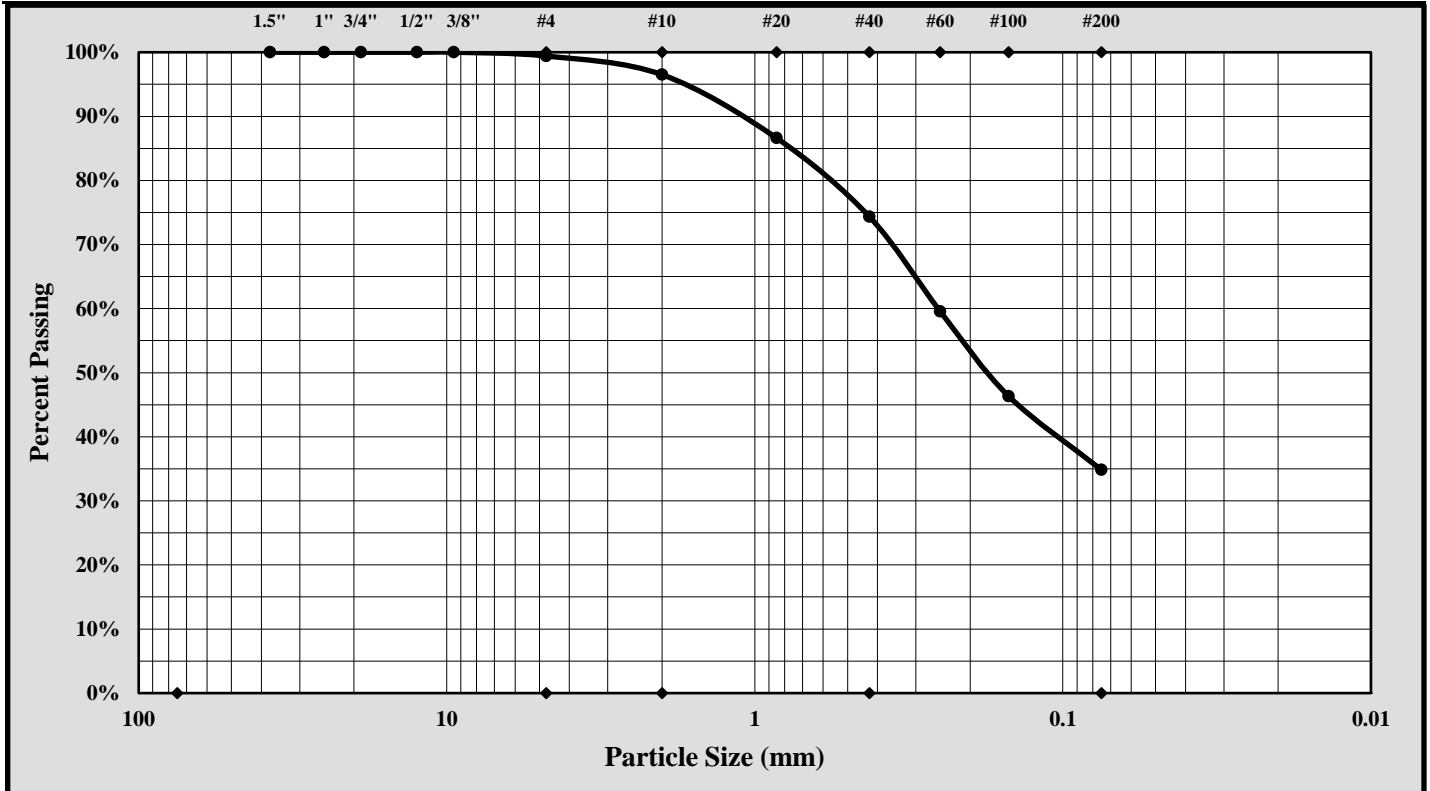


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	SS-3
		Sample Date:	1/25/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	4.0' - 6.0'
Sample Description:	Clayey Sand (SC, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 mm and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.6%
 Silt & Clay (% Passing #200): 34.8% Total Sand: 64.6%

Liquid Limit	27	Plastic Limit	18	Plastic Index	9
Coarse Sand:	2.9%	Medium Sand:	22.1%	Fine Sand:	39.5%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



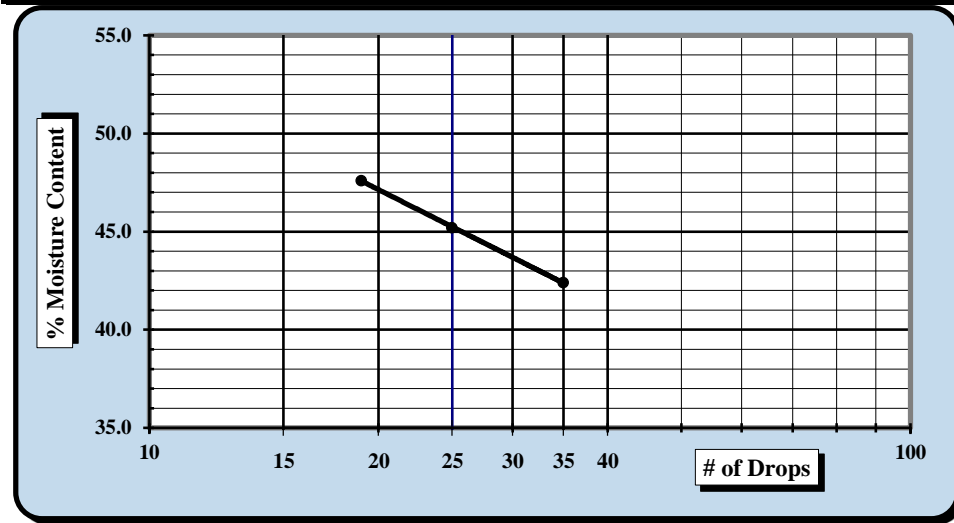
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	SS-6
		Sample Date:	1/25/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'

Sample Description: Silty Sand (SM, A-2-7(1))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	27.77	26.31	27.32				26.85	26.76	
B	Wet Soil Weight + A	45.22	42.17	43.84				33.63	33.75	
C	Dry Soil Weight + A	40.02	37.23	38.51				32.07	32.13	
D	Water Weight (B-C)	5.20	4.94	5.33				1.56	1.62	
E	Dry Soil Weight (C-A)	12.25	10.92	11.19				5.22	5.37	
F	% Moisture (D/E)*100	42.4%	45.2%	47.6%				29.9%	30.2%	
N	# OF DROPS	35	25	19				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							30.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	45
Plastic Limit	30
Plastic Index	15
Group Symbol	SM

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 33.3%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/09/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/09/18</u> Date
---	------------------------	--	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

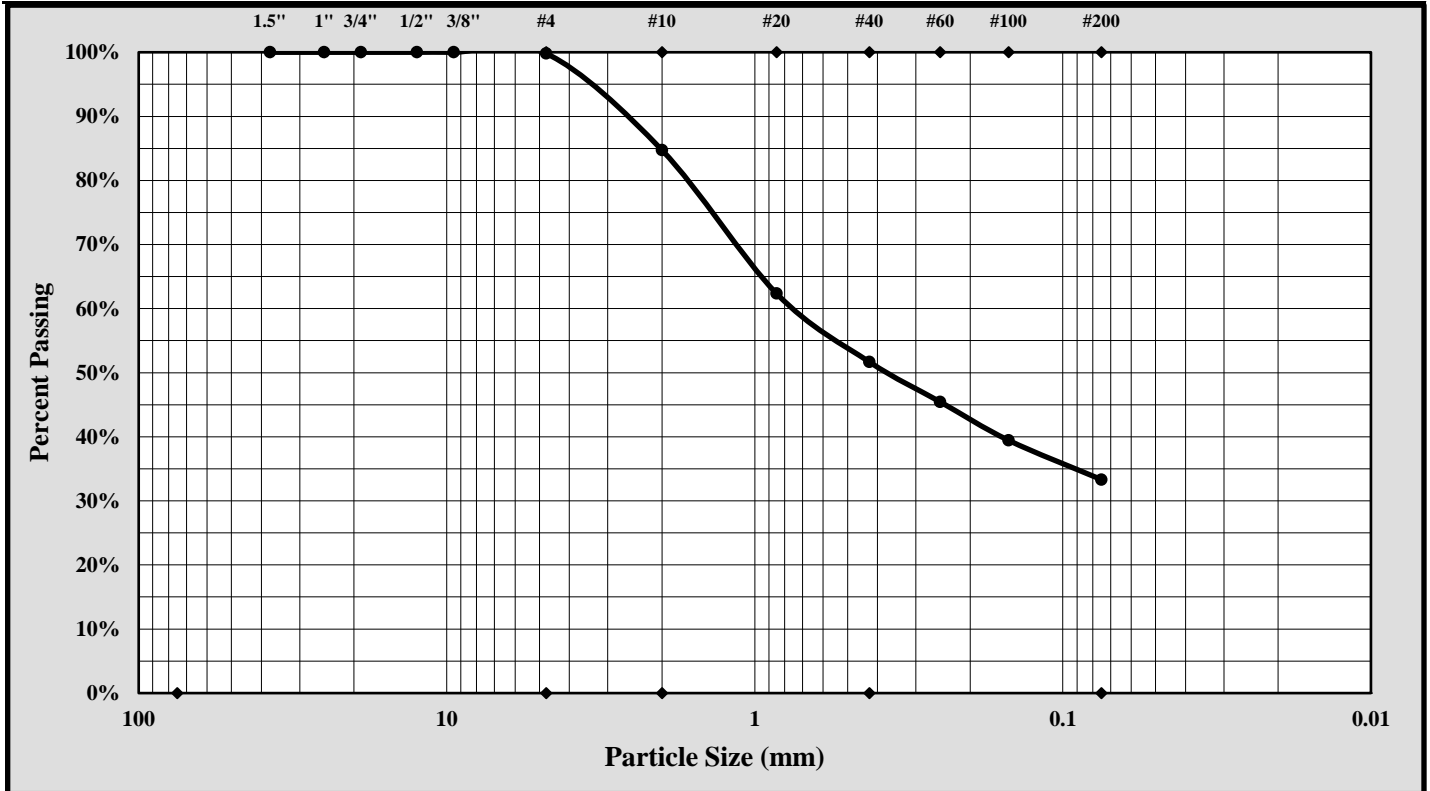


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	SS-6
		Sample Date:	1/25/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
Sample Description:	Silty Sand (SM, A-2-7(1))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.2%
 Silt & Clay (% Passing #200): 33.3% Total Sand: 66.5%

Liquid Limit 45 Plastic Limit 30 Plastic Index 15

Coarse Sand: 15.1% Medium Sand: 33.0% Fine Sand: 18.4%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/09/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



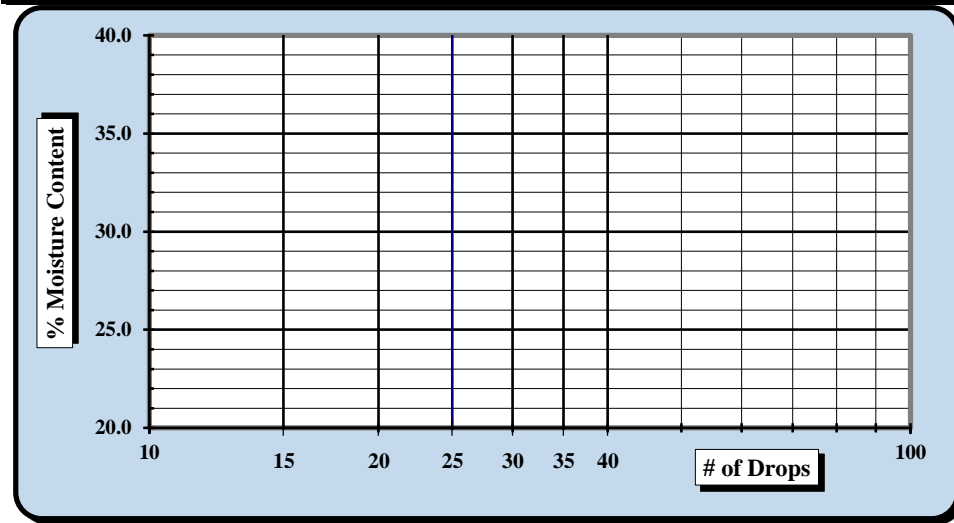
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	SS-8
		Sample Date:	1/25/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'
Sample Description:	Silty Sand (SM, A-2-4)		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #		Liquid Limit					Plastic Limit		
		Tare #:							
A	Tare Weight								
B	Wet Soil Weight + A								
C	Dry Soil Weight + A								
D	Water Weight (B-C)								
E	Dry Soil Weight (C-A)								
F	% Moisture (D/E)*100								
N	# OF DROPS								Moisture Contents determined by ASTM D 2216
LL	LL = F * FACTOR								
Ave.	Average								



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **NP**

Plastic Limit **NP**

Plastic Index **NP**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 24.4%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

3/09/18
Date

Brian Vaughan
Technical Responsibility

3/09/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

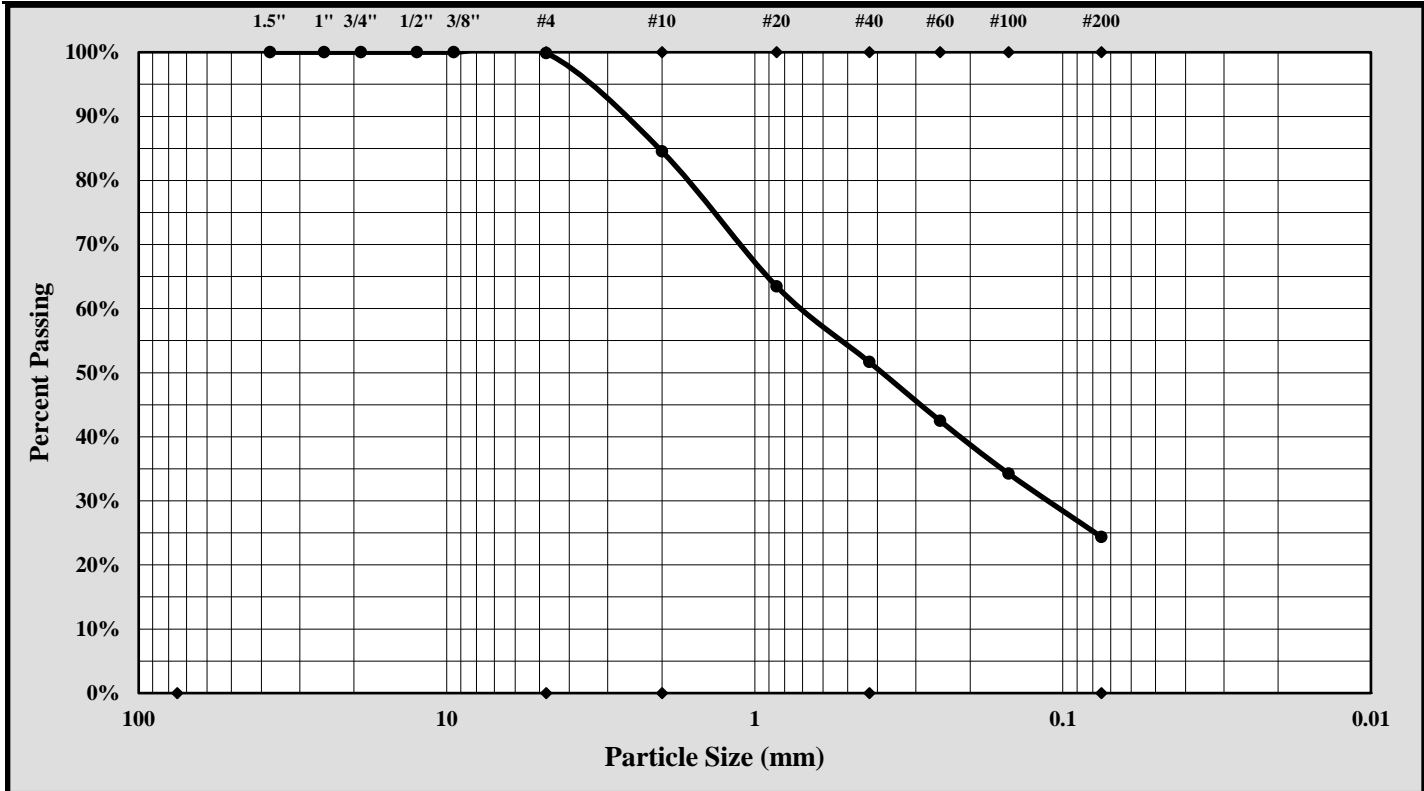


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	SS-8
		Sample Date:	1/25/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'
Sample Description:	Silty Sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.1%
 Silt & Clay (% Passing #200): 24.4% Total Sand: 75.5%

Liquid Limit	---	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	15.4%	Medium Sand:	32.9%	Fine Sand:	27.3%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.

Technical Responsibility

Signature

Group Leader

Position

3/09/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

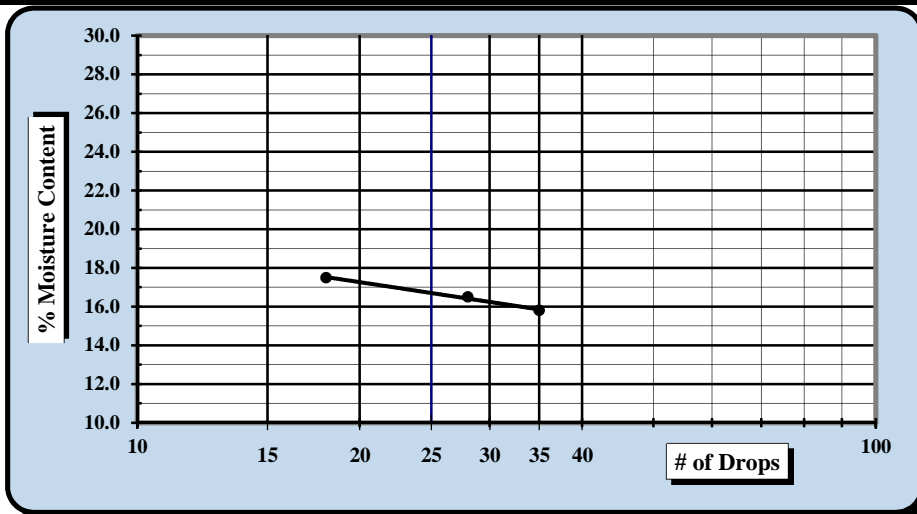
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-38	Sample #:	SS-1A
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 1.0'

Sample Description: Silty, clayey sand (SC-SM, A-2-4)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		14	17	1			18	16	
A	Tare Weight	15.47	15.49	15.34			15.41	15.64	
B	Wet Soil Weight + A	24.69	25.71	26.77			25.58	24.47	
C	Dry Soil Weight + A	23.32	24.26	25.21			24.50	23.54	
D	Water Weight (B-C)	1.37	1.45	1.56			1.08	0.93	
E	Dry Soil Weight (C-A)	7.85	8.77	9.87			9.09	7.90	
F	% Moisture (D/E)*100	17.5%	16.5%	15.8%			11.9%	11.8%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						11.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **17**

Plastic Limit **12**

Plastic Index **5**

Group Symbol **CL-ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

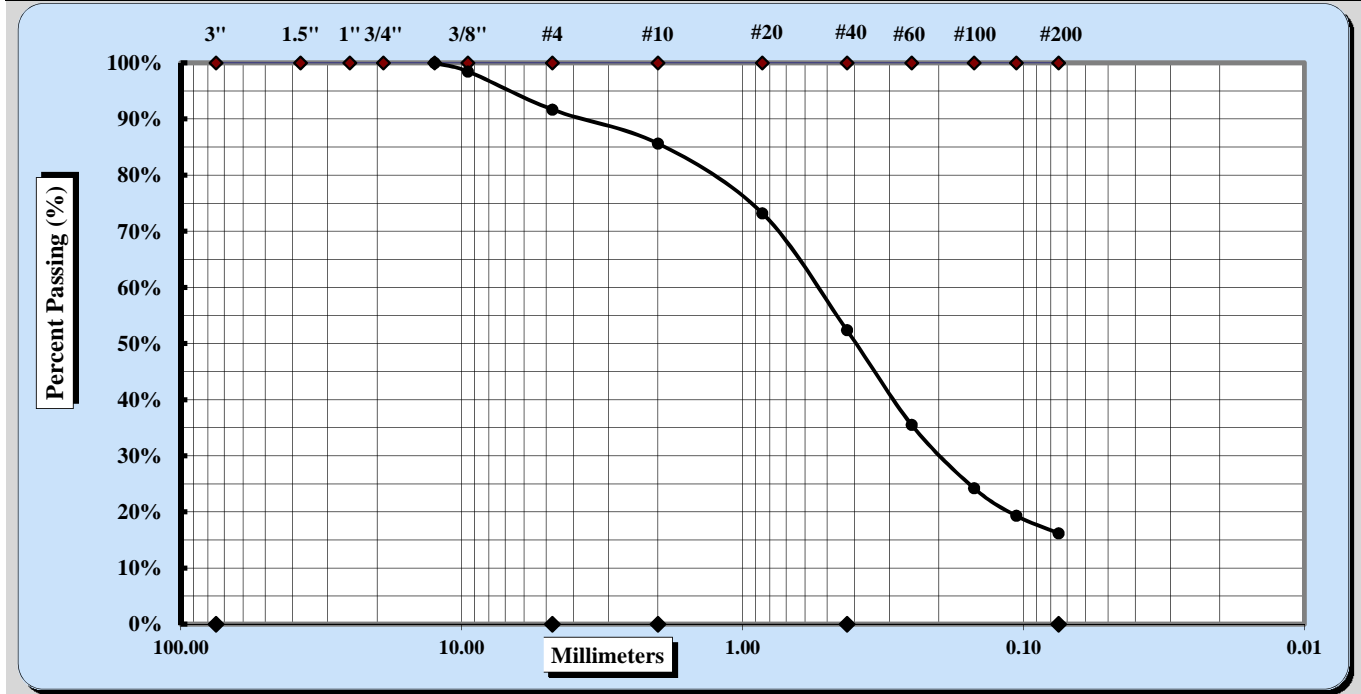


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/25/18 - 5/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	RW-38	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	1A
Sample Date:	Various		
Depth:	0.0' - 1.0'		
Sample Description:	Silty, clayey sand (SC-SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	6%	Fine Sand	36%
Gravel	8%	Medium Sand	33%	Silt & Clay	16%
Liquid Limit	17	Plastic Limit	12	Plastic Index	5

Coarse Sand	6%	Medium Sand	33%	Fine Sand	36%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.		Staff Professional	5/31/2018
Technical Responsibility	Signature	Position	Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

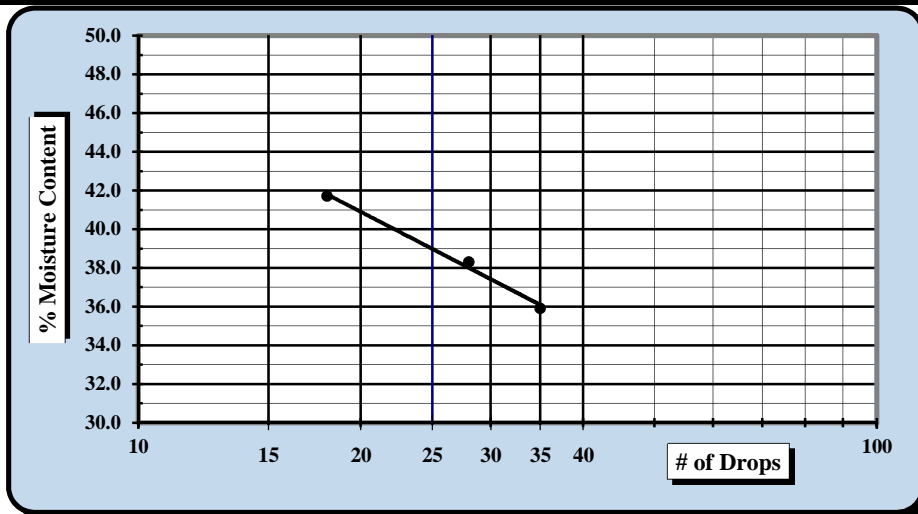
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-38	Sample #:	SS-2
Log #:	43-2321	Sample Date:	Various
		Depth:	2.0' - 4.0'

Sample Description: Lean clay with sand (CL, A-6 (13))

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		23	8	6			21	20	
A	Tare Weight	15.44	15.51	15.45			15.51	15.46	
B	Wet Soil Weight + A	28.52	29.56	30.34			23.97	24.75	
C	Dry Soil Weight + A	24.67	25.67	26.41			22.53	23.17	
D	Water Weight (B-C)	3.85	3.89	3.93			1.44	1.58	
E	Dry Soil Weight (C-A)	9.23	10.16	10.96			7.02	7.71	
F	% Moisture (D/E)*100	41.7%	38.3%	35.9%			20.5%	20.5%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						20.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **39**

Plastic Limit **21**

Plastic Index **18**

Group Symbol **CL**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

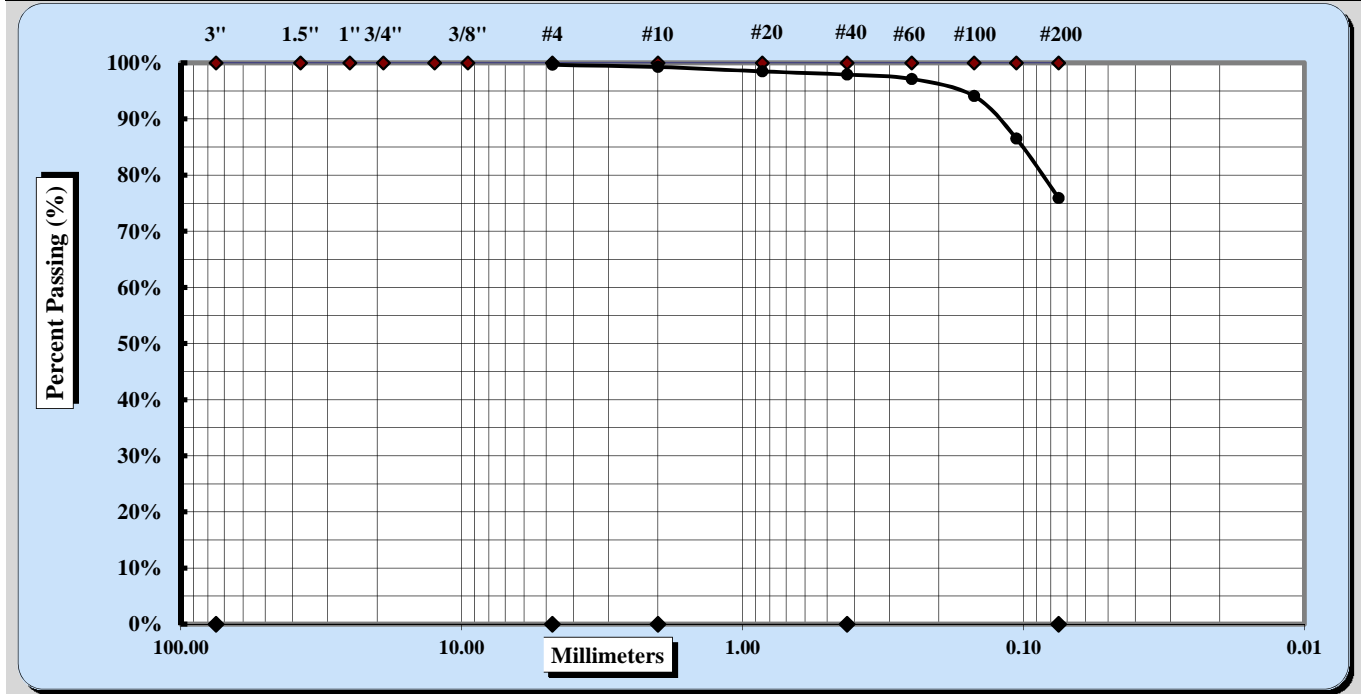


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/25/18 - 5/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	RW-38	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	2
Sample Date:	Various		
Depth:	2.0' - 4.0'		
Sample Description:	Lean clay with sand (CL, A-6 (13))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 4	Coarse Sand	0%	Fine Sand	22%
Gravel	0%	Medium Sand	1%	Silt & Clay	76%
Liquid Limit	39	Plastic Limit	21	Plastic Index	18

Coarse Sand	0%	Medium Sand	1%	Fine Sand	22%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/31/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



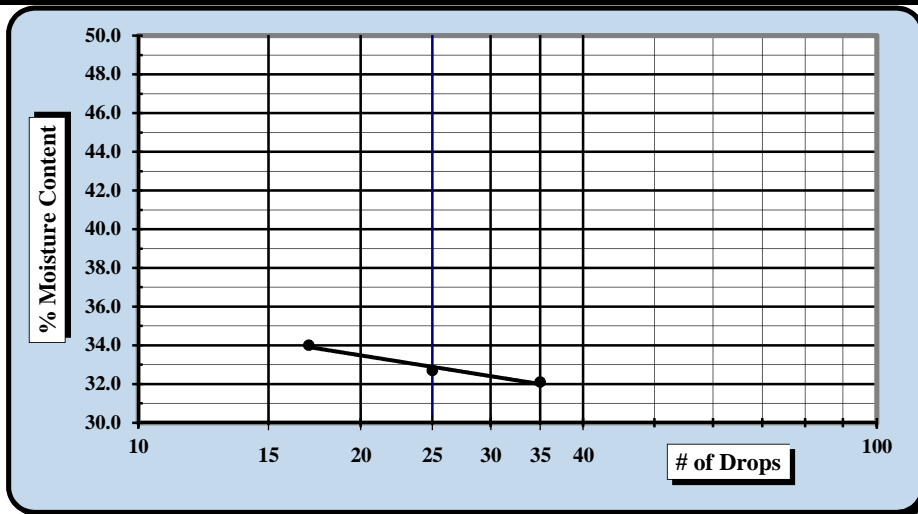
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #:	1461-16-047.2B	Report Date:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	5/29/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-38	Sample #:	SS-4
Log #:	43-2321	Sample Date:	Various
		Depth:	6.0' - 8.0'

Sample Description: Lean clay with sand (CL, A-6 (11))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	18435	4/10/2018	Grooving tool	32239	2/16/2018
LL Apparatus	18414	10/6/2017	No. 40 Sieve	31434	4/7/2018
Oven	12872	3/17/2018			

Pan #	Tare #:	Liquid Limit				Plastic Limit		
		19	15	16		22	7	
A	Tare Weight	15.42	15.32	15.64		15.38	15.41	
B	Wet Soil Weight + A	27.27	28.43	29.15		24.17	24.86	
C	Dry Soil Weight + A	24.26	25.20	25.87		22.75	23.33	
D	Water Weight (B-C)	3.01	3.23	3.28		1.42	1.53	
E	Dry Soil Weight (C-A)	8.84	9.88	10.23		7.37	7.92	
F	% Moisture (D/E)*100	34.0%	32.7%	32.1%		19.3%	19.3%	
N	# OF DROPS	17	25	35		Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR							
Ave.	Average					19.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	33
Plastic Limit	19
Plastic Index	14
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol is for minus No. 40 portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Derek Baker
Technician Name

5/29/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Sieve Analysis of Soils

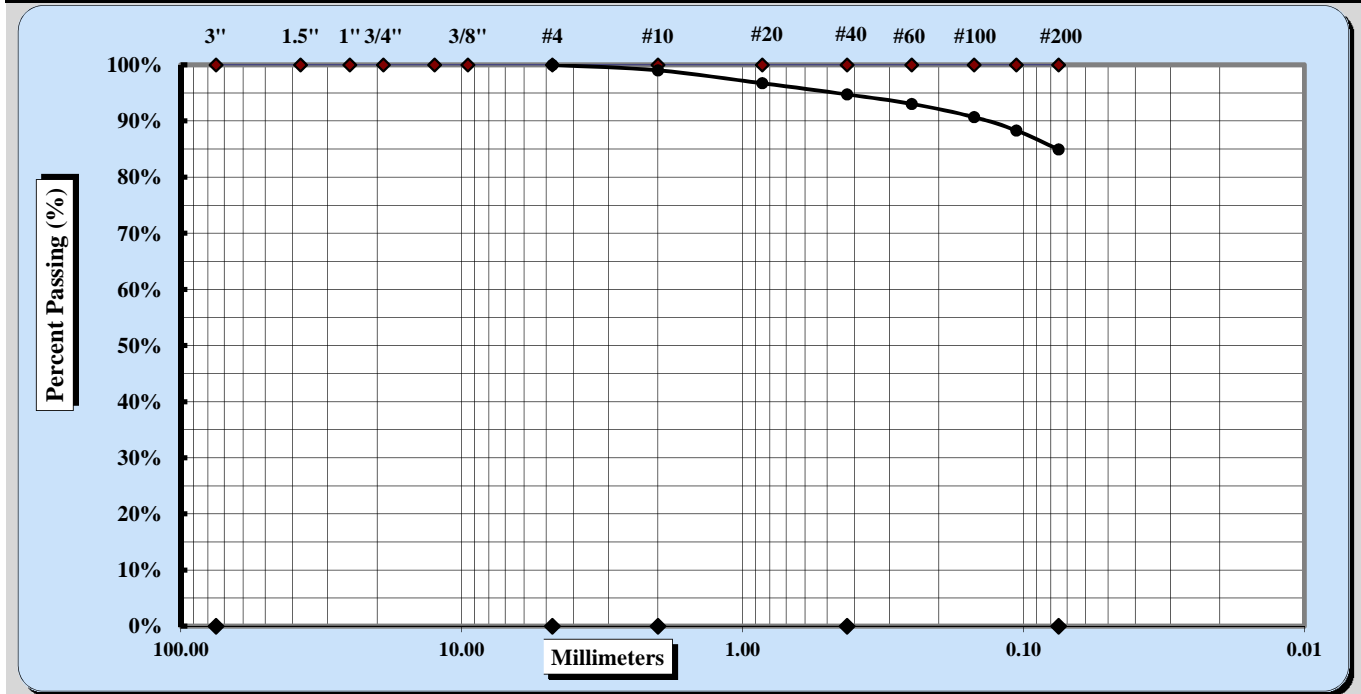


Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project #: 1461-16-047.2B	Report Date:	5/31/2018
Project Name: Carolina Crossroads Project	Test Date(s):	5/25/18 - 5/29/18
Client Name: HDR Engineering, Inc.		
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		
Sample ID: RW-38	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 4	Depth: 6.0' - 8.0'
Sample Description: Lean clay with sand (CL, A-6 (11))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	No. 4	Coarse Sand	1%	Fine Sand	10%
Gravel	0%	Medium Sand	4%	Silt & Clay	85%
Liquid Limit	33	Plastic Limit	19	Plastic Index	14

Coarse Sand	1%	Medium Sand	4%	Fine Sand	10%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.		Staff Professional	5/31/2018
Technical Responsibility	Signature	Position	Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/28 - 3/29/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	3/05, 3/08 & 3/09/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	13942	Calibration Date:	8/18/17 <th>Oven ID.</th> <td>13978</td> <th>Calibration Date:</th> <td>10/07/17</td>	Oven ID.	13978	Calibration Date:	10/07/17
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note		
		ft.		grams	grams	grams	grams	%			
W-18	SS-1	0.4 - 2.4	D-117	0.00	54.56	46.03	8.53	18.5%			
W-18	SS-2	2.4 - 4.4	D-13	0.00	53.06	43.04	10.02	23.3%			
W-18	SS-3	4.4 - 6.4	D-1	0.00	53.65	46.97	6.68	14.2%			
W-18	SS-5	8.4 - 10.4	F	0.00	52.82	44.57	8.25	18.5%			
W-18	SS-6	13.5 - 15.0	26	0.00	52.22	43.00	9.22	21.4%			
W-23	SS-1	0.2 - 2.2	H	0.00	53.92	46.00	7.92	17.2%			
W-23	SS-4	6.2 - 8.2	R	0.00	53.41	42.32	11.09	26.2%			
W-24	SS-1	0.0 - 2.0	E	0.00	52.01	48.70	3.31	6.8%			
W-24	SS-2	2.0 - 4.0	P	0.00	53.26	45.83	7.43	16.2%			
W-24	SS-5	8.0 - 10.0	B-141	0.00	53.38	43.26	10.12	23.4%			
W-24	SS-7	18.5 - 20.0	D-27	0.00	52.56	40.18	12.38	30.8%			

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Benjamin Kovaleski
Technician Name

Benjamin J. Kovaleski
Signature

NICET Lab Level III/117226
Certification Type / No.

4/26/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/26/18
Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	3/16/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/08 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	2/05 - 2/07/18
Sampling Method:	Split-spoon	Drill Rig:	CME 55/Diedrich D-50

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	13942	Calibration Date:	8/18/17 <th>Oven ID.</th> <td>13978</td> <th>Calibration Date:</th> <td>10/07/17</td>	Oven ID.	13978	Calibration Date:	10/07/17
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note		
		ft.		grams	grams	grams	grams	%			
W-22	SS-1	0.0 - 2.0	262	0.00	75.19	65.48	9.71	14.8%			
W-22	SS-4	6.0 - 8.0	D-27	0.00	75.61	62.78	12.83	20.4%			
W-22	SS-6	13.5 - 15.0	P	0.00	84.59	68.94	15.65	22.7%			
W-22	SS-8	23.5 - 25.0	B-141	0.00	71.19	61.13	10.06	16.5%			
W-25	SS-2	2.0 - 4.0	E	0.00	73.25	55.63	17.62	31.7%			
W-25	SS-5	8.0 - 10.0	T-1	0.00	70.02	58.51	11.51	19.7%			
W-25	SS-8	23.5 - 25.0	A-2	0.00	73.30	57.65	15.65	27.1%			
W-32	SS-2	2.0 - 4.0	D-3	0.00	74.58	63.48	11.10	17.5%			
W-32	SS-5	8.0 - 10.0	D-117	0.00	78.52	68.27	10.25	15.0%			
W-32	SS-6	13.5 - 15.0	JJ	0.00	76.83	71.42	5.41	7.6%			
W-32	SS-11	38.5 - 40.0	T-2	0.00	73.60	59.22	14.38	24.3%			

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Benjamin Kovaleski
Technician Name

Signature

NICET Lab Level III/117226
Certification Type / No.

3/16/18
Date

Brian Vaughan, P.E.
Technical Responsibility

Signature

Group Leader
Position

3/16/18
Date

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5/21/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/11-4/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample by:	S&ME	Sample Date(s):	Various
Sampling Method:	Split Spoon	Drill Rig:	N/A

Method:	A (1%) <input checked="" type="checkbox"/>	B (0.1%) <input type="checkbox"/>	Balance ID. 25128	Calibration Date: 4/4/18
			Oven ID. 31332	Calibration Date: 2/21/18

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
W-28	SS-6	13.5'-15'	TD-1	105.07	251.75	228.93	22.82	18.4%	
W-28	SS-2	2'-4'	J13	97.13	230.76	213.84	16.92	14.5%	
W-28	SS-8	23.5'-25'	NP3	107.07	234.31	212.85	21.46	20.3%	
W-28	SS-10	33.5'-35'	J11	98.19	327.14	277.53	49.61	27.7%	
W-28	SS-12	43.5'-45'	J7	90.51	223.96	190.88	33.08	33.0%	
W-28	SS-16	63.5'-65'	J9	89.84	224.77	198.94	25.83	23.7%	
W-30	SS-1	1.7'-3.7'	M-4	93.80	202.43	167.35	35.08	47.7%	
W-30	SS-4	7.7'-9.7'	J3	90.01	190.02	159.32	30.70	44.3%	
W-30	SS-9	28.5'-30'	J17	89.07	224.54	188.92	35.62	35.7%	
W-30	SS-11	38.5'-40'	J5	97.55	181.56	161.41	20.15	31.6%	
P-42	SS-1	0.8'-2.8'	NP2	107.05	258.64	235.96	22.68	17.6%	
P-44	SS-1	1.1'-3.1'	J2	90.23	218.73	189.03	29.70	30.1%	
P-45	SS-1	1'-3'	J12	95.74	285.64	262.85	22.79	13.6%	
P-47	SS-1	1.4'-3.4'	NP4	106.11	249.17	231.46	17.71	14.1%	
P-49	SS-1	1'-3'	J14	98.13	232.57	209.43	23.14	20.8%	
P-54	SS-1	0.7'-2.7'	G7	96.59	254.09	230.74	23.35	17.4%	

Notes / Deviations / References

Jimmy Hanson
Technician Name

5/21/2018
Date

Nathan Price
Technical Responsibility

Nathan Price

Signature

Laboratory Manager
Position

5/21/2018
Date

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



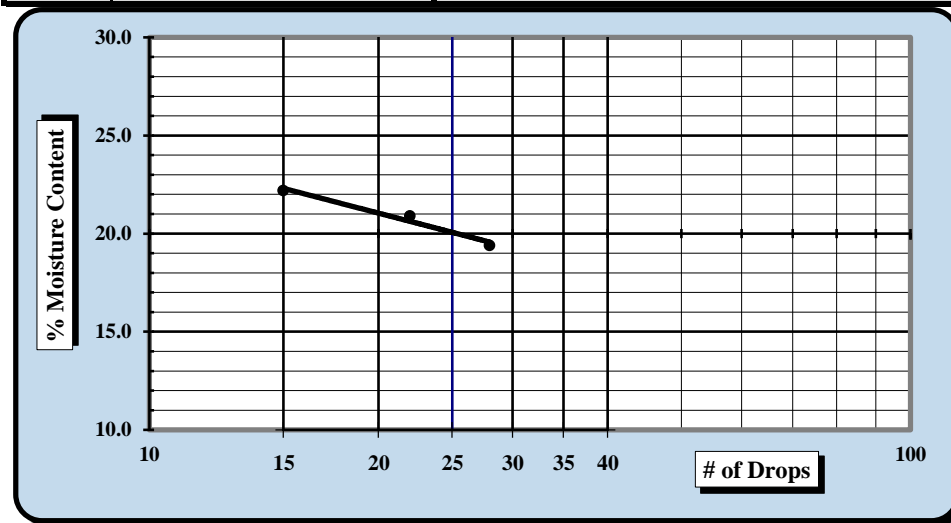
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date:	4/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-1
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'

Sample Description: Silty Clayey Sand (SC-SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.69	26.46	26.32				25.93	26.94	
B	Wet Soil Weight + A	48.75	44.17	46.75				33.85	33.63	
C	Dry Soil Weight + A	45.16	41.11	43.04				32.89	32.82	
D	Water Weight (B-C)	3.59	3.06	3.71				0.96	0.81	
E	Dry Soil Weight (C-A)	18.47	14.65	16.72				6.96	5.88	
F	% Moisture (D/E)*100	19.4%	20.9%	22.2%				13.8%	13.8%	
N	# OF DROPS	28	22	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							13.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	20
Plastic Limit	14
Plastic Index	6
Group Symbol	CL-ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

4/04/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/04/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

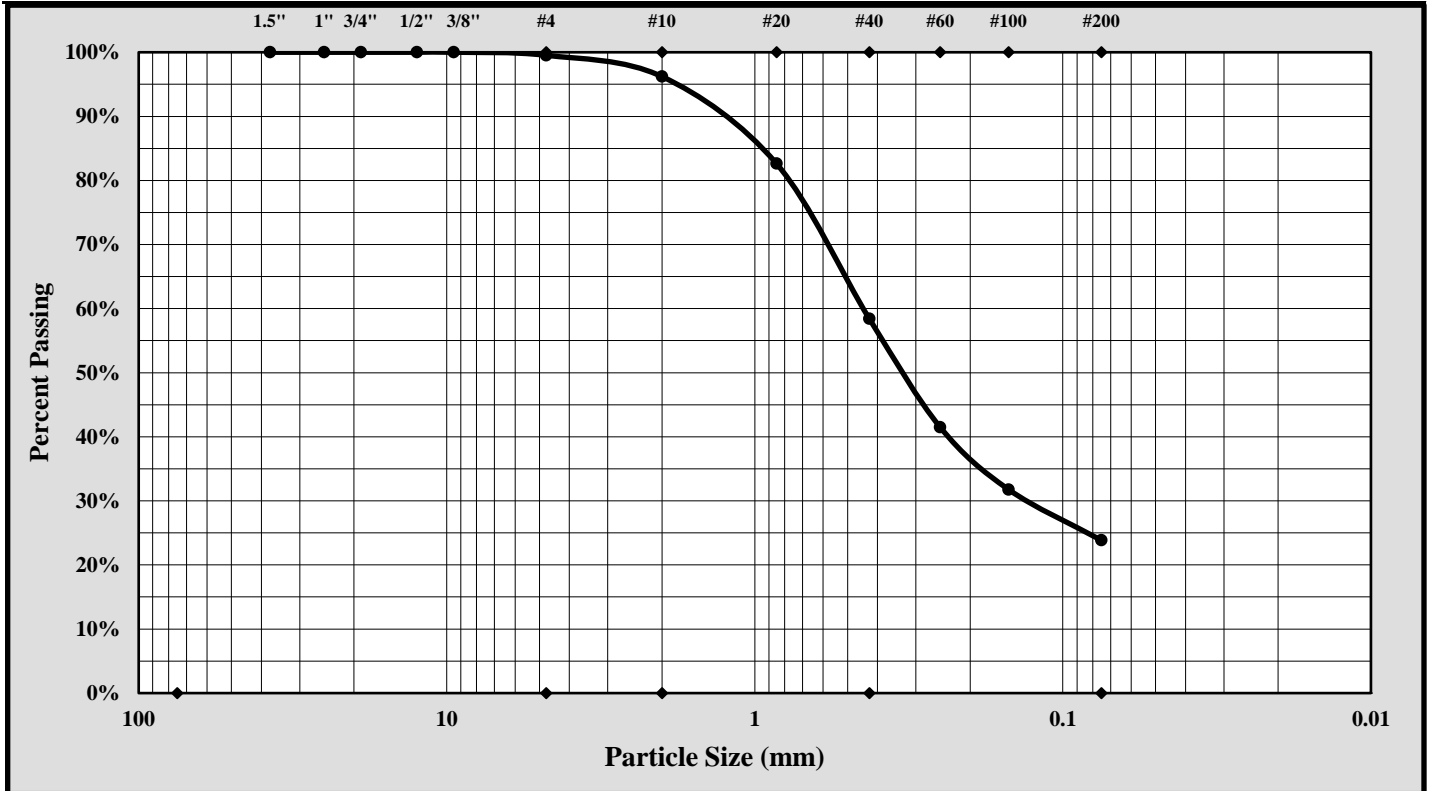


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/26 - 4/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-1
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Silty Clayey Sand (SC-SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#20)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 mm and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	4.75 mm	Gravel:	0.5%
Silt & Clay (% Passing #200):	23.8%	Total Sand:	75.7%

Liquid Limit	20	Plastic Limit	14	Plastic Index	6
Coarse Sand:	3.3%	Medium Sand:	37.8%	Fine Sand:	34.6%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/04/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



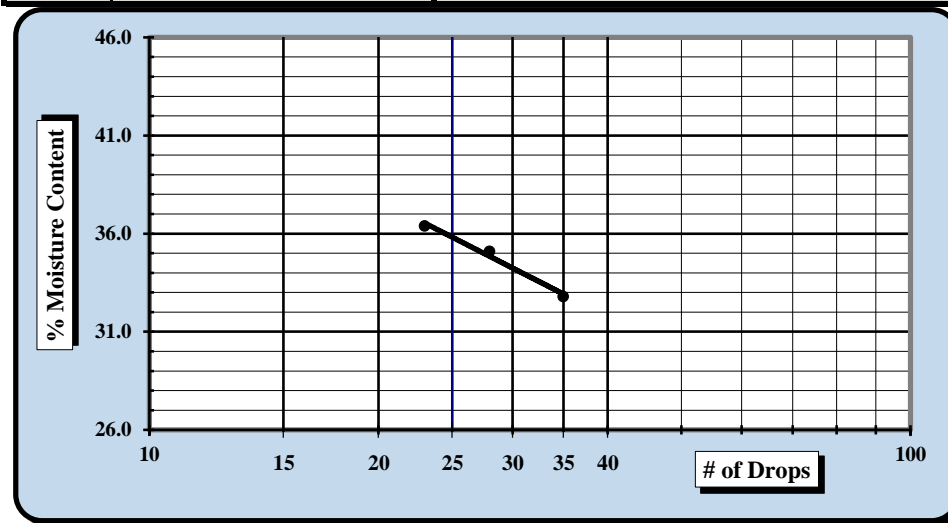
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date:	4/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-4
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'

Sample Description: Silty Sand (SM, A-6(2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	27.76	26.29	27.33				26.84	26.75	
B	Wet Soil Weight + A	44.24	43.69	41.54				32.91	33.64	
C	Dry Soil Weight + A	40.17	39.17	37.75				31.71	32.26	
D	Water Weight (B-C)	4.07	4.52	3.79				1.20	1.38	
E	Dry Soil Weight (C-A)	12.41	12.88	10.42				4.87	5.51	
F	% Moisture (D/E)*100	32.8%	35.1%	36.4%				24.6%	25.0%	
N	# OF DROPS	35	28	23				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							24.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	36
Plastic Limit	25
Plastic Index	11
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/04/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

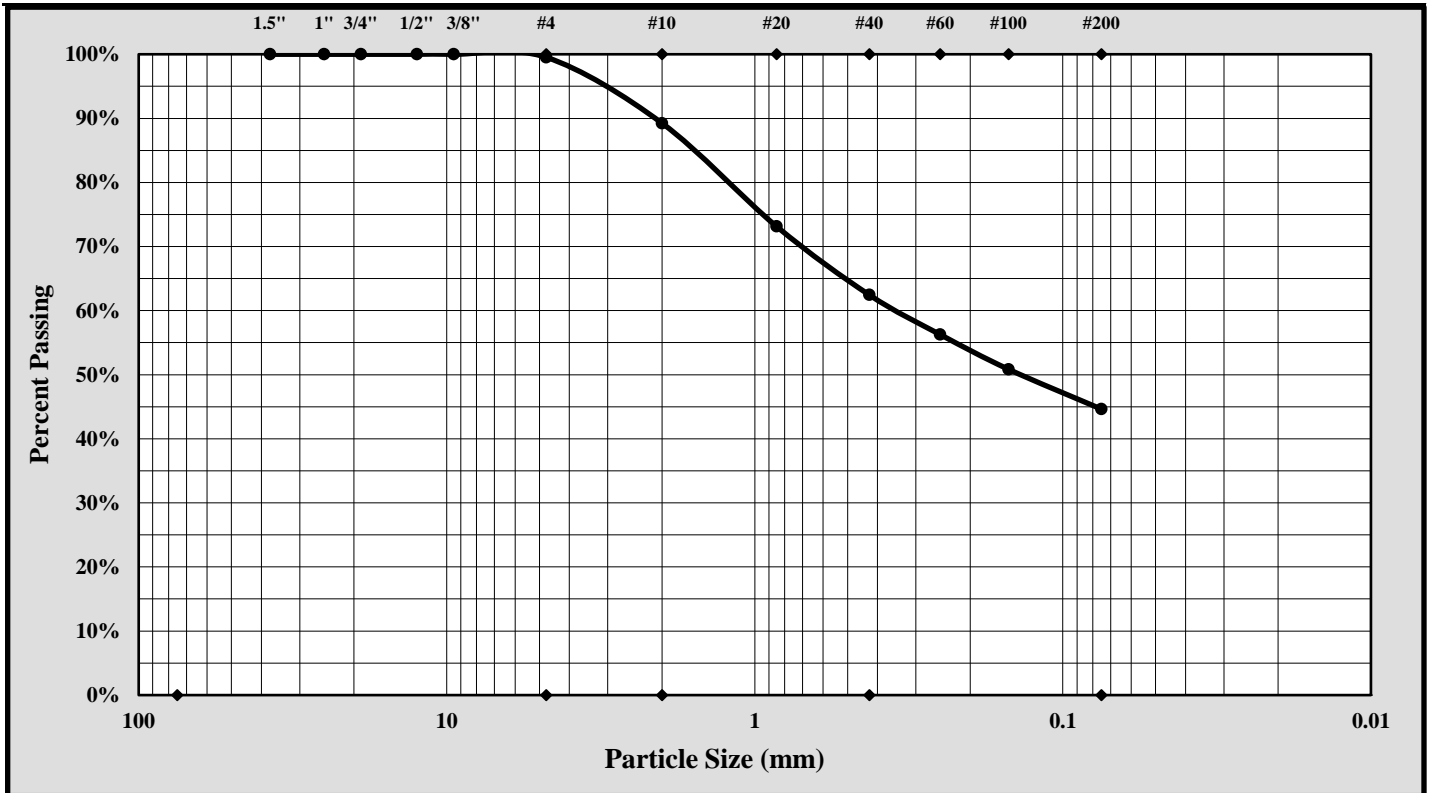


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/26 - 4/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-4
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Silty Sand (SM, A-6(2))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.5%
 Silt & Clay (% Passing #200): 44.6% Total Sand: 54.9%

Liquid Limit	36	Plastic Limit	25	Plastic Index	11
Coarse Sand:	10.3%	Medium Sand:	26.8%	Fine Sand:	17.8%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/04/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date:	4/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-6
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'

Sample Description: Silty Clayey Sand (SC-SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.68	26.63	26.75			26.65	27.60	
B	Wet Soil Weight + A	43.88	43.99	46.09			33.04	34.00	
C	Dry Soil Weight + A	40.14	39.95	41.38			31.84	32.80	
D	Water Weight (B-C)	3.74	4.04	4.71			1.20	1.20	
E	Dry Soil Weight (C-A)	13.46	13.32	14.63			5.19	5.20	
F	% Moisture (D/E)*100	27.8%	30.3%	32.2%			23.1%	23.1%	
N	# OF DROPS	35	23	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						23.1%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	30	
Plastic Limit	23	
Plastic Index	7	
Group Symbol	CL-ML	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/04/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

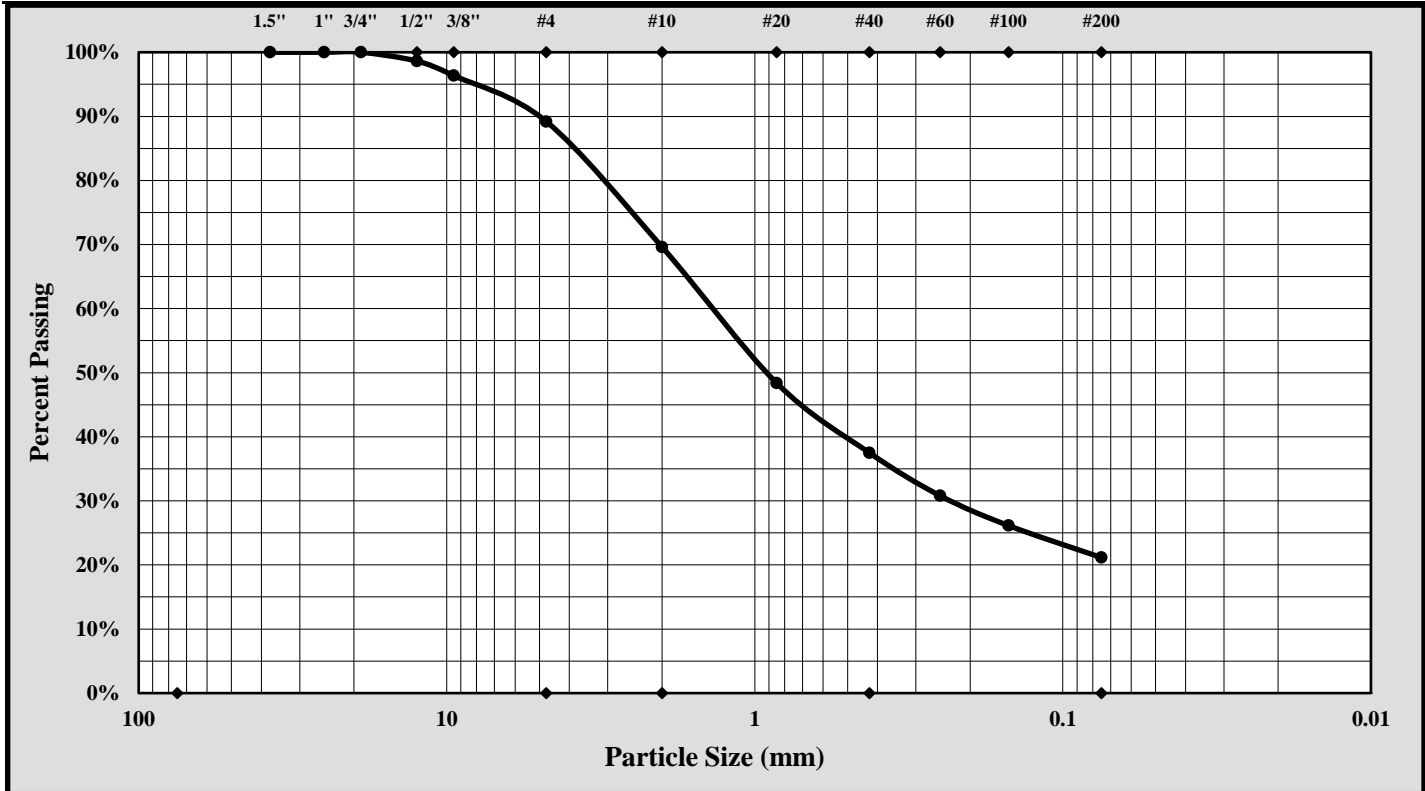


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/26 - 4/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-6
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
Sample Description:	Silty Clayey Sand (SC-SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.0 mm Gravel: 10.8%
 Silt & Clay (% Passing #200): 21.2% Total Sand: 68.0%

Liquid Limit 30 Plastic Limit 23 Plastic Index 7

Coarse Sand: 19.6% Medium Sand: 32.1% Fine Sand: 16.4%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/04/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



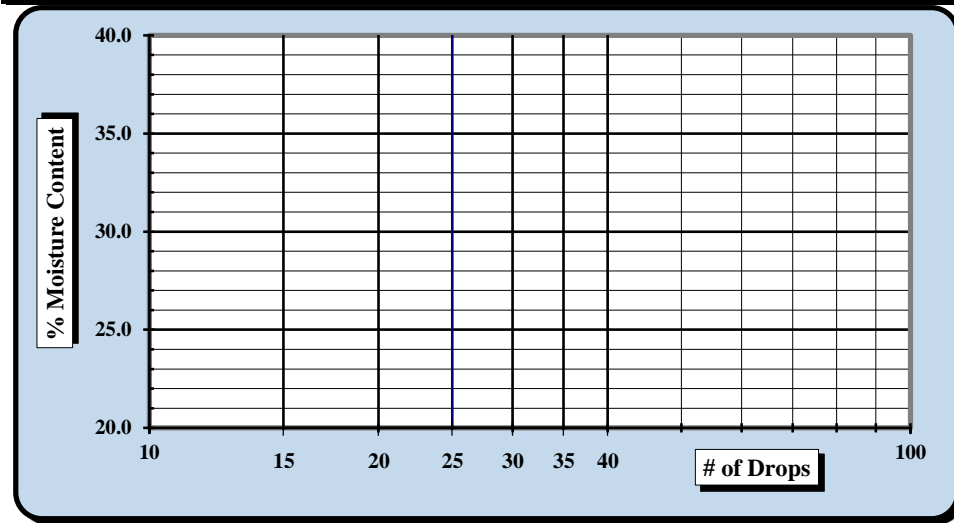
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date:	4/03/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-8
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'

Sample Description: Silty Sand (SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #		Liquid Limit				Plastic Limit	
Tare #:							
A	Tare Weight						
B	Wet Soil Weight + A						
C	Dry Soil Weight + A						
D	Water Weight (B-C)						
E	Dry Soil Weight (C-A)						
F	% Moisture (D/E)*100						
N	# OF DROPS					Moisture Contents determined by ASTM D 2216	
LL	LL = F * FACTOR						
Ave.	Average						



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit

Plastic Limit **NP**

Plastic Index **NP**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/04/18</u> Date
---	------------------------	---	------------------------

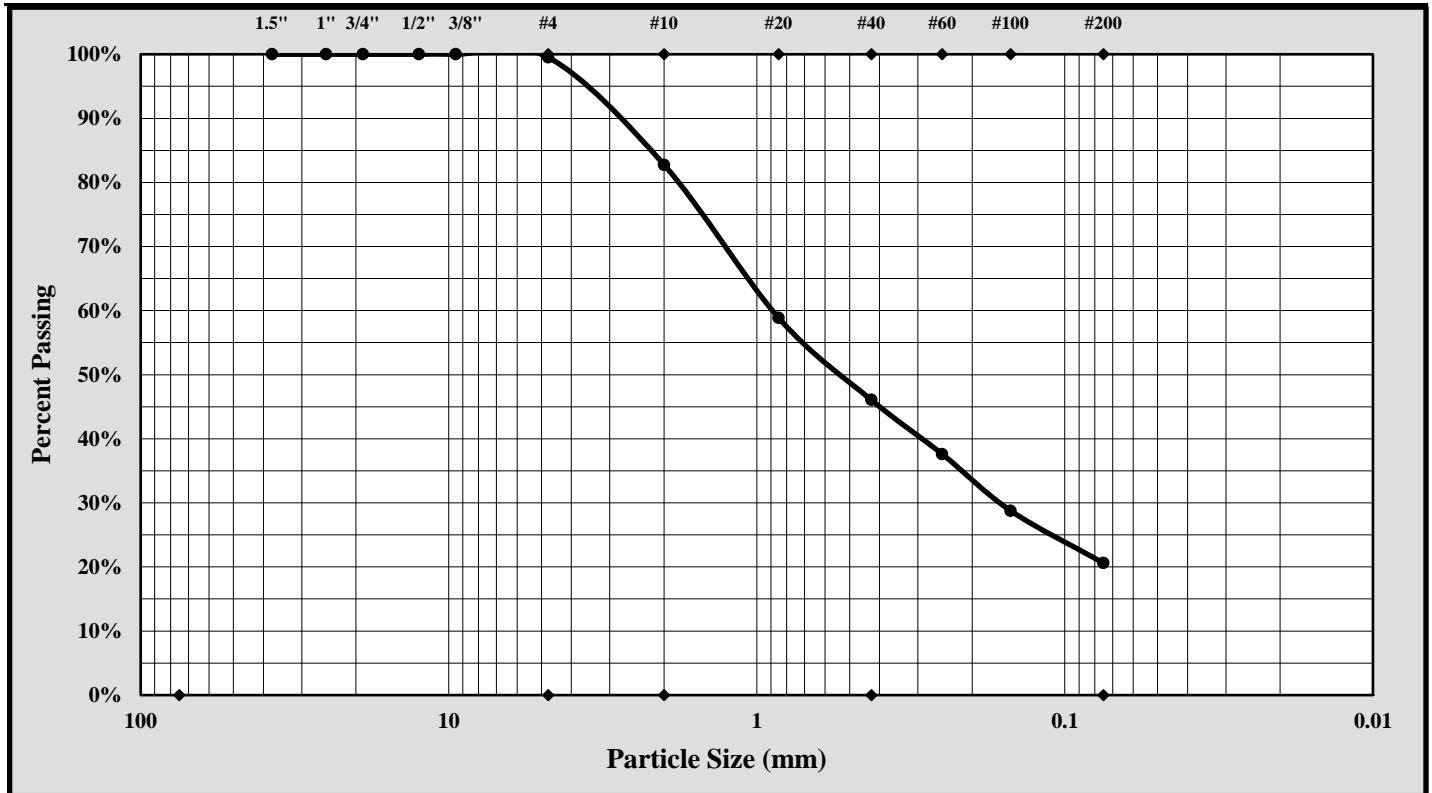
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	4/04/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/26 - 4/04/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-22	Sample #:	SS-8
		Sample Date:	2/07/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'
Sample Description:	Silty Sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 mm and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.5%

Silt & Clay (% Passing #200): 20.6% Total Sand: 78.9%

Liquid Limit	---	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	16.7%	Medium Sand:	36.7%	Fine Sand:	25.4%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/04/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



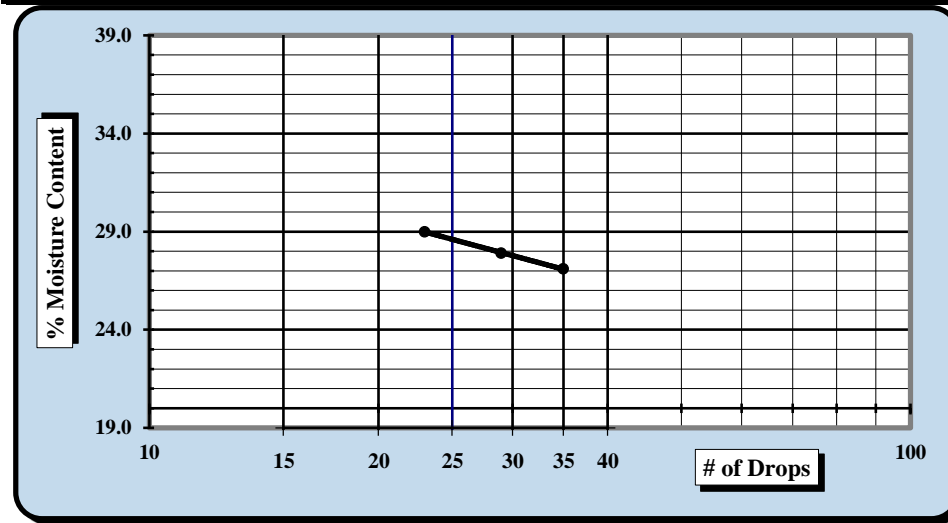
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date:	4/23/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-23	Sample #:	SS-1
		Sample Date:	3/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	0.2' - 2.2'

Sample Description: Clayey Sand with Gravel (SC, A-2-6(1))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		46	47	48			49	50	
A	Tare Weight	27.57	25.83	26.38			28.66	28.90	
B	Wet Soil Weight + A	42.07	37.23	38.53			35.48	36.41	
C	Dry Soil Weight + A	38.98	34.74	35.80			34.63	35.46	
D	Water Weight (B-C)	3.09	2.49	2.73			0.85	0.95	
E	Dry Soil Weight (C-A)	11.41	8.91	9.42			5.97	6.56	
F	% Moisture (D/E)*100	27.1%	27.9%	29.0%			14.2%	14.5%	
N	# OF DROPS	35	29	23			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						14.4%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	29	
Plastic Limit	14	
Plastic Index	15	
Group Symbol	CL	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/26/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/26/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

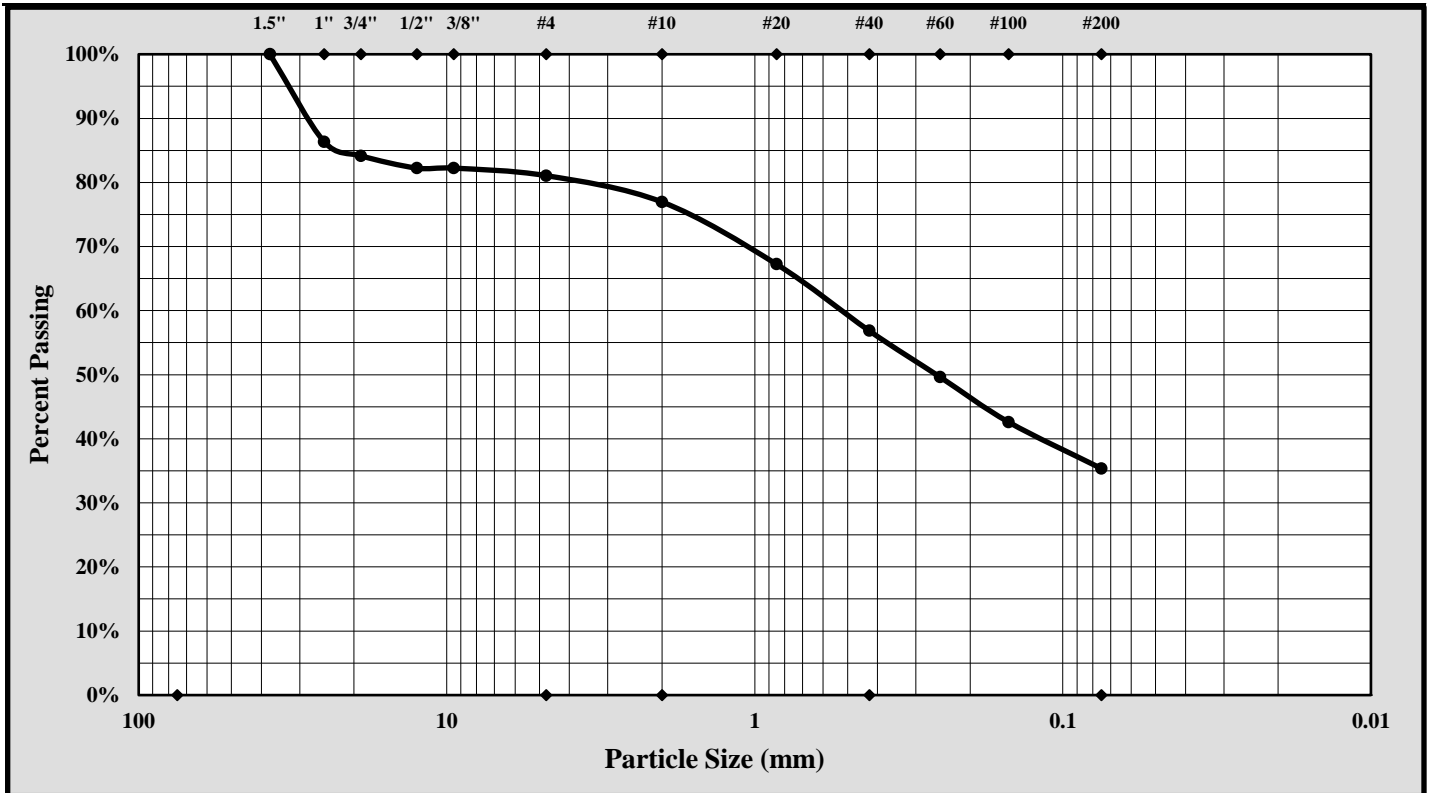


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/12 - 4/26/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-23	Sample #:	SS-1
		Sample Date:	3/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	0.2' - 2.2'
Sample Description:	Clayey Sand with Gravel (SC, A-2-6(1))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 37.5 mm Gravel: 18.9%
 Silt & Clay (% Passing #200): 35.4% Total Sand: 45.7%

Liquid Limit	29	Plastic Limit	14	Plastic Index	15
Coarse Sand:	4.1%	Medium Sand:	20.1%	Fine Sand:	21.5%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/26/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



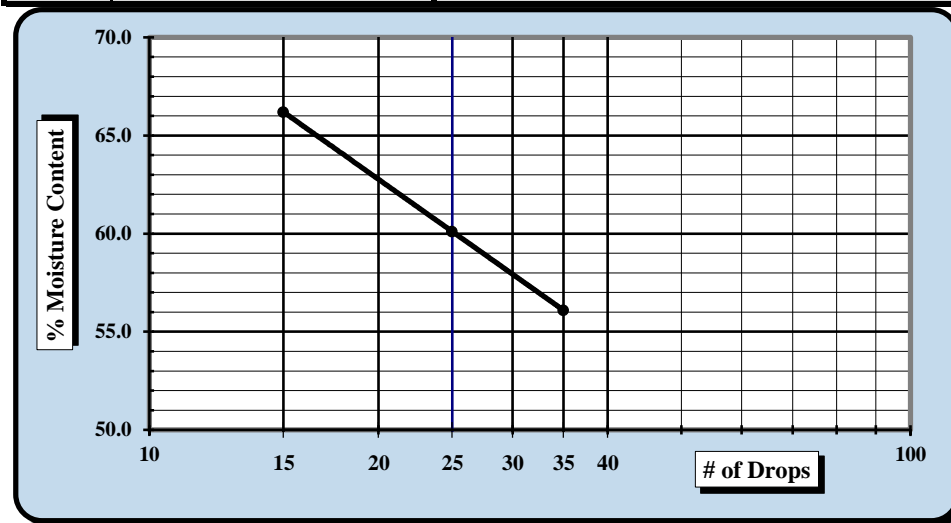
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/26/18
Project Name:	Carolina Crossroads Project	Test Date:	4/23/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-23	Sample #:	SS-4
		Sample Date:	3/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	6.2' - 8.2'

Sample Description: Fat Clay with Sand (CH, A-7-6(32))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		51	52	53			54	55	
A	Tare Weight	28.45	24.98	28.39			27.60	26.01	
B	Wet Soil Weight + A	43.65	41.21	44.58			35.10	32.14	
C	Dry Soil Weight + A	38.19	35.12	38.13			33.80	31.08	
D	Water Weight (B-C)	5.46	6.09	6.45			1.30	1.06	
E	Dry Soil Weight (C-A)	9.74	10.14	9.74			6.20	5.07	
F	% Moisture (D/E)*100	56.1%	60.1%	66.2%			21.0%	20.9%	
N	# OF DROPS	35	25	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						21.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	60
Plastic Limit	21
Plastic Index	39
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/26/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/26/18</u> Date
---	------------------------	---	------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #: 1461-16-047.2B

Report Date: 2/21/2018

Project Name: Carolina Crossroads Project

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	N o t e
		ft.		grams	grams	grams	grams	%	
P-32	SS-1	.9-2.9	211	20.83	42.46	38.48	3.98	23%	
P-33	SS-1	1.3-3.3	201	20.87	41.71	38.30	3.41	20%	
P-34	SS-1	.7-2.7	45	20.76	47.08	42.98	4.10	19%	
P-35	SS-1	.9-2.9	209	21.08	42.99	38.58	4.41	25%	
P-36	SS-1	.9-2.9	1	20.64	42.12	39.82	2.30	12%	
P-37	SS-1	2-4	31	20.81	42.08	35.61	6.47	44%	
P-39	SS-1	.8-2.8	200	20.86	42.22	40.12	2.10	11%	
P-40	SS-1	.9-2.9	7	20.80	40.62	38.19	2.43	14%	
P-41	SS-1	2-4	207	20.93	42.12	38.15	3.97	23%	
P-43	SS-1	.2-2.2	8	20.60	41.71	38.35	3.36	19%	
P-65	SS-1	.8-2.8	100	20.56	41.00	36.52	4.48	28%	

Notes / Deviations / References

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/22-2/23/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample by:	S&ME	Sample Date(s):	Various
Sampling Method:	Split-spoon	Drill Rig :	CME 55/Diedrich D-50

Method:	A (1%) <input checked="" type="checkbox"/>	B (0.1%) <input type="checkbox"/>	Balance ID.	25711	Calibration Date:	8/30/17
			Oven ID.	25722	Calibration Date:	8/18/17

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
P-2	SS-1	1.0 - 3.0	16	20.69	42.06	39.26	2.80	15%	
P-4	SS-1	0.8 - 2.8	240	20.77	41.25	40.44	0.81	4%	
P-6	SS-1	1.1 - 3.1	201	20.86	43.15	36.55	6.60	42%	
P-8	SS-1	0.8 - 2.8	46	20.74	41.15	36.33	4.82	31%	
P-10	SS-1	1.6 - 3.6	44	20.77	41.92	39.94	1.98	10%	
P-12	SS-1	1.2 - 3.2	123	20.56	40.57	39.52	1.05	6%	
P-14	SS-1	0.7 - 2.7	210	20.97	41.42	37.20	4.22	26%	
P-16	SS-1	0.8 - 2.8	211	20.84	41.02	39.19	1.83	10%	
P-18	SS-1	1.3 - 3.3	32	20.45	42.11	38.51	3.60	20%	
P-20	SS-1	1.5 - 3.5	146	20.55	41.46	37.62	3.84	22%	
P-22	SS-1	1.4 - 3.4	1	20.67	41.49	39.63	1.86	10%	
P-24	SS-1	0.7 - 2.7	195	20.55	42.02	40.32	1.70	9%	
P-26	SS-1	0.6 - 2.6	235	20.76	41.16	35.51	5.65	38%	
P-28	SS-1	0.7 - 2.7	9	20.80	42.92	40.83	2.09	10%	
P-30	SS-1	0.7 - 2.7	45	20.75	41.08	38.07	3.01	17%	
P-38	SS-1	0.8 - 2.8	222	20.85	41.99	39.32	2.67	14%	

Notes / Deviations / References

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Matthew Wolfe
Technician Name

NICET 123218
Certification Type / No.

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

5/3/2018
Date

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



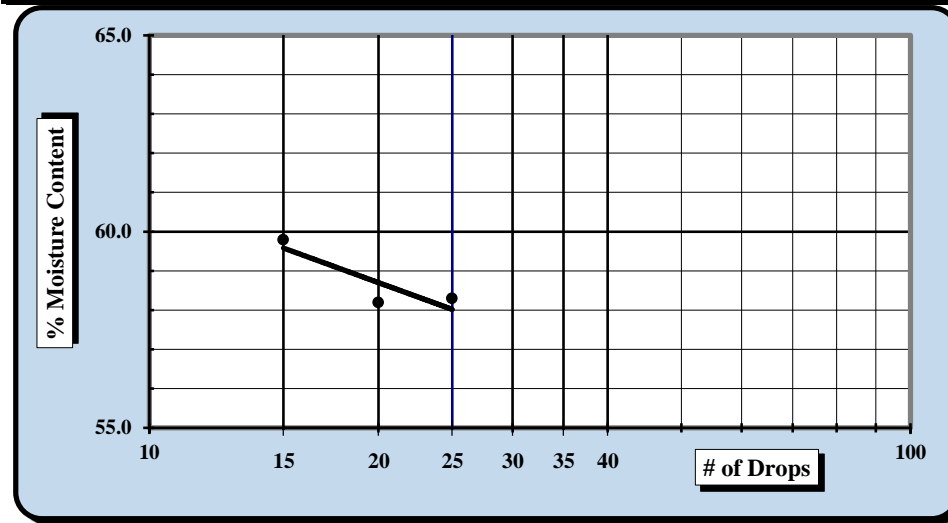
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/15-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-37	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.7' - 3.7'

Sample Description: Sandy Elastic Silt (MH, A-7-5(14))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28573	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		214	6	217			9	19	
A	Tare Weight	20.84	20.57	20.91			20.82	20.53	
B	Wet Soil Weight + A	28.50	27.83	28.87			28.61	27.42	
C	Dry Soil Weight + A	25.68	25.16	25.89			26.43	25.47	
D	Water Weight (B-C)	2.82	2.67	2.98			2.18	1.95	
E	Dry Soil Weight (C-A)	4.84	4.59	4.98			5.61	4.94	
F	% Moisture (D/E)*100	58.3%	58.2%	59.8%			38.9%	39.5%	
N	# OF DROPS	25	20	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						39.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	58
Plastic Limit	39
Plastic Index	19
Group Symbol	MH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

3/8/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

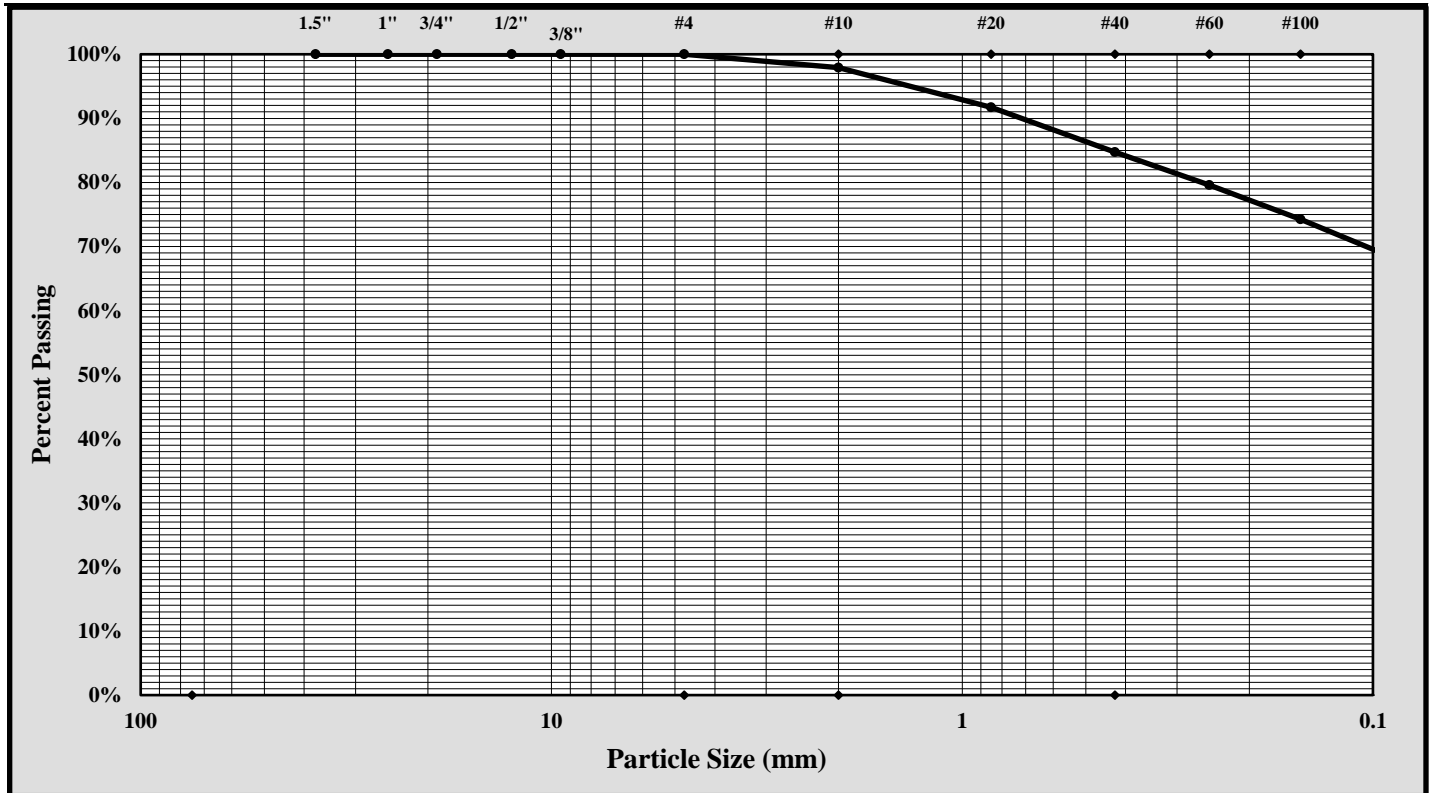
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/5-2/19/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-37	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.7' - 3.7'
Sample Description:	Sandy Elastic Silt (MH, A-7-5(14))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: #10 Gravel: 0%
 Silt & Clay (% Passing #200): 66% Total Sand: 34%

Liquid Limit	58	Plastic Limit	39	Plastic Index	19
Coarse Sand:	2%	Medium Sand:	13%	Fine Sand:	18%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

3/8/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/7-4/2/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-38	Sample #:	SS-1
		Sample Date:	1/29/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.8' - 2.8'

Sample Description: Clayey Sand (SC, A-2-6)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28574	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		36	214	227			123	19	
A	Tare Weight	20.95	20.83	20.81			20.56	20.52	
B	Wet Soil Weight + A	29.37	28.04	27.37			27.10	26.54	
C	Dry Soil Weight + A	27.37	26.24	25.66			26.28	25.80	
D	Water Weight (B-C)	2.00	1.80	1.71			0.82	0.74	
E	Dry Soil Weight (C-A)	6.42	5.41	4.85			5.72	5.28	
F	% Moisture (D/E)*100	31.2%	33.3%	35.3%			14.3%	14.0%	
N	# OF DROPS	28	24	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						14.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	14
Plastic Index	18
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group Symbol for minus No. 40 sieve portion only.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

5/3/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

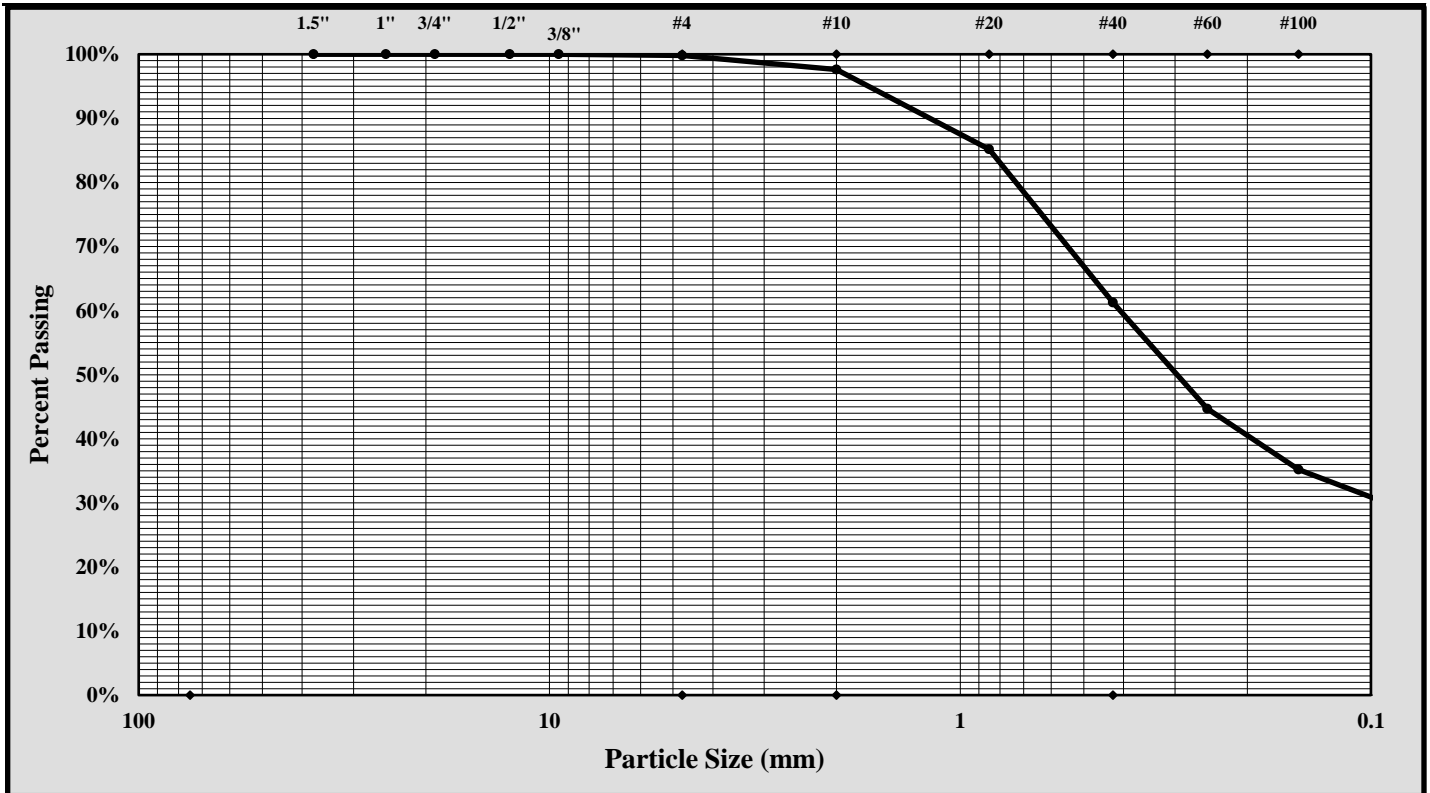
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	3/1-3/7/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-38	Sample #:	SS-1
		Sample Date:	1/29/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.8' - 2.8'
Sample Description:	Clayey Sand (SC, A-2-6)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: #4 Gravel: 0.2%
 Silt & Clay (% Passing #200): 27.9% Total Sand: 71.9%

Liquid Limit	32	Plastic Limit	14	Plastic Index	18
Coarse Sand:	2.2%	Medium Sand:	36.3%	Fine Sand:	33.4%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

5/3/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/15-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-39	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.8' - 2.8'

Sample Description: Clayey Sand (SC, A-6(2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28573	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		240	32	123			206	245	
A	Tare Weight	20.78	20.41	20.57			20.92	20.77	
B	Wet Soil Weight + A	30.72	29.69	29.53			29.88	27.47	
C	Dry Soil Weight + A	28.37	27.43	27.29			28.68	26.59	
D	Water Weight (B-C)	2.35	2.26	2.24			1.20	0.88	
E	Dry Soil Weight (C-A)	7.59	7.02	6.72			7.76	5.82	
F	% Moisture (D/E)*100	31.0%	32.2%	33.3%			15.5%	15.1%	
N	# OF DROPS	35	24	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						15.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	15
Plastic Index	17
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

3/8/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

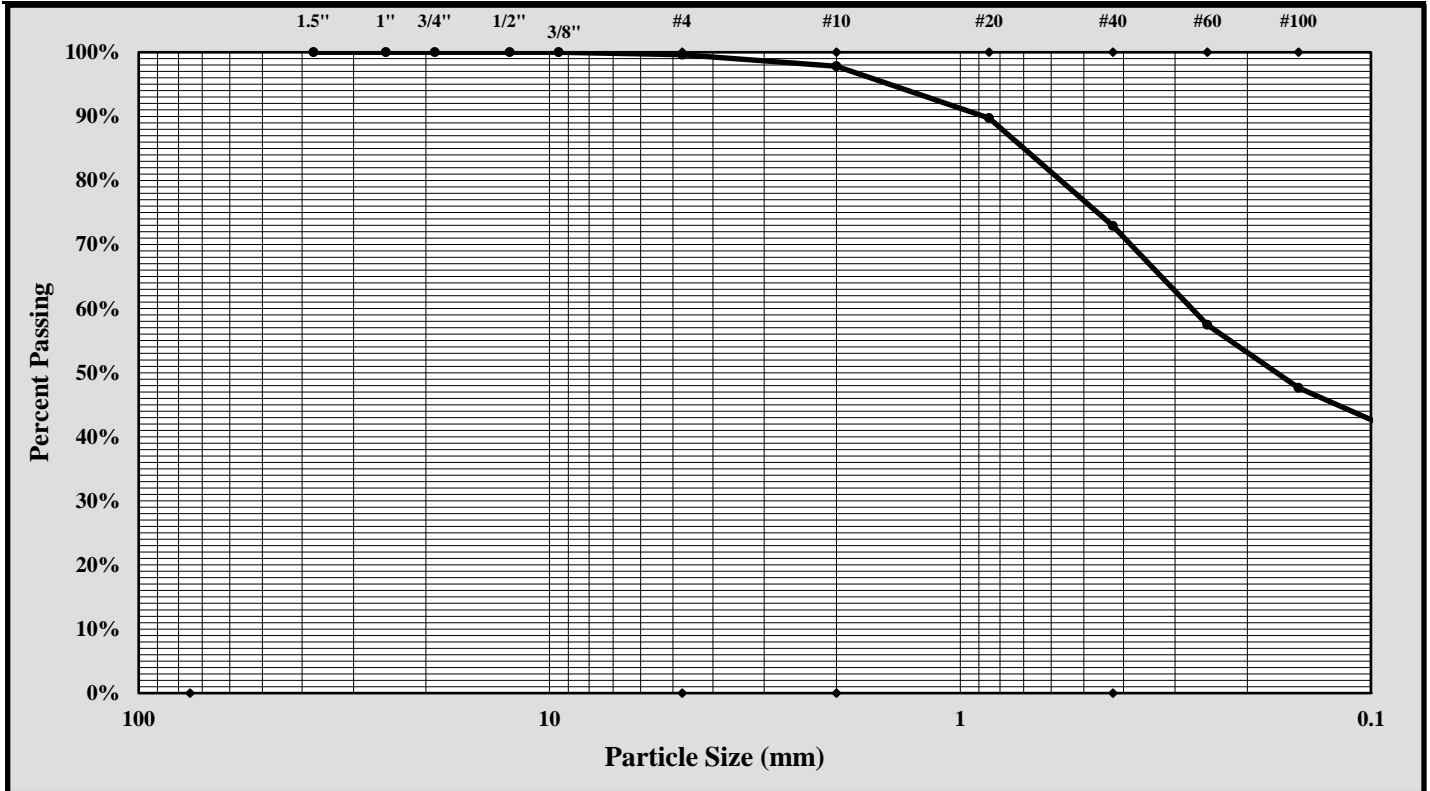
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/5-2/19/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-39	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.8' - 2.8'
Sample Description:	Clayey Sand (SC, A-6(2))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: #4 Gravel: 0%
 Silt & Clay (% Passing #200): 39% Total Sand: 60%

Liquid Limit	32	Plastic Limit	15	Plastic Index	17
Coarse Sand:	2%	Medium Sand:	25%	Fine Sand:	34%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

3/8/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/15-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-40	Sample #:	SS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 2.9'

Sample Description: Clayey Sand (SC, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28573	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		146	211	195			227	243	
A	Tare Weight	20.55	20.82	20.53			20.82	20.75	
B	Wet Soil Weight + A	29.27	30.15	31.18			30.63	28.59	
C	Dry Soil Weight + A	27.44	28.14	28.78			29.12	27.41	
D	Water Weight (B-C)	1.83	2.01	2.40			1.51	1.18	
E	Dry Soil Weight (C-A)	6.89	7.32	8.25			8.30	6.66	
F	% Moisture (D/E)*100	26.6%	27.5%	29.1%			18.2%	17.7%	
N	# OF DROPS	31	20	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						18.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	27
Plastic Limit	18
Plastic Index	9
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

3/8/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

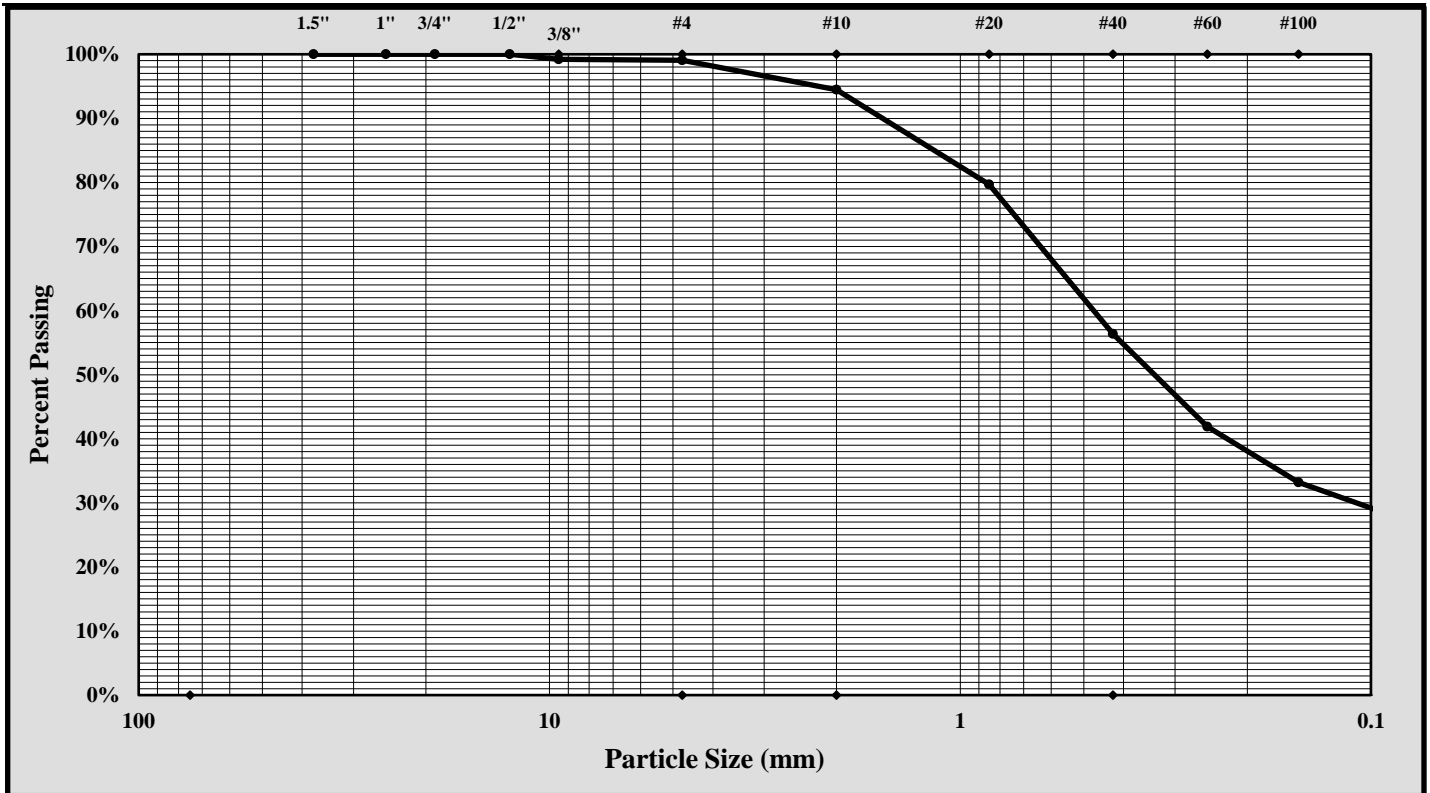
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/5-2/19/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-40	Sample #:	SS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 2.9'
Sample Description:	Clayey Sand (SC, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 3/8-inch Gravel: 1%
 Silt & Clay (% Passing #200): 26% Total Sand: 73%

Liquid Limit	27	Plastic Limit	18	Plastic Index	9
Coarse Sand:	5%	Medium Sand:	38%	Fine Sand:	30%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

3/8/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



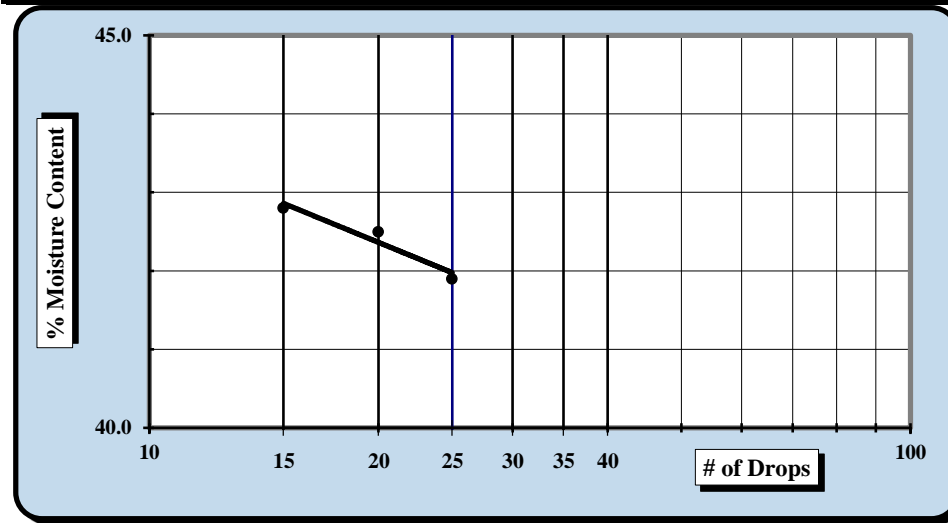
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/15-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' - 4.0'

Sample Description: Silty Sand (SM, A-2-5)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28573	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		8	212	3			36	30		
A	Tare Weight	20.61	20.87	20.80				20.98	20.82	
B	Wet Soil Weight + A	29.49	30.15	30.24				29.37	28.87	
C	Dry Soil Weight + A	26.87	27.38	27.41				27.33	26.96	
D	Water Weight (B-C)	2.62	2.77	2.83				2.04	1.91	
E	Dry Soil Weight (C-A)	6.26	6.51	6.61				6.35	6.14	
F	% Moisture (D/E)*100	41.9%	42.5%	42.8%				32.1%	31.1%	
N	# OF DROPS	25	20	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average						31.6%			



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	42
Plastic Limit	32
Plastic Index	10
Group Symbol	ML
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

3/8/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

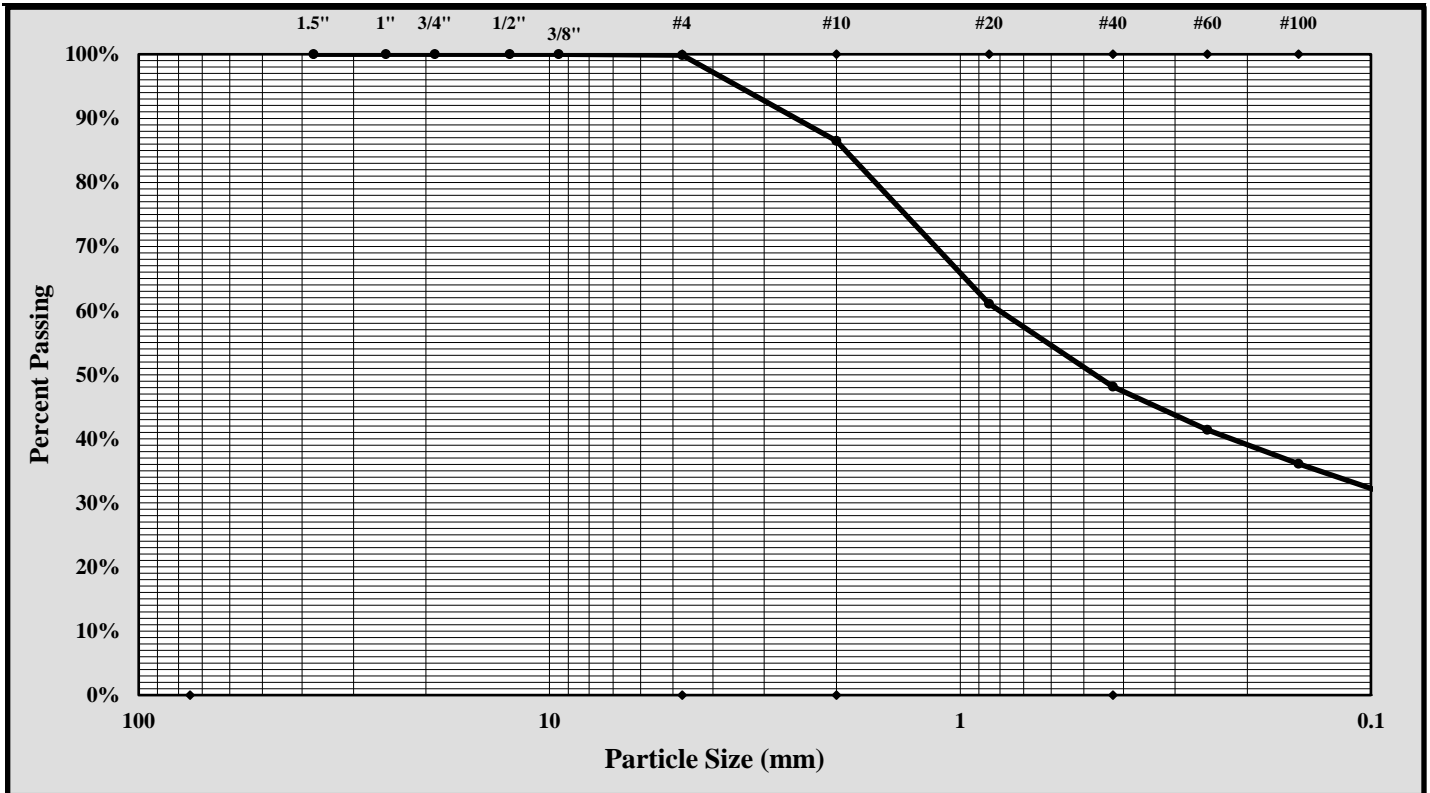
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/5-2/19/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' - 4.0'
Sample Description:	Silty Sand (SM, A-2-5)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: #4 Gravel: 0%
 Silt & Clay (% Passing #200): 30% Total Sand: 70%

