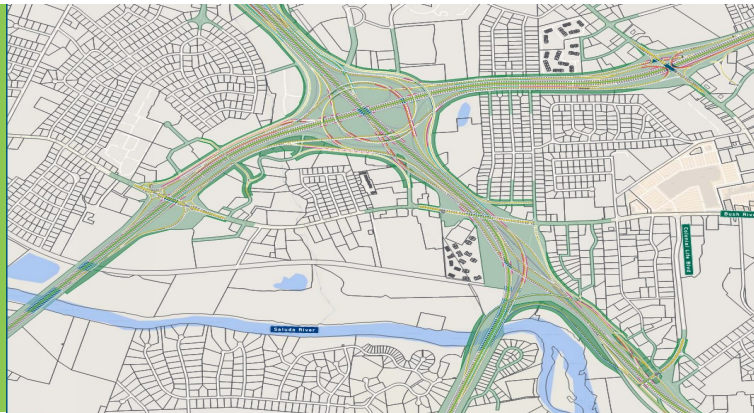


GEOTECHNICAL SUBSURFACE DATA REPORT

Carolina Crossroads - Phase 2
Richland 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

JULY 24, 2020

July 24, 2020

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

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

Ms. Slayton:

Submitted herein is the Geotechnical Subsurface Data Report (GSDR) for the Phase 2 portion of the Carolina Crossroads project. This report includes field test data and laboratory test results from geotechnical investigations performed in 2018. Only data in the vicinity of the Phase 2 project limits is provided.

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 2

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

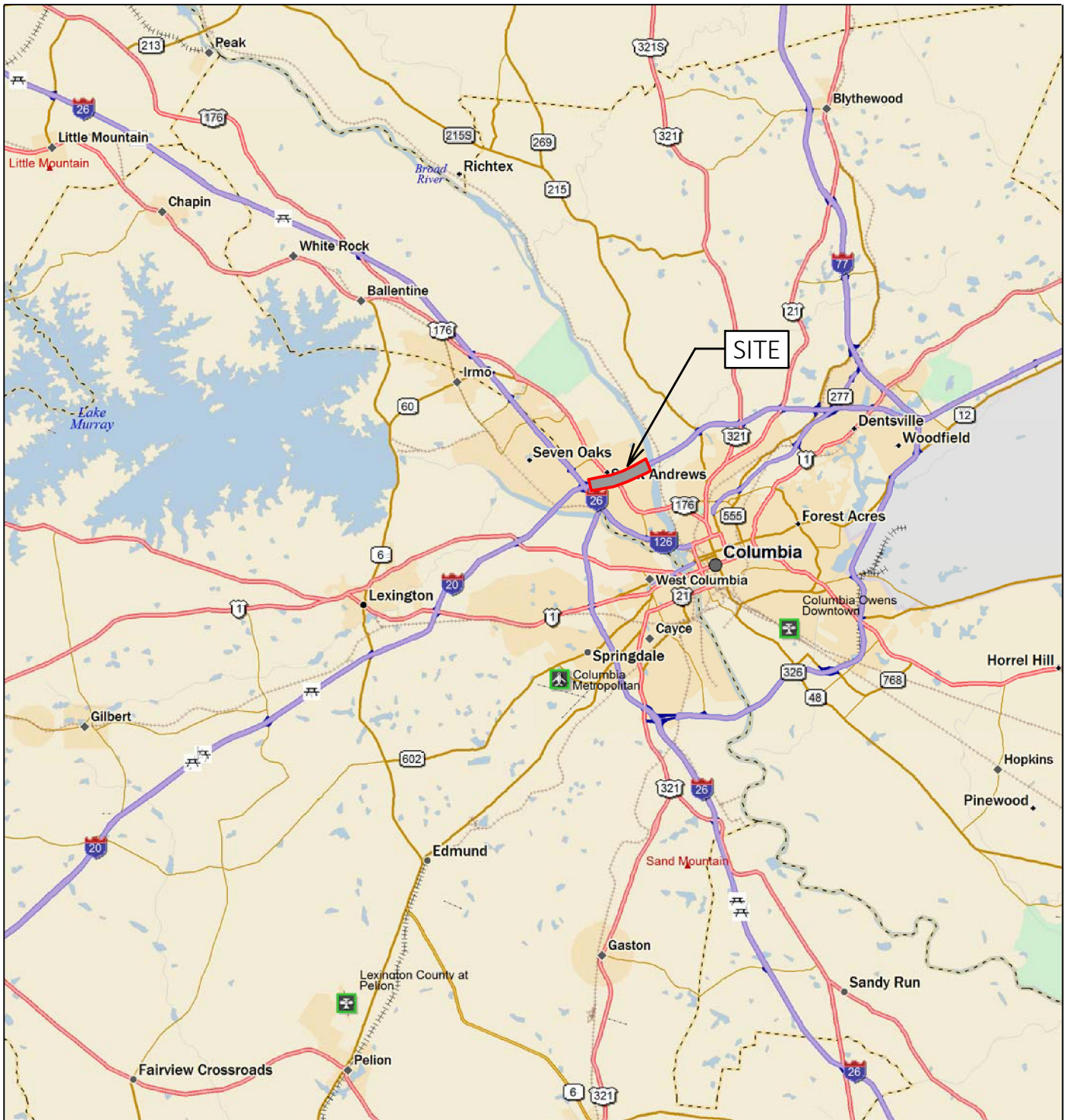
Carolina Crossroads – Phase 2

Geotechnical Subsurface Data Report

APPENDIX

SECTION 1 SITE LOCATION PLANS

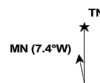
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3	SC	LEX/RICH		I-26/20/126	



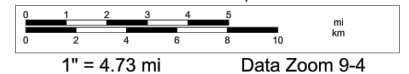
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F&M CONSULTANTS, INC.
COLUMBIA, SC

4			
3			
2			
1			
REV. NO.	BY	DATE	DESCRIPTION OF REVISION
TOPO.		DATE	
DWG.	CTC	DATE 7.7.20	GROUP -- --
R/W		DATE	

CAROLINA CROSSROADS PHASE 2
RICHLAND/LEXINGTON COUNTY, SOUTH CAROLINA

SITE LOCATION PLAN

F&M PROJECT NO. G5662.010

SCALE: AS NOTED

FIGURE 1

Carolina Crossroads – Phase 2

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-56	Bridge	I-20	201+61	183 L	802731	1971322	34.039615	-81.094676	305.8	101.4
B-57	Bridge	I-20	203+12	117 R	802509	1971574	34.039007	-81.093844	311.6	105.2
B-58	Bridge	I-20	204+86	130 L	802806	1971629	34.039822	-81.093664	318.6	102.4
B-59	Bridge	I-20	206+15	155 R	802608	1971871	34.039279	-81.092863	322.4	119.6

	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>
W-27	Wall	I-20	182+21	134 R	802157	1968593	34.038030	-81.103686	275.3	74.1
W-28	Wall	I-20	196+37	79 R	802228	1969995	34.038228	-81.099057	319.9	69.8
W-29	Wall	I-20	205+84	192 R	802230	1970979	34.038238	-81.095809	284.2	59.9
W-30	Wall	I-20	226+17	110 L	803339	1972737	34.041290	-81.090007	292.4	64.0
W-31	Wall	I-20	240+69	167 R	803742	1974160	34.042401	-81.085312	224.7	64.5
W-31A	Wall	I-20	240+67	163 R	803745	1974156	34.042408	-81.085323	223.9	67.9
W-31B	Wall	I-20	240+65	166 R	803741	1974156	34.042398	-81.085324	224.2	64.0
W-32	Wall	I-20	252+84	60 L	804490	1975143	34.044459	-81.082066	189.8	54.7



	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>
RW-42	Embankment	I-20	199+05	149 L	802463	1970253	34.038875	-81.098205	312.4	50.0
RW-43	Embankment	I-20	223+94	137 L	803018	1972649	34.040407	-81.090298	304.1	50.0



	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>
DH-2	Downhole Seismic	I20RAC	3159+24	78 L	802270	1966257	34.038335	-81.111397	278.8	118.6
DH-5	Downhole Seismic	I-20	262+96	138 R	804767	1976137	34.045222	-81.078785	165.7	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-55	Pavement	I-20	180+25	47 L	802313	1968378	34.038459	-81.104394	289.1	10.9
P-56	Pavement	I-20	191+76	50 R	802260	1969534	34.038516	-81.100580	314.9	10.9
P-57	Pavement	I-20	201+47	50 L	802387	1970497	34.038666	-81.097399	311.6	11.1
P-58	Pavement	I-20	211+11	45 R	802536	1971451	34.039080	-81.094251	306.2	11.1
P-59	Pavement	I-20	221+44	50 L	803073	1972342	34.040557	-81.091312	308.6	11.4
P-60	Pavement	I-20	230+48	62 R	803378	1973199	34.041399	-81.088482	276.7	11.0
P-61	Pavement	I-20	241+06	61 L	803963	1974090	34.043008	-81.085541	234.0	11.4
P-62	Pavement	I-20	249+59	45 R	804251	1974901	34.043800	-81.082867	200.3	11.1
P-63	Pavement	I-20	261+07	50 L	804850	1975883	34.045449	-81.079624	179.2	11.3
P-64	Pavement	I-20	269+93	46 R	805162	1976719	34.046308	-81.076867	177.4	11.1

	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-RW42	Embankment	I-20	190+07	92 L.	802407	1970259	34.038721	81.098185	313.3	49.9
CPT-B56	Bridge	I-20	201+60	175 L.	802723	1971325	34.039592	81.094669	305.7	50.1
CPT-B58	Bridge	I-20	204+85	130 L.	802806	1971628	34.039821	81.093666	318.1	50.0

	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-56UD	B-56	I-20	201+60	193 L	802740	1971318	34.03963907	-81.09469147	305.8	32.0
RW-42UD	RW-42	I-20	190+15	90 L	802405	1970267	34.03871512	-81.09815873	313.7	42.0
W-27UD	W-27	I-20	173+18	137 R	802153	1968591	34.03801933	-81.10369185	275.2	27.0

	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>
P-56BS	Ex. Embankment	I-20	191+76	50 R	802260	1969534	34.038316	-81.100580	314.9	10.9
P-58BS	Ex. Embankment	I-20	211+11	45 R	802536	1971451	34.039080	-81.094251	306.2	11.1
P-63BS	Ex. Embankment	I-20	261+07	50 L	804850	1975883	34.045449	-81.079624	179.2	11.3
RW-42BS	Ex. Embankment	I-20	199+05	149 L	802463	1970253	34.038875	-81.098205	312.4	10.0
RW-43BS	Ex. Embankment	I-20	223+94	137 L	803018	1972649	34.040407	-81.090298	304.1	10.1

Carolina Crossroads – Phase 2

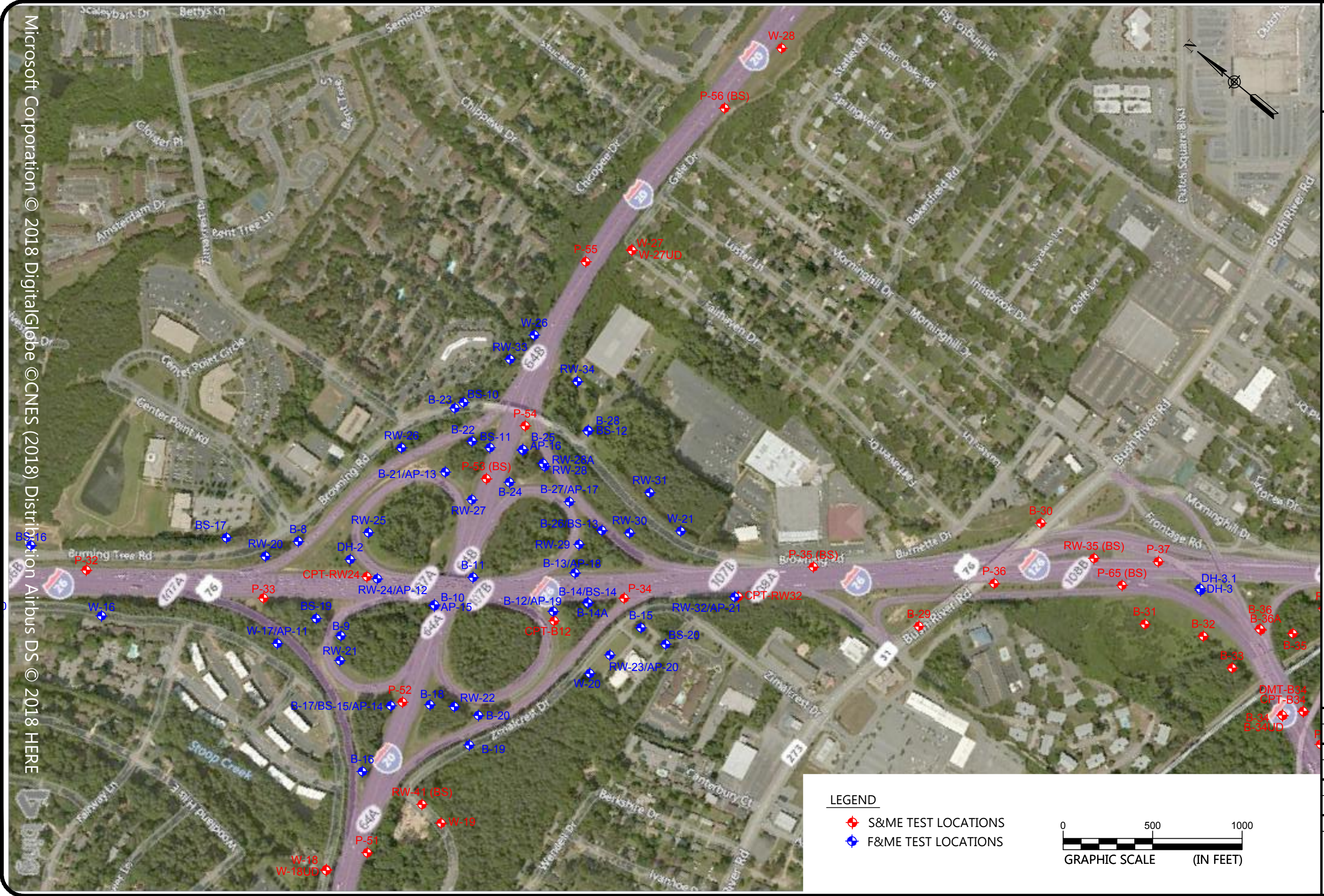
Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 BORING LOCATION PLANS

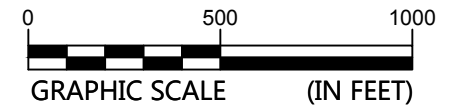
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- ◆ S&ME TEST LOCATIONS
- ◆ F&ME TEST LOCATIONS



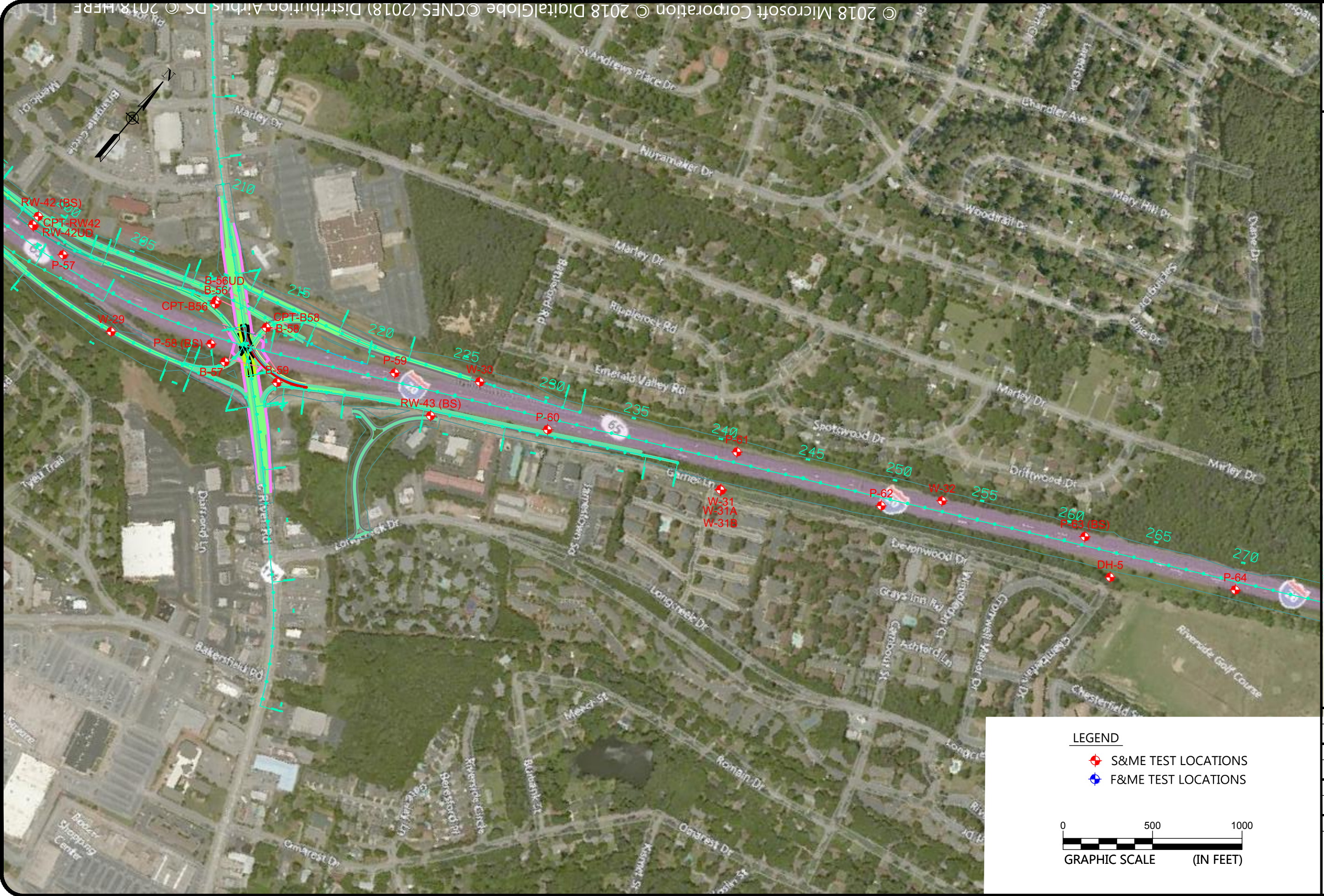
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PHASE 2A & 2B**

I-26 STATION 320+00 TO STATION 385+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.

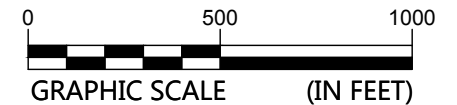
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LEGEND

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



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

I-20 STATION 200+00 TO STATION 270+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.

Carolina Crossroads – Phase 2

Geotechnical Subsurface Data Report


















APPENDIX

SECTION 4 FIELD TESTING LOGS

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS




SOIL TYPES

(Shown in Graphic Log)

	Fill
	Asphalt
	Concrete
	Topsoil
	Gravel
	Sand
	Silt
	Clay
	Organic
	Silty Sand
	Clayey Sand
	Sandy Silt
	Clayey Silt
	Sandy Clay
	Silty Clay
	Partially Weathered Rock
	Cored Rock

WATER LEVELS

(Shown in Water Level Column)

-  = Water Level At Termination of Boring
-  = Water Level Taken After 24 Hours
-  = Loss of Drilling Water
- HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

<u>CONSISTENCY</u>	<u>STD. PENETRATION RESISTANCE BLOWS/FOOT</u>
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

<u>RELATIVE DENSITY</u>	<u>STD. PENETRATION RESISTANCE BLOWS/FOOT</u>
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.



SCDOT Soil Test Boring Log Descriptors

ROCK WEATHERING / ALTERATION

Description	Recognition
Residual Soil	Original minerals of rock have been entirely decomposed to secondary minerals, and original rock fabric is not apparent; material can be easily broken by hand
Completely Weathered / Altered	Original minerals of rock have been almost entirely decomposed to secondary minerals, although the original fabric may be intact; material can be granulated by hand
Highly Weathered / Altered	More than half of the rock is decomposed; rock is weakened so that a minimum 1-7/8 inch diameter sample can be easily broken readily by hand across rock fabric
Moderately Weathered / Altered	Rock is discolored and noticeably weakened, but less than half is decomposed; a minimum 1-7/8 inch diameter sample cannot be broken readily by hand across rock fabric
Slightly Weathered / Altered	Rock is slightly discolored, but not noticeably lower in strength than fresh rock
Fresh	Rock shows no discoloration, loss of strength, or other effect of weathering / alteration

ROCK STRENGTH

Description	Recognition	Approximately Uniaxial Compressive Strength (psi)
Extremely Weak Rock	Can be indented by thumbnail	35 – 150
Very Weak Rock	Can be peeled by pocket knife	150 – 700
Weak Rock	Can be peeled with difficulty by pocket knife	700 – 3,500
Medium Strong Rock	Can be indented 3/16 inch with sharp end of pick	3,500 – 7,200
Strong Rock	Requires one hammer blow to fracture	7,200 – 14,500
Very Strong Rock	Requires many hammer blows to fracture	14,500 – 35,000
Extremely Strong Rock	Can only be chipped with hammer blows	> 35,000

DISCONTINUITY DESCRIPTORS

k - Dip of fracture surface measured relative to horizontal with bearing and direction

l Discontinuity Type	m Discontinuity Width (millimeters)	n Amount of Infilling
F - Fault	W - Wide (12.5 – 50)	Su - Surface Stain
J - Joint	MW - Moderately Wide (2.5 – 12.5)	Sp - Spotty
Sh - Shear	N - Narrow (1.25 – 2.5)	Pa - Partially Filled
Fo - Foliation	VN - Very Narrow (< 1.25)	Fi - Filled
V - Vein	T - Tight (0)	No - None
B - Bedding		

o Type of Infilling	p Surface Shape of Joint	q Discontinuity Spacing (feet)
Cl - Clay	Wa - Wavy	EW Extremely Wide (> 65)
Ca - Calcite	Pl - Planar	W Wide (22 – 65)
Ch - Chloride	St - Stepped	M Moderate (7.5 – 22)
Fe - Iron Oxide	Ir - Irregular	C Close (2 – 7.5)
Gy - Gypsum/Talc		VC Very Close (< 2)
H - Healed		
No - None		
Py - Pyrite		
Qz - Quartz		
Sd - Sand		

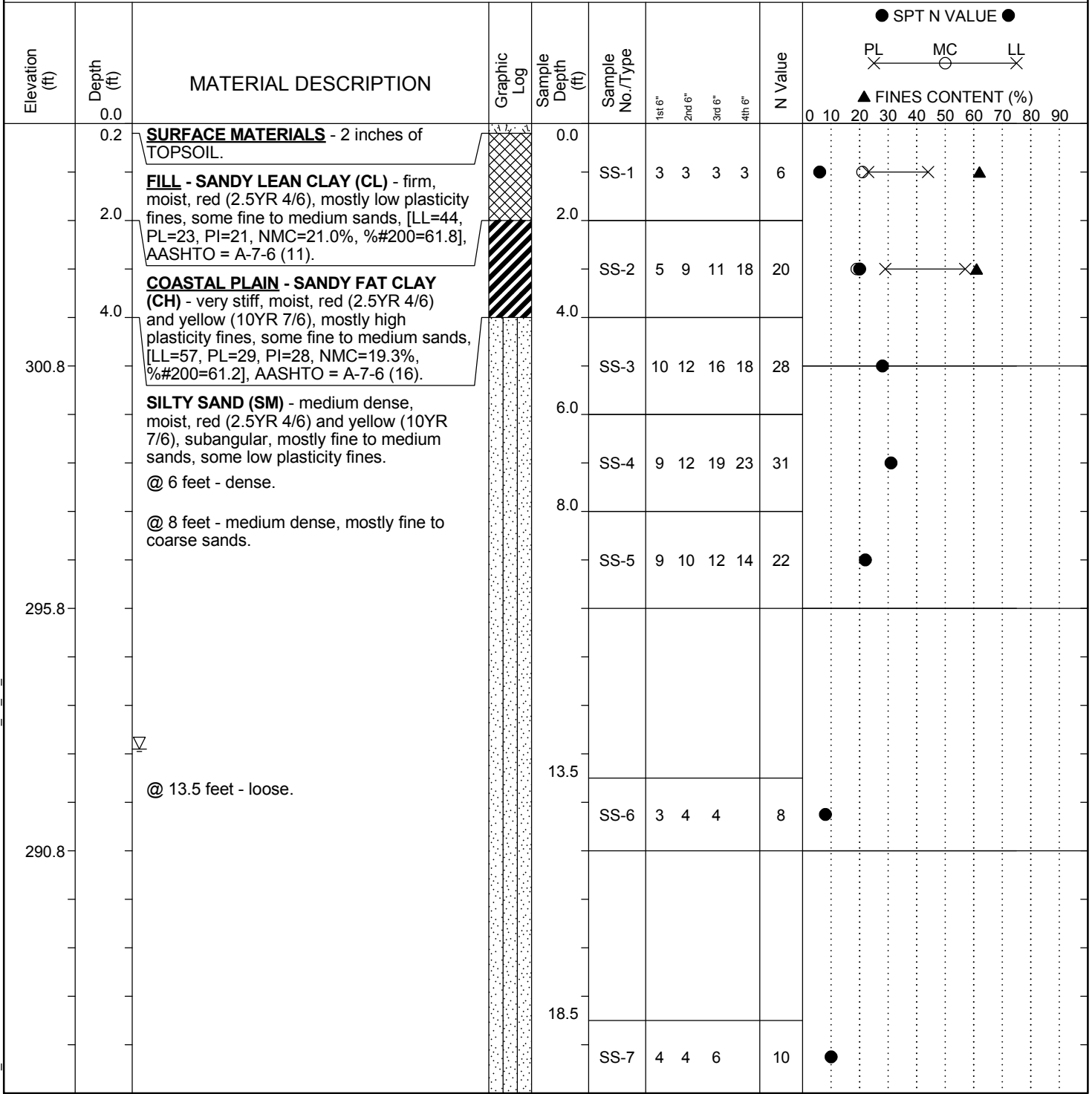
r **Roughness of Surface**

- Slk - Slickensided (surface has smooth, glassy finish with visual evidence of striations)
- S - Smooth (surface appears smooth and feels so to the touch)
- SR - Slightly Rough (asperities on the discontinuity surfaces are distinguishable and can be felt)
- R - Rough (some ridges and side-angle steps are evident; asperities are clearly visible, and discontinuity surface feels very abrasive)
- VR - Very Rough (near-vertical steps and ridges occur on the discontinuity surface)

Figure 6-12, SCDOT Soil Test Boring Log Descriptors - Rock

SCDOT Soil Test Log

Project ID:	P027662		County:	Lexington/Richland	Boring No.:	B-56		
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route:	Site 38		
Eng./Geo.:	AKS	Boring Location:	201+60.83	Offset:	L:183.302	Alignment:	Proposed	
Elev.:	305.8 ft	Latitude:	34.039615	Longitude:	-81.094676	Date Started:	3/16/2018	
Total Depth:	101.4 ft	Soil Depth:	80.8 ft	Core Depth:	20.6 ft	Date Completed:	3/20/2018	
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:	NQ	Driller:	J. Millwood	Groundwater:	TOB	12.9 ft	24HR	20.7 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-56
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project	Route: Site 38			
Eng./Geo.: AKS	Boring Location: 201+60.83	Offset:	L:183.302	Alignment: Proposed
Elev.: 305.8 ft	Latitude: 34.039615	Longitude: -81.094676	Date Started: 3/16/2018	
Total Depth: 101.4 ft	Soil Depth: 80.8 ft	Core Depth: 20.6 ft	Date Completed: 3/20/2018	
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y <input checked="" type="radio"/> N <input type="radio"/>	Liner Used: Y <input checked="" type="radio"/> N <input type="radio"/>	
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB	12.9 ft 24HR 20.7 ft	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	● SPT N VALUE ● PL X — MC ○ — LL X ▲ FINES CONTENT (%)														
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80	90					
		@ 23.5 feet - very loose.		23.5	SS-8	1	1	1		2	●														
		@ 28.5 feet - loose.		28.5	SS-9	2	1	4		5	●														
280.8		PIEDMONT RESIDUUM - ELASTIC SILT WITH SAND (MH) - stiff, moist, yellowish brown (10YR 5/4), mostly high plasticity fines, little fine sands, trace weathered rock fragments, [LL=60, PL=36, PI=24, NMC=38.6%, %#200=75.8], AASHTO = A-7-5 (21).		33.5	SS-10	1	4	5		9	●	×	○	×	▲										
275.8					38.5	SS-11	3	5	6		11	●													
270.8		@ 38.5 feet - trace mica.																							

LEGEND

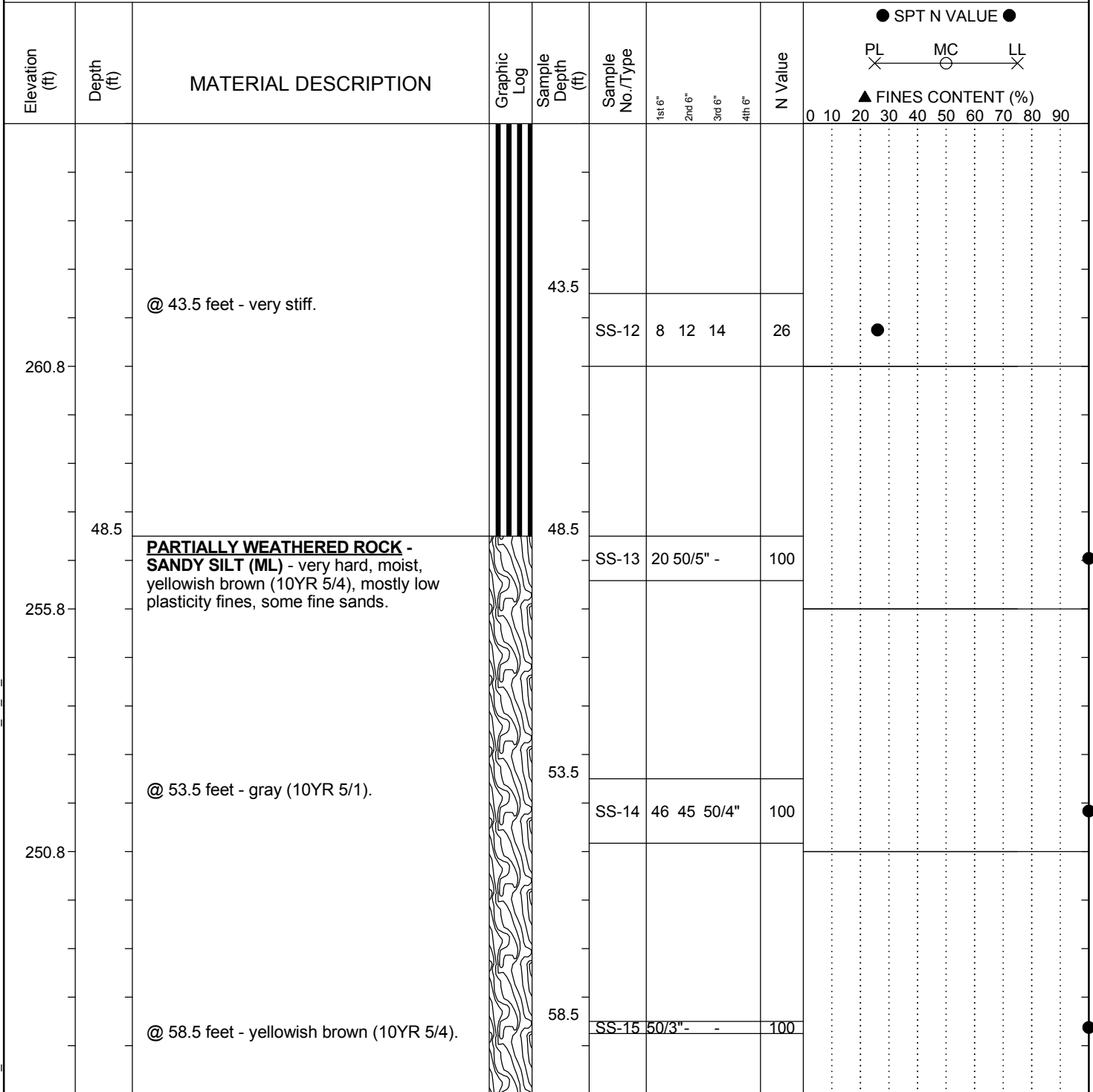
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-56
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 38
Eng./Geo.: AKS	Boring Location: 201+60.83	Offset: L:183.302' Alignment: Proposed
Elev.: 305.8 ft	Latitude: 34.039615	Longitude: -81.094676
Total Depth: 101.4 ft	Soil Depth: 80.8 ft	Core Depth: 20.6 ft
Date Started: 3/16/2018	Date Completed: 3/20/2018	
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: NQ	Driller: J. Millwood	Groundwater: TOB 12.9 ft 24HR 20.7 ft



LEGEND

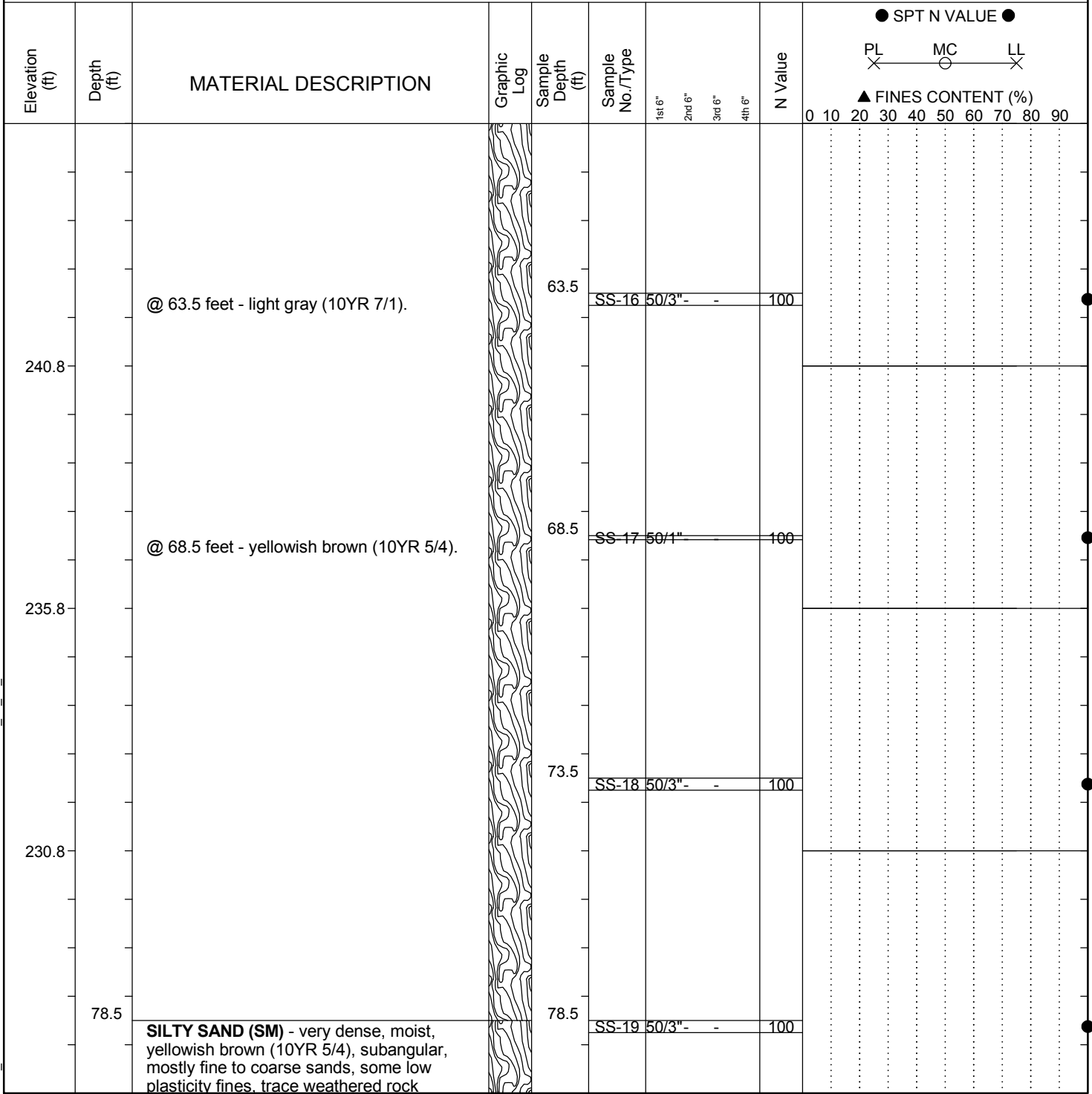
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SAMPLER TYPE SS - Split Spoon UD - Undisturbed Sample AWG - Rock Core, 1-1/8"		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	
NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube		RW - Rotary Wash RC - 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.: B-56
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 38	
Eng./Geo.: AKS	Boring Location: 201+60.83		Offset: L:183.302	Alignment: Proposed
Elev.: 305.8 ft	Latitude: 34.039615	Longitude: -81.094676	Date Started: 3/16/2018	
Total Depth: 101.4 ft	Soil Depth: 80.8 ft	Core Depth: 20.6 ft	Date Completed: 3/20/2018	
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: NQ	Driller: J. Millwood	Groundwater: TOB	12.9 ft 24HR: 20.7 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-56
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 38
Eng./Geo.: AKS	Boring Location: 201+60.83	Offset: L:183.302' Alignment: Proposed
Elev.: 305.8 ft	Latitude: 34.039615	Longitude: -81.094676
Total Depth: 101.4 ft	Soil Depth: 80.8 ft	Core Depth: 20.6 ft
Bore Hole Diameter (in): 7.5		Sampler Configuration: 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: 12.9 ft
		24HR: 20.7 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"		
80.8	80.8	fragments. Tri-Cone Bit Refusal at 80.8 feet. Install NW Casing to 80.8 feet for NQ wireline coring. For discontinuity descriptors, see discontinuity worksheet.		80.8							
220.8		METAMORPHIC BEDROCK - SCHIST - bluish gray (GLEY 2 5/10B), fine to medium grained, slightly weathered, foliated strong rock, quartz veins and stringers throughout. @ 84 feet - moderately weathered, medium strong rock. RC-1: Rec= 100%, RQD= 73%, GSI= 60-70, RMR = 28. @ 85.6 feet - quartz vein.		85.4	RC-1						
215.8		RC-2: Rec= 96%, RQD= 30%, GSI= 60-70. @ 91.1 feet - slightly weathered, strong rock.		90.4	RC-2						
210.8		RC-3: Rec= 100%, RQD= 78%, GSI= 60-70, RMR = 42. @ 97.6 - 98.4 feet - brown (10YR 4/3), residual soil zone. @ 98.4 feet - bluish gray (5/10B), moderately weathered, medium strong rock.		95.4	RC-3						
					RC-4						

LEGEND

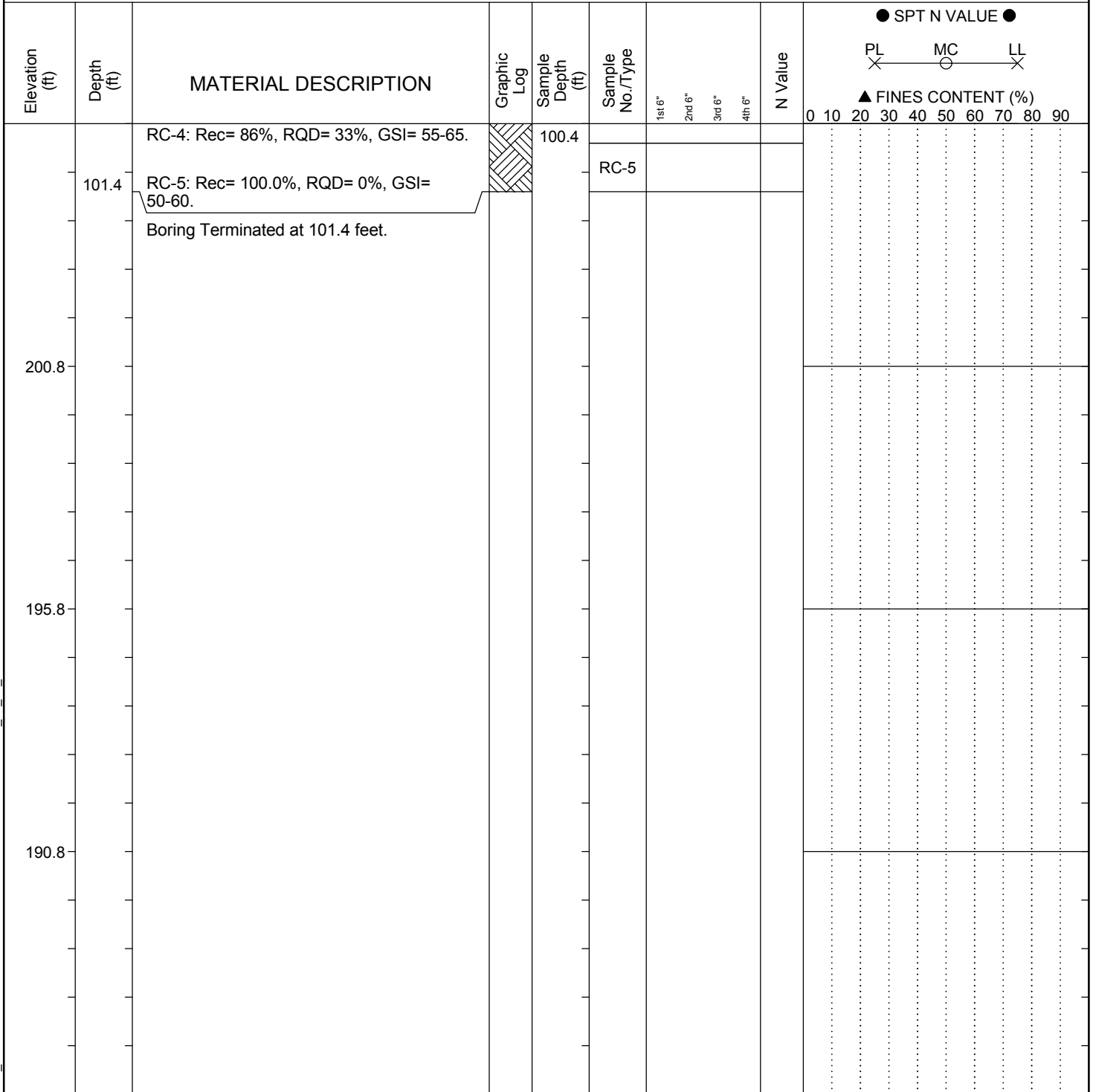
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-56
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 38
Eng./Geo.:	AKS	Boring Location:	201+60.83	Offset:	L:183.302	Alignment:	Proposed
Elev.:	305.8 ft	Latitude:	34.039615	Longitude:	-81.094676	Date Started:	3/16/2018
Total Depth:	101.4 ft	Soil Depth:	80.8 ft	Core Depth:	20.6 ft	Date Completed:	3/20/2018
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:	NQ	Driller:	J. Millwood	Groundwater:	TOB 12.9 ft	24HR	20.7 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

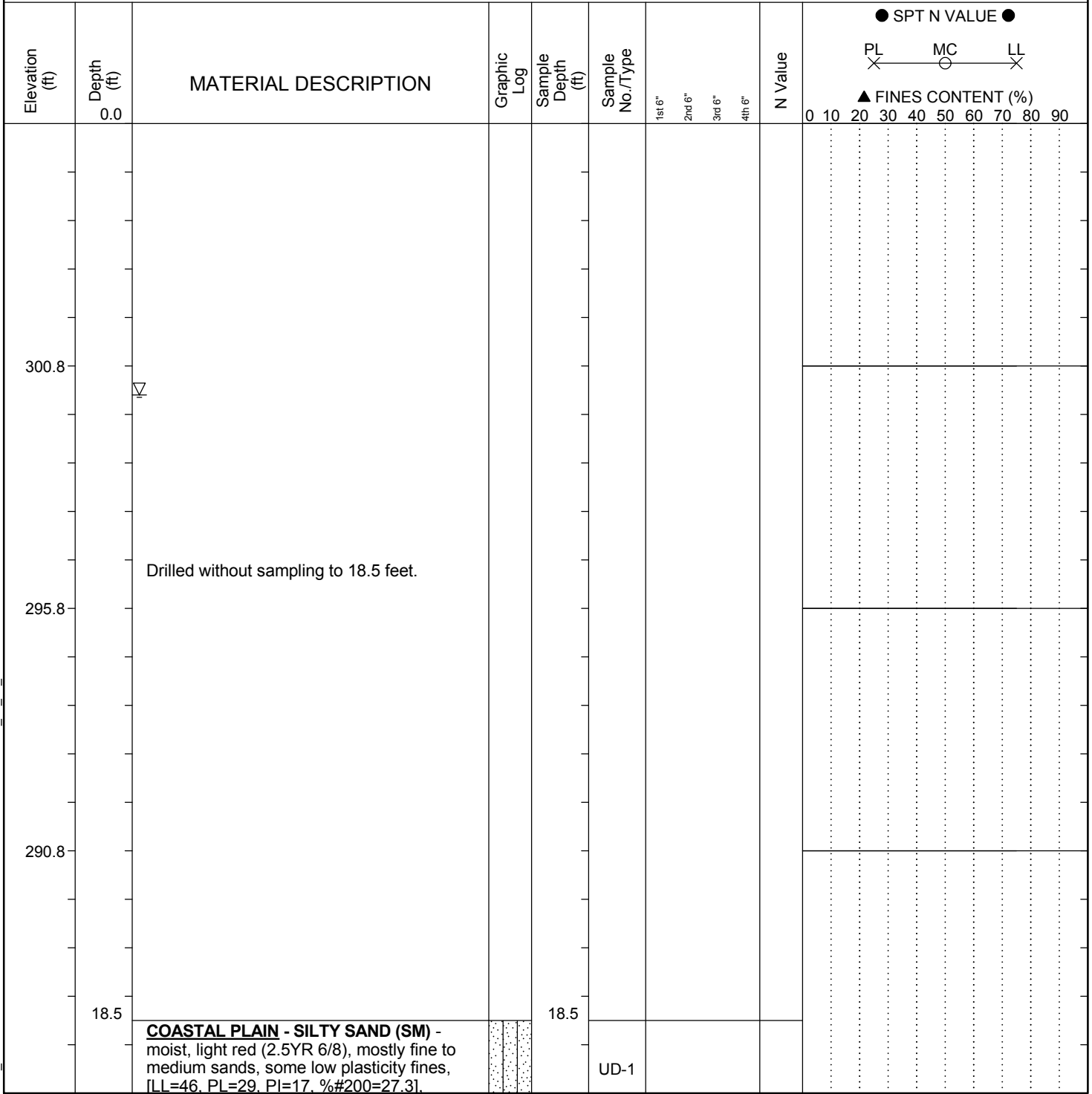
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 3/20/2018

Boring Number: B-56
 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
81.1	1	J	23	VN	Pa	Fe	St	SR	
81.6	2	J	90	N	No	N/A	Pl	SR	
82.7	3	J	85	N	No	N/A	Pl	SR	
83.8	4	J	N/A	N/A	Fi	Fe	Ir	SR	Fractured zone 83.8' - 84.7'
84.7	5	J	90	T	No	N/A	Pl	SR	
86.1	6	J	83	VN	Pa	Fe	Pl	SR	
86.5	7	J	84	VN	Pa	Fe	Pl	SR	
86.9	8	J	90	N	Pa	Fe	Pl	SR	
87.1	9	J	91	N	Pa	Fe	Pl	SR	
87.9	10	J	89	N	Pa	Fe	Pl	SR	
88.6	11	J	90	VN	Fi	Fe	Pl	SR	
90	12	J	0	VN	Fi	Fe	Ir	SR	
90.9	13	J	28	VN	Fi	Fe	Pl	SR	
91.1	14	J	N/A	N/A	Fi	Fe	Ir	SR	Fractured zone 91.1' - 91.6'
92.9	15	J	83	VN	Fi	Fe	Pl	SR	
93.4	16	J	84	VN	Fi	Fe	Pl	SR	
94.4	17	J	57	N	Fi	Fe	Pl	SR	
95.3	18	J	79	N	Fi	Fe	Pl	SR	
95.8	19	J	88	VN	No	N/A	St	SR	
96.6	20	J	89	N	No	N/A	Ir	SR	
97	21	J	31	T	Fi	Fe	Pl	SR	
97.6	22	J	N/A	N/A	No	N/A	Ir	R	Fractured zone 97.6' - 98.4'
98.7	23	J	50	VN	No	N/A	St	SR	
99.2	24	J	72	T	No	N/A	St	SR	
99.8	25	J	34	VN	Fi	Fe	Pl	SR	
100.4	26	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 100.4' - 101.4'

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	B-56UD
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 38
Eng./Geo.:	AKS	Boring Location:	201+59.65	Offset:	L:193.265	Alignment:	Proposed
Elev.:	305.8 ft	Latitude:	34.039639	Longitude:	-81.094691	Date Started:	4/3/2018
Total Depth:	32 ft	Soil Depth:	32 ft	Core Depth:	0 ft	Date Completed:	4/3/2018
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	5.6 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-56UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 38
Eng./Geo.: AKS	Boring Location: 201+59.65	Offset: L:193.265' Alignment: Proposed
Elev.: 305.8 ft	Latitude: 34.039639	Longitude: -81.094691
Total Depth: 32 ft	Soil Depth: 32 ft	Core Depth: 0 ft
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 5.6 ft 24HR: N/A

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL X — MC O — LL X	▲ FINES CONTENT (%)
						1st 6"	2nd 6"	3rd 6"	4th 6"			
280.8	20.5	AASHTO = A-2-7 (1). @ 20.5 feet - very loose, moist, pinkish-white (2.5YR 8/2).		20.5	SS-1	2	1	2		3	●	
	23.5	@ 23.5 feet - pink (5YR 7/3), [LL=39, PL=27, PI=12, %#200=47.1], AASHTO = A-6 (3).		23.5	UD-2							
	25.5	@ 25.5 feet - white (5YR 8/1).		25.5	SS-2	1	WOH			0	●	
275.8	27.0	POORLY GRADED SAND (SP) - wet, white (7.5YR 8/1), subangular, mostly fine to medium sands, trace non-plastic fines.		28.5	UD-3							
	30.5	PIEDMONT RESIDUUM - SILT WITH SAND (ML) - stiff, moist, yellow (2.5Y 7/6), mostly low plasticity fines, little fine to medium sands.		30.5	SS-3	3	4	5		9	●	
270.8	32.0	Boring Terminated at 32 feet.										

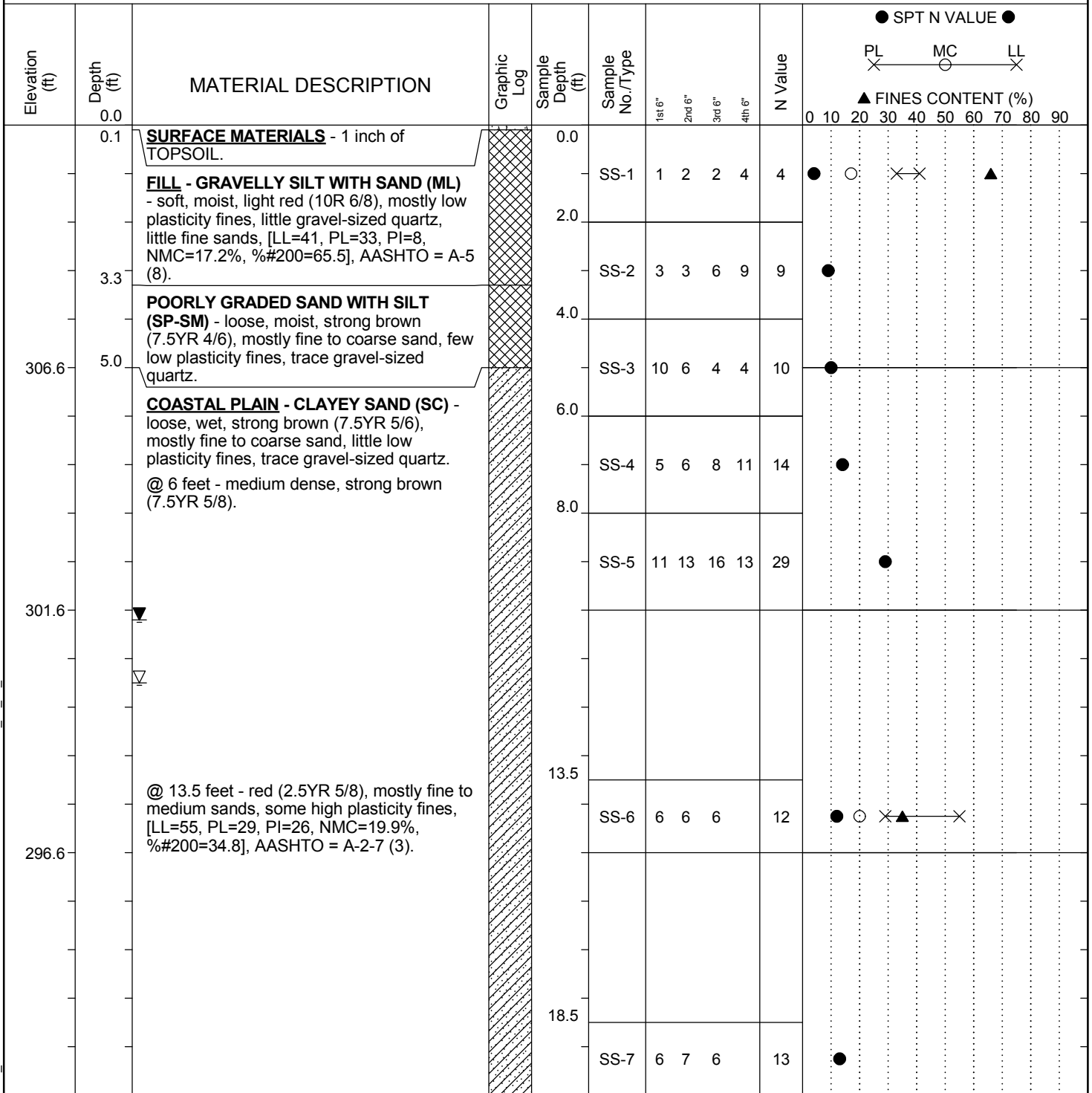
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 203+12.24	Offset: R:116.704
Alignment: Proposed	Date Started: 1/9/2018	
Elev.: 311.6 ft	Latitude: 34.039007	Longitude: -81.093844
Total Depth: 105.2 ft	Soil Depth: 96.1 ft	Core Depth: 9.1 ft
Date Completed: 1/12/2018		
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 750	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 86.0%		
Core Size: NQ	Driller: S. Gowan	Groundwater: TOB 11.5 ft
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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 203+12.24	Offset: R:116.704
Alignment: Proposed	Date Started: 1/9/2018	Date Completed: 1/12/2018
Elev.: 311.6 ft	Latitude: 34.039007	Longitude: -81.093844
Total Depth: 105.2 ft	Soil Depth: 96.1 ft	Core Depth: 9.1 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 750	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.0%	Groundwater: TOB 11.5 ft
Core Size: NQ	Driller: S. Gowan	24HR: 10.2 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 (%)							
286.6	28.5	PIEDMONT RESIDUUM - SILT WITH SAND (ML) - firm, moist, strong brown (7.5YR 5/8), mostly low plasticity fines, little fine sands. @ 33.5 feet - no recovery, stiff. @ 38.5 feet - [LL=49, PL=30, PI=19, NMC=39.1%, %#200=82.6], AASHTO = A-7-5 (18).	[Hatched Pattern]	23.5	SS-8	1	5	7		12	●										
281.6	28.5			SS-9	6	4	4		8	●											
276.6	33.5			SS-10	8	5	6		11	●											
	38.5			SS-11	5	7	6		13	●	×	○	×	▲							

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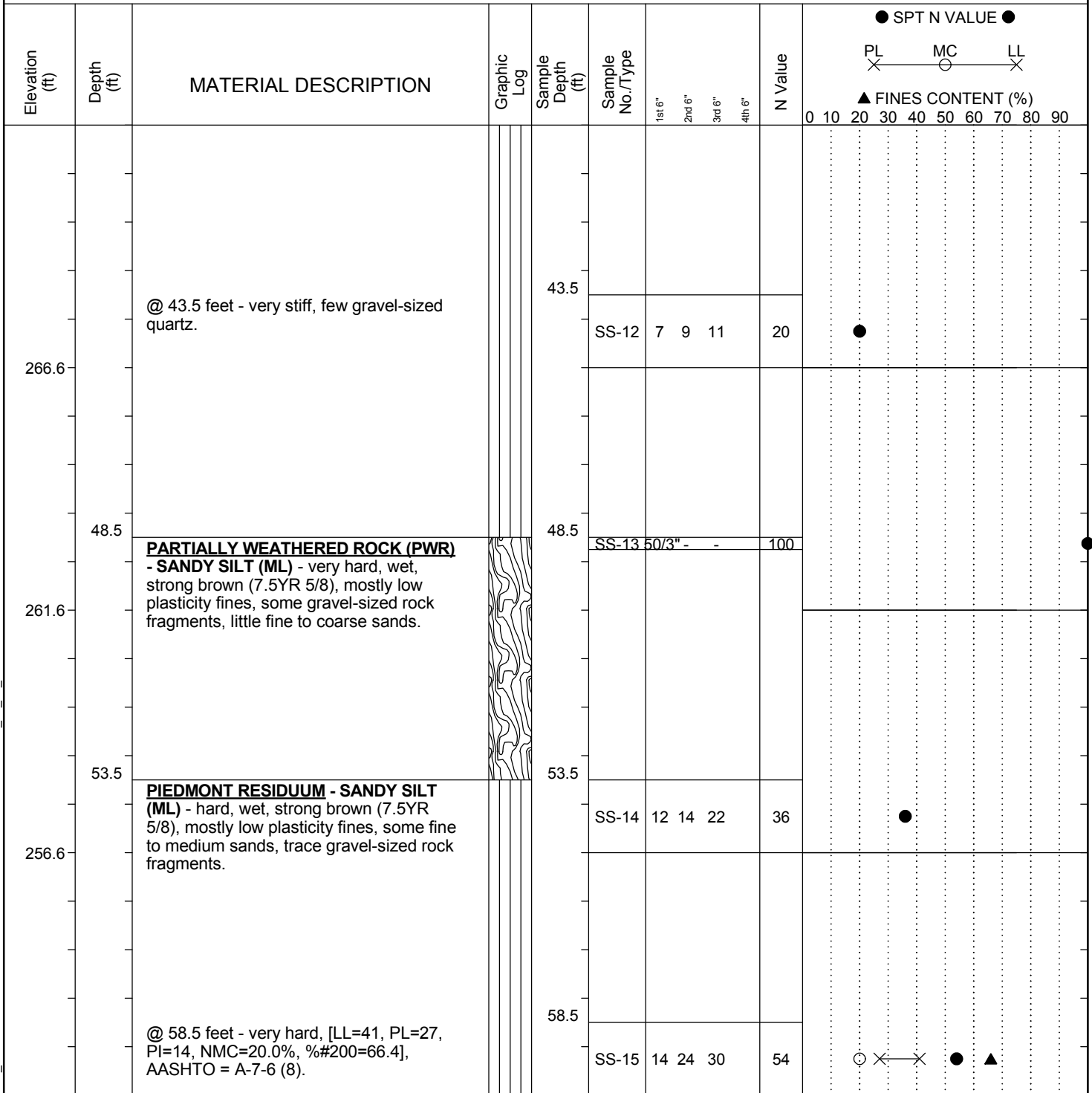
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 203+12.24	Offset: R:116.704
Alignment: Proposed	Date Started: 1/9/2018	
Elev.: 311.6 ft	Latitude: 34.039007	Longitude: -81.093844
Total Depth: 105.2 ft	Soil Depth: 96.1 ft	Core Depth: 9.1 ft
Date Completed: 1/12/2018		
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 750	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 86.0%		
Core Size: NQ	Driller: S. Gowan	Groundwater: TOB 11.5 ft
24HR: 10.2 ft		



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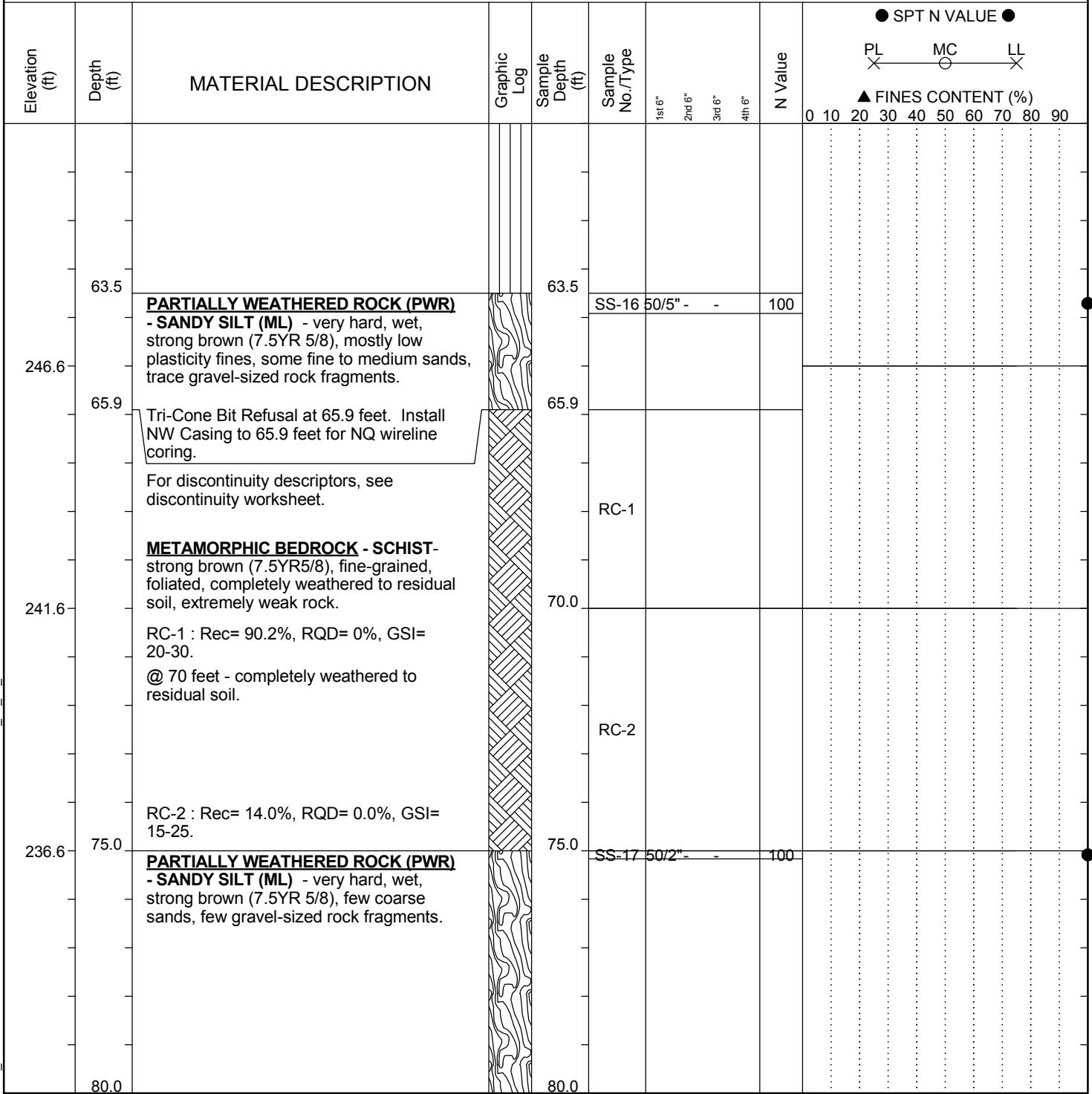
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 203+12.24	Offset: R:116.704
Alignment: Proposed	Date Started: 1/9/2018	Date Completed: 1/12/2018
Elev.: 311.6 ft	Latitude: 34.039007	Longitude: -81.093844
Total Depth: 105.2 ft	Soil Depth: 96.1 ft	Core Depth: 9.1 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 750	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.0%	Core Size: NQ
Driller: S. Gowan	Groundwater: TOB	11.5 ft
24HR	10.2 ft	



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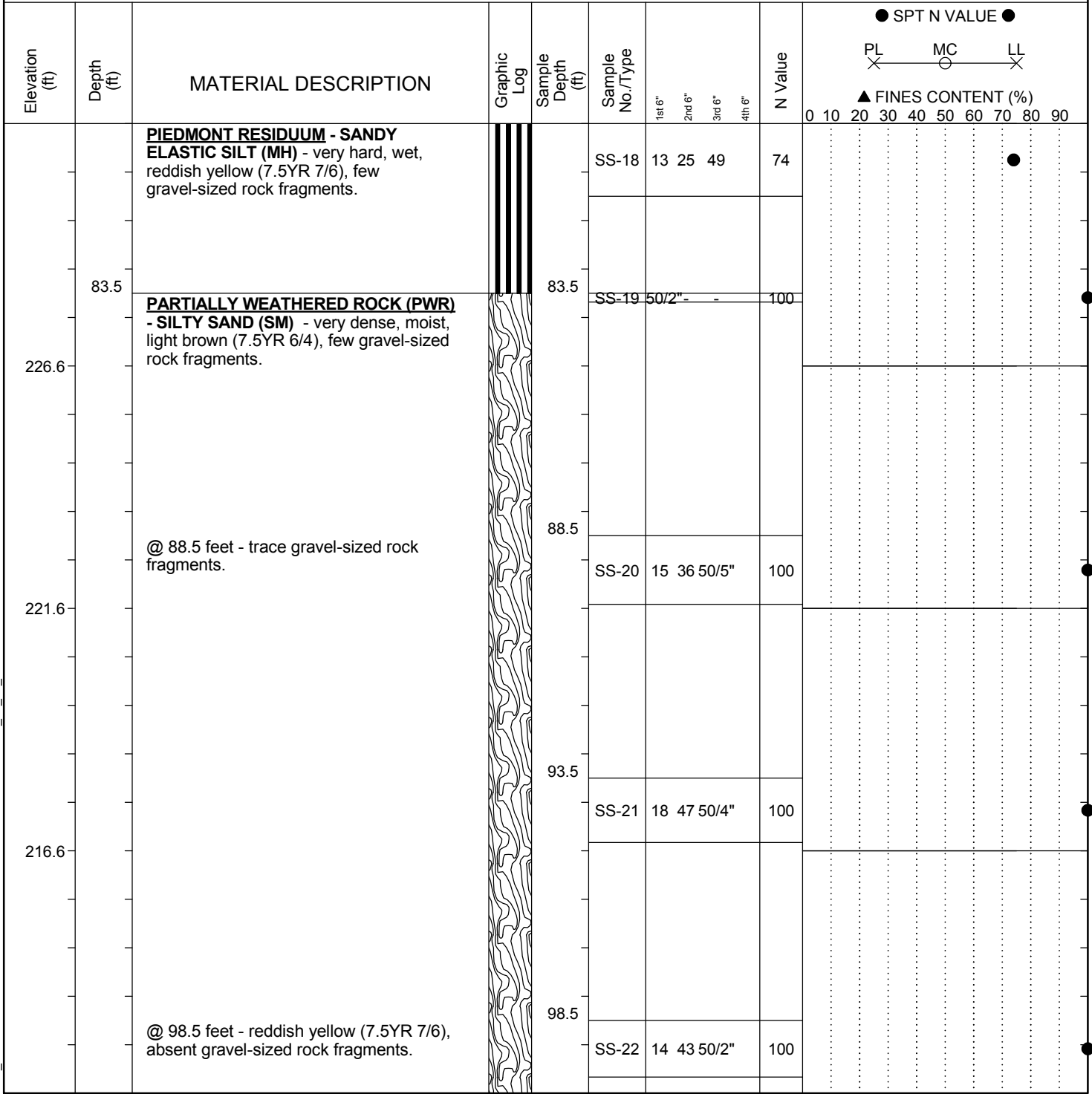
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 203+12.24	Offset: R:116.704
Alignment: Proposed	Date Started: 1/9/2018	
Elev.: 311.6 ft	Latitude: 34.039007	Longitude: -81.093844
Total Depth: 105.2 ft	Soil Depth: 96.1 ft	Core Depth: 9.1 ft
Date Completed: 1/12/2018		
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 750	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 86.0%		
Core Size: NQ	Driller: S. Gowan	Groundwater: TOB 11.5 ft
24HR: 10.2 ft		



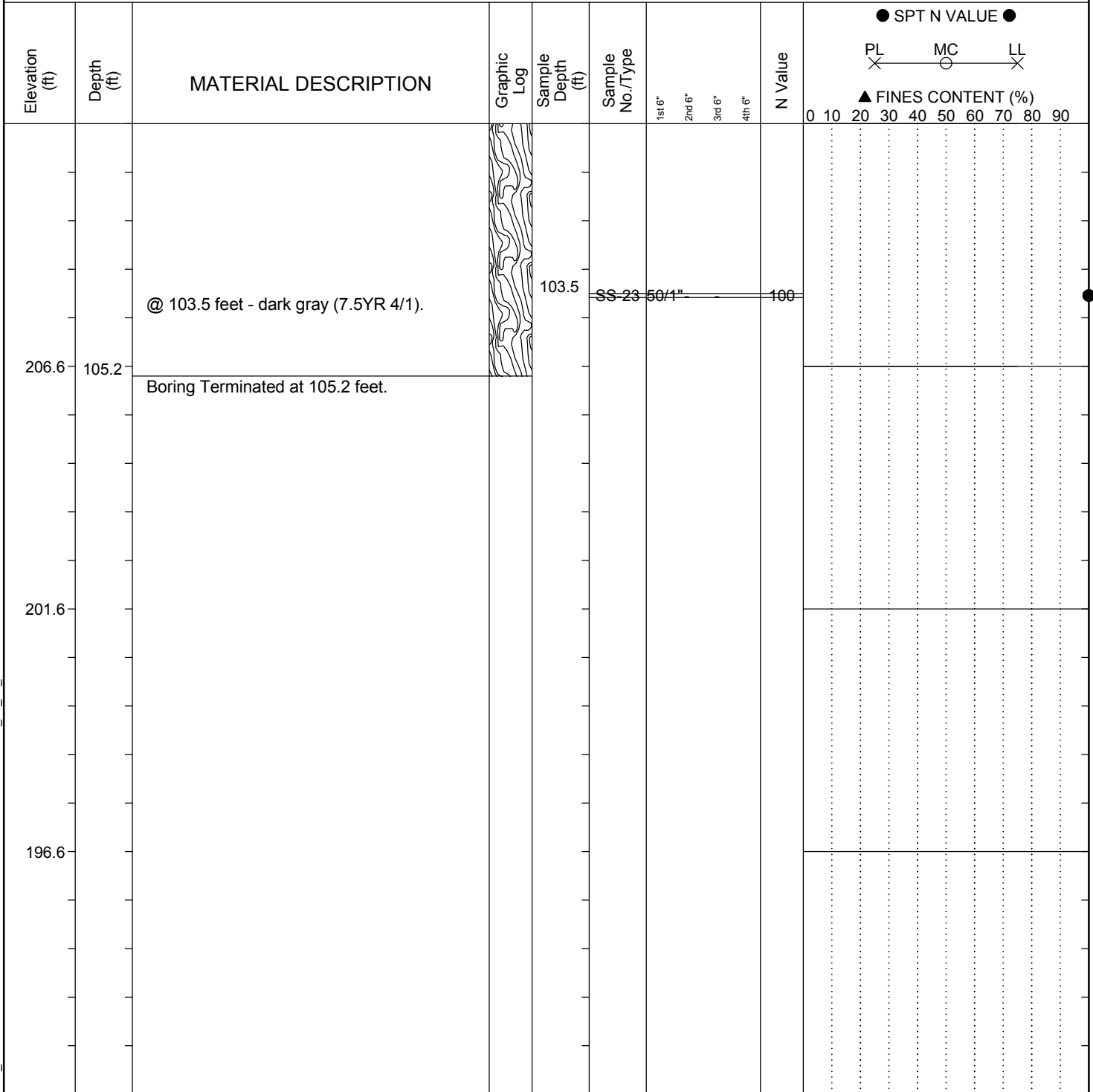
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 37	
Eng./Geo.: ELF/MFC	Boring Location: 203+12.24		Offset: R:116.704	Alignment: Proposed
Elev.: 311.6 ft	Latitude: 34.039007	Longitude: -81.093844	Date Started: 1/9/2018	
Total Depth: 105.2 ft	Soil Depth: 96.1 ft	Core Depth: 9.1 ft	Date Completed: 1/12/2018	
Bore Hole Diameter (in): 3.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME 750	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.0%	
Core Size: NQ	Driller: S. Gowan	Groundwater: TOB	11.5 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

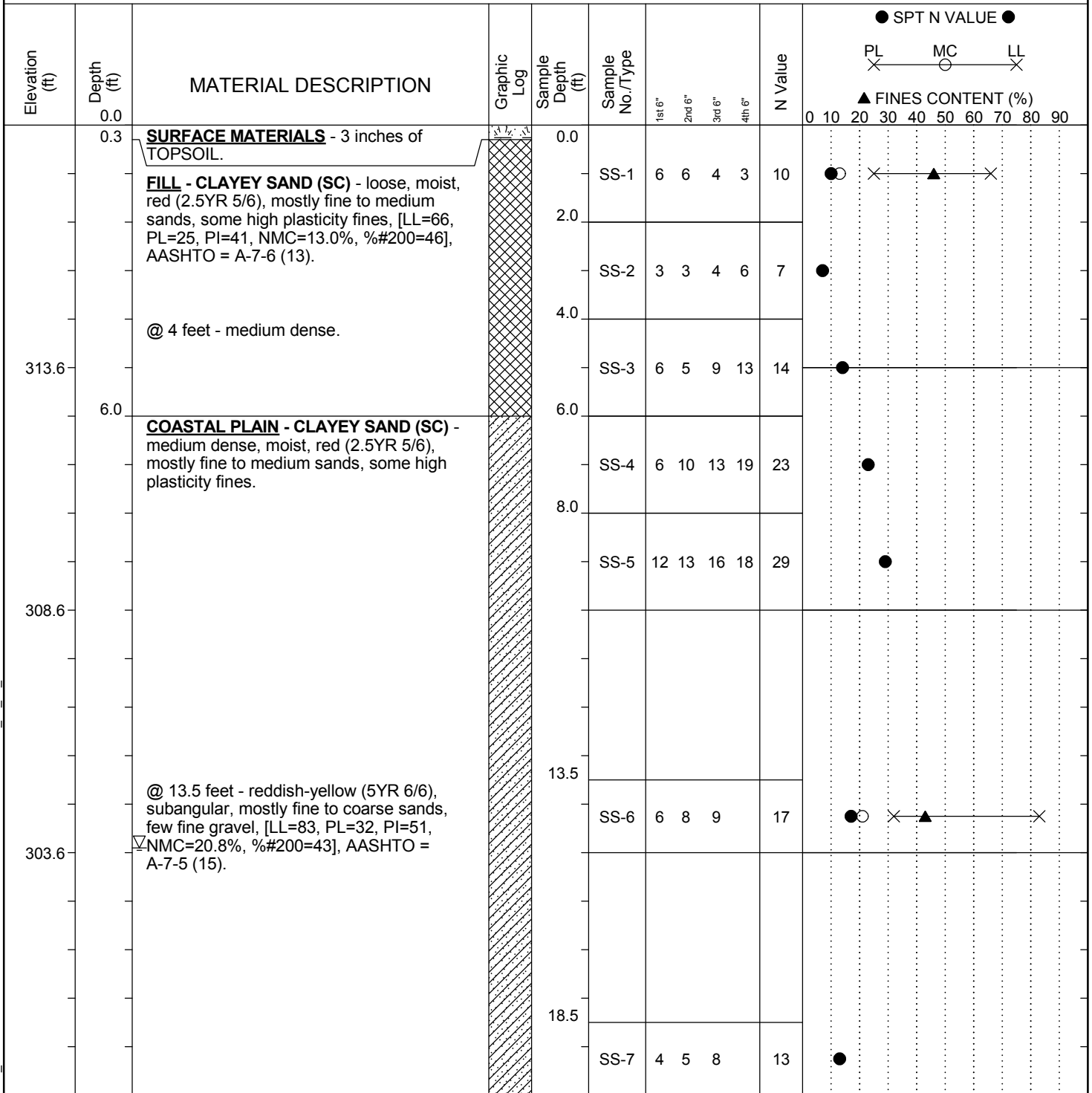
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Gowan
 Logged By: Lehe Fender
 Date: 1/10/2018

Boring Number: B-57
 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
65.9	1	J	72	W	Pa	Sd/Cl	Ir	SR	Fractured zone 65.9' - 67'
69	2	J	55	W	Pa	Sd/Cl	Ir	SR	Fractured zone 69' - 69.6'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-58
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 39	
Eng./Geo.: AKS	Boring Location: 204+85.63		Offset: L:130.273	Alignment: Proposed
Elev.: 318.6 ft	Latitude: 34.039822	Longitude: -81.093664	Date Started: 4/4/2018	
Total Depth: 102.4 ft	Soil Depth: 102.4 ft	Core Depth: 0 ft	Date Completed: 4/6/2018	
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: N/A	Driller: J. Millwood	Groundwater: TOB	14.9 ft 24HR 32.5 ft	



LEGEND

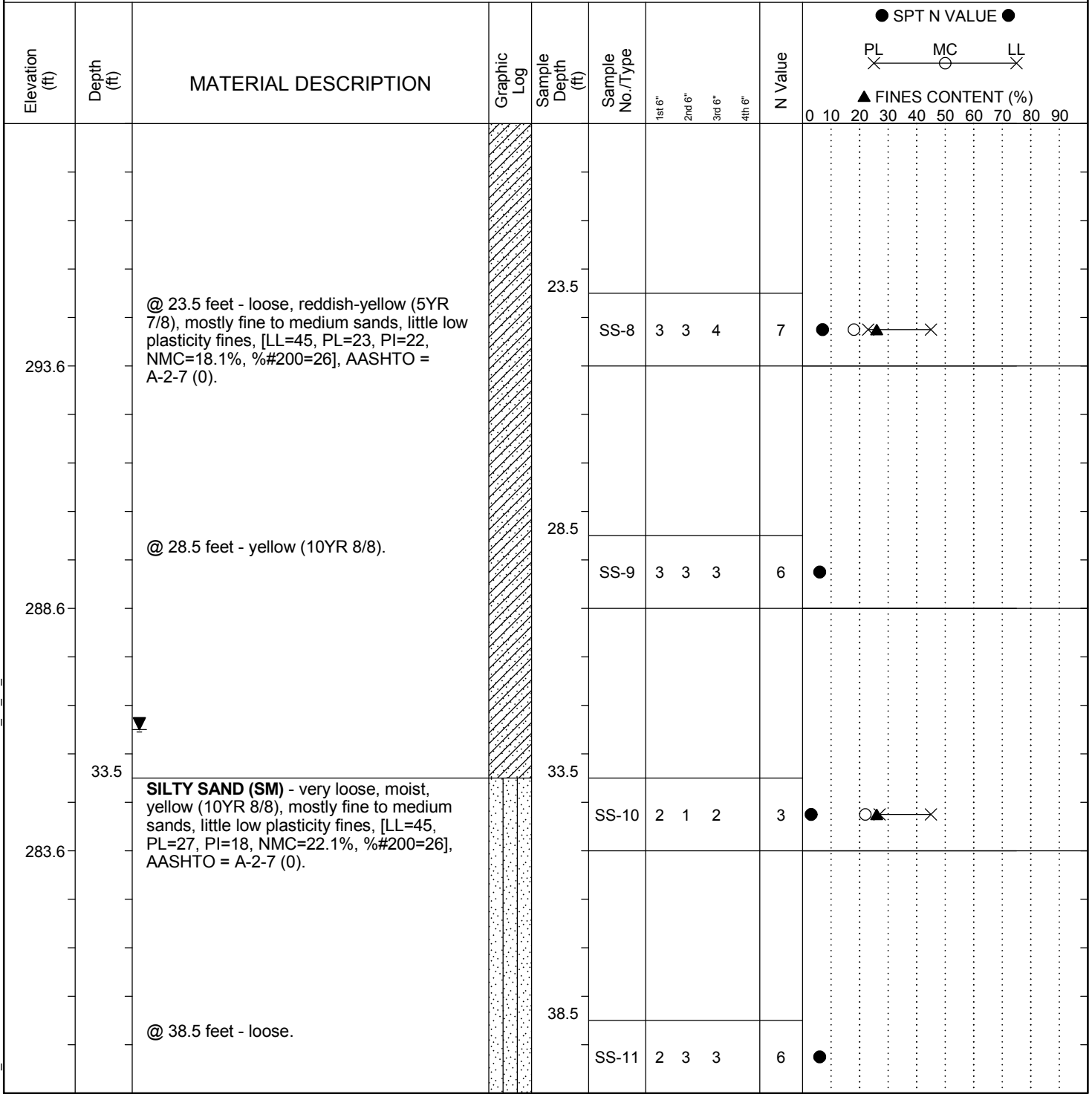
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SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

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-58
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 39
Eng./Geo.: AKS	Boring Location: 204+85.63	Offset: L:130.273
Elev.: 318.6 ft	Latitude: 34.039822	Longitude: -81.093664
Total Depth: 102.4 ft	Soil Depth: 102.4 ft	Core Depth: 0 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: N/A	Driller: J. Millwood	Energy Ratio: 86.5%
	Groundwater: TOB	14.9 ft
	24HR	32.5 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-58	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route: Site 39	
Eng./Geo.: AKS		Boring Location: 204+85.63		Offset: L:130.273		Alignment: Proposed
Elev.: 318.6 ft	Latitude: 34.039822	Longitude: -81.093664	Date Started: 4/4/2018			
Total Depth: 102.4 ft	Soil Depth: 102.4 ft	Core Depth: 0 ft	Date Completed: 4/6/2018			
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: N/A		Driller: J. Millwood		Groundwater: TOB	14.9 ft	24HR 32.5 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	FINES CONTENT (%)				N Value	SPT N VALUE	
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC
273.6		@ 43.5 feet - medium dense.		43.5	SS-12	5	7	7		14	●	
268.6	48.5	PIEDMONT RESIDUUM - SILT WITH SAND (ML) - hard, moist, gray (10YR 6/1), yellow (10YR 8/8), and brown (10YR 4/3), mostly low plasticity fines, little fine sands, [LL=48, PL=30, PI=18, NMC=28.0%, %200=78], AASHTO = A-7-5 (15).		48.5	SS-13	10	14	20		34	○●	×
263.6		@ 53.5 feet - yellow (10YR 7/6).		53.5	SS-14	14	21	28		49	●	
				58.5	SS-15	15	17	33		50	●	

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-58
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 39	
Eng./Geo.: AKS	Boring Location: 204+85.63		Offset: L:130.273	Alignment: Proposed
Elev.: 318.6 ft	Latitude: 34.039822	Longitude: -81.093664	Date Started: 4/4/2018	
Total Depth: 102.4 ft	Soil Depth: 102.4 ft	Core Depth: 0 ft	Date Completed: 4/6/2018	
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: N/A	Driller: J. Millwood	Groundwater: TOB	14.9 ft 24HR 32.5 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	▲ FINES CONTENT (%)						
253.6	63.5	PARTIALLY WEATHERED ROCK (PWR) - SILTY SAND (SM) - very dense, moist, grayish-brown (10YR 4/2).		63.5	SS-16	50/5"-	-	-	-	100										
248.6		@ 68.5 feet - light gray (10YR 7/1).		68.5	SS-17	27	40	50/5"		100										
243.6				73.5	SS-18	50/3"-	-	-		100										
				78.5	SS-19	50/2"-	-	-		100										

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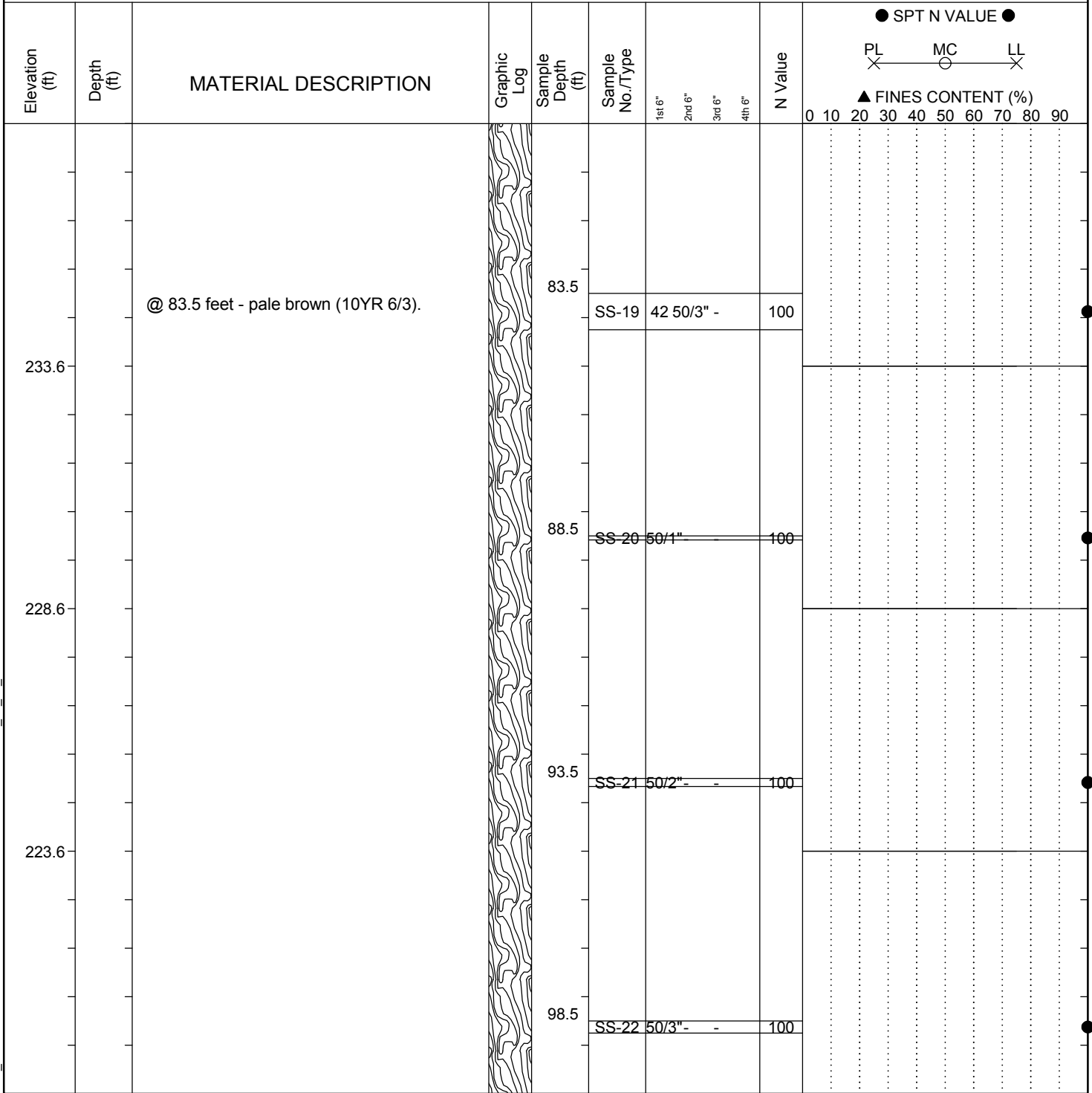
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-58
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 39	
Eng./Geo.: AKS	Boring Location: 204+85.63		Offset: L:130.273	Alignment: Proposed
Elev.: 318.6 ft	Latitude: 34.039822	Longitude: -81.093664	Date Started: 4/4/2018	
Total Depth: 102.4 ft	Soil Depth: 102.4 ft	Core Depth: 0 ft	Date Completed: 4/6/2018	
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: N/A	Driller: J. Millwood	Groundwater: TOB	14.9 ft 24HR: 32.5 ft	



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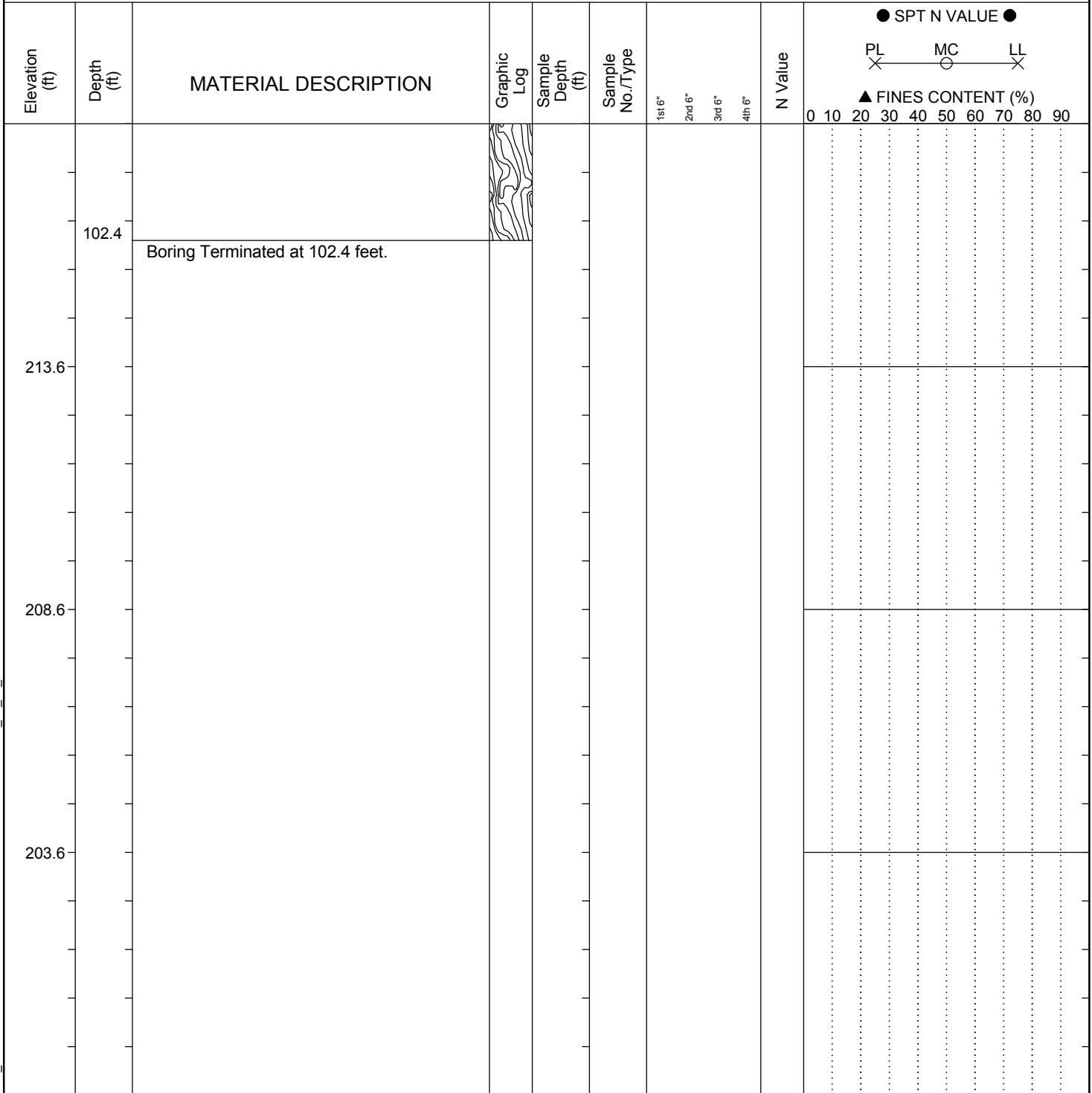
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-58
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 39
Eng./Geo.:	AKS	Boring Location:	204+85.63	Offset:	L:130.273	Alignment:	Proposed
Elev.:	318.6 ft	Latitude:	34.039822	Longitude:	-81.093664	Date Started:	4/4/2018
Total Depth:	102.4 ft	Soil Depth:	102.4 ft	Core Depth:	0 ft	Date Completed:	4/6/2018
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:	N/A	Driller:	J. Millwood	Groundwater:	TOB	14.9 ft	24HR 32.5 ft



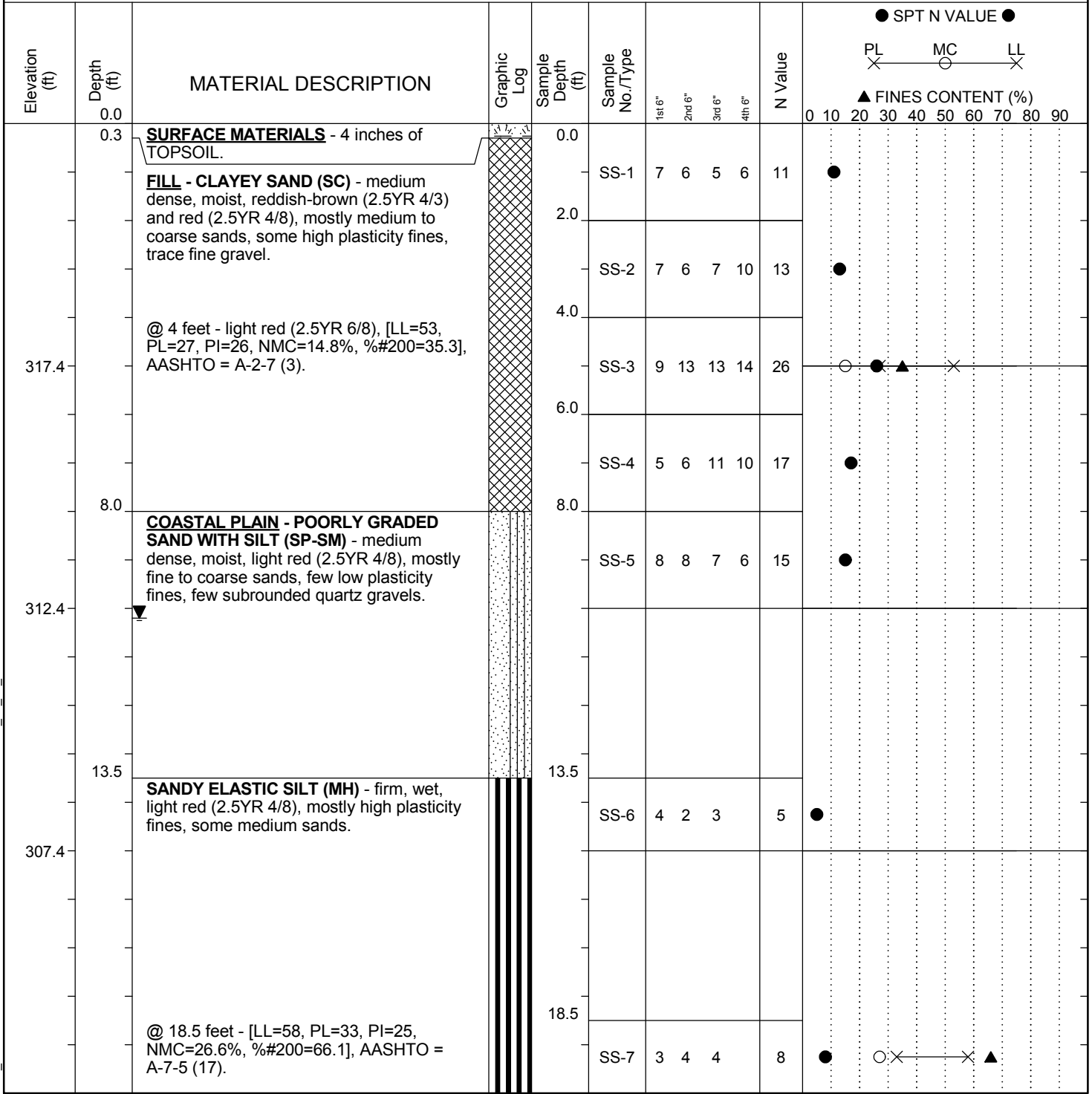
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 206+15.30	Offset: R:154.848
Alignment: Proposed	Date Started: 1/15/2018	Date Completed: 1/19/2018
Elev.: 322.4 ft	Latitude: 34.039279	Longitude: -81.092863
Total Depth: 119.6 ft	Soil Depth: 110 ft	Core Depth: 9.6 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: 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-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 206+15.30	Offset: R:154.848
Alignment: Proposed	Date Started: 1/15/2018	Date Completed: 1/19/2018
Elev.: 322.4 ft	Latitude: 34.039279	Longitude: -81.092863
Total Depth: 119.6 ft	Soil Depth: 110 ft	Core Depth: 9.6 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: 10.2 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
297.4	23.5	PIEDMONT RESIDUUM - SANDY SILT (ML) - firm, moist, light red to light reddish-brown (2.5YR 4/8 to 7/4), mostly low plasticity fines, some fine to medium sands.		23.5	SS-8	3	3	5	8	●	
292.4	28.5	@ 28.5 feet - red (2.5YR 4/6).		28.5	SS-9	2	3	3	6	●	
287.4	33.5	SILT (ML) - firm, moist, red (2.5YR 4/6), mostly low plasticity fines, few fine sands, [LL=47, PL=34, PI=13, NMC=45.4%, %200=92.9], AASHTO = A-7-5 (16).		33.5	SS-10	3	2	4	6	●	×
	38.5			38.5	SS-11	2	3	4	7	●	▲

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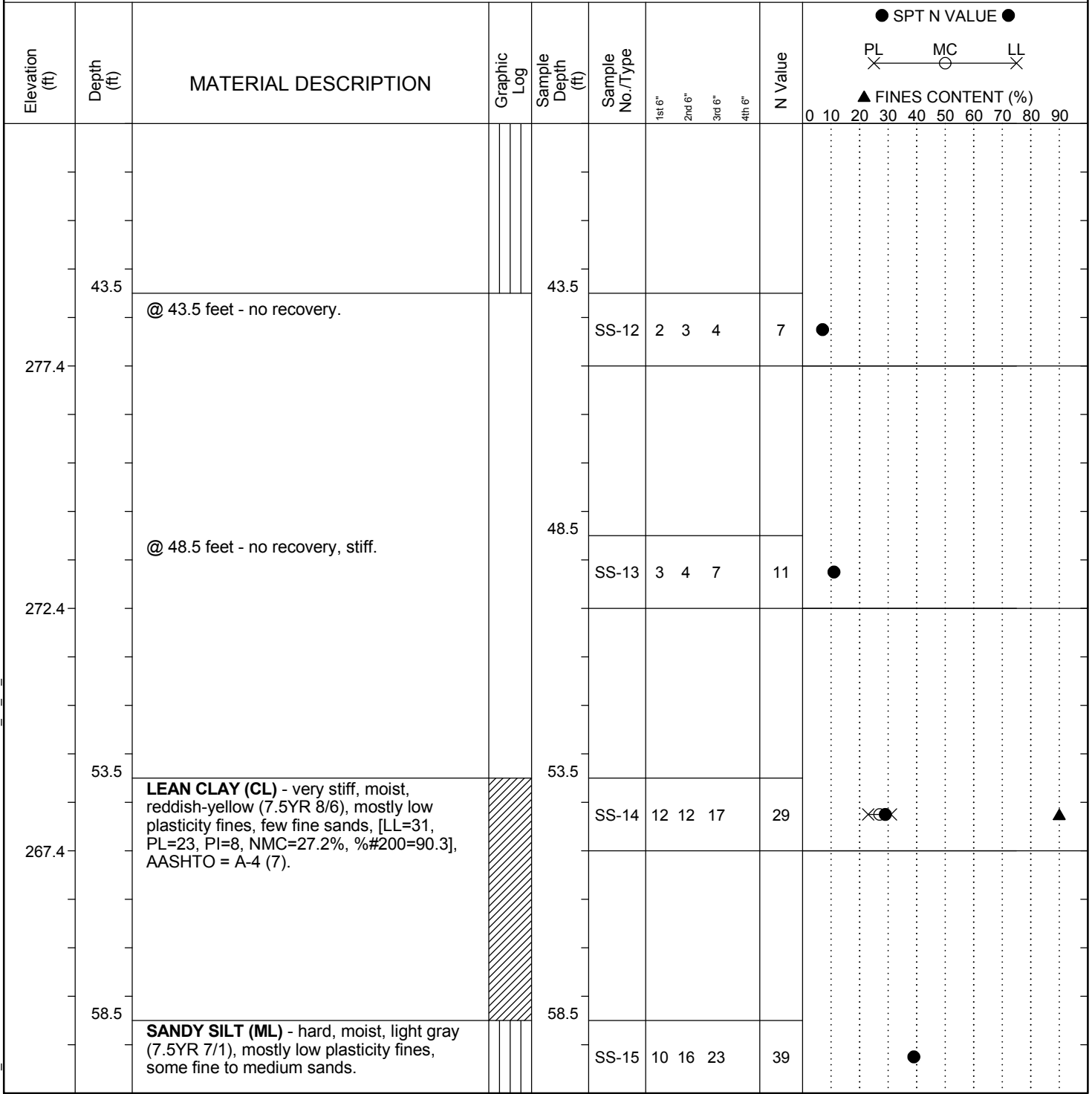
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 206+15.30	Offset: R:154.848
Alignment: Proposed	Date Started: 1/15/2018	Date Completed: 1/19/2018
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Total Depth: 119.6 ft	Soil Depth: 110 ft	Core Depth: 9.6 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: 10.2 ft



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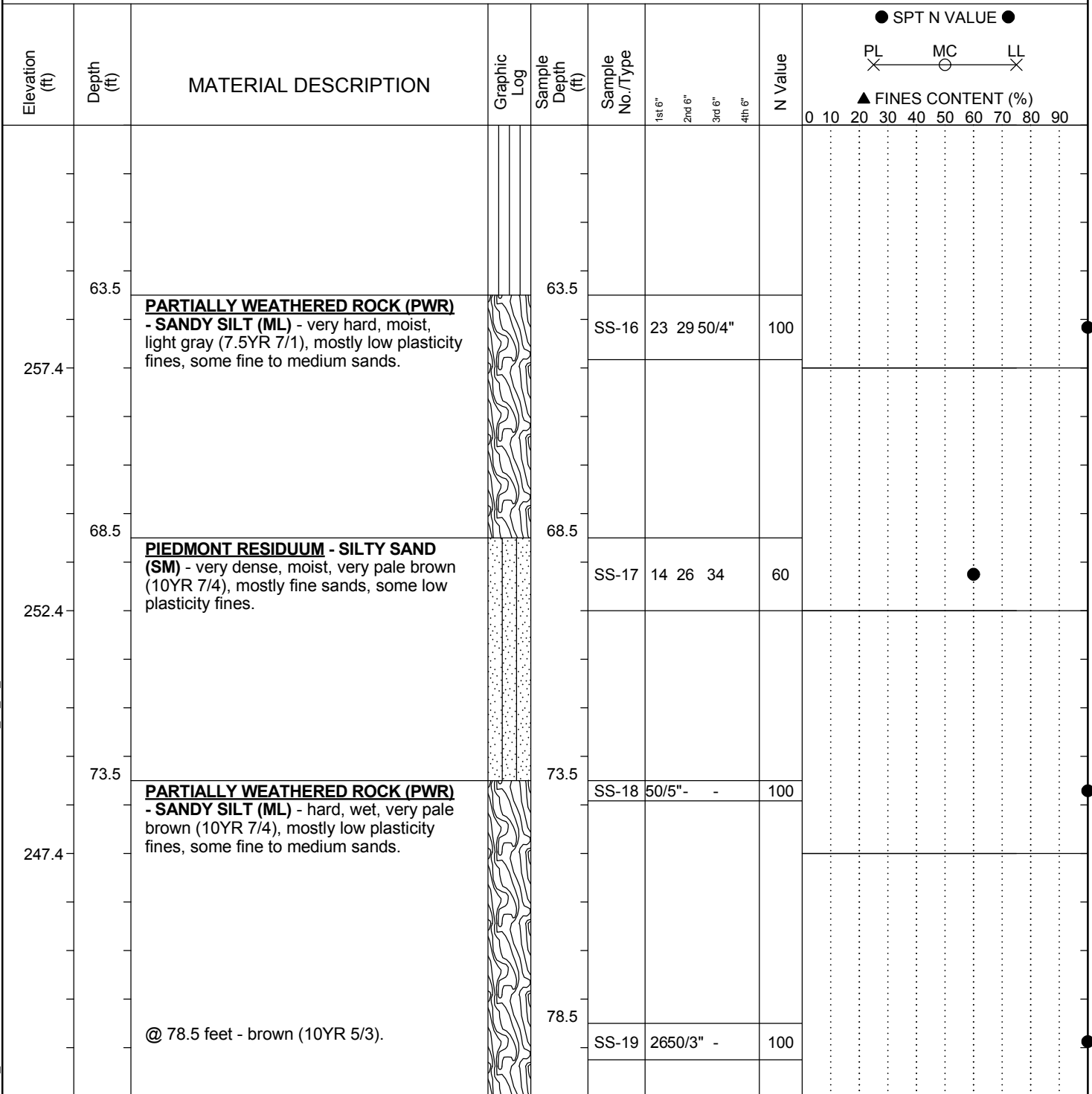
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 206+15.30	Offset: R:154.848	Alignment: Proposed
Elev.: 322.4 ft	Latitude: 34.039279	Longitude: -81.092863	Date Started: 1/15/2018
Total Depth: 119.6 ft	Soil Depth: 110 ft	Core Depth: 9.6 ft	Date Completed: 1/19/2018
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: 10.2 ft



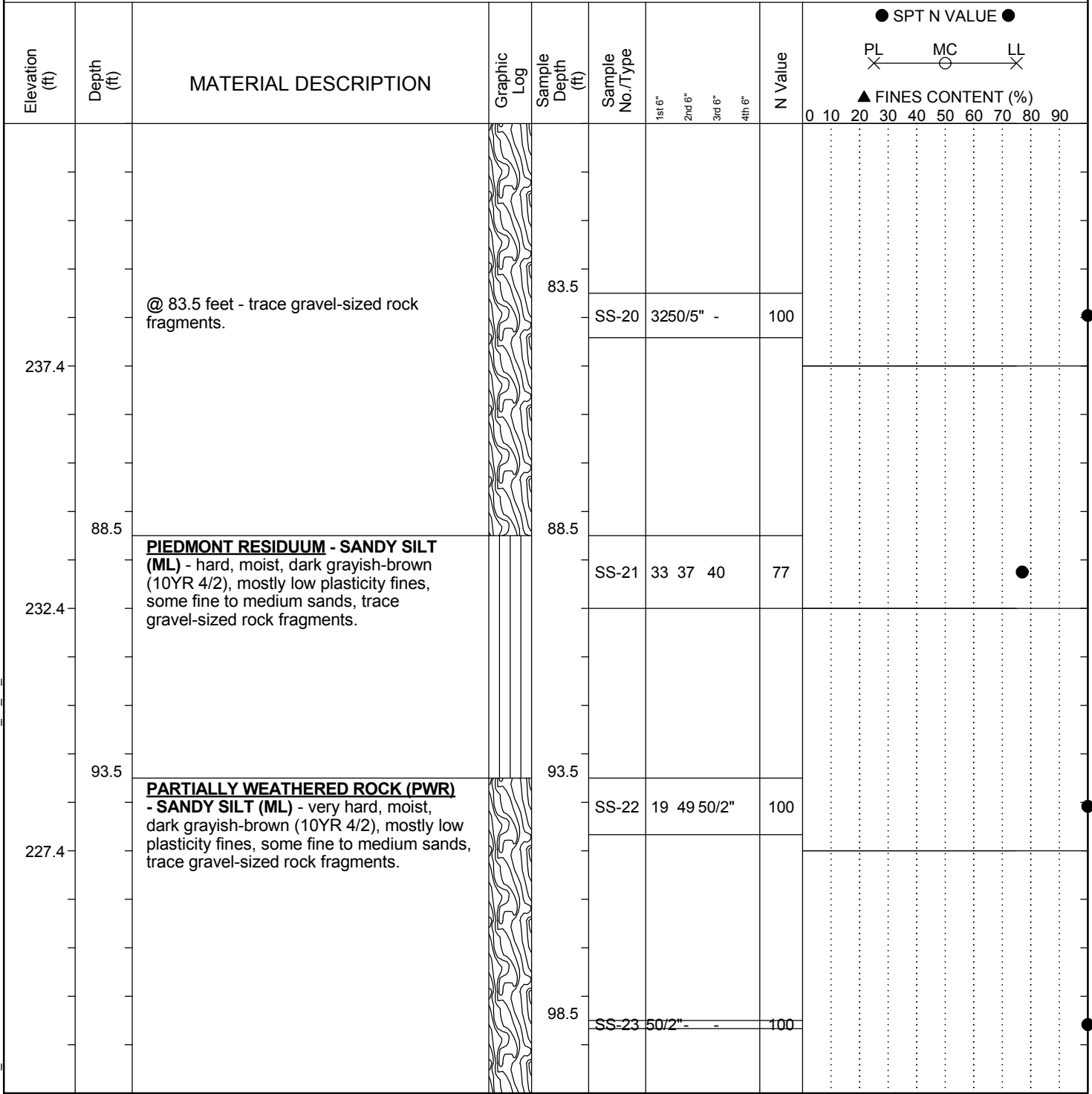
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 206+15.30	Offset: R:154.848
Alignment: Proposed		
Elev.: 322.4 ft	Latitude: 34.039279	Longitude: -81.092863
Date Started: 1/15/2018		
Total Depth: 119.6 ft	Soil Depth: 110 ft	Core Depth: 9.6 ft
Date Completed: 1/19/2018		
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: 10.2 ft		



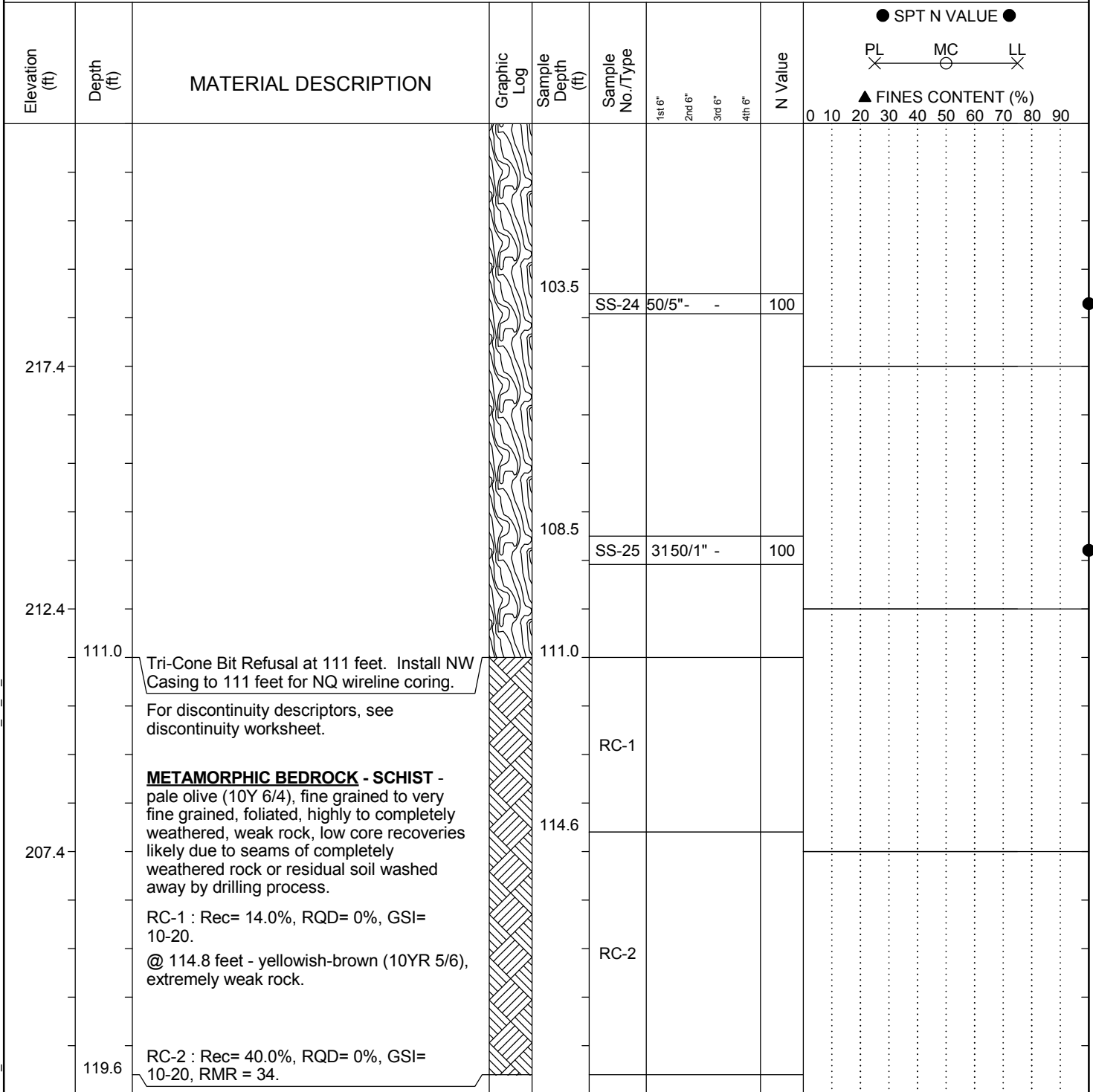
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 37
Eng./Geo.: ELF/MFC	Boring Location: 206+15.30	Offset: R:154.848
Alignment: Proposed	Date Started: 1/15/2018	Date Completed: 1/19/2018
Elev.: 322.4 ft	Latitude: 34.039279	Longitude: -81.092863
Total Depth: 119.6 ft	Soil Depth: 110 ft	Core Depth: 9.6 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: 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-59		
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route: Site 37			
Eng./Geo.: ELF/MFC		Boring Location: 206+15.30		Offset:		R:154.848		Alignment: Proposed
Elev.: 322.4 ft		Latitude: 34.039279		Longitude: -81.092863		Date Started: 1/15/2018		
Total Depth: 119.6 ft		Soil Depth: 110 ft		Core Depth: 9.6 ft		Date Completed: 1/19/2018		
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: 10.2 ft		

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL		MC		LL		FINES CONTENT (%)	
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70
197.4		Boring Terminated at 119.6 feet.																
192.4																		
187.4																		

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

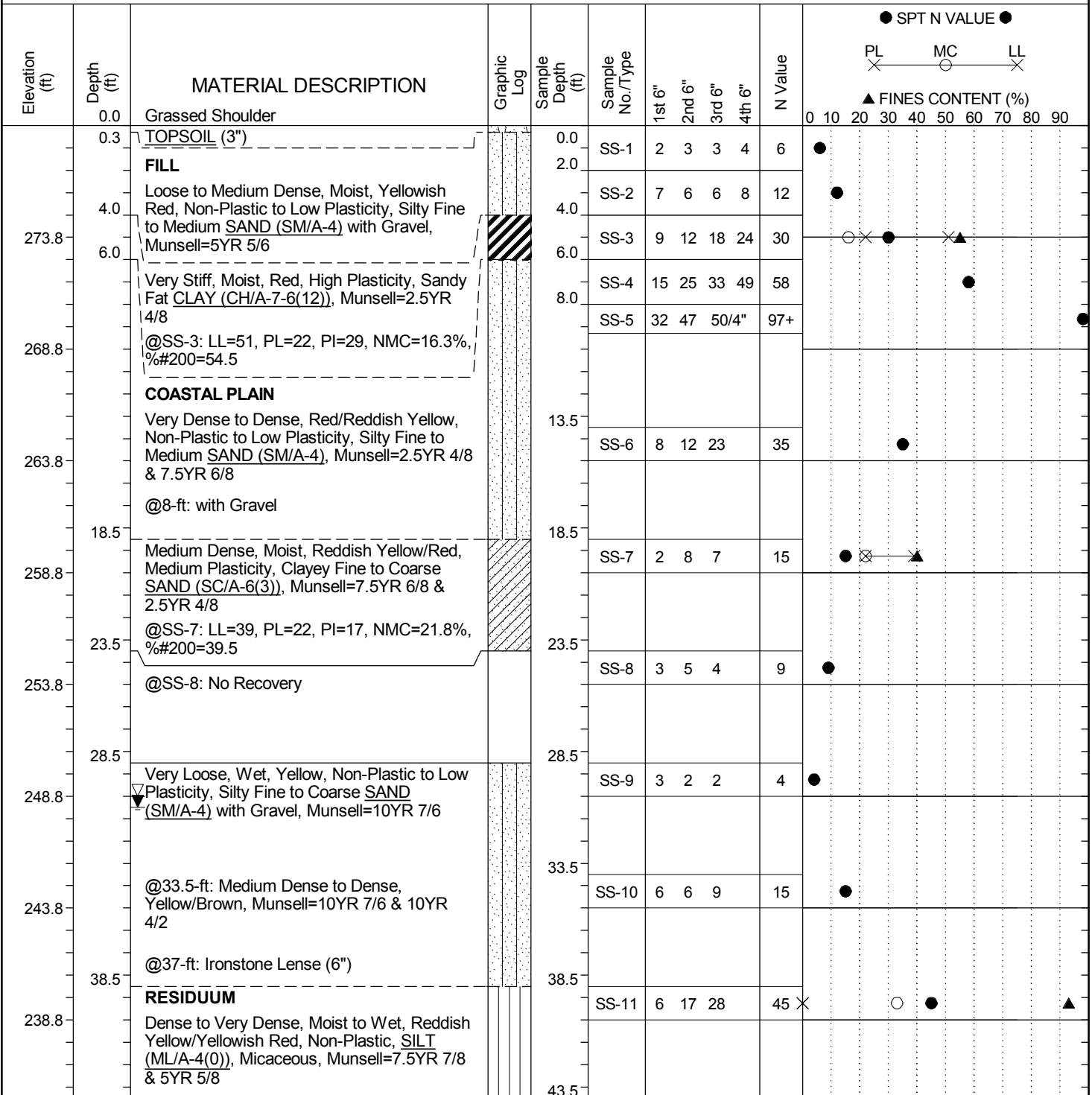
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Lehe Fender
 Date(s) Drilled: 1/19/2018

Boring Number: B-59
 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
111.1	1	J	10	W	Pa	Qz	St	VR	
111.2	2	J	0	W	No	No	Ir	VR	Fractured zone 111.2' - 115.2'
115.4	4	J	0	W	No	No	Pl	S	
116.1	5	J	8	MW	Su	Fe	Pl	SR	Fractured zone 116.1' - 119.6'

SCDOT Soil Test Log

Project ID: P027662	County: Richland/Lexington	Boring No.: DH-2
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements		Route: I20RAC
Eng./Geo.: R. Wessinger	Boring Location: 3159+24	Offset: 78 L
Alignment: Mainline	Date Started: 1/8/2018	Date Completed: 1/10/2018
Elev.: 278.8 ft	Latitude: 34.038335	Longitude: -81.111397
Total Depth: 118.6 ft	Soil Depth: 118.6 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 4	Sampler Configuration:	Liner Required: Y (N)
Drill Machine: CME 45B	Drill Method: RW	Liner Used: Y (N)
Hammer Type: Automatic	Energy Ratio: 90%	Groundwater: TOB 30.0 ft
Core Size: N/A	Driller: L. Guempel	24HR: 30.5 ft



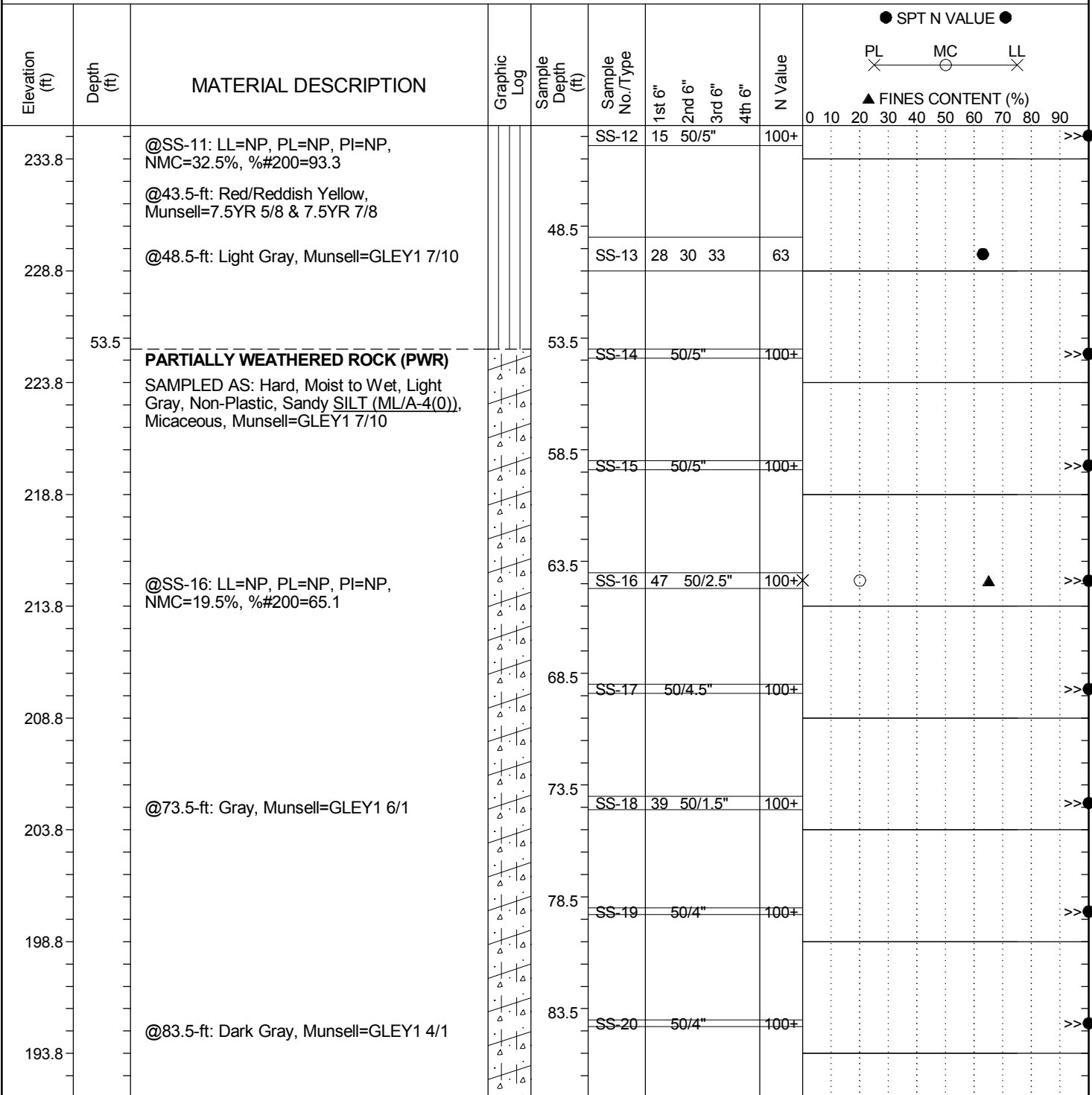
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving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

Continued Next Page

SCDOT Soil Test Log

Project ID: P027662		County: Richland/Lexington		Boring No.: DH-2	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements				Route: I20RAC	
Eng./Geo.: R. Wessinger		Boring Location: 3159+24		Offset: 78 L	
Alignment: Mainline					
Elev.: 278.8 ft		Latitude: 34.038335		Longitude: -81.111397	
Date Started: 1/8/2018					
Total Depth: 118.6 ft		Soil Depth: 118.6 ft		Core Depth: 0 ft	
Date Completed: 1/10/2018					
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 30.0 ft	
24HR: 30.5 ft					



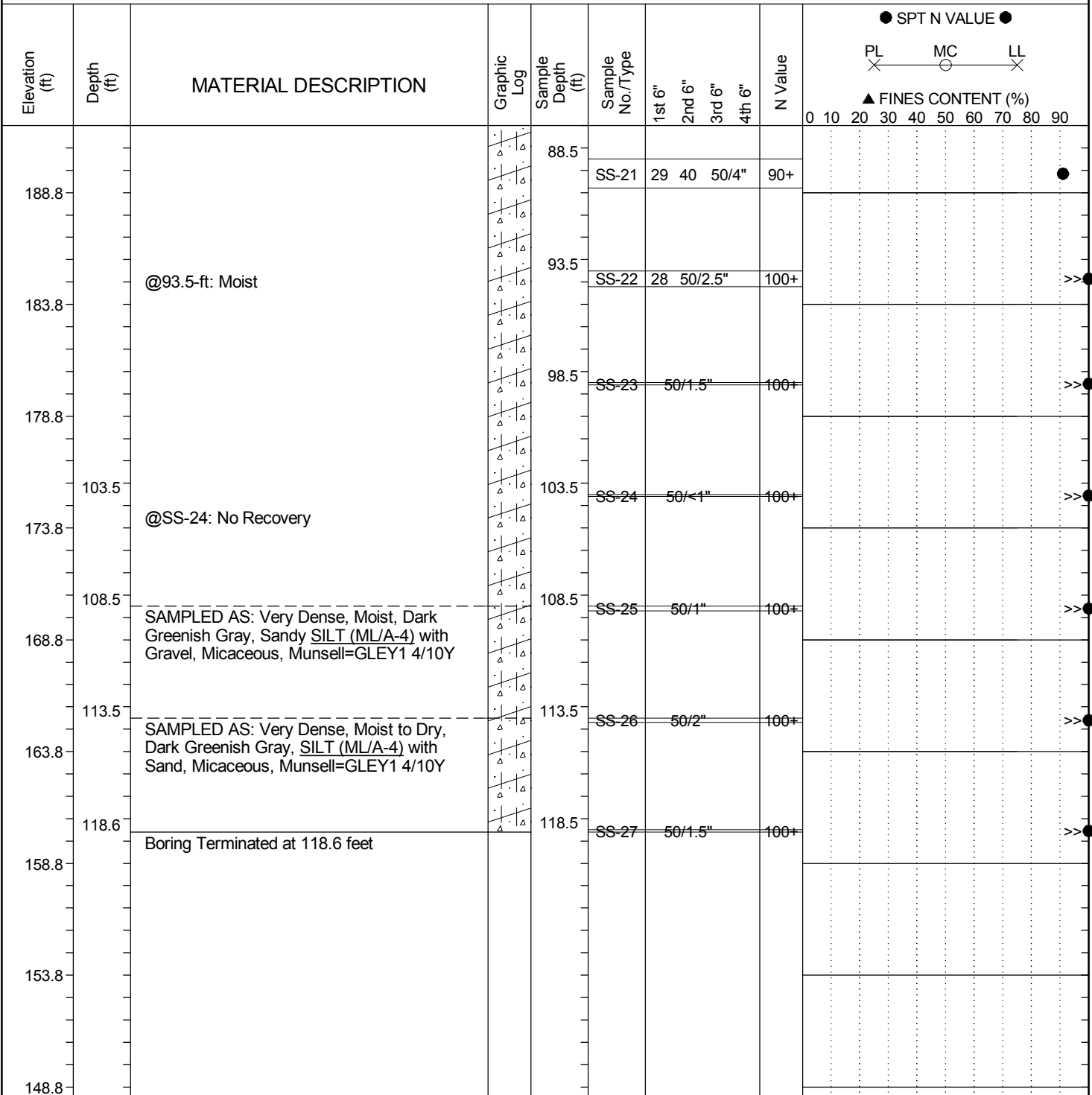
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving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

SCDOT Soil Test Log

Project ID: P027662	County: Richland/Lexington	Boring No.: DH-2
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvements		Route: I20RAC
Eng./Geo.: R. Wessinger	Boring Location: 3159+24	Offset: 78 L
Alignment: Mainline	Elev.: 278.8 ft	Latitude: 34.038335
Longitude: -81.111397	Date Started: 1/8/2018	
Total Depth: 118.6 ft	Soil Depth: 118.6 ft	Core Depth: 0 ft
Date Completed: 1/10/2018	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 30.0 ft	24HR 30.5 ft	

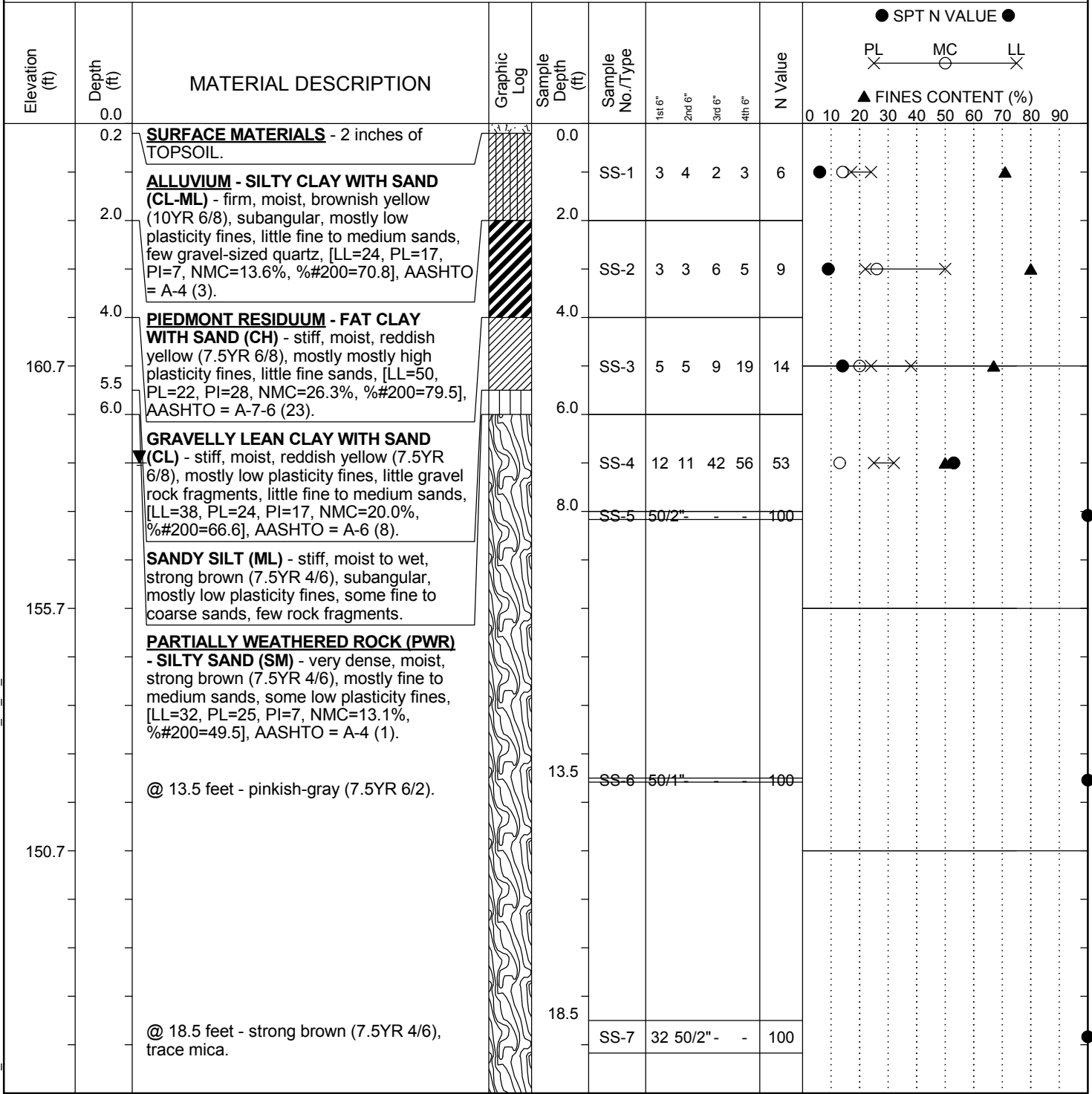


LEGEND

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	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: DH-5
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: ELF/MFC	Boring Location: 262+96.46	Offset: R:138.025
Alignment: Proposed	Date Started: 1/4/2018	Date Completed: 1/9/2018
Elev.: 165.7 ft	Latitude: 34.045222	Longitude: -81.078785
Total Depth: 120.6 ft	Soil Depth: 42 ft	Core Depth: 78.6 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 750	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.0%	Core Size: HQ
Driller: S. Gowan	Groundwater: TOB	24HR: 7 ft



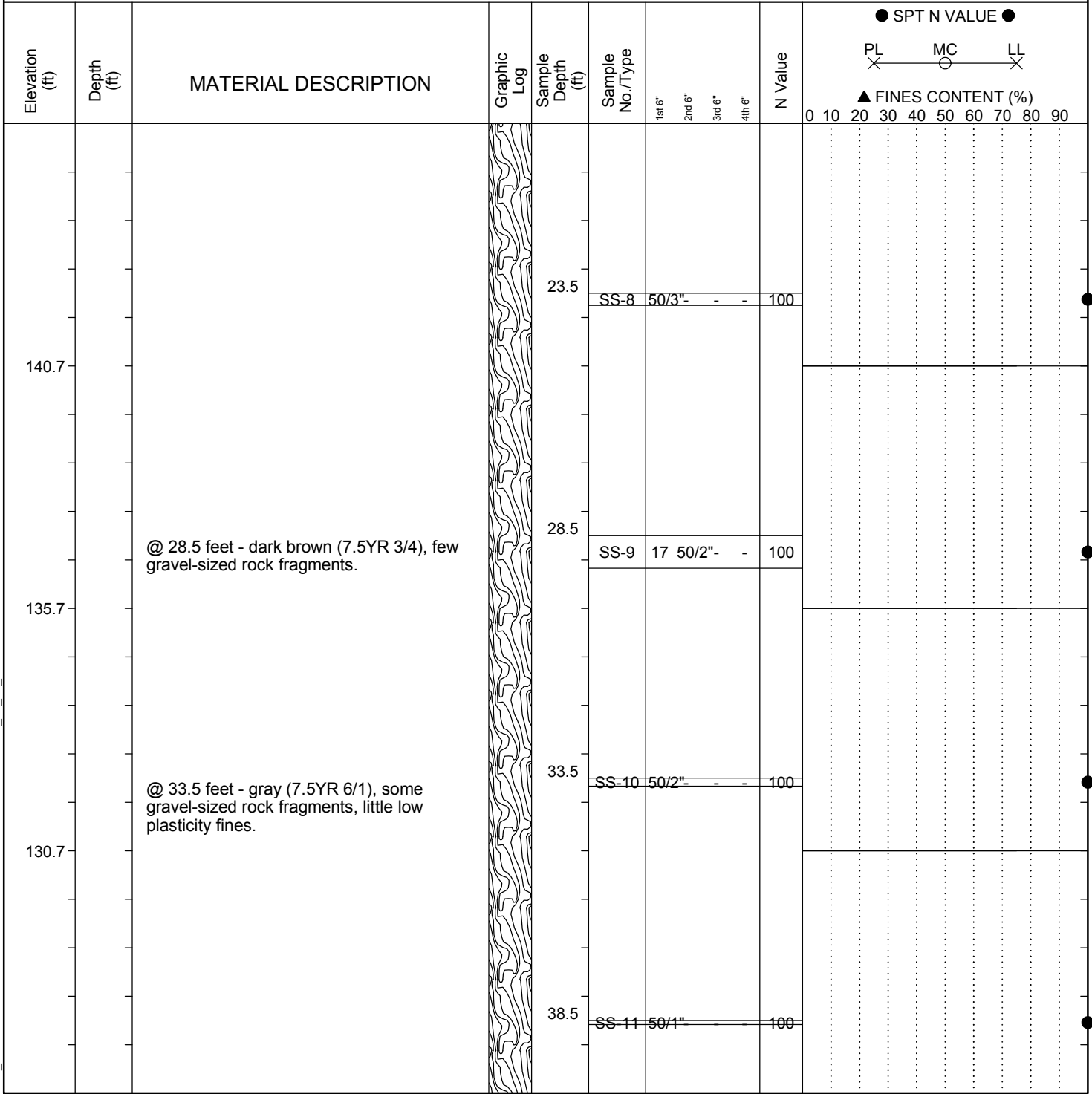
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-5
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: ELF/MFC	Boring Location: 262+96.46	Offset: R:138.025
Alignment: Proposed	Date Started: 1/4/2018	Date Completed: 1/9/2018
Elev.: 165.7 ft	Latitude: 34.045222	Longitude: -81.078785
Total Depth: 120.6 ft	Soil Depth: 42 ft	Core Depth: 78.6 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 750	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.0%	Core Size: HQ
Driller: S. Gowan	Groundwater: TOB	24HR: 7 ft



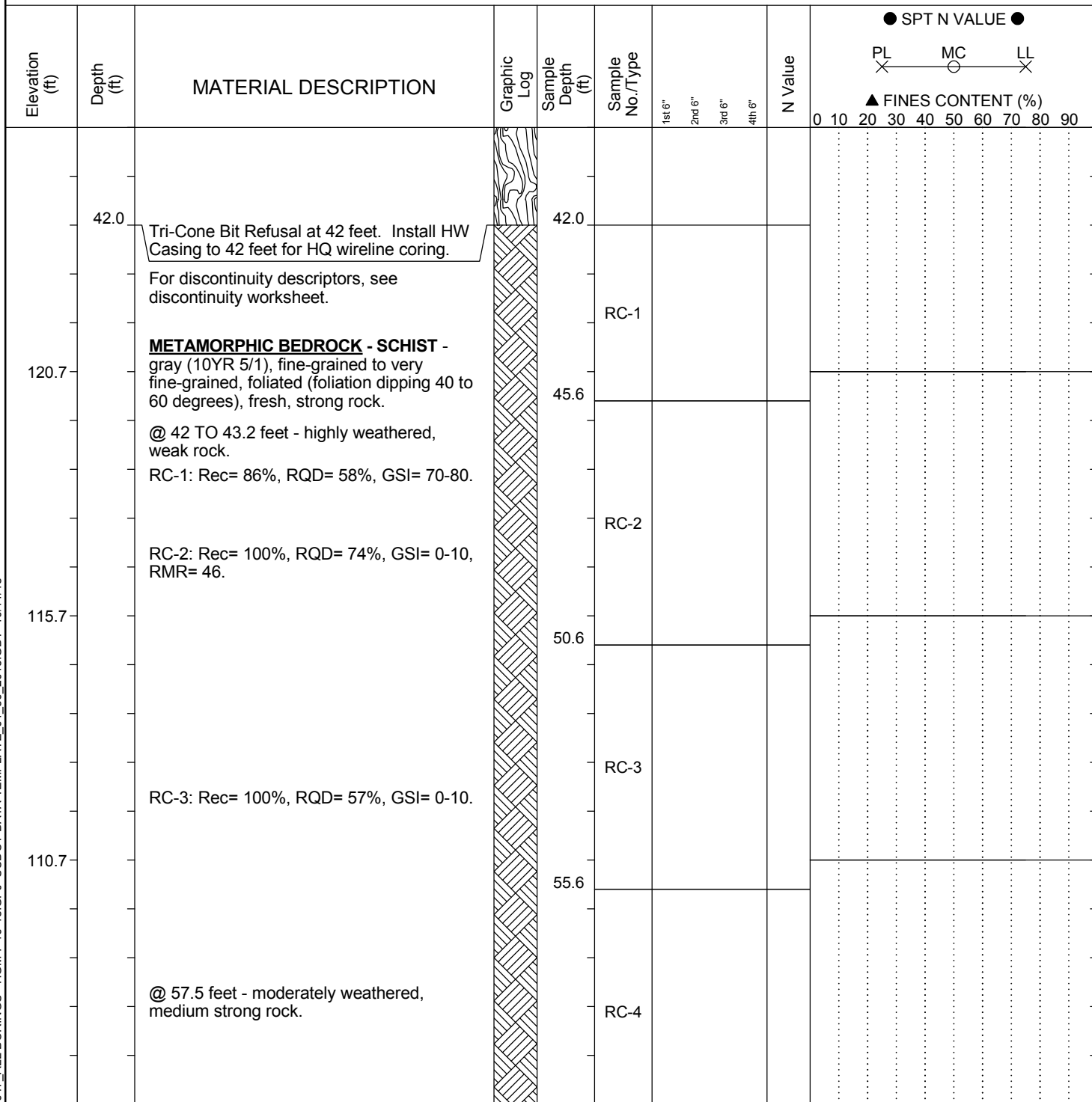
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-5		
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route:	I-20		
Eng./Geo.:	ELF/MFC	Boring Location:	262+96.46		Offset:	R:138.025	Alignment:	Proposed		
Elev.:	165.7 ft	Latitude:	34.045222	Longitude:	-81.078785	Date Started:	1/4/2018			
Total Depth:	120.6 ft	Soil Depth:	42 ft	Core Depth:	78.6 ft	Date Completed:	1/9/2018			
Bore Hole Diameter (in):	7.5	Sampler Configuration			Liner Required:	Y (N)		Liner Used:	Y (N)	
Drill Machine:	CME 750	Drill Method:	RW		Hammer Type:	Automatic		Energy Ratio:	86.0%	
Core Size:	HQ	Driller:	S. Gowan		Groundwater:	TOB	N/A	24HR	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.: DH-5
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: ELF/MFC	Boring Location: 262+96.46	Offset: R:138.025
Alignment: Proposed	Date Started: 1/4/2018	Date Completed: 1/9/2018
Elev.: 165.7 ft	Latitude: 34.045222	Longitude: -81.078785
Total Depth: 120.6 ft	Soil Depth: 42 ft	Core Depth: 78.6 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 750	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.0%	Core Size: HQ
Driller: S. Gowan	Groundwater: TOB	24HR: 7 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
		RC-4: Rec= 100%, RQD= 67.5%, GSI= 0-10, RMR= 44.		60.6							
		RC-5									
100.7		RC-5: Rec= 100%, RQD= 95%, GSI= 10-20, RMR= 29.		65.6							
		@ 68.2 to 71 feet - highly weathered, weak.									
95.7		RC-6: Rec= 94%, RQD= 25%, GSI= 10-20.		70.6							
		RC-6									
90.7		RC-7: Rec= 94%, RQD= 45%, GSI= 0-10.		75.6							
		RC-7									
		RC-8									

LEGEND

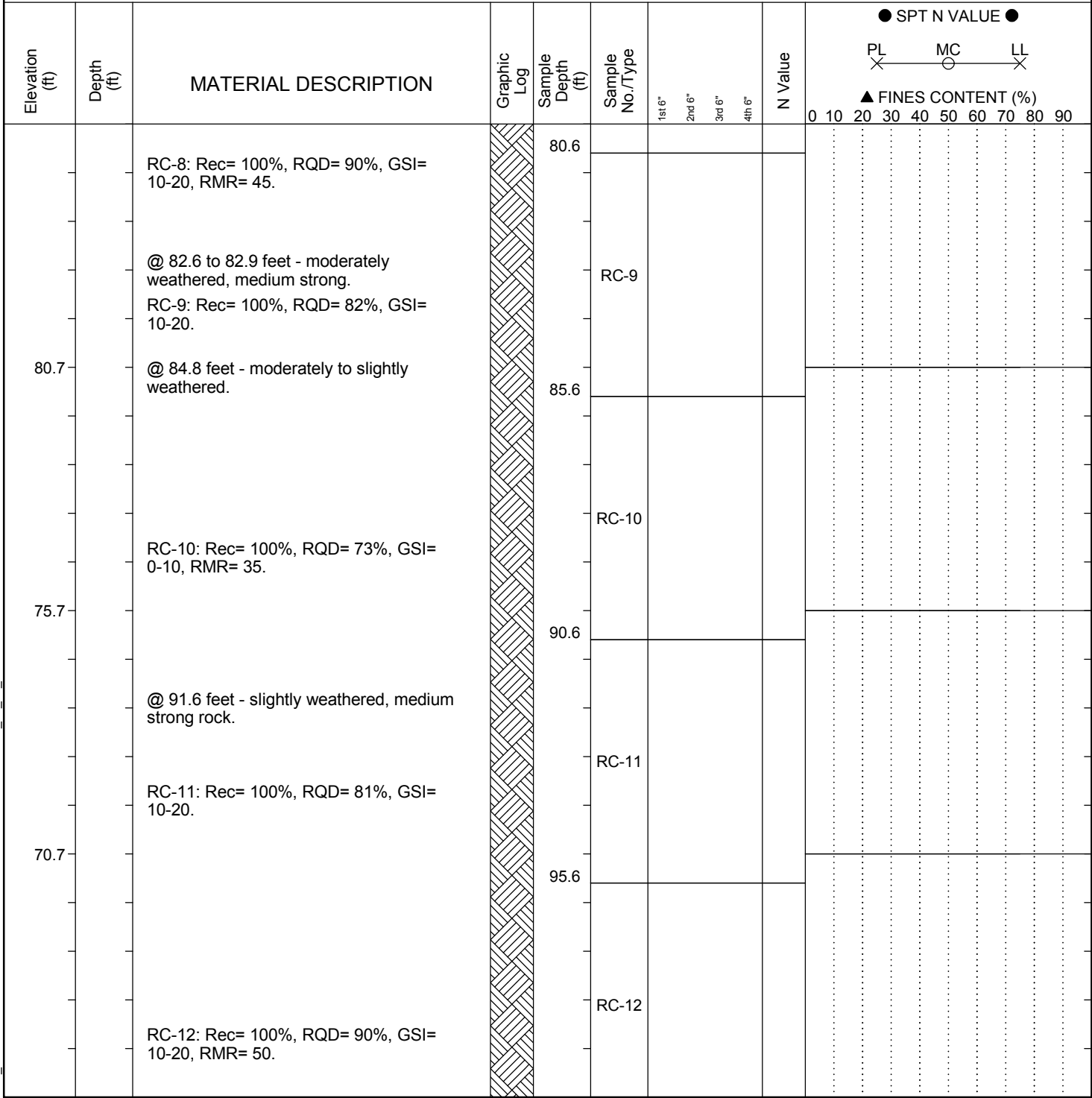
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-5		
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route: I-20		
Eng./Geo.: ELF/MFC		Boring Location: 262+96.46		Offset:		R:138.025/Alignment: Proposed		
Elev.: 165.7 ft		Latitude: 34.045222		Longitude: -81.078785		Date Started: 1/4/2018		
Total Depth: 120.6 ft		Soil Depth: 42 ft		Core Depth: 78.6 ft		Date Completed: 1/9/2018		
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)		
Drill Machine: CME 750		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 86.0%		
Core Size: HQ		Driller: S. Gowan		Groundwater: TOB N/A		24HR: 7 ft		



LEGEND

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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-5
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: ELF/MFC	Boring Location: 262+96.46	Offset: R:138.025
Alignment: Proposed	Date Started: 1/4/2018	Date Completed: 1/9/2018
Elev.: 165.7 ft	Latitude: 34.045222	Longitude: -81.078785
Total Depth: 120.6 ft	Soil Depth: 42 ft	Core Depth: 78.6 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 750	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.0%	Core Size: HQ
Driller: S. Gowan	Groundwater: TOB	24HR: 7 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
60.7		RC-13: Rec= 100%, RQD= 98%, GSI= 10-20.		100.6	RC-13						
		RC-14: Rec= 100%, RQD= 43%, GSI= 0-10, RMR= 36.		105.6	RC-14						
55.7		@ 111.6 to 112.6 feet - slightly weathered.		110.6	RC-15						
		RC-15: Rec= 96%, RQD= 46%, GSI= 10-20, RMR= 17.		115.6	RC-16						
50.7		@ 117.4 to 118.4 feet - slightly weathered.									
		RC-16: Rec= 100%, RQD= 41%, GSI= 0-10.									

