

GEOTECHNICAL SUBSURFACE DATA REPORT

Carolina Crossroads Phase 3C
Lexington County, South Carolina



PREPARED FOR

HDR, Inc.
1201 Main Street, Suite 800
Columbia, South Carolina 29201



PREPARED BY

F&ME Consultants, Inc.
211 Business Park Blvd.
Columbia, South Carolina 29203

SCDOT Project ID: P043325
F&ME Project No. G5662.03

AUGUST 6, 2024

August 6, 2024

Mr. Lee Tupper, PhD, PE
HDR, Inc.
1201 Main Street, Suite 800
Columbia, South Carolina 29201

Re: Geotechnical Subsurface Data Report
Carolina Crossroads – Phase 3C
Lexington County, South Carolina
SCDOT Project ID: P043325
F&ME Project No.: G5662.03

Mr. Tupper:

Submitted herein is F&ME Consultants, Inc's (FME) Geotechnical Subsurface Data Report (GSDR) for the Phase 3C portion of the Carolina Crossroads project. Provided herein are the boring location plan, soil testing logs, laboratory test results, and photos of the recovered soil and rock samples from the subsurface investigations performed.

Please notify us if there are any questions or if we can be of further assistance.

Sincerely,

F&ME CONSULTANTS



John F. Hamilton, PE
Geotechnical Design Manager

Attachments



Carolina Crossroads – Phase 3C

Geotechnical Subsurface Data Report

APPENDIX

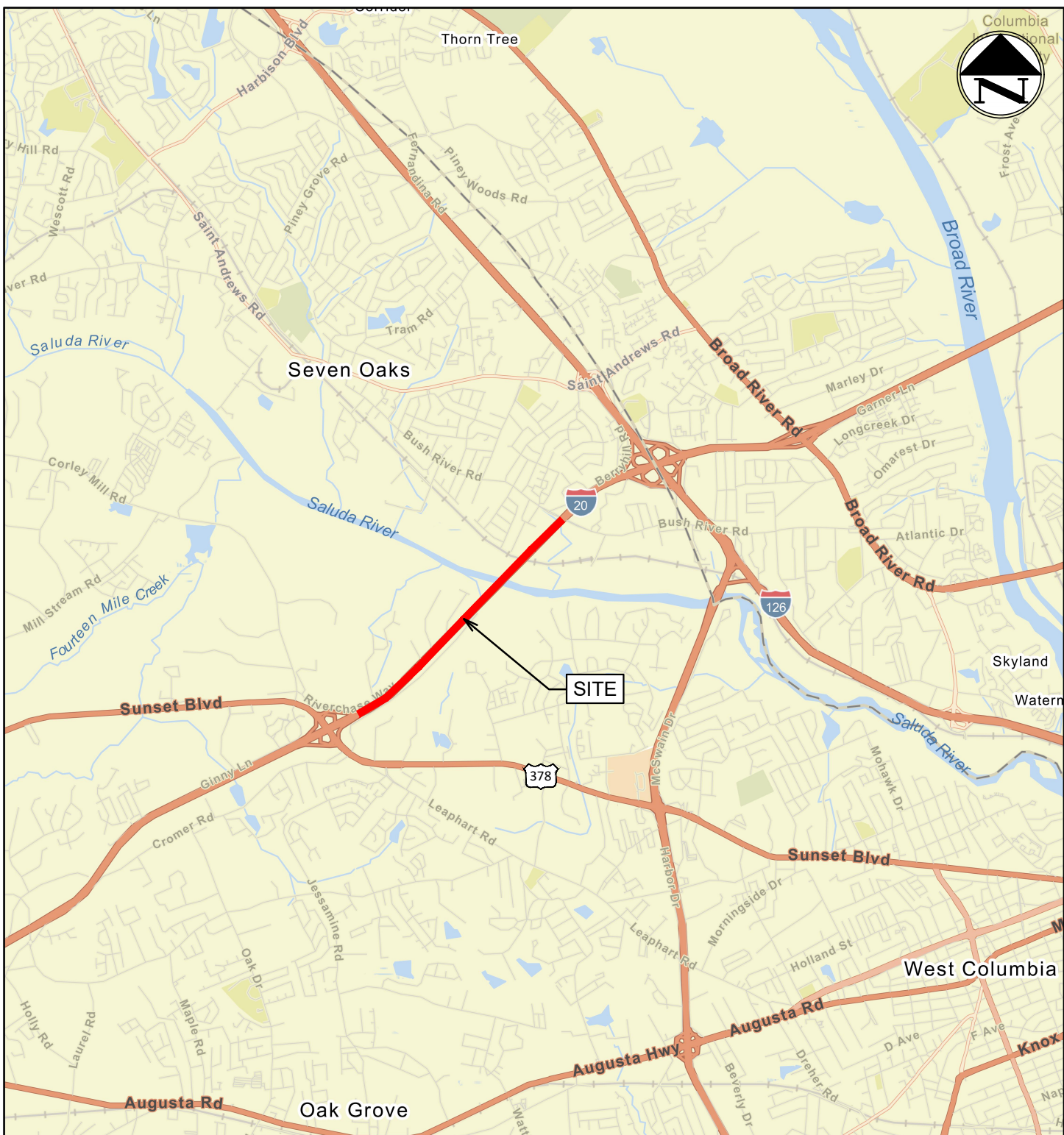
- SECTION 1 SITE LOCATION PLAN
- SECTION 2 BORING LOCATION PLAN
- SECTION 3 GEOTECHNICAL EXPLORATION LOGS
 - SECTION 3A SOIL BORING LOGS
 - SECTION 3B CPT LOGS
 - SECTION 3C AUGER BORING LOGS
- SECTION 4 LABORATORY TEST RESULTS
 - SECTION 4A SPLIT-SPOON SAMPLES
 - SECTION 4B ROCK SAMPLES
 - SECTION 4C UD SAMPLES
 - SECTION 4D BULK SAMPLES
- SECTION 5 GEOPHYSICAL TEST RESULTS
- SECTION 6 ROCK CORE PHOTOS
- SECTION 7 SPT HAMMER ENERGY REPORTS

Carolina Crossroads – Phase 3C

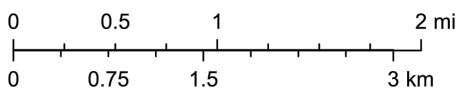
Geotechnical Subsurface Data Report

APPENDIX

SECTION 1 SITE LOCATION PLAN



1:72,000



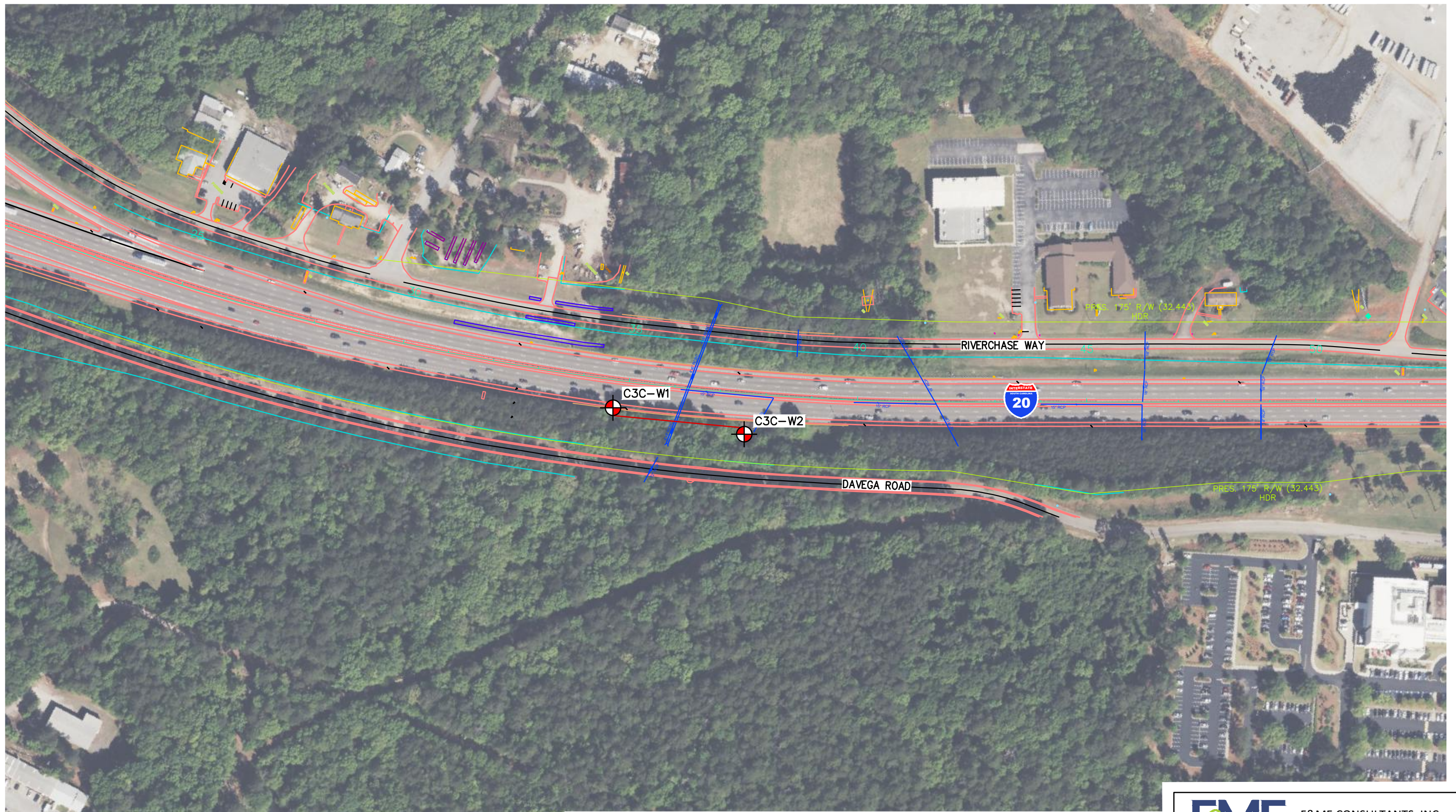
4				
3				
2				
1				
REV.	BY	DATE	DESCRIPTION OF REVISION	
TOPO.		DATE		
DWG.	CTC	DATE 6.5.24	GROUP	-- --
R/W		DATE		

CAROLINA CROSSROADS PHASE 3C LEXINGTON COUNTY, SOUTH CAROLINA	
SITE LOCATION PLAN	
SCALE: AS NOTED	FME JOB NO. G5662.030
	FIGURE 1



Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 2 BORING LOCATION PLAN



LEGEND:

	SOIL TEST LOCATION
	SOIL TEST LOCATION (2018 SUBSURFACE INVESTIGATION)

4			
3			
2			
1			
REV.	BY	DATE	DESCRIPTION OF REVISION
TOPO.		DATE	
DWG.	CTC	DATE 6.5.24	GROUP -- --
R/W		DATE	

F&ME CONSULTANTS, INC.
COLUMBIA, SC

CAROLINA CROSSROADS PHASE 3C
LEXINGTON COUNTY, SOUTH CAROLINA

BORING LOCATION PLAN

SCALE: 1" = 200'

FME JOB NO. G5662.030
FIGURE 2



LEGEND:

	SOIL TEST LOCATION
	SOIL TEST LOCATION (2018 SUBSURFACE INVESTIGATION)

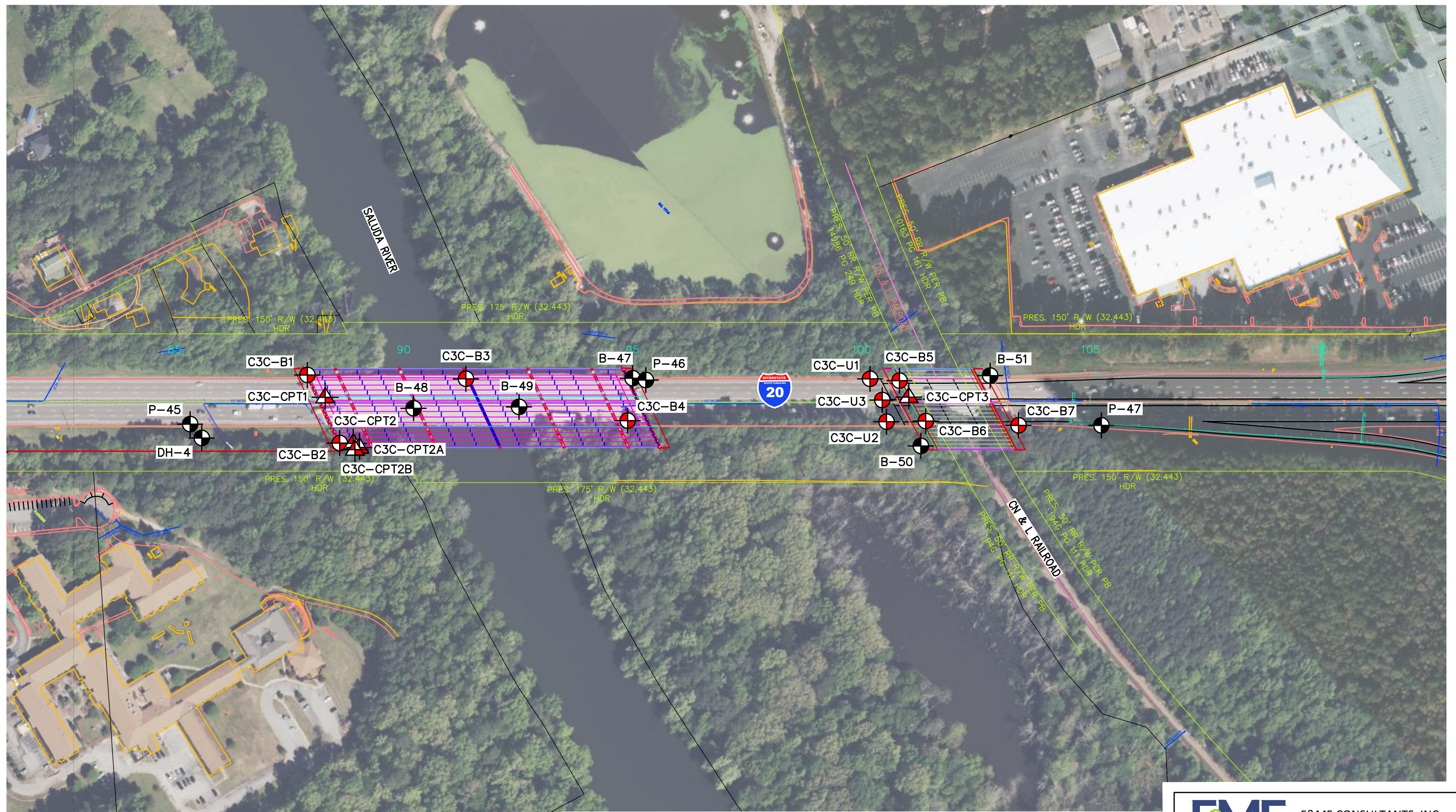
4				
3				
2				
1				
REV.	BY	DATE	DESCRIPTION OF REVISION	
TOPO.		DATE		
DWG.	CTC	DATE 6.5.24	GROUP	
R/W		DATE		

F&ME CONSULTANTS, INC.
COLUMBIA, SC

CAROLINA CROSSROADS PHASE 3C
LEXINGTON COUNTY, SOUTH CAROLINA

BORING LOCATION PLAN

SCALE: 1" = 200'
FME JOB NO. G5662.030
FIGURE 3



LEGEND:

	SOIL TEST LOCATION
	SOIL TEST LOCATION (2018 SUBSURFACE INVESTIGATION)

4				
3				
2				
1				
REV.	BY	DATE	DESCRIPTION OF REVISION	
TOPO.		DATE		
DWG.	CTC	DATE 6.5.24	GROUP	- - -
R/W		DATE		

F&ME CONSULTANTS, INC.
COLUMBIA, SC

CAROLINA CROSSROADS PHASE 3C
LEXINGTON COUNTY, SOUTH CAROLINA

BORING LOCATION PLAN

FME JOB NO. G5662.030

SCALE: 1" = 200'

FIGURE 4



LEGEND:



F&ME SOIL TEST BORING LOCATION



AUJV TEST LOCATION



S&ME TEST LOCATION

4				
3				
2				
1				
REV.	BY	DATE	DESCRIPTION OF REVISION	
TOPO.		DATE		
DWG.	CTC	DATE 6.25.24	GROUP	
R/W		DATE		



F&ME CONSULTANTS, INC.
COLUMBIA, SC

CAROLINA CROSSROADS PHASE 3C
LEXINGTON COUNTY, SOUTH CAROLINA

BORING LOCATION PLAN

SCALE: 1" = 200'

FME JOB NO. G5662.030

FIGURE 5

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 GEOTECHNICAL EXPLORATION LOGS

Test ID	Performed By	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>
C3C-B1	F&ME	Bridge	I-20 Median	87+90	60-L	797428	1960788	34.02500945	-81.12943314	190.7	41.5
C3C-B2	F&ME	Bridge	I-20 Median	88+60	89-R	797374	1960943	34.02486204	-81.12891973	177.2	41.5
C3C-B3	F&ME	Bridge	I-20 Median	91+36	52-L	797669	1961037	34.02567278	-81.12861274	192.4	66.0
C3C-B4	F&ME	Bridge	I-20 Median	94+90	40-R	797857	1961350	34.02619071	-81.12758027	197.5	61.8
C3C-B5	F&ME	Bridge	I-20 Median	100+83	48-L	798342	1961704	34.02752332	-81.12641358	213.2	83.5
C3C-B6	F&ME	Bridge	I-20 Median	101+41	40-R	798321	1961807	34.02746596	-81.1260731	215.0	76.5
C3C-B7	F&ME	Bridge	I-20 Median	103+43	50-R	798459	1961955	34.02784566	-81.12558276	218.9	83.5
C3C-CPT1	F&ME	Bridge	I-20 Median	88+29	11-L	797422	1960850	34.02499237	-81.12922819	191.4	20.7
C3C-CPT2	F&ME	Bridge	I-20 Median	88+90	89-R	797395	1960965	34.02491975	-81.12884866	176.5	4.8
C3C-CPT2A	F&ME	Bridge	I-20 Median	89+04	98-R	797398	1960980	34.02492833	-81.12879666	176.5	5.5
C3C-CPT2B	F&ME	Bridge	I-20 Median	88+94	103-R	797388	1960977	34.02489986	-81.12880858	176.5	6.0
C3C-CPT3	F&ME	Bridge	I-20 Median	101+04	12-L	798331	1961743	34.02749416	-81.12628214	213.9	38.0
C3C-W1	F&ME	Earth Retaining Structure	I-20 Median	34+72	61-R	793582	1957106	34.01442692	-81.14156777	334.0	66.5
C3C-W2	F&ME	Earth Retaining Structure	I-20 Median	37+59	88-R	793746	1957348	34.01487733	-81.14077013	318.0	49.4
C3C-W3	F&ME	Noise Wall	I-20 Median	65+63	137-R	795702	1959366	34.02026159	-81.13411829	266.6	21.5
C3C-W4	F&ME	Noise Wall	I-20 Median	73+61	96-R	796300	1959897	34.0219058	-81.13237003	220.4	28.7
C3C-W5	F&ME	Noise Wall	I-20 Median	81+08	109-R	796823	1960430	34.02334636	-81.13061226	197.9	37
C3C-U1	F&ME	Utility	I-20 Median	100+19	52-L	798299	1961656	34.02740527	-81.12657176	210.9	59.6
C3C-U2	F&ME	Utility	I-20 Median	100+55	42-R	798259	1961748	34.02729489	-81.12626802	212.5	58.9
C3C-U3	F&ME	Utility	I-20 Median	100+46	5-L	798285	1961707	34.02736797	-81.12640113	212.0	59.9
B-47	S&ME	Bridge	I-20 Median	86+31	46-L	797947	1961317	34.026437	-81.127687	198.1	66.9
B-48	S&ME	Bridge	I-20 Median	80+48	76-R	797446	1960995	34.025058	-81.128747	173.3	34.7
B-49	S&ME	Bridge	I-20 Median	84+09	42-L	797786	1961164	34.025993	-81.128191	194.4	58.3
B-50	S&ME	Bridge	I-20 Median	91+54	47-R	798255	1961751	34.027285	-81.126258	212.6	92.2
B-50UD	S&ME	Bridge	I-20 Median	91+52	49-R	798252	1961751	34.02727689	-81.12625825	212.3	42.5
B-51	S&ME	Bridge	I-20 Median	93+59	160-L	798545	1961746	34.028083	-81.126273	214.8	59.7
DH-4	S&ME	Downhole Seismic	I-20 Median	76+09	87-R	797125	1960696	34.024177	-81.129735	185.7	120.2
RW-40	S&ME	Embankment	I-20 Median	69+86	61-L	796143	1959522	34.021474	-81.133604	238.9	20.8
P-44	S&ME	Pavement	I-20 Median	74+76	48-L	796483	1959876	34.022409	-81.132440	220.3	11.1
P-45	S&ME	Pavement	I-20 Median	84+69	47-R	797125	1960639	34.024176	-81.129923	193.4	11.0
P-46	S&ME	Not Performed									
P-47	S&ME	Pavement	I-20 Median	104+83	46-R	798561	1962051	34.028128	-81.125269	220.7	11.4
P-48	S&ME	Pavement	I-20 Median	115+75	50-L	799407	1962748	34.030453	-81.122970	217.0	11.0
P-49	S&ME	Pavement	I-20 Median	125+37	59-R	800016	1963500	34.032131	-81.120490	232.7	11.0

Carolina Crossroads – Phase 3C

Geotechnical Subsurface Data Report

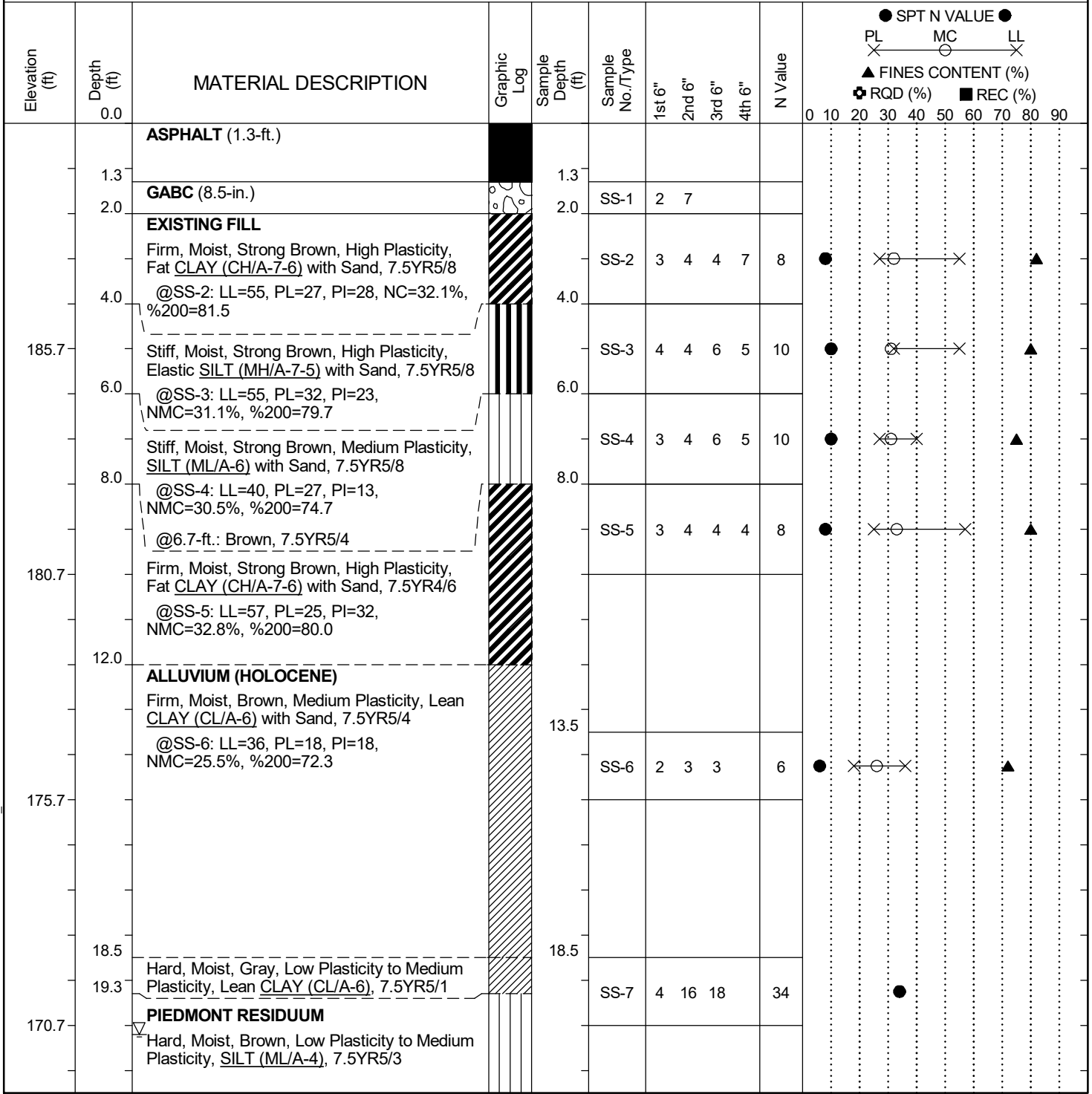
APPENDIX

SECTION 3 GEOTECHNICAL EXPLORATION LOGS

SECTION 3A SOIL BORING LOGS

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 87+90	Offset: 60-L
Alignment: I-20 Median	Date Started: 5/5/2024	
Elev.: 190.7 ft	Latitude: 34.02500945	Longitude: -81.12943314
Total Depth: 41.5 ft	Soil Depth: 31.5 ft	Core Depth: 10 ft
Date Completed: 5/5/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 20.2 (Cave @ 24.1 ft) Backfilled



LEGEND

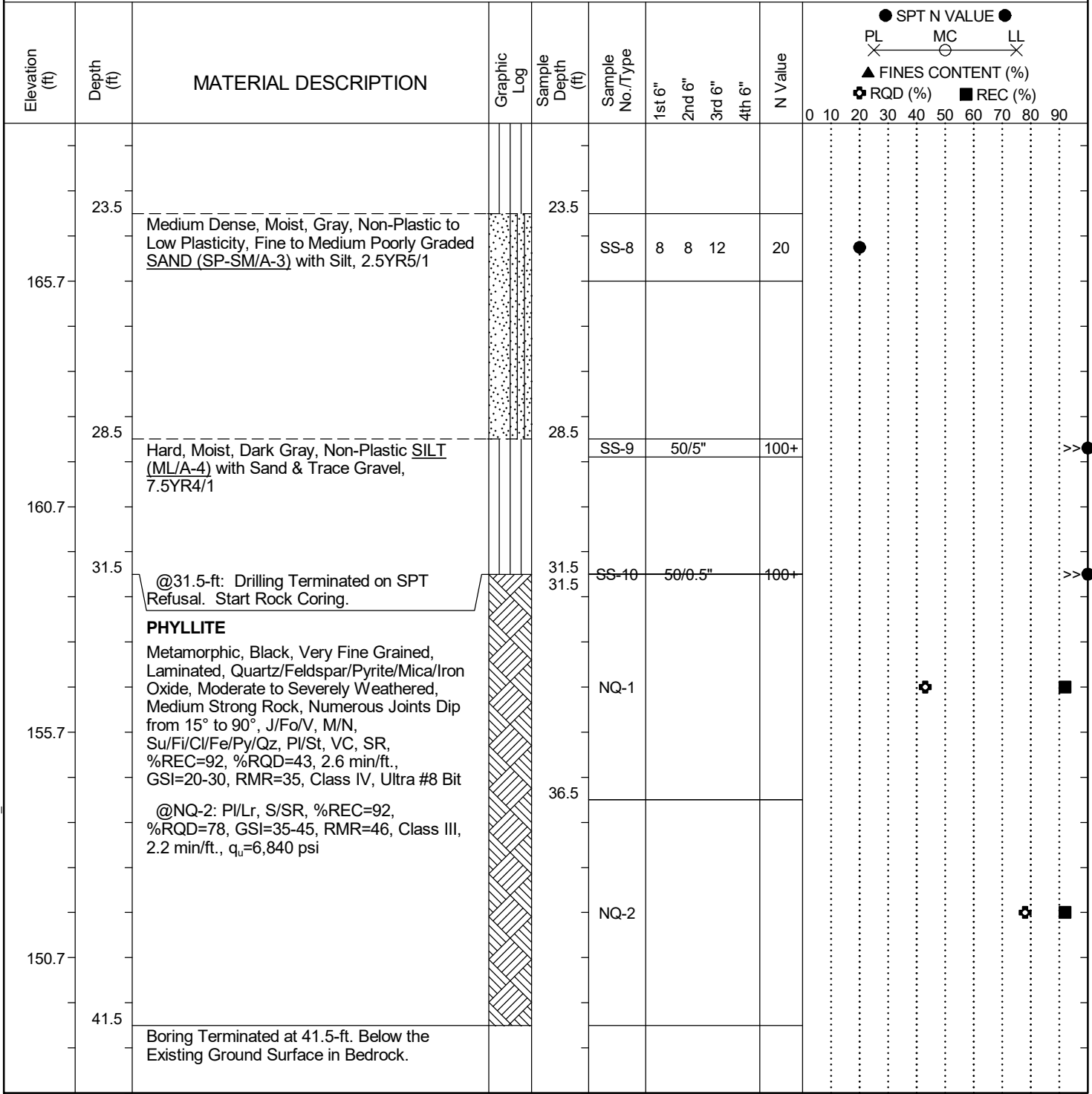
Continued Next Page

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 G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 87+90	Offset: 60-L
Alignment: I-20 Median	Date Started: 5/5/2024	
Elev.: 190.7 ft	Latitude: 34.02500945	Longitude: -81.12943314
Total Depth: 41.5 ft	Soil Depth: 31.5 ft	Core Depth: 10 ft
Date Completed: 5/5/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 20.2 (Cave @ 24.1 ft) Backfilled



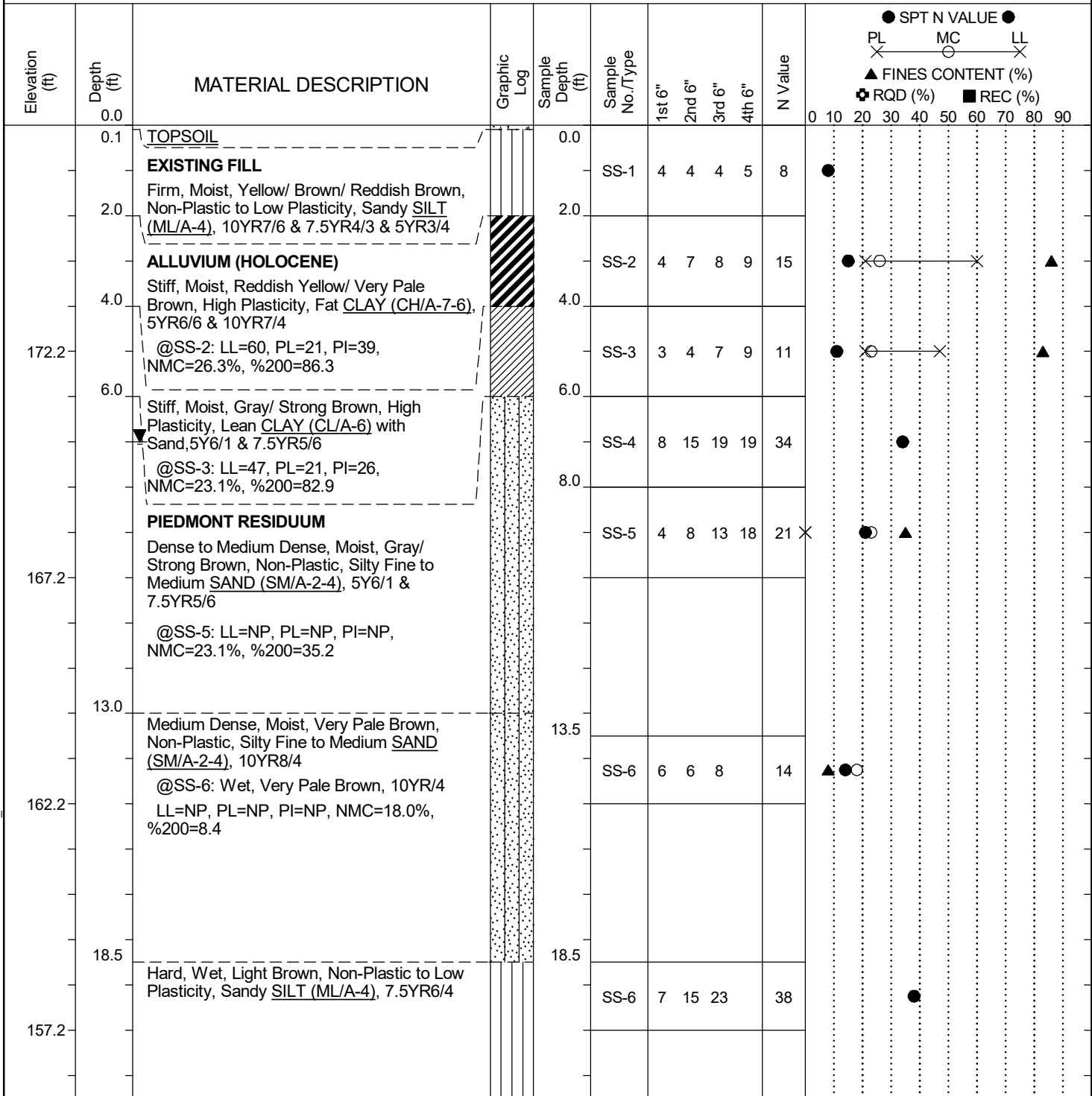
LEGEND

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

SC.DOT G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B2
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 88+60	Offset: 89-R
Alignment: I-20 Median	Date Started: 3/20/2024	
Elev.: 177.2 ft	Latitude: 34.02486204	Longitude: -81.12891973
Total Depth: 41.5 ft	Soil Depth: 31.5 ft	Core Depth: 10 ft
Date Completed: 3/20/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB NE
24HR: 7(Cave@18)		



LEGEND

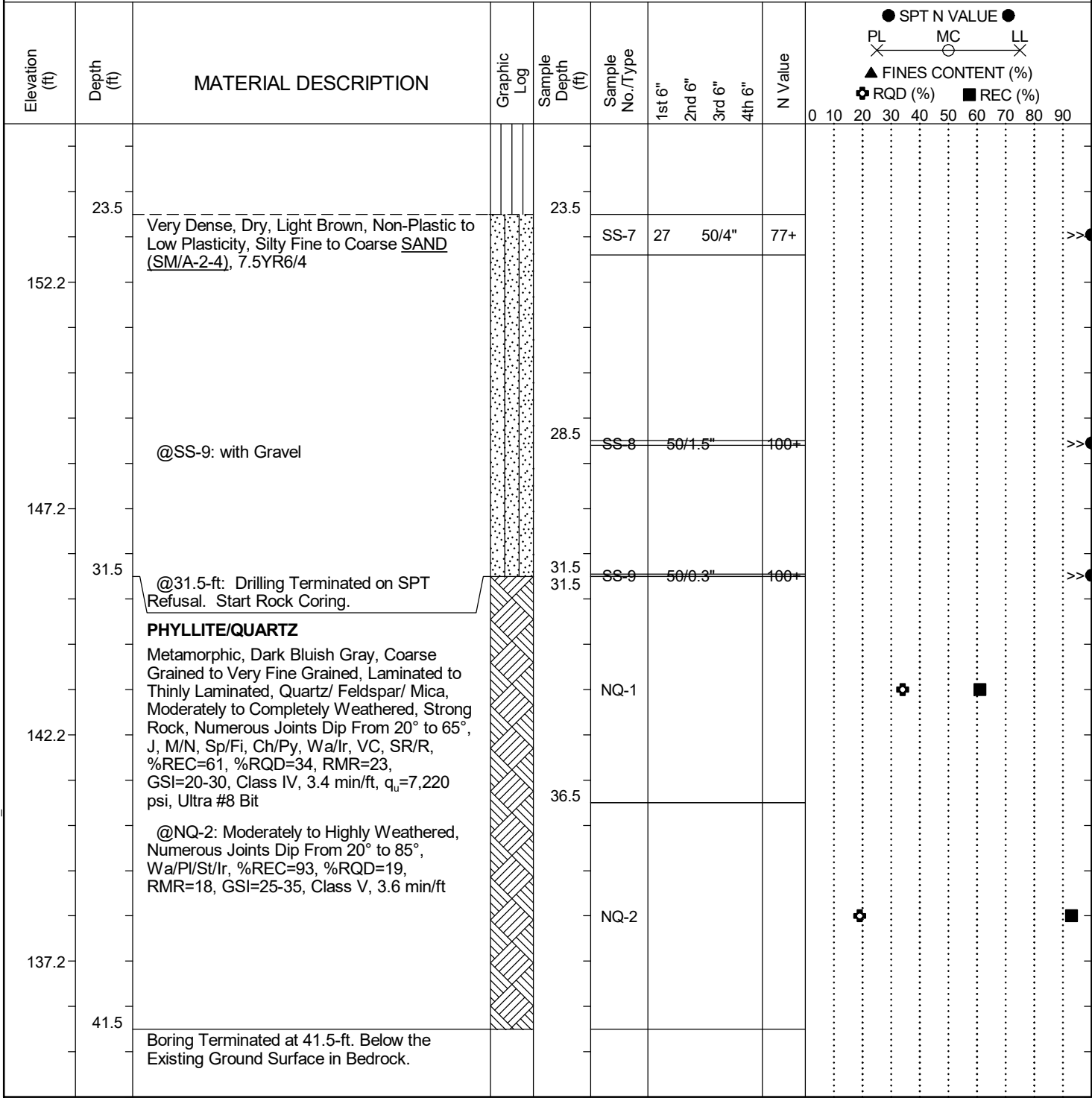
Continued Next Page

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

SC.DOT G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B2
Site Description: Carolina Crossroads Phase 3C	Route: I-20	
Eng./Geo.: C. Piercy	Boring Location: 88+60	Offset: 89-R
Alignment: I-20 Median		
Elev.: 177.2 ft	Latitude: 34.02486204	Longitude: -81.12891973
Date Started: 3/20/2024		
Total Depth: 41.5 ft	Soil Depth: 31.5 ft	Core Depth: 10 ft
Date Completed: 3/20/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB NE
24HR: 7(Cave@18)		



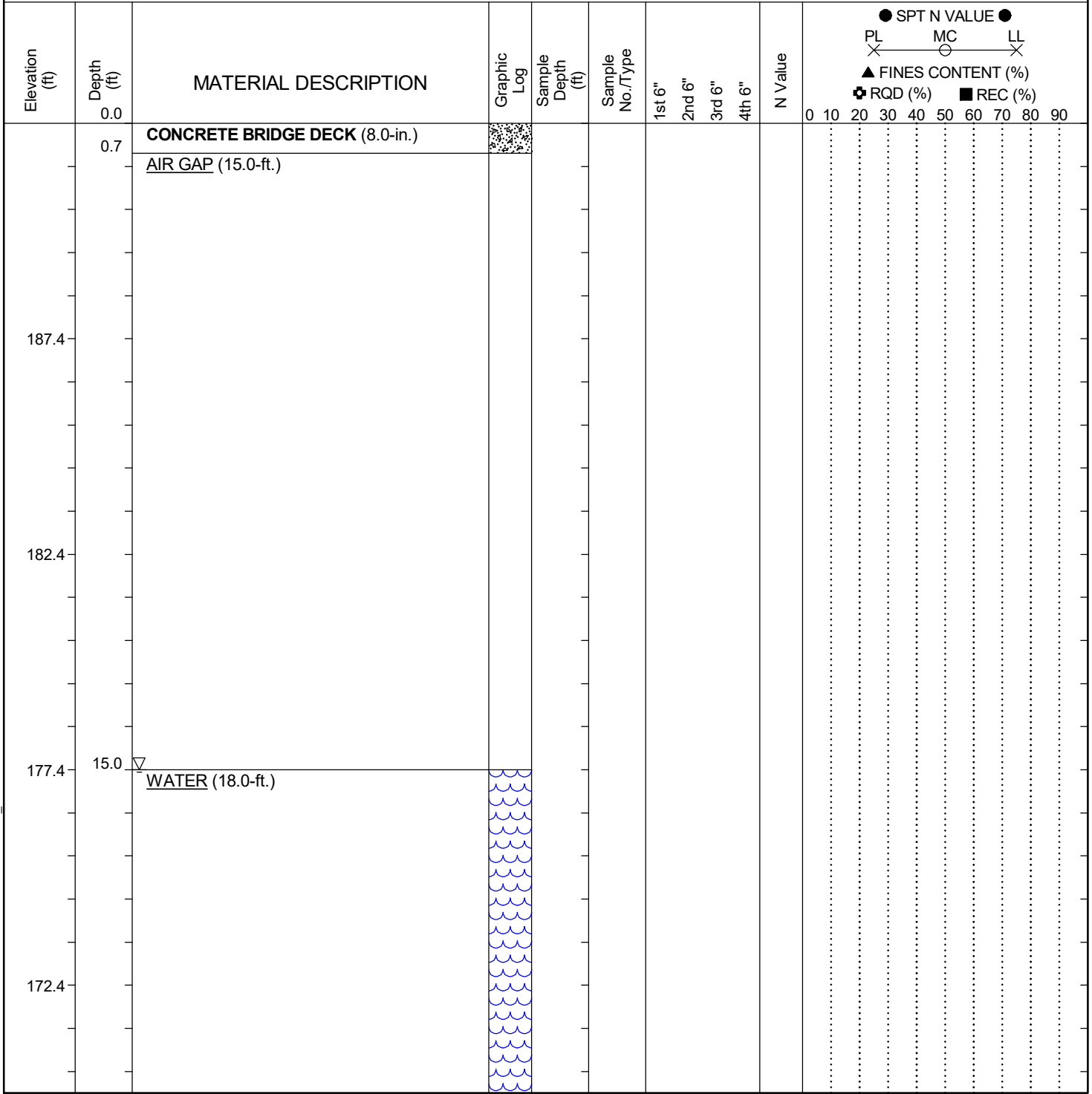
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B3
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 91+36	Offset: 52-L
Alignment: I-20 Median	Date Started: 5/6/2024	
Elev.: 192.4 ft	Latitude: 34.02567278	Longitude: -81.12861274
Total Depth: 66 ft	Soil Depth: 13 ft	Core Depth: 20 ft
Date Completed: 5/6/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 15 ft
24HR: N/A		



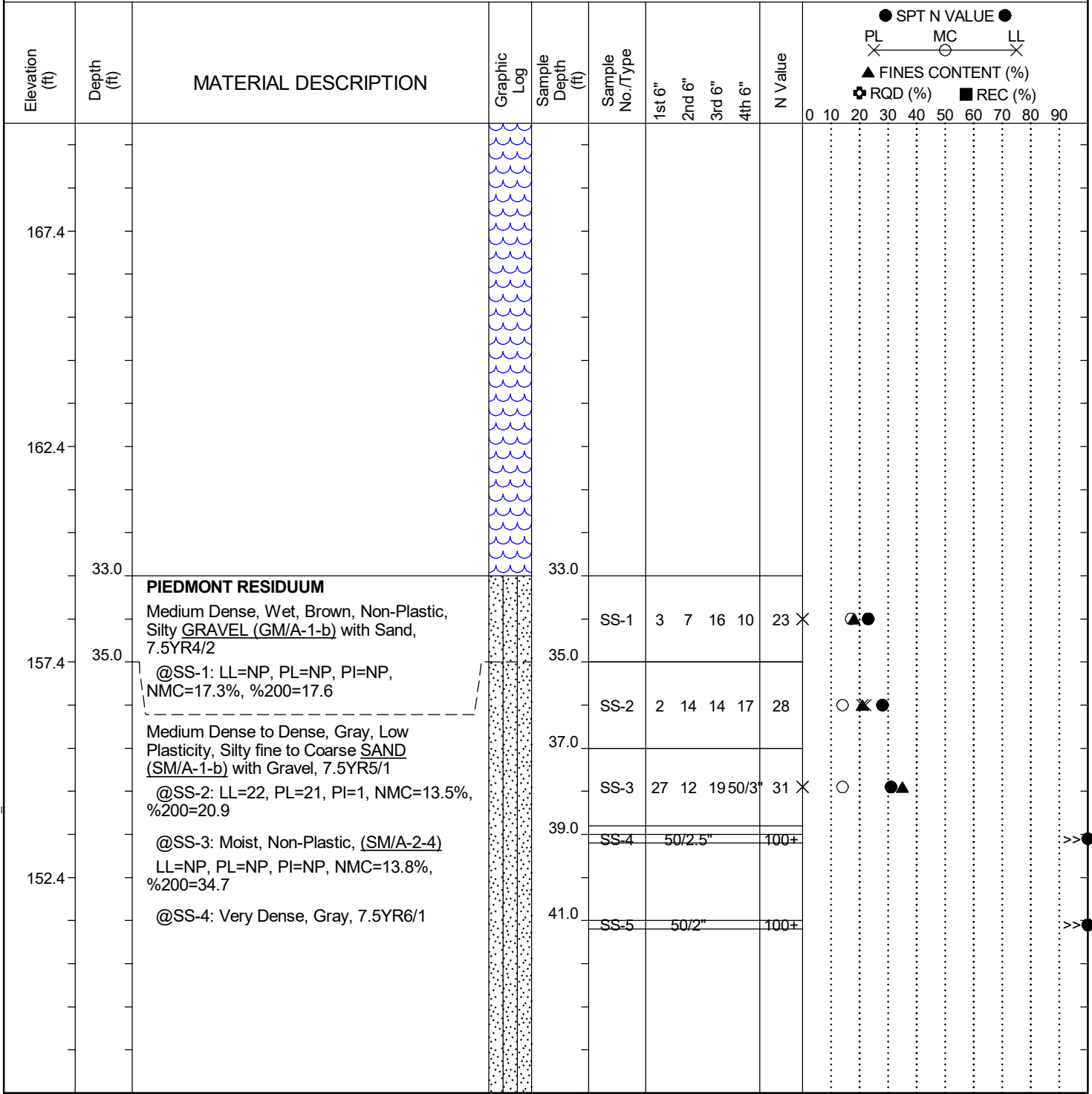
LEGEND Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B3
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 91+36	Offset: 52-L
Alignment: I-20 Median	Date Started: 5/6/2024	
Elev.: 192.4 ft	Latitude: 34.02567278	Longitude: -81.12861274
Total Depth: 66 ft	Soil Depth: 13 ft	Core Depth: 20 ft
Date Completed: 5/6/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 15 ft
24HR: N/A		



LEGEND

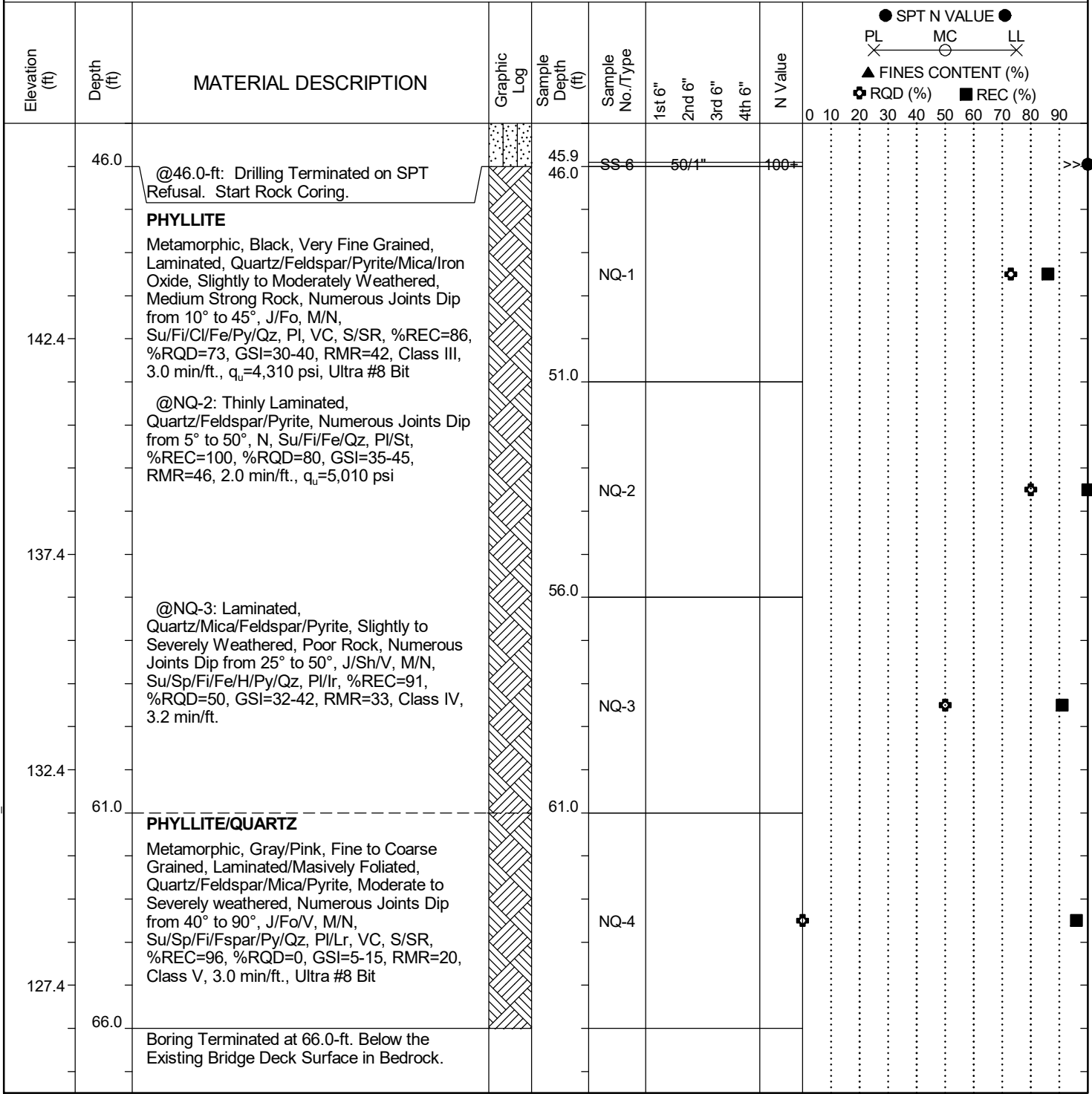
Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B3
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 91+36	Offset: 52-L
Alignment: I-20 Median	Date Started: 5/6/2024	
Elev.: 192.4 ft	Latitude: 34.02567278	Longitude: -81.12861274
Total Depth: 66 ft	Soil Depth: 13 ft	Core Depth: 20 ft
Date Completed: 5/6/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 15 ft
24HR: N/A		



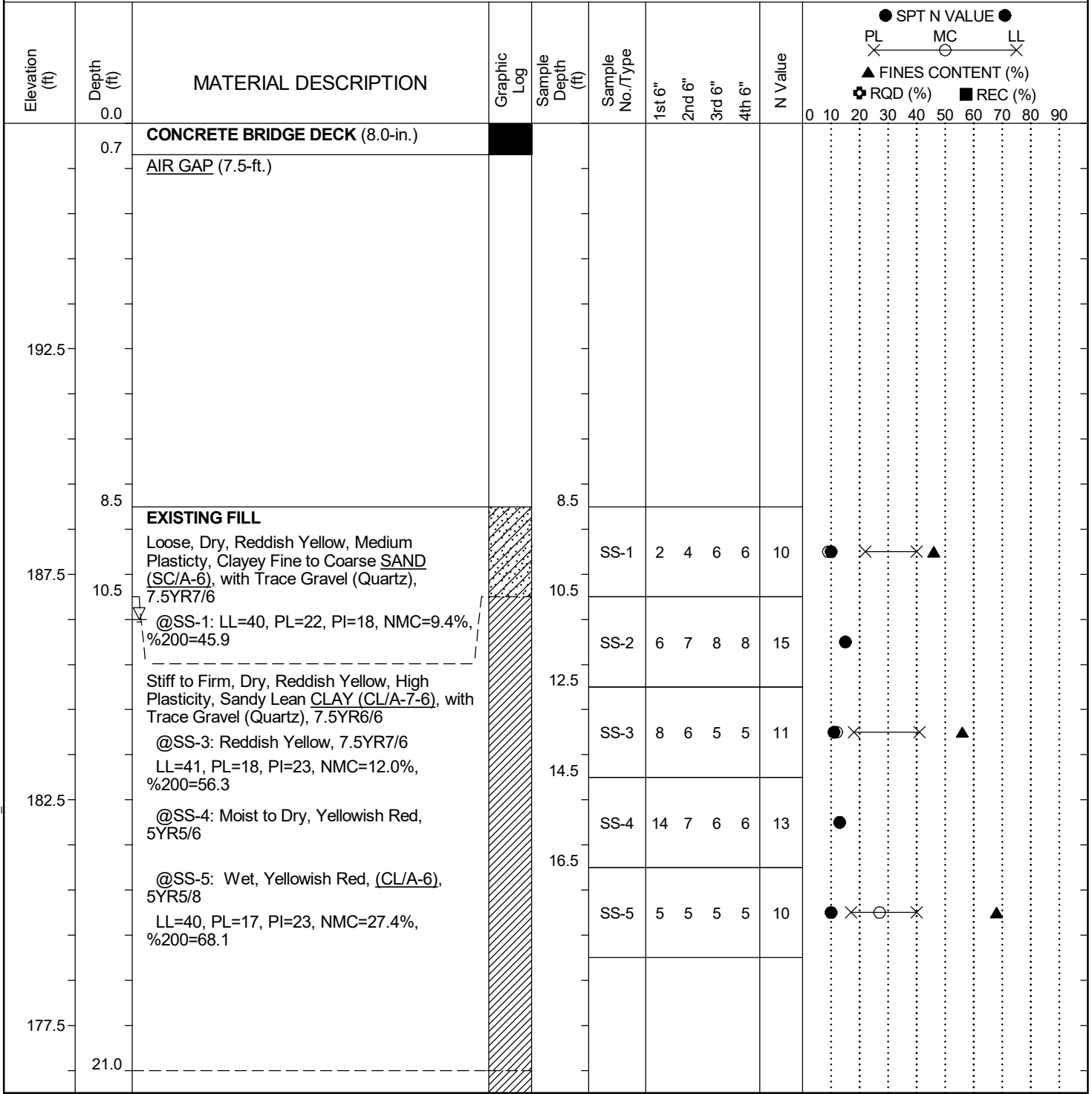
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B4
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 94+90	Offset: 40-R Alignment: I-20 Median
Elev.: 197.5 ft	Latitude: 34.02619071	Longitude: -81.12758027 Date Started: 4/17/2024
Total Depth: 61.8 ft	Soil Depth: 33.3 ft	Core Depth: 20 ft Date Completed: 4/17/2024
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 85.4%
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 11 ft 24HR: N/A



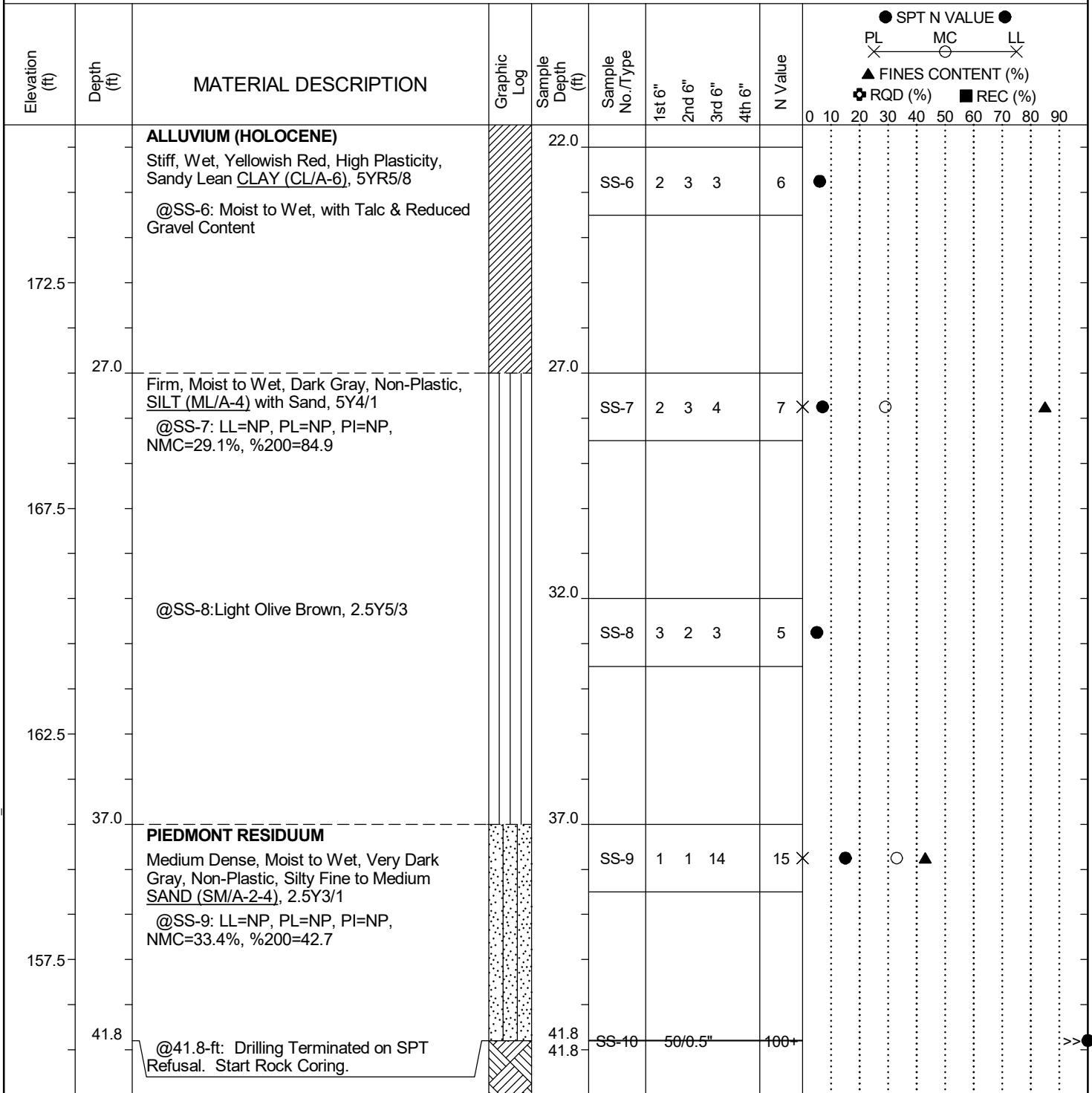
LEGEND Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B4
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 94+90	Offset: 40-R
Alignment: I-20 Median	Elev.: 197.5 ft	Latitude: 34.02619071
Longitude: -81.12758027	Date Started: 4/17/2024	
Total Depth: 61.8 ft	Soil Depth: 33.3 ft	Core Depth: 20 ft
Date Completed: 4/17/2024	Bore Hole Diameter (in): 3	Sampler Configuration
Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%	Core Size: NQ	Driller: L. Guempel
Groundwater: TOB	11 ft	24HR: N/A



LEGEND

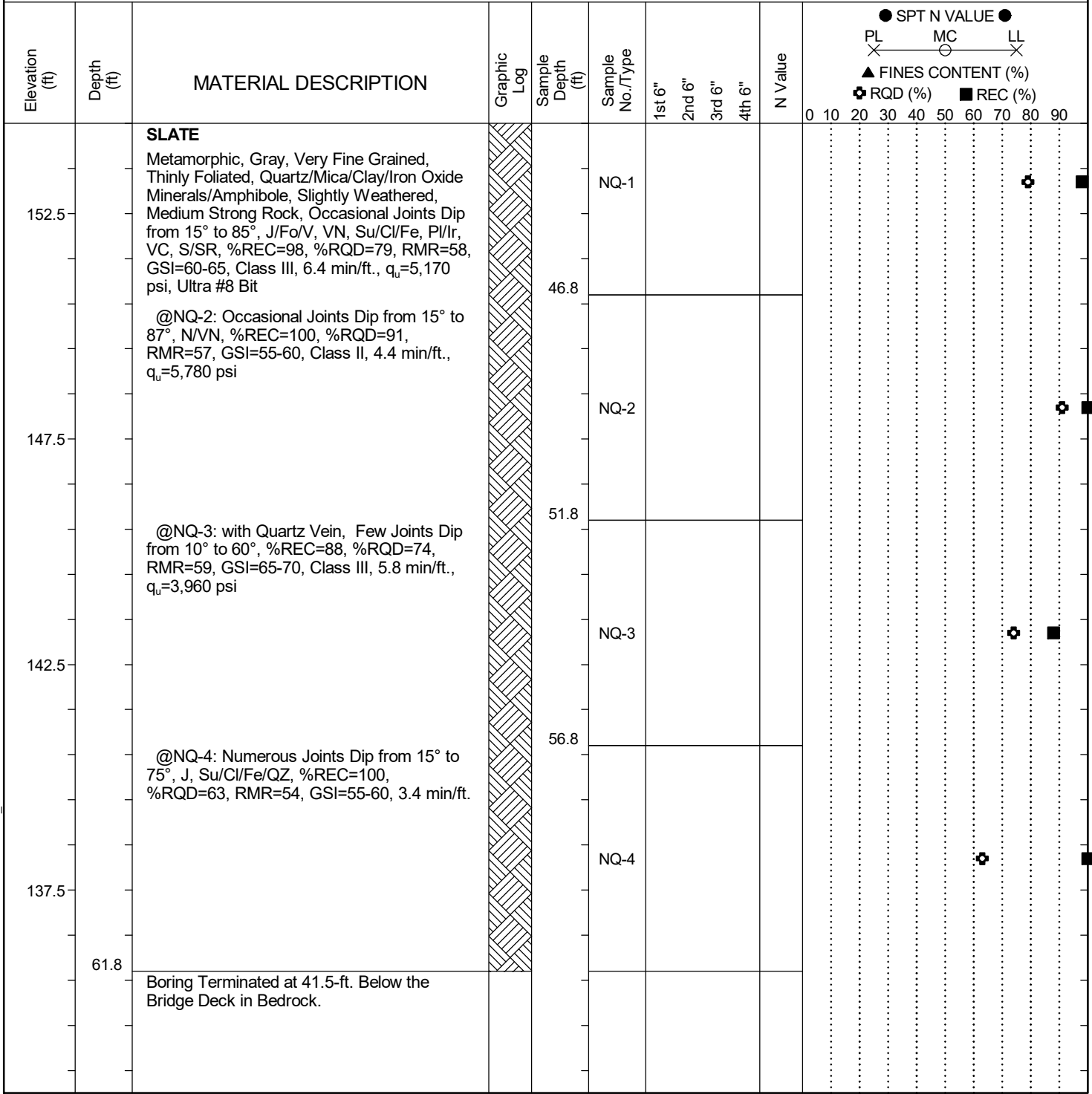
Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B4
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 94+90	Offset: 40-R Alignment: I-20 Median
Elev.: 197.5 ft	Latitude: 34.02619071	Longitude: -81.12758027 Date Started: 4/17/2024
Total Depth: 61.8 ft	Soil Depth: 33.3 ft	Core Depth: 20 ft Date Completed: 4/17/2024
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 85.4%
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 11 ft 24HR: N/A



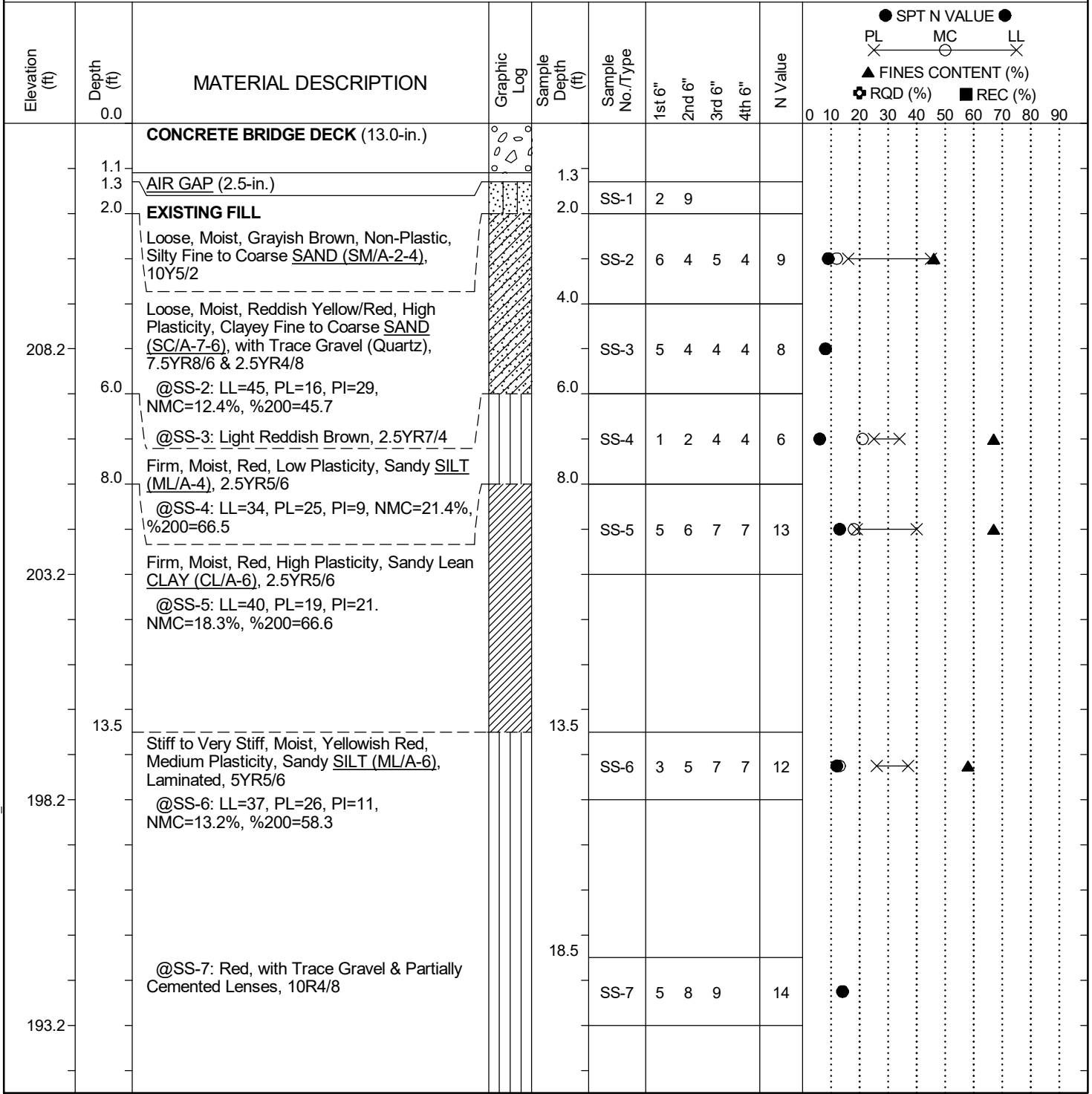
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B5
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 100+83	Offset: 48-L
Alignment: I-20 Median	Date Started: 4/23/2024	
Elev.: 213.2 ft	Latitude: 34.02752332	Longitude: -81.12641358
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/23/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 35(Cave@7724HR) N/A



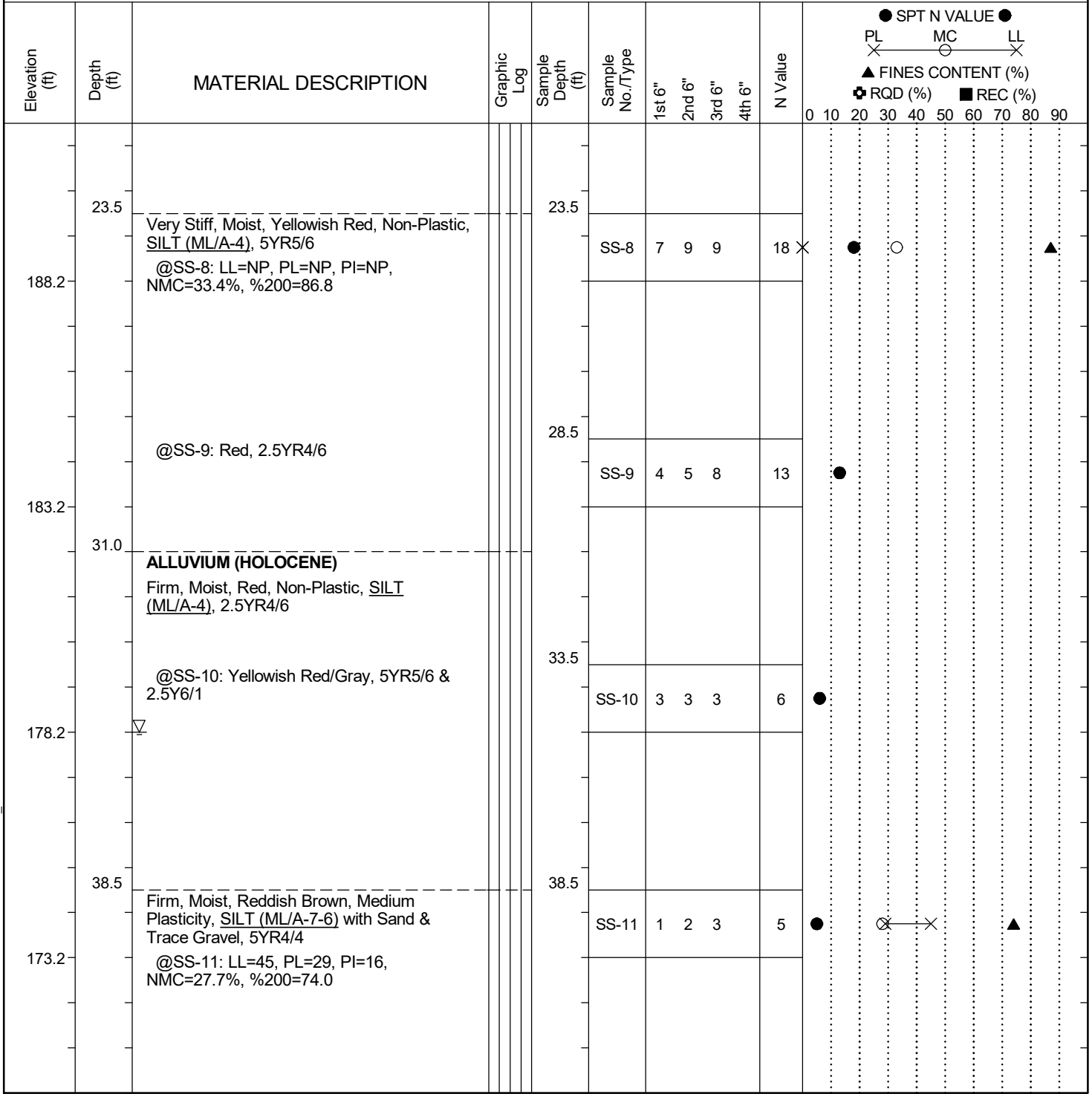
LEGEND Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B5
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 100+83	Offset: 48-L
Alignment: I-20 Median	Date Started: 4/23/2024	
Elev.: 213.2 ft	Latitude: 34.02752332	Longitude: -81.12641358
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/23/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 35(Cave@7724HR) N/A



LEGEND

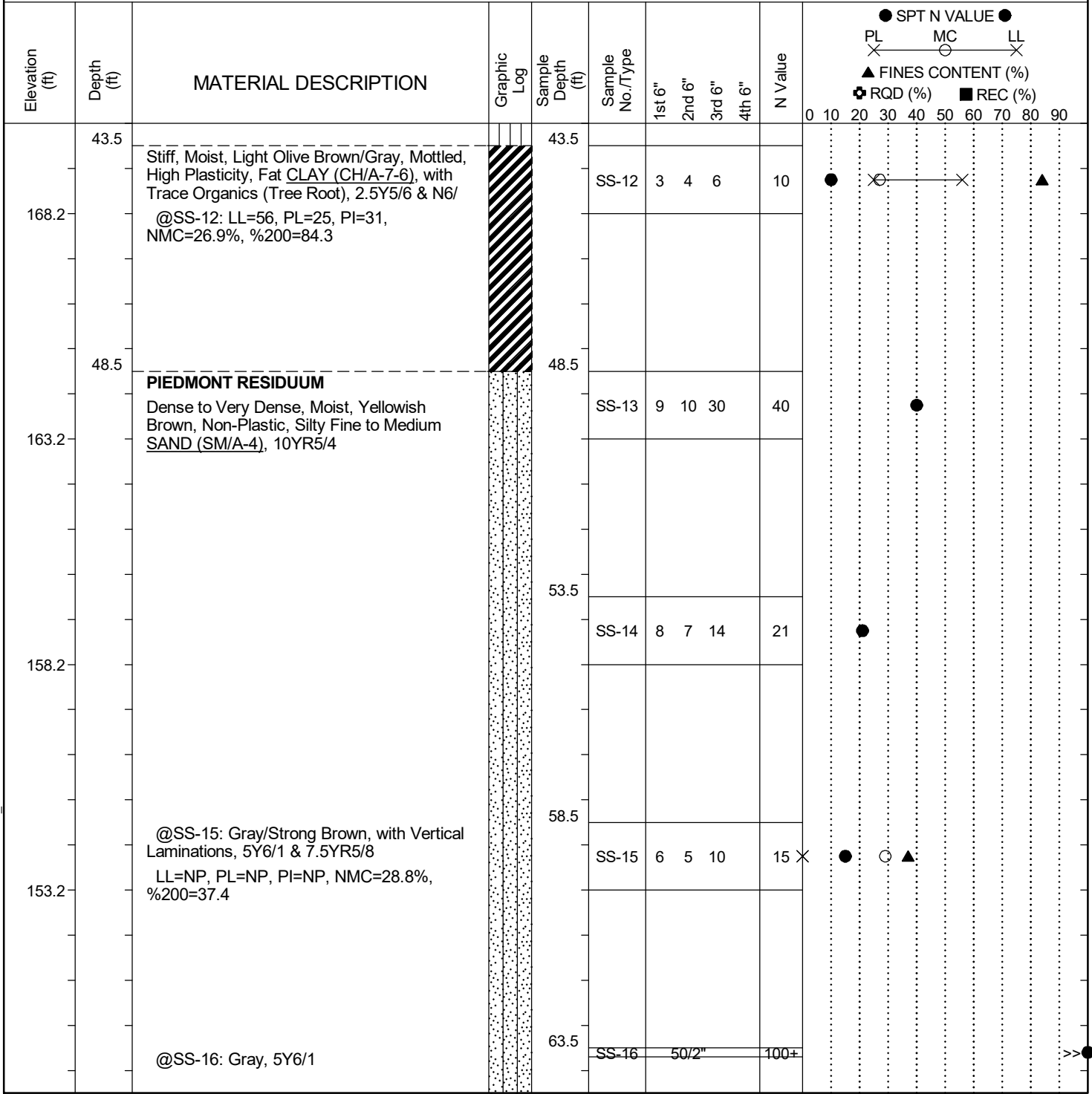
Continued Next Page

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 G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B5
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 100+83	Offset: 48-L
Alignment: I-20 Median		
Elev.: 213.2 ft	Latitude: 34.02752332	Longitude: -81.12641358
Date Started: 4/23/2024		
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/23/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 35(Cave@7724HR) N/A



LEGEND

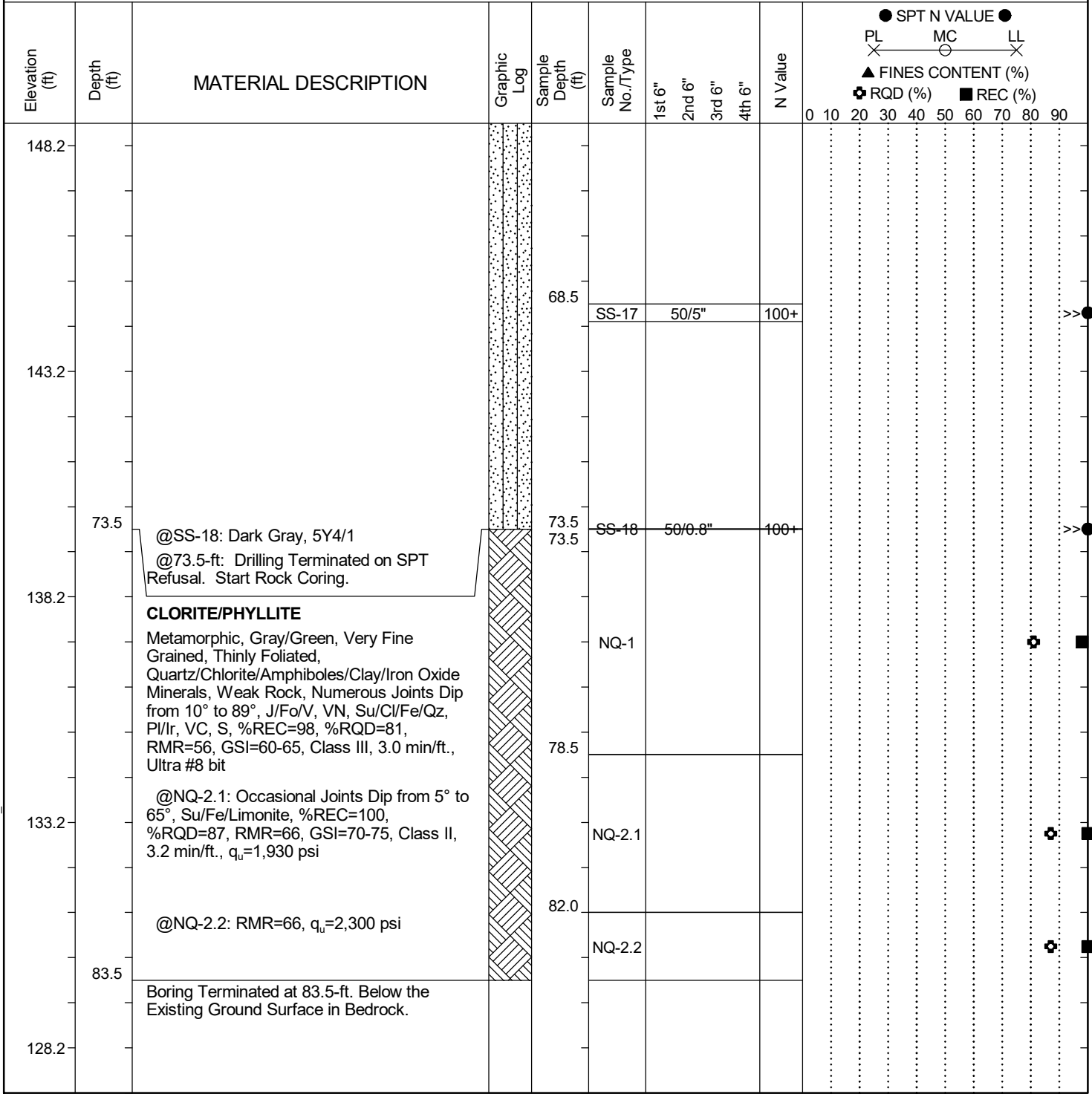
Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B5
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 100+83	Offset: 48-L Alignment: I-20 Median
Elev.: 213.2 ft	Latitude: 34.02752332	Longitude: -81.12641358 Date Started: 4/23/2024
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft Date Completed: 4/23/2024
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 85.4%
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 35(Cave@7724HR) N/A



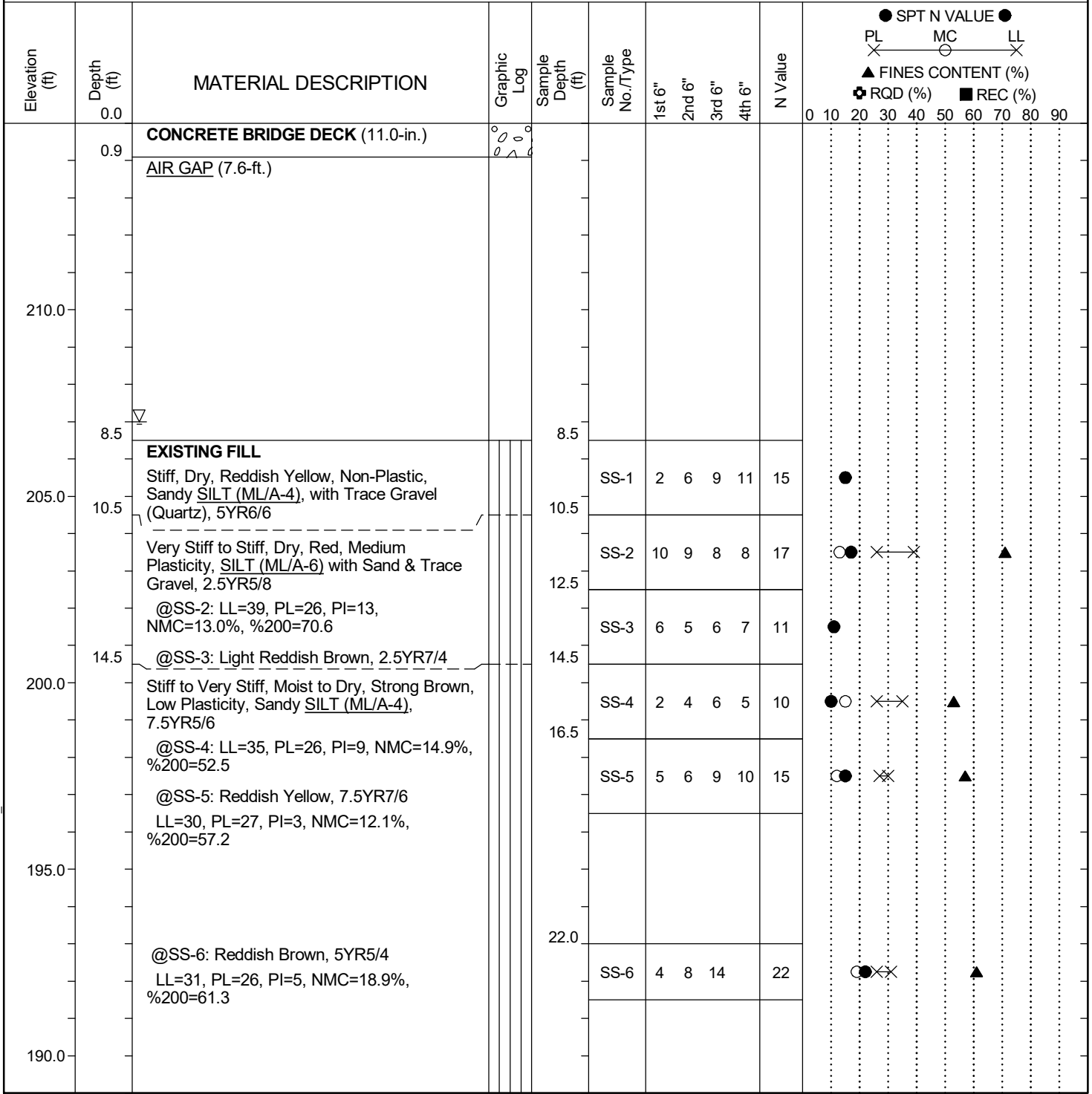
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B6
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 101+41	Offset: 40-R
Alignment: I-20 Median		
Elev.: 215.0 ft	Latitude: 34.02746596	Longitude: -81.1260731
Date Started: 4/18/2024		
Total Depth: 76.5 ft	Soil Depth: 58 ft	Core Depth: 10 ft
Date Completed: 4/24/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB Cave@33 24HR N/A



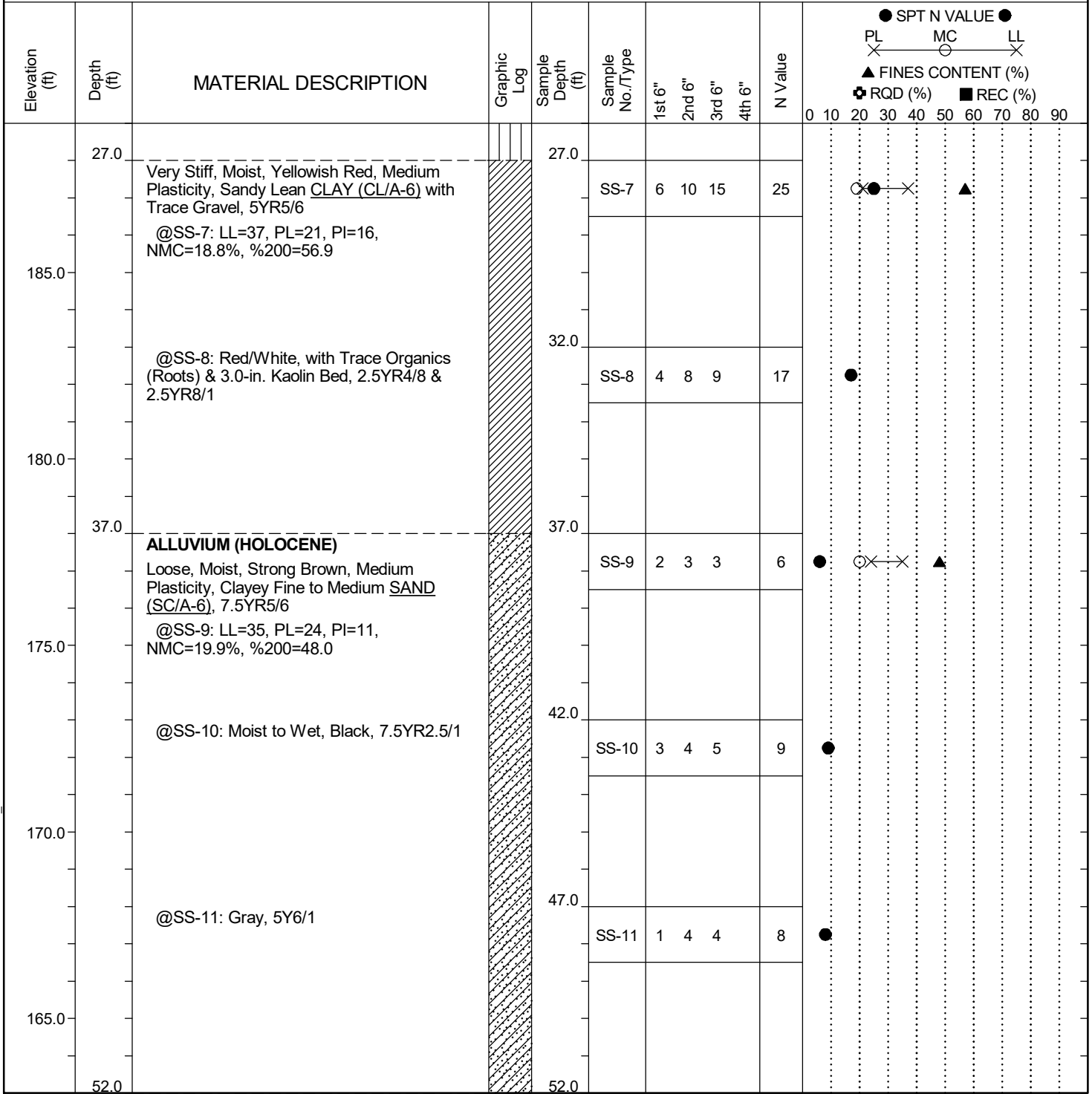
LEGEND Continued Next Page

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 G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B6
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 101+41	Offset: 40-R
Alignment: I-20 Median	Date Started: 4/18/2024	
Elev.: 215.0 ft	Latitude: 34.02746596	Longitude: -81.1260731
Total Depth: 76.5 ft	Soil Depth: 58 ft	Core Depth: 10 ft
Date Completed: 4/24/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB
		Cave@33
		24HR
		N/A



LEGEND

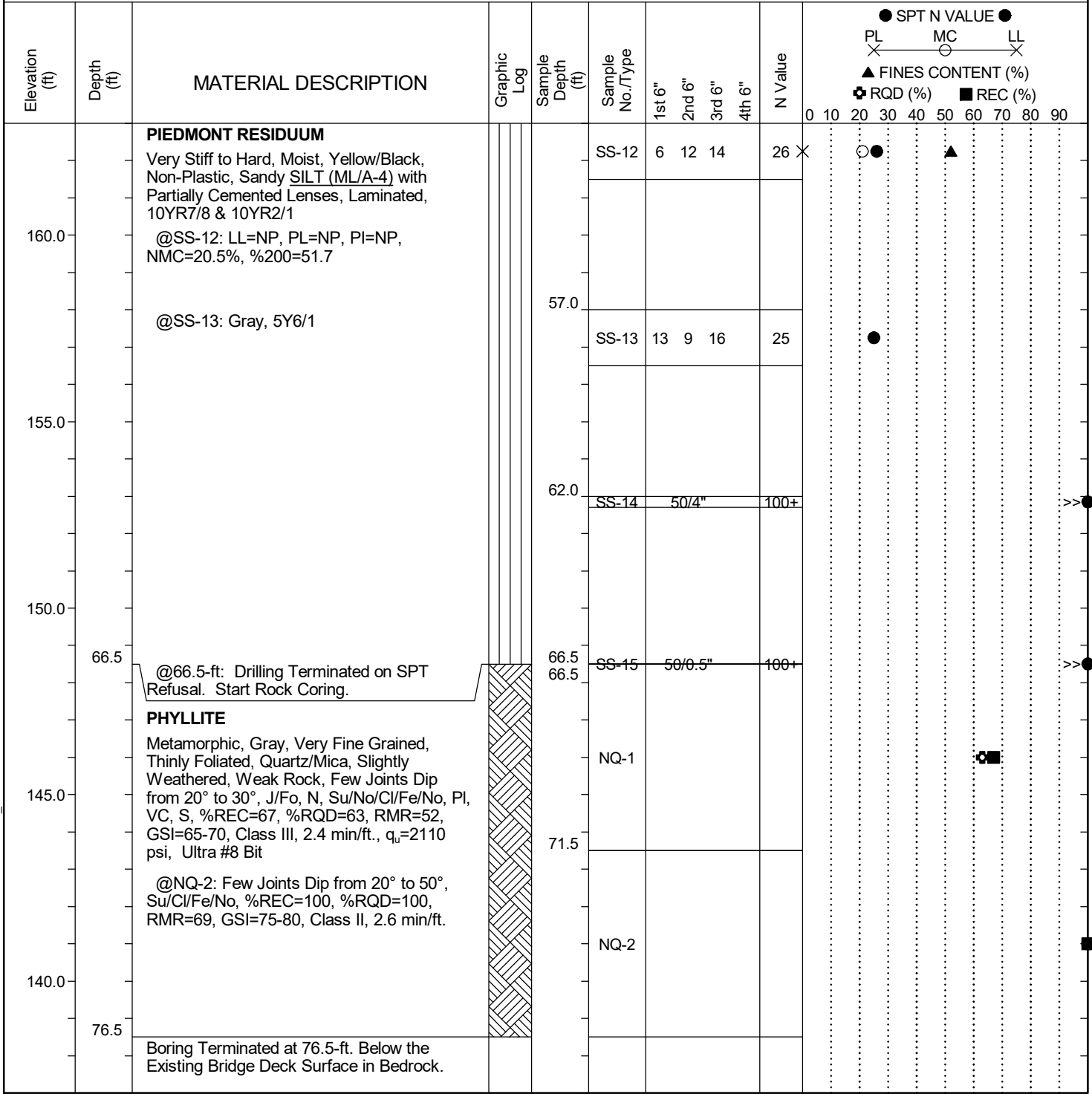
Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B6
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 101+41	Offset: 40-R
Alignment: I-20 Median	Date Started: 4/18/2024	
Elev.: 215.0 ft	Latitude: 34.02746596	Longitude: -81.1260731
Total Depth: 76.5 ft	Soil Depth: 58 ft	Core Depth: 10 ft
Date Completed: 4/24/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB Cave@33 24HR N/A



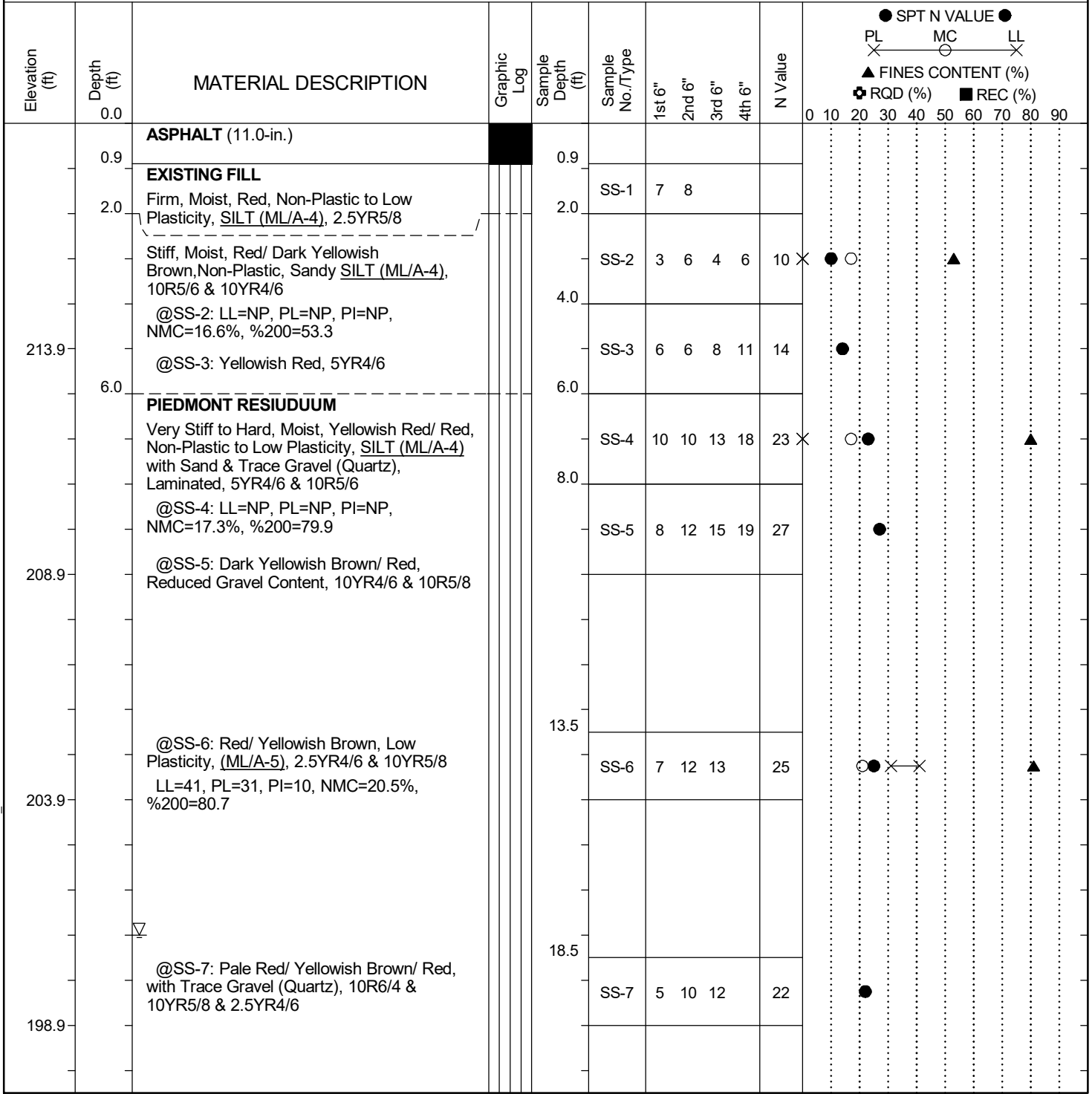
LEGEND

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 G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B7
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 103+43	Offset: 50-R
Alignment: I-20 Median		
Elev.: 218.9 ft	Latitude: 34.02784566	Longitude: -81.12558276
Date Started: 4/21/2024		
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/22/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 18(Cave@4824HR) N/A



LEGEND

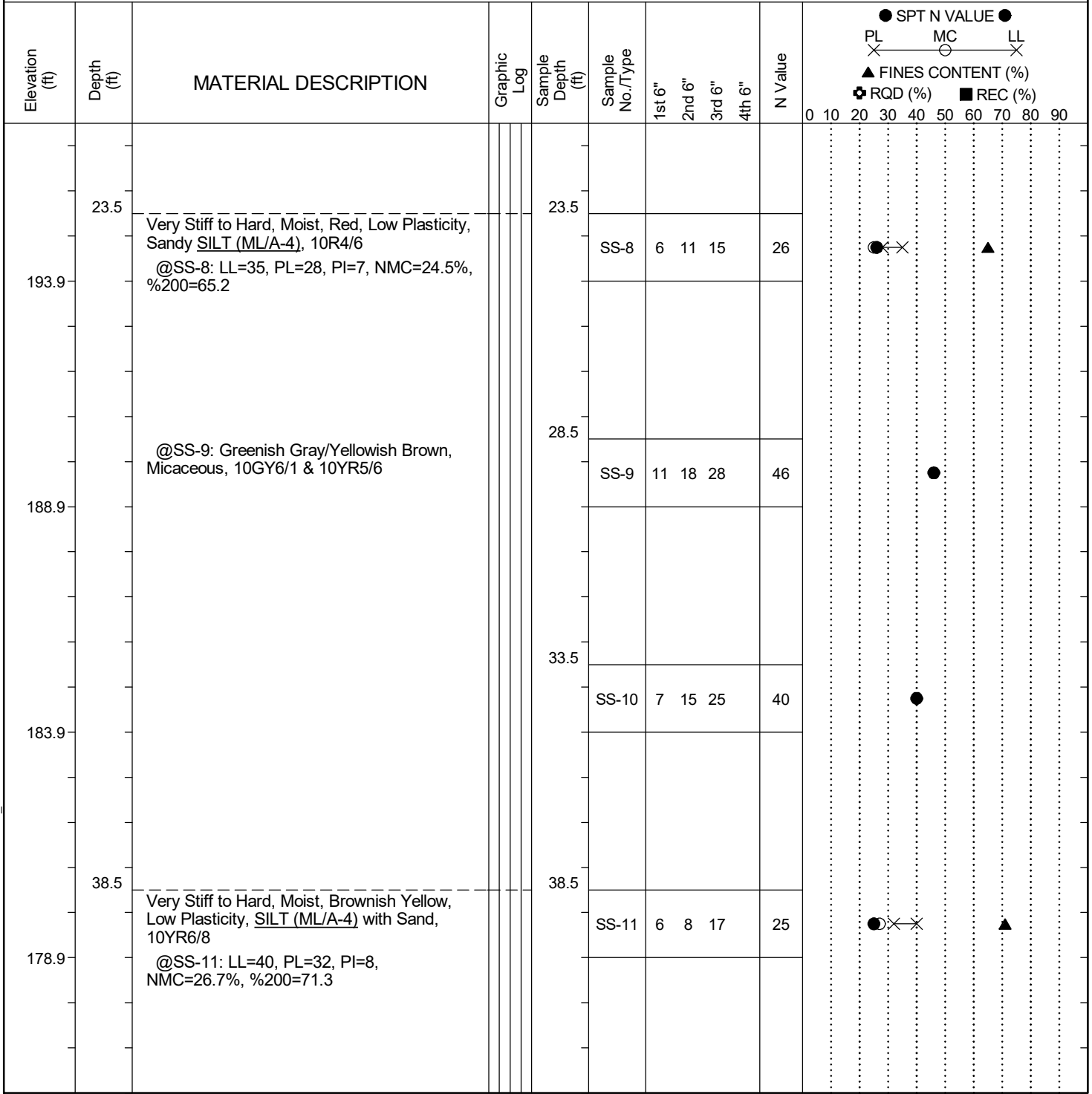
Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B7
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 103+43	Offset: 50-R
Alignment: I-20 Median	Date Started: 4/21/2024	
Elev.: 218.9 ft	Latitude: 34.02784566	Longitude: -81.12558276
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/22/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 18(Cave@4824HR) N/A



LEGEND

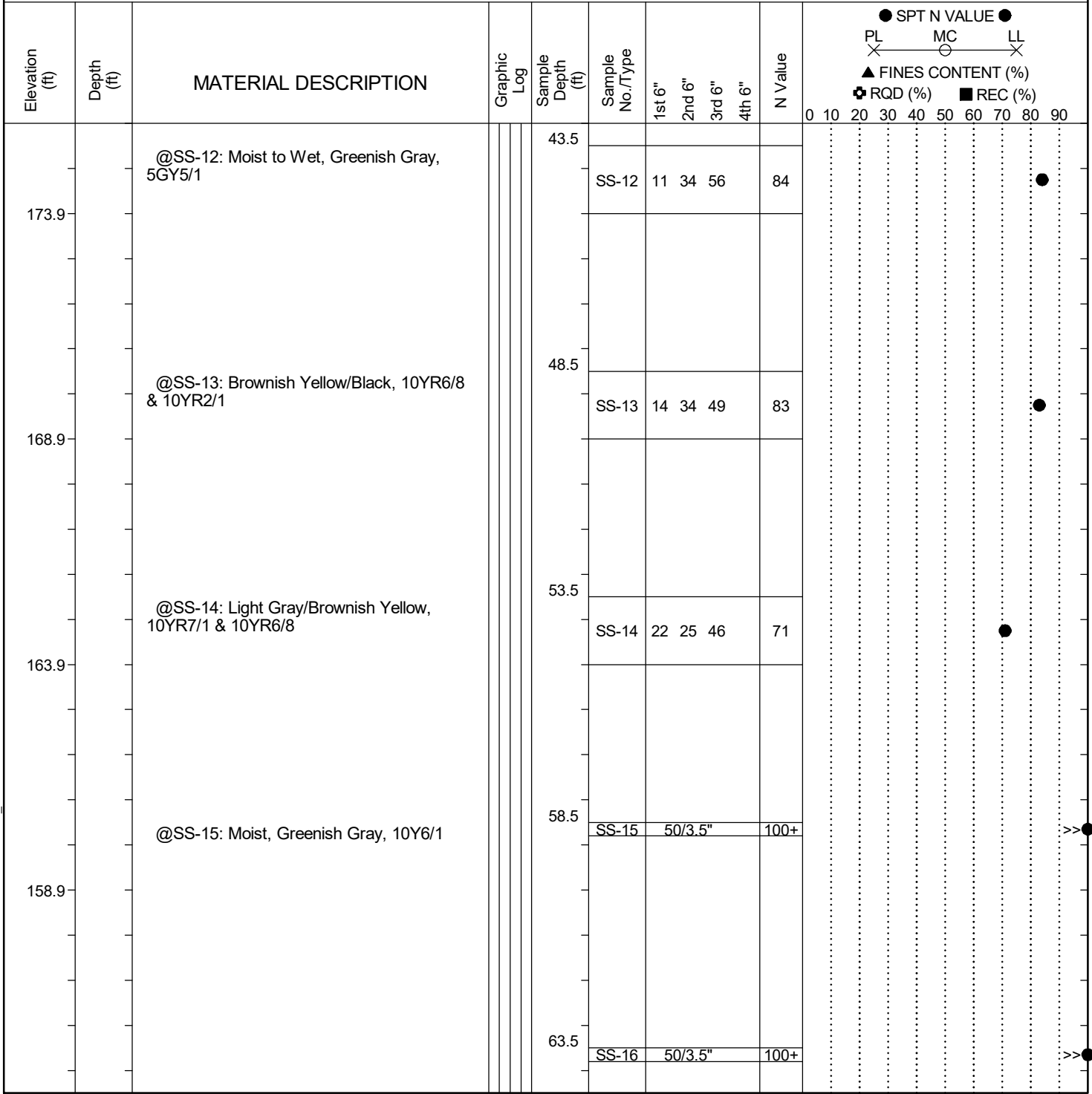
Continued Next Page

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

SC.DOT G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B7
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 103+43	Offset: 50-R
Alignment: I-20 Median		
Elev.: 218.9 ft	Latitude: 34.02784566	Longitude: -81.12558276
Date Started: 4/21/2024		
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/22/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 18(Cave@4824HR) N/A



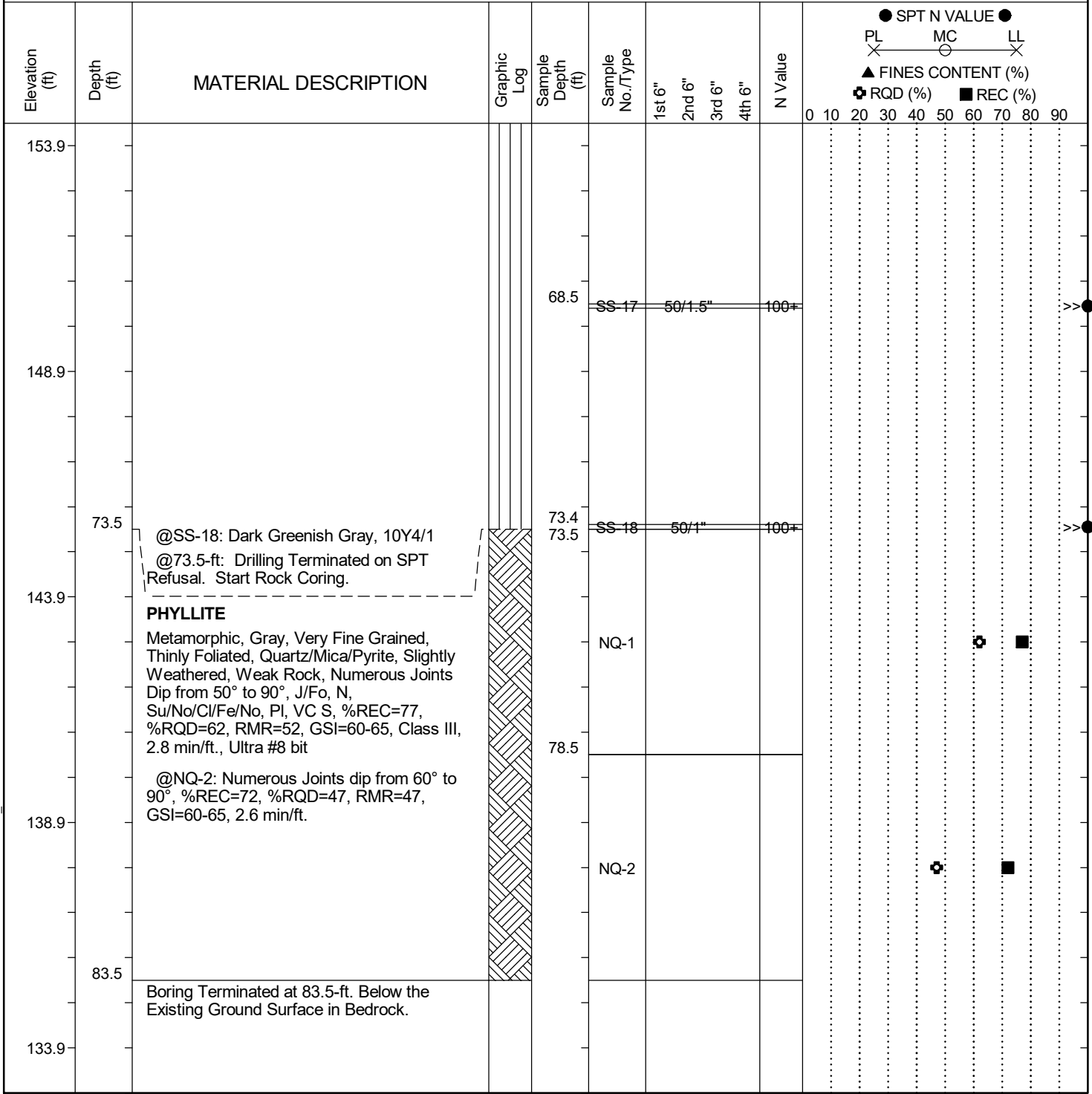
LEGEND Continued Next Page

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

SC.DOT G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-B7
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 103+43	Offset: 50-R
Alignment: I-20 Median		
Elev.: 218.9 ft	Latitude: 34.02784566	Longitude: -81.12558276
Date Started: 4/21/2024		
Total Depth: 83.5 ft	Soil Depth: 73.5 ft	Core Depth: 10 ft
Date Completed: 4/22/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: NQ	Driller: L. Guempel	Groundwater: TOB 18(Cave@4824HR) N/A



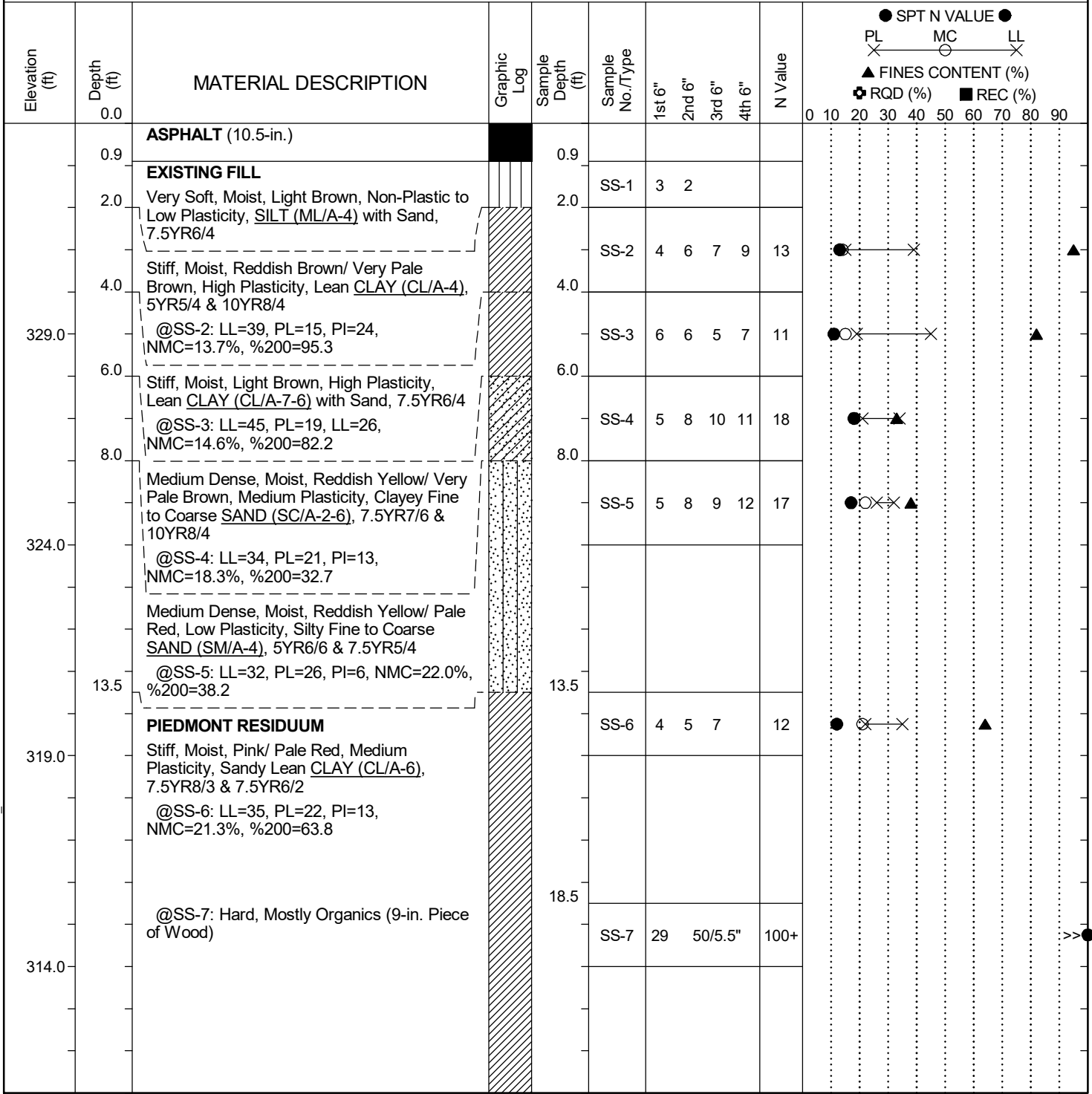
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 34+72	Offset: 61-R
Alignment: I-20 Median	Date Started: 4/9/2024	
Elev.: 334.0 ft	Latitude: 34.01442692	Longitude: -81.14156777
Total Depth: 66.5 ft	Soil Depth: 66.5 ft	Core Depth: 0 ft
Date Completed: 4/9/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB NE
		24HR: NE



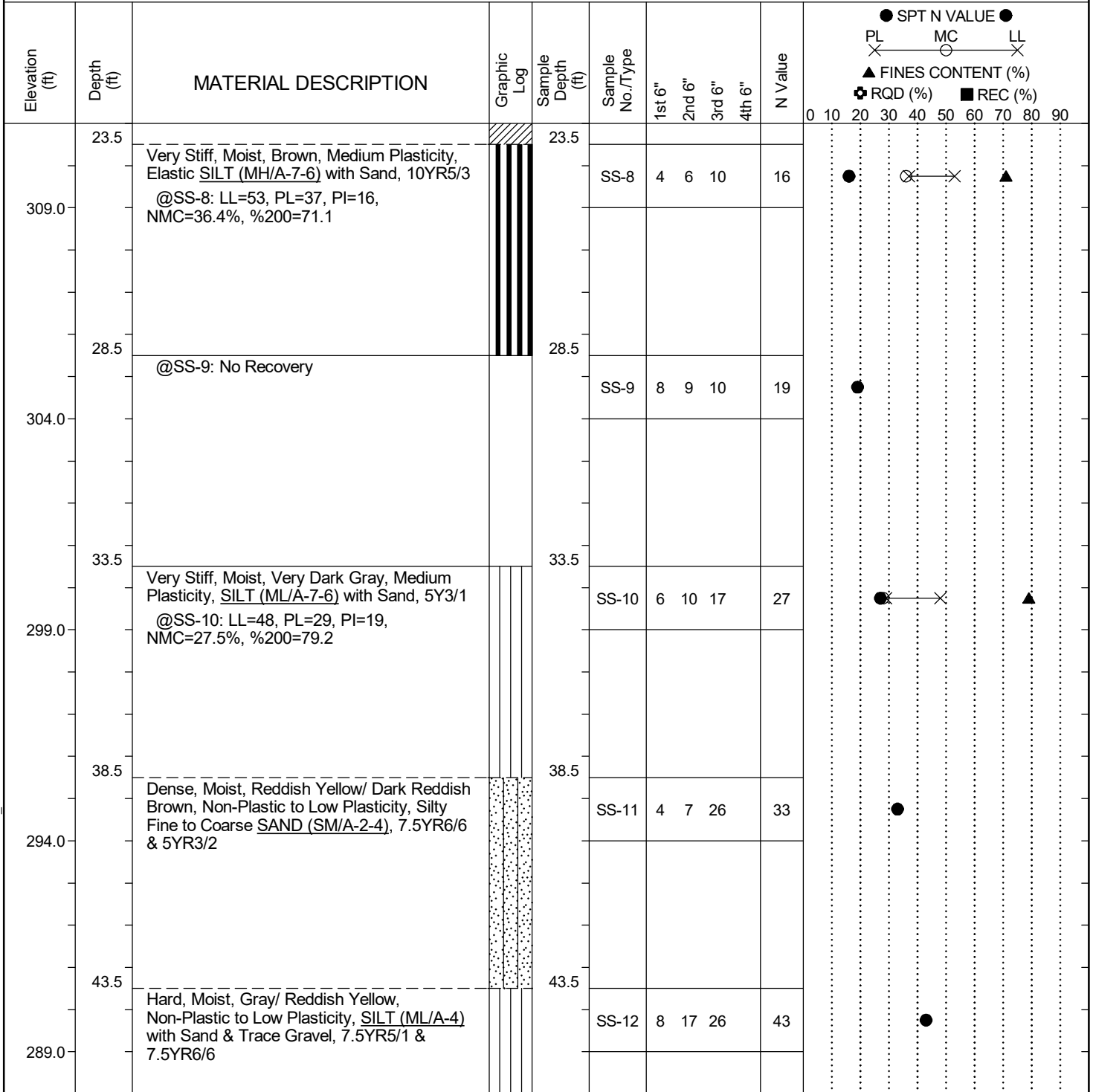
LEGEND Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 34+72	Offset: 61-R
Alignment: I-20 Median	Elev.: 334.0 ft	Latitude: 34.01442692
Longitude: -81.14156777	Date Started: 4/9/2024	
Total Depth: 66.5 ft	Soil Depth: 66.5 ft	Core Depth: 0 ft
Date Completed: 4/9/2024	Bore Hole Diameter (in): 3	Sampler Configuration
Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%	Core Size: N/A	Driller: L. Guempel
Groundwater: TOB	NE	24HR NE



LEGEND

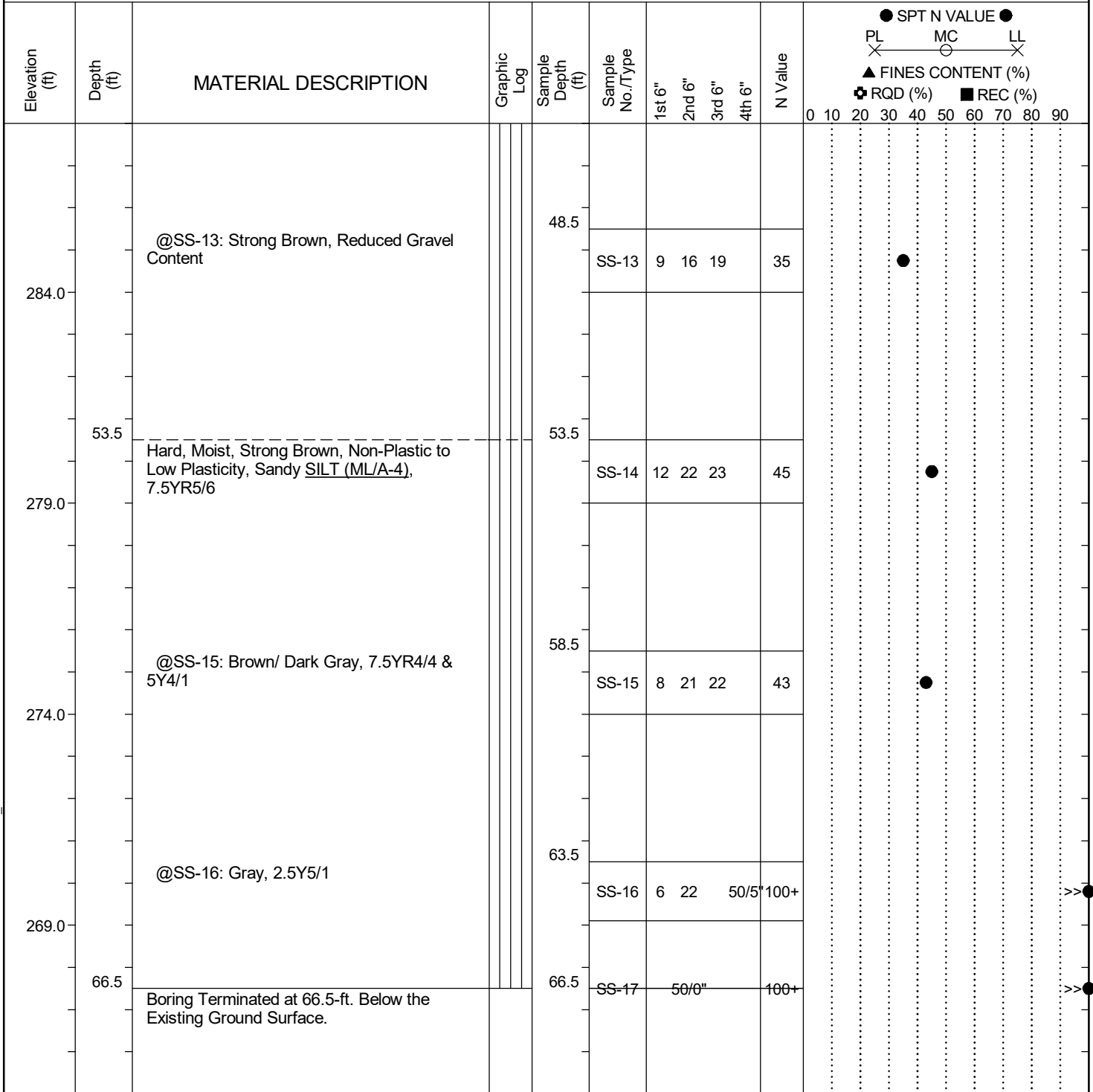
Continued Next Page

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

SC.DOT G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W1
Site Description: Carolina Crossroads Phase 3C	Route: I-20	
Eng./Geo.: C. Piercy	Boring Location: 34+72	Offset: 61-R
Alignment: I-20 Median		
Elev.: 334.0 ft	Latitude: 34.01442692	Longitude: -81.14156777
Date Started: 4/9/2024		
Total Depth: 66.5 ft	Soil Depth: 66.5 ft	Core Depth: 0 ft
Date Completed: 4/9/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB NE
24HR: NE		



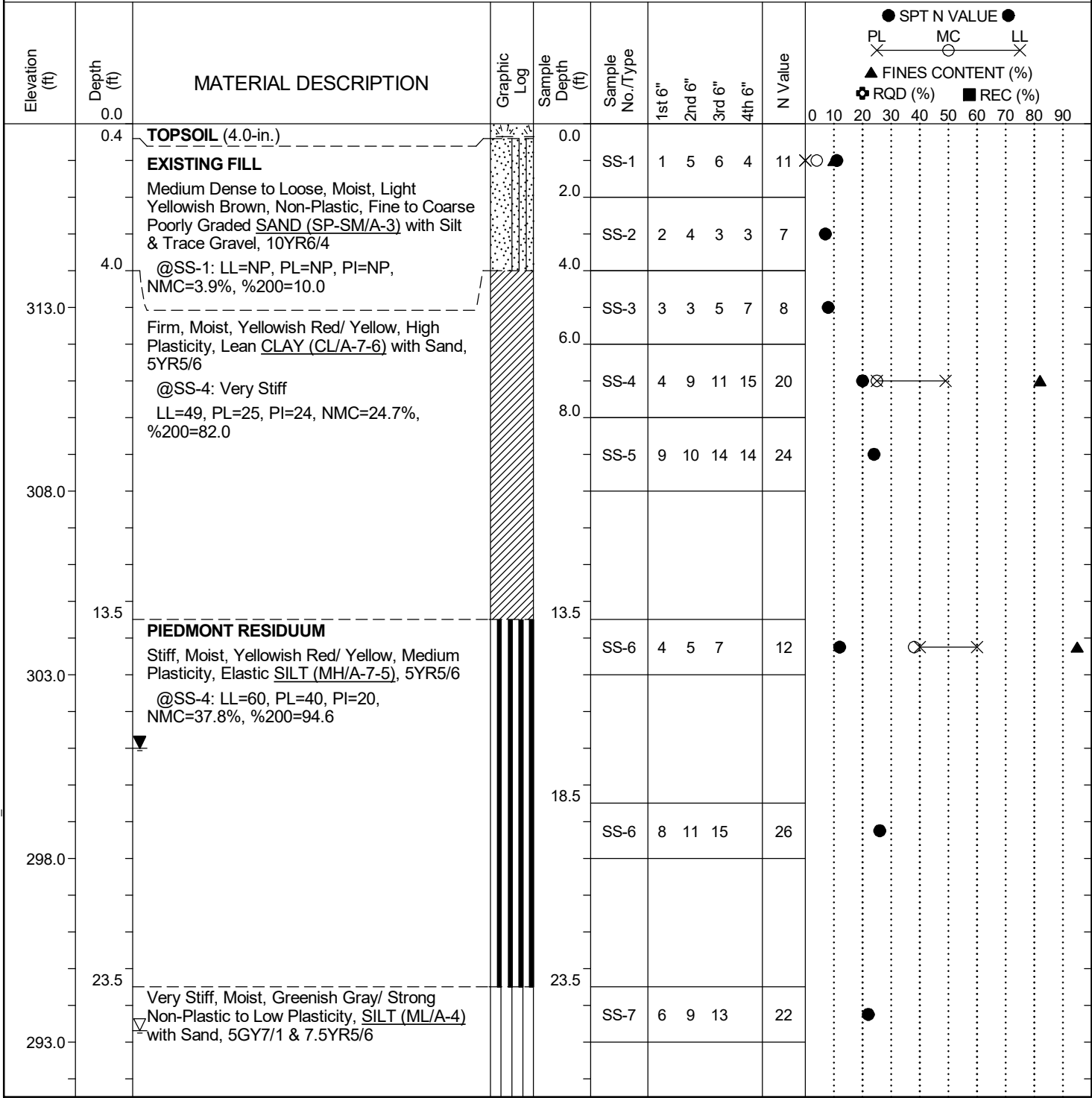
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W2
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 37+59	Offset: 88-R
Alignment: I-20 Median	Date Started: 3/19/2024	
Elev.: 318.0 ft	Latitude: 34.01487733	Longitude: -81.14077013
Total Depth: 49.4 ft	Soil Depth: 49.4 ft	Core Depth: 0 ft
Date Completed: 3/19/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 24.7(Cave@24HR) 17(Cave@25)



LEGEND

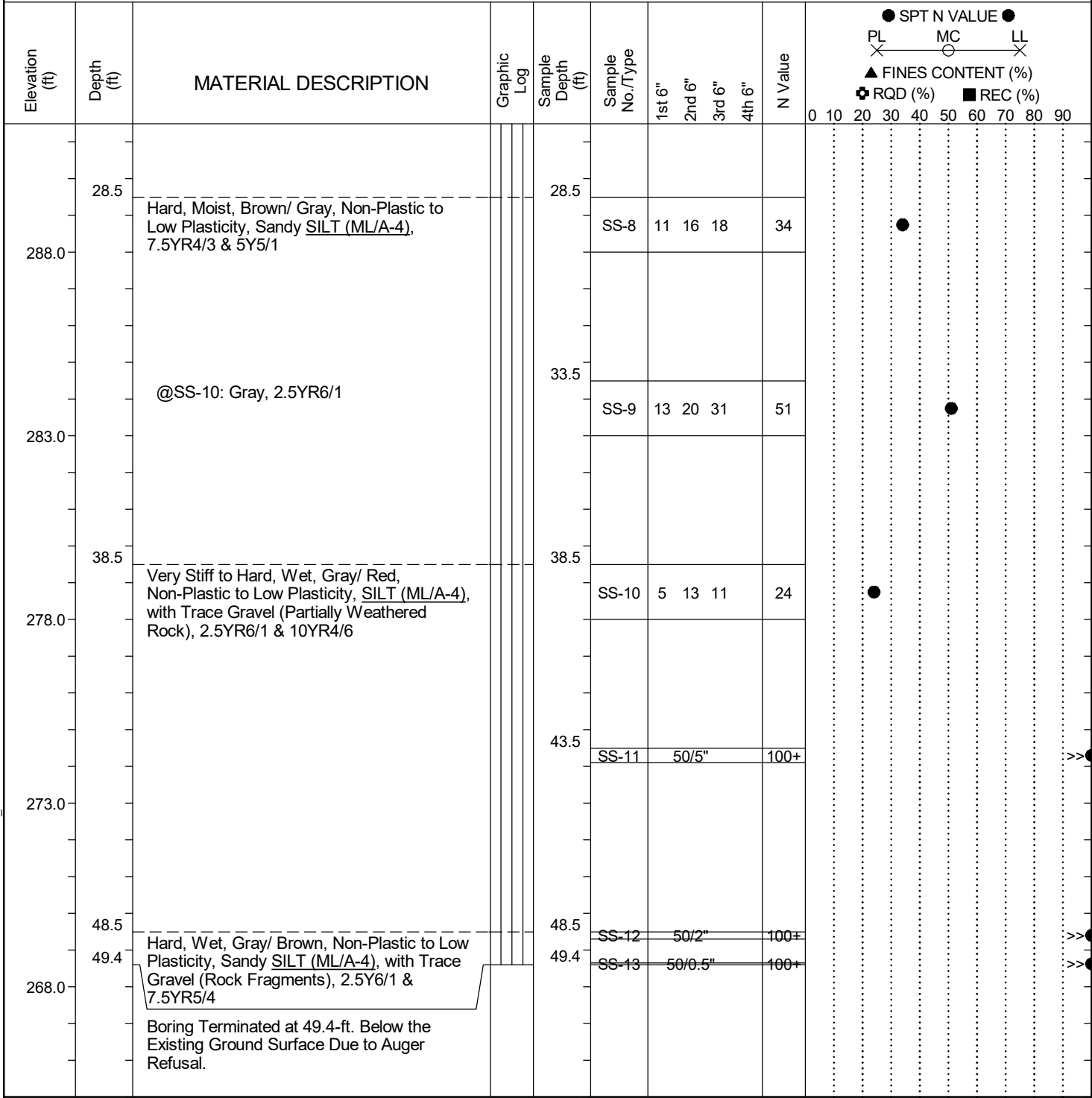
Continued Next Page

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W2
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 37+59	Offset: 88-R
Alignment: I-20 Median	Date Started: 3/19/2024	
Elev.: 318.0 ft	Latitude: 34.01487733	Longitude: -81.14077013
Total Depth: 49.4 ft	Soil Depth: 49.4 ft	Core Depth: 0 ft
Date Completed: 3/19/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 24.7(Cave@24HR) 17(Cave@25)



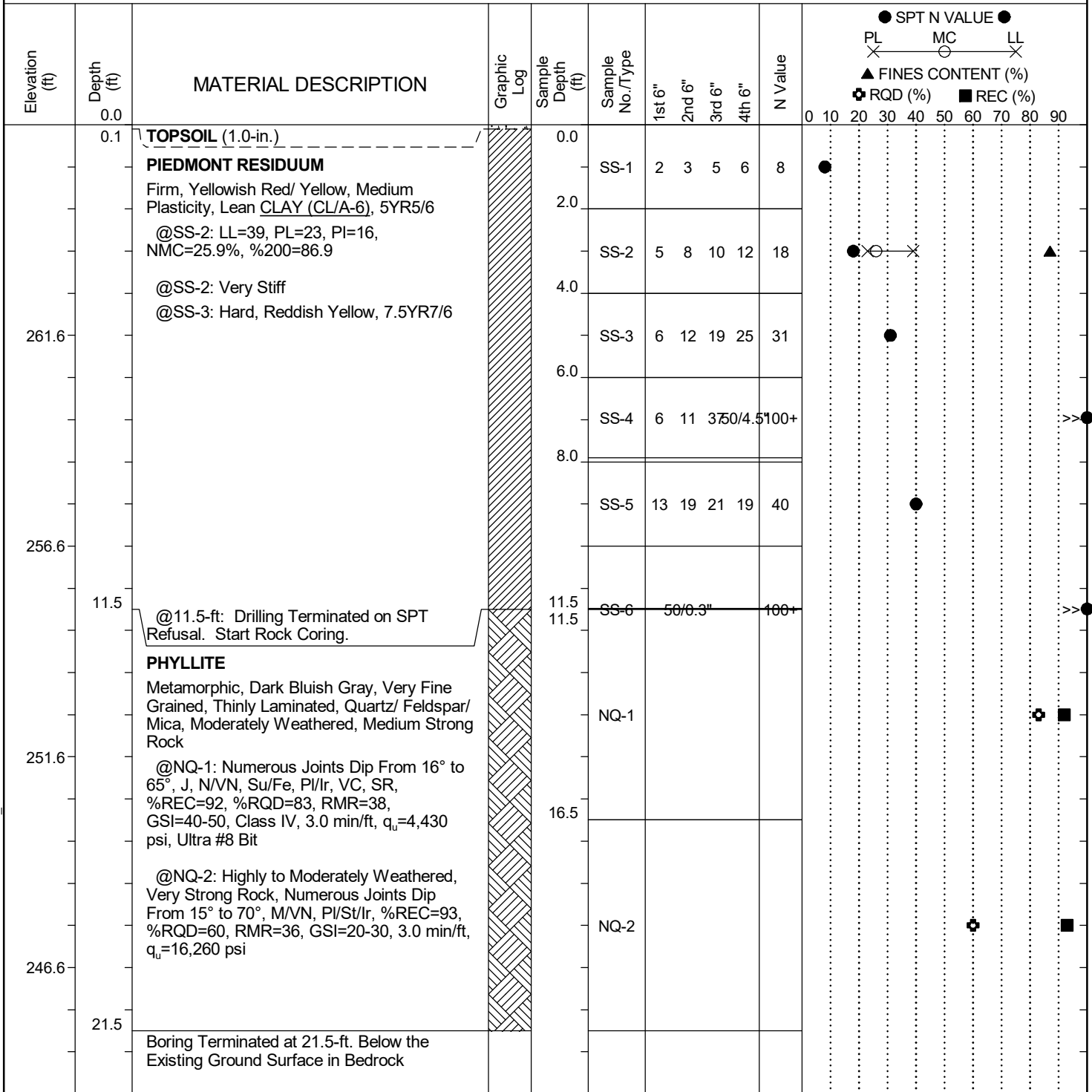
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W3
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 65+63	Offset: 137-R
Elev.: 266.6 ft	Latitude: 34.02026159	Longitude: -81.13411829
Total Depth: 21.5 ft	Soil Depth: 11.5 ft	Core Depth: 10 ft
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Core Size: NQ	Driller: L. Guempel	Energy Ratio: 85.4%
Groundwater: TOB		NE(Cave@8)24HR NE(Cave@10)



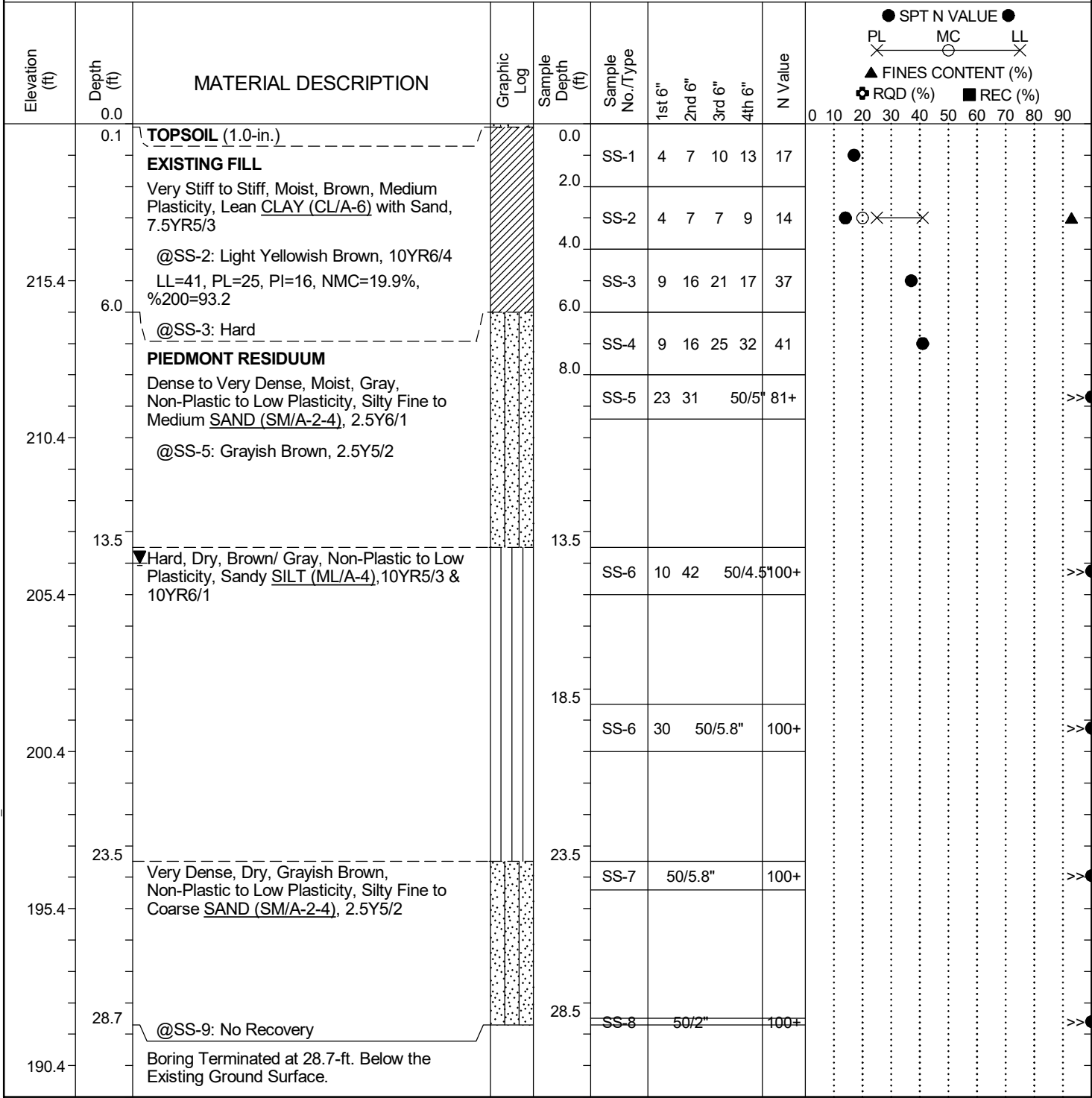
LEGEND

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.G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT.DATATEMPLATE.GDT 7/18/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W4
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 73+61	Offset: 96-R
Alignment: I-20 Median	Date Started: 3/19/2024	
Elev.: 220.4 ft	Latitude: 34.0219058	Longitude: -81.13237003
Total Depth: 28.7 ft	Soil Depth: 28.7 ft	Core Depth: 0 ft
Date Completed: 3/19/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB NE(Cave@22)HR 14(Cave@22)



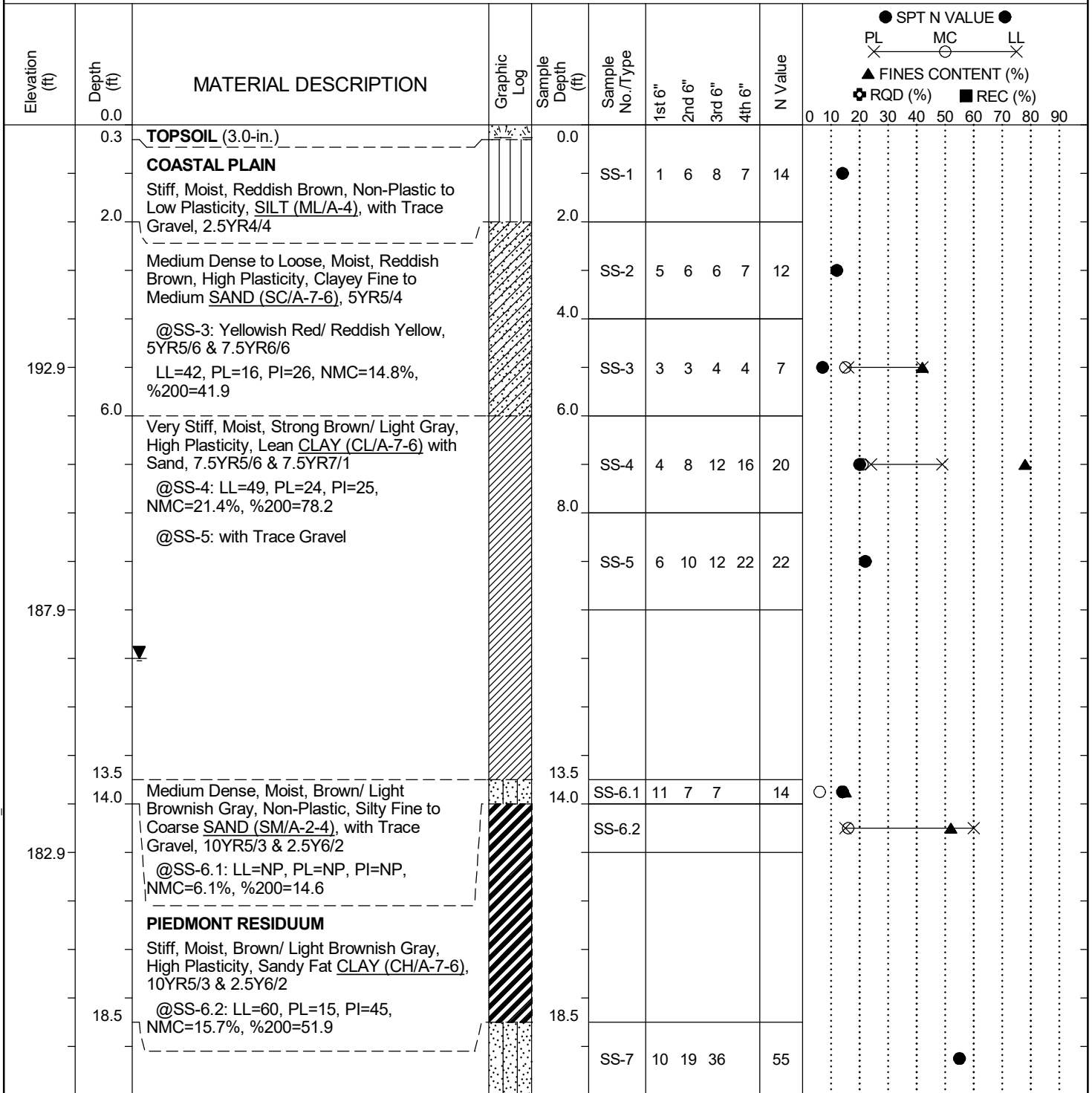
LEGEND

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 G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W5
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 81+08	Offset: 109-R
Alignment: I-20 Median	Date Started: 3/19/2024	
Elev.: 197.9 ft	Latitude: 34.02334636	Longitude: -81.13061226
Total Depth: 37 ft	Soil Depth: 37 ft	Core Depth: 0 ft
Date Completed: 3/19/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 20.8(Cave@22HR) 11(Cave@20)



LEGEND

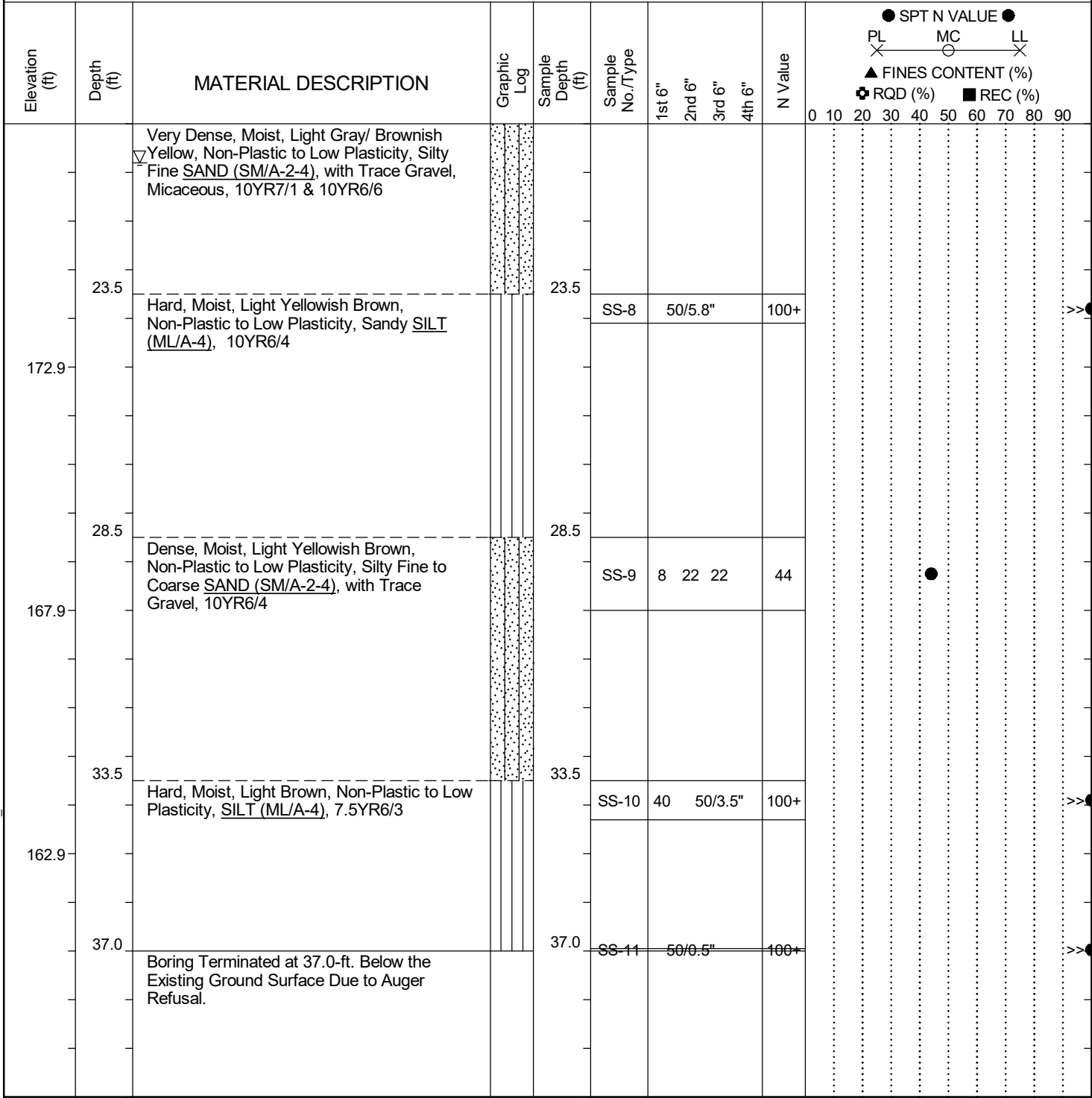
Continued Next Page

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

SC.DOT G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-W5
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 81+08	Offset: 109-R
Alignment: I-20 Median	Date Started: 3/19/2024	
Elev.: 197.9 ft	Latitude: 34.02334636	Longitude: -81.13061226
Total Depth: 37 ft	Soil Depth: 37 ft	Core Depth: 0 ft
Date Completed: 3/19/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 20.8(Cave@22)HR 11(Cave@20)



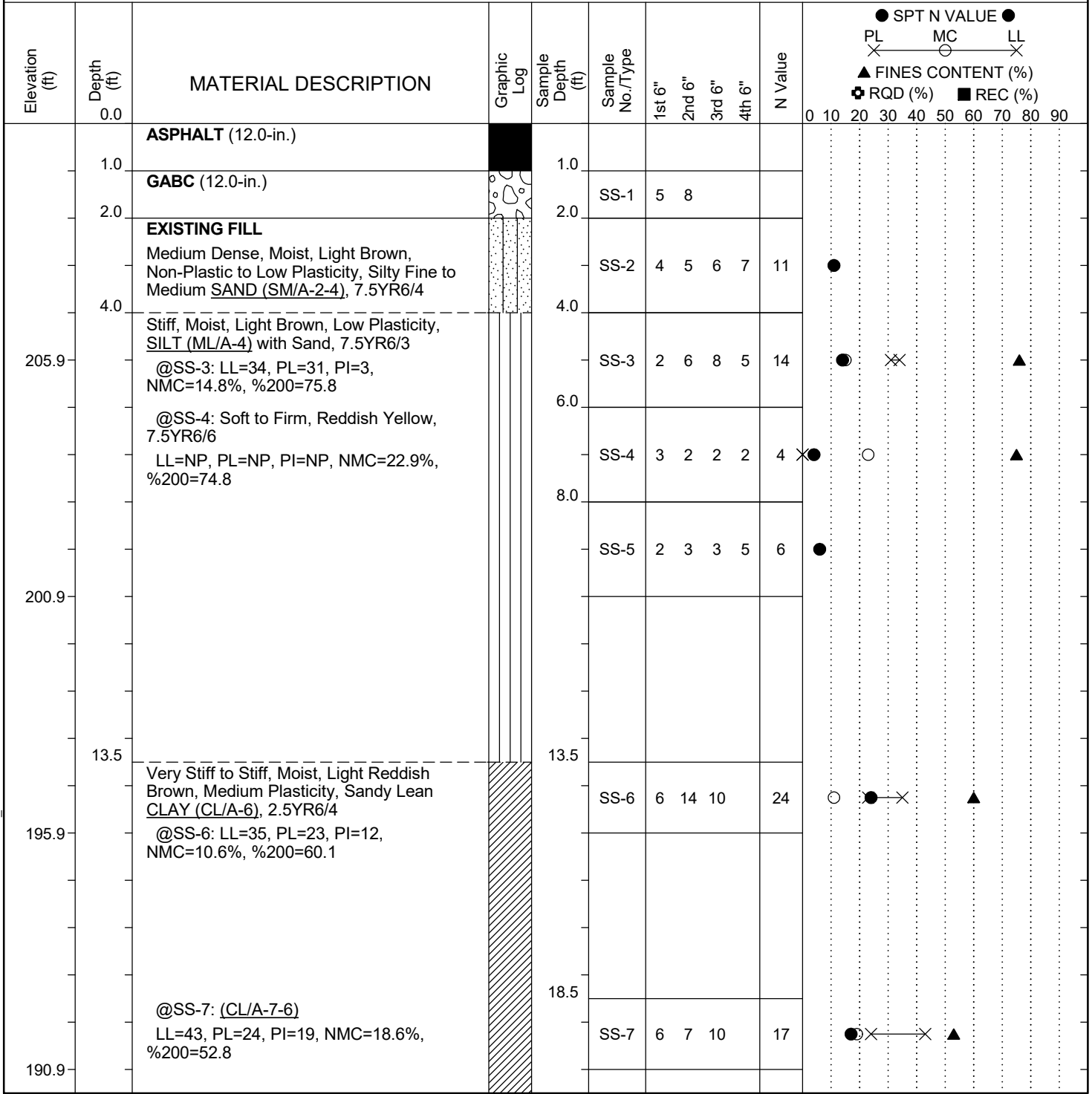
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/12/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-U1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 100+19	Offset: 52-L
Alignment: I-20 Median	Date Started: 5/5/2024	
Elev.: 210.9 ft	Latitude: 34.02740527	Longitude: -81.12657176
Total Depth: 59.6 ft	Soil Depth: 59.6 ft	Core Depth: 0 ft
Date Completed: 5/6/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 21.9(Cave@24HR) N/A



LEGEND

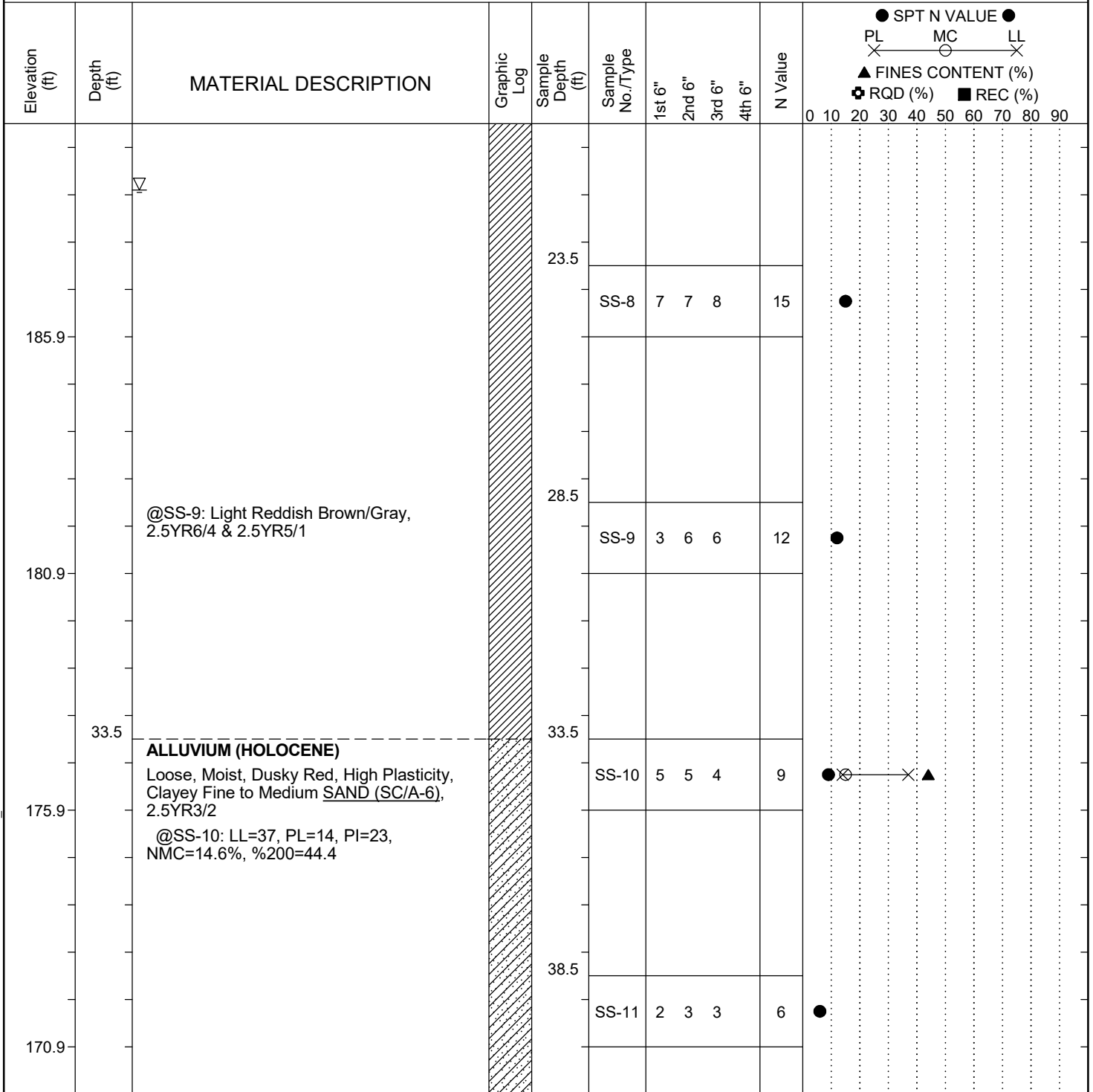
Continued Next Page

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

SC_DOT G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/25/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-U1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 100+19	Offset: 52-L
Alignment: I-20 Median	Date Started: 5/5/2024	
Elev.: 210.9 ft	Latitude: 34.02740527	Longitude: -81.12657176
Total Depth: 59.6 ft	Soil Depth: 59.6 ft	Core Depth: 0 ft
Date Completed: 5/6/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 21.9(Cave@24HR) N/A



LEGEND

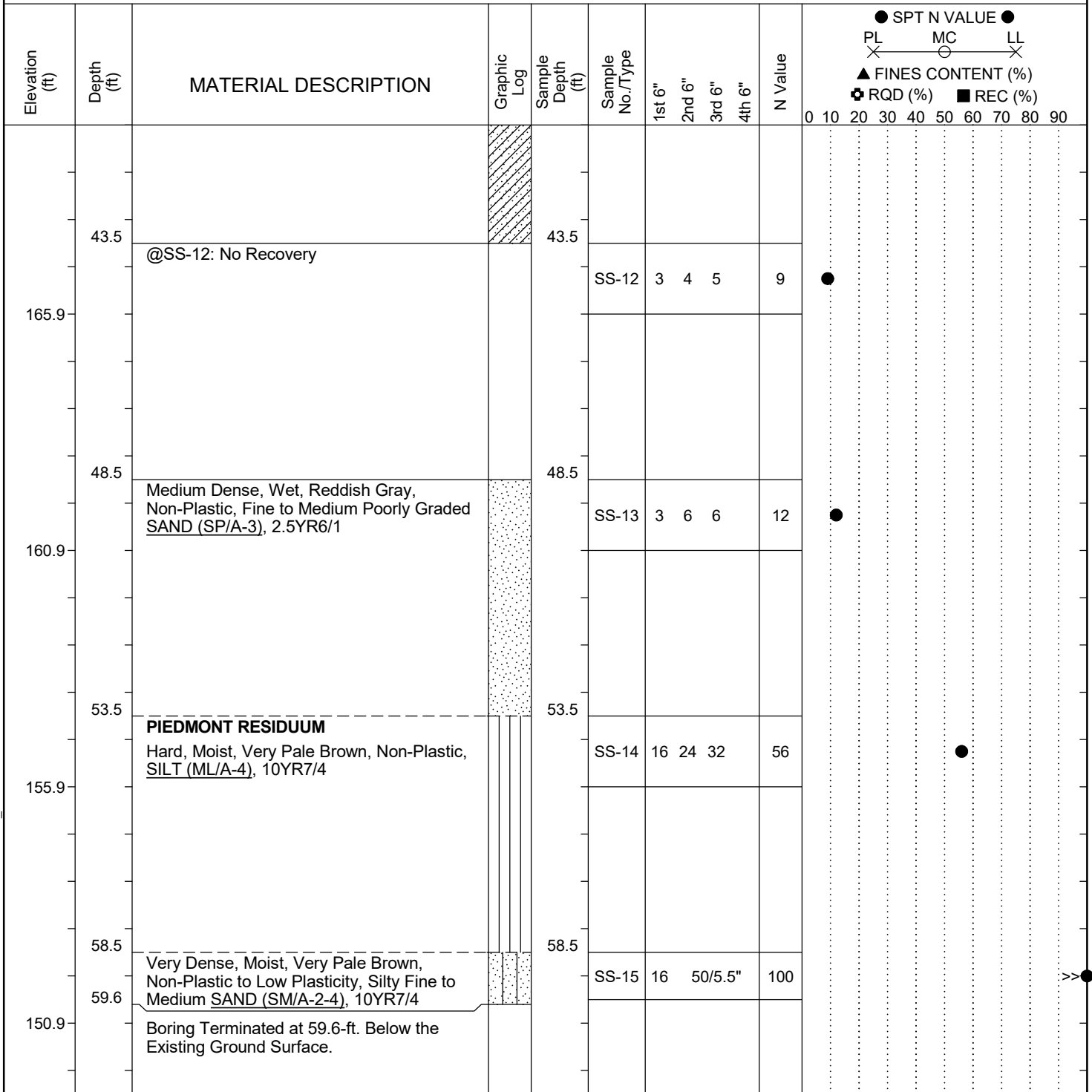
Continued Next Page

SC_DOT_G5662.03-CAROLINA_CROSSROADS_PH_3C.GPJ_SCDOT_DATA_TEMPLATE.GDT_6/25/24

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: P039720	County: Richland	Boring No.: C3C-U1
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Thomas	Boring Location: 100+19	Offset: 52-L
Alignment: I-20 Median	Date Started: 5/5/2024	
Elev.: 210.9 ft	Latitude: 34.02740527	Longitude: -81.12657176
Total Depth: 59.6 ft	Soil Depth: 59.6 ft	Core Depth: 0 ft
Date Completed: 5/6/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 21.9(Cave@24HR) N/A



