

GEOTECHNICAL SUBSURFACE DATA REPORT

S-9-22 over Caw Caw Creek
Calhoun County, South Carolina



PREPARED FOR

SCDOT

955 Park Street

Columbia, South Carolina 29201



PREPARED BY

F&ME Consultants, Inc.

211 Business Park Boulevard

Columbia, South Carolina 29203

SCDOT Project ID.: PO44267

FME Project No.: G7100.009—Task 00010

February 11, 2025

February 11, 2025

Mr. Trapp Harris, P.E.
South Carolina Department of Transportation
955 Park Street
Columbia, South Carolina 29201

Re: Geotechnical Subsurface Data Report
S-9-22 over Caw Caw Creek
Greenville County, South Carolina
Bridge ID: 970002200300
Asset ID: 670
SCDOT Project ID.: P044267
FME Project No.: G7100.009 – Task 00010

Mr. Harris:

Submitted herein is F&ME Consultants, Inc.'s (FME) Geotechnical Subsurface Data Report for the S-9-22 over Caw Caw Creek project. This report contains findings from our subsurface field exploration and laboratory testing program

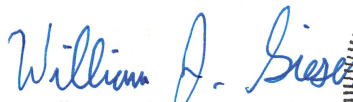
It has been a pleasure working with you on this project and we appreciate the opportunity to be of service. Please notify us if there are any questions or if we can be of further assistance.

Respectfully Submitted,

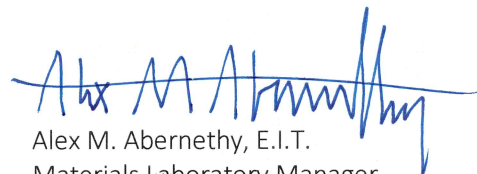
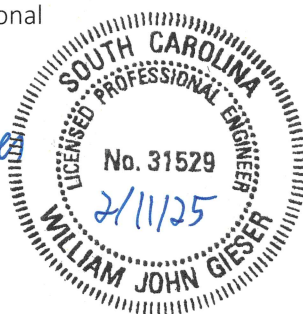
F&ME CONSULTANTS, INC.

A handwritten signature in blue ink that reads 'J. Trey Peterson'.

J. Trey Peterson, E.I.T.
Geotechnical Staff Professional

A handwritten signature in blue ink that reads 'William J. Gieser'.

William J. Gieser, P.E.
Senior Project Engineer

A handwritten signature in blue ink that reads 'Alex M. Abernethy'.

Alex M. Abernethy, E.I.T.
Materials Laboratory Manager



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1. INTRODUCTION

1.1. GENERAL

The project takes place along S-9-22 (Burke Road) and is located approximately nine (9) miles north of Orangeburg, South Carolina. We understand that this project will involve the demolition/removal of the existing culvert structure and the replacement with a new bridge structure on the existing roadway alignment. A Site Location Plan (Figure 1) is presented in Section 1 of the Appendix of this report.

1.2. SCOPE

FME performed a geotechnical subsurface exploration and laboratory testing for the project. The original South Carolina Department of Transportation (SCDOT) Scope of Services was issued on December 16, 2024, and a revised Scope of Services was provided on January 6, 2025. The field exploration consisted of Soil Test Borings (STB) with Standard Penetration Testing (SPT), Electro-Piezocone Sounding (CPT), Downhole Shear Wave Velocity DHT) testing, and the collection of Bulk Soil Samples (BS). Laboratory testing was performed on soil samples collected from the Soil Test Borings and the Bulk Soil Samples.

Field exploration methods and laboratory procedures were conducted in general accordance with the current American Association of State Highway and Transportation Officials (AASHTO), American Society of Testing and Materials (ASTM) Standards. This report was prepared in general accordance with the 2022 SCDOT Geotechnical Design Manual (GDM).

2. SUBSURFACE EXPLORATION SUMMARY

From December 20, 2024, through January 2, 2025, FME performed eight (8) Soil Test Borings, one (1) Downhole Shear Wave Velocity Test (DHT), and two (2) Electro-Piezocone Soundings (2). Additionally, two (2) bulk soil samples were collected on site via Manual Auger Boring methodologies.

The soils were visually classified in the field based upon the Unified Soil Classification System (USCS) in general accordance with ASTM D2488. Testing locations and target exploration depths were provided by the SCDOT. A Boring Location Plan (Figure 2) displaying the test locations performed during the subsurface exploration is contained in Section 2 of the Appendix within to this report.

2.1. SOIL TEST BORINGS

Soil Test Borings were performed utilizing a CME 550X ATV-mounted drill rig. The measured energy transfer ratio for the CME 550X was 89.8% utilizing an automatic hammer. SPT hammer calibration records are provided within Section 8 of the Appendix of this report. Soil Test Borings B-1/DHT and B-2 utilized rotary wash drilling techniques to maintain a stable borehole. Soil Test Borings B-1/DHT and B-2 were sampled continuously through the upper ten (10) feet and upper twenty (20) feet, respectively, utilizing SPT testing. Following the continuous sampling, SPT testing was performed on standard five (5) foot intervals thereafter until the target boring depth was achieved. SPT sampling was performed in general accordance with ASTM D1586 to determine the relative densities and consistencies of the subsurface soils, and to collect subsurface soil samples.

FME also conducted six (6) roadway approach Soil Test Borings, designated as P-1 through P-6. Pavement core samples from each Soil Test Boring were bagged and transported to FME's laboratory facility following boring completion. These cores were measured and photographed to document thickness, distress, and existing surface conditions. Copies of the Soil Test Boring Logs are contained within Section 3A in the Appendix of this report. Additionally, pavement core photographic documentation is presented within Section 7 of the Appendix of this report. The locations, depths, and elevations of the Soil Test Borings performed for the subsurface investigation are provided in the following table.

Table 1 – Field Exploration Summary Table – Soil Test Borings

Test ID	Test Type	Total Boring Depth (ft)	Latitude	Longitude	Elevation (ft-MSL)
B-1/DHT	STB/DHT	120.0	33.62269031	-80.88937017	214.1
B-2	STB	100.0	33.62312606	-80.88881395	213.0
P-1	STB	6.0	33.62237320	-80.88967265	215.9
P-2	STB	6.0	33.62206068	-80.89000194	219.1
P-3	STB	6.0	33.62177952	-80.89033407	224.7
P-4	STB	6.0	33.62345449	-80.88850728	214.5
P-5	STB	6.0	33.62376690	-80.88818659	217.9
P-6	STB	6.0	33.62407999	-80.88786380	223.1
Total		256.0			

2.2. ELECTRO-PIEZOCONE SOUNDING TESTS

Electro-Piezcone Sounding (CPT) Tests were advanced on site using a CME 550X ATV Mounted drill rig. Copies of the Electro-Piezcone Sounding Logs are contained within Section 3C in the Appendix of this report. The following table is a summary of the Electro-Piezcone Sounding Test designations, depths, locations, and surface elevations.

Table 2 – Field Exploration Summary Table – Electro Piezocone Soundings

Test ID	Test Type	Route	Test Depth (ft)	Latitude	Longitude	Elevation
CPT-1	CPT	S-9-22	19.2	33.62266320	-80.88933319	214.1
CPT-2	CPT	S-9-22	22.3	33.62316648	-80.88887046	213.0
Total						

2.3. BULK SOIL SAMPLES

Two Bulk Soil Samples (designated as BS-1 and BS-2) were collected on-site. Bulk Soil Sample BS-1 was collected via Manual Auger Boring Methodologies (MAB) from the embankment near B-1/DHT. Bulk Soil Sample BS-2 was collected as a composite sample from the upper six (6) feet of auger cuttings encountered within the six (6) roadway approach Soil Test Borings. Locations where the material was sampled are presented in Section 2 in the Appendix.

The table below summarizes test designations, depth, locations and existing surface elevations for the Bulk Soil Samples

Table 3 – Field Exploration Summary Table – Bulk Soil Samples

Test ID	Test Type	Test Depth (ft)	Latitude	Longitude	Elevation (ft-MSL)
BS-1	MAB	5.0	33.62270902	-80.88939510	213.5
BS-2 ¹	STP	6.0	N/A	N/A	N/A
TOTAL		11.0			

¹Composite Bulk Soil Sample BS-2 was Created from Upper Six (6) feet of Auger Cuttings Collected within Soil Test Borings P-1 through P-6.

2.5. DOWNHOLE SHEAR WAVE VELOCITY TESTING

On January 7, 2025, Downhole Shear Wave Velocity testing (DHT) was performed at approximately two and one-half (2.5) foot depths within Soil Test Boring B-1/DHT. At each depth, a hammer strike was applied at the ground surface to a shear beam, and the response was measured in the geophones within the borehole. The downhole testing generated a one-dimensional subsurface shear wave velocity profile at the discrete locations of boring B-1/DHT. The results from the downhole shear wave velocity testing are provided in Section 4 of the Appendix.

Table 4 – Field Exploration Summary Table – Downhole Shear Wave Velocity Testing

Test ID	Test Type	Test Depth (ft)	Latitude	Longitude	Elevation (ft-MSL)
B-1/DHT	STB/DHT	112.5	33.62269031	-80.88937017	214.1

2.6. GROUND WATER

Groundwater depths were recorded at the time of boring (TOB) and/or twenty-four (24) hours following boring completion. Groundwater depth measurements are noted on the individual Subsurface Exploration Logs in Section 3 of the Appendix.

2.7. TEST LOCATION TABLE

The following table summarizes the state plane coordinates in feet, latitude-longitude in decimal degrees, and existing surface elevations of the test locations for the subsurface exploration.

Table 5 – Test Location Table

Test ID	Test Type	Northing	Easting	Latitude	Longitude	Elevation (ft-MSL)
B-1/DHT	STB/DHT	651043.757	2033672.451	33.62269031	-80.88937017	214.1
B-2	STB	651202.474	2033841.577	33.62312606	-80.88881395	213.0
BS-1	STB	651050.556	2033664.855	33.62270902	-80.88939510	213.5
BS-2 ¹	MAB	N/A	N/A	N/A	N/A	N/A
CPT-1	CPT	651033.904	2033683.715	33.62266320	-80.88933319	214.1
CPT-2	CPT	651217.161	2033824.361	33.62316648	-80.88887046	213.0
P-1	STB	650928.286	2033580.506	33.62237320	-80.88967265	215.9

P-2	STB	650814.479	2033480.400	33.62206068	-80.89000194	219.1
P-3	STB	650712.077	2033379.419	33.62177952	-80.89033407	224.7
P-4	STB	651322.063	2033934.789	33.62345449	-80.88850728	214.5
P-5	STB	651435.831	2034032.274	33.62376690	-80.88818659	217.9
P-6	STB	651549.844	2034130.394	33.62407999	-80.88786380	223.1

¹Bulk Soil Sample BS-2 was a composite sample created from the upper 6-ft. of auger cuttings from the specified boreholes.

3. LABORATORY TESTING SUMMARY

Following completion of FME's field exploration, draft boring logs were generated and reviewed internally by FME. Based on the data represented in these logs, FME was authorized to designate soil samples for laboratory testing on behalf of the SCDOT. The laboratory testing performed on the soil samples collected from the Soil Test Borings is summarized in the table below. Data sheets containing the results from this testing are provided in Section 5A and 5C within the Appendix of this report.