Liquid Limit	42	Plastic Limit	32	Plastic Index	10
Coarse Sand:	13%	Medium Sand:	38%	Fine Sand:	19%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

3/8/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



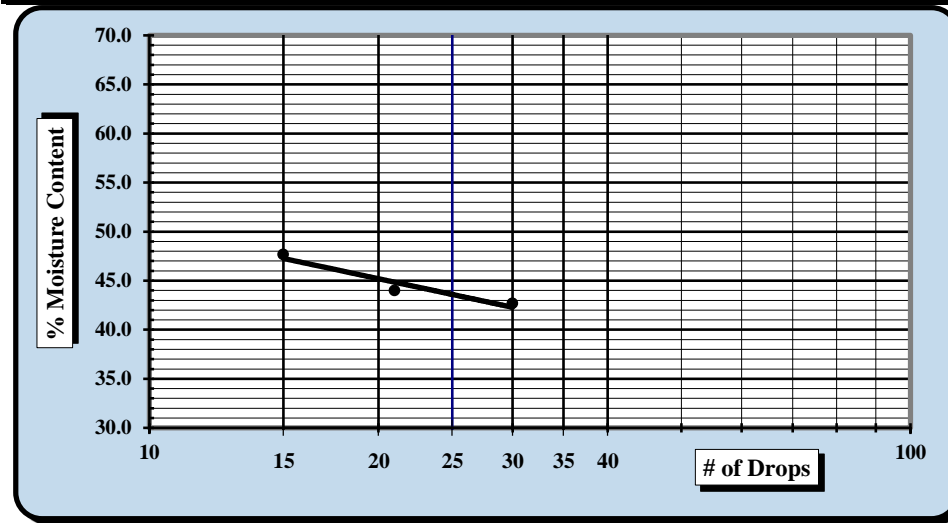
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #:	1461-16-047.2B	Report Date:	5-1-2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	SS-1
Location:	Pavement Boring	Sample Date:	Various
	Offset: N/A	Depth:	0.8' - 2.8'

Sample Description: Clayey Sand (SC, A-7-6 (8))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	25128	3/17/2017	Grooving tool	26551	2/23/2018
LL Apparatus	31336	2/23/2018	Grooving tool		
Oven	31332	2/20/2018	Grooving tool		

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		35	36	37			38	39	
A	Tare Weight	15.99	15.09	15.69			15.26	16.02	
B	Wet Soil Weight + A	28.18	27.49	27.73			21.26	22.07	
C	Dry Soil Weight + A	24.53	23.70	23.84			20.32	21.12	
D	Water Weight (B-C)	3.65	3.79	3.89			0.94	0.95	
E	Dry Soil Weight (C-A)	8.54	8.61	8.15			5.06	5.10	
F	% Moisture (D/E)*100	42.7%	44.0%	47.7%			18.6%	18.6%	
N	# OF DROPS	30	21	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						18.6%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	44	
Plastic Limit	19	
Plastic Index	25	
Group Symbol	CL	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

<u>Jimmy Hanson</u> Technician Name	<u>4/28/2018</u> Date	 Technical Responsibility
		<u>4/30/2018</u> Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils



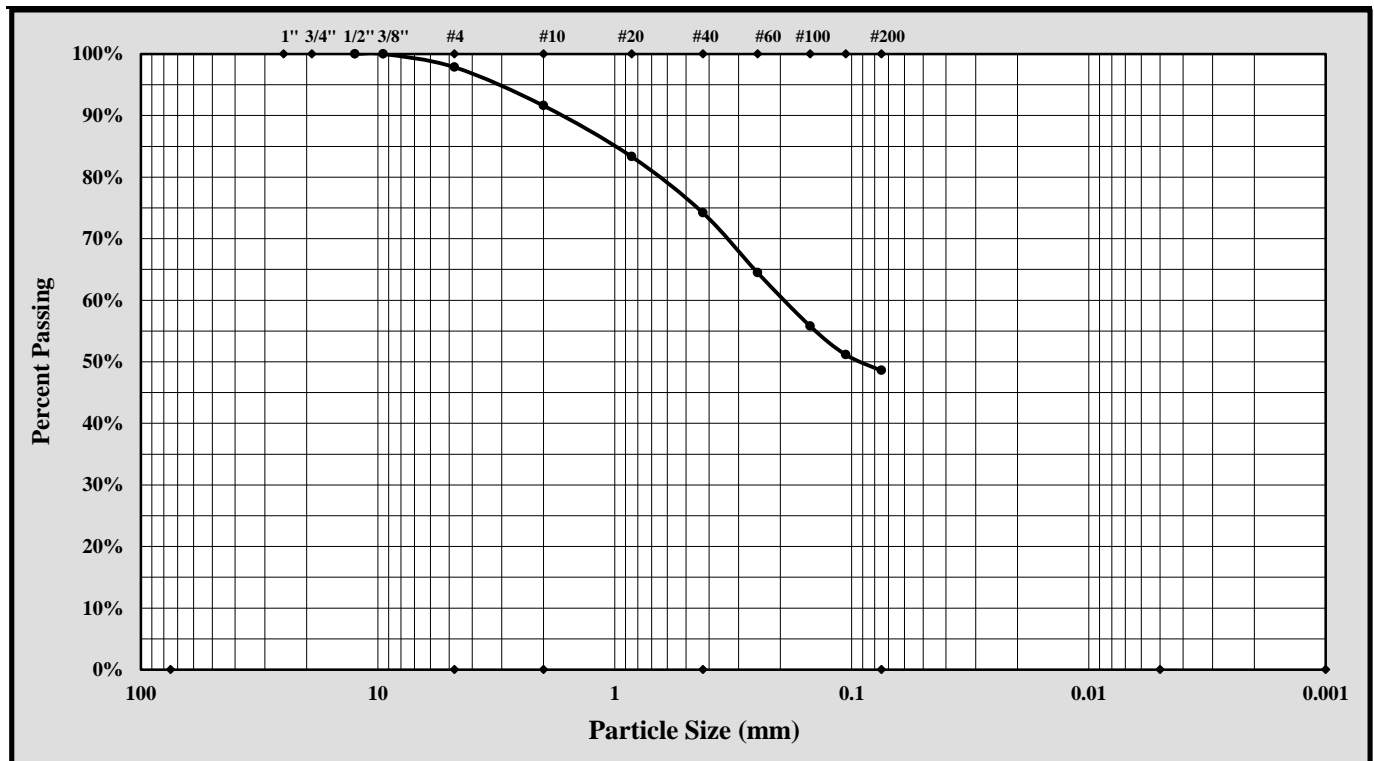
Quality Assurance

Sample Log No.:

ASTM D6913/D7928

S&ME, Inc., 4350 Rivergreen Parkway, Suite 200, Duluth, GA 30096

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	P-42	Type:	Split Spoon
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	0.8' - 2.8'
Sample Description:	Clayey Sand (SC, A-7-6 (8))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	Gravel:	2.1%
Silt & Clay (% Passing #200):	Total Sand:	49.3%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	19
	Plastic Index	25

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input type="checkbox"/>	Hard & Durable <input type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
Sample Prep Method: Moist Prep	Dispersion Period: 1 min.	Dispersing Agent: Sodium Hexametaphosphate:	50 g./ Liter		

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/1/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



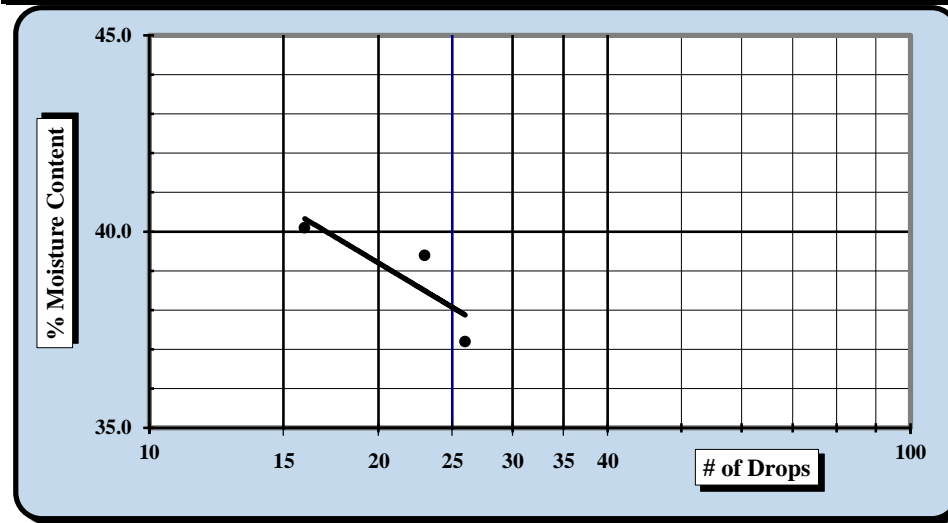
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/15-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 2.5'

Sample Description: Clayey Sand with Gravel (SC, A-6(3))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28573	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		45	235	16			226	222	
A	Tare Weight	20.77	20.76	20.68			20.94	20.84	
B	Wet Soil Weight + A	29.21	27.84	29.24			27.74	27.59	
C	Dry Soil Weight + A	26.92	25.84	26.79			26.60	26.50	
D	Water Weight (B-C)	2.29	2.00	2.45			1.14	1.09	
E	Dry Soil Weight (C-A)	6.15	5.08	6.11			5.66	5.66	
F	% Moisture (D/E)*100	37.2%	39.4%	40.1%			20.1%	19.3%	
N	# OF DROPS	26	23	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						19.7%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	38	
Plastic Limit	20	
Plastic Index	18	
Group Symbol	CL	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Matthew Wolfe</u> Technician Name	<u>NICET 123218</u> Certification	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility
		<u>3/8/2018</u> Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

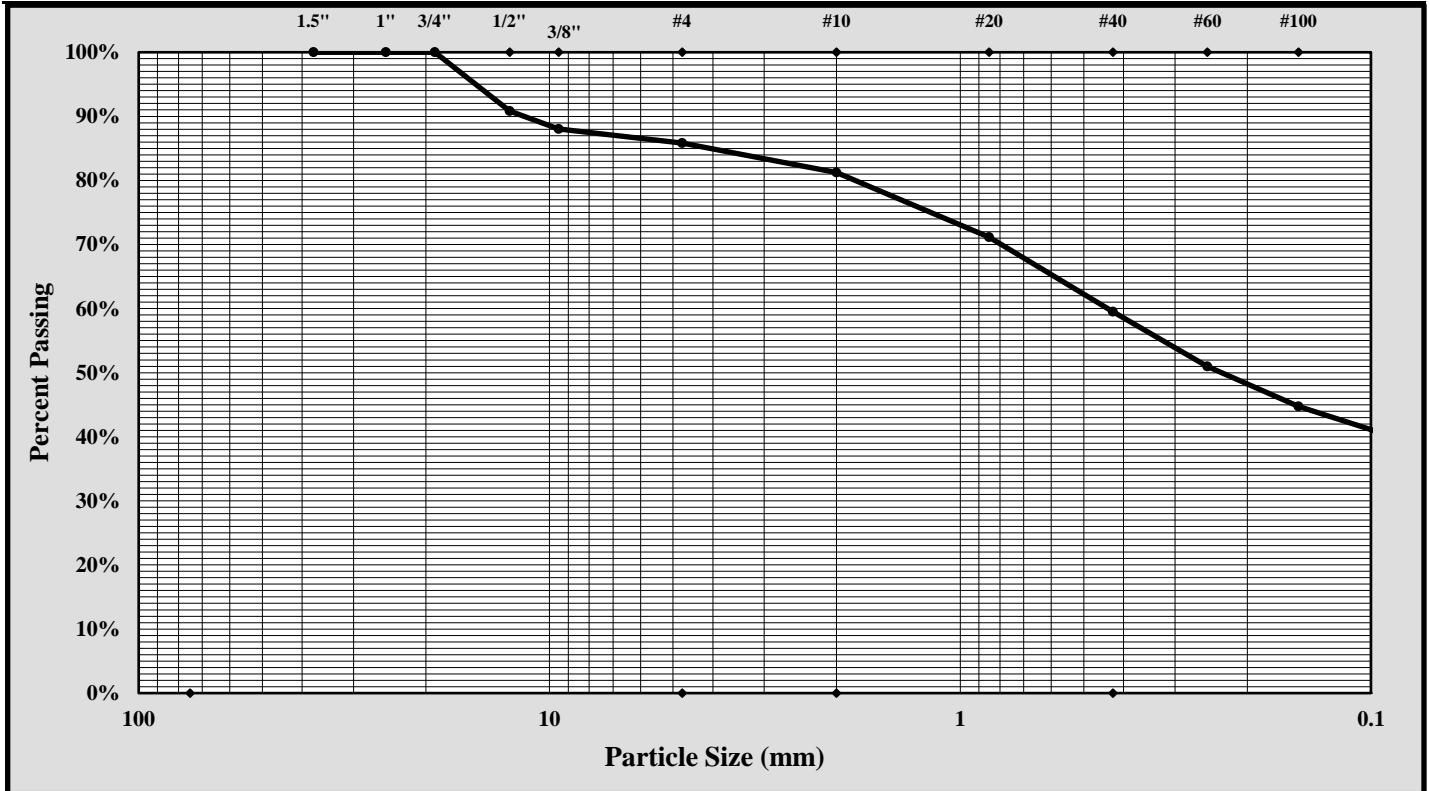
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/5-2/19/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	SS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 2.5'
Sample Description:	Clayey Sand with Gravel (SC, A-6(3))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 1/2-inch Gravel: 14%
 Silt & Clay (% Passing #200): 39% Total Sand: 47%

Liquid Limit	38	Plastic Limit	20	Plastic Index	18
Coarse Sand:	5%	Medium Sand:	22%	Fine Sand:	21%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

3/8/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Laboratory Test Data Sheets – Bulk Samples

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/14/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/06 - 2/07/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	Various
Sampling Method:	Bulk	Drill Rig:	CME 55/Diedrich D-50

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	13942	Calibration Date:	8/18/17 <th>Oven ID.</th> <td>13978</td> <th>Calibration Date:</th> <td>10/07/17</td>	Oven ID.	13978	Calibration Date:	10/07/17
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note		
		ft.		grams	grams	grams	grams	%			
P-10	BS-1	1.2 - 5.0	Y-11	0.00	721.7	657.9	63.8	9.7%			
P-20	BS-1	1.5 - 11.4	DM-5	0.00	794.1	625.3	168.8	27.0%			
P-30	BS-1	0.7 - 10.7	DM-20	0.00	696.6	566.5	130.1	23.0%			
P-35	BS-1	0.8 - 10.8	BJ-1	0.00	740.6	626.2	114.4	18.3%			
P-42	BS-1	0.8 - 10.8	BK-7	0.00	621.8	537.7	84.1	15.6%			
RW-37	BS-1	0.0 - 10.0	PC-3	0.00	573.7	498.4	75.3	15.1%			
RW-39	BS-1	0.0 - 10.0	T-1	0.00	534.6	466.7	67.9	14.5%			

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

<u>Benjamin Kovaleski</u> Technician Name	 Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>2/14/18</u> Date
<u>Brian Vaughan, P.E.</u> Technical Responsibility	 Signature	<u>Group Leader</u> Position	<u>2/14/18</u> Date

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



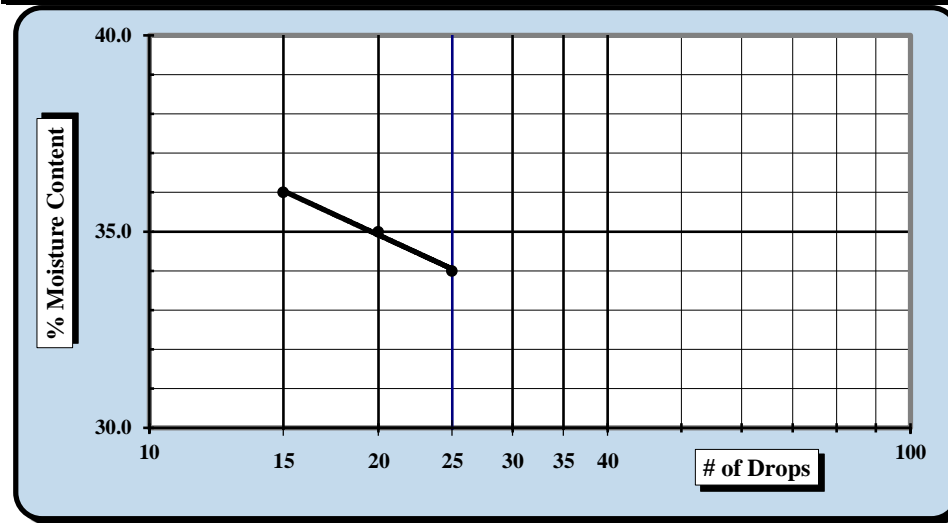
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/14-2/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' - 10.0'

Sample Description: Silty Sand (SM, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28574	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		244	17	10			207	35	
A	Tare Weight	20.79	20.63	20.79			20.94	20.80	
B	Wet Soil Weight + A	32.72	29.51	30.57			27.65	27.17	
C	Dry Soil Weight + A	29.69	27.21	27.98			26.30	25.88	
D	Water Weight (B-C)	3.03	2.30	2.59			1.35	1.29	
E	Dry Soil Weight (C-A)	8.90	6.58	7.19			5.36	5.08	
F	% Moisture (D/E)*100	34.0%	35.0%	36.0%			25.2%	25.4%	
N	# OF DROPS	25	20	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						25.3%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	34	
Plastic Limit	25	
Plastic Index	9	
Group Symbol	ML	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Matthew Wolfe</u> Technician Name	<u>NICET 123218</u> Certification	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/25/2018</u> Date
---	--------------------------------------	---	--------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

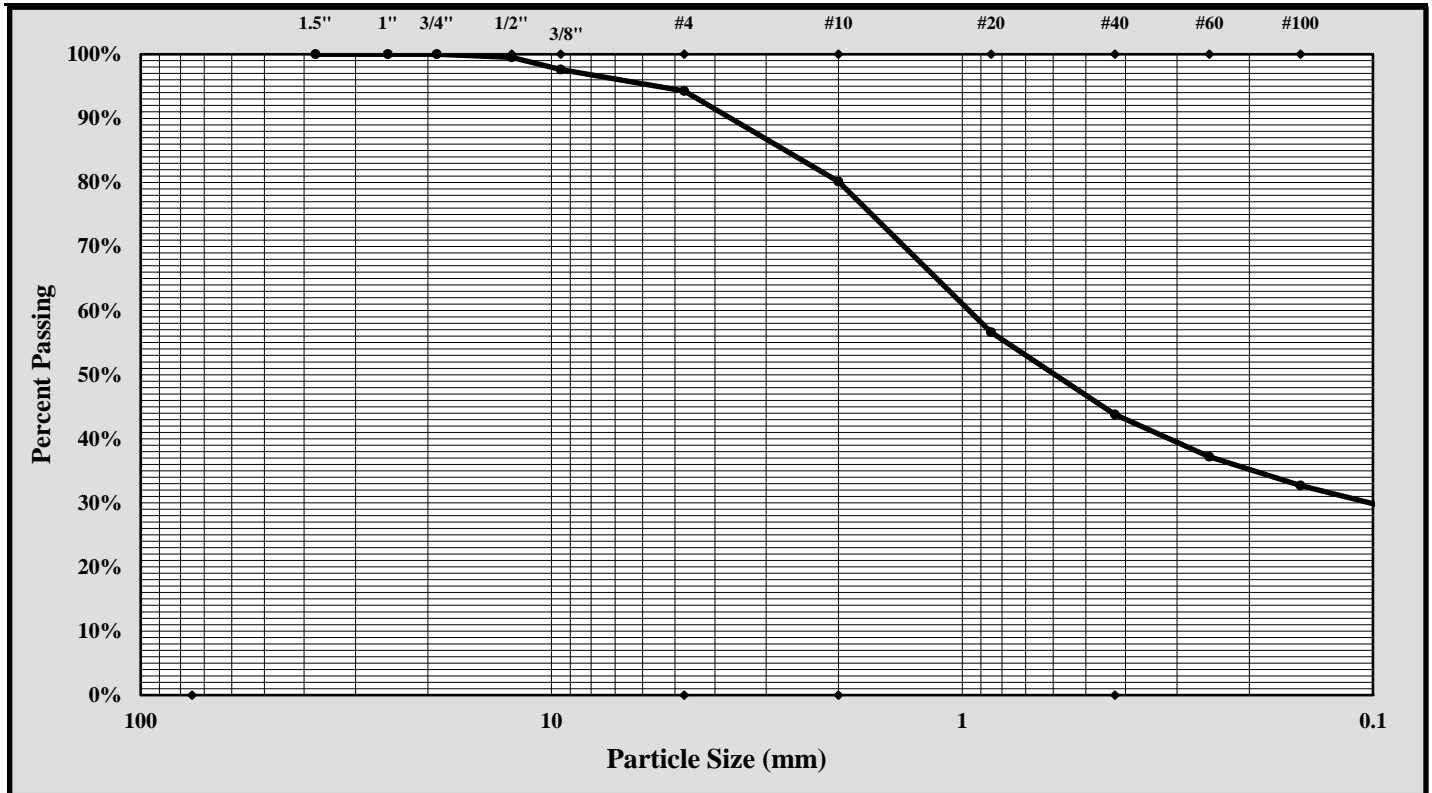
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/14-2/21/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	BS-1
		Sample Date:	
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' - 10.0'
Sample Description:	Silty Sand (SM, A-2-4)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 1/2-inch Gravel: 5.7%
 Silt & Clay (% Passing #200): 27.9% Total Sand: 66.4%

Liquid Limit	34	Plastic Limit	25	Plastic Index	9
Coarse Sand:	14.2%	Medium Sand:	36.3%	Fine Sand:	15.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/25/2018

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

MOISTURE - DENSITY REPORT

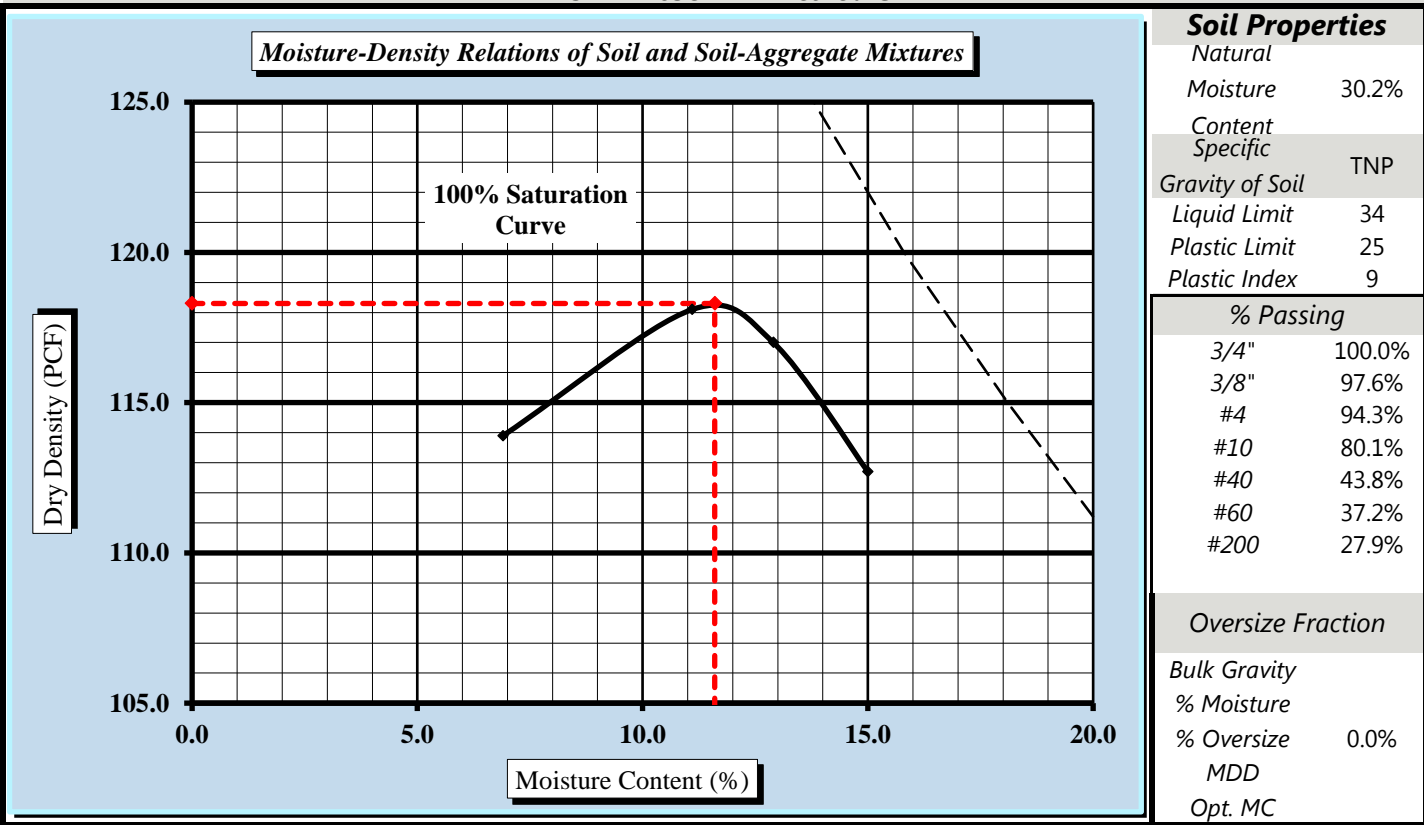


Quality Assurance

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210			
S&ME Project #:	1461-16-047.2B	Report Date:	2/15/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/14-2/15/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	BS-1
Location:	Pavement Boring	Offset:	N/A
Sample Description:	Silty Sand (SM, A-2-4)		

Maximum Dry Density	118.3	PCF.	Optimum Moisture Content	11.6%
---------------------	-------	------	--------------------------	-------

ASTM D 698 - - Method C



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position	<u>4/25/2018</u> Date
---	------------------------------------	--------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



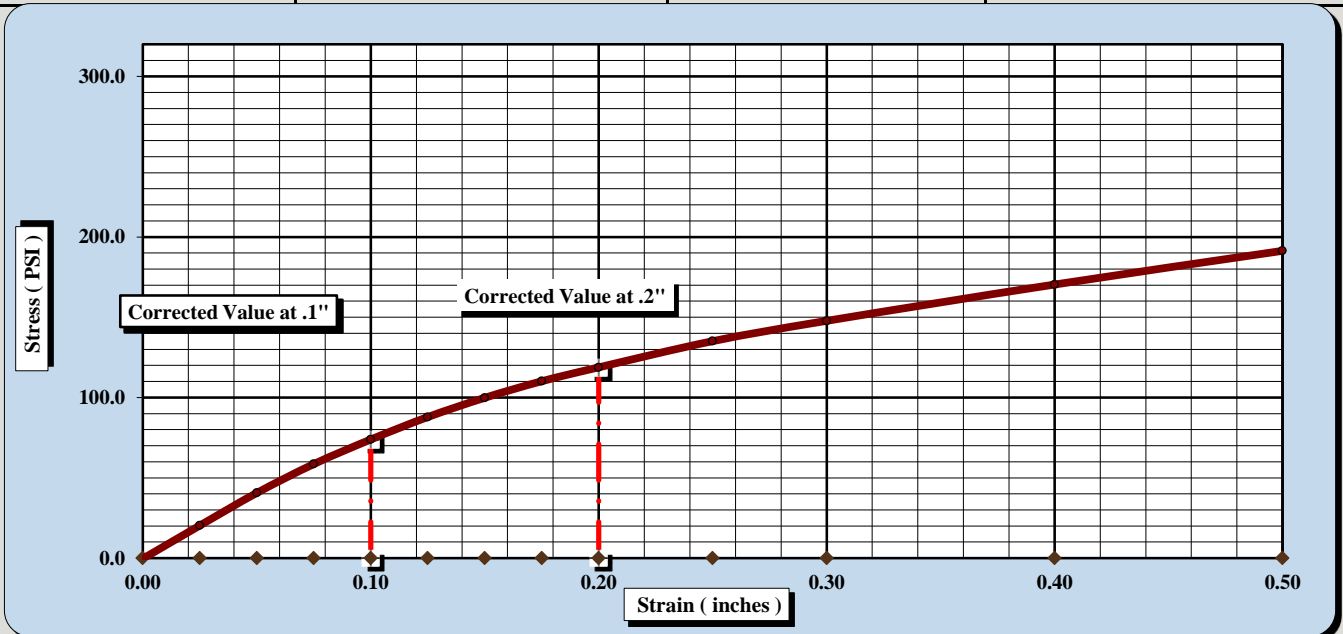
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/16-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' -10.0'
Sample Description:	Silty Sand (SM, A-2-4)		

ASTM D 698 Method C	Maximum Dry Density: 118.3 PCF	Optimum Moisture Content: 11.6%	
	Compaction Test performed on grading complying with CBR spec.	% Retained on the 3/4" sieve: 0.0%	

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	7.4	CBR at 0.1 in.	7.4
CBR at 0.2 in.	7.9	CBR at 0.2 in.	7.9



CBR Sample Preparation:

The replacement method was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	15	Final Dry Density (PCF)	111.1
Initial Dry Density (PCF)	111.4	Moisture Content (top 1" after soaking)	16.0%
Moisture Content of the Compacted Specimen	12.3%	Percent Swell	0.2%
Percent Compaction	94.1%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 34	Plastic Index: 9	Apparent Relative Density: TNP	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



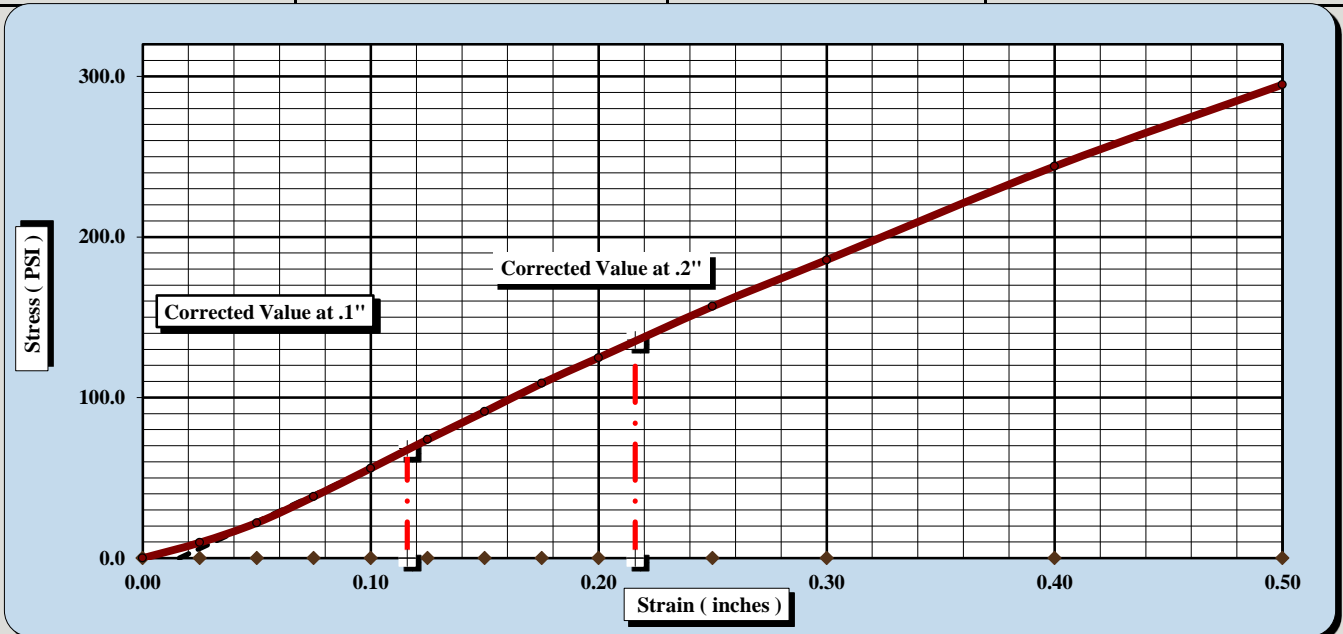
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/16-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' - 10.0'
Sample Description:	Silty Sand (SM, A-2-4)		

ASTM D 698 Method C	Maximum Dry Density: 118.3 PCF	Optimum Moisture Content: 11.6%	
	Compaction Test performed on grading complying with CBR spec.	% Retained on the 3/4" sieve: 0.0%	

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	5.6	CBR at 0.1 in.	6.9
CBR at 0.2 in.	8.3	CBR at 0.2 in.	9.1



CBR Sample Preparation:

The replacement method was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	35	Final Dry Density (PCF)	117.4
Initial Dry Density (PCF)	117.5	Moisture Content (top 1" after soaking)	14.8%
Moisture Content of the Compacted Specimen	11.9%	Percent Swell	0.1%
Percent Compaction	99.3%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 34	Plastic Index: 9	Apparent Relative Density: TNP	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



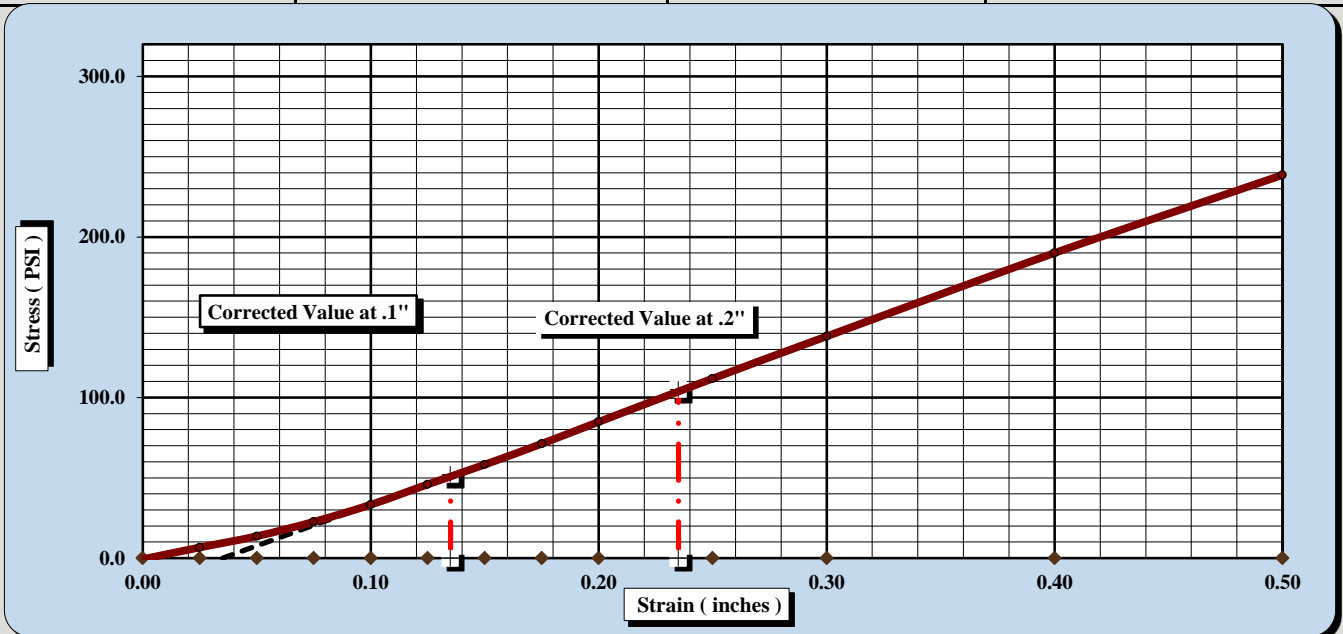
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/16-2/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-41	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	2.0' - 10.0'
Sample Description:	Silty Sand (SM, A-2-4)		

ASTM D 698 Method C	Maximum Dry Density:	118.3 PCF	Optimum Moisture Content:	11.6%
Compaction Test performed on grading complying with CBR spec.			% Retained on the 3/4" sieve:	0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	3.3	CBR at 0.1 in.	5.2
CBR at 0.2 in.	5.7	CBR at 0.2 in.	7.0



CBR Sample Preparation:

The replacement method was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	65	Final Dry Density (PCF)	118.2
Initial Dry Density (PCF)	118.3	Moisture Content (top 1" after soaking)	13.9%
Moisture Content of the Compacted Specimen	12.2%	Percent Swell	0.2%
Percent Compaction	100.0%		

Soak Time:	96 hours	Surcharge Weight	10.0
Liquid Limit	34	Plastic Index	9
		Surcharge Wt. per sq. Ft.	50.9
		Apparent Relative Density	TNP

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



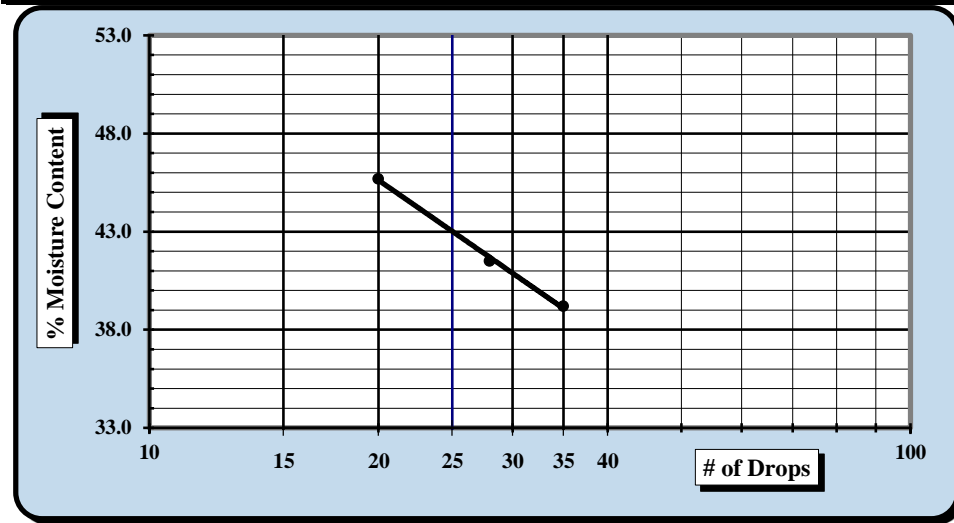
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/17/18
Project Name:	Carolina Crossroads Project	Test Date:	2/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	BS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	0.8' - 10.8'

Sample Description: Clayey Sand (SC, A-7-6(5))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	26.72	26.32	27.34				27.93	26.76	
B	Wet Soil Weight + A	44.74	47.39	48.78				35.66	34.36	
C	Dry Soil Weight + A	39.67	41.21	42.06				34.38	33.13	
D	Water Weight (B-C)	5.07	6.18	6.72				1.28	1.23	
E	Dry Soil Weight (C-A)	12.95	14.89	14.72				6.45	6.37	
F	% Moisture (D/E)*100	39.2%	41.5%	45.7%				19.8%	19.3%	
N	# OF DROPS	35	28	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							19.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	43
Plastic Limit	20
Plastic Index	23
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 40.6%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

2/17/18
Date

Brian Vaughan
Technical Responsibility

2/17/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



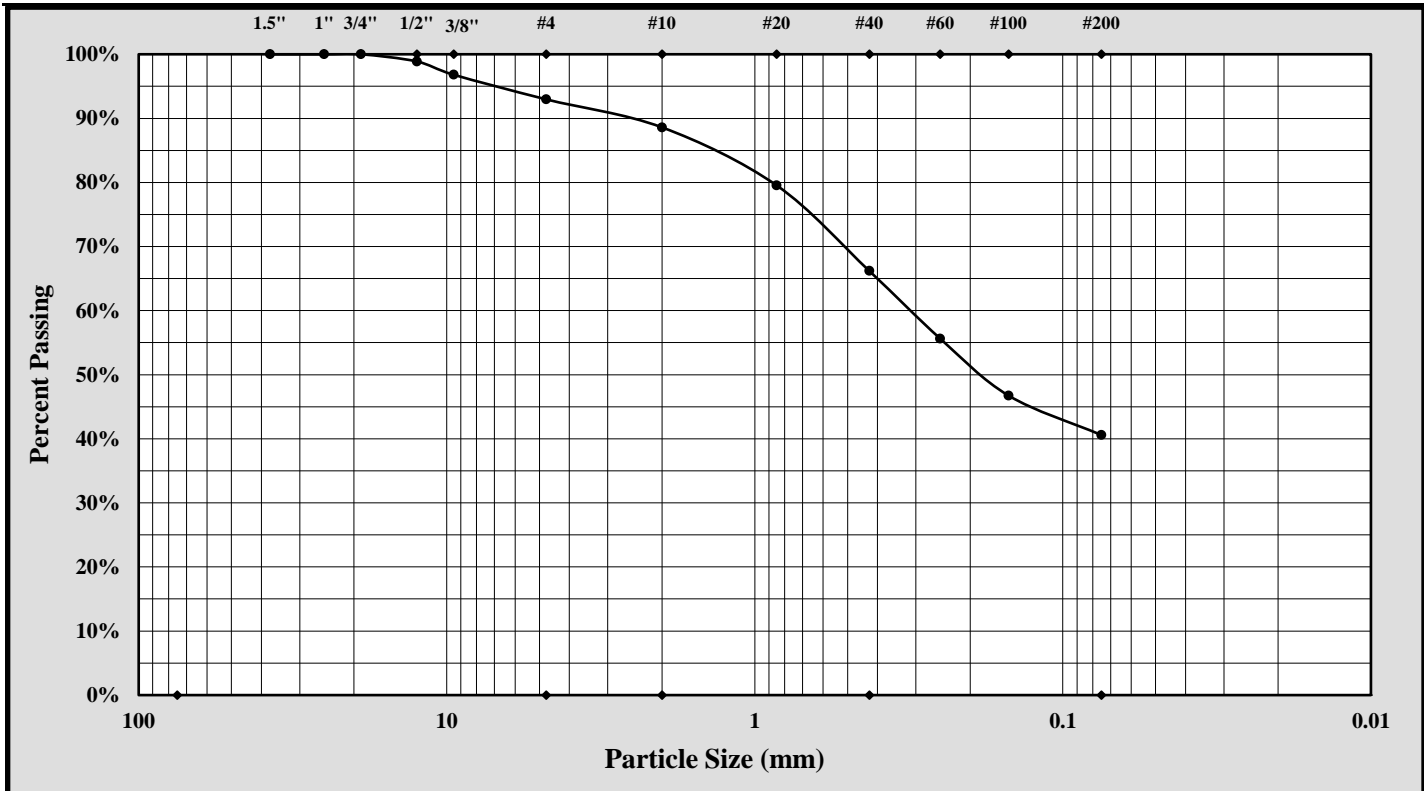
Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	2/17/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/13 - 2/15/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	BS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	0.8' - 10.8'

Sample Description: Clayey Sand (SC, A-7-6(5))



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.00 mm Gravel: 7.0%
 Silt & Clay (% Passing #200): 40.6% Total Sand: 52.4%

Liquid Limit	43	Plastic Limit	20	Plastic Index	23
Coarse Sand:	4.4%	Medium Sand:	22.4%	Fine Sand:	25.6%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

2/17/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

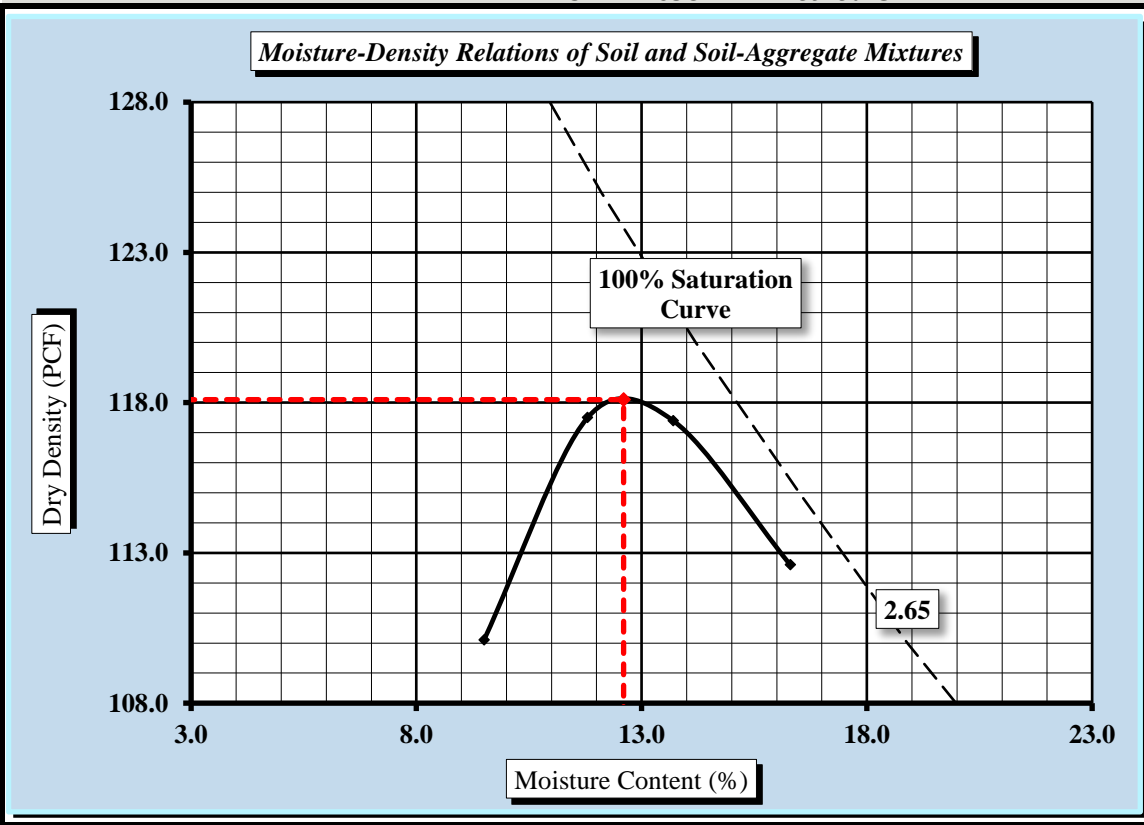
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	2/17/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/11/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	BS-1
Location:	Pavement Boring	Type:	Bulk
Sample Description:	Clayey Sand (SC, A-7-6(5))		

Maximum Dry Density	118.1	PCF.	Optimum Moisture Content	12.6%
---------------------	-------	------	--------------------------	-------

ASTM D 698 - - Method C



Soil Properties	
Natural	
Moisture Content	15.6%
Specific Gravity of Soil	2.650
Liquid Limit	43
Plastic Limit	20
Plastic Index	23
% Passing	
3/4"	100.0%
3/8"	96.8%
#4	93.0%
#10	88.6%
#40	66.2%
#60	55.6%
#100	46.7%
#200	40.6%
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Brian Vaughan, P.E. Brian Vaughan Group Leader 2/17/18
 Technical Responsibility Signature Position Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



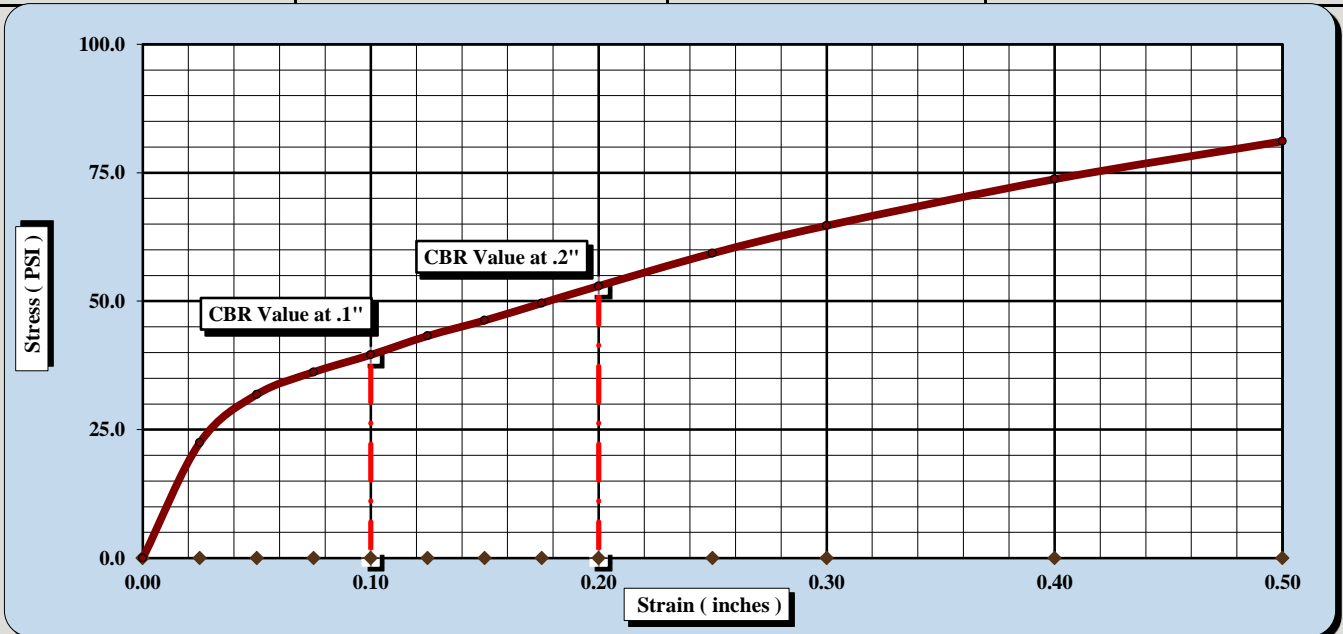
ASTM D 1883

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/17/18
Project Name:	Carolina Crossroads Project	Test Date(s)	2/12 - 2/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	BS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	0.8' - 10.8'
Sample Description:	Clayey Sand (SC, A-7-6(5))		

ASTM D 698 Method C Maximum Dry Density: 118.1 PCF Optimum Moisture Content: 12.6%
 Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	4.0	CBR at 0.1 in.	4.0
CBR at 0.2 in.	3.5	CBR at 0.2 in.	3.5



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	15	Final Dry Density (PCF)	106.1
Initial Dry Density (PCF)	106.3	Moisture Content (top 1" after soaking)	18.6%
Moisture Content of the Compacted Specimen	12.6%	Percent Swell	0.2%
Percent Compaction	90.0%		

Soak Time:	96 hrs.	Surcharge Weight	10.0
Liquid Limit	43	Plastic Index	23
		Surcharge Wt. per sq. Ft.	50.9
		% Passing the #200 Sieve	40.6%

Notes/Deviations/References:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

2/17/18
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



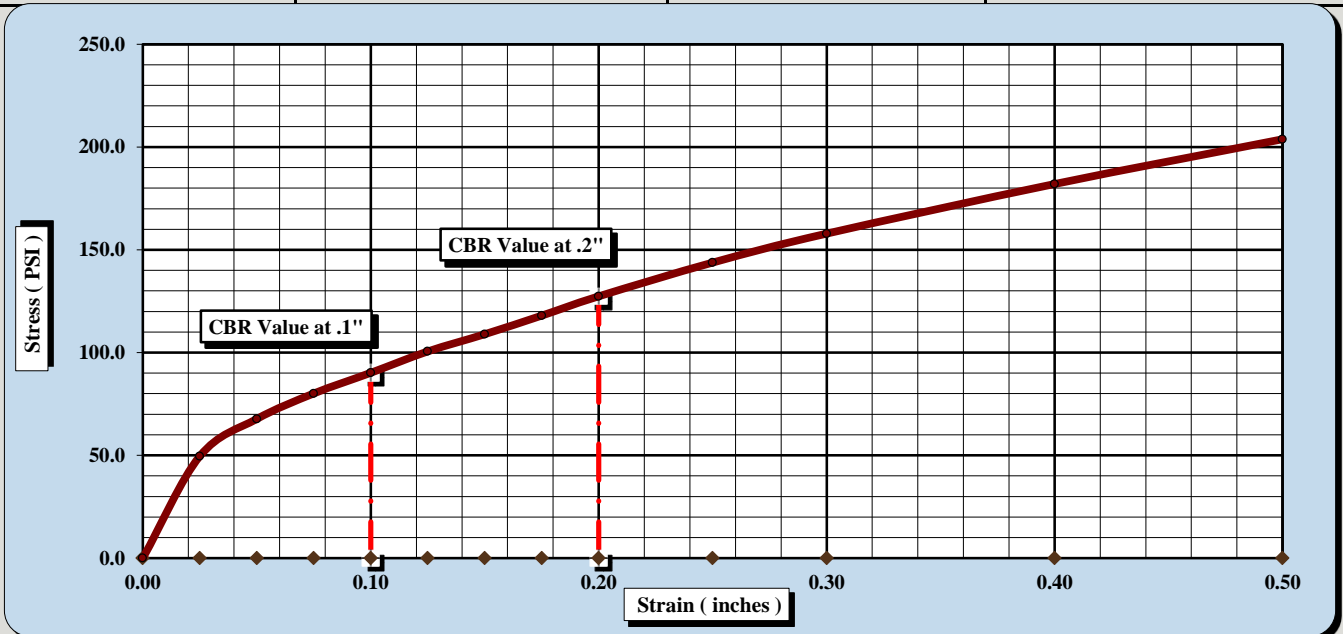
ASTM D 1883

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/17/18
Project Name:	Carolina Crossroads Project	Test Date(s)	2/12 - 2/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	BS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	0.8' - 10.8'
Sample Description:	Clayey Sand (SC, A-7-6(5))		

ASTM D 698 Method C Maximum Dry Density: 118.1 PCF Optimum Moisture Content: 12.6%
 Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	9.0	CBR at 0.1 in.	9.0
CBR at 0.2 in.	8.5	CBR at 0.2 in.	8.5



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	25	Final Dry Density (PCF)	112.1
Initial Dry Density (PCF)	112.2	Moisture Content (top 1" after soaking)	15.9%
Moisture Content of the Compacted Specimen	12.6%	Percent Swell	0.1%
Percent Compaction	95.0%		

Soak Time:	96 hrs.	Surcharge Weight	10.0
Liquid Limit	43	Plastic Index	23
		Surcharge Wt. per sq. Ft.	50.9
		% Passing the #200 Sieve	40.6%

Notes/Deviations/References:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

2/17/18
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



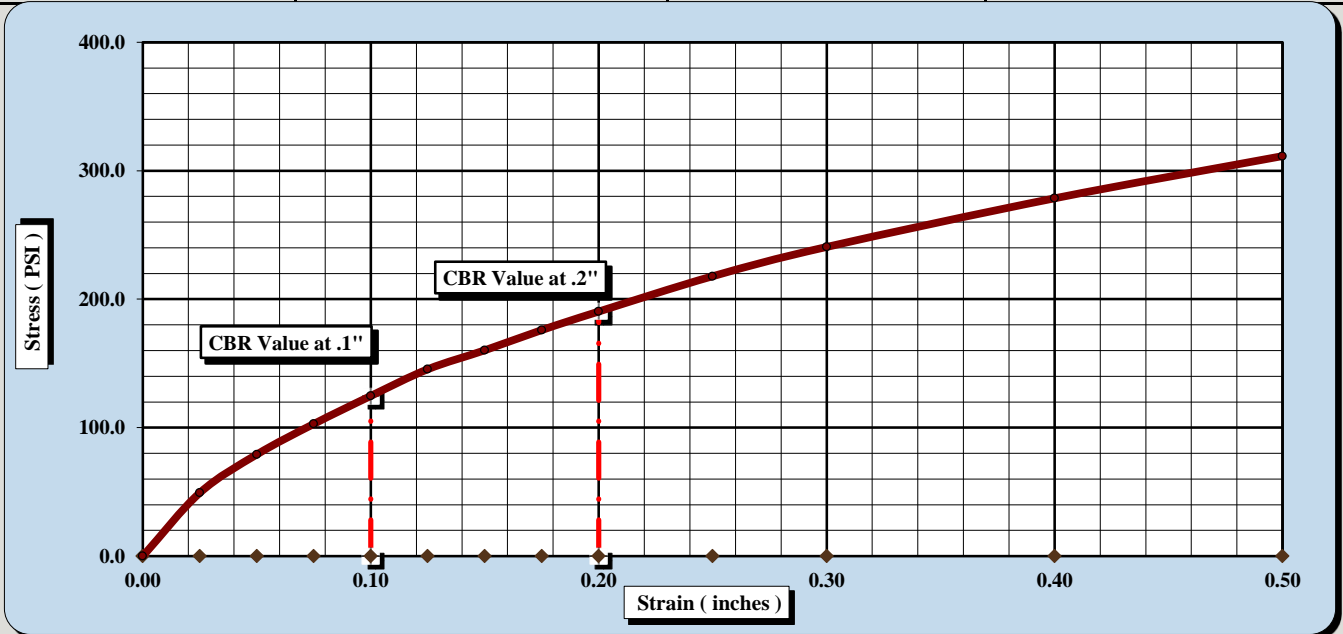
ASTM D 1883

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/17/18
Project Name:	Carolina Crossroads Project	Test Date(s)	2/12 - 2/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-42	Sample #:	BS-1
		Sample Date:	1/25/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	0.8' - 10.8'
Sample Description:	Clayey Sand (SC, A-7-6(5))		

ASTM D 698 Method C	Maximum Dry Density:	118.1 PCF	Optimum Moisture Content:	12.6%
Compaction Test performed on grading complying with CBR spec.			% Retained on the 3/4" sieve:	0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	12.5	CBR at 0.2 in.	12.7
CBR at 0.1 in.	12.5	CBR at 0.2 in.	12.7



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	50	Final Dry Density (PCF)	118.0
Initial Dry Density (PCF)	118.1	Moisture Content (top 1" after soaking)	11.5%
Moisture Content of the Compacted Specimen	12.6%	Percent Swell	0.1%
Percent Compaction	100.0%		

Soak Time:	96 hrs.	Surcharge Weight	10.0
Liquid Limit	43	Surcharge Wt. per sq. Ft.	51.0
		Plastic Index	23
		% Passing the #200 Sieve	40.6%

Notes/Deviations/References:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

2/17/18
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



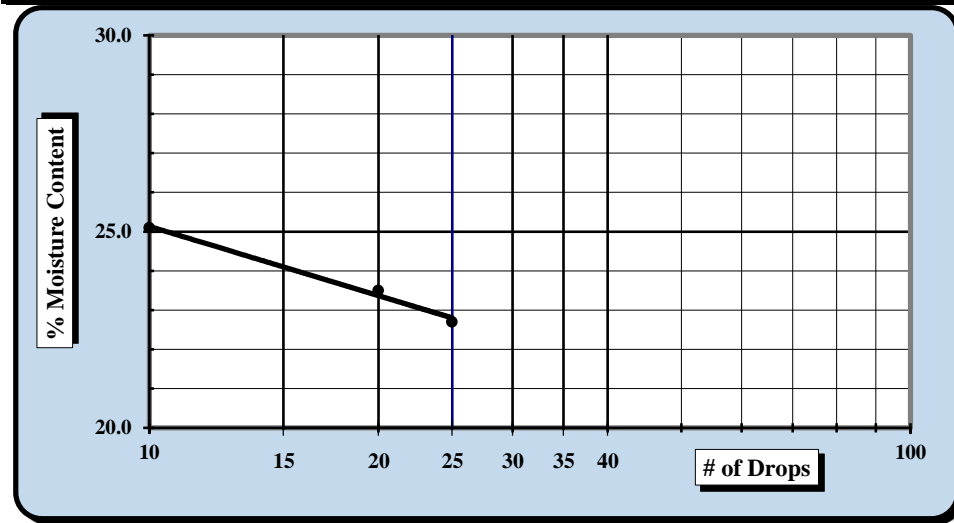
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/9/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	1/30-2/8/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 10.5'

Sample Description: Clayey Sand (SC, A-6(1))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	15425	8/30/2017	Flat Grooving tool	28573	11/10/2017
LL Apparatus	28562	5/12/2017			
Oven	25722	8/18/2017	No. 40 Sieve	21775	1/8/2018

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		24	116	209			244	43	
A	Tare Weight	20.76	20.56	21.07			20.77	20.83	
B	Wet Soil Weight + A	33.75	32.23	33.49			27.80	28.86	
C	Dry Soil Weight + A	31.35	30.01	31.00			27.05	27.96	
D	Water Weight (B-C)	2.40	2.22	2.49			0.75	0.90	
E	Dry Soil Weight (C-A)	10.59	9.45	9.93			6.28	7.13	
F	% Moisture (D/E)*100	22.7%	23.5%	25.1%			11.9%	12.6%	
N	# OF DROPS	25	20	10			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						12.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	23
Plastic Limit	12
Plastic Index	11
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Matthew Wolfe</u> Technician Name	<u>NICET 123218</u> Certification	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/25/2018</u> Date
---	--------------------------------------	---	--------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

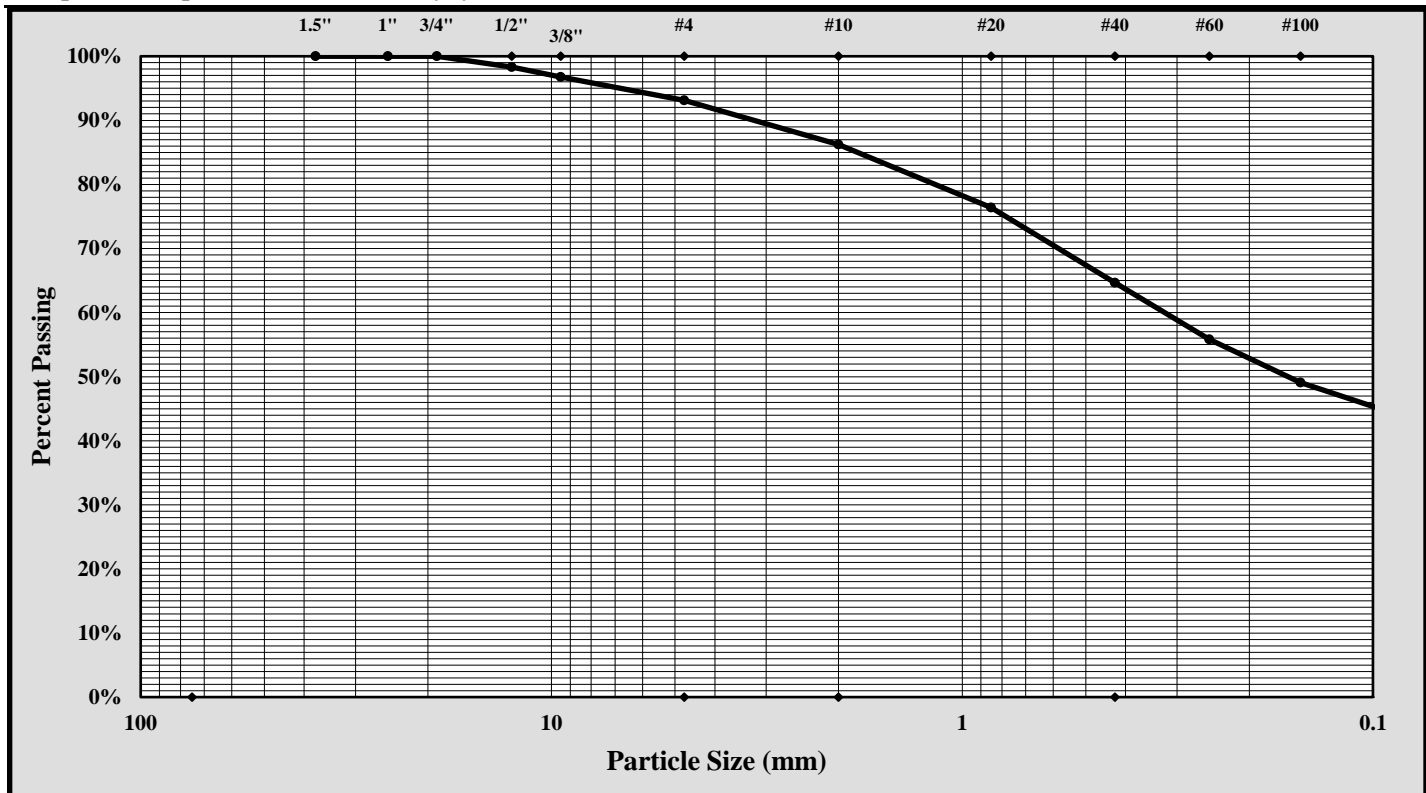
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	2/9/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	1/30-2/2/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	BS-1
		Sample Date:	1/23-1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 10.5'
Sample Description:	Clayey Sand (SC, A-6(1))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 1/2-inch Gravel: 6.9%
 Silt & Clay (% Passing #200): 42.7% Total Sand: 50.4%

Liquid Limit	23	Plastic Limit	12	Plastic Index	11
Coarse Sand:	6.9%	Medium Sand:	21.6%	Fine Sand:	21.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/25/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

MOISTURE - DENSITY REPORT

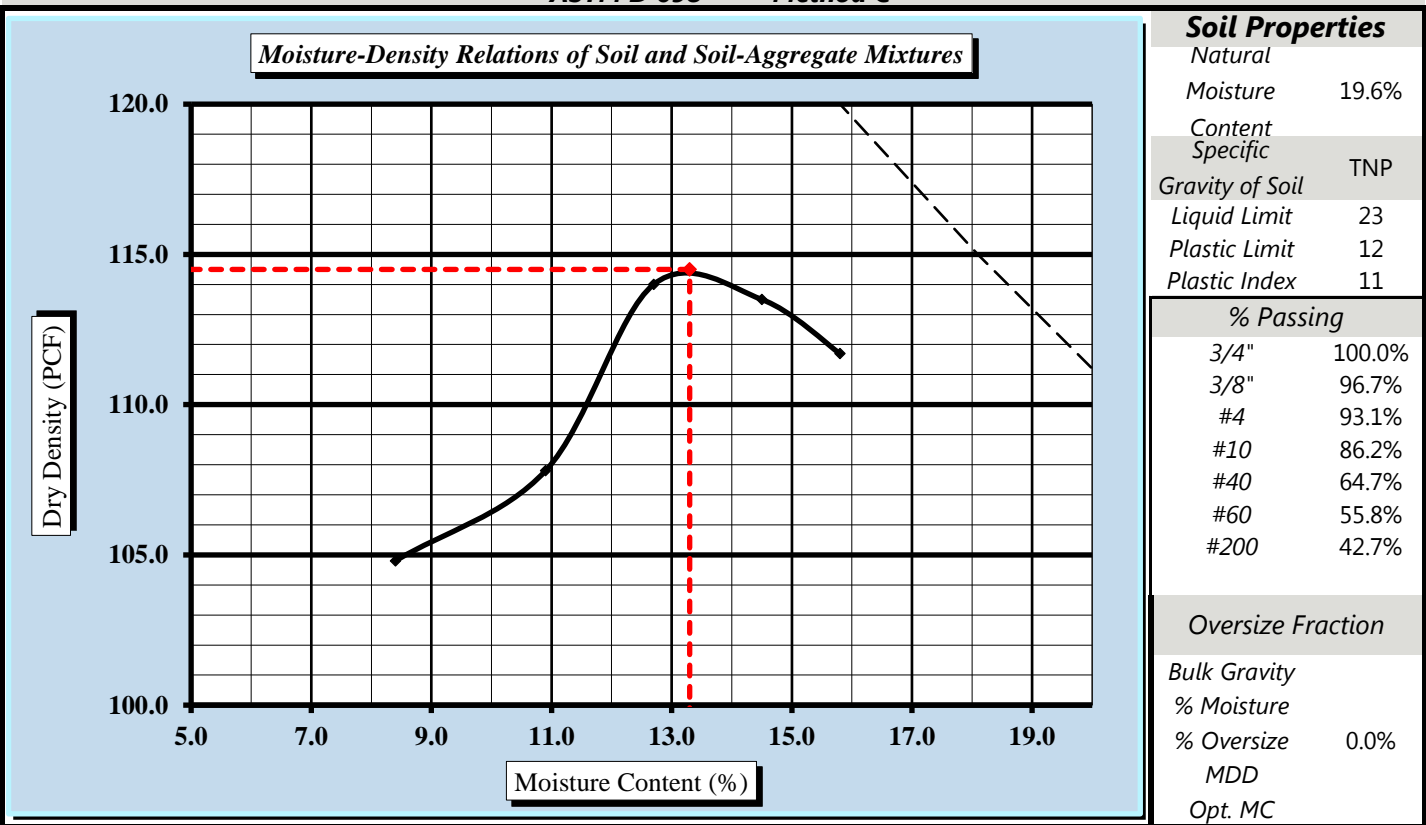


Quality Assurance

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210			
S&ME Project #:	1461-16-047.2B	Report Date:	2/13/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	1/31-2/2/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	BS-1
Location:	Pavement Boring	Offset:	N/A
Sample Date:	1/24/2018		
Depth:	0.5' - 10.5'		
Sample Description:	Clayey Sand (SC, A-6(1))		

Maximum Dry Density 114.5 PCF. Optimum Moisture Content 13.3%

ASTM D 698 - - Method C



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/25/2018
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



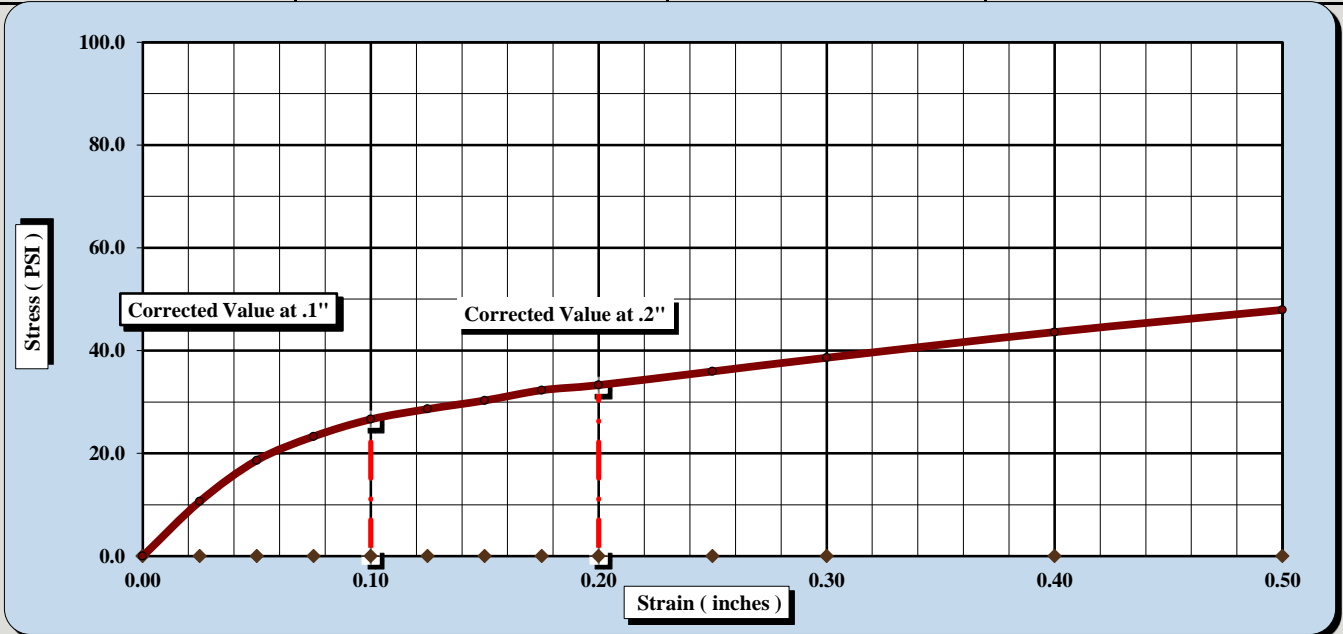
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/13/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/8-2/12/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 10.5'
Sample Description:	Clayey Sand (SC, A-6(1))		

ASTM D 698 Method C	Maximum Dry Density: 114.5 PCF	Optimum Moisture Content: 13.3%	
	Compaction Test performed on grading complying with CBR spec.	% Retained on the 3/4" sieve: 0.0%	

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	2.7	CBR at 0.1 in.	2.7
CBR at 0.2 in.	2.2	CBR at 0.2 in.	2.2



CBR Sample Preparation:

The replacement method was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	15	Final Dry Density (PCF)	103.1
Initial Dry Density (PCF)	103.8	Moisture Content (top 1" after soaking)	18.9%
Moisture Content of the Compacted Specimen	12.9%	Percent Swell	0.6%
Percent Compaction	90.6%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 23	Plastic Index: 11	Apparent Relative Density: TNP	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



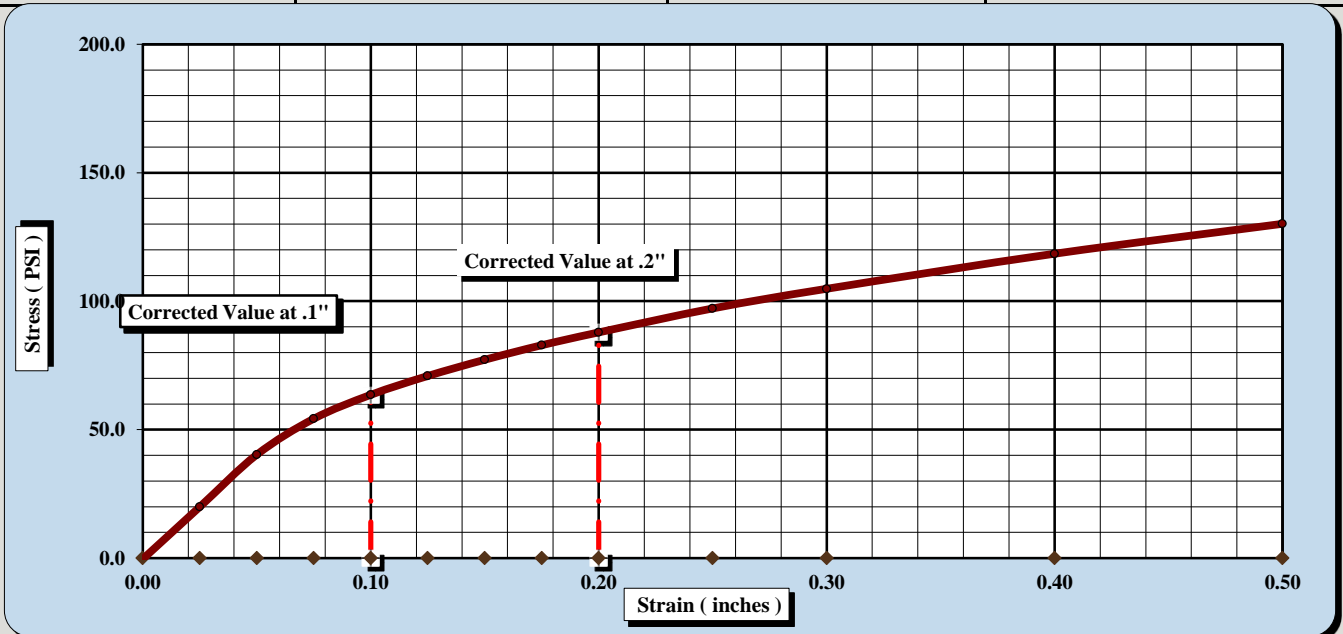
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/13/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/8-2/12/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	BS-1
		Sample Date:	1/24/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 10.5'
Sample Description:	Clayey Sand (SC, A-6(1))		

ASTM D 698 Method C	Maximum Dry Density: 114.5 PCF	Optimum Moisture Content: 13.3%	
Compaction Test performed on grading complying with CBR spec.		% Retained on the 3/4" sieve: 0.0%	

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	6.4	CBR at 0.1 in.	6.4
CBR at 0.2 in.	5.9	CBR at 0.2 in.	5.9



CBR Sample Preparation:

The replacement method was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	35	Final Dry Density (PCF)	108.1
Initial Dry Density (PCF)	109.2	Moisture Content (top 1" after soaking)	18.2%
Moisture Content of the Compacted Specimen	12.7%	Percent Swell	1.0%
Percent Compaction	95.4%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 23	Plastic Index: 11	Apparent Relative Density: TNP	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



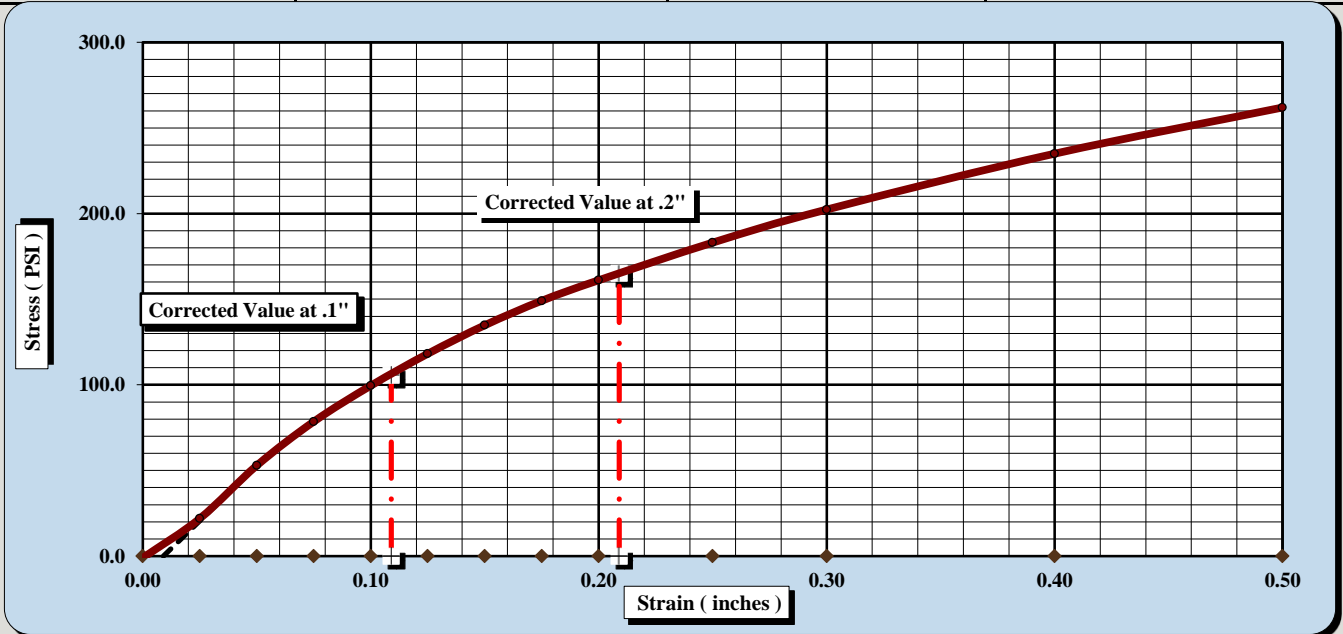
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	2/13/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/8-2/12/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-43	Sample #:	BS-1
		Sample Date:	1/21/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.5' - 10.5'
Sample Description:	Clayey Sand (SC, A-6(1))		

ASTM D 698 Method C	Maximum Dry Density: 114.5 PCF	Optimum Moisture Content: 13.3%	
	Compaction Test performed on grading complying with CBR spec.	% Retained on the 3/4" sieve: 0.0%	

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	10.0	CBR at 0.1 in.	10.6
CBR at 0.2 in.	10.7	CBR at 0.2 in.	11.0



CBR Sample Preparation:

The replacement method was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	65	Final Dry Density (PCF)	115.1
Initial Dry Density (PCF)	115.6	Moisture Content (top 1" after soaking)	15.7%
Moisture Content of the Compacted Specimen	13.5%	Percent Swell	0.4%
Percent Compaction	101.0%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 23	Plastic Index: 11	Apparent Relative Density: TNP	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



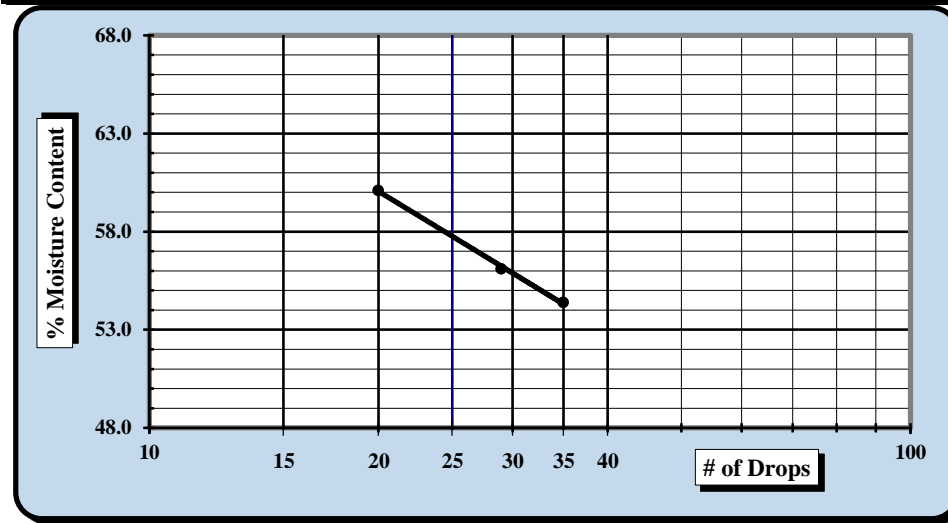
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/25/18
Project Name:	Carolina Crossroads Project	Test Date:	4/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-36	Sample #:	BS-1
Location:	Embankment Boring	Type:	Bulk
		Sample Date:	3/1/2018
		Depth:	0.0' - 10.0'

Sample Description: Fat Clay with Sand (CH, A-7-6(30))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.69	26.46	26.34				25.93	26.96	
B	Wet Soil Weight + A	43.13	44.33	47.19				32.24	35.06	
C	Dry Soil Weight + A	37.34	37.91	39.36				31.04	33.55	
D	Water Weight (B-C)	5.79	6.42	7.83				1.20	1.51	
E	Dry Soil Weight (C-A)	10.65	11.45	13.02				5.11	6.59	
F	% Moisture (D/E)*100	54.4%	56.1%	60.1%				23.5%	22.9%	
N	# OF DROPS	35	29	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							23.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	58
Plastic Limit	23
Plastic Index	35
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/25/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/27/2018</u> Date
---	------------------------	---	--------------------------

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

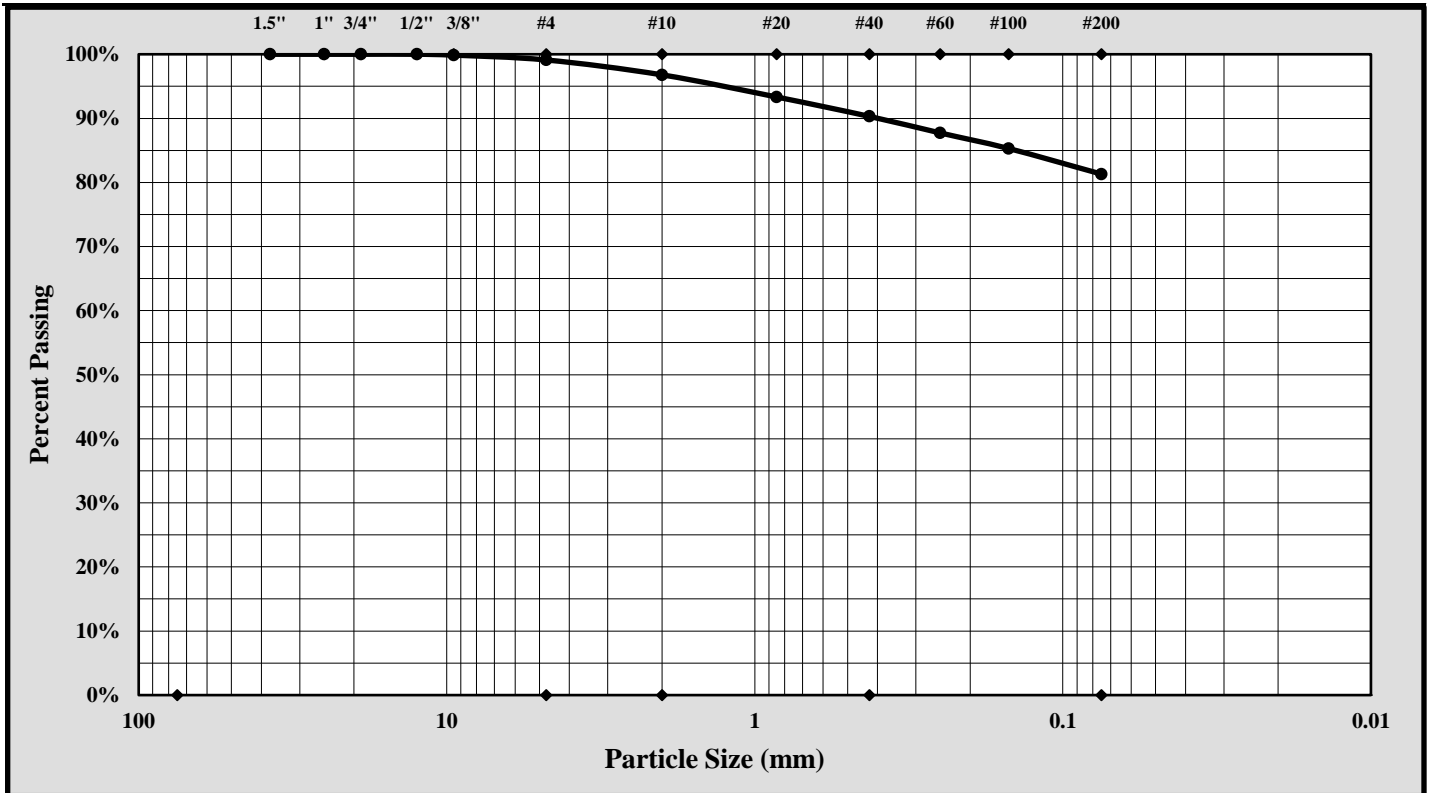


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	4/25/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/11 - 4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-36	Sample #:	BS-1
		Sample Date:	3/1/2018
Location:	Embankment Boring	Type:	Bulk
		Depth:	0.0' - 10.0'
Sample Description:	Fat Clay with Sand (CH, A-7-6(30))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 4.75 mm Gravel: 0.9%
 Silt & Clay (% Passing #200): 81.3% Total Sand: 17.8%

Liquid Limit	58	Plastic Limit	23	Plastic Index	35
Coarse Sand:	2.3%	Medium Sand:	6.5%	Fine Sand:	9.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/25/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

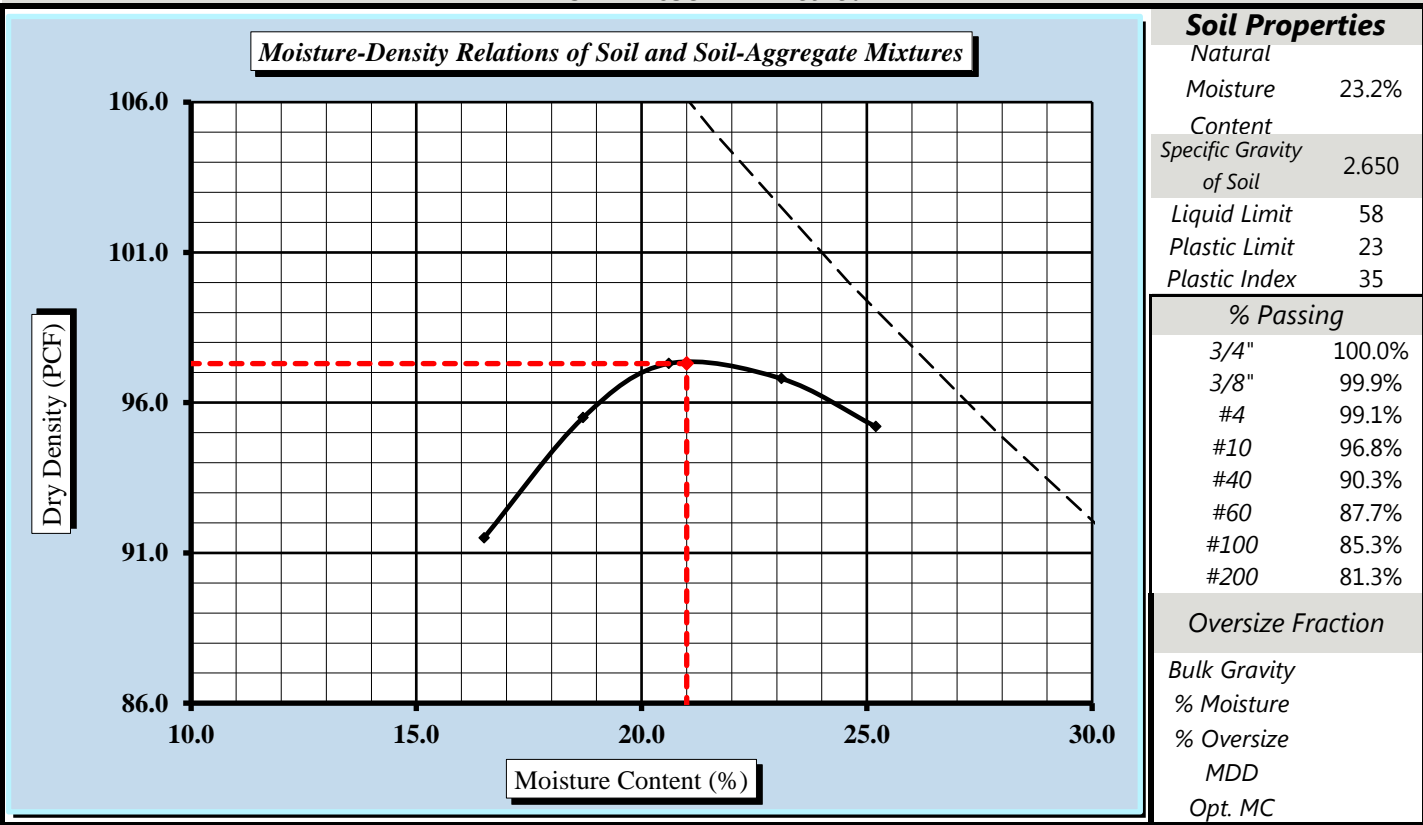
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	4/25/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/26/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-36	Sample #:	BS-1
Sample Date:	3/1/18		
Location:	Embankment Boring	Type:	Bulk
Depth:	0.0' - 10.0'		
Sample Description:	Fat Clay with Sand (CH, A-7-6(30))		

Maximum Dry Density 97.3 PCF. Optimum Moisture Content 21.0%

ASTM D 698 - - Method A



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/27/2018
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

% Ignition Loss of Inorganic Soils

SC T 36



Project #: 1461-16-047.2B
Project Name: Carolina Crossroads Project
Client Name: HDR Engineering, Inc.
Client Address: 4400 Leeds Ave., North Charleston, South Carolina

Report Date: 4/25/18
Test Date(s): 4/21/18

Boring #: RW-36 **Sample #:** BS-1 **Sample Date:** 3/1/2018
Location: Embankment Boring **Type:** Bulk **Depth:** 0.0' - 10.0'
Sample Description: Fat Clay with Sand (CH, A-7-6(30))

Equipment: Balance (GP1/G1): S&ME ID# 13942 0.01 g. Readability, 500g. Minimum Capacity
Oven: S&ME ID# 13978 Muffle Furnace: S&ME ID# 23123

Gradation Percentage Determination

		Tare #	D-7
T	Total Mass of Oven Dry Sample	grams	1641.48
d	Mass Retained on 2mm Sieve	grams	52.53
e	Mass Passing 2mm and Retained on 75µm Sieve	grams	254.43
f	Mass Passing 75µm Sieve	T-(d+e)	1334.52
P	% Passing 75µm Sieve of Sample Passing 2mm Sieve	$1 - (f / (e+f)) * 100$	16.0%

% Ignition Loss Determination

Muffle Furnace Temperature: 1000 ± 50 °C

		Tare #	B
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	56.22
b	Mass of Oven Dry Specimen + Tare Wt.	grams	76.46
c	Ash Weight + Tare Wt.	grams	76.12
M	Mass of Oven Dry Specimen	(b-t)	20.24
C	Ash Weight	c-t	19.90
L	Loss	M-C	0.34
	% Ignition Loss	$(P*L)/M*100$	0.3%

Remarks:

References: SC T 36: Procedure for Determining % Ignition Loss of Inorganic Soils

Technician Name: Benjamin Kovaleski NICET Lab Level III 117226
Certification #

Technical Responsibility: Matthew F. Cooke, P.G. Project Manager
Position

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



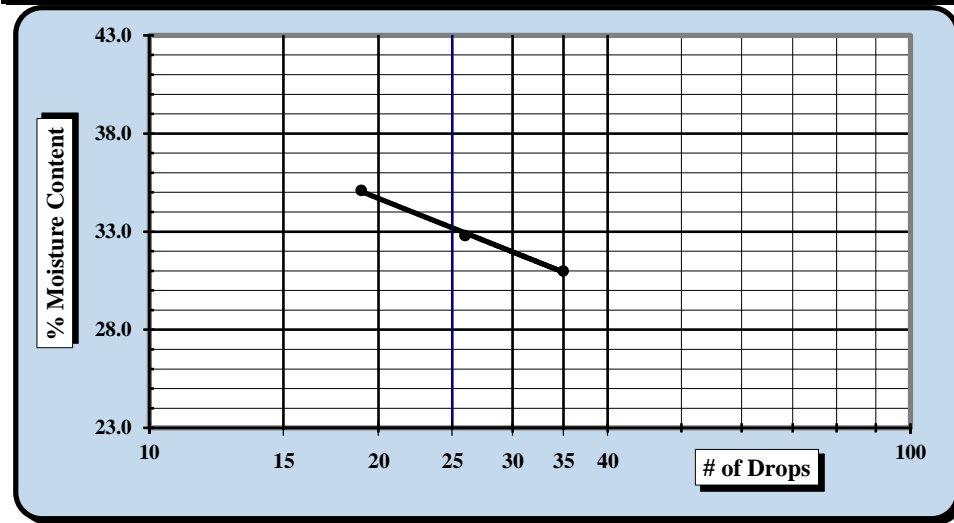
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	2/28/18
Project Name:	Carolina Crossroads Project	Test Date:	2/27/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	BS-1
Location:	Embankment Boring	Sample Date:	1/25/2018
	Type: Bulk	Depth:	0.0' - 10.0'

Sample Description: Clayey Sand (SC, A-6(2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	26.71	26.31	27.35				27.91	26.76	
B	Wet Soil Weight + A	46.46	47.40	47.86				35.39	35.17	
C	Dry Soil Weight + A	41.79	42.19	42.53				34.21	33.85	
D	Water Weight (B-C)	4.67	5.21	5.33				1.18	1.32	
E	Dry Soil Weight (C-A)	15.08	15.88	15.18				6.30	7.09	
F	% Moisture (D/E)*100	31.0%	32.8%	35.1%				18.7%	18.6%	
N	# OF DROPS	35	26	19				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							18.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	33
Plastic Limit	19
Plastic Index	14
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 43.1%

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
 Technician Name

2/28/18
 Date

Brian Vaughan
 Technical Responsibility

2/28/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

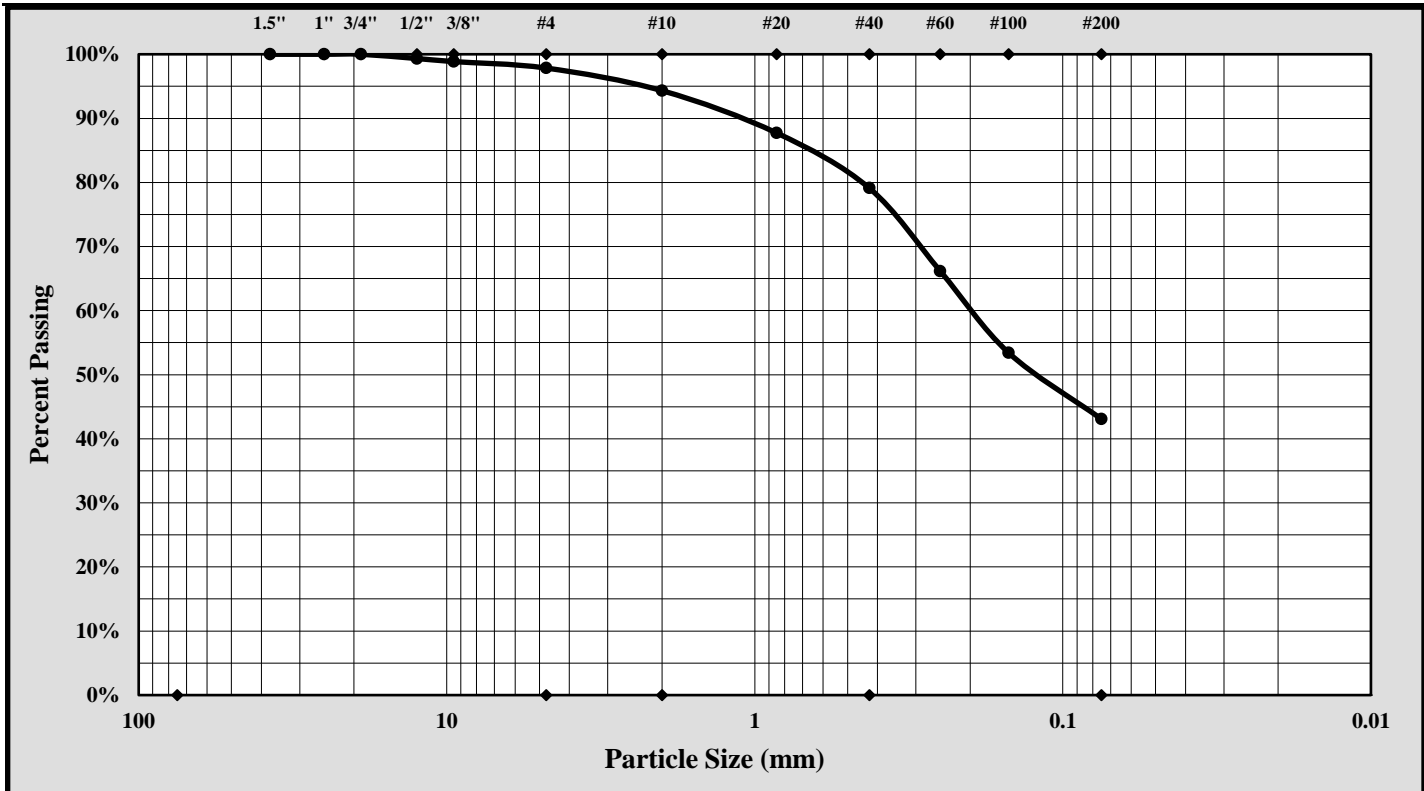


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	2/28/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/20 - 2/24/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	BS-1
		Sample Date:	1/25/2018
Location:	Embankment Boring	Type:	Bulk
		Depth:	0.0' - 10.0'
Sample Description:	Clayey Sand (SC, A-6(2))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 12.50 mm Gravel: 2.2%
 Silt & Clay (% Passing #200): 43.1% Total Sand: 54.8%

Liquid Limit	33	Plastic Limit	19	Plastic Index	14
Coarse Sand:	3.5%	Medium Sand:	15.2%	Fine Sand:	36.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input checked="" type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

2/28/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

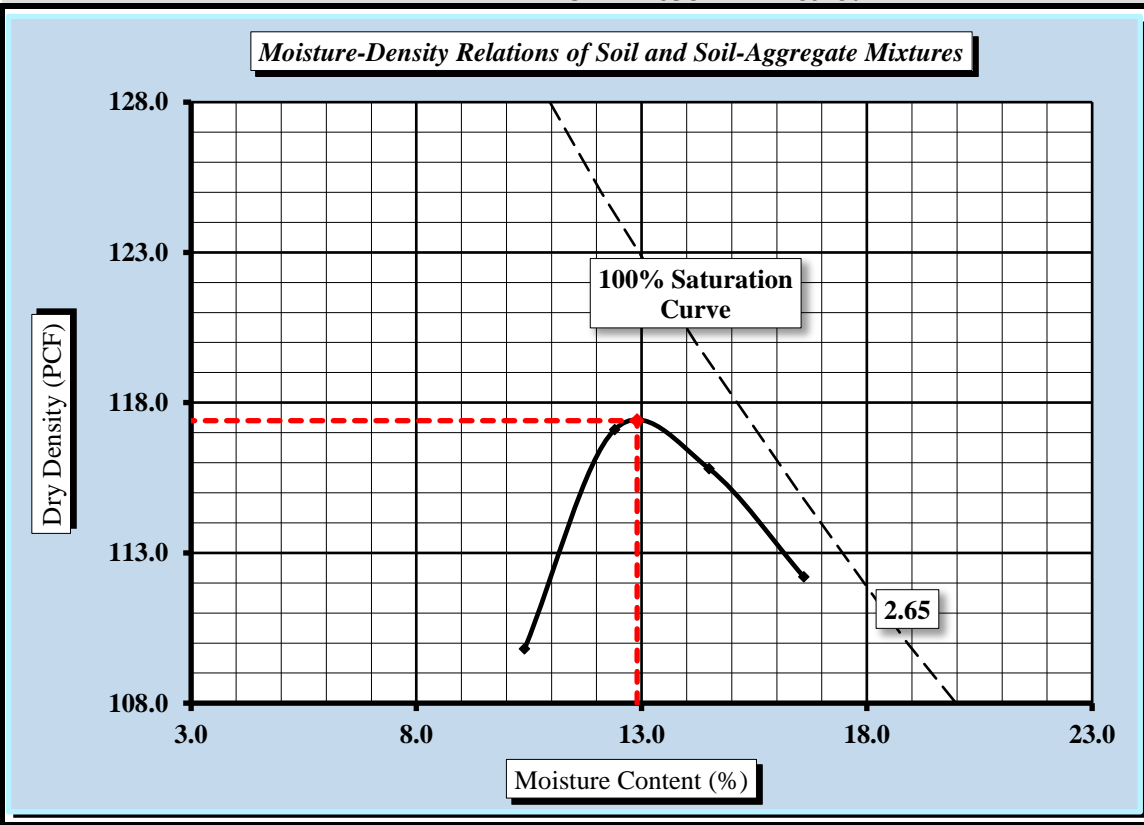
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	2/28/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-37	Sample #:	BS-1
Location:	Embankment Boring	Type:	Bulk
Sample Description:	Clayey Sand (SC, A-6(2))		

Maximum Dry Density	117.4	PCF.	Optimum Moisture Content	12.9%
---------------------	-------	------	--------------------------	-------

ASTM D 698 - - Method A



Soil Properties	
Natural	
Moisture Content	15.1%
Specific Gravity of Soil	2.650
Liquid Limit	33
Plastic Limit	19
Plastic Index	14
% Passing	
3/4"	100.0%
3/8"	98.9%
#4	97.8%
#10	94.3%
#40	79.1%
#60	66.2%
#100	53.4%
#200	43.1%
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Brian Vaughan, P.E. Brian Vaughan Group Leader 2/28/18
 Technical Responsibility Signature Position Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

% Ignition Loss of Inorganic Soils

SCT 36



Project #: 1461-16-047.2B
Project Name: Carolina Crossroads Project
Client Name: HDR Engineering, Inc.
Client Address: 4400 Leeds Ave., North Charleston, South Carolina

Report Date: 2/28/18
Test Date(s): 2/26/18

Boring #: RW-37 **Sample #:** BS-1 **Sample Date:** 1/25/2018
Location: Embankment Boring **Type:** Bulk **Depth:** 0.0' - 10.0'
Sample Description: Clayey Sand (SC, A-6(2))

Equipment: Balance (GP1/G1): S&ME ID# 13942 0.01 g. Readability, 500g. Minimum Capacity
Oven: S&ME ID# 13978 Muffle Furnace: S&ME ID# 23123

Gradation Percentage Determination

		Tare #	YM-2
T	Total Mass of Oven Dry Sample	grams	1815.20
d	Mass Retained on 2mm Sieve	grams	103.47
e	Mass Passing 2mm and Retained on 75µm Sieve	grams	929.39
f	Mass Passing 75µm Sieve	T-(d+e)	782.34
P	% Passing 75µm Sieve of Sample Passing 2mm Sieve	1-(f/(e+f))*100	54.3%

% Ignition Loss Determination

Muffle Furnace Temperature: 1000 ± 50 °C

		Tare #	D
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	55.71
b	Mass of Oven Dry Specimen + Tare Wt.	grams	76.46
c	Ash Weight + Tare Wt.	grams	76.42
M	Mass of Oven Dry Specimen	(b-t)	20.75
C	Ash Weight	c-t	20.71
L	Loss	M-C	0.04
	% Ignition Loss	(P*L)/M*100	0.1%

Remarks:

References: SCT 36: Procedure for Determining % Ignition Loss of Inorganic Soils

Technician Name: Benjamin Kovaleski NICET Lab Level III 117226
Certification #

Technical Responsibility: Brian Vaughan, P.E.