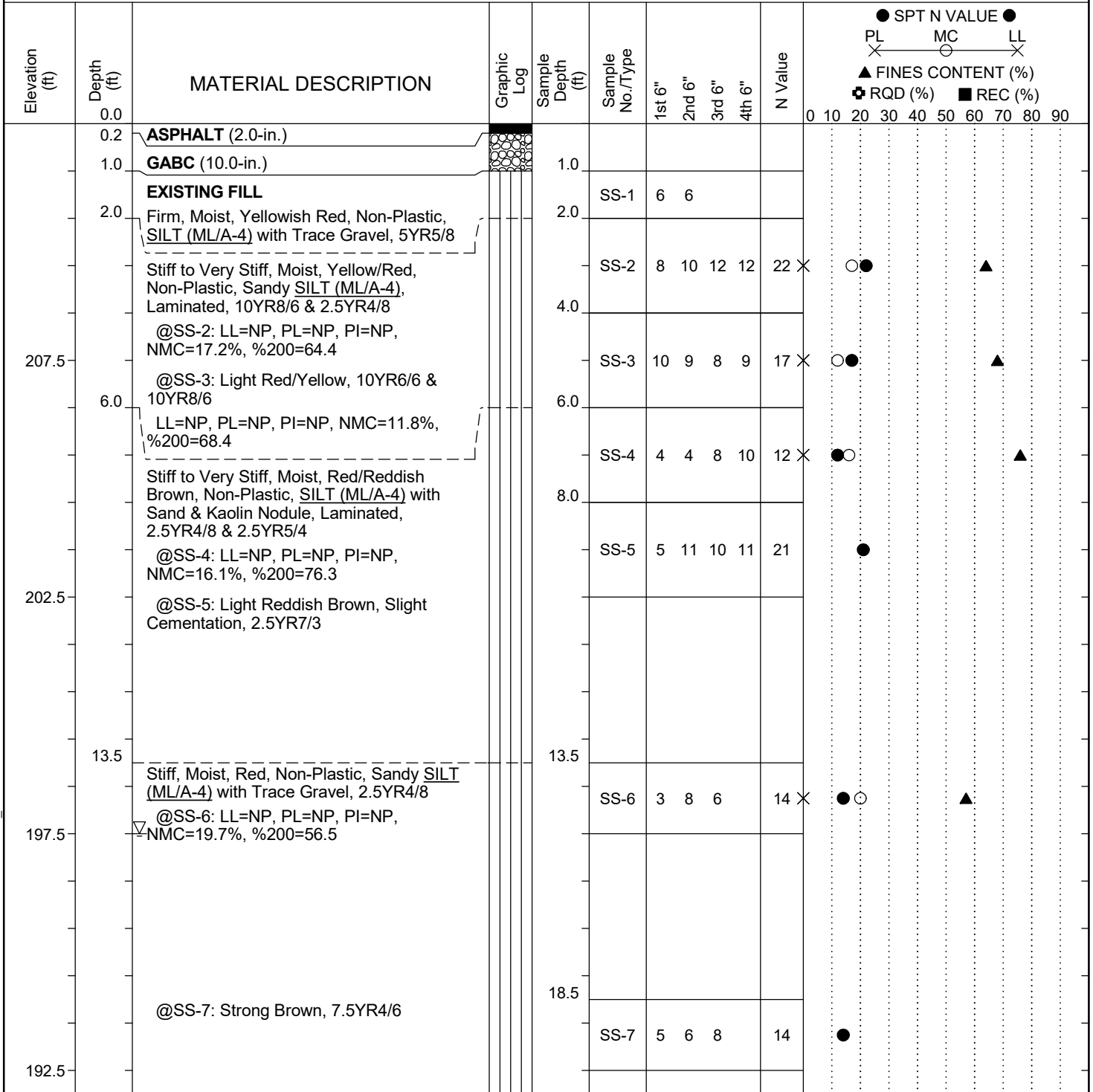
LEGEND

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 G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATA_TEMPLATE.GDT 6/25/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-U2
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 100+55	Offset: 42-R
Alignment: I-20 Median		
Elev.: 212.5 ft	Latitude: 34.02729489	Longitude: -81.12626802
Date Started: 4/18/2024		
Total Depth: 58.9 ft	Soil Depth: 58.9 ft	Core Depth: 0 ft
Date Completed: 4/18/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 15 ft
24HR: N/A		



LEGEND

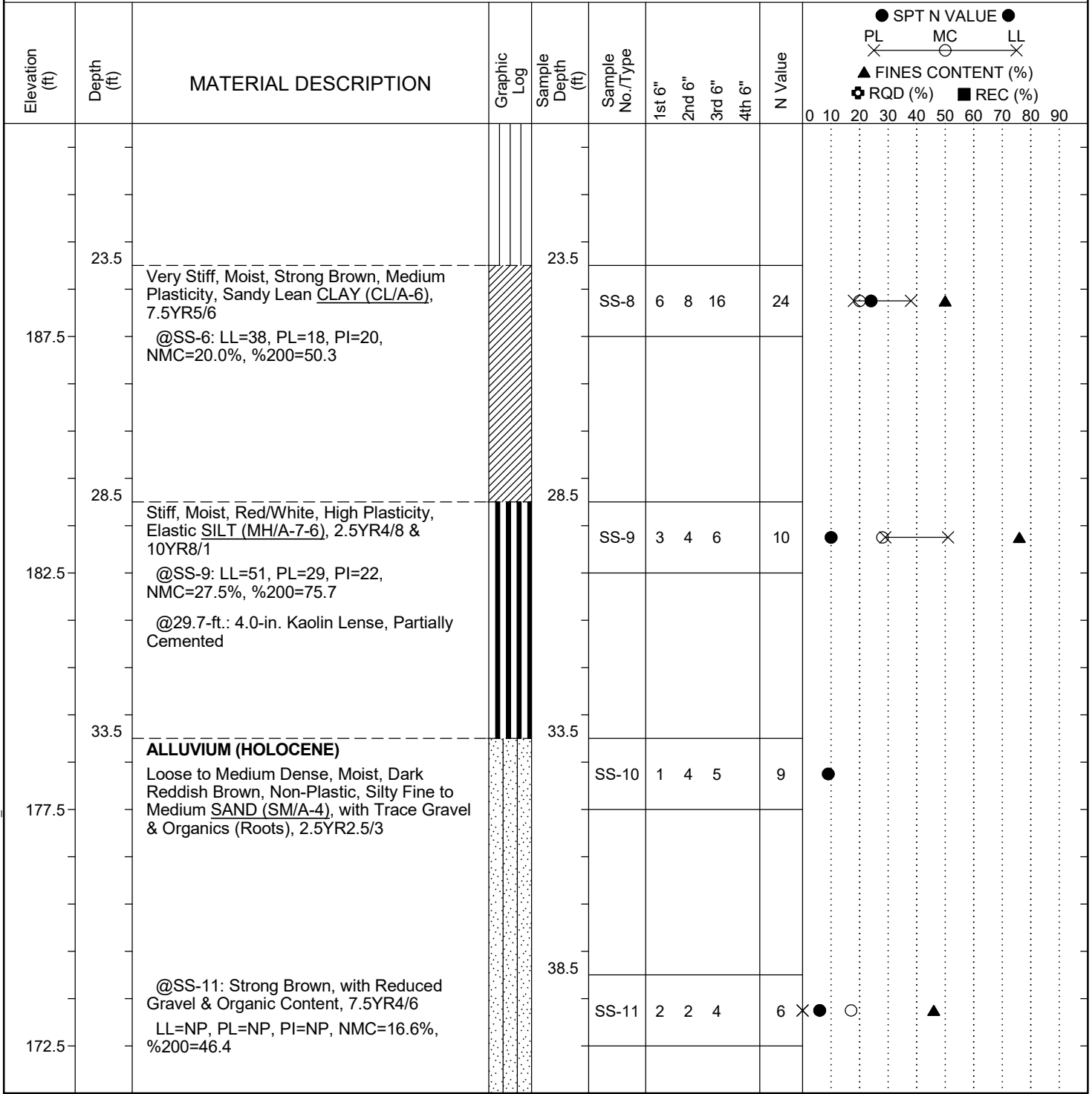
Continued Next Page

SC_DOT_G5662.03-CAROLINA CROSSROADS PH 3C.GPJ_SCDOT_DATA_TEMPLATE.GDT 6/25/24

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: P039720	County: Richland	Boring No.: C3C-U2
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: G. Cantelle	Boring Location: 100+55	Offset: 42-R
Alignment: I-20 Median		
Elev.: 212.5 ft	Latitude: 34.02729489	Longitude: -81.12626802
Date Started: 4/18/2024		
Total Depth: 58.9 ft	Soil Depth: 58.9 ft	Core Depth: 0 ft
Date Completed: 4/18/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 15 ft
24HR: N/A		



LEGEND

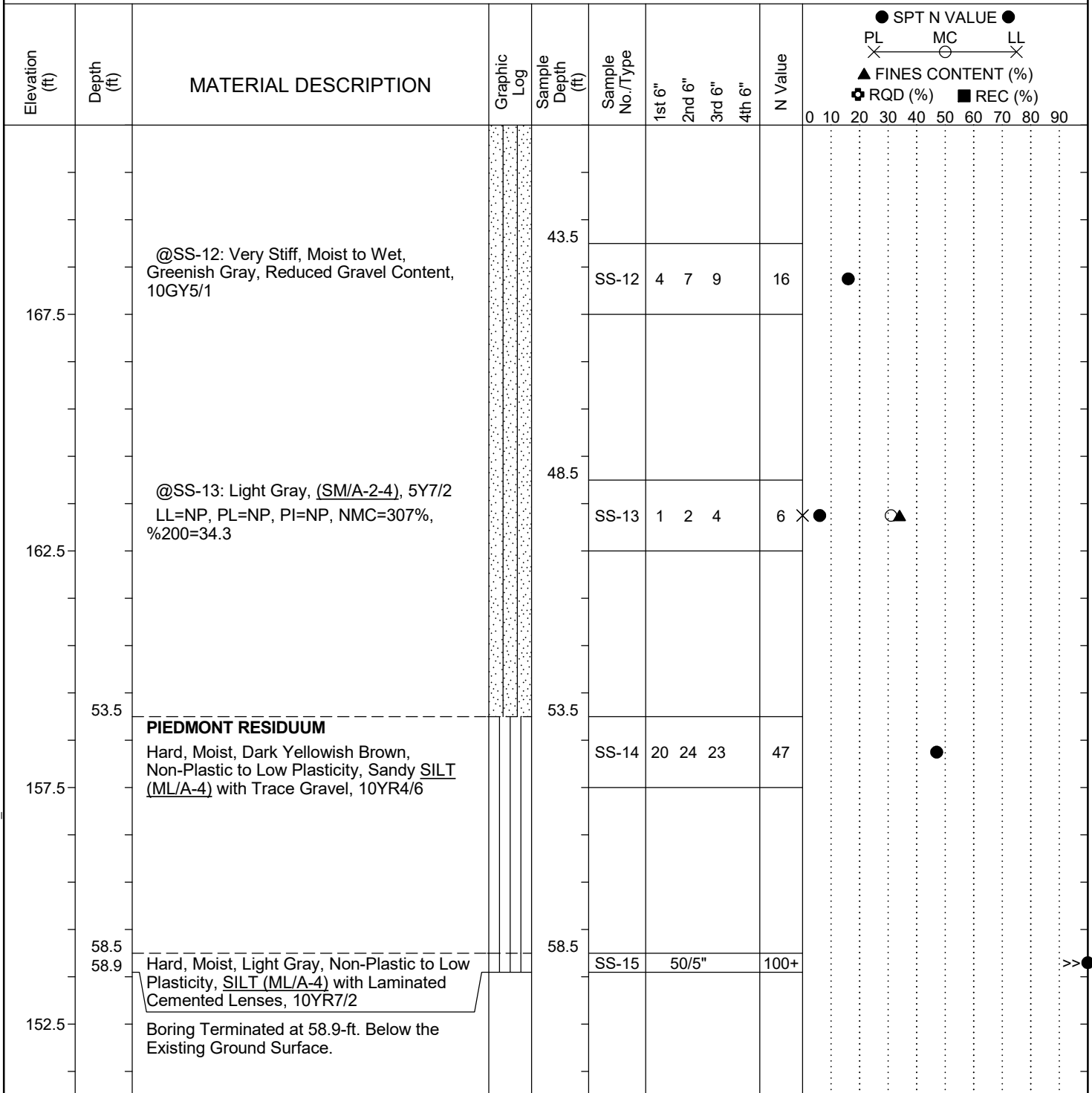
Continued Next Page

SC.DOT G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT_DATATEMPLATE.GDT 6/25/24

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:	P039720			County:	Richland	Boring No.:	C3C-U2
Site Description:	Carolina Crossroads Phase 3C					Route:	I-20
Eng./Geo.:	G. Cantelle	Boring Location:	100+55	Offset:	42-R	Alignment:	I-20 Median
Elev.:	212.5 ft	Latitude:	34.02729489	Longitude:	-81.12626802	Date Started:	4/18/2024
Total Depth:	58.9 ft	Soil Depth:	58.9 ft	Core Depth:	0 ft	Date Completed:	4/18/2024
Bore Hole Diameter (in):	3	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	CME 550X	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	85.4%
Core Size:	N/A	Driller:	L. Guempel	Groundwater:	TOB 15 ft	24HR	N/A



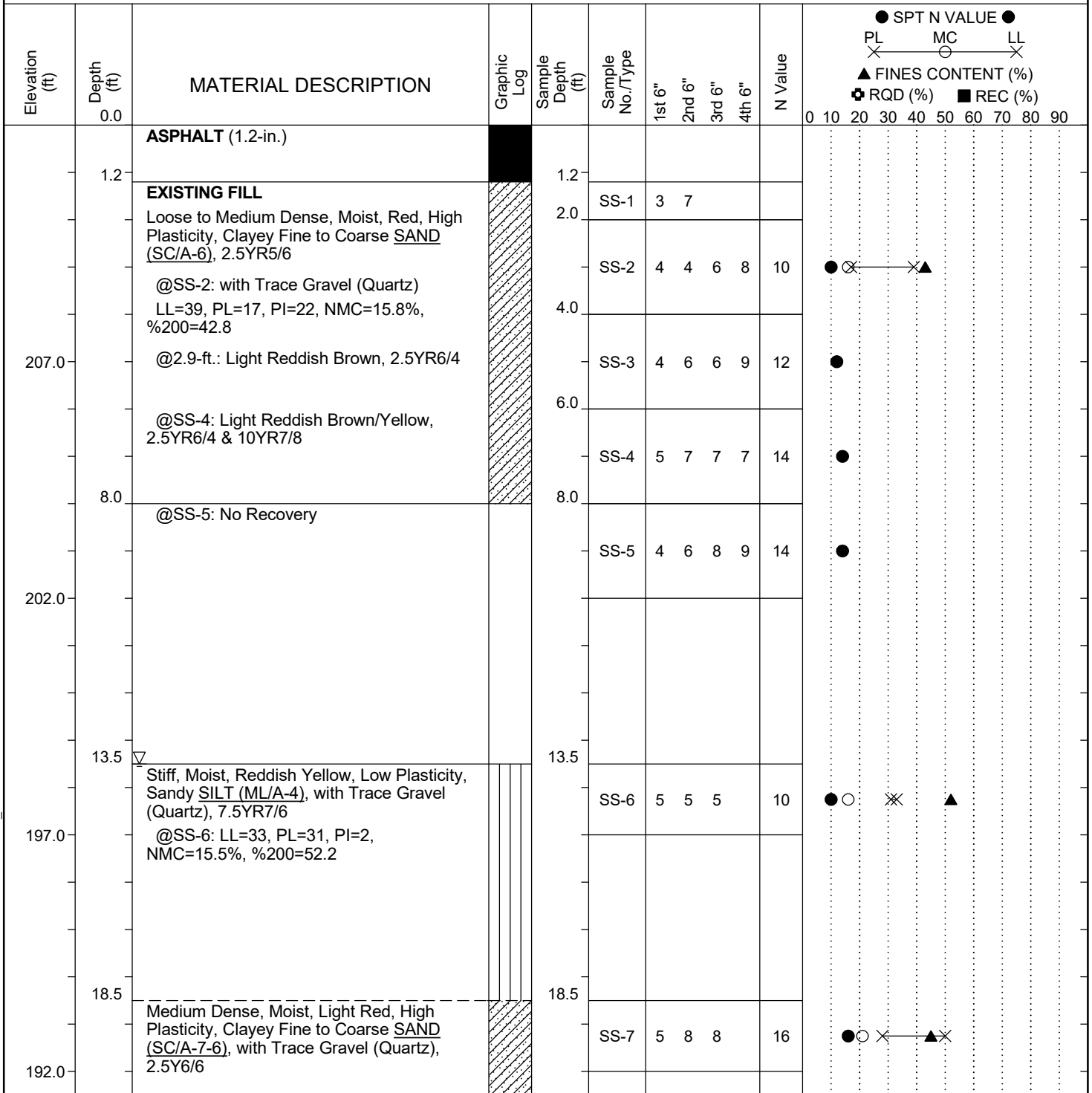
LEGEND

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_G5662.03-CAROLINA CROSSROADS PH 3C.GPJ_SCDOT_DATA TEMPLATE.GDT 6/25/24

SCDOT Soil Test Log

Project ID: P039720	County: Richland	Boring No.: C3C-U3
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 100+46	Offset: 5-L
Alignment: I-20 Median		
Elev.: 212.0 ft	Latitude: 34.02736797	Longitude: -81.12640113
Date Started: 5/7/2024		
Total Depth: 59.9 ft	Soil Depth: 59.9 ft	Core Depth: 0 ft
Date Completed: 5/7/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 13.5 ft
24HR: N/A		



LEGEND

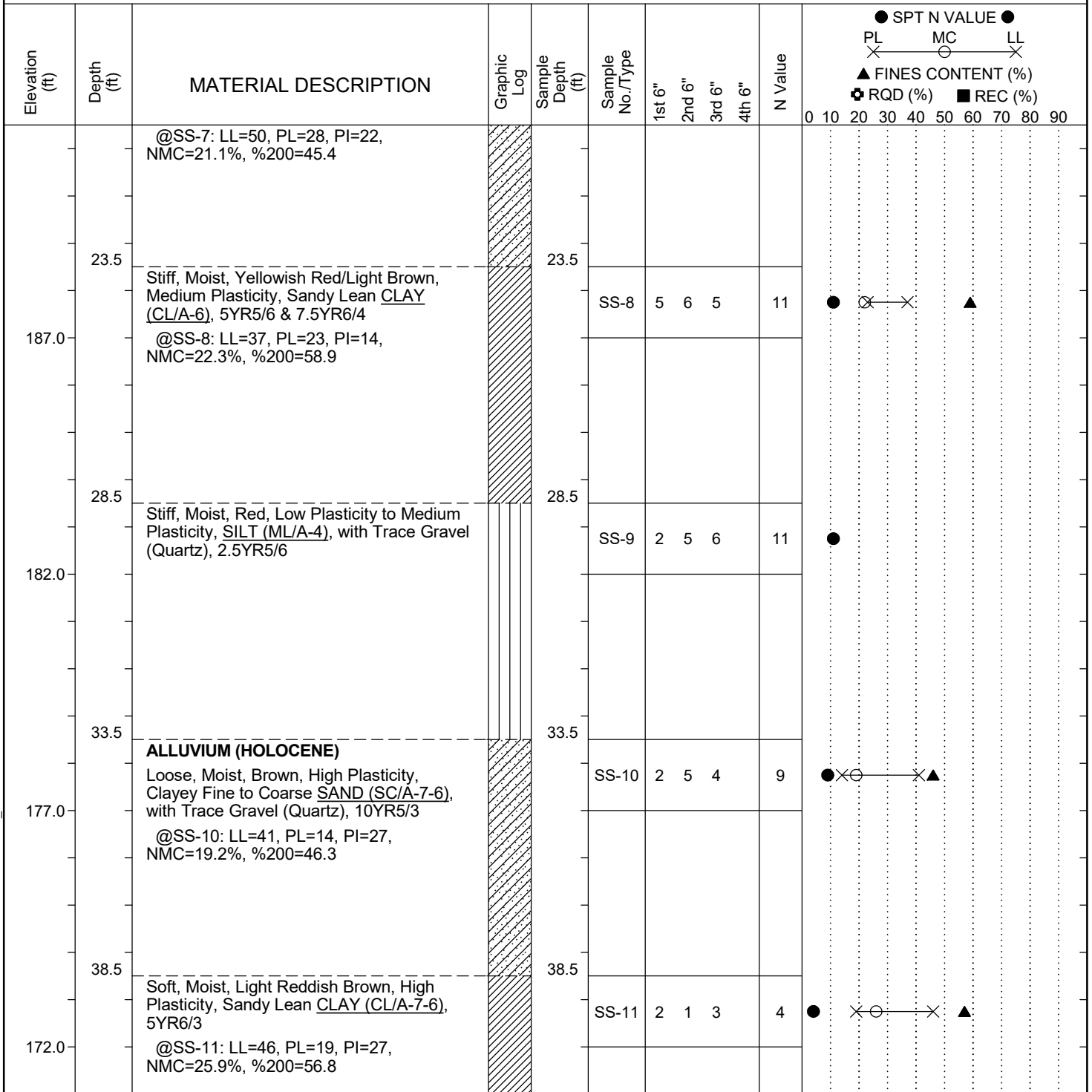
Continued Next Page

SC_DOT_G5662.03-CAROLINA CROSSROADS PH 3C.GPJ_SCDOT_DATA TEMPLATE.GDT 6/25/24

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: P039720	County: Richland	Boring No.: C3C-U3
Site Description: Carolina Crossroads Phase 3C		Route: I-20
Eng./Geo.: C. Piercy	Boring Location: 100+46	Offset: 5-L
Alignment: I-20 Median		
Elev.: 212.0 ft	Latitude: 34.02736797	Longitude: -81.12640113
Date Started: 5/7/2024		
Total Depth: 59.9 ft	Soil Depth: 59.9 ft	Core Depth: 0 ft
Date Completed: 5/7/2024		
Bore Hole Diameter (in): 3	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: CME 550X	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 85.4%		
Core Size: N/A	Driller: L. Guempel	Groundwater: TOB 13.5 ft
24HR: N/A		



LEGEND

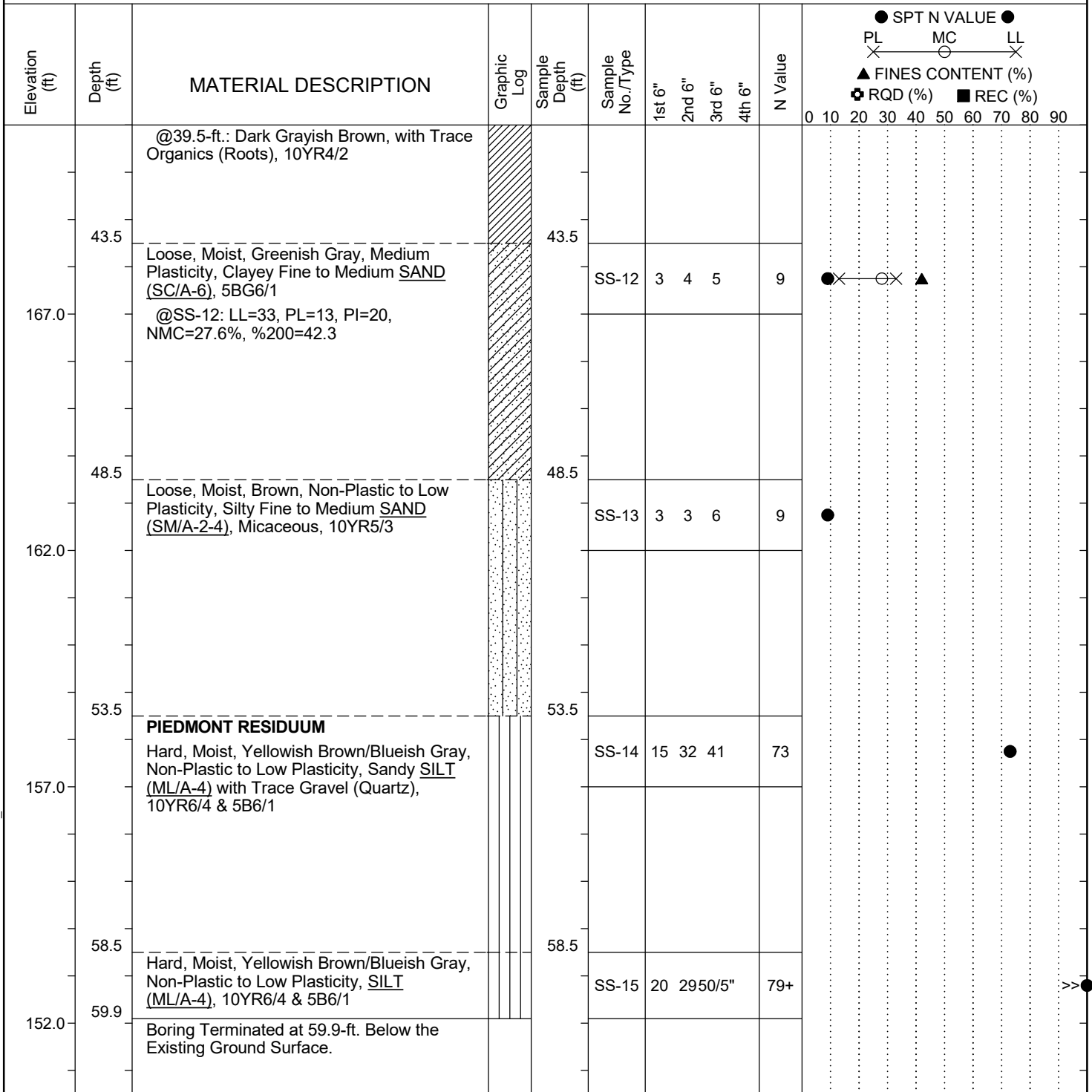
Continued Next Page

SC_DOT_G5662.03-CAROLINA CROSSROADS PH 3C.GPJ_SCDOT_DATA TEMPLATE.GDT 6/25/24

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:	P039720			County:	Richland	Boring No.:	C3C-U3		
Site Description:	Carolina Crossroads Phase 3C					Route:	I-20		
Eng./Geo.:	C. Piercy	Boring Location:	100+46	Offset:	5-L	Alignment:	I-20 Median		
Elev.:	212.0 ft	Latitude:	34.02736797	Longitude:	-81.12640113	Date Started:	5/7/2024		
Total Depth:	59.9 ft	Soil Depth:	59.9 ft	Core Depth:	0 ft	Date Completed:	5/7/2024		
Bore Hole Diameter (in):	3	Sampler Configuration			Liner Required:	Y (N)	Liner Used:	Y (N)	
Drill Machine:	CME 550X	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	85.4%		
Core Size:	N/A	Driller:	L. Guempel	Groundwater:	TOB	13.5 ft	24HR	N/A	



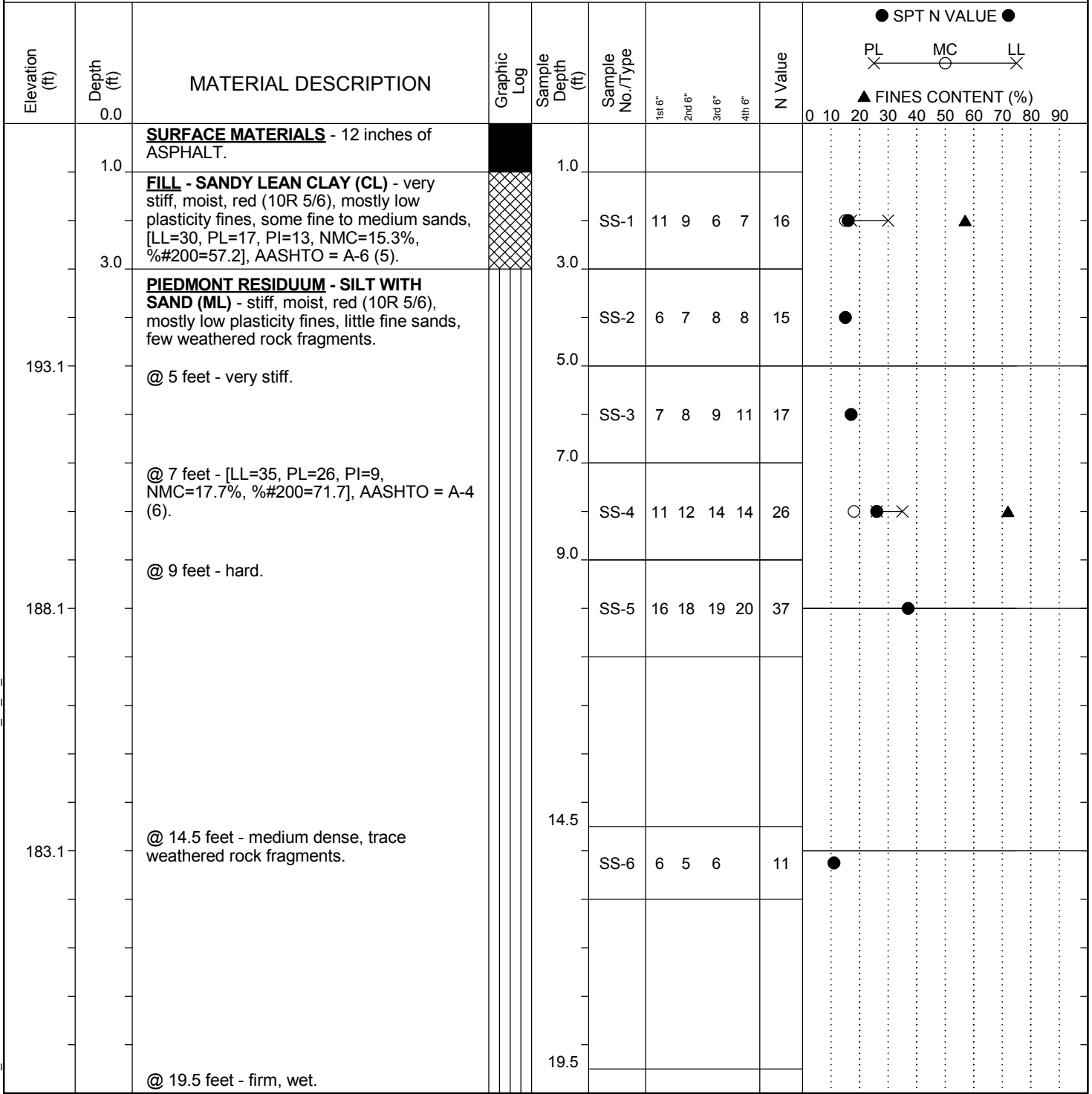
LEGEND

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

SC_DOT_G5662.03-CAROLINA CROSSROADS PH 3C.GPJ_SCDOT_DATA_TEMPLATE.GDT 6/25/24

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-47
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 43
Eng./Geo.: AKS	Boring Location: 86+30.73	Offset: L:46.226'
Elev.: 198.1 ft	Latitude: 34.026437	Longitude: -81.127687
Total Depth: 66.9 ft	Soil Depth: 46.9 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Energy Ratio: 86.5%
Groundwater: TOB		24HR: N/A



LEGEND

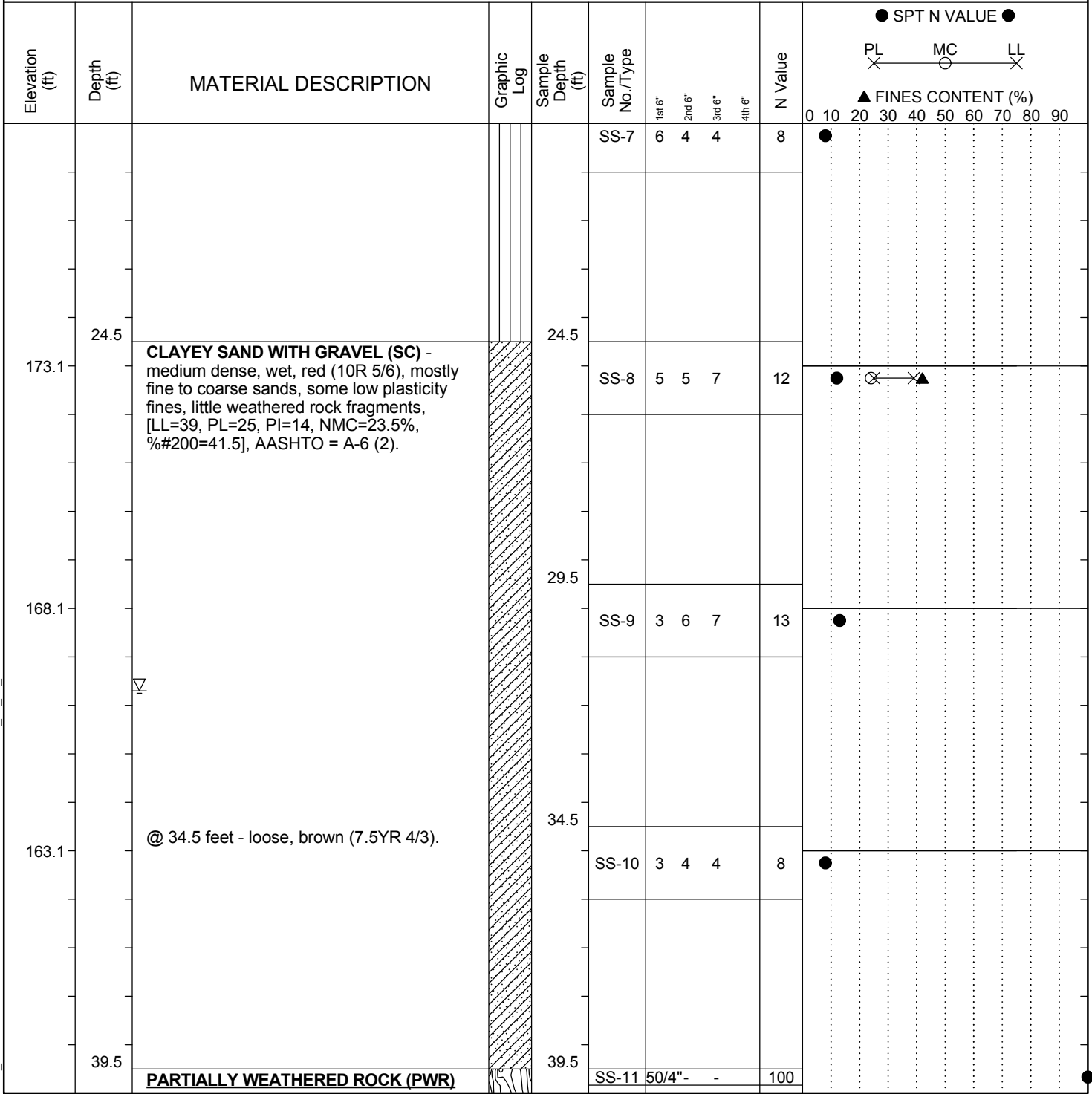
Continued Next Page

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-47
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 43
Eng./Geo.: AKS	Boring Location: 86+30.73	Offset: L:46.226'	Alignment: Proposed
Elev.: 198.1 ft	Latitude: 34.026437	Longitude: -81.127687	Date Started: 2/12/2018
Total Depth: 66.9 ft	Soil Depth: 46.9 ft	Core Depth: 20 ft	Date Completed: 2/12/2018
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 31.7 ft	24HR: N/A



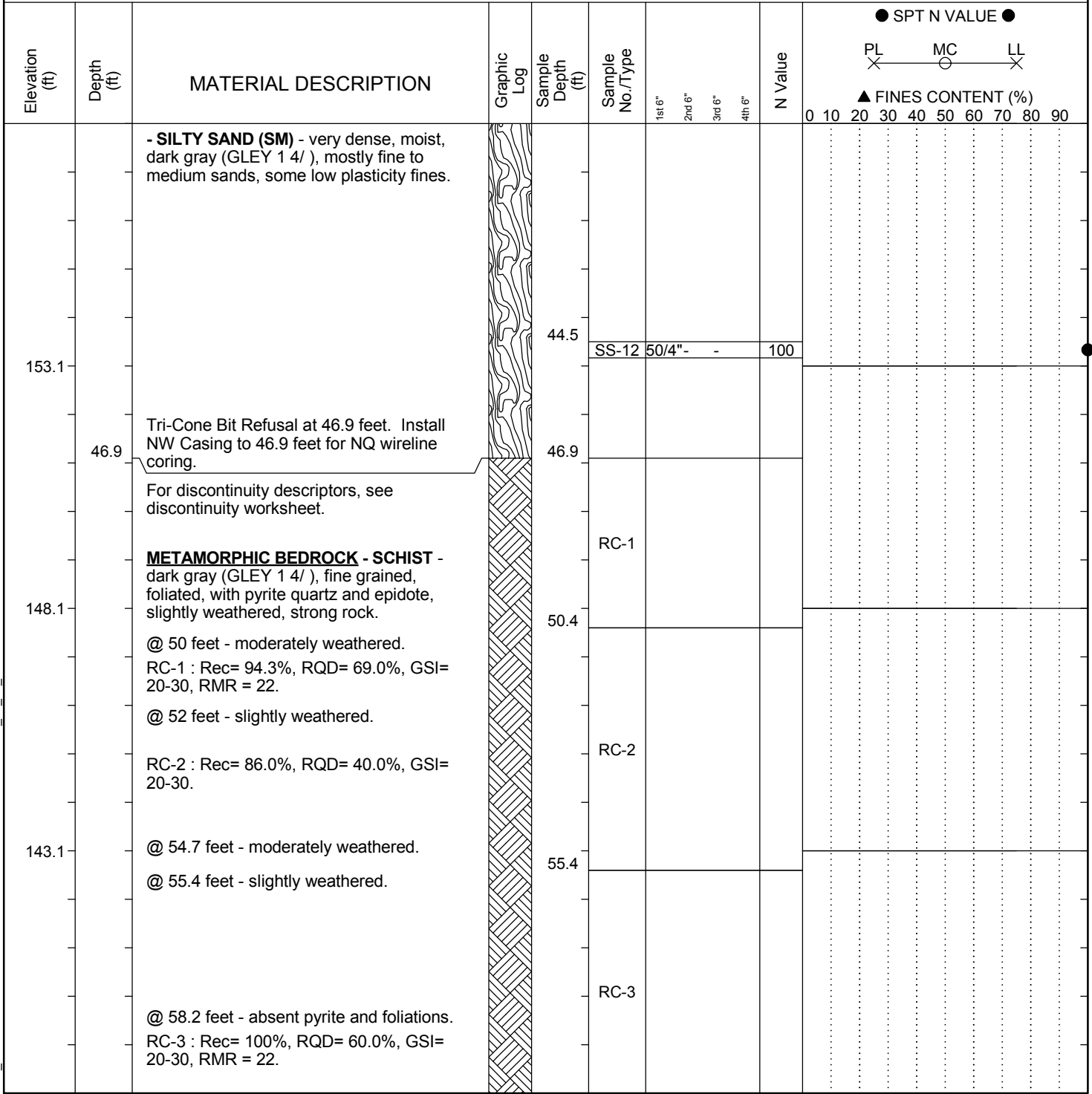
LEGEND Continued Next Page

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-47
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 43
Eng./Geo.:	AKS	Boring Location:	86+30.73	Offset:	L:46.226'	Alignment:	Proposed
Elev.:	198.1 ft	Latitude:	34.026437	Longitude:	-81.127687	Date Started:	2/12/2018
Total Depth:	66.9 ft	Soil Depth:	46.9 ft	Core Depth:	20 ft	Date Completed:	2/12/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB	31.7 ft	24HR N/A



LEGEND

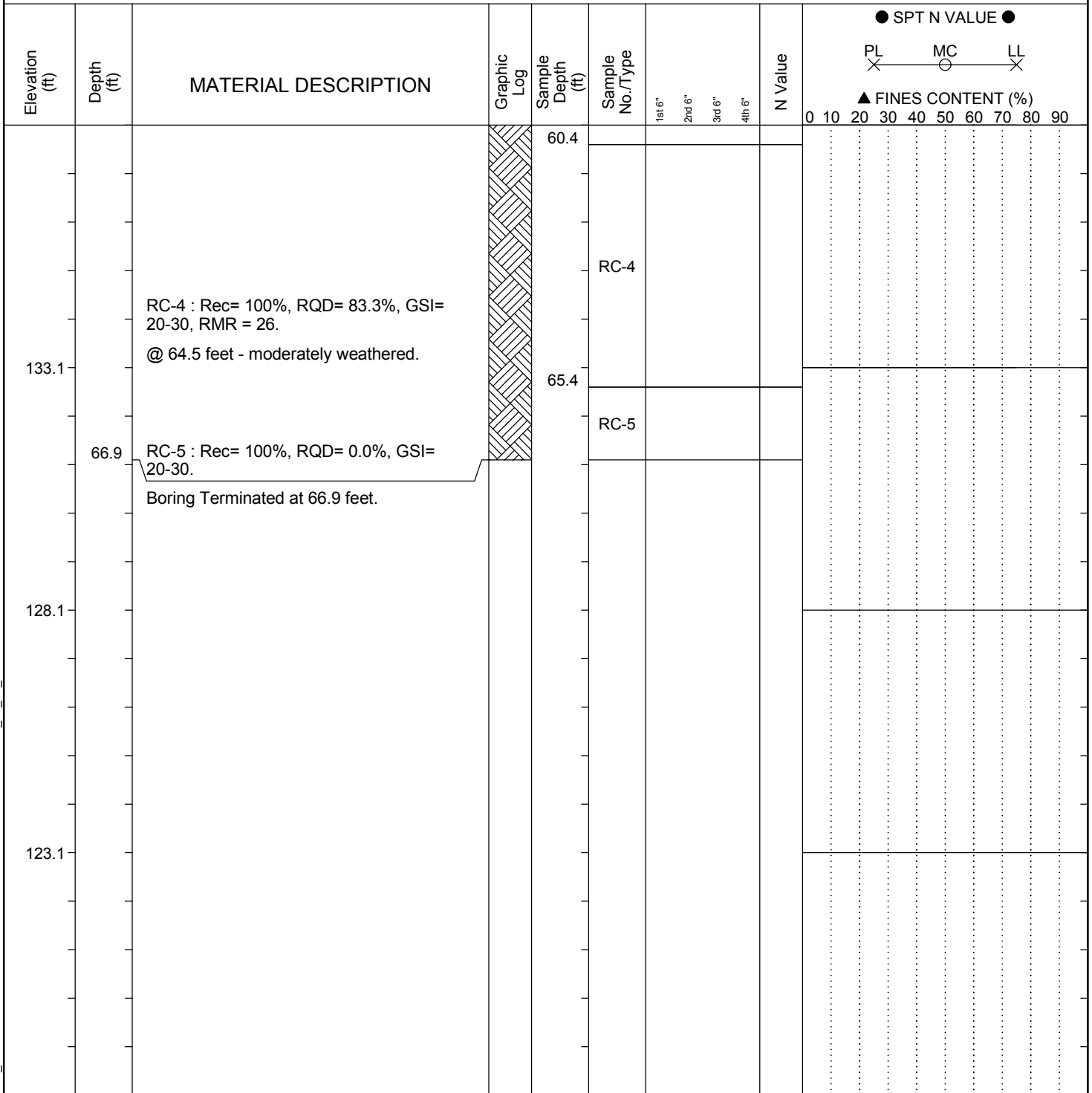
Continued Next Page

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-47
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	Site 43
Eng./Geo.:	AKS	Boring Location:	86+30.73	Offset:	L:46.226'	Alignment:	Proposed
Elev.:	198.1 ft	Latitude:	34.026437	Longitude:	-81.127687	Date Started:	2/12/2018
Total Depth:	66.9 ft	Soil Depth:	46.9 ft	Core Depth:	20 ft	Date Completed:	2/12/2018
Bore Hole Diameter (in):	3.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	NQ	Driller:	J. Millwood	Groundwater:	TOB	31.7 ft	24HR N/A



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

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

Boring Number: B-47

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

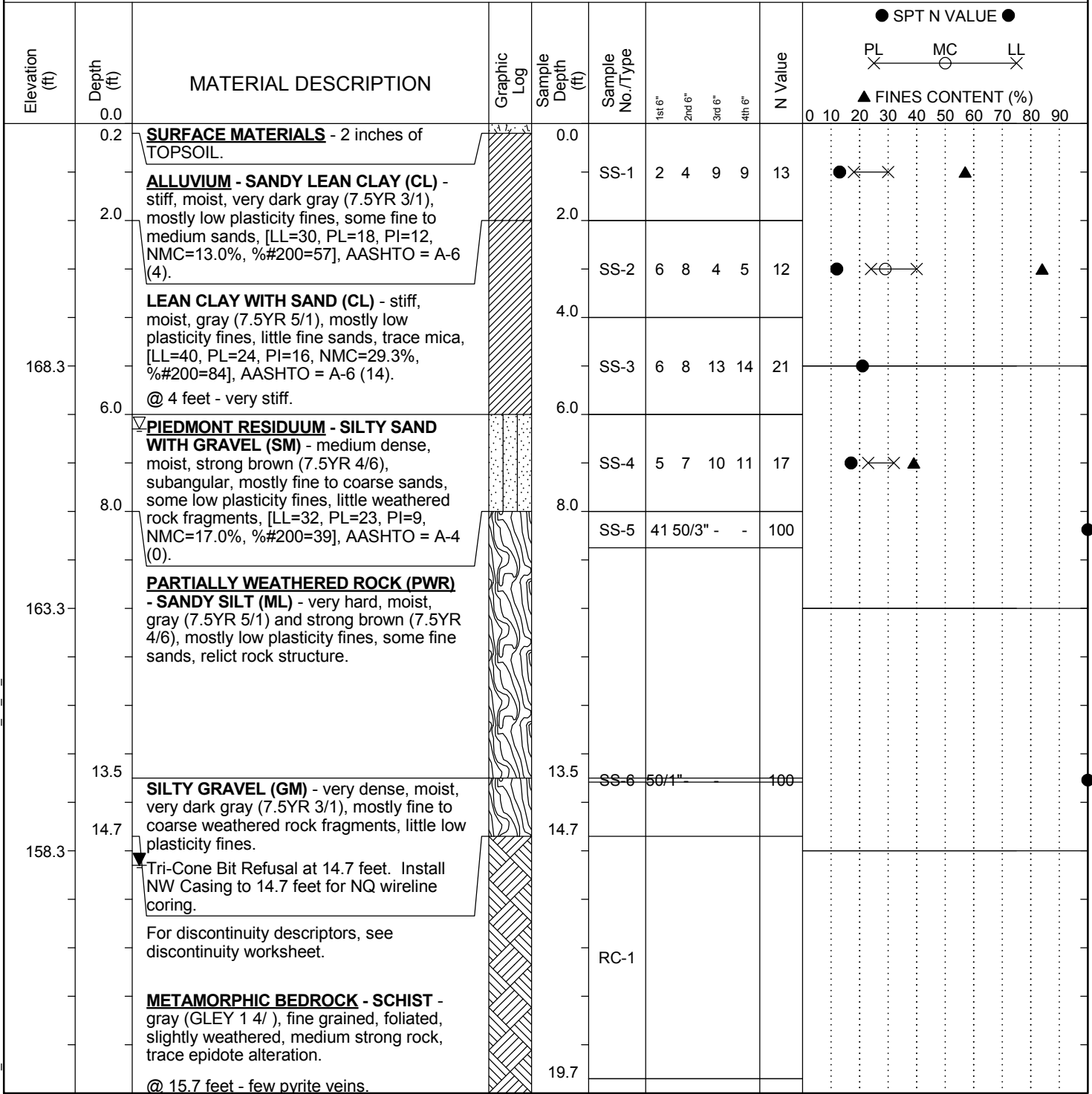
Date: 2/12/2018

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
47.2	1	J	26	N/A	Su	Fe	Pl	S	
48.1	2	J	33	N/A	No	N/A	Pl	S	
48.8	3	J	N/A	N/A	Su	Fe	Ir	SR	
50	4	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 50 - 50.4
50.6	5	J	36	N/A	Su	Fe	Pl	SR	
51	6	J	N/A	N/A	Su	Fe	Ir	SR	Fractured zone 51 - 51.5
53.1	7	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 53.1 - 53.4
53.8	8	J	10	N/A	No	N/A	Ir	SR	
57.4	9	J	23	N/A	Fi	Qz	Pl	R	
57.8	10	J	29	N/A	No	N/A	St	SR	
59.7	11	J	52	N/A	Su	Fe	Pl	SR	
60	12	J	54	N/A	Su	Fe	Pl	SR	Fractured zone 60 - 60.4
62.2	13	J	41	N/A	Su	Fe	Pl	SR	
62.7	14	J	39	N/A	Su	Fe	Pl	SR	
63.2	15	J	19	N/A	No	N/A	St	SR	
63.5	16	J	37	N/A	No	N/A	Pl	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-48
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 43
Eng./Geo.: AKS	Boring Location: 80+47.91	Offset: R:75.741'
Elev.: 173.3 ft	Latitude: 34.025058	Longitude: -81.128747
Total Depth: 34.7 ft	Soil Depth: 14.7 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Energy Ratio: 86.5%
Groundwater: TOB		24HR: 15.3 ft



LEGEND

Continued Next Page

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

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



Rock Core Discontinuity Worksheet

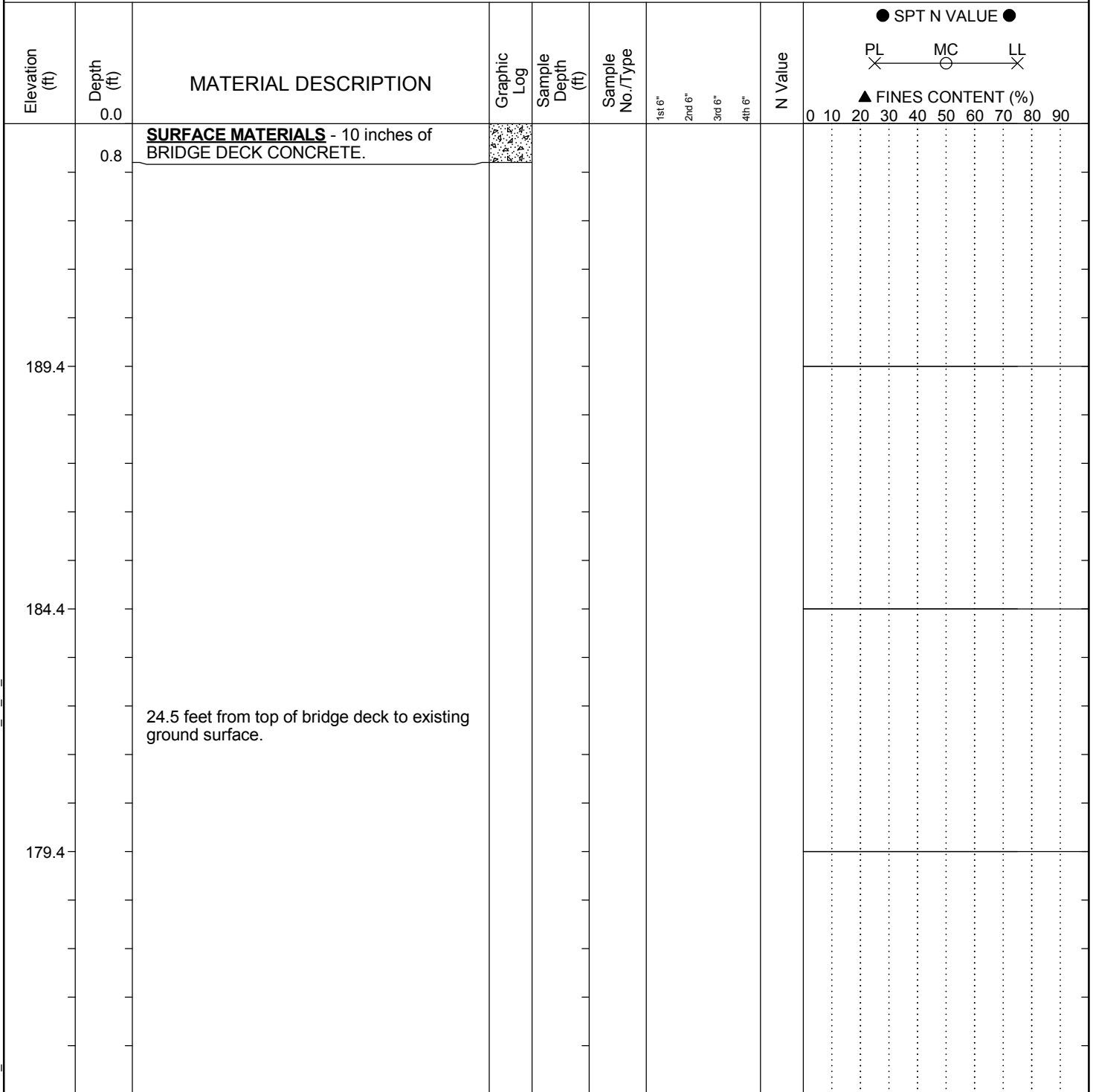
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 4/2/2018

Boring Number: B-48
 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
15.1	1	J	28	VN	Pa	Cl	Pl	SR	
16.2	2	J	35	N	Pa	Cl	Ir	SR	
16.7	3	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 16.7' - 17.6'
18.1	4	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 18.1' - 19.7'
20.9	5	J	70	N	No	N/A	Pl	SR	
21.2	6	J	90	VN	No	N/A	Pl	SR	
21.3	7	J	64	VN	Pa	Cl	Pl	SR	
21.7	8	J	51	N	Pa	Cl	St	SR	
22.6	9	J	838	VN	Pa	Cl	St	SR	
23.1	10	J	17	T	No	N/A	Pl	SR	
23.4	11	J	79	N	No	N/A	St	SR	
23.9	12	J	88	N	No	N/A	Pl	SR	
24.3	13	J	56	T	No	N/A	Pl	SR	
25.1	14	J	39	N	Pa	Cl	Pl	SR	
26.2	15	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 26.2' - 31.1'
30.6	16	J	3	N	No	N/A	Pl	SR	
30.8	17	J	5	VN	Pa	Cl	Pl	SR	
30.9	18	J	N/A	N/A	No	N/A	Ir	SR	Fractured zone 30.9' - 31.2'
31.6	19	J	2	VN	No	N/A	Wa	SR	
31.8	20	J	86	VN	No	N/A	Ir	SR	
32.3	21	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 32.3' - 32.9'
33.5	22	J	76	VN	Pa	Cl	Pl	SR	
33.6	23	J	19	T	No	N/A	Pl	SR	
33.9	24	J	4	VN	No	N/A	Pl	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-49
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 43
Eng./Geo.: AKS	Boring Location: 84+08.75	Offset: L:42.286'
Alignment: Proposed	Date Started: 2/22/2018	Date Completed: 2/22/2018
Elev.: 194.4 ft	Latitude: 34.025993	Longitude: -81.128191
Total Depth: 58.3 ft	Soil Depth: 38.3 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: D-50	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.5%	Groundwater: TOB 31.1 ft
Core Size: NQ	Driller: J. Millwood	24HR: N/A



LEGEND

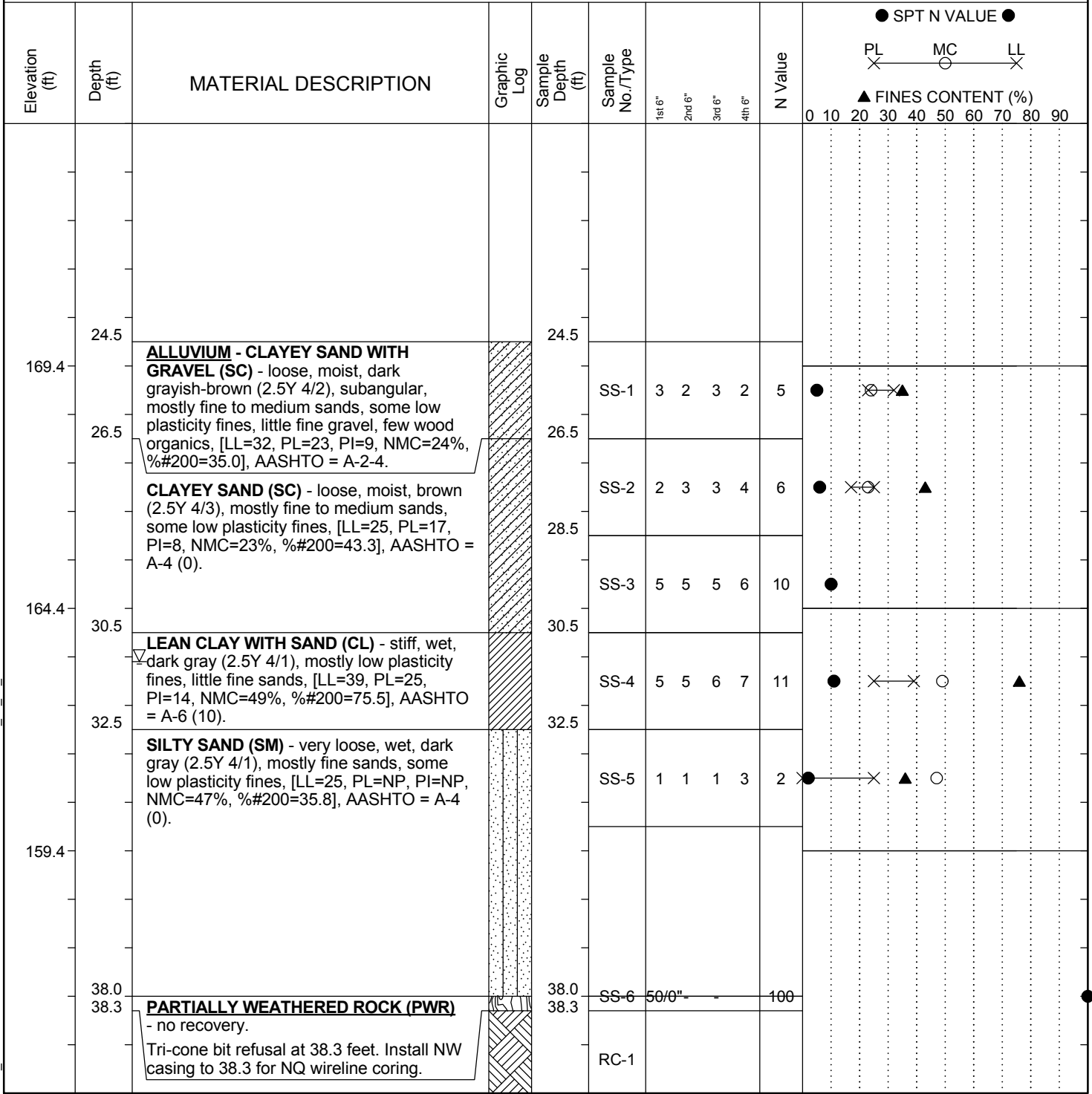
Continued Next Page

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

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-49
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 43
Eng./Geo.: AKS	Boring Location: 84+08.75	Offset: L:42.286'
Elev.: 194.4 ft	Latitude: 34.025993	Longitude: -81.128191
Total Depth: 58.3 ft	Soil Depth: 38.3 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: J. Millwood	Energy Ratio: 86.5%
Groundwater: TOB		24HR: N/A



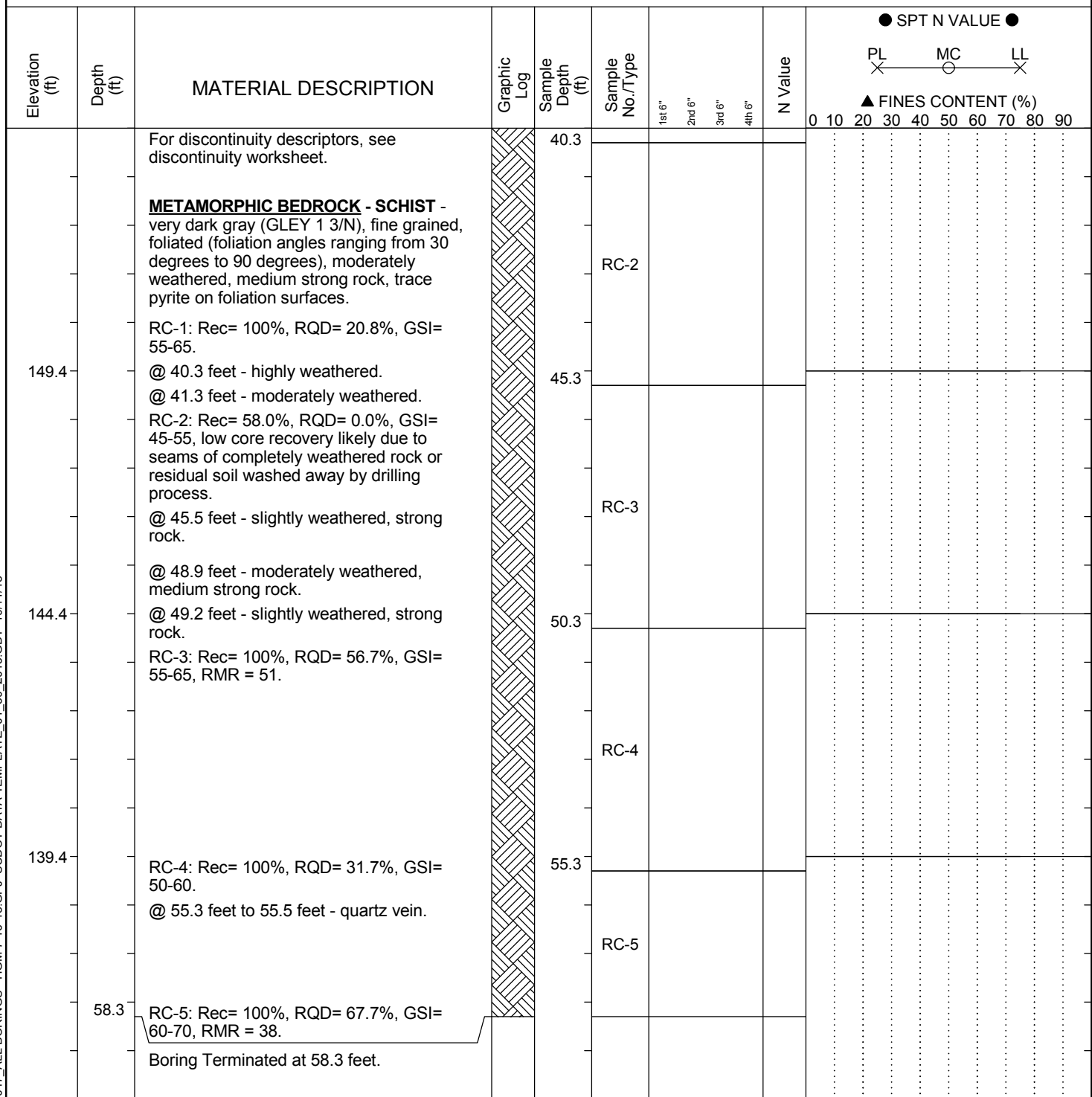
LEGEND Continued Next Page

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-49	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 43	
Eng./Geo.: AKS		Boring Location: 84+08.75		Offset:	L:42.286'
Elev.: 194.4 ft		Latitude: 34.025993	Longitude: -81.128191		Date Started: 2/22/2018
Total Depth: 58.3 ft		Soil Depth: 38.3 ft	Core Depth: 20 ft		Date Completed: 2/22/2018
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50		Drill Method: RW		Hammer Type: Automatic	Energy Ratio: 86.5%
Core Size: NQ		Driller: J. Millwood		Groundwater: TOB	31.1 ft
				24HR	N/A



LEGEND

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

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



Rock Core Discontinuity Worksheet

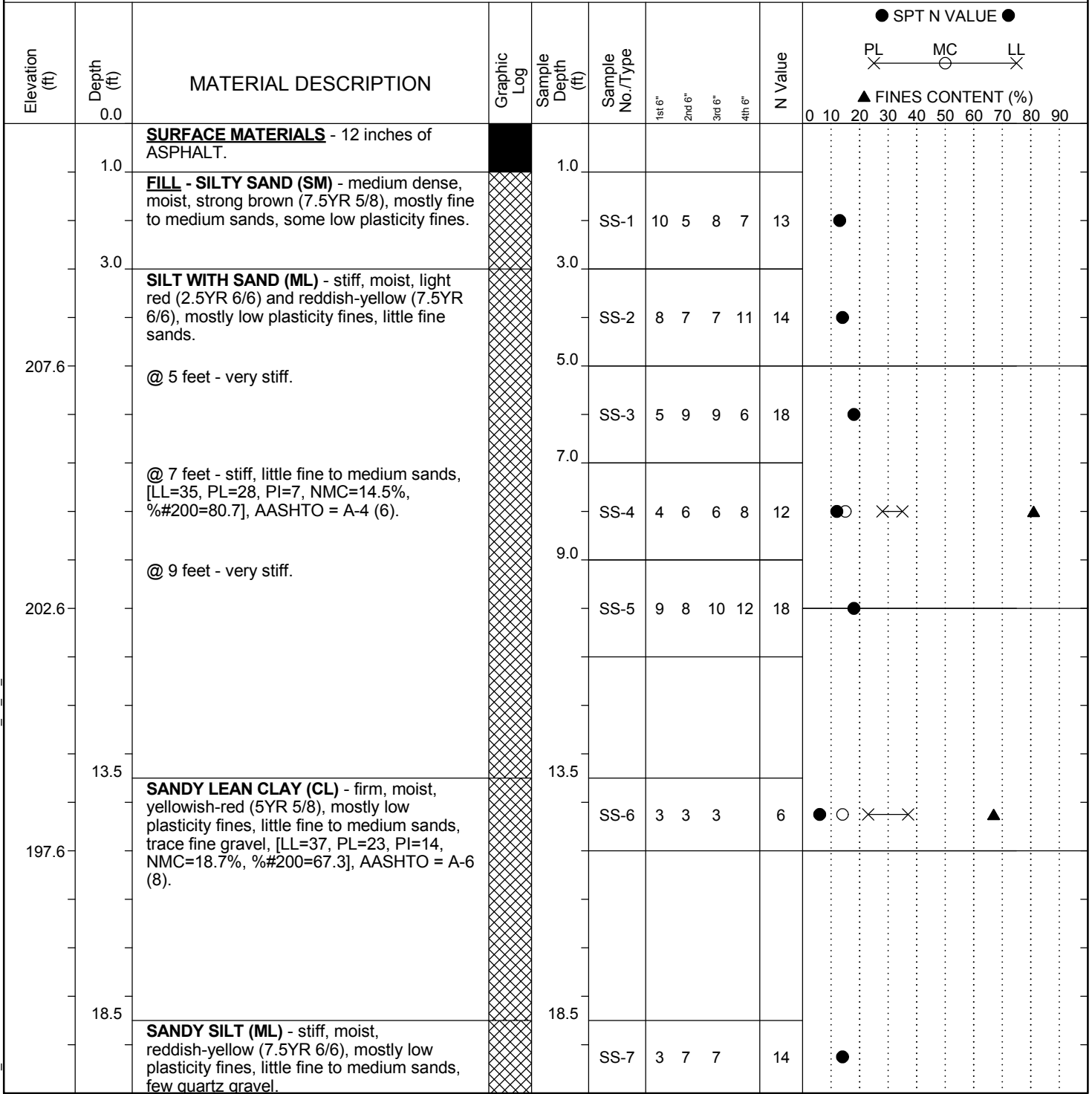
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 2/22/2018

Boring Number: B-49
 Core Barrel Type: NQ
 Core Barrel Length: 5 ft
 Coring Technique: Wireline
 Number of Core Boxes: 2

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
39	1	J	79	N	Pa	Cl	Ir	SR	
40.3	2	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 40.3' - 45.6'
47.2	3	J	50	VN	Pa	Cl	Pl	SR	
47.7	4	J	3	T	Pa	Cl	Pl	SR	
48.1	5	J	9	T	No	N/A	St	SR	
48.4	6	J	7	T	No	N/A	Ir	SR	
49.1	7	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 49.1' - 49.5'
50.4	8	J	54	VN	Pa	Cl	Pl	SR	
52.3	9	J	52	T	Pa	Cl	Wa	SR	Fractured zone 52.3' - 55.6'
52.8	10	J	60	T	No	N/A	Ir	SR	
52.9	11	J	70	T	No	N/A	Ir	SR	
53.1	12	J	65	T	No	N/A	Ir	SR	
53.3	13	J	70	T	No	N/A	St	SR	
53.5	14	J	30	T	No	N/A	St	SR	
53.9	15	J	65	T	No	N/A	Ir	SR	
54.7	16	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 54.7' - 55.6'
57.6	17	J	0	N	Pa	Cl	Ir	SR	
58.1	18	J	N/A	N/A	Pa	Cl	Ir	SR	Fractured zone 58.1' - 58.3'

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-50
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: NGS	Boring Location: 91+54.21	Offset: R:46.690'
Alignment: Proposed	Date Started: 2/18/2018	Date Completed: 2/18/2018
Elev.: 212.6 ft	Latitude: 34.027285	Longitude: -81.126258
Total Depth: 92.2 ft	Soil Depth: 72.2 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 84.1%	Groundwater: TOB
Core Size: NQ	Driller: T. Miller	24HR: 38 ft



LEGEND

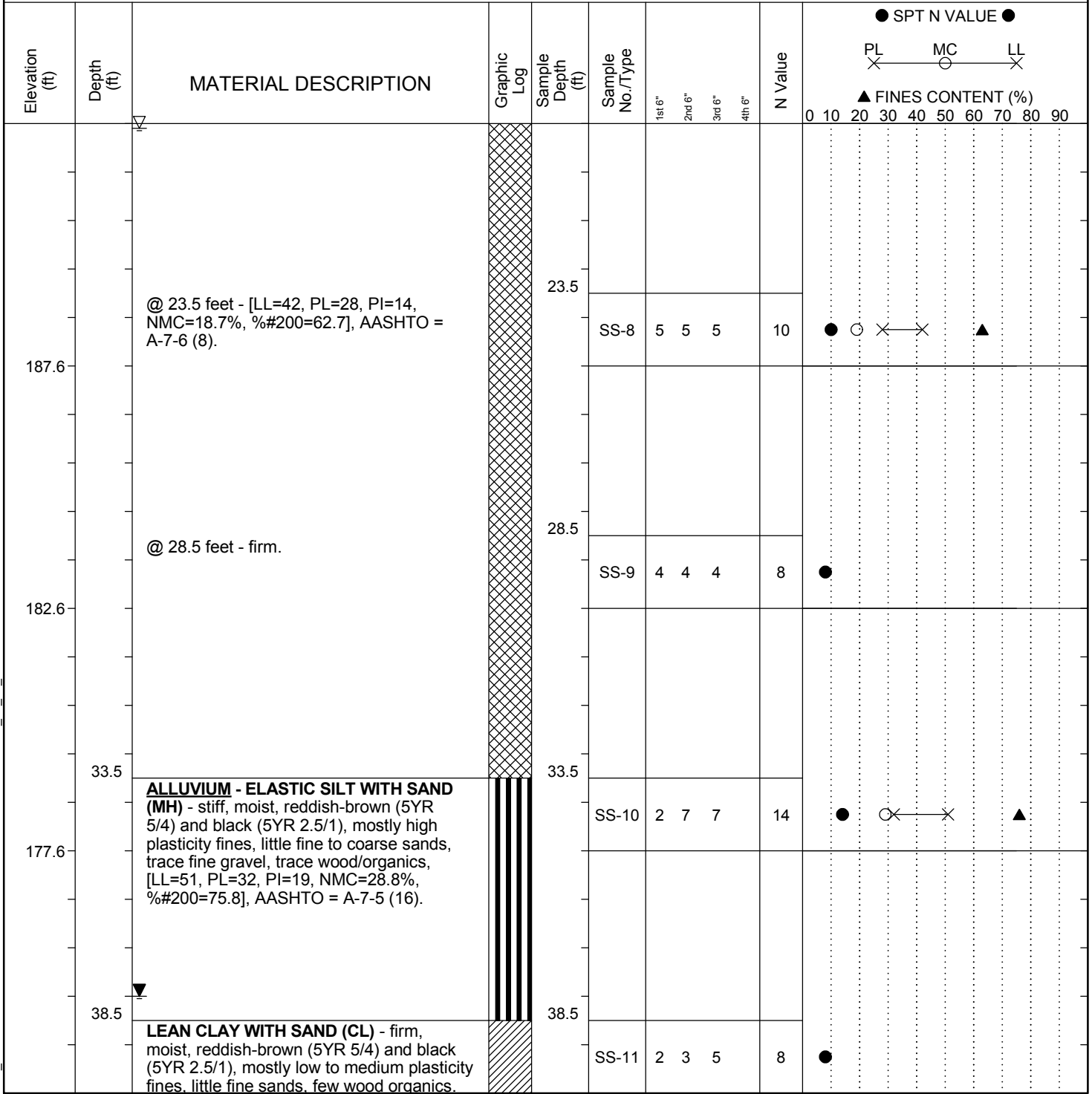
Continued Next Page

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-50
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: NGS	Boring Location: 91+54.21	Offset: R:46.690'
Alignment: Proposed	Date Started: 2/18/2018	Date Completed: 2/18/2018
Elev.: 212.6 ft	Latitude: 34.027285	Longitude: -81.126258
Total Depth: 92.2 ft	Soil Depth: 72.2 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: CME 55	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 84.1%	Groundwater: TOB 20.1 ft
Core Size: NQ	Driller: T. Miller	24HR: 38 ft



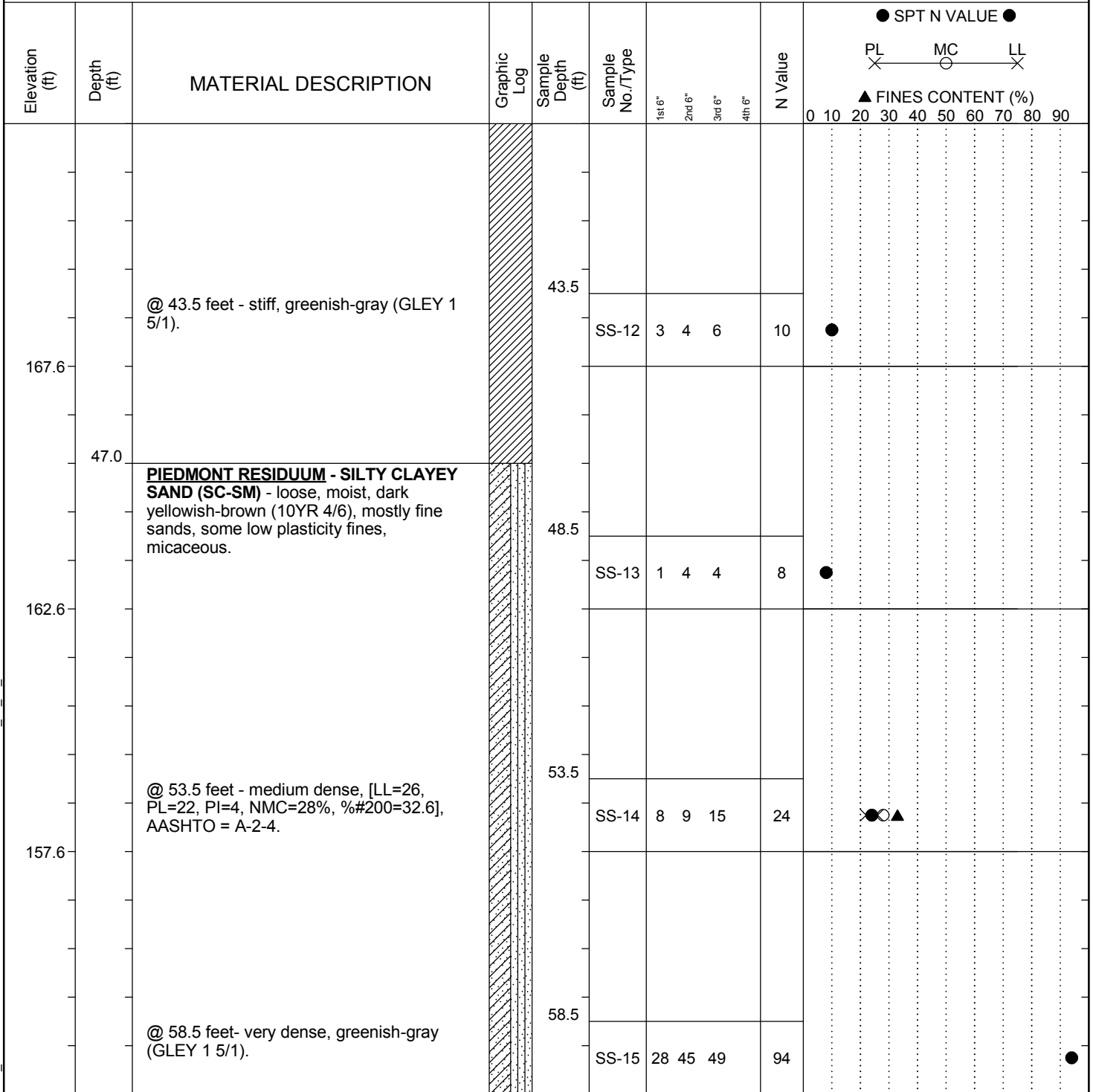
LEGEND Continued Next Page

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-50
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: NGS	Boring Location: 91+54.21	Offset: R:46.690' Alignment: Proposed
Elev.: 212.6 ft	Latitude: 34.027285	Longitude: -81.126258 Date Started: 2/18/2018
Total Depth: 92.2 ft	Soil Depth: 72.2 ft	Core Depth: 20 ft Date Completed: 2/18/2018
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 20.1 ft 24HR: 38 ft



LEGEND

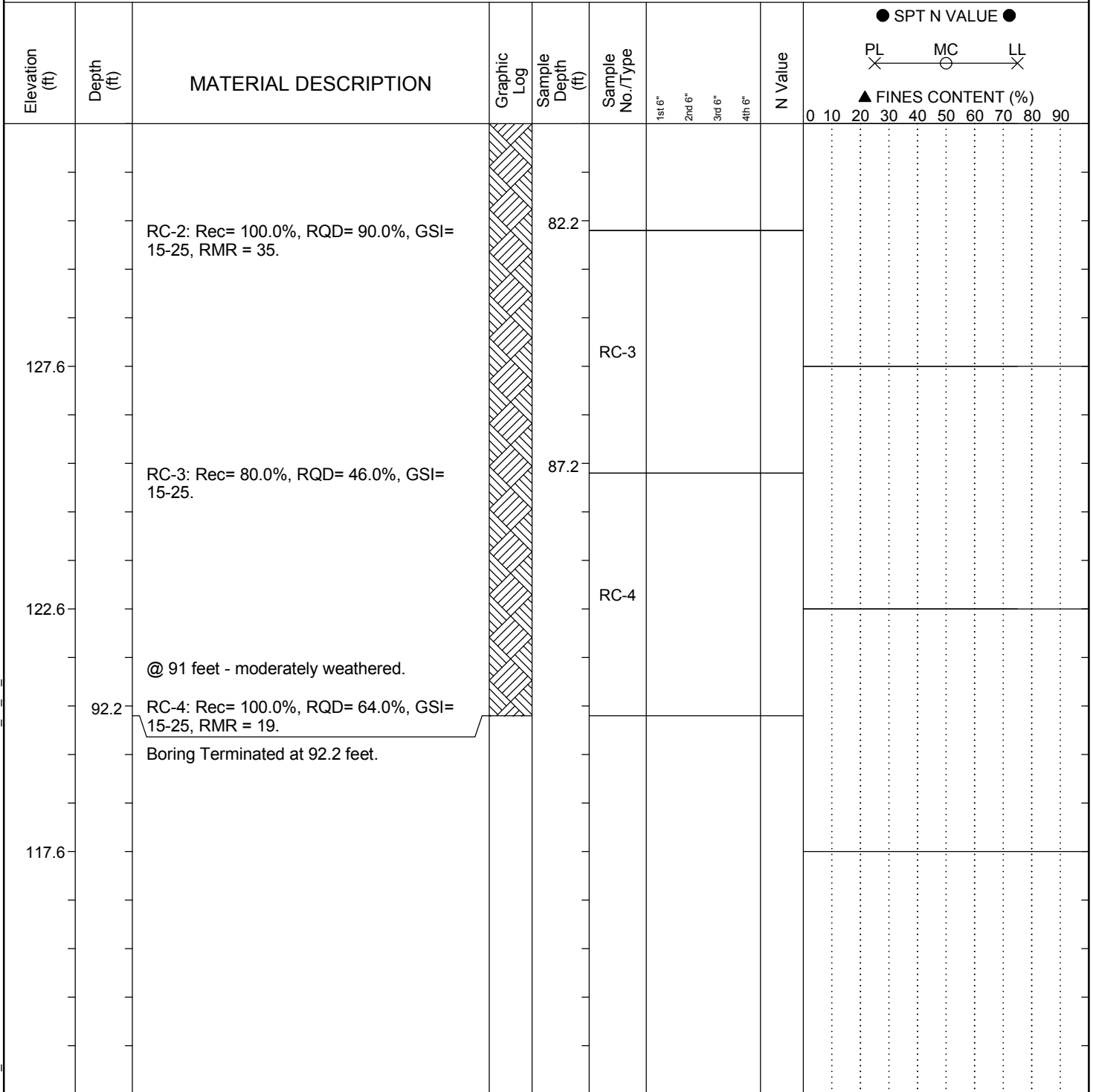
Continued Next Page

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-50
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: NGS	Boring Location: 91+54.21	Offset: R:46.690'
Elev.: 212.6 ft	Latitude: 34.027285	Longitude: -81.126258
Total Depth: 92.2 ft	Soil Depth: 72.2 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N)
Drill Machine: CME 55	Drill Method: RW	Hammer Type: Automatic
Core Size: NQ	Driller: T. Miller	Energy Ratio: 84.1%
Groundwater: TOB		24HR: 20.1 ft
		38 ft



LEGEND

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

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



Rock Core Discontinuity Worksheet

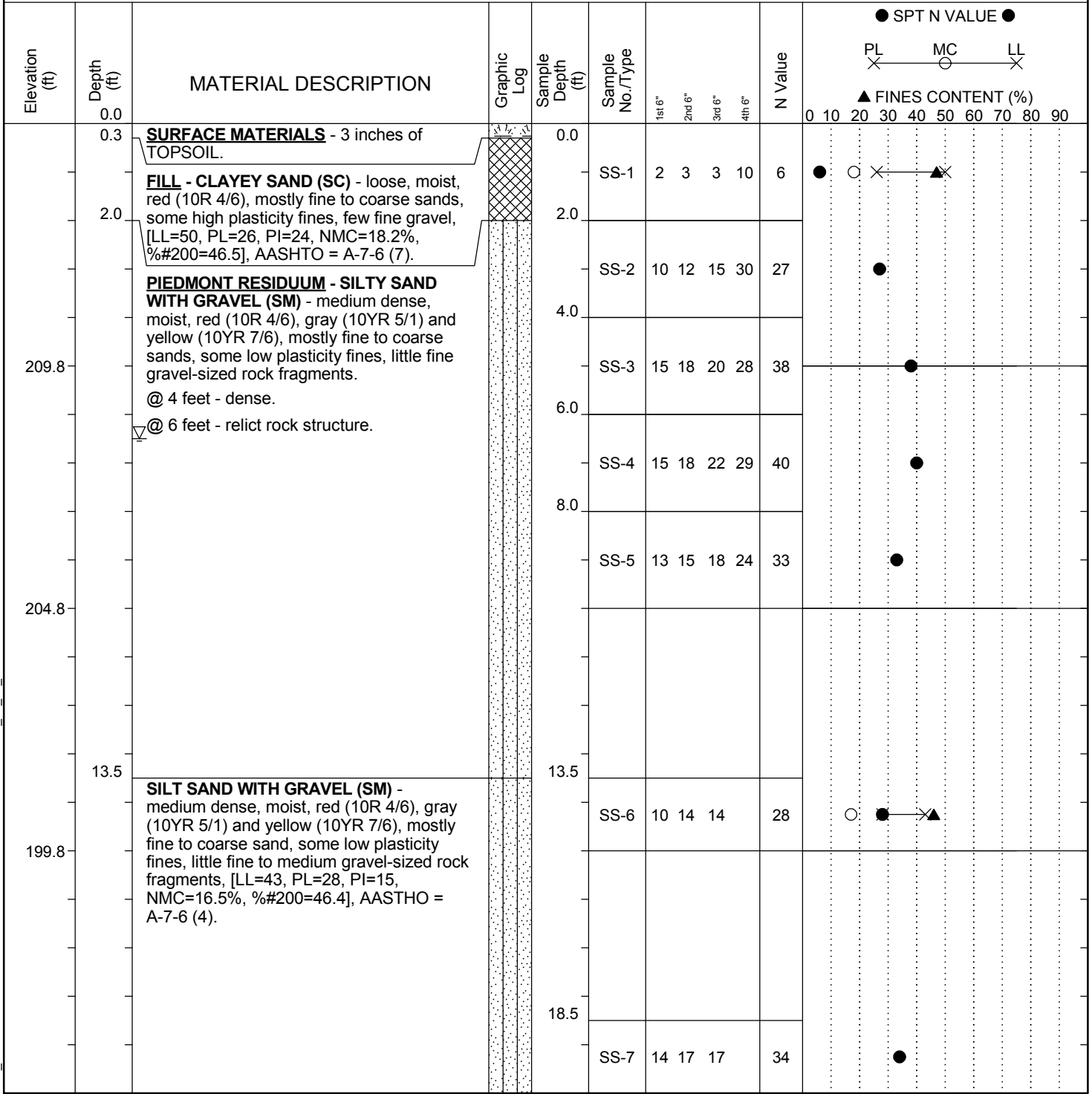
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Miller
 Logged By: Nathaniel Shuff
 Date: 2/18/2018

Boring Number: B-50
 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
73.2	1	J	60	VN	Su	Fe	Pl	SR	
73.7	2	J	5	MW	No	N/A	Wa	SR	
74.3	3	J	50	VN	Sp	Ca	Pl	SR	
76.9	4	J	25	MW	No	N/A	Pl	SR	
77.7	5	J	5	MW	No	N/A	Pl	SR	
79.4	6	J	60	N	No	N/A	Wa	SR	
79.7	7	J	60	VN	No	N/A	Wa	SR	
80.7	8	J	60	VN	No	N/A	Wa	S	
80.9	9	J	60	N	Su	Fe	Wa	SR	
81.3	10	J	60	VN	No	N/A	Wa	SR	
82.7	11	J	55	N	No	N/A	Wa	S	
82.9	12	J	55	VN	No	N/A	Wa	S	
83	13	J	55	VN	Sp	Cl	Wa	S	
83.1	14	J	60	VN	No	N/A	Wa	SR	
83.5	15	J	55	VN	No	N/A	Wa	SR	
83.8	16	J	60	VN	No	N/A	Wa	S	
84.2	17	J	60	VN	Sp	Cl	Wa	S	
84.8	18	J	60	N	No	N/A	Wa	SR	
85.3	19	J	55	VN	Sp	Fe	Wa	S	
85.9	20	J	55	N	No	N/A	Wa	S	
86.1	21	J	55	N	No	N/A	Wa	S	
87.7	22	J	55	N	No	N/A	Wa	S	
88.5	23	J	55	VN	No	N/A	Wa	S	
88.9	24	J	55	VN	No	N/A	Wa	S	
89.1	25	J	60	N	Su	Fe	Wa	SR	
89.6	26	J	60	N	Su	Fe	Wa	SR	
80.2	27	J	60	N	Su	Fe/Cl	Wa	SR	
91.2	28	J	55	N	Su	Cl	Wa	SR	
91.4	29	J	60	N	Su	Fe	Wa	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-51
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: AKS	Boring Location: 93+58.51	Offset: L:160.130' Alignment: Proposed
Elev.: 214.8 ft	Latitude: 34.028083	Longitude: -81.126273
Total Depth: 59.7 ft	Soil Depth: 39.7 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5		Sampler Configuration: Y (N) Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic Energy Ratio: 86.5%
Core Size: NQ	Driller: J. Millwood	Groundwater: TOB 6.5 ft 24HR: N/A



LEGEND

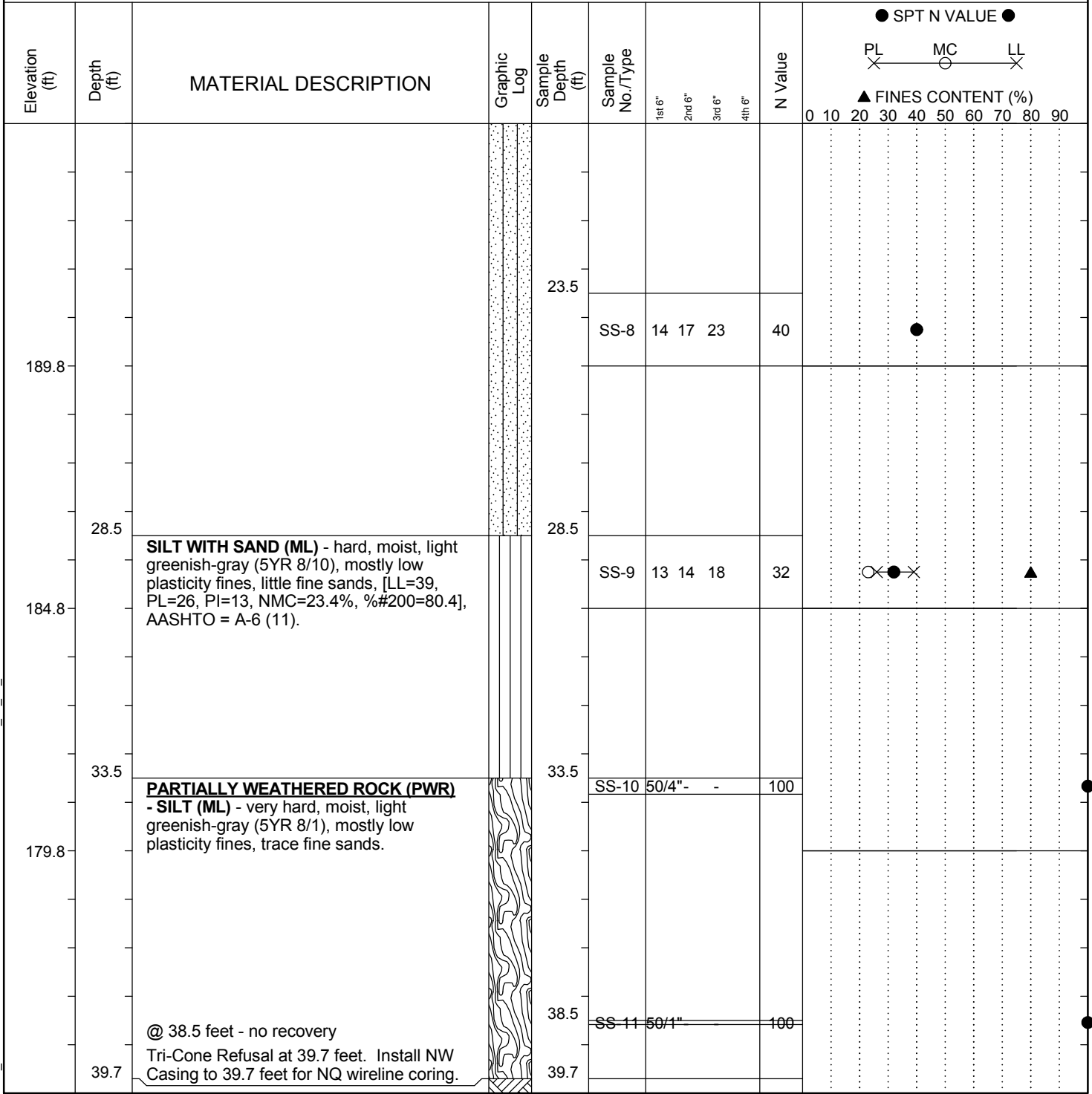
Continued Next Page

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

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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-51
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: AKS	Boring Location: 93+58.51	Offset: L:160.130
Alignment: Proposed	Date Started: 2/8/2018	Date Completed: 2/8/2018
Elev.: 214.8 ft	Latitude: 34.028083	Longitude: -81.126273
Total Depth: 59.7 ft	Soil Depth: 39.7 ft	Core Depth: 20 ft
Bore Hole Diameter (in): 3.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)	Drill Machine: D-50	Drill Method: RW
Hammer Type: Automatic	Energy Ratio: 86.5%	Core Size: NQ
Driller: J. Millwood	Groundwater: TOB	24HR: N/A



LEGEND

Continued Next Page

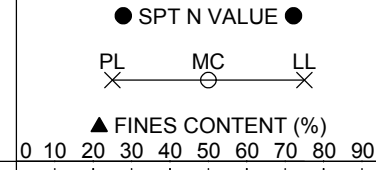
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

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-51	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 44	
Eng./Geo.: AKS		Boring Location: 93+58.51		Offset: L:160.130' Alignment: Proposed	
Elev.: 214.8 ft		Latitude: 34.028083		Longitude: -81.126273	
Total Depth: 59.7 ft		Soil Depth: 39.7 ft		Core Depth: 20 ft	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y <input checked="" type="radio"/> (N)	
Drill Machine: D-50		Drill Method: RW		Energy Ratio: 86.5%	
Core Size: NQ		Driller: J. Millwood		Groundwater: TOB 6.5 ft 24HR N/A	
Date Started: 2/8/2018		Date Completed: 2/8/2018			

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"		
169.8	59.7 - 44.7	<p>For discontinuity descriptors, see discontinuity worksheet.</p> <p>METAMORPHIC BEDROCK - SCHIST - gray (GLEYS 1 5/), very fine grained, thinly laminated, highly weathered, extremely weak rock, quartz veins and stringer throughout.</p> <p>@ 39.9 feet - completely weathered. RC-1 : Rec= 100%, RQD= 0.0%, GSI= 10-20.</p> <p>@ 44.8 feet - highly weathered.</p>	[Diagonal Hatching]	44.7	RC-1						
164.8	59.7 - 49.7	<p>Moderate recoveries below 44.7 feet likely due to seams of completely weathered rock or residual soil.</p> <p>RC-2 : Rec= 76.0%, RQD= 21.7%, GSI= 10-20.</p>	[Diagonal Hatching]	49.7	RC-2						
159.8	59.7 - 54.7	<p>RC-3 : Rec= 50.0%, RQD= 26.7%, GSI= 10-20.</p>	[Diagonal Hatching]	54.7	RC-3						
	59.7 - 58.0	<p>RC-4 : Rec= 48.0%, RQD= 20.0%, GSI= 10-20.</p>	[Diagonal Hatching]	58.0	RC-4						



LEGEND

Continued Next Page

SAMPLER TYPE

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

DRILLING METHOD

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

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

SCDOT Soil Test Log

Project ID: P027662		County: Lexington/Richland		Boring No.: B-51	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 44	
Eng./Geo.: AKS		Boring Location: 93+58.51		Offset: L:160.130' Alignment: Proposed	
Elev.: 214.8 ft		Latitude: 34.028083		Longitude: -81.126273	
Total Depth: 59.7 ft		Soil Depth: 39.7 ft		Core Depth: 20 ft	
Bore Hole Diameter (in): 3.5		Sampler Configuration		Liner Required: Y <input checked="" type="radio"/> N	
Drill Machine: D-50		Drill Method: RW		Hammer Type: Automatic	
Core Size: NQ		Driller: J. Millwood		Energy Ratio: 86.5%	
		Groundwater: TOB		24HR: N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE ●				N Value	PL — MC — LL										
						1st 6"	2nd 6"	3rd 6"	4th 6"		▲ FINES CONTENT (%)										
											0	10	20	30	40	50	60	70	80	90	
149.8		Boring Terminated at 59.7 feet.																			
144.8																					
139.8																					

LEGEND

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

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



Rock Core Discontinuity Worksheet

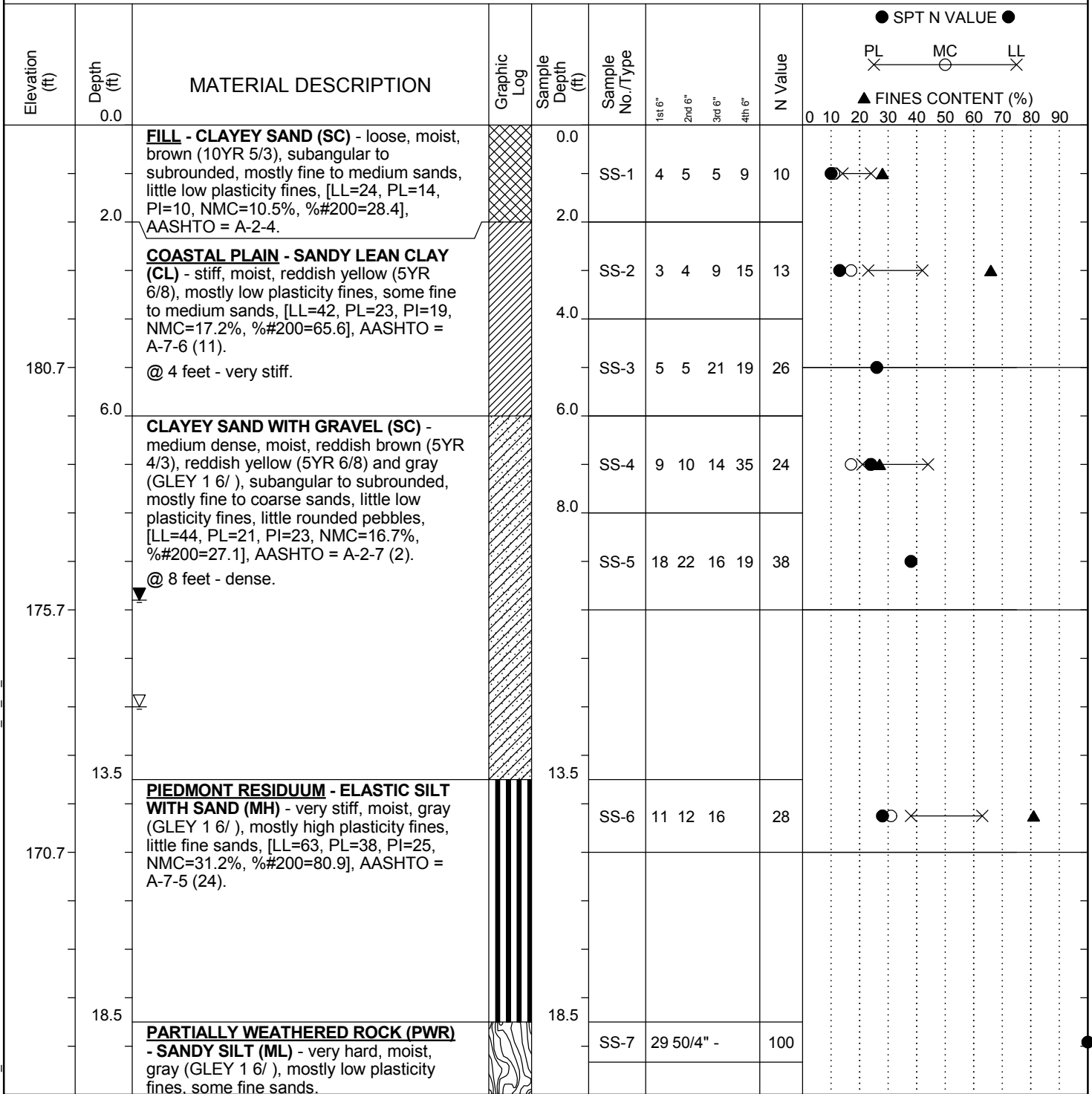
Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project
 Project Number: 1461-16-047
 Driller (Company/Name): S&ME/Millwood
 Logged By: Austin Syms
 Date: 2/8/2018

Boring Number: B-51
 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
40.8	1	J	5	N	No	N/A	Pl	SR	
41.8	2	J	55	N	No	N/A	Ir	R	
42.1	3	J	5	N	No	N/A	Ir	R	
42.7	4	J	10	VN	No	N/A	Ir	R	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: DH-4
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 43	
Eng./Geo.: AKS	Boring Location: 76+09.40		Offset: R:86.778'	Alignment: Proposed
Elev.: 185.7 ft	Latitude: 34.024177	Longitude: -81.129735	Date Started: 1/4/2018	
Total Depth: 120.2 ft	Soil Depth: 51.8 ft	Core Depth: 68.4 ft	Date Completed: 1/9/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: HQ	Driller: J. Millwood	Groundwater: TOB	12.0 ft 24HR 9.8 ft	



LEGEND

Continued Next Page

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

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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: DH-4
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: Site 43	
Eng./Geo.: AKS	Boring Location: 76+09.40		Offset: R:86.778'	Alignment: Proposed
Elev.: 185.7 ft	Latitude: 34.024177	Longitude: -81.129735	Date Started: 1/4/2018	
Total Depth: 120.2 ft	Soil Depth: 51.8 ft	Core Depth: 68.4 ft	Date Completed: 1/9/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration	Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic	Energy Ratio: 86.5%	
Core Size: HQ	Driller: J. Millwood	Groundwater: TOB	12.0 ft 24HR: 9.8 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 (%)						
160.7				23.5	SS-8	42	50/3" -			100										
				28.5	SS-9	43	50/5" -			100										
155.7				33.5	SS-10	50/1"				100										
150.7				38.5	SS-11	50/4" -	-			100										

@ 38.5 feet - gray (GLEYS 1 6/) with mottled brown (10YR 5/3), some fine to coarse sands, trace gravel.

LEGEND

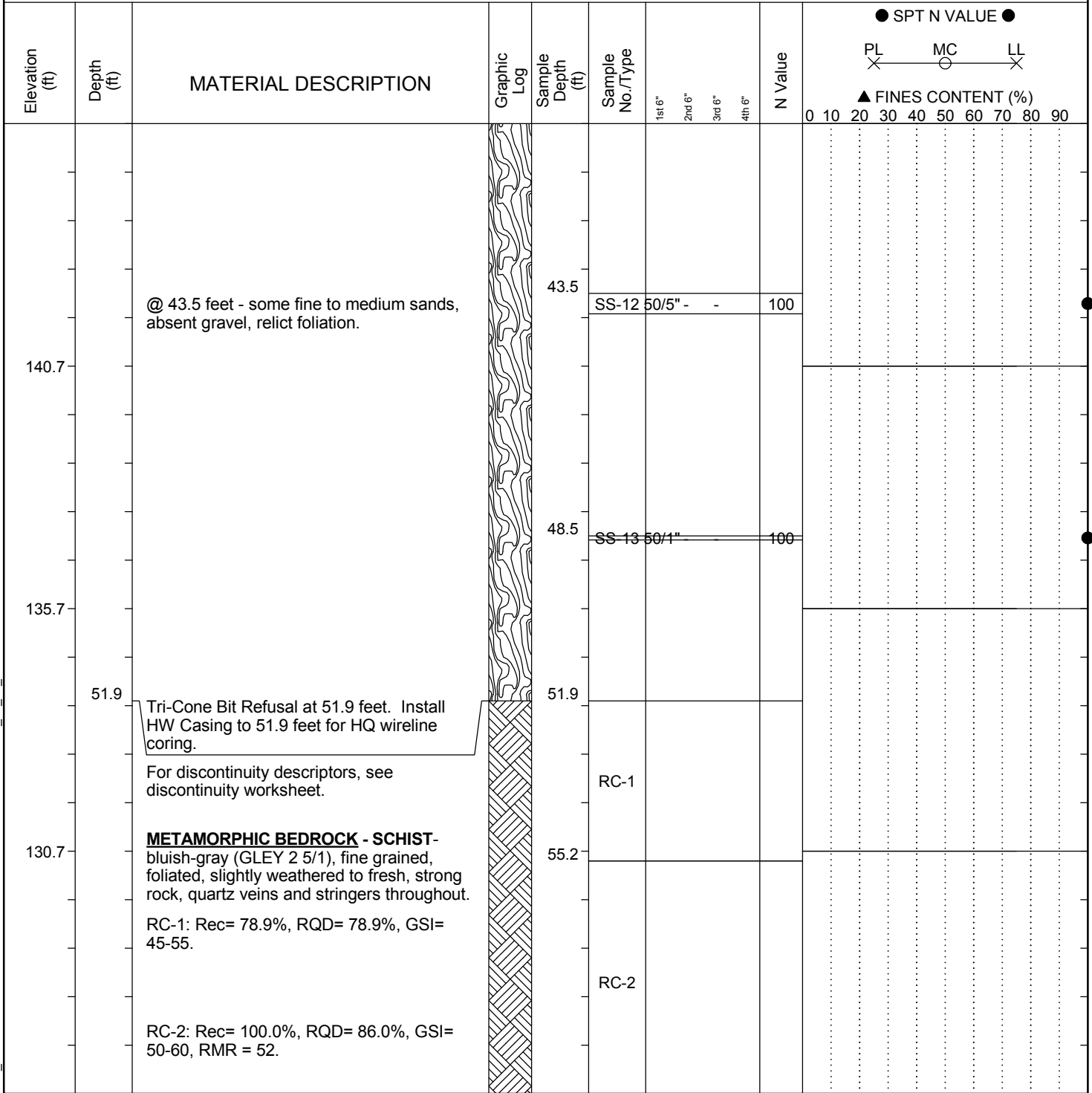
Continued Next Page

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-4	
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route:	Site 43	
Eng./Geo.:	AKS	Boring Location:	76+09.40	Offset:	R:86.778'	Alignment:	Proposed
Elev.:	185.7 ft	Latitude:	34.024177	Longitude:	-81.129735	Date Started:	1/4/2018
Total Depth:	120.2 ft	Soil Depth:	51.8 ft	Core Depth:	68.4 ft	Date Completed:	1/9/2018
Bore Hole Diameter (in):	7.5	Sampler Configuration		Liner Required:	Y (N)	Liner Used:	Y (N)
Drill Machine:	D-50	Drill Method:	RW	Hammer Type:	Automatic	Energy Ratio:	86.5%
Core Size:	HQ	Driller:	J. Millwood	Groundwater:	TOB 12.0 ft	24HR	9.8 ft



LEGEND

Continued Next Page

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

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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: DH-4
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 43
Eng./Geo.: AKS	Boring Location: 76+09.40	Offset: R:86.778'
Alignment: Proposed	Date Started: 1/4/2018	
Elev.: 185.7 ft	Latitude: 34.024177	Longitude: -81.129735
Total Depth: 120.2 ft	Soil Depth: 51.8 ft	Core Depth: 68.4 ft
Date Completed: 1/9/2018		
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Liner Used: Y (N)		
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Energy Ratio: 86.5%		
Core Size: HQ	Driller: J. Millwood	Groundwater: TOB 12.0 ft
24HR: 9.8 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-3: Rec= 100%, RQD= 94.2%, GSI= 70-80.		60.2	RC-3						
120.7		@ 64.9 feet - very dark greenish-gray (GLEY 2 3/1), bluish-gray (GLEY 2 5/1), pale red (10R 6/3), fresh.		65.2	RC-4						
		RC-4: Rec= 98.0%, RQD= 98.0%, GSI= 70-80, RMR = 61.									
115.7		@ 70.8 feet - epidote mineralization.		70.2	RC-5						
		RC-5: Rec= 100.0%, RQD= 100.0%, GSI= 70-80.									
110.7		@ 74.3 feet - epidote mineralization.		75.2	RC-6						
		RC-6: Rec= 100.0%, RQD= 100.0%, GSI= 70-80, RMR = 61.									

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-4	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 43	
Eng./Geo.: AKS		Boring Location: 76+09.40		Offset: R:86.778'	
Elev.: 185.7 ft		Latitude: 34.024177		Longitude: -81.129735	
Total Depth: 120.2 ft		Soil Depth: 51.8 ft		Core Depth: 68.4 ft	
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: Y (N)	
Drill Machine: D-50		Drill Method: RW		Hammer Type: Automatic	
Core Size: HQ		Driller: J. Millwood		Energy Ratio: 86.5%	
		Groundwater: TOB		12.0 ft	
				24HR 9.8 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
		@ 80.0 feet - pyrite mineralization.		80.2							
		@ 81.8 feet - quartz veins, pyrite mineralization throughout RC-7.			RC-7						
100.7		RC-7: Rec= 100.0%, RQD= 94.0%, GSI= 70-80.		85.2							
		@ 85.2 feet - quartz veins, pyrite throughout RC-8.			RC-8						
		RC-8: Rec= 100.0%, RQD= 88.0%, GSI= 65-75, RMR = 58.		90.2							
95.7					RC-9						
		RC-9: Rec= 100.0%, RQD= 94.0%, GSI= 75-85.		95.2							
90.7					RC-10						
		@ 97.6 feet - pegmatite dike (epidote and quartz), light grayish-green (GLEY 6/1) and white (10YR 8.5/1).									
		RC-10: Rec= 100.0%, RQD= 100.0%, GSI= 70-80, RMR = 66.									

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-4
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 43
Eng./Geo.: AKS	Boring Location: 76+09.40	Offset: R:86.778'
Elev.: 185.7 ft	Latitude: 34.024177	Longitude: -81.129735
Total Depth: 120.2 ft	Soil Depth: 51.8 ft	Core Depth: 68.4 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: RW	Hammer Type: Automatic
Core Size: HQ	Driller: J. Millwood	Energy Ratio: 86.5%
	Groundwater: TOB	24HR: 12.0 ft
		9.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"	PL	MC	LL	▲ FINES CONTENT (%)						
		@ 99 feet - very dark greenish-gray (GLE Y 2 3/1), bluish-gray (GLE Y 2 5/1) and pale red (10R 6/3), fresh, strong rock.		100.2															
		RC-11: Rec= 100.0%, RQD= 96.0%, GSI= 75-85.			RC-11														
80.7				105.2															
		RC-12: Rec= 102.0%, RQD= 83%, GSI= 70-80, RMR = 48.			RC-12														
		@ 108.2 feet - pegmatite dike (quartz), white (10YR 8.5/1).																	
75.7		@ 109.2 feet - very dark greenish-gray (GLE Y 2 3/1), bluish-gray (GLE Y 2 5/1), pale red (10R 6/3), fresh, strong rock.		110.2															
		@ 110.2 feet - bluish-gray (GLE Y 2 5/1), foliated, slightly weathered, weak rock.			RC-13														
		RC-13: Rec= 100.0%, RQD= 100%, GSI= 70-80.																	
70.7				115.2															
		RC-14: Rec= 96.0%, RQD= 96.0%, GSI= 70-80, RMR = 61.			RC-14														
		@ 119.6 feet - pegmatite dike (quartz, mica																	

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-4	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project						Route: Site 43	
Eng./Geo.: AKS		Boring Location: 76+09.40		Offset: R:86.778'		Alignment: Proposed	
Elev.: 185.7 ft		Latitude: 34.024177		Longitude: -81.129735		Date Started: 1/4/2018	
Total Depth: 120.2 ft		Soil Depth: 51.8 ft		Core Depth: 68.4 ft		Date Completed: 1/9/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: D-50		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 86.5%	
Core Size: HQ		Driller: J. Millwood		Groundwater: TOB 12.0 ft		24HR: 9.8 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 (%)						
120.2	120.2	and feldspar), white (10YR 8.5/1), pale yellow (5Y 8/3), fresh, strong rock. Boring Terminated at 120.2 feet.	X																	
60.7																				
55.7																				
50.7																				

LEGEND

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

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



Rock Core Discontinuity Worksheet

Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project

Boring Number: DH-4

Project Number: 1461-16-047

Core Barrel Type: HQ

Driller (Company/Name): S&ME/Millwood

Core Barrel Length: 5 feet

Logged By: Austin Syms

Coring Technique: Wireline

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

Number of Core Boxes: 5

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
52.4	1	J	50	N	No	N/A	PI	R	
52.9	2	J	9	N	No	N/A	W	R	
53.6	3	J	32	MW	No	N/A	PI	R	
53.7	4	J	0	N	No	N/A	W	R	
55	5	J	43	MW	No	N/A	PI	SR	
54.3	6	V	47	W	Fi	Ca	PI	N/A	
55.5	7	V	55	MW	Fi	Ca	PI	N/A	
57.4	8	J	26	T	No	N/A	W	R	
58.7	9	J	14	T	No	N/A	PI	R	
58.9	10	J	5	T	No	N/A	PI	R	
59.5	11	J	20	T	No	N/A	PI	R	
63.3	12	J	63	T	No	N/A	PI	R	
64.7	13	J	65	T	No	N/A	PI	SR	
67.8	14	J	9	T	No	N/A	W	SR	
69.1	15	J	0	T	No	N/A	St	R	
69.7	16	J	6	T	No	N/A	PI	SR	
71.6	17	J	27	T	No	N/A	St	R	
74.5	18	J	10	T	No	N/A	PI	SR	
76.3	19	J	21	T	No	N/A	PI	SR	
77.2	20	J	13	T	No	N/A	PI	SR	
78.2	21	V	35	MW	Fi	Qz	PI	N/A	
78.9	22	V	63	W	Fi	Qz	PI	N/A	
81.4	23	J	25	T	No	N/A	PI	R	
81.6	24	J	16	T	No	N/A	St	R	
82.5	25	J	11	T	No	N/A	PI	R	
83.6	26	J	25	T	No	N/A	W	R	
84.1	27	J	18	T	No	N/A	PI	R	
85.8	28	J	0	T	No	N/A	PI	R	
87	29	J	0	T	No	N/A	PI	R	



Rock Core Discontinuity Worksheet

Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project

Boring Number: DH-4

Project Number: 1461-16-047

Core Barrel Type: HQ

Driller (Company/Name): S&ME/Millwood

Core Barrel Length: 5 feet

Logged By: Austin Syms

Coring Technique: Wireline

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

Number of Core Boxes: 5

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
87.9	30	J	0	T	No	N/A	PI	R	
88.2	31	J	0	T	No	N/A	W	R	
88.8	32	J	N/A	N/A	No	N/A	N/A	N/A	Fractured zone 88.8' - 89.6'
91.9	33	J	0	T	No	N/A	St	SR	
92.9	34	J	15	T	No	N/A	PI	SR	
93.2	35	J	12	T	Fi	Qz	W	R	
91.4	36	V	46	MW	Fi	Qz/Py	W	N/A	
91.9	37	V	72	MW	Fi	Qz/Py	PI	N/A	
95.3	42	V	44	MW	Fi	Qz	PI	N/A	
96	43	V	83	N	Fi	Epidote	PI	N/A	
96.5	44	V	78	N	Fi	Epidote	PI	N/A	
96.7	40	J	12	T	No	N/A	PI	R	
97.4	45	V	85	N	Fi	Epidote	PI	N/A	
97.8	38	J	26	T	No	N/A	St	R	
98.2	39	J	8	T	No	N/A	PI	R	
99.4	41	J	0	T	No	N/A	St	SR	
104.3	46	J	14	T	No	N/A	PI	SR	
104.6	47	J	17	T	No	N/A	PI	SR	
106.1	48	J	47	T	No	N/A	PI	R	
106.4	49	J	46	T	No	N/A	PI	R	
107.8	50	J	27	T	No	N/A	St	R	
108	51	J	0	T	No	N/A	PI	R	
109.3	52	J	0	T	No	N/A	PI	R	
111	53	Sh	63	T	No	N/A	PI	Slk	
111.8	54	Sh	6	T	No	N/A	PI	Slk	
113.6	55	Sh	62	T	No	N/A	PI	Slk	
114.8	56	Sh	39	T	No	N/A	PI	Slk	
116.5	57	J	15	T	No	N/A	PI	R	
117.6	58	J	0	T	No	N/A	Ir	SR	



Rock Core Discontinuity Worksheet

Project Name: Carolina Crossroads I-20/I-26/I-126 Improvement Project

Boring Number: DH-4

Project Number: 1461-16-047

Core Barrel Type: HQ

Driller (Company/Name): S&ME/Millwood

Core Barrel Length: 5 feet

Logged By: Austin Syms

Coring Technique: Wireline

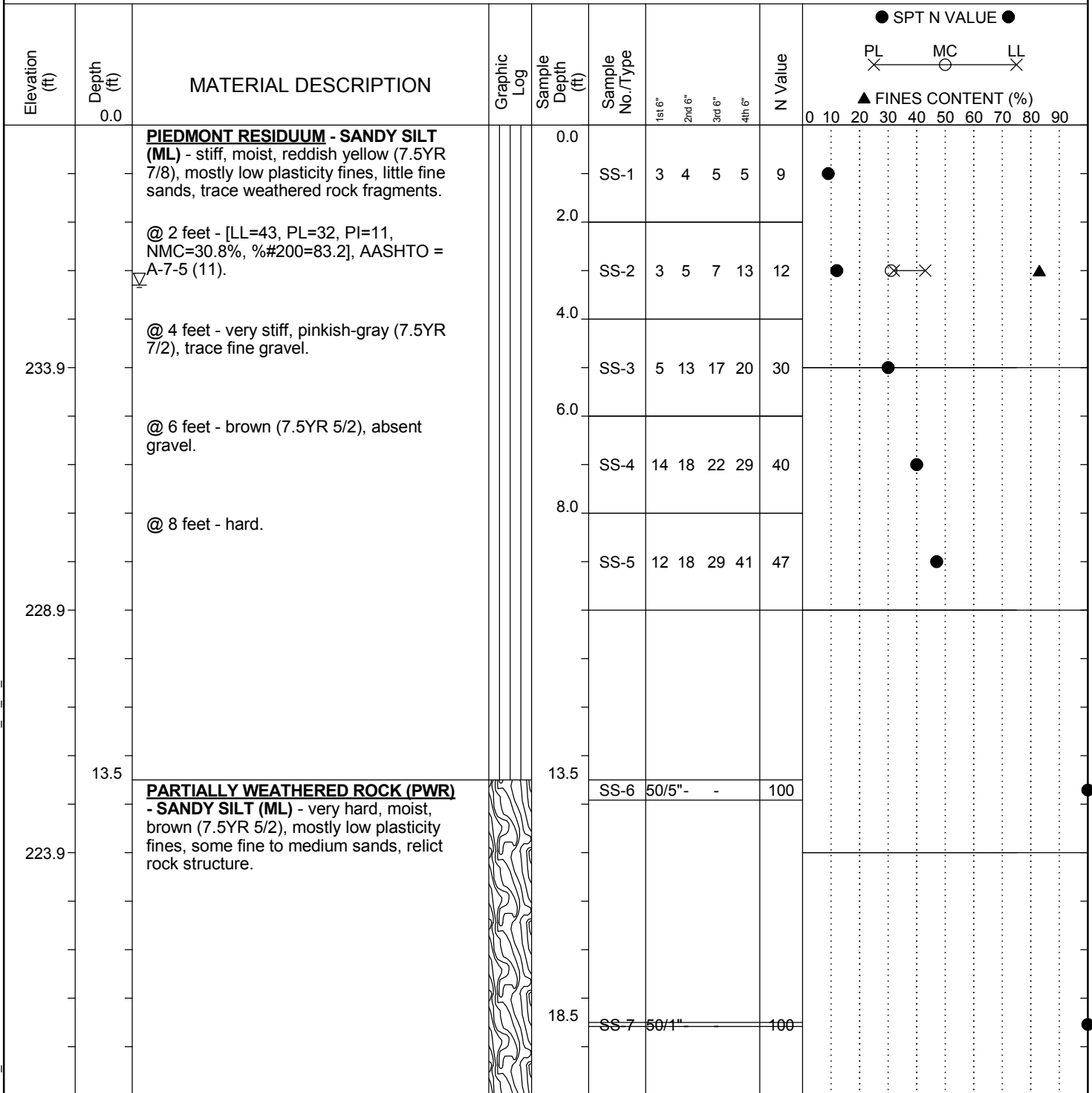
Date: 1/4/2018 - 1/9/2018

Number of Core Boxes: 5

Depth (ft)	Disc. No.	Disc. Type	Dip Angle (deg)	Disc. Width (mm)	Infill Amount	Infill Type	Surface Shape	Surface Roughness	Notes
118.7	59	Sh	35	T	No	N/A	PI	Slk	
119.6	60	J	0	T	No	N/A	PI	SR	

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: RW-40
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 69+86.46	Offset: L:60.995' Alignment: Proposed
Elev.: 238.9 ft	Latitude: 34.021474	Longitude: -81.133604 Date Started: 2/13/2018
Total Depth: 20.8 ft	Soil Depth: 20.8 ft	Core Depth: 0 ft Date Completed: 2/13/2018
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 3.3 ft 24HR: N/A



LEGEND

Continued Next Page

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

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

SCDOT Soil Test Log

Project ID: P027662		County: Lexington/Richland		Boring No.: RW-40	
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: I-20	
Eng./Geo.: AKS		Boring Location: 69+86.46		Offset: L:60.995'	
Elev.: 238.9 ft		Latitude: 34.021474		Longitude: -81.133604	
Total Depth: 20.8 ft		Soil Depth: 20.8 ft		Core Depth: 0 ft	
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: Y (N)	
Drill Machine: D-50		Drill Method: H.S.A / RW		Hammer Type: Automatic	
Core Size: N/A		Driller: J. Millwood		Energy Ratio: 86.5%	
				Groundwater: TOB 3.3 ft	
				24HR: N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	<p style="text-align: center;">● SPT N VALUE ●</p> <p style="text-align: center;">PL MC LL</p> <p style="text-align: center;">X-----O-----X</p> <p style="text-align: center;">▲ FINES CONTENT (%)</p> <p style="text-align: center;">0 10 20 30 40 50 60 70 80 90</p>																
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80	90							
213.9	20.8	Boring Terminated at 20.8 feet due to Tri-Cone but refusal. Obtained bulk sample from auger cuttings 0.0 to 10.0 feet.																									
208.9																											
203.9																											

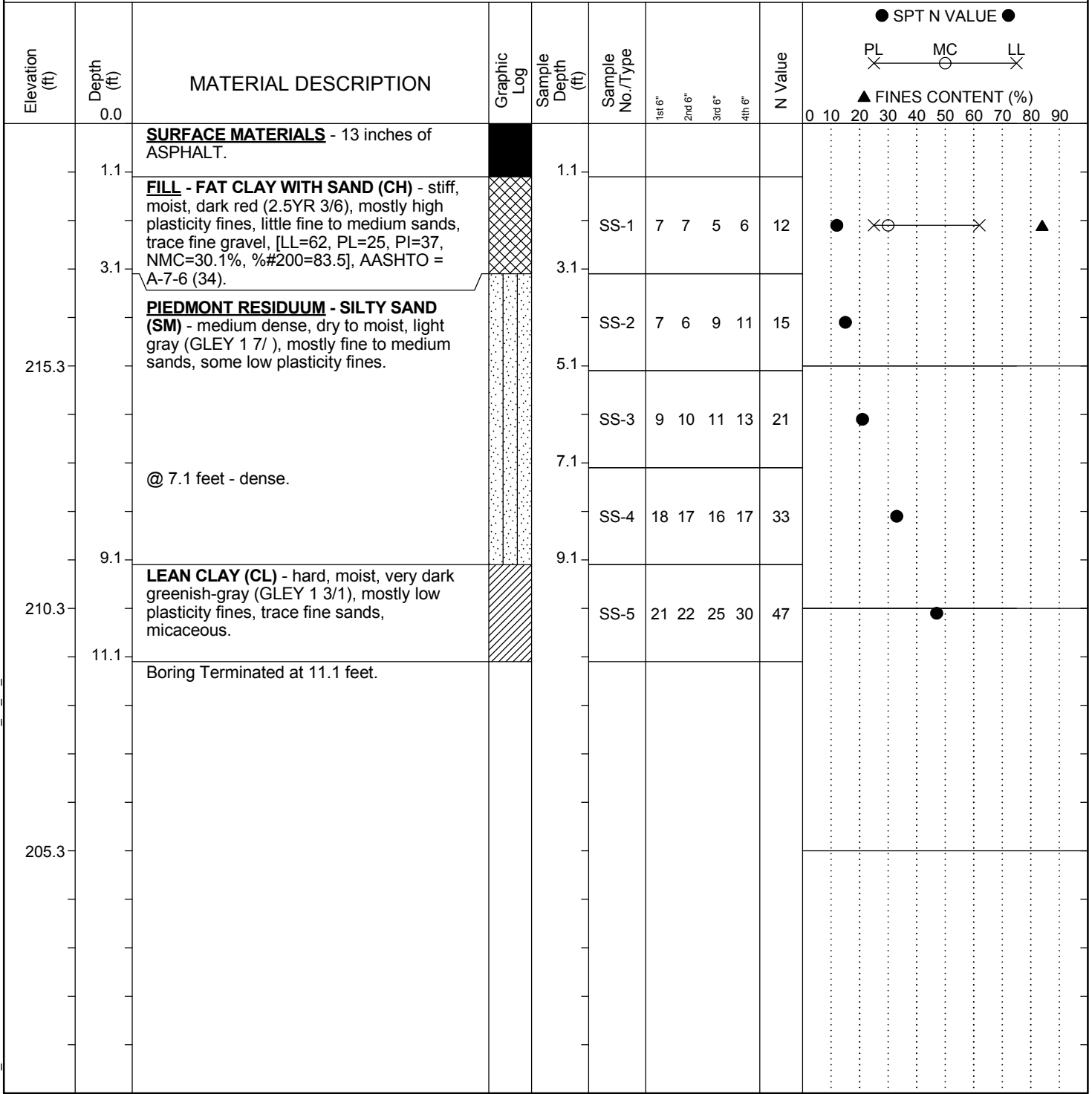
LEGEND

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.: P-44
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project			Route: I-20	
Eng./Geo.: AKS	Boring Location: 74+76.27		Offset: L:47.554'	Alignment: Proposed
Elev.: 220.3 ft	Latitude: 34.022409	Longitude: -81.132440	Date Started: 2/13/2018	
Total Depth: 11.1 ft	Soil Depth: 11.1 ft	Core Depth: 0 ft	Date Completed: 2/13/2018	
Bore Hole Diameter (in): 7.5		Sampler Configuration		Liner Required: 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



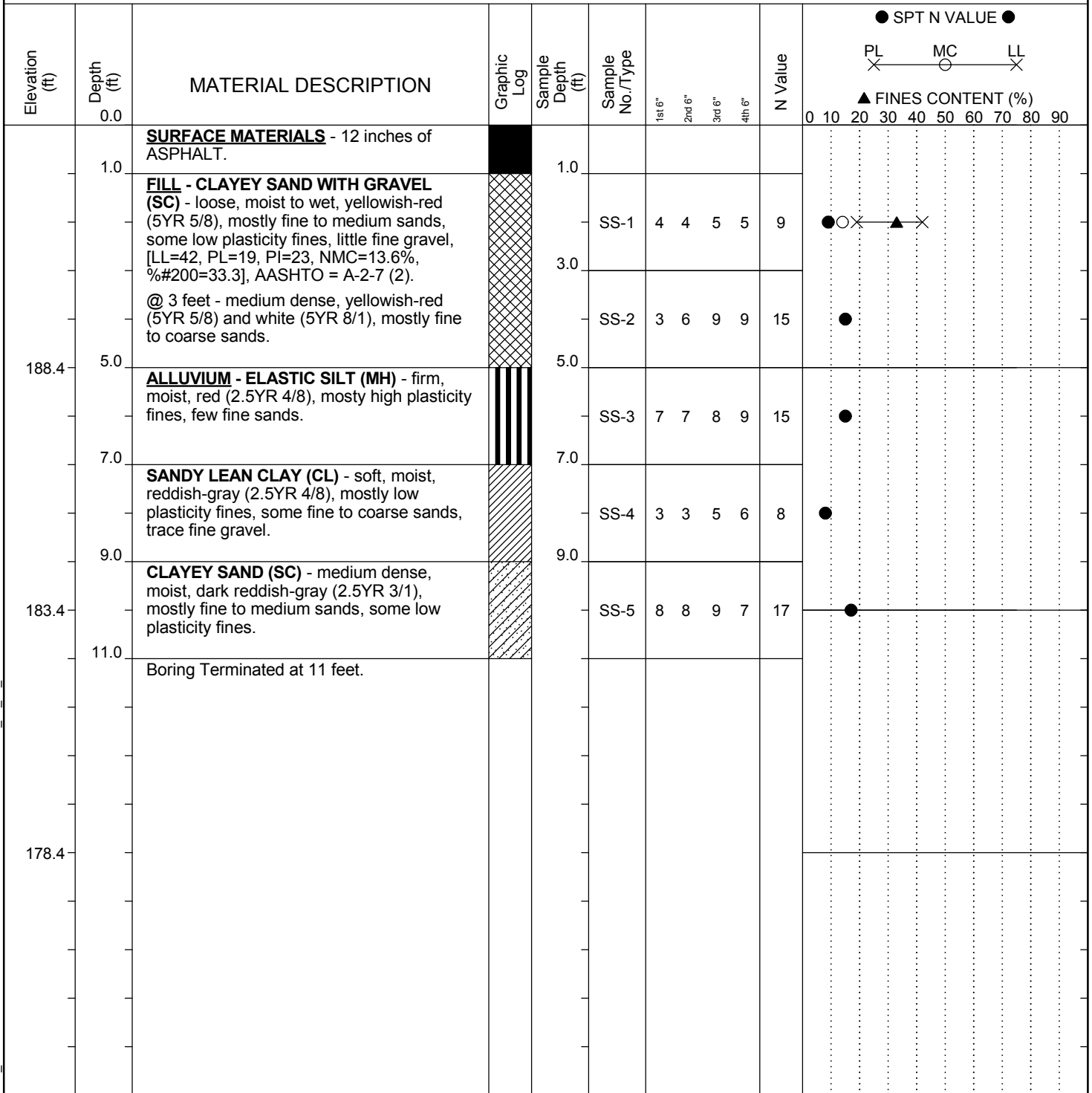
LEGEND

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-45
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: ELF	Boring Location: 84+69.20	Offset: R:46.558'
Alignment: Proposed		
Elev.: 193.4 ft	Latitude: 34.024176	Longitude: -81.129923
Date Started: 2/15/2018		
Total Depth: 11 ft	Soil Depth: 11 ft	Core Depth: 0 ft
Date Completed: 2/15/2018		
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		



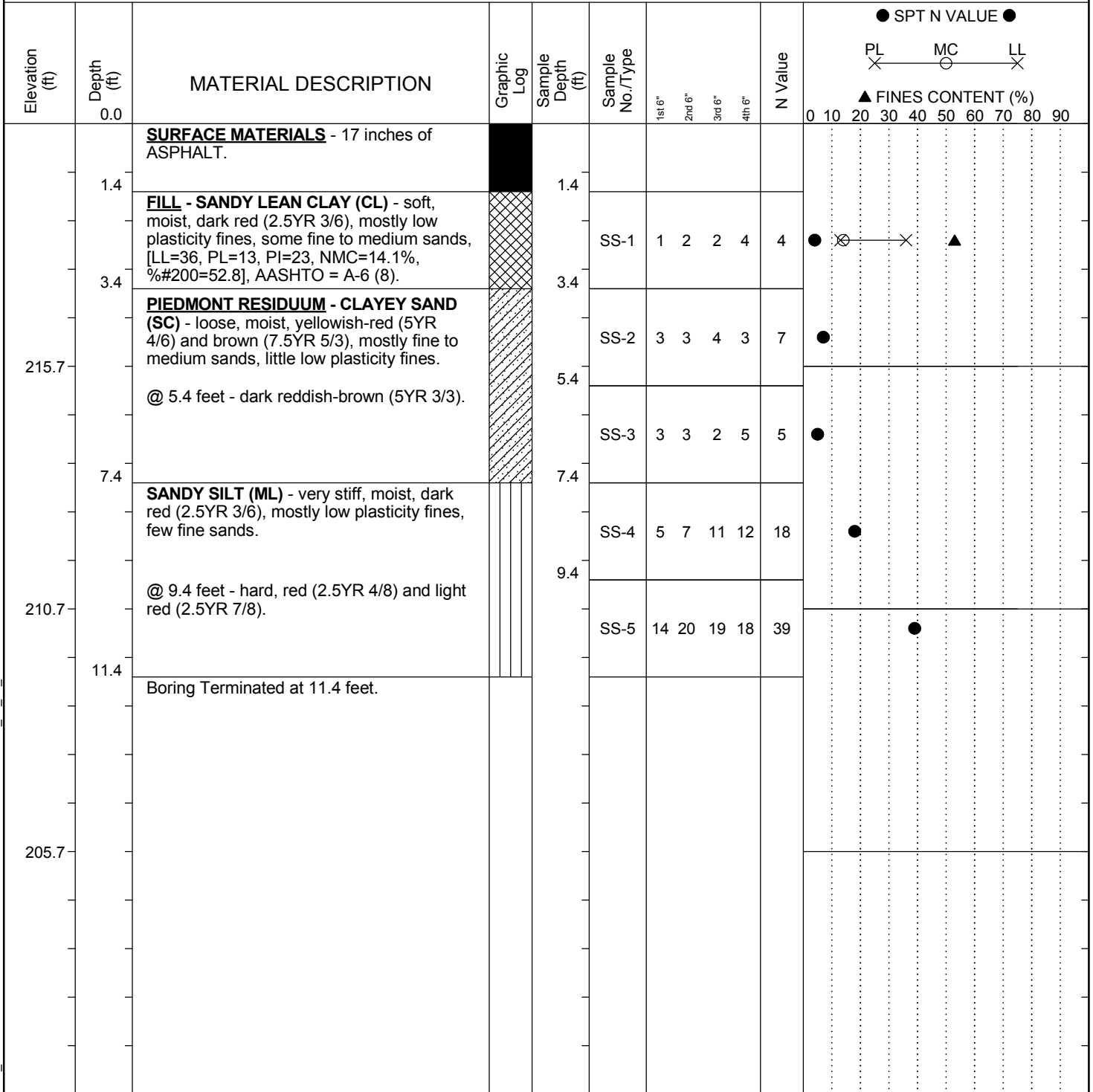
LEGEND

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-47
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: ELF	Boring Location: 104+83.25	Offset: R:45.744'
Alignment: Proposed		
Elev.: 220.7 ft	Latitude: 34.028128	Longitude: -81.125269
Date Started: 2/15/2018		
Total Depth: 11.4 ft	Soil Depth: 11.4 ft	Core Depth: 0 ft
Date Completed: 2/15/2018		
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		



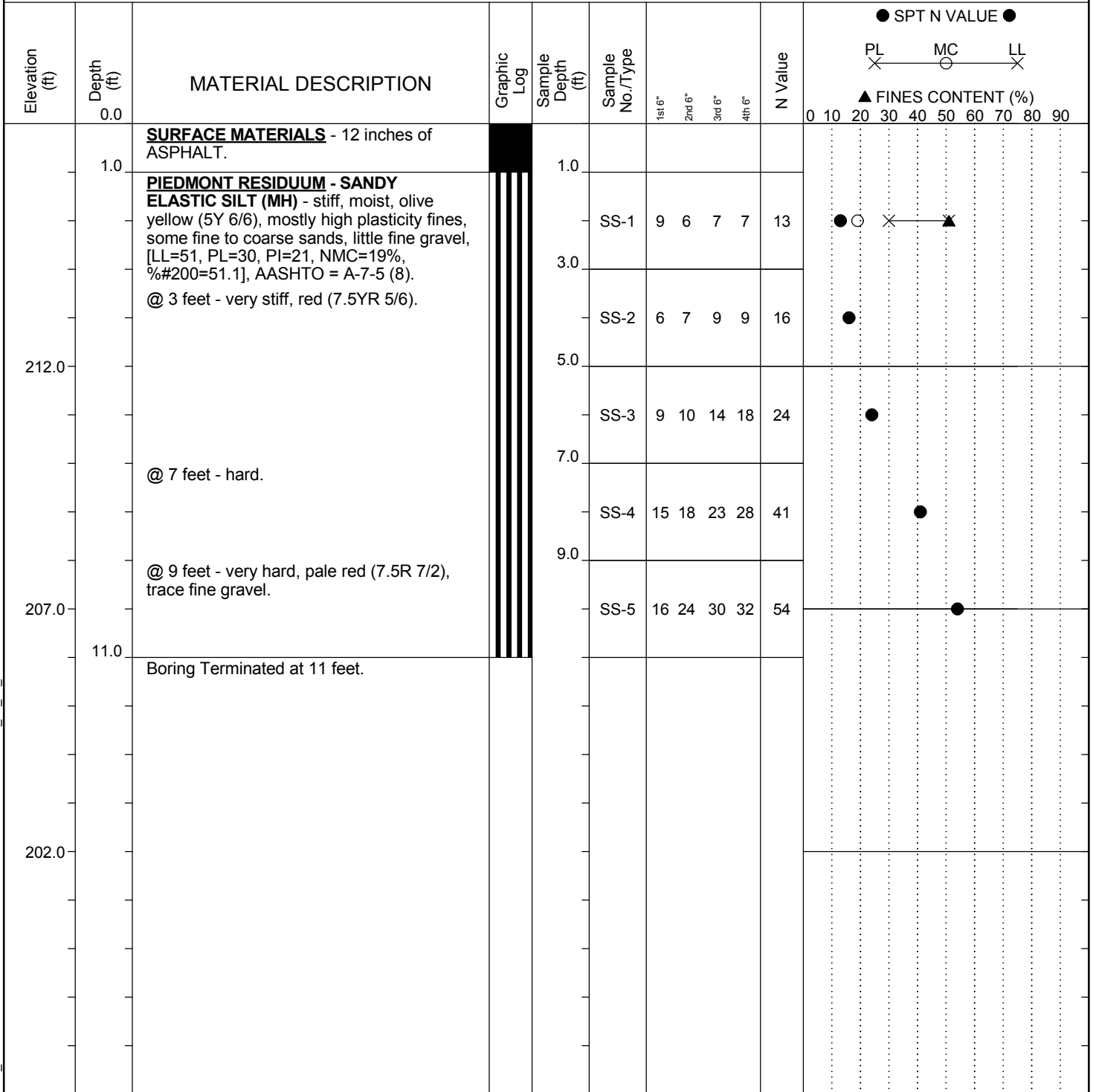
LEGEND

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-48
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: I-20
Eng./Geo.: AKS	Boring Location: 115+74.80	Offset: L:49.969'
Elev.: 217.0 ft	Latitude: 34.030453	Longitude: -81.122970
Total Depth: 11 ft	Soil Depth: 11.0 ft	Core Depth: 0 ft
Bore Hole Diameter (in): 7.5	Sampler Configuration	Liner Required: Y (N)
Drill Machine: D-50	Drill Method: H.S.A.	Hammer Type: Automatic
Core Size: N/A	Driller: J. Millwood	Groundwater: TOB N/A
		Energy Ratio: 86.5%
		24HR: N/A



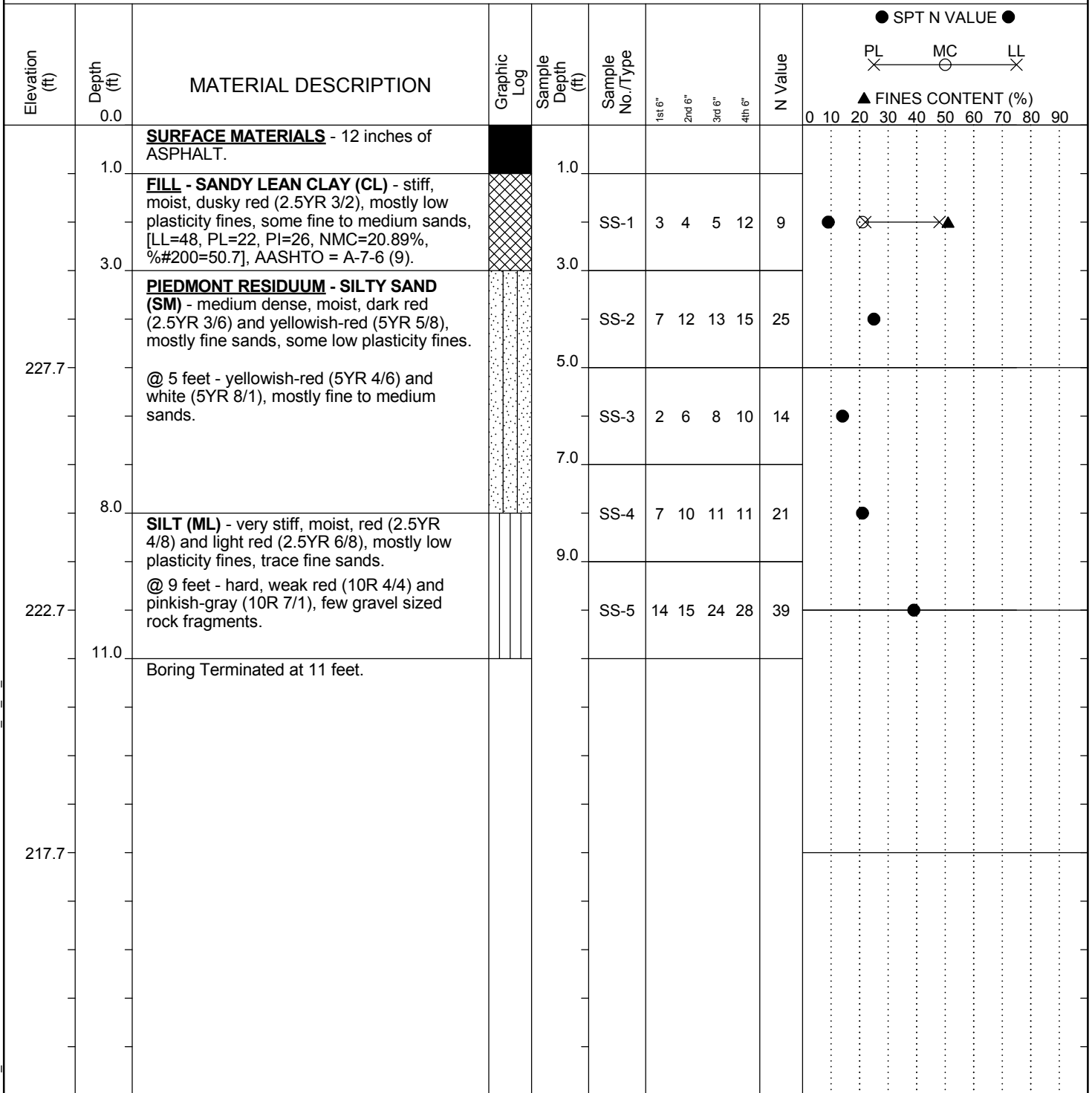
LEGEND

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-49
Site Description:	Carolina Crossroads I-20/26/126 Corridor Improvement Project					Route:	I-20
Eng./Geo.:	ELF	Boring Location:	125+36.64	Offset:	R:58.851'	Alignment:	Proposed
Elev.:	232.7 ft	Latitude:	34.032131	Longitude:	-81.120490	Date Started:	2/15/2018
Total Depth:	11 ft	Soil Depth:	11 ft	Core Depth:	0 ft	Date Completed:	2/15/2018
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



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	

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 GEOTECHNICAL EXPLORATION LOGS

SECTION 3B CPT LOGS

Cone Penetration Test



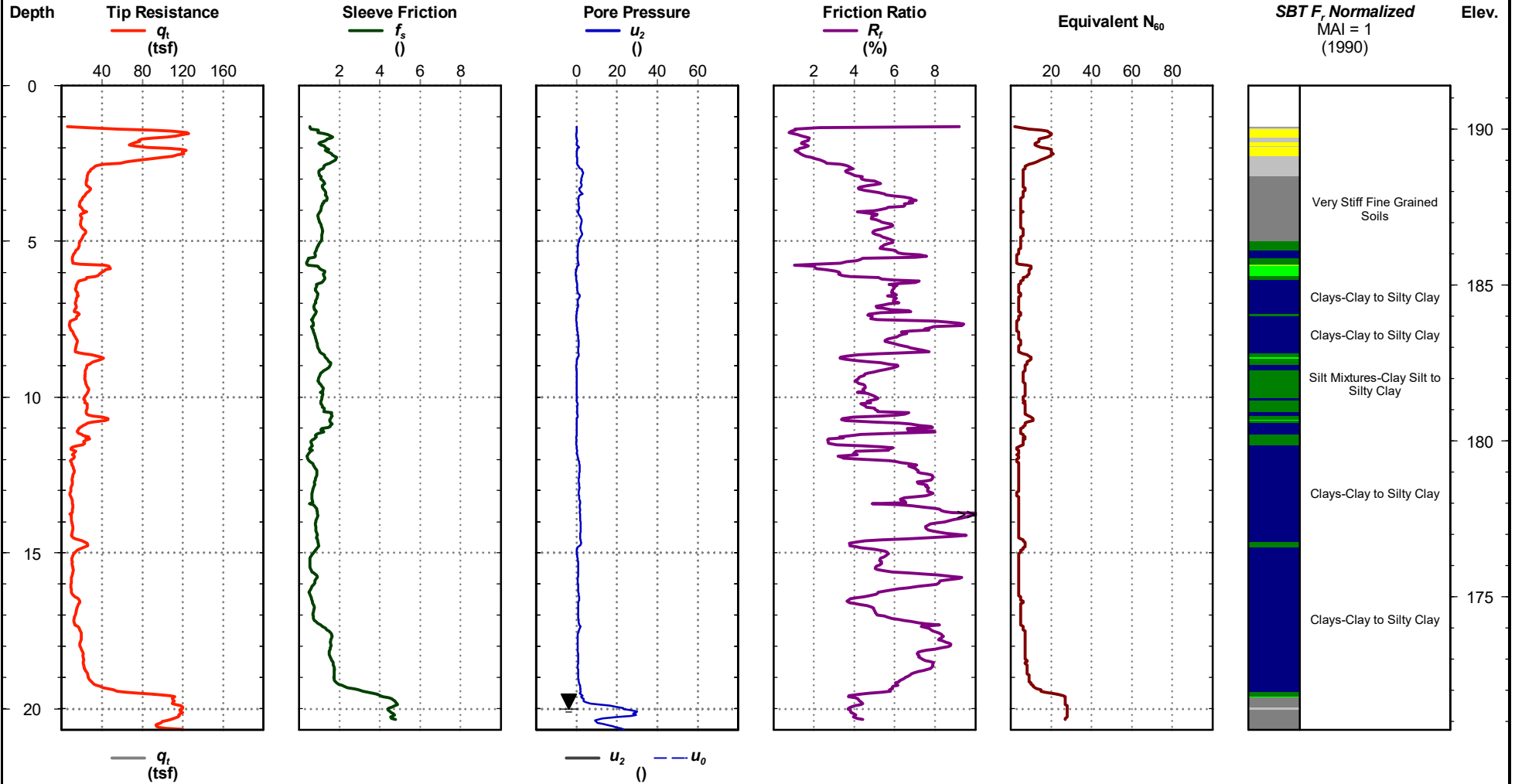
Carolina Crossroads I-20/26/126 Corridor Improvements
(South Carolina)
Project No. :P039720

C3C-CPT1

Date: May. 7, 2024
Estimated Water Depth: 20 ft
Rig/Operator: C. Piercy

Station: 88+29
Offset: 11-L
Elevation: 191.4 ft-MSL

Total Depth: 20.7 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1330



CPT REPORT - STANDARD_G5662.03-CAROLINA CROSSROADS PH 3C.GPJ_FME2017.GDT_6/12/24

C3C-CPT1

Cone Penetration Test



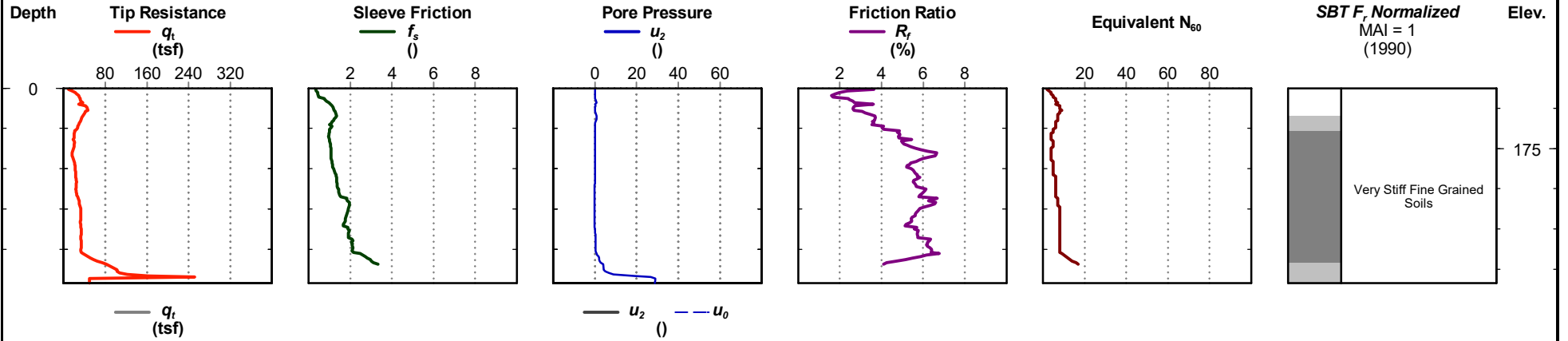
Carolina Crossroads Phase 3C
(South Carolina)
Project No. :P039720

C3C-CPT2

Date: Mar. 20, 2024
Estimated Water Depth: NE
Rig/Operator: C. Piercy

Station: 88+90
Offset: 89-R
Elevation: 176.5 ft-MSL

Total Depth: 4.8 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1330



C3C-CPT2

Cone Penetration Test



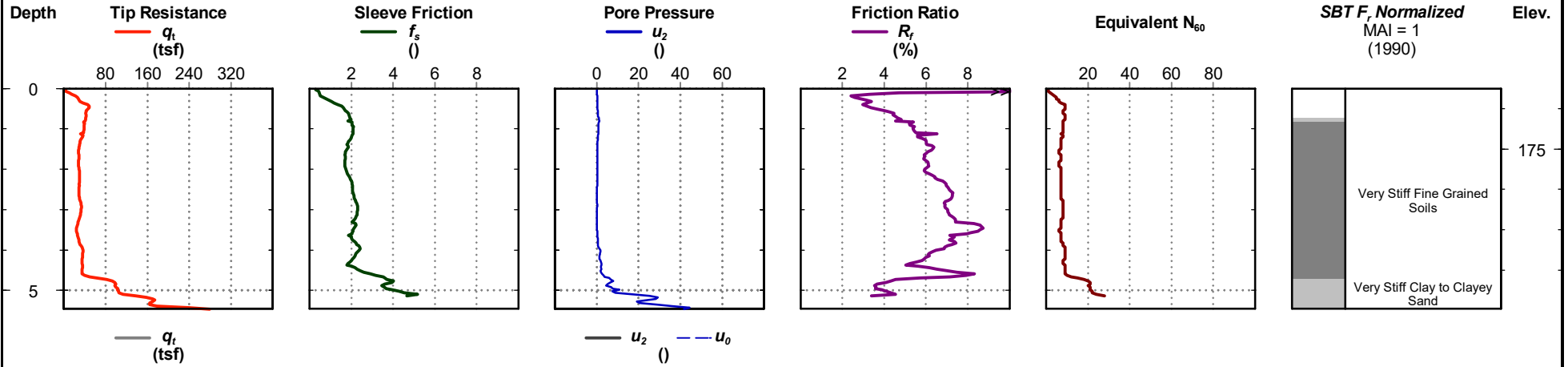
Carolina Crossroads Phase 3C
(South Carolina)
Project No. :P039720

C3C-CPT2A

Date: Mar. 20, 2024
Estimated Water Depth: NE
Rig/Operator: C. Piercy

Station: 89+04
Offset: 98-R
Elevation: 176.5 ft-MSL

Total Depth: 5.5 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1330



CPT REPORT - STANDARD_G5662.03-CAROLINA CROSSROADS PH.3C.GPJ_FME2017.GDT_6/12/24

Cone Penetration Test



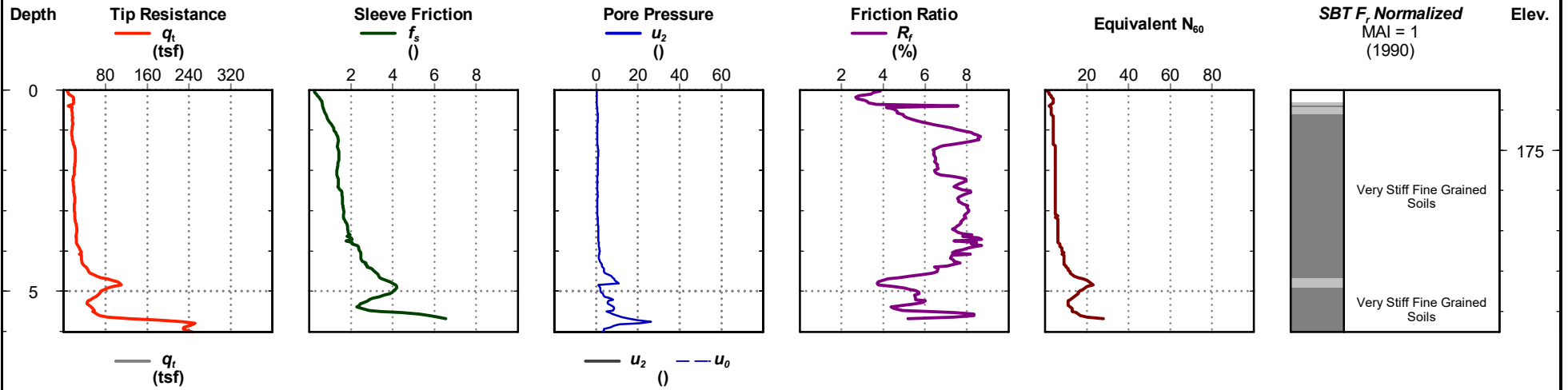
Carolina Crossroads Phase 3C
(South Carolina)
Project No. :P039720