Table 6 – Laboratory Testing Summary Table – Soil Test Boring (Split-Spoon) Samples

Type of Test	Quantity	Procedure
Moisture Content	14	AASHTO T265 (ASTM D2216)
Atterberg Limits	14	AASHTO T89/T90 (ASTM D4318)
Hydrometer and Grain Size	6	ASTM D6913/AASHTO T11 (ASDM D1140)
Grain-Size Distribution w/ Wash 200	8	AASHTO D6913/AASHTO T11 (ASTM D1140)
pH	2	AASHTO T289 (ASTM G51)
Soil Sulfate Content	2	AASHTO T290 (ASTM C1580)
Soil Chloride Content	2	AASHTO T291
Soil Resistivity	2	AASHTO T288

The laboratory testing performed for the Bulk Soil samples are summarized in the table below. Data sheets containing the results from this testing are provided in Section 5B of the Appendix attached to this report.

Table 7 – Laboratory Testing Summary Table – Bulk Soil Samples

Type of Test	Quantity	Procedure
Moisture Content	2	AASHTO T265 (ASTM D2216)
Atterberg Limits	2	AASHTO T89/T90 (ASTM D4318)
Grain-size Distribution w/ Wash 200	2	ASTM D6913/AASHTO T11 (ASTM D1140)
Standard Proctor	2	AASHTO T99 (ASTM D698)
California Bearing Ratio Test	1	AASHTO T193
Direct Shear	1	AASHTO T236 (ASTM D3080)

S-9-22 over Caw Caw Creek

Geotechnical Subsurface Data Report

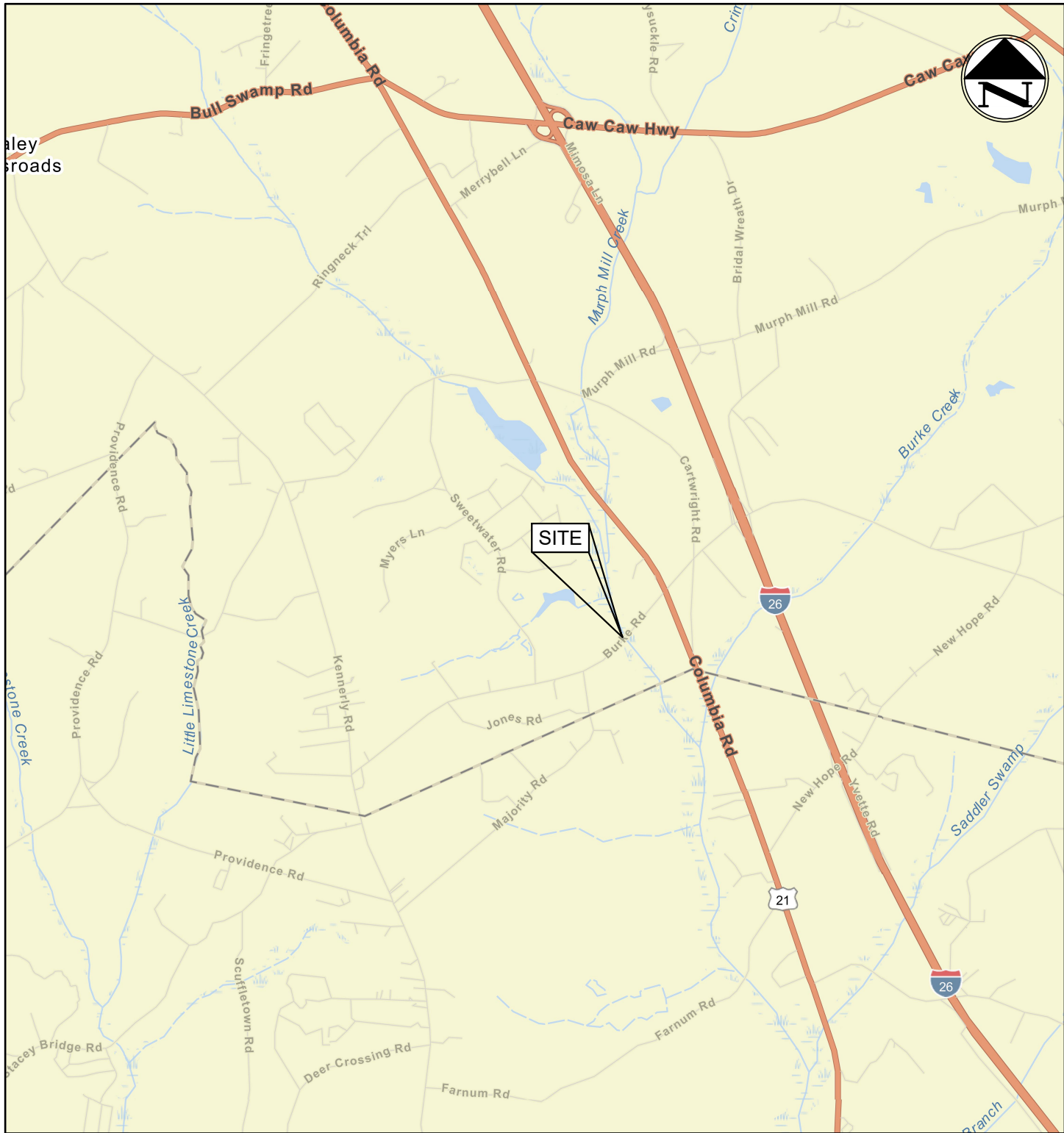
APPENDIX

SECTION 1	SITE LOCATION PLAN
SECTION 2	BORING LOCATION PLAN
SECTION 3	SUBSURFACE EXPLORATION LOGS
SECTION 3A	SOIL TEST BORING (STB) LOGS
SECTION 3B	BULK SOIL SAMPLE (BS) LOGS
SECTION 3C	ELECTRO-PIEZOCONE SOUNDING (CPT) LOGS
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SECTION 5	LABORATORY TEST RESULTS
SECTION 5A	SPLIT SPOON SAMPLES (SS)
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SECTION 5C	CORROSION SERIES TESTING
SECTION 6	ON-SITE DRILL RIG PHOTOS
SECTION 7	PAVEMENT CORE PHOTOS
SECTION 8	SPT HAMMER CALIBRATION
SECTION 9	GEOSCOPING FORM

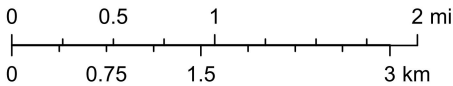
S-9-22 over Caw Caw Creek
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APPENDIX

SECTION 1 SITE LOCATION PLAN



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F&ME CONSULTANTS, INC.
COLUMBIA, SC

4			
3			
2			
1			
REV.	BY	DATE	DESCRIPTION OF REVISION
TOPO.		DATE	
DWG.	CTC	DATE 1.22.25	GROUP -- --
R/W		DATE	

S-9-22 OVER CAW CAW CREEK
CALHOUN COUNTY, SOUTH CAROLINA

SITE LOCATION PLAN

SCDOT PROJECT ID: P044267

FME JOB NO. G7100.009 TASK 00010

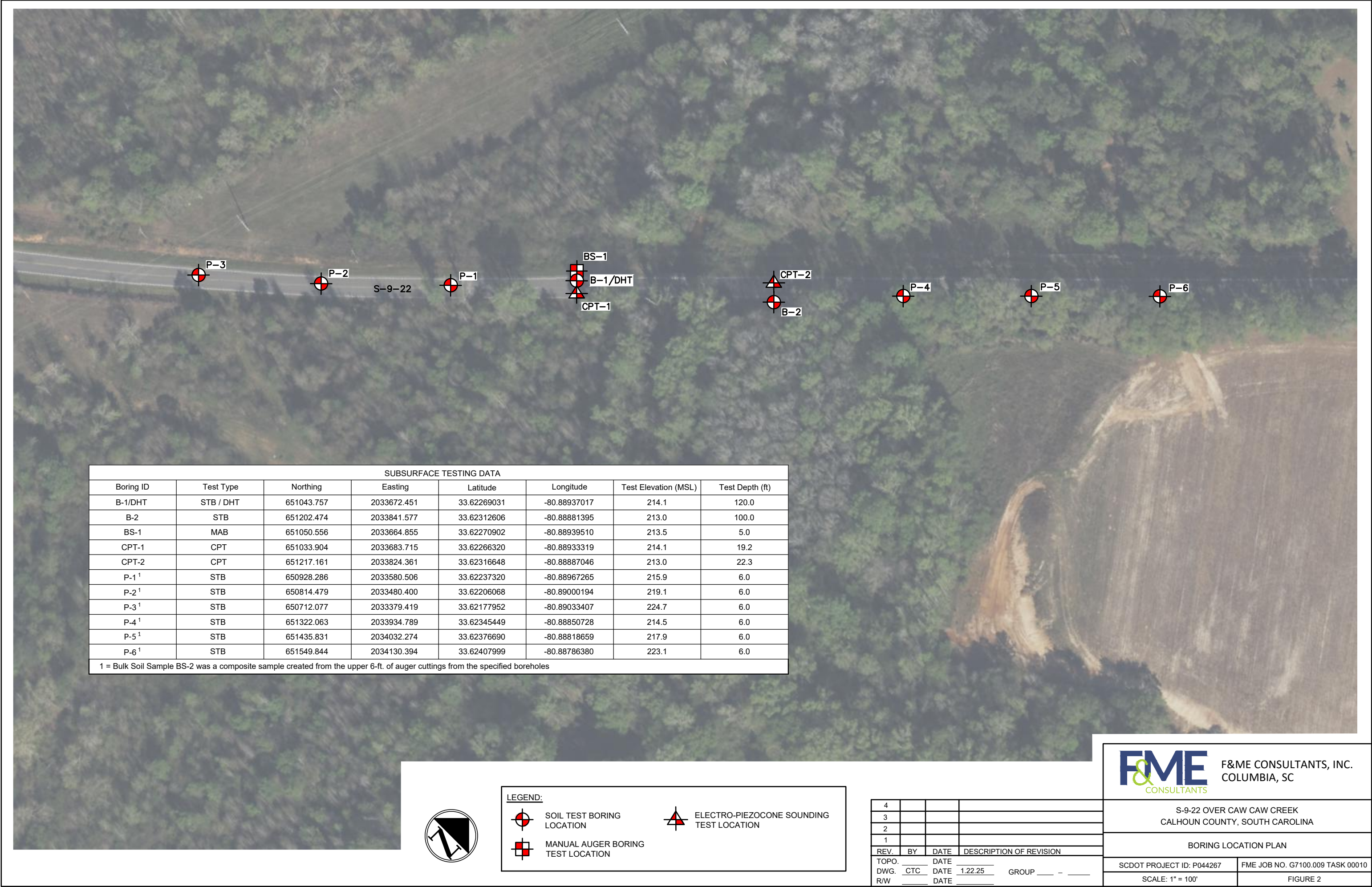
SCALE: AS NOTED

FIGURE 1

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 2 BORING LOCATION PLAN



SUBSURFACE TESTING DATA							
Boring ID	Test Type	Northing	Easting	Latitude	Longitude	Test Elevation (MSL)	Test Depth (ft)
B-1/DHT	STB / DHT	651043.757	2033672.451	33.62269031	-80.88937017	214.1	120.0
B-2	STB	651202.474	2033841.577	33.62312606	-80.88881395	213.0	100.0
BS-1	MAB	651050.556	2033664.855	33.62270902	-80.88939510	213.5	5.0
CPT-1	CPT	651033.904	2033683.715	33.62266320	-80.88933319	214.1	19.2
CPT-2	CPT	651217.161	2033824.361	33.62316648	-80.88887046	213.0	22.3
P-1 ¹	STB	650928.286	2033580.506	33.62237320	-80.88967265	215.9	6.0
P-2 ¹	STB	650814.479	2033480.400	33.62206068	-80.89000194	219.1	6.0
P-3 ¹	STB	650712.077	2033379.419	33.62177952	-80.89033407	224.7	6.0
P-4 ¹	STB	651322.063	2033934.789	33.62345449	-80.88850728	214.5	6.0
P-5 ¹	STB	651435.831	2034032.274	33.62376690	-80.88818659	217.9	6.0
P-6 ¹	STB	651549.844	2034130.394	33.62407999	-80.88786380	223.1	6.0
1 = Bulk Soil Sample BS-2 was a composite sample created from the upper 6-ft. of auger cuttings from the specified boreholes							