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-5
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20
Eng./Geo.:	ELF/MFC	Boring Location:	262+96.46	Offset:	R:138.025	Alignment:	Proposed
Elev.:	165.7 ft	Latitude:	34.045222	Longitude:	-81.078785	Date Started:	1/4/2018
Total Depth:	120.6 ft	Soil Depth:	42 ft	Core Depth:	78.6 ft	Date Completed:	1/9/2018
Bore Hole Diameter (in):	7.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 750	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.0%
Core Size:	HQ	Driller:	S. Gowan	Groundwater:	TOB N/A	24HR	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
	120.6	Boring Terminated at 120.6 feet.															
40.7																	
35.7																	
30.7																	

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	



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: Lehe Fender
 Date: 1/4/2018 - 1/9/2018

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

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
42.4	1	J	3	W	No	N/A	Pl	R	
43.1	2	J	31	VN	No	N/A	Pl	SR	
43.5	3	J	9	W	Fi	Sd/Cl	Ir	R	
44	4	J	11	W	Pa	Sd/Cl	Ir	R	
44.5	5	J	36	VN	No	N/A	Pl	SR	
44.8	6	V	52	W	Fi	Qz	Pl	N/A	
47.9	7	J	43	VN	No	N/A	Pl	SR	
48.3	8	J	48	W	Su	Cl	Ir	R	Fractured zone 48.3' - 49.0'
49.5	9	J	41	MW	Su	Cl	Ir	SR	
49.8	10	J	40	W	Su	Sd/Cl	Ir	SR	
50.9	11	J	39	VN	No	N/A	Pl	SR	
52.4	12	J	47	VN	No	N/A	Pl	SR	
52.7	13	J	36	W	No	N/A	Pl	SR	Fractured zone 52.7' - 53.3'
53.7	14	J	40	VN	No	N/A	Pl	S	
53.9	15	J	37	VN	Su	Ch	Pl	SR	
54.2	16	J	29	VN	No	N/A	St	SR	
54.7	17	J	39	VN	Su	Cl	Pl	SR	
54.9	18	J	30	W	No	N/A	Pl	SR	Fractured zone 54.9' - 55.1'
55.2	19	J	14	VN	No	N/A	Pl	SR	
55.9	20	J	29	MW	Su	Ch	Wa	S	
56.2	21	J	35	VN	No	N/A	Wa	SR	
57.2	22	J	39	W	Su	Sd/Cl	Ir	SR	Fractured zone 57.2' - 57.4'
58.2	23	J	50	W	Su	Sd/Cl	Ir	SR	Fractured zone 58.2' - 59.5'
60.3	24	J	54	N	Su	Sd/Cl	Ir	SR	
62	25	J	5	W	No	N/A	Ir	SR	
65.2	26	J	60	N	No	N/A	Wa	SR	
66.1	27	J	27	N	No	N/A	Pl	SR	
66.3	28	J	80	MW	No	N/A	Pl	SR	
67.5	29	J	10	VN	No	N/A	St	VR	
68.3	30	J	56	MW	No	N/A	Pl	SR	
68.5	31	J	50	W	Pa	Sd/Cl	Ir	SR	Fractured zone 68.5' - 68.9'
69.1	32	J	7	W	Pa	Sd/Cl	Ir	SR	Fractured zone 69.1' - 69.7'
69.9	33	J	15	W	Pa	Sd/Cl	Ir	R	
70.8	34	J	55	MW	Pa	Sd/Cl	Ir	SR	Fractured zone 70.8' - 71.0'
71.3	35	J	46	VN	No	N/A	Wa	VR	



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: Lehe Fender
 Date: 1/4/2018 - 1/9/2018

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

71.5	36	J	57	MW	Su	Qz	St	VR	
72	37	J	60	W	No	N/A	St	R	
72.4	38	J	49	MW	No	N/A	Ir	VR	
73.6	39	J	38	MW	No	N/A	St	R	
74.4	40	V	35	W	Fi	Qz	Pl	N/A	Fractured zone 74.4' - 74.6'
74.7	41	V	33	W	Fi	Qz	Pl	N/A	Fractured zone 74.7' - 75.0'
75.8	42	J	17	MW	Pa	Qz	Pl	SR	
75.9	43	J	51	N	Su	Cl	Pl	SR	
77	44	J	45	N	No	N/A	Pl	SR	
80.4	45	J	18	VN	No	N/A	Wa	SR	
81.4	46	J	5	MW	No	N/A	Ir	SR	
81.9	47	J	84	W	Su	Cl	Ir	SR	Fractured zone 81.9' - 82.2'
84	48	J	29	N	No	N/A	St	VR	
84.8	49	J	37	MW	No	N/A	Pl	SR	
84.9	50	J	32	W	No	N/A	Ir	SR	Fractured zone 84.9' - 85.1'
86.4	51	J	34	N	No	N/A	Pl	SR	
86.7	52	J	5	N	No	N/A	Pl	SR	
87.5	53	J	21	W	No	N/A	Ir	SR	
88.3	54	J	30	MW	No	N/A	Pl	SR	Fractured zone 88.3' - 88.5'
89.4	55	J	7	W	No	N/A	Wa	SR	
89.9	56	J	58	W	No	N/A	Pl	SR	
90.4	57	J	52	W	Pa	Qz	Ir	R	
91.6	58	J	67	W	Su	Fe	Ir	R	Fractured zone 91.6' - 92.0'
92.5	59	J	34	W	No	N/A	Pl	SR	
92.9	60	J	42	MW	No	N/A	Pl	SR	
93.3	61	J	8	W	No	N/A	Pl	SR	
99.1	62	J	6	MW	No	N/A	Wa	SR	
99.7	63	J	5	MW	No	N/A	Wa	SR	
99.9	64	J	9	W	Pa	Qz/Cl	Ir	R	Fractured zone 99.9' - 100.1'
100.3	65	J	19	N	Pa	Qz/Cl	Wa	R	
102.3	66	J	12	W	Su	Fe	Ir	R	
105.8	67	J	14	W	No	N/A	Wa	SR	
107.6	68	J	9	N	No	N/A	Pl	SR	
108.1	69	J	29	N	No	N/A	Pl	SR	
108.3	70	J	43	W	Pa	Qz	Ir	SR	Fractured zone 108.3' - 108.5'
108.6	71	J	27	MW	Pa	Qz	St	R	
108.7	72	J	42	W	No	N/A	St	VR	Fractured zone 108.7' - 108.9'



Rock Core Discontinuity Worksheet

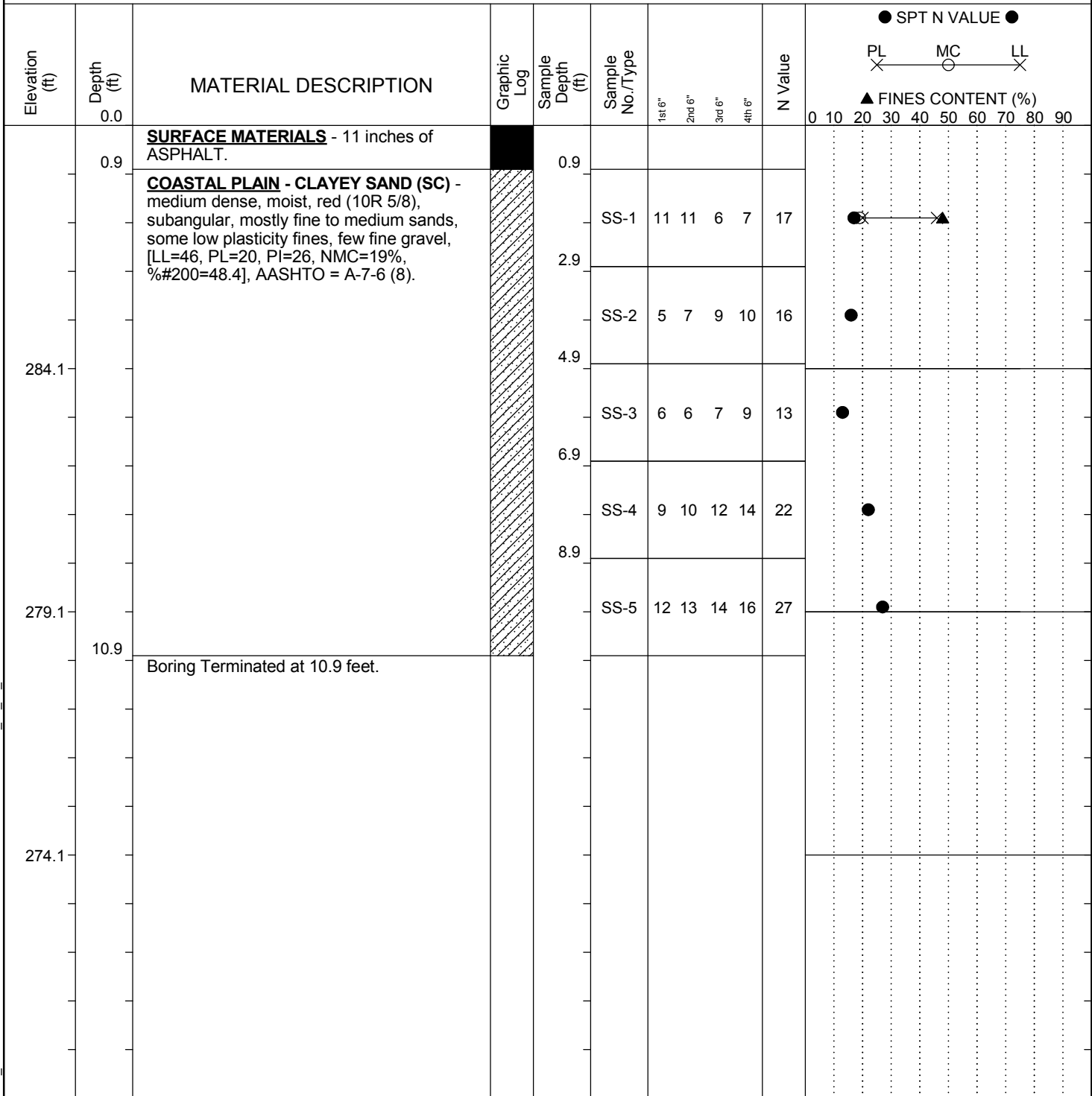
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Gowan
 Logged By: Lehe Fender
 Date: 1/4/2018 - 1/9/2018

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

109.2	73	J	76	W	No	N/A	Ir	VR	Fractured zone 109.2' - 109.7'
110	74	J	35	W	Pa	Qz	Ir	VR	Fractured zone 110.0' - 110.3'
111.1	75	J	85	W	Pa	Sd	Ir	VR	Fractured zone 111.1' - 112.4'
113.5	76	J	10	W	Pa	Sd	St	VR	
114	77	J	14	MW	Pa	Sd/Cl	St	SR	
114.5	78	J	12	W	Pa	Sd/Cl	Wa	SR	Fractured zone 114.5' - 114.6'
114.9	79	J	4	N	No	N/A	Pl	R	
115.6	80	J	82	N	Su	Sd	Pl	SR	Fractured zone 115.6' - 116.2'
116.5	81	J	14	W	No	N/A	Ir	R	
117.5	82	J	26	MW	No	N/A	Pl	SR	Fractured zone 117.5' - 117.6'
117.8	83	J	20	W	Su	Cl	Wa	SR	Fractured zone 117.8' - 117.9'
118.2	84	J	51	W	No	N/A	Pl	S	Fractured zone 118.2' - 118.4'
118.6	85	J	29	W	Su	Sd/Cl	Ir	SR	Fractured zone 118.6' - 118.8'
119.2	86	J	52	W	No	N/A	Ir	SR	Fractured zone 119.2' - 119.3'
119.7	87	J	20	W	No	N/A	Wa	SR	
120.4	88	J	49	W	No	N/A	Pl	S	

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	P-55			
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route:	I-20		
Eng./Geo.:	AKS		Boring Location:	180+24.57		Offset:	L:46.514'		Alignment:	Proposed
Elev.:	289.1 ft		Latitude:	34.038459		Longitude:	-81.104394		Date Started:	2/7/2018
Total Depth:	10.9 ft		Soil Depth:	10.9 ft		Core Depth:	0 ft		Date Completed:	2/7/2018
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



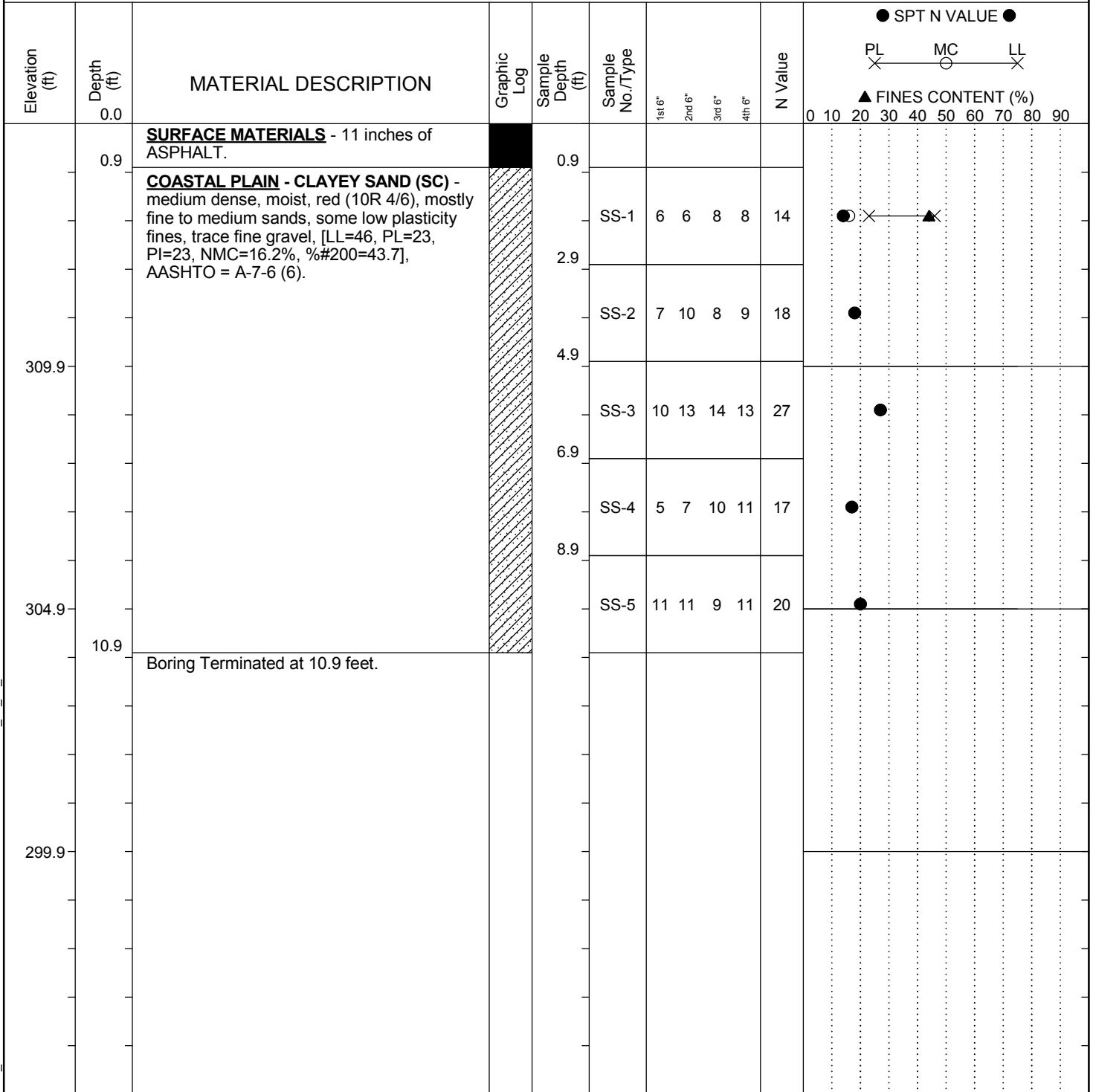
LEGEND

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	

SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: P-56
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 191+75.79	Offset: R:50.067'
Alignment: Proposed	Date Started: 2/21/2018	Date Completed: 2/21/2018
Elev.: 314.9 ft	Latitude: 34.038316	Longitude: -81.100580
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%	Groundwater: TOB N/A
Core Size: N/A	Driller: T. Miller	24HR: N/A



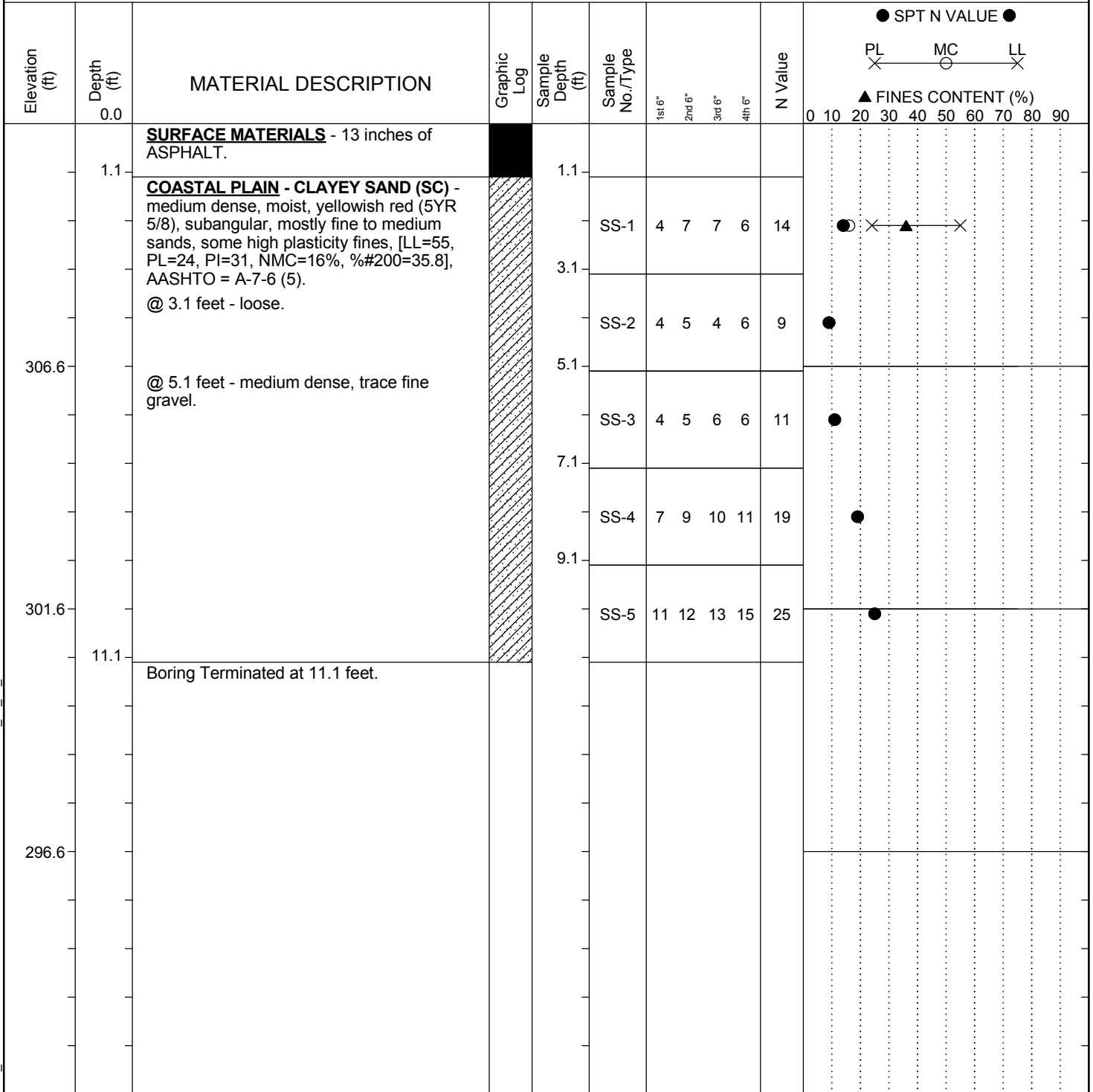
LEGEND

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-57
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 201+46.64	Offset: L:49.658' Alignment: Proposed
Elev.: 311.6 ft	Latitude: 34.038666	Longitude: -81.097399
Total Depth: 11.1 ft	Soil Depth: 11.1 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



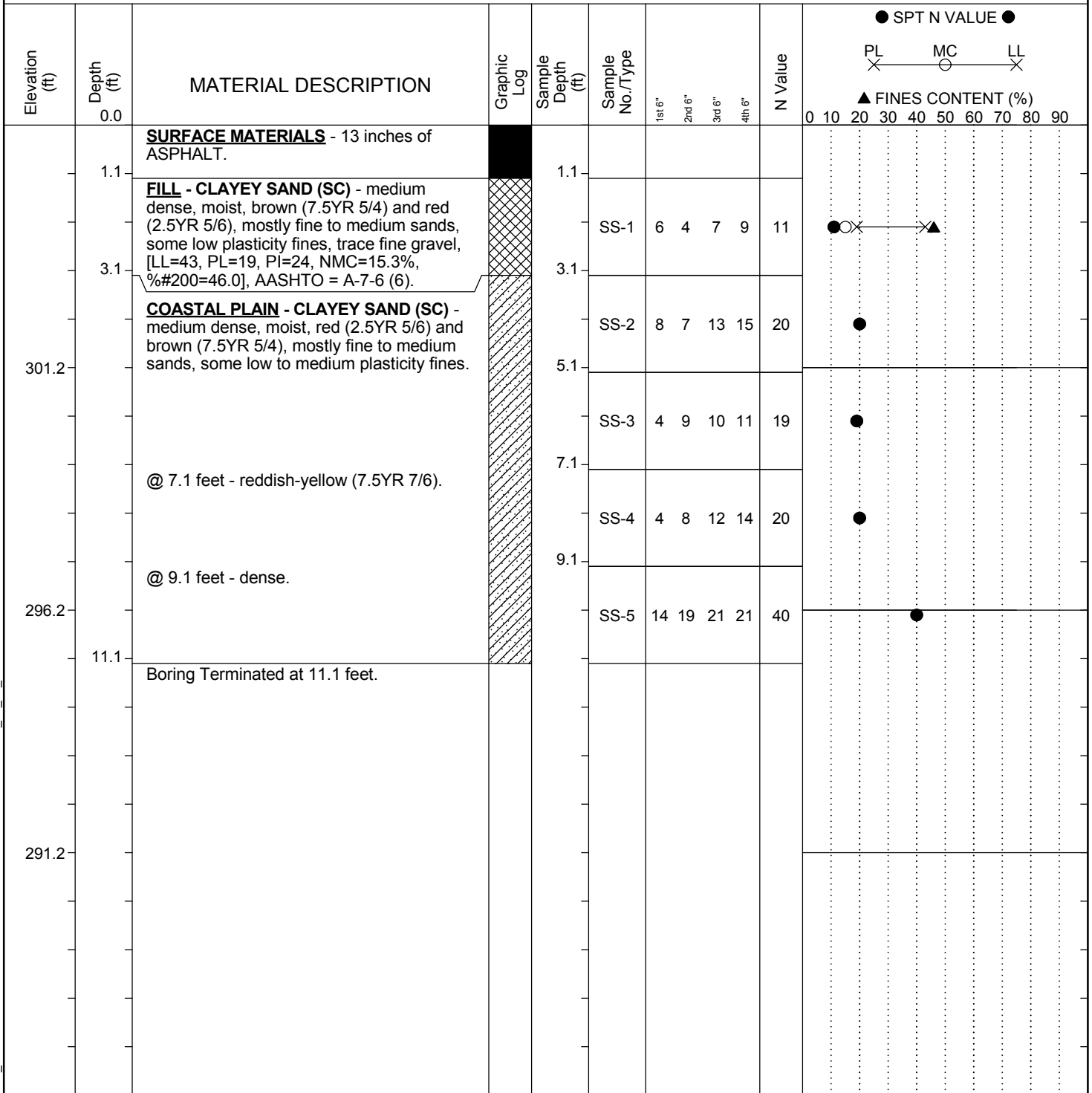
LEGEND

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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: P-58
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 211+10.61	Offset: R:44.689'
Elev.: 306.2 ft	Latitude: 34.039080	Longitude: -81.094251
Total Depth: 11.1 ft	Soil Depth: 11.1 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5		Sampler Configuration: Y (N)
Drill Machine: CME 55	Drill Method: H.S.A.	Hammer Type: Automatic
Core Size: N/A	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: N/A



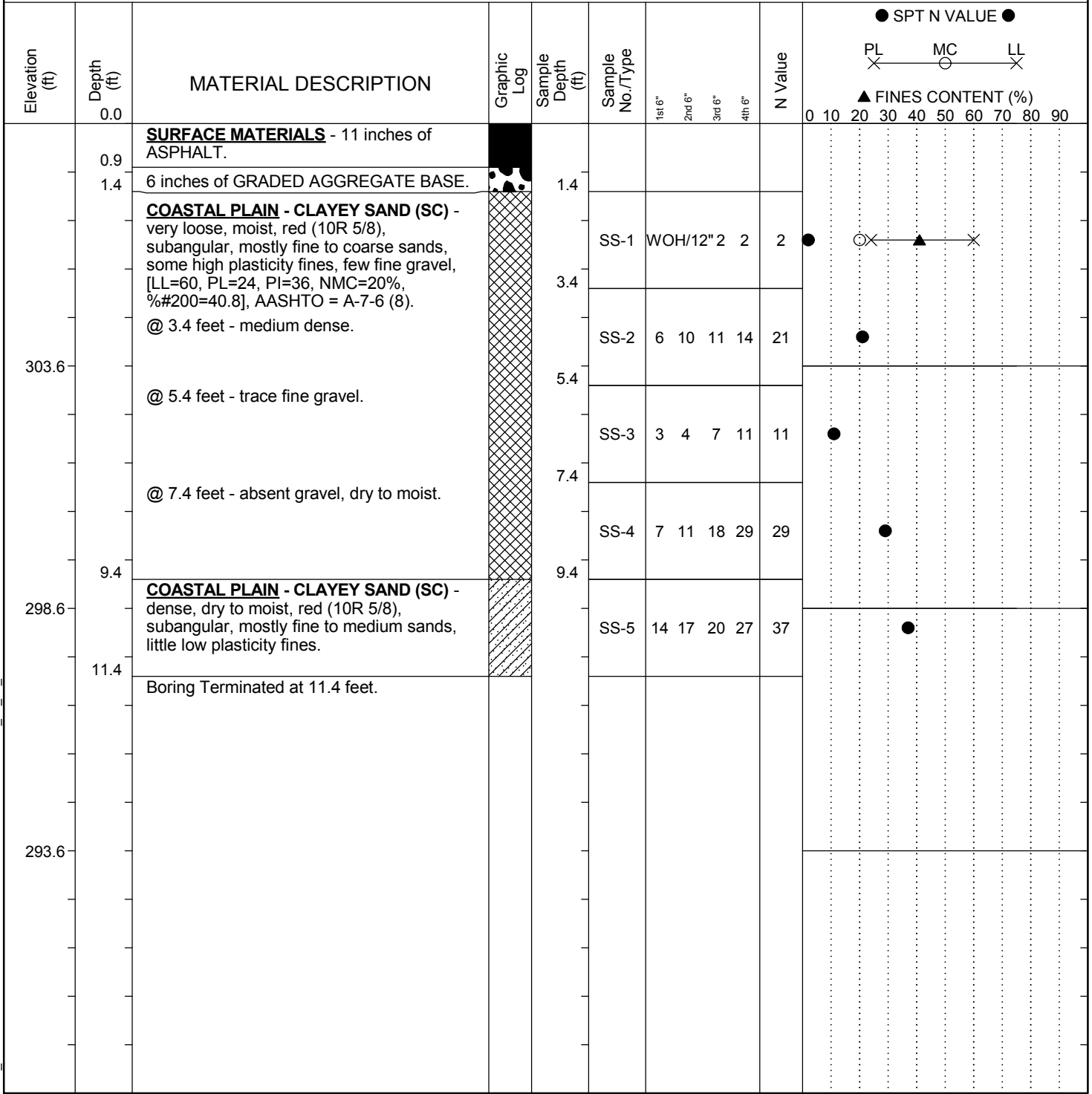
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-59
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 221+43.83	Offset: L:49.641' Alignment: Proposed
Elev.: 308.6 ft	Latitude: 34.040557	Longitude: -81.091312
Total Depth: 11.4 ft	Soil Depth: 11.4 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



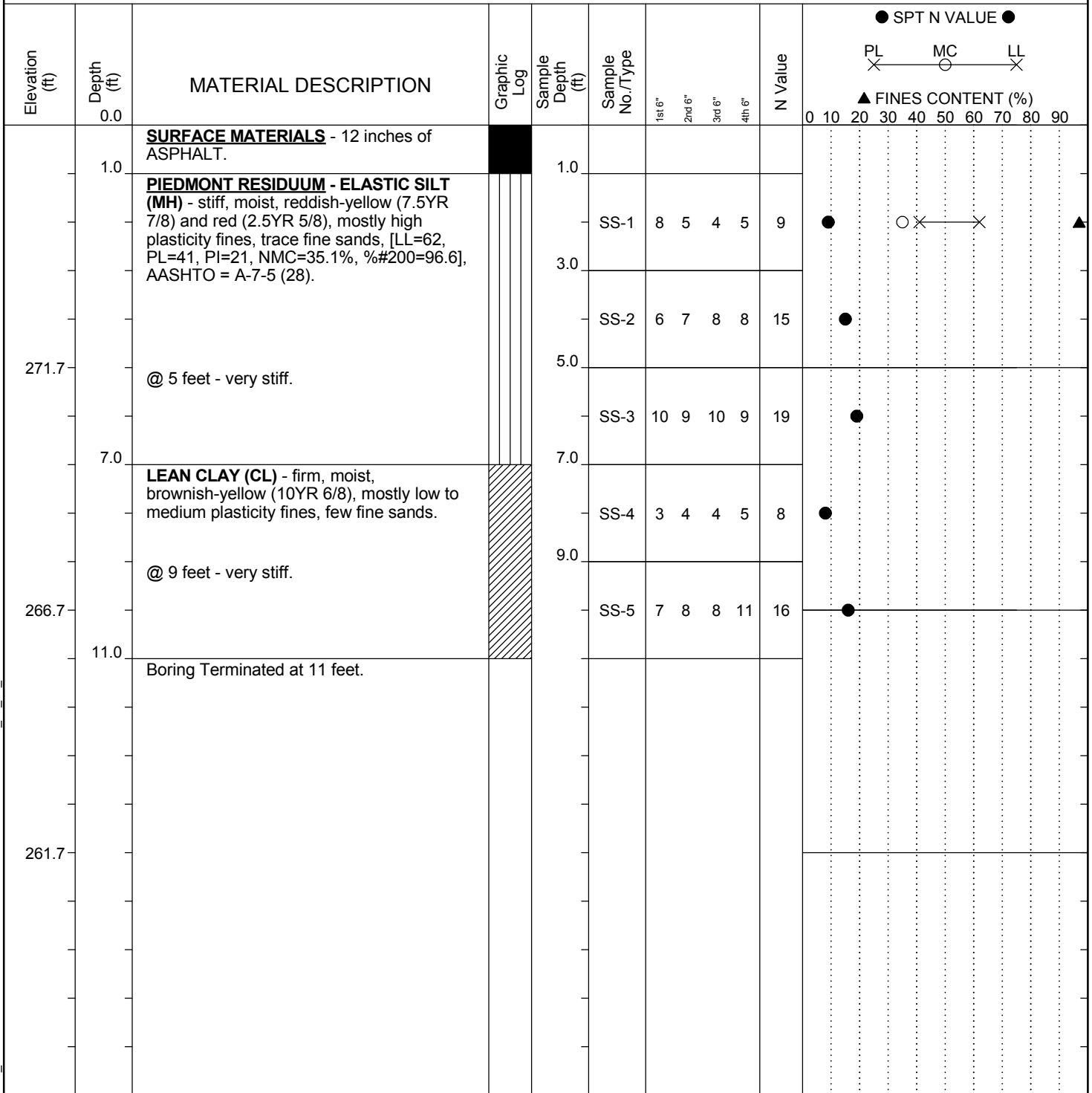
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-60
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 230+47.56	Offset: R:61.676'
Alignment: Proposed		
Elev.: 276.7 ft	Latitude: 34.041399	Longitude: -81.088482
Date Started: 2/26/2018		
Total Depth: 11 ft	Soil Depth: 11 ft	Core Depth: 0 ft
Date Completed: 2/26/2018		
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.	Hammer Type: Automatic
Energy Ratio: 84.1%		
Core Size: N/A	Driller: T. Miller	Groundwater: TOB N/A
24HR: N/A		



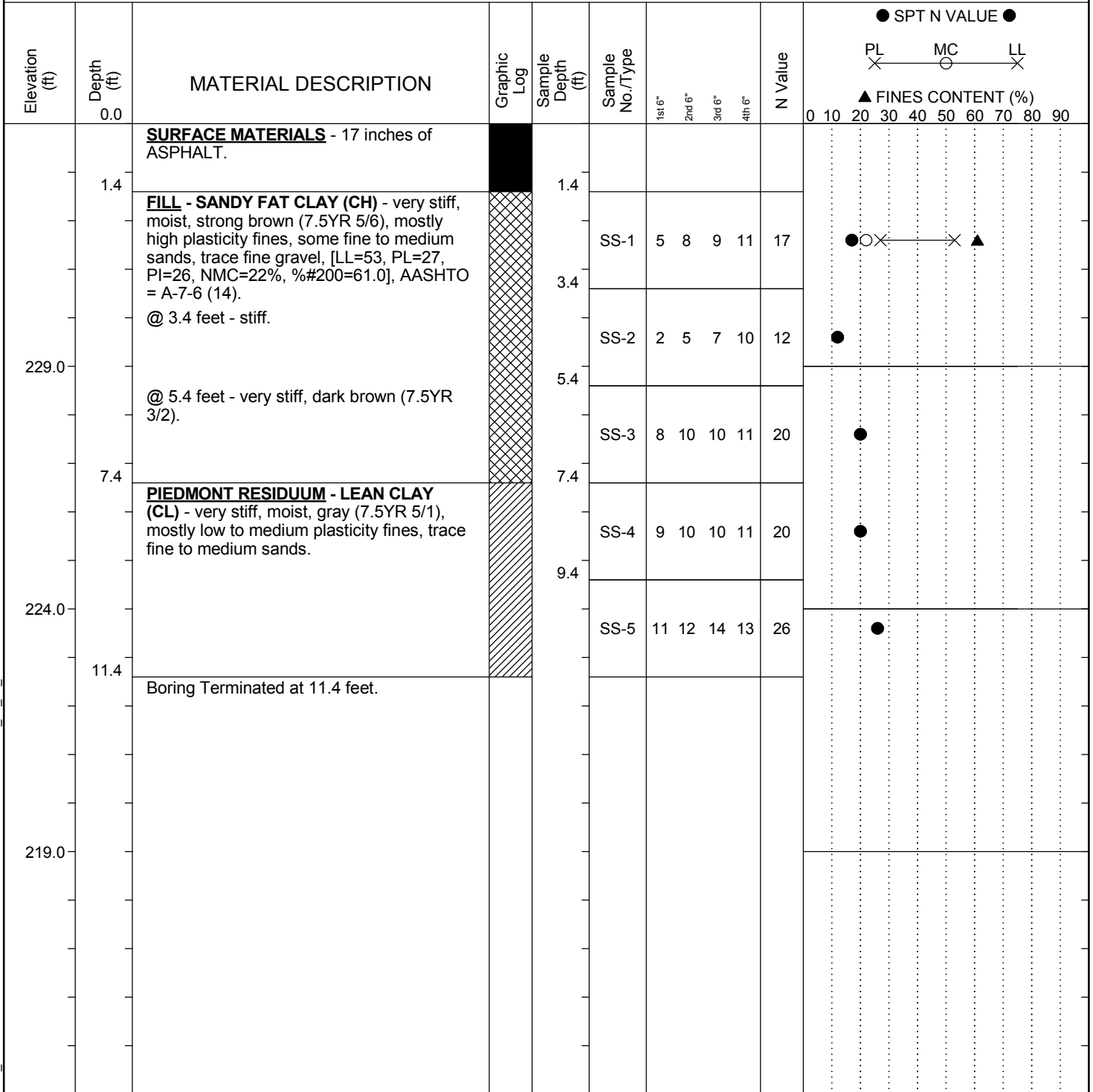
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-61
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20
Eng./Geo.: AKS	Boring Location: 241+06.24		Offset: L:61.325'	Alignment: Proposed
Elev.: 234.0 ft	Latitude: 34.043008	Longitude: -81.085541	Date Started: 2/6/2018	
Total Depth: 11.4 ft	Soil Depth: 11.4 ft	Core Depth: 0 ft	Date Completed: 2/6/2018	
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



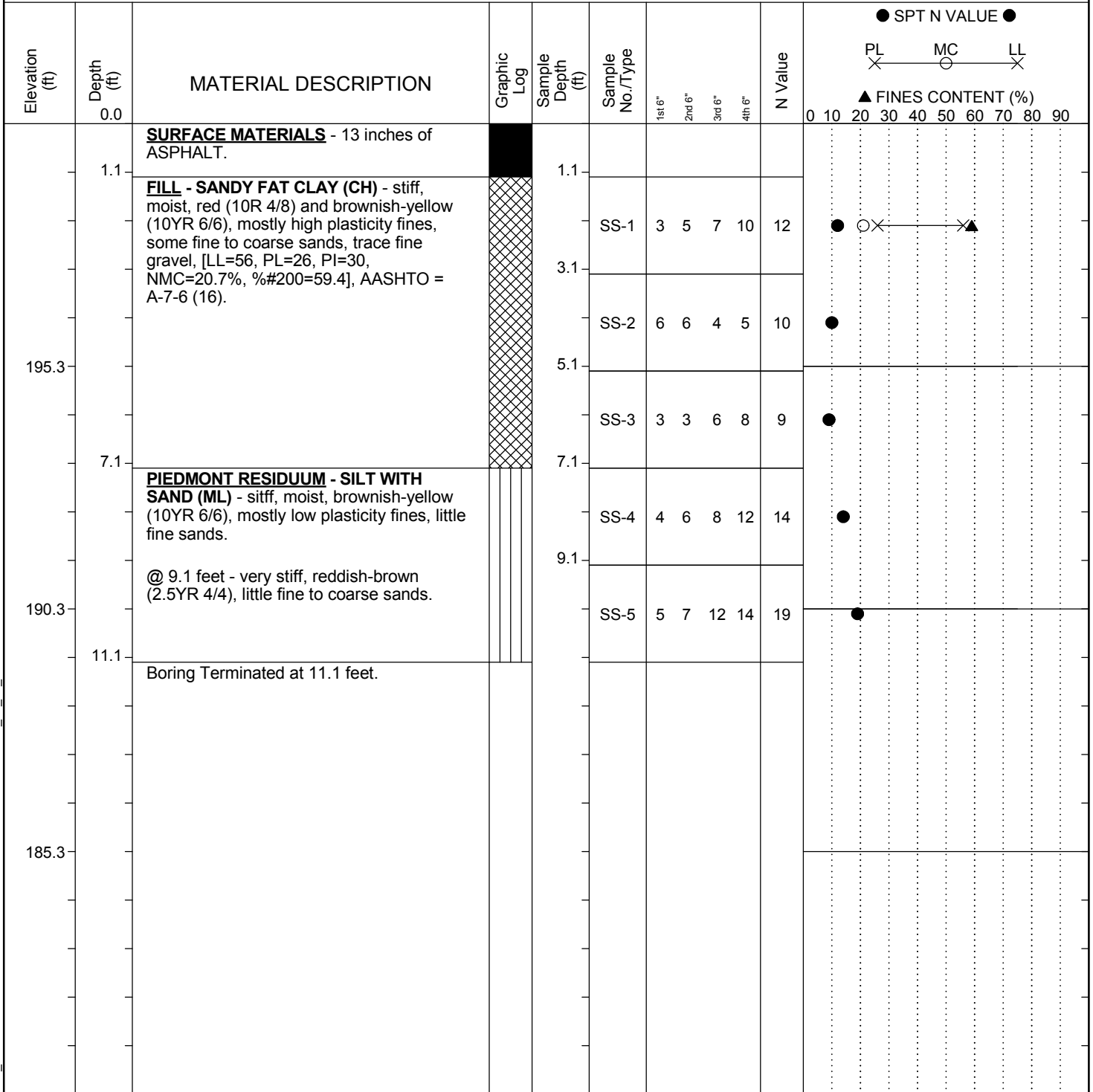
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-62
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 249+59.48	Offset: R:44.881'
Alignment: Proposed		
Elev.: 200.3 ft	Latitude: 34.043800	Longitude: -81.082867
Date Started: 2/26/2018		
Total Depth: 11.1 ft	Soil Depth: 11.1 ft	Core Depth: 0 ft
Date Completed: 2/26/2018		
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.	Hammer Type: Automatic
Energy Ratio: 84.1%		
Core Size: N/A	Driller: T. Miller	Groundwater: TOB N/A
24HR: N/A		



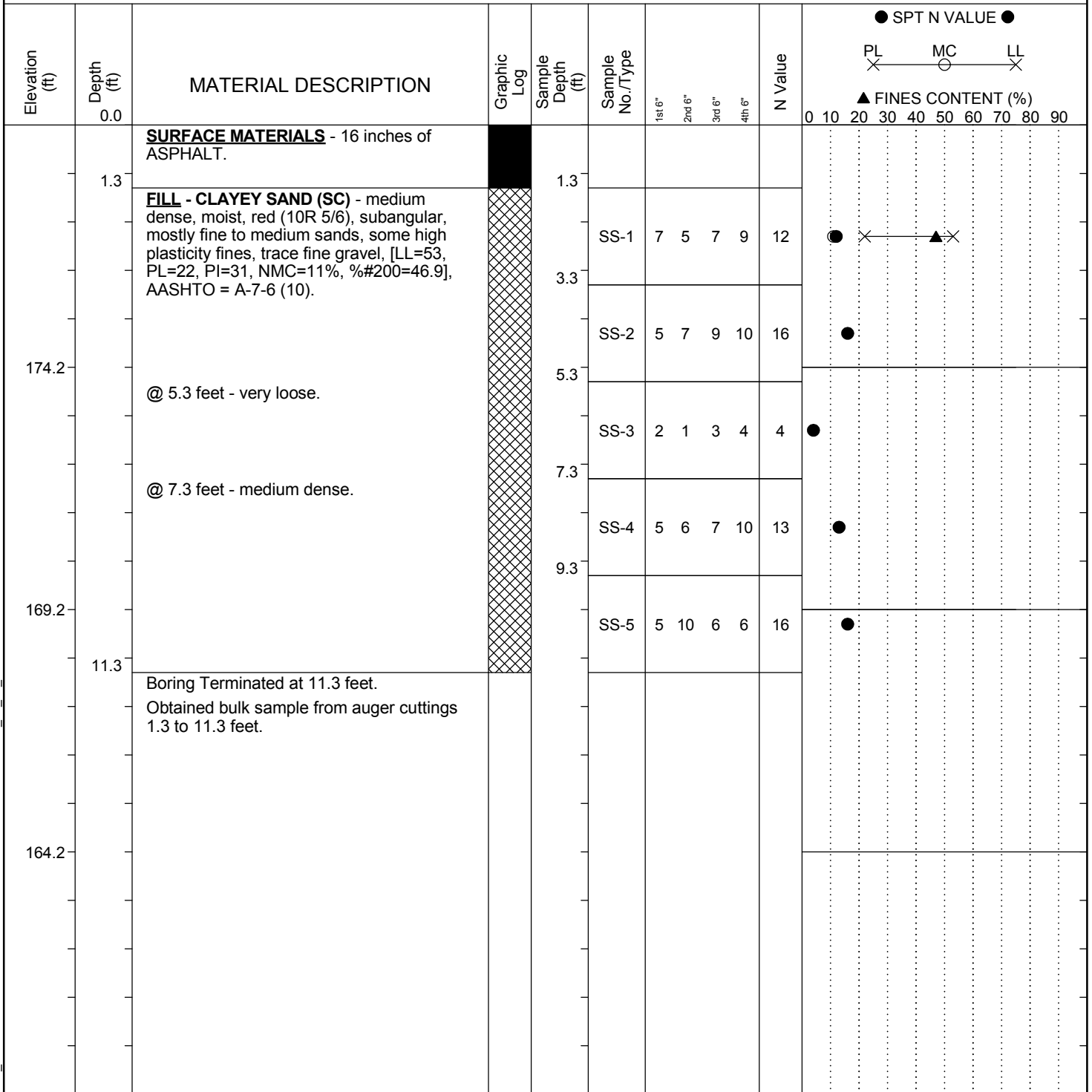
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-63
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 261+06.5	Offset: L:50.047' Alignment: Proposed
Elev.: 179.2 ft	Latitude: 34.045449	Longitude: -81.079624 Date Started: 2/6/2018
Total Depth: 11.3 ft	Soil Depth: 11.3 ft	Core Depth: 0 ft Date Completed: 2/6/2018
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



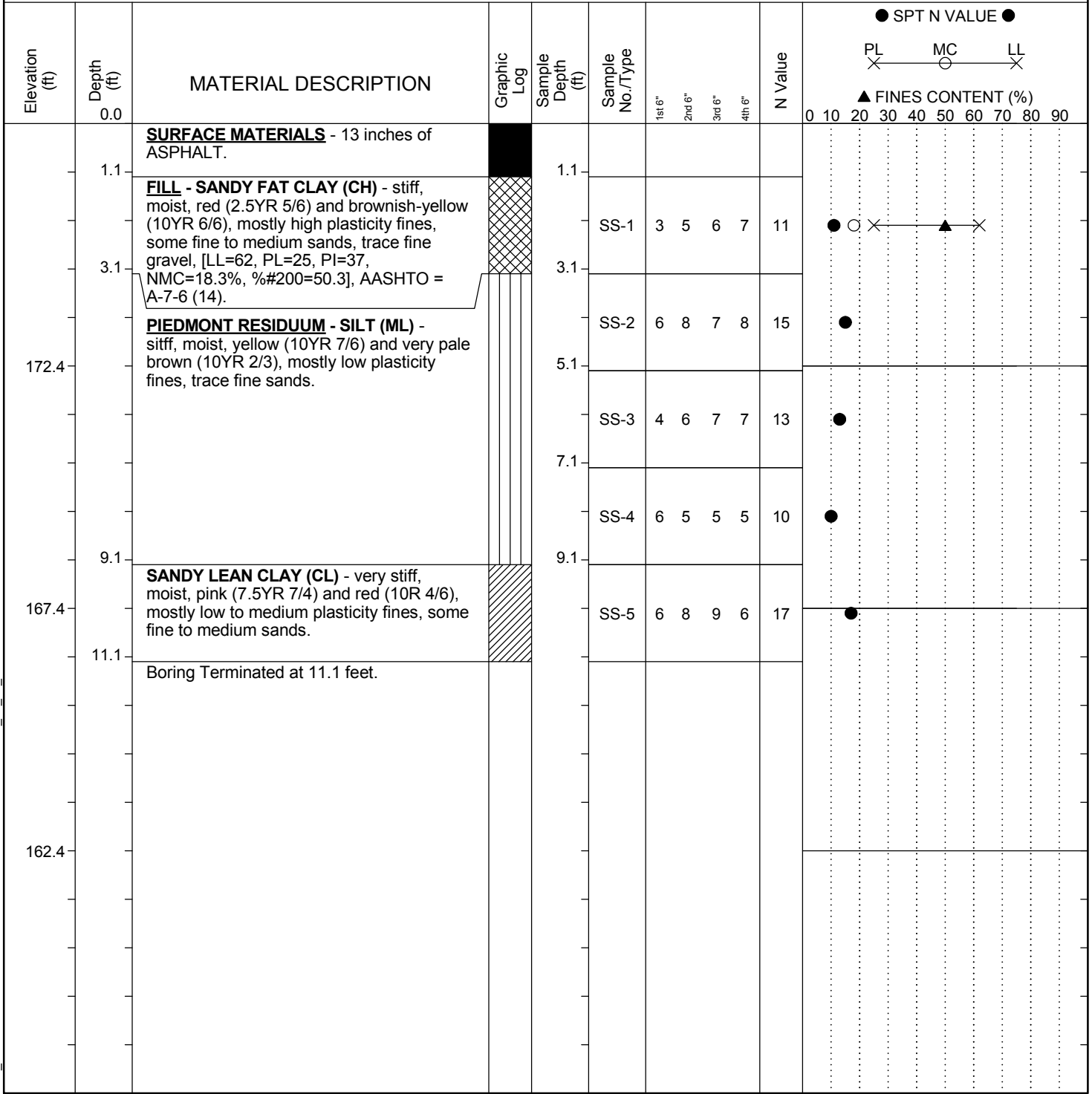
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-64
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 269+92.95	Offset: R:45.622'
Alignment: Proposed	Date Started: 2/26/2018	Date Completed: 2/26/2018
Elev.: 177.4 ft	Latitude: 34.046308	Longitude: -81.076867
Total Depth: 11.1 ft	Soil Depth: 11.1 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%	24HR: N/A
Core Size: N/A	Driller: T. Miller	Groundwater: TOB N/A



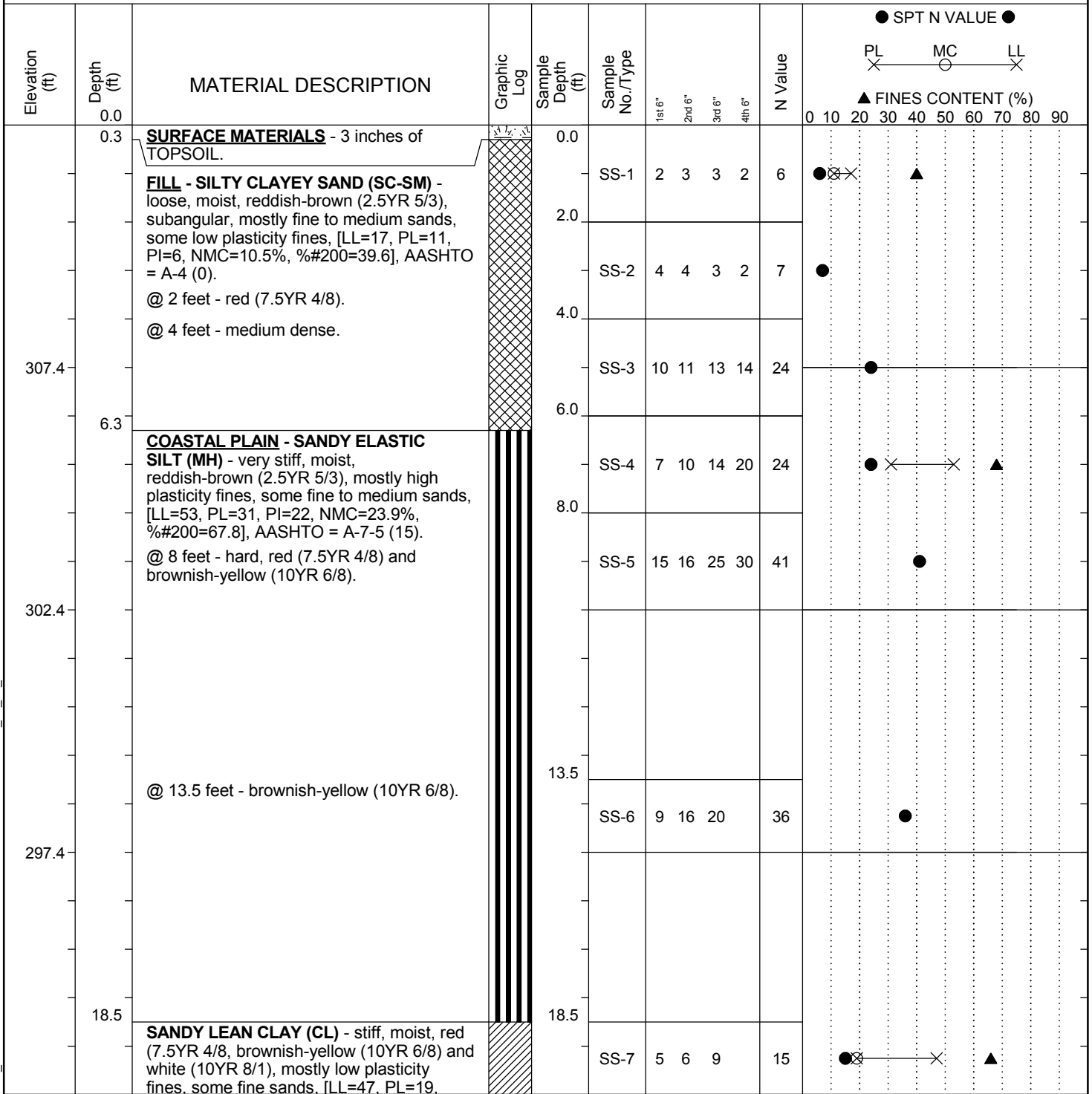
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 199+04.58	Offset: L:148.652
Elev.: 312.4 ft	Latitude: 34.038875	Longitude: -81.098205
Total Depth: 50 ft	Soil Depth: 50 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 20.5 ft
		Energy Ratio: 86.5%
		24HR: N/A



LEGEND

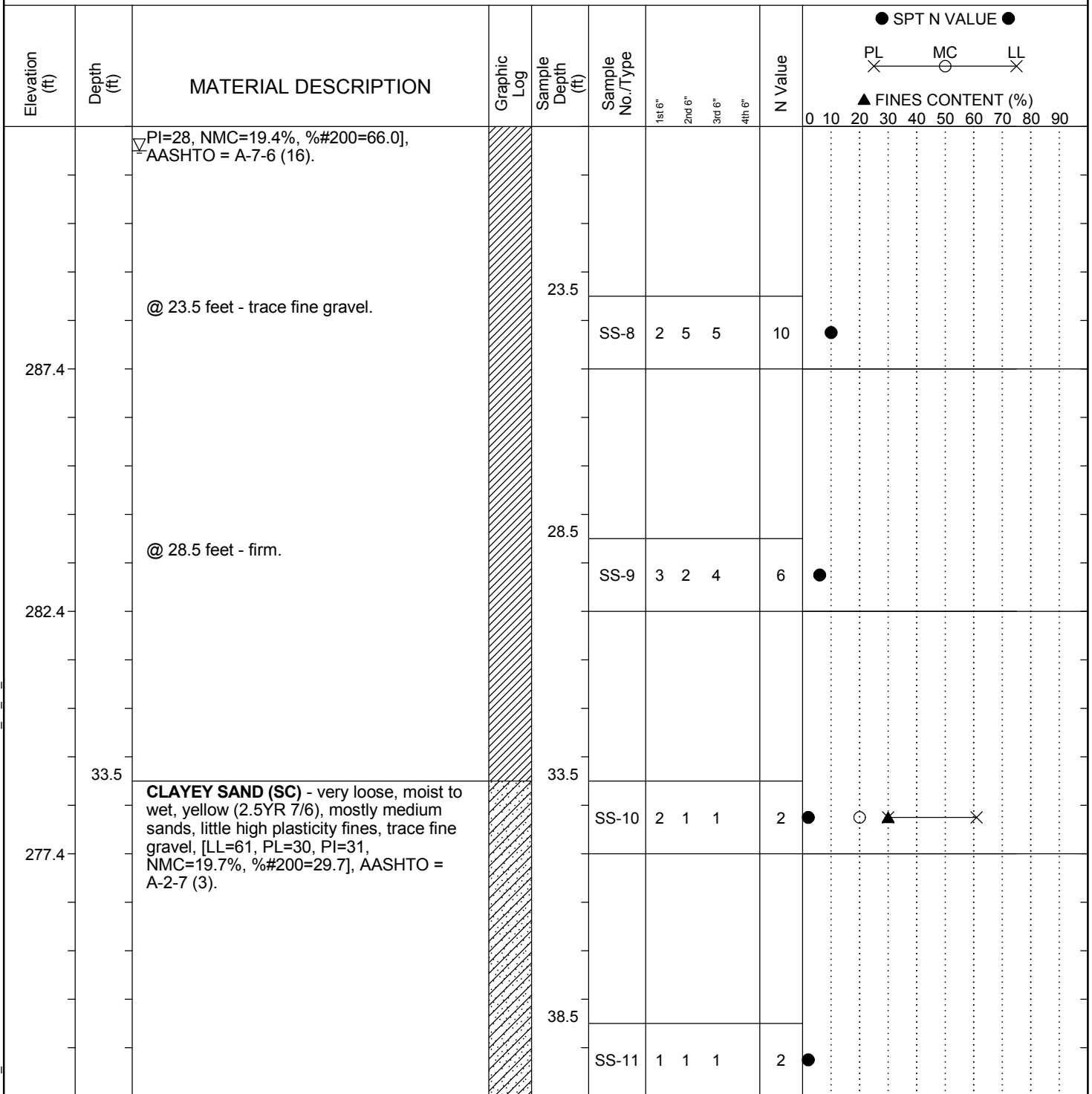
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SC_DOT 1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

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-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 199+04.58	Offset: L:148.652' Alignment: Proposed
Elev.: 312.4 ft	Latitude: 34.038875	Longitude: -81.098205
Total Depth: 50 ft	Soil Depth: 50 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5		Sampler Configuration: 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 20.5 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-42
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20
Eng./Geo.: AKS	Boring Location: 199+04.58		Offset: L:148.652	Alignment: Proposed
Elev.: 312.4 ft	Latitude: 34.038875	Longitude: -81.098205	Date Started: 3/15/2018	
Total Depth: 50 ft	Soil Depth: 50 ft	Core Depth: 0 ft	Date Completed: 3/15/2018	
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	20.5 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	MC	LL		
267.4		@ 43.5 feet - loose, little low plasticity fines, [LL=44, PL=26, PI=18, NMC=28.3%, %200=17.5], AASHTO = A-2-7 (0).		43.5	SS-12	3	2	3		5	●	▲	⊗	⊗
262.4	50.0	@ 48.5 feet - medium dense, wet, absent gravel.		48.5	SS-13	3	7	8		15	●			
257.4		Boring Terminated at 50 feet. Obtained bulk sample from auger cuttings 0.3 to 10.0 feet.												

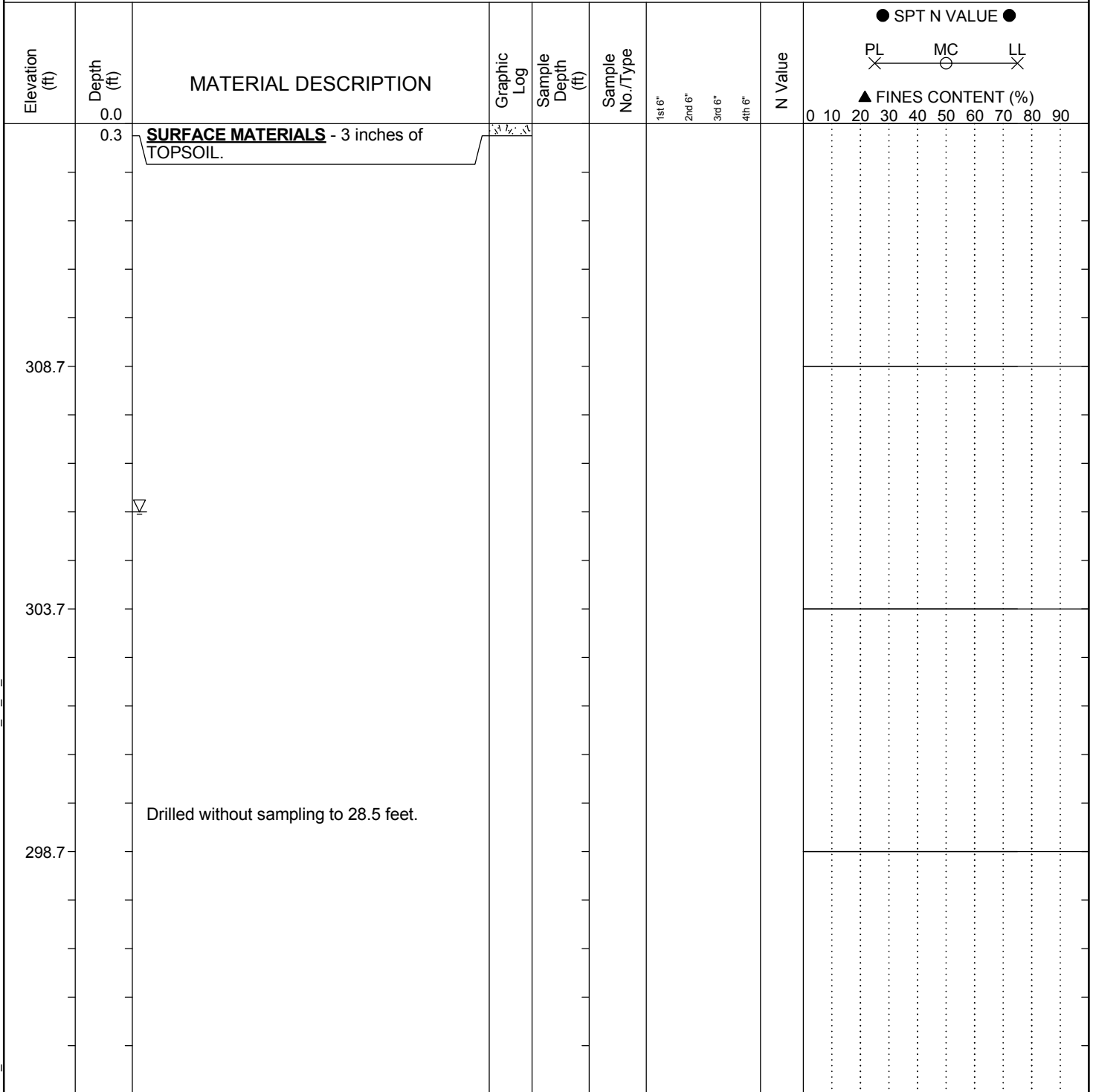
LEGEND

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

SCDOT Soil Test Log

Project ID:	P027662			County:	Lexington/Richland	Boring No.:	RW-42UD			
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20			
Eng./Geo.:	NGS		Boring Location:	199+15.15		Offset:	L:89.726'	Alignment:	Proposed	
Elev.:	313.7 ft		Latitude:	34.038715		Longitude:	-81.098159		Date Started:	3/28/2018
Total Depth:	42 ft		Soil Depth:	42 ft		Core Depth:	0 ft		Date Completed:	3/28/2018
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	8 ft	24HR	N/A



LEGEND

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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-42UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 199+15.15	Offset: L:89.726' Alignment: Proposed
Elev.: 313.7 ft	Latitude: 34.038715	Longitude: -81.098159 Date Started: 3/28/2018
Total Depth: 42 ft	Soil Depth: 42 ft	Core Depth: 0 ft Date Completed: 3/28/2018
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 8 ft 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	▲ FINES CONTENT (%)						
288.7																				
283.7	28.5	COASTAL PLAIN - CLAYEY SAND (SC) - very loose, moist, yellow (10YR 7/8), mostly fine to medium sands, little low to medium plasticity fines.		28.5	UD-1															
		@ 33.5 feet - red (10R 5/6), some low plasticity fines.		30.5	SS-1	2	1	2	3	●										
		@ 35.5 feet - yellow (10YR 8/8).		33.5	UD-2															
278.7				35.5	SS-2	1	1	1	2	●										
				38.5	UD-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.:	RW-42UD		
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route:	I-20		
Eng./Geo.:	NGS		Boring Location:	199+15.15	Offset:	L:89.726'	Alignment:	Proposed
Elev.:	313.7 ft	Latitude:	34.038715	Longitude:	-81.098159		Date Started:	3/28/2018
Total Depth:	42 ft	Soil Depth:	42 ft	Core Depth:	0 ft		Date Completed:	3/28/2018
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	
Core Size:	N/A		Driller:	T. Miller		Groundwater:	TOB	8 ft
						24HR	N/A	

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
	42.0	Boring Terminated at 42 feet.	[Hatched Box]	40.5	SS-3	1	2	5		7	●									
268.7																				
263.7																				
258.7																				

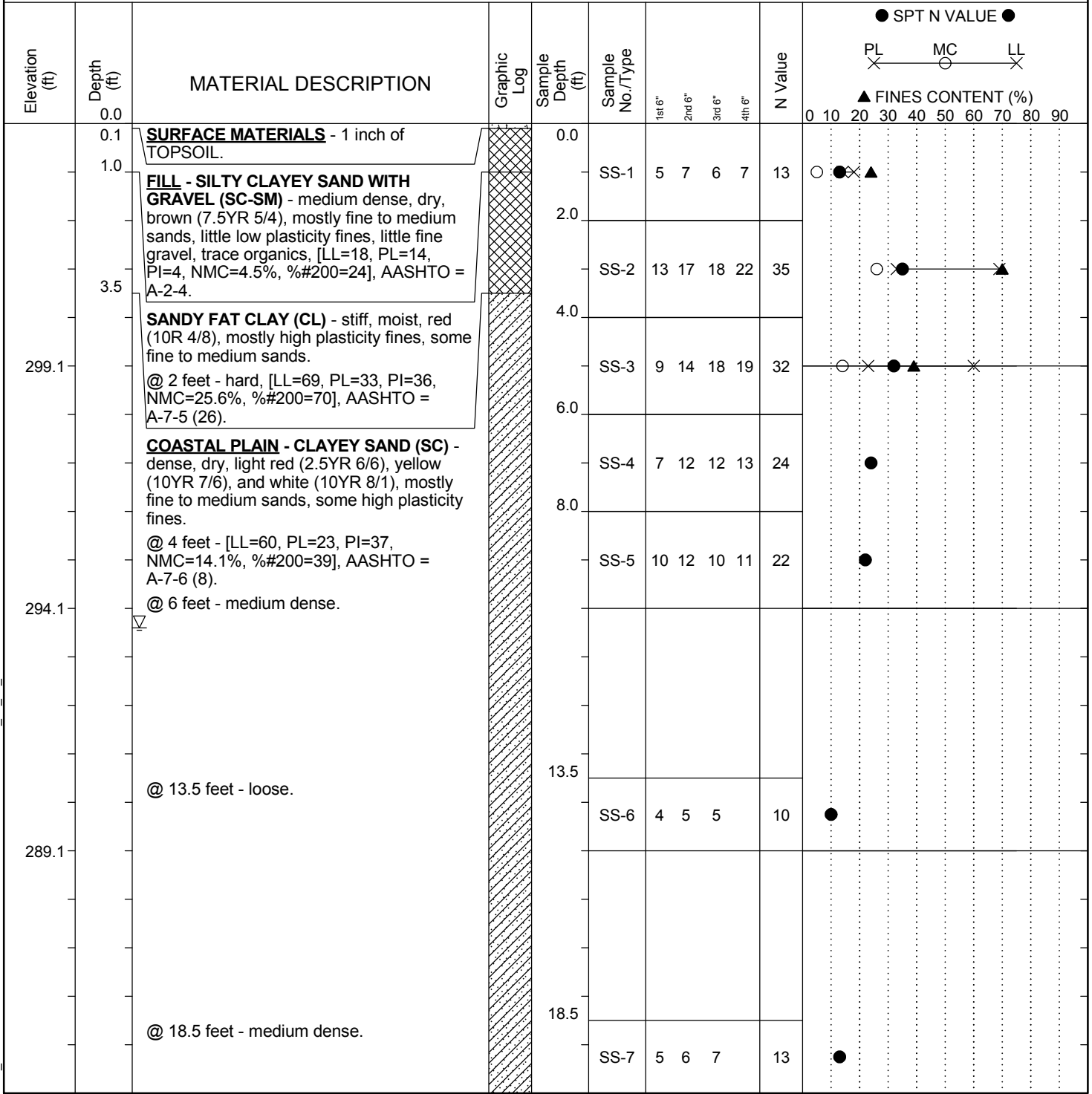
LEGEND

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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: RW-43
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 223+93.71	Offset: R:137.088
Alignment: Proposed	Date Started: 4/4/2018	Date Completed: 4/4/2018
Elev.: 304.1 ft	Latitude: 34.040407	Longitude: -81.090298
Total Depth: 50 ft	Soil Depth: 50 ft	Core Depth: 0 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 10.4 ft
Core Size: N/A	Driller: T. Miller	24HR: N/A



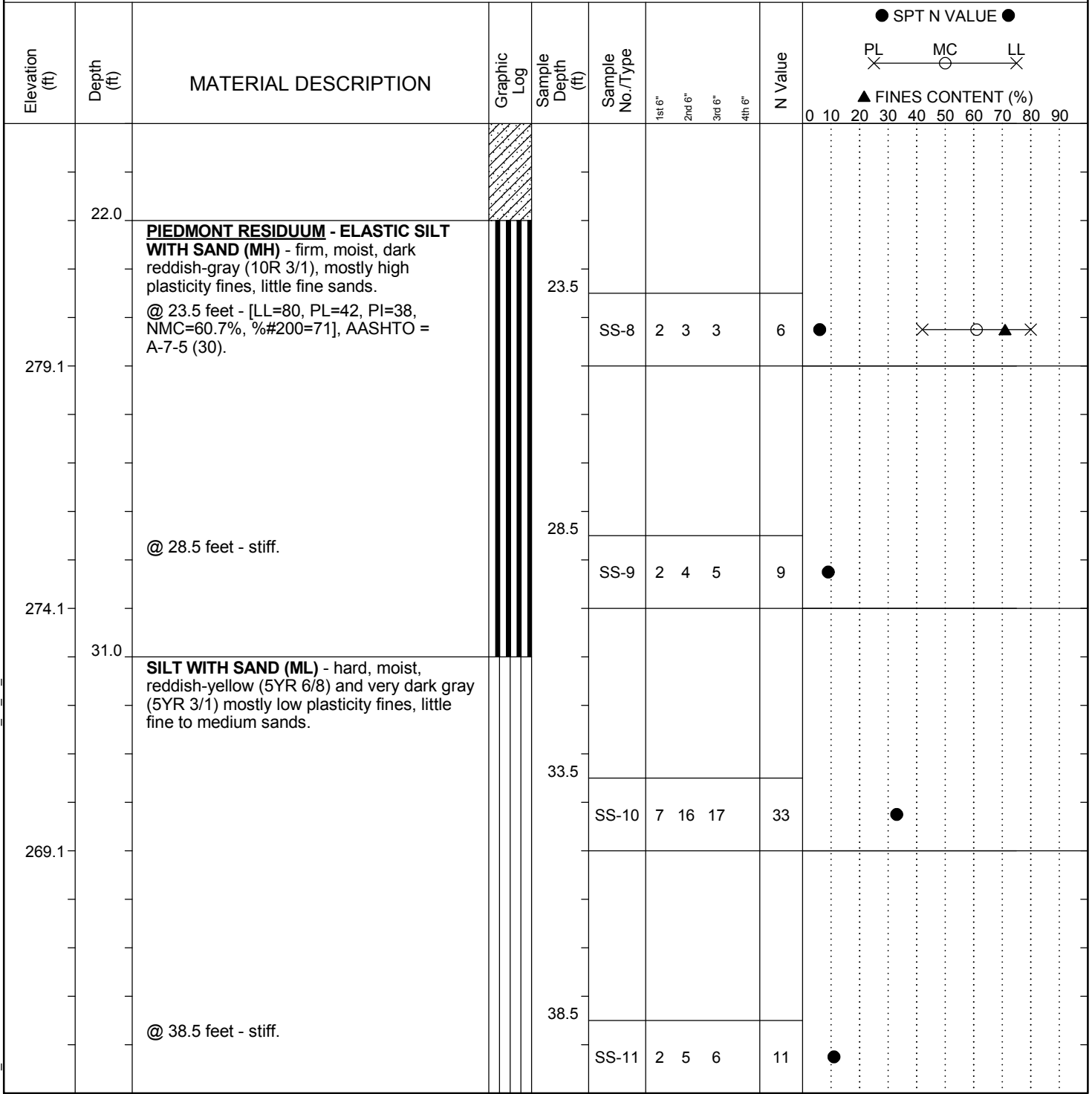
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-43
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 223+93.71	Offset: R:137.088
Alignment: Proposed	Date Started: 4/4/2018	Date Completed: 4/4/2018
Elev.: 304.1 ft	Latitude: 34.040407	Longitude: -81.090298
Total Depth: 50 ft	Soil Depth: 50 ft	Core Depth: 0 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 10.4 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.:	RW-43	
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20	
Eng./Geo.:	NGS		Boring Location:	223+93.71	Offset:	R:137.088	Alignment:	Proposed
Elev.:	304.1 ft	Latitude:	34.040407	Longitude:	-81.090298	Date Started:	4/4/2018	
Total Depth:	50 ft	Soil Depth:	50 ft	Core Depth:	0 ft	Date Completed:	4/4/2018	
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	
Core Size:	N/A		Driller:	T. Miller		Groundwater:	TOB	10.4 ft
						24HR	N/A	

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
259.1		@ 43.5 feet - firm.		43.5	SS-12	5	4	4		8		●								
254.1	50.0	@ 48.5 feet - very stiff.		48.5	SS-13	7	10	14		24		●								
249.1		Boring Terminated at 50 feet. Obtained bulk sample from auger cuttings 0.1 to 10.1 feet.																		

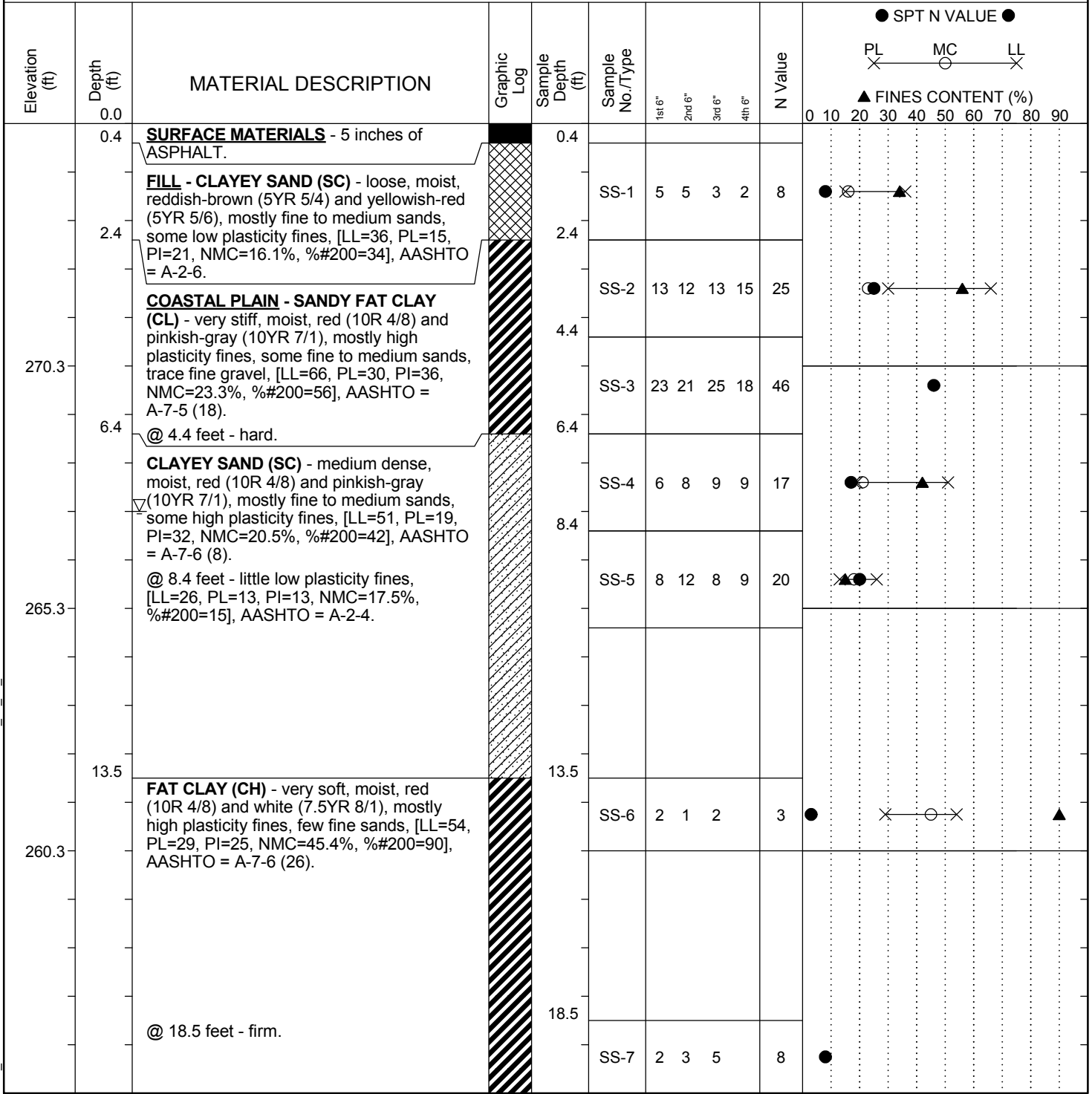
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SAMPLER TYPE			DRILLING METHOD		
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash	CFA - Continuous Flight Augers	RC - Rock Core
UD - Undisturbed Sample	CU - Cuttings	DC - Driving Casing			
AWG - Rock Core, 1-1/8"	CT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

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-27
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 182+20.61	Offset: R:133.688
Alignment: Proposed	Date Started: 3/23/2018	Date Completed: 3/23/2018
Elev.: 275.3 ft	Latitude: 34.038030	Longitude: -81.103686
Total Depth: 74.1 ft	Soil Depth: 63.9 ft	Core Depth: 10.2 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%	Groundwater: TOB 8 ft
Core Size: NQ	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-27
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 182+20.61	Offset: R:133.688
Alignment: Proposed		
Elev.: 275.3 ft	Latitude: 34.038030	Longitude: -81.103686
Date Started: 3/23/2018		
Total Depth: 74.1 ft	Soil Depth: 63.9 ft	Core Depth: 10.2 ft
Date Completed: 3/23/2018		
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 8 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	MC	LL
250.3		@ 23.5 feet - stiff.		23.5	SS-8	2	4	6		10	●	
245.3	29.5	PIEDMONT RESIDUUM - ELASTIC SILT WITH SAND (ML) - stiff, moist, white (10R 8/1) and brownish-yellow (10YR 6/8), mostly high plasticity fines, little fine to medium sands.		28.5	SS-9	5	5	6		11	●	
240.3		@ 33.5 feet - very stiff, red (10R 4/8), relict rock structure, [LL=56, PL=36, PI=20, NMC=41.1%, %#200=72], AASHTO = A-7-5 (16).		33.5	SS-10	4	6	10		16	●	⊗ ⊙ ⊗ ▲
		@ 38.5 feet - stiff.		38.5	SS-11	3	5	7		12	●	

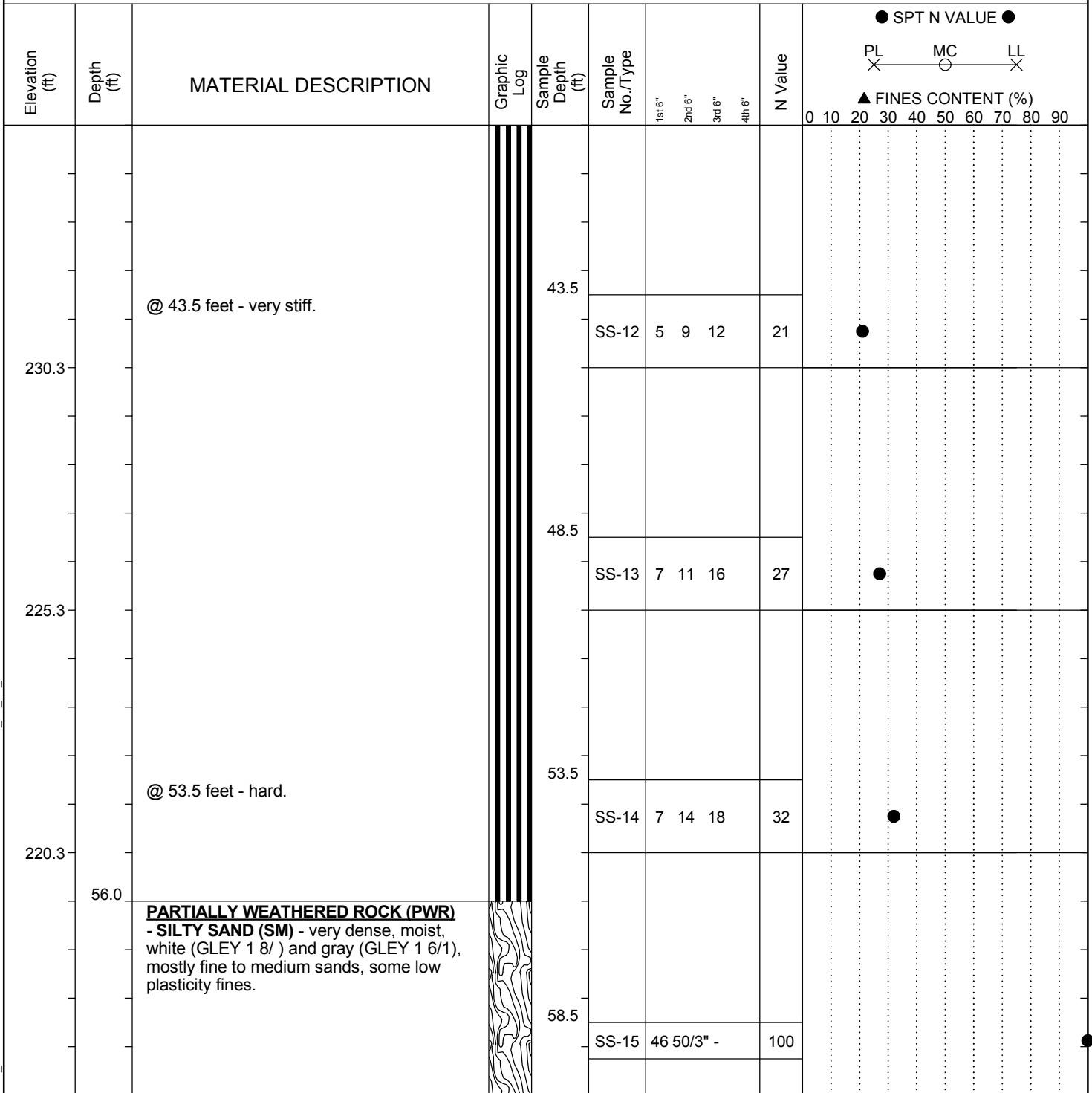
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-27
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 182+20.61	Offset: R:133.688
Alignment: Proposed		
Elev.: 275.3 ft	Latitude: 34.038030	Longitude: -81.103686
Date Started: 3/23/2018		
Total Depth: 74.1 ft	Soil Depth: 63.9 ft	Core Depth: 10.2 ft
Date Completed: 3/23/2018		
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 8 ft
24HR: N/A		



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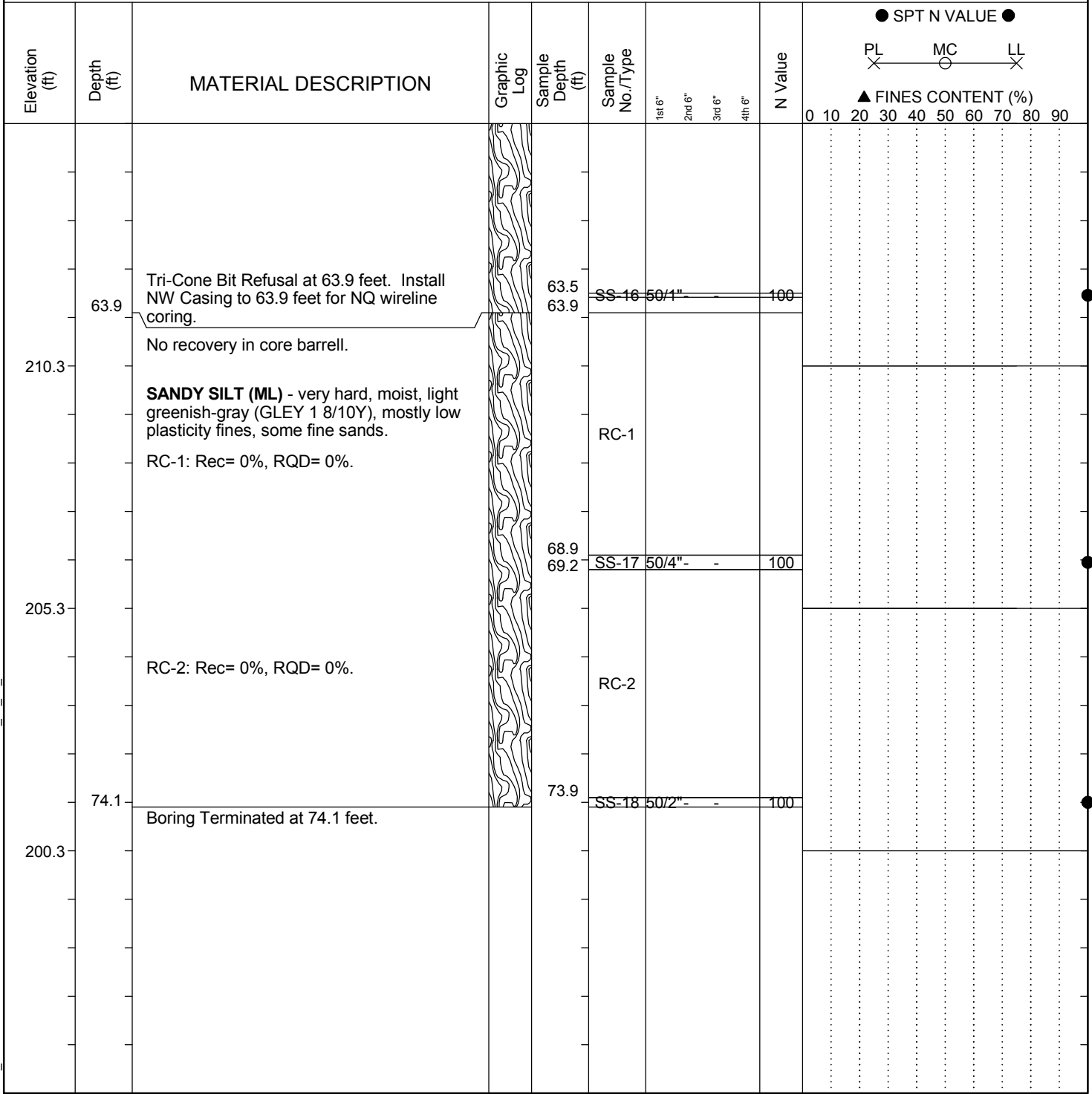
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-27
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 182+20.61	Offset: R:133.688
Alignment: Proposed	Date Started: 3/23/2018	Date Completed: 3/23/2018
Elev.: 275.3 ft	Latitude: 34.038030	Longitude: -81.103686
Total Depth: 74.1 ft	Soil Depth: 63.9 ft	Core Depth: 10.2 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	24HR: N/A



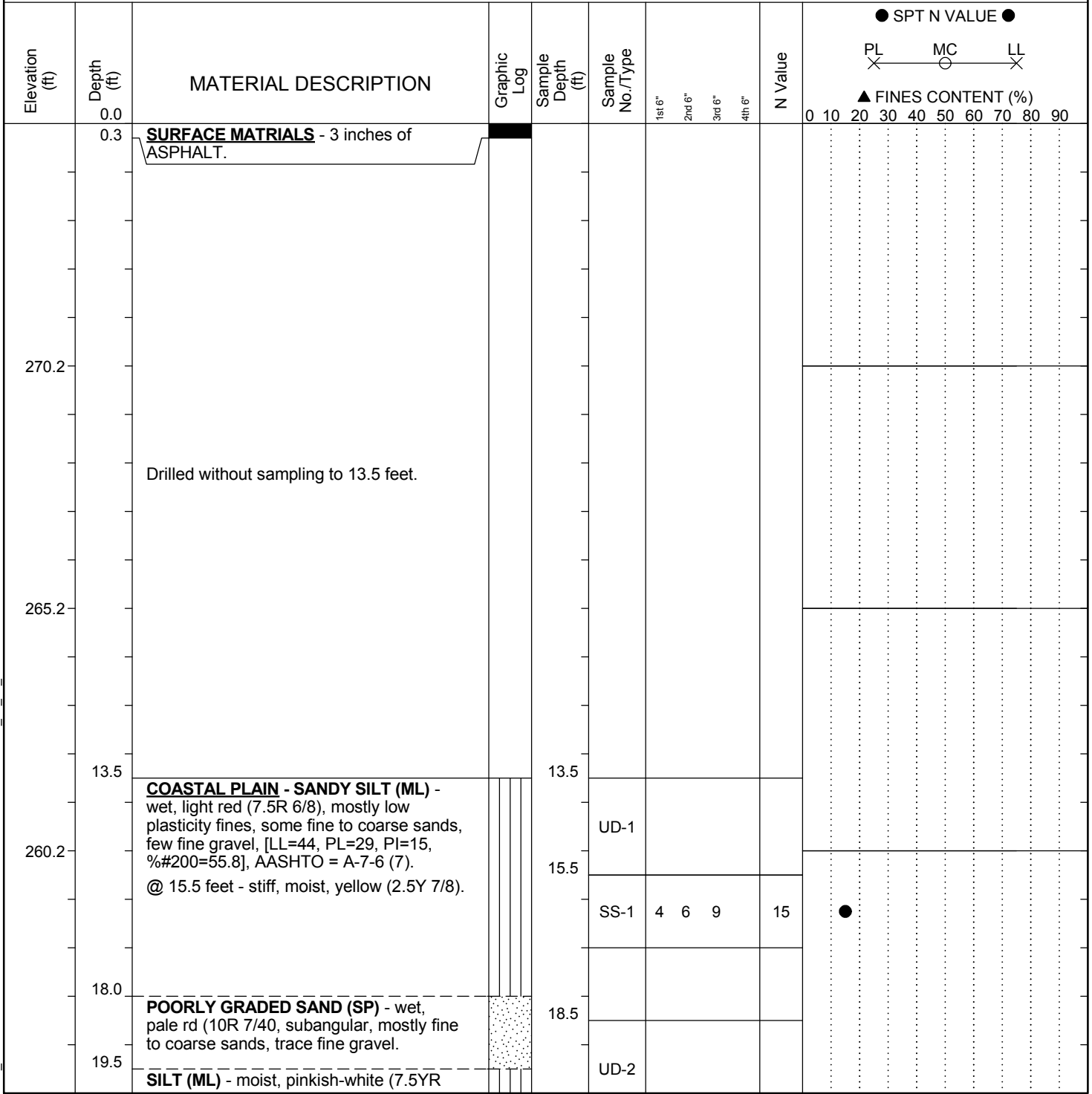
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-27UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 182+18.46	Offset: R:137.491
Elev.: 275.2 ft	Latitude: 34.038019	Longitude: -81.103692
Total Depth: 27 ft	Soil Depth: 27 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 4.5		Sampler Configuration: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: N/A	Driller: T. Millwood	Groundwater: TOB N/A
Liner Required: Y (N)		Liner Used: Y (N)
Energy Ratio: 86.5%		24HR: N/A



LEGEND

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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-27UD
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20
Eng./Geo.:	AKS	Boring Location:	182+18.46	Offset:	R:137.491	Alignment:	Proposed
Elev.:	275.2 ft	Latitude:	34.038019	Longitude:	-81.103692	Date Started:	3/29/2018
Total Depth:	27 ft	Soil Depth:	27 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:	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

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"	N	0	10	20	30	40	50	60	70
		8/2), mostly low plasticity fines, trace fine to coarse sands. @ 20.5 feet - stiff, pale brown (2.5Y 8/3), trace fine to medium sands.		20.5														
					SS-2	3	4	5		9	●							
	23.0	CLAYEY SAND (SC) - moist, pinkish-white (7.5YR 8/2), subangular, mostly fine to coarse sands, little low plasticity fines, trace fine gravel.		23.5														
	24.5				UD-3													
250.2	25.5	SANDY SILT (ML) - moist, pinkish-white (7.5YR 8/2), mostly low plasticity fines, some fine to medium sands.		25.5														
	27.0	SILT (ML) - stiff, moist, white (7.5YR 8/1), mostly low plasticity fines, trace fine to medium sands. Boring Terminated at 27 feet.			SS-3	4	5	7		12	●							

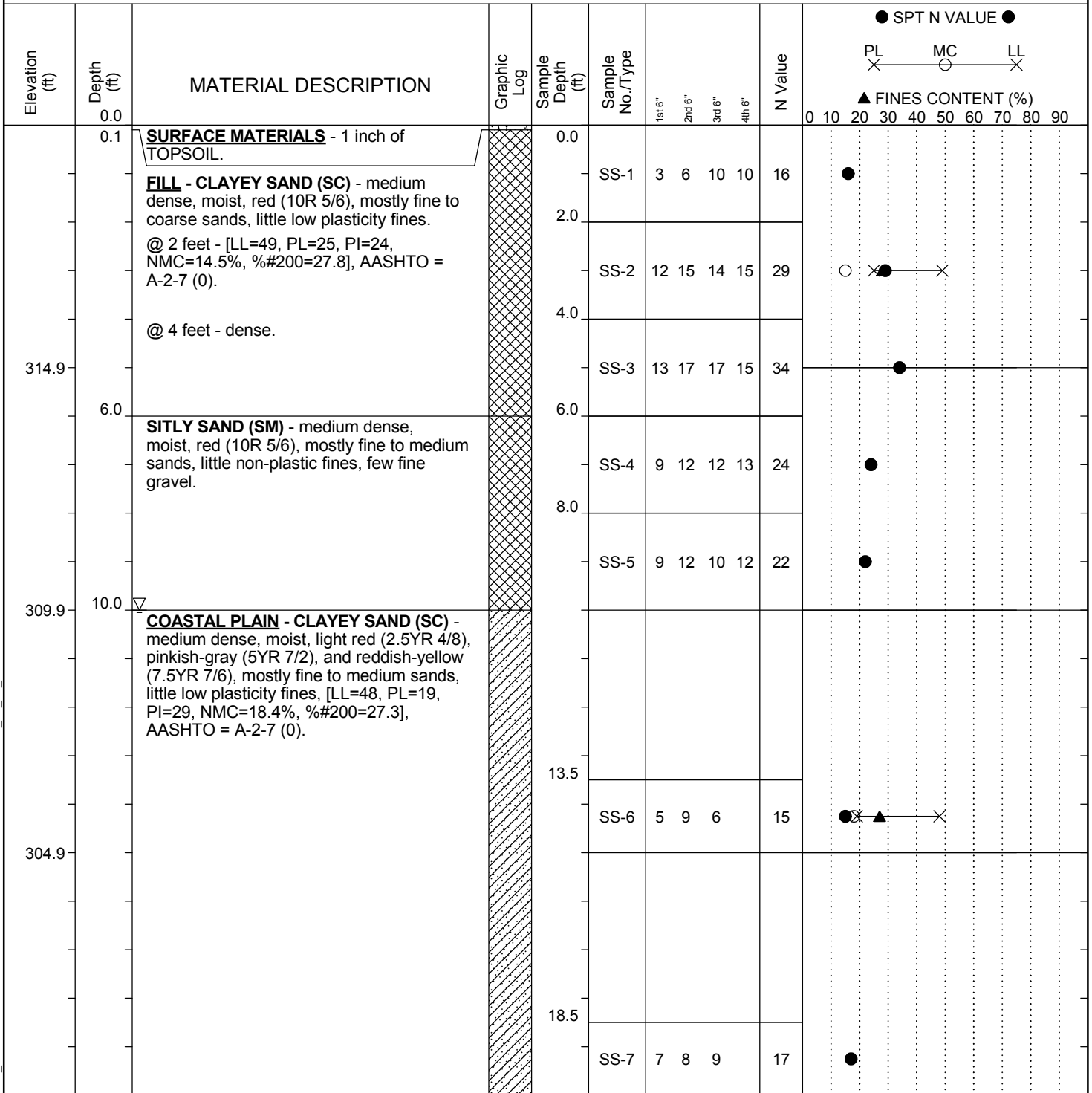
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-28
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-20
Eng./Geo.: NGS	Boring Location: 196+37.42	Offset: R:79.032'	Alignment: Proposed
Elev.: 319.9 ft	Latitude: 34.038228	Longitude: -81.099057	Date Started: 2/21/2018
Total Depth: 69.8 ft	Soil Depth: 69.8 ft	Core Depth: 0 ft	Date Completed: 2/21/2018
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 10 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-28
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 196+37.42	Offset: R:79.032' Alignment: Proposed
Elev.: 319.9 ft	Latitude: 34.038228	Longitude: -81.099057
Total Depth: 69.8 ft	Soil Depth: 69.8 ft	Core Depth: 0 ft
Date Started: 2/21/2018	Date Completed: 2/21/2018	
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 10 ft 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"		0	10	20	30	40	50	60	70	80	90
294.9		@ 23.5 feet - reddish-yellow (7.5YR 7/6), [LL=46, PL=20, PI=26, NMC=20.3%, %200=16.5], AASHTO = A-2-7 (0).		23.5	SS-8	6	9	10		19										
289.9				28.5	SS-9	3	9	8		17										
284.9		@ 33.5 feet - very loose, wet, reddish-yellow (7.5YR 6/6), mostly fine to coarse sands, little high plasticity fines, trace fine gravel, [LL=56, PL=28, PI=28, NMC=27.7%, %200=20.7], AASHTO = A-2-7 (0).		33.5	SS-10	3	2	1		3										
		@ 38.5 feet - loose.		38.5	SS-11	4	4	5		9										

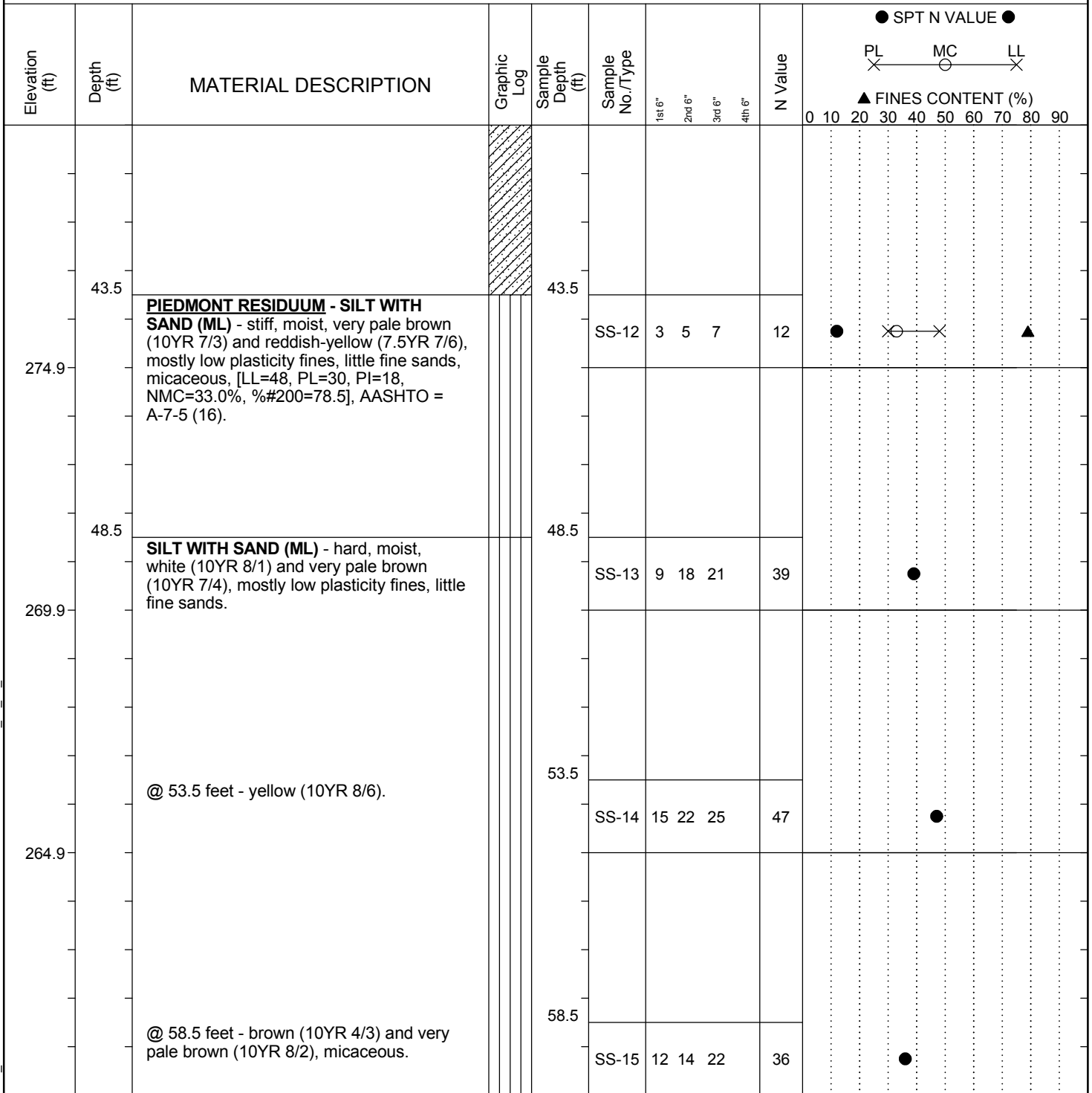
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-28
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 196+37.42	Offset: R:79.032' Alignment: Proposed
Elev.: 319.9 ft	Latitude: 34.038228	Longitude: -81.099057
Total Depth: 69.8 ft	Soil Depth: 69.8 ft	Core Depth: 0 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: N/A	Driller: T. Miller	Groundwater: TOB 10 ft 24HR: N/A



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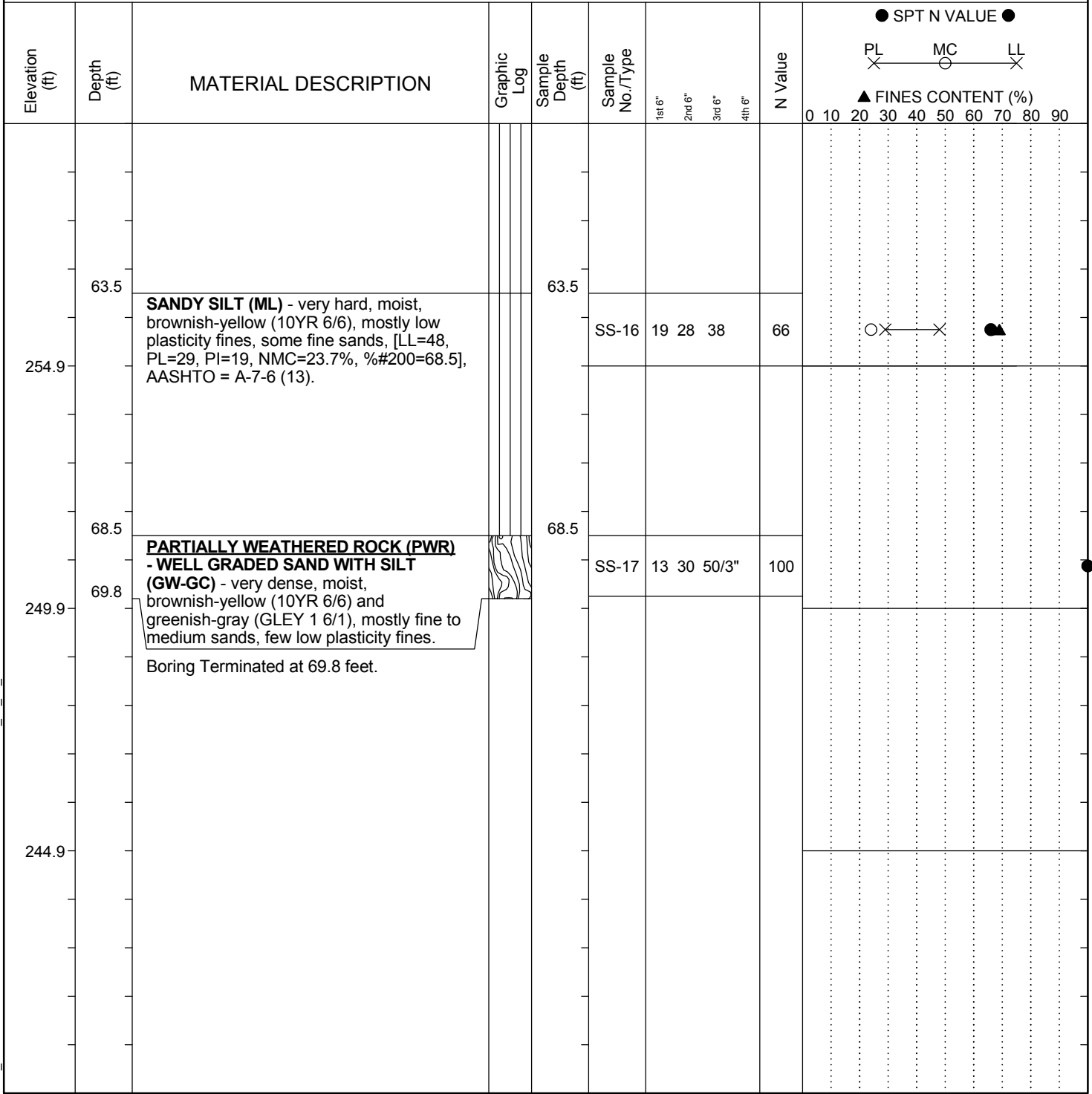
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-28
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 196+37.42	Offset: R:79.032' Alignment: Proposed
Elev.: 319.9 ft	Latitude: 34.038228	Longitude: -81.099057
Total Depth: 69.8 ft	Soil Depth: 69.8 ft	Core Depth: 0 ft
Date Started: 2/21/2018	Date Completed: 2/21/2018	
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 10 ft 24HR: N/A



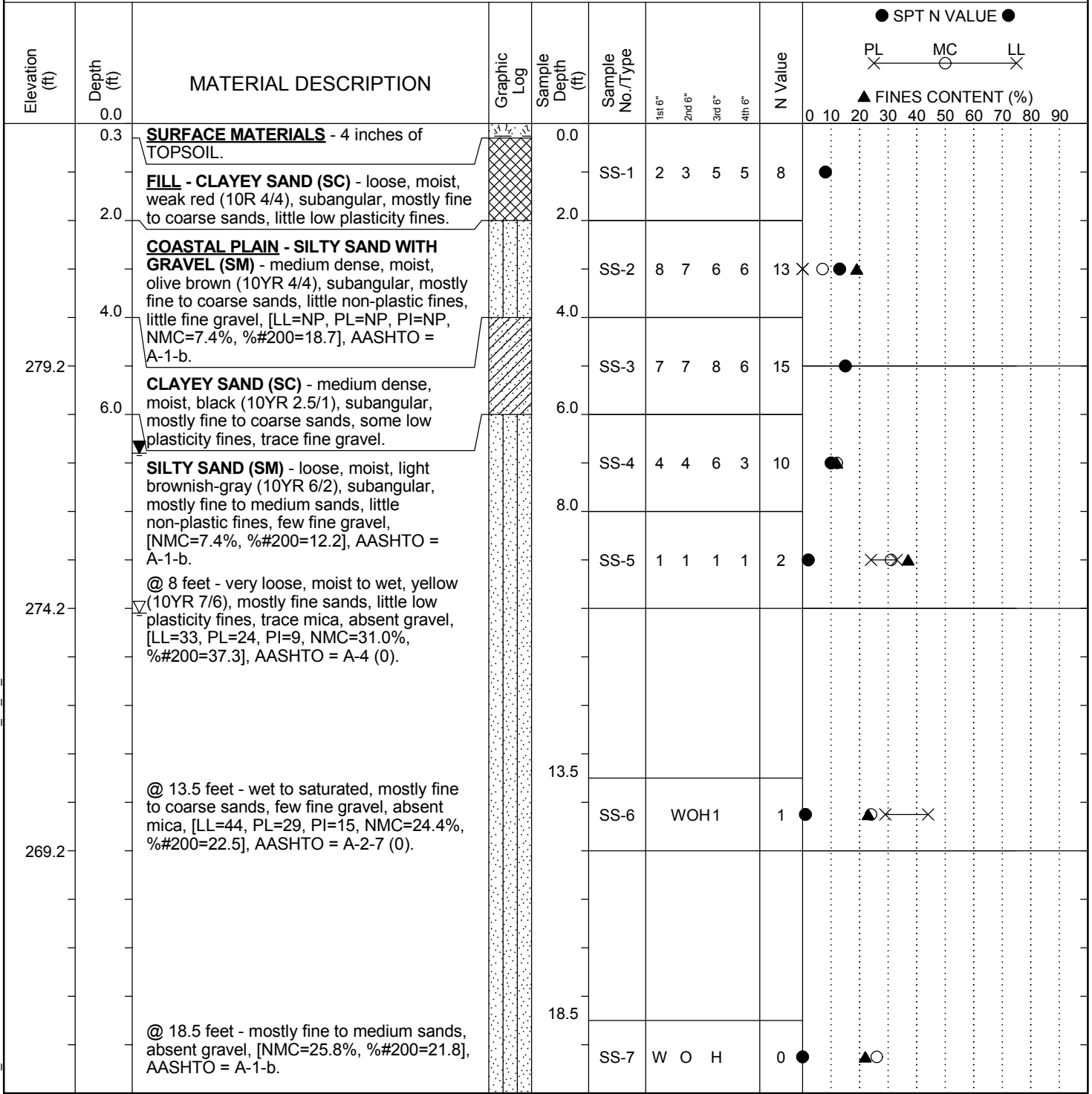
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-29
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 205+83.54	Offset: R:192.263
Alignment: Proposed		
Elev.: 284.2 ft	Latitude: 34.038238	Longitude: -81.095809
Date Started: 3/23/2018		
Total Depth: 59.9 ft	Soil Depth: 49.3 ft	Core Depth: 10.6 ft
Date Completed: 3/26/2018		
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 10.1 ft
24HR: 6.8 ft		



LEGEND

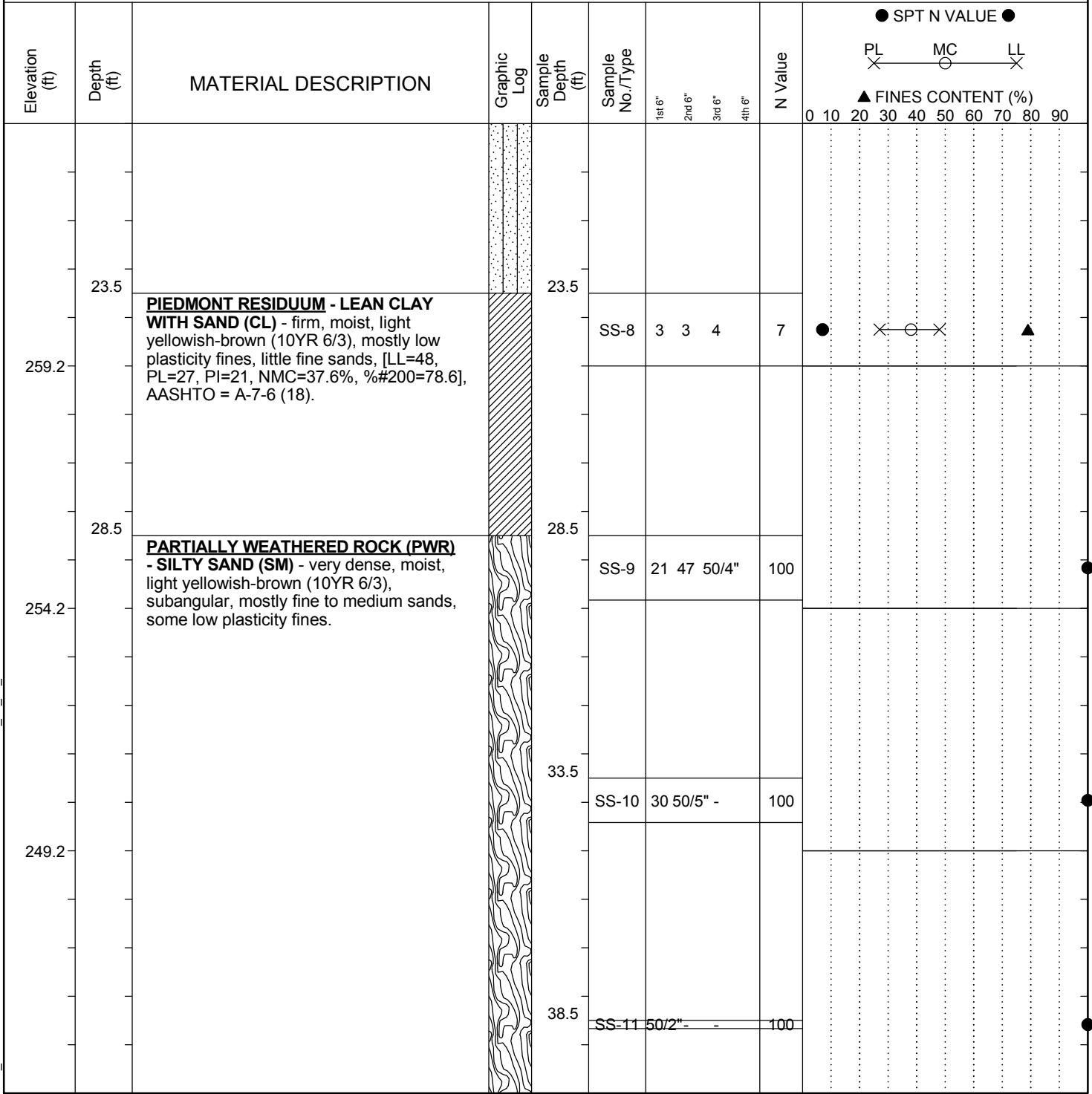
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-29
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20
Eng./Geo.: AKS	Boring Location: 205+83.54		Offset: R:192.263	Alignment: Proposed
Elev.: 284.2 ft	Latitude: 34.038238	Longitude: -81.095809	Date Started: 3/23/2018	
Total Depth: 59.9 ft	Soil Depth: 49.3 ft	Core Depth: 10.6 ft	Date Completed: 3/26/2018	
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	10.1 ft	24HR 6.8 ft