C3C-CPT2B

Date: Mar. 20, 2024
Estimated Water Depth: NE
Rig/Operator: C. Piercy

Station: 88+94
Offset: 103-R
Elevation: 176.5 ft-MSL

Total Depth: 6.0 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1330



CPT REPORT - STANDARD_G5662.03- CAROLINA CROSSROADS PH.3C.GPJ FME2017.GDT 6/12/24

C3C-CPT2B

Cone Penetration Test



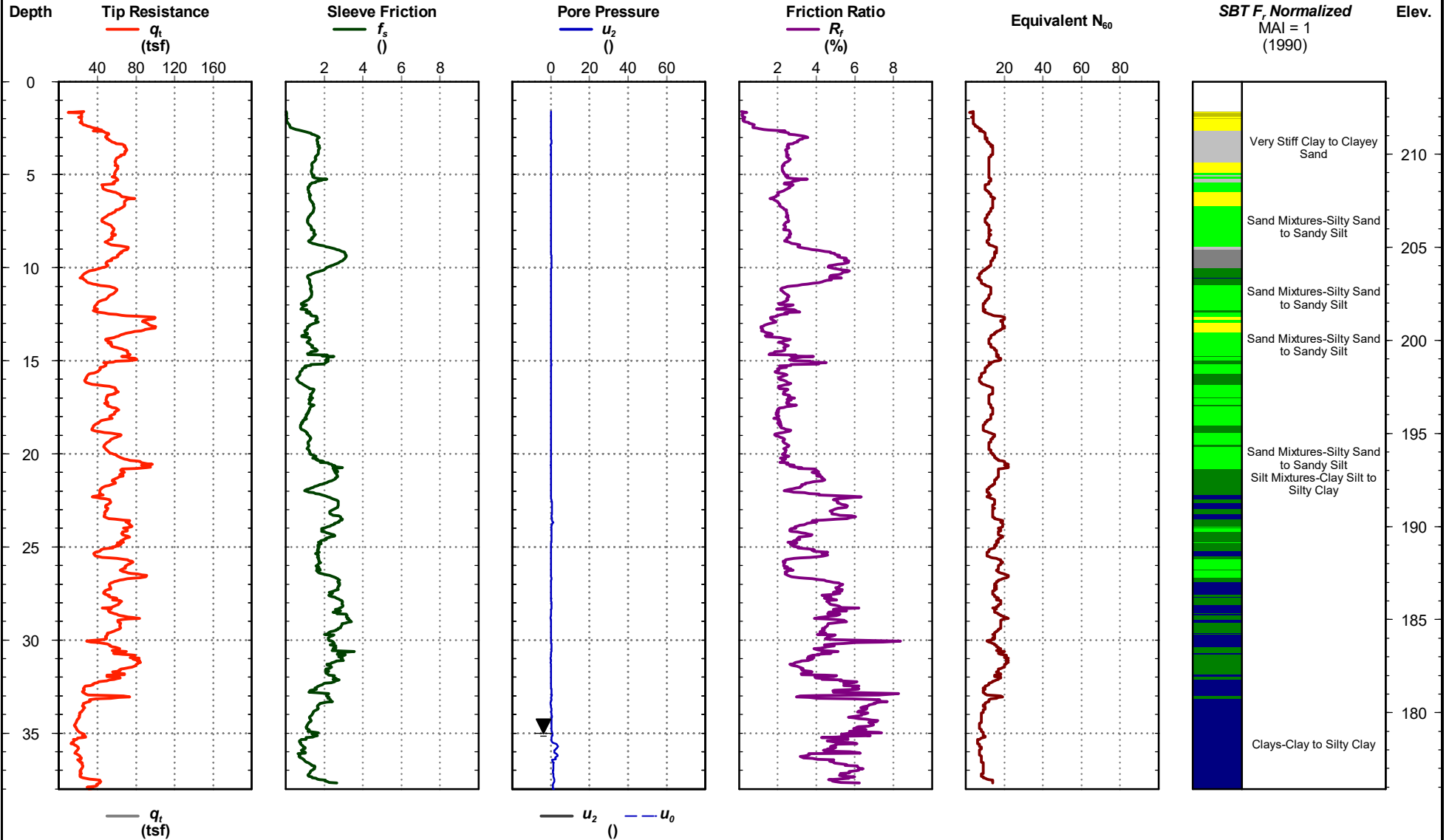
Carolina Crossroads Phase 3C
(South Carolina)
Project No. :P039720

C3C-CPT3

Date: May. 7, 2024
Estimated Water Depth: 35 ft
Rig/Operator: C. Piercy

Station: 101+04
Offset: 12-L
Elevation: 213.9 ft-MSL

Total Depth: 38.0 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1330



CPT REPORT - STANDARD G5662.03-CAROLINA CROSSROADS PH.3C.GPJ FME2017.GDT 6/12/24

C3C-CPT3

Carolina Crossroads – Phase 3C

Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 GEOTECHNICAL EXPLORATION LOGS

SECTION 3C AUGER BORING LOGS

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland			Boring No.: B-50UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project				Route: Site 44
Eng./Geo.: NGS	Boring Location: 91+52.23		Offset: R:48.640'	Alignment: Proposed
Elev.: 212.3 ft	Latitude: 34.027277	Longitude: -81.126258	Date Started: 3/27/2018	
Total Depth: 42.5 ft	Soil Depth: 42.5 ft	Core Depth: 0 ft	Date Completed: 3/27/2018	
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	12 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
187.3		Drilled without sampling to 33.5 feet.									
182.3											
33.5	33.5	RIVER TERRACE ALLUVIUM - LEAN CLAY WITH SAND (CL) - firm, moist, dark reddish-brown (2.5YR 3/4), mostly low to medium plasticity fines, little fine to medium sands, trace wood/organics.		33.5	SS-3	3	3	3		6	●
177.3	35.0	SANDY FAT CLAY (CH) - moist, dark reddish-brown (2.5YR 3/4), mostly high plasticity fines, some fine to medium sands, trace fine gravel, [LL=51, PL=28, PI=23, %#200=51.0], AASHTO = A-7-6 (9).		35.0	UD-2						
	37.0	CLAYEY SAND (SC) - medium dense, moist, light brownish-gray (10YR 6/2), mostly fine to medium sands, some low to medium plasticity fines.		37.0	SS-4	6	7	6		13	●
	39.0	@ 39 feet - light brownish-gray (1YR 6/2).		39.0							

LEGEND

Continued Next Page

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

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

SCDOT Soil Test Log

Project ID: P027662	County: Lexington/Richland	Boring No.: B-50UD
Site Description: Carolina Crossroads I-20/26/126 Corridor Improvement Project		Route: Site 44
Eng./Geo.: NGS	Boring Location: 91+52.23	Offset: R:48.640'
Alignment: Proposed	Date Started: 3/27/2018	Date Completed: 3/27/2018
Elev.: 212.3 ft	Latitude: 34.027277	Longitude: -81.126258
Total Depth: 42.5 ft	Soil Depth: 42.5 ft	Core Depth: 0 ft
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%	Groundwater: TOB 12 ft
Core Size: N/A	Driller: T. Miller	24HR: N/A

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	SPT N VALUE				N Value	FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		PL	MC	LL	0	10	20	30	40	50	60
	41.0	LEAN CLAY WITH SAND (CL) - firm, moist, greenish-gray (GLEY 1 5/1), mostly low to medium plasticity fines, little fine sands, trace wood/organics. Boring Terminated at 42.5 feet.		41.0	UD-3															
	42.5			SS-5	3	2	3	5	●											
167.3																				
162.3																				
157.3																				

LEGEND

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

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

Carolina Crossroads – Phase 3C

Geotechnical Subsurface Data Report

APPENDIX

SECTION 4 LABORATORY TEST RESULTS

**CAROLINA CROSSROADS PHASE 3C
LEXINGTON COUNTY, SOUTH CAROLINA
F&ME PROJECT NO.: G5662.03; SCDOT PROJECT NO.: P039720**

SOIL LABORATORY RESULTS SUMMARY

Boring Number	Sample Number	Sample Depth (ft)	Index									Corrosion Series				Standard Proctor		CU Triaxial Shear			
			% Gravel	% Sand	% Fines (Silt/Clay)	LL	PL	PI	Moisture Content	USCS	AASHTO Class	pH	Resistivity (Ohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	Optimum Moisture Content (%)	Maximum Dry Density (pcf)	φ (degrees)	C (psf)	φ' (degrees)	C' (psf)
B-47	SS-4	7.0-9.0	10.0	18.3	71.7	35	26	9	17.7	ML	A-4	--	--	--	--	--	--	--	--	--	--
B-47	SS-8	24.5-26.0	21.6	37.0	41.5	39	25	14	23.5	SC	A-6	--	--	--	--	--	--	--	--	--	--
B-47	SS-9 & SS-10	29.5-36.0	--	--	--	--	--	--	--	--	--	7.15	10,050	60	138	--	--	--	--	--	--
B-48	SS-1	0.0-2.0	1.0	42.0	57.0	30	18	12	13.0	CL	A-6	--	--	--	--	--	--	--	--	--	--
B-48	SS-2	2.0-4.0	0.0	16.0	84.0	40	24	16	29.3	CL	A-6	--	--	--	--	--	--	--	--	--	--
B-48	SS-3	6.0-8.0	13.0	48.0	39.0	32	23	9	17.0	SM	A-4	--	--	--	--	--	--	--	--	--	--
B-49	SS-1	24.5-26.5	16.4	48.6	35.0	32	23	9	24.0	SC	A-2-4	--	--	--	--	--	--	--	--	--	--
B-49	SS-2	26.5-28.5	0.1	56.6	43.3	25	17	8	23.0	SC	A-4	--	--	--	--	--	--	--	--	--	--
B-49	SS-4	30.5-32.5	0.0	24.5	75.5	39	25	14	49.0	CL	A-6	--	--	--	--	--	--	--	--	--	--
B-49	SS-5	32.5-34.5	0.0	64.2	35.8	25	NP	NP	47.0	SM	A-4	--	--	--	--	--	--	--	--	--	--
B-50	SS-4	7.0-9.0	1.3	18.0	80.7	35	28	7	14.5	ML	A-4	--	--	--	--	--	--	--	--	--	--
B-50	SS-6	13.5-15.0	3.1	29.7	67.3	37	23	14	13.9	CL	A-6	--	--	--	--	--	--	--	--	--	--
B-50	SS-8	23.5-25.0	10.7	26.6	62.7	42	28	14	18.7	ML	A-7-6	--	--	--	--	--	--	--	--	--	--
B-50	SS-10	33.5-35.0	3.7	20.6	75.8	51	32	19	28.8	MH	A-7-5	--	--	--	--	--	--	--	--	--	--
B-50	SS-11 & SS-12	38.5-45.0	--	--	--	--	--	--	--	--	--	7.18	50,920	15	3	--	--	--	--	--	--
B-50	SS-14	53.5-55.0	0.0	67.4	32.6	26	22	4	28.0	SC-SM	A-2-4	--	--	--	--	--	--	--	--	--	--
B-50UD	UD-1	13.5-15.5	3.3	22.5	74.2	38	29	9	--	ML	A-4	--	--	--	--	--	--	22	271	32	72
B-50UD	UD-2	35.0-37.0	4.7	44.3	51.0	51	28	23	--	CH	A-7-6	--	--	--	--	--	--	23	74	35	333
B-51	SS-1	0.0-2.0	11.3	42.2	46.5	50	26	24	18.2	SC	A-7-6	--	--	--	--	--	--	--	--	--	--
B-51	SS-3 & SS-4	4.0-8.0	--	--	--	--	--	--	--	--	--	6.81	61,640	6	12	--	--	--	--	--	--
B-51	SS-6	13.5-15.0	27.1	26.6	46.4	43	28	15	16.5	GM	A-7-6	--	--	--	--	--	--	--	--	--	--
B-51	SS-9	28.5-30.0	0.0	19.6	80.4	39	26	13	23.4	ML	A-6	--	--	--	--	--	--	--	--	--	--
DH-4	SS-1	0.0-2.0	0.4	71.2	28.4	24	14	10	10.5	SC	A-2-4	--	--	--	--	--	--	--	--	--	--
DH-4	SS-2	2.0-4.0	1.2	33.2	65.6	42	23	19	17.2	CL	A-7-6	--	--	--	--	--	--	--	--	--	--
DH-4	SS-4	6.0-8.0	26.3	46.6	27.1	44	21	23	16.7	SC	A-2-7	--	--	--	--	--	--	--	--	--	--
DH-4	SS-3 & SS-5	4.0-10.0	--	--	--	--	--	--	--	--	--	7.68	60,300	21	9	--	--	--	--	--	--
DH-4	SS-6	13.5-15.0	0.0	19.1	80.9	63	38	25	31.2	MH	A-7-5	--	--	--	--	--	--	--	--	--	--
P-44	SS-1	1.1-3.1	1.7	14.8	83.5	62	25	37	30.1	CH	A-7-6	--	--	--	--	--	--	--	--	--	--
P-45	SS-1	1.0-3.0	13.0	53.7	33.3	42	19	23	13.6	SC	A-2-7	--	--	--	--	--	--	--	--	--	--
P-47	SS-1	1.4-3.4	0.7	46.5	52.8	36	13	23	14.1	CL	A-6	--	--	--	--	--	--	--	--	--	--
P-48	SS-1	1.0-3.0	14.4	34.6	51.1	51	30	21	19.0	MH	A-7-5	--	--	--	--	--	--	--	--	--	--
P-49	SS-1	1.0-3.0	0.0	49.3	50.7	48	22	26	20.8	CL	A-7-6	--	--	--	--	--	--	--	--	--	--
RW-40	SS-2	2.0-4.0	4.6	12.3	83.2	43	32	11	30.8	ML	A-7-5	--	--	--	--	--	--	--	--	--	--
P-44 BS	BS-1	1.1-11.1	5.8	27.6	66.6	50	23	27	23.2	CH	A-7-6	--	--	--	--	20.0%	105.2	--	--	--	--
P-47 BS	BS-1	1.4-11.4	1.8	55.4	42.8	29	14	15	14.3	SC	A-6	--	--	--	--	10.7%	123.2	--	--	--	--
RW-40 BS	BS-1	0.0-10.0	3.4	17.6	79.0	42	23	19	22.6	CL	A-7-6	--	--	--	--	17.0%	108.3	--	--	--	--

**CAROLINA CROSSROADS PHASE 3C
LEXINGTON COUNTY, SOUTH CAROLINA
F&ME PROJECT NO.: G5662.03; SCDOT PROJECT NO.: P039720**

ROCK LABORATORY RESULTS SUMMARY

Boring Number	Core Run Number	Rock Type	Sample Depth (ft)	Unit Weight (pcf)	Elastic Modulus (ksi)	Poissons Ratio	REC	RQD	RMR	GSI	Unconfined Compressive Strength (psi)
C3C-B1	NQ-2	Phyllite	36.9-37.3	173.7	5020	0.13	91	78	46	35-45	6,840
C3C-B2	NQ-1	Phyllite	32.1-32.4	159.4	4200	0.87	61	34	23	20-30	7,220
C3C-B3	NQ-1	Phyllite	46.8-47.2	170.6	2360	0.15	86	73	42	30-40	4,310
C3C-B3	NQ-2	Phyllite	51.1-51.5	174.5	4360	0.09	100	80	46	35-45	5,010
C3C-B4	NQ-1	Slate	43.0-43.4	169.6	1810	0.23	98	79	58	60-65	5,170
C3C-B4	NQ-2	Slate	47.2-47.6	170.6	3000	0.28	100	91	57	55-60	5,780
C3C-B4	NQ-3	Slate	52.1-52.5	170.3	3310	0.12	88	74	59	65-70	3,960
C3C-B5	NQ-2.1	Phyllite	81.6-82.0	169.5	1290	0.02	100	87	66	70-75	1,930
C3C-B5	NQ-2.2	Phyllite	83.0-83.4	168.1	1980	0.05	100	87	66	70-75	2,300
C3C-B6	NQ-1	Phyllite	66.5-66.9	165.1	2980	0.04	67	63	52	65-70	2,110
C3C-B6	NQ-2	Phyllite	74.3-74.7	165.5	3300	0.04	100	100	69	75-80	2,190
C3C-W3	NQ-1	Phyllite	12.3-12.7	172.3	2650	0.21	92	83	38	40-50	4,430
C3C-W3	NQ-2	Phyllite	16.5-16.9	170.1	5070	0.22	93	60	36	20-30	16,260
B-47	RC-1	Schist	47.2-47.8	166.4	1500		94	69	22	20-30	6260
B-47	RC-3	Schist	55.4-56.2	170.6	4220		100	60	22	20-30	4824
B-47	RC-4	Schist	64.0-65.0	169.3	5560		100	83	26	20-30	3260
B-48	RC-1	Schist	15.1-15.9	178.5	3000		96	22	24	50-60	11152
B-48	RC-2	Schist	19.7-20.6	175.9	1590		100	65	39	55-65	10712
B-48	RC-4	Schist	34.0-34.7	179.1	6160		100	40	34	40-50	19123
B-49	RC-3	Schist	49.2-50.3	167.8	5320		100	57	51	55-65	5919
B-49	RC-5	Schist	56.6-57.6	169.4	4840		100	67	38	60-70	6493
B-50	RC-1	Schist	73.7-74.3	170.8	4440		98	80	40	15-25	1969
B-50	RC-2	Schist	81.2-82.2	172.5	10000		100	90	35	15-25	1571
B-50	RC-4	Schist	87.7-88.5	167.6	1900		100	64	19	15-25	866
DH-4	RC-2	Schist	55.2-56.4	176	3600		100	86	52	50-60	1091
DH-4	RC-4	Schist	65.2-66.3	170.1	8240		98	98	61	70-80	11795
DH-4	RC-6	Schist	75.2-76.3	169.5	5590		100	100	61	70-80	13569
DH-4	RC-8	Schist	85.2-86.7	178.5	10120		100	88	58	65-75	9134
DH-4	RC-10	Schist	96.7-97.5	169.5	8270		100	100	66	70-80	14660
DH-4	RC-12	Schist	106.2-107.5	171.3	6930		102	83	48	70-80	12748
DH-4	RC-14	Schist	115.2-116.4	170.9	5360		96	96	61	70-80	7611

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 4 LABORATORY TEST RESULTS

SECTION 4A SPLIT-SPOON SAMPLES

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1537	DATE REQUESTED:	5/14/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AAB	DATE OF TESTING:	5/14/2024
WEIGHED BY:	AAB	DATE OF WEIGHING:	5/15/2024

BORING NO.	C3C-B1	C3C-B1	C3C-B1	C3C-B1	C3C-B1
SAMPLE NO.	SS-2	SS-3	SS-4	SS-5	SS-6
SAMPLE DEPTH	2.0 - 4.0	4.0 - 6.0	6.0 - 8.0	8.0 - 10.0	13.5 - 15.0
WATER CONTENT, W%	32.1	31.1	30.5	32.8	25.5

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%					

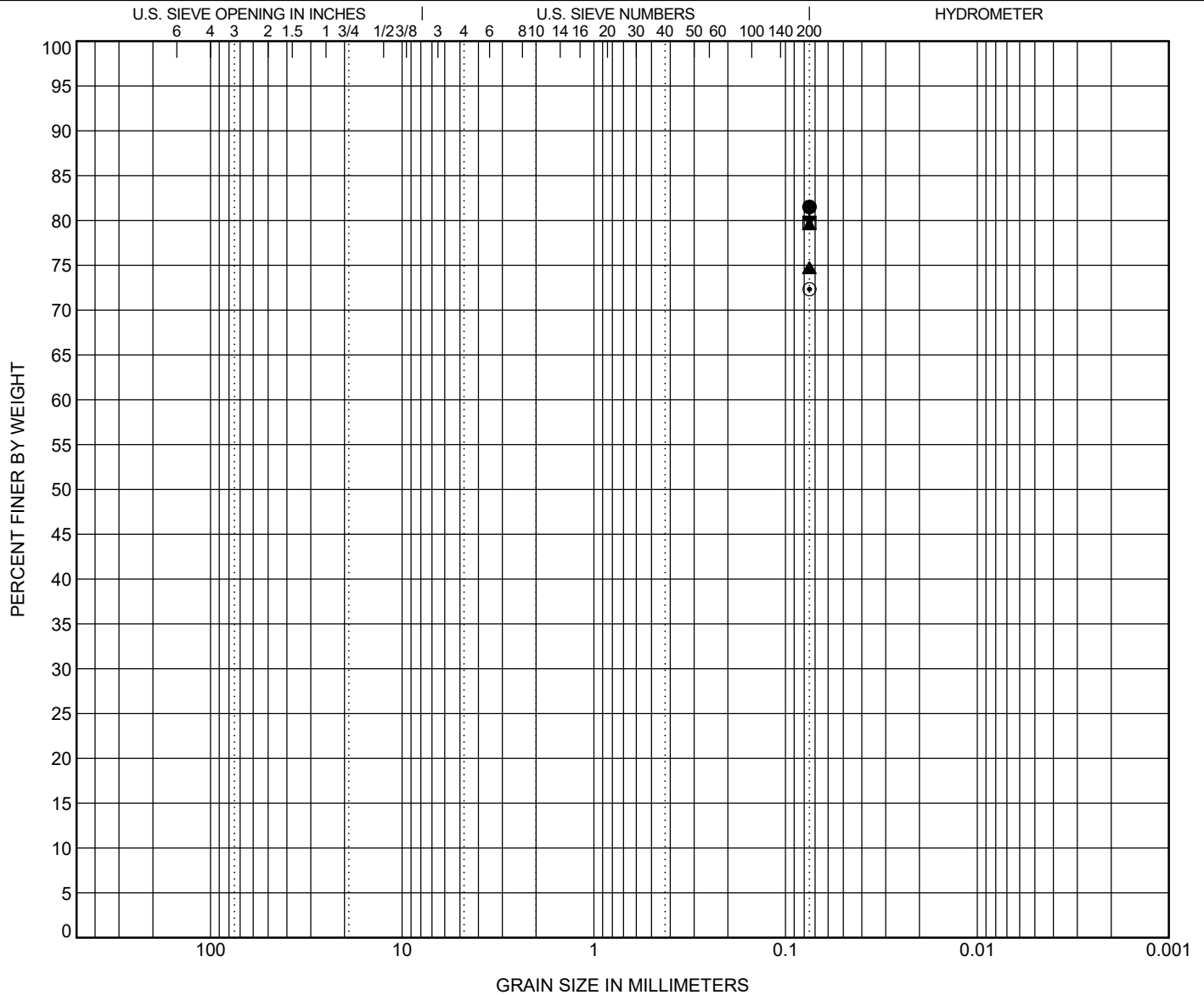


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/17/24

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-B1	4.0	FAT CLAY with SAND (CH/A-7-6)					55	27	28		
☒ C3C-B1	6.0	ELASTIC SILT with SAND (MH/A-7-5)					55	32	23		
▲ C3C-B1	8.0	SILT with SAND (ML/A-6)					40	27	13		
★ C3C-B1	10.0	FAT CLAY with SAND (CH/A-7-6)					57	25	32		
◎ C3C-B1	15.0	LEAN CLAY with SAND (CL/A-6)					36	18	18		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● C3C-B1	4.0	0.075							81.5		
☒ C3C-B1	6.0	0.075							79.7		
▲ C3C-B1	8.0	0.075							74.7		
★ C3C-B1	10.0	0.075							80.0		
◎ C3C-B1	15.0	0.075							72.3		

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-0975	DATE REQUESTED:	3/28/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AC	DATE OF TESTING:	3/28/2024
WEIGHED BY:	AB	DATE OF WEIGHING:	3/29/2024

BORING NO.	C3C-B2	C3C-B2	C3C-B2	C3C-B2	
SAMPLE NO.	SS-2	SS-3	SS-5	SS-6	
SAMPLE DEPTH	2.0 - 4.0	4.0 - 6.0	8.0 - 10.0	13.5 - 15.0	
WATER CONTENT, W%	26.3	23.1	23.1	18.0	

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%					

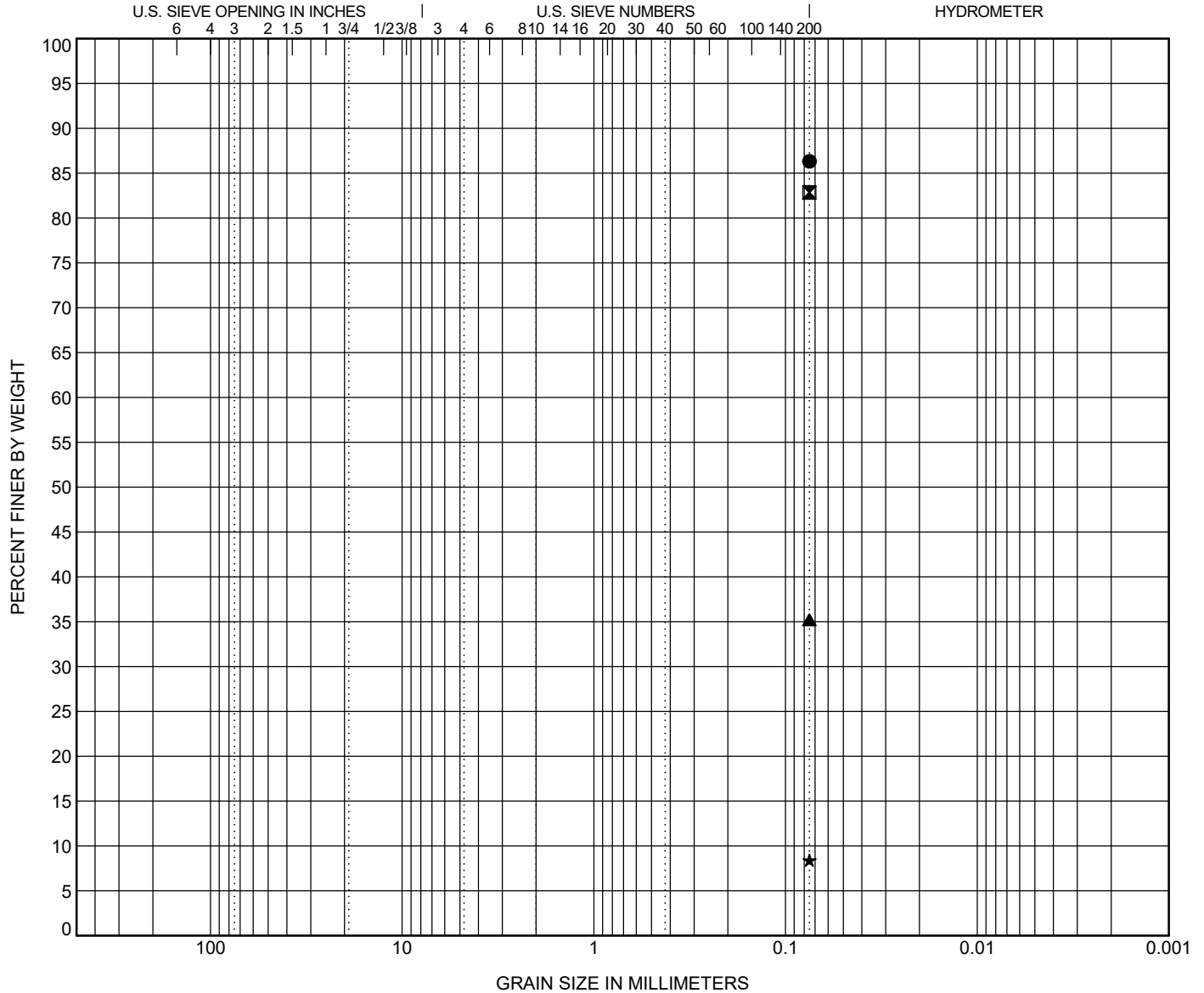


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-B2	4.0	FAT CLAY (CH/A-7-6)					60	21	39		
☒ C3C-B2	6.0	LEAN CLAY with SAND (CL/A-7-6)					47	21	26		
▲ C3C-B2	10.0	SILTY SAND (SM/A-2-4)					NP	NP	NP		
★ C3C-B2	15.0	SILTY SAND (SM/A-2-4)									

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B2	4.0	0.075							86.3
☒ C3C-B2	6.0	0.075							82.9
▲ C3C-B2	10.0	0.075							35.2
★ C3C-B2	15.0	0.075							8.4

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/9/24

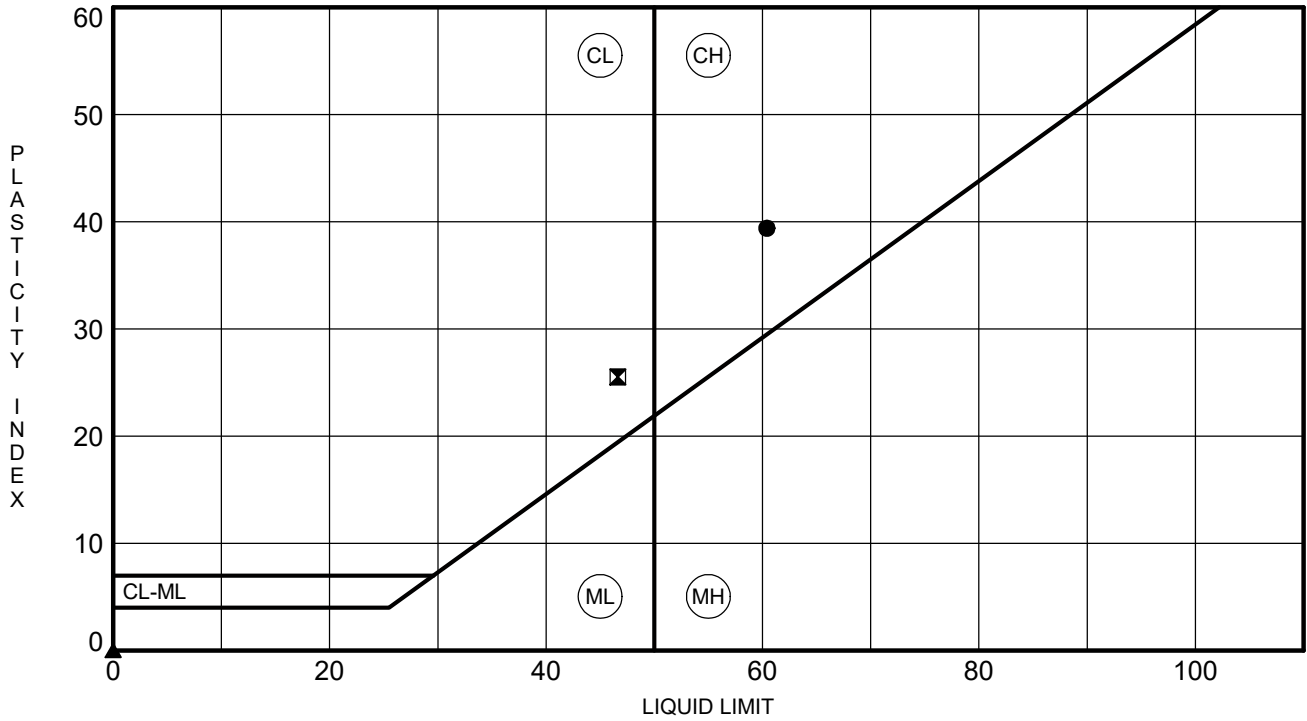


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● C3C-B2	4.0	60	21	39	86	FAT CLAY (CH/A-7-6)
⊠ C3C-B2	6.0	47	21	26	83	LEAN CLAY with SAND (CL/A-7-6)
▲ C3C-B2	10.0	NP	NP	NP	35	SILTY SAND (SM/A-2-4)

ATTERBERG LIMITS G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/9/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1538	DATE REQUESTED:	5/14/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AAB	DATE OF TESTING:	5/14/2024
WEIGHED BY:	AAB	DATE OF WEIGHING:	5/15/2024

BORING NO.	C3C-B3	C3C-B3	C3C-B3		
SAMPLE NO.	SS-1	SS-2	SS-3		
SAMPLE DEPTH	0.0 - 2.0	2.0 - 4.0	4.0 - 6.0		
WATER CONTENT, W%	17.3	13.5	13.8		

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%					

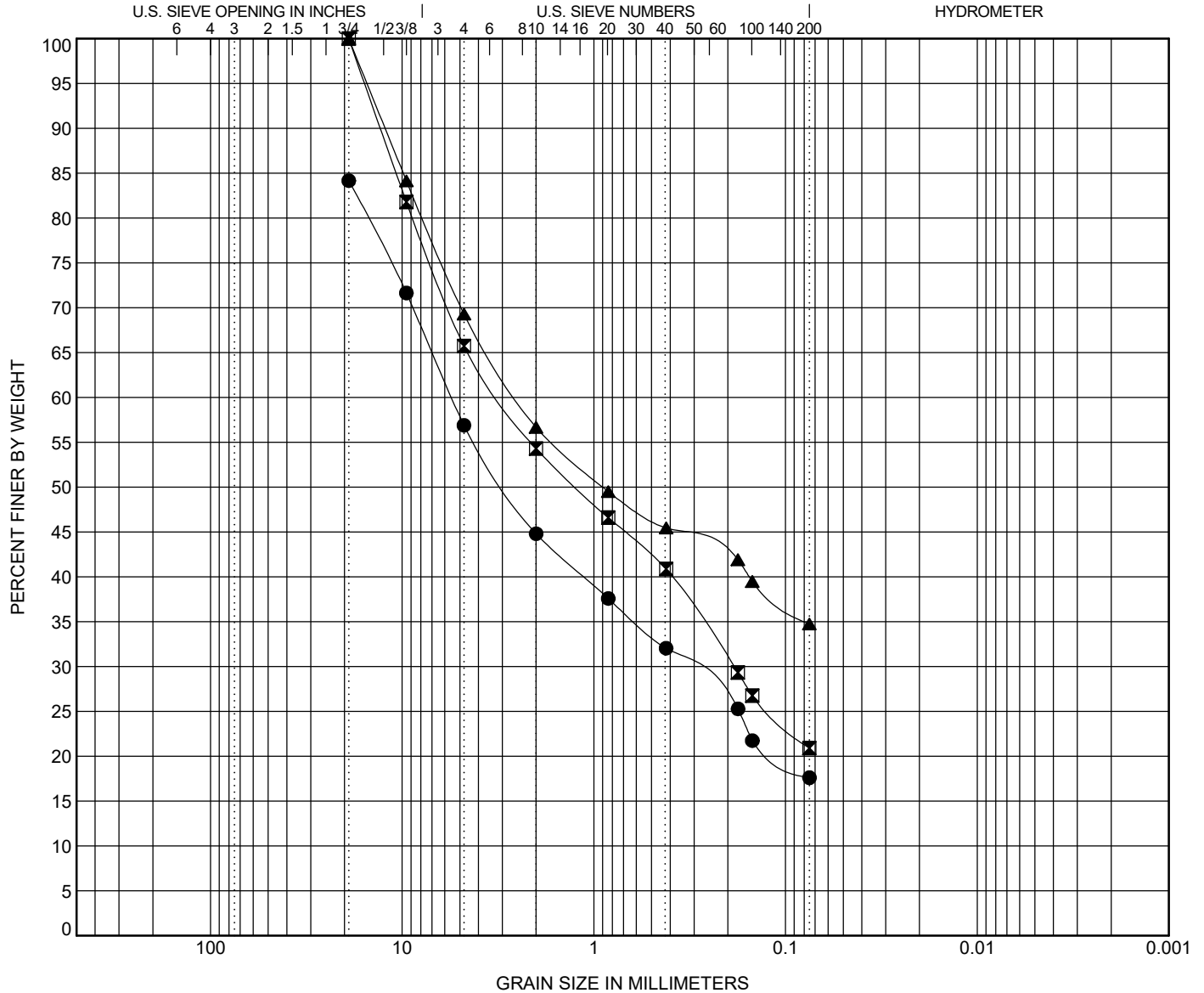


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-B3	2.0	SILTY GRAVEL with SAND (GM/A-1-b)	NP	NP	NP		
◻ C3C-B3	4.0	SILTY SAND with GRAVEL (SM/A-1-b)	22	21	1		
▲ C3C-B3	6.0	SILTY SAND with GRAVEL (SM/A-2-4)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B3	2.0	19	5.507	0.323		27.3	39.3	17.6	
◻ C3C-B3	4.0	19	3.083	0.186		34.3	44.8	20.9	
▲ C3C-B3	6.0	19	2.515			30.7	34.5	34.7	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/17/24

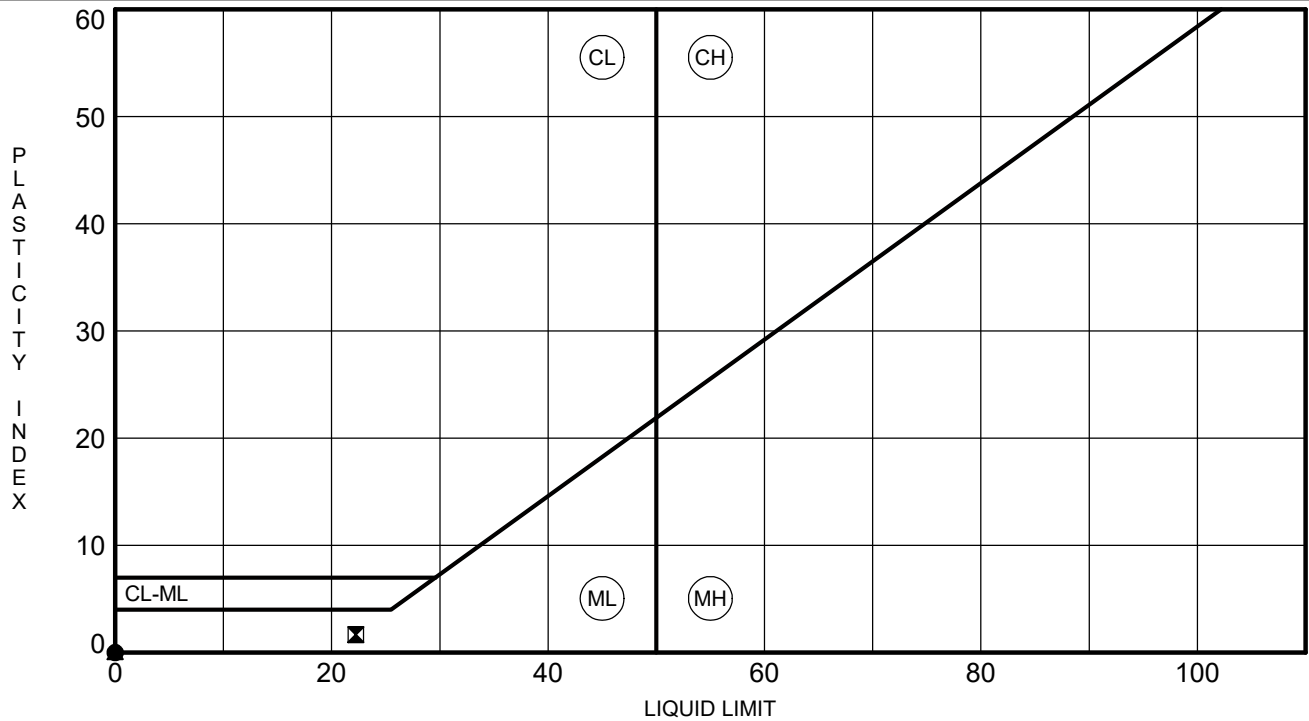


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	C3C-B3	2.0	NP	NP	NP	18	SILTY GRAVEL with SAND (GM/A-1-b)
☒	C3C-B3	4.0	22	21	1	21	SILTY SAND with GRAVEL (SM/A-1-b)
▲	C3C-B3	6.0	NP	NP	NP	35	SILTY SAND with GRAVEL (SM/A-2-4)

ATTERBERG LIMITS: G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/17/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1335	DATE REQUESTED:	4/22/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	CJ/CR	DATE OF TESTING:	4/22/2024
WEIGHED BY:	AGB	DATE OF WEIGHING:	4/23/2024

BORING NO.	C3C-B4	C3C-B4	C3C-B4	C3C-B4	C3C-B4
SAMPLE NO.	SS-1	SS-3	SS-5	SS-7	SS-9
SAMPLE DEPTH	8.5 - 10.5	12.5 - 14.5	16.5 - 18.5	27.0 - 28.5	37.0 - 38.5
WATER CONTENT, W%	9.4	12.0	27.4	29.1	33.4

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

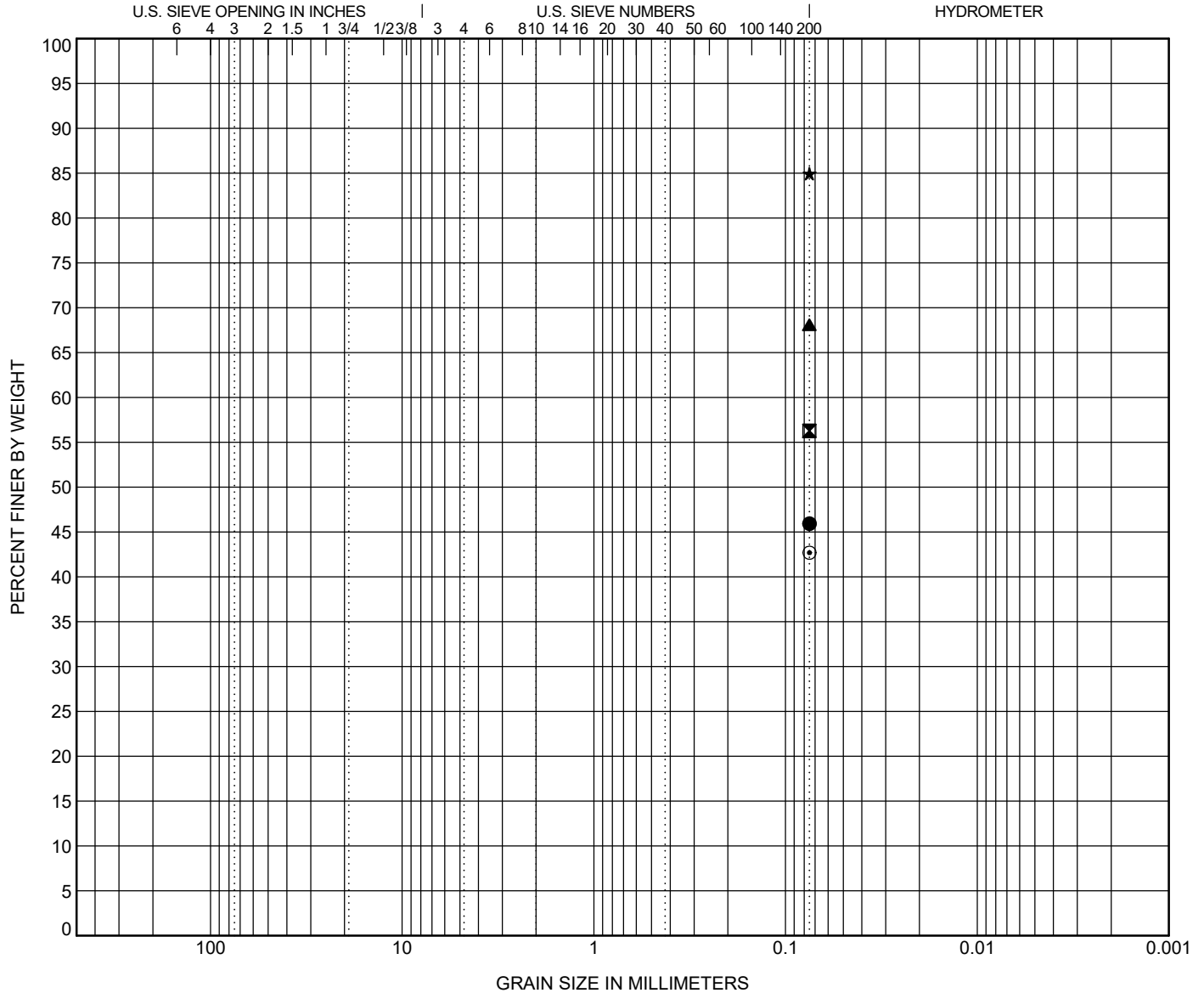


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-B4	10.5	CLAYEY SAND (SC/A-6)	40	22	18		
■ C3C-B4	14.5	SANDY LEAN CLAY (CL/A-7-6)	41	18	23		
▲ C3C-B4	18.5	SANDY LEAN CLAY (CL/A-6)	40	17	23		
★ C3C-B4	28.5	SILT with SAND (ML/A-4)	NP	NP	NP		
○ C3C-B4	38.5	SILTY SAND (SM/A-4)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B4	10.5	0.075							45.9
■ C3C-B4	14.5	0.075							56.3
▲ C3C-B4	18.5	0.075							68.1
★ C3C-B4	28.5	0.075							84.9
○ C3C-B4	38.5	0.075							42.7

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

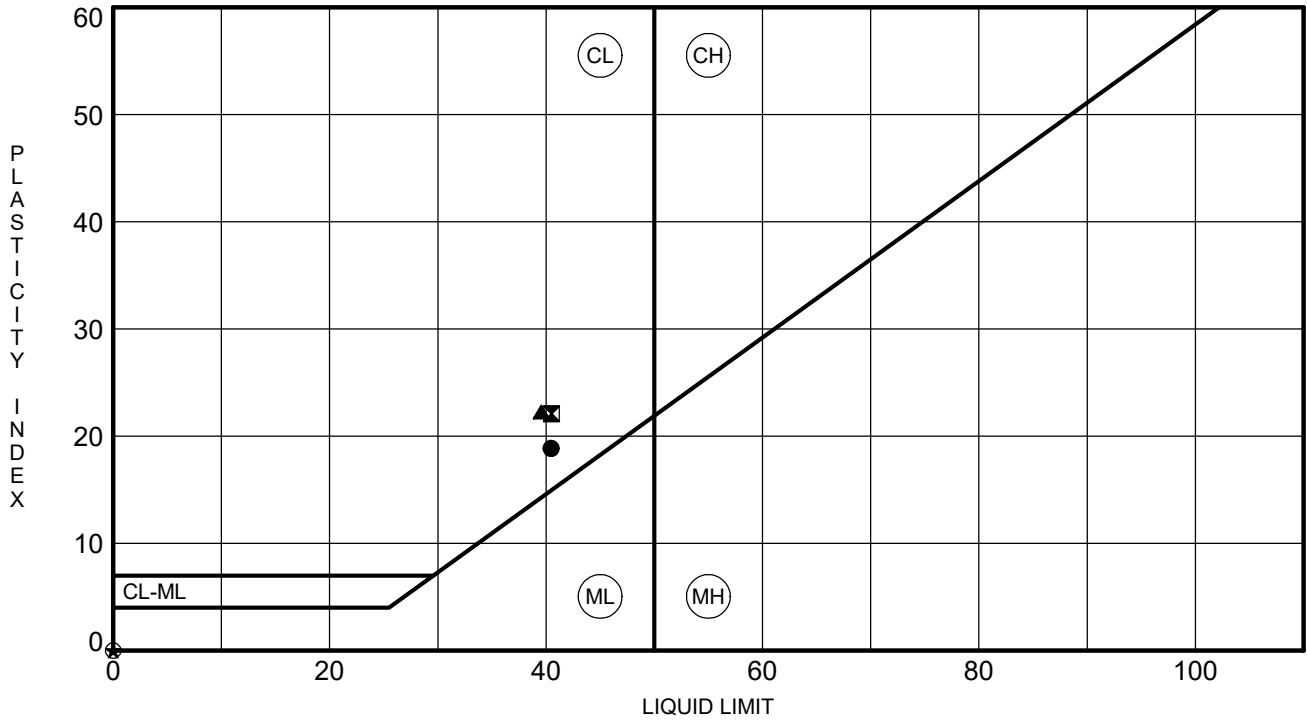


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	C3C-B4	10.5	40	22	18	46	CLAYEY SAND (SC/A-6)
▣	C3C-B4	14.5	41	18	23	56	SANDY LEAN CLAY (CL/A-7-6)
▲	C3C-B4	18.5	40	17	23	68	SANDY LEAN CLAY (CL/A-6)
★	C3C-B4	28.5	NP	NP	NP	85	SILT with SAND (ML/A-4)
⊙	C3C-B4	38.5	NP	NP	NP	43	SILTY SAND (SM/A-4)

ATTERBERG LIMITS G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1368	DATE REQUESTED:	4/25/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	CR/TE	DATE OF TESTING:	4/25/2024
WEIGHED BY:	TW	DATE OF WEIGHING:	4/26/2024

BORING NO.	C3C-B5	C3C-B5	C3C-B5	C3C-B5	C3C-B5
SAMPLE NO.	SS-2	SS-4	SS-5	SS-6	SS-8
SAMPLE DEPTH	2.0 - 4.0	6.0 - 8.0	8.0 - 10.0	13.5 - 15.0	23.5 - 25.0
WATER CONTENT, W%	12.4	21.4	18.3	13.2	33.4

BORING NO.	C3C-B5	C3C-B5	C3C-B5		
SAMPLE NO.	SS-11	SS-12	SS-15		
SAMPLE DEPTH	38.5 - 40.0	43.5 - 45.0	58.5 - 60.0		
WATER CONTENT, W%	27.7	26.9	28.8		

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

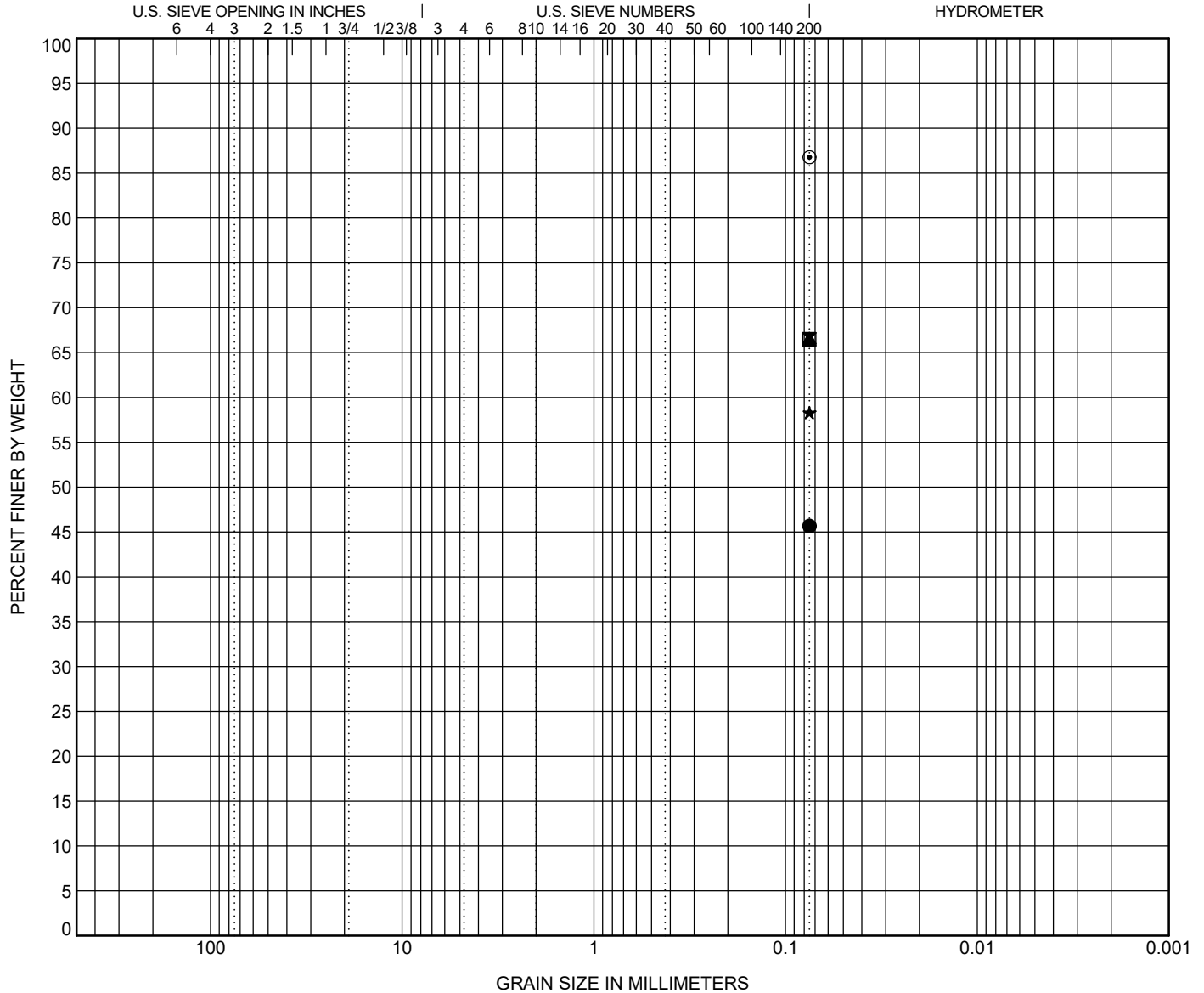


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-B5	4.0	CLAYEY SAND (SC/A-7-6)	45	16	29		
☒ C3C-B5	8.0	SANDY SILT (ML/A-4)	34	25	9		
▲ C3C-B5	10.0	SANDY LEAN CLAY (CL/A-6)	40	19	21		
★ C3C-B5	15.0	SANDY SILT (ML/A-6)	37	26	11		
◎ C3C-B5	25.0	SILT (ML/A-4)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B5	4.0	0.075							45.7
☒ C3C-B5	8.0	0.075							66.5
▲ C3C-B5	10.0	0.075							66.6
★ C3C-B5	15.0	0.075							58.3
◎ C3C-B5	25.0	0.075							86.8

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

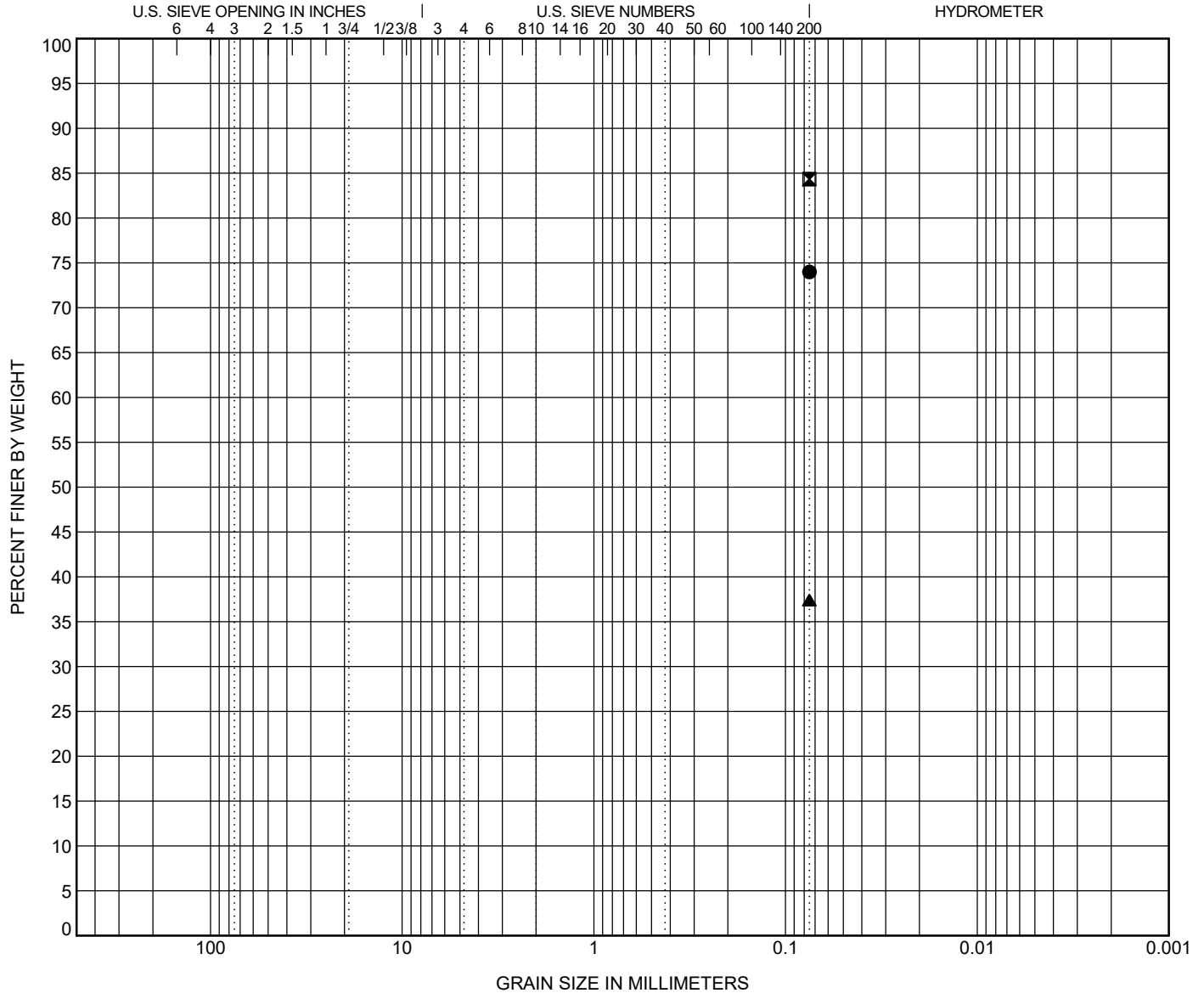


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-B5	40.0	SILT with SAND (ML/A-7-6)	45	29	16		
☒ C3C-B5	45.0	FAT CLAY with SAND (CH/A-7-6)	56	25	31		
▲ C3C-B5	60.0	SILTY SAND (SM/A-4)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B5	40.0	0.075						74.0	
☒ C3C-B5	45.0	0.075						84.3	
▲ C3C-B5	60.0	0.075						37.4	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

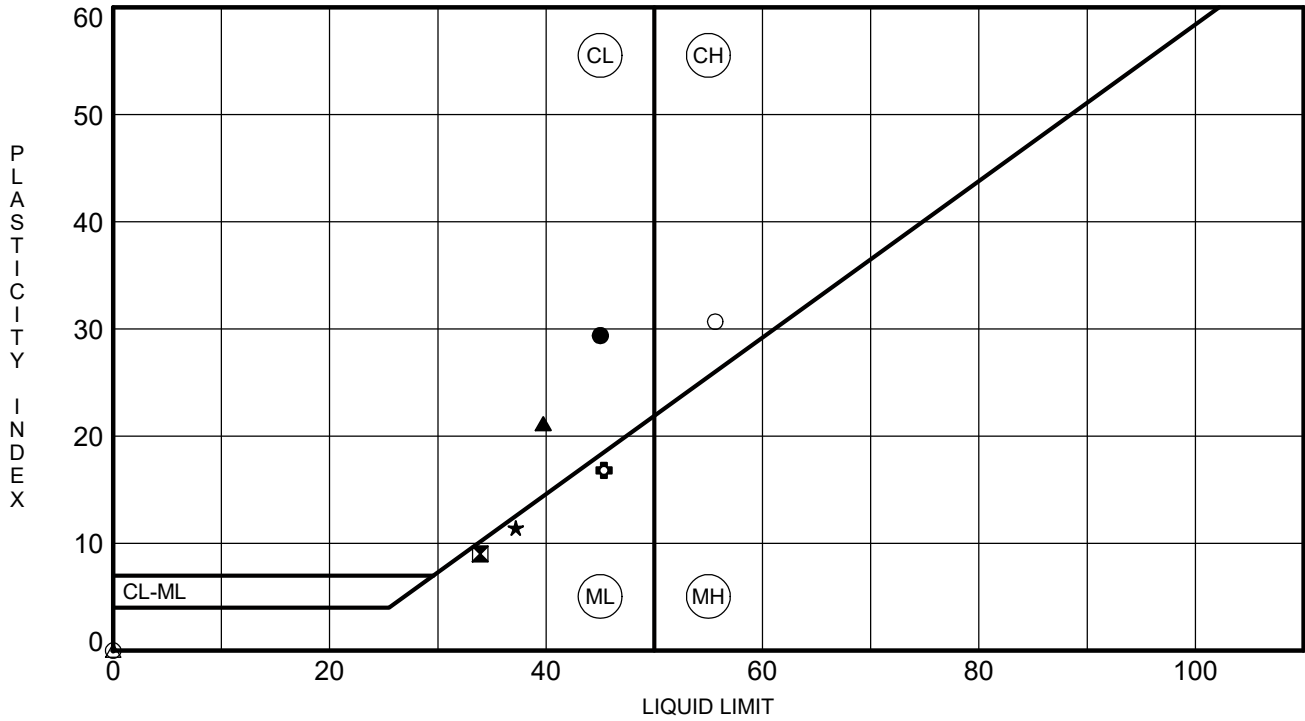


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	C3C-B5	4.0	45	16	29	46	CLAYEY SAND (SC/A-7-6)
⊠	C3C-B5	8.0	34	25	9	66	SANDY SILT (ML/A-4)
▲	C3C-B5	10.0	40	19	21	67	SANDY LEAN CLAY (CL/A-6)
★	C3C-B5	15.0	37	26	11	58	SANDY SILT (ML/A-6)
⊙	C3C-B5	25.0	NP	NP	NP	87	SILT (ML/A-4)
⊕	C3C-B5	40.0	45	29	16	74	SILT with SAND (ML/A-7-6)
○	C3C-B5	45.0	56	25	31	84	FAT CLAY with SAND (CH/A-7-6)
△	C3C-B5	60.0	NP	NP	NP	37	SILTY SAND (SM/A-4)

ATTERBERG LIMITS G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1369	DATE REQUESTED:	4/25/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	CR/TE	DATE OF TESTING:	4/25/2024
WEIGHED BY:	TW	DATE OF WEIGHING:	4/26/2024

BORING NO.	C3C-B6	C3C-B6	C3C-B6	C3C-B6	C3C-B6
SAMPLE NO.	SS-2	SS-4	SS-5	SS-6	SS-7
SAMPLE DEPTH	10.5 - 12.5	14.5 - 16.5	16.5 - 18.5	22.0 - 23.5	27.0 - 28.5
WATER CONTENT, W%	13.0	14.9	12.1	18.9	18.8

BORING NO.	C3C-B6	C3C-B6			
SAMPLE NO.	SS-9	SS-12			
SAMPLE DEPTH	37.0 - 38.5	52.0 - 53.5			
WATER CONTENT, W%	19.9	20.5			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

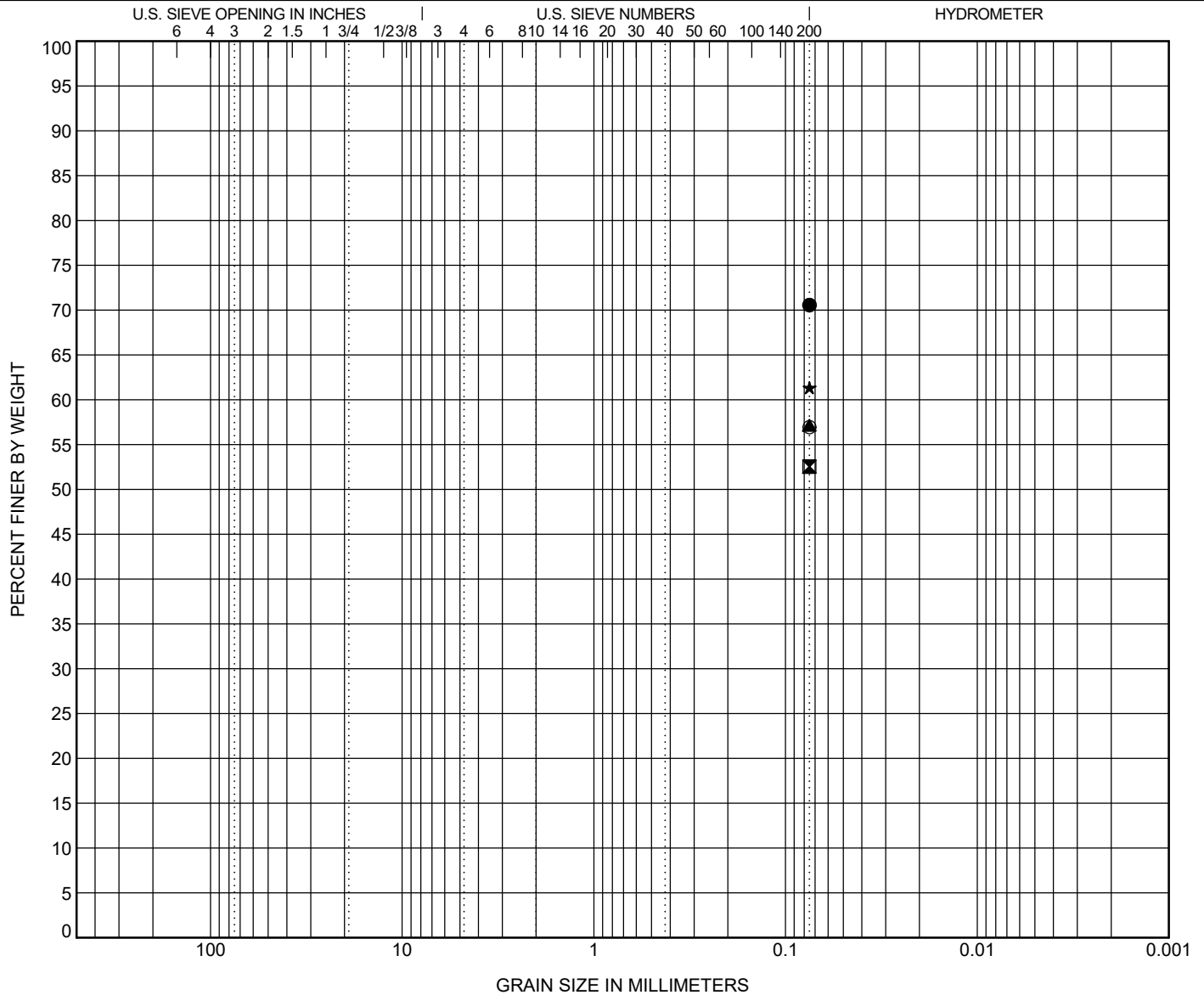


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-B6	12.5	SILT with SAND (ML/A-6)	39	26	13		
☒ C3C-B6	16.5	SANDY SILT (ML/A-4)	35	26	9		
▲ C3C-B6	18.5	SANDY SILT (ML/A-4)	30	27	3		
★ C3C-B6	23.5	SANDY SILT (ML/A-4)	31	26	5		
◎ C3C-B6	28.5	SANDY LEAN CLAY (CL/A-6)	37	21	16		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B6	12.5	0.075							70.6
☒ C3C-B6	16.5	0.075							52.5
▲ C3C-B6	18.5	0.075							57.2
★ C3C-B6	23.5	0.075							61.3
◎ C3C-B6	28.5	0.075							56.9

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

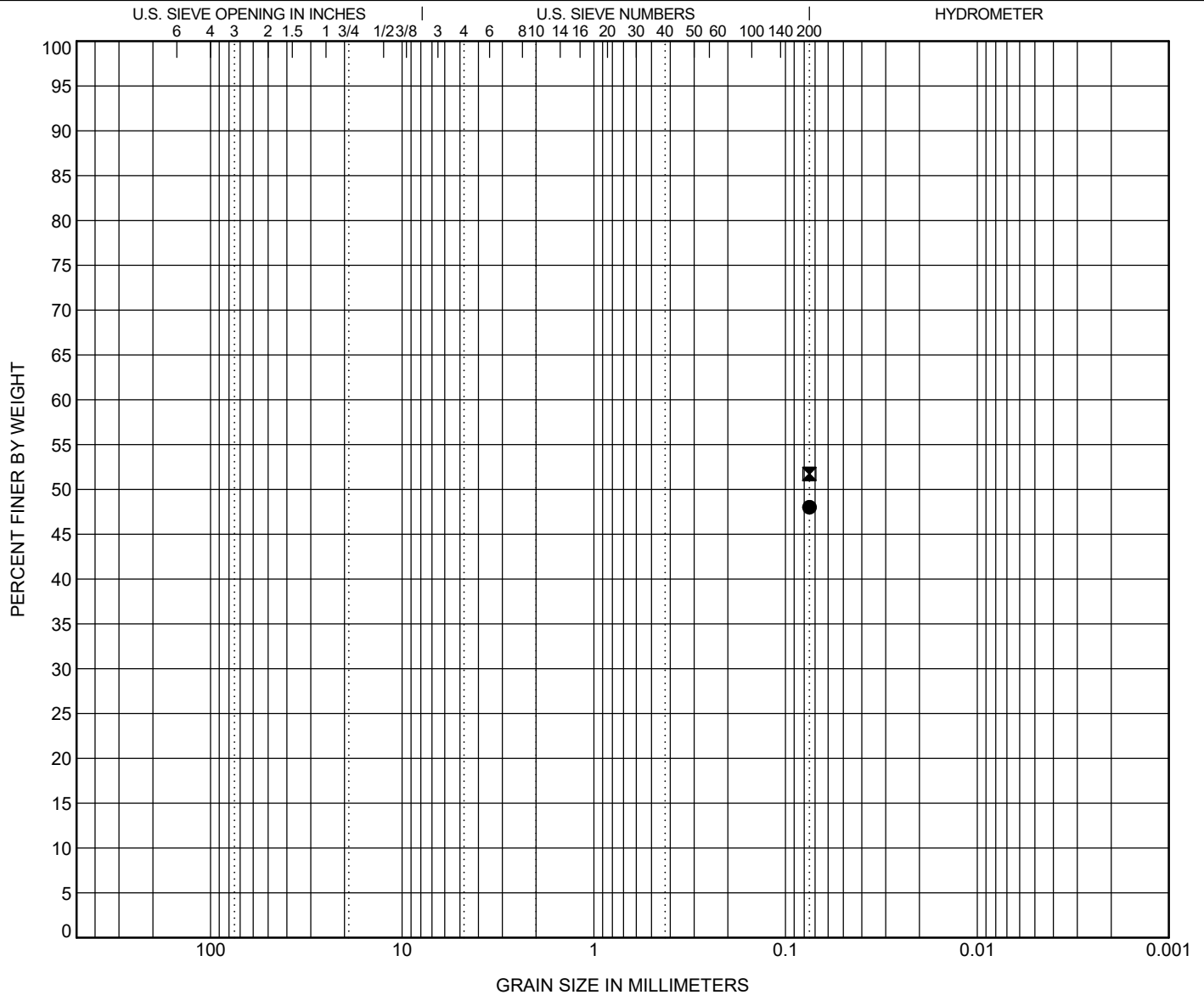


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-B6	38.5	CLAYEY SAND (SC/A-6)					35	24	11		
☒ C3C-B6	53.5	SANDY SILT (ML/A-4)					NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B6	38.5	0.075						48.0	
☒ C3C-B6	53.5	0.075						51.7	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1370	DATE REQUESTED:	4/25/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	CR/TE	DATE OF TESTING:	4/25/2024
WEIGHED BY:	TW	DATE OF WEIGHING:	4/26/2024

BORING NO.	C3C-B7	C3C-B7	C3C-B7	C3C-B7	C3C-B7
SAMPLE NO.	SS-2	SS-4	SS-6	SS-8	SS-11
SAMPLE DEPTH	2.0 - 4.0	6.0 - 8.0	13.5 - 15.0	23.5 - 25.0	38.5 - 40.0
WATER CONTENT, W%	16.6	17.3	20.5	24.5	26.7

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%					

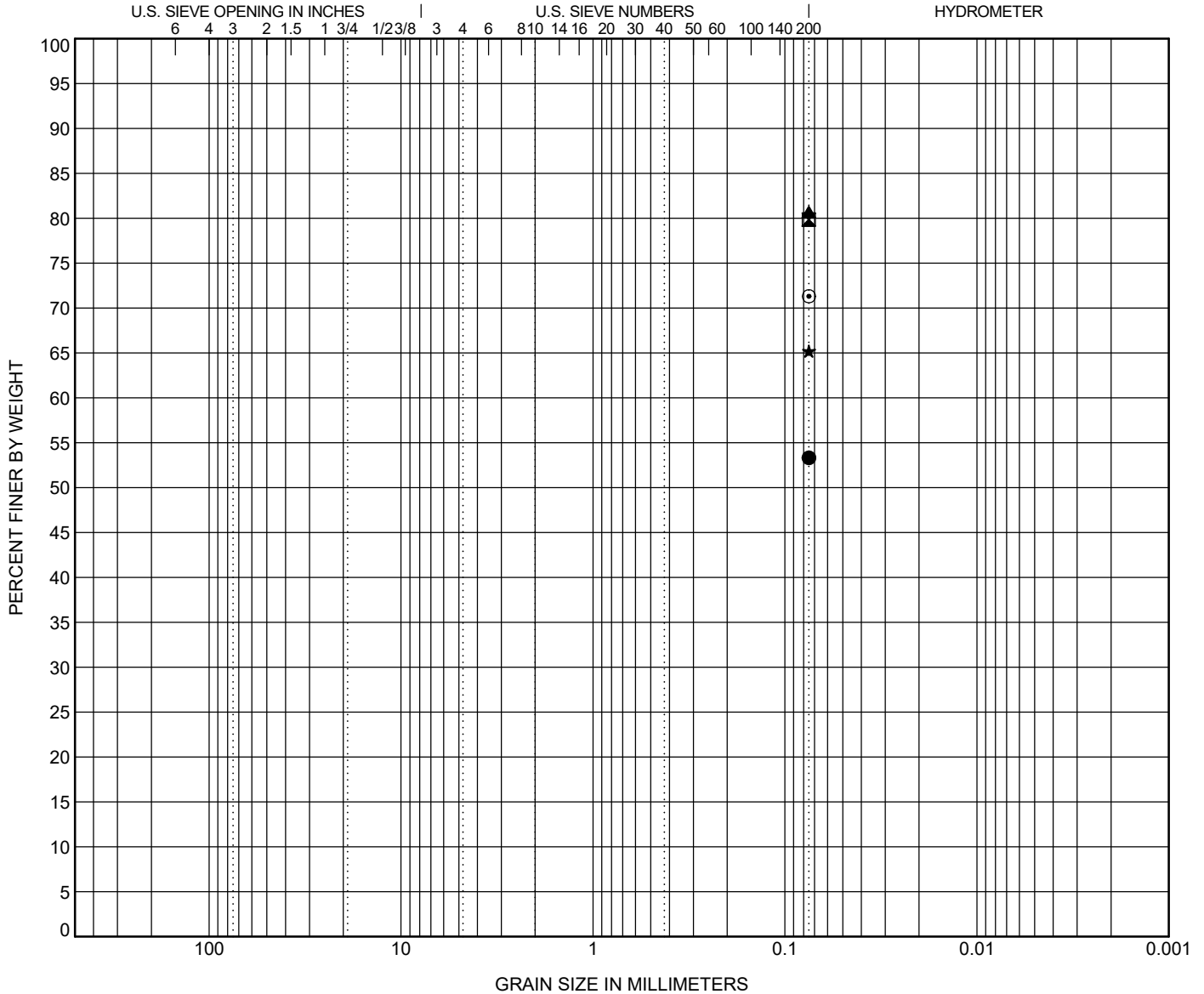


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-B7	4.0	SANDY SILT (ML/A-4)	NP	NP	NP		
☒ C3C-B7	8.0	SILT with SAND (ML/A-4)	NP	NP	NP		
▲ C3C-B7	15.0	SILT with SAND (ML/A-5)	41	31	10		
★ C3C-B7	25.0	SANDY SILT (ML/A-4)	35	28	7		
◎ C3C-B7	40.0	SILT with SAND (ML/A-4)	40	32	8		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-B7	4.0	0.075							53.3
☒ C3C-B7	8.0	0.075							79.9
▲ C3C-B7	15.0	0.075							80.7
★ C3C-B7	25.0	0.075							65.2
◎ C3C-B7	40.0	0.075							71.3

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

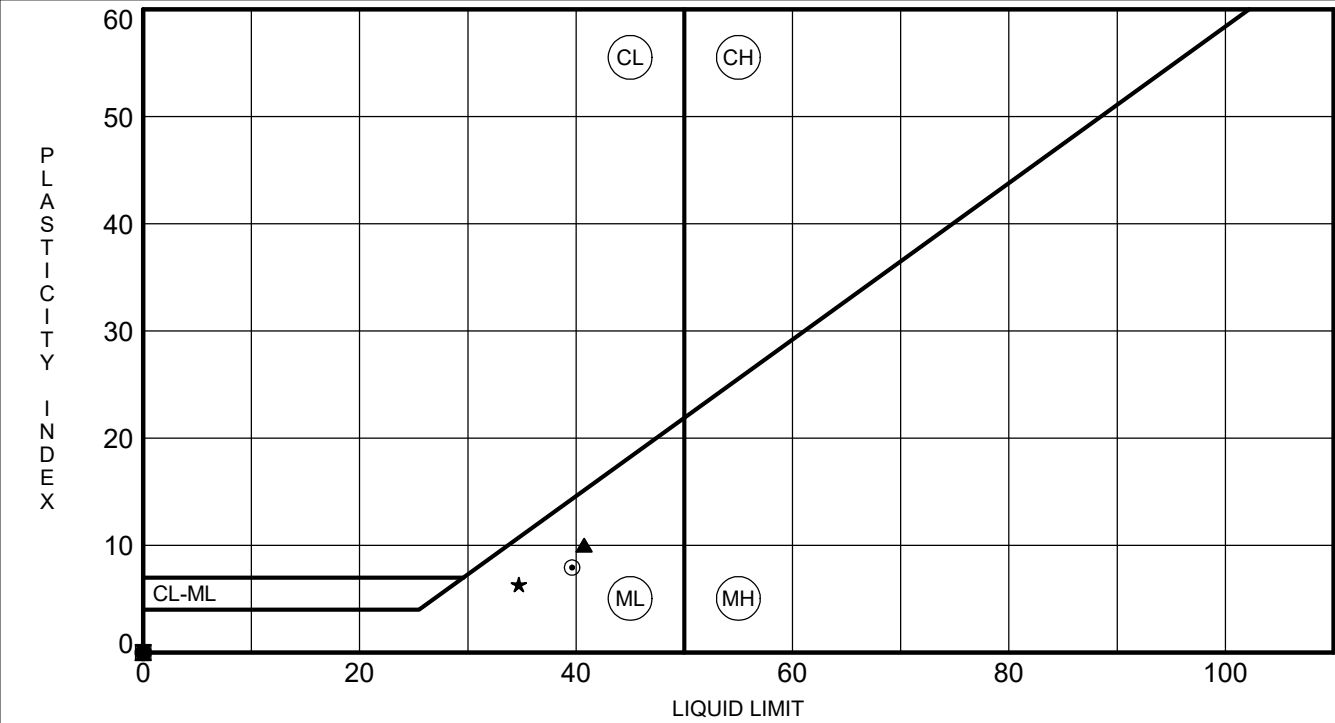


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	C3C-B7	4.0	NP	NP	NP	53	SANDY SILT (ML/A-4)
☒	C3C-B7	8.0	NP	NP	NP	80	SILT with SAND (ML/A-4)
▲	C3C-B7	15.0	41	31	10	81	SILT with SAND (ML/A-5)
★	C3C-B7	25.0	35	28	7	65	SANDY SILT (ML/A-4)
◎	C3C-B7	40.0	40	32	8	71	SILT with SAND (ML/A-4)

ATTERBERG LIMITS G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1539	DATE REQUESTED:	5/14/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AAB	DATE OF TESTING:	5/14/2024
WEIGHED BY:	AAB	DATE OF WEIGHING:	5/15/2024

BORING NO.	C3C-U1	C3C-U1	C3C-U1	C3C-U1	C3C-U1
SAMPLE NO.	SS-6	SS-4	SS-6	SS-7	SS-10
SAMPLE DEPTH	4.0 - 6.0	6.0 - 8.0	13.5 - 15.0	18.5 - 20.0	33.5 - 35.0
WATER CONTENT, W%	14.8	22.9	10.6	18.6	14.6

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%					

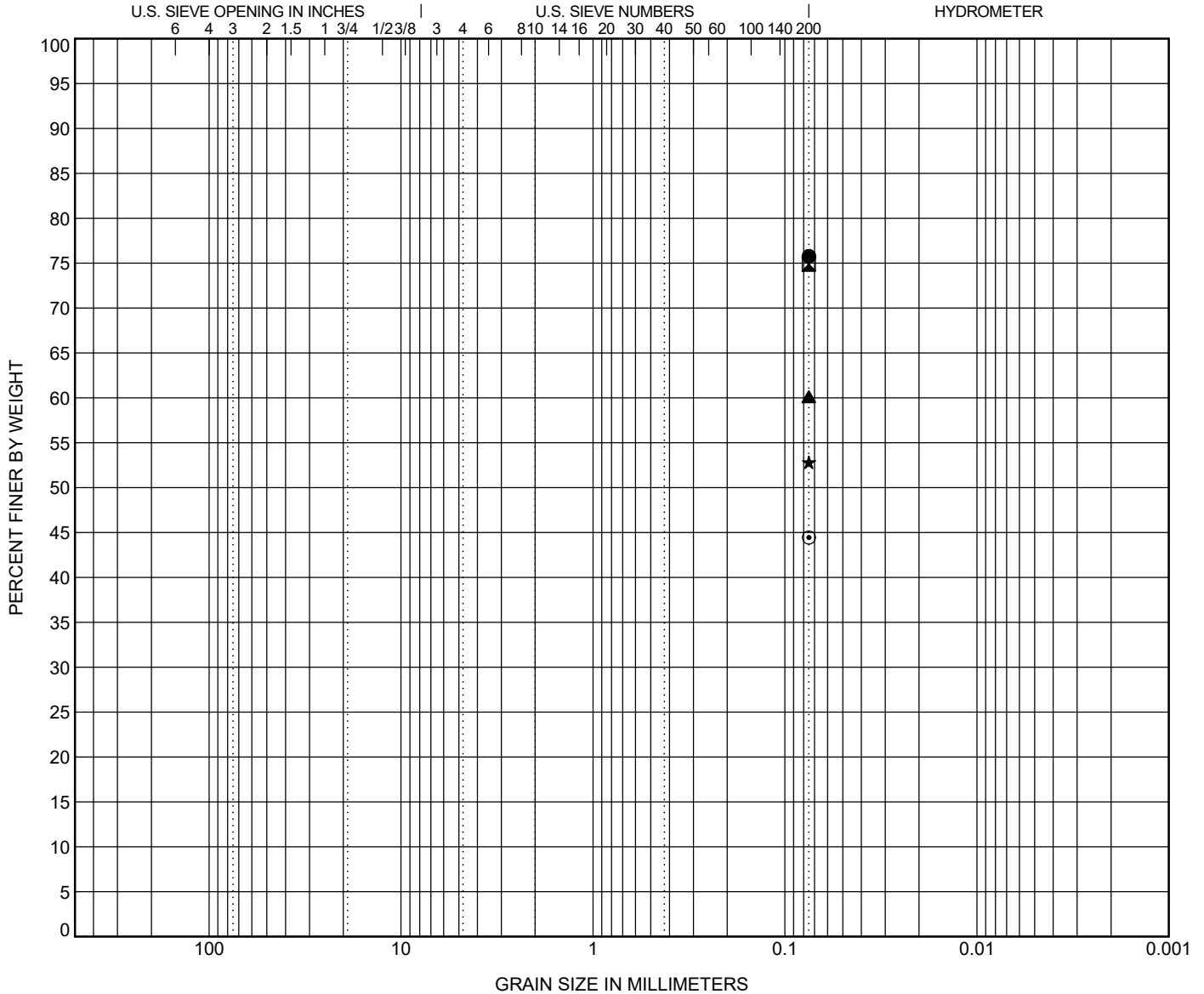


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/17/24

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-U1	6.0	SILT with SAND (ML/A-4)					34	31	3		
☒ C3C-U1	8.0	SILT with SAND (ML/A-4)					NP	NP	NP		
▲ C3C-U1	15.0	SANDY LEAN CLAY (CL/A-6)					35	23	12		
★ C3C-U1	20.0	SANDY LEAN CLAY (CL/A-7-6)					43	24	19		
◎ C3C-U1	35.0	CLAYEY SAND (SC/A-6)					37	14	23		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● C3C-U1	6.0	0.075							75.8		
☒ C3C-U1	8.0	0.075							74.8		
▲ C3C-U1	15.0	0.075							60.1		
★ C3C-U1	20.0	0.075							52.8		
◎ C3C-U1	35.0	0.075							44.4		

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1336	DATE REQUESTED:	4/22/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	CJ/CR	DATE OF TESTING:	4/22/2024
WEIGHED BY:	AGB	DATE OF WEIGHING:	4/23/2024

BORING NO.	C3C-U2	C3C-U2	C3C-U2	C3C-U2	C3C-U2
SAMPLE NO.	SS-2	SS-3	SS-4	SS-6	SS-8
SAMPLE DEPTH	2.0 - 4.0	4.0 - 6.0	6.0 - 8.0	13.5 - 15.0	23.0 - 25.0
WATER CONTENT, W%	17.2	11.8	16.1	19.7	20.0

BORING NO.	C3C-U2	C3C-U2	C3C-U2		
SAMPLE NO.	SS-9	SS-11	SS-13		
SAMPLE DEPTH	28.5 - 30.0	38.5 - 40.0	48.5 - 50.0		
WATER CONTENT, W%	27.5	16.6	30.7		

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

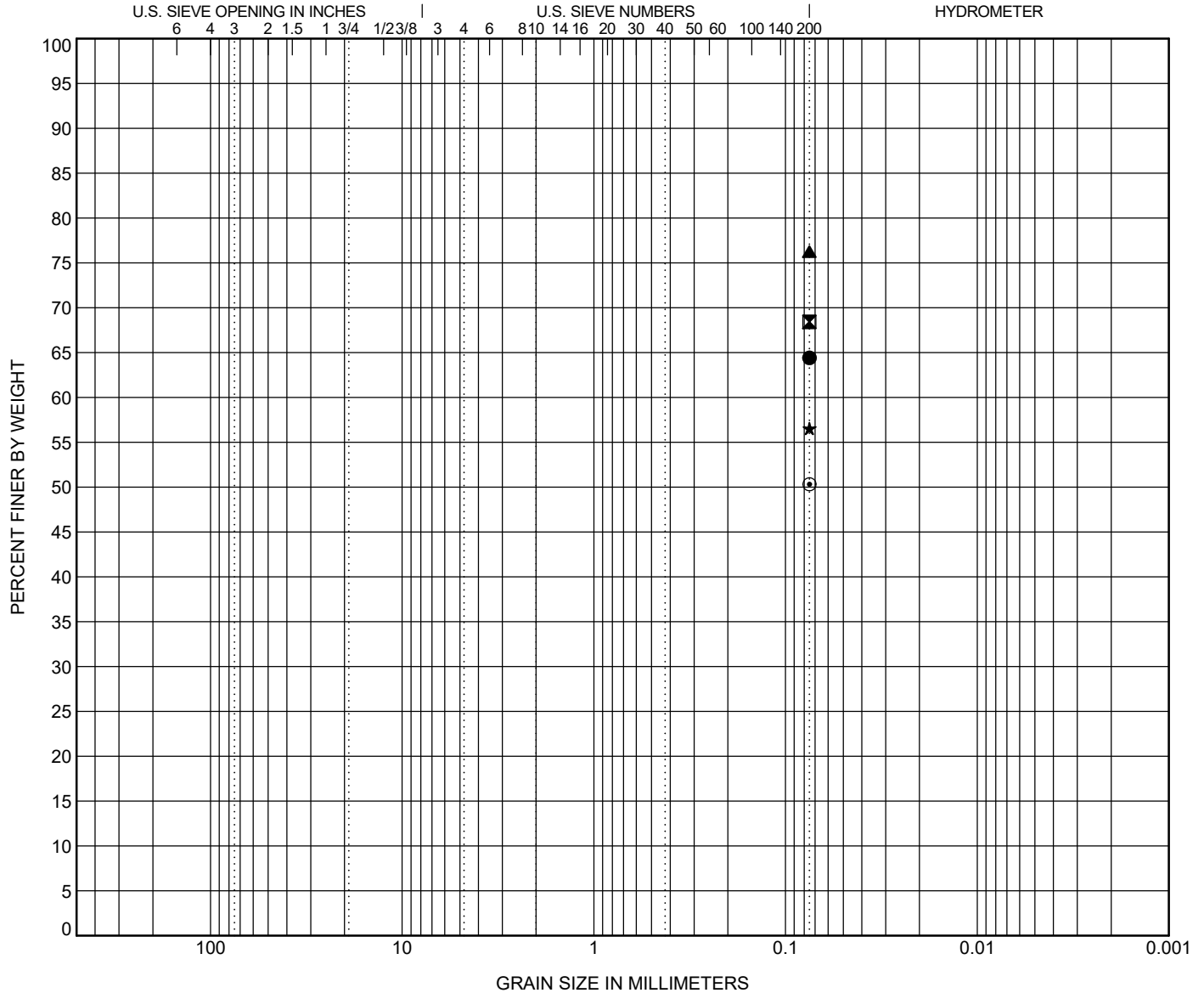


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-U2	4.0	SANDY SILT (ML/A-4)	NP	NP	NP		
■ C3C-U2	6.0	SANDY SILT (ML/A-4)	NP	NP	NP		
▲ C3C-U2	8.0	SILT with SAND (ML/A-4)	NP	NP	NP		
★ C3C-U2	15.0	SANDY SILT (ML/A-4)	NP	NP	NP		
◎ C3C-U2	25.0	SANDY LEAN CLAY (CL/A-6)	38	18	20		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-U2	4.0	0.075							64.4
■ C3C-U2	6.0	0.075							68.4
▲ C3C-U2	8.0	0.075							76.3
★ C3C-U2	15.0	0.075							56.5
◎ C3C-U2	25.0	0.075							50.3

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE 01_30_2015.GDT 5/2/24

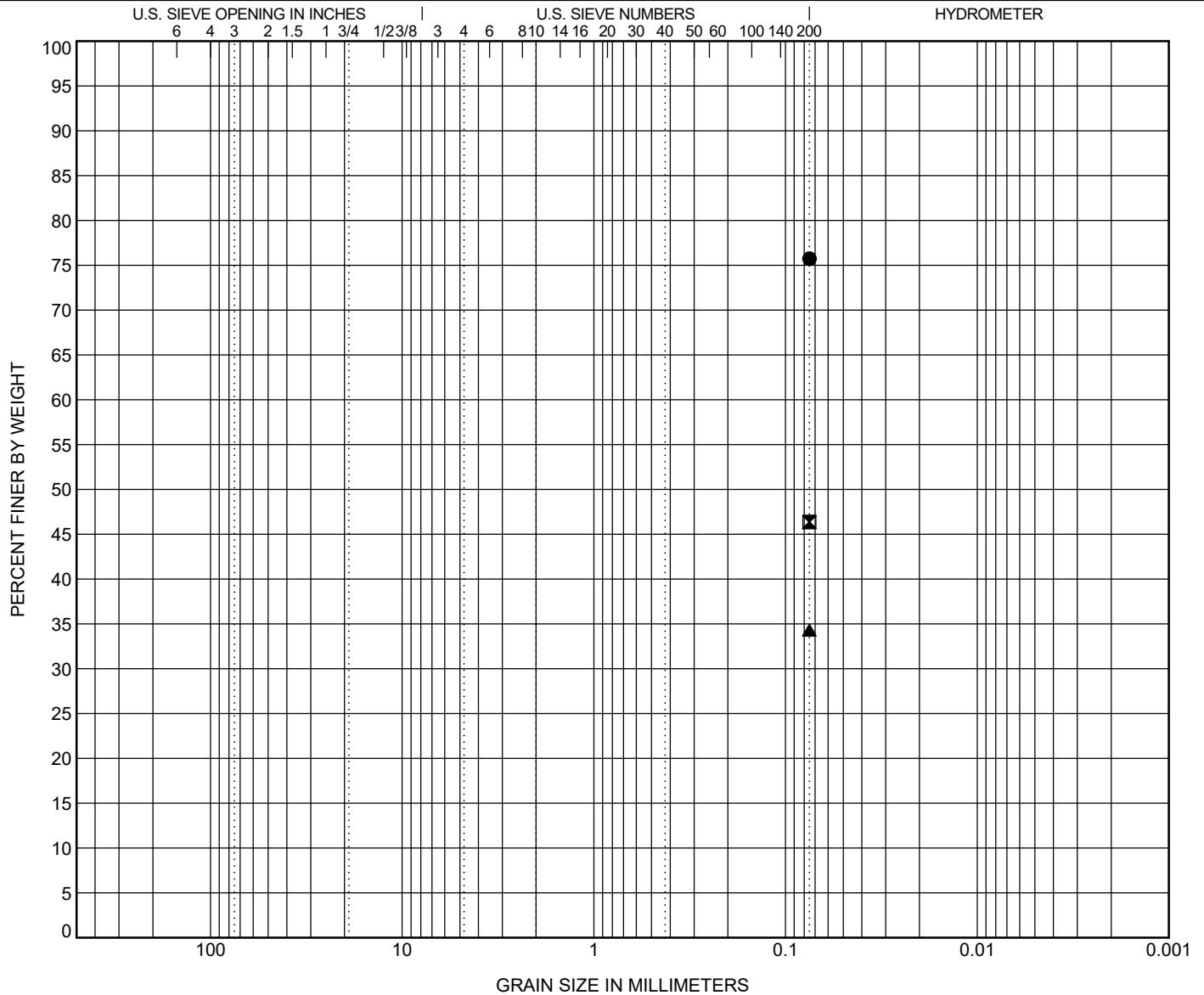


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-U2	30.0	ELASTIC SILT with SAND (MH/A-7-6)	51	29	22		
☒ C3C-U2	40.0	SILTY SAND (SM/A-4)	NP	NP	NP		
▲ C3C-U2	50.0	SILTY SAND (SM/A-2-4)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-U2	30.0	0.075						75.7	
☒ C3C-U2	40.0	0.075						46.4	
▲ C3C-U2	50.0	0.075						34.3	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

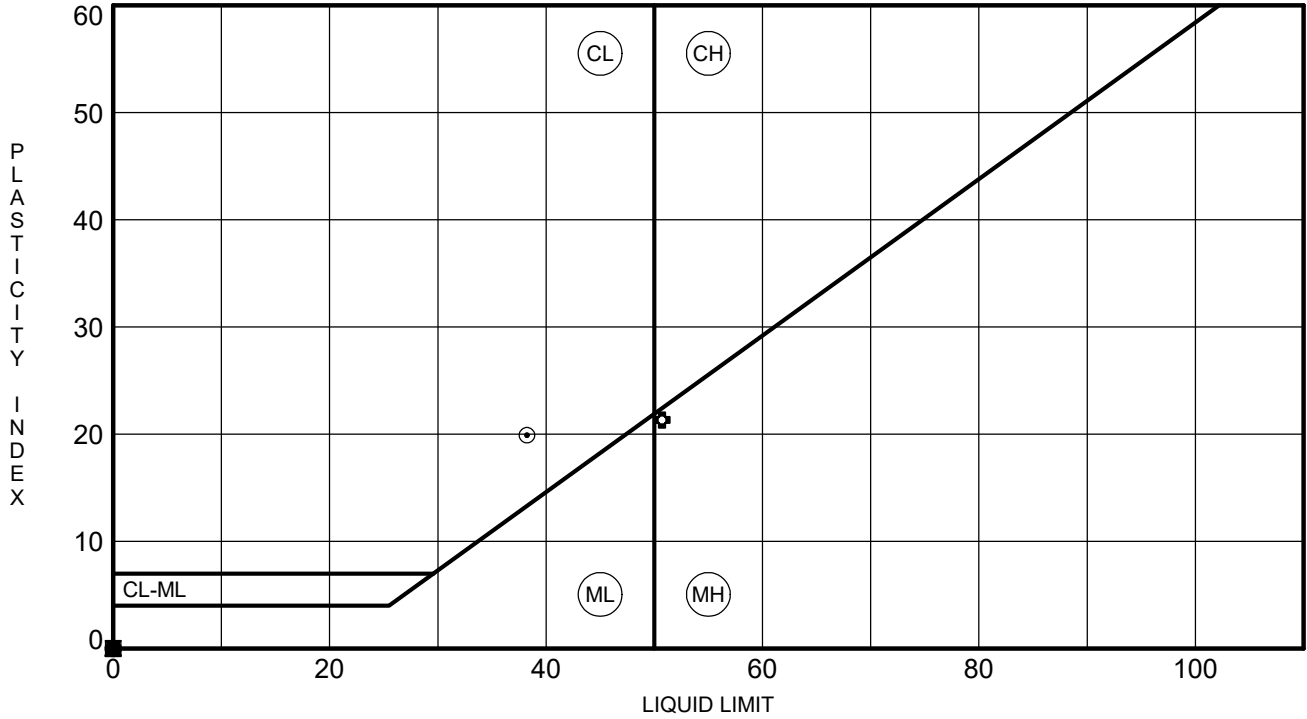


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	C3C-U2	4.0	NP	NP	NP	64	SANDY SILT (ML/A-4)
■	C3C-U2	6.0	NP	NP	NP	68	SANDY SILT (ML/A-4)
▲	C3C-U2	8.0	NP	NP	NP	76	SILT with SAND (ML/A-4)
★	C3C-U2	15.0	NP	NP	NP	57	SANDY SILT (ML/A-4)
⊙	C3C-U2	25.0	38	18	20	50	SANDY LEAN CLAY (CL/A-6)
⊕	C3C-U2	30.0	51	29	22	76	ELASTIC SILT with SAND (MH/A-7-6)
○	C3C-U2	40.0	NP	NP	NP	46	SILTY SAND (SM/A-4)
△	C3C-U2	50.0	NP	NP	NP	34	SILTY SAND (SM/A-2-4)

ATTERBERG LIMITS G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/2/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1508	DATE REQUESTED:	5/10/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AAB	DATE OF TESTING:	5/10/2024
WEIGHED BY:	AAB	DATE OF WEIGHING:	5/13/2024

BORING NO.	C3C-U3	C3C-U3	C3C-U3	C3C-U3	C3C-U3
SAMPLE NO.	SS-2	SS-6	SS-7	SS-8	SS-10
SAMPLE DEPTH	2.0 - 4.0	13.5 - 15.0	18.5 - 20.0	23.5 - 25.0	33.5 - 35.0
WATER CONTENT, W%	15.8	15.5	21.1	22.3	19.2

BORING NO.	C3C-U3	C3C-U3			
SAMPLE NO.	SS-11	SS-12			
SAMPLE DEPTH	38.5 - 40.0	43.5 - 45.0			
WATER CONTENT, W%	25.9	27.6			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

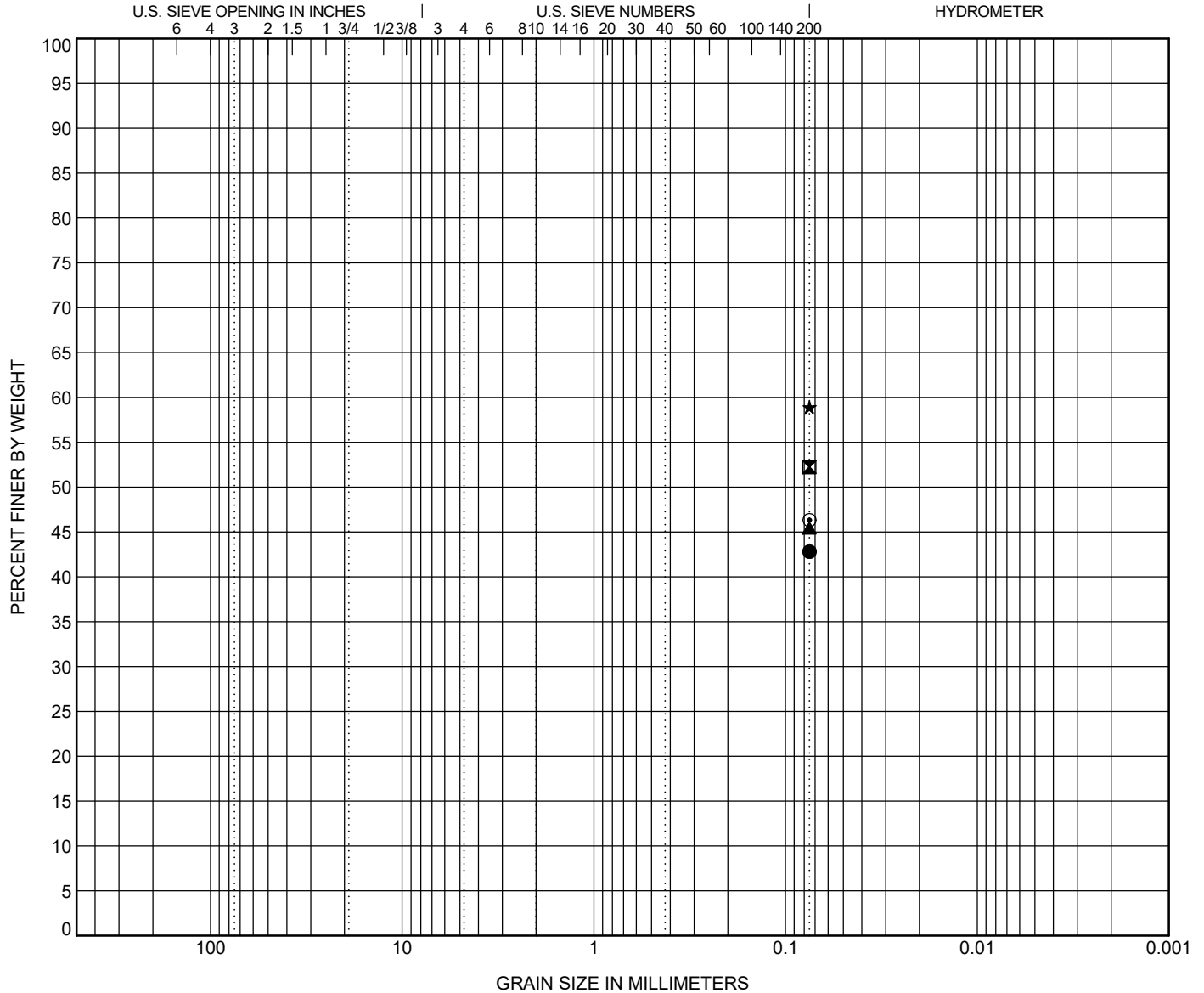


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-U3	4.0	CLAYEY SAND (SC/A-6)	39	17	22		
☒ C3C-U3	15.0	SANDY SILT (ML/A-4)	33	31	2		
▲ C3C-U3	20.0	CLAYEY SAND (SC/A-7-6)	50	28	22		
★ C3C-U3	25.0	SANDY LEAN CLAY (CL/A-6)	37	23	14		
◎ C3C-U3	35.0	CLAYEY SAND (SC/A-7-6)	41	14	27		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-U3	4.0	0.075							42.8
☒ C3C-U3	15.0	0.075							52.2
▲ C3C-U3	20.0	0.075							45.4
★ C3C-U3	25.0	0.075							58.9
◎ C3C-U3	35.0	0.075							46.3

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/15/24

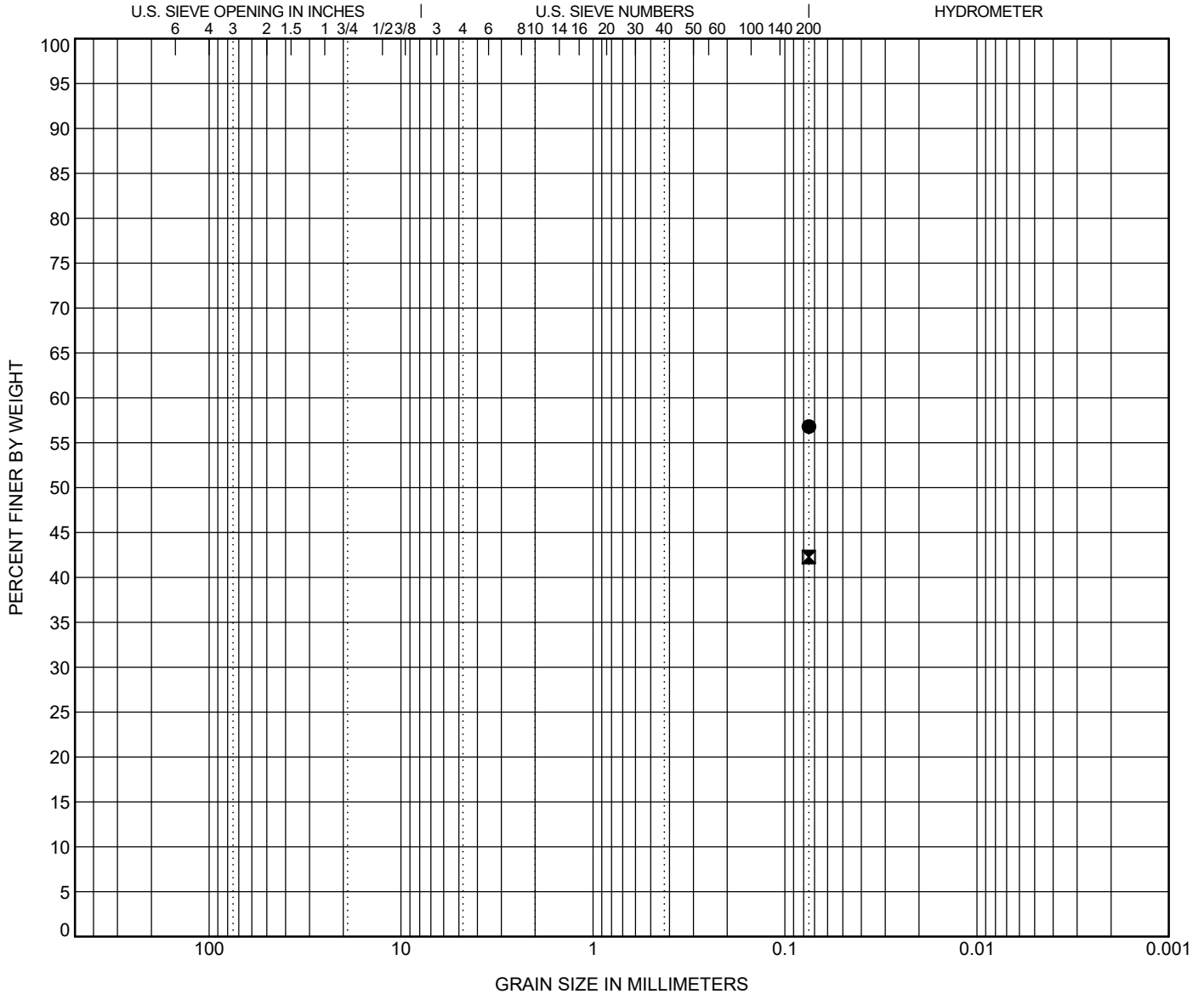


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-U3	40.0	SANDY LEAN CLAY (CL/A-7-6)	46	19	27		
■ C3C-U3	45.0	CLAYEY SAND (SC/A-6)	33	13	20		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-U3	40.0	0.075							56.8
■ C3C-U3	45.0	0.075							42.3

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/15/24

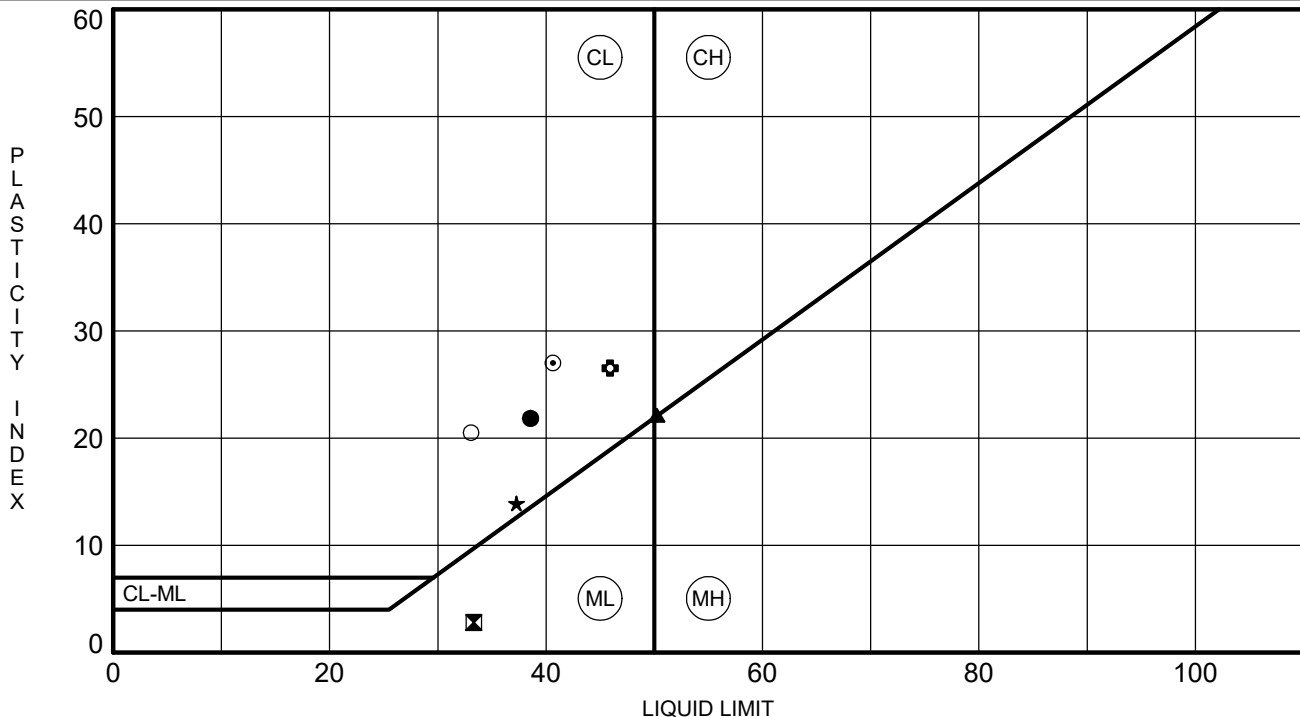


ATTERBERG LIMITS' RESULTS

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● C3C-U3	4.0	39	17	22	43	CLAYEY SAND (SC/A-6)
☒ C3C-U3	15.0	33	31	2	52	SANDY SILT (ML/A-4)
▲ C3C-U3	20.0	50	28	22	45	CLAYEY SAND (SC/A-7-6)
★ C3C-U3	25.0	37	23	14	59	SANDY LEAN CLAY (CL/A-6)
⊙ C3C-U3	35.0	41	14	27	46	CLAYEY SAND (SC/A-7-6)
⊕ C3C-U3	40.0	46	19	27	57	SANDY LEAN CLAY (CL/A-7-6)
○ C3C-U3	45.0	33	13	20	42	CLAYEY SAND (SC/A-6)

ATTERBERG LIMITS G5662.03- CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 5/15/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-1301	DATE REQUESTED:	4/12/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	TP	DATE OF TESTING:	4/15/2024
WEIGHED BY:	AB	DATE OF WEIGHING:	4/16/2024

BORING NO.	C3C-W1	C3C-W1	C3C-W1	C3C-W1	C3C-W1
SAMPLE NO.	SS-2	SS-3	SS-4	SS-5	SS-6
SAMPLE DEPTH	2.0 - 4.0	4.0 - 6.0	6.0 - 8.0	8.0 - 10.0	13.5 - 15.0
WATER CONTENT, W%	13.7	14.6	18.3	22.0	21.3

BORING NO.	C3C-W1	C3C-W1			
SAMPLE NO.	SS-8	SS-10			
SAMPLE DEPTH	23.5 - 25.0	33.5 - 35.0			
WATER CONTENT, W%	36.4	27.5			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH					
WATER CONTENT, W%					

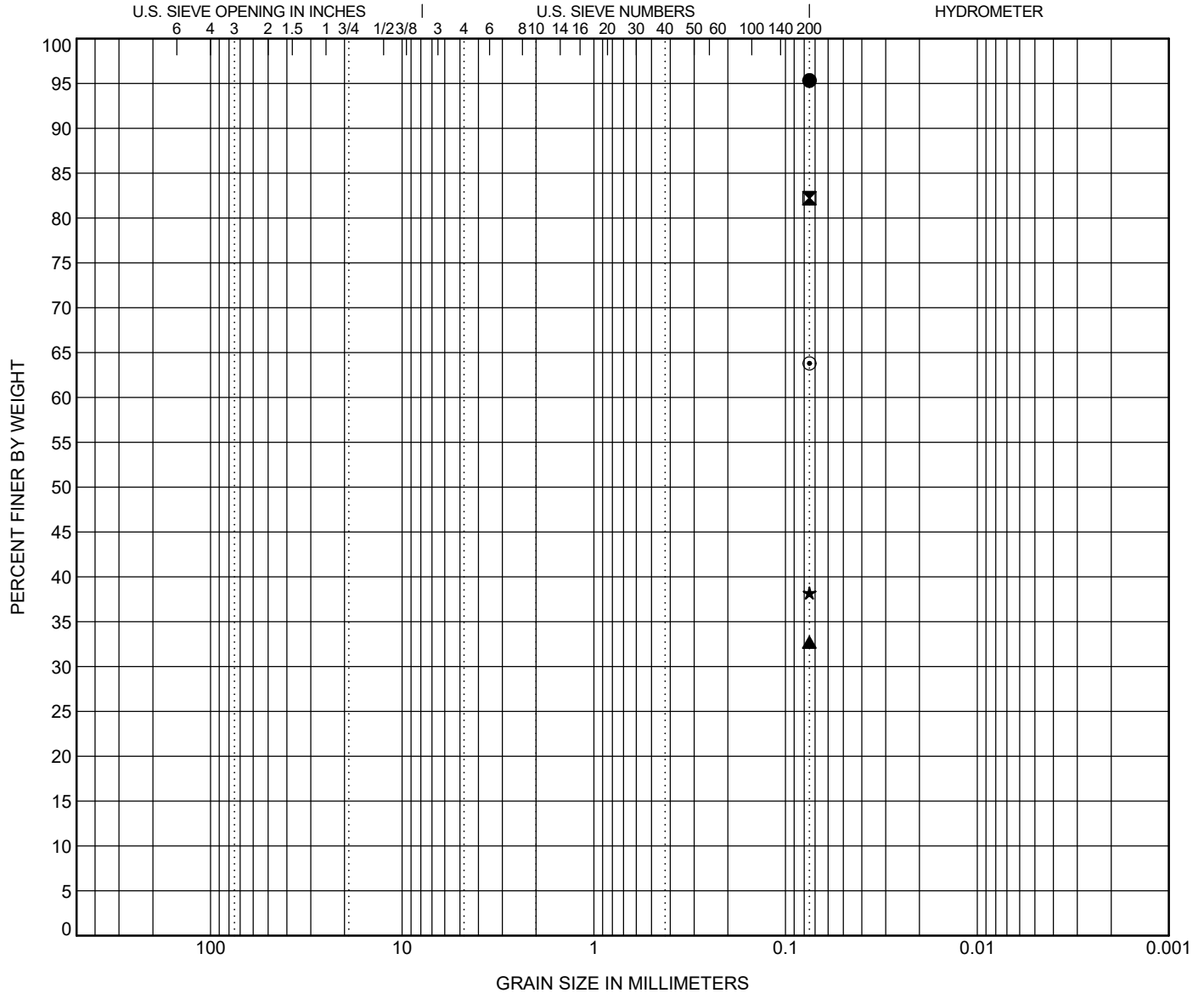


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-W1	4.0	LEAN CLAY (CL/A-6)	39	15	24		
■ C3C-W1	6.0	LEAN CLAY with SAND (CL/A-7-6)	45	19	26		
▲ C3C-W1	8.0	CLAYEY SAND (SC/A-2-6)	34	21	13		
★ C3C-W1	10.0	SILTY SAND (SM/A-4)	32	26	6		
◎ C3C-W1	15.0	SANDY LEAN CLAY (CL/A-6)	35	22	13		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-W1	4.0	0.075							95.3
■ C3C-W1	6.0	0.075							82.2
▲ C3C-W1	8.0	0.075							32.7
★ C3C-W1	10.0	0.075							38.2
◎ C3C-W1	15.0	0.075							63.8

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/23/24

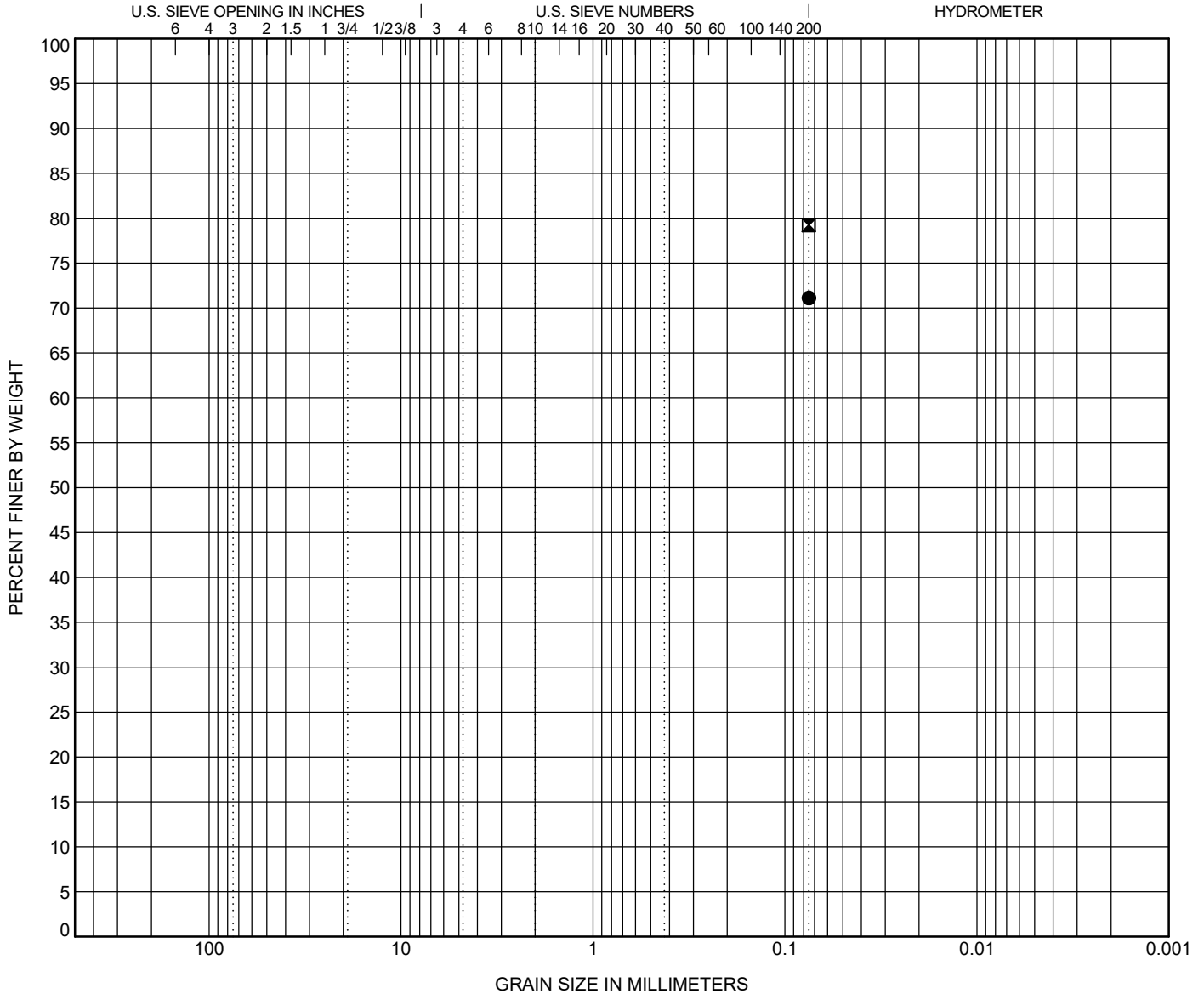


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-W1	25.0	ELASTIC SILT with SAND (MH/A-7-5)					53	37	16		
☒ C3C-W1	35.0	SILT with SAND (ML/A-7-6)					48	29	19		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● C3C-W1	25.0	0.075							71.1		
☒ C3C-W1	35.0	0.075							79.2		

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/23/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-0667	DATE REQUESTED:	3/28/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AC	DATE OF TESTING:	3/28/2024
WEIGHED BY:	AB	DATE OF WEIGHING:	3/29/2024

BORING NO.	C3C-W2	C3C-W2	C3C-W2		
SAMPLE NO.	SS-1	SS-4	SS-6		
SAMPLE DEPTH	0.0 - 2.0	6.0 - 8.0	13.5 - 15.0		
WATER CONTENT, W%	3.9	24.7	37.8		

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%					

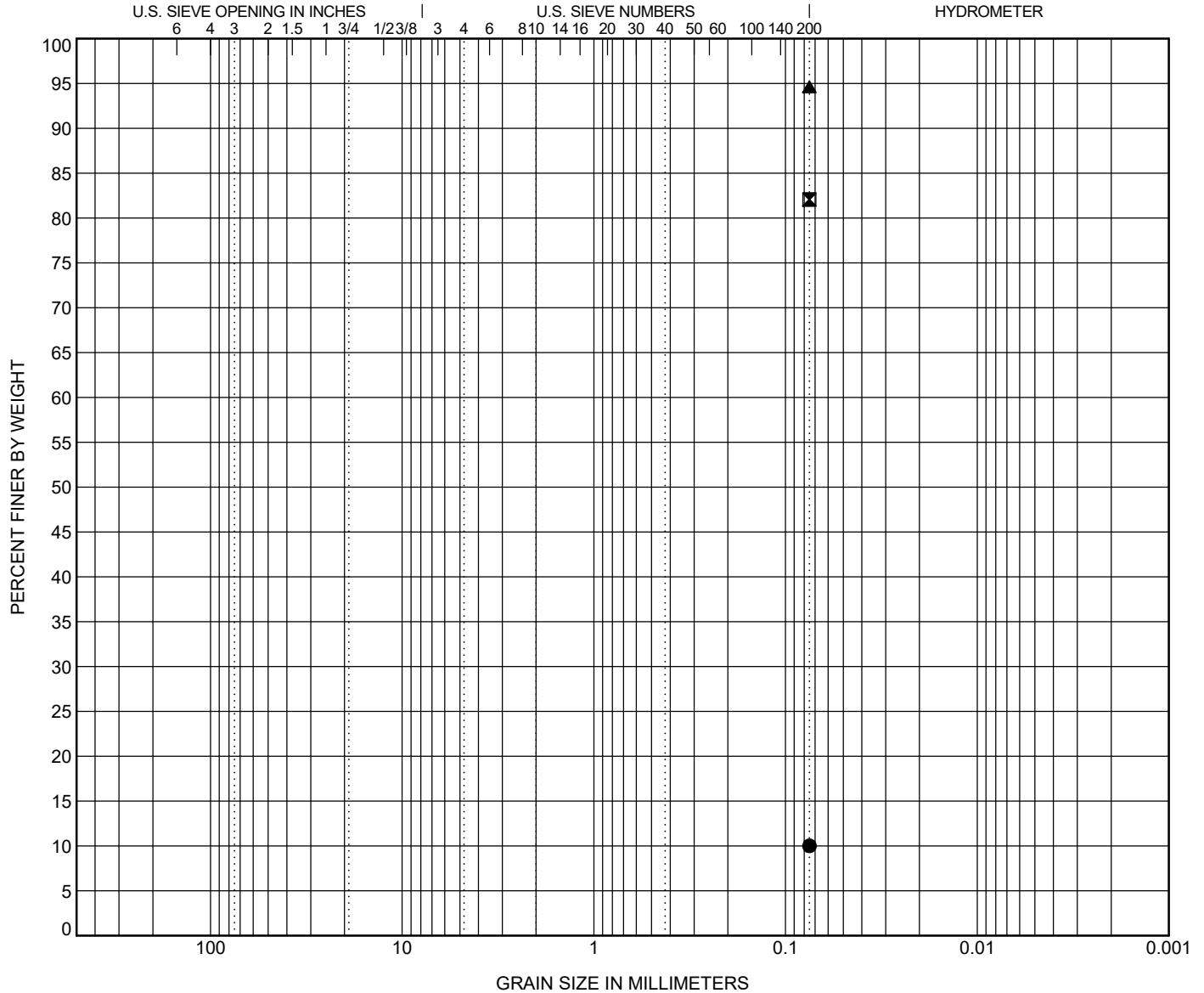


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● C3C-W2	2.0	POORLY GRADED SAND (SP-SM/A-3) with SILT	NP	NP	NP		
☒ C3C-W2	8.0	LEAN CLAY with SAND (CL/A-7-6)	49	25	24		
▲ C3C-W2	15.0	ELASTIC SILT (MH/A-7-5)	60	40	20		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-W2	2.0	0.075						10.0	
☒ C3C-W2	8.0	0.075						82.0	
▲ C3C-W2	15.0	0.075						94.6	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/9/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-0972	DATE REQUESTED:	3/28/2024
DESCRIPTION OF SOIL:	LEAN CLAY (CL/A-6)		
TESTED BY:	AC	DATE OF TESTING:	3/28/2024
WEIGHED BY:	AB	DATE OF WEIGHING:	3/29/2024

BORING NO.	C3C-W3				
SAMPLE NO.	SS-2				
SAMPLE DEPTH	2.0 - 4.0				
WATER CONTENT, W%	25.9				

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%					

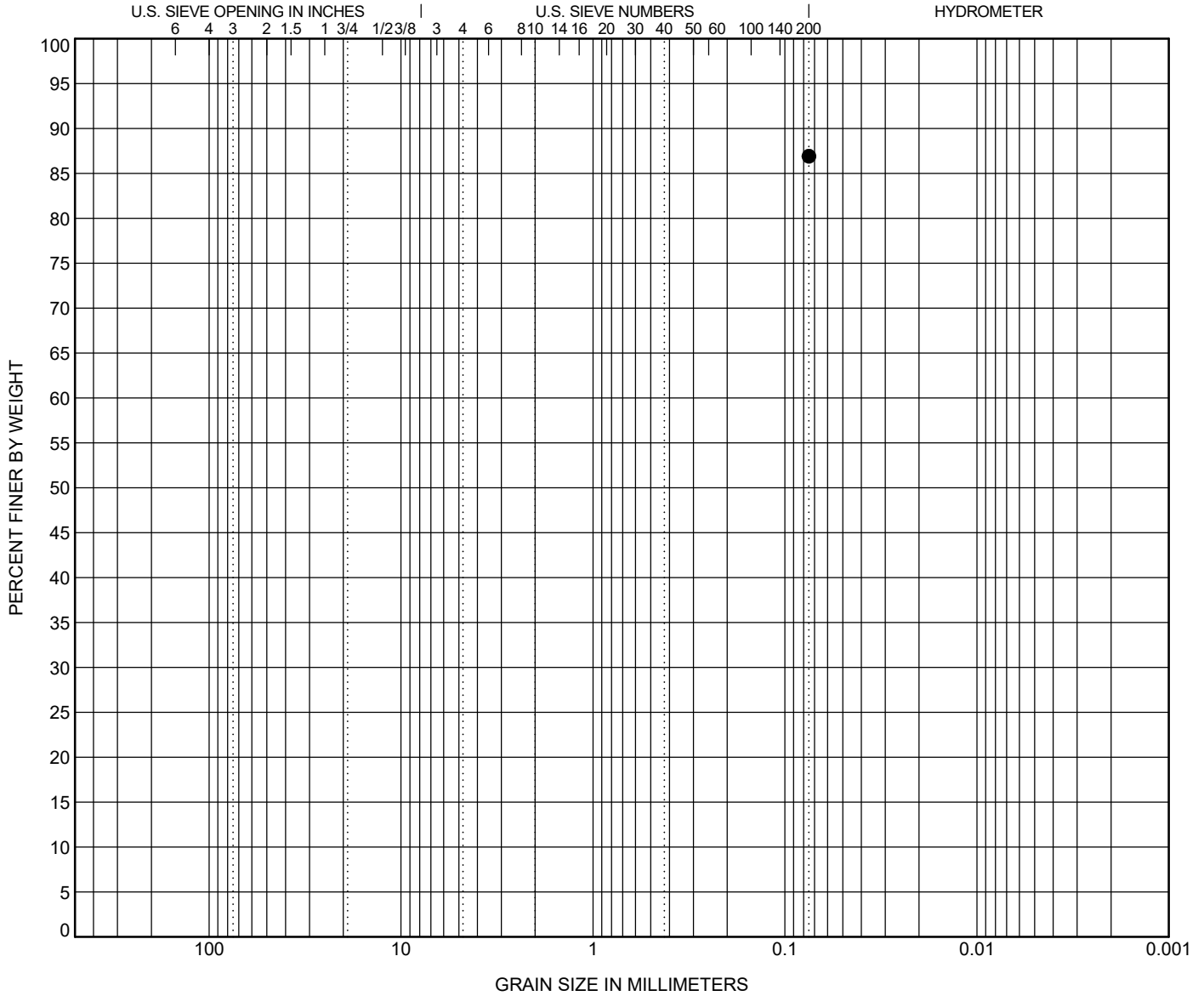


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-W3	4.0	LEAN CLAY (CL/A-6)					39	23	16		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-W3	4.0	0.075						86.9	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/9/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-0973	DATE REQUESTED:	3/28/2024
DESCRIPTION OF SOIL:	LEAN CLAY (CL/A-7-6)		
TESTED BY:	AC	DATE OF TESTING:	3/28/2024
WEIGHED BY:	AB	DATE OF WEIGHING:	3/29/2024

BORING NO.	C3C-W4				
SAMPLE NO.	SS-2				
SAMPLE DEPTH	2.0 - 4.0				
WATER CONTENT, W%	19.9				

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%					

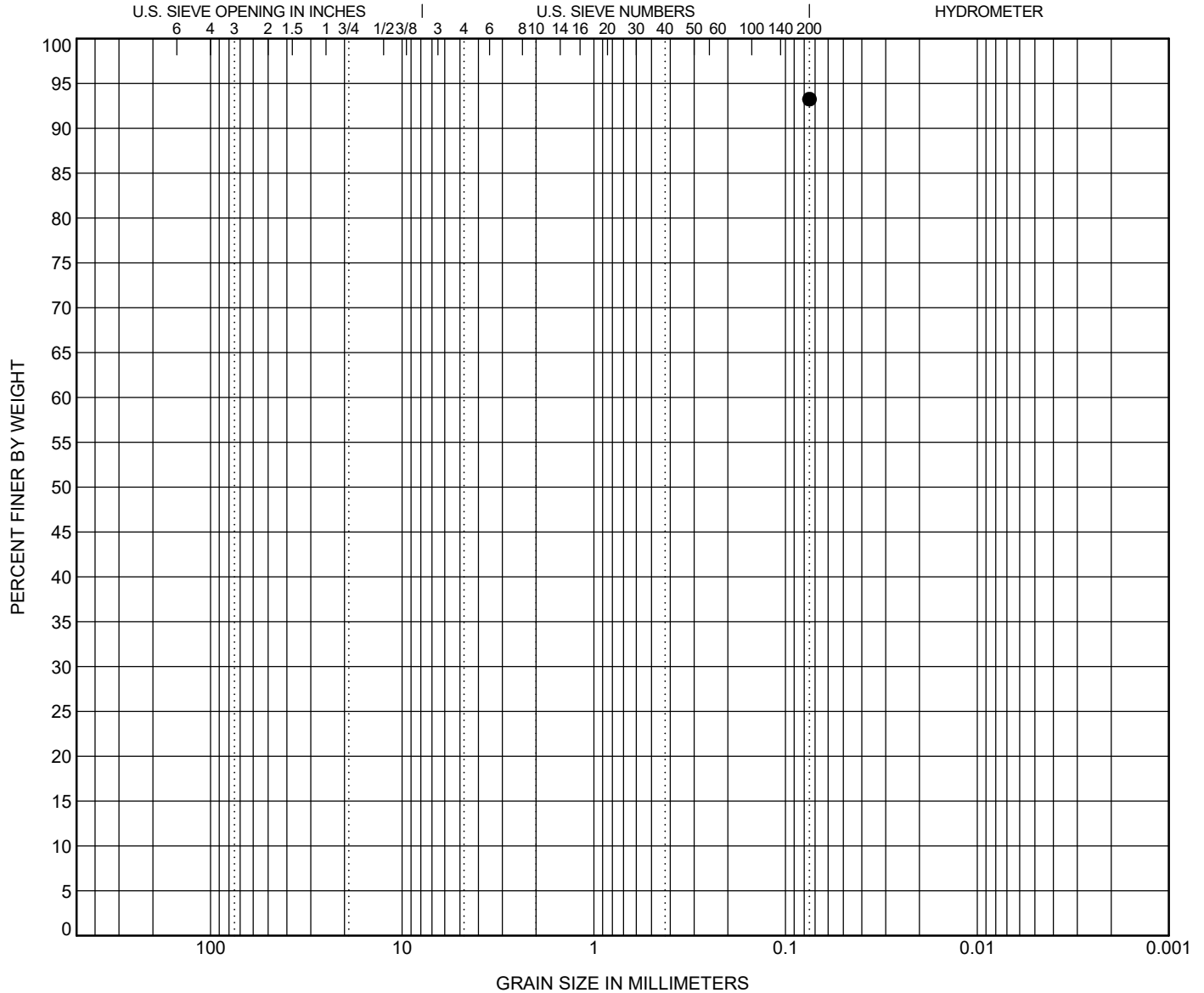


GRAIN SIZE DISTRIBUTION

PROJECT ID P039720

PROJECT NAME Carolina Crossroads I-20/26/126 Corridor Improvements

PROJECT COUNTY Richland/Lexington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● C3C-W4	4.0	LEAN CLAY (CL/A-7-6)					41	25	16		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C3C-W4	4.0	0.075						93.2	

GRAIN SIZE G5662.03-CAROLINA CROSSROADS PH 3C.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 4/9/24

**F&ME CONSULTANTS
211 Business Park Blvd.
Columbia, SC 29203**

**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	Carolina Cross Roads Corridor Improvement Phase 2A- CM1 (Contract Mod 8-CM8)	SCDOT PROJECT ID:	P039720
SAMPLE NUMBER:	24-0974	DATE REQUESTED:	3/28/2024
DESCRIPTION OF SOIL:	VARIOUS		
TESTED BY:	AC	DATE OF TESTING:	3/28/2024
WEIGHED BY:	AB	DATE OF WEIGHING:	3/29/2024

BORING NO.	C3C-W5	C3C-W5	C3C-W5	C3C-W5	
SAMPLE NO.	SS-3	SS-4	SS-6.1	SS-6.2	
SAMPLE DEPTH	4.0 - 6.0	6.0 - 8.0	13.5 - 14.0	14.0 - 15.0	
WATER CONTENT, W%	14.8	21.4	6.1	15.7	

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%					

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

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

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

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

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

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

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

Matt Jacobs
Technician Name

NICET Lab Level III / 118202
Certification Type / No.