LEGEND:

SOIL TEST BORING
LOCATION

MANUAL AUGER BORING
TEST LOCATION

ELECTRO-PIEZOCONE SOUNDING
TEST LOCATION

4			
3			
2			
1			
REV.	BY	DATE	DESCRIPTION OF REVISION
TOPO.		DATE	
DWG.	CTC	DATE 1.22.25	GROUP -
R/W		DATE	

F&ME CONSULTANTS, INC.
COLUMBIA, SC

S-9-22 OVER CAW CAW CREEK
CALHOUN COUNTY, SOUTH CAROLINA

BORING LOCATION PLAN

SCDOT PROJECT ID: P044267

FME JOB NO. G7100.009 TASK 00010

SCALE: 1" = 100'

FIGURE 2

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 SUBSURFACE EXPLORATION LOGS

Soil Test Boring Log Descriptors

Correlation of Penetration Resistance with Relative Density and Consistency














Coarse Grained Soils (Sands/Gravel)		Fine Grained Soils (Silt/Clay)	
SPT Blow Count	Relative Density	SPT Blow Count	Consistency
≤ 4	Very Loose	≤ 2	Very Soft
5 – 10	Loose	3 – 4	Soft
11 – 30	Medium Dense	5 – 8	Firm
31 – 50	Dense	9 – 15	Stiff
≥ 51	Very Dense	16 – 30	Very Stiff
		≥ 31	Hard

Particle Size Identification

Gravel	Sieve Size
Fine	#4 to ¾ inch
Coarse	¾ inch to 3 inch

Sand	Sieve Size
Fine	#200 to #40
Medium	#40 to #10
Coarse	#10 to #4

Gravel	Sieve Size
Fines Content	< #200

SYMBOL	PRINT CODE*	TYPICAL DESCRIPTION
	SCCT	CONCRETE
	SCAT	ASPHALT
	SCTS	TOPSOIL/PEAT
	SCSAND	SAND
	SCSTSAND	SILTY SAND/SANDY SILT
	SCCLSAND	CLAYEY SAND/SANDY CLAY
	SCCLAY	CLAY
	SCSILT	SILT
	SCSTCLAY	SILTY CLAY/CLAYEY SILT
	SCSAP	SAPROLITE
	SCLS	LIMESTONE
	SCBR	GRANITE (BEDROCK)
	SCMARL	MARL

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
				ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
				MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
HIGHLY ORGANIC SOILS				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS



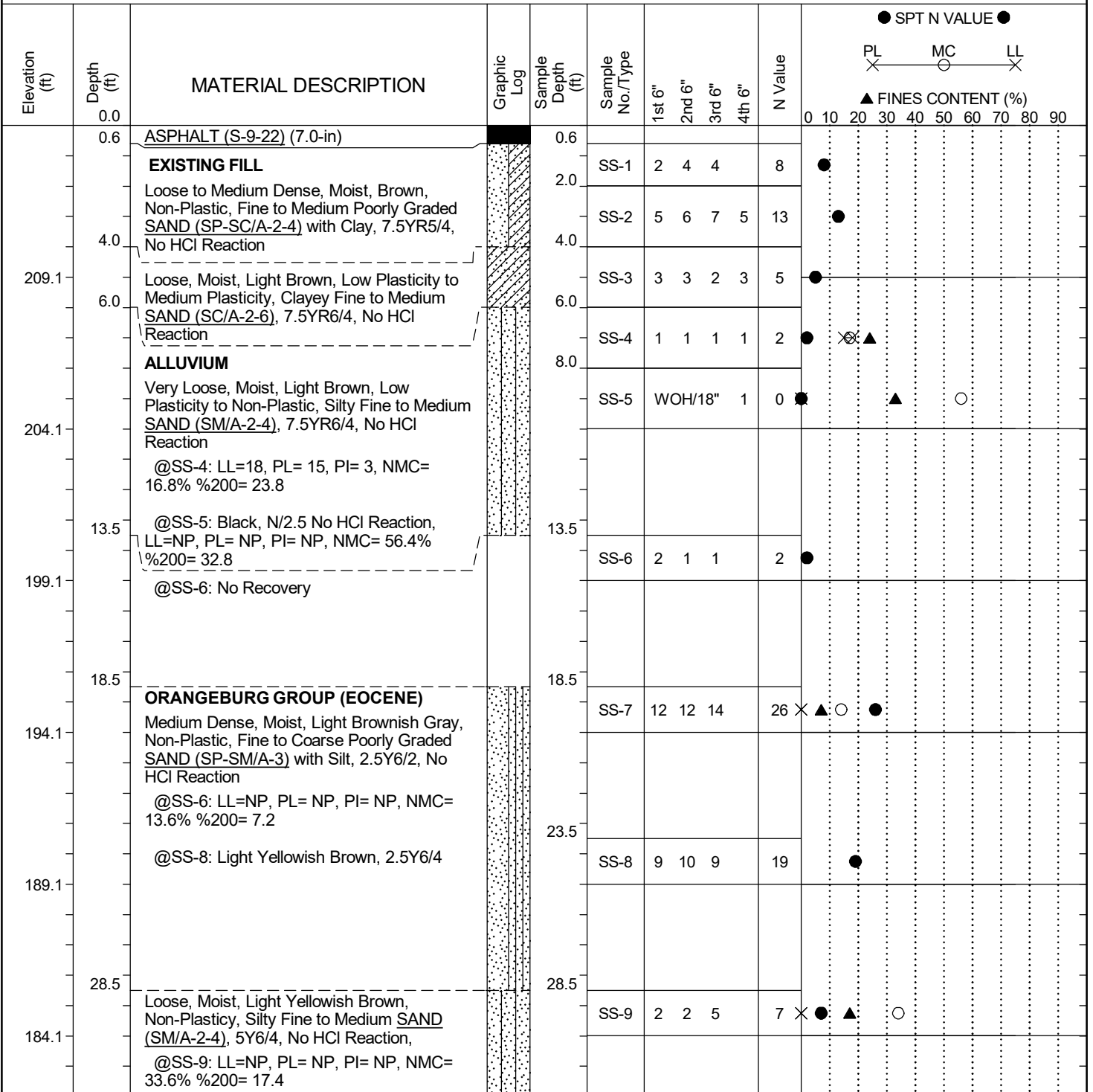
S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 SUBSURFACE EXPLORATION LOGS
SECTION 3A SOIL TEST BORING (STB) LOGS

SCDOT Soil Test Log

Project ID:	P044267	County:	Calhoun	Boring No.:	B-1/DHT
Site Description:	S-9-22 over Caw Caw Creek			Route:	S-9-22
Eng./Geo.:	T. Peterson	Boring Location:	N/A	Offset:	N/A
Elev.:	214.1 ft	Latitude:	33.62269031	Longitude:	-80.88937017
Total Depth:	120 ft	Soil Depth:	120 ft	Core Depth:	N/A ft
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	CME 550X	Drill Method:	RW	Hammer Type:	Automatic
Core Size:	N/A	Driller:	L. Guempel	Energy Ratio:	89.8%
				Groundwater:	TOB Not Measured
				24HR	N/A



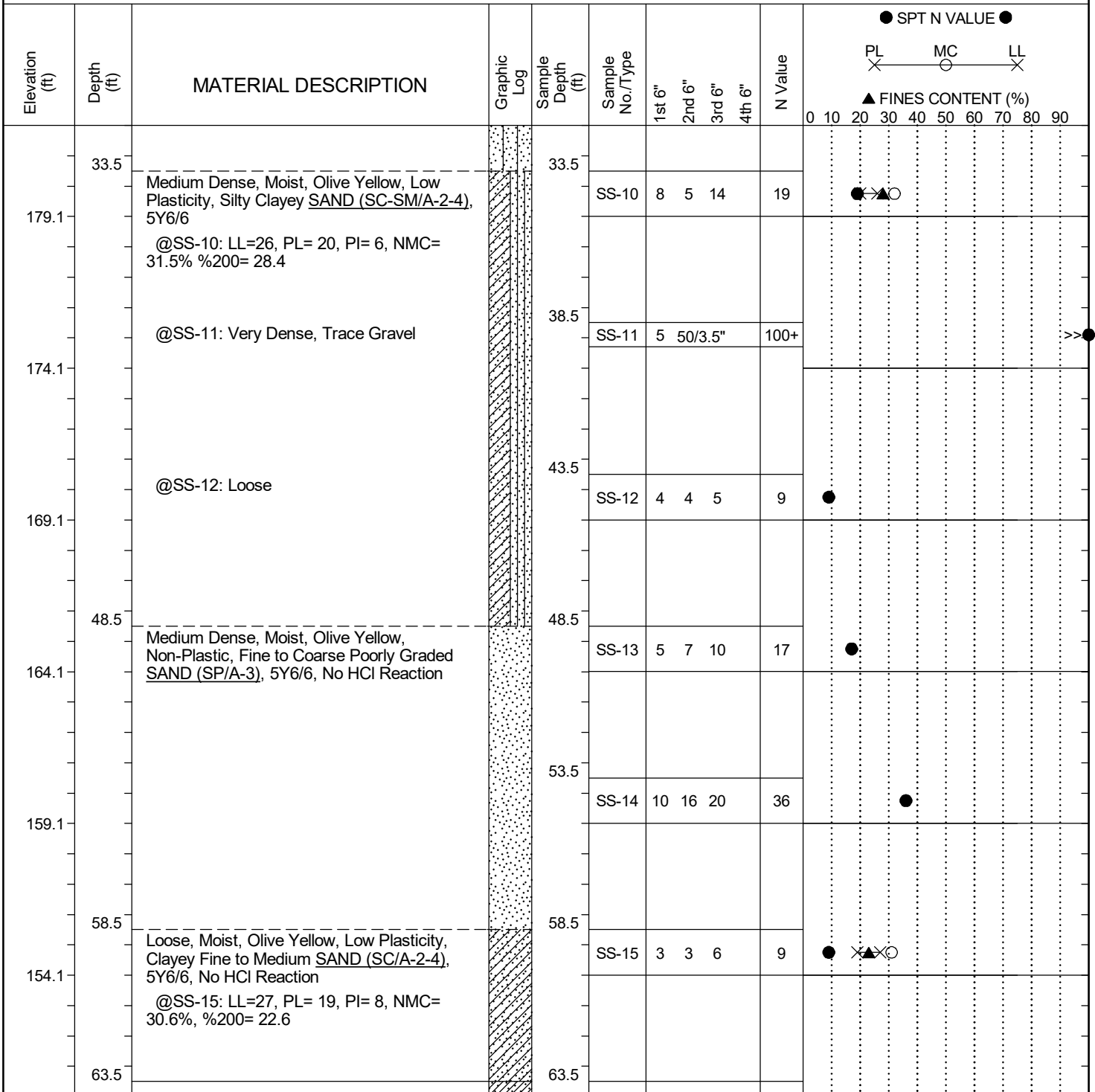
LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: B-1/DHT	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: T. Peterson		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 214.1 ft		Latitude: 33.62269031		Longitude: -80.88937017		Date Started: 12/20/2024	
Total Depth: 120 ft		Soil Depth: 120 ft		Core Depth: N/A ft		Date Completed: 12/21/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y ⓘ		Liner Used: Y ⓘ	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB Not Measured		24HR N/A	