LEGEND

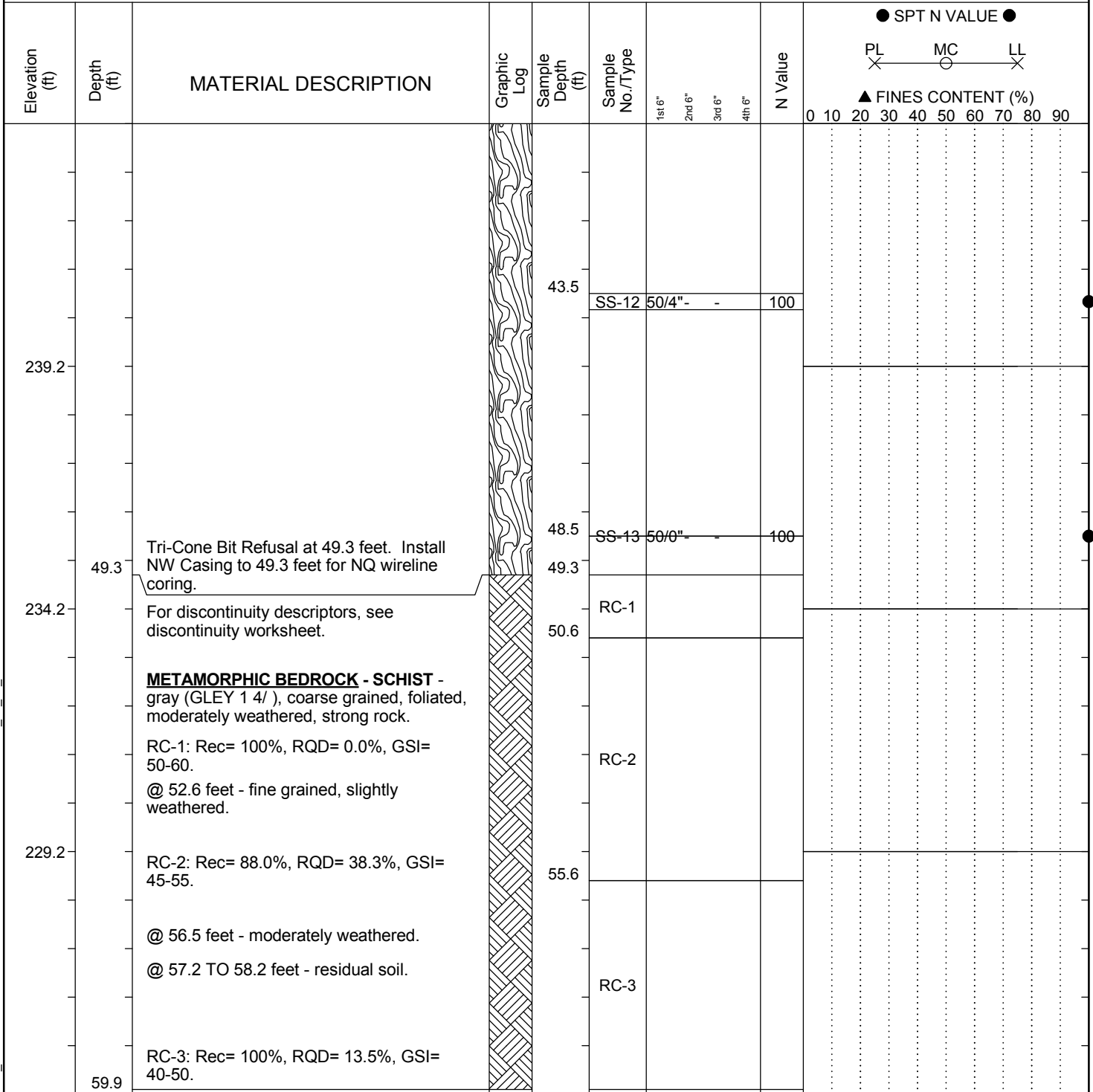
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-29
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 205+83.54	Offset: R:192.263
Alignment: Proposed		
Elev.: 284.2 ft	Latitude: 34.038238	Longitude: -81.095809
Date Started: 3/23/2018		
Total Depth: 59.9 ft	Soil Depth: 49.3 ft	Core Depth: 10.6 ft
Date Completed: 3/26/2018		
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 10.1 ft
24HR: 6.8 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.:	W-29
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20
Eng./Geo.:	AKS	Boring Location:	205+83.54	Offset:	R:192.263	Alignment:	Proposed
Elev.:	284.2 ft	Latitude:	34.038238	Longitude:	-81.095809	Date Started:	3/23/2018
Total Depth:	59.9 ft	Soil Depth:	49.3 ft	Core Depth:	10.6 ft	Date Completed:	3/26/2018
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 10.1 ft	24HR	6.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL		MC	LL		FINES CONTENT (%)	
						1st 6"	2nd 6"	3rd 6"	4th 6"		X	X	O	X	X	X	X
		Boring Terminated at 59.9 feet.															
219.2																	
214.2																	
209.2																	

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

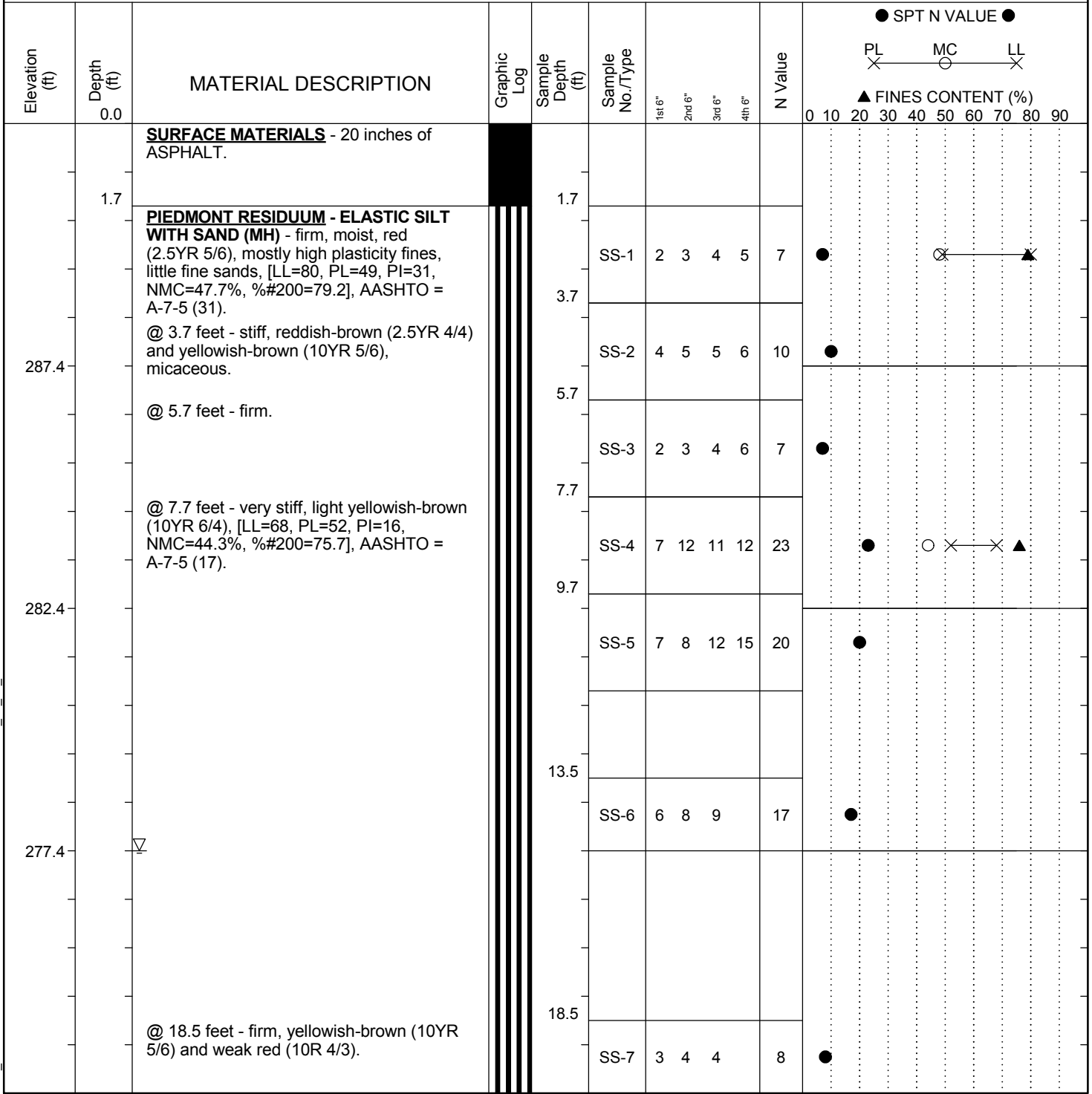
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 3/26/2018

Boring Number: W-29
 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
49.4	1	J	86	N	Pa	Fe	Pl	SR	
49.6	2	J	85	N	Pa	Fe	Pl	SR	
50.2	3	J	69	T	Pa	Fe	Ir	SR	
51	4	J	50	N	Pa	Fe	Ir	SR	
51.4	5	J	31	VN	Pa	Fe	Pl	SR	
52	6	J	22	N	Pa	Fe	Pl	SR	
53	7	J	24	VN	Pa	Fe	Pl	SR	
55	8	J	35	T	No	N/A	Pl	SR	
55.3	9	J	33	T	No	N/A	Pl	SR	
56.5	10	J	91	N	Pa	Fe	Pl	SR	
56.7	11	N/A	N/A	N/A	N/A	N/A	N/A	SR	Fractured zone 46.7' - 59.9'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-30
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 226+16.92	Offset: L:110.400' Alignment: Proposed
Elev.: 292.4 ft	Latitude: 34.041290	Longitude: -81.090007
Total Depth: 64 ft	Soil Depth: 53.6 ft	Core Depth: 10.4 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 15 ft 24HR: N/A



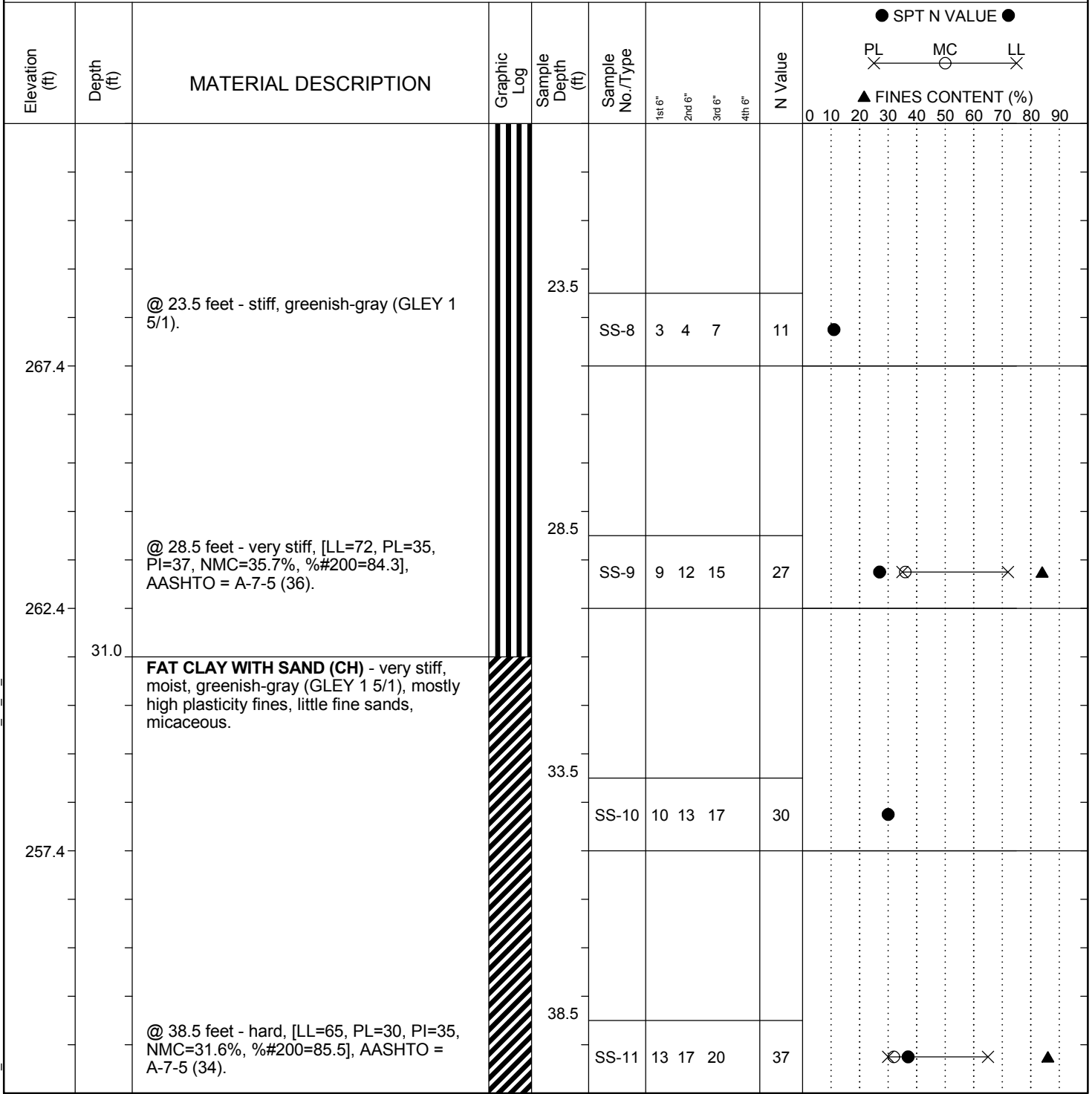
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-30
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 226+16.92	Offset: L:110.400' Alignment: Proposed
Elev.: 292.4 ft	Latitude: 34.041290	Longitude: -81.090007
Total Depth: 64 ft	Soil Depth: 53.6 ft	Core Depth: 10.4 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 15 ft 24HR: N/A



LEGEND

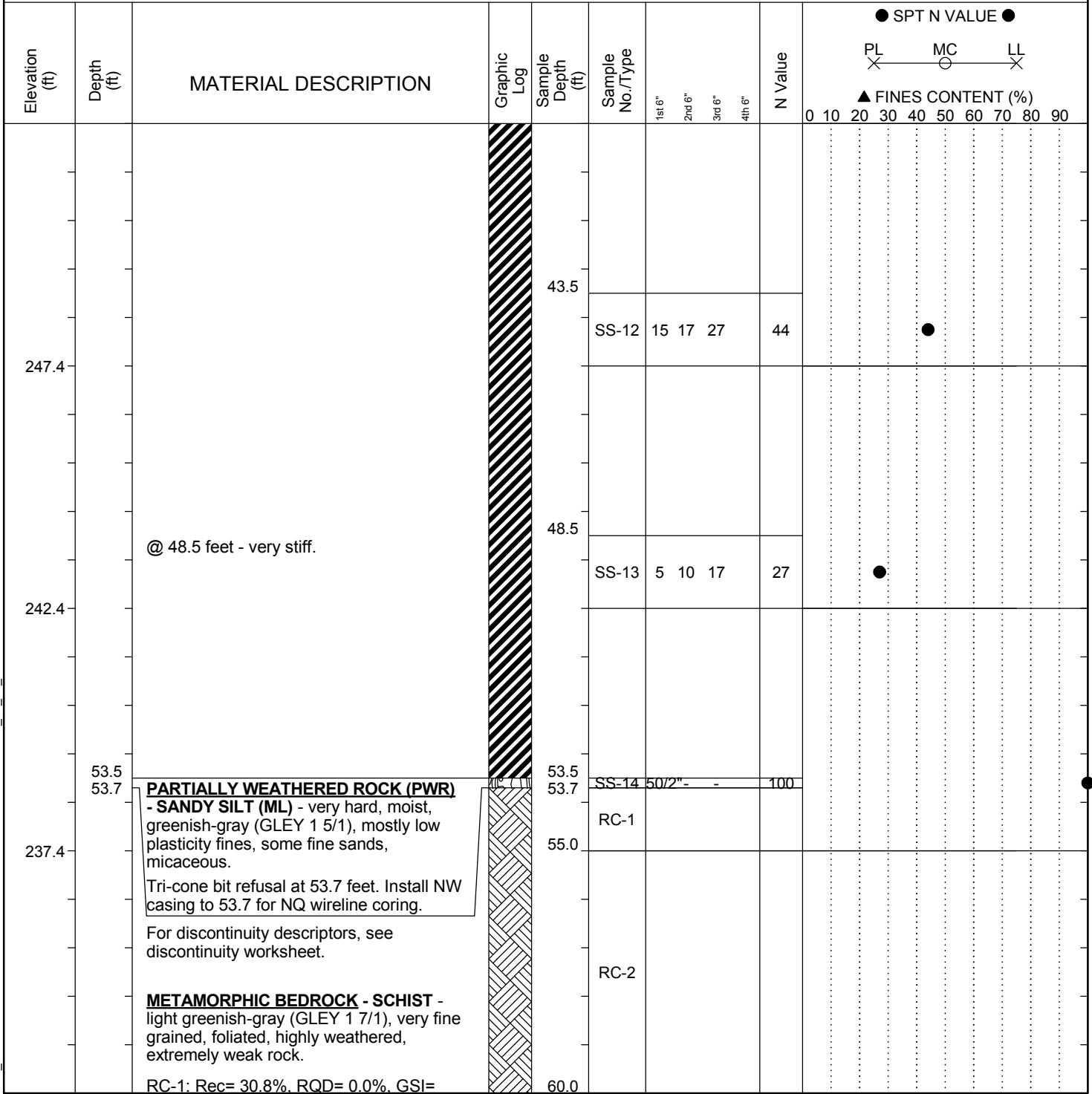
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-30
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 226+16.92	Offset: L:110.400' Alignment: Proposed
Elev.: 292.4 ft	Latitude: 34.041290	Longitude: -81.090007
Total Depth: 64 ft	Soil Depth: 53.6 ft	Core Depth: 10.4 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



LEGEND

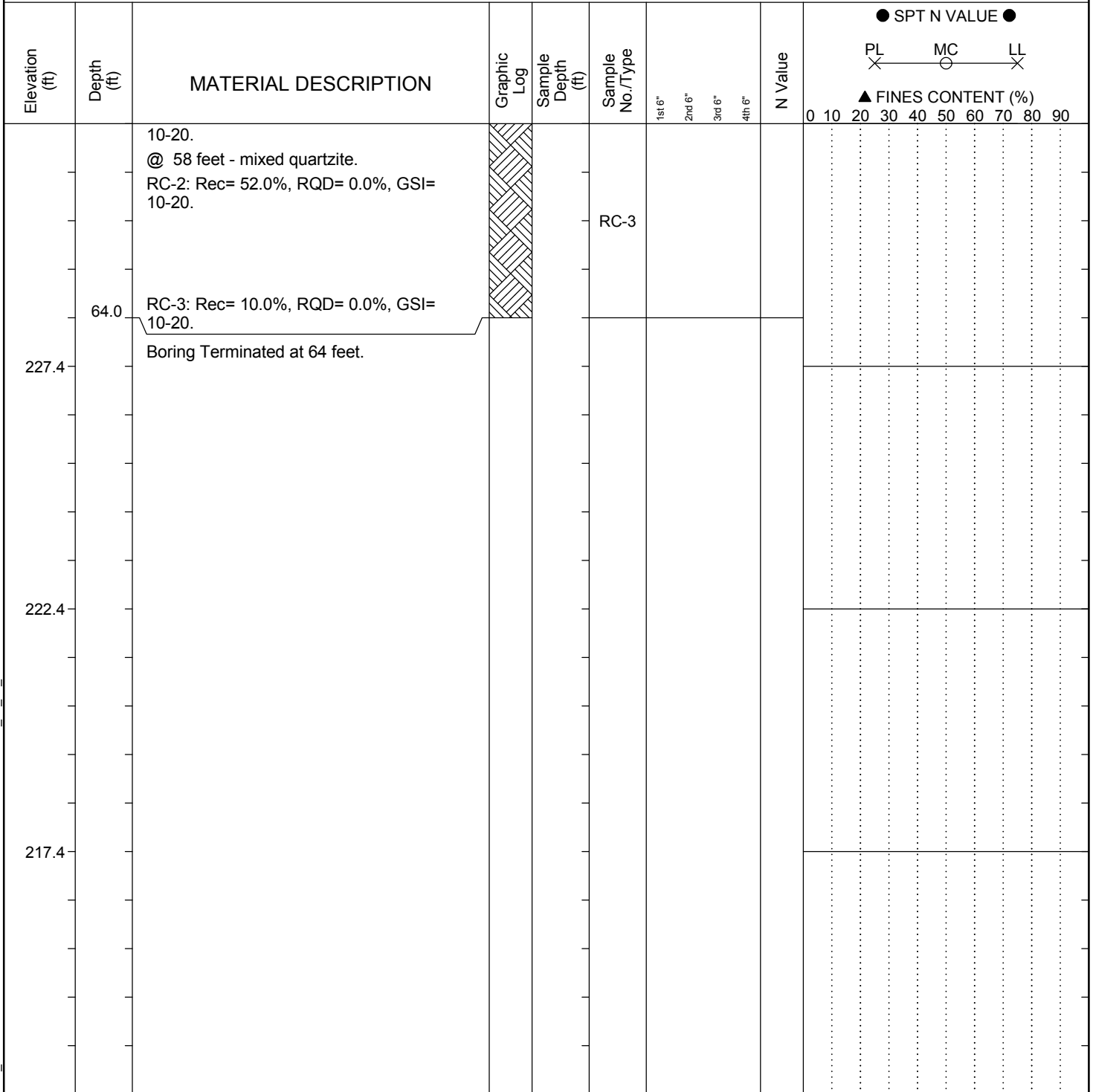
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-30
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-20
Eng./Geo.: NGS	Boring Location: 226+16.92	Offset: L:110.400	Alignment: Proposed
Elev.: 292.4 ft	Latitude: 34.041290	Longitude: -81.090007	Date Started: 2/22/2018
Total Depth: 64 ft	Soil Depth: 53.6 ft	Core Depth: 10.4 ft	Date Completed: 2/22/2018
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 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

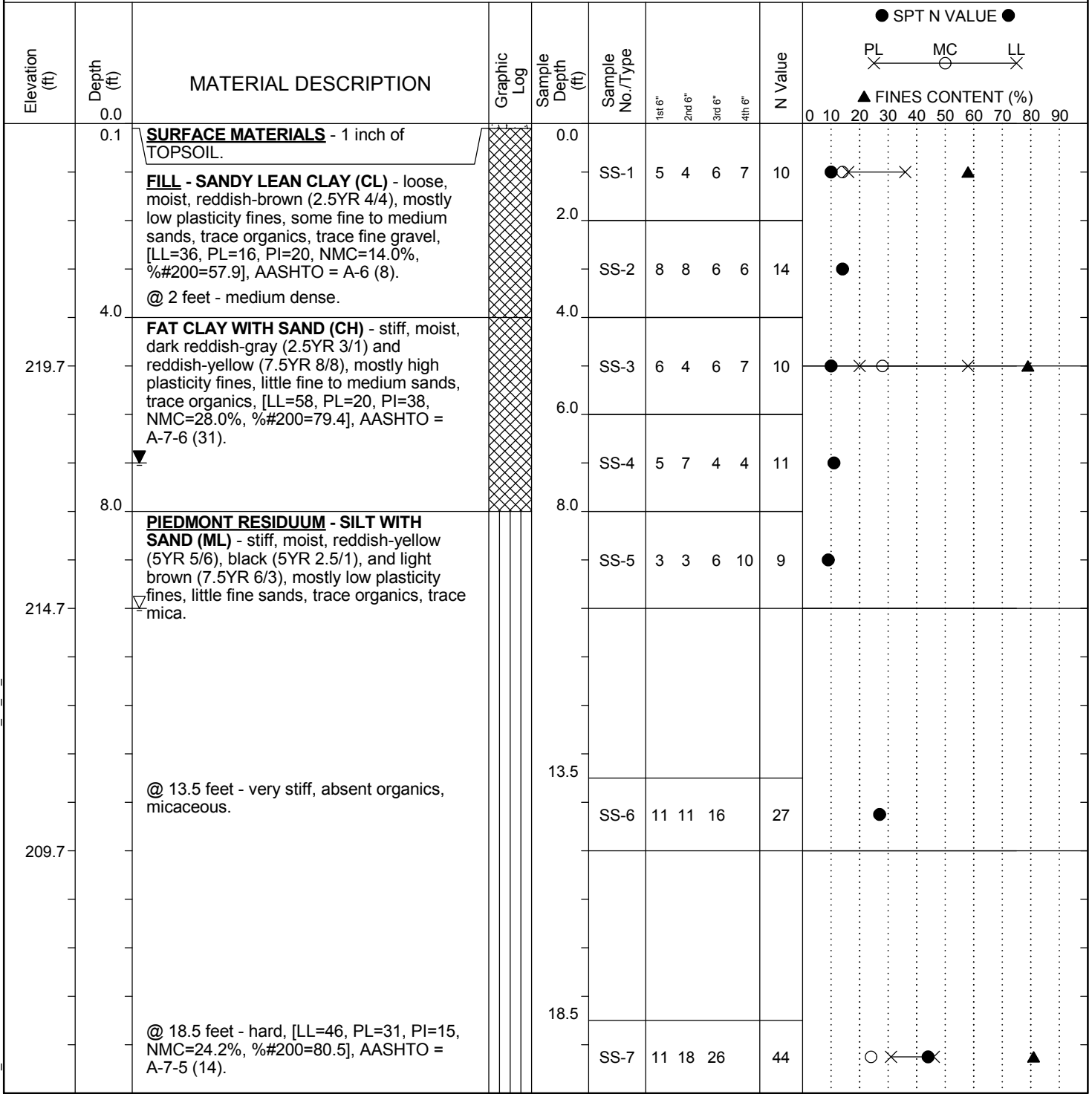
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Nat Shuff
 Date: 2/22/2018

Boring Number: W-30
 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
53.7	1	J	65	VN	Su	Fe	Wa	SR	
55	2	J	N/A	N/A	Su	Fe	Ir	SR	Fractured zone 55.0' - 64.0'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-31
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 240+69.16	Offset: R:167.336
Alignment: Proposed	Date Started: 3/13/2018	Date Completed: 3/14/2018
Elev.: 224.7 ft	Latitude: 34.042401	Longitude: -81.085312
Total Depth: 64.5 ft	Soil Depth: 64.5 ft	Core Depth: 0 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 10 ft
Core Size: N/A	Driller: T. Miller	24HR: 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.: W-31
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: NGS	Boring Location: 240+69.16	Offset: R:167.336
Alignment: Proposed		
Elev.: 224.7 ft	Latitude: 34.042401	Longitude: -81.085312
Date Started: 3/13/2018		
Total Depth: 64.5 ft	Soil Depth: 64.5 ft	Core Depth: 0 ft
Date Completed: 3/14/2018		
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: N/A	Driller: T. Miller	Groundwater: TOB 10 ft
24HR: 7 ft		

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	SPT N VALUE													
											PL	MC	LL	FINES CONTENT (%)										
											0	10	20	30	40	50	60	70	80	90				
199.7	23.5	PARTIALLY WEATHERED ROCK (PWR) - SANDY SILT (ML) - very hard, moist, reddish-yellow (5YR 5/6), black (5YR 2.5/1), and light brown (7.5YR 6/3), mostly low to medium plasticity fines, some fine sands, micaceous.		23.5	SS-8	24 50/5" -				100														
194.7	28.5	PIEDMONT RESIDUUM - SILT WITH SAND (ML) - very hard, moist, reddish-yellow (5YR 5/6) and gray (7.5YR 6/1), mostly low to medium plasticity fines, little fine sands, micaceous.		28.5	SS-9	21	25	40		65														
189.7	33.5	PARTIALLY WEATHERED ROCK (PWR) - SILT WITH SAND (ML) - very hard, moist, reddish-yellow (5YR 5/6) and gray (7.5YR 6/1), mostly low to medium plasticity fines, some fine sands, micaceous.		33.5	SS-10	18 31 50/5"				100														
38.5	38.5	PIEDMONT RESIDUUM - SILT WITH SAND (ML) - very hard, moist, reddish-yellow (5YR 5/6) and gray (7.5YR 6/1), mostly low to medium plasticity fines.		38.5	SS-11	10	12	18		30														

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.: W-31	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-20		
Eng./Geo.: NGS		Boring Location: 240+69.16		Offset: R:167.336	
Elev.: 224.7 ft		Latitude: 34.042401		Longitude: -81.085312	
Total Depth: 64.5 ft		Soil Depth: 64.5 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 10 ft	
				24HR: 7 ft	
Date Started: 3/13/2018					
Date Completed: 3/14/2018					
Alignment: Proposed					

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL X MC O LL X ▲ FINES CONTENT (%) 0 10 20 30 40 50 60 70 80 90
						1st 6"	2nd 6"	3rd 6"	4th 6"		
		little fine sands, micaceous.									
179.7	43.5	PARTIALLY WEATHERED ROCK (PWR) - CLAYEY SAND (SC) - very dense, moist, yellowish-red (5YR 4/6) and dark reddish-brown (5YR 3/2), mostly medium to coarse sands, some low to medium plasticity fines, trace weathered rock fragments.		43.5	SS-12	27	36	50/5"	100		
				48.5	SS-13	17	50/5"	-	100		
174.7				53.5	SS-14	50/5"	-	-	100		
169.7				58.5	SS-15	50/4"	-	-	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	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-31
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project	Route: I-20	
Eng./Geo.: NGS	Boring Location: 240+69.16	Offset: R:167.336
Alignment: Proposed		
Elev.: 224.7 ft	Latitude: 34.042401	Longitude: -81.085312
Date Started: 3/13/2018		
Total Depth: 64.5 ft	Soil Depth: 64.5 ft	Core Depth: 0 ft
Date Completed: 3/14/2018		
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: N/A	Driller: T. Miller	Groundwater: TOB 10 ft
24HR: 7 ft		

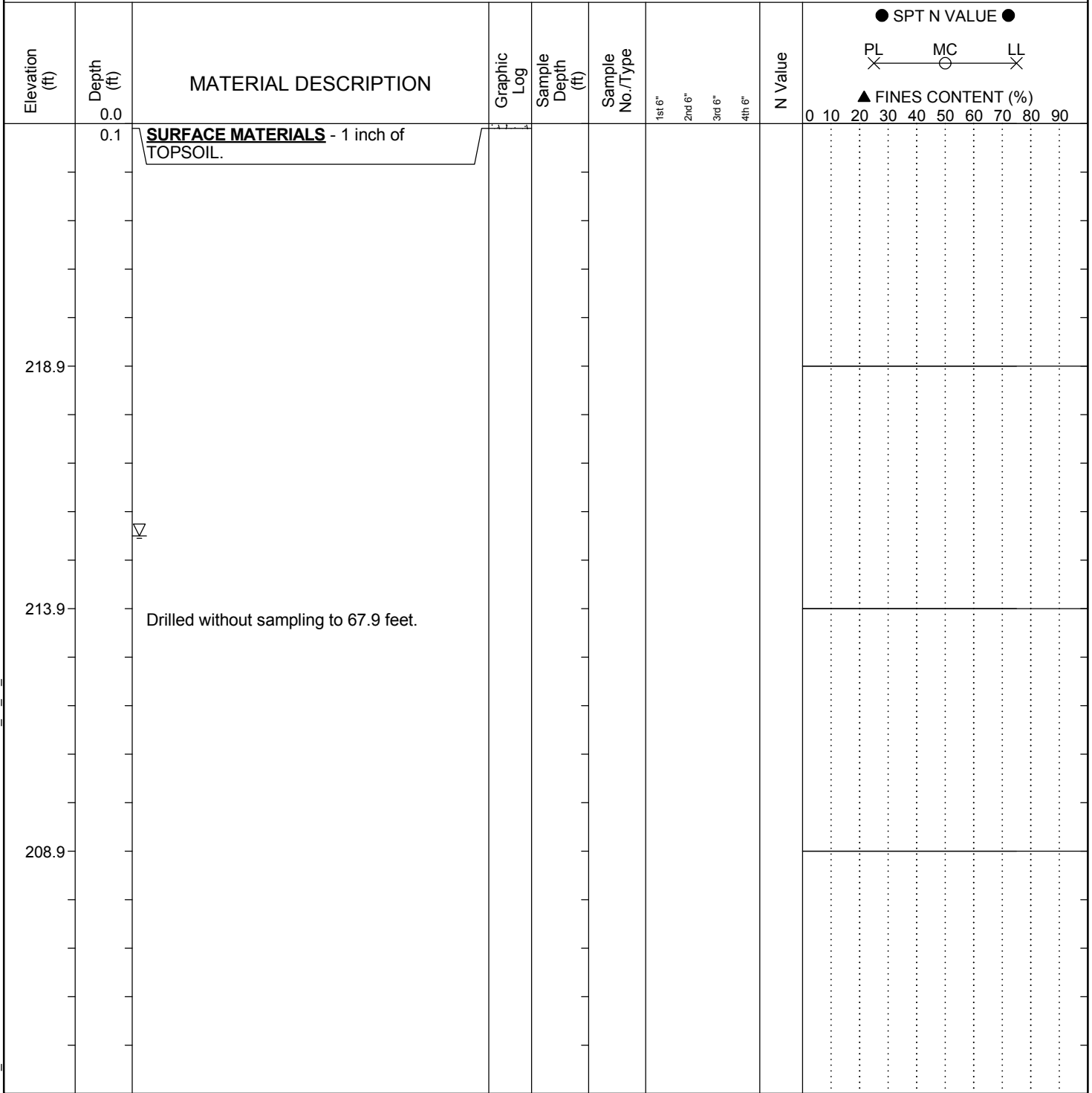
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL		MC		LL		FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80
159.7	64.5	Tri-Cone Bit Refusal at 64.5 feet. Attempted to install NW Casing to 64.5 feet for NQ wireline coring, but casing broke off in hole. Hole was abandoned with casing in-place, and rig offset to W-31A.		63.5	SS-16	50	3	-	-	100									
154.7																			
149.7																			

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	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-31A
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: HGM	Boring Location: 240+67.18	Offset: R:163.335
Alignment: Proposed		
Elev.: 223.9 ft	Latitude: 34.042408	Longitude: -81.085323
Date Started: 3/16/2018		
Total Depth: 67.9 ft	Soil Depth: 67.9 ft	Core Depth: 0 ft
Date Completed: 3/17/2018		
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 8.5 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-31A
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: HGM	Boring Location: 240+67.18	Offset: R:163.335
Alignment: Proposed		
Elev.: 223.9 ft	Latitude: 34.042408	Longitude: -81.085323
Date Started: 3/16/2018		
Total Depth: 67.9 ft	Soil Depth: 67.9 ft	Core Depth: 0 ft
Date Completed: 3/17/2018		
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 8.5 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
198.9											
193.9											
188.9											

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.: W-31A	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20	
Eng./Geo.: HGM		Boring Location: 240+67.18		Offset: R:163.335	
Alignment: Proposed		Date Started: 3/16/2018		Date Completed: 3/17/2018	
Elev.: 223.9 ft		Latitude: 34.042408		Longitude: -81.085323	
Total Depth: 67.9 ft		Soil Depth: 67.9 ft		Core Depth: 0 ft	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y <input checked="" type="checkbox"/> N	
Liner Used: Y <input checked="" type="checkbox"/> N		Drill Machine: CME 55		Drill Method: RW	
Hammer Type: Automatic		Energy Ratio: 84.1%		Core Size: N/A	
Driller: T. Miller		Groundwater: TOB		24HR: N/A	

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 X — O — X ▲ FINES CONTENT (%) 0 10 20 30 40 50 60 70 80 90
						1st 6"	2nd 6"	3rd 6"	4th 6"		
178.9											
173.9											
168.9											

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.: W-31A	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20	
Eng./Geo.: HGM		Boring Location: 240+67.18		Offset: R:163.335	
Alignment: Proposed					
Elev.: 223.9 ft		Latitude: 34.042408		Longitude: -81.085323	
Date Started: 3/16/2018					
Total Depth: 67.9 ft		Soil Depth: 67.9 ft		Core Depth: 0 ft	
Date Completed: 3/17/2018					
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 8.5 ft	
24HR: N/A					

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL		MC		LL		FINES CONTENT (%)		
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80
158.9																			
	67.9	Tri-Cone Bit Refusal at 67.9 feet. Attempted to install NW Casing to 67.9 feet for NQ wireline coring, but casing broke off in hole. Hole was abandoned with casing in-place, and rig offset to W-31B.																	
153.9																			
148.9																			

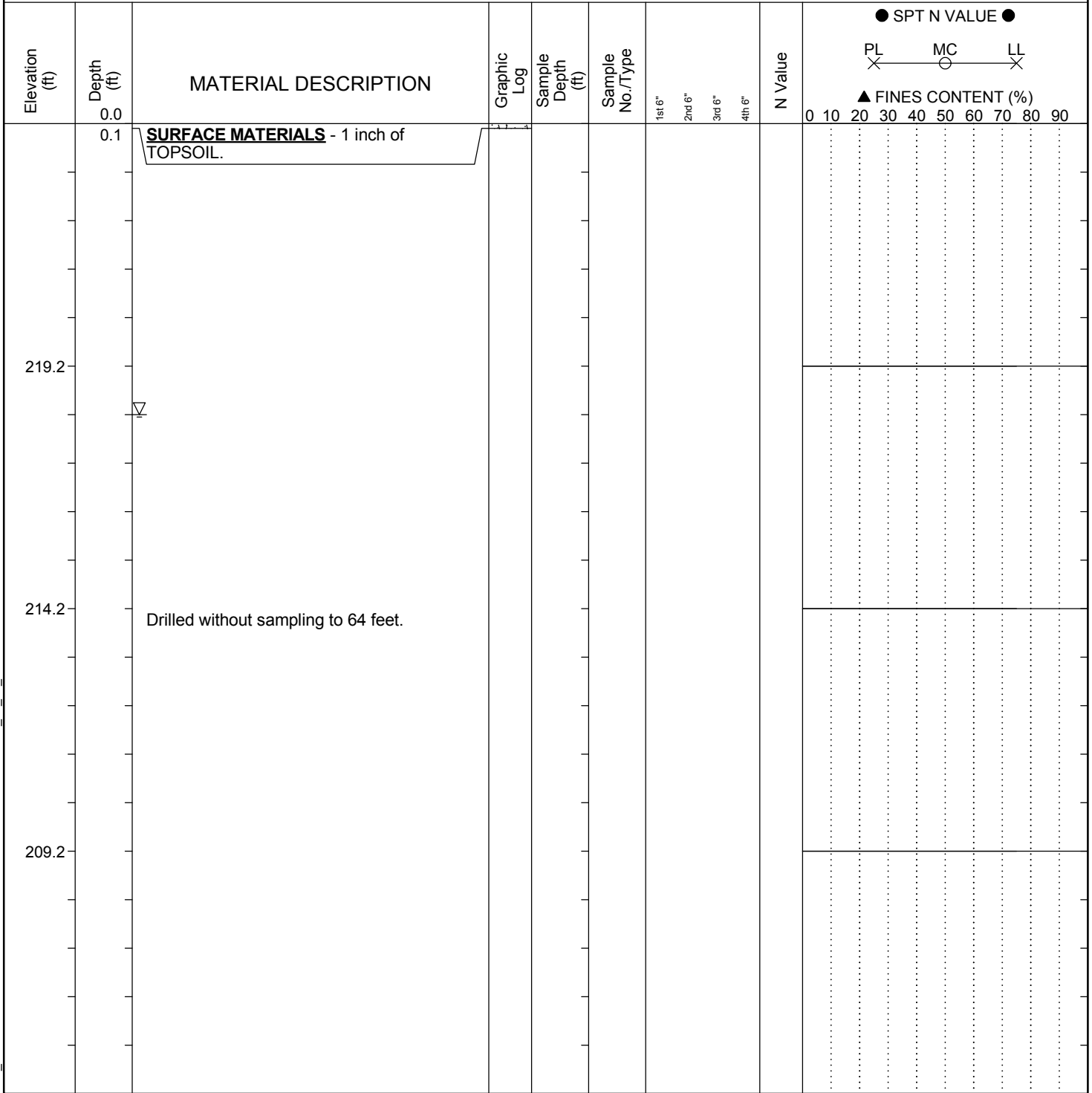
LEGEND

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-31B
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20
Eng./Geo.:	NGS	Boring Location:	240+65.25	Offset:	R:166.494	Alignment:	Proposed
Elev.:	224.2 ft	Latitude:	34.042398	Longitude:	-81.085324	Date Started:	3/21/2018
Total Depth:	64 ft	Soil Depth:	64 ft	Core Depth:	0 ft	Date Completed:	3/22/2018
Bore Hole Diameter (in):	7	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 6 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-31B	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20	
Eng./Geo.: NGS		Boring Location: 240+65.25		Offset: R:166.494	
Alignment: Proposed		Date Started: 3/21/2018		Date Completed: 3/22/2018	
Elev.: 224.2 ft		Latitude: 34.042398		Longitude: -81.085324	
Total Depth: 64 ft		Soil Depth: 64 ft		Core Depth: 0 ft	
Bore Hole Diameter (in): 7		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		6 ft	
24HR: N/A					

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	PL MC LL		FINES CONTENT (%)
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	
199.2													
194.2													
189.2													

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.: W-31B	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route: I-20	
Eng./Geo.: NGS		Boring Location: 240+65.25		Offset: R:166.494		Alignment: Proposed	
Elev.: 224.2 ft		Latitude: 34.042398		Longitude: -81.085324		Date Started: 3/21/2018	
Total Depth: 64 ft		Soil Depth: 64 ft		Core Depth: 0 ft		Date Completed: 3/22/2018	
Bore Hole Diameter (in): 7		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 6 ft		24HR: N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	<div style="text-align: right;">● SPT N VALUE ●</div> <div style="text-align: center;"> PL MC LL X O X </div> <div style="text-align: center;">▲ FINES CONTENT (%)</div>										
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80	90	
179.2																					
174.2																					
169.2																					

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.: W-31B	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route: I-20	
Eng./Geo.: NGS		Boring Location: 240+65.25		Offset: R:166.494		Alignment: Proposed	
Elev.: 224.2 ft		Latitude: 34.042398		Longitude: -81.085324		Date Started: 3/21/2018	
Total Depth: 64 ft		Soil Depth: 64 ft		Core Depth: 0 ft		Date Completed: 3/22/2018	
Bore Hole Diameter (in): 7		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 6 ft		24HR: N/A	

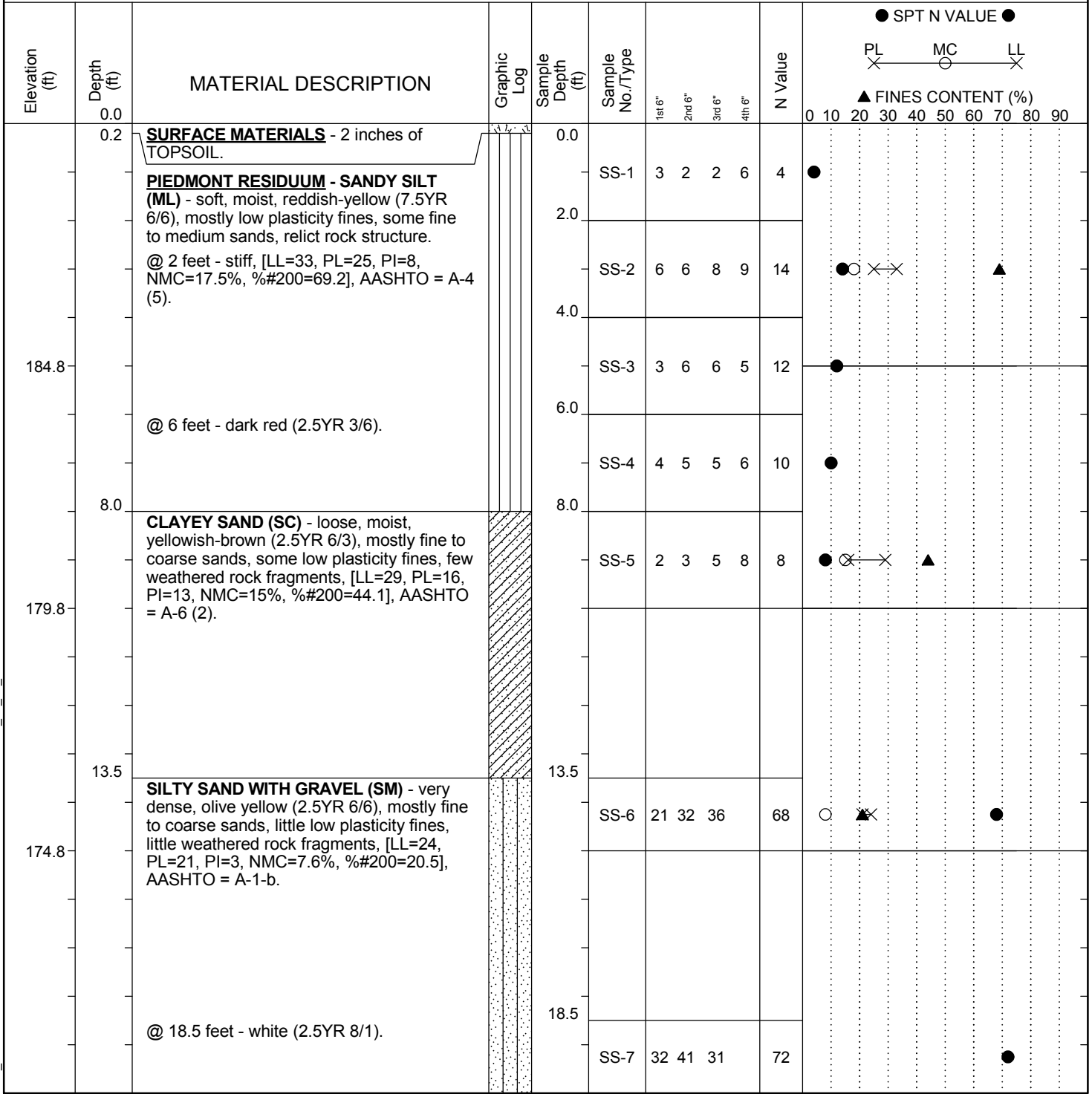
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	N Value				SPT N VALUE ●								
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL X	MC ○	LL X						
							▲ FINES CONTENT (%)											
							0	10	20	30	40	50	60	70	80	90		
159.2	64.0	Tri-Cone Bit Refusal at 64 feet. Attempted to install NW Casing to 64 feet for NQ wireline coring, but casing broke off in hole. Hole was abandoned.																
154.2																		
149.2																		

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.: W-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 252+83.83	Offset: L:60.487'
Elev.: 189.8 ft	Latitude: 34.044459	Longitude: -81.082066
Total Depth: 54.7 ft	Soil Depth: 44.7 ft	Core Depth: 10 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 N/A
		Energy Ratio: 86.5%
		24HR: 21.2 ft



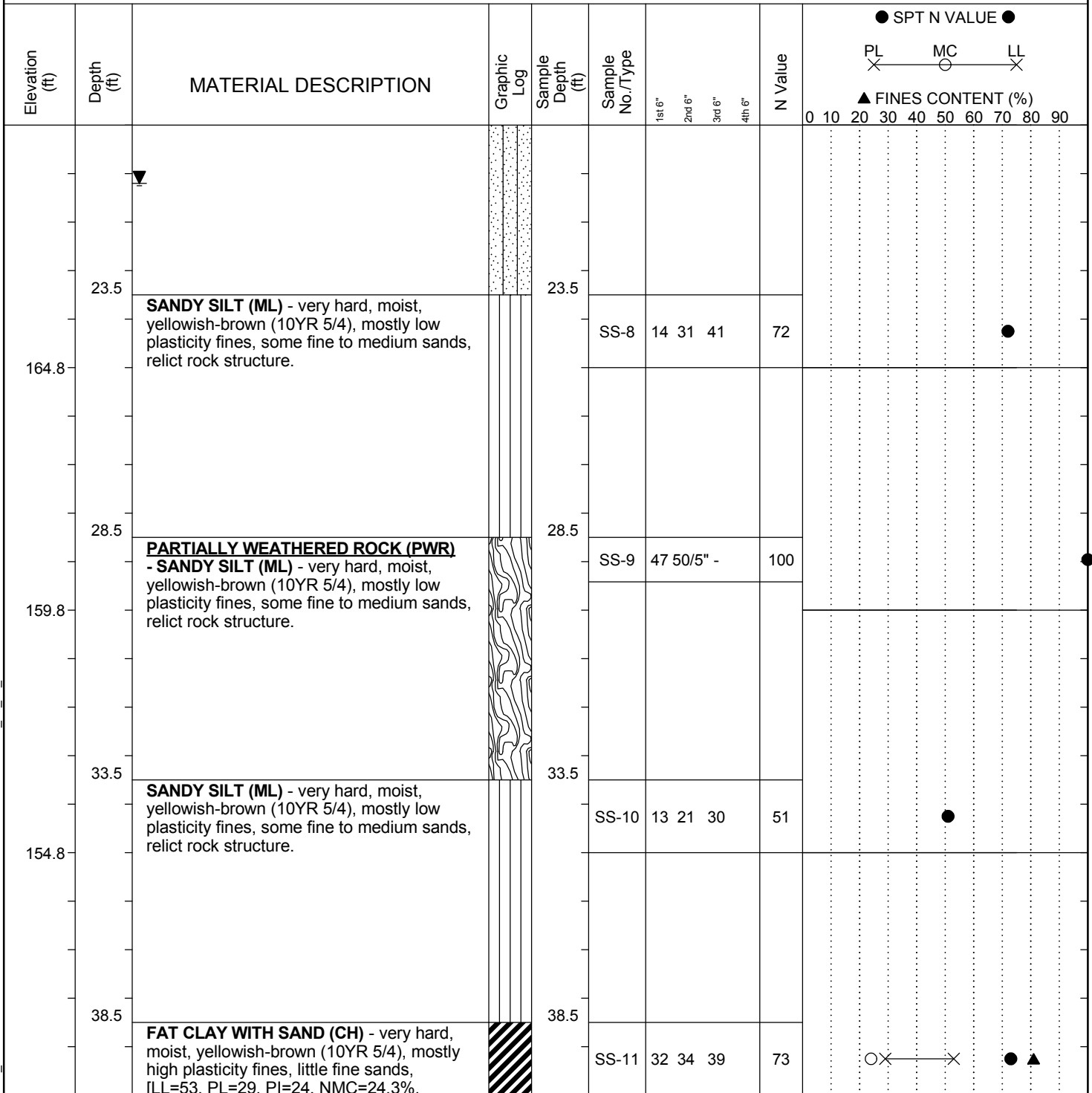
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SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving 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-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 252+83.83	Offset: L:60.487' Alignment: Proposed
Elev.: 189.8 ft	Latitude: 34.044459	Longitude: -81.082066 Date Started: 2/5/2018
Total Depth: 54.7 ft	Soil Depth: 44.7 ft	Core Depth: 10 ft Date Completed: 2/6/2018
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: 21.2 ft



LEGEND

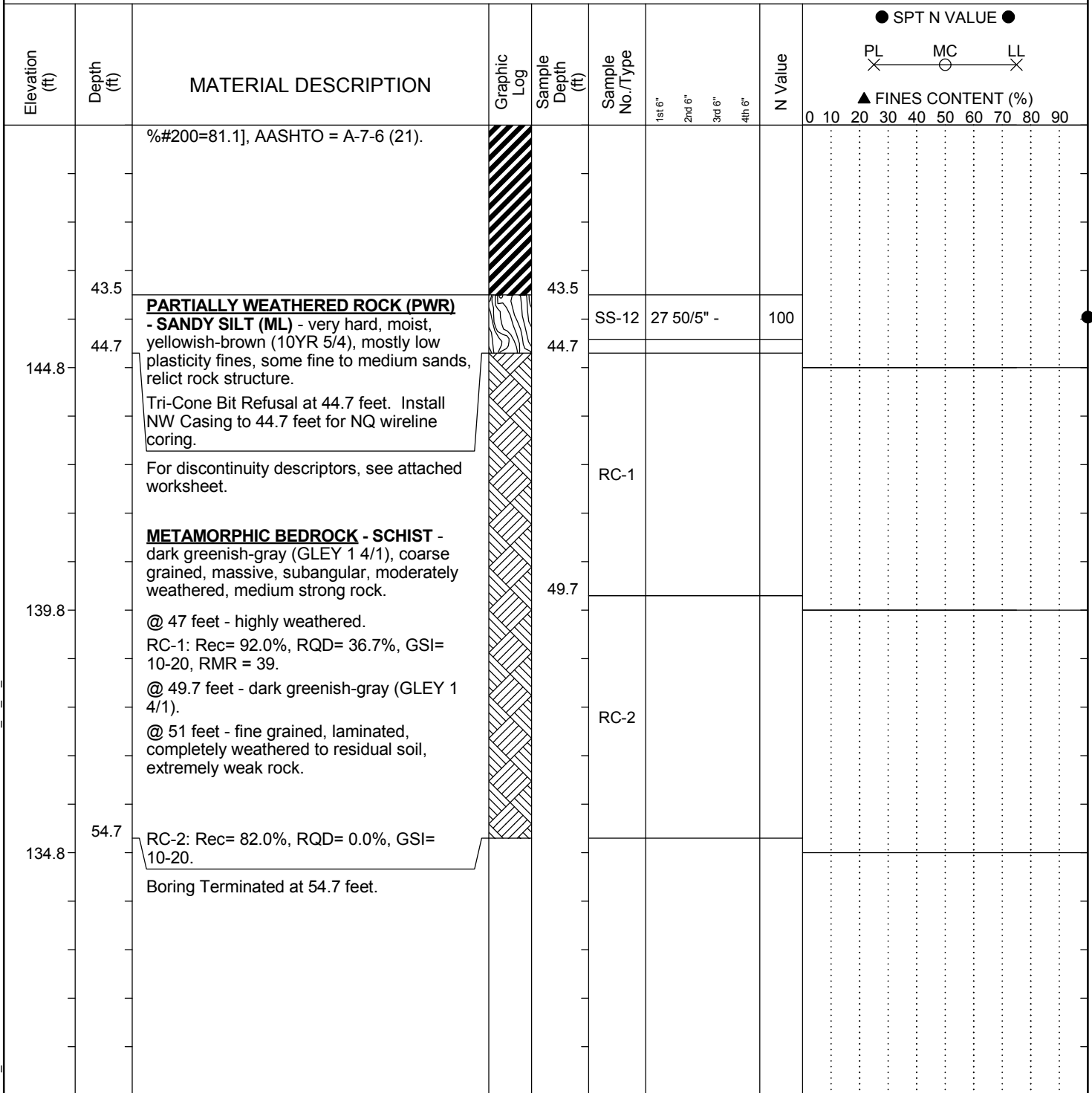
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SC_DOT_1461-16-047_ALL BORINGS - HGM 7-16-18.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 10/11/18

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	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: W-32
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 252+83.83	Offset: L:60.487'
Elev.: 189.8 ft	Latitude: 34.044459	Longitude: -81.082066
Total Depth: 54.7 ft	Soil Depth: 44.7 ft	Core Depth: 10 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 N/A
		Energy Ratio: 86.5%
		24HR: 21.2 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 Boring Number: W-32
 Project Number: 1461-16-047 Core Barrel Type: NQ
 Driller (Company/Name): S&ME/Millwood Core Barrel Length: 5 ft
 Logged By: Austin Syms Coring Technique: Wireline
 Date: 2/5/2018 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
44.7	1	J	N/A	N/A	No	N/A	lr	SR	Fractured zone 44.7' to 46.5'
47	2	J	N/A	N/A	No	N/A	lr	SR	
48.7	3	J	N/A	N/A	No	N/A	lr	SR	Fractured zone 48.7' to 49.7'

Cone Penetration Sounding Logs

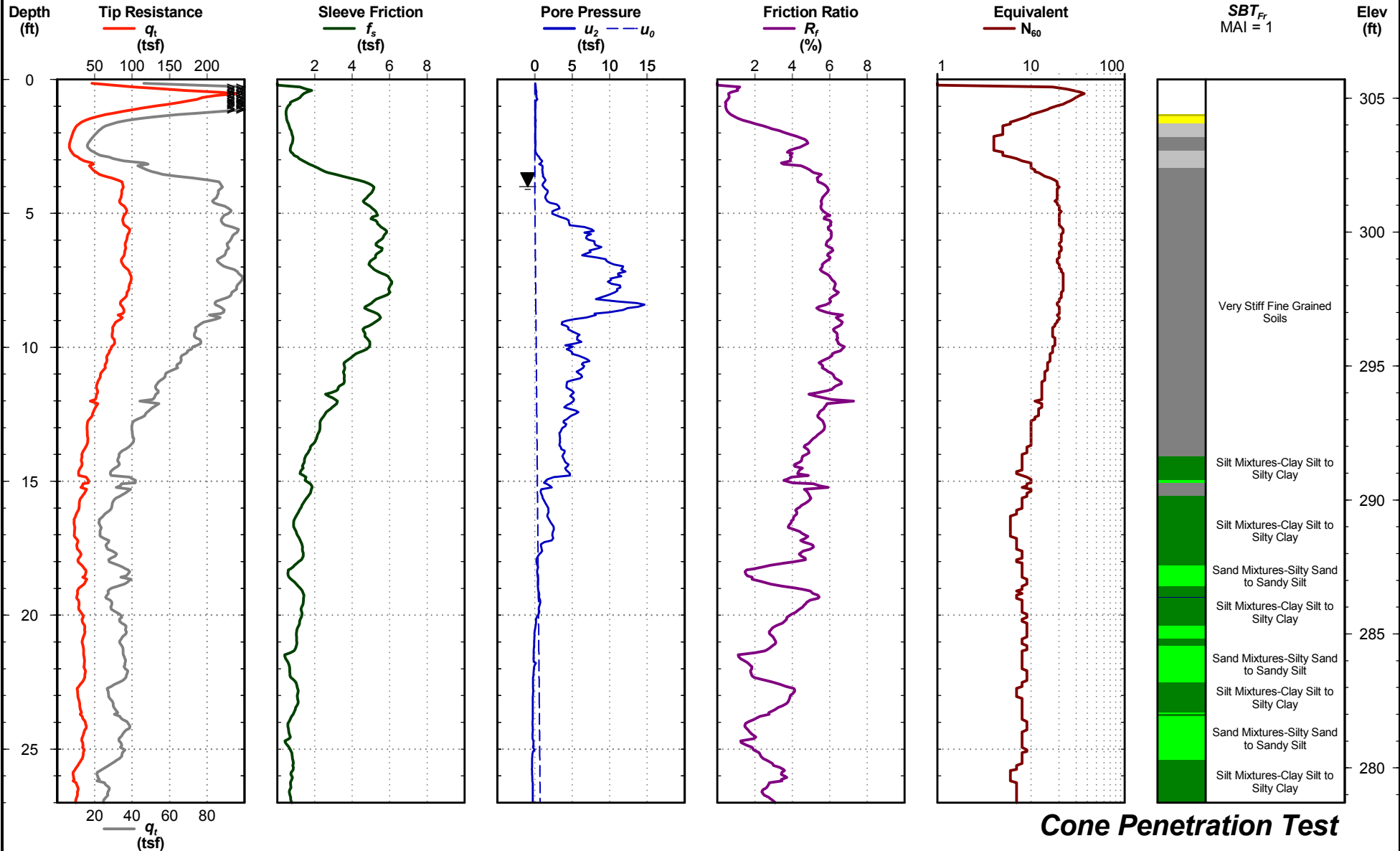


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.039592
Longitude: -81.094669
Elevation: 305.7 ft MSL
Date: May. 22, 2018
Estimated Water Depth: 4 ft
Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B56

Total Depth: 50.1 ft
Termination Criteria: Target Depth
Cone Size: 1.75



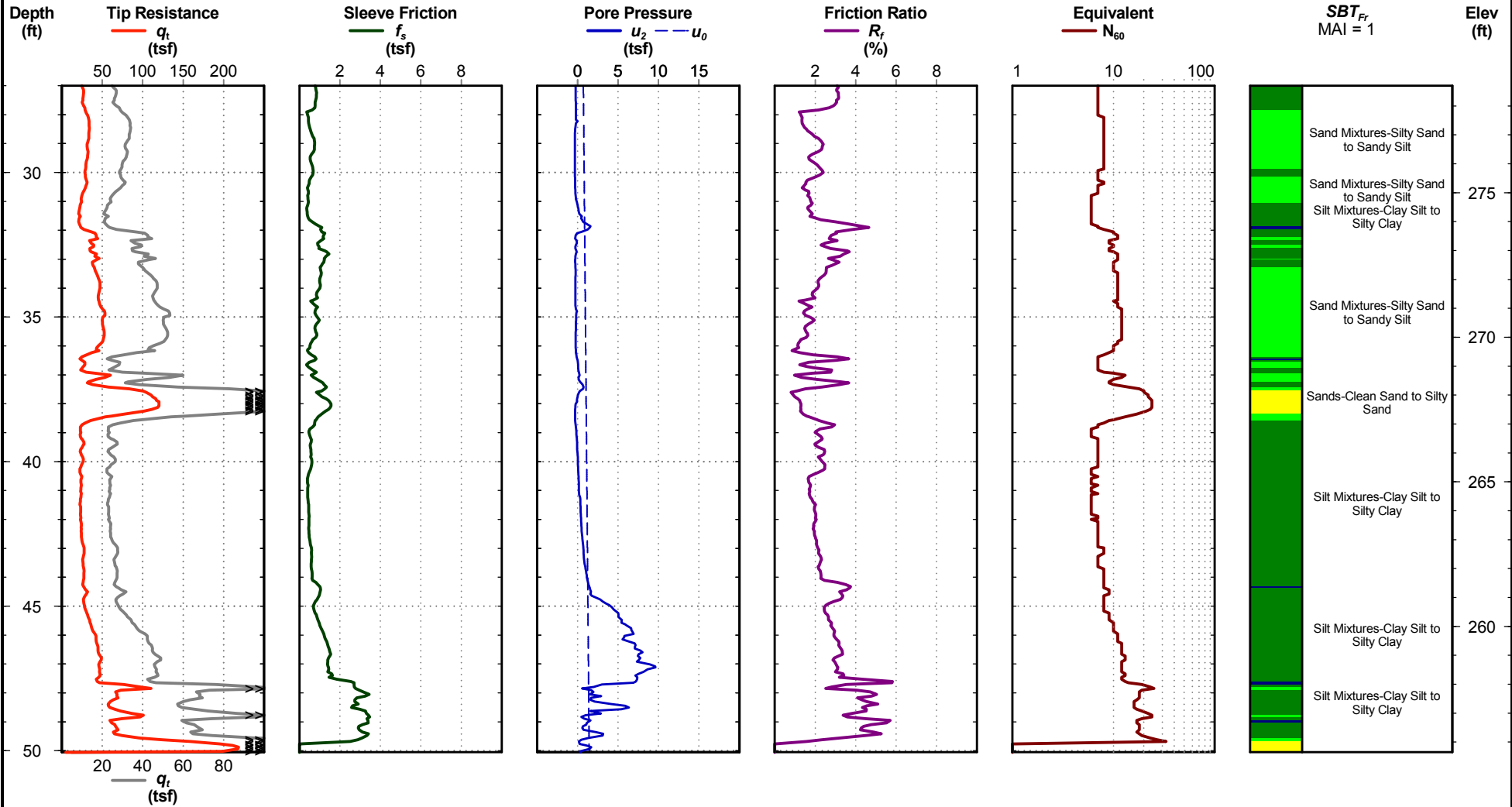


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.039592
Longitude: -81.094669
Elevation: 305.7 ft MSL
Date: May. 22, 2018
Estimated Water Depth: 4 ft
Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B56

Total Depth: 50.1 ft
Termination Criteria: Target Depth
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

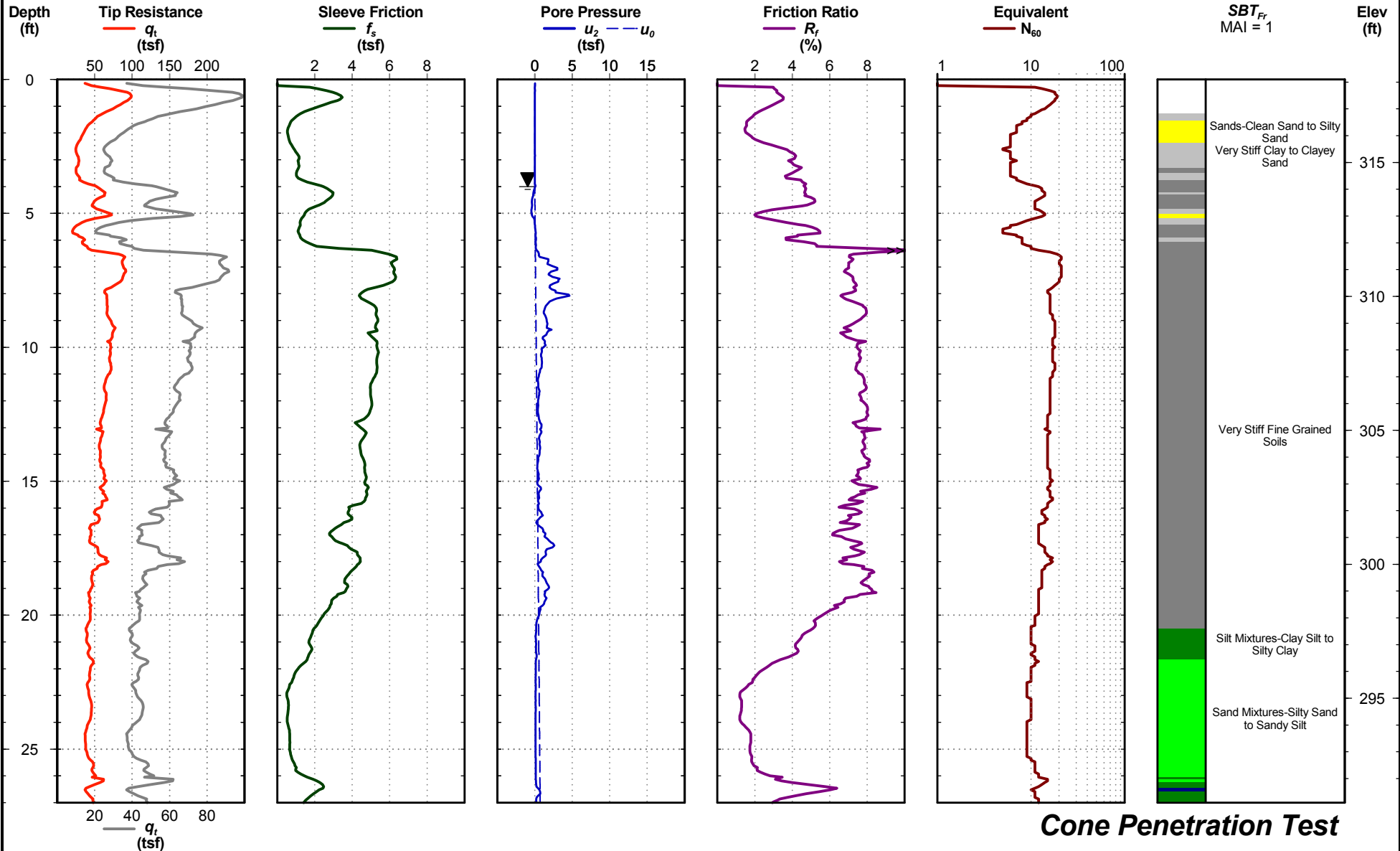


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.039821
 Longitude: -81.093666
 Elevation: 318.1 ft MSL
 Date: May. 21, 2018
 Estimated Water Depth: 4 ft
 Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B58

Total Depth: 50.0 ft
 Termination Criteria: Target Depth
 Cone Size: 1.75



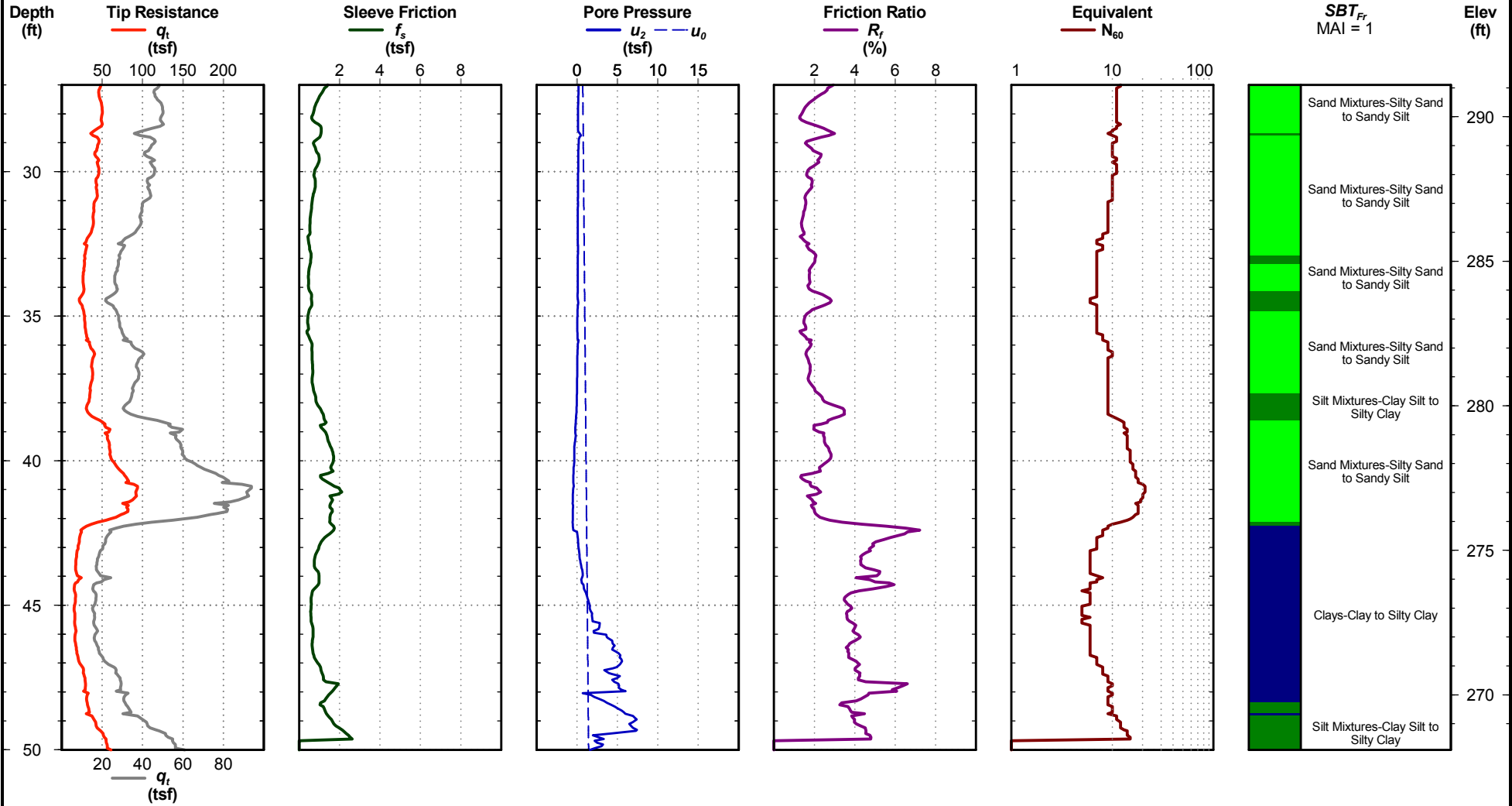


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.039821
Longitude: -81.093666
Elevation: 318.1 ft MSL
Date: May. 21, 2018
Estimated Water Depth: 4 ft
Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-B58

Total Depth: 50.0 ft
Termination Criteria: Target Depth
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

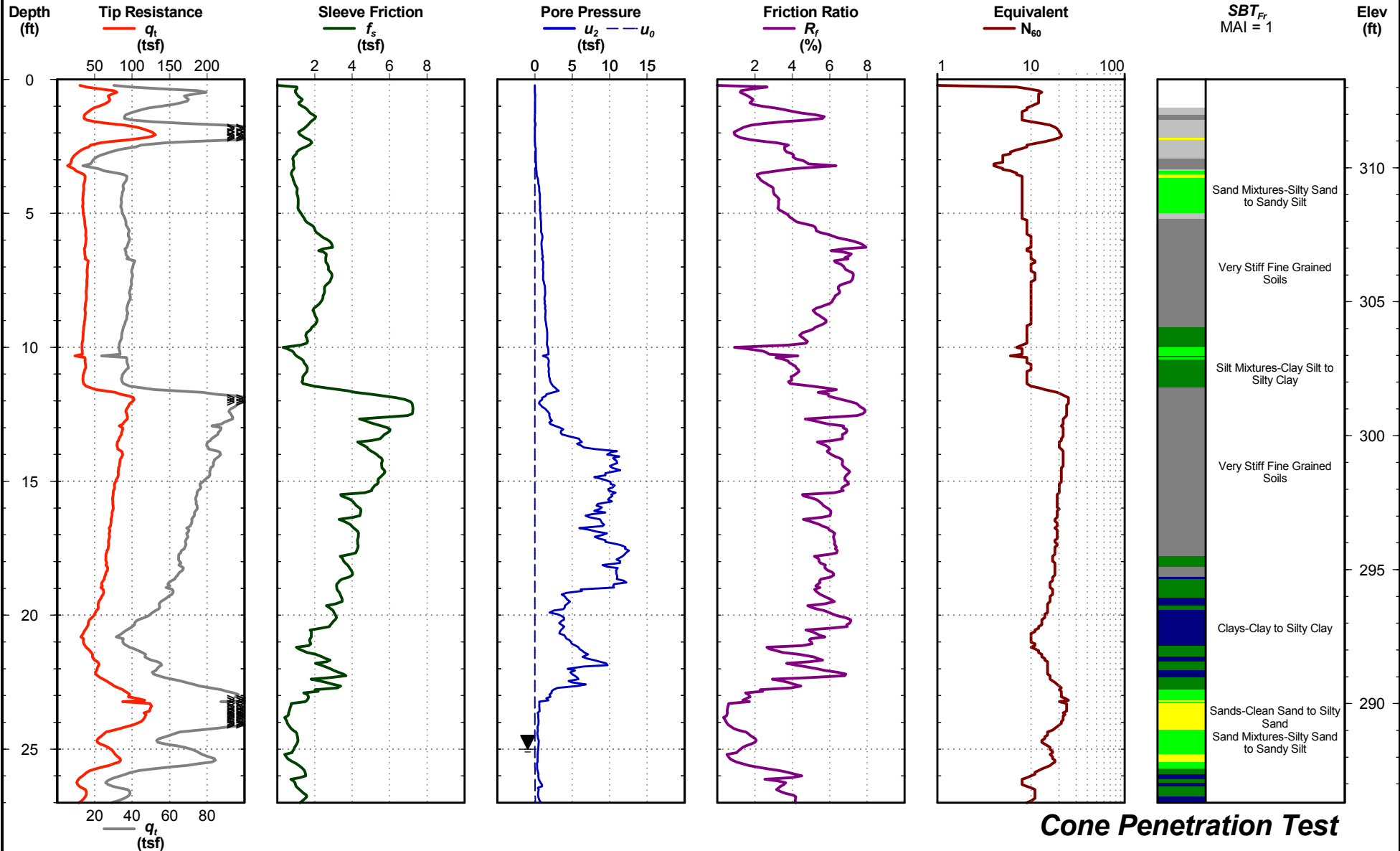


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.038721
 Longitude: -81.098185
 Elevation: 313.3 ft MSL
 Date: Jun. 5, 2018
 Estimated Water Depth: 25 ft
 Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-RW42

Total Depth: 49.9 ft
 Termination Criteria: Target Depth
 Cone Size: 1.75



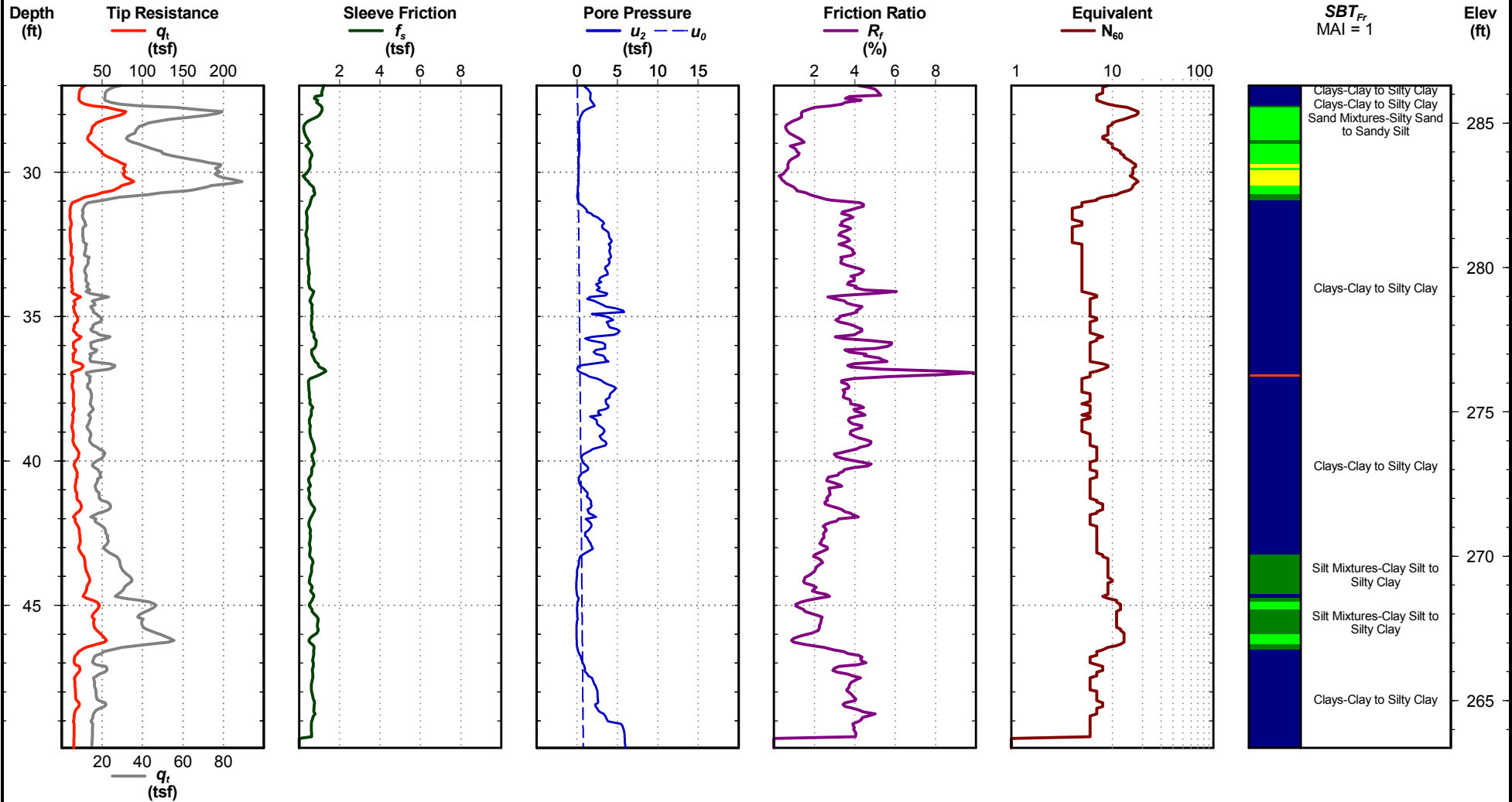


CCR I-20/26/126 Improvement Project
Lexington/Richland
S&ME Project No: 1461-16-047

Latitude: 34.038721
 Longitude: -81.098185
 Elevation: 313.3 ft MSL
 Date: Jun. 5, 2018
 Estimated Water Depth: 25 ft
 Rig/Operator: CPT Truck/D. Watson

Sounding ID: CPT-RW42

Total Depth: 49.9 ft
 Termination Criteria: Target Depth
 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

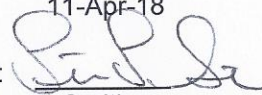
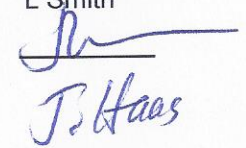
Cone Penetration Test

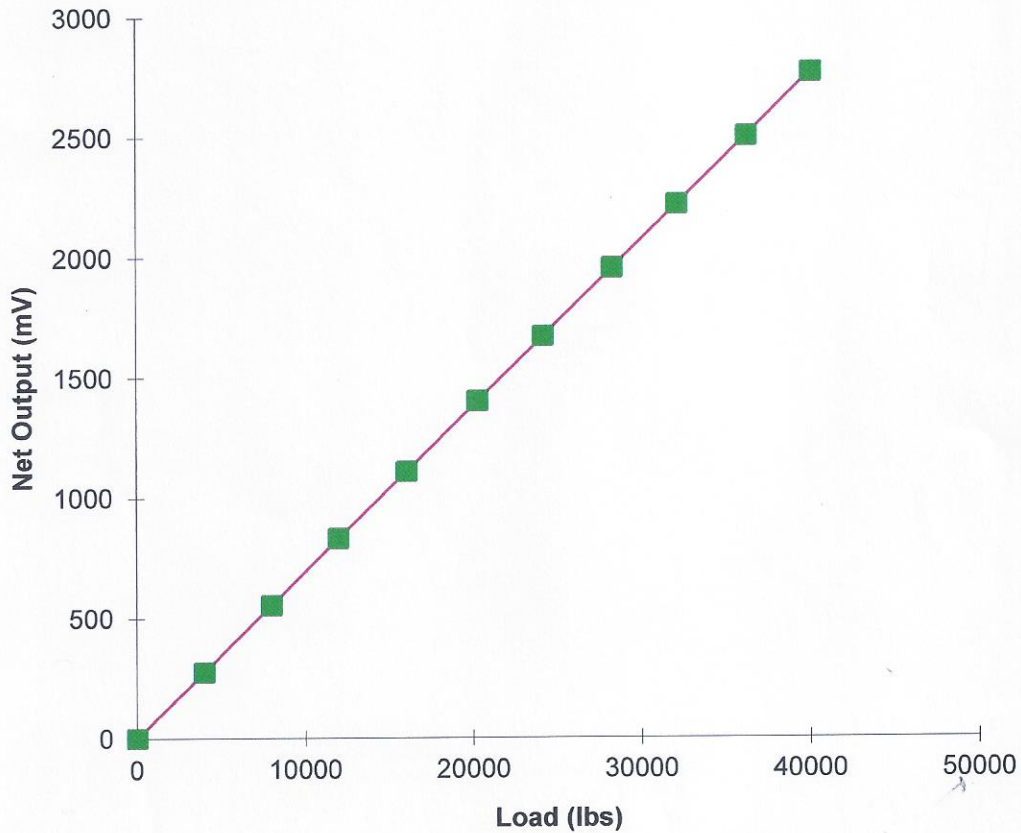


250 Beanville Road
Randolph, Vermont 05060
phone: (800)639-6315 fax: (802)728-9871

Cone Penetrometer Calibration
Digital Cone Tip

Cone Serial No.: 4444.177
Rated Range: 50000 lbs
Load Reference: Ref LC-SN: 390752A
Ref. DVM: MY47029221
Ref. Excitation: 9.887 V_{dc}

Date: 11-Apr-18
Calibrated By: 
L. Smith
Approved By: 
J. Haas



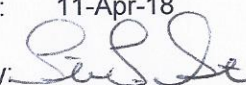
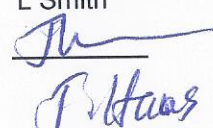
Cal Factor: 69.097E-3 mV/lbs 52.000E-3 nominal
R²: 1.00000
Nonlinearity: 0.13
Zero Load Output: 259.938E-3 mV

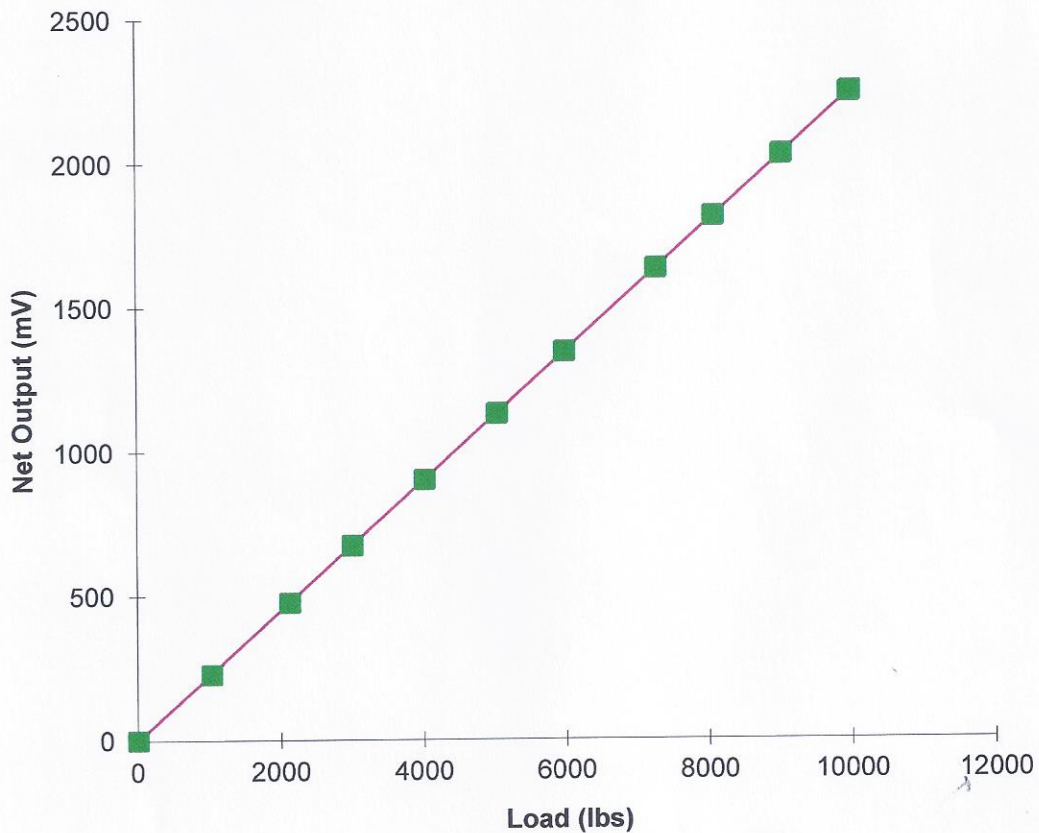


250 Beanville Road
Randolph, Vermont 05060
phone: (800)639-6315 fax: (802)728-9871

Cone Penetrometer Calibration
Digital Cone Sleeve

Cone Serial No.: 4444.177
Rated Range: 10000 lbs
Load Reference: Ref LC-SN: 390752A
Ref. DVM: MY47029221
Ref. Excitation: 9.888 V_{dc}

Date: 11-Apr-18
Calibrated By: 
L Smith
Approved By: 
J Adams




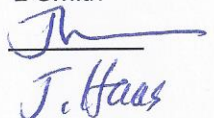
Cal Factor: 224.791E-3 mV/lbs 212.000E-3 nominal
R²: 1.00000
Nonlinearity: 0.10
Zero Load Output: 347.762E-3 mV

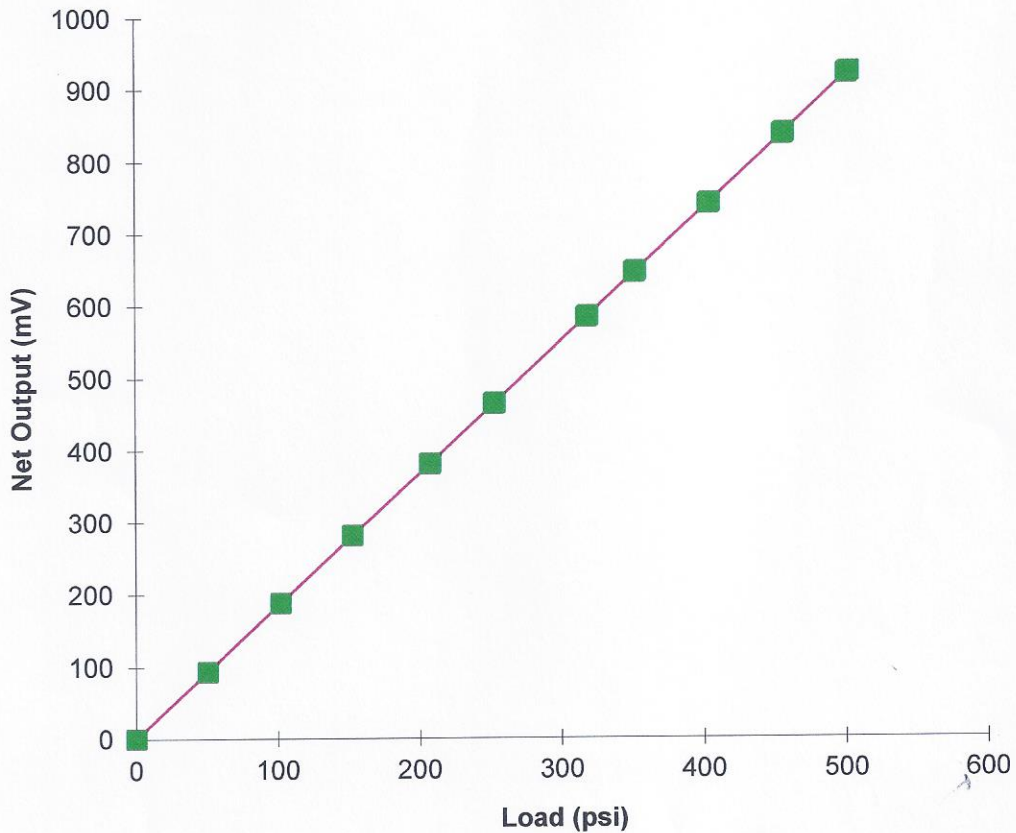


250 Beanville Road
Randolph, Vermont 05060
phone: (800)639-6315 fax: (802)728-9871

Cone Penetrometer Calibration
Digital Cone Pore Pressure

Cone Serial No.: 4444.177
Rated Range: 1000 psi
Load Reference: Ref PT-13131-01G34P
Ref. DVM: MY47029221
Ref. Excitation: 5.034 V_{dc}

Date: 11-Apr-18
Calibrated By: 
L Smith
Approved By: 
J. Haas



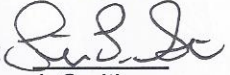

Cal Factor: 1.836E+0 mV/psi 2.500E+0 nominal
R²: 1.00000
Nonlinearity: 0.10
Zero Load Output: 198.302E-3 mV

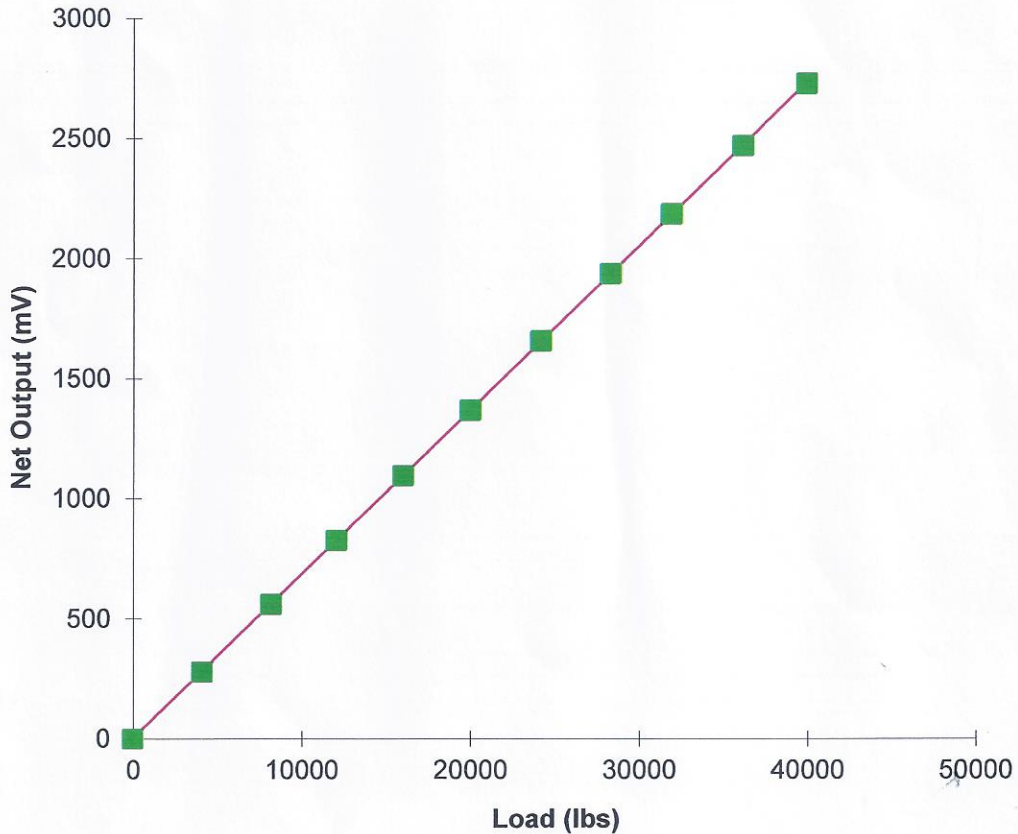


250 Beanville Road
Randolph, Vermont 05060
phone: (800)639-6315 fax: (802)728-9871

Cone Penetrometer Calibration
Digital Cone Tip

Cone Serial No.: 4433.102
Rated Range: 50000 lbs
Load Reference: Ref LC-SN: 390752A
Ref. DVM: MY47029221
Ref. Excitation: 9.884 V_{dc}

Date: 7-Jul-17
Calibrated By: 
L Smith
Approved By: 
J. Haas



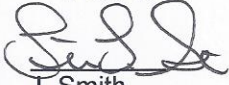
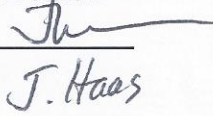
Cal Factor: 68.217E-3 mV/lbs 65.000E-3 nominal
R²: 1.00000
Nonlinearity: 0.14
Zero Load Output: 258.769E-3 mV

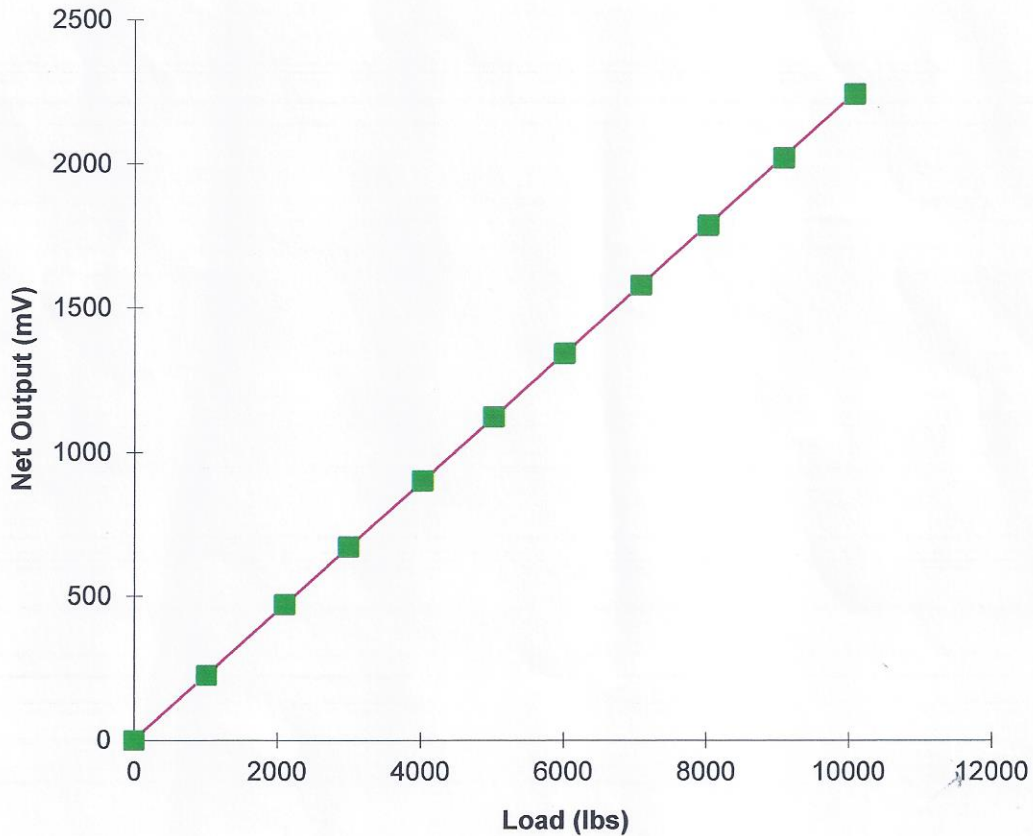


250 Beanville Road
Randolph, Vermont 05060
phone: (800)639-6315 fax: (802)728-9871

Cone Penetrometer Calibration
Digital Cone Sleeve

Cone Serial No.: 4433.102
Rated Range: 10000 lbs
Load Reference: Ref LC-SN: 390752A
Ref. DVM: MY47029221
Ref. Excitation: 9.884 V_{dc}

Date: 7-Jul-17
Calibrated By: 
L. Smith
Approved By: 
J. Haas



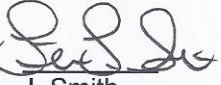
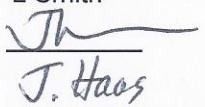
Cal Factor: 222.315E-3 mV/lbs 212.000E-3 nominal
R²: 1.00000
Nonlinearity: 0.16
Zero Load Output: 288.896E-3 mV

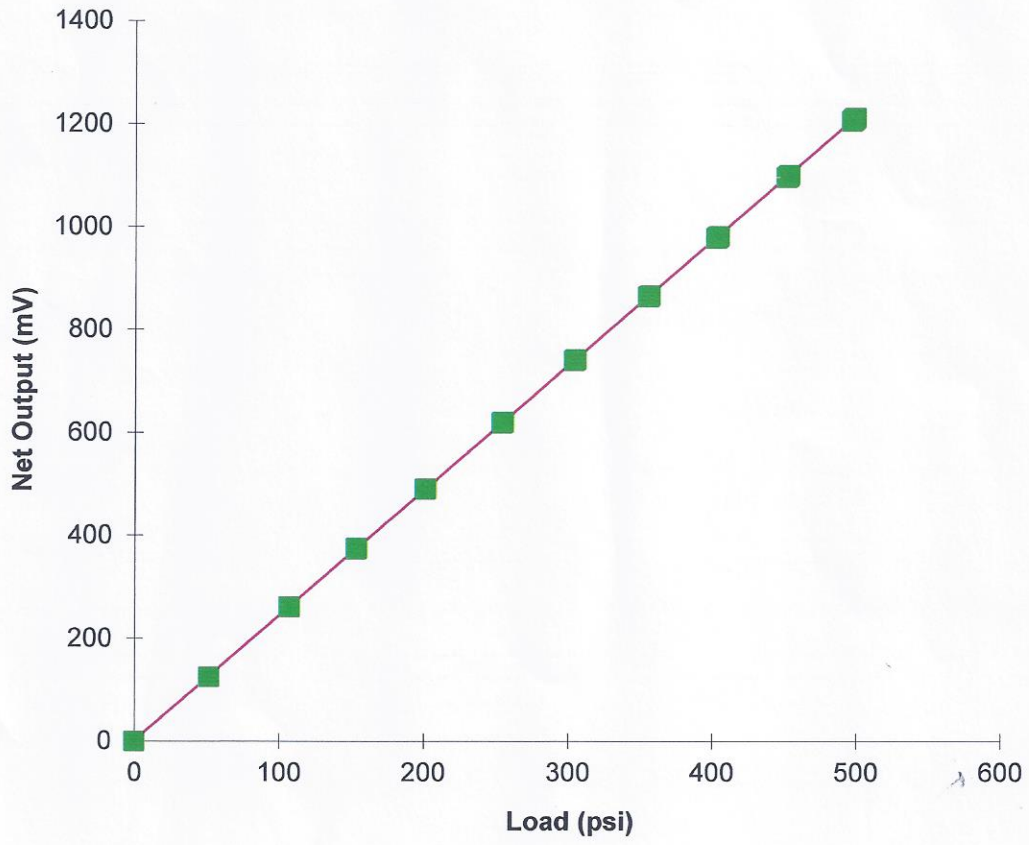


250 Beanville Road
Randolph, Vermont 05060
phone: (800)639-6315 fax: (802)728-9871

Cone Penetrometer Calibration
Digital Cone Pore Pressure

Cone Serial No.: 4433.102
Rated Range: 1000 psi
Load Reference: Ref PT-16244-01PDKV
Ref. DVM: MY47029221
Ref. Excitation: 5.034 V_{dc}

Date: 7-Jul-17
Calibrated By: 
L. Smith
Approved By: 
J. Haas



Cal Factor: 2.427E+0 mV/psi 12.000E+0 nominal
R²: 1.00000
Nonlinearity: 0.13
Zero Load Output: 186.201E-3 mV

Carolina Crossroads – Phase 2

Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 LABORATORY TEST RESULTS

Laboratory Test Data Sheets - Split-Spoon Samples

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

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:	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	N o t e
		ft.		grams	grams	grams	grams	%	
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

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

<u>Derek Baker</u> Technician Name		4/24/2018 Date
<u>Michael D. Kelso, E.I.</u> Technical Responsibility	_____ Signature	Staff Professional 5/23/2018 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



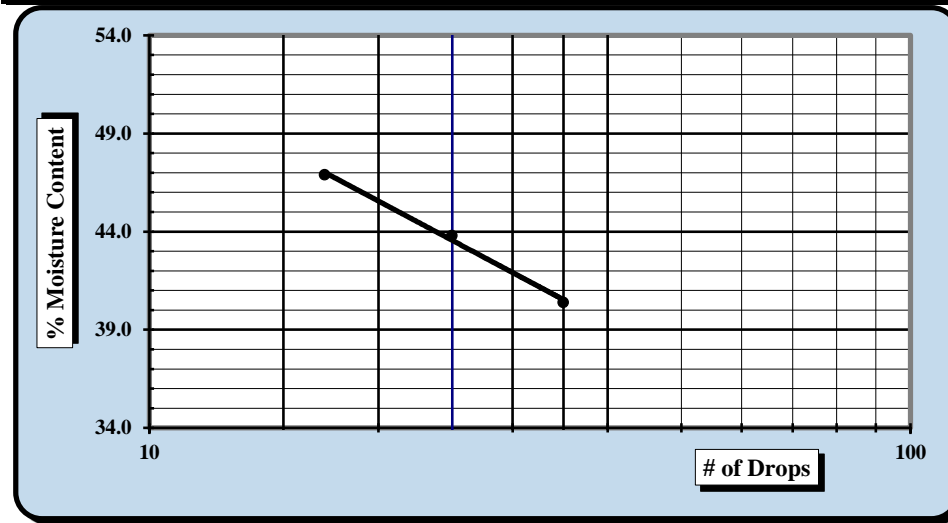
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-56	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	3/16/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Sandy Lean Clay (CL, 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		
		21	22	23			24	25	
A	Tare Weight	28.07	25.68	27.29			25.98	26.78	
B	Wet Soil Weight + A	43.35	39.77	43.92			32.47	33.32	
C	Dry Soil Weight + A	38.95	35.48	38.61			31.28	32.10	
D	Water Weight (B-C)	4.40	4.29	5.31			1.19	1.22	
E	Dry Soil Weight (C-A)	10.88	9.80	11.32			5.30	5.32	
F	% Moisture (D/E)*100	40.4%	43.8%	46.9%			22.5%	22.9%	
N	# OF DROPS	35	25	17			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	44
Plastic Limit	23
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

Benjamin J. Kovaleski
 Technician Name

5/04/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/04/18
 Date

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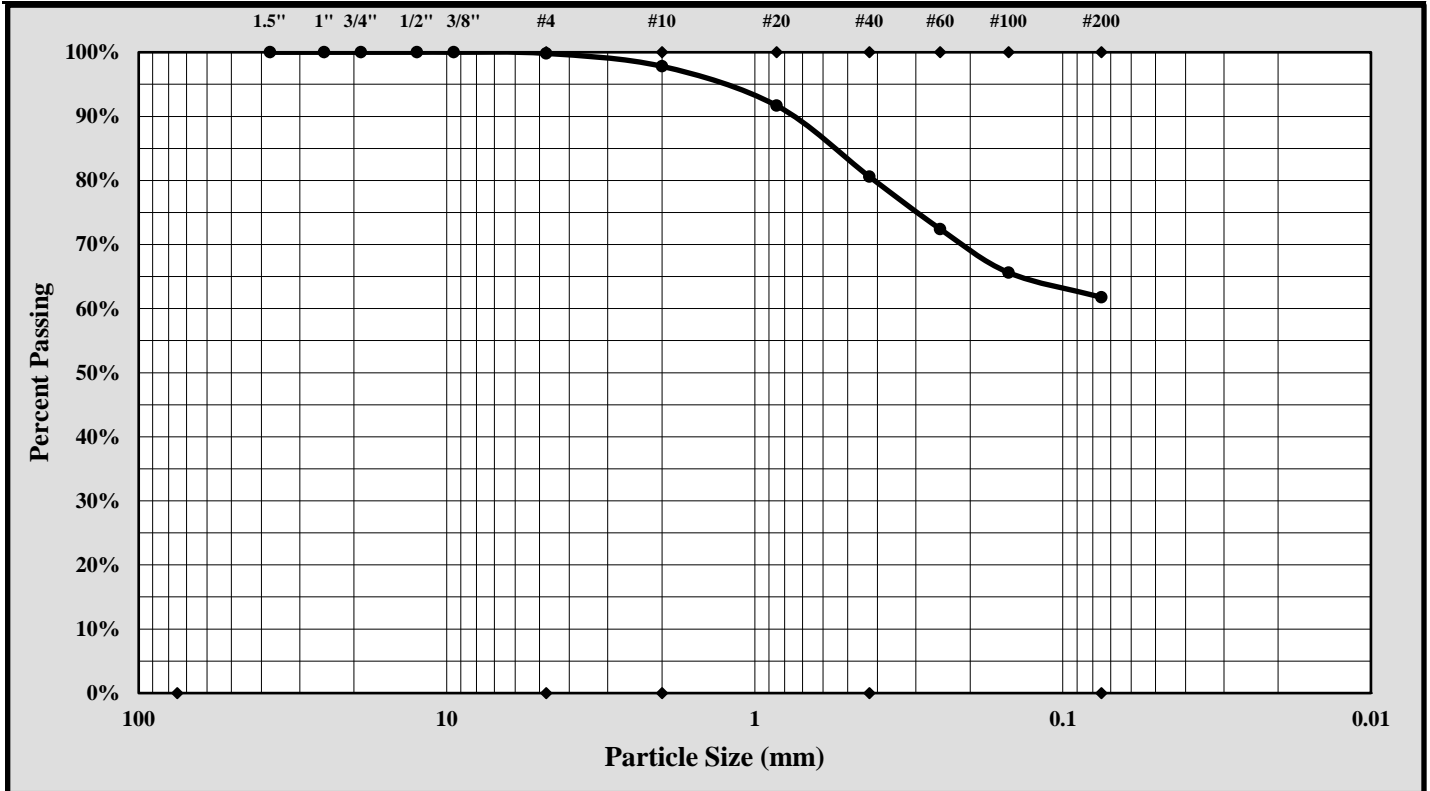


Particle Size Analysis of Soils

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-56	Sample #:	SS-1
		Sample Date:	3/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Sandy Lean Clay (CL, 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): 61.8% Total Sand: 38.0%

Liquid Limit	44	Plastic Limit	23	Plastic Index	21
Coarse Sand:	2.0%	Medium Sand:	17.2%	Fine Sand:	18.8%
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

5/04/18

Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



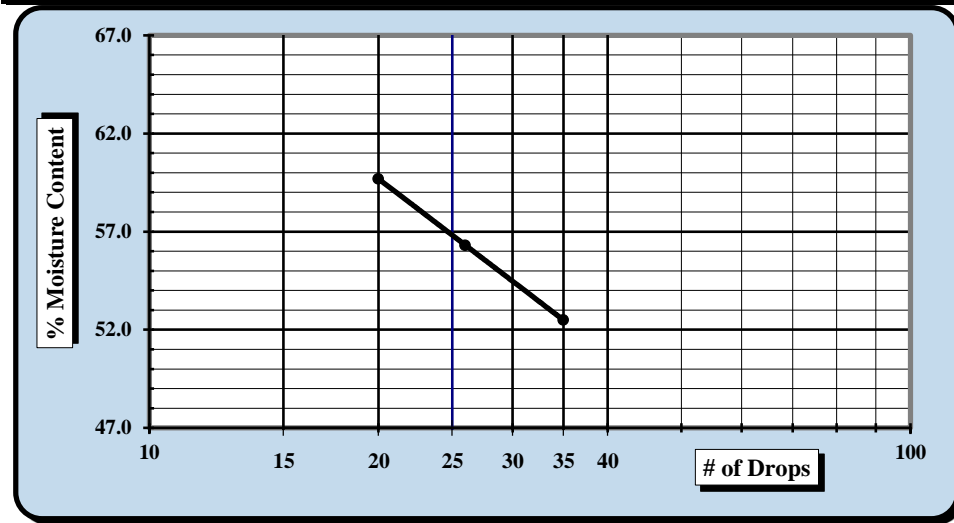
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-56	Sample #:	SS-2
Location:	Bridge Boring	Sample Date:	3/16/18
Type:	Split-spoon	Depth:	2.0' - 4.0'

Sample Description: Sandy Fat Clay (CL, 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			
		26	27	28			29	30		
A	Tare Weight	27.34	26.99	26.83				26.99	27.37	
B	Wet Soil Weight + A	44.01	41.24	40.02				33.59	34.36	
C	Dry Soil Weight + A	38.27	36.11	35.09				32.09	32.79	
D	Water Weight (B-C)	5.74	5.13	4.93				1.50	1.57	
E	Dry Soil Weight (C-A)	10.93	9.12	8.26				5.10	5.42	
F	% Moisture (D/E)*100	52.5%	56.3%	59.7%				29.4%	29.0%	
N	# OF DROPS	35	26	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							29.2%		



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	57
Plastic Limit	29
Plastic Index	28
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>5/04/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/04/18</u> Date
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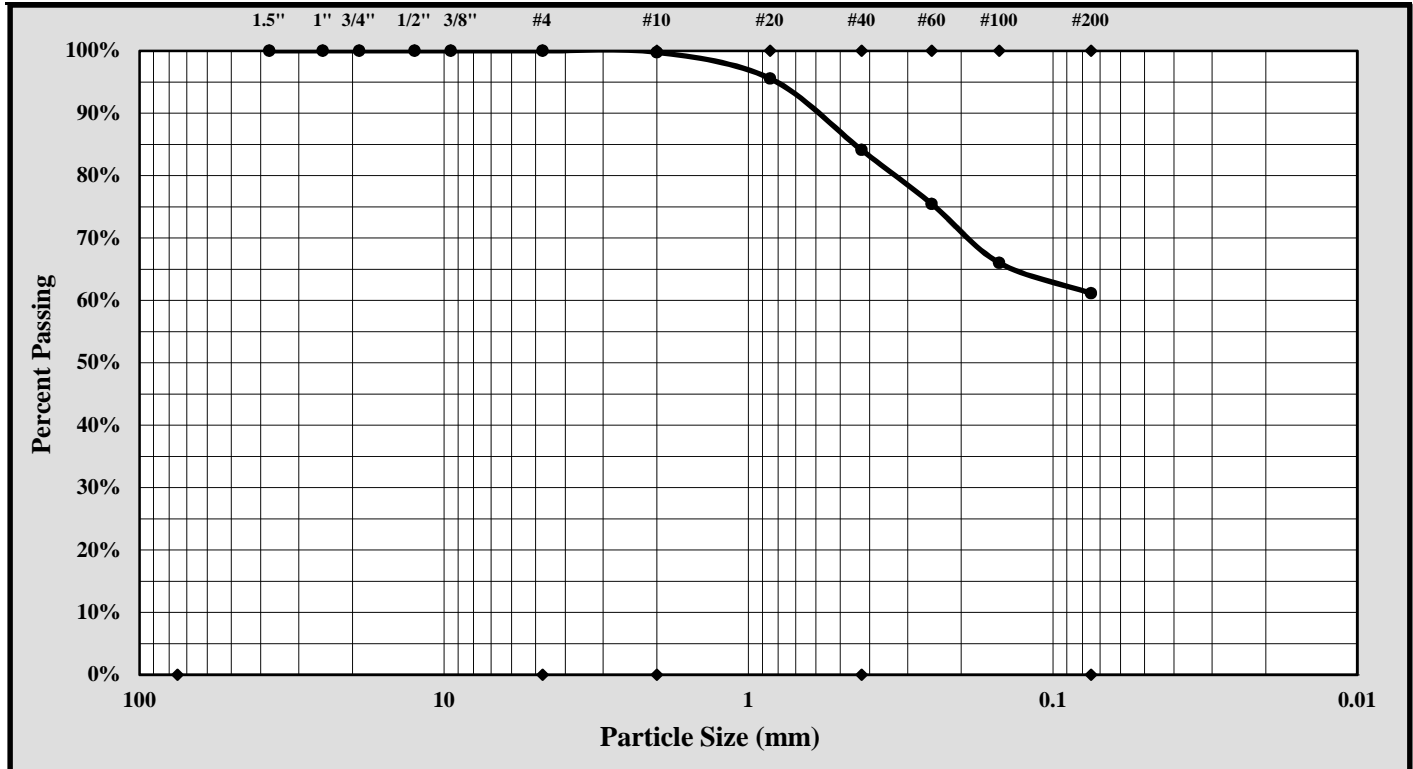


Particle Size Analysis of Soils

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-56	Sample #:	SS-2
		Sample Date:	3/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
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:	2.00 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	61.2%	Total Sand:	38.8%

Liquid Limit	57	Plastic Limit	29	Plastic Index	28
Coarse Sand:	0.2%	Medium Sand:	15.7%	Fine Sand:	22.9%

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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



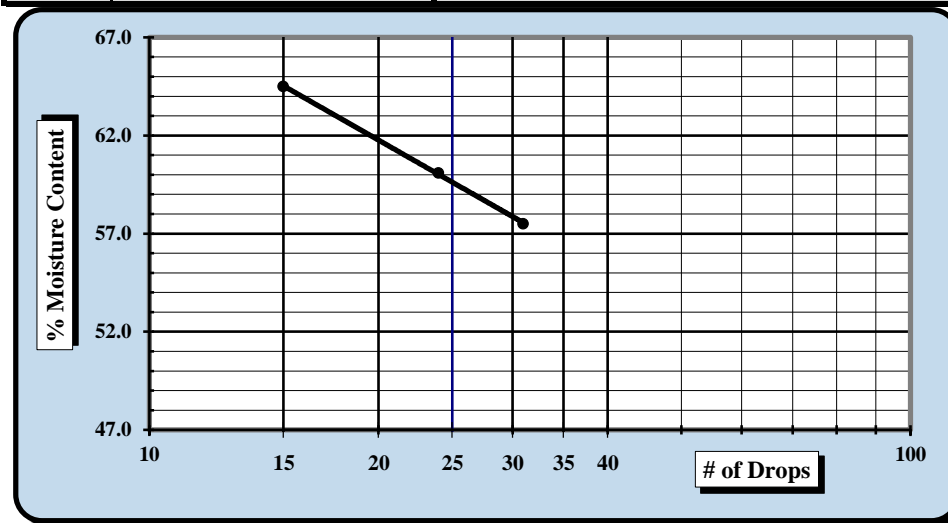
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-56	Sample #:	SS-10
Location:	Bridge Boring	Sample Date:	3/16/18
Type:	Split-spoon	Depth:	33.5' - 35.0'

Sample Description: Elastic Silt with Sand (MH, A-7-5(21))					
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	28.62	27.64	26.69			28.25	26.95	
B	Wet Soil Weight + A	43.13	41.97	42.76			35.68	33.24	
C	Dry Soil Weight + A	37.83	36.59	36.46			33.73	31.59	
D	Water Weight (B-C)	5.30	5.38	6.30			1.95	1.65	
E	Dry Soil Weight (C-A)	9.21	8.95	9.77			5.48	4.64	
F	% Moisture (D/E)*100	57.5%	60.1%	64.5%			35.6%	35.6%	
N	# OF DROPS	31	24	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						35.6%		



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	60
Plastic Limit	36
Plastic Index	24
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

5/04/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/04/18
Date

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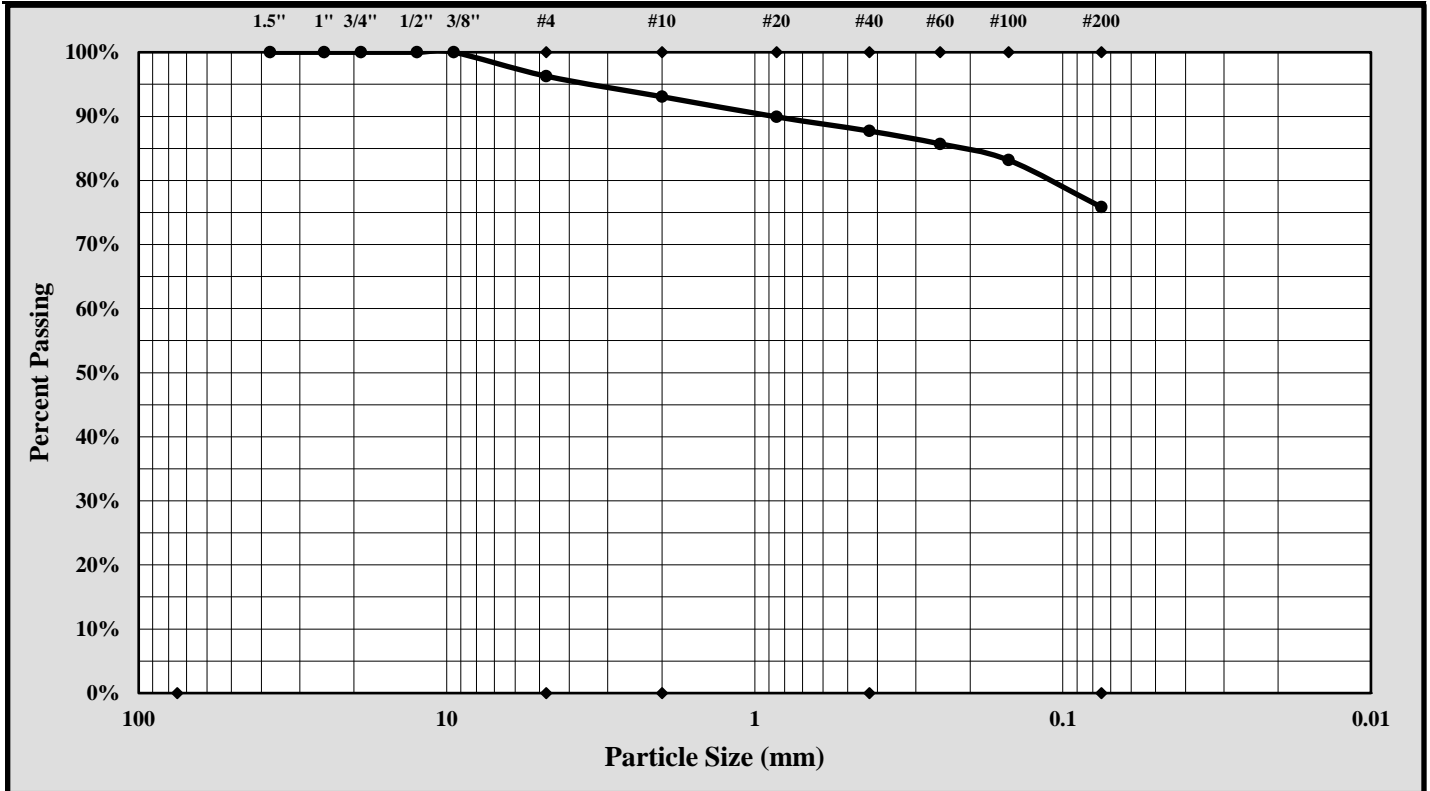


Particle Size Analysis of Soils

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-56	Sample #:	SS-10
		Sample Date:	3/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	33.5' - 35.0'
Sample Description:	Elastic Silt with Sand (MH, A-7-5(21))		



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: 3.7%
 Silt & Clay (% Passing #200): 75.8% Total Sand: 20.4%

Liquid Limit	60	Plastic Limit	36	Plastic Index	24
Coarse Sand:	3.2%	Medium Sand:	5.4%	Fine Sand:	11.9%
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

5/04/18

Date

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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:	3/19/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-57	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	1/09/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

Sample Description: Gravelly Silt with Sand (ML, A-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			
		31	32	33			34	35		
A	Tare Weight	28.62	27.62	26.69				28.28	26.97	
B	Wet Soil Weight + A	47.94	46.34	42.32				34.58	33.86	
C	Dry Soil Weight + A	42.43	40.78	37.46				33.02	32.16	
D	Water Weight (B-C)	5.51	5.56	4.86				1.56	1.70	
E	Dry Soil Weight (C-A)	13.81	13.16	10.77				4.74	5.19	
F	% Moisture (D/E)*100	39.9%	42.2%	45.1%				32.9%	32.8%	
N	# OF DROPS	28	21	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							32.9%		



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	41
Plastic Limit	33
Plastic Index	8
Group Symbol	ML

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 65.5%

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
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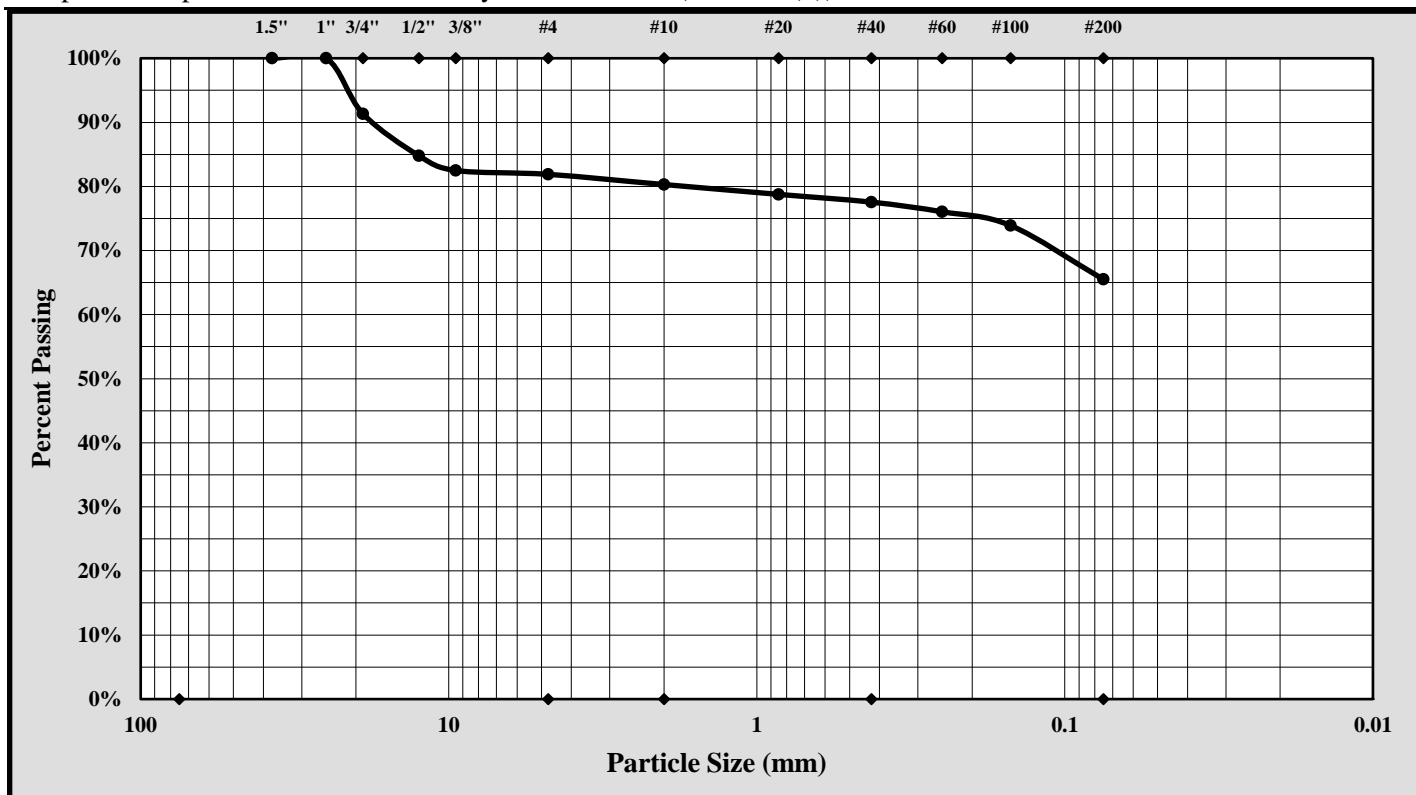
Particle Size Analysis of Soils

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-57	Sample #:	SS-1
		Sample Date:	1/09/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Gravelly Silt with Sand (ML, A-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: 25.0 mm Gravel: 18.1%
 Silt & Clay (% Passing #200): 65.5% Total Sand: 16.4%

Liquid Limit 41 Plastic Limit 33 Plastic Index 8

Coarse Sand: 1.6% Medium Sand: 2.7% Fine Sand: 12.1%

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

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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:	3/19/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-57	Sample #:	SS-6
Location:	Bridge Boring	Sample Date:	1/09/18
Type:	Split-spoon	Depth:	13.5' - 15.0'

Sample Description: Clayey Sand (SC, A-2-7(3))					
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	25.72	26.20	26.30			25.87	26.28	
B	Wet Soil Weight + A	33.21	35.52	38.61			33.75	33.59	
C	Dry Soil Weight + A	30.64	32.20	34.00			31.98	31.95	
D	Water Weight (B-C)	2.57	3.32	4.61			1.77	1.64	
E	Dry Soil Weight (C-A)	4.92	6.00	7.70			6.11	5.67	
F	% Moisture (D/E)*100	52.2%	55.3%	59.9%			29.0%	28.9%	
N	# OF DROPS	31	25	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						29.0%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	55	
Plastic Limit	29	
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: 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

<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
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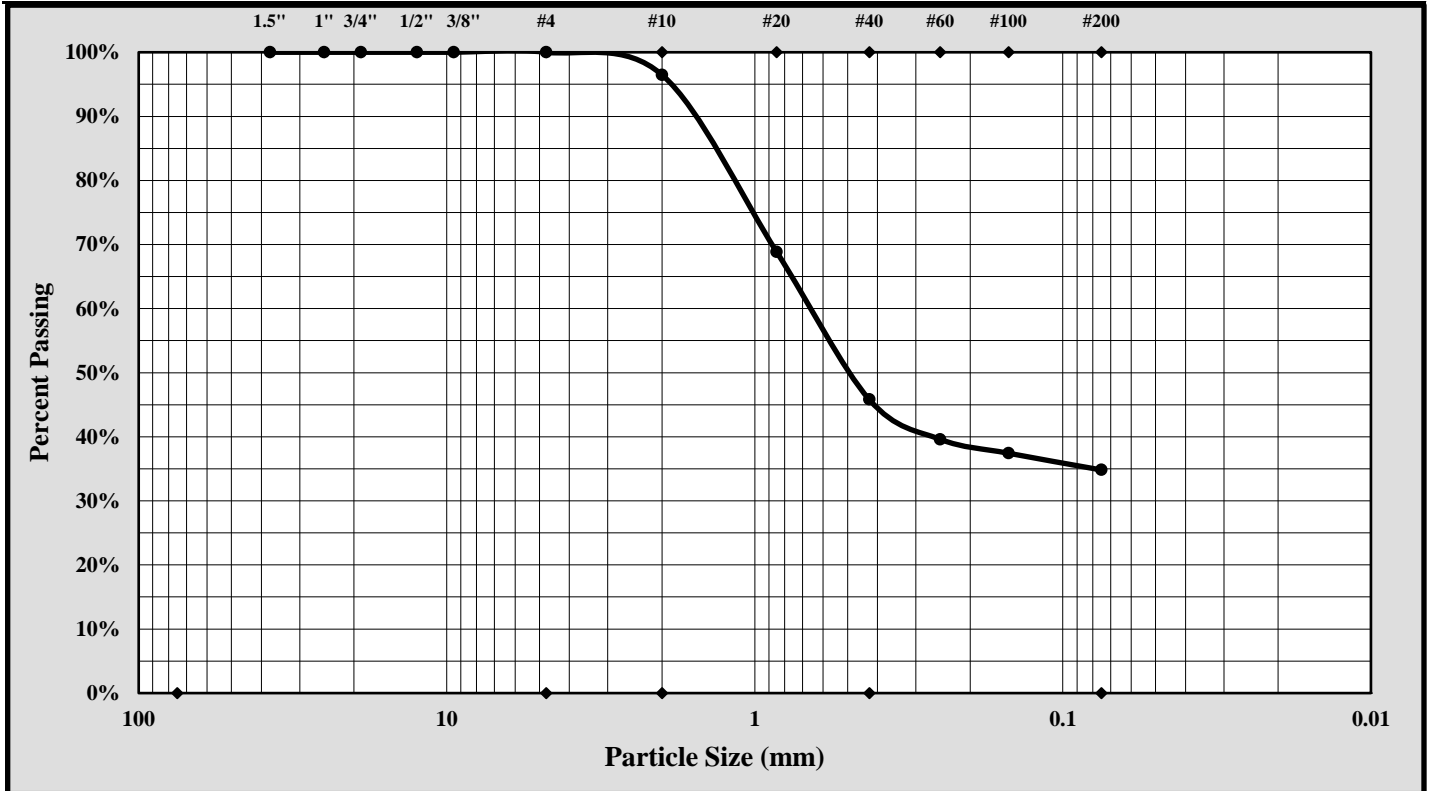


Particle Size Analysis of Soils

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-57	Sample #:	SS-6
		Sample Date:	1/09/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
Sample Description:	Clayey Sand (SC, A-2-7(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: 4.75 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 34.8% Total Sand: 65.2%

Liquid Limit	55	Plastic Limit	29	Plastic Index	26
Coarse Sand:	3.5%	Medium Sand:	50.7%	Fine Sand:	11.0%
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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