2/22/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

2/22/18
Date

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

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

LABORATORY DETERMINATION OF WATER CONTENT



Quality Assurance ASTM D 2216 AASHTO T 265

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

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

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

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

Notes / Deviations / References

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

Derek Baker
Technician Name

4/24/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

Signature

Staff Professional
Position

5/23/2018
Date

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

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):	3/15 - 3/16/18
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 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	%			
B-49	SS-1	24.5 - 26.5	H	0.00	53.61	43.24	10.37	24.0%			
B-49	SS-2	26.5 - 28.5	R	0.00	59.93	48.71	11.22	23.0%			
B-49	SS-4	30.5 - 32.5	F	0.00	59.59	40.00	19.59	49.0%			
B-49	SS-5	32.5 - 34.5	26	0.00	73.99	50.35	23.64	47.0%			
B-50	SS-4	7.0 - 9.0	D-13	0.00	60.88	53.18	7.70	14.5%			
B-50	SS-6	13.5 - 15.0	D-1	0.00	57.59	50.56	7.03	13.9%			
B-50	SS-8	23.5 - 25.0	T-2	0.00	63.48	53.49	9.99	18.7%			
B-50	SS-10	33.5 - 35.0	D-117	0.00	58.53	45.46	13.07	28.8%			
B-50	SS-14	53.5 - 55.0	JJ	0.00	74.06	57.86	16.20	28.0%			
B-55	SS-1	1.2 - 3.2	A-2	0.00	62.19	49.45	12.74	25.8%			
B-55	SS-5	9.2 - 11.2	D-3	0.00	53.41	45.84	7.57	16.5%			
B-55	SS-9	28.5 - 30.0	T-1	0.00	60.87	50.46	10.41	20.6%			

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

Benjamin Kovalski
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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



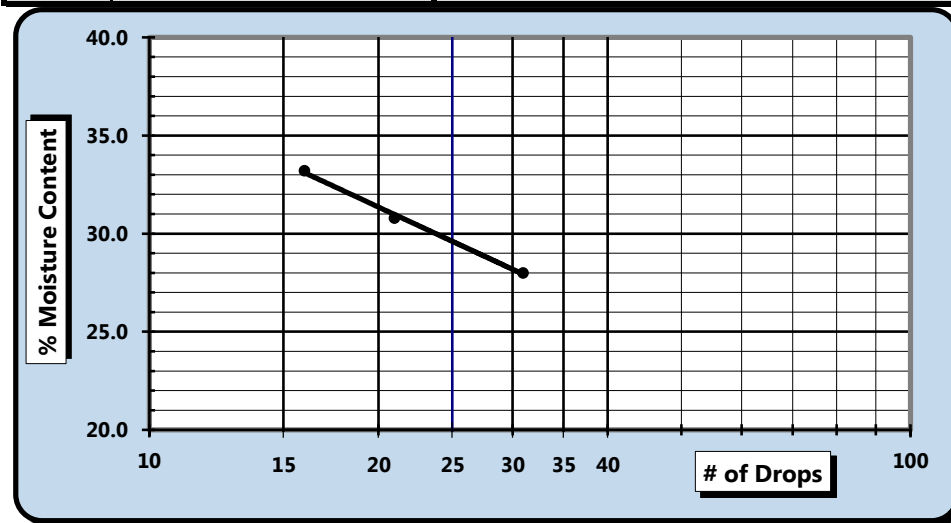
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-47	Sample #:	SS-1
Location:	Bridge Boring	Sample Date:	2/12/18
Type:	Split-spoon	Depth:	1.0' - 3.0'

Sample Description: Sandy Lean Clay (CL, A-6(5))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Y-1	Y-2	Y-3			5	6	
A	Tare Weight	16.43	16.47	17.00			12.10	12.29	
B	Wet Soil Weight + A	39.04	39.03	38.42			19.27	19.11	
C	Dry Soil Weight + A	34.10	33.72	33.08			18.21	18.12	
D	Water Weight (B-C)	4.94	5.31	5.34			1.06	0.99	
E	Dry Soil Weight (C-A)	17.67	17.25	16.08			6.11	5.83	
F	% Moisture (D/E)*100	28.0%	30.8%	33.2%			17.3%	17.0%	
N	# OF DROPS	31	21	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	30
Plastic Limit	17
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

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



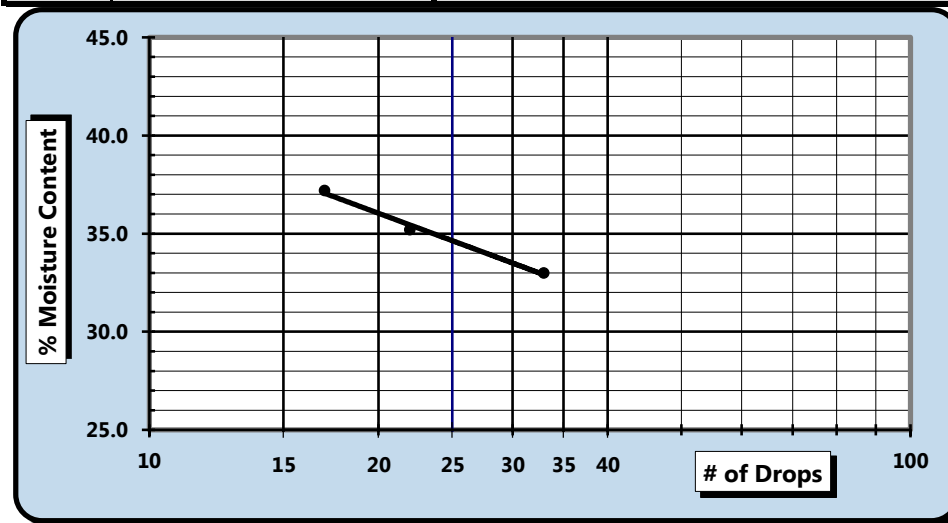
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-47	Sample #:	SS-4
		Sample Date:	2/12/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	7.0' - 9.0'

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

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		Z-1	Z-2	Z-3			7	9	
A	Tare Weight	15.92	16.62	16.77			12.00	12.24	
B	Wet Soil Weight + A	39.27	38.76	39.03			18.53	18.89	
C	Dry Soil Weight + A	33.48	33.00	32.99			17.18	17.53	
D	Water Weight (B-C)	5.79	5.76	6.04			1.35	1.36	
E	Dry Soil Weight (C-A)	17.56	16.38	16.22			5.18	5.29	
F	% Moisture (D/E)*100	33.0%	35.2%	37.2%			26.1%	25.7%	
N	# OF DROPS	33	22	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						25.9%		



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	35
Plastic Limit	26
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

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

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

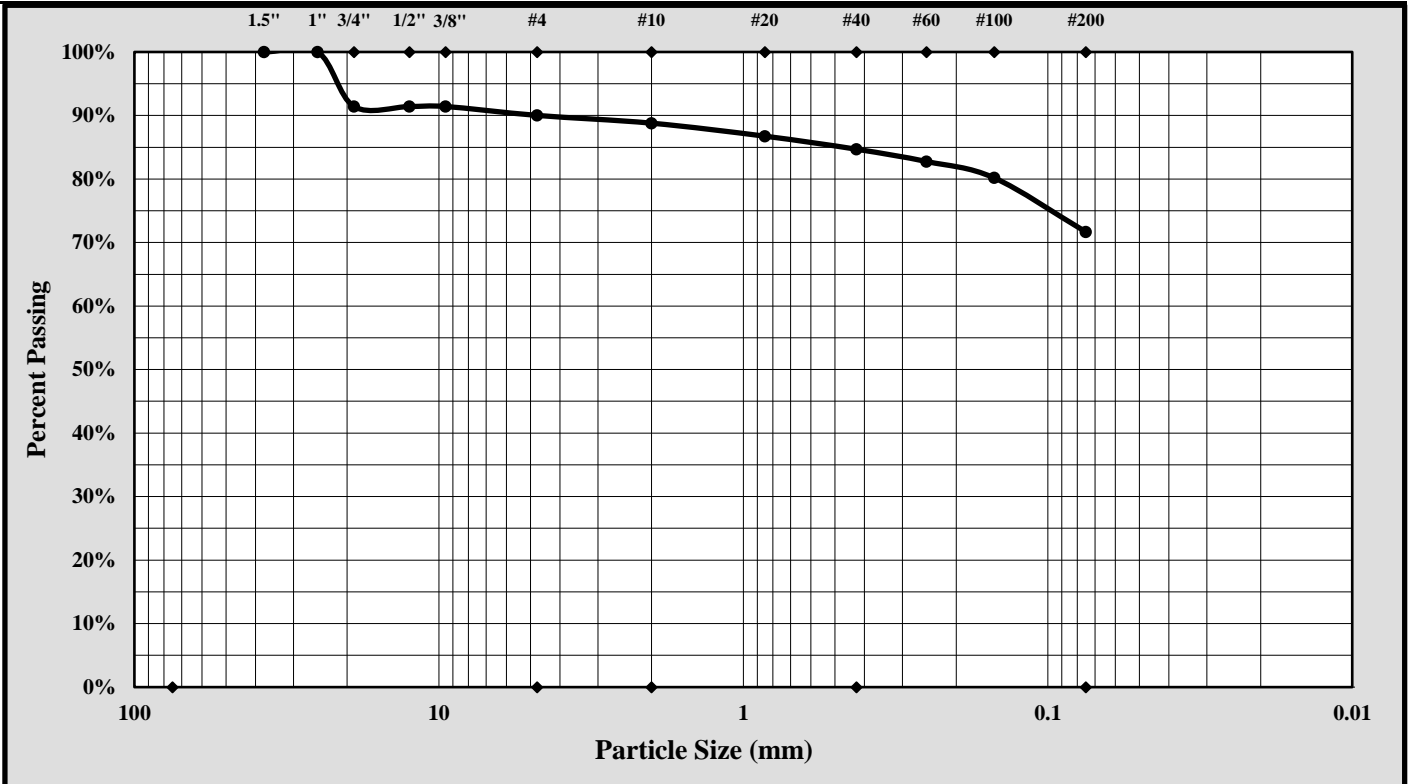
Particle Size Analysis of Soils

ASTM D 6913



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

S&ME Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/28/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-47	Sample #:	SS-4
		Sample Date:	2/12/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	7.0' - 9.0'
Sample Description:	Silt with Sand (ML, A-4(6))		



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

Maximum Particle Size: 25.00 mm Gravel: 10.0%
 Silt & Clay (% Passing #200): 71.7% Total Sand: 18.3%

Liquid Limit	35	Plastic Limit	26	Plastic Index	9
Coarse Sand:	1.2%	Medium Sand:	4.1%	Fine Sand:	13.0%
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

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



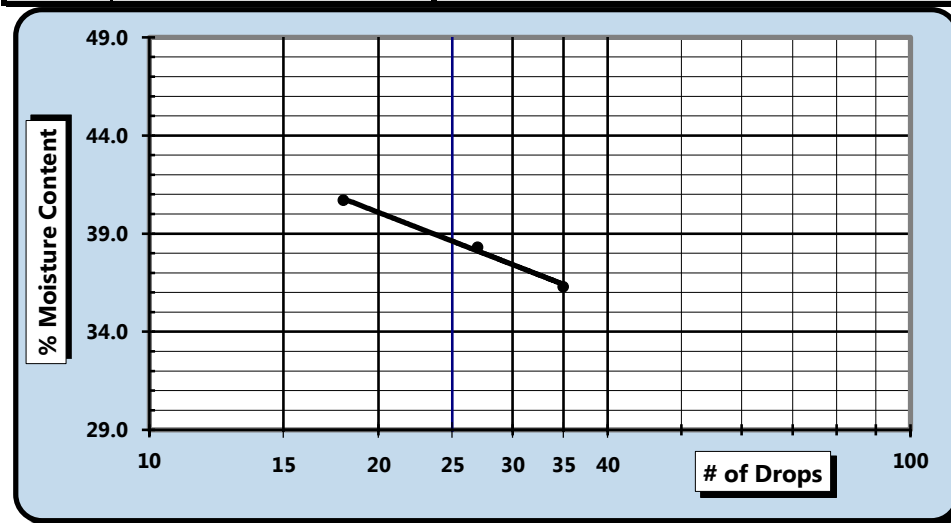
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date:	5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-47	Sample #:	SS-8
		Sample Date:	2/12/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	24.5' - 26.0'

Sample Description: Clayey Sand With Gravel (SC, A-6(2))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	7537	1/31/2018	Grooving tool	14185	9/12/2017
LL Apparatus	13859	9/12/2017			
Oven	7313	7/28/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		P-4	P-5	P-6			12	13	
A	Tare Weight	16.62	16.61	15.95			11.16	12.11	
B	Wet Soil Weight + A	39.30	37.89	37.56			18.12	19.24	
C	Dry Soil Weight + A	33.26	32.00	31.31			16.75	17.83	
D	Water Weight (B-C)	6.04	5.89	6.25			1.37	1.41	
E	Dry Soil Weight (C-A)	16.64	15.39	15.36			5.59	5.72	
F	% Moisture (D/E)*100	36.3%	38.3%	40.7%			24.5%	24.7%	
N	# OF DROPS	35	27	18			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	39
Plastic Limit	25
Plastic Index	14
Group Symbol	CL

Multipoint Method
 One-point Method

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

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

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

Matt Jacobs
Technician Name

NICET 118202
Certification#

Matthew F. Cooke, P.G.
Technical Responsibility

5/11/18
Date

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

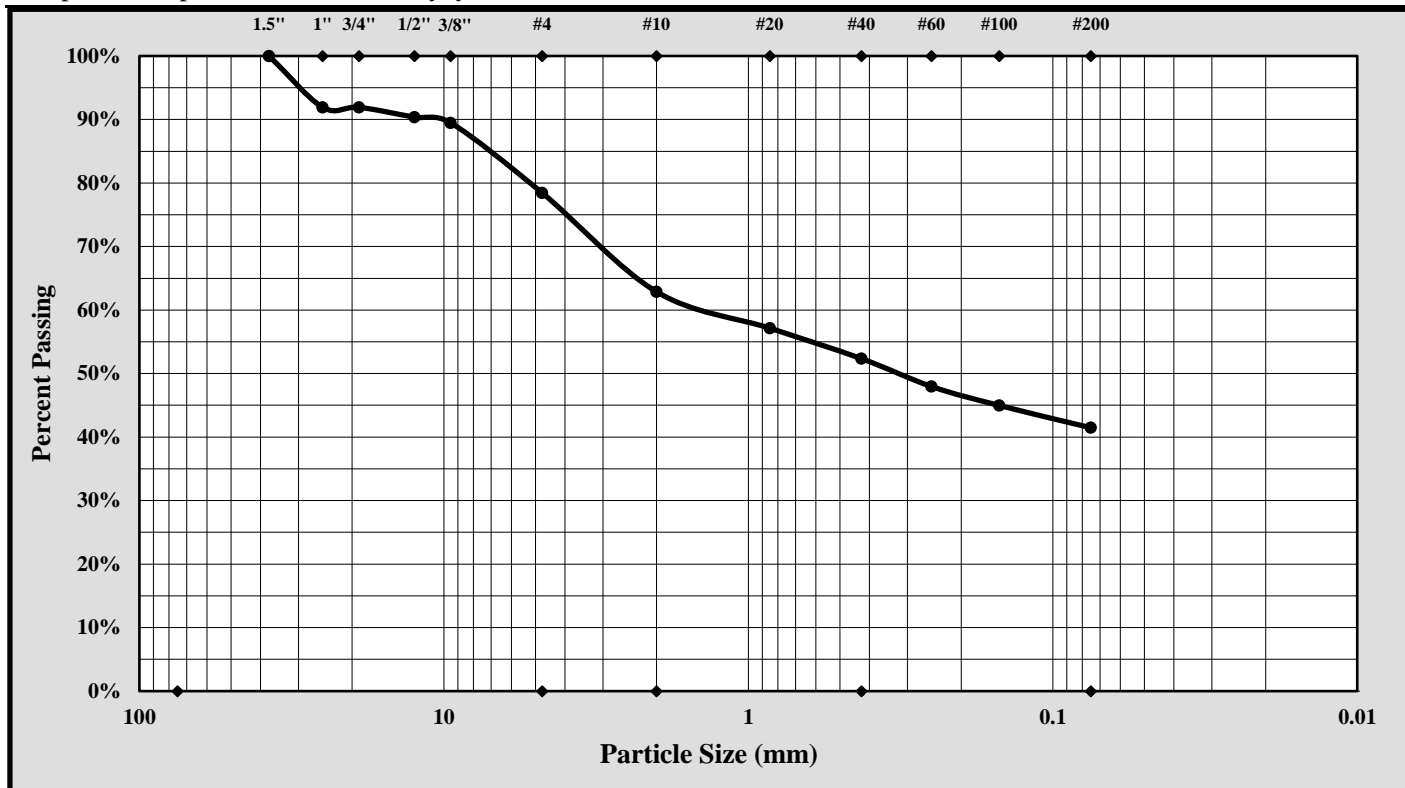


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	5/11/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/21 - 2/28/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-47	Sample #:	SS-8
		Sample Date:	2/12/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	24.5'- 26.0'
Sample Description:	Clayey Sand with Gravel (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: 31.25 mm Gravel: 21.6%
 Silt & Clay (% Passing #200): 41.5% Total Sand: 37.0%

Liquid Limit	39	Plastic Limit	25	Plastic Index	14
Coarse Sand:	15.6%	Medium Sand:	10.5%	Fine Sand:	10.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

5/11/18
 Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



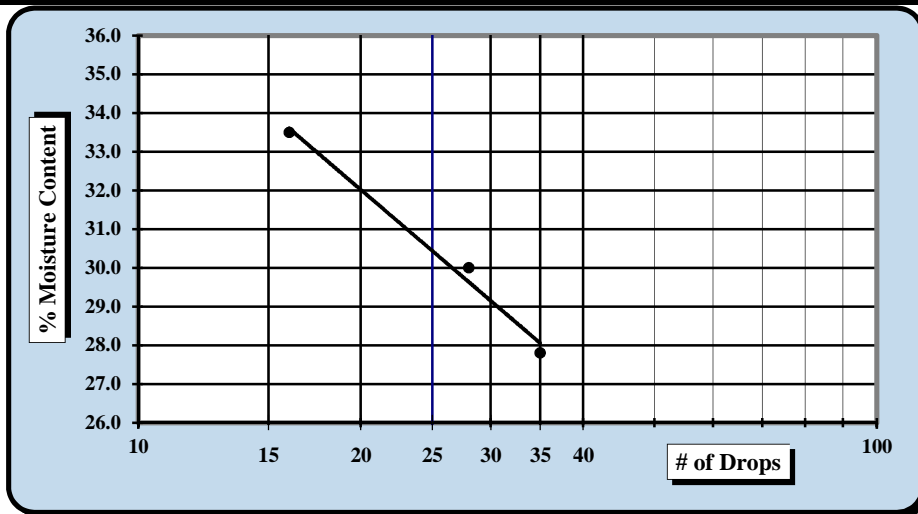
Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-48	Sample #:	SS-1
Log #:	43-2321	Sample Date:	Various
		Depth:	0.0' - 2.0'

Sample Description: Sandy lean clay (CL, A-6 (4))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	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	6	18			15	16	
A	Tare Weight	15.34	15.45	15.42			15.32	15.64	
B	Wet Soil Weight + A	25.71	26.40	27.57			25.45	24.27	
C	Dry Soil Weight + A	23.11	23.87	24.93			23.93	22.98	
D	Water Weight (B-C)	2.60	2.53	2.64			1.52	1.29	
E	Dry Soil Weight (C-A)	7.77	8.42	9.51			8.61	7.34	
F	% Moisture (D/E)*100	33.5%	30.0%	27.8%			17.7%	17.6%	
N	# OF DROPS	16	28	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						17.7%		



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

NP, Non-Plastic

Liquid Limit **30**

Plastic Limit **18**

Plastic Index **12**

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

4/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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

Sieve Analysis of Soils

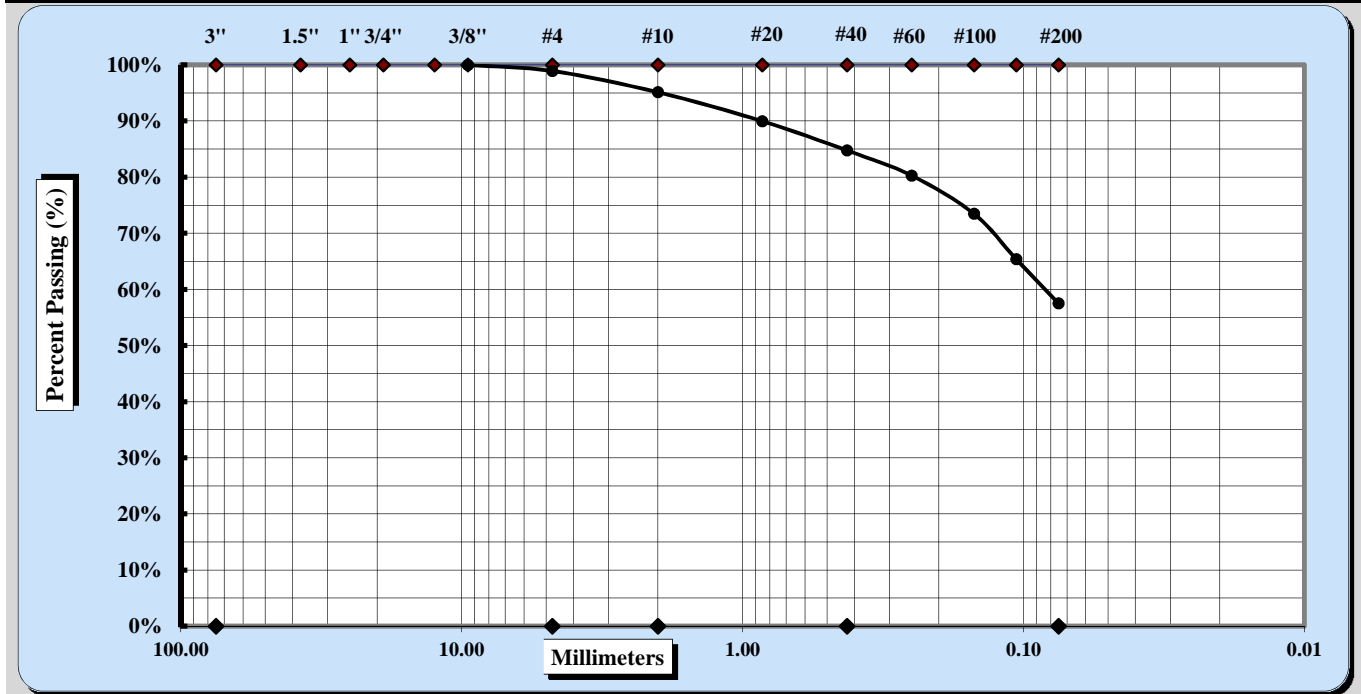


Quality Assurance

ASTM D6913 Method A

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

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/21/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-48	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	1
		Depth:	0.0' - 2.0'
Sample Description:	Sandy lean clay (CL, A-6 (4))		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
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	4%	Fine Sand	27%
Gravel	1%	Medium Sand	10%	Silt & Clay	57%
Liquid Limit	30	Plastic Limit	18	Plastic Index	12

Coarse Sand	4%	Medium Sand	10%	Fine Sand	27%
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.		Staff Professional	5/23/2018
Technical Responsibility	Signature	Position	Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-48	Sample #:	SS-2
Log #:	43-2321	Sample Date:	Various
		Depth:	2.0' - 4.0'

Sample Description: Lean clay with sand (CL, A-6 (14))

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	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	20	2			3	21	
A	Tare Weight	15.39	15.46	15.55			15.49	15.51	
B	Wet Soil Weight + A	26.68	27.65	28.14			24.75	24.55	
C	Dry Soil Weight + A	23.32	24.18	24.69			22.94	22.77	
D	Water Weight (B-C)	3.36	3.47	3.45			1.81	1.78	
E	Dry Soil Weight (C-A)	7.93	8.72	9.14			7.45	7.26	
F	% Moisture (D/E)*100	42.4%	39.8%	37.7%			24.3%	24.5%	
N	# OF DROPS	16	25	35			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

Liquid Limit **40**

Plastic Limit **24**

Plastic Index **16**

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

4/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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

Sieve Analysis of Soils

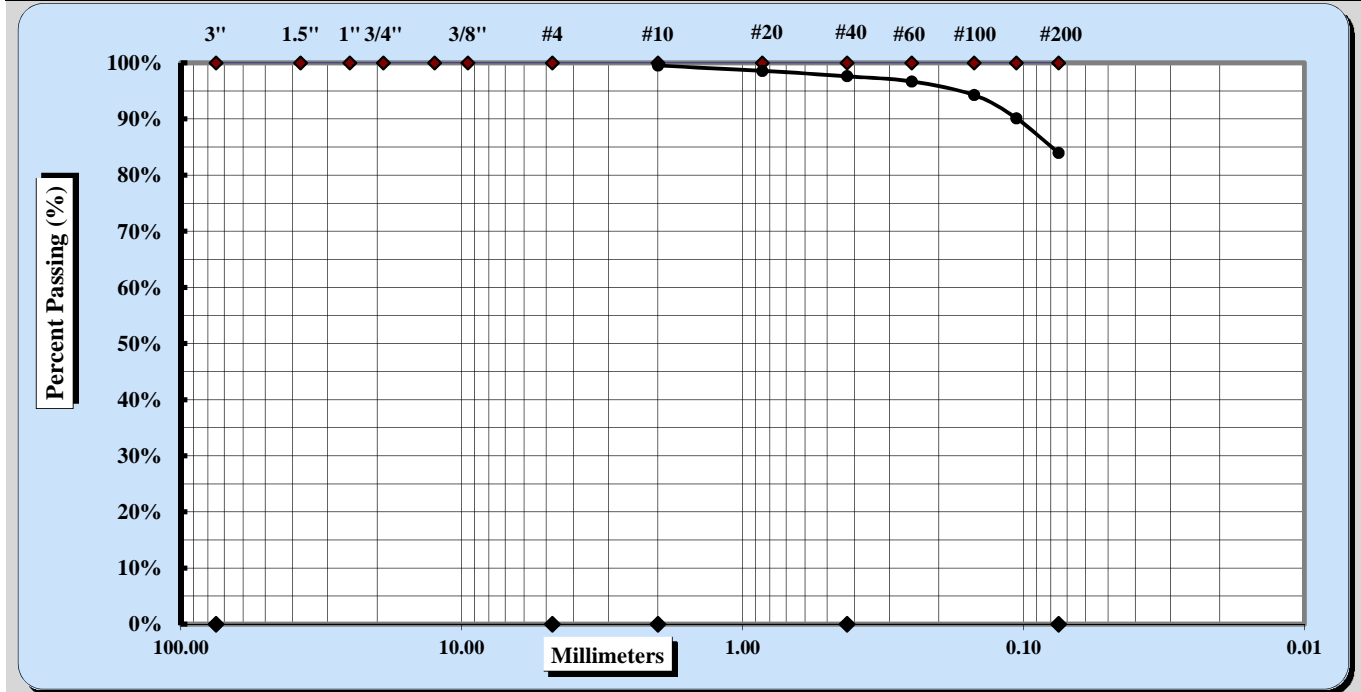


Quality Assurance

ASTM D6913 Method A

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

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/21/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-48	Type:	Split Spoon
		Sample Date:	Various
Sample Log No.:	43-2321	Sample:	2
		Depth:	2.0' - 4.0'
Sample Description:	Lean clay with sand (CL, A-6 (14))		



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

Maximum Particle Size	No. 10	Coarse Sand	0%	Fine Sand	14%
Gravel	0%	Medium Sand	2%	Silt & Clay	84%
Liquid Limit	40	Plastic Limit	24	Plastic Index	16

Coarse Sand	0%	Medium Sand	2%	Fine Sand	14%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



Quality Assurance ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/30/2018
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-48	Sample #:	SS-4
Log #:	43-2321	Sample Date:	Various
		Elevation:	6.0' - 8.0'

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)	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	22	23			4	28-B	
A	Tare Weight	15.42	15.39	15.44			15.44	17.69	
B	Wet Soil Weight + A	25.74	26.50	27.77			25.14	26.97	
C	Dry Soil Weight + A	23.11	23.81	24.88			23.31	25.22	
D	Water Weight (B-C)	2.63	2.69	2.89			1.83	1.75	
E	Dry Soil Weight (C-A)	7.69	8.42	9.44			7.87	7.53	
F	% Moisture (D/E)*100	34.2%	31.9%	30.6%			23.3%	23.2%	
N	# OF DROPS	16	26	35			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						23.3%		



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

NP, Non-Plastic

Liquid Limit **32**

Plastic Limit **23**

Plastic Index **9**

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

4/30/2018
Date

Michael D. Kelso, E.I.
Technical Responsibility

5/23/2018
Date

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

Sieve Analysis of Soils

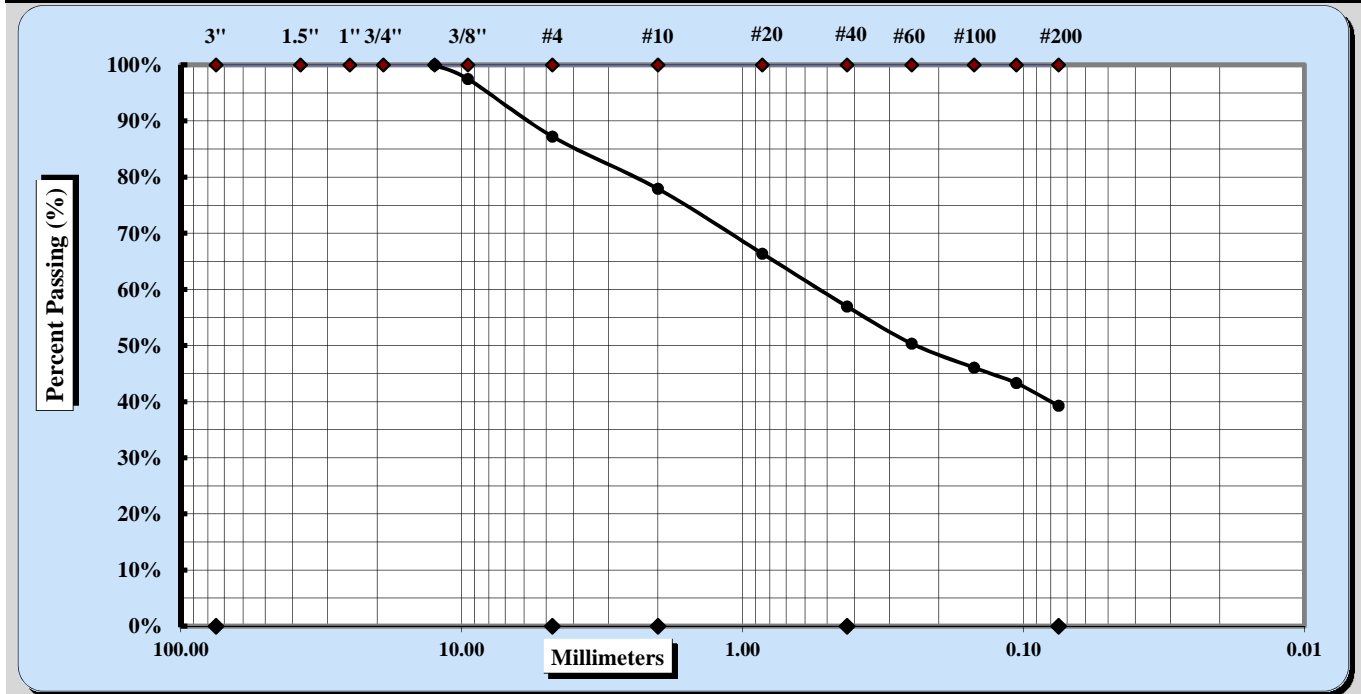


Quality Assurance

ASTM D6913 Method A

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

Project #:	1461-16-047.2B	Report Date:	5/23/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	5/21/18 - 5/22/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	B-48	Type:	Split Spoon
Sample Log No.:	43-2321	Sample:	4
Sample Date:	Various		
Depth:	6.0' - 8.0'		
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
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	9%	Fine Sand	18%
Gravel	13%	Medium Sand	21%	Silt & Clay	39%
Liquid Limit	32	Plastic Limit	23	Plastic Index	9

Coarse Sand	9%	Medium Sand	21%	Fine Sand	18%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

5/23/2018
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



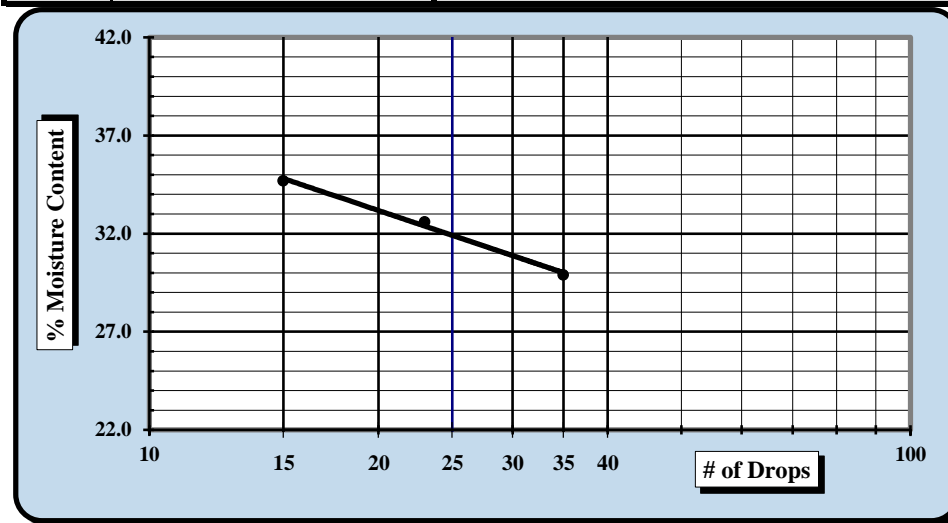
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-1
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	24.5' - 26.5'

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

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.70	26.48	26.32				25.93	26.94	
B	Wet Soil Weight + A	41.95	44.54	41.93				33.05	33.65	
C	Dry Soil Weight + A	38.44	40.10	37.91				31.73	32.39	
D	Water Weight (B-C)	3.51	4.44	4.02				1.32	1.26	
E	Dry Soil Weight (C-A)	11.74	13.62	11.59				5.80	5.45	
F	% Moisture (D/E)*100	29.9%	32.6%	34.7%				22.8%	23.1%	
N	# OF DROPS	35	23	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							23.0%		



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

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	32
Plastic Limit	23
Plastic Index	9
Group Symbol	CL

Multipoint Method
 One-point Method

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

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

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

Benjamin J. Kovaleski
Technician Name

4/10/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/10/18
Date

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

**MOISTURE, ASH, AND
 ORGANIC MATTER**



ASTM D-2974

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-1
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	24.5' - 26.5'
Sample Description:	Clayey Sand with Gravel (SC, A-2-4)		
Equipment:	Balance: 0.01 g. Readability, 500g. Minimum Capacity		
Balance:	S&ME ID #: 13942	Cal. Date: 8/19/17	Due: 8/19/18

Method A: Moisture Content Determination

Required Oven Temperature: 105 ± 5 °C

Oven Temperature: 105 °C		Tare #	
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	
a	Mass of As-Received Specimen + Tare Wt.	grams	
b	Mass of Oven Dry Specimen + Tare Wt.	grams	
w	Water Weight	(a-b)	
A	Mass of As-Received Specimen	(a-t)	
B	Mass of Oven Dry Specimen	(b-t)	
% Moisture Content as a % of As Received or Total Mass		(w/A)*100	
% Moisture Content as a % of Oven-dried Mass		(w/B)*100	

Oven	S&ME ID #:	Cal. Date:	Due:
------	------------	------------	------

Method C (440 °C) or D (750 °C): Ash Content and Organic Matter Determination

Muffle Furnace: 440 °C		Tare #	B
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	56.78
b	Mass of Oven Dry Specimen + Tare Wt.	grams	87.83
c	Ash Weight + Tare Wt.	grams	86.89
C	Ash Weight	c-t	30.11
B	Mass of Oven Dry Specimen	(b-t)	31.05
D	% Ash Content	(C/B)*100	97.0%
	% Organic Matter	100-D	3.0%

Muffle Furnace:	S&ME ID #: 23123	Cal. Date: N/A	Due: N/A
-----------------	------------------	----------------	----------

Notes / Deviations / References: ASTM D2974: Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

Benjamin Kovalski
 Technician Name

Signature

NICET Level III/117226
 Level/Certification

4/10/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/10/18
 Date

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

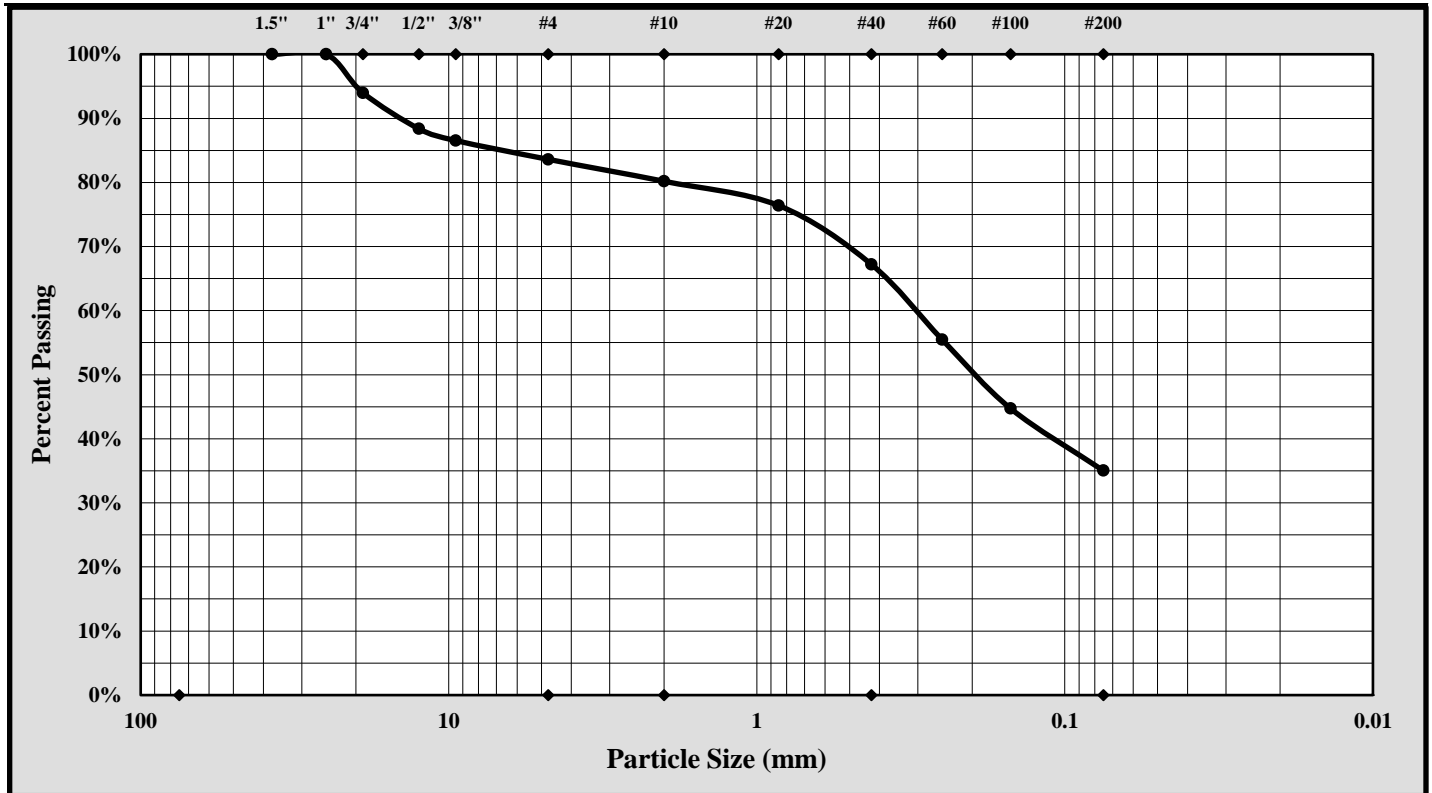


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-1
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	24.5' - 26.5'
Sample Description:	Clayey Sand with Gravel (SC, A-2-4)		



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

Maximum Particle Size: 25.0 mm Gravel: 16.4%
 Silt & Clay (% Passing #200): 35.0% Total Sand: 48.6%

Liquid Limit	32	Plastic Limit	23	Plastic Index	9
Coarse Sand:	3.4%	Medium Sand:	13.0%	Fine Sand:	32.2%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/10/18

Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



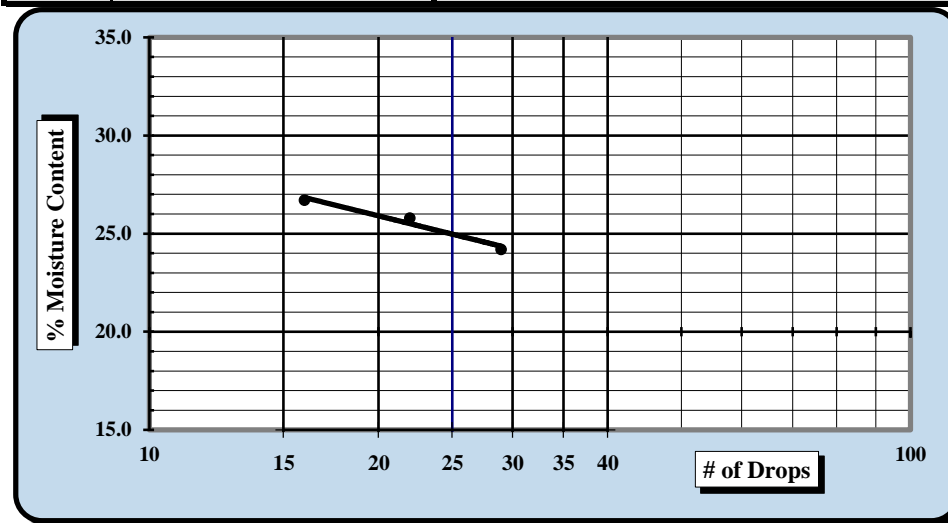
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-2
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	26.5' - 28.5'

Sample Description: Clayey Sand (SC, A-4(0))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	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	26.32	27.30				26.85	26.75	
B	Wet Soil Weight + A	47.64	45.50	46.48				34.55	33.87	
C	Dry Soil Weight + A	43.77	41.57	42.44				33.40	32.82	
D	Water Weight (B-C)	3.87	3.93	4.04				1.15	1.05	
E	Dry Soil Weight (C-A)	16.01	15.25	15.14				6.55	6.07	
F	% Moisture (D/E)*100	24.2%	25.8%	26.7%				17.6%	17.3%	
N	# OF DROPS	29	22	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							17.5%		



NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	25
Plastic Limit	17
Plastic Index	8
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>4/10/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/10/18</u> Date
---	------------------------	---	------------------------

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

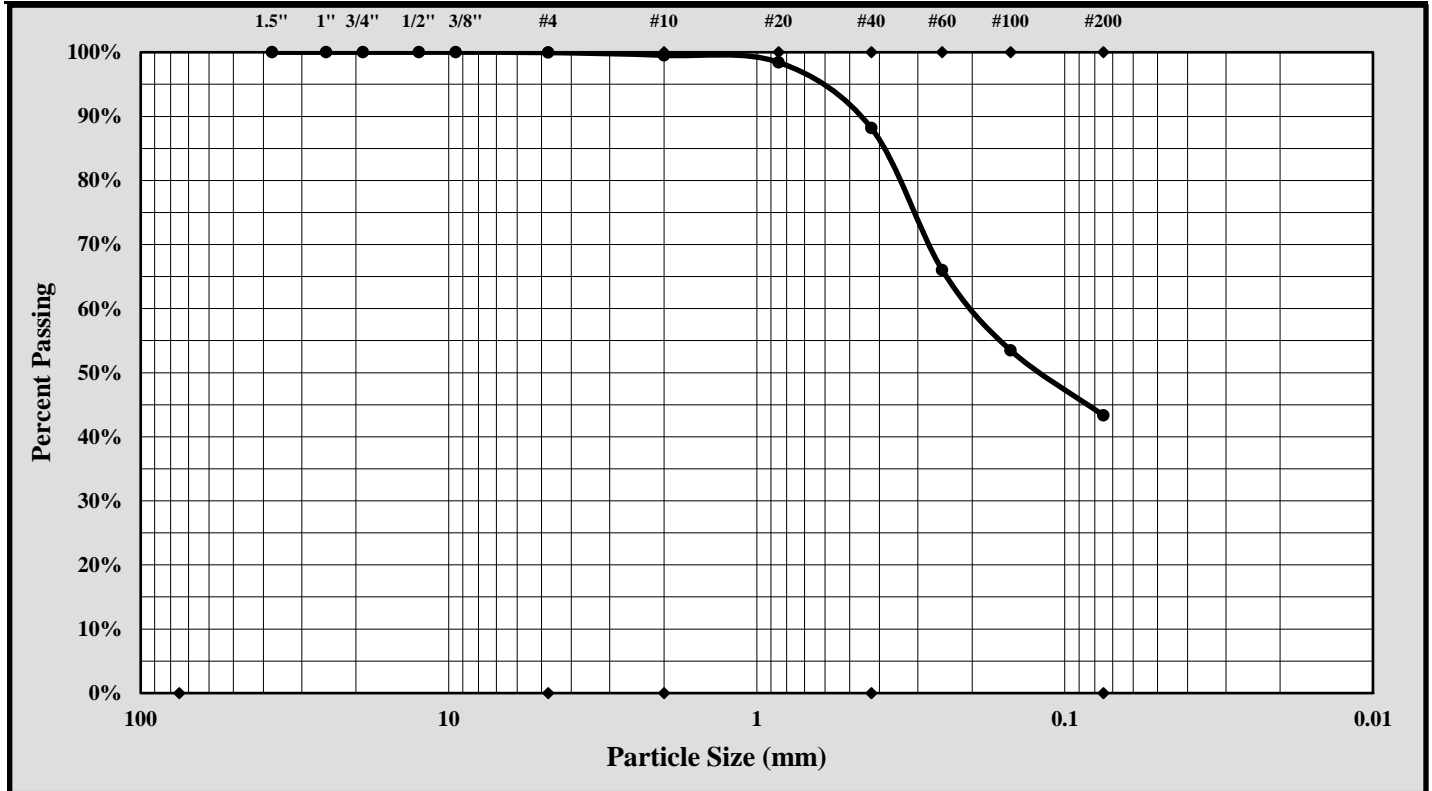


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-2
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	26.5' - 28.5'
Sample Description:	Clayey Sand (SC, A-4(0))		



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

Maximum Particle Size:	2.00 mm	Gravel:	0.1%
Silt & Clay (% Passing #200):	43.3%	Total Sand:	56.6%

Liquid Limit	25	Plastic Limit	17	Plastic Index	8
Coarse Sand:	0.4%	Medium Sand:	11.3%	Fine Sand:	44.8%

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

4/10/18

Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-4
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	30.5' - 32.5'

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

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		11	12	13			14	15		
A	Tare Weight	26.66	26.65	26.75				26.65	27.60	
B	Wet Soil Weight + A	47.52	45.76	43.28				33.12	35.54	
C	Dry Soil Weight + A	41.94	40.39	38.31				31.80	33.94	
D	Water Weight (B-C)	5.58	5.37	4.97				1.32	1.60	
E	Dry Soil Weight (C-A)	15.28	13.74	11.56				5.15	6.34	
F	% Moisture (D/E)*100	36.5%	39.1%	43.0%				25.6%	25.2%	
N	# OF DROPS	35	25	15				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							25.4%		



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	39
Plastic Limit	25
Plastic Index	14
Group Symbol	CL

Multipoint Method
 One-point Method

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

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

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

Benjamin J. Kovaleski
 Technician Name

4/10/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/10/18
 Date

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

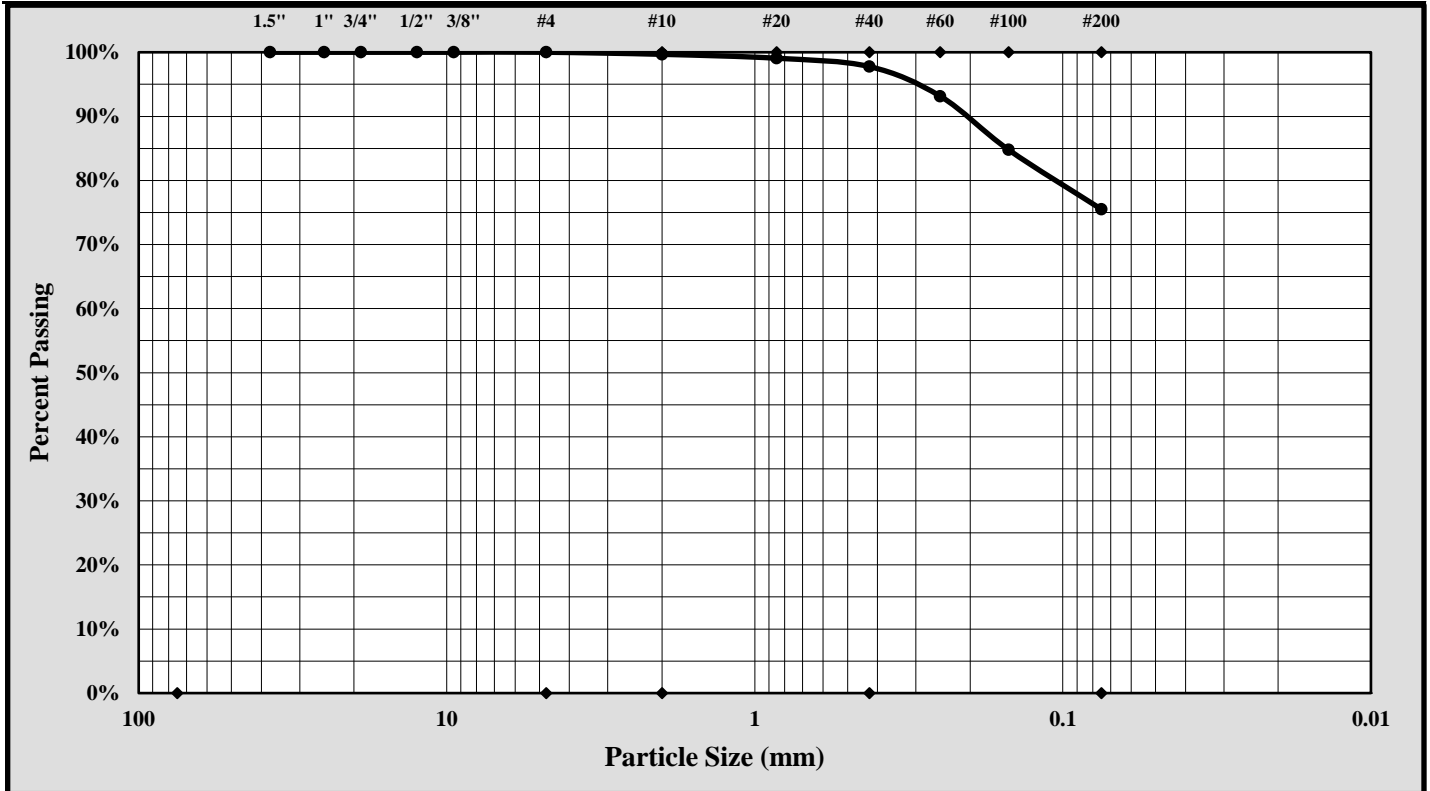
Particle Size Analysis of Soils

ASTM D 6913



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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-4
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	30.5' - 32.5'
Sample Description:	Lean Clay with Sand (CL, A-6(10))		



LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



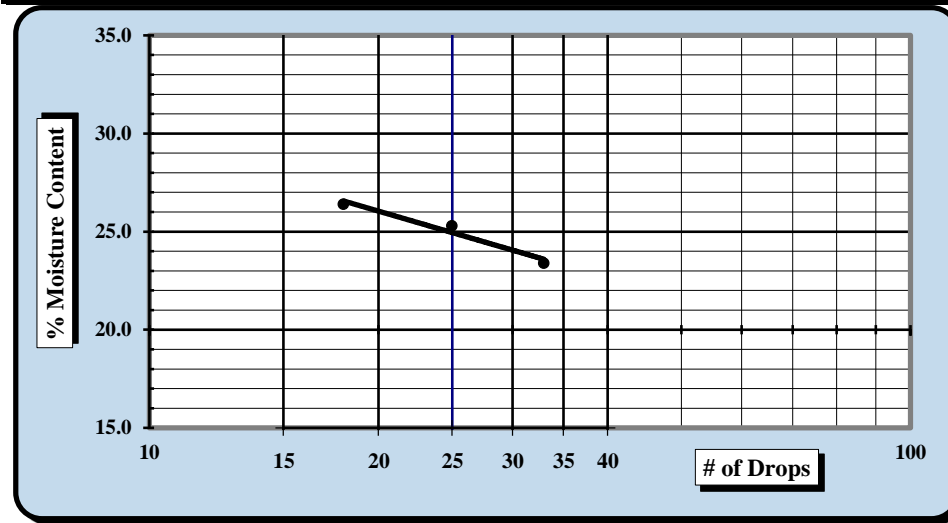
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-49	Sample #:	SS-5
		Sample Date:	2/22/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	32.5' - 34.5'

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					
A	Tare Weight	26.58	26.64	26.82					
B	Wet Soil Weight + A	45.29	44.81	46.11					
C	Dry Soil Weight + A	41.74	41.14	42.08					
D	Water Weight (B-C)	3.55	3.67	4.03					
E	Dry Soil Weight (C-A)	15.16	14.50	15.26					
F	% Moisture (D/E)*100	23.4%	25.3%	26.4%					
N	# OF DROPS	33	25	18					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	25
Plastic Limit	NP
Plastic Index	NP
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> <i>Technician Name</i>	<u>4/10/18</u> <i>Date</i>	<u>Matthew F. Cooke, P.G.</u> <i>Technical Responsibility</i>	<u>4/10/18</u> <i>Date</i>
--	-------------------------------	--	-------------------------------

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



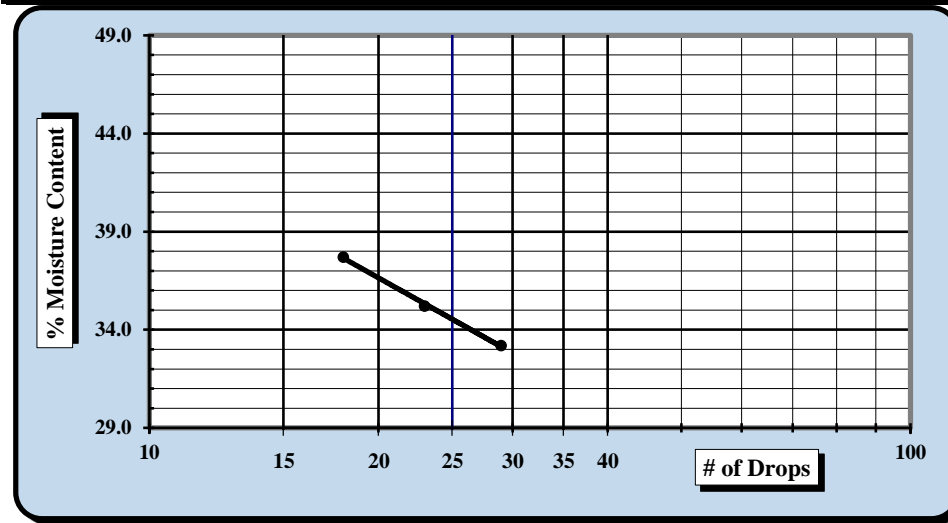
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-4
Location:	Bridge Boring	Sample Date:	2/18/18
Type:	Split-spoon	Depth:	7.0' - 9.0'

Sample Description: Silt with Sand (ML, A-4(6))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		21	22	23			24	25		
A	Tare Weight	28.08	25.67	27.24				25.99	26.80	
B	Wet Soil Weight + A	46.33	43.32	44.30				32.06	34.40	
C	Dry Soil Weight + A	41.78	38.72	39.63				30.74	32.77	
D	Water Weight (B-C)	4.55	4.60	4.67				1.32	1.63	
E	Dry Soil Weight (C-A)	13.70	13.05	12.39				4.75	5.97	
F	% Moisture (D/E)*100	33.2%	35.2%	37.7%				27.8%	27.3%	
N	# OF DROPS	29	23	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							27.6%		



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	35
Plastic Limit	28
Plastic Index	7
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

4/10/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/10/18
 Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-6
Location:	Bridge Boring	Sample Date:	2/18/18
Type:	Split-spoon	Depth:	13.5' - 15.0'

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		
		26	27	28			29	30	
A	Tare Weight	27.34	27.01	26.81			27.00	27.38	
B	Wet Soil Weight + A	44.85	42.59	42.30			34.98	34.55	
C	Dry Soil Weight + A	40.31	38.31	37.75			33.48	33.20	
D	Water Weight (B-C)	4.54	4.28	4.55			1.50	1.35	
E	Dry Soil Weight (C-A)	12.97	11.30	10.94			6.48	5.82	
F	% Moisture (D/E)*100	35.0%	37.9%	41.6%			23.1%	23.2%	
N	# OF DROPS	31	23	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						23.2%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	37	
Plastic Limit	23	
Plastic Index	14	
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>4/10/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/10/18</u> Date
---	------------------------	---	------------------------

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

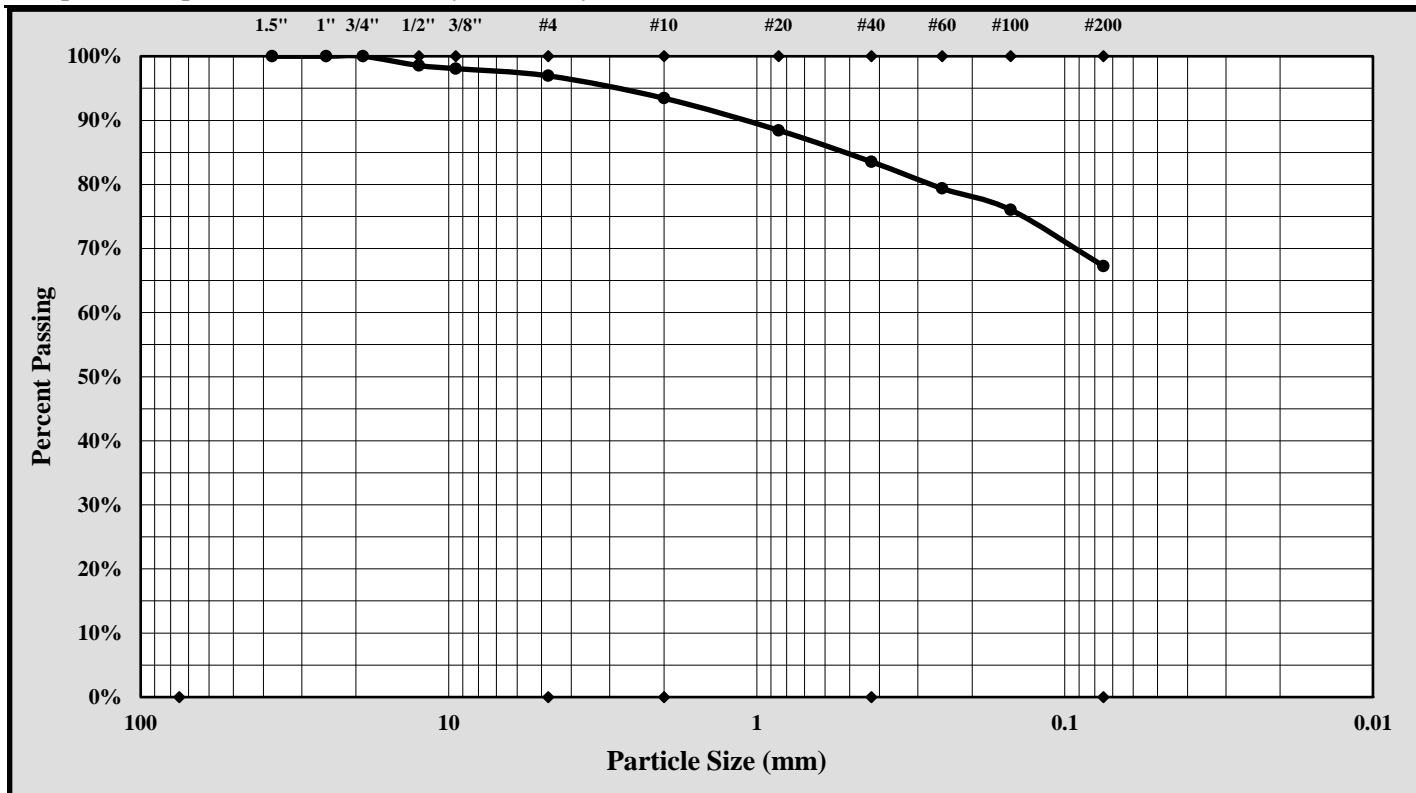


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-6
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
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:	3.1%
Silt & Clay (% Passing #200):	67.3%	Total Sand:	29.7%

Liquid Limit	37	Plastic Limit	23	Plastic Index	14
Coarse Sand:	3.5%	Medium Sand:	9.9%	Fine Sand:	16.3%
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

4/10/18
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



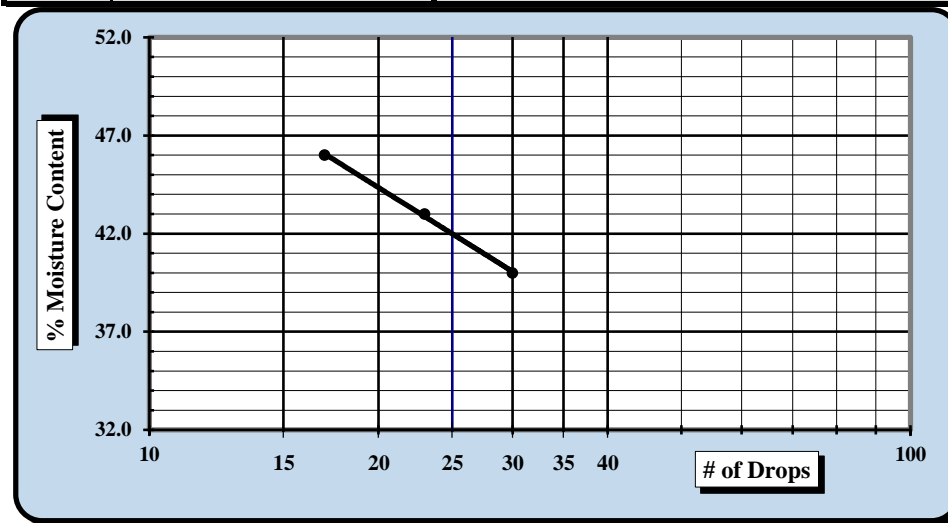
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-8
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'

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		
		31	32	33			34	35	
A	Tare Weight	28.61	27.65	26.68			28.25	26.95	
B	Wet Soil Weight + A	45.73	41.38	42.80			34.98	34.41	
C	Dry Soil Weight + A	40.84	37.25	37.72			33.48	32.77	
D	Water Weight (B-C)	4.89	4.13	5.08			1.50	1.64	
E	Dry Soil Weight (C-A)	12.23	9.60	11.04			5.23	5.82	
F	% Moisture (D/E)*100	40.0%	43.0%	46.0%			28.7%	28.2%	
N	# OF DROPS	30	23	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.5%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	42	
Plastic Limit	28	
Plastic Index	14	
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

Benjamin J. Kovaleski
Technician Name

4/10/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/10/18
Date

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

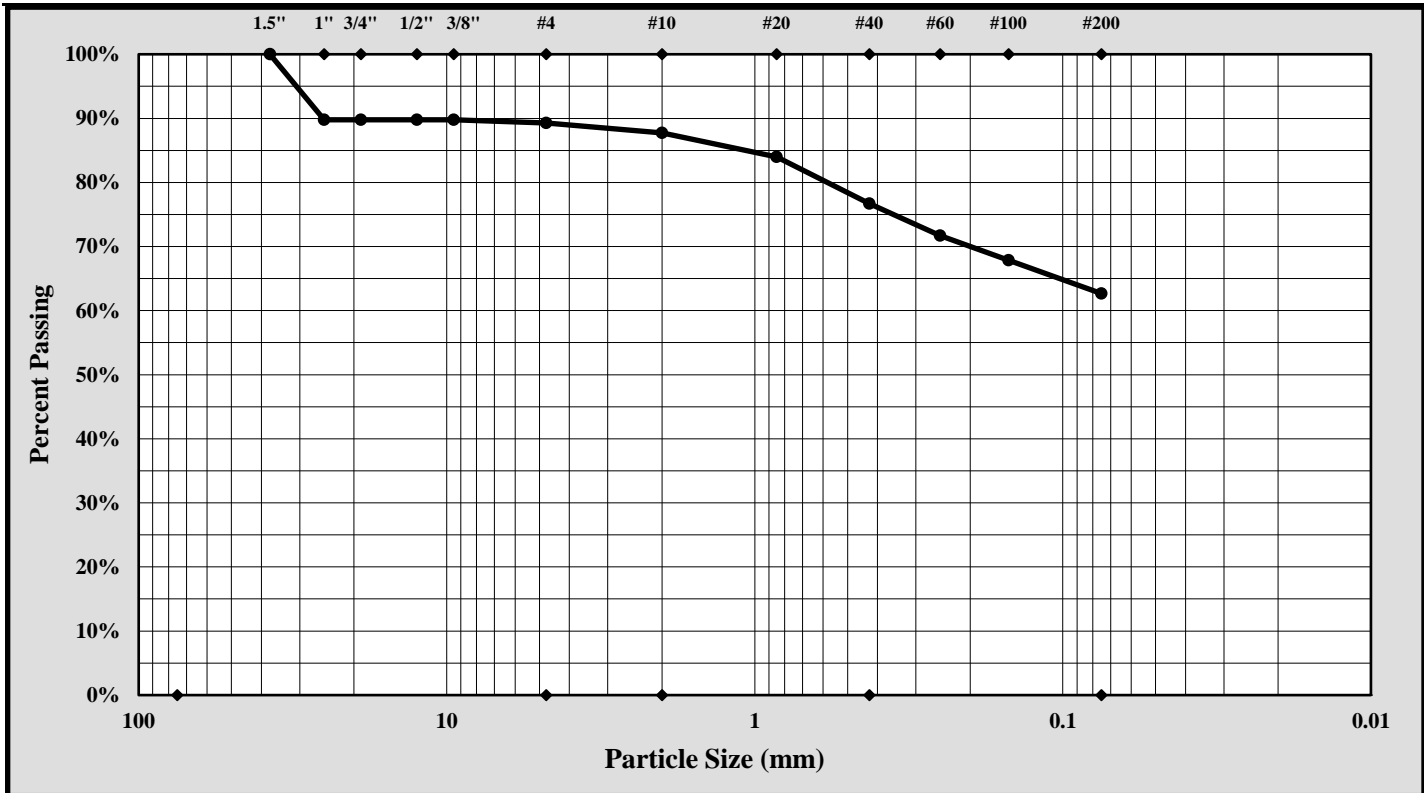


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-8
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	23.5' - 25.0'
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: 37.5 mm Gravel: 10.7%
 Silt & Clay (% Passing #200): 62.7% Total Sand: 26.6%

Liquid Limit	42	Plastic Limit	28	Plastic Index	14
Coarse Sand:	1.5%	Medium Sand:	11.0%	Fine Sand:	14.0%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.

Technical Responsibility

Project Manager

Position

4/10/18

Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-10
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		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)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		36	37	38			39	40	
A	Tare Weight	25.68	26.21	26.29			25.90	26.28	
B	Wet Soil Weight + A	36.47	37.93	39.46			32.77	34.17	
C	Dry Soil Weight + A	33.02	34.00	34.89			31.07	32.26	
D	Water Weight (B-C)	3.45	3.93	4.57			1.70	1.91	
E	Dry Soil Weight (C-A)	7.34	7.79	8.60			5.17	5.98	
F	% Moisture (D/E)*100	47.0%	50.4%	53.1%			32.9%	31.9%	
N	# OF DROPS	35	26	20			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						32.4%		



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	51
Plastic Limit	32
Plastic Index	19
Group Symbol	MH

Multipoint Method
 One-point Method

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

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

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

Benjamin J. Kovaleski
Technician Name

4/10/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/10/18
Date

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

MOISTURE, ASH, AND ORGANIC MATTER



ASTM D-2974

S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-10
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	33.5' - 35.0'
Sample Description:	Elastic Silt with Sand (MH, A-7-5(6))		
Equipment:	Balance: 0.01 g. Readability, 500g. Minimum Capacity		
Balance:	S&ME ID #: 13942	Cal. Date: 8/19/17	Due: 8/19/18

Method A: Moisture Content Determination

Required Oven Temperature: 105 ± 5 °C

Oven Temperature: 105 °C		Tare #	
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	
a	Mass of As-Received Specimen + Tare Wt.	grams	
b	Mass of Oven Dry Specimen + Tare Wt.	grams	
w	Water Weight	(a-b)	
A	Mass of As-Received Specimen	(a-t)	
B	Mass of Oven Dry Specimen	(b-t)	
% Moisture Content as a % of As Received or Total Mass		(w/A)*100	
% Moisture Content as a % of Oven-dried Mass		(w/B)*100	

Oven	S&ME ID #:	Cal. Date:	Due:
------	------------	------------	------

Method C (440 °C) or D (750 °C): Ash Content and Organic Matter Determination

Muffle Furnace: 440 °C		Tare #	D
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	55.72
b	Mass of Oven Dry Specimen + Tare Wt.	grams	75.96
c	Ash Weight + Tare Wt.	grams	75.54
C	Ash Weight	c-t	19.82
B	Mass of Oven Dry Specimen	(b-t)	20.24
D	% Ash Content	(C/B)*100	97.9%
	% Organic Matter	100-D	2.1%

Muffle Furnace:	S&ME ID #: 23123	Cal. Date: N/A	Due: N/A
-----------------	------------------	----------------	----------

Notes / Deviations / References: ASTM D2974: Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

Benjamin Kovalski
 Technician Name

Signature

NICET Level III/117226
 Level/Certification

4/10/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/10/18
 Date

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

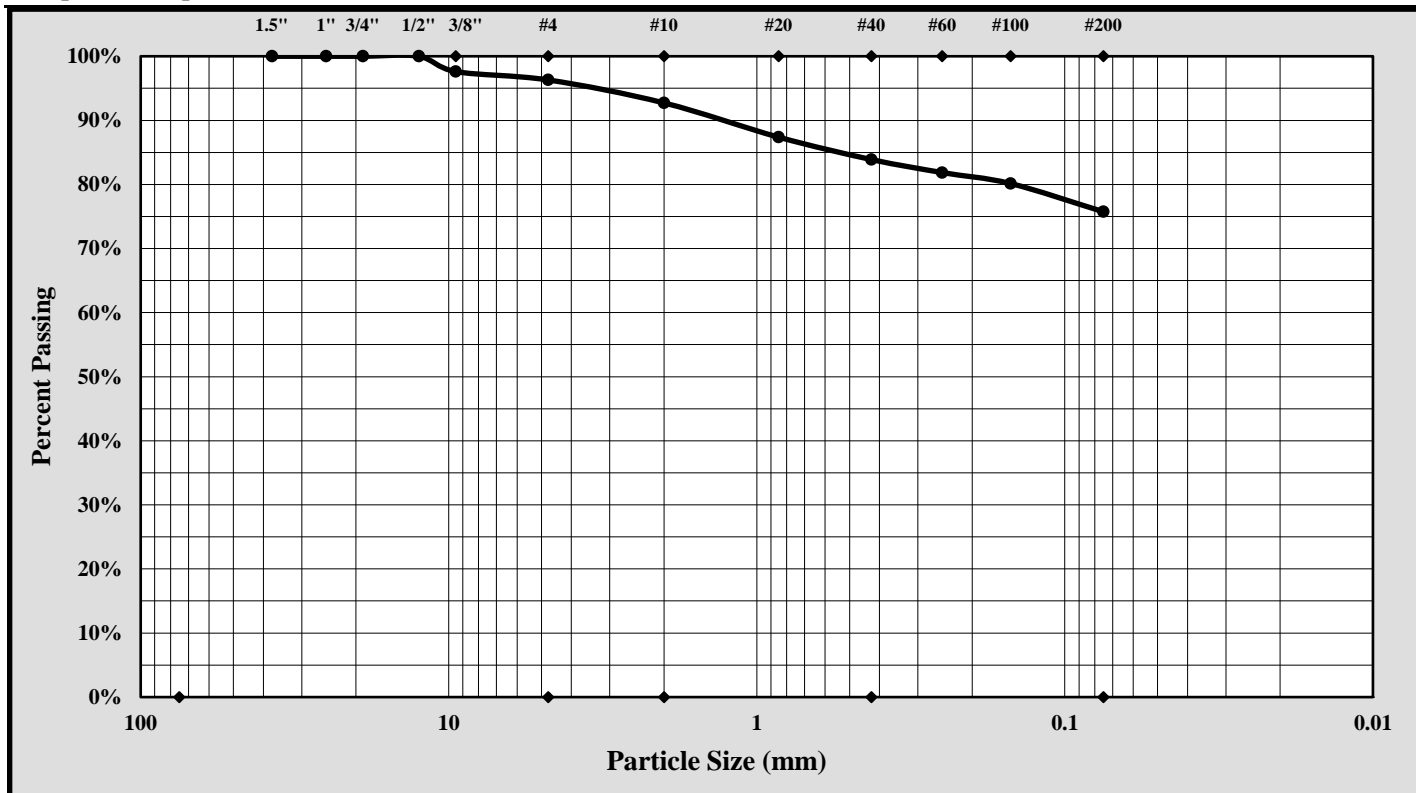


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-10
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		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 (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	12.5 mm	Gravel:	3.7%
Silt & Clay (% Passing #200):	75.8%	Total Sand:	20.6%

Liquid Limit	51	Plastic Limit	32	Plastic Index	19
Coarse Sand:	3.6%	Medium Sand:	8.8%	Fine Sand:	8.1%

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

4/10/18

Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



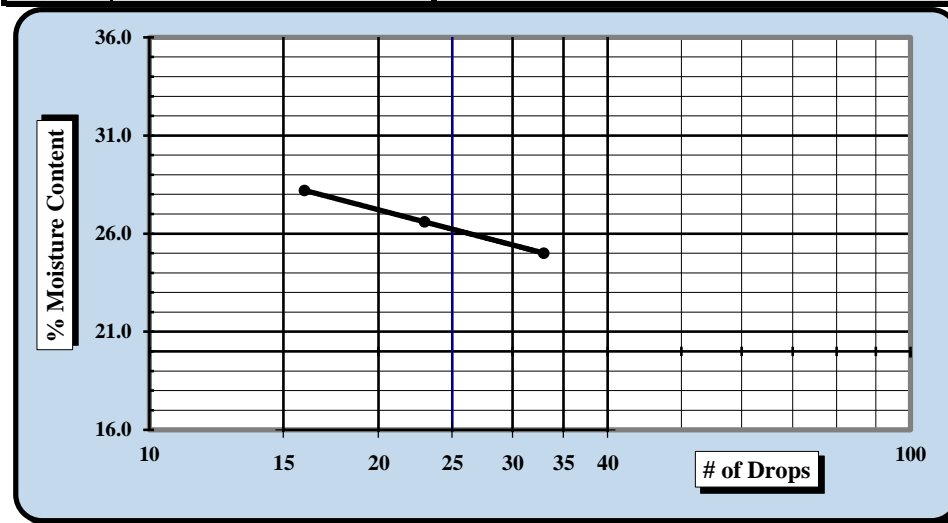
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date:	4/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-14
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	53.5' - 55.0'

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		
		41	42	43			44	45	
A	Tare Weight	28.74	28.64	28.38			25.78	25.10	
B	Wet Soil Weight + A	46.75	47.37	48.68			32.03	31.90	
C	Dry Soil Weight + A	43.15	43.44	44.22			30.89	30.67	
D	Water Weight (B-C)	3.60	3.93	4.46			1.14	1.23	
E	Dry Soil Weight (C-A)	14.41	14.80	15.84			5.11	5.57	
F	% Moisture (D/E)*100	25.0%	26.6%	28.2%			22.3%	22.1%	
N	# OF DROPS	33	23	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						22.2%		



NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	26
Plastic Limit	22
Plastic Index	4
Group Symbol	CL-ML
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

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

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

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

Benjamin J. Kovaleski
Technician Name

4/10/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/10/18
Date

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

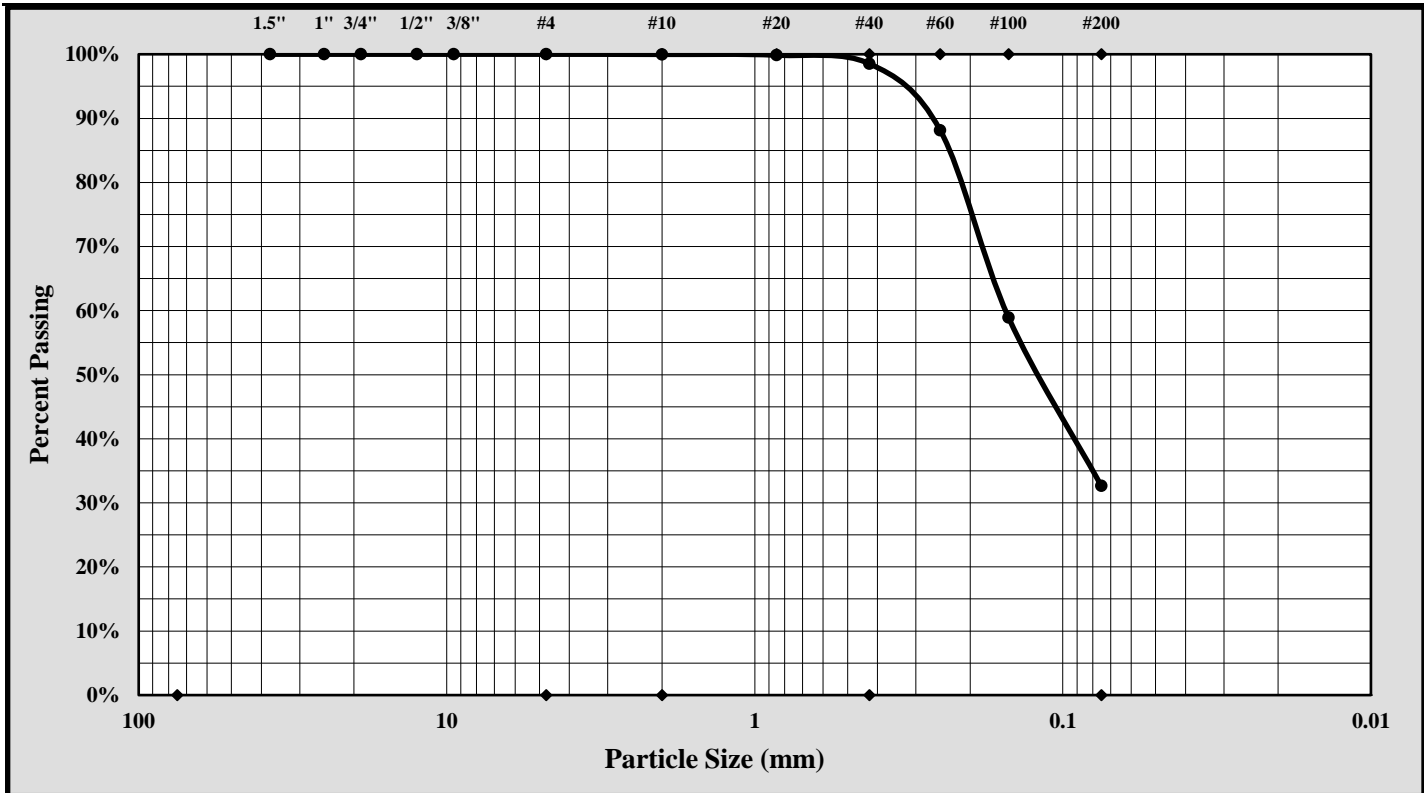


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/10/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/27 - 4/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	SS-14
		Sample Date:	2/18/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	53.5' - 55.0'
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: 0.85 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 32.6% Total Sand: 67.4%

Liquid Limit	26	Plastic Limit	22	Plastic Index	4
Coarse Sand:	0.0%	Medium Sand:	1.4%	Fine Sand:	65.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/10/18
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date:	4/02/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-51	Sample #:	SS-1
		Sample Date:	2/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'

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

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		26	27	28			29	30		
A	Tare Weight	27.37	27.00	26.80				27.00	27.36	
B	Wet Soil Weight + A	41.85	41.23	41.71				33.57	35.09	
C	Dry Soil Weight + A	37.22	36.46	36.43				32.22	33.47	
D	Water Weight (B-C)	4.63	4.77	5.28				1.35	1.62	
E	Dry Soil Weight (C-A)	9.85	9.46	9.63				5.22	6.11	
F	% Moisture (D/E)*100	47.0%	50.4%	54.8%				25.9%	26.5%	
N	# OF DROPS	32	24	15				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	50
Plastic Limit	26
Plastic Index	24
Group Symbol	CL

Multipoint Method
 One-point Method

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

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

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

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/03/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/03/18</u> Date
---	------------------------	---	------------------------

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date:	4/02/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-51	Sample #:	SS-6
		Sample Date:	2/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'

Sample Description: Silty Gravel with Sand (GM, A-7-6(4))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		31	32	33			34	35	
A	Tare Weight	28.62	27.70	26.70			28.25	26.96	
B	Wet Soil Weight + A	44.46	44.50	41.98			34.52	33.98	
C	Dry Soil Weight + A	40.00	39.45	37.02			33.17	32.45	
D	Water Weight (B-C)	4.46	5.05	4.96			1.35	1.53	
E	Dry Soil Weight (C-A)	11.38	11.75	10.32			4.92	5.49	
F	% Moisture (D/E)*100	39.2%	43.0%	48.1%			27.4%	27.9%	
N	# OF DROPS	35	25	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						27.7%		



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

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	43
Plastic Limit	28
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

<u>Benjamin J. Kovaleski</u> Technician Name	<u>4/03/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>4/03/18</u> Date
---	------------------------	---	------------------------

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

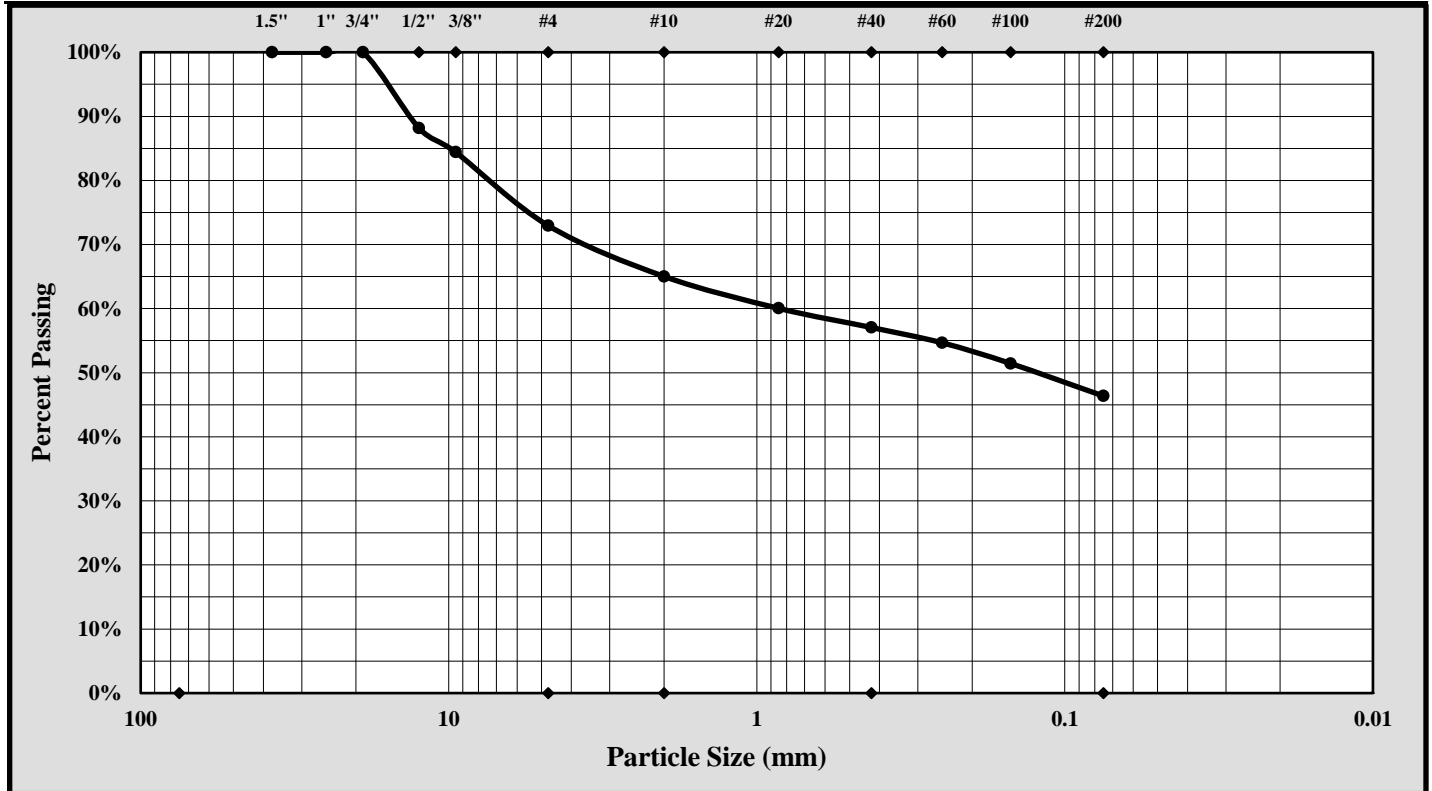


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/23 - 4/02/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-51	Sample #:	SS-6
		Sample Date:	2/08/18
Location:	Bridge Boring	Type:	Split-spoon
		Depth:	13.5' - 15.0'
Sample Description:	Silty Gravel with Sand (GM, A-7-6(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: 19.0 mm Gravel: 27.1%
 Silt & Clay (% Passing #200): 46.4% Total Sand: 26.6%

Liquid Limit 43 Plastic Limit 28 Plastic Index 15

Coarse Sand: 7.9% Medium Sand: 8.0% Fine Sand: 10.7%

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

4/03/18

Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date:	4/02/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-51	Sample #:	SS-9
		Sample Date:	2/08/18
Location:	Bridge boring	Type:	Split-spoon
		Depth:	28.5' - 30.0'

Sample Description: Silt with Sand (ML, A-6(11))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		36	37	38			39	40		
A	Tare Weight	25.69	26.19	26.28				25.90	26.27	
B	Wet Soil Weight + A	42.35	43.26	43.90				32.87	33.20	
C	Dry Soil Weight + A	37.79	38.46	38.83				31.41	31.78	
D	Water Weight (B-C)	4.56	4.80	5.07				1.46	1.42	
E	Dry Soil Weight (C-A)	12.10	12.27	12.55				5.51	5.51	
F	% Moisture (D/E)*100	37.7%	39.1%	40.4%				26.5%	25.8%	
N	# OF DROPS	33	25	19				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	39
Plastic Limit	26
Plastic Index	13
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

4/03/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

4/03/18
 Date

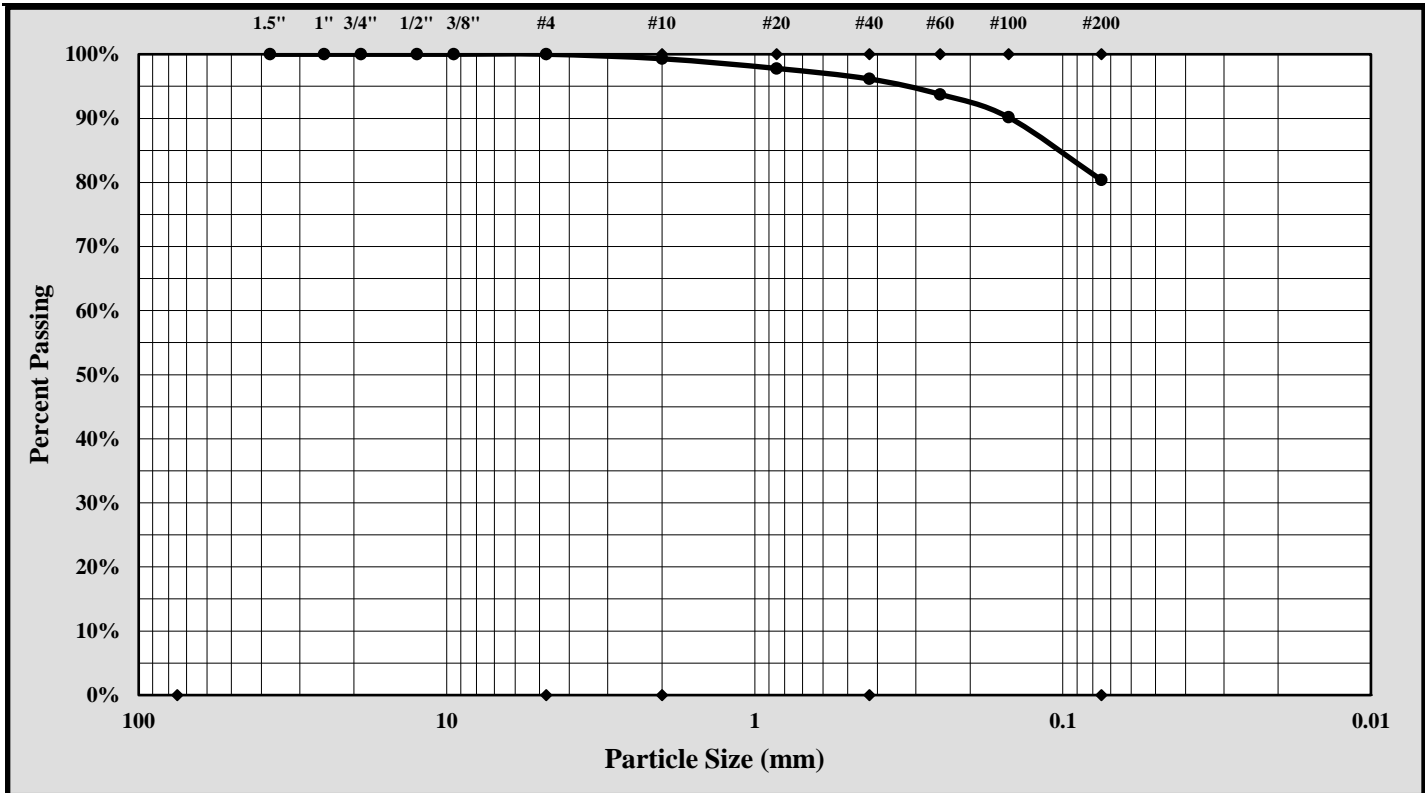
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Particle Size Analysis of Soils

ASTM D 6913



S&ME, Inc. Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/23 - 4/02/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-51	Sample #:	SS-9
		Sample Date:	2/08/18
Location:	Bridge boring	Type:	Split-spoon
		Depth:	28.5 - 30.0'
Sample Description:	Silt with Sand (ML, A-6(11))		



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

Maximum Particle Size: 2.00 mm Gravel: 0.0%
 Silt & Clay (% Passing #200): 80.4% Total Sand: 19.6%

Liquid Limit 39 Plastic Limit 26 Plastic Index 13

Coarse Sand: 0.7% Medium Sand: 3.2% Fine Sand: 15.8%

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

4/03/18

Date

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

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

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

Project #:	1461-16-047.2B	Report Date:	2/14/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/12 - 2/13/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sampled by:	S&ME	Sample Date(s):	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 <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	%			
DH-4	SS-1	0.0 - 2.0	WX-Z	0.00	71.20	64.42	6.78	10.5%			
DH-4	SS-2	2.0 - 4.0	D-5	0.00	50.95	43.48	7.47	17.2%			
DH-4	SS-4	6.0 - 8.0	YM-5	0.00	52.42	44.92	7.50	16.7%			
DH-4	SS-6	13.5 - 15.0	D-12	0.00	54.02	41.18	12.84	31.2%			
DH-5	SS-1	0.0 - 2.0	D-22	0.00	72.35	63.67	8.68	13.6%			
DH-5	SS-2	2.0 - 4.0	YM-7	0.00	73.44	58.17	15.27	26.3%			
DH-5	SS-3	4.0 - 6.0	YM-6	0.00	73.42	61.16	12.26	20.0%			
DH-5	SS-4	6.0 - 8.0	D-21	0.00	72.14	63.77	8.37	13.1%			
DH-6	SS-1	0.0 - 2.0	D-7	0.00	70.54	59.07	11.47	19.4%			
DH-6	SS-2	2.0 - 4.0	D-9	0.00	71.96	61.42	10.54	17.2%			
DH-6	SS-3	4.0 - 6.0	D-3A	0.00	73.49	60.80	12.69	20.9%			

Notes / Deviations / References

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

<u>Benjamin Kovaleski</u> Technician Name	 Signature	<u>NICET Lab Level III/117226</u> Certification Type / No.	<u>2/14/18</u> Date
<u>Brian Vaughan, P.E.</u> Technical Responsibility	 Signature	<u>Group Leader</u> Position	<u>2/14/18</u> Date

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



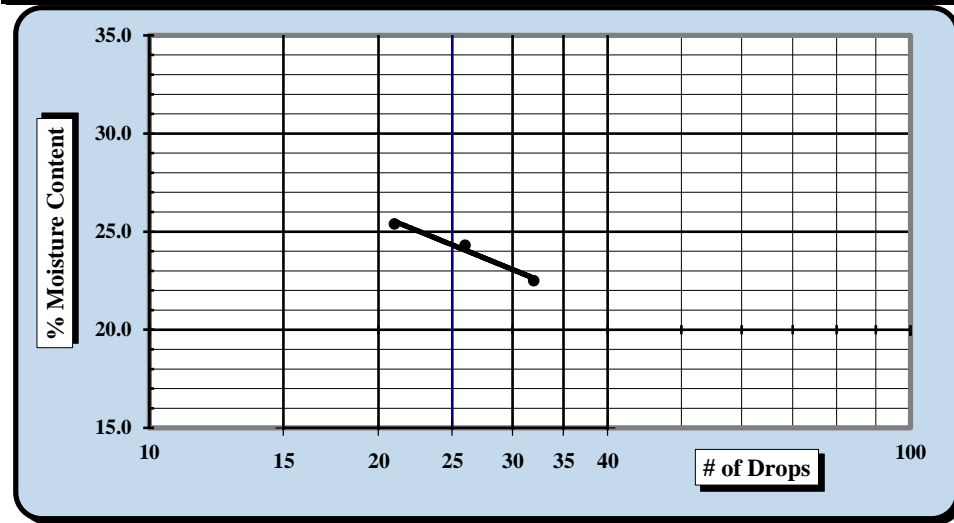
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - 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-4	Sample #:	SS-1
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/04/18
		Depth:	0.0' - 2.0'

Sample Description: Clayey Sand (SC, A-2-4)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	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	26.99	26.46	26.37				25.93	26.95	
B	Wet Soil Weight + A	46.06	43.64	43.43				31.95	33.15	
C	Dry Soil Weight + A	42.56	40.28	39.97				31.21	32.38	
D	Water Weight (B-C)	3.50	3.36	3.46				0.74	0.77	
E	Dry Soil Weight (C-A)	15.57	13.82	13.60				5.28	5.43	
F	% Moisture (D/E)*100	22.5%	24.3%	25.4%				14.0%	14.2%	
N	# OF DROPS	32	26	21				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							14.1%		



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	24
Plastic Limit	14
Plastic Index	10
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 28.4%

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

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

<u>Benjamin J. Kovaleski</u> Technician Name	<u>3/14/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/14/18</u> Date
---	------------------------	--	------------------------

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

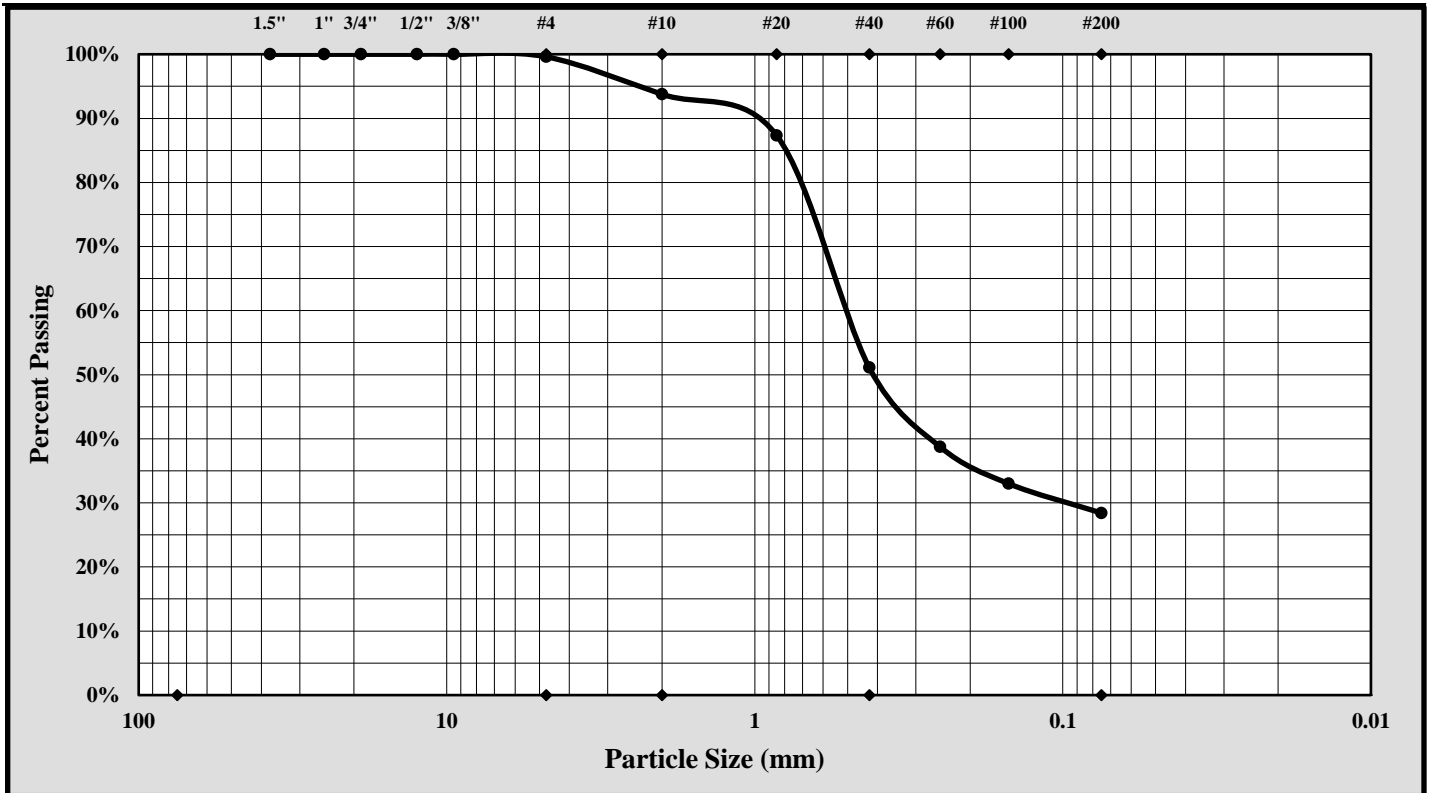


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	3/13/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-4	Sample #:	SS-1
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	0.0' - 2.0'
Sample Description:	Clayey Sand (SC, A-2-4)		



LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



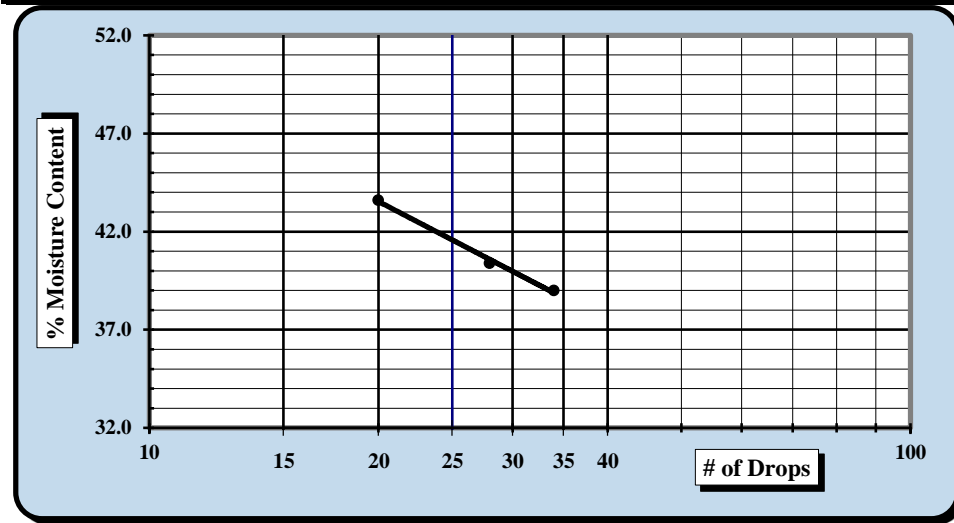
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-4	Sample #:	SS-2
Location:	Seismic Boring	Type:	Split-spoon
		Sample Date:	1/04/18
		Depth:	2.0' - 4.0'

Sample Description: Sandy Lean Clay (CL, A-7-6(11))					
<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			
		6	7	8			9	10		
A	Tare Weight	27.76	26.30	27.32				26.86	26.76	
B	Wet Soil Weight + A	42.69	40.66	42.21				33.55	34.84	
C	Dry Soil Weight + A	38.50	36.53	37.69				32.28	33.32	
D	Water Weight (B-C)	4.19	4.13	4.52				1.27	1.52	
E	Dry Soil Weight (C-A)	10.74	10.23	10.37				5.42	6.56	
F	% Moisture (D/E)*100	39.0%	40.4%	43.6%				23.4%	23.2%	
N	# OF DROPS	34	28	20				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							23.3%		



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

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	42
Plastic Limit	23
Plastic Index	19
Group Symbol	CL

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 65.6%

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>3/14/18</u> Date	<u>Brian Vaughan</u> Technical Responsibility	<u>3/14/18</u> Date
---	------------------------	--	------------------------

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

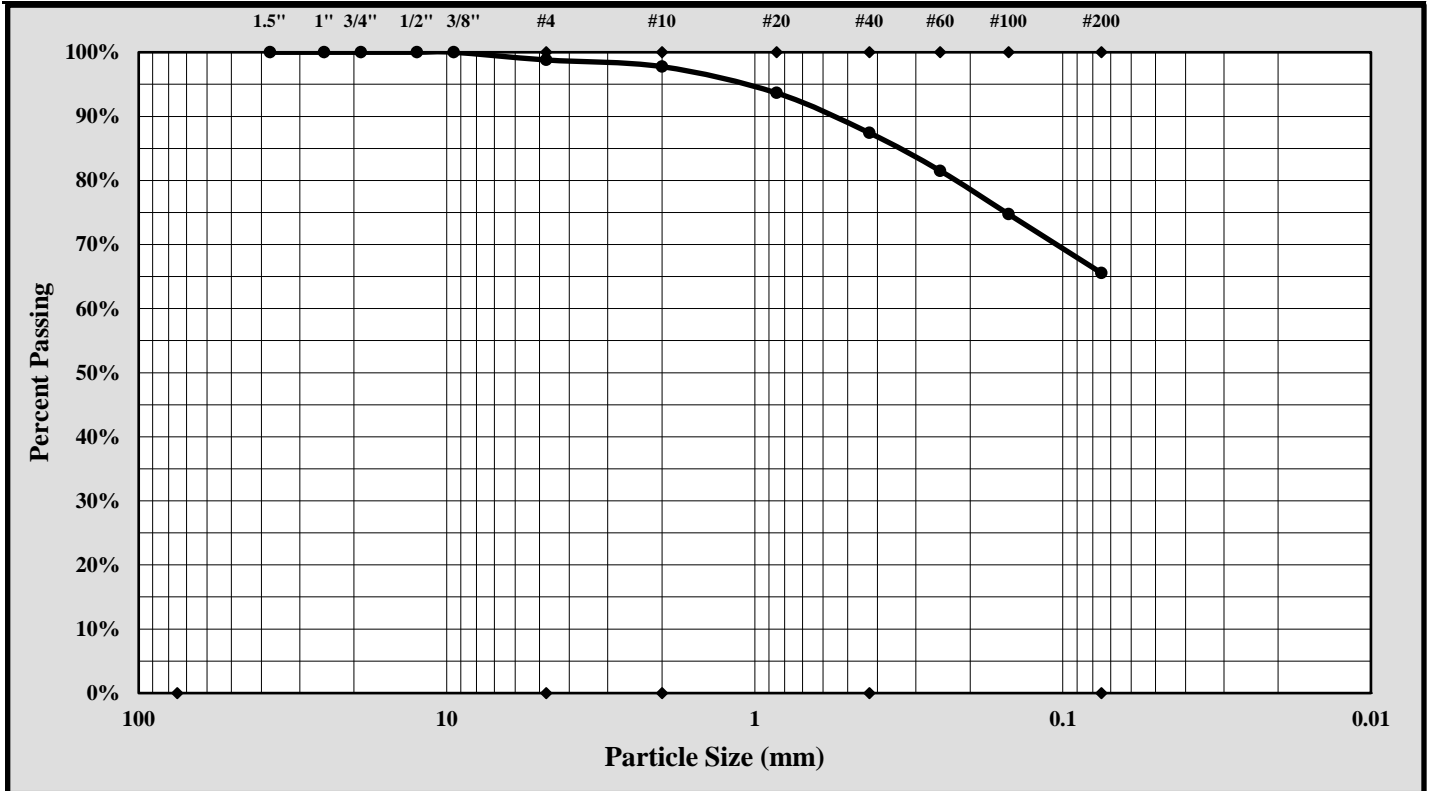


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	3/13/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-4	Sample #:	SS-2
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split-spoon
		Depth:	2.0' - 4.0'
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:	9.50 mm	Gravel:	1.2%
Silt & Clay (% Passing #200):	65.6%	Total Sand:	33.2%

Liquid Limit	42	Plastic Limit	23	Plastic Index	19
Coarse Sand:	1.0%	Medium Sand:	10.3%	Fine Sand:	21.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

3/13/18
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



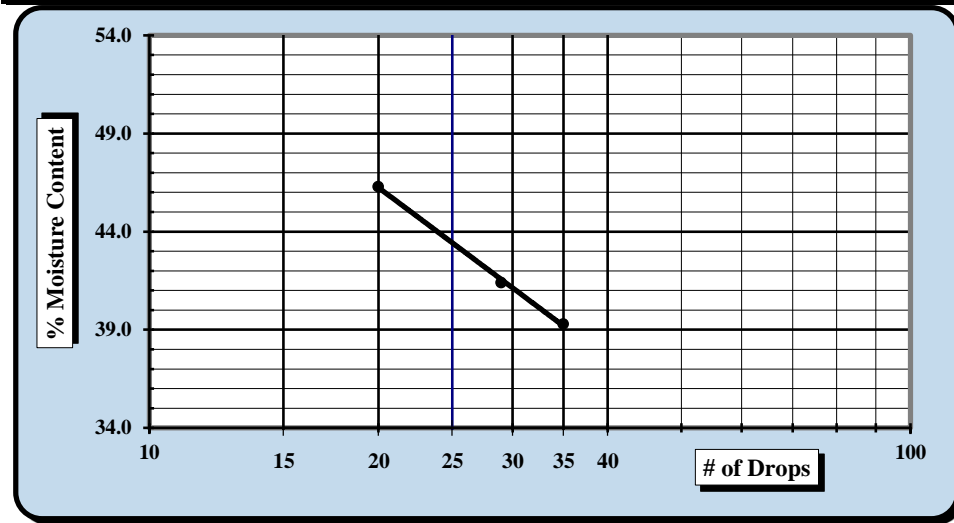
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/14/18
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-4	Sample #:	SS-4
Location:	Seismic Boring	Sample Date:	1/04/18
Type:	Split-spoon	Depth:	6.0' - 8.0'

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

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		11	12	13			14	15	
A	Tare Weight	26.67	26.66	26.79			26.66	27.61	
B	Wet Soil Weight + A	41.14	43.58	42.47			32.66	33.61	
C	Dry Soil Weight + A	37.06	38.63	37.51			31.62	32.59	
D	Water Weight (B-C)	4.08	4.95	4.96			1.04	1.02	
E	Dry Soil Weight (C-A)	10.39	11.97	10.72			4.96	4.98	
F	% Moisture (D/E)*100	39.3%	41.4%	46.3%			21.0%	20.5%	
N	# OF DROPS	35	29	20			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						20.8%		



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	21
Plastic Index	23
Group Symbol	CL

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 27.1%

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>3/14/18</u> Date	 Technical Responsibility	<u>3/14/18</u> Date
---	------------------------	------------------------------	------------------------

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

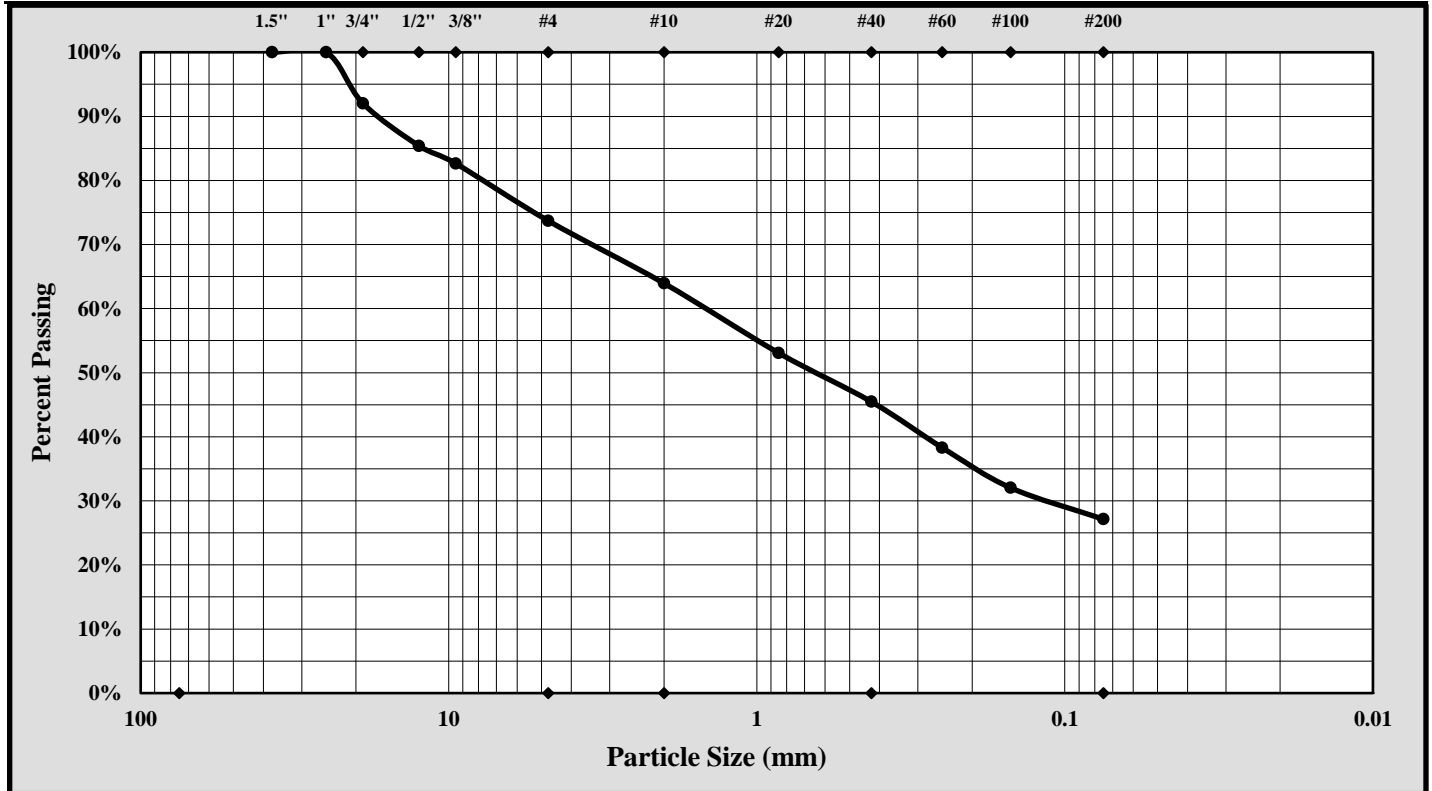
Particle Size Analysis of Soils

ASTM D 6913



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

S&ME Project #:	1461-16-047.2B	Report Date:	3/13/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	DH-4	Sample #:	SS-4
		Sample Date:	1/04/18
Location:	Seismic Boring	Type:	Split- spoon
		Depth:	6.0' - 8.0'
Sample Description:	Clayey Sand with Gravel (SC, A-2-7(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: 25.00 mm Gravel: 26.3%
 Silt & Clay (% Passing #200): 27.1% Total Sand: 46.6%

Liquid Limit	44	Plastic Limit	21	Plastic Index	23
Coarse Sand:	9.7%	Medium Sand:	18.5%	Fine Sand:	18.3%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/13/18
 Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/14/18
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-4	Sample #:	SS-6
Location:	Seismic Boring	Sample Date:	1/04/18
Type:	Split-spoon	Depth:	13.5' - 15.0'

Sample Description: Elastic Silt with Sand (MH, A-7-5(24))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		16	17	18			19	20		
A	Tare Weight	26.57	26.63	26.79				26.68	26.83	
B	Wet Soil Weight + A	43.80	39.66	41.32				32.68	33.13	
C	Dry Soil Weight + A	37.47	34.68	35.51				31.02	31.40	
D	Water Weight (B-C)	6.33	4.98	5.81				1.66	1.73	
E	Dry Soil Weight (C-A)	10.90	8.05	8.72				4.34	4.57	
F	% Moisture (D/E)*100	58.1%	61.9%	66.6%				38.2%	37.9%	
N	# OF DROPS	35	27	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							38.1%		



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	63
Plastic Limit	38
Plastic Index	25
Group Symbol	MH

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 80.9%

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>3/14/18</u> Date	 Technical Responsibility	<u>3/14/18</u> Date
---	------------------------	------------------------------	------------------------

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

LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216 AASHTO T 265

S&ME, Inc. - 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
		ft. or m.		grams	grams	grams	grams	%	
W-28	SS-6	13.5'-15'	TD-1	105.07	251.75	228.93	22.82	18.4%	
W-28	SS-2	2'-4'	J13	97.13	230.76	213.84	16.92	14.5%	
W-28	SS-8	23.5'-25'	NP3	107.07	234.31	212.85	21.46	20.3%	
W-28	SS-10	33.5'-35'	J11	98.19	327.14	277.53	49.61	27.7%	
W-28	SS-12	43.5'-45'	J7	90.51	223.96	190.88	33.08	33.0%	
W-28	SS-16	63.5'-65'	J9	89.84	224.77	198.94	25.83	23.7%	
W-30	SS-1	1.7'-3.7'	M-4	93.80	202.43	167.35	35.08	47.7%	
W-30	SS-4	7.7'-9.7'	J3	90.01	190.02	159.32	30.70	44.3%	
W-30	SS-9	28.5'-30'	J17	89.07	224.54	188.92	35.62	35.7%	
W-30	SS-11	38.5'-40'	J5	97.55	181.56	161.41	20.15	31.6%	
P-42	SS-1	0.8'-2.8'	NP2	107.05	258.64	235.96	22.68	17.6%	
P-44	SS-1	1.1'-3.1'	J2	90.23	218.73	189.03	29.70	30.1%	
P-45	SS-1	1'-3'	J12	95.74	285.64	262.85	22.79	13.6%	
P-47	SS-1	1.4'-3.4'	NP4	106.11	249.17	231.46	17.71	14.1%	
P-49	SS-1	1'-3'	J14	98.13	232.57	209.43	23.14	20.8%	
P-54	SS-1	0.7'-2.7'	G7	96.59	254.09	230.74	23.35	17.4%	

Notes / Deviations / References

Jimmy Hanson
Technician Name

5/21/2018
Date

Nathan Price
Technical Responsibility

Nathan Price

Signature

Laboratory Manager
Position

5/21/2018
Date

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

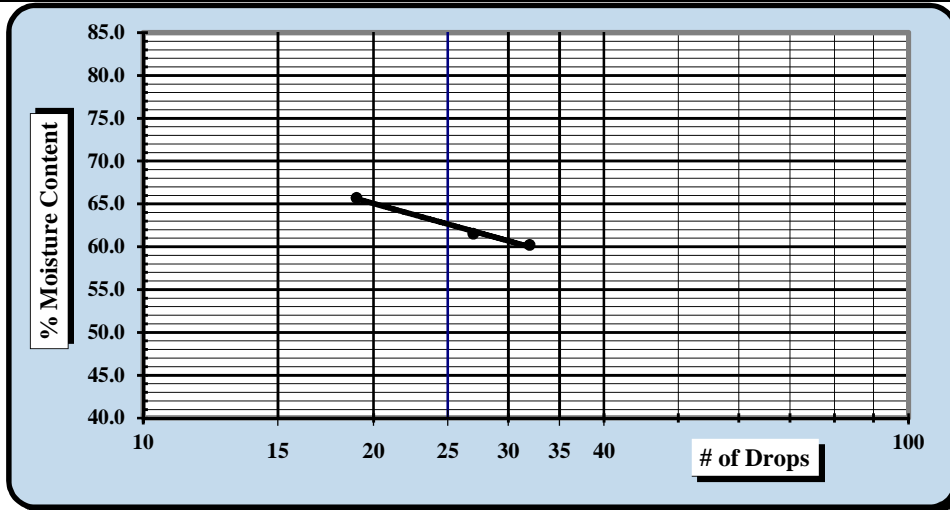
Project #:	1461-16-047.2B	Report Date:	4/30/18
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		

Boring #:	P-44	Sample #:	SS-1	Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A	Depth:	1.1' - 3.1'

Sample Description: Fat Clay with Sand (CH, A-7-6 (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 #	327	Tare #:	Liquid Limit				Plastic Limit			
			60	61	62	63	64			
A		Tare Weight	16.01	15.07	15.56			15.10	15.88	
B		Wet Soil Weight + A	27.98	27.12	27.19			22.25	22.67	
C		Dry Soil Weight + A	23.48	22.53	22.58			20.82	21.30	
D		Water Weight (B-C)	4.50	4.59	4.61			1.43	1.37	
E		Dry Soil Weight (C-A)	7.47	7.46	7.02			5.72	5.42	
F		% Moisture (D/E)*100	60.2%	61.5%	65.7%			25.0%	25.3%	
N		# OF DROPS	32	27	19			Moisture Contents determined by ASTM D 2216		
LL		LL = F * FACTOR								
Ave.		Average						25.2%		



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

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

Jimmy Hanson
Technical Responsibility

4/30/2018
Date

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

Particle Size Analysis of Soils



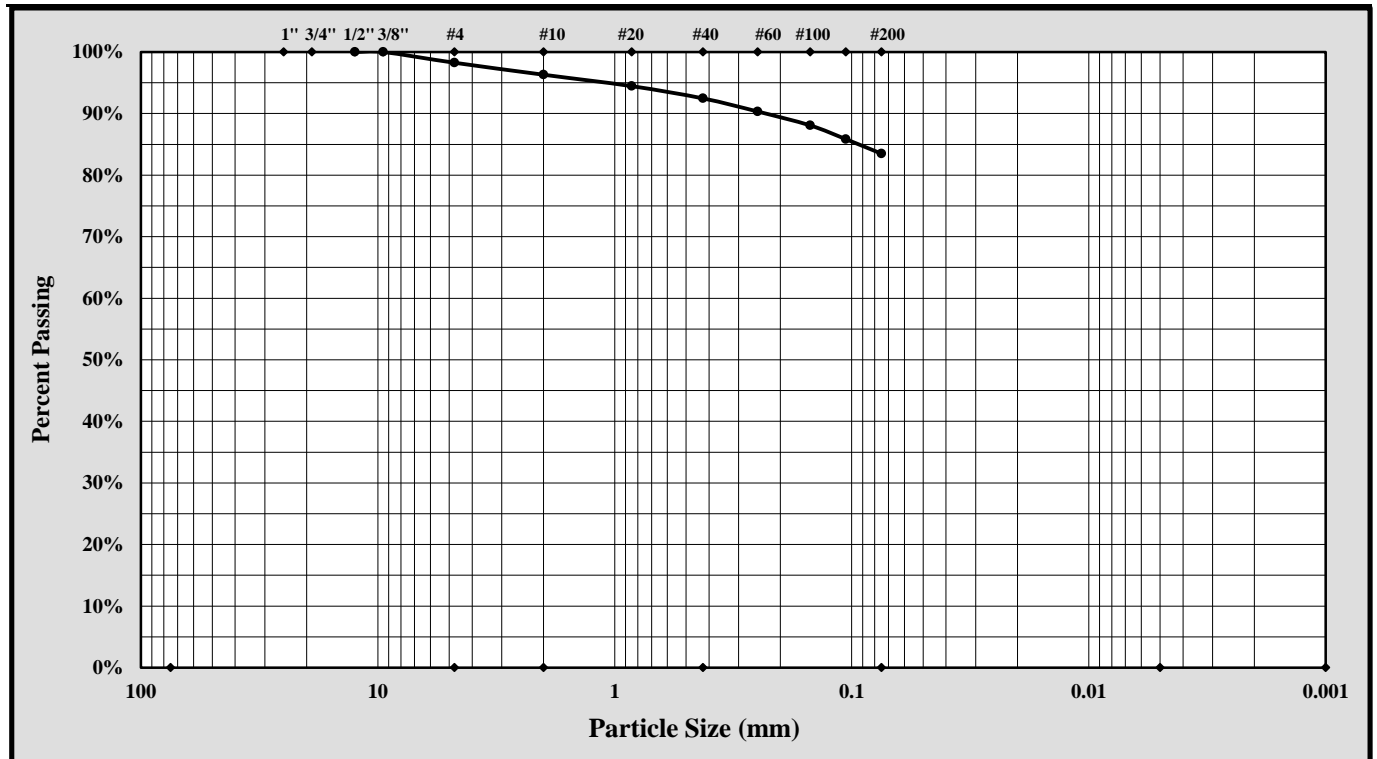
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	P-44	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.1' - 3.1'
Sample Description:	Fat Clay with Sand (CH, A-7-6 (34))		



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-45	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.0' - 3.0'

Sample Description: Clayey Sand with Gravel (SC, A-2-7 (2))					
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 #	189	Tare #:	Liquid Limit				Plastic Limit		
			66				77	79	
A		Tare Weight	26.68				29.17	29.31	
B		Wet Soil Weight + A	39.78				36.57	38.12	
C		Dry Soil Weight + A	35.92				35.37	36.69	
D		Water Weight (B-C)	3.86				1.20	1.43	
E		Dry Soil Weight (C-A)	9.24				6.20	7.38	
F		% Moisture (D/E)*100	41.8%				19.4%	19.4%	
N		# OF DROPS	25				Moisture Contents determined by ASTM D 2216		
LL		LL = F * FACTOR							
Ave.		Average					19.4%		



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	42
Plastic Limit	19
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

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

4/30/2018
Date

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

Particle Size Analysis of Soils



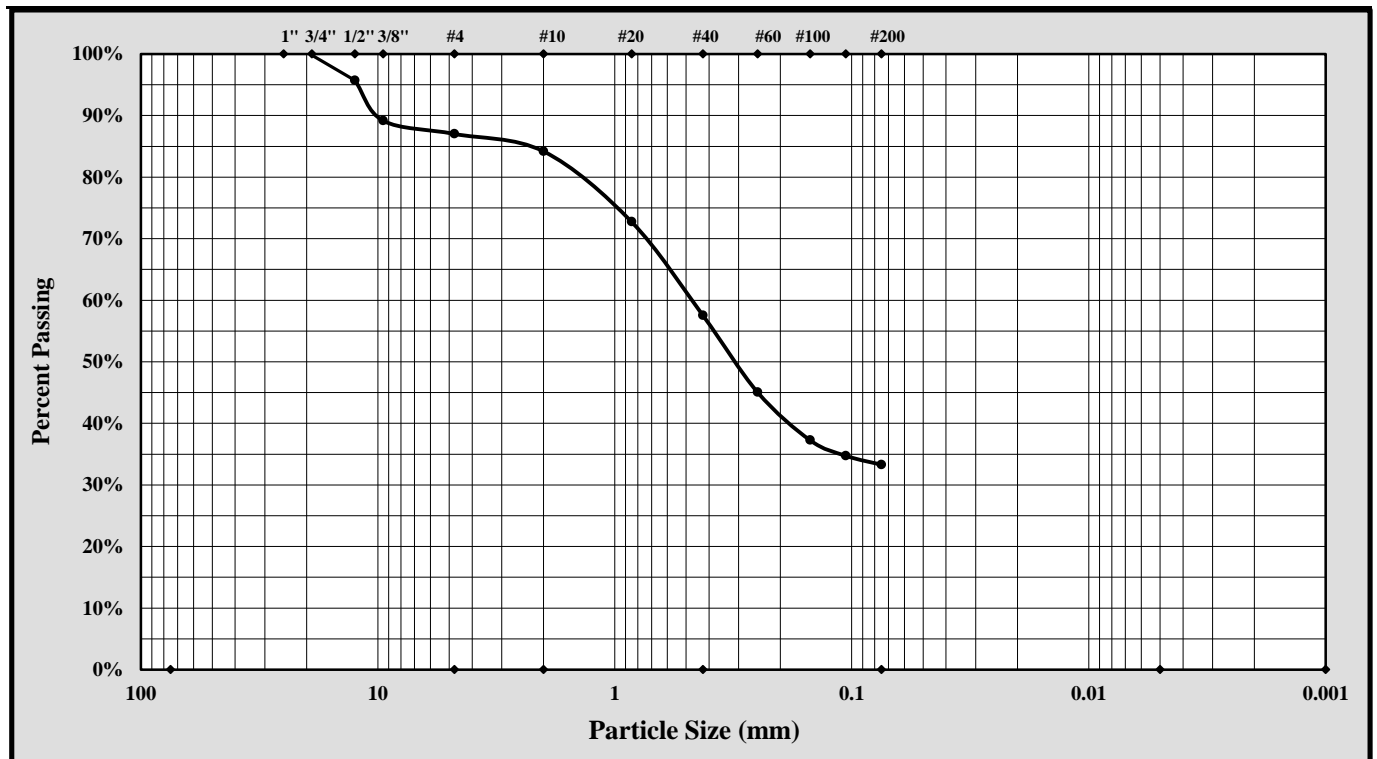
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	P-45	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.0' - 3.0'
Sample Description:	Clayey Sand with Gravel (SC, A-2-7 (2))		



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

Maximum Particle Size:	Gravel:	13.0%
Silt & Clay (% Passing #200):	Total Sand:	53.7%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	19
	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

5/4/2018
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



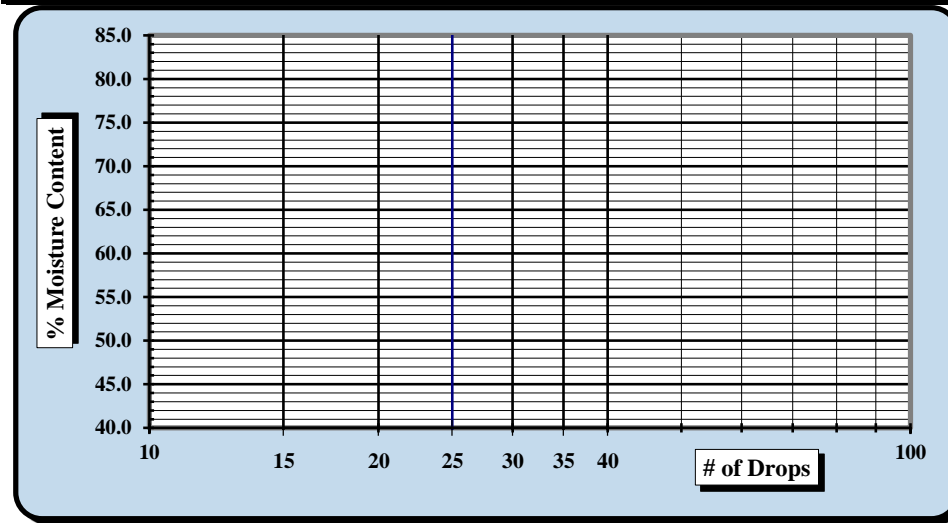
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	5-2-2018
Project Name:	Carolina Crossroads Project	Test Date(s)	4/27-4/28/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.4' - 3.4'

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

Pan #		468		Liquid Limit				Plastic Limit		
		Tare #:	82					88	89	
A	Tare Weight		16.98					17.08	17.27	
B	Wet Soil Weight + A		27.80					23.58	23.45	
C	Dry Soil Weight + A		24.94					22.82	22.72	
D	Water Weight (B-C)		2.86					0.76	0.73	
E	Dry Soil Weight (C-A)		7.96					5.74	5.45	
F	% Moisture (D/E)*100		35.9%					13.2%	13.4%	
N	# OF DROPS		26					Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							13.3%		



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	36
Plastic Limit	13
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

Jimmy Hanson
Technician Name

4/28/2018
Date

[Signature]
Technical Responsibility

5/2/2018
Date

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

Particle Size Analysis of Soils



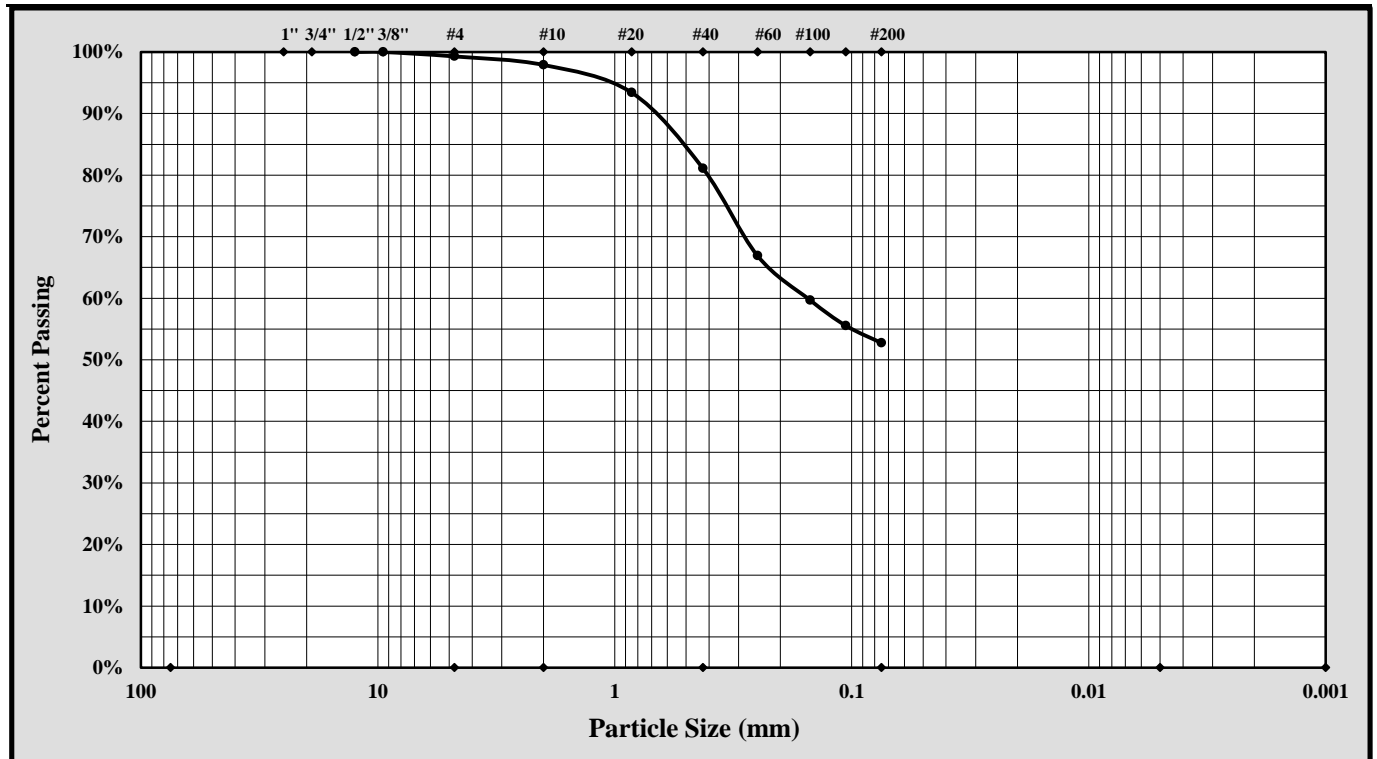
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	P-47	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.4' - 3.4'
Sample Description:	Sandy Lean Clay (CL, A-6 (8))		



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

Maximum Particle Size:	Gravel:	0.7%
Silt & Clay (% Passing #200):	Total Sand:	46.5%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	36 13 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

5/2/2018
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



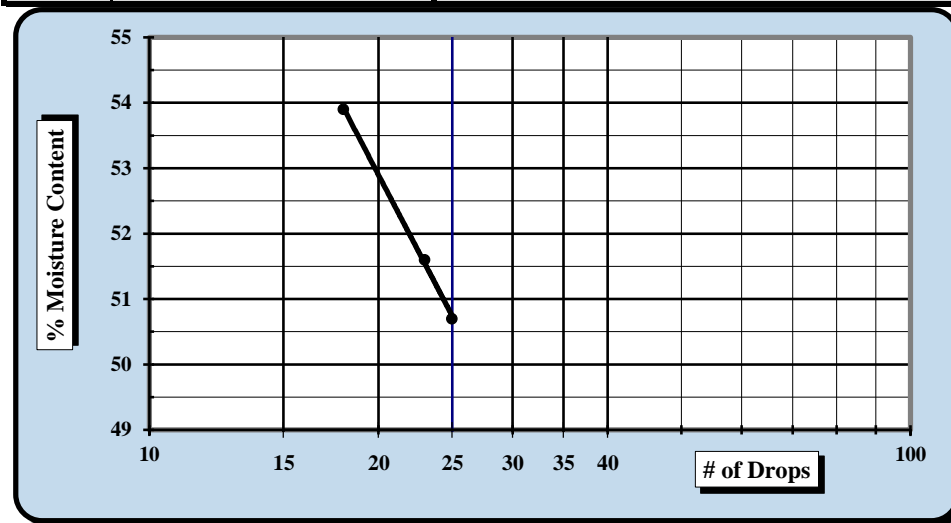
ASTM D 4318 AASHTO T 89 AASHTO T 90

S&ME, Inc. - 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)	3/7-3/26/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-48	Sample #:	SS-1
		Sample Date:	2/7/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.0' - 3.0'

Sample Description: Sandy Elastic Silt (MH, A-7-5(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		
		6	235	31			210	227	
A	Tare Weight	20.56	20.76	20.81			20.92	20.81	
B	Wet Soil Weight + A	29.36	28.16	29.26			28.82	27.28	
C	Dry Soil Weight + A	26.40	25.64	26.30			26.99	25.80	
D	Water Weight (B-C)	2.96	2.52	2.96			1.83	1.48	
E	Dry Soil Weight (C-A)	5.84	4.88	5.49			6.07	4.99	
F	% Moisture (D/E)*100	50.7%	51.6%	53.9%			30.1%	29.7%	
N	# OF DROPS	25	23	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						29.9%		



NP, Non-Plastic <input type="checkbox"/>	
Liquid Limit	51
Plastic Limit	30
Plastic Index	21
Group Symbol	MH
Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

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

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

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

Matthew Wolfe
Technician Name

NICET 123218
Certification

Matthew F. Cooke, P.G.
Technical Responsibility

5/3/2018
Date

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

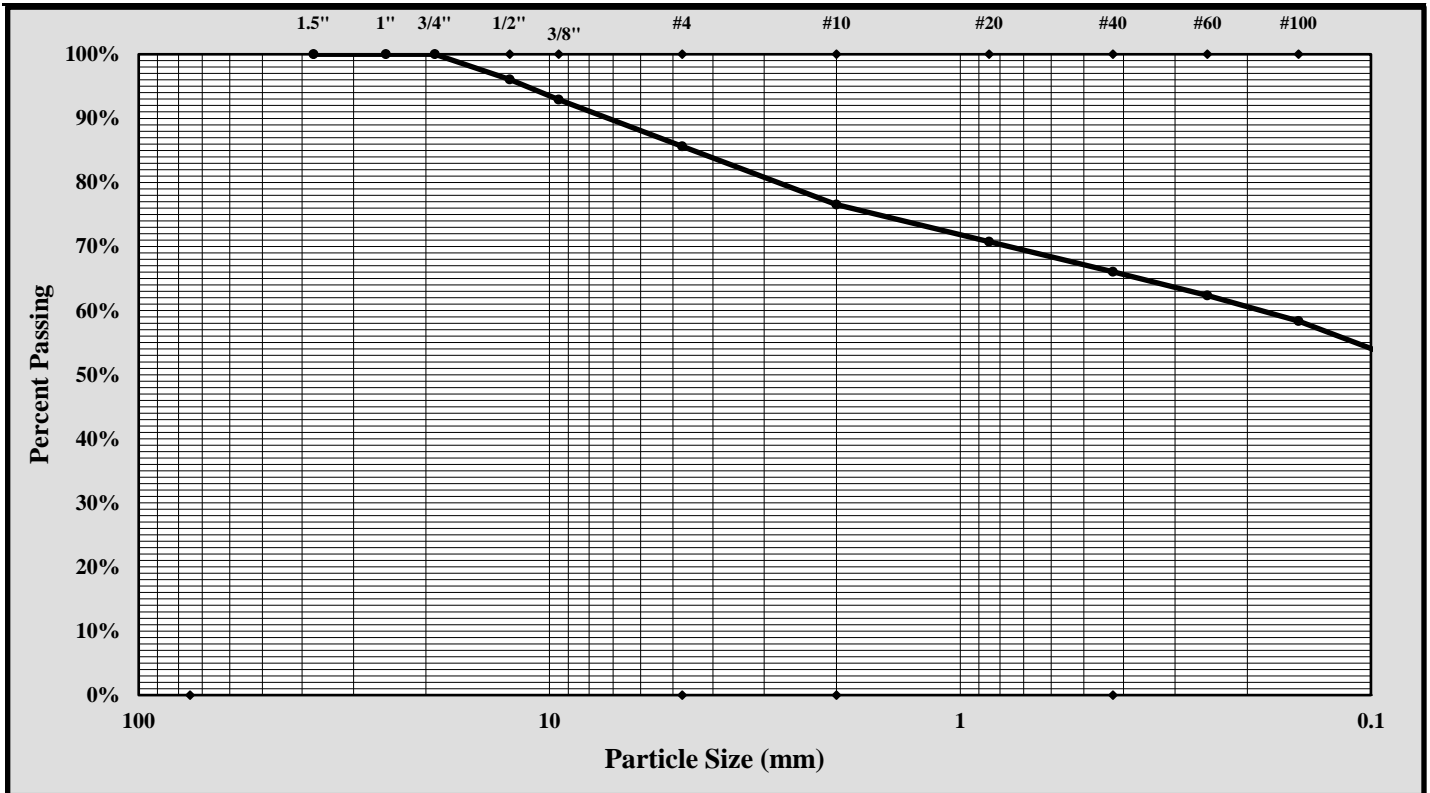
Particle Size Analysis of Soils

ASTM D 6913



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

S&ME Project #:	1461-16-047.2B	Report Date:	4/25/2018
Project Name:	Carolina Crossroads Project	Test Date(s):	3/1-3/7/2018
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-48	Sample #:	SS-1
		Sample Date:	2/7/18
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.0' - 3.0'
Sample Description:	Sandy Elastic Silt (MH, A-7-5(8))		



LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



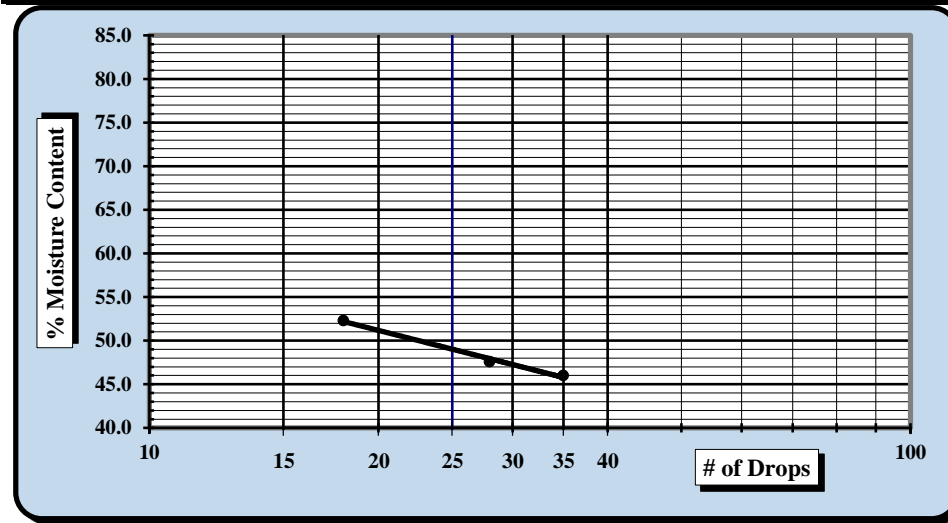
ASTM D 4318 AASHTO T 89 AASHTO T 90

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-49	Sample #:	SS-1
		Sample Date:	Various
Location:	Pavement Boring	Offset:	N/A
		Depth:	1.0' - 3.0'

Sample Description: Sandy Lean Clay (CL, A-7-6 (9))					
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			
		20	21	22			23	24		
A	Tare Weight	15.46	15.34	15.43				14.90	15.23	
B	Wet Soil Weight + A	27.40	26.00	26.70				21.91	21.57	
C	Dry Soil Weight + A	23.64	22.56	22.83				20.65	20.42	
D	Water Weight (B-C)	3.76	3.44	3.87				1.26	1.15	
E	Dry Soil Weight (C-A)	8.18	7.22	7.40				5.75	5.19	
F	% Moisture (D/E)*100	46.0%	47.6%	52.3%				21.9%	22.2%	
N	# OF DROPS	35	28	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							22.1%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	48	
Plastic Limit	22	
Plastic Index	26	
Group Symbol	CL	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

Wet Preparation Dry Preparation Air Dried

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

<u>Jimmy Hanson</u> Technician Name	<u>4/28/2018</u> Date	 Technical Responsibility
		<u>5/1/2018</u> Date

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

Particle Size Analysis of Soils



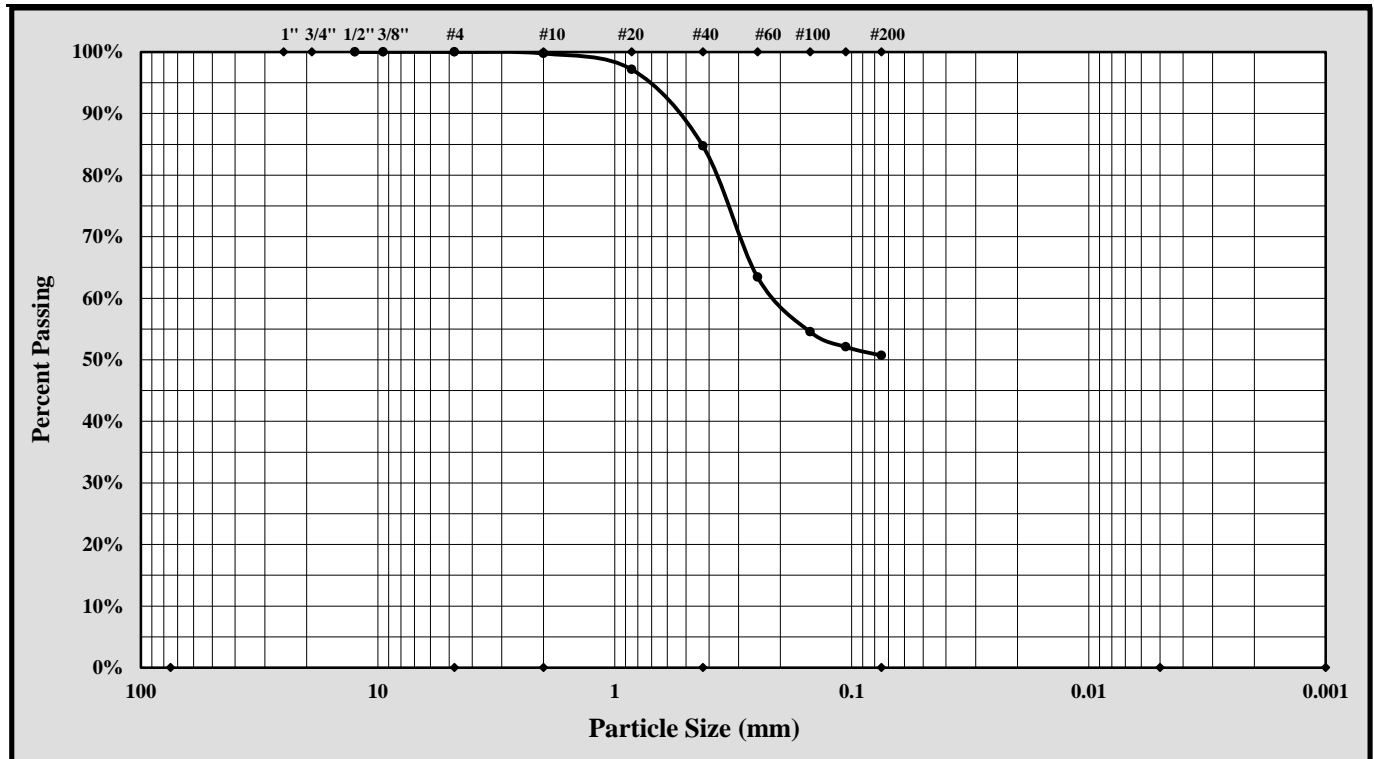
Sample Log No.:

ASTM D6913/D7928

Quality Assurance

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/23/18
Project Name:	Carolina Crossroads Project	Test Date(s):	4/19-4/20/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Sample ID:	P-49	Type:	Split Spoon
		Sample Date:	Various
Location:	Pavement Boring	Sample No.:	SS-1
		Depth:	1.0' - 3.0'
Sample Description:	Sandy Lean Clay (CL, A-7-6 (9))		



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:	49.3%
Assumed Specific Gravity:		2.65
Liquid Limit	Plastic Limit	22
	Plastic Index	26

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

References / Comments / Deviations:

Nathan Price
Technical Responsibility

Nathan Price
Signature

Laboratory Group Leader
Position

5/1/2018
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



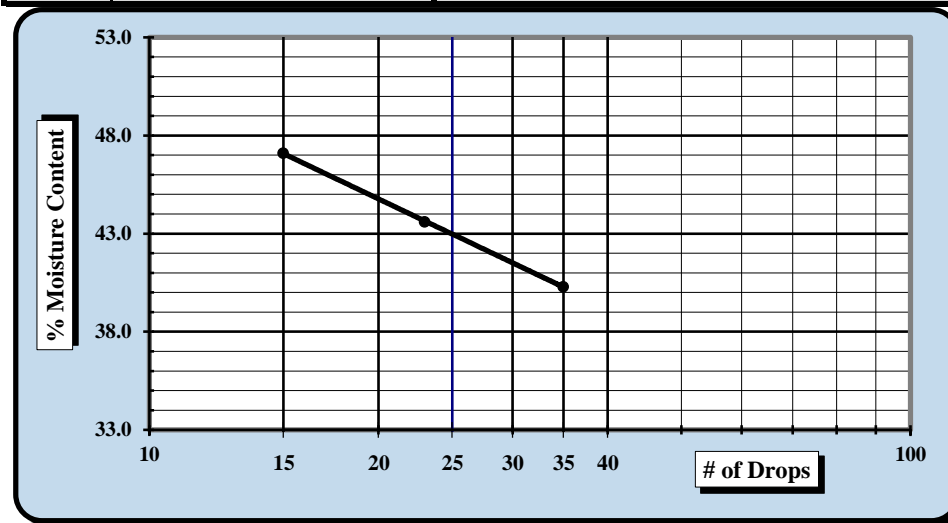
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date:	4/02/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-40	Sample #:	SS-2
Location:	Embankment Boring	Type:	Split-spoon
		Sample Date:	2/13/18
		Depth:	2.0' - 4.0'

Sample Description: Silt with Sand (ML, A-7-5(11))					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		21	22	23			24	25		
A	Tare Weight	28.09	25.67	27.24				25.99	26.81	
B	Wet Soil Weight + A	45.32	39.01	45.44				33.70	33.91	
C	Dry Soil Weight + A	40.37	34.96	39.61				31.84	32.18	
D	Water Weight (B-C)	4.95	4.05	5.83				1.86	1.73	
E	Dry Soil Weight (C-A)	12.28	9.29	12.37				5.85	5.37	
F	% Moisture (D/E)*100	40.3%	43.6%	47.1%				31.8%	32.2%	
N	# OF DROPS	35	23	15				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	43
Plastic Limit	32
Plastic Index	11
Group Symbol	ML

Multipoint Method
 One-point Method

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

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

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

Benjamin J. Kovaleski
 Technician Name

4/03/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

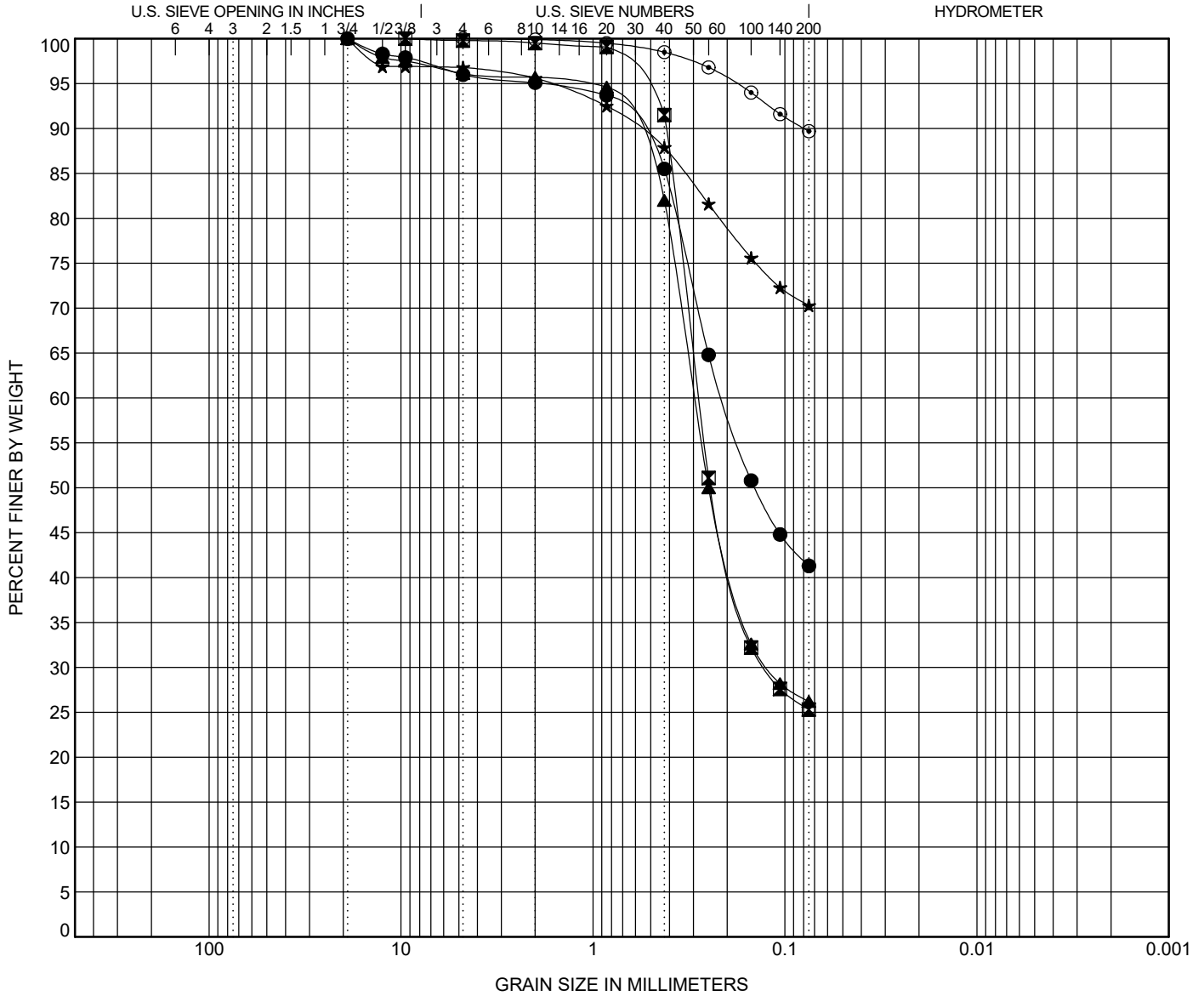
4/03/18
 Date

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

PROJECT ID P027662

PROJECT NAME Carolina Crossroads Phase 3

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

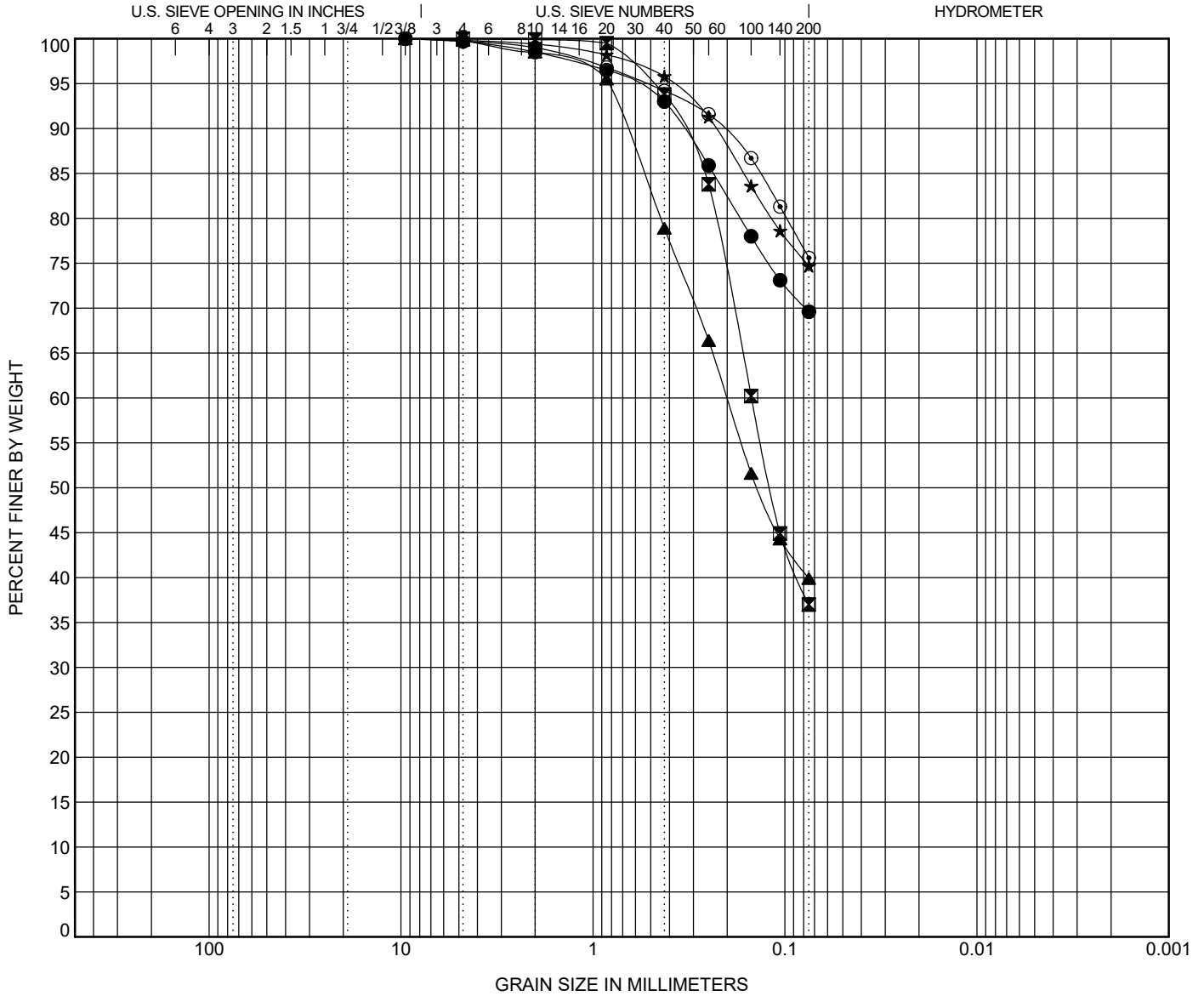
BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● G- 18A	0.0	SILTY SAND(SM)	NP	NP	NP		
☒ G- 18A	6.0	SILTY SAND(SM)	NP	NP	NP		
▲ G- 18A	8.0	SILTY SAND(SM)	NP	NP	NP		
★ G- 27	28.0	SILT with SAND(ML)	NP	NP	NP		
◎ G- 27	30.0	LEAN CLAY(CL)	25	16	9		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● G- 18A	0.0	19	0.21			4.0	54.7		41.3
☒ G- 18A	6.0	9.5	0.281	0.127		0.2	74.5		25.3
▲ G- 18A	8.0	19	0.295	0.122		3.9	69.9		26.2
★ G- 27	28.0	19				3.2	26.5		70.3
◎ G- 27	30.0	4.75				0.0	10.3		89.7

PROJECT ID P027662

PROJECT NAME Carolina Crossroads Phase 3

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● G-44	2.0	SANDY SILT(ML)	NP	NP	NP		
☒ G-44	8.0	SILTY SAND(SM)	NP	NP	NP		
▲ G-44	10.0	SILTY SAND(SM)	NP	NP	NP		
★ G-46	2.0	LEAN CLAY with SAND(CL)	32	23	9		
◎ G-46	4.0	LEAN CLAY with SAND(CL)	34	18	16		

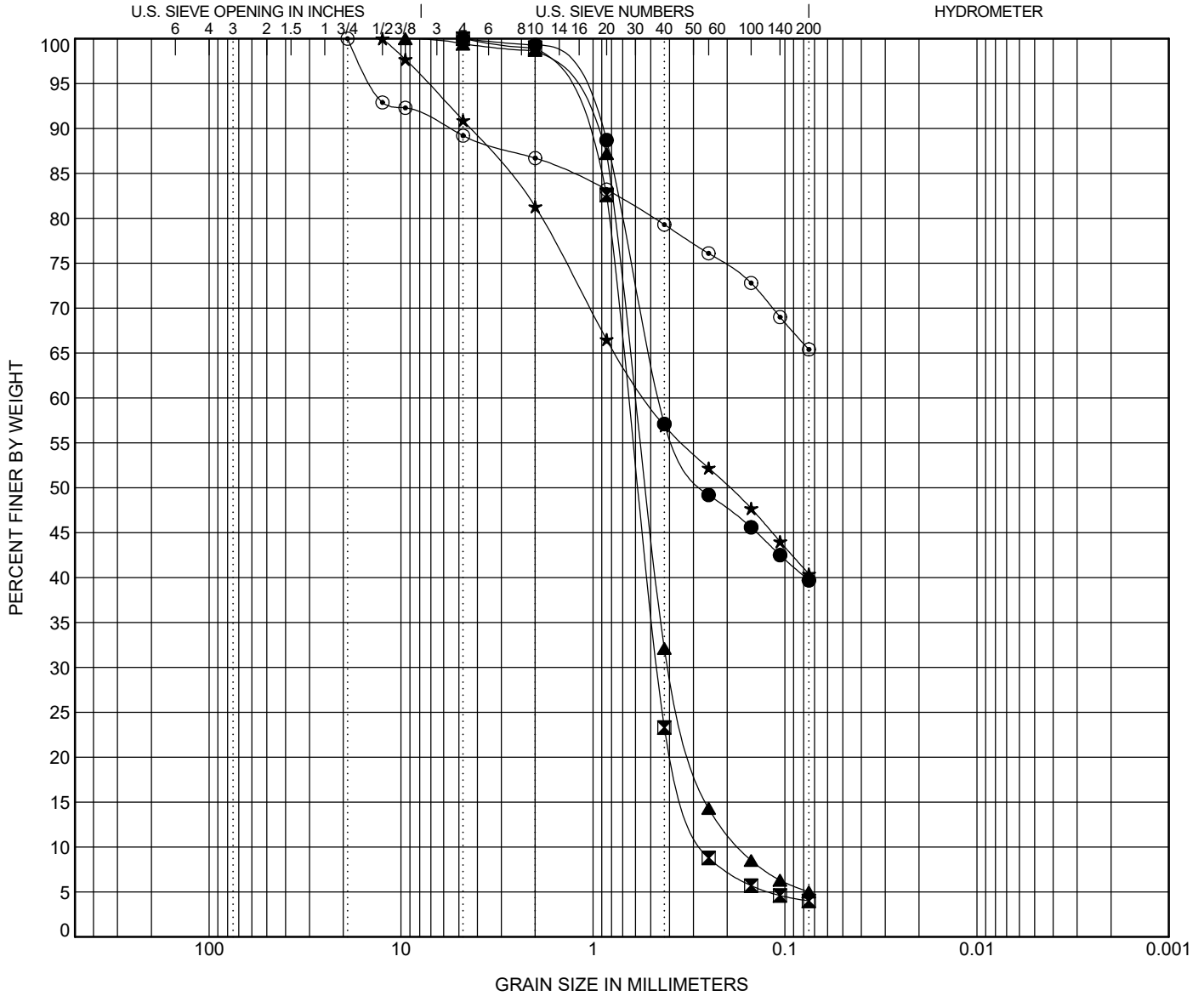
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● G-44	2.0	9.5				0.3	30.1		69.6
☒ G-44	8.0	4.75	0.149			0.0	63.0		37.0
▲ G-44	10.0	9.5	0.2			0.2	59.9		39.9
★ G-46	2.0	9.5				0.2	25.1		74.7
◎ G-46	4.0	9.5				0.3	24.1		75.6

GRAIN SIZE_CCR3_PURSUIT_BH.GPJ_SCDOT_DATA_TEMPLATE_01_30_2015.GDT 2/6/24

PROJECT ID P027662

PROJECT NAME Carolina Crossroads Phase 3

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● G-46	8.0	CLAYEY SAND(SC)	28	18	10		
☒ G-46	10.0	POORLY GRADED SAND(SP)	NP	NP	NP	1.24	2.50
▲ G-46	12.0	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	1.54	3.53
★ G-46	16.0	SILTY SAND(SM)	NP	NP	NP		
◎ G-49	0.0	SANDY LEAN CLAY(CL)	39	21	18		

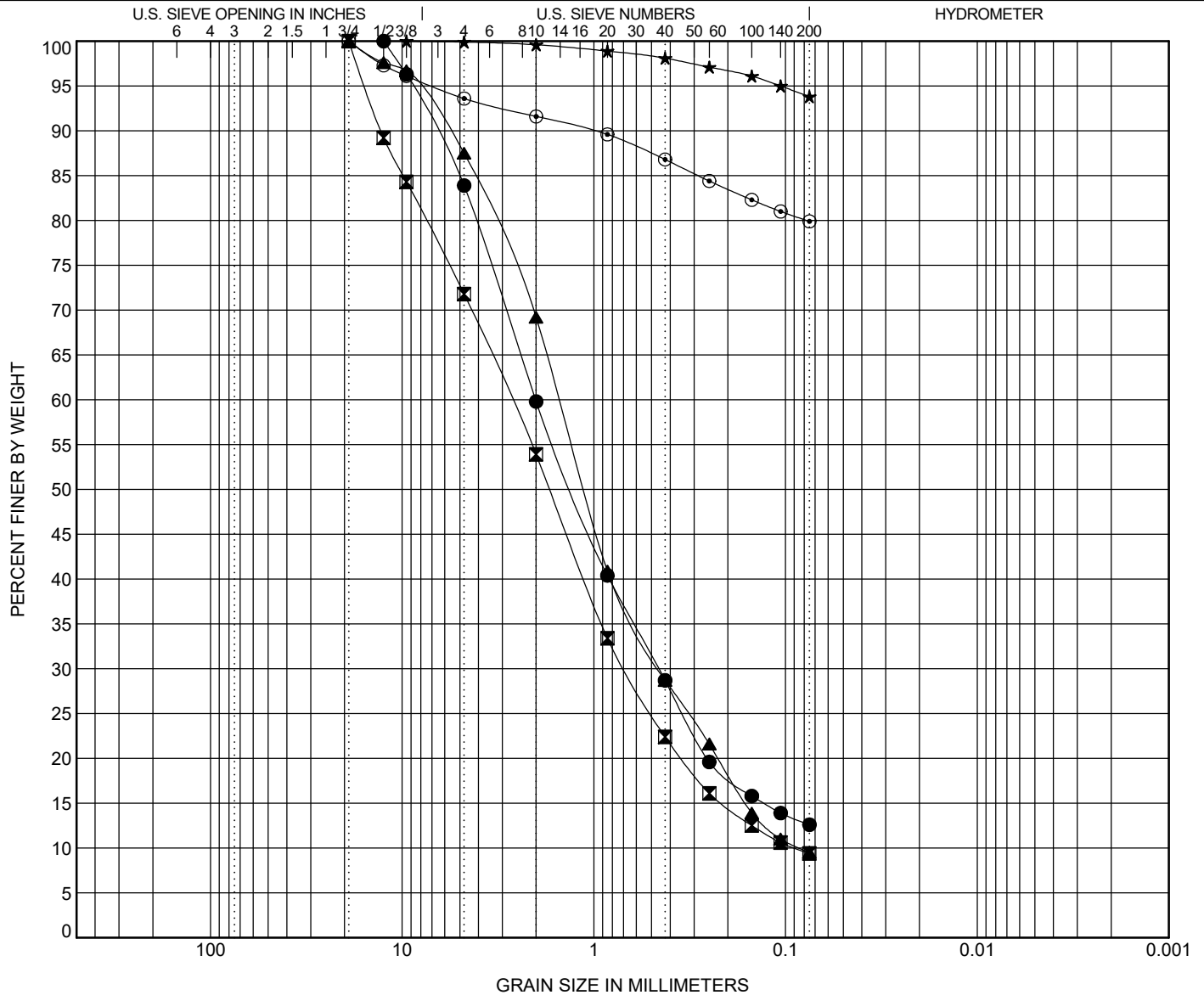
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● G-46	8.0	4.75	0.453			0.0	60.3		39.7
☒ G-46	10.0	4.75	0.653	0.46	0.261	0.0	96.0	4.0	
▲ G-46	12.0	9.5	0.604	0.399	0.171	0.6	94.4	5.0	
★ G-46	16.0	12.5	0.532			9.1	50.5	40.4	
◎ G-49	0.0	19				10.8	23.8		65.4

GRAIN SIZE CCR3_PURSUIT_BH.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 2/6/24

PROJECT ID P027662

PROJECT NAME Carolina Crossroads Phase 3

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● G-49	6.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
☒ G-49	8.0	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)	NP	NP	NP	1.97	30.12
▲ G-49	10.0	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP	1.64	17.99
★ G-56	8.0	FAT CLAY(CH)	75	26	49		
◎ G-56	10.0	FAT CLAY with SAND(CH)	70	24	46		

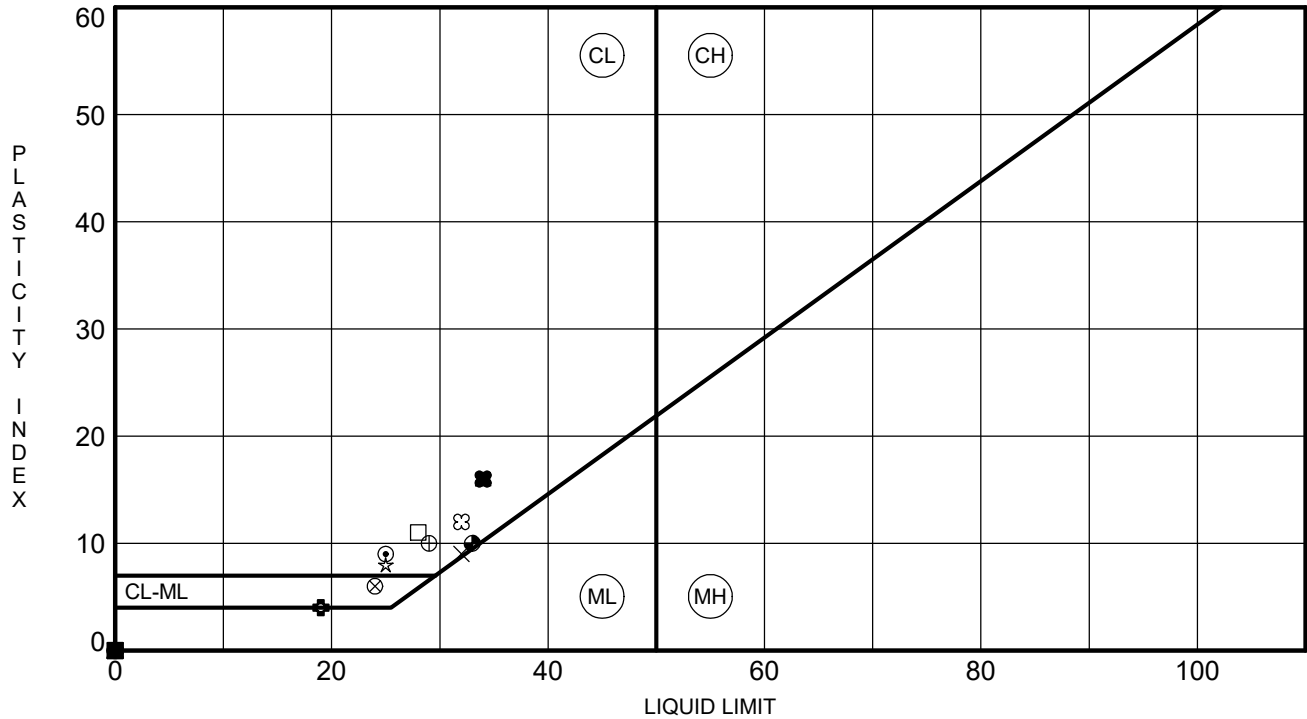
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● G-49	6.0	12.5	2.014	0.459		16.1	71.3		12.6
☒ G-49	8.0	19	2.686	0.686	0.089	28.2	62.4		9.4
▲ G-49	10.0	19	1.514	0.458	0.084	12.5	78.0		9.5
★ G-56	8.0	9.5				0.1	6.1		93.8
◎ G-56	10.0	19				6.4	13.7		79.9

GRAIN SIZE CCR3_PURSUIT_BH.GPJ_SCDOT_DATA_TEMPLATE_01_30_2015.GDT 2/6/24

PROJECT ID P027662

PROJECT NAME Carolina Crossroads Phase 3

PROJECT COUNTY Richland



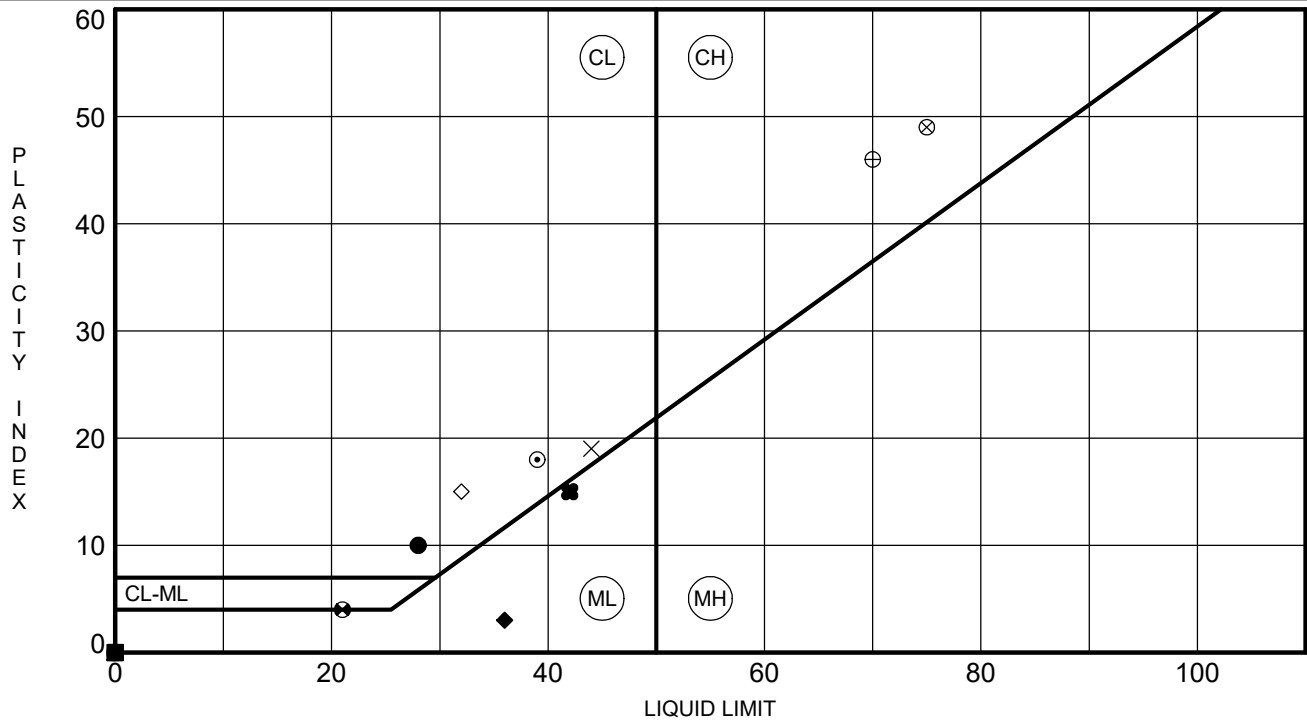
BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● G- 18A	0.0	NP	NP	NP	41	SILTY SAND(SM)
⊠ G- 18A	6.0	NP	NP	NP	25	SILTY SAND(SM)
▲ G- 18A	8.0	NP	NP	NP	26	SILTY SAND(SM)
★ G- 27	28.0	NP	NP	NP	70	SILT with SAND(ML)
⊙ G- 27	30.0	25	16	9	90	LEAN CLAY(CL)
⊕ G- 27	33.5	19	15	4	37	SILTY, CLAYEY SAND(SC-SM)
○ G- 31	4.0	NP	NP	NP	65	SANDY SILT(ML)
△ G- 31	6.0	34	18	16	54	SANDY LEAN CLAY(CL)
⊗ G- 36	8.0	24	18	6	73	SILTY CLAY with SAND(CL-ML)
⊕ G- 36	10.0	29	19	10	63	SANDY LEAN CLAY(CL)
□ G- 36	12.0	28	17	11	59	SANDY LEAN CLAY(CL)
⊕ G- 36	14.0	NP	NP	NP	51	SANDY SILT(ML)
⊕ G- 43	6.0	33	23	10	61	SANDY LEAN CLAY(CL)
★ G- 43	8.0	25	17	8	61	SANDY LEAN CLAY(CL)
⊗ G- 43	10.0	32	20	12	64	SANDY LEAN CLAY(CL)
■ G- 44	2.0	NP	NP	NP	70	SANDY SILT(ML)
◆ G- 44	8.0	NP	NP	NP	37	SILTY SAND(SM)
◇ G- 44	10.0	NP	NP	NP	40	SILTY SAND(SM)
× G- 46	2.0	32	23	9	75	LEAN CLAY with SAND(CL)
⊕ G- 46	4.0	34	18	16	76	LEAN CLAY with SAND(CL)

ATTERBERG LIMITS CCR3 PURSUIT BH.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 2/5/24

PROJECT ID P027662

PROJECT NAME Carolina Crossroads Phase 3

PROJECT COUNTY Richland



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	G-46	8.0	28	18	10	40	CLAYEY SAND(SC)
☒	G-46	10.0	NP	NP	NP	4	POORLY GRADED SAND(SP)
▲	G-46	12.0	NP	NP	NP	5	POORLY GRADED SAND with SILT(SP-SM)
★	G-46	16.0	NP	NP	NP	40	SILTY SAND(SM)
⊕	G-49	0.0	39	21	18	65	SANDY LEAN CLAY(CL)
⊕	G-49	6.0	NP	NP	NP	13	SILTY SAND with GRAVEL(SM)
○	G-49	8.0	NP	NP	NP	9	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)
△	G-49	10.0	NP	NP	NP	10	WELL-GRADED SAND with SILT(SW-SM)
⊗	G-56	8.0	75	26	49	94	FAT CLAY(CH)
⊕	G-56	10.0	70	24	46	80	FAT CLAY with SAND(CH)
□	G-94	8.0	NP	NP	NP	77	SILT with SAND(ML)
⊕	G-94	10.0	21	17	4	88	SILTY CLAY(CL-ML)
●	G-94	14.0	NP	NP	NP	50	SILTY SAND with GRAVEL(SM)
★	G-108	6.0	NP	NP	NP	62	SANDY SILT(ML)
⊗	G-108	8.0	NP	NP	NP	55	SANDY SILT(ML)
■	G-108	10.0	NP	NP	NP	58	SANDY SILT(ML)
◆	G-130	0.0	36	33	3	61	SANDY SILT(ML)
◇	G-130	2.0	32	17	15	58	SANDY LEAN CLAY(CL)
×	G-133	0.0	44	25	19	73	LEAN CLAY with SAND(CL)
●	G-136	0.0	42	27	15	61	SANDY SILT(ML)

ATTERBERG LIMITS CCR3 PURSUIT BH.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 2/5/24



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
		As Rec'd	Minimum	(mg/kg)	(wt%)	(mg/kg)	(wt%)	
	(ft)	(Ohm-cm)	(Ohm-cm)	(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



Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

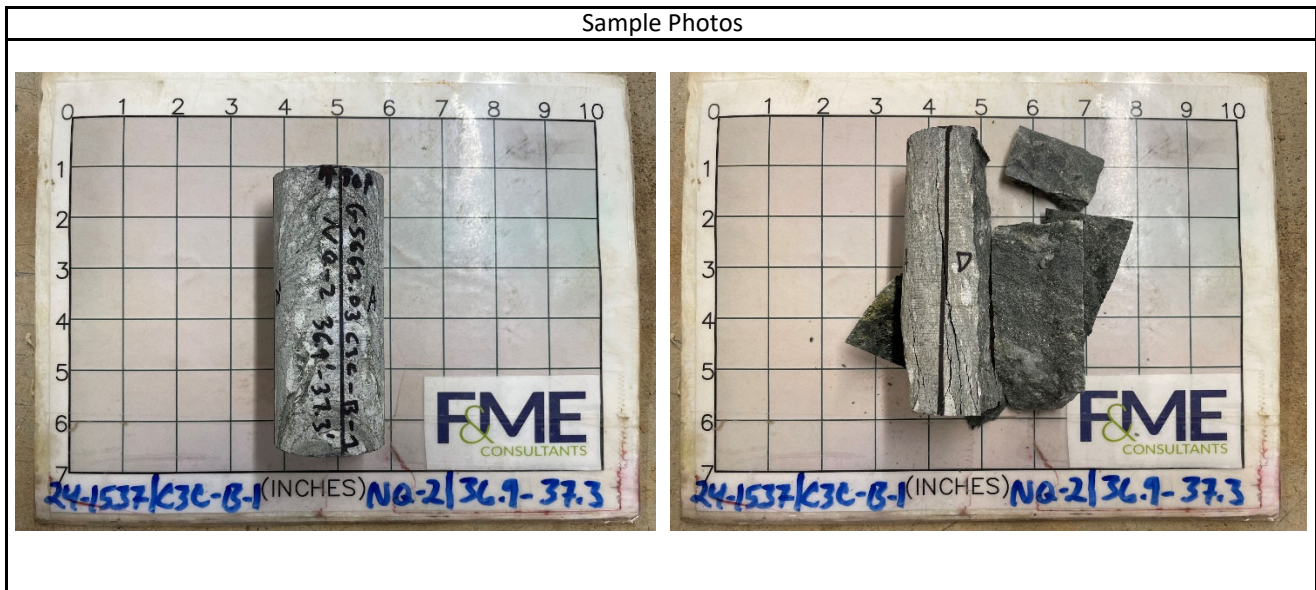
APPENDIX

SECTION 4 LABORATORY TEST RESULTS

SECTION 4B ROCK SAMPLES

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/20/2024
Project No.	G5662.030	Sample Diameter (in.)	1.87	Tested By	WAP
SCDOT ID	P039720	Sample Length (in.)	4.62	Reviewed By	WJG
Boring	C3C-B1	Unit Weight (pcf)	173.7	Core Size	NQ
Sample No.	NQ-2 / 24-1537	L/D Ratio	2.47	Recovery	91%
Depth	36.9' - 37.3'	Load Rate (psi/sec)	20	RQD	78%
Description	Black Phyllite				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	-162	23	1,877	683	8.43	0.14
20%	-450	64	3,760	1,369	6.09	0.14
30%	-739	99	5,632	2,051	5.55	0.13
40%	-1072	141	7,510	2,735	5.10	0.13
50%	-1446	180	9,390	3,419	4.73	0.12
60%	-1905	229	11,258	4,099	4.30	0.12
70%	-2405	273	13,147	4,787	3.98	0.11
80%	-3840	369	15,019	5,469	2.85	0.10
90%	-6147	517	16,897	6,152	2.00	0.08
100%	-22582	396	18,774	6,836		



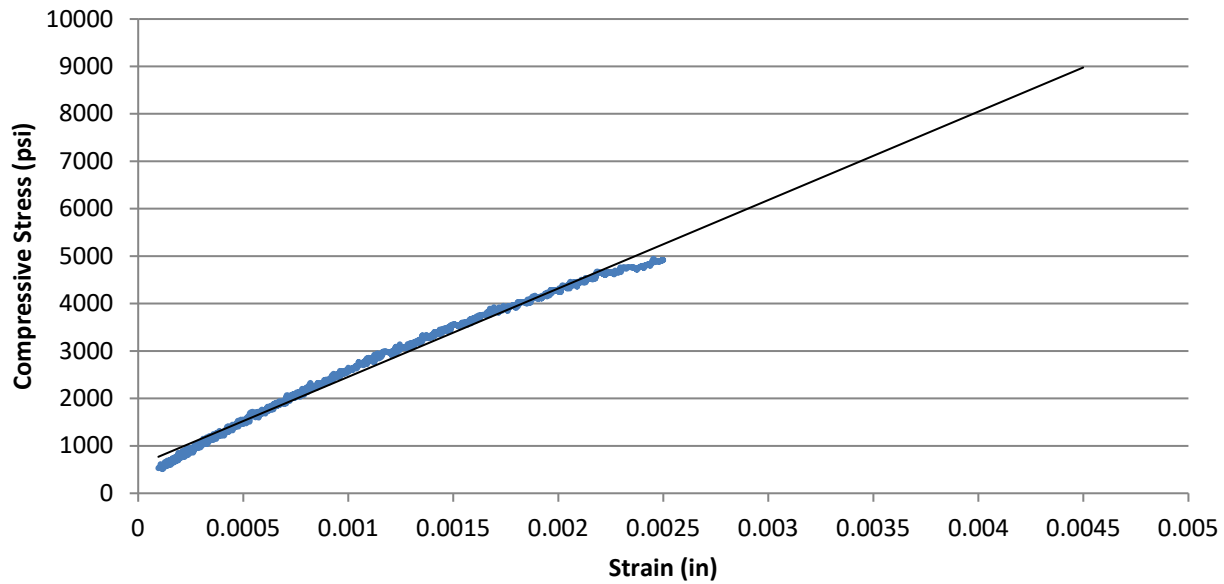
Test Results			
Unconfined Compressive Strength (psi)	6,840	Elastic Modulus (psi)	5.02E+06
		Poisson's Ratio in Elastic Range	0.13
Comments	Elastic range was taken as between 0.0005 and 0.002 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



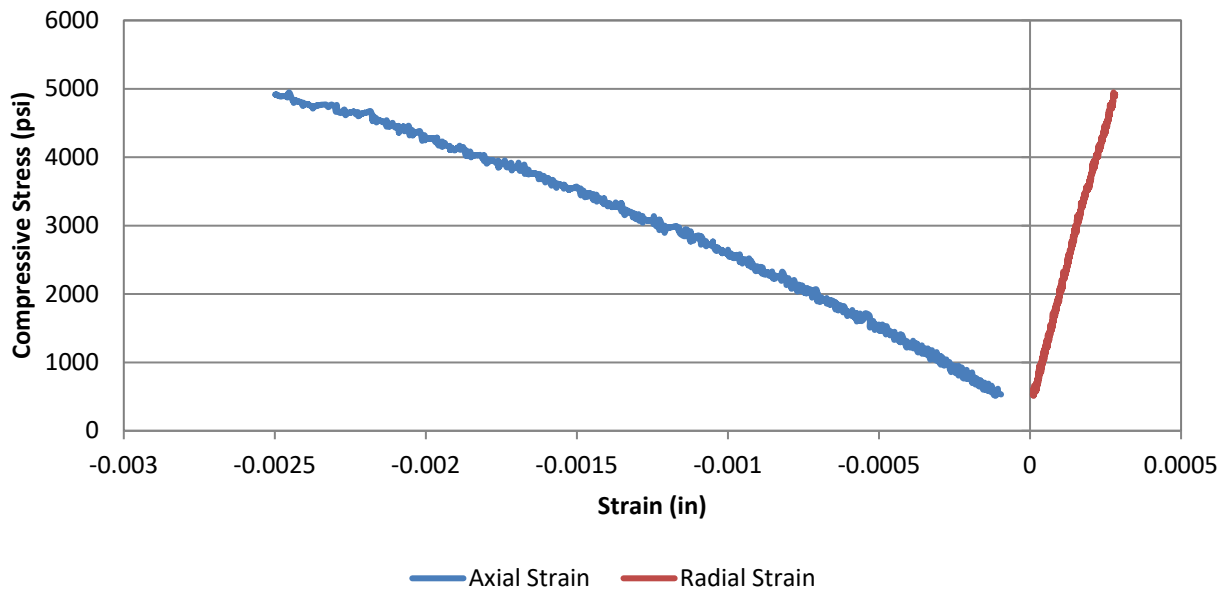
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/20/2024
Project No.	G5662.030	Sample Diameter (in.)	1.87	Tested By	WAP
SCDOT ID	P039720	Sample Length (in.)	4.62	Reviewed By	WJG
Boring	C3C-B1	Unit Weight (pcf)	173.7	Core Size	NQ
Sample No.	NQ-2 / 24-1537	L/D Ratio	2.47	Recovery	91%
Depth	36.9' - 37.3'	Load Rate (psi/sec)	20	RQD	78%
Description	Black Phyllite				

Axial Stress vs. Strain

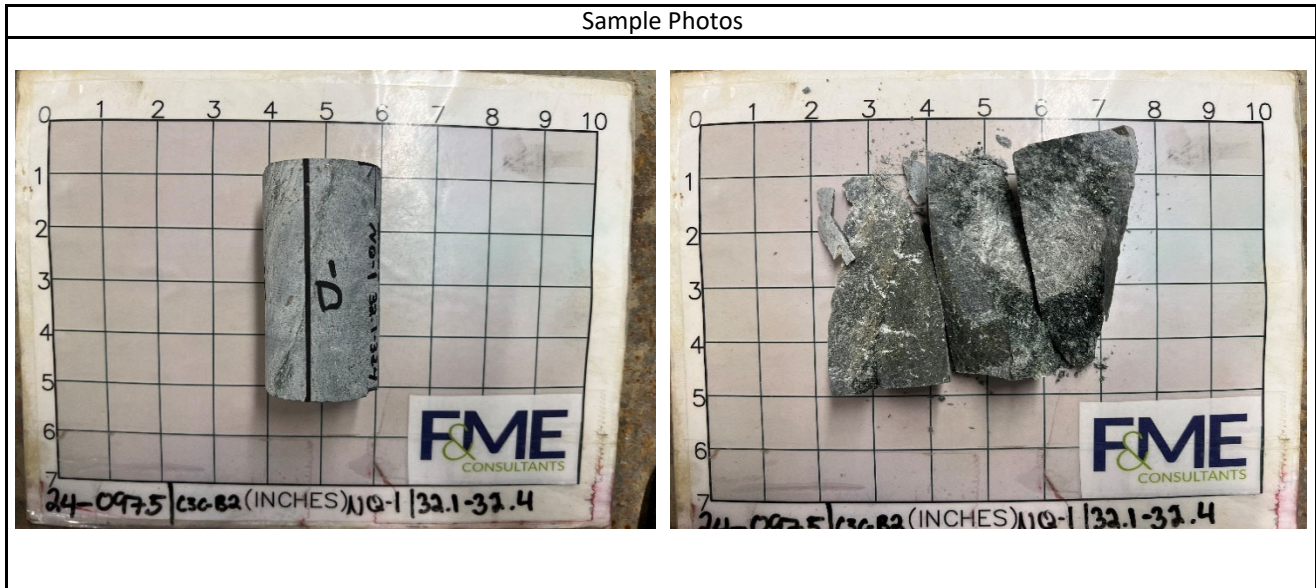


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/12/2024
Project No.	G5662.030	Sample Diameter (in.)	1.897	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	3.765	Reviewed By	WAP
Boring	C3C-B2	Unit Weight (pcf)	159.4	Core Size	NQ
Sample No.	NQ-1 / 24-0975	L/D Ratio	1.98	Recovery	61%
Depth	32.1' - 32.4'	Load Rate (psi/sec)	20	RQD	34%
Description	Dark Bluish Gray Phyllite w/ Quartz and Feldspar Xenoliths				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	-309	107	2,009	721	4.60	0.35
20%	-633	564	4,015	1,442	4.48	0.89
30%	-978	836	6,032	2,166	4.37	0.85
40%	-1284	1088	8,029	2,883	4.43	0.85
50%	-1679	1450	10,056	3,611	4.24	0.86
60%	-2171	1954	12,091	4,342	3.94	0.90
70%	-2834	2581	14,071	5,053	3.51	0.91
80%	-3298	3102	16,086	5,776	3.45	0.94
90%	-3789	3669	18,097	6,499	3.38	0.97
100%	-5352	5960	20,108	7,221		



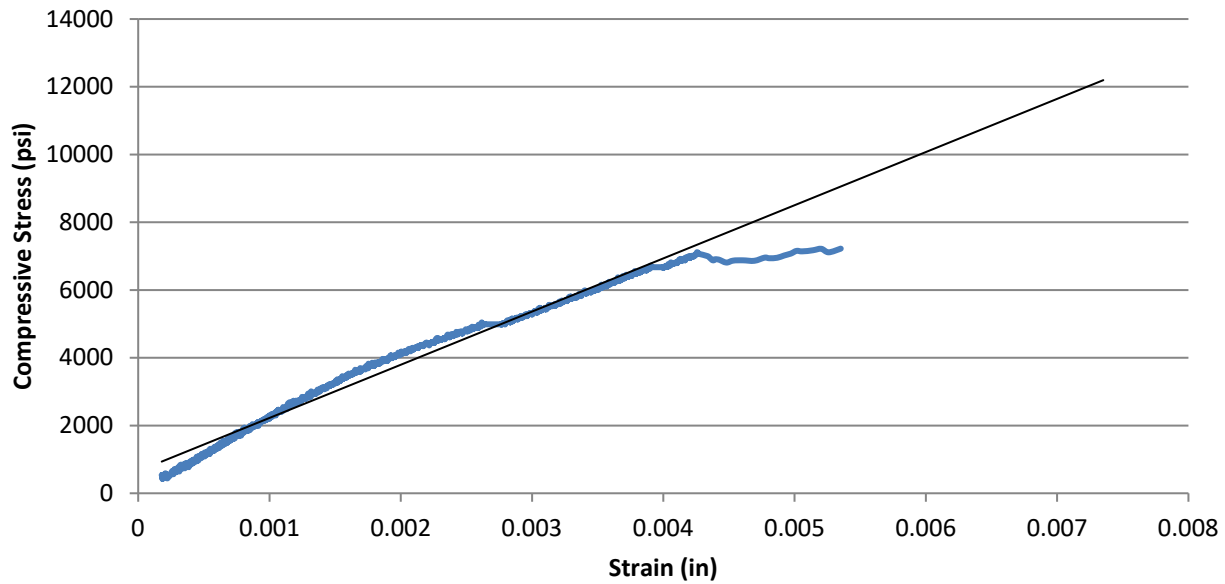
Test Results			
Unconfined Compressive Strength (psi)	7,220	Elastic Modulus (psi)	4.20E+06
		Poisson's Ratio in Elastic Range	0.87
Comments	Elastic range was taken as between 0.001 and 0.0025 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range. Poisson's Ratio is outside the anticipated range and should be used with care.		