Signature

Group Leader
Position

Laboratory Test Data Sheets – Corrosion Series Testing



Results Only Soil Testing for Carolina Crossroads Project

March 13, 2018

**Prepared for:
Hunter McKenzie
S&ME, Inc
134 Suber Road
Columbia, SC 29210
hmckenzie@smeinc.com**

**Project X Job#: S180308B
Client Job or PO#: 1461-16-047**



Soil Analysis Lab Results

Client: S&ME, Inc
 Job Name: Carolina Crossroads Project
 Client Job Number: 1461-16-047
 Project X Job Number: S180308B
 March 13, 2018

Bore# / Description	Method	ASTM G187		ASTM D516		ASTM D512B		ASTM G51
	Depth	Resistivity		Sulfates		Chlorides		pH
	(ft)	As Rec'd	Minimum	(mg/kg)	(wt%)	(mg/kg)	(wt%)	
SS-3, SS-5 - DH-4	4.0-10.0	60,300	17,420	21	0.0021	9	0.0009	7.68
SS-5, SS-6, SS-7 - DH-5	8.2-20.0	4,154	3,953	60	0.0060	75	0.0075	7.34
SS-5, SS-6 - DH-6	8.3-15.0	30,820	8,710	30	0.0030	33	0.0033	7.12
SS-6, SS-7 - B-29	14.5-21.0	7,370	7,370	9	0.0009	12	0.0012	7.83
SS-11, SS-12 - B-30	38.5-45.0	1,943	1,943	120	0.0120	120	0.0120	7.87
SS-8, SS-9 - B-34	23.5-30.0	8,040	8,040	3	0.0003	9	0.0009	7.15
SS-11, SS-13 - B-36	38.5-50.0	3,752	3,484	18	0.0018	24	0.0024	7.18
SS-5, SS-6 - B-41	8.8-15.0	19,430	16,750	9	0.0009	24	0.0024	7.25
SS-3, SS-4 - B-43	18.8-22.8	3,417	3,283	90	0.0090	300	0.0300	6.75
SS-9, SS-10 - B-47	29.5-36.0	12,730	10,050	60	0.0060	138	0.0138	7.15
SS-11, SS-12 - B-50	38.5-45.0	54,270	50,920	15	0.0015	3	0.0003	7.18
SS-3, SS-4 - B-51	4.0-8.0	61,640	46,230	6	0.0006	12	0.0012	6.81
SS-10, SS-11 - B-52	33.5-40.0	50,920	36,180	21	0.0021	6	0.0006	6.57
SS-10, SS-11 - B-53	33.5-40.0	63,650	47,570	3	0.0003	6	0.0006	6.55
SS-7, SS-8 - B-55	18.5-25.0	33,500	30,150	12	0.0012	9	0.0009	6.31
SS-4, SS-5 - B-57	6.1-10.1	16,080	15,410	18	0.0018	6	0.0006	5.68
SS-5, SS-6 - B-59	8.3-15.0	120,600	87,100	15	0.0015	9	0.0009	5.86

Unk = Unknown
 NT = Not Tested
 mg/kg = milligrams per kilogram (parts per million) of dry soil weight
 Chemical Analysis performed on 1:3 Soil-To-Water extract

Please call if you have any questions.

Respectfully Submitted,

Eddie Hernandez, M.Sc., P.E.
 Sr. Corrosion Consultant
 NACE Corrosion Technologist #16592
 Professional Engineer
 California No. M37102
ehernandez@projectxcorrosion.com





IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Project X Job #:	
Date:	3/2/2018

Company Name:	S&ME, Inc.	Contact Name:	Hunter McKenzie	Phone No. :	843-557-5430
Mailing Address:	134 Suber Road, Columbia, SC 29210	Contact Email:	hmckenzie@smeinc.com		
Accounting Contact:	Kathryn Friedrichs	Invoice Email:	mcooke@smeinc.com		
Project Name:	Carolina Crossroads Project				
Client Project No:	1461-16-047	P.O. #:	1461-16-047		

Turn Around Time:	5 Day Normal	3 Day RUSH 75% mark-up	2 Day RUSH 100% mark-up	ANALYSIS REQUESTED (Please circle)										NOTES			
	<input checked="" type="checkbox"/>			Min. Resistivity, Sulfate, Chloride, Sulfide, Redox, pH, Ammonia, Nitrate	ASTM AASHTO Caltrans T2888	ASTM AASHTO Caltrans T 289	ASTM AASHTO Caltrans T 290	ASTM AASHTO Caltrans T 291	SM 2580B	SM 2320B	SM 2520B	SM 2510B	Hach 835	Hach 830	SM 4500-S2	ASTM D2216	

Results By:	<input type="checkbox"/> Phone <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Mail <input type="checkbox"/> Overnight Mail (charges apply)																
Received by:	Default Method																

SPECIAL INSTRUCTIONS:

SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED	CORROSION SERIES	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	BiCarbonate	Alkalinity	Acidity	Nitrate	Ammonia	Sulfide	Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis	
1	SS-3, SS-5 - DH-4	4 - 10	1/4/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-3 & SS-5
2	SS-5, SS-6, SS-7 - DH-5	8.2 - 20	1/4/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-5, SS-6, & SS-7
3	SS-5, SS-6 - DH-6	8.3 - 15	1/10/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-5 & SS-6
4	SS-6, SS-7 - B-29	14.5 - 21	2/14/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-6 & SS-7
5	SS-11, SS-12 - B-30	38.5 - 45	2/15/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-11 & SS-12
6	SS-8, SS-9 - B-34	23.5 - 30	2/5/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-8 & SS-9
7	SS-11, SS-13 - B-36	38.5 - 50	2/12/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-11 & SS-13
8	SS-5, SS-6 - B-41	8.8 - 15	1/21/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-5 & SS-6
9	SS-3, SS-4 - B-43	18.8 - 22.8	2/26/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-3 & SS-4
10	SS-9, SS-10 - B-47	29.5 - 36	2/12/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-9 & SS-10
11	SS-11, SS-12 - B-50	38.5 - 45	2/18/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-11 & SS-12
12	SS-3, SS-4 - B-51	4 - 8	2/8/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-3 & SS-4
13	SS-10, SS-11 - B-52	33.5 - 40	2/20/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-10 & SS-11
14	SS-10, SS-11 - B-53	33.5 - 40	2/18/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											combine SS-10 & SS-11



Results Only Soil Testing for Carolina Crossroads Project

April 27, 2018

**Prepared for:
Hunter McKenzie
S&ME, Inc
134 Suber Road
Columbia, SC 29210
hmmckenzie@smeinc.com**

**Project X Job#: S180420G
Client Job or PO#: 1461-16-047**



Soil Analysis Lab Results

Client: S&ME, Inc
 Job Name: Carolina Crossroads Project
 Client Job Number: 1461-16-047
 Project X Job Number: S180420G
 April 27, 2018

Bore# / Description	Method	ASTM G187		ASTM D516		ASTM D512B		ASTM G51
	Depth	Resistivity		Sulfates		Chlorides		pH
	(ft)	As Rec'd	Minimum	(mg/kg)	(wt%)	(mg/kg)	(wt%)	
SS-7 , SS-8 - B-31	18.5-25.0	3,752	3,752	30	0.0030	63	0.0063	6.43
SS-5 , SS-6 - B-32	8.0-15.0	7,370	7,370	12	0.0012	174	0.0174	7.09
SS-6 , SS-7 - B-33	13.5-20.0	17,420	12,060	18	0.0018	57	0.0057	6.82
SS-6 , SS-7 - B-35	13.5-20.1	14,070	8,710	30	0.0030	72	0.0072	6.99
SS-6 , SS-7 - B-37	13.5-20.2	8,040	6,700	90	0.0090	168	0.0168	7.00
SS-1 , SS-3 - B-38	0.0-6.0	67,670	41,540	12	0.0012	6	0.0006	5.02
SS-8 , SS-9 - B-42	23.5-30.0	50,920	50,920	30	0.0030	3	0.0003	5.97
SS-2 , SS-3 - B-44	2.0-6.0	9,380	9,380	300	0.0300	390	0.0390	6.11
SS-4 , SS-5 - B-46	6.0-10.0	1,608	1,474	270	0.0270	642	0.0642	6.88
SS-6 , SS-7 - B-54	13.9-20.4	63,650	60,300	15	0.0015	6	0.0006	4.96
SS-7 , SS-9 - B-56	18.5-30.0	18,090	17,420	24	0.0024	33	0.0033	4.84
SS-11 , SS-12 - B-58	38.5-45.0	100,500	100,500	30	0.0030	3	0.0003	5.10
SS-4 , SS-5 - B-61	6.0-10.0	14,070	1,407	6	0.0006	3	0.0003	7.90
SS-3 , SS-4 - B-62	4.0-8.0	36,850	36,850	9	0.0009	3	0.0003	6.12
SS-4 , SS-5 - B-39	6.0-10.0	4,355	4,355	420	0.0420	765	0.0765	6.84

Unk = Unknown

NT = Not Tested

mg/kg = milligrams per kilogram (parts per million) of dry soil weight

Chemical Analysis performed on 1:3 Soil-To-Water extract



Please call if you have any questions.

Prepared by,

Ernesto Padilla, BSME
Field Engineer

Respectfully Submitted,

Eddie Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com





IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Project X Job #:	
Date:	4/18/2018

Company Name:	S&ME, Inc.	Contact Name:	Hunter McKenzie	Phone No. :	843-557-5430
Mailing Address:	134 Suber Road, Columbia, SC 29210	Contact Email:	hmckenzie@smeinc.com		
Accounting Contact:	Kathryn Friedrichs	Invoice Email:	mcooke@smeinc.com		
Project Name:	Carolina Crossroads Project				

Client Project No:	1461-16-047	P.O. #:	1461-16-047
---------------------------	-------------	----------------	-------------

		5 Day Normal	3 Day RUSH 75% mark-up	2 Day RUSH 100% mark-up	ANALYSIS REQUESTED (Please circle)	NOTES
Turn Around Time:		✓				

Results By:	<input type="checkbox"/> Phone <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Mail <input type="checkbox"/> Overnight Mail (charges apply)
--------------------	---

Received by:		Default Method	
---------------------	--	-----------------------	--

SPECIAL INSTRUCTIONS:

SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED	CORROSION SERIES	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	BiCarbonate	Alkalinity	Acidity	Nitrate	Ammonia	Sulfide	Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis	
1	SS-7, SS-8 - B-31	18.5 - 25	3/5/2018		✓	✓	✓	✓											combine SS-7 & SS-8
2	SS-5, SS-6 - B-32	8 - 15	3/13/2018		✓	✓	✓	✓											combine SS-5 & SS-6
3	SS-6, SS-7 - B-33	13.5 - 20	3/8/2018		✓	✓	✓	✓											combine SS-6 & SS-7
4	SS-6, SS-7 - B-35	13.5 - 20	3/2/2018		✓	✓	✓	✓											combine SS-6 & SS-7
5	SS-6, SS-7 - B-37	13.5 - 20	3/7/2018		✓	✓	✓	✓											combine SS-6 & SS-7
6	SS-1, SS-3 - B-38	0 - 6	1/23/2018		✓	✓	✓	✓											combine SS-1 & SS-3
7	SS-8, SS-9 - B-42	23.5 - 30	3/1/2018		✓	✓	✓	✓											combine SS-8 & SS-9
8	SS-2, SS-3 - B-44	2 - 6	3/21/2018		✓	✓	✓	✓											combine SS-2 & SS-3
9	SS-4, SS-5 - B-46	6 - 10	4/2/2018		✓	✓	✓	✓											combine SS-4 & SS-5
10	SS-6, SS-7 - B-54	13.9 - 20.4	3/28/2018		✓	✓	✓	✓											combine SS-6 & SS-7
11	SS-7, SS-9 - B-56	18.5 - 30	3/17/2018		✓	✓	✓	✓											combine SS-7 & SS-9
12	SS-11, SS-12 - B-58	38.5 - 45	4/4/2018		✓	✓	✓	✓											combine SS-11 & SS-12
13	SS-4, SS-5 - B-61	6 - 10	4/12/2018		✓	✓	✓	✓											combine SS-4 & SS-5
14	SS-3, SS-4 - B-62	4 - 8	4/10/2018		✓	✓	✓	✓											combine SS-3 & SS-4



Project X

Corrosion Engineering
Corrosion Control - Soil, Water, and Metallurgy Lab

S1804 20 G S&ME 1461-16-047
14 quad + (1)
= 15 QUAD

Lab Request Sheet Chain of Custody
Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com
Ship Samples To: 29970 Technology Dr, Suite 105F, Murrieta, CA 92563

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Project X Job #:	
Date:	4/18/2018

Company Name:	S&ME, Inc.	Contact Name:	Hunter McKenzie	Phone No. :	843-557-5430
Mailing Address:	134 Suber Road, Columbia, SC 29210	Contact Email:	hmckenzie@smeinc.com		
Accounting Contact:	Kathryn Friedrichs	Invoice Email:	mcooke@smeinc.com		
Project Name:	Carolina Crossroads Project				
Client Project No:	1461-16-047	P.O. #:	1461-16-047		

		5 Day Normal	3 Day RUSH 75% mark-up	2 Day RUSH 100% mark-up	ANALYSIS REQUESTED (Please circle)										NOTES									
Turn Around Time:		<input checked="" type="checkbox"/>			Min. Resistivity, Sulfate, Chloride, Sulfide, Redox, pH, Ammonia, Nitrate	ASTM G187	ASTM T2888	ASTM G51	ASTM D516	ASTM D512B	SM 2580B	SM 2320B	SM 2520B	SM 2510B	Hach 835	Hach 830	SM 4500-S2	ASTM D2216						

Results By:	<input type="checkbox"/> Phone <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Mail <input type="checkbox"/> Overnight Mail (charges apply)																						
-------------	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Received by:	Default Method																					
--------------	----------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SPECIAL INSTRUCTIONS:																							
-----------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED	CORROSION SERIES	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	BiCarbonate	Alkalinity	Acidity	Nitrate	Ammonia	Sulfide	Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis						
1	SS-4, SS-5 - B-39	6 - 10	4/9/2018		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																combine SS-4 & SS-5
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								

149

Laboratory Test Data Sheets – Undisturbed Samples

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/22/18
Project Name:	Carolina Crossroads Project	Test Date:	5/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34UD	Sample #:	UD-1
		Sample Date:	3/29/2018
Location:	Bridge Boring	Type:	Undisturbed Sample
		Depth:	33.5' - 35.5'

Sample Description: Sandy Lean Clay (CL, A-6(4))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		6	7	8			9	10		
A	Tare Weight	27.75	26.30	27.30				26.84	26.74	
B	Wet Soil Weight + A	42.16	41.16	42.21				34.85	34.43	
C	Dry Soil Weight + A	39.04	37.80	38.64				33.77	33.40	
D	Water Weight (B-C)	3.12	3.36	3.57				1.08	1.03	
E	Dry Soil Weight (C-A)	11.29	11.50	11.34				6.93	6.66	
F	% Moisture (D/E)*100	27.6%	29.2%	31.5%				15.6%	15.5%	
N	# OF DROPS	34	24	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							15.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	29
Plastic Limit	16
Plastic Index	13
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Benjamin J. Kovaleski</u> Technician Name	<u>5/22/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/22/18</u> Date
---	------------------------	---	------------------------

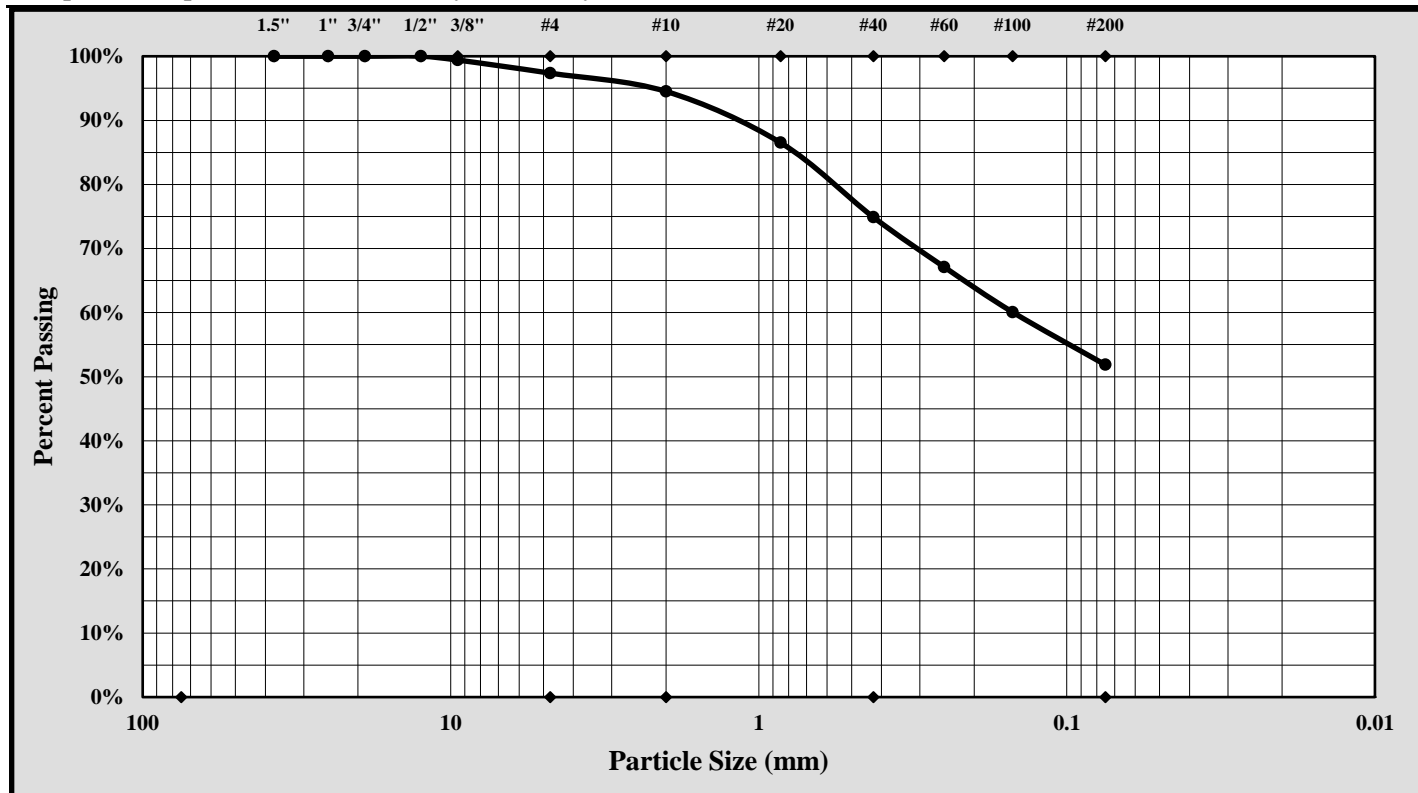
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	5/22/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/05 - 5/14/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34UD	Sample #:	UD-1
		Sample Date:	3/29/2018
Location:	Bridge Boring	Type:	Undisturbed
		Depth:	33.5' - 35.5'
Sample Description:	Sandy Lean Clay (CL, A-6(4))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 9.50 mm Gravel: 2.6%
 Silt & Clay (% Passing #200): 51.9% Total Sand: 45.5%

Liquid Limit	29	Plastic Limit	16	Plastic Index	13
Coarse Sand:	2.8%	Medium Sand:	19.6%	Fine Sand:	23.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

5/22/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

SPECIFIC GRAVITY OF SOIL



Oven dried Specimens

ASTM D 854 Method B

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
Project #:	1461-16-047.2B	Report Date:	5/22/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/02 - 5/04/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34UD	Sample #:	UD-1
Location:	Bridge Boring	Type:	Undisturbed Sample
Sample Description:	Sandy Lean Clay (CL, A-6(4))		
Material Excluded:	2.6%	% Passing #4 Sieve:	97.4%

Balance ID.	0.01 gram	ID#:	13942	Cal. Date:	8/18/17	Cal. Due:	8/18/18
Pycnometer ID No.	23161	Cal. Date:	2/10/18	Balance Verification	Check Mass:	500 gram	
Pycnometer Volume (V _p)	249.81	ml.	Mass Determination:		500.00 grams		
Pycnometer Mass (PM)	110.90	grams	If [PM - M _p] is greater than .06 grams, recalibrate the dry mass of the pycnometer.				
Ave. Pycnometer Mass (M _p)	110.90	grams					

Method B: Oven-dried Specimens			Soaking Time	ASTM C127: 24 ± 4 hrs.	<input type="checkbox"/>
Table 2 ASTM D 854	Specimen Dry Mass (g.)		Aggregate not initially dried <input type="checkbox"/>		
Soil Type	250-ml. beaker	500-ml. beaker	Initial Dry Mass of Test Specimen - <i>not required.</i> grams		
SP, SP-SM	60 ± 10	100 ± 10			
SP-SC, SM, SC	45 ± 10	75 ± 10			
Silt or Clay	35 ± 5	50 ± 10			

M_{psw;t} = Mass of the Pycnometer, soil, and water = **384.59** grams

Mass of Dry Soil (grams)		Tare #	BB-2	T_t =	Test Temperature T _t	21.6 °C
A	Tare Weight		227.24	K =	Temperature Coefficient at T _t	0.99966
C	Dry Wt. + Tare Wt.		266.08	K =	Temperature Coefficient at 23°C	0.99933
M_s	Dry Weight	C-A	38.84	p_{w;t} =	Density of Water at T _t	0.99786 g./ml.

M_{pw;t} = Mass of the Pycnometer and water at T_t M_{pw;t} = M_p + (V_p × p_{w;t}) **360.18** grams
G_t = Specific Gravity of Soil Solids at the T_t G_t = M_s / (M_{pw;t} - (M_{psw;t} - M_s)) **2.692**
G = Specific Gravity of Soil Solids at the 20°C G = K × G_t **2.691**

Soils containing plus #4 material tested per **R** = % of Soil retained on the #4 sieve **2.6%**
ASTM C 127 **P** = % of Soil passing the #4 sieve **97.4%**

G₊₄ Apparent Specific Gravity of plus #4 material at the 23°C per ASTM C127
 Apparent Specific Gravity of plus #4 material corrected to 20°C

G_{total} Total Sample Specific Gravity **G_{total}** = $\frac{1}{\frac{R}{100 \times G_{+4}} + \frac{P}{100 \times G}}$ = **2.691**

Notes / Deviations / References: ASTM D854: Specific Gravity of Soil Solids by Water Pycnometer

Matthew F. Cooke, P.G.
 Project Manager

Project Manager
 Position

5/22/18
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.



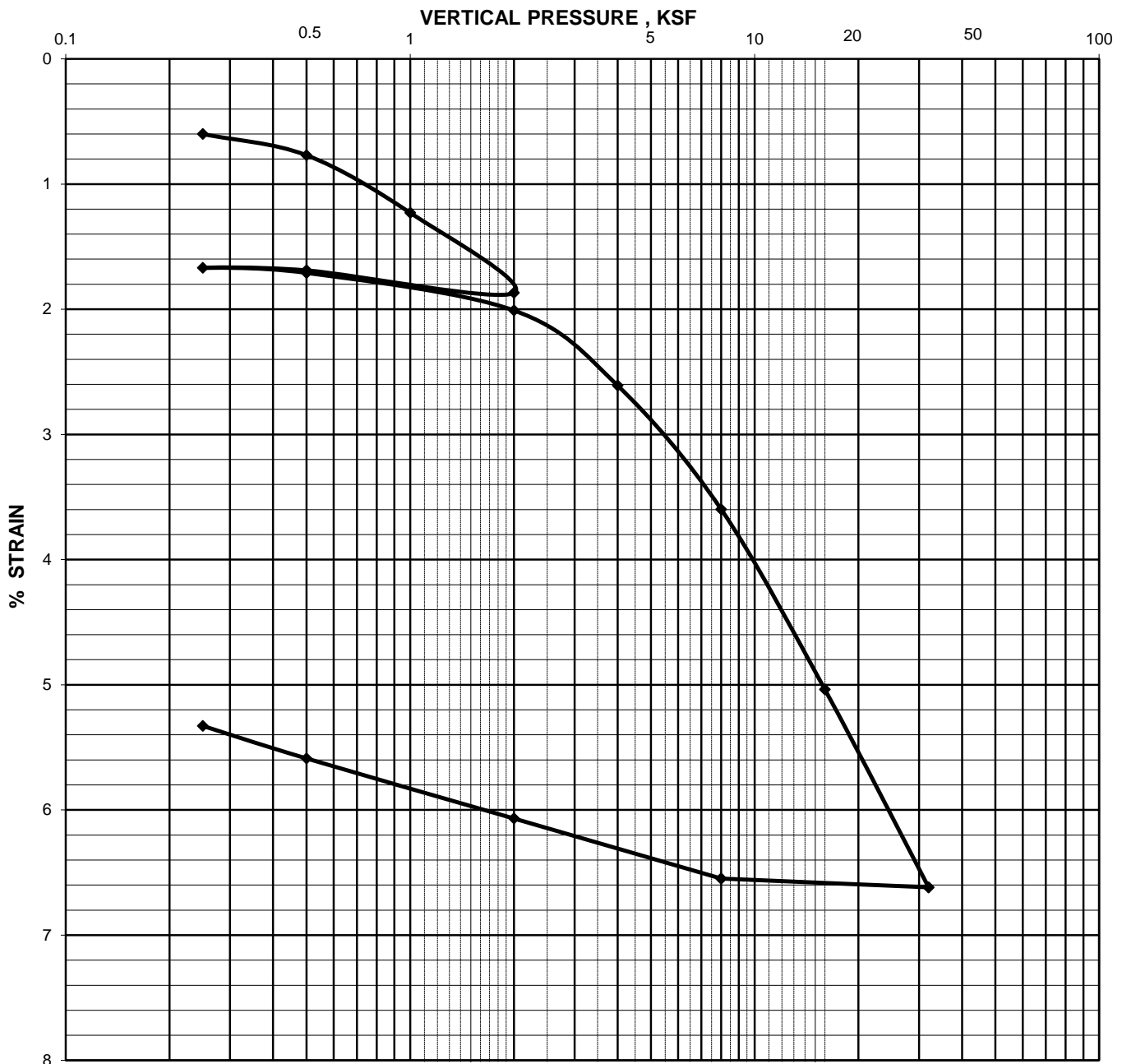
CONSOLIDATION TEST REPORT

(ASTM D 2435)

Page 1

Project Name:	Carolina Crossroads Project		Report Date:	5/22/2018	
Project No.:	1461-16-047.2B		Boring No.:	B-34	
Client Name:	HDR Engineering, Inc.		Depth/Elev.:	33.5 - 35.5'	
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		Sample Type:	Undisturbed	
Initial Wet Density, γ_{wet}, pcf:	136.3	Load vs. Time Plot:	Log of time	Sample Type:	Undisturbed
Initial Void Ratio, e_o:	0.403	Final Void Ratio, e_f:	0.328	Log No.:	UD-1
Initial Saturation, S_o, %:	92.9	Final Saturation, S_f, %:	100.0	Sp. Gravity, G_s:	2.691
Initial Dry Density, γ_{DRY}, pcf:	119.7	Final Dry Density, γ_{DRY}, pcf:	127.2	Estimated Preconsolidation	
Initial Moisture Content, %:	13.9	Final Moisture Content, %:	13.3	Stress, P_e, ksf:	4.6
Liquid Limit, %:	29	Plasticity Index, %:	13	Fines, %:	51.9
Sample Description:	Sandy Lean Clay [CL, A-6(4)]				
Remolded Properties:	-				

Notes: Loading Schedule - (ksf) - 0.25, 0.5, 1.0, 2.0, 0.5, 0.25, 0.5, 2.0, 4.0, 8.0, 16.0, 32.0, 8.0, 2.0, 0.5, 0.25





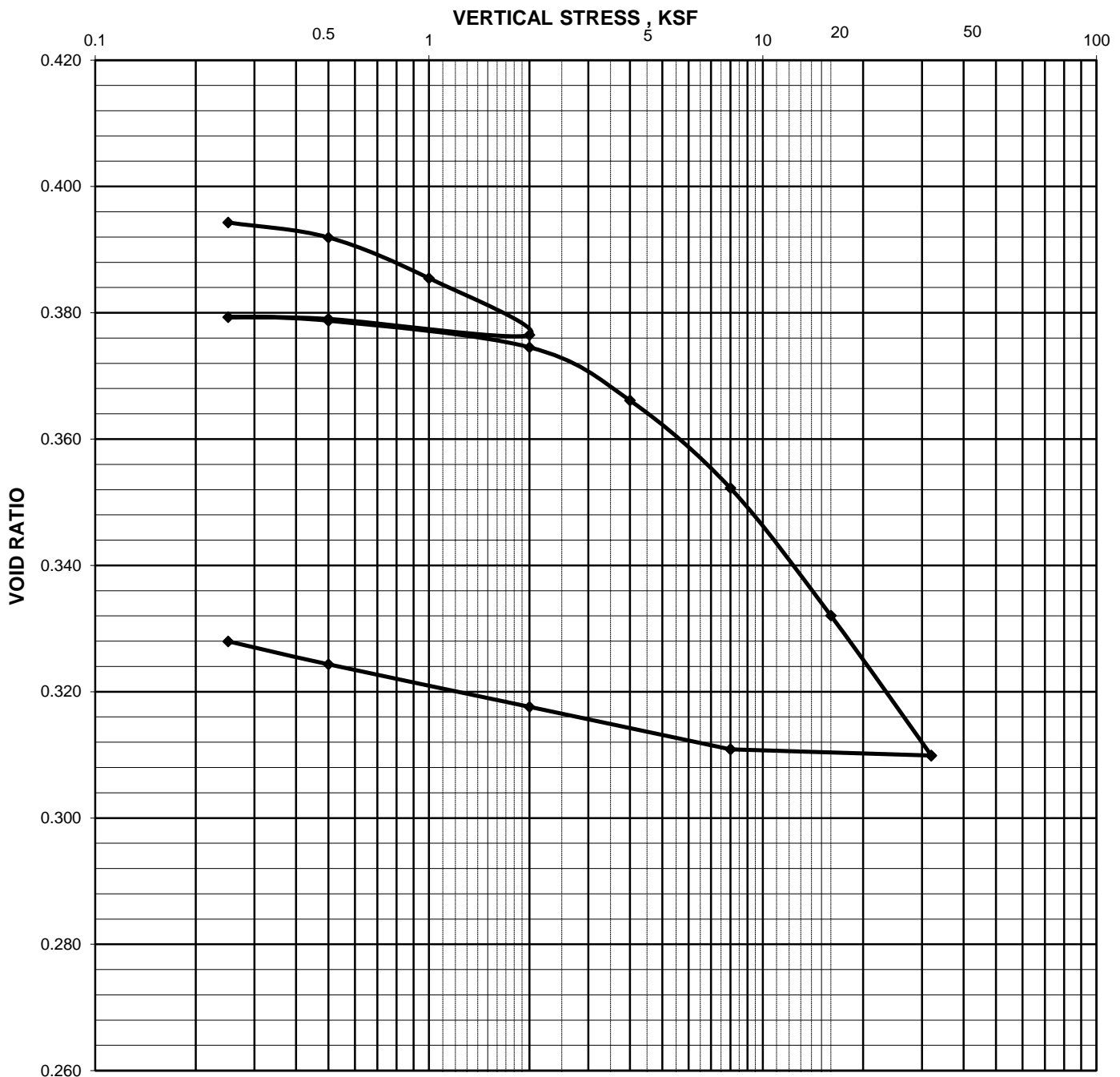
CONSOLIDATION TEST REPORT

(ASTM D 2435)

Page 2

Project Name:	Carolina Crossroads Project				
Project No.:	1461-16-047.2B	Report Date:	5/22/2018		
Client Name:	HDR Engineering, Inc.		Boring No.:	B-34	
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		Depth/Elev.:	33.5 - 35.5'	
Initial Wet Density, γ_{wet}, pcf:	136.3	Load vs. Time Plot:	Log of time	Sample Type:	Undisturbed
Initial Void Ratio, e_o:	0.403	Final Void Ratio, e_f:	0.328	Log No.:	UD-1
Initial Saturation, S_o, %:	92.9	Final Saturation, S_f, %:	100.0	Sp. Gravity, G_s:	2.691
Initial Dry Density, γ_{DRY}, pcf:	119.7	Final Dry Density, γ_{DRY}, pcf:	127.2	Estimated Preconsolidation	
Initial Moisture Content, %:	13.9	Final Moisture Content, %:	13.3	Stress, P_e, ksf:	4.6
Liquid Limit, %:	29	Plasticity Index, %:	13	Fines, %:	51.9
Sample Description:	Sandy Lean Clay [CL, A-6(4)]				
Remolded Properties:	-				

Notes: Loading Schedule - (ksf) - 0.25, 0.5, 1.0, 2.0, 0.5, 0.25, 0.5, 2.0, 4.0, 8.0, 16.0, 32.0, 8.0, 2.0, 0.5, 0.25





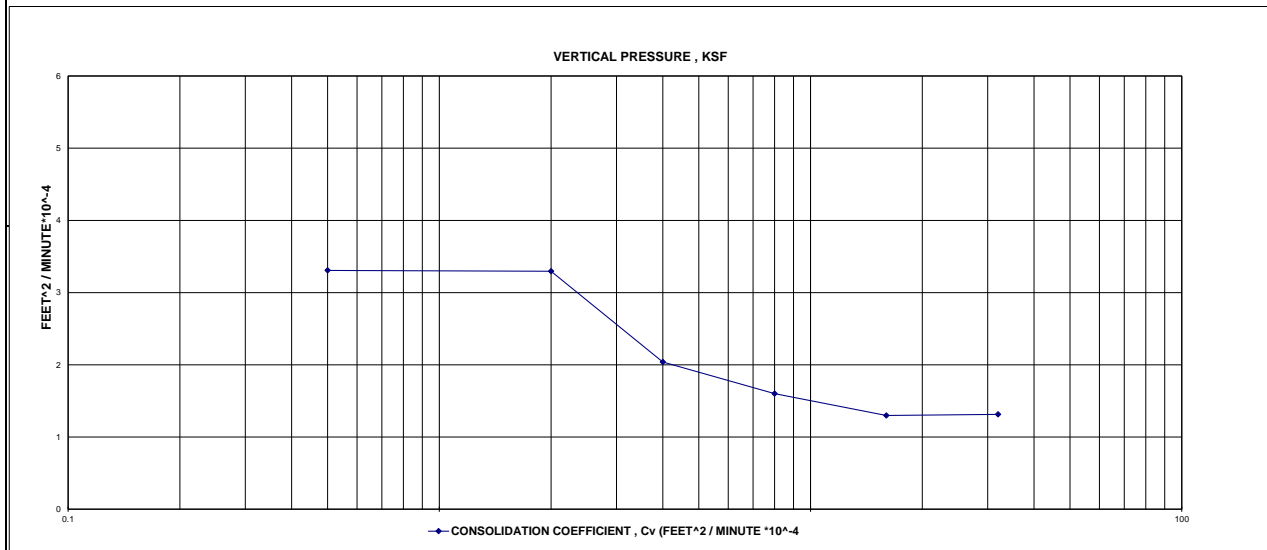
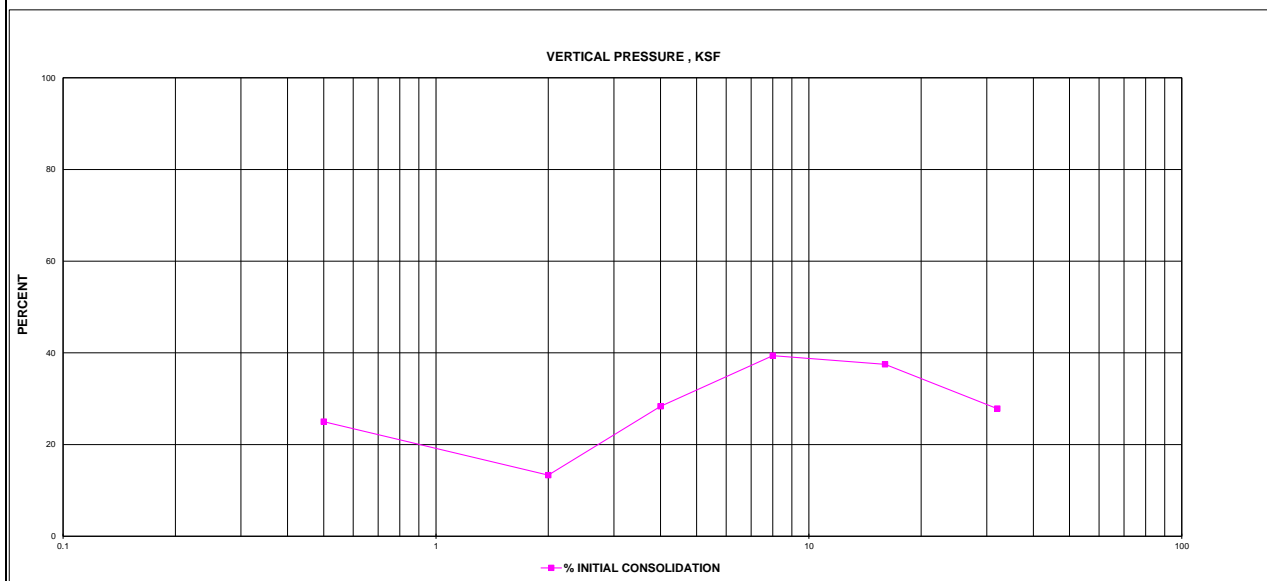
CONSOLIDATION TEST REPORT

(ASTM D 2435)

Page 3

Project Name: Carolina Crossroads Project	
Project No.: 1461-16-047.2B	Report Date: 5/22/2018
Client Name: HDR Engineering, Inc.	Boring No.: B-34
Client Address: 4400 Leeds Ave., North Charleston, South Carolina	Depth/Elev.: 33.5 - 35.5'

Pressure (ksf)	D ₀ (in.)	D ₁₀₀ (in.)	D ₅₀ (in.)	Stone Correction (in.)	D _{0c} (in.)	D _{100c}	D _{50c} (in.)	h (in.)	VOID RATIO e	Percent Strain (%)	t ₅₀ /t ₉₀ t ₅₀	C _v Log of Time (ft ² /10 ⁻⁴ min)	C _i (%)
0.25		0.0060		0.0000		0.0060			0.394	0.600			
0.5		0.0083		0.0006		0.0077			0.392	0.770			
1.0		0.0135		0.0012		0.0123			0.385	1.230			
2.0		0.0206		0.0019		0.0187			0.377	1.869			
0.5		0.0183		0.0014		0.0169			0.379	1.689			
0.25		0.0175		0.0008		0.0167			0.379	1.669			
0.5	0.0180	0.0183	0.0182	0.0012	0.0168	0.0171	0.0170	0.4917	0.379	1.709	1.0	3.31	25.0
2.0	0.0194	0.0220	0.0207	0.0019	0.0175	0.0201	0.0188	0.4908	0.375	2.009	1.0	3.29	13.3
4.0	0.0250	0.0293	0.0272	0.0032	0.0218	0.0261	0.0240	0.4882	0.366	2.609	1.6	2.04	28.3
8.0	0.0345	0.0405	0.0375	0.0045	0.0300	0.0360	0.0330	0.4837	0.352	3.599	2.0	1.60	39.4
16.0	0.0470	0.0560	0.0515	0.0056	0.0414	0.0504	0.0459	0.4772	0.332	5.038	2.4	1.30	37.5
32.0	0.0614	0.0728	0.0671	0.0066	0.0548	0.0662	0.0605	0.4699	0.310	6.618	2.3	1.31	27.8
8.0		0.0700		0.0045		0.0655			0.311	6.548			
2.0		0.0642		0.0035		0.0607			0.318	6.068			
0.25		0.0548		0.0015		0.0533			0.328	5.328			



LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



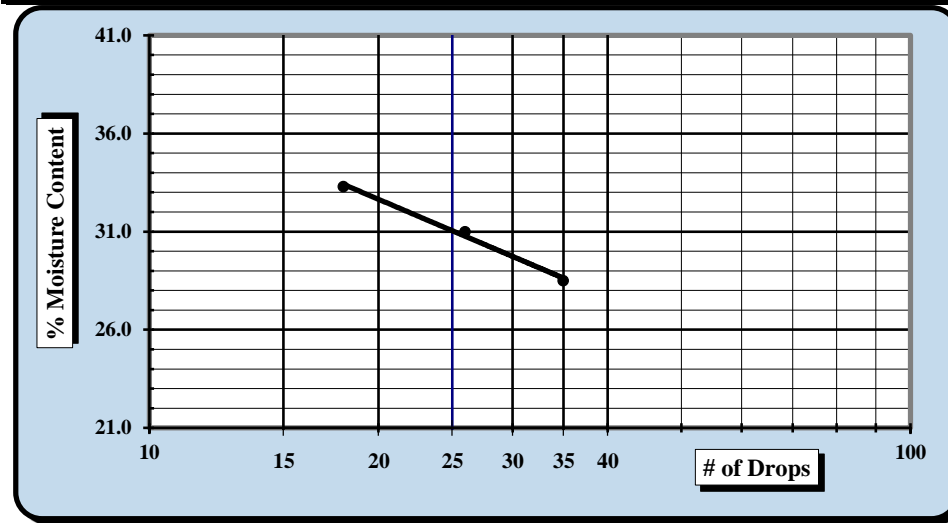
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/15/18
Project Name:	Carolina Crossroads Project	Test Date:	5/14/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	UD-2
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	36 - 38'

Sample Description: Clayey Sand [SC, A-2-6(1)]					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.70	26.48	26.32				25.92	26.94	
B	Wet Soil Weight + A	42.17	41.88	42.34				34.25	34.27	
C	Dry Soil Weight + A	38.74	38.24	38.34				33.23	33.37	
D	Water Weight (B-C)	3.43	3.64	4.00				1.02	0.90	
E	Dry Soil Weight (C-A)	12.04	11.76	12.02				7.31	6.43	
F	% Moisture (D/E)*100	28.5%	31.0%	33.3%				14.0%	14.0%	
N	# OF DROPS	35	26	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							14.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	31
Plastic Limit	14
Plastic Index	17
Group Symbol	CL
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: N/A

Notes / Deviations / References: Group symbol for minus No. 40 sieve portion only

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Benjamin J. Kovaleski
Technician Name

5/15/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/15/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

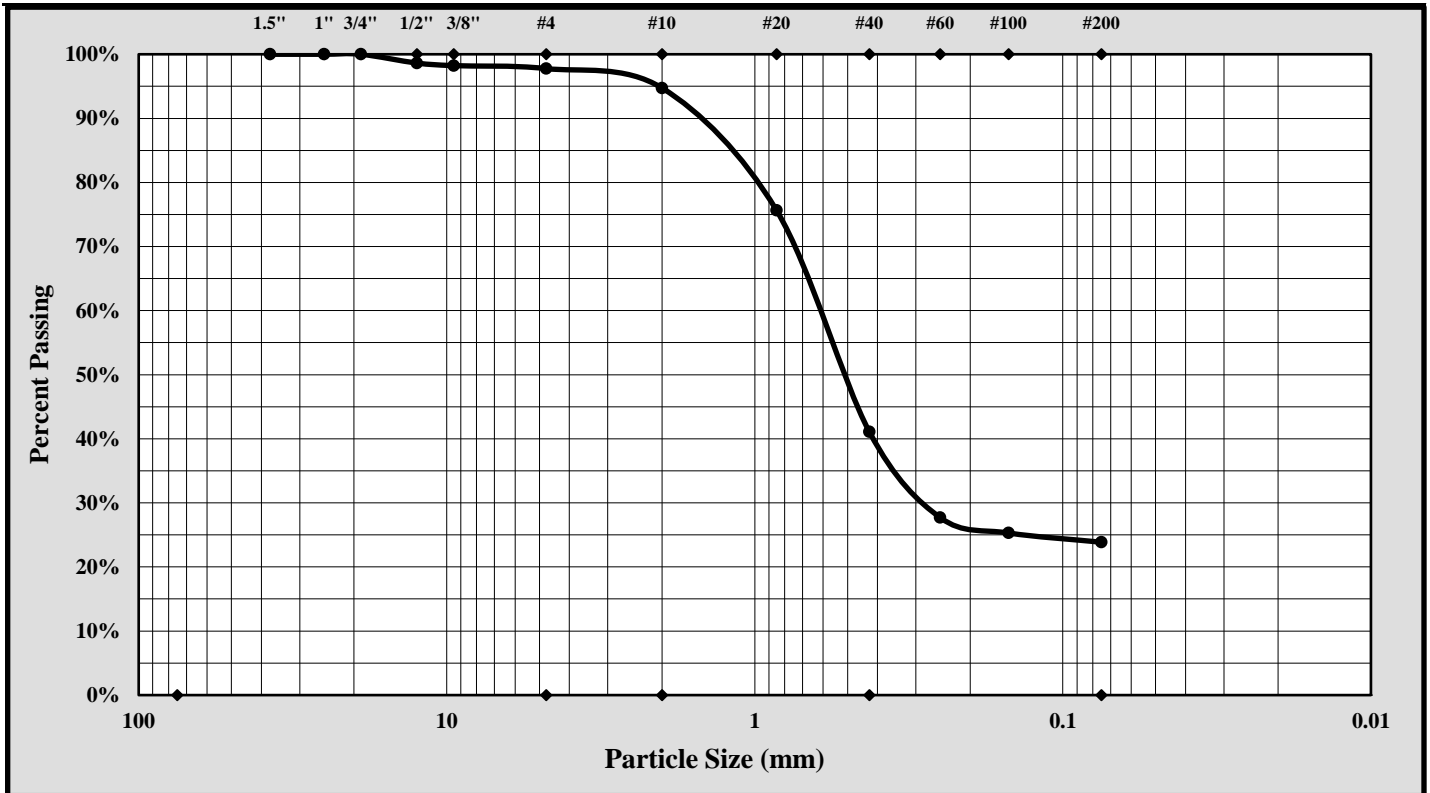


Particle Size Analysis of Soils

ASTM D 6913

S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

S&ME Project #:	1461-16-047.2B	Report Date:	5/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/01 - 5/10/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	UD-2
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	36 - 38'
Sample Description:	Clayey Sand [SC, A-2-6(1)]		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size: 19.0 mm Gravel: 2.2%
 Silt & Clay (% Passing #200): 23.9% Total Sand: 73.9%

Liquid Limit	31	Plastic Limit	14	Plastic Index	17
Coarse Sand:	3.0%	Medium Sand:	53.6%	Fine Sand:	17.3%

Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>
--------------------------------	----------------------------------	---	--	-------------------------------	--

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

5/15/18

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

SPECIFIC GRAVITY OF SOIL



Oven dried Specimens

ASTM D 854 Method B

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
Project #:	1461-16-047.2B	Report Date:	5/15/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/02 - 5/04/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-34	Sample #:	UD-2
Location:	UD Borings	Type:	Undisturbed
Sample Description:	Clayey Sand [SC, A-2-6(1)]		
Material Excluded:	2.2%	% Passing #4 Sieve:	97.8%

Balance ID.	0.01 gram	ID#:	13942	Cal. Date:	8/18/17	Cal. Due:	8/18/18
Pycnometer ID No.	23162	Cal. Date:	2/10/18	Balance Verification	Check Mass:	500 gram	
Pycnometer Volume (V _p)	249.82	ml.	Mass Determination:		500.00 grams		
Pycnometer Mass (PM)	115.03	grams	If [PM - M _p] is greater than .06 grams, recalibrate the dry mass of the pycnometer.				
Ave. Pycnometer Mass (M _p)	115.03	grams					

Method B: Oven-dried Specimens			Soaking Time	ASTM C127: 24 ± 4 hrs.	<input type="checkbox"/>
Table 2 ASTM D 854	Specimen Dry Mass (g.)		Aggregate not initially dried <input type="checkbox"/>		
Soil Type	250-ml. beaker	500-ml. beaker	Initial Dry Mass of Test Specimen - <i>not required.</i> grams		
SP, SP-SM	60 ± 10	100 ± 10			
SP-SC, SM, SC	45 ± 10	75 ± 10			
Silt or Clay	35 ± 5	50 ± 10			

M_{psw;t} = Mass of the Pycnometer, soil, and water = **388.48** grams

Mass of Dry Soil (grams)	Tare #	8	T_t =	Test Temperature T _t	21.8 °C
A Tare Weight		203.88	K =	Temperature Coefficient at T _t	0.99961
C Dry Wt. + Tare Wt.		242.43	K =	Temperature Coefficient at 23°C	0.99933
M_s Dry Weight	C-A	38.55	p_{w;t} =	Density of Water at T _t	0.99782 g./ml.

M_{pw;t} = Mass of the Pycnometer and water at T_t M_{pw;t} = M_p + (V_p × p_{w;t}) **364.31** grams
G_t = Specific Gravity of Soil Solids at the T_t G_t = M_s / (M_{pw;t} - (M_{psw;t} - M_s)) **2.681**
G = Specific Gravity of Soil Solids at the 20°C G = K × G_t **2.680**

Soils containing plus #4 material tested per **R** = % of Soil retained on the #4 sieve **2.2%**
ASTM C 127 **P** = % of Soil passing the #4 sieve **97.8%**

G₊₄ Apparent Specific Gravity of plus #4 material at the 23°C per ASTM C127
 Apparent Specific Gravity of plus #4 material corrected to 20°C

G_{total} Total Sample Specific Gravity **G_{total}** = $\frac{1}{\frac{R}{100 \times G_{+4}} + \frac{P}{100 \times G}}$ = **2.680**

Notes / Deviations / References: ASTM D854: Specific Gravity of Soil Solids by Water Pycnometer

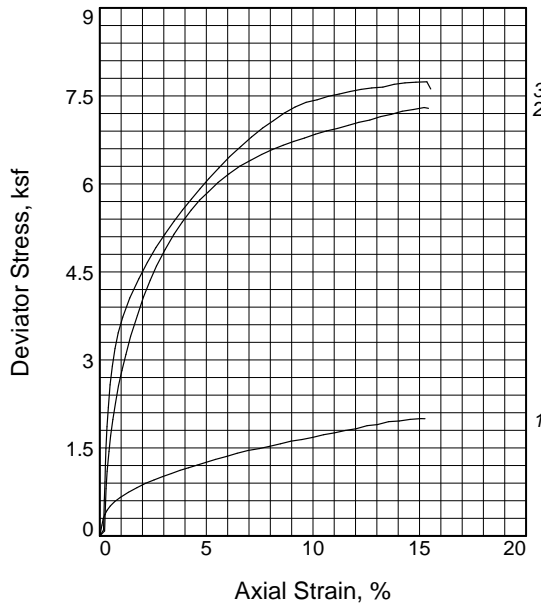
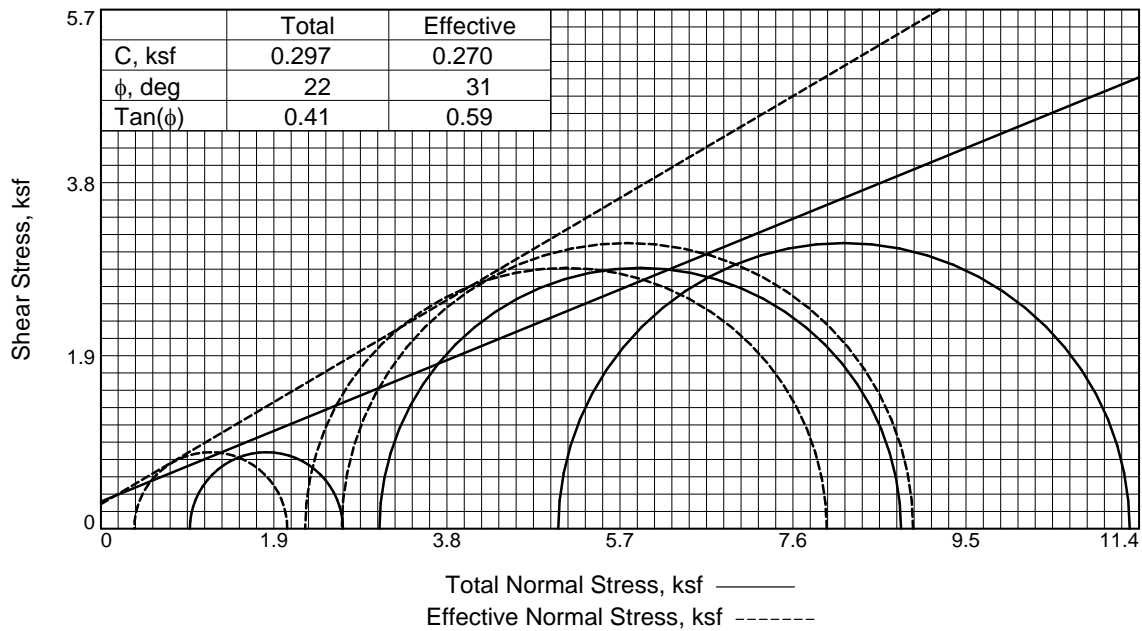
Matthew F. Cooke
Project Manager

Project Manager
Position

5/15/18
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Specimen No.	1	2	3	
Initial	Water Content, %	17.2	15.6	18.4
	Dry Density, pcf	106.4	111.0	106.9
	Saturation, %	80.3	82.6	87.4
	Void Ratio	0.5729	0.5068	0.5651
	Diameter, in.	2.857	2.886	2.858
Height, in.	5.796	5.795	5.735	
At Test	Water Content, %	20.2	17.2	17.6
	Dry Density, pcf	108.6	114.4	113.6
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5411	0.4618	0.4722
	Diameter, in.	2.839	2.858	2.802
Height, in.	5.750	5.732	5.613	
Strain rate, %/min.	0.25	0.25	0.25	
Eff. Cell Pressure, ksf	0.978	3.059	5.023	
Fail. Stress, ksf	1.680	5.727	6.274	
Total Pore Pr., ksf	8.531	8.735	10.298	
Strain, %	10.0	4.7	5.6	
Ult. Stress, ksf	2.000	7.304	7.741	
Total Pore Pr., ksf	8.347	7.702	9.435	
Strain, %	15.1	15.2	15.3	
$\bar{\sigma}_1$ Failure, ksf	2.047	7.971	8.919	
$\bar{\sigma}_3$ Failure, ksf	0.367	2.243	2.644	

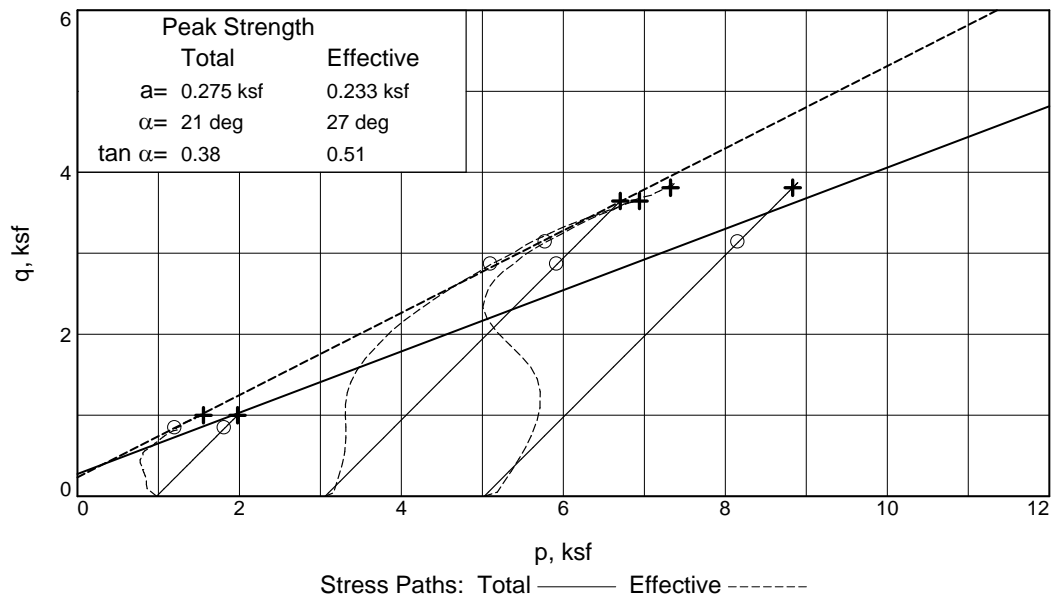
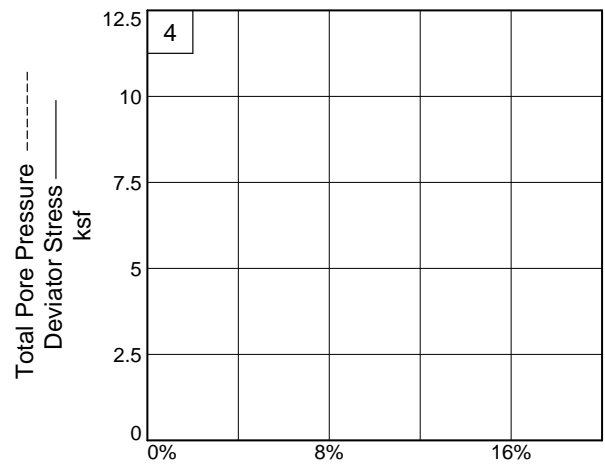
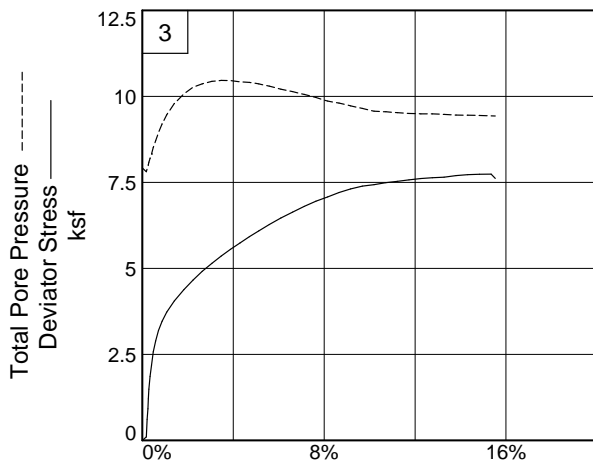
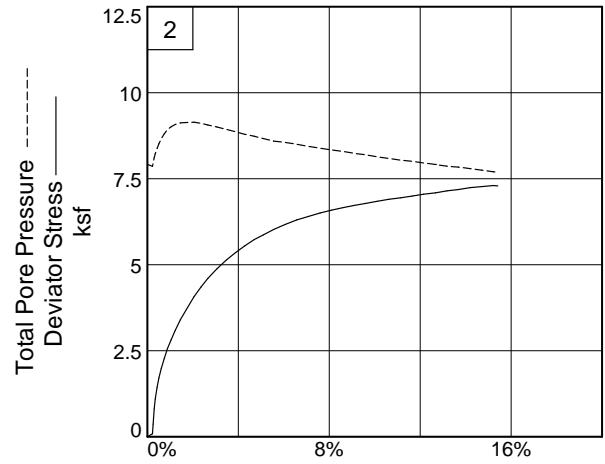
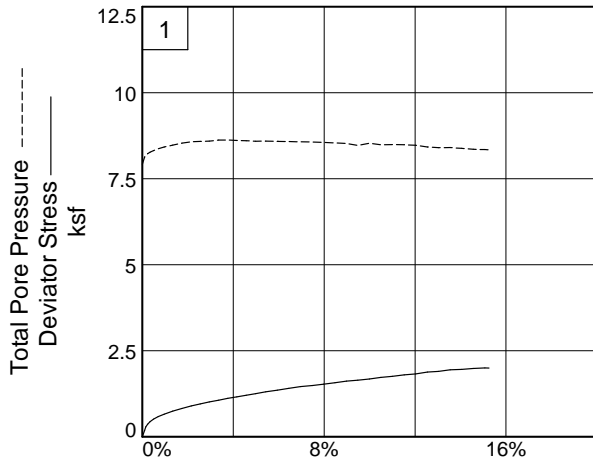
Type of Test: CU with Pore Pressures
Sample Type: Undisturbed
Description: Clayey Sand [SC, A-2-6(1)]
LL= 31 PL= 14 PI= 17
Specific Gravity= 2.68
Remarks: Specimen failed in shear. Failure selected at peak obliquity. ASTM D4767.
 Percent passing the #200 sieve: 23.9%

Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Location: UD borings
Sample Number: B-34 **Depth:** 36 - 38'
Proj. No.: 1461-16-047.2B **Date Sampled:** Various

TRIAXIAL SHEAR TEST REPORT
 S&ME, Inc.
 Greenville, SC

Figure 1

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Client: HDR Engineering, Inc.

Project: Carolina Crossroads Project

Location: UD borings

Depth: 36 - 38'

Sample Number: B-34

Project No.: 1461-16-047.2B

Figure 2

S&ME, Inc.

Tested By: Benjamin Kovaleski

Checked By: Matthew F. Cooke, P.G.

TRIAxIAL COMPRESSION TEST
CU with Pore Pressures

5/17/2018
4:22 PM

Date: Various
Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Project No.: 1461-16-047.2B
Location: UD borings
Depth: 36 - 38' **Sample Number:** B-34
Description: Clayey Sand [SC, A-2-6(1)]
Remarks: Specimen failed in shear. Failure selected at peak obliquity. ASTM D4767. Percent passing the #200 sieve: 23.9%
Type of Sample: Undisturbed
Specific Gravity=2.68 **LL**=31 **PL**=14 **PI**=17
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	56.320			1291.150
Moisture content: Dry soil+tare, gms.	48.070			1074.340
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	17.2	21.3	20.2	20.2
Moist specimen weight, gms.	1215.50			
Diameter, in.	2.857	2.856	2.839	
Area, in. ²	6.411	6.406	6.331	
Height, in.	5.796	5.794	5.750	
Net decrease in height, in.		0.002	0.044	
Net decrease in water volume, cc.			11.700	
Wet density, pcf	124.6	129.2	130.5	
Dry density, pcf	106.4	106.5	108.6	
Void ratio	0.5729	0.5713	0.5411	
Saturation, %	80.3	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = .167543 kN/cm²
Membrane thickness = .03048 cm
Consolidation cell pressure = 61.790 psi (8.898 ksf)
Consolidation back pressure = 55.000 psi (7.920 ksf)
Consolidation effective confining stress = 0.978 ksf
Strain rate, %/min. = 0.25
Fail. Stress = 1.680 ksf at reading no. 27
Ult. Stress = 2.000 ksf at reading no. 37

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	0.978	0.978	1.00	55.000	0.978	0.000
1	0.0057	8.147	8.1	0.1	0.185	0.769	0.954	1.24	56.450	0.861	0.093
2	0.0089	12.624	12.6	0.2	0.287	0.708	0.995	1.40	56.871	0.852	0.143
3	0.0137	16.132	16.1	0.2	0.366	0.668	1.034	1.55	57.149	0.851	0.183
4	0.0196	19.362	19.4	0.3	0.439	0.628	1.067	1.70	57.429	0.847	0.219
5	0.0284	22.668	22.7	0.5	0.513	0.579	1.092	1.89	57.772	0.835	0.257
6	0.0400	25.893	25.9	0.7	0.585	0.527	1.112	2.11	58.130	0.819	0.292
7	0.0554	29.184	29.2	1.0	0.657	0.477	1.134	2.38	58.481	0.805	0.329
8	0.0769	33.193	33.2	1.3	0.745	0.421	1.166	2.77	58.863	0.794	0.372
9	0.1002	36.809	36.8	1.7	0.823	0.365	1.187	3.26	59.258	0.776	0.411
10	0.1237	40.351	40.4	2.2	0.898	0.325	1.223	3.76	59.534	0.774	0.449
11	0.1466	43.139	43.1	2.5	0.956	0.314	1.270	4.04	59.608	0.792	0.478
12	0.1694	45.840	45.8	2.9	1.012	0.305	1.317	4.31	59.670	0.811	0.506
13	0.1933	48.428	48.4	3.4	1.064	0.275	1.339	4.87	59.882	0.807	0.532
14	0.2164	51.118	51.1	3.8	1.119	0.271	1.390	5.12	59.906	0.831	0.559
15	0.2392	53.307	53.3	4.2	1.162	0.286	1.448	5.07	59.807	0.867	0.581
16	0.2627	55.630	55.6	4.6	1.207	0.292	1.499	5.14	59.766	0.895	0.604
17	0.2866	58.053	58.1	5.0	1.255	0.307	1.562	5.09	59.658	0.934	0.627
18	0.3124	60.707	60.7	5.4	1.306	0.305	1.610	5.28	59.674	0.958	0.653
19	0.3415	63.339	63.3	5.9	1.355	0.313	1.668	5.33	59.618	0.990	0.678
20	0.3706	66.220	66.2	6.4	1.409	0.318	1.727	5.44	59.584	1.022	0.705
21	0.4000	68.896	68.9	7.0	1.458	0.326	1.784	5.48	59.529	1.055	0.729
22	0.4302	70.808	70.8	7.5	1.490	0.330	1.820	5.51	59.495	1.075	0.745
23	0.4583	72.951	73.0	8.0	1.527	0.342	1.869	5.47	59.416	1.105	0.764
24	0.4876	75.475	75.5	8.5	1.571	0.357	1.928	5.40	59.308	1.143	0.786
25	0.5163	78.040	78.0	9.0	1.616	0.372	1.988	5.34	59.205	1.180	0.808
26	0.5452	79.832	79.8	9.5	1.644	0.431	2.074	4.82	58.799	1.253	0.822
27	0.5746	82.069	82.1	10.0	1.680	0.367	2.047	5.58	59.245	1.207	0.840
28	0.6035	84.735	84.7	10.5	1.725	0.412	2.137	5.19	58.929	1.274	0.862
29	0.6330	86.804	86.8	11.0	1.757	0.406	2.163	5.33	58.972	1.284	0.878
30	0.6626	89.421	89.4	11.5	1.799	0.409	2.209	5.40	58.949	1.309	0.900
31	0.6915	91.364	91.4	12.0	1.828	0.427	2.255	5.29	58.827	1.341	0.914
32	0.7211	94.561	94.6	12.5	1.881	0.475	2.356	4.96	58.492	1.415	0.941
33	0.7491	96.012	96.0	13.0	1.899	0.496	2.396	4.83	58.343	1.446	0.950
34	0.7789	99.072	99.1	13.5	1.948	0.492	2.440	4.96	58.371	1.466	0.974
35	0.8080	100.242	100.2	14.1	1.960	0.516	2.476	4.80	58.207	1.496	0.980
36	0.8371	102.236	102.2	14.6	1.987	0.542	2.529	4.66	58.024	1.536	0.993
37	0.8666	103.515	103.5	15.1	2.000	0.550	2.550	4.63	57.968	1.550	1.000
38	0.8771	103.688	103.7	15.3	1.999	0.557	2.556	4.59	57.921	1.556	0.999

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	87.210			1268.000
Moisture content: Dry soil+tare, gms.	75.430			1081.530
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	15.6	18.7	17.2	17.2
Moist specimen weight, gms.	1277.46			
Diameter, in.	2.886	2.882	2.858	
Area, in. ²	6.542	6.523	6.416	
Height, in.	5.795	5.787	5.732	
Net decrease in height, in.		0.008	0.055	
Net decrease in water volume, cc.			15.950	
Wet density, pcf	128.4	132.3	134.2	
Dry density, pcf	111.0	111.5	114.4	
Void ratio	0.5068	0.5005	0.4618	
Saturation, %	82.6	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 76.240 psi (10.979 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 3.059 ksf

Strain rate, %/min. = 0.25

Fail. Stress = 5.727 ksf at reading no. 21

Ult. Stress = 7.304 ksf at reading no. 42

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	3.059	3.059	1.00	55.000	3.059	0.000
1	0.0128	3.800	3.8	0.2	0.085	3.120	3.205	1.03	54.576	3.162	0.043
2	0.0143	16.333	16.3	0.2	0.366	3.024	3.390	1.12	55.239	3.207	0.183
3	0.0169	36.007	36.0	0.3	0.806	2.869	3.675	1.28	56.313	3.272	0.403
4	0.0199	49.292	49.3	0.3	1.102	2.750	3.853	1.40	57.139	3.302	0.551
5	0.0246	64.530	64.5	0.4	1.442	2.593	4.035	1.56	58.232	3.314	0.721
6	0.0289	76.413	76.4	0.5	1.706	2.462	4.168	1.69	59.143	3.315	0.853
7	0.0351	88.963	89.0	0.6	1.984	2.316	4.300	1.86	60.158	3.308	0.992
8	0.0422	101.886	101.9	0.7	2.270	2.175	4.445	2.04	61.135	3.310	1.135
9	0.0504	115.054	115.1	0.9	2.559	2.052	4.612	2.25	61.987	3.332	1.280
10	0.0597	126.998	127.0	1.0	2.821	1.966	4.787	2.43	62.586	3.376	1.410
11	0.0703	139.513	139.5	1.2	3.093	1.900	4.992	2.63	63.048	3.446	1.546
12	0.0830	153.802	153.8	1.4	3.402	1.854	5.256	2.84	63.367	3.555	1.701
13	0.1011	170.441	170.4	1.8	3.758	1.842	5.600	3.04	63.445	3.721	1.879
14	0.1176	185.431	185.4	2.1	4.076	1.837	5.913	3.22	63.483	3.875	2.038
15	0.1354	198.832	198.8	2.4	4.357	1.870	6.226	3.33	63.257	4.048	2.178
16	0.1523	210.602	210.6	2.7	4.601	1.915	6.516	3.40	62.938	4.216	2.300
17	0.1756	224.422	224.4	3.1	4.882	1.976	6.858	3.47	62.518	4.417	2.441
18	0.1994	237.354	237.4	3.5	5.142	2.046	7.188	3.51	62.032	4.617	2.571
19	0.2221	248.072	248.1	3.9	5.352	2.115	7.467	3.53	61.554	4.791	2.676
20	0.2456	258.444	258.4	4.3	5.552	2.188	7.739	3.54	61.047	4.964	2.776
21	0.2690	267.767	267.8	4.7	5.727	2.243	7.971	3.55	60.662	5.107	2.864
22	0.2924	275.552	275.6	5.1	5.869	2.313	8.182	3.54	60.178	5.247	2.934

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
23	0.3181	284.236	284.2	5.5	6.025	2.384	8.409	3.53	59.685	5.396	3.013
24	0.3472	292.692	292.7	6.1	6.171	2.422	8.593	3.55	59.423	5.507	3.085
25	0.3765	300.619	300.6	6.6	6.304	2.477	8.781	3.54	59.037	5.629	3.152
26	0.4056	307.038	307.0	7.1	6.403	2.536	8.939	3.52	58.629	5.738	3.202
27	0.4352	313.578	313.6	7.6	6.503	2.592	9.096	3.51	58.238	5.844	3.252
28	0.4639	319.311	319.3	8.1	6.586	2.640	9.226	3.49	57.906	5.933	3.293
29	0.4930	324.639	324.6	8.6	6.659	2.686	9.345	3.48	57.587	6.016	3.330
30	0.5219	329.701	329.7	9.1	6.726	2.741	9.467	3.45	57.207	6.104	3.363
31	0.5506	334.298	334.3	9.6	6.782	2.784	9.566	3.44	56.905	6.175	3.391
32	0.5799	339.423	339.4	10.1	6.847	2.842	9.689	3.41	56.505	6.265	3.424
33	0.6092	344.119	344.1	10.6	6.902	2.890	9.792	3.39	56.171	6.341	3.451
34	0.6388	348.359	348.4	11.1	6.947	2.939	9.886	3.36	55.828	6.413	3.473
35	0.6678	352.925	352.9	11.7	6.998	2.972	9.970	3.35	55.601	6.471	3.499
36	0.6966	357.598	357.6	12.2	7.050	3.020	10.070	3.33	55.267	6.545	3.525
37	0.7262	361.733	361.7	12.7	7.090	3.064	10.154	3.31	54.961	6.609	3.545
38	0.7551	366.880	366.9	13.2	7.149	3.115	10.264	3.30	54.611	6.689	3.575
39	0.7843	370.946	370.9	13.7	7.186	3.141	10.327	3.29	54.429	6.734	3.593
40	0.8133	375.877	375.9	14.2	7.239	3.184	10.422	3.27	54.132	6.803	3.619
41	0.8431	379.774	379.8	14.7	7.270	3.231	10.500	3.25	53.805	6.866	3.635
42	0.8725	383.867	383.9	15.2	7.304	3.276	10.580	3.23	53.489	6.928	3.652
43	0.8837	384.022	384.0	15.4	7.290	3.295	10.585	3.21	53.356	6.940	3.645

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	80.430			1218.300
Moisture content: Dry soil+tare, gms.	67.910			1035.790
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	18.4	19.9	17.6	17.6
Moist specimen weight, gms.	1222.70			
Diameter, in.	2.858	2.839	2.802	
Area, in. ²	6.415	6.330	6.166	
Height, in.	5.735	5.697	5.613	
Net decrease in height, in.		0.038	0.084	
Net decrease in water volume, cc.			23.800	
Wet density, pcf	126.6	130.8	133.7	
Dry density, pcf	106.9	109.1	113.6	
Void ratio	0.5651	0.5340	0.4722	
Saturation, %	87.4	100.0	100.0	

Test Readings for Specimen No. 3

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 89.880 psi (12.943 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 5.023 ksf

Strain rate, %/min. = 0.25

Fail. Stress = 6.274 ksf at reading no. 23

Ult. Stress = 7.741 ksf at reading no. 42

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	5.023	5.023	1.00	55.000	5.023	0.000
1	0.0098	4.372	4.4	0.2	0.102	5.133	5.235	1.02	54.233	5.184	0.051
2	0.0119	26.400	26.4	0.2	0.615	5.048	5.663	1.12	54.826	5.355	0.308
3	0.0138	39.528	39.5	0.2	0.921	4.991	5.912	1.18	55.222	5.451	0.460
4	0.0149	51.755	51.8	0.3	1.206	4.930	6.136	1.24	55.642	5.533	0.603
5	0.0162	63.977	64.0	0.3	1.490	4.858	6.348	1.31	56.142	5.603	0.745
6	0.0191	80.008	80.0	0.3	1.862	4.743	6.605	1.39	56.942	5.674	0.931
7	0.0226	93.986	94.0	0.4	2.186	4.618	6.804	1.47	57.812	5.711	1.093
8	0.0271	110.841	110.8	0.5	2.576	4.426	7.002	1.58	59.143	5.714	1.288
9	0.0330	124.619	124.6	0.6	2.893	4.232	7.125	1.68	60.495	5.678	1.447
10	0.0400	137.721	137.7	0.7	3.194	3.999	7.193	1.80	62.107	5.596	1.597
11	0.0486	149.557	149.6	0.9	3.463	3.745	7.207	1.92	63.876	5.476	1.731
12	0.0603	161.422	161.4	1.1	3.730	3.478	7.207	2.07	65.730	5.342	1.865
13	0.0791	176.188	176.2	1.4	4.057	3.150	7.207	2.29	68.007	5.178	2.028
14	0.1029	191.195	191.2	1.8	4.384	2.868	7.251	2.53	69.964	5.060	2.192
15	0.1254	204.233	204.2	2.2	4.663	2.674	7.338	2.74	71.309	5.006	2.332
16	0.1480	216.211	216.2	2.6	4.917	2.579	7.496	2.91	71.971	5.037	2.458
17	0.1718	227.339	227.3	3.1	5.147	2.505	7.652	3.05	72.482	5.079	2.574
18	0.1951	237.833	237.8	3.5	5.362	2.478	7.840	3.16	72.671	5.159	2.681
19	0.2176	247.438	247.4	3.9	5.555	2.482	8.036	3.24	72.647	5.259	2.777
20	0.2412	256.855	256.9	4.3	5.741	2.520	8.261	3.28	72.378	5.391	2.871
21	0.2644	266.069	266.1	4.7	5.921	2.534	8.456	3.34	72.281	5.495	2.961
22	0.2873	274.869	274.9	5.1	6.091	2.579	8.670	3.36	71.971	5.624	3.045

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
23	0.3134	284.532	284.5	5.6	6.274	2.644	8.919	3.37	71.515	5.782	3.137
24	0.3421	294.825	294.8	6.1	6.466	2.736	9.202	3.36	70.882	5.969	3.233
25	0.3710	304.226	304.2	6.6	6.636	2.805	9.441	3.37	70.401	6.123	3.318
26	0.3997	313.535	313.5	7.1	6.801	2.886	9.687	3.36	69.841	6.286	3.401
27	0.4286	322.299	322.3	7.6	6.953	2.975	9.928	3.34	69.218	6.452	3.476
28	0.4576	330.022	330.0	8.2	7.079	3.080	10.160	3.30	68.488	6.620	3.540
29	0.4857	337.794	337.8	8.7	7.207	3.138	10.344	3.30	68.091	6.741	3.603
30	0.5145	344.666	344.7	9.2	7.312	3.217	10.529	3.27	67.541	6.873	3.656
31	0.5433	350.343	350.3	9.7	7.390	3.293	10.683	3.24	67.013	6.988	3.695
32	0.5723	354.431	354.4	10.2	7.434	3.374	10.808	3.20	66.446	7.091	3.717
33	0.6015	359.334	359.3	10.7	7.493	3.390	10.883	3.21	66.336	7.137	3.747
34	0.6303	363.337	363.3	11.2	7.533	3.416	10.949	3.20	66.155	7.183	3.766
35	0.6587	367.437	367.4	11.7	7.575	3.438	11.012	3.20	66.007	7.225	3.787
36	0.6879	371.433	371.4	12.3	7.612	3.449	11.061	3.21	65.928	7.255	3.806
37	0.7163	374.855	374.9	12.8	7.638	3.451	11.088	3.21	65.918	7.269	3.819
38	0.7453	377.666	377.7	13.3	7.649	3.466	11.115	3.21	65.813	7.290	3.825
39	0.7748	382.373	382.4	13.8	7.698	3.487	11.184	3.21	65.666	7.336	3.849
40	0.8036	385.979	386.0	14.3	7.724	3.489	11.213	3.21	65.654	7.351	3.862
41	0.8324	388.883	388.9	14.8	7.735	3.496	11.232	3.21	65.601	7.364	3.868
42	0.8613	391.533	391.5	15.3	7.741	3.508	11.249	3.21	65.522	7.378	3.871
43	0.8715	386.134	386.1	15.5	7.618	3.515	11.133	3.17	65.473	7.324	3.809



Project Name: Carolina Crossroads Project

Boring #: B-34

Depth: 36 – 38'

Sample #: UD-2

Test Type: Consolidated Undrained Triaxial Shear (ASTM D4767)



LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



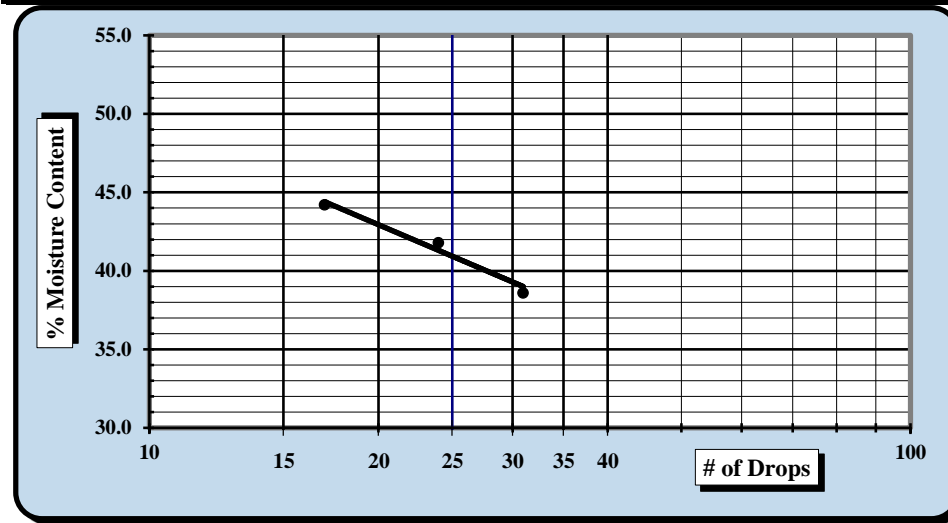
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1461-16-047.2B	Report Date:	6/1/18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/18-5/20/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Avenue, North Charleston, SC 29405		
Boring #:	B-41UD	Sample #:	UD-1
		Sample Date:	Various
Location:	UD Borings	Offset:	NA
		Elevation:	18.5-20.5'

Sample Description: Gray Silty Clay w/Medium to Fine Sand (CL)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	3222	7/29/2017	Grooving tool	30427	9/27/2017
LL Apparatus	20336	2/21/2018	Grooving tool		
Oven	10844	8/22/2017	Grooving tool		

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		51	P-2	16			P-4	P-7	
A	Tare Weight	15.78	12.66	15.75			12.38	12.72	
B	Wet Soil Weight + A	26.16	23.65	26.36			20.59	20.94	
C	Dry Soil Weight + A	23.27	20.41	23.11			19.33	19.67	
D	Water Weight (B-C)	2.89	3.24	3.25			1.26	1.27	
E	Dry Soil Weight (C-A)	7.49	7.75	7.36			6.95	6.95	
F	% Moisture (D/E)*100	38.6%	41.8%	44.2%			18.1%	18.3%	
N	# OF DROPS	31	24	17					
LL	LL = F * FACTOR								
Ave.	Average						18.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	41
Plastic Limit	18
Plastic Index	23
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: _____

Notes / Deviations / References:

Karen Warner
 Technician Name

6/1/2018
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

7/18/2018
 Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

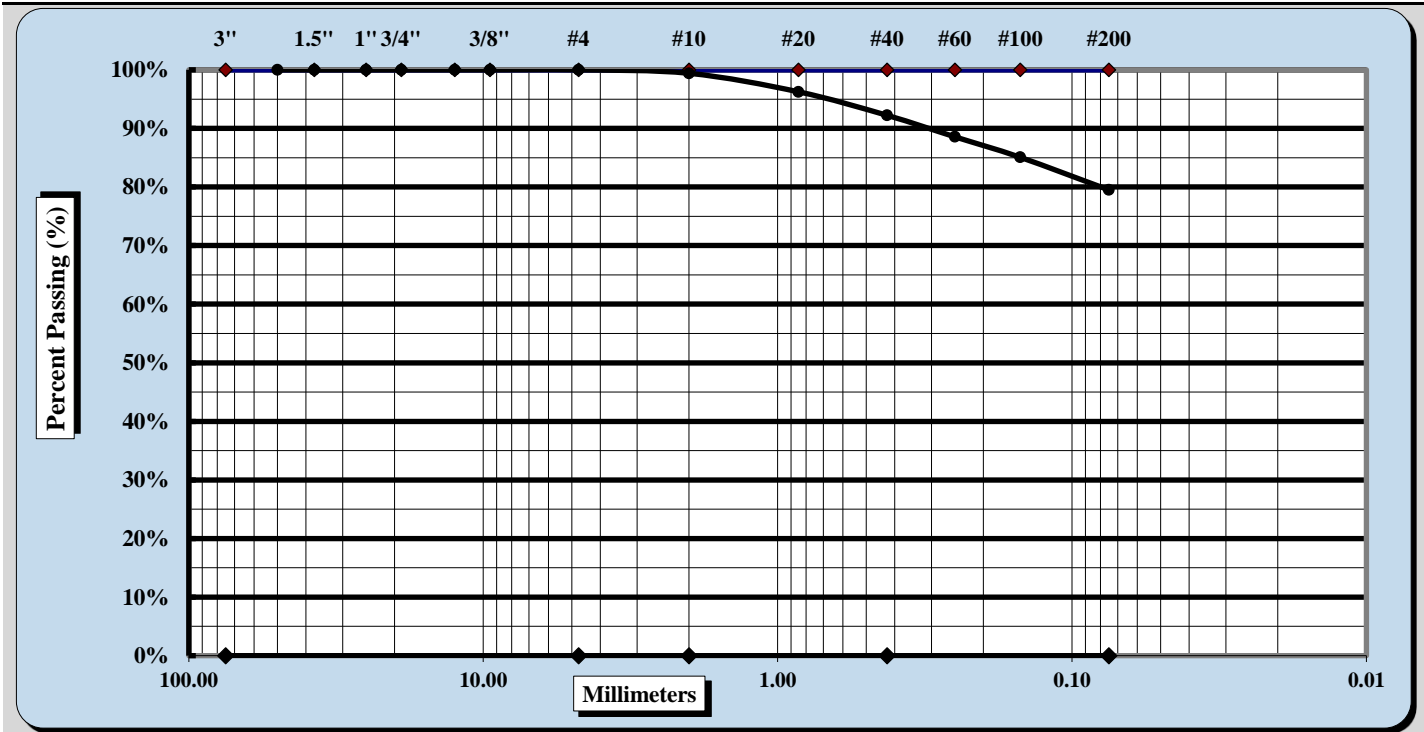


ASTM D 422

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1461-16-047.2B	Report Date:	6/1/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/18-25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Avenue, North Charleston, SC 29405		
Sample Id.	B-41UD	Type:	Undisturbed
		Sample Date:	Various
Location:	UD Borings	Sample:	UD-1
		Elevation:	18.5-20.5

Sample Description: Gray Silty Clay w/Medium to Fine Sand (CL)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#10	Coarse Sand	0.6%	Fine Sand	12.7%
Gravel	0.0%	Medium Sand	7.2%	Silt & Clay	79.5%
Liquid Limit	41	Plastic Limit	18	Plastic Index	23
Specific Gravity	ND			Moisture Content	Various
Coarse Sand	0.6%	Medium Sand	7.2%	Fine Sand	12.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND: Not Determined

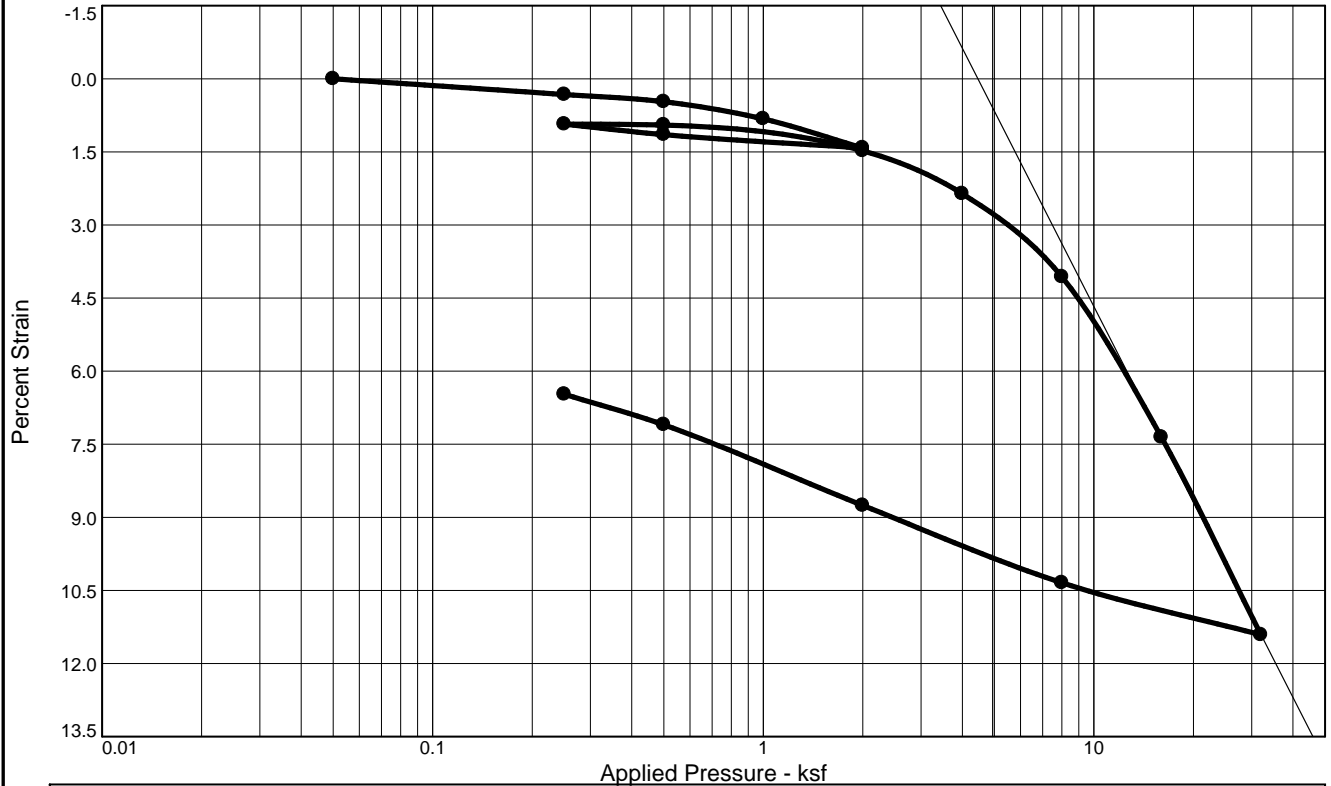
Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

7/18/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (ksf)	C_v (ft.2/day)	C_α	No.	Load (ksf)	C_v (ft.2/day)	C_α	No.	Load (ksf)	C_v (ft.2/day)	C_α
1	0.05	0.100		8	0.50	14.504		15	2.00	0.158	
2	0.25	6.153		9	2.00	12.637		16	0.50	0.030	
3	0.50	3.057		10	4.00	7.884		17	0.25	0.035	
4	1.00	2.855		11	8.00	8.853					
5	2.00	6.801		12	16.00	0.166					
6	0.50	10.454		13	32.00	0.121					
7	0.25	12.790		14	8.00	12.681					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	e_o	Swell Press. (ksf)	Swell %	C_r
Sat.	Moist.									
98.0 %	25.4 %	100.3	41	23	2.65		0.686			0.02

MATERIAL DESCRIPTION	USCS	AASHTO
Gray Silty Clay w/Medium to Fine Sand (CL)	CL	

<p>Project No. 1461-16- Client: HDR Engineering, Inc.</p> <p>Project: Carolina Crossroads Project</p> <p>Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1</p> <p style="text-align: center;">S & ME, INC.</p> <p style="text-align: center;">Charlotte, North Carolina</p>	<p>Remarks: Tested as saturated</p>
--	--

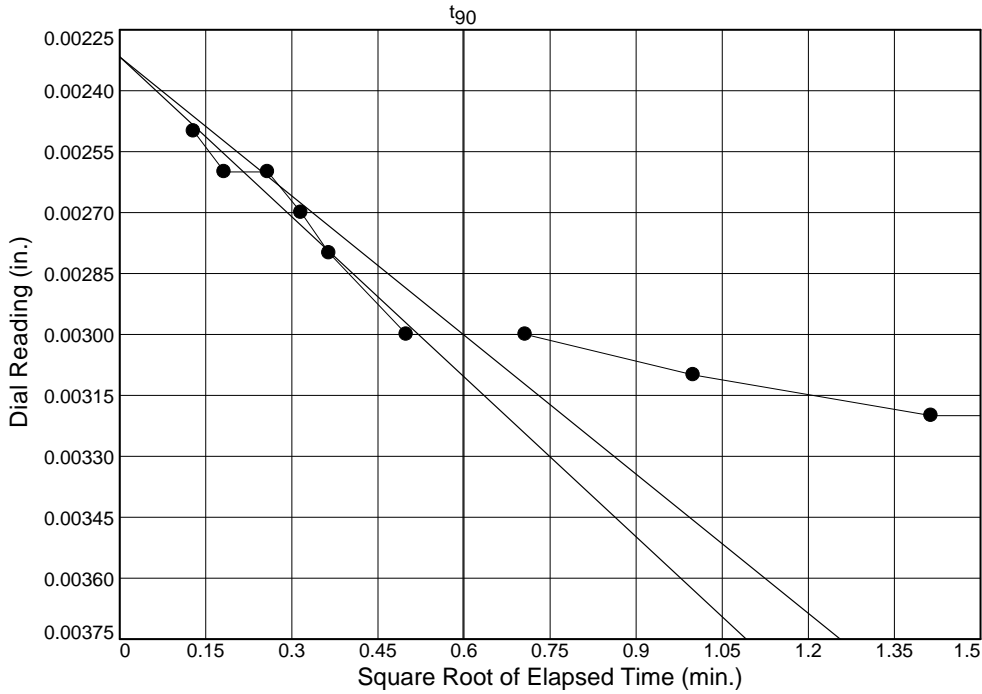
Figure B-41 UD

Tested By: Karen Warner **Checked By:** Jason Reeves

Dial Reading vs. Time

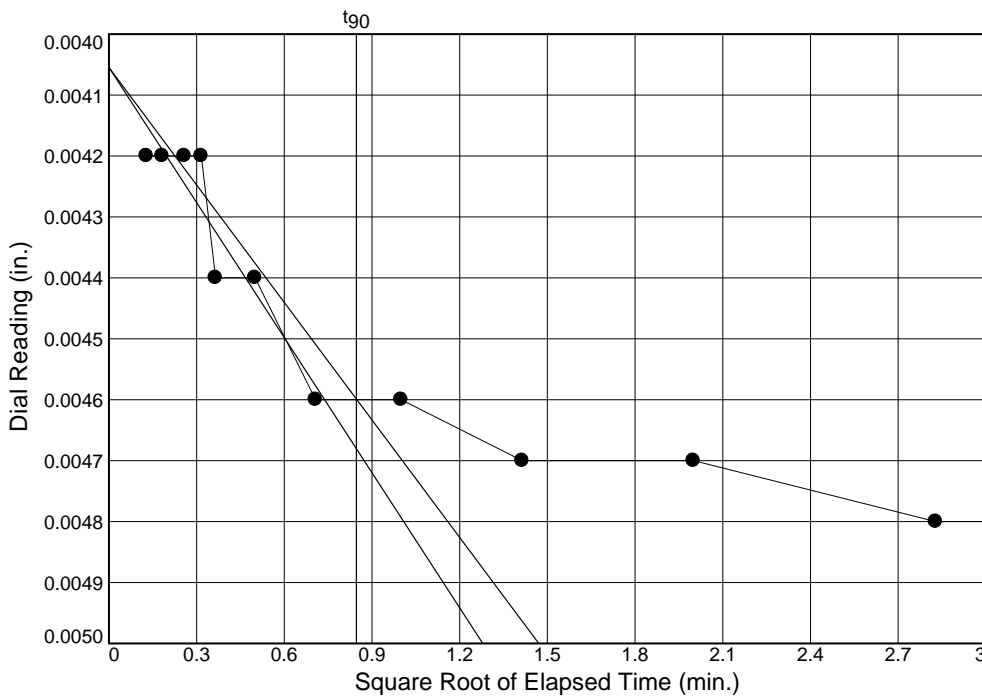
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 2
 Load= 0.25 ksf
 $D_0 = 0.0023$
 $D_{90} = 0.0030$
 $D_{100} = 0.0031$
 $T_{90} = 0.36 \text{ min.}$

$C_v @ T_{90}$
 6.153 ft.²/day



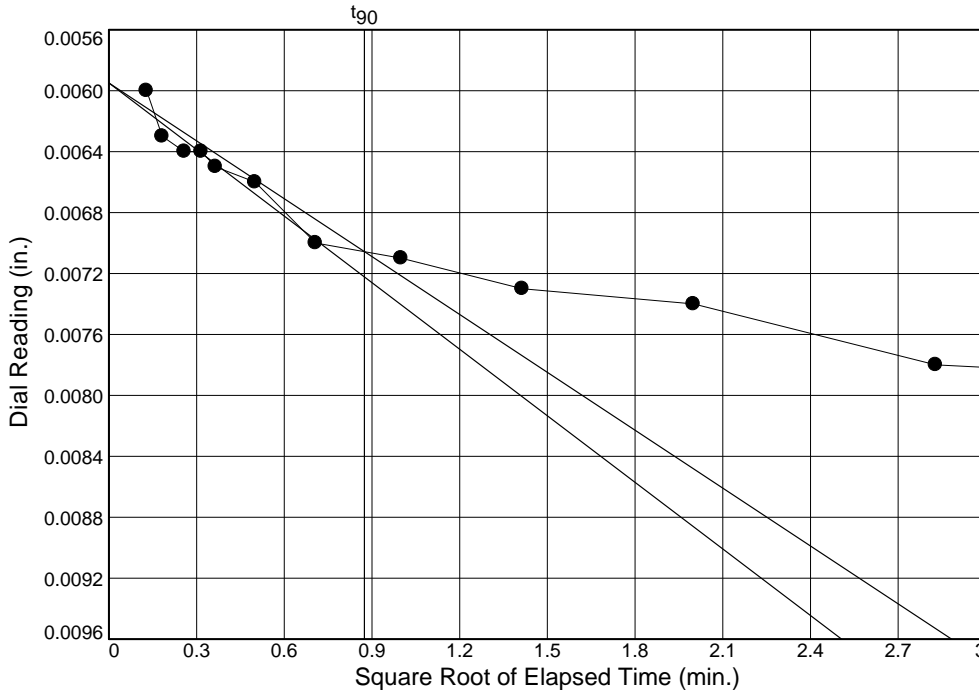
Load No.= 3
 Load= 0.50 ksf
 $D_0 = 0.0041$
 $D_{90} = 0.0046$
 $D_{100} = 0.0047$
 $T_{90} = 0.72 \text{ min.}$

$C_v @ T_{90}$
 3.057 ft.²/day

Dial Reading vs. Time

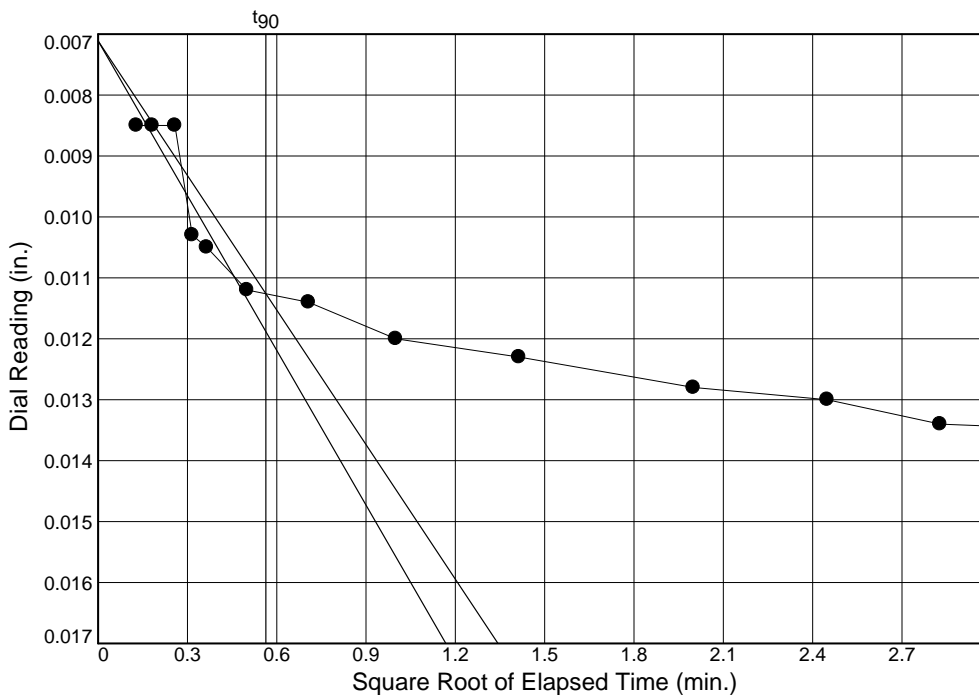
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 4
 Load= 1.00 ksf
 $D_0 = 0.0059$
 $D_{90} = 0.0071$
 $D_{100} = 0.0072$
 $T_{90} = 0.76 \text{ min.}$