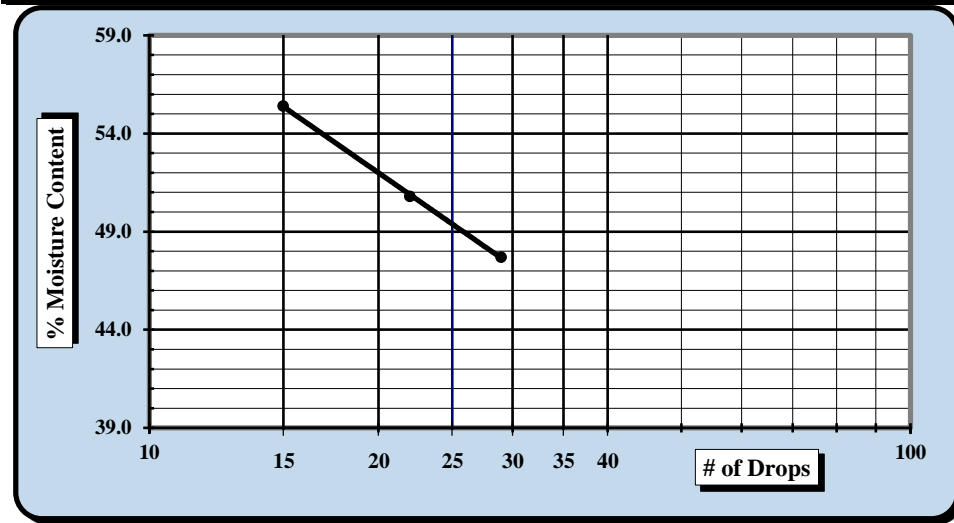
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/22/18
Project Name:	Carolina Crossroads Project	Test Date:	3/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-57	Sample #:	SS-11
Location:	Bridge Boring	Sample Date:	1/10/18
Type:	Split-spoon	Depth:	38.5' - 40.0'

Sample Description: Silt with Sand (ML, A-7-5(18))					
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	26.34				25.94	26.96	
B	Wet Soil Weight + A	39.58	43.72	43.20				33.45	34.60	
C	Dry Soil Weight + A	35.42	37.91	37.19				31.71	32.83	
D	Water Weight (B-C)	4.16	5.81	6.01				1.74	1.77	
E	Dry Soil Weight (C-A)	8.73	11.44	10.85				5.77	5.87	
F	% Moisture (D/E)*100	47.7%	50.8%	55.4%				30.2%	30.2%	
N	# OF DROPS	29	22	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							30.2%		



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	30
Plastic Index	19
Group Symbol	ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 82.6%

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>3/22/18</u> Date	 Technical Responsibility	<u>3/22/18</u> Date
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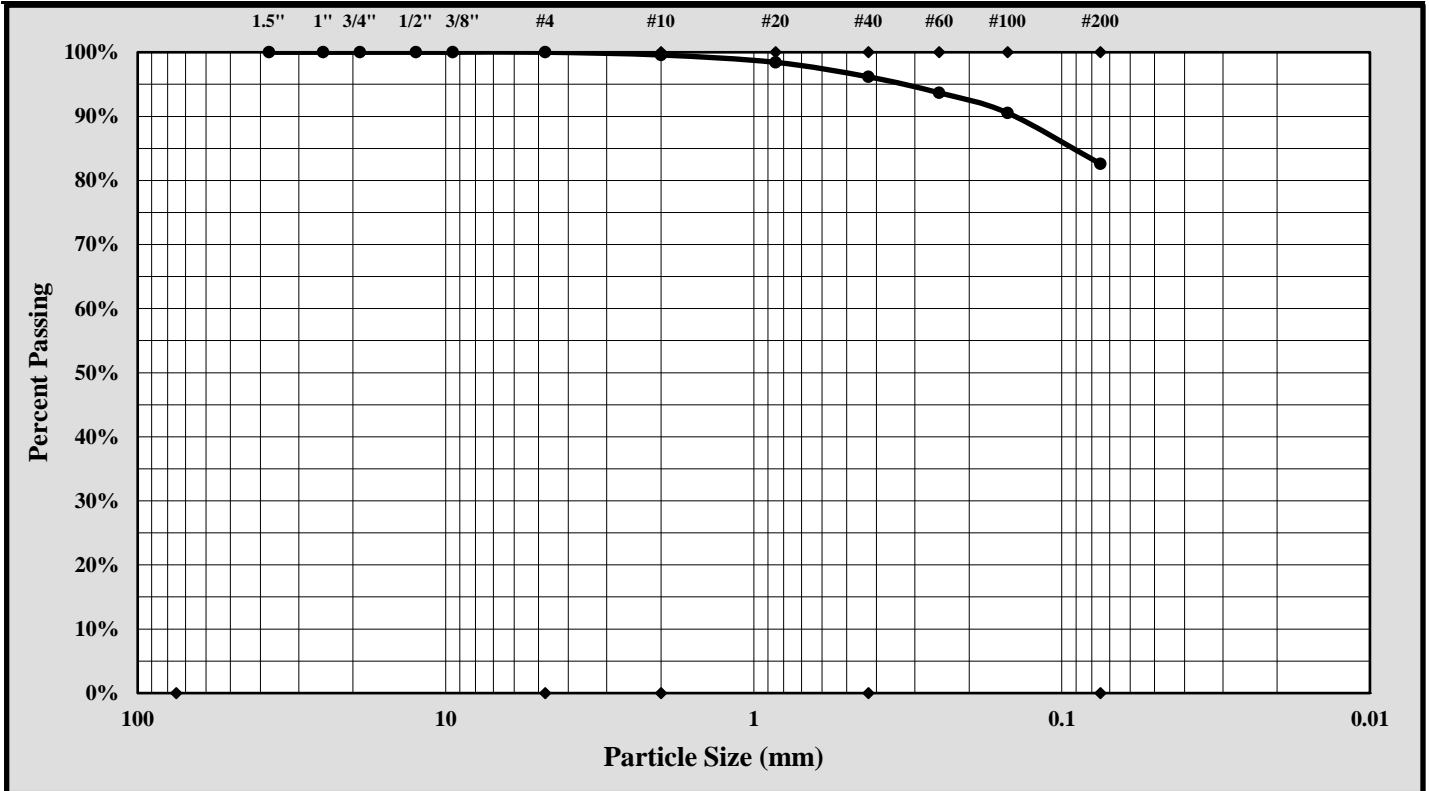


Particle Size Analysis of Soils

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 - 3/13/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-57	Sample #:	SS-11
		Sample Date:	1/10/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	38.5' - 40.0'
Sample Description:	Silt with Sand (ML, A-7-5(18))		



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): 82.6% Total Sand: 17.4%

Liquid Limit 49 Plastic Limit 30 Plastic Index 19

Coarse Sand: 0.4% Medium Sand: 3.4% Fine Sand: 13.6%

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

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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:	3/22/18
Project Name:	Carolina Crossroads Project	Test Date:	3/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-57	Sample #:	SS-15
Location:	Bridge Boring	Sample Date:	1/10/18
Type:	Split-spoon	Depth:	58.5' - 60.0'

Sample Description: Sandy Silt (ML, 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		
		6	7	8				9	10	
A	Tare Weight	27.77	26.30	27.32				26.85	26.76	
B	Wet Soil Weight + A	47.55	44.94	44.53				33.32	34.70	
C	Dry Soil Weight + A	42.25	39.62	39.16				31.95	33.02	
D	Water Weight (B-C)	5.30	5.32	5.37				1.37	1.68	
E	Dry Soil Weight (C-A)	14.48	13.32	11.84				5.10	6.26	
F	% Moisture (D/E)*100	36.6%	39.9%	45.4%				26.9%	26.8%	
N	# OF DROPS	35	28	17				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							26.9%		



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	41
Plastic Limit	27
Plastic Index	14
Group Symbol	ML

Multipoint Method
 One-point Method

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

Benjamin J. Kovaleski
Technician Name

3/22/18
Date

Brian Vaughan
Technical Responsibility

3/22/18
Date

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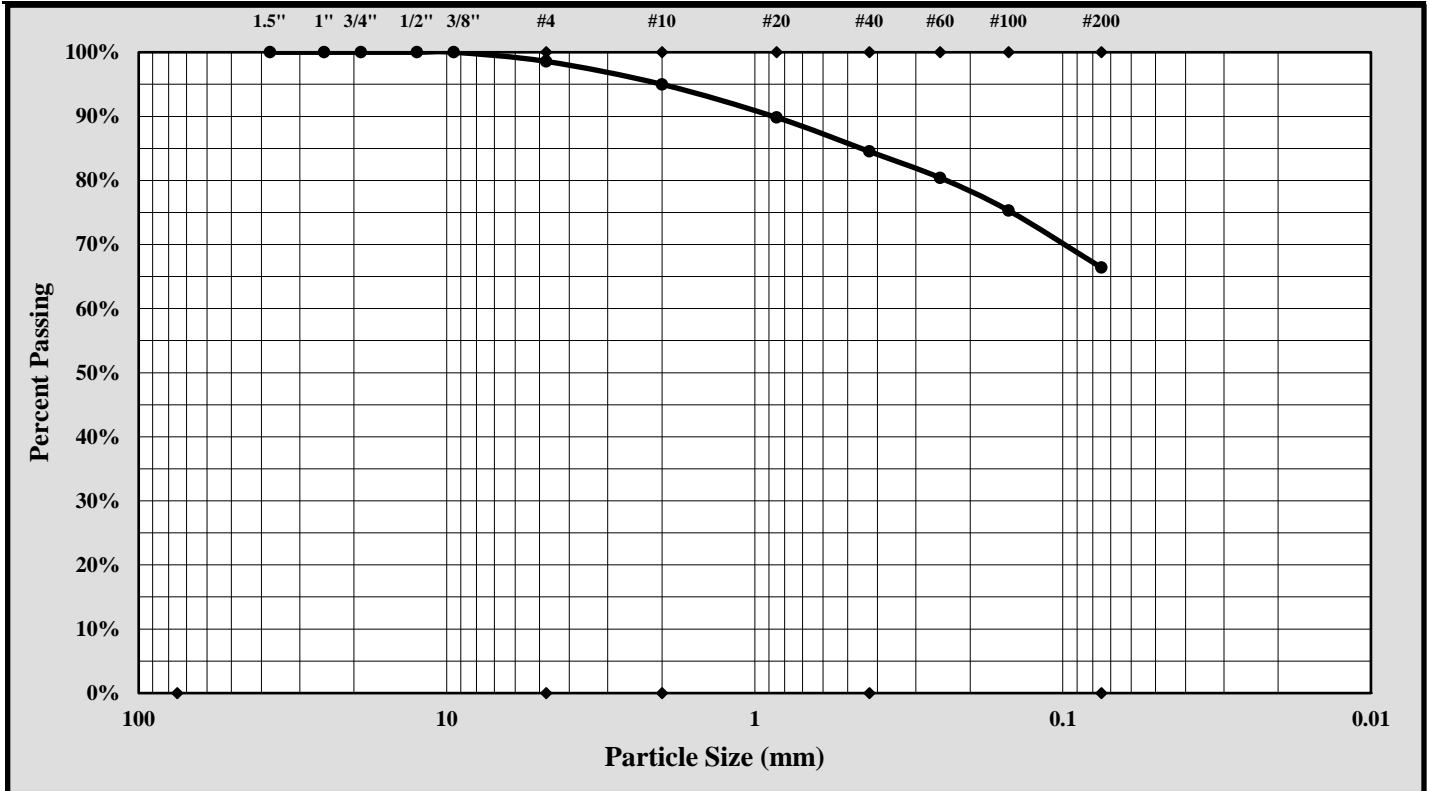


Particle Size Analysis of Soils

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 - 3/13/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-57	Sample #:	SS-15
		Sample Date:	1/10/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	58.5' - 60.0'
Sample Description:	Sandy Silt (ML, 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:	9.50 mm	Gravel:	1.4%
Silt & Clay (% Passing #200):	66.4%	Total Sand:	32.2%

Liquid Limit	41	Plastic Limit	27	Plastic Index	14
Coarse Sand:	3.6%	Medium Sand:	10.5%	Fine Sand:	18.1%
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

Brian Vaughan
Signature

Group Leader
Position

3/21/18
Date

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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)	5/17/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-58	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 2.0'

Sample Description: Clayey sand (SC, A-7-6 (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		
		C-76	C-78	32-B			30	29	
A	Tare Weight	22.58	15.56	17.84			17.81	17.80	
B	Wet Soil Weight + A	30.51	26.53	27.75			25.27	26.35	
C	Dry Soil Weight + A	27.24	22.16	23.92			23.79	24.67	
D	Water Weight (B-C)	3.27	4.37	3.83			1.48	1.68	
E	Dry Soil Weight (C-A)	4.66	6.60	6.08			5.98	6.87	
F	% Moisture (D/E)*100	70.2%	66.2%	63.0%			24.7%	24.5%	
N	# OF DROPS	15	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.6%		



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	66
Plastic Limit	25
Plastic Index	41
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

5/17/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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Sieve Analysis of Soils

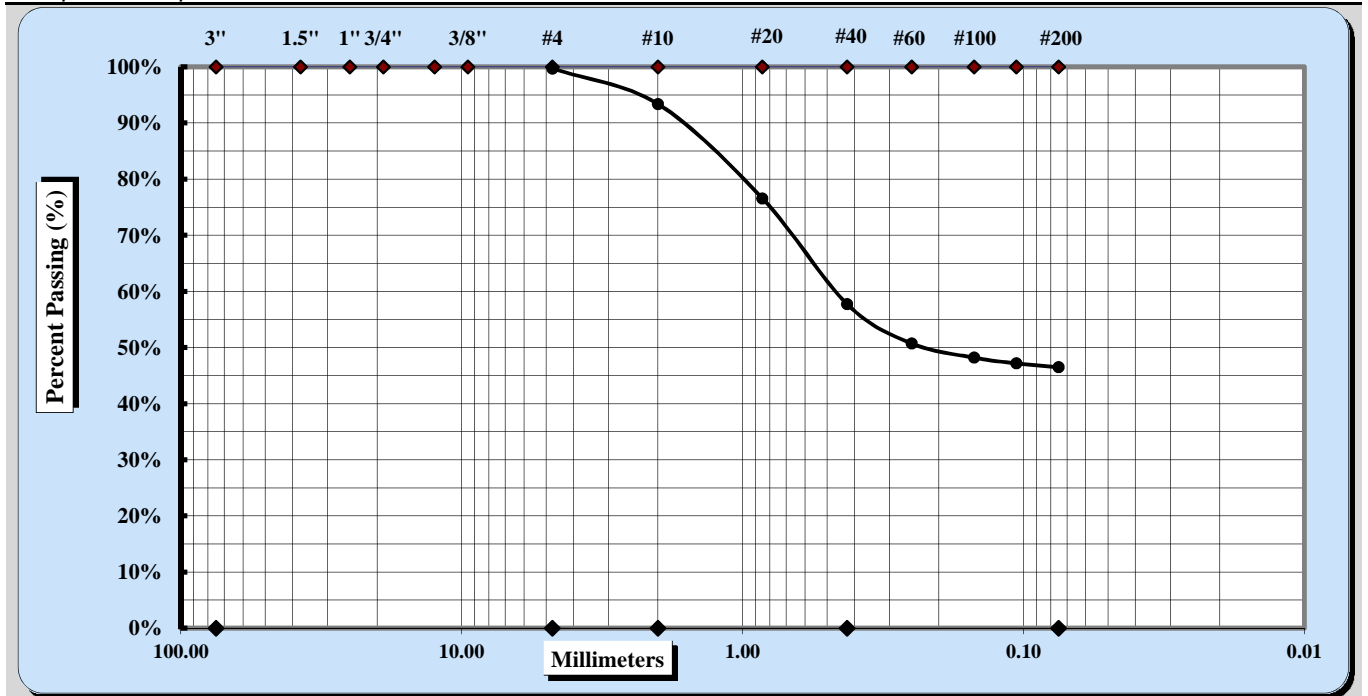


Quality Assurance

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-58	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	1
		Depth:	0.0' - 2.0'
Sample Description:	Clayey sand (SC, A-7-6 (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	6%	Fine Sand	11%
Gravel	0%	Medium Sand	36%	Silt & Clay	46%
Liquid Limit	66	Plastic Limit	25	Plastic Index	41

Coarse Sand	6%	Medium Sand	36%	Fine Sand	11%
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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



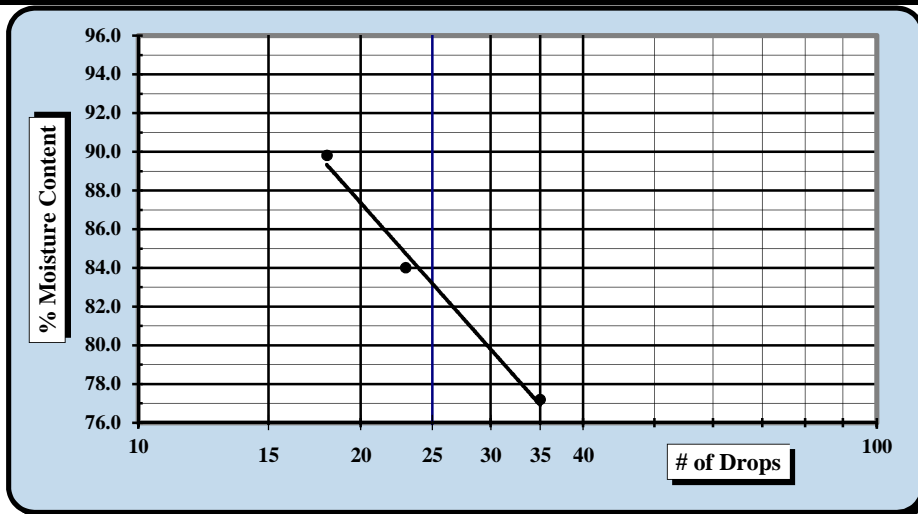
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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)	5/17/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-58	Sample #:	SS-6
Log #:	43-2321	Sample Date:	Various
		Depth:	13.5' - 15.0'

Sample Description: Clayey sand (SC, A-7-5 (15))					
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		
		18	20	1		2	7	
A	Tare Weight	15.42	15.46	15.34		15.55	15.40	
B	Wet Soil Weight + A	22.50	23.41	24.29		22.95	22.78	
C	Dry Soil Weight + A	19.15	19.78	20.39		21.15	21.00	
D	Water Weight (B-C)	3.35	3.63	3.90		1.80	1.78	
E	Dry Soil Weight (C-A)	3.73	4.32	5.05		5.60	5.60	
F	% Moisture (D/E)*100	89.8%	84.0%	77.2%		32.1%	31.8%	
N	# OF DROPS	18	23	35		Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR							
Ave.	Average					32.0%		



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	83
Plastic Limit	32
Plastic Index	51
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

5/17/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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Sieve Analysis of Soils

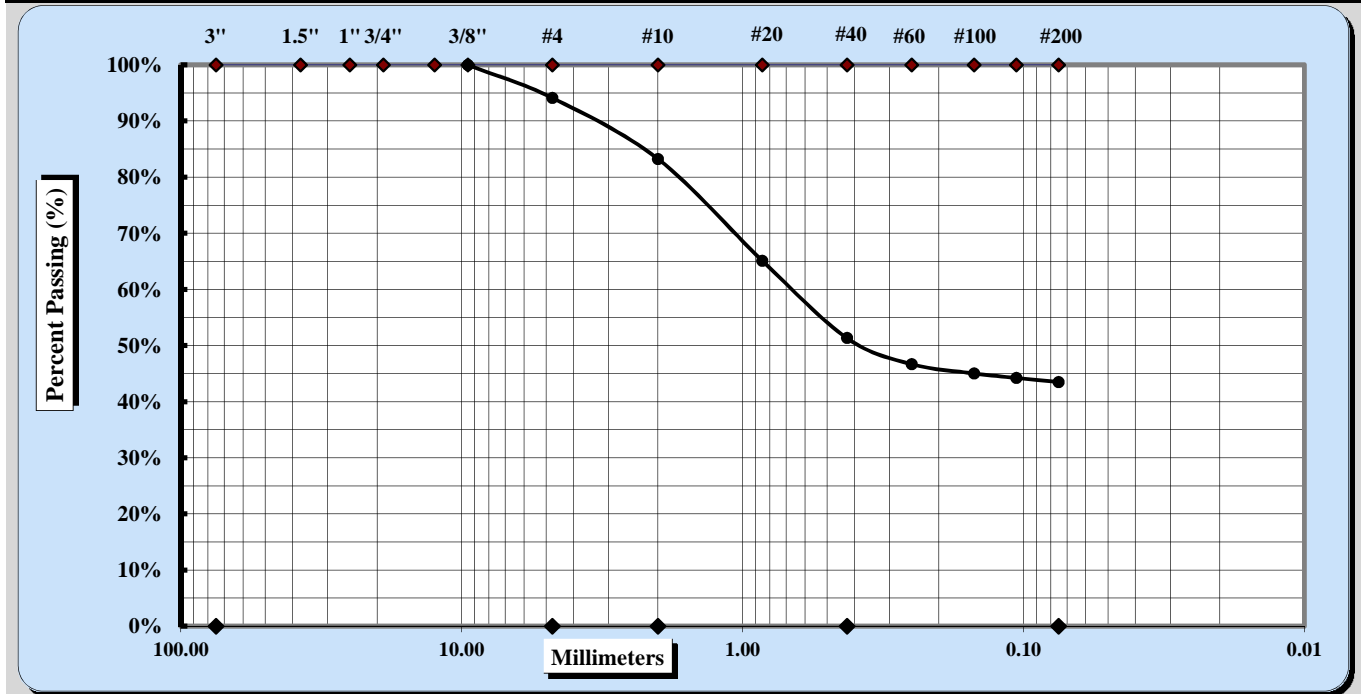


Quality Assurance

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-58	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	6
		Depth:	13.5' - 15.0'
Sample Description:	Clayey sand (SC, A-7-5 (15))		



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	11%	Fine Sand	8%
Gravel	6%	Medium Sand	32%	Silt & Clay	43%
Liquid Limit	83	Plastic Limit	32	Plastic Index	51

Coarse Sand	11%	Medium Sand	32%	Fine Sand	8%
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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



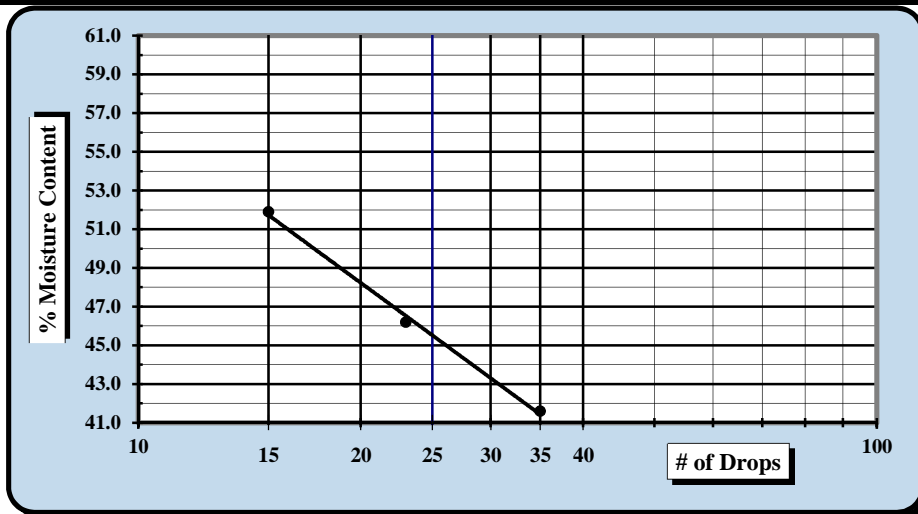
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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)	5/17/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-58	Sample #:	SS-8
Log #:	43-2321	Sample Date:	Various
		Depth:	23.5' - 25.0'

Sample Description: Clayey sand (SC, A-2-7 (0))					
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	11	14			24	4	
A	Tare Weight	15.45	15.42	15.46			15.43	15.44	
B	Wet Soil Weight + A	21.48	22.16	23.12			24.06	23.85	
C	Dry Soil Weight + A	19.42	20.03	20.87			22.45	22.27	
D	Water Weight (B-C)	2.06	2.13	2.25			1.61	1.58	
E	Dry Soil Weight (C-A)	3.97	4.61	5.41			7.02	6.83	
F	% Moisture (D/E)*100	51.9%	46.2%	41.6%			22.9%	23.1%	
N	# OF DROPS	15	23	35			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

Liquid Limit **45**

Plastic Limit **23**

Plastic Index **22**

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

5/17/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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Sieve Analysis of Soils

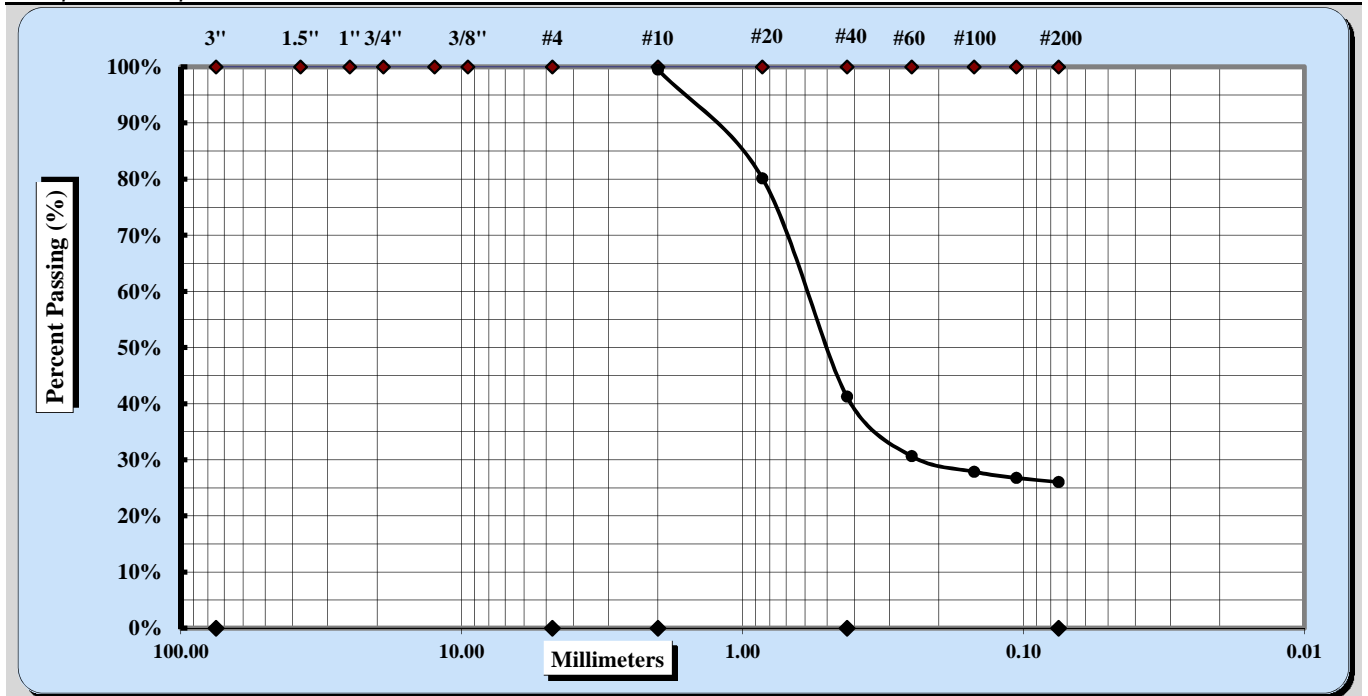


Quality Assurance

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-58	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 8	Depth: 23.5' - 25.0'
Sample Description: Clayey sand (SC, A-2-7 (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	No. 10	Coarse Sand	0%	Fine Sand	15%
Gravel	0%	Medium Sand	58%	Silt & Clay	26%
Liquid Limit	45	Plastic Limit	23	Plastic Index	22

Coarse Sand	0%	Medium Sand	58%	Fine Sand	15%
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

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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)	5/17/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-58	Sample #:	SS-10
Log #:	43-2321	Sample Date:	Various
		Depth:	33.5' - 35.0'

Sample Description: Silty sand (SM, A-2-7 (0))					
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	16	23			5	21	
A	Tare Weight	15.38	15.63	15.44			15.39	15.51	
B	Wet Soil Weight + A	23.39	24.55	25.25			24.91	23.88	
C	Dry Soil Weight + A	20.83	21.79	22.30			22.91	22.12	
D	Water Weight (B-C)	2.56	2.76	2.95			2.00	1.76	
E	Dry Soil Weight (C-A)	5.45	6.16	6.86			7.52	6.61	
F	% Moisture (D/E)*100	47.0%	44.8%	43.0%			26.6%	26.6%	
N	# OF DROPS	18	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						26.6%		



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

Liquid Limit **45**

Plastic Limit **27**

Plastic Index **18**

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

5/17/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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Sieve Analysis of Soils

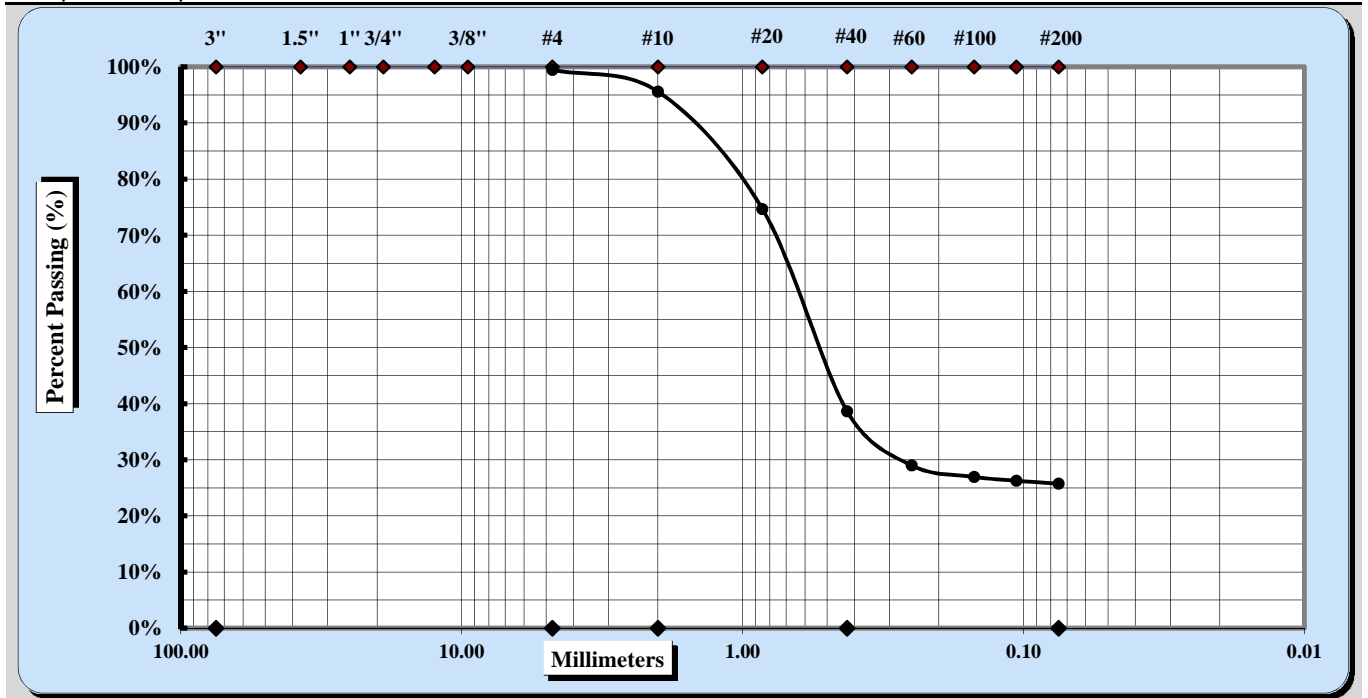


Quality Assurance

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-58	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 10	Depth: 33.5' - 35.0'
Sample Description: Silty sand (SM, A-2-7 (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	No. 4	Coarse Sand	4%	Fine Sand	13%
Gravel	0%	Medium Sand	57%	Silt & Clay	26%
Liquid Limit	45	Plastic Limit	27	Plastic Index	18

Coarse Sand	4%	Medium Sand	57%	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.		Staff Professional	5/23/2018
Technical Responsibility	Signature	Position	Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



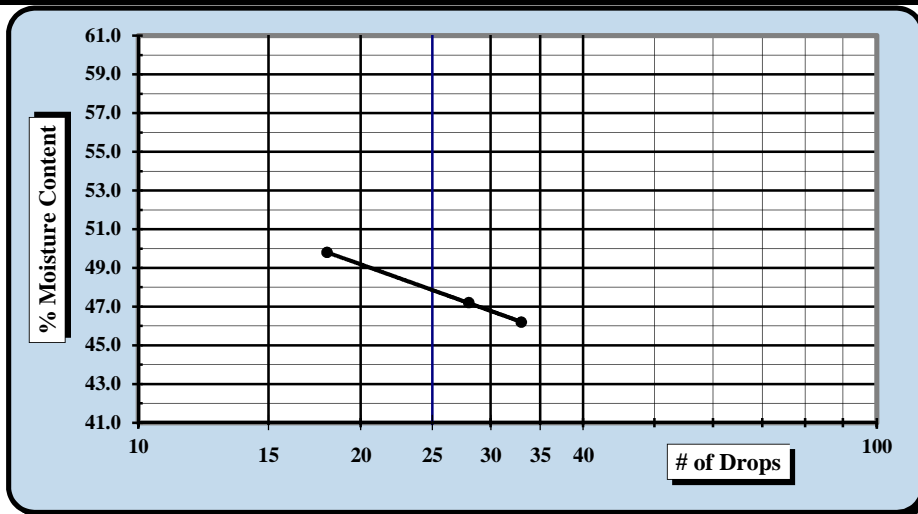
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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-58	Sample #:	SS-13
Log #:	43-2321	Sample Date:	Various
		Depth:	48.5' - 50.0'

Sample Description: Silt with sand (ML, A-7-5 (15))					
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		
		18	20	7			2	11	
A	Tare Weight	15.41	15.46	15.41			15.55	15.43	
B	Wet Soil Weight + A	25.46	26.53	27.78			24.88	24.11	
C	Dry Soil Weight + A	22.12	22.98	23.87			22.71	22.10	
D	Water Weight (B-C)	3.34	3.55	3.91			2.17	2.01	
E	Dry Soil Weight (C-A)	6.71	7.52	8.46			7.16	6.67	
F	% Moisture (D/E)*100	49.8%	47.2%	46.2%			30.3%	30.1%	
N	# OF DROPS	18	28	33			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						30.2%		



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	48
Plastic Limit	30
Plastic Index	18
Group Symbol	ML
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

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Sieve Analysis of Soils

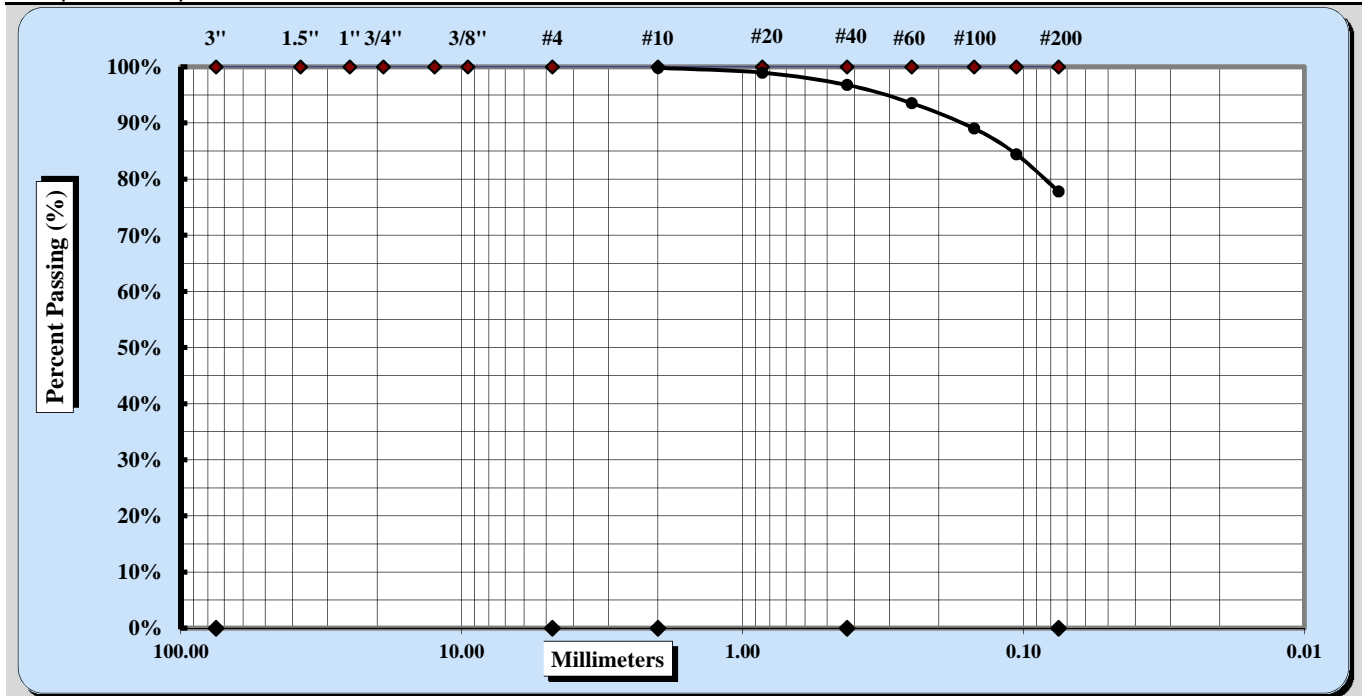


Quality Assurance

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-58	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	13
		Depth:	48.5' - 50.0'
Sample Description:	Silt with sand (ML, A-7-5 (15))		



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	19%
Gravel	0%	Medium Sand	3%	Silt & Clay	78%
Liquid Limit	48	Plastic Limit	30	Plastic Index	18

Coarse Sand	0%	Medium Sand	3%	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 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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



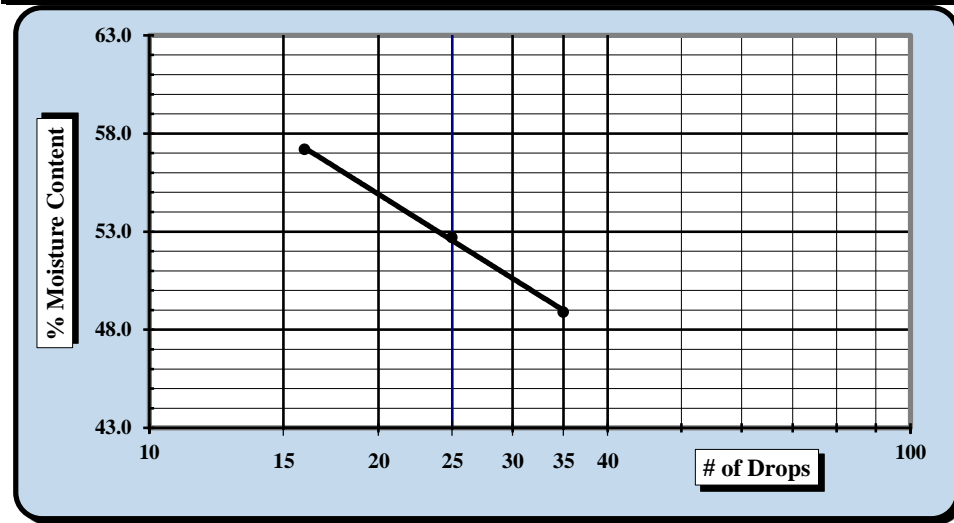
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/22/18
Project Name:	Carolina Crossroads Project	Test Date:	3/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-3
Location:	Bridge Boring	Sample Date:	1/15/18
Type:	Split-spoon	Depth:	4.0' - 6.0'

Sample Description: Clayey Sand (SC, A-2-7(3))					
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	41.22	41.15	41.82				33.64	33.92	
C	Dry Soil Weight + A	36.44	36.15	36.35				32.17	32.60	
D	Water Weight (B-C)	4.78	5.00	5.47				1.47	1.32	
E	Dry Soil Weight (C-A)	9.77	9.49	9.57				5.51	4.99	
F	% Moisture (D/E)*100	48.9%	52.7%	57.2%				26.7%	26.5%	
N	# OF DROPS	35	25	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							26.6%		



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	53
Plastic Limit	27
Plastic Index	26
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 35.3%

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>3/22/18</u> Date	 Technical Responsibility	<u>3/22/18</u> Date
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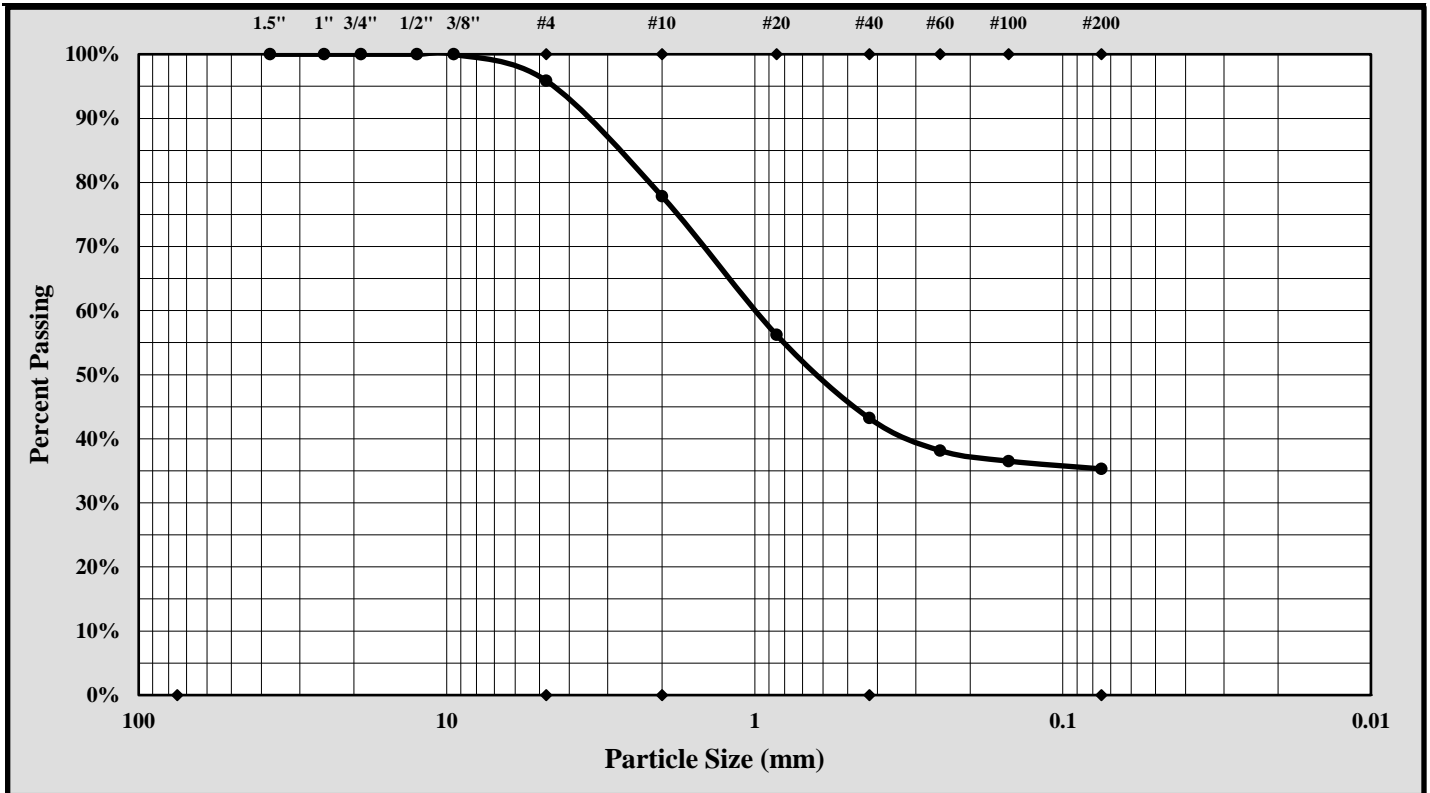


Particle Size Analysis of Soils

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 - 3/13/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-3
		Sample Date:	1/15/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	4.0' - 6.0'
Sample Description:	Clayey Sand (SC, A-2-7(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:	9.50 mm	Gravel:	4.1%
Silt & Clay (% Passing #200):	35.3%	Total Sand:	60.6%

Liquid Limit	53	Plastic Limit	27	Plastic Index	26
Coarse Sand:	18.0%	Medium Sand:	34.6%	Fine Sand:	7.9%
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:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

3/21/18
Date

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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:	3/22/18
Project Name:	Carolina Crossroads Project	Test Date:	3/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-7
Location:	Bridge Boring	Sample Date:	1/16/18
Type:	Split-spoon	Depth:	18.5' - 20.0'

Sample Description: Sandy Elastic Silt (MH, A-7-5(17))					
<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			
		16	17	18			19	20		
A	Tare Weight	26.58	26.64	26.80				26.68	26.85	
B	Wet Soil Weight + A	41.64	43.55	42.70				34.07	34.60	
C	Dry Soil Weight + A	36.31	37.39	36.64				32.25	32.70	
D	Water Weight (B-C)	5.33	6.16	6.06				1.82	1.90	
E	Dry Soil Weight (C-A)	9.73	10.75	9.84				5.57	5.85	
F	% Moisture (D/E)*100	54.8%	57.3%	61.6%				32.7%	32.5%	
N	# OF DROPS	35	26	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							32.6%		



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	58
Plastic Limit	33
Plastic Index	25
Group Symbol	MH
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 66.1%

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>3/22/18</u> Date	 Technical Responsibility	<u>3/22/18</u> Date
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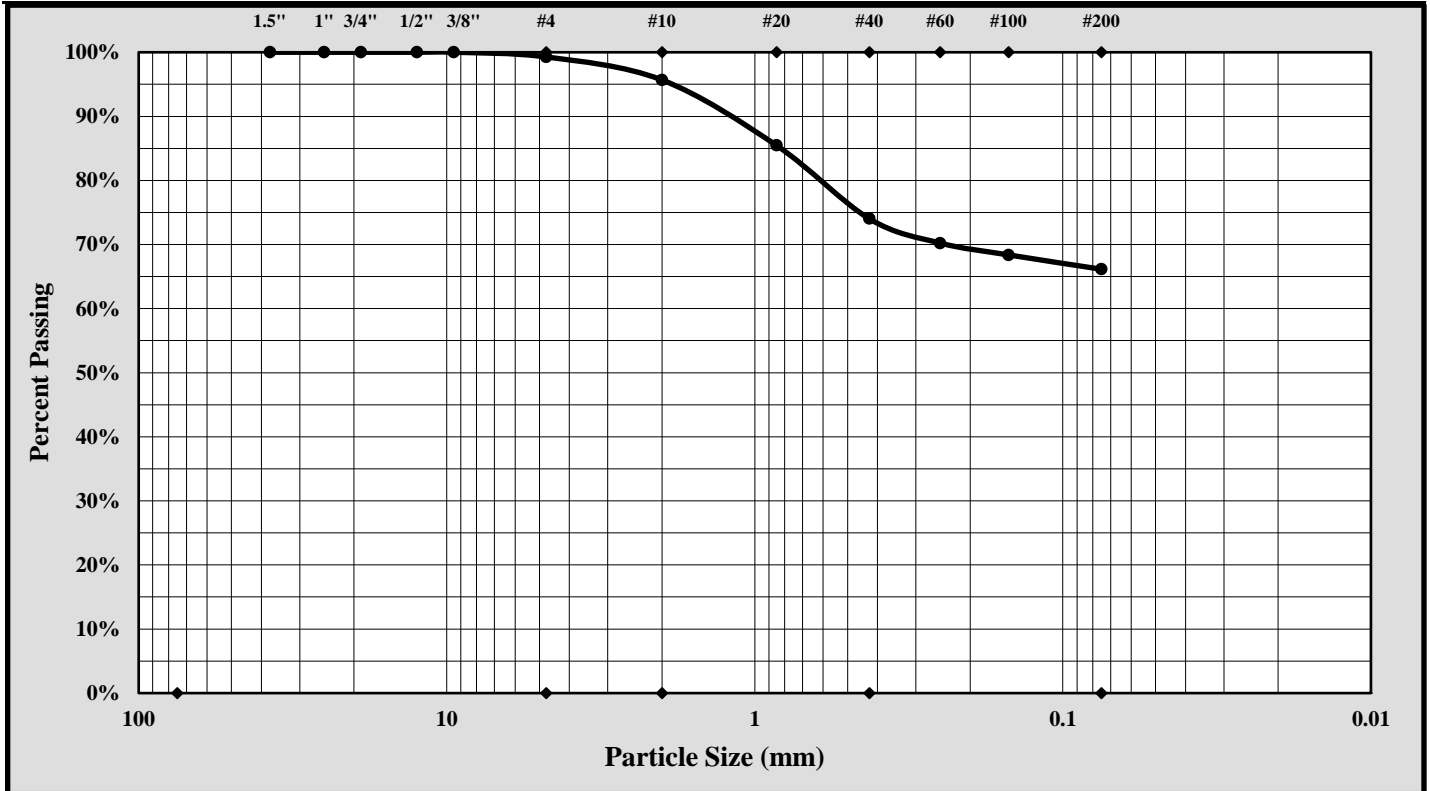


Particle Size Analysis of Soils

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 - 3/13/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-7
		Sample Date:	1/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Sandy Elastic Silt (MH, A-7-5(17))		



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): 66.1% Total Sand: 33.1%

Liquid Limit	58	Plastic Limit	33	Plastic Index	25
Coarse Sand:	3.6%	Medium Sand:	21.6%	Fine Sand:	7.9%
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:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/21/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



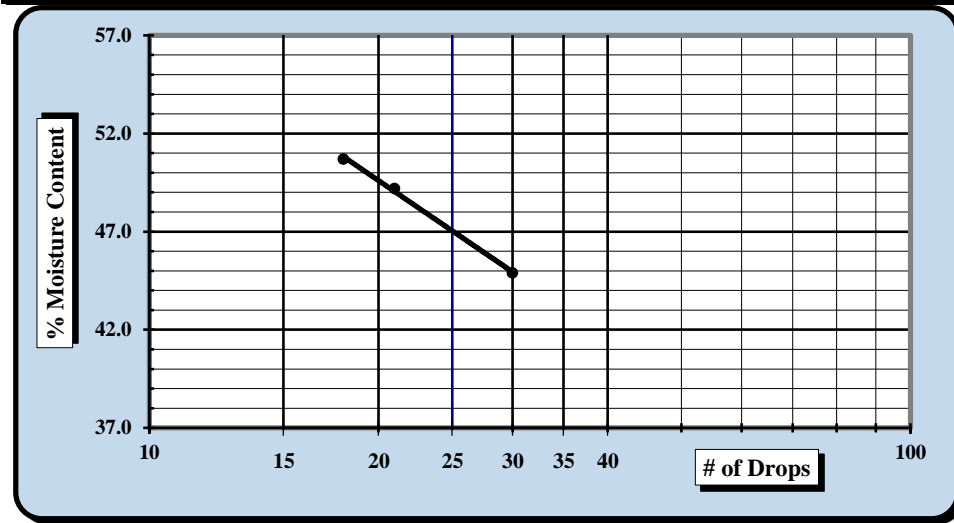
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/22/18
Project Name:	Carolina Crossroads Project	Test Date:	3/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-10
Location:	Bridge Boring	Sample Date:	1/16/18
Type:	Split-spoon	Depth:	33.5' - 35.0'

Sample Description: Silt (ML, A-7-5(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		
		21	22	23			24	25	
A	Tare Weight	28.09	25.68	27.23			25.99	26.81	
B	Wet Soil Weight + A	45.58	43.57	43.25			32.07	33.93	
C	Dry Soil Weight + A	40.16	37.67	37.86			30.52	32.13	
D	Water Weight (B-C)	5.42	5.90	5.39			1.55	1.80	
E	Dry Soil Weight (C-A)	12.07	11.99	10.63			4.53	5.32	
F	% Moisture (D/E)*100	44.9%	49.2%	50.7%			34.2%	33.8%	
N	# OF DROPS	30	21	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						34.0%		



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	47
Plastic Limit	34
Plastic Index	13
Group Symbol	ML

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 92.9%

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>3/22/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/22/18</u> Date
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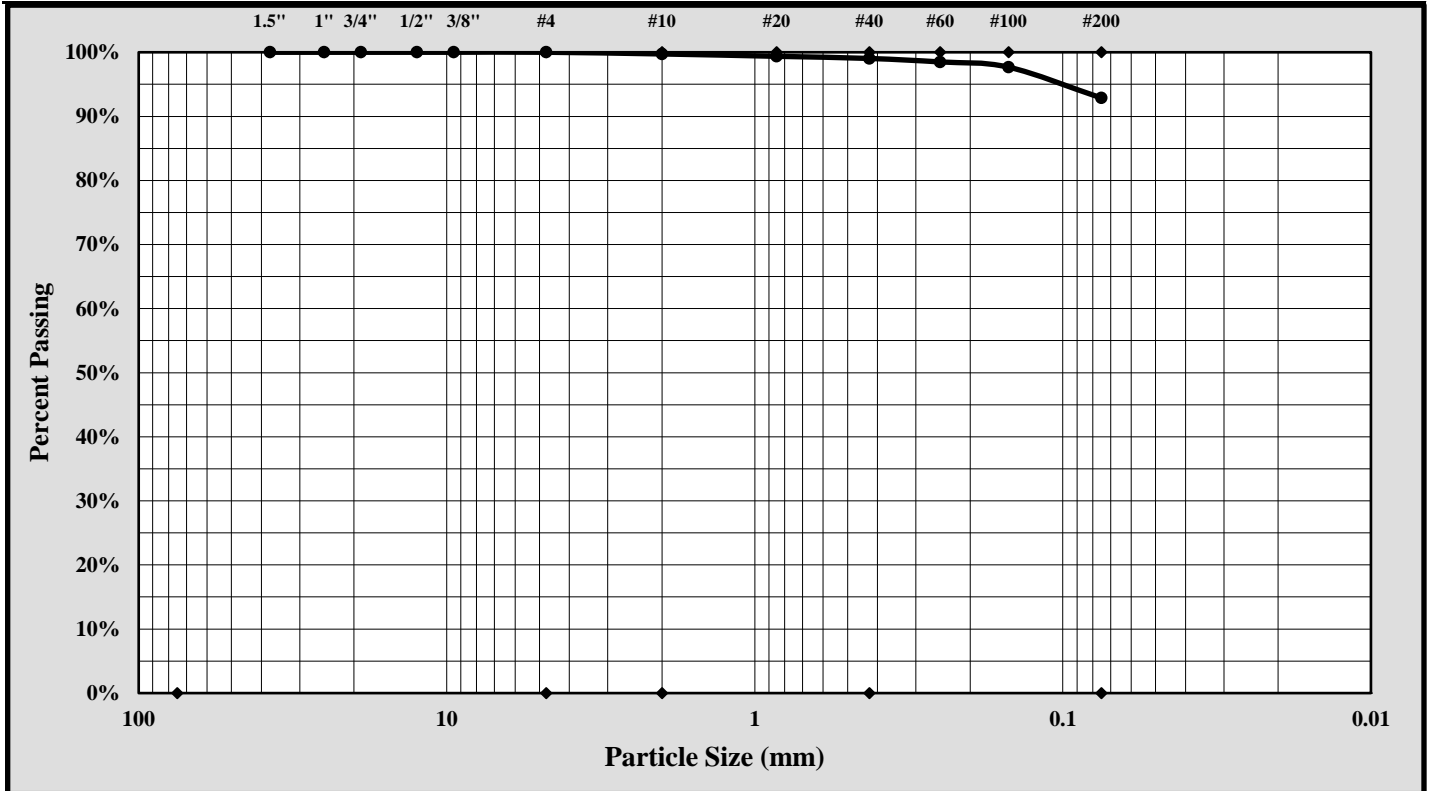
Particle Size Analysis of Soils

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 - 3/13/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-10
		Sample Date:	1/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	33.5' - 35.0'
Sample Description:	Silt (ML, A-7-5(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: .425 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 92.9% Total Sand: 7.1%

Liquid Limit	47	Plastic Limit	34	Plastic Index	13
Coarse Sand:	0.3%	Medium Sand:	0.7%	Fine Sand:	6.2%

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:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/21/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



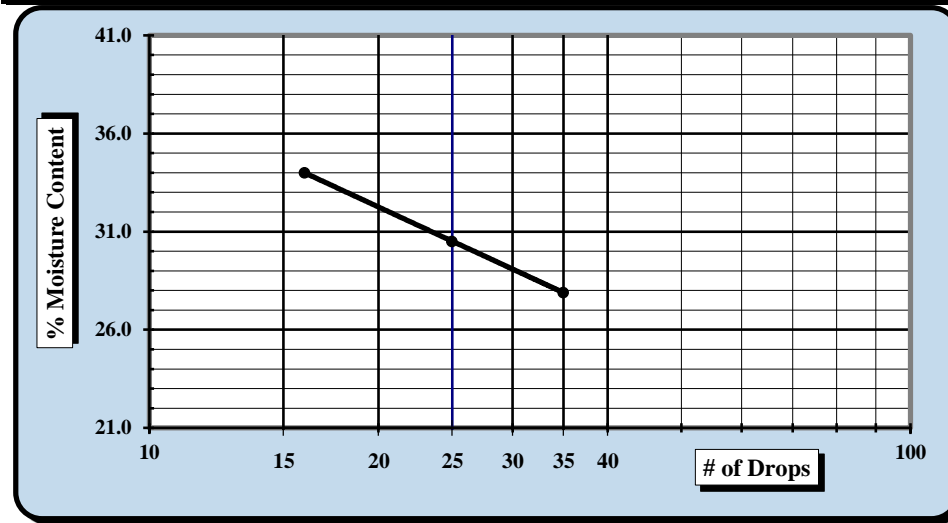
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/22/18
Project Name:	Carolina Crossroads Project	Test Date:	3/21/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-14
		Sample Date:	1/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	53.5' - 55.0'

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			
		26	27	28			29	30		
A	Tare Weight	27.34	27.03	26.82				27.03	27.39	
B	Wet Soil Weight + A	42.02	42.79	43.02				34.09	33.48	
C	Dry Soil Weight + A	38.82	39.11	38.91				32.78	32.36	
D	Water Weight (B-C)	3.20	3.68	4.11				1.31	1.12	
E	Dry Soil Weight (C-A)	11.48	12.08	12.09				5.75	4.97	
F	% Moisture (D/E)*100	27.9%	30.5%	34.0%				22.8%	22.5%	
N	# OF DROPS	35	25	16				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	31
Plastic Limit	23
Plastic Index	8
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 90.3%

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

3/22/18
 Date

Brian Vaughan
 Technical Responsibility

3/22/18
 Date

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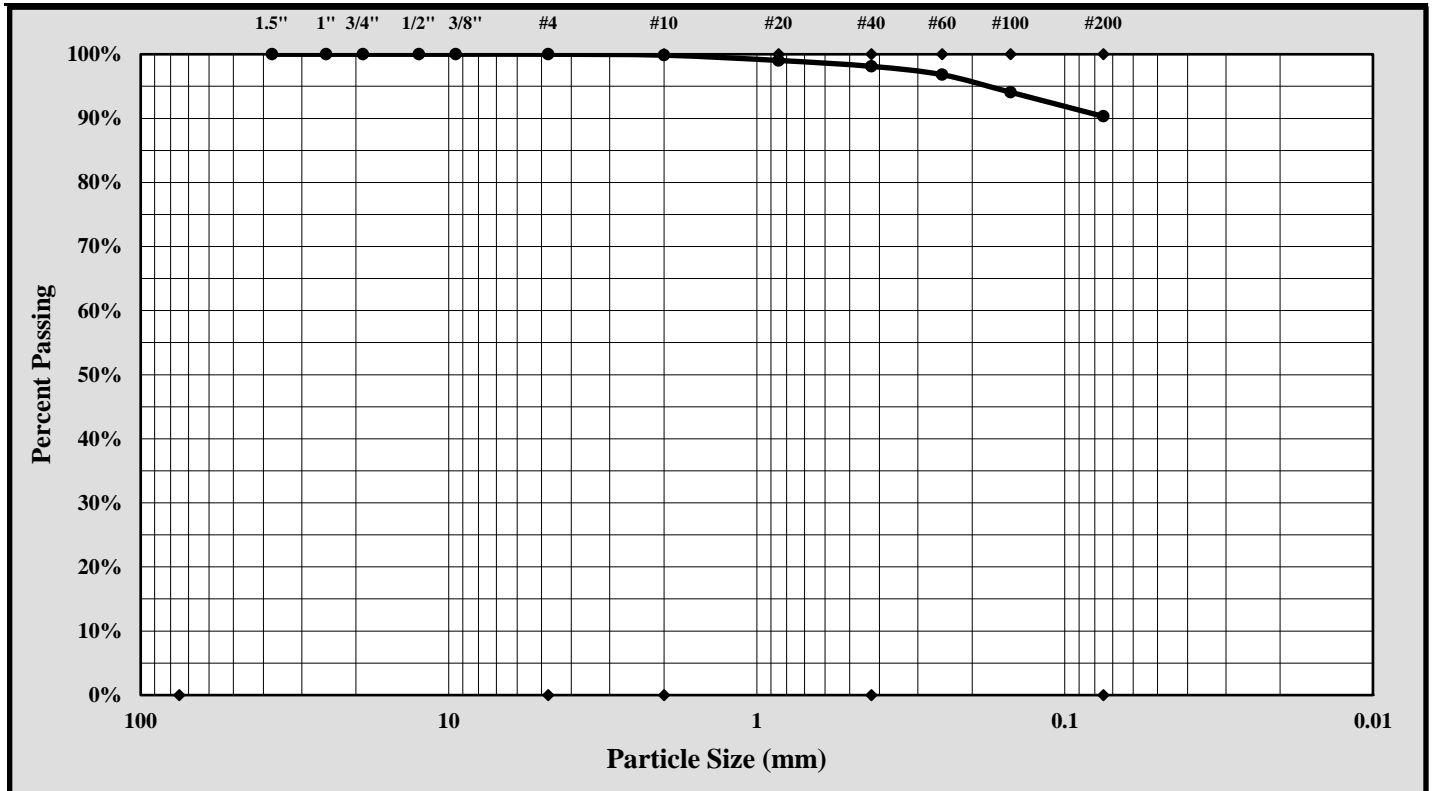


Particle Size Analysis of Soils

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 - 3/13/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-59	Sample #:	SS-14
		Sample Date:	1/16/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	53.5' - 55.0'
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 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:	0.85 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	90.3%	Total Sand:	9.7%

Liquid Limit	31	Plastic Limit	23	Plastic Index	8
Coarse Sand:	0.1%	Medium Sand:	1.7%	Fine Sand:	7.8%
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

Signature

Group Leader
Position

3/21/18
Date

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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: 18-0052 **DATE SAMPLE RECEIVED:** 1/12/2018
DESCRIPTION OF SOIL: VARIOUS
TESTED BY: MB **DATE OF TESTING:** 1/12/2018
DATE OF WEIGHING: 1/15/2018

BORING NO.	DH-2	DH-2	DH-2	DH-2	
SAMPLE NO.	18-0052C SS-3	18-0052F SS-7	18-0052I SS-11	18-0052L SS-16	
SAMPLE DEPTH	4.0 - 6.0'	18.5 - 20.0'	38.5 - 40.0'	63.5 - 65.0'	
WATER CONTENT, W%	16.3	21.8	32.5	19.5	

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%					

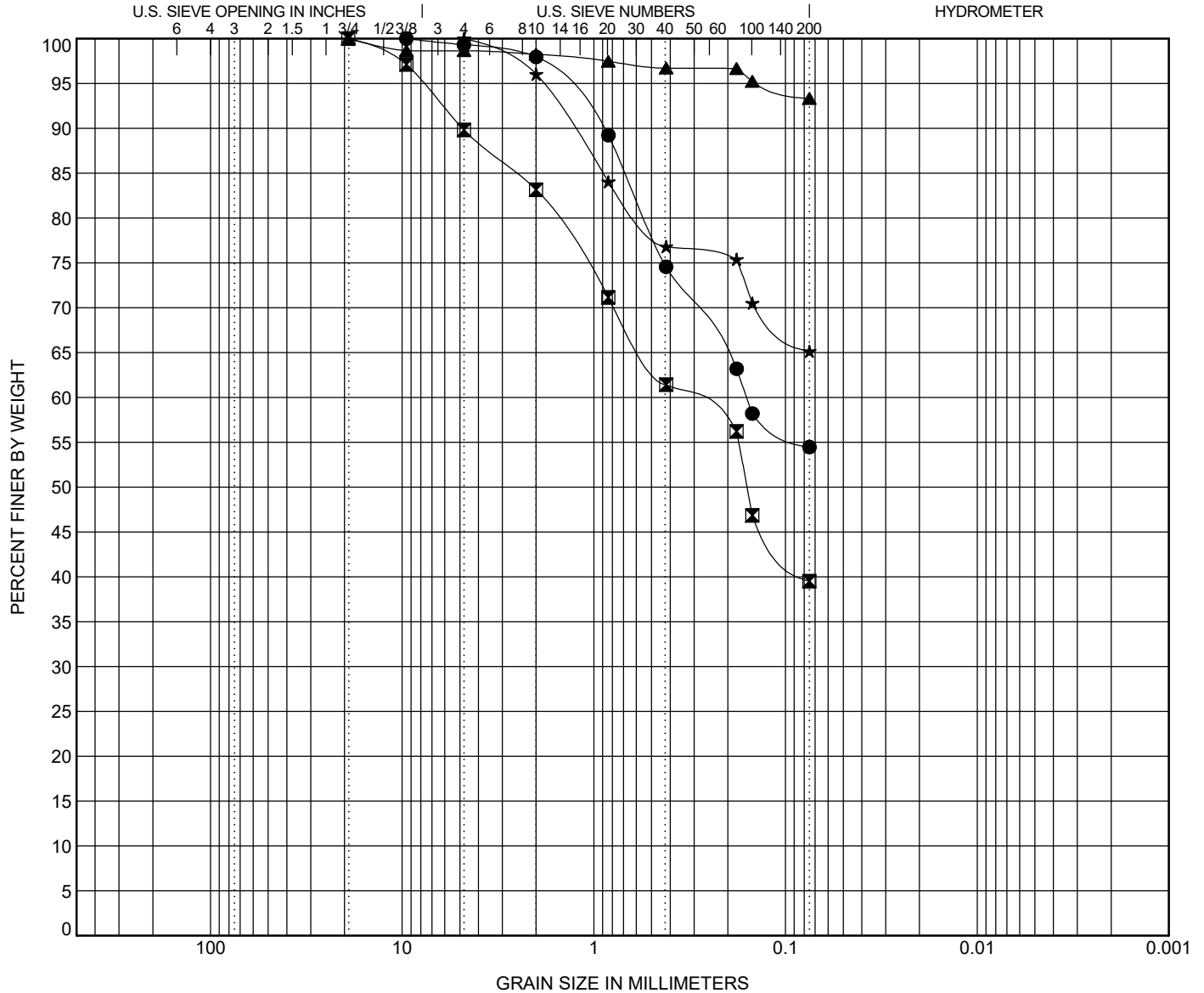


GRAIN SIZE DISTRIBUTION

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-2	6.0	Sandy Fat CLAY (CH) A-7-6(12)	51	22	29		
☒ DH-2	20.0	Clayey F/C SAND (SC) A-6(3)	39	22	17		
▲ DH-2	40.0	SILT (ML) A-4(0)	NP	NP	NP		
★ DH-2	65.0	Sandy SILT (ML) A-4(0)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D95	D50	D10	%Gravel	%Sand	%Silt	%Clay
● DH-2	6.0	9.52	1.49			0.7	44.8		54.5
☒ DH-2	20.0	19.1	7.791	0.159		10.2	50.3		39.5
▲ DH-2	40.0	19.1	0.137			1.4	5.3		93.3
★ DH-2	65.0	4.76	1.856			0.0	34.9		65.1

GRAIN SIZE - SCDOT_G5662.01 - CAROLINA CROSSROADS.GPJ_FME2017.GDT_1/24/18

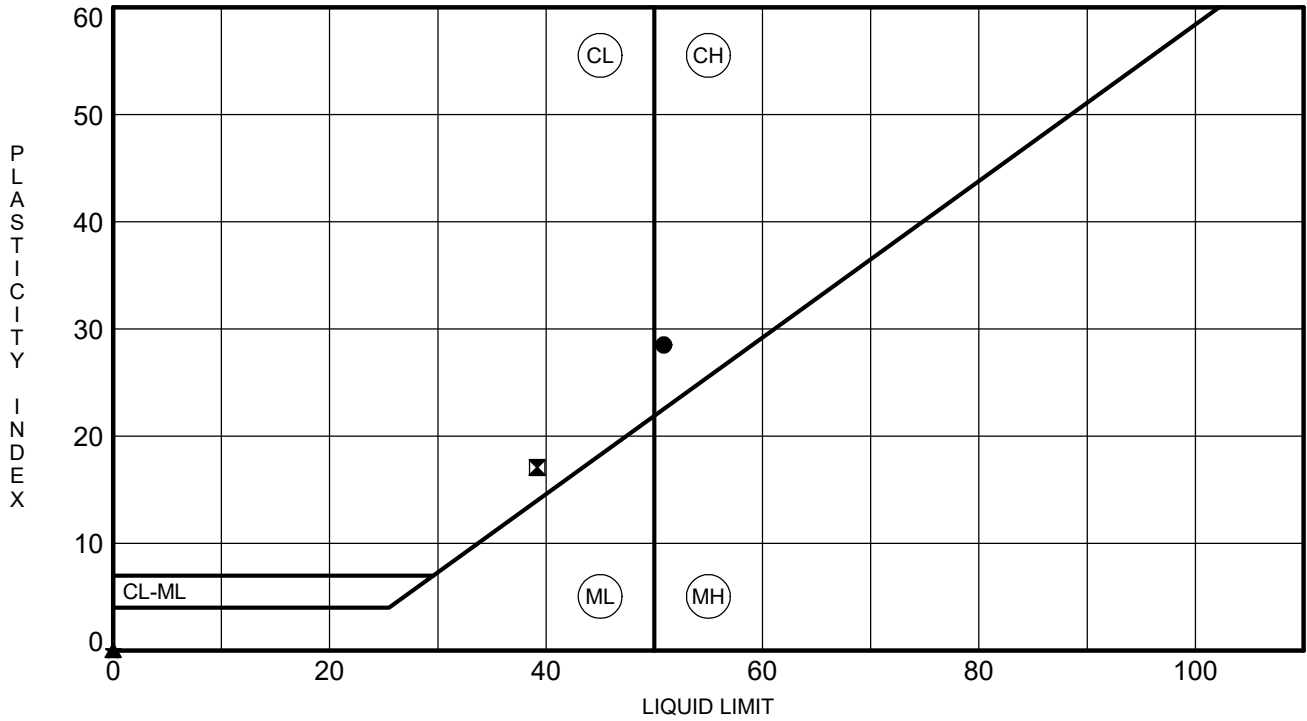


ATTERBERG LIMITS' RESULTS

PROJECT ID P027662

PROJECT NAME I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● DH-2	6.0	51	22	29	54	Sandy Fat CLAY (CH) A-7-6(12)
■ DH-2	20.0	39	22	17	40	Clayey F/C SAND (SC) A-6(3)
▲ DH-2	40.0	NP	NP	NP	93	SILT (ML) A-4(0)
★ DH-2	65.0	NP	NP	NP	65	Sandy SILT (ML) A-4(0)

ATTERBERG LIMITS - SCDOT G5662.01 - CAROLINA CROSSROADS.GPJ FME2017.GDT 1/24/18

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



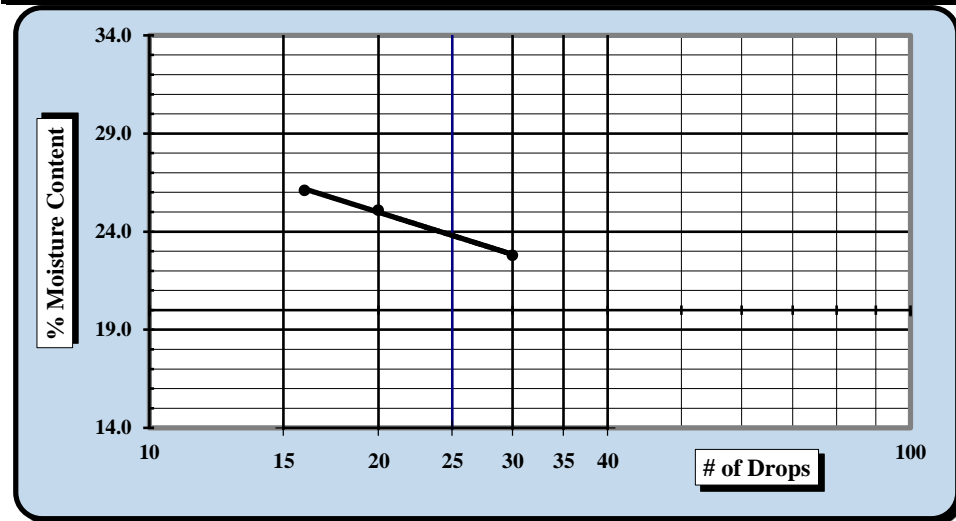
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/14/18
Project Name:	Carolina Crossroads Project	Test Date:	3/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-5	Sample #:	SS-1
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/04/18
		Depth:	0.0' - 2.0'

Sample Description: Silty Clay with Sand (CL-ML, A-4(3))					
<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		
		21	22	23			24	25	
A	Tare Weight	28.09	25.68	27.23			26.01	26.83	
B	Wet Soil Weight + A	48.70	45.87	43.86			32.82	35.54	
C	Dry Soil Weight + A	44.87	41.82	40.42			31.82	34.27	
D	Water Weight (B-C)	3.83	4.05	3.44			1.00	1.27	
E	Dry Soil Weight (C-A)	16.78	16.14	13.19			5.81	7.44	
F	% Moisture (D/E)*100	22.8%	25.1%	26.1%			17.2%	17.1%	
N	# OF DROPS	30	20	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						17.2%		



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	24
Plastic Limit	17
Plastic Index	7
Group Symbol	CL-ML

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 70.8%

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

3/14/18
 Date

Brian Vaughan
 Technical Responsibility

3/14/18
 Date

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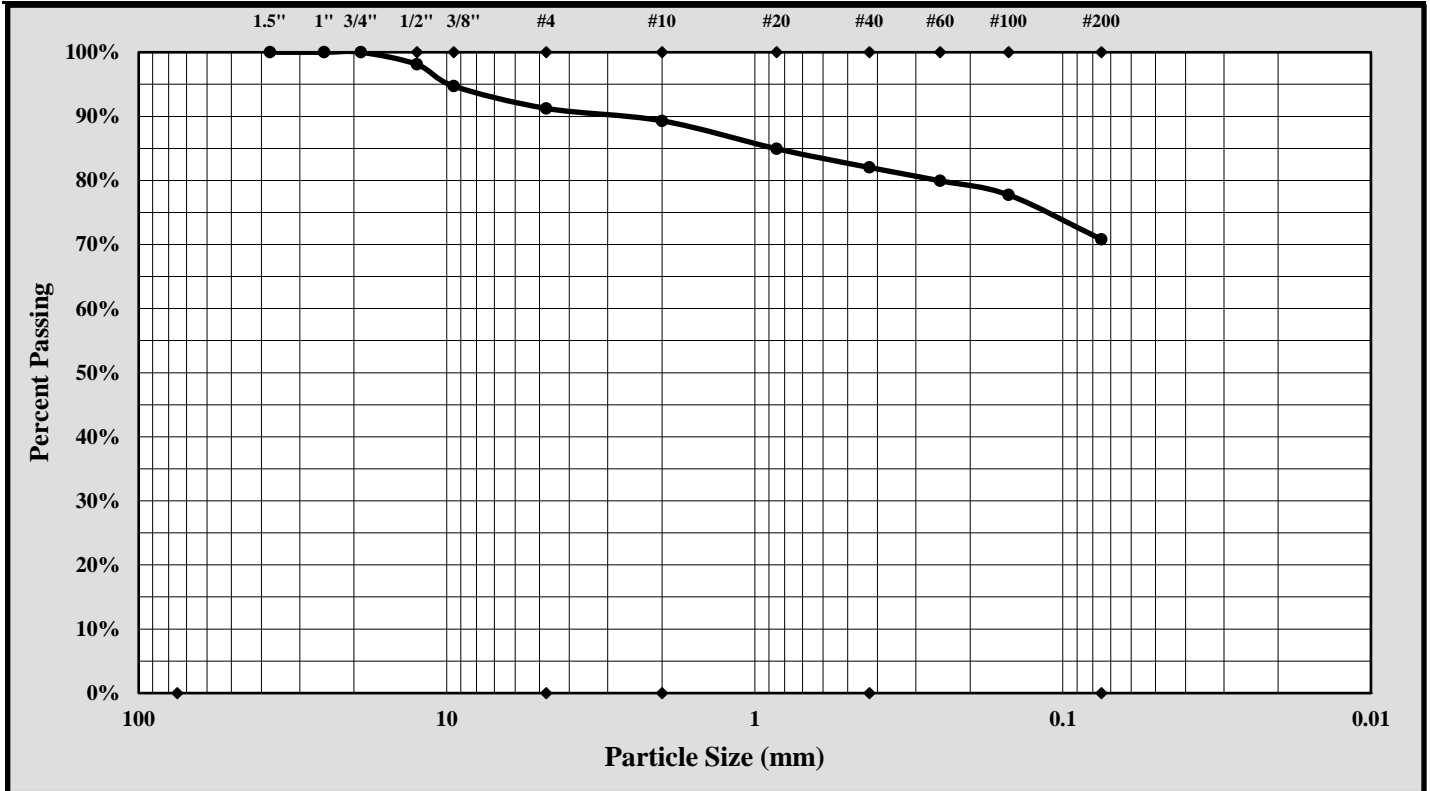


Particle Size Analysis of Soils

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:	3/13/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/05 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-5	Sample #:	SS-1
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split- spoon
		Depth:	0.0' - 2.0'
Sample Description:	Silty Clay with Sand (CL-ML, A-4(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: 19.00 mm Gravel: 8.8%
 Silt & Clay (% Passing #200): 70.8% Total Sand: 20.4%

Liquid Limit	24	Plastic Limit	17	Plastic Index	7
Coarse Sand:	1.9%	Medium Sand:	7.3%	Fine Sand:	11.2%
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:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/13/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



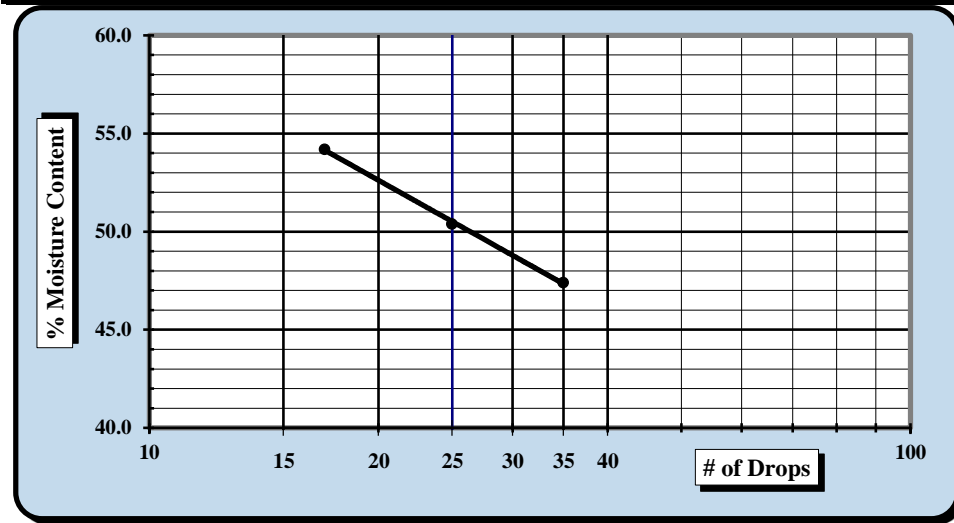
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/14/18
Project Name:	Carolina Crossroads Project	Test Date:	3/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-5	Sample #:	SS-2
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/04/18
		Depth:	2.0' - 4.0'

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			
		26	27	28			29	30		
A	Tare Weight	27.33	27.03	26.83				27.03	27.39	
B	Wet Soil Weight + A	39.95	43.23	38.58				33.51	35.02	
C	Dry Soil Weight + A	35.89	37.80	34.45				32.36	33.66	
D	Water Weight (B-C)	4.06	5.43	4.13				1.15	1.36	
E	Dry Soil Weight (C-A)	8.56	10.77	7.62				5.33	6.27	
F	% Moisture (D/E)*100	47.4%	50.4%	54.2%				21.6%	21.7%	
N	# OF DROPS	35	25	17				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	50
Plastic Limit	22
Plastic Index	28
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 79.5%

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>3/14/18</u> Date	 Technical Responsibility	<u>3/14/18</u> Date
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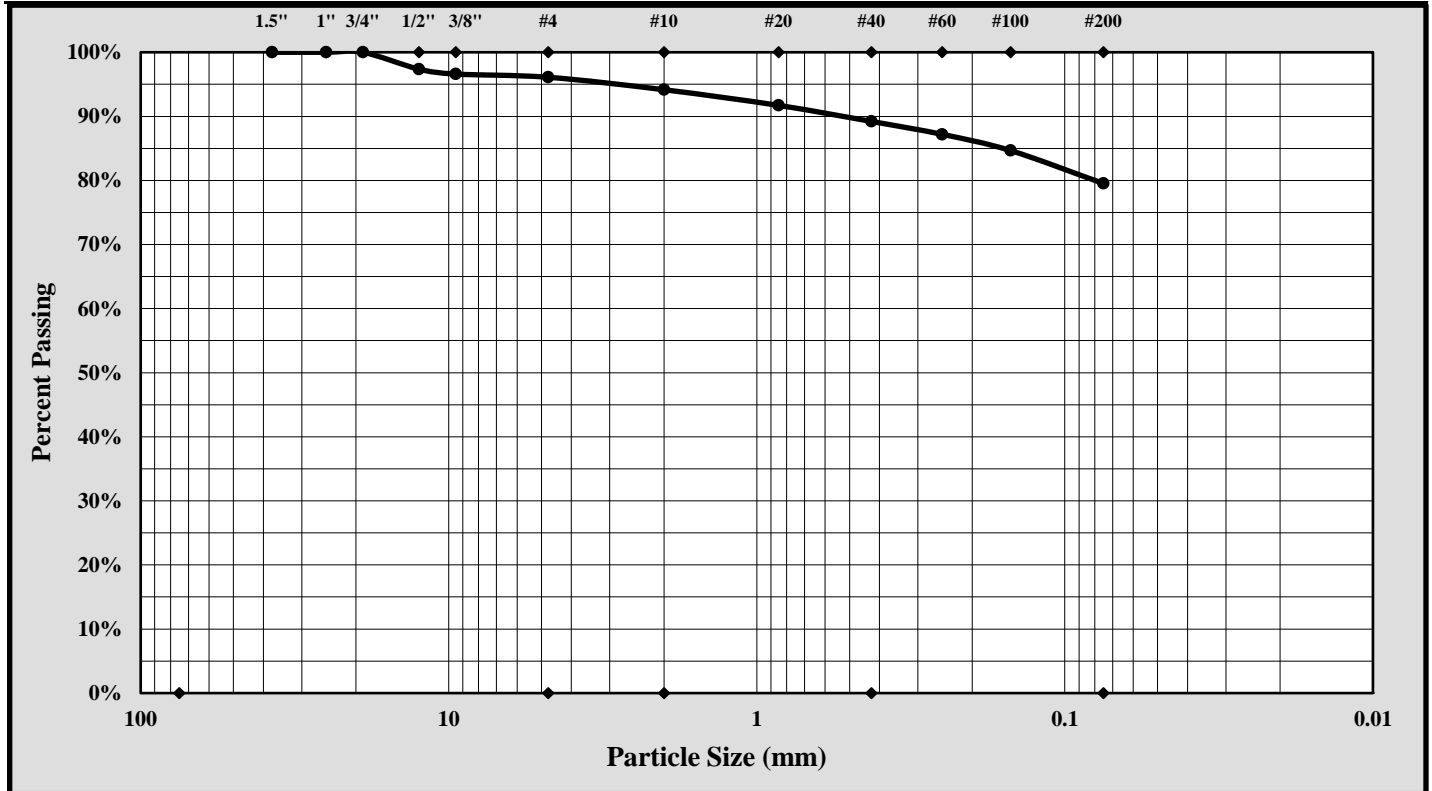
Particle Size Analysis of Soils

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:	3/13/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/02 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-5	Sample #:	SS-2
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
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: 19.00 mm Gravel: 3.9%
 Silt & Clay (% Passing #200): 79.5% Total Sand: 16.6%

Liquid Limit	50	Plastic Limit	22	Plastic Index	28
Coarse Sand:	1.9%	Medium Sand:	4.9%	Fine Sand:	9.7%
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

3/13/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



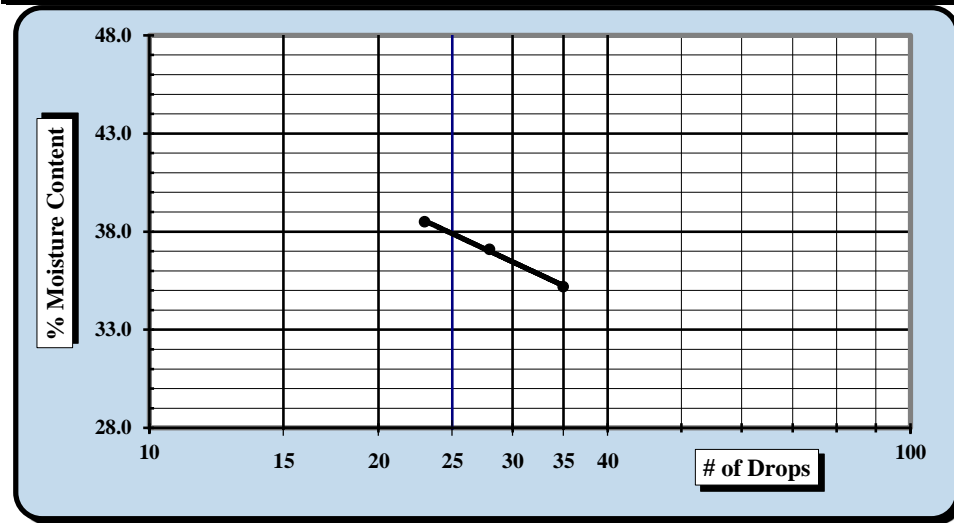
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-5	Sample #:	SS-3
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/04/18
		Depth:	4.0' - 6.0'

Sample Description: Gravelly Lean Clay with Sand (CL, A-6(8))					
<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	26.35				25.92	26.95	
B	Wet Soil Weight + A	49.56	47.44	42.79				33.13	34.70	
C	Dry Soil Weight + A	43.60	41.77	38.22				31.74	33.22	
D	Water Weight (B-C)	5.96	5.67	4.57				1.39	1.48	
E	Dry Soil Weight (C-A)	16.91	15.30	11.87				5.82	6.27	
F	% Moisture (D/E)*100	35.2%	37.1%	38.5%				23.9%	23.6%	
N	# OF DROPS	35	28	23				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							23.8%		



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	38
Plastic Limit	24
Plastic Index	14
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 66.6%

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>3/15/18</u> Date	 Technical Responsibility	<u>3/15/18</u> Date
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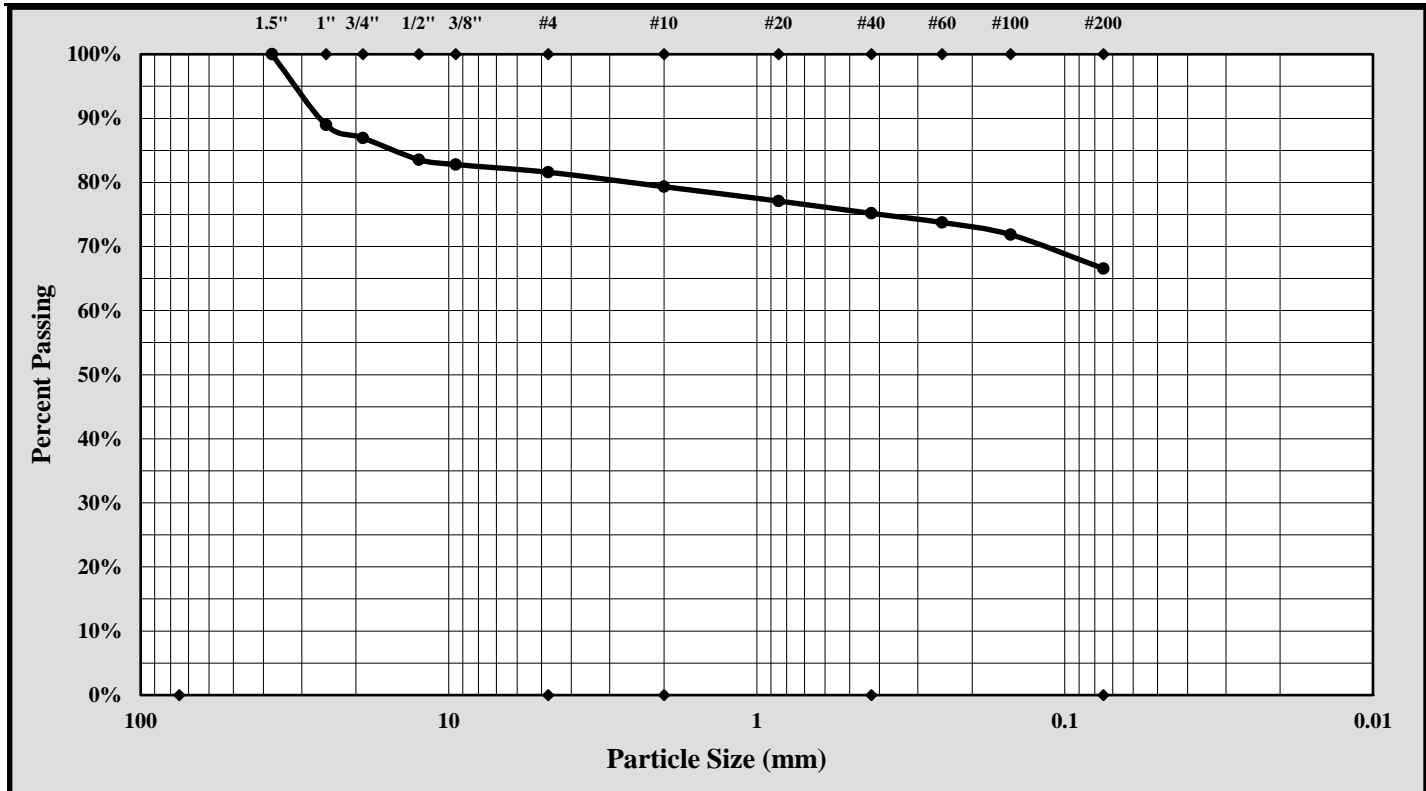
Particle Size Analysis of Soils

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-5	Sample #:	SS-3
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	4.0' - 6.0'
Sample Description:	Gravelly 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 (#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: 38.1 mm Gravel: 18.4%
 Silt & Clay (% Passing #200): 66.6% Total Sand: 15.0%

Liquid Limit	38	Plastic Limit	24	Plastic Index	14
Coarse Sand:	2.3%	Medium Sand:	4.2%	Fine Sand:	8.6%
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:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/15/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



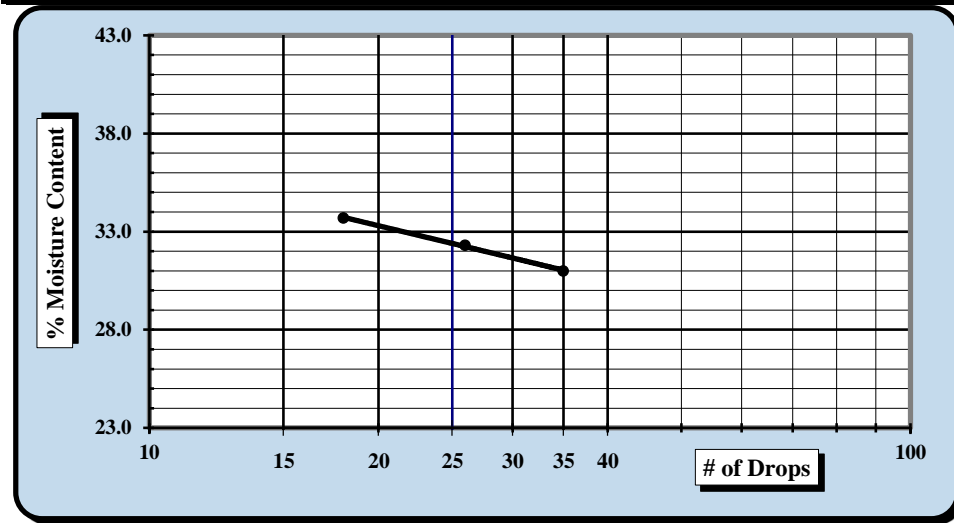
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-5	Sample #:	SS-4
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/04/18
		Depth:	6.0' - 8.0'

Sample Description: Silty Sand (SM, 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			
		6	7	8			9	10		
A	Tare Weight	27.76	26.30	27.32				26.85	26.75	
B	Wet Soil Weight + A	48.30	47.22	50.60				33.84	33.66	
C	Dry Soil Weight + A	43.44	42.11	44.73				32.44	32.27	
D	Water Weight (B-C)	4.86	5.11	5.87				1.40	1.39	
E	Dry Soil Weight (C-A)	15.68	15.81	17.41				5.59	5.52	
F	% Moisture (D/E)*100	31.0%	32.3%	33.7%				25.0%	25.2%	
N	# OF DROPS	35	26	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							25.1%		



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	25
Plastic Index	7
Group Symbol	ML

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 49.5%

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	<u>Brian Vaughan</u> Technical Responsibility	<u>3/15/18</u> Date
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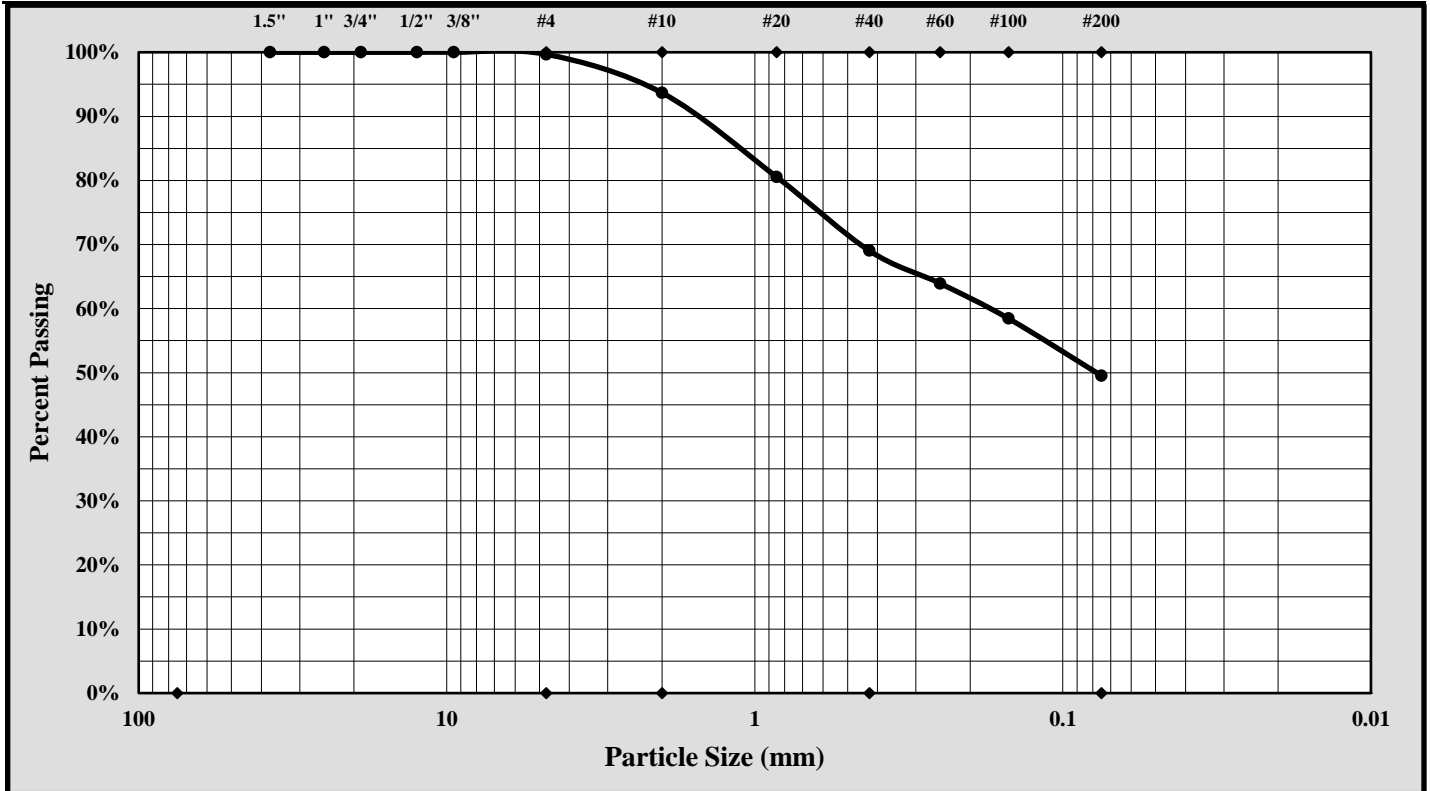


Particle Size Analysis of Soils

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-5	Sample #:	SS-4
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Silty Sand (SM, 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: 0.3%
 Silt & Clay (% Passing #200): 49.5% Total Sand: 50.1%

Liquid Limit	32	Plastic Limit	25	Plastic Index	7
Coarse Sand:	6.0%	Medium Sand:	24.6%	Fine Sand:	19.5%
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

3/15/18
 Date

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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

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-48	SS-1	1.0 - 3.0	3	20.80	41.06	37.80	3.26	19%	
P-50	SS-1	1.0 - 3.0	229	20.74	40.90	36.83	4.07	25%	
P-52	SS-1	1.2 - 3.2	36	20.94	42.37	39.10	3.27	18%	
P-53	SS-1	0.6 - 2.6	30	20.82	41.93	37.61	4.32	26%	
P-55	SS-1	0.9 - 2.9	4	20.53	43.24	39.54	3.70	19%	
P-57	SS-1	1.1 - 3.1	217	20.90	41.48	38.60	2.88	16%	
P-59	SS-1	1.4 - 3.4	19	20.57	44.50	40.57	3.93	20%	
P-61	SS-1	1.4 - 3.4	116	20.63	43.66	39.44	4.22	22%	
P-63	SS-1	1.3 - 3.3	39	20.81	41.75	39.68	2.07	11%	
P-67	SS-1	0.6 - 2.6	25	20.62	42.32	38.47	3.85	22%	
P-68	SS-1	1.1 - 3.1	6	20.58	44.94	43.09	1.85	8%	
P-69	SS-1	1.0 - 3.0	214	20.84	43.02	39.42	3.60	19%	
P-70	SS-1	0.6 - 2.6	7	20.82	43.32	39.96	3.36	18%	
P-71	SS-1	1.3 - 3.3	29	20.80	43.18	41.34	1.84	9%	

Notes / Deviations / References

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



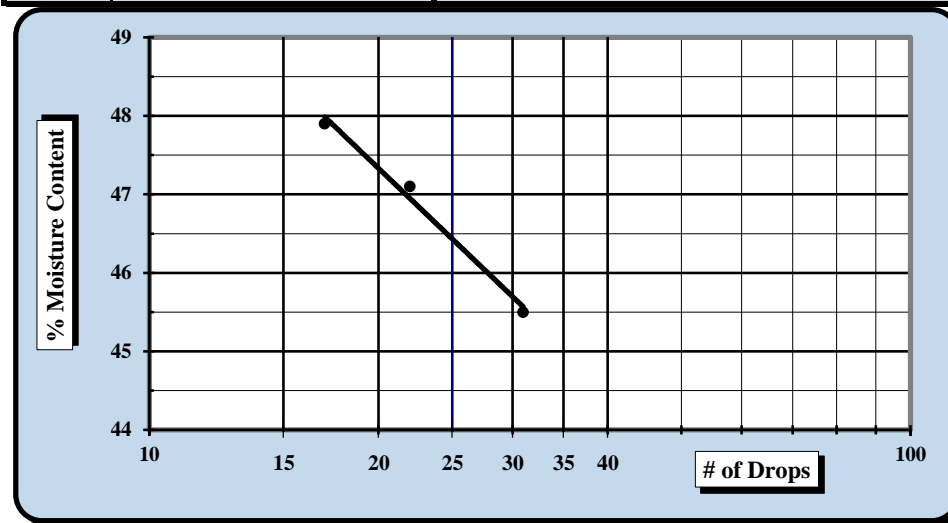
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-55	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 2.9'

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)	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		
		210	217	200			1	240	
A	Tare Weight	20.93	20.87	20.86			20.63	20.76	
B	Wet Soil Weight + A	28.35	27.87	27.68			27.11	27.10	
C	Dry Soil Weight + A	26.03	25.63	25.47			26.04	26.06	
D	Water Weight (B-C)	2.32	2.24	2.21			1.07	1.04	
E	Dry Soil Weight (C-A)	5.10	4.76	4.61			5.41	5.30	
F	% Moisture (D/E)*100	45.5%	47.1%	47.9%			19.8%	19.6%	
N	# OF DROPS	31	22	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						19.7%		



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	46
Plastic Limit	20
Plastic Index	26
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

5/3/2018
Date

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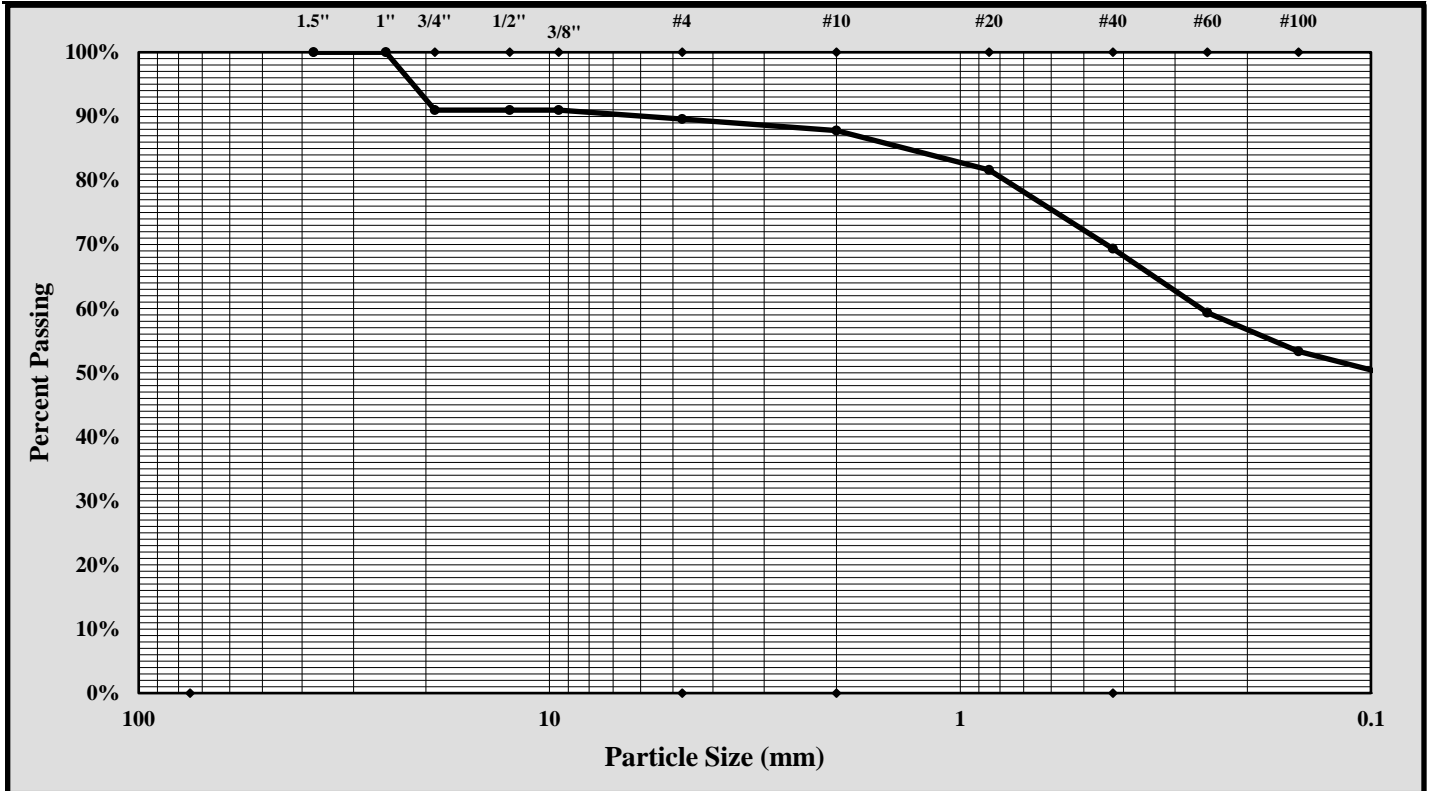
Particle Size Analysis of Soils

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):	3/7-3/8/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-55	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 2.9'
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 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: 3/4-inch Gravel: 10.4%
 Silt & Clay (% Passing #200): 48.4% Total Sand: 41.2%

Liquid Limit	46	Plastic Limit	20	Plastic Index	26
Coarse Sand:	1.8%	Medium Sand:	18.4%	Fine Sand:	21.0%
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:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

5/3/2018

Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



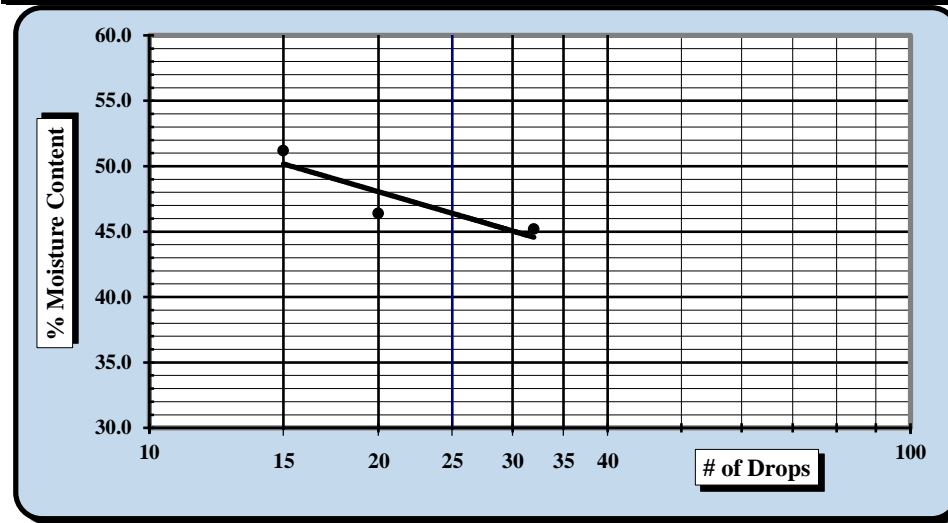
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-56	Sample #:	SS-1
Location:	Pavement Boring	Sample Date:	Various
	Offset: N/A	Depth:	0.9' - 2.9'

Sample Description: Clayey Sand (SC, A-7-6 (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				
		1	4	5			6	7			
A	Tare Weight	15.04	15.03	15.34					15.57	16.01	
B	Wet Soil Weight + A	26.50	28.12	28.13					22.50	23.29	
C	Dry Soil Weight + A	22.93	23.97	23.80					21.22	21.96	
D	Water Weight (B-C)	3.57	4.15	4.33					1.28	1.33	
E	Dry Soil Weight (C-A)	7.89	8.94	8.46					5.65	5.95	
F	% Moisture (D/E)*100	45.2%	46.4%	51.2%					22.7%	22.4%	
N	# OF DROPS	32	20	15					Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR										
Ave.	Average								22.6%		



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	46
Plastic Limit	23
Plastic Index	23
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>5/1/2018</u> Date

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Particle Size Analysis of Soils



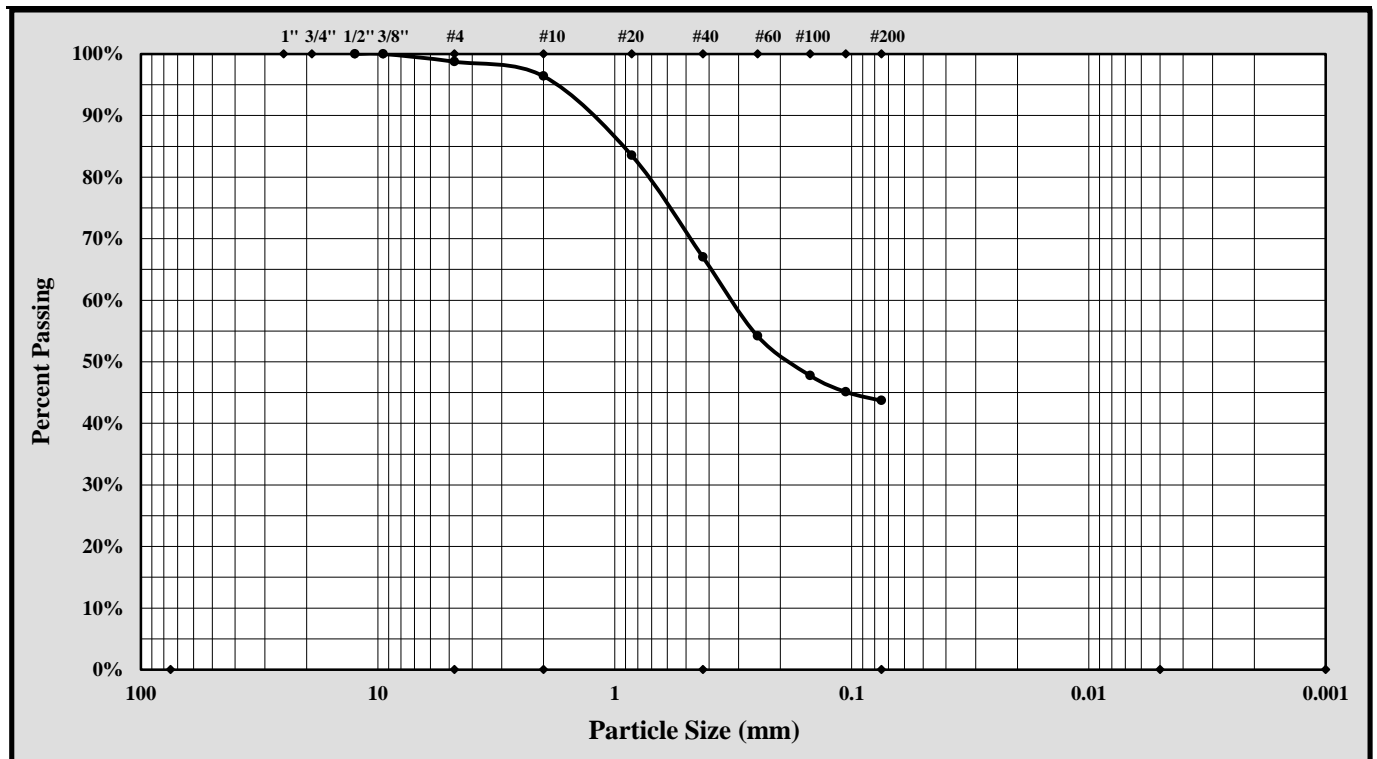
Sample Log No.:

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:	P-56	Type:	Split Spoon
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	0.9' - 2.9'
Sample Description:	Clayey Sand (SC, A-7-6 (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:	1.2%
Silt & Clay (% Passing #200):	Total Sand:	55.1%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	23
	Plastic Index	23

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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



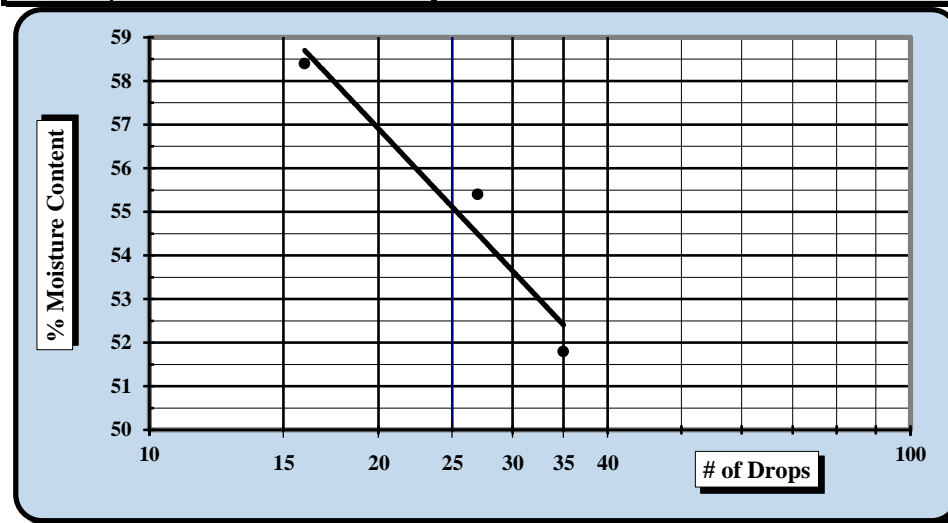
ASTM D 4318 AASHTO T 89 AASHTO T 90

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)	4/2-4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-57	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 3.1'

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)	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		
		235	204	10			123	209	
A	Tare Weight	20.77	20.87	20.79			20.55	21.09	
B	Wet Soil Weight + A	27.69	27.69	27.92			26.55	28.22	
C	Dry Soil Weight + A	25.33	25.26	25.29			25.38	26.85	
D	Water Weight (B-C)	2.36	2.43	2.63			1.17	1.37	
E	Dry Soil Weight (C-A)	4.56	4.39	4.50			4.83	5.76	
F	% Moisture (D/E)*100	51.8%	55.4%	58.4%			24.2%	23.8%	
N	# OF DROPS	35	27	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.0%		



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	55
Plastic Limit	24
Plastic Index	31
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

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

5/3/2018
Date

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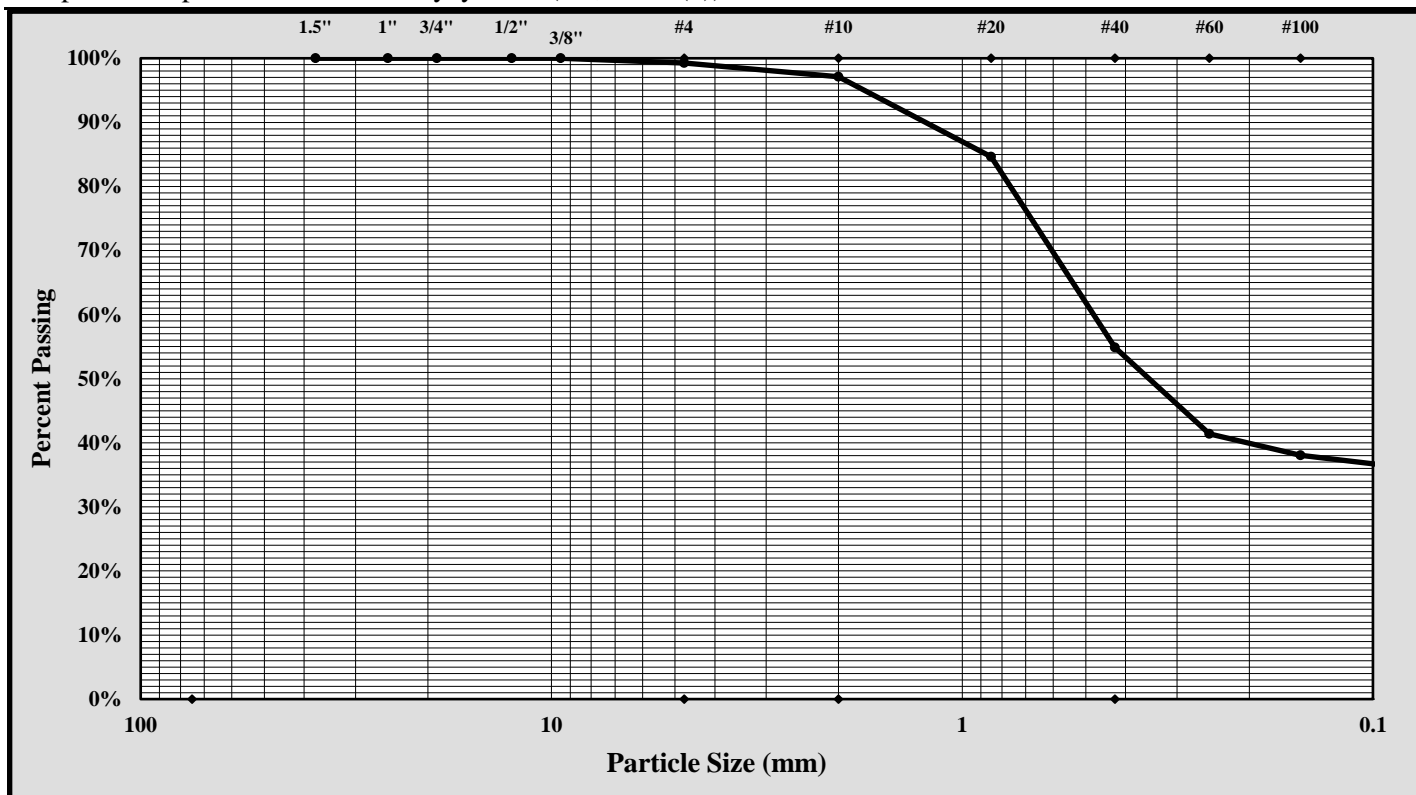
Particle Size Analysis of Soils

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):	4/2-4/25/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-57	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 3.1'
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: #4 Gravel: 0.8%
 Silt & Clay (% Passing #200): 35.8% Total Sand: 63.5%

Liquid Limit	55	Plastic Limit	24	Plastic Index	31
Coarse Sand:	2.1%	Medium Sand:	42.2%	Fine Sand:	19.1%
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 checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/3/2018
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



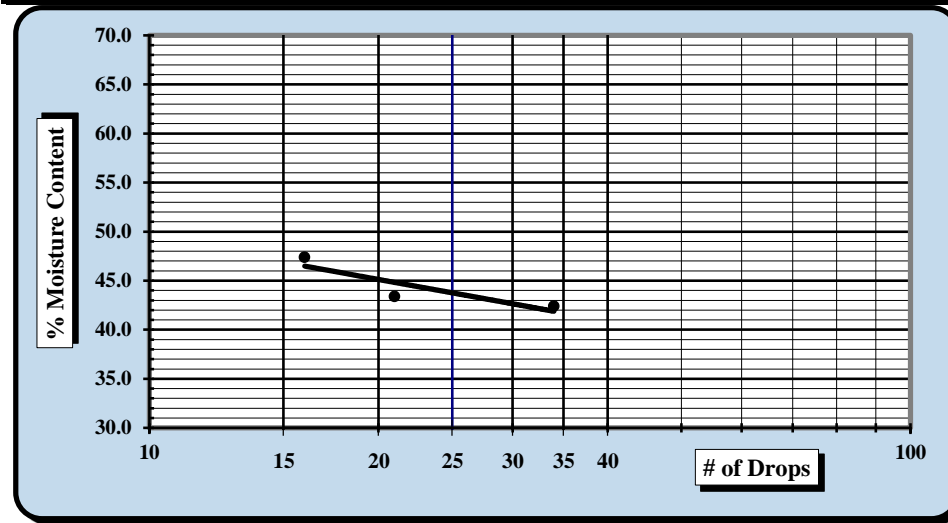
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-58	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 3.1'

Sample Description: Clayey Sand (SC, A-7-6 (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			
		40	41	42			43	44		
A	Tare Weight	14.85	15.10	15.03				14.96	15.10	
B	Wet Soil Weight + A	26.71	26.14	27.34				22.92	22.89	
C	Dry Soil Weight + A	23.18	22.80	23.38				21.67	21.67	
D	Water Weight (B-C)	3.53	3.34	3.96				1.25	1.22	
E	Dry Soil Weight (C-A)	8.33	7.70	8.35				6.71	6.57	
F	% Moisture (D/E)*100	42.4%	43.4%	47.4%				18.6%	18.6%	
N	# OF DROPS	34	21	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	43
Plastic Limit	19
Plastic Index	24
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

5/1/2018
Date

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Particle Size Analysis of Soils



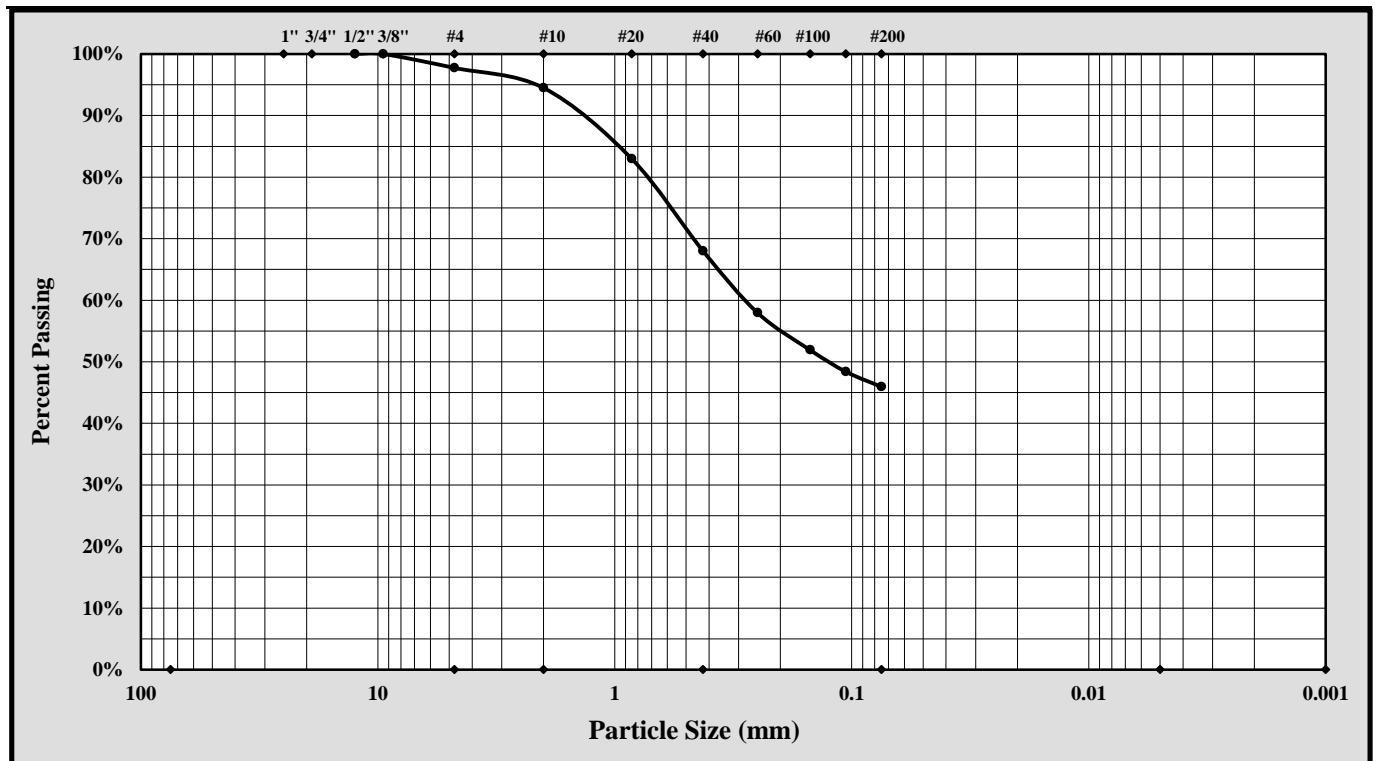
Sample Log No.:

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:	P-58	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.1' - 3.1'
Sample Description:	Clayey Sand (SC, A-7-6 (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:	2.3%
Silt & Clay (% Passing #200):	Total Sand:	51.8%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	19
	Plastic Index	24

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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



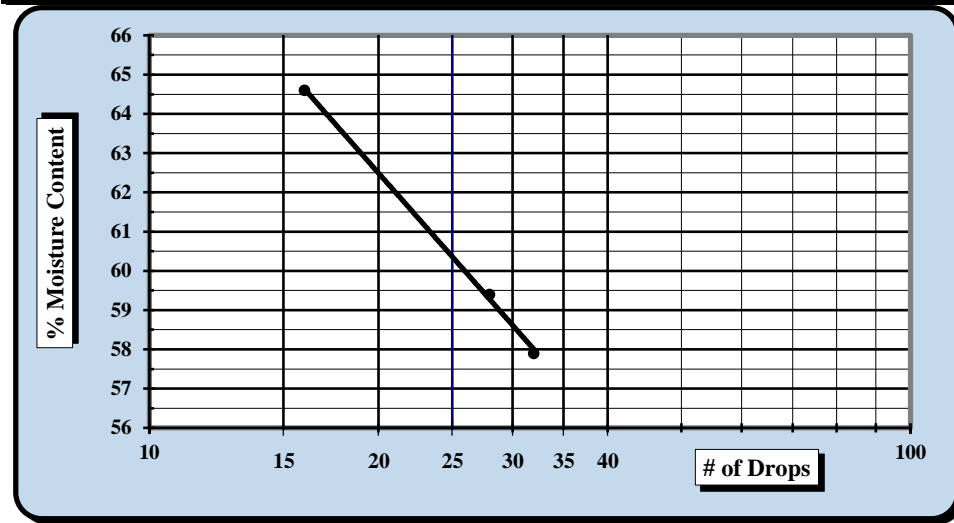
ASTM D 4318 AASHTO T 89 AASHTO T 90

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)	4/2-4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-59	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.4' - 3.4'

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)	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		
		240	6	29			19	46	
A	Tare Weight	20.78	20.58	20.82			20.55	20.74	
B	Wet Soil Weight + A	27.65	26.67	27.04			26.30	27.28	
C	Dry Soil Weight + A	25.13	24.40	24.60			25.16	26.01	
D	Water Weight (B-C)	2.52	2.27	2.44			1.14	1.27	
E	Dry Soil Weight (C-A)	4.35	3.82	3.78			4.61	5.27	
F	% Moisture (D/E)*100	57.9%	59.4%	64.6%			24.7%	24.1%	
N	# OF DROPS	32	28	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.4%		



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	60
Plastic Limit	24
Plastic Index	36
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>Matthew Wolfe</u> Technician Name	<u>NICET 123218</u> Certification	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/3/2018</u> Date
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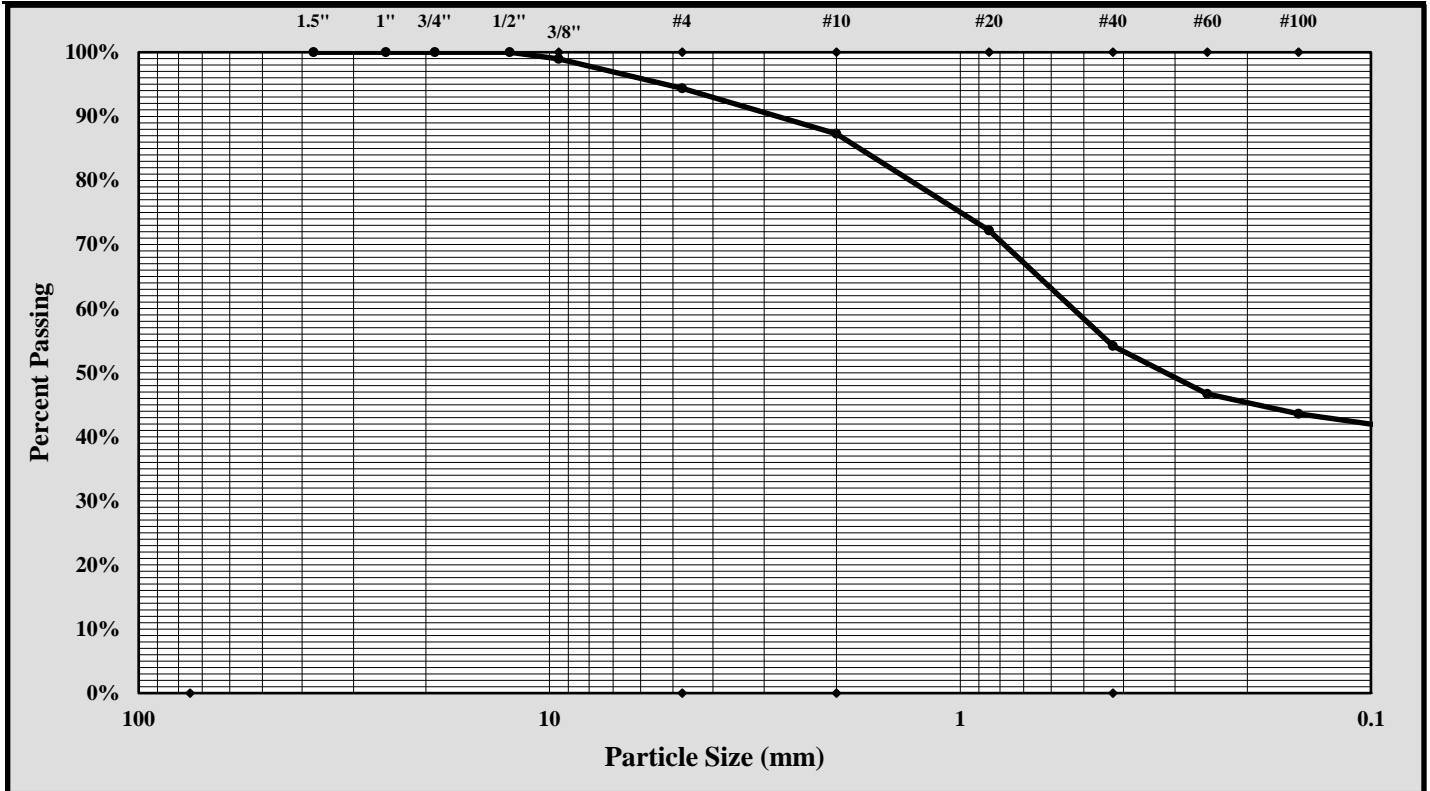
Particle Size Analysis of Soils