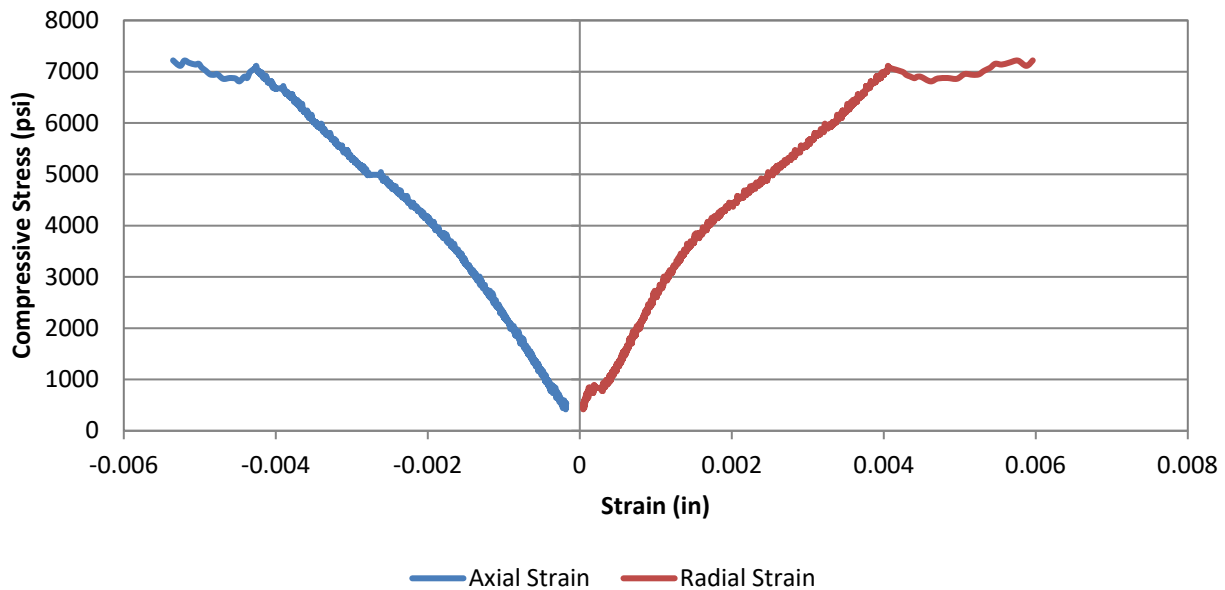
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
 ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/12/2024
Project No.	G5662.030	Sample Diameter (in.)	1.897	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	3.765	Reviewed By	WAP
Boring	C3C-B2	Unit Weight (pcf)	159.4	Core Size	NQ
Sample No.	NQ-1 / 24-0975	L/D Ratio	1.98	Recovery	61%
Depth	32.1' - 32.4'	Load Rate (psi/sec)	20	RQD	34%
Description	Dark Bluish Gray Phyllite w/ Quartz and Feldspar Xenoliths				

Axial Stress vs. Strain

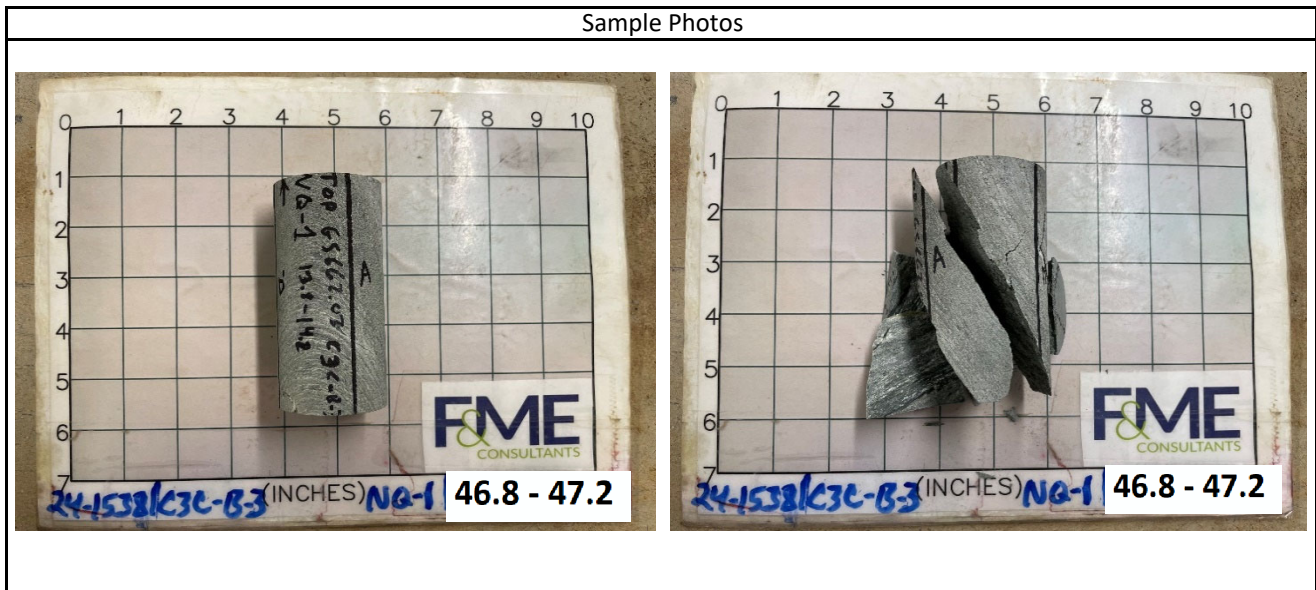


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/20/2024
Project No.	G5662.030	Sample Diameter (in.)	1.866	Tested By	WAP
SCDOT ID	P039720	Sample Length (in.)	3.915	Reviewed By	WJG
Boring	C3C-B3	Unit Weight (pcf)	170.6	Core Size	NQ
Sample No.	NQ-1 / 24-1538	L/D Ratio	2.10	Recovery	86%
Depth	46.8' - 47.2'	Load Rate (psi/sec)	20	RQD	73%
Description	Black Phyllite				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%	-456	51	2,355	861	3.78	0.11
30%	-817	97	3,524	1,289	3.15	0.12
40%	-1324	172	4,715	1,724	2.61	0.13
50%	-1827	260	5,886	2,152	2.36	0.14
60%	-2407	383	7,060	2,582	2.14	0.16
70%	-3118	577	8,241	3,013	1.93	0.18
80%	-3849	818	9,420	3,444	1.79	0.21
90%	-4717	1138	10,597	3,875	1.64	0.24
100%	-5671	1483	11,774	4,305		



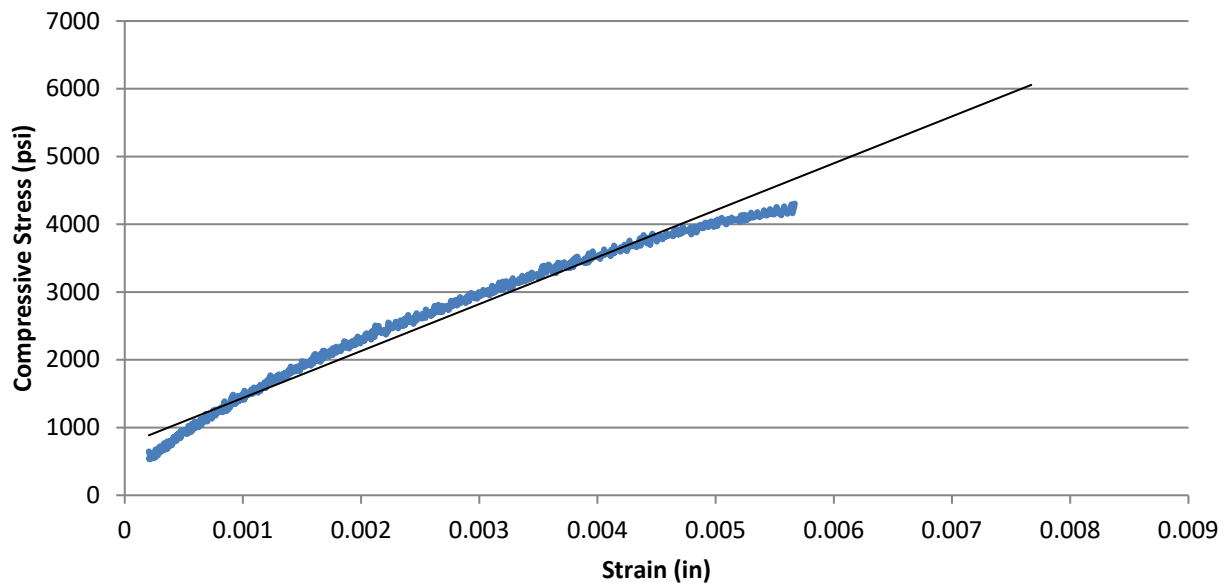
Test Results			
Unconfined Compressive Strength (psi)	4,310	Elastic Modulus (psi)	2.36E+06
		Poisson's Ratio in Elastic Range	0.15
Comments	Elastic range was taken as between 0.001 and 0.003 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



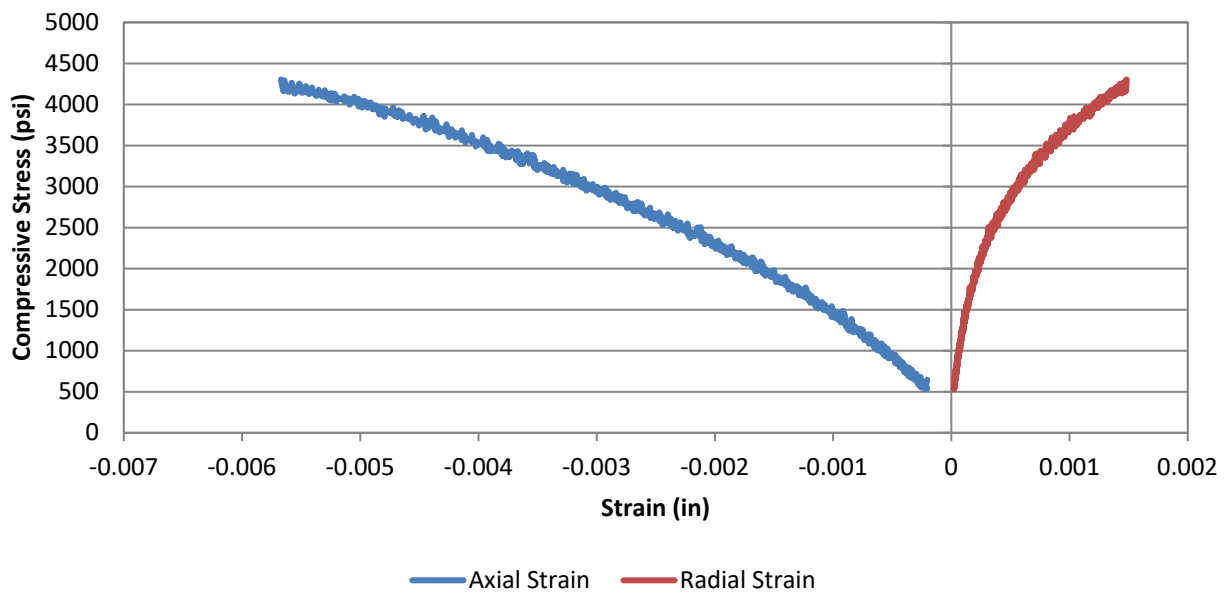
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/20/2024
Project No.	G5662.030	Sample Diameter (in.)	1.866	Tested By	WAP
SCDOT ID	P039720	Sample Length (in.)	3.915	Reviewed By	WJG
Boring	C3C-B3	Unit Weight (pcf)	170.6	Core Size	NQ
Sample No.	NQ-1 / 24-1538	L/D Ratio	2.10	Recovery	86%
Depth	46.8' - 47.2'	Load Rate (psi/sec)	20	RQD	73%
Description	Black Phyllite				

Axial Stress vs. Strain

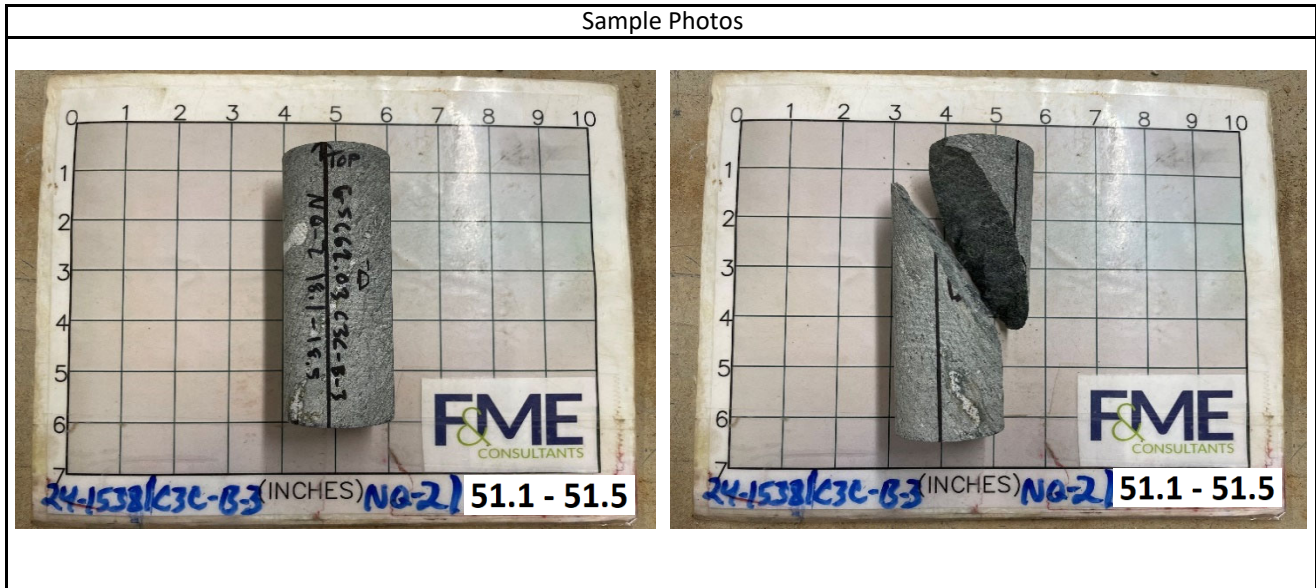


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/20/2024
Project No.	G5662.030	Sample Diameter (in.)	1.873	Tested By	WAP
SCDOT ID	P039720	Sample Length (in.)	4.612	Reviewed By	WJG
Boring	C3C-B3	Unit Weight (pcf)	174.5	Core Size	NQ
Sample No.	NQ-2 / 24-1538	L/D Ratio	2.46	Recovery	100%
Depth	51.1' - 51.5'	Load Rate (psi/sec)	20	RQD	80%
Description	Black Phyllite				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%	-403	42	2,759	1,002	4.97	0.10
30%	-613	60	4,126	1,498	4.88	0.10
40%	-885	82	5,519	2,003	4.53	0.09
50%	-1156	102	6,901	2,505	4.33	0.09
60%	-1427	125	8,291	3,009	4.22	0.09
70%	-1687	148	9,661	3,506	4.16	0.09
80%	-1969	174	11,039	4,007	4.07	0.09
90%	-2258	203	12,419	4,507	3.99	0.09
100%	-2549	237	13,799	5,008		



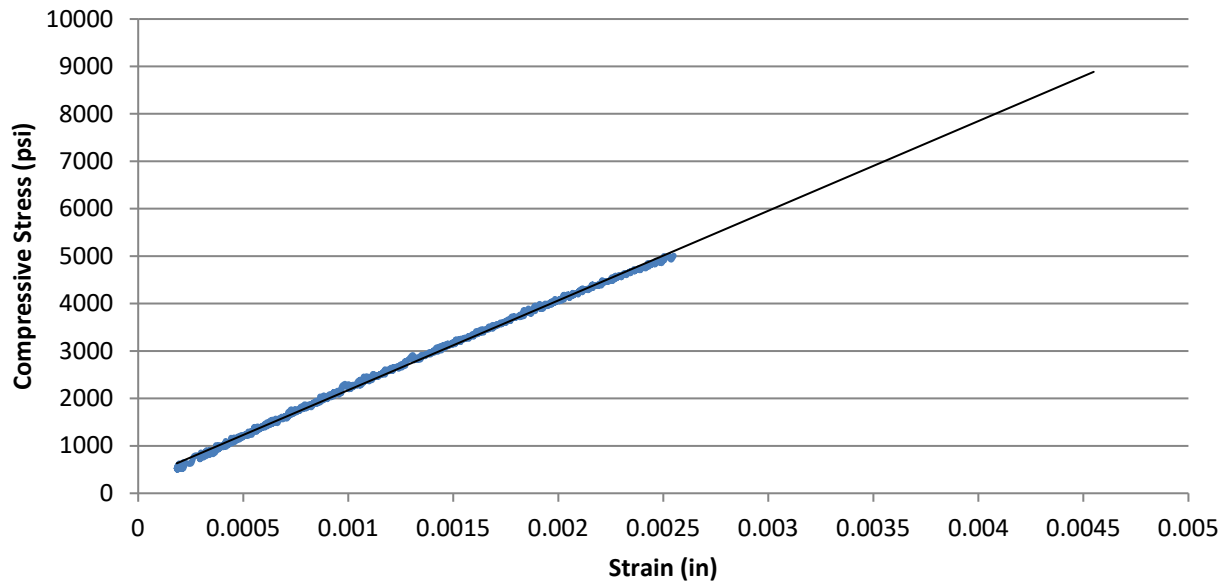
Test Results			
Unconfined Compressive Strength (psi)	5,010	Elastic Modulus (psi)	4.36E+06
		Poisson's Ratio in Elastic Range	0.09
Comments	Elastic range was taken as between 0.0005 and 0.002 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



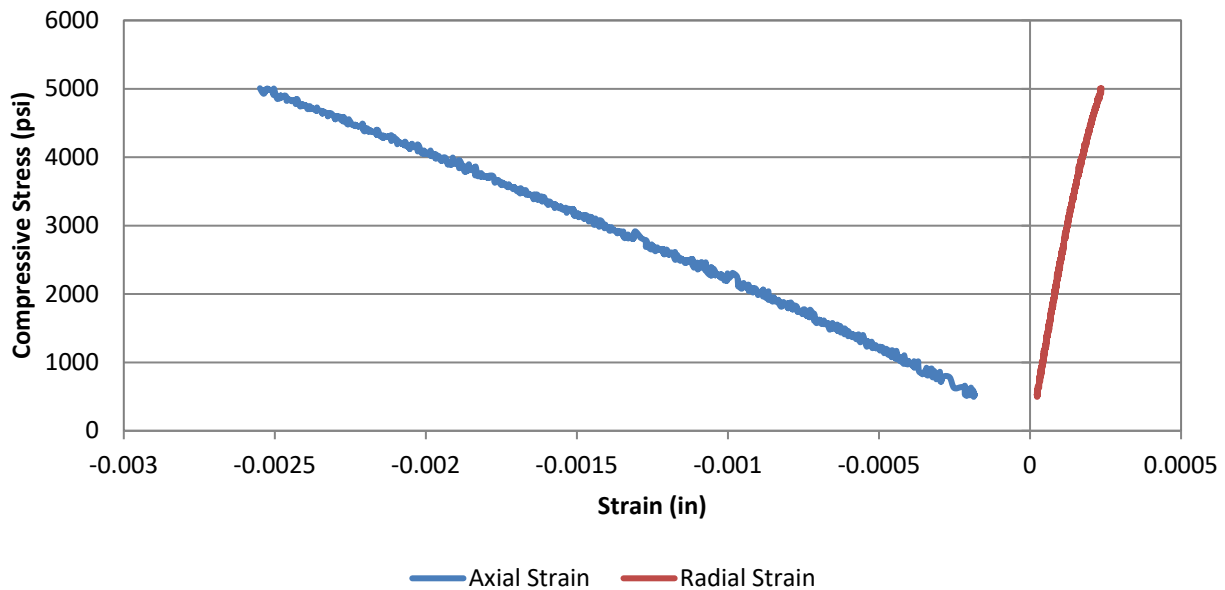
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
 ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/20/2024
Project No.	G5662.030	Sample Diameter (in.)	1.873	Tested By	WAP
SCDOT ID	P039720	Sample Length (in.)	4.612	Reviewed By	WJG
Boring	C3C-B3	Unit Weight (pcf)	174.5	Core Size	NQ
Sample No.	NQ-2 / 24-1538	L/D Ratio	2.46	Recovery	100%
Depth	51.1' - 51.5'	Load Rate (psi/sec)	20	RQD	80%
Description	Black Phyllite				

Axial Stress vs. Strain

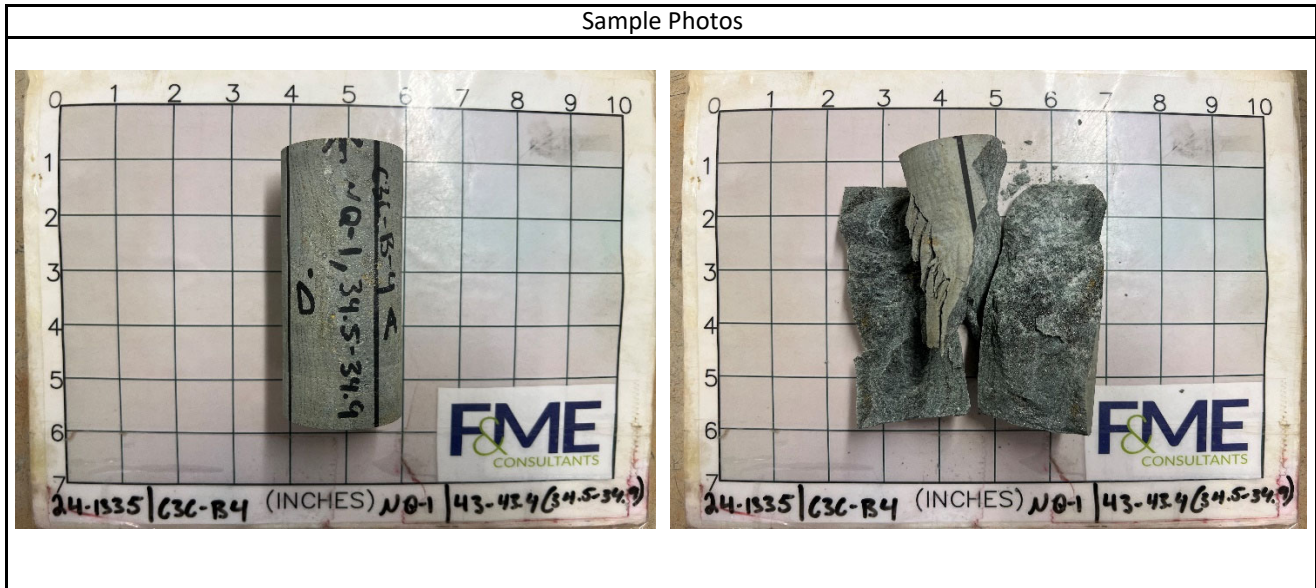


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/26/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.19	Reviewed By	WAP
Boring	C3C-B4	Unit Weight (pcf)	169.6	Core Size	NQ
Sample No.	NQ-1 / 24-1335	L/D Ratio	2.24	Recovery	98%
Depth	43.0' - 43.4'	Load Rate (psi/sec)	20	RQD	79%
Description	Green/Gray/White Metamorphic Slate				

Test Data						
Percent of Failure Load	Strain (10^{-6})		Load (lbs)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%	-748	96	2,833	1,034	2.76	0.13
30%	-1264	172	4,250	1,551	2.45	0.14
40%	-1944	315	5,672	2,070	2.13	0.16
50%	-2675	531	7,085	2,585	1.93	0.20
60%	-3477	827	8,505	3,103	1.79	0.24
70%	-4229	1148	9,921	3,620	1.71	0.27
80%	-5348	1677	11,335	4,136	1.55	0.31
90%	-6914	2238	12,751	4,653	1.35	0.32
100%	-11071	3611	14,169	5,170		



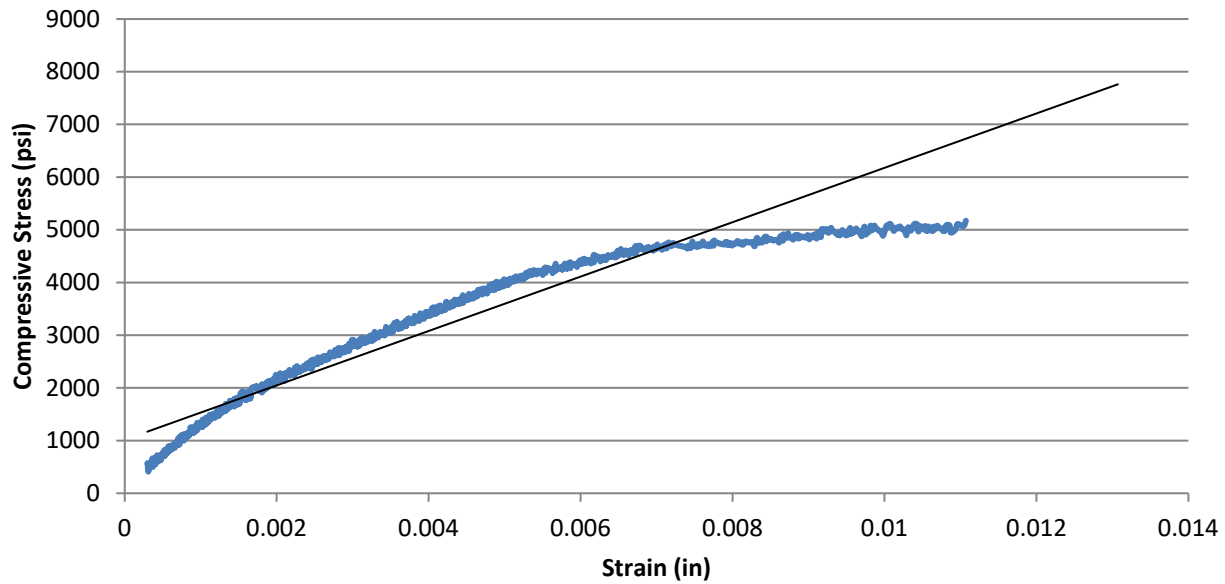
Test Results			
Unconfined Compressive Strength (psi)	5,170	Elastic Modulus (psi)	1.81E+06
		Poisson's Ratio in Elastic Range	0.23
Comments	Elastic range was taken as between 0.002 and 0.005 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



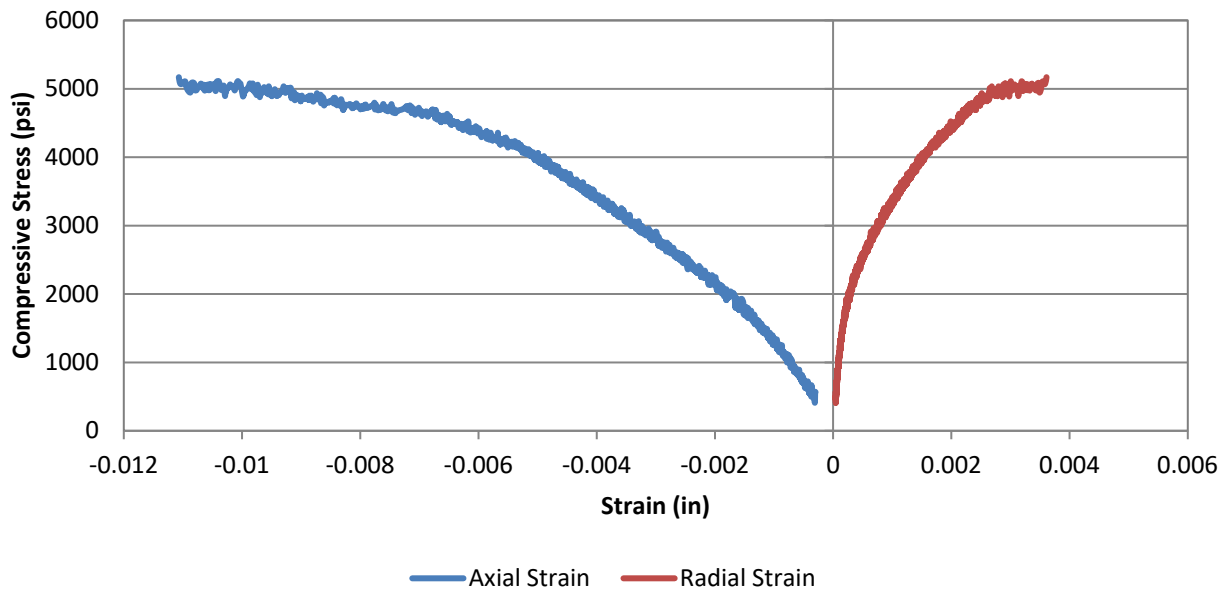
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/26/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.19	Reviewed By	WAP
Boring	C3C-B4	Unit Weight (pcf)	169.6	Core Size	NQ
Sample No.	NQ-1 / 24-1335	L/D Ratio	2.24	Recovery	98%
Depth	43.0' - 43.4'	Load Rate (psi/sec)	20	RQD	79%
Description	Green/Gray/White Metamorphic Slate				

Axial Stress vs. Strain

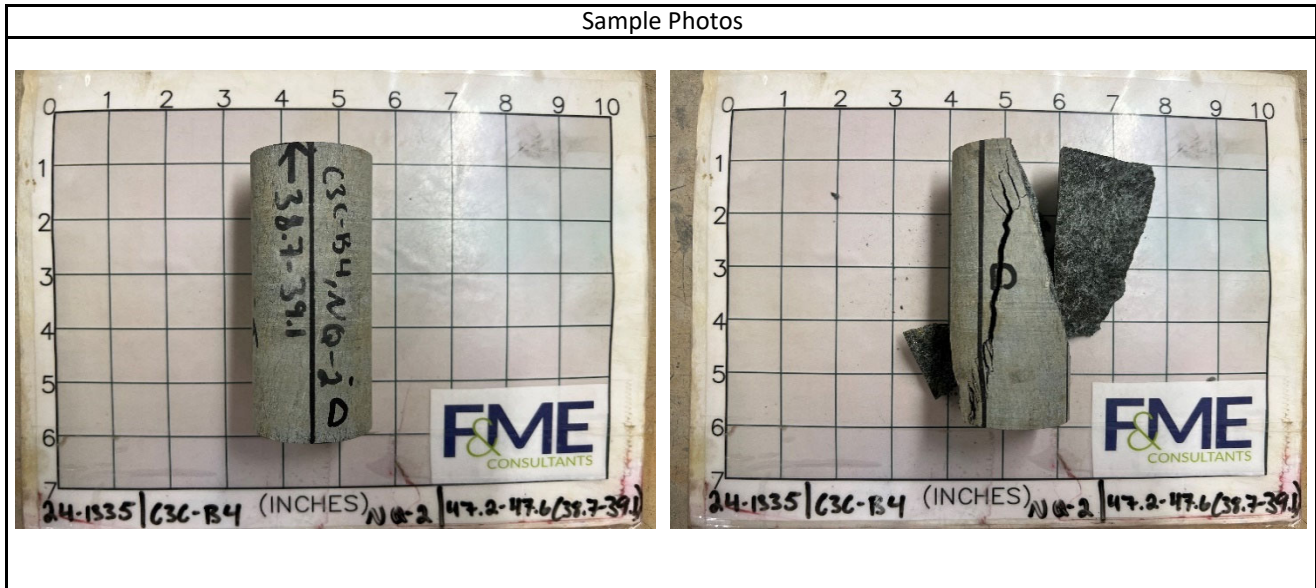


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/26/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.344	Reviewed By	WAP
Boring	C3C-B4	Unit Weight (pcf)	170.6	Core Size	NQ
Sample No.	NQ-2 / 24-1335	L/D Ratio	2.33	Recovery	100%
Depth	47.2' - 47.6'	Load Rate (psi/sec)	20	RQD	91%
Description	Green/Gray/White Metamorphic Slate				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%	-516	139	3,168	1,156	4.48	0.27
30%	-940	246	4,749	1,733	3.69	0.26
40%	-1431	382	6,336	2,312	3.23	0.27
50%	-1998	564	7,923	2,891	2.89	0.28
60%	-2538	753	9,506	3,469	2.73	0.30
70%	-3301	1026	11,089	4,046	2.45	0.31
80%	-5454	1257	12,660	4,619	1.69	0.23
90%	-6885	1526	14,254	5,201	1.51	0.22
100%	-10606	2075	15,839	5,780		



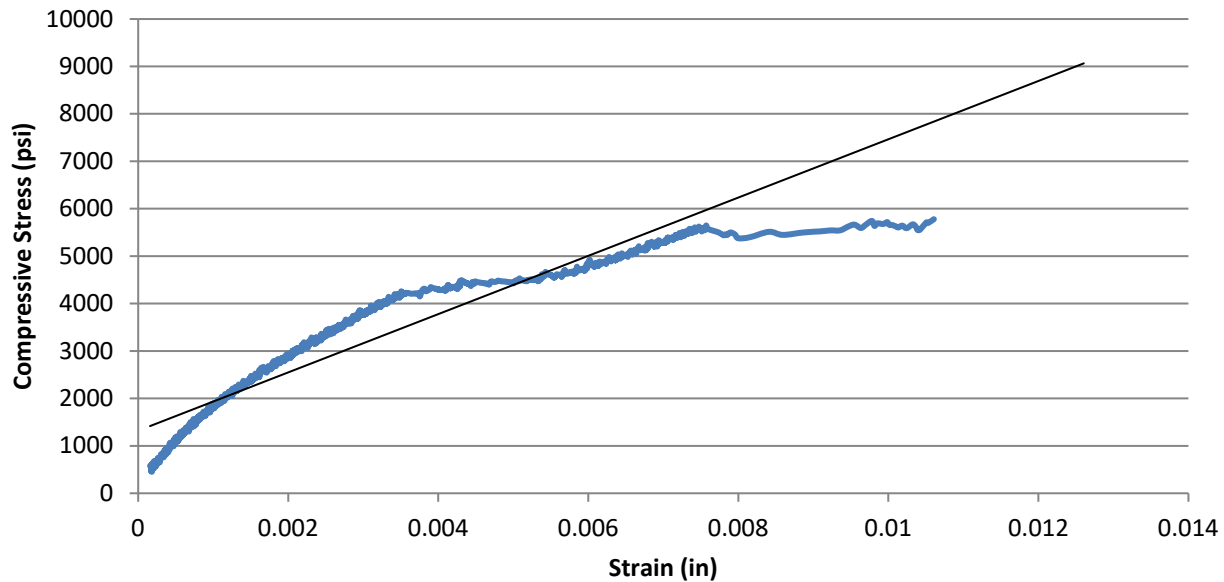
Test Results			
Unconfined Compressive Strength (psi)	5,780	Elastic Modulus (psi)	3.00E+06
		Poisson's Ratio in Elastic Range	0.28
Comments	Elastic range was taken as between 0.001 and 0.003 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



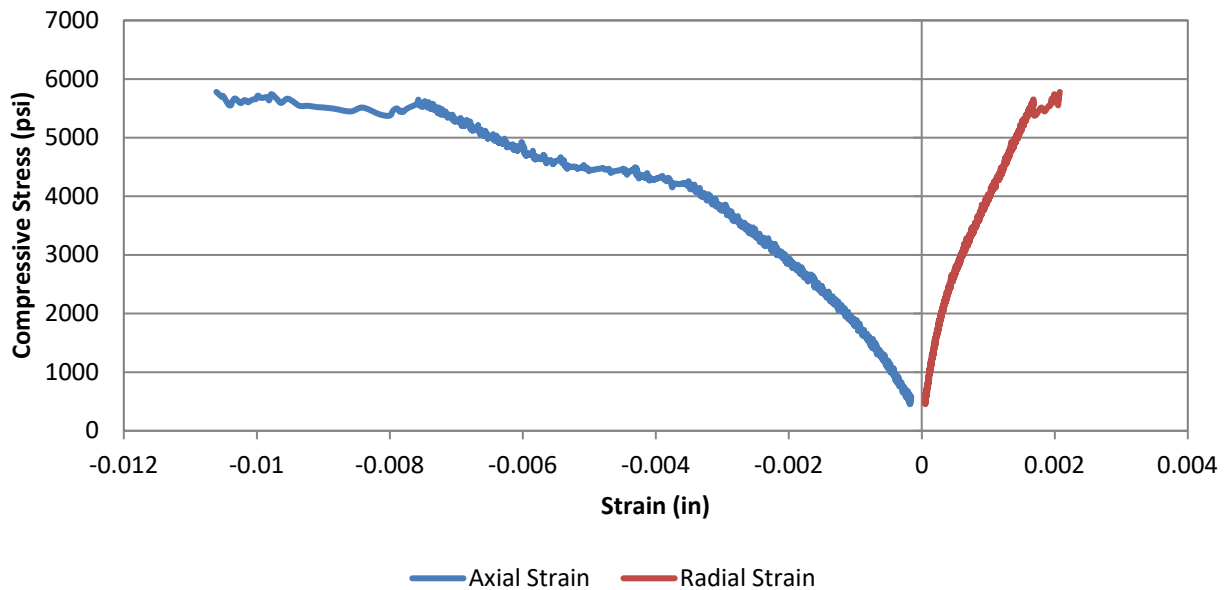
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/26/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.344	Reviewed By	WAP
Boring	C3C-B4	Unit Weight (pcf)	170.6	Core Size	NQ
Sample No.	NQ-2 / 24-1335	L/D Ratio	2.33	Recovery	100%
Depth	47.2' - 47.6'	Load Rate (psi/sec)	20	RQD	91%
Description	Green/Gray/White Metamorphic Slate				

Axial Stress vs. Strain

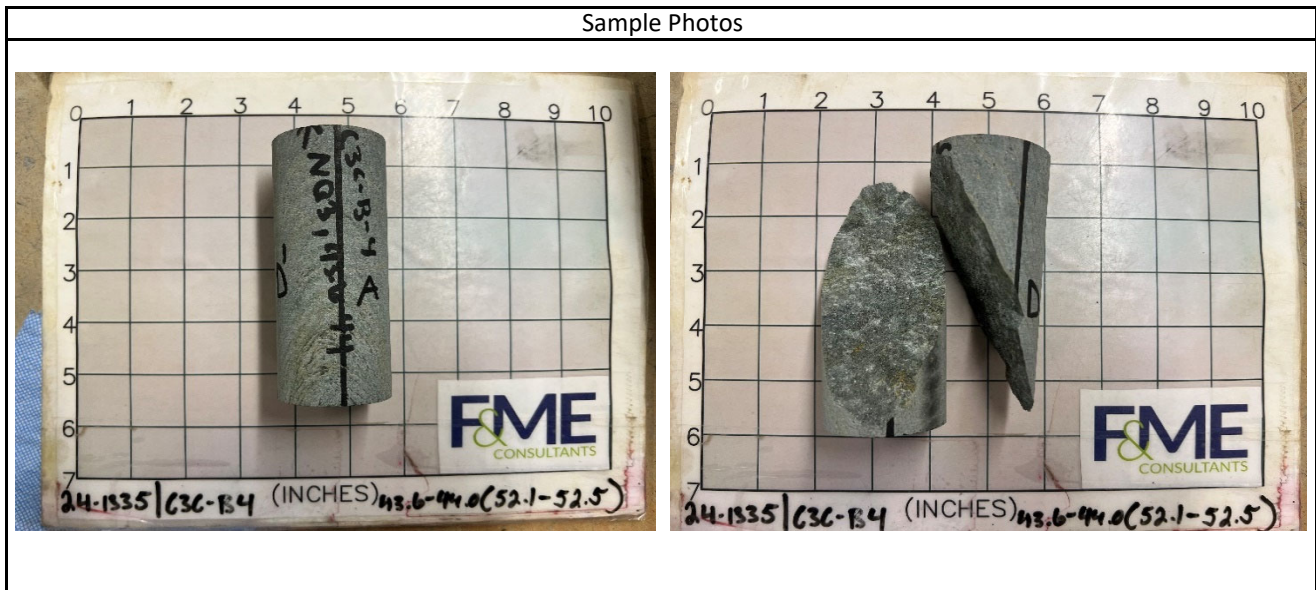


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/26/2024
Project No.	G5662.030	Sample Diameter (in.)	1.865	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.315	Reviewed By	WAP
Boring	C3C-B4	Unit Weight (pcf)	170.3	Core Size	NQ
Sample No.	NQ-3 / 24-1335	L/D Ratio	2.31	Recovery	88%
Depth	52.1' - 52.5'	Load Rate (psi/sec)	20	RQD	74%
Description	Green/Gray/White Metamorphic Slate				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%	-649	71	2,157	790	2.44	0.11
30%	-1054	120	3,233	1,183	2.25	0.11
40%	-1414	168	4,323	1,582	2.24	0.12
50%	-1788	219	5,414	1,982	2.22	0.12
60%	-2118	271	6,482	2,373	2.24	0.13
70%	-2498	334	7,575	2,773	2.22	0.13
80%	-2889	402	8,647	3,165	2.19	0.14
90%	-3246	535	9,728	3,561	2.19	0.16
100%	-3511	604	10,808	3,956		



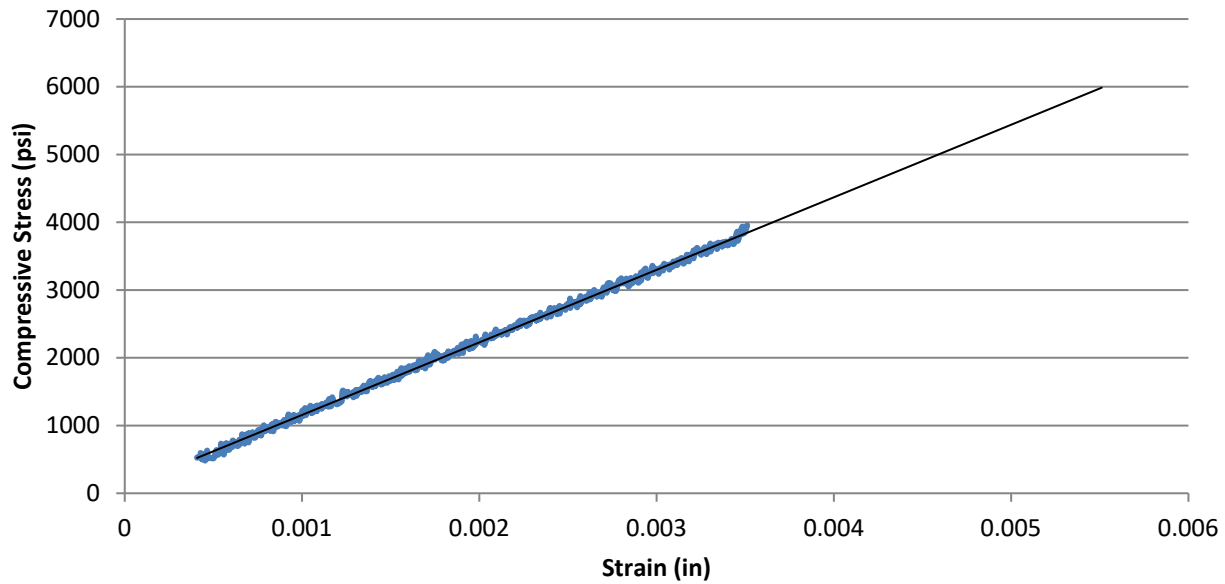
Test Results			
Unconfined Compressive Strength (psi)	3,960	Elastic Modulus (psi)	3.31E+06
		Poisson's Ratio in Elastic Range	0.12
Comments	Elastic range was taken as between 0.001 and 0.0025 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



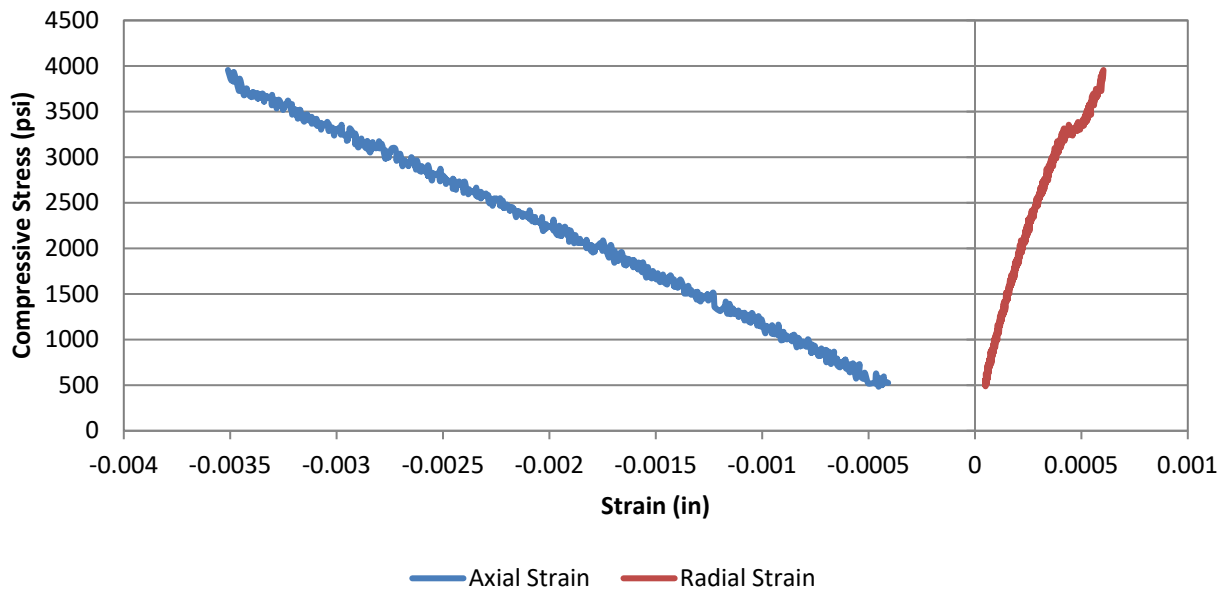
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/26/2024
Project No.	G5662.030	Sample Diameter (in.)	1.865	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.315	Reviewed By	WAP
Boring	C3C-B4	Unit Weight (pcf)	170.3	Core Size	NQ
Sample No.	NQ-3 / 24-1335	L/D Ratio	2.31	Recovery	88%
Depth	52.1' - 52.5'	Load Rate (psi/sec)	20	RQD	74%
Description	Green/Gray/White Metamorphic Slate				

Axial Stress vs. Strain

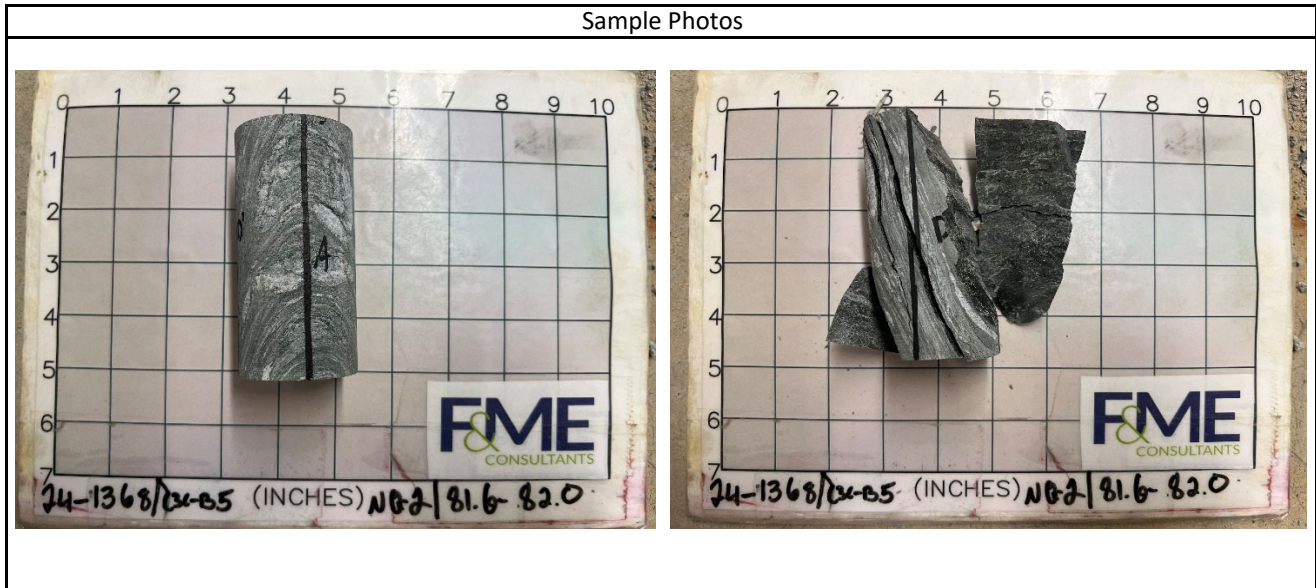


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.87	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	3.936	Reviewed By	WAP
Boring	C3C-B5	Unit Weight (pcf)	169.5	Core Size	NQ
Sample No.	NQ-2.1 / 24-1368	L/D Ratio	2.10	Recovery	100%
Depth	81.6' - 82.0'	Load Rate (psi/sec)	20	RQD	87%
Description	Gray/Green Chlorite/Phyllite				

Test Data						
Percent of Failure Load	Strain (10^{-6})		Load (lbs)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%						
30%						
40%	-1158	24	2,123	773	1.34	0.02
50%	-1474	29	2,652	966	1.31	0.02
60%	-1782	36	3,182	1,159	1.30	0.02
70%	-2079	47	3,717	1,353	1.30	0.02
80%	-2372	62	4,243	1,545	1.30	0.03
90%	-2887	307	4,777	1,739	1.20	0.11
100%	-3202	463	5,303	1,931		



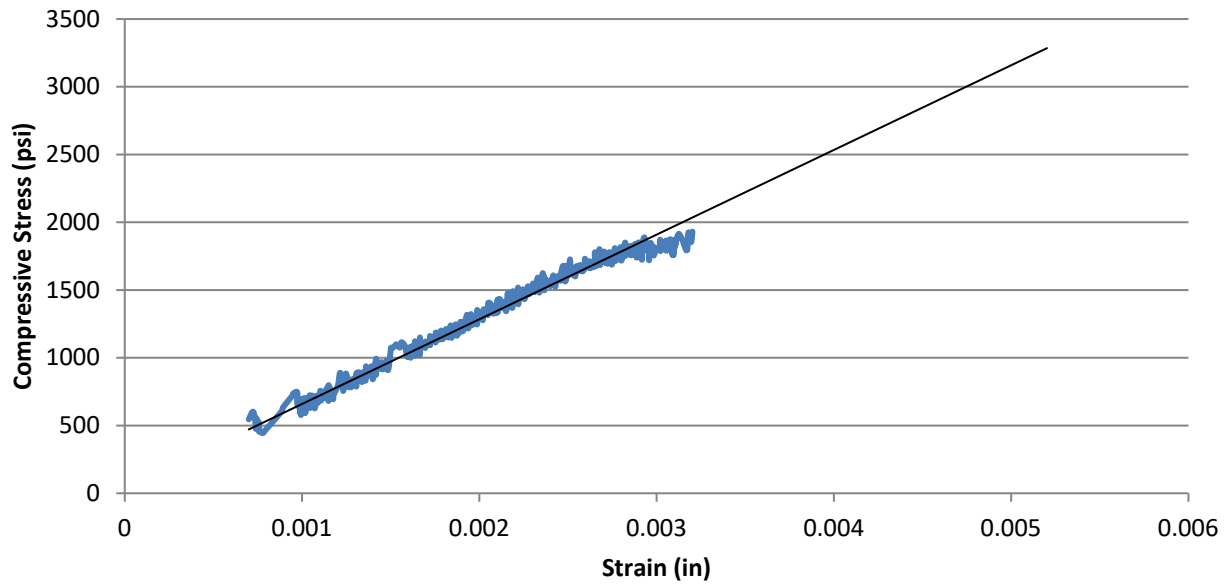
Test Results			
Unconfined Compressive Strength (psi)	1,930	Elastic Modulus (psi)	1.29E+06
		Poisson's Ratio in Elastic Range	0.02
Comments	Elastic range was taken as between 0.001 and 0.002 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



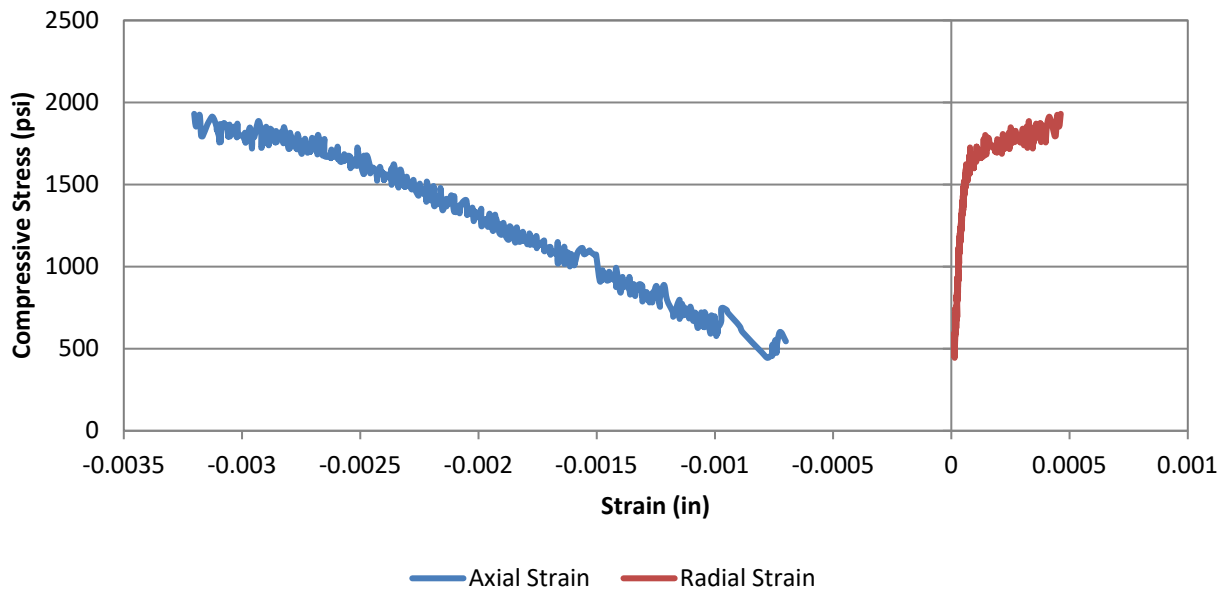
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.87	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	3.936	Reviewed By	WAP
Boring	C3C-B5	Unit Weight (pcf)	169.5	Core Size	NQ
Sample No.	NQ-2.1 / 24-1368	L/D Ratio	2.10	Recovery	100%
Depth	81.6' - 82.0'	Load Rate (psi/sec)	20	RQD	87%
Description	Gray/Green Chlorite/Phyllite				

Axial Stress vs. Strain

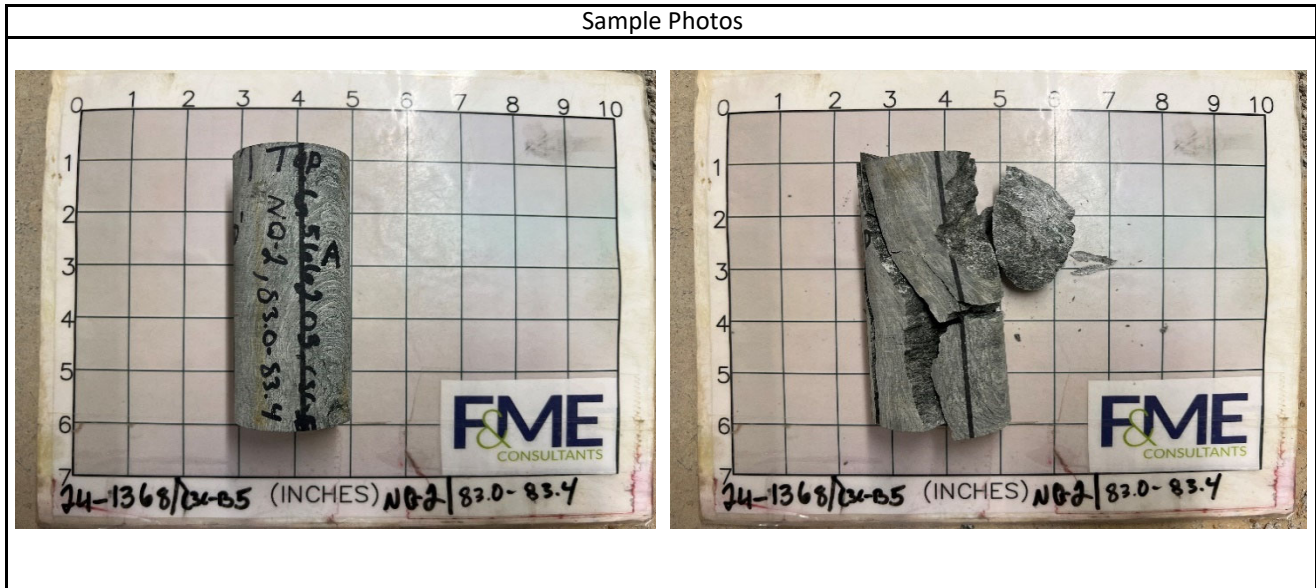


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.315	Reviewed By	WAP
Boring	C3C-B5	Unit Weight (pcf)	168.1	Core Size	NQ
Sample No.	NQ-2.2 / 24-1368	L/D Ratio	2.31	Recovery	100%
Depth	83.0' - 83.4'	Load Rate (psi/sec)	20	RQD	87%
Description	Gray/Green Chlorite/Phyllite				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%						
30%	-571	30	1,880	686	2.40	0.05
40%	-869	20	2,518	919	2.12	0.02
50%	-1108	32	3,149	1,149	2.07	0.03
60%	-1383	56	3,778	1,379	1.99	0.04
70%	-1673	115	4,402	1,606	1.92	0.07
80%	-2006	228	5,035	1,837	1.83	0.11
90%	-2370	424	5,664	2,067	1.74	0.18
100%	-2730	776	6,294	2,297		



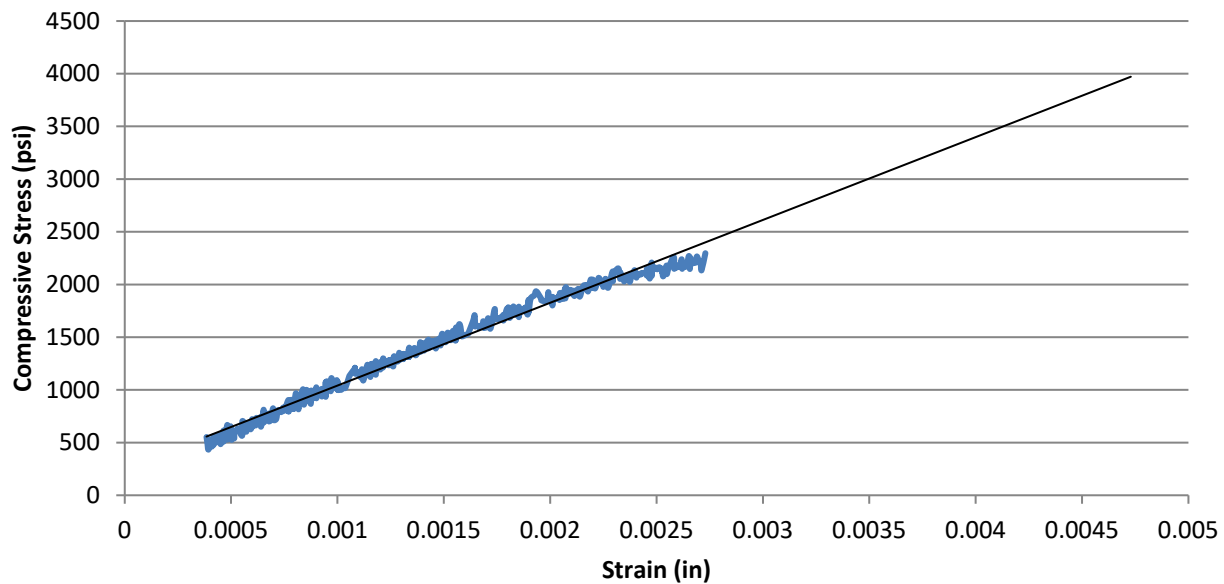
Test Results			
Unconfined Compressive Strength (psi)	2,300	Elastic Modulus (psi)	1.98E+06
		Poisson's Ratio in Elastic Range	0.05
Comments	Elastic range was taken as between 0.001 and 0.002 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



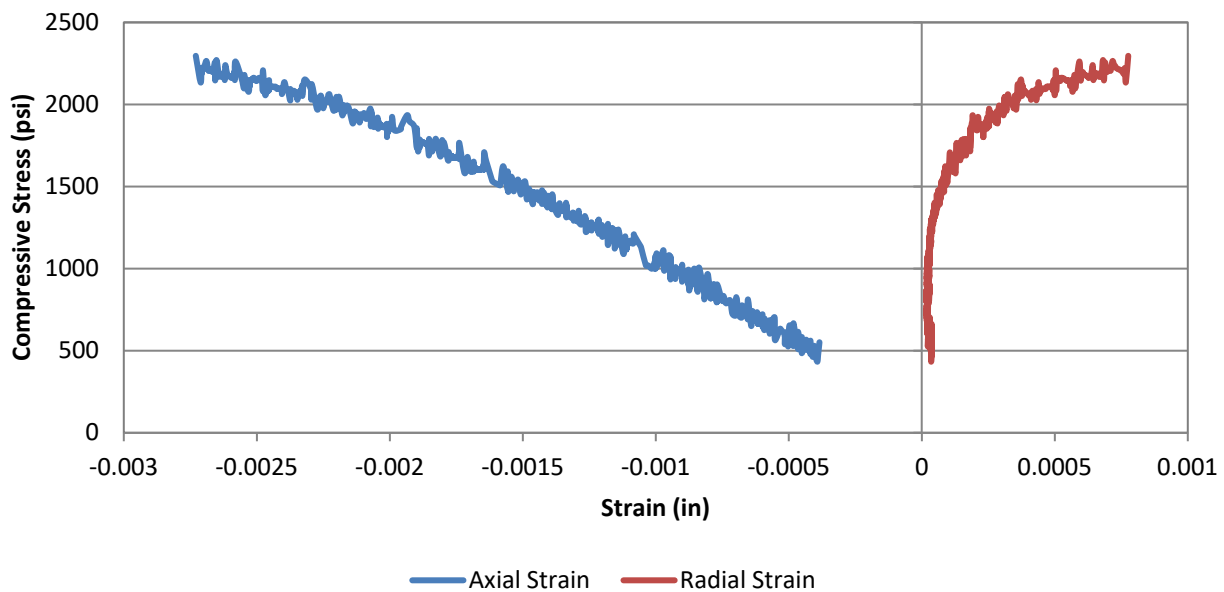
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.315	Reviewed By	WAP
Boring	C3C-B5	Unit Weight (pcf)	168.1	Core Size	NQ
Sample No.	NQ-2.2 / 24-1368	L/D Ratio	2.31	Recovery	100%
Depth	83.0' - 83.4'	Load Rate (psi/sec)	20	RQD	87%
Description	Gray/Green Chlorite/Phyllite				

Axial Stress vs. Strain

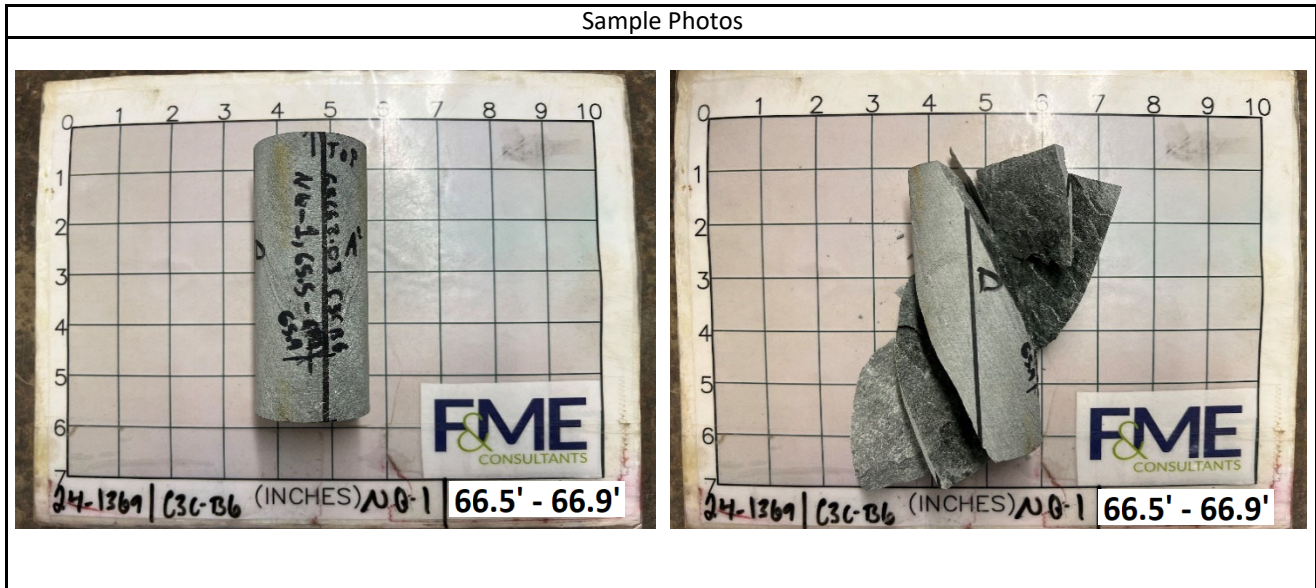


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.498	Reviewed By	WAP
Boring	C3C-B6	Unit Weight (pcf)	165.1	Core Size	NQ
Sample No.	NQ-1 / 24-1369	L/D Ratio	2.41	Recovery	67%
Depth	66.5' - 66.9'	Load Rate (psi/sec)	20	RQD	63%
Description	Gray, Phyllite				

Test Data						
Percent of Failure Load	Strain (10^{-6})		Load (lbs)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%						
30%	-386	8	1,722	628	3.26	0.02
40%	-536	18	2,310	843	3.15	0.03
50%	-701	30	2,881	1,051	3.00	0.04
60%	-891	43	3,459	1,262	2.83	0.05
70%	-1006	51	4,039	1,474	2.93	0.05
80%	-1195	63	4,616	1,684	2.82	0.05
90%	-1585	84	5,194	1,895	2.39	0.05
100%	-1815	100	5,770	2,106		



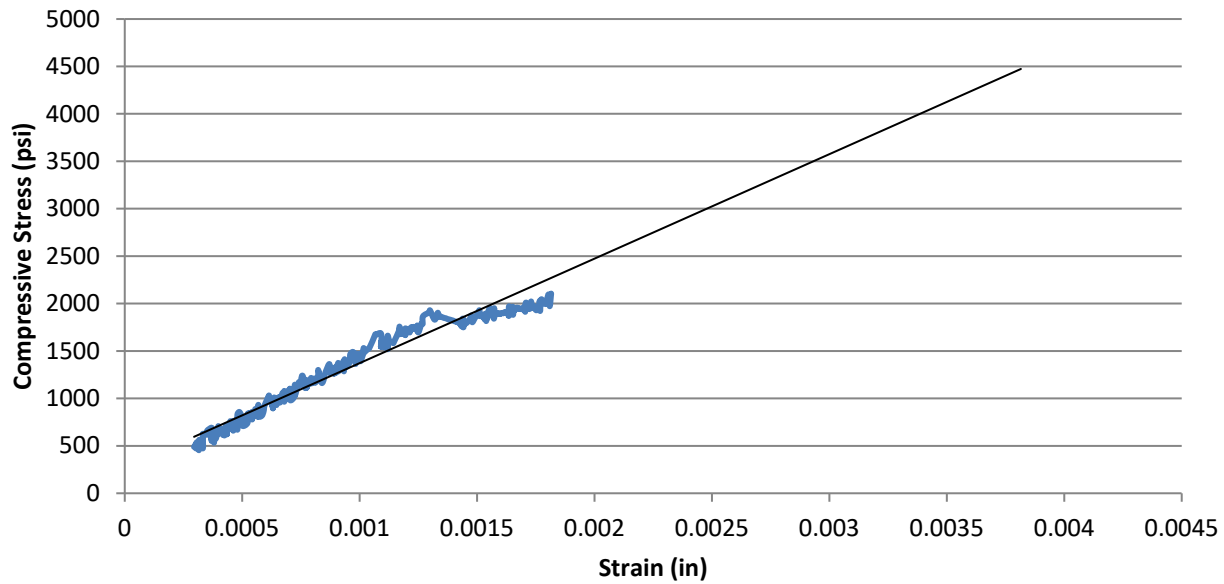
Test Results			
Unconfined Compressive Strength (psi)	2,110	Elastic Modulus (psi)	2.98E+06
		Poisson's Ratio in Elastic Range	0.04
Comments	Elastic range was taken as between 0.0005 and 0.001 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



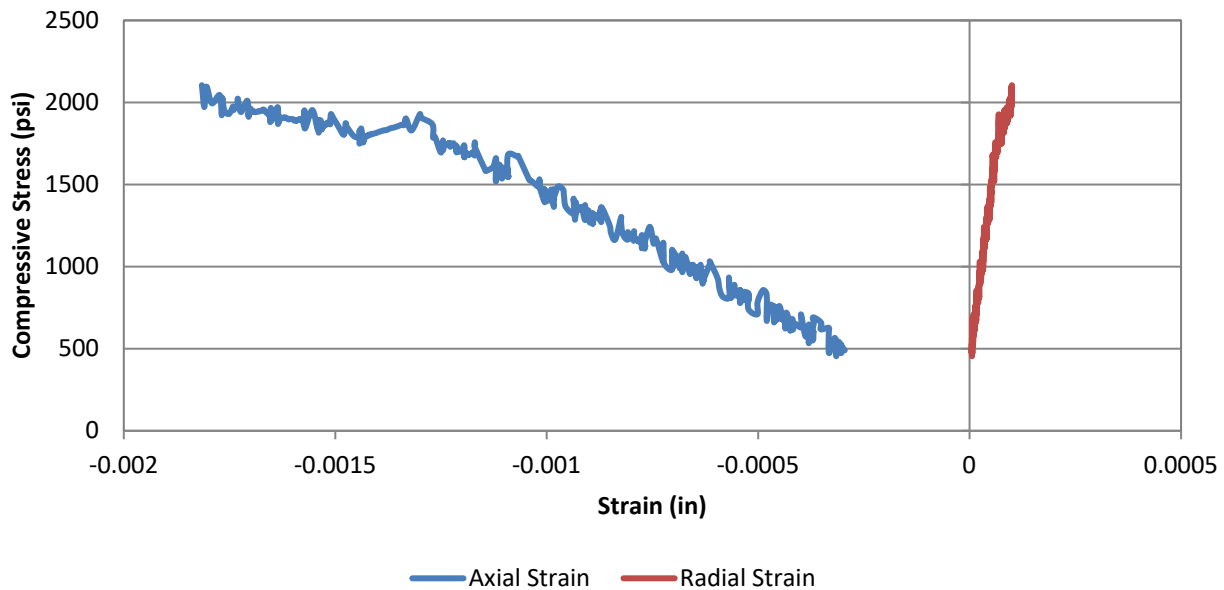
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.868	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.498	Reviewed By	WAP
Boring	C3C-B6	Unit Weight (pcf)	165.1	Core Size	NQ
Sample No.	NQ-1 / 24-1369	L/D Ratio	2.41	Recovery	67%
Depth	66.5' - 66.9'	Load Rate (psi/sec)	20	RQD	63%
Description	Gray, Phyllite				

Axial Stress vs. Strain

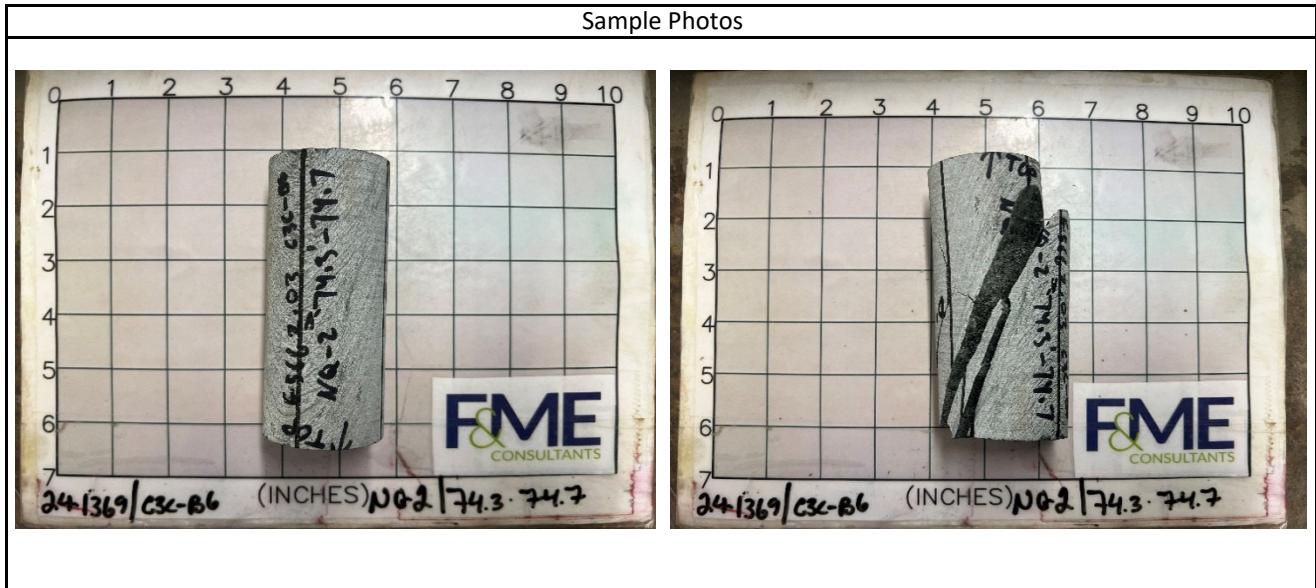


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.87	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.346	Reviewed By	WAP
Boring	C3C-B6	Unit Weight (pcf)	165.5	Core Size	NQ
Sample No.	NQ-2 / 24-1369	L/D Ratio	2.32	Recovery	100%
Depth	74.3' - 74.7'	Load Rate (psi/sec)	20	RQD	100%
Description	Gray Phyllite				

Test Data						
Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Sample Preload Range					
20%						
30%	-383	6	1,804	657	3.43	0.02
40%	-524	15	2,404	875	3.34	0.03
50%	-681	27	2,997	1,091	3.20	0.04
60%	-799	38	3,605	1,313	3.29	0.05
70%	-930	48	4,203	1,530	3.29	0.05
80%	-1008	57	4,806	1,750	3.47	0.06
90%	-1172	83	5,407	1,969	3.36	0.07
100%	-1220	128	6,011	2,189		



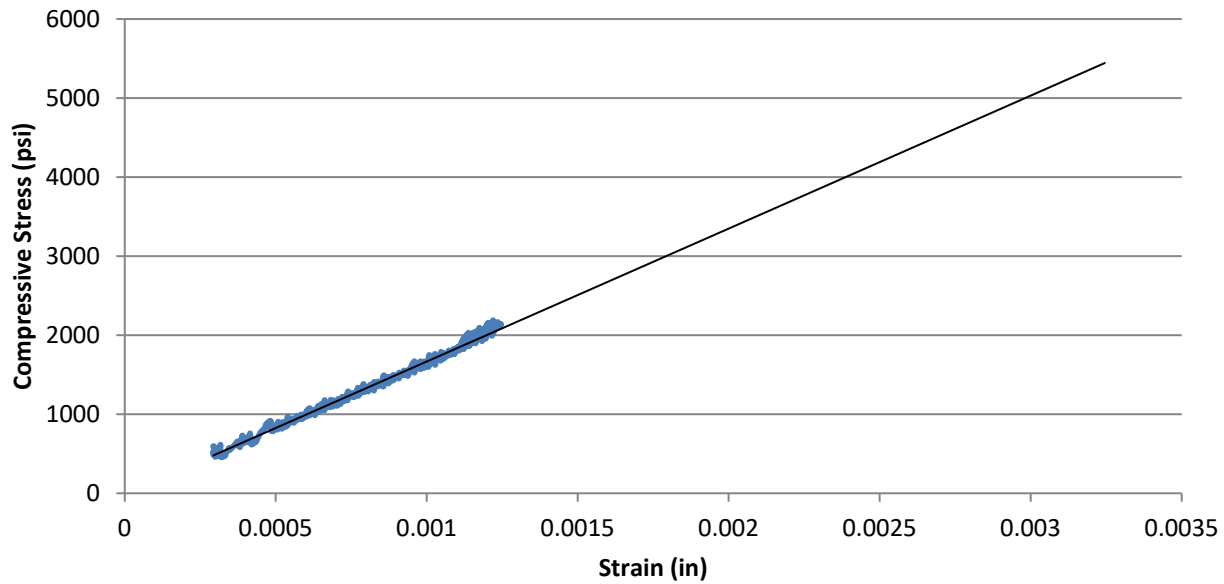
Test Results			
Unconfined Compressive Strength (psi)	2,190	Elastic Modulus (psi)	3.30E+06
		Poisson's Ratio in Elastic Range	0.04
Comments	Elastic range was taken as between 0.0005 and 0.001 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



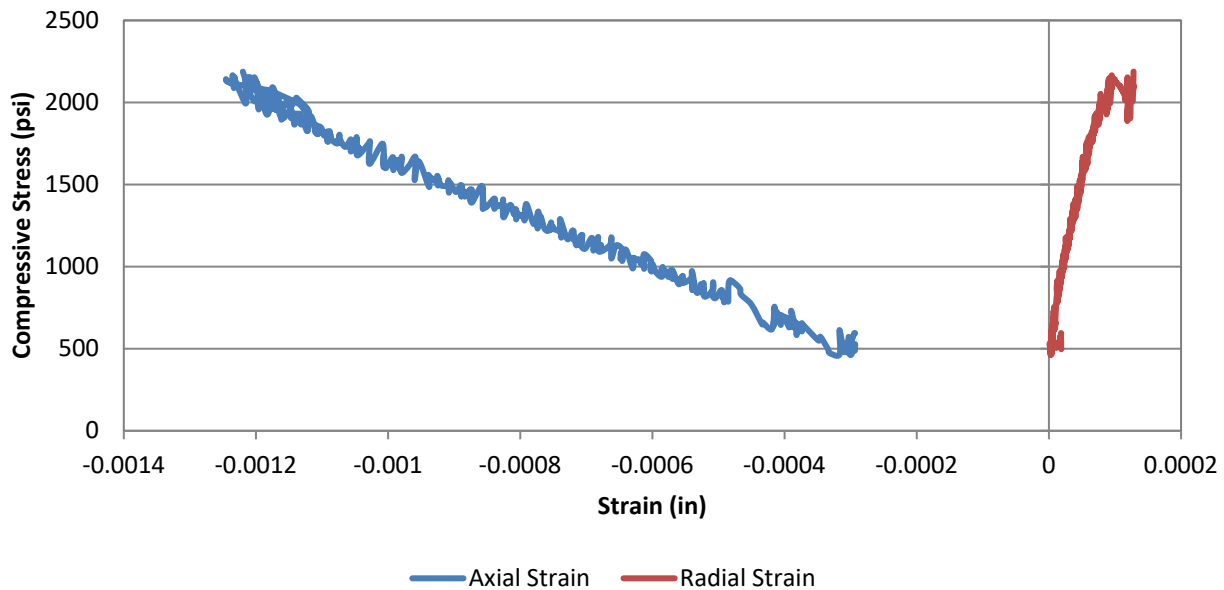
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
 ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	5/6/2024
Project No.	G5662.030	Sample Diameter (in.)	1.87	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.346	Reviewed By	WAP
Boring	C3C-B6	Unit Weight (pcf)	165.5	Core Size	NQ
Sample No.	NQ-2 / 24-1369	L/D Ratio	2.32	Recovery	100%
Depth	74.3' - 74.7'	Load Rate (psi/sec)	20	RQD	100%
Description	Gray Phyllite				

Axial Stress vs. Strain

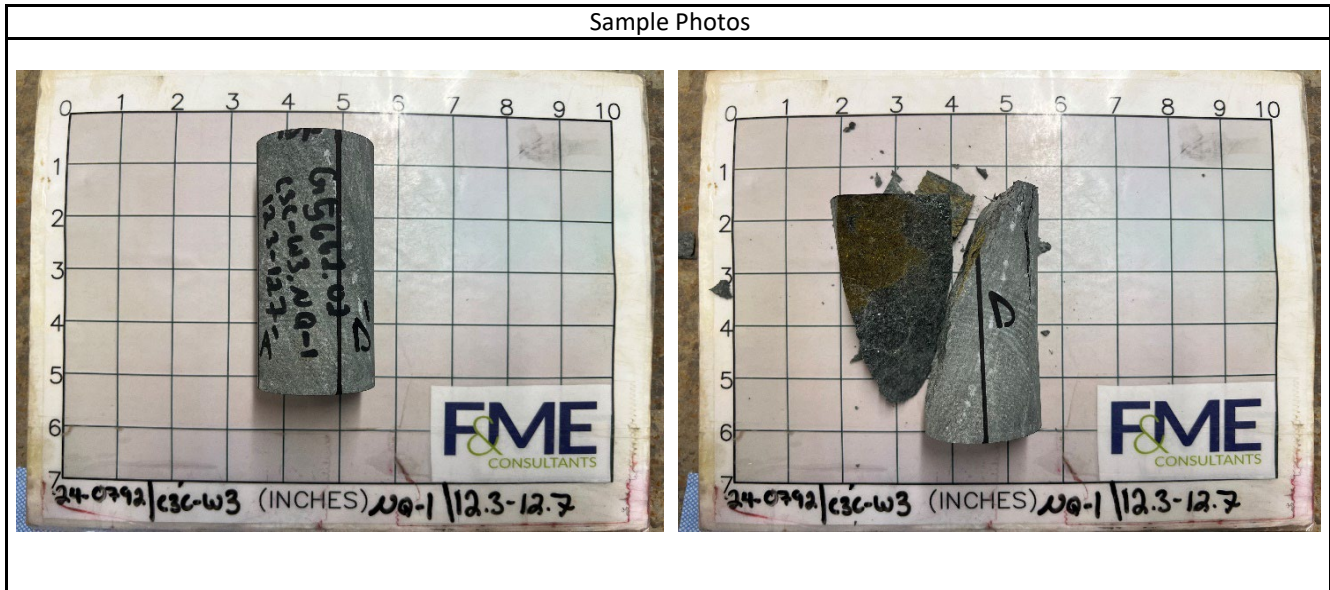


Stress vs. Strain



Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/12/2024
Project No.	G5662.030	Sample Diameter (in.)	1.869	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	3.975	Reviewed By	WAP
Boring	C3C-W3	Unit Weight (pcf)	172.3	Core Size	NQ
Sample No.	NQ-1 / 24-0972	L/D Ratio	2.13	Recovery	92%
Depth	12.3' - 12.7'	Load Rate (psi/sec)	20	RQD	83%
Description	Dark Bluish Gray Phyllite				

Percent of Failure Load	Strain (10^{-6})		Load (lbs)	Compressive Stress (psi)	Secant Modulus $\times 10^6$ (psi)	Poisson's Ratio
	Axial	Radial				
10%	Preload Range					
20%	-731	153	2,460	897	2.45	0.21
30%	-981	206	3,653	1,331	2.71	0.21
40%	-1347	279	4,856	1,770	2.63	0.21
50%	-1672	343	6,080	2,216	2.65	0.21
60%	-1979	405	7,310	2,664	2.69	0.20
70%	-2345	482	8,508	3,101	2.64	0.21
80%	-2668	548	9,733	3,548	2.66	0.21
90%	-3045	628	10,948	3,991	2.62	0.21
100%	-3886	878	12,165	4,434		



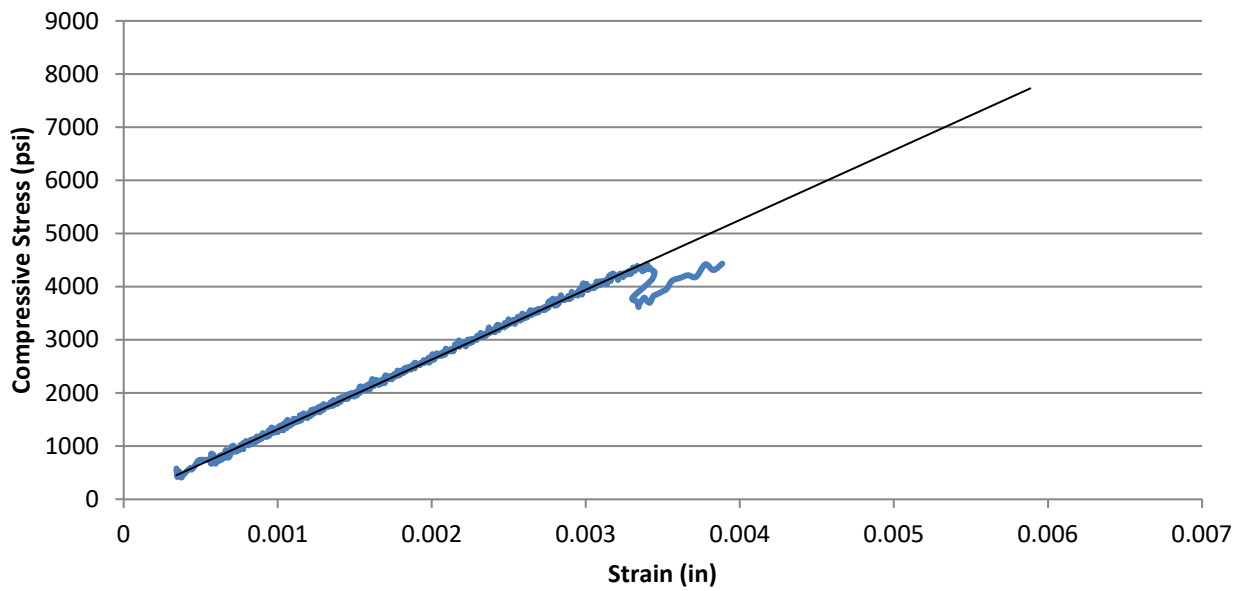
Test Results			
Unconfined Compressive Strength (psi)	4,430	Elastic Modulus (psi)	2.65E+06
		Poisson's Ratio in Elastic Range	0.21
Comments	Elastic range was taken as between 0.001 and 0.0025 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



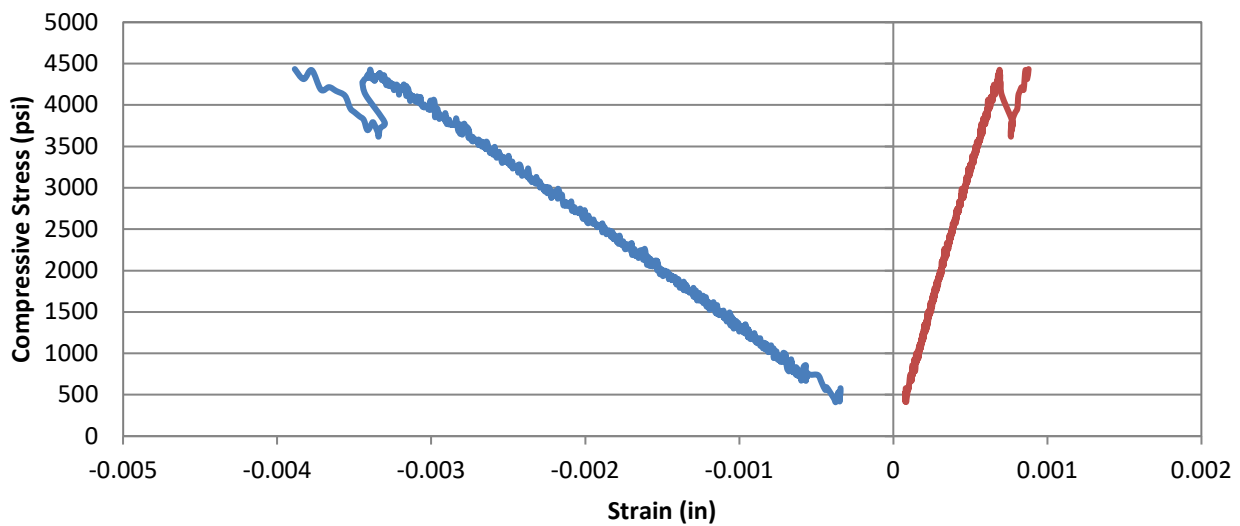
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/12/2024
Project No.	G5662.030	Sample Diameter (in.)	1.869	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	3.975	Reviewed By	WAP
Boring	C3C-W3	Unit Weight (pcf)	172.3	Core Size	NQ
Sample No.	NQ-1 / 24-0972	L/D Ratio	2.13	Recovery	92%
Depth	12.3' - 12.7'	Load Rate (psi/sec)	20	RQD	83%
Description	Dark Bluish Gray Phyllite				

Axial Stress vs. Strain



Stress vs. Strain

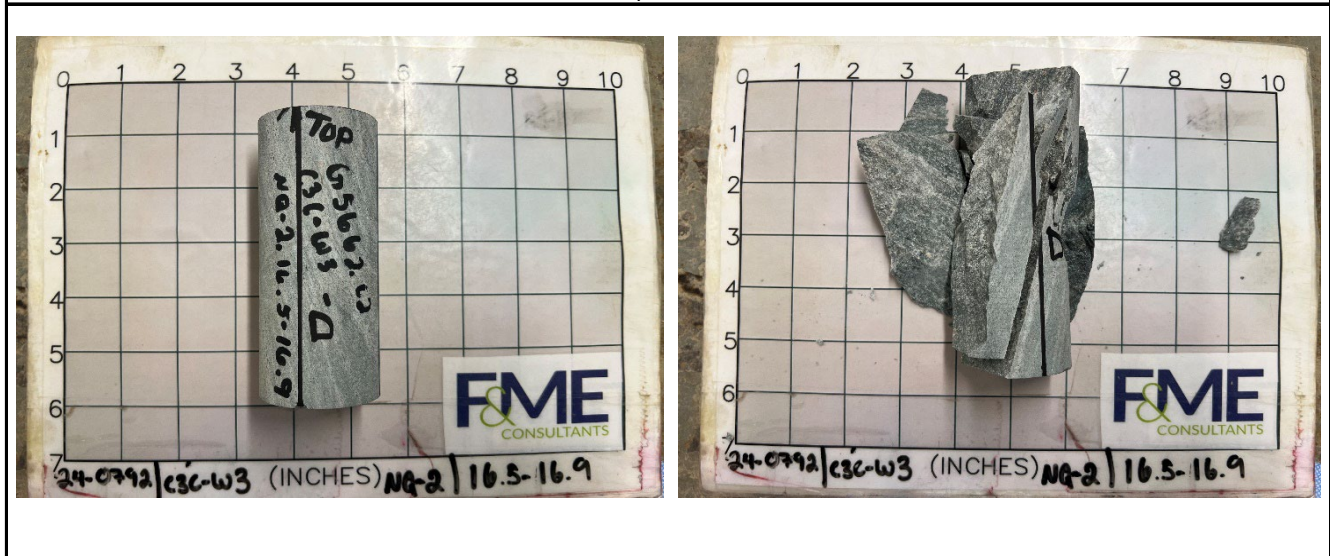


— Axial Strain — Radial Strain

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/12/2024
Project No.	G5662.030	Sample Diameter (in.)	1.866	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.233	Reviewed By	WAP
Boring	C3C-W3	Unit Weight (pcf)	170.1	Core Size	NQ
Sample No.	NQ-2 / 24-0972	L/D Ratio	2.27	Recovery	93%
Depth	16.5' - 16.9'	Load Rate (psi/sec)	20	RQD	60%
Description	Dark Bluish Gray Phyllite				

Percent of Failure Load	Strain (10 ⁻⁶)		Load (lbs)	Compressive Stress (psi)	Secant Modulus x10 ⁶ (psi)	Poisson's Ratio
	Axial	Radial				
10%	-638	143	4,456	1,629	5.11	0.22
20%	-1292	277	8,887	3,250	5.03	0.21
30%	-1928	424	13,342	4,879	5.06	0.22
40%	-2542	581	17,781	6,502	5.12	0.23
50%	-3082	736	22,226	8,127	5.27	0.24
60%	-3592	918	26,695	9,762	5.43	0.26
70%	-3963	1130	31,125	11,381	5.74	0.29
80%	-4511	1384	35,568	13,006	5.77	0.31
90%	-4400	1779	40,018	14,633	6.65	0.40
100%	-3838	2218	44,465	16,260		

Sample Photos



Test Results

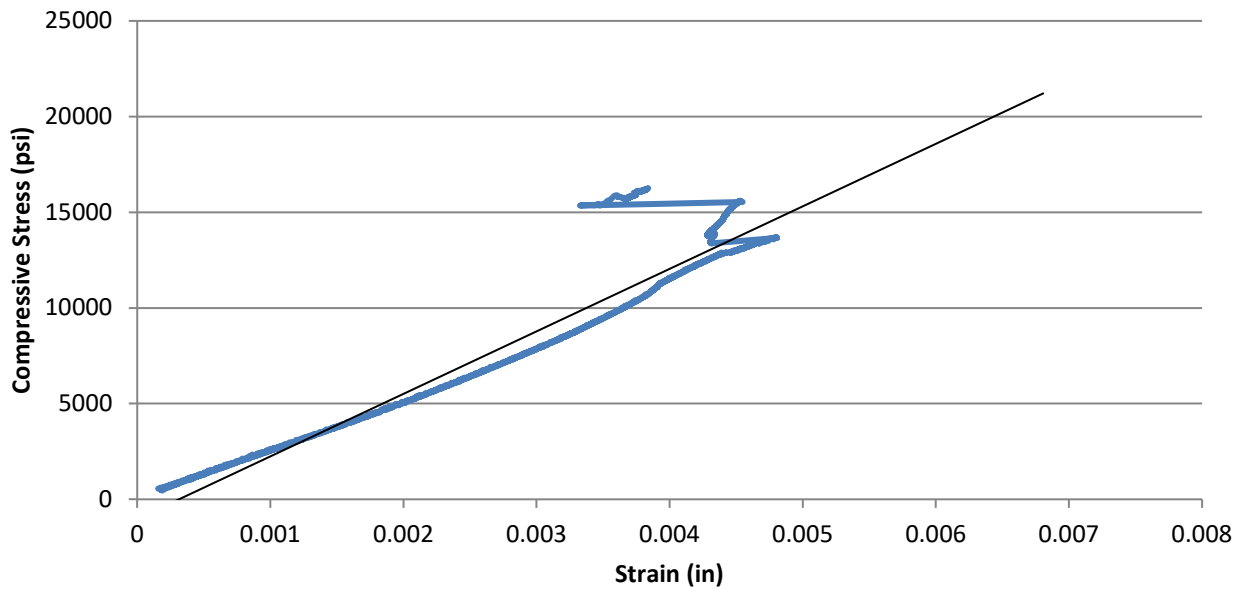
Unconfined Compressive Strength (psi)	16,260	Elastic Modulus (psi)	5.07E+06
		Poisson's Ratio in Elastic Range	0.22
Comments	Elastic range was taken as between 0.001 and 0.0025 inches of axial strain. This range was chosen to avoid any non-linear behavior from the initial loading and the inflection point at the end of the elastic range.		



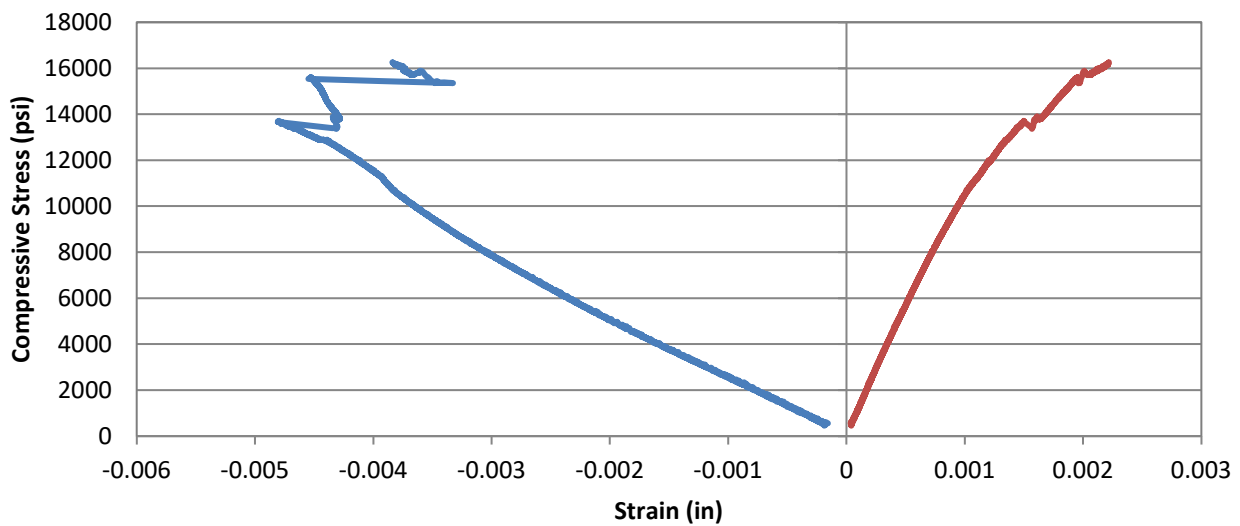
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens
 ASTM D7012 - Method D / SC-T-39

Project	Carolina Crossroads I-20/26/126 Corridor Improvements			Date	4/12/2024
Project No.	G5662.030	Sample Diameter (in.)	1.866	Tested By	TP
SCDOT ID	P039720	Sample Length (in.)	4.233	Reviewed By	WAP
Boring	C3C-W3	Unit Weight (pcf)	170.1	Core Size	NQ
Sample No.	NQ-2 / 24-0972	L/D Ratio	2.27	Recovery	93%
Depth	16.5' - 16.9'	Load Rate (psi/sec)	20	RQD	60%
Description	Dark Bluish Gray Phyllite				

Axial Stress vs. Strain



Stress vs. Strain



— Axial Strain — Radial Strain

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



1413 Topside Road, Louisville, TN 37777

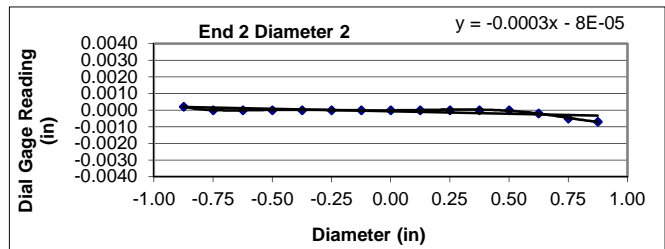
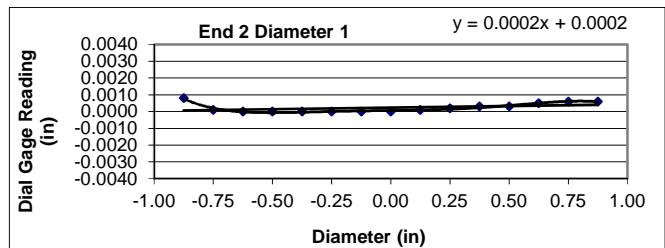
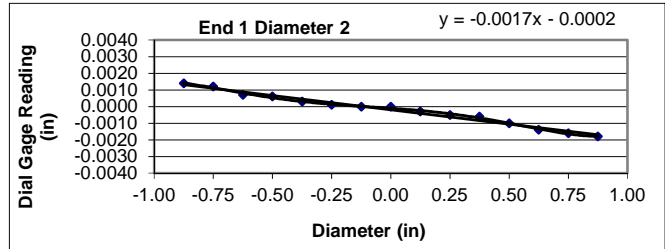
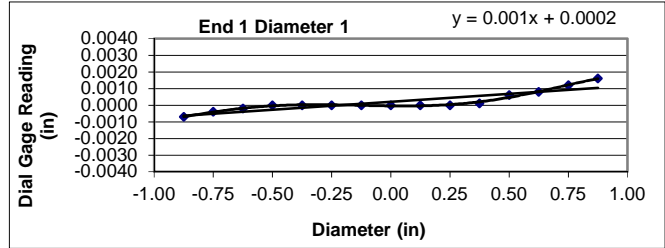
Project: Carolina Crossroads Project	Diameter (in): 1.99	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.40	Tested by: BKP
Boring Id: B-47	Unit Weight (pcf): 166.4	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.4	
Depth (ft): 47.2 - 47.8		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0007	0.0014	0.0008	0.0002
- 6/8	-0.0004	0.0012	0.0001	0.0000
- 5/8	-0.0002	0.0007	0.0000	0.0000
- 4/8	0.0000	0.0006	0.0000	0.0000
- 3/8	0.0000	0.0003	0.0000	0.0000
- 2/8	0.0000	0.0001	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0003	0.0001	0.0000
2/8	0.0000	-0.0005	0.0002	0.0000
3/8	0.0001	-0.0006	0.0003	0.0000
4/8	0.0006	-0.0010	0.0003	0.0000
5/8	0.0008	-0.0014	0.0005	-0.0002
6/8	0.0012	-0.0016	0.0006	-0.0005
7/8	0.0016	-0.0018	0.0006	-0.0007



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00095
	Angle of Best Fit Line:	0.05468
End 2:	Slope of Best Fit Line:	0.00019
	Angle of Best Fit Line:	0.01097
	Max Angular Difference:	0.04

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00172
	Angle of Best Fit Line:	-0.09871
End 2:	Slope of Best Fit Line:	-0.00029
	Angle of Best Fit Line:	-0.01686
	Max Angular Difference:	-0.08

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0023	0.0012	YES
End 1 Diam 2	0.0032	0.0016	YES
End 2 Diam 1	0.0008	0.0004	YES
End 2 Diam 2	0.0009	0.0005	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

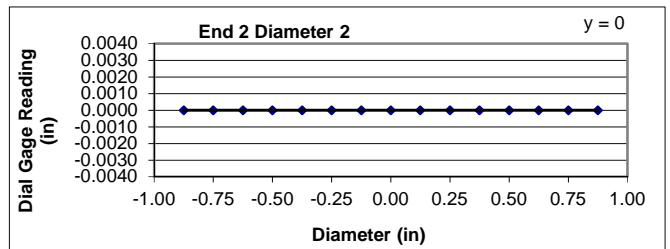
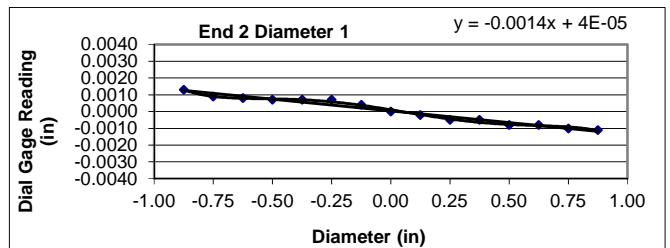
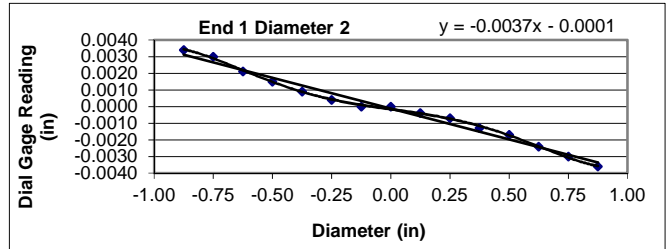
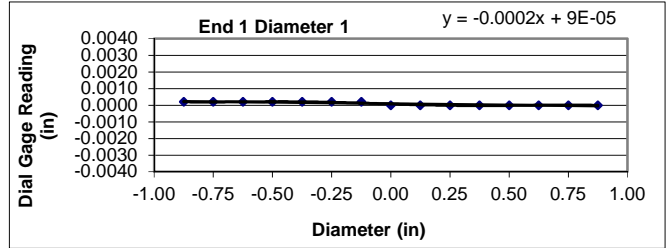
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.47	Tested by: BKP
Boring Id: B-47	Unit Weight (pcf): 170.6	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.4	
Depth (ft): 55.4 - 56.2		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0002	0.0034	0.0013	0.0000
- 6/8	0.0002	0.0030	0.0009	0.0000
- 5/8	0.0002	0.0021	0.0008	0.0000
- 4/8	0.0002	0.0015	0.0007	0.0000
- 3/8	0.0002	0.0009	0.0007	0.0000
- 2/8	0.0002	0.0004	0.0007	0.0000
- 1/8	0.0002	0.0000	0.0004	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0004	-0.0002	0.0000
2/8	0.0000	-0.0007	-0.0005	0.0000
3/8	0.0000	-0.0013	-0.0005	0.0000
4/8	0.0000	-0.0017	-0.0008	0.0000
5/8	0.0000	-0.0024	-0.0008	0.0000
6/8	0.0000	-0.0030	-0.0010	0.0000
7/8	0.0000	-0.0036	-0.0011	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00016
	Angle of Best Fit Line:	-0.00917
End 2:	Slope of Best Fit Line:	-0.00139
	Angle of Best Fit Line:	-0.07989
	Max Angular Difference:	0.07

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00370
	Angle of Best Fit Line:	-0.21199
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	-0.21

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0002	0.0001	YES
End 1 Diam 2	0.0070	0.0035	YES
End 2 Diam 1	0.0024	0.0012	YES
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

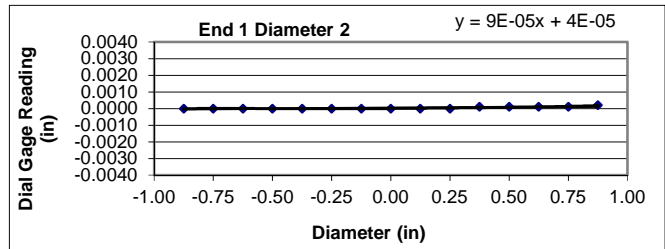
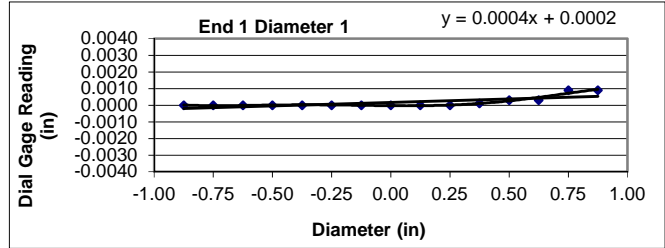
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.45	Tested by: BKP
Boring Id: B-47	Unit Weight (pcf): 169.3	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.4	
Depth (ft): 64.0 - 65.0		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

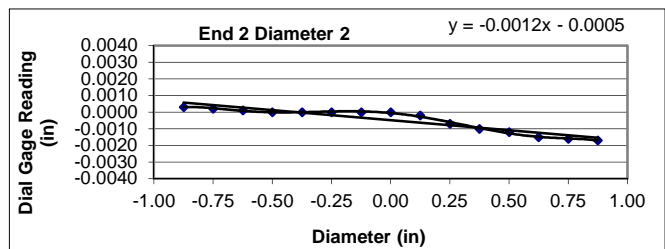
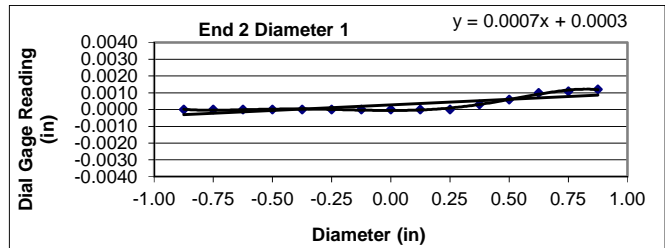
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0000	0.0000	0.0003
- 6/8	0.0000	0.0000	0.0000	0.0002
- 5/8	0.0000	0.0000	0.0000	0.0001
- 4/8	0.0000	0.0000	0.0000	0.0000
- 3/8	0.0000	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0002
2/8	0.0000	0.0000	0.0000	-0.0007
3/8	0.0001	0.0001	0.0003	-0.0010
4/8	0.0003	0.0001	0.0006	-0.0012
5/8	0.0003	0.0001	0.0010	-0.0015
6/8	0.0009	0.0001	0.0011	-0.0016
7/8	0.0009	0.0002	0.0012	-0.0017



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00042
	Angle of Best Fit Line:	0.02406
End 2:	Slope of Best Fit Line:	0.00067
	Angle of Best Fit Line:	0.03814
	Max Angular Difference:	-0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00009
	Angle of Best Fit Line:	0.00524
End 2:	Slope of Best Fit Line:	-0.00121
	Angle of Best Fit Line:	-0.06908
	Max Angular Difference:	0.07

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0009	0.0005	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0012	0.0006	YES
End 2 Diam 2	0.0020	0.0010	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

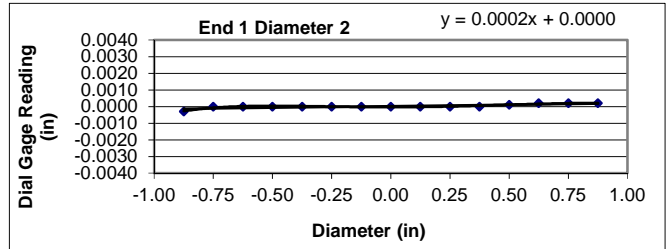
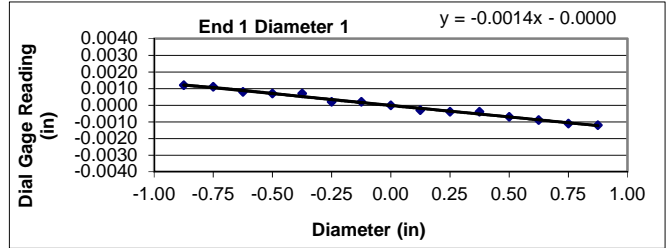
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.46	Tested by: BKP
Boring Id: B-48	Unit Weight (pcf): 178.5	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.2	
Depth (ft): 15.1 - 15.9		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

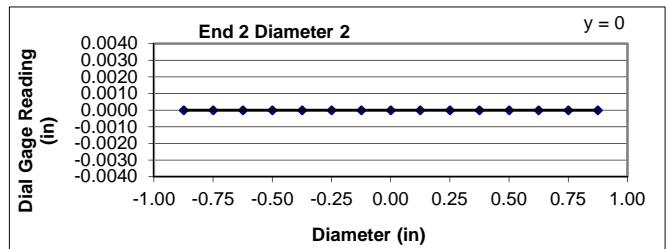
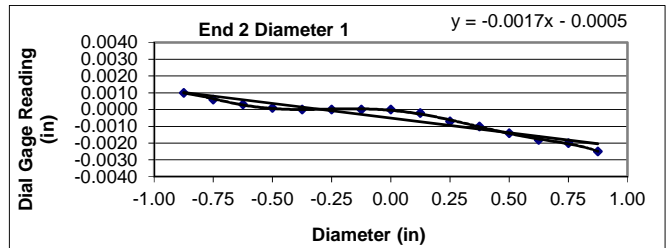
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0012	-0.0003	0.0010	0.0000
- 6/8	0.0011	0.0000	0.0006	0.0000
- 5/8	0.0008	0.0000	0.0003	0.0000
- 4/8	0.0007	0.0000	0.0001	0.0000
- 3/8	0.0007	0.0000	0.0000	0.0000
- 2/8	0.0002	0.0000	0.0000	0.0000
- 1/8	0.0002	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0003	0.0000	-0.0002	0.0000
2/8	-0.0004	0.0000	-0.0007	0.0000
3/8	-0.0004	0.0000	-0.0010	0.0000
4/8	-0.0007	0.0001	-0.0014	0.0000
5/8	-0.0009	0.0002	-0.0018	0.0000
6/8	-0.0011	0.0002	-0.0020	0.0000
7/8	-0.0012	0.0002	-0.0025	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00140
	Angle of Best Fit Line:	-0.08038
End 2:	Slope of Best Fit Line:	-0.00175
	Angle of Best Fit Line:	-0.10019
	Max Angular Difference:	0.02

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00017
	Angle of Best Fit Line:	0.00999
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0024	0.0012	YES
End 1 Diam 2	0.0005	0.0003	YES
End 2 Diam 1	0.0035	0.0018	YES
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

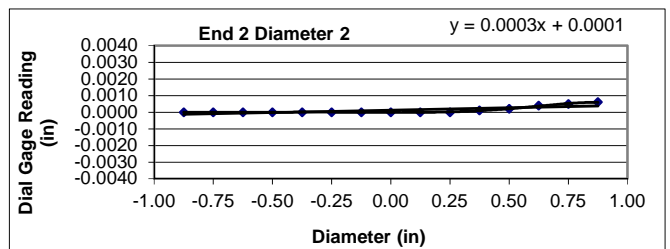
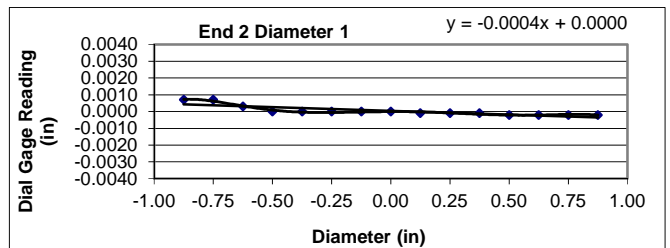
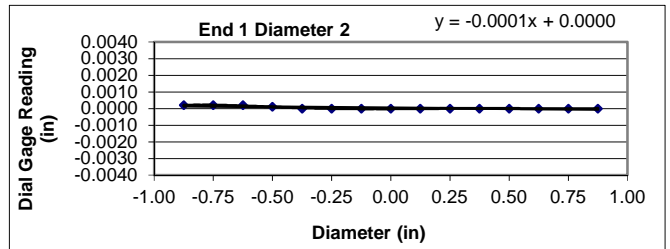
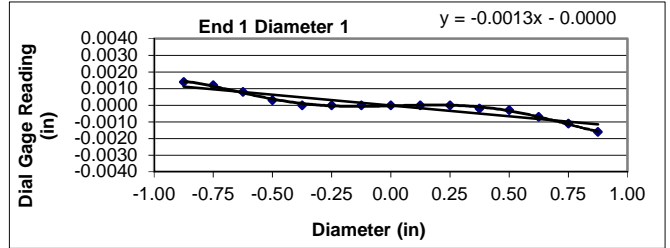
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.45	Tested by: BKP
Boring Id: B-48	Unit Weight (pcf): 175.9	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.5	
Depth (ft): 19.7 - 20.6		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0014	0.0002	0.0007	0.0000
- 6/8	0.0012	0.0002	0.0007	0.0000
- 5/8	0.0008	0.0002	0.0003	0.0000
- 4/8	0.0003	0.0001	0.0000	0.0000
- 3/8	0.0000	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0001	0.0000
2/8	0.0000	0.0000	-0.0001	0.0000
3/8	-0.0002	0.0000	-0.0001	0.0001
4/8	-0.0003	0.0000	-0.0002	0.0002
5/8	-0.0007	0.0000	-0.0002	0.0004
6/8	-0.0011	0.0000	-0.0002	0.0005
7/8	-0.0016	0.0000	-0.0002	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:	-0.00129
	Angle of Best Fit Line:	-0.07416
End 2:	Slope of Best Fit Line:	-0.00045
	Angle of Best Fit Line:	-0.02554
	Max Angular Difference:	-0.05

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00011
	Angle of Best Fit Line:	-0.00655
End 2:	Slope of Best Fit Line:	0.00029
	Angle of Best Fit Line:	0.01686
	Max Angular Difference:	-0.02

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0030	0.0015	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0009	0.0005	YES
End 2 Diam 2	0.0006	0.0003	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

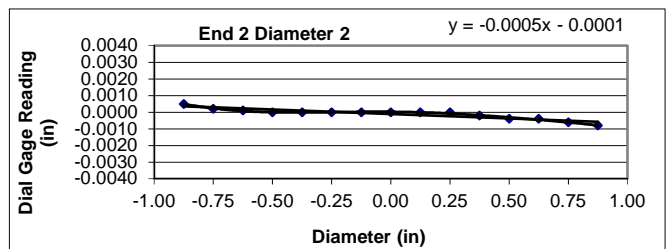
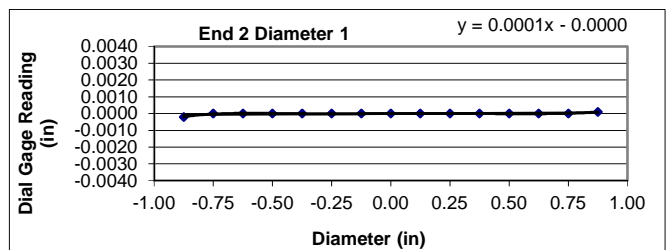
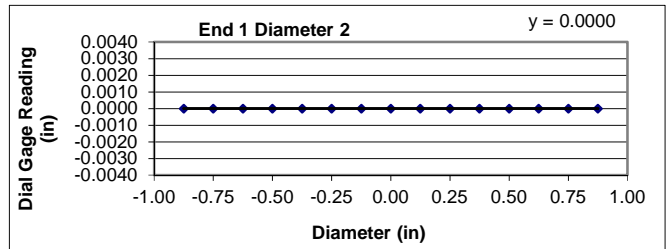
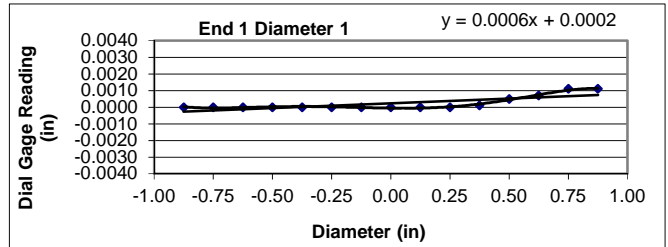
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 4/30/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.37	Tested by: BKP
Boring Id: B-48	Unit Weight (pcf): 179.1	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.3	
Depth (ft): 34.0 - 34.7		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0000	-0.0002	0.0005
- 6/8	0.0000	0.0000	0.0000	0.0002
- 5/8	0.0000	0.0000	0.0000	0.0001
- 4/8	0.0000	0.0000	0.0000	0.0000
- 3/8	0.0000	0.0000	0.0000	0.0000
- 2/8	0.0000	0.0000	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0000	0.0000
3/8	0.0001	0.0000	0.0000	-0.0002
4/8	0.0005	0.0000	0.0000	-0.0004
5/8	0.0007	0.0000	0.0000	-0.0004
6/8	0.0011	0.0000	0.0000	-0.0006
7/8	0.0011	0.0000	0.0001	-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:	0.00057
	Angle of Best Fit Line:	0.03290
End 2:	Slope of Best Fit Line:	0.00006
	Angle of Best Fit Line:	0.00344
	Max Angular Difference:	0.03

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line:	-0.00053
	Angle of Best Fit Line:	-0.03045
	Max Angular Difference:	0.03

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0011	0.0006	YES
End 1 Diam 2	0.0000	0.0000	YES
End 2 Diam 1	0.0003	0.0002	YES
End 2 Diam 2	0.0013	0.0007	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

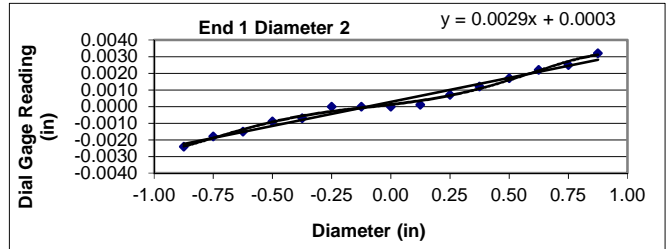
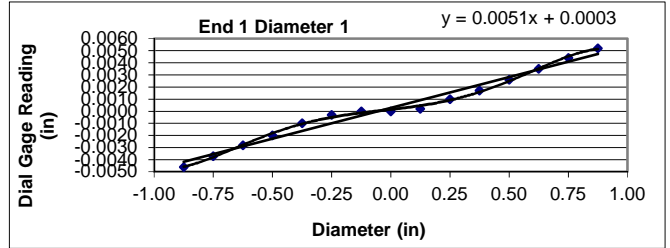
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/8/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.48	Tested by: BKP
Boring Id: B-49	Unit Weight (pcf): 167.8	Reviewed by: JBB
Sample No.: RC-3	Moisture Content (%): 0.3	
Depth (ft): 49.2 - 50.3		

Deviation From Straightness (Procedure S1)

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

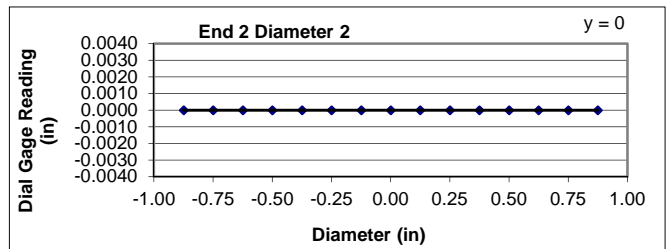
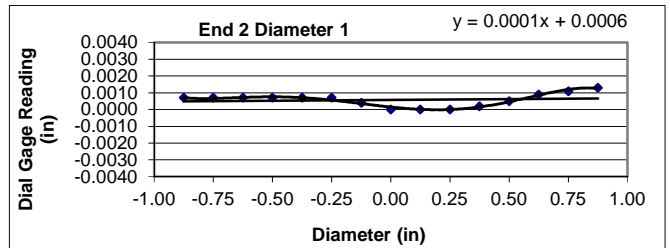
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0046	-0.0024	0.0007	0.0000
- 6/8	-0.0037	-0.0018	0.0007	0.0000
- 5/8	-0.0028	-0.0015	0.0007	0.0000
- 4/8	-0.0020	-0.0009	0.0007	0.0000
- 3/8	-0.0010	-0.0007	0.0007	0.0000
- 2/8	-0.0003	0.0000	0.0007	0.0000
- 1/8	0.0000	0.0000	0.0004	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0002	0.0001	0.0000	0.0000
2/8	0.0010	0.0007	0.0000	0.0000
3/8	0.0017	0.0012	0.0002	0.0000
4/8	0.0026	0.0017	0.0005	0.0000
5/8	0.0035	0.0022	0.0009	0.0000
6/8	0.0044	0.0025	0.0011	0.0000
7/8	0.0052	0.0032	0.0013	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES



Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00509
	Angle of Best Fit Line:	0.29139
End 2:	Slope of Best Fit Line:	0.00010
	Angle of Best Fit Line:	0.00573
	Max Angular Difference:	0.29

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00289
	Angle of Best Fit Line:	0.16550
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	0.17

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	0.0098	0.0049	NO
End 1 Diam 2	0.0056	0.0028	YES
End 2 Diam 1	0.0013	0.0007	YES
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? NO

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



1413 Topside Road, Louisville, TN 37777

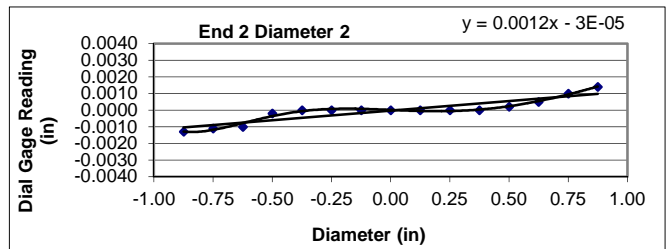
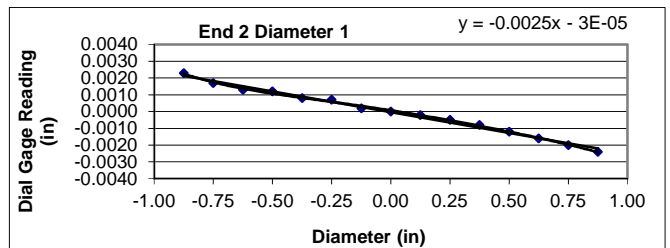
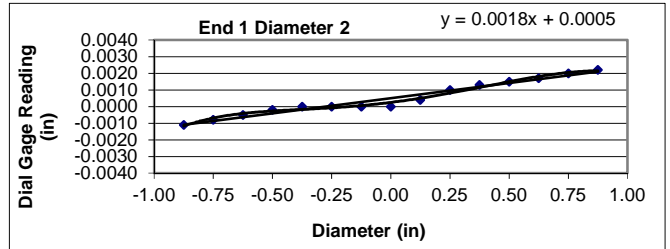
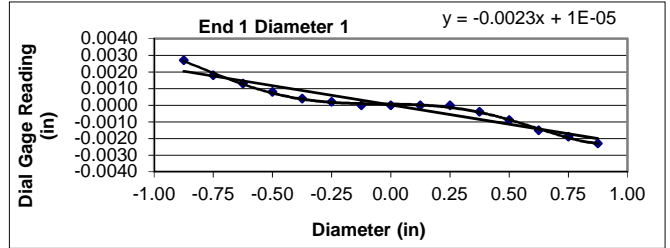
Project: Carolina Crossroads Project	Diameter (in): 1.98	Date: 3/8/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.38	Tested by: BKP
Boring Id: B-49	Unit Weight (pcf): 169.4	Reviewed by: JBB
Sample No.: RC-5	Moisture Content (%): 0.4	
Depth (ft): 56.6 - 57.6		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0027	-0.0011	0.0023	-0.0013
- 6/8	0.0018	-0.0008	0.0017	-0.0011
- 5/8	0.0013	-0.0005	0.0013	-0.0010
- 4/8	0.0008	-0.0002	0.0012	-0.0002
- 3/8	0.0004	0.0000	0.0008	0.0000
- 2/8	0.0002	0.0000	0.0007	0.0000
- 1/8	0.0000	0.0000	0.0002	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0004	-0.0002	0.0000
2/8	0.0000	0.0010	-0.0005	0.0000
3/8	-0.0004	0.0013	-0.0008	0.0000
4/8	-0.0009	0.0015	-0.0012	0.0002
5/8	-0.0015	0.0017	-0.0016	0.0005
6/8	-0.0019	0.0020	-0.0020	0.0010
7/8	-0.0023	0.0022	-0.0024	0.0014



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00231
	Angle of Best Fit Line:	-0.13227
End 2:	Slope of Best Fit Line:	-0.00248
	Angle of Best Fit Line:	-0.14209
	Max Angular Difference:	0.01

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00183
	Angle of Best Fit Line:	0.10477
End 2:	Slope of Best Fit Line:	0.00116
	Angle of Best Fit Line:	0.06646
	Max Angular Difference:	0.04

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	0.0050	0.0025	YES
End 1 Diam 2	0.0033	0.0017	YES
End 2 Diam 1	0.0047	0.0024	YES
End 2 Diam 2	0.0027	0.0014	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

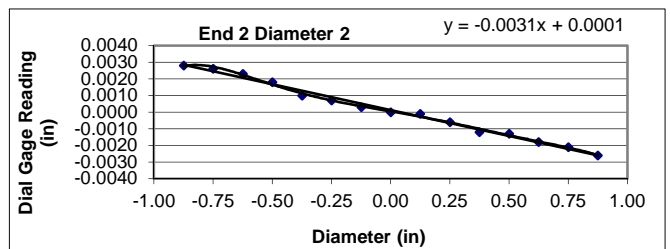
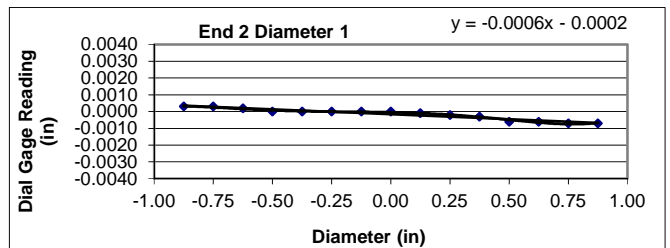
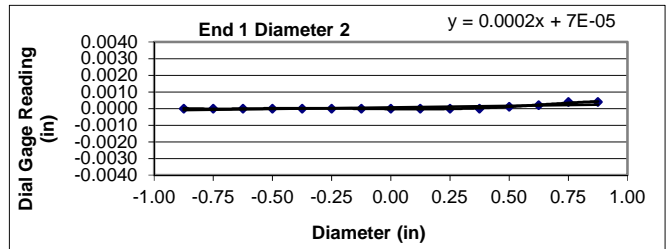
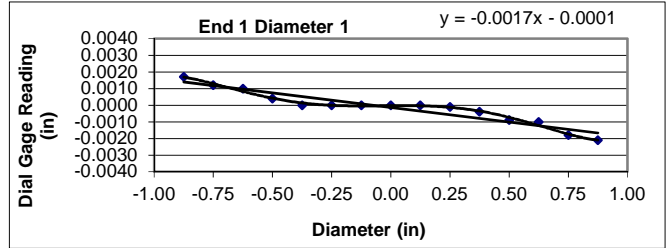
Project: Carolina Crossroads Project	Diameter (in): 1.96	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.32	Tested by: BKP
Boring Id: B-50	Unit Weight (pcf): 170.8	Reviewed by: JBB
Sample No.: RC-1	Moisture Content (%): 0.3	
Depth (ft): 73.7 - 74.3		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0017	0.0000	0.0003	0.0028
- 6/8	0.0012	0.0000	0.0003	0.0026
- 5/8	0.0010	0.0000	0.0002	0.0023
- 4/8	0.0004	0.0000	0.0000	0.0018
- 3/8	0.0000	0.0000	0.0000	0.0010
- 2/8	0.0000	0.0000	0.0000	0.0007
- 1/8	0.0000	0.0000	0.0000	0.0003
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0001	-0.0001
2/8	-0.0001	0.0000	-0.0002	-0.0006
3/8	-0.0004	0.0000	-0.0003	-0.0012
4/8	-0.0009	0.0001	-0.0006	-0.0013
5/8	-0.0010	0.0002	-0.0006	-0.0018
6/8	-0.0018	0.0004	-0.0007	-0.0021
7/8	-0.0021	0.0004	-0.0007	-0.0026



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:	-0.00175
	Angle of Best Fit Line:	-0.10019
End 2:	Slope of Best Fit Line:	-0.00059
	Angle of Best Fit Line:	-0.03405
	Max Angular Difference:	-0.07

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00019
	Angle of Best Fit Line:	0.01080
End 2:	Slope of Best Fit Line:	-0.00310
	Angle of Best Fit Line:	-0.17762
	Max Angular Difference:	0.19

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	0.0038	0.0019	YES
End 1 Diam 2	0.0004	0.0002	YES
End 2 Diam 1	0.0010	0.0005	YES
End 2 Diam 2	0.0054	0.0028	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

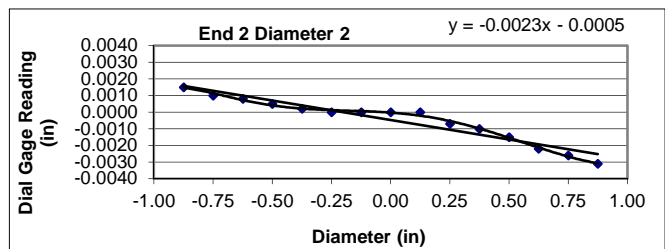
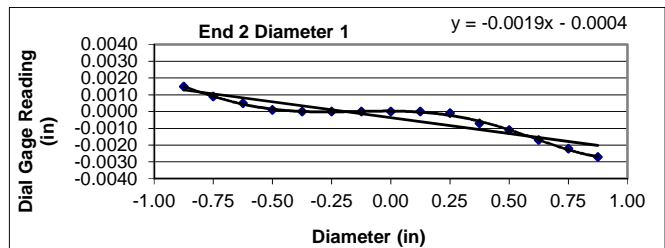
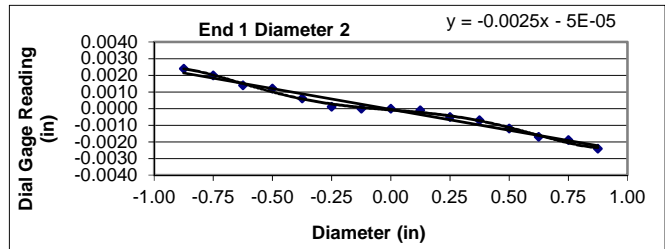
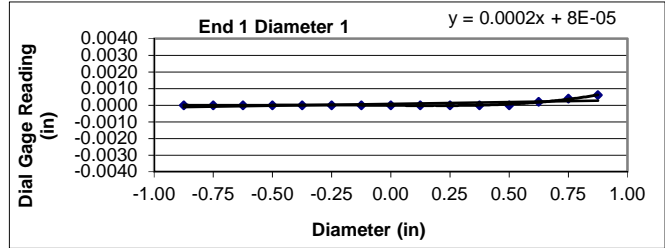
Project: Carolina Crossroads Project	Diameter (in): 1.96	Date: 3/8/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.43	Tested by: BKP
Boring Id: B-50	Unit Weight (pcf): 172.5	Reviewed by: JBB
Sample No.: RC-2	Moisture Content (%): 0.3	
Depth (ft): 81.2 - 82.2		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0024	0.0015	0.0015
- 6/8	0.0000	0.0020	0.0009	0.0010
- 5/8	0.0000	0.0014	0.0005	0.0008
- 4/8	0.0000	0.0012	0.0001	0.0005
- 3/8	0.0000	0.0006	0.0000	0.0002
- 2/8	0.0000	0.0001	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0001	0.0000	0.0000
2/8	0.0000	-0.0005	-0.0001	-0.0007
3/8	0.0000	-0.0007	-0.0007	-0.0010
4/8	0.0000	-0.0012	-0.0011	-0.0015
5/8	0.0002	-0.0017	-0.0017	-0.0022
6/8	0.0004	-0.0019	-0.0022	-0.0026
7/8	0.0006	-0.0024	-0.0027	-0.0031



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:	0.00022
	Angle of Best Fit Line:	0.01244
End 2:	Slope of Best Fit Line:	-0.00189
	Angle of Best Fit Line:	-0.10821
	Max Angular Difference:	0.12

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00249
	Angle of Best Fit Line:	-0.14291
End 2:	Slope of Best Fit Line:	-0.00234
	Angle of Best Fit Line:	-0.13391
	Max Angular Difference:	-0.01

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0006	0.0003	YES
End 1 Diam 2	0.0048	0.0024	YES
End 2 Diam 1	0.0042	0.0021	YES
End 2 Diam 2	0.0046	0.0023	YES

Perpendicularity Tolerance Met? YES

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



1413 Topside Road, Louisville, TN 37777

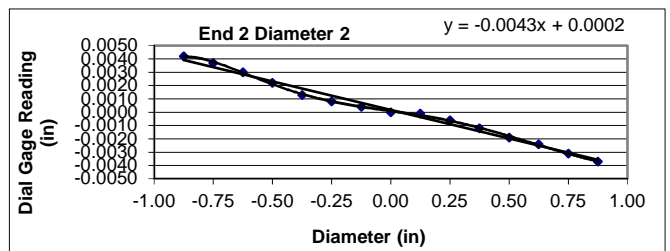
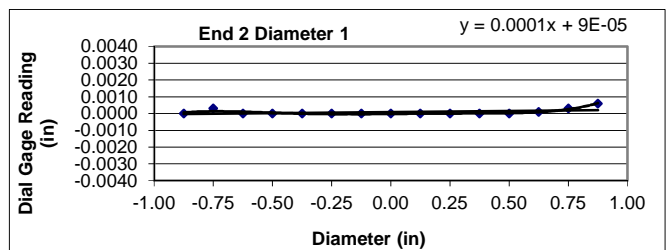
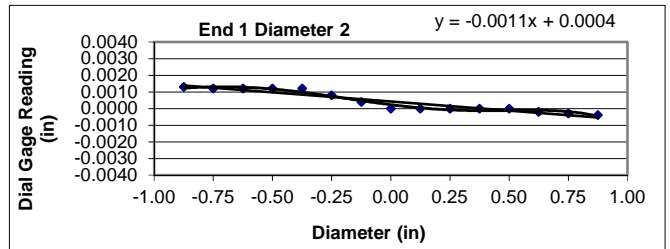
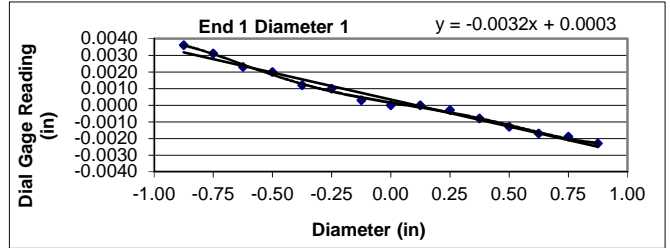
Project: Carolina Crossroads Project	Diameter (in): 1.95	Date: 2/27/2018
Project No.: 1461-16-047 Phase B	Length (in): 4.34	Tested by: BKP
Boring Id: B-50	Unit Weight (pcf): 167.6	Reviewed by: JBB
Sample No.: RC-4	Moisture Content (%): 0.3	
Depth (ft): 87.7 - 88.5		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0036	0.0013	0.0000	0.0042
- 6/8	0.0031	0.0012	0.0003	0.0037
- 5/8	0.0023	0.0012	0.0000	0.0030
- 4/8	0.0020	0.0012	0.0000	0.0022
- 3/8	0.0012	0.0012	0.0000	0.0013
- 2/8	0.0010	0.0008	0.0000	0.0008
- 1/8	0.0003	0.0004	0.0000	0.0004
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0001
2/8	-0.0003	0.0000	0.0000	-0.0006
3/8	-0.0008	0.0000	0.0000	-0.0012
4/8	-0.0013	0.0000	0.0000	-0.0019
5/8	-0.0017	-0.0002	0.0001	-0.0024
6/8	-0.0019	-0.0003	0.0003	-0.0031
7/8	-0.0023	-0.0004	0.0006	-0.0037



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:	-0.00324
	Angle of Best Fit Line:	-0.18564
End 2:	Slope of Best Fit Line:	0.00013
	Angle of Best Fit Line:	0.00769
	Max Angular Difference:	-0.19

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00109
	Angle of Best Fit Line:	-0.06270
End 2:	Slope of Best Fit Line:	-0.00429
	Angle of Best Fit Line:	-0.24604
	Max Angular Difference:	0.18

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	0.0059	0.0030	YES
End 1 Diam 2	0.0017	0.0009	YES
End 2 Diam 1	0.0006	0.0003	YES
End 2 Diam 2	0.0079	0.0041	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

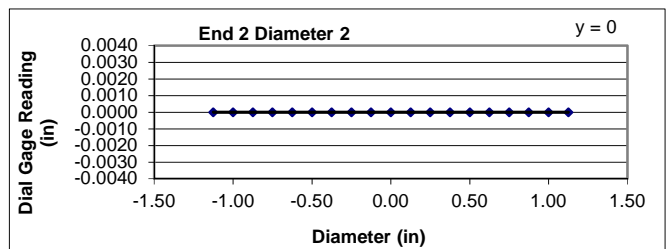
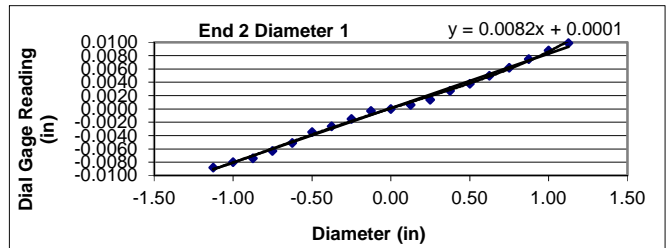
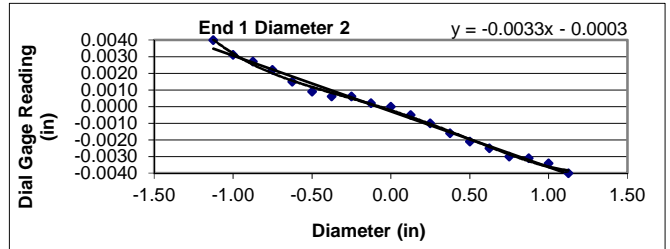
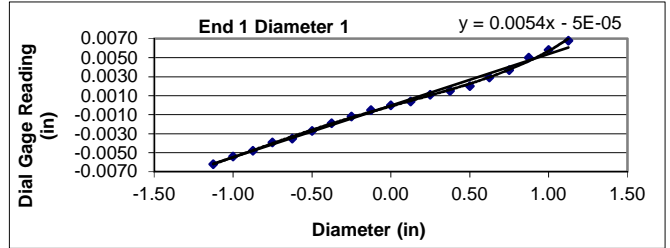
Project:	Carolina Crossroads Project	Diameter (in):	2.48	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.48	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	176.0	Reviewed by:	JBB
Sample No.:	RC-2	Moisture Content (%):	0.2		
Depth (ft):	55.2 - 56.4				

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	-0.0062	0.0040	-0.0088	0.0000
-1	-0.0054	0.0031	-0.0080	0.0000
- 7/8	-0.0048	0.0027	-0.0074	0.0000
- 6/8	-0.0039	0.0022	-0.0063	0.0000
- 5/8	-0.0035	0.0015	-0.0051	0.0000
- 4/8	-0.0027	0.0009	-0.0035	0.0000
- 3/8	-0.0019	0.0006	-0.0026	0.0000
- 2/8	-0.0012	0.0006	-0.0015	0.0000
- 1/8	-0.0005	0.0002	-0.0003	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0004	-0.0005	0.0006	0.0000
2/8	0.0011	-0.0010	0.0014	0.0000
3/8	0.0015	-0.0016	0.0027	0.0000
4/8	0.0020	-0.0021	0.0038	0.0000
5/8	0.0029	-0.0025	0.0050	0.0000
6/8	0.0037	-0.0030	0.0062	0.0000
7/8	0.0050	-0.0031	0.0075	0.0000
1	0.0058	-0.0034	0.0088	0.0000
1 1/8	0.0068	-0.0040	0.0099	0.0000



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00544
	Angle of Best Fit Line:	0.31145
End 2:	Slope of Best Fit Line:	0.00820
	Angle of Best Fit Line:	0.46987
	Max Angular Difference:	-0.16

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00334
	Angle of Best Fit Line:	-0.19163
End 2:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
	Max Angular Difference:	-0.19

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	0.0130	0.0052	NO
End 1 Diam 2	0.0080	0.0032	YES
End 2 Diam 1	0.0187	0.0075	NO
End 2 Diam 2	0.0000	0.0000	YES

Perpendicularity Tolerance Met? NO

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

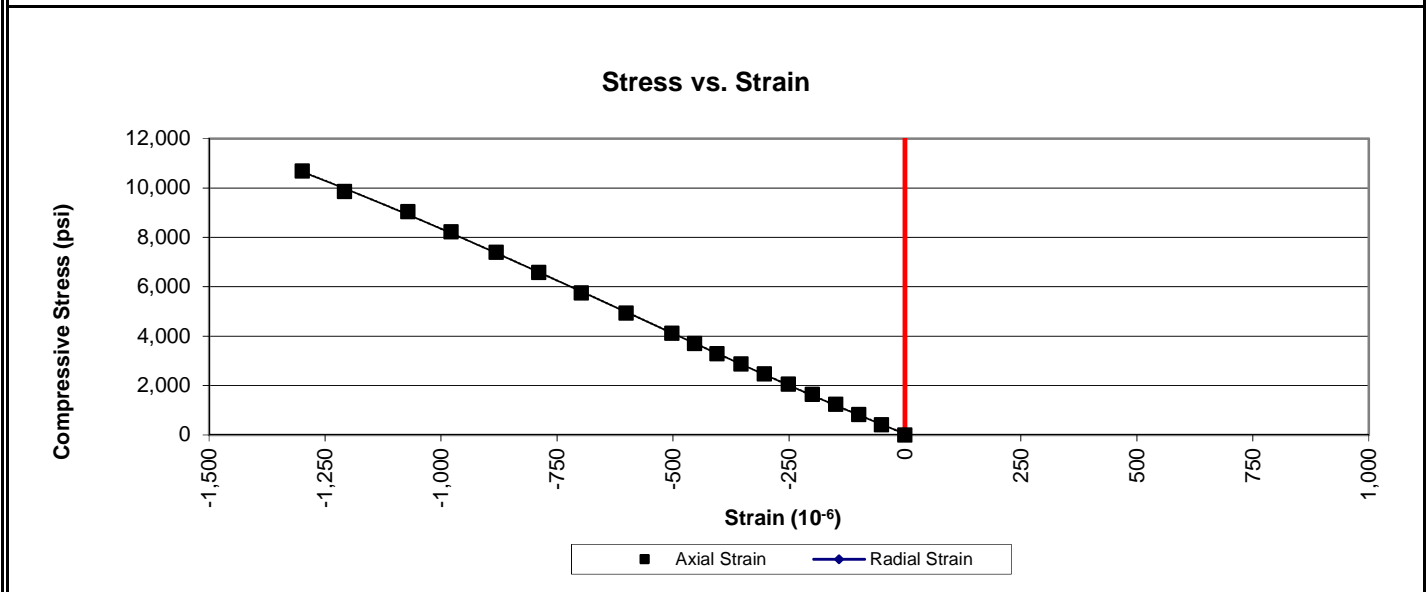


1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.57	Tested by:	BKP / MG
Boring Id:	DH-4	Unit Weight, pcf:	170.1	Reviewed by:	JBB
Sample No:	RC-4	Moisture Content, %:	0.1		
Depth (ft):	65.2 - 66.3	Load Rate, psi/sec:	67		