$C_v @ T_{90}$
 2.855 ft.²/day



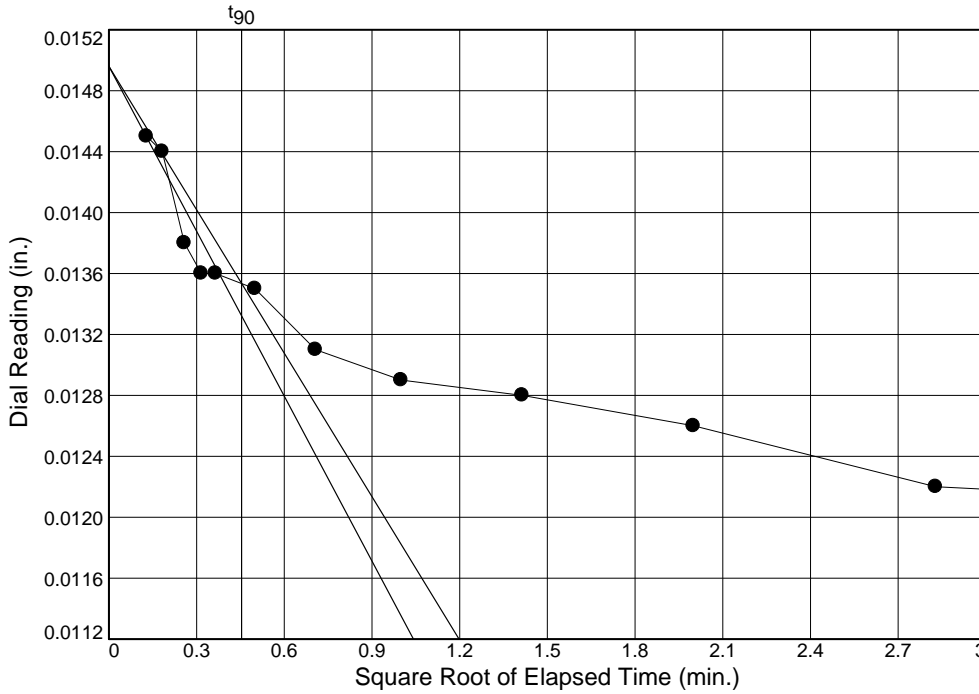
Load No.= 5
 Load= 2.00 ksf
 $D_0 = 0.0071$
 $D_{90} = 0.0113$
 $D_{100} = 0.0117$
 $T_{90} = 0.32 \text{ min.}$

$C_v @ T_{90}$
 6.801 ft.²/day

Dial Reading vs. Time

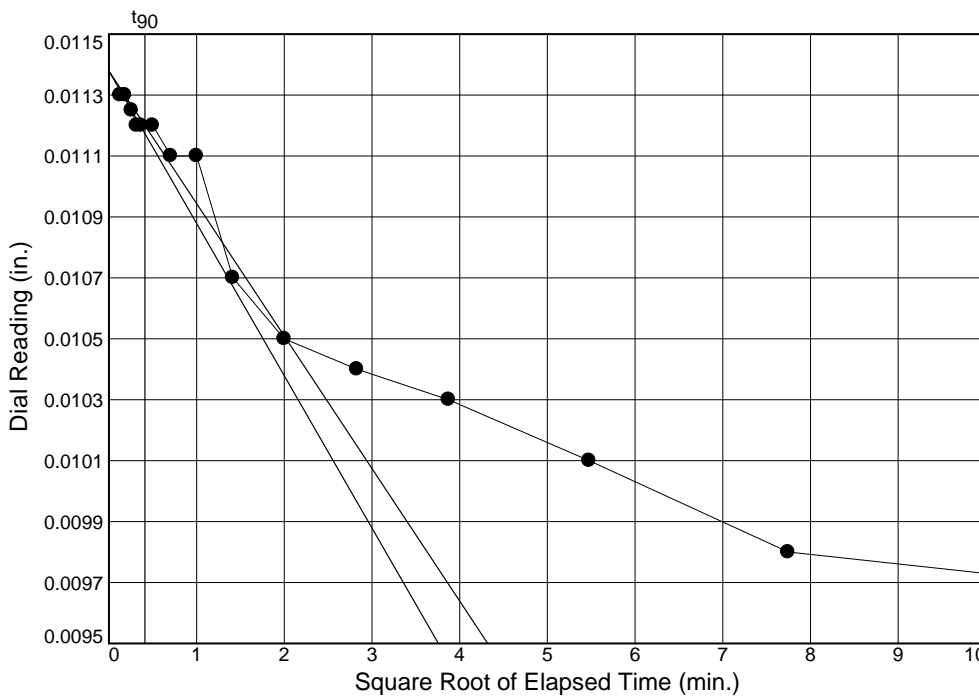
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 6
 Load= 0.50 ksf
 $D_0 = 0.0150$
 $D_{90} = 0.0135$
 $D_{100} = 0.0134$
 $T_{90} = 0.21 \text{ min.}$

$C_v @ T_{90}$
 10.454 ft.²/day



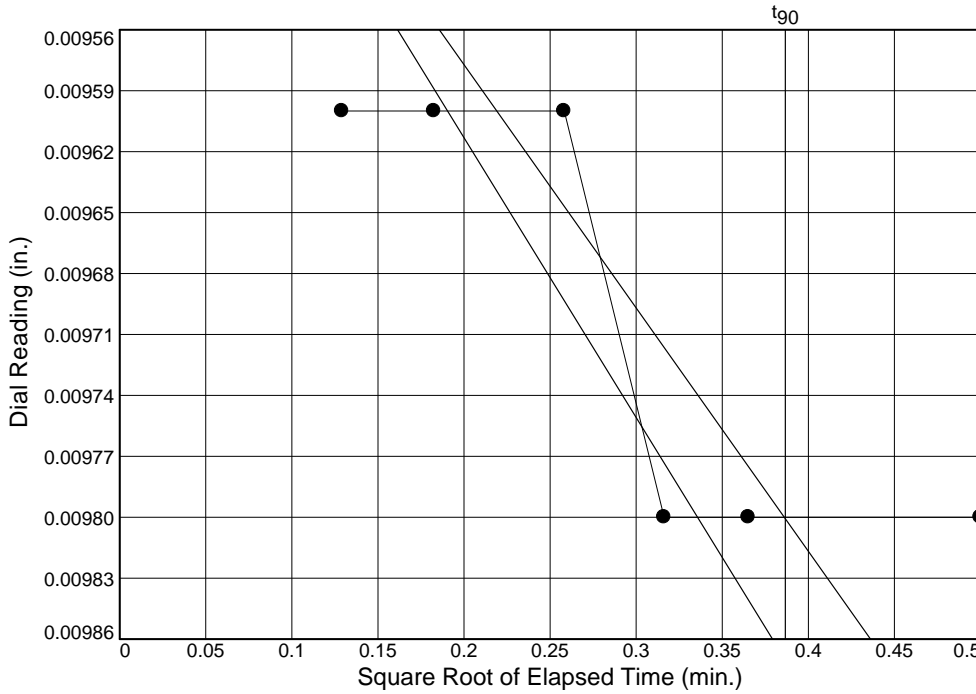
Load No.= 7
 Load= 0.25 ksf
 $D_0 = 0.0114$
 $D_{90} = 0.0112$
 $D_{100} = 0.0112$
 $T_{90} = 0.17 \text{ min.}$

$C_v @ T_{90}$
 12.790 ft.²/day

Dial Reading vs. Time

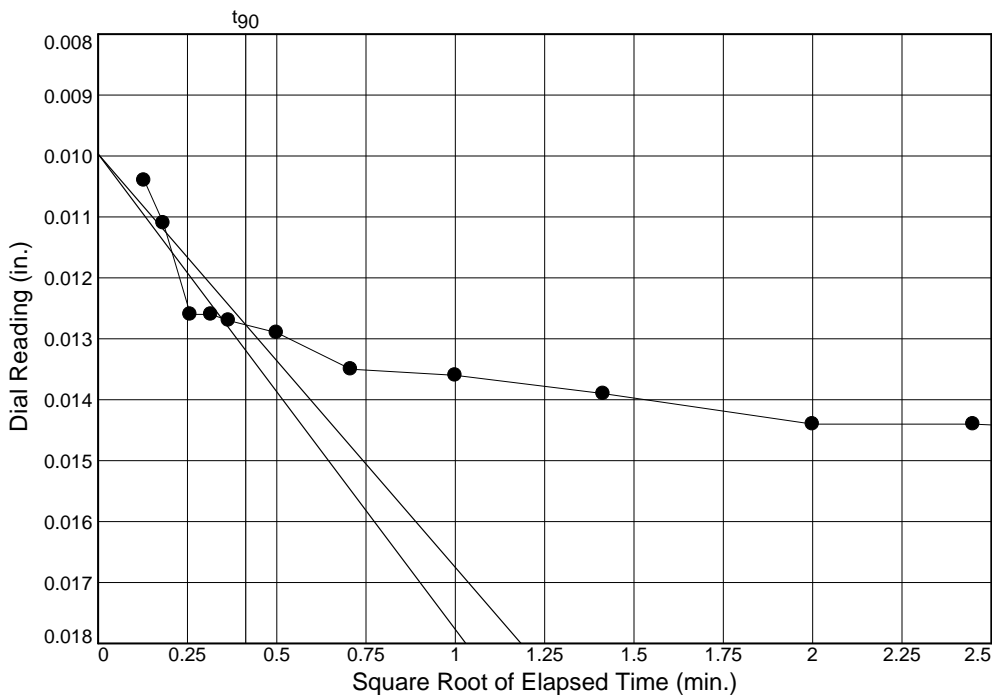
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 8
 Load= 0.50 ksf
 $D_0 = 0.0093$
 $D_{90} = 0.0098$
 $D_{100} = 0.0099$
 $T_{90} = 0.15 \text{ min.}$

$C_v @ T_{90}$
 14.504 ft.²/day



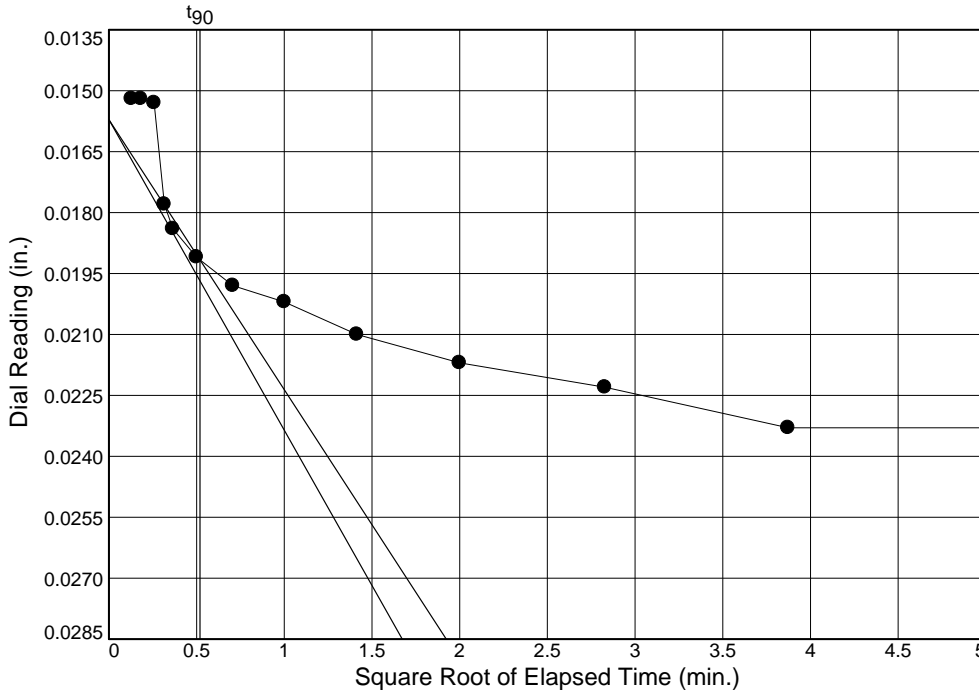
Load No.= 9
 Load= 2.00 ksf
 $D_0 = 0.0100$
 $D_{90} = 0.0128$
 $D_{100} = 0.0131$
 $T_{90} = 0.17 \text{ min.}$

$C_v @ T_{90}$
 12.637 ft.²/day

Dial Reading vs. Time

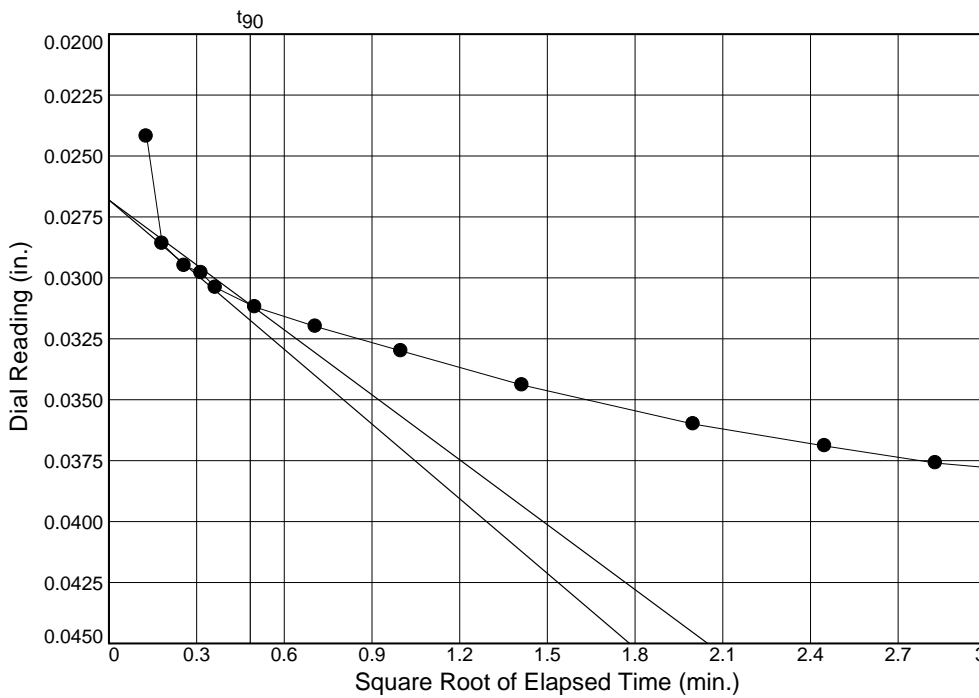
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 10
 Load= 4.00 ksf
 $D_0 = 0.0157$
 $D_{90} = 0.0192$
 $D_{100} = 0.0195$
 $T_{90} = 0.27 \text{ min.}$

$C_v @ T_{90}$
 7.884 ft.²/day



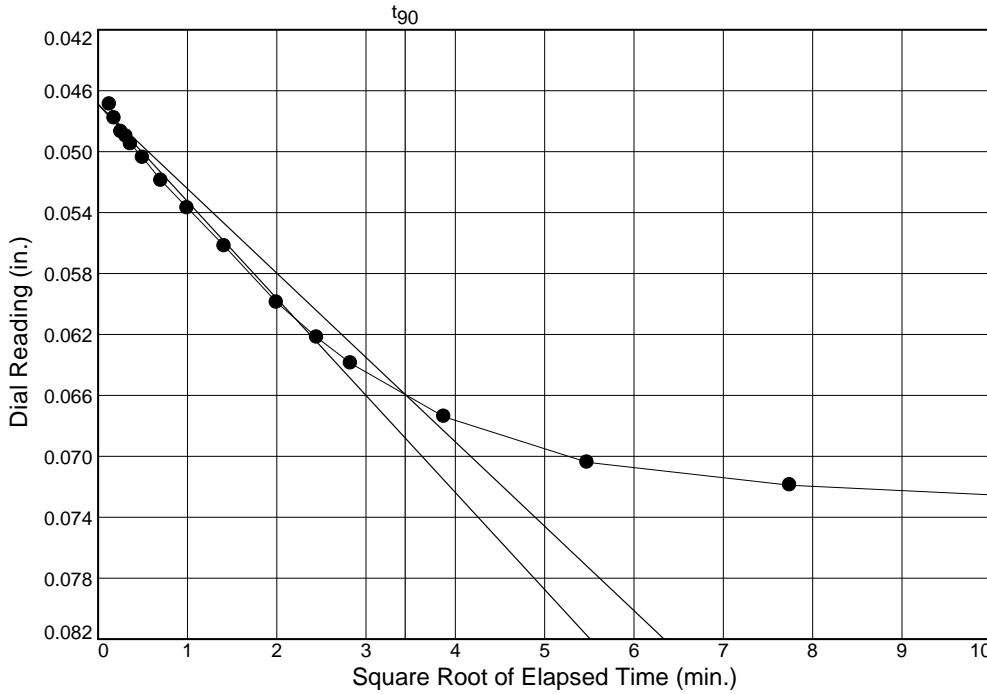
Load No.= 11
 Load= 8.00 ksf
 $D_0 = 0.0268$
 $D_{90} = 0.0311$
 $D_{100} = 0.0316$
 $T_{90} = 0.23 \text{ min.}$

$C_v @ T_{90}$
 8.853 ft.²/day

Dial Reading vs. Time

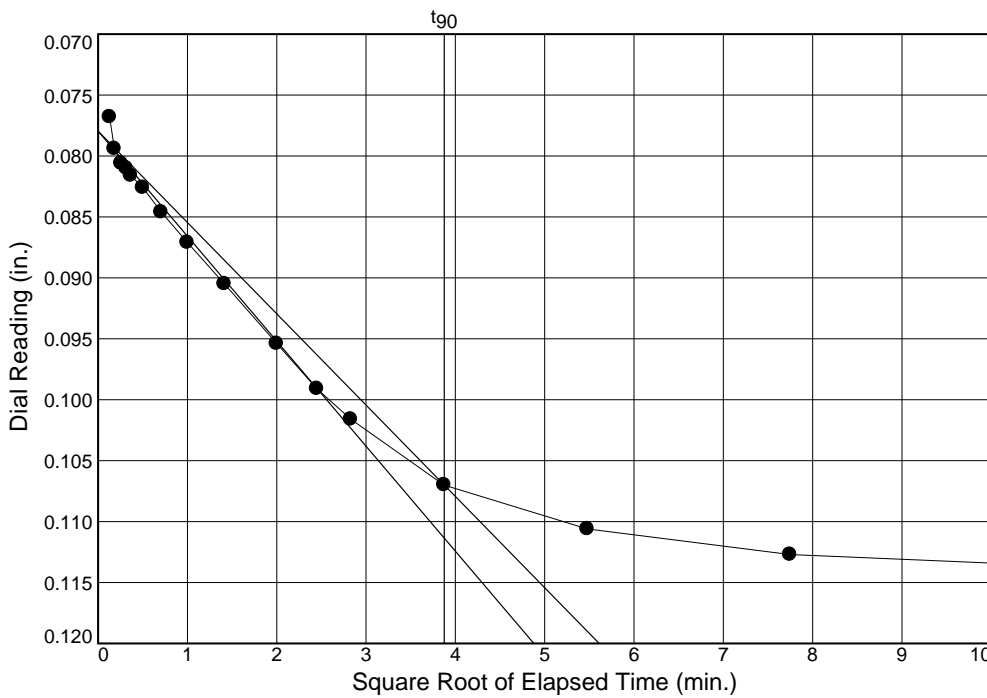
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 12
 Load= 16.00 ksf
 $D_0 = 0.0469$
 $D_{90} = 0.0659$
 $D_{100} = 0.0681$
 $T_{90} = 11.82 \text{ min.}$

$C_v @ T_{90}$
 0.166 ft.²/day



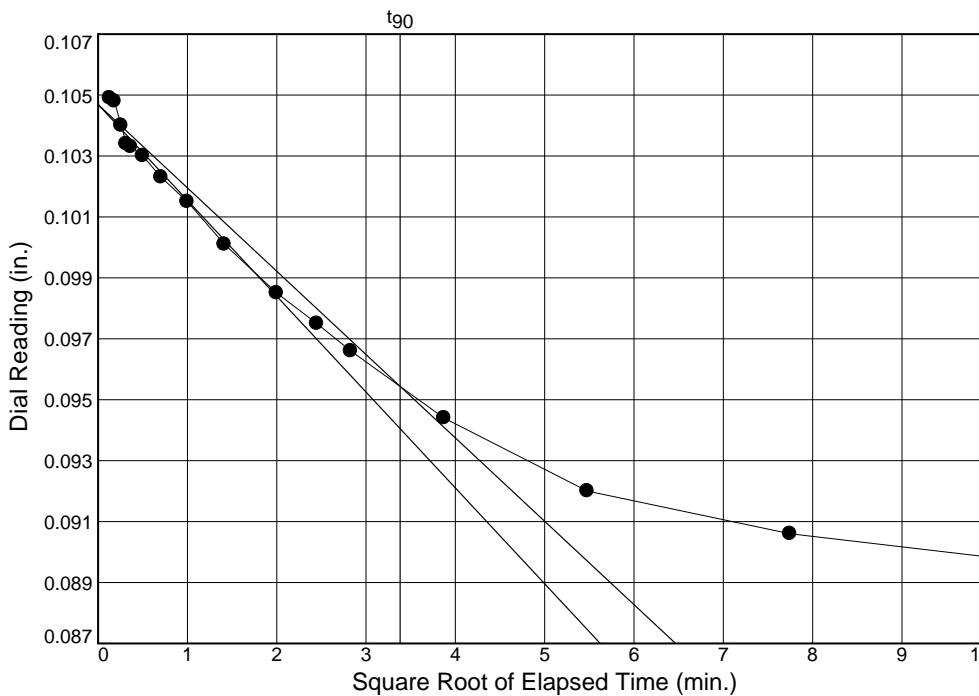
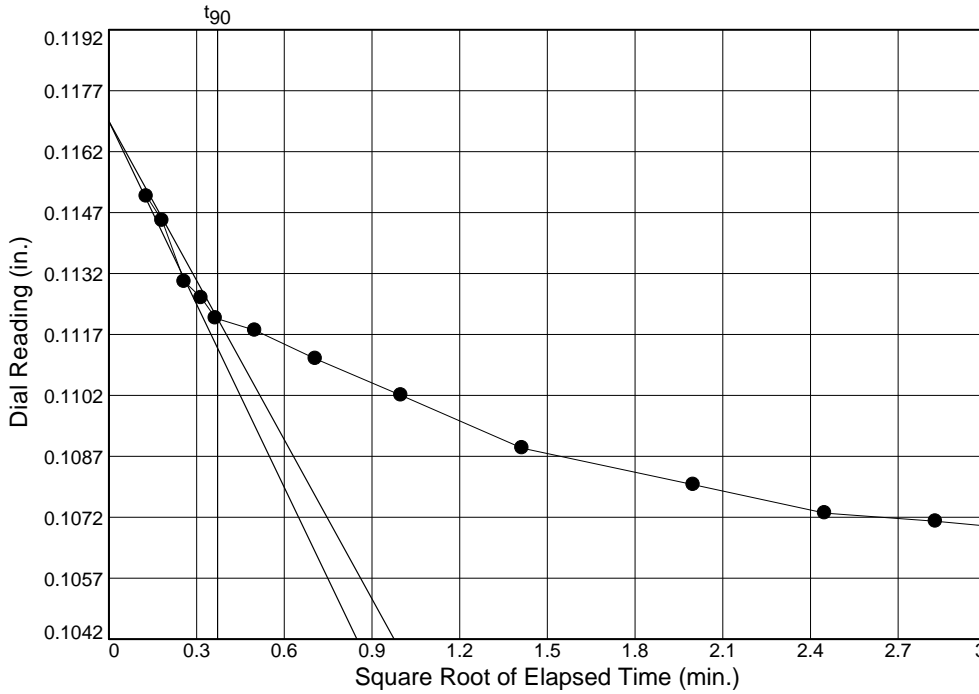
Load No.= 13
 Load= 32.00 ksf
 $D_0 = 0.0780$
 $D_{90} = 0.1070$
 $D_{100} = 0.1102$
 $T_{90} = 15.03 \text{ min.}$

$C_v @ T_{90}$
 0.121 ft.²/day

Dial Reading vs. Time

Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

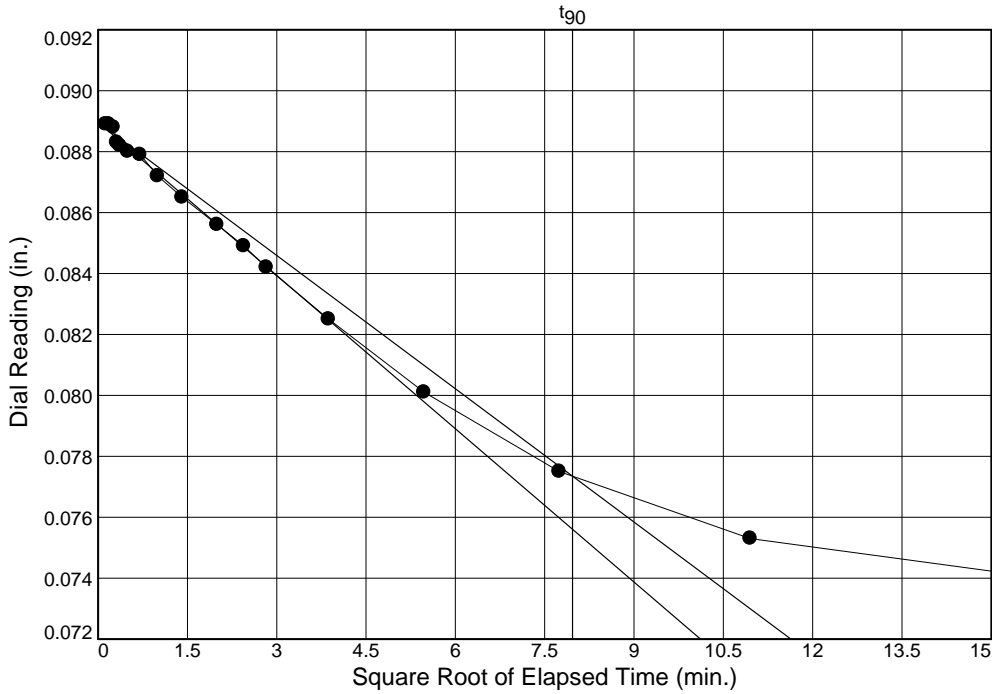
Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Dial Reading vs. Time

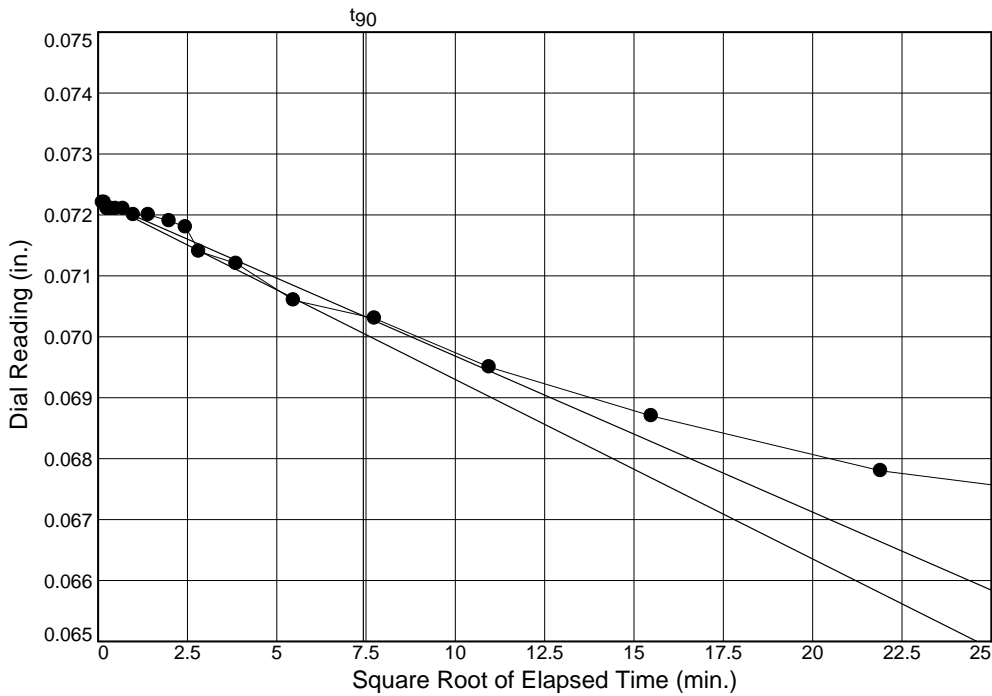
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 18.5-20.5' Sample Number: B-41UD UD-1



Load No.= 16
 Load= 0.50 ksf
 $D_0 = 0.0890$
 $D_{90} = 0.0773$
 $D_{100} = 0.0761$
 $T_{90} = 63.47 \text{ min.}$

$C_v @ T_{90}$
 0.030 ft.²/day



Load No.= 17
 Load= 0.25 ksf
 $D_0 = 0.0722$
 $D_{90} = 0.0703$
 $D_{100} = 0.0701$
 $T_{90} = 55.10 \text{ min.}$

$C_v @ T_{90}$
 0.035 ft.²/day

CONSOLIDATION TEST DATA

6/26/2018

Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Project Number: 1461-16-047.2B
Location: UD Borings
Depth: 18.5-20.5'
Material Description: Gray Silty Clay w/Medium to Fine Sand (CL)
Liquid Limit: 41
USCS: CL
Figure No.: B-41 UD
Testing Remarks: Tested as saturated
Tested by: Karen Warner

Sample Number: B-41UD UD-1
Plasticity Index: 23

Checked by: Jason Reeves

Test Specimen Data

<p>NATURAL MOISTURE</p> <p>Wet w+t = 419.06 g. Dry w+t = 350.85 g. Tare Wt. = 81.99 g. Moisture = 25.4 %</p> <p>UNIT WEIGHT</p> <p>Height = 0.998 in. Diameter = 2.493 in. Weight = 160.66 g. Dry Dens. = 100.3 pcf</p>	<p>VOID RATIO</p> <p>Spec. Gr. = 2.65 Est. Ht. Solids = 0.606 in. Init. V.R. = 0.686 Init. Sat. = 98.0 %</p> <p>TEST START</p> <p>Height = 1.021 in. Diameter = 2.493 in.</p>	<p>AFTER TEST</p> <p>Wet w+t = 264.37 g. Dry w+t = 234.75 g. Tare Wt. = 106.40 g. Moisture = 23.1 %</p> <p>Dry Wt. = 128.35* g.</p>
---	---	---

End-Of-Load Summary

Pressure (ksf)	Final Dial (in.)	Deformation (in.)	C _v (ft. ² /day)	C _α	Void Ratio	% Strain
start	0.00010	0.00000			0.686	
0.05	0.00010	0.00000	0.100		0.686	0.0 Compr.
0.25	0.00340	0.00330	6.153		0.681	0.3 Compr.
0.50	0.00490	0.00480	3.057		0.678	0.5 Compr.
1.00	0.00850	0.00840	2.855		0.672	0.8 Compr.
2.00	0.01460	0.01450	6.801		0.662	1.4 Compr.
0.50	0.01180	0.01170	10.454		0.667	1.1 Compr.
0.25	0.00960	0.00950	12.790		0.671	0.9 Compr.
0.50	0.00980	0.00970	14.504		0.670	1.0 Compr.
2.00	0.01520	0.01510	12.637		0.661	1.5 Compr.
4.00	0.02420	0.02410	7.884		0.646	2.4 Compr.
8.00	0.04160	0.04150	8.853		0.618	4.1 Compr.
16.00	0.07520	0.07510	0.166		0.562	7.4 Compr.
32.00	0.11660	0.11650	0.121		0.494	11.4 Compr.
8.00	0.10570	0.10560	12.681		0.512	10.3 Compr.
2.00	0.08950	0.08940	0.158		0.539	8.8 Compr.
0.50	0.07260	0.07250	0.030		0.566	7.1 Compr.
0.25	0.06620	0.06610	0.035		0.577	6.5 Compr.

TEST RESULTS SUMMARY

Compression index (C_c), ksf = 0.22 Preconsolidation pressure (P_p), ksf = 7.8 Void ratio at P_p (e_m) = 0.619
 Recompression index (C_r) = 0.02

Pressure: 0.05 ksf TEST READINGS Load No. 1

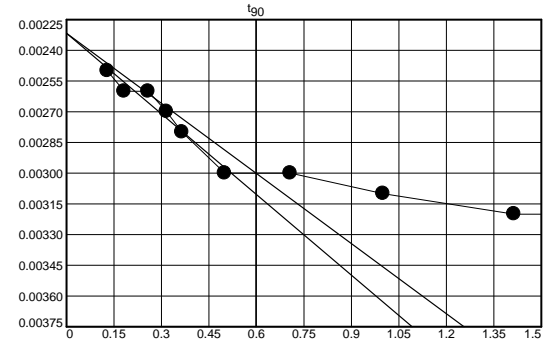
No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	+0 : :	0.00010	11	+0 00:04:00	0.00010
2	+0 00:00:01	0.00010	12	+0 00:08:00	0.00010
3	+0 00:00:02	0.00010	13	+0 00:15:00	0.00010
4	+0 00:00:04	0.00010	14	+0 00:22:00	0.00010
5	+0 00:00:06	0.00010			
6	+0 00:00:08	0.00010			
7	+0 00:00:15	0.00010			
8	+0 00:00:30	0.00010			
9	+0 00:00:60	0.00010			
10	+0 00:02:00	0.00010			

Void Ratio = 0.686 Compression = 0.0%

$D_0 = 0.0001$ $D_{90} = 0.0001$ $D_{100} = 0.0001$ C_v at 22.00 min. = 0.100 ft.²/day

Pressure: 0.25 ksf TEST READINGS Load No. 2

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00010	11	+0 00:04:00	0.00320
2	+0 00:00:01	0.00250	12	+0 00:08:00	0.00320
3	+0 00:00:02	0.00260	13	+0 00:15:00	0.00330
4	+0 00:00:04	0.00260	14	+0 00:30:00	0.00330
5	+0 00:00:06	0.00270	15	+0 00:60:00	0.00330
6	+0 00:00:08	0.00280	16	+0 02:00:00	0.00330
7	+0 00:00:15	0.00300	17	+0 04:00:00	0.00340
8	+0 00:00:30	0.00300	18	+0 08:00:00	0.00340
9	+0 00:00:60	0.00310			
10	+0 00:02:00	0.00320			



Void Ratio = 0.681 Compression = 0.3%

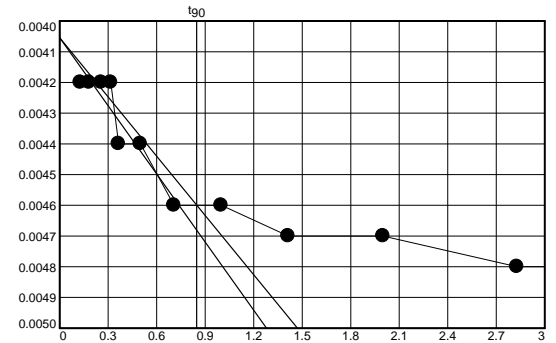
$D_0 = 0.0023$ $D_{90} = 0.0030$ $D_{100} = 0.0031$ C_v at 0.36 min. = 6.153 ft.²/day

Pressure: 0.50 ksf

TEST READINGS

Load No. 3

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00340	11	+0 00:04:00	0.00470
2	+0 00:00:01	0.00420	12	+0 00:08:00	0.00480
3	+0 00:00:02	0.00420	13	+0 00:15:00	0.00480
4	+0 00:00:04	0.00420	14	+0 00:30:00	0.00480
5	+0 00:00:06	0.00420	15	+0 00:60:00	0.00480
6	+0 00:00:08	0.00440	16	+0 02:00:00	0.00490
7	+0 00:00:15	0.00440	17	+0 04:00:00	0.00490
8	+0 00:00:30	0.00460	18	+0 04:06:00	0.00490
9	+0 00:00:60	0.00460			
10	+0 00:02:00	0.00470			



Void Ratio = 0.678 Compression = 0.5%

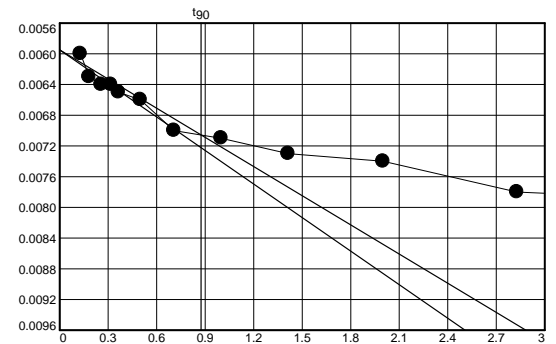
D₀ = 0.0041 D₉₀ = 0.0046 D₁₀₀ = 0.0047 C_v at 0.72 min. = 3.057 ft.²/day

Pressure: 1.00 ksf

TEST READINGS

Load No. 4

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00490	11	+0 00:04:00	0.00740
2	+0 00:00:01	0.00600	12	+0 00:08:00	0.00780
3	+0 00:00:02	0.00630	13	+0 00:15:00	0.00790
4	+0 00:00:04	0.00640	14	+0 00:30:00	0.00810
5	+0 00:00:06	0.00640	15	+0 00:60:00	0.00810
6	+0 00:00:08	0.00650	16	+0 02:00:00	0.00820
7	+0 00:00:15	0.00660	17	+0 04:00:00	0.00850
8	+0 00:00:30	0.00700	18	+0 04:31:00	0.00850
9	+0 00:00:60	0.00710			
10	+0 00:02:00	0.00730			



Void Ratio = 0.672 Compression = 0.8%

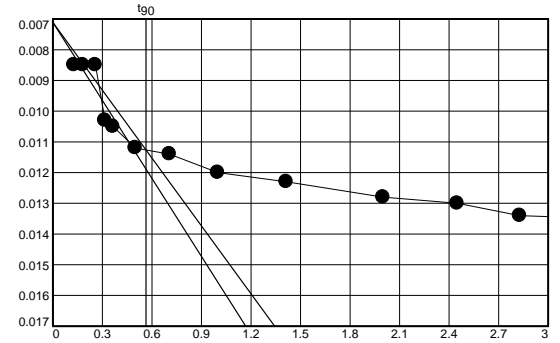
D₀ = 0.0059 D₉₀ = 0.0071 D₁₀₀ = 0.0072 C_v at 0.76 min. = 2.855 ft.²/day

Pressure: 2.00 ksf

TEST READINGS

Load No. 5

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00850	12	+0 00:06:00	0.01300
2	+0 00:00:01	0.00850	13	+0 00:08:00	0.01340
3	+0 00:00:02	0.00850	14	+0 00:15:00	0.01360
4	+0 00:00:04	0.00850	15	+0 00:30:00	0.01380
5	+0 00:00:06	0.01030	16	+0 00:60:00	0.01420
6	+0 00:00:08	0.01050	17	+0 02:00:00	0.01430
7	+0 00:00:15	0.01120	18	+0 04:00:00	0.01440
8	+0 00:00:30	0.01140	19	+0 08:00:00	0.01450
9	+0 00:00:60	0.01200	20	+0 15:00:00	0.01450
10	+0 00:02:00	0.01230	21	+0 18:00:00	0.01460
11	+0 00:04:00	0.01280			



Void Ratio = 0.662 Compression = 1.4%

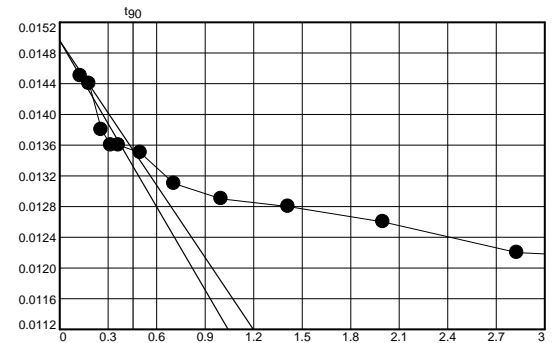
$D_0 = 0.0071$ $D_{90} = 0.0113$ $D_{100} = 0.0117$ C_v at 0.32 min. = 6.801 ft.²/day

Pressure: 0.50 ksf

TEST READINGS

Load No. 6

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01460	11	+0 00:04:00	0.01260
2	+0 00:00:01	0.01450	12	+0 00:08:00	0.01220
3	+0 00:00:02	0.01440	13	+0 00:15:00	0.01210
4	+0 00:00:04	0.01380	14	+0 00:30:00	0.01190
5	+0 00:00:06	0.01360	15	+0 00:60:00	0.01190
6	+0 00:00:08	0.01360	16	+0 02:00:00	0.01190
7	+0 00:00:15	0.01350	17	+0 02:18:00	0.01180
8	+0 00:00:30	0.01310			
9	+0 00:00:60	0.01290			
10	+0 00:02:00	0.01280			



Void Ratio = 0.667 Compression = 1.1%

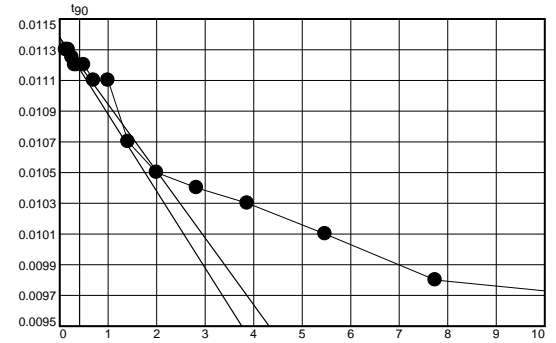
$D_0 = 0.0150$ $D_{90} = 0.0135$ $D_{100} = 0.0134$ C_v at 0.21 min. = 10.454 ft.²/day

Pressure: 0.25 ksf

TEST READINGS

Load No. 7

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01180	11	+0 00:04:00	0.01050
2	+0 00:00:01	0.01130	12	+0 00:08:00	0.01040
3	+0 00:00:02	0.01130	13	+0 00:15:00	0.01030
4	+0 00:00:04	0.01125	14	+0 00:30:00	0.01010
5	+0 00:00:06	0.01120	15	+0 00:60:00	0.00980
6	+0 00:00:08	0.01120	16	+0 02:00:00	0.00970
7	+0 00:00:15	0.01120	17	+0 04:00:00	0.00960
8	+0 00:00:30	0.01110	18	+0 05:21:00	0.00960
9	+0 00:00:60	0.01110			
10	+0 00:02:00	0.01070			



Void Ratio = 0.671 Compression = 0.9%

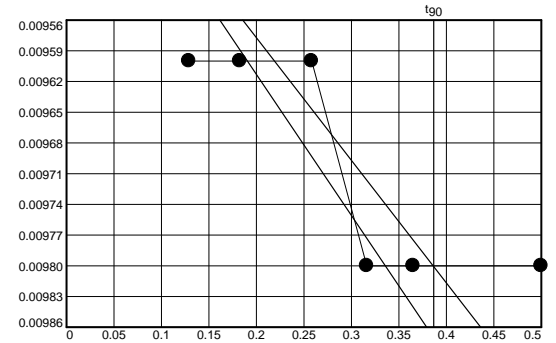
D₀ = 0.0114 D₉₀ = 0.0112 D₁₀₀ = 0.0112 C_v at 0.17 min. = 12.790 ft.²/day

Pressure: 0.50 ksf

TEST READINGS

Load No. 8

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00960	11	+0 00:04:00	0.00980
2	+0 00:00:01	0.00960	12	+0 00:08:00	0.00980
3	+0 00:00:02	0.00960	13	+0 00:15:00	0.00980
4	+0 00:00:04	0.00960	14	+0 00:30:00	0.00980
5	+0 00:00:06	0.00980	15	+0 00:60:00	0.00980
6	+0 00:00:08	0.00980	16	+0 01:39:47	0.00980
7	+0 00:00:15	0.00980			
8	+0 00:00:30	0.00980			
9	+0 00:00:60	0.00980			
10	+0 00:02:00	0.00980			



Void Ratio = 0.670 Compression = 1.0%

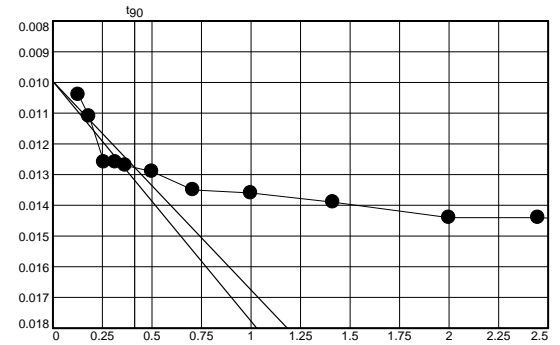
D₀ = 0.0093 D₉₀ = 0.0098 D₁₀₀ = 0.0099 C_v at 0.15 min. = 14.504 ft.²/day

Pressure: 2.00 ksf

TEST READINGS

Load No. 9

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00980	12	+0 00:06:00	0.01440
2	+0 00:00:01	0.01040	13	+0 00:08:00	0.01450
3	+0 00:00:02	0.01110	14	+0 00:15:00	0.01460
4	+0 00:00:04	0.01260	15	+0 00:30:00	0.01480
5	+0 00:00:06	0.01260	16	+0 00:60:00	0.01500
6	+0 00:00:08	0.01270	17	+0 02:00:00	0.01510
7	+0 00:00:15	0.01290	18	+0 04:00:00	0.01510
8	+0 00:00:30	0.01350	19	+0 08:00:00	0.01510
9	+0 00:00:60	0.01360	20	+0 15:00:00	0.01520
10	+0 00:02:00	0.01390	21	+0 24:00:00	0.01520
11	+0 00:04:00	0.01440	22	+1 24:80:00	0.01520



Void Ratio = 0.661 Compression = 1.5%

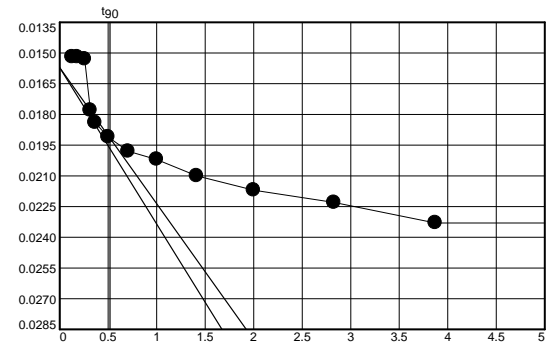
D₀ = 0.0100 D₉₀ = 0.0128 D₁₀₀ = 0.0131 C_v at 0.17 min. = 12.637 ft.²/day

Pressure: 4.00 ksf

TEST READINGS

Load No. 10

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01520	12	+0 00:08:00	0.02230
2	+0 00:00:01	0.01520	13	+0 00:15:00	0.02330
3	+0 00:00:02	0.01520	14	+0 00:30:00	0.02330
4	+0 00:00:04	0.01530	15	+0 00:60:00	0.02360
5	+0 00:00:06	0.01780	16	+0 02:00:00	0.02390
6	+0 00:00:08	0.01840	17	+0 04:00:00	0.02390
7	+0 00:00:15	0.01910	18	+0 08:00:00	0.02410
8	+0 00:00:30	0.01980	19	+0 15:00:00	0.02420
9	+0 00:00:60	0.02020	20	+0 24:00:00	0.02420
10	+0 00:02:00	0.02100	21	+1 31:36:00	0.02420
11	+0 00:04:00	0.02170			



Void Ratio = 0.646 Compression = 2.4%

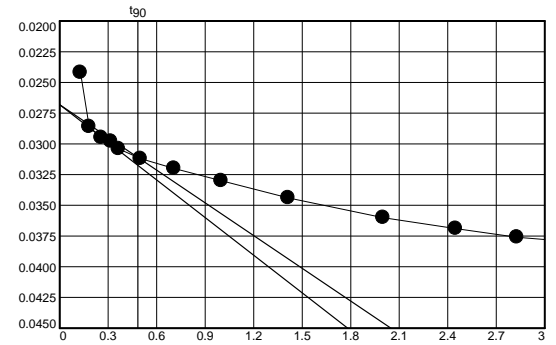
D₀ = 0.0157 D₉₀ = 0.0192 D₁₀₀ = 0.0195 C_v at 0.27 min. = 7.884 ft.²/day

Pressure: 8.00 ksf

TEST READINGS

Load No. 11

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.02420	11	+0 00:04:00	0.03600
2	+0 00:00:01	0.02420	12	+0 00:06:00	0.03690
3	+0 00:00:02	0.02860	13	+0 00:08:00	0.03760
4	+0 00:00:04	0.02950	14	+0 00:15:00	0.03870
5	+0 00:00:06	0.02980	15	+0 00:30:00	0.03980
6	+0 00:00:08	0.03040	16	+0 00:60:00	0.04020
7	+0 00:00:15	0.03120	17	+0 02:00:00	0.04080
8	+0 00:00:30	0.03200	18	+0 04:00:00	0.04140
9	+0 00:00:60	0.03300	19	+0 08:00:00	0.04160
10	+0 00:02:00	0.03440			



Void Ratio = 0.618 Compression = 4.1%

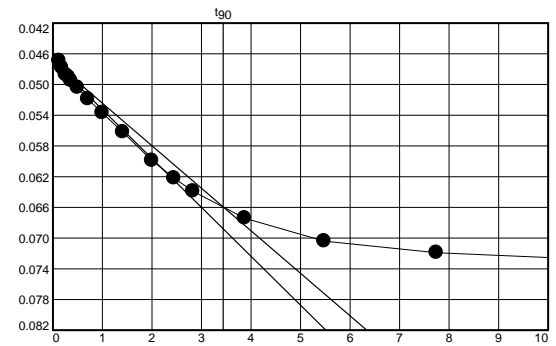
D₀ = 0.0268 D₉₀ = 0.0311 D₁₀₀ = 0.0316 C_v at 0.23 min. = 8.853 ft.²/day

Pressure: 16.00 ksf

TEST READINGS

Load No. 12

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.04160	12	+0 00:06:00	0.06220
2	+0 00:00:01	0.04690	13	+0 00:08:00	0.06390
3	+0 00:00:02	0.04780	14	+0 00:15:00	0.06740
4	+0 00:00:04	0.04870	15	+0 00:30:00	0.07040
5	+0 00:00:06	0.04900	16	+0 00:60:00	0.07190
6	+0 00:00:08	0.04950	17	+0 02:00:00	0.07280
7	+0 00:00:15	0.05040	18	+0 04:00:00	0.07360
8	+0 00:00:30	0.05190	19	+0 08:00:00	0.07430
9	+0 00:00:60	0.05370	20	+0 15:00:00	0.07490
10	+0 00:02:00	0.05620	21	+0 20:00:00	0.07520
11	+0 00:04:00	0.05990			



Void Ratio = 0.562 Compression = 7.4%

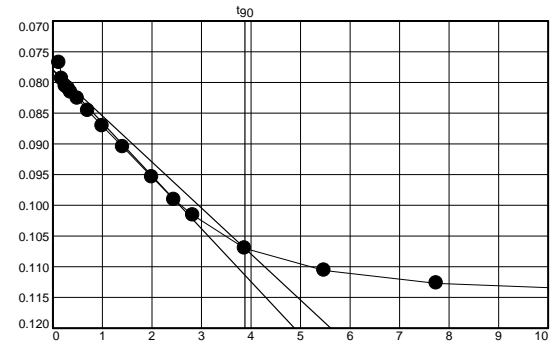
D₀ = 0.0469 D₉₀ = 0.0659 D₁₀₀ = 0.0681 C_v at 11.82 min. = 0.166 ft.²/day

Pressure: 32.00 ksf

TEST READINGS

Load No. 13

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.07520	12	+0 00:06:00	0.09910
2	+0 00:00:01	0.07680	13	+0 00:08:00	0.10160
3	+0 00:00:02	0.07940	14	+0 00:15:00	0.10700
4	+0 00:00:04	0.08060	15	+0 00:30:00	0.11060
5	+0 00:00:06	0.08100	16	+0 00:60:00	0.11270
6	+0 00:00:08	0.08160	17	+0 02:00:00	0.11370
7	+0 00:00:15	0.08260	18	+0 04:00:00	0.11460
8	+0 00:00:30	0.08460	19	+0 08:00:00	0.11540
9	+0 00:00:60	0.08710	20	+0 15:00:00	0.11610
10	+0 00:02:00	0.09050	21	+0 22:10:00	0.11660
11	+0 00:04:00	0.09540			



Void Ratio = 0.494 Compression = 11.4%

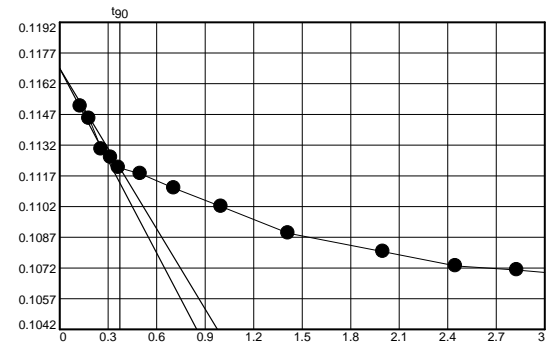
$D_0 = 0.0780$ $D_{90} = 0.1070$ $D_{100} = 0.1102$ C_v at 15.03 min. = 0.121 ft.²/day

Pressure: 8.00 ksf

TEST READINGS

Load No. 14

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.11660	11	+0 00:04:00	0.10800
2	+0 00:00:01	0.11510	12	+0 00:06:00	0.10730
3	+0 00:00:02	0.11450	13	+0 00:08:00	0.10710
4	+0 00:00:04	0.11300	14	+0 00:15:00	0.10640
5	+0 00:00:06	0.11260	15	+0 00:30:00	0.10630
6	+0 00:00:08	0.11210	16	+0 00:60:00	0.10580
7	+0 00:00:15	0.11180	17	+0 02:00:00	0.10570
8	+0 00:00:30	0.11110	18	+0 02:09:00	0.10570
9	+0 00:00:60	0.11020			
10	+0 00:02:00	0.10890			



Void Ratio = 0.512 Compression = 10.3%

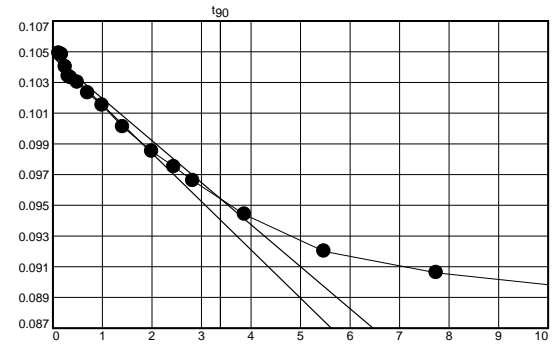
$D_0 = 0.1169$ $D_{90} = 0.1121$ $D_{100} = 0.1115$ C_v at 0.14 min. = 12.681 ft.²/day

Pressure: 2.00 ksf

TEST READINGS

Load No. 15

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.10570	11	+0 00:04:00	0.09850
2	+0 00:00:01	0.10490	12	+0 00:06:00	0.09750
3	+0 00:00:02	0.10480	13	+0 00:08:00	0.09660
4	+0 00:00:04	0.10400	14	+0 00:15:00	0.09440
5	+0 00:00:06	0.10340	15	+0 00:30:00	0.09200
6	+0 00:00:08	0.10330	16	+0 00:60:00	0.09060
7	+0 00:00:15	0.10300	17	+0 02:00:00	0.08950
8	+0 00:00:30	0.10230	18	+0 04:60:00	0.08950
9	+0 00:00:60	0.10150			
10	+0 00:02:00	0.10010			



Void Ratio = 0.539 Compression = 8.8%

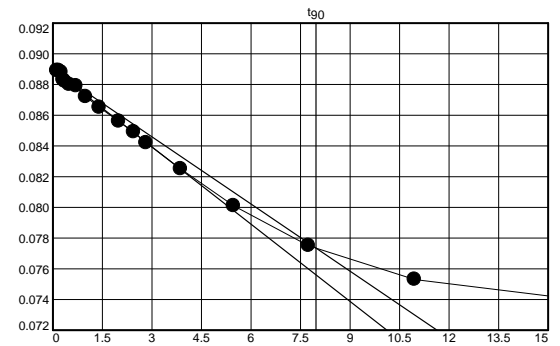
D₀ = 0.1047 D₉₀ = 0.0954 D₁₀₀ = 0.0944 C_v at 11.44 min. = 0.158 ft.²/day

Pressure: 0.50 ksf

TEST READINGS

Load No. 16

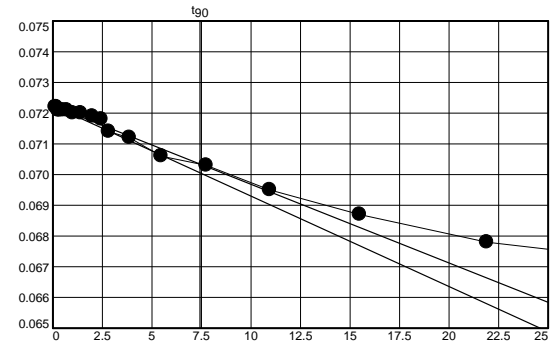
No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.08950	12	+0 00:06:00	0.08490
2	+0 00:00:01	0.08890	13	+0 00:08:00	0.08420
3	+0 00:00:02	0.08890	14	+0 00:15:00	0.08250
4	+0 00:00:04	0.08880	15	+0 00:30:00	0.08010
5	+0 00:00:06	0.08830	16	+0 00:60:00	0.07750
6	+0 00:00:08	0.08820	17	+0 02:00:00	0.07530
7	+0 00:00:15	0.08800	18	+0 04:00:00	0.07410
8	+0 00:00:30	0.08790	19	+0 08:00:00	0.07310
9	+0 00:00:60	0.08720	20	+0 15:00:00	0.07270
10	+0 00:02:00	0.08650	21	+0 17:27:00	0.07260
11	+0 00:04:00	0.08560			



Void Ratio = 0.566 Compression = 7.1%

D₀ = 0.0890 D₉₀ = 0.0773 D₁₀₀ = 0.0761 C_v at 63.47 min. = 0.030 ft.²/day

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.07260	12	+0 00:06:00	0.07180
2	+0 00:00:01	0.07220	13	+0 00:08:00	0.07140
3	+0 00:00:02	0.07220	14	+0 00:15:00	0.07120
4	+0 00:00:04	0.07210	15	+0 00:30:00	0.07060
5	+0 00:00:06	0.07210	16	+0 00:60:00	0.07030
6	+0 00:00:08	0.07210	17	+0 02:00:00	0.06950
7	+0 00:00:15	0.07210	18	+0 04:00:00	0.06870
8	+0 00:00:30	0.07210	19	+0 08:00:00	0.06780
9	+0 00:00:60	0.07200	20	+0 15:00:00	0.06720
10	+0 00:02:00	0.07200	21	+0 24:00:00	0.06620
11	+0 00:04:00	0.07190			



Void Ratio = 0.577 Compression = 6.5%

$D_0 = 0.0722$ $D_{90} = 0.0703$ $D_{100} = 0.0701$ C_v at 55.10 min. = 0.035 ft.²/day

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1461-16-047.2B	Report Date:	6/1/18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/18-5/20/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Avenue, North Charleston, SC 29405		
Boring #:	W-23UD	Sample #:	UD-2
		Sample Date:	Various
Location:	UD Borings	Offset:	NA
		Elevation:	8.5-10

Sample Description:		Brown Gray Clay (CH)			
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	3222	7/29/2017	Grooving tool	30427	9/27/2017
LL Apparatus	20336	2/21/2018	Grooving tool		
Oven	10844	8/22/2017	Grooving tool		

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		LL	60	II			BB	23	
A	Tare Weight	16.98	13.90	16.92			15.37	14.09	
B	Wet Soil Weight + A	26.73	24.76	28.05			23.54	22.37	
C	Dry Soil Weight + A	23.18	20.74	23.88			21.96	20.75	
D	Water Weight (B-C)	3.55	4.02	4.17			1.58	1.62	
E	Dry Soil Weight (C-A)	6.20	6.84	6.96			6.59	6.66	
F	% Moisture (D/E)*100	57.3%	58.8%	59.9%			24.0%	24.3%	
N	# OF DROPS	34	26	20					
LL	LL = F * FACTOR								
Ave.	Average						24.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	59
Plastic Limit	24
Plastic Index	35
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: _____

Notes / Deviations / References: _____

Karen Warner
Technician Name

6/1/2018
Date

Matthew F. Cooke, P.G.
Technical Responsibility

7/18/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

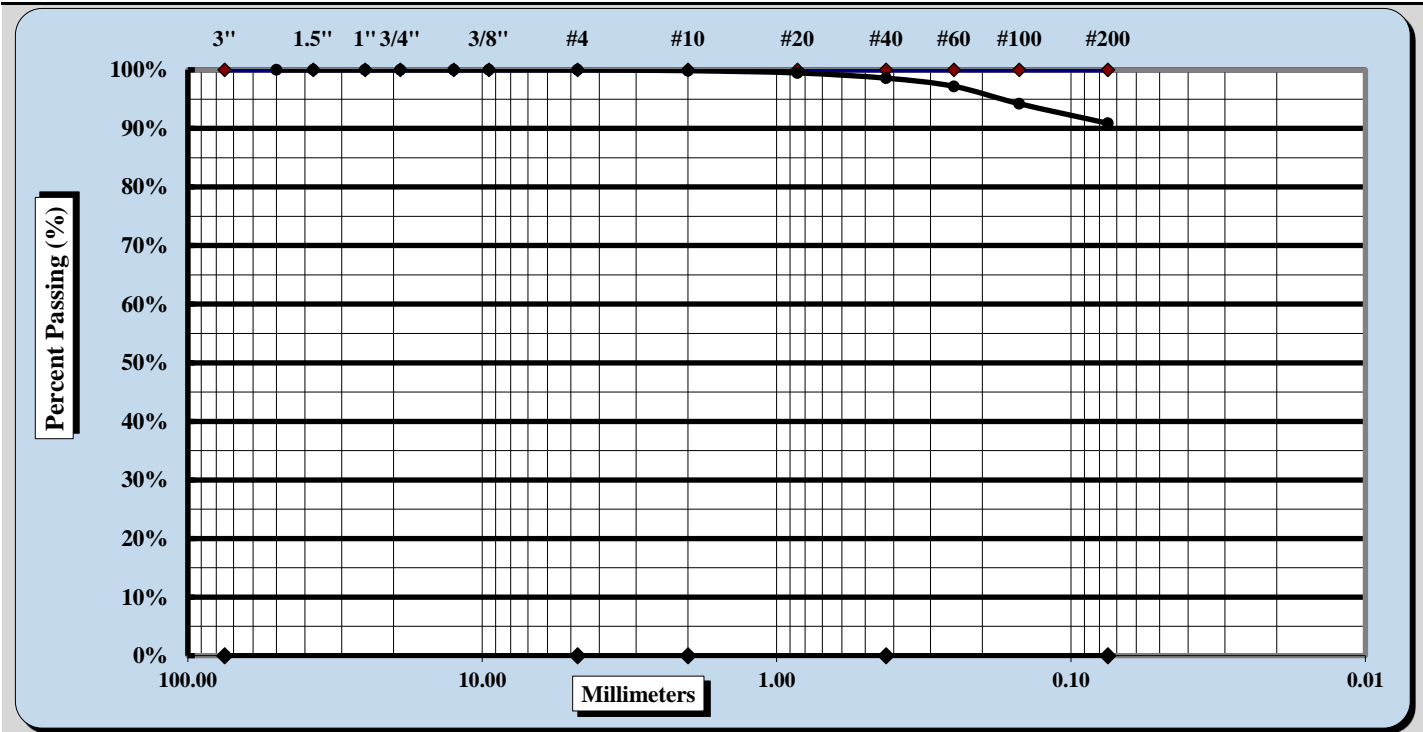


ASTM D 422

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1461-16-047.2B	Report Date:	6/1/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/18-25/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Avenue, North Charleston, SC 29405		
Sample Id.	W-23UD	Type:	Undisturbed
		Sample Date:	Various
Location:	UD Borings	Sample:	UD-2
		Elevation:	8.5-10

Sample Description: Brown Gray Clay (CH)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#10	Coarse Sand	0.1%	Fine Sand	7.7%
Gravel	0.0%	Medium Sand	1.3%	Silt & Clay	90.9%
Liquid Limit	59	Plastic Limit	24	Plastic Index	35
Specific Gravity	ND			Moisture Content	Various
Coarse Sand	0.1%	Medium Sand	1.3%	Fine Sand	7.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND: Not Determined

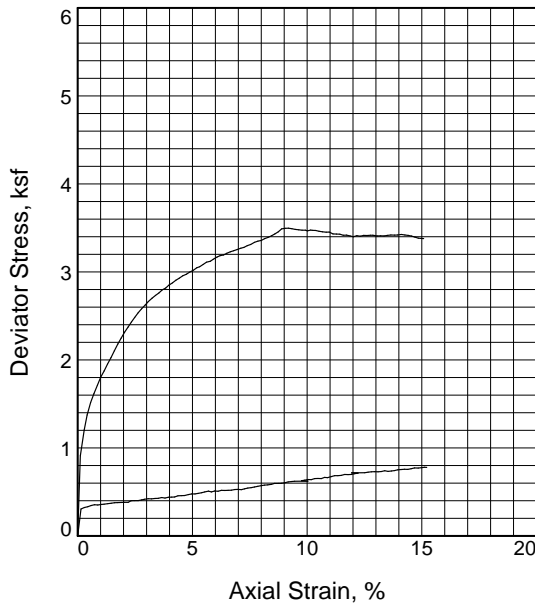
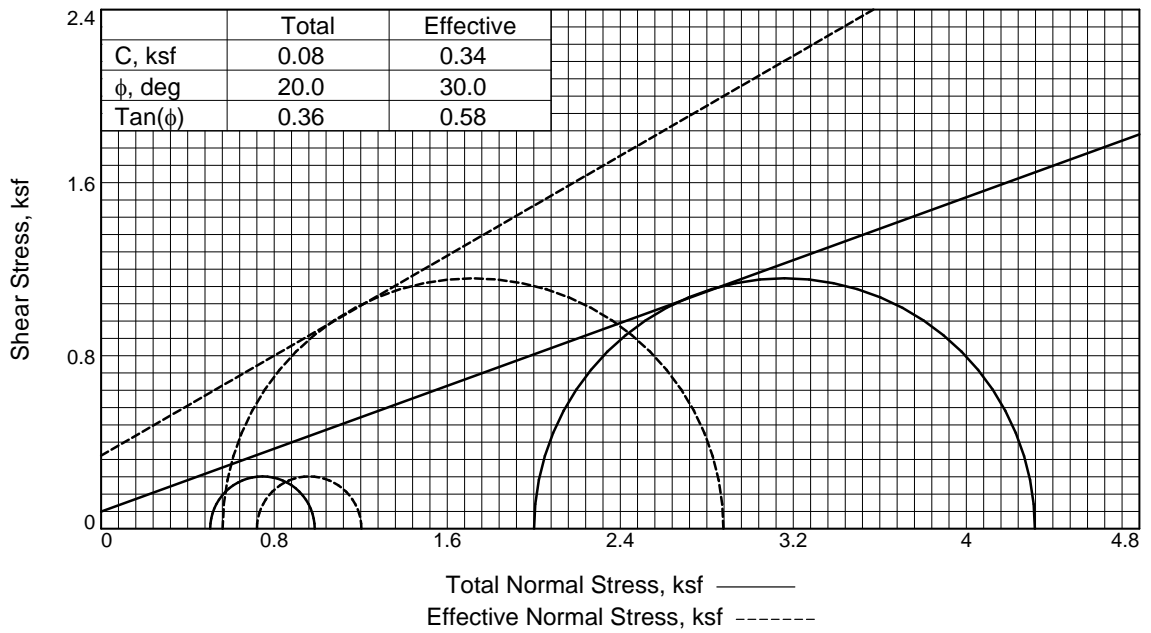
Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

7/8/2018
Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Sample No.	1	2	
Initial	Water Content, %	25.0	25.0
	Dry Density, pcf	84.3	96.2
	Saturation, %	68.8	92.1
	Void Ratio	0.9634	0.7194
	Diameter, in.	2.857	2.854
	Height, in.	6.362	6.180
At Test	Water Content, %	30.1	23.8
	Dry Density, pcf	92.0	101.4
	Saturation, %	100.0	100.0
	Void Ratio	0.7972	0.6320
	Diameter, in.	2.774	2.805
	Height, in.	6.179	6.074
Strain rate, in./min.	0.009	0.009	
Eff. Cell Pressure, ksf	0.50	2.00	
Fail. Stress, ksf	0.48	2.32	
Total Pore Pr., ksf	8.42	10.08	
Strain, %	5.2	2.0	
Ult. Stress, ksf	0.78	3.38	
Total Pore Pr., ksf	8.32	9.00	
Strain, %	15.2	15.1	
$\bar{\sigma}_1$ Failure, ksf	1.20	2.88	
$\bar{\sigma}_3$ Failure, ksf	0.72	0.56	

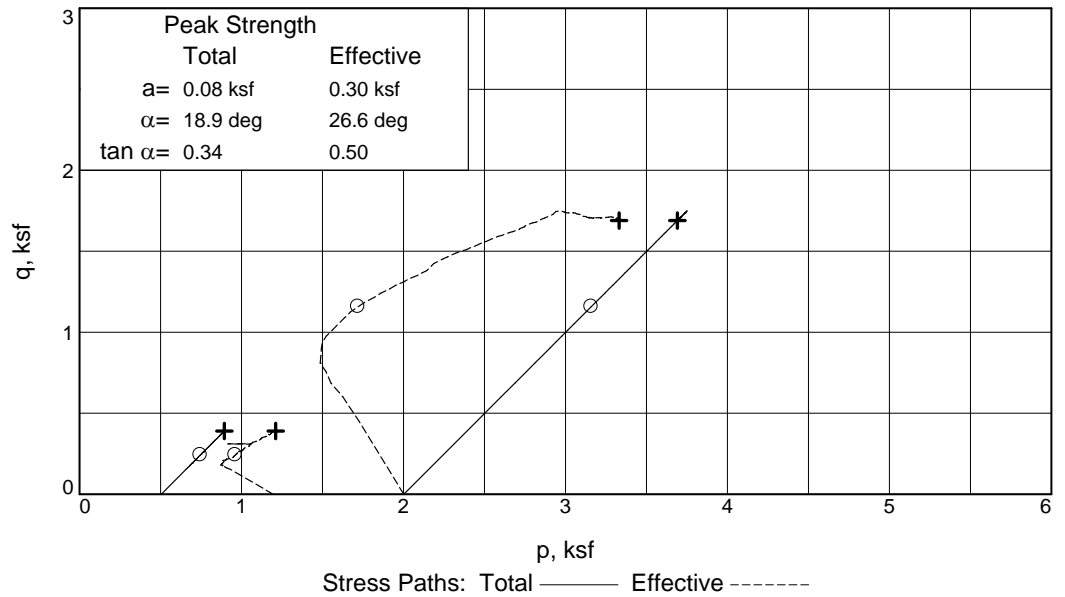
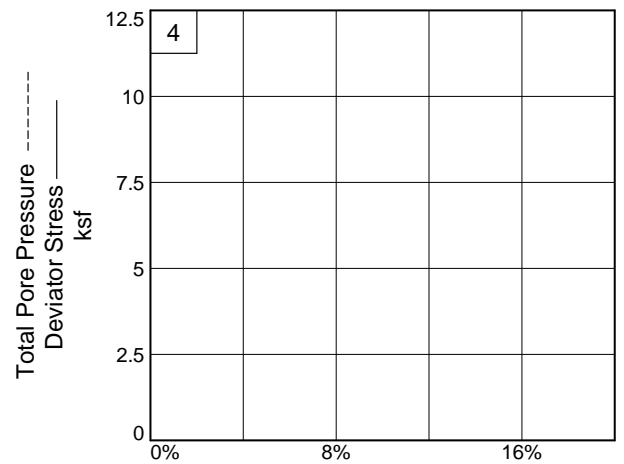
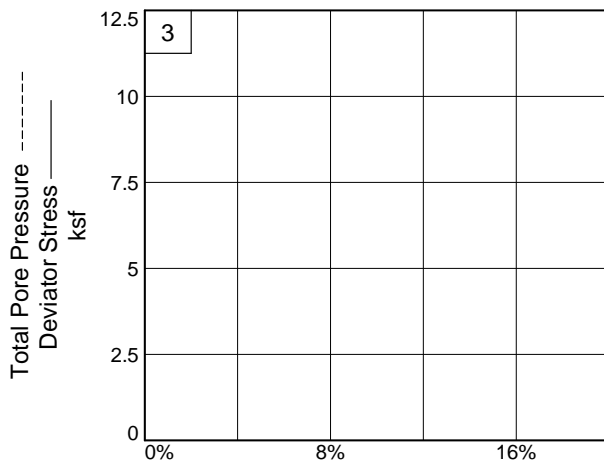
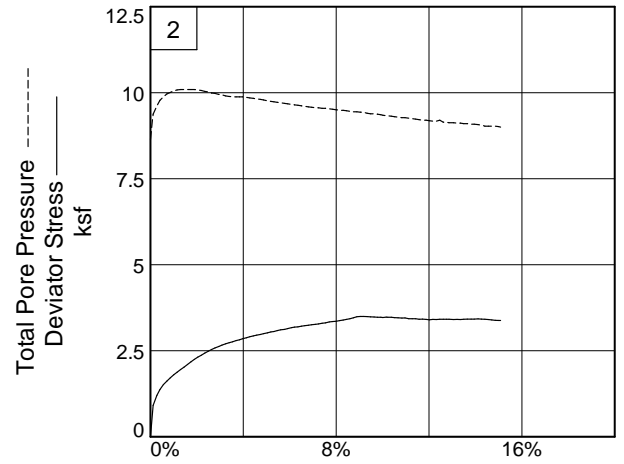
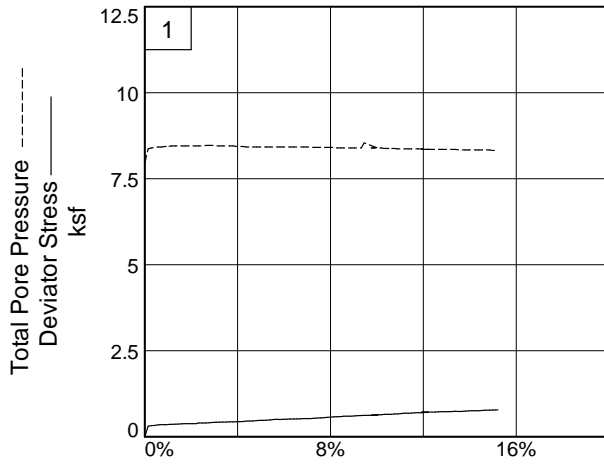
Type of Test: CU with Pore Pressures
Sample Type: Undisturbed
Description: Brown Gray Clay (CH)
LL= 59 PL= 24 PI= 35
Assumed Specific Gravity= 2.65
Remarks: Only 2 specimens suitable for testing. Specimen S-1 failed in bulge, S-2 Specimen failed in shear (ASTM 4767).

Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Location: UD Borings
Sample Number: W-23UD UD-2 **Depth:** 8.5-10.5
Proj. No.: 1461-16-047.2B **Date Sampled:** Various
TRIAXIAL SHEAR TEST REPORT
S & ME, INC.
Charlotte, North Carolina

Tested By: Karen Warner

Checked By: Jason Reeves

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Client: HDR Engineering, Inc.

Project: Carolina Crossroads Project

Location: UD Borings **Depth:** 8.5-10.5

Sample Number: W-23UD UD-2

Project No.: 1461-16-047.2B

Figure W-23UD UD-2

S & ME, INC.

Tested By: Karen Warner

Checked By: Jason Reeves

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0100	18.100	0.0	0.0	0.00	1.20	1.20	1.00	55.20	1.20	0.00
1	0.0190	31.000	12.9	0.1	0.31	0.78	1.08	1.39	58.10	0.93	0.15
2	0.0280	31.700	13.6	0.3	0.32	0.75	1.07	1.43	58.30	0.91	0.16
3	0.0370	32.100	14.0	0.4	0.33	0.73	1.07	1.45	58.40	0.90	0.17
4	0.0460	32.700	14.6	0.6	0.35	0.72	1.07	1.48	58.50	0.89	0.17
5	0.0550	33.100	15.0	0.7	0.35	0.72	1.07	1.49	58.50	0.90	0.18
6	0.0640	33.000	14.9	0.9	0.35	0.71	1.06	1.50	58.60	0.88	0.18
7	0.0730	33.300	15.2	1.0	0.36	0.71	1.06	1.51	58.60	0.88	0.18
8	0.0810	33.400	15.3	1.1	0.36	0.69	1.05	1.52	58.70	0.87	0.18
9	0.0910	33.700	15.6	1.3	0.37	0.69	1.06	1.53	58.70	0.87	0.18
10	0.1000	33.900	15.8	1.5	0.37	0.69	1.06	1.54	58.70	0.88	0.19
11	0.1090	34.200	16.1	1.6	0.38	0.69	1.07	1.55	58.70	0.88	0.19
12	0.1180	34.300	16.2	1.7	0.38	0.69	1.07	1.55	58.70	0.88	0.19
13	0.1270	34.400	16.3	1.9	0.38	0.69	1.07	1.55	58.70	0.88	0.19
14	0.1360	34.500	16.4	2.0	0.38	0.69	1.07	1.55	58.70	0.88	0.19
15	0.1460	34.500	16.4	2.2	0.38	0.69	1.07	1.55	58.70	0.88	0.19
16	0.1540	35.300	17.2	2.3	0.40	0.69	1.09	1.58	58.70	0.89	0.20
17	0.1640	35.400	17.3	2.5	0.40	0.69	1.09	1.58	58.70	0.89	0.20
18	0.1730	35.400	17.3	2.6	0.40	0.68	1.08	1.59	58.80	0.88	0.20
19	0.1820	35.800	17.7	2.8	0.41	0.68	1.09	1.61	58.80	0.88	0.21
20	0.1900	36.100	18.0	2.9	0.42	0.68	1.09	1.62	58.80	0.89	0.21
21	0.2000	36.400	18.3	3.1	0.42	0.69	1.11	1.61	58.70	0.90	0.21
22	0.2090	36.400	18.3	3.2	0.42	0.69	1.11	1.61	58.70	0.90	0.21
23	0.2180	36.600	18.5	3.4	0.43	0.69	1.12	1.62	58.70	0.90	0.21
24	0.2270	36.700	18.6	3.5	0.43	0.69	1.12	1.62	58.70	0.91	0.21
25	0.2360	37.100	19.0	3.7	0.44	0.69	1.13	1.63	58.70	0.91	0.22
26	0.2450	36.900	18.8	3.8	0.43	0.69	1.12	1.62	58.70	0.91	0.22
27	0.2540	37.300	19.2	3.9	0.44	0.71	1.15	1.62	58.60	0.93	0.22
28	0.2630	37.400	19.3	4.1	0.44	0.71	1.15	1.63	58.60	0.93	0.22
29	0.2710	37.500	19.4	4.2	0.44	0.71	1.15	1.63	58.60	0.93	0.22
30	0.2800	38.100	20.0	4.4	0.46	0.72	1.18	1.63	58.50	0.95	0.23
31	0.2890	38.200	20.1	4.5	0.46	0.72	1.18	1.64	58.50	0.95	0.23
32	0.2980	38.300	20.2	4.7	0.46	0.72	1.18	1.64	58.50	0.95	0.23
33	0.3080	38.800	20.7	4.8	0.47	0.72	1.19	1.65	58.50	0.95	0.23
34	0.3170	39.200	21.1	5.0	0.48	0.72	1.20	1.66	58.50	0.96	0.24
35	0.3260	39.200	21.1	5.1	0.48	0.72	1.20	1.66	58.50	0.96	0.24
36	0.3340	39.500	21.4	5.2	0.48	0.72	1.20	1.67	58.50	0.96	0.24
37	0.3440	39.900	21.8	5.4	0.49	0.72	1.21	1.68	58.50	0.97	0.25
38	0.3520	40.300	22.2	5.5	0.50	0.72	1.22	1.69	58.50	0.97	0.25
39	0.3620	40.800	22.7	5.7	0.51	0.72	1.23	1.71	58.50	0.98	0.26
40	0.3700	40.400	22.3	5.8	0.50	0.72	1.22	1.70	58.50	0.97	0.25
41	0.3790	40.900	22.8	6.0	0.51	0.72	1.23	1.71	58.50	0.98	0.26
42	0.3880	40.800	22.7	6.1	0.51	0.72	1.23	1.71	58.50	0.97	0.25
43	0.3970	41.300	23.2	6.3	0.52	0.72	1.24	1.72	58.50	0.98	0.26
44	0.4060	41.300	23.2	6.4	0.52	0.72	1.24	1.72	58.50	0.98	0.26
45	0.4150	41.400	23.3	6.6	0.52	0.72	1.24	1.72	58.50	0.98	0.26
46	0.4240	41.500	23.4	6.7	0.52	0.72	1.24	1.72	58.50	0.98	0.26

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
47	0.4330	41.900	23.8	6.8	0.53	0.72	1.25	1.73	58.50	0.98	0.26
48	0.4410	42.000	23.9	7.0	0.53	0.72	1.25	1.74	58.50	0.98	0.26
49	0.4510	41.900	23.8	7.1	0.53	0.72	1.25	1.73	58.50	0.98	0.26
50	0.4590	42.300	24.2	7.3	0.53	0.73	1.27	1.73	58.40	1.00	0.27
51	0.4680	42.800	24.7	7.4	0.55	0.73	1.28	1.74	58.40	1.01	0.27
52	0.4770	43.000	24.9	7.6	0.55	0.73	1.28	1.75	58.40	1.01	0.27
53	0.4860	43.400	25.3	7.7	0.56	0.73	1.29	1.76	58.40	1.01	0.28
54	0.4950	43.800	25.7	7.8	0.56	0.73	1.30	1.77	58.40	1.02	0.28
55	0.5040	44.200	26.1	8.0	0.57	0.73	1.31	1.78	58.40	1.02	0.29
56	0.5130	44.500	26.4	8.1	0.58	0.73	1.31	1.79	58.40	1.02	0.29
57	0.5220	44.700	26.6	8.3	0.58	0.75	1.33	1.78	58.30	1.04	0.29
58	0.5320	45.000	26.9	8.4	0.59	0.75	1.34	1.78	58.30	1.04	0.29
59	0.5400	45.500	27.4	8.6	0.60	0.75	1.35	1.80	58.30	1.05	0.30
60	0.5500	45.600	27.5	8.7	0.60	0.75	1.35	1.80	58.30	1.05	0.30
61	0.5590	45.700	27.6	8.9	0.60	0.75	1.35	1.80	58.30	1.05	0.30
62	0.5680	46.000	27.9	9.0	0.60	0.75	1.35	1.81	58.30	1.05	0.30
63	0.5770	46.500	28.4	9.2	0.61	0.75	1.36	1.82	58.30	1.06	0.31
64	0.5860	46.700	28.6	9.3	0.62	0.75	1.37	1.83	58.30	1.06	0.31
65	0.5940	46.900	28.8	9.5	0.62	0.60	1.23	2.03	59.30	0.92	0.31
66	0.6300	47.200	29.1	10.0	0.62	0.75	1.37	1.83	58.30	1.06	0.31
67	0.6130	47.300	29.2	9.8	0.63	0.75	1.38	1.84	58.30	1.06	0.31
68	0.6210	47.600	29.5	9.9	0.63	0.75	1.38	1.85	58.30	1.07	0.32
69	0.6300	48.000	29.9	10.0	0.64	0.75	1.39	1.86	58.30	1.07	0.32
70	0.6390	48.000	29.9	10.2	0.64	0.75	1.39	1.85	58.30	1.07	0.32
71	0.6480	48.600	30.5	10.3	0.65	0.76	1.42	1.85	58.20	1.09	0.33
72	0.6570	48.700	30.6	10.5	0.65	0.76	1.42	1.86	58.20	1.09	0.33
73	0.6660	48.700	30.6	10.6	0.65	0.76	1.42	1.85	58.20	1.09	0.33
74	0.6750	49.400	31.3	10.8	0.67	0.76	1.43	1.87	58.20	1.10	0.33
75	0.6830	49.300	31.2	10.9	0.66	0.78	1.44	1.85	58.10	1.11	0.33
76	0.6930	49.900	31.8	11.1	0.67	0.78	1.45	1.87	58.10	1.11	0.34
77	0.7020	50.500	32.4	11.2	0.69	0.78	1.46	1.88	58.10	1.12	0.34
78	0.7110	50.500	32.4	11.3	0.68	0.78	1.46	1.88	58.10	1.12	0.34
79	0.7200	50.700	32.6	11.5	0.69	0.78	1.47	1.88	58.10	1.12	0.34
80	0.7290	51.300	33.2	11.6	0.70	0.78	1.48	1.90	58.10	1.13	0.35
81	0.7380	51.300	33.2	11.8	0.70	0.78	1.48	1.90	58.10	1.13	0.35
82	0.7470	51.400	33.3	11.9	0.70	0.78	1.48	1.90	58.10	1.13	0.35
83	0.7560	51.900	33.8	12.1	0.71	0.79	1.50	1.89	58.00	1.15	0.35
84	0.7650	52.200	34.1	12.2	0.71	0.79	1.51	1.90	58.00	1.15	0.36
85	0.7474	52.300	34.2	11.9	0.72	0.79	1.51	1.91	58.00	1.15	0.36
86	0.7830	52.600	34.5	12.5	0.72	0.79	1.51	1.91	58.00	1.15	0.36
87	0.7920	52.900	34.8	12.7	0.72	0.79	1.52	1.91	58.00	1.15	0.36
88	0.8010	53.200	35.1	12.8	0.73	0.79	1.52	1.92	58.00	1.16	0.36
89	0.8100	53.300	35.2	12.9	0.73	0.79	1.52	1.92	58.00	1.16	0.37
90	0.8190	53.300	35.2	13.1	0.73	0.79	1.52	1.92	58.00	1.16	0.36
91	0.8280	53.500	35.4	13.2	0.73	0.79	1.52	1.92	58.00	1.16	0.37
92	0.8370	54.000	35.9	13.4	0.74	0.79	1.53	1.94	58.00	1.16	0.37
93	0.8460	53.700	35.6	13.5	0.73	0.81	1.54	1.91	57.90	1.17	0.37

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
94	0.8550	54.000	35.9	13.7	0.74	0.81	1.55	1.92	57.90	1.18	0.37
95	0.8630	54.300	36.2	13.8	0.74	0.81	1.55	1.92	57.90	1.18	0.37
96	0.8720	54.800	36.7	14.0	0.75	0.81	1.56	1.93	57.90	1.18	0.38
97	0.8810	55.000	36.9	14.1	0.76	0.81	1.56	1.94	57.90	1.18	0.38
98	0.8900	55.200	37.1	14.2	0.76	0.81	1.56	1.94	57.90	1.19	0.38
99	0.8990	55.200	37.1	14.4	0.76	0.81	1.56	1.94	57.90	1.18	0.38
100	0.9080	55.600	37.5	14.5	0.76	0.81	1.57	1.95	57.90	1.19	0.38
101	0.9170	56.100	38.0	14.7	0.77	0.81	1.58	1.96	57.90	1.19	0.39
102	0.9270	56.100	38.0	14.8	0.77	0.81	1.58	1.96	57.90	1.19	0.39
103	0.9360	56.400	38.3	15.0	0.78	0.82	1.60	1.95	57.80	1.21	0.39
104	0.9440	56.700	38.6	15.1	0.78	0.82	1.60	1.95	57.80	1.21	0.39
105	0.9500	56.700	38.6	15.2	0.78	0.82	1.60	1.95	57.80	1.21	0.39

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	243.730			n/a
Moisture content: Dry soil+tare, gms.	211.340			n/a
Moisture content: Tare, gms.	81.830			n/a
Moisture, %	25.0	26.7	23.8	
Moist specimen weight, gms.	1248.21			
Diameter, in.	2.854	2.848	2.805	
Area, in. ²	6.397	6.370	6.178	
Height, in.	6.180	6.167	6.074	
Net decrease in height, in.		0.013	0.093	
Wet density, pcf	120.3	122.7	125.5	
Dry density, pcf	96.2	96.8	101.4	
Void ratio	0.7194	0.7086	0.6320	
Saturation, %	92.1	100.0	100.0	

Test Readings for Specimen No. 2

Consolidation cell pressure = 73.90 psi (10.64 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 2.00 ksf
Strain rate, in./min. = 0.009
Fail. Stress = 2.32 ksf at reading no. 14
Ult. Stress = 3.38 ksf at reading no. 103

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0190	15.500	0.0	0.0	0.00	2.00	2.00	1.00	60.00	2.00	0.00
1	0.0260	54.600	39.1	0.1	0.91	1.27	2.18	1.72	65.10	1.72	0.46
2	0.0360	67.300	51.8	0.3	1.20	1.02	2.23	2.18	66.80	1.62	0.60
3	0.0440	74.700	59.2	0.4	1.37	0.86	2.24	2.59	67.90	1.55	0.69
4	0.0530	80.900	65.4	0.6	1.52	0.76	2.28	2.99	68.60	1.52	0.76
5	0.0620	85.400	69.9	0.7	1.62	0.68	2.29	3.39	69.20	1.49	0.81
6	0.0710	89.600	74.1	0.9	1.71	0.63	2.35	3.70	69.50	1.49	0.86
7	0.0800	93.700	78.2	1.0	1.80	0.59	2.39	4.06	69.80	1.49	0.90
8	0.0890	96.900	81.4	1.2	1.88	0.56	2.44	4.34	70.00	1.50	0.94
9	0.0980	100.400	84.9	1.3	1.95	0.55	2.50	4.57	70.10	1.52	0.98

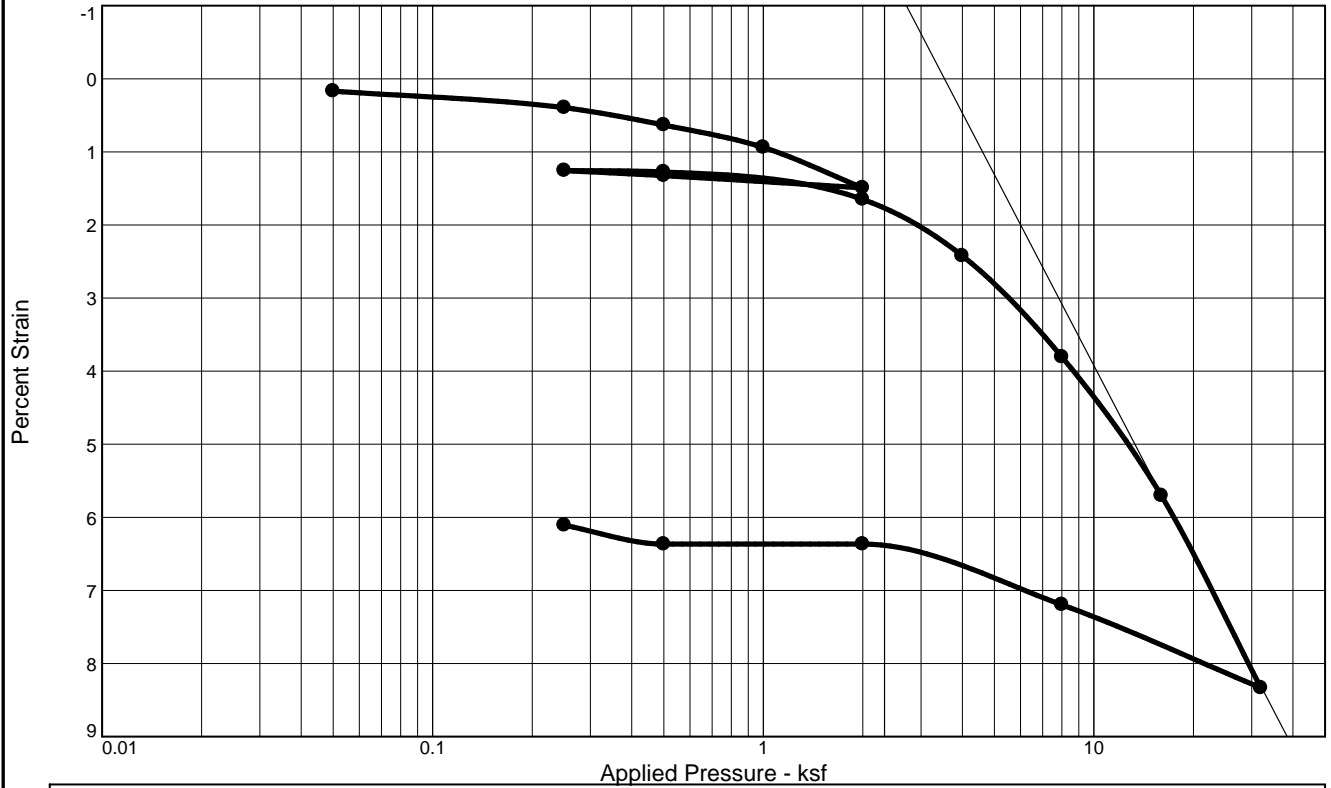
Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
10	0.1070	103.700	88.2	1.4	2.03	0.55	2.57	4.70	70.10	1.56	1.01
11	0.1160	107.200	91.7	1.6	2.10	0.55	2.65	4.84	70.10	1.60	1.05
12	0.1250	110.700	95.2	1.7	2.18	0.55	2.73	4.98	70.10	1.64	1.09
13	0.1340	113.800	98.3	1.9	2.25	0.55	2.80	5.11	70.10	1.67	1.12
14	0.1430	116.900	101.4	2.0	2.32	0.56	2.88	5.12	70.00	1.72	1.16
15	0.1520	119.500	104.0	2.2	2.37	0.58	2.95	5.12	69.90	1.76	1.19
16	0.1610	122.300	106.8	2.3	2.43	0.60	3.04	5.02	69.70	1.82	1.22
17	0.1700	124.800	109.3	2.5	2.48	0.62	3.10	5.01	69.60	1.86	1.24
18	0.1790	127.300	111.8	2.6	2.54	0.65	3.19	4.92	69.40	1.92	1.27
19	0.1880	129.400	113.9	2.8	2.58	0.66	3.24	4.90	69.30	1.95	1.29
20	0.1980	131.500	116.0	2.9	2.62	0.69	3.32	4.80	69.10	2.00	1.31
21	0.2060	133.400	117.9	3.1	2.66	0.71	3.37	4.77	69.00	2.04	1.33
22	0.2160	135.300	119.8	3.2	2.70	0.73	3.44	4.68	68.80	2.09	1.35
23	0.2250	136.900	121.4	3.4	2.73	0.75	3.48	4.65	68.70	2.12	1.37
24	0.2340	138.300	122.8	3.5	2.76	0.76	3.52	4.62	68.60	2.14	1.38
25	0.2430	140.100	124.6	3.7	2.80	0.76	3.56	4.67	68.60	2.16	1.40
26	0.2520	141.200	125.7	3.8	2.82	0.76	3.58	4.69	68.60	2.17	1.41
27	0.2600	142.800	127.3	4.0	2.85	0.76	3.61	4.73	68.60	2.19	1.42
28	0.2700	144.200	128.7	4.1	2.88	0.78	3.65	4.70	68.50	2.22	1.44
29	0.2790	145.800	130.3	4.3	2.91	0.79	3.70	4.67	68.40	2.25	1.45
30	0.2880	147.000	131.5	4.4	2.93	0.81	3.74	4.63	68.30	2.27	1.46
31	0.2970	148.400	132.9	4.6	2.96	0.82	3.78	4.60	68.20	2.30	1.48
32	0.3070	149.500	134.0	4.7	2.98	0.84	3.81	4.56	68.10	2.32	1.49
33	0.3150	150.700	135.2	4.9	3.00	0.85	3.85	4.53	68.00	2.35	1.50
34	0.3250	151.900	136.4	5.0	3.02	0.88	3.90	4.44	67.80	2.39	1.51
35	0.3340	153.400	137.9	5.2	3.05	0.89	3.94	4.41	67.70	2.42	1.52
36	0.3420	154.100	138.6	5.3	3.06	0.91	3.97	4.37	67.60	2.44	1.53
37	0.3510	155.500	140.0	5.5	3.08	0.92	4.01	4.35	67.50	2.46	1.54
38	0.3600	156.900	141.4	5.6	3.11	0.94	4.05	4.32	67.40	2.49	1.56
39	0.3700	157.600	142.1	5.8	3.12	0.95	4.07	4.28	67.30	2.51	1.56
40	0.3780	158.900	143.4	5.9	3.14	0.96	4.11	4.26	67.20	2.54	1.57
41	0.3880	160.300	144.8	6.1	3.17	0.98	4.15	4.24	67.10	2.56	1.59
42	0.3960	161.200	145.7	6.2	3.19	0.99	4.18	4.21	67.00	2.59	1.59
43	0.4050	161.800	146.3	6.4	3.19	1.01	4.20	4.17	66.90	2.60	1.60
44	0.4140	162.900	147.4	6.5	3.21	1.02	4.23	4.14	66.80	2.63	1.61
45	0.4230	163.900	148.4	6.7	3.23	1.04	4.27	4.11	66.70	2.65	1.61
46	0.4320	164.700	149.2	6.8	3.24	1.05	4.29	4.08	66.60	2.67	1.62
47	0.4410	165.600	150.1	6.9	3.26	1.07	4.32	4.06	66.50	2.69	1.63
48	0.4510	166.500	151.0	7.1	3.27	1.08	4.35	4.03	66.40	2.71	1.63
49	0.4590	167.200	151.7	7.2	3.28	1.08	4.36	4.04	66.40	2.72	1.64
50	0.4680	168.300	152.8	7.4	3.30	1.09	4.39	4.01	66.30	2.74	1.65
51	0.4770	169.200	153.7	7.5	3.31	1.09	4.41	4.03	66.30	2.75	1.66
52	0.4870	170.600	155.1	7.7	3.34	1.11	4.45	4.01	66.20	2.78	1.67
53	0.4960	171.500	156.0	7.9	3.35	1.12	4.47	3.98	66.10	2.80	1.68
54	0.5050	172.100	156.6	8.0	3.36	1.14	4.50	3.95	66.00	2.82	1.68
55	0.5140	173.300	157.8	8.1	3.38	1.15	4.53	3.93	65.90	2.84	1.69
56	0.5230	174.200	158.7	8.3	3.39	1.15	4.54	3.94	65.90	2.85	1.70

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
57	0.5320	175.300	159.8	8.4	3.41	1.17	4.58	3.92	65.80	2.87	1.71
58	0.5410	176.600	161.1	8.6	3.43	1.18	4.61	3.91	65.70	2.90	1.72
59	0.5500	178.000	162.5	8.7	3.46	1.20	4.65	3.89	65.60	2.92	1.73
60	0.5590	179.800	164.3	8.9	3.49	1.20	4.68	3.92	65.60	2.94	1.74
61	0.5680	180.400	164.9	9.0	3.50	1.21	4.71	3.89	65.50	2.96	1.75
62	0.5770	180.700	165.2	9.2	3.50	1.21	4.71	3.89	65.50	2.96	1.75
63	0.5860	180.700	165.2	9.3	3.49	1.24	4.73	3.82	65.30	2.98	1.75
64	0.5950	180.600	165.1	9.5	3.48	1.25	4.74	3.78	65.20	2.99	1.74
65	0.6040	180.700	165.2	9.6	3.48	1.25	4.73	3.78	65.20	2.99	1.74
66	0.6130	180.700	165.2	9.8	3.47	1.27	4.74	3.74	65.10	3.00	1.74
67	0.6220	181.000	165.5	9.9	3.47	1.28	4.76	3.71	65.00	3.02	1.74
68	0.6270	180.800	165.3	10.0	3.47	1.30	4.76	3.68	64.90	3.03	1.73
69	0.6360	181.500	166.0	10.2	3.48	1.31	4.79	3.65	64.80	3.05	1.74
70	0.6400	181.500	166.0	10.2	3.47	1.31	4.78	3.65	64.80	3.05	1.74
71	0.6490	181.700	166.2	10.4	3.47	1.32	4.80	3.62	64.70	3.06	1.74
72	0.6580	181.500	166.0	10.5	3.46	1.34	4.80	3.59	64.60	3.07	1.73
73	0.6670	181.500	166.0	10.7	3.46	1.35	4.81	3.55	64.50	3.08	1.73
74	0.6770	181.600	166.1	10.8	3.45	1.37	4.82	3.52	64.40	3.09	1.73
75	0.6850	181.900	166.4	11.0	3.45	1.37	4.82	3.52	64.40	3.09	1.73
76	0.6950	181.200	165.7	11.1	3.43	1.38	4.81	3.48	64.30	3.10	1.72
77	0.7040	181.400	165.9	11.3	3.43	1.40	4.83	3.46	64.20	3.11	1.72
78	0.7130	181.600	166.1	11.4	3.43	1.41	4.84	3.43	64.10	3.13	1.71
79	0.7220	181.300	165.8	11.6	3.42	1.43	4.84	3.40	64.00	3.13	1.71
80	0.7310	181.600	166.1	11.7	3.42	1.44	4.86	3.37	63.90	3.15	1.71
81	0.7400	181.500	166.0	11.9	3.41	1.44	4.85	3.37	63.90	3.15	1.71
82	0.7490	181.300	165.8	12.0	3.40	1.45	4.85	3.34	63.80	3.15	1.70
83	0.7580	182.200	166.7	12.2	3.41	1.47	4.88	3.32	63.70	3.18	1.71
84	0.7670	182.200	166.7	12.3	3.41	1.47	4.88	3.32	63.70	3.17	1.70
85	0.7760	182.900	167.4	12.5	3.42	1.44	4.86	3.37	63.90	3.15	1.71
86	0.7850	183.100	167.6	12.6	3.41	1.50	4.91	3.28	63.50	3.20	1.71
87	0.7940	183.500	168.0	12.8	3.42	1.50	4.91	3.28	63.50	3.21	1.71
88	0.8003	183.700	168.2	12.9	3.42	1.51	4.93	3.26	63.40	3.22	1.71
89	0.8120	183.700	168.2	13.1	3.41	1.51	4.92	3.25	63.40	3.22	1.70
90	0.8210	184.100	168.6	13.2	3.41	1.53	4.94	3.23	63.30	3.23	1.71
91	0.8300	184.300	168.8	13.4	3.41	1.53	4.94	3.23	63.30	3.23	1.70
92	0.8390	184.900	169.4	13.5	3.42	1.54	4.96	3.22	63.20	3.25	1.71
93	0.8480	185.400	169.9	13.6	3.42	1.54	4.96	3.22	63.20	3.25	1.71
94	0.8580	185.700	170.2	13.8	3.42	1.56	4.97	3.20	63.10	3.26	1.71
95	0.8660	186.000	170.5	13.9	3.42	1.56	4.98	3.20	63.10	3.27	1.71
96	0.8760	186.600	171.1	14.1	3.43	1.57	5.00	3.18	63.00	3.28	1.71
97	0.8850	186.600	171.1	14.3	3.42	1.58	5.00	3.16	62.90	3.29	1.71
98	0.8940	186.700	171.2	14.4	3.42	1.61	5.03	3.12	62.70	3.32	1.71
99	0.9030	186.600	171.1	14.6	3.41	1.61	5.02	3.11	62.70	3.32	1.70
100	0.9120	186.300	170.8	14.7	3.40	1.61	5.01	3.11	62.70	3.31	1.70
101	0.9210	186.000	170.5	14.9	3.38	1.61	5.00	3.10	62.70	3.30	1.69
102	0.9300	186.100	170.6	15.0	3.38	1.63	5.01	3.08	62.60	3.32	1.69
103	0.9350	186.200	170.7	15.1	3.38	1.64	5.02	3.06	62.50	3.33	1.69

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (ksf)	C _v (ft.2/day)	C _α	No.	Load (ksf)	C _v (ft.2/day)	C _α	No.	Load (ksf)	C _v (ft.2/day)	C _α
1	0.05	1.833		9	2.00	6.245		17	0.25	1.363	
3	0.50	1.599		10	4.00	22.622					
4	1.00	14.756		11	8.00	11.809					
5	2.00	12.743		12	16.00	10.330					
6	0.50	16.286		13	32.00	12.406					
7	0.25	0.774		14	8.00	11.094					
8	0.50	13.246		16	0.50	1.421					

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	e ₀	Swell Press. (ksf)	Swell %	C _r
Sat.	Moist.									
90.5 %	25.0 %	95.6	59	35	2.70		0.746			0.02

MATERIAL DESCRIPTION	USCS	AASHTO
Brown Gray Clay (CH)	CH	

<p>Project No. 1461-16- Client: HDR Engineering, Inc. Project: Carolina Crossroads Project</p> <p>Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2</p> <p style="text-align: center;">S & ME, INC.</p> <p style="text-align: center;">Charlotte, North Carolina</p>	<p>Remarks: Tested Unsaturated</p>
--	---

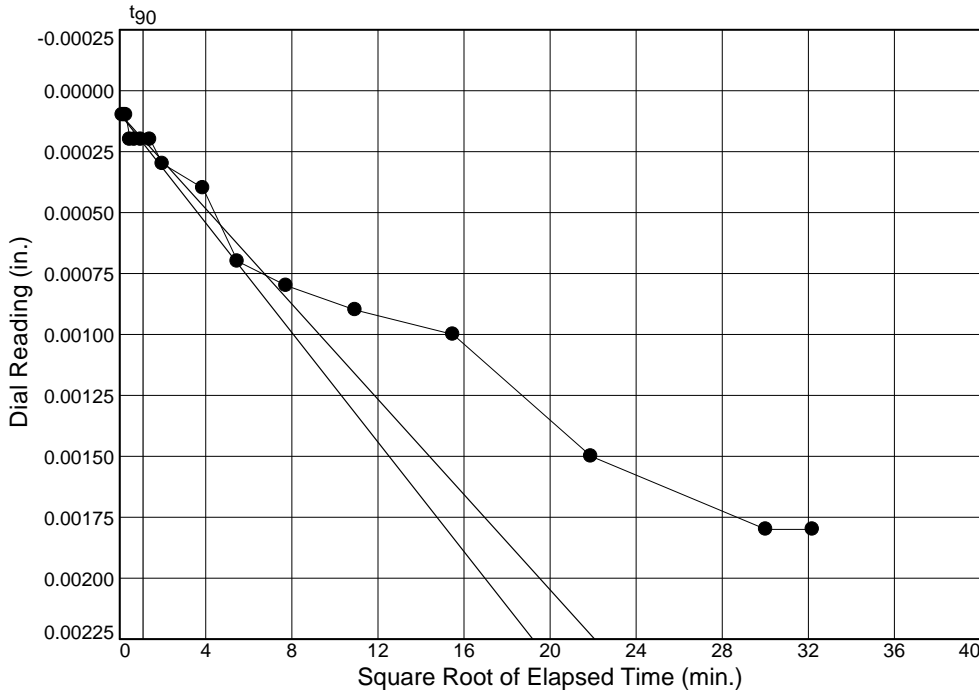
Figure W-23 UD-

Tested By: Karen Warner **Checked By:** Jason Reeves

Dial Reading vs. Time

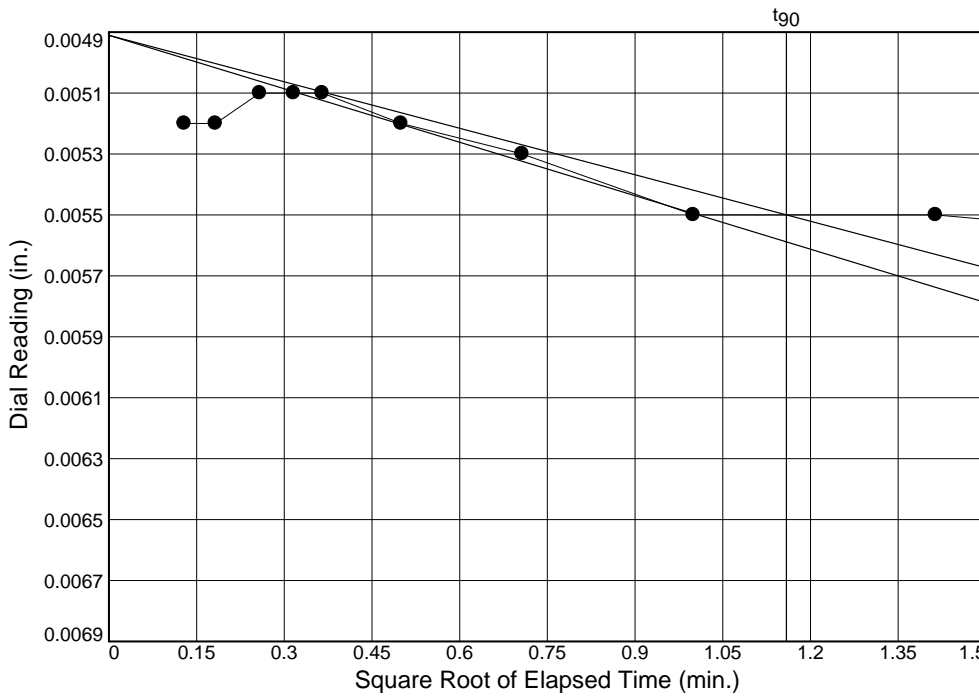
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Load No.= 1
 Load= 0.05 ksf
 $D_0 = 0.0001$
 $D_{90} = 0.0002$
 $D_{100} = 0.0002$
 $T_{90} = 1.18 \text{ min.}$

$C_v @ T_{90}$
 1.833 ft.²/day



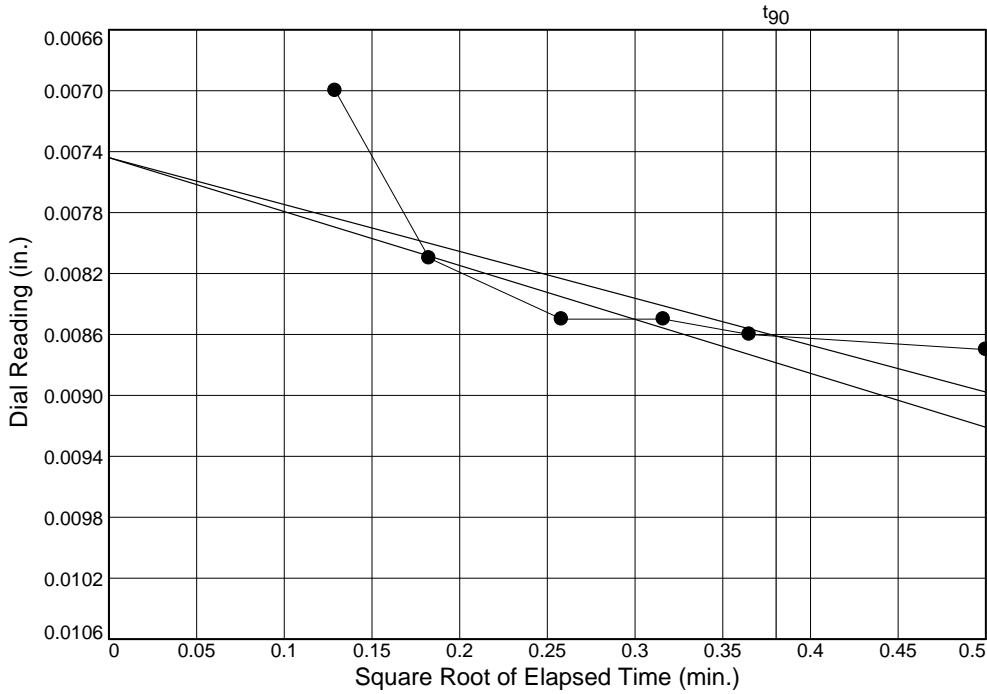
Load No.= 3
 Load= 0.50 ksf
 $D_0 = 0.0049$
 $D_{90} = 0.0055$
 $D_{100} = 0.0056$
 $T_{90} = 1.34 \text{ min.}$

$C_v @ T_{90}$
 1.599 ft.²/day

Dial Reading vs. Time

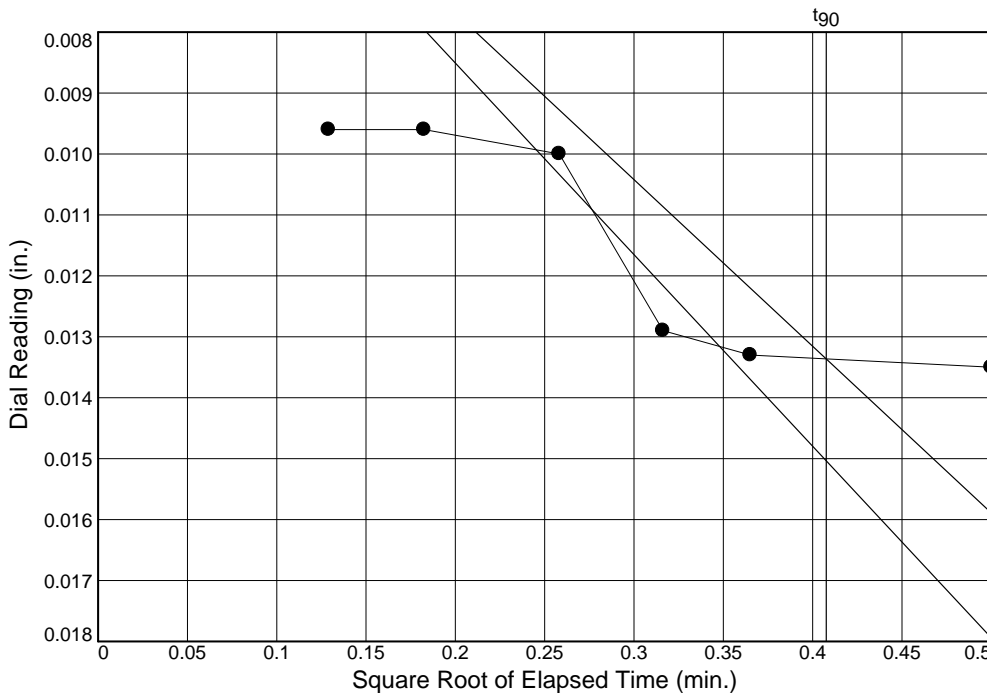
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Load No.= 4
 Load= 1.00 ksf
 $D_0 = 0.0074$
 $D_{90} = 0.0086$
 $D_{100} = 0.0087$
 $T_{90} = 0.14$ min.