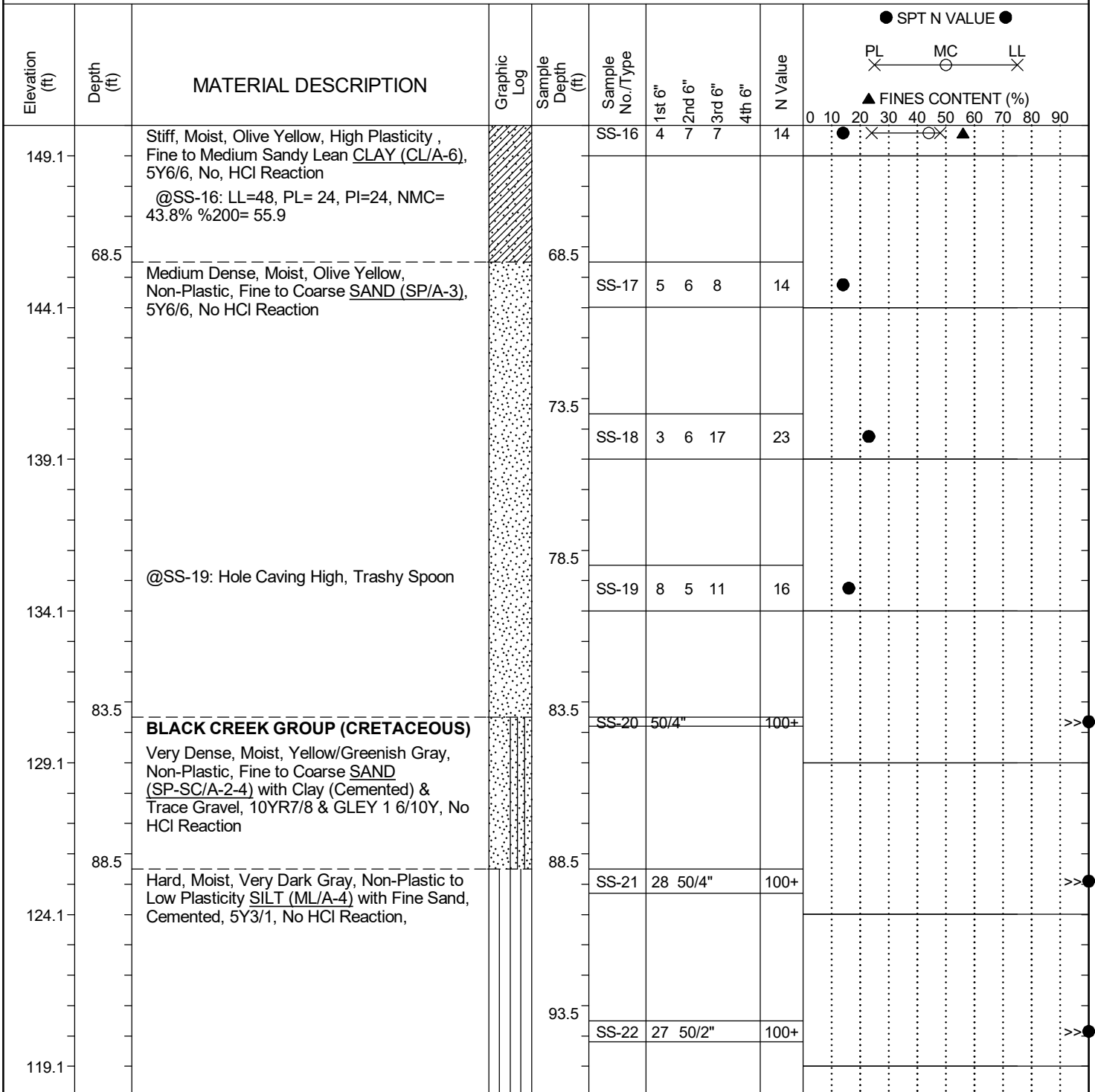
LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: B-1/DHT	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: T. Peterson		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 214.1 ft		Latitude: 33.62269031		Longitude: -80.88937017		Date Started: 12/20/2024	
Total Depth: 120 ft		Soil Depth: 120 ft		Core Depth: N/A ft		Date Completed: 12/21/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB Not Measured		24HR N/A	



LEGEND

Continued Next Page

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: B-1/DHT	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: T. Peterson		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 214.1 ft		Latitude: 33.62269031		Longitude: -80.88937017		Date Started: 12/20/2024	
Total Depth: 120 ft		Soil Depth: 120 ft		Core Depth: N/A ft		Date Completed: 12/21/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB Not Measured		24HR N/A	

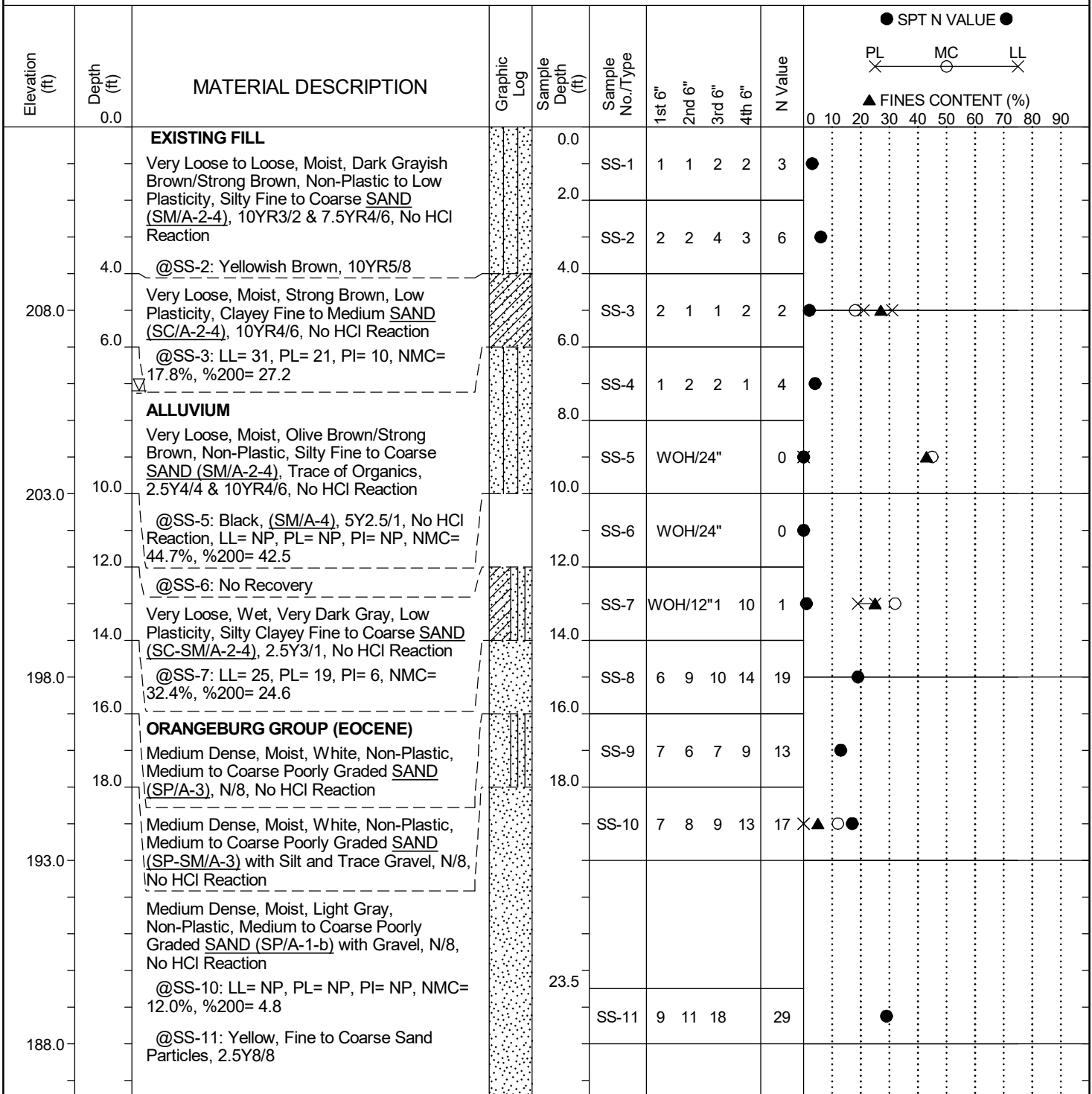
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	<div> <div>● SPT N VALUE ●</div> <div> <div>PL X</div> <div>MC ○</div> <div>LL X</div> </div> <div>▲ FINES CONTENT (%)</div> <div>0 10 20 30 40 50 60 70 80 90</div> </div>
114.1	98.5				SS-23	23	43	50/2"		100+	●
109.1	103.5				SS-24	26	50/4.5"			100+	>>●
104.1	108.5	Hard, Moist, Dark Gray, Non-Plastic to Low Plasticity, Fine to Medium Sandy <u>SILT</u> (ML/A-4), 2.5Y4/1, No HCl Reaction		108.5	SS-25	10	17	21		38	●
99.1	113.5			113.5	SS-26	10	14	21		35	●
94.1	118.5	Dense, Moist, Light Greenish Gray, Non-Plastic to Low Plasticity, Silty <u>SAND</u> (SM/A-2-4), GLEY1 7/5GY, No HCl Reaction		118.5	SS-27	13	22	25		47	●
	120.0	Boring Terminated at 120.0-ft. Below the Existing Roadway Surface. Boring Achieved Target Depth.									
89.1											

LEGEND

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

SCDOT Soil Test Log

Project ID:	P044267	County:	Calhoun	Boring No.:	B-2
Site Description:	S-9-22 over Caw Caw Creek			Route:	S-9-22
Eng./Geo.:	G. Cantele	Boring Location:	N/A	Offset:	N/A
Elev.:	213.0 ft	Latitude:	33.62312606	Longitude:	-80.88881395
Date Started:	12/31/2024				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	N/A ft
Date Completed:	12/31/2024				
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)
Liner Used:	Y (N)	Drill Machine:	CME 550X	Drill Method:	RW
Hammer Type:	Automatic	Energy Ratio:	89.8%		
Core Size:	N/A	Driller:	L. Guempel	Groundwater:	TOB 7.2 (Cave @ 12.7)
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	

Continued Next Page

SCDOT Soil Test Log

Project ID:	P044267	County:	Calhoun	Boring No.:	B-2
Site Description:	S-9-22 over Caw Caw Creek			Route:	S-9-22
Eng./Geo.:	G. Cantele	Boring Location:	N/A	Offset:	N/A
Elev.:	213.0 ft	Latitude:	33.62312606	Longitude:	-80.88881395
Date Started:	12/31/2024				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	N/A ft
Date Completed:	12/31/2024				
Bore Hole Diameter (in):	4	Sampler Configuration			
Liner Required:	Y	Liner Used:	Y		
Drill Machine:	CME 550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	89.8%				
Core Size:	N/A	Driller:	L. Guempel	Groundwater:	TOB 7.2 (Cave @ 12.7)
24HR	N/A				