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	-50		2,000	411	8.22		
3	-99		4,000	821	8.29		
4	-149		6,000	1,232	8.27		
5	-199		8,000	1,643	8.26		
6	-251		10,000	2,053	8.18		
7	-303		12,000	2,464	8.13		
8	-353		14,000	2,875	8.14		
9	-405		16,000	3,285	8.11		
10	-453		18,000	3,696	8.16		
11	-502		20,000	4,107	8.18		
12	-601		24,000	4,928	8.20		
13	-697		28,000	5,749	8.25		
14	-789		32,000	6,571	8.33		
15	-881		36,000	7,392	8.39		
16	-978		40,000	8,214	8.40		
17	-1,071		44,000	9,035	8.44		
18	-1,208		48,000	9,856	8.16		
19	-1,299		52,000	10,678	8.22		
20			57,443	11,795			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)



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



1413 Topside Road, Louisville, TN 37777

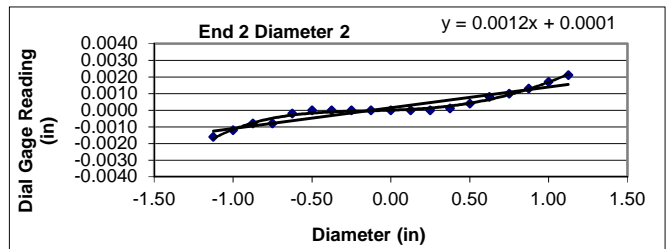
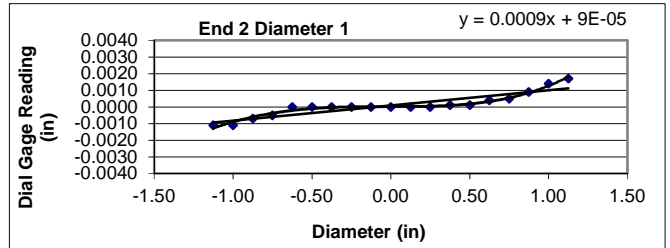
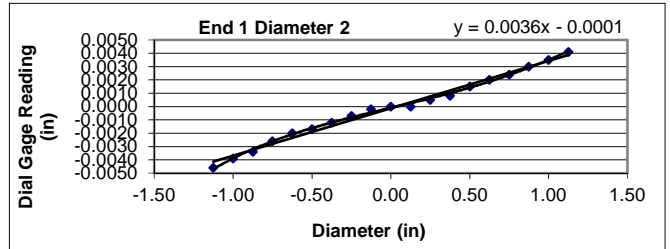
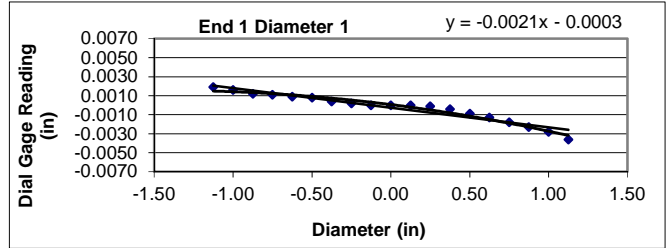
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.57	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	170.1	Reviewed by:	JBB
Sample No.:	RC-4	Moisture Content (%):	0.1		
Depth (ft):	65.2-66.3				

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	0.0019	-0.0046	-0.0011	-0.0016
-1	0.0016	-0.0039	-0.0011	-0.0012
-7/8	0.0012	-0.0034	-0.0007	-0.0008
-6/8	0.0011	-0.0026	-0.0005	-0.0008
-5/8	0.0009	-0.0020	0.0000	-0.0002
-4/8	0.0008	-0.0017	0.0000	0.0000
-3/8	0.0004	-0.0012	0.0000	0.0000
-2/8	0.0002	-0.0007	0.0000	0.0000
-1/8	0.0000	-0.0002	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	-0.0001	0.0005	0.0000	0.0000
3/8	-0.0004	0.0008	0.0001	0.0001
4/8	-0.0009	0.0015	0.0001	0.0004
5/8	-0.0013	0.0020	0.0004	0.0008
6/8	-0.0018	0.0024	0.0005	0.0010
7/8	-0.0023	0.0030	0.0009	0.0013
1	-0.0028	0.0035	0.0014	0.0017
1 1/8	-0.0036	0.0041	0.0017	0.0021



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:	-0.00207
	Angle of Best Fit Line:	-0.11853
End 2:	Slope of Best Fit Line:	0.00091
	Angle of Best Fit Line:	0.05235
	Max Angular Difference:	-0.17

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00356
	Angle of Best Fit Line:	0.20401
End 2:	Slope of Best Fit Line:	0.00125
	Angle of Best Fit Line:	0.07149
	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	0.0055	0.0022	YES
End 1 Diam 2	0.0087	0.0035	YES
End 2 Diam 1	0.0028	0.0011	YES
End 2 Diam 2	0.0037	0.0015	YES

Perpendicularity Tolerance Met? YES

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



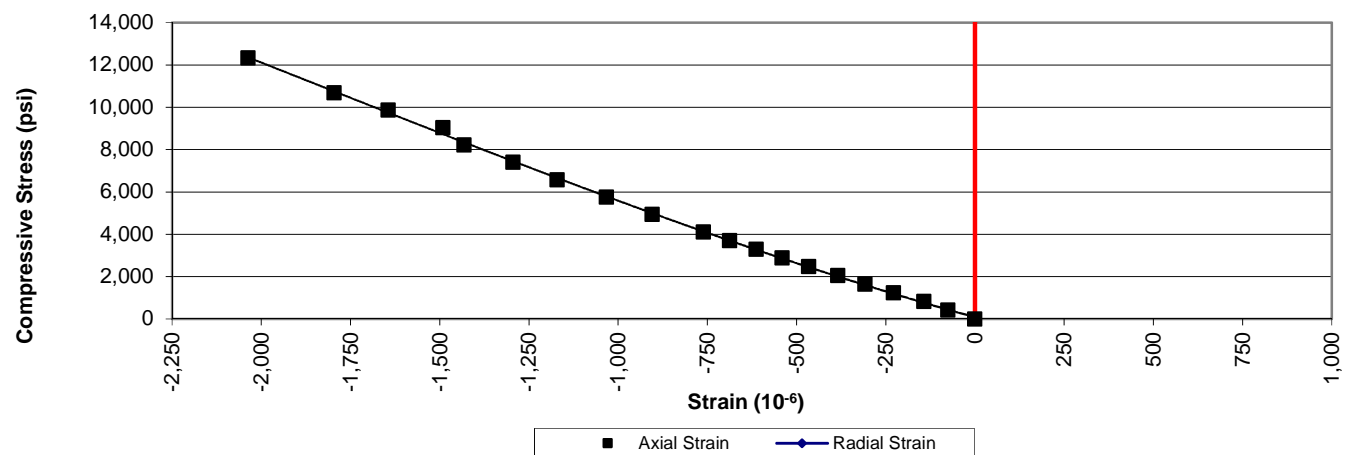
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.51	Tested by:	BKP / MG
Boring Id:	DH-4	Unit Weight, pcf:	169.5	Reviewed by:	JBB
Sample No:	RC-6	Moisture Content, %:	0.1		
Depth (ft):	75.2 - 76.3	Load Rate, psi/sec:	72		

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	-76		2,000	411	5.41		
3	-143		4,000	821	5.74		
4	-228		6,000	1,232	5.40		
5	-308		8,000	1,643	5.33		
6	-384		10,000	2,053	5.35		
7	-466		12,000	2,464	5.29		
8	-540		14,000	2,875	5.32		
9	-613		16,000	3,285	5.36		
10	-687		18,000	3,696	5.38		
11	-761		20,000	4,107	5.40		
12	-904		24,000	4,928	5.45		
13	-1,033		28,000	5,749	5.57		
14	-1,171		32,000	6,571	5.61		
15	-1,294		36,000	7,392	5.71		
16	-1,432		40,000	8,214	5.74		
17	-1,491		44,000	9,035	6.06		
18	-1,644		48,000	9,856	6.00		
19	-1,796		52,000	10,678	5.95		
20	-2,037		60,000	12,320	6.05		
			66,081	13,569			Failure

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



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



1413 Topside Road, Louisville, TN 37777

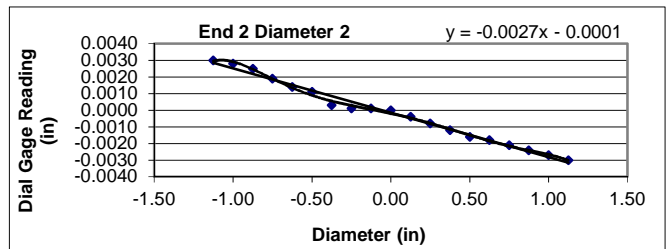
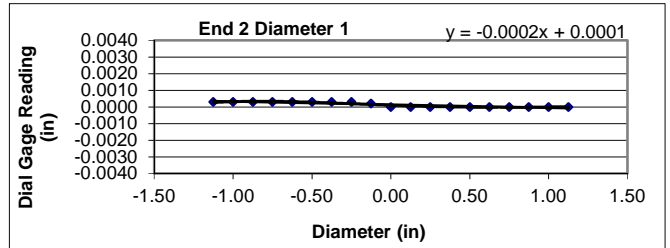
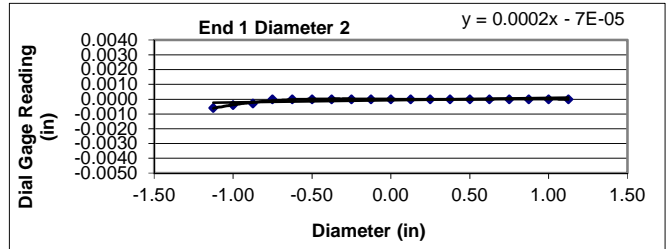
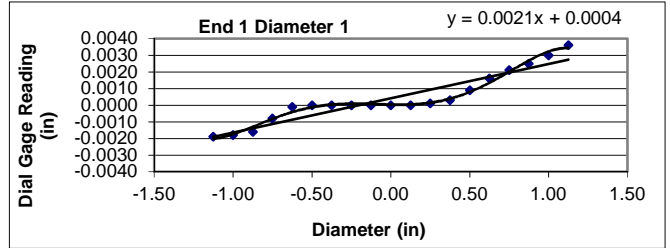
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.51	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	169.5	Reviewed by:	JBB
Sample No.:	RC-6	Moisture Content (%):	0.1		
Depth (ft):	75.2-76.3				

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
-1 1/8	-0.0019	-0.0006	0.0003	0.0030
-1	-0.0018	-0.0004	0.0003	0.0028
- 7/8	-0.0016	-0.0003	0.0003	0.0025
- 6/8	-0.0008	0.0000	0.0003	0.0019
- 5/8	-0.0001	0.0000	0.0003	0.0014
- 4/8	0.0000	0.0000	0.0003	0.0011
- 3/8	0.0000	0.0000	0.0003	0.0003
- 2/8	0.0000	0.0000	0.0003	0.0001
- 1/8	0.0000	0.0000	0.0002	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	-0.0004
2/8	0.0001	0.0000	0.0000	-0.0008
3/8	0.0003	0.0000	0.0000	-0.0012
4/8	0.0009	0.0000	0.0000	-0.0016
5/8	0.0016	0.0000	0.0000	-0.0018
6/8	0.0021	0.0000	0.0000	-0.0021
7/8	0.0025	0.0000	0.0000	-0.0024
1	0.0030	0.0000	0.0000	-0.0027
1 1/8	0.0036	0.0000	0.0000	-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:	0.00207
	Angle of Best Fit Line:	0.11837
End 2:	Slope of Best Fit Line:	-0.00019
	Angle of Best Fit Line:	-0.01078
	Max Angular Difference:	0.13

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00015
	Angle of Best Fit Line:	0.00860
End 2:	Slope of Best Fit Line:	-0.00267
	Angle of Best Fit Line:	-0.15271
	Max Angular Difference:	0.16

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0055	0.0022	YES
End 1 Diam 2	0.0006	0.0002	YES
End 2 Diam 1	0.0003	0.0001	YES
End 2 Diam 2	0.0060	0.0024	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

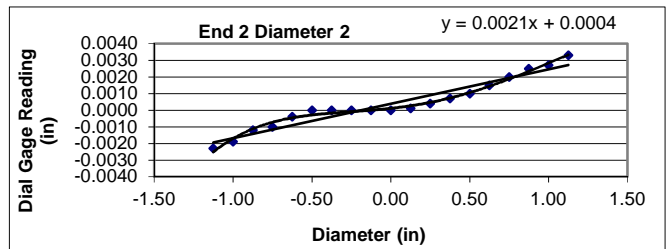
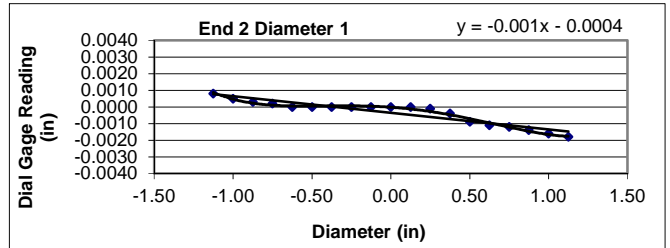
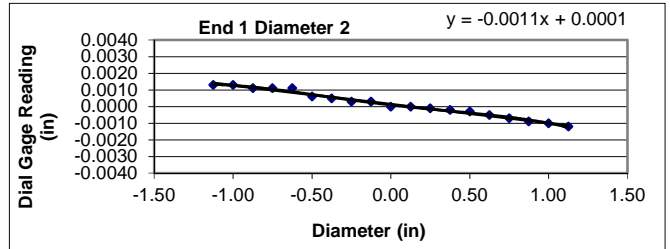
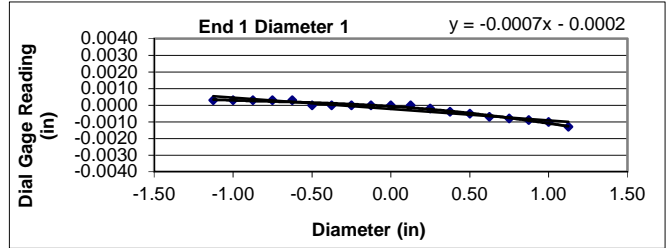
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.61	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	178.5	Reviewed by:	JBB
Sample No.:	RC-8	Moisture Content (%):	0.2		
Depth (ft):	85.5-86.7				

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)
-1 1/8	0.0003	0.0013	0.0008	-0.0023
-1	0.0003	0.0013	0.0005	-0.0019
- 7/8	0.0003	0.0011	0.0003	-0.0012
- 6/8	0.0003	0.0011	0.0002	-0.0010
- 5/8	0.0003	0.0011	0.0000	-0.0004
- 4/8	0.0000	0.0006	0.0000	0.0000
- 3/8	0.0000	0.0005	0.0000	0.0000
- 2/8	0.0000	0.0003	0.0000	0.0000
- 1/8	0.0000	0.0003	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0001
2/8	-0.0002	-0.0001	-0.0001	0.0004
3/8	-0.0004	-0.0002	-0.0004	0.0007
4/8	-0.0005	-0.0003	-0.0009	0.0010
5/8	-0.0007	-0.0005	-0.0011	0.0015
6/8	-0.0008	-0.0007	-0.0012	0.0020
7/8	-0.0009	-0.0009	-0.0014	0.0025
1	-0.0010	-0.0010	-0.0016	0.0027
1 1/8	-0.0013	-0.0012	-0.0018	0.0033



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:	-0.00068
	Angle of Best Fit Line:	-0.03892
End 2:	Slope of Best Fit Line:	-0.00100
	Angle of Best Fit Line:	-0.05709
	Max Angular Difference:	0.02

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00113
	Angle of Best Fit Line:	-0.06473
End 2:	Slope of Best Fit Line:	0.00207
	Angle of Best Fit Line:	0.11869
	Max Angular Difference:	-0.18

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	0.0016	0.0006	YES
End 1 Diam 2	0.0025	0.0010	YES
End 2 Diam 1	0.0026	0.0010	YES
End 2 Diam 2	0.0056	0.0022	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

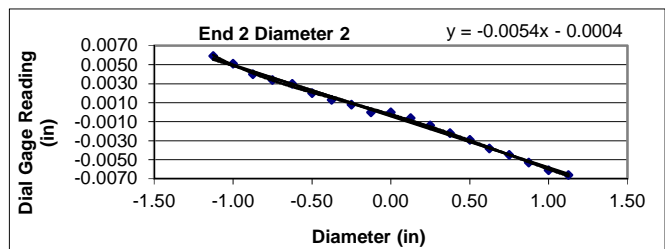
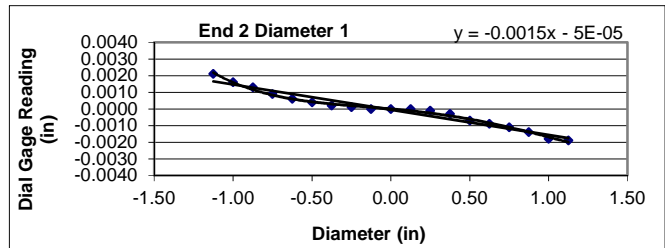
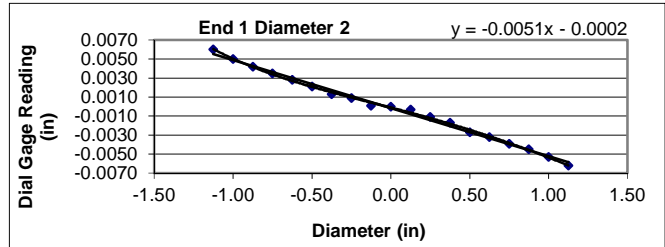
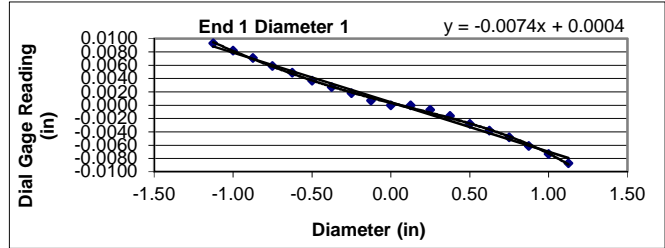
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.47	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	169.5	Reviewed by:	JBB
Sample No.:	RC-10	Moisture Content (%):	0.2		
Depth (ft):	96.5-97.5				

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	0.0093	0.0060	0.0021	0.0059
-1	0.0082	0.0050	0.0016	0.0051
- 7/8	0.0071	0.0042	0.0013	0.0040
- 6/8	0.0059	0.0035	0.0009	0.0034
- 5/8	0.0049	0.0028	0.0006	0.0030
- 4/8	0.0037	0.0021	0.0004	0.0020
- 3/8	0.0027	0.0013	0.0002	0.0013
- 2/8	0.0018	0.0009	0.0001	0.0008
- 1/8	0.0007	0.0001	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	-0.0003	0.0000	-0.0006
2/8	-0.0007	-0.0011	-0.0001	-0.0014
3/8	-0.0016	-0.0017	-0.0003	-0.0022
4/8	-0.0028	-0.0027	-0.0007	-0.0029
5/8	-0.0038	-0.0032	-0.0009	-0.0038
6/8	-0.0048	-0.0039	-0.0011	-0.0045
7/8	-0.0061	-0.0045	-0.0014	-0.0053
1	-0.0073	-0.0053	-0.0018	-0.0061
1 1/8	-0.0087	-0.0062	-0.0019	-0.0066



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:	-0.00745
	Angle of Best Fit Line:	-0.42676
End 2:	Slope of Best Fit Line:	-0.00151
	Angle of Best Fit Line:	-0.08677
	Max Angular Difference:	-0.34

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00505
	Angle of Best Fit Line:	-0.28957
End 2:	Slope of Best Fit Line:	-0.00539
	Angle of Best Fit Line:	-0.30855
	Max Angular Difference:	0.02

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	0.0180	0.0072	NO
End 1 Diam 2	0.0122	0.0049	NO
End 2 Diam 1	0.0040	0.0016	YES
End 2 Diam 2	0.0125	0.0050	NO

Perpendicularity Tolerance Met? NO

**UNCONFINED COMPRESSION WITH YOUNG'S MODULUS AND POISSON'S RATIO
(ASTM D7012 Method C and D)**



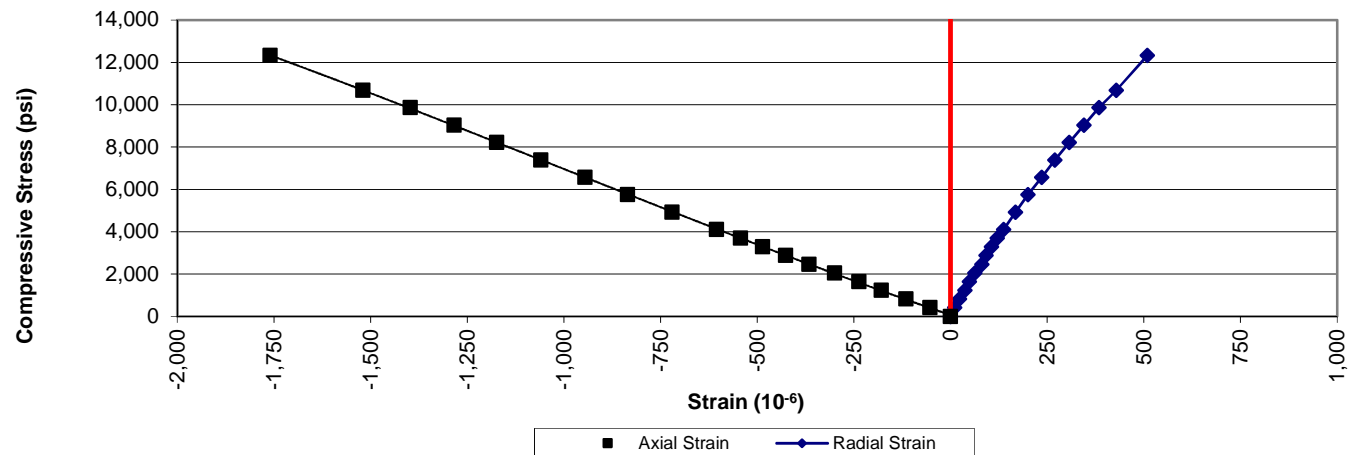
1413 Topside Road, Louisville, TN 37777

Project:	Carolina Crossroads Project	Diameter, in.:	2.49	Date:	2/19/2018
Project No.:	1461-16-047 Phase 2B	Length, in.:	5.58	Tested by:	BKP / MG
Boring Id:	DH-4	Unit Weight, pcf:	171.3	Reviewed by:	JBB
Sample No:	RC-12	Moisture Content, %:	0.1		
Depth (ft):	106.2 - 107.5	Load Rate, psi/sec:	62		

Data Point	Strain (10 ⁻⁶)		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10 ⁶ (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0	0	0	0	0.00	0.00	
2	-53	11	2,000	411	7.75	0.21	
3	-115	23	4,000	821	7.14	0.20	
4	-179	37	6,000	1,232	6.88	0.21	
5	-237	49	8,000	1,643	6.93	0.21	
6	-300	63	10,000	2,053	6.84	0.21	
7	-366	81	12,000	2,464	6.73	0.22	
8	-426	92	14,000	2,875	6.75	0.22	
9	-486	106	16,000	3,285	6.76	0.22	
10	-543	121	18,000	3,696	6.81	0.22	
11	-605	137	20,000	4,107	6.79	0.23	
12	-720	168	24,000	4,928	6.84	0.23	
13	-835	200	28,000	5,749	6.89	0.24	
14	-945	236	32,000	6,571	6.95	0.25	
15	-1,060	270	36,000	7,392	6.97	0.25	
16	-1,174	307	40,000	8,214	7.00	0.26	
17	-1,284	345	44,000	9,035	7.04	0.27	
18	-1,397	384	48,000	9,856	7.06	0.27	
19	-1,520	429	52,000	10,678	7.03	0.28	
20	-1,760	509	60,000	12,320	7.00	0.29	
21			62,084	12,748			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. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.

Stress vs. Strain



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



1413 Topside Road, Louisville, TN 37777

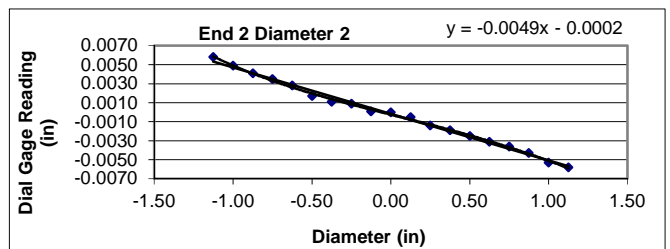
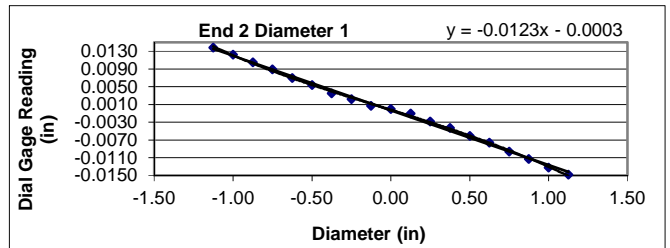
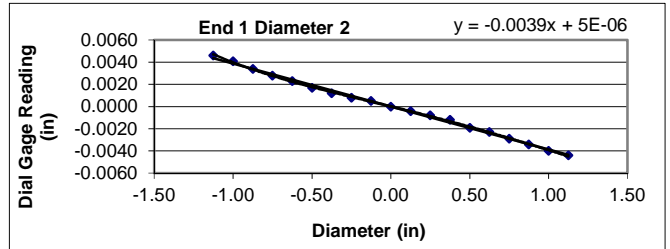
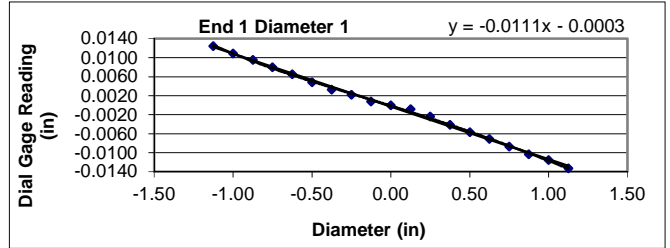
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.58	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	171.3	Reviewed by:	JBB
Sample No.:	RC-12	Moisture Content (%):	0.1		
Depth (ft):	106.2-107.5				

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	0.0124	0.0046	0.0138	0.0058
-1	0.0109	0.0041	0.0122	0.0049
- 7/8	0.0095	0.0034	0.0105	0.0041
- 6/8	0.0080	0.0028	0.0089	0.0035
- 5/8	0.0065	0.0023	0.0070	0.0028
- 4/8	0.0048	0.0017	0.0054	0.0017
- 3/8	0.0033	0.0012	0.0035	0.0011
- 2/8	0.0022	0.0008	0.0022	0.0009
- 1/8	0.0008	0.0005	0.0007	0.0001
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0008	-0.0004	-0.0010	-0.0005
2/8	-0.0024	-0.0008	-0.0028	-0.0014
3/8	-0.0041	-0.0012	-0.0043	-0.0019
4/8	-0.0057	-0.0019	-0.0061	-0.0025
5/8	-0.0071	-0.0023	-0.0076	-0.0031
6/8	-0.0087	-0.0029	-0.0096	-0.0036
7/8	-0.0103	-0.0034	-0.0113	-0.0043
1	-0.0115	-0.0040	-0.0132	-0.0053
1 1/8	-0.0133	-0.0044	-0.0148	-0.0058



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:	-0.01112
	Angle of Best Fit Line:	-0.63713
End 2:	Slope of Best Fit Line:	-0.01233
	Angle of Best Fit Line:	-0.70629
	Max Angular Difference:	0.07

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00388
	Angle of Best Fit Line:	-0.22219
End 2:	Slope of Best Fit Line:	-0.00488
	Angle of Best Fit Line:	-0.27976
	Max Angular Difference:	0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0257	0.0103	NO
End 1 Diam 2	0.0090	0.0036	YES
End 2 Diam 1	0.0286	0.0115	NO
End 2 Diam 2	0.0116	0.0047	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

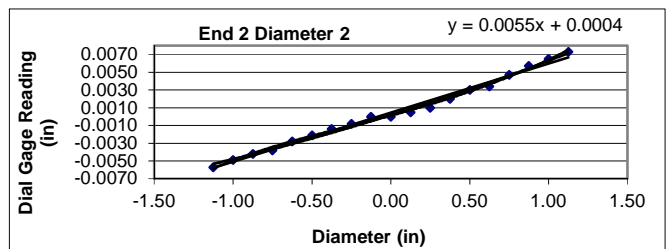
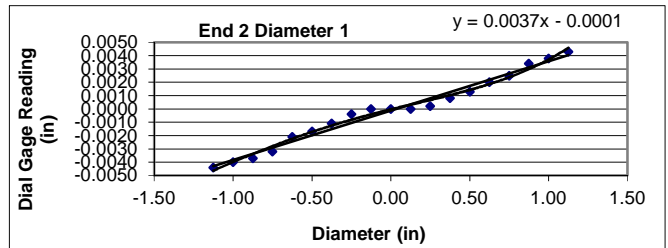
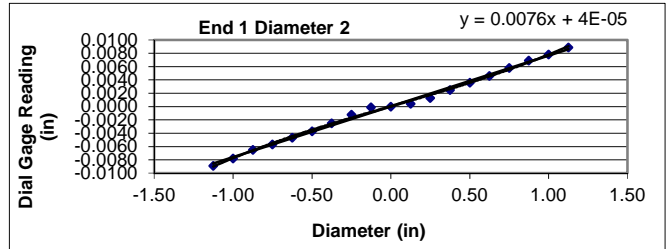
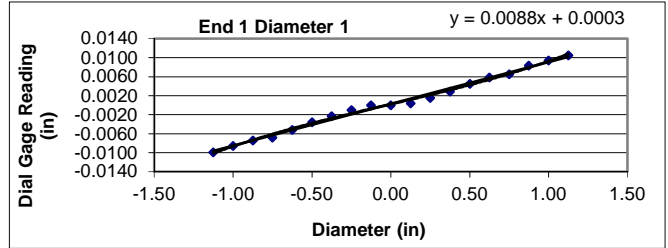
Project:	Carolina Crossroads Project	Diameter (in):	2.49	Date:	2/8/2018
Project No.:	1461-16-047 Phase 2B	Length (in):	5.40	Tested by:	BKP
Boring Id:	DH-4	Unit Weight (pcf):	170.9	Reviewed by:	JBB
Sample No.:	RC-14	Moisture Content (%):	0.1		
Depth (ft):	115.2-116.4				

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	-0.0099	-0.0089	-0.0044	-0.0057
-1	-0.0086	-0.0078	-0.0040	-0.0049
- 7/8	-0.0074	-0.0065	-0.0037	-0.0042
- 6/8	-0.0068	-0.0057	-0.0032	-0.0038
- 5/8	-0.0052	-0.0047	-0.0021	-0.0028
- 4/8	-0.0036	-0.0037	-0.0017	-0.0021
- 3/8	-0.0023	-0.0025	-0.0011	-0.0014
- 2/8	-0.0010	-0.0012	-0.0004	-0.0008
- 1/8	0.0000	-0.0001	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0004	0.0004	0.0000	0.0005
2/8	0.0015	0.0013	0.0002	0.0010
3/8	0.0029	0.0025	0.0008	0.0020
4/8	0.0045	0.0036	0.0013	0.0030
5/8	0.0058	0.0046	0.0020	0.0034
6/8	0.0065	0.0058	0.0025	0.0047
7/8	0.0083	0.0069	0.0034	0.0057
1	0.0094	0.0078	0.0038	0.0065
1 1/8	0.0105	0.0089	0.0043	0.0073



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:	0.00878
	Angle of Best Fit Line:	0.50316
End 2:	Slope of Best Fit Line:	0.00371
	Angle of Best Fit Line:	0.21230
	Max Angular Difference:	0.29

Parallelism Diameter 2

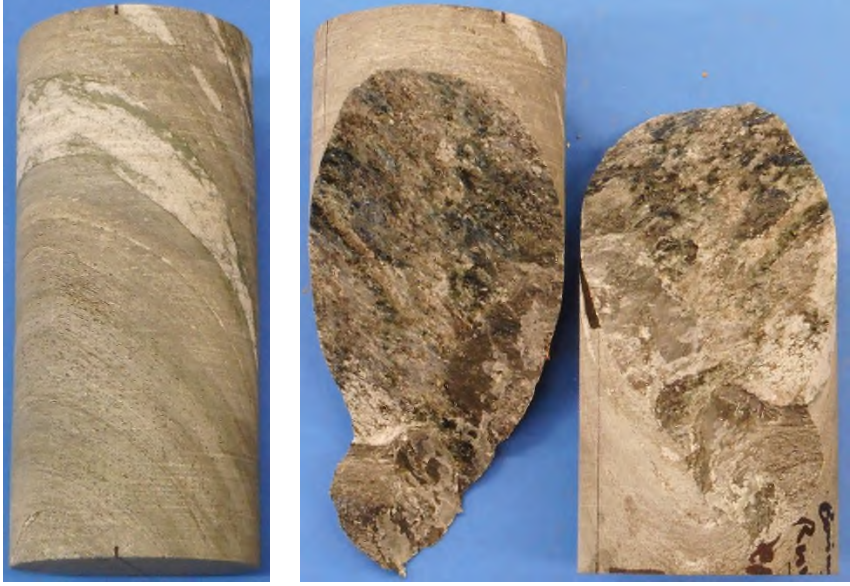
End 1:	Slope of Best Fit Line:	0.00764
	Angle of Best Fit Line:	0.43746
End 2:	Slope of Best Fit Line:	0.00553
	Angle of Best Fit Line:	0.31700
	Max Angular Difference:	0.12

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	0.0204	0.0082	NO
End 1 Diam 2	0.0178	0.0071	NO
End 2 Diam 1	0.0087	0.0035	YES
End 2 Diam 2	0.0130	0.0052	NO

Perpendicularity Tolerance Met? NO

		Date: 2/19/2018
		Photographer: Ben Painter
1	Location / Orientation	DH-4 RC-2 (55.2' – 56.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 2/19/2018
		Photographer: Ben Painter
2	Location / Orientation	DH-4 RC-4 (65.2' – 66.3')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)


3	Location / Orientation	DH-4 RC-6 (75.2' – 76.3')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		

4	Location / Orientation	DH-4 RC-8 (85.2' – 86.7')	Photographer: Ben Painter	Date: 2/19/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		

		Date: 2/19/2018
		Photographer: Ben Painter
5	Location / Orientation	DH-4 RC-10 (96.7' – 97.5')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 2/19/2018
		Photographer: Ben Painter
6	Location / Orientation	DH-4 RC-12 (106.2' – 107.5')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		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)

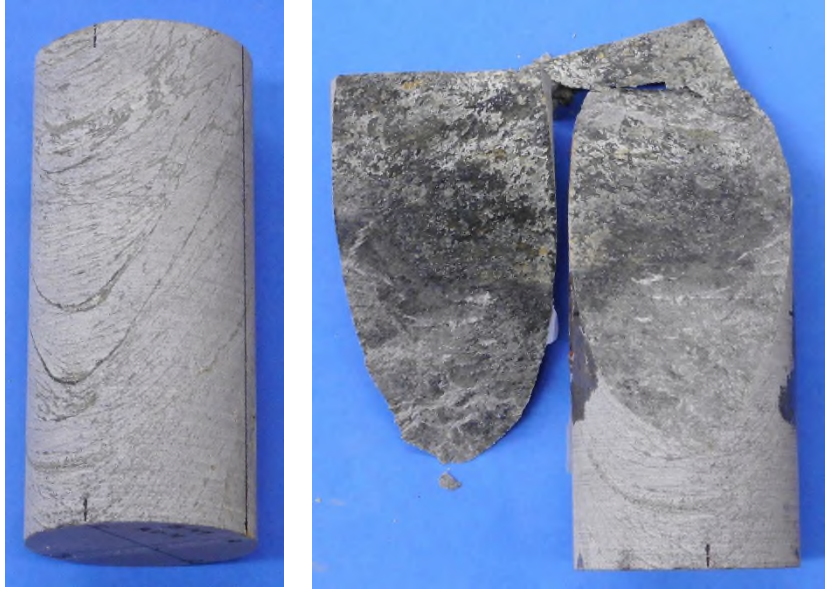
7	Location / Orientation	B-45, RC-6 (42.8' – 43.4')	Photographer: Ben Painter	Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



8	Location / Orientation	B-47, RC-1 (47.2' – 47.8')	Photographer: Ben Painter	Date: 3/1/2018
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)		



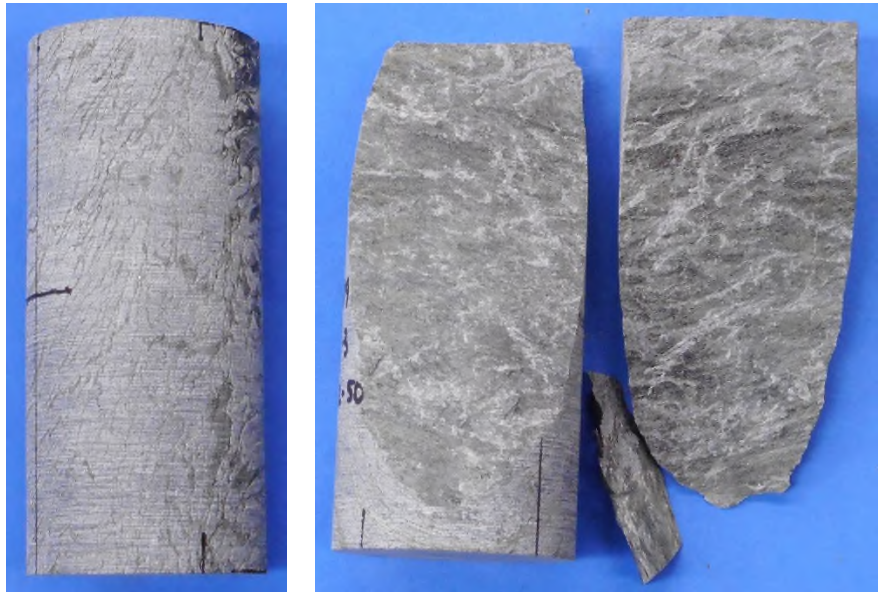
		Date: 3/1/2018
		Photographer: Ben Painter
9	Location / Orientation	B-47, RC-3 (55.4' – 56.2')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)



		Date: 3/1/2018
		Photographer: Ben Painter
10	Location / Orientation	B-47, RC-4 (64.0' – 65.0')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)



		Date: 3/1/2018
		Photographer: Ben Painter
11	Location / Orientation	B-50, RC-1 (73.7' – 74.3')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

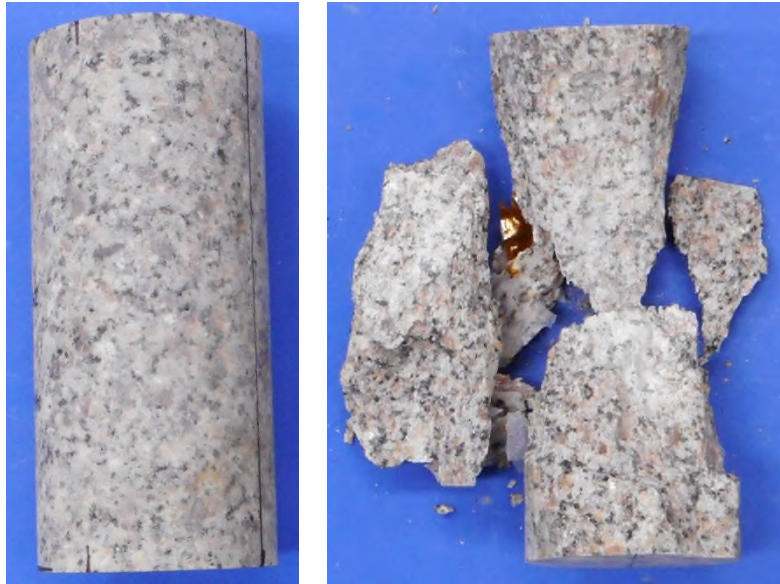
		Date: 3/1/2018
		Photographer: Ben Painter
12	Location / Orientation	B-50, RC-4 (87.7' – 88.5')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)


		Date: 3/12/2018
		Photographer: Ben Painter
3	Location / Orientation	B-50, RC-2 (81.2' – 82.2')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/12/2018
		Photographer: Ben Painter
4	Location / Orientation	B-49, RC-3 (49.2' – 50.3')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)


 		Date: 3/12/2018
		Photographer: Ben Painter
5	Location / Orientation	B-49, RC-5 (56.6' – 57.6')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

 		Date: 3/12/2018
		Photographer: Ben Painter
6	Location / Orientation	B-55, RC-2 (59.6' – 60.6')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

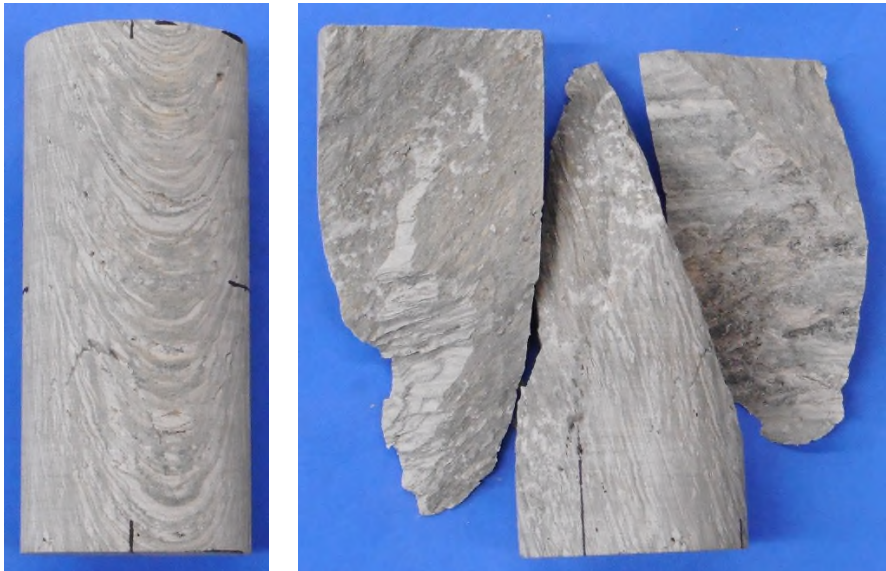
		Date: 5/1/2018
		Photographer: Ben Painter
3	Location / Orientation	B-39, RC-5 (29.1' – 30.1')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 5/1/2018
		Photographer: Ben Painter
4	Location / Orientation	B-48, RC-1 (15.1' – 15.9')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 5/1/2018
		Photographer: Ben Painter
5	Location / Orientation	B-48, RC-2 (19.7' – 20.6')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 5/1/2018
		Photographer: Ben Painter
6	Location / Orientation	B-48, RC-4 (34.0' – 34.7')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/12/2018
		Photographer: Ben Painter
9	Location / Orientation	B-52, RC-2 (75.4' – 76.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

		Date: 3/12/2018
		Photographer: Ben Painter
10	Location / Orientation	B-52, RC-5 (90.4' – 91.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012)

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 4 LABORATORY TEST RESULTS

SECTION 4C UD 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:	5/17/18
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-50	Sample #:	UD-1
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	13.5 - 15.5'

Sample Description: Silt with Sand [ML, 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		
		21	22	23			24	25	
A	Tare Weight	28.07	25.68	27.28			25.98	26.78	
B	Wet Soil Weight + A	44.13	42.24	48.56			33.02	33.04	
C	Dry Soil Weight + A	39.96	37.75	42.53			31.44	31.64	
D	Water Weight (B-C)	4.17	4.49	6.03			1.58	1.40	
E	Dry Soil Weight (C-A)	11.89	12.07	15.25			5.46	4.86	
F	% Moisture (D/E)*100	35.1%	37.2%	39.5%			28.9%	28.8%	
N	# OF DROPS	35	28	19			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						28.9%		



NP, Non-Plastic		<input type="checkbox"/>
Liquid Limit	38	
Plastic Limit	29	
Plastic Index	9	
Group Symbol	ML	
Multipoint Method	<input checked="" type="checkbox"/>	
One-point Method	<input type="checkbox"/>	

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

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

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

<u>Benjamin J. Kovaleski</u> Technician Name	<u>5/17/18</u> Date	<u>Matthew F. Cooke, P.G.</u> Technical Responsibility	<u>5/17/18</u> Date
---	------------------------	---	------------------------

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

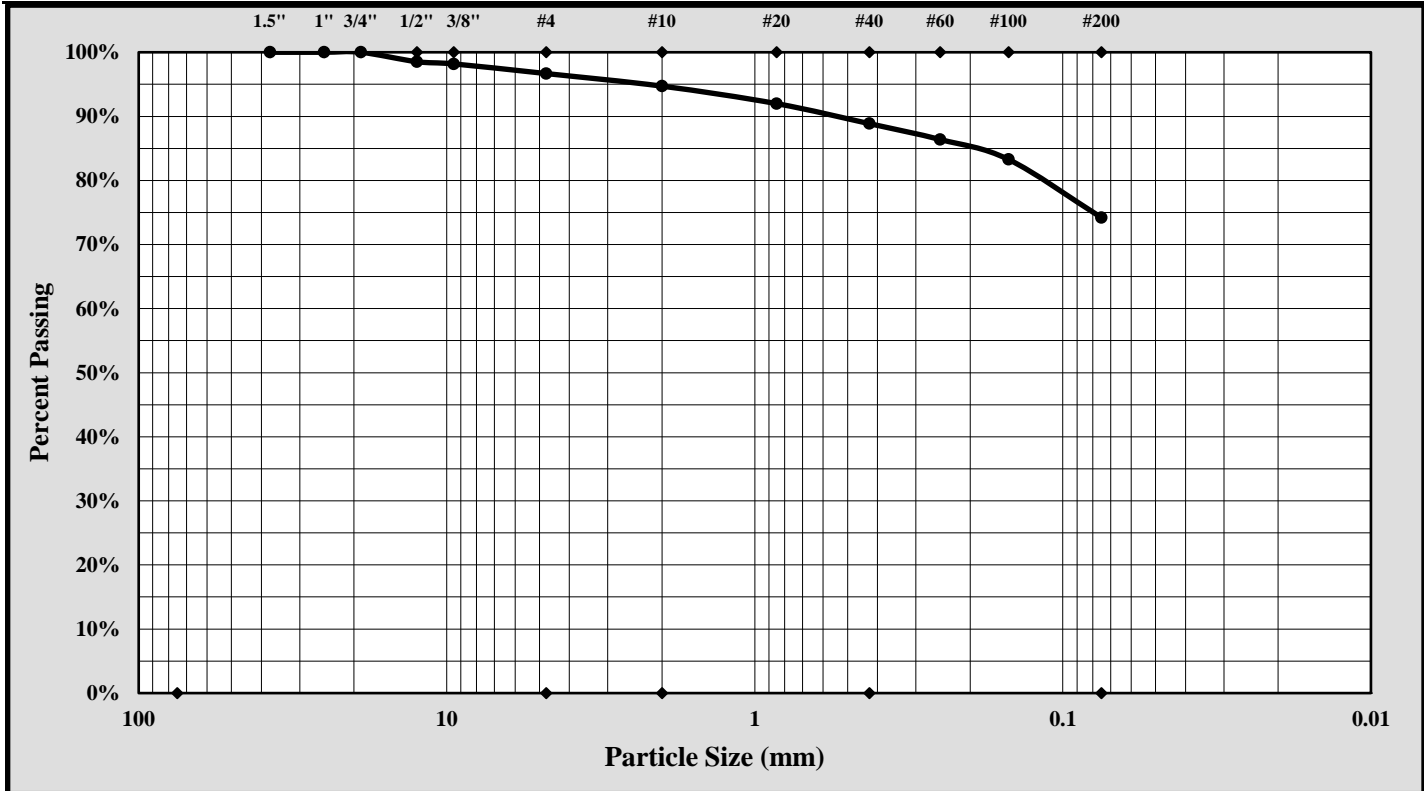


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	5/17/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/10 - 5/14/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	UD-1
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	13.5 - 15.5'
Sample Description:	Silt with Sand [ML, A-4(7)]		



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

Maximum Particle Size: 19.0 mm	Gravel: 3.3%
Silt & Clay (% Passing #200): 74.2%	Total Sand: 22.5%

Liquid Limit	38	Plastic Limit	29	Plastic Index	9
Coarse Sand:	2.0%	Medium Sand:	5.8%	Fine Sand:	14.7%

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

5/17/18

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:	5/14/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/07 - 5/09/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	UD-1
Location:	UD Borings	Type:	Undisturbed
Sample Description:	Silt with Sand [ML, A-4(7)]		
Material Excluded:	3.3%	% Passing #4 Sieve:	96.7%

Balance ID.	0.01 gram	ID#:	13942	Cal. Date:	8/18/17	Cal. Due:	8/18/18
Pycnometer ID No.	23161	Cal. Date:	2/10/18	Balance Verification	Check Mass:	500 gram	
Pycnometer Volume (V _p)	249.81	ml.	Mass Determination:		500.00 grams		
Pycnometer Mass (PM)	110.90	grams	If [PM - M _p] is greater than .06 grams, recalibrate the dry mass of the pycnometer.				
Ave. Pycnometer Mass (M _p)	110.90	grams					

Method B: Oven-dried Specimens			Soaking Time	ASTM C127: 24 ± 4 hrs.	<input type="checkbox"/>
Table 2 ASTM D 854	Specimen Dry Mass (g.)		Aggregate not initially dried <input type="checkbox"/>		
Soil Type	250-ml. beaker	500-ml. beaker	Initial Dry Mass of Test Specimen - <i>not required.</i> grams		
SP, SP-SM	60 ± 10	100 ± 10			
SP-SC, SM, SC	45 ± 10	75 ± 10			
Silt or Clay	35 ± 5	50 ± 10			

M_{psw;t} = Mass of the Pycnometer, soil, and water = **384.16** grams

Mass of Dry Soil (grams)		Tare #	BB-8	T_t =	Test Temperature T _t	21.5 °C
A	Tare Weight		204.29	K =	Temperature Coefficient at T _t	0.99968
C	Dry Wt. + Tare Wt.		242.01	K =	Temperature Coefficient at 23°C	0.99933
M_s	Dry Weight	C-A	37.72	p_{w;t} =	Density of Water at T _t	0.99789 g./ml.

M_{pw;t} = Mass of the Pycnometer and water at T_t M_{pw;t} = M_p + (V_p × p_{w;t}) **360.18** grams

G_t = Specific Gravity of Soil Solids at the T_t G_t = M_s / (M_{pw;t} - (M_{psw;t} - M_s)) **2.745**

G = Specific Gravity of Soil Solids at the 20°C G = K × G_t **2.744**

Soils containing plus #4 material tested per **R** = % of Soil retained on the #4 sieve **3.3%**

ASTM C 127 **P** = % of Soil passing the #4 sieve **96.7%**

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}** = $\frac{1}{\frac{R}{100 \times G_{+4}} + \frac{P}{100 \times G}}$ = **2.744**

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

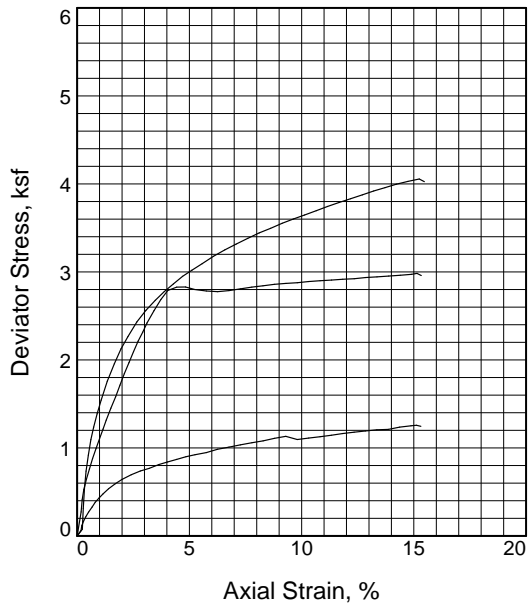
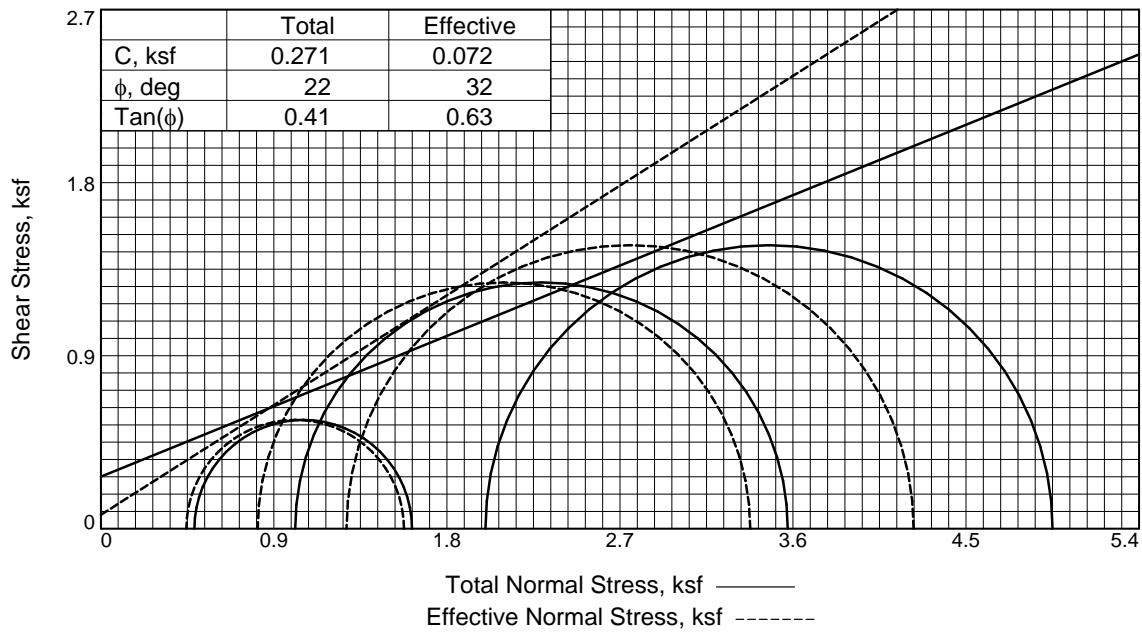
Matthew F. Cooke
Project Manager

Project Manager
Position

5/14/18
Date

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

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Specimen No.		1	2	3
Initial	Water Content, %	18.8	20.4	20.0
	Dry Density, pcf	99.2	104.5	103.1
	Saturation, %	71.1	87.6	82.8
	Void Ratio	0.7262	0.6390	0.6622
	Diameter, in.	2.845	2.883	2.862
At Test	Height, in.	5.802	5.897	5.850
	Water Content, %	25.0	21.8	21.9
	Dry Density, pcf	101.6	107.1	107.1
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6856	0.5990	0.6001
At Test	Diameter, in.	2.823	2.861	2.826
	Height, in.	5.754	5.843	5.775
	Strain rate, %/min.	0.34	0.34	0.34
	Eff. Cell Pressure, ksf	0.487	1.011	2.000
	Fail. Stress, ksf	1.132	2.562	2.950
	Total Pore Pr., ksf	7.962	8.115	8.642
	Strain, %	9.3	3.4	4.7
	Ult. Stress, ksf	1.258	2.983	4.056
	Total Pore Pr., ksf	7.873	7.267	7.962
	Strain, %	15.1	15.1	15.2
$\bar{\sigma}_1$ Failure, ksf	1.576	3.378	4.227	
$\bar{\sigma}_3$ Failure, ksf	0.445	0.816	1.278	

Type of Test:

CU with Pore Pressures

Sample Type: Undisturbed

Description: Silt with Sand [ML, A-4(7)]

LL= 38 PL= 29 PI= 9

Specific Gravity= 2.744

Remarks: The specimens failed with bulging and shear. Failure selected at peak obliquity. ASTM D4767.

Percent passing the #200 sieve: 74.2%

Figure 1

Client: HDR Engineering, Inc.

Project: Carolina Crossroads Project

Location: UD borings

Sample Number: B-50

Depth: 13.5 - 15.5'

Proj. No.: 1461-16-047.2B

Date Sampled: Various

TRIAXIAL SHEAR TEST REPORT

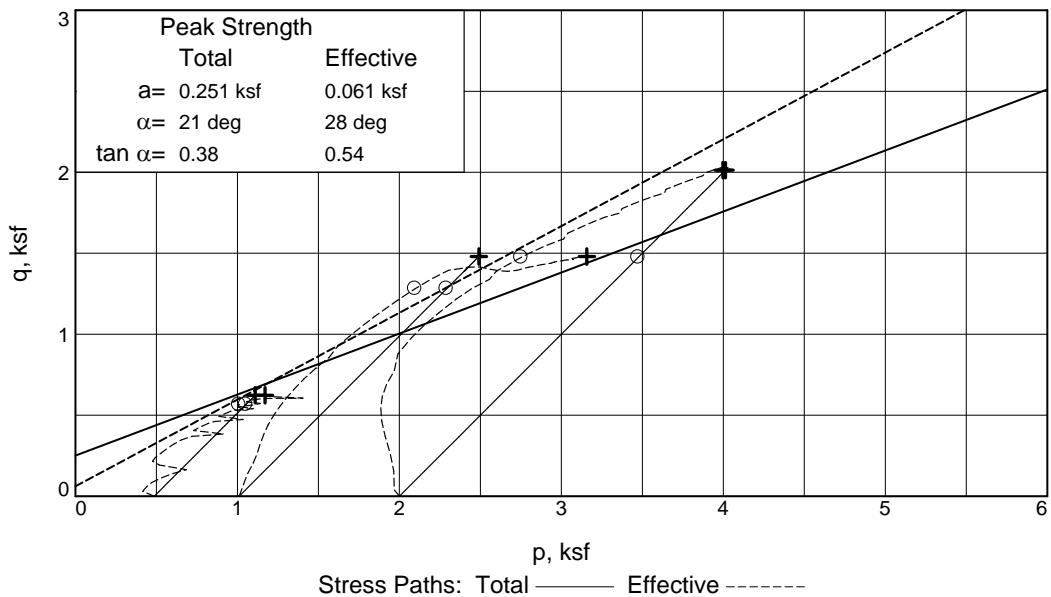
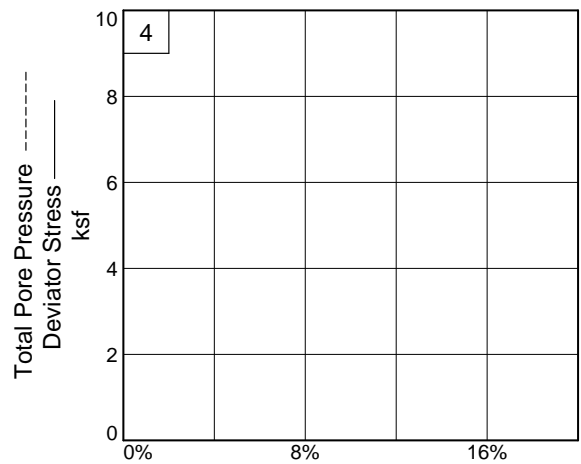
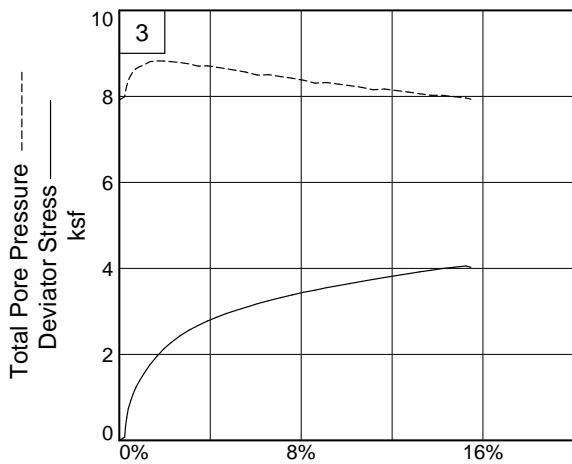
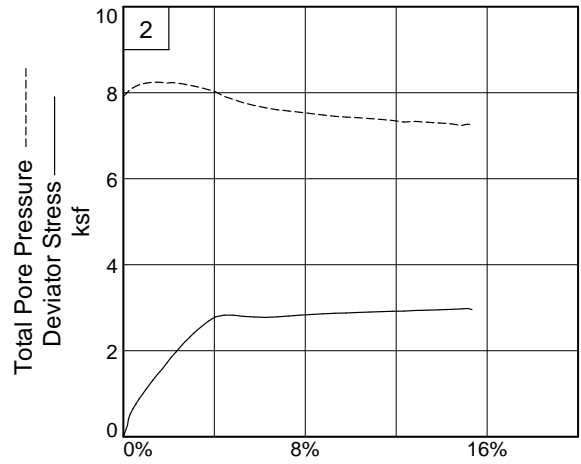
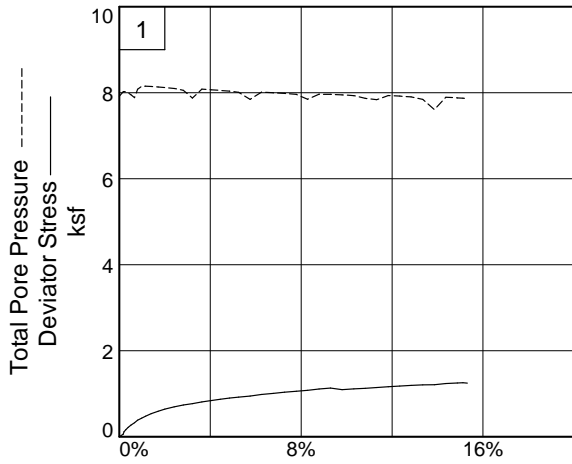
S&ME, Inc.

Greenville, SC

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: 13.5 - 15.5'

Sample Number: B-50

Project No.: 1461-16-047.2B

Figure 2

S&ME, Inc.

Tested By: Benjamin Kovaleski

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

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

5/17/2018
4:37 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:** B-50
Description: Silt with Sand [ML, A-4(7)]
Remarks: The specimens failed with bulging and shear. Failure selected at peak obliquity. ASTM D4767.
Percent passing the #200 sieve: 74.2%
Type of Sample: Undisturbed
Specific Gravity=2.744 **LL**=38 **PL**=29 **PI**=9
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	54.300			1177.430
Moisture content: Dry soil+tare, gms.	45.700			941.960
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	18.8	25.2	25.0	25.0
Moist specimen weight, gms.	1141.60			
Diameter, in.	2.845	2.825	2.823	
Area, in. ²	6.357	6.269	6.259	
Height, in.	5.802	5.762	5.754	
Net decrease in height, in.		0.040	0.008	
Net decrease in water volume, cc.			1.700	
Wet density, pcf	117.9	126.8	127.0	
Dry density, pcf	99.2	101.3	101.6	
Void ratio	0.7262	0.6905	0.6856	
Saturation, %	71.1	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = .167543 kN/cm²
Membrane thickness = .03048 cm
Consolidation cell pressure = 58.380 psi (8.407 ksf)
Consolidation back pressure = 55.000 psi (7.920 ksf)
Consolidation effective confining stress = 0.487 ksf
Strain rate, %/min. = 0.34
Fail. Stress = 1.132 ksf at reading no. 28
Ult. Stress = 1.258 ksf at reading no. 40

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	0.487	0.487	1.00	55.000	0.487	0.000
1	0.0099	2.644	2.6	0.2	0.061	0.385	0.446	1.16	55.706	0.415	0.030
2	0.0118	5.079	5.1	0.2	0.117	0.381	0.497	1.31	55.737	0.439	0.058
3	0.0166	7.259	7.3	0.3	0.167	0.386	0.552	1.43	55.700	0.469	0.083
4	0.0223	9.515	9.5	0.4	0.218	0.412	0.630	1.53	55.521	0.521	0.109
5	0.0295	11.892	11.9	0.5	0.272	0.452	0.725	1.60	55.239	0.588	0.136
6	0.0384	14.330	14.3	0.7	0.327	0.521	0.848	1.63	54.764	0.684	0.164
7	0.0464	16.847	16.8	0.8	0.384	0.326	0.710	2.18	56.116	0.518	0.192
8	0.0562	18.967	19.0	1.0	0.432	0.260	0.692	2.66	56.574	0.476	0.216
9	0.0665	21.047	21.0	1.2	0.479	0.254	0.732	2.89	56.618	0.493	0.239
10	0.0807	23.658	23.7	1.4	0.537	0.263	0.799	3.04	56.555	0.531	0.268
11	0.0982	26.300	26.3	1.7	0.595	0.273	0.867	3.18	56.486	0.570	0.297
12	0.1152	28.510	28.5	2.0	0.643	0.286	0.928	3.25	56.397	0.607	0.321
13	0.1389	31.009	31.0	2.4	0.696	0.307	1.003	3.27	56.250	0.655	0.348
14	0.1621	33.043	33.0	2.8	0.739	0.351	1.089	3.11	55.946	0.720	0.369
15	0.1850	34.531	34.5	3.2	0.769	0.530	1.299	2.45	54.697	0.915	0.384
16	0.2090	36.608	36.6	3.6	0.812	0.323	1.135	3.51	56.134	0.729	0.406
17	0.2320	38.116	38.1	4.0	0.842	0.337	1.179	3.49	56.037	0.758	0.421
18	0.2555	39.611	39.6	4.4	0.871	0.353	1.224	3.47	55.930	0.788	0.435
19	0.2787	41.125	41.1	4.8	0.900	0.371	1.271	3.43	55.806	0.821	0.450
20	0.3022	42.327	42.3	5.3	0.923	0.398	1.321	3.32	55.616	0.859	0.461
21	0.3312	43.707	43.7	5.8	0.948	0.561	1.509	2.69	54.481	1.035	0.474
22	0.3599	45.680	45.7	6.3	0.985	0.394	1.379	3.50	55.644	0.887	0.493
23	0.3894	47.098	47.1	6.8	1.010	0.408	1.419	3.47	55.543	0.914	0.505
24	0.4184	48.537	48.5	7.3	1.035	0.424	1.459	3.44	55.435	0.942	0.518
25	0.4480	49.955	50.0	7.8	1.060	0.445	1.504	3.38	55.292	0.975	0.530
26	0.4766	51.197	51.2	8.3	1.080	0.558	1.638	2.94	54.507	1.098	0.540
27	0.5058	52.891	52.9	8.8	1.110	0.442	1.552	3.51	55.311	0.997	0.555
28	0.5348	54.233	54.2	9.3	1.132	0.445	1.576	3.54	55.292	1.011	0.566
29	0.5641	55.606	55.6	9.8	1.095	0.456	1.552	3.40	55.211	1.004	0.548
30	0.5936	56.901	56.9	10.3	1.113	0.474	1.587	3.35	55.087	1.030	0.556
31	0.6225	58.080	58.1	10.8	1.127	0.538	1.665	3.10	54.647	1.101	0.564
32	0.6516	59.434	59.4	11.3	1.145	0.569	1.714	3.01	54.430	1.141	0.573
33	0.6809	60.901	60.9	11.8	1.165	0.473	1.637	3.46	55.098	1.055	0.582
34	0.7099	62.100	62.1	12.3	1.179	0.486	1.665	3.43	55.006	1.075	0.589
35	0.7385	63.315	63.3	12.8	1.193	0.505	1.698	3.36	54.875	1.101	0.597
36	0.7684	64.507	64.5	13.4	1.206	0.562	1.768	3.15	54.477	1.165	0.603
37	0.7976	65.273	65.3	13.9	1.211	0.799	2.010	2.52	52.833	1.404	0.606
38	0.8268	67.158	67.2	14.4	1.237	0.511	1.749	3.42	54.831	1.130	0.619
39	0.8557	68.433	68.4	14.9	1.252	0.526	1.778	3.38	54.724	1.152	0.626
40	0.8699	69.030	69.0	15.1	1.258	0.534	1.792	3.36	54.675	1.163	0.629
41	0.8810	68.640	68.6	15.3	1.246	0.547	1.794	3.28	54.578	1.171	0.623

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	58.970			1309.400
Moisture content: Dry soil+tare, gms.	48.980			1074.710
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	20.4	22.6	21.8	21.8
Moist specimen weight, gms.	1271.51			
Diameter, in.	2.883	2.871	2.861	
Area, in. ²	6.528	6.475	6.427	
Height, in.	5.897	5.873	5.843	
Net decrease in height, in.		0.024	0.030	
Net decrease in water volume, cc.			7.700	
Wet density, pcf	125.8	129.7	130.5	
Dry density, pcf	104.5	105.8	107.1	
Void ratio	0.6390	0.6190	0.5990	
Saturation, %	87.6	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 62.020 psi (8.931 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 1.011 ksf

Strain rate, %/min. = 0.34

Fail. Stress = 2.562 ksf at reading no. 20

Ult. Stress = 2.983 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	1.011	1.011	1.00	55.000	1.011	0.000
1	0.0105	12.245	12.2	0.2	0.274	0.925	1.199	1.30	55.598	1.062	0.137
2	0.0131	18.471	18.5	0.2	0.413	0.892	1.305	1.46	55.826	1.098	0.206
3	0.0172	23.552	23.6	0.3	0.526	0.859	1.385	1.61	56.056	1.122	0.263
4	0.0240	28.779	28.8	0.4	0.642	0.819	1.461	1.78	56.331	1.140	0.321
5	0.0319	34.068	34.1	0.5	0.759	0.782	1.541	1.97	56.587	1.162	0.380
6	0.0403	39.612	39.6	0.7	0.881	0.749	1.630	2.18	56.820	1.189	0.441
7	0.0492	44.768	44.8	0.8	0.995	0.725	1.720	2.37	56.982	1.223	0.497
8	0.0583	49.793	49.8	1.0	1.104	0.708	1.813	2.56	57.102	1.260	0.552
9	0.0673	54.732	54.7	1.2	1.212	0.696	1.908	2.74	57.186	1.302	0.606
10	0.0757	59.496	59.5	1.3	1.316	0.690	2.006	2.91	57.227	1.348	0.658
11	0.0877	65.763	65.8	1.5	1.451	0.686	2.138	3.11	57.254	1.412	0.726
12	0.1002	71.836	71.8	1.7	1.582	0.694	2.275	3.28	57.204	1.484	0.791
13	0.1114	77.894	77.9	1.9	1.712	0.709	2.421	3.41	57.096	1.565	0.856
14	0.1227	84.106	84.1	2.1	1.845	0.695	2.539	3.66	57.196	1.617	0.922
15	0.1351	90.032	90.0	2.3	1.970	0.704	2.674	3.80	57.132	1.689	0.985
16	0.1467	95.874	95.9	2.5	2.094	0.719	2.813	3.91	57.029	1.766	1.047
17	0.1585	101.485	101.5	2.7	2.212	0.737	2.949	4.00	56.903	1.843	1.106
18	0.1707	106.480	106.5	2.9	2.316	0.757	3.073	4.06	56.762	1.915	1.158
19	0.1820	111.526	111.5	3.1	2.421	0.779	3.200	4.11	56.607	1.990	1.210
20	0.2003	118.403	118.4	3.4	2.562	0.816	3.378	4.14	56.354	2.097	1.281
21	0.2179	124.603	124.6	3.7	2.687	0.858	3.546	4.13	56.058	2.202	1.344
22	0.2359	129.726	129.7	4.0	2.789	0.908	3.697	4.07	55.717	2.302	1.395

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	0.2591	132.097	132.1	4.4	2.828	1.017	3.845	3.78	54.961	2.431	1.414
24	0.2822	132.695	132.7	4.8	2.829	1.085	3.914	3.61	54.485	2.500	1.415
25	0.3065	131.939	131.9	5.2	2.801	1.162	3.963	3.41	53.952	2.562	1.400
26	0.3364	131.857	131.9	5.8	2.784	1.228	4.012	3.27	53.493	2.620	1.392
27	0.3657	132.211	132.2	6.3	2.777	1.281	4.057	3.17	53.128	2.669	1.388
28	0.3952	133.506	133.5	6.8	2.789	1.328	4.117	3.10	52.798	2.722	1.394
29	0.4247	135.157	135.2	7.3	2.808	1.355	4.163	3.07	52.610	2.759	1.404
30	0.4545	136.873	136.9	7.8	2.828	1.386	4.214	3.04	52.397	2.800	1.414
31	0.4838	138.357	138.4	8.3	2.843	1.417	4.260	3.01	52.179	2.839	1.422
32	0.5132	139.888	139.9	8.8	2.859	1.448	4.307	2.97	51.966	2.877	1.429
33	0.5436	141.275	141.3	9.3	2.871	1.481	4.351	2.94	51.737	2.916	1.435
34	0.5729	142.419	142.4	9.8	2.878	1.498	4.376	2.92	51.614	2.937	1.439
35	0.6029	143.901	143.9	10.3	2.891	1.512	4.403	2.91	51.521	2.957	1.446
36	0.6324	145.204	145.2	10.8	2.901	1.532	4.433	2.89	51.384	2.982	1.451
37	0.6620	146.388	146.4	11.3	2.908	1.552	4.460	2.87	51.241	3.006	1.454
38	0.6913	147.706	147.7	11.8	2.918	1.575	4.492	2.85	51.085	3.033	1.459
39	0.7211	148.827	148.8	12.3	2.923	1.613	4.535	2.81	50.821	3.074	1.461
40	0.7510	150.387	150.4	12.9	2.936	1.598	4.534	2.84	50.921	3.066	1.468
41	0.7807	151.659	151.7	13.4	2.944	1.618	4.561	2.82	50.787	3.089	1.472
42	0.8111	153.086	153.1	13.9	2.954	1.634	4.588	2.81	50.671	3.111	1.477
43	0.8409	154.463	154.5	14.4	2.963	1.653	4.615	2.79	50.542	3.134	1.481
44	0.8704	155.922	155.9	14.9	2.973	1.691	4.664	2.76	50.275	3.178	1.486
45	0.8848	156.909	156.9	15.1	2.983	1.664	4.647	2.79	50.467	3.155	1.492
46	0.8957	156.023	156.0	15.3	2.960	1.677	4.637	2.76	50.372	3.157	1.480

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	68.060			1238.980
Moisture content: Dry soil+tare, gms.	56.720			1016.680
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	20.0	23.7	21.9	21.9
Moist specimen weight, gms.	1221.65			
Diameter, in.	2.862	2.855	2.826	
Area, in. ²	6.433	6.402	6.273	
Height, in.	5.850	5.836	5.775	
Net decrease in height, in.		0.014	0.061	
Net decrease in water volume, cc.			18.600	
Wet density, pcf	123.7	128.4	130.5	
Dry density, pcf	103.1	103.8	107.1	
Void ratio	0.6622	0.6503	0.6001	
Saturation, %	82.8	100.0	100.0	

Test Readings for Specimen No. 3

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 68.890 psi (9.920 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 2.000 ksf

Strain rate, %/min. = 0.34

Fail. Stress = 2.950 ksf at reading no. 19

Ult. Stress = 4.056 ksf at reading no. 40

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	2.000	2.000	1.00	55.000	2.000	0.000
1	0.0136	3.361	3.4	0.2	0.077	1.930	2.007	1.04	55.487	1.969	0.038
2	0.0157	13.578	13.6	0.3	0.311	1.810	2.121	1.17	56.323	1.965	0.155
3	0.0189	23.513	23.5	0.3	0.538	1.673	2.211	1.32	57.272	1.942	0.269
4	0.0229	32.197	32.2	0.4	0.736	1.545	2.281	1.48	58.161	1.913	0.368
5	0.0287	40.180	40.2	0.5	0.918	1.433	2.350	1.64	58.941	1.892	0.459
6	0.0355	47.946	47.9	0.6	1.094	1.338	2.432	1.82	59.596	1.885	0.547
7	0.0424	54.286	54.3	0.7	1.237	1.277	2.514	1.97	60.022	1.895	0.618
8	0.0514	61.048	61.0	0.9	1.389	1.228	2.617	2.13	60.364	1.922	0.694
9	0.0618	67.961	68.0	1.1	1.543	1.196	2.739	2.29	60.585	1.968	0.772
10	0.0777	77.613	77.6	1.3	1.758	1.112	2.870	2.58	61.166	1.991	0.879
11	0.0957	86.694	86.7	1.7	1.957	1.097	3.054	2.78	61.275	2.075	0.978
12	0.1130	94.501	94.5	2.0	2.127	1.098	3.225	2.94	61.262	2.162	1.063
13	0.1306	101.014	101.0	2.3	2.266	1.112	3.378	3.04	61.171	2.245	1.133
14	0.1537	108.862	108.9	2.7	2.432	1.134	3.566	3.15	61.017	2.350	1.216
15	0.1771	115.259	115.3	3.1	2.564	1.165	3.730	3.20	60.797	2.448	1.282
16	0.2010	120.828	120.8	3.5	2.677	1.217	3.894	3.20	60.439	2.555	1.338
17	0.2243	125.899	125.9	3.9	2.778	1.209	3.987	3.30	60.491	2.598	1.389
18	0.2476	130.386	130.4	4.3	2.865	1.243	4.108	3.30	60.258	2.675	1.432
19	0.2714	134.844	134.8	4.7	2.950	1.278	4.227	3.31	60.017	2.753	1.475
20	0.2952	138.657	138.7	5.1	3.020	1.313	4.333	3.30	59.775	2.823	1.510
21	0.3218	142.744	142.7	5.6	3.094	1.357	4.451	3.28	59.469	2.904	1.547
22	0.3505	147.383	147.4	6.1	3.178	1.425	4.603	3.23	58.995	3.014	1.589

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	0.3796	151.545	151.5	6.6	3.250	1.416	4.666	3.29	59.055	3.041	1.625
24	0.4092	155.530	155.5	7.1	3.317	1.457	4.774	3.28	58.771	3.116	1.659
25	0.4390	159.495	159.5	7.6	3.383	1.499	4.881	3.26	58.482	3.190	1.691
26	0.4685	163.293	163.3	8.1	3.444	1.544	4.988	3.23	58.169	3.266	1.722
27	0.4978	166.697	166.7	8.6	3.497	1.612	5.109	3.17	57.693	3.361	1.748
28	0.5275	170.334	170.3	9.1	3.553	1.599	5.151	3.22	57.788	3.375	1.776
29	0.5565	173.629	173.6	9.6	3.601	1.634	5.235	3.20	57.544	3.434	1.801
30	0.5851	176.826	176.8	10.1	3.648	1.669	5.316	3.19	57.302	3.493	1.824
31	0.6150	180.169	180.2	10.6	3.695	1.709	5.404	3.16	57.022	3.557	1.848
32	0.6443	183.620	183.6	11.2	3.745	1.766	5.510	3.12	56.630	3.638	1.872
33	0.6742	186.946	186.9	11.7	3.790	1.751	5.541	3.16	56.730	3.646	1.895
34	0.7036	190.142	190.1	12.2	3.833	1.784	5.617	3.15	56.502	3.700	1.916
35	0.7336	193.407	193.4	12.7	3.875	1.817	5.693	3.13	56.269	3.755	1.938
36	0.7630	196.782	196.8	13.2	3.920	1.858	5.778	3.11	55.985	3.818	1.960
37	0.7921	199.816	199.8	13.7	3.957	1.894	5.852	3.09	55.734	3.873	1.979
38	0.8213	203.050	203.1	14.2	3.998	1.896	5.894	3.11	55.722	3.895	1.999
39	0.8509	205.894	205.9	14.7	4.030	1.927	5.957	3.09	55.508	3.942	2.015
40	0.8803	208.479	208.5	15.2	4.056	1.958	6.014	3.07	55.295	3.986	2.028
41	0.8932	207.492	207.5	15.5	4.026	1.985	6.011	3.03	55.108	3.998	2.013



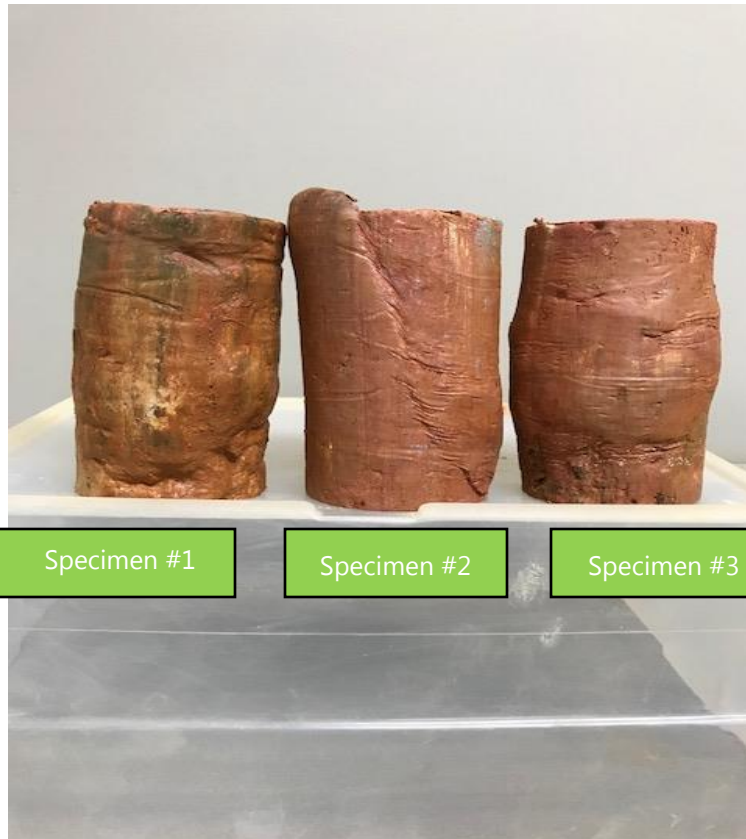
Project Name: Carolina Crossroads Project

Boring #: B-50

Depth: 13.5 – 15.5'

Sample #: UD-1

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:	5/18/18
Project Name:	Carolina Crossroads Project	Test Date:	5/16/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	UD-2
		Sample Date:	Various
Location:	UD borings	Type:	Undisturbed
		Depth:	35 - 37'

Sample Description: Sandy Fat Clay [CH, A-7-6(9)]					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		1	2	3			4	5		
A	Tare Weight	26.70	26.48	26.32				25.92	26.94	
B	Wet Soil Weight + A	40.66	43.66	41.90				33.96	34.64	
C	Dry Soil Weight + A	36.15	37.96	36.39				32.19	32.95	
D	Water Weight (B-C)	4.51	5.70	5.51				1.77	1.69	
E	Dry Soil Weight (C-A)	9.45	11.48	10.07				6.27	6.01	
F	% Moisture (D/E)*100	47.7%	49.7%	54.7%				28.2%	28.1%	
N	# OF DROPS	35	28	18				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							28.2%		



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

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	51
Plastic Limit	28
Plastic Index	23
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

5/18/18
 Date

Matthew F. Cooke, P.G.
 Technical Responsibility

5/18/18
 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:	5/14/18
Project Name:	Carolina Crossroads Project	Test Date(s):	5/08 - 5/10/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	B-50	Sample #:	UD-2
Location:	UD Borings	Type:	Undisturbed
Sample Description:	Sandy Fat Clay [CH, A-7-6(9)]		
Material Excluded:	4.7%	% Passing #4 Sieve:	95.3%

Balance ID.	0.01 gram	ID#:	13942	Cal. Date:	8/18/17	Cal. Due:	8/18/18
Pycnometer ID No.	23162	Cal. Date:	2/10/18	Balance Verification	Check Mass:	500 gram	
Pycnometer Volume (V _p)	249.82	ml.	Mass Determination:		500.00 grams		
Pycnometer Mass (PM)	115.03	grams	<i>If [PM - M_p] is greater than .06 grams, recalibrate the dry mass of the pycnometer.</i>				
Ave. Pycnometer Mass (M _p)	115.03	grams					

Method B: Oven-dried Specimens			Soaking Time	ASTM C127: 24 ± 4 hrs. <input type="checkbox"/>
Table 2 ASTM D 854	Specimen Dry Mass (g.)		Aggregate not initially dried <input type="checkbox"/>	
Soil Type	250-ml. beaker	500-ml. beaker	Initial Dry Mass of Test Specimen - <i>not required.</i> grams	
SP, SP-SM	60 ± 10	100 ± 10		
SP-SC, SM, SC	45 ± 10	75 ± 10		
Silt or Clay	35 ± 5	50 ± 10		

M_{psw,t} = Mass of the Pycnometer, soil, and water = **388.44** grams

Mass of Dry Soil (grams)		Tare #	7	T_t = Test Temperature T _t	21.5 °C
A	Tare Weight		192.22	K = Temperature Coefficient at T _t	0.99968
C	Dry Wt. + Tare Wt.		230.33	K = Temperature Coefficient at 23°C	0.99933
M_s	Dry Weight	C-A	38.11	p_{w,t} = Density of Water at T _t	0.99789 g./ml.

M_{pw,t} = Mass of the Pycnometer and water at T_t M_{pw,t} = M_p + (V_p × p_{w,t}) **364.32** grams

G_t = Specific Gravity of Soil Solids at the T_t G_t = M_s / (M_{pw,t} - (M_{psw,t} - M_s)) **2.724**

G = Specific Gravity of Soil Solids at the 20°C G = K × G_t **2.723**

Soils containing plus #4 material tested per **R** = % of Soil retained on the #4 sieve **4.7%**

ASTM C 127 **P** = % of Soil passing the #4 sieve **95.3%**

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}** = $\frac{1}{\frac{R}{100 \times G_{+4}} + \frac{P}{100 \times G}}$ = **2.723**

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

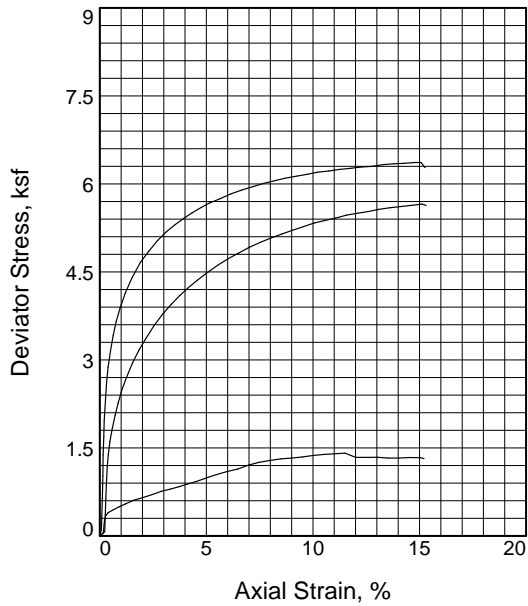
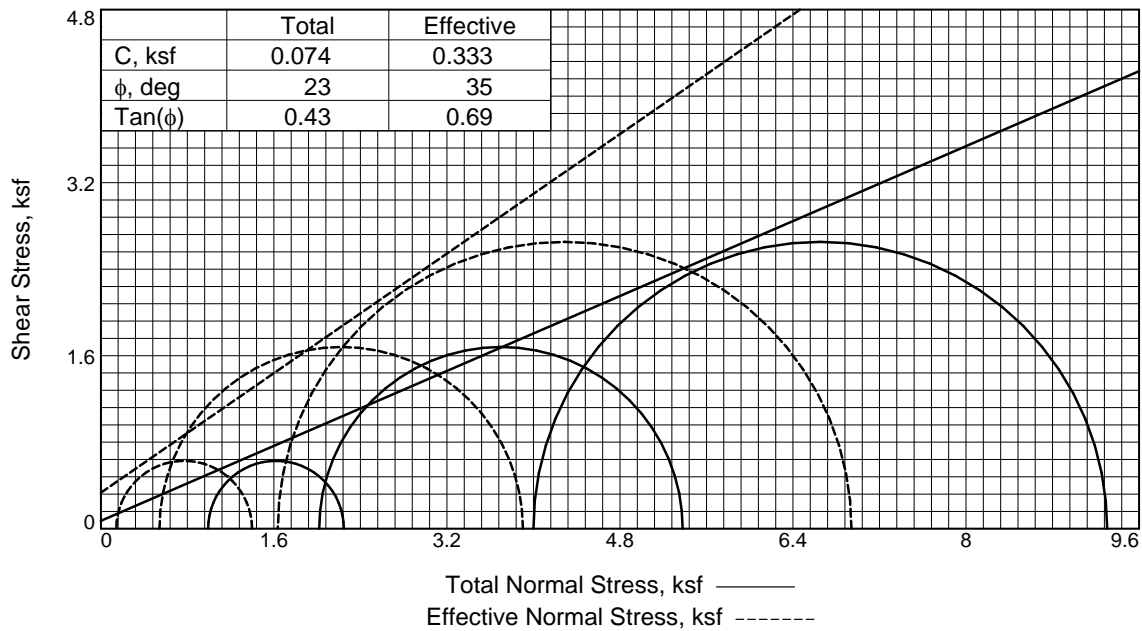
Matthew F. Cooke
Project Manager

Project Manager
Position

5/14/18
Date

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

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Specimen No.	1	2	3	
Initial	Water Content, %	15.1	20.5	23.0
	Dry Density, pcf	116.9	108.8	103.5
	Saturation, %	90.9	99.4	97.5
	Void Ratio	0.4538	0.5617	0.6422
	Diameter, in.	2.864	2.878	2.879
At Test	Height, in.	5.152	5.354	5.512
	Water Content, %	15.1	19.6	21.3
	Dry Density, pcf	120.4	110.8	107.5
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4115	0.5338	0.5810
Strain rate, %/min.	Diameter, in.	2.827	2.862	2.844
	Height, in.	5.133	5.318	5.439
	0.25	0.25	0.25	
	Eff. Cell Pressure, ksf	0.992	2.019	4.000
	Fail. Stress, ksf	1.255	3.361	5.305
Total Pore Pr., ksf	Total Pore Pr., ksf	8.769	9.397	10.284
	Strain, %	7.5	2.2	3.5
Ult. Stress, ksf	Ult. Stress, ksf	1.336	5.657	6.365
	Total Pore Pr., ksf	8.668	7.789	9.301
Strain, %	Strain, %	15.0	15.1	15.1
	$\bar{\sigma}_1$ Failure, ksf	1.397	3.903	6.941
$\bar{\sigma}_3$ Failure, ksf	0.143	0.542	1.636	

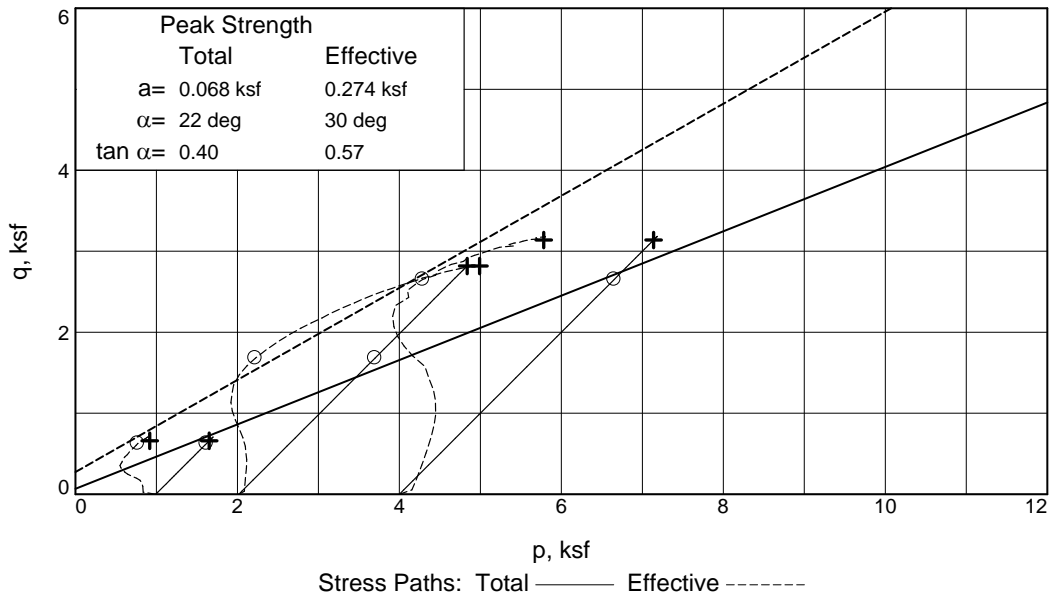
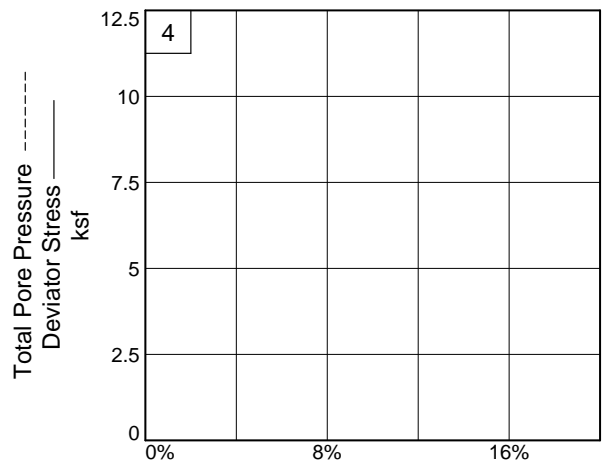
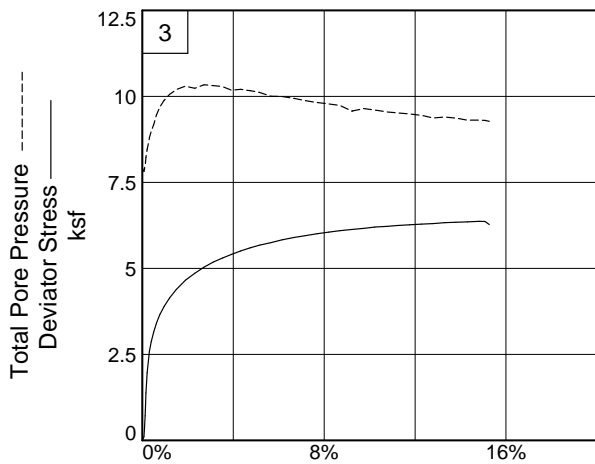
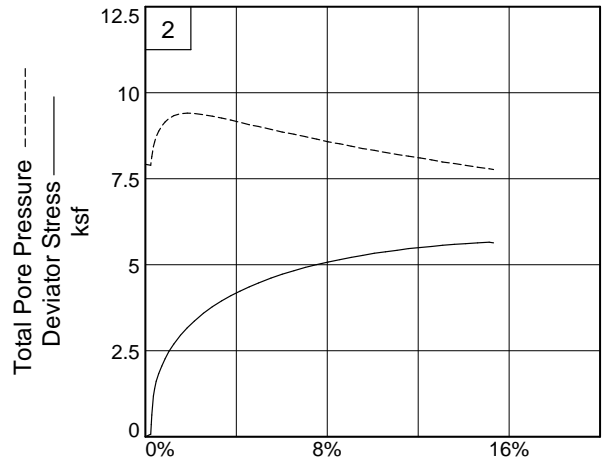
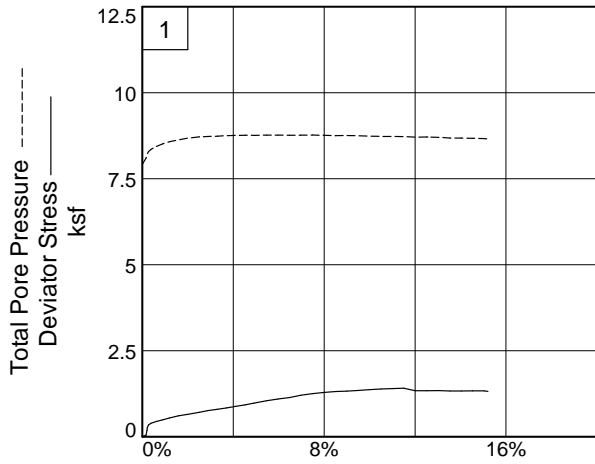
Type of Test: CU with Pore Pressures
Sample Type: Undisturbed
Description: Sandy Fat Clay [CH, A-7-6(9)]
LL= 51 PL= 28 PI= 23
Specific Gravity= 2.723
Remarks: Specimen failed with shear and bulging. Failure selected at peak obliquity. ASTM D4767.
 Percent passing the #200 sieve: 51.0%

Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Location: UD borings
Sample Number: B-50 **Depth:** 35 - 37'
Proj. No.: 1461-16-047.2B **Date Sampled:** Various

TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Greenville, SC

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: 35 - 37'

Sample Number: B-50

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

5/18/2018
4:15 PM

Date: Various
Client: HDR Engineering, Inc.
Project: Carolina Crossroads Project
Project No.: 1461-16-047.2B
Location: UD borings
Depth: 35 - 37' **Sample Number:** B-50
Description: Sandy Fat Clay [CH, A-7-6(9)]
Remarks: Specimen failed with shear and bulging. Failure selected at peak obliquity. ASTM D4767.
Percent passing the #200 sieve: 51.0%
Type of Sample: Undisturbed
Specific Gravity=2.723 **LL**=51 **PL**=28 **PI**=23
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	15.810			245.850
Moisture content: Dry soil+tare, gms.	13.730			213.570
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	15.1	16.4	15.1	15.1
Moist specimen weight, gms.	1173.09			
Diameter, in.	2.864	2.860	2.827	
Area, in. ²	6.442	6.425	6.278	
Height, in.	5.152	5.145	5.133	
Net decrease in height, in.		0.007	0.012	
Net decrease in water volume, cc.			13.600	
Wet density, pcf	134.6	136.7	138.6	
Dry density, pcf	116.9	117.4	120.4	
Void ratio	0.4538	0.4478	0.4115	
Saturation, %	90.9	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = .167543 kN/cm²
Membrane thickness = .03048 cm
Consolidation cell pressure = 61.890 psi (8.912 ksf)
Consolidation back pressure = 55.000 psi (7.920 ksf)
Consolidation effective confining stress = 0.992 ksf
Strain rate, %/min. = 0.25
Fail. Stress = 1.255 ksf at reading no. 22
Ult. Stress = 1.336 ksf at reading no. 37

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	0.992	0.992	1.00	55.000	0.992	0.000
1	0.0085	2.156	2.2	0.2	0.049	0.812	0.862	1.06	56.248	0.837	0.025
2	0.0104	8.268	8.3	0.2	0.189	0.738	0.927	1.26	56.767	0.832	0.095
3	0.0113	11.383	11.4	0.2	0.261	0.692	0.953	1.38	57.083	0.822	0.130
4	0.0140	15.021	15.0	0.3	0.344	0.626	0.970	1.55	57.542	0.798	0.172
5	0.0196	17.274	17.3	0.4	0.395	0.558	0.953	1.71	58.013	0.756	0.197
6	0.0324	19.600	19.6	0.6	0.447	0.469	0.916	1.95	58.634	0.692	0.223
7	0.0464	21.795	21.8	0.9	0.495	0.396	0.891	2.25	59.143	0.643	0.248
8	0.0618	24.090	24.1	1.2	0.546	0.336	0.882	2.62	59.556	0.609	0.273
9	0.0818	27.014	27.0	1.6	0.610	0.282	0.891	3.17	59.934	0.586	0.305
10	0.1030	29.073	29.1	2.0	0.653	0.233	0.886	3.81	60.272	0.560	0.327
11	0.1282	31.769	31.8	2.5	0.710	0.195	0.906	4.64	60.533	0.551	0.355
12	0.1482	34.212	34.2	2.9	0.762	0.184	0.946	5.15	60.615	0.565	0.381
13	0.1697	36.049	36.0	3.3	0.800	0.177	0.976	5.52	60.663	0.577	0.400
14	0.1903	38.050	38.1	3.7	0.840	0.160	1.000	6.26	60.780	0.580	0.420
15	0.2110	40.258	40.3	4.1	0.885	0.153	1.038	6.80	60.830	0.595	0.443
16	0.2322	42.410	42.4	4.5	0.929	0.148	1.077	7.28	60.863	0.612	0.464
17	0.2520	44.833	44.8	4.9	0.978	0.151	1.129	7.47	60.841	0.640	0.489
18	0.2808	48.247	48.2	5.5	1.046	0.144	1.190	8.25	60.887	0.667	0.523
19	0.3065	50.940	50.9	6.0	1.099	0.144	1.243	8.62	60.889	0.693	0.549
20	0.3326	53.210	53.2	6.5	1.141	0.148	1.289	8.72	60.863	0.719	0.571
21	0.3576	56.544	56.5	7.0	1.207	0.147	1.353	9.23	60.872	0.750	0.603
22	0.3838	59.123	59.1	7.5	1.255	0.143	1.397	9.79	60.898	0.770	0.627
23	0.4097	60.991	61.0	8.0	1.287	0.150	1.437	9.60	60.850	0.793	0.644
24	0.4362	62.641	62.6	8.5	1.315	0.160	1.475	9.20	60.777	0.818	0.657
25	0.4621	63.656	63.7	9.0	1.329	0.157	1.486	9.45	60.798	0.822	0.664
26	0.4871	64.800	64.8	9.5	1.345	0.163	1.509	9.24	60.756	0.836	0.673
27	0.5130	66.366	66.4	10.0	1.370	0.175	1.545	8.84	60.676	0.860	0.685
28	0.5389	67.664	67.7	10.5	1.389	0.182	1.571	8.63	60.626	0.877	0.695
29	0.5647	68.581	68.6	11.0	1.400	0.184	1.584	8.60	60.611	0.884	0.700
30	0.5906	69.606	69.6	11.5	1.413	0.186	1.599	8.61	60.601	0.892	0.706
31	0.6164	69.898	69.9	12.0	1.339	0.203	1.543	7.58	60.477	0.873	0.670
32	0.6426	70.487	70.5	12.5	1.340	0.200	1.540	7.71	60.504	0.870	0.670
33	0.6689	71.090	71.1	13.0	1.341	0.209	1.550	7.42	60.439	0.879	0.670
34	0.6947	71.054	71.1	13.5	1.329	0.228	1.557	6.82	60.305	0.893	0.664
35	0.7202	71.613	71.6	14.0	1.329	0.229	1.557	6.81	60.302	0.893	0.664
36	0.7457	72.566	72.6	14.5	1.336	0.236	1.573	6.66	60.249	0.904	0.668
37	0.7722	73.134	73.1	15.0	1.336	0.244	1.580	6.48	60.196	0.912	0.668
38	0.7804	72.461	72.5	15.2	1.319	0.258	1.577	6.12	60.101	0.917	0.660

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	36.450			251.200
Moisture content: Dry soil+tare, gms.	30.250			210.020
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	20.5	20.5	19.6	19.6
Moist specimen weight, gms.	1199.13			
Diameter, in.	2.878	2.875	2.862	
Area, in. ²	6.505	6.493	6.432	
Height, in.	5.354	5.349	5.318	
Net decrease in height, in.		0.005	0.031	
Net decrease in water volume, cc.			8.600	
Wet density, pcf	131.2	131.5	132.6	
Dry density, pcf	108.8	109.2	110.8	
Void ratio	0.5617	0.5573	0.5338	
Saturation, %	99.4	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 69.020 psi (9.939 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 2.019 ksf

Strain rate, %/min. = 0.25

Fail. Stress = 3.361 ksf at reading no. 15

Ult. Stress = 5.657 ksf at reading no. 42

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	2.019	2.019	1.00	55.000	2.019	0.000
1	0.0124	3.284	3.3	0.2	0.073	2.049	2.122	1.04	54.790	2.086	0.037
2	0.0135	15.819	15.8	0.3	0.353	1.920	2.274	1.18	55.684	2.097	0.177
3	0.0149	28.276	28.3	0.3	0.631	1.796	2.427	1.35	56.550	2.111	0.316
4	0.0164	38.605	38.6	0.3	0.862	1.683	2.545	1.51	57.329	2.114	0.431
5	0.0186	53.037	53.0	0.3	1.183	1.505	2.689	1.79	58.565	2.097	0.592
6	0.0215	62.473	62.5	0.4	1.393	1.371	2.764	2.02	59.496	2.068	0.696
7	0.0253	72.471	72.5	0.5	1.615	1.215	2.829	2.33	60.585	2.022	0.807
8	0.0311	82.558	82.6	0.6	1.837	1.055	2.893	2.74	61.691	1.974	0.919
9	0.0383	92.560	92.6	0.7	2.057	0.908	2.965	3.27	62.714	1.937	1.029
10	0.0461	102.230	102.2	0.9	2.269	0.786	3.055	3.89	63.560	1.921	1.134
11	0.0550	112.118	112.1	1.0	2.484	0.691	3.175	4.59	64.219	1.933	1.242
12	0.0662	121.926	121.9	1.2	2.696	0.605	3.301	5.46	64.818	1.953	1.348
13	0.0820	133.923	133.9	1.5	2.952	0.548	3.500	6.38	65.213	2.024	1.476
14	0.0978	144.197	144.2	1.8	3.169	0.533	3.702	6.95	65.320	2.117	1.584
15	0.1145	153.427	153.4	2.2	3.361	0.542	3.903	7.20	65.258	2.222	1.680
16	0.1357	164.542	164.5	2.6	3.590	0.577	4.167	7.22	65.010	2.372	1.795
17	0.1566	173.931	173.9	2.9	3.779	0.621	4.401	7.08	64.704	2.511	1.890
18	0.1784	182.526	182.5	3.4	3.949	0.674	4.623	6.86	64.341	2.648	1.975
19	0.2000	190.357	190.4	3.8	4.101	0.734	4.836	6.58	63.920	2.785	2.051
20	0.2214	197.343	197.3	4.2	4.234	0.798	5.032	6.30	63.477	2.915	2.117
21	0.2431	203.916	203.9	4.6	4.356	0.869	5.226	6.01	62.982	3.048	2.178
22	0.2644	210.171	210.2	5.0	4.471	0.920	5.391	5.86	62.633	3.155	2.236

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	0.2937	218.096	218.1	5.5	4.613	1.003	5.616	5.60	62.052	3.310	2.306
24	0.3201	224.576	224.6	6.0	4.725	1.082	5.807	5.37	61.505	3.445	2.362
25	0.3474	230.566	230.6	6.5	4.824	1.144	5.968	5.22	61.079	3.556	2.412
26	0.3739	236.539	236.5	7.0	4.923	1.216	6.139	5.05	60.577	3.677	2.462
27	0.4007	241.837	241.8	7.5	5.006	1.288	6.294	4.89	60.075	3.791	2.503
28	0.4274	246.704	246.7	8.0	5.079	1.367	6.446	4.72	59.530	3.906	2.540
29	0.4547	251.416	251.4	8.6	5.147	1.425	6.572	4.61	59.123	3.999	2.574
30	0.4812	256.000	256.0	9.0	5.212	1.492	6.704	4.49	58.662	4.098	2.606
31	0.5085	260.400	260.4	9.6	5.272	1.563	6.835	4.37	58.168	4.199	2.636
32	0.5351	264.963	265.0	10.1	5.335	1.614	6.949	4.30	57.808	4.282	2.667
33	0.5619	268.552	268.6	10.6	5.377	1.675	7.052	4.21	57.388	4.363	2.688
34	0.5885	272.114	272.1	11.1	5.418	1.732	7.150	4.13	56.992	4.441	2.709
35	0.6154	276.204	276.2	11.6	5.468	1.785	7.253	4.06	56.621	4.519	2.734
36	0.6426	279.508	279.5	12.1	5.501	1.836	7.337	4.00	56.271	4.586	2.751
37	0.6700	282.652	282.7	12.6	5.531	1.893	7.423	3.92	55.877	4.658	2.765
38	0.6956	286.020	286.0	13.1	5.566	1.954	7.520	3.85	55.451	4.737	2.783
39	0.7229	289.227	289.2	13.6	5.595	1.999	7.594	3.80	55.139	4.796	2.797
40	0.7496	291.911	291.9	14.1	5.614	2.050	7.664	3.74	54.781	4.857	2.807
41	0.7773	294.771	294.8	14.6	5.634	2.104	7.738	3.68	54.410	4.921	2.817
42	0.8041	297.685	297.7	15.1	5.657	2.150	7.806	3.63	54.092	4.978	2.828
43	0.8144	297.257	297.3	15.3	5.636	2.172	7.808	3.59	53.934	4.990	2.818

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	15.400			251.450
Moisture content: Dry soil+tare, gms.	12.520			207.250
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	23.0	22.9	21.3	21.3
Moist specimen weight, gms.	1199.30			
Diameter, in.	2.879	2.868	2.844	
Area, in. ²	6.510	6.460	6.351	
Height, in.	5.512	5.491	5.439	
Net decrease in height, in.		0.021	0.052	
Net decrease in water volume, cc.			15.200	
Wet density, pcf	127.3	128.7	130.5	
Dry density, pcf	103.5	104.7	107.5	
Void ratio	0.6422	0.6234	0.5810	
Saturation, %	97.5	100.0	100.0	

Test Readings for Specimen No. 3

Membrane modulus = .167543 kN/cm²

Membrane thickness = .03048 cm

Consolidation cell pressure = 82.780 psi (11.920 ksf)

Consolidation back pressure = 55.000 psi (7.920 ksf)

Consolidation effective confining stress = 4.000 ksf

Strain rate, %/min. = 0.25

Fail. Stress = 5.305 ksf at reading no. 21

Ult. Stress = 6.365 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	4.000	4.000	1.00	55.000	4.000	0.000
1	0.0040	4.675	4.7	0.1	0.106	4.101	4.207	1.03	54.301	4.154	0.053
2	0.0050	14.771	14.8	0.1	0.335	4.036	4.371	1.08	54.749	4.204	0.167
3	0.0068	31.634	31.6	0.1	0.716	3.918	4.635	1.18	55.569	4.277	0.358
4	0.0077	44.936	44.9	0.1	1.017	3.820	4.838	1.27	56.249	4.329	0.509
5	0.0086	61.058	61.1	0.2	1.382	3.697	5.079	1.37	57.104	4.388	0.691
6	0.0101	74.906	74.9	0.2	1.695	3.579	5.274	1.47	57.925	4.427	0.848
7	0.0114	86.714	86.7	0.2	1.962	3.466	5.428	1.57	58.709	4.447	0.981
8	0.0148	103.026	103.0	0.3	2.329	3.280	5.609	1.71	60.004	4.444	1.165
9	0.0170	114.655	114.7	0.3	2.591	3.123	5.714	1.83	61.095	4.418	1.296
10	0.0213	127.200	127.2	0.4	2.873	2.927	5.799	1.98	62.457	4.363	1.436
11	0.0272	139.521	139.5	0.5	3.147	2.744	5.891	2.15	63.727	4.317	1.574
12	0.0339	151.490	151.5	0.6	3.413	2.459	5.872	2.39	65.702	4.166	1.707
13	0.0418	162.487	162.5	0.8	3.656	2.231	5.887	2.64	67.287	4.059	1.828
14	0.0521	173.287	173.3	1.0	3.891	2.036	5.927	2.91	68.642	3.981	1.946
15	0.0652	184.828	184.8	1.2	4.140	1.861	6.001	3.22	69.856	3.931	2.070
16	0.0813	196.560	196.6	1.5	4.390	1.722	6.112	3.55	70.819	3.917	2.195
17	0.1033	209.552	209.6	1.9	4.661	1.623	6.284	3.87	71.510	3.953	2.330
18	0.1254	219.302	219.3	2.3	4.857	1.686	6.543	3.88	71.074	4.114	2.429
19	0.1473	228.238	228.2	2.7	5.035	1.584	6.618	4.18	71.783	4.101	2.517
20	0.1695	235.940	235.9	3.1	5.183	1.605	6.788	4.23	71.635	4.196	2.591
21	0.1920	242.528	242.5	3.5	5.305	1.636	6.941	4.24	71.420	4.288	2.652
22	0.2135	248.319	248.3	3.9	5.409	1.743	7.152	4.10	70.677	4.447	2.705

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	0.2355	253.921	253.9	4.3	5.508	1.714	7.222	4.21	70.878	4.468	2.754
24	0.2580	259.153	259.2	4.7	5.597	1.755	7.352	4.19	70.592	4.554	2.798
25	0.2801	263.950	263.9	5.1	5.676	1.804	7.480	4.15	70.254	4.642	2.838
26	0.3076	268.805	268.8	5.7	5.750	1.918	7.668	4.00	69.458	4.793	2.875
27	0.3353	274.170	274.2	6.2	5.833	1.923	7.756	4.03	69.426	4.839	2.916
28	0.3630	278.770	278.8	6.7	5.899	1.978	7.877	3.98	69.041	4.928	2.949
29	0.3909	282.981	283.0	7.2	5.955	2.044	7.999	3.91	68.582	5.022	2.977
30	0.4182	287.154	287.2	7.7	6.010	2.100	8.110	3.86	68.199	5.105	3.005
31	0.4461	290.878	290.9	8.2	6.054	2.138	8.192	3.83	67.934	5.165	3.027
32	0.4732	294.595	294.6	8.7	6.098	2.187	8.285	3.79	67.590	5.236	3.049
33	0.5014	297.913	297.9	9.2	6.132	2.348	8.480	3.61	66.476	5.414	3.066
34	0.5292	301.211	301.2	9.7	6.165	2.274	8.439	3.71	66.989	5.356	3.082
35	0.5560	304.653	304.7	10.2	6.201	2.316	8.517	3.68	66.699	5.416	3.101
36	0.5844	307.446	307.4	10.7	6.222	2.372	8.594	3.62	66.308	5.483	3.111
37	0.6120	310.477	310.5	11.3	6.247	2.402	8.649	3.60	66.098	5.526	3.124
38	0.6395	313.271	313.3	11.8	6.267	2.433	8.700	3.58	65.884	5.567	3.134
39	0.6678	316.164	316.2	12.3	6.288	2.469	8.757	3.55	65.634	5.613	3.144
40	0.6956	318.683	318.7	12.8	6.301	2.549	8.850	3.47	65.081	5.699	3.151
41	0.7235	322.055	322.1	13.3	6.330	2.521	8.852	3.51	65.270	5.687	3.165
42	0.7505	324.550	324.5	13.8	6.343	2.550	8.893	3.49	65.071	5.722	3.172
43	0.7785	327.018	327.0	14.3	6.353	2.613	8.966	3.43	64.635	5.789	3.177
44	0.8060	329.693	329.7	14.8	6.367	2.609	8.976	3.44	64.661	5.793	3.184
45	0.8200	330.574	330.6	15.1	6.365	2.619	8.984	3.43	64.591	5.802	3.182
46	0.8303	326.751	326.8	15.3	6.277	2.644	8.921	3.37	64.422	5.782	3.139



Project Name: Carolina Crossroads Project

Boring #: B-50

Depth: 35 - 37'

Sample #: UD-2

Test Type: Consolidated Undrained Triaxial Shear (ASTM D4767)



Specimen #1

Specimen #2

Specimen #3

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 4 LABORATORY TEST RESULTS

SECTION 4D BULK SAMPLES

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



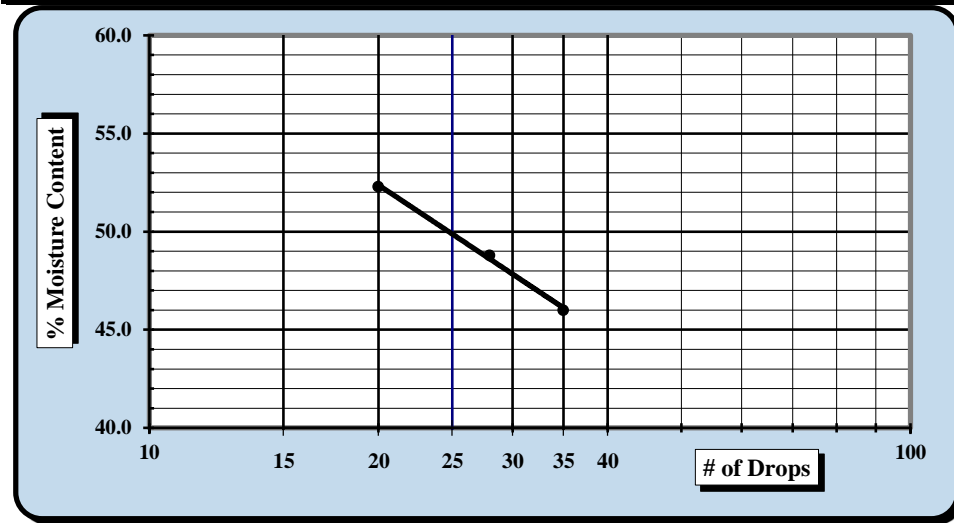
ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-44	Sample #:	BS-1
		Sample Date:	2/13/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.1' - 11.1'

Sample Description: Sandy Fat Clay (A-7-6 (17))					
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	27.68	26.68			28.27	26.96	
B	Wet Soil Weight + A	44.79	43.42	39.75			35.75	33.78	
C	Dry Soil Weight + A	39.70	38.26	35.26			34.33	32.51	
D	Water Weight (B-C)	5.09	5.16	4.49			1.42	1.27	
E	Dry Soil Weight (C-A)	11.07	10.58	8.58			6.06	5.55	
F	% Moisture (D/E)*100	46.0%	48.8%	52.3%			23.4%	22.9%	
N	# OF DROPS	35	28	20			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						23.2%		



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

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	50
Plastic Limit	23
Plastic Index	27
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 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>3/09/18</u> Date	 Technical Responsibility	<u>3/09/18</u> Date
---	------------------------	------------------------------	------------------------

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

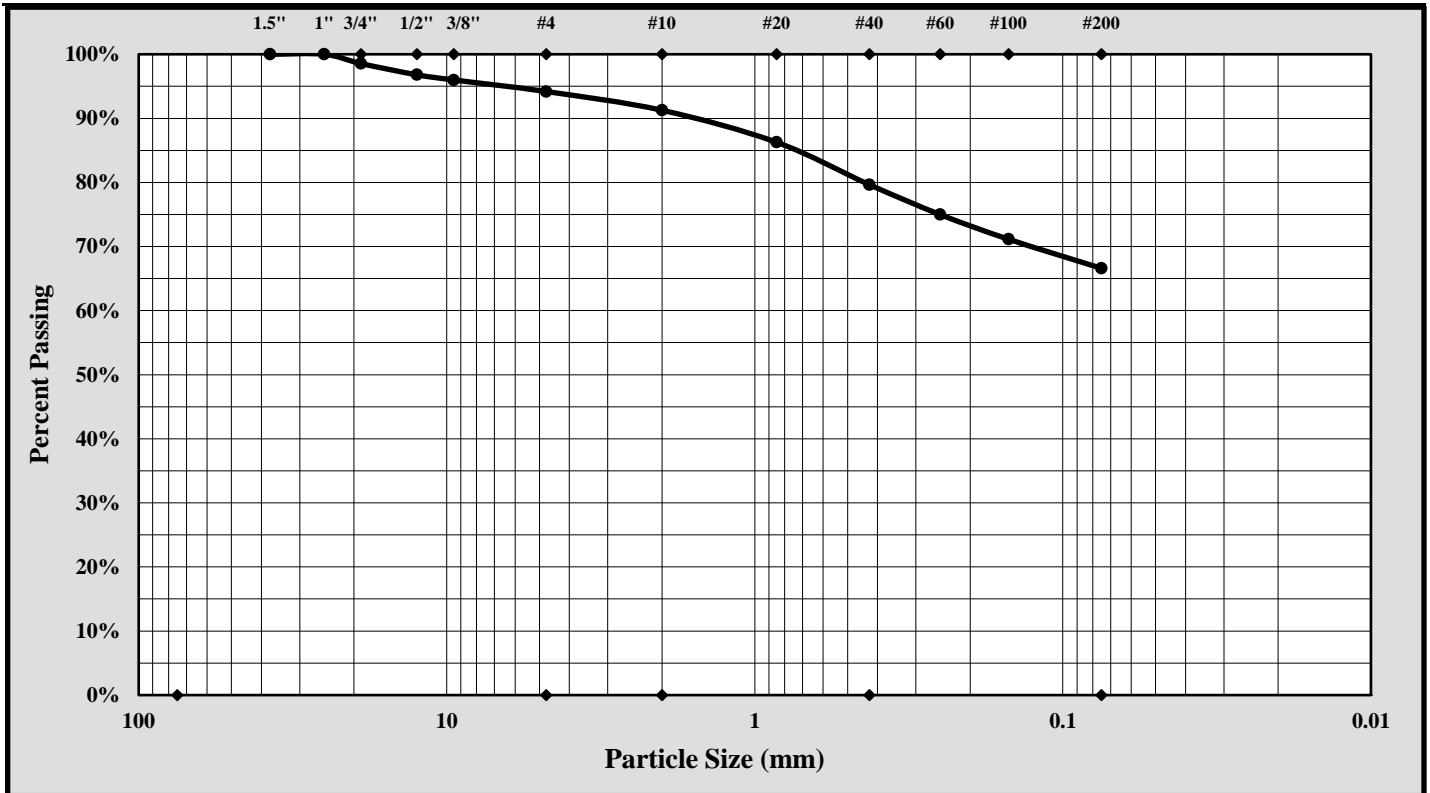
Particle Size Analysis of Soils

ASTM D 6913



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

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/05 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-44	Sample #:	BS-1
		Sample Date:	2/13/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.1' - 11.1'
Sample Description:	Sandy Fat Clay (CH, A-7-6(17))		



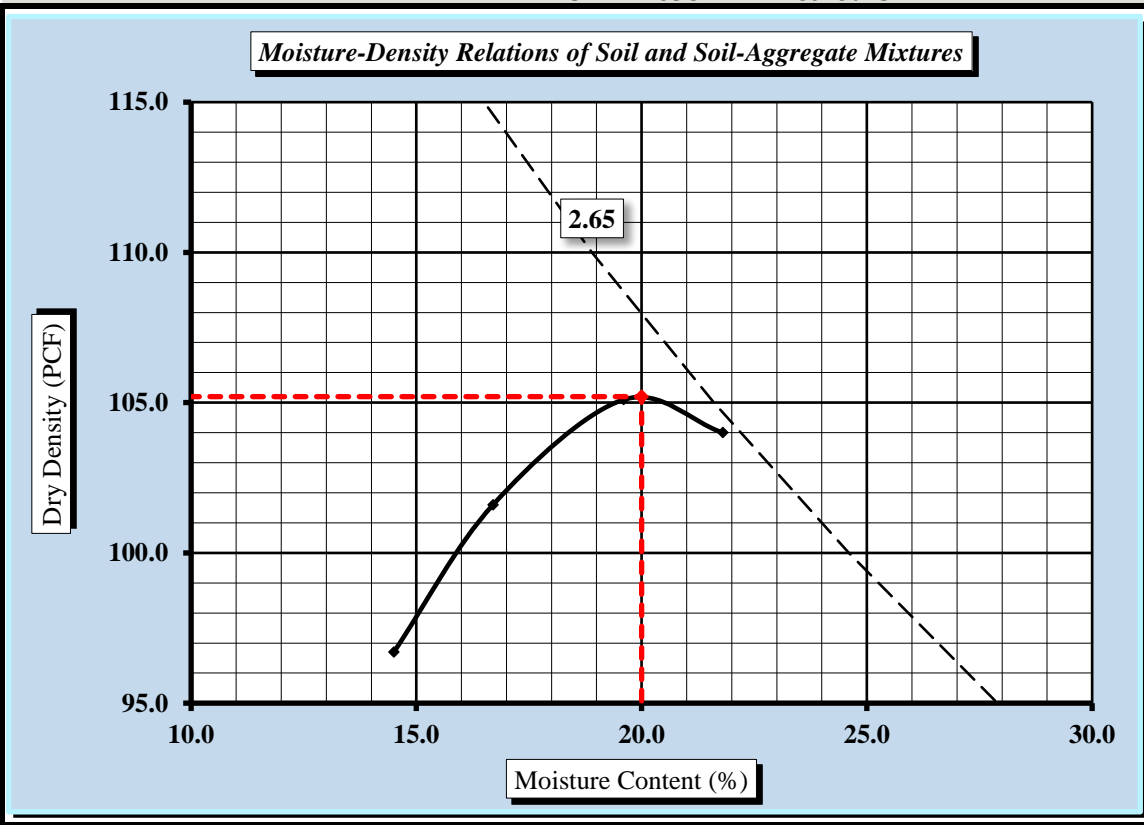
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/01/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-44	Sample #:	BS-1
Location:	Pavement Boring	Type:	Bulk
Sample Description:	Sandy Fat Clay (CH, A-7-6(17))		

Maximum Dry Density	105.2	PCF.	Optimum Moisture Content	20.0%
---------------------	-------	------	--------------------------	-------

ASTM D 698 - - Method C



Soil Properties	
Natural	
Moisture Content	25.9%
Specific Gravity of Soil	2.650
Liquid Limit	50
Plastic Limit	23
Plastic Index	27
% Passing	
3/4"	98.6%
3/8"	96.0%
#4	94.2%
#10	91.3%
#40	79.7%
#60	75.0%
#100	71.1%
#200	66.6%
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:
 ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

<u>Brian Vaughan, P.E.</u> Technical Responsibility	 Signature	<u>Group Leader</u> Position	<u>3/09/18</u> Date
--	---------------	---------------------------------	------------------------

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



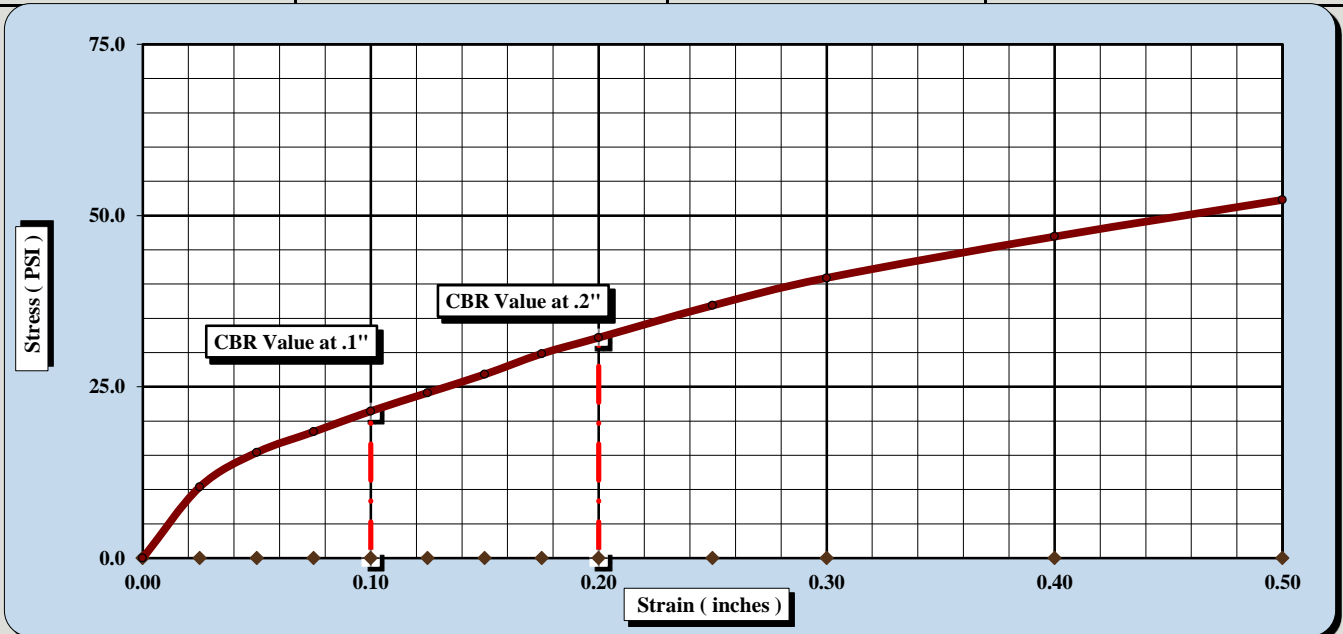
ASTM D 1883

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

Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s)	3/02 - 3/06/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-44	Sample #:	BS-1
		Sample Date:	2/13/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.1' - 11.1'
Sample Description:	Sandy Fat Clay (CH, A-7-6(17))		

ASTM D 698 Method C Maximum Dry Density: 105.2 PCF Optimum Moisture Content: 20.0%
 Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 1.4%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	2.1	CBR at 0.2 in.	2.1
		CBR at 0.1 in.	2.2
		CBR at 0.2 in.	2.1



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	20	Final Dry Density (PCF)	92.9
Initial Dry Density (PCF)	94.7	Moisture Content (top 1" after soaking)	32.4%
Moisture Content of the Compacted Specimen	20.0%	Percent Swell	1.9%
Percent Compaction	90.0%		

Soak Time:	96 hrs.	Surcharge Weight	10.0
Liquid Limit	50	Plastic Index	27
		Surcharge Wt. per sq. Ft.	50.9
		% Passing the #200 Sieve	66.6%

Notes/Deviations/References:

Brian Vaughan, P.E.
Technical Responsibility

Brian Vaughan
Signature

Group Leader
Position

3/09/18
Date

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



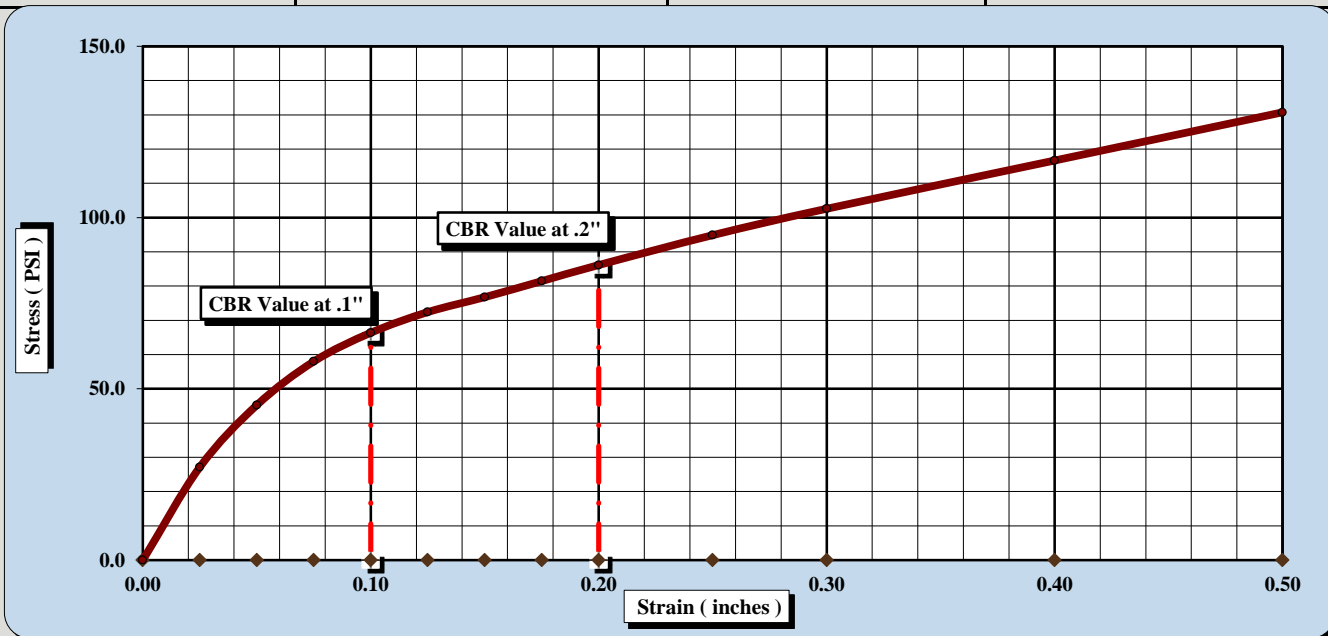
ASTM D 1883

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

Project #:	1461-16-047.2B	Report Date:	3/06/18
Project Name:	Carolina Crossroads Project	Test Date(s)	3/02 - 3/06/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-44	Sample #:	BS-1
		Sample Date:	2/13/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.1' - 11.1'
Sample Description:	Sandy Fat Clay (CH, A-7-6(17))		

ASTM D 698 Method C Maximum Dry Density: 105.2 PCF Optimum Moisture Content: 20.0%
 Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 1.4%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	6.6	CBR at 0.2 in.	5.7
CBR at 0.1 in.	6.6	CBR at 0.2 in.	5.7



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	35	Final Dry Density (PCF)	98.7
Initial Dry Density (PCF)	99.9	Moisture Content (top 1" after soaking)	26.7%
Moisture Content of the Compacted Specimen	20.0%	Percent Swell	1.2%
Percent Compaction	95.0%		

Soak Time:	96 hrs.	Surcharge Weight	10.0
Liquid Limit	50	Surcharge Wt. per sq. Ft.	50.9
		Plastic Index	27
		% Passing the #200 Sieve	66.6%

Notes/Deviations/References:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/06/18
 Date

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



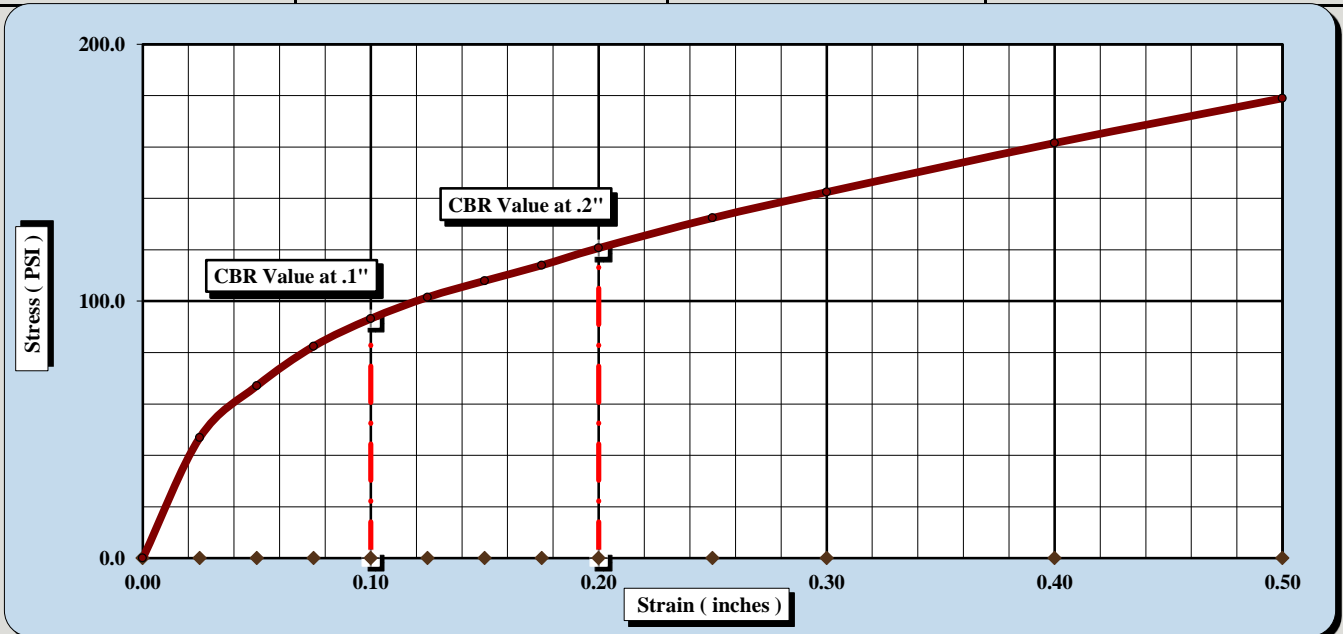
ASTM D 1883

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

Project #:	1461-16-047.2B	Report Date:	3/06/18
Project Name:	Carolina Crossroads Project	Test Date(s)	3/02 - 3/06/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-44	Sample #:	BS-1
		Sample Date:	2/13/2018
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.1' - 11.1'
Sample Description:	Sandy Fat Clay (CH, A-7-6(17))		

ASTM D 698 Method C Maximum Dry Density: 105.2 PCF Optimum Moisture Content: 20.0%
 Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 1.4%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	9.3	CBR at 0.2 in.	8.0
CBR at 0.1 in.	9.3	CBR at 0.2 in.	8.0



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	104.2
Initial Dry Density (PCF)	105.2	Moisture Content (top 1" after soaking)	26.9%
Moisture Content of the Compacted Specimen	20.0%	Percent Swell	0.9%
Percent Compaction	100.0%		

Soak Time:	96 hrs.	Surcharge Weight	10.0
Liquid Limit	50	Plastic Index	27
		Surcharge Wt. per sq. Ft.	50.9
		% Passing the #200 Sieve	66.6%

Notes/Deviations/References:

Brian Vaughan, P.E.
 Technical Responsibility

Brian Vaughan
 Signature

Group Leader
 Position

3/06/18
 Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date:	4/02/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	BS-1
		Sample Date:	2/15/18
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.4' - 11.4'

Sample Description: Clayey Sand (SC, 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			
		1	2	3			4	5		
A	Tare Weight	26.70	26.48	26.36				25.93	26.95	
B	Wet Soil Weight + A	44.16	46.75	43.32				32.68	34.93	
C	Dry Soil Weight + A	40.53	42.11	39.19				31.83	33.94	
D	Water Weight (B-C)	3.63	4.64	4.13				0.85	0.99	
E	Dry Soil Weight (C-A)	13.83	15.63	12.83				5.90	6.99	
F	% Moisture (D/E)*100	26.2%	29.7%	32.2%				14.4%	14.2%	
N	# OF DROPS	35	24	17				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average							14.3%		



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	29
Plastic Limit	14
Plastic Index	15
Group Symbol	CL

Multipoint Method
 One-point Method

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

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

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

Benjamin J. Kovaleski
Technician Name

4/03/18
Date

Matthew F. Cooke, P.G.
Technical Responsibility

4/03/18
Date

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

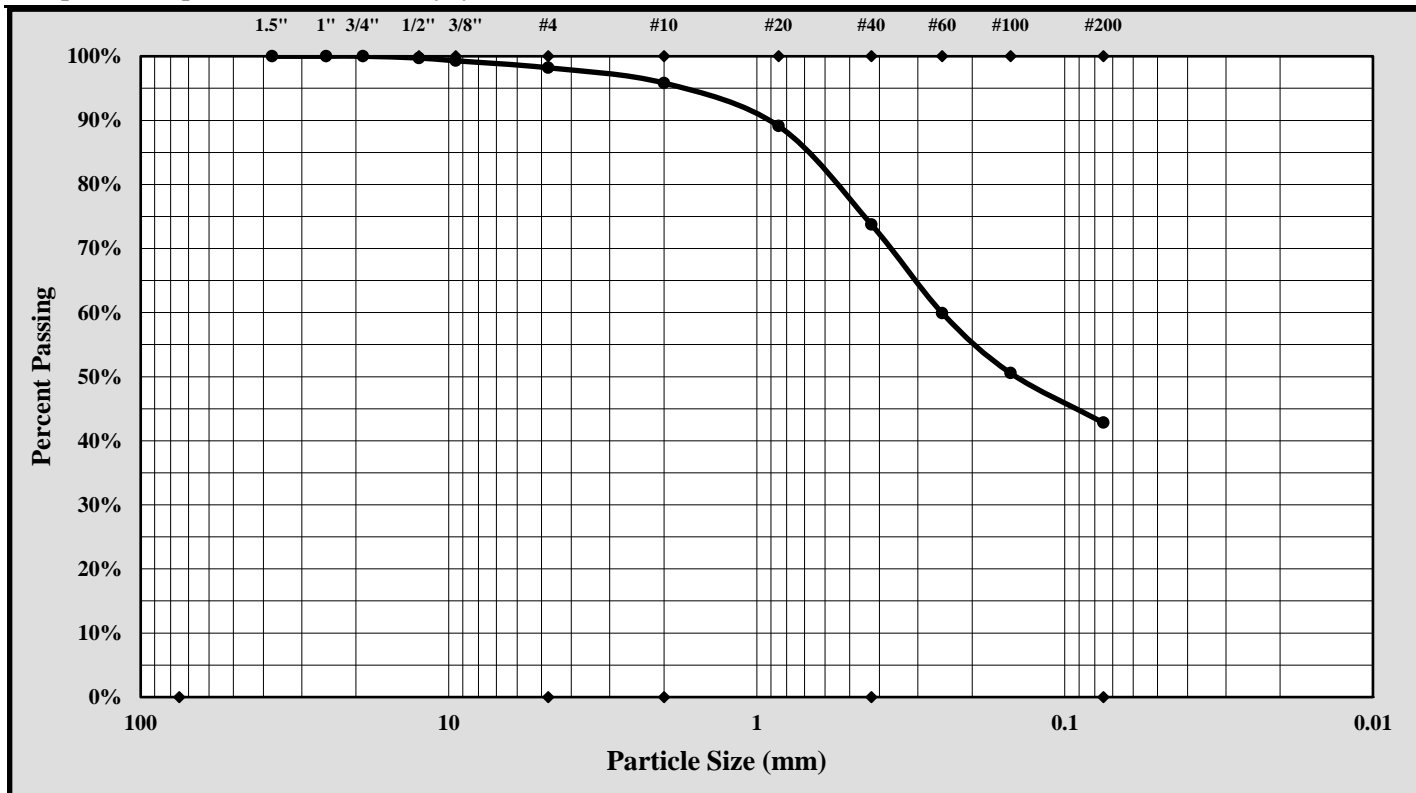


Particle Size Analysis of Soils

ASTM D 6913

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

S&ME Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/26 - 4/02/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	BS-1
		Sample Date:	2/15/18
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.4' - 11.4'
Sample Description:	Clayey Sand (SC, A-6(3))		



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

Maximum Particle Size: 9.50 mm Gravel: 1.8%
 Silt & Clay (% Passing #200): 42.8% Total Sand: 55.4%

Liquid Limit	29	Plastic Limit	14	Plastic Index	15
Coarse Sand:	2.4%	Medium Sand:	22.1%	Fine Sand:	30.9%
Description of Sand and Gravel	Rounded <input type="checkbox"/>	Angular <input checked="" type="checkbox"/>	Hard & Durable <input checked="" type="checkbox"/>	Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

References / Comments / Deviations:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/03/18
 Date

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

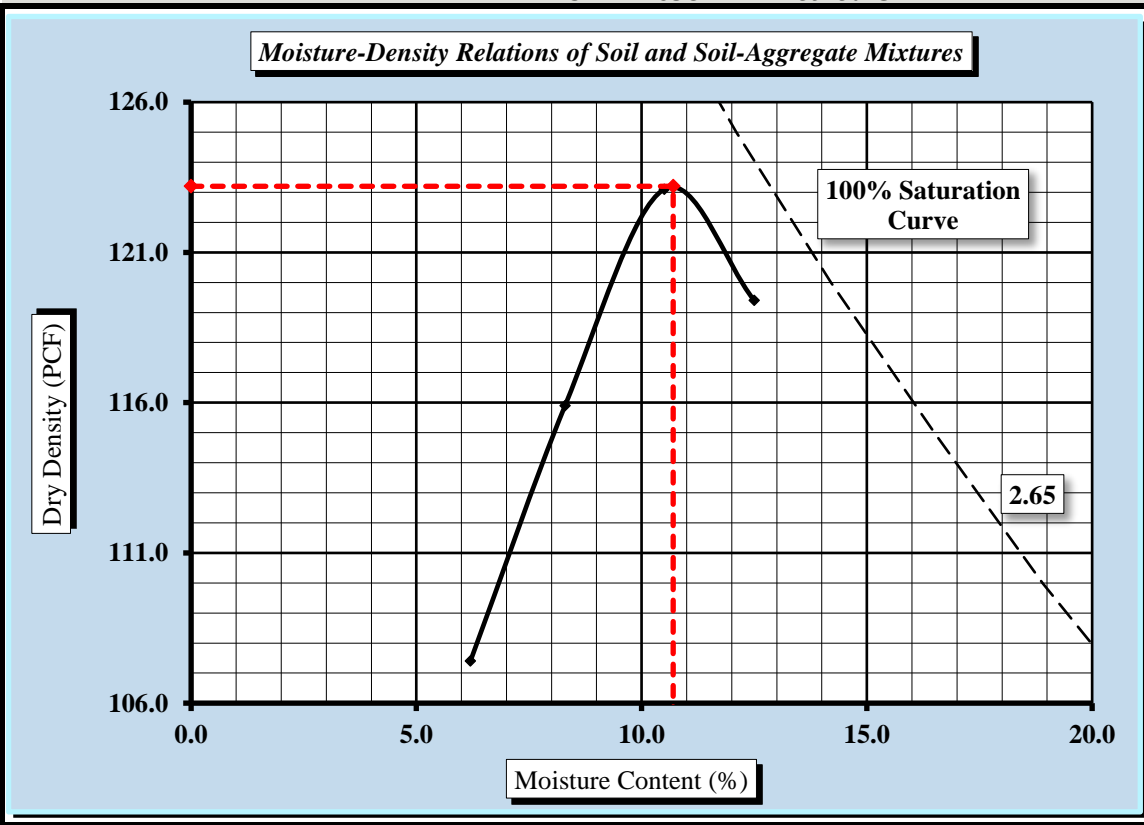
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	BS-1
Location:	Pavement Boring	Type:	Bulk
Sample Description:	Clayey Sand (SC, A-6(3))		

Maximum Dry Density 123.2 PCF. Optimum Moisture Content 10.7%

ASTM D 698 - - Method C



Soil Properties	
Natural	
Moisture Content	16.6%
Specific Gravity of Soil	2.650
Liquid Limit	29
Plastic Limit	14
Plastic Index	15
% Passing	
3/4"	100.0%
3/8"	99.3%
#4	98.2%
#10	96.0%
#40	74.0%
#60	60.0%
#100	50.6%
#200	42.8%
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

Matthew F. Cooke, P.G. Project Manager 4/03/18
 Technical Responsibility Position Date

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



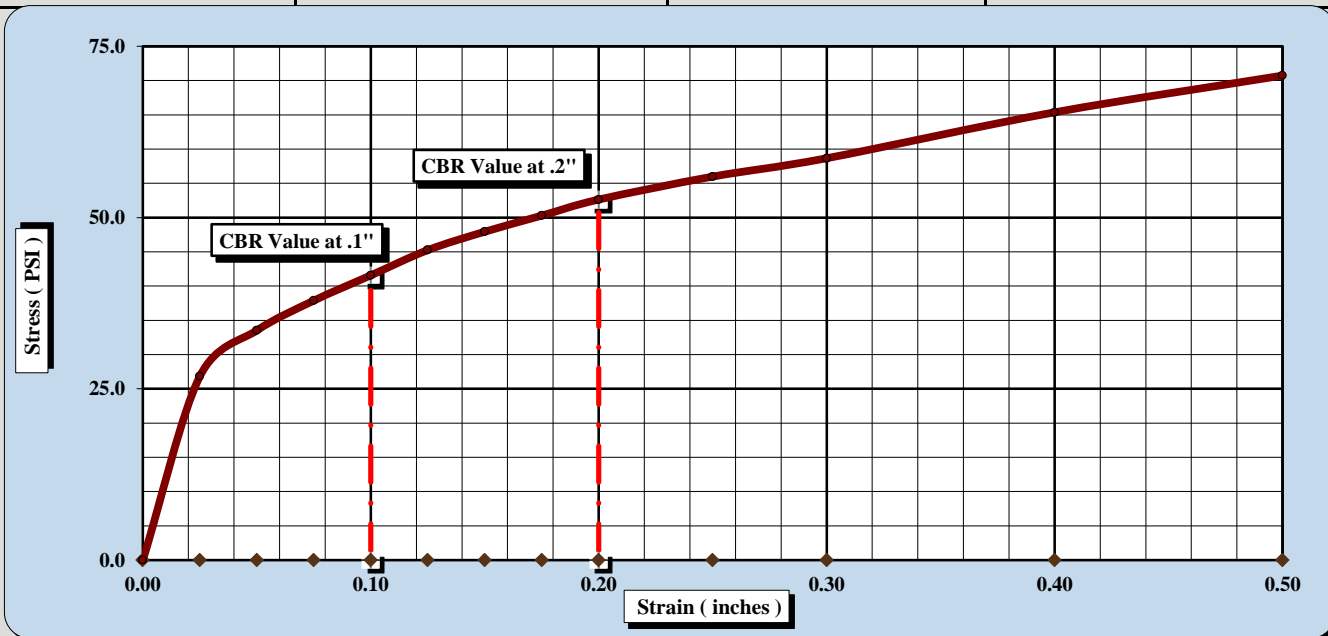
ASTM D 1883

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s)	3/16 - 3/20/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	BS-1
		Sample Date:	2/15/18
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.4' - 11.4'
Sample Description:	Clayey Sand (SC, A-6(3))		

ASTM D 698 Method C	Maximum Dry Density: 123.2 PCF	Optimum Moisture Content: 10.7%	
	Compaction Test performed on grading complying with CBR spec.	% Retained on the 3/4" sieve: 0.0%	

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	4.2	CBR at 0.1 in.	4.2
CBR at 0.2 in.	3.5	CBR at 0.2 in.	3.5



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	15	Final Dry Density (PCF)	110.8
Initial Dry Density (PCF)	110.9	Moisture Content (top 1" after soaking)	16.3%
Moisture Content of the Compacted Specimen	10.7%	Percent Swell	0.0%
Percent Compaction	90.0%		

Soak Time: 96 hrs.	Surcharge Weight: 20.0	Surcharge Wt. per sq. Ft.: 101.9	
Liquid Limit: 29	Plastic Index: 15	% Passing the #200 Sieve: 42.8%	

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/03/18
Date

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



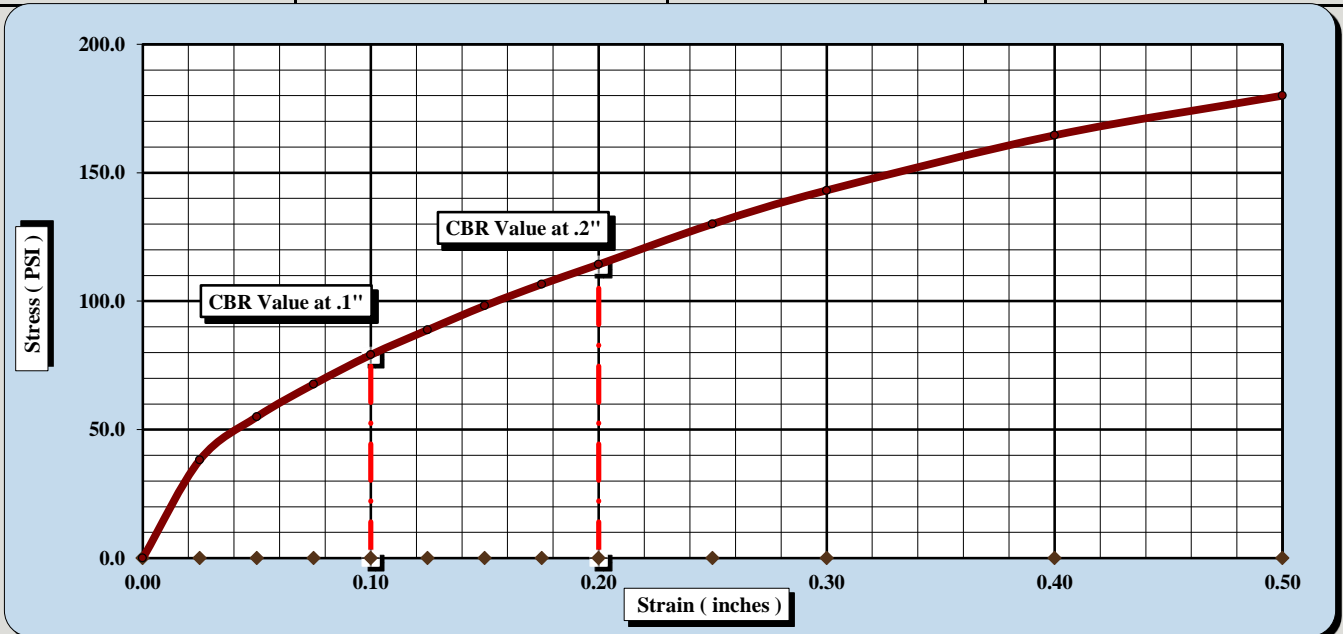
ASTM D 1883

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s)	3/16 - 3/20/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	BS-1
		Sample Date:	2/15/18
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.4' - 11.4'
Sample Description:	Clayey Sand (SC, A-6(3))		

ASTM D 698 Method C Maximum Dry Density: 123.2 PCF Optimum Moisture Content: 10.7%
 Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	7.9	CBR at 0.2 in.	7.6
CBR at 0.1 in.	7.9	CBR at 0.2 in.	7.6



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	25	Final Dry Density (PCF)	117.0
Initial Dry Density (PCF)	117.0	Moisture Content (top 1" after soaking)	12.6%
Moisture Content of the Compacted Specimen	10.7%	Percent Swell	0.0%
Percent Compaction	95.0%		

Soak Time:	96 hrs.	Surcharge Weight	20.0
Liquid Limit	29	Surcharge Wt. per sq. Ft.	101.8
		Plastic Index	15
		% Passing the #200 Sieve	42.8%

Notes/Deviations/References:

Matthew F. Cooke, P.G.
 Technical Responsibility

Project Manager
 Position

4/03/18
 Date

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



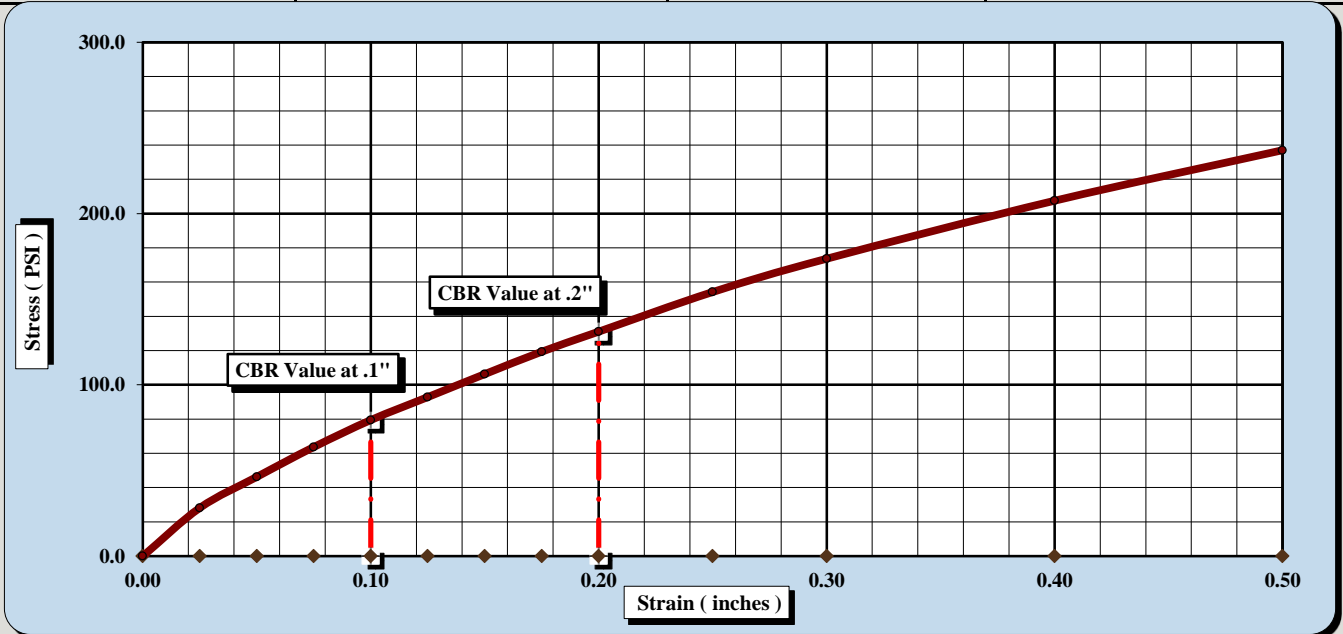
ASTM D 1883

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

Project #:	1461-16-047.2B	Report Date:	4/03/18
Project Name:	Carolina Crossroads Project	Test Date(s)	3/16 - 3/20/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	P-47	Sample #:	BS-1
		Sample Date:	2/15/18
Location:	Pavement Boring	Type:	Bulk
		Depth:	1.4' - 11.4'
Sample Description:	Clayey Sand (SC, A-6(3))		

ASTM D 698 Method C	Maximum Dry Density:	123.2 PCF	Optimum Moisture Content:	10.7%
Compaction Test performed on grading complying with CBR spec.			% Retained on the 3/4" sieve:	0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	7.9	CBR at 0.1 in.	8.0
CBR at 0.2 in.	8.7	CBR at 0.2 in.	8.7



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	50	Final Dry Density (PCF)	123.2
Initial Dry Density (PCF)	123.2	Moisture Content (top 1" after soaking)	11.9%
Moisture Content of the Compacted Specimen	10.7%	Percent Swell	0.0%
Percent Compaction	100.0%		

Soak Time:	96 hrs.	Surcharge Weight	20.0
Liquid Limit	29	Surcharge Wt. per sq. Ft.	101.9
		Plastic Index	15
		% Passing the #200 Sieve	42.8%

Notes/Deviations/References:

Matthew F. Cooke, P.G.
Technical Responsibility

Project Manager
Position

4/03/18
Date

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

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



ASTM D 4318 AASHTO T 89 AASHTO T 90

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

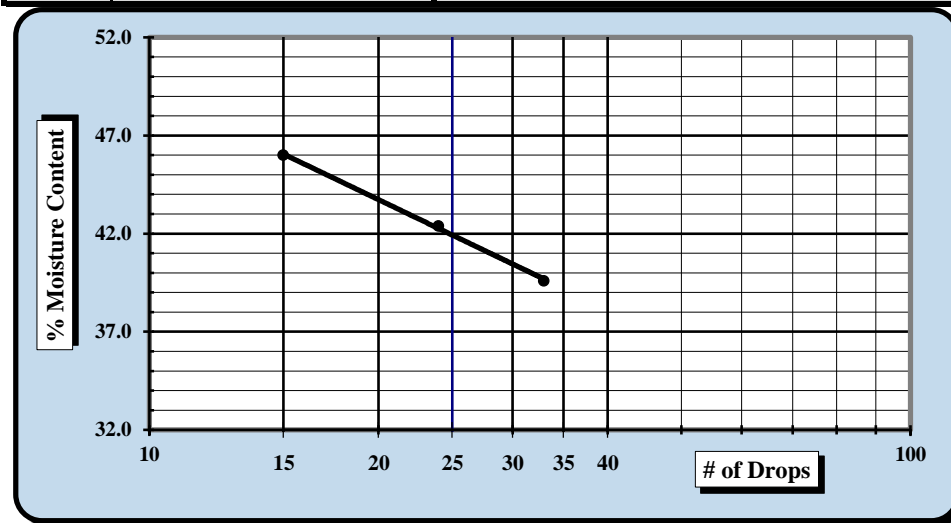
Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date:	3/08/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		

Boring #:	RW-40	Sample #:	BS-1	Sample Date:	2/13/2018
Location:	Embankment Boring	Type:	Bulk	Depth:	0.0' - 10.0'

Sample Description: Lean Clay with Sand (CL, A-7-6(15))

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	13942	8/18/2017	Grooving tool	23119	10/15/2017
LL Apparatus	23158	2/1/2018			
Oven	13978	10/7/2017			

Pan #	Tare #:	Liquid Limit					Plastic Limit			
		36	37	38			39	40		
A	Tare Weight	25.70	26.22	26.28				25.90	26.29	
B	Wet Soil Weight + A	42.91	41.96	41.39				34.13	34.35	
C	Dry Soil Weight + A	38.03	37.27	36.63				32.61	32.87	
D	Water Weight (B-C)	4.88	4.69	4.76				1.52	1.48	
E	Dry Soil Weight (C-A)	12.33	11.05	10.35				6.71	6.58	
F	% Moisture (D/E)*100	39.6%	42.4%	46.0%				22.7%	22.5%	
N	# OF DROPS	33	24	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

Liquid Limit **42**

Plastic Limit **23**

Plastic Index **19**

Group Symbol **CL**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried % Passing the #200 Sieve: 79.0%

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

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

Benjamin J. Kovaleski
Technician Name

3/09/18
Date

Brian Vaughan
Technical Responsibility

3/09/18
Date

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

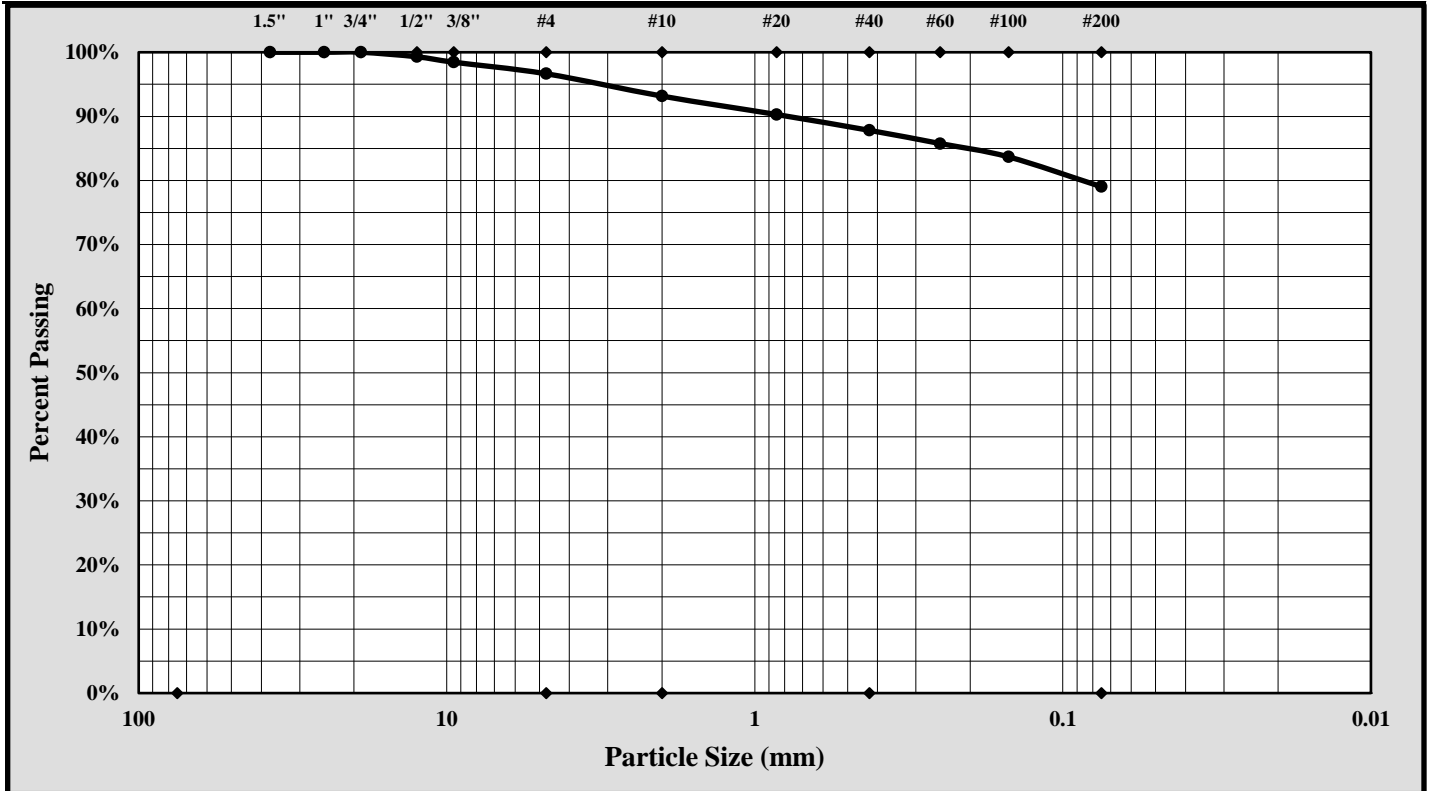
Particle Size Analysis of Soils

ASTM D 6913



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

S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	3/05 - 3/09/18
Client Name:	HDR Engineering, Inc.		
Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-40	Sample #:	BS-1
		Sample Date:	2/13/2018
Location:	Embankment Boring	Type:	Bulk
		Depth:	0.0' - 10.0'
Sample Description:	Lean Clay with Sand (CL, A-7-6(15))		



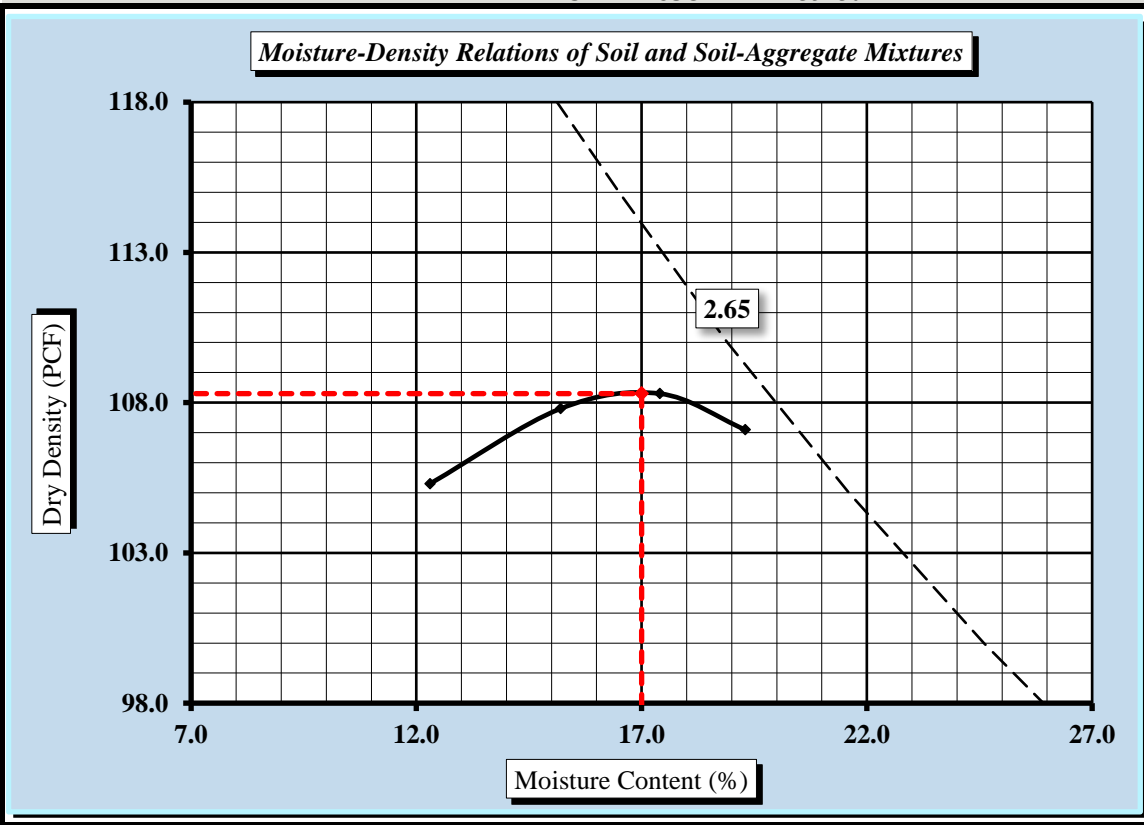
MOISTURE - DENSITY REPORT



S&ME, Inc. - Greenville 48 Brookfield Oaks Dr., Suite F Greenville, SC 29607			
S&ME Project #:	1461-16-047.2B	Report Date:	3/09/18
Project Name:	Carolina Crossroads Project	Test Date(s):	2/27/18
Client Name:	HDR Engineering, Inc.		
Client Address:	4400 Leeds Ave., North Charleston, South Carolina		
Boring #:	RW-40	Sample #:	BS-1
Location:	Embankment Boring	Type:	Bulk
Sample Description:	Lean Clay with Sand (CL, A-7-6(15))		

Maximum Dry Density	108.3	PCF.	Optimum Moisture Content	17.0%
---------------------	-------	------	--------------------------	-------

ASTM D 698 - - Method A



Soil Properties	
Natural	
Moisture Content	16.9%
Specific Gravity of Soil	2.650
Liquid Limit	42
Plastic Limit	23
Plastic Index	19
% Passing	
3/4"	100.0%
3/8"	98.4%
#4	96.6%
#10	93.2%
#40	87.8%
#60	85.8%
#100	83.7%
#200	79.0%
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>Brian Vaughan, P.E.</u> Technical Responsibility	 Signature	<u>Group Leader</u> Position	<u>3/09/18</u> Date
--	---------------	---------------------------------	------------------------

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

% Ignition Loss of Inorganic Soils

SCT 36



Project #: 1461-16-047.2B
Project Name: Carolina Crossroads Project
Client Name: HDR Engineering, Inc.
Client Address: 4400 Leeds Ave., North Charleston, South Carolina

Report Date: 3/09/18
Test Date(s): 3/09/18

Boring #: RW-40 **Sample #:** BS-1 **Sample Date:** 2/13/2018
Location: Embankment Boring **Type:** Bulk **Depth:** 0.0' - 10.0'
Sample Description: Lean Clay with Sand (CL, A-7-6(15))

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 #	
T	Total Mass of Oven Dry Sample	grams	2291.37
d	Mass Retained on 2mm Sieve	grams	155.81
e	Mass Passing 2mm and Retained on 75µm Sieve	grams	325.38
f	Mass Passing 75µm Sieve	T-(d+e)	1810.18
P	% Passing 75µm Sieve of Sample Passing 2mm Sieve	1-(f/(e+f))*100	15.2%

% Ignition Loss Determination

Muffle Furnace Temperature: 1000 ± 50 °C

		Tare #	B
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	56.78
b	Mass of Oven Dry Specimen + Tare Wt.	grams	78.20
c	Ash Weight + Tare Wt.	grams	77.84
M	Mass of Oven Dry Specimen	(b-t)	21.42
C	Ash Weight	c-t	21.06
L	Loss	M-C	0.36
	% Ignition Loss	(P*L)/M*100	0.3%

Remarks:

References: SCT 36: Procedure for Determining % Ignition Loss of Inorganic Soils

Technician Name: Benjamin Kovaleski NICET Lab Level III 117226
Certification #

Technical Responsibility: Brian Vaughan, P.E.