$C_v @ T_{90}$
 14.756 ft.²/day



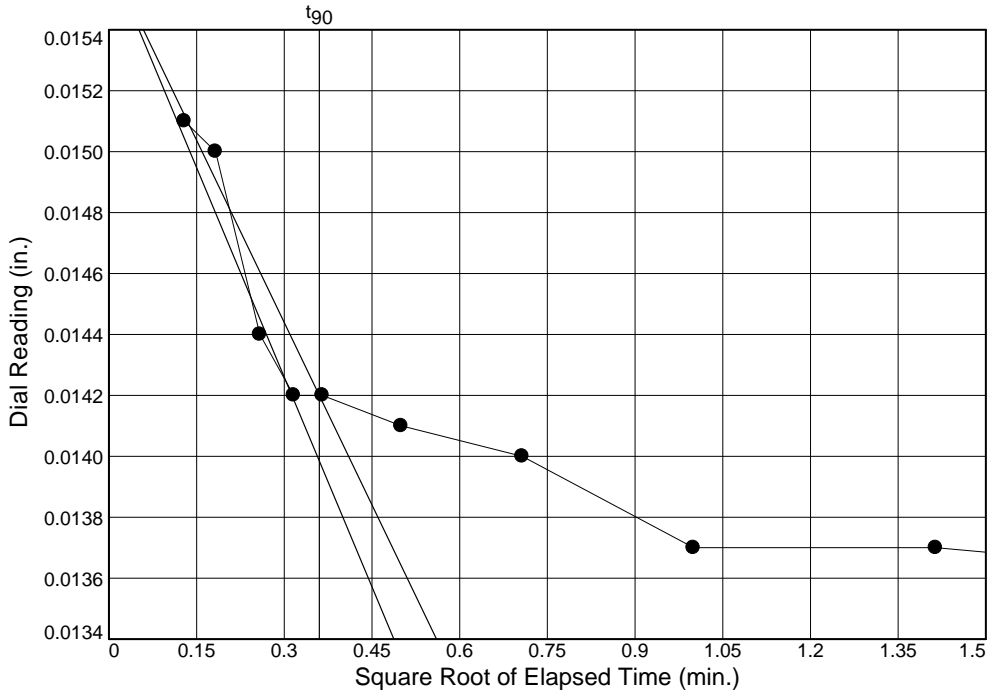
Load No.= 5
 Load= 2.00 ksf
 $D_0 = 0.0022$
 $D_{90} = 0.0134$
 $D_{100} = 0.0146$
 $T_{90} = 0.17$ min.

$C_v @ T_{90}$
 12.743 ft.²/day

Dial Reading vs. Time

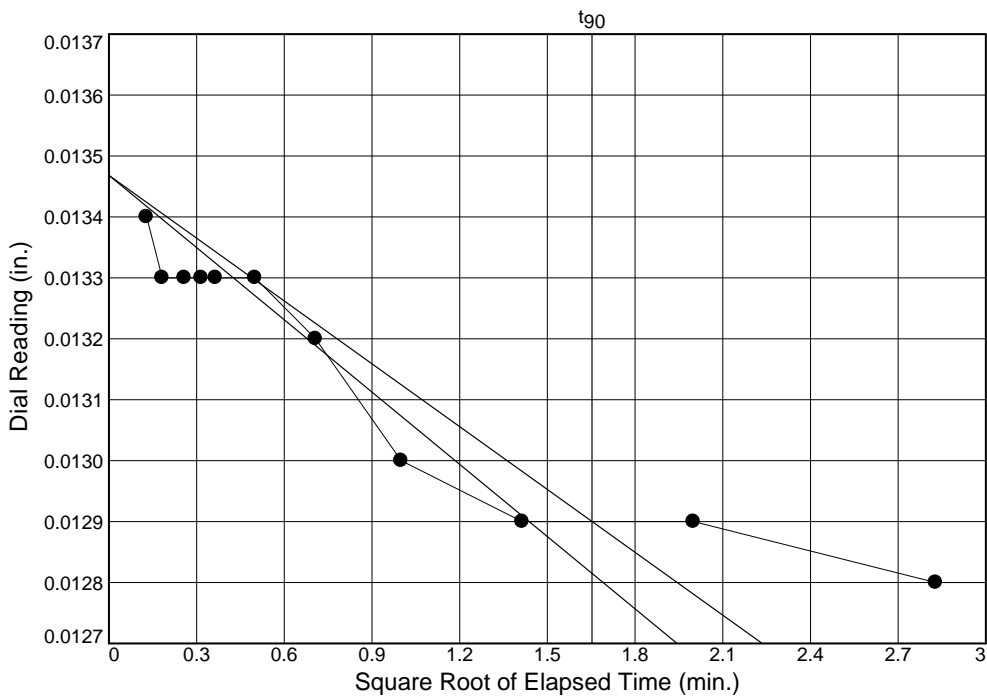
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Load No.= 6
 Load= 0.50 ksf
 $D_0 = 0.0156$
 $D_{90} = 0.0142$
 $D_{100} = 0.0140$
 $T_{90} = 0.13 \text{ min.}$

$C_v @ T_{90}$
 16.286 ft.²/day



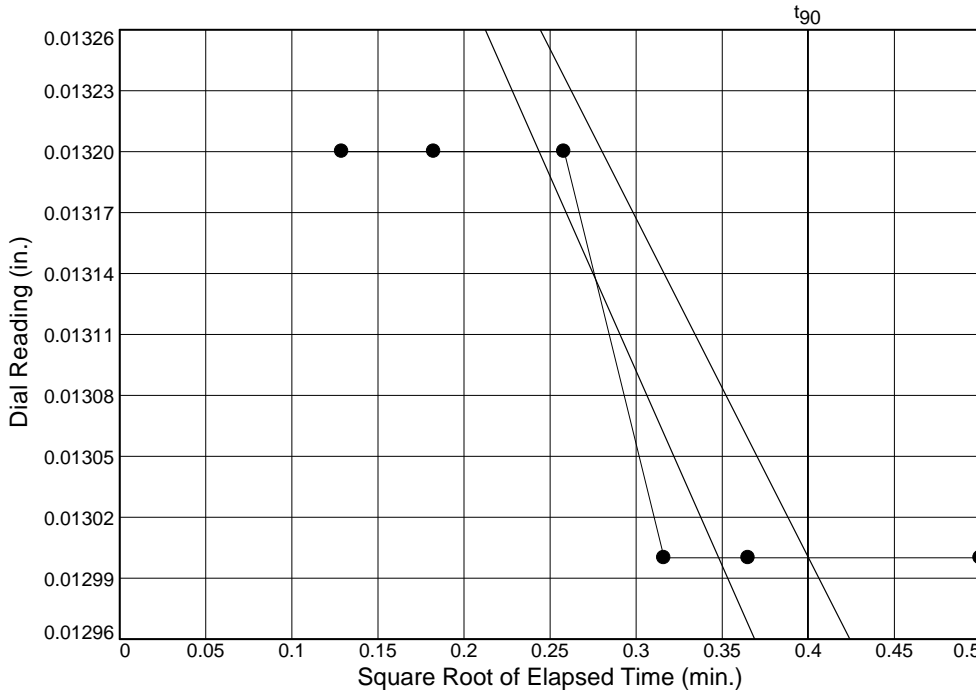
Load No.= 7
 Load= 0.25 ksf
 $D_0 = 0.0135$
 $D_{90} = 0.0129$
 $D_{100} = 0.0128$
 $T_{90} = 2.73 \text{ min.}$

$C_v @ T_{90}$
 0.774 ft.²/day

Dial Reading vs. Time

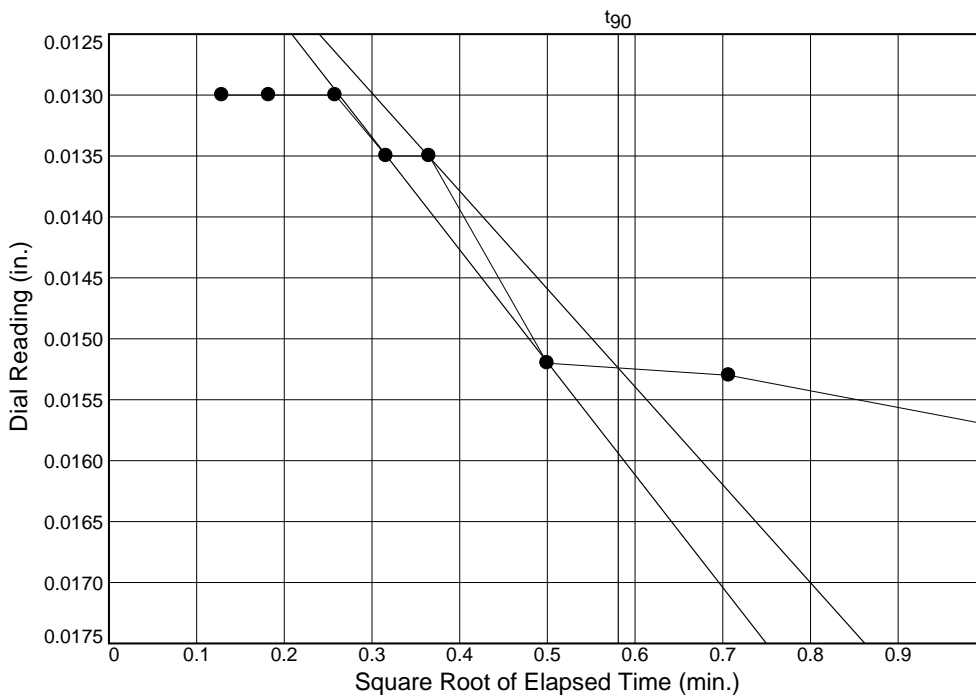
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Load No.= 8
 Load= 0.50 ksf
 $D_0 = 0.0137$
 $D_{90} = 0.0130$
 $D_{100} = 0.0129$
 $T_{90} = 0.16$ min.

$C_v @ T_{90}$
 13.246 ft.²/day



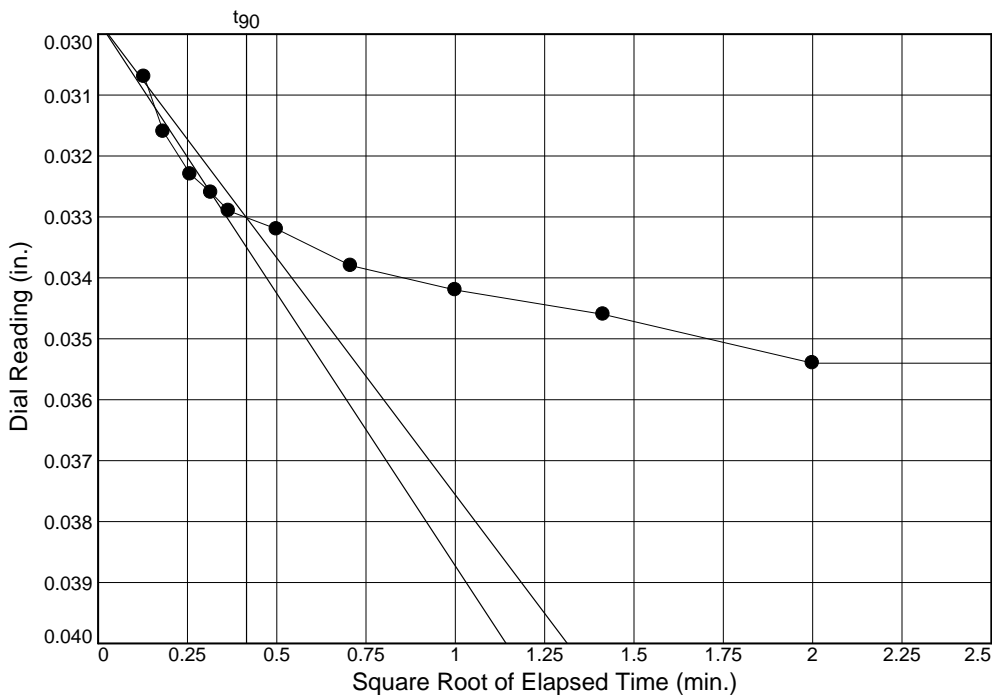
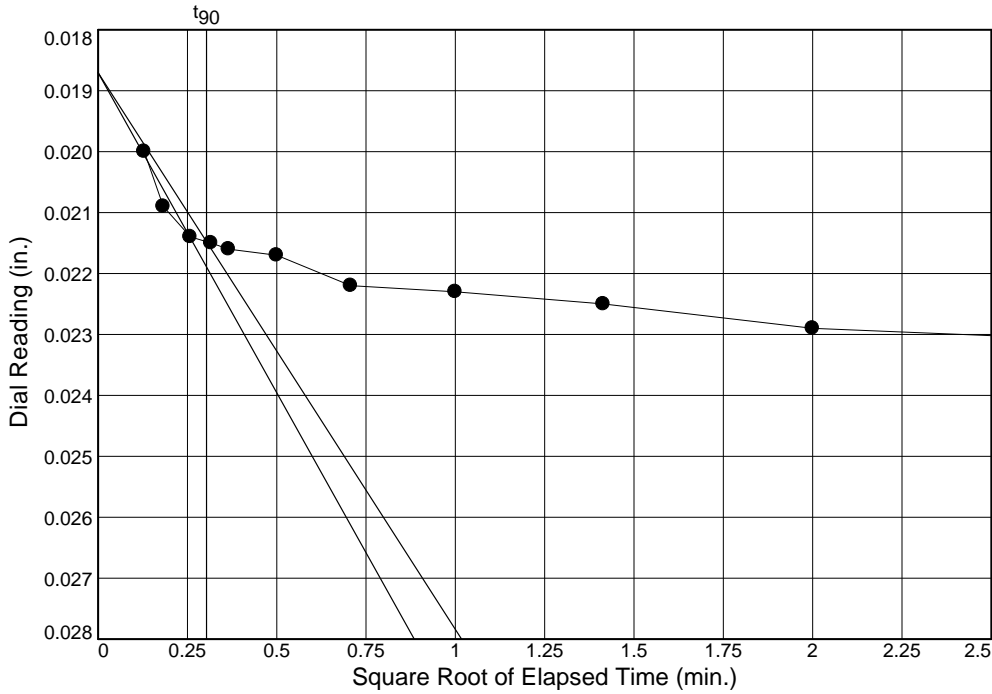
Load No.= 9
 Load= 2.00 ksf
 $D_0 = 0.0106$
 $D_{90} = 0.0152$
 $D_{100} = 0.0158$
 $T_{90} = 0.34$ min.

$C_v @ T_{90}$
 6.245 ft.²/day

Dial Reading vs. Time

Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

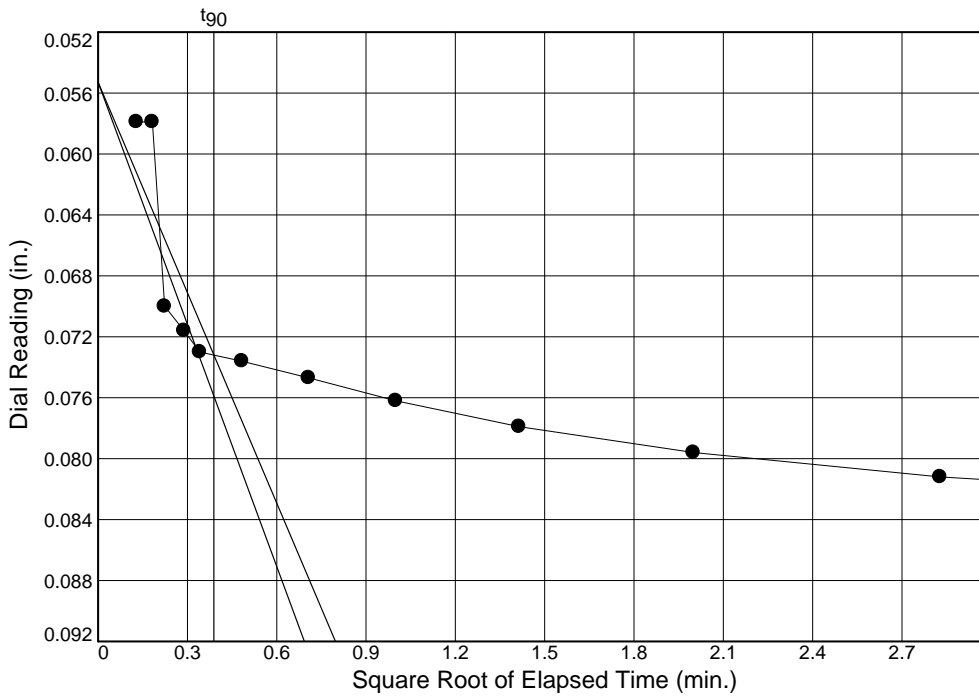
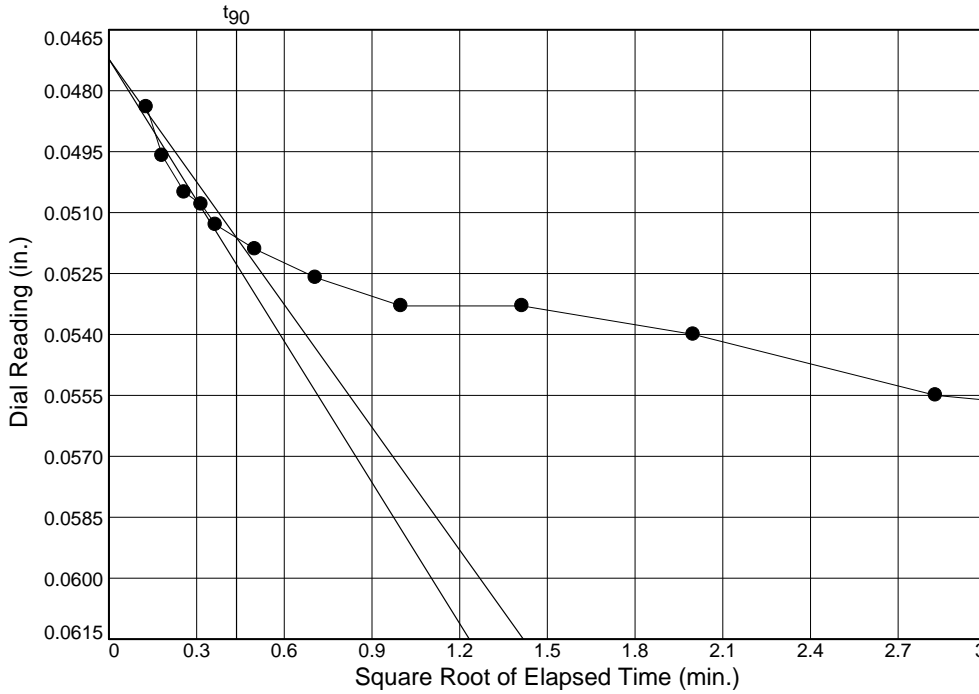
Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Dial Reading vs. Time

Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

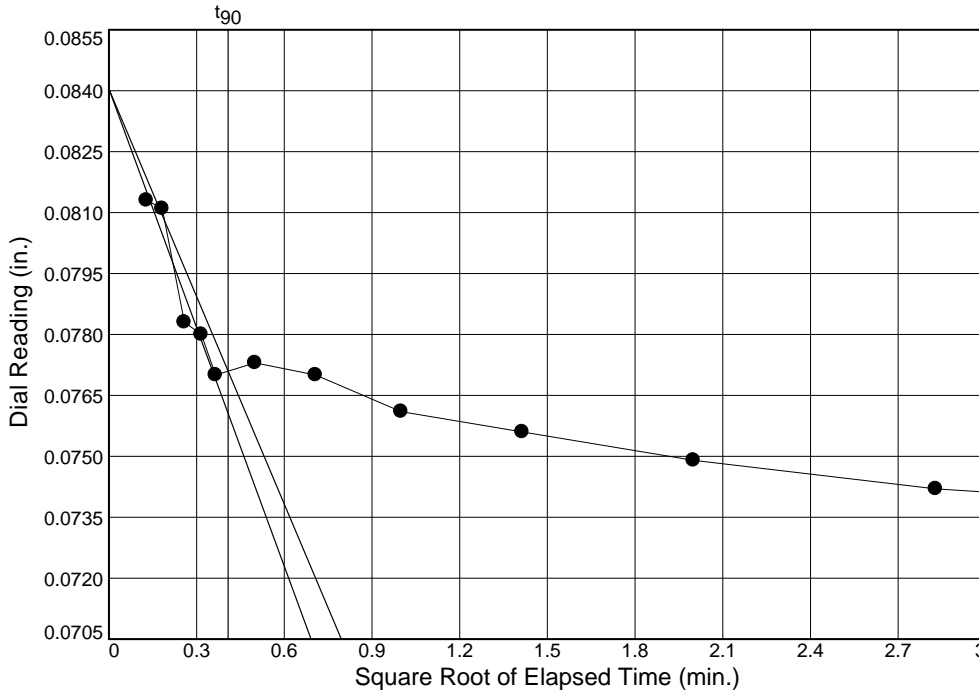
Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Dial Reading vs. Time

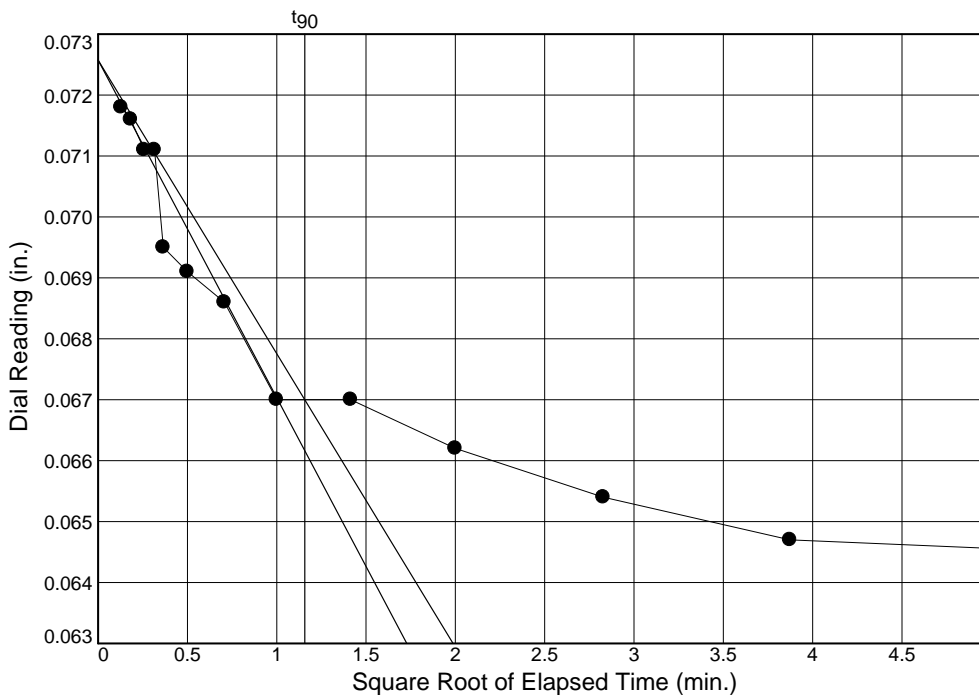
Project No.: 1461-16-047.2B
 Project: Carolina Crossroads Project

Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Load No.= 14
 Load= 8.00 ksf
 $D_0 = 0.0840$
 $D_{90} = 0.0771$
 $D_{100} = 0.0763$
 $T_{90} = 0.17 \text{ min.}$

$C_v @ T_{90}$
 11.094 ft.²/day



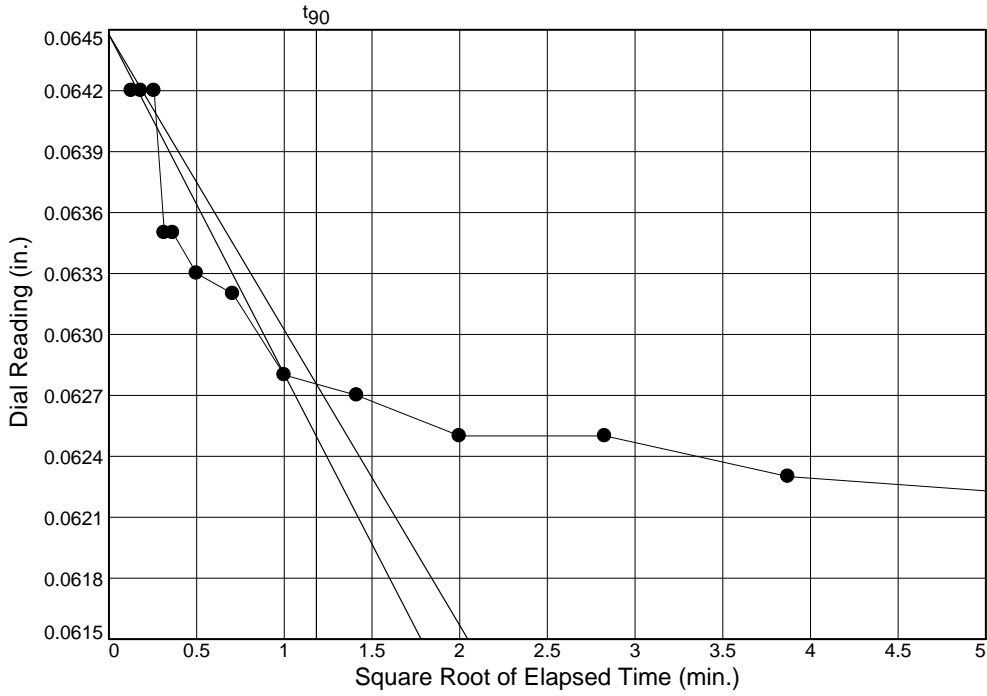
Load No.= 16
 Load= 0.50 ksf
 $D_0 = 0.0726$
 $D_{90} = 0.0670$
 $D_{100} = 0.0664$
 $T_{90} = 1.34 \text{ min.}$

$C_v @ T_{90}$
 1.421 ft.²/day

Dial Reading vs. Time

Project No.: 1461-16-047.2B
Project: Carolina Crossroads Project

Location: UD Borings Depth: 8.5-10.5 Sample Number: W-23UD UD-2



Load No.= 17
Load= 0.25 ksf
 $D_0 = 0.0645$
 $D_{90} = 0.0628$
 $D_{100} = 0.0626$
 $T_{90} = 1.40 \text{ min.}$

$C_v @ T_{90}$
1.363 ft.²/day

CONSOLIDATION TEST DATA

6/28/2018

Client: HDR Engineering, Inc.

Project: Carolina Crossroads Project

Project Number: 1461-16-047.2B

Location: UD Borings

Depth: 8.5-10.5

Sample Number: W-23UD UD-2

Material Description: Brown Gray Clay (CH)

Liquid Limit: 59

Plasticity Index: 35

USCS: CH

Figure No.: W-23 UD-2

Testing Remarks: Tested Unsaturated

Tested by: Karen Warner

Checked by: Jason Reeves

Test Specimen Data

<p>NATURAL MOISTURE</p> <p>Wet w+t = 243.73 g. Dry w+t = 211.34 g. Tare Wt. = 81.83 g. Moisture = 25.0 %</p> <p>UNIT WEIGHT</p> <p>Height = 0.998 in. Diameter = 2.496 in. Weight = 153.16 g. Dry Dens. = 95.6 pcf</p>	<p>VOID RATIO</p> <p>Spec. Gr. = 2.70 Est. Ht. Solids = 0.579 in. Init. V.R. = 0.746 Init. Sat. = 90.5 %</p> <p>TEST START</p> <p>Height = 1.012 in. Diameter = 2.496 in.</p>	<p>AFTER TEST</p> <p>Wet w+t = 251.83 g. Dry w+t = 223.77 g. Tare Wt. = 98.37 g. Moisture = 22.4 %</p> <p>Dry Wt. = 125.40* g.</p>
--	---	--

End-Of-Load Summary

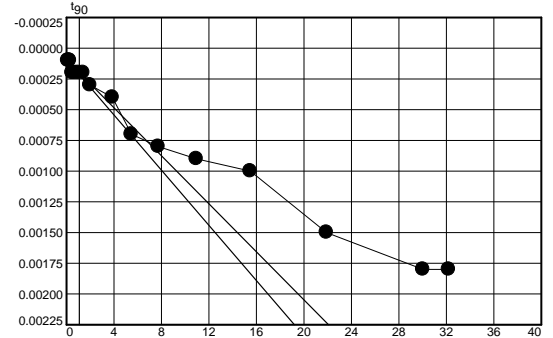
Pressure (ksf)	Final Dial (in.)	Deformation (in.)	C _v (ft. ² /day)	C _α	Void Ratio	% Strain
start	0.00010	0.00000			0.746	
0.05	0.00180	0.00170	1.833		0.743	0.2 Compr.
0.25	0.00410	0.00400			0.739	0.4 Compr.
0.50	0.00650	0.00640	1.599		0.735	0.6 Compr.
1.00	0.00960	0.00950	14.756		0.729	0.9 Compr.
2.00	0.01520	0.01510	12.743		0.720	1.5 Compr.
0.50	0.01350	0.01340	16.286		0.723	1.3 Compr.
0.25	0.01280	0.01270	0.774		0.724	1.3 Compr.
0.50	0.01300	0.01290	13.246		0.724	1.3 Compr.
2.00	0.01680	0.01670	6.245		0.717	1.7 Compr.
4.00	0.02460	0.02450	22.622		0.704	2.4 Compr.
8.00	0.03860	0.03850	11.809		0.679	3.8 Compr.
16.00	0.05780	0.05770	10.330		0.646	5.7 Compr.
32.00	0.08440	0.08430	12.406		0.600	8.3 Compr.
8.00	0.07290	0.07280	11.094		0.620	7.2 Compr.
2.00	0.06450	0.06440			0.635	6.4 Compr.
0.50	0.06450	0.06440	1.421		0.635	6.4 Compr.
0.25	0.06190	0.06180	1.363		0.639	6.1 Compr.

TEST RESULTS SUMMARY

Compression index (C_c), ksf = 0.15 Preconsolidation pressure (P_p), ksf = 6.4 Void ratio at P_p (e_m) = 0.688
 Recompression index (C_r) = 0.02

Pressure: 0.05 ksf **TEST READINGS** **Load No. 1**

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	+0 00:00:01	0.00010	11	+0 00:30:00	0.00070
2	+0 00:00:02	0.00010	12	+0 00:60:00	0.00080
3	+0 00:00:04	0.00010	13	+0 02:00:00	0.00090
4	+0 00:00:06	0.00010	14	+0 04:00:00	0.00100
5	+0 00:00:15	0.00020	15	+0 08:00:00	0.00150
6	+0 00:00:30	0.00020	16	+0 15:02:00	0.00180
7	+0 00:00:60	0.00020	17	+0 17:17:00	0.00180
8	+0 00:02:00	0.00020			
9	+0 00:04:00	0.00030			
10	+0 00:15:00	0.00040			



Void Ratio = 0.743 Compression = 0.2%
 $D_0 = 0.0001$ $D_{90} = 0.0002$ $D_{100} = 0.0002$ C_v at 1.18 min. = 1.833 ft.²/day

Pressure: 0.25 ksf **TEST READINGS** **Load No. 2**

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00180	11	+0 00:04:00	0.00350
2	+0 00:00:01	0.00250	12	+0 00:08:00	0.00350
3	+0 00:00:02	0.00350	13	+0 00:15:00	0.00360
4	+0 00:00:04	0.00350	14	+0 00:30:00	0.00360
5	+0 00:00:06	0.00350	15	+0 00:60:00	0.00390
6	+0 00:00:08	0.00350	16	+0 02:00:00	0.00410
7	+0 00:00:15	0.00350	17	+0 02:35:00	0.00410
8	+0 00:00:30	0.00350			
9	+0 00:00:60	0.00350			
10	+0 00:02:00	0.00350			

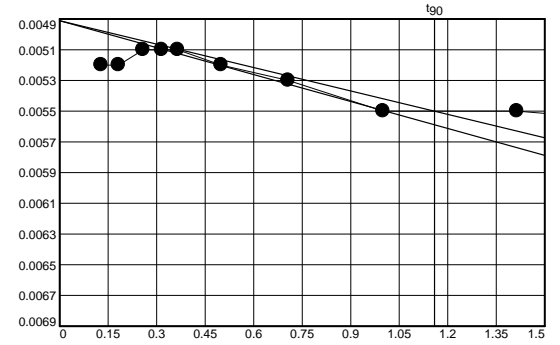
Void Ratio = 0.739 Compression = 0.4%

Pressure: 0.50 ksf

TEST READINGS

Load No. 3

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00410	11	+0 00:04:00	0.00560
2	+0 00:00:01	0.00520	12	+0 00:08:00	0.00570
3	+0 00:00:02	0.00520	13	+0 00:15:00	0.00580
4	+0 00:00:04	0.00510	14	+0 00:30:00	0.00580
5	+0 00:00:06	0.00510	15	+0 00:60:00	0.00600
6	+0 00:00:08	0.00510	16	+0 02:00:00	0.00630
7	+0 00:00:15	0.00520	17	+0 03:20:00	0.00650
8	+0 00:00:30	0.00530			
9	+0 00:00:60	0.00550			
10	+0 00:02:00	0.00550			



Void Ratio = 0.735 Compression = 0.6%

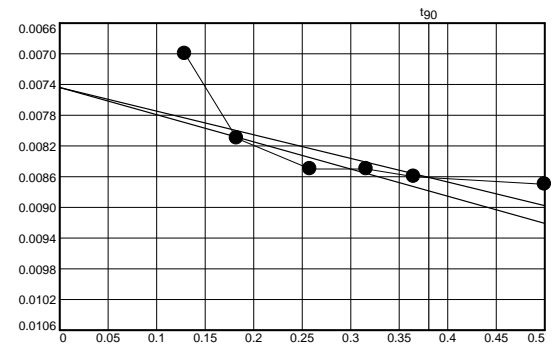
D₀ = 0.0049 D₉₀ = 0.0055 D₁₀₀ = 0.0056 C_v at 1.34 min. = 1.599 ft.²/day

Pressure: 1.00 ksf

TEST READINGS

Load No. 4

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00650	11	+0 00:04:00	0.00890
2	+0 00:00:01	0.00700	12	+0 00:08:00	0.00920
3	+0 00:00:02	0.00810	13	+0 00:15:00	0.00930
4	+0 00:00:04	0.00850	14	+0 00:30:00	0.00950
5	+0 00:00:06	0.00850	15	+0 00:60:00	0.00960
6	+0 00:00:08	0.00860	16	+0 00:63:00	0.00960
7	+0 00:00:15	0.00870			
8	+0 00:00:30	0.00870			
9	+0 00:00:60	0.00880			
10	+0 00:02:00	0.00880			



Void Ratio = 0.729 Compression = 0.9%

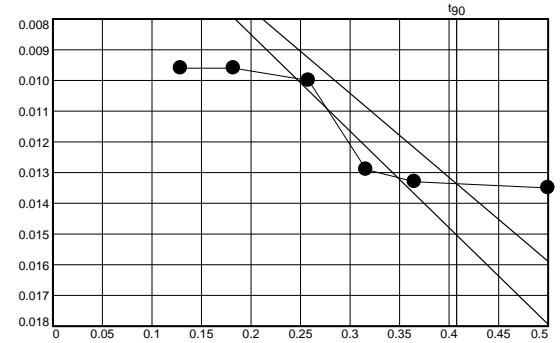
D₀ = 0.0074 D₉₀ = 0.0086 D₁₀₀ = 0.0087 C_v at 0.14 min. = 14.756 ft.²/day

Pressure: 2.00 ksf

TEST READINGS

Load No. 5

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.00960	11	+0 00:04:00	0.01430
2	+0 00:00:01	0.00960	12	+0 00:08:00	0.01440
3	+0 00:00:02	0.00960	13	+0 00:15:00	0.01460
4	+0 00:00:04	0.01000	14	+0 00:30:00	0.01490
5	+0 00:00:06	0.01290	15	+0 00:60:00	0.01510
6	+0 00:00:08	0.01330	16	+0 00:68:00	0.01520
7	+0 00:00:15	0.01350			
8	+0 00:00:30	0.01360			
9	+0 00:00:60	0.01390			
10	+0 00:02:00	0.01420			



Void Ratio = 0.720 Compression = 1.5%

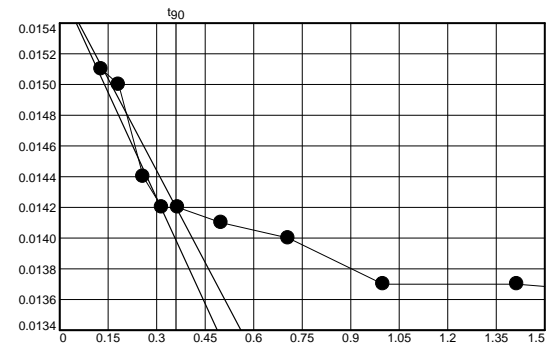
D₀ = 0.0022 D₉₀ = 0.0134 D₁₀₀ = 0.0146 C_v at 0.17 min. = 12.743 ft.²/day

Pressure: 0.50 ksf

TEST READINGS

Load No. 6

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01520	11	+0 00:04:00	0.01360
2	+0 00:00:01	0.01510	12	+0 00:08:00	0.01360
3	+0 00:00:02	0.01500	13	+0 00:15:00	0.01360
4	+0 00:00:04	0.01440	14	+0 00:30:00	0.01360
5	+0 00:00:06	0.01420	15	+0 00:60:00	0.01360
6	+0 00:00:08	0.01420	16	+0 01:30:00	0.01350
7	+0 00:00:15	0.01410			
8	+0 00:00:30	0.01400			
9	+0 00:00:60	0.01370			
10	+0 00:02:00	0.01370			



Void Ratio = 0.723 Compression = 1.3%

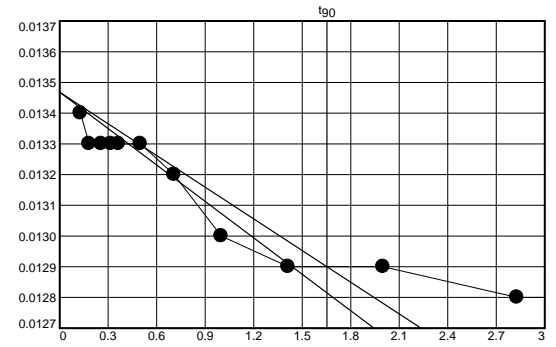
D₀ = 0.0156 D₉₀ = 0.0142 D₁₀₀ = 0.0140 C_v at 0.13 min. = 16.286 ft.²/day

Pressure: 0.25 ksf

TEST READINGS

Load No. 7

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01350	11	+0 00:04:00	0.01290
2	+0 00:00:01	0.01340	12	+0 00:08:00	0.01280
3	+0 00:00:02	0.01330	13	+0 00:15:00	0.01280
4	+0 00:00:04	0.01330	14	+0 00:30:00	0.01280
5	+0 00:00:06	0.01330	15	+0 00:60:00	0.01280
6	+0 00:00:08	0.01330	16	+0 02:00:00	0.01280
7	+0 00:00:15	0.01330	17	+0 04:00:00	0.01280
8	+0 00:00:30	0.01320	18	+0 08:00:00	0.01280
9	+0 00:00:60	0.01300	19	+0 14:10:00	0.01280
10	+0 00:02:00	0.01290			



Void Ratio = 0.724 Compression = 1.3%

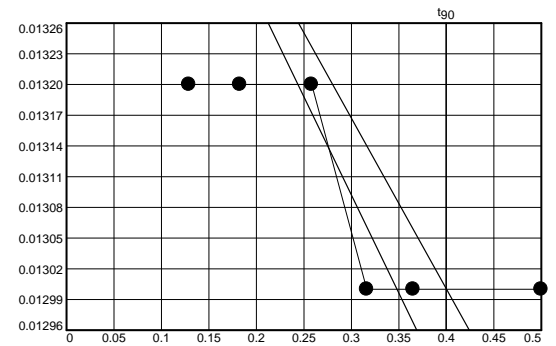
D₀ = 0.0135 D₉₀ = 0.0129 D₁₀₀ = 0.0128 C_v at 2.73 min. = 0.774 ft.²/day

Pressure: 0.50 ksf

TEST READINGS

Load No. 8

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01280	11	+0 00:04:00	0.01300
2	+0 00:00:01	0.01320	12	+0 00:08:02	0.01300
3	+0 00:00:02	0.01320	13	+0 00:15:00	0.01300
4	+0 00:00:04	0.01320	14	+0 00:30:05	0.01300
5	+0 00:00:06	0.01300	15	+0 00:60:01	0.01300
6	+0 00:00:08	0.01300	16	+0 00:77:10	0.01300
7	+0 00:00:15	0.01300			
8	+0 00:00:30	0.01300			
9	+0 00:00:60	0.01300			
10	+0 00:02:00	0.01300			



Void Ratio = 0.724 Compression = 1.3%

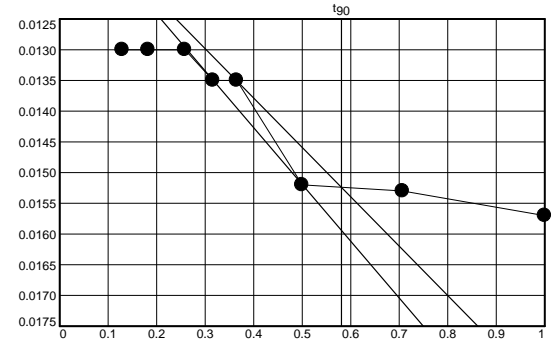
D₀ = 0.0137 D₉₀ = 0.0130 D₁₀₀ = 0.0129 C_v at 0.16 min. = 13.246 ft.²/day

Pressure: 2.00 ksf

TEST READINGS

Load No. 9

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01300	11	+0 00:04:00	0.01580
2	+0 00:00:01	0.01300	12	+0 00:08:00	0.01590
3	+0 00:00:02	0.01300	13	+0 00:15:00	0.01600
4	+0 00:00:04	0.01300	14	+0 00:30:05	0.01610
5	+0 00:00:06	0.01350	15	+0 00:60:00	0.01650
6	+0 00:00:08	0.01350	16	+0 02:00:00	0.01660
7	+0 00:00:15	0.01520	17	+0 03:29:00	0.01680
8	+0 00:00:30	0.01530			
9	+0 00:00:60	0.01570			
10	+0 00:02:00	0.01580			



Void Ratio = 0.717 Compression = 1.7%

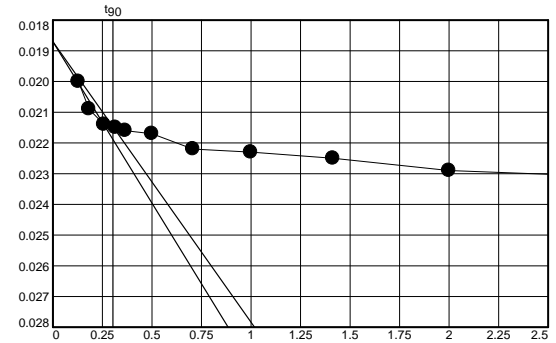
$D_0 = 0.0106$ $D_{90} = 0.0152$ $D_{100} = 0.0158$ C_v at 0.34 min. = 6.245 ft.²/day

Pressure: 4.00 ksf

TEST READINGS

Load No. 10

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.01680	11	+0 00:04:00	0.02290
2	+0 00:00:01	0.02000	12	+0 00:08:00	0.02310
3	+0 00:00:02	0.02090	13	+0 00:15:00	0.02320
4	+0 00:00:04	0.02140	14	+0 00:30:00	0.02350
5	+0 00:00:06	0.02150	15	+0 00:60:00	0.02380
6	+0 00:00:08	0.02160	16	+0 02:00:00	0.02400
7	+0 00:00:15	0.02170	17	+0 04:00:00	0.02460
8	+0 00:00:30	0.02220	18	+0 04:55:00	0.02460
9	+0 00:00:60	0.02230			
10	+0 00:02:00	0.02250			



Void Ratio = 0.704 Compression = 2.4%

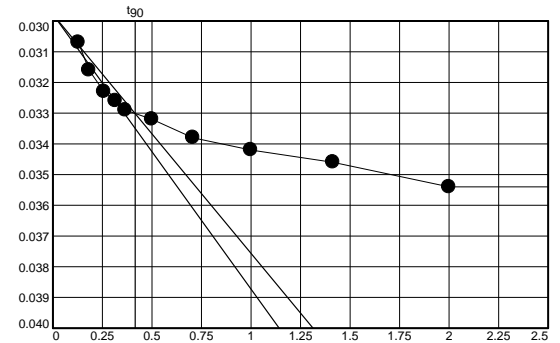
$D_0 = 0.0187$ $D_{90} = 0.0215$ $D_{100} = 0.0218$ C_v at 0.09 min. = 22.622 ft.²/day

Pressure: 8.00 ksf

TEST READINGS

Load No. 11

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.02460	11	+0 00:04:00	0.03540
2	+0 00:00:01	0.03070	12	+0 00:08:00	0.03540
3	+0 00:00:02	0.03160	13	+0 00:15:00	0.03580
4	+0 00:00:04	0.03230	14	+0 00:30:00	0.03620
5	+0 00:00:06	0.03260	15	+0 00:60:00	0.03650
6	+0 00:00:08	0.03290	16	+0 02:00:00	0.03700
7	+0 00:00:15	0.03320	17	+0 04:00:00	0.03720
8	+0 00:00:30	0.03380	18	+0 08:00:00	0.03780
9	+0 00:00:60	0.03420	19	+0 15:00:00	0.03850
10	+0 00:02:00	0.03460	20	+0 16:16:00	0.03860



Void Ratio = 0.679 Compression = 3.8%

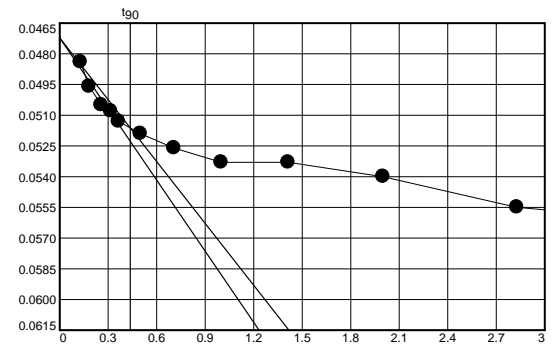
D₀ = 0.0298 D₉₀ = 0.0330 D₁₀₀ = 0.0334 C_v at 0.17 min. = 11.809 ft.²/day

Pressure: 16.00 ksf

TEST READINGS

Load No. 12

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.03860	11	+0 00:04:00	0.05400
2	+0 00:00:01	0.04840	12	+0 00:08:00	0.05550
3	+0 00:00:02	0.04960	13	+0 00:15:00	0.05620
4	+0 00:00:04	0.05050	14	+0 00:30:00	0.05670
5	+0 00:00:06	0.05080	15	+0 00:60:00	0.05710
6	+0 00:00:08	0.05130	16	+0 02:00:00	0.05740
7	+0 00:00:15	0.05190	17	+0 03:47:00	0.05780
8	+0 00:00:30	0.05260			
9	+0 00:00:60	0.05330			
10	+0 00:02:00	0.05330			



Void Ratio = 0.646 Compression = 5.7%

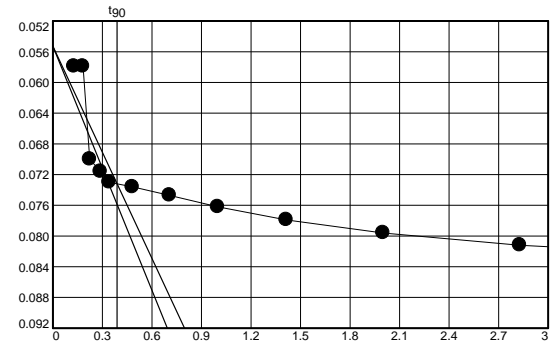
D₀ = 0.0472 D₉₀ = 0.0516 D₁₀₀ = 0.0521 C_v at 0.19 min. = 10.330 ft.²/day

Pressure: 32.00 ksf

TEST READINGS

Load No. 13

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.05780	11	+0 00:04:00	0.07960
2	+0 00:00:01	0.05790	12	+0 00:08:00	0.08120
3	+0 00:00:02	0.05790	13	+0 00:15:00	0.08240
4	+0 00:00:03	0.07000	14	+0 00:30:00	0.08310
5	+0 00:00:05	0.07160	15	+0 00:60:00	0.08350
6	+0 00:00:07	0.07300	16	+0 02:00:00	0.08410
7	+0 00:00:14	0.07360	17	+0 04:00:00	0.08440
8	+0 00:00:30	0.07470	18	+0 08:00:00	0.08440
9	+0 00:00:60	0.07620	19	+0 15:00:00	0.08440
10	+0 00:02:00	0.07790	20	+0 29:25:00	0.08440



Void Ratio = 0.600 Compression = 8.3%

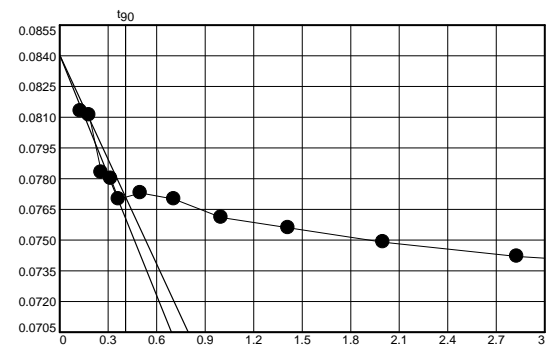
D₀ = 0.0553 D₉₀ = 0.0732 D₁₀₀ = 0.0752 C_v at 0.15 min. = 12.406 ft.²/day

Pressure: 8.00 ksf

TEST READINGS

Load No. 14

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.08440	11	+0 00:04:00	0.07490
2	+0 00:00:01	0.08130	12	+0 00:08:00	0.07420
3	+0 00:00:02	0.08110	13	+0 00:15:02	0.07370
4	+0 00:00:04	0.07830	14	+0 00:30:03	0.07340
5	+0 00:00:06	0.07800	15	+0 00:60:00	0.07340
6	+0 00:00:08	0.07700	16	+0 02:00:00	0.07320
7	+0 00:00:15	0.07730	17	+0 03:20:05	0.07290
8	+0 00:00:30	0.07700			
9	+0 00:00:60	0.07610			
10	+0 00:02:00	0.07560			



Void Ratio = 0.620 Compression = 7.2%

D₀ = 0.0840 D₉₀ = 0.0771 D₁₀₀ = 0.0763 C_v at 0.17 min. = 11.094 ft.²/day

Pressure: 2.00 ksf

TEST READINGS

Load No. 15

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.07290	11	+0 00:04:00	0.06620
2	+0 00:00:01	0.01780	12	+0 00:08:20	0.06540
3	+0 00:00:02	0.07160	13	+0 00:15:00	0.06470
4	+0 00:00:04	0.07110	14	+0 00:30:00	0.06450
5	+0 00:00:06	0.07000	15	+0 00:60:00	0.06450
6	+0 00:00:08	0.06950	16	+0 00:67:00	0.06450
7	+0 00:00:15	0.06910			
8	+0 00:00:30	0.06860			
9	+0 00:00:60	0.06790			
10	+0 00:02:00	0.06710			

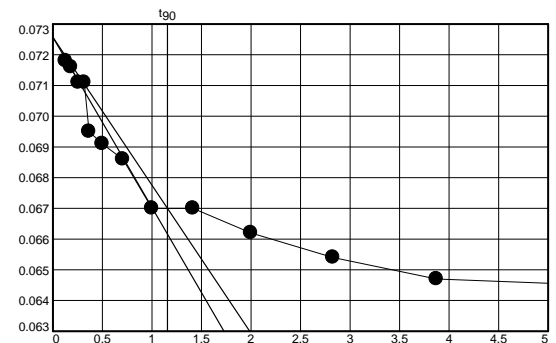
Void Ratio = 0.635 Compression = 6.4%

Pressure: 0.50 ksf

TEST READINGS

Load No. 16

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.06450	11	+0 00:04:00	0.06620
2	+0 00:00:01	0.07180	12	+0 00:08:00	0.06540
3	+0 00:00:02	0.07160	13	+0 00:15:00	0.06470
4	+0 00:00:04	0.07110	14	+0 00:30:00	0.06450
5	+0 00:00:06	0.07110	15	+0 00:60:00	0.06450
6	+0 00:00:08	0.06950	16	+0 00:67:00	0.06450
7	+0 00:00:15	0.06910			
8	+0 00:00:30	0.06860			
9	+0 00:00:60	0.06700			
10	+0 00:02:00	0.06700			



Void Ratio = 0.635 Compression = 6.4%

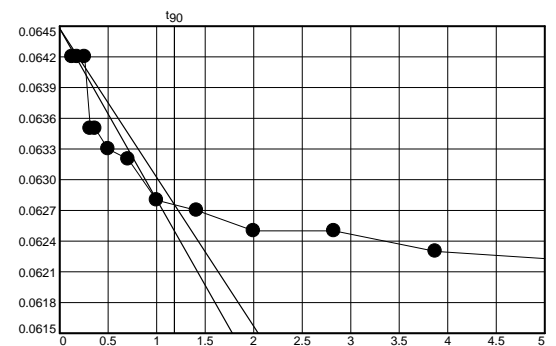
D₀ = 0.0726 D₉₀ = 0.0670 D₁₀₀ = 0.0664 C_v at 1.34 min. = 1.421 ft.²/day

Pressure: 0.25 ksf

TEST READINGS

Load No. 17

No.	Clock Time	Dial Reading	No.	Clock Time	Dial Reading
1	0	0.06450	11	+0 00:04:00	0.06250
2	+0 00:00:01	0.06420	12	+0 00:08:00	0.06250
3	+0 00:00:02	0.06420	13	+0 00:15:00	0.06230
4	+0 00:00:04	0.06420	14	+0 00:30:00	0.06220
5	+0 00:00:06	0.06350	15	+0 00:60:00	0.06210
6	+0 00:00:08	0.06350	16	+0 02:00: 0	0.06190
7	+0 00:00:15	0.06330	17	+0 04:00:00	0.06190
8	+0 00:00:30	0.06320	18	+0 06:09:00	0.06190
9	+0 00:00:60	0.06280			
10	+0 00:02:00	0.06270			



Void Ratio = 0.639 Compression = 6.1%

D₀ = 0.0645 D₉₀ = 0.0628 D₁₀₀ = 0.0626 C_v at 1.40 min. = 1.363 ft.²/day

**ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
TEST FOR COHESIVE SOILS**

Project No.: 1461-16-047 .2B

Project Name: Carolina Crossroads

Sample ID: 1461-16-047.2B W-23UD UD-2

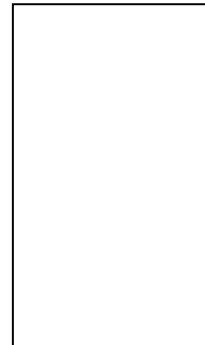
Depth: 8.5-10.5'

Failed Specimens

Specimen No.: 1
Effective Confining Pressure: 3.5 psi
Notes: Failed in shear



Specimen No.: _____
Effective Confining Pressure: _____
Notes: No Specimen



Specimen No.: 3
Effective Confining Pressure: 13.9 psi
Notes: Failed in shear



Sheared By: Karen Warner

Reviewed By: Jason Reeves

Date: 6/26/2018

Laboratory Test Data Sheets Rock Core Samples

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: February 26, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
DH-5	RC-10	88.4 - 89.4	5.64	2.49	E	4.87	171.2	71	52,888	10,860	0.1
DH-5	RC-12	95.6 - 96.5	5.54	2.49	D	4.87	174.8	61	36,274	7,448	0.1
DH-5	RC-14	106.2 - 107.3	5.70	2.49	B	4.87	176.0	73	64,454	13,235	0.1
DH-6	RC-1	25.6 - 26.6	5.65	2.47	D	4.79	165.1	75	133,865	27,947	0.2
DH-6	RC-3	35.4 - 36.5	5.64	2.49	A	4.87	165.7	85	161,125	33,085	0.2

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: February 26, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
DH-6	RC-5	47.3 - 48.6	5.69	2.49	A	4.87	165.4	81	145,892	29,957	0.3
DH-6	RC-7	58.2 - 59.2	5.68	2.49	A	4.87	165.2	80	150,011	30,803	0.2
DH-6	RC-9	60.6 - 61.7	4.54	1.98	A	3.08	165.4	83	104,528	33,938	0.2
DH-6	RC-11	70.6 - 71.8	4.51	1.98	A	3.08	165.9	69	105,328	34,197	0.2
DH-6	RC-13	80.6 - 81.8	4.52	1.98	A	3.08	165.6	77	111,542	36,215	0.2

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: February 26, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
DH-6	RC-15	94.4 - 95.6	4.49	1.98	A	3.08	165.8	84	106,709	34,646	0.2
B-38	RC-1	11.9 - 13.1	4.50	1.98	A	3.08	168.9	63	71,285	23,144	0.2
B-38	RC-3	20.5 - 21.6	4.46	1.98	A	3.08	165.4	75	98,802	32,079	0.1
B-38	RC-5	30.5 - 31.7	4.51	1.98	A	3.08	166.0	74	100,801	32,728	0.1
B-40	RC-1	77.7 - 78.5	4.51	1.98	A	3.08	163.0	62	40,733	13,225	0.3

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: February 26, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-40	RC-3	84.3 - 85.1	4.53	1.98	A	3.08	165.8	74	57,320	18,610	0.1
B-41	RC-2	60.2 - 61.3	4.23	1.98	A	3.08	158.8	37	15,227	4,944	0.4
B-41	RC-5	75.5 - 76.4	4.50	1.98	A	3.08	164.5	88	72,883	23,663	0.3
B-59	RC-2	115.4 - 116.1	4.32	1.98	A	3.08	170.6	19	4,038	1,311	1.3

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



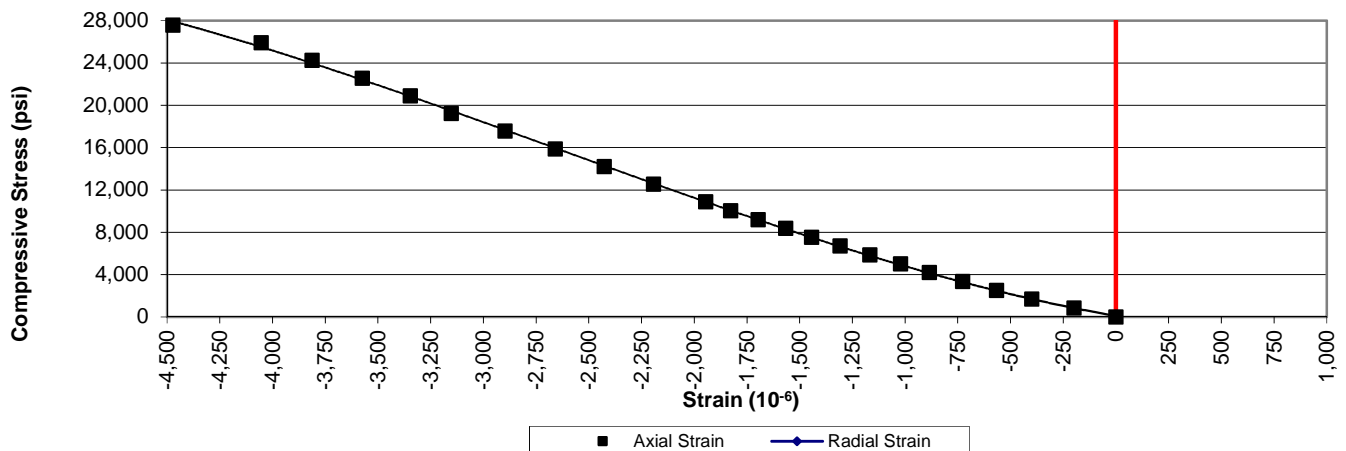
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.47	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.65	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.1	Reviewed by:	JBB
Sample No:	RC-1	Moisture Content, %:	0.2		
Depth (ft):	25.6 - 26.6	Load Rate, psi/sec:	75		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-199		4,000	835	4.20		
3	-398		8,000	1,670	4.20		
4	-566		12,000	2,505	4.43		
5	-727		16,000	3,340	4.59		
6	-885		20,000	4,175	4.72		
7	-1,021		24,000	5,010	4.91		
8	-1,166		28,000	5,846	5.01		
9	-1,307		32,000	6,681	5.11		
10	-1,443		36,000	7,516	5.21		
11	-1,566		40,000	8,351	5.33		
12	-1,696		44,000	9,186	5.42		
13	-1,826		48,000	10,021	5.49		
14	-1,945		52,000	10,856	5.58		
15	-2,192		60,000	12,526	5.71		
16	-2,426		68,000	14,196	5.85		
17	-2,659		76,000	15,866	5.97		
18	-2,897		84,000	17,537	6.05		
19	-3,152		92,000	19,207	6.09		
20	-3,346		100,000	20,877	6.24		
21	-3,574		108,000	22,547	6.31		
22	-3,812		116,000	24,217	6.35		
23	-4,053		124,000	25,887	6.39		
24	-4,471		132,000	27,557	6.16		
25			133,865	27,947			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



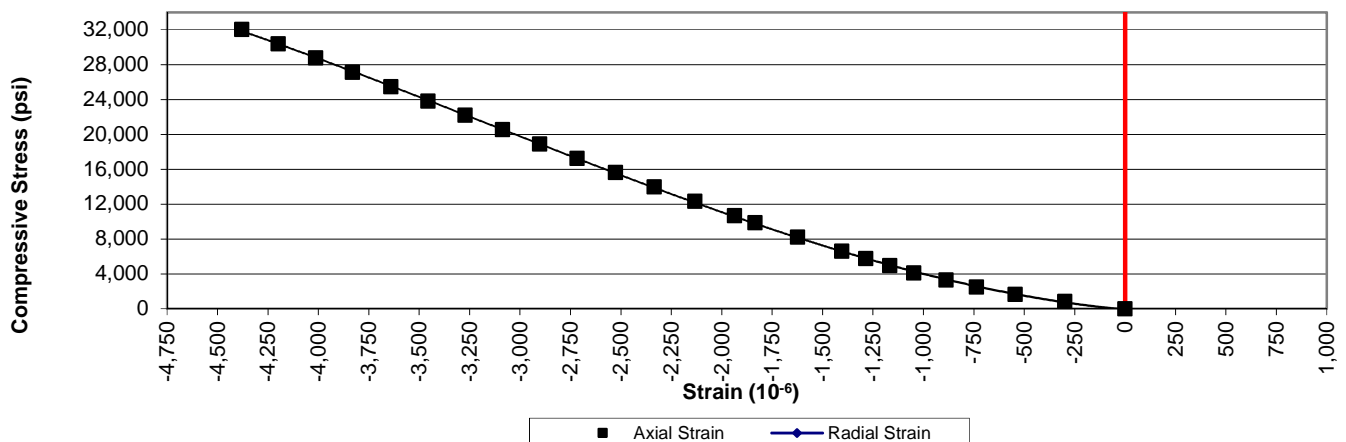
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.64	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.7	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.2		
Depth (ft):	35.4 - 36.5	Load Rate, psi/sec:	85		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-299		4,000	821	2.75		
3	-544		8,000	1,643	3.02		
4	-737		12,000	2,464	3.34		
5	-887		16,000	3,285	3.70		
6	-1,048		20,000	4,107	3.92		
7	-1,167		24,000	4,928	4.22		
8	-1,286		28,000	5,749	4.47		
9	-1,405		32,000	6,571	4.68		
10	-1,623		40,000	8,214	5.06		
11	-1,835		48,000	9,856	5.37		
12	-1,936		52,000	10,678	5.52		
13	-2,133		60,000	12,320	5.78		
14	-2,334		68,000	13,963	5.98		
15	-2,527		76,000	15,606	6.18		
16	-2,717		84,000	17,248	6.35		
17	-2,903		92,000	18,891	6.51		
18	-3,087		100,000	20,534	6.65		
19	-3,272		108,000	22,177	6.78		
20	-3,456		116,000	23,819	6.89		
21	-3,640		124,000	25,462	7.00		
22	-3,830		132,000	27,105	7.08		
23	-4,013		140,000	28,747	7.16		
24	-4,199		148,000	30,390	7.24		
25	-4,380		156,000	32,033	7.31		
26			161,125	33,085			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



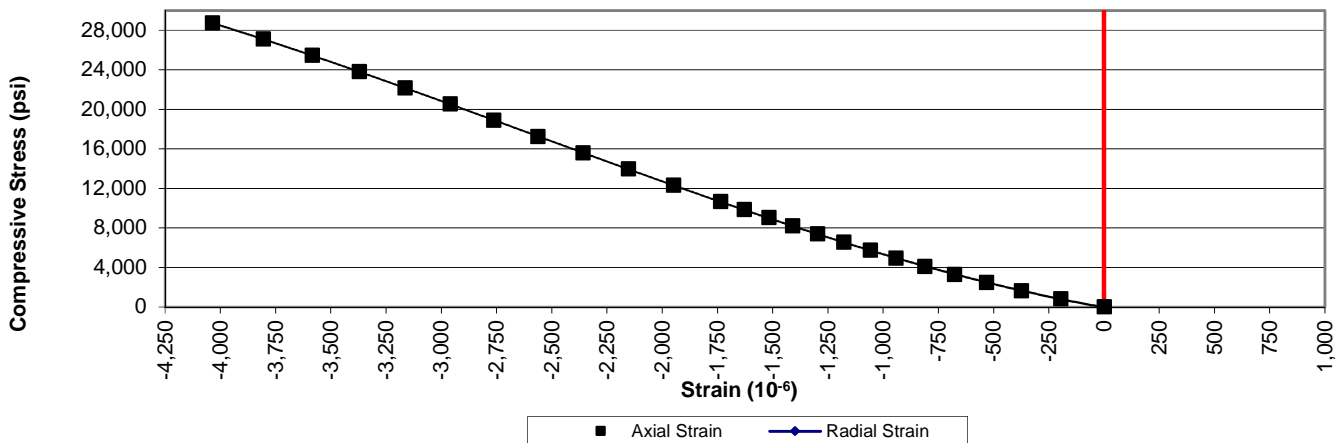
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.69	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.4	Reviewed by:	JBB
Sample No:	RC-5	Moisture Content, %:	0.3		
Depth (ft):	47.3 - 48.6	Load Rate, psi/sec:	81		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-196		4,000	821	4.19		
3	-375		8,000	1,643	4.38		
4	-532		12,000	2,464	4.63		
5	-678		16,000	3,285	4.85		
6	-812		20,000	4,107	5.06		
7	-942		24,000	4,928	5.23		
8	-1,058		28,000	5,749	5.43		
9	-1,179		32,000	6,571	5.57		
10	-1,297		36,000	7,392	5.70		
11	-1,411		40,000	8,214	5.82		
12	-1,518		44,000	9,035	5.95		
13	-1,629		48,000	9,856	6.05		
14	-1,737		52,000	10,678	6.15		
15	-1,949		60,000	12,320	6.32		
16	-2,154		68,000	13,963	6.48		
17	-2,359		76,000	15,606	6.62		
18	-2,563		84,000	17,248	6.73		
19	-2,764		92,000	18,891	6.83		
20	-2,961		100,000	20,534	6.93		
21	-3,164		108,000	22,177	7.01		
22	-3,372		116,000	23,819	7.06		
23	-3,585		124,000	25,462	7.10		
24	-3,807		132,000	27,105	7.12		
25	-4,037		140,000	28,747	7.12		
26			145,892	29,957			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



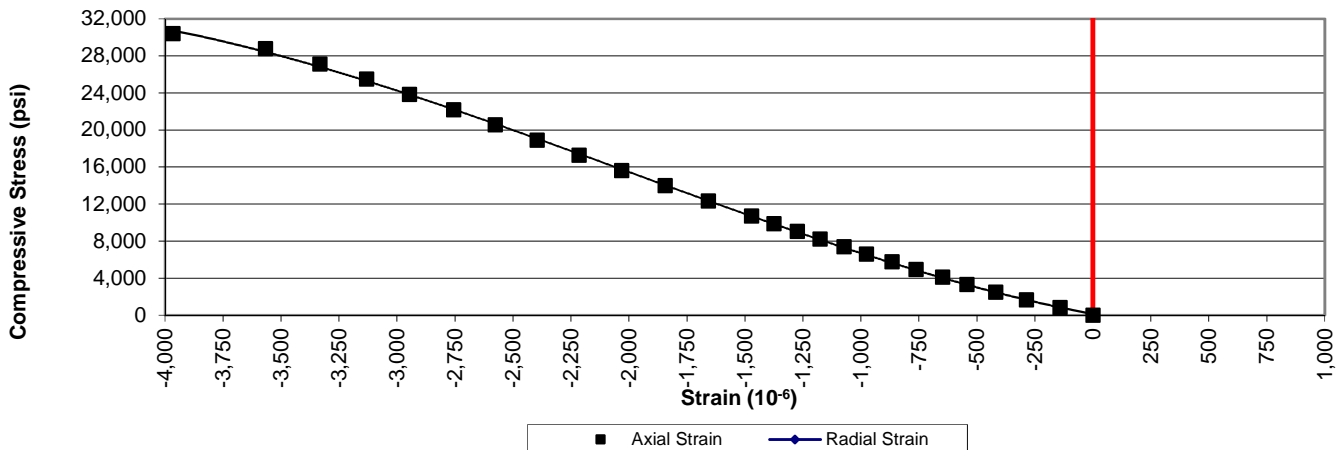
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.68	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.2	Reviewed by:	JBB
Sample No:	RC-7	Moisture Content, %:	0.2		
Depth (ft):	58.2 - 59.2	Load Rate, psi/sec:	80		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-142		4,000	821	5.78		
3	-287		8,000	1,643	5.72		
4	-420		12,000	2,464	5.87		
5	-543		16,000	3,285	6.05		
6	-648		20,000	4,107	6.34		
7	-763		24,000	4,928	6.46		
8	-867		28,000	5,749	6.63		
9	-977		32,000	6,571	6.73		
10	-1,074		36,000	7,392	6.88		
11	-1,177		40,000	8,214	6.98		
12	-1,275		44,000	9,035	7.09		
13	-1,375		48,000	9,856	7.17		
14	-1,472		52,000	10,678	7.25		
15	-1,659		60,000	12,320	7.43		
16	-1,844		68,000	13,963	7.57		
17	-2,032		76,000	15,606	7.68		
18	-2,215		84,000	17,248	7.79		
19	-2,397		92,000	18,891	7.88		
20	-2,577		100,000	20,534	7.97		
21	-2,756		108,000	22,177	8.05		
22	-2,947		116,000	23,819	8.08		
23	-3,132		124,000	25,462	8.13		
24	-3,333		132,000	27,105	8.13		
25	-3,568		140,000	28,747	8.06		
26	-3,967		148,000	30,390	7.66		
27			150,011	30,803			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



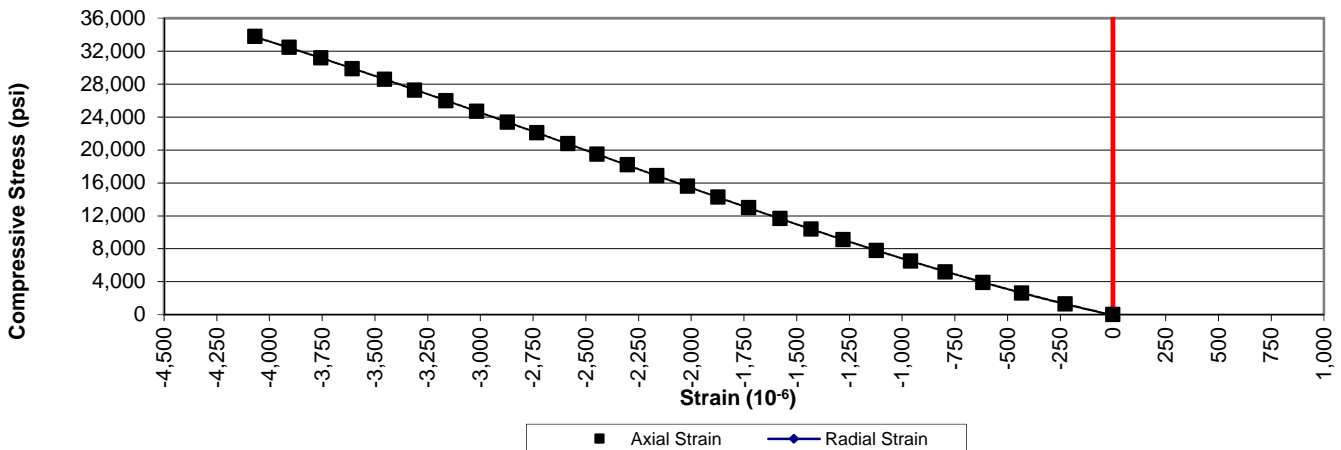
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.54	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.4	Reviewed by:	JBB
Sample No:	RC-9	Moisture Content, %:	0.2		
Depth (ft):	60.6 - 61.7	Load Rate, psi/sec:	83		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-226		4,000	1,299	5.75		
3	-433		8,000	2,597	6.00		
4	-617		12,000	3,896	6.31		
5	-796		16,000	5,195	6.53		
6	-960		20,000	6,494	6.76		
7	-1,122		24,000	7,792	6.94		
8	-1,279		28,000	9,091	7.11		
9	-1,432		32,000	10,390	7.26		
10	-1,579		36,000	11,688	7.40		
11	-1,727		40,000	12,987	7.52		
12	-1,873		44,000	14,286	7.63		
13	-2,018		48,000	15,584	7.72		
14	-2,163		52,000	16,883	7.81		
15	-2,303		56,000	18,182	7.89		
16	-2,447		60,000	19,481	7.96		
17	-2,585		64,000	20,779	8.04		
18	-2,732		68,000	22,078	8.08		
19	-2,872		72,000	23,377	8.14		
20	-3,017		76,000	24,675	8.18		
21	-3,163		80,000	25,974	8.21		
22	-3,312		84,000	27,273	8.23		
23	-3,454		88,000	28,571	8.27		
24	-3,607		92,000	29,870	8.28		
25	-3,757		96,000	31,169	8.30		
26	-3,907		100,000	32,468	8.31		
27	-4,069		104,000	33,766	8.30		
28			104,528	33,938			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



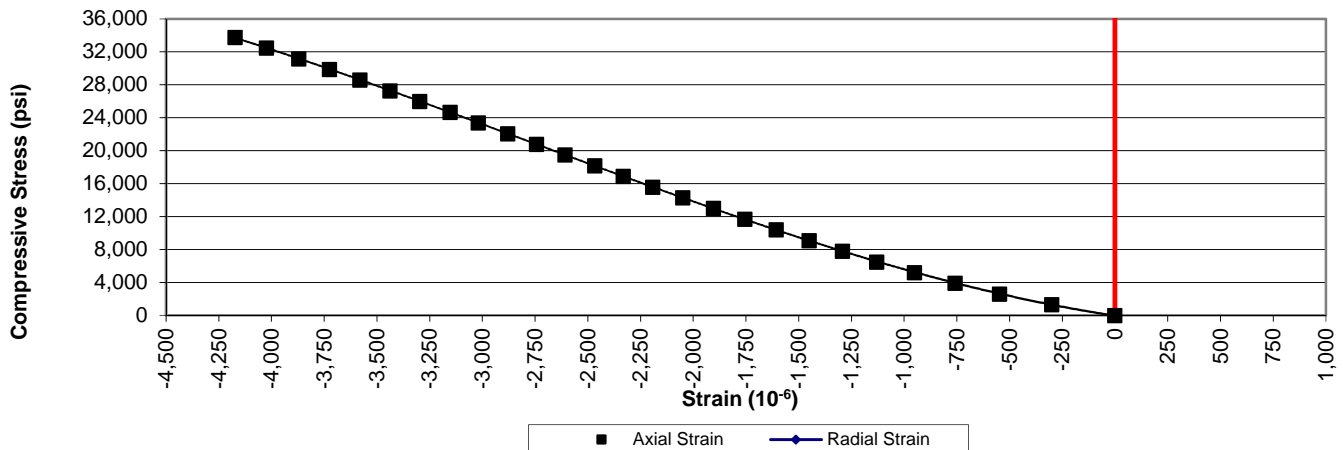
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.51	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.9	Reviewed by:	JBB
Sample No:	RC-11	Moisture Content, %:	0.2		
Depth (ft):	70.6 - 71.8	Load Rate, psi/sec:	69		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-300		4,000	1,299	4.33		
3	-547		8,000	2,597	4.75		
4	-757		12,000	3,896	5.15		
5	-950		16,000	5,195	5.47		
6	-1,129		20,000	6,494	5.75		
7	-1,292		24,000	7,792	6.03		
8	-1,450		28,000	9,091	6.27		
9	-1,606		32,000	10,390	6.47		
10	-1,755		36,000	11,688	6.66		
11	-1,904		40,000	12,987	6.82		
12	-2,049		44,000	14,286	6.97		
13	-2,192		48,000	15,584	7.11		
14	-2,332		52,000	16,883	7.24		
15	-2,466		56,000	18,182	7.37		
16	-2,607		60,000	19,481	7.47		
17	-2,743		64,000	20,779	7.58		
18	-2,879		68,000	22,078	7.67		
19	-3,019		72,000	23,377	7.74		
20	-3,152		76,000	24,675	7.83		
21	-3,297		80,000	25,974	7.88		
22	-3,438		84,000	27,273	7.93		
23	-3,580		88,000	28,571	7.98		
24	-3,725		92,000	29,870	8.02		
25	-3,870		96,000	31,169	8.05		
26	-4,024		100,000	32,468	8.07		
27	-4,172		104,000	33,766	8.09		
28			105,328	34,197			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS AND POISSON'S RATIO
(ASTM D7012 Method C and D)



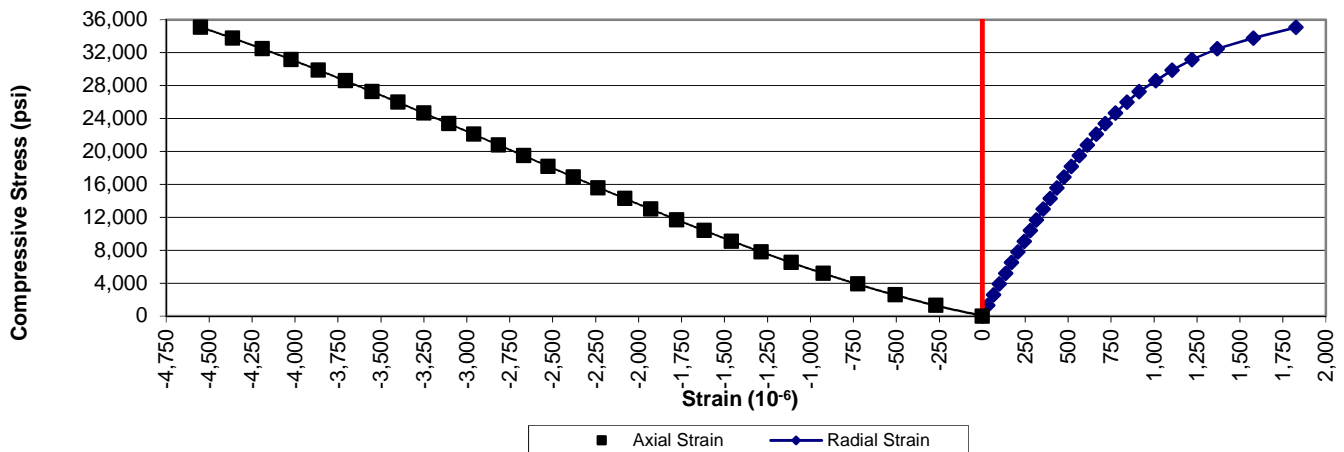
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.52	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.6	Reviewed by:	JBB
Sample No:	RC-13	Moisture Content, %:	0.2		
Depth (ft):	80.6 - 81.8	Load Rate, psi/sec:	77		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0	0	0	0	0.00	0.00	
2	-270	32	4,000	1,299	4.81	0.12	
3	-507	65	8,000	2,597	5.12	0.13	
4	-724	100	12,000	3,896	5.38	0.14	
5	-925	137	16,000	5,195	5.62	0.15	
6	-1,112	170	20,000	6,494	5.84	0.15	
7	-1,287	207	24,000	7,792	6.05	0.16	
8	-1,460	244	28,000	9,091	6.23	0.17	
9	-1,618	280	32,000	10,390	6.42	0.17	
10	-1,779	316	36,000	11,688	6.57	0.18	
11	-1,929	355	40,000	12,987	6.73	0.18	
12	-2,080	395	44,000	14,286	6.87	0.19	
13	-2,236	435	48,000	15,584	6.97	0.19	
14	-2,380	475	52,000	16,883	7.09	0.20	
15	-2,527	519	56,000	18,182	7.20	0.21	
16	-2,669	564	60,000	19,481	7.30	0.21	
17	-2,815	611	64,000	20,779	7.38	0.22	
18	-2,959	663	68,000	22,078	7.46	0.22	
19	-3,104	716	72,000	23,377	7.53	0.23	
20	-3,250	776	76,000	24,675	7.59	0.24	
21	-3,400	842	80,000	25,974	7.64	0.25	
22	-3,552	913	84,000	27,273	7.68	0.26	
23	-3,706	1,009	88,000	28,571	7.71	0.27	
24	-3,864	1,104	92,000	29,870	7.73	0.29	
25	-4,023	1,220	96,000	31,169	7.75	0.30	
26	-4,191	1,368	100,000	32,468	7.75	0.33	
27	-4,363	1,578	104,000	33,766	7.74	0.36	
28	-4,550	1,826	108,000	35,065	7.71	0.40	
29			111,542	36,215			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



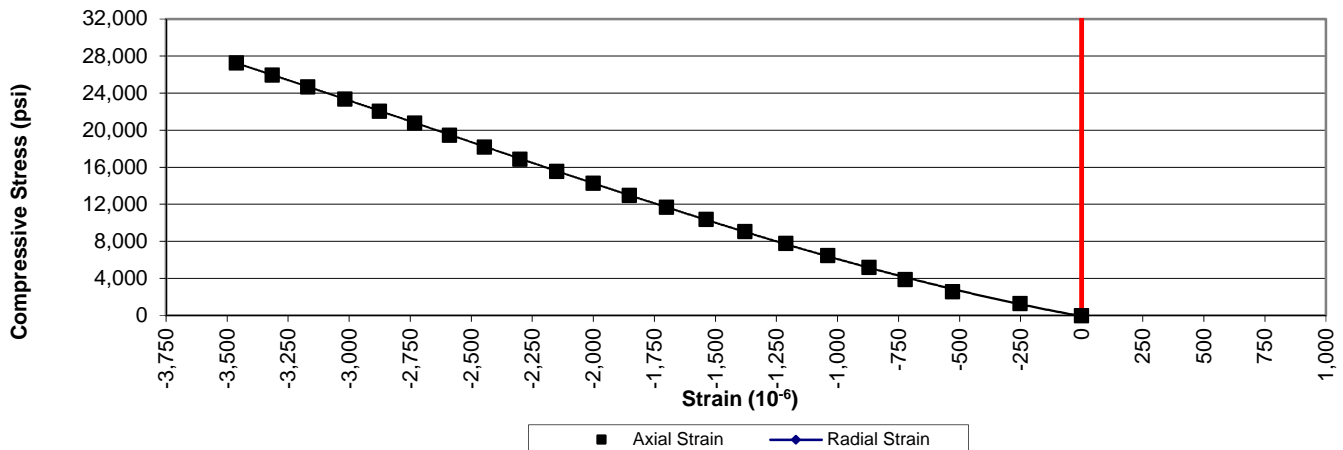
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.49	Tested by:	BKP / MG
Boring Id:	DH-6	Unit Weight, pcf:	165.8	Reviewed by:	JBB
Sample No:	RC-15	Moisture Content, %:	0.2		
Depth (ft):	94.4 - 95.6	Load Rate, psi/sec:	84		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-252		4,000	1,299	5.15		
3	-528		8,000	2,597	4.92		
4	-722		12,000	3,896	5.40		
5	-870		16,000	5,195	5.97		
6	-1,040		20,000	6,494	6.24		
7	-1,211		24,000	7,792	6.43		
8	-1,379		28,000	9,091	6.59		
9	-1,538		32,000	10,390	6.76		
10	-1,700		36,000	11,688	6.88		
11	-1,852		40,000	12,987	7.01		
12	-2,000		44,000	14,286	7.14		
13	-2,150		48,000	15,584	7.25		
14	-2,300		52,000	16,883	7.34		
15	-2,446		56,000	18,182	7.43		
16	-2,589		60,000	19,481	7.52		
17	-2,732		64,000	20,779	7.61		
18	-2,876		68,000	22,078	7.68		
19	-3,018		72,000	23,377	7.75		
20	-3,169		76,000	24,675	7.79		
21	-3,315		80,000	25,974	7.84		
22	-3,462		84,000	27,273	7.88		lost readings
23			106,709	34,646			Failure
24							
25							
26							
27							
28							

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



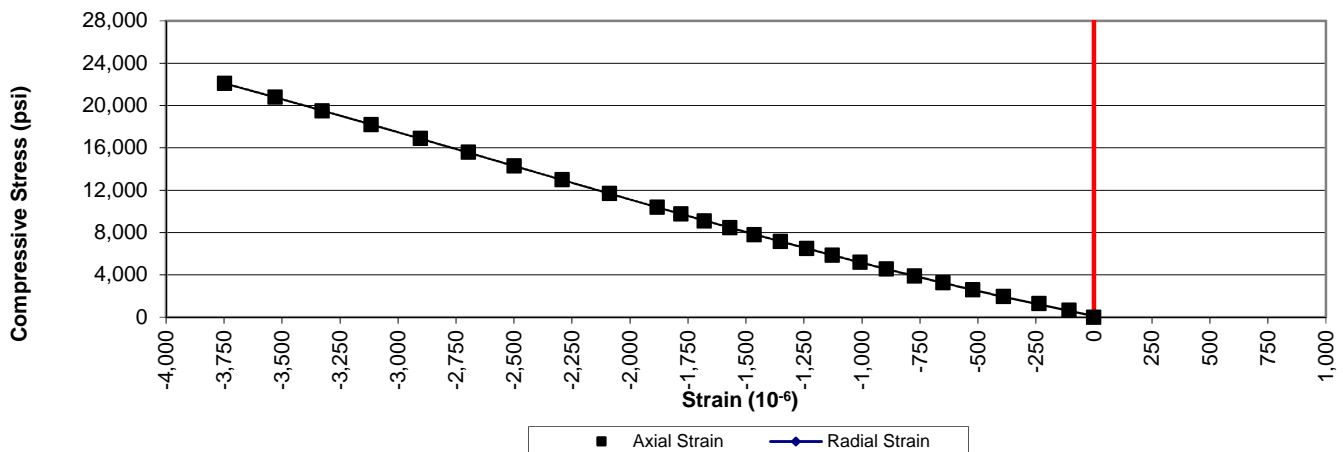
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.50	Tested by:	BKP / MG
Boring Id:	B-38	Unit Weight, pcf:	168.9	Reviewed by:	JBB
Sample No:	RC-1	Moisture Content, %:	0.2		
Depth (ft):	11.9 - 13.1	Load Rate, psi/sec:	63		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-107		2,000	649	6.07		
3	-237		4,000	1,299	5.48		
4	-389		6,000	1,948	5.01		
5	-522		8,000	2,597	4.98		
6	-650		10,000	3,247	5.00		
7	-773		12,000	3,896	5.04		
8	-894		14,000	4,545	5.08		
9	-1,008		16,000	5,195	5.15		
10	-1,127		18,000	5,844	5.19		
11	-1,238		20,000	6,494	5.25		
12	-1,351		22,000	7,143	5.29		
13	-1,464		24,000	7,792	5.32		
14	-1,569		26,000	8,442	5.38		
15	-1,679		28,000	9,091	5.41		
16	-1,780		30,000	9,740	5.47		
17	-1,883		32,000	10,390	5.52		
18	-2,088		36,000	11,688	5.60		
19	-2,292		40,000	12,987	5.67		
20	-2,499		44,000	14,286	5.72		
21	-2,696		48,000	15,584	5.78		
22	-2,903		52,000	16,883	5.82		
23	-3,115		56,000	18,182	5.84		
24	-3,327		60,000	19,481	5.86		
25	-3,529		64,000	20,779	5.89		
26	-3,748		68,000	22,078	5.89		
27			71,285	23,144			Failure
28							