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	<div> <div>● SPT N VALUE ●</div> <div> <div>PL X</div> <div>MC ○</div> <div>LL X</div> </div> <div>▲ FINES CONTENT (%)</div> </div>
183.0	28.5	@SS-12: No Recovery		28.5	SS-12	4	5	7		12	●
178.0	33.5	Loose, Moist, Olive, Medium Plasticity, Clayey Fine to Coarse SAND (SM/A-2-6), 5Y5/6 @SS-13: LL= 27, PL= 15, PI= 12, NMC= 31.2%, %200= 17.1		33.5	SS-13	2	3	3		6	● ▲ X ○
173.0	38.5			38.5	SS-14	3	2	4		6	●
168.0	43.5	Very Dense, Moist, Light Grayish Olive, Non-Plastic, Fine to Coarse Poorly Graded SAND (SP/A-3), Cemented, 10Y6/2, No HCl Reaction		43.5	SS-15	50/1.0"				100+	>> ●
163.0	48.5	Medium Dense, Moist, Low Plasticity to Medium Plasticity, Silty Fine to Coarse SAND (SM/A-2-4), 5Y5/6, No HCl Reaction		48.5	SS-16	8	5	7		12	●

LEGEND

Continued Next Page

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

SCDOT Soil Test Log

Project ID:	P044267	County:	Calhoun	Boring No.:	B-2
Site Description:	S-9-22 over Caw Caw Creek			Route:	S-9-22
Eng./Geo.:	G. Cantele	Boring Location:	N/A	Offset:	N/A
Elev.:	213.0 ft	Latitude:	33.62312606	Longitude:	-80.88881395
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	N/A ft
Bore Hole Diameter (in):	4	Sampler Configuration		Liner Required:	Y (N)
Drill Machine:	CME 550X	Drill Method:	RW	Hammer Type:	Automatic
Core Size:	N/A	Driller:	L. Guempel	Energy Ratio:	89.8%
				Groundwater:	TOB 7.2 (Cave @ 12.7)
				24HR	N/A

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	<div> <div>● SPT N VALUE ●</div> <div> <div>PL X</div> <div>MC ○</div> <div>LL X</div> </div> <div>▲ FINES CONTENT (%)</div> <div>0 10 20 30 40 50 60 70 80 90</div> </div>
158.0		@SS-17: Loose, Olive, Low Plasticity, Silty Fine to Coarse SAND (SM/A-4), 5Y5/6, No HCl Reaction, LL= 29, PL= 23, PI= 6, NMC= 37.6%, %200= 38.5		53.5	SS-17	2	3	3		6	●
153.0	58.5	Medium Dense, Moist, Yellow, Non-Plastic, Fine to Coarse Poorly Graded SAND (SP/A-3), 2.5Y7/6 & 2.5Y8/8, No HCl Reaction		58.5	SS-18	9	10	10		20	●
148.0				63.5	SS-19	6	7	10		17	●
143.0	68.5	Loose, Moist, Yellow, Non-Plastic, Fine to Coarse SAND (SP-SM/A-3) with Silt, 2.5Y8/6, No HCl Reaction		68.5	SS-20	3	4	4		8	●
138.0	73.5	Medium Dense to Loose, Moist, Brownish Yellow, Non-Plastic, Fine to Coarse Poorly Graded SAND (SP/A-2-4), 10YR6/8 @SS-21: LL= 32, PL= 24, PI= 8, NMC= 19.4%, %200= 4.4		73.5	SS-21	7	7	6		13	▲ ● ○ X X
		@SS-22: Strong Brown, 7.5YR5/8		78.5	SS-22	3	6	4		10	●

LEGEND

Continued Next Page

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

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

SCDOT Soil Test Log

Project ID:	P044267	County:	Calhoun	Boring No.:	B-2
Site Description:	S-9-22 over Caw Caw Creek			Route:	S-9-22
Eng./Geo.:	G. Cantele	Boring Location:	N/A	Offset:	N/A
Elev.:	213.0 ft	Latitude:	33.62312606	Longitude:	-80.88881395
Date Started:	12/31/2024				
Total Depth:	100 ft	Soil Depth:	100 ft	Core Depth:	N/A ft
Date Completed:	12/31/2024				
Bore Hole Diameter (in):	4	Sampler Configuration			
Liner Required:	Y (N)	Liner Used:	Y (N)		
Drill Machine:	CME 550X	Drill Method:	RW	Hammer Type:	Automatic
Energy Ratio:	89.8%				
Core Size:	N/A	Driller:	L. Guempel	Groundwater:	TOB 7.2 (Cave @ 12.7) 24HR N/A

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	<div> <div>● SPT N VALUE ●</div> <div> <div>PL X</div> <div>MC ○</div> <div>LL X</div> </div> <div>▲ FINES CONTENT (%)</div> <div>0 10 20 30 40 50 60 70 80 90</div> </div>
133.0											
	83.5	BLACK CREEK GROUP (CRETACEOUS) Hard, Moist, Yellowish Brown, Low Plasticity to Medium Plasticity, <u>SILT (ML/A-4)</u> with Fine Sand, 10YR5/8, No HCl Reaction		83.5	SS-23	11	50/4.5"			100+	>>●
128.0											
		@SS-24: Black, Non-Plastic, Partially Cemented, GLEY1 2.5/N		88.5	SS-24	26	50/4.5"			100+	>>●
123.0											
				93.5	SS-25	18	25 50/4.0"			75+	>>●
118.0											
				98.5	SS-26	19	31 50/3.0"			81+	>>●
113.0	100.0	Boring Terminated at 100.0-ft. Below Existing Ground Surface. Boring Achieved Target Depth.									
108.0											

LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: P-1	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 215.9 ft		Latitude: 33.6223732		Longitude: -80.88967265		Date Started: 12/30/2024	
Total Depth: 6 ft		Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/30/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB N/A		24HR N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	● SPT N VALUE ● PL X MC O LL X ▲ FINES CONTENT (%)
	0.0	ASPHALT (S-9-22) (6.0-in)									0 10 20 30 40 50 60 70 80 90
	0.5	Medium Dense to Loose, Moist, Strong Brown, Non-Plastic to Low Plasticity, Silty Fine to Coarse SAND (SM/A-2-4), 7.5YR5/6		0.5	SS-1	11	9	15		24	●
		@SS-2: Very Dark Brown, 7.5YR2.5/3		2.0	SS-2	7	6	6	7	12	●
				4.0	SS-3	3	4	4	4	8	●
210.9	6.0	Boring Terminated at 6.0-ft. Below the Existing Ground Surface. Boring Achieved Target Depth.									

LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: P-2	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 219.1 ft		Latitude: 33.62206068		Longitude: -80.89000194		Date Started: 12/30/2024	
Total Depth: 6 ft		Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/30/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB N/A		24HR N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	● SPT N VALUE ● PL X — MC ○ — LL X ▲ FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80	90
	0.0	ASPHALT (S-9-22) (8.0-in)																		
	0.7	Medium Dense, Moist, Strong Brown, Non-Plastic to Low Plasticity, Silty Fine to Coarse SAND (SM/A-2-4), 7.5YR5/6		0.7	SS-1	4	10	15		25										
	2.0			2.0	SS-2	3	7	6	8	13										
	4.0			4.0	SS-3	3	7	7	5	14										
214.1	6.0	Boring Terminated at 6.0-ft. Below the Existing Ground Surface. Boring Achieved Target Depth.																		

LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: P-3	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 224.7 ft		Latitude: 33.62177952		Longitude: -80.89033407		Date Started: 12/30/2024	
Total Depth: 6 ft		Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/30/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB N/A		24HR N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	● SPT N VALUE ● PL X — MC — LL X ▲ FINES CONTENT (%) 0 10 20 30 40 50 60 70 80 90									
	0.0	ASPHALT (S-9-22) (7.5-in)																		
	0.6	Medium Dense to Dense, Moist, Strong Brown, Non-Plastic to Low Plasticity, Silty Fine to Coarse SAND (SM/A-2-4), 7.5YR5/6		0.6	SS-1	7	15	17		32										
				2.0																
					SS-2	10	9	9	7	18										
		@SS-3: Loose		4.0																
					SS-3	5	5	4	5	9										
219.7																				
	6.0	Boring Terminated at 6.0-ft. Below the Existing Ground Surface. Boring Achieved Target Depth.																		

LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: P-4	
Site Description: S-9-22 over Caw Caw Creek					Route: S-9-22		
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 214.5 ft		Latitude: 33.62345449		Longitude: -80.88850728		Date Started: 12/30/2024	
Total Depth: 6 ft		Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/30/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB N/A		24HR N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	● SPT N VALUE ● PL X — MC — LL X ▲ FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80	90
	0.0	ASPHALT (S-9-22) (9.0-in)																		
	0.8	Medium Dense, Moist, Strong Brown, Non-Plastic to Low Plasticity, Silty Fine to Coarse SAND (SM/A-2-4), 7.5YR5/6		0.8	SS-1	4	8	9		17										
		@SS-2: Trace Gravel		2.0																
					SS-2	13	17	8	8	25										
				4.0																
209.5					SS-3	7	6	5	5	11										
	6.0	Boring Terminated at 6.0-ft. Below the Existing Ground Surface. Boring Achieved Target Depth.																		

LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: P-5	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 217.9 ft		Latitude: 33.6237669		Longitude: -80.88818659		Date Started: 12/30/2024	
Total Depth: 6 ft		Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/30/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB N/A		24HR N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	● SPT N VALUE ● PL X MC O LL X ▲ FINES CONTENT (%) 0 10 20 30 40 50 60 70 80 90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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LEGEND

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

SCDOT Soil Test Log

Project ID: P044267				County: Calhoun		Boring No.: P-6	
Site Description:		S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 223.1 ft		Latitude: 33.62407999		Longitude: -80.8878638		Date Started: 12/30/2024	
Total Depth: 6 ft		Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/30/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME 550X		Drill Method: RW		Hammer Type: Automatic		Energy Ratio: 89.8%	
Core Size: N/A		Driller: L. Guempel		Groundwater: TOB N/A		24HR N/A	

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type					N Value	● SPT N VALUE ● PL X — MC ○ — LL X ▲ FINES CONTENT (%)									
						1st 6"	2nd 6"	3rd 6"	4th 6"		0	10	20	30	40	50	60	70	80	90
	0.0	ASPHALT (S-9-22) (6.0-in)																		
	0.5	Medium Dense, Moist, Strong Brown, Non-Plastic to Low Plasticity, Silty Fine to Coarse SAND (SM/A-2-4), 7.5YR5/6		0.7	SS-1	3	11	12		23										
				2.0	SS-2	10	10	11	12	21										
				4.0																
218.1					SS-3	9	10	12	14	22										
	6.0	Boring Terminated at 6.0-ft. Below the Existing Ground Surface. Boring Achieved Target Depth.																		