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):	4/2-4/25/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-59	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.4' - 3.4'
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: 3/8-inch Gravel: 5.6%
 Silt & Clay (% Passing #200): 40.8% Total Sand: 53.6%

Liquid Limit	60	Plastic Limit	24	Plastic Index	36
Coarse Sand:	7.1%	Medium Sand:	33.1%	Fine Sand:	13.3%
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 checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/3/2018
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



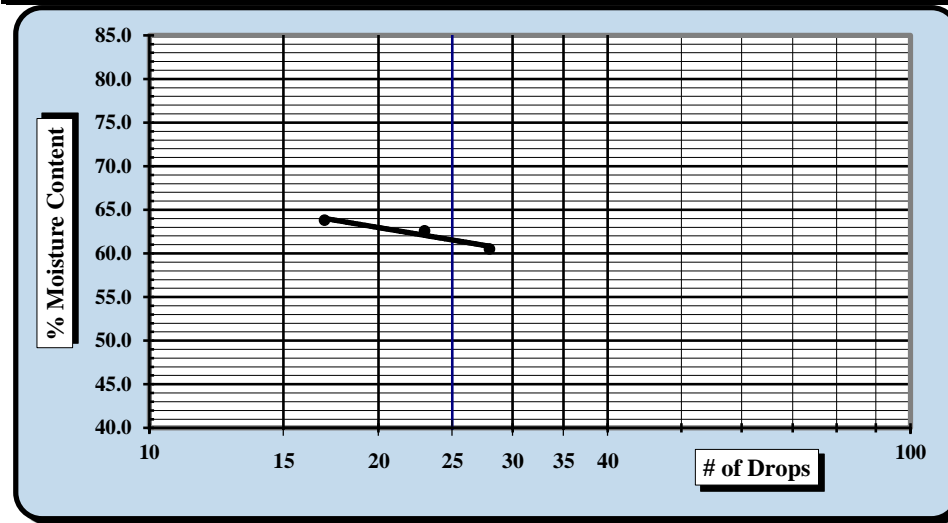
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-60	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.0' - 3.0'

Sample Description: Elastic Silt (MH, A-7-5 (28))					
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		
		10	11	12			13	14	
A	Tare Weight	15.64	14.95	15.20			15.42	15.70	
B	Wet Soil Weight + A	27.66	25.83	27.99			22.15	23.78	
C	Dry Soil Weight + A	23.13	21.64	23.01			20.21	21.45	
D	Water Weight (B-C)	4.53	4.19	4.98			1.94	2.33	
E	Dry Soil Weight (C-A)	7.49	6.69	7.81			4.79	5.75	
F	% Moisture (D/E)*100	60.5%	62.6%	63.8%			40.5%	40.5%	
N	# OF DROPS	28	23	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						40.5%		



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	62
Plastic Limit	41
Plastic Index	21
Group Symbol	MH

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

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Particle Size Analysis of Soils



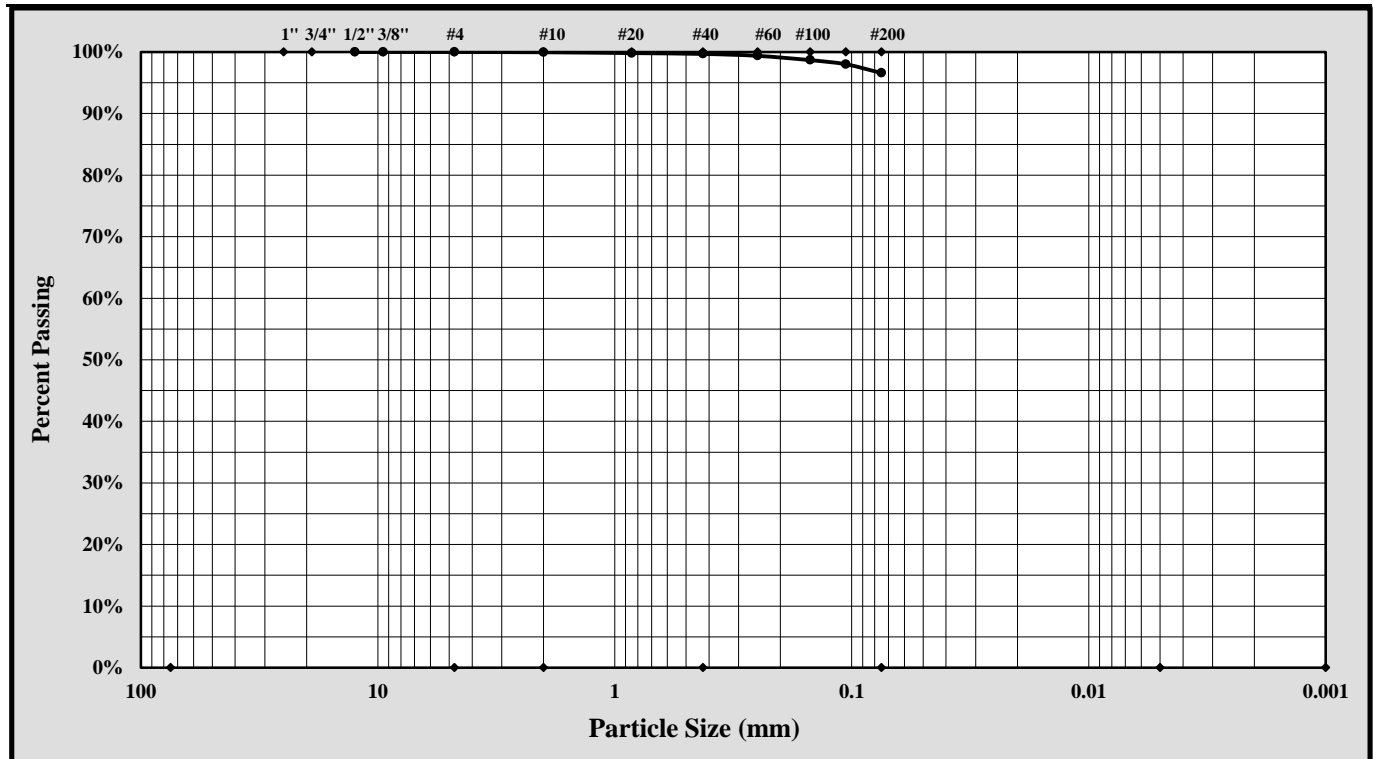
Sample Log No.:

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:	P-60	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.0' - 3.0'
Sample Description:	Elastic Silt (MH, A-7-5 (28))		



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:	3.4%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	41
	Plastic Index	21

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

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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)	4/2-4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-61	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.4' - 3.4'

Sample Description: Sandy Fat Clay (CH, A-7-6(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	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		
		40	31	207			146	243	
A	Tare Weight	20.85	20.82	20.94			20.58	20.76	
B	Wet Soil Weight + A	27.01	27.84	27.84			28.14	27.71	
C	Dry Soil Weight + A	24.92	25.38	25.34			26.54	26.25	
D	Water Weight (B-C)	2.09	2.46	2.50			1.60	1.46	
E	Dry Soil Weight (C-A)	4.07	4.56	4.40			5.96	5.49	
F	% Moisture (D/E)*100	51.4%	53.9%	56.8%			26.8%	26.6%	
N	# OF DROPS	27	24	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						26.7%		



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	53
Plastic Limit	27
Plastic Index	26
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>Matthew Wolfe</u> Technician Name	<u>NICET 123218</u> Certification	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/3/2018</u> Date
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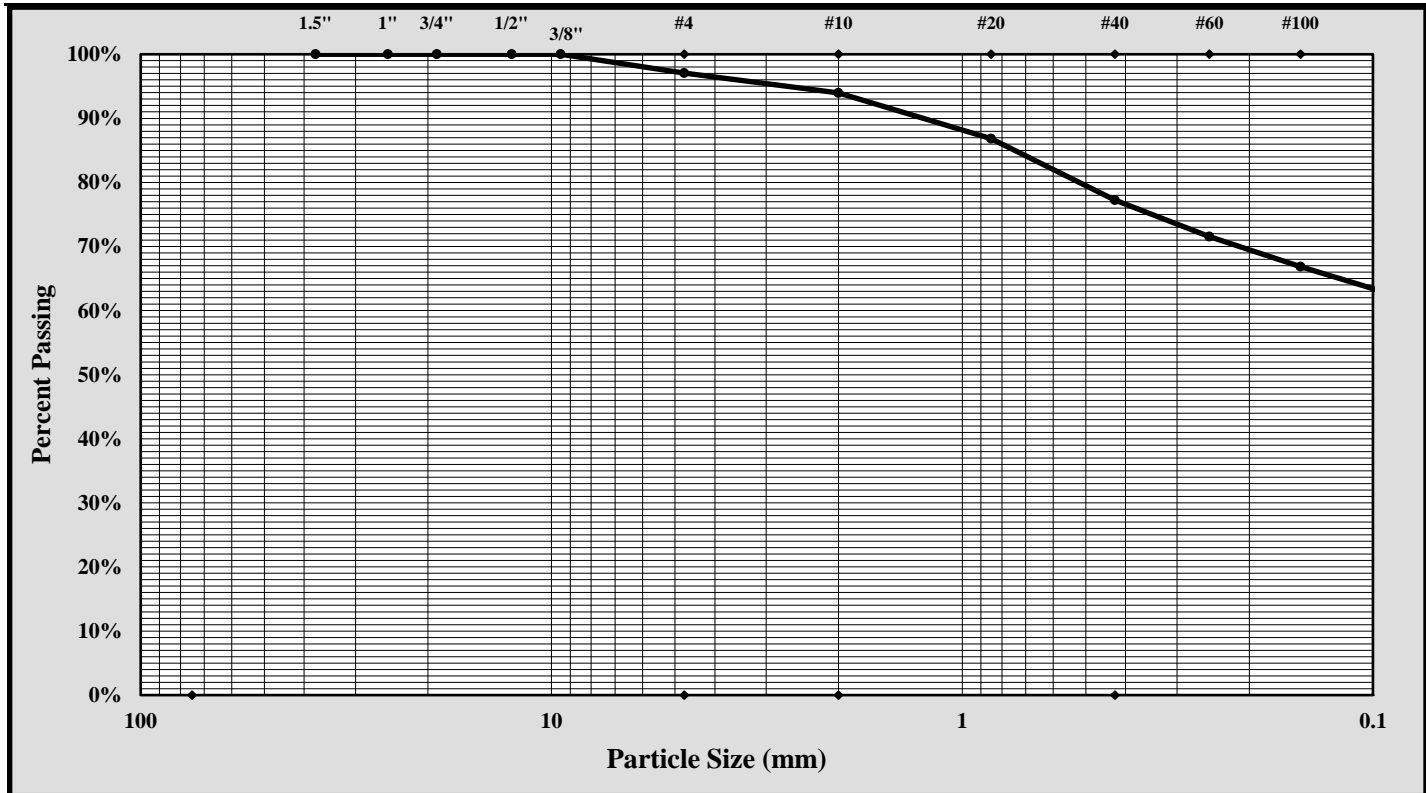
Particle Size Analysis of Soils

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):	4/2-4/25/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-61	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.4' - 3.4'
Sample Description:	Sandy Fat Clay (CH, A-7-6(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 Gravel: 2.9%
 Silt & Clay (% Passing #200): 61.0% Total Sand: 36.1%

Liquid Limit	53	Plastic Limit	27	Plastic Index	26
Coarse Sand:	3.1%	Medium Sand:	16.7%	Fine Sand:	16.2%

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 checked="" type="checkbox"/>
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References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

5/3/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



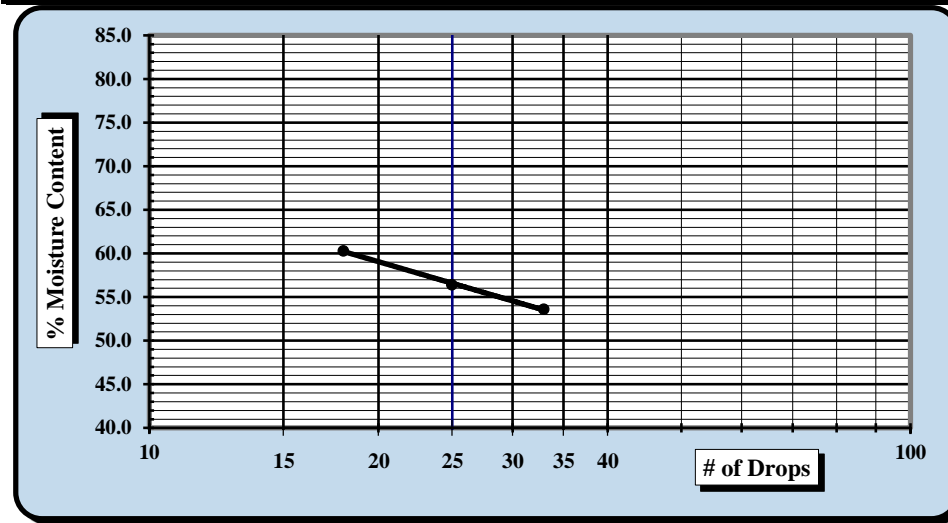
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-62	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 3.1'

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)	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 #	131	Tare #:	Liquid Limit				Plastic Limit				
			30	31	32		33	34			
A		Tare Weight	15.36	15.46	15.18				15.57	15.28	
B		Wet Soil Weight + A	25.48	26.33	27.97				22.87	22.18	
C		Dry Soil Weight + A	21.95	22.41	23.16				21.38	20.72	
D		Water Weight (B-C)	3.53	3.92	4.81				1.49	1.46	
E		Dry Soil Weight (C-A)	6.59	6.95	7.98				5.81	5.44	
F		% Moisture (D/E)*100	53.6%	56.4%	60.3%				25.6%	26.8%	
N		# OF DROPS	33	25	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	56
Plastic Limit	26
Plastic Index	30
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

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/1/2018
Date

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Particle Size Analysis of Soils



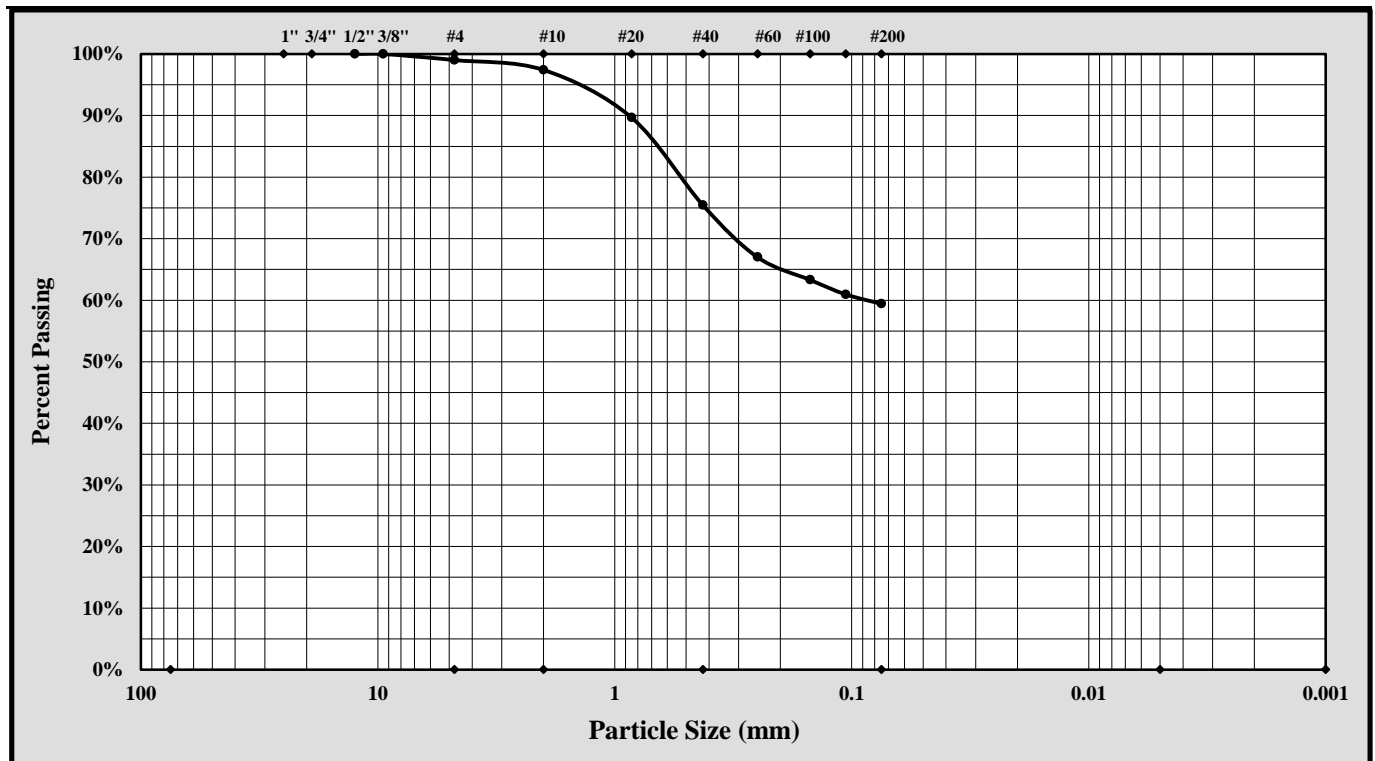
Sample Log No.:

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:	P-62	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.1' - 3.1'
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
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:	1.0%
Silt & Clay (% Passing #200):	Total Sand:	39.6%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	26
	Plastic Index	30

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

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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)	4/2-4/24/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 3.3'

Sample Description: Clayey Sand (SC, A-7-6(10))					
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		
		200	44	1			36	3	
A	Tare Weight	20.86	20.75	20.66			20.97	20.80	
B	Wet Soil Weight + A	27.71	26.97	28.11			27.16	26.90	
C	Dry Soil Weight + A	25.41	24.83	25.48			26.03	25.80	
D	Water Weight (B-C)	2.30	2.14	2.63			1.13	1.10	
E	Dry Soil Weight (C-A)	4.55	4.08	4.82			5.06	5.00	
F	% Moisture (D/E)*100	50.5%	52.5%	54.6%			22.3%	22.0%	
N	# OF DROPS	34	30	21			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						22.2%		



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	53
Plastic Limit	22
Plastic Index	31
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>Matthew Wolfe</u> Technician Name	<u>NICET 123218</u> Certification	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/3/2018</u> Date
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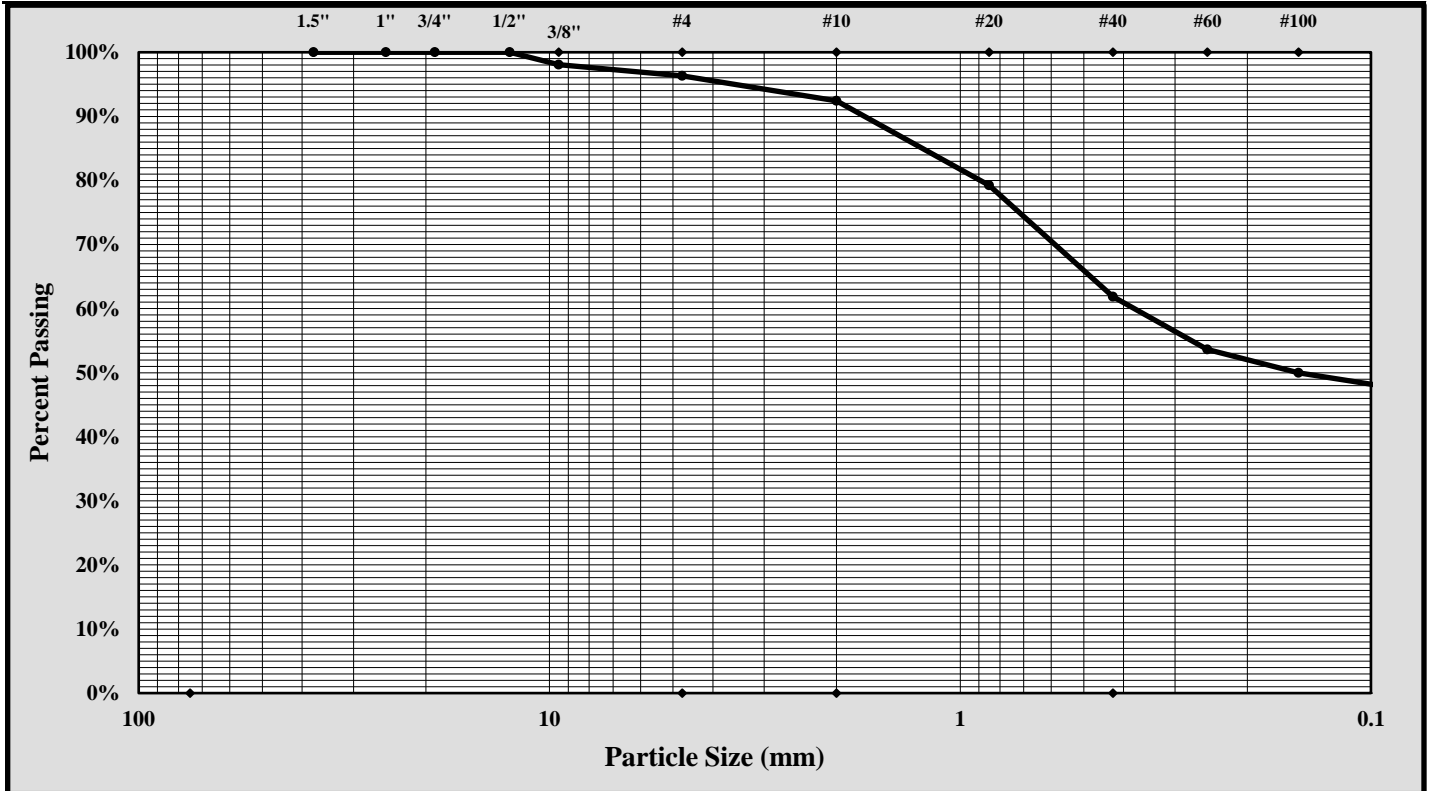
Particle Size Analysis of Soils

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):	4/2-4/25/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	SS-1
		Sample Date:	2/6/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 3.3'
Sample Description:	Clayey Sand (SC, 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: 3/8-inch Gravel: 3.7%
 Silt & Clay (% Passing #200): 46.9% Total Sand: 49.4%

Liquid Limit	53	Plastic Limit	22	Plastic Index	31
Coarse Sand:	3.9%	Medium Sand:	30.6%	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 checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

5/3/2018

Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



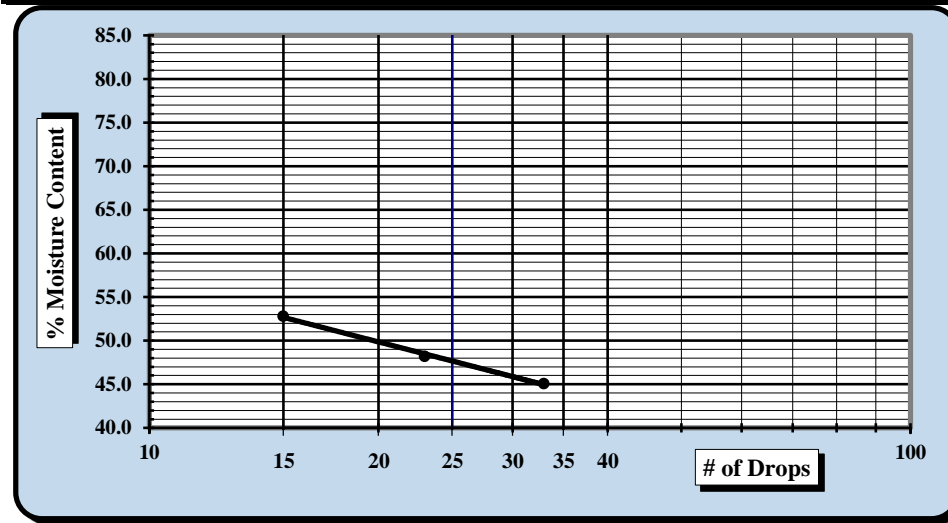
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	P-64	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 3.1'

Sample Description: Sandy Fat Clay (CH, A-7-6 (14))					
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 #	156	Tare #:	Liquid Limit				Plastic Limit				
			20	21	22	23	24				
A		Tare Weight	15.42	15.34	15.42				14.90	15.21	
B		Wet Soil Weight + A	26.61	26.23	29.74				21.30	21.65	
C		Dry Soil Weight + A	23.13	22.69	24.79				20.16	20.49	
D		Water Weight (B-C)	3.48	3.54	4.95				1.14	1.16	
E		Dry Soil Weight (C-A)	7.71	7.35	9.37				5.26	5.28	
F		% Moisture (D/E)*100	45.1%	48.2%	52.8%				21.7%	22.0%	
N		# OF DROPS	33	23	15				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	62
Plastic Limit	25
Plastic Index	37
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

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

4/30/2018
Date

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Particle Size Analysis of Soils



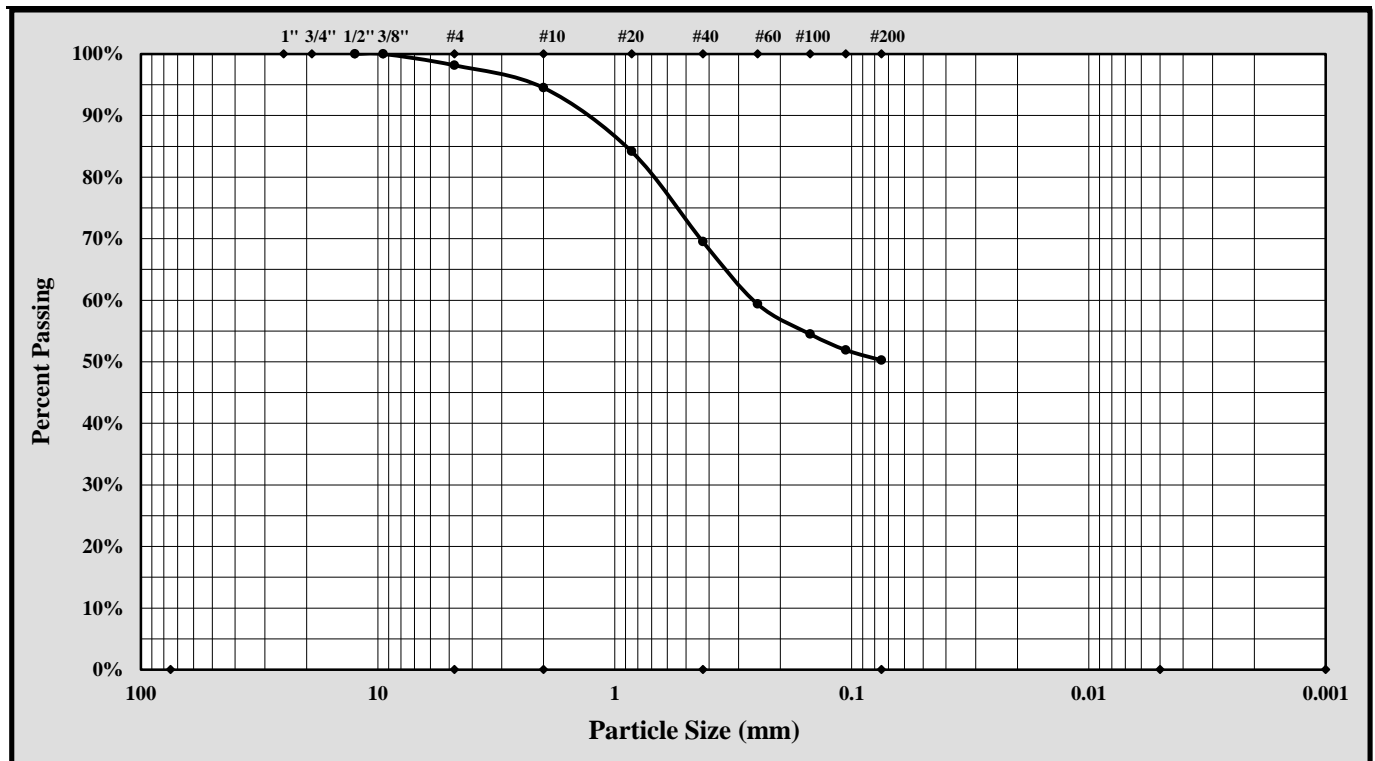
Sample Log No.:

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:	P-64	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.1' - 3.1'
Sample Description:	Sandy Fat Clay (CH, A-7-6 (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:	Gravel:	1.8%
Silt & Clay (% Passing #200):	Total Sand:	47.9%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	25
	Plastic Index	37

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

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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:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	4/25/2018
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
RW-38	SS-1A	0.0 - 1.0	C-66	30.88	182.93	171.51	11.42	8.1%	
RW-38	SS-2	2.0 - 4.0	C-15	30.86	80.60	71.21	9.39	23.3%	
RW-38	SS-4	6.0 - 8.0	C-33	30.36	83.49	72.57	10.92	25.9%	
RW-43	SS-1A	0.0 - 1.0	C-62	31.39	88.65	86.17	2.48	4.5%	
RW-43	SS-2	2.0 - 4.0	C-45	31.34	79.71	69.86	9.85	25.6%	
RW-43	SS-3	4.0 - 6.0	C-5	29.82	80.68	74.41	6.27	14.1%	
RW-43	SS-8	23.5 - 25.0	C-29	31.54	88.59	67.03	21.56	60.7%	

Notes / Deviations / References

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

<u>Derek Baker</u> <i>Technician Name</i>		<u>4/25/2018</u> <i>Date</i>
<u>Michael D. Kelso, E.I.</u> <i>Technical Responsibility</i>	 <i>Signature</i>	<u>5/31/2018</u> <i>Date</i>
	<u>Staff Professional</u> <i>Position</i>	

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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
		ft.		grams	grams	grams	grams	%	
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	<u></u> Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>5/08/18</u> Date
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<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position	<u>5/08/18</u> Date
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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



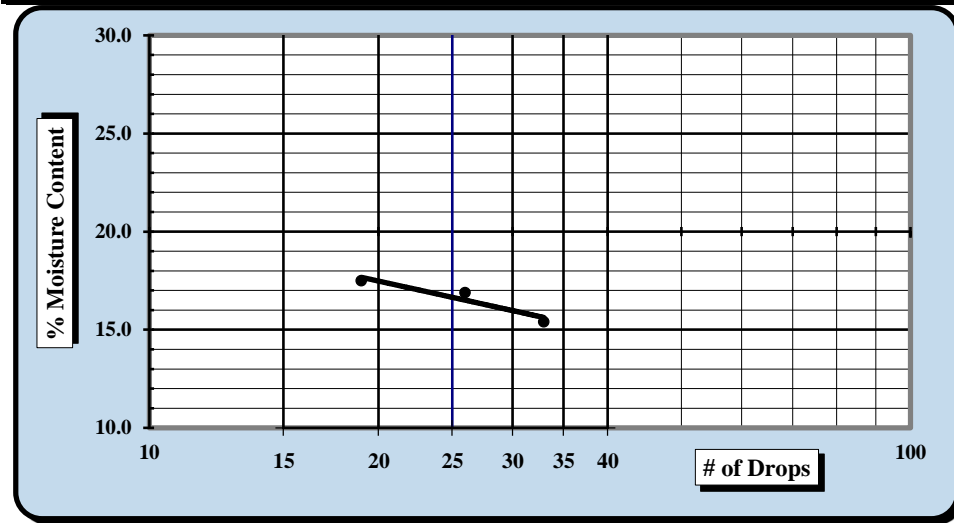
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date:	5/07/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-1
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	3/15/18
		Depth:	0.0' - 2.0'

Sample Description: Silty Clayey Sand (SC-SM, A-4(0))					
<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			
		16	17	18			19	20		
A	Tare Weight	26.60	26.62	26.78				26.67	26.84	
B	Wet Soil Weight + A	48.61	45.62	45.56				33.50	33.59	
C	Dry Soil Weight + A	45.68	42.87	42.76				32.86	32.94	
D	Water Weight (B-C)	2.93	2.75	2.80				0.64	0.65	
E	Dry Soil Weight (C-A)	19.08	16.25	15.98				6.19	6.10	
F	% Moisture (D/E)*100	15.4%	16.9%	17.5%				10.3%	10.7%	
N	# OF DROPS	33	26	19				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							10.5%		



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	17
Plastic Limit	11
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

5/08/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/08/18
 Date

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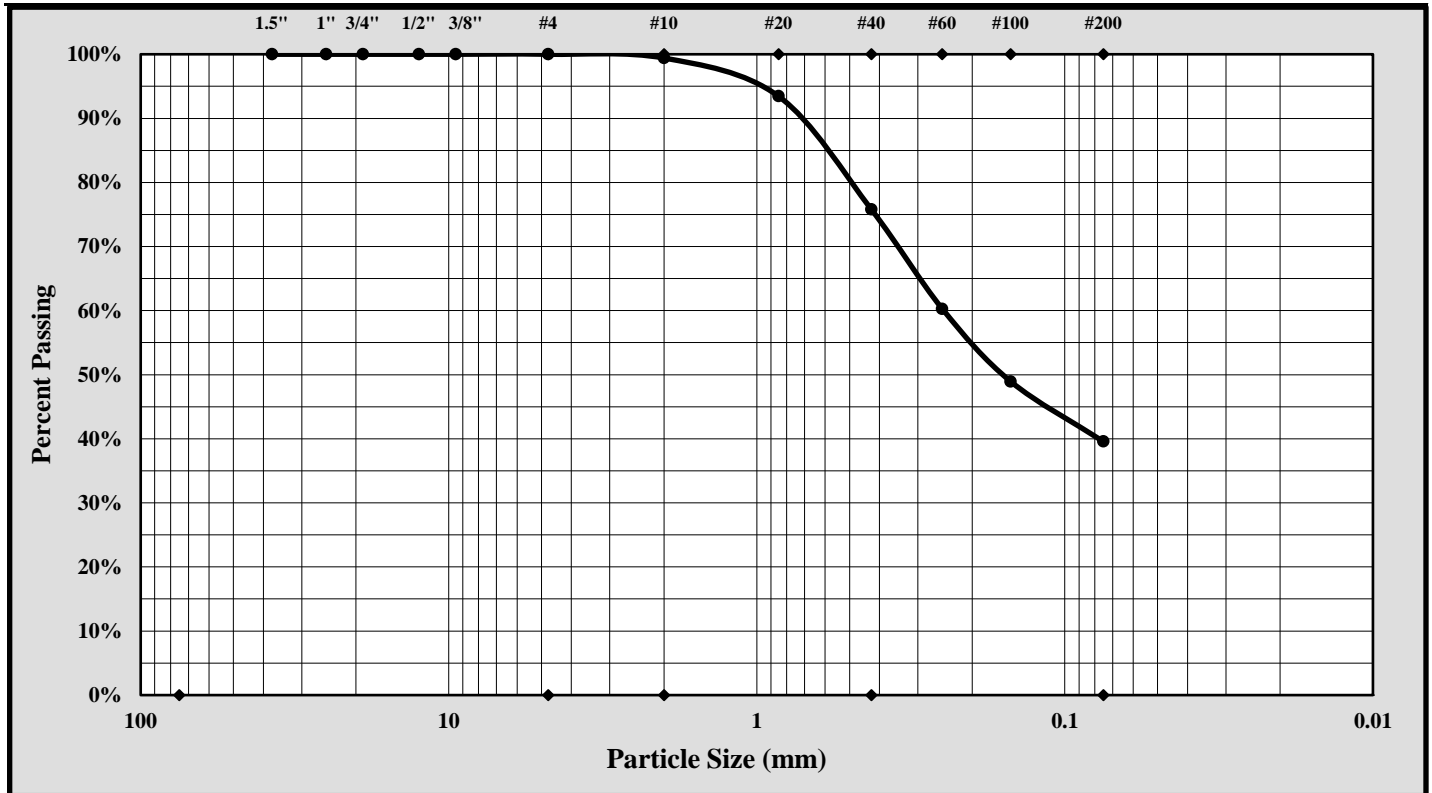


Particle Size Analysis of Soils

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:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/05 - 5/08/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-1
		Sample Date:	3/15/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Silty Clayey Sand (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 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: 2.00 mm Gravel: 0.0%
Silt & Clay (% Passing #200): 39.6% Total Sand: 60.4%

Liquid Limit	17	Plastic Limit	11	Plastic Index	6
Coarse Sand:	0.6%	Medium Sand:	23.6%	Fine Sand:	36.2%
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

5/08/18
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



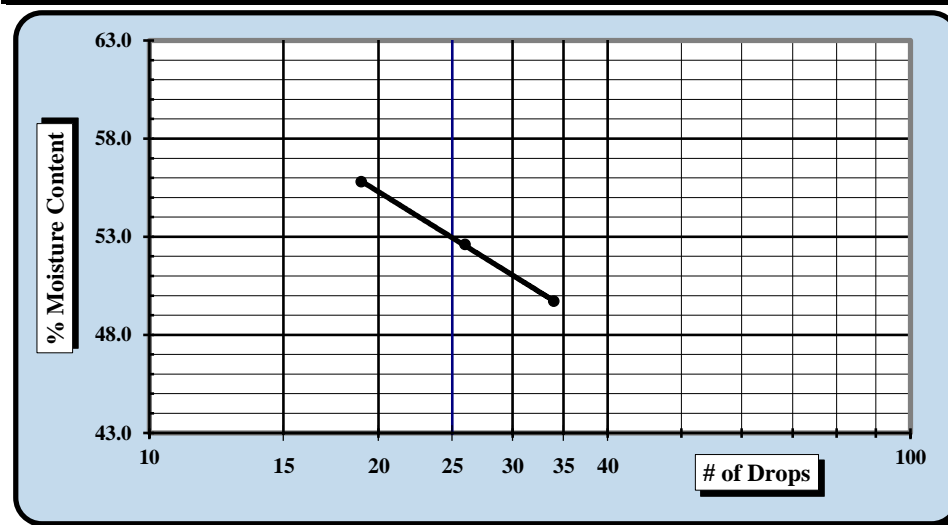
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date:	5/07/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-4
Location:	Embankment Boring	Sample Date:	3/15/18
Type:	Split-spoon	Depth:	6.0' - 8.0'

Sample Description: Sandy Elastic Silt (MH, A-7-5(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		
		21	22	23			24	25	
A	Tare Weight	28.08	25.68	27.29			25.99	26.78	
B	Wet Soil Weight + A	43.56	41.38	41.95			34.17	34.30	
C	Dry Soil Weight + A	38.42	35.97	36.70			32.22	32.51	
D	Water Weight (B-C)	5.14	5.41	5.25			1.95	1.79	
E	Dry Soil Weight (C-A)	10.34	10.29	9.41			6.23	5.73	
F	% Moisture (D/E)*100	49.7%	52.6%	55.8%			31.3%	31.2%	
N	# OF DROPS	34	26	19			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	53
Plastic Limit	31
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

5/08/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/08/18
 Date

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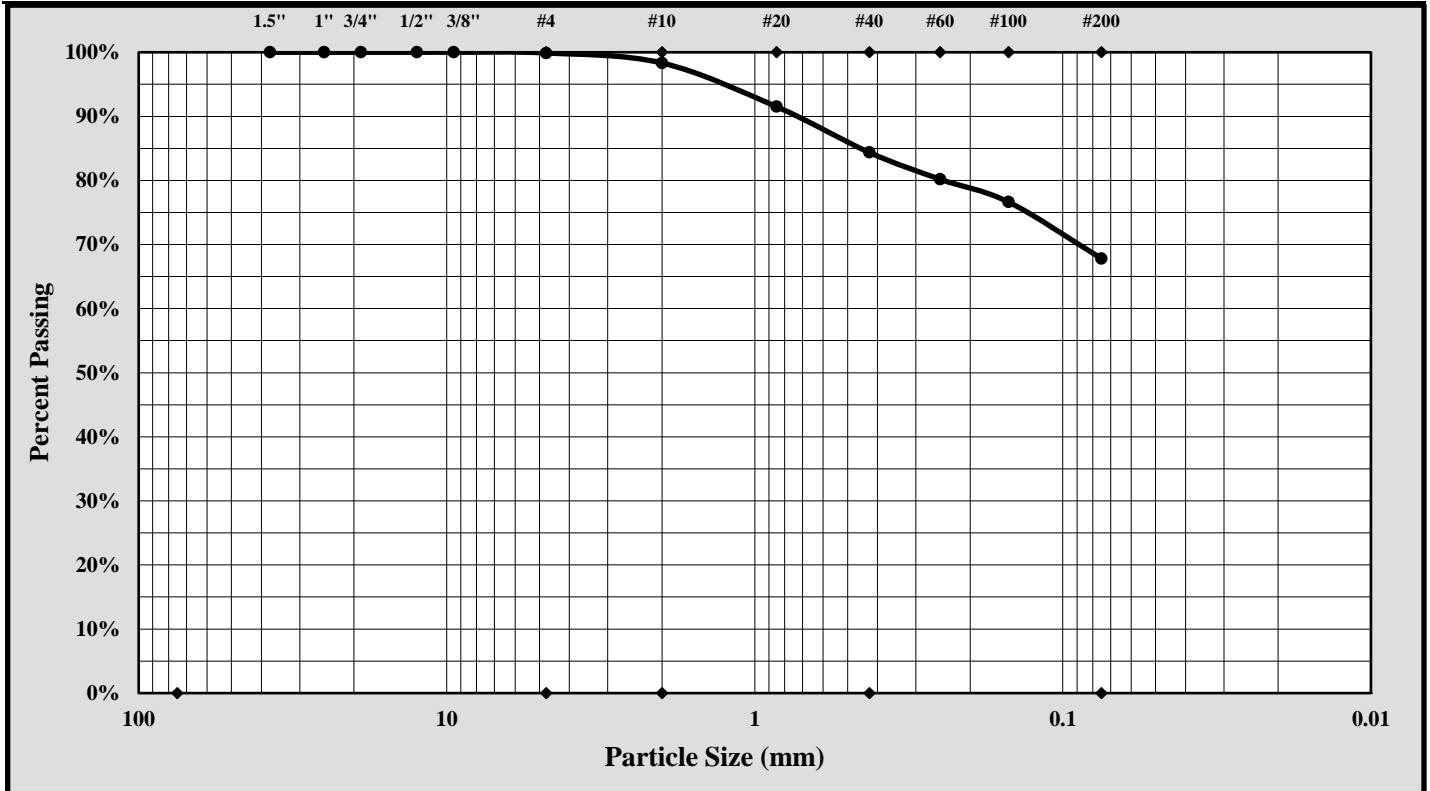


Particle Size Analysis of Soils

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:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/05 - 5/08/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-4
		Sample Date:	3/15/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Sandy Elastic Silt (MH, A-7-5(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: 0.1%
 Silt & Clay (% Passing #200): 67.8% Total Sand: 32.1%

Liquid Limit	53	Plastic Limit	31	Plastic Index	22
Coarse Sand:	1.6%	Medium Sand:	14.0%	Fine Sand:	16.5%
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

5/08/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



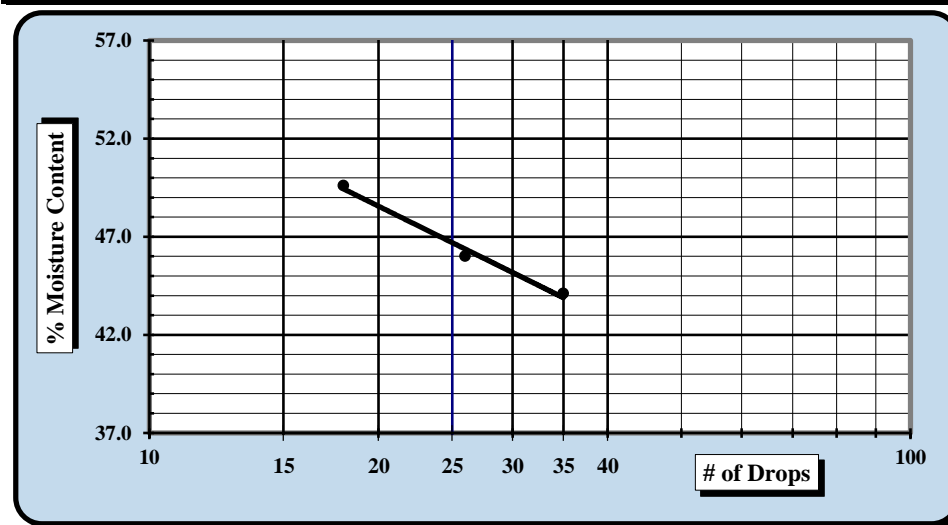
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date:	5/07/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-7
Location:	Embankment Boring	Sample Date:	3/15/18
Type:	Split-spoon	Depth:	18.5' - 20.0'
Sample Description:	Sandy Lean Clay (CL, 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			
		26	27	28			29	30		
A	Tare Weight	27.34	26.97	26.83				26.99	27.37	
B	Wet Soil Weight + A	42.59	41.26	41.88				36.06	34.87	
C	Dry Soil Weight + A	37.92	36.76	36.89				34.64	33.70	
D	Water Weight (B-C)	4.67	4.50	4.99				1.42	1.17	
E	Dry Soil Weight (C-A)	10.58	9.79	10.06				7.65	6.33	
F	% Moisture (D/E)*100	44.1%	46.0%	49.6%				18.6%	18.5%	
N	# OF DROPS	35	26	18				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	47
Plastic Limit	19
Plastic Index	28
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

5/08/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/08/18
Date

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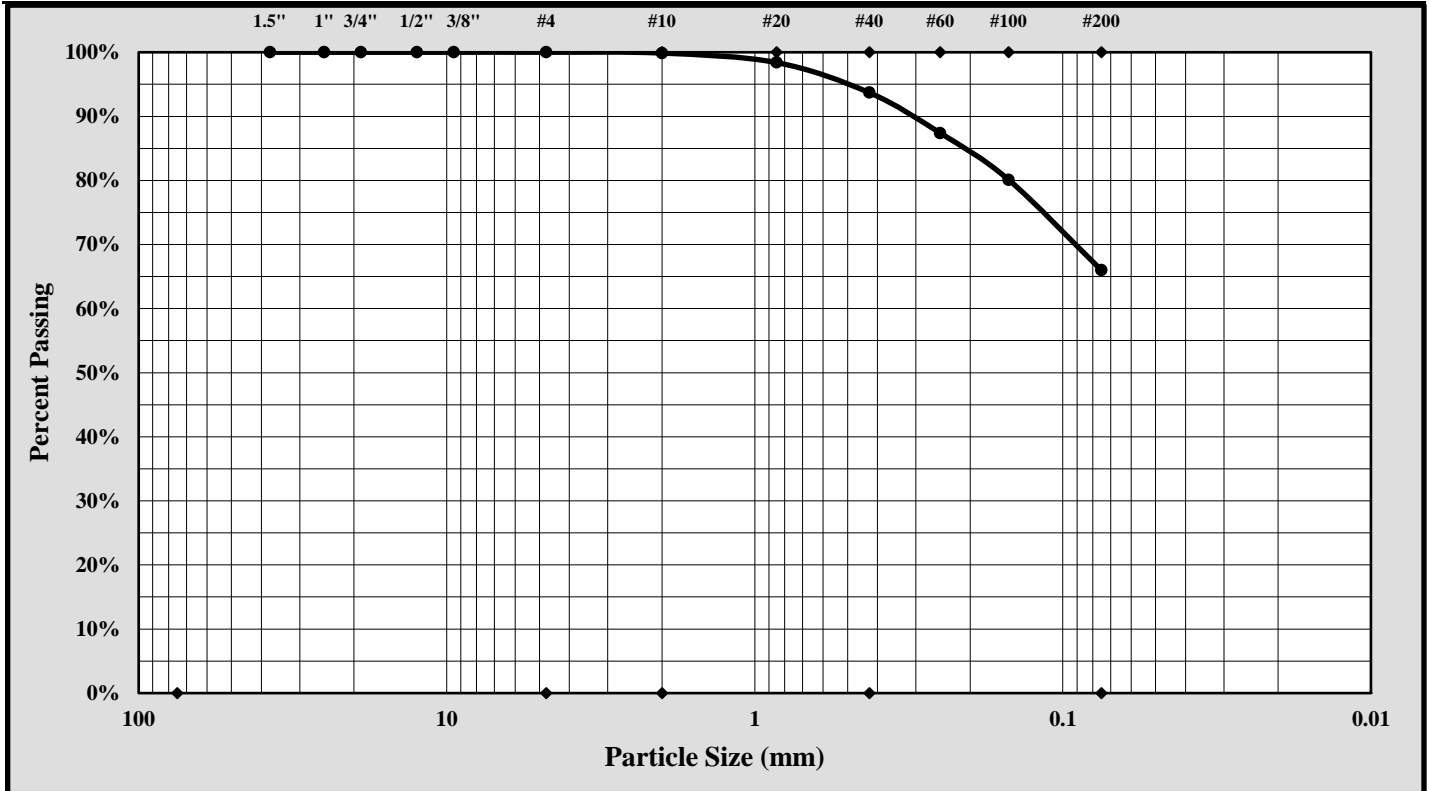


Particle Size Analysis of Soils

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:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/05 - 5/08/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-7
		Sample Date:	3/15/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Sandy Lean Clay (CL, 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: 2.00 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 66.0% Total Sand: 34.0%

Liquid Limit	47	Plastic Limit	19	Plastic Index	28
Coarse Sand:	0.1%	Medium Sand:	6.2%	Fine Sand:	27.7%
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

5/08/18
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



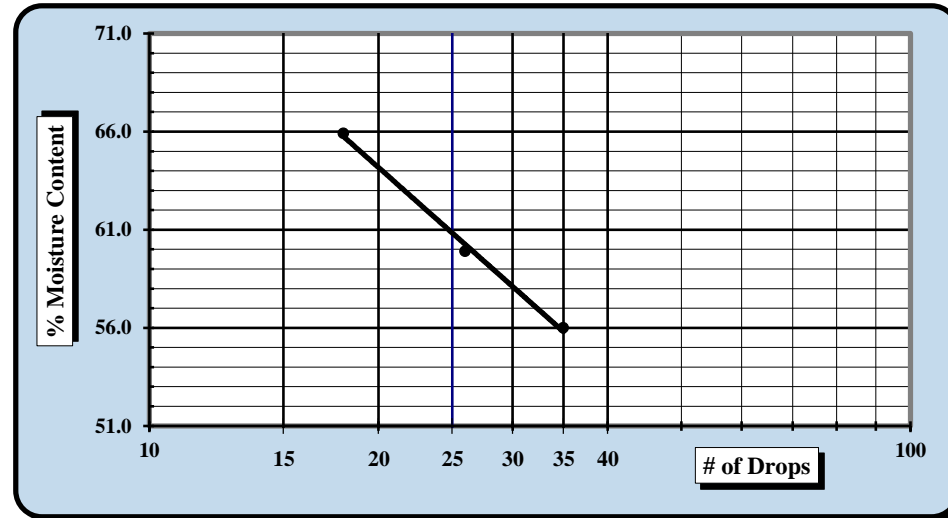
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date:	5/07/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-10
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	3/15/18
		Depth:	33.5' - 35.0'

Sample Description: Clayey Sand (SC, A-2-7(3))					
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	28.63	27.64	26.69			28.25	26.95	
B	Wet Soil Weight + A	40.72	40.29	41.89			36.42	34.23	
C	Dry Soil Weight + A	36.38	35.55	35.85			34.55	32.58	
D	Water Weight (B-C)	4.34	4.74	6.04			1.87	1.65	
E	Dry Soil Weight (C-A)	7.75	7.91	9.16			6.30	5.63	
F	% Moisture (D/E)*100	56.0%	59.9%	65.9%			29.7%	29.3%	
N	# OF DROPS	35	26	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						29.5%		



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	61
Plastic Limit	30
Plastic Index	31
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

5/08/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/08/18
Date

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Particle Size Analysis of Soils

ASTM D 6913



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

Table with project details including S&ME Project #, Report Date, Project Name, Test Date(s), Client Name, Address, Boring #, Sample #, Sample Date, Location, Type, Depth, and Sample Description.

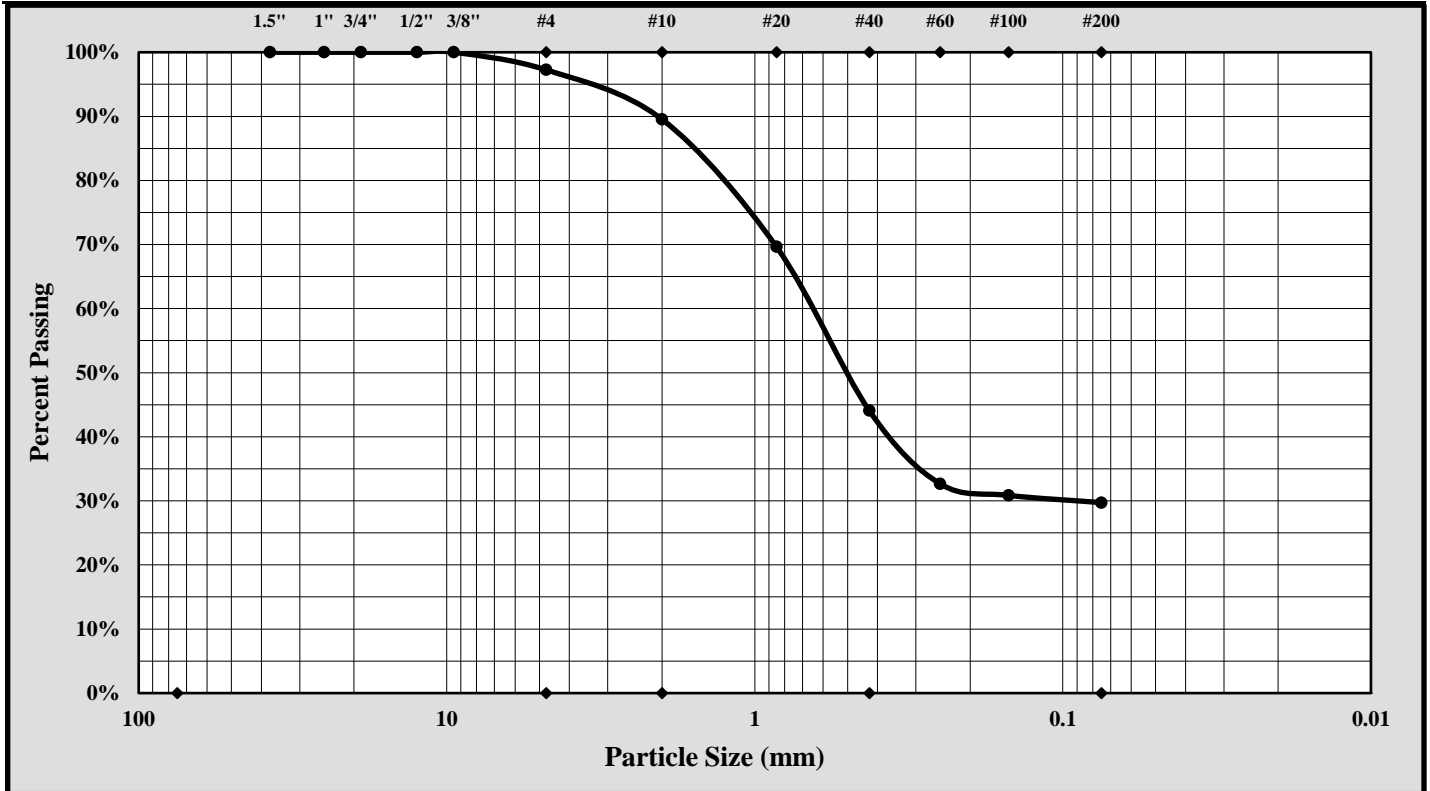


Table defining soil categories: Cobbles, Gravel, Coarse Sand, Medium Sand, Fine Sand, Silt, Clay, and Colloids with their respective size ranges.

Maximum Particle Size: 9.50 mm, Gravel: 2.8%, Silt & Clay (% Passing #200): 29.7%, Total Sand: 67.5%

Table with soil characteristics: Liquid Limit (61), Plastic Limit (30), Plastic Index (31), Coarse Sand (7.7%), Medium Sand (45.4%), Fine Sand (14.4%), and sand/gravel description checkboxes.

References / Comments / Deviations:

Matthew F. Cooke, P.G., Technical Responsibility

Project Manager, Position

5/08/18, Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



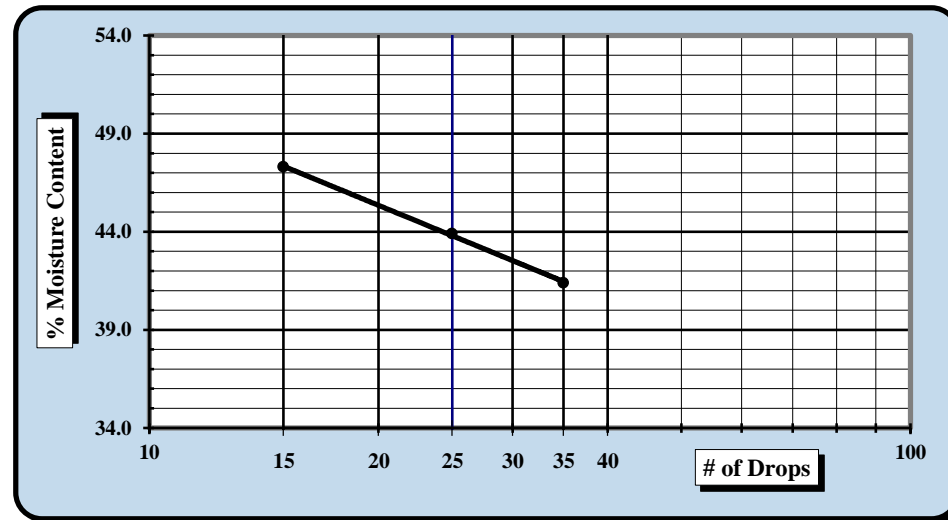
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date:	5/07/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-12
Location:	Embankment Boring	Sample Date:	3/15/18
Type:	Split-spoon	Depth:	43.5' - 45.0'

Sample Description: Clayey Sand (SC, A-2-7(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		
		36	37	38			39	40	
A	Tare Weight	25.68	26.22	26.29			25.88	26.27	
B	Wet Soil Weight + A	41.11	42.95	41.46			32.60	34.80	
C	Dry Soil Weight + A	36.59	37.85	36.59			31.20	33.01	
D	Water Weight (B-C)	4.52	5.10	4.87			1.40	1.79	
E	Dry Soil Weight (C-A)	10.91	11.63	10.30			5.32	6.74	
F	% Moisture (D/E)*100	41.4%	43.9%	47.3%			26.3%	26.6%	
N	# OF DROPS	35	25	15			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	44
Plastic Limit	26
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

<u>Benjamin J. Kovaleski</u> Technician Name	<u>5/08/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/08/18</u> Date
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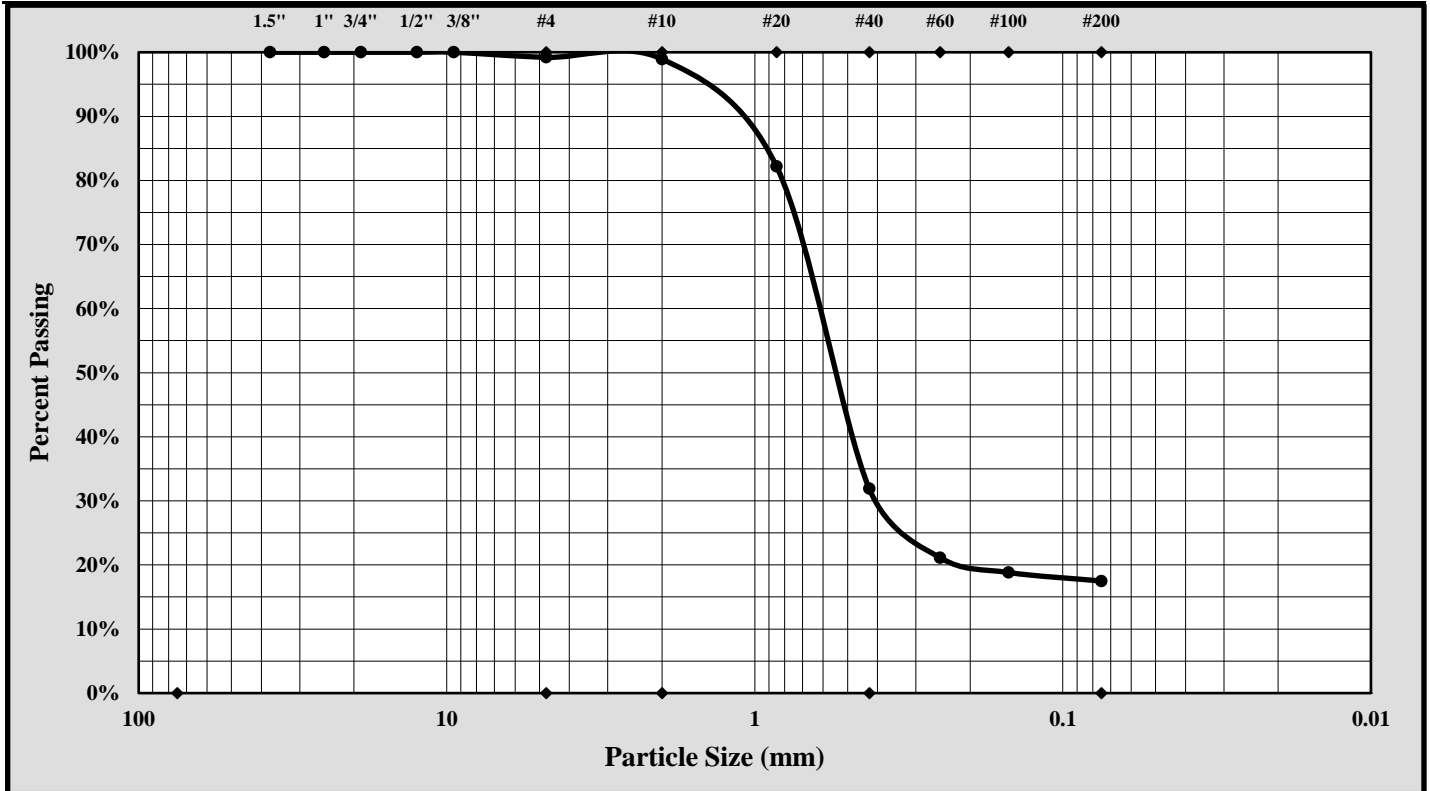


Particle Size Analysis of Soils

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:	5/08/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/05 - 5/08/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	SS-12
		Sample Date:	3/15/18
Location:	Embankment Boring	Type:	Split-spoon
		Depth:	43.5' - 45.0'
Sample Description:	Clayey Sand (SC, A-2-7(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 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: 0.8%
 Silt & Clay (% Passing #200): 17.5% Total Sand: 81.7%

Liquid Limit 44 Plastic Limit 26 Plastic Index 18

Coarse Sand: 0.3% Medium Sand: 67.1% Fine Sand: 14.4%

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

5/08/18
 Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



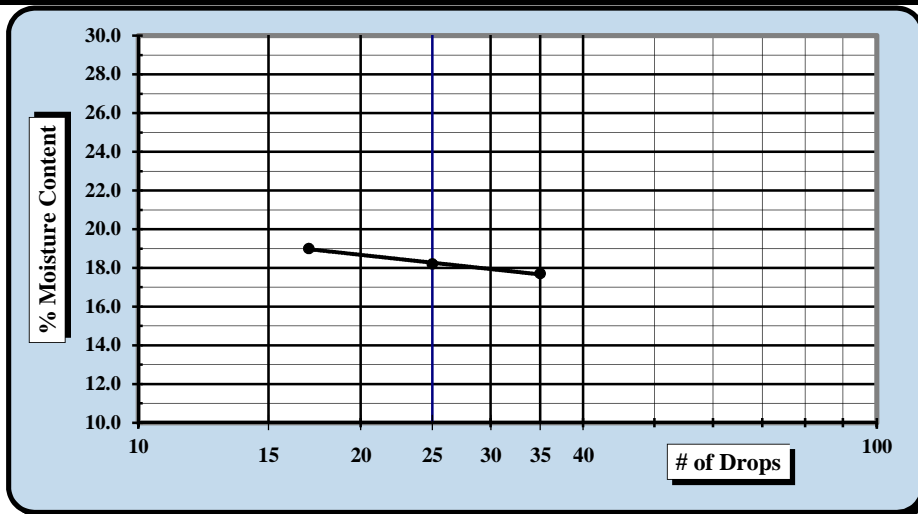
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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-43	Sample #:	SS-1A
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 1.0'

Sample Description: Silty, clayey sand with gravel (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		
		18	6	3			11	12	
A	Tare Weight	15.41	15.44	15.48			15.43	15.56	
B	Wet Soil Weight + A	26.24	27.19	29.11			24.92	25.76	
C	Dry Soil Weight + A	24.51	25.38	27.06			23.80	24.55	
D	Water Weight (B-C)	1.73	1.81	2.05			1.12	1.21	
E	Dry Soil Weight (C-A)	9.10	9.94	11.58			8.37	8.99	
F	% Moisture (D/E)*100	19.0%	18.2%	17.7%			13.4%	13.5%	
N	# OF DROPS	17	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						13.5%		



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 **18**

Plastic Limit **14**

Plastic Index **4**

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

5/29/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

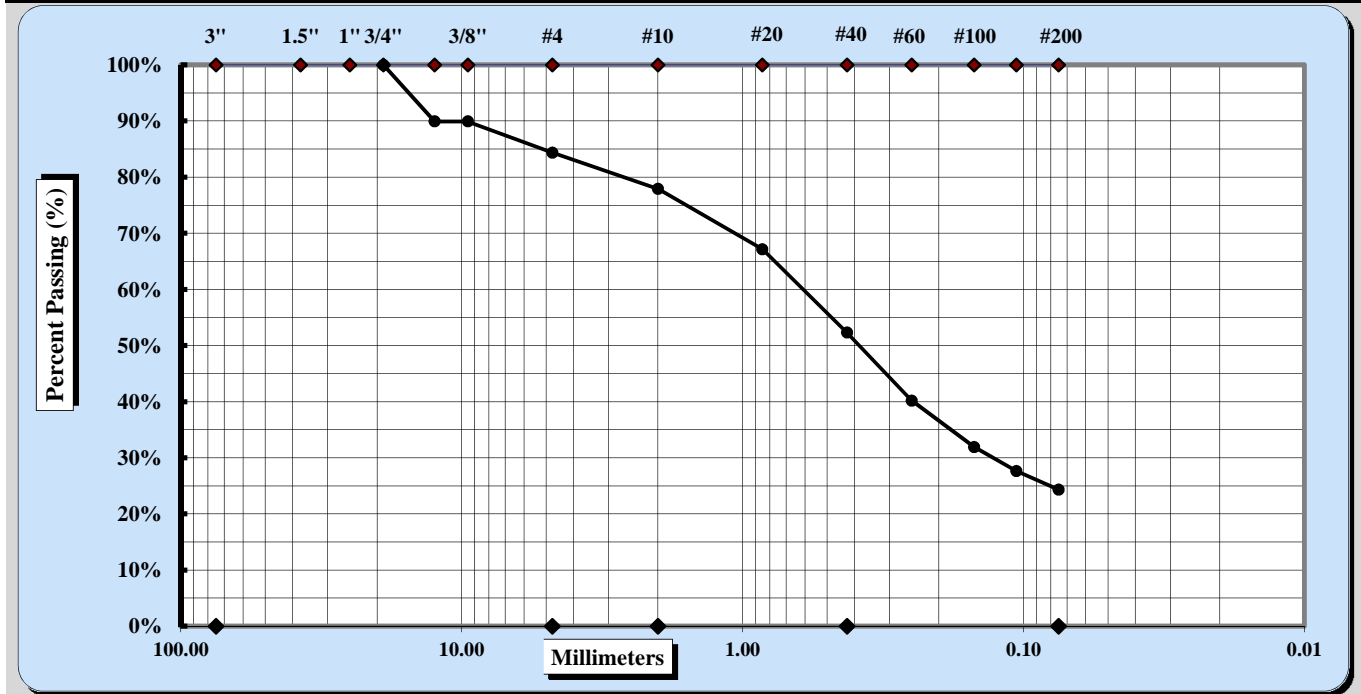


Quality Assurance

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-43	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 1A	Depth: 0.0' - 1.0'
Sample Description: Silty, clayey sand with gravel (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	3/4"	Coarse Sand	6%	Fine Sand	28%
Gravel	16%	Medium Sand	26%	Silt & Clay	24%
Liquid Limit	18	Plastic Limit	14	Plastic Index	4

Coarse Sand	6%	Medium Sand	26%	Fine Sand	28%
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 checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.		Staff Professional	5/31/2018
Technical Responsibility	Signature	Position	Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

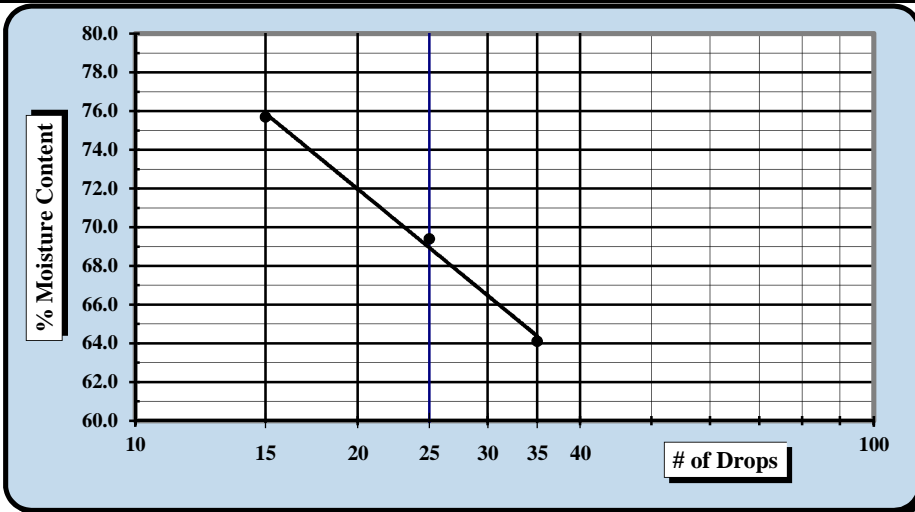
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

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-43	Sample #:	SS-2
Log #:	43-2321	Sample Date:	Various
		Elevation:	2.0' - 4.0'

Sample Description: Sandy fat clay (CH, A-7-5 (26))

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		
		13	8	17			9	21	
A	Tare Weight	15.39	15.51	15.49			15.42	15.51	
B	Wet Soil Weight + A	24.23	25.27	26.45			24.46	23.19	
C	Dry Soil Weight + A	20.42	21.27	22.17			22.24	21.28	
D	Water Weight (B-C)	3.81	4.00	4.28			2.22	1.91	
E	Dry Soil Weight (C-A)	5.03	5.76	6.68			6.82	5.77	
F	% Moisture (D/E)*100	75.7%	69.4%	64.1%			32.6%	33.1%	
N	# OF DROPS	15	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						32.9%		



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	69
Plastic Limit	33
Plastic Index	36
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

5/29/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

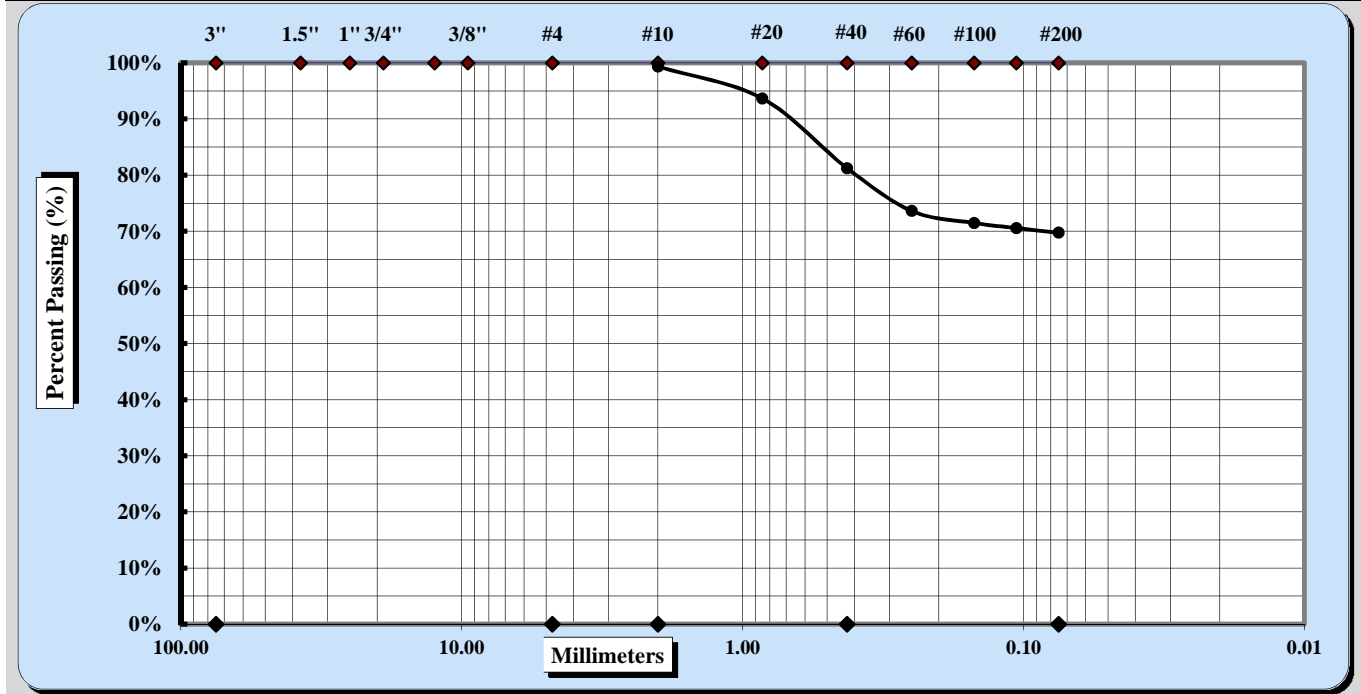


Quality Assurance

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-43	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	2
		Depth:	2.0' - 4.0'
Sample Description:	Sandy fat clay (CH, A-7-5 (26))		



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	1%	Fine Sand	12%
Gravel	0%	Medium Sand	18%	Silt & Clay	70%
Liquid Limit	69	Plastic Limit	33	Plastic Index	36

Coarse Sand	1%	Medium Sand	18%	Fine Sand	12%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

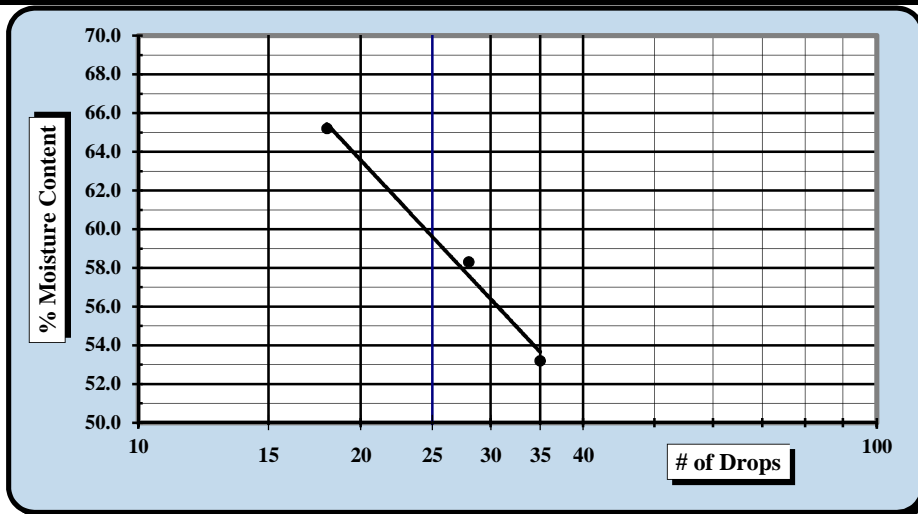
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

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-43	Sample #:	SS-3
Log #:	43-2321	Sample Date:	Various
		Elevation:	4.0' - 6.0'

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		
		1	5	23			4	14	
A	Tare Weight	15.34	15.39	15.44			15.44	15.47	
B	Wet Soil Weight + A	24.51	25.27	26.38			23.61	23.09	
C	Dry Soil Weight + A	20.89	21.63	22.58			22.11	21.69	
D	Water Weight (B-C)	3.62	3.64	3.80			1.50	1.40	
E	Dry Soil Weight (C-A)	5.55	6.24	7.14			6.67	6.22	
F	% Moisture (D/E)*100	65.2%	58.3%	53.2%			22.5%	22.5%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						22.5%		



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	60
Plastic Limit	23
Plastic Index	37
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

5/29/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

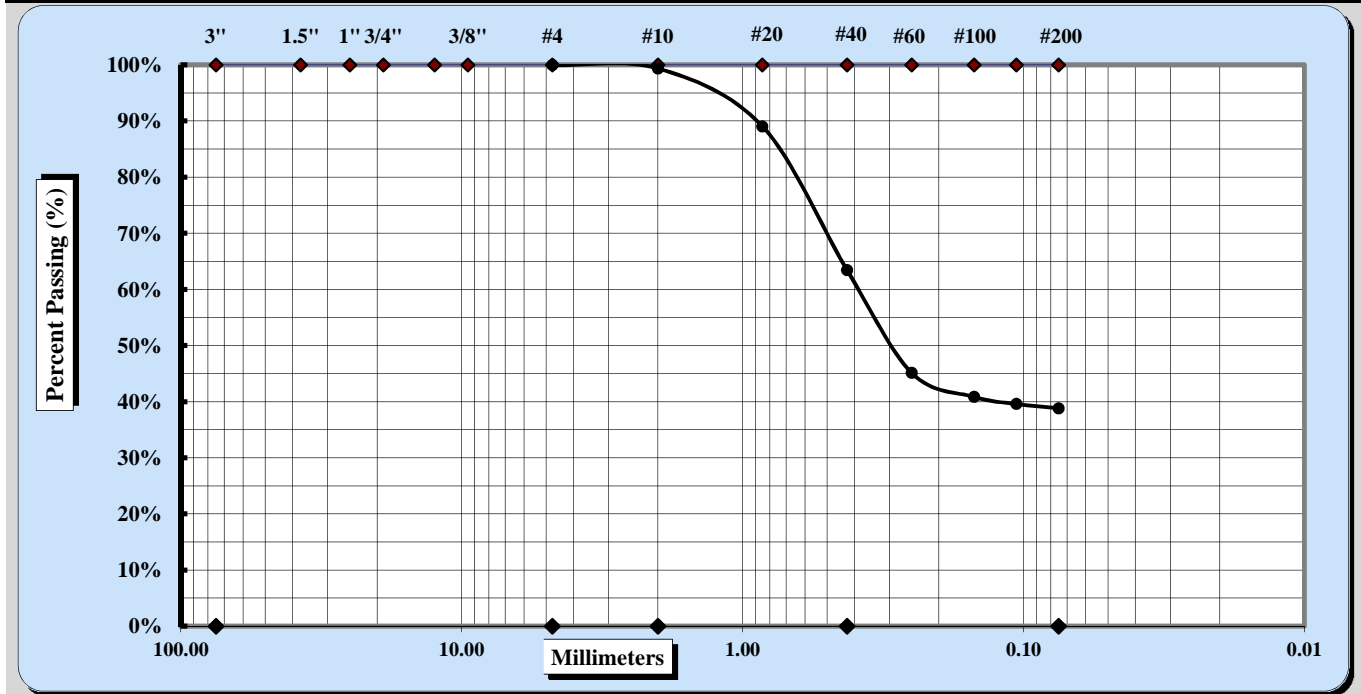


Quality Assurance

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-43	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 3	Depth: 4.0' - 6.0'
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	No. 10	Coarse Sand	1%	Fine Sand	25%
Gravel	0%	Medium Sand	36%	Silt & Clay	39%
Liquid Limit	60	Plastic Limit	23	Plastic Index	37

Coarse Sand	1%	Medium Sand	36%	Fine Sand	25%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



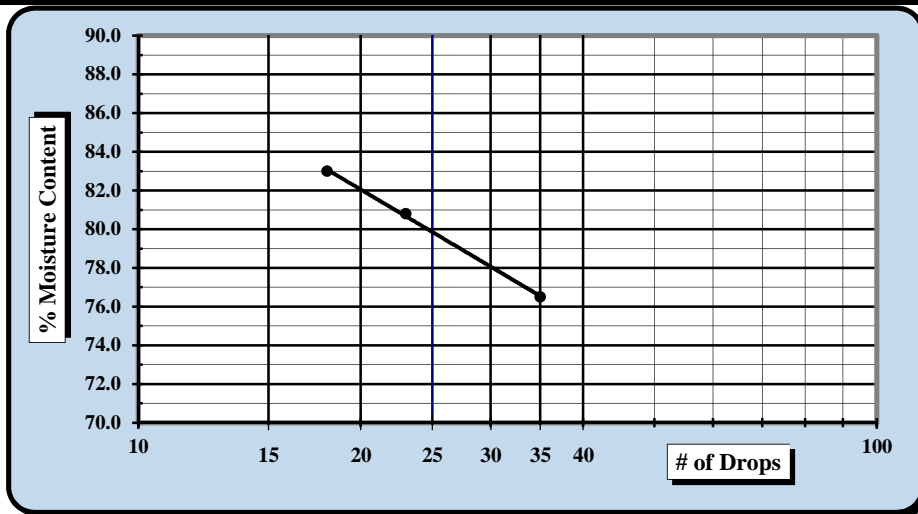
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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-43	Sample #:	SS-8
Log #:	43-2321	Sample Date:	Various
		Elevation:	23.5' - 25.0'

Sample Description: Elastic silt with sand (MH, A-7-5 (30))					
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		
		13	2	24			10	30	
A	Tare Weight	15.39	15.55	15.43			15.40	17.82	
B	Wet Soil Weight + A	25.73	26.20	27.24			22.82	25.79	
C	Dry Soil Weight + A	21.04	21.44	22.12			20.62	23.43	
D	Water Weight (B-C)	4.69	4.76	5.12			2.20	2.36	
E	Dry Soil Weight (C-A)	5.65	5.89	6.69			5.22	5.61	
F	% Moisture (D/E)*100	83.0%	80.8%	76.5%			42.1%	42.1%	
N	# OF DROPS	18	23	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						42.1%		



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	80
Plastic Limit	42
Plastic Index	38
Group Symbol	MH
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

5/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

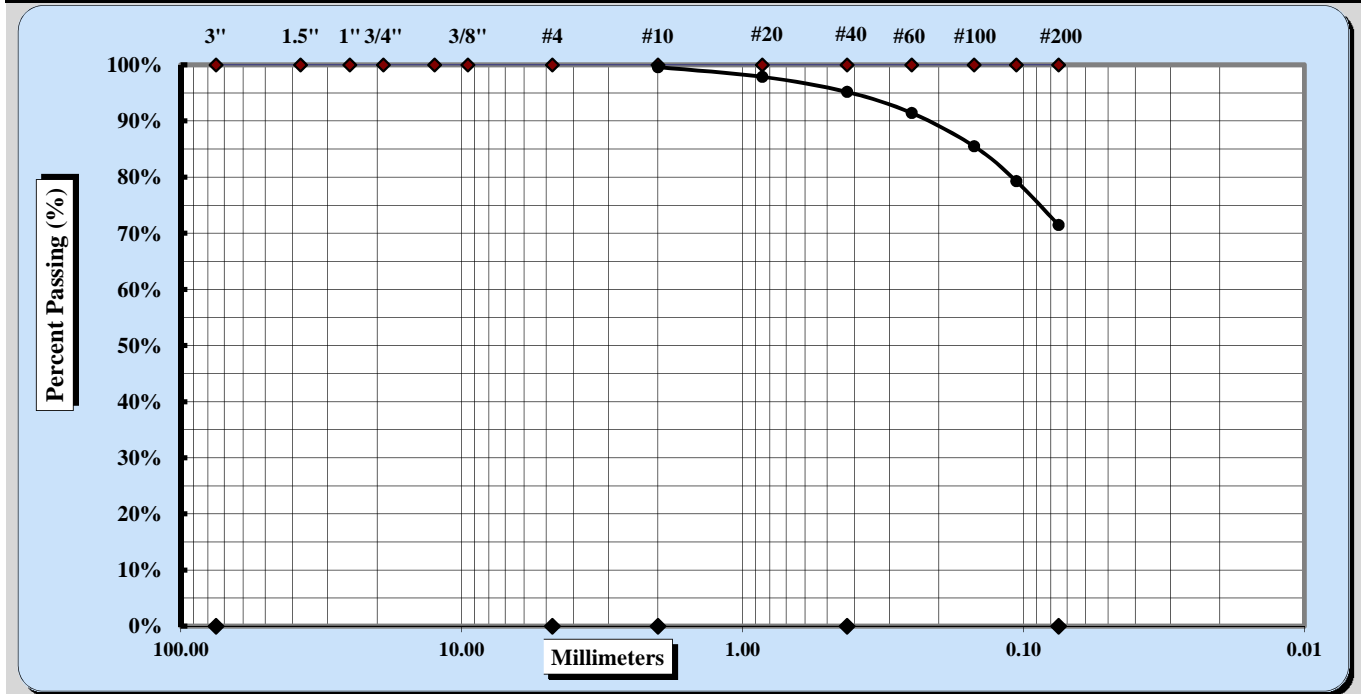


Quality Assurance

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-43	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	8
		Depth:	23.5' - 25.0'
Sample Description:	Elastic silt with sand (MH, A-7-5 (30))		



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	24%
Gravel	0%	Medium Sand	4%	Silt & Clay	71%
Liquid Limit	80	Plastic Limit	42	Plastic Index	38

Coarse Sand	0%	Medium Sand	4%	Fine Sand	24%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

5/31/2018
Date

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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):	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, 3/19 & 3/23
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		
		ft.		grams	grams	grams	grams	%			
W-19	SS-1	0.0 - 2.0	T-2	0.00	53.29	47.86	5.43	11.3%			
W-19	SS-2	2.0 - 4.0	JJ	0.00	50.89	40.38	10.51	26.0%			
W-19	SS-5	8.0 - 10.0	T-1	0.00	51.91	41.88	10.03	23.9%			
W-29	SS-2	2.0 - 4.0	P-11	0.00	51.30	47.77	3.53	7.4%			
W-29	SS-4	6.0 - 8.0	S-14	0.00	52.69	47.09	5.60	11.9%			
W-29	SS-5	8.0 - 10.0	S-17	0.00	52.80	40.30	12.50	31.0%			
W-29	SS-6	13.5 - 15.0	P-2	0.00	54.05	43.44	10.61	24.4%			
W-29	SS-7	18.5 - 20.0	P-5	0.00	53.40	42.45	10.95	25.8%			
W-29	SS-8	23.5 - 25.0	S-13	0.00	52.66	38.27	14.39	37.6%			
W-31	SS-1	0.0 - 2.0	S-18	0.00	52.57	46.11	6.46	14.0%			
W-31	SS-3	4.0 - 6.0	S-4	0.00	51.74	40.43	11.31	28.0%			
W-31	SS-7	18.5 - 20.0	P-10	0.00	54.44	43.84	10.60	24.2%			

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

Benjamin J. Kovaleski
Signature

NICET Lab Level III/117226
Certification Type / No.

5/11/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

5/11/18
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

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:	5/31/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	4/25/2018
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	%	
W-27	1	0.4 - 2.4	C-65	30.48	82.27	75.09	7.18	16.1%	
W-27	2	2.4 - 4.0	C-64	31.50	84.81	74.72	10.09	23.3%	
W-27	4	6.4 - 8.4	C-6	30.54	82.56	73.72	8.84	20.5%	
W-27	5	8.4 - 10.4	C-39	30.87	99.45	89.26	10.19	17.5%	
W-27	6	13.5 - 15.0	C-1	30.36	97.47	76.51	20.96	45.4%	
W-27	10	33.5 - 35.0	C-12	30.14	88.68	71.64	17.04	41.1%	

Notes / Deviations / References

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

<u>Derek Baker</u> Technician Name		4/25/2018 Date
<u>Michael D. Kelso, E.I.</u> Technical Responsibility	 Signature	Staff Professional Position
		5/31/2018 Date

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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



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)	5/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-27	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Depth:	0.4' - 2.4'

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		
		24	23	2			14	28-B	
A	Tare Weight	15.43	15.44	15.55			15.46	17.69	
B	Wet Soil Weight + A	26.65	27.63	28.40			23.55	26.57	
C	Dry Soil Weight + A	23.37	24.48	25.35			22.50	25.42	
D	Water Weight (B-C)	3.28	3.15	3.05			1.05	1.15	
E	Dry Soil Weight (C-A)	7.94	9.04	9.80			7.04	7.73	
F	% Moisture (D/E)*100	41.3%	34.8%	31.1%			14.9%	14.9%	
N	# OF DROPS	18	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						14.9%		



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	36
Plastic Limit	15
Plastic Index	21
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

5/21/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

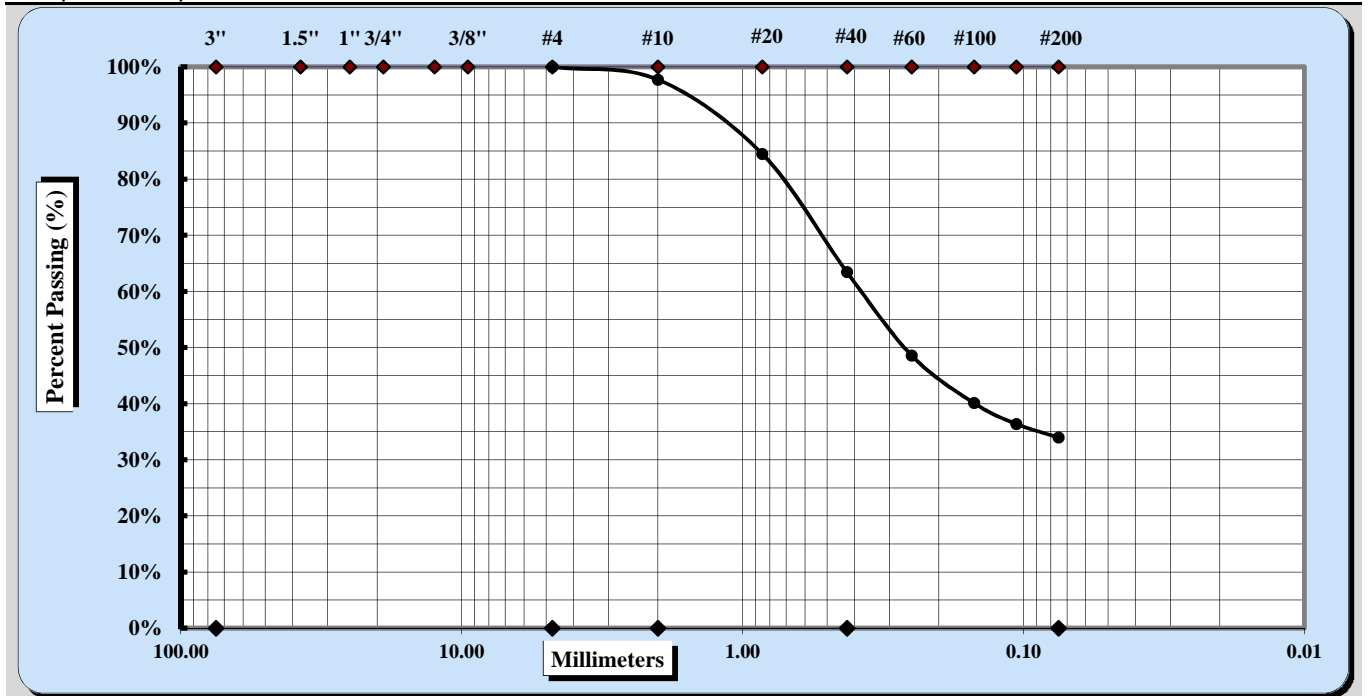


Quality Assurance

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: W-27	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 1	Depth: 0.4' - 2.4'
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	2%	Fine Sand	29%
Gravel	0%	Medium Sand	34%	Silt & Clay	34%
Liquid Limit	36	Plastic Limit	15	Plastic Index	21

Coarse Sand	2%	Medium Sand	34%	Fine Sand	29%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

Signature

Staff Professional
Position

5/31/2018
Date

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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)	5/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-27	Sample #:	SS-2
Log #:	43-2321	Sample Date:	Various
		Depth:	2.4' - 4.4'

Sample Description: Sandy fat clay (CH, A-7-5 (18))

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-78	C-76	30			32-B	29	
A	Tare Weight	15.57	22.59	17.81			17.84	17.80	
B	Wet Soil Weight + A	26.67	27.60	28.75			25.35	25.54	
C	Dry Soil Weight + A	22.05	25.61	24.56			23.60	23.74	
D	Water Weight (B-C)	4.62	1.99	4.19			1.75	1.80	
E	Dry Soil Weight (C-A)	6.48	3.02	6.75			5.76	5.94	
F	% Moisture (D/E)*100	71.3%	65.9%	62.1%			30.4%	30.3%	
N	# OF DROPS	15	25	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						30.4%		



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	66
Plastic Limit	30
Plastic Index	36
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

5/21/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

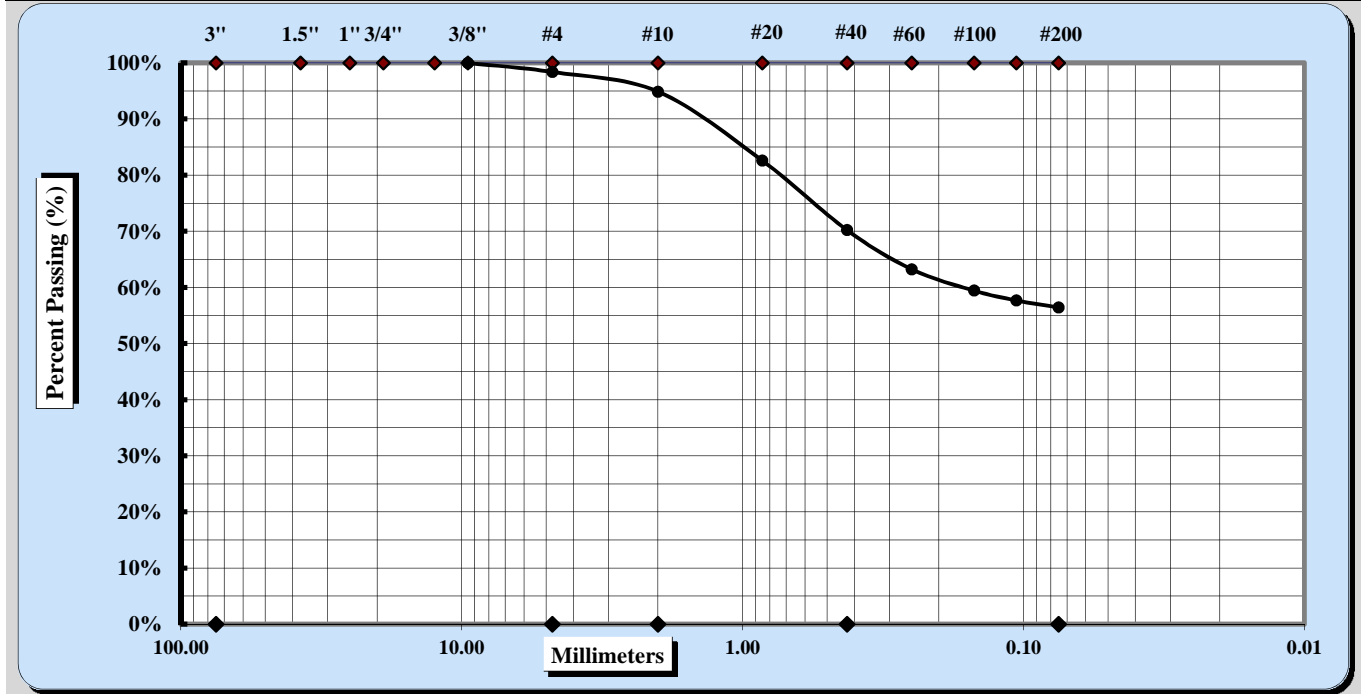


Quality Assurance

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:	W-27	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	2
		Depth:	2.4' - 4.0'
Sample Description:	Sandy fat clay (CH, A-7-5 (18))		



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	3%	Fine Sand	14%
Gravel	2%	Medium Sand	25%	Silt & Clay	56%
Liquid Limit	66	Plastic Limit	30	Plastic Index	36

Coarse Sand	3%	Medium Sand	25%	Fine Sand	14%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

5/31/2018
Date

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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)	5/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-27	Sample #:	SS-4
Log #:	43-2321	Sample Date:	Various
		Depth:	6.4' - 8.4'

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		
		22	19	15			1	12	
A	Tare Weight	15.38	15.42	15.32			15.34	15.57	
B	Wet Soil Weight + A	25.49	26.35	27.68			22.81	24.17	
C	Dry Soil Weight + A	21.92	22.67	23.75			21.60	22.81	
D	Water Weight (B-C)	3.57	3.68	3.93			1.21	1.36	
E	Dry Soil Weight (C-A)	6.54	7.25	8.43			6.26	7.24	
F	% Moisture (D/E)*100	54.6%	50.8%	46.6%			19.3%	18.8%	
N	# OF DROPS	18	24	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						19.1%		



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	51
Plastic Limit	19
Plastic Index	32
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

5/21/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

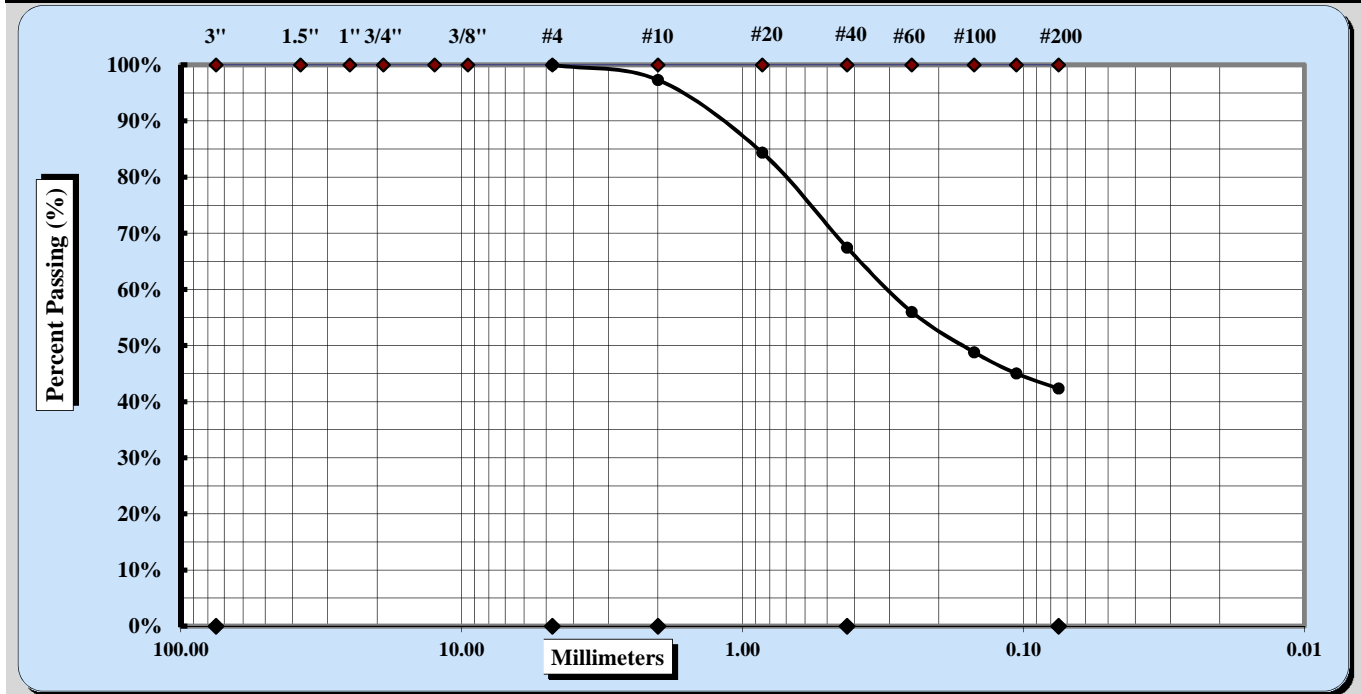


Quality Assurance

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:	W-27	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	4
		Depth:	6.4' - 8.4'
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	No. 4	Coarse Sand	3%	Fine Sand	25%
Gravel	0%	Medium Sand	30%	Silt & Clay	42%
Liquid Limit	51	Plastic Limit	19	Plastic Index	32

Coarse Sand	3%	Medium Sand	30%	Fine Sand	25%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

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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)	5/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-27	Sample #:	SS-5
Log #:	43-2321	Sample Date:	Various
		Depth:	8.4' - 10.4'

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)	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		
		5	7	17			11	21	
A	Tare Weight	15.39	15.40	15.50			15.43	15.51	
B	Wet Soil Weight + A	24.70	25.45	26.66			25.10	24.23	
C	Dry Soil Weight + A	22.64	23.36	24.49			23.97	23.22	
D	Water Weight (B-C)	2.06	2.09	2.17			1.13	1.01	
E	Dry Soil Weight (C-A)	7.25	7.96	8.99			8.54	7.71	
F	% Moisture (D/E)*100	28.4%	26.3%	24.1%			13.2%	13.1%	
N	# OF DROPS	18	23	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						13.2%		



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	26
Plastic Limit	13
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

5/21/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

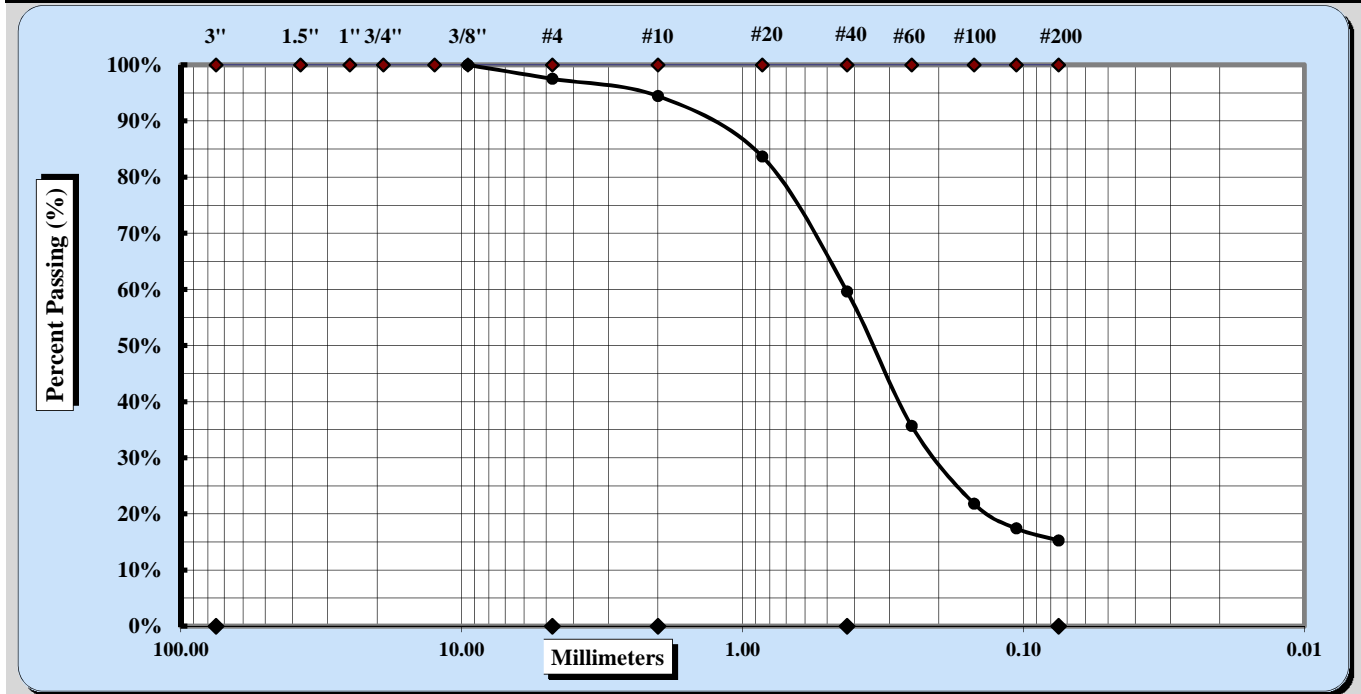


Quality Assurance

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:	W-27	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	5
Sample Description:	Clayey sand (SC, A-2-4)		
		Sample Date:	Various
		Depth:	8.4' - 10.4'



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	3/8"	Coarse Sand	3%	Fine Sand	44%
Gravel	2%	Medium Sand	35%	Silt & Clay	15%
Liquid Limit	26	Plastic Limit	13	Plastic Index	13

Coarse Sand	3%	Medium Sand	35%	Fine Sand	44%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

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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)	5/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-27	Sample #:	SS-6
Log #:	43-2321	Sample Date:	Various
		Depth:	13.5' - 15.0'

Sample Description: Fat clay (CH, A-7-6 (26))					
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		
		9	3	6			10	18	
A	Tare Weight	15.42	15.48	15.45			15.40	15.41	
B	Wet Soil Weight + A	23.82	24.79	25.89			22.86	22.63	
C	Dry Soil Weight + A	20.80	21.54	22.32			21.19	21.02	
D	Water Weight (B-C)	3.02	3.25	3.57			1.67	1.61	
E	Dry Soil Weight (C-A)	5.38	6.06	6.87			5.79	5.61	
F	% Moisture (D/E)*100	56.1%	53.6%	52.0%			28.8%	28.7%	
N	# OF DROPS	18	25	33			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.8%		



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	54
Plastic Limit	29
Plastic Index	25
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

5/21/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

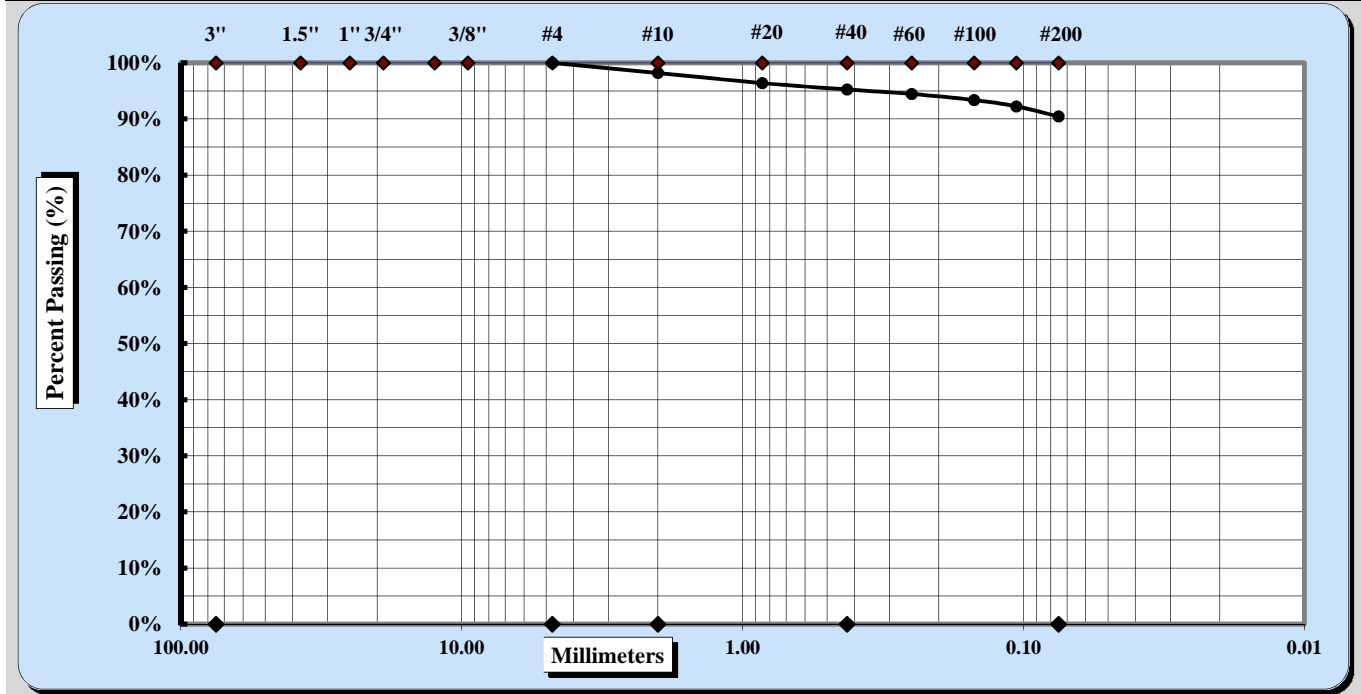


Quality Assurance

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:	W-27	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	6
		Depth:	13.5' - 15.0'
Sample Description:	Fat clay (CH, A-7-6 (26))		



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	2%	Fine Sand	5%
Gravel	0%	Medium Sand	3%	Silt & Clay	90%
Liquid Limit	54	Plastic Limit	29	Plastic Index	25

Coarse Sand	2%	Medium Sand	3%	Fine Sand	5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

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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)	5/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-27	Sample #:	SS-10
Log #:	43-2321	Sample Date:	Various
		Depth:	33.5' - 35.0'

Sample Description: Elastic silt with sand (MH, A-7-5 (16))					
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	13	16			4	20	
A	Tare Weight	15.52	15.39	15.63			15.43	15.46	
B	Wet Soil Weight + A	23.63	24.96	26.89			23.61	24.40	
C	Dry Soil Weight + A	20.62	21.54	22.93			21.45	22.03	
D	Water Weight (B-C)	3.01	3.42	3.96			2.16	2.37	
E	Dry Soil Weight (C-A)	5.10	6.15	7.30			6.02	6.57	
F	% Moisture (D/E)*100	59.0%	55.6%	54.2%			35.9%	36.1%	
N	# OF DROPS	16	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						36.0%		



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	56
Plastic Limit	36
Plastic Index	20
Group Symbol	MH
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

5/21/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/31/2018
Date

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Sieve Analysis of Soils

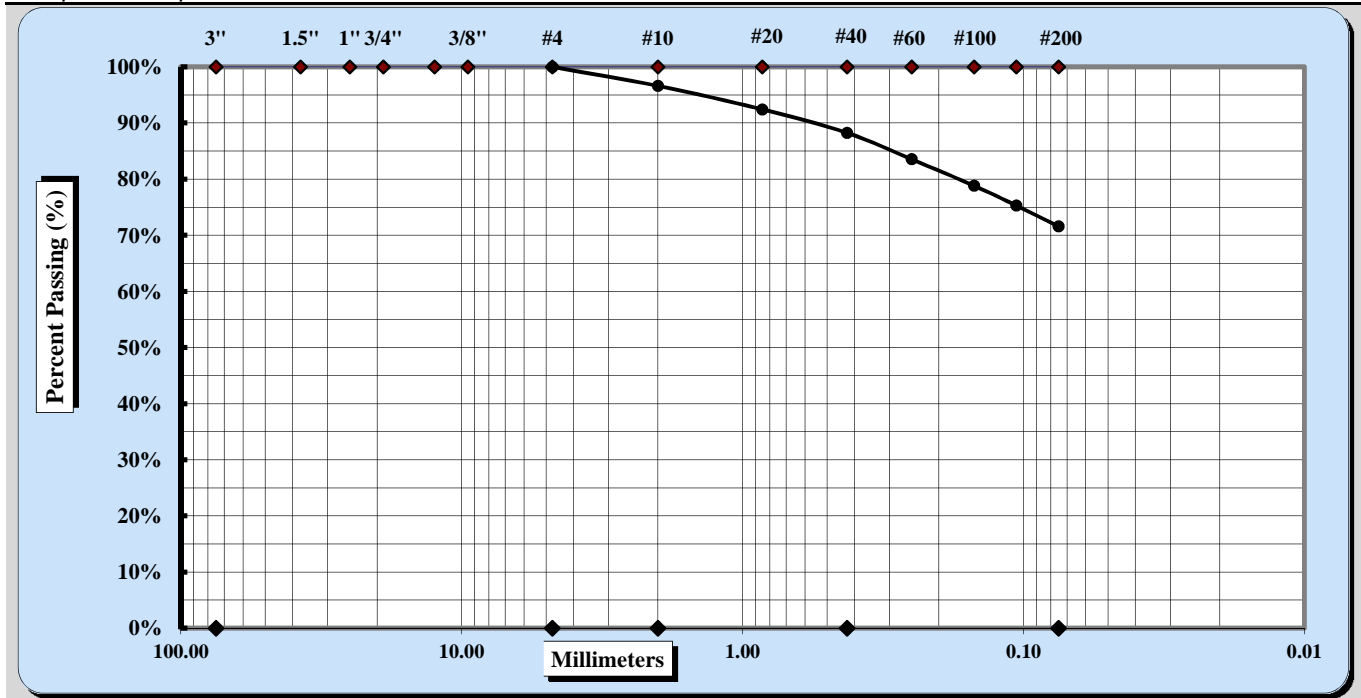


Quality Assurance

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: W-27	Type: Split Spoon	Sample Date: Various
Sample Log No.: 43-2321	Sample: 10	Depth: 33.5' - 35.0'
Sample Description: Elastic silt with sand (MH, A-7-5 (16))		



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	17%
Gravel	0%	Medium Sand	8%	Silt & Clay	72%
Liquid Limit	56	Plastic Limit	36	Plastic Index	20

Coarse Sand	3%	Medium Sand	8%	Fine Sand	17%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input 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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



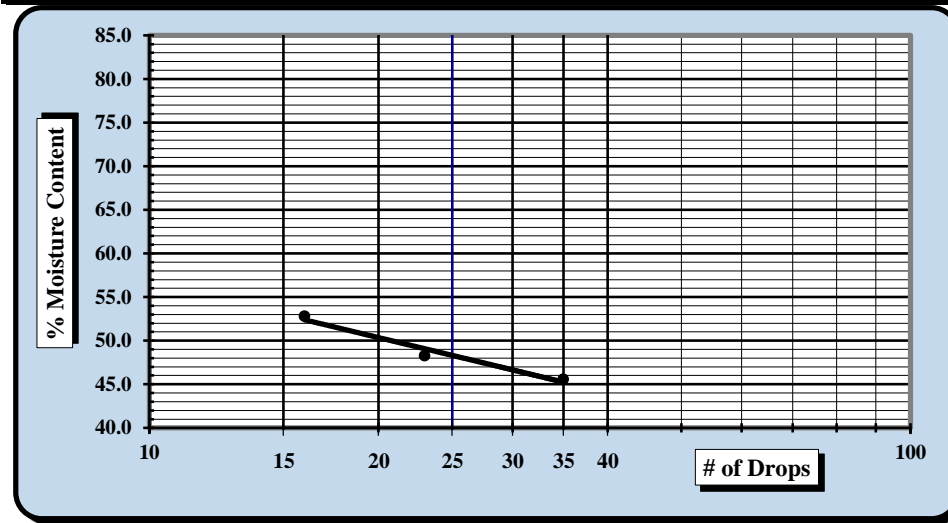
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-28	Sample #:	SS-2
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	2.0' - 4.0'

Sample Description: Clayey Sand (SC, A-2-7 (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 #	Tare #:	Liquid Limit					Plastic Limit		
		55	56	57			58	78	
A	Tare Weight	15.73	15.20	15.34			15.15	15.03	
B	Wet Soil Weight + A	27.06	27.11	25.85			21.59	22.07	
C	Dry Soil Weight + A	23.51	23.23	22.22			20.32	20.67	
D	Water Weight (B-C)	3.55	3.88	3.63			1.27	1.40	
E	Dry Soil Weight (C-A)	7.78	8.03	6.88			5.17	5.64	
F	% Moisture (D/E)*100	45.6%	48.3%	52.8%			24.6%	24.8%	
N	# OF DROPS	35	23	16			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	49
Plastic Limit	25
Plastic Index	24
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

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Particle Size Analysis of Soils



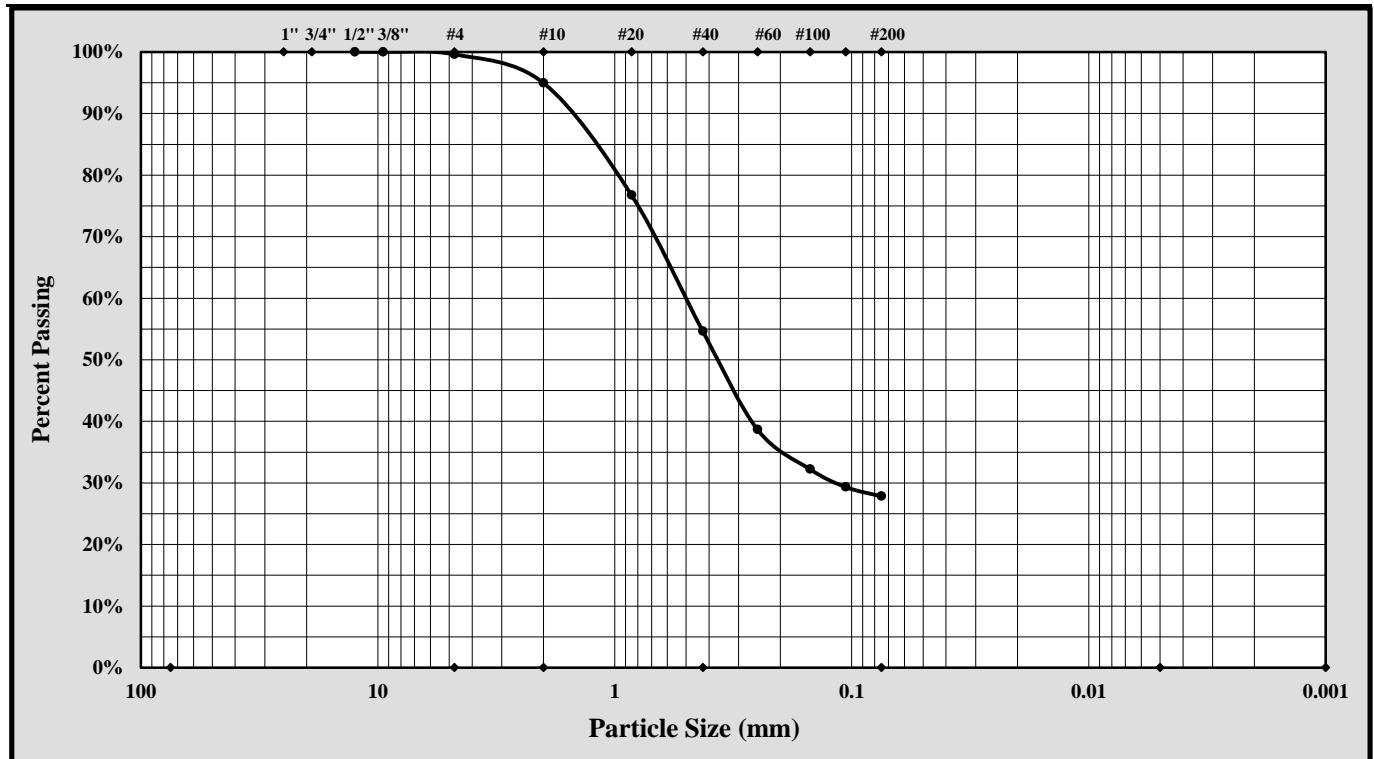
Sample Log No.:

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:	W-28	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-2
		Depth:	2.0' - 4.0'
Sample Description:	Clayey Sand (SC, A-2-7 (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:	0.4%
Silt & Clay (% Passing #200):	Total Sand:	71.8%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	25
	Plastic Index	24

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

5/4/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



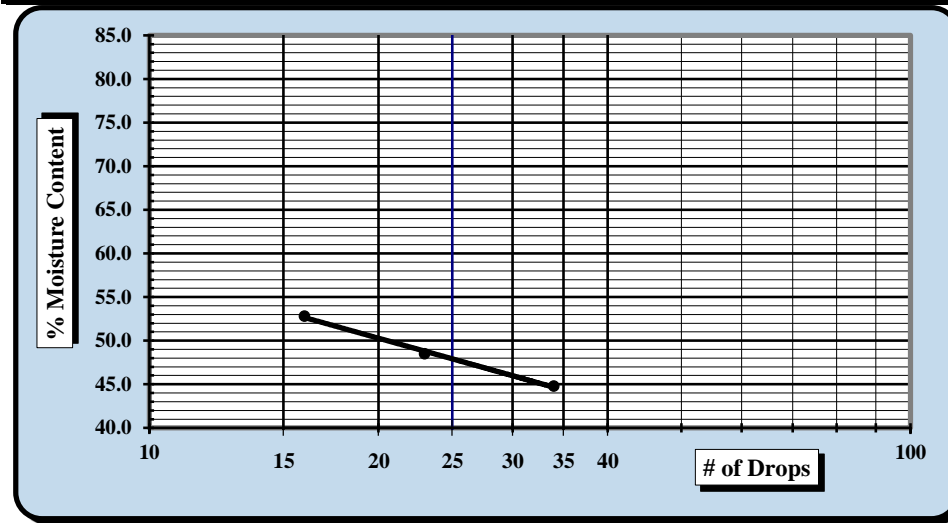
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-28	Sample #:	SS-6
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	13.5' - 15.0'

Sample Description: Clayey Sand (SC, A-2-7 (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 #	438	Tare #:	Liquid Limit				Plastic Limit		
			60	61	62	63	64		
A		Tare Weight	16.01	15.06	15.55			15.09	15.88
B		Wet Soil Weight + A	26.42	26.72	26.61			22.19	23.34
C		Dry Soil Weight + A	23.20	22.91	22.79			21.07	22.17
D		Water Weight (B-C)	3.22	3.81	3.82			1.12	1.17
E		Dry Soil Weight (C-A)	7.19	7.85	7.24			5.98	6.29
F		% Moisture (D/E)*100	44.8%	48.5%	52.8%			18.7%	18.6%
N		# OF DROPS	34	23	16			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	48
Plastic Limit	19
Plastic Index	29
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

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Particle Size Analysis of Soils



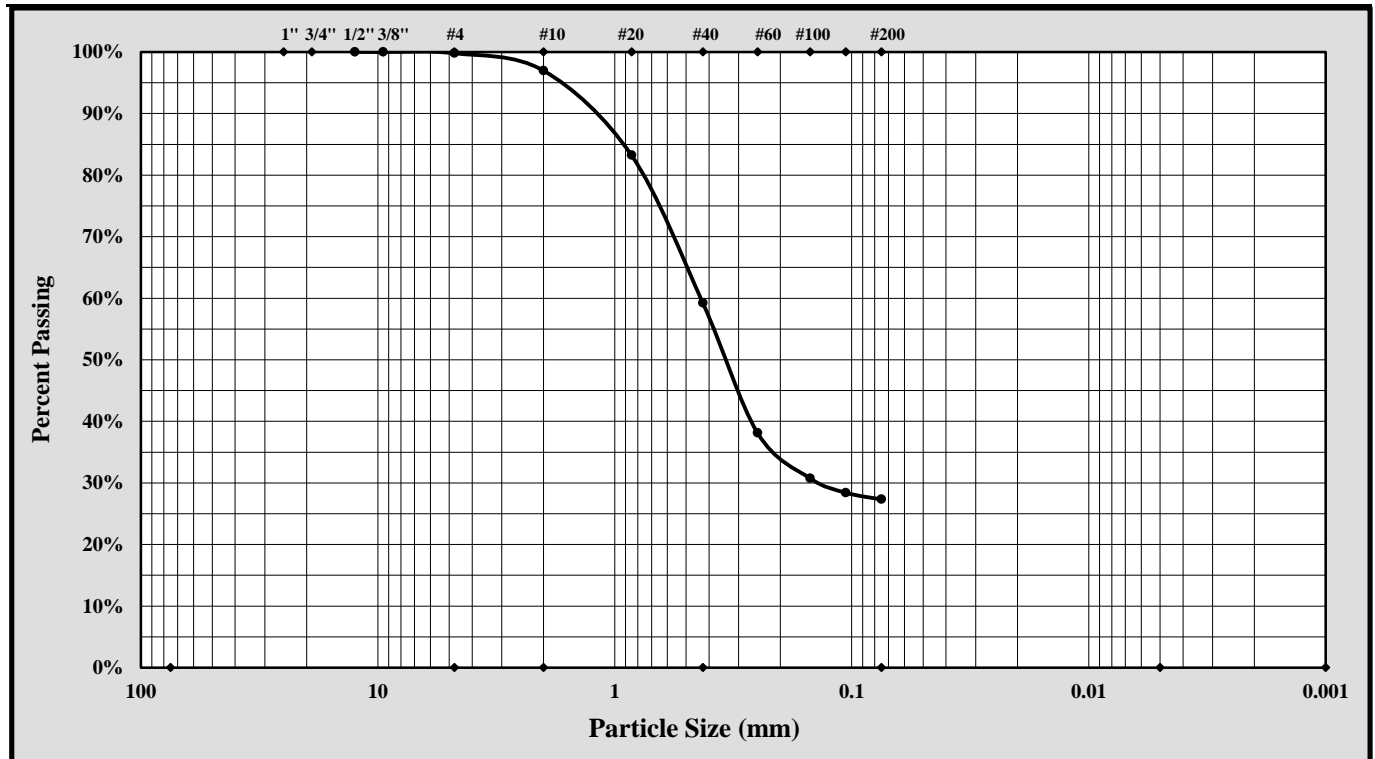
Sample Log No.:

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:	W-28	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-6
		Depth:	13.5' - 15.0'
Sample Description:	Clayey Sand (SC, A-2-7 (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:	0.2%
Silt & Clay (% Passing #200):	Total Sand:	72.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	19
	Plastic Index	29

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"/>
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

5/4/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



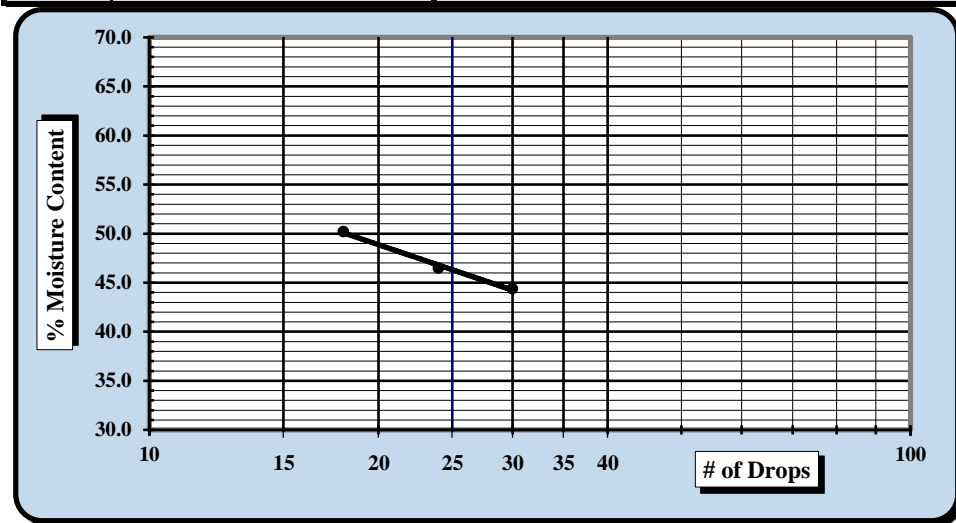
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-28	Sample #:	SS-8
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	23.5' - 25.0'

Sample Description: Clayey Sand (SC, A-2-7 (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 #	Tare #:	Liquid Limit					Plastic Limit			
		25	26	27			28	65		
A	Tare Weight	15.22	16.01	15.96				16.06	16.05	
B	Wet Soil Weight + A	25.99	28.64	28.85				26.26	21.96	
C	Dry Soil Weight + A	22.68	24.63	24.54				24.57	20.99	
D	Water Weight (B-C)	3.31	4.01	4.31				1.69	0.97	
E	Dry Soil Weight (C-A)	7.46	8.62	8.58				8.51	4.94	
F	% Moisture (D/E)*100	44.4%	46.5%	50.2%				19.9%	19.6%	
N	# OF DROPS	30	24	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							19.8%		



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	46
Plastic Limit	20
Plastic Index	26
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

5/2/2018
Date

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Particle Size Analysis of Soils



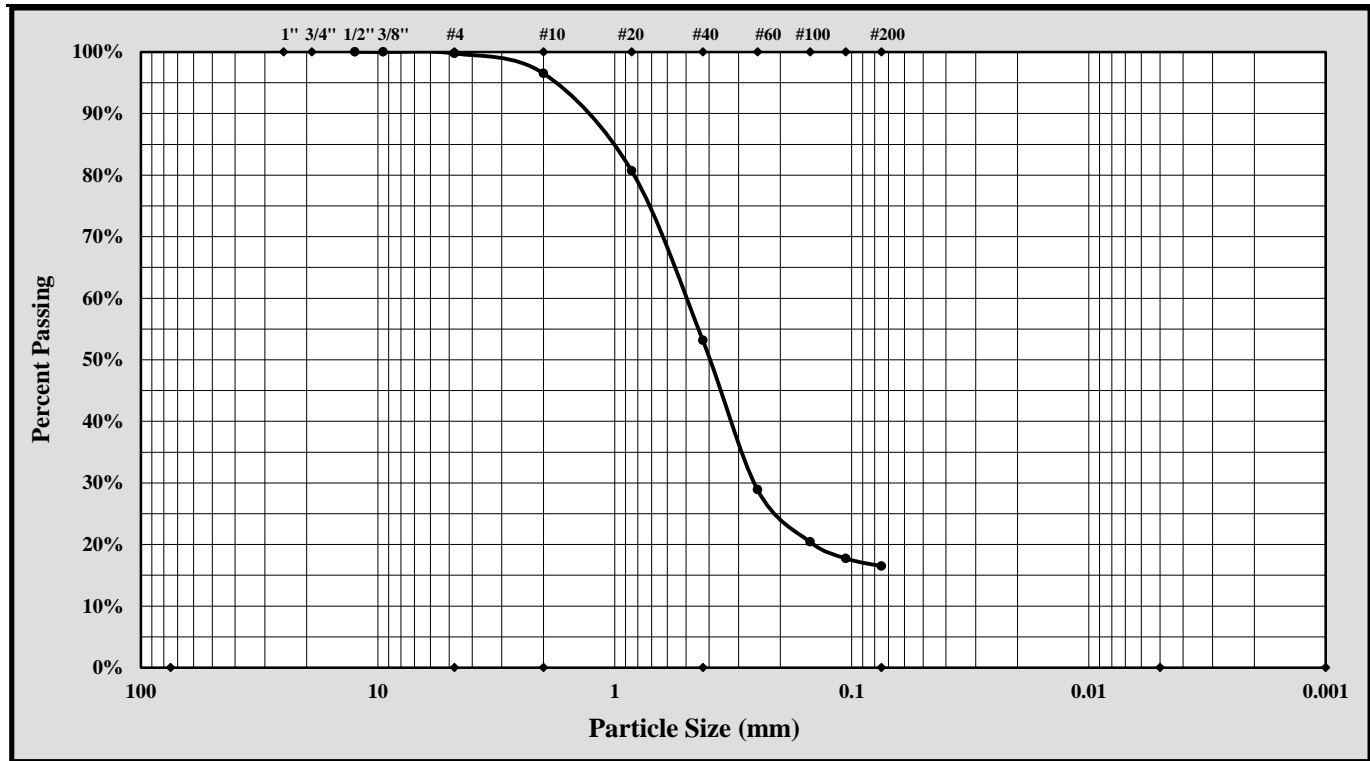
Sample Log No.:

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:	W-28	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-8
		Depth:	23.5' - 25.0'
Sample Description:	Clayey Sand (SC, A-2-7 (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:	0.2%
Silt & Clay (% Passing #200):	Total Sand:	83.3%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	20
	Plastic Index	26

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"/>
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

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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 #:	W-28	Sample #:	SS-10
Location:	Wall Boring	Sample Date:	Various
	Offset: N/A	Depth:	33.5' - 35.0'

Sample Description: Clayey Sand (SC, A-2-7 (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 #	Tare #:	Liquid Limit				Plastic Limit	
		9				83	96
A	Tare Weight	15.58				14.96	15.05
B	Wet Soil Weight + A	26.81				21.84	22.73
C	Dry Soil Weight + A	22.76				20.34	21.08
D	Water Weight (B-C)	4.05				1.50	1.65
E	Dry Soil Weight (C-A)	7.18				5.38	6.03
F	% Moisture (D/E)*100	56.4%				27.9%	27.4%
N	# OF DROPS	24				Moisture Contents determined by ASTM D 2216	
LL	LL = F * FACTOR						
Ave.	Average					27.7%	



NP, Non-Plastic <input type="checkbox"/>	
Liquid Limit	56
Plastic Limit	28
Plastic Index	28
Group Symbol	CH
Multipoint Method	<input type="checkbox"/>
One-point Method	<input checked="" 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

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Particle Size Analysis of Soils



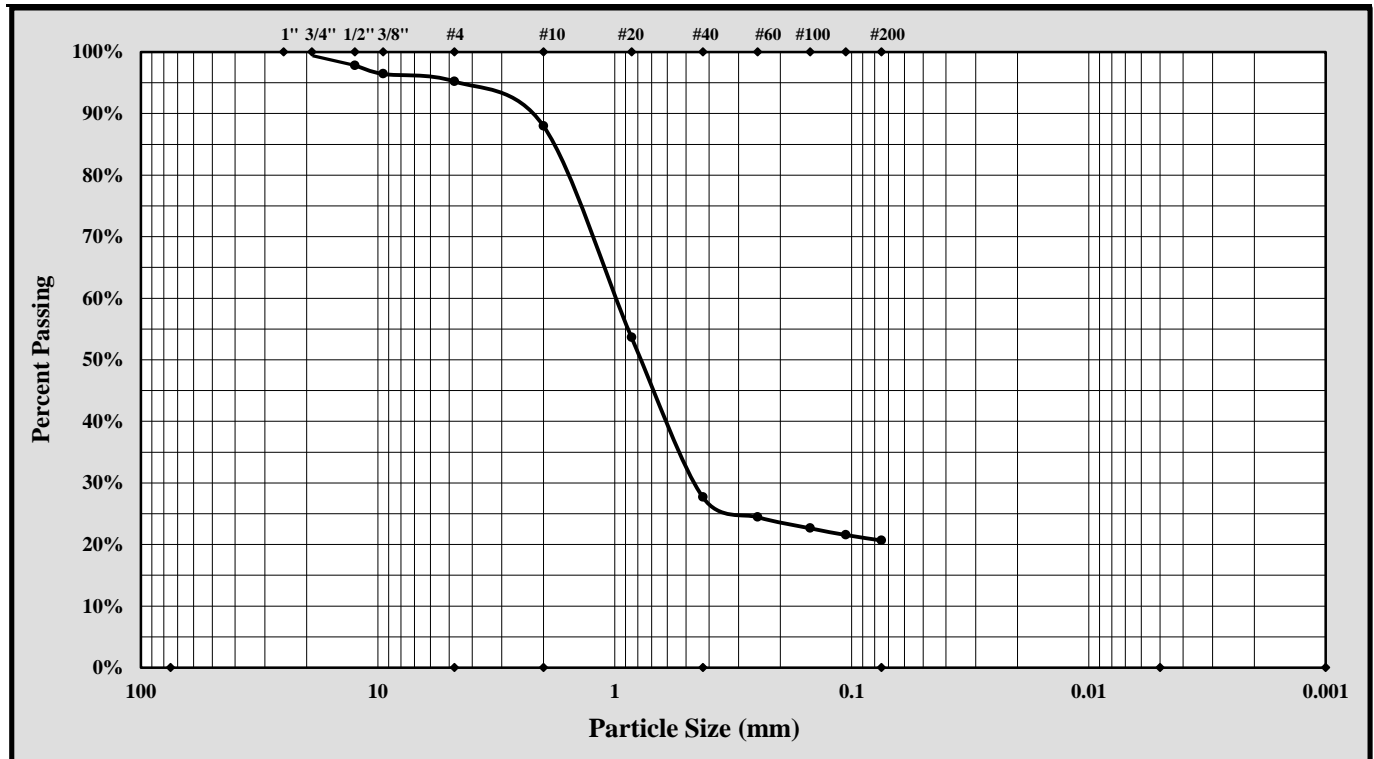
Sample Log No.:

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:	W-28	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-10
		Depth:	33.5' - 35.0'
Sample Description:	Clayey Sand (SC, A-2-7 (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:	4.8%
Silt & Clay (% Passing #200):	Total Sand:	74.6%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	28
	Plastic Index	28

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

5/4/2028
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



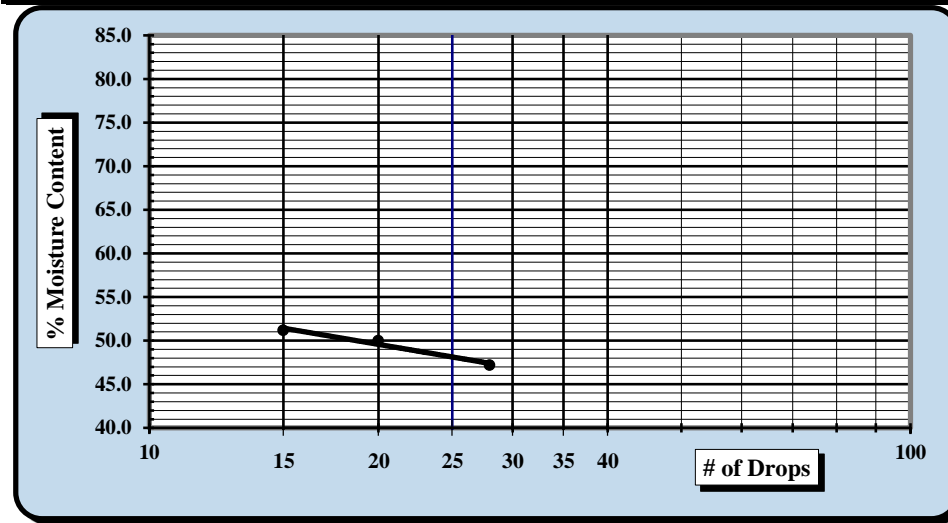
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5-2-18
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 #:	W-28	Sample #:	SS-12
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	43.5' - 45.0'

Sample Description: Silt with Sand (ML, A-7-5 (16))					
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		
		45	46	47			48	49	
A	Tare Weight	15.28	15.89	15.70			15.35	15.34	
B	Wet Soil Weight + A	30.63	28.28	26.62			21.69	21.77	
C	Dry Soil Weight + A	25.71	24.15	22.92			20.28	20.27	
D	Water Weight (B-C)	4.92	4.13	3.70			1.41	1.50	
E	Dry Soil Weight (C-A)	10.43	8.26	7.22			4.93	4.93	
F	% Moisture (D/E)*100	47.2%	50.0%	51.2%			28.6%	30.4%	
N	# OF DROPS	28	20	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						29.5%		



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	48
Plastic Limit	30
Plastic Index	18
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

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Particle Size Analysis of Soils



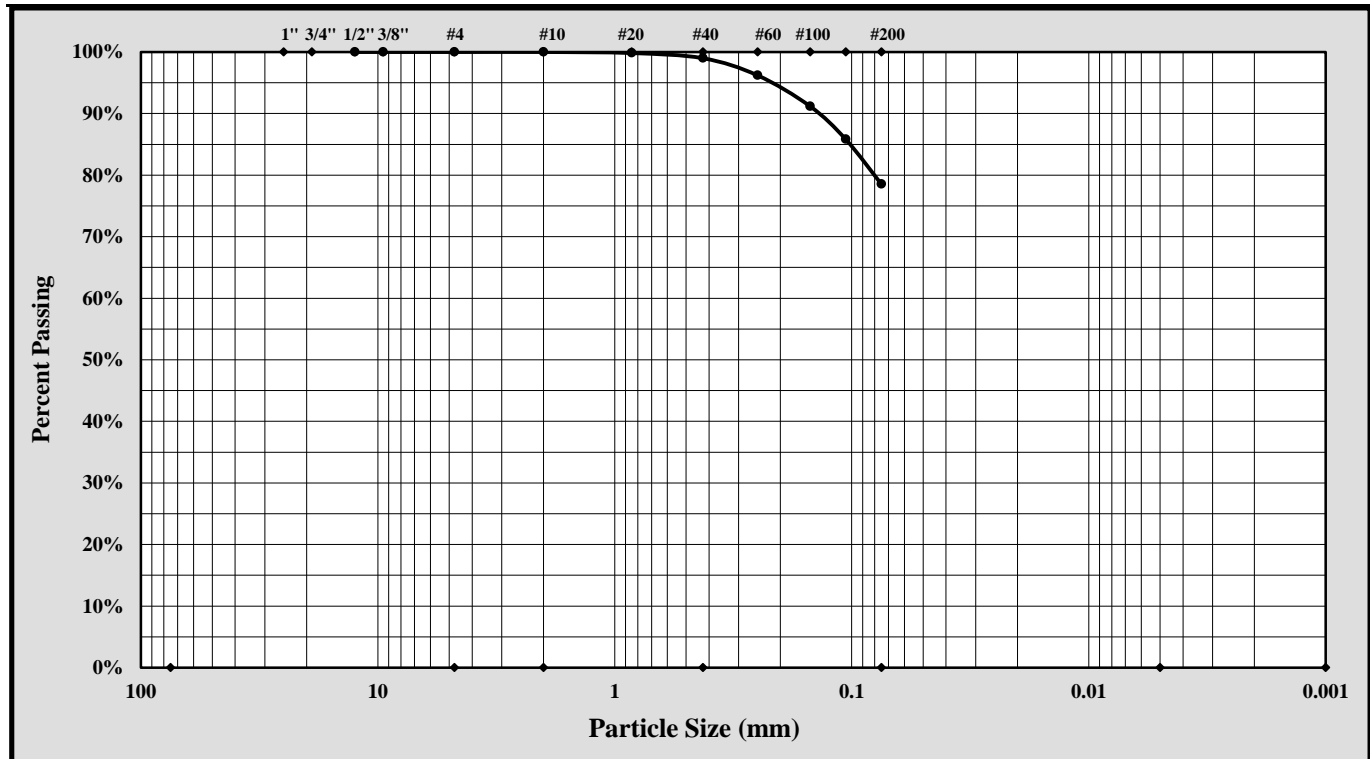
Sample Log No.:

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:	W-28	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-12
		Depth:	43.5' - 45.0'
Sample Description:	Silt with Sand (ML, A-7-5 (16))		



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:	21.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	30
	Plastic Index	18

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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



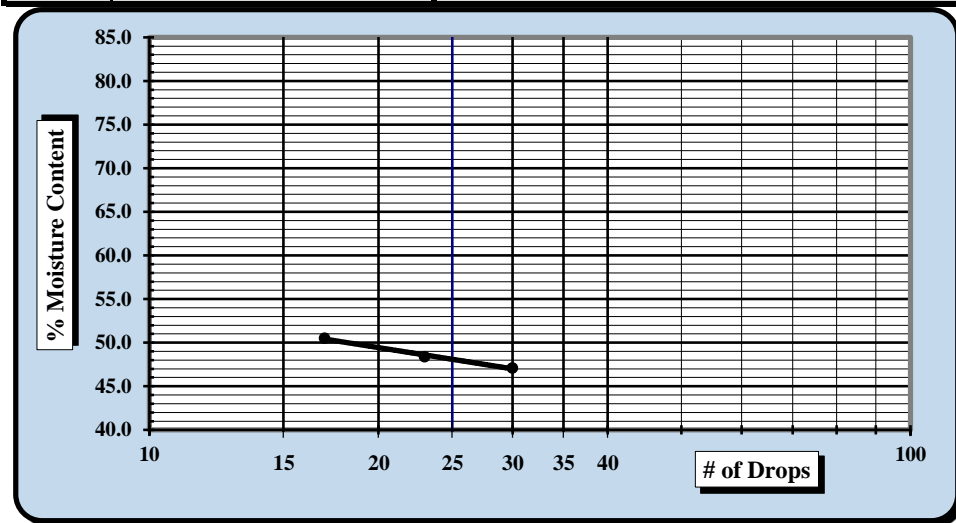
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-28	Sample #:	SS-16
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	63.5' - 65.0'

Sample Description: Sandy Silt (ML, A-7-6 (13))					
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		
		91	92	93			94	95	
A	Tare Weight	15.16	15.13	15.07			15.05	15.06	
B	Wet Soil Weight + A	26.69	27.73	28.39			22.90	21.99	
C	Dry Soil Weight + A	23.00	23.62	23.92			21.13	20.42	
D	Water Weight (B-C)	3.69	4.11	4.47			1.77	1.57	
E	Dry Soil Weight (C-A)	7.84	8.49	8.85			6.08	5.36	
F	% Moisture (D/E)*100	47.1%	48.4%	50.5%			29.1%	29.3%	
N	# OF DROPS	30	23	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						29.2%		



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	48
Plastic Limit	29
Plastic Index	19
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

4/30/2018
Date

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Particle Size Analysis of Soils



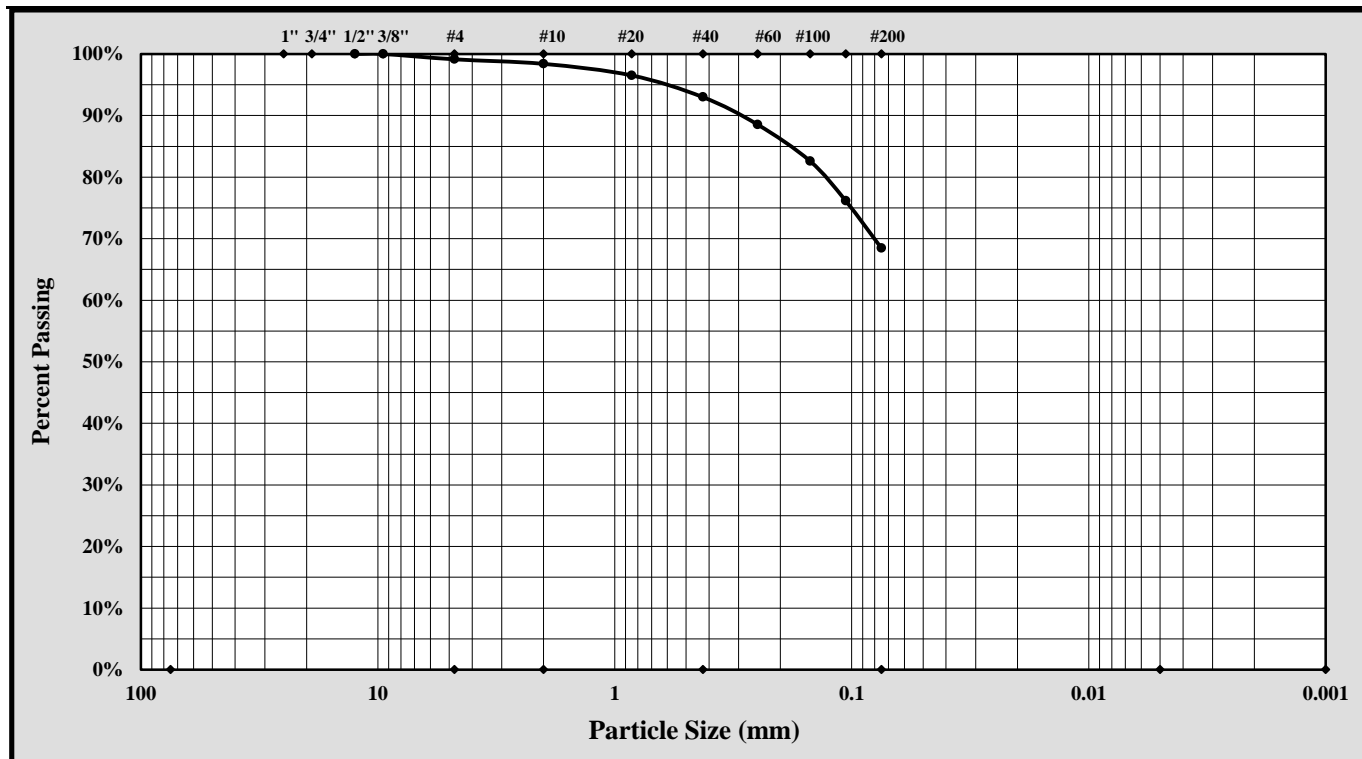
Quality Assurance

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:	W-28	Type:	Split Spoon
Location:	Wall Boring	Sample No.:	SS-16
		Depth:	63.5' - 65.0'
Sample Description:	Sandy Silt (ML, A-7-6 (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:	Gravel:	0.9%
Silt & Clay (% Passing #200):	Total Sand:	30.7%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	29
	Plastic Index	19

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

5/4/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



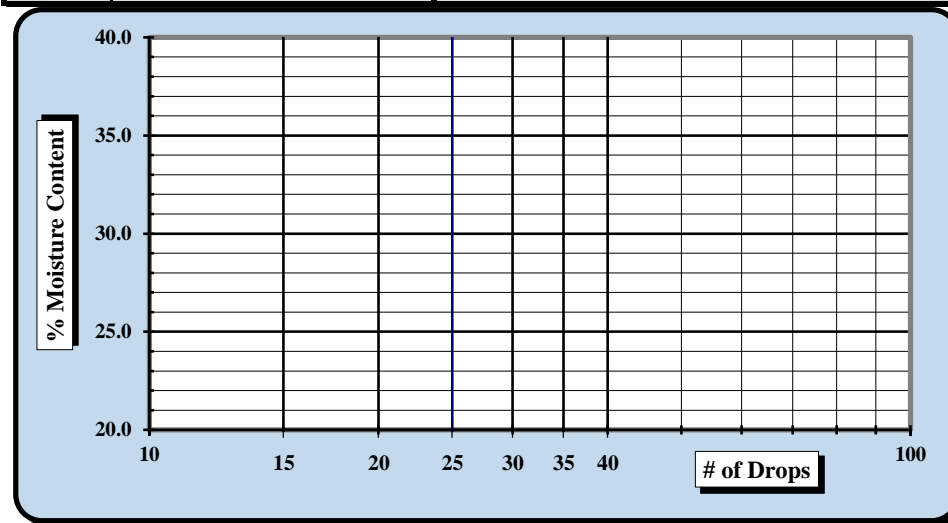
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-29	Sample #:	SS-2
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'

Sample Description: Silty Sand with Gravel (SM, A-1-b)					
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	<input checked="" type="checkbox"/>
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

Benjamin J. Kovaleski
 Technician Name

5/11/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/11/18
 Date

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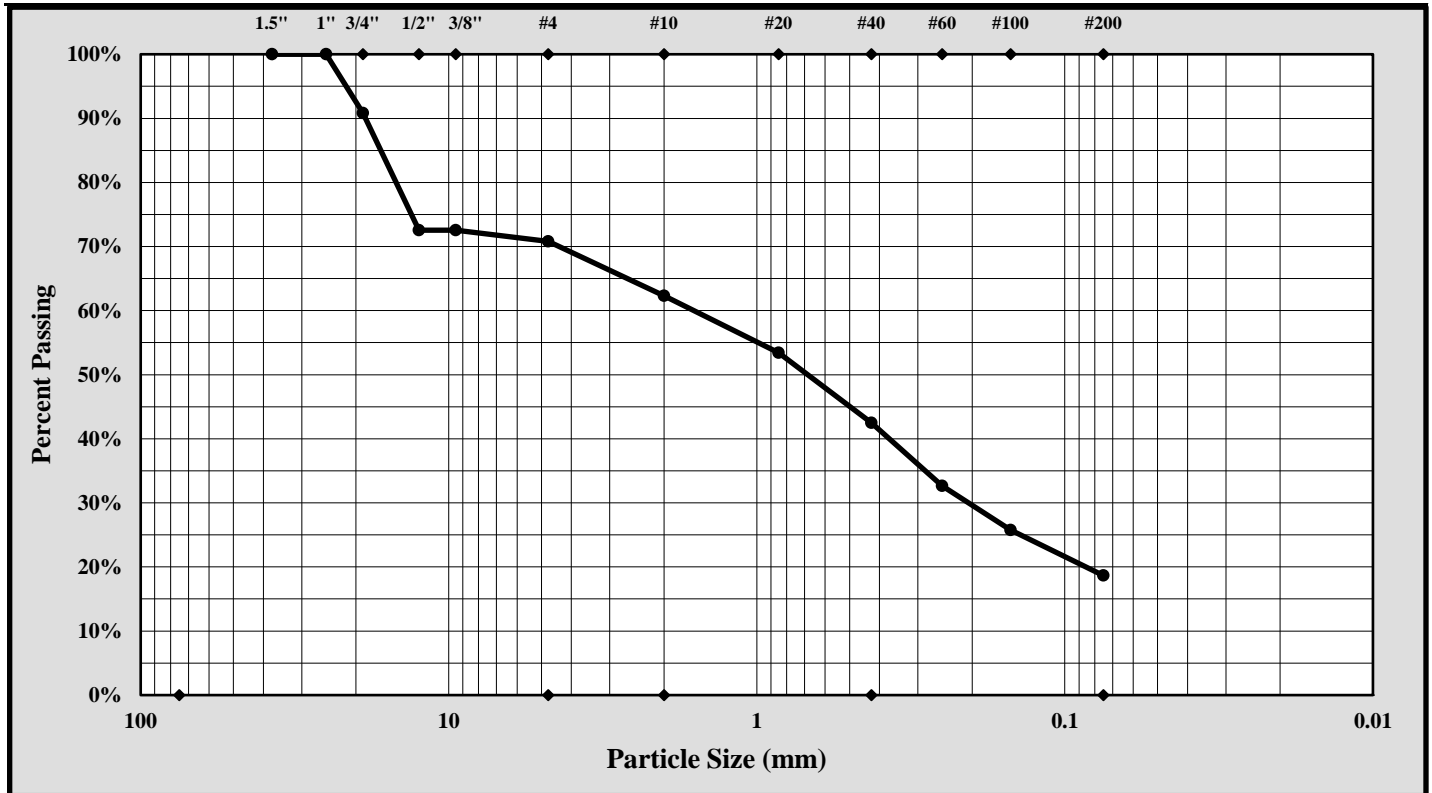


Particle Size Analysis of Soils

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 #:	W-29	Sample #:	SS-2
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Silty Sand with Gravel (SM, A-1-b)		



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: 29.2%
 Silt & Clay (% Passing #200): 18.7% Total Sand: 52.1%

Liquid Limit	---	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	8.5%	Medium Sand:	19.8%	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:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/11/18
 Date

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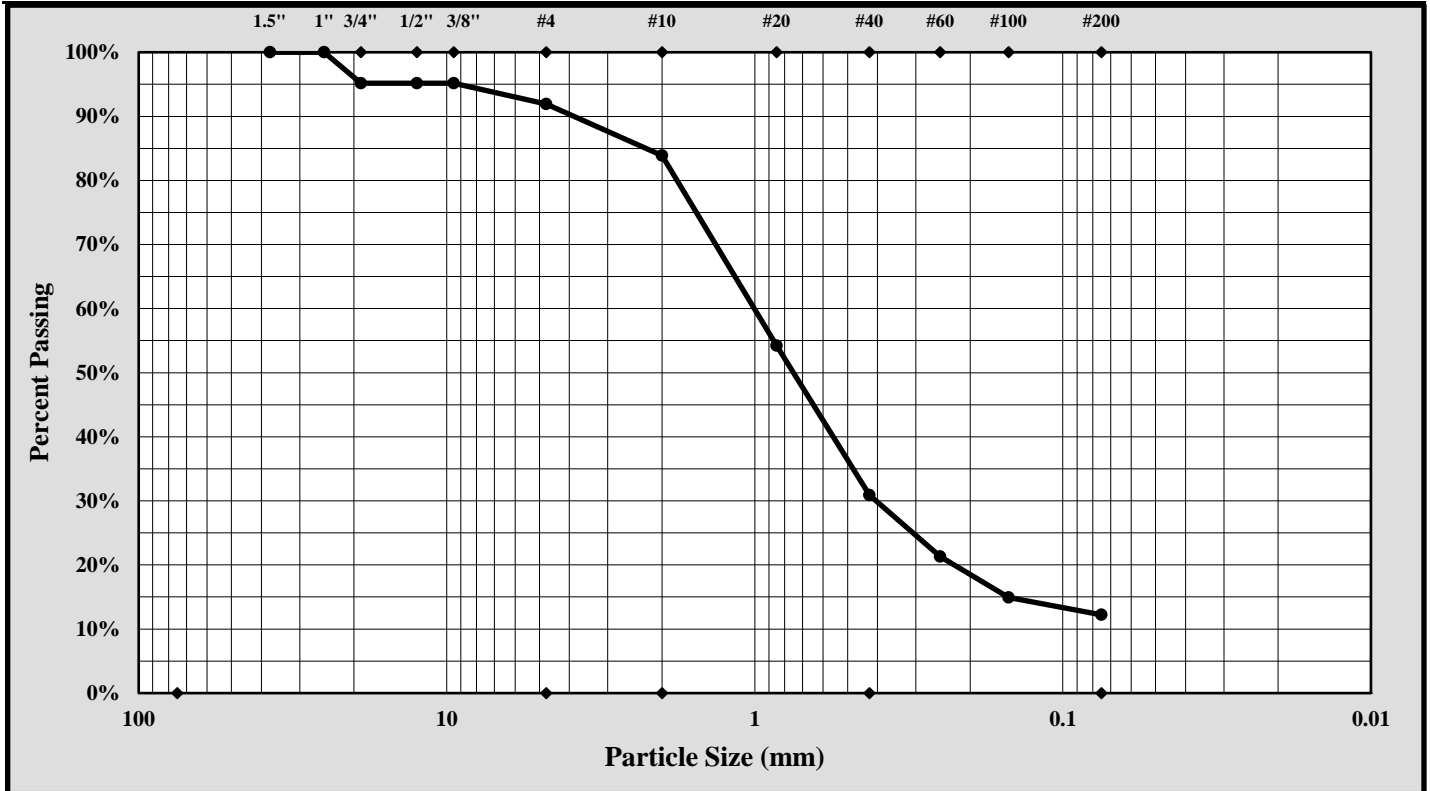
Particle Size Analysis of Soils

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 #:	W-29	Sample #:	SS-4
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	6.0' - 8.0'
Sample Description:	Silty Sand (SM, A-1-b)		



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: 8.1%
 Silt & Clay (% Passing #200): 12.2% Total Sand: 79.7%

Liquid Limit	N/A	Plastic Limit	N/A	Plastic Index	N/A
Coarse Sand:	8.0%	Medium Sand:	53.0%	Fine Sand:	18.7%
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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



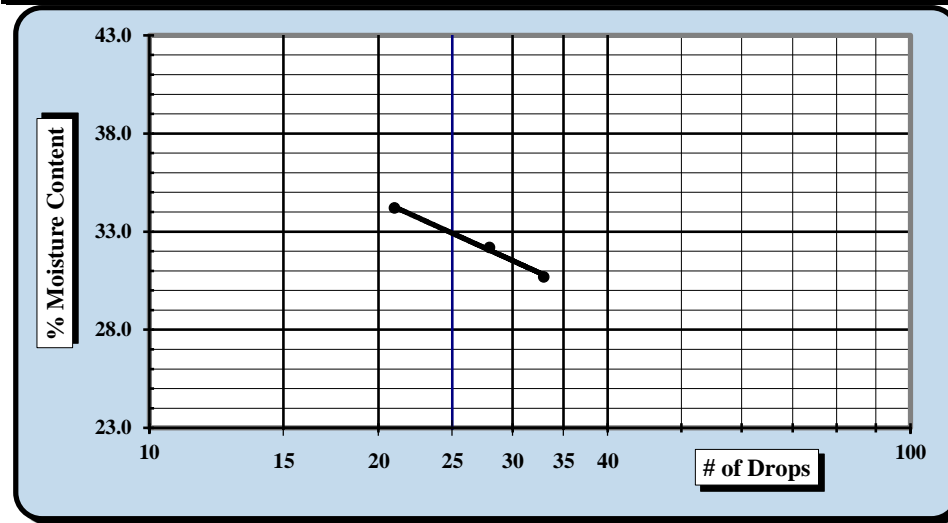
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-29	Sample #:	SS-5
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'

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			
		16	17	18			19	20		
A	Tare Weight	26.57	26.63	26.78				26.67	26.83	
B	Wet Soil Weight + A	47.04	47.24	46.58				33.15	33.58	
C	Dry Soil Weight + A	42.23	42.22	41.53				31.90	32.27	
D	Water Weight (B-C)	4.81	5.02	5.05				1.25	1.31	
E	Dry Soil Weight (C-A)	15.66	15.59	14.75				5.23	5.44	
F	% Moisture (D/E)*100	30.7%	32.2%	34.2%				23.9%	24.1%	
N	# OF DROPS	33	28	21				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							24.0%		



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	33
Plastic Limit	24
Plastic Index	9
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

5/11/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/11/18
 Date

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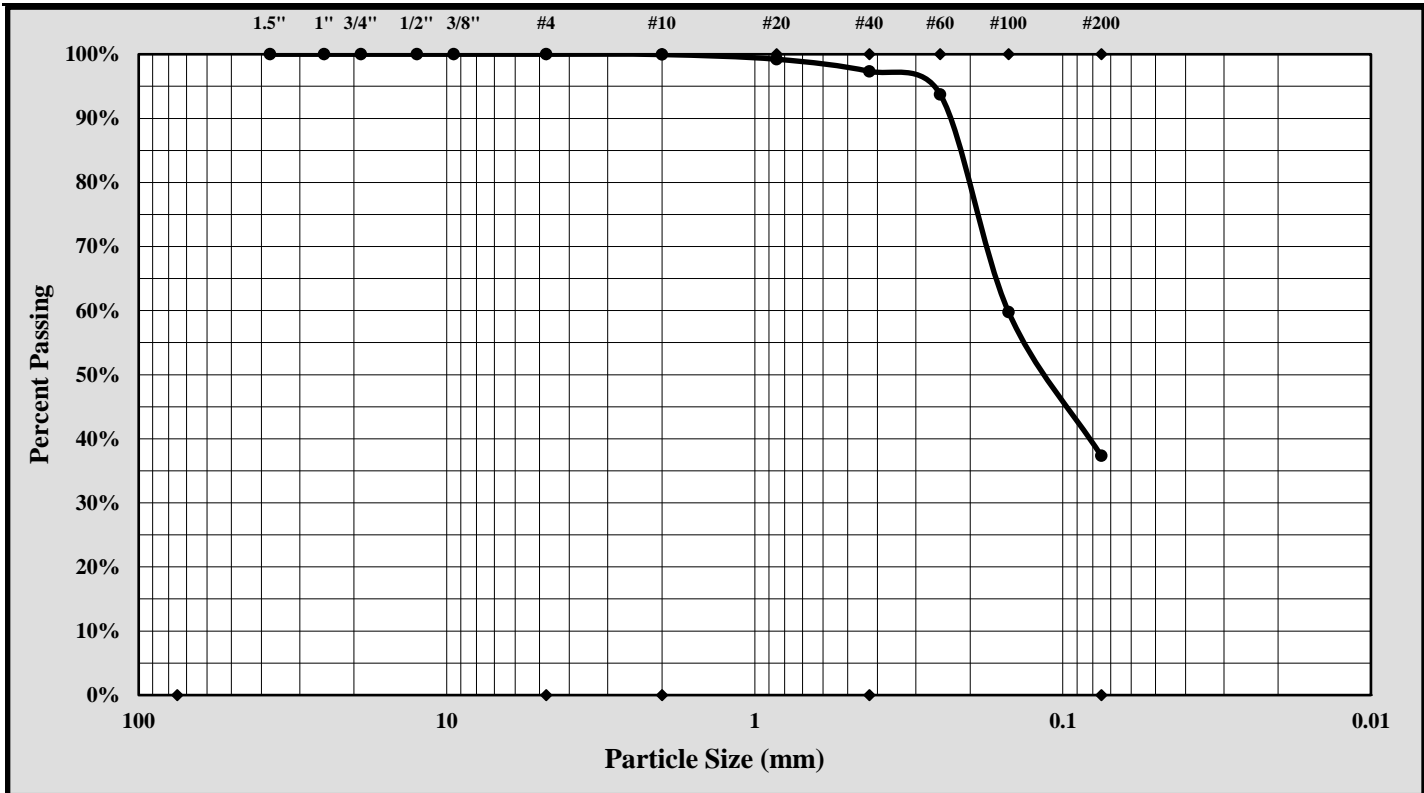


Particle Size Analysis of Soils

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 #:	W-29	Sample #:	SS-5
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	8.0' - 10.0'
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 (#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:	.85 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	37.3%	Total Sand:	62.7%

Liquid Limit	33	Plastic Limit	24	Plastic Index	9
Coarse Sand:	0.1%	Medium Sand:	2.6%	Fine Sand:	60.0%
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

5/11/18

Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



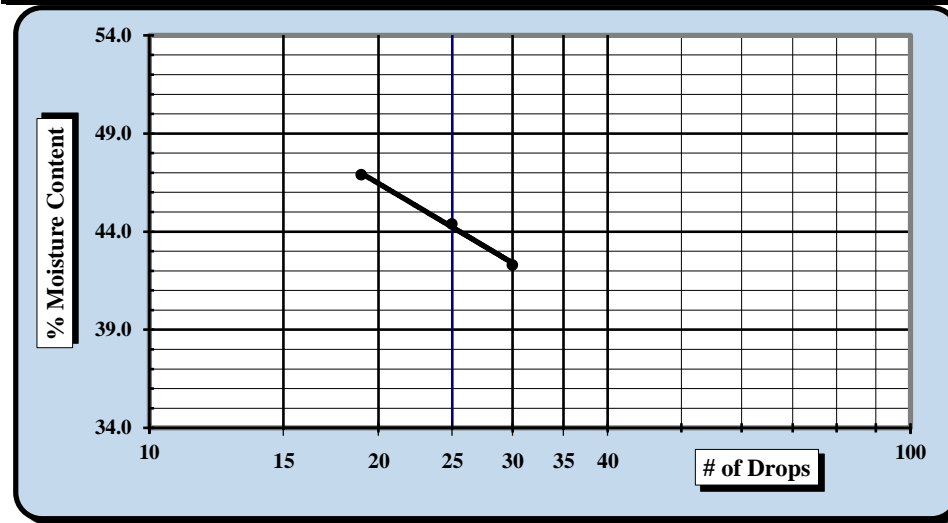
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-29	Sample #:	SS-6
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'

Sample Description: Silty Sand (SM, A-2-7(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		
		21	22	23			24	25	
A	Tare Weight	28.07	25.68	27.28			25.99	26.79	
B	Wet Soil Weight + A	47.36	38.49	43.72			32.23	32.81	
C	Dry Soil Weight + A	41.63	34.55	38.47			30.82	31.45	
D	Water Weight (B-C)	5.73	3.94	5.25			1.41	1.36	
E	Dry Soil Weight (C-A)	13.56	8.87	11.19			4.83	4.66	
F	% Moisture (D/E)*100	42.3%	44.4%	46.9%			29.2%	29.2%	
N	# OF DROPS	30	25	19			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						29.2%		



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	44
Plastic Limit	29
Plastic Index	15
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

5/11/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/11/18
 Date

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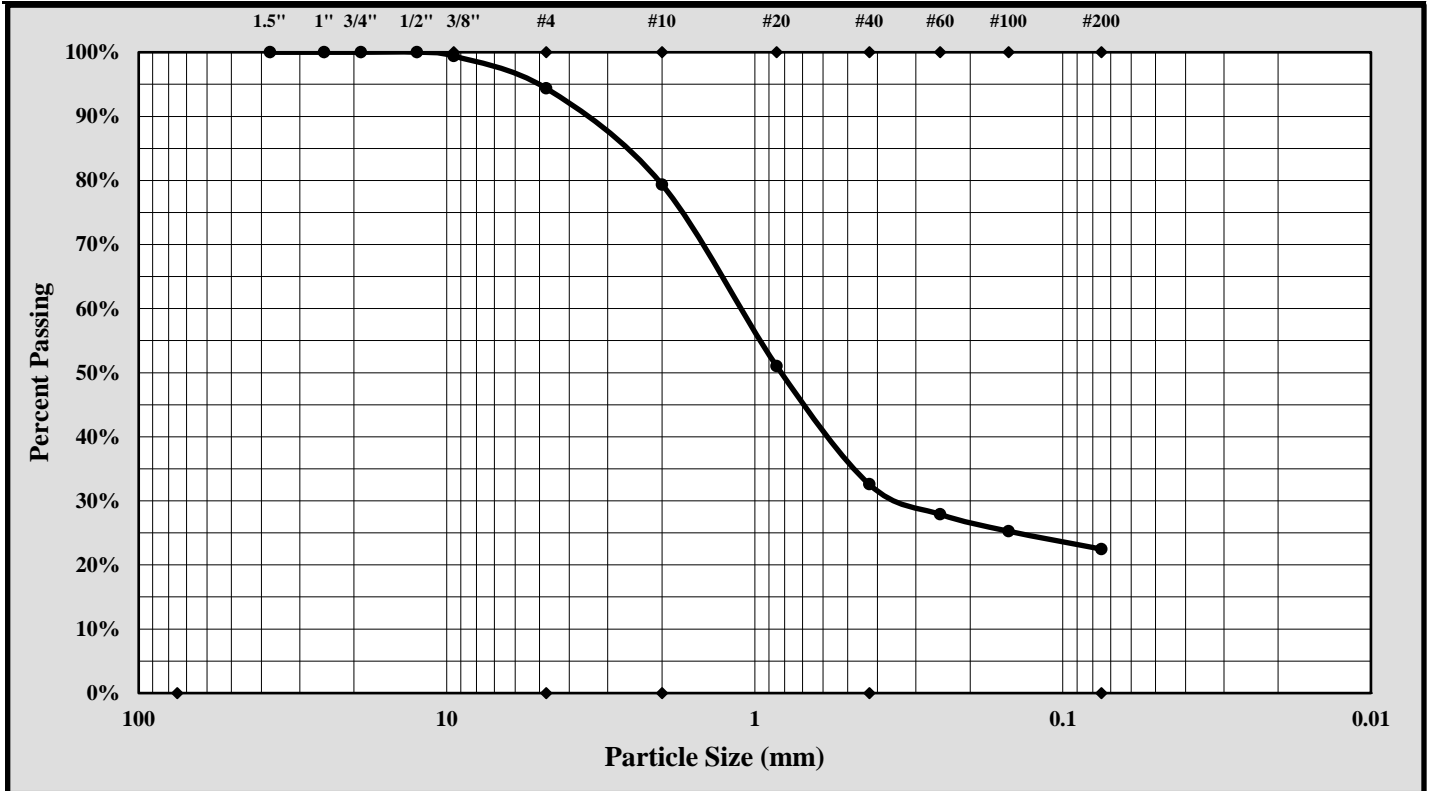
Particle Size Analysis of Soils

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 #:	W-29	Sample #:	SS-6
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
Sample Description:	Silty Sand (SM, A-2-7(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: 9.50 mm Gravel: 5.6%
 Silt & Clay (% Passing #200): 22.5% Total Sand: 71.9%

Liquid Limit 44 Plastic Limit 29 Plastic Index 15

Coarse Sand: 15.0% Medium Sand: 46.8% Fine Sand: 10.1%

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

5/11/18

Date

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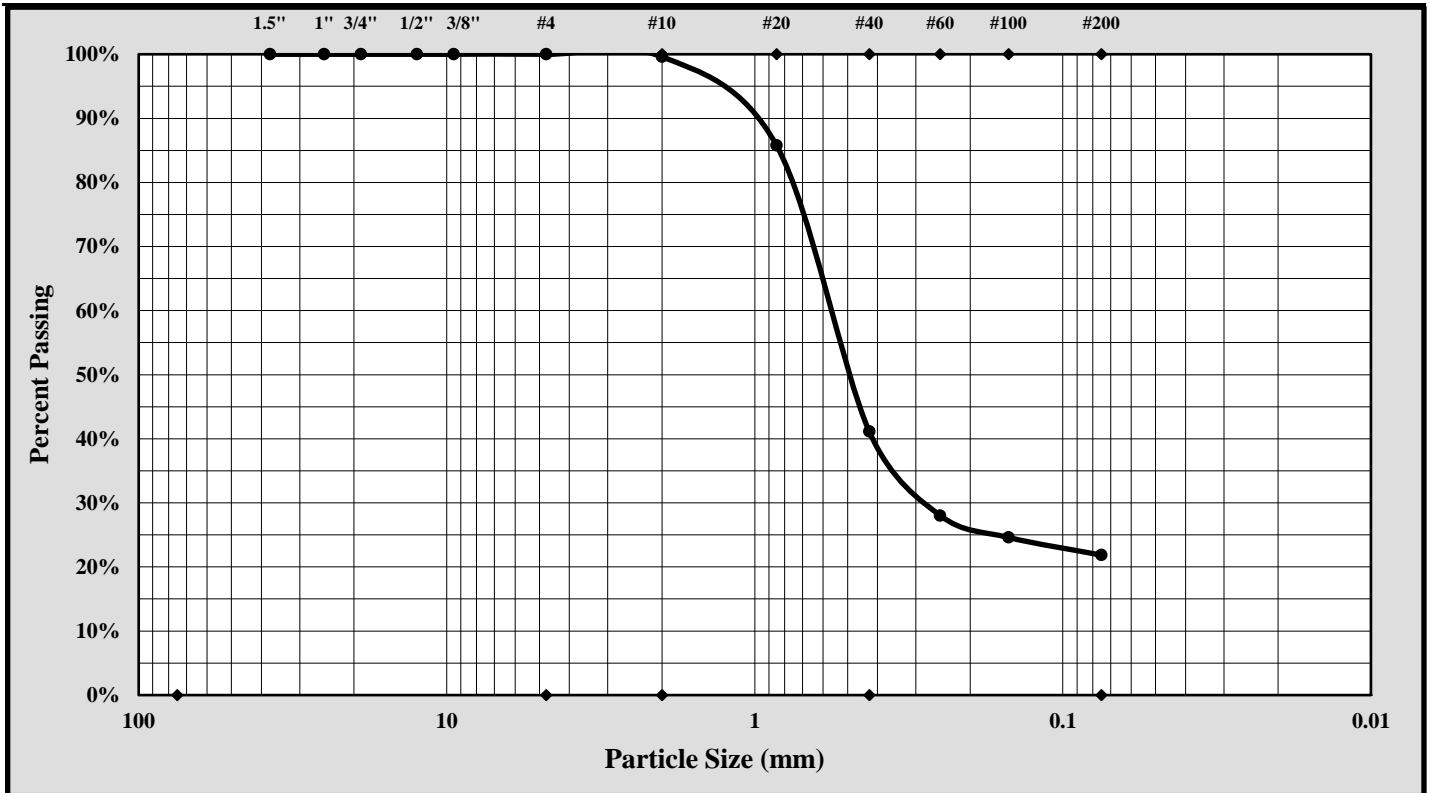


Particle Size Analysis of Soils

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 #:	W-29	Sample #:	SS-7
		Sample Date:	3/23/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
Sample Description:	Silty Sand (SM, A-1-b)		



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): 21.8% Total Sand: 78.2%

Liquid Limit	N/A	Plastic Limit	N/A	Plastic Index	N/A
Coarse Sand:	0.4%	Medium Sand:	58.5%	Fine Sand:	19.3%
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

5/11/18
 Date

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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 #:	W-29	Sample #:	SS-8
Location:	Wall Boring	Type:	Split-spoon
Sample Date:	3/23/18		
Depth:	23.5' - 25.0'		

Sample Description: Lean Clay with Sand (CL, A-7-6(18))

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	27.34	26.98	26.82				26.98	27.36	
B	Wet Soil Weight + A	42.92	40.09	43.55				34.22	34.41	
C	Dry Soil Weight + A	38.04	35.81	37.82				32.67	32.91	
D	Water Weight (B-C)	4.88	4.28	5.73				1.55	1.50	
E	Dry Soil Weight (C-A)	10.70	8.83	11.00				5.69	5.55	
F	% Moisture (D/E)*100	45.6%	48.5%	52.1%				27.2%	27.0%	
N	# OF DROPS	34	22	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							27.1%		



NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	48
Plastic Limit	27
Plastic Index	21
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>5/11/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/11/18</u> Date
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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



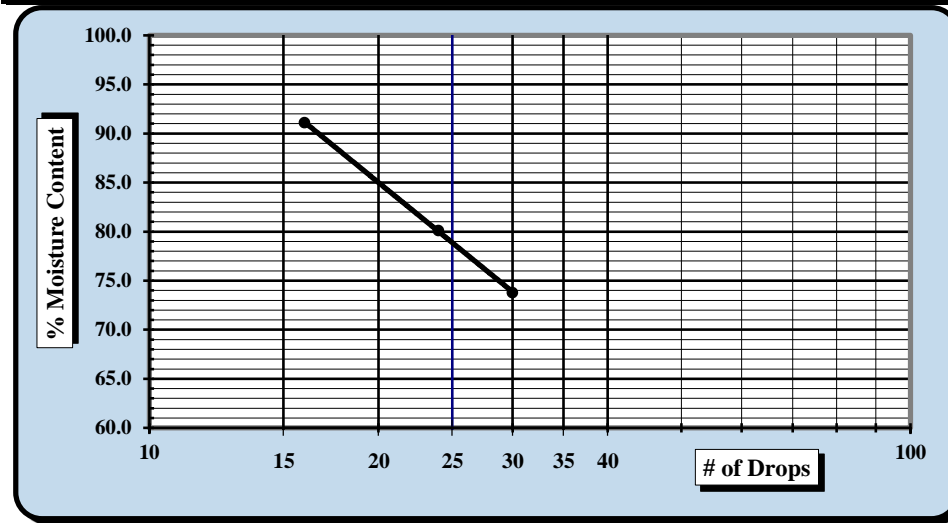
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-30	Sample #:	SS-1
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	1.7' - 3.7'

Sample Description: Elastic Silt with Sand (MH, A-7-5 (31))					
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			
		50	51	52			53	54		
A	Tare Weight	15.19	15.98	15.11				15.45	15.12	
B	Wet Soil Weight + A	24.87	24.75	24.82				21.59	21.34	
C	Dry Soil Weight + A	20.76	20.85	20.19				19.55	19.30	
D	Water Weight (B-C)	4.11	3.90	4.63				2.04	2.04	
E	Dry Soil Weight (C-A)	5.57	4.87	5.08				4.10	4.18	
F	% Moisture (D/E)*100	73.8%	80.1%	91.1%				49.8%	48.8%	
N	# OF DROPS	30	24	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							49.3%		



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	80
Plastic Limit	49
Plastic Index	31
Group Symbol	MH

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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



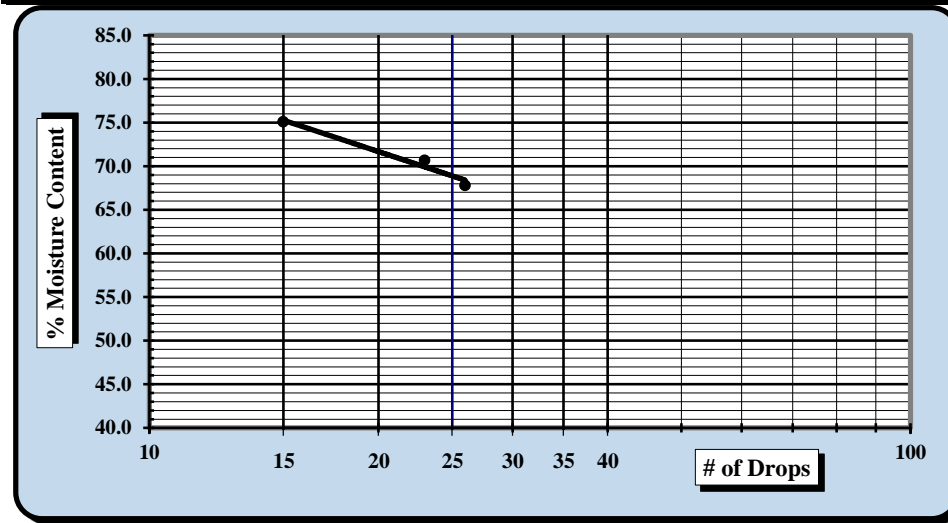
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-30	Sample #:	SS-4
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	7.7' - 9.7'

Sample Description: Elastic Silt with Sand (MH, A-7-5 (17))					
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		
		15	16	17			18	19	
A	Tare Weight	16.01	15.09	15.50			15.26	15.08	
B	Wet Soil Weight + A	28.56	26.32	28.88			23.64	21.81	
C	Dry Soil Weight + A	23.49	21.67	23.14			20.76	19.49	
D	Water Weight (B-C)	5.07	4.65	5.74			2.88	2.32	
E	Dry Soil Weight (C-A)	7.48	6.58	7.64			5.50	4.41	
F	% Moisture (D/E)*100	67.8%	70.7%	75.1%			52.4%	52.6%	
N	# OF DROPS	26	23	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR		%						
Ave.	Average						52.5%		



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	68
Plastic Limit	52
Plastic Index	16
Group Symbol	MH

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

4/30/2018
Date

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Particle Size Analysis of Soils



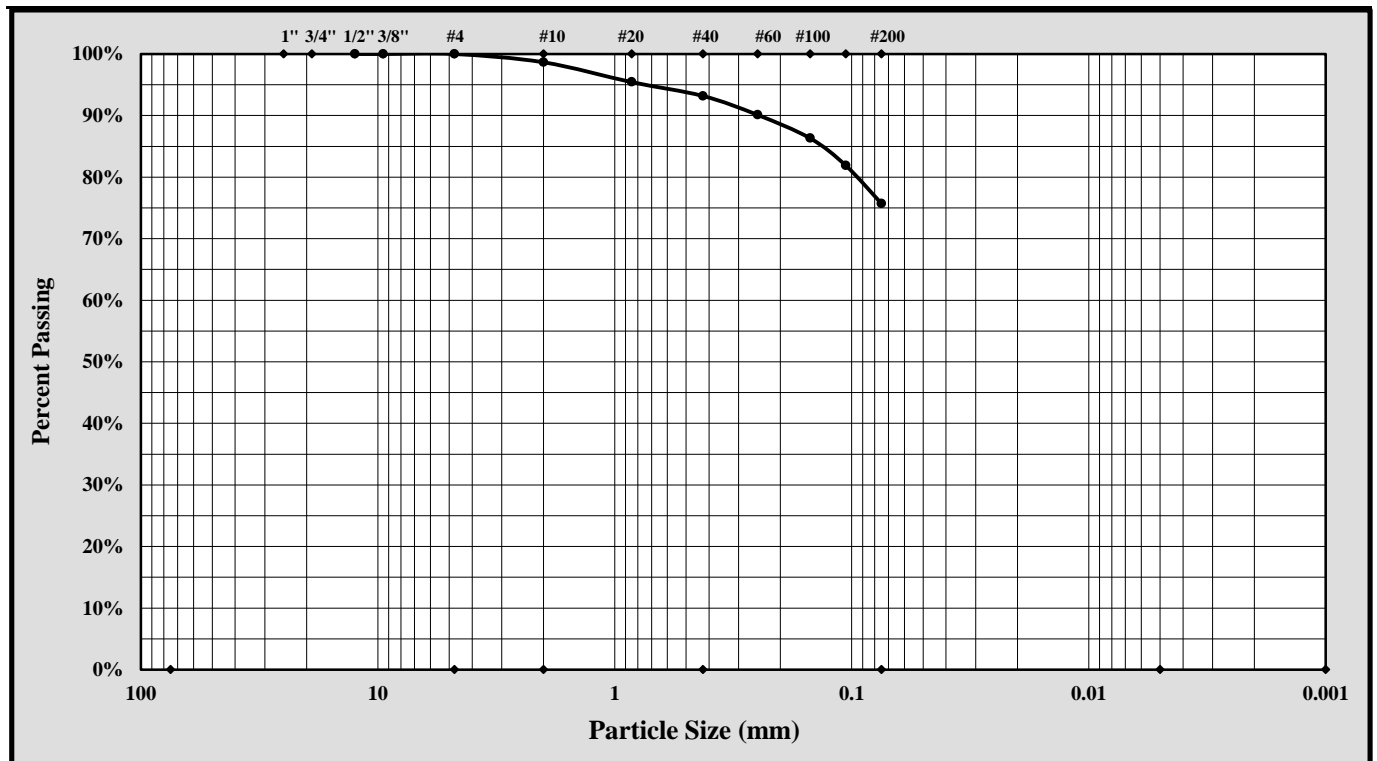
Sample Log No.:

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:	W-30	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-4
		Depth:	7.7' - 9.7'
Sample Description:	Elastic Silt with Sand (MH, A-7-5 (17))		



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:	24.3%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	68 52 Plastic Index 16

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

5/4/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



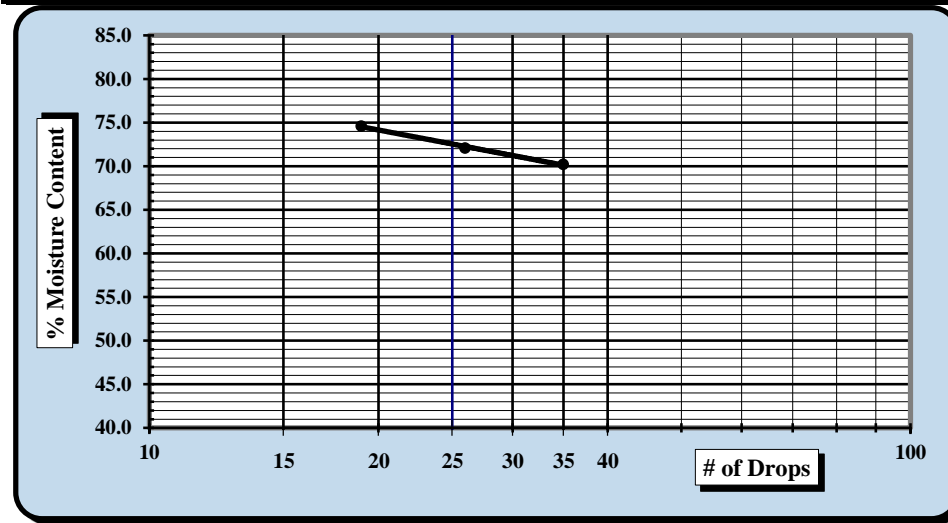
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-30	Sample #:	SS-9
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	28.5' - 30.0'

Sample Description: Elastic Silt with Sand (MH, A-7-5 (36))					
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		
		10	11	12			13	14	
A	Tare Weight	15.65	14.94	15.17			15.41	15.69	
B	Wet Soil Weight + A	26.97	26.61	26.45			22.28	21.97	
C	Dry Soil Weight + A	22.30	21.72	21.63			20.44	20.40	
D	Water Weight (B-C)	4.67	4.89	4.82			1.84	1.57	
E	Dry Soil Weight (C-A)	6.65	6.78	6.46			5.03	4.71	
F	% Moisture (D/E)*100	70.2%	72.1%	74.6%			36.6%	33.3%	
N	# OF DROPS	35	26	19			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						35.0%		



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	72
Plastic Limit	35
Plastic Index	37
Group Symbol	MH

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

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Particle Size Analysis of Soils



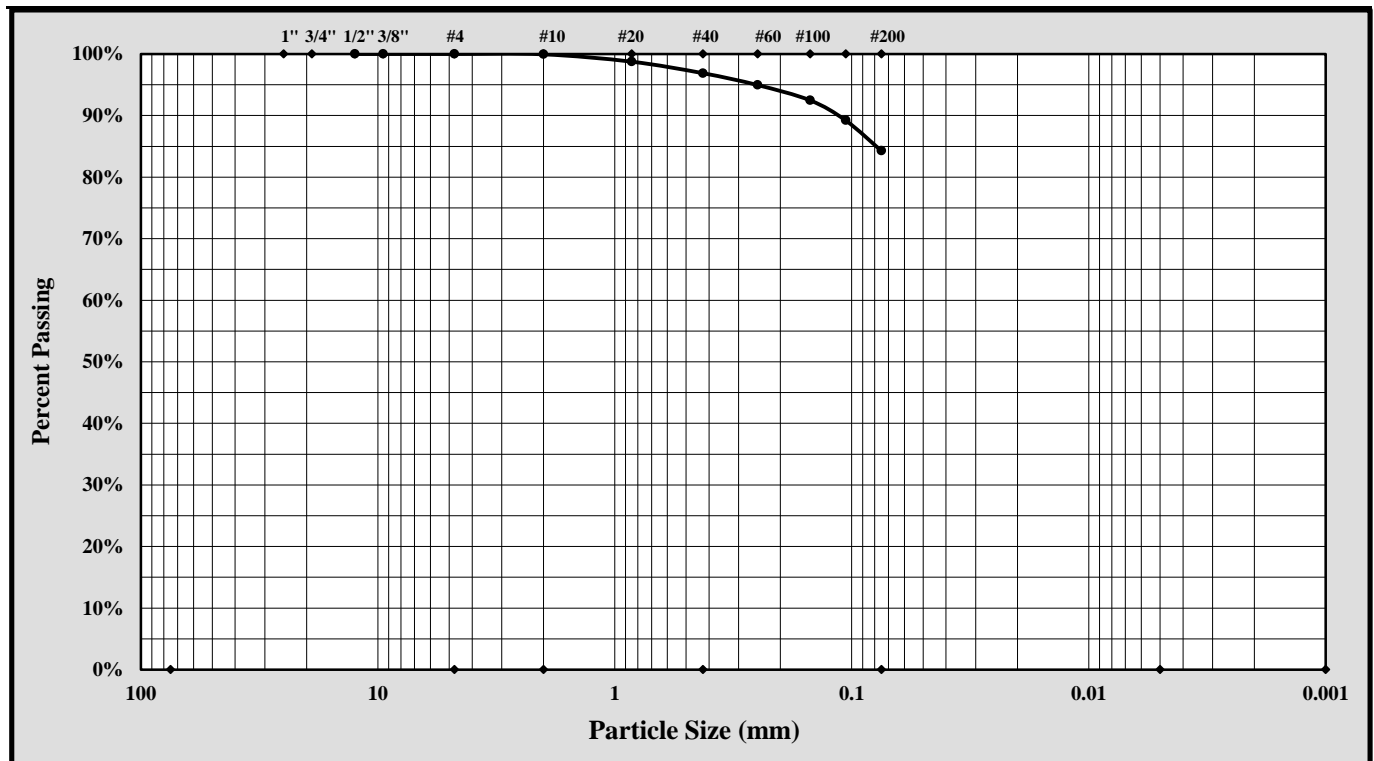
Sample Log No.:

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:	W-30	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-9
		Depth:	28.5' - 30.0'
Sample Description:	Elastic Silt with Sand (MH, A-7-5 (36))		



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):	84.3%	Total Sand:	15.7%
Assumed Specific Gravity:	2.65		
Liquid Limit	72	Plastic Limit	35
		Plastic Index	37

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

5/4/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



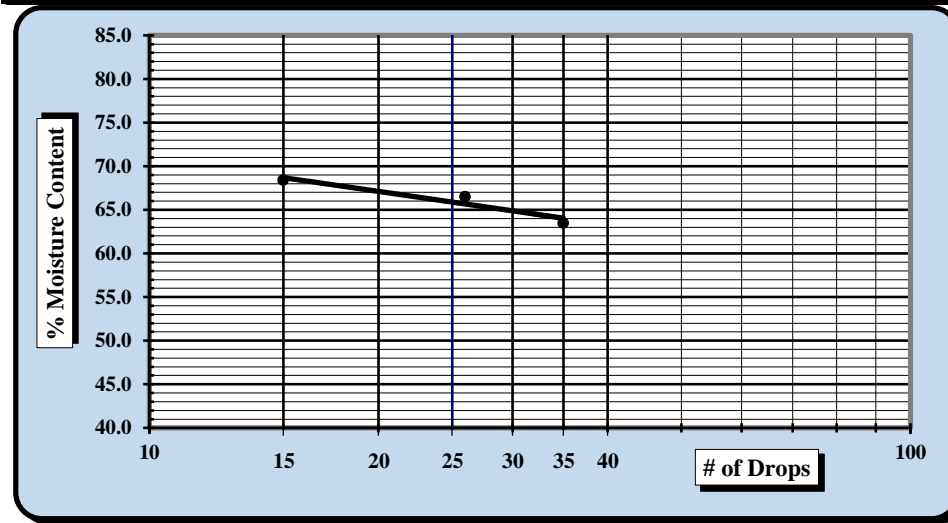
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5-2-18
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 #:	W-30	Sample #:	SS-11
		Sample Date:	Various
Location:	Wall Boring	Offset:	N/A
		Depth:	38.5' - 40'

Sample Description: Fat Clay with Sand (CH, A-7-5 (34))					
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	15.03	15.01	15.34				15.58	16.00	
B	Wet Soil Weight + A	26.23	26.70	29.03				21.40	21.34	
C	Dry Soil Weight + A	21.88	22.03	23.47				20.05	20.12	
D	Water Weight (B-C)	4.35	4.67	5.56				1.35	1.22	
E	Dry Soil Weight (C-A)	6.85	7.02	8.13				4.47	4.12	
F	% Moisture (D/E)*100	63.5%	66.5%	68.4%				30.2%	29.6%	
N	# OF DROPS	35	26	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							29.9%		



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	65
Plastic Limit	30
Plastic Index	35
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

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/2/2018
Date

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Particle Size Analysis of Soils



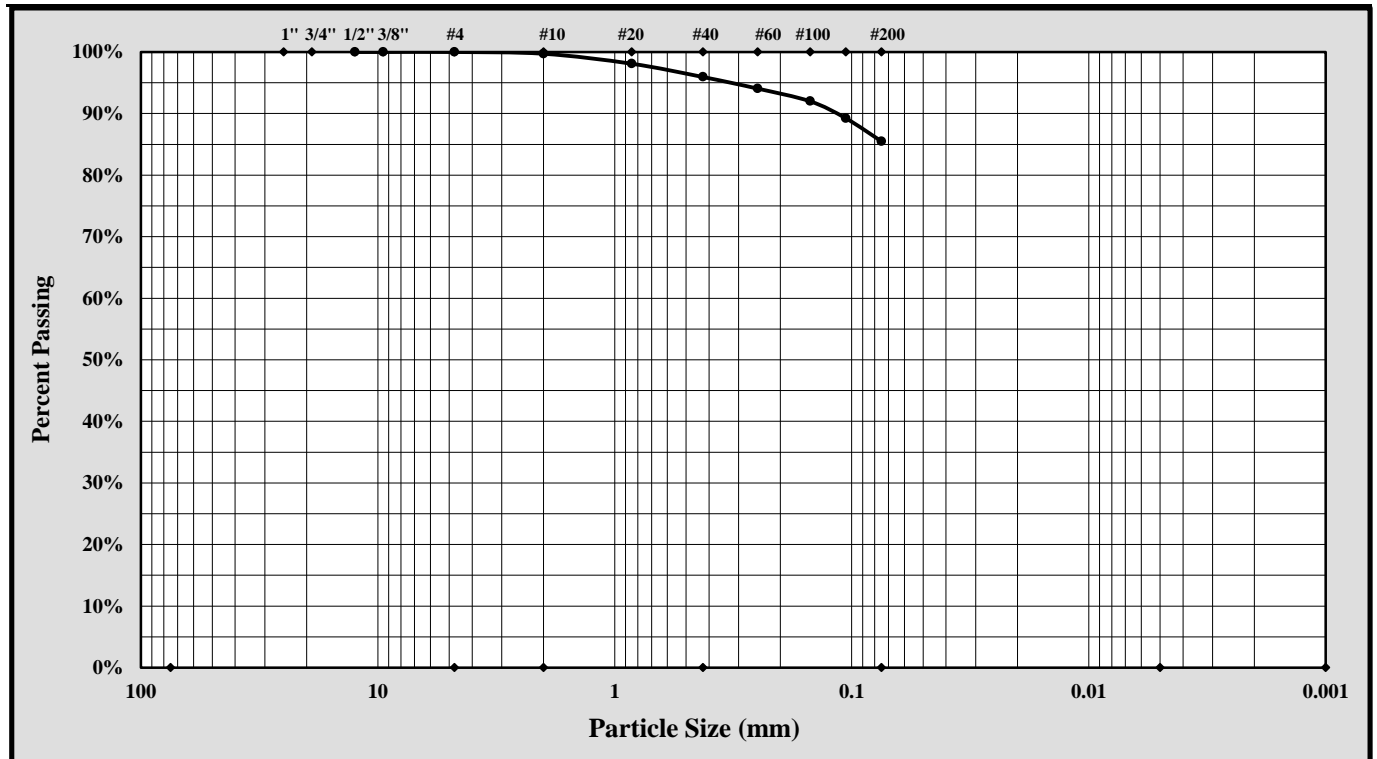
Sample Log No.:

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:	5/2/2018
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:	W-30	Type:	Split Spoon
		Sample Date:	Various
Location:	Wall Boring	Sample No.:	SS-11
		Depth:	38.5' - 40.0'
Sample Description:	Fat Clay with Sand (CH, A-7-5 (34))		



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:	14.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	30
	Plastic Index	35

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

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



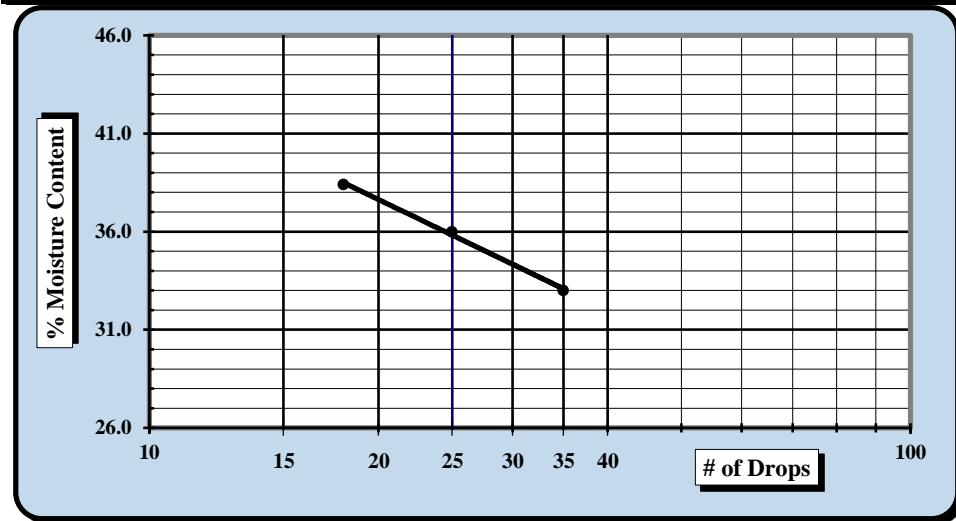
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-31	Sample #:	SS-1
Location:	Wall Boring	Sample Date:	3/13/18
Type:	Split-spoon	Depth:	0.0' - 2.0'

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)	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	28.61	27.62	26.69			28.25	26.96	
B	Wet Soil Weight + A	43.79	42.29	41.78			35.15	33.19	
C	Dry Soil Weight + A	40.02	38.41	37.59			34.17	32.32	
D	Water Weight (B-C)	3.77	3.88	4.19			0.98	0.87	
E	Dry Soil Weight (C-A)	11.41	10.79	10.90			5.92	5.36	
F	% Moisture (D/E)*100	33.0%	36.0%	38.4%			16.6%	16.2%	
N	# OF DROPS	35	25	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						16.4%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	36	
Plastic Limit	16	
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

Benjamin J. Kovaleski
Technician Name

5/11/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

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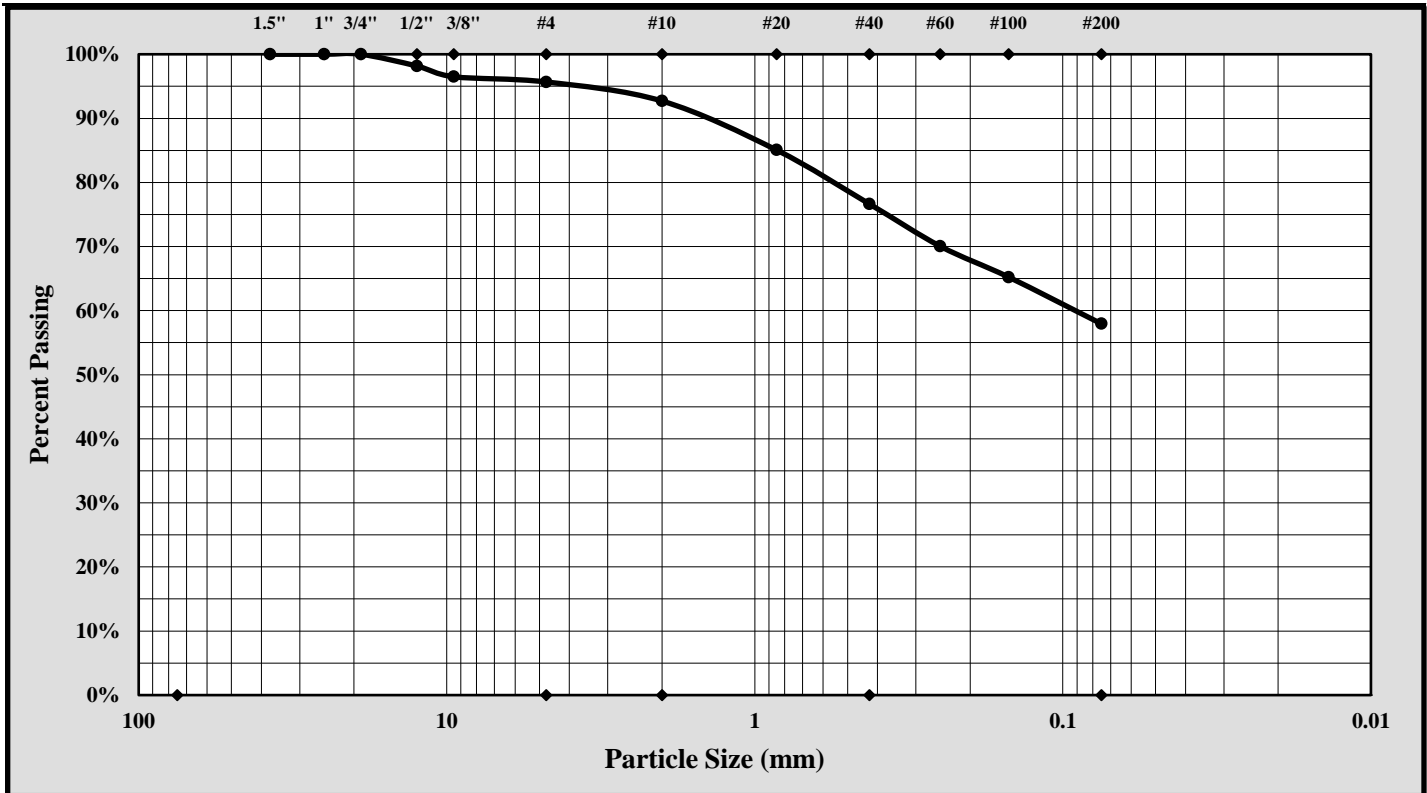


Particle Size Analysis of Soils

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 #:	W-31	Sample #:	SS-1
		Sample Date:	3/13/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
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: 19.0 mm Gravel: 4.3%
 Silt & Clay (% Passing #200): 57.9% Total Sand: 37.7%

Liquid Limit	36	Plastic Limit	16	Plastic Index	20
Coarse Sand:	3.0%	Medium Sand:	16.0%	Fine Sand:	18.7%
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

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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 #:	W-31	Sample #:	SS-3
Location:	Wall Boring	Sample Date:	3/13/18
Type:	Split-spoon	Depth:	4.0' - 6.0'

Sample Description: Fat Clay with Sand (CH, A-7-6(31))					
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	25.67	26.19	28.27				25.86	26.96	
B	Wet Soil Weight + A	37.61	39.10	40.58				32.46	33.19	
C	Dry Soil Weight + A	33.53	34.47	35.87				31.36	32.15	
D	Water Weight (B-C)	4.08	4.63	4.71				1.10	1.04	
E	Dry Soil Weight (C-A)	7.86	8.28	7.60				5.50	5.19	
F	% Moisture (D/E)*100	51.9%	55.9%	62.0%				20.0%	20.0%	
N	# OF DROPS	35	28	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							20.0%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	58	
Plastic Limit	20	
Plastic Index	38	
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

Benjamin J. Kovaleski
Technician Name

5/11/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

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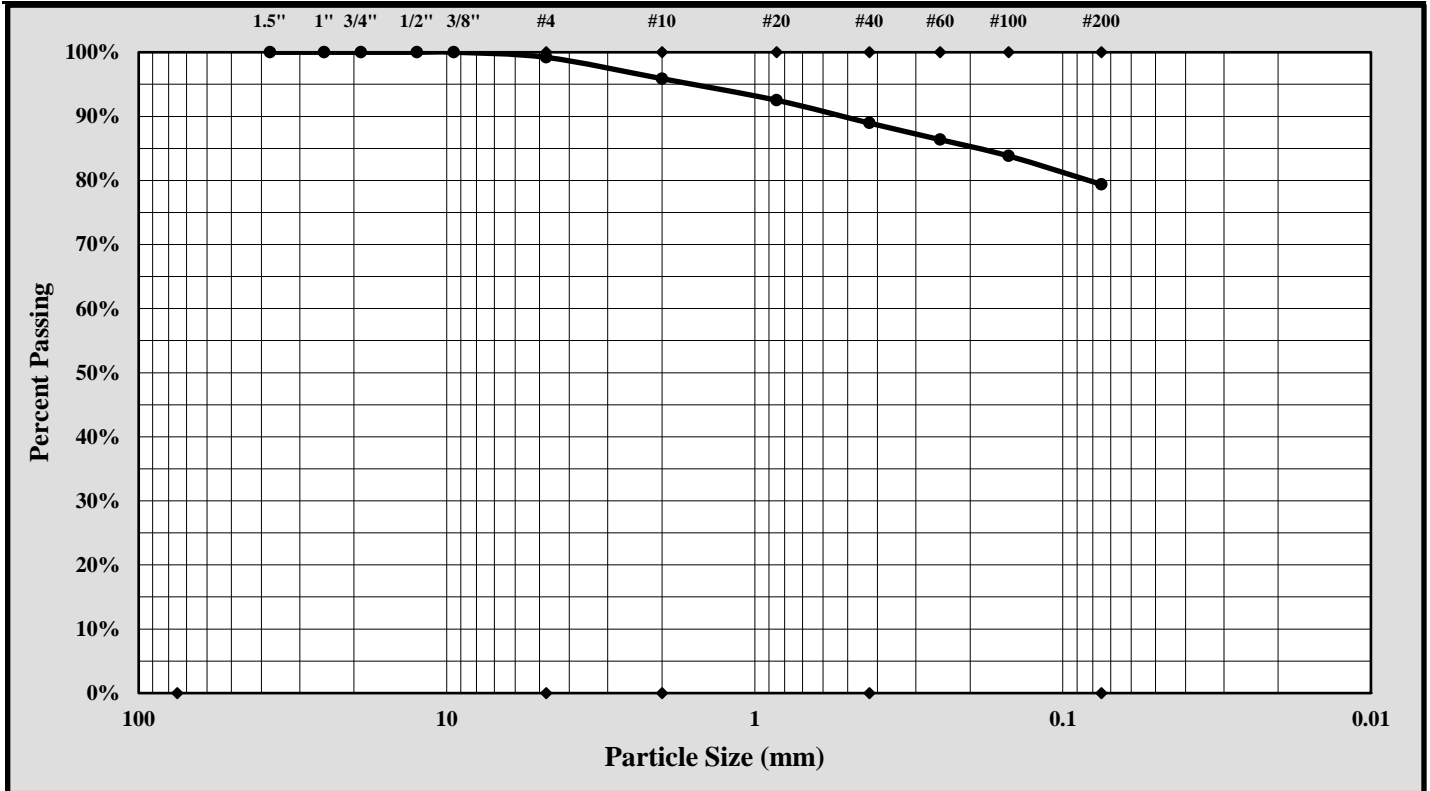


Particle Size Analysis of Soils

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 #:	W-31	Sample #:	SS-3
		Sample Date:	3/13/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	4.0' - 6.0'
Sample Description:	Fat Clay with Sand (CH, A-7-6(31))		



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): 79.4%	Total Sand: 19.8%

Liquid Limit	58	Plastic Limit	20	Plastic Index	38
Coarse Sand:	3.3%	Medium Sand:	6.9%	Fine Sand:	9.6%

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

5/11/18
Date

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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 #:	W-31	Sample #:	SS-7
Location:	Wall Boring	Type:	Split-spoon
		Sample Date:	3/13/18
		Depth:	18.5' - 20.0'

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)	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	28.75	28.65	28.37			25.76	25.07	
B	Wet Soil Weight + A	46.17	49.86	46.48			32.16	31.89	
C	Dry Soil Weight + A	40.89	43.13	40.56			30.65	30.26	
D	Water Weight (B-C)	5.28	6.73	5.92			1.51	1.63	
E	Dry Soil Weight (C-A)	12.14	14.48	12.19			4.89	5.19	
F	% Moisture (D/E)*100	43.5%	46.5%	48.6%			30.9%	31.4%	
N	# OF DROPS	35	24	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						31.2%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	46	
Plastic Limit	31	
Plastic Index	15	
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>5/11/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/11/18</u> Date
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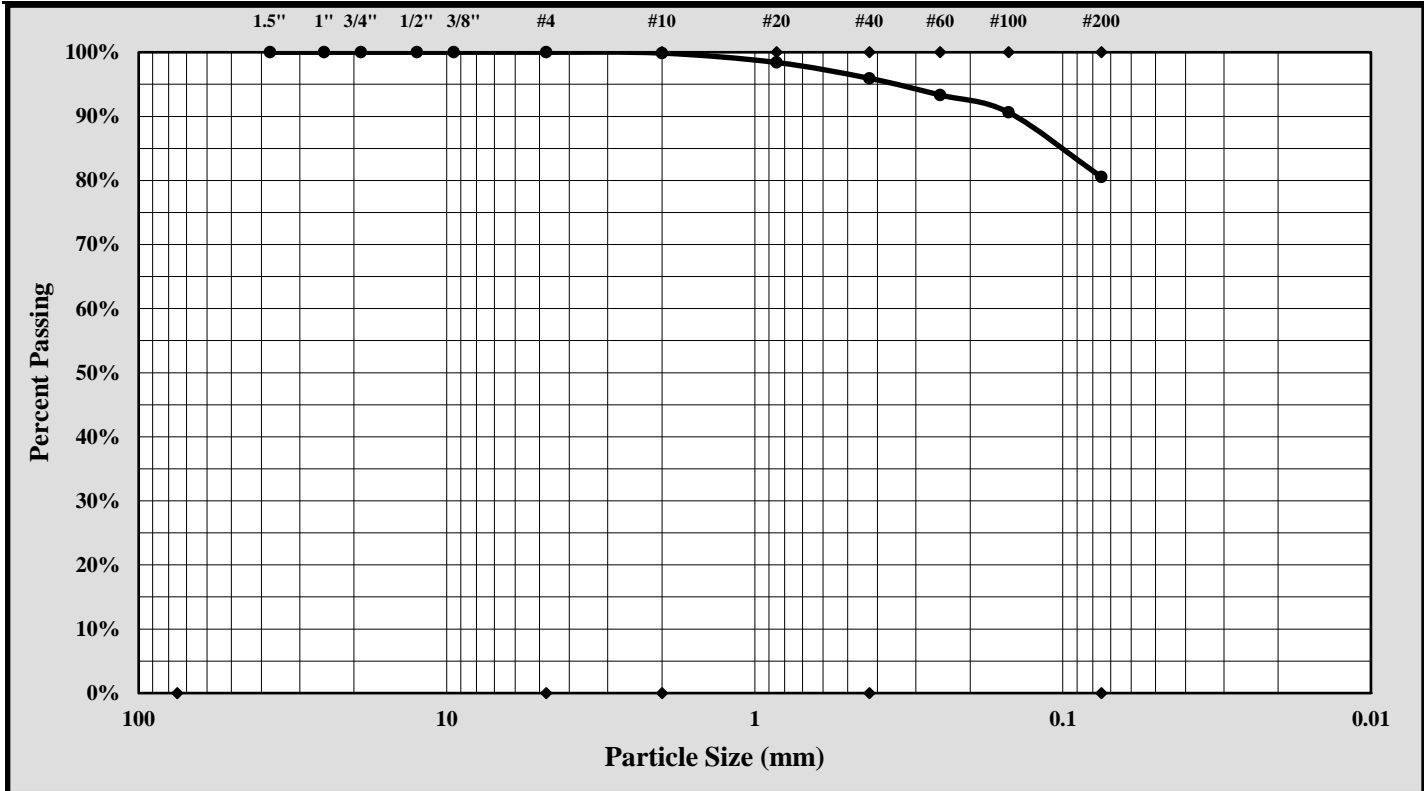
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Particle Size Analysis of Soils

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 #:	W-31	Sample #:	SS-7
		Sample Date:	3/13/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	18.5' - 20.0'
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 (#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:	2.00 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	80.5%	Total Sand:	19.5%

Liquid Limit	46	Plastic Limit	31	Plastic Index	15
Coarse Sand:	0.1%	Medium Sand:	3.9%	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:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

5/11/18
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

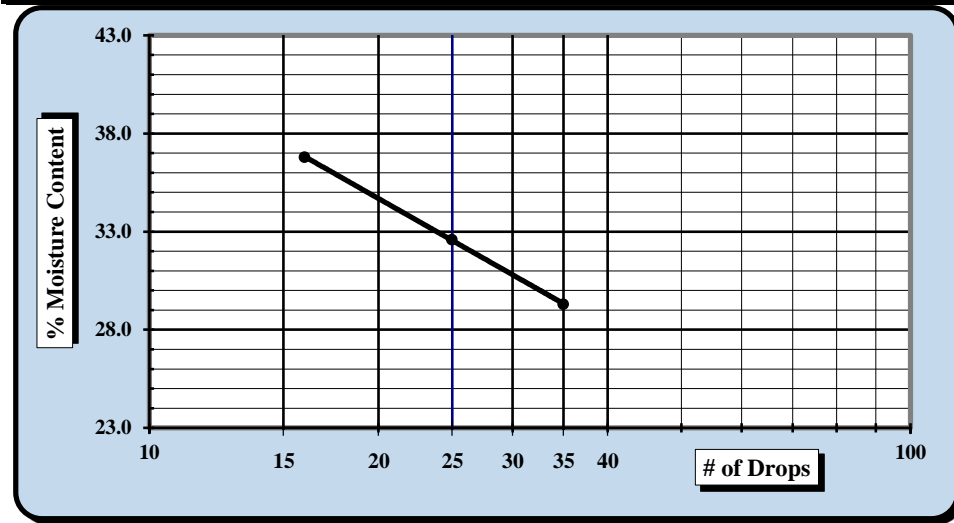
S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	4/05/18
Project Name:	Carolina Crossroads Project	Test Date:	4/04/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		

Boring #:	W-32	Sample #:	SS-2
Location:	Wall Boring	Type:	Split-spoon
Sample Date:	2/05/18		
Depth:	2.0' - 4.0'		

Sample Description: Sandy Silt (ML, 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		
		11	12	13			14	15	
A	Tare Weight	26.67	26.64	26.74			26.65	27.60	
B	Wet Soil Weight + A	42.19	43.17	43.54			33.54	34.04	
C	Dry Soil Weight + A	38.67	39.11	39.02			32.17	32.75	
D	Water Weight (B-C)	3.52	4.06	4.52			1.37	1.29	
E	Dry Soil Weight (C-A)	12.00	12.47	12.28			5.52	5.15	
F	% Moisture (D/E)*100	29.3%	32.6%	36.8%			24.8%	25.0%	
N	# OF DROPS	35	25	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						24.9%		



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	33
Plastic Limit	25
Plastic Index	8
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

4/05/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/05/18
 Date

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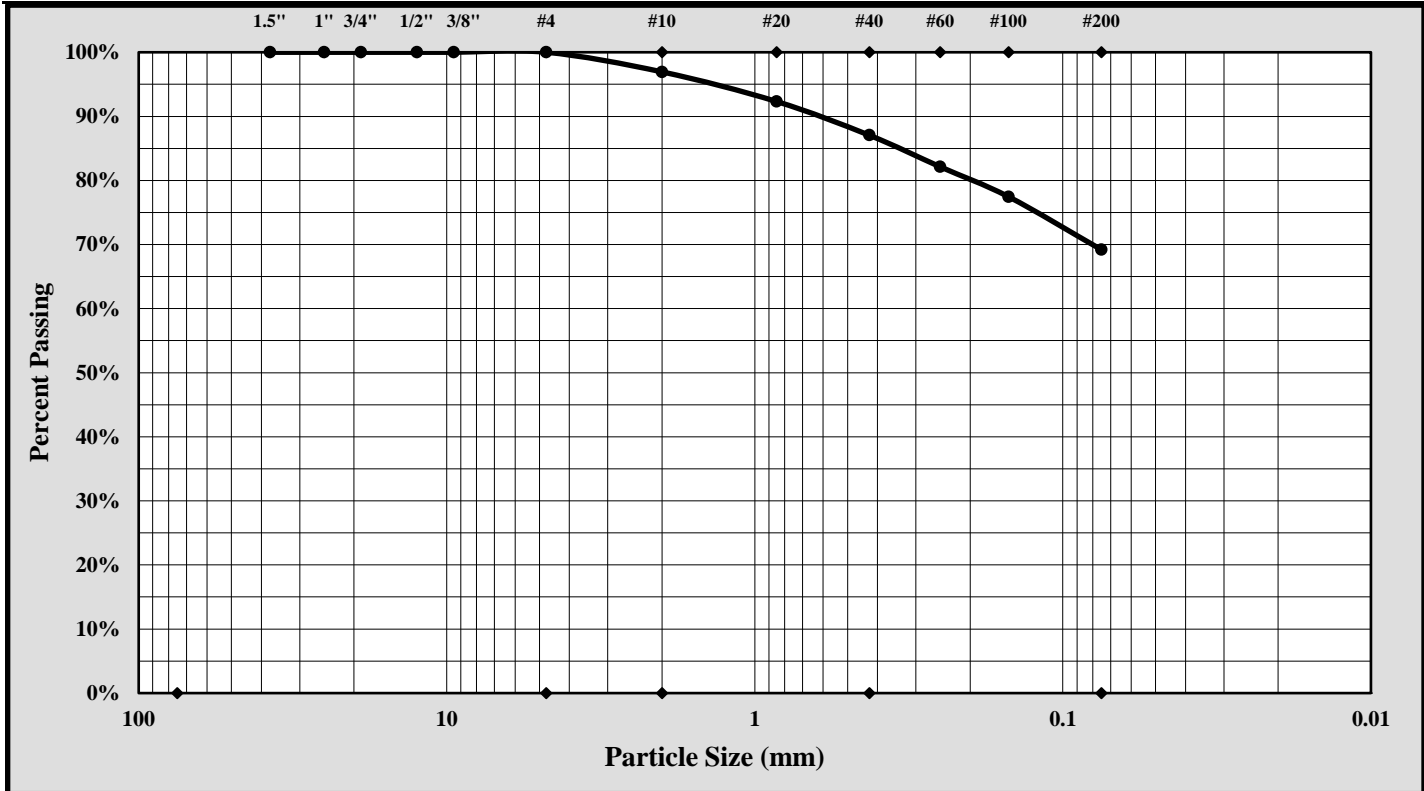


Particle Size Analysis of Soils

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 - 4/05/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-2
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
Sample Description:	Sandy Silt (ML, 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:	4.75 mm	Gravel:	0.0%
Silt & Clay (% Passing #200):	69.2%	Total Sand:	30.8%

Liquid Limit	33	Plastic Limit	25	Plastic Index	8
Coarse Sand:	3.1%	Medium Sand:	9.9%	Fine Sand:	17.9%

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

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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:	4/05/18
Project Name:	Carolina Crossroads Project	Test Date:	4/04/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-5
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	8.0' - 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			
		16	17	18			19	20		
A	Tare Weight	26.57	26.64	26.80				26.66	26.82	
B	Wet Soil Weight + A	42.75	43.13	43.03				34.15	34.98	
C	Dry Soil Weight + A	39.41	39.41	39.08				33.13	33.87	
D	Water Weight (B-C)	3.34	3.72	3.95				1.02	1.11	
E	Dry Soil Weight (C-A)	12.84	12.77	12.28				6.47	7.05	
F	% Moisture (D/E)*100	26.0%	29.1%	32.2%				15.8%	15.7%	
N	# OF DROPS	35	25	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							15.8%		



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>4/05/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/05/18</u> Date
---	------------------------	---	------------------------

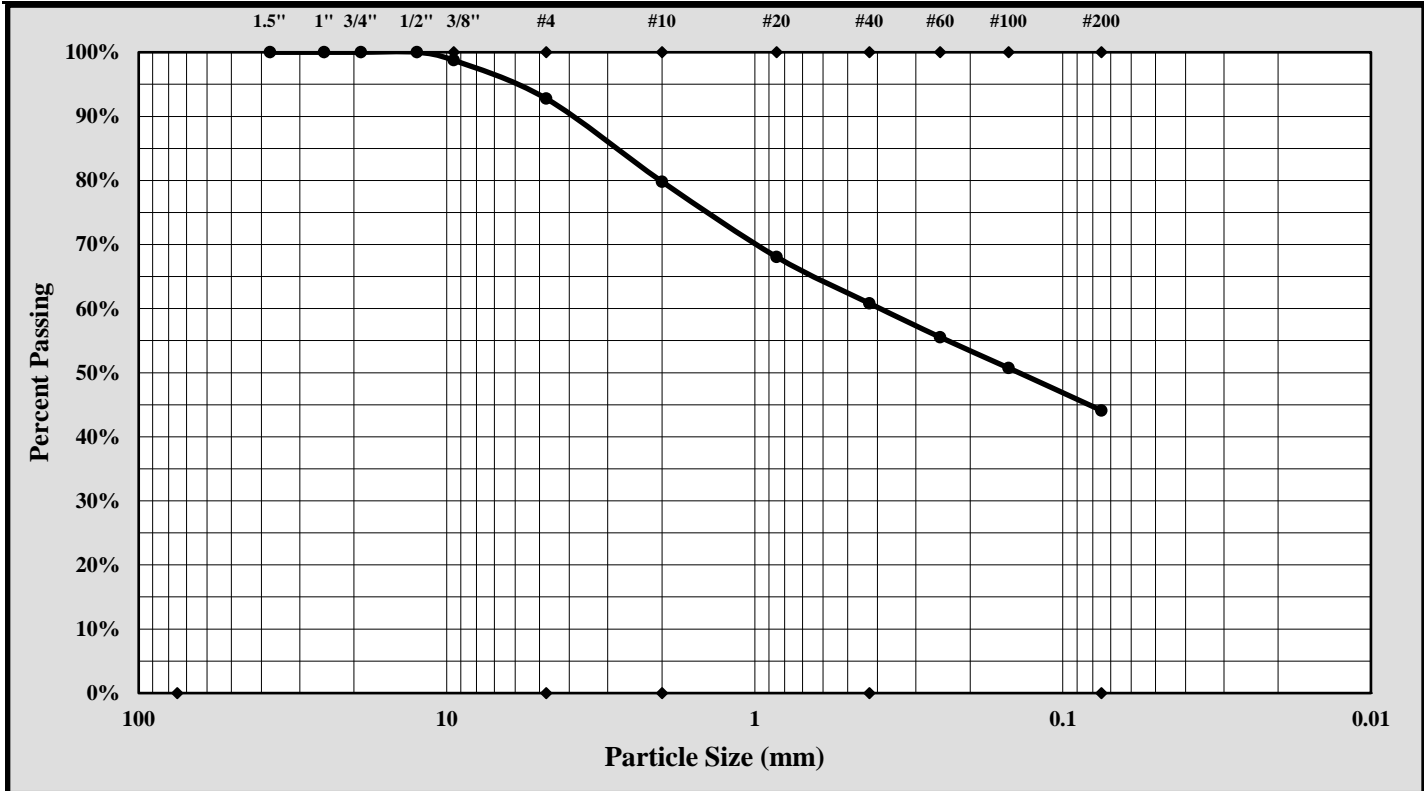
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Particle Size Analysis of Soils

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 - 4/05/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-5
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	8.0' - 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: 7.2%
 Silt & Clay (% Passing #200): 44.1% Total Sand: 48.6%

Liquid Limit	29	Plastic Limit	16	Plastic Index	13
Coarse Sand:	13.0%	Medium Sand:	19.0%	Fine Sand:	16.7%
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

4/04/18

Date

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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:	4/05/18
Project Name:	Carolina Crossroads Project	Test Date:	4/04/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-6
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'

Sample Description: Silty Sand with Gravel (SM, A-1-b)					
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	25.66	27.23			25.99	26.80	
B	Wet Soil Weight + A	46.77	35.27	42.31			33.08	33.41	
C	Dry Soil Weight + A	43.32	33.42	39.29			31.86	32.29	
D	Water Weight (B-C)	3.45	1.85	3.02			1.22	1.12	
E	Dry Soil Weight (C-A)	15.23	7.76	12.06			5.87	5.49	
F	% Moisture (D/E)*100	22.7%	23.8%	25.0%			20.8%	20.4%	
N	# OF DROPS	35	28	20			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						20.6%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	24	
Plastic Limit	21	
Plastic Index	3	
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>4/05/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/05/18</u> Date
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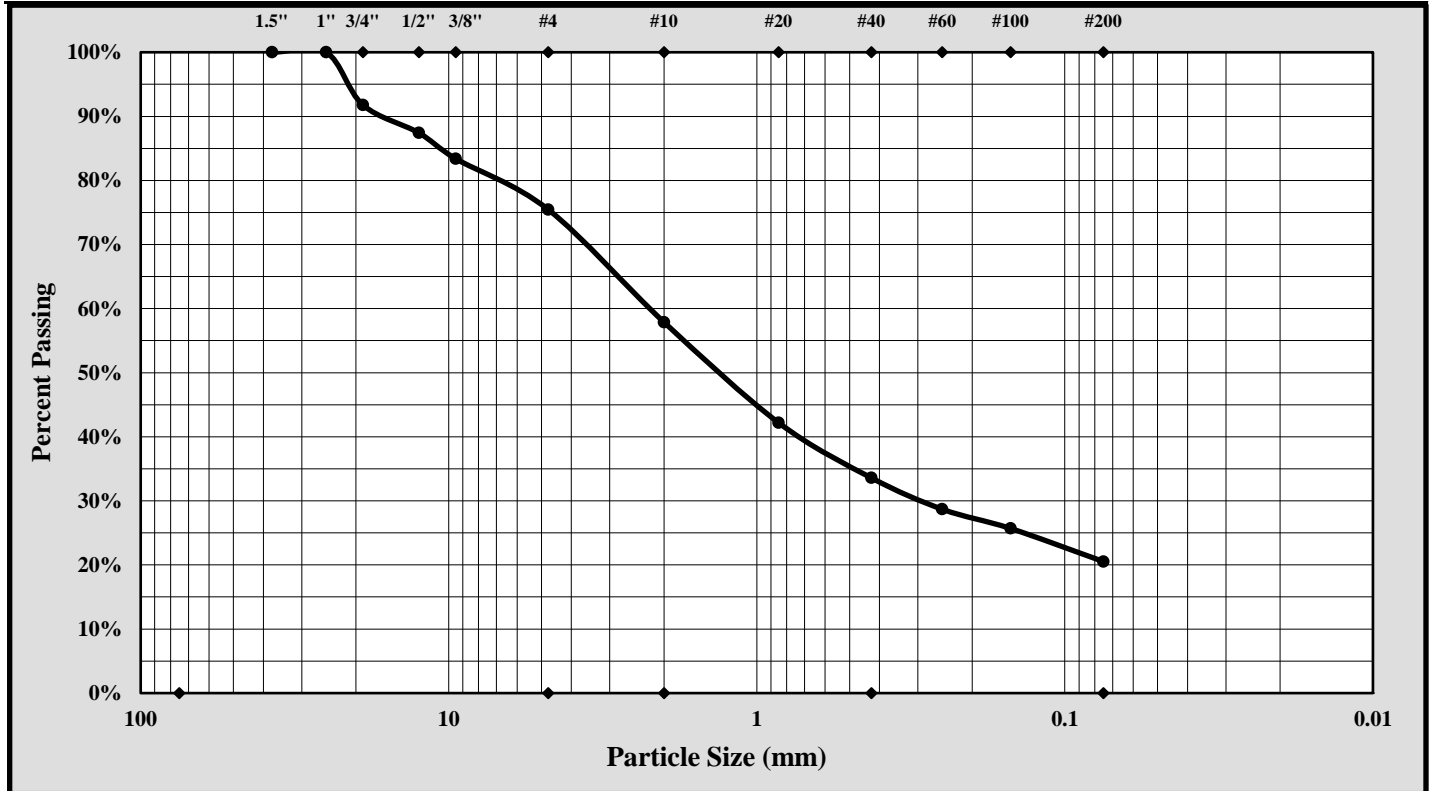
Particle Size Analysis of Soils

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 - 4/05/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-6
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
Sample Description:	Silty Sand with Gravel (SM, A-1-b)		



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: 24.6%
Silt & Clay (% Passing #200): 20.5%	Total Sand: 54.9%

Liquid Limit	24	Plastic Limit	21	Plastic Index	3
Coarse Sand:	17.6%	Medium Sand:	24.3%	Fine Sand:	13.1%
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

4/04/18

Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



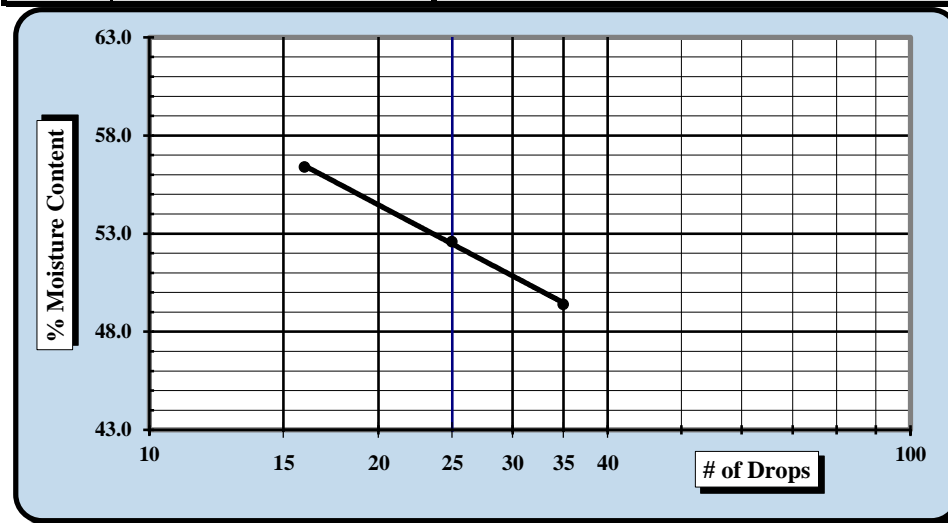
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/05/18
Project Name:	Carolina Crossroads Project	Test Date:	4/04/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-11
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	38.5' - 40.0'

Sample Description: Fat Clay with Sand (CH, A-7-6(21))					
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	27.35	27.00	26.79				27.00	27.36	
B	Wet Soil Weight + A	43.07	41.54	40.69				33.21	34.75	
C	Dry Soil Weight + A	37.87	36.53	35.68				31.81	33.10	
D	Water Weight (B-C)	5.20	5.01	5.01				1.40	1.65	
E	Dry Soil Weight (C-A)	10.52	9.53	8.89				4.81	5.74	
F	% Moisture (D/E)*100	49.4%	52.6%	56.4%				29.1%	28.7%	
N	# OF DROPS	35	25	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							28.9%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	53	
Plastic Limit	29	
Plastic Index	24	
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

Benjamin J. Kovaleski
Technician Name

4/05/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/05/18
Date

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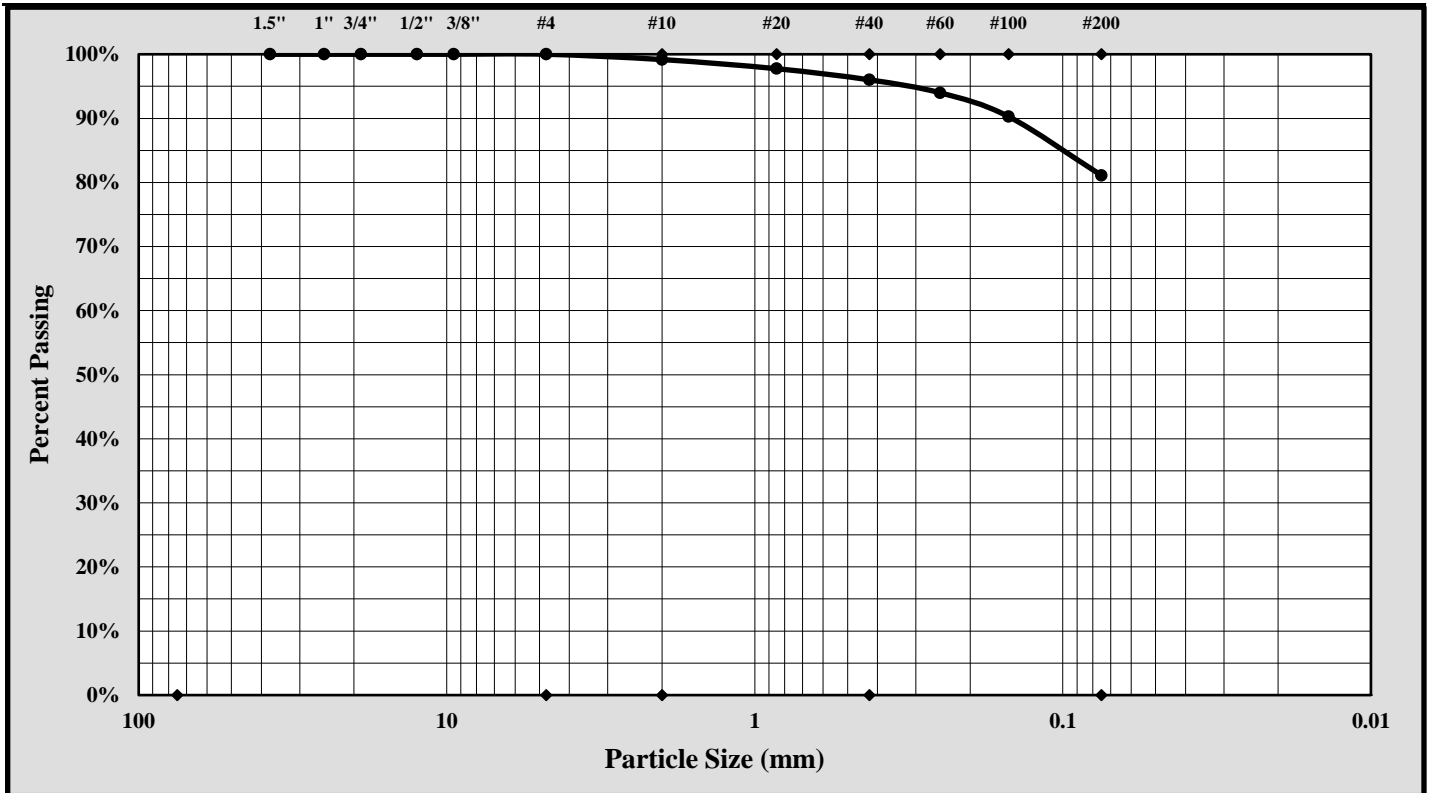


Particle Size Analysis of Soils

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 - 4/05/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	W-32	Sample #:	SS-11
		Sample Date:	2/05/18
Location:	Wall Boring	Type:	Split-spoon
		Depth:	38.5' - 40.0'
Sample Description:	Fat Clay with Sand (CH, A-7-6(21))		



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):	81.1%	Total Sand:	18.9%

Liquid Limit	53	Plastic Limit	29	Plastic Index	24
Coarse Sand:	0.8%	Medium Sand:	3.2%	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:

<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position	<u>4/04/18</u> Date
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Laboratory Test Data Sheets - Bulk Samples

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):	3/14-3/15/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample by:	S&ME	Sample Date(s):	2/21/2018
Sampling Method:	Bulk	Drill Rig :	CME 55

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" 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	N o t e
		ft.		grams	grams	grams	grams	%	
P-56	BS-1	0.9 - 10.9	18	150.49	335.02	301.49	33.53	22%	

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 4/27/2018
Position Date

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):	3/19/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample by:	S&ME	Sample Date(s):	2/26/2018
Sampling Method:	Bulk	Drill Rig :	CME 55

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" 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
		ft.		grams	grams	grams	grams	%	
P-58	BS-1	1.1 - 11.1	22	150.35	355.99	332.28	23.71	13.0%	

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 4/27/2018
Position Date

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:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/16-2/19/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample by:	S&ME	Sample Date(s):	2/6/2018
Sampling Method:	Bulk	Drill Rig :	Diedrich D-50

Method:	A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" 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
		ft.		grams	grams	grams	grams	%	
P-63	BS-1	1.3 - 11.3	26	149.85	810.13	693.71	116.42	21.4%	

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

4/27/2018
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:	5/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/24 - 4/26/18
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
			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-38	BS-1	0.0 - 10.0	BK-12	0.00	228.7	190.7	38.0	19.9%	
RW-42	BS-1	0.0 - 10.0	BK-3	0.00	212.2	192.4	19.8	10.3%	
RW-43	BS-1	0.0 - 10.0	BK-12	0.00	241.5	210.9	30.6	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 Kovalski</u> <i>Technician Name</i>	 <i>Signature</i>	<u>NICET Lab Level III/117226</u> <i>Certification Type / No.</i>	<u>5/03/18</u> <i>Date</i>
<u>Matthew F. Cooke, P.G.</u> <i>Technical Responsibility</i>		<u>Project Manager</u> <i>Position</i>	<u>5/03/18</u> <i>Date</i>

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



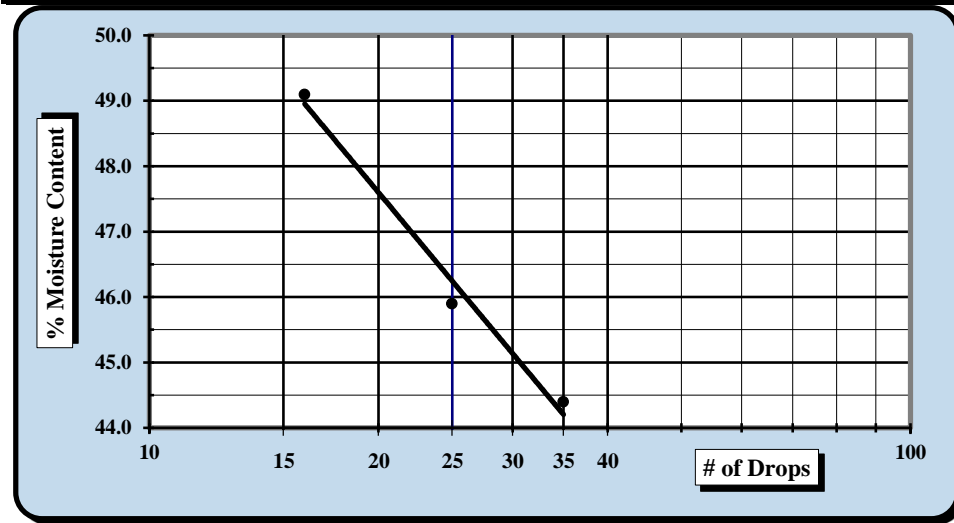
ASTM D 4318 AASHTO T 89 AASHTO T 90

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)	3/14-3/16/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-56	Sample #:	BS-1
		Sample Date:	1/21/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 10.9'

Sample Description: Clayey Sand (SC, A-7-6(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	28575	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		
		3	10	147			209	1	
A	Tare Weight	20.79	20.78	20.75			21.07	20.64	
B	Wet Soil Weight + A	27.81	28.76	28.07			28.14	27.32	
C	Dry Soil Weight + A	25.65	26.25	25.66			26.96	26.22	
D	Water Weight (B-C)	2.16	2.51	2.41			1.18	1.10	
E	Dry Soil Weight (C-A)	4.86	5.47	4.91			5.89	5.58	
F	% Moisture (D/E)*100	44.4%	45.9%	49.1%			20.0%	19.7%	
N	# OF DROPS	35	25	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						19.9%		



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	46
Plastic Limit	20
Plastic Index	26
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>4/27/2018</u> Date
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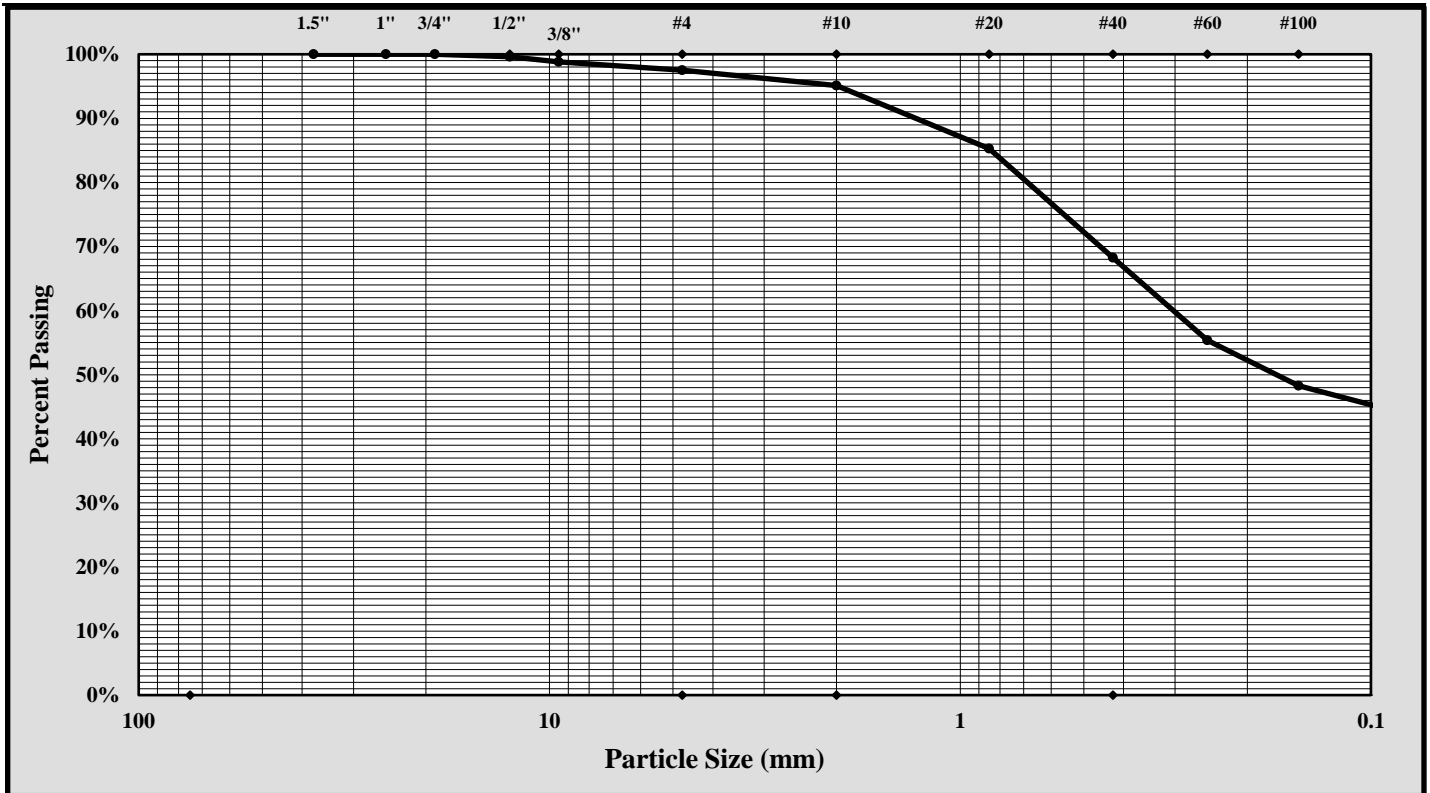
Particle Size Analysis of Soils

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):	3/14-3/15/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-56	Sample #:	BS-1
		Sample Date:	1/21/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 10.9'
Sample Description:	Clayey Sand (SC, A-7-6(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: 1/2-inch Gravel: 2.5%
 Silt & Clay (% Passing #200): 43.2% Total Sand: 54.3%

Liquid Limit	46	Plastic Limit	20	Plastic Index	26
Coarse Sand:	2.4%	Medium Sand:	26.9%	Fine Sand:	25.0%
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:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/27/2018

Date

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MOISTURE - DENSITY REPORT

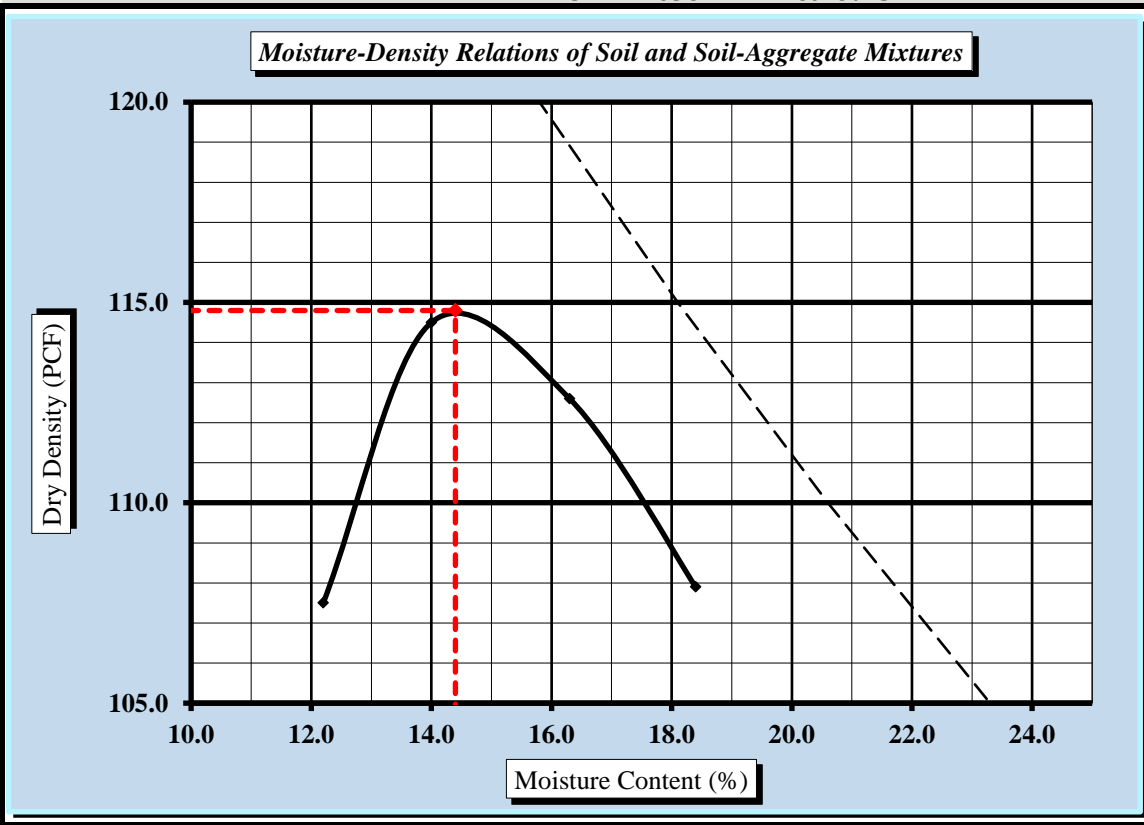


Quality Assurance

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210			
S&ME Project #:	1461-16-047.2B	Report Date:	4/24/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	3/14-3/15/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-56	Sample #:	BS-1
Location:	Pavement Boring	Offset:	N/A
		Sample Date:	1/21/2018
		Depth:	0.9' - 10.9'
Sample Description:	Clayey Sand (SC, A-7-6(6))		

Maximum Dry Density 114.8 PCF. Optimum Moisture Content 14.4%

ASTM D 698 - - Method C



Soil Properties	
Natural	
Moisture Content	22.0%
Specific Gravity of Soil	TNP
Liquid Limit	46
Plastic Limit	20
Plastic Index	26
% Passing	
3/4"	100.0%
3/8"	98.8%
#4	97.5%
#10	95.1%
#40	68.2%
#60	55.4%
#200	43.2%
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	0.0%
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

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/27/2018
 Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



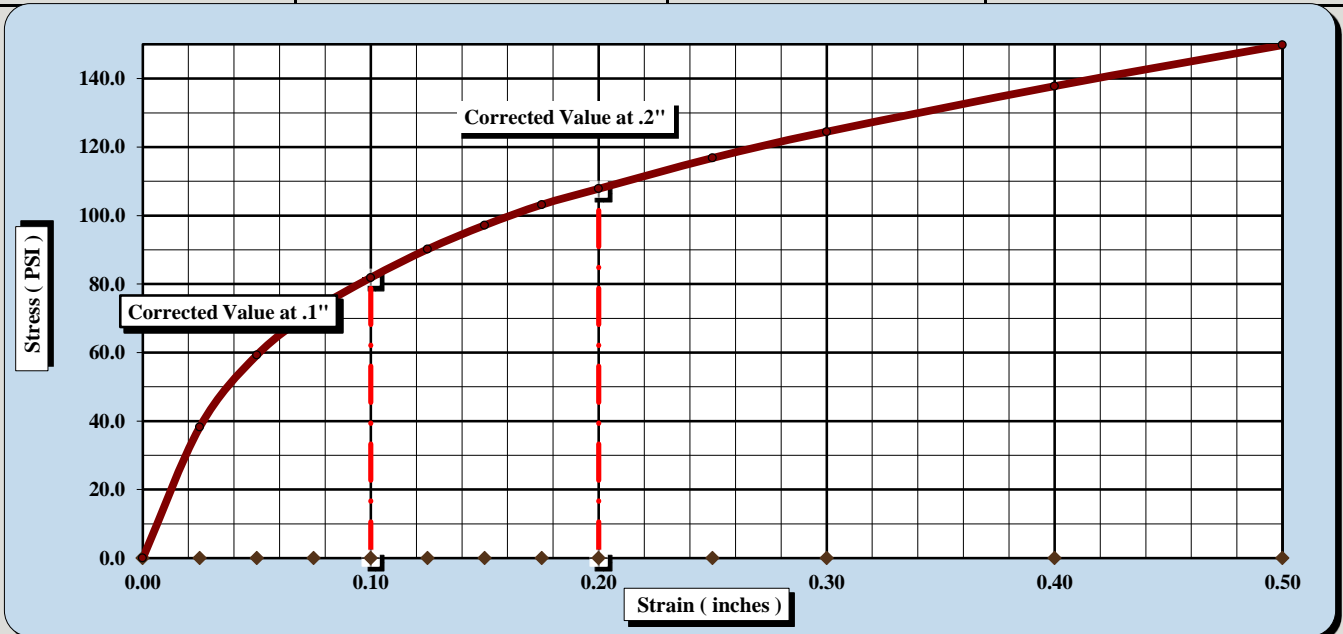
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/16-3/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-56	Sample #:	BS-1
		Sample Date:	2/21/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 10.9'
Sample Description:	Clayey Sand (SC, A-7-6(6))		

ASTM D 698 Method C	Maximum Dry Density: 114.8 PCF	Optimum Moisture Content: 14.4%	
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.	8.2	CBR at 0.1 in.	8.2
CBR at 0.2 in.	7.2	CBR at 0.2 in.	7.2



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)	25	Final Dry Density (PCF)	105.4
Initial Dry Density (PCF)	105.6	Moisture Content (top 1" after soaking)	19.5%
Moisture Content of the Compacted Specimen	14.8%	Percent Swell	0.1%
Percent Compaction	92.0%		

Soak Time: 96 hours	Surcharge Weight: 20.0	Surcharge Wt. per sq. Ft.: 101.8	
Liquid Limit: 46	Plastic Index: 26	Apparent Relative Density: TNP	

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/2018
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



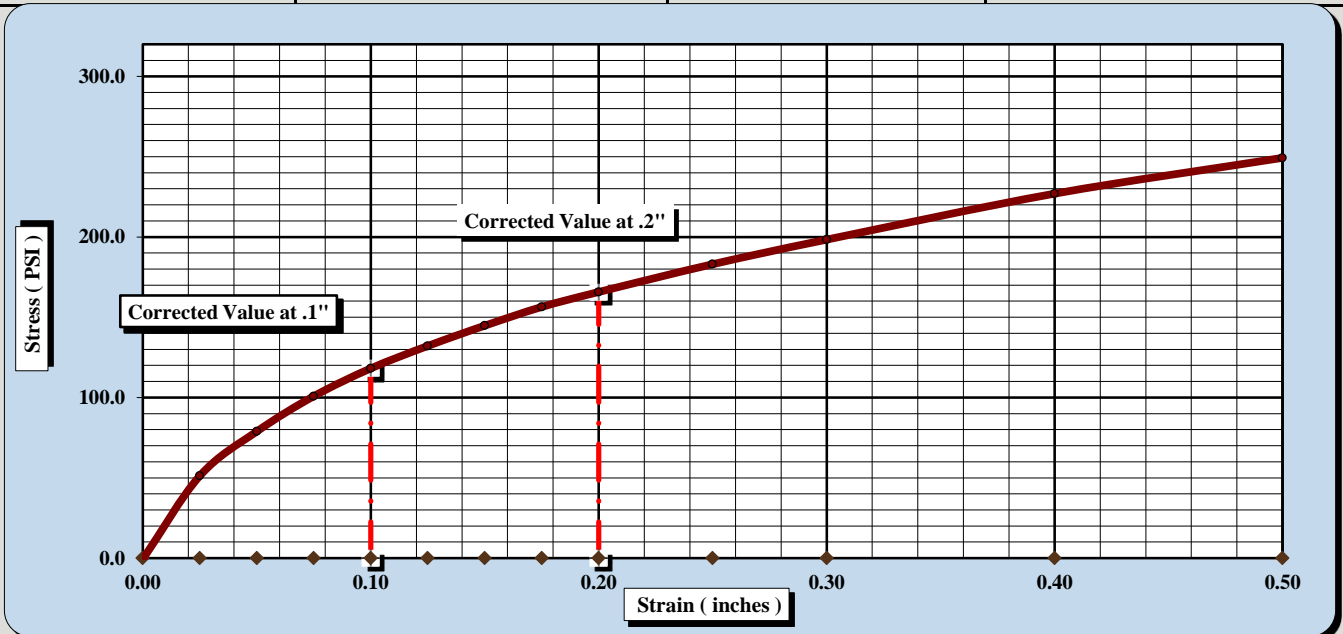
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/16-3/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-56	Sample #:	BS-1
		Sample Date:	2/21/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 10.9'
Sample Description:	Clayey Sand (SC, A-7-6(6))		

ASTM D 698 Method C	Maximum Dry Density: 114.8 PCF	Optimum Moisture Content: 14.4%	
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.	11.8	CBR at 0.1 in.	11.8
CBR at 0.2 in.	11.0	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)	35	Final Dry Density (PCF)	111.1
Initial Dry Density (PCF)	111.2	Moisture Content (top 1" after soaking)	19.2%
Moisture Content of the Compacted Specimen	14.4%	Percent Swell	0.1%
Percent Compaction	96.9%		

Soak Time: 96 hours	Surcharge Weight: 20.0	Surcharge Wt. per sq. Ft.: 101.9	
Liquid Limit: 46	Plastic Index: 26	Apparent Relative Density: TNP	

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Specific Gravity: ASTM D 854, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/2018
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



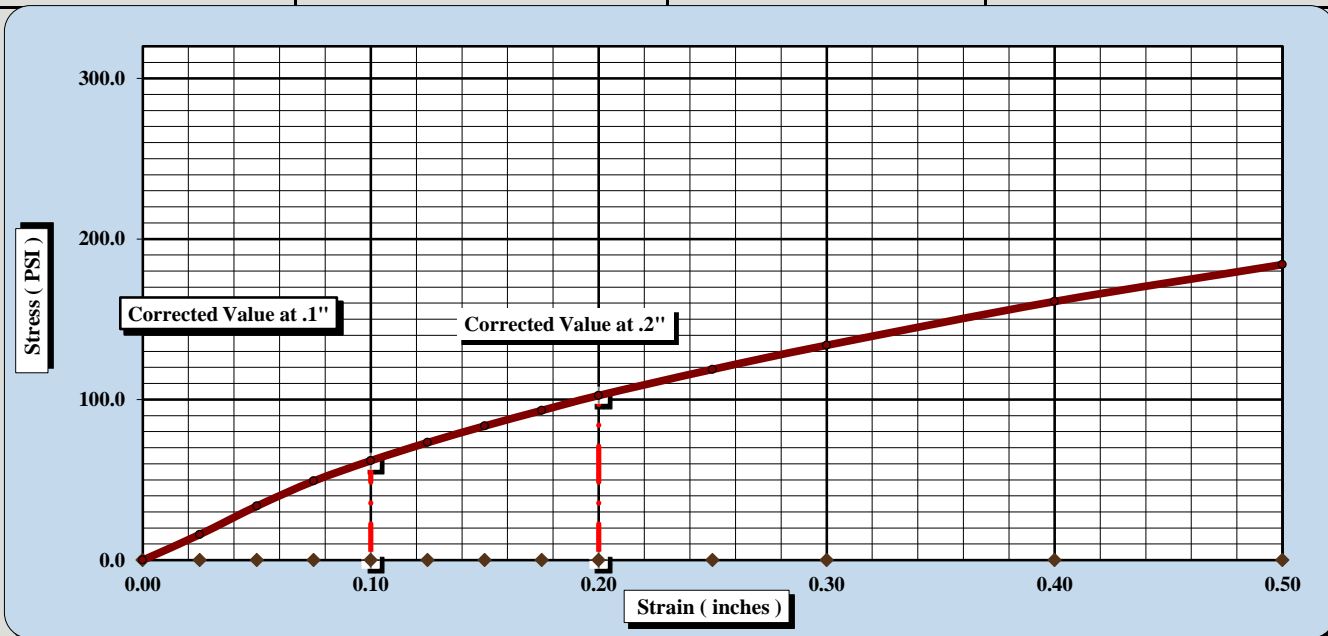
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/16-3/20/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-56	Sample #:	BS-1
		Sample Date:	2/21/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	0.9' - 10.9'
Sample Description:	Clayey Sand (SC, A-7-6(6))		

ASTM D 698 Method C	Maximum Dry Density: 114.8 PCF	Optimum Moisture Content: 14.4%	
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.	6.2	CBR at 0.1 in.	6.2
CBR at 0.2 in.	6.8	CBR at 0.2 in.	6.8



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)	56	Final Dry Density (PCF)	114.2
Initial Dry Density (PCF)	114.2	Moisture Content (top 1" after soaking)	17.8%
Moisture Content of the Compacted Specimen	14.4%	Percent Swell	0.0%
Percent Compaction	99.5%		

Soak Time: 96 hours	Surcharge Weight: 20.0	Surcharge Wt. per sq. Ft.: 101.8	
Liquid Limit: 46	Plastic Index: 26	Apparent Relative Density: TNP	

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/2018
Date

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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:	4/24/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/19-3/23/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-58	Sample #:	BS-1
		Sample Date:	2/26/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 11.1'

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)	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		
		4	235	6			31	227	
A	Tare Weight	20.54	20.76	20.57			20.80	20.81	
B	Wet Soil Weight + A	29.04	29.67	30.41			27.80	28.30	
C	Dry Soil Weight + A	26.75	27.21	27.63			26.77	27.19	
D	Water Weight (B-C)	2.29	2.46	2.78			1.03	1.11	
E	Dry Soil Weight (C-A)	6.21	6.45	7.06			5.97	6.38	
F	% Moisture (D/E)*100	36.9%	38.1%	39.4%			17.3%	17.4%	
N	# OF DROPS	26	23	15			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	37
Plastic Limit	17
Plastic Index	20
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 refers only to material passing the No. 40 sieve.