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



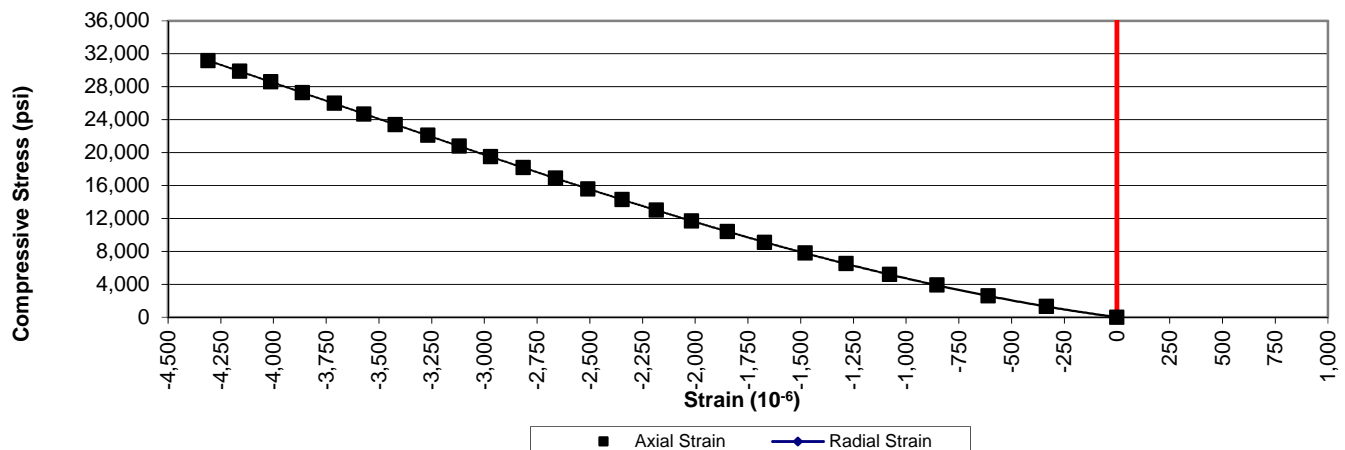
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.46	Tested by:	BKP / MG
Boring Id:	B-38	Unit Weight, pcf:	165.4	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.1		
Depth (ft):	20.5 - 21.6	Load Rate, psi/sec:	75		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-335		4,000	1,299	3.88		
3	-611		8,000	2,597	4.25		
4	-854		12,000	3,896	4.56		
5	-1,078		16,000	5,195	4.82		
6	-1,285		20,000	6,494	5.05		
7	-1,478		24,000	7,792	5.27		
8	-1,672		28,000	9,091	5.44		
9	-1,848		32,000	10,390	5.62		
10	-2,018		36,000	11,688	5.79		
11	-2,184		40,000	12,987	5.95		
12	-2,346		44,000	14,286	6.09		
13	-2,509		48,000	15,584	6.21		
14	-2,662		52,000	16,883	6.34		
15	-2,815		56,000	18,182	6.46		
16	-2,971		60,000	19,481	6.56		
17	-3,119		64,000	20,779	6.66		
18	-3,268		68,000	22,078	6.76		
19	-3,422		72,000	23,377	6.83		
20	-3,571		76,000	24,675	6.91		
21	-3,711		80,000	25,974	7.00		
22	-3,862		84,000	27,273	7.06		
23	-4,013		88,000	28,571	7.12		
24	-4,160		92,000	29,870	7.18		
25	-4,311		96,000	31,169	7.23		
26			98,802	32,079			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



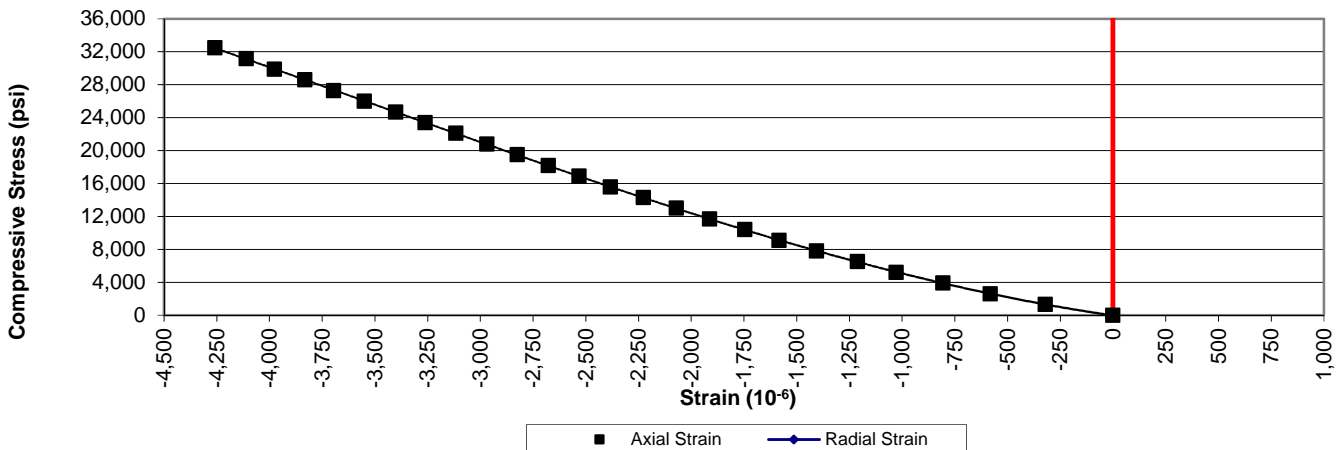
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.51	Tested by:	BKP / MG
Boring Id:	B-38	Unit Weight, pcf:	166.0	Reviewed by:	JBB
Sample No:	RC-5	Moisture Content, %:	0.1		
Depth (ft):	30.5 - 31.7	Load Rate, psi/sec:	74		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-321		4,000	1,299	4.05		
3	-581		8,000	2,597	4.47		
4	-807		12,000	3,896	4.83		
5	-1,028		16,000	5,195	5.05		
6	-1,212		20,000	6,494	5.36		
7	-1,405		24,000	7,792	5.55		
8	-1,583		28,000	9,091	5.74		
9	-1,745		32,000	10,390	5.95		
10	-1,912		36,000	11,688	6.11		
11	-2,071		40,000	12,987	6.27		
12	-2,227		44,000	14,286	6.41		
13	-2,383		48,000	15,584	6.54		
14	-2,531		52,000	16,883	6.67		
15	-2,678		56,000	18,182	6.79		
16	-2,825		60,000	19,481	6.90		
17	-2,969		64,000	20,779	7.00		
18	-3,116		68,000	22,078	7.09		
19	-3,261		72,000	23,377	7.17		
20	-3,401		76,000	24,675	7.26		
21	-3,550		80,000	25,974	7.32		
22	-3,696		84,000	27,273	7.38		
23	-3,832		88,000	28,571	7.46		
24	-3,977		92,000	29,870	7.51		
25	-4,110		96,000	31,169	7.58		
26	-4,258		100,000	32,468			
27			100,801	32,728			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



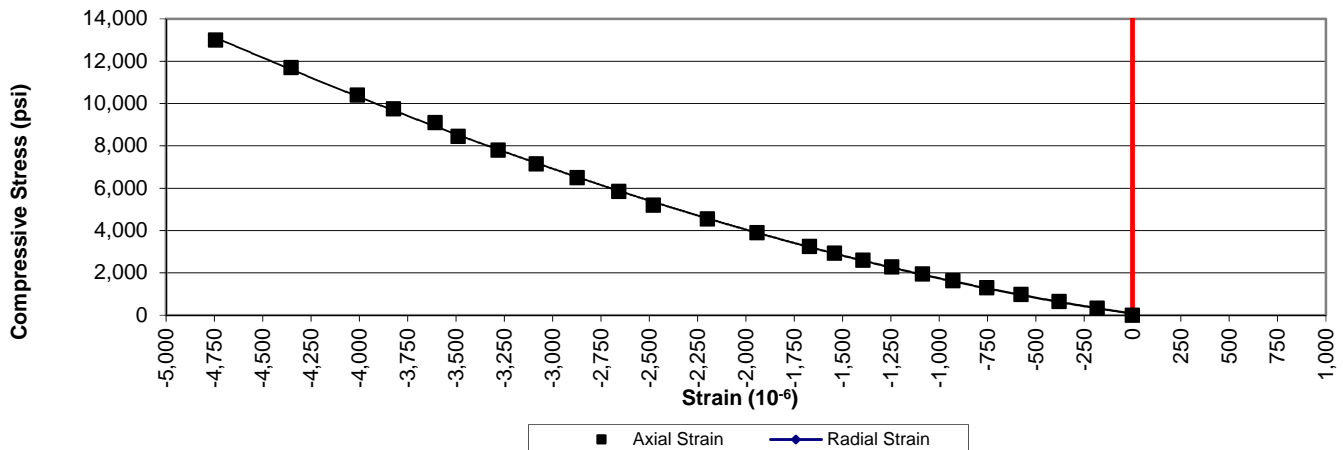
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.51	Tested by:	BKP / MG
Boring Id:	B-40	Unit Weight, pcf:	163.0	Reviewed by:	JBB
Sample No:	RC-1	Moisture Content, %:	0.3		
Depth (ft):	77.7 - 78.5	Load Rate, psi/sec:	62		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-182		1,000	325	1.79		
3	-379		2,000	649	1.71		
4	-576		3,000	974	1.69		
5	-754		4,000	1,299	1.72		
6	-929		5,000	1,623	1.75		
7	-1,087		6,000	1,948	1.79		
8	-1,245		7,000	2,273	1.83		
9	-1,394		8,000	2,597	1.86		
10	-1,542		9,000	2,922	1.89		
11	-1,671		10,000	3,247	1.94		
12	-1,942		12,000	3,896	2.01		
13	-2,199		14,000	4,545	2.07		
14	-2,479		16,000	5,195	2.10		
15	-2,658		18,000	5,844	2.20		
16	-2,872		20,000	6,494	2.26		
17	-3,085		22,000	7,143	2.32		
18	-3,281		24,000	7,792	2.37		
19	-3,488		26,000	8,442	2.42		
20	-3,608		28,000	9,091	2.52		
21	-3,823		30,000	9,740	2.55		
22	-4,010		32,000	10,390	2.59		
23	-4,353		36,000	11,688	2.69		
24	-4,744		40,000	12,987	2.74		
25			40,733	13,225			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



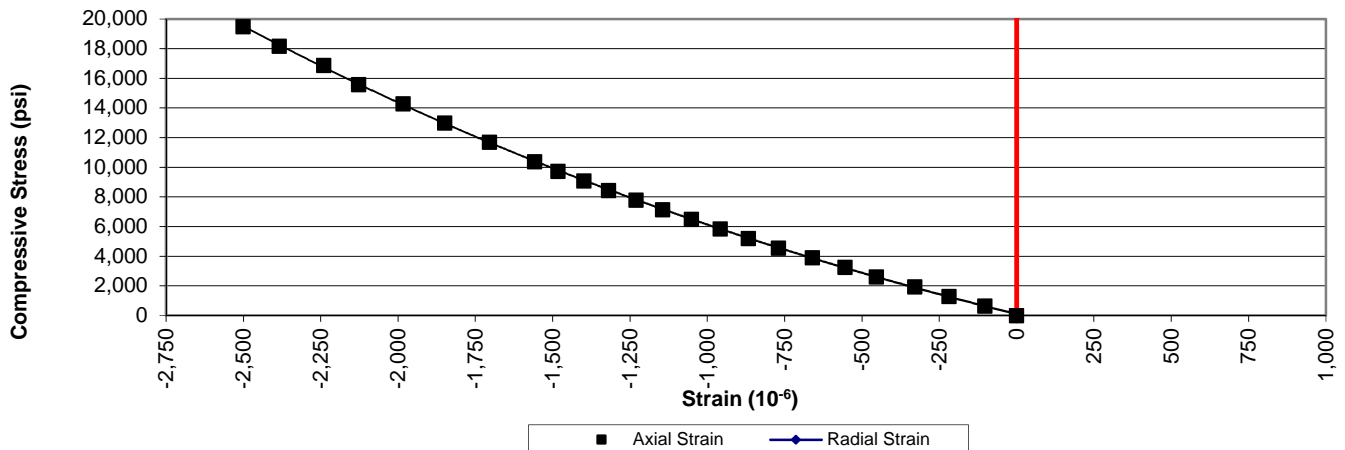
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	2/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.50	Tested by:	BKP / MG
Boring Id:	B-41	Unit Weight, pcf:	164.5	Reviewed by:	JBB
Sample No:	RC-5	Moisture Content, %:	0.3		
Depth (ft):	75.5 - 76.4	Load Rate, psi/sec:	88		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0	0	0	0	0.00		
2	-102		2,000	649	6.36		
3	-218		4,000	1,299	5.96		
4	-329		6,000	1,948	5.92		
5	-453		8,000	2,597	5.73		
6	-554		10,000	3,247	5.86		
7	-660		12,000	3,896	5.90		
8	-770		14,000	4,545	5.90		
9	-867		16,000	5,195	5.99		
10	-958		18,000	5,844	6.10		
11	-1,051		20,000	6,494	6.18		
12	-1,144		22,000	7,143	6.24		
13	-1,230		24,000	7,792	6.33		
14	-1,319		26,000	8,442	6.40		
15	-1,399		28,000	9,091	6.50		
16	-1,482		30,000	9,740	6.57		
17	-1,558		32,000	10,390	6.67		
18	-1,704		36,000	11,688	6.86		
19	-1,849		40,000	12,987	7.02		
20	-1,983		44,000	14,286	7.20		
21	-2,127		48,000	15,584	7.33		
22	-2,240		52,000	16,883	7.54		
23	-2,384		56,000	18,182	7.63		
24	-2,501		60,000	19,481	7.79		lost readings
25			72,883	23,663			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

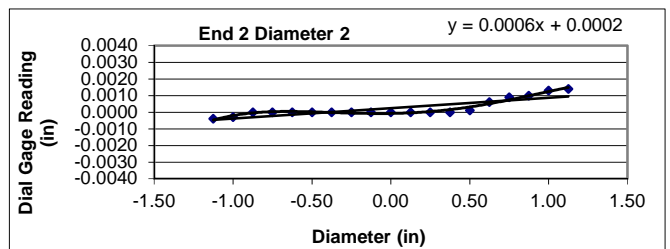
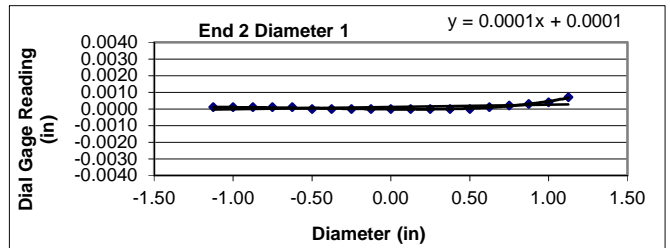
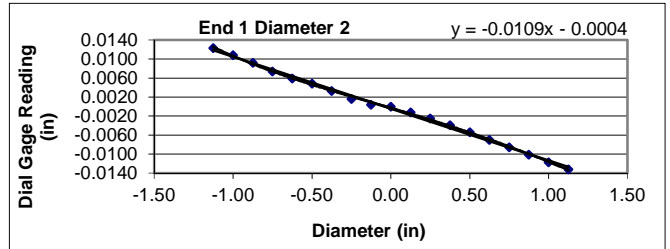
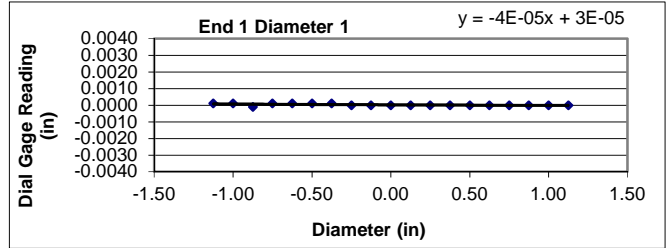
Project:	Carolina Crossroads Project	Diameter (in):	2.47	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.65	Tested by:	BKP
Boring Id:	DH-6	Unit Weight (pcf):	165.1	Reviewed by:	JBB
Sample No.:	RC-1	Moisture Content (%):	0.2		
Depth (ft):	25.6 - 26.6				

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? NO Straightness Tolerance Met? NO

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	0.0001	0.0123	0.0001	-0.0004
-1	0.0001	0.0108	0.0001	-0.0003
- 7/8	-0.0001	0.0092	0.0001	0.0000
- 6/8	0.0001	0.0074	0.0001	0.0000
- 5/8	0.0001	0.0059	0.0001	0.0000
- 4/8	0.0001	0.0048	0.0000	0.0000
- 3/8	0.0001	0.0033	0.0000	0.0000
- 2/8	0.0000	0.0016	0.0000	0.0000
- 1/8	0.0000	0.0004	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0012	0.0000	0.0000
2/8	0.0000	-0.0025	0.0000	0.0000
3/8	0.0000	-0.0039	0.0000	0.0000
4/8	0.0000	-0.0054	0.0000	0.0001
5/8	0.0000	-0.0070	0.0001	0.0006
6/8	0.0000	-0.0086	0.0002	0.0009
7/8	0.0000	-0.0101	0.0003	0.0010
1	0.0000	-0.0117	0.0004	0.0013
1 1/8	0.0000	-0.0132	0.0007	0.0014



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00004
	Angle of Best Fit Line:	-0.00225
End 2:	Slope of Best Fit Line:	0.00014
	Angle of Best Fit Line:	0.00788
	Max Angular Difference:	-0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.01091
	Angle of Best Fit Line:	-0.62507
End 2:	Slope of Best Fit Line:	0.00063
	Angle of Best Fit Line:	0.03603
	Max Angular Difference:	-0.66

Parallelism Tolerance Met? NO

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0002	0.0001	YES
End 1 Diam 2	0.0255	0.0103	NO
End 2 Diam 1	0.0007	0.0003	YES
End 2 Diam 2	0.0018	0.0007	YES

Perpendicularity Tolerance Met? NO

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

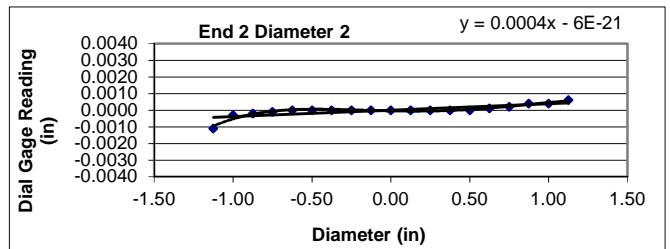
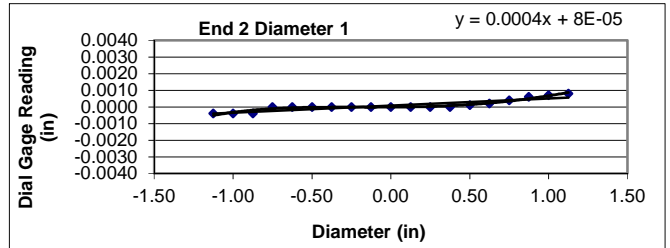
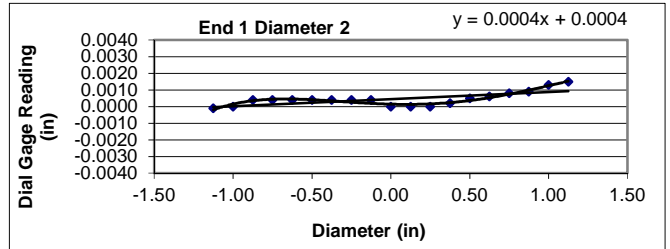
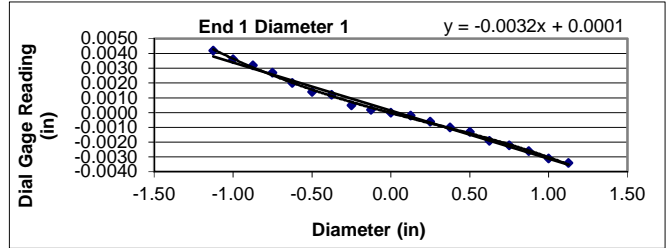
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.64	Tested by:	BKP
Boring Id:	DH-6	Unit Weight (pcf):	165.7	Reviewed by:	JBB
Sample No.:	RC-3	Moisture Content (%):	0.2		
Depth (ft):	35.4-36.5				

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	0.0042	-0.0001	-0.0004	-0.0011
-1	0.0036	0.0000	-0.0004	-0.0003
- 7/8	0.0032	0.0004	-0.0004	-0.0002
- 6/8	0.0027	0.0004	0.0000	-0.0001
- 5/8	0.0020	0.0004	0.0000	0.0000
- 4/8	0.0014	0.0004	0.0000	0.0000
- 3/8	0.0012	0.0004	0.0000	0.0000
- 2/8	0.0005	0.0004	0.0000	0.0000
- 1/8	0.0002	0.0004	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0002	0.0000	0.0000	0.0000
2/8	-0.0006	0.0000	0.0000	0.0000
3/8	-0.0010	0.0002	0.0000	0.0000
4/8	-0.0013	0.0005	0.0001	0.0000
5/8	-0.0019	0.0006	0.0002	0.0001
6/8	-0.0022	0.0008	0.0004	0.0002
7/8	-0.0026	0.0009	0.0006	0.0004
1	-0.0031	0.0013	0.0007	0.0004
1 1/8	-0.0034	0.0015	0.0008	0.0006



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00325
	Angle of Best Fit Line:	-0.18616
End 2:	Slope of Best Fit Line:	0.00043
	Angle of Best Fit Line:	0.02445
	Max Angular Difference:	-0.21

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00043
	Angle of Best Fit Line:	0.02437
End 2:	Slope of Best Fit Line:	0.00038
	Angle of Best Fit Line:	0.02203
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0076	0.0031	YES
End 1 Diam 2	0.0016	0.0006	YES
End 2 Diam 1	0.0012	0.0005	YES
End 2 Diam 2	0.0017	0.0007	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

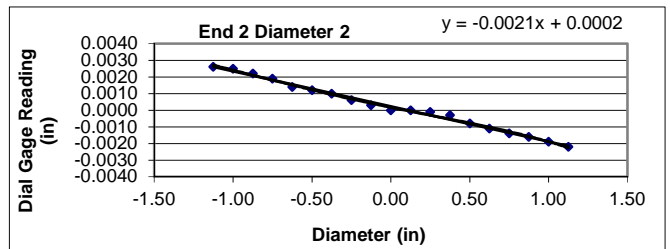
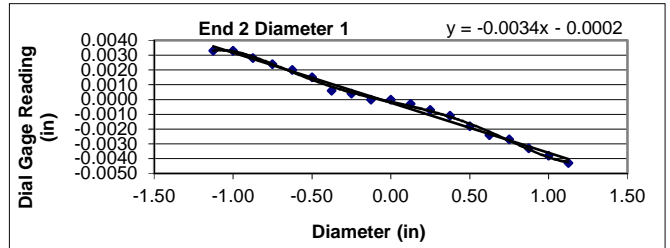
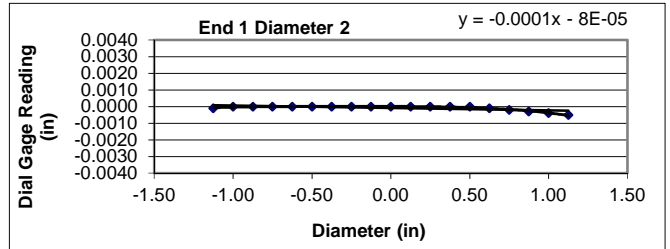
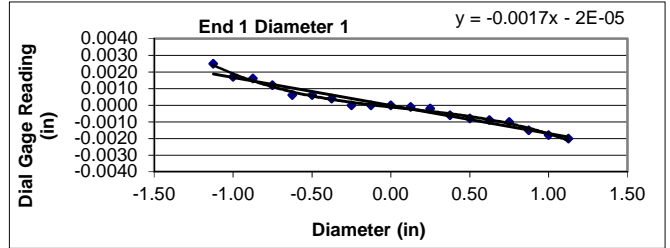
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.69	Tested by:	BKP
Boring Id:	DH-6	Unit Weight (pcf):	165.4	Reviewed by:	JBB
Sample No.:	RC-5	Moisture Content (%):	0.3		
Depth (ft):	47.3-48.6				

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	0.0025	-0.0001	0.0033	0.0026
-1	0.0017	0.0000	0.0033	0.0025
- 7/8	0.0016	0.0000	0.0028	0.0022
- 6/8	0.0012	0.0000	0.0024	0.0019
- 5/8	0.0006	0.0000	0.0020	0.0014
- 4/8	0.0006	0.0000	0.0015	0.0012
- 3/8	0.0004	0.0000	0.0006	0.0010
- 2/8	0.0000	0.0000	0.0004	0.0006
- 1/8	0.0000	0.0000	0.0000	0.0003
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0001	0.0000	-0.0003	0.0000
2/8	-0.0002	0.0000	-0.0007	-0.0001
3/8	-0.0006	0.0000	-0.0011	-0.0003
4/8	-0.0008	0.0000	-0.0018	-0.0008
5/8	-0.0009	-0.0001	-0.0024	-0.0011
6/8	-0.0010	-0.0002	-0.0027	-0.0014
7/8	-0.0015	-0.0003	-0.0033	-0.0016
1	-0.0018	-0.0004	-0.0038	-0.0019
1 1/8	-0.0020	-0.0005	-0.0043	-0.0022



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00168
	Angle of Best Fit Line:	-0.09650
End 2:	Slope of Best Fit Line:	-0.00339
	Angle of Best Fit Line:	-0.19404
	Max Angular Difference:	0.10

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00015
	Angle of Best Fit Line:	-0.00852
End 2:	Slope of Best Fit Line:	-0.00212
	Angle of Best Fit Line:	-0.12135
	Max Angular Difference:	0.11

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0045	0.0018	YES
End 1 Diam 2	0.0005	0.0002	YES
End 2 Diam 1	0.0076	0.0031	YES
End 2 Diam 2	0.0048	0.0019	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

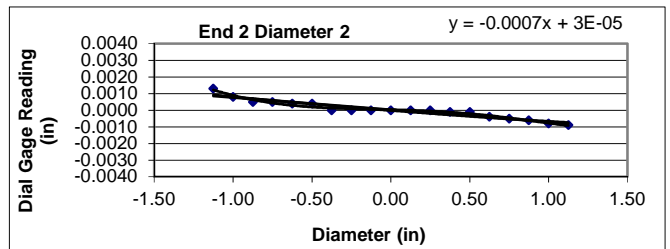
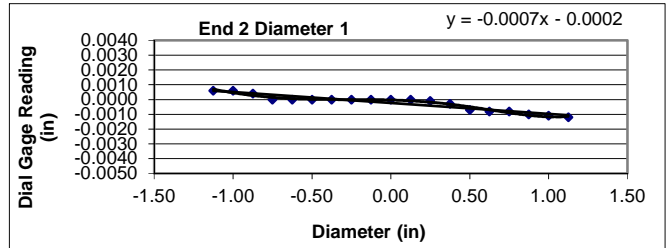
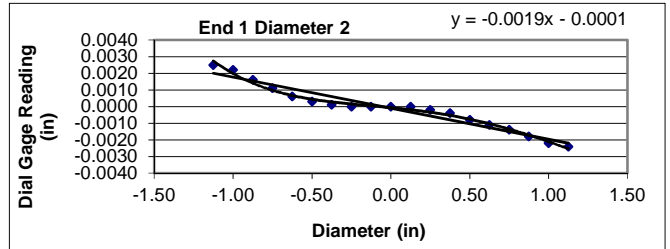
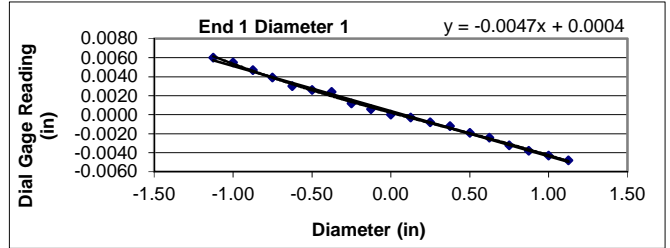
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.68	Tested by:	BKP
Boring Id:	DH-6	Unit Weight (pcf):	165.2	Reviewed by:	JBB
Sample No.:	RC-7	Moisture Content (%):	0.2		
Depth (ft):	58.2-59.2				

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	0.0060	0.0025	0.0006	0.0013
-1	0.0055	0.0022	0.0006	0.0008
- 7/8	0.0047	0.0016	0.0004	0.0005
- 6/8	0.0039	0.0011	0.0000	0.0005
- 5/8	0.0030	0.0006	0.0000	0.0004
- 4/8	0.0026	0.0003	0.0000	0.0004
- 3/8	0.0024	0.0001	0.0000	0.0000
- 2/8	0.0012	0.0000	0.0000	0.0000
- 1/8	0.0006	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0003	0.0000	0.0000	0.0000
2/8	-0.0008	-0.0002	-0.0001	0.0000
3/8	-0.0012	-0.0004	-0.0003	-0.0001
4/8	-0.0019	-0.0008	-0.0007	-0.0001
5/8	-0.0024	-0.0011	-0.0008	-0.0004
6/8	-0.0032	-0.0014	-0.0008	-0.0005
7/8	-0.0038	-0.0018	-0.0010	-0.0006
1	-0.0043	-0.0022	-0.0011	-0.0008
1 1/8	-0.0048	-0.0024	-0.0012	-0.0009



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00475
	Angle of Best Fit Line:	-0.27212
End 2:	Slope of Best Fit Line:	-0.00073
	Angle of Best Fit Line:	-0.04206
	Max Angular Difference:	-0.23

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00187
	Angle of Best Fit Line:	-0.10687
End 2:	Slope of Best Fit Line:	-0.00074
	Angle of Best Fit Line:	-0.04230
	Max Angular Difference:	-0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0108	0.0043	YES
End 1 Diam 2	0.0049	0.0020	YES
End 2 Diam 1	0.0018	0.0007	YES
End 2 Diam 2	0.0022	0.0009	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

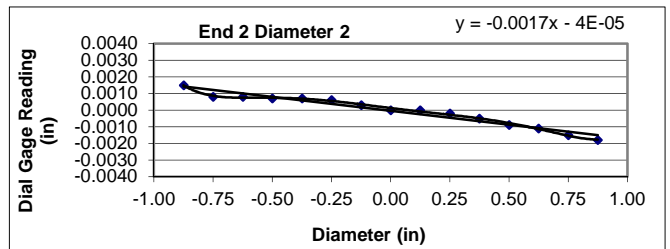
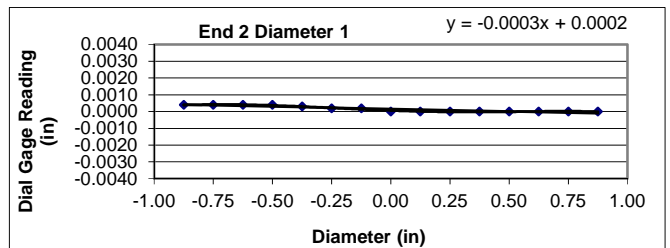
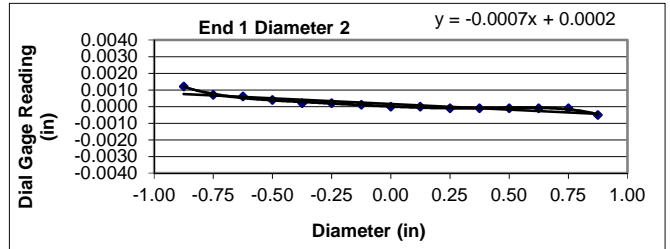
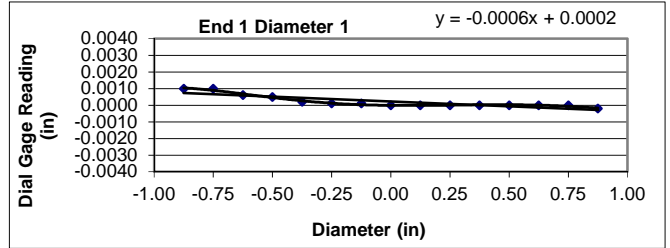
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.54	Tested by: BKP
Boring Id: DH-6	Unit Weight (pcf): 165.4	Reviewed by: JBB
Sample No.: RC-9	Moisture Content (%): 0.2	
Depth (ft): 60.6 - 61.7		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0010	0.0012	0.0004	0.0015
- 6/8	0.0010	0.0007	0.0004	0.0008
- 5/8	0.0006	0.0006	0.0004	0.0008
- 4/8	0.0005	0.0004	0.0004	0.0007
- 3/8	0.0002	0.0002	0.0003	0.0007
- 2/8	0.0001	0.0002	0.0002	0.0006
- 1/8	0.0001	0.0001	0.0002	0.0003
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	-0.0001	0.0000	-0.0002
3/8	0.0000	-0.0001	0.0000	-0.0005
4/8	0.0000	-0.0001	0.0000	-0.0009
5/8	0.0000	-0.0001	0.0000	-0.0011
6/8	0.0000	-0.0001	0.0000	-0.0015
7/8	-0.0002	-0.0005	0.0000	-0.0018



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00058
	Angle of Best Fit Line:	-0.03323
End 2:	Slope of Best Fit Line:	-0.00029
	Angle of Best Fit Line:	-0.01686
	Max Angular Difference:	-0.02

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00068
	Angle of Best Fit Line:	-0.03896
End 2:	Slope of Best Fit Line:	-0.00167
	Angle of Best Fit Line:	-0.09544
	Max Angular Difference:	0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0012	0.0006	YES
End 1 Diam 2	0.0017	0.0009	YES
End 2 Diam 1	0.0004	0.0002	YES
End 2 Diam 2	0.0033	0.0017	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

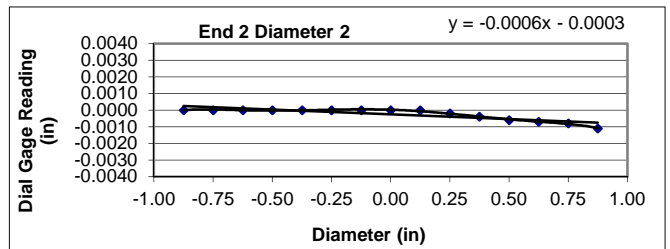
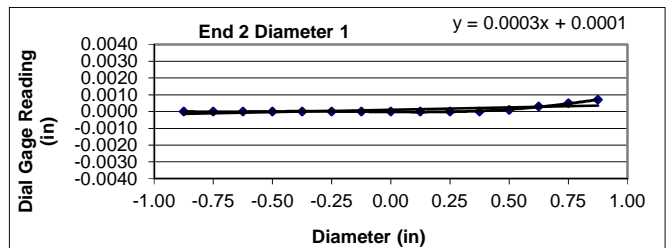
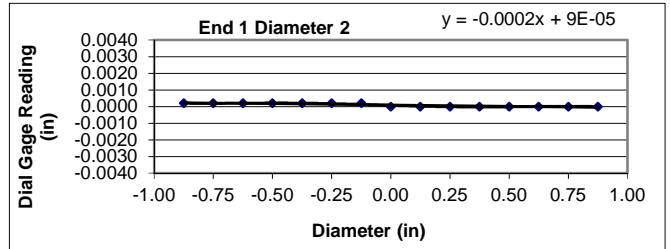
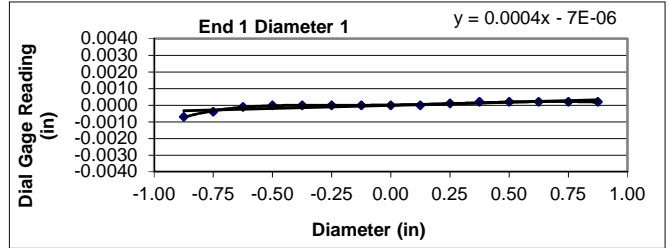
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.51	Tested by: BKP
Boring Id: DH-6	Unit Weight (pcf): 165.9	Reviewed by: JBB
Sample No.: RC-11	Moisture Content (%): 0.2	
Depth (ft): 70.6 - 71.8		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0007	0.0002	0.0000	0.0000
- 6/8	-0.0004	0.0002	0.0000	0.0000
- 5/8	-0.0001	0.0002	0.0000	0.0000
- 4/8	0.0000	0.0002	0.0000	0.0000
- 3/8	0.0000	0.0002	0.0000	0.0000
- 2/8	0.0000	0.0002	0.0000	0.0000
- 1/8	0.0000	0.0002	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0001	0.0000	0.0000	-0.0002
3/8	0.0002	0.0000	0.0000	-0.0004
4/8	0.0002	0.0000	0.0001	-0.0006
5/8	0.0002	0.0000	0.0003	-0.0007
6/8	0.0002	0.0000	0.0005	-0.0008
7/8	0.0002	0.0000	0.0007	-0.0011



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00037
	Angle of Best Fit Line:	0.02128
End 2:	Slope of Best Fit Line:	0.00028
	Angle of Best Fit Line:	0.01604
	Max Angular Difference:	0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00016
	Angle of Best Fit Line:	-0.00917
End 2:	Slope of Best Fit Line:	-0.00057
	Angle of Best Fit Line:	-0.03274
	Max Angular Difference:	0.02

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0009	0.0005	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0007	0.0004	YES
End 2 Diam 2	0.0011	0.0006	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

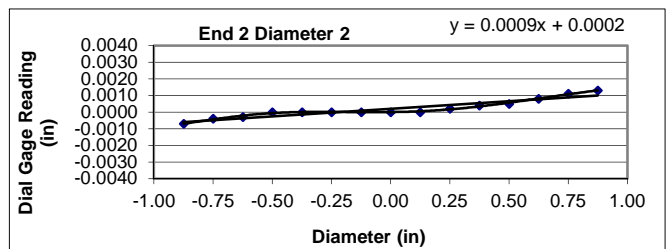
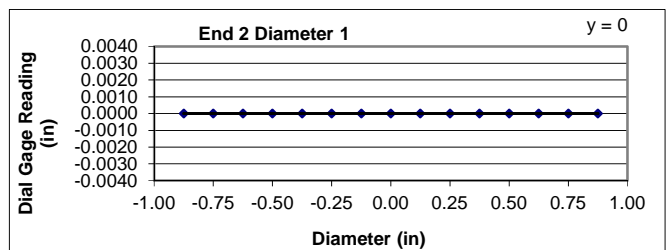
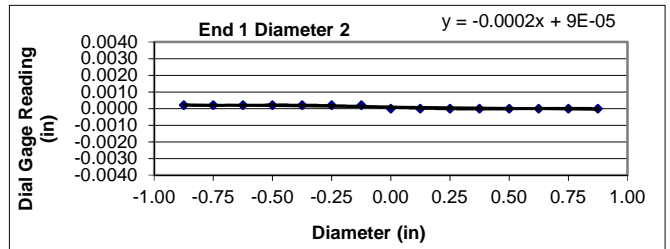
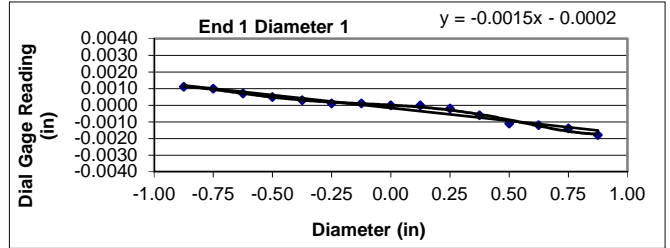
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.52	Tested by: BKP
Boring Id: DH-6	Unit Weight (pcf): 165.6	Reviewed by: JBB
Sample No.: RC-13	Moisture Content (%): 0.2	
Depth (ft): 80.6 - 81.8		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0011	0.0002	0.0000	-0.0007
- 6/8	0.0010	0.0002	0.0000	-0.0004
- 5/8	0.0007	0.0002	0.0000	-0.0003
- 4/8	0.0005	0.0002	0.0000	0.0000
- 3/8	0.0003	0.0002	0.0000	0.0000
- 2/8	0.0001	0.0002	0.0000	0.0000
- 1/8	0.0001	0.0002	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	-0.0002	0.0000	0.0000	0.0002
3/8	-0.0006	0.0000	0.0000	0.0004
4/8	-0.0011	0.0000	0.0000	0.0005
5/8	-0.0012	0.0000	0.0000	0.0008
6/8	-0.0014	0.0000	0.0000	0.0011
7/8	-0.0018	0.0000	0.0000	0.0013



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00154
	Angle of Best Fit Line:	-0.08840
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	-0.09

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00016
	Angle of Best Fit Line:	-0.00917
End 2:	Slope of Best Fit Line:	0.00092
	Angle of Best Fit Line:	0.05255
	Max Angular Difference:	-0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0029	0.0015	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0000	0.0000	YES
End 2 Diam 2	0.0020	0.0010	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

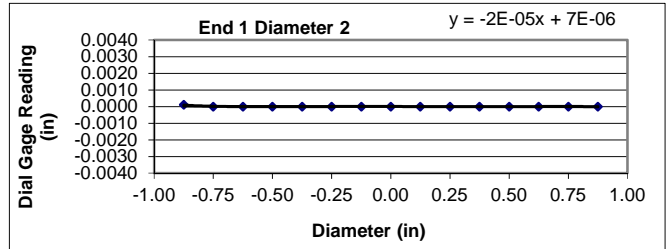
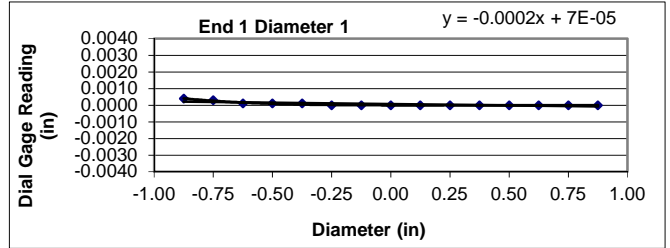
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.49	Tested by: BKP
Boring Id: DH-6	Unit Weight (pcf): 165.8	Reviewed by: JBB
Sample No.: RC-15	Moisture Content (%): 0.2	
Depth (ft): 94.4 - 95.6		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

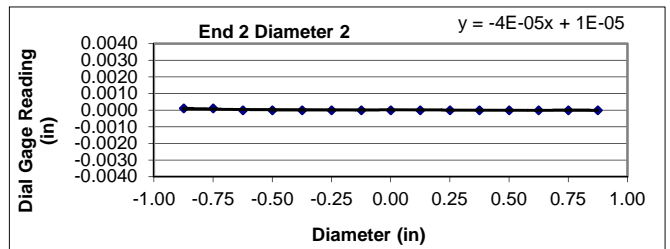
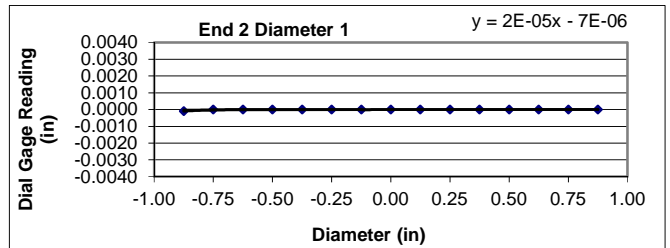
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0004	0.0001	-0.0001	0.0001
- 6/8	0.0003	0.0000	0.0000	0.0001
- 5/8	0.0001	0.0000	0.0000	0.0000
- 4/8	0.0001	0.0000	0.0000	0.0000
- 3/8	0.0001	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0000	0.0000	0.0000	0.0000
4/8	0.0000	0.0000	0.0000	0.0000
5/8	0.0000	0.0000	0.0000	0.0000
6/8	0.0000	0.0000	0.0000	0.0000
7/8	0.0000	0.0000	0.0000	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00017
	Angle of Best Fit Line:	-0.00949
End 2:	Slope of Best Fit Line:	0.00002
	Angle of Best Fit Line:	0.00115
	Max Angular Difference:	-0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00002
	Angle of Best Fit Line:	-0.00115
End 2:	Slope of Best Fit Line:	-0.00004
	Angle of Best Fit Line:	-0.00213
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0004	0.0002	YES
End 1 Diam 2	0.0001	0.0001	YES
End 2 Diam 1	0.0001	0.0001	YES
End 2 Diam 2	0.0001	0.0001	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

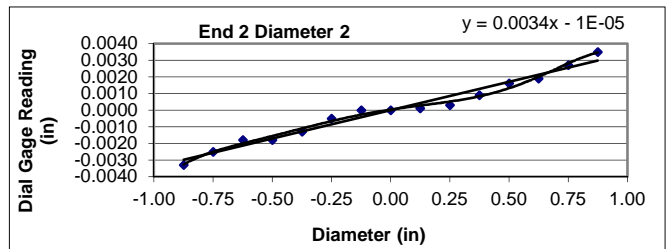
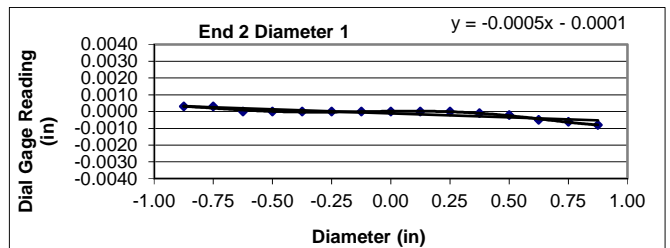
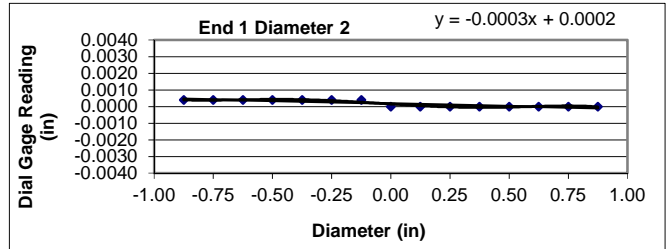
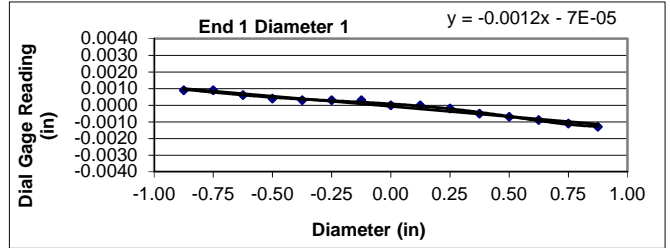
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.50	Tested by: BKP
Boring Id: B-38	Unit Weight (pcf): 168.9	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.2	
Depth (ft): 11.9 - 13.1		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0009	0.0004	0.0003	-0.0033
- 6/8	0.0009	0.0004	0.0003	-0.0025
- 5/8	0.0006	0.0004	0.0000	-0.0018
- 4/8	0.0004	0.0004	0.0000	-0.0018
- 3/8	0.0003	0.0004	0.0000	-0.0013
- 2/8	0.0003	0.0004	0.0000	-0.0005
- 1/8	0.0003	0.0004	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0001
2/8	-0.0002	0.0000	0.0000	0.0003
3/8	-0.0005	0.0000	-0.0001	0.0009
4/8	-0.0007	0.0000	-0.0002	0.0016
5/8	-0.0009	0.0000	-0.0005	0.0019
6/8	-0.0011	0.0000	-0.0006	0.0027
7/8	-0.0013	0.0000	-0.0008	0.0035



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00123
	Angle of Best Fit Line:	-0.07039
End 2:	Slope of Best Fit Line:	-0.00048
	Angle of Best Fit Line:	-0.02734
	Max Angular Difference:	-0.04

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00032
	Angle of Best Fit Line:	-0.01833
End 2:	Slope of Best Fit Line:	0.00341
	Angle of Best Fit Line:	0.19513
	Max Angular Difference:	-0.21

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0022	0.0011	YES
End 1 Diam 2	0.0004	0.0002	YES
End 2 Diam 1	0.0011	0.0006	YES
End 2 Diam 2	0.0068	0.0034	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

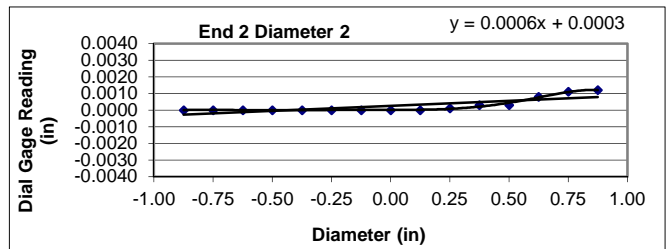
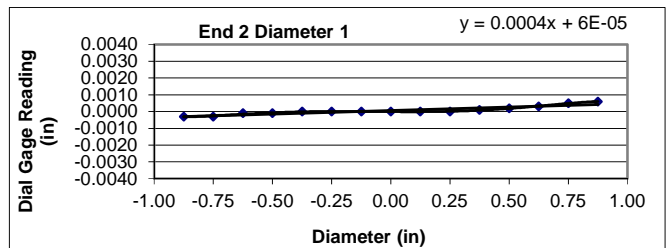
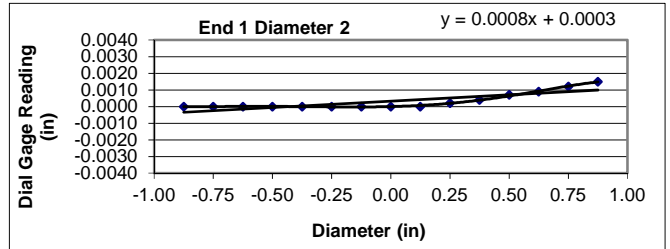
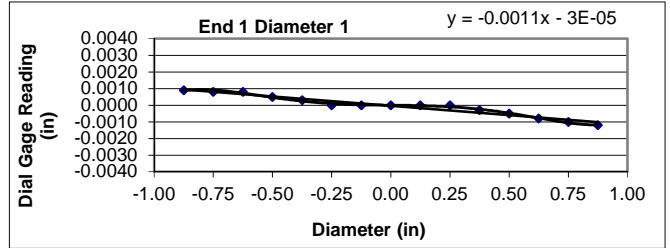
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.46	Tested by: BKP
Boring Id: B-38	Unit Weight (pcf): 165.3	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.1	
Depth (ft): 20.5 - 21.6		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0009	0.0000	-0.0003	0.0000
- 6/8	0.0008	0.0000	-0.0003	0.0000
- 5/8	0.0008	0.0000	-0.0001	0.0000
- 4/8	0.0005	0.0000	-0.0001	0.0000
- 3/8	0.0003	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0002	0.0000	0.0001
3/8	-0.0003	0.0004	0.0001	0.0003
4/8	-0.0005	0.0007	0.0002	0.0003
5/8	-0.0008	0.0009	0.0003	0.0008
6/8	-0.0010	0.0012	0.0005	0.0011
7/8	-0.0012	0.0015	0.0006	0.0012



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00112
	Angle of Best Fit Line:	-0.06433
End 2:	Slope of Best Fit Line:	0.00042
	Angle of Best Fit Line:	0.02390
	Max Angular Difference:	-0.09

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00076
	Angle of Best Fit Line:	0.04354
End 2:	Slope of Best Fit Line:	0.00061
	Angle of Best Fit Line:	0.03487
	Max Angular Difference:	0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0021	0.0011	YES
End 1 Diam 2	0.0015	0.0008	YES
End 2 Diam 1	0.0009	0.0005	YES
End 2 Diam 2	0.0012	0.0006	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

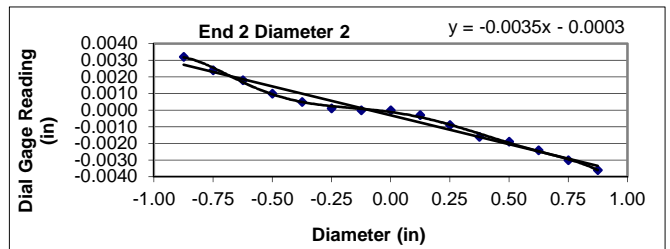
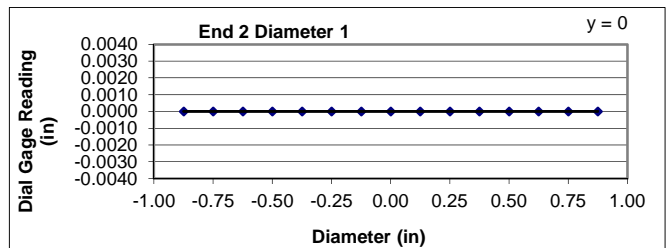
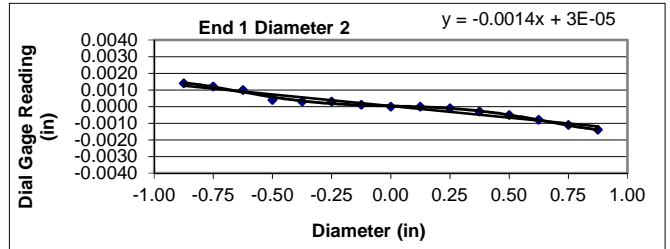
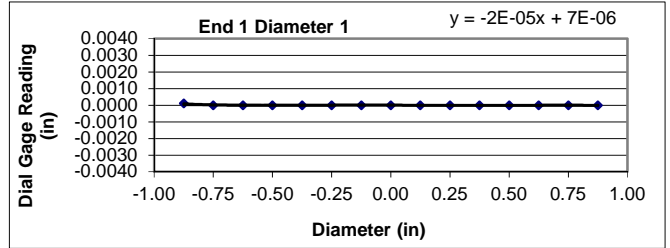
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.51	Tested by: BKP
Boring Id: B-38	Unit Weight (pcf): 166.0	Reviewed by: JBB
Sample No.: RC-5	Moisture Content (%): 0.1	
Depth (ft): 30.5 - 31.7		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0001	0.0014	0.0000	0.0032
- 6/8	0.0000	0.0012	0.0000	0.0024
- 5/8	0.0000	0.0010	0.0000	0.0018
- 4/8	0.0000	0.0004	0.0000	0.0010
- 3/8	0.0000	0.0003	0.0000	0.0005
- 2/8	0.0000	0.0003	0.0000	0.0001
- 1/8	0.0000	0.0001	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0003
2/8	0.0000	-0.0001	0.0000	-0.0009
3/8	0.0000	-0.0003	0.0000	-0.0016
4/8	0.0000	-0.0005	0.0000	-0.0019
5/8	0.0000	-0.0008	0.0000	-0.0024
6/8	0.0000	-0.0011	0.0000	-0.0030
7/8	0.0000	-0.0014	0.0000	-0.0036



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00002
	Angle of Best Fit Line:	-0.00115
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.00

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00139
	Angle of Best Fit Line:	-0.07972
End 2:	Slope of Best Fit Line:	-0.00346
	Angle of Best Fit Line:	-0.19841
	Max Angular Difference:	0.12

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0001	0.0001	YES
End 1 Diam 2	0.0028	0.0014	YES
End 2 Diam 1	0.0000	0.0000	YES
End 2 Diam 2	0.0068	0.0034	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

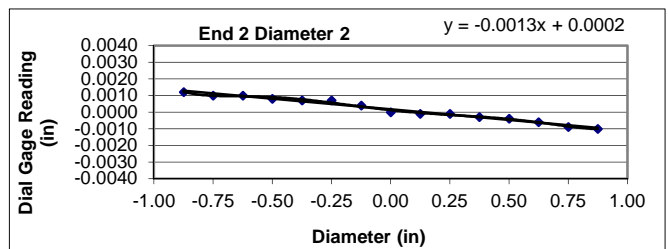
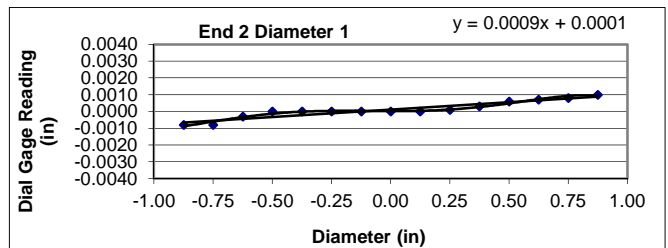
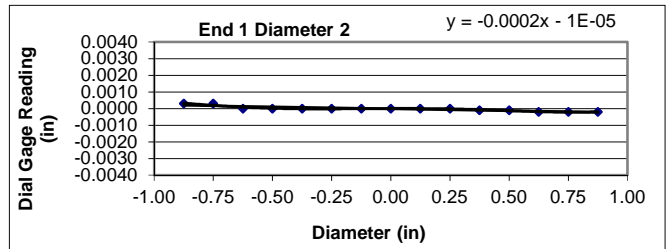
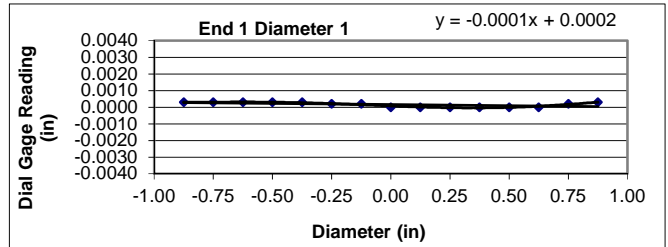
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.51	Tested by: BKP
Boring Id: B-40	Unit Weight (pcf): 163.0	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.3	
Depth (ft): 77.7 - 78.5		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0003	0.0003	-0.0008	0.0012
- 6/8	0.0003	0.0003	-0.0008	0.0010
- 5/8	0.0003	0.0000	-0.0003	0.0010
- 4/8	0.0003	0.0000	0.0000	0.0008
- 3/8	0.0003	0.0000	0.0000	0.0007
- 2/8	0.0002	0.0000	0.0000	0.0007
- 1/8	0.0002	0.0000	0.0000	0.0004
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0001
2/8	0.0000	0.0000	0.0001	-0.0001
3/8	0.0000	-0.0001	0.0003	-0.0003
4/8	0.0000	-0.0001	0.0006	-0.0004
5/8	0.0000	-0.0002	0.0007	-0.0006
6/8	0.0002	-0.0002	0.0008	-0.0009
7/8	0.0003	-0.0002	0.0010	-0.0010



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00014
	Angle of Best Fit Line:	-0.00786
End 2:	Slope of Best Fit Line:	0.00088
	Angle of Best Fit Line:	0.05026
	Max Angular Difference:	-0.06

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00023
	Angle of Best Fit Line:	-0.01342
End 2:	Slope of Best Fit Line:	-0.00128
	Angle of Best Fit Line:	-0.07317
	Max Angular Difference:	0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0003	0.0002	YES
End 1 Diam 2	0.0005	0.0003	YES
End 2 Diam 1	0.0018	0.0009	YES
End 2 Diam 2	0.0022	0.0011	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

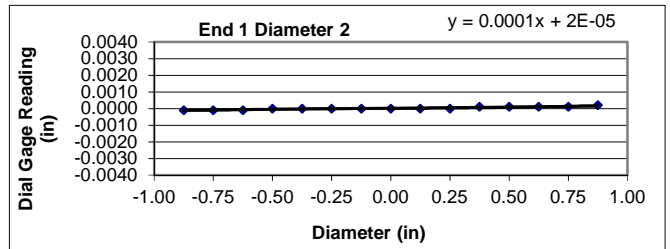
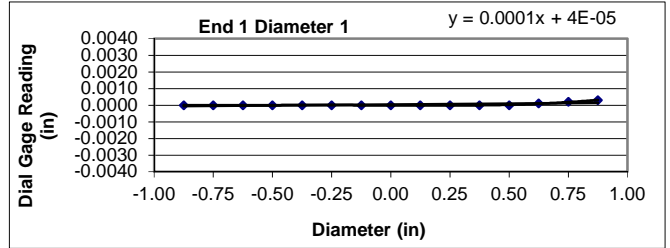
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.53	Tested by: BKP
Boring Id: B-40	Unit Weight (pcf): 165.8	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.1	
Depth (ft): 84.3 - 85.1		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

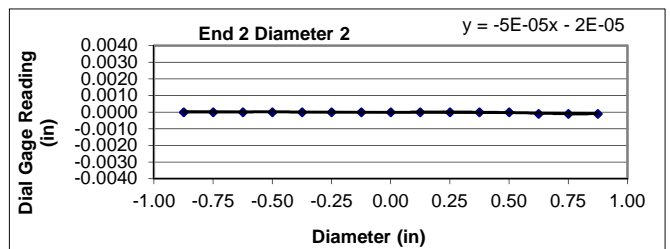
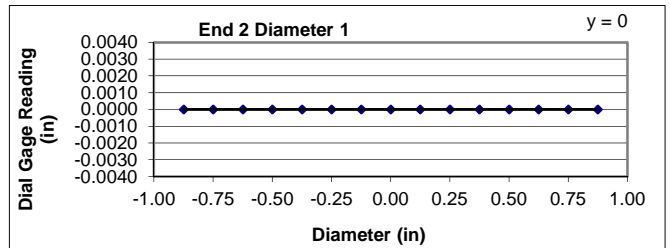
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	-0.0001	0.0000	0.0000
- 6/8	0.0000	-0.0001	0.0000	0.0000
- 5/8	0.0000	-0.0001	0.0000	0.0000
- 4/8	0.0000	0.0000	0.0000	0.0000
- 3/8	0.0000	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0000	0.0001	0.0000	0.0000
4/8	0.0000	0.0001	0.0000	0.0000
5/8	0.0001	0.0001	0.0000	-0.0001
6/8	0.0002	0.0001	0.0000	-0.0001
7/8	0.0003	0.0002	0.0000	-0.0001



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00011
	Angle of Best Fit Line:	0.00622
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00014
	Angle of Best Fit Line:	0.00819
End 2:	Slope of Best Fit Line:	-0.00005
	Angle of Best Fit Line:	-0.00295
	Max Angular Difference:	0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0003	0.0002	YES
End 1 Diam 2	0.0003	0.0002	YES
End 2 Diam 1	0.0000	0.0000	YES
End 2 Diam 2	0.0001	0.0001	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

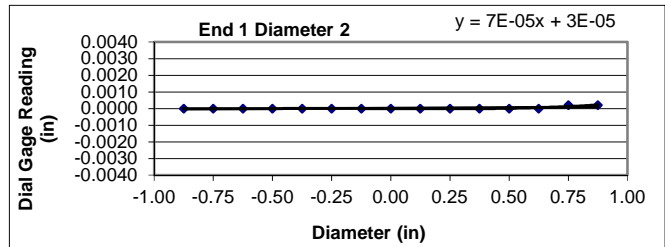
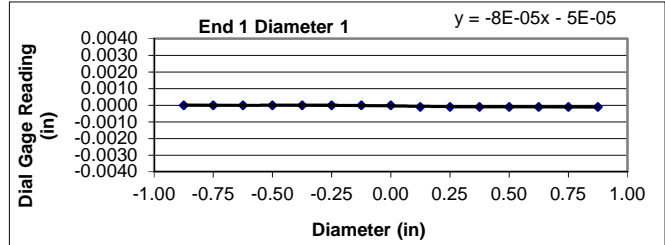
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.23	Tested by: BKP
Boring Id: B-41	Unit Weight (pcf): 158.8	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.4	
Depth (ft): 60.2 - 61.3		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

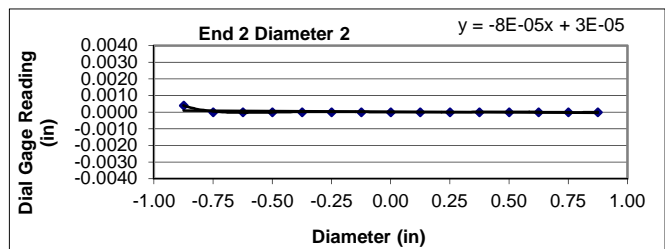
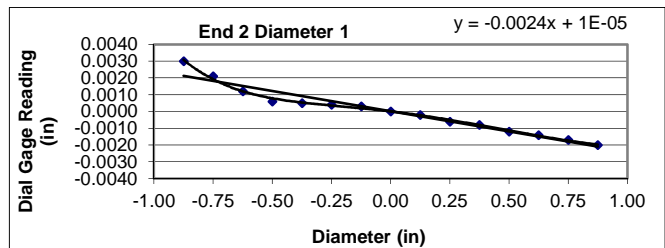
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0000	0.0030	0.0004
- 6/8	0.0000	0.0000	0.0021	0.0000
- 5/8	0.0000	0.0000	0.0012	0.0000
- 4/8	0.0000	0.0000	0.0006	0.0000
- 3/8	0.0000	0.0000	0.0005	0.0000
- 2/8	0.0000	0.0000	0.0004	0.0000
- 1/8	0.0000	0.0000	0.0003	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0001	0.0000	-0.0002	0.0000
2/8	-0.0001	0.0000	-0.0006	0.0000
3/8	-0.0001	0.0000	-0.0008	0.0000
4/8	-0.0001	0.0000	-0.0012	0.0000
5/8	-0.0001	0.0000	-0.0014	0.0000
6/8	-0.0001	0.0002	-0.0017	0.0000
7/8	-0.0001	0.0002	-0.0020	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00008
	Angle of Best Fit Line:	-0.00458
End 2:	Slope of Best Fit Line:	-0.00241
	Angle of Best Fit Line:	-0.13816
	Max Angular Difference:	0.13

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00007
	Angle of Best Fit Line:	0.00426
End 2:	Slope of Best Fit Line:	-0.00008
	Angle of Best Fit Line:	-0.00458
	Max Angular Difference:	0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0001	0.0001	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0050	0.0025	YES
End 2 Diam 2	0.0004	0.0002	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

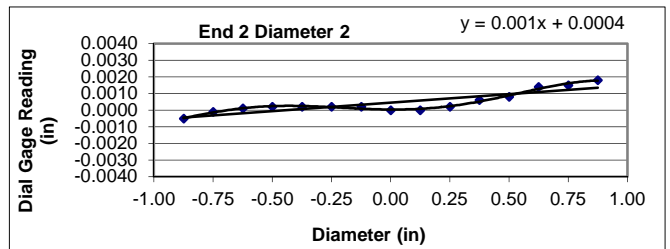
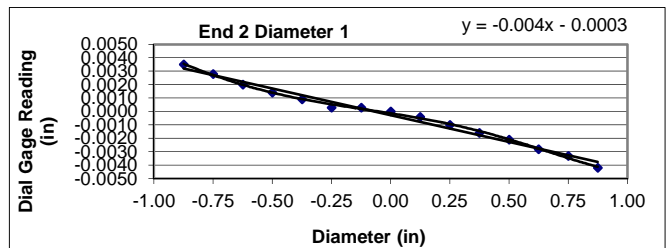
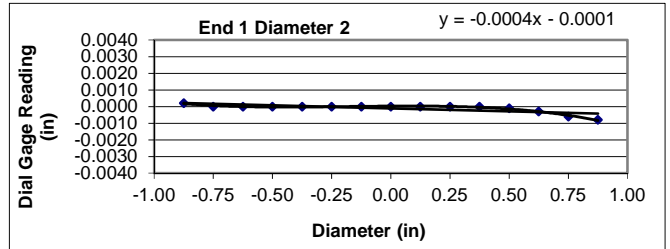
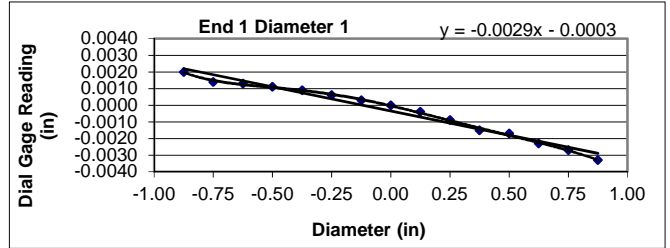
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.50	Tested by: BKP
Boring Id: B-41	Unit Weight (pcf): 164.5	Reviewed by: JBB
Sample No.: RC-5	Moisture Content (%): 0.3	
Depth (ft): 75.5 - 76.4		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0020	0.0002	0.0035	-0.0005
- 6/8	0.0014	0.0000	0.0028	-0.0001
- 5/8	0.0013	0.0000	0.0020	0.0001
- 4/8	0.0011	0.0000	0.0014	0.0002
- 3/8	0.0009	0.0000	0.0009	0.0002
- 2/8	0.0006	0.0000	0.0003	0.0002
- 1/8	0.0003	0.0000	0.0003	0.0002
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0004	0.0000	-0.0004	0.0000
2/8	-0.0009	0.0000	-0.0010	0.0002
3/8	-0.0015	0.0000	-0.0016	0.0006
4/8	-0.0017	-0.0001	-0.0021	0.0008
5/8	-0.0023	-0.0003	-0.0028	0.0014
6/8	-0.0027	-0.0006	-0.0033	0.0015
7/8	-0.0033	-0.0008	-0.0042	0.0018



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00291
	Angle of Best Fit Line:	-0.16665
End 2:	Slope of Best Fit Line:	-0.00398
	Angle of Best Fit Line:	-0.22804
	Max Angular Difference:	0.06

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00036
	Angle of Best Fit Line:	-0.02046
End 2:	Slope of Best Fit Line:	0.00102
	Angle of Best Fit Line:	0.05828
	Max Angular Difference:	-0.08

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0053	0.0027	YES
End 1 Diam 2	0.0010	0.0005	YES
End 2 Diam 1	0.0077	0.0039	YES
End 2 Diam 2	0.0023	0.0012	YES

Perpendicularity Tolerance Met? YES

13	Location / Orientation	DH-5, RC-14 (106.2' – 107.3')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



14	Location / Orientation	DH-6, RC-1 (25.6' – 26.6')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



15	Location / Orientation	DH-6, RC-3 (35.4' – 36.5')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



16	Location / Orientation	DH-6, RC-5 (47.3' – 48.6')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



17	Location / Orientation	DH-6, RC-7 (58.2' – 59.2')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



18	Location / Orientation	DH-6, RC-9 (60.6' – 61.7')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



19	Location / Orientation	DH-6, RC-11 (70.6' – 71.8')		Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)			



20	Location / Orientation	DH-6, RC-13 (80.6' – 81.8')		Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)			



21	Location / Orientation	DH-6, RC-15 (94.4' – 95.6')	Date: 2/19/2018 Photographer: Ben Painter
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	



22	Location / Orientation	B-38, RC-1 (11.9' – 13.1')	Date: 2/19/2018 Photographer: Ben Painter
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	





23	Location / Orientation	B-38, RC-3 (20.5' – 21.6')	Date: 2/19/2018 Photographer: Ben Painter
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	



24	Location / Orientation	B-38, RC-5 (30.5' – 31.7')	Date: 2/19/2018 Photographer: Ben Painter
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	





25	Location / Orientation	B-40, RC-1 (77.7' – 78.5')	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	

26	Location / Orientation	B-40, RC-3 (84.3' – 85.1')	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	






27	Location / Orientation	B-41, RC-2 (60.2' – 61.3')	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	

Photographer: Ben Painter

28	Location / Orientation	B-41, RC-5 (75.5' – 76.4')	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	

Photographer: Ben Painter

UNCONFINED COMPRESSION
(ASTM D7012 Method C)



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 6, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-29	RC-3	65.4 - 66.1	4.35	1.98	A	3.08	183.1	88	132,108	42,892	0.0
B-29	RC-4	70.3 - 70.9	4.38	1.98	A	3.08	180.9	82	60,645	19,690	0.1
B-29	RC-5	75.6 - 76.4	4.39	1.98	A	3.08	182.3	91	69,013	22,407	0.1
B-36	RC-3	69.3 - 69.9	4.36	1.98	A	3.08	198.6	77	69,199	22,467	0.1
B-45	RC-2	30.6 - 31.4	4.37	1.98	A	3.08	163.5	86	74,649	24,237	0.4

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

UNCONFINED COMPRESSION
(ASTM D7012 Method C)



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 6, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-45	RC-3	37.9 - 38.5	4.48	1.98	A	3.08	163.9	89	94,201	30,585	0.3
B-45	RC-6	42.8 - 43.4	4.37	1.98	A	3.08	163.3	82	68,417	22,213	0.4
B-47	RC-1	47.2 - 47.8	4.40	1.99	A	3.11	166.4	48	19,469	6,260	0.4
B-47	RC-3	55.4 - 56.2	4.47	1.98	A	3.08	170.6	42	14,859	4,824	0.4
B-47	RC-4	64.0 - 65.0	4.45	1.98	A	3.08	169.3	44	10,041	3,260	0.4

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

UNCONFINED COMPRESSION
(ASTM D7012 Method C)



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 6, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-50	RC-1	73.7 - 74.3	4.32	1.96	A	3.02	170.8	22	5,945	1,969	0.3
B-50	RC-4	87.7 - 88.5	4.34	1.95	A	2.99	167.6	22	2,590	866	0.3
W-22	RC-3	16.5 - 17.0	4.39	1.98	A	3.08	164.2	85	81,245	26,378	0.3
W-25	RC-2	30.5 - 31.3	4.38	1.98	A	3.08	165.3	89	98,111	31,854	0.3
W-32	RC-1	48.0 - 48.7	4.39	1.98	A	3.08	179.9	95	61,645	20,015	0.2

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



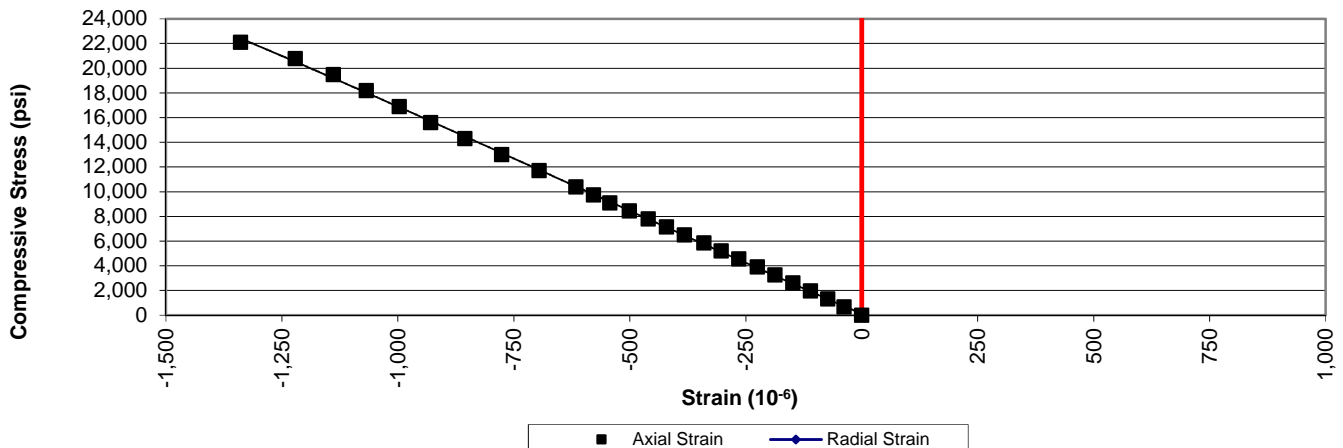
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/1/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.36	Tested by:	BKP / MG
Boring Id:	B-36	Unit Weight, pcf:	198.6	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.1		
Depth (ft):	69.3 - 69.9	Load Rate, psi/sec:	77		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-38		2,000	649	17.08		
3	-73		4,000	1,299	17.79		
4	-110		6,000	1,948	17.71		
5	-148		8,000	2,597	17.55		
6	-187		10,000	3,247	17.36		
7	-225		12,000	3,896	17.32		
8	-265		14,000	4,545	17.15		
9	-303		16,000	5,195	17.15		
10	-340		18,000	5,844	17.19		
11	-382		20,000	6,494	17.00		
12	-421		22,000	7,143	16.97		
13	-460		24,000	7,792	16.94		
14	-501		26,000	8,442	16.85		
15	-543		28,000	9,091	16.74		
16	-578		30,000	9,740	16.85		
17	-616		32,000	10,390	16.87		
18	-695		36,000	11,688	16.82		
19	-776		40,000	12,987	16.74		
20	-855		44,000	14,286	16.71		
21	-929		48,000	15,584	16.78		
22	-997		52,000	16,883	16.93		
23	-1,068		56,000	18,182	17.02		
24	-1,139		60,000	19,481	17.10		
25	-1,221		64,000	20,779	17.02		
26	-1,339		68,000	22,078	16.49		
27			69,199	22,467			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



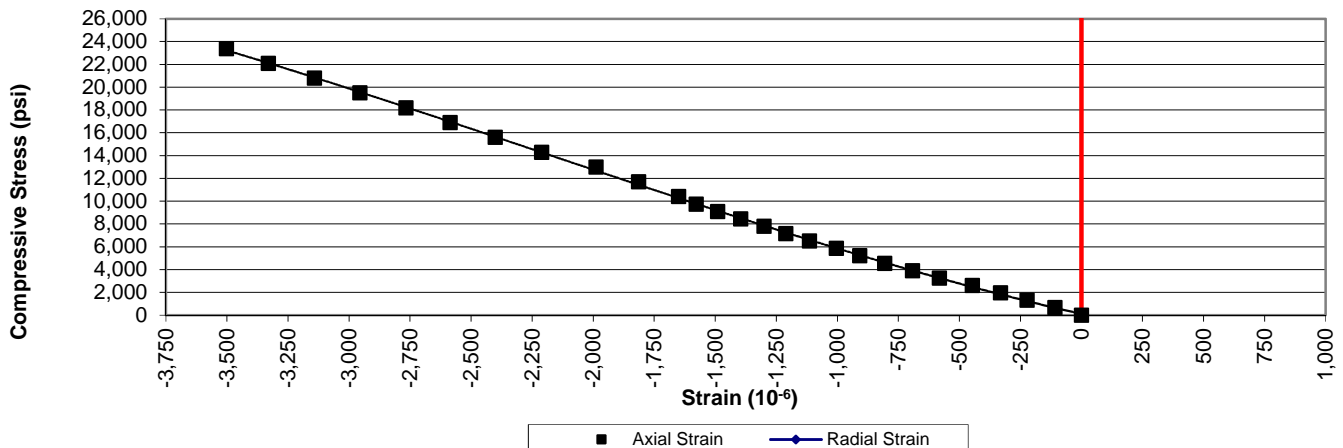
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/1/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.37	Tested by:	BKP / MG
Boring Id:	B-45	Unit Weight, pcf:	163.5	Reviewed by:	JBB
Sample No:	RC-2	Moisture Content, %:	0.4		
Depth (ft):	30.6 - 31.4	Load Rate, psi/sec:	86		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-108		2,000	649	6.01		
3	-222		4,000	1,299	5.85		
4	-331		6,000	1,948	5.89		
5	-447		8,000	2,597	5.81		
6	-581		10,000	3,247	5.59		
7	-691		12,000	3,896	5.64		
8	-805		14,000	4,545	5.65		
9	-908		16,000	5,195	5.72		
10	-1,003		18,000	5,844	5.83		
11	-1,114		20,000	6,494	5.83		
12	-1,211		22,000	7,143	5.90		
13	-1,300		24,000	7,792	5.99		
14	-1,395		26,000	8,442	6.05		
15	-1,490		28,000	9,091	6.10		
16	-1,578		30,000	9,740	6.17		
17	-1,650		32,000	10,390	6.30		
18	-1,814		36,000	11,688	6.44		
19	-1,988		40,000	12,987	6.53		
20	-2,210		44,000	14,286	6.46		
21	-2,401		48,000	15,584	6.49		
22	-2,586		52,000	16,883	6.53		
23	-2,766		56,000	18,182	6.57		
24	-2,955		60,000	19,481	6.59		
25	-3,141		64,000	20,779	6.62		
26	-3,330		68,000	22,078	6.63		
27	-3,502		72,000	23,377	6.68		
28			74,649	24,237			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



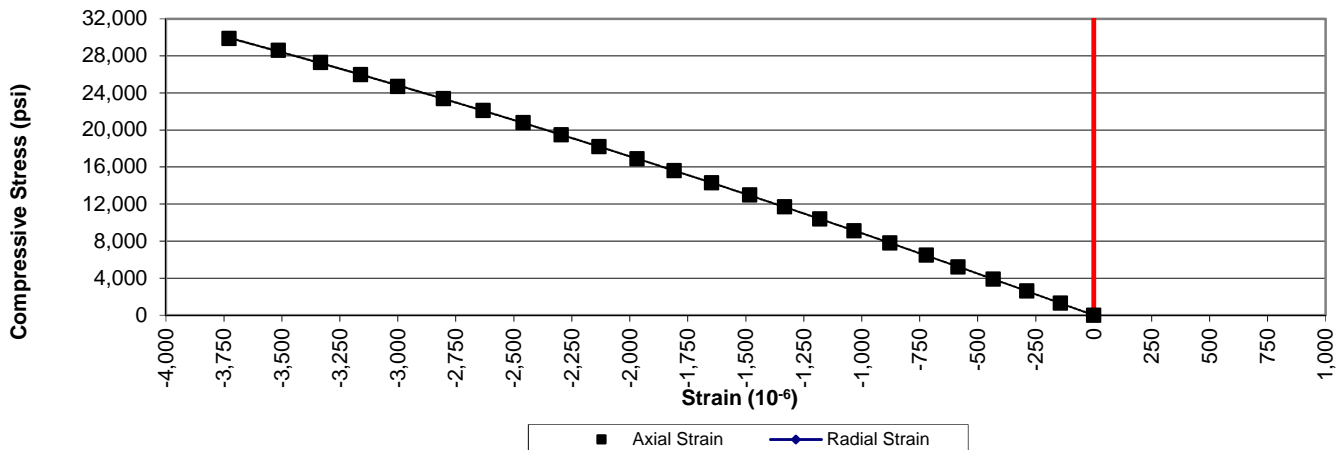
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/1/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.48	Tested by:	BKP / MG
Boring Id:	B-45	Unit Weight, pcf:	163.9	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.3		
Depth (ft):	37.9 - 38.5	Load Rate, psi/sec:	89		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-143		4,000	1,299	9.08		
3	-288		8,000	2,597	9.02		
4	-433		12,000	3,896	9.00		
5	-585		16,000	5,195	8.88		
6	-721		20,000	6,494	9.01		
7	-879		24,000	7,792	8.86		
8	-1,033		28,000	9,091	8.80		
9	-1,180		32,000	10,390	8.81		
10	-1,332		36,000	11,688	8.77		
11	-1,483		40,000	12,987	8.76		
12	-1,647		44,000	14,286	8.67		
13	-1,808		48,000	15,584	8.62		
14	-1,968		52,000	16,883	8.58		
15	-2,132		56,000	18,182	8.53		
16	-2,296		60,000	19,481	8.48		
17	-2,459		64,000	20,779	8.45		
18	-2,632		68,000	22,078	8.39		
19	-2,803		72,000	23,377	8.34		
20	-3,000		76,000	24,675	8.23		
21	-3,160		80,000	25,974	8.22		
22	-3,333		84,000	27,273	8.18		
23	-3,515		88,000	28,571	8.13		
24	-3,728		92,000	29,870	8.01		
25			94,201	30,585			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



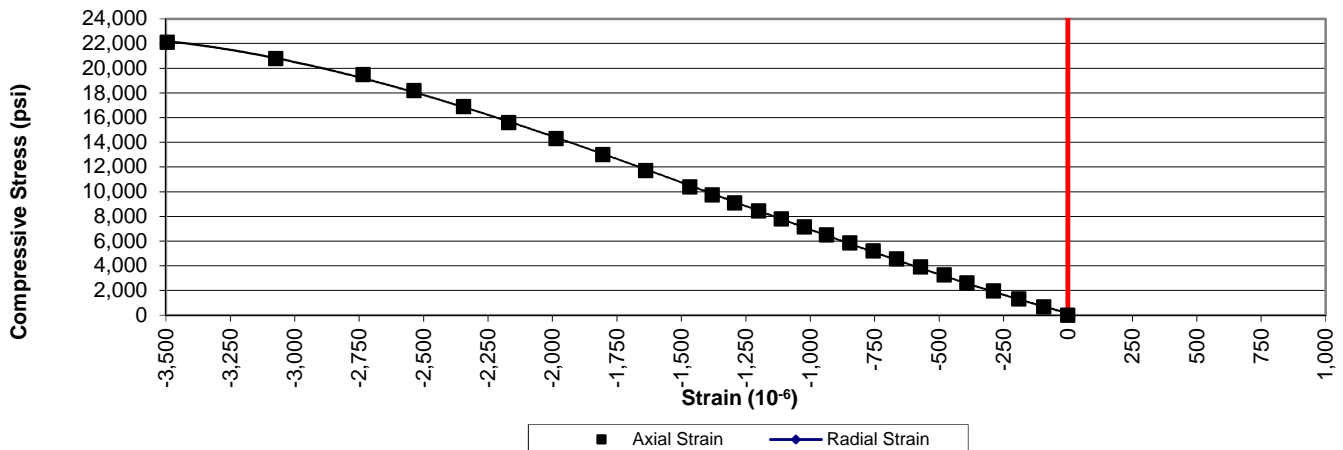
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/1/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.37	Tested by:	BKP / MG
Boring Id:	B-45	Unit Weight, pcf:	163.3	Reviewed by:	JBB
Sample No:	RC-6	Moisture Content, %:	0.4		
Depth (ft):	42.8 - 43.4	Load Rate, psi/sec:	82		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-93		2,000	649	6.98		
3	-190		4,000	1,299	6.84		
4	-288		6,000	1,948	6.76		
5	-391		8,000	2,597	6.64		
6	-479		10,000	3,247	6.78		
7	-572		12,000	3,896	6.81		
8	-664		14,000	4,545	6.84		
9	-755		16,000	5,195	6.88		
10	-846		18,000	5,844	6.91		
11	-936		20,000	6,494	6.94		
12	-1,022		22,000	7,143	6.99		
13	-1,111		24,000	7,792	7.01		
14	-1,200		26,000	8,442	7.04		
15	-1,293		28,000	9,091	7.03		
16	-1,380		30,000	9,740	7.06		
17	-1,467		32,000	10,390	7.08		
18	-1,638		36,000	11,688	7.14		
19	-1,805		40,000	12,987	7.20		
20	-1,986		44,000	14,286	7.19		
21	-2,169		48,000	15,584	7.18		
22	-2,344		52,000	16,883	7.20		
23	-2,537		56,000	18,182	7.17		
24	-2,734		60,000	19,481	7.13		
25	-3,073		64,000	20,779	6.76		
26	-3,494		68,000	22,078	6.32		
27			68,417	22,213			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**

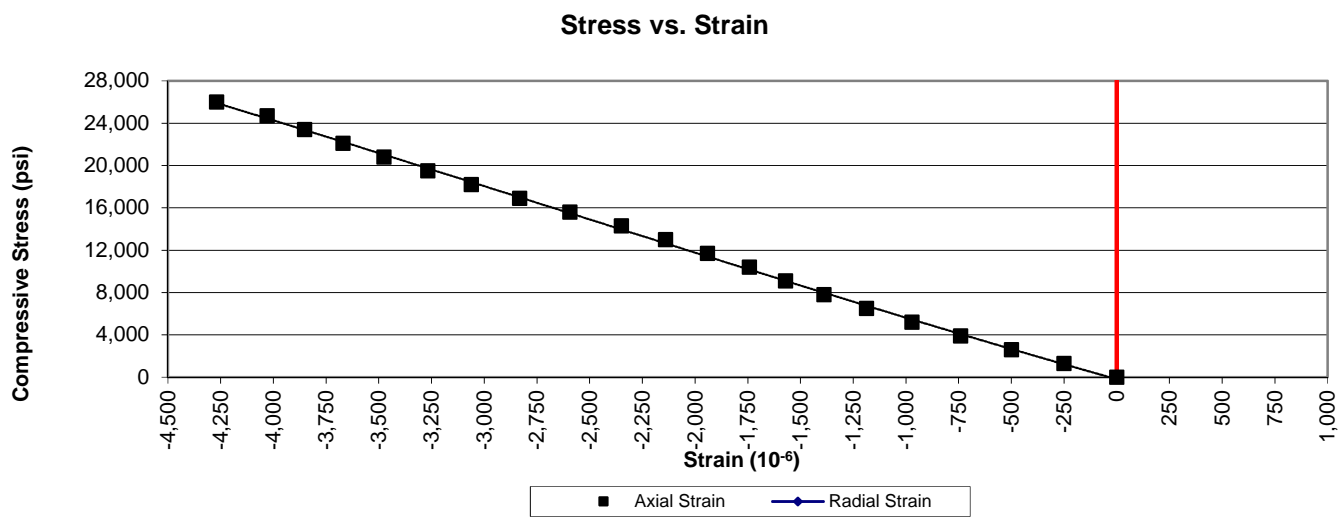


1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/1/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.39	Tested by:	BKP / MG
Boring Id:	W-22	Unit Weight, pcf:	164.2	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.3		
Depth (ft):	16.5 - 17.0	Load Rate, psi/sec:	85		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-250		4,000	1,299	5.20		
3	-499		8,000	2,597	5.20		
4	-740		12,000	3,896	5.26		
5	-970		16,000	5,195	5.36		
6	-1,186		20,000	6,494	5.48		
7	-1,388		24,000	7,792	5.61		
8	-1,570		28,000	9,091	5.79		
9	-1,741		32,000	10,390	5.97		
10	-1,941		36,000	11,688	6.02		
11	-2,139		40,000	12,987	6.07		
12	-2,348		44,000	14,286	6.08		
13	-2,593		48,000	15,584	6.01		
14	-2,831		52,000	16,883	5.96		
15	-3,061		56,000	18,182	5.94		
16	-3,267		60,000	19,481	5.96		
17	-3,475		64,000	20,779	5.98		
18	-3,669		68,000	22,078	6.02		
19	-3,851		72,000	23,377	6.07		
20	-4,029		76,000	24,675	6.12		
21	-4,268		80,000	25,974	6.09		
22			81,245	26,378			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

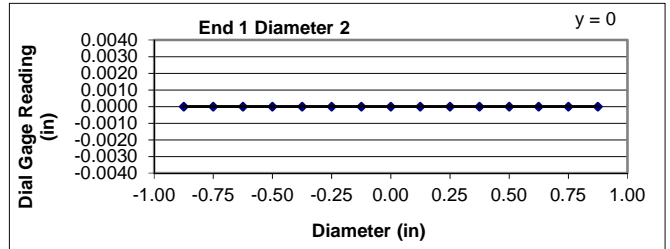
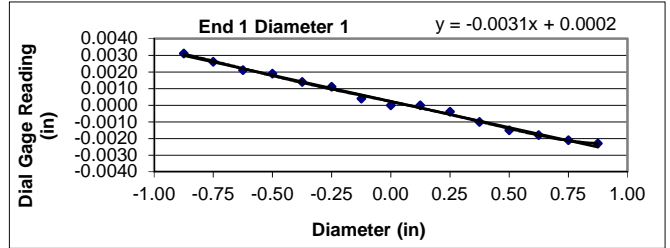
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.36	Tested by: BKP
Boring Id: B-36	Unit Weight (pcf): 198.6	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.1	
Depth (ft): 69.3 - 69.9		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

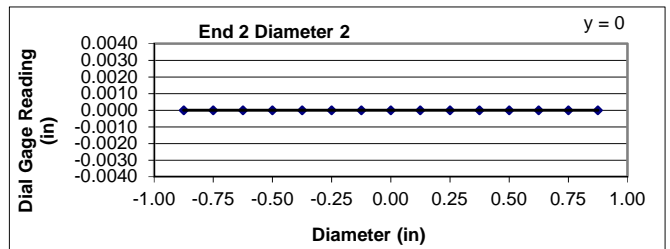
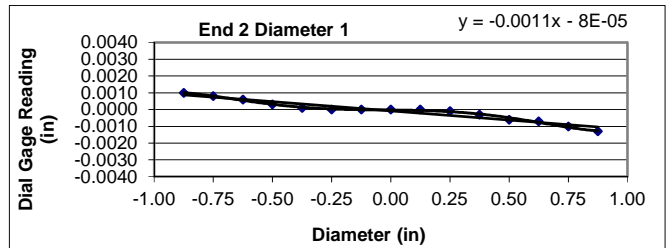
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0031	0.0000	0.0010	0.0000
- 6/8	0.0026	0.0000	0.0008	0.0000
- 5/8	0.0021	0.0000	0.0006	0.0000
- 4/8	0.0019	0.0000	0.0003	0.0000
- 3/8	0.0014	0.0000	0.0001	0.0000
- 2/8	0.0011	0.0000	0.0000	0.0000
- 1/8	0.0004	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	-0.0004	0.0000	-0.0001	0.0000
3/8	-0.0010	0.0000	-0.0003	0.0000
4/8	-0.0015	0.0000	-0.0006	0.0000
5/8	-0.0018	0.0000	-0.0007	0.0000
6/8	-0.0021	0.0000	-0.0010	0.0000
7/8	-0.0023	0.0000	-0.0013	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00313
	Angle of Best Fit Line:	-0.17958
End 2:	Slope of Best Fit Line:	-0.00110
	Angle of Best Fit Line:	-0.06286
	Max Angular Difference:	-0.12

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0054	0.0027	YES
End 1 Diam 2	0.0000	0.0000	YES
End 2 Diam 1	0.0023	0.0012	YES
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

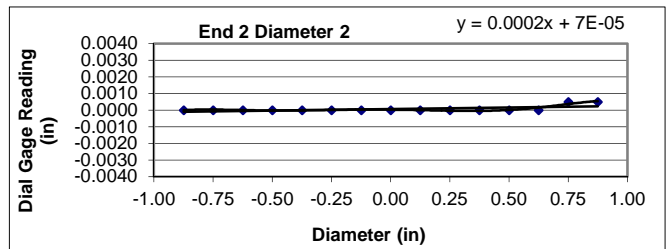
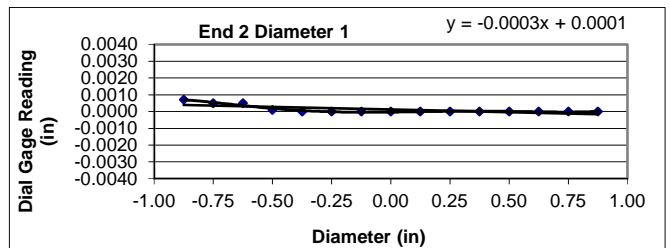
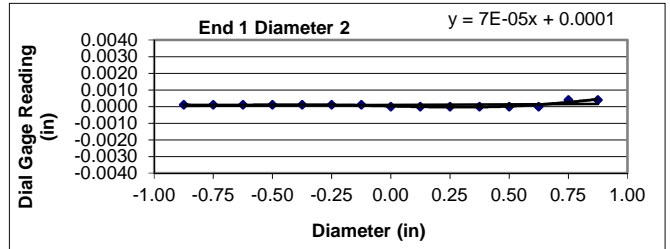
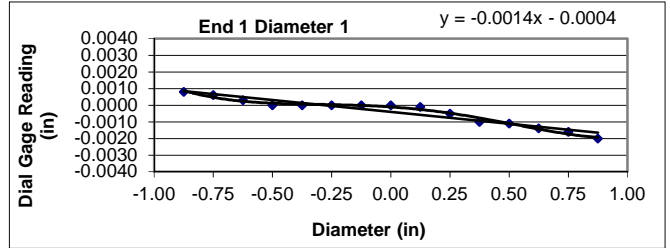
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.37	Tested by: BKP
Boring Id: B-45	Unit Weight (pcf): 163.5	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.4	
Depth (ft): 30.6 - 31.4		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0008	0.0001	0.0007	0.0000
- 6/8	0.0006	0.0001	0.0005	0.0000
- 5/8	0.0003	0.0001	0.0005	0.0000
- 4/8	0.0000	0.0001	0.0001	0.0000
- 3/8	0.0000	0.0001	0.0000	0.0000
- 2/8	0.0000	0.0001	0.0000	0.0000
- 1/8	0.0000	0.0001	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0001	0.0000	0.0000	0.0000
2/8	-0.0005	0.0000	0.0000	0.0000
3/8	-0.0010	0.0000	0.0000	0.0000
4/8	-0.0011	0.0000	0.0000	0.0000
5/8	-0.0014	0.0000	0.0000	0.0000
6/8	-0.0016	0.0004	0.0000	0.0005
7/8	-0.0020	0.0004	0.0000	0.0005



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00142
	Angle of Best Fit Line:	-0.08152
End 2:	Slope of Best Fit Line:	-0.00031
	Angle of Best Fit Line:	-0.01768
	Max Angular Difference:	-0.06

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00007
	Angle of Best Fit Line:	0.00393
End 2:	Slope of Best Fit Line:	0.00019
	Angle of Best Fit Line:	0.01064
	Max Angular Difference:	-0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0028	0.0014	YES
End 1 Diam 2	0.0004	0.0002	YES
End 2 Diam 1	0.0007	0.0004	YES
End 2 Diam 2	0.0005	0.0003	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

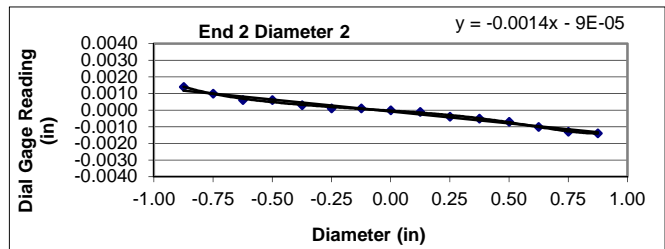
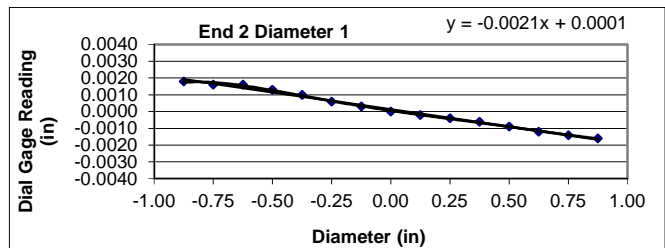
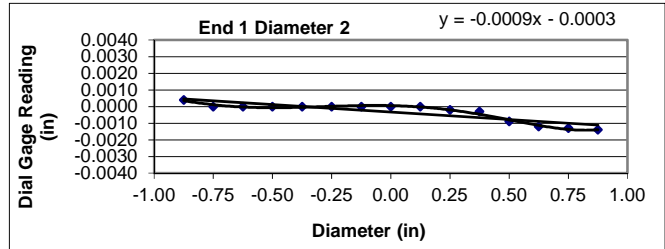
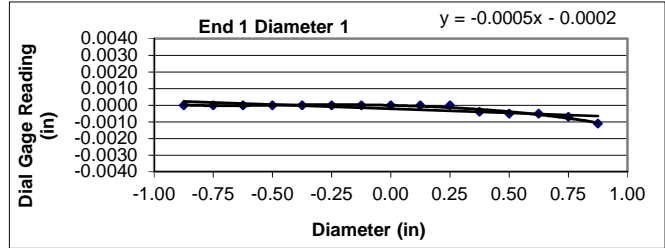
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.48	Tested by: BKP
Boring Id: B-45	Unit Weight (pcf): 163.9	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.3	
Depth (ft): 37.9 - 38.5		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0004	0.0018	0.0014
- 6/8	0.0000	0.0000	0.0016	0.0010
- 5/8	0.0000	0.0000	0.0016	0.0006
- 4/8	0.0000	0.0000	0.0013	0.0006
- 3/8	0.0000	0.0000	0.0010	0.0003
- 2/8	0.0000	0.0000	0.0006	0.0001
- 1/8	0.0000	0.0000	0.0003	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0002	-0.0001
2/8	0.0000	-0.0002	-0.0004	-0.0004
3/8	-0.0004	-0.0003	-0.0006	-0.0005
4/8	-0.0005	-0.0009	-0.0009	-0.0007
5/8	-0.0005	-0.0012	-0.0012	-0.0010
6/8	-0.0007	-0.0013	-0.0014	-0.0013
7/8	-0.0011	-0.0014	-0.0016	-0.0014



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00050
	Angle of Best Fit Line:	-0.02881
End 2:	Slope of Best Fit Line:	-0.00205
	Angle of Best Fit Line:	-0.11770
	Max Angular Difference:	0.09

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00089
	Angle of Best Fit Line:	-0.05124
End 2:	Slope of Best Fit Line:	-0.00143
	Angle of Best Fit Line:	-0.08218
	Max Angular Difference:	0.03

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0011	0.0006	YES
End 1 Diam 2	0.0018	0.0009	YES
End 2 Diam 1	0.0034	0.0017	YES
End 2 Diam 2	0.0028	0.0014	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

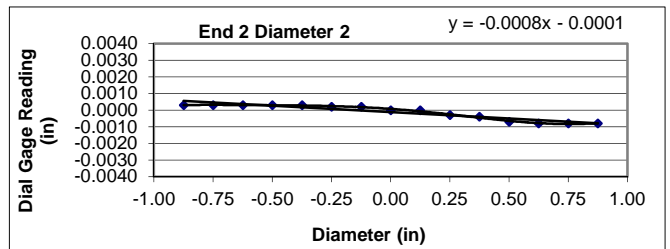
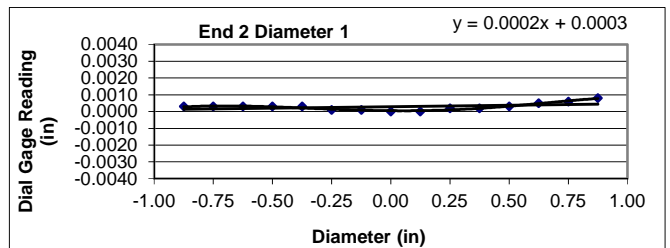
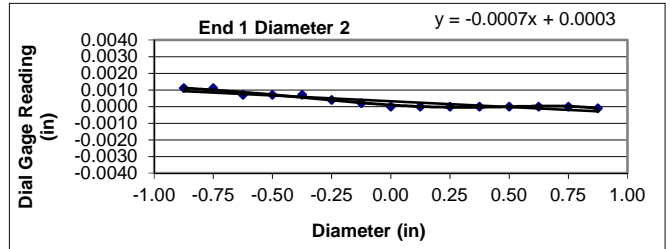
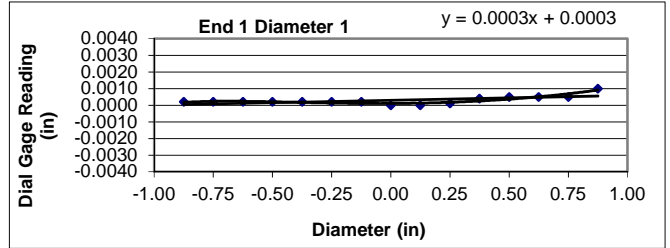
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.37	Tested by: BKP
Boring Id: B-45	Unit Weight (pcf): 163.3	Reviewed by: JBB
Sample No.: RC-6	Moisture Content (%): 0.4	
Depth (ft): 42.8 - 43.4		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0002	0.0011	0.0003	0.0003
- 6/8	0.0002	0.0011	0.0003	0.0003
- 5/8	0.0002	0.0007	0.0003	0.0003
- 4/8	0.0002	0.0007	0.0003	0.0003
- 3/8	0.0002	0.0007	0.0003	0.0003
- 2/8	0.0002	0.0004	0.0001	0.0002
- 1/8	0.0002	0.0002	0.0001	0.0002
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0001	0.0000	0.0002	-0.0003
3/8	0.0004	0.0000	0.0002	-0.0004
4/8	0.0005	0.0000	0.0003	-0.0007
5/8	0.0005	0.0000	0.0005	-0.0008
6/8	0.0005	0.0000	0.0006	-0.0008
7/8	0.0010	-0.0001	0.0008	-0.0008



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00029
	Angle of Best Fit Line:	0.01686
End 2:	Slope of Best Fit Line:	0.00017
	Angle of Best Fit Line:	0.00999
	Max Angular Difference:	0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00070
	Angle of Best Fit Line:	-0.03994
End 2:	Slope of Best Fit Line:	-0.00077
	Angle of Best Fit Line:	-0.04436
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0010	0.0005	YES
End 1 Diam 2	0.0012	0.0006	YES
End 2 Diam 1	0.0008	0.0004	YES
End 2 Diam 2	0.0011	0.0006	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

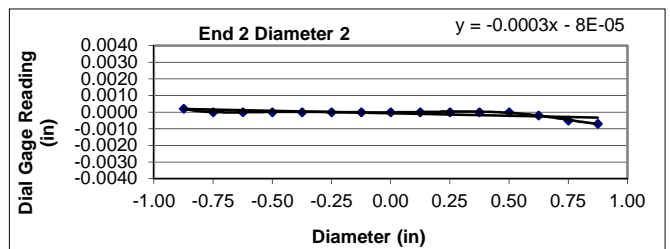
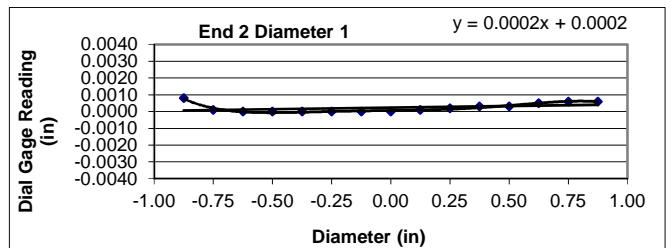
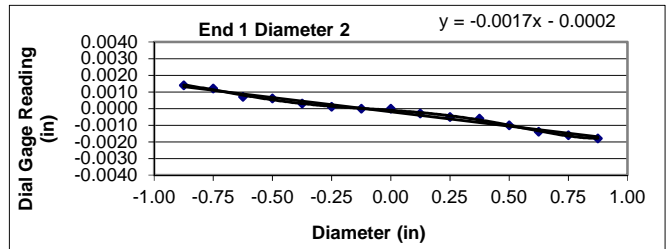
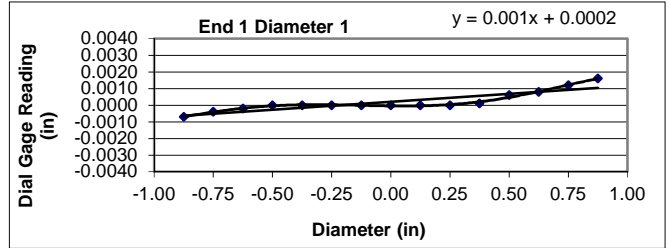
Project: Carolina Crossroads Project	Diameter (in): 1.99	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.40	Tested by: BKP
Boring Id: B-47	Unit Weight (pcf): 166.4	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.4	
Depth (ft): 47.2 - 47.8		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0007	0.0014	0.0008	0.0002
- 6/8	-0.0004	0.0012	0.0001	0.0000
- 5/8	-0.0002	0.0007	0.0000	0.0000
- 4/8	0.0000	0.0006	0.0000	0.0000
- 3/8	0.0000	0.0003	0.0000	0.0000
- 2/8	0.0000	0.0001	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0003	0.0001	0.0000
2/8	0.0000	-0.0005	0.0002	0.0000
3/8	0.0001	-0.0006	0.0003	0.0000
4/8	0.0006	-0.0010	0.0003	0.0000
5/8	0.0008	-0.0014	0.0005	-0.0002
6/8	0.0012	-0.0016	0.0006	-0.0005
7/8	0.0016	-0.0018	0.0006	-0.0007



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00095
	Angle of Best Fit Line:	0.05468
End 2:	Slope of Best Fit Line:	0.00019
	Angle of Best Fit Line:	0.01097
	Max Angular Difference:	0.04

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00172
	Angle of Best Fit Line:	-0.09871
End 2:	Slope of Best Fit Line:	-0.00029
	Angle of Best Fit Line:	-0.01686
	Max Angular Difference:	-0.08

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0023	0.0012	YES
End 1 Diam 2	0.0032	0.0016	YES
End 2 Diam 1	0.0008	0.0004	YES
End 2 Diam 2	0.0009	0.0005	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

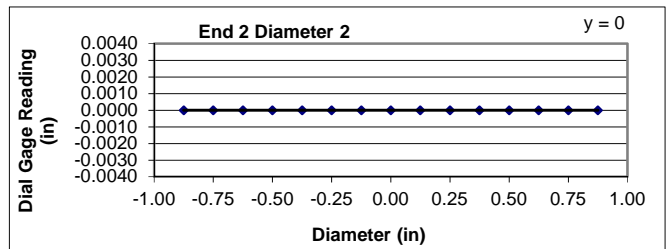
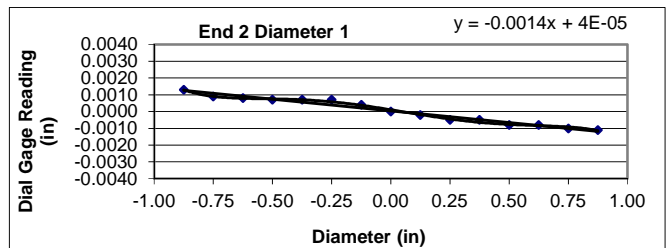
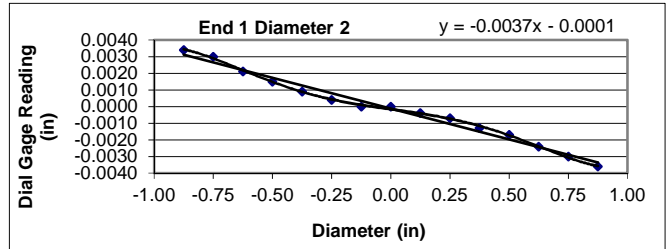
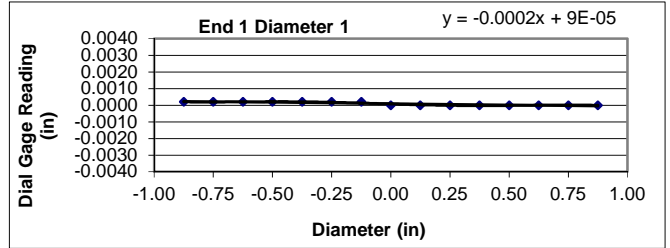
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.47	Tested by: BKP
Boring Id: B-47	Unit Weight (pcf): 170.6	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.4	
Depth (ft): 55.4 - 56.2		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0002	0.0034	0.0013	0.0000
- 6/8	0.0002	0.0030	0.0009	0.0000
- 5/8	0.0002	0.0021	0.0008	0.0000
- 4/8	0.0002	0.0015	0.0007	0.0000
- 3/8	0.0002	0.0009	0.0007	0.0000
- 2/8	0.0002	0.0004	0.0007	0.0000
- 1/8	0.0002	0.0000	0.0004	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0004	-0.0002	0.0000
2/8	0.0000	-0.0007	-0.0005	0.0000
3/8	0.0000	-0.0013	-0.0005	0.0000
4/8	0.0000	-0.0017	-0.0008	0.0000
5/8	0.0000	-0.0024	-0.0008	0.0000
6/8	0.0000	-0.0030	-0.0010	0.0000
7/8	0.0000	-0.0036	-0.0011	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00016
	Angle of Best Fit Line:	-0.00917
End 2:	Slope of Best Fit Line:	-0.00139
	Angle of Best Fit Line:	-0.07989
	Max Angular Difference:	0.07

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00370
	Angle of Best Fit Line:	-0.21199
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	-0.21

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0002	0.0001	YES
End 1 Diam 2	0.0070	0.0035	YES
End 2 Diam 1	0.0024	0.0012	YES
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

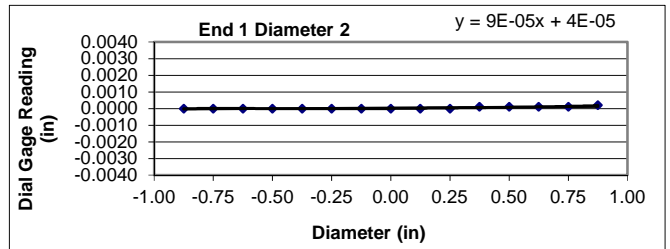
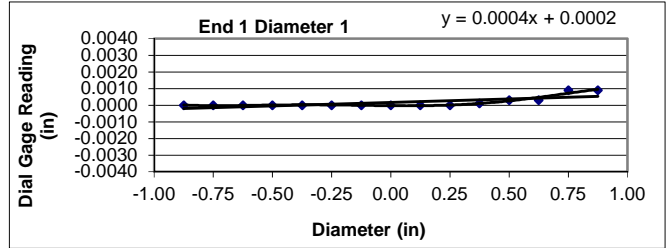
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.45	Tested by: BKP
Boring Id: B-47	Unit Weight (pcf): 169.3	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.4	
Depth (ft): 64.0 - 65.0		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

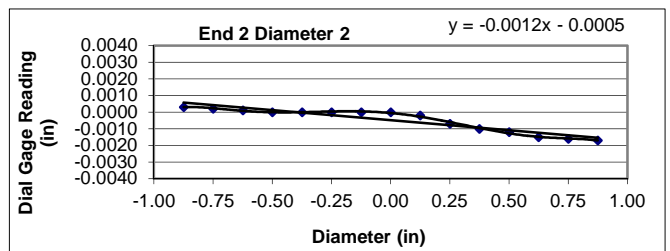
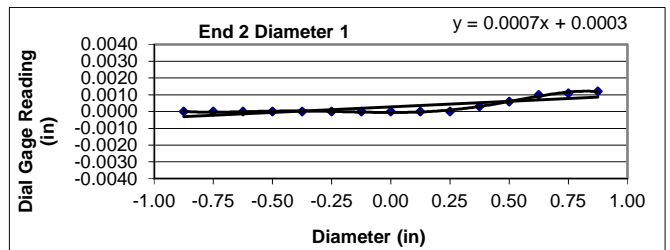
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0000	0.0000	0.0003
- 6/8	0.0000	0.0000	0.0000	0.0002
- 5/8	0.0000	0.0000	0.0000	0.0001
- 4/8	0.0000	0.0000	0.0000	0.0000
- 3/8	0.0000	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0002
2/8	0.0000	0.0000	0.0000	-0.0007
3/8	0.0001	0.0001	0.0003	-0.0010
4/8	0.0003	0.0001	0.0006	-0.0012
5/8	0.0003	0.0001	0.0010	-0.0015
6/8	0.0009	0.0001	0.0011	-0.0016
7/8	0.0009	0.0002	0.0012	-0.0017



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00042
	Angle of Best Fit Line:	0.02406
End 2:	Slope of Best Fit Line:	0.00067
	Angle of Best Fit Line:	0.03814
	Max Angular Difference:	-0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00009
	Angle of Best Fit Line:	0.00524
End 2:	Slope of Best Fit Line:	-0.00121
	Angle of Best Fit Line:	-0.06908
	Max Angular Difference:	0.07

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0009	0.0005	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0012	0.0006	YES
End 2 Diam 2	0.0020	0.0010	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

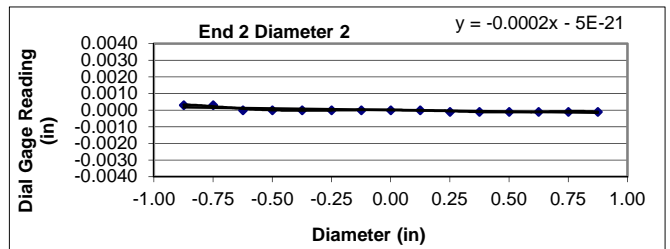
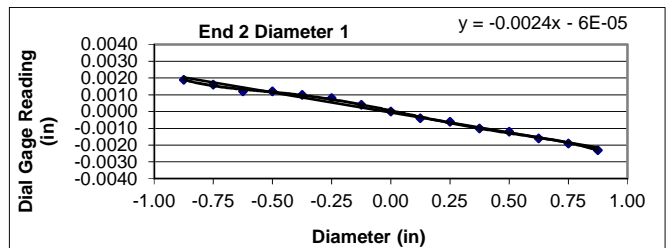
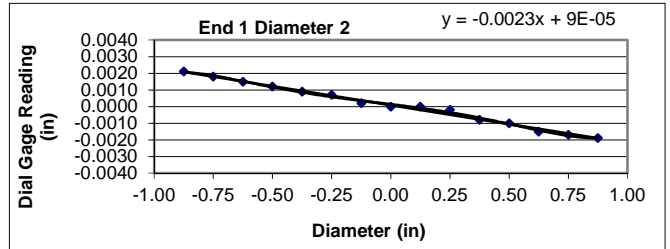
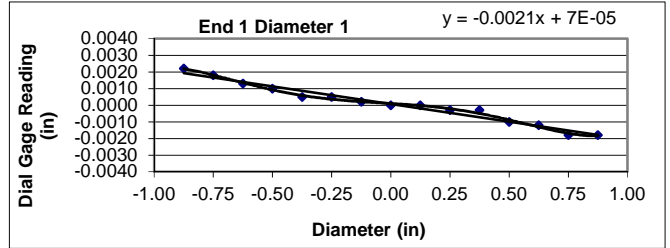
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.39	Tested by: BKP
Boring Id: W-22	Unit Weight (pcf): 164.2	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.3	
Depth (ft): 16.5 - 17.0		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0022	0.0021	0.0019	0.0003
- 6/8	0.0018	0.0018	0.0016	0.0003
- 5/8	0.0013	0.0015	0.0012	0.0000
- 4/8	0.0010	0.0012	0.0012	0.0000
- 3/8	0.0005	0.0009	0.0010	0.0000
- 2/8	0.0005	0.0007	0.0008	0.0000
- 1/8	0.0002	0.0002	0.0004	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0004	0.0000
2/8	-0.0003	-0.0002	-0.0006	-0.0001
3/8	-0.0003	-0.0008	-0.0010	-0.0001
4/8	-0.0010	-0.0010	-0.0012	-0.0001
5/8	-0.0012	-0.0015	-0.0016	-0.0001
6/8	-0.0018	-0.0017	-0.0019	-0.0001
7/8	-0.0018	-0.0019	-0.0023	-0.0001



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00212
	Angle of Best Fit Line:	-0.12163
End 2:	Slope of Best Fit Line:	-0.00239
	Angle of Best Fit Line:	-0.13686
	Max Angular Difference:	0.02

Parallelism Diameter 2


End 1:	Slope of Best Fit Line:	-0.00228
	Angle of Best Fit Line:	-0.13080
End 2:	Slope of Best Fit Line:	-0.00019
	Angle of Best Fit Line:	-0.01080
	Max Angular Difference:	-0.12

Parallelism Tolerance Met? YES


Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .


	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0040	0.0020	YES
End 1 Diam 2	0.0040	0.0020	YES
End 2 Diam 1	0.0042	0.0021	YES
End 2 Diam 2	0.0004	0.0002	YES

Perpendicularity Tolerance Met? YES

		Date: 3/1/2018
		Photographer: Ben Painter
3	Location / Orientation	B-29, RC-5 (75.6' – 76.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/1/2018
		Photographer: Ben Painter
4	Location / Orientation	B-36, RC-3 (69.3' – 69.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/1/2018
		Photographer: Ben Painter
5	Location / Orientation	B-45, RC-2 (30.6' – 31.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/1/2018
		Photographer: Ben Painter
6	Location / Orientation	B-45, RC-3 (37.9' – 38.5')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

7	Location / Orientation	B-45, RC-6 (42.8' – 43.4')	Photographer: Ben Painter	Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



8	Location / Orientation	B-47, RC-1 (47.2' – 47.8')	Photographer: Ben Painter	Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



9	Location / Orientation	B-47, RC-3 (55.4' – 56.2')	Photographer: Ben Painter	Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



10	Location / Orientation	B-47, RC-4 (64.0' – 65.0')	Photographer: Ben Painter	Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



13	Location / Orientation	W-22, RC-3 (16.5' – 17.0')	Photographer: Ben Painter Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	



14	Location / Orientation	W-25, RC-2 (30.5' – 31.3')	Photographer: Ben Painter Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	



**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 14, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-42	RC-2	70.8 - 71.7	4.44	1.98	A	3.08	166.0	85	98,530	31,990	0.2
B-42	RC-4	79.5 - 80.4	4.46	1.98	A	3.08	165.9	85	78,260	25,409	0.2
W-23	RC-2	20.7 - 21.5	4.42	1.98	A	3.08	164.2	88	89,833	29,167	0.3

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



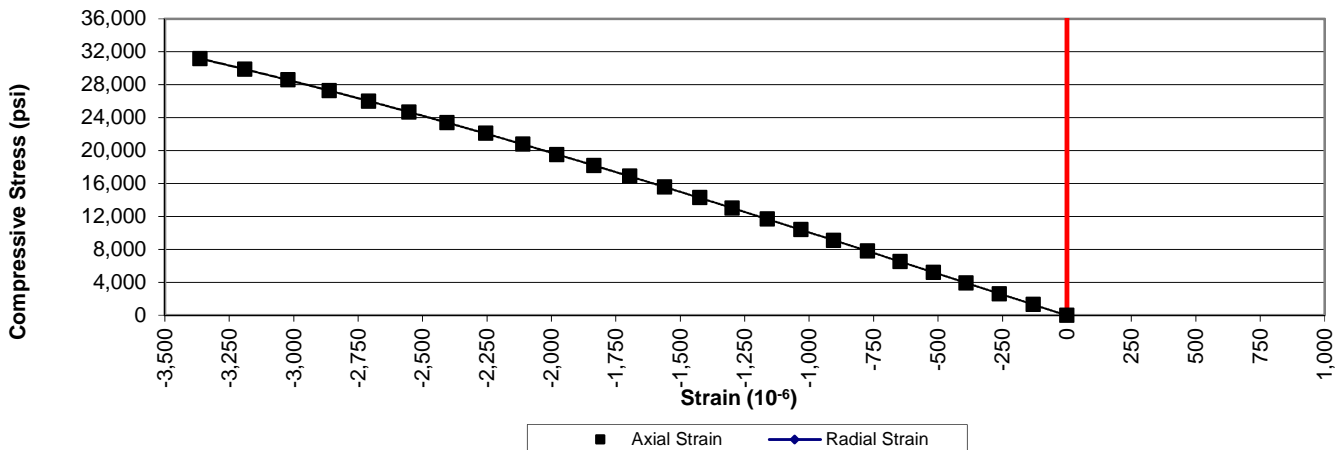
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/12/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.44	Tested by:	BKP / MG
Boring Id:	B-42	Unit Weight, pcf:	166.0	Reviewed by:	JBB
Sample No:	RC-2	Moisture Content, %:	0.2		
Depth (ft):	70.8 - 71.7	Load Rate, psi/sec:	85		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-130		4,000	1,299	9.99		
3	-262		8,000	2,597	9.91		
4	-391		12,000	3,896	9.96		
5	-518		16,000	5,195	10.03		
6	-647		20,000	6,494	10.04		
7	-774		24,000	7,792	10.07		
8	-905		28,000	9,091	10.05		
9	-1,032		32,000	10,390	10.07		
10	-1,162		36,000	11,688	10.06		
11	-1,298		40,000	12,987	10.01		
12	-1,424		44,000	14,286	10.03		
13	-1,561		48,000	15,584	9.98		
14	-1,696		52,000	16,883	9.95		
15	-1,835		56,000	18,182	9.91		
16	-1,979		60,000	19,481	9.84		
17	-2,111		64,000	20,779	9.84		
18	-2,255		68,000	22,078	9.79		
19	-2,405		72,000	23,377	9.72		
20	-2,553		76,000	24,675	9.67		
21	-2,709		80,000	25,974	9.59		
22	-2,862		84,000	27,273	9.53		
23	-3,022		88,000	28,571	9.45		
24	-3,189		92,000	29,870	9.37		
25	-3,363		96,000	31,169	9.27		
26			98,530	31,990			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**

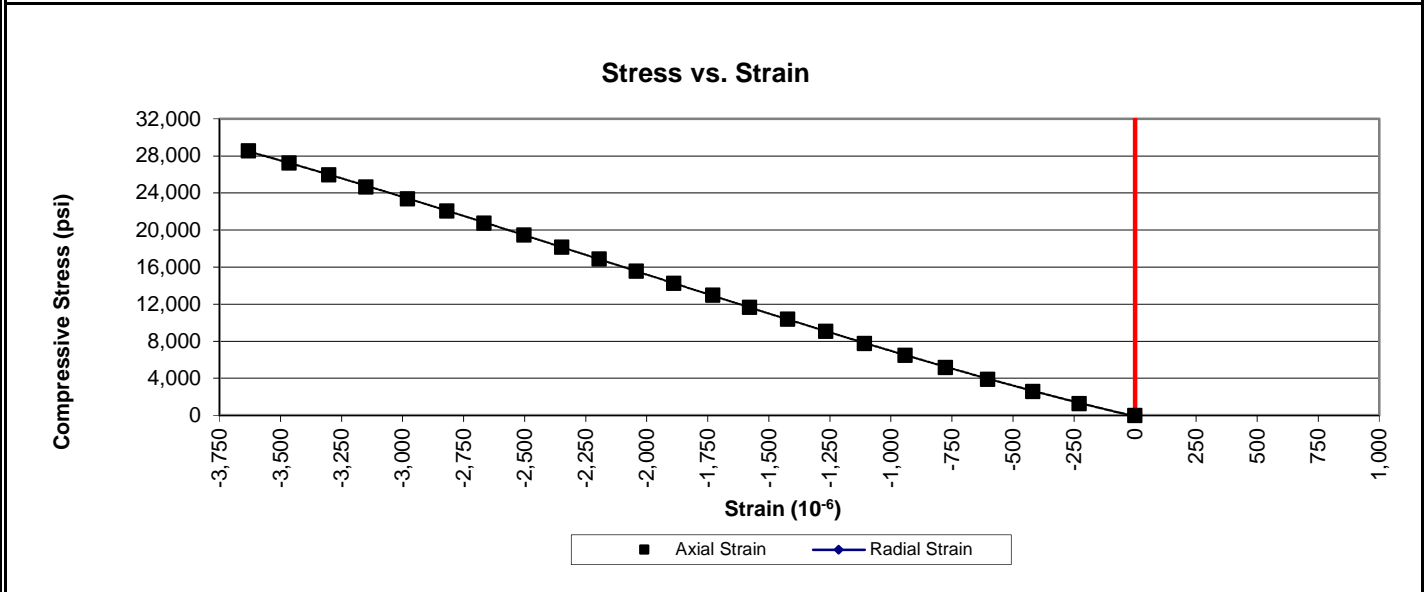


1413 Toppide Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/12/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.42	Tested by:	BKP / MG
Boring Id:	W-23	Unit Weight, pcf:	164.2	Reviewed by:	JBB
Sample No:	RC-2	Moisture Content, %:	0.3		
Depth (ft):	20.7 - 21.5	Load Rate, psi/sec:	88		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-228		4,000	1,299	5.70		
3	-419		8,000	2,597	6.20		
4	-604		12,000	3,896	6.45		
5	-777		16,000	5,195	6.69		
6	-941		20,000	6,494	6.90		
7	-1,108		24,000	7,792	7.03		
8	-1,266		28,000	9,091	7.18		
9	-1,423		32,000	10,390	7.30		
10	-1,579		36,000	11,688	7.40		
11	-1,729		40,000	12,987	7.51		
12	-1,889		44,000	14,286	7.56		
13	-2,043		48,000	15,584	7.63		
14	-2,195		52,000	16,883	7.69		
15	-2,348		56,000	18,182	7.74		
16	-2,503		60,000	19,481	7.78		
17	-2,667		64,000	20,779	7.79		
18	-2,819		68,000	22,078	7.83		
19	-2,979		72,000	23,377	7.85		
20	-3,150		76,000	24,675	7.83		
21	-3,302		80,000	25,974	7.87		
22	-3,465		84,000	27,273	7.87		
23	-3,631		88,000	28,571	7.87		
24			89,833	29,167			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

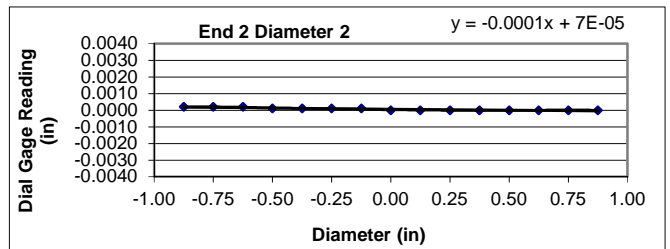
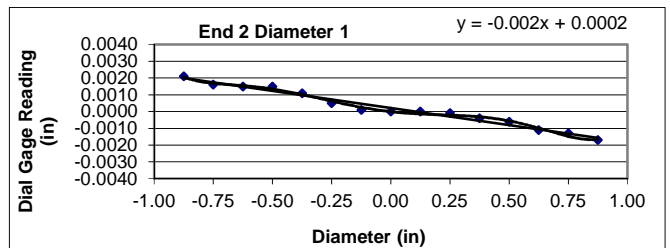
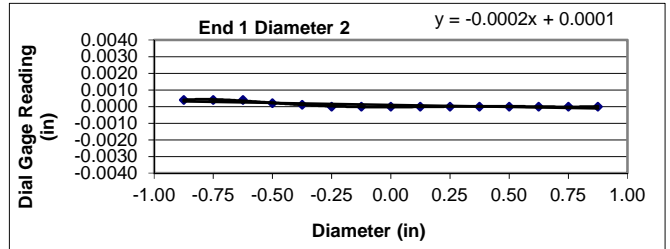
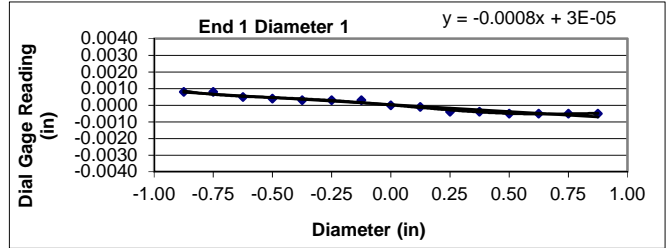
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/8/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.44	Tested by: BKP
Boring Id: B-42	Unit Weight (pcf): 166.0	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.2	
Depth (ft): 70.8 - 71.7		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0008	0.0004	0.0021	0.0002
- 6/8	0.0008	0.0004	0.0016	0.0002
- 5/8	0.0005	0.0004	0.0015	0.0002
- 4/8	0.0004	0.0002	0.0015	0.0001
- 3/8	0.0003	0.0001	0.0011	0.0001
- 2/8	0.0003	0.0000	0.0005	0.0001
- 1/8	0.0003	0.0000	0.0001	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0001	0.0000	0.0000	0.0000
2/8	-0.0004	0.0000	-0.0001	0.0000
3/8	-0.0004	0.0000	-0.0004	0.0000
4/8	-0.0005	0.0000	-0.0006	0.0000
5/8	-0.0005	0.0000	-0.0011	0.0000
6/8	-0.0005	0.0000	-0.0013	0.0000
7/8	-0.0005	0.0000	-0.0017	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00084
	Angle of Best Fit Line:	-0.04813
End 2:	Slope of Best Fit Line:	-0.00203
	Angle of Best Fit Line:	-0.11656
	Max Angular Difference:	0.07

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00024
	Angle of Best Fit Line:	-0.01359
End 2:	Slope of Best Fit Line:	-0.00013
	Angle of Best Fit Line:	-0.00753
	Max Angular Difference:	-0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0013	0.0007	YES
End 1 Diam 2	0.0004	0.0002	YES
End 2 Diam 1	0.0038	0.0019	YES
End 2 Diam 2	0.0002	0.0001	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

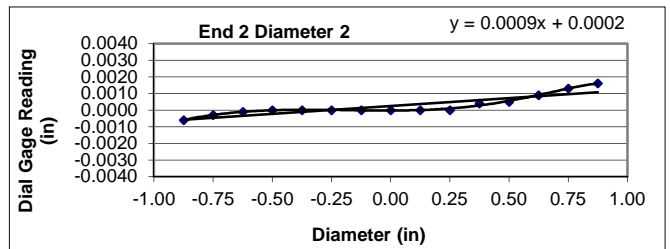
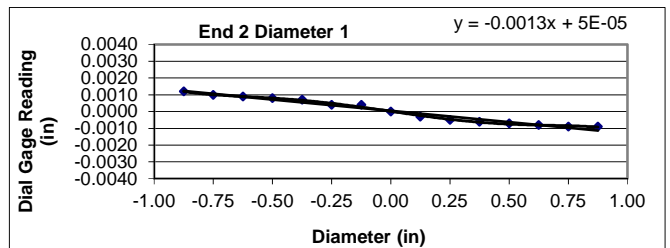
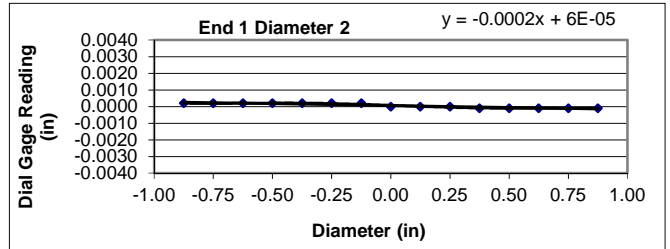
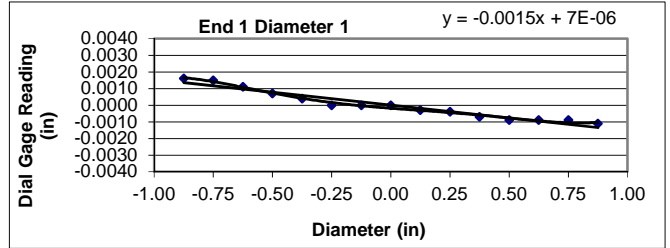
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/8/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.46	Tested by: BKP
Boring Id: B-42	Unit Weight (pcf): 165.9	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.2	
Depth (ft): 79.5 - 80.4		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0016	0.0002	0.0012	-0.0006
- 6/8	0.0015	0.0002	0.0010	-0.0003
- 5/8	0.0011	0.0002	0.0009	-0.0001
- 4/8	0.0007	0.0002	0.0008	0.0000
- 3/8	0.0004	0.0002	0.0007	0.0000
- 2/8	0.0000	0.0002	0.0004	0.0000
- 1/8	0.0000	0.0002	0.0004	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0003	0.0000	-0.0003	0.0000
2/8	-0.0004	0.0000	-0.0005	0.0000
3/8	-0.0007	-0.0001	-0.0006	0.0004
4/8	-0.0009	-0.0001	-0.0007	0.0005
5/8	-0.0009	-0.0001	-0.0008	0.0009
6/8	-0.0009	-0.0001	-0.0009	0.0013
7/8	-0.0011	-0.0001	-0.0009	0.0016



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00155
	Angle of Best Fit Line:	-0.08856
End 2:	Slope of Best Fit Line:	-0.00134
	Angle of Best Fit Line:	-0.07694
	Max Angular Difference:	-0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00023
	Angle of Best Fit Line:	-0.01326
End 2:	Slope of Best Fit Line:	0.00095
	Angle of Best Fit Line:	0.05435
	Max Angular Difference:	-0.07

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0027	0.0014	YES
End 1 Diam 2	0.0003	0.0002	YES
End 2 Diam 1	0.0021	0.0011	YES
End 2 Diam 2	0.0022	0.0011	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

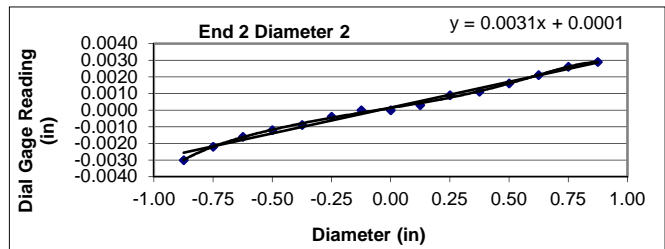
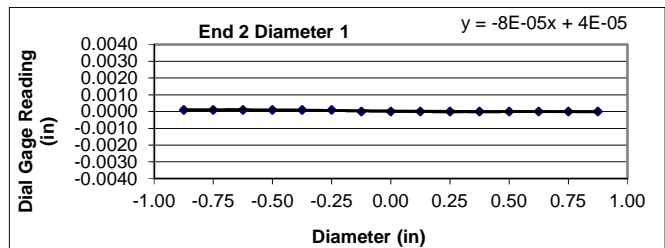
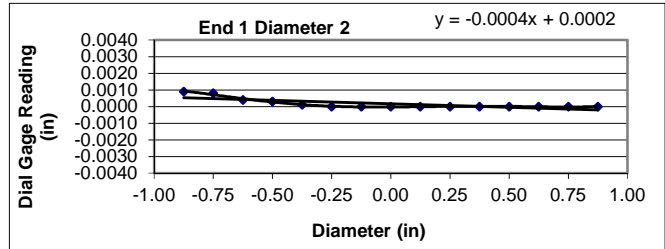
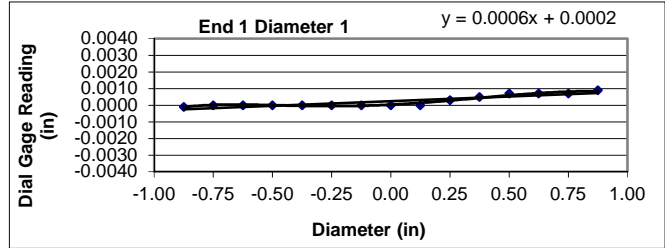
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/8/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.42	Tested by: BKP
Boring Id: W-23	Unit Weight (pcf): 164.2	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.3	
Depth (ft): 20.7 - 21.5		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0001	0.0009	0.0001	-0.0030
- 6/8	0.0000	0.0008	0.0001	-0.0022
- 5/8	0.0000	0.0004	0.0001	-0.0016
- 4/8	0.0000	0.0003	0.0001	-0.0012
- 3/8	0.0000	0.0001	0.0001	-0.0009
- 2/8	0.0000	0.0000	0.0001	-0.0004
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0003
2/8	0.0003	0.0000	0.0000	0.0009
3/8	0.0005	0.0000	0.0000	0.0011
4/8	0.0007	0.0000	0.0000	0.0016
5/8	0.0007	0.0000	0.0000	0.0021
6/8	0.0007	0.0000	0.0000	0.0026
7/8	0.0009	0.0000	0.0000	0.0029



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00056
	Angle of Best Fit Line:	0.03209
End 2:	Slope of Best Fit Line:	-0.00008
	Angle of Best Fit Line:	-0.00442
	Max Angular Difference:	0.04

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00042
	Angle of Best Fit Line:	-0.02390
End 2:	Slope of Best Fit Line:	0.00311
	Angle of Best Fit Line:	0.17794
	Max Angular Difference:	-0.20

Parallelism Tolerance Met? YES


Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0010	0.0005	YES
End 1 Diam 2	0.0009	0.0005	YES
End 2 Diam 1	0.0001	0.0001	YES
End 2 Diam 2	0.0059	0.0030	YES

Perpendicularity Tolerance Met? YES

11	Location / Orientation	B-42, RC-2 (70.8' – 71.7')	Photographer: Ben Painter	Date: 3/12/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		

12	Location / Orientation	B-42, RC-4 (79.5' – 80.4')	Photographer: Ben Painter	Date: 3/12/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		

		Date: 3/12/2018
		Photographer: Ben Painter
13	Location / Orientation	W-23, RC-2 (20.7' – 21.5')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 22, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
W-24	RC-1	27.2 - 28.2	4.47	1.99	A	3.11	165.0	73	67,834	21,812	0.4
B-31	RC-1	26.7 - 27.4	4.44	1.97	A	3.05	186.6	83	159,430	52,272	0.0
B-31	RC-4	41.3 - 42.0	4.42	1.97	B	3.05	187.0	80	92,296	30,261	0.1
B-33	RC-6	72.2 - 73.0	4.44	1.98	A	3.08	166.7	79	93,854	30,472	0.1
B-37	RC-4	52.6 - 53.3	4.44	1.99	A	3.11	176.0	76	46,382	14,914	0.1

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 22, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-37	RC-5	57.2 - 58.0	4.49	1.99	A	3.11	183.6	73	67,731	21,778	0.1
B-37	RC-6	63.2 - 63.8	4.47	1.99	A	3.11	176.9	72	32,195	10,352	0.2

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



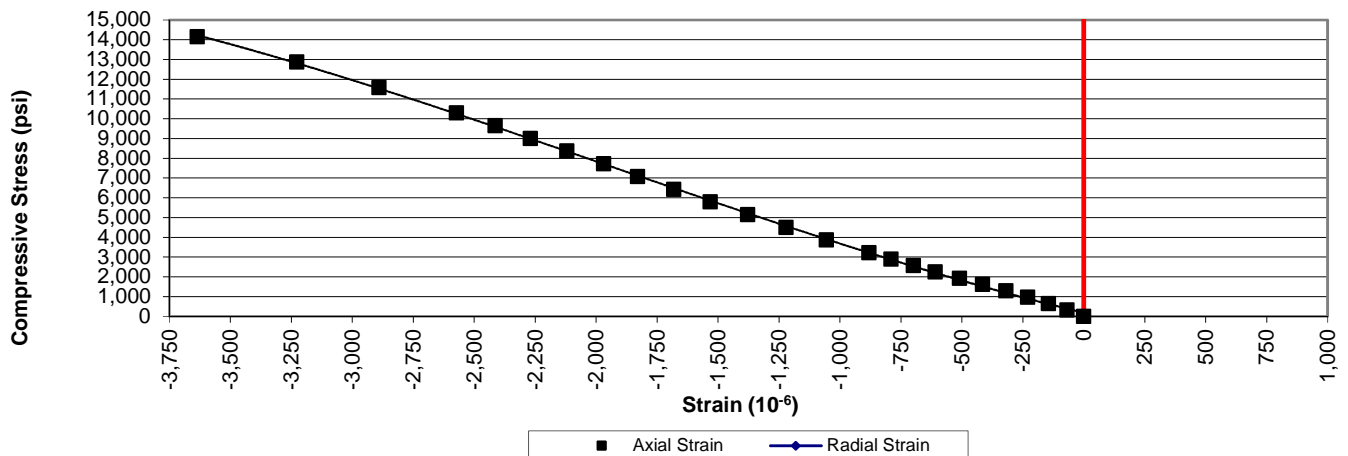
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.99	Date:	3/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.44	Tested by:	BKP / MG
Boring Id:	B-37	Unit Weight, pcf:	176.0	Reviewed by:	JBB
Sample No:	RC-4	Moisture Content, %:	0.1		
Depth (ft):	52.6 - 53.3	Load Rate, psi/sec:	76		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-69		1,000	322	4.67		
3	-144		2,000	643	4.47		
4	-230		3,000	965	4.20		
5	-319		4,000	1,286	4.03		
6	-415		5,000	1,608	3.87		
7	-510		6,000	1,929	3.78		
8	-609		7,000	2,251	3.70		
9	-699		8,000	2,572	3.68		
10	-790		9,000	2,894	3.66		
11	-881		10,000	3,215	3.65		
12	-1,055		12,000	3,859	3.66		
13	-1,221		14,000	4,502	3.69		
14	-1,378		16,000	5,145	3.73		
15	-1,532		18,000	5,788	3.78		
16	-1,681		20,000	6,431	3.83		
17	-1,830		22,000	7,074	3.87		
18	-1,969		24,000	7,717	3.92		
19	-2,120		26,000	8,360	3.94		
20	-2,270		28,000	9,003	3.97		
21	-2,414		30,000	9,646	4.00		
22	-2,572		32,000	10,289	4.00		
23	-2,890		36,000	11,576	4.01		
24	-3,227		40,000	12,862	3.99		
25	-3,635		44,000	14,148	3.89		
26			46,382	14,914			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



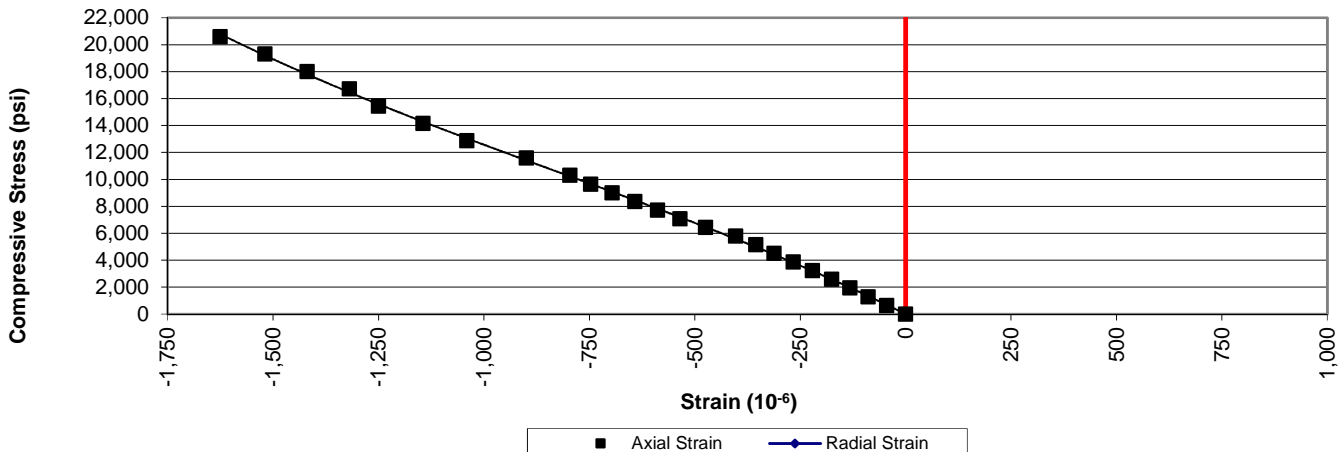
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.99	Date:	3/20/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.49	Tested by:	BKP / MG
Boring Id:	B-37	Unit Weight, pcf:	183.6	Reviewed by:	JBB
Sample No:	RC-5	Moisture Content, %:	0.1		
Depth (ft):	57.2 - 58.0	Load Rate, psi/sec:	73		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-45		2,000	643	14.29		
3	-89		4,000	1,286	14.45		
4	-132		6,000	1,929	14.61		
5	-175		8,000	2,572	14.70		
6	-221		10,000	3,215	14.55		
7	-266		12,000	3,859	14.51		
8	-312		14,000	4,502	14.43		
9	-355		16,000	5,145	14.49		
10	-403		18,000	5,788	14.36		
11	-474		20,000	6,431	13.57		
12	-535		22,000	7,074	13.22		
13	-588		24,000	7,717	13.12		
14	-642		26,000	8,360	13.02		
15	-696		28,000	9,003	12.94		
16	-747		30,000	9,646	12.91		
17	-796		32,000	10,289	12.93		
18	-899		36,000	11,576	12.88		
19	-1,040		40,000	12,862	12.37		
20	-1,144		44,000	14,148	12.37		
21	-1,250		48,000	15,434	12.35		
22	-1,319		52,000	16,720	12.68		
23	-1,419		56,000	18,006	12.69		
24	-1,519		60,000	19,293	12.70		
25	-1,625		64,000	20,579	12.66		
26			67,731	21,778			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

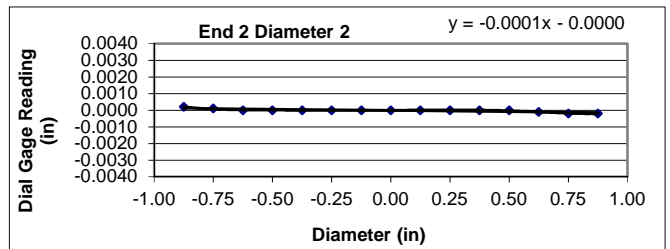
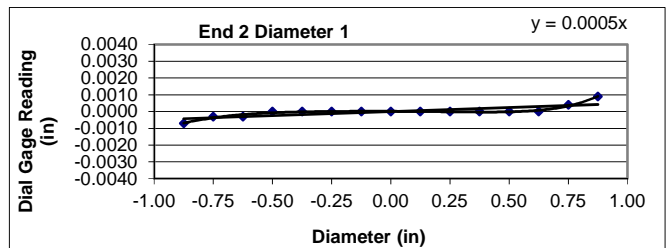
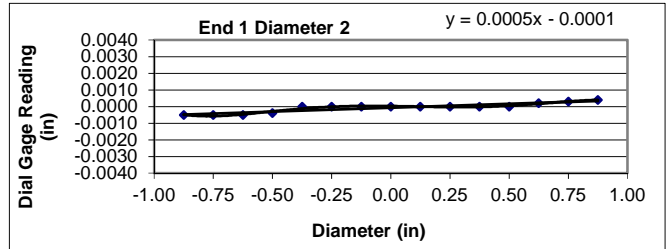
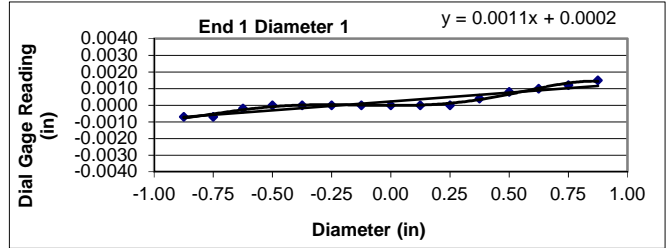
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/19/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.44	Tested by: BKP
Boring Id: B-33	Unit Weight (pcf): 166.7	Reviewed by: JBB
Sample No.: RC-6	Moisture Content (%): 0.1	
Depth (ft): 72.2 - 73.0		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0007	-0.0005	-0.0007	0.0002
- 6/8	-0.0007	-0.0005	-0.0003	0.0001
- 5/8	-0.0002	-0.0005	-0.0003	0.0000
- 4/8	0.0000	-0.0004	0.0000	0.0000
- 3/8	0.0000	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0004	0.0000	0.0000	0.0000
4/8	0.0008	0.0000	0.0000	0.0000
5/8	0.0010	0.0002	0.0000	-0.0001
6/8	0.0012	0.0003	0.0004	-0.0002
7/8	0.0015	0.0004	0.0009	-0.0002



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00106
	Angle of Best Fit Line:	0.06090
End 2:	Slope of Best Fit Line:	0.00048
	Angle of Best Fit Line:	0.02767
	Max Angular Difference:	0.03

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00046
	Angle of Best Fit Line:	0.02652
End 2:	Slope of Best Fit Line:	-0.00015
	Angle of Best Fit Line:	-0.00835
	Max Angular Difference:	0.03

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0022	0.0011	YES
End 1 Diam 2	0.0009	0.0005	YES
End 2 Diam 1	0.0016	0.0008	YES
End 2 Diam 2	0.0004	0.0002	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

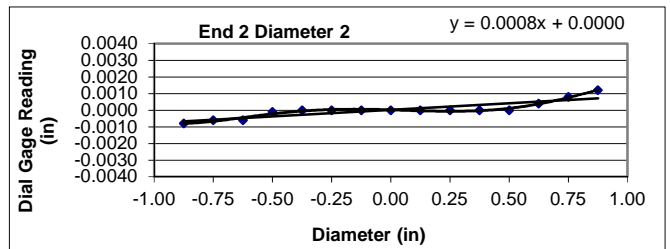
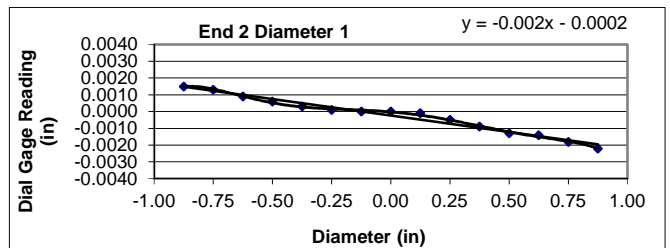
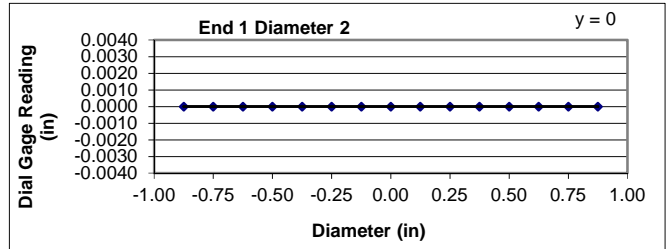
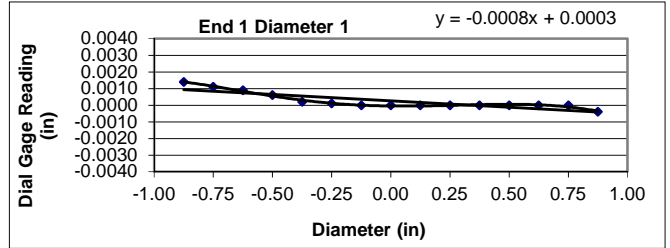
Project: Carolina Crossroads Project	Diameter (in): 1.99	Date: 3/19/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.44	Tested by: BKP
Boring Id: B-37	Unit Weight (pcf): 176.0	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.1	
Depth (ft): 52.6 - 53.3		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0014	0.0000	0.0015	-0.0008
- 6/8	0.0011	0.0000	0.0013	-0.0006
- 5/8	0.0009	0.0000	0.0009	-0.0006
- 4/8	0.0006	0.0000	0.0006	-0.0001
- 3/8	0.0002	0.0000	0.0003	0.0000
- 2/8	0.0001	0.0000	0.0001	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0001	0.0000
2/8	0.0000	0.0000	-0.0005	0.0000
3/8	0.0000	0.0000	-0.0009	0.0000
4/8	0.0000	0.0000	-0.0013	0.0000
5/8	0.0000	0.0000	-0.0014	0.0004
6/8	0.0000	0.0000	-0.0018	0.0008
7/8	-0.0004	0.0000	-0.0022	0.0012



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00077
	Angle of Best Fit Line:	-0.04404
End 2:	Slope of Best Fit Line:	-0.00196
	Angle of Best Fit Line:	-0.11214
	Max Angular Difference:	0.07

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line:	0.00079
	Angle of Best Fit Line:	0.04551
	Max Angular Difference:	-0.05

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0018	0.0009	YES
End 1 Diam 2	0.0000	0.0000	YES
End 2 Diam 1	0.0037	0.0019	YES
End 2 Diam 2	0.0020	0.0010	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

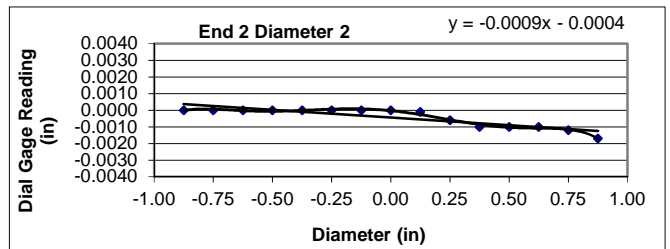
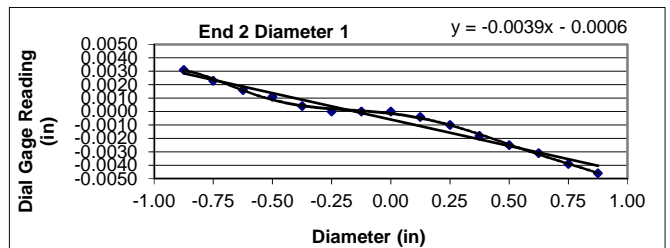
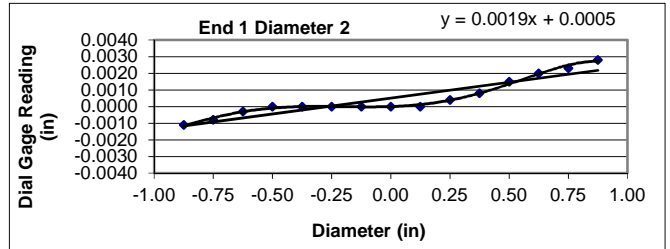
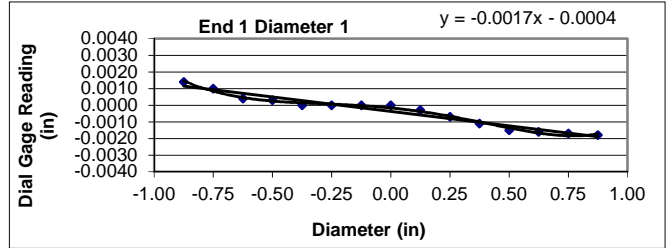
Project: Carolina Crossroads Project	Diameter (in): 1.99	Date: 3/19/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.49	Tested by: BKP
Boring Id: B-37	Unit Weight (pcf): 183.6	Reviewed by: JBB
Sample No.: RC-5	Moisture Content (%): 0.1	
Depth (ft): 57.2 - 58.0		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0014	-0.0011	0.0031	0.0000
- 6/8	0.0010	-0.0008	0.0023	0.0000
- 5/8	0.0004	-0.0003	0.0016	0.0000
- 4/8	0.0003	0.0000	0.0011	0.0000
- 3/8	0.0000	0.0000	0.0004	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0003	0.0000	-0.0004	-0.0001
2/8	-0.0007	0.0004	-0.0010	-0.0006
3/8	-0.0011	0.0008	-0.0018	-0.0010
4/8	-0.0015	0.0015	-0.0025	-0.0010
5/8	-0.0016	0.0020	-0.0031	-0.0010
6/8	-0.0017	0.0023	-0.0039	-0.0012
7/8	-0.0018	0.0028	-0.0046	-0.0017



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00174
	Angle of Best Fit Line:	-0.09953
End 2:	Slope of Best Fit Line:	-0.00394
	Angle of Best Fit Line:	-0.22591
	Max Angular Difference:	0.13

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00190
	Angle of Best Fit Line:	0.10903
End 2:	Slope of Best Fit Line:	-0.00093
	Angle of Best Fit Line:	-0.05304
	Max Angular Difference:	0.16

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0032	0.0016	YES
End 1 Diam 2	0.0039	0.0020	YES
End 2 Diam 1	0.0077	0.0039	YES
End 2 Diam 2	0.0017	0.0009	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

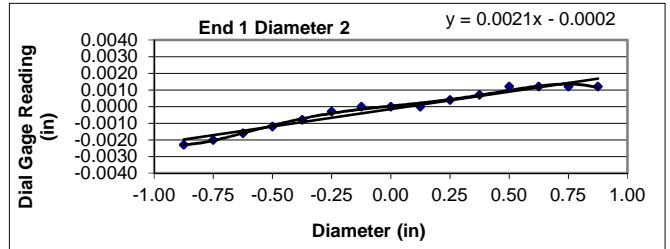
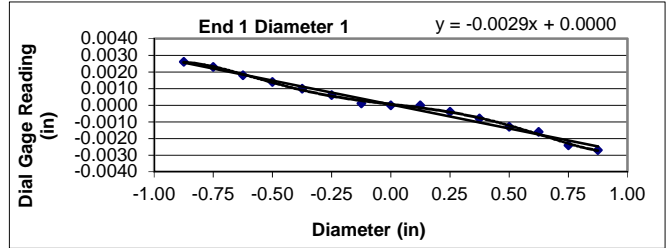
Project: Carolina Crossroads Project	Diameter (in): 1.99	Date: 3/19/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.47	Tested by: BKP
Boring Id: B-37	Unit Weight (pcf): 176.9	Reviewed by: JBB
Sample No.: RC-6	Moisture Content (%): 0.2	
Depth (ft): 63.2 - 63.8		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

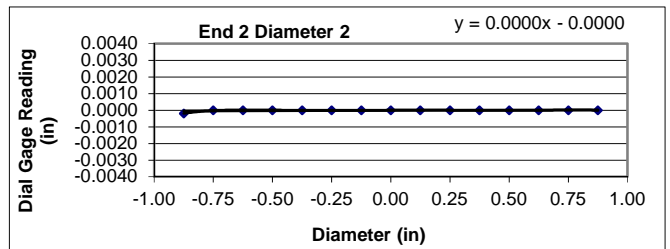
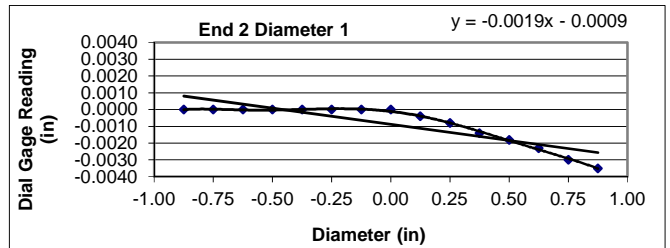
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0026	-0.0023	0.0000	-0.0002
- 6/8	0.0023	-0.0020	0.0000	0.0000
- 5/8	0.0018	-0.0016	0.0000	0.0000
- 4/8	0.0014	-0.0012	0.0000	0.0000
- 3/8	0.0010	-0.0008	0.0000	0.0000
- 2/8	0.0006	-0.0003	0.0000	0.0000
- 1/8	0.0001	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0004	0.0000
2/8	-0.0004	0.0004	-0.0008	0.0000
3/8	-0.0008	0.0007	-0.0014	0.0000
4/8	-0.0013	0.0012	-0.0018	0.0000
5/8	-0.0016	0.0012	-0.0023	0.0000
6/8	-0.0024	0.0012	-0.0030	0.0000
7/8	-0.0027	0.0012	-0.0035	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00287
	Angle of Best Fit Line:	-0.16468
End 2:	Slope of Best Fit Line:	-0.00193
	Angle of Best Fit Line:	-0.11034
	Max Angular Difference:	-0.05

Parallelism Diameter 2


End 1:	Slope of Best Fit Line:	0.00209
	Angle of Best Fit Line:	0.11983
End 2:	Slope of Best Fit Line:	0.00004
	Angle of Best Fit Line:	0.00229
	Max Angular Difference:	0.12


Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0053	0.0027	YES
End 1 Diam 2	0.0035	0.0018	YES
End 2 Diam 1	0.0035	0.0018	YES
End 2 Diam 2	0.0002	0.0001	YES

Perpendicularity Tolerance Met? YES

		Date: 3/20/2018
		Photographer: Ben Painter
3	Location / Orientation	B-31, RC-4 (41.3' – 42.0')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/20/2018
		Photographer: Ben Painter
4	Location / Orientation	B-33, RC-6 (72.2' – 73.0')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

5	Location / Orientation	B-37, RC-4 (52.6' – 53.3')	Photographer: Ben Painter	Date: 3/20/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



6	Location / Orientation	B-37, RC-5 (57.2' – 58.0')	Photographer: Ben Painter	Date: 3/20/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		





		Date: 3/20/2018
		Photographer: Ben Painter
7	Location / Orientation	B-37, RC-6 (63.2' – 63.8')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: March 30, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
W-19	RC-3	53.5 - 54.1	4.26	1.97	A	3.05	151.6	21	3,166	1,038	0.8
B-32	RC-2	67.2 - 68.1	4.42	1.98	D	3.08	178.7	81	93,085	30,222	0.3
B-44	RC-1	9.2 - 9.9	4.50	1.98	A	3.08	163.5	83	101,124	32,832	0.2
B-44	RC-3	16.2 - 17.1	4.45	1.98	A	3.08	162.7	84	30,278	9,831	0.3
B-44	RC-4	23.2 - 23.9	4.46	1.98	A	3.08	162.4	37	10,251	3,328	0.4

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



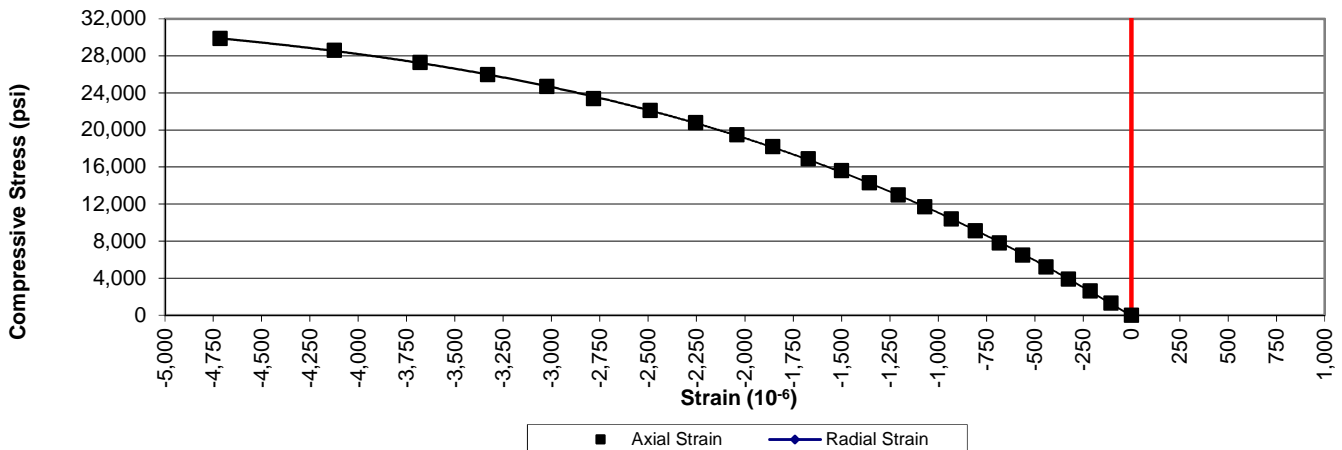
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/28/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.42	Tested by:	BKP / MG
Boring Id:	B-32	Unit Weight, pcf:	178.7	Reviewed by:	JBB
Sample No:	RC-2	Moisture Content, %:	0.3		
Depth (ft):	67.2 - 68.1	Load Rate, psi/sec:	81		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-106		4,000	1,299	12.25		
3	-213		8,000	2,597	12.19		
4	-326		12,000	3,896	11.95		
5	-442		16,000	5,195	11.75		
6	-562		20,000	6,494	11.56		
7	-683		24,000	7,792	11.41		
8	-808		28,000	9,091	11.25		
9	-932		32,000	10,390	11.15		
10	-1,069		36,000	11,688	10.93		
11	-1,207		40,000	12,987	10.76		
12	-1,356		44,000	14,286	10.54		
13	-1,500		48,000	15,584	10.39		
14	-1,672		52,000	16,883	10.10		
15	-1,855		56,000	18,182	9.80		
16	-2,041		60,000	19,481	9.54		
17	-2,254		64,000	20,779	9.22		
18	-2,490		68,000	22,078	8.87		
19	-2,782		72,000	23,377	8.40		
20	-3,024		76,000	24,675	8.16		
21	-3,331		80,000	25,974	7.80		
22	-3,679		84,000	27,273	7.41		
23	-4,124		88,000	28,571	6.93		
24	-4,714		92,000	29,870	6.34		
25			93,085	30,222			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.

Stress vs. Strain



**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)**



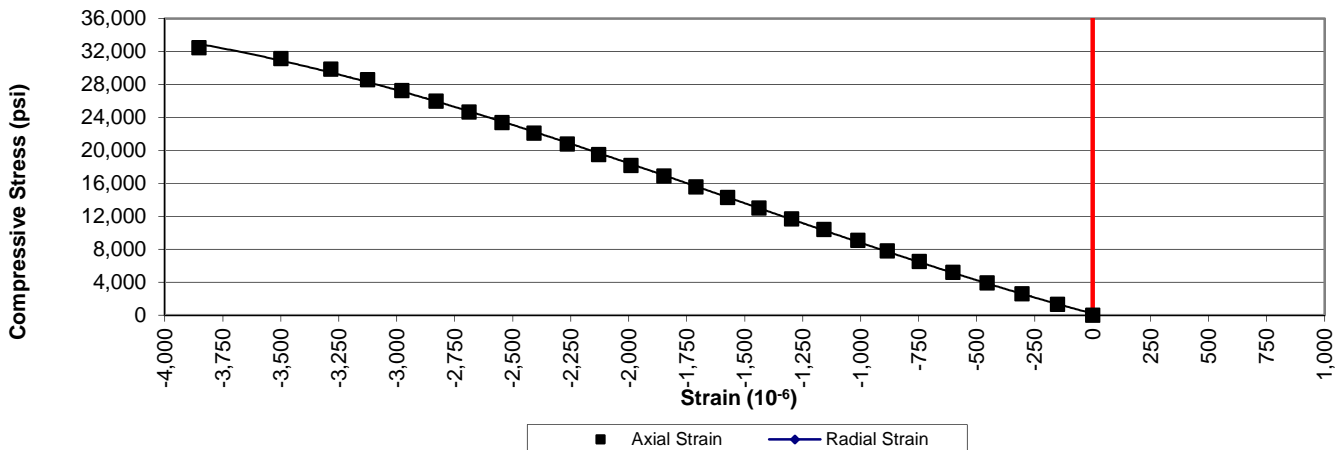
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/28/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.50	Tested by:	BKP / MG
Boring Id:	B-44	Unit Weight, pcf:	163.5	Reviewed by:	JBB
Sample No:	RC-1	Moisture Content, %:	0.2		
Depth (ft):	9.2 - 9.9	Load Rate, psi/sec:	83		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-152		4,000	1,299	8.55		
3	-304		8,000	2,597	8.54		
4	-455		12,000	3,896	8.56		
5	-603		16,000	5,195	8.62		
6	-747		20,000	6,494	8.69		
7	-886		24,000	7,792	8.79		
8	-1,013		28,000	9,091	8.97		
9	-1,158		32,000	10,390	8.97		
10	-1,298		36,000	11,688	9.00		
11	-1,438		40,000	12,987	9.03		
12	-1,574		44,000	14,286	9.08		
13	-1,710		48,000	15,584	9.11		
14	-1,848		52,000	16,883	9.14		
15	-1,990		56,000	18,182	9.14		
16	-2,130		60,000	19,481	9.15		
17	-2,265		64,000	20,779	9.17		
18	-2,408		68,000	22,078	9.17		
19	-2,547		72,000	23,377	9.18		
20	-2,689		76,000	24,675	9.18		
21	-2,831		80,000	25,974	9.17		
22	-2,978		84,000	27,273	9.16		
23	-3,126		88,000	28,571	9.14		
24	-3,285		92,000	29,870	9.09		
25	-3,500		96,000	31,169	8.91		
26	-3,853		100,000	32,468	8.43		
27			101,124	32,832			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



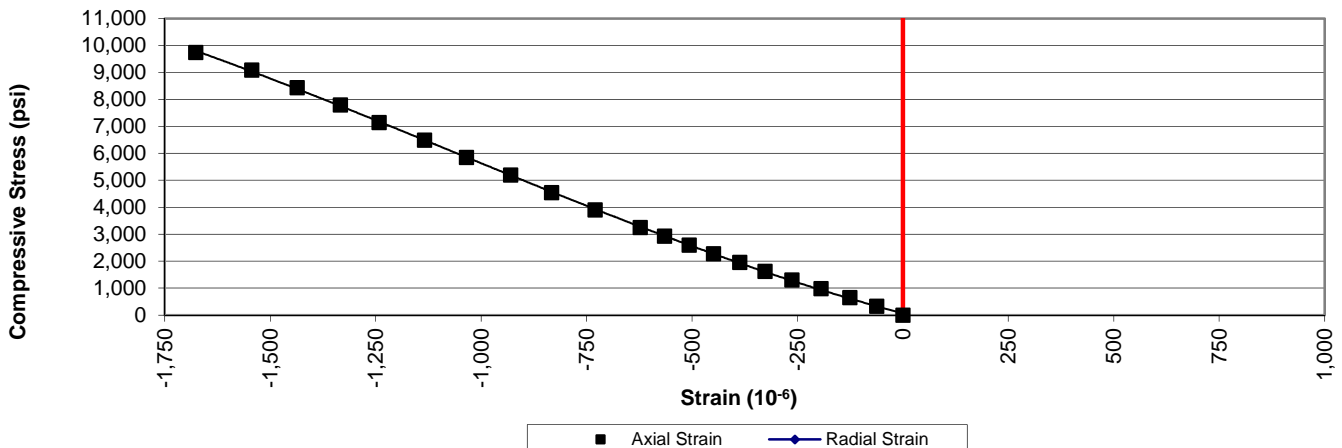
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/28/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.45	Tested by:	BKP / MG
Boring Id:	B-44	Unit Weight, pcf:	162.7	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.3		
Depth (ft):	16.2 - 17.1	Load Rate, psi/sec:	84		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-62		1,000	325	5.24		
3	-126		2,000	649	5.15		
4	-194		3,000	974	5.02		
5	-263		4,000	1,299	4.94		
6	-327		5,000	1,623	4.96		
7	-387		6,000	1,948	5.03		
8	-449		7,000	2,273	5.06		
9	-507		8,000	2,597	5.12		
10	-565		9,000	2,922	5.17		
11	-623		10,000	3,247	5.21		
12	-730		12,000	3,896	5.34		
13	-833		14,000	4,545	5.46		
14	-930		16,000	5,195	5.59		
15	-1,035		18,000	5,844	5.65		
16	-1,134		20,000	6,494	5.73		
17	-1,242		22,000	7,143	5.75		
18	-1,334		24,000	7,792	5.84		
19	-1,436		26,000	8,442	5.88		
20	-1,544		28,000	9,091	5.89		
21	-1,677		30,000	9,740	5.81		
22			30,278	9,831			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

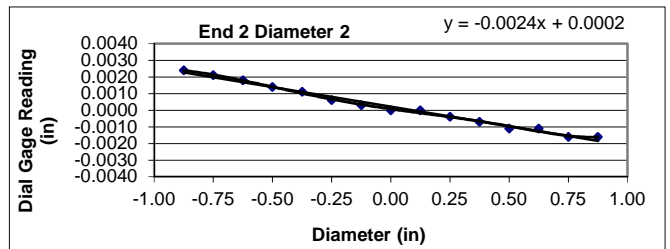
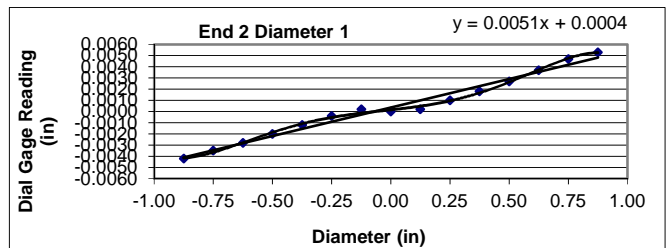
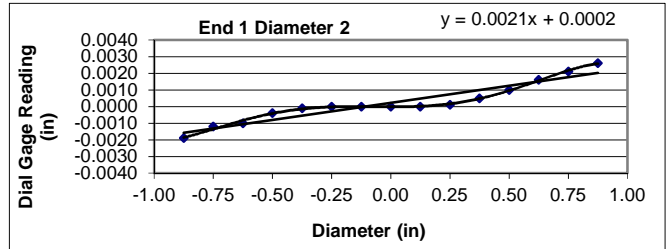
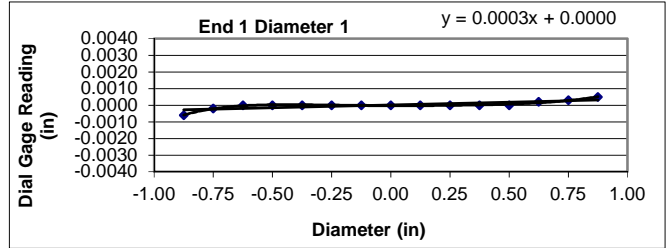
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.42	Tested by: BKP
Boring Id: B-32	Unit Weight (pcf): 178.7	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.3	
Depth (ft): 67.2 - 68.1		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? NO Straightness Tolerance Met? NO

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0006	-0.0019	-0.0042	0.0024
- 6/8	-0.0002	-0.0012	-0.0035	0.0021
- 5/8	0.0000	-0.0010	-0.0028	0.0018
- 4/8	0.0000	-0.0004	-0.0020	0.0014
- 3/8	0.0000	-0.0001	-0.0012	0.0011
- 2/8	0.0000	0.0000	-0.0004	0.0006
- 1/8	0.0000	0.0000	0.0002	0.0003
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0002	0.0000
2/8	0.0000	0.0001	0.0010	-0.0004
3/8	0.0000	0.0005	0.0018	-0.0007
4/8	0.0000	0.0010	0.0027	-0.0011
5/8	0.0002	0.0016	0.0037	-0.0011
6/8	0.0003	0.0021	0.0047	-0.0016
7/8	0.0005	0.0026	0.0053	-0.0016



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00033
	Angle of Best Fit Line:	0.01915
End 2:	Slope of Best Fit Line:	0.00511
	Angle of Best Fit Line:	0.29270
	Max Angular Difference:	-0.27

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00205
	Angle of Best Fit Line:	0.11770
End 2:	Slope of Best Fit Line:	-0.00235
	Angle of Best Fit Line:	-0.13489
	Max Angular Difference:	0.25

Parallelism Tolerance Met? NO

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0011	0.0006	YES
End 1 Diam 2	0.0045	0.0023	YES
End 2 Diam 1	0.0095	0.0048	NO
End 2 Diam 2	0.0040	0.0020	YES

Perpendicularity Tolerance Met? NO

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

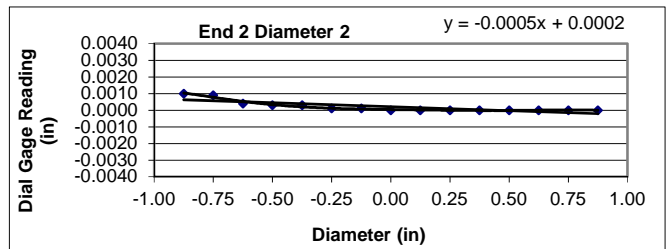
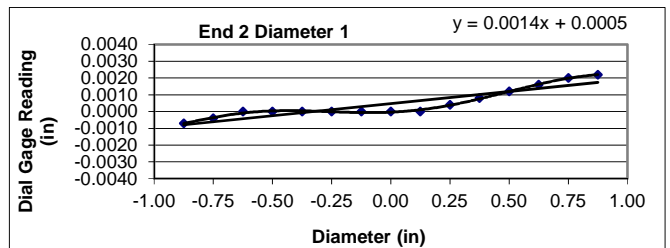
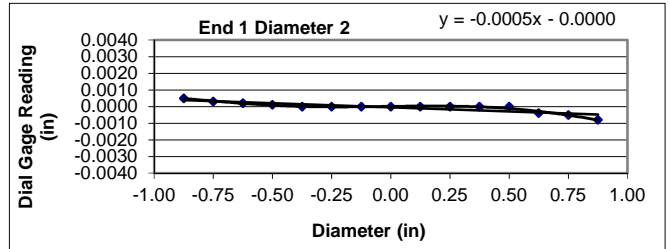
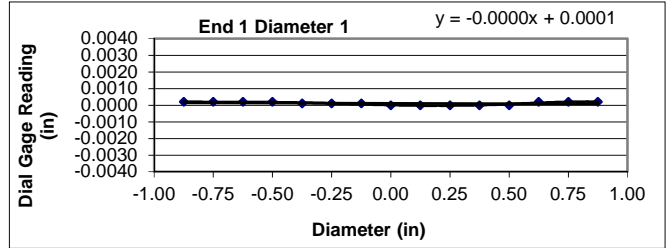
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.50	Tested by: BKP
Boring Id: B-44	Unit Weight (pcf): 163.5	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.2	
Depth (ft): 9.2 - 9.9		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0002	0.0005	-0.0007	0.0010
- 6/8	0.0002	0.0003	-0.0004	0.0009
- 5/8	0.0002	0.0002	0.0000	0.0004
- 4/8	0.0002	0.0001	0.0000	0.0003
- 3/8	0.0001	0.0000	0.0000	0.0003
- 2/8	0.0001	0.0000	0.0000	0.0001
- 1/8	0.0001	0.0000	0.0000	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0004	0.0000
3/8	0.0000	0.0000	0.0008	0.0000
4/8	0.0000	0.0000	0.0012	0.0000
5/8	0.0002	-0.0004	0.0016	0.0000
6/8	0.0002	-0.0005	0.0020	0.0000
7/8	0.0002	-0.0008	0.0022	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00004
	Angle of Best Fit Line:	-0.00229
End 2:	Slope of Best Fit Line:	0.00145
	Angle of Best Fit Line:	0.08300
	Max Angular Difference:	-0.09

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00049
	Angle of Best Fit Line:	-0.02832
End 2:	Slope of Best Fit Line:	-0.00048
	Angle of Best Fit Line:	-0.02750
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0002	0.0001	YES
End 1 Diam 2	0.0013	0.0007	YES
End 2 Diam 1	0.0029	0.0015	YES
End 2 Diam 2	0.0010	0.0005	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

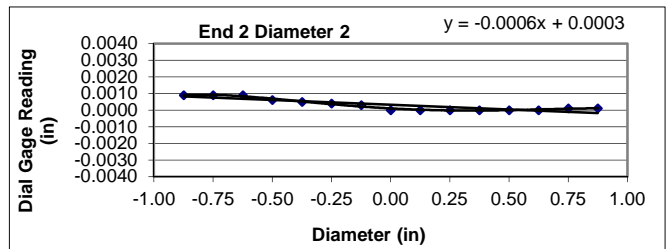
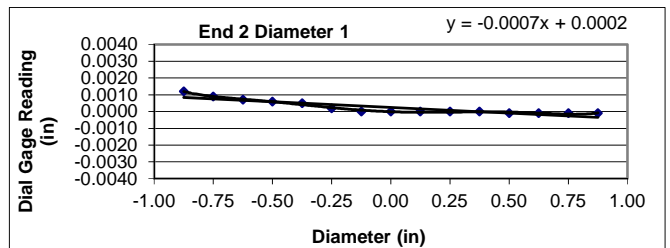
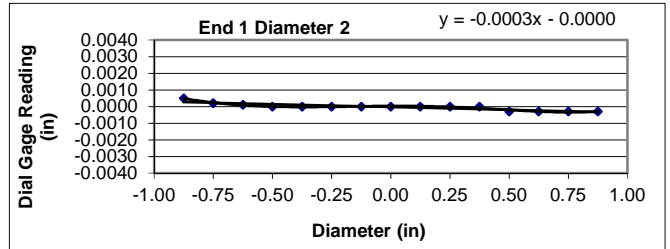
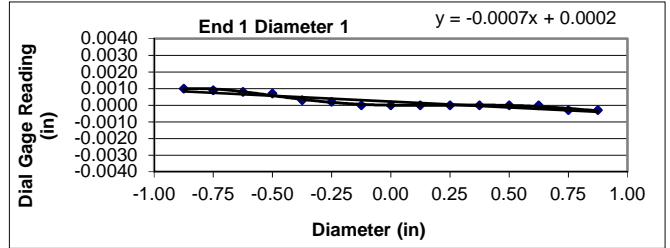
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.45	Tested by: BKP
Boring Id: B-44	Unit Weight (pcf): 162.7	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.3	
Depth (ft): 16.2 - 17.1		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0010	0.0005	0.0012	0.0009
- 6/8	0.0009	0.0002	0.0009	0.0009
- 5/8	0.0008	0.0001	0.0007	0.0009
- 4/8	0.0007	0.0000	0.0006	0.0006
- 3/8	0.0003	0.0000	0.0005	0.0005
- 2/8	0.0002	0.0000	0.0002	0.0004
- 1/8	0.0000	0.0000	0.0000	0.0003
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0000	0.0000	0.0000	0.0000
4/8	0.0000	-0.0003	-0.0001	0.0000
5/8	0.0000	-0.0003	-0.0001	0.0000
6/8	-0.0003	-0.0003	-0.0001	0.0001
7/8	-0.0003	-0.0003	-0.0001	0.0001



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00070
	Angle of Best Fit Line:	-0.03994
End 2:	Slope of Best Fit Line:	-0.00068
	Angle of Best Fit Line:	-0.03896
	Max Angular Difference:	0.00

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00034
	Angle of Best Fit Line:	-0.01932
End 2:	Slope of Best Fit Line:	-0.00057
	Angle of Best Fit Line:	-0.03258
	Max Angular Difference:	0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0013	0.0007	YES
End 1 Diam 2	0.0008	0.0004	YES
End 2 Diam 1	0.0013	0.0007	YES
End 2 Diam 2	0.0009	0.0005	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

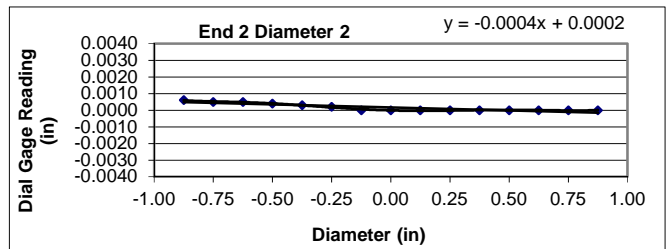
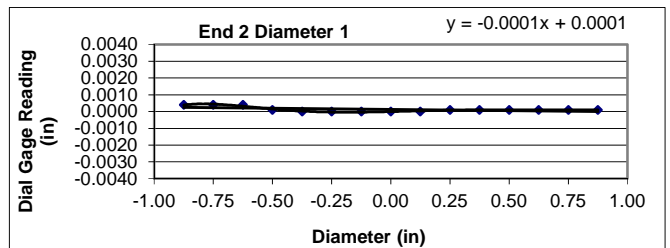
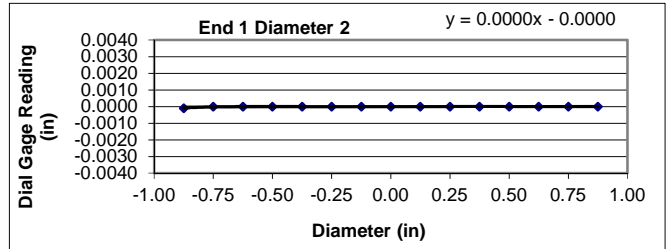
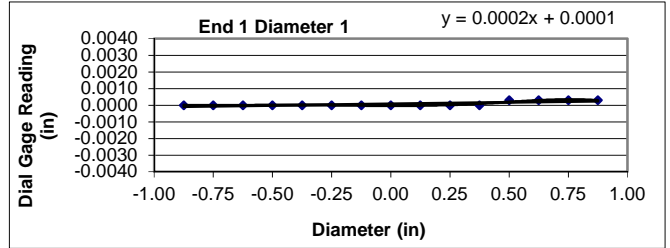
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.46	Tested by: BKP
Boring Id: B-44	Unit Weight (pcf): 162.4	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.4	
Depth (ft): 23.2 - 23.9		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	-0.0001	0.0004	0.0006
- 6/8	0.0000	0.0000	0.0004	0.0005
- 5/8	0.0000	0.0000	0.0004	0.0005
- 4/8	0.0000	0.0000	0.0001	0.0004
- 3/8	0.0000	0.0000	0.0000	0.0003
- 2/8	0.0000	0.0000	0.0000	0.0002
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0001	0.0000
3/8	0.0000	0.0000	0.0001	0.0000
4/8	0.0003	0.0000	0.0001	0.0000
5/8	0.0003	0.0000	0.0001	0.0000
6/8	0.0003	0.0000	0.0001	0.0000
7/8	0.0003	0.0000	0.0001	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00019
	Angle of Best Fit Line:	0.01080
End 2:	Slope of Best Fit Line:	-0.00014
	Angle of Best Fit Line:	-0.00802
	Max Angular Difference:	0.02

Parallelism Diameter 2


End 1:	Slope of Best Fit Line:	0.00002
	Angle of Best Fit Line:	0.00115
End 2:	Slope of Best Fit Line:	-0.00036
	Angle of Best Fit Line:	-0.02063
	Max Angular Difference:	0.02

Parallelism Tolerance Met? YES


Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

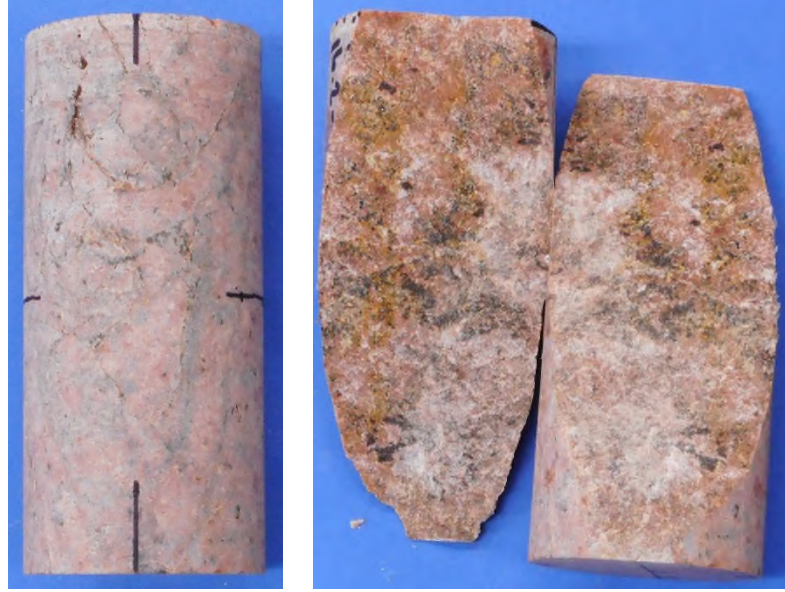
	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0003	0.0002	YES
End 1 Diam 2	0.0001	0.0001	YES
End 2 Diam 1	0.0004	0.0002	YES
End 2 Diam 2	0.0006	0.0003	YES

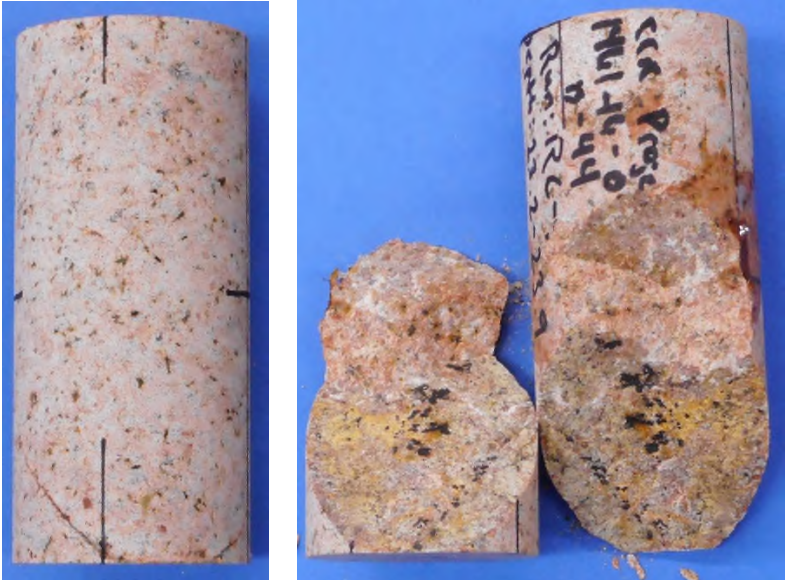
Perpendicularity Tolerance Met? YES


 		Date: 3/28/2018
		Photographer: Ben Painter
1	Location / Orientation	W-19, RC-3 (53.5' – 54.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

 		Date: 3/28/2018
		Photographer: Ben Painter
2	Location / Orientation	B-32, RC-2 (67.1' – 68.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/28/2018
		Photographer: Ben Painter
3	Location / Orientation	B-44, RC-1 (9.2' – 9.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/28/2018
		Photographer: Ben Painter
4	Location / Orientation	B-44, RC-3 (16.2' – 17.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/28/2018
		Photographer: Ben Painter
5	Location / Orientation	B-44, RC-4 (23.2' – 23.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/28/2018
		Photographer: Ben Painter
6	Location / Orientation	B-56, RC-1 (84.7' – 85.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: May 3, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-39	RC-2	15.8 - 16.8	4.41	1.98	A	3.08	165.5	83	114,313	37,115	0.2
B-39	RC-3	22.1 - 23.1	4.49	1.98	A	3.08	165.6	90	109,393	35,517	0.2
B-39	RC-5	29.1 - 30.1	4.45	1.98	A	3.08	166.5	82	106,987	34,736	0.2
B-48	RC-1	15.1 - 15.9	4.46	1.98	A	3.08	178.5	68	34,349	11,152	0.2
B-48	RC-2	19.7 - 20.6	4.45	1.98	A	3.08	175.9	73	32,993	10,712	0.5

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: May 3, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-48	RC-4	34.0 - 34.7	4.37	1.98	A	3.08	179.1	73	58,898	19,123	0.3
B-54	RC-1	74.6 - 75.3	4.44	1.98	A	3.08	167.0	41	8,313	2,699	0.3
B-54	RC-3	82.6 - 83.4	4.50	1.98	A	3.08	166.9	70	25,518	8,285	0.2
B-54	RC-4	86.2 - 86.9	4.52	1.98	A	3.08	165.4	80	70,751	22,971	0.2
B-60	RC-3	16.2 - 16.9	4.52	1.98	A	3.08	165.2	70	38,622	12,540	0.1

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Carolina Crossroads Project
Project Number: 1461-16-047 Phase 2B

Report Date: May 3, 2018
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B-60	RC-4	23.3 - 24.3	4.50	1.98	A	3.08	165.8	83	125,130	40,627	0.2
B-60	RC-5	26.2 - 26.7	4.37	1.98	A	3.08	165.7	80	98,848	32,094	0.2
B-61	RC-4	38.7 - 39.4	4.38	1.97	A	3.05	176.3	83	47,491	15,571	0.2

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{E1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{E1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)

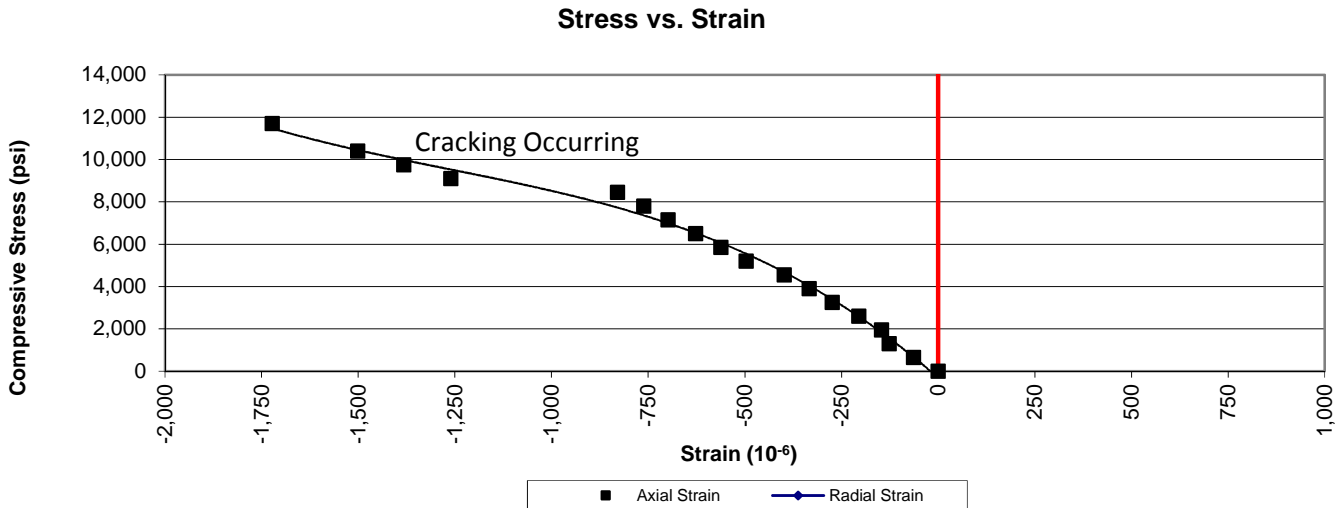


1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	5/2/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.52	Tested by:	BKP
Boring Id:	B-60	Unit Weight, pcf:	165.2	Reviewed by:	JBB
Sample No:	RC-3	Moisture Content, %:	0.1		
Depth (ft):	16.2 - 16.9	Load Rate, psi/sec:	70		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-63		2,000	649	10.30		
3	-126		4,000	1,299	10.31		
4	-146		6,000	1,948	13.34		
5	-205		8,000	2,597	12.67		
6	-274		10,000	3,247	11.85		
7	-333		12,000	3,896	11.70		
8	-398		14,000	4,545	11.42		
9	-496		16,000	5,195	10.47		
10	-562		18,000	5,844	10.40		
11	-627		20,000	6,494	10.36		
12	-698		22,000	7,143	10.23		
13	-761		24,000	7,792	10.24		
14	-829		26,000	8,442	10.18		
15	-1,260		28,000	9,091	7.22		
16	-1,382		30,000	9,740	7.05		cracking occurring
17	-1,501		32,000	10,390	6.92		
18	-1,722		36,000	11,688	6.79		
19			38,622	12,540			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis) tolerances practicable.



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)



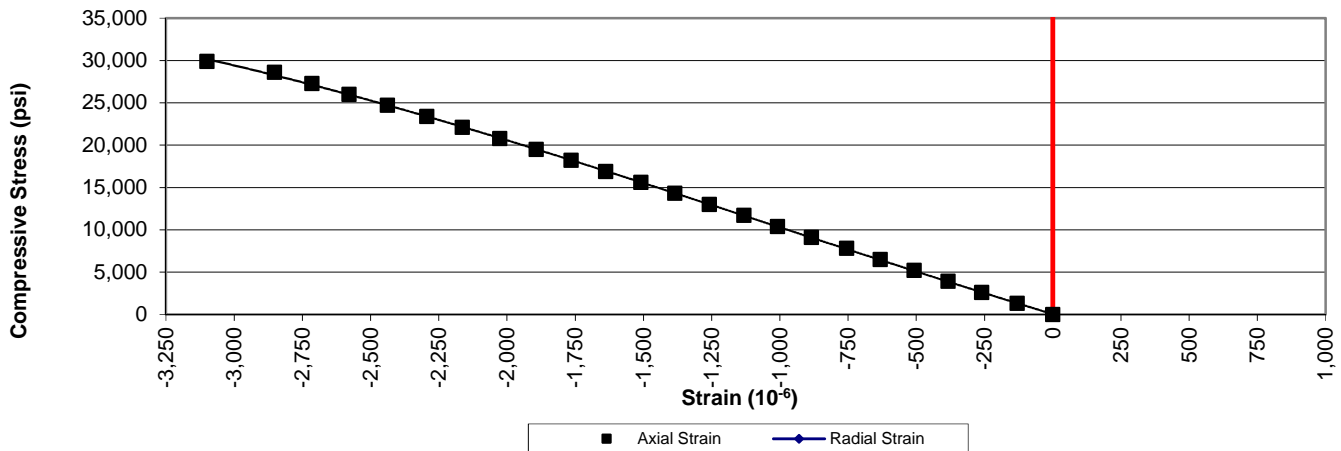
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	5/2/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.37	Tested by:	BKP
Boring Id:	B-60	Unit Weight, pcf:	165.7	Reviewed by:	JBB
Sample No:	RC-5	Moisture Content, %:	0.2		
Depth (ft):	26.2 - 26.7	Load Rate, psi/sec:	80		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0		0	0	0.00		
2	-130		4,000	1,299	9.99		
3	-260		8,000	2,597	9.99		
4	-383		12,000	3,896	10.17		
5	-508		16,000	5,195	10.23		
6	-632		20,000	6,494	10.28		
7	-755		24,000	7,792	10.32		
8	-884		28,000	9,091	10.28		
9	-1,008		32,000	10,390	10.31		
10	-1,132		36,000	11,688	10.33		
11	-1,258		40,000	12,987	10.32		
12	-1,385		44,000	14,286	10.31		
13	-1,509		48,000	15,584	10.33		
14	-1,638		52,000	16,883	10.31		
15	-1,765		56,000	18,182	10.30		
16	-1,892		60,000	19,481	10.30		
17	-2,026		64,000	20,779	10.26		
18	-2,163		68,000	22,078	10.21		
19	-2,294		72,000	23,377	10.19		
20	-2,438		76,000	24,675	10.12		
21	-2,578		80,000	25,974	10.08		
22	-2,715		84,000	27,273	10.05		
23	-2,852		88,000	28,571	10.02		
24	-3,099		92,000	29,870	9.64		
25			98,848	32,094			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
 Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis) tolerances practicable.