Signature

Group Leader
Position

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 GEOPHYSICAL TEST RESULTS



GeoWave Solutions, Inc.
www.geowavesolutions.com

I-26 Corridor Improvements at I-20/I-126

F&ME Consultants
Columbia, South Carolina

Downhole Seismic
Shear-Wave Investigation

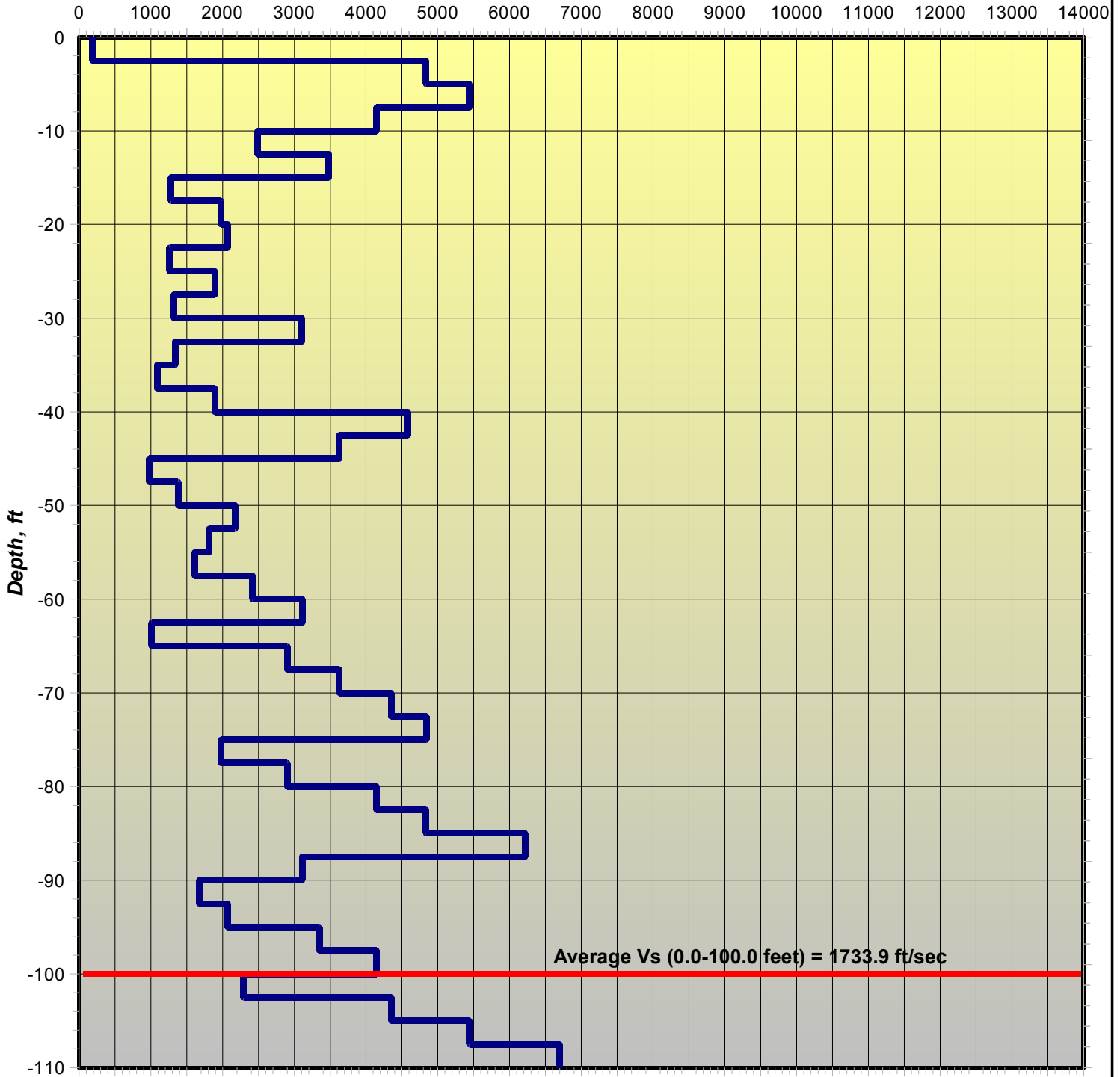
February 7, 2018

Project Manager: M. Ellers

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



I-26 Corridor Improvements at I-20/I-126

F&ME Consultants
Columbia, South Carolina

Downhole Seismic
Shear-Wave Investigation

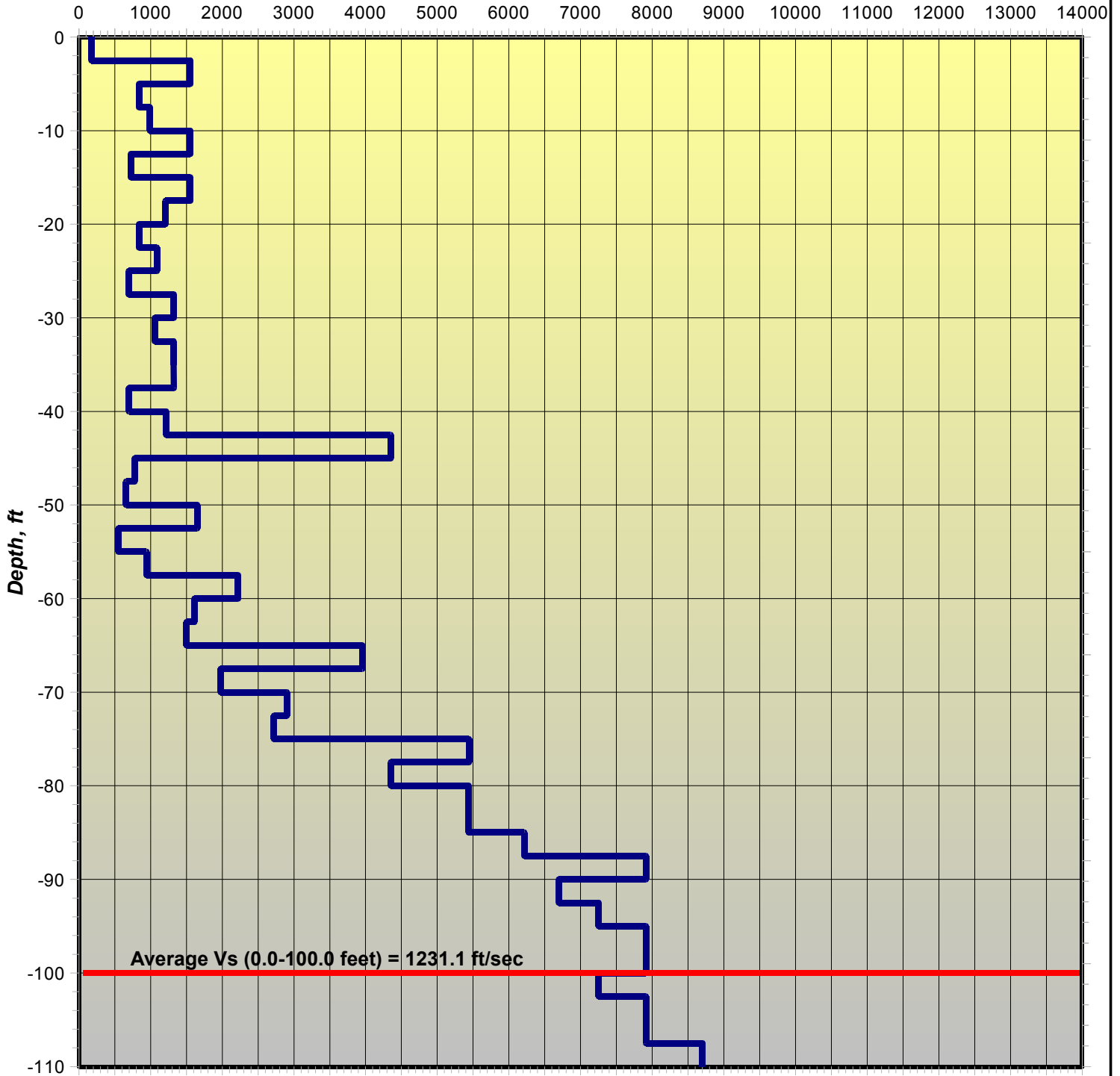
February 7, 2018

Project Manager: M. Ellers

DH-3

34° 1.683'N 81° 6.111'W

Shear-Wave Velocity, ft/sec



Average Vs (0.0-100.0 feet) = 1231.1 ft/sec

Average Vs (0-110 feet) = 1333.5 ft/sec



GeoWave Solutions, Inc.
4575 Ansley Lane
Cumming, Georgia 30040
Tel: 770-886-3776
Fax: 770-886-7212
www.geowavesolutions.com

I-26 Corridor Improvements at I-20/I-126

F&ME Consultants

Downhole Seismic Shear-Wave Investigation

Project Manager: M. Ellers

February 7, 2018

DH-3

34° 1.683'N 81° 6.111'W

Depth (ft)	Vs (ft/sec)
-2.5	172.7
-5.0	1553.8
-7.5	837.0
-10.0	989.3
-12.5	1553.8
-15.0	725.5
-17.5	1553.8
-20.0	1208.9
-22.5	837.0
-25.0	1087.9
-27.5	692.7
-30.0	1322.8
-32.5	1058.0
-35.0	1322.1
-37.5	1322.8
-40.0	696.0
-42.5	1216.1
-45.0	4352.0
-47.5	777.1
-50.0	659.1
-52.5	1652.3
-55.0	551.0
-57.5	944.8
-60.0	2222.2
-62.5	1611.4
-65.0	1500.7
-67.5	3956.4
-70.0	1978.2
-72.5	2900.4
-75.0	2720.4
-77.5	5442.0
-80.0	4352.0
-82.5	5440.0
-85.0	5440.0
-87.5	6217.1
-90.0	7912.8
-92.5	6695.4
-95.0	7253.3
-97.5	7912.8
-100.0	7912.7
-102.5	7253.3
-105.0	7912.8
-107.5	7912.7
-110.0	8704.1



GeoWave Solutions, Inc.
4575 Ansley Lane
Cumming, Georgia 30040
Tel: 770-886-3776
Fax: 770-886-7212
www.geowavesolutions.com

I-26 Corridor Improvements at I-20/I-126

F&ME Consultants

Downhole Seismic Shear-Wave Investigation

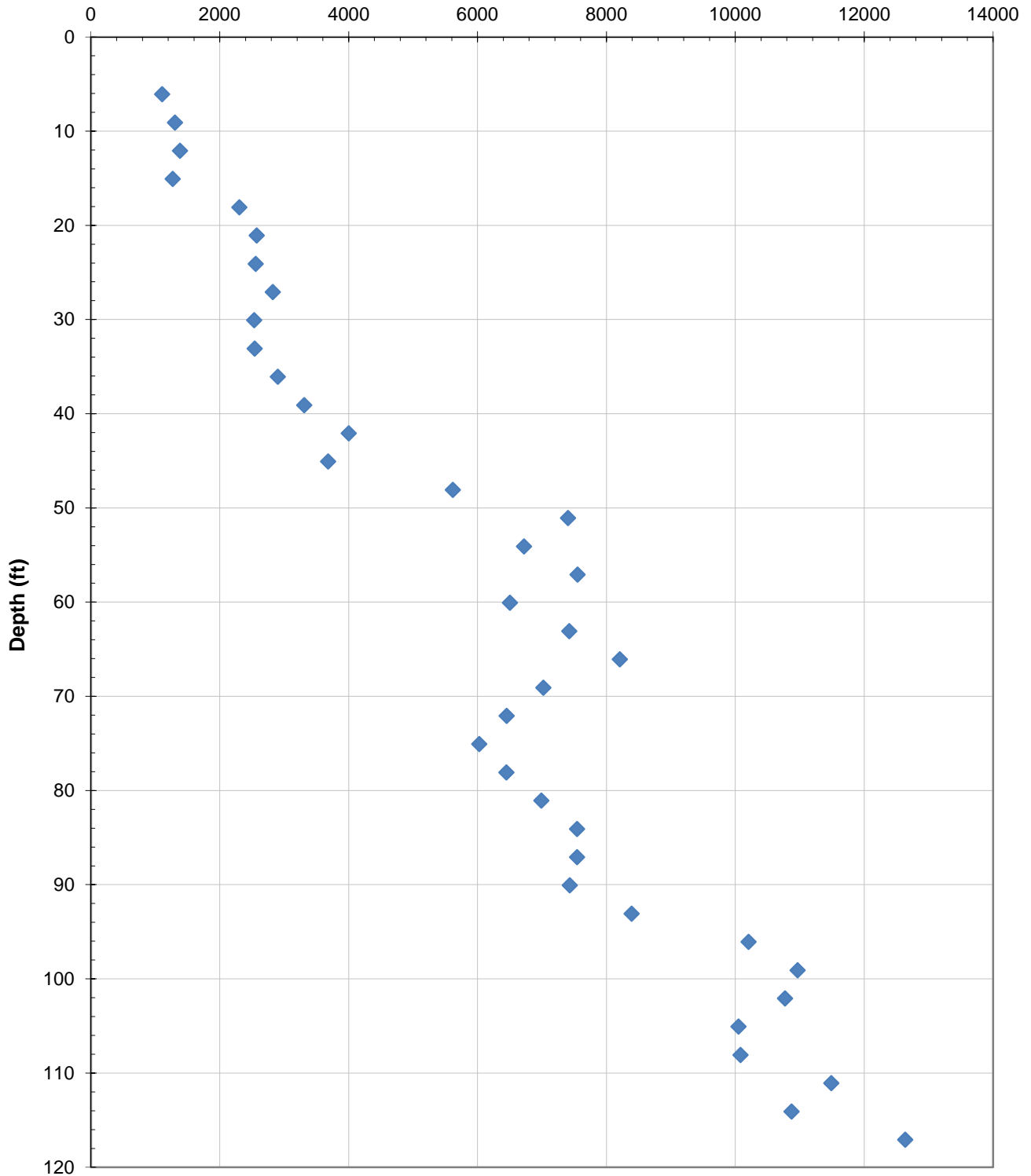
Project Manager: M. Ellers

February 7, 2018



Shear Wave Velocity Profile DH-4
I-20/26/126 Improvement Project
Lexington and Richland Counties, South Carolina
1461-16-047

Shear Wave Velocity, V_s (ft/sec)





Shear Wave Velocity Calculations

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

Sounding ID: **DH-4**

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

Geophone Offset: 0.00 Feet
Casing Stickup: 1.42 Feet
Source Offset: 6.00 Feet

Date: 17-Jan-17

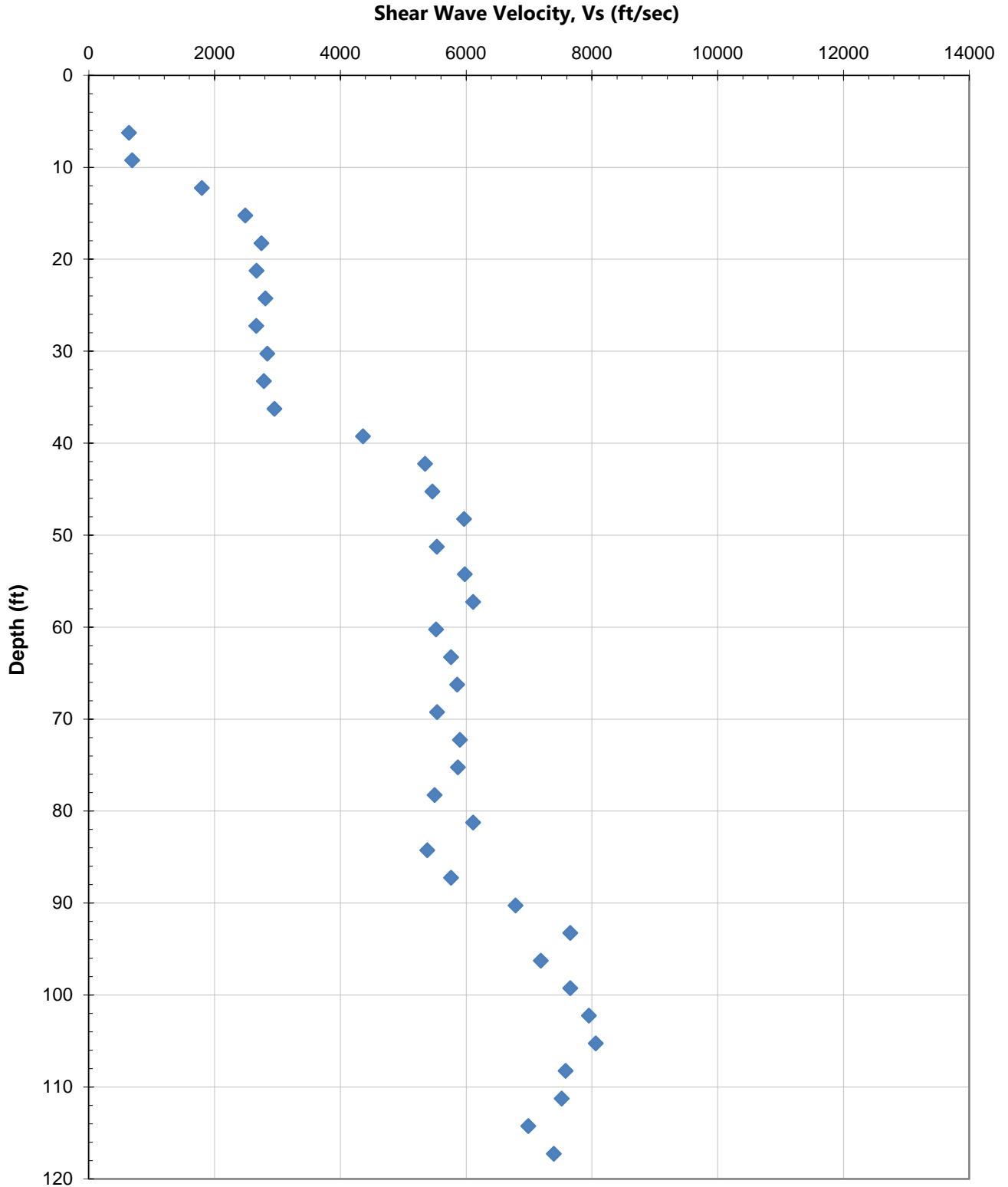
Rig: n/a

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)			
4.58	4.58	7.55	7.55	0.0075					
7.58	7.58	9.67	2.12	0.0094	0.0019	1102.7	6.08	0.00551	0.34
10.58	10.58	12.16	2.50	0.0113	0.0019	1302.6	9.08	0.00230	0.41
13.58	13.58	14.85	2.68	0.0133	0.0019	1380.2	12.08	0.00217	0.45
16.58	16.58	17.63	2.79	0.0155	0.0022	1266.7	15.08	0.00237	0.47
19.58	19.58	20.48	2.85	0.0167	0.0012	2303.5	18.08	0.00130	0.48
22.58	22.58	23.36	2.88	0.0178	0.0011	2570.4	21.08	0.00117	0.46
25.58	25.58	26.27	2.91	0.0190	0.0011	2554.7	24.08	0.00117	0.46
28.58	28.58	29.20	2.93	0.0200	0.0010	2823.4	27.08	0.00106	0.45
31.58	31.58	32.14	2.94	0.0212	0.0012	2531.7	30.08	0.00118	0.47
34.58	34.58	35.10	2.95	0.0223	0.0012	2540.2	33.08	0.00118	0.47
37.58	37.58	38.06	2.96	0.0233	0.0010	2900.4	36.08	0.00103	0.46
40.58	40.58	41.02	2.97	0.0242	0.0009	3310.9	39.08	0.00091	0.44
43.58	43.58	43.99	2.97	0.0250	0.0007	3999.6	42.08	0.00075	0.41
46.58	46.58	46.96	2.97	0.0258	0.0008	3681.6	45.08	0.00081	0.42
49.58	49.58	49.94	2.98	0.0263	0.0005	5616.9	48.08	0.00053	0.28
52.58	52.58	52.92	2.98	0.0267	0.0004	7403.3	51.08	0.00041	0.23
55.58	55.58	55.90	2.98	0.0272	0.0004	6718.6	54.08	0.00045	0.31
58.58	58.58	58.89	2.98	0.0276	0.0004	7551.0	57.08	0.00040	0.36
61.58	61.58	61.87	2.99	0.0280	0.0005	6501.6	60.08	0.00046	0.37
64.58	64.58	64.86	2.99	0.0284	0.0004	7420.8	63.08	0.00040	0.44
67.58	67.58	67.85	2.99	0.0288	0.0004	8207.1	66.08	0.00037	0.38
70.58	70.58	70.83	2.99	0.0292	0.0004	7019.9	69.08	0.00043	0.44
73.58	73.58	73.82	2.99	0.0297	0.0005	6449.5	72.08	0.00047	0.44
76.58	76.58	76.81	2.99	0.0302	0.0005	6025.6	75.08	0.00050	0.41
79.58	79.58	79.81	2.99	0.0306	0.0005	6448.5	78.08	0.00047	0.43
82.58	82.58	82.80	2.99	0.0311	0.0004	6990.9	81.08	0.00043	0.42
85.58	85.58	85.79	2.99	0.0315	0.0004	7541.6	84.08	0.00040	0.37
88.58	88.58	88.78	2.99	0.0319	0.0004	7542.9	87.08	0.00040	0.37
91.58	91.58	91.78	2.99	0.0323	0.0004	7431.8	90.08	0.00040	0.39
94.58	94.58	94.77	2.99	0.0326	0.0004	8391.0	93.08	0.00036	0.36
97.58	97.58	97.76	2.99	0.0329	0.0003	10204.3	96.08	0.00029	0.26
100.58	100.58	100.76	2.99	0.0332	0.0003	10965.0	99.08	0.00027	0.20
103.58	103.58	103.75	2.99	0.0335	0.0003	10770.2	102.08	0.00028	0.23
106.58	106.58	106.75	3.00	0.0338	0.0003	10048.3	105.08	0.00030	0.22
109.58	109.58	109.74	3.00	0.0341	0.0003	10081.9	108.08	0.00030	0.33
112.58	112.58	112.74	3.00	0.0343	0.0003	11488.9	111.08	0.00026	0.26
115.58	115.58	115.74	3.00	0.0346	0.0003	10872.6	114.08	0.00028	0.29
118.58	118.58	118.73	3.00	0.0348	0.0002	12634.3	117.08	0.00024	0.24
Weighted Average Soil Shear Wave Velocity, v_s 100 (ft/s):								3232	0.37

Note: The weighted average shear wave velocity reported above is for the interval from 6.08 to 105.08 feet.



**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

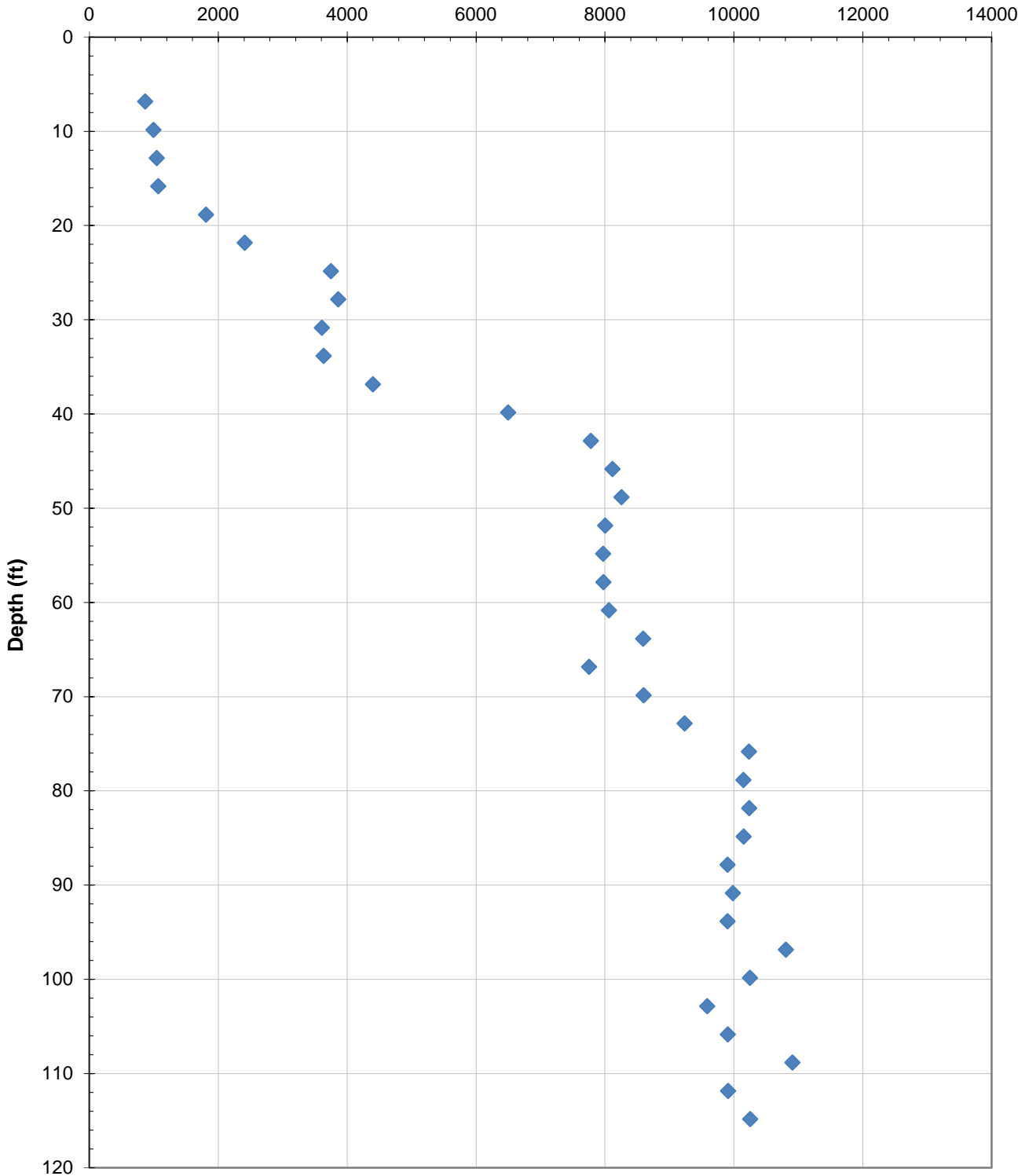
Rig: n/a

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.



Shear Wave Velocity Profile DH-6
I-20/26/126 Improvement Project
Lexington and Richland Counties, South Carolina
1461-16-047
Shear Wave Velocity, Vs (ft/sec)





Shear Wave Velocity Calculations

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

Sounding ID: **DH-6**

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

Geophone Offset: 0.00 Feet

Date: 30-Jan-17

Casing Stickup: 0.66 Feet

Source Offset: 6.00 Feet

Rig: n/a

Test Depth (feet)	Geophone Depth (feet)	Waveform Ray Path (feet)	Incremental Distance (feet)	S-WAVE			Interval Depth (feet)	d_1/v_{s1}	Poissons
				Characteristic Arrival Time (seconds)	Incremental Time Interval (seconds)	Interval Velocity (ft/s)			
5.34	5.34	8.03	8.03	0.0071					
8.34	8.34	10.27	2.24	0.0097	0.0026	866.1	6.84	0.00790	0.20
11.34	11.34	12.83	2.56	0.0123	0.0026	992.4	9.84	0.00302	0.25
14.34	14.34	15.54	2.72	0.0149	0.0026	1044.3	12.84	0.00287	0.23
17.34	17.34	18.35	2.80	0.0175	0.0026	1069.2	15.84	0.00281	0.22
20.34	20.34	21.21	2.86	0.0191	0.0016	1807.2	18.84	0.00166	0.20
23.34	23.34	24.10	2.89	0.0203	0.0012	2410.4	21.84	0.00124	0.33
26.34	26.34	27.01	2.92	0.0211	0.0008	3745.7	24.84	0.00080	0.35
29.34	29.34	29.95	2.93	0.0218	0.0008	3860.8	27.84	0.00078	0.33
32.34	32.34	32.89	2.94	0.0227	0.0008	3607.6	30.84	0.00083	0.35
35.34	35.34	35.85	2.95	0.0235	0.0008	3635.6	33.84	0.00083	0.41
38.34	38.34	38.81	2.96	0.0241	0.0007	4398.1	36.84	0.00068	0.42
41.34	41.34	41.77	2.97	0.0246	0.0005	6495.9	39.84	0.00046	0.35
44.34	44.34	44.74	2.97	0.0250	0.0004	7782.0	42.84	0.00039	0.24
47.34	47.34	47.72	2.97	0.0253	0.0004	8117.4	45.84	0.00037	0.20
50.34	50.34	50.70	2.98	0.0257	0.0004	8256.0	48.84	0.00036	0.21
53.34	53.34	53.68	2.98	0.0261	0.0004	8001.4	51.84	0.00037	0.21
56.34	56.34	56.66	2.98	0.0265	0.0004	7971.4	54.84	0.00038	0.20
59.34	59.34	59.64	2.98	0.0268	0.0004	7976.1	57.84	0.00038	0.20
62.34	62.34	62.63	2.99	0.0272	0.0004	8061.7	60.84	0.00037	0.21
65.34	65.34	65.61	2.99	0.0275	0.0003	8591.3	63.84	0.00035	0.20
68.34	68.34	68.60	2.99	0.0279	0.0004	7751.9	66.84	0.00039	0.23
71.34	71.34	71.59	2.99	0.0283	0.0003	8597.4	69.84	0.00035	0.24
74.34	74.34	74.58	2.99	0.0286	0.0003	9235.8	72.84	0.00032	0.25
77.34	77.34	77.57	2.99	0.0289	0.0003	10233.7	75.84	0.00029	0.28
80.34	80.34	80.56	2.99	0.0292	0.0003	10148.6	78.84	0.00030	0.29
83.34	83.34	83.56	2.99	0.0295	0.0003	10238.2	81.84	0.00029	0.21
86.34	86.34	86.55	2.99	0.0298	0.0003	10152.6	84.84	0.00030	0.32
89.34	89.34	89.54	2.99	0.0301	0.0003	9900.4	87.84	0.00030	0.36
92.34	92.34	92.53	2.99	0.0304	0.0003	9985.1	90.84	0.00030	0.35
95.34	95.34	95.53	2.99	0.0307	0.0003	9903.3	93.84	0.00030	0.30
98.34	98.34	98.52	2.99	0.0310	0.0003	10805.0	96.84	0.00028	0.22
101.34	101.34	101.52	2.99	0.0312	0.0003	10247.2	99.84	0.00029	0.34
104.34	104.34	104.51	2.99	0.0316	0.0003	9587.1	102.84	0.00031	0.33
107.34	107.34	107.51	3.00	0.0319	0.0003	9907.6	105.84	0.00030	0.23
110.34	110.34	110.50	3.00	0.0321	0.0003	10908.4	108.84	0.00028	0.28
113.34	113.34	113.50	3.00	0.0324	0.0003	9909.3	111.84	0.00030	0.31
116.34	116.34	116.49	3.00	0.0327	0.0003	10251.7	114.84	0.00029	0.25
119.34	119.34	119.49	3.00	0.0330	0.0003	10164.8	117.84	0.00030	0.42
Weighted Average Soil Shear Wave Velocity, v_s 100 (ft/s):								3207	0.28

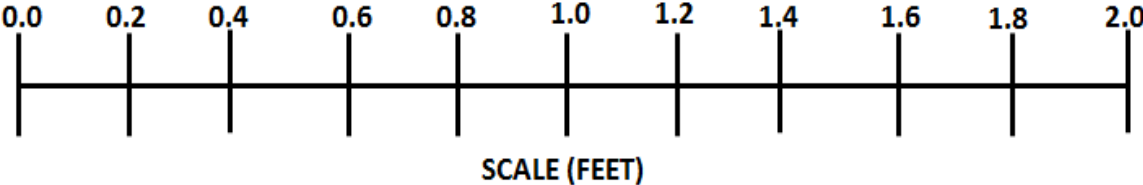
Note: The weighted average shear wave velocity reported above is for the interval from 6.84 to 105.84 feet.

Carolina Crossroads – Phase 3C
Geotechnical Subsurface Data Report

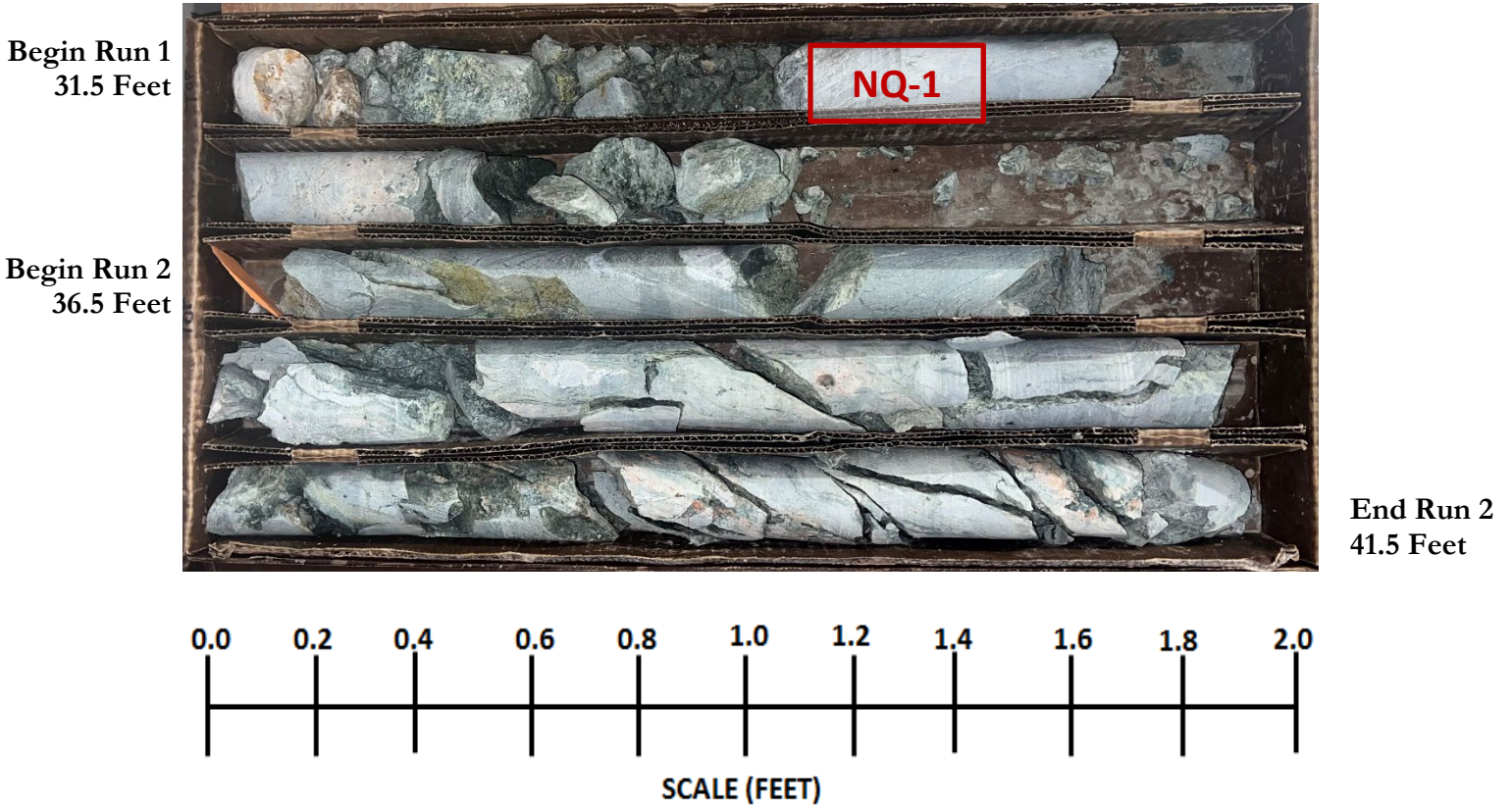
APPENDIX

SECTION 6 ROCK CORE PHOTOS

Carolina Crossroads Ph. 3C
CORE PHOTOGRAPHS: C3C-B1



Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-B2



Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-B3

Begin Run 1
46.0 Feet



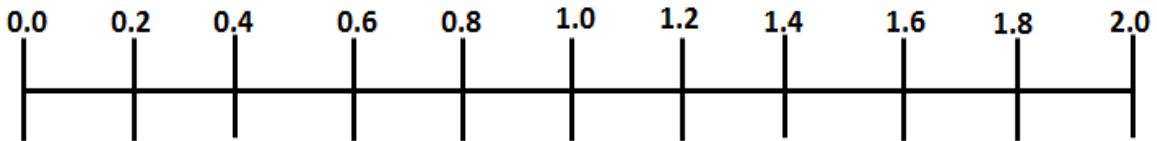
Begin Run 2
51.0 Feet

End Run 2
56.0 Feet

Begin Run 3
56.0 Feet

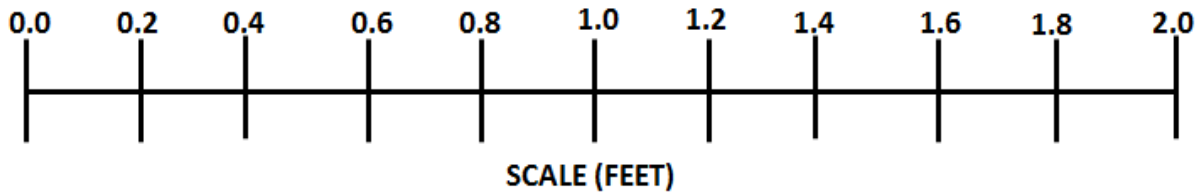


End Run 4
66.0 Feet

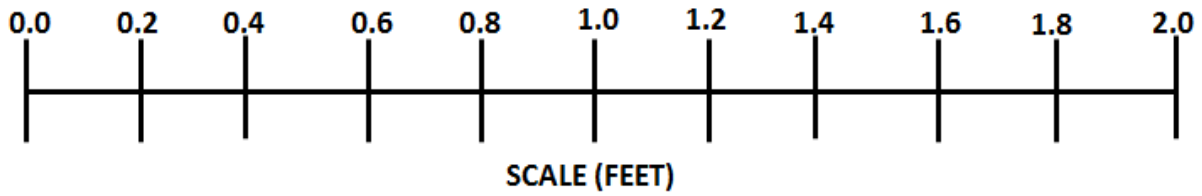


SCALE (FEET)

Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-B4

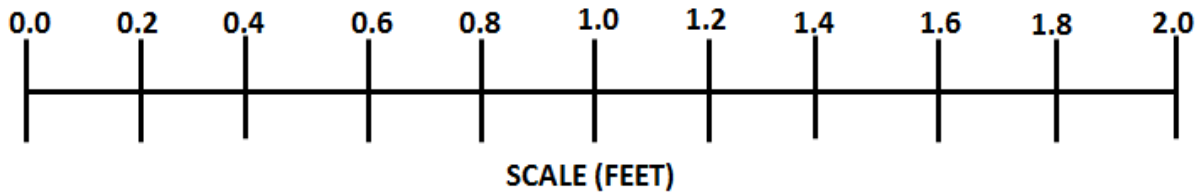
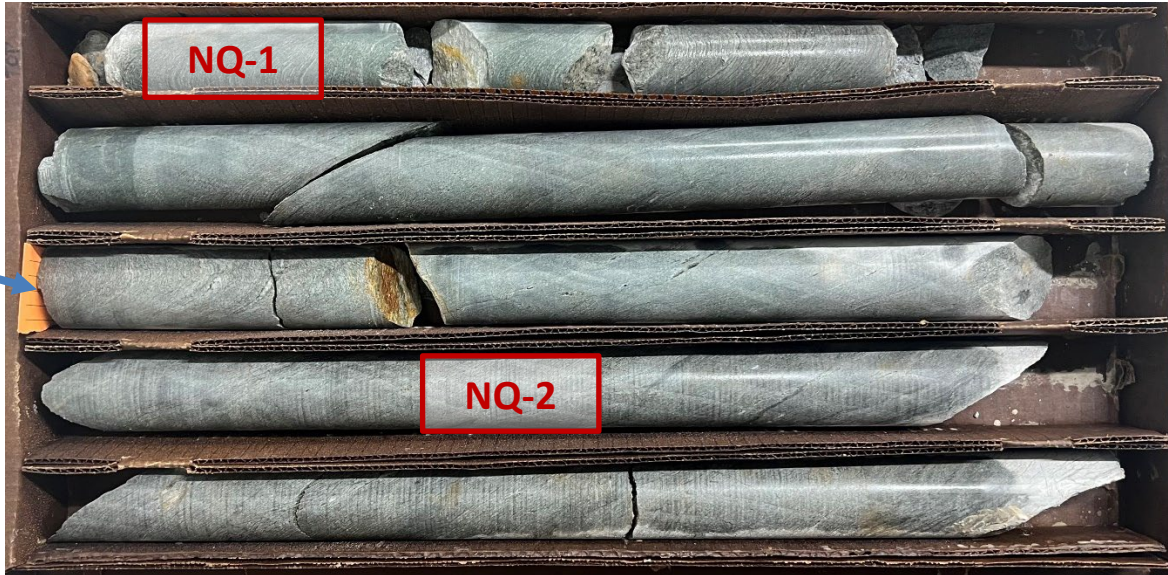


Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-B5



Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-B6

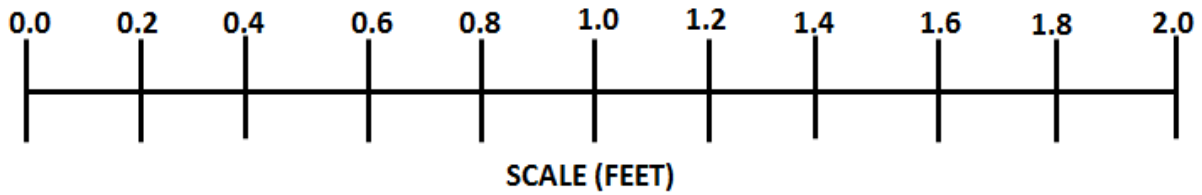
Begin Run 1
66.5 Feet



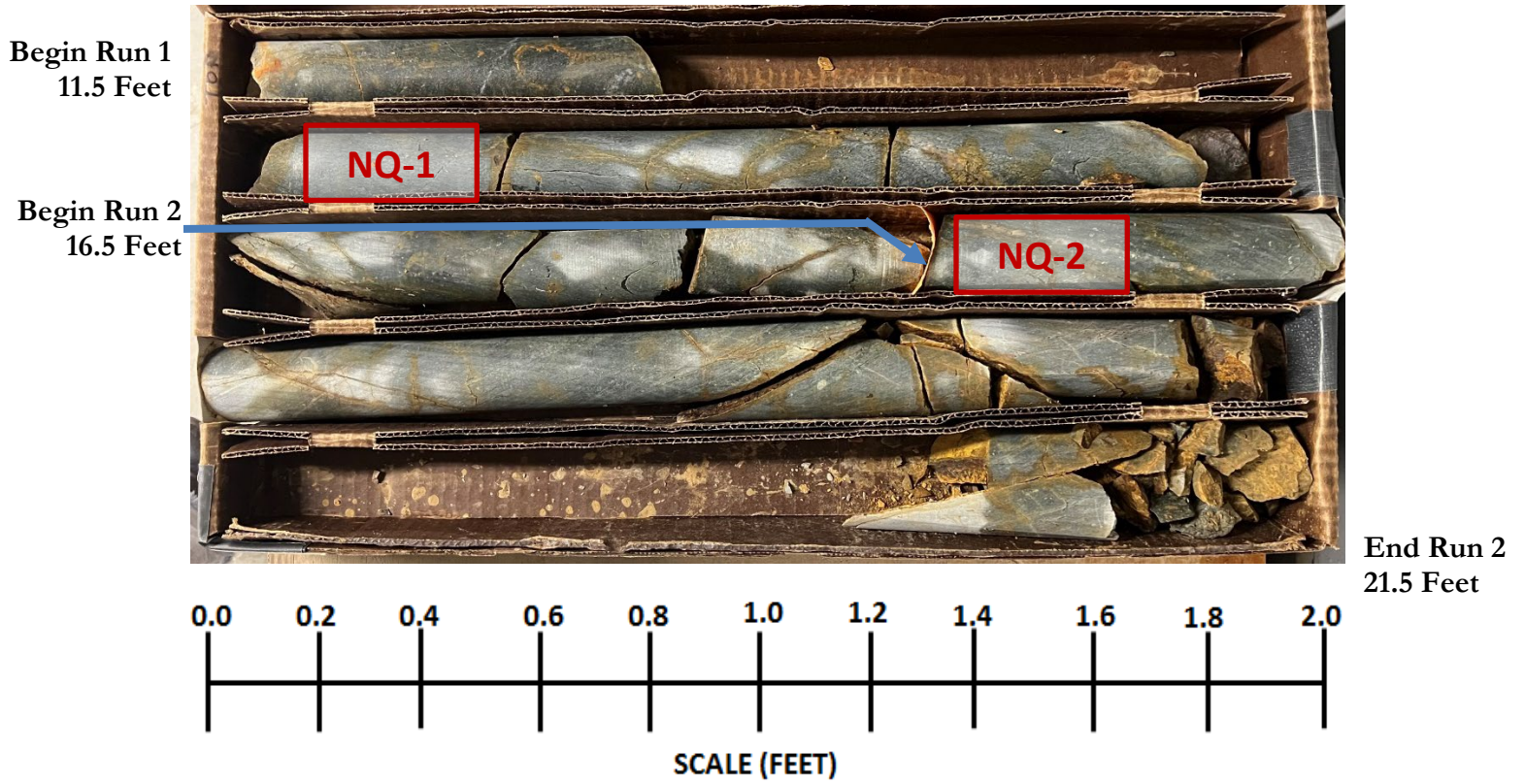
Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-B7



*** No Testable Cores**



Carolina Crossroads Ph. 3C CORE PHOTOGRAPHS: C3C-W3





Boring B-47, Box 1 & 2



1 Remarks: Boring B-47, Box 1



2 Remarks: Boring B-47, Box 2



Boring B-48, Box 1 & 2

Run	Depth Int.	Length	Rec	RSD
RC-1	14.7 - 19.7	5.0	4.8	65%
RC-2	19.7 - 24.7	5.0	4.8	65%
RC-3	24.7 - 29.7	5.0	4.8	65%

CCR
M61-16-047.2B
Run 1 to 3
14.7 ft to 29.7 ft
B-48
Box 1

Run	Depth Int.	Length	Rec	RSD
RC-4	29.7 - 34.7	5.0	5.0	100%

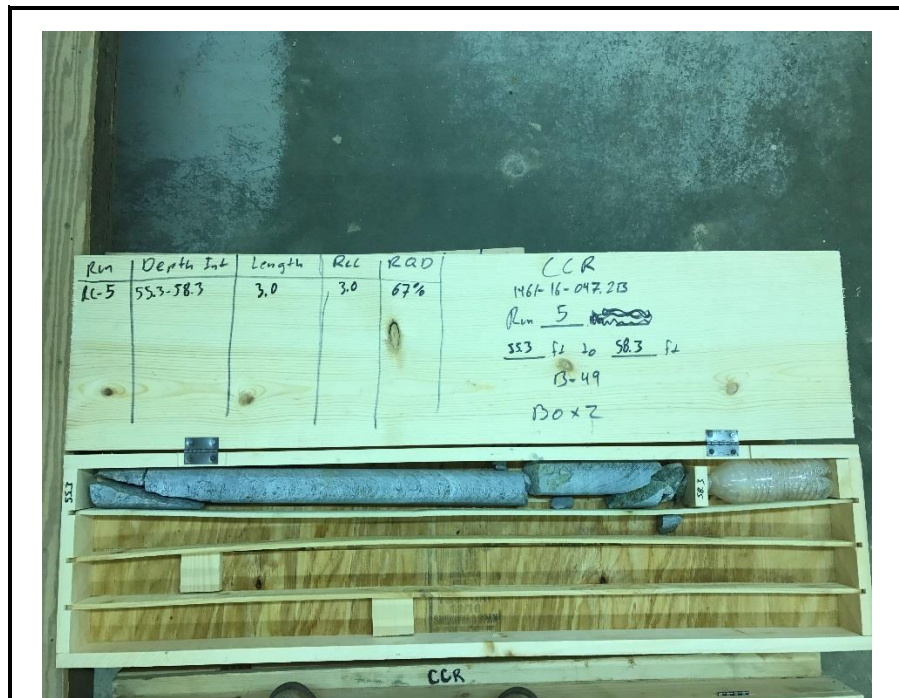
CCR
M61-16-047.2B
Run 4 to X
29.7 ft to 34.7 ft
B-48
Box 2



Boring B-49, Box 1 & 2



1 Remarks: **Boring B-49, Box 1**



2 Remarks: **Boring B-49, Box 2**



Boring B-50, Box 1 & 2

RUN	DEPTH INT	LENGTH	REC	RQD
1	72.2 - 77.2	5'	4	20%
2	77.2 - 82.2	5'	5	40%
3	82.2 - 87.2	5'	4	40%

CCR
M61-16-047.2B
RUN 1 to 3
72.2 ft to 87.2 ft
B-50
Box 1 of 2

RUN	DEPTH INT	LENGTH	REC	RQD
4	87.2 - 92.2	5'	5	64

CCR
M61-16-047.2B
B-50
RUN 4
87.2 ft to 92.2 ft
Box 2



Boring B-51, Box 1

Run	Depth Int.	Length	REL	ROD	
RC-1	34.7-44.7	5.0	5.0	0%	CCR 1461-16-047.2B Run 1 to 4 39.7 ft to 59.7 ft B-51 Box 1
RC-2	44.7-49.7	5.0	3.8	21%	
RC-3	49.7-54.7	5.0	2.5	27%	
RC-4	54.7-59.7	5.0	2.4	20%	

1	Remarks:	Boring B-51, Box 1
----------	----------	---------------------------



Boring B-52, Box 1 & 2



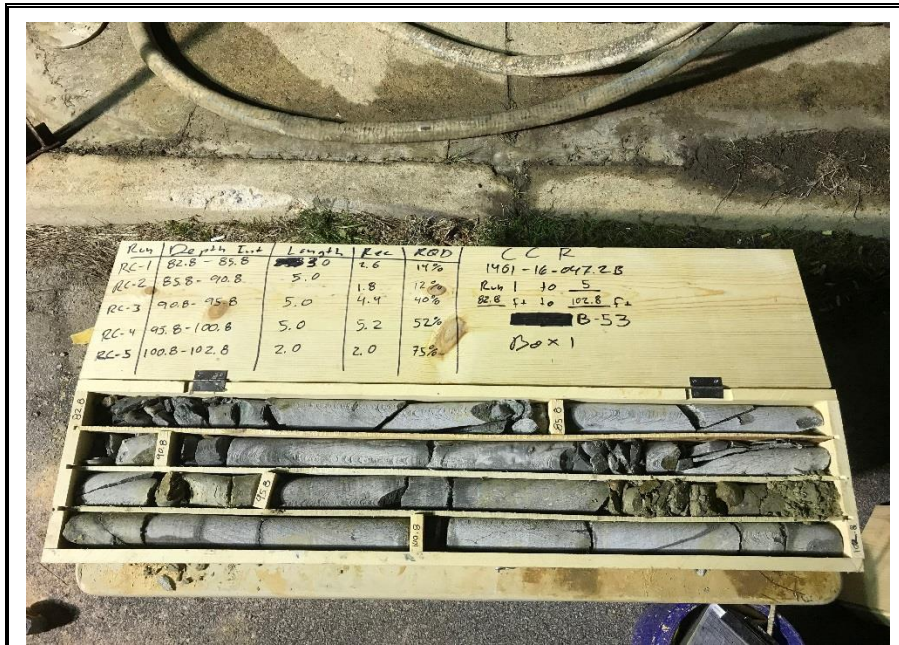
1 Remarks: Boring B-52, Box 1



2 Remarks: Boring B-52, Box 2



Boring B-53, Box 1



1	Remarks:	Boring B-53, Box 1
----------	-----------------	---------------------------

Carolina Crossroads – Phase 3C

Geotechnical Subsurface Data Report

APPENDIX

SECTION 7 SPT HAMMER ENERGY REPORTS



2400 Crownpoint Executive Drive
Suite 800
Charlotte, NC 28227



(980) 339-8684



contact@carolinasgeotech.com



www.carolinasgeotech.com

April 16, 2023

Mr. Adam J. Shannon
Breccia Construction, LLC
620-B Industrial Way
Chester, South Carolina 29706

SUBJECT: Report of SPT Hammer Energy
Breccia Construction, LLC CME 550X ATV Rig (SN 294593)
Chester, South Carolina
CG2 Project No.: 240021095

Dear Mr. Shannon:

Carolinas Geotechnical Group, PLLC (CG2) has completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer mounted on a Breccia Construction, LLC (Breccia) CME 550X ATV-mounted drill rig with a serial number of 294593, see attached Drill Rig Photo Log. This service was performed by Mr. Robert E. Kral, PE on April 7, 2023. SPT energy testing was performed in general accordance with ASTM D4633 and the most recent revision of the North Carolina Department of Transportation (NCDOT), Geotechnical Engineering Unit's requirements. The testing procedures, equipment used during testing, and detailed results are presented in this report.

CG2 recommends Breccia submit this Report of SPT Hammer Energy to the NCDOT Geotechnical Engineering Unit for review and approval no later than May 5, 2023.

DYNAMIC TESTING METHODOLOGY

Testing was performed using a model SPT (Serial No. 4549 TB) Pile Driving Analyzer™ (PDA) manufactured by Pile Dynamics, Inc. The PDA was used to record and interpret data from two piezoresistive accelerometers (Serial Nos. K10959 and K10960) bolted to a 2-foot long AWJ drill rod (SN 528AWJ) internally instrumented with two strain transducers. The instrumented AWJ drill rod has a cross-sectional area of 1.19 square inches, an outside diameter of approximately 1.75 inches, and an inside diameter of 1.25 inches at the gauge location. The accelerometers and strain gauges, which are mounted on opposing axis near the middle of the instrumented rod, monitor acceleration and strain for each hammer blow. The analyzer converts the data to velocities and forces and computes the maximum transferred hammer energies with the "EFV" method described in ASTM D4633. Preliminary results are recorded and displayed in real-time for each blow. Calibration sheets for the PDA, accelerometers, and the instrumented rod are included in the Appendix III.

Report of SPT Hammer Energy
 Chester, South Carolina
 CG2 Project No.: 240021095

TESTING AND OBSERVATIONS

CG2 personnel was on site April 7, 2023 to observe and perform high-strain dynamic testing during SPT sampling on the CME 550X ATV-mounted drill rig operated by L. Guempel of Breccia. The measurements were taken during drilling operations at 1817 Lowrys Highway in Chester, South Carolina (Chester County). The approximate coordinates (not professionally surveyed) for the test location are 34.7703792, -81.2453281. No Soil Test Boring Log was maintained. SPT energy measurements were recorded during three intervals at depths of approximately 28½, 33½, and 38½, feet below the existing ground surface. The information presented in the table below summarizes the equipment tested and tooling used during the SPT energy measurements.

Table 1: SPT Field Data

Drill Rig Information	
Manufacturer	CME
Model	550X
Serial Number	294593
Operator	L. Guempel
Carrier	ATV
Hammer Information	
Model / Type	CME / Auto
Serial Number	N/A
Anvil Height (inches)	11.5
Anvil Diameter (inches)	2.5
Drop Height (inches)	30
Ram Weight (pounds)	140
Ram Serial Number	N/A
Drilling and Instrumented Rod Information	
Drill Rod Type	AWJ
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in ²)	1.19
Typical Lengths (feet)	5
Instrumented Rod Type	AWJ (SN 528)
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in ²)	1.19
Total Instrumented Rod Length (feet)	2.00
Length Below Gages (feet)	0.70
Split-Spoon Length (feet)	2.85

Report of SPT Hammer Energy
 Chester, South Carolina
 CG2 Project No.: 240021095

DYNAMIC TESTING RESULTS

The total rod length from the instrumentation to the tip of the split-spoon sampler was determined by adding 3.6 feet to the required drill rod length at each sample depth. Based on the test data, the automatic hammer on the CME 550X ATV-mounted drill rig operated at a rate of about 55.5 to 58.6 blows per minute (BPM) during dynamic testing. The measured transferred hammer energy (EFV) ranged from 280.5 to 315.7 foot-pounds, which corresponds to Energy Transfer Ratio (ETR) values of 80.1 to 90.2%, respectively. These data ranges are based on the overall minimum and maximum values for the last 12 inches of each sample interval.

The SPT Energy Measurement Data Summary tables in the Appendix present the test data from every hammer blow at each sampling interval along with representative force and velocity traces for each test interval. The reported blow counts, obtained by the drill rig personnel, a summary of the test data, and average computed BPM, EFV, and ETR values are provided in Table 2. The BPM, EFV, and ETR values presented in Table 2 were computed by averaging data from the last 12 inches of each sample interval. Plots and tables of the following are also included in the Appendix and present the test data with depth for each test interval:

- Penetration vs. BLC
- Penetration vs. CSX
- Average ETR vs. Rod Length
- Penetration vs. FMX
- Penetration vs. VMX
- ETR vs. Rod Length
- Penetration vs. EFV
- Penetration vs. ETR

Table 2: Summary of Dynamic Testing Results

Data Set ID	Sample Depth (ft)	Drill Rod Length (ft)	Instrumentation to Sampler Tip Length (ft)	Blows per 6" Increment / N-value	Soil Sample Description (Piedmont Residual)	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (%)
1	28½ - 30	30	33.6	4-6-7 / 13	SA SILT	58.3	303.9	86.8
2	33½ - 35	35	38.6	3-6-7 / 13	SA SILT	55.9	288.6	82.5
3	38½ - 40	40	43.6	4-6-7 / 13	SA SILT	56.4	304.6	87.0
Overall Average						56.9	299.1	85.4

The average hammer rate, transferred energy, and transfer ratio were calculated for each depth interval. Per ASTM D4633, only the blows from the final foot of each sample interval (i.e., the blows that determine the N-value) were included when computing the average values shown in Table 2. The overall average transferred hammer energy for the automatic hammer on the CME 550X ATV-mounted drill rig (for the depth intervals presented in Table 2) was 299.1 foot-pounds, with an average ETR of 85.4%.

Report of SPT Hammer Energy
Chester, South Carolina
CG2 Project No.: 240021095

LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The information contained in this report were based on the applicable standards of our profession in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

CLOSING

CG2 is pleased to have the opportunity to provide these services to you. If you have questions concerning the content of this report, or if CG2 can be of further service, please contact CG2 at (980) 339-8684.

Sincerely,
Carolinas Geotechnical Group, PLLC

DocuSigned by:

D. Matthew Brewer

386129C0A4C1462...

D. Matthew Brewer, PE
Senior Project Engineer

DocuSigned by:

Robert E. Kral

8AD703B2A8484F4...

Robert E. Kral, PE
Senior Project Engineer
NC Registration No. 042642



Appendices:

- Appendix I - CME 550X ATV Rig (SN 294593) SPT Energy Measurements Summary Plots and Tables
- Appendix II - SPT Hammer Energy Field Form (Field Log) and Drill Rig Photo Log
- Appendix III - Instrumented Rod and Accelerometer Calibration Sheets
- Appendix IV - Certificate of Proficiency



APPENDIX I

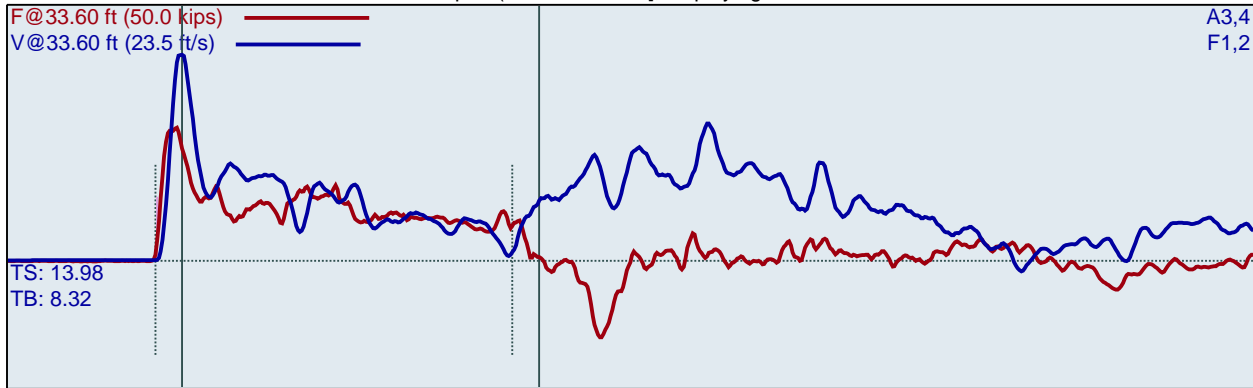
CME 550X (SN 294593)
REK
B-1

B-1
Interval start: 4/7/2023

AR: 1.19 in²
LE: 33.60 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (28.50 - 30.00 ft), displaying BN: 15



F1 : [528AWJ-1] 203.51 PDICAL (1) FF1
F2 : [528AWJ-2] 203.28 PDICAL (1) FF1

A3 (PR): [K10960] 419.894 mv/6.4v/5000g (1) VF1
A4 (PR): [K10959] 413.827 mv/6.4v/5000g (1) VF1

BPM: Blows/Minute

FMX: Maximum Force

VMX: Maximum Velocity

DMX: Maximum Displacement

CSX: Compression Stress Maximum

DFN: Final Displacement

EFV: Maximum Energy

ETR: Energy Transfer Ratio - Rated

LP	BL#	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
ft		/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
28.63	1	4	1.9	27.4	17.1	2.6	23.0	1.5	278.1	79.4
28.75	2	4	52.5	27.9	17.8	1.8	23.5	1.5	292.5	83.6
28.88	3	4	57.1	27.9	18.0	1.6	23.4	1.5	297.5	85.0
29.00	4	4	57.8	27.5	18.0	1.6	23.1	1.5	295.9	84.6
29.08	5	6	58.1	28.1	18.2	1.6	23.6	1.0	300.5	85.9
29.17	6	6	57.9	27.4	18.2	1.4	23.0	1.0	298.8	85.4
29.25	7	6	58.6	27.4	18.4	1.3	23.0	1.0	299.9	85.7
29.33	8	6	58.0	27.0	18.4	1.2	22.7	1.0	307.4	87.8
29.42	9	6	58.4	26.8	18.5	1.1	22.5	1.0	301.5	86.2
29.50	10	6	58.1	27.1	18.6	1.1	22.8	1.0	311.5	89.0
29.57	11	7	58.2	26.7	18.5	1.1	22.5	0.9	300.6	85.9
29.64	12	7	58.6	26.5	18.6	1.0	22.2	0.9	306.3	87.5
29.71	13	7	58.1	26.2	18.9	0.9	22.0	0.9	308.1	88.0
29.79	14	7	58.6	26.1	18.7	1.0	21.9	0.9	308.9	88.3
29.86	15	7	58.1	26.0	19.0	0.9	21.8	0.9	303.9	86.8
29.93	16	7	58.5	26.1	19.0	0.9	21.9	0.9	306.8	87.7
30.00	17	7	58.3	26.0	19.2	0.9	21.8	0.9	296.7	84.8
Average			58.3	26.7	18.6	1.1	22.5	0.9	303.9	86.8
Std Dev			0.2	0.6	0.3	0.2	0.5	0.1	4.4	1.3
Maximum			58.6	28.1	19.2	1.6	23.6	1.0	311.5	89.0
Minimum			57.9	26.0	18.2	0.9	21.8	0.9	296.7	84.8

N-value: 13

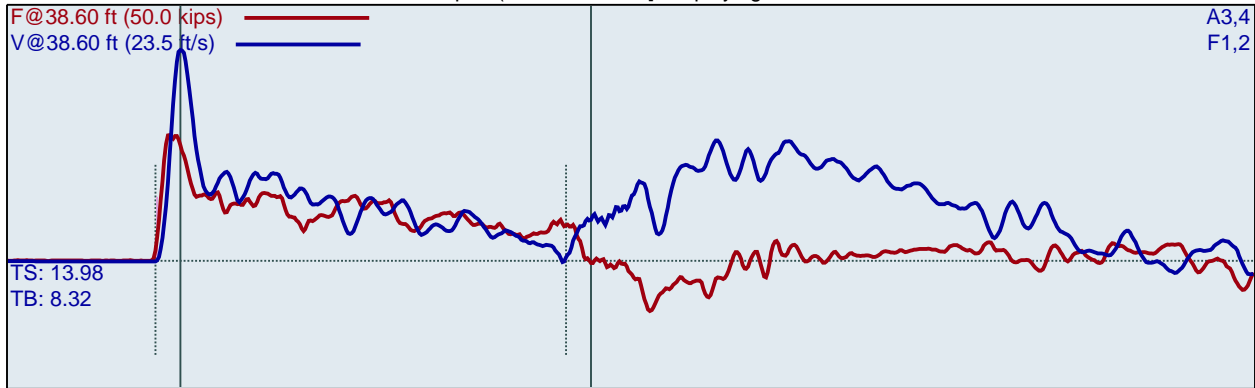
CME 550X (SN 294593)
REK
B-1

B-1
Interval start: 4/7/2023

AR: 1.19 in²
LE: 38.60 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (33.50 - 35.00 ft), displaying BN: 14



F1 : [528AWJ-1] 203.51 PDICAL (1) FF1
F2 : [528AWJ-2] 203.28 PDICAL (1) FF1

A3 (PR): [K10960] 419.894 mv/6.4v/5000g (1) VF1
A4 (PR): [K10959] 413.827 mv/6.4v/5000g (1) VF1

LP ft	BL#	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
33.67	1	3	1.9	26.2	18.4	2.0	22.0	2.0	283.6	81.0
33.83	2	3	55.1	25.2	18.7	2.0	21.1	2.0	293.9	84.0
34.00	3	3	55.4	24.8	19.0	2.0	20.9	2.0	295.1	84.3
34.08	4	6	55.9	24.6	19.0	1.1	20.7	1.0	280.5	80.1
34.17	5	6	55.5	24.9	19.0	1.1	20.9	1.0	286.3	81.8
34.25	6	6	56.1	24.6	19.2	1.0	20.7	1.0	283.7	81.1
34.33	7	6	55.9	24.7	19.2	1.0	20.7	1.0	284.7	81.3
34.42	8	6	56.2	24.7	19.2	1.0	20.8	1.0	288.1	82.3
34.50	9	6	55.8	24.5	19.3	1.0	20.6	1.0	287.4	82.1
34.57	10	7	56.1	24.6	19.4	0.9	20.7	0.9	291.4	83.3
34.64	11	7	55.9	24.7	19.4	0.9	20.7	0.9	289.6	82.7
34.71	12	7	56.0	24.4	19.5	0.9	20.5	0.9	287.6	82.2
34.79	13	7	55.9	24.5	19.5	0.9	20.6	0.9	291.5	83.3
34.86	14	7	55.8	24.5	19.4	0.9	20.6	0.9	295.4	84.4
34.93	15	7	56.0	24.5	19.4	0.9	20.6	0.9	294.4	84.1
35.00	16	7	55.5	24.6	19.3	0.9	20.7	0.9	291.7	83.3
Average			55.9	24.6	19.3	1.0	20.7	0.9	288.6	82.5
Std Dev			0.2	0.1	0.1	0.1	0.1	0.1	4.1	1.2
Maximum			56.2	24.9	19.5	1.1	20.9	1.0	295.4	84.4
Minimum			55.5	24.4	19.0	0.9	20.5	0.9	280.5	80.1

N-value: 13

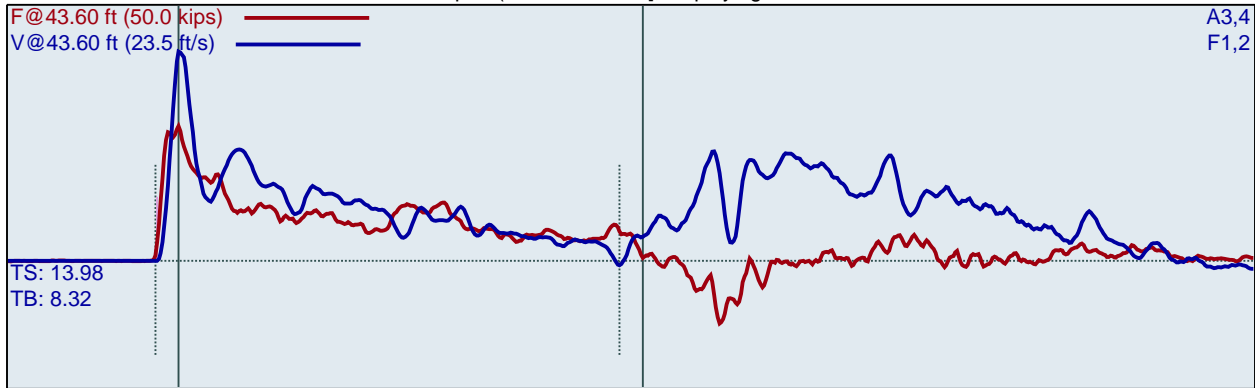
CME 550X (SN 294593)
REK
B-1

B-1
Interval start: 4/7/2023

AR: 1.19 in²
LE: 43.60 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (38.50 - 40.00 ft), displaying BN: 15



F1 : [528AWJ-1] 203.51 PDICAL (1) FF1
F2 : [528AWJ-2] 203.28 PDICAL (1) FF1

A3 (PR): [K10960] 419.894 mv/6.4v/5000g (1) VF1
A4 (PR): [K10959] 413.827 mv/6.4v/5000g (1) VF1

LP ft	BL#	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
38.63	1	4	1.9	28.1	17.7	1.6	23.7	1.5	283.3	80.9
38.75	2	4	53.0	28.3	18.0	1.6	23.8	1.5	287.4	82.1
38.88	3	4	54.8	28.3	18.6	1.5	23.8	1.5	294.7	84.2
39.00	4	4	55.9	27.7	18.6	1.5	23.3	1.5	295.9	84.5
39.08	5	6	56.2	28.2	18.9	1.1	23.7	1.0	297.3	85.0
39.17	6	6	56.3	27.0	18.5	1.0	22.7	1.0	295.7	84.5
39.25	7	6	56.3	27.7	18.5	1.1	23.3	1.0	297.8	85.1
39.33	8	6	56.7	27.4	19.1	1.2	23.1	1.0	306.9	87.7
39.42	9	6	56.1	26.7	18.8	1.0	22.4	1.0	300.3	85.8
39.50	10	6	56.7	26.9	18.8	1.0	22.6	1.0	301.1	86.0
39.57	11	7	56.3	27.2	19.2	0.9	22.9	0.9	305.3	87.2
39.64	12	7	56.5	26.6	19.2	0.9	22.4	0.9	305.7	87.4
39.71	13	7	56.3	26.7	19.0	0.9	22.4	0.9	308.4	88.1
39.79	14	7	56.6	26.5	19.3	0.9	22.3	0.9	311.1	88.9
39.86	15	7	56.3	26.3	19.2	0.9	22.1	0.9	308.5	88.1
39.93	16	7	56.3	25.5	19.8	0.9	21.4	0.9	315.7	90.2
40.00	17	7	56.7	26.4	19.4	0.9	22.2	0.9	306.3	87.5
Average			56.4	26.9	19.1	1.0	22.6	0.9	304.6	87.0
Std Dev			0.2	0.7	0.3	0.1	0.6	0.1	5.6	1.6
Maximum			56.7	28.2	19.8	1.2	23.7	1.0	315.7	90.2
Minimum			56.1	25.5	18.5	0.9	21.4	0.9	295.7	84.5

N-value: 13

Summary of SPT Test Results

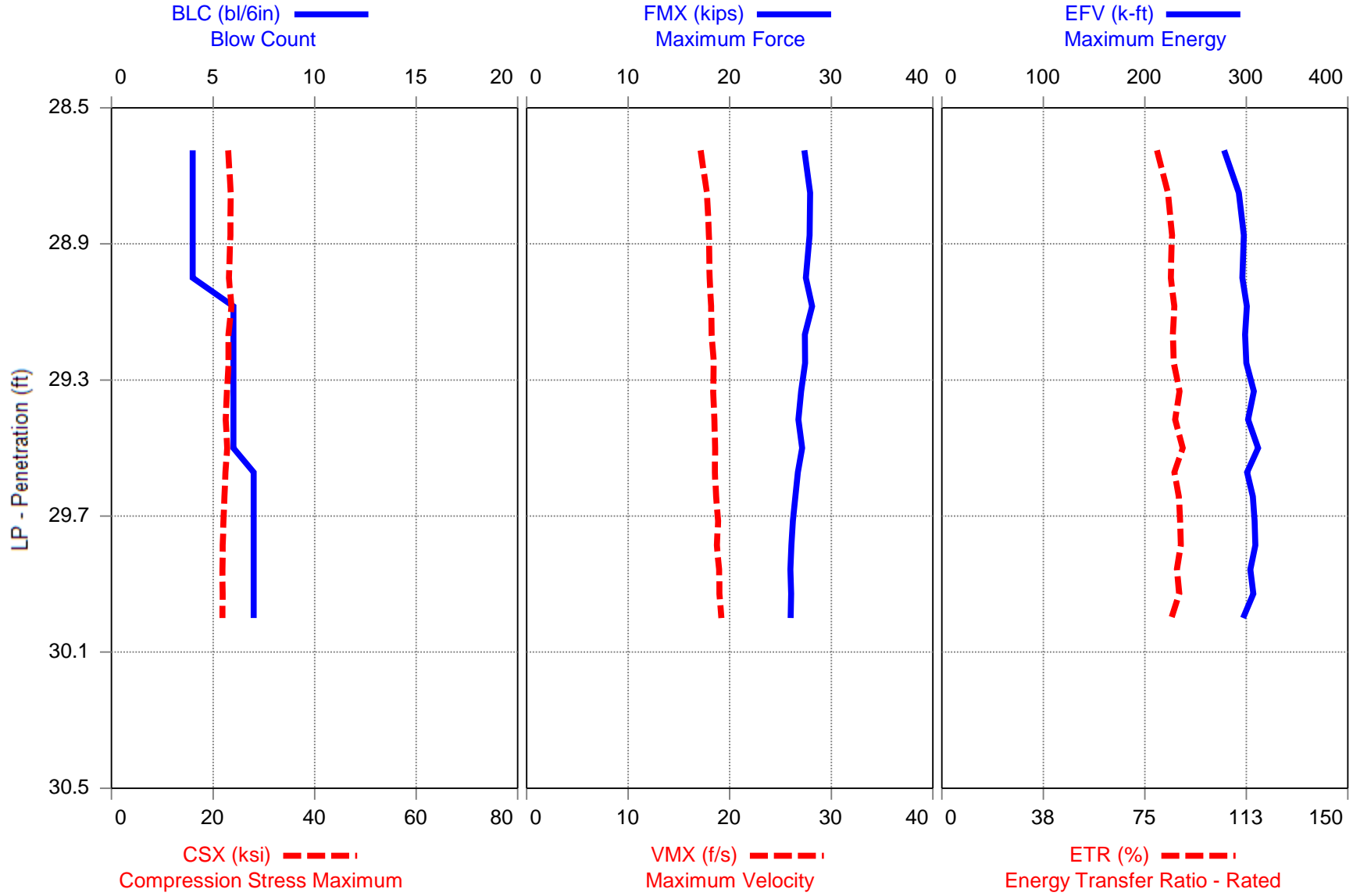
Project: CME 550X (SN 294593), Test Date: 4/7/2023

Instr. Length ft	Start Depth ft	Final Depth ft	Blows Applied /6"	N Value	N60 Value	Average BPM bpm	Average FMX kips	Average VMX ft/s	Average DMX in	Average CSX ksi	Average DFN in	Average EFV ft-lb	Average ETR %
33.60	28.50	30.00	4-6-7	13	18	58.3	26.7	18.6	1.1	22.5	0.9	303.9	86.8
38.60	33.50	35.00	3-6-7	13	18	55.9	24.6	19.3	1.0	20.7	0.9	288.6	82.5
43.60	38.50	40.00	4-6-7	13	18	56.4	26.9	19.1	1.0	22.6	0.9	304.6	87.0
Overall Average Values:						56.9	26.1	19.0	1.0	21.9	0.9	299.1	85.4
Standard Deviation:						1.0	1.2	0.4	0.2	1.0	0.1	8.8	2.5
Overall Maximum Value:						58.6	28.2	19.8	1.6	23.7	1.0	315.7	90.2
Overall Minimum Value:						55.5	24.4	18.2	0.9	20.5	0.9	280.5	80.1

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

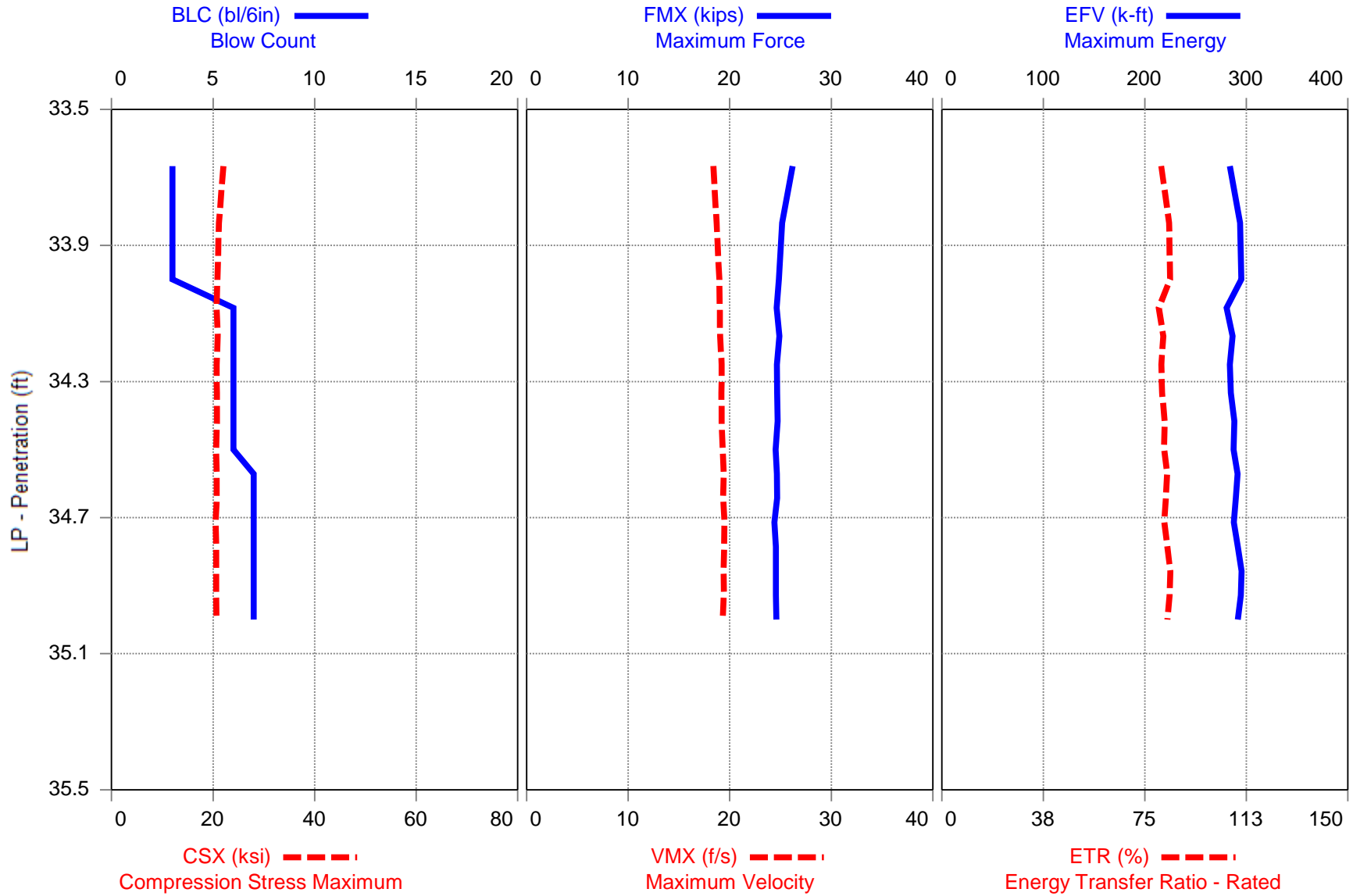


CME 550X (SN 294593) - 28.5 TO 30.0



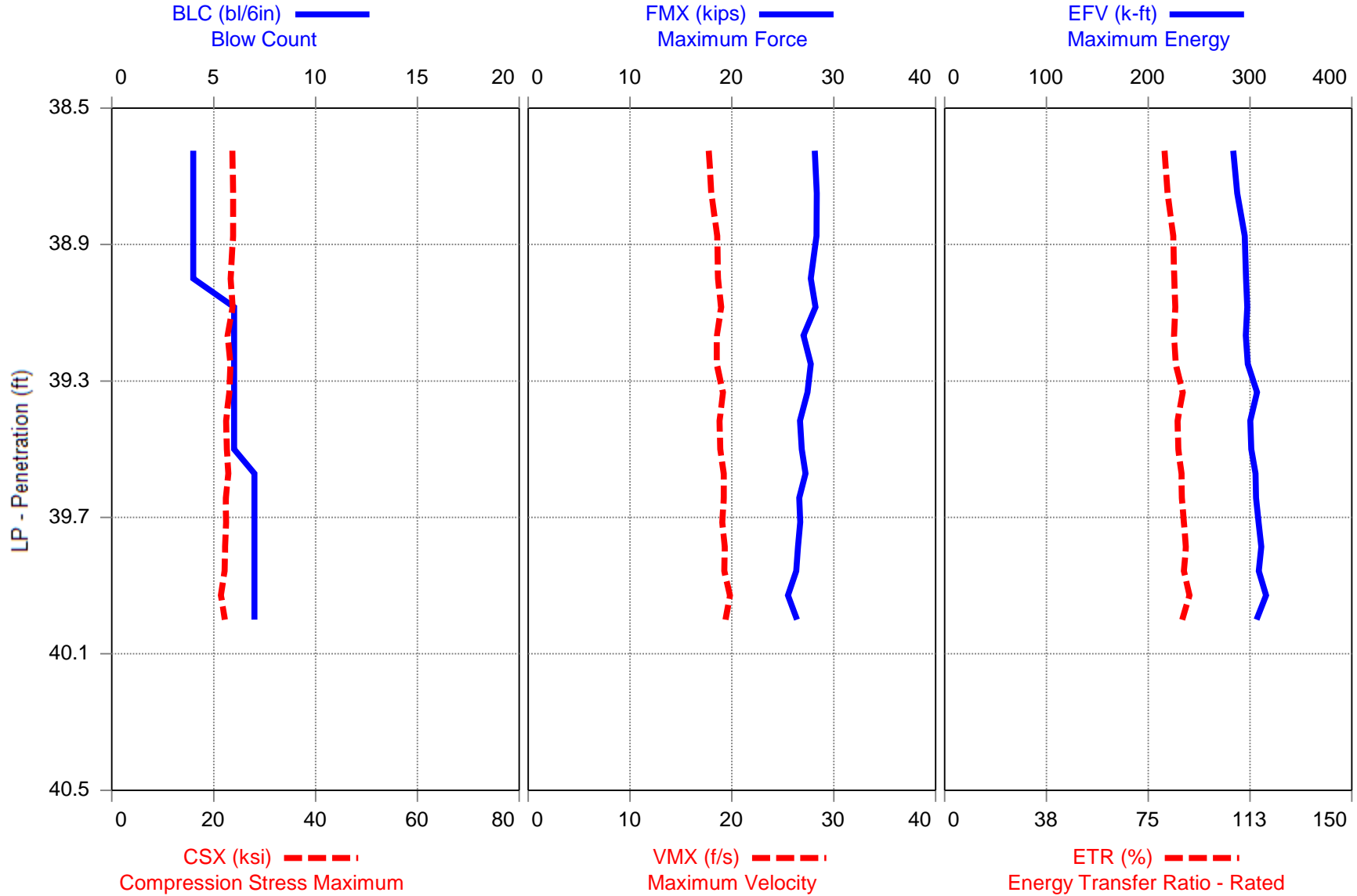


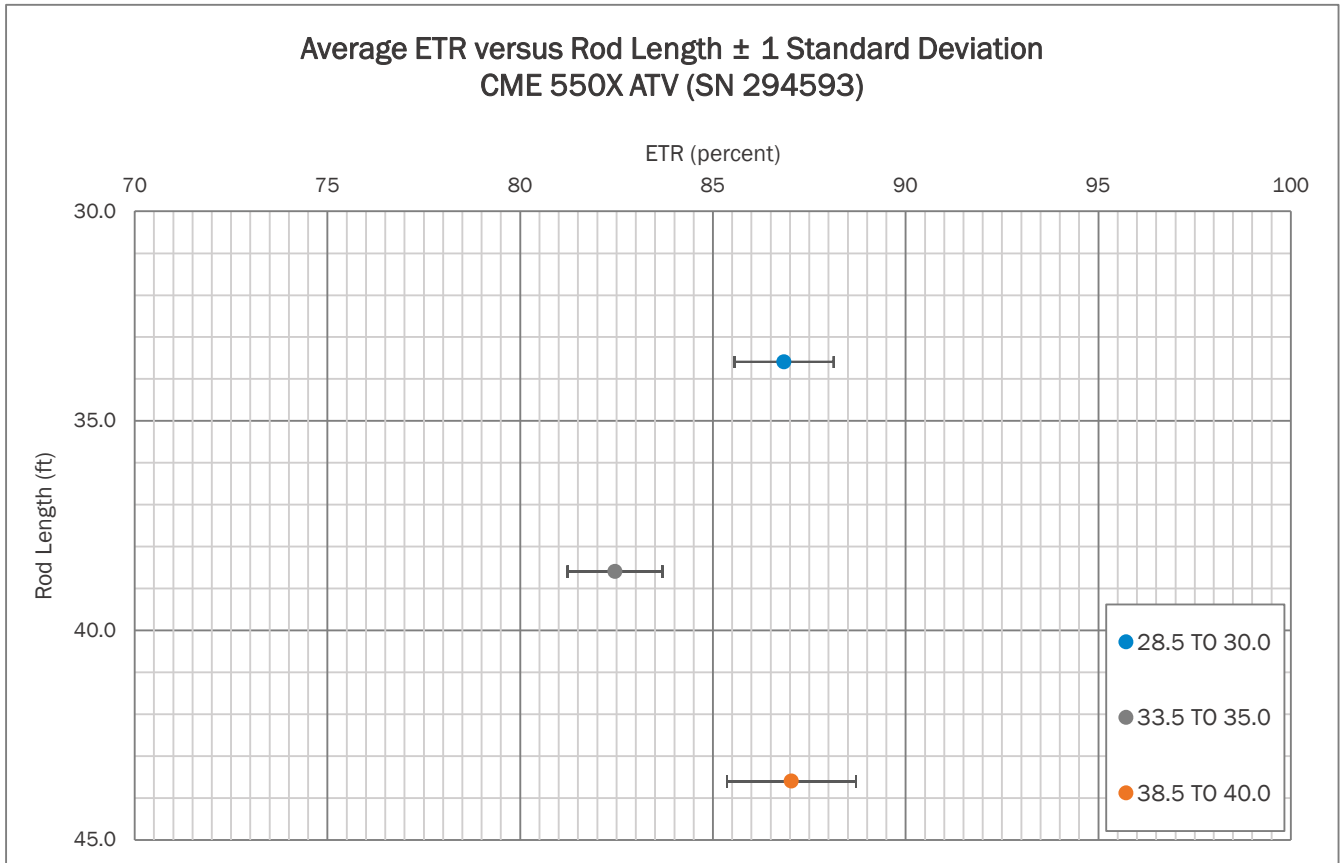
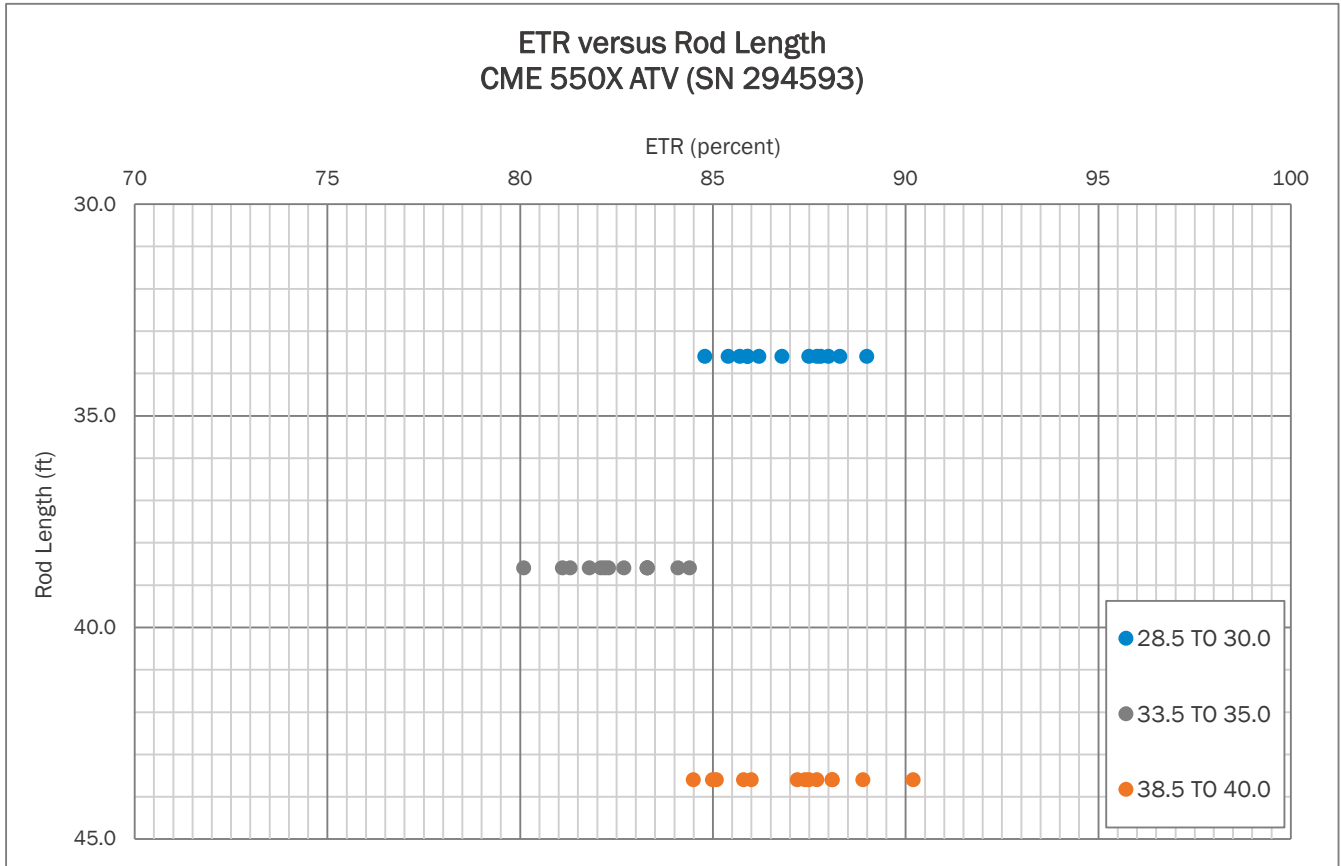
CME 550X (SN 294593) - 33.5 TO 35.0





CME 550X (SN 294593) - 38.5 TO 40.0







APPENDIX II

Project: SPT HAMMER ENERGY
Project No.: 240021095
Boring No.: B-1

Date: 4/7/2023
Weather: 50's CLOUDY
Drill Rod Type: AWJ

On-site Personnel

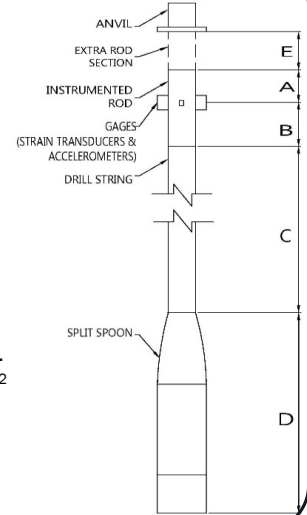
Drilling Company: BRECCIA CONSTRUCTION, LLC
 Rig Operator: L. GUEMPEL
 Engr/Geologist: N/A
 Client Rep.: N/A
 Analyzer Oper.: R. KRAL

Rig/Hammer Info

Drill Rig Make/Model: CME 550X
 Carrier Type: ATV
 Rig Serial No.: 294593 (DR-4)
 Hammer Type/Model: CME
 Hammer Serial No.: N/A
 Hammer Drop System: AUTO
 Lubrication Condition: PER MANUFACTURER
 Manufacturer Recommended
 Operation Rate (bpm): 55
 Drop Height (in.): 30
 Hammer Weight (lbs): 140
 Anvil Dimension (in.): 11.5
 Drilling Method: 2.25 HSA

Rod Info

(A + E) Impact Surface to Gages Length: 1.36 ft
(B) Instr. Rod Length below Gages: 0.70 ft
(A) + (B) Instr. Rod Length: 2.00 ft
(D) Spoon Length: 2.85 ft
(E) Rod Length Above Instr. Rod (if applicable): 0.06 ft
 Instr. Rod S/N: 528AWJ
 Instr. Rod Outside Dia.: 1.75 in.
 Instr. Rod Area: 1.19 in²
 PDA Make/Model: SPT
 PDA Serial No.: 4549 TB
 Calib. Pulse Test (y/n): Y



Gage Info

Gage		Serial No.	Calibration No.
Accel.	A3	K10959	413.83
	A4	K10960	419.89
Strain	F3	528AWJ-1	205.26
	F4	528AWJ-2	205.86

Date of Test	Test Depth Increment (ft to ft)	Test Time Start / Stop (military)	Length of Drill String (ft) (C)	(LE) Length below Gages (ft) (B) + (C) + (D)	Avg. Meas. Hammer Rate (BPM)	SPT Blow Counts				Drop Height in Tolerance (y/n)	Soil Class.
						6"	12"	18"	N-Value		
7-Apr	28.5 TO 30.0	0837/0837	30	33.6	57	4	6	7	13	Y	SA SI
7-Apr	33.5 TO 35.0	0843/0843	35	38.6	56	3	6	7	13	Y	SA SI
7-Apr	38.5 TO 40.0	0853/0853	40	43.6	56	4	6	7	13	Y	SA SI

Notes:
 TESTING PERFORMED AT 1817 LOWRYS HIGHWAY IN CHESTER, SOUTH CAROLINA (CHESTER COUNTY). THE APPROXIMATE COORDINATES ARE 34.7703792, -81.2453281.
 NOTE: (1) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. verticality, weather, or lubrication between trials). (2) Note any changes in rod diameter along drill string and record locations of short rod sections.

Prepared By (print/signature) Date 4/7/2023



Figure No. 1: Rear View of Drill Rig



Figure No. 2: Side View of Drill Rig

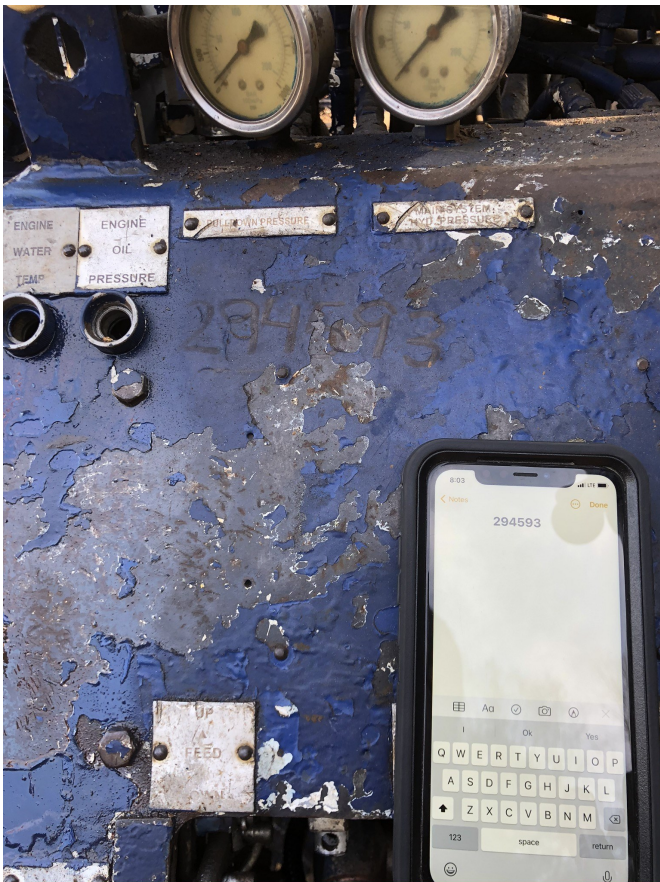


Figure No. 3: Serial Number Plate



Figure No. 4: Automatic Hammer



APPENDIX III

Certificate of Calibration

Pile Dynamics, Inc. certifies that the

Pile Driving Analyzer®, Model SPT

Serial Number: 4549 TB

was calibrated on 14 July 2022

using a PDA Calibration Box whose output was calibrated with test equipment traceable to NIST.

This certificate is valid for 2 years from above date.



Tested by

MCO

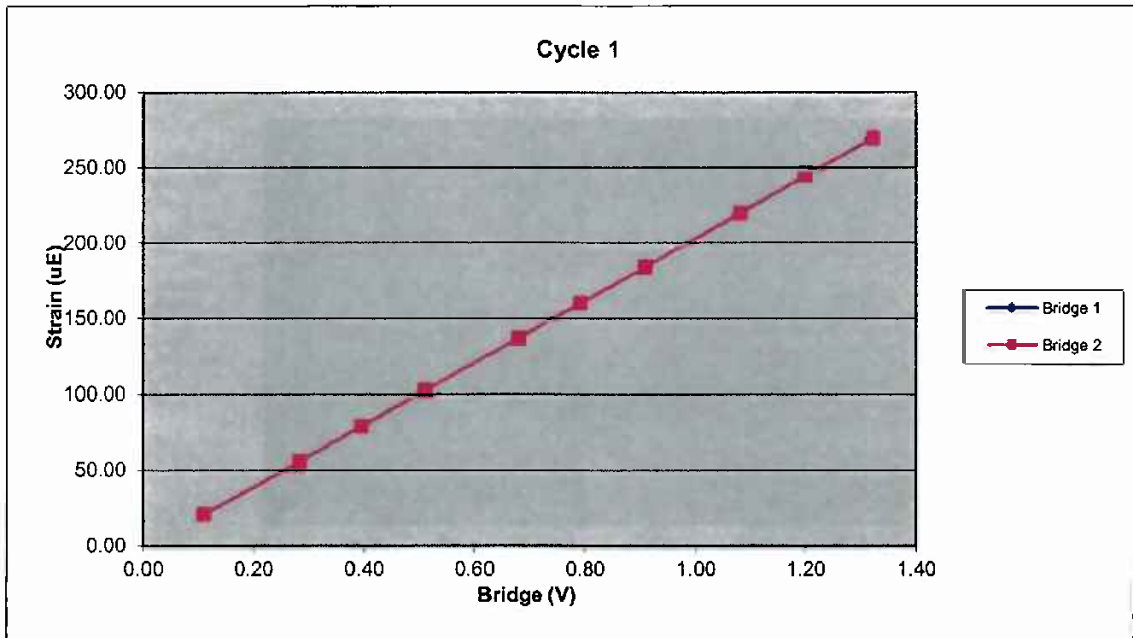


Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, Ohio 44139 USA

528AWJ		Cycle 1		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	803.20	21.15	0.11	0.11
3	2080.73	56.33	0.28	0.28
4	2904.01	79.79	0.39	0.39
5	3765.89	103.49	0.51	0.51
6	5005.11	138.03	0.68	0.68
7	5828.59	161.56	0.79	0.79
8	6692.71	185.68	0.91	0.91
9	7962.93	221.03	1.08	1.08
10	8831.54	245.89	1.20	1.20
11	9736.80	270.68	1.32	1.32

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7358.13	Force Calibration (lb/V)	7351.82
Offset	3.52	Offset	6.26
Correlation	0.999999	Correlation	0.999999
Strain Calibration ($\mu\text{E}/\text{V}$)	205.90	Strain Calibration ($\mu\text{E}/\text{V}$)	205.73
Offset	-1.56	Offset	-1.48
Correlation	0.999995	Correlation	0.999996

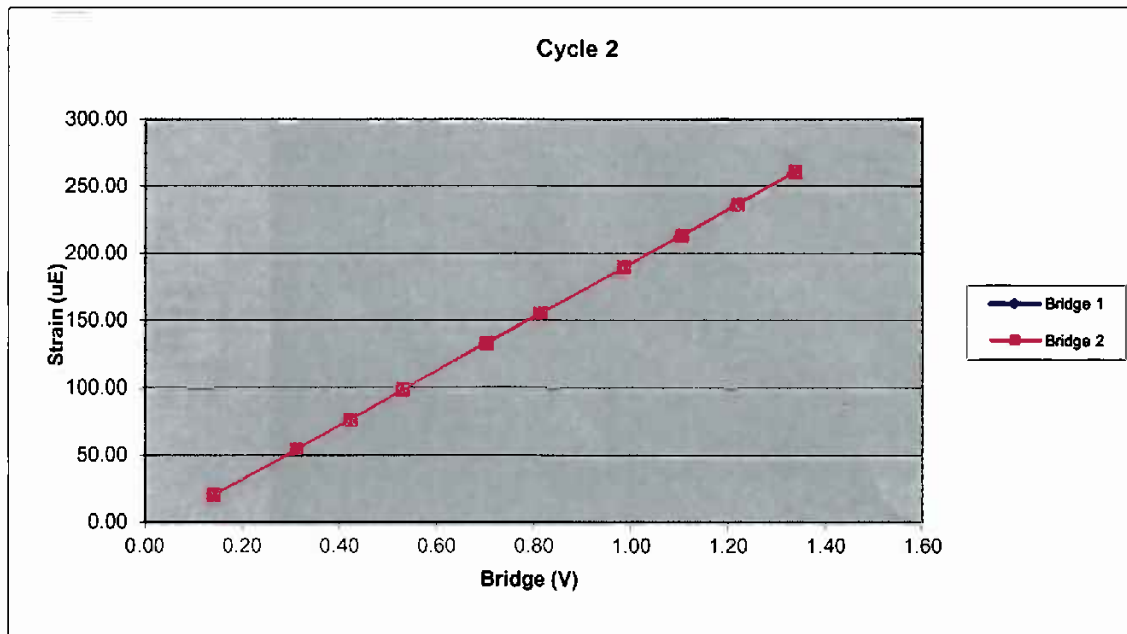
Force Strain Calibration	
EA (Kips)	35735.87
Offset	59.29
Correlation	0.999995



528AWJ		Cycle 2		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	1038.71	19.60	0.14	0.14
3	2288.25	53.30	0.31	0.31
4	3093.11	75.49	0.42	0.42
5	3893.00	97.84	0.53	0.53
6	5167.50	132.26	0.70	0.70
7	5988.25	154.39	0.81	0.81
8	7248.72	188.87	0.98	0.98
9	8125.71	212.29	1.10	1.10
10	8976.19	235.45	1.22	1.22
11	9854.85	259.50	1.33	1.34

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7381.92	Force Calibration (lb/V)	7365.94
Offset	-0.76	Offset	4.69
Correlation	0.999998	Correlation	0.999999
Strain Calibration ($\mu\text{E}/\text{V}$)	200.83	Strain Calibration ($\mu\text{E}/\text{V}$)	200.40
Offset	-8.59	Offset	-8.44
Correlation	0.999997	Correlation	0.999996

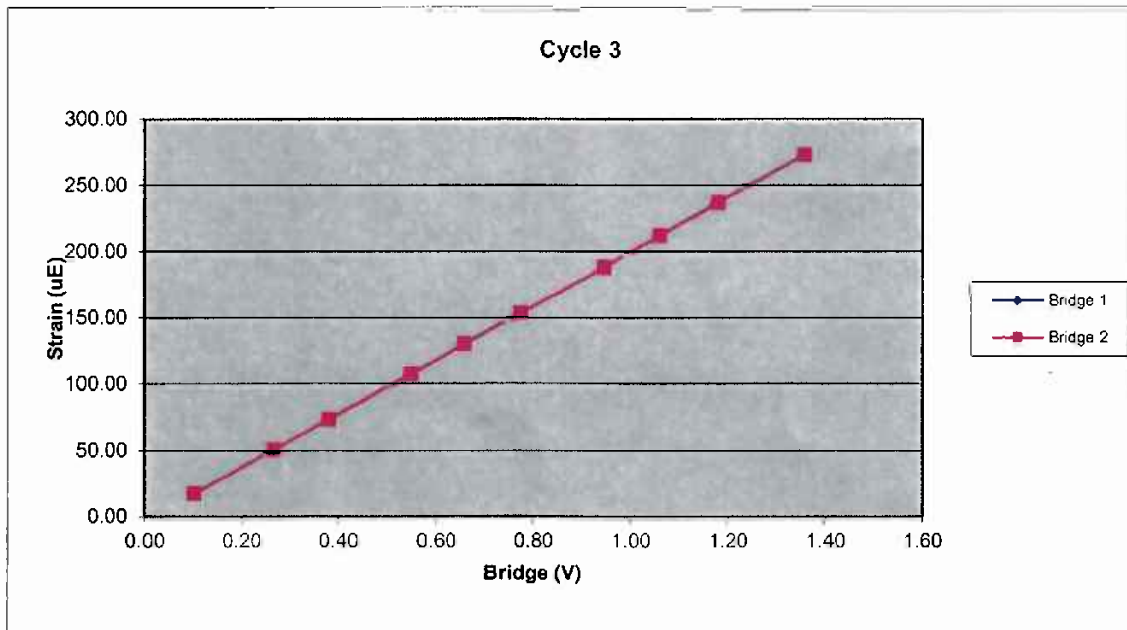
Force Strain Calibration	
EA (Kips)	36756.34
Offset	315.07
Correlation	0.999995



528AWJ		Cycle 3		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	734.68	18.74	0.10	0.10
3	1943.58	51.94	0.26	0.26
4	2781.29	75.07	0.38	0.38
5	4027.81	108.88	0.55	0.55
6	4829.55	131.78	0.66	0.66
7	5689.29	155.36	0.77	0.77
8	6956.49	190.12	0.95	0.95
9	7799.46	214.09	1.06	1.06
10	8693.90	238.78	1.18	1.18
11	10007.88	275.06	1.36	1.36

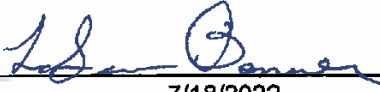
Bridge 1		Bridge 2	
Force Calibration (lb/V)	7366.71	Force Calibration (lb/V)	7364.49
Offset	-6.17	Offset	-9.40
Correlation	0.999998	Correlation	0.999999
Strain Calibration ($\mu\text{E}/\text{V}$)	203.78	Strain Calibration ($\mu\text{E}/\text{V}$)	203.72
Offset	-2.08	Offset	-2.17
Correlation	0.999989	Correlation	0.999993

Force Strain Calibration	
EA (Kips)	36149.33
Offset	69.26
Correlation	0.999994



Bridge Excitation (V) 5
Shunt Resistor (ohm) 60.4k

Calibration Factors	528AWJ		
Bridge 1 ($\mu E/V$)	203.51	Bridge 2 ($\mu E/V$)	203.28
EA Factor (Kips)	36213.85	Area (in²)	1.21

Calibrated by: 
Calibrated Date: 7/18/2022

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Accelerometer Calibration Certificate

Pile Dynamics, Inc.



Calibrated by Pile Dynamics, Inc.
 Calibration performed on 14Jun2022

Serial No: K10959 Temperature: 79.0 °F
 Model: PR Humidity: 50%
 Calibrated on: Channel 3 on 8G 5161 LE

PDA CALIBRATION FACTOR

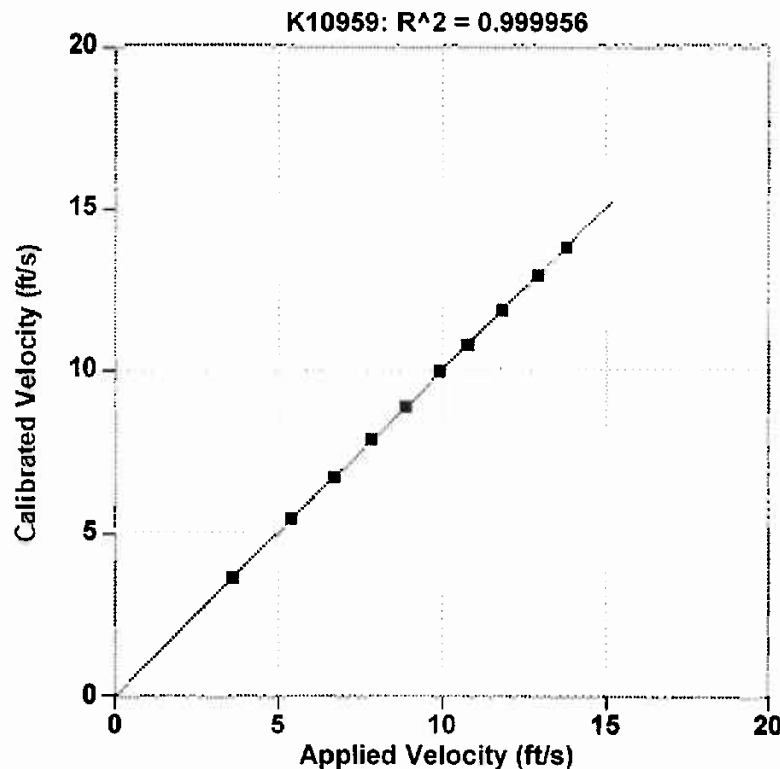
413.8 mv/5000g
 (82.8 μ v/g)
 R²: 0.999956 [Chip programmed]

Ref Acc 1: 72517! Cal on: 24Mar2022
 1049 g's/volt
 Ref Acc 2: 72505! Cal on: 24Mar2022
 1035 g's/volt

Operator: William Johnson

William Johnson
 Signed

Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).



Reference Velocity ft/s	S/N K10959 Velocity ft/s
3.605	3.589
5.397	5.412
6.705	6.699
7.841	7.862
8.877	8.913
9.904	9.929
10.746	10.721
11.807	11.815
12.910	12.889
13.783	13.762

Maximum Acceleration: 935 g's

Accelerometer Calibration Certificate

Pile Dynamics, Inc.



Calibrated by Pile Dynamics, Inc.
 Calibration performed on 14Jun2022

Serial No: K10960 Temperature: 79.0 °F
 Model: PR Humidity: 50%
 Calibrated on: Channel 3 on 8G 5161 LE

PDA CALIBRATION FACTOR

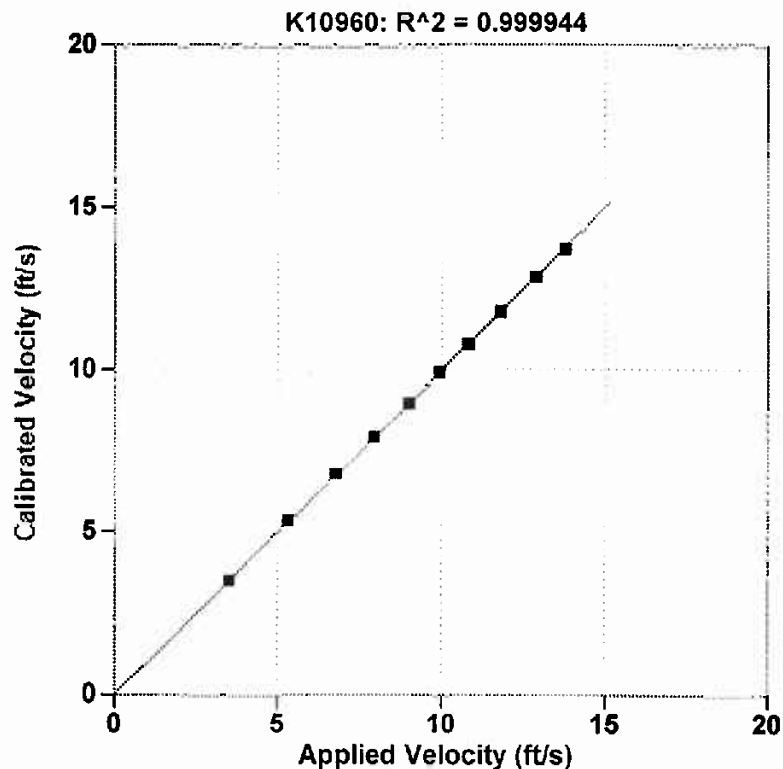
419.9 mv/5000g
 (84.0 μ v/g)
 R²: 0.999944 [Chip programmed]

Operator: William Johnson

Ref Acc 1: 72517! Cal on: 24Mar2022
 1049 g's/volt
 Ref Acc 2: 72505! Cal on: 24Mar2022
 1035 g's/volt

Signed

Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).



Reference Velocity ft/s	S/N K10960 Velocity ft/s
3.513	3.540
5.322	5.345
6.769	6.796
7.933	7.937
8.998	9.037
9.912	9.923
10.788	10.775
11.781	11.779
12.877	12.863
13.771	13.732

Maximum Acceleration: 934 g's

Accelerometer Calibration Certificate

Pile Dynamics, Inc.



Calibrated by Pile Dynamics, Inc.
 Calibration performed on 14Jun2022

Serial No: K11957 Temperature: 79.0 °F
 Model: PR Humidity: 50%
 Calibrated on: Channel 3 on 8G 5161 LE

PDA CALIBRATION FACTOR

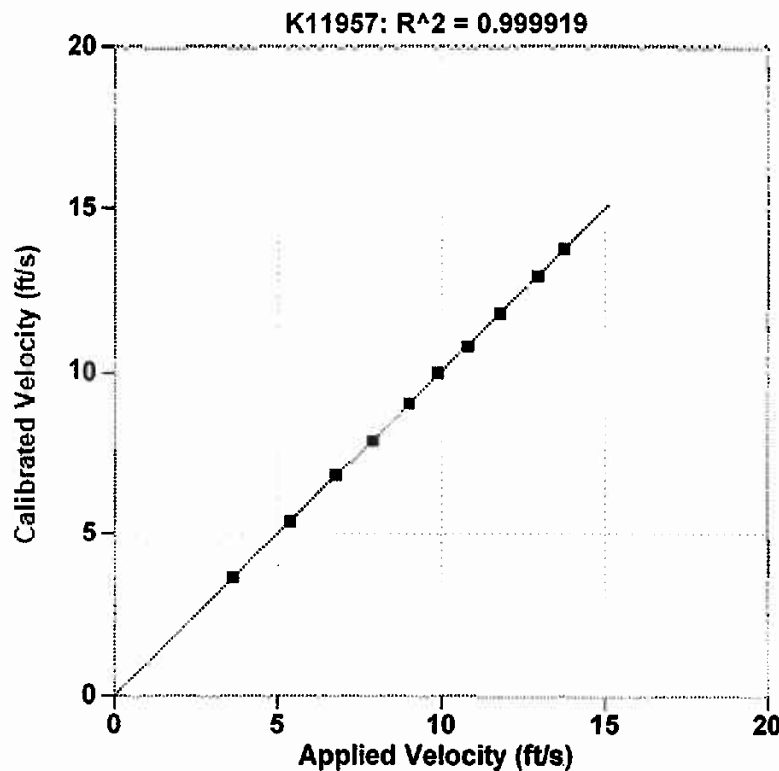
409.6 mv/5000g
 (81.9 μ v/g)
 R²: 0.999919 [Chip programmed]

Ref Acc 1: 72517! Cal on: 24Mar2022
 1049 g's/volt
 Ref Acc 2: 72505! Cal on: 24Mar2022
 1035 g's/volt

Operator: William Johnson

William Johnson
 Signed

Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).



Reference Velocity ft/s	S/N K11957 Velocity ft/s
3.643	3.661
5.377	5.363
6.761	6.783
7.895	7.905
8.973	8.989
9.864	9.918
10.780	10.730
11.763	11.749
12.920	12.894
13.735	13.746

Maximum Acceleration: 931 g's



APPENDIX IV



This documents that
Robert E. Kral
Carolinas Geotechnical Group

has on May 20, 2016 achieved the rank of

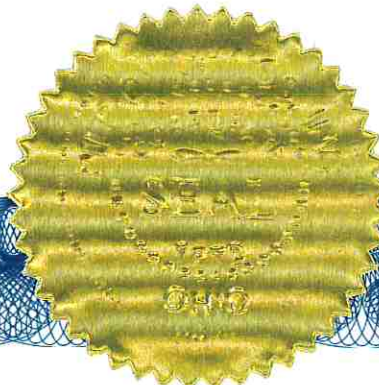
ADVANCED


on the Dynamic Measurement and Analysis Proficiency Test.

The individual identified on this document demonstrated to the degree granted above an understanding of theory, data quality evaluation, interpretation and signal matching for high strain dynamic testing of deep foundations. ***It is recommended that individuals at the Advanced level seek Master or Expert levels through additional study within six years of the date of this document.***

The ability of the individual named to provide appropriate knowledge and advice on a specific project is not implied or warranted by the Pile Driving Contractors Association or Pile Dynamics, Inc. **This certificate can be verified at www.PDAproficiencytest.com.** The Pile Driving Contractors Association or Pile Dynamics, Inc. assumes no liability for foundation testing and analysis work performed by the bearer of this certificate.


Steven A. Hall, Executive Director
Pile Driving Contractors Association



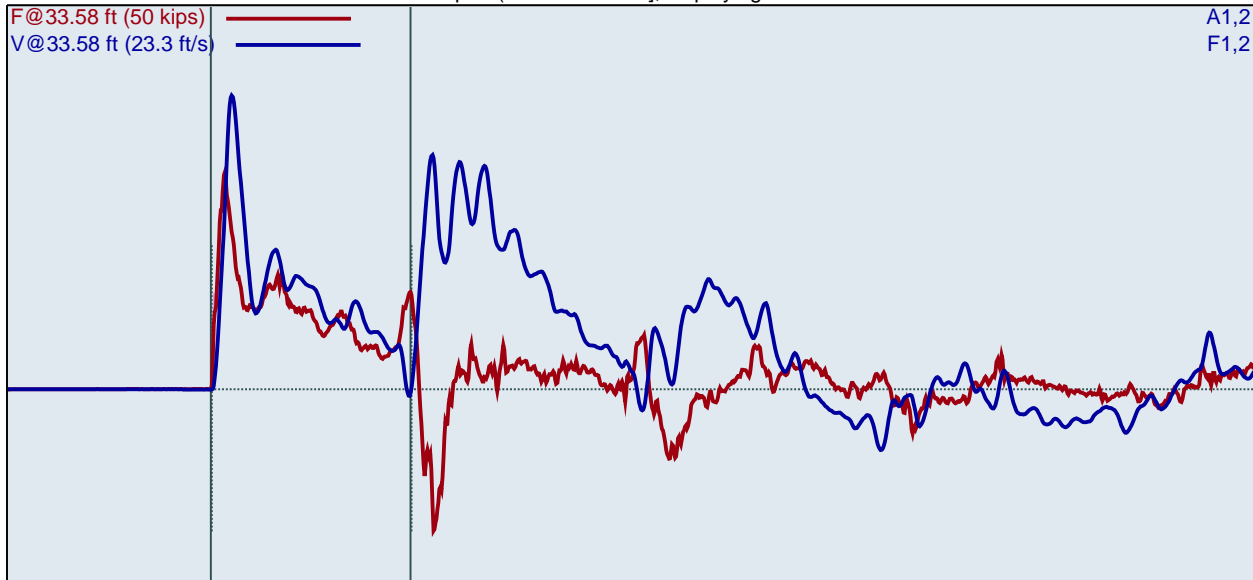

Garland Likins, Senior Partner
Pile Dynamics, Inc.

No. 2072

CME 750X ATV - SN322938 (R-58)
H. Forbes
AR: 1.20 in²
LE: 33.58 ft
WS: 16807.9 ft/s

S&ME Annual Testing
Test date: 8/7/2017
SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (28.50 - 30.00 ft], displaying BN: 23



BPM: Blows/Minute
FMX: Maximum Force
VMX: Maximum Velocity
DMX: Maximum Displacement

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	28.60	5	1.9	28	17.5	1.20	23.5	1.20	288.9	82.6
2	28.70	5	50.3	29	17.6	1.20	24.1	1.20	286.6	81.9
3	28.80	5	50.3	29	17.8	1.20	24.6	1.20	289.0	82.6
4	28.90	5	50.4	27	17.2	1.20	22.4	1.20	290.4	83.0
5	29.00	5	50.3	29	18.1	1.20	24.0	1.20	290.3	82.9
6	29.06	8	50.4	29	18.1	0.84	24.5	0.75	291.6	83.3
7	29.13	8	50.4	28	17.6	0.83	23.4	0.75	289.2	82.6
8	29.19	8	50.5	28	16.6	0.81	23.2	0.75	287.1	82.0
9	29.25	8	50.4	28	17.9	0.80	23.0	0.75	290.6	83.0
10	29.31	8	50.5	28	17.5	0.81	23.0	0.75	285.5	81.6
11	29.38	8	50.3	28	17.6	0.83	23.6	0.75	287.7	82.2
12	29.44	8	50.4	29	17.8	0.85	24.2	0.75	283.7	81.1
13	29.50	8	50.4	28	17.8	0.90	23.3	0.75	290.0	82.9
14	29.54	12	50.4	29	17.6	0.95	24.3	0.50	286.2	81.8
15	29.58	12	50.6	30	18.1	0.91	25.1	0.50	289.9	82.8
16	29.63	12	50.3	30	18.1	0.84	24.6	0.50	289.8	82.8
17	29.67	12	50.5	29	18.3	0.81	24.0	0.50	291.2	83.2
18	29.71	12	50.2	30	18.2	0.82	24.7	0.50	293.3	83.8
19	29.75	12	50.3	28	18.3	0.80	23.2	0.50	291.2	83.2
20	29.79	12	50.3	30	17.6	0.79	24.6	0.50	289.4	82.7
21	29.83	12	50.4	29	18.0	0.79	24.4	0.50	292.0	83.4
22	29.88	12	50.4	28	18.1	0.83	23.7	0.50	294.1	84.0
23	29.92	12	50.4	28	17.9	0.80	23.6	0.50	292.2	83.5
24	29.96	12	50.4	29	18.1	0.81	24.2	0.50	292.9	83.7
25	30.00	12	50.4	29	17.8	0.80	24.1	0.50	296.0	84.6

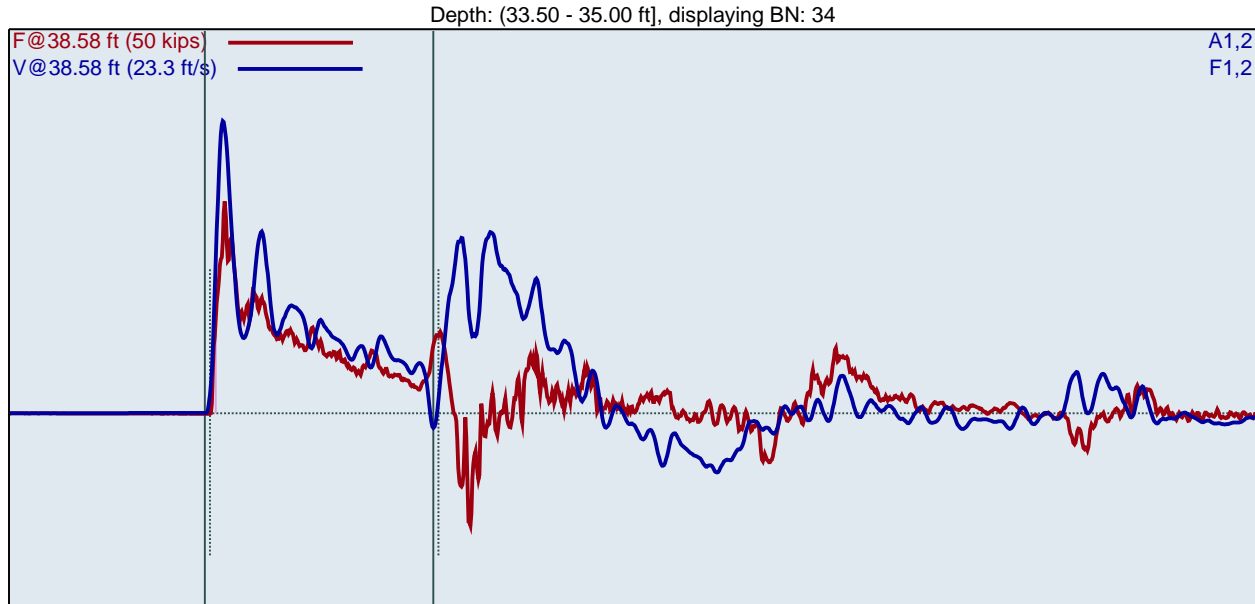
Average	50.4	29	17.8	0.83	23.9	0.60	290.2	82.9
Std Dev	0.1	1	0.4	0.04	0.6	0.12	3.0	0.8
Maximum	50.6	30	18.3	0.95	25.1	0.75	296.0	84.6
Minimum	50.2	28	16.6	0.79	23.0	0.50	283.7	81.1

N-value: 20

Sample Interval Time: 28.54 seconds.

CME 750X ATV - SN322938 (R-58)
H. Forbes
AR: 1.20 in²
LE: 38.58 ft
WS: 16807.9 ft/s

S&ME Annual Testing
Test date: 8/7/2017
SP: 0.492 k/ft³
EM: 30000 ksi



BPM: Blows/Minute

FMX: Maximum Force

VMX: Maximum Velocity

DMX: Maximum Displacement

CSX: Compression Stress Maximum

DFN: Final Displacement

EFV: Maximum Energy

ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	33.55	11	56.3	29	16.4	1.09	23.9	0.55	296.5	84.7
2	33.59	11	51.7	29	16.8	0.77	24.4	0.55	303.4	86.7
3	33.64	11	52.0	28	17.1	0.68	23.7	0.55	302.0	86.3
4	33.68	11	51.7	28	17.6	0.66	23.7	0.55	304.4	87.0
5	33.73	11	52.0	29	17.0	0.64	23.8	0.55	301.2	86.1
6	33.77	11	51.6	29	17.7	0.63	24.3	0.55	307.0	87.7
7	33.82	11	51.8	27	17.0	0.61	22.8	0.55	295.1	84.3
8	33.86	11	51.9	28	16.6	0.61	23.5	0.55	302.0	86.3
9	33.91	11	51.9	29	17.2	0.61	24.3	0.55	304.6	87.0
10	33.95	11	51.9	29	17.5	0.60	23.8	0.55	302.9	86.6
11	34.00	11	51.8	28	16.7	0.59	23.5	0.55	300.3	85.8
12	34.04	12	51.9	28	17.5	0.57	23.3	0.50	297.2	84.9
13	34.08	12	51.7	28	17.3	0.58	23.1	0.50	304.7	87.1
14	34.13	12	52.1	28	17.7	0.59	23.1	0.50	304.3	87.0
15	34.17	12	51.7	29	17.4	0.57	23.8	0.50	304.2	86.9
16	34.21	12	51.9	29	17.3	0.56	24.0	0.50	304.2	86.9
17	34.25	12	51.9	28	16.6	0.54	23.6	0.50	298.8	85.4
18	34.29	12	51.8	29	16.7	0.53	23.8	0.50	298.8	85.4
19	34.33	12	51.9	28	17.0	0.54	23.4	0.50	300.8	85.9
20	34.38	12	51.8	28	17.0	0.52	23.7	0.50	299.1	85.5
21	34.42	12	51.8	28	17.3	0.52	23.1	0.50	299.0	85.4
22	34.46	12	51.7	28	17.5	0.53	23.7	0.50	301.5	86.1
23	34.50	12	52.0	28	17.6	0.53	23.5	0.50	301.1	86.0
24	34.54	13	51.6	28	17.7	0.53	23.1	0.46	304.2	86.9
25	34.58	13	52.0	29	17.6	0.53	23.8	0.46	301.4	86.1

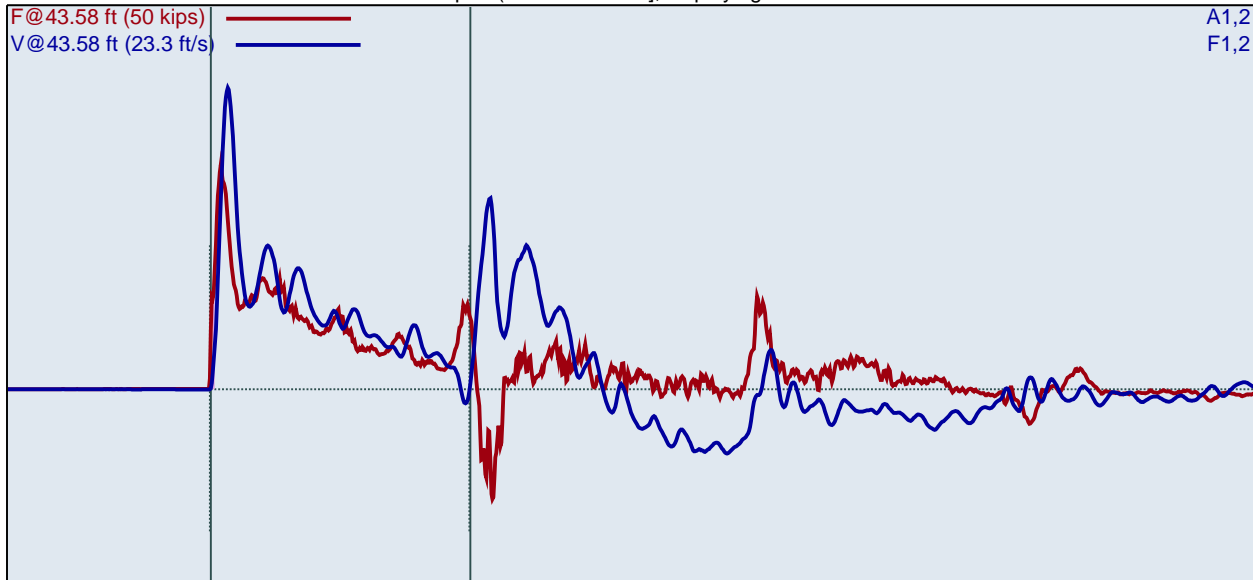
26	34.62	13	51.6	28	17.8	0.52	23.1	0.46	300.3	85.8
27	34.65	13	52.0	27	17.9	0.51	22.8	0.46	301.3	86.1
28	34.69	13	51.8	28	17.8	0.52	22.9	0.46	299.5	85.6
29	34.73	13	51.7	27	18.0	0.52	22.8	0.46	302.9	86.6
30	34.77	13	52.0	28	17.8	0.51	23.1	0.46	298.1	85.2
31	34.81	13	51.6	26	17.0	0.52	21.7	0.46	297.8	85.1
32	34.85	13	51.9	26	17.7	0.52	21.4	0.46	297.4	85.0
33	34.88	13	51.8	26	16.5	0.53	21.3	0.46	296.5	84.7
34	34.92	13	51.8	28	17.8	0.53	23.0	0.46	302.7	86.5
35	34.96	13	51.7	26	17.9	0.51	21.6	0.46	299.8	85.6
36	35.00	13	51.9	25	17.7	0.50	21.1	0.46	302.3	86.4
Average			51.8	28	17.4	0.53	22.9	0.48	300.7	85.9
Std Dev			0.1	1	0.4	0.02	0.8	0.02	2.5	0.7
Maximum			52.1	29	18.0	0.59	24.0	0.50	304.7	87.1
Minimum			51.6	25	16.5	0.50	21.1	0.46	296.5	84.7
N-value: 25										

Sample Interval Time: 40.46 seconds.

CME 750X ATV - SN322938 (R-58)
H. Forbes
AR: 1.20 in²
LE: 43.58 ft
WS: 16807.9 ft/s

S&ME Annual Testing
Test date: 8/7/2017
SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (38.50 - 40.00 ft], displaying BN: 42



BPM: Blows/Minute

FMX: Maximum Force

VMX: Maximum Velocity

DMX: Maximum Displacement

CSX: Compression Stress Maximum

DFN: Final Displacement

EFV: Maximum Energy

ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	38.54	13	59.6	28	18.3	0.97	23.7	0.46	296.6	84.7
2	38.58	13	51.2	28	18.2	0.80	23.0	0.46	299.5	85.6
3	38.62	13	51.5	28	17.9	0.76	22.9	0.46	295.4	84.4
4	38.65	13	51.1	28	18.2	0.74	23.4	0.46	298.5	85.3
5	38.69	13	51.3	28	18.4	0.72	23.2	0.46	297.5	85.0
6	38.73	13	51.3	28	17.4	0.70	23.3	0.46	295.4	84.4
7	38.77	13	51.3	27	18.2	0.68	22.9	0.46	294.9	84.3
8	38.81	13	51.5	29	18.0	0.66	24.5	0.46	297.0	84.9
9	38.85	13	51.7	29	18.2	0.64	24.3	0.46	298.7	85.3
10	38.88	13	51.7	27	17.9	0.62	22.9	0.46	297.2	84.9
11	38.92	13	51.7	29	18.1	0.61	23.8	0.46	297.1	84.9
12	38.96	13	51.7	29	18.2	0.59	24.3	0.46	295.6	84.5
13	39.00	13	51.5	29	18.3	0.59	23.9	0.46	297.1	84.9
14	39.04	14	51.8	29	17.9	0.57	24.1	0.43	297.1	84.9
15	39.07	14	51.5	29	18.4	0.56	24.3	0.43	297.6	85.0
16	39.11	14	51.7	28	18.2	0.56	23.6	0.43	297.2	84.9
17	39.14	14	51.5	28	18.1	0.55	23.6	0.43	295.0	84.3
18	39.18	14	51.6	28	17.8	0.55	23.7	0.43	297.3	85.0
19	39.21	14	51.7	28	18.1	0.54	23.3	0.43	294.4	84.1
20	39.25	14	51.6	29	18.1	0.54	24.2	0.43	296.3	84.7
21	39.29	14	51.6	28	18.0	0.53	23.0	0.43	294.3	84.1
22	39.32	14	51.5	30	17.8	0.53	25.1	0.43	296.6	84.7
23	39.36	14	51.8	28	17.8	0.52	23.1	0.42	293.8	84.0
24	39.39	14	51.5	30	17.8	0.52	24.7	0.43	298.5	85.3
25	39.43	14	51.7	27	17.7	0.52	22.7	0.43	295.1	84.3

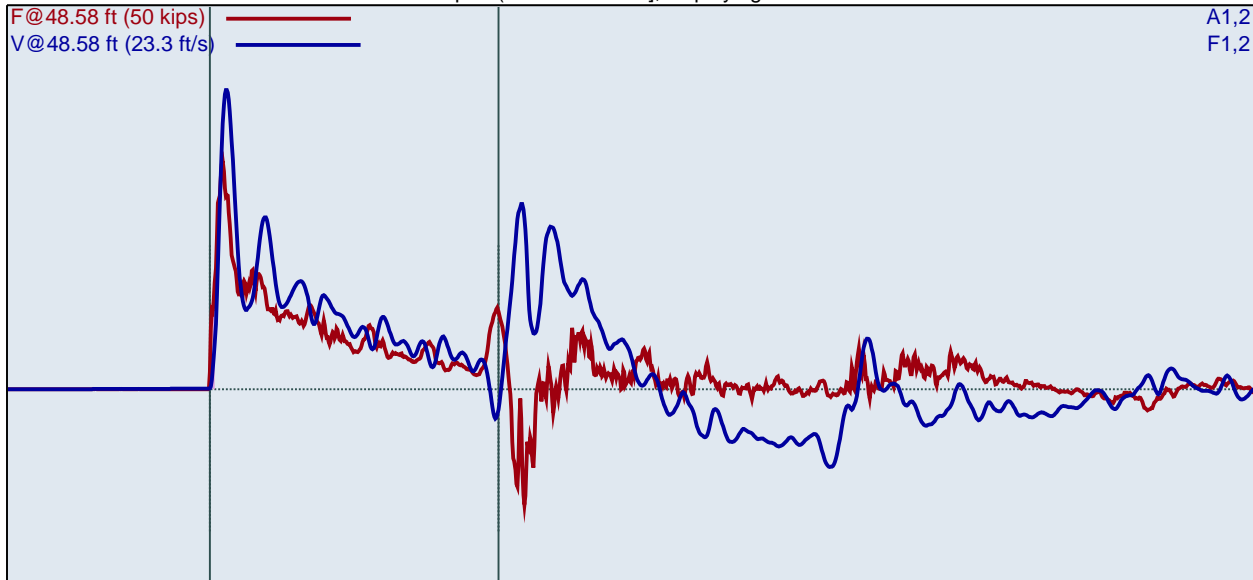
26	39.46	14	51.5	29	17.7	0.51	24.1	0.43	295.8	84.5
27	39.50	14	51.7	28	18.0	0.51	22.9	0.43	296.6	84.7
28	39.53	17	51.6	30	17.8	0.51	24.8	0.35	295.8	84.5
29	39.56	17	51.5	27	17.5	0.50	22.4	0.35	295.9	84.6
30	39.59	17	51.7	29	17.9	0.50	24.0	0.35	294.0	84.0
31	39.62	17	51.4	28	18.1	0.50	23.5	0.35	297.6	85.0
32	39.65	17	51.8	26	17.2	0.49	21.9	0.35	292.2	83.5
33	39.68	17	51.5	29	17.8	0.49	23.9	0.35	293.9	84.0
34	39.71	17	51.5	28	17.7	0.49	23.3	0.35	295.9	84.5
35	39.74	17	51.6	30	17.7	0.49	25.0	0.35	295.7	84.5
36	39.76	17	51.5	27	17.8	0.48	22.8	0.35	294.0	84.0
37	39.79	17	51.7	30	17.7	0.48	25.2	0.35	296.7	84.8
38	39.82	17	51.6	28	17.9	0.47	23.7	0.35	296.8	84.8
39	39.85	17	51.7	29	17.9	0.47	24.5	0.35	295.7	84.5
40	39.88	17	51.5	29	18.0	0.47	24.3	0.35	296.8	84.8
41	39.91	17	51.8	28	17.9	0.46	23.6	0.35	296.0	84.6
42	39.94	17	51.6	29	18.3	0.46	24.3	0.35	295.4	84.4
43	39.97	17	51.7	28	17.2	0.46	23.0	0.35	293.6	83.9
44	40.00	17	51.5	29	17.5	0.45	24.1	0.35	297.9	85.1
Average			51.6	29	17.8	0.51	23.8	0.39	295.8	84.5
Std Dev			0.1	1	0.3	0.03	0.8	0.04	1.5	0.4
Maximum			51.8	30	18.4	0.57	25.2	0.43	298.5	85.3
Minimum			51.4	26	17.2	0.45	21.9	0.35	292.2	83.5
N-value: 31										

Sample Interval Time: 49.95 seconds.

CME 750X ATV - SN322938 (R-58)
H. Forbes
AR: 1.20 in²
LE: 48.58 ft
WS: 16807.9 ft/s

S&ME Annual Testing
Test date: 8/7/2017
SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (43.50 - 45.00 ft], displaying BN: 37



BPM: Blows/Minute

FMX: Maximum Force

VMX: Maximum Velocity

DMX: Maximum Displacement

CSX: Compression Stress Maximum

DFN: Final Displacement

EFV: Maximum Energy

ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	43.55	10	59.9	29	17.7	1.08	24.5	0.60	304.6	87.0
2	43.60	10	51.9	28	17.5	0.78	23.7	0.60	298.4	85.2
3	43.65	10	51.8	30	17.9	0.77	24.7	0.60	302.6	86.4
4	43.70	10	52.0	29	18.4	0.77	24.3	0.60	308.2	88.1
5	43.75	10	51.8	30	18.4	0.71	25.2	0.60	305.0	87.1
6	43.80	10	51.9	29	18.1	0.71	24.4	0.60	303.5	86.7
7	43.85	10	51.9	30	18.4	0.70	24.9	0.60	310.5	88.7
8	43.90	10	52.0	30	18.2	0.68	24.6	0.60	305.7	87.3
9	43.95	10	51.5	29	17.8	0.67	24.5	0.60	309.1	88.3
10	44.00	10	51.9	31	18.4	0.67	26.0	0.60	312.2	89.2
11	44.04	12	51.9	30	18.1	0.64	25.3	0.50	306.2	87.5
12	44.08	12	51.7	29	17.9	0.62	24.0	0.50	309.0	88.3
13	44.13	12	51.9	30	18.0	0.59	24.8	0.50	301.6	86.2
14	44.17	12	51.6	31	18.3	0.60	25.5	0.50	313.4	89.5
15	44.21	12	52.0	30	18.2	0.58	24.9	0.50	302.7	86.5
16	44.25	12	51.7	30	17.9	0.59	24.9	0.50	311.4	89.0
17	44.29	12	51.8	30	18.3	0.59	25.2	0.50	309.4	88.4
18	44.33	12	51.8	30	17.9	0.59	25.2	0.50	312.3	89.2
19	44.38	12	51.8	29	17.9	0.57	24.4	0.50	303.9	86.8
20	44.42	12	51.7	30	17.8	0.56	24.9	0.50	305.4	87.3
21	44.46	12	51.7	29	17.9	0.56	24.3	0.50	304.9	87.1
22	44.50	12	52.1	29	17.7	0.56	24.3	0.50	305.3	87.2
23	44.53	17	51.7	31	18.1	0.56	25.7	0.35	306.8	87.7
24	44.56	17	52.1	29	17.8	0.55	24.6	0.35	305.1	87.2
25	44.59	17	51.4	30	18.3	0.56	24.8	0.35	311.8	89.1

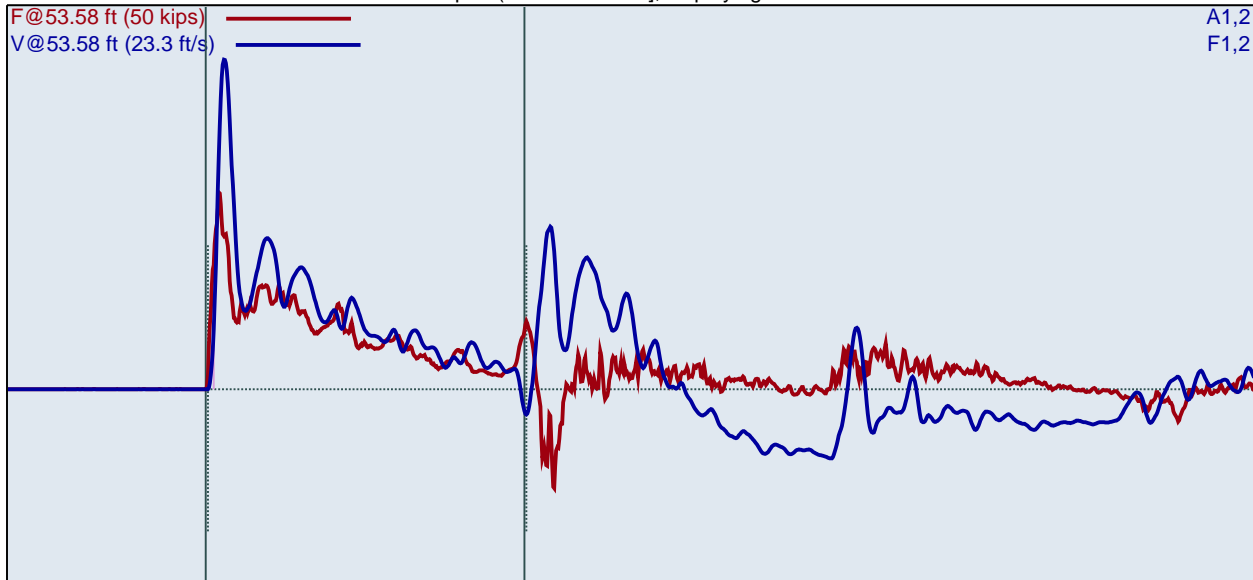
26	44.62	17	52.1	29	17.6	0.54	24.2	0.35	300.3	85.8
27	44.65	17	51.7	29	17.6	0.53	24.1	0.35	306.0	87.4
28	44.68	17	51.9	29	17.9	0.53	24.0	0.35	303.5	86.7
29	44.71	17	51.7	29	16.9	0.53	24.0	0.35	301.9	86.3
30	44.74	17	51.6	27	17.1	0.52	22.1	0.35	302.1	86.3
31	44.76	17	52.0	29	17.7	0.49	23.9	0.35	297.0	84.8
32	44.79	17	51.7	28	18.0	0.49	23.6	0.35	297.5	85.0
33	44.82	17	51.9	29	17.7	0.50	24.0	0.35	301.9	86.3
34	44.85	17	51.6	29	18.0	0.50	23.9	0.35	302.8	86.5
35	44.88	17	51.7	29	17.8	0.51	24.5	0.35	306.2	87.5
36	44.91	17	51.6	29	17.8	0.51	24.1	0.35	306.3	87.5
37	44.94	17	51.9	30	18.2	0.50	24.8	0.35	307.4	87.8
38	44.97	17	52.0	29	17.8	0.50	24.5	0.35	304.8	87.1
39	45.00	17	51.7	28	17.3	0.49	23.3	0.35	305.2	87.2
Average			51.8	29	17.8	0.55	24.4	0.41	305.2	87.2
Std Dev			0.2	1	0.3	0.04	0.7	0.07	4.0	1.1
Maximum			52.1	31	18.3	0.64	25.7	0.50	313.4	89.5
Minimum			51.4	27	16.9	0.49	22.1	0.35	297.0	84.8
N-value: 29										

Sample Interval Time: 43.93 seconds.