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

4/27/2018
Date

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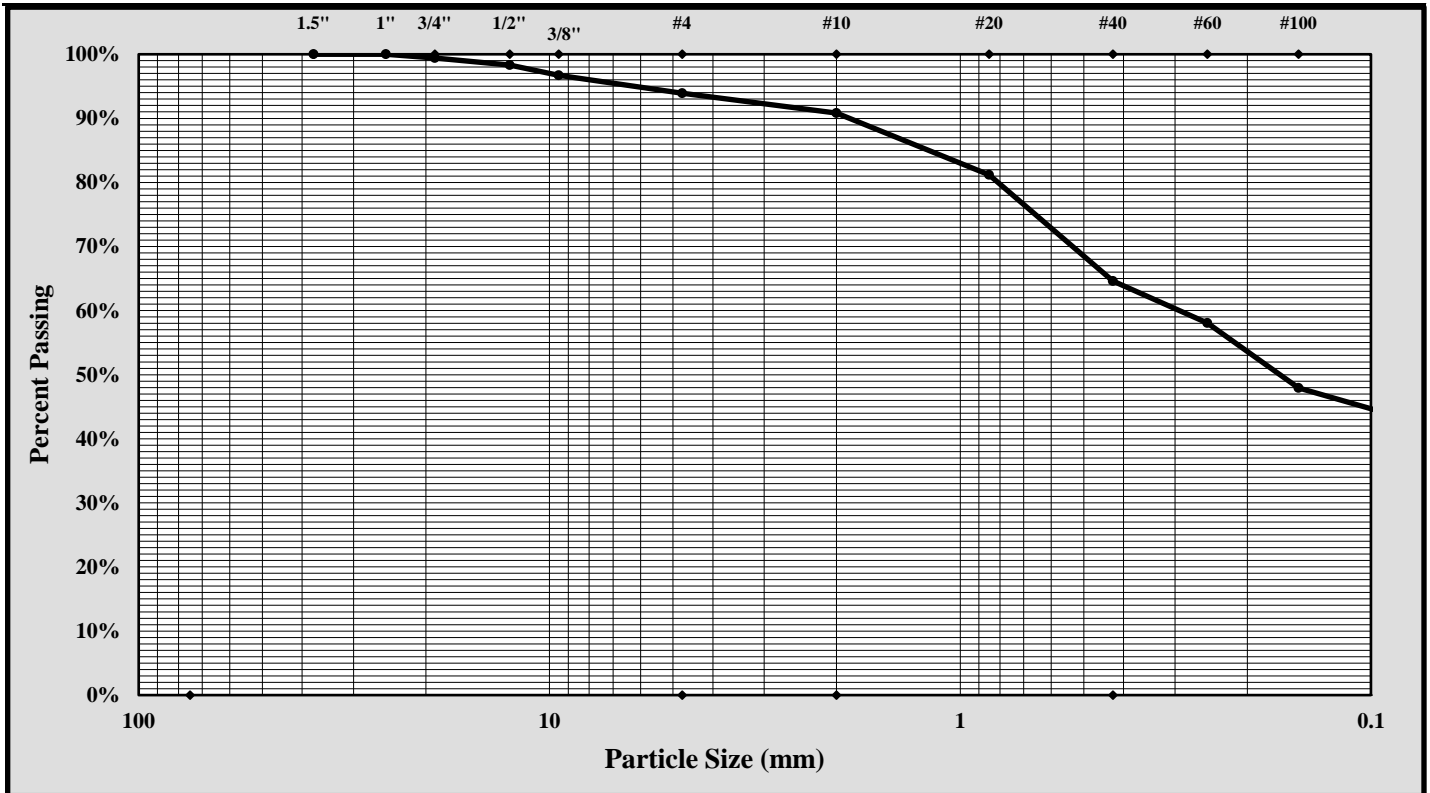
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	3/21/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	3/19-3/20/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-58	Sample #:	BS-1
		Sample Date:	2/26/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 11.1'
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: 3/4-inch Gravel: 6.1%
 Silt & Clay (% Passing #200): 42.4% Total Sand: 51.6%

Liquid Limit	37	Plastic Limit	17	Plastic Index	20
Coarse Sand:	3.1%	Medium Sand:	26.2%	Fine Sand:	22.2%
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 checked="" type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/27/2018

Date

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MOISTURE - DENSITY REPORT

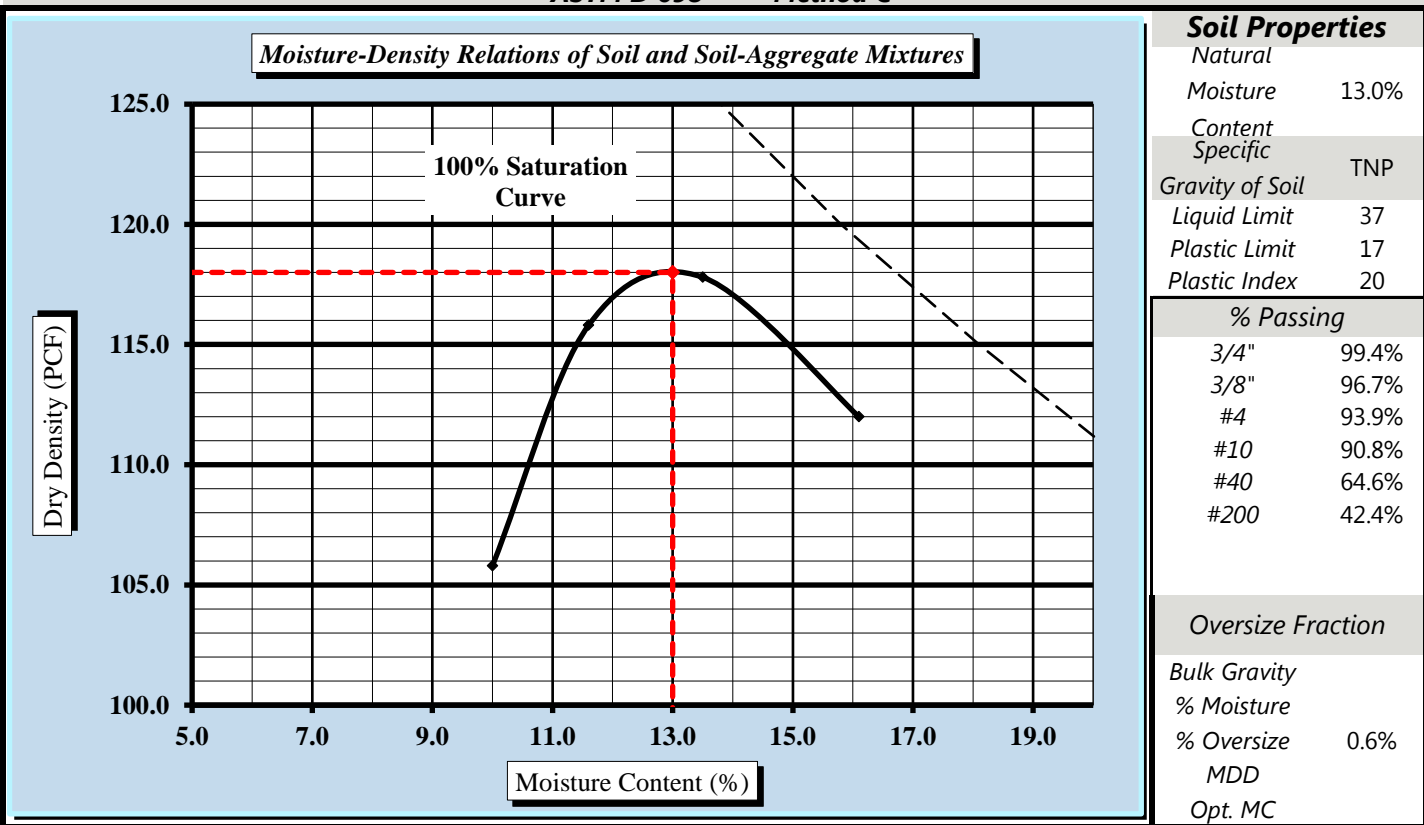


Quality Assurance

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210			
S&ME Project #:	1461-16-047.2B	Report Date:	4/24/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	3/19-3/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-58	Sample #:	BS-1
Location:	Pavement Boring	Offset:	N/A
		Sample Date:	2/26/2018
		Depth:	1.1' - 11.1'
Sample Description:	Clayey Sand (SC, A-6(4))		

Maximum Dry Density 118.0 PCF. Optimum Moisture Content 13.0%

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: Replacement method used for CBR preparation.
 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

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



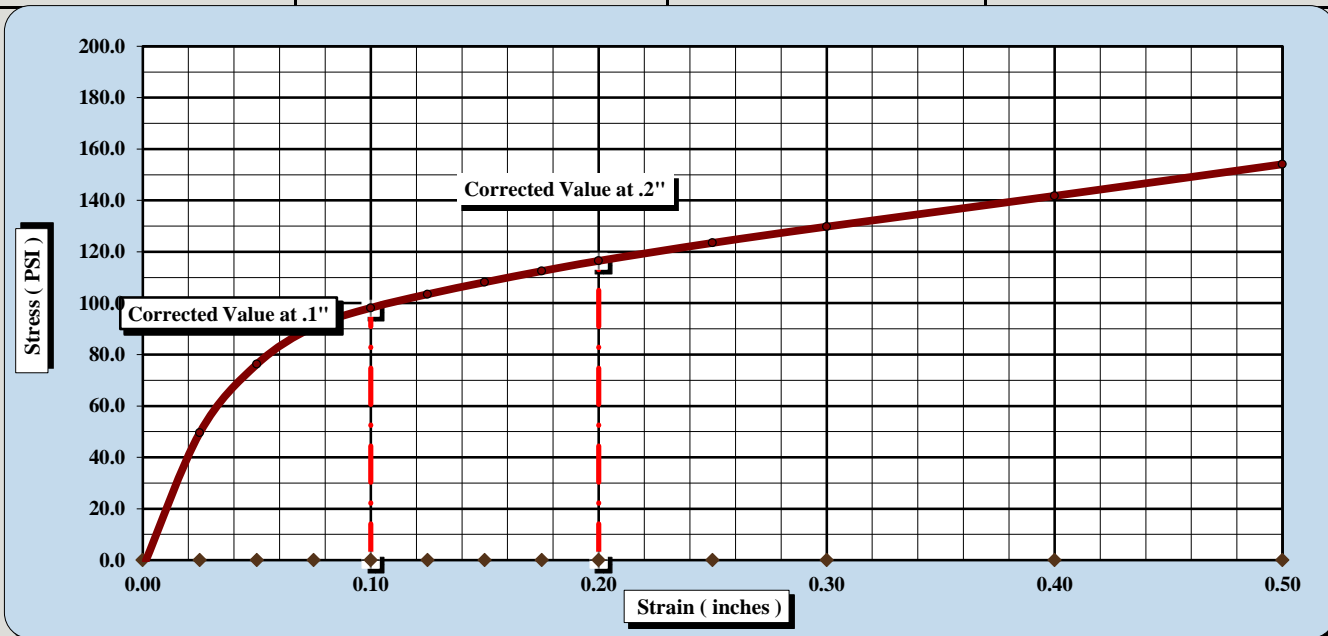
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/24/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/23-3/27/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-58	Sample #:	BS-1
		Sample Date:	2/26/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 11.1'
Sample Description:	Clayey Sand (SC, A-6(4))		

ASTM D 698	Method C	Maximum Dry Density:	118.0 PCF	Optimum Moisture Content:	13.0%
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.	9.8	CBR at 0.1 in.	9.8
CBR at 0.2 in.	7.8	CBR at 0.2 in.	7.8



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)	25	Final Dry Density (PCF)	108.4
Initial Dry Density (PCF)	108.5	Moisture Content (top 1" after soaking)	17.4%
Moisture Content of the Compacted Specimen	13.2%	Percent Swell	0.1%
Percent Compaction	91.9%		

Soak Time:	96 hours	Surcharge Weight	20.0	Surcharge Wt. per sq. Ft.	101.8
Liquid Limit	37	Plastic Index	20	Apparent Relative Density	TNP

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/2018
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



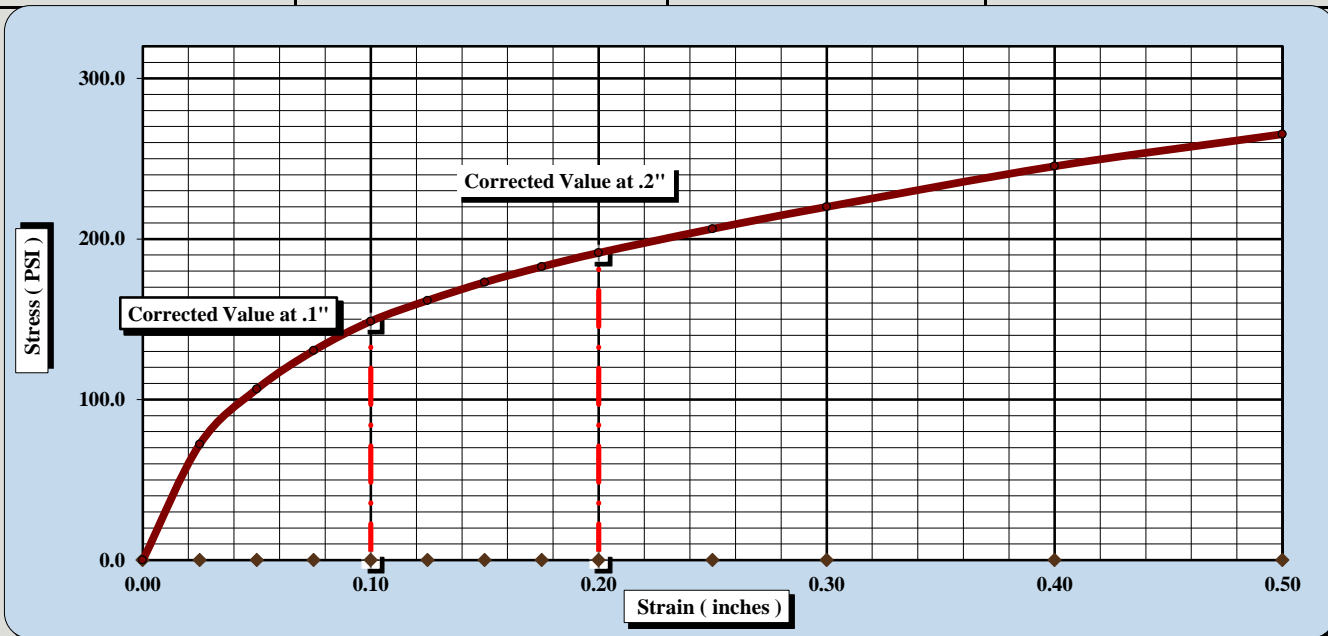
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/24/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/23-3/27/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-58	Sample #:	BS-1
		Sample Date:	2/26/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 11.1'
Sample Description:	Clayey Sand (SC, A-6(4))		

ASTM D 698	Method C	Maximum Dry Density:	118.0 PCF	Optimum Moisture Content:	13.0%
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.	14.9	CBR at 0.1 in.	14.9
CBR at 0.2 in.	12.8	CBR at 0.2 in.	12.8



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)	112.9
Initial Dry Density (PCF)	113.0	Moisture Content (top 1" after soaking)	15.9%
Moisture Content of the Compacted Specimen	13.4%	Percent Swell	0.1%
Percent Compaction	95.8%		

Soak Time:	96 hours	Surcharge Weight	20.0	Surcharge Wt. per sq. Ft.	101.8
Liquid Limit	37	Plastic Index	20	Apparent Relative Density	TNP

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/2018
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



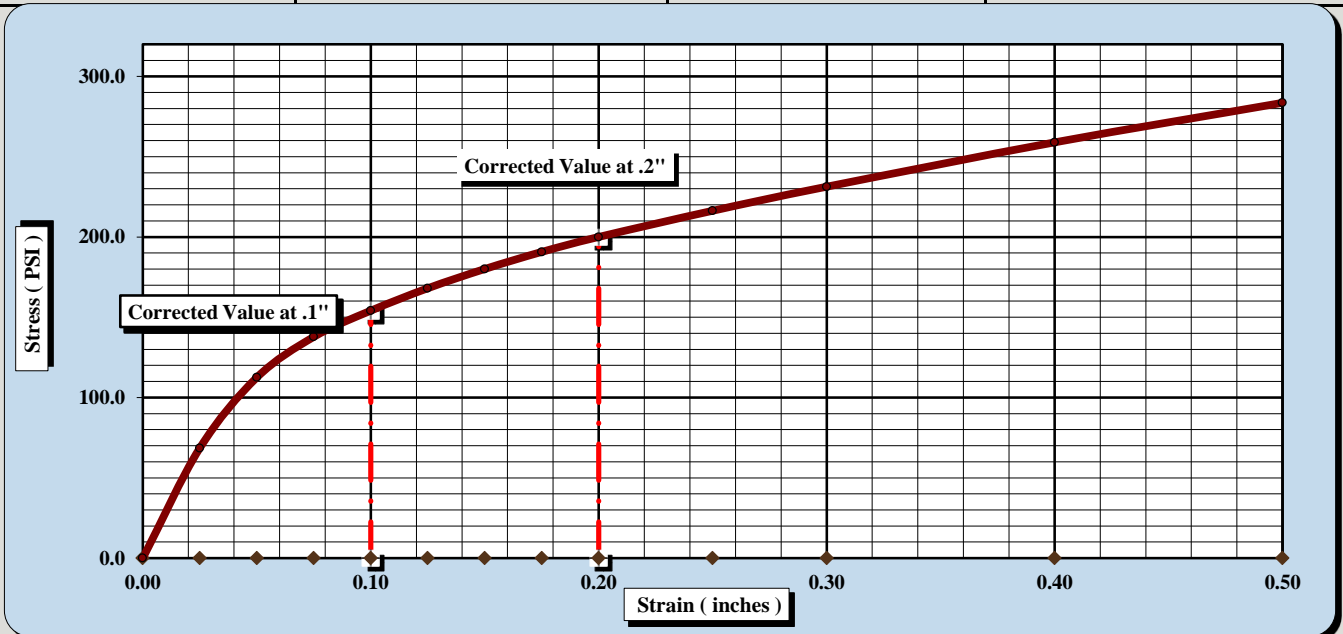
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	4/24/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	3/23-3/27/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-58	Sample #:	BS-1
		Sample Date:	2/26/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.1' - 11.1'
Sample Description:	Clayey Sand (SC, A-6(4))		

ASTM D 698 Method C Maximum Dry Density: 118.0 PCF Optimum Moisture Content: 13.0%
 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.	15.4	CBR at 0.2 in.	13.3
		CBR at 0.1 in.	15.4
		CBR at 0.2 in.	13.3



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)	56	Final Dry Density (PCF)	114.5
Initial Dry Density (PCF)	114.5	Moisture Content (top 1" after soaking)	14.8%
Moisture Content of the Compacted Specimen	13.8%	Percent Swell	0.1%
Percent Compaction	97.1%		

Soak Time: 96 hours	Surcharge Weight: 20.0	Surcharge Wt. per sq. Ft.: 101.9	
Liquid Limit: 37	Plastic Index: 20	Apparent Relative Density: TNP	

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/27/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



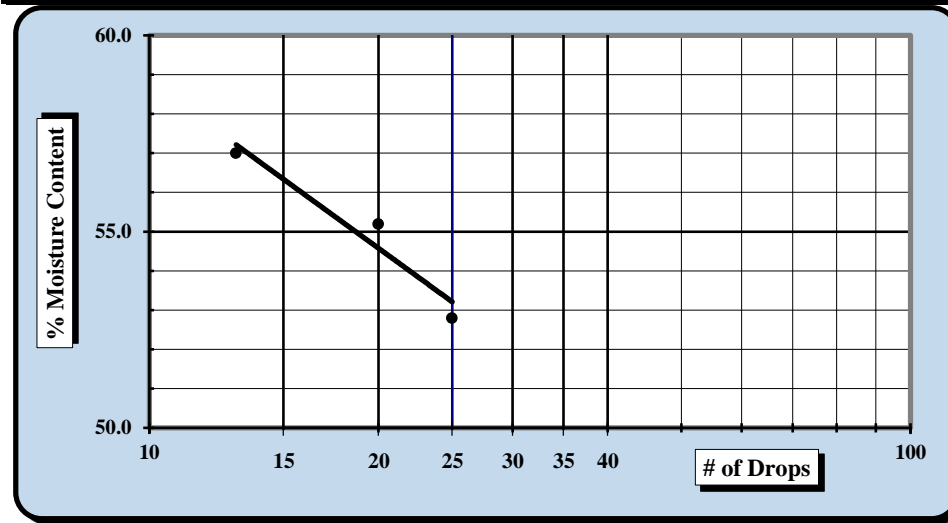
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/19-2/23/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	BS-1
		Sample Date:	2/6/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 11.3'

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)	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 #	ZZ	Tare #:	Liquid Limit				Plastic Limit				
			24	209	10		35	244			
A		Tare Weight	20.75	21.10	20.80				20.79	20.79	
B		Wet Soil Weight + A	28.74	28.21	28.51				27.00	27.20	
C		Dry Soil Weight + A	25.98	25.68	25.71				25.77	25.93	
D		Water Weight (B-C)	2.76	2.53	2.80				1.23	1.27	
E		Dry Soil Weight (C-A)	5.23	4.58	4.91				4.98	5.14	
F		% Moisture (D/E)*100	52.8%	55.2%	57.0%				24.7%	24.7%	
N		# OF DROPS	25	20	13				Moisture Contents determined by ASTM D 2216		
LL		LL = F * FACTOR									
Ave.		Average							24.7%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	53	
Plastic Limit	25	
Plastic Index	28	
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 refers only to material passing the No. 40 sieve.

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>4/27/2018</u> Date
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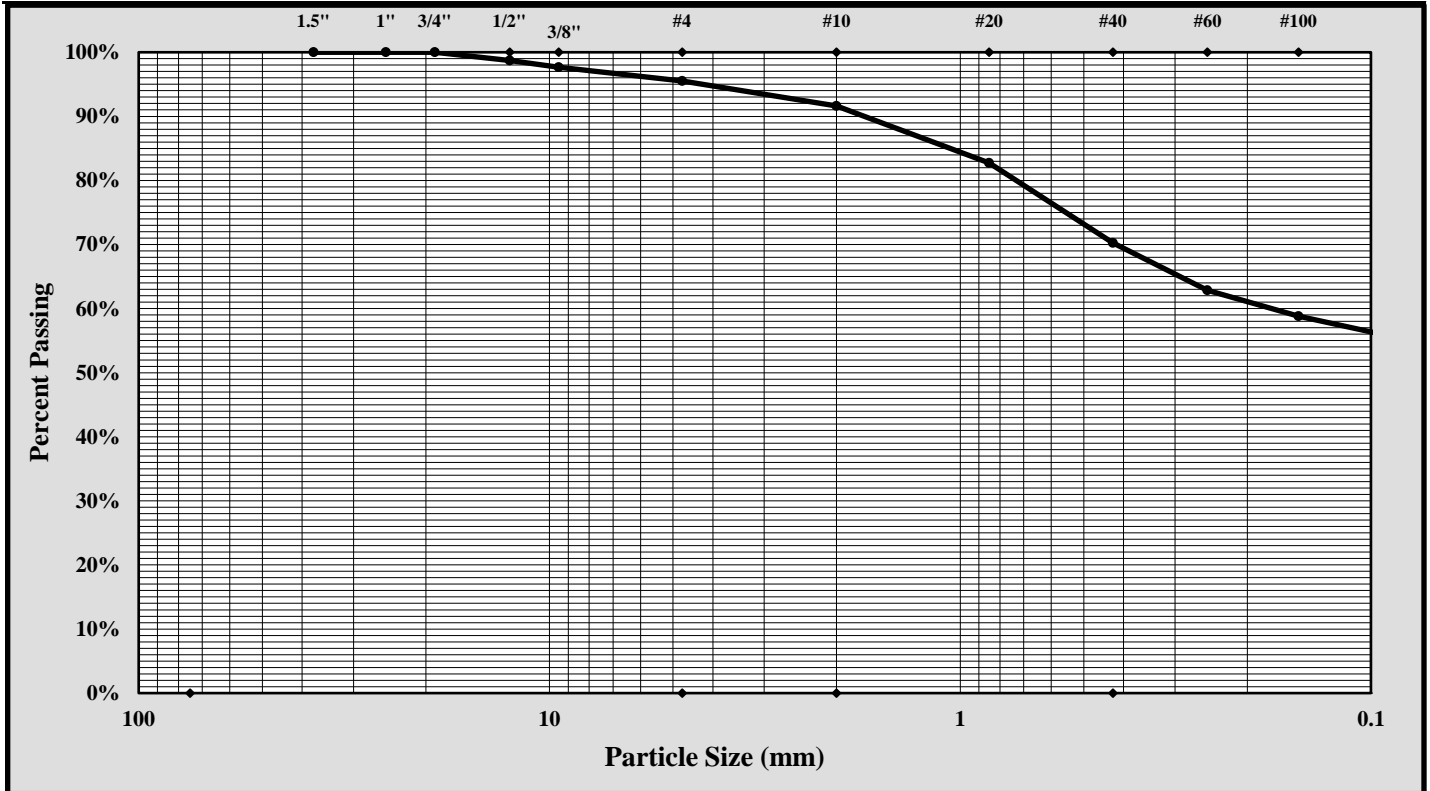
Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Columbia Office, 134 Suber Road Columbia SC 29210

S&ME Project #:	1461-16-047.2B	Report Date:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/19-2/20/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	BS-1
		Sample Date:	2/6/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 11.3'
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 (#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: 4.5%
 Silt & Clay (% Passing #200): 54.6% Total Sand: 40.9%

Liquid Limit	53	Plastic Limit	25	Plastic Index	28
Coarse Sand:	3.9%	Medium Sand:	21.4%	Fine Sand:	15.6%
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:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/27/2018

Date

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MOISTURE - DENSITY REPORT

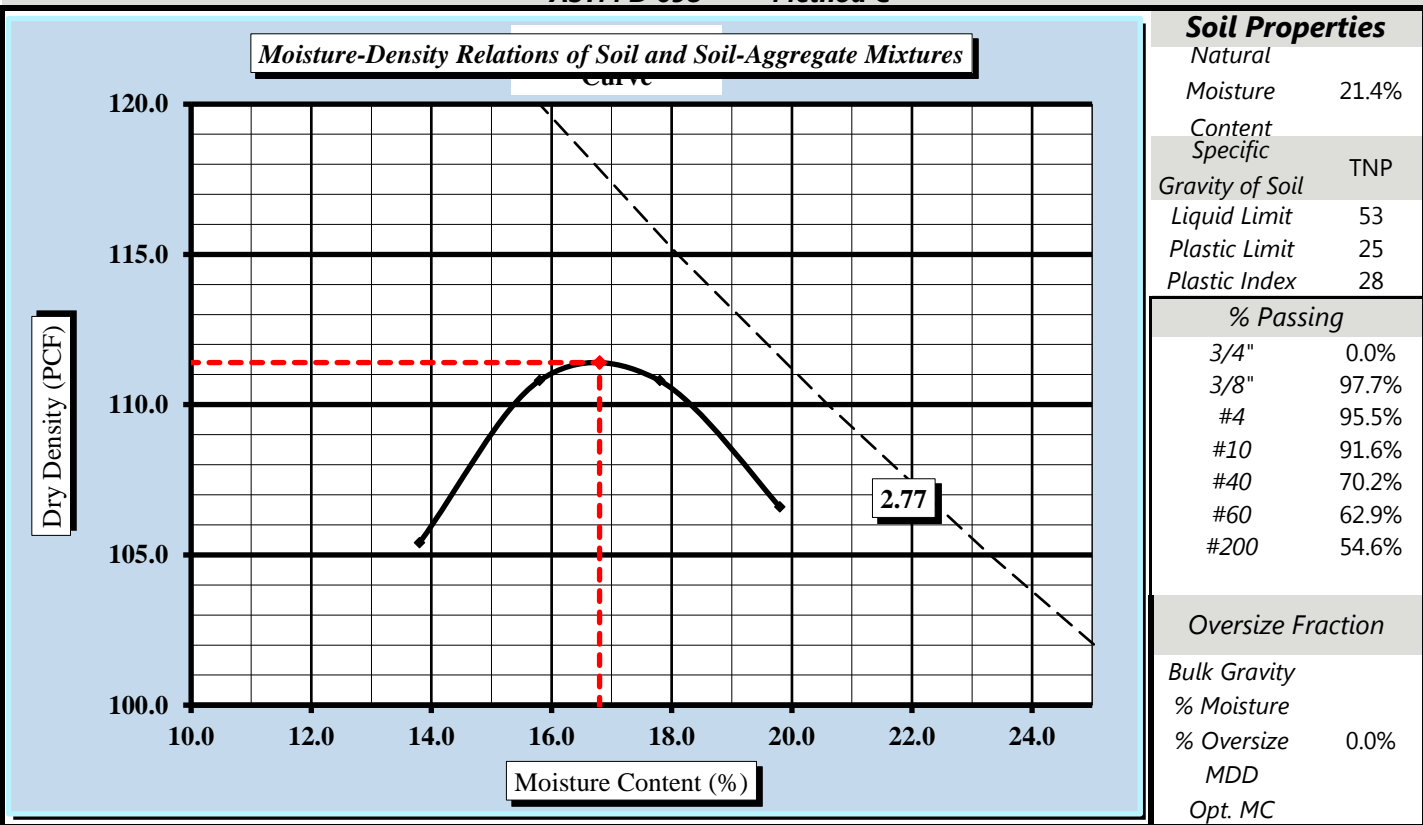


Quality Assurance

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210			
S&ME Project #:	1461-16-047.2B	Report Date:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	2/19-2/21/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	BS-1
Location:	Pavement Boring	Offset:	N/A
Sample Date:	2/6/2018		
Depth:	1.3' - 11.3'		
Sample Description:	Sandy Fat Clay (CH, A-7-6(12))		

Maximum Dry Density 111.4 PCF. Optimum Moisture Content 16.8%

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

4/27/2018
 Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



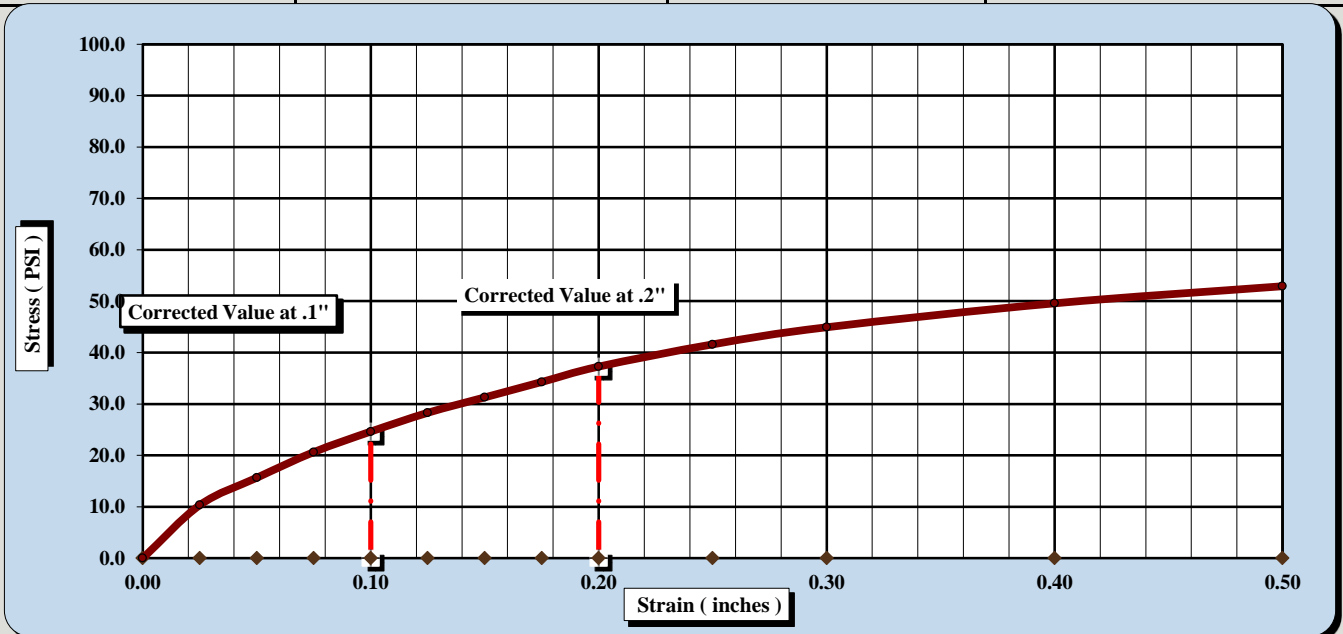
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/23-2/27/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	BS-1
		Sample Date:	2/6/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 11.3'
Sample Description:	Sandy Fat Clay (CH, A-7-6(12))		

ASTM D 698 Method C	Maximum Dry Density: 111.4 PCF	Optimum Moisture Content: 16.8%	
	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.	2.5	CBR at 0.1 in.	2.5
	CBR at 0.2 in. 2.5		CBR at 0.2 in. 2.5



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)	93.7
Initial Dry Density (PCF)	94.7	Moisture Content (top 1" after soaking)	26.1%
Moisture Content of the Compacted Specimen	17.2%	Percent Swell	1.1%
Percent Compaction	85.0%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 53	Plastic Index: 28	Apparent Relative Density: TNP	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



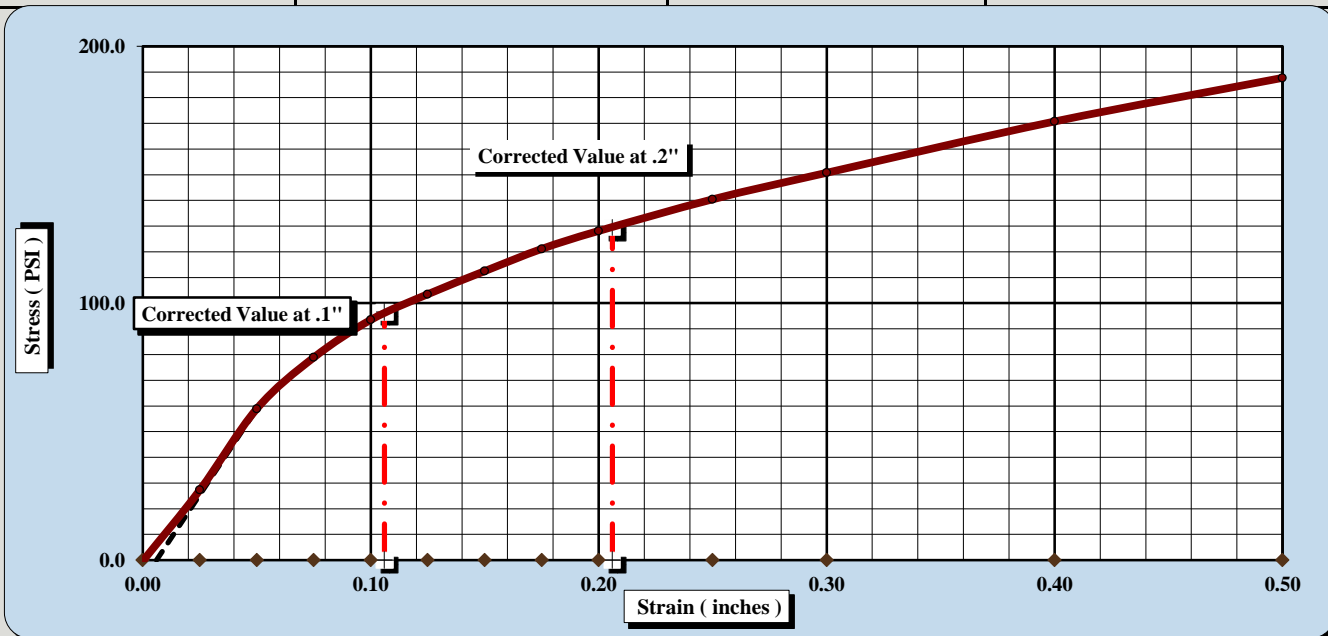
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/23-2/27/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	BS-1
		Sample Date:	2/6/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 11.3'
Sample Description:	Sandy Fat Clay (CH, A-7-6(12))		

ASTM D 698 Method C	Maximum Dry Density: 111.4 PCF	Optimum Moisture Content: 16.8%	
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.	9.4	CBR at 0.1 in.	9.7
CBR at 0.2 in.	8.5	CBR at 0.2 in.	8.6



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)	106.6
Initial Dry Density (PCF)	107.1	Moisture Content (top 1" after soaking)	22.2%
Moisture Content of the Compacted Specimen	16.8%	Percent Swell	0.5%
Percent Compaction	96.2%		

Soak Time: 96 hours	Surcharge Weight: 10.0	Surcharge Wt. per sq. Ft.: 50.9	
Liquid Limit: 53	Plastic Index: 28	Apparent Relative Density: TNP	

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Specific Gravity: ASTM D 854, Classification: ASTM D 2487

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



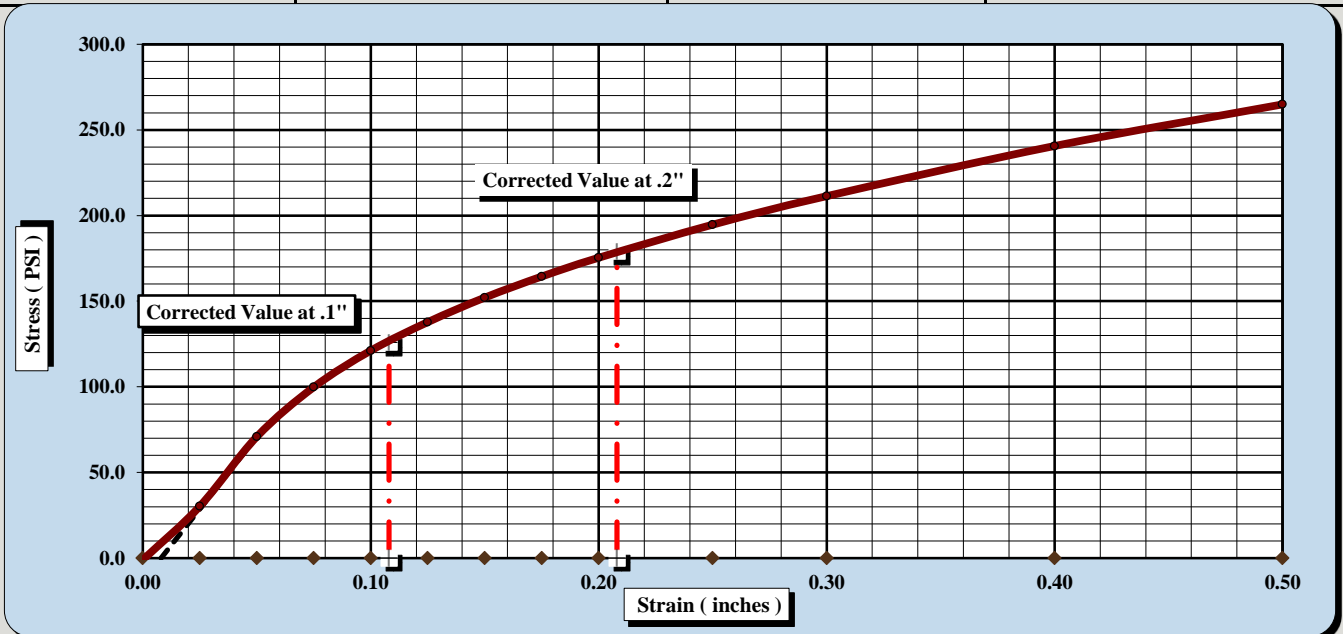
ASTM D 1883

S&ME, Inc. - Columbia: 134 Suber Road, Columbia, SC 29210

Project #:	1461-16-047.2B	Report Date:	3/5/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	2/23-2/27/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-63	Sample #:	BS-1
		Sample Date:	2/6/2018
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.3' - 11.3'
Sample Description:	Sandy Fat Clay (CH, A-7-6(12))		

ASTM D 698	Method C	Maximum Dry Density:	111.4 PCF	Optimum Moisture Content:	16.8%
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.	12.1	CBR at 0.2 in.	11.7
CBR at 0.1 in.	12.6	CBR at 0.2 in.	11.9



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)	56	Final Dry Density (PCF)	109.3
Initial Dry Density (PCF)	109.8	Moisture Content (top 1" after soaking)	19.7%
Moisture Content of the Compacted Specimen	15.8%	Percent Swell	0.4%
Percent Compaction	98.5%		

Soak Time:	96 hours	Surcharge Weight	10.0
Liquid Limit	53	Surcharge Wt. per sq. Ft.	50.9
		Plastic Index	28
		Apparent Relative Density	TNP

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/5/2018
Date

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LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



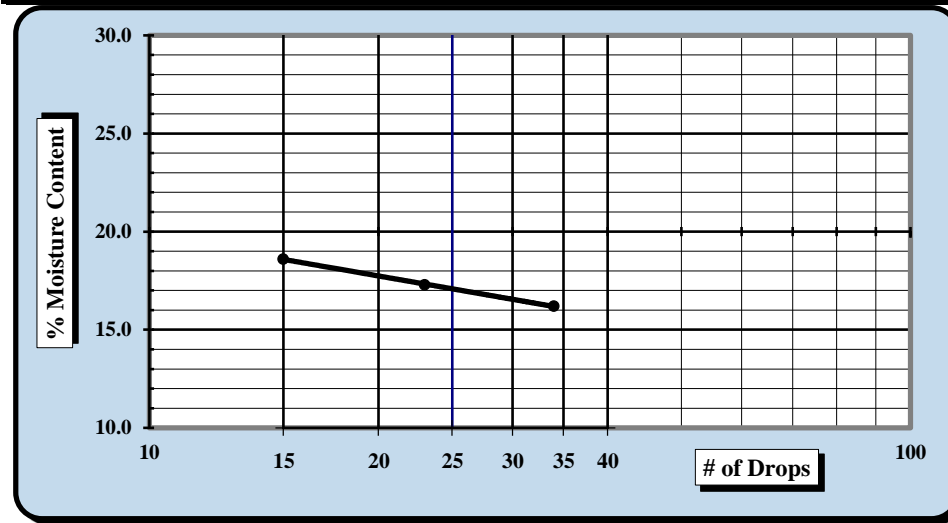
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/3/18
Project Name:	Carolina Crossroads Project	Test Date:	5/2/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	BS-1
Sample Date:	3/15/2018		
Location:	Embankment Boring	Type:	Bulk
Depth:	0.0' - 10.0'		
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			
		6	7	8			9	10		
A	Tare Weight	27.74	26.30	27.31				26.84	26.75	
B	Wet Soil Weight + A	47.94	45.58	48.13				35.64	34.09	
C	Dry Soil Weight + A	45.12	42.74	44.87				34.80	33.40	
D	Water Weight (B-C)	2.82	2.84	3.26				0.84	0.69	
E	Dry Soil Weight (C-A)	17.38	16.44	17.56				7.96	6.65	
F	% Moisture (D/E)*100	16.2%	17.3%	18.6%				10.6%	10.4%	
N	# OF DROPS	34	23	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							10.5%		



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	17
Plastic Limit	11
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

5/4/2018
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/4/2018
 Date

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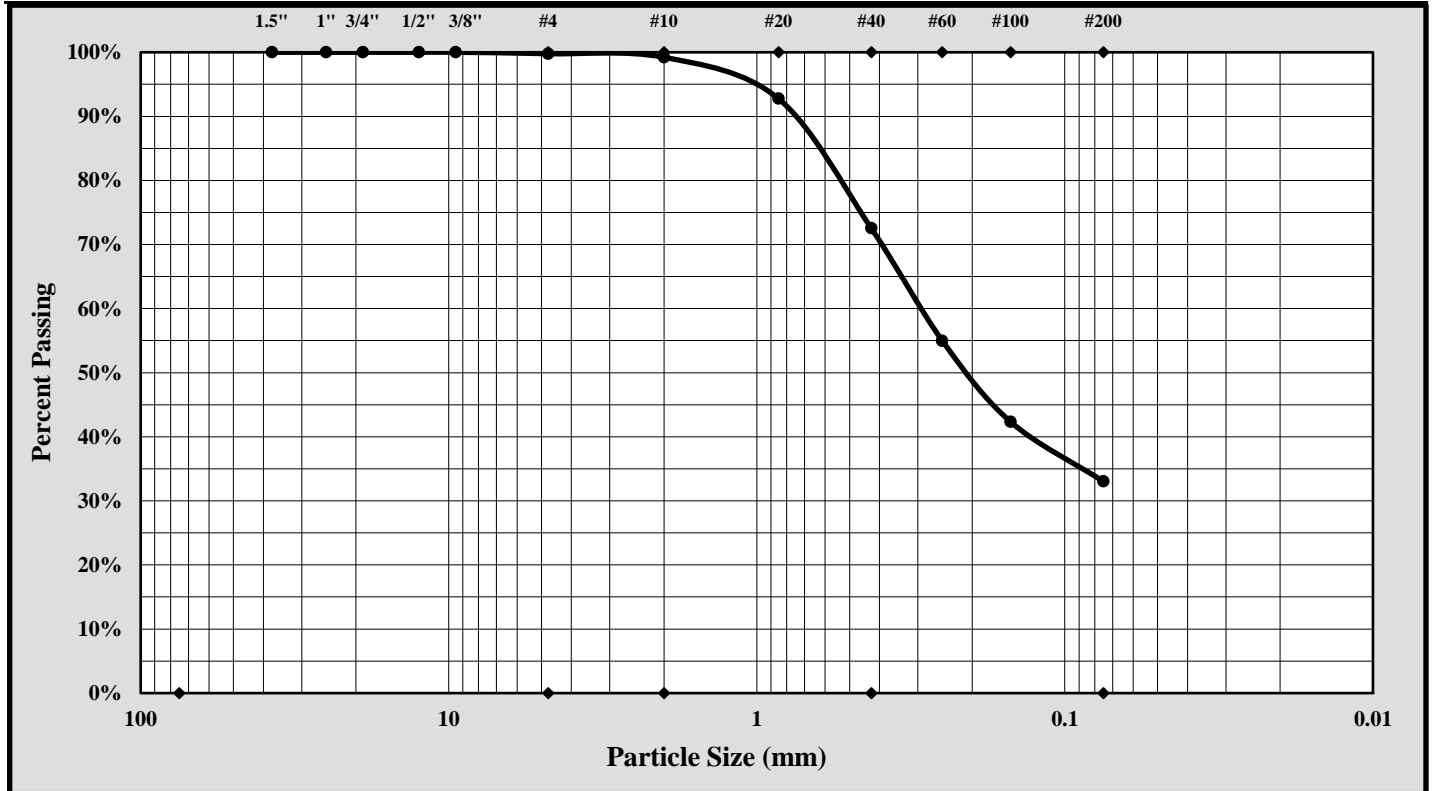


Particle Size Analysis of Soils

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:	5/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/01 - 5/03/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	BS-1
		Sample Date:	3/15/2018
Location:	Embankment Boring	Type:	Bulk
		Depth:	0.0' - 10.0'
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: 2.00 mm Gravel: 0.2%
 Silt & Clay (% Passing #200): 33.0% Total Sand: 66.7%

Liquid Limit	17	Plastic Limit	11	Plastic Index	6
Coarse Sand:	0.6%	Medium Sand:	26.7%	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:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/03/18
 Date

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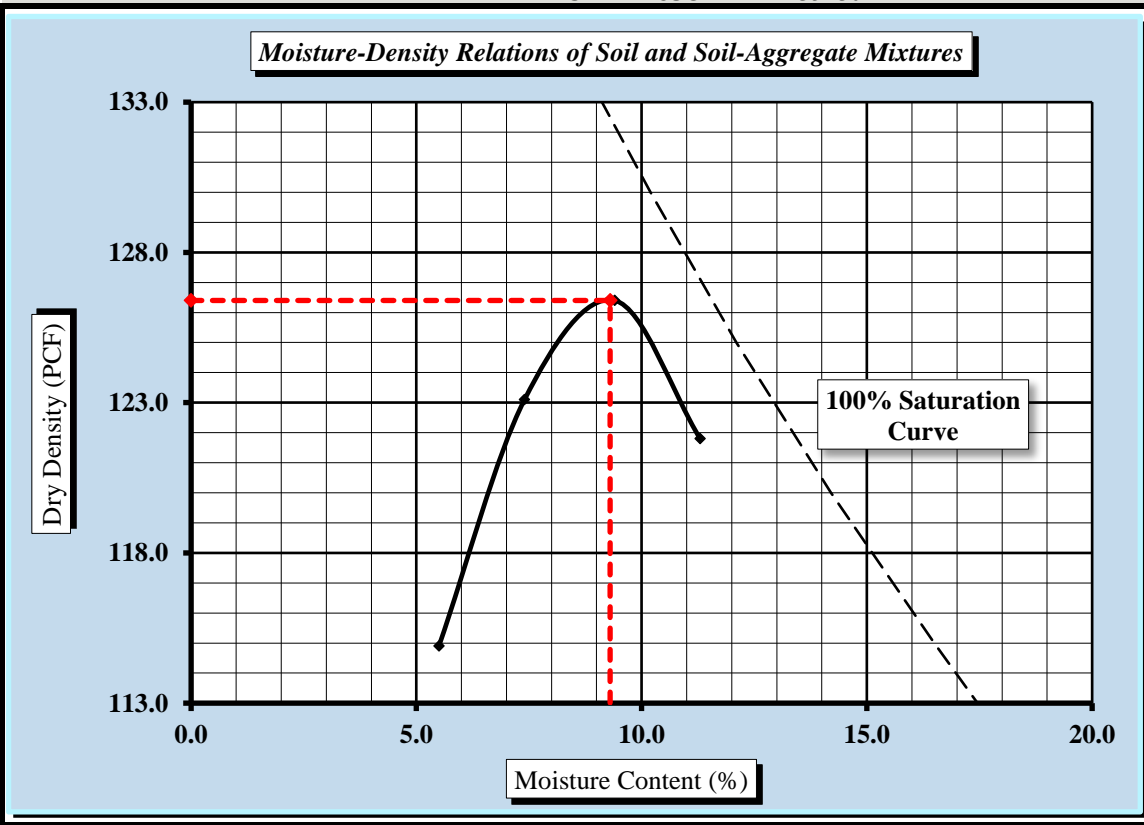
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	5/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/26/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-42	Sample #:	BS-1
Location:	Embankment Boring	Type:	Bulk
Sample Description:	Silty Clayey Sand (SC-SM, A-2-4)		

Maximum Dry Density	126.4	PCF.	Optimum Moisture Content	9.3%
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ASTM D 698 - - Method A



Soil Properties	
Natural	
Moisture Content	10.4%
Specific Gravity of Soil	2.650
Liquid Limit	17
Plastic Limit	11
Plastic Index	6
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	99.8%
#10	99.2%
#40	73.0%
#60	55.0%
#100	42.3%
#200	33.0%
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

<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>Project Manager</u> Position	<u>5/03/18</u> Date
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% 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: 5/04/18
Test Date(s): 5/03/18

Boring #: RW-42 **Sample #:** BS-1 **Sample Date:** 3/15/2018

Location: Embankment Boring **Type:** Bulk **Depth:** 0.0' - 10.0'

Sample Description: Silty Clayey Sand (SC-SM, A-2-4)

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-6
T	Total Mass of Oven Dry Sample	grams	1248.99
d	Mass Retained on 2mm Sieve	grams	9.99
e	Mass Passing 2mm and Retained on 75µm Sieve	grams	826.83
f	Mass Passing 75µm Sieve	T-(d+e)	412.17
P	% Passing 75µm Sieve of Sample Passing 2mm Sieve	$1 - (f/(e+f)) * 100$	66.7%

% Ignition Loss Determination

Muffle Furnace Temperature: 1000 ± 50 °C

		Tare #	A
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	57.44
b	Mass of Oven Dry Specimen + Tare Wt.	grams	78.01
c	Ash Weight + Tare Wt.	grams	77.95
M	Mass of Oven Dry Specimen	(b-t)	20.57
C	Ash Weight	c-t	20.51
L	Loss	M-C	0.06
	% Ignition Loss	$(P*L)/M*100$	0.2%

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:	5/3/18
Project Name:	Carolina Crossroads Project	Test Date:	5/2/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-43	Sample #:	BS-1
		Sample Date:	4/4/2018
Location:	Embankment Boring	Type:	Bulk
		Depth:	0.0' - 10.0'

Sample Description: Clayey Sand (SC, A-7-6(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		
		11	12	13			14	15	
A	Tare Weight	26.68	26.66	26.76			26.65	27.60	
B	Wet Soil Weight + A	43.05	44.47	43.31			33.28	34.92	
C	Dry Soil Weight + A	38.35	39.10	37.94			32.09	33.60	
D	Water Weight (B-C)	4.70	5.37	5.37			1.19	1.32	
E	Dry Soil Weight (C-A)	11.67	12.44	11.18			5.44	6.00	
F	% Moisture (D/E)*100	40.3%	43.2%	48.0%			21.9%	22.0%	
N	# OF DROPS	35	28	19			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						22.0%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	45	
Plastic Limit	22	
Plastic Index	23	
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>43223</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>43223</u> Date
---	----------------------	---	----------------------

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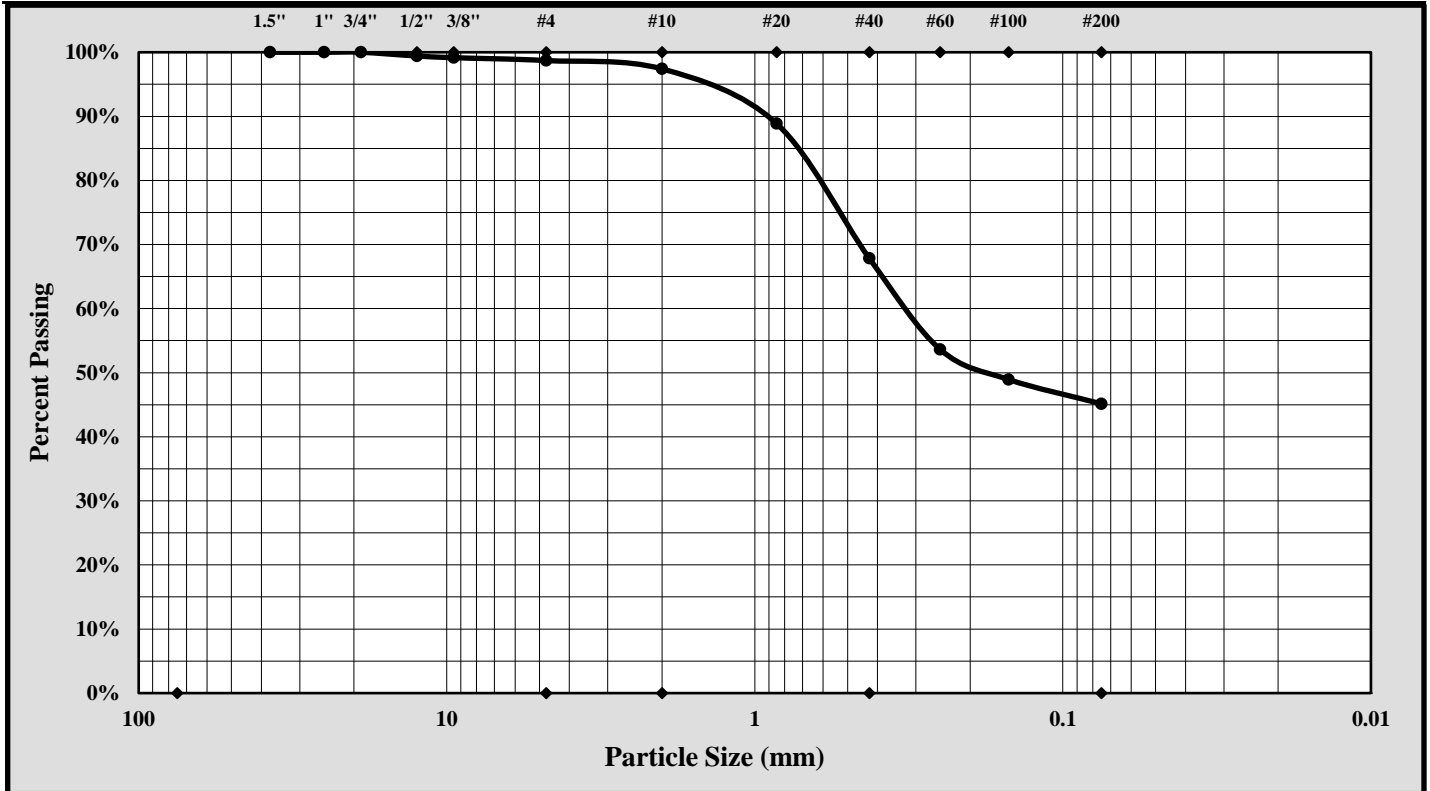


Particle Size Analysis of Soils

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:	5/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/01 - 5/03/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-43	Sample #:	BS-1
		Sample Date:	4/4/2018
Location:	Embankment Boring	Type:	Bulk
		Depth:	0.0' - 10.0'
Sample Description:	Clayey Sand (SC, A-7-6(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: 9.50 mm Gravel: 1.3%
 Silt & Clay (% Passing #200): 45.1% Total Sand: 53.6%

Liquid Limit	45	Plastic Limit	22	Plastic Index	23
Coarse Sand:	1.3%	Medium Sand:	29.5%	Fine Sand:	22.7%
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

5/03/18
 Date

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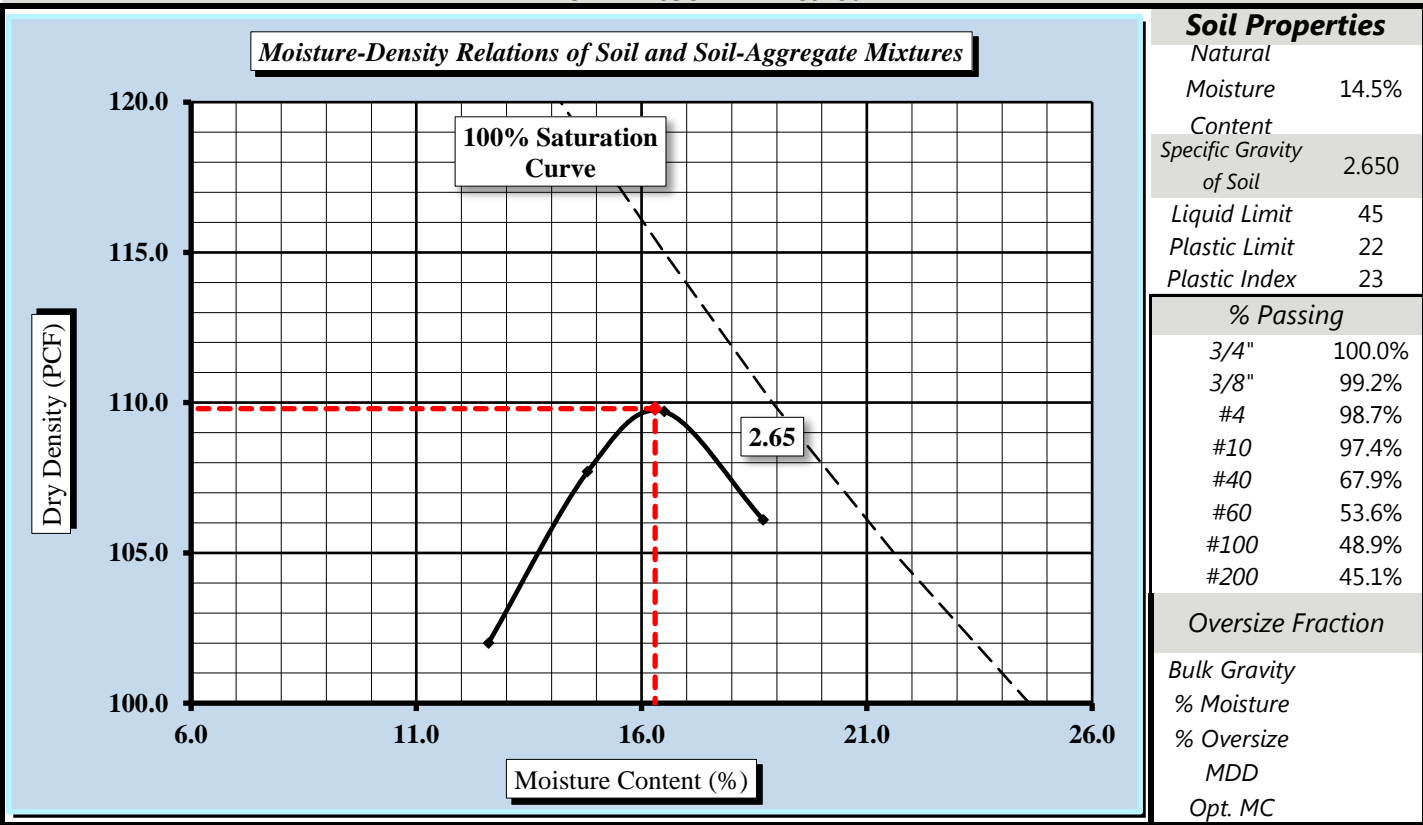
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	5/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/26/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-43	Sample #:	BS-1
Location:	Embankment Boring	Type:	Bulk
Sample Description:	Clayey Sand (SC, A-7-6(6))		

Maximum Dry Density 109.8 PCF. Optimum Moisture Content 16.3%

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

5/03/18
 Date

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% 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: 5/04/18
Test Date(s): 5/03/18

Boring #: RW-43 **Sample #:** BS-1 **Sample Date:** 4/4/2018

Location: Embankment Boring **Type:** Bulk **Depth:** 0.0' - 10.0'

Sample Description: Clayey Sand (SC, A-7-6(6))

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-9
T	Total Mass of Oven Dry Sample	grams	1330.13
d	Mass Retained on 2mm Sieve	grams	34.58
e	Mass Passing 2mm and Retained on 75µm Sieve	grams	695.66
f	Mass Passing 75µm Sieve	T-(d+e)	599.89
P	% Passing 75µm Sieve of Sample Passing 2mm Sieve	$1 - (f/(e+f)) * 100$	53.7%

% Ignition Loss Determination

Muffle Furnace Temperature: 1000 ± 50 °C

		Tare #	B2
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	152.56
b	Mass of Oven Dry Specimen + Tare Wt.	grams	174.28
c	Ash Weight + Tare Wt.	grams	174.22
M	Mass of Oven Dry Specimen	(b-t)	21.72
C	Ash Weight	c-t	21.66
L	Loss	M-C	0.06
	% Ignition Loss	$(P*L)/M*100$	0.1%

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

Laboratory Test Data Sheets - Corrosion Series



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





S180308B S&ME-1461-16-047 - 17 Quads

Project X

Corrosion Engineering
Corrosion Control - Soil, Water, and Metallurgy Lab

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:	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		

		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)	Default Method	Min. Resistivity, Sulfate, Chloride, Sulfide, Redox, pH, Ammonia, Nitrate, ASTM AASHTO T2888 G187, ASTM AASHTO T289 G51, ASTM AASHTO D516, ASTM AASHTO D512B, SM 2580B, SM 2320B, SM 2520B, SM 2510B, Hach 835, Hach 830, SM 4500-S2, SM 4500-S2, ASTM D2216
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SPECIAL INSTRUCTIONS:		CORROSION SERIES	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	BiCarbonate	Alkalinity	Acidity	Nitrate	Ammonia	Sulfide	Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis
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	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		✓	✓	✓	✓											combine SS-3 & SS-5
2	SS-5, SS-6, SS-7 - DH-5		8.2 - 20	1/4/2018		✓	✓	✓	✓											combine SS-5, SS-6, & SS-7
3	SS-5, SS-6 - DH-6		8.3 - 15	1/10/2018		✓	✓	✓	✓											combine SS-5 & SS-6
4	SS-6, SS-7 - B-29		14.5 - 21	2/14/2018		✓	✓	✓	✓											combine SS-6 & SS-7
5	SS-11, SS-12 - B-30		38.5 - 45	2/15/2018		✓	✓	✓	✓											combine SS-11 & SS-12
6	SS-8, SS-9 - B-34		23.5 - 30	2/5/2018		✓	✓	✓	✓											combine SS-8 & SS-9
7	SS-11, SS-13 - B-36		38.5 - 50	2/12/2018		✓	✓	✓	✓											combine SS-11 & SS-13
8	SS-5, SS-6 - B-41		8.8 - 15	1/21/2018		✓	✓	✓	✓											combine SS-5 & SS-6
9	SS-3, SS-4 - B-43		18.8 - 22.8	2/26/2018		✓	✓	✓	✓											combine SS-3 & SS-4
10	SS-9, SS-10 - B-47		29.5 - 36	2/12/2018		✓	✓	✓	✓											combine SS-9 & SS-10
11	SS-11, SS-12 - B-50		38.5 - 45	2/18/2018		✓	✓	✓	✓											combine SS-11 & SS-12
12	SS-3, SS-4 - B-51		4 - 8	2/8/2018		✓	✓	✓	✓											combine SS-3 & SS-4
13	SS-10, SS-11 - B-52		33.5 - 40	2/20/2018		✓	✓	✓	✓											combine SS-10 & SS-11
14	SS-10, SS-11 - B-53		33.5 - 40	2/18/2018		✓	✓	✓	✓											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
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		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)
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Received by:		Default Method	
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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



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		

Turn Around Time:	5 Day Normal	3 Day RUSH 75% mark-up	2 Day RUSH 100% mark-up	ANALYSIS REQUESTED (Please circle)												NOTES	
	✓			Min. Resistivity, Sulfate, Chloride, Sulfide, Redox, pH, Ammonia, Nitrate	ASTM G187	ASTM T2888	ASTM G51	ASTM T289	ASTM D516	ASTM D512B	SM 2580B	SM 2320B	SM 2520B	SM 2510B	Hach 835		Hach 830

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)	Default Method														
Received by:															

SPECIAL INSTRUCTIONS:				CORROSION SERIES	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	BiCarbonate	Alkalinity	Acidity	Nitrate	Ammonia	Sulfide	Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis
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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		✓	✓	✓	✓											combine SS-4 & SS-5
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			

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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:	5/23/18
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-56	Sample #:	UD-1
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	18.5 - 20.5'

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			
		16	17	18			19	20		
A	Tare Weight	26.57	26.63	26.77				26.66	26.83	
B	Wet Soil Weight + A	38.63	38.09	41.71				34.01	33.20	
C	Dry Soil Weight + A	35.12	34.52	36.71				32.37	31.79	
D	Water Weight (B-C)	3.51	3.57	5.00				1.64	1.41	
E	Dry Soil Weight (C-A)	8.55	7.89	9.94				5.71	4.96	
F	% Moisture (D/E)*100	41.1%	45.2%	50.3%				28.7%	28.4%	
N	# OF DROPS	35	26	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							28.6%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	46	
Plastic Limit	29	
Plastic Index	17	
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>5/23/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/23/18</u> Date
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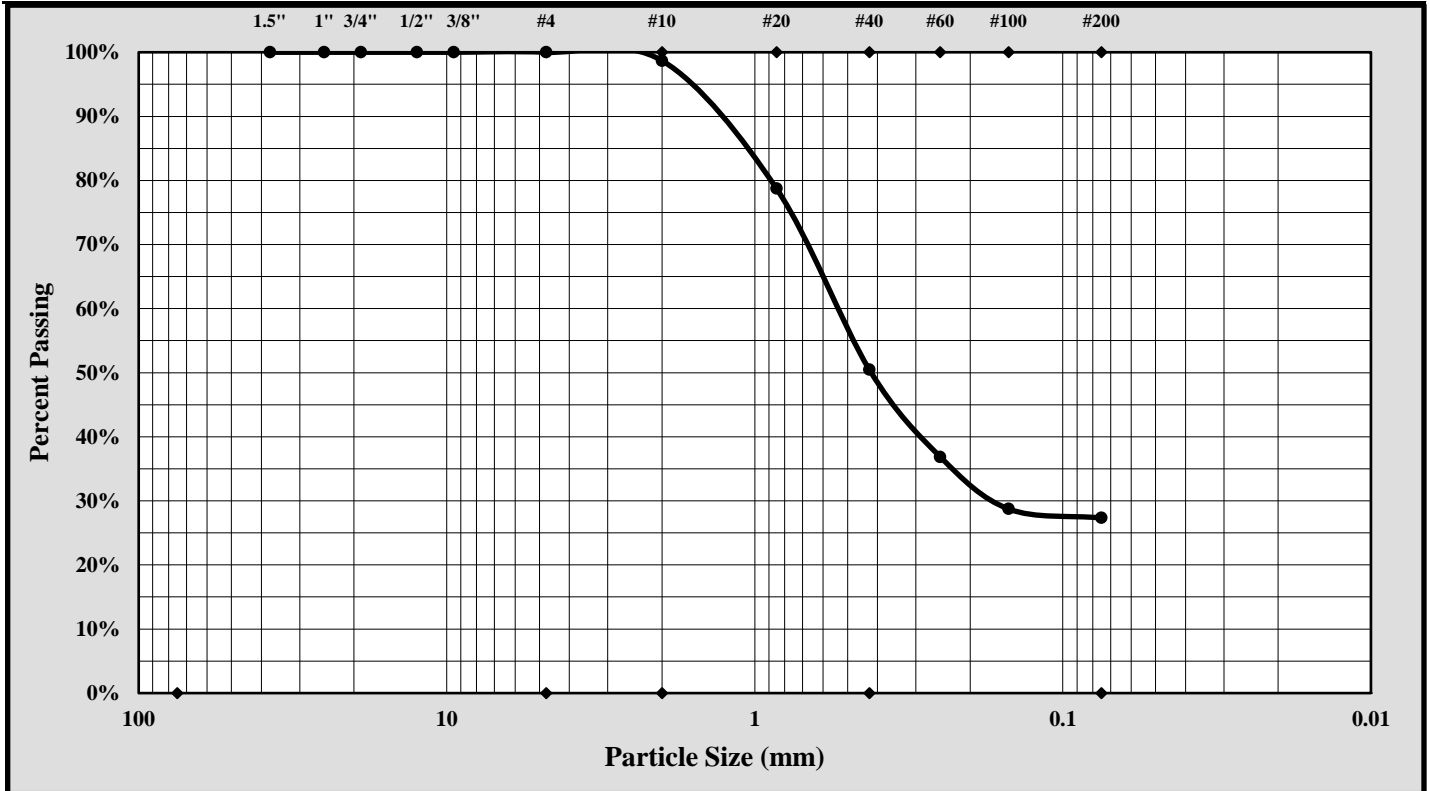
Particle Size Analysis of Soils

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:	5/23/18
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-56	Sample #:	UD-1
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	18.5 - 20.5'
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: 0.0%
 Silt & Clay (% Passing #200): 27.3% Total Sand: 72.7%

Liquid Limit 46 Plastic Limit 29 Plastic Index 17

Coarse Sand: 1.3% Medium Sand: 48.2% Fine Sand: 23.2%

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

5/23/18

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:	5/23/18
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-56	Sample #:	UD-1
Location:	UD Borings	Type:	Undisturbed
Sample Description:	Silty Sand [SM, A-2-7(1)]		
Material Excluded:	0%	% Passing #4 Sieve:	100.0%

Balance ID.	0.01 gram	ID#:	13942	Cal. Date:	8/18/17	Cal. Due:	8/18/18
Pycnometer ID No.	23169	Cal. Date:	3/10/18	Balance Verification	Check Mass:	500 gram	
Pycnometer Volume (V _p)	249.73	ml.	Mass Determination:		500.00 grams		
Pycnometer Mass (PM)	104.28	grams	If [PM - M _p] is greater than .06 grams, recalibrate the dry mass of the pycnometer.				
Ave. Pycnometer Mass (M _p)	104.28	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 = **377.67** grams

Mass of Dry Soil (grams)		Tare #	BB-8	T_t =	Test Temperature T _t	21.4 °C
A	Tare Weight		204.25	K =	Temperature Coefficient at T _t	0.99970
C	Dry Wt. + Tare Wt.		243.03	K =	Temperature Coefficient at 23°C	0.99933
M_s	Dry Weight	C-A	38.78	p_{w;t} =	Density of Water at T _t	0.99791 g./ml.

M_{pw;t} = Mass of the Pycnometer and water at T_t M_{pw;t} = M_p + (V_p × p_{w;t}) **353.49** grams
G_t = Specific Gravity of Soil Solids at the T_t G_t = M_s / (M_{pw;t} - (M_{psw;t} - M_s)) **2.656**
G = Specific Gravity of Soil Solids at the 20°C G = K × G_t **2.655**

Soils containing plus #4 material tested per **R** = % of Soil retained on the #4 sieve **0.0%**
ASTM C 127 **P** = % of Soil passing the #4 sieve **100.0%**

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}** = $\frac{1}{\frac{R}{100 \times G_{+4}} + \frac{P}{100 \times G}}$ = **2.655**

Notes / Deviations / References: ASTM D854: Specific Gravity of Soil Solids by Water Pycnometer

Matthew F. Cooke
Project Manager

Project Manager
Position

5/23/18
Date

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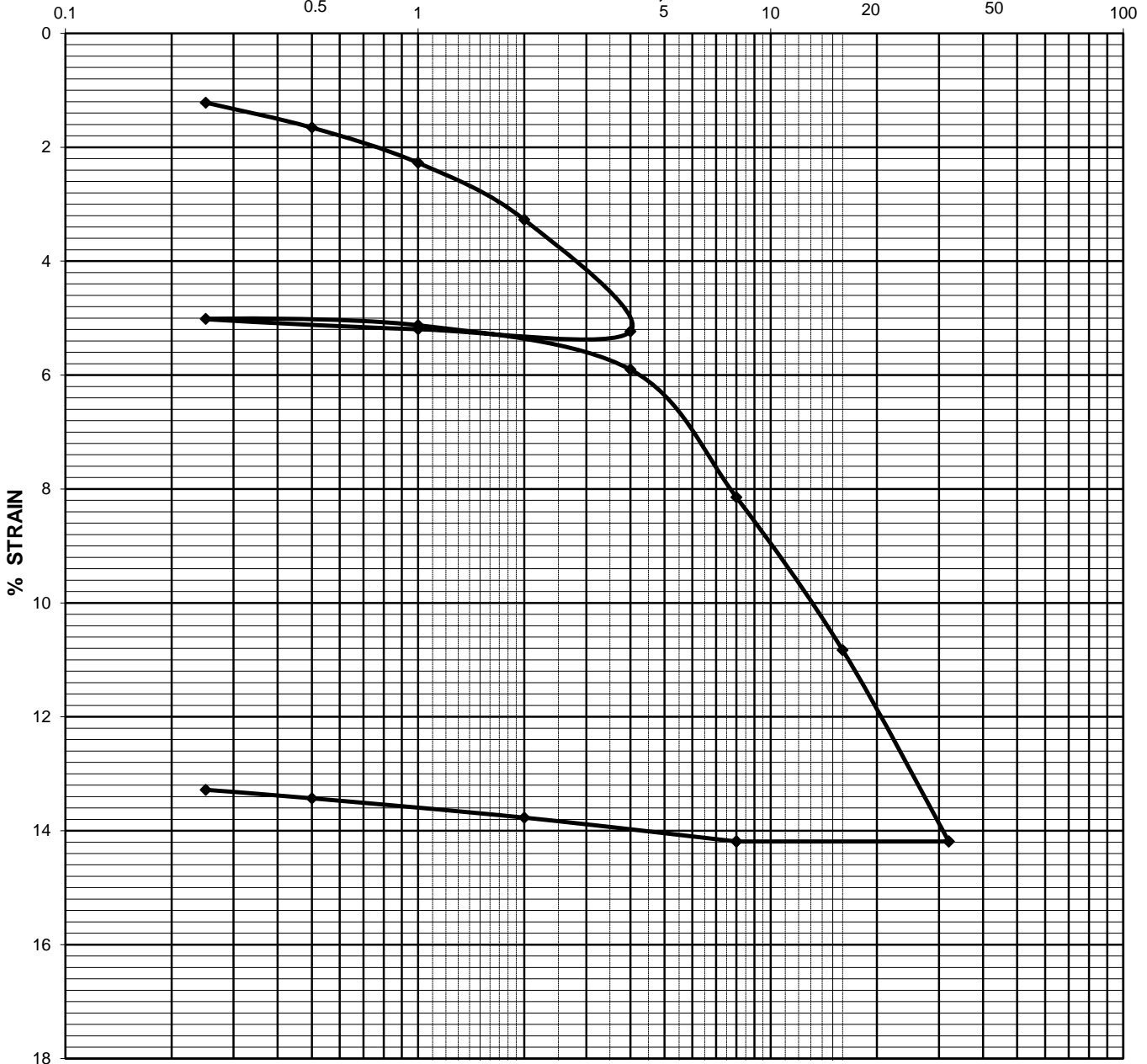
CONSOLIDATION TEST REPORT

(ASTM D 2435)

Page 1

Project Name: Carolina Crossroads Project		Report Date: 5/23/2018
Project No.: 1461-16-047.2B	Boring No.: B-56	
Client Name: HDR Engineering, Inc.		Depth/Elev.: 18.5 - 20.5'
Client Address: 4400 Leeds Ave., North Charleston, South Carolina		Sample Type: Undisturbed
Initial Wet Density, γ_{wet}, pcf: 116.7	Load vs. Time Plot: Log of time	Log No.: UD-1
Initial Void Ratio, e_o: 0.702	Final Void Ratio, e_f: 0.476	Sp. Gravity, G_s: 2.655
Initial Saturation, S_o, %: 75.2	Final Saturation, S_f, %: 100.0	Estimated Preconsolidation Stress, P_e, ksf: 6.6
Initial Dry Density, γ_{DRY}, pcf: 97.3	Final Dry Density, γ_{DRY}, pcf: 107.2	
Initial Moisture Content, %: 19.9	Final Moisture Content, %: 21.7	Fines, %: 27.3
Liquid Limit, %: 46	Plasticity Index, %: 17	
Sample Description: Silty Sand [SM, A-2-7(1)]		
Remolded Properties: - - -		
Notes: Loading Schedule - (ksf) - 0.25, 0.5, 1.0, 2.0, 4.0, 1.0, 0.25, 1.0, 4.0, 8.0, 16.0, 32.0, 8.0, 2.0, 0.5, 0.25		

VERTICAL PRESSURE, KSF





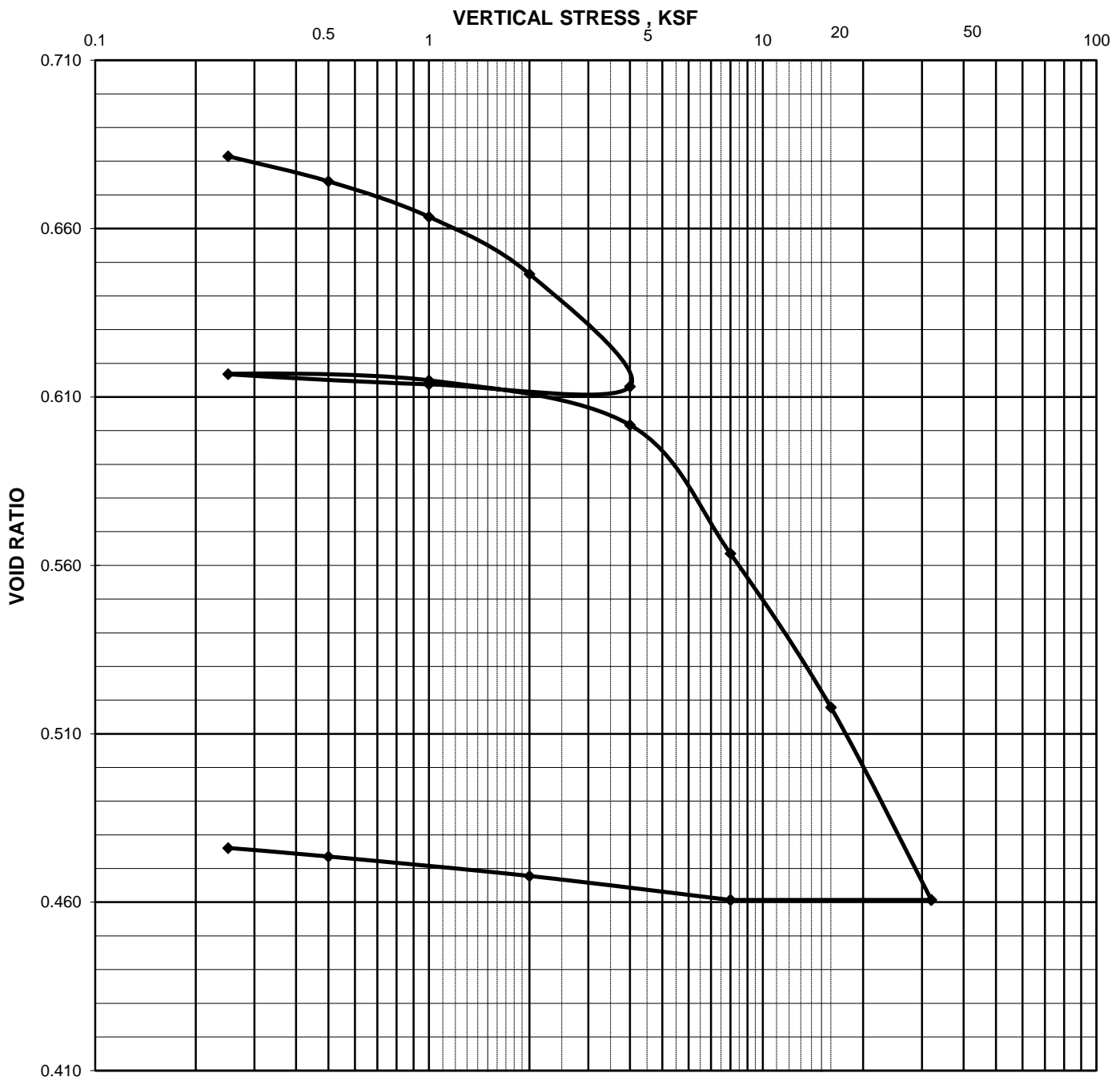
CONSOLIDATION TEST REPORT

(ASTM D 2435)

Page 2

Project Name:	Carolina Crossroads Project				
Project No.:	1461-16-047.2B	Report Date:	5/23/2018		
Client Name:	HDR Engineering, Inc.		Boring No.:	B-56	
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		Depth/Elev.:	18.5 - 20.5'	
Initial Wet Density, γ_{wet}, pcf:	116.7	Load vs. Time Plot:	Log of time	Sample Type:	Undisturbed
Initial Void Ratio, e_o:	0.702	Final Void Ratio, e_f:	0.476	Log No.:	UD-1
Initial Saturation, S_o, %:	75.2	Final Saturation, S_f, %:	100.0	Sp. Gravity, G_s:	2.655
Initial Dry Density, γ_{DRY}, pcf:	97.3	Final Dry Density, γ_{DRY}, pcf:	107.2	Estimated Preconsolidation	
Initial Moisture Content, %:	19.9	Final Moisture Content, %:	21.7	Stress, P_e, ksf:	6.6
Liquid Limit, %:	46	Plasticity Index, %:	17	Fines, %:	27.3
Sample Description:	Silty Sand [SM, A-2-7(1)]				
Remolded Properties:	-				

Notes: Loading Schedule - (ksf) - 0.25, 0.5, 1.0, 2.0, 4.0, 1.0, 0.25, 1.0, 4.0, 8.0, 16.0, 32.0, 8.0, 2.0, 0.5, 0.25





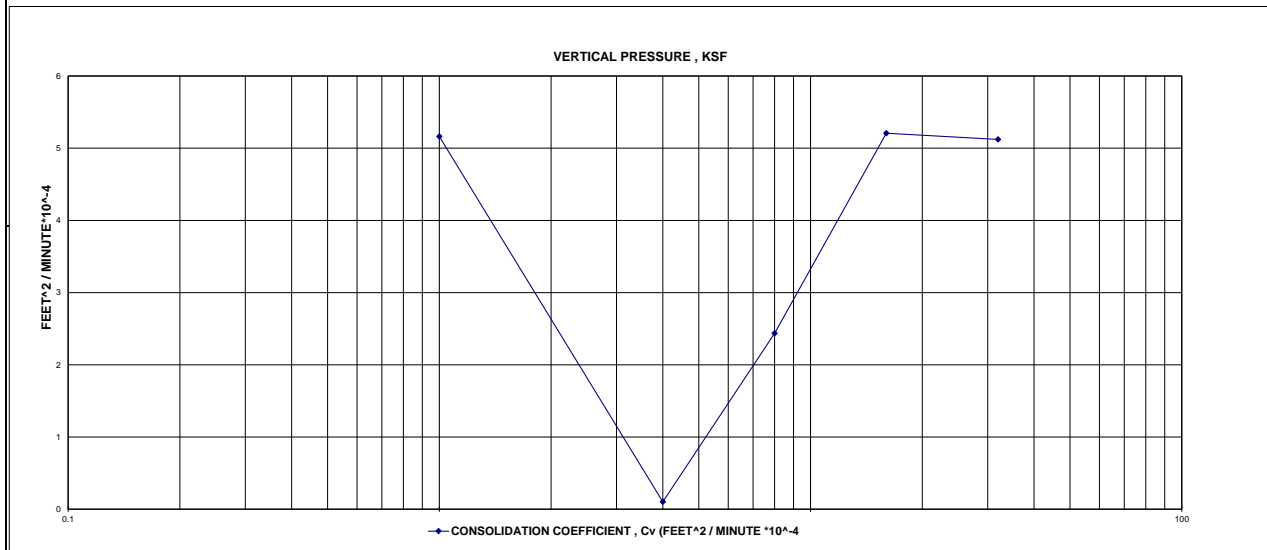
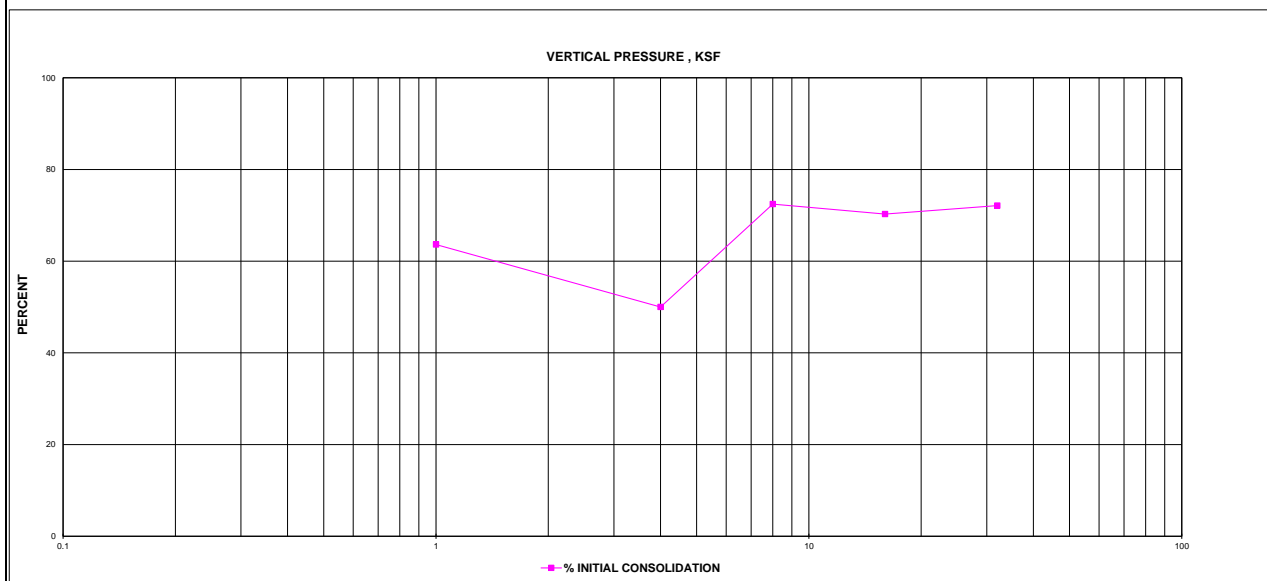
CONSOLIDATION TEST REPORT

(ASTM D 2435)

Page 3

Project Name: Carolina Crossroads Project	
Project No.: 1461-16-047.2B	Report Date: 5/23/2018
Client Name: HDR Engineering, Inc.	Boring No.: B-56
Client Address: 4400 Leeds Ave., North Charleston, South Carolina	Depth/Elev.: 18.5 - 20.5'

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		0.0124		0.0002		0.0122			0.681	1.216			
0.5		0.0172		0.0006		0.0166			0.674	1.655			
1.0		0.0243		0.0015		0.0228			0.663	2.273			
2.0		0.0352		0.0024		0.0328			0.647	3.271			
4.0		0.0557		0.0032		0.0525			0.613	5.235			
1.0		0.0545		0.0024		0.0521			0.614	5.195			
0.25		0.0513		0.0010		0.0503			0.617	5.015			
1.0	0.0525	0.0529	0.0527	0.0015	0.0510	0.0514	0.0512	0.4759	0.615	5.125	0.6	5.16	63.6
4.0	0.0585	0.0624	0.0604	0.0032	0.0553	0.0592	0.0572	0.4729	0.602	5.903	30.0	0.10	50.0
8.0	0.0800	0.0862	0.0831	0.0045	0.0755	0.0817	0.0786	0.4622	0.564	8.146	1.2	2.43	72.4
16.0	0.1062	0.1142	0.1102	0.0056	0.1006	0.1086	0.1046	0.4492	0.518	10.829	0.5	5.21	70.3
32.0	0.1395	0.1489	0.1442	0.0066	0.1329	0.1423	0.1376	0.4327	0.461	14.189	0.5	5.12	72.1
8.0		0.1471		0.0048		0.1423			0.461	14.189			
2.0		0.1417		0.0036		0.1381			0.468	13.770			
0.25		0.1347		0.0015		0.1332			0.476	13.281			





Project Name: Carolina Crossroads Project

Boring #: B-56

Depth: 23.5 – 25.5'

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. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607

Project #:	1461-16-047.2B	Report Date:	5/16/18
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-56	Sample #:	UD-2
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	23.5 - 25.5'

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)	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				26.64	27.60	
B	Wet Soil Weight + A	43.58	43.52	40.89				33.74	35.01	
C	Dry Soil Weight + A	39.01	38.78	36.80				32.23	33.44	
D	Water Weight (B-C)	4.57	4.74	4.09				1.51	1.57	
E	Dry Soil Weight (C-A)	12.34	12.12	10.04				5.59	5.84	
F	% Moisture (D/E)*100	37.0%	39.1%	40.7%				27.0%	26.9%	
N	# OF DROPS	35	27	19				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							27.0%		



One Point Liquid Limit	
NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	39
Plastic Limit	27
Plastic Index	12
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>5/16/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/16/18</u> Date
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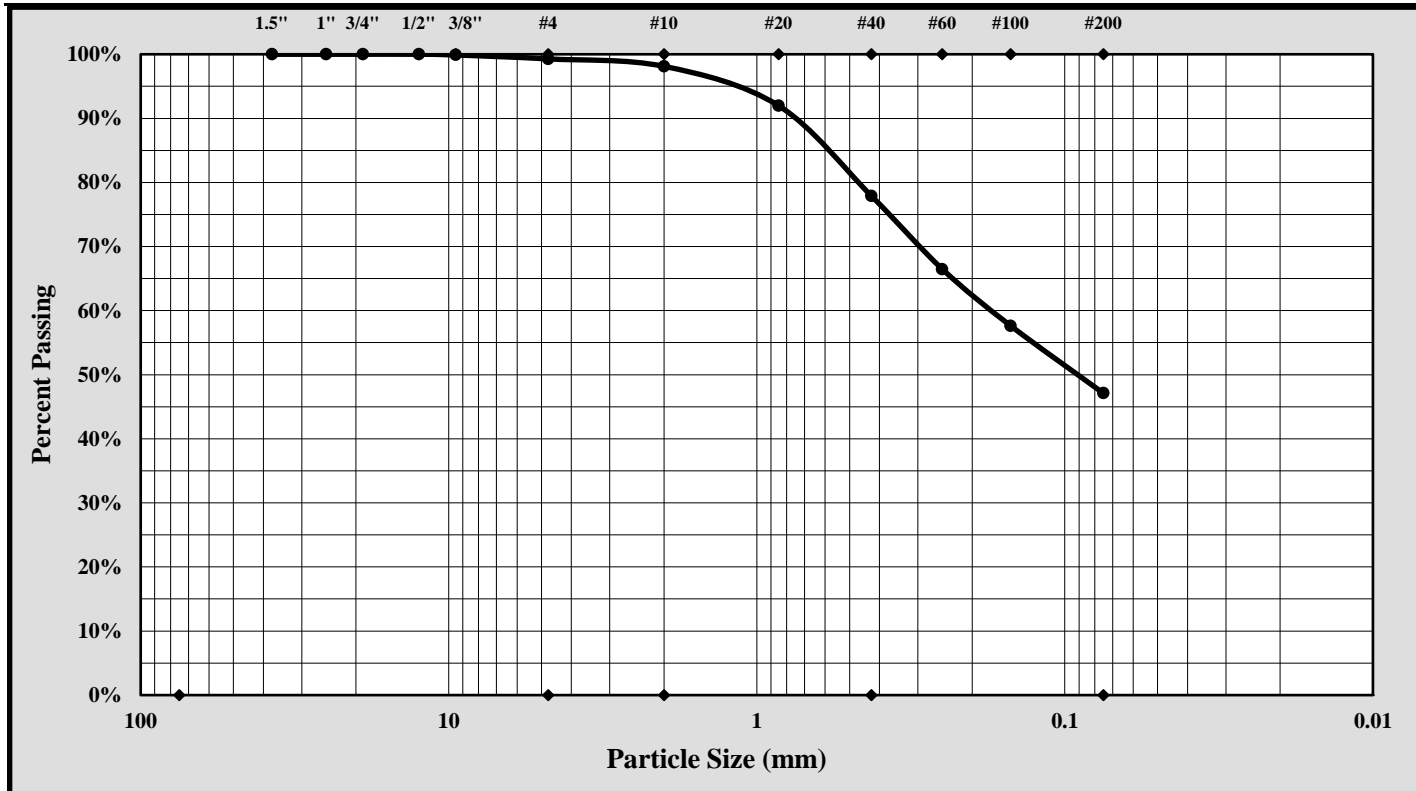
Particle Size Analysis of Soils

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:	5/16/18
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-56	Sample #:	UD-2
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	23.5 - 25.5'
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 (#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): 47.1% Total Sand: 52.2%

Liquid Limit	39	Plastic Limit	27	Plastic Index	12
Coarse Sand:	1.2%	Medium Sand:	20.2%	Fine Sand:	30.8%
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

5/16/18

Date

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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:	5/04/18
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-56	Sample #:	UD-2
Location:	UD Borings	Type:	Undisturbed
Sample Description:	Silty Sand [SM, A-6(3)]		
Material Excluded:	0.7%	% Passing #4 Sieve:	99.3%

Balance ID.	0.01 gram	ID#:	13942	Cal. Date:	8/18/17	Cal. Due:	8/18/18
Pycnometer ID No.	23170	Cal. Date:	3/10/18	Balance Verification	Check Mass:	500 gram	
Pycnometer Volume (V _p)	249.76	ml.	Mass Determination:		500.00 grams		
Pycnometer Mass (PM)	106.34	grams	<i>If [PM - M_p] is greater than .06 grams, recalibrate the dry mass of the pycnometer.</i>				
Ave. Pycnometer Mass (M _p)	106.34	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 = **379.44** grams

Mass of Dry Soil (grams)		Tare #	7	T_t = Test Temperature T _t	21.4 °C
A	Tare Weight		192.29	K = Temperature Coefficient at T _t	0.99970
C	Dry Wt. + Tare Wt.		230.56	K = Temperature Coefficient at 23°C	0.99933
M_s	Dry Weight	C-A	38.27	p_{w;t} = Density of Water at T _t	0.99791 g./ml.

M_{pw;t} = Mass of the Pycnometer and water at T _t	$M_{pw;t} = M_p + (V_p \times p_{w;t})$	355.58 grams
G_t = Specific Gravity of Soil Solids at the T _t	$G_t = M_s / (M_{pw;t} - (M_{psw;t} - M_s))$	2.656
G = Specific Gravity of Soil Solids at the 20°C	$G = K \times G_t$	2.655

Soils containing plus #4 material tested per ASTM C 127	R = % of Soil retained on the #4 sieve	0.7%
	P = % of Soil passing the #4 sieve	99.3%

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} =	$\frac{1}{\frac{R}{100 \times G_{+4}} + \frac{P}{100 \times G}}$	=	2.655
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Notes / Deviations / References: ASTM D854: Specific Gravity of Soil Solids by Water Pycnometer

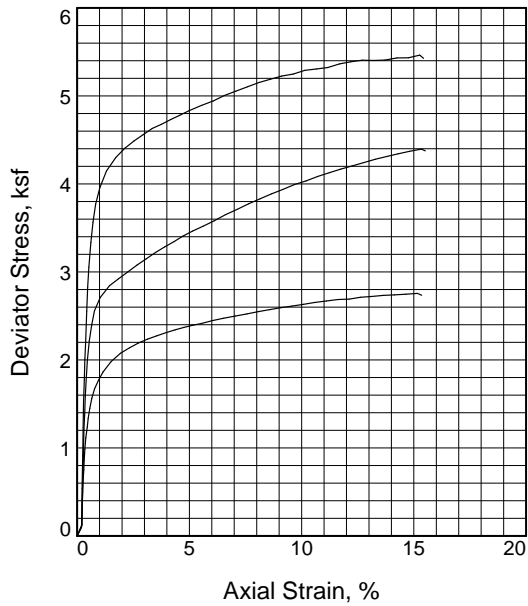
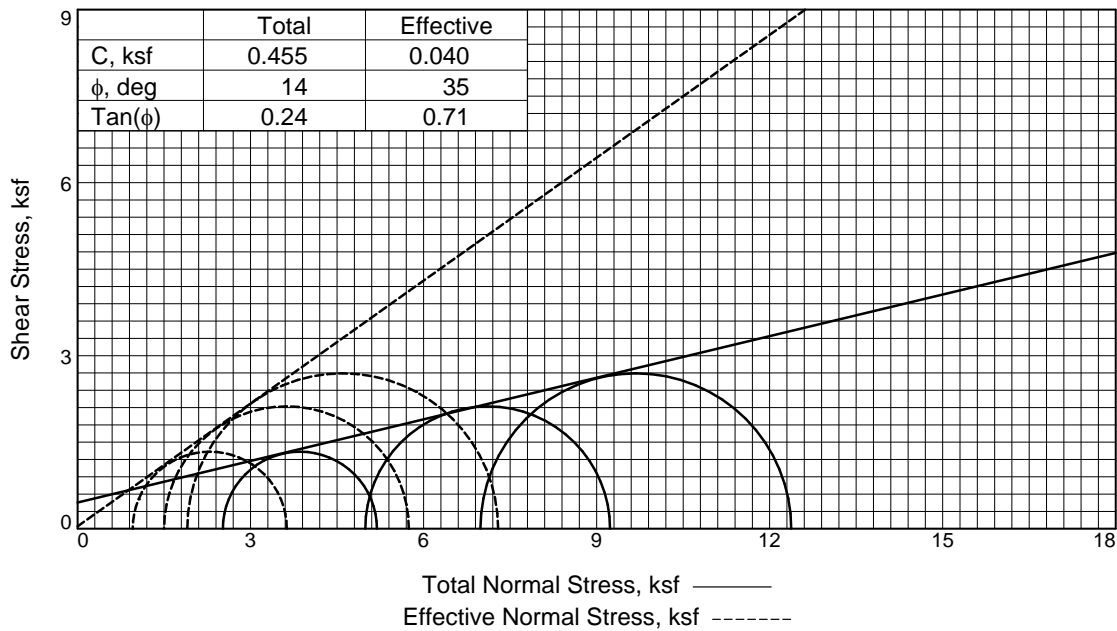
Matthew F. Cooke
Project Manager

Project Manager
Position

5/04/18
Date

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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.



	1	2	3	
Specimen No.				
Initial	Water Content, %	22.2	21.5	21.4
	Dry Density, pcf	98.8	97.7	101.6
	Saturation, %	86.9	82.0	89.9
	Void Ratio	0.6784	0.6970	0.6315
	Diameter, in.	2.862	2.900	2.868
	Height, in.	5.803	5.485	5.776
At Test	Water Content, %	23.6	22.5	20.1
	Dry Density, pcf	102.0	103.8	108.0
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6257	0.5968	0.5342
	Diameter, in.	2.829	2.839	2.803
	Height, in.	5.752	5.387	5.686
Strain rate, %/min.	0.34	0.34	0.34	
Eff. Cell Pressure, ksf	2.520	4.990	6.985	
Fail. Stress, ksf	2.671	4.243	5.388	
Total Pore Pr., ksf	9.483	11.408	13.002	
Strain, %	11.1	12.8	12.2	
Ult. Stress, ksf	2.756	4.396	5.464	
Total Pore Pr., ksf	9.435	11.313	12.960	
Strain, %	15.2	15.3	15.3	
$\bar{\sigma}_1$ Failure, ksf	3.628	5.744	7.291	
$\bar{\sigma}_3$ Failure, ksf	0.957	1.502	1.903	

Type of Test:

CU with Pore Pressures

Sample Type: Undisturbed

Description: Silty Sand [SM, A-6(3)]

LL= 39 **PL=** 27 **PI=** 12

Specific Gravity= 2.655

Remarks: The specimens failed with bulging.

Failure selected at peak obliquity. ASTM D4767. Percent passing the #200: 47.1%

Client: HDR Engineering, Inc.

Project: Carolina Crossroads Project

Location: UD borings

Sample Number: B-56

Depth: 23.5 - 25.5'

Proj. No.: 1461-16-047.2B

Date Sampled: Various

TRIAXIAL SHEAR TEST REPORT

S&ME, Inc.

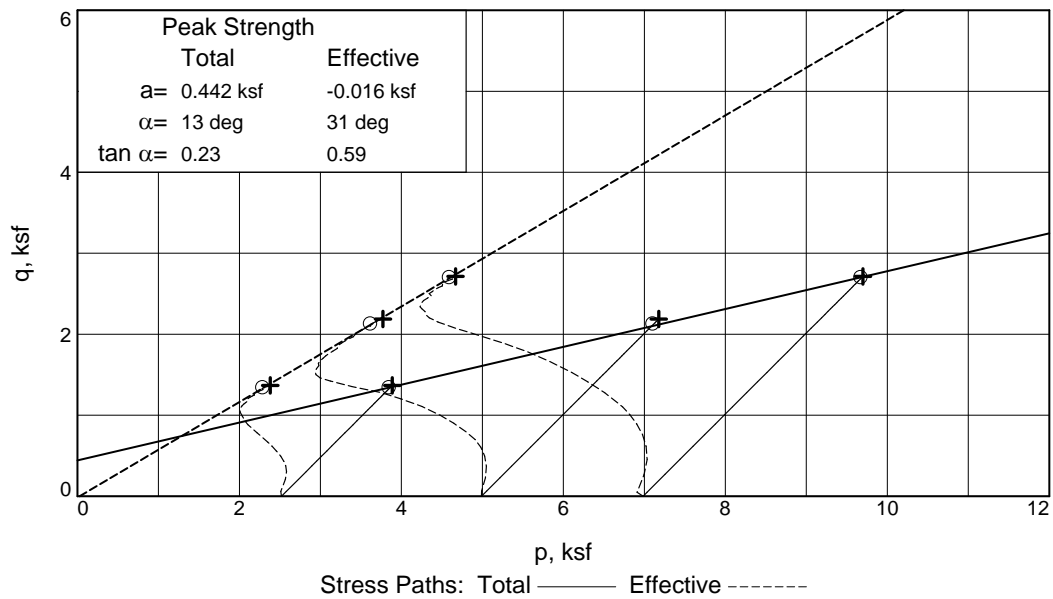
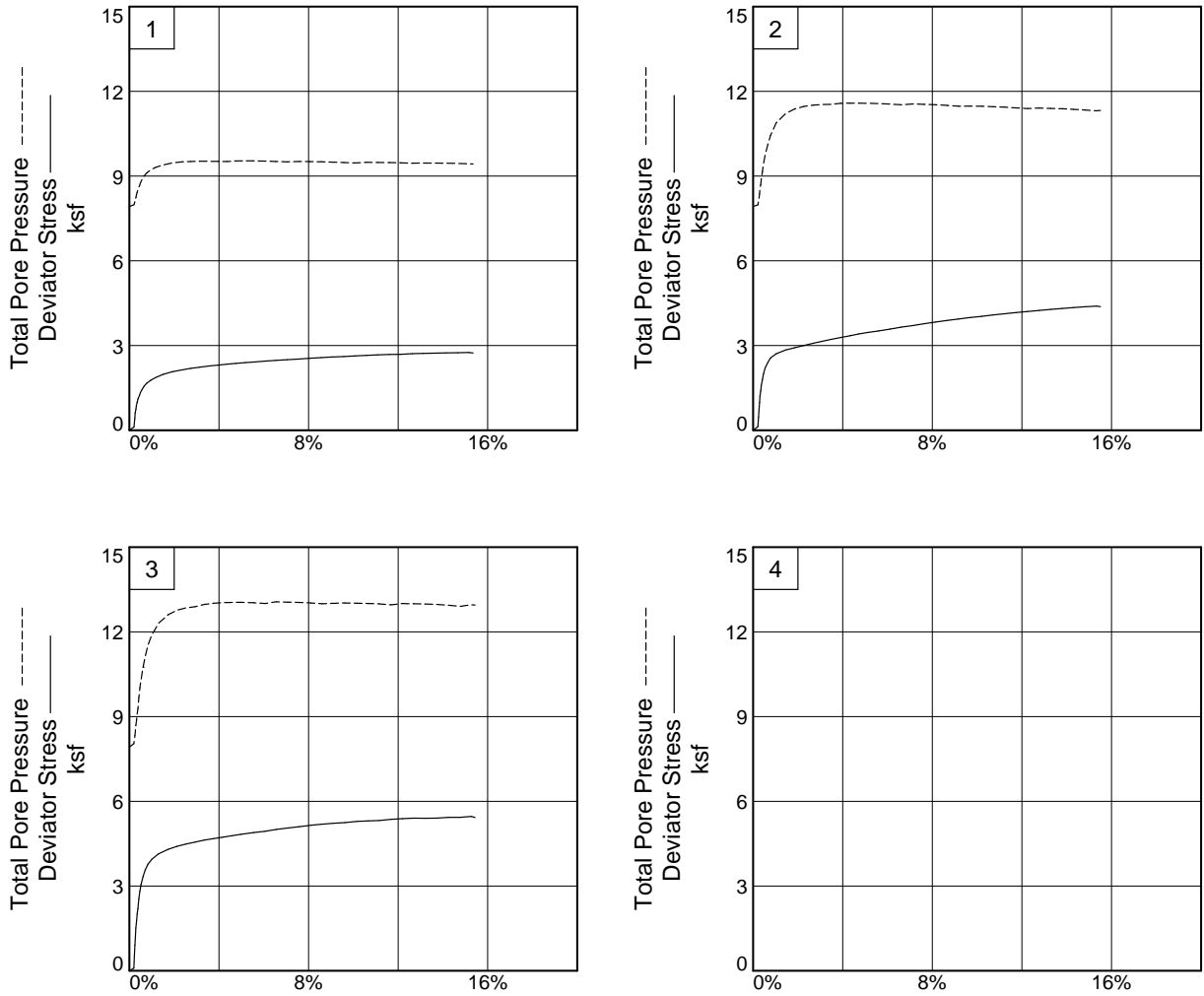
Greenville, SC

Figure 1

Tested By: Benjamin Kovaleski

Checked By: Matthew F. Cooke, P.G.

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: 23.5 - 25.5'

Sample Number: B-56

Project No.: 1461-16-047.2B

Figure 2

S&ME, Inc.

Tested By: Benjamin Kovalski

Checked By: Matthew F. Cooke, P.G.

TRIAxIAL COMPRESSION TEST
CU with Pore Pressures

5/17/2018
4:25 PM

Date: Various
Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Project No.: 1461-16-047.2B
Location: UD borings
Depth: 23.5 - 25.5' **Sample Number:** B-56
Description: Silty Sand [SM, A-6(3)]
Remarks: The specimens failed with bulging. Failure selected at peak obliquity. ASTM D4767. Percent passing the #200: 47.1%
Type of Sample: Undisturbed
Specific Gravity=2.655 **LL**=39 **PL**=27 **PI**=12
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	55.750			1179.140
Moisture content: Dry soil+tare, gms.	45.620			954.270
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	22.2	24.9	23.6	23.6
Moist specimen weight, gms.	1182.60			
Diameter, in.	2.862	2.853	2.829	
Area, in. ²	6.433	6.391	6.286	
Height, in.	5.803	5.784	5.752	
Net decrease in height, in.		0.019	0.032	
Net decrease in water volume, cc.			13.200	
Wet density, pcf	120.7	124.6	126.0	
Dry density, pcf	98.8	99.7	102.0	
Void ratio	0.6784	0.6619	0.6257	
Saturation, %	86.9	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = .167543 kN/cm²
Membrane thickness = .03048 cm
Consolidation cell pressure = 72.500 psi (10.440 ksf)
Consolidation back pressure = 55.000 psi (7.920 ksf)
Consolidation effective confining stress = 2.520 ksf
Strain rate, %/min. = 0.34
Fail. Stress = 2.671 ksf at reading no. 36
Ult. Stress = 2.756 ksf at reading no. 44

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	2.520	2.520	1.00	55.000	2.520	0.000
1	0.0119	5.118	5.1	0.2	0.117	2.452	2.569	1.05	55.470	2.511	0.058
2	0.0138	18.171	18.2	0.2	0.415	2.359	2.774	1.18	56.117	2.567	0.208
3	0.0149	26.673	26.7	0.3	0.609	2.277	2.887	1.27	56.685	2.582	0.305
4	0.0170	32.842	32.8	0.3	0.750	2.196	2.946	1.34	57.249	2.571	0.375
5	0.0180	37.858	37.9	0.3	0.864	2.116	2.980	1.41	57.808	2.548	0.432
6	0.0199	43.240	43.2	0.3	0.987	2.017	3.004	1.49	58.493	2.511	0.494
7	0.0222	48.937	48.9	0.4	1.117	1.899	3.016	1.59	59.312	2.457	0.558
8	0.0259	54.238	54.2	0.5	1.237	1.784	3.021	1.69	60.113	2.402	0.618
9	0.0284	58.640	58.6	0.5	1.337	1.682	3.019	1.79	60.819	2.350	0.668
10	0.0326	63.662	63.7	0.6	1.450	1.561	3.011	1.93	61.662	2.286	0.725
11	0.0378	68.757	68.8	0.7	1.565	1.436	3.001	2.09	62.526	2.219	0.782
12	0.0449	73.615	73.6	0.8	1.673	1.322	2.995	2.27	63.320	2.158	0.837
13	0.0546	77.942	77.9	0.9	1.768	1.221	2.989	2.45	64.023	2.105	0.884
14	0.0664	82.250	82.3	1.2	1.862	1.136	2.999	2.64	64.608	2.068	0.931
15	0.0870	87.868	87.9	1.5	1.982	1.044	3.026	2.90	65.249	2.035	0.991
16	0.1112	92.446	92.4	1.9	2.077	0.971	3.047	3.14	65.759	2.009	1.038
17	0.1343	95.547	95.5	2.3	2.138	0.938	3.076	3.28	65.983	2.007	1.069
18	0.1572	98.407	98.4	2.7	2.193	0.923	3.115	3.38	66.093	2.019	1.096
19	0.1805	100.781	100.8	3.1	2.236	0.915	3.151	3.44	66.145	2.033	1.118
20	0.2042	102.979	103.0	3.5	2.275	0.916	3.191	3.48	66.140	2.053	1.138
21	0.2283	105.026	105.0	4.0	2.310	0.921	3.231	3.51	66.105	2.076	1.155
22	0.2504	106.887	106.9	4.4	2.342	0.926	3.268	3.53	66.069	2.097	1.171
23	0.2738	108.663	108.7	4.8	2.371	0.904	3.274	3.62	66.224	2.089	1.185
24	0.2976	110.276	110.3	5.2	2.395	0.901	3.296	3.66	66.242	2.099	1.198
25	0.3179	111.584	111.6	5.5	2.415	0.902	3.316	3.68	66.239	2.109	1.207
26	0.3469	113.667	113.7	6.0	2.447	0.909	3.355	3.69	66.191	2.132	1.223
27	0.3758	115.604	115.6	6.5	2.475	0.922	3.397	3.69	66.099	2.159	1.238
28	0.4052	117.338	117.3	7.0	2.498	0.936	3.434	3.67	66.001	2.185	1.249
29	0.4348	119.141	119.1	7.6	2.523	0.924	3.447	3.73	66.085	2.185	1.261
30	0.4635	121.033	121.0	8.1	2.549	0.927	3.476	3.75	66.064	2.201	1.275
31	0.4931	122.793	122.8	8.6	2.572	0.935	3.506	3.75	66.010	2.220	1.286
32	0.5219	124.589	124.6	9.1	2.595	0.945	3.540	3.75	65.936	2.243	1.297
33	0.5507	126.142	126.1	9.6	2.613	0.959	3.572	3.72	65.838	2.266	1.306
34	0.5801	127.813	127.8	10.1	2.632	0.974	3.606	3.70	65.737	2.290	1.316
35	0.6090	129.525	129.5	10.6	2.653	0.954	3.607	3.78	65.876	2.280	1.326
36	0.6385	131.154	131.2	11.1	2.671	0.957	3.628	3.79	65.853	2.293	1.335
37	0.6679	132.722	132.7	11.6	2.687	0.962	3.649	3.79	65.821	2.305	1.344
38	0.6970	133.722	133.7	12.1	2.692	0.971	3.663	3.77	65.755	2.317	1.346
39	0.7264	135.536	135.5	12.6	2.713	0.986	3.699	3.75	65.652	2.342	1.356
40	0.7545	136.741	136.7	13.1	2.721	0.978	3.700	3.78	65.705	2.339	1.361
41	0.7845	138.194	138.2	13.6	2.734	0.979	3.712	3.79	65.703	2.346	1.367
42	0.8135	139.311	139.3	14.1	2.740	0.984	3.724	3.78	65.668	2.354	1.370
43	0.8427	140.518	140.5	14.7	2.747	0.992	3.739	3.77	65.611	2.366	1.374
44	0.8722	141.830	141.8	15.2	2.756	1.005	3.762	3.74	65.518	2.384	1.378
45	0.8829	141.084	141.1	15.3	2.736	1.013	3.749	3.70	65.466	2.381	1.368

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	83.010			1104.280
Moisture content: Dry soil+tare, gms.	68.300			901.570
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	21.5	24.9	22.5	22.5
Moist specimen weight, gms.	1128.92			
Diameter, in.	2.900	2.880	2.839	
Area, in. ²	6.605	6.513	6.328	
Height, in.	5.485	5.447	5.387	
Net decrease in height, in.		0.038	0.060	
Net decrease in water volume, cc.			22.700	
Wet density, pcf	118.7	124.6	127.1	
Dry density, pcf	97.7	99.7	103.8	
Void ratio	0.6970	0.6617	0.5968	
Saturation, %	82.0	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 89.650 psi (12.910 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 4.990 ksf

Strain rate, %/min. = 0.34

Fail. Stress = 4.243 ksf at reading no. 38

Ult. Stress = 4.396 ksf at reading no. 43

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	4.990	4.990	1.00	55.000	4.990	0.000
1	0.0114	5.623	5.6	0.2	0.128	4.927	5.054	1.03	55.436	4.991	0.064
2	0.0129	20.158	20.2	0.2	0.458	4.809	5.266	1.10	56.256	5.038	0.229
3	0.0143	32.618	32.6	0.3	0.740	4.680	5.420	1.16	57.152	5.050	0.370
4	0.0153	43.601	43.6	0.3	0.989	4.534	5.523	1.22	58.165	5.029	0.495
5	0.0164	53.368	53.4	0.3	1.211	4.376	5.587	1.28	59.261	4.981	0.605
6	0.0181	61.661	61.7	0.3	1.398	4.212	5.610	1.33	60.401	4.911	0.699
7	0.0196	69.959	70.0	0.4	1.586	4.008	5.594	1.40	61.814	4.801	0.793
8	0.0223	79.530	79.5	0.4	1.802	3.745	5.548	1.48	63.640	4.647	0.901
9	0.0248	88.266	88.3	0.5	1.999	3.479	5.479	1.57	65.488	4.479	1.000
10	0.0291	97.892	97.9	0.5	2.215	3.149	5.364	1.70	67.785	4.256	1.108
11	0.0353	106.318	106.3	0.7	2.403	2.794	5.197	1.86	70.248	3.996	1.202
12	0.0417	113.285	113.3	0.8	2.558	2.472	5.029	2.03	72.485	3.751	1.279
13	0.0552	120.329	120.3	1.0	2.710	2.031	4.741	2.33	75.545	3.386	1.355
14	0.0778	126.843	126.8	1.4	2.845	1.701	4.546	2.67	77.837	3.123	1.422
15	0.0996	130.877	130.9	1.8	2.923	1.535	4.458	2.90	78.989	2.997	1.461
16	0.1217	134.940	134.9	2.3	3.001	1.445	4.446	3.08	79.617	2.945	1.501
17	0.1440	139.029	139.0	2.7	3.079	1.398	4.477	3.20	79.945	2.937	1.539
18	0.1657	142.774	142.8	3.1	3.149	1.377	4.526	3.29	80.085	2.952	1.574
19	0.1880	146.717	146.7	3.5	3.222	1.369	4.591	3.35	80.143	2.980	1.611
20	0.2102	150.234	150.2	3.9	3.285	1.333	4.619	3.46	80.390	2.976	1.643
21	0.2324	153.595	153.6	4.3	3.344	1.328	4.672	3.52	80.426	3.000	1.672
22	0.2540	157.205	157.2	4.7	3.408	1.328	4.736	3.57	80.428	3.032	1.704

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	0.2766	160.499	160.5	5.1	3.465	1.333	4.797	3.60	80.395	3.065	1.732
24	0.3019	163.814	163.8	5.6	3.519	1.343	4.861	3.62	80.325	3.102	1.759
25	0.3292	167.677	167.7	6.1	3.582	1.361	4.944	3.63	80.195	3.153	1.791
26	0.3563	171.849	171.8	6.6	3.652	1.383	5.035	3.64	80.043	3.209	1.826
27	0.3841	175.578	175.6	7.1	3.710	1.356	5.066	3.74	80.234	3.211	1.855
28	0.4114	179.612	179.6	7.6	3.775	1.370	5.144	3.76	80.138	3.257	1.887
29	0.4392	183.369	183.4	8.2	3.832	1.385	5.217	3.77	80.033	3.301	1.916
30	0.4667	187.072	187.1	8.7	3.888	1.408	5.296	3.76	79.869	3.352	1.944
31	0.4941	190.558	190.6	9.2	3.938	1.437	5.375	3.74	79.673	3.406	1.969
32	0.5213	194.244	194.2	9.7	3.992	1.433	5.425	3.79	79.701	3.429	1.996
33	0.5496	197.499	197.5	10.2	4.035	1.438	5.473	3.81	79.667	3.455	2.018
34	0.5773	201.093	201.1	10.7	4.085	1.452	5.538	3.81	79.563	3.495	2.043
35	0.6052	204.319	204.3	11.2	4.127	1.470	5.597	3.81	79.443	3.533	2.063
36	0.6326	207.531	207.5	11.7	4.168	1.494	5.662	3.79	79.273	3.578	2.084
37	0.6601	210.601	210.6	12.3	4.205	1.517	5.722	3.77	79.113	3.620	2.102
38	0.6878	213.740	213.7	12.8	4.243	1.502	5.744	3.83	79.222	3.623	2.121
39	0.7153	216.934	216.9	13.3	4.281	1.514	5.794	3.83	79.138	3.654	2.140
40	0.7433	219.886	219.9	13.8	4.313	1.526	5.839	3.83	79.053	3.682	2.156
41	0.7705	222.733	222.7	14.3	4.343	1.546	5.889	3.81	78.917	3.717	2.172
42	0.7983	225.502	225.5	14.8	4.371	1.571	5.942	3.78	78.740	3.756	2.185
43	0.8261	228.191	228.2	15.3	4.396	1.597	5.993	3.75	78.560	3.795	2.198
44	0.8353	227.619	227.6	15.5	4.376	1.584	5.961	3.76	78.648	3.772	2.188

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	50.960			1180.450
Moisture content: Dry soil+tare, gms.	41.980			982.660
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	21.4	22.9	20.1	20.1
Moist specimen weight, gms.	1207.92			
Diameter, in.	2.868	2.853	2.803	
Area, in. ²	6.460	6.395	6.171	
Height, in.	5.776	5.747	5.686	
Net decrease in height, in.		0.029	0.061	
Net decrease in water volume, cc.			27.250	
Wet density, pcf	123.3	126.7	129.8	
Dry density, pcf	101.6	103.1	108.0	
Void ratio	0.6315	0.6069	0.5342	
Saturation, %	89.9	100.0	100.0	

Test Readings for Specimen No. 3

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 103.510 psi (14.905 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 6.985 ksf

Strain rate, %/min. = 0.34

Fail. Stress = 5.388 ksf at reading no. 39

Ult. Stress = 5.464 ksf at reading no. 45

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	6.985	6.985	1.00	55.000	6.985	0.000
1	0.0113	4.143	4.1	0.2	0.096	6.861	6.958	1.01	55.861	6.910	0.048
2	0.0126	23.138	23.1	0.2	0.539	6.729	7.267	1.08	56.783	6.998	0.269
3	0.0141	39.116	39.1	0.2	0.910	6.579	7.490	1.14	57.820	7.035	0.455
4	0.0153	52.830	52.8	0.3	1.229	6.407	7.637	1.19	59.014	7.022	0.615
5	0.0163	65.259	65.3	0.3	1.518	6.219	7.738	1.24	60.321	6.978	0.759
6	0.0184	76.563	76.6	0.3	1.781	6.017	7.798	1.30	61.724	6.908	0.890
7	0.0196	86.336	86.3	0.3	2.008	5.820	7.827	1.34	63.095	6.824	1.004
8	0.0217	94.983	95.0	0.4	2.208	5.627	7.835	1.39	64.435	6.731	1.104
9	0.0242	110.007	110.0	0.4	2.556	5.233	7.789	1.49	67.172	6.511	1.278
10	0.0267	121.702	121.7	0.5	2.826	4.887	7.713	1.58	69.576	6.300	1.413
11	0.0299	131.627	131.6	0.5	3.055	4.578	7.633	1.67	71.721	6.105	1.528
12	0.0347	143.763	143.8	0.6	3.334	4.156	7.491	1.80	74.646	5.823	1.667
13	0.0402	153.913	153.9	0.7	3.566	3.776	7.342	1.94	77.288	5.559	1.783
14	0.0470	162.965	163.0	0.8	3.771	3.386	7.158	2.11	79.994	5.272	1.886
15	0.0573	171.278	171.3	1.0	3.956	3.005	6.961	2.32	82.645	4.983	1.978
16	0.0744	180.056	180.1	1.3	4.147	2.597	6.743	2.60	85.476	4.670	2.073
17	0.0981	187.528	187.5	1.7	4.300	2.303	6.604	2.87	87.514	4.454	2.150
18	0.1204	192.874	192.9	2.1	4.405	2.143	6.548	3.06	88.629	4.345	2.203
19	0.1438	197.313	197.3	2.5	4.488	2.056	6.544	3.18	89.230	4.300	2.244
20	0.1675	201.391	201.4	2.9	4.561	2.011	6.572	3.27	89.546	4.291	2.280
21	0.1901	205.320	205.3	3.3	4.631	1.936	6.566	3.39	90.068	4.251	2.315
22	0.2134	208.299	208.3	3.8	4.678	1.893	6.571	3.47	90.364	4.232	2.339

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	0.2371	211.591	211.6	4.2	4.731	1.873	6.604	3.53	90.505	4.238	2.366
24	0.2602	214.717	214.7	4.6	4.781	1.862	6.643	3.57	90.580	4.252	2.390
25	0.2834	217.920	217.9	5.0	4.832	1.859	6.690	3.60	90.602	4.274	2.416
26	0.3151	221.987	222.0	5.5	4.893	1.875	6.768	3.61	90.487	4.322	2.446
27	0.3445	225.484	225.5	6.1	4.943	1.901	6.844	3.60	90.309	4.372	2.471
28	0.3730	229.534	229.5	6.6	5.005	1.840	6.845	3.72	90.729	4.343	2.502
29	0.4022	233.111	233.1	7.1	5.055	1.853	6.908	3.73	90.638	4.381	2.527
30	0.4321	236.729	236.7	7.6	5.104	1.863	6.967	3.74	90.573	4.415	2.552
31	0.4610	240.312	240.3	8.1	5.153	1.881	7.033	3.74	90.451	4.457	2.576
32	0.4894	243.379	243.4	8.6	5.190	1.910	7.101	3.72	90.244	4.505	2.595
33	0.5180	246.421	246.4	9.1	5.226	1.895	7.121	3.76	90.352	4.508	2.613
34	0.5475	248.894	248.9	9.6	5.249	1.882	7.131	3.79	90.440	4.506	2.624
35	0.5767	252.319	252.3	10.1	5.290	1.890	7.180	3.80	90.386	4.535	2.645
36	0.6058	254.486	254.5	10.7	5.306	1.899	7.205	3.79	90.319	4.552	2.653
37	0.6349	256.799	256.8	11.2	5.323	1.915	7.238	3.78	90.213	4.576	2.662
38	0.6642	260.277	260.3	11.7	5.364	1.947	7.311	3.75	89.986	4.629	2.682
39	0.6931	262.976	263.0	12.2	5.388	1.903	7.291	3.83	90.294	4.597	2.694
40	0.7220	265.383	265.4	12.7	5.406	1.912	7.318	3.83	90.231	4.615	2.703
41	0.7507	266.771	266.8	13.2	5.403	1.919	7.322	3.82	90.186	4.620	2.702
42	0.7799	268.565	268.6	13.7	5.407	1.932	7.339	3.80	90.093	4.636	2.704
43	0.8098	271.482	271.5	14.2	5.433	1.964	7.396	3.77	89.874	4.680	2.716
44	0.8389	273.119	273.1	14.8	5.433	2.005	7.437	3.71	89.589	4.721	2.716
45	0.8678	276.326	276.3	15.3	5.464	1.945	7.409	3.81	90.002	4.677	2.732
46	0.8774	275.063	275.1	15.4	5.428	1.955	7.383	3.78	89.932	4.669	2.714



Project Name: Carolina Crossroads Project

Boring #: B-56

Depth: 23.5 – 25.5'

Sample #: UD-2

Test Type: Consolidated Undrained Triaxial Shear (ASTM D4767)



LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



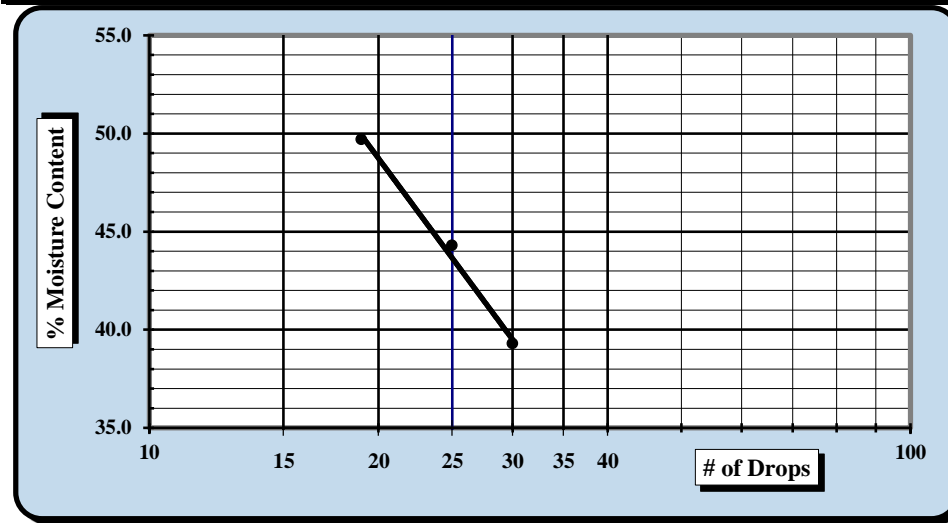
ASTM D 4318 AASHTO T 89 AASHTO T 90

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 #:	W-27UD	Sample #:	UD-1
		Sample Date:	Various
Location:	UD Borings	Offset:	NA
		Elevation:	13.5-15.5'

Sample Description: Pink Gray Tan Fine to Coarse Sandy Silt (ML)					
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		
		29	1	41			PP	P-17	
A	Tare Weight	14.21	13.89	15.80			16.18	12.36	
B	Wet Soil Weight + A	26.48	26.88	27.07			24.54	20.42	
C	Dry Soil Weight + A	23.02	22.89	23.33			22.66	18.63	
D	Water Weight (B-C)	3.46	3.99	3.74			1.88	1.79	
E	Dry Soil Weight (C-A)	8.81	9.00	7.53			6.48	6.27	
F	% Moisture (D/E)*100	39.3%	44.3%	49.7%			29.0%	28.5%	
N	# OF DROPS	30	25	19					
LL	LL = F * FACTOR								
Ave.	Average						28.8%		



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	44
Plastic Limit	29
Plastic Index	15
Group Symbol	ML

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

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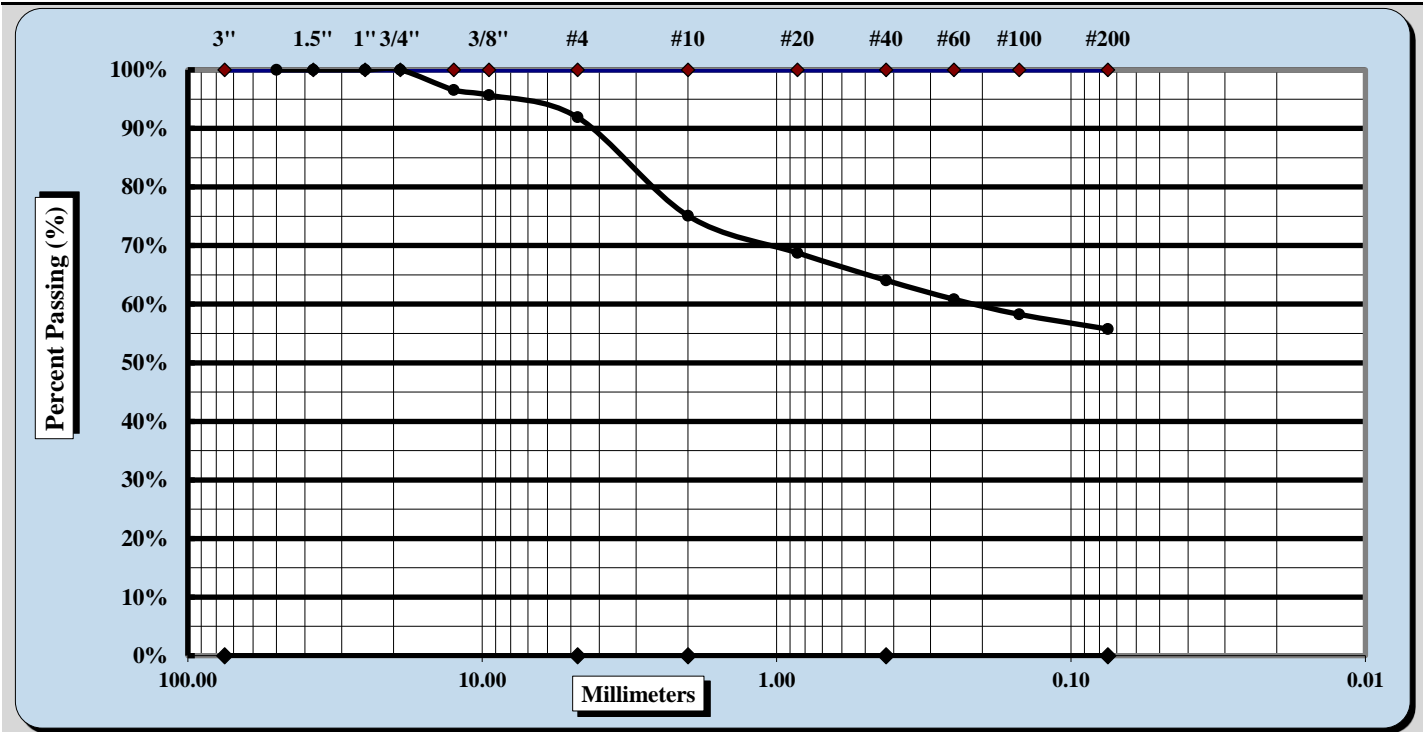


ASTM D 422

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-27UD	Type:	Undisturbed
Location:	UD Borings	Sample:	UD-1
		Elevation:	13.5-15.5

Sample Description: Pink Gray Tan Fine to Coarse Sandy Silt (ML)



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	16.8%	Fine Sand	8.3%
Gravel	8.1%	Medium Sand	11.0%	Silt & Clay	55.8%
Liquid Limit	44	Plastic Limit	29	Plastic Index	15
Specific Gravity	ND			Moisture Content	Various
Coarse Sand	16.8%	Medium Sand	11.0%	Fine Sand	8.3%
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

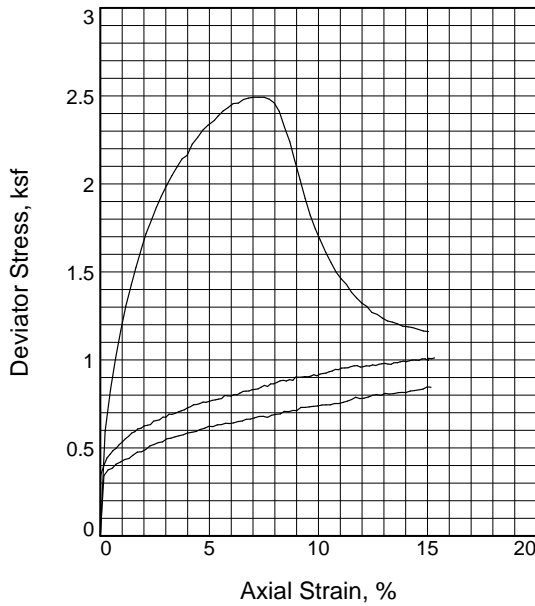
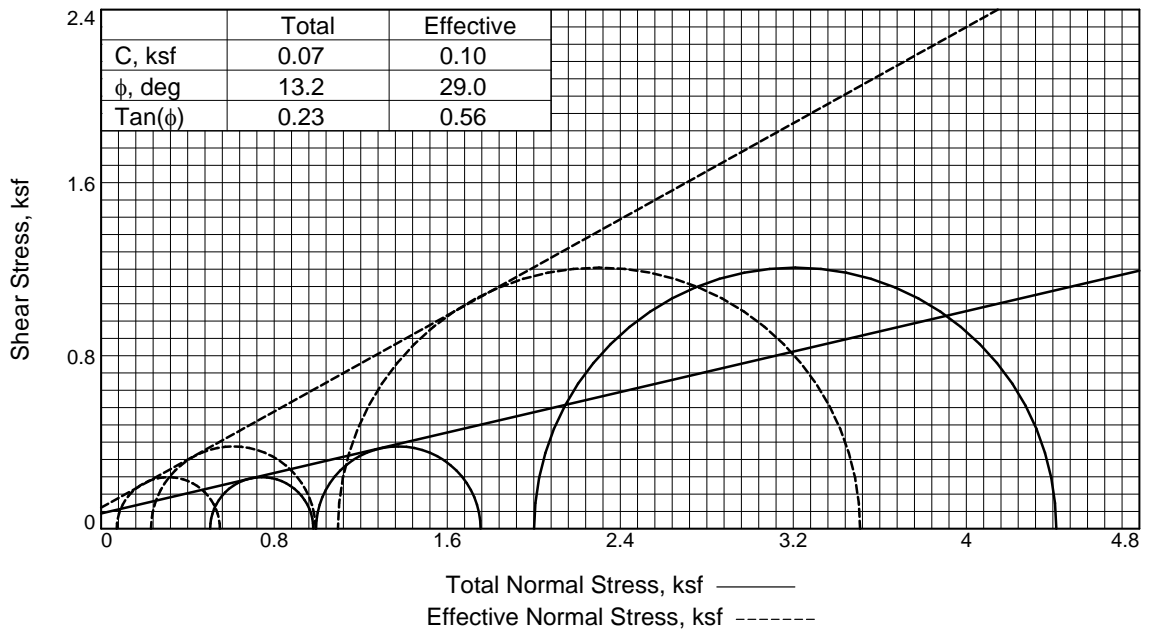
Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

7/18/2018
Date

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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	3
Initial			
Water Content, %	29.4	29.4	40.7
Dry Density, pcf	84.9	90.7	78.9
Saturation, %	82.1	94.5	98.3
Void Ratio	0.9482	0.8239	1.0978
Diameter, in.	2.876	2.859	2.868
Height, in.	6.501	6.462	6.130
At Test			
Water Content, %	27.5	24.9	36.8
Dry Density, pcf	95.6	99.7	83.8
Saturation, %	100.0	100.0	100.0
Void Ratio	0.7301	0.6596	0.9742
Diameter, in.	2.764	2.770	2.810
Height, in.	6.252	6.264	6.008
Strain rate, in./min.	0.006	0.004	0.007
Eff. Cell Pressure, ksf	0.50	0.99	2.00
Fail. Stress, ksf	0.48	0.76	2.41
Total Pore Pr., ksf	9.07	9.40	9.55
Strain, %	1.7	4.7	5.6
Ult. Stress, ksf	0.85	1.01	1.16
Total Pore Pr., ksf	8.99	9.29	9.43
Strain, %	15.2	15.3	15.0
$\bar{\sigma}_1$ Failure, ksf	0.55	0.99	3.51
$\bar{\sigma}_3$ Failure, ksf	0.07	0.23	1.09

Type of Test: CU with Pore Pressures
Sample Type: Undisturbed
Description: Pink Gray Tan Fine to Coarse Sandy Silt (ML)
LL= 44 PL= 29 PI= 15
Assumed Specific Gravity= 2.65
Remarks: Specimen S-1 was wet and disturbed, failed in bulge. Specimens S-2 and S-3 failed in shear (ASTM 4767).