Stress vs. Strain



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

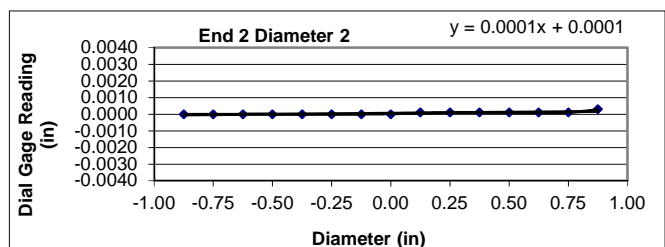
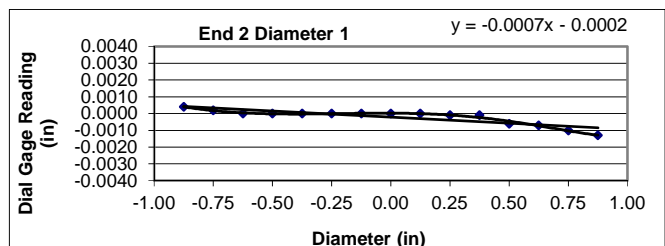
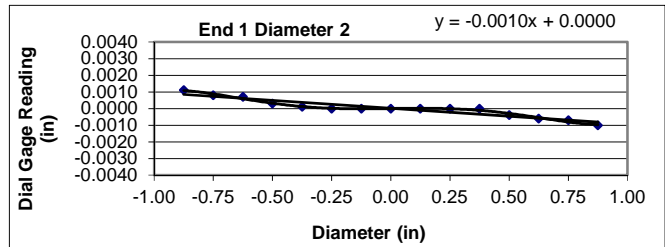
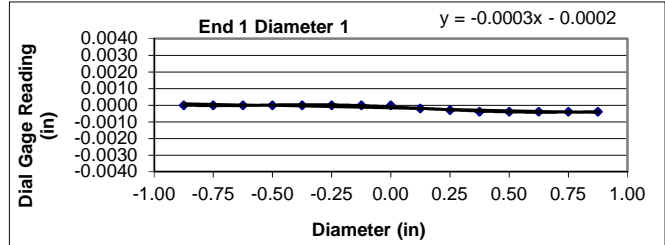
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.41	Tested by: BKP
Boring Id: B-39	Unit Weight (pcf): 165.5	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.2	
Depth (ft): 15.8 - 16.8		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0011	0.0004	0.0000
- 6/8	0.0000	0.0008	0.0002	0.0000
- 5/8	0.0000	0.0007	0.0000	0.0000
- 4/8	0.0000	0.0003	0.0000	0.0000
- 3/8	0.0000	0.0001	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0002	0.0000	0.0000	0.0001
2/8	-0.0003	0.0000	-0.0001	0.0001
3/8	-0.0004	0.0000	-0.0001	0.0001
4/8	-0.0004	-0.0004	-0.0006	0.0001
5/8	-0.0004	-0.0006	-0.0007	0.0001
6/8	-0.0004	-0.0007	-0.0010	0.0001
7/8	-0.0004	-0.0010	-0.0013	0.0003



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00031
	Angle of Best Fit Line:	-0.01768
End 2:	Slope of Best Fit Line:	-0.00073
	Angle of Best Fit Line:	-0.04174
	Max Angular Difference:	0.02

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00095
	Angle of Best Fit Line:	-0.05451
End 2:	Slope of Best Fit Line:	0.00012
	Angle of Best Fit Line:	0.00688
	Max Angular Difference:	-0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0004	0.0002	YES
End 1 Diam 2	0.0021	0.0011	YES
End 2 Diam 1	0.0017	0.0009	YES
End 2 Diam 2	0.0003	0.0002	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

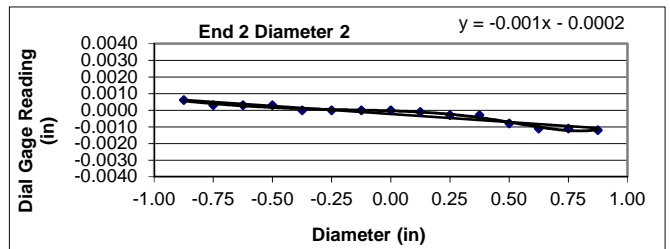
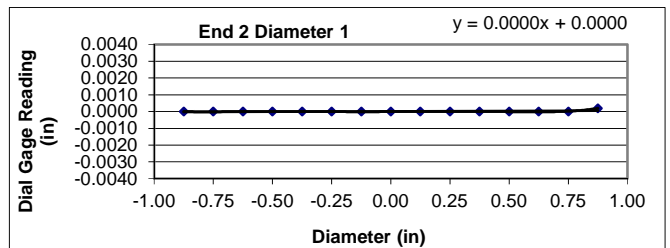
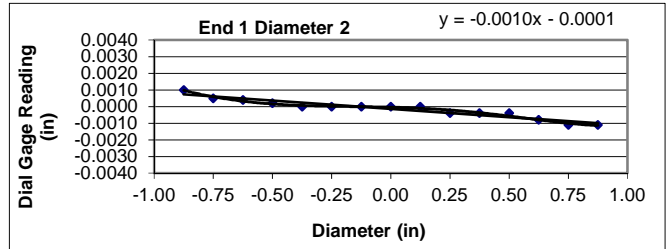
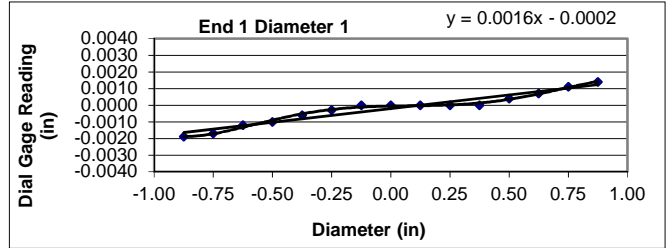
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.49	Tested by: BKP
Boring Id: B-39	Unit Weight (pcf): 165.6	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.2	
Depth (ft): 22.1 - 23.1		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0019	0.0010	0.0000	0.0006
- 6/8	-0.0017	0.0005	0.0000	0.0003
- 5/8	-0.0012	0.0004	0.0000	0.0003
- 4/8	-0.0010	0.0002	0.0000	0.0003
- 3/8	-0.0006	0.0000	0.0000	0.0000
- 2/8	-0.0003	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0001
2/8	0.0000	-0.0004	0.0000	-0.0003
3/8	0.0000	-0.0004	0.0000	-0.0003
4/8	0.0004	-0.0004	0.0000	-0.0008
5/8	0.0007	-0.0008	0.0000	-0.0011
6/8	0.0011	-0.0011	0.0000	-0.0011
7/8	0.0014	-0.0011	0.0002	-0.0012



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00164
	Angle of Best Fit Line:	0.09397
End 2:	Slope of Best Fit Line:	0.00004
	Angle of Best Fit Line:	0.00229
	Max Angular Difference:	0.09

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00099
	Angle of Best Fit Line:	-0.05680
End 2:	Slope of Best Fit Line:	-0.00097
	Angle of Best Fit Line:	-0.05566
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0033	0.0017	YES
End 1 Diam 2	0.0021	0.0011	YES
End 2 Diam 1	0.0002	0.0001	YES
End 2 Diam 2	0.0018	0.0009	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

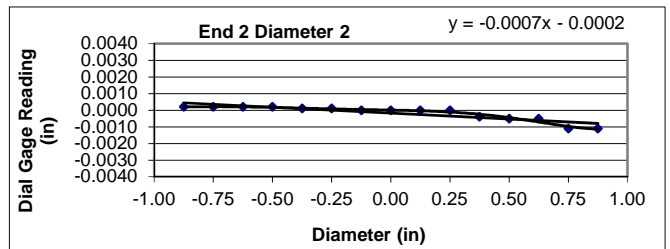
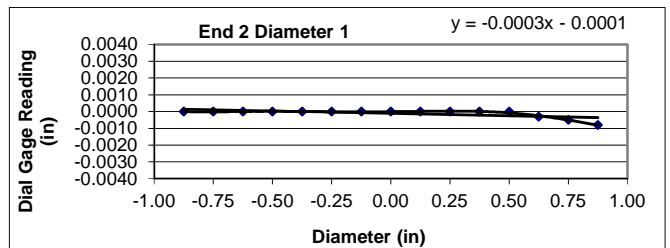
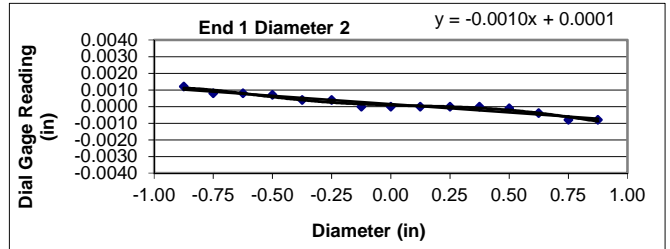
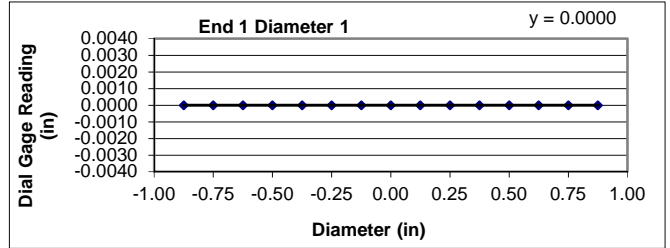
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.45	Tested by: BKP
Boring Id: B-39	Unit Weight (pcf): 166.5	Reviewed by: JBB
Sample No.: RC-5	Moisture Content (%): 0.2	
Depth (ft): 29.1 - 30.1		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0012	0.0000	0.0002
- 6/8	0.0000	0.0008	0.0000	0.0002
- 5/8	0.0000	0.0008	0.0000	0.0002
- 4/8	0.0000	0.0007	0.0000	0.0002
- 3/8	0.0000	0.0004	0.0000	0.0001
- 2/8	0.0000	0.0004	0.0000	0.0001
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0000	0.0000	0.0000	-0.0004
4/8	0.0000	-0.0001	0.0000	-0.0005
5/8	0.0000	-0.0004	-0.0003	-0.0005
6/8	0.0000	-0.0008	-0.0005	-0.0011
7/8	0.0000	-0.0008	-0.0008	-0.0011



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line:	-0.00029
	Angle of Best Fit Line:	-0.01653
	Max Angular Difference:	0.02

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00099
	Angle of Best Fit Line:	-0.05697
End 2:	Slope of Best Fit Line:	-0.00071
	Angle of Best Fit Line:	-0.04076
	Max Angular Difference:	-0.02

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0000	0.0000	YES
End 1 Diam 2	0.0020	0.0010	YES
End 2 Diam 1	0.0008	0.0004	YES
End 2 Diam 2	0.0013	0.0007	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

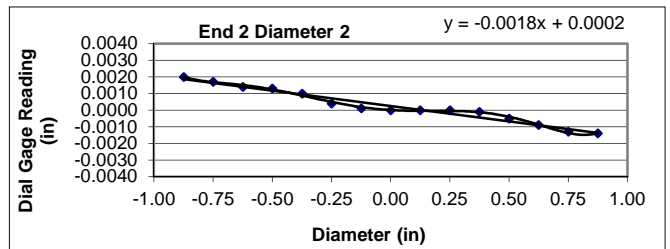
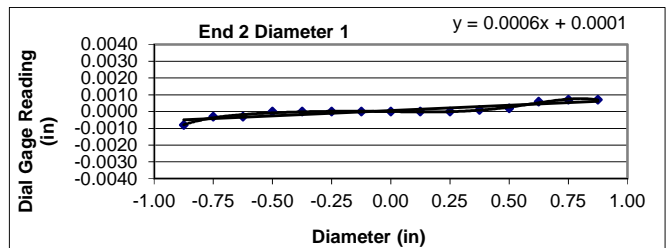
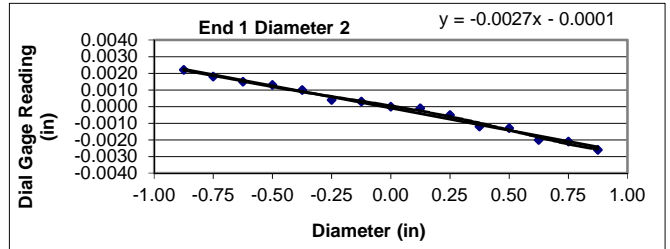
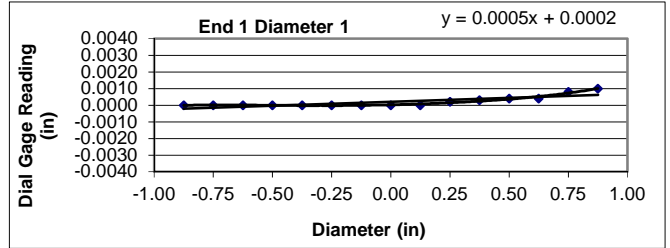
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.52	Tested by: BKP
Boring Id: B-60	Unit Weight (pcf): 165.2	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.1	
Depth (ft): 16.2 - 16.9		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0022	-0.0008	0.0020
- 6/8	0.0000	0.0018	-0.0003	0.0017
- 5/8	0.0000	0.0015	-0.0003	0.0014
- 4/8	0.0000	0.0013	0.0000	0.0013
- 3/8	0.0000	0.0010	0.0000	0.0010
- 2/8	0.0000	0.0004	0.0000	0.0004
- 1/8	0.0000	0.0003	0.0000	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0001	0.0000	0.0000
2/8	0.0002	-0.0005	0.0000	0.0000
3/8	0.0003	-0.0012	0.0001	-0.0001
4/8	0.0004	-0.0013	0.0002	-0.0005
5/8	0.0004	-0.0020	0.0006	-0.0009
6/8	0.0008	-0.0021	0.0007	-0.0013
7/8	0.0010	-0.0026	0.0007	-0.0014



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00048
	Angle of Best Fit Line:	0.02734
End 2:	Slope of Best Fit Line:	0.00063
	Angle of Best Fit Line:	0.03618
	Max Angular Difference:	-0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00268
	Angle of Best Fit Line:	-0.15339
End 2:	Slope of Best Fit Line:	-0.00185
	Angle of Best Fit Line:	-0.10592
	Max Angular Difference:	-0.05

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0010	0.0005	YES
End 1 Diam 2	0.0048	0.0024	YES
End 2 Diam 1	0.0015	0.0008	YES
End 2 Diam 2	0.0034	0.0017	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

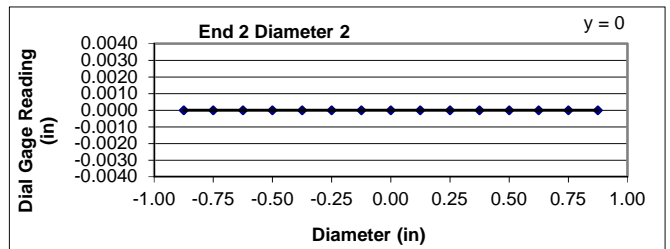
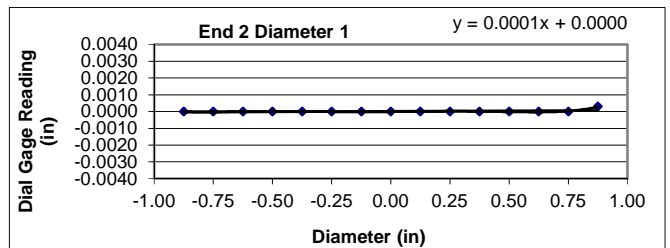
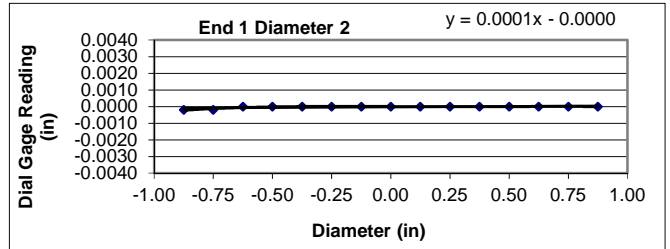
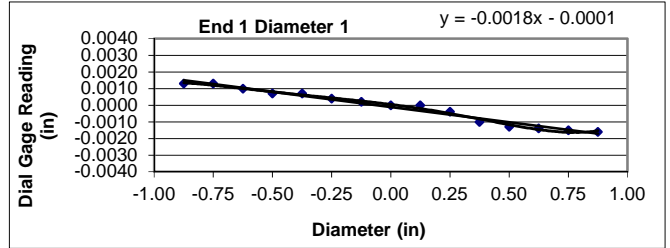
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.50	Tested by: BKP
Boring Id: B-60	Unit Weight (pcf): 165.8	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.2	
Depth (ft): 23.3 - 24.3		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0013	-0.0002	0.0000	0.0000
- 6/8	0.0013	-0.0002	0.0000	0.0000
- 5/8	0.0010	0.0000	0.0000	0.0000
- 4/8	0.0007	0.0000	0.0000	0.0000
- 3/8	0.0007	0.0000	0.0000	0.0000
- 2/8	0.0004	0.0000	0.0000	0.0000
- 1/8	0.0002	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	-0.0004	0.0000	0.0000	0.0000
3/8	-0.0010	0.0000	0.0000	0.0000
4/8	-0.0013	0.0000	0.0000	0.0000
5/8	-0.0014	0.0000	0.0000	0.0000
6/8	-0.0015	0.0000	0.0000	0.0000
7/8	-0.0016	0.0000	0.0003	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00183
	Angle of Best Fit Line:	-0.10477
End 2:	Slope of Best Fit Line:	0.00006
	Angle of Best Fit Line:	0.00344
	Max Angular Difference:	-0.11

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00007
	Angle of Best Fit Line:	0.00426
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.00

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0029	0.0015	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0003	0.0002	YES
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

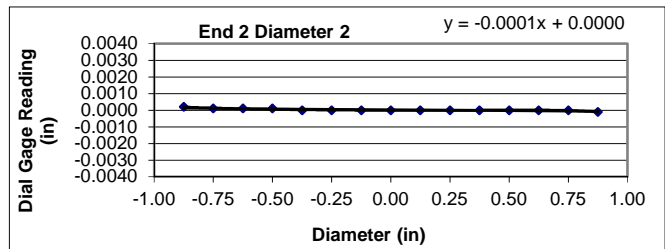
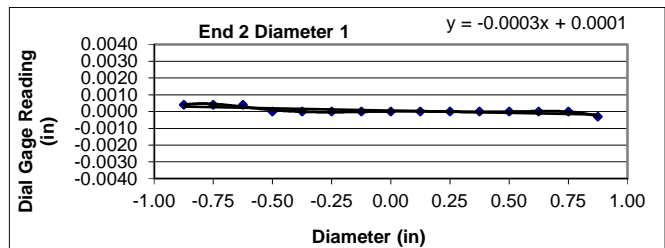
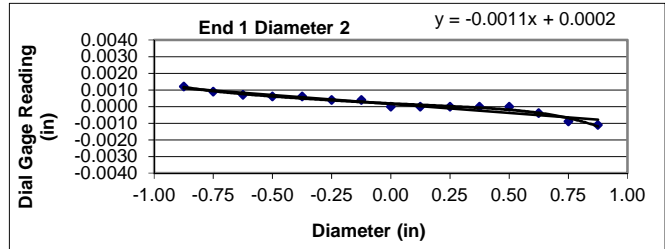
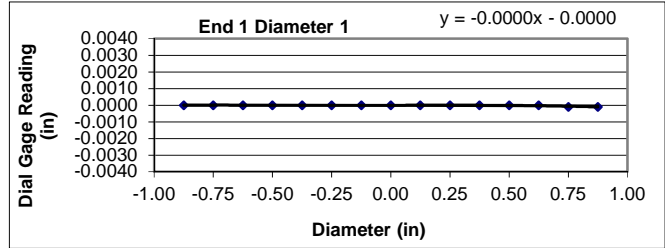
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.37	Tested by: BKP
Boring Id: B-60	Unit Weight (pcf): 165.7	Reviewed by: JBB
Sample No.: RC-5	Moisture Content (%): 0.2	
Depth (ft): 26.2 - 26.7		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0012	0.0004	0.0002
- 6/8	0.0000	0.0009	0.0004	0.0001
- 5/8	0.0000	0.0007	0.0004	0.0001
- 4/8	0.0000	0.0006	0.0000	0.0001
- 3/8	0.0000	0.0006	0.0000	0.0000
- 2/8	0.0000	0.0004	0.0000	0.0000
- 1/8	0.0000	0.0004	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0000	0.0000	0.0000	0.0000
4/8	0.0000	0.0000	0.0000	0.0000
5/8	0.0000	-0.0004	0.0000	0.0000
6/8	-0.0001	-0.0009	0.0000	0.0000
7/8	-0.0001	-0.0011	-0.0003	-0.0001



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00004
	Angle of Best Fit Line:	-0.00213
End 2:	Slope of Best Fit Line:	-0.00027
	Angle of Best Fit Line:	-0.01522
	Max Angular Difference:	0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00108
	Angle of Best Fit Line:	-0.06188
End 2:	Slope of Best Fit Line:	-0.00010
	Angle of Best Fit Line:	-0.00589
	Max Angular Difference:	-0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0001	0.0001	YES
End 1 Diam 2	0.0023	0.0012	YES
End 2 Diam 1	0.0007	0.0004	YES
End 2 Diam 2	0.0003	0.0002	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

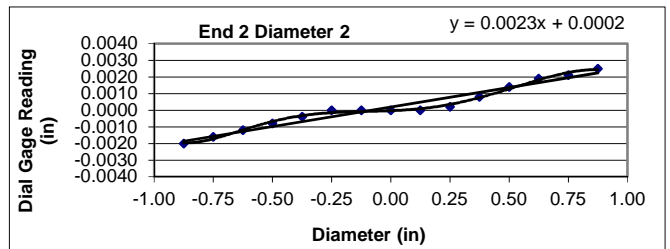
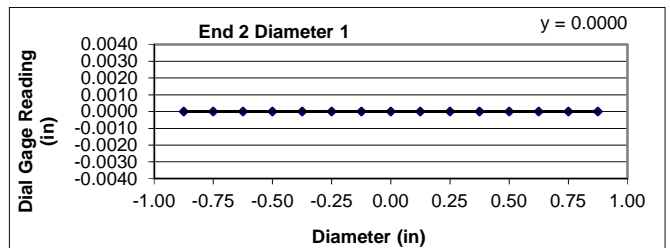
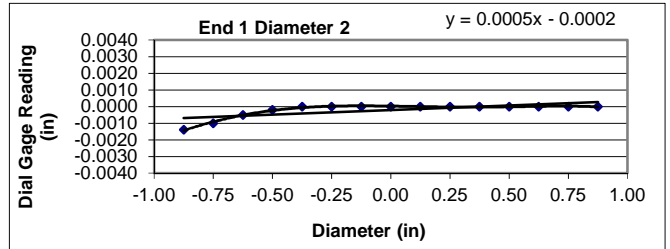
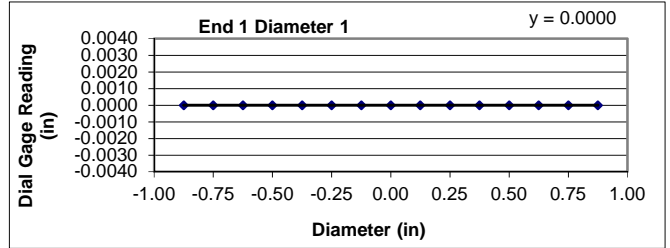
Project: Carolina Crossroads Project	Diameter (in): 1.97	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.38	Tested by: BKP
Boring Id: B-61	Unit Weight (pcf): 176.3	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.2	
Depth (ft): 38.7 - 39.4		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	-0.0014	0.0000	-0.0020
- 6/8	0.0000	-0.0010	0.0000	-0.0016
- 5/8	0.0000	-0.0005	0.0000	-0.0012
- 4/8	0.0000	-0.0002	0.0000	-0.0008
- 3/8	0.0000	0.0000	0.0000	-0.0004
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0002
3/8	0.0000	0.0000	0.0000	0.0008
4/8	0.0000	0.0000	0.0000	0.0014
5/8	0.0000	0.0000	0.0000	0.0019
6/8	0.0000	0.0000	0.0000	0.0021
7/8	0.0000	0.0000	0.0000	0.0025



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.00

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00055
	Angle of Best Fit Line:	0.03127
End 2:	Slope of Best Fit Line:	0.00234
	Angle of Best Fit Line:	0.13424
	Max Angular Difference:	-0.10



Parallelism Tolerance Met? YES


Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .


	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0000	0.0000	YES
End 1 Diam 2	0.0014	0.0007	YES
End 2 Diam 1	0.0000	0.0000	YES
End 2 Diam 2	0.0045	0.0023	YES



Perpendicularity Tolerance Met? YES

 		Date: 5/1/2018
		Photographer: Ben Painter
1	Location / Orientation	B-39, RC-2 (15.8' – 16.8')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

 		Date: 5/1/2018
		Photographer: Ben Painter
2	Location / Orientation	B-39, RC-3 (22.1' – 23.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 5/1/2018
		Photographer: Ben Painter
3	Location / Orientation	B-39, RC-5 (29.1' – 30.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 5/1/2018
		Photographer: Ben Painter
4	Location / Orientation	B-48, RC-1 (15.1' – 15.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

 		Date: 5/1/2018
		Photographer: Ben Painter
9	Location / Orientation	B-54, RC-4 (86.2' – 86.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)


 		Date: 5/1/2018
		Photographer: Ben Painter
10	Location / Orientation	B-60, RC-3 (16.2' – 16.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

11	Location / Orientation	B-60, RC-4 (23.3' – 24.3')	Photographer: Ben Painter	Date: 5/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



12	Location / Orientation	B-60, RC-5 (26.2' – 26.7')	Photographer: Ben Painter	Date: 5/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



		Date: 5/1/2018
		Photographer: Ben Painter
13	Location / Orientation	B-61, RC-4 (38.7' – 39.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

F&ME CONSULTANTS
3112 Devine Street
Columbia, South Carolina 29205

ROCK CORE COMPRESSION TEST

PROJECT: I-20/26/126 Corridor Improvements

PROJECT NO: G5662.01

SAMPLED BY: CP

DATE SAMPLED: 5/18/2018

TESTED BY: BF

DATE TESTED: 5/23/2018

Lab No.	18-0985A	18-0985B	18-0985C	18-0985D	
Boring No.	B-63	B-63	B-63	B-63	
Sample No.	NQ-1	NQ-3	NQ-4	NQ-5	
Depth	44.0-44.3	50.5-50.8	57.4-57.7	61.4-61.7	
Length (in)	3.92	3.97	4.00	3.99	
Diameter (in)	1.86	1.86	1.85	1.85	
Mass (g)	464.48	477.97	481.36	480.89	
Cross Sectional Area (in²)	2.70	2.70	2.70	2.70	
Load (lb)	10865	12180	19605	11075	
Compressive Strength (psi)	4020	4510	7270	4110	
Corrected Compressive Strength (psi)					
Unit Weight (lb/ft³)	167.02	169.84	170.21	170.17	

Signature: _____

Remarks:

F&ME CONSULTANTS
3112 Devine Street
Columbia, South Carolina 29205

ROCK CORE COMPRESSION TEST

PROJECT: I-20/26/126 Corridor Improvements

PROJECT NO: G5662.01

SAMPLED BY: RW

DATE SAMPLED: 1/22/2018

TESTED BY: BF

DATE TESTED: 2/2/2018

Lab No.	18-0156A	18-0156B	18-0156C	18-0156D	18-0156E
Boring No.	DH-3.1	DH-3.1	DH-3.1	DH-3.1	DH-3.1
Sample No.	NQ-1	NQ-4	NQ-9	NQ-10	NQ-10
Depth	2.9-3.2	21.1-21.4	72.3-72.6	76.5-76.8	80.6-80.9
Length (in)	4.08	3.86	3.94	4.02	3.97
Diameter (in)	1.86	1.85	1.85	1.85	1.86
Mass (g)	566.99	498.97	510.35	549.26	519.50
Cross Sectional Area (in²)	2.72	2.68	2.70	2.70	2.71
Load (lb)	189270	98135	60965	37020	45430
Compressive Strength (psi)	69510	36670	22610	13710	16760
Corrected Compressive Strength (psi)					
Unit Weight (lb/ft³)	194.66	184.14	183.17	192.95	183.95

Signature: _____

Remarks:

F&ME CONSULTANTS
3112 Devine Street
Columbia, South Carolina 29205

ROCK CORE COMPRESSION TEST

PROJECT: I-20/26/126 Corridor Improvements

PROJECT NO: G5662.01

SAMPLED BY: RW

DATE SAMPLED: 1/22/2018

TESTED BY: BF

DATE TESTED: 2/2/2018

Lab No.	18-0156F	18-0156G	18-0156H		
Boring No.	DH-3.1	DH-3.1	DH-3.1		
Sample No.	NQ-11	NQ-12	NQ-15		
Depth	84.6-84.9	89.6-89.9	103.3-103.6		
Length (in)	3.99	4.00	3.97		
Diameter (in)	1.86	1.86	1.86		
Mass (g)	524.43	522.69	518.34		
Cross Sectional Area (in²)	2.71	2.71	2.72		
Load (lb)	77635	101135	79100		
Compressive Strength (psi)	28600	37260	29080		
Corrected Compressive Strength (psi)					
Unit Weight (lb/ft³)	184.71	183.45	182.95		

Signature: _____

Remarks:

Carolina Crossroads – Phase 1

Geotechnical Subsurface Data Report

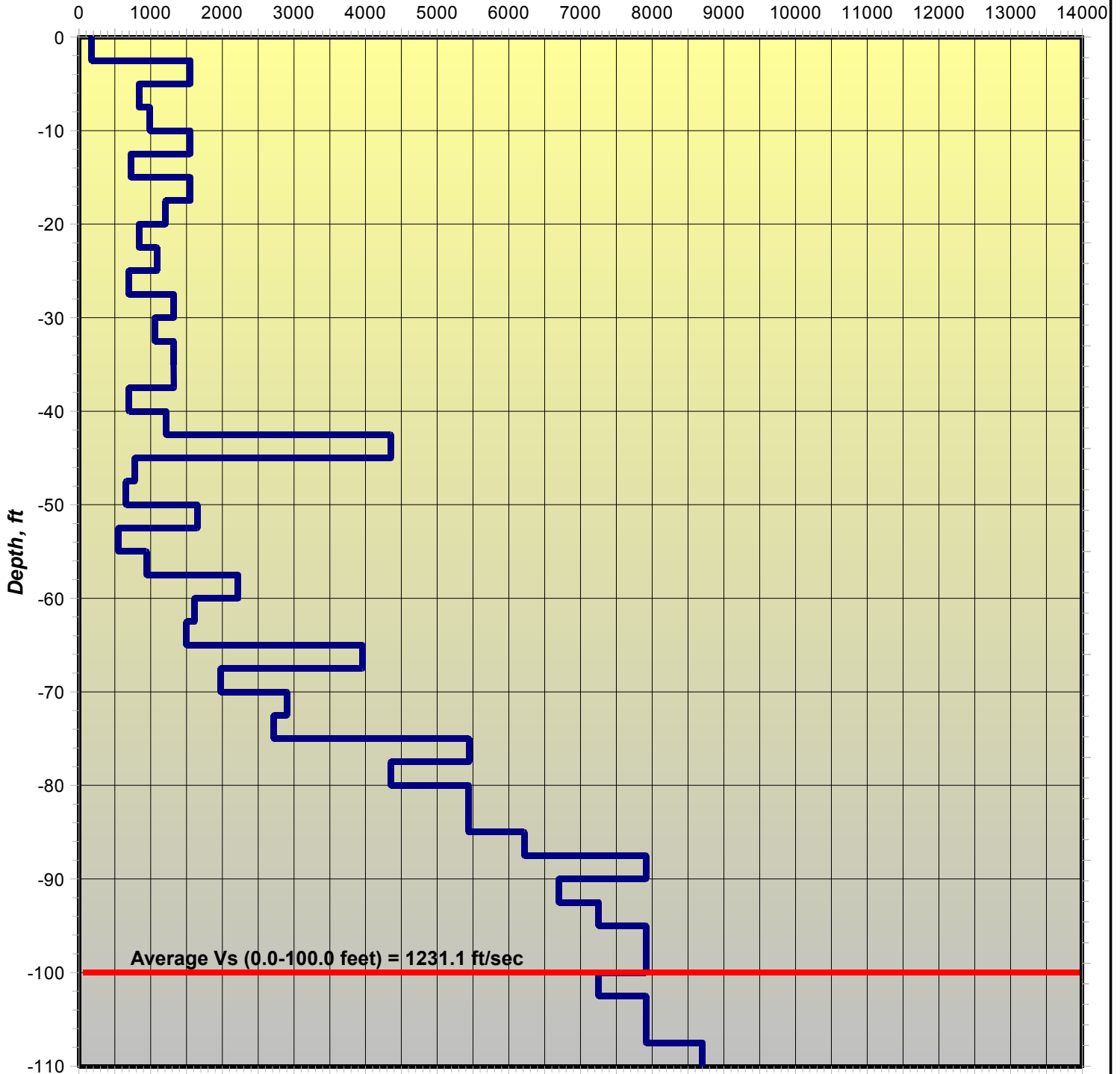
APPENDIX

SECTION 6 GEOPHYSICAL TEST RESULTS

DH-3.1

34° 1.683'N 81° 6.111'W

Shear-Wave Velocity, ft/sec



Average Vs (0-110 feet) = 1333.5 ft/sec



GeoWave Solutions, Inc.
4575 Ansley Lane
Cumming, Georgia 30040
Tel: 770-886-3776
Fax: 770-886-7212
www.geowavesolutions.com

I-26 Corridor Improvements at I-20/I-126

F&ME Consultants

Downhole Seismic Shear-Wave Investigation

Project Manager: M. Ellers

February 7, 2018

DH-3.1

34° 1.683'N 81° 6.111'W

Depth (ft)	Vs (ft/sec)
-2.5	172.7
-5.0	1553.8
-7.5	837.0
-10.0	989.3
-12.5	1553.8
-15.0	725.5
-17.5	1553.8
-20.0	1208.9
-22.5	837.0
-25.0	1087.9
-27.5	692.7
-30.0	1322.8
-32.5	1058.0
-35.0	1322.1
-37.5	1322.8
-40.0	696.0
-42.5	1216.1
-45.0	4352.0
-47.5	777.1
-50.0	659.1
-52.5	1652.3
-55.0	551.0
-57.5	944.8
-60.0	2222.2
-62.5	1611.4
-65.0	1500.7
-67.5	3956.4
-70.0	1978.2
-72.5	2900.4
-75.0	2720.4
-77.5	5442.0
-80.0	4352.0
-82.5	5440.0
-85.0	5440.0
-87.5	6217.1
-90.0	7912.8
-92.5	6695.4
-95.0	7253.3
-97.5	7912.8
-100.0	7912.7
-102.5	7253.3
-105.0	7912.8
-107.5	7912.7
-110.0	8704.1



GeoWave Solutions, Inc.
4575 Ansley Lane
Cumming, Georgia 30040
Tel: 770-886-3776
Fax: 770-886-7212
www.geowavesolutions.com

I-26 Corridor Improvements at I-20/I-126

F&ME Consultants

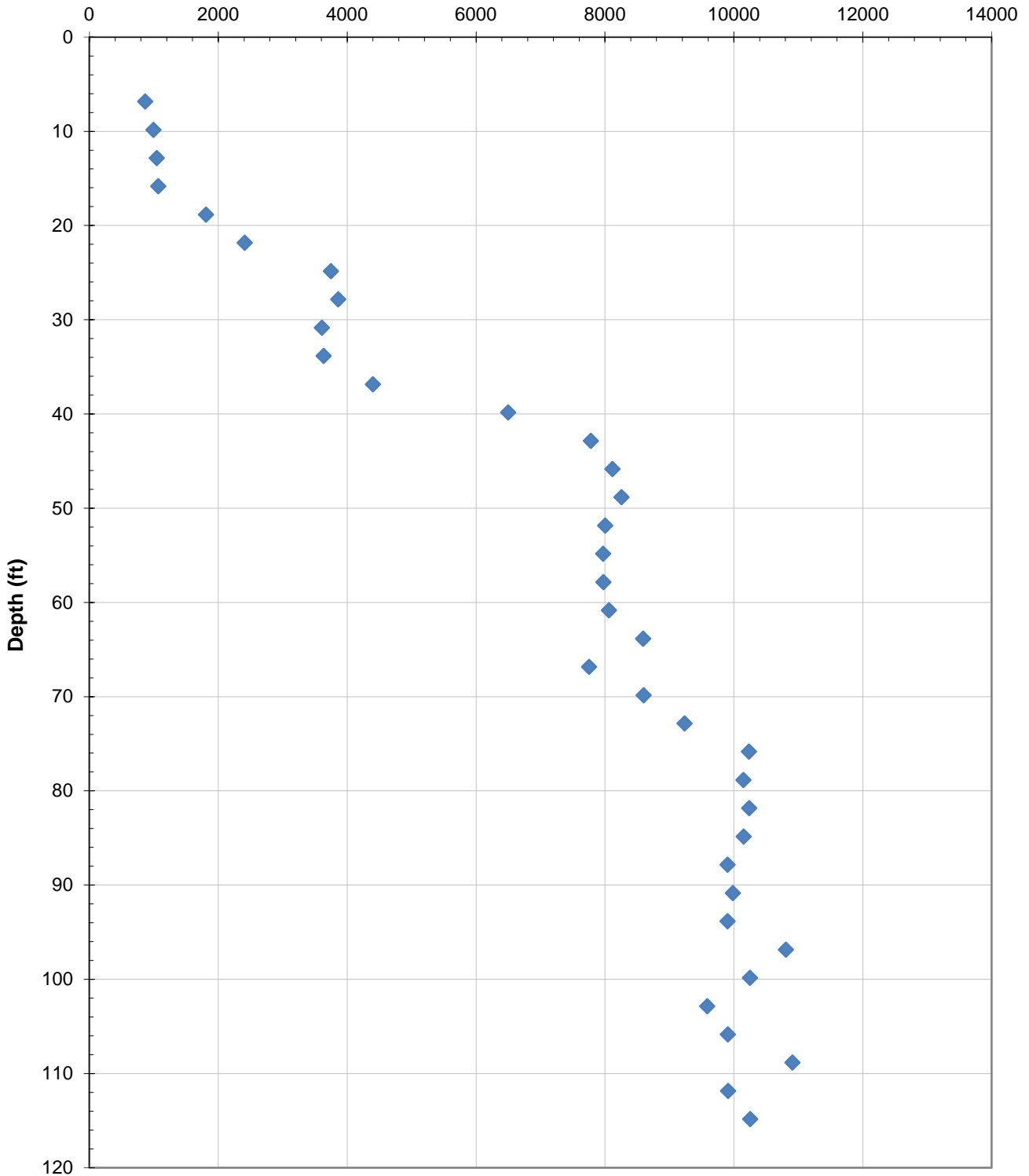
Downhole Seismic Shear-Wave Investigation

Project Manager: M. Ellers

February 7, 2018



Shear Wave Velocity Profile DH-6
I-20/26/126 Improvement Project
Lexington and Richland Counties, South Carolina
1461-16-047
Shear Wave Velocity, Vs (ft/sec)





Shear Wave Velocity Calculations

Carolina Crossroads I-20/26/126 Improvement Project
Lexington and Richland Counties, South Carolina

Sounding ID: **DH-6**

Project Number: **1461-16-047**

Geophone Offset: 0.00 Feet
Casing Stickup: 0.66 Feet
Source Offset: 6.00 Feet

Date: 30-Jan-17

Rig: n/a

Test Depth (feet)	Geophone Depth (feet)	Waveform Ray Path (feet)	Incremental Distance (feet)	S-WAVE			Interval Depth (feet)	d_1/v_{s1}	Poissons
				Characteristic Arrival Time (seconds)	Incremental Time Interval (seconds)	Interval Velocity (ft/s)			
5.34	5.34	8.03	8.03	0.0071					
8.34	8.34	10.27	2.24	0.0097	0.0026	866.1	6.84	0.00790	0.20
11.34	11.34	12.83	2.56	0.0123	0.0026	992.4	9.84	0.00302	0.25
14.34	14.34	15.54	2.72	0.0149	0.0026	1044.3	12.84	0.00287	0.23
17.34	17.34	18.35	2.80	0.0175	0.0026	1069.2	15.84	0.00281	0.22
20.34	20.34	21.21	2.86	0.0191	0.0016	1807.2	18.84	0.00166	0.20
23.34	23.34	24.10	2.89	0.0203	0.0012	2410.4	21.84	0.00124	0.33
26.34	26.34	27.01	2.92	0.0211	0.0008	3745.7	24.84	0.00080	0.35
29.34	29.34	29.95	2.93	0.0218	0.0008	3860.8	27.84	0.00078	0.33
32.34	32.34	32.89	2.94	0.0227	0.0008	3607.6	30.84	0.00083	0.35
35.34	35.34	35.85	2.95	0.0235	0.0008	3635.6	33.84	0.00083	0.41
38.34	38.34	38.81	2.96	0.0241	0.0007	4398.1	36.84	0.00068	0.42
41.34	41.34	41.77	2.97	0.0246	0.0005	6495.9	39.84	0.00046	0.35
44.34	44.34	44.74	2.97	0.0250	0.0004	7782.0	42.84	0.00039	0.24
47.34	47.34	47.72	2.97	0.0253	0.0004	8117.4	45.84	0.00037	0.20
50.34	50.34	50.70	2.98	0.0257	0.0004	8256.0	48.84	0.00036	0.21
53.34	53.34	53.68	2.98	0.0261	0.0004	8001.4	51.84	0.00037	0.21
56.34	56.34	56.66	2.98	0.0265	0.0004	7971.4	54.84	0.00038	0.20
59.34	59.34	59.64	2.98	0.0268	0.0004	7976.1	57.84	0.00038	0.20
62.34	62.34	62.63	2.99	0.0272	0.0004	8061.7	60.84	0.00037	0.21
65.34	65.34	65.61	2.99	0.0275	0.0003	8591.3	63.84	0.00035	0.20
68.34	68.34	68.60	2.99	0.0279	0.0004	7751.9	66.84	0.00039	0.23
71.34	71.34	71.59	2.99	0.0283	0.0003	8597.4	69.84	0.00035	0.24
74.34	74.34	74.58	2.99	0.0286	0.0003	9235.8	72.84	0.00032	0.25
77.34	77.34	77.57	2.99	0.0289	0.0003	10233.7	75.84	0.00029	0.28
80.34	80.34	80.56	2.99	0.0292	0.0003	10148.6	78.84	0.00030	0.29
83.34	83.34	83.56	2.99	0.0295	0.0003	10238.2	81.84	0.00029	0.21
86.34	86.34	86.55	2.99	0.0298	0.0003	10152.6	84.84	0.00030	0.32
89.34	89.34	89.54	2.99	0.0301	0.0003	9900.4	87.84	0.00030	0.36
92.34	92.34	92.53	2.99	0.0304	0.0003	9985.1	90.84	0.00030	0.35
95.34	95.34	95.53	2.99	0.0307	0.0003	9903.3	93.84	0.00030	0.30
98.34	98.34	98.52	2.99	0.0310	0.0003	10805.0	96.84	0.00028	0.22
101.34	101.34	101.52	2.99	0.0312	0.0003	10247.2	99.84	0.00029	0.34
104.34	104.34	104.51	2.99	0.0316	0.0003	9587.1	102.84	0.00031	0.33
107.34	107.34	107.51	3.00	0.0319	0.0003	9907.6	105.84	0.00030	0.23
110.34	110.34	110.50	3.00	0.0321	0.0003	10908.4	108.84	0.00028	0.28
113.34	113.34	113.50	3.00	0.0324	0.0003	9909.3	111.84	0.00030	0.31
116.34	116.34	116.49	3.00	0.0327	0.0003	10251.7	114.84	0.00029	0.25
119.34	119.34	119.49	3.00	0.0330	0.0003	10164.8	117.84	0.00030	0.42
Weighted Average Soil Shear Wave Velocity, v_s 100 (ft/s):								3207	0.28

Note: The weighted average shear wave velocity reported above is for the interval from 6.84 to 105.84 feet.

Carolina Crossroads – Phase 1

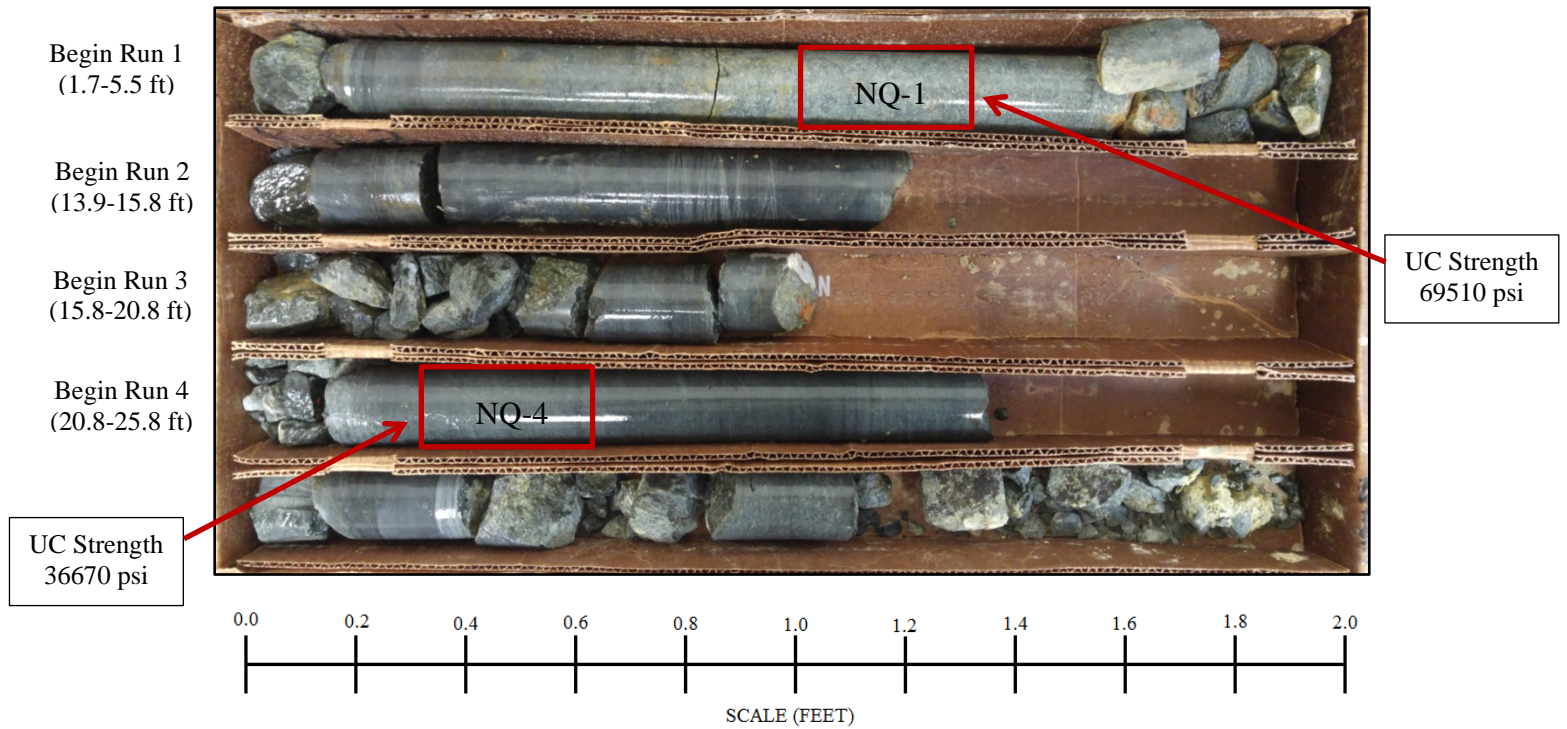
Geotechnical Subsurface Data Report

APPENDIX

SECTION 7 ROCK CORE PHOTOS

I-20/26/126 CORRIDOR IMPROVEMENTS

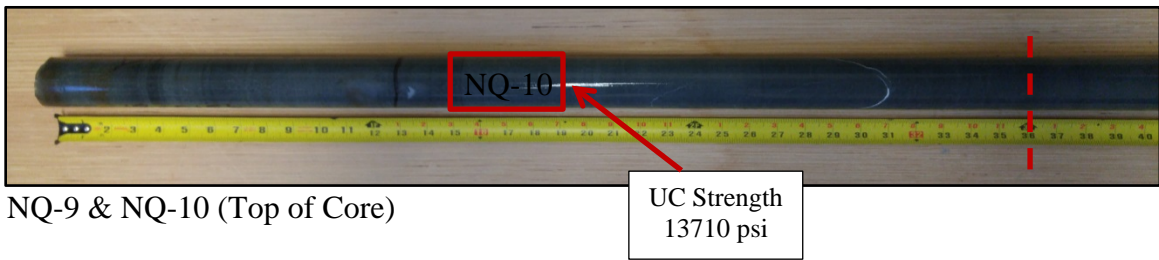
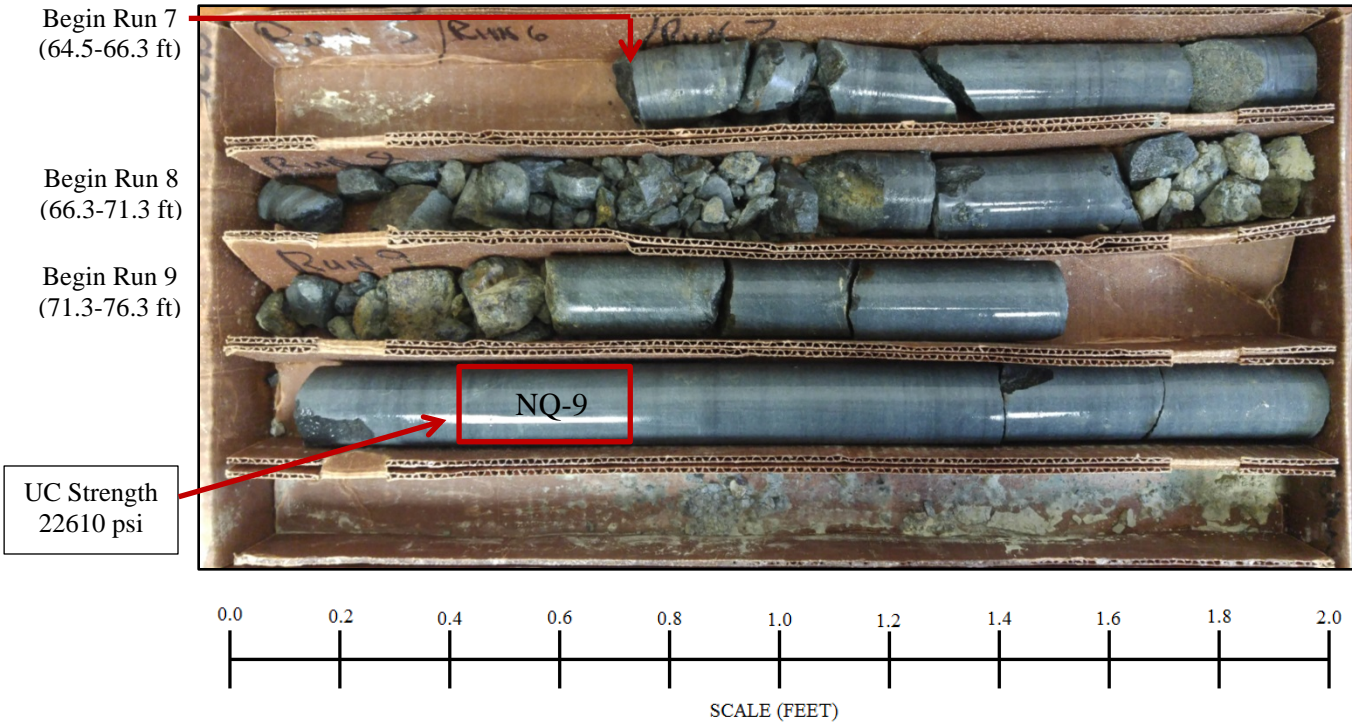
Boring DH-3.1: I26RCA Alignment – Station 5383+53, 113 ft – R



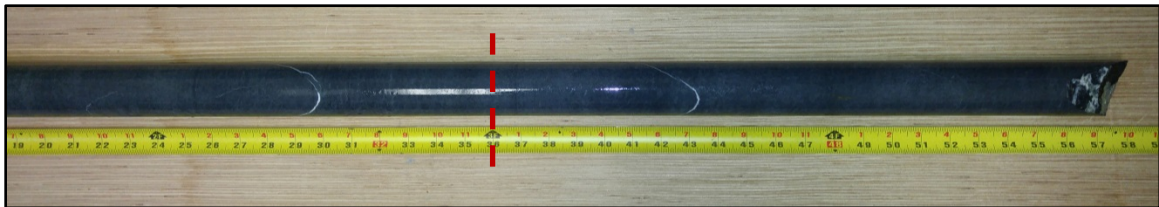
Soil (clay) was recovered in coring samples NQ-5 & NQ-6.

I-20/26/126 CORRIDOR IMPROVEMENTS

Boring DH-3.1: I26RCA Alignment – Station 5383+53, 113 ft – R



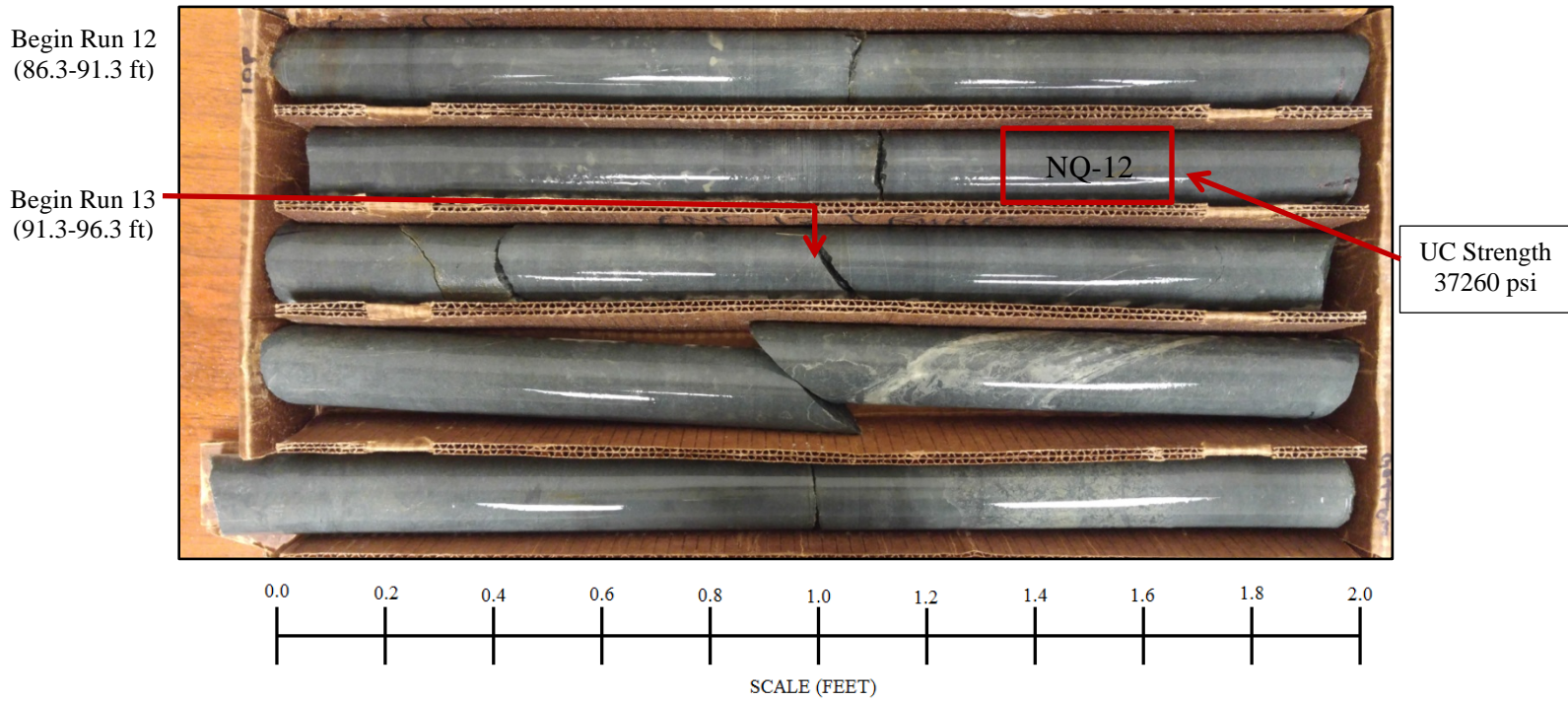
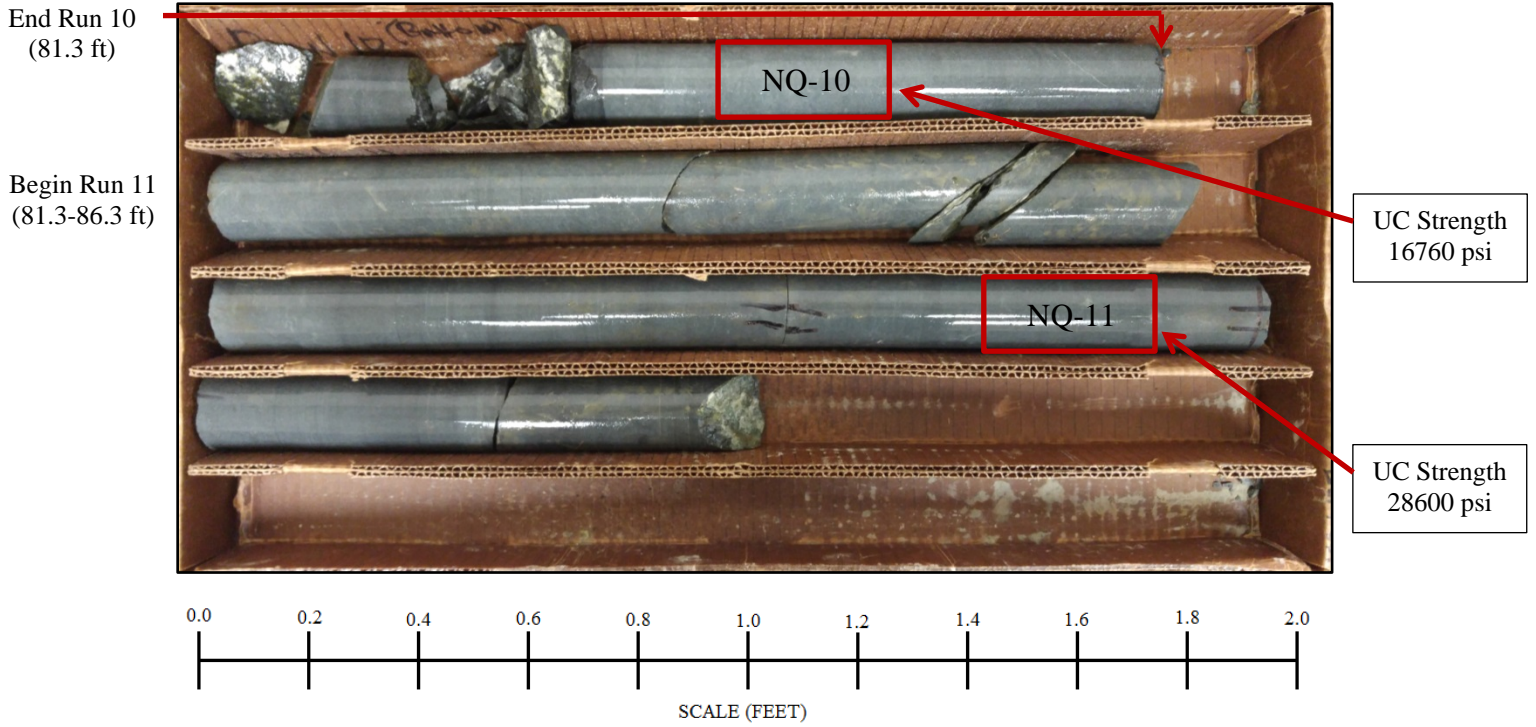
NQ-9 & NQ-10 (Top of Core)



NQ-10 (Bottom of Core)

I-20/26/126 CORRIDOR IMPROVEMENTS

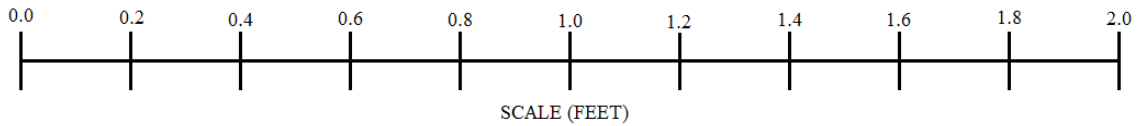
Boring DH-3.1: I26RCA Alignment – Station 5383+53, 113 ft – R



I-20/26/126 CORRIDOR IMPROVEMENTS

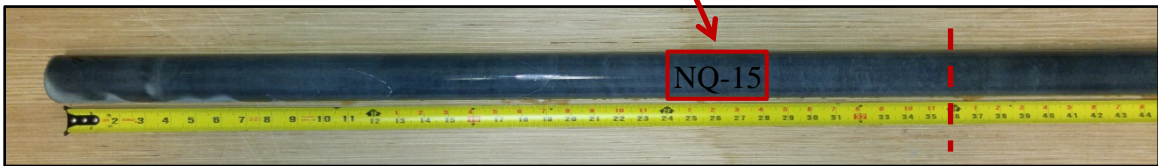
Boring DH-3.1: I26RCA Alignment – Station 5383+53, 113 ft – R

Begin Run 14
(96.3-101.3 ft)



NQ-15 (101.3-106.3 ft)

UC Strength
29080 psi



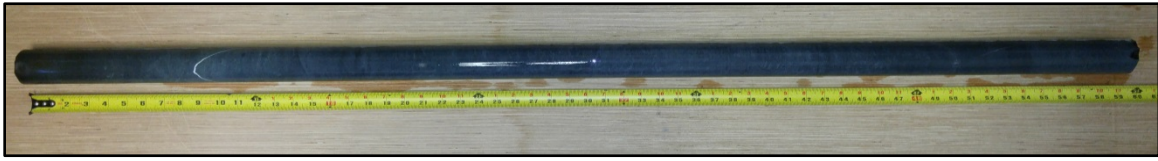
NQ-15 (Top of Core)



NQ-15 (Bottom of Core)

I-20/26/126 CORRIDOR IMPROVEMENTS

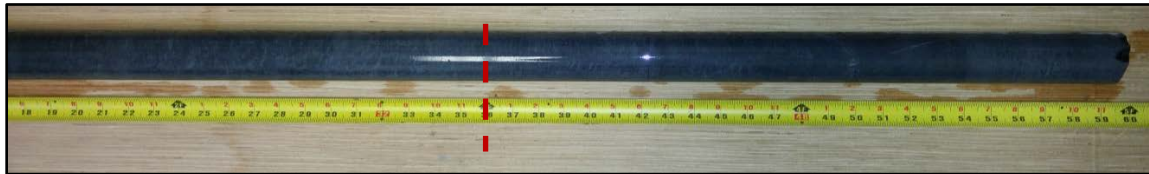
Boring DH-3.1: I26RCA Alignment – Station 5383+53, 113 ft – R



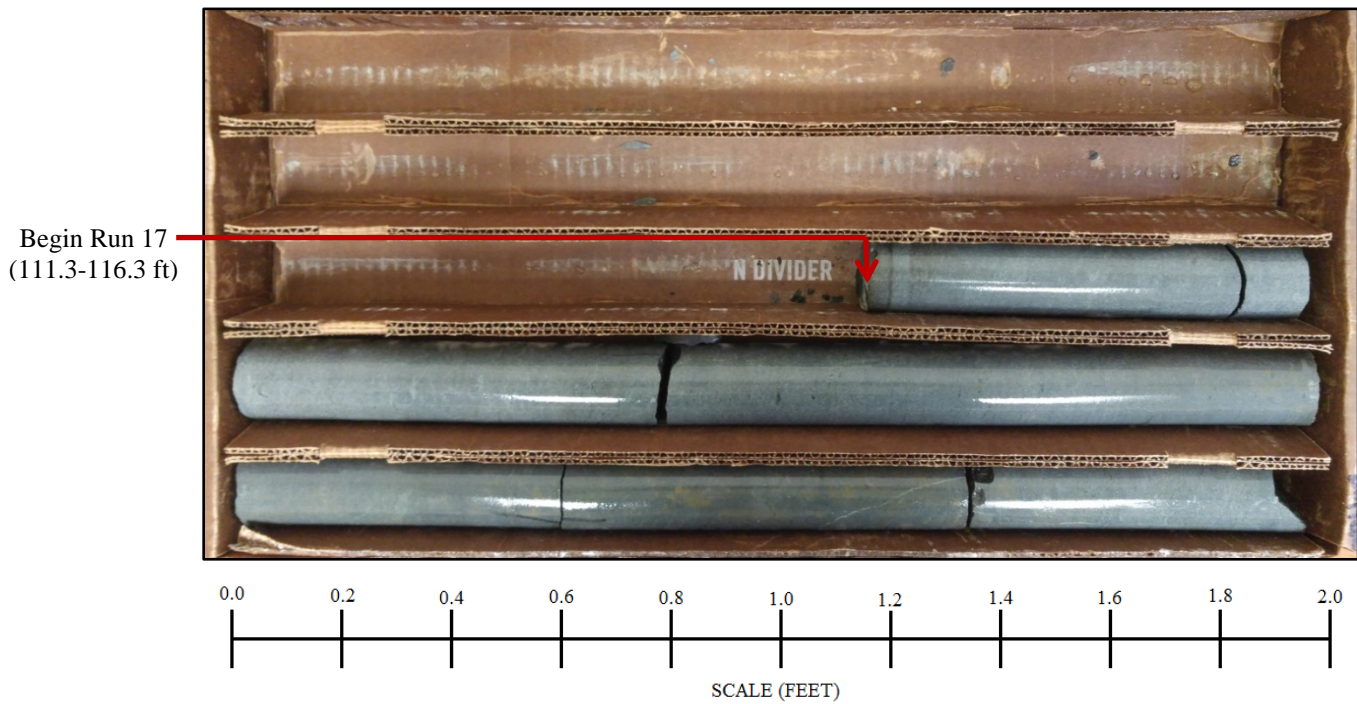
NQ-16 (106.3-111.3)



NQ-16 (Top of Core)



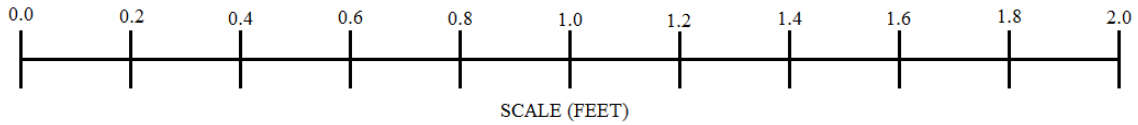
NQ-16 (Bottom of Core)



I-20/26/126 CORRIDOR IMPROVEMENTS

Boring DH-3.1: I26RCA Alignment – Station 5383+53, 113 ft – R

Begin Run 18
(111.3-120.7 ft)

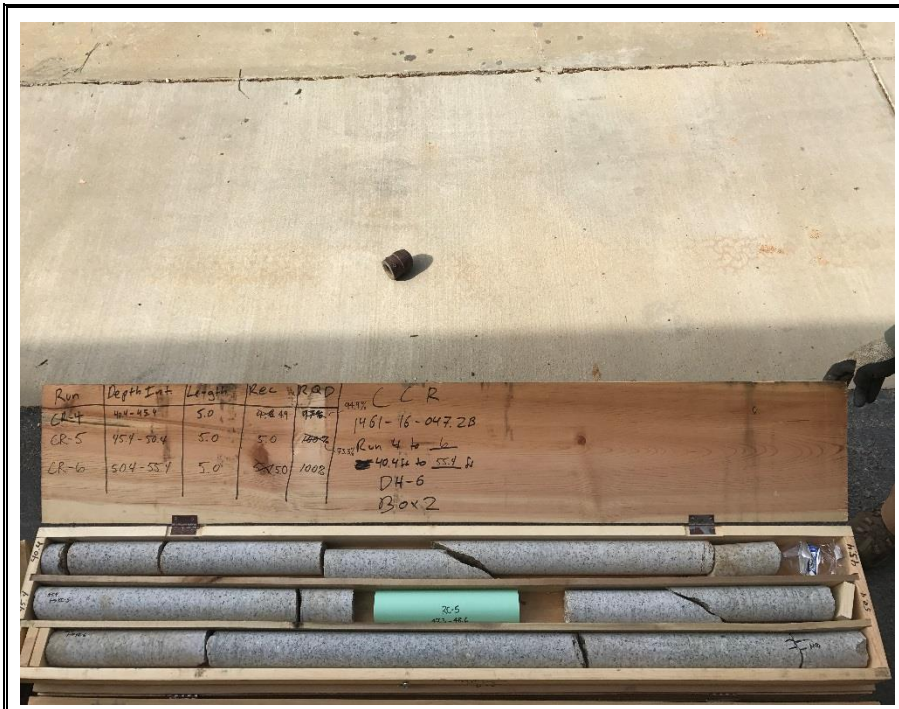




Boring DH-6, Box 1 & 2



1 **Remarks:** **Boring DH-6, Box 1**



2 **Remarks:** **Boring DH-6, Box 2**



Boring DH-6, Box 3 & 4



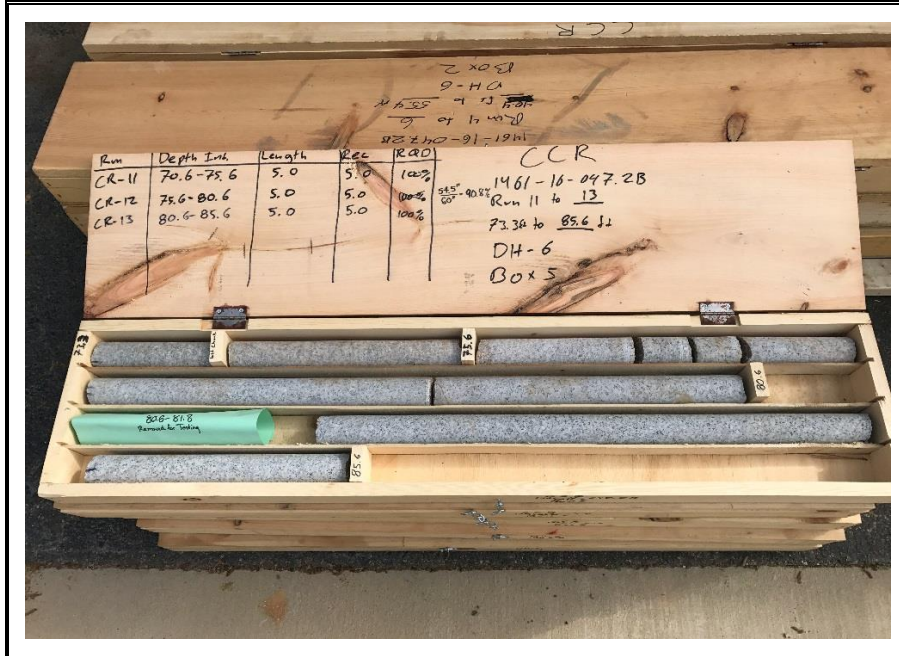
1 Remarks: Boring DH-6, Box 3



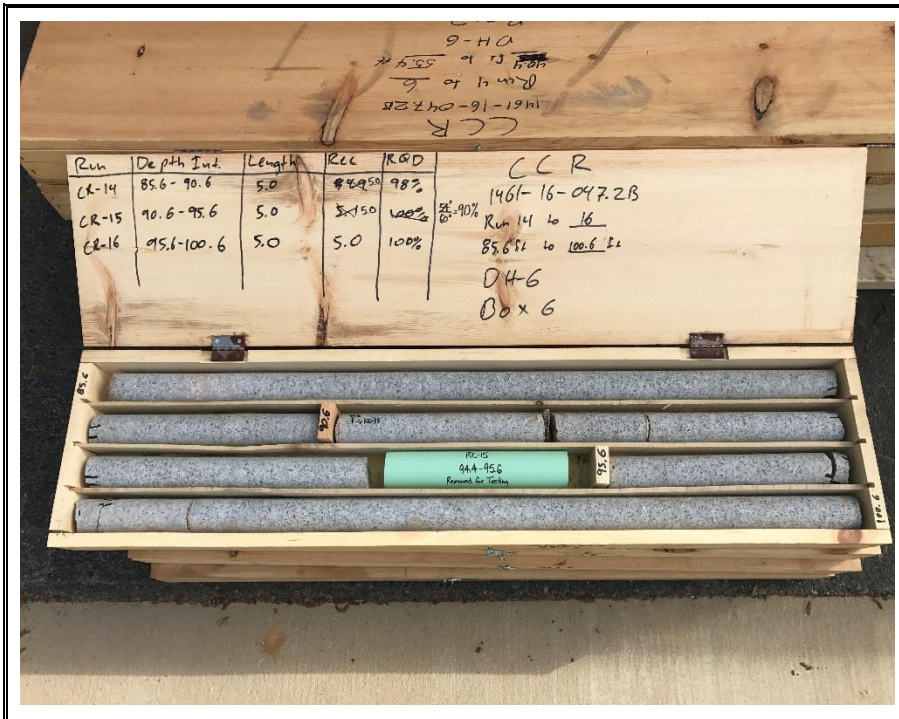
2 Remarks: Boring DH-6, Box 4



Boring DH-6, Box 5 & 6



1	Remarks:	Boring DH-6, Box 5
----------	----------	---------------------------



2	Remarks:	Boring DH-6, Box 6
----------	----------	---------------------------



Boring DH-6, Box 7 & 8



1 Remarks: Boring DH-6, Box 7



2 Remarks: Boring DH-6, Box 8



Boring B-32, Box 1



1	Remarks:	Boring B-32, Box 1
----------	-----------------	---------------------------



Boring B-33, Box 1

Run	Depth Int.	Length	Rec.	RSD
RC-1	45.9 - 50.6	4.7	1.0	0%
RC-2	50.6 - 55.6	5.0	0.6	0%
RC-3	55.6 - 60.6	5.0	1.0	0%
RC-4	60.6 - 65.6	5.0	1.5	0%
RC-5	65.6 - 70.6	5.0	4.0	0%
RC-6	70.6 - 75.6	5.0	4.0	17%

CCR
 1461-16-047.2A
 Run 1 to 6
 45.9 ft to 75.6 ft
 B-33
 Box 1

1

Remarks:

Boring B-33, Box 1



Boring B-34, Box 1

Run	Depth Int.	Length	Rec	RAD
1	41.5-44.6	3.1	0.5-1.5%	0
2	44.6-48.0	3.4	1.5-16%	0
3	48.0-51.4	3.4	1.5-20%	0
4	51.4-54.8	3.4	1.5-25%	0
5	54.8-58.2	3.4	1.5-30%	0
6	58.2-61.6	3.4	1.5-35%	0
7	61.6-64.6	3.0	1.5-38%	0

CCR
1461-16-047ZB
B-34
Run 1 to 7
41.5 ft to 74.6 ft
Box 1

1

Remarks: Boring B-34, Box 1



Boring B-35, Box 1



1	Remarks:	Boring B-35, Box 1
---	----------	--------------------



Boring B-36, Box 1

Run	Depth Int	Length	Ret.	RAD
1	66.0-68.0	2.0	1.5	0
2	68.0-68.4	0.4	0.4	0
3	68.4-71.2	2.8	2.8	54% ^{25'} 15% ^{25'}
4	71.2-73.4	2.2	1.6	45% ^{25'} 15% ^{25'}
5	73.4-76.6	3.2	1.5	0
6	76.6-77.2	0.6	0.6	0

CCR
M61-16-0472B
B-36
Run 1 to 6
66.4 to 77.2 ft
Box 1

1
Remarks: Boring B-36, Box 1



Boring B-36A, Box 1

Run	Depth Int.	Length	Rec.	ROD
1	42.4-45.0	2.6	0.1	0
2	55.4-69.4	5.0	0.4	0
3	68.4-69.4	5.0	0.6	0
4	68.4-70.4	5.0	1.2	0
5	70.4-73.4	3.0	1.4	0
6	73.4-75.4	2.0	0.3	0
7	75.4-78.6	3.2	1.0	0

CCR
1461-16-047 ZB
B-36A
Run 1 to 7
42.4 ft to 45 ft, 55.4 ft to 78.6 ft
Box 1

1

Remarks:

Boring B-36A, Box 1



Boring B-37, Box 1 & 2

RUN	DEPTH INT	LENGTH	REC	R.O.D.
1	7.7-9.5	1.8	1.7	0%
2	39.7-44.5	4.8		
3	46.2-49.3	3.1	3.5	13%
4	49.3-54.3	5.0	6.6	30%
5	54.3-59.3	5.0	4.8	32%

CCR
1461-16-047 2B
B-37
Run 1 to 5
Box 1

1

Remarks:

Boring B-37, Box 1

RUN	DEPTH INT	LENGTH	REC	R.O.D.
5	54.3-59.3	5.0	4.8	32%
6	59.3-64.3	5.0	4.6	30%

CCR
1461-16-047 2B
B-37
Run 5 to 6
Box 2

2

Remarks:

Boring B-37, Box 2



Boring B-38, Box 1 & 2



1 **Remarks:** **Boring B-38, Box 1**



2 **Remarks:** **Boring B-38, Box 2**



Boring B-39, Box 1 & 2



1 **Remarks:** **Boring B-39, Box 1**



2 **Remarks:** **Boring B-39, Box 2**



Boring B-40, Box 1 & 2

Run	Depth Int. (ft)	Length (ft)	Rec	RGD
1	76.5 - 79.0	2.5	2.4/2.5 = 96.0%	50%
2	79.0 - 84.0	5.0	4.6/5.0 = 92.0%	68%
3	84.0 - 89.0	5.0	5.0/5.0 = 100%	70%

1

Remarks: Boring B-40, Box 1

1-16-047 2B
Run 1 to 3
76.5' to 89.0'
B-40
Box 1

Run	Depth Int. (ft)	Length (ft)	Rec	RGD
4	87.0 - 92.0	5.0	5.0/5.0 = 100%	84%
5	92.0			

2

Remarks: Boring B-40, Box 2



Boring B-41, Box 1

Run	Depth Int.	Length	Rec	Retd	
CR-1	58.5 - 60.0	1.5	0.3	20%	CCR 1461-16-047.2B Run 1 to 5 58.5 ft to 78.5 ft B-41 Box 1
CR-2	60.0 - 65.0	5.0	1.6	32%	
CR-3	65.0 - 70.0	5.0	3.9	42%	
CR-4	70.0 - 75.0	5.0	2.3	0%	
CR-5	75.0 - 78.5	3.5	3.5	52%	

1	Remarks:	Boring B-41, Box 1
----------	----------	---------------------------



Boring B-42, Box 1 & 2



1 Remarks: Boring B-42, Box 1



2 Remarks: Boring B-42, Box 2



Boring B-43, Box 1 & 2



1 Remarks: **Boring B-43, Box 1**



2 Remarks: **Boring B-43, Box 2**



Boring B-44, Box 1 & 2



1 Remarks: Boring B-44, Box 1



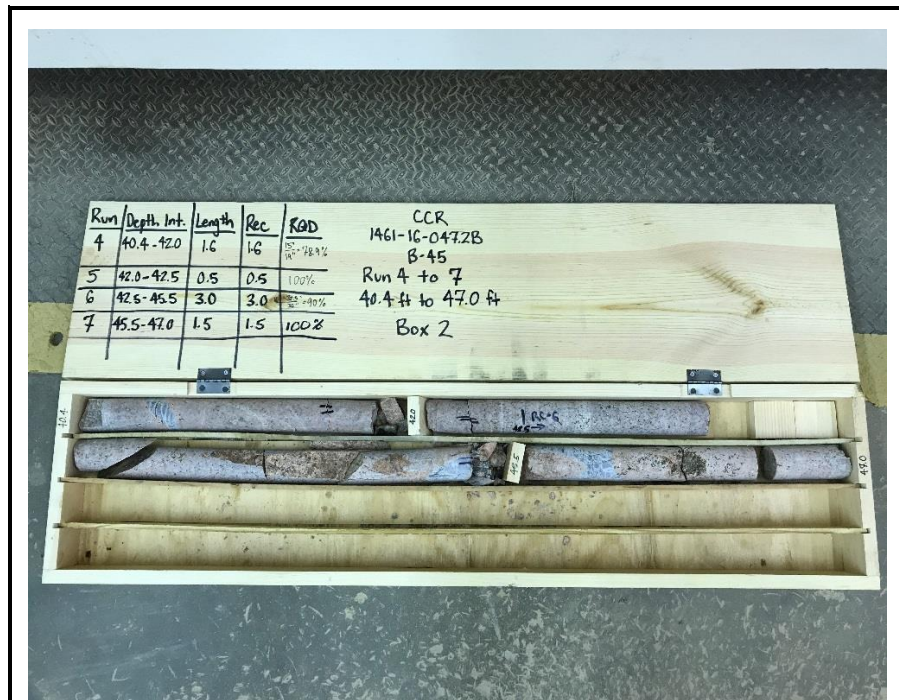
2 Remarks: Boring B-44, Box 2



Boring B-45, Box 1 & 2



1 Remarks: **Boring B-45, Box 1**



2 Remarks: **Boring B-45, Box 2**



Boring B-46, Box 1 & 2



1 Remarks: **Boring B-46, Box 1**



2 Remarks: **Boring B-46, Box 2**



Boring B-60, Box 1 & 2



1 Remarks: **Boring B-60, Box 1**



2 Remarks: **Boring B-60, Box 2**



Boring B-61, Box 1

The photograph shows an open wooden box containing soil samples from Boring B-61, Box 1. The lid of the box is propped open and has a handwritten data table and notes. The table lists five runs (RC-1 to RC-5) with their respective depths, lengths, RLC values, and ROD percentages. The notes on the lid include the project name 'CCR 1461-16-047.2B', 'Run 1 to 5', '22.5 to 42.5', 'B-61', and 'Box 1'. The box is filled with soil samples, and a hammer is visible in the foreground.

Run	Depth Int	Length	RLC	ROD
RC-1	25.5-25.7	2.2	0.2	0%
RC-2	26.2-30.2	5.0	2.1	0%
RC-3	30.2-35.2	5.0	5.0	70%
RC-4	35.2-40.2	5.0	5.0	52%
RC-5	40.2-42.5	2.3	2.3	14%

CCR
1461-16-047.2B
Run 1 to 5
22.5 to 42.5
B-61
Box 1

1

Remarks:

Boring B-61, Box 1



Boring B-62, Box 1

Run	Depth Int.	Length	Rec	R/O
RC-1	23.7-25.7	2.0	0.7	0%
RC-2	25.7-30.7	5.0	2.8	0%
RC-3	30.7-35.7	5.0	1.8	7%
RC-4	35.7-40.7	5.0	0.0	0%
RC-5	40.7-45.7	5.0	3.0	0%
RC-6	45.7-47.7	2.0	2.0	50%

CCR
1461-16-047.213
Run 1 to 6
2.7 ft to 35.7 ft
B-62
Box 1

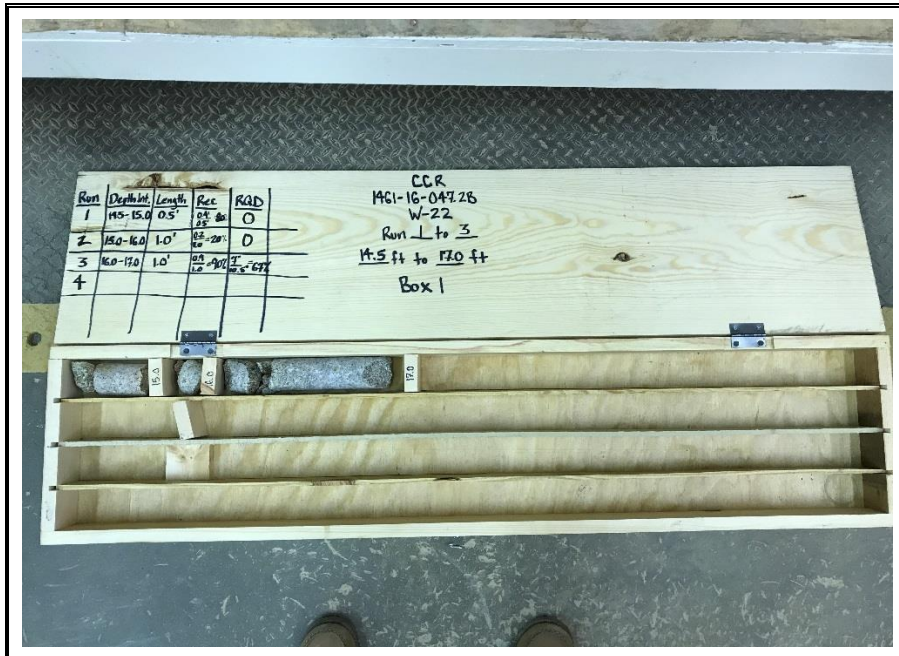
1

Remarks:

Boring B-62, Box 1



Boring W-22, Box 1



1	Remarks:	Boring W-22, Box 1
----------	----------	---------------------------



Boring W-23, Box 1

The photograph shows a wooden box containing soil samples from Boring W-23. A data table is handwritten on the inside of the box lid, and several soil samples are visible in the box. A yellow measuring tape is placed across the samples for scale. Handwritten notes on the right side of the lid provide project details.

RUN	DEPTH INT	LENGTH	REC	R.D
1	15.9 - 19.5	3.7	0.3	0.58%
2	19.1 - 24.1	5.0	4.9	96%
3	24.1 - 28.6	4.5	4.5	100%

CCR
1461-16-047 2B
RUN 1 to 3
W-23
Box 1

1

Remarks: Boring W-23, Box 1

Carolina Crossroads – Phase 1

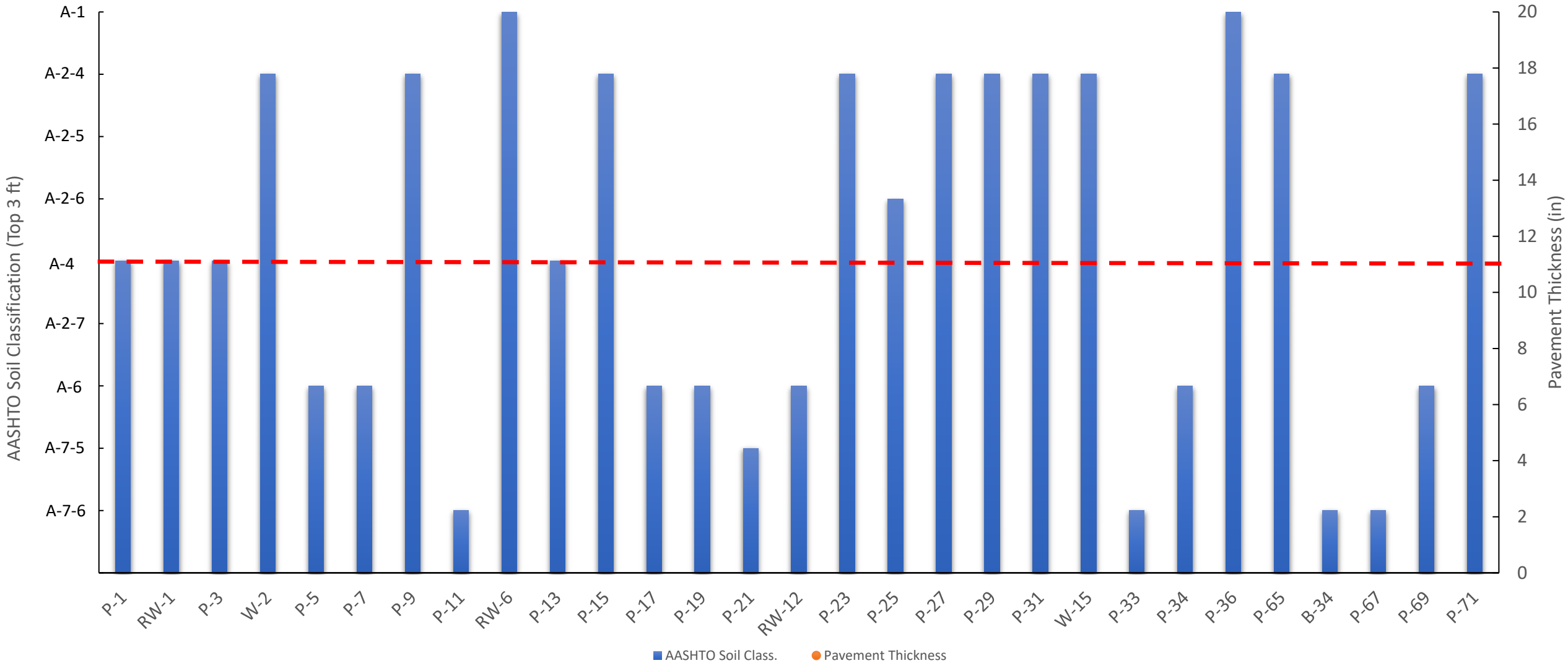
Geotechnical Subsurface Data Report

APPENDIX

SECTION 8 EXISTING PAVED SHOULDER DATA

Carolina Crossroads Existing Paved Shoulder Data

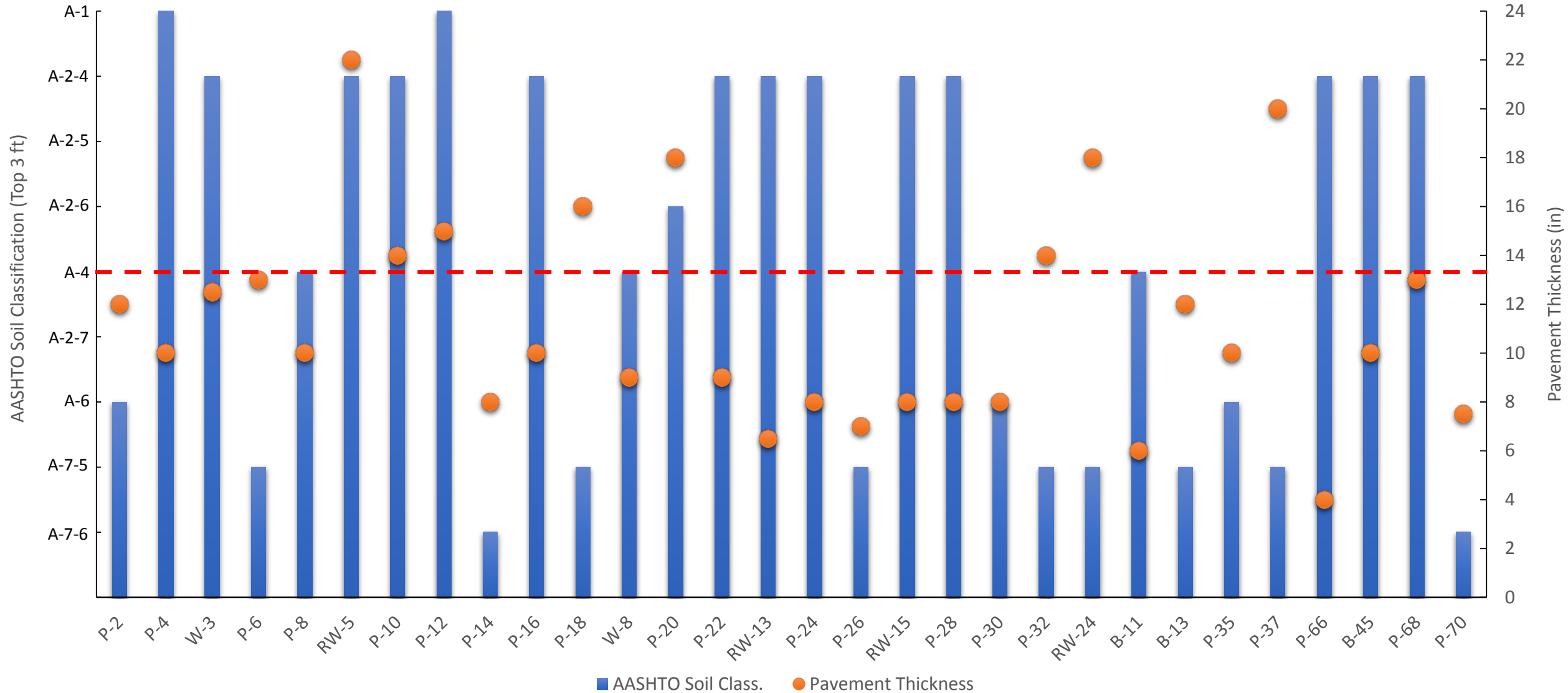
I-26 EB



Carolina Crossroads

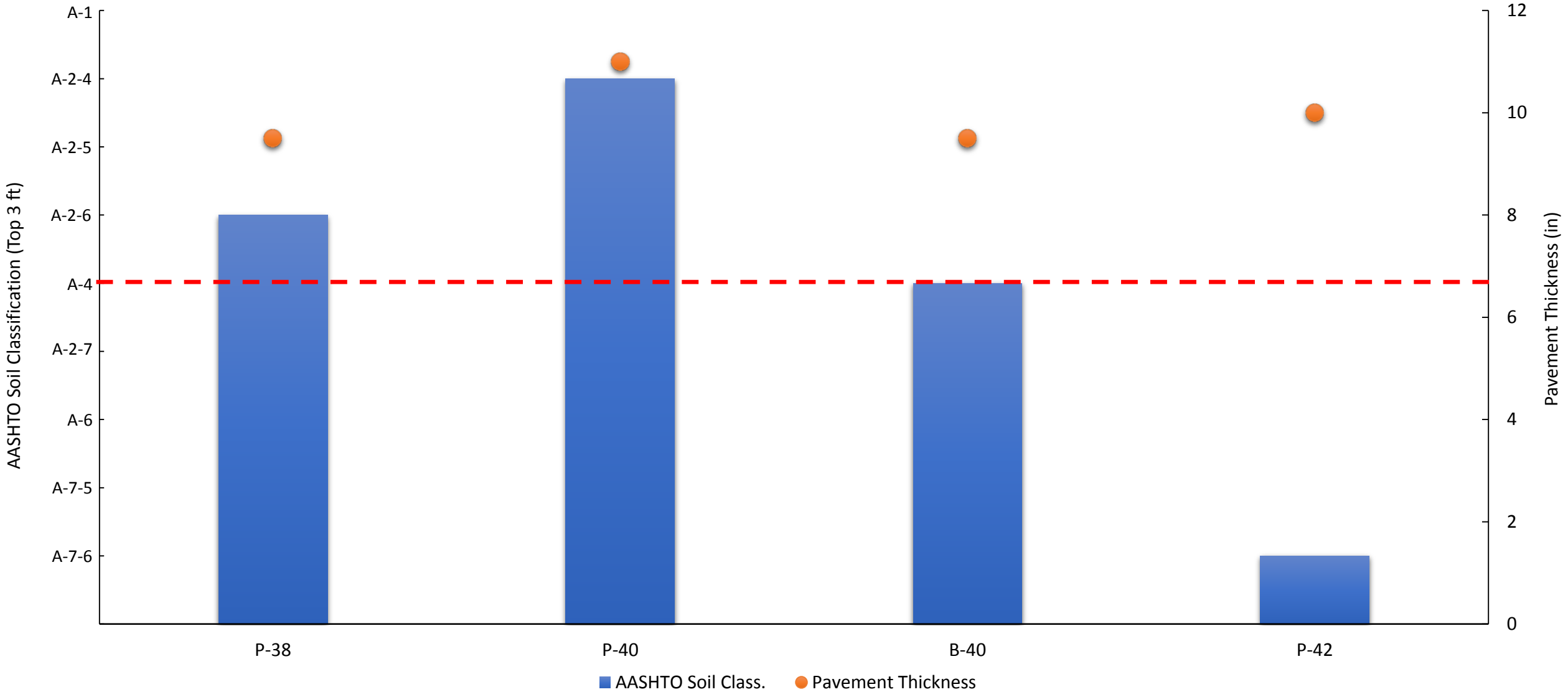
Existing Paved Shoulder Data

I-26 WB



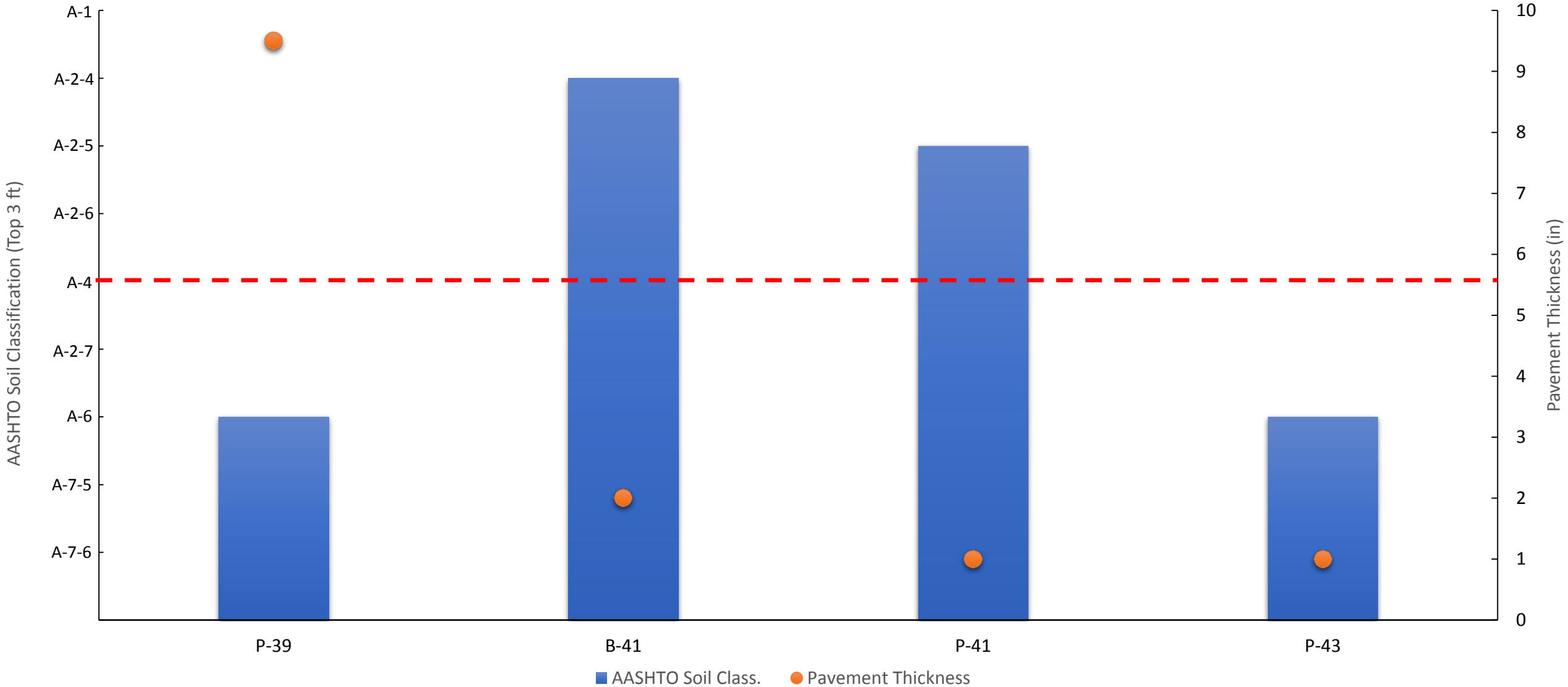
Carolina Crossroads Existing Paved Shoulder Data

I-126 EB



Carolina Crossroads Existing Paved Shoulder Data


I-126 WB






Carolina Crossroads I-20/I-26/I-126 Improvement Project Phase 2B

SCDOT Project ID P027662
S&ME Project No. 1461-16-047

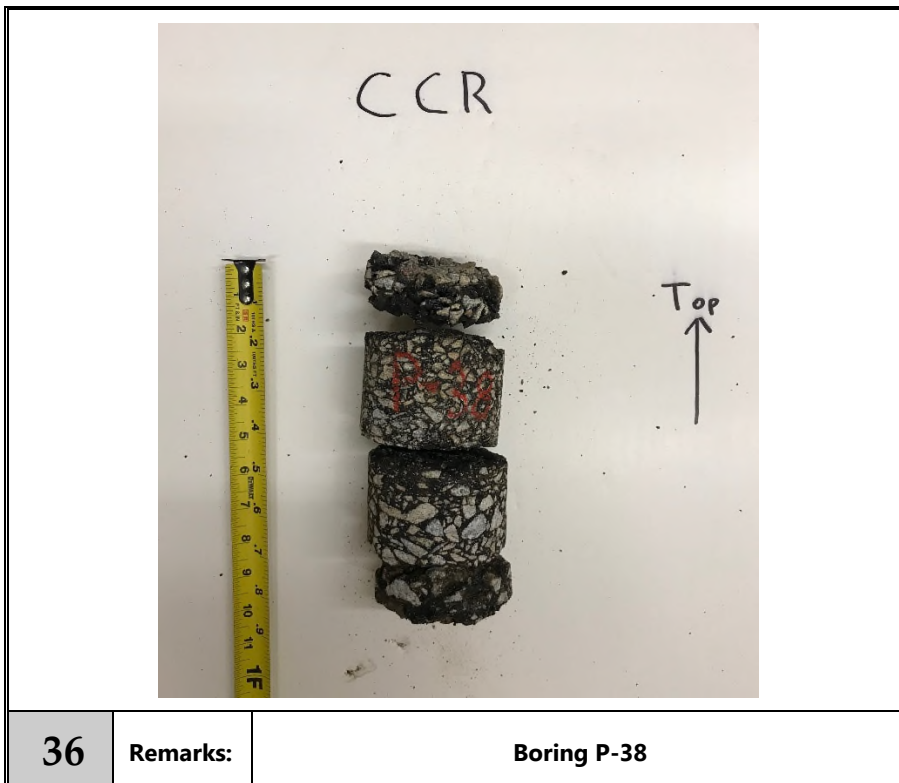
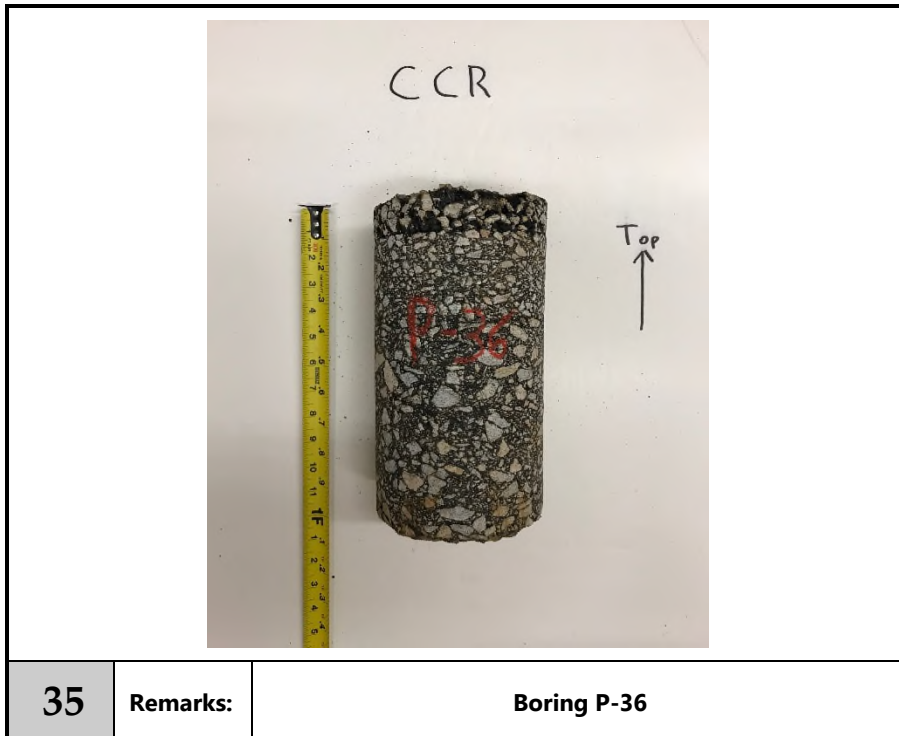
		
3	Remarks:	Boring B-37

		
4	Remarks:	Boring B-40



Carolina Crossroads I-20/I-26/I-126 Improvement Project Phase 2B

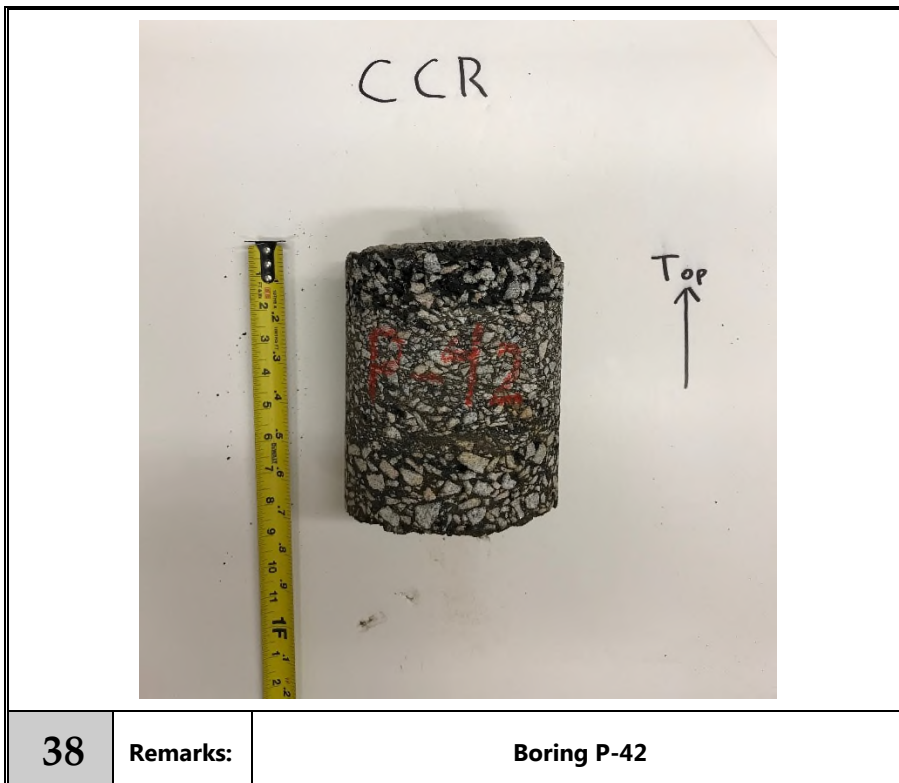
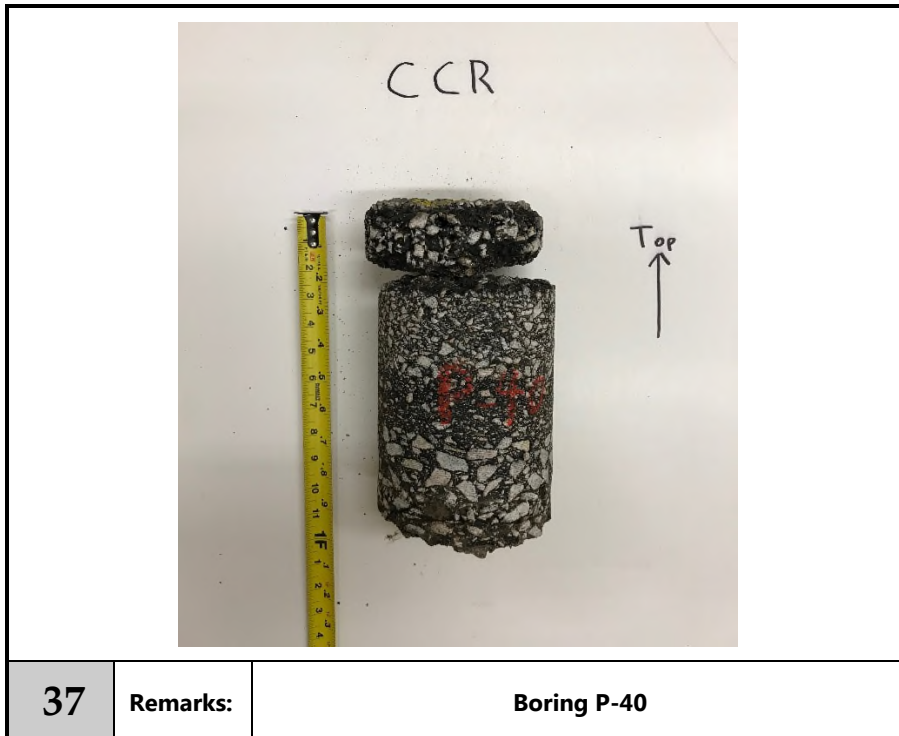
SCDOT Project ID P027662
S&ME Project No. 1461-16-047





Carolina Crossroads I-20/I-26/I-126 Improvement Project Phase 2B

SCDOT Project ID P027662
S&ME Project No. 1461-16-047







Carolina Crossroads I-20/I-26/I-126 Improvement Project Phase 2B

SCDOT Project ID P027662

S&ME Project No. 1461-16-047

		
59	Remarks:	Boring P-65

		
60	Remarks:	Boring P-66