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	

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

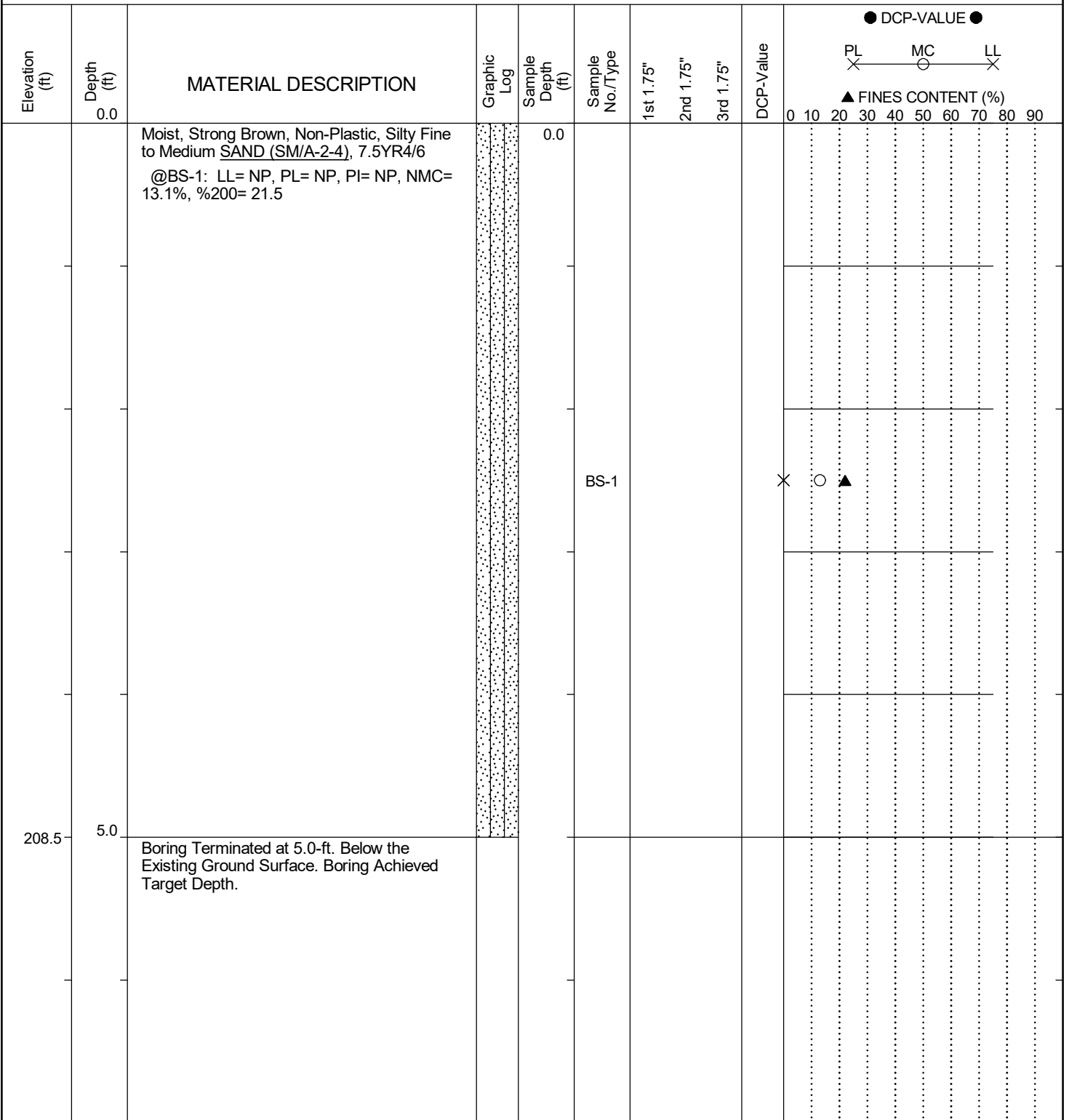
APPENDIX

SECTION 3 SUBSURFACE EXPLORATION LOGS

SECTION 3B BULK SOIL SAMPLE (BS) LOGS

SCDOT Manual Auger Log

Project ID: P044267				County: Calhoun		Boring No.: BS-1	
Site Description: S-9-22 over Caw Caw Creek					Route: S-9-22		
Driller: L. Guempel		Boring Location: N/A		Offset: N/A		Alignment: Existing (S-9-22)	
Elev.: 213.5 ft		Latitude: 33.62270902		Longitude: -80.8893951		Date Started: 12/31/2024	
Total Depth: 5 ft		Groundwater: TOB		N/A 24 hr N/A		Date Completed: 12/31/2024	
Dynamic Cone Penetrometer Test Procedure:				Sowers and Hedges (1966)			



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	DCP - Dynamic Cone Penetrometer	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: P044267		County: Calhoun		Boring No.: BS-2	
Site Description: S-9-22 over Caw Caw Creek				Route: S-9-22	
Eng./Geo.: G. Cantele		Boring Location: N/A		Offset: N/A	
Alignment: Existing (S-9-22)		Elev.: N/A ft		Latitude:	
Longitude:		Date Started: 12/31/2024		Total Depth: 6 ft	
Soil Depth: 6 ft		Core Depth: N/A ft		Date Completed: 12/31/2024	
Bore Hole Diameter (in): 4		Sampler Configuration		Liner Required: Y (N)	
Liner Used: Y (N)		Drill Machine: HA		Drill Method: MAB	
Hammer Type: Gravity		Energy Ratio: N/A%		Core Size: N/A	
Driller: L. Guempel		Groundwater: TOB N/A		24HR: N/A	

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

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	

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 3 SUBSURFACE EXPLORATION LOGS
SECTION 3C ELECTRO-PIEZOCONE SOUNDING (CPT)
LOGS

Cone Penetration Test



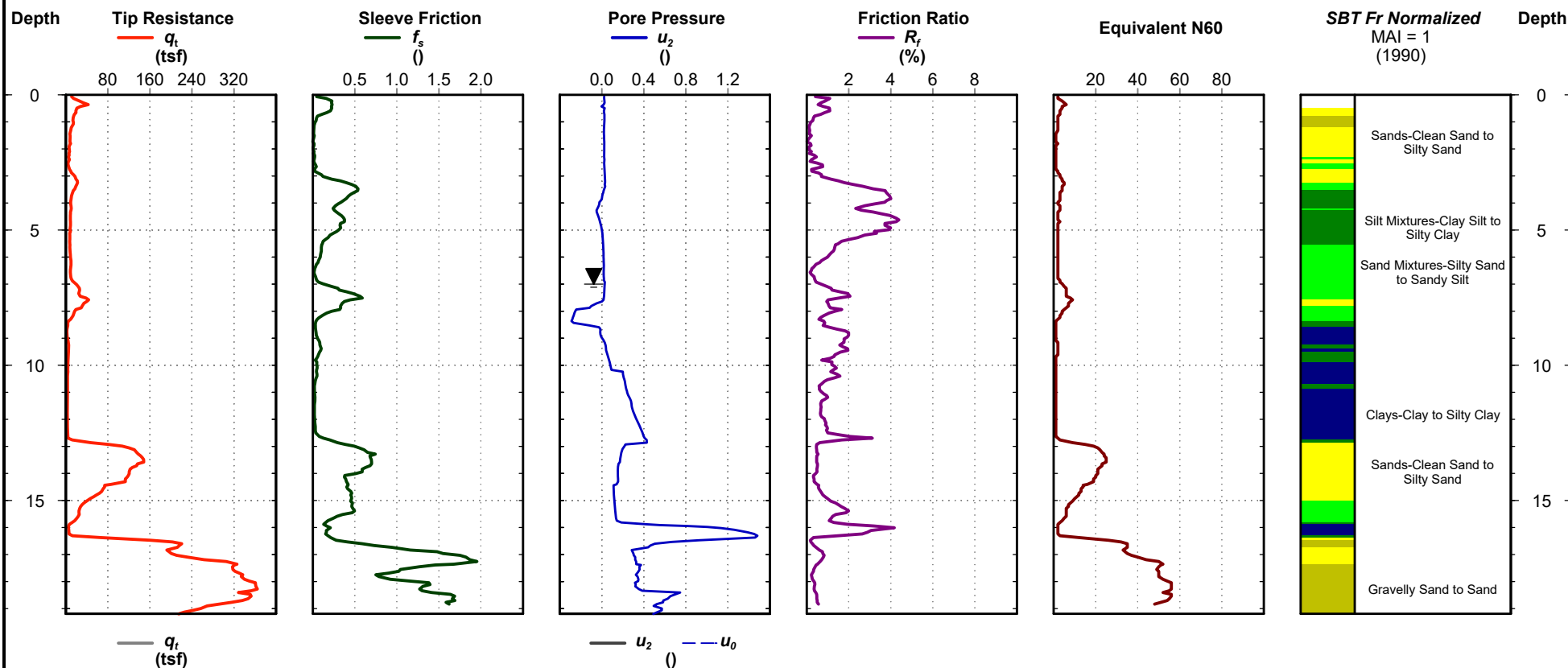
S-9-22 over Caw Caw Creek
(Calhoun County, South Carolina)
 Project Number :P044267

CPT-1

Date: Jan. 2, 2025
Estimated Water Depth: 7 ft
Rig/Operator: G. Cantele

Station:
Offset:
Elevation: 214.1ft-MSL

Total Depth: 19.2 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1329



CPT REPORT - STANDARD G7100.009 - TASK 00010 - S-9-22 OVER CAW CAW CREEK GPJ FME2017 GDT 1/20/25

CPT-1

Cone Penetration Test



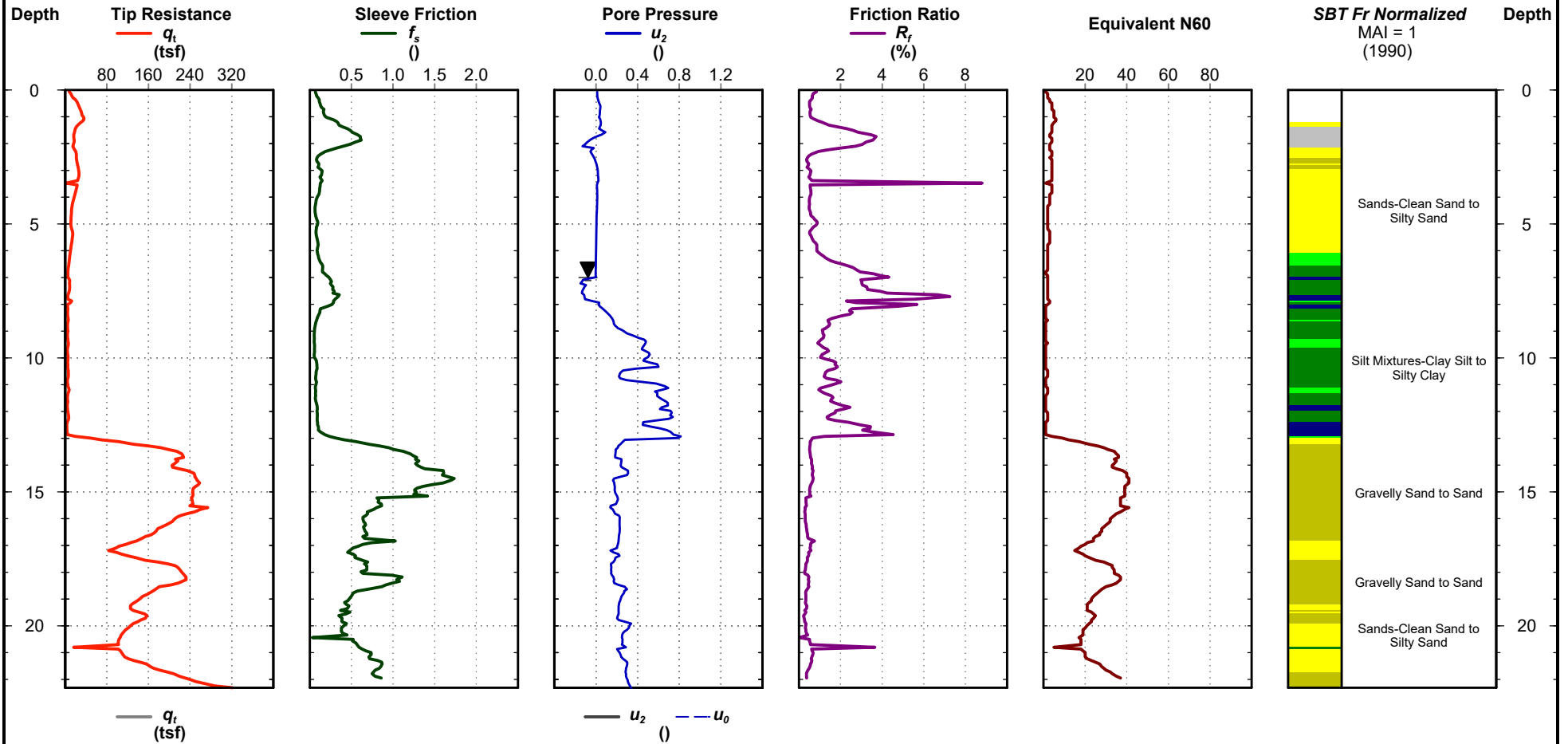
S-9-22 over Caw Caw Creek
(Calhoun County, South Carolina)
 Project Number :P044267

CPT-2

Date: Jan. 2, 2025
Estimated Water Depth: 7 ft
Rig/Operator: G. Cantele

Station:
Offset:
Elevation: 213.0 ft-MSL

Total Depth: 22.3 ft
Termination Criteria: Maximum Reaction Force
CPT Probe ID: DDG1329



CPT-2

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 4 DOWNHOLE SHEAR WAVE VELOCITY TESTING

January 14, 2025

Mr. Trapp Harris, P.E.
South Carolina Department of Transportation
955 Park Street
Columbia, South Carolina 29201

Re: Geotechnical Subsurface Data Report
S-9-22 over Caw Caw Creek
Calhoun County, South Carolina
Bridge ID: 970002200300
SCDOT Project ID: P044267
FME Project No.: G7100.009 – Task 00010

Mr. Harris:

A downhole seismic test, designated as Borehole Borehole B-1/DHT, was conducted at S-9-22 over Caw Caw Creek on January 7, 2025, to determine shear-wave velocities at 2.5-foot intervals for the proposed bridge project. This report summarizes the downhole testing method and presents the shear-wave and compression-wave velocity results.