Figure W-27UD UD-1

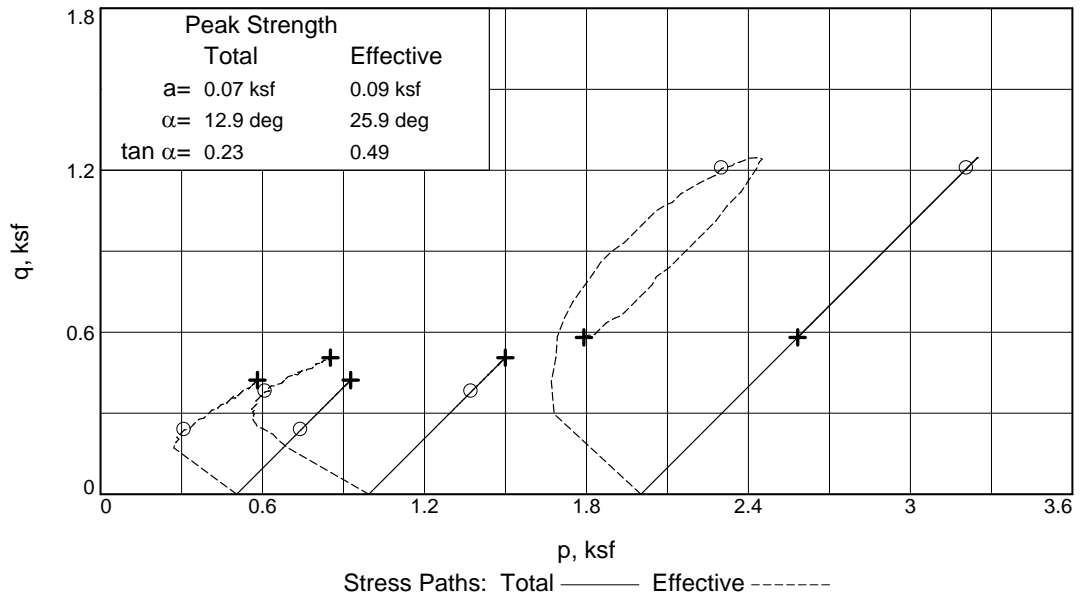
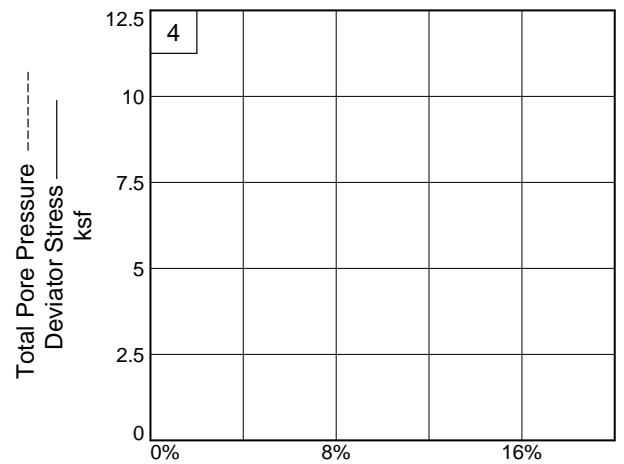
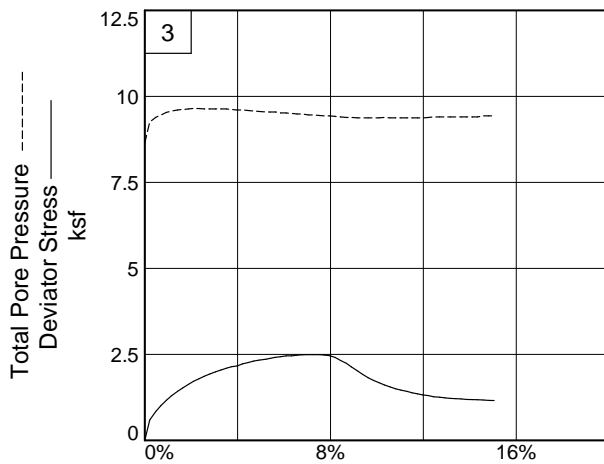
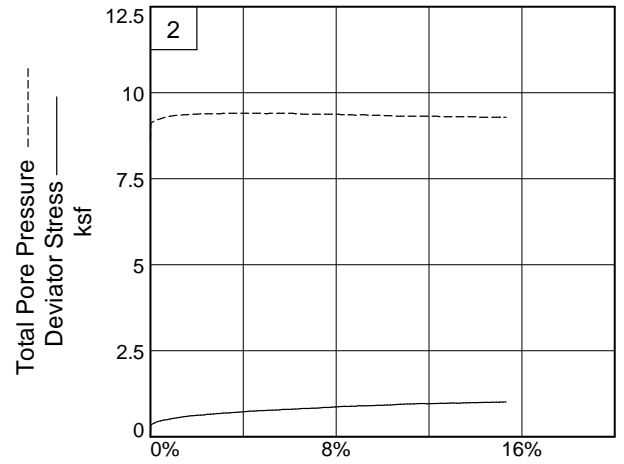
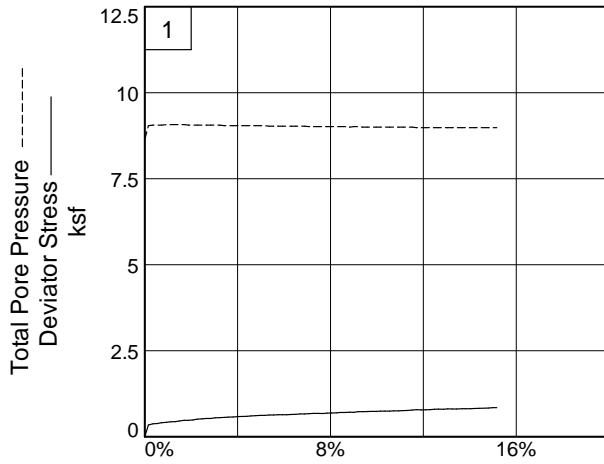
Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Location: UD Borings
Sample Number: W-27UD UD-1 **Depth:** 13.5-15.5
Proj. No.: 1461-16-047.2B **Date Sampled:** Various

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: 13.5-15.5

Sample Number: W-27UD UD-1

Project No.: 1461-16-047.2B

Figure W-27UD UD-1

S & ME, INC.

Tested By: Karen Warner

Checked By: Jason Reeves

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

6/26/2018
3:09 PM

Date: Various
Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Project No.: 1461-16-047.2B
Location: UD Borings
Depth: 13.5-15.5 **Sample Number:** W-27UD UD-1
Description: Pink Gray Tan Fine to Coarse Sandy Silt (ML)
Remarks: Specimen S-1 was wet and disturbed, failed in shear. Specimens S-2 and S-3 failed in shear (ASTM 4767).
Type of Sample: Undisturbed
Assumed Specific Gravity=2.65 **LL**=44 **PL**=29 **PI**=15
Test Method: COE uniform strain

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	384.010			1238.430
Moisture content: Dry soil+tare, gms.	315.570			996.410
Moisture content: Tare, gms.	82.500			84.850
Moisture, %	29.4	33.1	27.5	26.6
Moist specimen weight, gms.	1217.79			
Diameter, in.	2.876	2.840	2.764	
Area, in. ²	6.496	6.334	5.999	
Height, in.	6.501	6.420	6.252	
Net decrease in height, in.		0.081	0.168	
Wet density, pcf	109.9	117.3	122.0	
Dry density, pcf	84.9	88.2	95.6	
Void ratio	0.9482	0.8760	0.7301	
Saturation, %	82.1	100.0	100.0	

Test Readings for Specimen No. 1

Consolidation cell pressure = 63.50 psi (9.14 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 0.50 ksf
Strain rate, in./min. = 0.006
Fail. Stress = 0.48 ksf at reading no. 9
Ult. Stress = 0.85 ksf at reading no. 78

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	0.0460	18.400	0.0	0.0	0.00	0.50	0.50	1.00	60.00	0.50	0.00
1	0.0560	32.700	14.3	0.2	0.34	0.10	0.44	4.40	62.80	0.27	0.17
2	0.0680	34.100	15.7	0.4	0.38	0.09	0.46	5.35	62.90	0.27	0.19
3	0.0800	34.500	16.1	0.5	0.38	0.09	0.47	5.45	62.90	0.28	0.19
4	0.0910	35.500	17.1	0.7	0.41	0.09	0.49	5.72	62.90	0.29	0.20
5	0.1040	36.100	17.7	0.9	0.42	0.07	0.49	6.85	63.00	0.28	0.21
6	0.1160	36.700	18.3	1.1	0.43	0.07	0.51	7.03	63.00	0.29	0.22
7	0.1280	37.000	18.6	1.3	0.44	0.07	0.51	7.12	63.00	0.29	0.22
8	0.1390	37.800	19.4	1.5	0.46	0.07	0.53	7.37	63.00	0.30	0.23
9	0.1520	38.600	20.2	1.7	0.48	0.07	0.55	7.62	63.00	0.31	0.24
10	0.1640	38.700	20.3	1.9	0.48	0.09	0.56	6.53	62.90	0.33	0.24
11	0.1760	39.300	20.9	2.1	0.49	0.09	0.58	6.69	62.90	0.33	0.25
12	0.1880	40.200	21.8	2.3	0.51	0.09	0.60	6.92	62.90	0.34	0.26
13	0.2000	40.600	22.2	2.5	0.52	0.09	0.61	7.02	62.90	0.35	0.26
14	0.2120	41.100	22.7	2.7	0.53	0.09	0.62	7.14	62.90	0.35	0.27
15	0.2240	41.300	22.9	2.8	0.53	0.09	0.62	7.18	62.90	0.35	0.27
16	0.2360	42.100	23.7	3.0	0.55	0.09	0.64	7.38	62.90	0.36	0.28
17	0.2480	42.300	23.9	3.2	0.56	0.09	0.64	7.43	62.90	0.36	0.28
18	0.2600	42.700	24.3	3.4	0.56	0.10	0.66	6.59	62.80	0.38	0.28
19	0.2710	43.000	24.6	3.6	0.57	0.10	0.67	6.65	62.80	0.39	0.28
20	0.2840	43.300	24.9	3.8	0.57	0.10	0.68	6.70	62.80	0.39	0.29
21	0.2960	43.800	25.4	4.0	0.59	0.10	0.69	6.81	62.80	0.39	0.29
22	0.3080	44.000	25.6	4.2	0.59	0.10	0.69	6.84	62.80	0.40	0.29
23	0.3210	44.300	25.9	4.4	0.59	0.10	0.70	6.90	62.80	0.40	0.30
24	0.3320	44.800	26.4	4.6	0.60	0.10	0.71	7.00	62.80	0.40	0.30
25	0.3450	45.200	26.8	4.8	0.61	0.10	0.71	7.08	62.80	0.41	0.31
26	0.3570	45.700	27.3	5.0	0.62	0.10	0.72	7.18	62.80	0.41	0.31
27	0.3690	45.700	27.3	5.2	0.62	0.10	0.72	7.17	62.80	0.41	0.31
28	0.3810	46.200	27.8	5.4	0.63	0.12	0.75	6.48	62.70	0.43	0.32
29	0.3930	46.300	27.9	5.6	0.63	0.12	0.75	6.49	62.70	0.43	0.32
30	0.4050	46.700	28.3	5.7	0.64	0.12	0.76	6.56	62.70	0.44	0.32
31	0.4170	46.700	28.3	5.9	0.64	0.12	0.75	6.55	62.70	0.43	0.32
32	0.4280	46.900	28.5	6.1	0.64	0.12	0.76	6.58	62.70	0.44	0.32
33	0.4410	47.300	28.9	6.3	0.65	0.12	0.77	6.64	62.70	0.44	0.32
34	0.4530	47.500	29.1	6.5	0.65	0.12	0.77	6.67	62.70	0.44	0.33
35	0.4640	48.000	29.6	6.7	0.66	0.12	0.78	6.76	62.70	0.45	0.33
36	0.4760	48.100	29.7	6.9	0.66	0.12	0.78	6.76	62.70	0.45	0.33
37	0.4880	48.500	30.1	7.1	0.67	0.13	0.80	6.18	62.60	0.47	0.34
38	0.5010	48.900	30.5	7.3	0.68	0.13	0.81	6.24	62.60	0.47	0.34
39	0.5130	49.000	30.6	7.5	0.68	0.13	0.81	6.24	62.60	0.47	0.34
40	0.5250	48.800	30.4	7.7	0.67	0.13	0.80	6.20	62.60	0.47	0.34
41	0.5370	49.400	31.0	7.9	0.69	0.13	0.82	6.29	62.60	0.47	0.34
42	0.5490	49.700	31.3	8.0	0.69	0.13	0.82	6.33	62.60	0.48	0.35
43	0.5620	49.900	31.5	8.3	0.69	0.13	0.82	6.35	62.60	0.48	0.35
44	0.5730	50.600	32.2	8.4	0.71	0.13	0.84	6.46	62.60	0.48	0.35
45	0.5860	50.600	32.2	8.6	0.71	0.13	0.84	6.45	62.60	0.48	0.35
46	0.5980	51.000	32.6	8.8	0.71	0.14	0.86	5.95	62.50	0.50	0.36

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	0.6090	51.000	32.6	9.0	0.71	0.13	0.84	6.49	62.60	0.49	0.36
48	0.6210	51.900	33.5	9.2	0.73	0.13	0.86	6.63	62.60	0.49	0.37
49	0.6330	52.000	33.6	9.4	0.73	0.14	0.87	6.08	62.50	0.51	0.37
50	0.6450	52.200	33.8	9.6	0.73	0.14	0.88	6.09	62.50	0.51	0.37
51	0.6570	52.400	34.0	9.8	0.74	0.14	0.88	6.11	62.50	0.51	0.37
52	0.6690	52.600	34.2	10.0	0.74	0.14	0.88	6.13	62.50	0.51	0.37
53	0.6810	52.900	34.5	10.2	0.74	0.14	0.89	6.17	62.50	0.52	0.37
54	0.6930	53.000	34.6	10.3	0.74	0.14	0.89	6.17	62.50	0.52	0.37
55	0.7050	53.100	34.7	10.5	0.75	0.14	0.89	6.17	62.50	0.52	0.37
56	0.7170	53.500	35.1	10.7	0.75	0.14	0.90	6.22	62.50	0.52	0.38
57	0.7300	53.600	35.2	10.9	0.75	0.14	0.90	6.23	62.50	0.52	0.38
58	0.7420	54.000	35.6	11.1	0.76	0.14	0.90	6.27	62.50	0.52	0.38
59	0.7540	54.400	36.0	11.3	0.77	0.14	0.91	6.32	62.50	0.53	0.38
60	0.7660	54.900	36.5	11.5	0.78	0.14	0.92	6.38	62.50	0.53	0.39
61	0.7780	55.600	37.2	11.7	0.79	0.16	0.95	5.98	62.40	0.55	0.39
62	0.7900	55.300	36.9	11.9	0.78	0.16	0.94	5.93	62.40	0.55	0.39
63	0.8020	55.500	37.1	12.1	0.78	0.16	0.94	5.94	62.40	0.55	0.39
64	0.8140	55.900	37.5	12.3	0.79	0.16	0.95	5.98	62.40	0.55	0.39
65	0.8260	56.400	38.0	12.5	0.80	0.16	0.96	6.04	62.40	0.56	0.40
66	0.8370	56.700	38.3	12.7	0.80	0.16	0.96	6.07	62.40	0.56	0.40
67	0.8500	56.600	38.2	12.9	0.80	0.16	0.96	6.04	62.40	0.56	0.40
68	0.8620	57.200	38.8	13.1	0.81	0.16	0.97	6.11	62.40	0.56	0.40
69	0.8740	57.100	38.7	13.2	0.81	0.16	0.96	6.09	62.40	0.56	0.40
70	0.8860	57.300	38.9	13.4	0.81	0.16	0.97	6.10	62.40	0.56	0.40
71	0.9010	57.700	39.3	13.7	0.81	0.16	0.97	6.14	62.40	0.57	0.41
72	0.9100	57.800	39.4	13.8	0.82	0.16	0.97	6.15	62.40	0.57	0.41
73	0.9220	57.900	39.5	14.0	0.82	0.16	0.97	6.15	62.40	0.57	0.41
74	0.9350	58.400	40.0	14.2	0.82	0.16	0.98	6.20	62.40	0.57	0.41
75	0.9460	58.600	40.2	14.4	0.83	0.16	0.98	6.22	62.40	0.57	0.41
76	0.9710	59.200	40.8	14.8	0.83	0.16	0.99	6.27	62.40	0.58	0.42
77	0.9830	59.900	41.5	15.0	0.85	0.16	1.01	6.35	62.40	0.58	0.42
78	0.9940	59.900	41.5	15.2	0.85	0.16	1.00	6.34	62.40	0.58	0.42

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	384.010			1292.340
Moisture content: Dry soil+tare, gms.	315.570			1011.260
Moisture content: Tare, gms.	82.500			84.410
Moisture, %	29.4	28.8	24.9	30.3
Moist specimen weight, gms.	1277.77			
Diameter, in.	2.859	2.827	2.770	
Area, in. ²	6.420	6.277	6.026	
Height, in.	6.462	6.390	6.264	
Net decrease in height, in.		0.072	0.126	
Wet density, pcf	117.3	120.8	124.5	
Dry density, pcf	90.7	93.8	99.7	
Void ratio	0.8239	0.7634	0.6596	
Saturation, %	94.5	100.0	100.0	

Test Readings for Specimen No. 2

Consolidation cell pressure = 66.90 psi (9.63 ksf)
 Consolidation back pressure = 60.00 psi (8.64 ksf)
 Consolidation effective confining stress = 0.99 ksf
 Strain rate, in./min. = 0.004
 Fail. Stress = 0.76 ksf at reading no. 34
 Ult. Stress = 1.01 ksf at reading no. 110

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	17.900	0.0	0.0	0.00	0.99	0.99	1.00	60.00	0.99	0.00
1	0.0110	32.400	14.5	0.0	0.35	0.52	0.86	1.67	63.30	0.69	0.17
2	0.0200	34.600	16.7	0.2	0.40	0.46	0.86	1.86	63.70	0.66	0.20
3	0.0290	36.500	18.6	0.3	0.44	0.42	0.86	2.06	64.00	0.64	0.22
4	0.0380	37.400	19.5	0.4	0.46	0.39	0.85	2.19	64.20	0.62	0.23
5	0.0460	38.300	20.4	0.6	0.48	0.36	0.84	2.35	64.40	0.60	0.24
6	0.0550	38.900	21.0	0.7	0.50	0.33	0.83	2.50	64.60	0.58	0.25
7	0.0640	39.800	21.9	0.9	0.52	0.32	0.84	2.64	64.70	0.58	0.26
8	0.0730	40.500	22.6	1.0	0.53	0.30	0.84	2.77	64.80	0.57	0.27
9	0.0820	41.300	23.4	1.1	0.55	0.29	0.84	2.92	64.90	0.56	0.28
10	0.0910	41.900	24.0	1.3	0.57	0.29	0.85	2.97	64.90	0.57	0.28
11	0.1000	42.700	24.8	1.4	0.58	0.27	0.86	3.13	65.00	0.57	0.29
12	0.1090	43.100	25.2	1.6	0.59	0.27	0.87	3.17	65.00	0.57	0.30
13	0.1180	43.800	25.9	1.7	0.61	0.26	0.87	3.35	65.10	0.56	0.30
14	0.1270	44.000	26.1	1.9	0.61	0.26	0.87	3.36	65.10	0.57	0.31
15	0.1360	44.600	26.7	2.0	0.63	0.26	0.88	3.41	65.10	0.57	0.31
16	0.1450	44.800	26.9	2.2	0.63	0.24	0.87	3.57	65.20	0.56	0.31
17	0.1540	45.000	27.1	2.3	0.63	0.24	0.88	3.58	65.20	0.56	0.32
18	0.1630	45.900	28.0	2.4	0.65	0.24	0.90	3.67	65.20	0.57	0.33
19	0.1720	46.100	28.2	2.6	0.66	0.24	0.90	3.68	65.20	0.57	0.33
20	0.1800	46.300	28.4	2.7	0.66	0.24	0.91	3.70	65.20	0.57	0.33
21	0.1900	47.000	29.1	2.9	0.68	0.24	0.92	3.76	65.20	0.58	0.34
22	0.1980	47.000	29.1	3.0	0.67	0.24	0.92	3.76	65.20	0.58	0.34
23	0.2070	47.800	29.9	3.1	0.69	0.23	0.92	4.00	65.30	0.58	0.35
24	0.2160	47.800	29.9	3.3	0.69	0.23	0.92	4.00	65.30	0.58	0.35
25	0.2250	48.100	30.2	3.4	0.70	0.23	0.93	4.02	65.30	0.58	0.35

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
26	0.2340	48.500	30.6	3.6	0.71	0.23	0.94	4.06	65.30	0.58	0.35
27	0.2420	48.800	30.9	3.7	0.71	0.23	0.94	4.09	65.30	0.59	0.36
28	0.2510	49.100	31.2	3.8	0.72	0.23	0.95	4.11	65.30	0.59	0.36
29	0.2600	49.600	31.7	4.0	0.73	0.23	0.96	4.16	65.30	0.59	0.36
30	0.2690	50.000	32.1	4.1	0.74	0.23	0.97	4.19	65.30	0.60	0.37
31	0.2780	50.500	32.6	4.3	0.75	0.23	0.98	4.24	65.30	0.60	0.37
32	0.2870	50.600	32.7	4.4	0.75	0.23	0.98	4.24	65.30	0.60	0.37
33	0.2960	50.900	33.0	4.6	0.75	0.23	0.98	4.27	65.30	0.61	0.38
34	0.3050	51.300	33.4	4.7	0.76	0.23	0.99	4.30	65.30	0.61	0.38
35	0.3140	51.300	33.4	4.9	0.76	0.23	0.99	4.30	65.30	0.61	0.38
36	0.3230	51.600	33.7	5.0	0.77	0.24	1.01	4.13	65.20	0.63	0.38
37	0.3320	51.900	34.0	5.1	0.77	0.23	1.00	4.34	65.30	0.62	0.39
38	0.3410	52.100	34.2	5.3	0.77	0.23	1.00	4.36	65.30	0.62	0.39
39	0.3490	52.300	34.4	5.4	0.78	0.23	1.01	4.37	65.30	0.62	0.39
40	0.3580	52.500	34.6	5.6	0.78	0.23	1.01	4.39	65.30	0.62	0.39
41	0.3670	53.300	35.4	5.7	0.80	0.23	1.03	4.46	65.30	0.63	0.40
42	0.3760	53.300	35.4	5.8	0.80	0.23	1.03	4.46	65.30	0.63	0.40
43	0.3850	53.300	35.4	6.0	0.80	0.23	1.03	4.45	65.30	0.63	0.40
44	0.3940	53.700	35.8	6.1	0.80	0.23	1.03	4.49	65.30	0.63	0.40
45	0.4020	53.700	35.8	6.3	0.80	0.24	1.05	4.28	65.20	0.65	0.40
46	0.4110	54.200	36.3	6.4	0.81	0.24	1.06	4.32	65.20	0.65	0.41
47	0.4200	54.700	36.8	6.5	0.82	0.26	1.08	4.17	65.10	0.67	0.41
48	0.4280	54.800	36.9	6.7	0.82	0.26	1.08	4.17	65.10	0.67	0.41
49	0.4370	54.900	37.0	6.8	0.82	0.26	1.08	4.18	65.10	0.67	0.41
50	0.4460	55.300	37.4	7.0	0.83	0.26	1.09	4.21	65.10	0.67	0.42
51	0.4540	55.400	37.5	7.1	0.83	0.26	1.09	4.21	65.10	0.68	0.42
52	0.4630	55.600	37.7	7.2	0.84	0.26	1.09	4.22	65.10	0.68	0.42
53	0.4720	56.100	38.2	7.4	0.85	0.26	1.10	4.26	65.10	0.68	0.42
54	0.4810	56.600	38.7	7.5	0.86	0.26	1.11	4.30	65.10	0.69	0.43
55	0.4900	56.400	38.5	7.7	0.85	0.26	1.11	4.28	65.10	0.68	0.42
56	0.4990	57.100	39.2	7.8	0.86	0.26	1.12	4.33	65.10	0.69	0.43
57	0.5080	57.200	39.3	8.0	0.86	0.26	1.12	4.33	65.10	0.69	0.43
58	0.5170	57.600	39.7	8.1	0.87	0.26	1.13	4.36	65.10	0.70	0.44
59	0.5260	58.100	40.2	8.2	0.88	0.27	1.16	4.22	65.00	0.71	0.44
60	0.5350	58.300	40.4	8.4	0.88	0.27	1.16	4.23	65.00	0.72	0.44
61	0.5440	58.200	40.3	8.5	0.88	0.27	1.15	4.22	65.00	0.71	0.44
62	0.5530	58.600	40.7	8.7	0.89	0.27	1.16	4.25	65.00	0.72	0.44
63	0.5630	58.500	40.6	8.8	0.88	0.29	1.17	4.07	64.90	0.73	0.44
64	0.5710	59.400	41.5	9.0	0.90	0.29	1.19	4.13	64.90	0.74	0.45
65	0.5790	59.400	41.5	9.1	0.90	0.27	1.18	4.30	65.00	0.72	0.45
66	0.5890	59.500	41.6	9.2	0.90	0.27	1.18	4.30	65.00	0.72	0.45
67	0.5970	59.700	41.8	9.4	0.91	0.29	1.19	4.14	64.90	0.74	0.45
68	0.6060	59.700	41.8	9.5	0.90	0.29	1.19	4.14	64.90	0.74	0.45
69	0.6150	60.000	42.1	9.7	0.91	0.29	1.20	4.16	64.90	0.74	0.45
70	0.6230	60.400	42.5	9.8	0.92	0.29	1.20	4.18	64.90	0.75	0.46
71	0.6320	60.200	42.3	9.9	0.91	0.29	1.20	4.16	64.90	0.74	0.46
72	0.6410	60.700	42.8	10.1	0.92	0.30	1.22	4.04	64.80	0.76	0.46

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
73	0.6490	60.900	43.0	10.2	0.92	0.30	1.23	4.05	64.80	0.76	0.46
74	0.6580	61.100	43.2	10.3	0.93	0.30	1.23	4.06	64.80	0.77	0.46
75	0.6670	61.500	43.6	10.5	0.93	0.32	1.25	3.94	64.70	0.78	0.47
76	0.6760	61.800	43.9	10.6	0.94	0.32	1.25	3.96	64.70	0.79	0.47
77	0.6850	62.300	44.4	10.8	0.95	0.32	1.26	3.99	64.70	0.79	0.47
78	0.6940	62.300	44.4	10.9	0.95	0.32	1.26	3.98	64.70	0.79	0.47
79	0.7030	62.800	44.9	11.1	0.95	0.32	1.27	4.01	64.70	0.79	0.48
80	0.7120	62.900	45.0	11.2	0.95	0.32	1.27	4.01	64.70	0.79	0.48
81	0.7210	63.000	45.1	11.4	0.96	0.32	1.27	4.02	64.70	0.79	0.48
82	0.7300	63.400	45.5	11.5	0.96	0.32	1.28	4.04	64.70	0.80	0.48
83	0.7390	63.700	45.8	11.6	0.97	0.32	1.28	4.05	64.70	0.80	0.48
84	0.7480	63.800	45.9	11.8	0.97	0.32	1.28	4.05	64.70	0.80	0.48
85	0.7570	63.500	45.6	11.9	0.96	0.32	1.28	4.03	64.70	0.80	0.48
86	0.7660	63.700	45.8	12.1	0.96	0.32	1.28	4.04	64.70	0.80	0.48
87	0.7740	64.000	46.1	12.2	0.97	0.32	1.28	4.05	64.70	0.80	0.48
88	0.7830	64.000	46.1	12.3	0.97	0.32	1.28	4.05	64.70	0.80	0.48
89	0.7920	64.400	46.5	12.5	0.97	0.33	1.30	3.94	64.60	0.82	0.49
90	0.8010	64.300	46.4	12.6	0.97	0.33	1.30	3.92	64.60	0.82	0.48
91	0.8100	64.700	46.8	12.8	0.98	0.33	1.31	3.95	64.60	0.82	0.49
92	0.8180	64.900	47.0	12.9	0.98	0.33	1.31	3.95	64.60	0.82	0.49
93	0.8270	65.100	47.2	13.0	0.98	0.33	1.31	3.96	64.60	0.82	0.49
94	0.8360	65.000	47.1	13.2	0.98	0.33	1.31	3.95	64.60	0.82	0.49
95	0.8450	65.000	47.1	13.3	0.98	0.33	1.31	3.95	64.60	0.82	0.49
96	0.8530	65.500	47.6	13.5	0.98	0.33	1.32	3.97	64.60	0.82	0.49
97	0.8630	65.600	47.7	13.6	0.98	0.33	1.32	3.97	64.60	0.82	0.49
98	0.8710	65.900	48.0	13.7	0.99	0.33	1.32	3.99	64.60	0.83	0.49
99	0.8810	66.200	48.3	13.9	0.99	0.33	1.32	4.00	64.60	0.83	0.50
100	0.8890	66.100	48.2	14.0	0.99	0.33	1.32	3.99	64.60	0.83	0.50
101	0.8990	66.500	48.6	14.2	1.00	0.35	1.34	3.88	64.50	0.84	0.50
102	0.9070	66.700	48.8	14.3	1.00	0.35	1.34	3.89	64.50	0.85	0.50
103	0.9160	66.800	48.9	14.5	1.00	0.35	1.35	3.89	64.50	0.85	0.50
104	0.9250	66.800	48.9	14.6	1.00	0.35	1.34	3.89	64.50	0.84	0.50
105	0.9340	67.300	49.4	14.8	1.01	0.35	1.35	3.91	64.50	0.85	0.50
106	0.9430	67.400	49.5	14.9	1.01	0.35	1.35	3.91	64.50	0.85	0.50
107	0.9520	67.000	49.1	15.0	1.00	0.35	1.34	3.88	64.50	0.84	0.50
108	0.9520	67.600	49.7	15.0	1.01	0.35	1.35	3.92	64.50	0.85	0.50
109	0.9610	67.600	49.7	15.2	1.01	0.35	1.35	3.91	64.50	0.85	0.50
110	0.9700	67.900	50.0	15.3	1.01	0.35	1.36	3.93	64.50	0.85	0.51

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	152.150			1210.500
Moisture content: Dry soil+tare, gms.	132.150			889.070
Moisture content: Tare, gms.	83.050			73.330
Moisture, %	40.7	40.2	36.8	39.4
Moist specimen weight, gms.	1153.70			
Diameter, in.	2.868	2.853	2.810	
Area, in. ²	6.460	6.391	6.203	
Height, in.	6.130	6.097	6.008	
Net decrease in height, in.		0.033	0.089	
Wet density, pcf	111.0	112.3	114.6	
Dry density, pcf	78.9	80.2	83.8	
Void ratio	1.0978	1.0640	0.9742	
Saturation, %	98.3	100.0	100.0	

Test Readings for Specimen No. 3

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. = 0.007

Fail. Stress = 2.41 ksf at reading no. 24

Ult. Stress = 1.16 ksf at reading no. 64

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	24.100	0.0	0.0	0.00	2.00	2.00	1.00	60.00	2.00	0.00
1	0.0230	49.800	25.7	0.2	0.60	1.38	1.98	1.43	64.30	1.68	0.30
2	0.0380	60.200	36.1	0.5	0.83	1.25	2.09	1.67	65.20	1.67	0.42
3	0.0520	68.000	43.9	0.7	1.01	1.18	2.19	1.86	65.70	1.69	0.51
4	0.0660	74.800	50.7	0.9	1.17	1.11	2.27	2.05	66.20	1.69	0.58
5	0.0800	81.000	56.9	1.2	1.31	1.07	2.37	2.23	66.50	1.72	0.65
6	0.0950	86.400	62.3	1.4	1.43	1.04	2.46	2.38	66.70	1.75	0.71
7	0.1080	90.900	66.8	1.6	1.53	1.02	2.55	2.49	66.80	1.79	0.76
8	0.1230	95.700	71.6	1.9	1.63	1.01	2.64	2.62	66.90	1.82	0.82
9	0.1360	99.700	75.6	2.1	1.72	0.99	2.71	2.73	67.00	1.85	0.86
10	0.1510	103.300	79.2	2.3	1.80	0.99	2.79	2.81	67.00	1.89	0.90
11	0.1640	106.600	82.5	2.6	1.87	1.01	2.87	2.85	66.90	1.94	0.93
12	0.1780	109.700	85.6	2.8	1.93	1.01	2.94	2.92	66.90	1.97	0.97
13	0.1930	112.700	88.6	3.0	1.99	1.01	3.00	2.98	66.90	2.01	1.00
14	0.2070	115.300	91.2	3.3	2.05	1.01	3.06	3.03	66.90	2.03	1.02
15	0.2210	117.700	93.6	3.5	2.10	1.01	3.10	3.08	66.90	2.06	1.05
16	0.2350	120.000	95.9	3.7	2.14	1.02	3.17	3.10	66.80	2.09	1.07
17	0.2490	121.100	97.0	4.0	2.16	1.04	3.20	3.09	66.70	2.12	1.08
18	0.2630	124.200	100.1	4.2	2.23	1.04	3.26	3.15	66.70	2.15	1.11
19	0.2780	126.200	102.1	4.5	2.26	1.05	3.32	3.15	66.60	2.18	1.13
20	0.2920	128.300	104.2	4.7	2.31	1.07	3.37	3.16	66.50	2.22	1.15
21	0.3060	129.800	105.7	4.9	2.33	1.08	3.41	3.16	66.40	2.25	1.17
22	0.3240	131.400	107.3	5.2	2.36	1.09	3.46	3.16	66.30	2.27	1.18
23	0.3340	132.700	108.6	5.4	2.39	1.09	3.48	3.18	66.30	2.29	1.19
24	0.3480	134.300	110.2	5.6	2.41	1.09	3.51	3.21	66.30	2.30	1.21
25	0.3620	135.500	111.4	5.9	2.43	1.12	3.56	3.17	66.10	2.34	1.22

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
26	0.3760	136.800	112.7	6.1	2.46	1.12	3.58	3.19	66.10	2.35	1.23
27	0.3900	137.200	113.1	6.3	2.46	1.14	3.60	3.16	66.00	2.37	1.23
28	0.4040	138.400	114.3	6.6	2.48	1.15	3.63	3.15	65.90	2.39	1.24
29	0.4180	139.100	115.0	6.8	2.49	1.15	3.64	3.16	65.90	2.40	1.24
30	0.4330	139.600	115.5	7.0	2.49	1.18	3.67	3.11	65.70	2.43	1.25
31	0.4470	139.900	115.8	7.3	2.49	1.18	3.67	3.11	65.70	2.43	1.25
32	0.4610	140.200	116.1	7.5	2.49	1.20	3.69	3.09	65.60	2.44	1.25
33	0.4750	140.000	115.9	7.7	2.48	1.21	3.69	3.05	65.50	2.45	1.24
34	0.4890	139.300	115.2	8.0	2.46	1.21	3.67	3.03	65.50	2.44	1.23
35	0.5030	137.300	113.2	8.2	2.41	1.22	3.64	2.97	65.40	2.43	1.21
36	0.5170	133.400	109.3	8.4	2.32	1.24	3.56	2.88	65.30	2.40	1.16
37	0.5320	129.800	105.7	8.7	2.24	1.25	3.49	2.79	65.20	2.37	1.12
38	0.5450	125.100	101.0	8.9	2.14	1.25	3.39	2.70	65.20	2.32	1.07
39	0.5600	120.100	96.0	9.2	2.02	1.27	3.29	2.60	65.10	2.28	1.01
40	0.5740	115.300	91.2	9.4	1.92	1.27	3.19	2.51	65.10	2.23	0.96
41	0.5880	111.000	86.9	9.6	1.82	1.27	3.09	2.44	65.10	2.18	0.91
42	0.6020	107.500	83.4	9.9	1.75	1.27	3.01	2.38	65.10	2.14	0.87
43	0.6160	104.600	80.5	10.1	1.68	1.27	2.95	2.33	65.10	2.11	0.84
44	0.6310	101.500	77.4	10.3	1.61	1.25	2.86	2.29	65.20	2.06	0.81
45	0.6450	99.000	74.9	10.6	1.55	1.27	2.82	2.23	65.10	2.04	0.78
46	0.6590	96.600	72.5	10.8	1.50	1.27	2.77	2.18	65.10	2.02	0.75
47	0.6730	94.900	70.8	11.0	1.46	1.27	2.73	2.15	65.10	2.00	0.73
48	0.6880	93.500	69.4	11.3	1.43	1.27	2.70	2.13	65.10	1.98	0.71
49	0.7020	91.500	67.4	11.5	1.38	1.27	2.65	2.09	65.10	1.96	0.69
50	0.7160	90.100	66.0	11.8	1.35	1.27	2.62	2.07	65.10	1.94	0.68
51	0.7300	88.900	64.8	12.0	1.32	1.27	2.59	2.04	65.10	1.93	0.66
52	0.7440	88.100	64.0	12.2	1.30	1.25	2.56	2.04	65.20	1.90	0.65
53	0.7580	86.600	62.5	12.5	1.27	1.24	2.51	2.03	65.30	1.87	0.64
54	0.7730	86.200	62.1	12.7	1.26	1.24	2.50	2.02	65.30	1.87	0.63
55	0.7870	85.300	61.2	12.9	1.24	1.24	2.48	2.00	65.30	1.86	0.62
56	0.8010	84.700	60.6	13.2	1.22	1.24	2.46	1.99	65.30	1.85	0.61
57	0.8150	84.500	60.4	13.4	1.21	1.24	2.45	1.98	65.30	1.85	0.61
58	0.8290	84.200	60.1	13.6	1.20	1.24	2.44	1.97	65.30	1.84	0.60
59	0.8430	83.700	59.6	13.9	1.19	1.24	2.43	1.96	65.30	1.83	0.60
60	0.8580	83.700	59.6	14.1	1.19	1.24	2.43	1.96	65.30	1.83	0.59
61	0.8710	83.600	59.5	14.3	1.18	1.24	2.42	1.96	65.30	1.83	0.59
62	0.8860	83.300	59.2	14.6	1.17	1.21	2.38	1.97	65.50	1.80	0.59
63	0.9000	83.000	58.9	14.8	1.16	1.21	2.37	1.96	65.50	1.79	0.58
64	0.9140	83.000	58.9	15.0	1.16	1.21	2.37	1.96	65.50	1.79	0.58

**ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
TEST FOR COHESIVE SOILS**

Project No.: 1461-16-047.2B
Project Name: Carolina Crossroads Project
Sample ID: W-27 UD-1
Depth: 13.5-15.5'

Failed Specimens

Specimen No.: 1
Effective Confining Pressure: 3.5 psi
Notes: Failed in bulge



Specimen No.: 2
Effective Confining Pressure: 6.9 psi
Notes: Failed in shear



Specimen No.: 3
Effective Confining Pressure: 13.9
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-4	RC-12	106.2 - 107.5	5.58	2.49	C	4.87	171.3	62	62,084	12,748	0.1
DH-4	RC-14	115.2 - 116.4	5.40	2.49	D	4.87	170.9	75	37,068	7,611	0.1
DH-5	RC-2	45.6 - 46.8	5.41	2.48	D	4.83	178.5	53	18,593	3,849	0.3
DH-5	RC-4	56.2 - 57.3	5.39	2.49	D	4.87	170.9	49	7,406	1,521	0.1
DH-5	RC-8	75.9 - 76.9	5.46	2.49	D	4.87	172.4	65	24,591	5,049	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-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: 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							
DH-5	RC-5	60.6 - 62.1	5.55	2.49	B	4.87	171.1	32	26,017	5,342	0.1
DH-5	RC-15	112.5 - 113.5	5.57	2.49	B	4.87	171.5	30	20,867	4,285	0.4
B-50	RC-2	81.2 - 82.2	4.43	1.96	A	3.02	172.5	22	4,745	1,571	0.3
B-49	RC-3	49.2 - 50.3	4.48	1.98	D	3.08	167.8	46	18,229	5,919	0.3
B-49	RC-5	56.6 - 57.6	4.38	1.98	A	3.08	169.4	46	19,997	6,493	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."

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- 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)
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- 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)

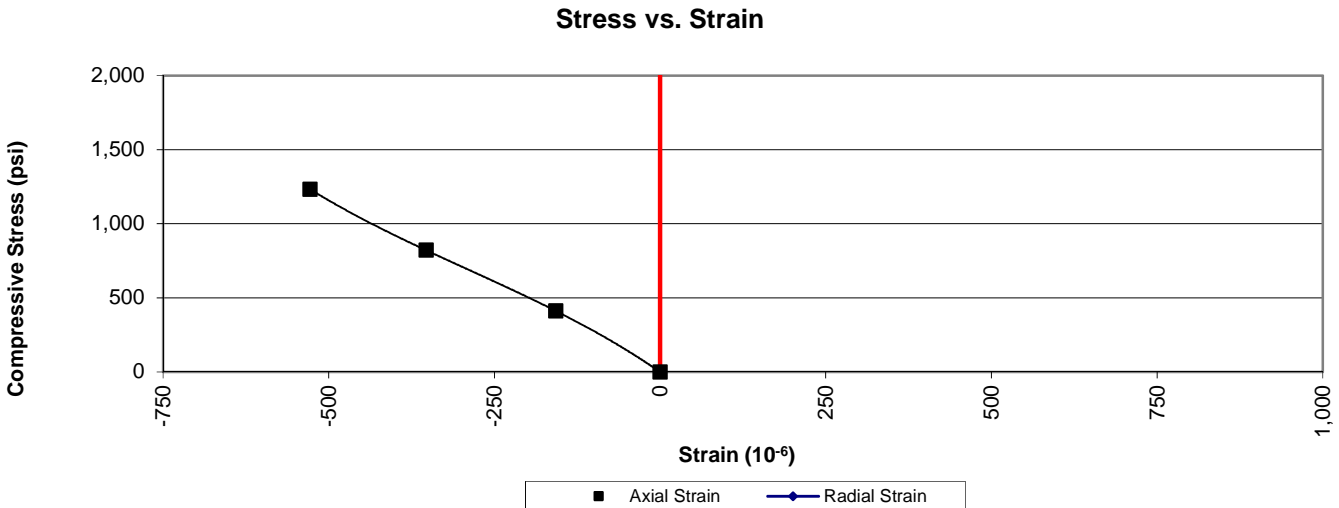


1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.39	Tested by:	BKP / MG
Boring Id:	DH-5	Unit Weight, pcf:	170.9	Reviewed by:	JBB
Sample No:	RC-4	Moisture Content, %:	0.1		
Depth (ft):	56.2 - 57.3	Load Rate, psi/sec:	49		

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	-157		2,000	411	2.62		
3	-353		4,000	821	2.33		
4	-528		6,000	1,232	2.33		
5			7,406	1,521			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes. Due to the low compressive strength of this specimen, readings of deformation at a minimum of ten evenly spaced load intervals were not able to be obtained. 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.



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)

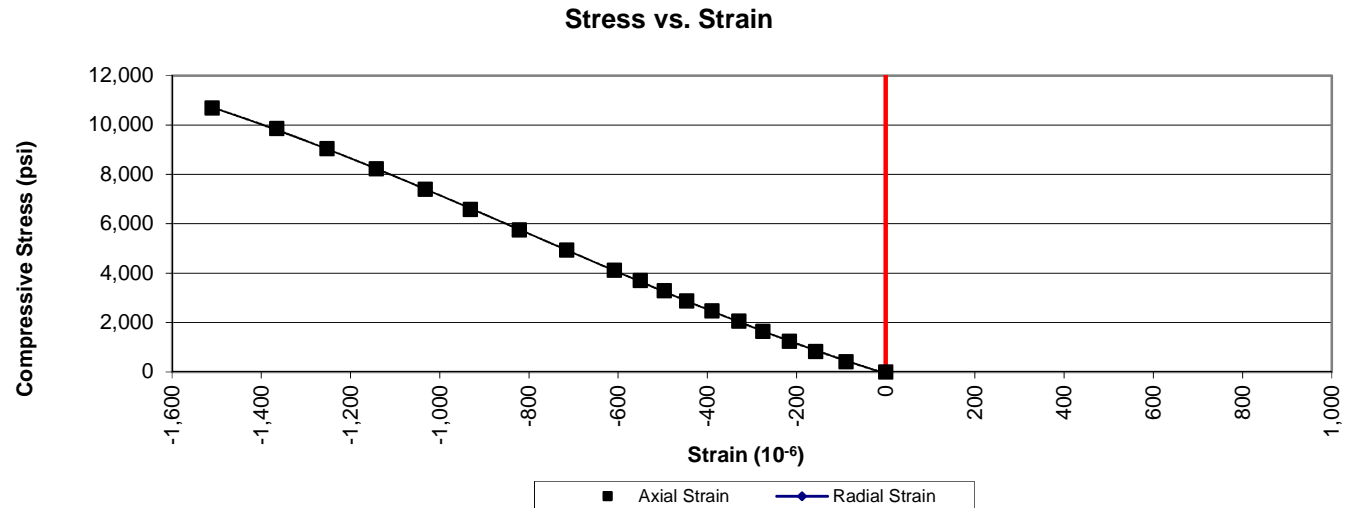


1413 Topside Road, Louisville, TN 37777

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-5	Unit Weight, pcf:	171.2	Reviewed by:	JBB
Sample No:	RC-10	Moisture Content, %:	0.1		
Depth (ft):	88.4 - 89.4	Load Rate, psi/sec:	71		

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	-89		2,000	411	4.62		
3	-157		4,000	821	5.23		
4	-216		6,000	1,232	5.70		
5	-275		8,000	1,643	5.97		
6	-329		10,000	2,053	6.24		
7	-389		12,000	2,464	6.33		
8	-446		14,000	2,875	6.45		
9	-496		16,000	3,285	6.62		
10	-550		18,000	3,696	6.72		
11	-608		20,000	4,107	6.75		
12	-715		24,000	4,928	6.89		
13	-821		28,000	5,749	7.00		
14	-931		32,000	6,571	7.06		
15	-1,032		36,000	7,392	7.16		
16	-1,142		40,000	8,214	7.19		
17	-1,252		44,000	9,035	7.22		
18	-1,365		48,000	9,856	7.22		
19	-1,510		52,000	10,678	7.07		
20			52,888	10,860			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 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)



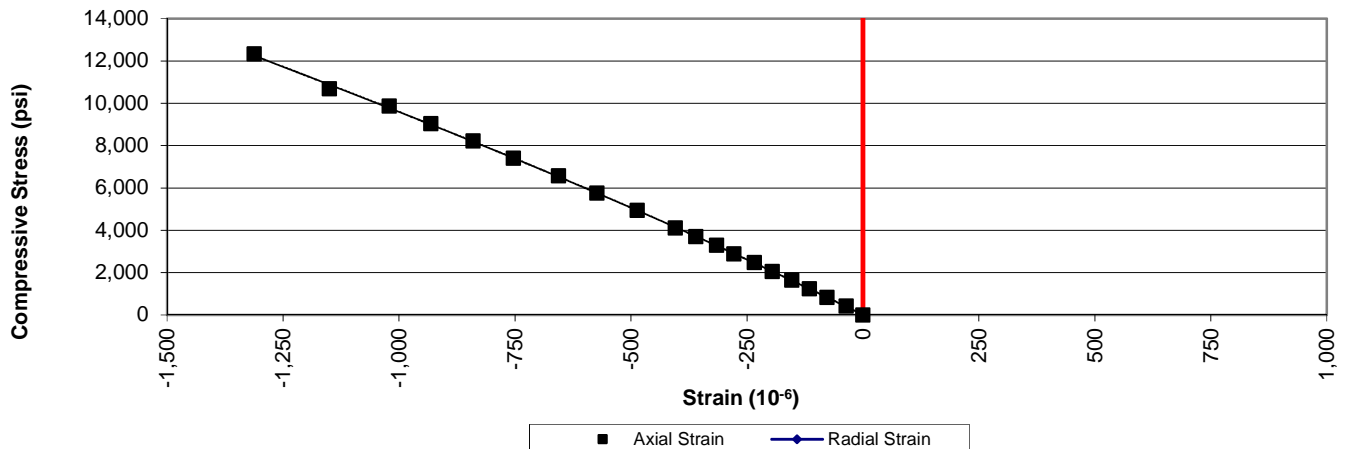
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.70	Tested by:	BKP / MG
Boring Id:	DH-5	Unit Weight, pcf:	176.0	Reviewed by:	JBB
Sample No:	RC-14	Moisture Content, %:	0.1		
Depth (ft):	106.2 - 107.3	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	-36		2,000	411	11.42		
3	-77		4,000	821	10.66		
4	-115		6,000	1,232	10.71		
5	-153		8,000	1,643	10.74		
6	-195		10,000	2,053	10.53		
7	-234		12,000	2,464	10.53		
8	-278		14,000	2,875	10.34		
9	-315		16,000	3,285	10.43		
10	-360		18,000	3,696	10.27		
11	-404		20,000	4,107	10.17		
12	-486		24,000	4,928	10.14		
13	-573		28,000	5,749	10.03		
14	-656		32,000	6,571	10.02		
15	-753		36,000	7,392	9.82		
16	-840		40,000	8,214	9.78		
17	-931		44,000	9,035	9.70		
18	-1,021		48,000	9,856	9.65		
19	-1,150		52,000	10,678	9.29		
20	-1,312		60,000	12,320	9.39		
21			64,454	13,235			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 & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.

Stress vs. Strain



UNCONFINED COMPRESSION WITH YOUNG'S MODULUS
(ASTM D7012 Method C and D)

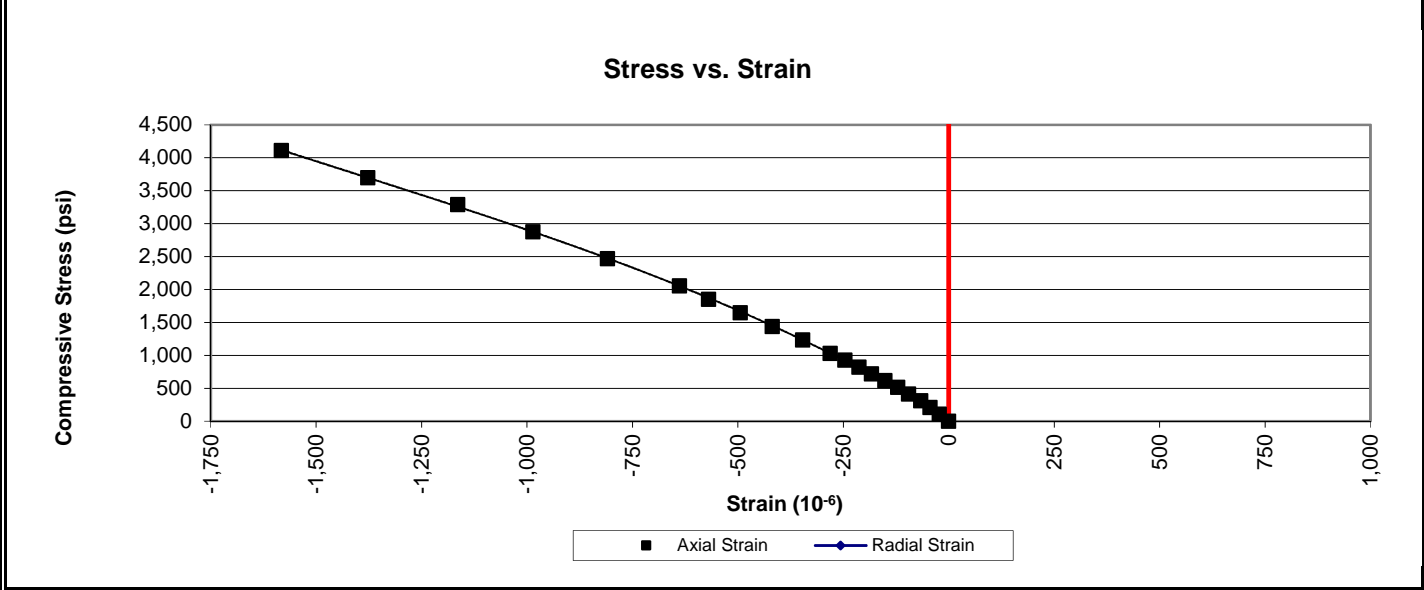


1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	3/12/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.57	Tested by:	BKP / MG
Boring Id:	DH-5	Unit Weight, pcf:	171.5	Reviewed by:	JBB
Sample No:	RC-15	Moisture Content, %:	0.4		
Depth (ft):	112.5 - 113.5	Load Rate, psi/sec:	30		

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	-22		500	103	4.68		
3	-44		1,000	205	4.66		
4	-66		1,500	308	4.67		
5	-95		2,000	411	4.33		
6	-121		2,500	513	4.24		
7	-151		3,000	616	4.08		
8	-183		3,500	719	3.93		
9	-213		4,000	821	3.85		
10	-246		4,500	924	3.76		
11	-281		5,000	1,027	3.65		
12	-346		6,000	1,232	3.56		
13	-418		7,000	1,437	3.44		
14	-494		8,000	1,643	3.33		
15	-569		9,000	1,848	3.25		
13	-638		10,000	2,053	3.22		
14	-809		12,000	2,464	3.05		
15	-986		14,000	2,875	2.92		
16	-1,164		16,000	3,285	2.82		
17	-1,377		18,000	3,696	2.68		
18	-1,582		20,000	4,107	2.60		
19			20,867	4,285			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 & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.



**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

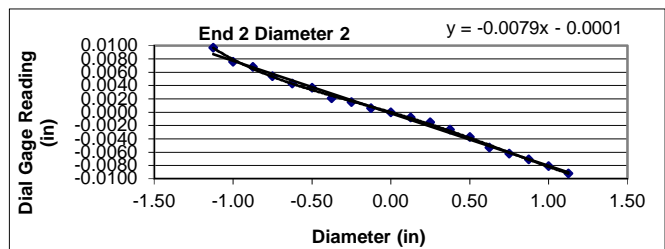
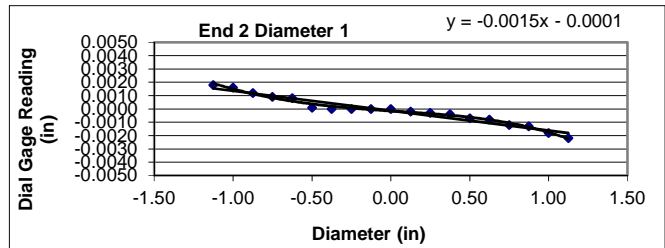
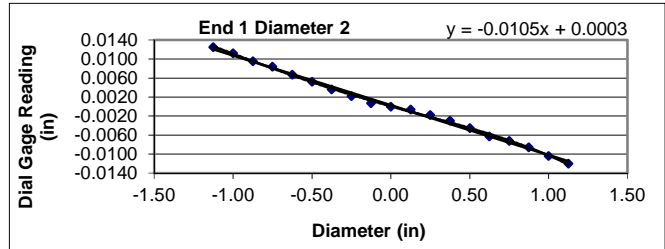
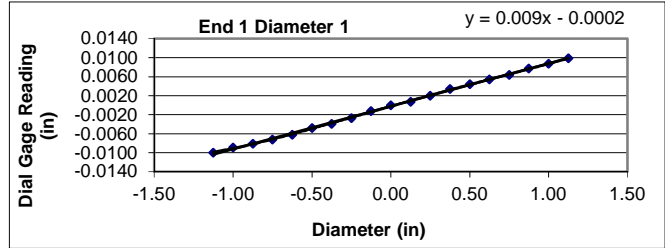
Project:	Carolina Crossroads Project	Diameter (in):	2.48	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.41	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	178.5	Reviewed by:	JBB
Sample No.:	RC-2	Moisture Content (%):	0.3		
Depth (ft):	45.6-46.8				

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	-0.0100	0.0125	0.0018	0.0097
-1	-0.0089	0.0112	0.0016	0.0076
- 7/8	-0.0081	0.0095	0.0012	0.0068
- 6/8	-0.0072	0.0084	0.0009	0.0054
- 5/8	-0.0062	0.0067	0.0008	0.0043
- 4/8	-0.0048	0.0052	0.0001	0.0037
- 3/8	-0.0039	0.0036	0.0000	0.0021
- 2/8	-0.0027	0.0022	0.0000	0.0015
- 1/8	-0.0012	0.0007	0.0000	0.0006
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0007	-0.0006	-0.0002	-0.0008
2/8	0.0020	-0.0018	-0.0003	-0.0015
3/8	0.0034	-0.0030	-0.0004	-0.0026
4/8	0.0044	-0.0045	-0.0007	-0.0037
5/8	0.0054	-0.0063	-0.0008	-0.0053
6/8	0.0064	-0.0072	-0.0012	-0.0062
7/8	0.0077	-0.0086	-0.0013	-0.0071
1	0.0087	-0.0104	-0.0018	-0.0081
1 1/8	0.0099	-0.0120	-0.0022	-0.0092



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:	0.00898
	Angle of Best Fit Line:	0.51474
End 2:	Slope of Best Fit Line:	-0.00149
	Angle of Best Fit Line:	-0.08564
	Max Angular Difference:	0.60

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.01048
	Angle of Best Fit Line:	-0.60030
End 2:	Slope of Best Fit Line:	-0.00788
	Angle of Best Fit Line:	-0.45169
	Max Angular Difference:	-0.15

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	0.0199	0.0080	NO
End 1 Diam 2	0.0245	0.0099	NO
End 2 Diam 1	0.0040	0.0016	YES
End 2 Diam 2	0.0189	0.0076	NO

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

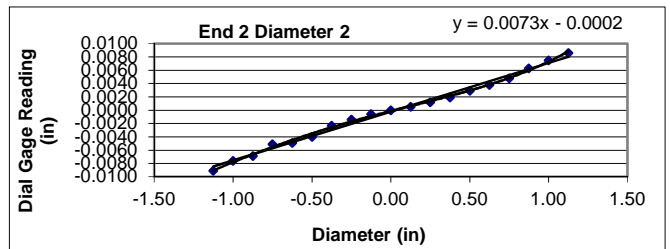
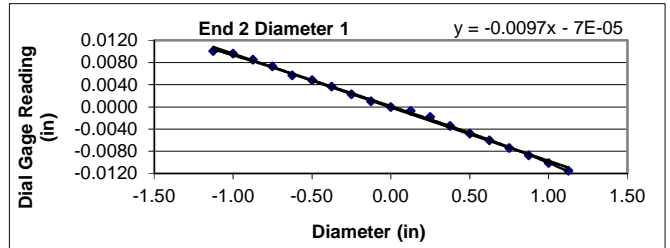
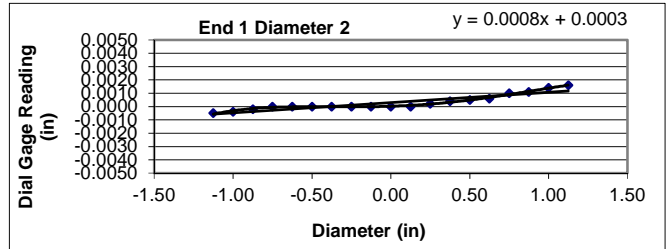
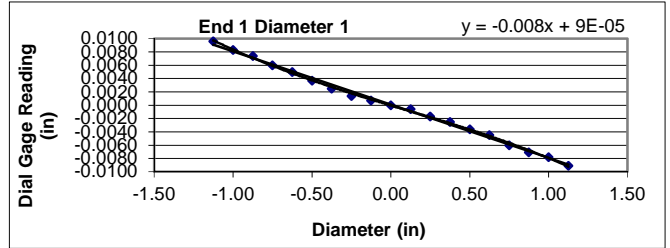
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.39	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	170.9	Reviewed by:	JBB
Sample No.:	RC-4	Moisture Content (%):	0.1		
Depth (ft):	56.2-57.3				

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(90)	End 2(90)
-1 1/8	0.0096	-0.0005	0.0101	-0.0091
-1	0.0083	-0.0004	0.0096	-0.0076
- 7/8	0.0074	-0.0002	0.0085	-0.0069
- 6/8	0.0060	0.0000	0.0073	-0.0051
- 5/8	0.0050	0.0000	0.0057	-0.0049
- 4/8	0.0037	0.0000	0.0048	-0.0040
- 3/8	0.0025	0.0000	0.0037	-0.0023
- 2/8	0.0014	0.0000	0.0023	-0.0014
- 1/8	0.0007	0.0000	0.0010	-0.0006
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0006	0.0000	-0.0007	0.0005
2/8	-0.0017	0.0002	-0.0018	0.0012
3/8	-0.0025	0.0004	-0.0034	0.0019
4/8	-0.0036	0.0005	-0.0048	0.0029
5/8	-0.0045	0.0006	-0.0060	0.0038
6/8	-0.0060	0.0010	-0.0074	0.0048
7/8	-0.0071	0.0011	-0.0087	0.0063
1	-0.0078	0.0014	-0.0101	0.0075
1 1/8	-0.0091	0.0016	-0.0115	0.0086



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:	-0.00800
	Angle of Best Fit Line:	-0.45821
End 2:	Slope of Best Fit Line:	-0.00967
	Angle of Best Fit Line:	-0.55382
	Max Angular Difference:	0.10

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00077
	Angle of Best Fit Line:	0.04423
End 2:	Slope of Best Fit Line:	0.00732
	Angle of Best Fit Line:	0.41969
	Max Angular Difference:	-0.38

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	0.0187	0.0075	NO
End 1 Diam 2	0.0021	0.0008	YES
End 2 Diam 1	0.0216	0.0087	NO
End 2 Diam 2	0.0177	0.0071	NO

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):	5.46	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	172.4	Reviewed by:	JBB
Sample No.:	RC-8	Moisture Content (%):	0.2		
Depth (ft):	75.9-76.9				

Deviation From Straightness (Procedure S1)

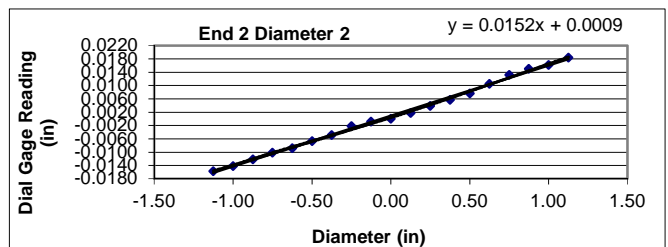
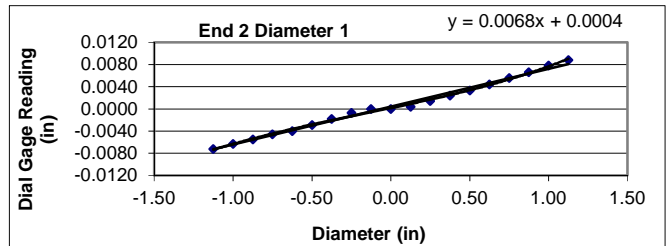
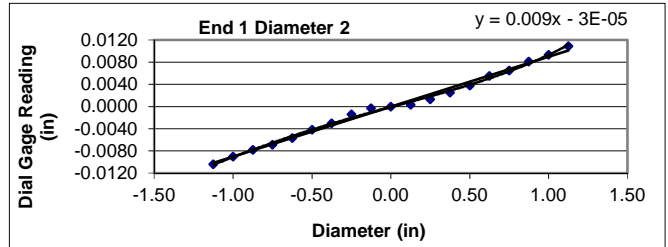
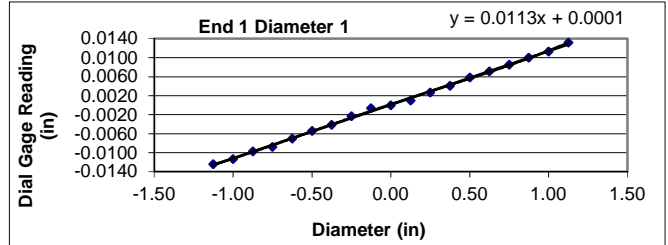
Is the maximum gap ≤ 0.02 in.? NO Straightness Tolerance Met? NO

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	-0.0124	-0.0104	-0.0072	-0.0157
-1	-0.0113	-0.0090	-0.0063	-0.0142
- 7/8	-0.0097	-0.0078	-0.0055	-0.0122
- 6/8	-0.0088	-0.0069	-0.0046	-0.0101
- 5/8	-0.0070	-0.0057	-0.0040	-0.0088
- 4/8	-0.0054	-0.0042	-0.0029	-0.0067
- 3/8	-0.0041	-0.0030	-0.0018	-0.0049
- 2/8	-0.0023	-0.0014	-0.0007	-0.0022
- 1/8	-0.0006	-0.0003	0.0000	-0.0008
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0010	0.0003	0.0004	0.0018
2/8	0.0027	0.0013	0.0014	0.0039
3/8	0.0041	0.0025	0.0024	0.0057
4/8	0.0058	0.0038	0.0033	0.0076
5/8	0.0071	0.0055	0.0044	0.0105
6/8	0.0085	0.0065	0.0056	0.0132
7/8	0.0100	0.0081	0.0066	0.0150
1	0.0113	0.0093	0.0078	0.0162
1 1/8	0.0132	0.0109	0.0088	0.0184

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:	0.01129
	Angle of Best Fit Line:	0.64686
End 2:	Slope of Best Fit Line:	0.00683
	Angle of Best Fit Line:	0.39138
	Max Angular Difference:	0.26

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00899
	Angle of Best Fit Line:	0.51490
End 2:	Slope of Best Fit Line:	0.01517
	Angle of Best Fit Line:	0.86897
	Max Angular Difference:	-0.35

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	0.0256	0.0103	NO
End 1 Diam 2	0.0213	0.0086	NO
End 2 Diam 1	0.0160	0.0064	NO
End 2 Diam 2	0.0341	0.0137	NO

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

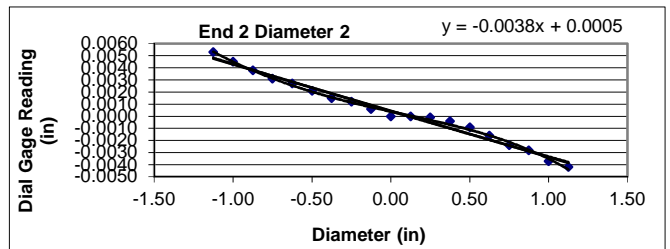
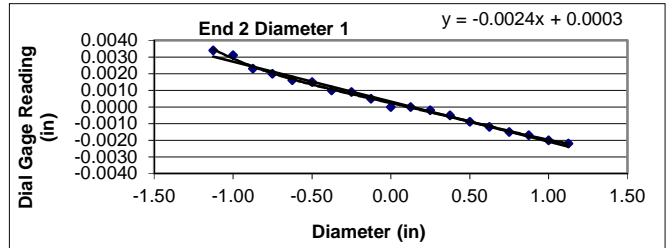
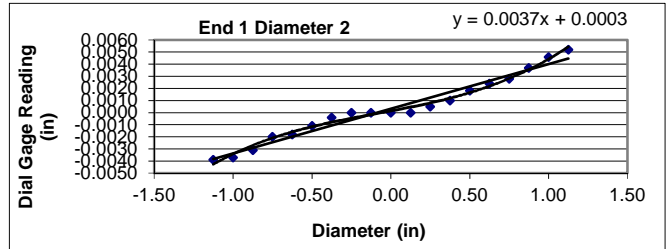
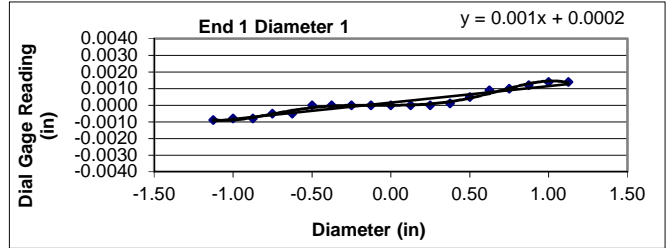
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.64	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	171.2	Reviewed by:	JBB
Sample No.:	RC-10	Moisture Content (%):	0.1		
Depth (ft):	88.4-89.4				

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	-0.0009	-0.0039	0.0034	0.0053
-1	-0.0008	-0.0037	0.0031	0.0045
- 7/8	-0.0008	-0.0031	0.0023	0.0038
- 6/8	-0.0005	-0.0020	0.0020	0.0031
- 5/8	-0.0005	-0.0018	0.0016	0.0027
- 4/8	0.0000	-0.0011	0.0015	0.0021
- 3/8	0.0000	-0.0004	0.0010	0.0015
- 2/8	0.0000	0.0000	0.0009	0.0012
- 1/8	0.0000	0.0000	0.0005	0.0006
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0005	-0.0002	-0.0001
3/8	0.0001	0.0010	-0.0005	-0.0004
4/8	0.0005	0.0018	-0.0009	-0.0009
5/8	0.0009	0.0024	-0.0012	-0.0016
6/8	0.0010	0.0028	-0.0015	-0.0024
7/8	0.0012	0.0037	-0.0017	-0.0028
1	0.0014	0.0046	-0.0020	-0.0037
1 1/8	0.0014	0.0052	-0.0022	-0.0042



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:	0.00099
	Angle of Best Fit Line:	0.05677
End 2:	Slope of Best Fit Line:	-0.00240
	Angle of Best Fit Line:	-0.13751
	Max Angular Difference:	0.19

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00368
	Angle of Best Fit Line:	0.21109
End 2:	Slope of Best Fit Line:	-0.00383
	Angle of Best Fit Line:	-0.21929
	Max Angular Difference:	0.43

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	0.0023	0.0009	YES
End 1 Diam 2	0.0091	0.0037	YES
End 2 Diam 1	0.0056	0.0022	YES
End 2 Diam 2	0.0095	0.0038	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

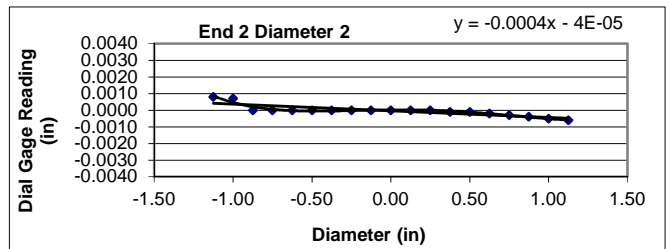
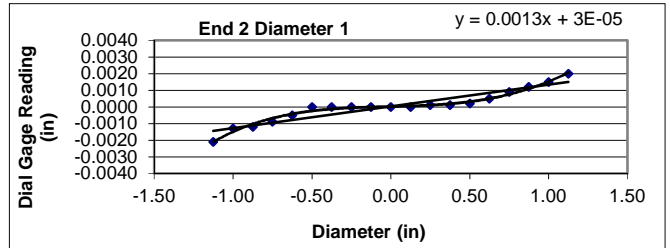
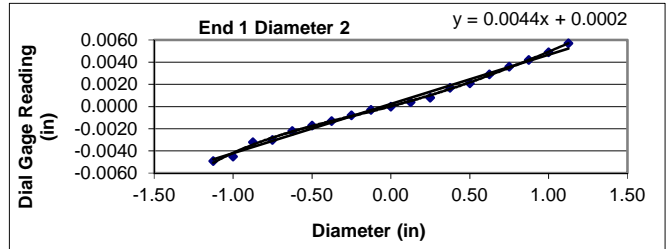
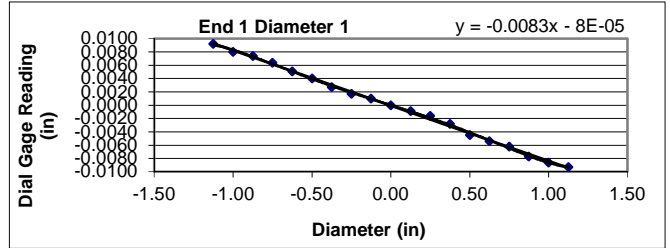
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.54	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	174.8	Reviewed by:	JBB
Sample No.:	RC-12	Moisture Content (%):	0.1		
Depth (ft):	95.6-96.5				

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	0.0092	-0.0049	-0.0021	0.0008
-1	0.0080	-0.0045	-0.0013	0.0007
- 7/8	0.0074	-0.0032	-0.0012	0.0000
- 6/8	0.0064	-0.0030	-0.0009	0.0000
- 5/8	0.0051	-0.0022	-0.0005	0.0000
- 4/8	0.0040	-0.0017	0.0000	0.0000
- 3/8	0.0027	-0.0013	0.0000	0.0000
- 2/8	0.0017	-0.0008	0.0000	0.0000
- 1/8	0.0010	-0.0003	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0009	0.0004	0.0000	0.0000
2/8	-0.0016	0.0008	0.0001	0.0000
3/8	-0.0028	0.0017	0.0001	-0.0001
4/8	-0.0045	0.0021	0.0002	-0.0001
5/8	-0.0054	0.0029	0.0005	-0.0002
6/8	-0.0062	0.0036	0.0009	-0.0003
7/8	-0.0077	0.0042	0.0012	-0.0004
1	-0.0086	0.0049	0.0015	-0.0005
1 1/8	-0.0093	0.0057	0.0020	-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:	-0.00831
	Angle of Best Fit Line:	-0.47614
End 2:	Slope of Best Fit Line:	0.00131
	Angle of Best Fit Line:	0.07495
	Max Angular Difference:	-0.55

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00443
	Angle of Best Fit Line:	0.25379
End 2:	Slope of Best Fit Line:	-0.00040
	Angle of Best Fit Line:	-0.02292
	Max Angular Difference:	0.28

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	0.0185	0.0074	NO
End 1 Diam 2	0.0106	0.0043	YES
End 2 Diam 1	0.0041	0.0016	YES
End 2 Diam 2	0.0014	0.0006	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

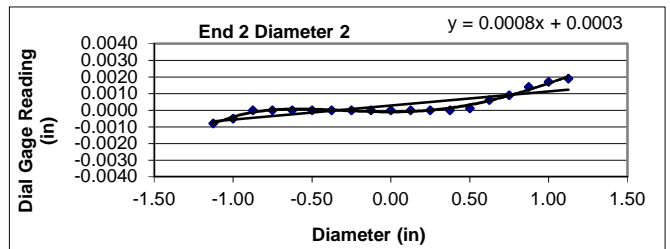
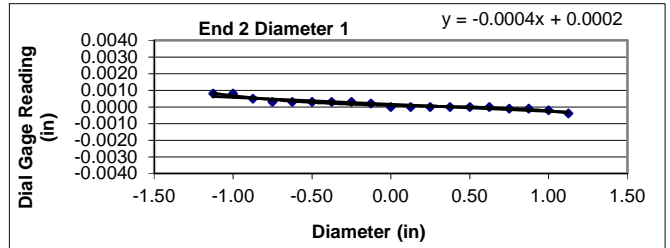
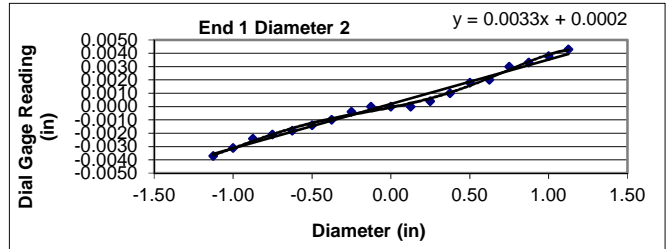
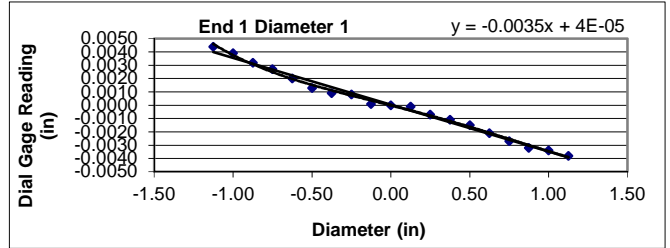
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.70	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	176.0	Reviewed by:	JBB
Sample No.:	RC-14	Moisture Content (%):	0.1		
Depth (ft):	106.2-107.3				

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	0.0044	-0.0037	0.0008	-0.0008
-1	0.0039	-0.0031	0.0008	-0.0005
- 7/8	0.0032	-0.0024	0.0005	0.0000
- 6/8	0.0027	-0.0021	0.0003	0.0000
- 5/8	0.0020	-0.0018	0.0003	0.0000
- 4/8	0.0013	-0.0014	0.0003	0.0000
- 3/8	0.0009	-0.0010	0.0003	0.0000
- 2/8	0.0008	-0.0004	0.0003	0.0000
- 1/8	0.0001	0.0000	0.0002	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0001	0.0000	0.0000	0.0000
2/8	-0.0007	0.0004	0.0000	0.0000
3/8	-0.0011	0.0010	0.0000	0.0000
4/8	-0.0015	0.0018	0.0000	0.0001
5/8	-0.0021	0.0020	0.0000	0.0006
6/8	-0.0027	0.0030	-0.0001	0.0009
7/8	-0.0032	0.0033	-0.0001	0.0014
1	-0.0034	0.0038	-0.0002	0.0017
1 1/8	-0.0038	0.0043	-0.0004	0.0019



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:	-0.00351
	Angle of Best Fit Line:	-0.20128
End 2:	Slope of Best Fit Line:	-0.00042
	Angle of Best Fit Line:	-0.02396
	Max Angular Difference:	-0.18

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00333
	Angle of Best Fit Line:	0.19066
End 2:	Slope of Best Fit Line:	0.00085
	Angle of Best Fit Line:	0.04865
	Max Angular Difference:	0.14

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	0.0082	0.0033	YES
End 1 Diam 2	0.0080	0.0032	YES
End 2 Diam 1	0.0012	0.0005	YES
End 2 Diam 2	0.0027	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):	2.49	Date:	3/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.57	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	171.5	Reviewed by:	JBB
Sample No.:	RC-15	Moisture Content (%):	0.4		
Depth (ft):	112.5 - 113.5				

Deviation From Straightness (Procedure S1)

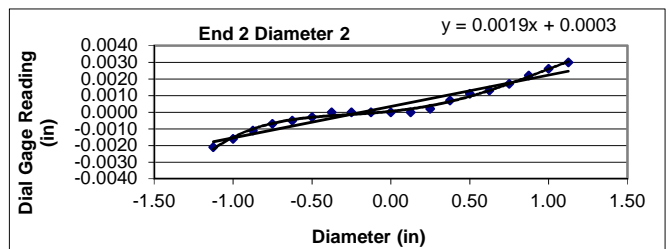
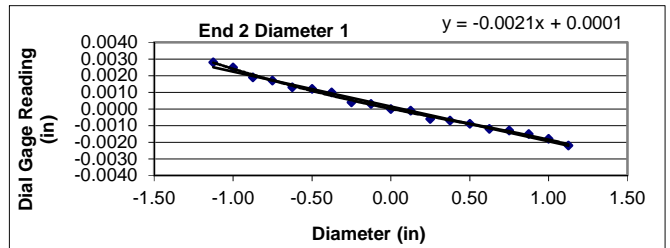
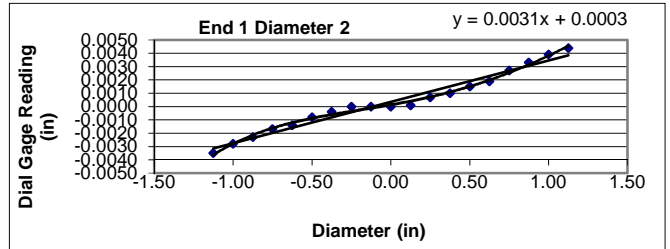
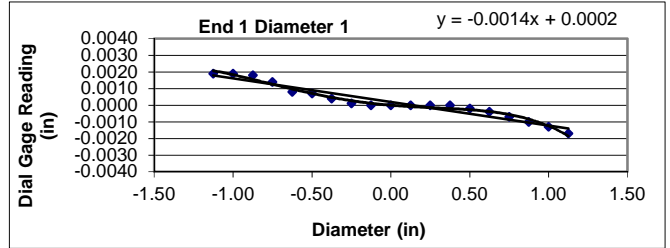
Is the maximum gap ≤ 0.02 in.? NO Straightness Tolerance Met? NO

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	0.0019	-0.0035	0.0028	-0.0021
-1	0.0019	-0.0028	0.0025	-0.0016
- 7/8	0.0018	-0.0023	0.0019	-0.0011
- 6/8	0.0014	-0.0017	0.0017	-0.0007
- 5/8	0.0008	-0.0014	0.0013	-0.0005
- 4/8	0.0007	-0.0008	0.0012	-0.0003
- 3/8	0.0004	-0.0004	0.0010	0.0000
- 2/8	0.0001	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	0.0000	0.0001	-0.0001	0.0000
2/8	0.0000	0.0007	-0.0006	0.0002
3/8	0.0000	0.0010	-0.0007	0.0007
4/8	-0.0002	0.0015	-0.0009	0.0011
5/8	-0.0004	0.0019	-0.0012	0.0013
6/8	-0.0007	0.0027	-0.0013	0.0017
7/8	-0.0010	0.0033	-0.0015	0.0022
1	-0.0013	0.0039	-0.0018	0.0026
1 1/8	-0.0017	0.0044	-0.0022	0.0030

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:	-0.08138
End 2:	Slope of Best Fit Line:	-0.00210
	Angle of Best Fit Line:	-0.12030
	Max Angular Difference:	0.04

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00311
	Angle of Best Fit Line:	0.17828
End 2:	Slope of Best Fit Line:	0.00188
	Angle of Best Fit Line:	0.10784
	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	0.0036	0.0014	YES
End 1 Diam 2	0.0079	0.0032	YES
End 2 Diam 1	0.0050	0.0020	YES
End 2 Diam 2	0.0051	0.0020	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

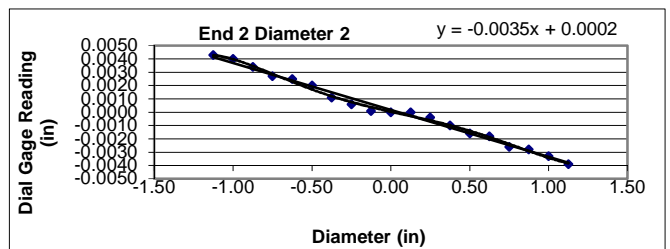
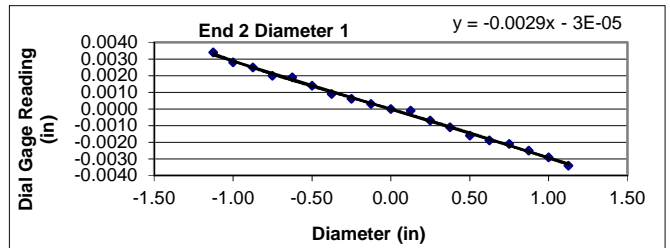
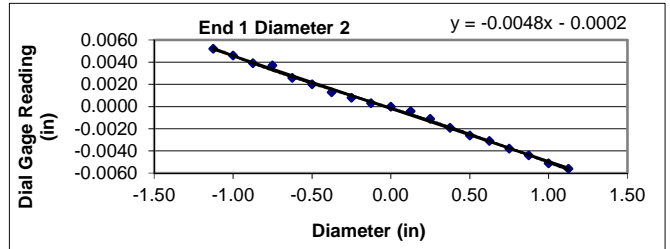
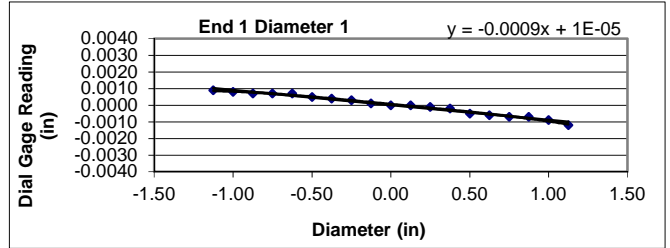
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.55	Tested by:	BKP
Boring Id:	DH-5	Unit Weight (pcf):	171.1	Reviewed by:	JBB
Sample No.:	RC-5	Moisture Content (%):	0.1		
Depth (ft):	60.6 - 62.1				

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)
-1 1/8	0.0009	0.0052	0.0034	0.0043
-1	0.0008	0.0046	0.0028	0.0040
- 7/8	0.0007	0.0039	0.0025	0.0034
- 6/8	0.0007	0.0037	0.0020	0.0027
- 5/8	0.0007	0.0026	0.0019	0.0025
- 4/8	0.0005	0.0020	0.0014	0.0020
- 3/8	0.0004	0.0013	0.0009	0.0011
- 2/8	0.0003	0.0008	0.0006	0.0006
- 1/8	0.0001	0.0003	0.0003	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0004	-0.0001	0.0000
2/8	-0.0001	-0.0011	-0.0007	-0.0004
3/8	-0.0002	-0.0019	-0.0011	-0.0010
4/8	-0.0005	-0.0026	-0.0016	-0.0016
5/8	-0.0006	-0.0031	-0.0019	-0.0018
6/8	-0.0007	-0.0038	-0.0021	-0.0026
7/8	-0.0007	-0.0044	-0.0025	-0.0028
1	-0.0009	-0.0051	-0.0029	-0.0033
1 1/8	-0.0012	-0.0056	-0.0034	-0.0039



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:	-0.00090
	Angle of Best Fit Line:	-0.05139
End 2:	Slope of Best Fit Line:	-0.00290
	Angle of Best Fit Line:	-0.16598
	Max Angular Difference:	0.11

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00476
	Angle of Best Fit Line:	-0.27253
End 2:	Slope of Best Fit Line:	-0.00353
	Angle of Best Fit Line:	-0.20240
	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	0.0021	0.0008	YES
End 1 Diam 2	0.0108	0.0043	YES
End 2 Diam 1	0.0068	0.0027	YES
End 2 Diam 2	0.0082	0.0033	YES

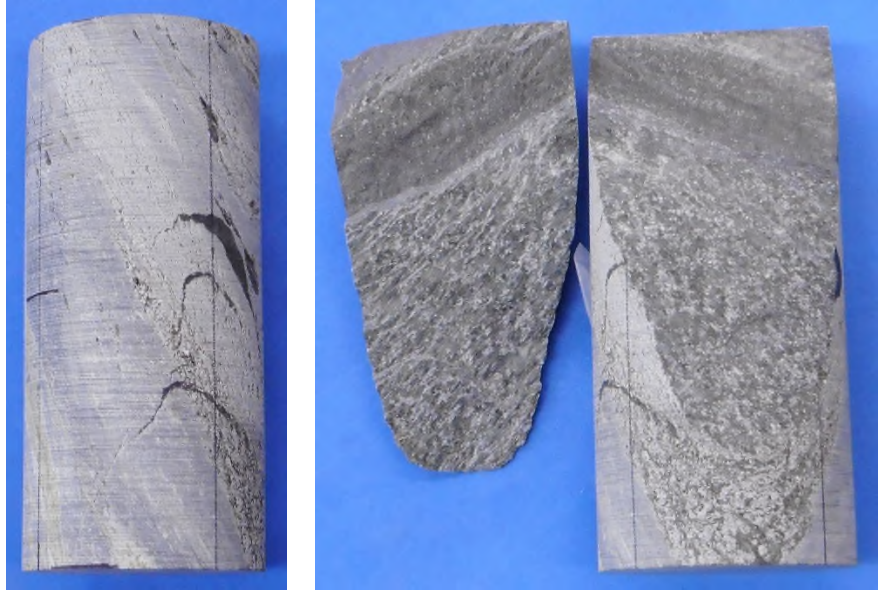
Perpendicularity Tolerance Met? YES


		Date: 2/19/2018
		Photographer: Ben Painter
7	Location / Orientation	DH-4, RC-14 (115.2' – 116.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 2/19/2018
		Photographer: Ben Painter
8	Location / Orientation	DH-5, RC-2 (45.6' – 46.8')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

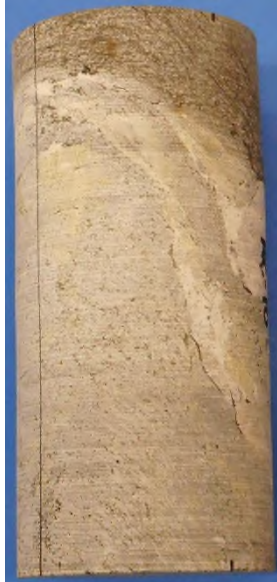
		Date: 2/19/2018
		Photographer: Ben Painter
9	Location / Orientation	DH-5, RC-4 (56.2' – 57.3')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 2/19/2018
		Photographer: Ben Painter
10	Location / Orientation	DH-5, RC-8 (75.9' – 76.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

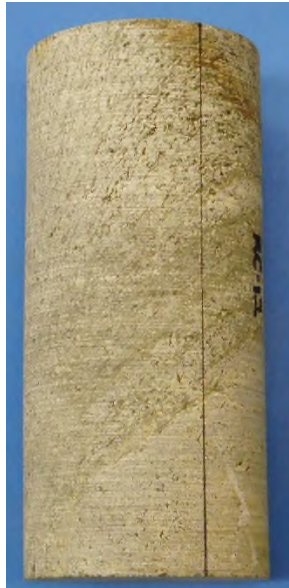
		Date: 3/12/2018
		Photographer: Ben Painter
1	Location / Orientation	DH-5, RC-5 (60.6' – 62.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/12/2018
		Photographer: Ben Painter
2	Location / Orientation	DH-5, RC-15 (112.5' – 113.5')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

11	Location / Orientation	DH-5, RC-10 (88.4' – 89.4')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		




12	Location / Orientation	DH-5, RC-12 (95.6' – 96.5')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



13	Location / Orientation	DH-5, RC-14 (106.2' – 107.3')	
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	







Date: 2/19/2018

 Photographer: Ben Painter

14	Location / Orientation	DH-6, RC-1 (25.6' – 26.6')	
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)	





Date: 2/19/2018

 Photographer: Ben Painter

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

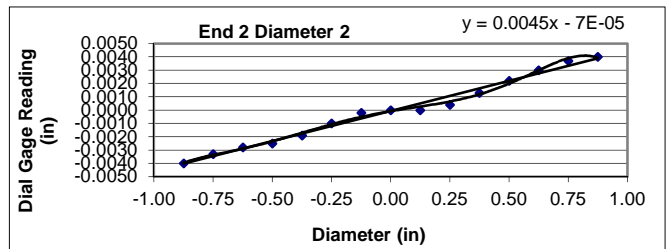
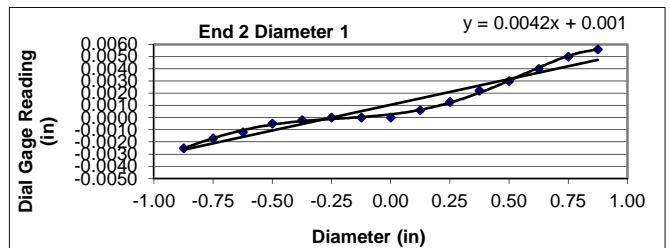
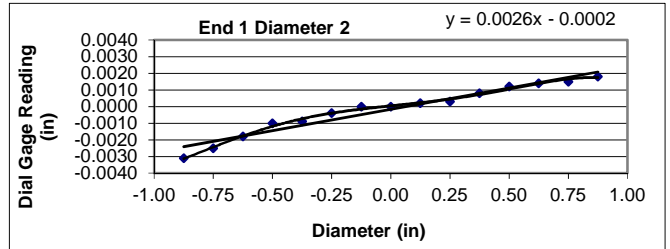
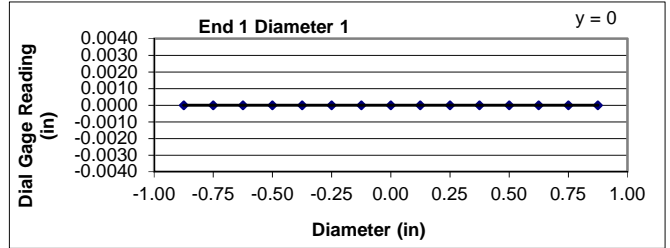
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/9/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.32	Tested by: BKP
Boring Id: B-59	Unit Weight (pcf): 170.6	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 1.3	
Depth (ft): 115.4 - 116.1		

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	-0.0031	-0.0025	-0.0040
- 6/8	0.0000	-0.0025	-0.0017	-0.0033
- 5/8	0.0000	-0.0018	-0.0012	-0.0028
- 4/8	0.0000	-0.0010	-0.0005	-0.0025
- 3/8	0.0000	-0.0009	-0.0002	-0.0019
- 2/8	0.0000	-0.0004	0.0000	-0.0010
- 1/8	0.0000	0.0000	0.0000	-0.0002
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0002	0.0006	0.0000
2/8	0.0000	0.0003	0.0013	0.0004
3/8	0.0000	0.0008	0.0022	0.0013
4/8	0.0000	0.0012	0.0030	0.0022
5/8	0.0000	0.0014	0.0040	0.0030
6/8	0.0000	0.0015	0.0050	0.0037
7/8	0.0000	0.0018	0.0056	0.0040



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:	0.00421
	Angle of Best Fit Line:	0.24113
	Max Angular Difference:	-0.24

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00257
	Angle of Best Fit Line:	0.14700
End 2:	Slope of Best Fit Line:	0.00453
	Angle of Best Fit Line:	0.25930
	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	0.0000	0.0000	YES
End 1 Diam 2	0.0049	0.0025	YES
End 2 Diam 1	0.0081	0.0041	YES
End 2 Diam 2	0.0080	0.0040	YES

Perpendicularity Tolerance Met? YES

		Date: 2/19/2018
29	Location / Orientation	B-59, RC-2 (115.4' – 116.1')
	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 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)



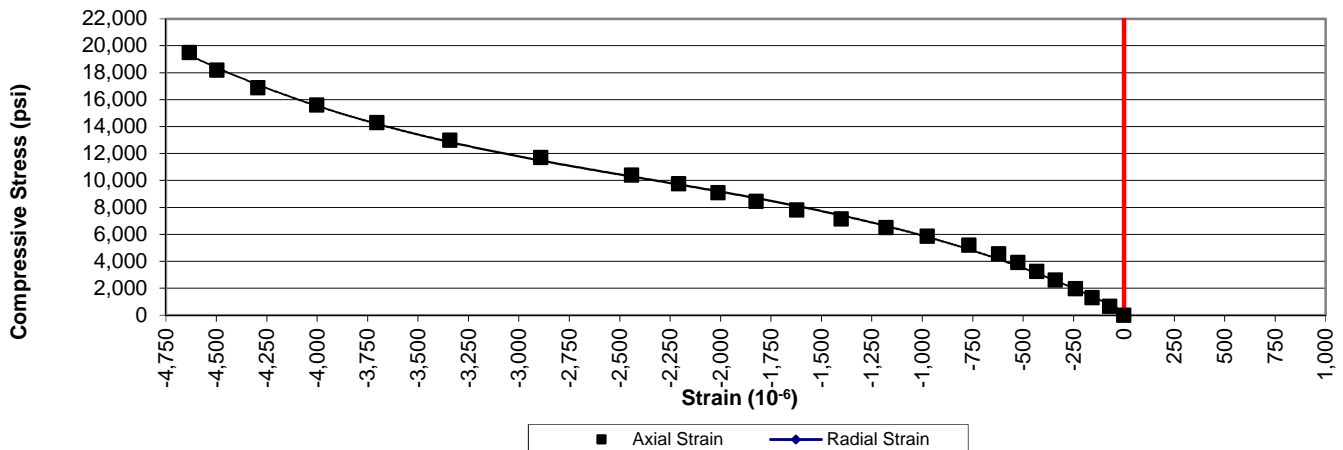
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	1.98	Date:	3/1/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	4.39	Tested by:	BKP / MG
Boring Id:	W-32	Unit Weight, pcf:	179.9	Reviewed by:	JBB
Sample No:	RC-1	Moisture Content, %:	0.2		
Depth (ft):	48.0 - 48.7	Load Rate, psi/sec:	95		

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	-71		2,000	649	9.14		
3	-157		4,000	1,299	8.27		
4	-240		6,000	1,948	8.12		
5	-340		8,000	2,597	7.64		
6	-432		10,000	3,247	7.52		
7	-526		12,000	3,896	7.41		
8	-621		14,000	4,545	7.32		
9	-768		16,000	5,195	6.76		
10	-974		18,000	5,844	6.00		
11	-1,180		20,000	6,494	5.50		
12	-1,402		22,000	7,143	5.09		
13	-1,622		24,000	7,792	4.80		
14	-1,823		26,000	8,442	4.63		
15	-2,013		28,000	9,091	4.52		
16	-2,207		30,000	9,740	4.41		
17	-2,441		32,000	10,390	4.26		
18	-2,891		36,000	11,688	4.04		
19	-3,341		40,000	12,987	3.89		
20	-3,704		44,000	14,286	3.86		
21	-4,001		48,000	15,584	3.90		
22	-4,293		52,000	16,883	3.93		
23	-4,497		56,000	18,182	4.04		
24	-4,633		60,000	19,481	4.20		
25			61,645	20,015			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

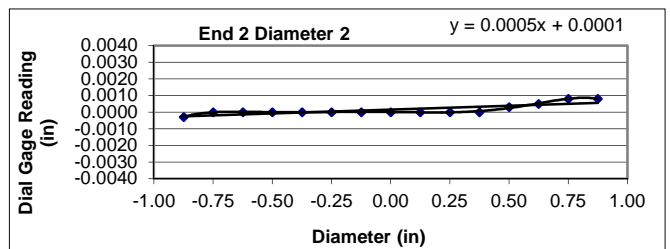
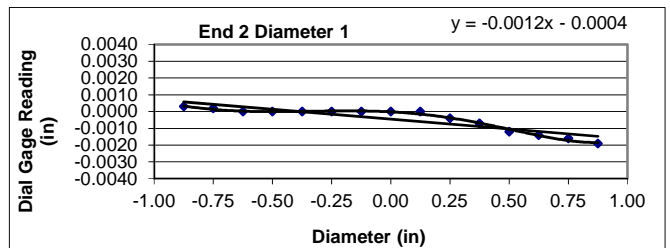
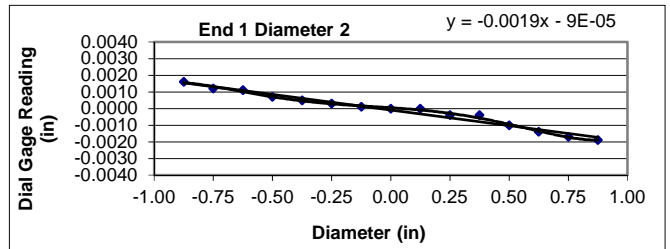
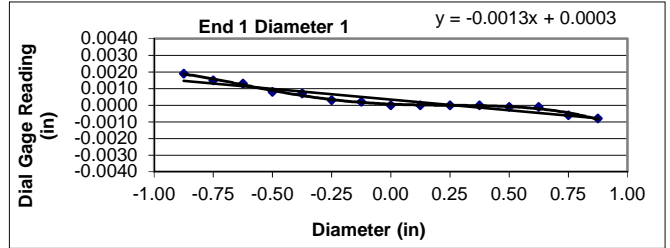
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.39	Tested by: BKP
Boring Id: W-32	Unit Weight (pcf): 179.9	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.2	
Depth (ft): 48.0 - 48.7		

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	0.0019	0.0016	0.0003	-0.0003
- 6/8	0.0015	0.0012	0.0002	0.0000
- 5/8	0.0013	0.0011	0.0000	0.0000
- 4/8	0.0008	0.0007	0.0000	0.0000
- 3/8	0.0007	0.0005	0.0000	0.0000
- 2/8	0.0003	0.0003	0.0000	0.0000
- 1/8	0.0002	0.0001	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	-0.0004	-0.0004	0.0000
3/8	0.0000	-0.0004	-0.0007	0.0000
4/8	-0.0001	-0.0010	-0.0012	0.0003
5/8	-0.0001	-0.0014	-0.0014	0.0005
6/8	-0.0006	-0.0017	-0.0016	0.0008
7/8	-0.0008	-0.0019	-0.0019	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:	-0.00129
	Angle of Best Fit Line:	-0.07367
End 2:	Slope of Best Fit Line:	-0.00117
	Angle of Best Fit Line:	-0.06695
	Max Angular Difference:	-0.01

Parallelism Diameter 2


End 1:	Slope of Best Fit Line:	-0.00187
	Angle of Best Fit Line:	-0.10706
End 2:	Slope of Best Fit Line:	0.00046
	Angle of Best Fit Line:	0.02652
	Max Angular Difference:	-0.13

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	0.0035	0.0018	YES
End 2 Diam 1	0.0022	0.0011	YES
End 2 Diam 2	0.0011	0.0006	YES

Perpendicularity Tolerance Met? YES

		Date: 3/1/2018
		Photographer: Ben Painter
15	Location / Orientation	W-32, RC-1 (48.0' – 48.7')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

Carolina Crossroads – Phase 2

Geotechnical Subsurface Data Report

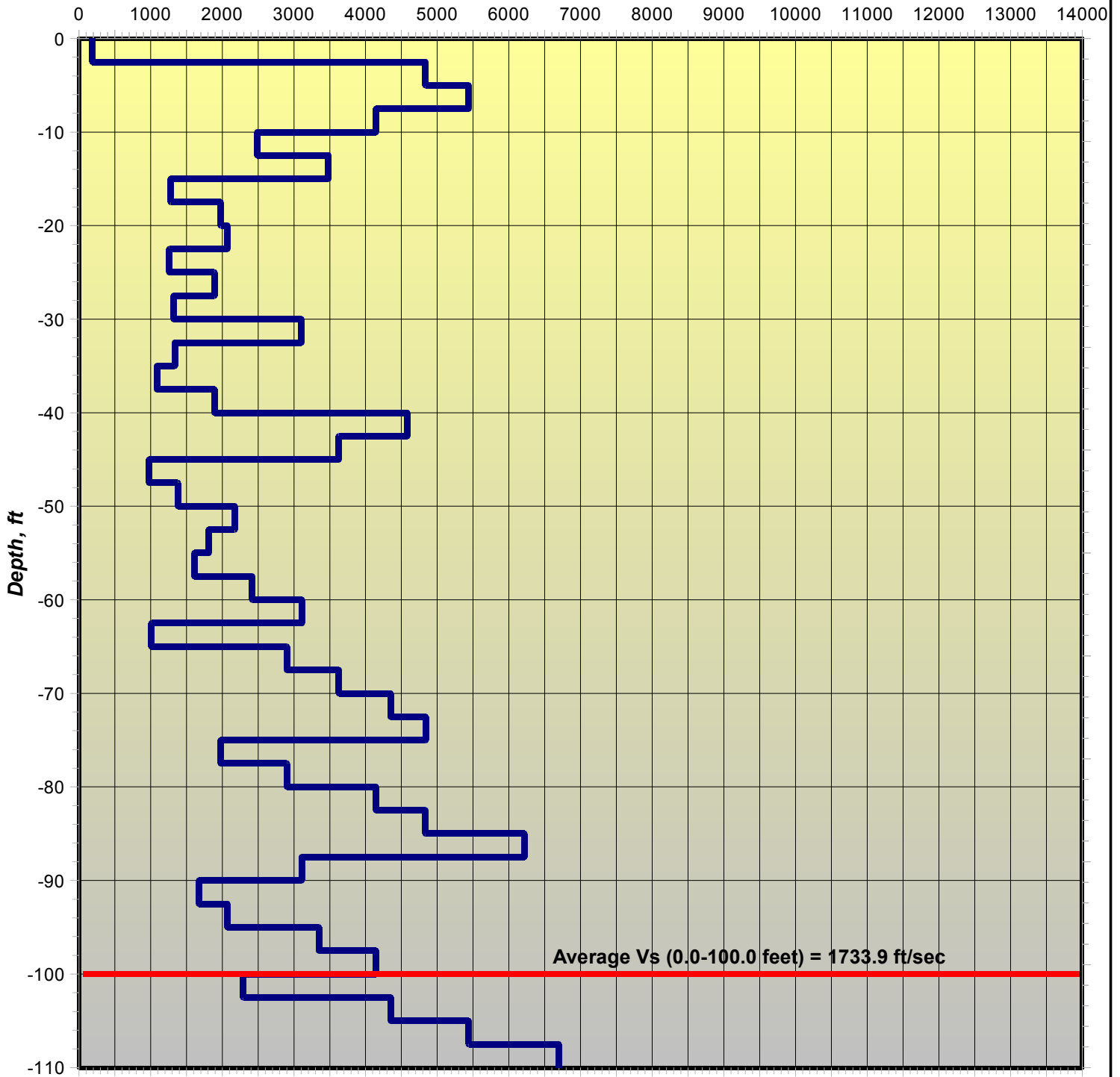
APPENDIX

SECTION 6 GEOPHYSICAL TEST RESULTS

DH-2

34° 2.305'N 81° 6.693'W

Shear-Wave Velocity, ft/sec



Average Vs (0.0-100.0 feet) = 1733.9 ft/sec

Average Vs (0-110 feet) = 1828.0 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-2

34° 2.305'N 81° 6.693'W

Depth (ft)	Vs (ft/sec)
-2.5	187.6
-5.0	4835.6
-7.5	5440.0
-10.0	4144.8
-12.5	2486.9
-15.0	3481.6
-17.5	1280.0
-20.0	1978.2
-22.5	2072.4
-25.0	1261.7
-27.5	1891.1
-30.0	1319.3
-32.5	3105.6
-35.0	1339.4
-37.5	1088.0
-40.0	1892.2
-42.5	4581.0
-45.0	3626.7
-47.5	978.0
-50.0	1381.9
-52.5	2175.8
-55.0	1812.9
-57.5	1611.9
-60.0	2417.6
-62.5	3109.5
-65.0	1012.1
-67.5	2900.2
-70.0	3628.4
-72.5	4347.8
-75.0	4837.8
-77.5	1978.2
-80.0	2901.3
-82.5	4144.8
-85.0	4835.6
-87.5	6217.1
-90.0	3108.6
-92.5	1673.8
-95.0	2072.4
-97.5	3347.7
-100.0	4144.7
-102.5	2290.5
-105.0	4352.0
-107.5	5440.0
-110.0	6695.4



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

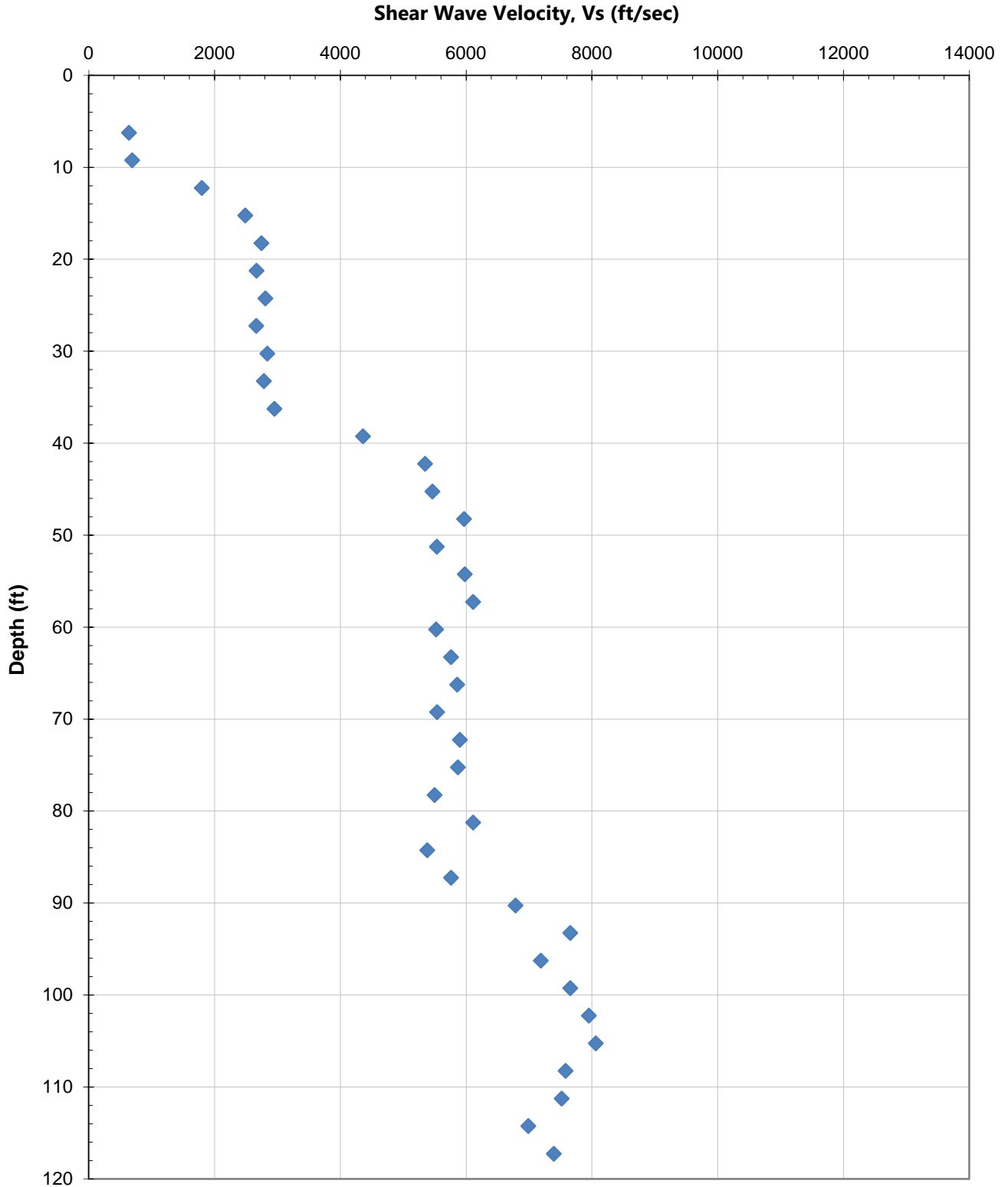
Downhole Seismic Shear-Wave Investigation

Project Manager: M. Ellers

February 7, 2018



Shear Wave Velocity Profile DH-5
I-20/26/126 Improvement Project
Lexington and Richland Counties, South Carolina
1461-16-047





Shear Wave Velocity Calculations

Carolina Crossroads I-20/26/126 Improvement Project
Lexington and Richland Counties, South Carolina

Sounding ID: **DH-5**

Project Number: **1461-16-047**

Geophone Offset: 0.00 Feet
Casing Stickup: 1.25 Feet
Source Offset: 6.00 Feet

Date: 17-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)			
4.75	4.75	7.65	7.65	0.0105					
7.75	7.75	9.80	2.15	0.0139	0.0034	639.9	6.25	0.00977	0.50
10.75	10.75	12.31	2.51	0.0175	0.0036	688.8	9.25	0.00436	0.50
13.75	13.75	15.00	2.69	0.0190	0.0015	1798.3	12.25	0.00167	0.49
16.75	16.75	17.79	2.79	0.0201	0.0011	2486.0	15.25	0.00121	0.48
19.75	19.75	20.64	2.85	0.0212	0.0010	2746.6	18.25	0.00109	0.48
22.75	22.75	23.53	2.89	0.0222	0.0011	2666.2	21.25	0.00113	0.48
25.75	25.75	26.44	2.91	0.0233	0.0010	2807.1	24.25	0.00107	0.48
28.75	28.75	29.37	2.93	0.0244	0.0011	2664.1	27.25	0.00113	0.48
31.75	31.75	32.31	2.94	0.0254	0.0010	2836.7	30.25	0.00106	0.48
34.75	34.75	35.26	2.95	0.0265	0.0011	2785.2	33.25	0.00108	0.47
37.75	37.75	38.22	2.96	0.0275	0.0010	2949.9	36.25	0.00102	0.46
40.75	40.75	41.19	2.97	0.0282	0.0007	4359.7	39.25	0.00069	0.42
43.75	43.75	44.16	2.97	0.0287	0.0006	5346.8	42.25	0.00056	0.35
46.75	46.75	47.13	2.97	0.0293	0.0005	5465.2	45.25	0.00055	0.39
49.75	49.75	50.11	2.98	0.0298	0.0005	5968.2	48.25	0.00050	0.31
52.75	52.75	53.09	2.98	0.0303	0.0005	5533.3	51.25	0.00054	0.41
55.75	55.75	56.07	2.98	0.0308	0.0005	5977.8	54.25	0.00050	0.35
58.75	58.75	59.06	2.98	0.0313	0.0005	6110.6	57.25	0.00049	0.25
61.75	61.75	62.04	2.99	0.0318	0.0005	5521.5	60.25	0.00054	0.34
64.75	64.75	65.03	2.99	0.0323	0.0005	5759.7	63.25	0.00052	0.32
67.75	67.75	68.02	2.99	0.0329	0.0005	5856.6	66.25	0.00051	0.33
70.75	70.75	71.00	2.99	0.0334	0.0005	5538.3	69.25	0.00054	0.27
73.75	73.75	73.99	2.99	0.0339	0.0005	5900.7	72.25	0.00051	0.24
76.75	76.75	76.98	2.99	0.0344	0.0005	5867.9	75.25	0.00051	0.21
79.75	79.75	79.98	2.99	0.0350	0.0005	5496.9	78.25	0.00055	0.39
82.75	82.75	82.97	2.99	0.0354	0.0005	6109.7	81.25	0.00049	0.36
85.75	85.75	85.96	2.99	0.0360	0.0006	5380.8	84.25	0.00056	0.39
88.75	88.75	88.95	2.99	0.0365	0.0005	5760.1	87.25	0.00052	0.38
91.75	91.75	91.95	2.99	0.0370	0.0004	6784.9	90.25	0.00044	0.33
94.75	94.75	94.94	2.99	0.0374	0.0004	7654.5	93.25	0.00039	0.23
97.75	97.75	97.93	2.99	0.0378	0.0004	7186.7	96.25	0.00042	0.30
100.75	100.75	100.93	2.99	0.0382	0.0004	7656.4	99.25	0.00039	0.24
103.75	103.75	103.92	2.99	0.0385	0.0004	7951.9	102.25	0.00038	0.32
106.75	106.75	106.92	3.00	0.0389	0.0004	8060.1	105.25	0.00037	0.15
109.75	109.75	109.91	3.00	0.0393	0.0004	7580.9	108.25	0.00040	0.26
112.75	112.75	112.91	3.00	0.0397	0.0004	7518.3	111.25	0.00040	0.24
115.75	115.75	115.91	3.00	0.0401	0.0004	6988.9	114.25	0.00043	0.34
118.75	118.75	118.90	3.00	0.0405	0.0004	7393.8	117.25	0.00041	0.42
Weighted Average Soil Shear Wave Velocity, v_s 100 (ft/s):								2775	0.36

Note: The weighted average shear wave velocity reported above is for the interval from 6.25 to 105.25 feet.

Carolina Crossroads – Phase 2

Geotechnical Subsurface Data Report

APPENDIX

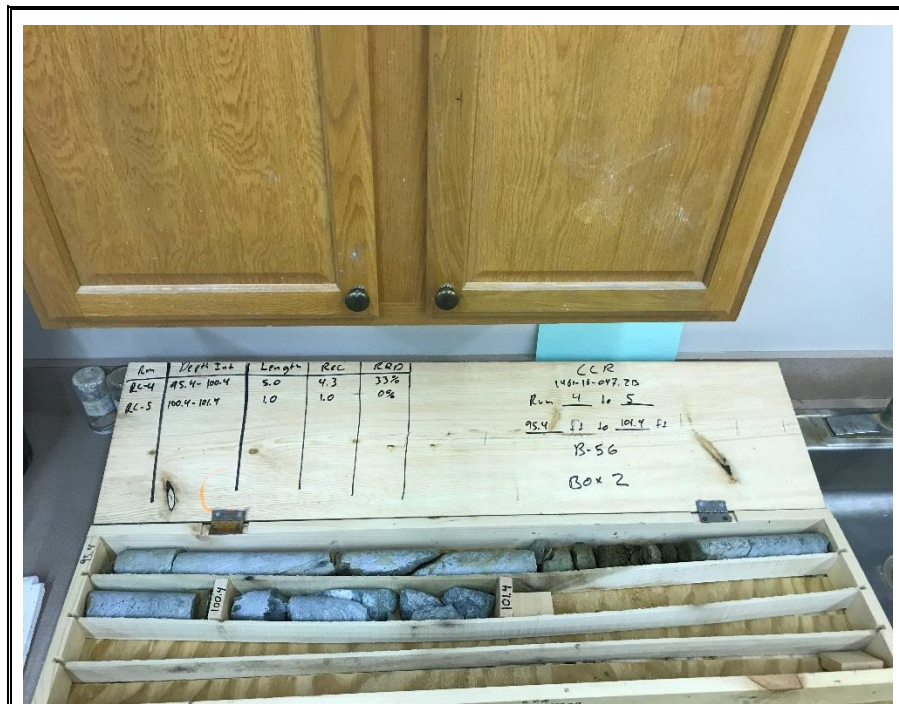
SECTION 7 ROCK CORE PHOTOS



Boring B-56, Box 1 & 2



1 Remarks: **Boring B-56, Box 1**



2 Remarks: **Boring B-56, Box 2**



Boring B-57, Box 1

Run	Depth Int.	Length	Rec.	R.O.D.
1	65'-100'	4.1	37	25-48% RZ
2	70'-75.0'	5	0.7	0%
3				

CCR
 1461-16-047 26
 B-57
 Run 1 to Run 2
 65.9 ft to 70.7 ft
 Box 1

1	Remarks:	Boring B-57, Box 1
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Boring B-59, Box 1



1	Remarks:	Boring B-59, Box 1
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Boring DH-5, Box 1 & 2

Run No.	Depth Interval	Length	REC	RQD
1		3.6		
2	42 - 45.6	5	100%	100%
3	50.456-50.8	5	100%	100%
	50.6-55.6	5	100%	100%

1
Remarks: Boring DH-5, Box 1

Run No.	Depth Int.	Length	REC	RQD
4	55.6-60.6	5	100%	100%
5	60.6-65.6	5	100%	100%
6	65.6-70.6	5	100%	100%

2
Remarks: Boring DH-5, Box 2



Boring DH-5, Box 3 & 4



1 **Remarks:** **Boring DH-5, Box 3**



2 **Remarks:** **Boring DH-5, Box 4**



Boring DH-5, Box 5 & 6



1 **Remarks:** **Boring DH-5, Box 5**



2 **Remarks:** **Boring DH-5, Box 6**



Boring W-29, Box 1



1	Remarks:	Boring W-29, Box 1
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Boring W-30, Box 1

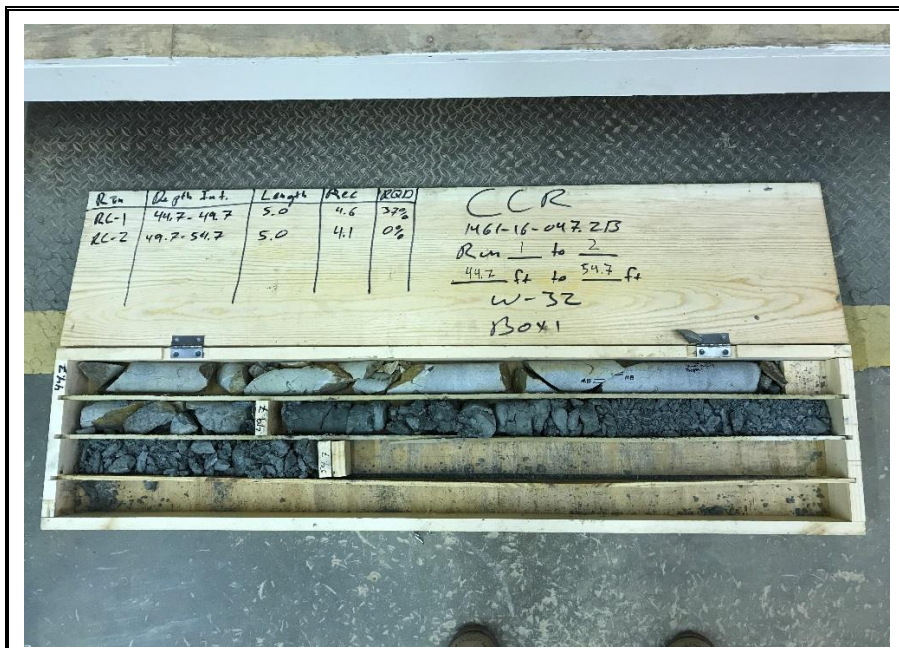
RUN	DEPTH INT	LENGTH	REG	RQD
1	53.7-55.0	1.3	0.4	0
2	55.0-60.0	5.0	2.6	0
3	60.0-64.0	4.0	0.4	0

CCR
 1461-16-047 2B
 W-30
 Run 1 to
 53.7 to C.A.D.
 Box 1

1	Remarks:	Boring W-30, Box 1
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Boring W-32, Box 1



1	Remarks:	Boring W-32, Box 1
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Carolina Crossroads – Phase 2

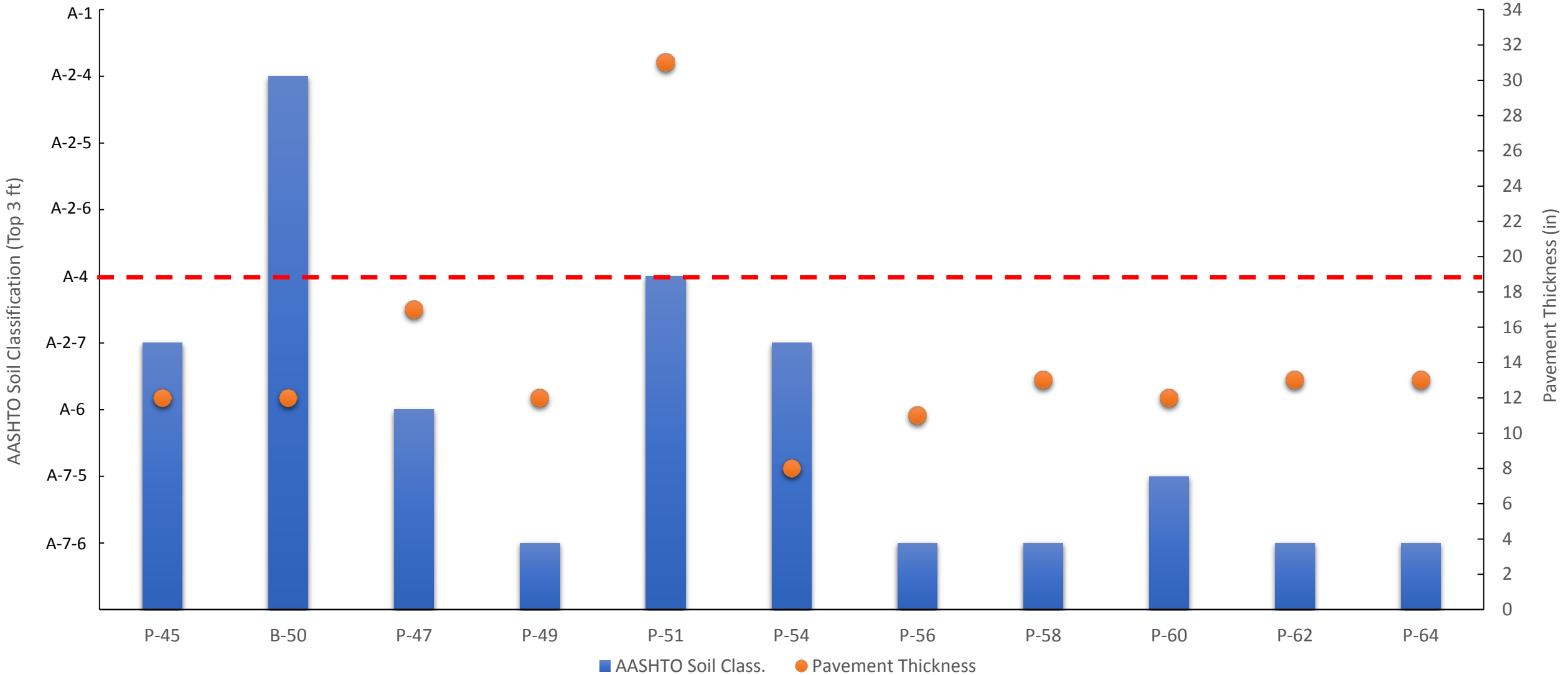
Geotechnical Subsurface Data Report

APPENDIX

SECTION 8 EXISTING PAVED SHOULDER DATA

Carolina Crossroads Existing Paved Shoulder Data

I-20 EB



Carolina Crossroads Existing Paved Shoulder Data

I-20 WB