CME 750X ATV - SN322938 (R-58)
H. Forbes
AR: 1.20 in²
LE: 53.58 ft
WS: 16807.9 ft/s

S&ME Annual Testing
Test date: 8/7/2017
SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (48.50 - 50.00 ft], displaying BN: 36



BPM: Blows/Minute

FMX: Maximum Force

VMX: Maximum Velocity

DMX: Maximum Displacement

CSX: Compression Stress Maximum

DFN: Final Displacement

EFV: Maximum Energy

ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	48.56	8	52.4	27	19.9	1.03	22.4	0.75	312.1	89.2
2	48.63	8	52.1	26	19.2	0.92	21.7	0.75	309.0	88.3
3	48.69	8	51.8	27	20.0	0.89	22.5	0.75	316.4	90.4
4	48.75	8	52.0	27	19.6	0.82	22.6	0.75	309.3	88.4
5	48.81	8	51.9	27	19.9	0.81	22.7	0.75	314.9	90.0
6	48.88	8	51.9	27	19.7	0.77	22.5	0.75	310.8	88.8
7	48.94	8	52.1	27	19.9	0.77	22.6	0.75	314.0	89.7
8	49.00	8	52.0	27	19.8	0.76	22.8	0.75	313.9	89.7
9	49.04	12	52.2	27	19.6	0.67	22.7	0.50	309.4	88.4
10	49.08	12	51.9	28	19.6	0.65	23.2	0.50	309.7	88.5
11	49.13	12	52.0	28	19.4	0.64	23.3	0.50	311.6	89.0
12	49.17	12	51.9	27	19.3	0.64	22.7	0.50	311.2	88.9
13	49.21	12	52.0	27	19.4	0.63	22.5	0.50	309.2	88.3
14	49.25	12	51.8	28	19.4	0.62	23.2	0.50	310.9	88.8
15	49.29	12	51.9	27	19.3	0.62	22.8	0.50	310.3	88.7
16	49.33	12	52.0	28	19.6	0.61	23.0	0.50	310.0	88.6
17	49.38	12	51.8	27	19.6	0.60	22.5	0.50	306.8	87.7
18	49.42	12	52.0	26	20.0	0.60	21.5	0.50	310.1	88.6
19	49.46	12	51.8	26	19.1	0.59	21.9	0.50	309.8	88.5
20	49.50	12	52.0	26	19.9	0.58	21.8	0.50	309.4	88.4
21	49.53	18	51.8	27	19.9	0.60	22.1	0.33	318.1	90.9
22	49.56	18	52.0	27	19.8	0.56	22.3	0.33	306.3	87.5
23	49.58	18	51.9	27	18.7	0.59	22.9	0.33	317.4	90.7
24	49.61	18	51.9	26	19.7	0.56	22.0	0.33	305.1	87.2
25	49.64	18	51.9	26	19.5	0.57	21.7	0.33	312.1	89.2

26	49.67	18	51.5	24	19.1	0.55	20.2	0.33	303.5	86.7
27	49.69	18	52.1	26	19.9	0.56	21.8	0.33	311.5	89.0
28	49.72	18	51.7	25	20.0	0.55	21.2	0.33	311.9	89.1
29	49.75	18	52.0	26	20.3	0.54	21.8	0.33	310.6	88.7
30	49.78	18	51.8	26	19.5	0.53	21.7	0.33	304.6	87.0
31	49.81	18	52.0	24	20.4	0.53	20.4	0.33	312.1	89.2
32	49.83	18	51.9	26	20.1	0.53	22.1	0.33	311.7	89.1
33	49.86	18	52.2	26	19.2	0.51	21.4	0.33	302.3	86.4
34	49.89	18	51.8	25	20.3	0.51	21.0	0.33	310.3	88.6
35	49.92	18	51.7	25	20.1	0.50	21.2	0.33	308.1	88.0
36	49.94	18	51.9	26	20.0	0.50	21.4	0.33	309.2	88.4
37	49.97	18	51.5	26	20.6	0.51	21.5	0.33	313.8	89.6
38	50.00	18	51.9	25	19.9	0.49	21.0	0.33	303.3	86.7
Average			51.9	26	19.7	0.57	22.0	0.40	309.7	88.5
Std Dev			0.2	1	0.4	0.05	0.8	0.08	3.6	1.0
Maximum			52.2	28	20.6	0.67	23.3	0.50	318.1	90.9
Minimum			51.5	24	18.7	0.49	20.2	0.33	302.3	86.4
N-value: 30										

Sample Interval Time: 42.70 seconds.

Summary of SPT Test Results

Project: CME 750X ATV - SN322938 (R-58), Test Date: 8/7/2017

Instr. Length ft	Start Depth ft	Final Depth ft	Blows Applied /6"	N Value	N60 Value	Average BPM bpm	Average FMX kips	Average VMX ft/s	Average DMX in	Average CSX ksi	Average DFN in	Average EFV ft-lb	Average ETR (%)
33.58	28.50	30.00	5-8-12	20	28	50.4	29	17.8	0.83	23.9	0.60	290.2	82.9
38.58	33.50	35.00	11-12-13	25	35	51.8	28	17.4	0.53	22.9	0.48	300.7	85.9
43.58	38.50	40.00	13-14-17	31	44	51.6	29	17.8	0.51	23.8	0.39	295.8	84.5
48.58	43.50	45.00	10-12-17	29	41	51.8	29	17.8	0.55	24.4	0.41	305.2	87.2
53.58	48.50	50.00	8-12-18	30	42	51.9	26	19.7	0.57	22.0	0.40	309.7	88.5
Overall Average Values:						51.6	28	18.2	0.58	23.4	0.44	301.0	86.0
Standard Deviation:						0.5	1	0.9	0.11	1.2	0.10	7.3	2.1
Overall Maximum Value:						52.2	31	20.6	0.95	25.7	0.75	318.1	90.9
Overall Minimum Value:						50.2	24	16.5	0.45	20.2	0.33	283.7	81.1

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

**Report of SPT Energy Measurements
S&ME CME-55 Truck (SN 328245)
Fayetteville, North Carolina
S&ME Project No. 6235-17-009**



Prepared for:
**North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699**

Prepared by:
**S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, NC 28273**

May 1, 2017



May 1, 2017

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

Attention: Mr. Shunyi (Chris) Chen, Ph.D., P.E.

cc: Ms. Cheryl A. Youngblood, L.G.

Reference: **Report of SPT Energy Measurements**
S&ME CME-55 Truck (SN 328245)
Fayetteville, North Carolina
S&ME Project No. 6235-17-009

Dear Mr. Chen:

We have completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer mounted on our CME-55 Truck drill rig with a serial number of 328245. This service was performed by our Mr. Robert E. Kral on April 4, 2017 between the times of 11:39 AM and 12:40 PM. SPT energy testing was performed in general accordance with ASTM D4633 and the most recent revision of the North Carolina Department of Transportation, Geotechnical Engineering Unit's requirements. The testing procedures, equipment used during testing, and detailed results are presented in this report.

1.0 Dynamic Testing Methodology

Testing was performed using a model PAX (Serial No. 3733L) Pile Driving Analyzer™ (PDA) manufactured by Pile Dynamics, Inc. The PDA records and interprets data from two piezoresistive accelerometers (Serial Nos. K5641 and K5642) bolted to a 2-foot long AWJ drill rod (SN203) internally instrumented with two strain transducers. The instrumented AWJ drill rod has a cross-sectional area of 1.20 square inches, an outside diameter of approximately 1.75 inches, and an inside diameter of 1.375 inches at the gage location. Calibration sheets for the accelerometers and the instrumented rod are included in the Appendix. The accelerometers and strain gages, which are mounted on opposing axes near the middle of the instrumented rod, monitor acceleration and strain for each hammer blow. The analyzer converts the data to velocities and forces, computing the maximum transferred hammer energies with the "EFV" method described in ASTM D4633. All results are recorded and displayed in real time for each blow.

2.0 Testing and Observations

S&ME personnel were on site on April 4, 2017 to observe and perform testing during SPT sampling on the CME-55 truck mounted rig operated by Ted Miller of S&ME. The measurements were taken during drilling operations at the Fayetteville Outer Loop (TIP U-2519AA) project in Fayetteville, North Carolina. The measurements were obtained during the SPT sampling of Soil Test Boring Y2_2800. SPT energy measurements were recorded during four intervals at depths of approximately 57.6, 62.6, 67.6, and 72.6 ft below the existing ground surface. The information presented in the tables below summarizes the equipment tested and tooling used for this Report of SPT Energy Measurements.

Table 2-1: Drill Rig Information

Manufacturer	CME
Model	55
Serial Number	328245
Operator	Ted Miller
Carrier	Truck

Table 2-2: Hammer Information

Model / Type	CME / Auto
Serial Number	N/A
Anvil Height (inches)	11.5
Anvil Diameter (inches)	2.5
Drop Height (inches)	30
Ram Weight (pounds)	140
Ram Serial Number	N/A

Table 2-3: Drilling and Instrumented Rod Information

Drill Rod Type	AWJ
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in²)	1.20
Typical Length (feet)	5 and 10
Instrumented Rod Type	AWJ (SN 203)
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in²)	1.20
Total Instrumented Rod Length (feet)	2.0
Length Below Gages (feet)	0.88
Split Spoon Length (feet)	2.88

The reported blow counts, obtained by the drill rig personnel, are presented with the energy data in Table 3-1 and on the Field and Boring Logs in the Appendix. A representative graph of force and normalized velocity vs. time for a typical blow and the following list of plots and tables are incorporated into the Appendix.

3.0 Dynamic Testing Results

Based on the test data, the automatic hammer on the CME-55 truck mounted rig operated at a rate of about 51.6 to 52.2 blows per minute (bpm) during dynamic testing. The measured transferred hammer energy (EFV) was generally in the range of about 267.1 to 307.3 ft-lbs, which corresponds to Energy Transfer Ratio (ETR) values of about 76.3% to 87.8%, respectively. The SPT Energy Measurement Data Summary tables in the Appendix present the test data from every hammer blow at each sampling interval along with representative force and velocity traces for each test interval. The reported blow counts, obtained by the drill rig personnel, and a summary of the test data and average computed hammer energy and transfer ratio values are provided in Table 3-1. Plots and tables of the following are also included in the Appendix and present the test data with depth for each test interval:

- ◆ Penetration vs. BLC
- ◆ Penetration vs. CSX
- ◆ Average ETR vs. Rod Length
- ◆ Penetration vs. FMX
- ◆ Penetration vs. VMX
- ◆ ETR vs. Rod Length
- ◆ Penetration vs. EFV
- ◆ Penetration vs. ETR

Table 3-1: Summary of Dynamic Testing Results

Data Set ID	Instrumentation to Sampler Tip Length (ft)	Sample Depth (ft)	Blows per 6" Increment / N-value	Soil Sample Description (Residual)	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (percent)
1	63.76	57.6 - 59.1	7-10-9 / 19	SAND	51.9	286.9	82.0
2	68.76	62.6 - 64.1	9-10-12 / 22	SAND	52.0	298.6	85.3
3	73.76	67.6 - 69.1	6-13-17 / 30	SAND	51.9	295.9	84.5
4	78.76	72.6 - 74.1	6-11-10 / 21	SAND	51.9	294.8	84.2
Overall Average					51.9	294.4	84.1

The average hammer rate, transferred energy, and transfer ratio were calculated for each depth interval. Per ASTM D4633, only the blows from the final foot of each sample interval (i.e. the blows that determine the N-value) were included when computing these average values. **The overall average transferred hammer energy for the automatic hammer on the CME-55 truck mounted rig (for all the depth intervals tested) was 294.4 foot-pounds, with an average ETR of 84.1%.**

4.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

5.0 Closing

S&ME appreciates the opportunity to provide this report to the North Carolina Department of Transportation Geotechnical Engineering Unit. Please let us know if you have any questions concerning this report.

Sincerely,

S&ME, Inc.



R. Heath Forbes, P.E. (SC)
Geotechnical Project Manager



Robert E. Kral, P.E.
Transportation Services Project Manager
N.C. Registration No. 042642



Senior Reviewed By: Kristen H. Hill, L.G., P.E.

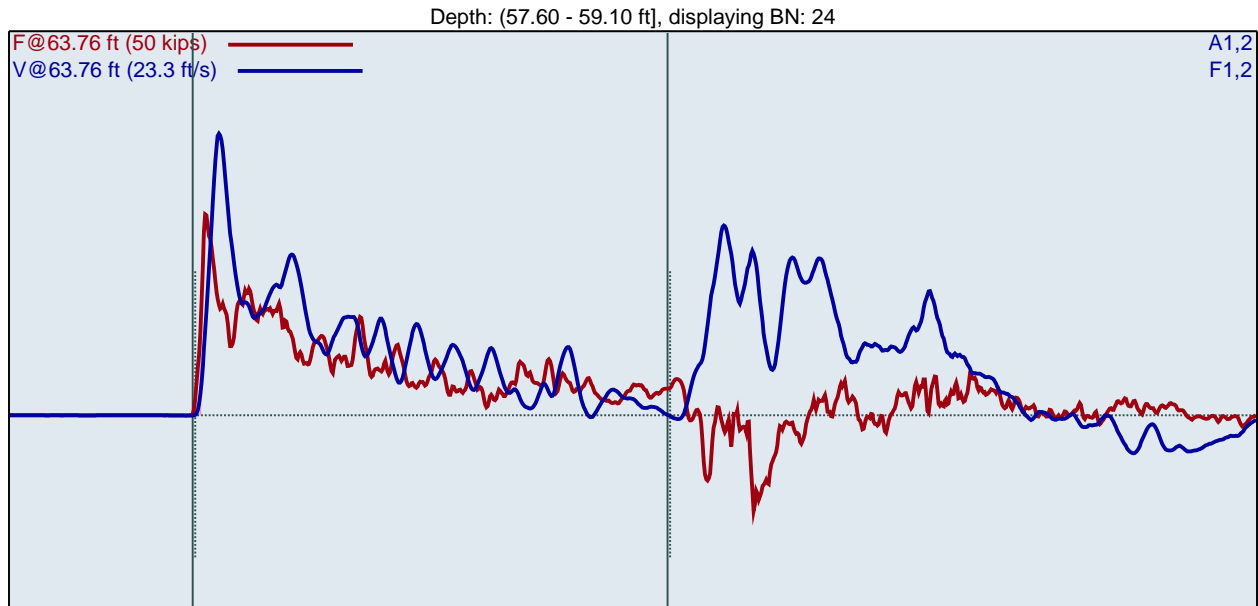
Appendices:

- ◆ Appendix I - CME 55 (SN 328245) SPT Energy Measurements Summary Plots and Tables
- ◆ Appendix II - Field Log and Boring Log
- ◆ Appendix III - Instrumented Rod and Accelerometer Calibration Sheets
- ◆ Appendix IV - Certificate of Proficiency

Appendix I

CME55 Truck (SN 328245)
R. Kral
AR: 1.20 in²
LE: 63.76 ft
WS: 16807.9 ft/s

28+00, 20LT
Test date: 4/4/2017
SP: 0.492 k/ft³
EM: 30000 ksi



BPM: Blows/Minute
FMX: Maximum Force
VMX: Maximum Velocity
DMX: Maximum Displacement

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	57.67	7	60.7	27	14.5	1.02	22.9	0.78	247.9	70.8
2	57.74	7	52.7	27	14.5	1.03	22.2	0.82	266.7	76.2
3	57.81	7	52.0	27	14.5	0.84	22.7	0.81	255.9	73.1
4	57.89	7	51.8	27	14.6	0.82	22.7	0.81	266.4	76.1
5	57.96	7	52.2	27	14.9	0.81	22.6	0.81	264.2	75.5
6	58.03	7	52.0	27	15.1	0.83	22.8	0.82	275.9	78.8
7	58.10	7	52.1	27	15.5	0.86	22.7	0.83	286.6	81.9
8	58.15	10	51.9	27	15.9	0.70	22.9	0.57	280.6	80.2
9	58.20	10	51.9	27	15.8	0.67	22.5	0.56	275.1	78.6
10	58.25	10	52.0	27	15.9	0.67	22.6	0.56	273.4	78.1
11	58.30	10	51.9	28	16.0	0.68	23.0	0.57	275.0	78.6
12	58.35	10	52.0	28	16.3	0.78	23.2	0.56	290.9	83.1
13	58.40	10	51.7	28	16.5	0.69	23.1	0.57	279.9	80.0
14	58.45	10	52.2	28	16.5	0.67	23.5	0.57	274.3	78.4
15	58.50	10	51.7	27	16.6	0.77	22.8	0.57	292.7	83.6
16	58.55	10	52.1	27	16.5	0.75	22.5	0.57	290.2	82.9
17	58.60	10	52.2	27	16.3	0.74	22.6	0.57	287.9	82.3
18	58.66	9	51.7	27	16.3	0.76	22.2	0.63	294.5	84.2
19	58.71	9	52.0	27	16.3	0.73	22.2	0.65	289.5	82.7
20	58.77	9	51.9	25	16.5	0.74	20.8	0.64	292.3	83.5
21	58.82	9	51.9	27	16.2	0.72	22.3	0.64	290.6	83.0
22	58.88	9	51.9	26	17.3	0.71	21.9	0.64	295.6	84.5
23	58.93	9	52.2	27	16.8	0.71	22.3	0.64	290.4	83.0
24	58.99	9	51.9	26	17.1	0.71	21.8	0.64	291.7	83.4
25	59.04	9	52.0	25	16.9	0.71	21.1	0.64	293.0	83.7

26	59.10	9	51.9	25	16.1	0.70	20.6	0.64	293.7	83.9
		Average	51.9	27	16.4	0.72	22.3	0.60	286.9	82.0
		Std Dev	0.1	1	0.4	0.03	0.8	0.04	7.5	2.1
		Maximum	52.2	28	17.3	0.78	23.5	0.65	295.6	84.5
		Minimum	51.7	25	15.8	0.67	20.6	0.56	273.4	78.1

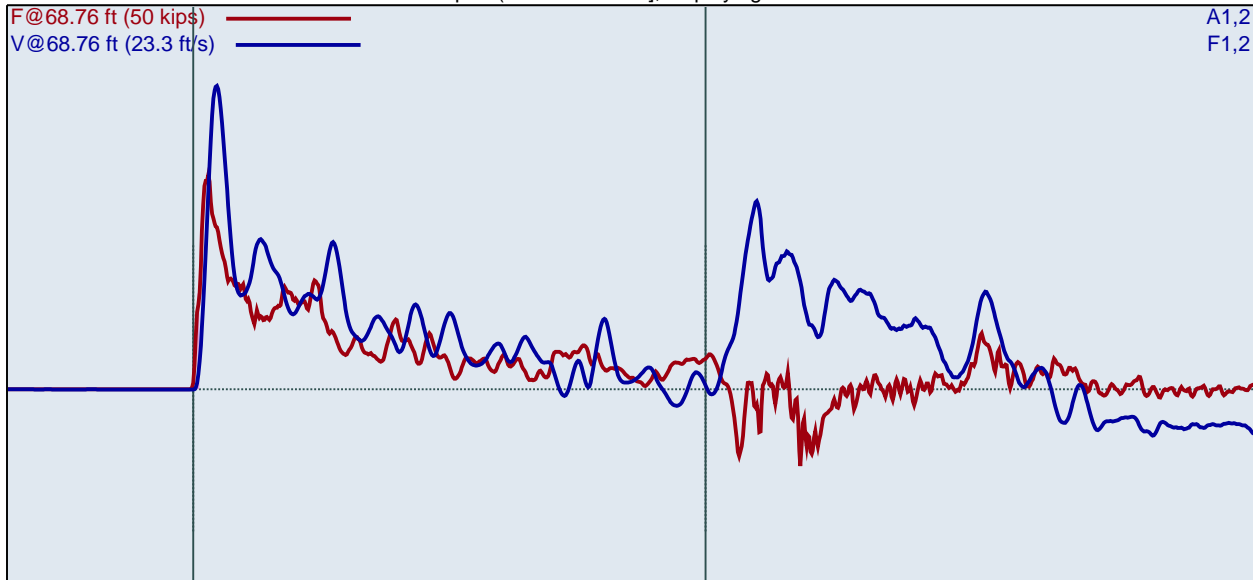
N-value: 19

Sample Interval Time: 28.81 seconds.

CME55 Truck (SN 328245)
R. Kral
AR: 1.20 in²
LE: 68.76 ft
WS: 16807.9 ft/s

28+00, 20LT
Test date: 4/4/2017
SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (62.60 - 64.10 ft], displaying BN: 29



BPM: Blows/Minute
FMX: Maximum Force
VMX: Maximum Velocity
DMX: Maximum Displacement

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	62.66	9	61.1	27	16.9	0.69	22.6	0.61	261.9	74.8
2	62.71	9	52.2	27	17.0	0.69	22.8	0.62	269.8	77.1
3	62.77	9	52.1	28	17.2	0.70	23.0	0.63	277.9	79.4
4	62.82	9	51.7	28	17.1	0.67	23.7	0.63	275.2	78.6
5	62.88	9	52.1	30	17.7	0.67	24.6	0.63	280.4	80.1
6	62.93	9	51.9	29	18.1	0.73	24.2	0.64	295.0	84.3
7	62.99	9	52.1	27	18.1	0.68	22.7	0.63	289.4	82.7
8	63.04	9	52.0	28	17.9	0.68	23.6	0.63	284.1	81.2
9	63.10	9	51.8	27	17.8	0.72	22.1	0.64	291.3	83.2
10	63.15	10	52.1	26	17.7	0.68	22.1	0.57	288.0	82.3
11	63.20	10	51.8	27	17.9	0.64	22.6	0.56	281.8	80.5
12	63.25	10	52.0	26	17.5	0.72	21.9	0.56	297.4	85.0
13	63.30	10	51.7	26	17.7	0.73	21.9	0.56	296.1	84.6
14	63.35	10	52.1	26	17.4	0.67	21.6	0.57	291.3	83.2
15	63.40	10	51.8	27	17.8	0.67	22.4	0.57	291.6	83.3
16	63.45	10	52.1	27	17.9	0.71	22.4	0.57	299.7	85.6
17	63.50	10	52.0	27	18.0	0.62	22.7	0.57	286.6	81.9
18	63.55	10	51.9	28	18.1	0.67	23.0	0.58	300.7	85.9
19	63.60	10	52.0	27	17.9	0.68	22.5	0.57	297.1	84.9
20	63.64	12	51.8	28	18.5	0.68	23.5	0.48	300.2	85.8
21	63.68	12	51.9	28	18.5	0.68	23.6	0.48	304.5	87.0
22	63.73	12	51.9	28	18.6	0.67	23.3	0.48	305.1	87.2
23	63.77	12	52.2	28	18.3	0.67	23.4	0.47	304.9	87.1
24	63.81	12	51.8	28	18.4	0.67	23.1	0.47	306.8	87.7
25	63.85	12	52.2	28	18.2	0.64	23.0	0.47	301.2	86.1

26	63.89	12	51.8	28	18.2	0.64	23.1	0.47	300.9	86.0
27	63.93	12	52.0	28	18.3	0.64	23.1	0.47	301.1	86.0
28	63.98	12	51.9	28	18.4	0.65	23.0	0.47	306.1	87.4
29	64.02	12	51.9	28	18.4	0.64	23.3	0.47	304.6	87.0
30	64.06	12	52.1	28	18.4	0.64	23.0	0.47	303.1	86.6
31	64.10	12	51.9	27	18.2	0.63	22.9	0.47	301.4	86.1
Average			52.0	27	18.1	0.67	22.8	0.52	298.6	85.3
Std Dev			0.1	1	0.3	0.03	0.5	0.05	6.7	1.9
Maximum			52.2	28	18.6	0.73	23.6	0.58	306.8	87.7
Minimum			51.7	26	17.4	0.62	21.6	0.47	281.8	80.5

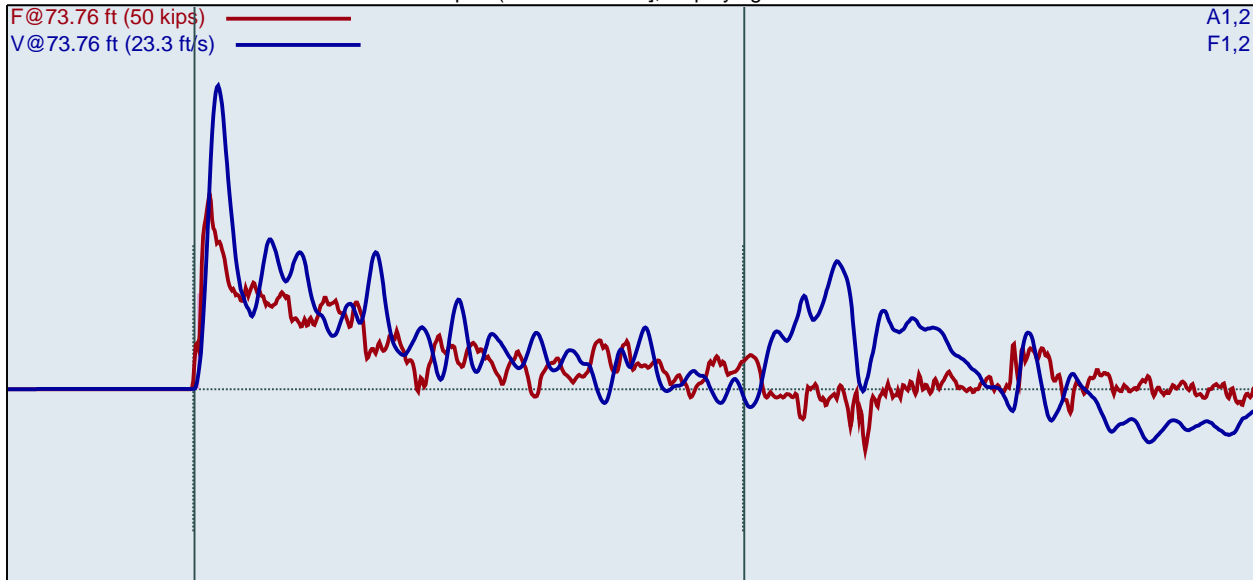
N-value: 22

Sample Interval Time: 34.59 seconds.

CME55 Truck (SN 328245)
R. Kral
AR: 1.20 in²
LE: 73.76 ft
WS: 16807.9 ft/s

28+00, 20LT
Test date: 4/4/2017
SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (67.60 - 69.10 ft], displaying BN: 34



BPM: Blows/Minute
FMX: Maximum Force
VMX: Maximum Velocity
DMX: Maximum Displacement

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

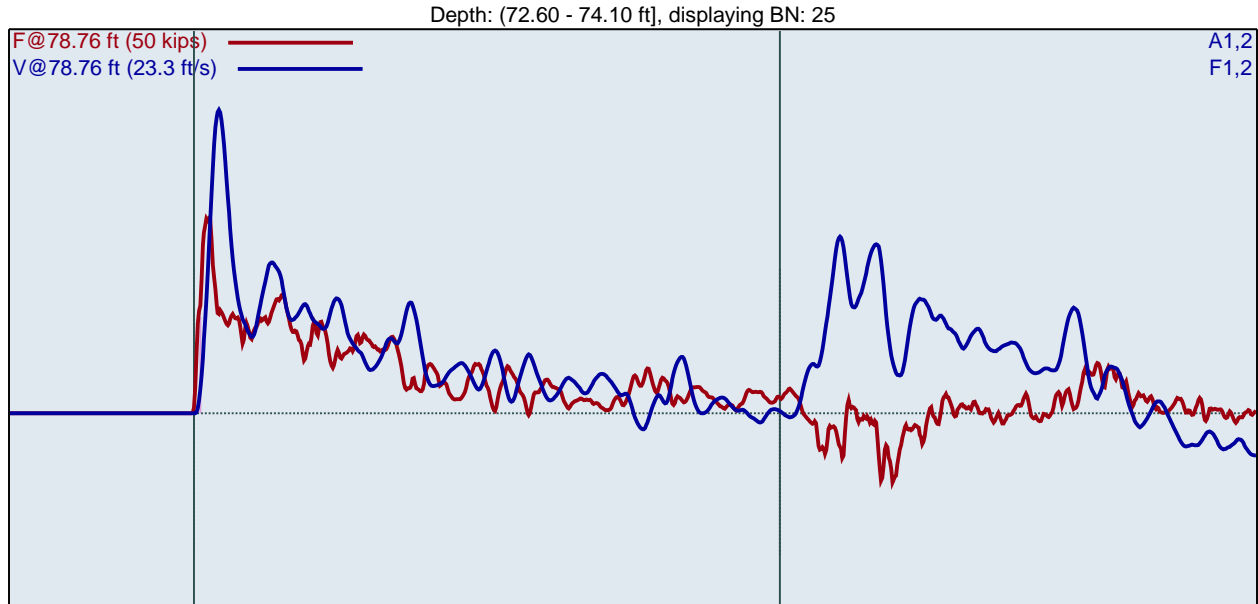
BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	67.68	6	107.6	26	17.9	1.46	22.0	0.93	302.9	86.5
2	67.77	6	52.5	27	18.4	1.25	22.6	0.94	298.6	85.3
3	67.85	6	51.6	26	17.8	1.10	22.0	0.95	295.1	84.3
4	67.93	6	52.1	27	18.0	1.00	22.3	0.97	297.0	84.8
5	68.02	6	52.0	27	18.1	0.96	22.3	0.96	298.5	85.3
6	68.10	6	51.7	27	18.2	0.97	22.3	0.97	297.2	84.9
7	68.14	13	52.0	26	17.9	0.81	21.8	0.43	296.1	84.6
8	68.18	13	52.0	26	18.3	0.62	21.4	0.42	274.8	78.5
9	68.22	13	51.8	26	18.2	0.59	22.1	0.42	274.6	78.5
10	68.25	13	52.2	25	18.2	0.55	20.8	0.42	267.1	76.3
11	68.29	13	52.0	25	18.3	0.57	21.0	0.42	271.7	77.6
12	68.33	13	51.9	26	18.1	0.59	21.4	0.43	282.2	80.6
13	68.37	13	51.8	25	17.7	0.61	20.6	0.44	291.8	83.4
14	68.41	13	51.7	25	17.5	0.54	20.8	0.44	289.3	82.7
15	68.45	13	52.1	26	18.2	0.53	21.4	0.44	298.8	85.4
16	68.48	13	51.9	24	17.6	0.53	19.7	0.44	294.4	84.1
17	68.52	13	51.9	25	18.0	0.52	20.5	0.44	296.4	84.7
18	68.56	13	51.6	24	17.8	0.52	20.2	0.44	300.1	85.7
19	68.60	13	52.1	24	17.4	0.51	20.3	0.44	298.5	85.3
20	68.63	17	51.8	24	17.3	0.51	19.7	0.33	299.4	85.5
21	68.66	17	52.1	24	17.5	0.52	20.1	0.34	298.9	85.4
22	68.69	17	51.8	26	18.3	0.49	21.3	0.33	296.4	84.7
23	68.72	17	51.9	24	17.7	0.53	20.2	0.33	302.2	86.3
24	68.75	17	51.9	25	17.7	0.54	20.7	0.33	302.7	86.5
25	68.78	17	51.9	23	17.3	0.54	19.5	0.33	300.3	85.8

26	68.81	17	51.8	25	17.6	0.54	20.7	0.33	302.2	86.3
27	68.84	17	52.0	26	18.3	0.53	21.8	0.33	305.8	87.4
28	68.86	17	52.1	24	17.8	0.55	20.0	0.33	302.1	86.3
29	68.89	17	51.9	26	18.4	0.54	21.5	0.33	305.1	87.2
30	68.92	17	52.1	26	17.8	0.54	21.5	0.33	298.9	85.4
31	68.95	17	51.8	26	18.6	0.53	21.6	0.33	301.3	86.1
32	68.98	17	51.8	25	18.2	0.54	21.2	0.33	301.2	86.1
33	69.01	17	51.6	25	18.1	0.54	20.8	0.33	304.1	86.9
34	69.04	17	51.9	25	18.5	0.54	21.2	0.33	305.7	87.3
35	69.07	17	51.6	25	17.9	0.55	20.8	0.33	306.3	87.5
36	69.10	17	51.7	26	18.1	0.54	21.3	0.33	307.3	87.8
Average			51.9	25	17.9	0.55	20.9	0.38	295.9	84.5
Std Dev			0.2	1	0.4	0.06	0.7	0.05	10.7	3.1
Maximum			52.2	26	18.6	0.81	22.1	0.44	307.3	87.8
Minimum			51.6	23	17.3	0.49	19.5	0.33	267.1	76.3
N-value: 30										

Sample Interval Time: 40.39 seconds.

CME55 Truck (SN 328245)
R. Kral
AR: 1.20 in²
LE: 78.76 ft
WS: 16807.9 ft/s

28+00, 20LT
Test date: 4/4/2017
SP: 0.492 k/ft³
EM: 30000 ksi



BPM: Blows/Minute
FMX: Maximum Force
VMX: Maximum Velocity
DMX: Maximum Displacement

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	72.68	6	60.7	26	18.7	1.34	21.6	0.94	303.1	86.6
2	72.77	6	52.6	25	17.9	1.18	20.9	0.95	297.0	84.9
3	72.85	6	52.2	27	17.8	1.01	22.1	0.96	292.2	83.5
4	72.93	6	52.0	24	17.9	1.00	19.9	0.96	290.9	83.1
5	73.02	6	51.9	23	18.0	0.96	19.2	0.96	297.6	85.0
6	73.10	6	52.1	24	18.4	0.96	20.0	0.96	296.8	84.8
7	73.15	11	51.8	23	18.1	0.76	19.4	0.50	296.0	84.6
8	73.19	11	52.1	24	18.6	0.76	20.2	0.50	297.6	85.0
9	73.24	11	51.7	25	18.9	0.74	20.8	0.51	298.2	85.2
10	73.28	11	52.2	24	18.3	0.72	19.8	0.51	297.6	85.0
11	73.33	11	52.0	24	19.1	0.71	20.1	0.51	297.5	85.0
12	73.37	11	52.2	25	19.4	0.71	21.1	0.51	296.2	84.6
13	73.42	11	51.7	23	18.5	0.72	19.5	0.51	295.7	84.5
14	73.46	11	51.9	26	18.9	0.72	21.9	0.51	298.1	85.2
15	73.51	11	52.1	25	19.6	0.72	20.8	0.51	297.2	84.9
16	73.55	11	51.8	26	19.0	0.71	21.7	0.51	294.0	84.0
17	73.60	11	52.0	26	20.0	0.72	21.8	0.51	299.1	85.5
18	73.65	10	52.0	26	19.3	0.71	21.4	0.57	294.4	84.1
19	73.70	10	52.1	25	19.1	0.70	20.6	0.57	290.9	83.1
20	73.75	10	51.7	25	20.2	0.70	21.0	0.57	297.5	85.0
21	73.80	10	52.0	27	19.1	0.69	22.3	0.58	290.9	83.1
22	73.85	10	52.0	25	18.9	0.70	21.2	0.58	293.6	83.9
23	73.90	10	52.0	26	18.8	0.69	21.4	0.58	292.7	83.6
24	73.95	10	52.1	25	18.9	0.68	20.9	0.58	288.9	82.5
25	74.00	10	51.6	25	18.4	0.68	21.1	0.58	288.7	82.5

26	74.05	10	52.1	25	18.9	0.69	21.0	0.57	294.1	84.0
27	74.10	10	51.8	25	19.2	0.68	20.7	0.58	291.6	83.3
Average			51.9	25	19.0	0.71	20.9	0.54	294.8	84.2
Std Dev			0.2	1	0.5	0.02	0.7	0.03	3.1	0.9
Maximum			52.2	27	20.2	0.76	22.3	0.58	299.1	85.5
Minimum			51.6	23	18.1	0.68	19.4	0.50	288.7	82.5
N-value: 21										

Sample Interval Time: 29.95 seconds.

Summary of SPT Test Results

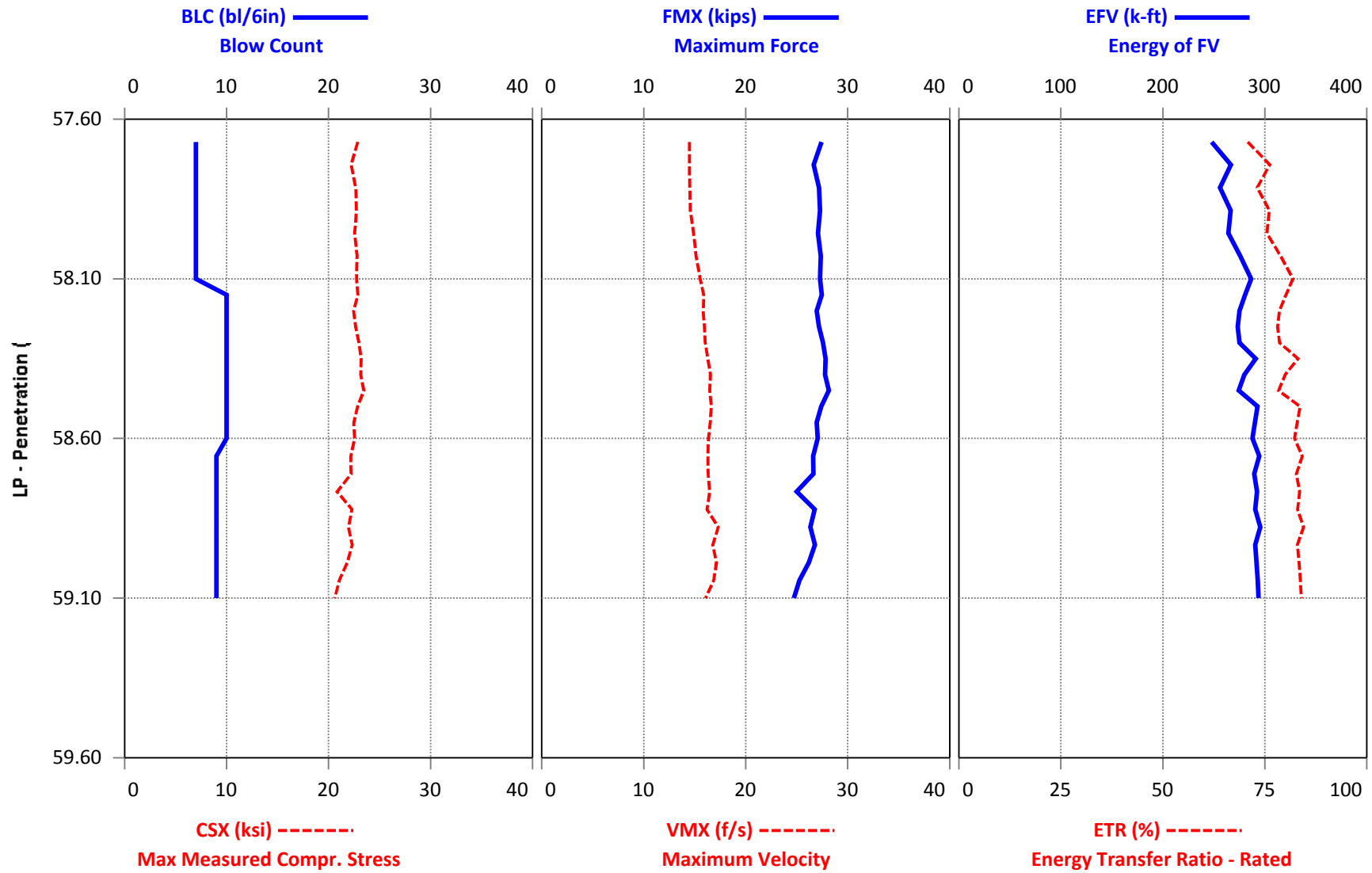
Project: CME55 Truck (SN 328245), Test Date: 4/4/2017

Instr. Length ft	Start Depth ft	Final Depth ft	Blows Applied /6"	N Value	N60 Value	Average BPM bpm	Average FMX kips	Average VMX ft/s	Average DMX in	Average CSX ksi	Average DFN in	Average EFV ft-lb	Average ETR (%)
63.76	57.60	59.10	7-10-9	19	26	51.9	27	16.4	0.72	22.3	0.60	286.9	82.0
68.76	62.60	64.10	9-10-12	22	30	52.0	27	18.1	0.67	22.8	0.52	298.6	85.3
73.76	67.60	69.10	6-13-17	30	42	51.9	25	17.9	0.55	20.9	0.38	295.9	84.5
78.76	72.60	74.10	6-11-10	21	29	51.9	25	19.0	0.71	20.9	0.54	294.8	84.2
Overall Average Values:						51.9	26	17.9	0.65	21.6	0.49	294.4	84.1
Standard Deviation:						0.2	1	1.0	0.08	1.1	0.10	8.9	2.5
Overall Maximum Value:						52.2	28	20.2	0.81	23.6	0.65	307.3	87.8
Overall Minimum Value:						51.6	23	15.8	0.49	19.4	0.33	267.1	76.3

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated



**CME55 Truck (SN 328245) - 57.6 to 59.1 ft
28+00, 20LT**





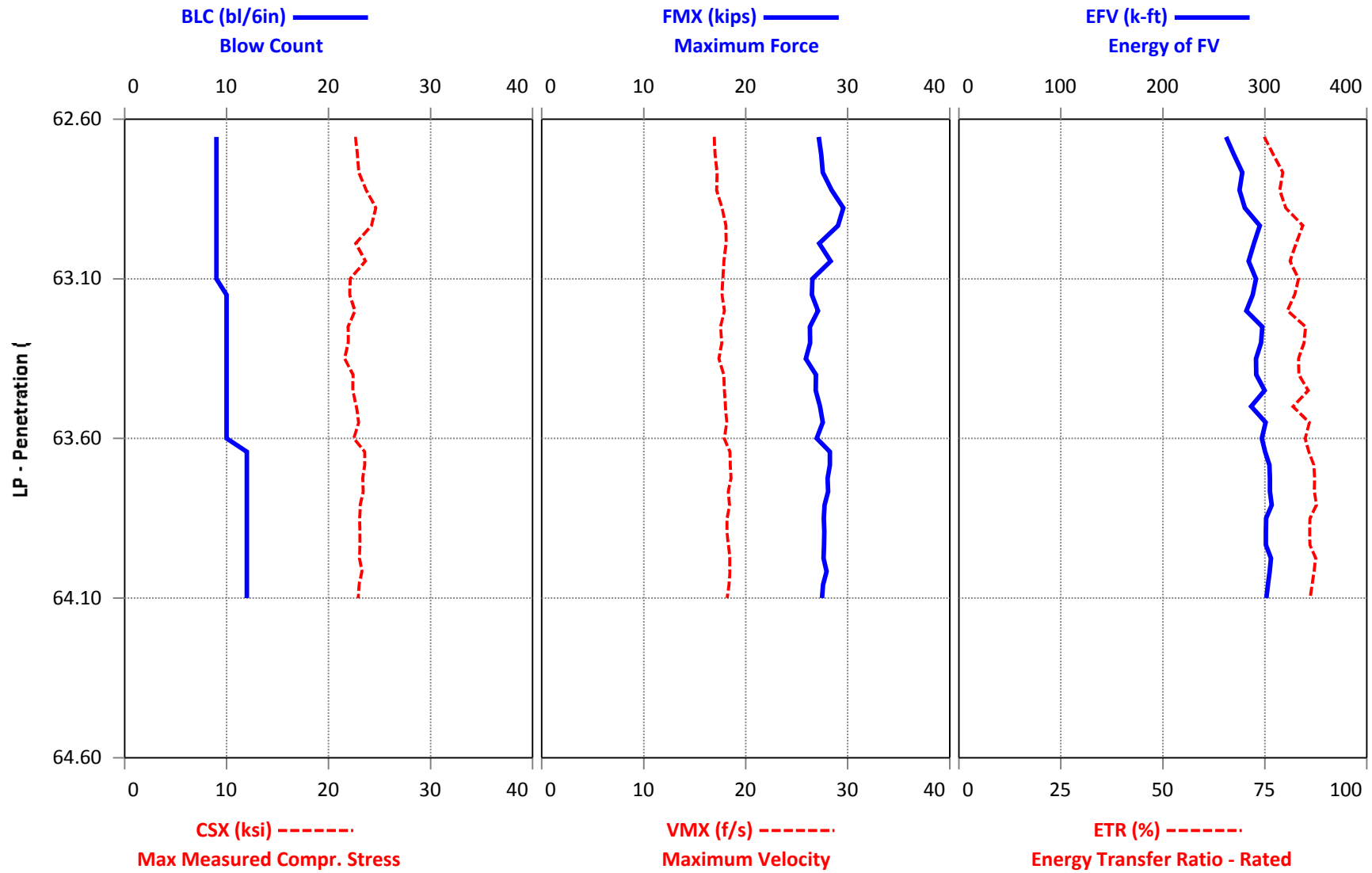
Printed: 25-April-2017

Pile Dynamics, Inc. - PDILOT2 Ver 2016.2.57.6 - Case Method & iCAP® Results

Test started: 04-April-2017



CME55 Truck (SN 328245) - 62.6 to 64.1 ft 28+00, 20LT





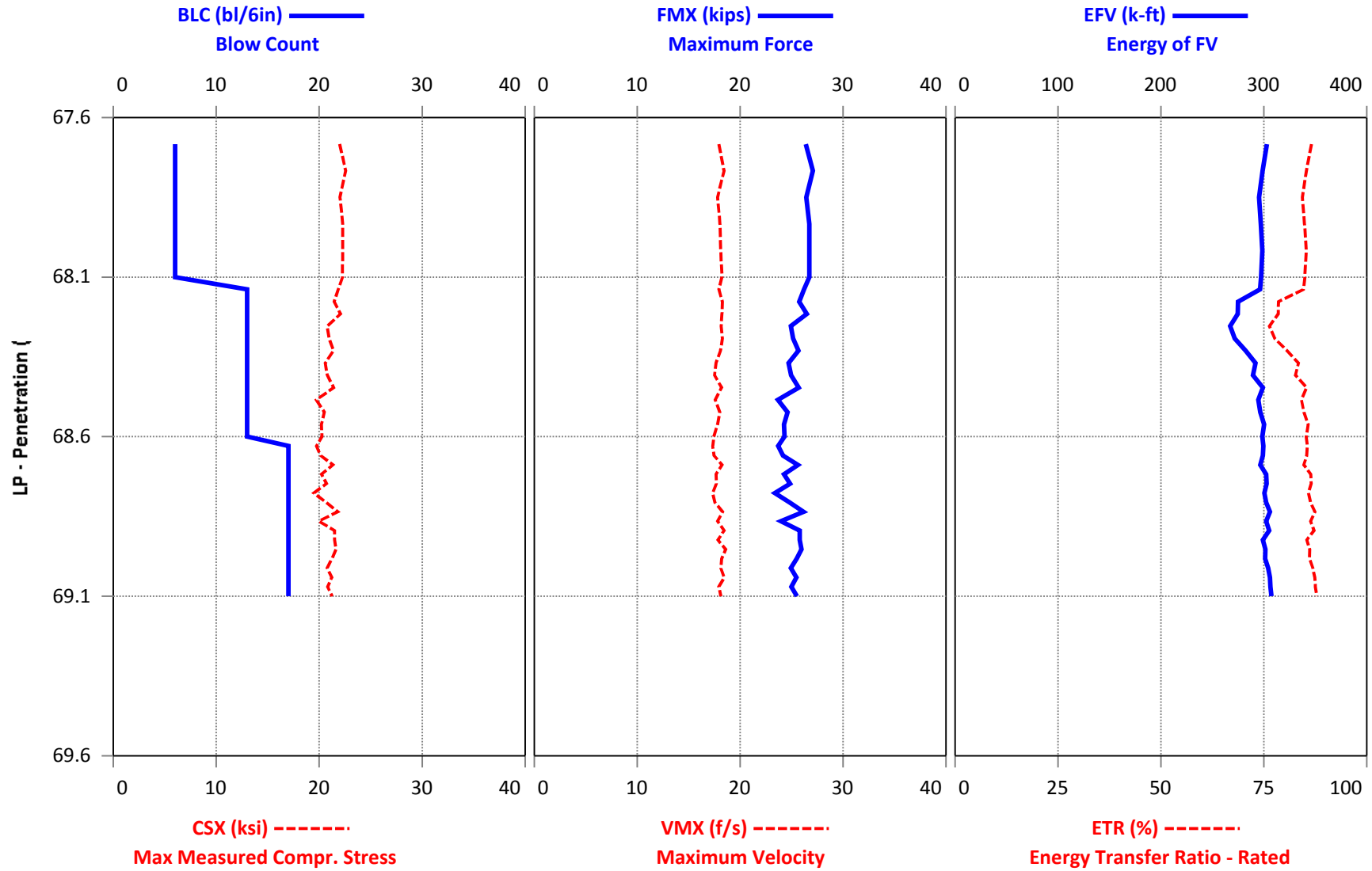
Printed: 25-April-2017

Pile Dynamics, Inc. - PDILOT2 Ver 2016.2.57.6 - Case Method & iCAP® Results

Test started: 04-April-2017



CME55 Truck (SN 328245) - 67.6 to 69.1 ft 28+00, 20LT





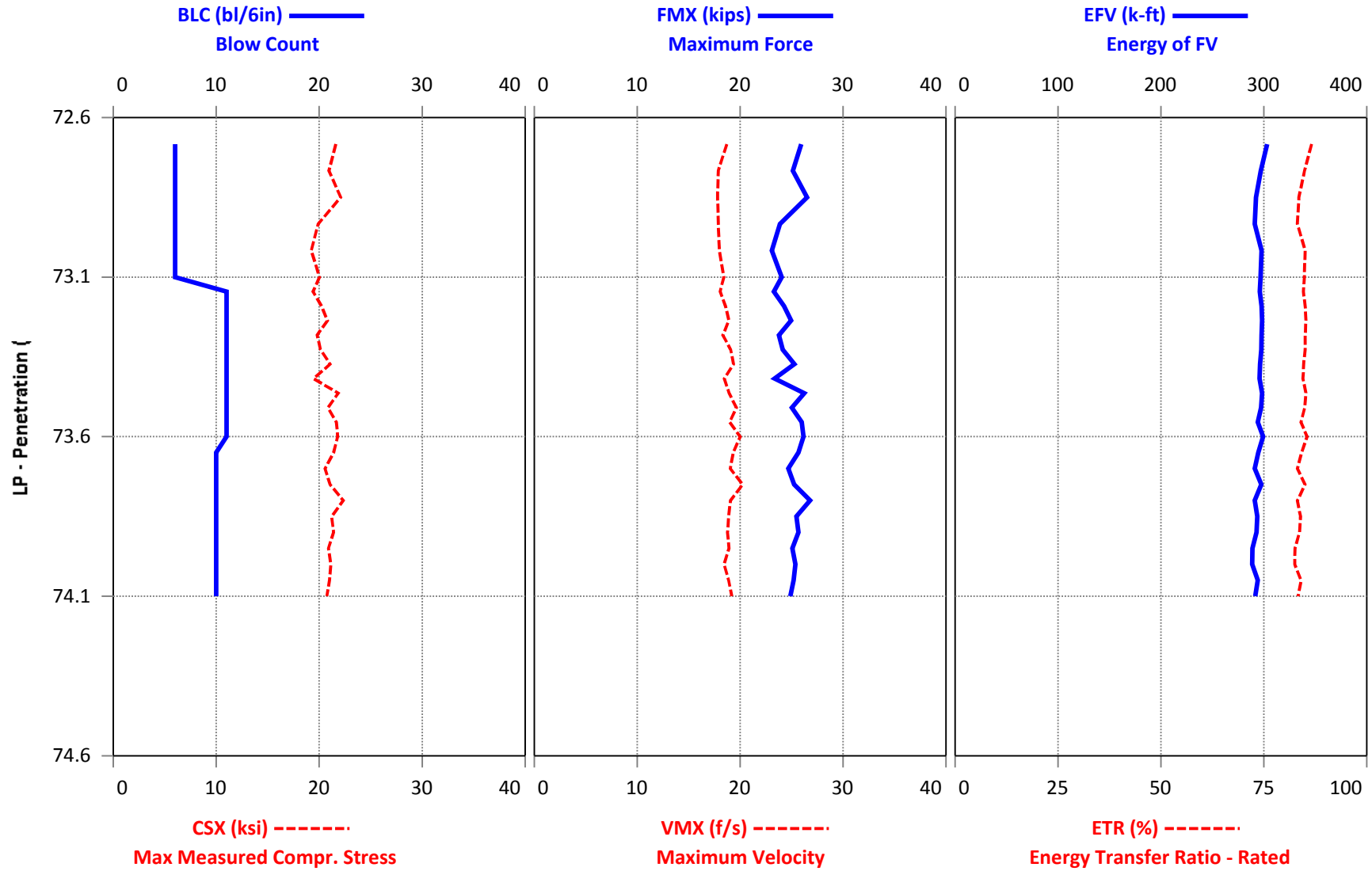
Printed: 25-April-2017

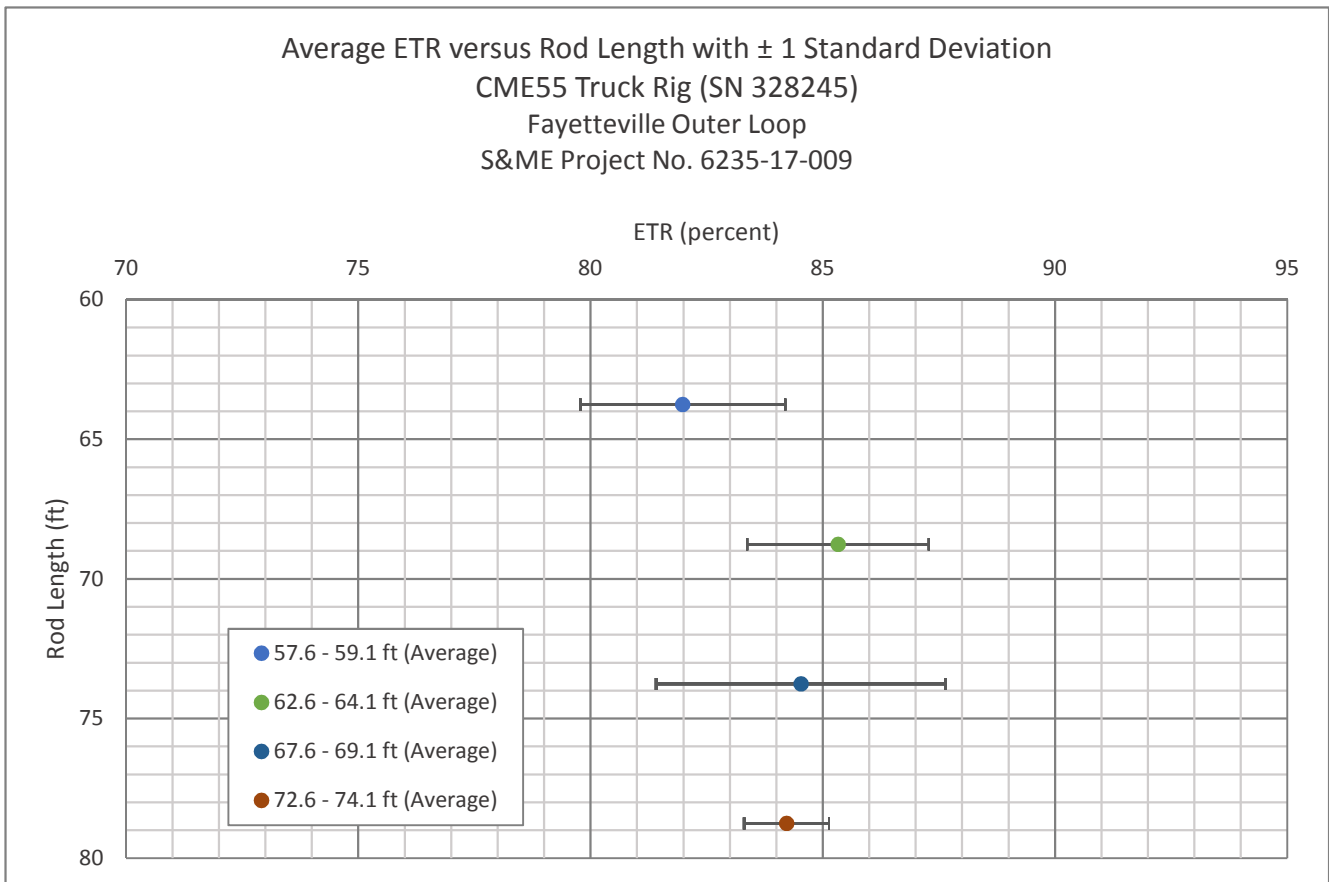
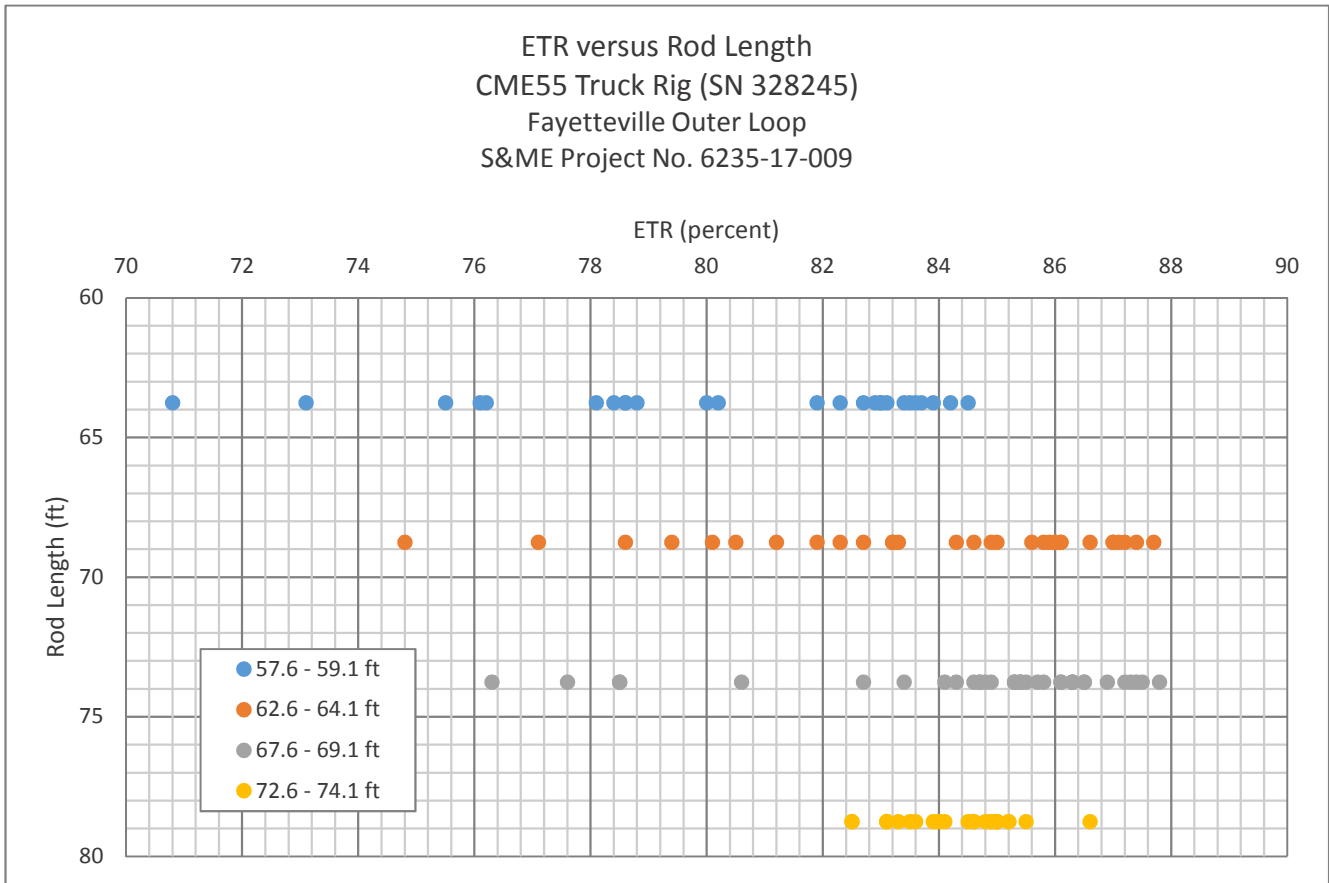
Pile Dynamics, Inc. - PDILOT2 Ver 2016.2.57.6 - Case Method & iCAP® Results

Test started: 04-April-2017



**CME55 Truck (SN 328245) - 72.6 to 74.1 ft
28+00, 20LT**





Appendix II

SPT Energy Evaluation Form



Project: FAYETTEVILLE OUTER LOOP
 Project No.: 6235-17-009
 Boring No.: 28+00 20 LEFT -12-

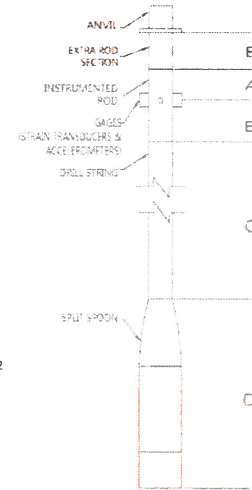
Date (s): 4/4/17
 Weather: PARTLY CLOUDY / 70°F
 Drill Rod Type: AWS

On-site Personnel

Drilling Company: S&ME
 Rig Oper./Helper: T. MILLER / A. PLATTENBURG
 Rig Engr/Geologist: J. SWARTLEY
 Analyzer Oper.: R. KRAL

Rod Info

(A + E) Impact Surface to Gages Length: 1.5 ft
 (B) Instr. Rod Length below Gages: 0.88 ft
 (A) + (B) Instr. Rod Length: 2 ft
 (D) Spoon Length: 2.68 ft
 (E) Rod Length Above Instr. Rod (if applicable): 0.38 ft
 Instr. Rod S/N: 203 AWS
 Instr. Rod Outside Dia.: 1.75 in.
 Instr. Rod Area: 1.20 in²
 PDA Make/Model: PAX
 PDA Serial No.: 3733L
 Calib. Pulse Test (y/n): Y



Rig/Hammer Info

Drill Rig Make/Model: CME 55
 Carrier Type: TRUCK
 Rig Serial No.: 328245
 Hammer Type/Model: CME-AUTO
 Hammer Serial No.: 328245
 Hammer Drop System: AUTOMATIC
 Lubrication Condition: REL. MANUFACTURER
 Manufacturer Recommended Operation Rate (bpm): 50
 Drop Height from Calibration Record (in.): 30
 Hammer Weight from Calibration Record (lbs): 140
 Anvil Dimension (in.): 11.5
 Drilling Method: MUD ROTARY

Gage Information

Gage	Serial No.	Calibration No.
Accel.	A3	K5641 358 376
	A4	K5642 314 324
Strain	F3	203 AWS 1 211.46 212.63
	F4	203 AWS 2 210.87 212.32

Date of Test	Test Depth Increment (ft to ft)	Test Time Start / Stop (Military)	Length of Drill String (ft) (C)	(LE) Length Below Gages (ft) (B)+(C)+(D)	Avg. Meas. Hammer Rate (BPM)	SPT Blow Counts				Drop Height In Tolerance (y/n)
						6"	12"	18"	N Value	
4/4	33.5 To 34.1	10:38/1041	35	38.76		60H	60H	60H	3	N/A
4/4	38.5 To 40.0	1050/1051	40	43.76		3	3	+	3	Y
	37.6 To 39.1	439/441								
4/4	57.6 To 59.6	1139/1140	60	63.76	52	7	10	9	19	Y
4/4	62.6 To 64.1	1157/1158	65	68.76	52	9	10	12	22	Y
4/4	67.6 To 69.1	1218/1219	70	73.76	52	6	13	17	30	Y
4/4	72.6 To 74.1	1239/1240	75	78.76	52	6	11	10	21	Y

Comments: (1) If there are any nonconformances or deficiencies identified during the testing, immediately pause the drilling and testing activities and notify the Site Manager and describe them in the space below; (2) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. verticality, weather, or lubrication between trials). Drop height tolerance is ± 1 inch. Drop height verified by Rig Geologist/Engineer at time of SPT Energy measurement for CME hammers and at the beginning of the day for Diedrich hammers; (3) Note any changes in rod diameter along drill string and record locations of short rod sections; (4) Prepare a sketch or take a picture of the instrumented drill rod assembly and indicate the approximate relative location and orientation of the strain gauges, accelerometers, and LE Datum; (5) Note: Identify all attached pages, including photographs, with the Project No., Boring No., and date.

ROB KRAL
 Prepared By (print/signature)
 SPT Energy Lead

4/4/17
 Date

Reviewed By (print/signature)
 Site Manager

Date



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 34817.1.S5	TIP U-2519AA	COUNTY CUMBERLAND	GEOLOGIST Contract Geologist
SITE DESCRIPTION FAYETTEVILLE OUTER LOOP FROM I-95 TO SOUTH OF SR 1118 (PARKTON RD.)			GROUND WTR (ft)
BORING NO. Y2_2800	STATION 28+00	OFFSET 20 ft LT	ALIGNMENT -Y2-
COLLAR ELEV. 184.7 ft	TOTAL DEPTH 104.1 ft	NORTHING 421,505	EASTING 2,013,281
DRILL RIG/HAMMER EFF./DATE SME275 CME-55 89% 01/15/2016		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 04/04/17	COMP. DATE 04/04/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
185															GROUND SURFACE	0.0
	184.1	0.6													ROADWAY EMBANKMENT (PAVEMENT)	0.6
	182.1	2.6	7	5	4										TAN, ORANGE AND GRAY, SILTY SAND	
180			3	4	4											
	177.1	7.6	7	6	8											
175																
	172.1	12.6	6	3	5											
170																
	167.1	17.6	9	8	3											
165																
	162.1	22.6	3	3	4											
160																
	157.1	27.6	9	10	10											
155																
	152.1	32.6	WOR	WOR	WOH											
150																
	147.1	37.6	3	2	1											
145																
	142.1	42.6	1	1	2											
140																
	137.1	47.6	5	9	11											
135																
	132.1	52.6	7	8	17											
130																
	127.1	57.6	7	10	9											
125																
	122.1	62.6	9	10	12											
120																
	117.1	67.6	6	13	17											
115																
	112.1	72.6	6	11	10											
110																
	107.1	77.6	6	9	9											
105																

NCDOT BORE SINGLE U2519AA_GEO_RDWY_BP.GPJ NC_DOT.GDT 4/26/17

Appendix III



Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI Accelerometer Calibration

Model PR-KICHER Serial # K5641

Cal Date: 27 FEB 17

Cal Due: 27 FEB 19

Temperature: 64.5 deg. F

Humidity 30 %

Calibrated at
Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, OH 44139

Manufactured by Pile Dynamics, Inc.

Procedure used: PDA Accelerometer Calibration Procedure 2016-6, Revision 20160422

Equipment was found to be

in tolerance As Received

out of tolerance As Received

in tolerance As Returned

out of tolerance As Returned

PDI Calibration: 0.0752 mv/5000g

Calibration Standards Utilized
Hopkinson Bar Force Calibration F2, verified on 25 APRIL 16

PDI HopBar DOS PAK, serial number 1273K, verified on 25 APRIL 16

Calibration performed by: Laine Wright
Laine Wright, Technician

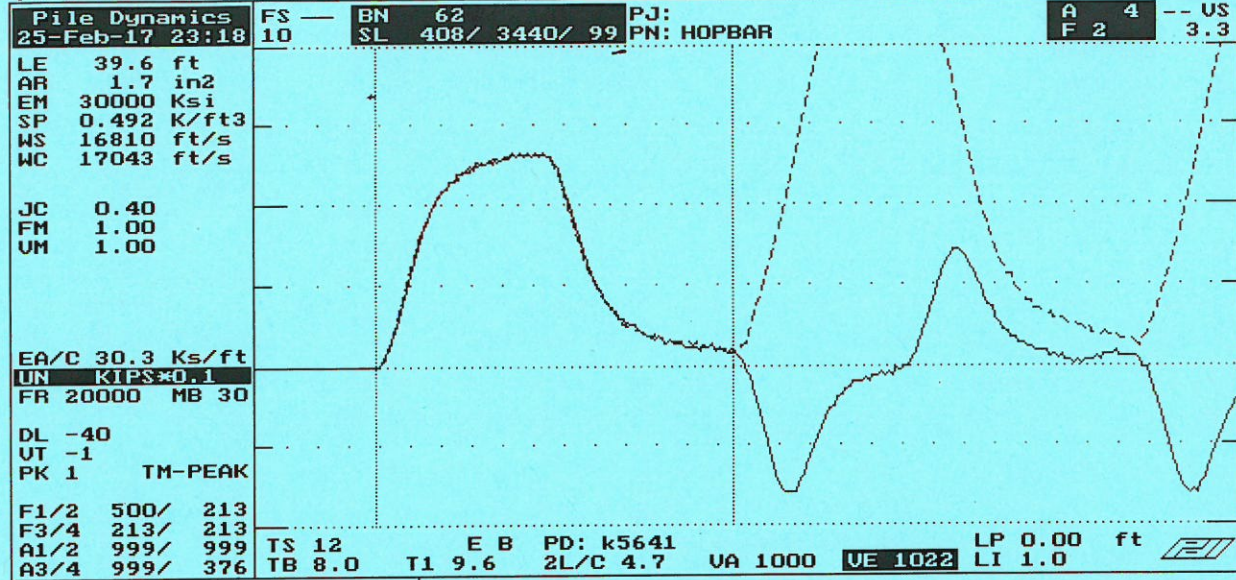
Reviewed by: Robert Sprenger
Robert Sprenger, Production Manager

Accelerometer CC-5 Issued 20160426

QBTA: ON [ALT-F1/BB=60]

Pile Dynamics, Inc.

TG F2 DPF



ACCEPT	SQ-OFF	FL-OFF	PR-OFF	UMX= 4.3	FMX= 66	AMX= 129
				EMX= 0.3	MEX= 129	FVP= 1.00



contact Pile Dynamics USA
with your questions
tel USA - 216 - 831- 6131
fax USA - 216 - 831- 0916

ACCELEROMETER CALIBRATION N.I.S.T. Traceable
SERIAL NUMBER: K5641
CALIBRATION FACTOR: .0752 MV/G
PAK (*5000): 376 DATE: 27Feb17
PDA OPERATOR: [Signature]

<-AT:PIEZORESISTIVE OP: laine lver:4.05] AT:PIEZOELECTRIC->

Smart Sensor

Smart Chip Programmed By S.M.W on 27Feb17 CRC Value 3C62



Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI Accelerometer Calibration

Model PR-KICHER Serial # K5642

Cal Date: 27 FEB 17

Cal Due: 27 FEB 19

Temperature: 64.5 deg. F

Humidity 30 %

Calibrated at
Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, OH 44139

Manufactured by Pile Dynamics, Inc.

Procedure used: PDA Accelerometer Calibration Procedure 2016-6, Revision 20160422

Equipment was found to be

in tolerance As Received

out of tolerance As Received

in tolerance As Returned

out of tolerance As Returned

PDI Calibration: .0648 mv/5000g

Calibration Standards Utilized

Hopkinson Bar Force Calibration F2, verified on 25 APRIL 16

PDI HopBar DOS PAK, serial number 1273K, verified on 25 APRIL 16

Calibration performed by: Laine Wright

Laine Wright, Technician

Reviewed by: Robert Sprenger

Robert Sprenger, Production Manager

Accelerometer CC-5 Issued 20160426

QBTA: ON [ALT-F1/BB=60]

Pile Dynamics, Inc.

TG F2 DPF

File Dynamics 25-Feb-17 23:16	FS — 10	BN 59 SL 406/ 3440/ 2	PJ: PN: HOPBAR	A 4 -- US F 2 3.3			
LE 39.6 ft AR 1.7 in2 EM 30000 Ksi SP 0.492 K/ft3 WS 16810 ft/s WC 17043 ft/s							
JC 0.40 FM 1.00 UM 1.00							
EA/C 30.3 Ks/ft UN KIPS*0.1 FR 20000 MB 30							
DL -40 UT -1 PK 1 TM-PEAK							
F1/2 500/ 213 F3/4 213/ 213 A1/2 999/ 999 A3/4 999/ 324							
TS 12 TB 8.0					E B PD: k5642 T1 9.6 2L/C 4.7	LP 0.00 ft LI 1.0	UA 1000 UE 1022
ACCEPT SQ-OFF FL-OFF PR-OFF							
UMX= 4.4 FMX= 67 AMX= 139 EMX= 0.3 MEX= 131 FUP= 0.99							
ACCELEROMETER CALIBRATION N.I.S.T. Traceable SERIAL NUMBER: <u>K5642</u> CALIBRATION FACTOR: <u>.0648 mV/g</u> PAK (*5000): <u>324</u> DATE: <u>27Feb17</u> PDA OPERATOR: <u>[Signature]</u>							
OP: laine [ver:4.05]							

contact Pile Dynamics USA
with your questions
tel USA - 216 - 831- 6131
fax USA - 216 - 831- 0916

←-AT:PIEZORESISTIVE

AT:PIEZOELECTRIC-→

Smart Sensor

Smart Chip Programmed By J.M.W. on 27 CRC Value 4A8A



Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI SPT Drill Rod Serial # 203 AWJ

Cal Date: 3-6-17

Cal Due: 3-6-19

Temperature: 69.2 deg. F

Humidity 42 %

Manufactured by Pile Dynamics, Inc.

Calibrated at: Pile Dynamics, Inc., 30725 Aurora Road, Cleveland, OH 44139

Procedure used: SPT Drill Rod Calibration Procedure 2016-4, Revision 20160422

Calibration Data: Attach SPT Rod Data Sheet DS-17

Equipment was found to be

in tolerance As Received

_____ out of tolerance As Received

in tolerance As Returned

_____ out of tolerance As Returned

Calibration Standards Utilized

1. PDI SPT Calibration Signal Conditioning Unit #000001, verified on 20160302
2. PDI Load Cell #75, Certificate #3482090006
3. Capacitec Displacement Sensor #2034, Certificate #3482090004
4. Capacitec Displacement Sensor #2040, Certificate #3482090004
5. Capacitec Displacement Mainframe #4004-671, Certificate #3482090004
6. Brown & Sharpe Digital Caliper #8G028506, Certificate #3482090001
7. National Instruments USB-6210 DAQ serial number 159AFDE, Certificate #3482090002

Calibration performed by:

David Burrell Technician

Reviewed by:

Robert Sprenger, Production Manager

SPT CC-16 Issued 20160425



Quality Assurance for Deep Foundations

SPT Calibration Data Sheet Revision number 20160426
Use Calibration Procedure Number 2016-8, Revision 20160422

SPT Drill Rod Data

Serial Number: 203 Awd Calibration Date: 3-6-17

Temperature: 69.2 °F Humidity: 42%

Calibration performed in accordance with PDI SPT Calibration Procedure 2016-4, Revision 20160422

As Received (circle one): Operational - Malfunctioning - Damaged

Calibration data

Pre-Load: 1. 8152 2. 8045 3. 8081

Total Load: 1. 18645 2. 17966 3. 9859

Common typical theoretical EA values based on SPT Rod Type:
AW: 35400 NW: 43100 or 68100 N3: 70800 BW:52344

EA Theoretical 35,400 EA Measured 36076.68 Error 1.91 %
Within 4% Tolerance Y/N

Alternative EA verification: Measure wall thickness, calculate area and multiply by 30000. (use spreadsheet for calculation)

Calibration values

Channel 1: As Found: (last cal): 215.76 As Left: 212.63 Within 5% Tolerance: Y/N
Channel 2: As Found: (last cal): 215.52 As Left: 212.32 Within 5% Tolerance: Y/N
EA: As Found: (last cal): 35465 As Left: 36076.68 Difference: 6.2 %

Calibration performed by:

David Burrell, Technician

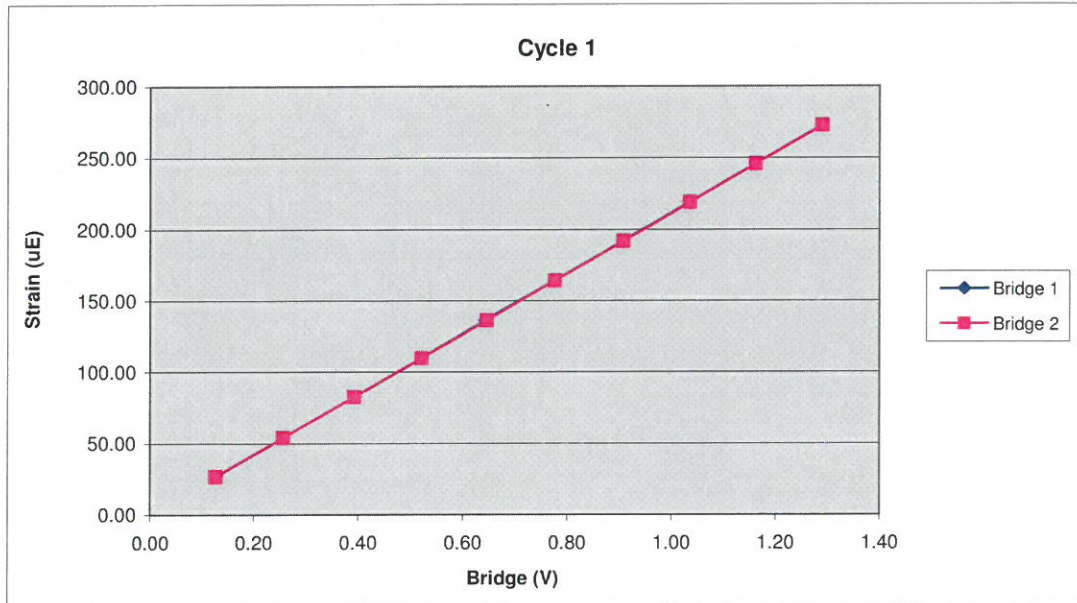
Reviewed by:

Robert Sprenger, Production Manager

203AWJ		Cycle 1		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	980.36	26.90	0.13	0.13
3	1968.60	54.22	0.26	0.26
4	3007.18	82.91	0.39	0.39
5	3992.07	109.88	0.52	0.52
6	4933.68	136.53	0.64	0.65
7	5952.40	164.15	0.78	0.78
8	6953.03	191.85	0.91	0.91
9	7927.29	218.90	1.04	1.04
10	8900.18	245.69	1.16	1.16
11	9893.92	272.74	1.29	1.29

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7662.50	Force Calibration (lb/V)	7652.99
Offset	-1.78	Offset	1.71
Correlation	0.999999	Correlation	0.999997
Strain Calibration ($\mu\text{E}/\text{V}$)	211.52	Strain Calibration ($\mu\text{E}/\text{V}$)	211.26
Offset	-0.14	Offset	-0.05
Correlation	0.999998	Correlation	0.999999

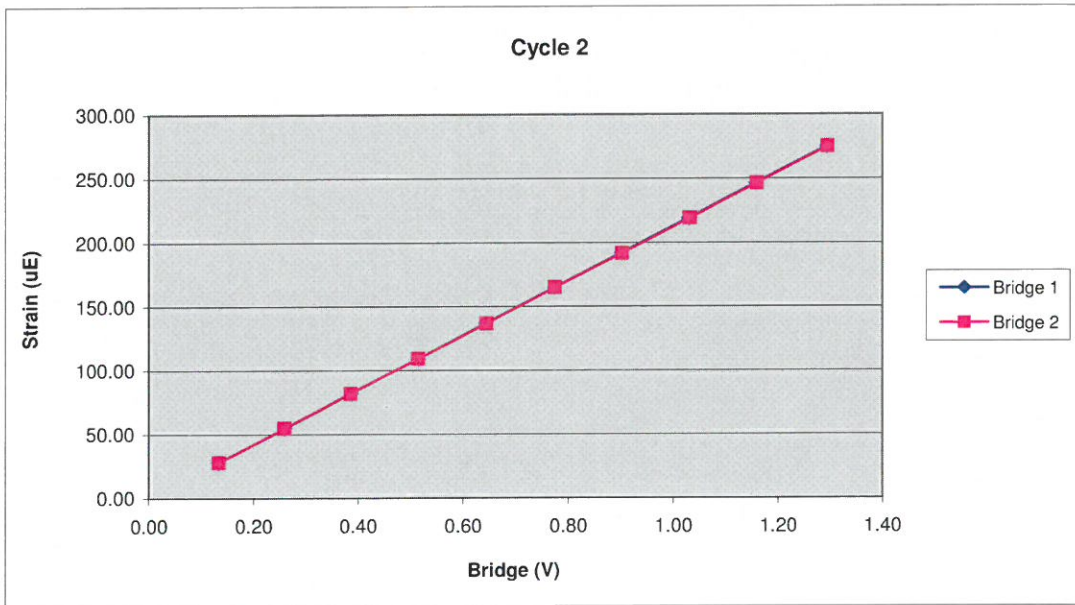
Force Strain Calibration	
EA (Kips)	36225.50
Offset	3.39
Correlation	0.999997



203AWJ		Cycle 2		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	1014.59	28.23	0.13	0.13
3	1983.94	54.87	0.26	0.26
4	2963.12	81.94	0.39	0.39
5	3939.16	109.15	0.51	0.51
6	4924.05	136.83	0.64	0.64
7	5932.34	164.92	0.77	0.78
8	6919.00	191.62	0.90	0.90
9	7908.80	219.00	1.03	1.03
10	8881.89	246.36	1.16	1.16
11	9921.85	274.90	1.29	1.29

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7681.97	Force Calibration (lb/V)	7665.41
Offset	-11.43	Offset	-6.15
Correlation	0.999999	Correlation	0.999998
Strain Calibration ($\mu\text{E}/\text{V}$)	212.92	Strain Calibration ($\mu\text{E}/\text{V}$)	212.46
Offset	-0.28	Offset	-0.14
Correlation	0.999998	Correlation	0.999998

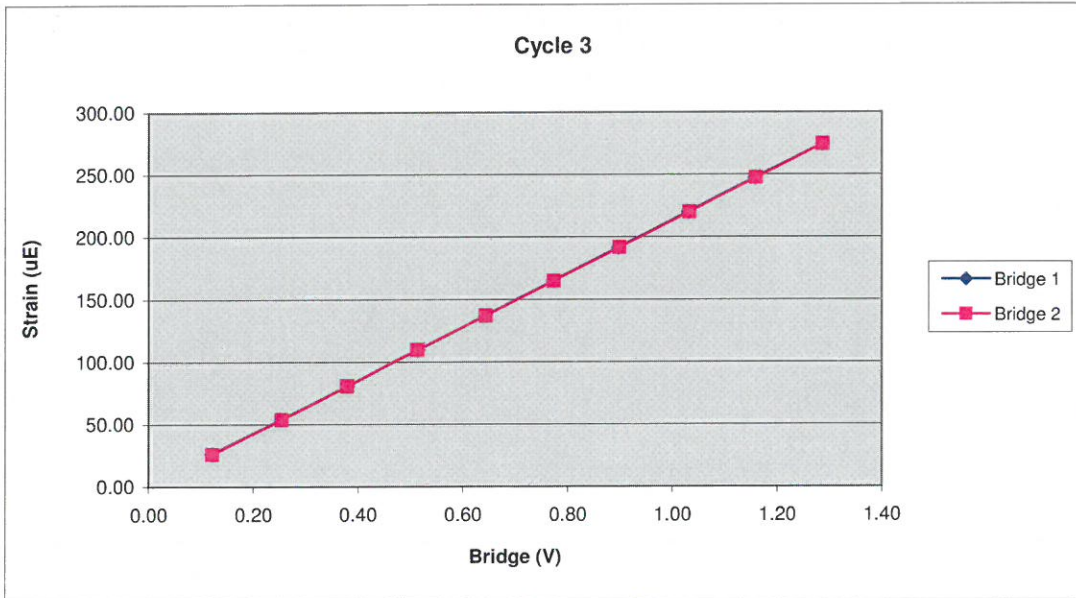
Force Strain Calibration	
EA (Kips)	36079.71
Offset	-1.25
Correlation	0.999996



203AWJ		Cycle 3		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	931.98	26.11	0.12	0.12
3	1944.40	53.79	0.25	0.25
4	2911.39	80.73	0.38	0.38
5	3940.93	109.71	0.51	0.51
6	4935.26	137.15	0.64	0.64
7	5929.39	164.84	0.77	0.77
8	6888.90	191.71	0.90	0.90
9	7914.90	219.99	1.03	1.03
10	8887.40	247.28	1.16	1.16
11	9859.30	274.46	1.29	1.29

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7667.78	Force Calibration (lb/V)	7660.59
Offset	2.72	Offset	1.09
Correlation	0.999999	Correlation	1.000000
Strain Calibration ($\mu\text{E}/\text{V}$)	213.44	Strain Calibration ($\mu\text{E}/\text{V}$)	213.24
Offset	-0.06	Offset	-0.11
Correlation	0.999998	Correlation	0.999997

Force Strain Calibration	
EA (Kips)	35924.82
Offset	4.97
Correlation	0.999998



Bridge Excitation (V) 5
Shunt Resistor (ohm) 60.4k

Calibration Factors	203AWJ		
Bridge 1 ($\mu\text{E}/\text{V}$)	212.63	Bridge 2 ($\mu\text{E}/\text{V}$)	212.32
EA Factor (Kips)	36076.68	Area (in²)	1.20

Calibrated by: 
Calibrated Date: 2/24/2017

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Appendix IV



This documents that
Robert E. Kral
AMEC Foster Wheeler

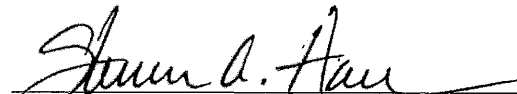
has on May 20, 2016 achieved the rank of

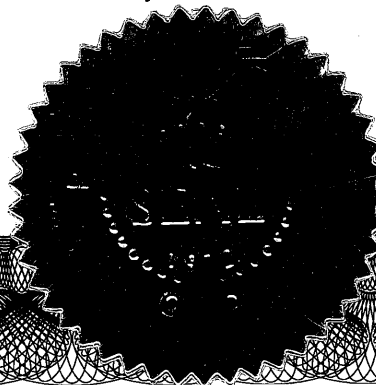
ADVANCED


on the **Dynamic Measurement and Analysis Proficiency Test.**

The individual identified on this document demonstrated to the degree granted above an understanding of theory, data quality evaluation, interpretation and signal matching for high strain dynamic testing of deep foundations. ***It is recommended that individuals at the Advanced level seek Master or Expert levels through additional study within four years of the date of this document.***

The ability of the individual named to provide appropriate knowledge and advice on a specific project is not implied or warranted by the Pile Driving Contractors Association or Pile Dynamics, Inc. **This certificate can be verified at www.PDAproficiencytest.com.** The Pile Driving Contractors Association or Pile Dynamics, Inc. assumes no liability for foundation testing and analysis work performed by the bearer of this certificate.


Steven A. Hall, Executive Director
Pile Driving Contractors Association




Garland Likins, Senior Partner
Pile Dynamics, Inc.

No. 2072



**Report of SPT Energy Measurements
S&ME Diedrich D-50 Track (SN 382)
Winston-Salem, North Carolina
S&ME Project No. 6235-17-020**

PREPARED FOR:

**North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699**

PREPARED BY:

**S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, NC 28273**

September 1, 2017



September 1, 2017

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

Attention: Dr. Shunyi (Chris) Chen, Ph.D., P.E.
Cc: Ms. Cheryl A. Youngblood, L.G.
Reference: **Report of SPT Energy Measurements
S&ME Diedrich D-50 Track (SN 382)**
Winston-Salem, North Carolina
S&ME Project No. 6235-17-020

Dear Dr. Chen:

We have completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer mounted on our Diedrich D-50 track-mounted drill rig with a serial number of 382. This service was performed by our Mr. Robert E. Kral, P.E. on August 22, 2017. SPT energy testing was performed in general accordance with ASTM D4633 and the most recent revision of the North Carolina Department of Transportation, Geotechnical Engineering Unit's requirements. The testing procedures, equipment used during testing, and detailed results are presented in this report.

1.0 Dynamic Testing Methodology

Testing was performed using a model PAX (Serial No. 3733L) Pile Driving Analyzer™ (PDA) manufactured by Pile Dynamics, Inc. The PDA records and interprets data from two piezoresistive accelerometers (Serial Nos. K5641 and K5642) bolted to a 2.67-foot long BW drill rod (SN102) internally instrumented with two strain transducers. The BW instrumented drill rod length included one BW box to BWJ pin and one BWJ box to BW pin sub. The instrumented BW drill rod has a cross-sectional area of 1.80 square inches, an outside diameter of approximately 2.125 inches, and an inside diameter of 1.75 inches at the gage location. The accelerometers and strain gages, which are mounted on opposing axis near the middle of the instrumented rod, monitor acceleration and strain for each hammer blow. The analyzer converts the data to velocities and forces, computing the maximum transferred hammer energies with the "EFV" method described in ASTM D4633. All results are recorded and displayed in real-time for each blow. Calibration sheets for the accelerometers and the instrumented rod are included in the Appendix.



2.0 Testing and Observations

S&ME personnel were on site on August 22, 2017, to observe and perform testing during SPT sampling on the Diedrich D-50 track-mounted rig operated by Justin Millwood of S&ME. The measurements were taken during drilling operations for the NCDOT R-2247CD Winston-Salem Northern Beltway Design-Build project in Winston-Salem, North Carolina. The measurements were obtained during the SPT sampling of Soil Test Boring Y25ARPB_2200. SPT energy measurements were recorded during four intervals at depths of approximately 33½, 38½, 43½, and 48½ ft below the existing ground surface. The information presented in the tables below summarizes the equipment tested and tooling used during the SPT Energy Measurements.

Table 2-1: Drill Rig Information

Manufacturer	Diedrich
Model	D-50
Serial Number	382
Operator	Justin Millwood
Carrier	Track

Table 2-2: Hammer Information

Model / Type	CME / Auto
Serial Number	382
Anvil Height (inches)	11.5
Anvil Diameter (inches)	2.5
Drop Height (inches)	30
Ram Weight (pounds)	140
Ram Serial Number	N/A

Table 2-3: Drilling and Instrumented Rod Information

Drill Rod Type	BWJ
OD (inches)	2.125
ID (inches)	1.75
Cross-Sectional Area (in ²)	1.80
Typical Lengths (feet)	5 and 10
Instrumented Rod Type	BW (SN 102)
OD (inches)	2.125
ID (inches)	1.75
Cross-Sectional Area (in ²)	1.80
Total Instrumented Rod Length (feet)	2.67
Length Below Gages (feet)	1.42
Split-Spoon Length (feet)	2.95



3.0 Dynamic Testing Results

The total rod length from the instrumentation to the tip of the split-spoon sampler was determined by adding 4.62 ft to the required drill rod length at each sample depth. Based on the test data, the automatic hammer on the Diedrich D-50 track-mounted rig operated at a rate of about 41.1 to 41.9 blows per minute (bpm) during dynamic testing. The measured transferred hammer energy (EFV) was generally in the range of about 282.2 to 320.4 ft-lbs, which corresponds to Energy Transfer Ratio (ETR) values of about 80.6% to 91.5%, respectively. The SPT Energy Measurement Data Summary tables in the Appendix present the test data from every hammer blow at each sampling interval along with representative force and velocity traces for each test interval. The reported blow counts, obtained by the drill rig personnel, and a summary of the test data and average computed hammer energy and transfer ratio values are provided in Table 3-1. Plots and tables of the following are also included in the Appendix and present the test data with depth for each test interval:

- Penetration vs. BLC
- Penetration vs. CSX
- Average ETR vs. Rod Length
- Penetration vs. FMX
- Penetration vs. VMX
- ETR vs. Rod Length
- Penetration vs. EFV
- Penetration vs. ETR

Table 3-1: Summary of Dynamic Testing Results

Data Set ID	Sample Depth (ft)	Drill Rod Length (ft)	Instrumentation to Sampler Tip Length (ft)	Blows per 6" Increment / N-value	Soil Sample Description (Coastal Plain)	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (%)
1	33½ - 35	34	38.62	3-3-4 / 7	Sandy CLAY	41.5	297.2	84.9
2	38½ - 40	39	43.62	3-4-4 / 8	Sandy SILT	41.6	297.0	84.9
3	43½ - 45	44	48.62	4-6-11 / 17	Sandy SILT	41.5	303.8	86.8
4	48½ - 50	49	53.62	4-7-10 / 17	Sandy SILT	41.6	307.0	87.7
Overall Average						41.6	302.9	86.5

The average hammer rate, transferred energy, and transfer ratio were calculated for each depth interval. Per ASTM D4633, only the blows from the final foot of each sample interval (i.e. the blows that determine the N-value) were included when computing the average values shown in Table 3-1. The overall average transferred hammer energy for the automatic hammer on the Diedrich D-50 track-mounted rig (for all the depth intervals tested) was 302.9 foot-pounds, with an average ETR of 86.5%.



4.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

5.0 Closing

S&ME appreciates the opportunity to provide this report to the North Carolina Department of Transportation Geotechnical Engineering Unit. Please let us know if you have any questions concerning this report.

Sincerely,

S&ME, Inc.

Gregory J. Canivan, P.E.
Technical Principal

Robert E. Kral, P.E.
Transportation Services Project Manager
N.C. Registration No. 042642



Appendices:

- Appendix I - Diedrich D-50 (SN 382) SPT Energy Measurements Summary Plots and Tables
- Appendix II - Field Log and Borelog Report
- Appendix III - Instrumented Rod and Accelerometer Calibration Sheets
- Appendix IV - Certificate of Proficiency

Appendices

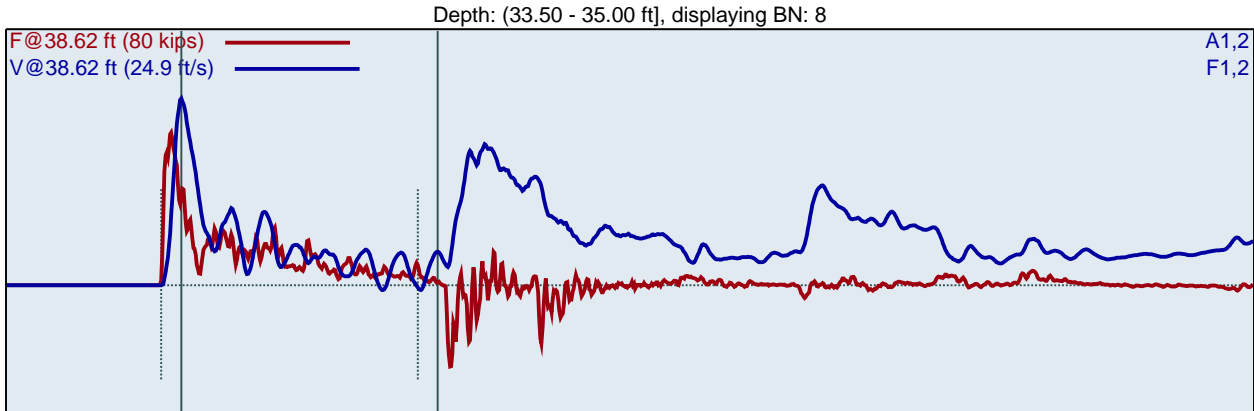
Appendix I

DIEDRICH D50 (SN382)
R. KRAL

Y25ARPB_2200
Test date: 8/22/2017

AR: 1.80 in²
LE: 38.62 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi



BPM: Blows/Minute

FMX: Maximum Force

VMX: Maximum Velocity

DMX: Maximum Displacement

CSX: Compression Stress Maximum

DFN: Final Displacement

EFV: Maximum Energy

ETR: Energy Transfer Ratio - Rated

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	33.67	3	1.9	45	14.5	2.25	24.9	2.00	261.5	74.7
2	33.83	3	41.1	46	16.5	2.26	25.8	2.00	301.0	86.0
3	34.00	3	41.9	46	18.1	2.17	25.5	2.00	312.3	89.2
4	34.17	3	41.5	46	17.0	2.00	25.3	2.00	298.7	85.3
5	34.33	3	41.4	49	18.1	2.00	27.2	2.00	304.9	87.1
6	34.50	3	41.6	48	16.9	2.00	26.5	2.00	288.7	82.5
7	34.63	4	41.5	48	17.5	1.51	26.5	1.50	295.4	84.4
8	34.75	4	41.6	48	18.2	1.50	26.5	1.50	299.8	85.7
9	34.88	4	41.1	48	17.3	1.50	26.8	1.50	295.9	84.5
10	35.00	4	41.8	49	18.1	1.50	27.2	1.50	297.0	84.9
Average			41.5	48	17.6	1.72	26.6	1.71	297.2	84.9
Std Dev			0.2	1	0.5	0.25	0.6	0.25	4.5	1.3
Maximum			41.8	49	18.2	2.00	27.2	2.00	304.9	87.1
Minimum			41.1	46	16.9	1.50	25.3	1.50	288.7	82.5

N-value: 7

Sample Interval Time: 13.01 seconds.

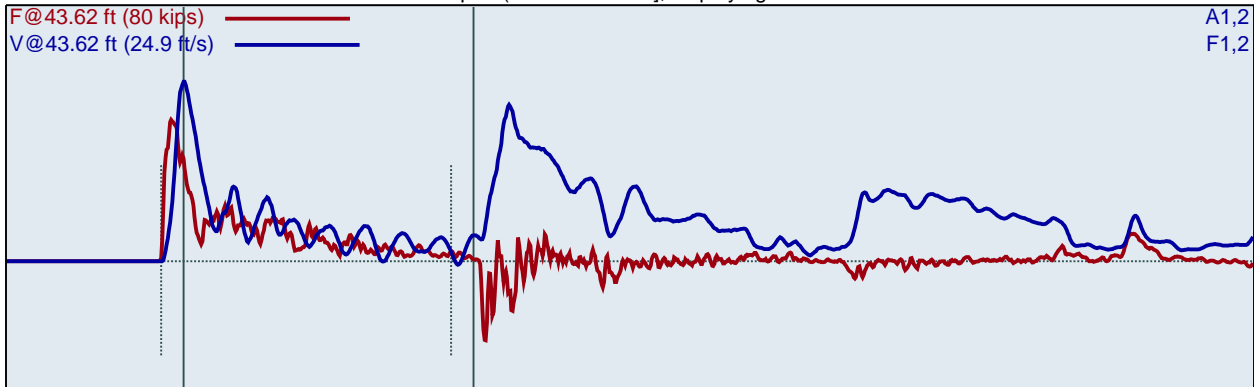
DIEDRICH D50 (SN382)
R. KRAL

Y25ARPB_2200
Test date: 8/22/2017

AR: 1.80 in²
LE: 43.62 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (38.50 - 40.00 ft], displaying BN: 9



BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	38.67	3	1.9	49	19.1	2.24	27.1	2.00	303.1	86.6
2	38.83	3	41.6	49	18.1	2.24	27.2	2.00	294.2	84.1
3	39.00	3	41.5	49	18.0	2.00	27.2	2.00	305.3	87.2
4	39.13	4	41.8	49	17.6	1.62	27.2	1.50	288.4	82.4
5	39.25	4	41.2	49	16.9	1.52	27.2	1.50	282.2	80.6
6	39.38	4	41.7	46	17.4	1.50	25.4	1.50	298.0	85.1
7	39.50	4	41.7	48	18.0	1.50	26.6	1.50	295.8	84.5
8	39.63	4	41.5	44	17.4	1.50	24.7	1.50	300.4	85.8
9	39.75	4	41.5	44	17.5	1.50	24.6	1.50	301.5	86.2
10	39.88	4	41.5	45	17.9	1.50	25.1	1.50	305.1	87.2
11	40.00	4	41.5	44	18.1	1.50	24.6	1.50	304.7	87.1
Average			41.6	46	17.6	1.52	25.7	1.50	297.0	84.9
Std Dev			0.2	2	0.4	0.04	1.1	0.00	7.5	2.1
Maximum			41.8	49	18.1	1.62	27.2	1.50	305.1	87.2
Minimum			41.2	44	16.9	1.50	24.6	1.50	282.2	80.6

N-value: 8

Sample Interval Time: 14.41 seconds.

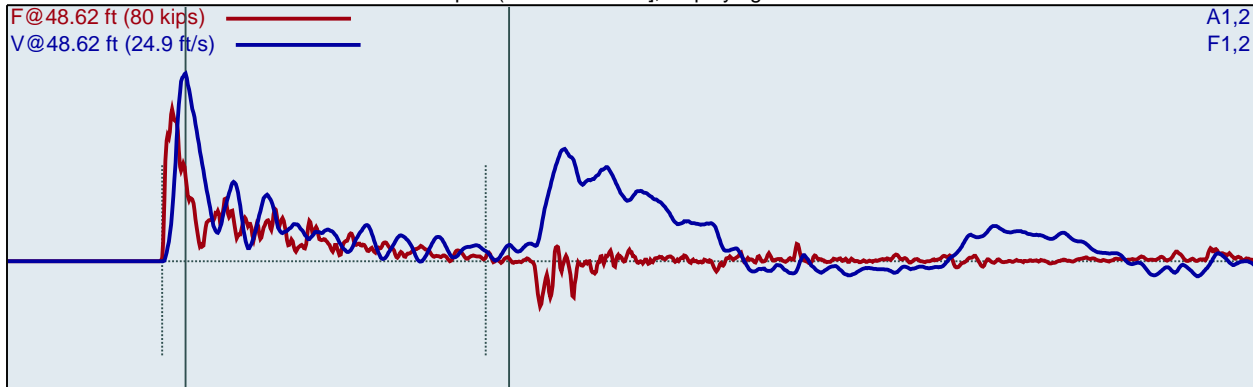
DIEDRICH D50 (SN382)
R. KRAL

Y25ARPB_2200
Test date: 8/22/2017

AR: 1.80 in²
LE: 48.62 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (43.50 - 45.00 ft], displaying BN: 19



BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	43.63	4	1.9	48	17.5	1.50	26.8	1.50	290.4	83.0
2	43.75	4	41.5	46	16.8	1.56	25.4	1.50	291.6	83.3
3	43.88	4	41.7	43	17.0	1.78	23.7	1.50	301.8	86.2
4	44.00	4	41.7	45	18.2	1.55	24.9	1.50	315.4	90.1
5	44.08	6	41.8	43	17.5	1.29	24.0	1.00	307.6	87.9
6	44.17	6	41.4	44	17.6	1.14	24.3	1.00	311.0	88.9
7	44.25	6	41.5	46	18.3	1.08	25.5	1.00	314.4	89.8
8	44.33	6	41.7	43	17.5	1.09	24.1	1.00	308.2	88.1
9	44.42	6	41.4	44	18.1	1.07	24.4	1.00	314.7	89.9
10	44.50	6	41.6	43	18.0	1.06	23.8	1.00	313.5	89.6
11	44.55	11	41.9	45	18.3	0.90	24.8	0.55	303.9	86.8
12	44.59	11	41.3	43	17.4	0.84	24.0	0.55	307.3	87.8
13	44.64	11	41.7	43	17.5	0.74	24.1	0.55	296.0	84.6
14	44.68	11	41.4	45	17.9	0.69	24.7	0.55	296.1	84.6
15	44.73	11	41.4	45	17.4	0.66	24.9	0.55	291.2	83.2
16	44.77	11	41.4	45	18.2	0.65	25.1	0.55	304.5	87.0
17	44.82	11	41.7	44	17.7	0.62	24.4	0.55	304.3	86.9
18	44.86	11	41.4	43	17.4	0.59	24.0	0.55	299.6	85.6
19	44.91	11	41.4	47	18.3	0.59	26.4	0.55	302.2	86.3
20	44.95	11	41.7	47	18.0	0.56	26.3	0.55	290.0	82.9
21	45.00	11	41.3	46	17.8	0.56	25.4	0.55	301.0	86.0
Average			41.5	44	17.8	0.83	24.7	0.71	303.8	86.8
Std Dev			0.2	1	0.3	0.24	0.8	0.22	7.4	2.1
Maximum			41.9	47	18.3	1.29	26.4	1.00	314.7	89.9
Minimum			41.3	43	17.4	0.56	23.8	0.55	290.0	82.9
N-value: 17										

Sample Interval Time: 28.83 seconds.

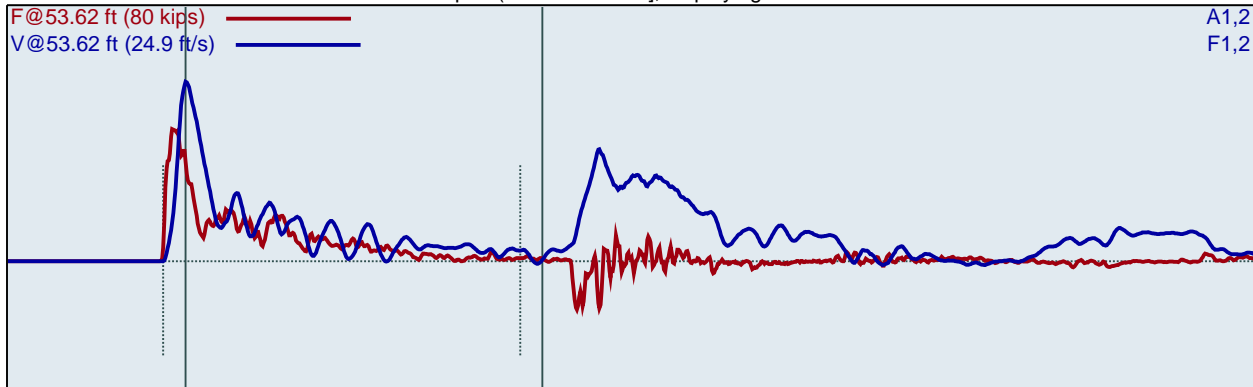
DIEDRICH D50 (SN382)
R. KRAL

Y25ARPB_2200
Test date: 8/22/2017

AR: 1.80 in²
LE: 53.62 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi

Depth: (48.50 - 50.00 ft), displaying BN: 19



BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR (%)
1	48.63	4	1.9	44	15.2	1.70	24.5	1.50	263.8	75.4
2	48.75	4	41.7	41	16.6	1.64	22.9	1.50	302.0	86.3
3	48.88	4	41.5	41	16.9	1.54	22.7	1.50	307.1	87.7
4	49.00	4	41.4	42	16.4	1.50	23.1	1.50	303.6	86.8
5	49.07	7	41.6	42	16.6	1.10	23.5	0.86	302.3	86.4
6	49.14	7	41.8	41	16.9	1.03	23.0	0.86	303.8	86.8
7	49.21	7	41.7	42	16.6	0.98	23.2	0.86	295.3	84.4
8	49.29	7	41.3	42	17.2	0.99	23.5	0.86	312.3	89.2
9	49.36	7	41.7	43	17.6	0.94	23.8	0.86	311.4	89.0
10	49.43	7	41.9	42	17.3	0.91	23.4	0.86	308.2	88.1
11	49.50	7	41.3	42	17.6	0.89	23.4	0.86	319.1	91.2
12	49.55	10	41.9	41	17.5	0.73	22.7	0.60	314.7	89.9
13	49.60	10	41.6	42	17.1	0.70	23.3	0.60	302.7	86.5
14	49.65	10	41.5	43	18.3	0.73	23.7	0.60	320.4	91.5
15	49.70	10	41.5	42	17.0	0.70	23.1	0.60	305.3	87.2
16	49.75	10	41.8	41	17.5	0.71	22.7	0.60	309.9	88.6
17	49.80	10	41.6	41	17.1	0.69	22.8	0.60	298.7	85.4
18	49.85	10	41.5	42	17.8	0.68	23.1	0.60	305.8	87.4
19	49.90	10	41.6	41	17.5	0.67	22.9	0.60	303.0	86.6
20	49.95	10	41.5	42	17.2	0.67	23.5	0.60	300.2	85.8
21	50.00	10	41.5	42	17.5	0.66	23.6	0.60	306.3	87.5
Average			41.6	42	17.3	0.81	23.2	0.71	307.0	87.7
Std Dev			0.2	1	0.4	0.15	0.3	0.13	6.7	1.9
Maximum			41.9	43	18.3	1.10	23.8	0.86	320.4	91.5
Minimum			41.3	41	16.6	0.66	22.7	0.60	295.3	84.4
N-value: 17										

Sample Interval Time: 28.80 seconds.

Summary of SPT Test Results

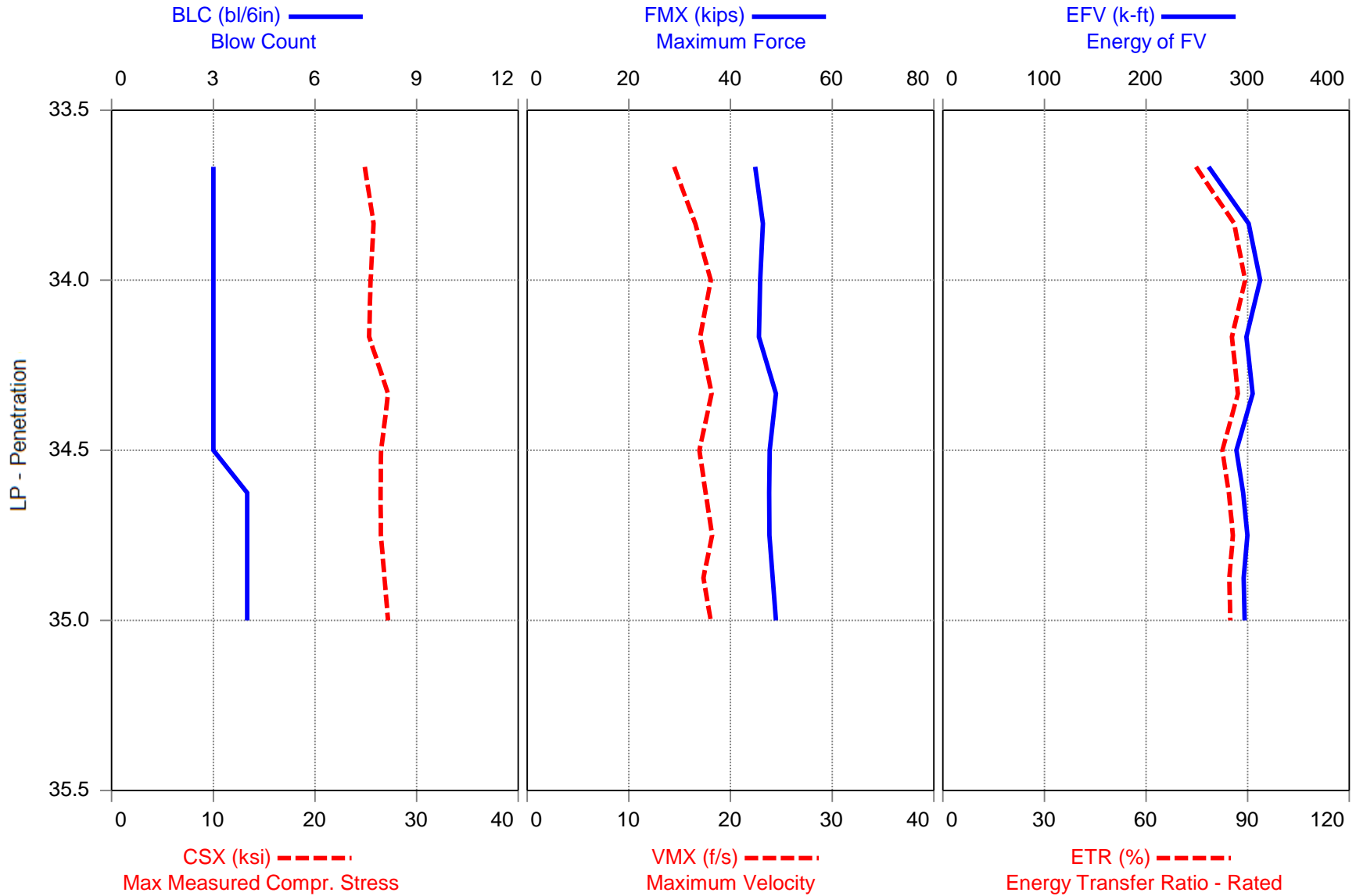
Project: DIEDRICH D50 (SN382), Test Date: 8/22/2017

Instr. Length ft	Start Depth ft	Final Depth ft	Blows Applied /6"	N Value	N60 Value	Average BPM bpm	Average FMX kips	Average VMX ft/s	Average DMX in	Average CSX ksi	Average DFN in	Average EFV ft-lb	Average ETR (%)
38.62	33.50	35.00	3-3-4	7	10	41.5	48	17.6	1.72	26.6	1.71	297.2	84.9
43.62	38.50	40.00	3-4-4	8	11	41.6	46	17.6	1.52	25.7	1.50	297.0	84.9
48.62	43.50	45.00	4-6-11	17	24	41.5	44	17.8	0.83	24.7	0.71	303.8	86.8
53.62	48.50	50.00	4-7-10	17	24	41.6	42	17.3	0.81	23.2	0.71	307.0	87.7
Overall Average Values:						41.6	44	17.6	1.06	24.6	0.98	302.9	86.5
Standard Deviation:						0.2	2	0.4	0.41	1.4	0.45	7.9	2.3
Overall Maximum Value:						41.9	49	18.3	2.00	27.2	2.00	320.4	91.5
Overall Minimum Value:						41.1	41	16.6	0.56	22.7	0.55	282.2	80.6

CSX: Compression Stress Maximum
DFN: Final Displacement
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

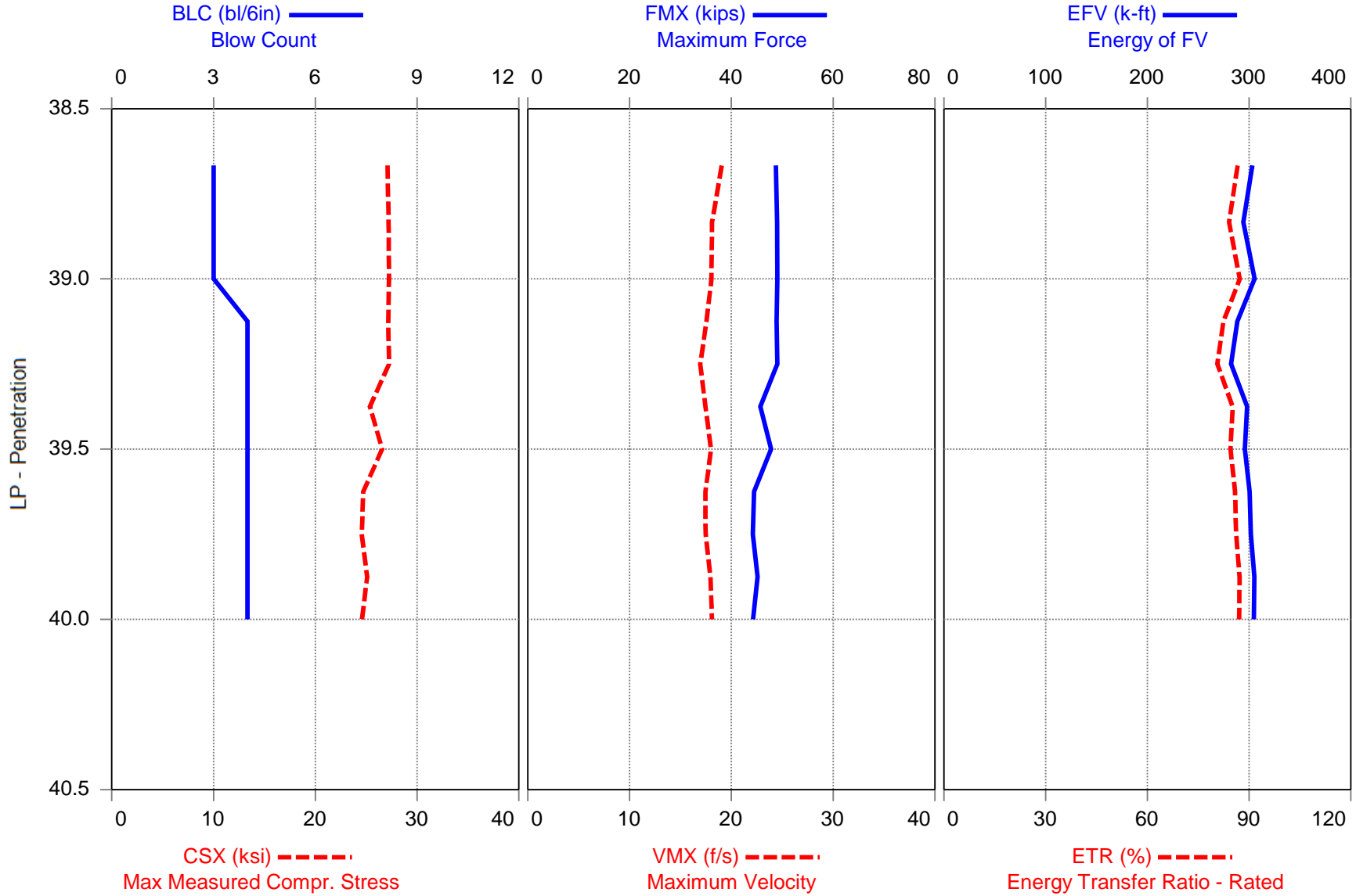


DIEDRICH D50 (SN382) - Y25ARPB_2200, 33.5 to 35



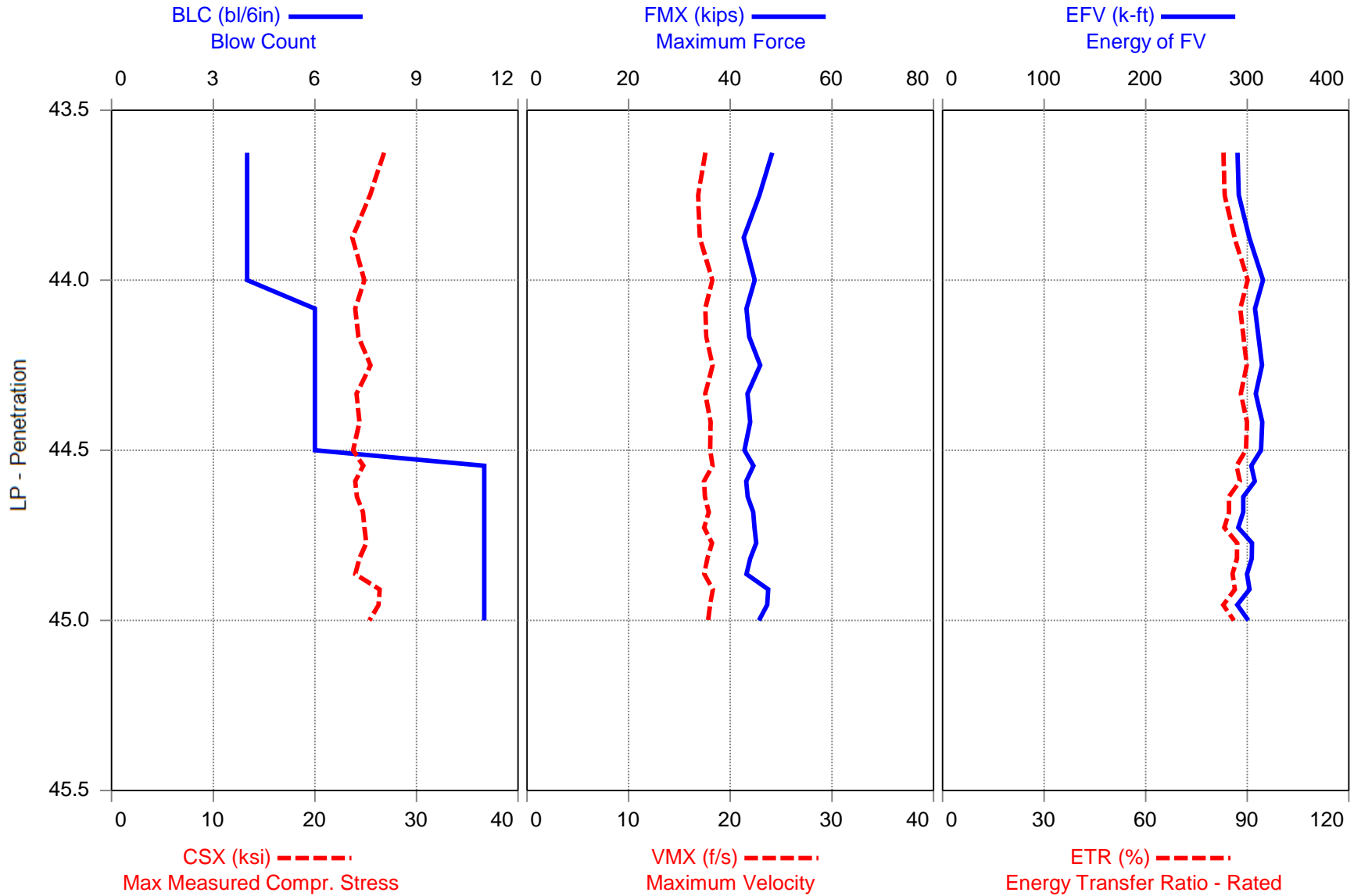


DIEDRICH D50 (SN382) - Y25ARPB_2200, 38.5 to 40



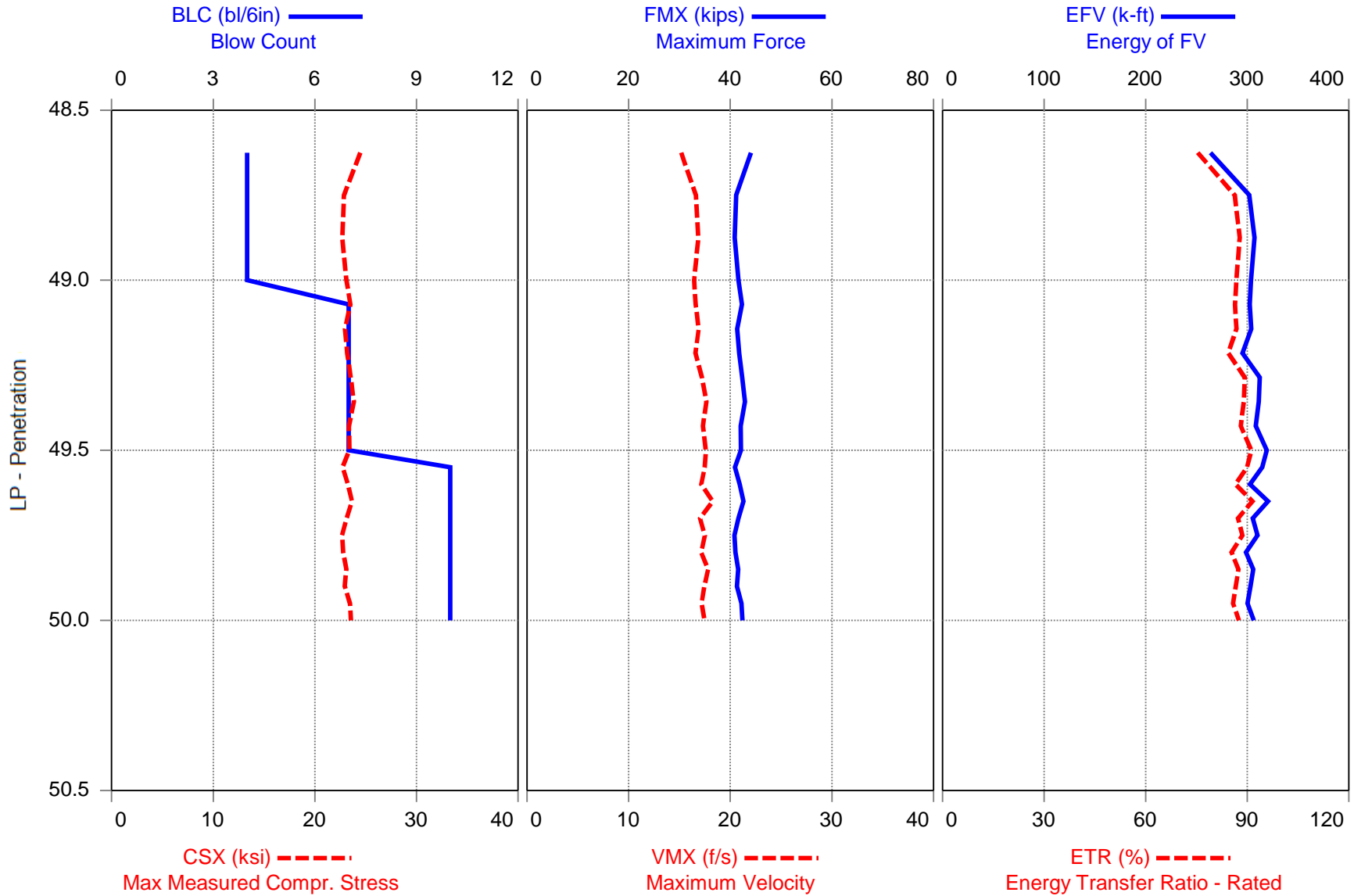


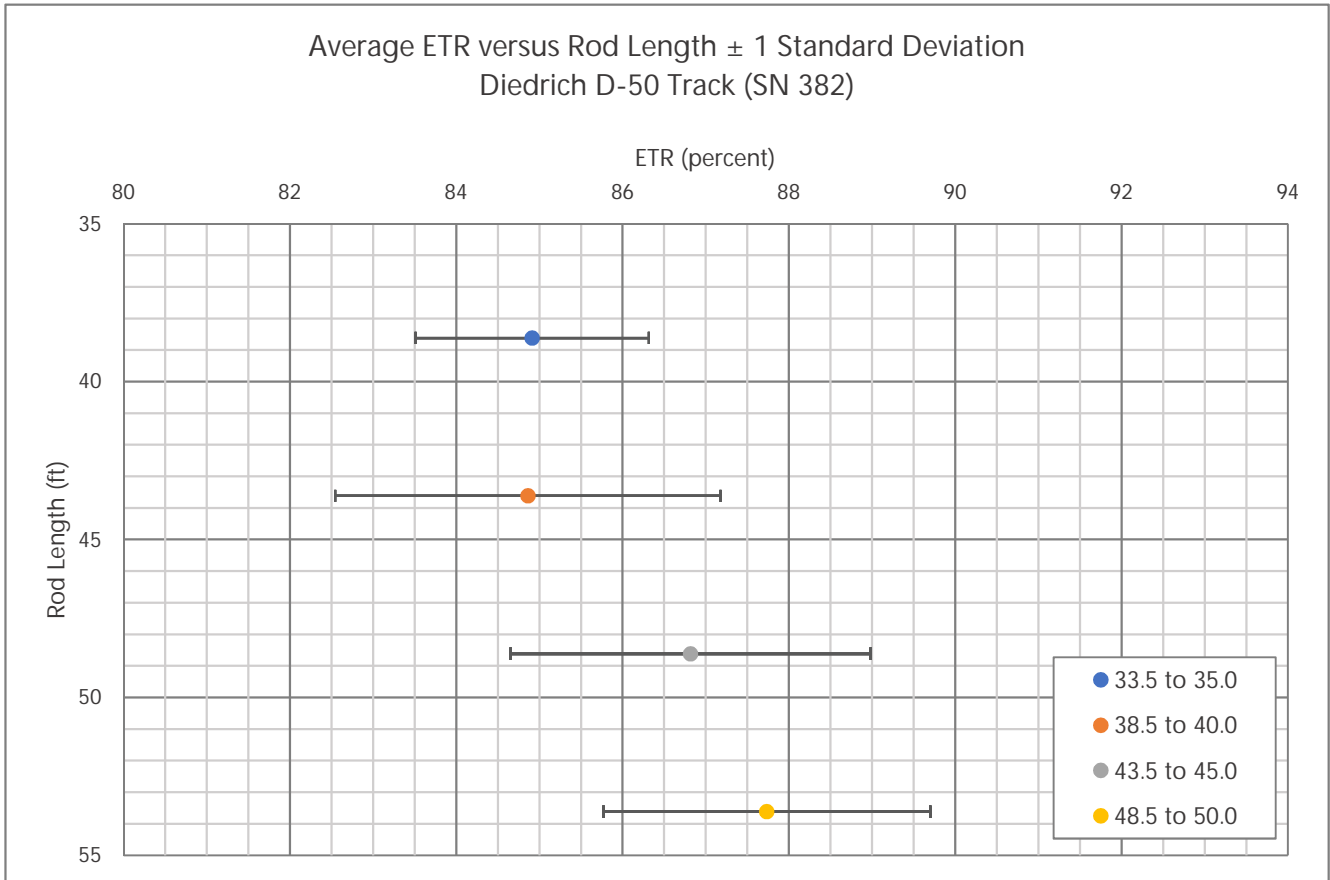
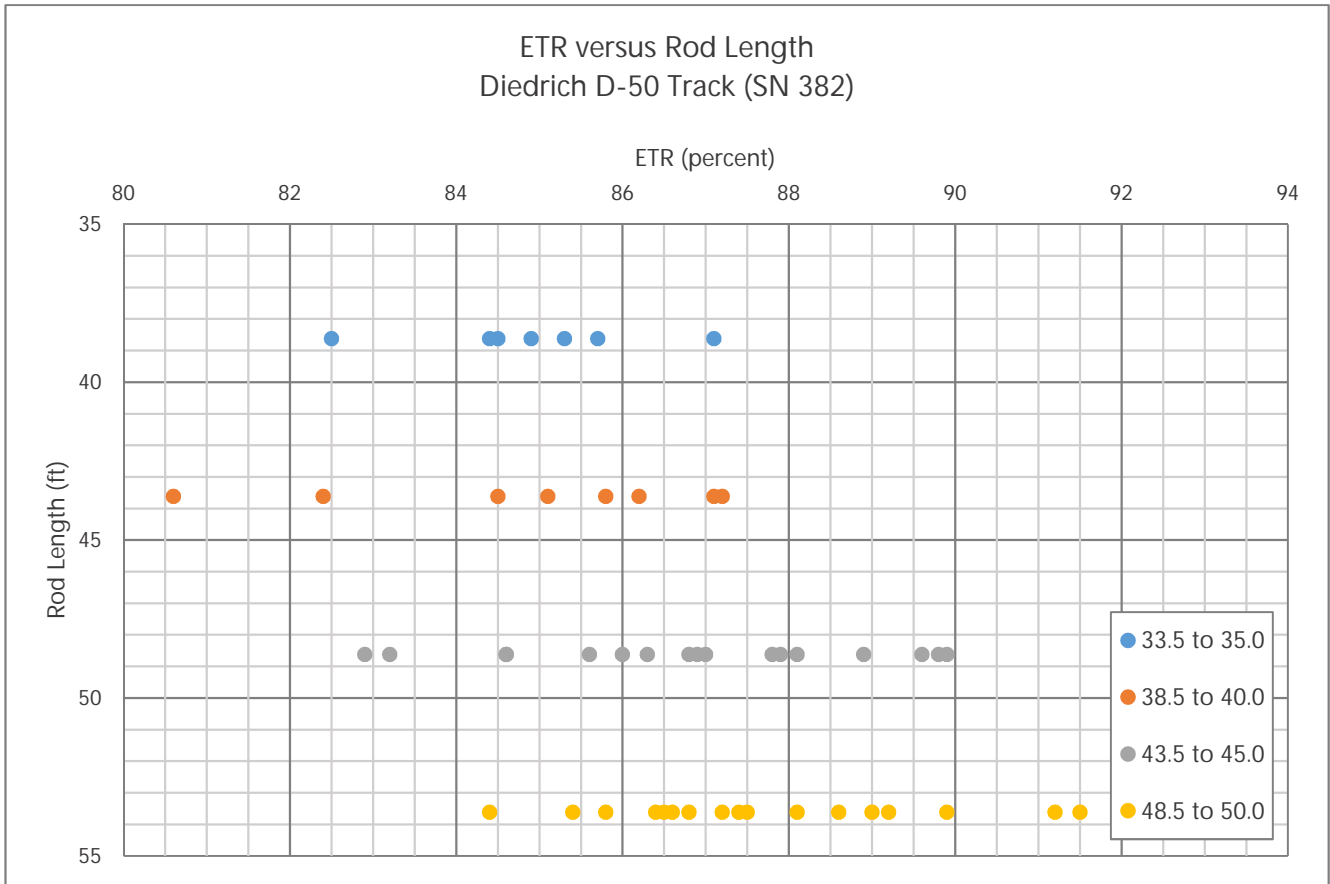
DIEDRICH D50 (SN382) - Y25ARPB_2200, 43.5 to 45





DIEDRICH D50 (SN382) - Y25ARPB_2200, 48.5 to 50





Appendix II

SPT Energy Evaluation Form



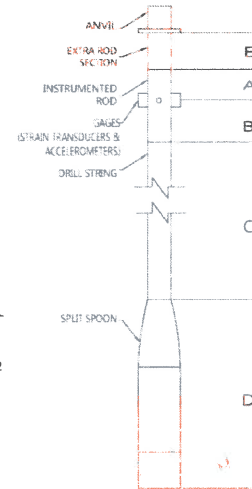
Project: R-2247 Date (s): 8/22/17
 Project No.: 6235-17-020 Weather: 90° SUNNY
 Boring No.: Y25AR7B-2200 Drill Rod Type: BW5

On-site Personnel

Drilling Company: S&ME, INC.
 Rig Oper./Helper: JUSTIN MILLWOOD
 Rig Engr./Geologist: FINLEY LLOYD
 Analyzer Oper.: BOB KRAL

Rod Info

(A + E) Impact Surface to Gages Length: 1.67 ft
 (B) Instr. Rod Length below Gages: 1.42 ft
 (A) + (B) Instr. Rod Length: 2.67 ft
 (D) Spoon Length: 2.95 ft
 (E) Rod Length Above Instr. Rod (if applicable): 0.42 ft
 Instr. Rod S/N: 102BW-2
 Instr. Rod Outside Dia.: 2.125 in.
 Instr. Rod Area: 1.80 in²
 PDA Make/Model: PA2
 PDA Serial No.: 3733L
 Calib. Pulse Test (y/n): Y



Rig/Hammer Info

Drill Rig Make/Model: DIEDRICH D-50
 Carrier Type: TRACK (MST-8000A)
 Rig Serial No.: 387
 Hammer Type/Model: DIEDRICH
 Hammer Serial No.: 382
 Hammer Drop System: AUTO
 Lubrication Condition: PER MANUFACTURER
 Manufacturer Recommended Operation Rate (bpm): 45
 Drop Height from Calibration Record (in.): 30
 Hammer Weight from Calibration Record (lbs): 140
 Anvil Dimension (in.): 30
 Drilling Method: HSA

Gage Information

Gage	Serial No.	Calibration No.
Accel.	A3	5641
	A4	5642
Strain	F3	102BW-1
	F4	102BW-2

Date of Test	Test Depth Increment (ft to ft)	Test Time Start / Stop (Military)	Length of Drill String (ft) (C)	(LE) Length Below Gages (ft) (B)+(C)+(D)	Avg. Meas. Hammer Rate (BPM)	SPT Blow Counts				Drop Height In Tolerance (y/n)
						6"	12"	18"	N Value	
8/22	33.5 To 35.0	11:35 / 11:35	34	38.62	41	3	3	4	7	Y
8/22	38.5 To 40.0	11:44 / 11:44	39	43.62	41	3	4	4	8	Y
8/22	42.5 To 45.0	11:53 / 11:53	44	48.62	41	4	6	11	17	Y
8/22	46.5 To 50.0	12:00 / 12:01	49	53.62	41	4	7	10	17	Y

SA-CL
 SA-S1
 SA-S1
 SA-S1

Comments: (1) If there are any nonconformances or deficiencies identified during the testing, immediately pause the drilling and testing activities and notify the Site Manager and describe them in the space below; (2) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. verticality, weather, or lubrication between trials). Drop height tolerance is ± 1 inch. Drop height verified by Rig Geologist/Engineer at time of SPT Energy measurement for CME hammers and at the beginning of the day for Diedrich hammers; (3) Note any changes in rod diameter along drill string and record locations of short rod sections; (4) Prepare a sketch or take a picture of the instrumented drill rod assembly and indicate the approximate relative location and orientation of the strain gauges, accelerometers, and LE Datum; (5) Note: Identify all attached pages, including photographs, with the Project No., Boring No., and date.

[Signature]
 Prepared By (print/signature)
 SPT Energy Lead

8/22/17
 Date

Appendix III



Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI Accelerometer Calibration

Model PR-KICHER Serial # K5641

Cal Date: 27 FEB 17

Cal Due: 27 FEB 19

Temperature: 64.5 deg. F

Humidity 30 %

Calibrated at
Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, OH 44139

Manufactured by Pile Dynamics, Inc.

Procedure used: PDA Accelerometer Calibration Procedure 2016-6, Revision 20160422

Equipment was found to be

in tolerance As Received

out of tolerance As Received

in tolerance As Returned

out of tolerance As Returned

PDI Calibration: 0.0752 mv/5000g

Calibration Standards Utilized
Hopkinson Bar Force Calibration F2, verified on 25 APRIL 16

PDI HopBar DOS PAK, serial number 1273K, verified on 25 APRIL 16

Calibration performed by: Laine Wright
Laine Wright, Technician

Reviewed by: Robert Sprenger
Robert Sprenger, Production Manager

Accelerometer CC-5 Issued 20160426

QBTA: ON [ALT-F1/BB=60]

Pile Dynamics, Inc.

TG F2 DPF

File Dynamics 25-Feb-17 23:18	FS — 10	BN 62 SL 408/ 3440/ 99	PJ: PN: HOPBAR	A 4 -- US F 2 3.3			
LE 39.6 ft AR 1.7 in2 EM 30000 Ksi SP 0.492 K/ft3 WS 16810 ft/s WC 17043 ft/s							
JC 0.40 FM 1.00 UM 1.00							
EA/C 30.3 Ks/ft UN KIPS*0.1 FR 20000 MB 30							
DL -40 UT -1 PK 1 TM-PEAK							
F1/2 500/ 213 F3/4 213/ 213 A1/2 999/ 999 A3/4 999/ 376							
TS 12 TB 8.0					E B PD: k5641 T1 9.6 2L/C 4.7	VA 1000 UE 1022	LP 0.00 ft LI 1.0
ACCEPT SQ-OFF FL-OFF PR-OFF							
UMX= 4.3 FMX= 66 AMX= 129 EMX= 0.3 MEX= 129 FVP= 1.00							
ACCELEROMETER CALIBRATION N.I.S.T. Traceable SERIAL NUMBER: <u>K5641</u> CALIBRATION FACTOR: <u>.0752 MV/G</u> PAK (*5000): <u>376</u> DATE: <u>27FEB17</u> PDA OPERATOR: <u>[Signature]</u>							
OP: laine [ver:4.05]							

contact Pile Dynamics USA
with your questions
tel USA - 216 - 831- 6131
fax USA - 216 - 831- 0916

←AT:PIEZORESISTIVE

AT:PIEZOELECTRIC→

Smart Sensor

Smart Chip Programmed By S.M.W on 27FEB17 CRC Value 3C62

QBTA: ON [ALT-F1/BB=60]

Pile Dynamics, Inc.

TG F2 DPF

Pile Dynamics 17-Jul-17 21:04	FS — 10	BN 460 SL 515/ 3440/ 99	PJ: PN: HOPBAR	A 4 -- US F 2 3.3			
LE 39.6 ft AR 1.7 in2 EM 30000 Ksi SP 0.492 K/ft3 WS 16810 ft/s WC 17043 ft/s							
JC 0.40 FM 1.00 VM 1.00							
EA/C 30.3 Ks/ft UN KIPS*0.1 FR 20000 MB 30							
DL -35 UT -1 PK 1 TM-PEAK							
F1/2 500/ 213 F3/4 213/ 213 A1/2 999/ 999 A3/4 999/ 320							
TS 12 TB 8.0					E B PD: k5642 T1 9.6 2L/C 4.7	VA 1000 VE 1022	LP 0.00 ft LI 1.0
UMV= 4.5 FMV= 68 AMV= 149 EMV= 0.3 MEX= 133 FVP= 1.00							
ACCEPT SQ-OFF FL-OFF PR-OFF							
ACCELEROMETER CALIBRATION N.I.S.T. Traceable							
SERIAL NUMBER: <u>K5642</u>							
CALIBRATION FACTOR: <u>.064 MV/g</u>							
PAK (*5000): <u>320</u> DATE: <u>19JULY17</u>							
PDA OPERATOR: <u>[Signature]</u>							

<p>contact Pile Dynamics USA with your questions tel USA - 216 - 831- 6131 fax USA - 216 - 831- 0916</p>	<-AT:PIEZORESISTIVE		OP: laine [ver:4.05]	AT:PIEZOELECTRIC->
--	---------------------	--	----------------------	--------------------

Smart Sensor

Smart Chip Programmed By A.M.W. on 19JULY17 CRC Value 73CE



Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI SPT Drill Rod Serial # 102 BW

Cal Date: 2-27-17

Cal Due : 2-27-19

Temperature: 69.2 deg. F

Humidity 42 %

Manufactured by Pile Dynamics, Inc.

Calibrated at: Pile Dynamics, Inc., 30725 Aurora Road, Cleveland, OH 44139

Procedure used: SPT Drill Rod Calibration Procedure 2016-4, Revision 20160422

Calibration Data: Attach SPT Rod Data Sheet DS-17

Equipment was found to be

in tolerance As Received

out of tolerance As Received

in tolerance As Returned

out of tolerance As Returned

Calibration Standards Utilized

1. PDI SPT Calibration Signal Conditioning Unit #000001, verified on 20160302
2. PDI Load Cell #75, Certificate #3482090006
3. Capacitec Displacement Sensor #2034, Certificate #3482090004
4. Capacitec Displacement Sensor #2040, Certificate #3482090004
5. Capacitec Displacement Mainframe #4004-671, Certificate #3482090004
6. Brown & Sharpe Digital Caliper #8G028506, Certificate #3482090001
7. National Instruments USB-6210 DAQ serial number 159AFDE, Certificate #3482090002

Calibration performed by:

David Burrell Technician

Reviewed by:

Robert Sprenger, Production Manager

SPT CC-16 Issued 20160425



Quality Assurance for Deep Foundations

SPT Calibration Data Sheet Revision number 20160426
Use Calibration Procedure Number 2016-8, Revision 20160422

SPT Drill Rod Data

Serial Number: 102 BW Calibration Date: 2-27-17

Temperature: 69.2 °F Humidity: 42%

Calibration performed in accordance with PDI SPT Calibration Procedure 2016-4, Revision 20160422

As Received (circle one): Operational - Malfunctioning - Damaged

Calibration data

Pre-Load: 1. 8032 2. 8103 3. 8051

Total Load: 1. 17944 2. 18025 3. 17918

Common typical theoretical EA values based on SPT Rod Type:

AW: 35400 NW: 43100 or 68100 N3: 70800 BW: 52344

EA Theoretical 52344 EA Measured 53973.2 Error 3.11 %

Within 4% Tolerance: Y N

Alternative EA verification: Measure wall thickness, calculate area and multiply by 30000. (use spreadsheet for calculation)

Calibration values

Channel 1: As Found: (last cal): 218.03 As Left: 211.49 Within 5% Tolerance: Y / N

Channel 2: As Found: (last cal): 216.99 As Left: 211.97 Within 5% Tolerance: Y / N

EA: As Found: (last cal): 52603.80 As Left: 53973.2 Difference: 2.6 %

Calibration performed by:

David Burrell
David Burrell, Technician

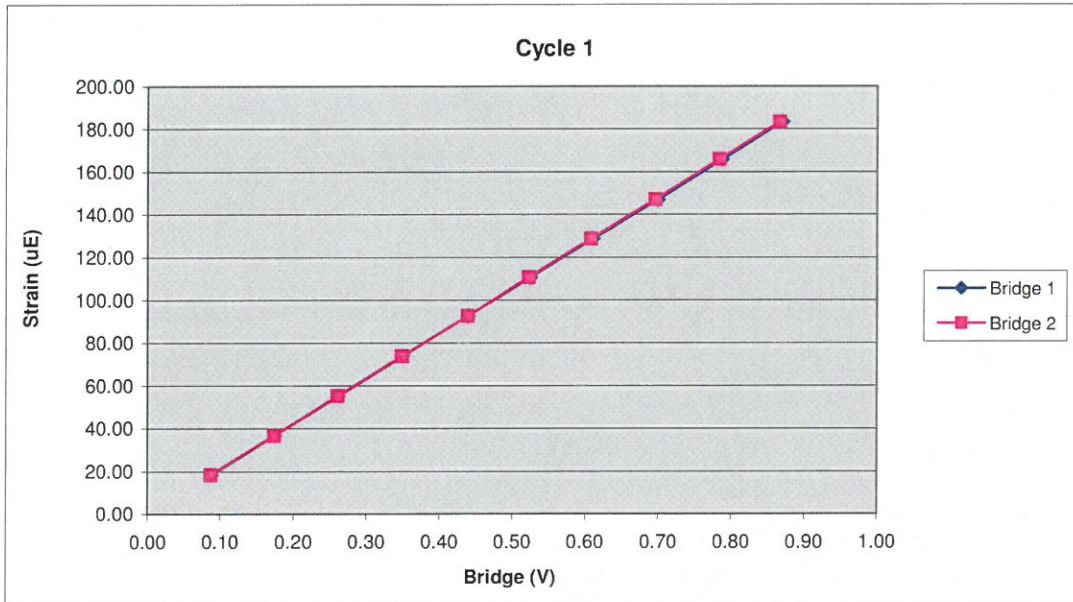
Reviewed by:

Robert Sprenger
Robert Sprenger, Production Manager

102BW		Cycle 1		
Sample	Force (lb)	Strain (μ E)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	994.33	18.41	0.09	0.09
3	1984.92	36.66	0.17	0.17
4	2976.10	55.17	0.26	0.26
5	3978.50	73.79	0.35	0.35
6	4997.02	92.56	0.44	0.44
7	5967.75	110.67	0.52	0.52
8	6936.11	128.65	0.61	0.61
9	7949.72	147.12	0.70	0.70
10	8958.80	165.80	0.79	0.78
11	9912.81	183.41	0.87	0.87

Bridge 1		Bridge 2	
Force Calibration (lb/V)	11383.56	Force Calibration (lb/V)	11443.76
Offset	-3.84	Offset	-11.61
Correlation	0.999997	Correlation	0.999997
Strain Calibration (μ E/V)	210.68	Strain Calibration (μ E/V)	211.79
Offset	0.00	Offset	-0.14
Correlation	0.999996	Correlation	0.999998

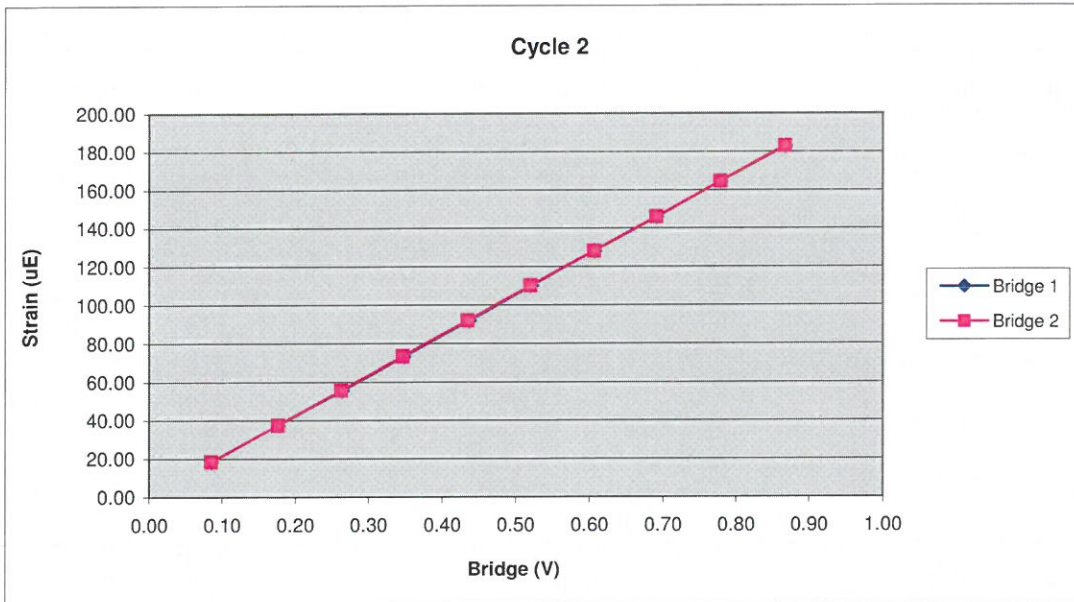
Force Strain Calibration	
EA (Kips)	54033.05
Offset	-3.88
Correlation	0.999998



102BW		Cycle 2		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	990.79	18.37	0.09	0.09
3	2024.07	37.45	0.18	0.18
4	3007.38	55.54	0.26	0.26
5	3968.86	73.37	0.35	0.35
6	4989.55	92.06	0.44	0.43
7	5960.67	110.16	0.52	0.52
8	6939.65	128.18	0.61	0.61
9	7913.13	145.93	0.69	0.69
10	8905.30	164.37	0.78	0.78
11	9922.44	182.88	0.87	0.87

Bridge 1		Bridge 2	
Force Calibration (lb/V)	11435.73	Force Calibration (lb/V)	11435.98
Offset	0.17	Offset	9.08
Correlation	0.999999	Correlation	0.999999
Strain Calibration ($\mu\text{E}/\text{V}$)	210.77	Strain Calibration ($\mu\text{E}/\text{V}$)	210.77
Offset	0.16	Offset	0.33
Correlation	0.999997	Correlation	0.999998

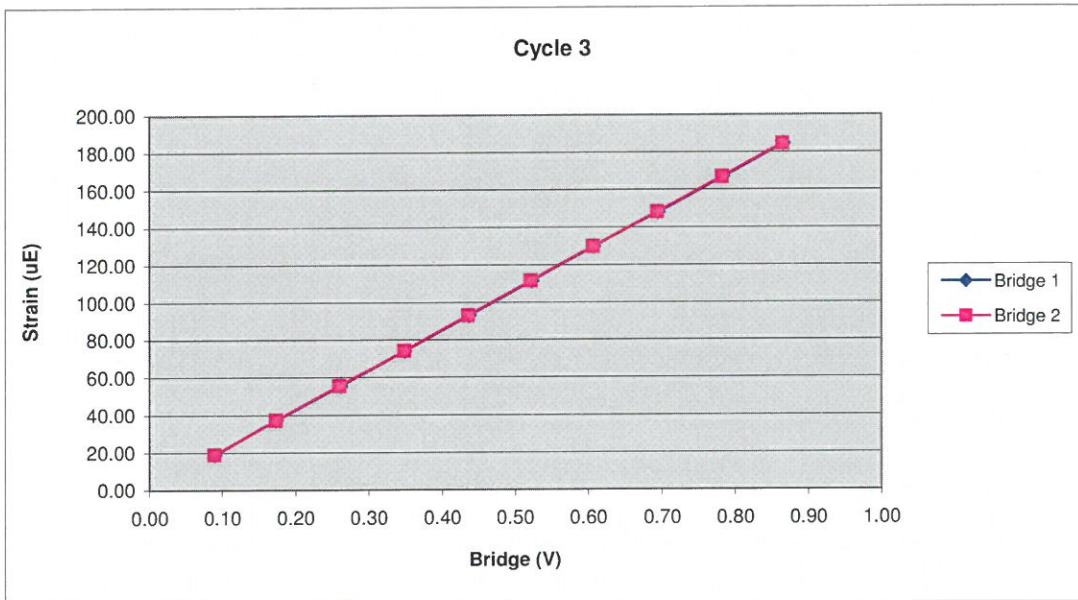
Force Strain Calibration	
EA (Kips)	54256.99
Offset	-8.56
Correlation	0.999999



102BW		Cycle 3		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	996.69	18.87	0.09	0.09
3	1961.32	37.18	0.17	0.17
4	2957.81	55.62	0.26	0.26
5	3966.89	74.24	0.35	0.35
6	4987.58	93.01	0.44	0.44
7	5947.49	111.39	0.52	0.52
8	6915.46	129.65	0.61	0.61
9	7914.71	148.00	0.70	0.69
10	8927.52	166.74	0.78	0.78
11	9867.37	184.37	0.87	0.86

Bridge 1		Bridge 2	
Force Calibration (lb/V)	11424.35	Force Calibration (lb/V)	11442.09
Offset	-20.96	Offset	-14.35
Correlation	0.999998	Correlation	0.999997
Strain Calibration ($\mu\text{E}/\text{V}$)	213.02	Strain Calibration ($\mu\text{E}/\text{V}$)	213.35
Offset	0.00	Offset	0.12
Correlation	0.999995	Correlation	0.999996

Force Strain Calibration	
EA (Kips)	53629.74
Offset	-20.93
Correlation	0.999994



Bridge Excitation (V) 5
Shunt Resistor (ohm) 60.4k

Calibration Factors	102BW		
Bridge 1 ($\mu\text{E}/\text{V}$)	211.49	Bridge 2 ($\mu\text{E}/\text{V}$)	211.97
EA Factor (Kips)	53973.26	Area (in²)	1.80

Calibrated by:



Calibrated Date:

2/27/2017

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Appendix IV



This documents that

Robert E. Kral
S&ME, Inc.

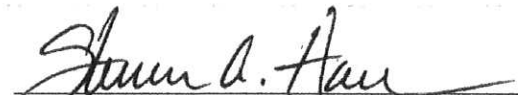
has on May 20, 2016 achieved the rank of

ADVANCED


on the **Dynamic Measurement and Analysis Proficiency Test.**

The individual identified on this document demonstrated to the degree granted above an understanding of theory, data quality evaluation, interpretation and signal matching for high strain dynamic testing of deep foundations. ***It is recommended that Individuals at the Advanced level seek Master or Expert levels through additional study within six years of the date of this document.***

The ability of the individual named to provide appropriate knowledge and advice on a specific project is not implied or warranted by the Pile Driving Contractors Association or Pile Dynamics, Inc. **This certificate can be verified at www.PDAproficiencytest.com.** The Pile Driving Contractors Association or Pile Dynamics, Inc. assumes no liability for foundation testing and analysis work performed by the bearer of this certificate.


Steven A. Hall, Executive Director
Pile Driving Contractors Association




Garland Likins, Senior Partner
Pile Dynamics, Inc.

No. 2072