The boring was cased with a two-inch PVC pipe and grouted in the annulus between the casing and the borehole wall, the deepest depth reading for the downhole test was at 112.5 ft. The grout setup a minimum of 72 hours before testing. Water was pumped from the downhole pipe prior to testing.

Seismic data for the downhole testing was collected by recording seismic shear-waves and compression waves with a Geometrics ES-3000 seismograph paired with a GeoStuff triaxial BHG-3 geophone. Seismic waves were generated by using a sixteen-pound sledgehammer to horizontally strike both ends of a 7-foot-long wood beam with steel plates attached to the ends. Compression waves were generated by striking an aluminum plate on the ground surface with the sledgehammer. Seismic data was recorded starting at the bottom of the borehole and continued at 2.5-foot intervals.

Shear wave data was collected by striking the beam from opposite sides to produce reverse polarized waves when they are combined, these waves were used to identify shear wave arrivals. First arrivals were identified for the compression waves. The arrival times were used to calculate seismic shear wave and compression wave velocities for the interval depths. The seismic velocities for the intervals are visually presented on the attached graph and in table form for both seismic wave types. Geometrics software was used to process the seismic data.

The results from the downhole seismic test are a $V_{s112.5}$ value of 828 ft/sec and a $V_{p112.5}$ value of 3,421 ft/sec. This downhole seismic test was conducted at one location at the test site, the attached seismic velocity models may not be representative of subsurface conditions across the entire project area.

Regards,

A handwritten signature in blue ink, appearing to read 'Craig Piercy'.

Craig Piercy, P.G.
Senior Geologist



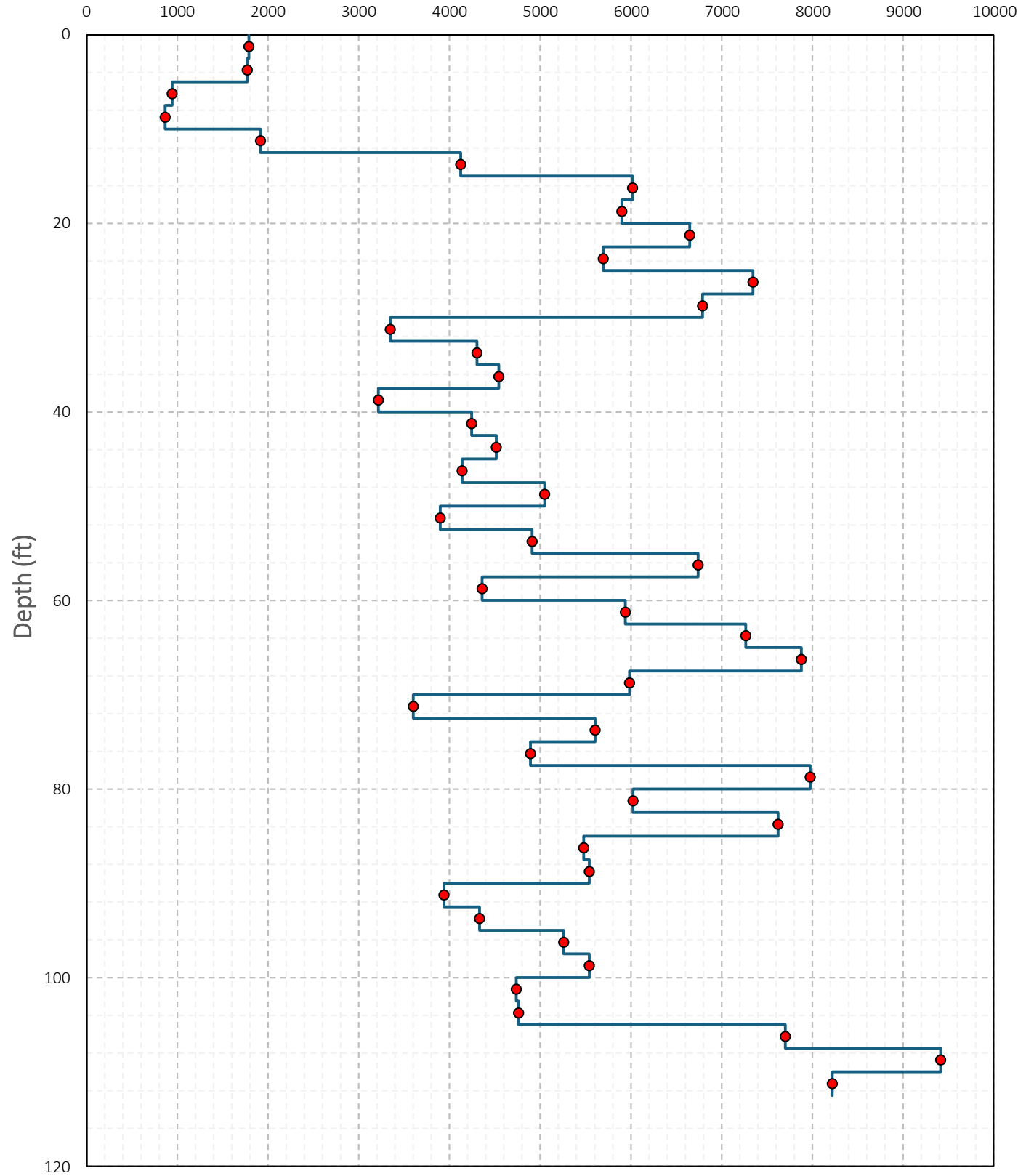
S-9-22 over Caw Caw Creek

B-1/DHT

Compression (P) Wave Velocity		Shear (S) Wave Velocity	
Depth(ft)	Interval velocity(ft/sec)	Depth(ft)	Interval velocity(ft/sec)
0.0	--	0.0	--
2.5	1,790	2.5	878
5.0	1,771	5.0	629
7.5	943	7.5	497
10.0	866	10.0	499
12.5	1,918	12.5	660
15.0	4,124	15.0	784
17.5	6,020	17.5	1,119
20.0	5,900	20.0	577
22.5	6,650	22.5	656
25.0	5,696	25.0	1,081
27.5	7,347	27.5	781
30.0	6,790	30.0	1,316
32.5	3,349	32.5	1,151
35.0	4,303	35.0	1,506
37.5	4,545	37.5	1,417
40.0	3,216	40.0	886
42.5	4,246	42.5	605
45.0	4,516	45.0	876
47.5	4,140	47.5	419
50.0	5,051	50.0	1,096
52.5	3,900	52.5	853
55.0	4,912	55.0	922
57.5	6,742	57.5	693
60.0	4,360	60.0	817
62.5	5,939	62.5	1,076
65.0	7,269	65.0	872
67.5	7,881	67.5	1,125
70.0	5,985	70.0	963
72.5	3,602	72.5	522
75.0	5,607	75.0	2,241
77.5	4,893	77.5	633
80.0	7,977	80.0	1,088
82.5	6,023	82.5	627
85.0	7,624	85.0	1,292
87.5	5,482	87.5	1,927
90.0	5,543	90.0	1,297
92.5	3,940	92.5	2,425
95.0	4,331	95.0	1,359
97.5	5,259	97.5	1,426
100.0	5,543	100.0	1,086
102.5	4,738	102.5	1,640
105.0	4,763	105.0	1,206
107.5	7,703	107.5	2,196
110.0	9,415	110.0	1,339
112.5	8,221	112.5	2,278
V _p 112.5 =3,421 ft/sec		V _s 112.5=828 ft/sec	

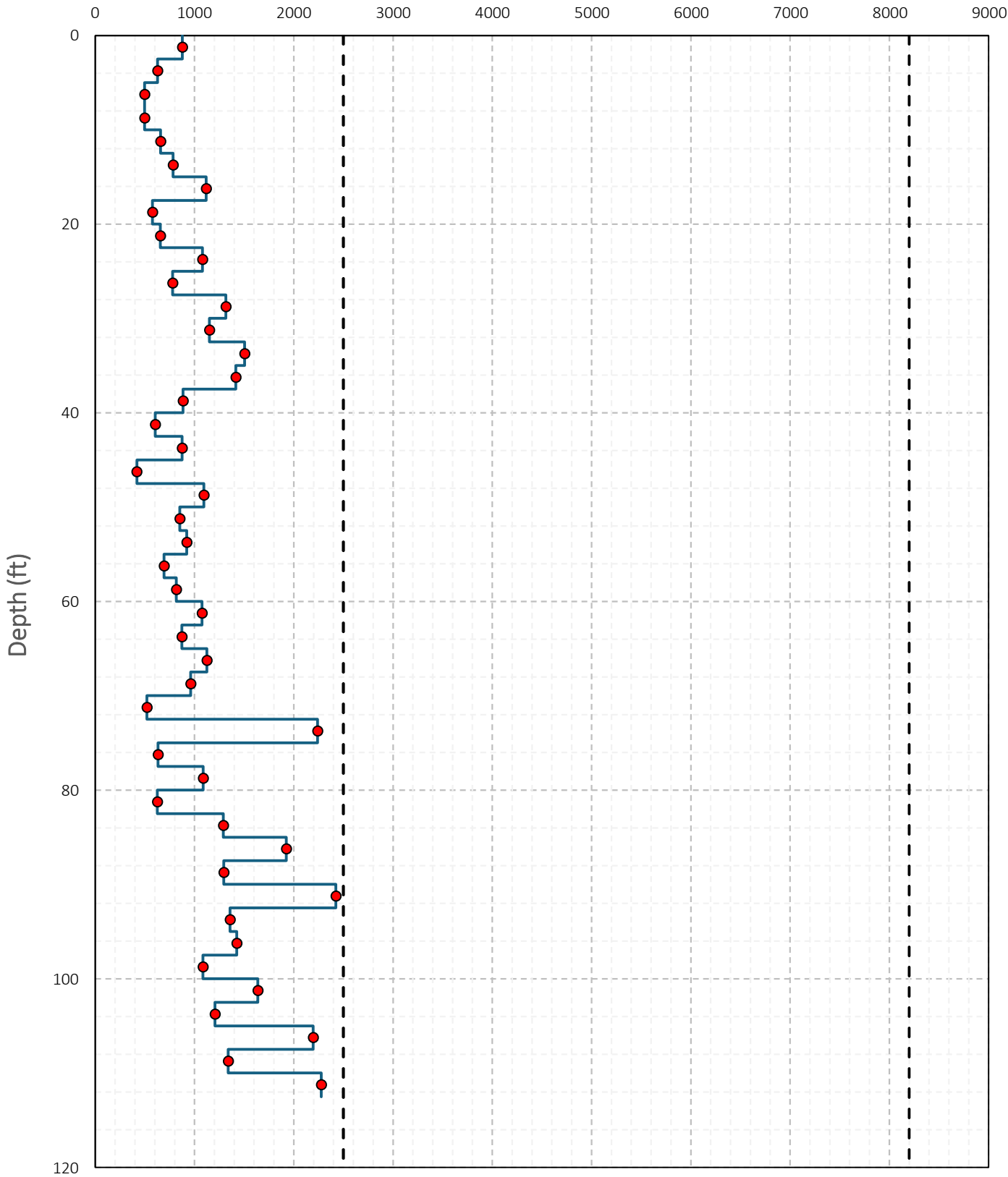


Compression Wave Velocity, V_p (ft/sec)





Shear Wave Velocity, Vs (ft/sec)



S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 LABORATORY TEST RESULTS

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 LABORATORY TEST RESULTS

SECTION 5A SPLIT SPOON SAMPLES (SS)



SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 1

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
B-1/DHT	8.0	18	15	3	4.76	24	SM	16.8			
B-1/DHT	10.0	NP	NP	NP	9.51	33	SM	56.4			
B-1/DHT	20.0	NP	NP	NP	19	7	SP-SM	13.6			
B-1/DHT	30.0	NP	NP	NP	4.76	17	SM	33.6			
B-1/DHT	35.0	26	20	6	9.51	28	SC-SM	31.5			
B-1/DHT	60.0	27	19	8	4.76	23	SC	30.6			
B-1/DHT	65.0	48	24	24	19	56	CL	43.8			
B-2	6.0	31	21	10	19	27	SC	17.8			
B-2	10.0	NP	NP	NP	9.51	43	SM	44.7			
B-2	14.0	25	19	6	4.76	25	SC-SM	32.4			
B-2	20.0	NP	NP	NP	19	5	SP	12.0			
B-2	35.0	27	15	12	19	17	SC	31.2			
B-2	55.0	29	23	6	4.76	38	SM	37.6			
B-2	75.0	32	24	8	9.51	4	SP	19.4			



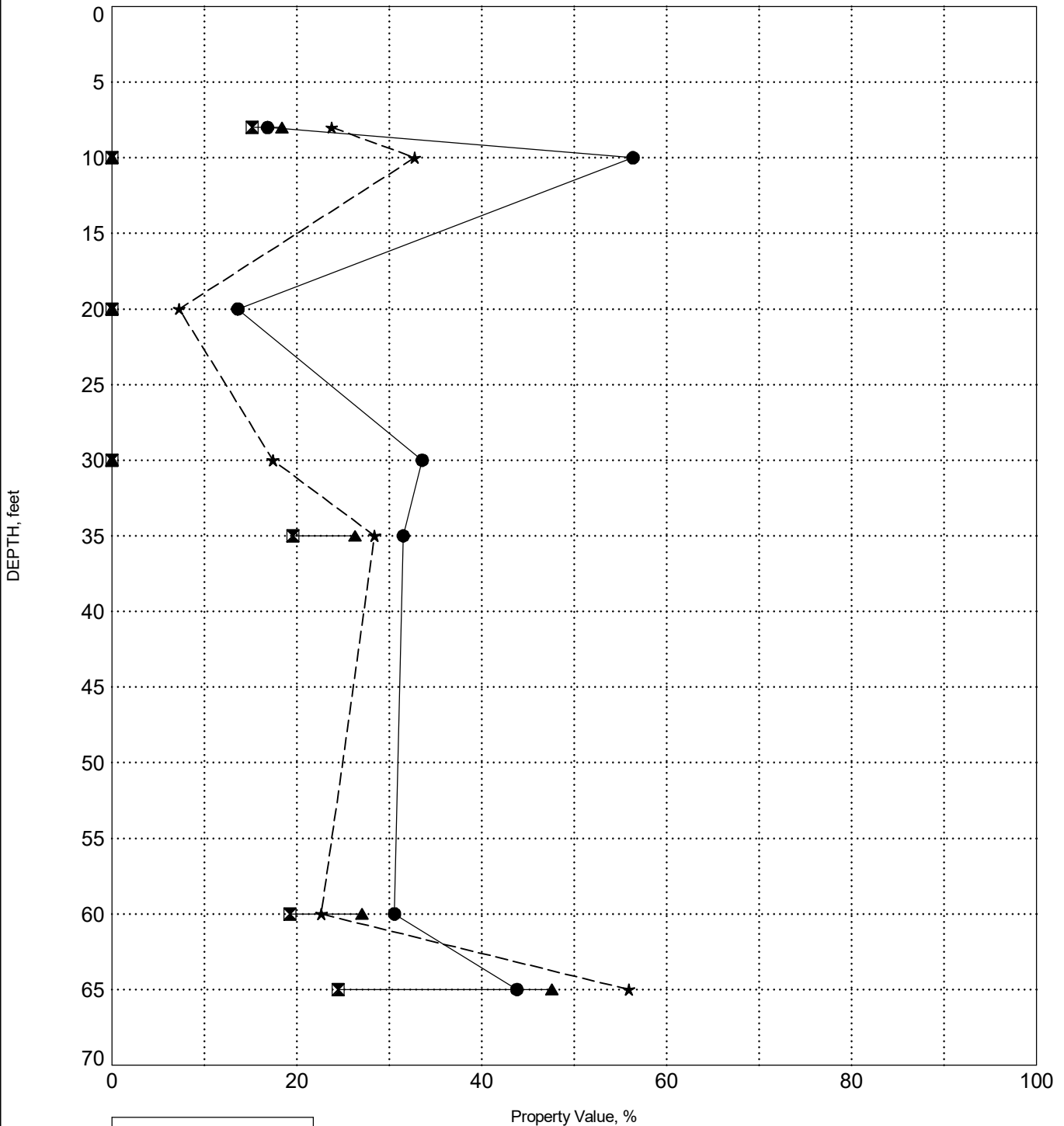
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

BORING B-1/DHT



LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines



PROJECT COUNTY Calhoun

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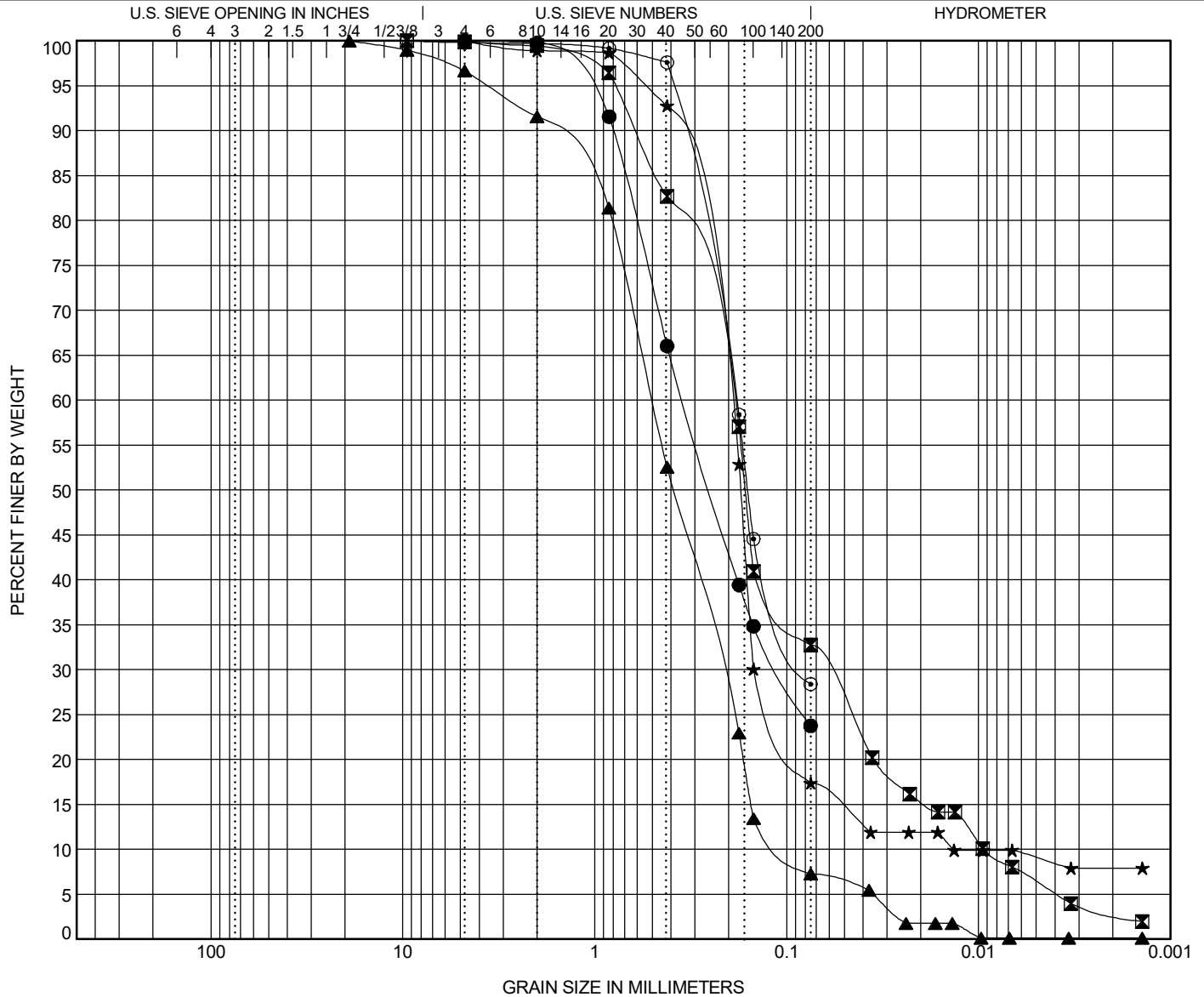


GRAIN SIZE DISTRIBUTION

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-1/DHT	8.0	SILTY SAND(SM)					18	15	3		
■ B-1/DHT	10.0	SILTY SAND(SM)					NP	NP	NP	2.22	20.90
▲ B-1/DHT	20.0	POORLY GRADED SAND with SILT(SP-SM)					NP	NP	NP	0.92	4.94
★ B-1/DHT	30.0	SILTY SAND(SM)					NP	NP	NP	7.90	15.29
◎ B-1/DHT	35.0	SILTY, CLAYEY SAND(SC-SM)					26	20	6		
BOREHOLE	DEPTH	D100	D95	D50	D10	%Gravel	%Sand	%Silt		%Clay	
● B-1/DHT	8.0	4.76	1.207	0.249		0.0	76.2	23.8			
■ B-1/DHT	10.0	9.51	0.782	0.164	0.009	0.1	67.2	26.4		6.4	
▲ B-1/DHT	20.0	19	3.591	0.39	0.102	3.4	89.4	7.1		0.1	
★ B-1/DHT	30.0	4.76	0.544	0.173	0.014	0.0	82.6	8.3		9.1	
◎ B-1/DHT	35.0	9.51	0.396	0.159		0.2	71.4	28.4			

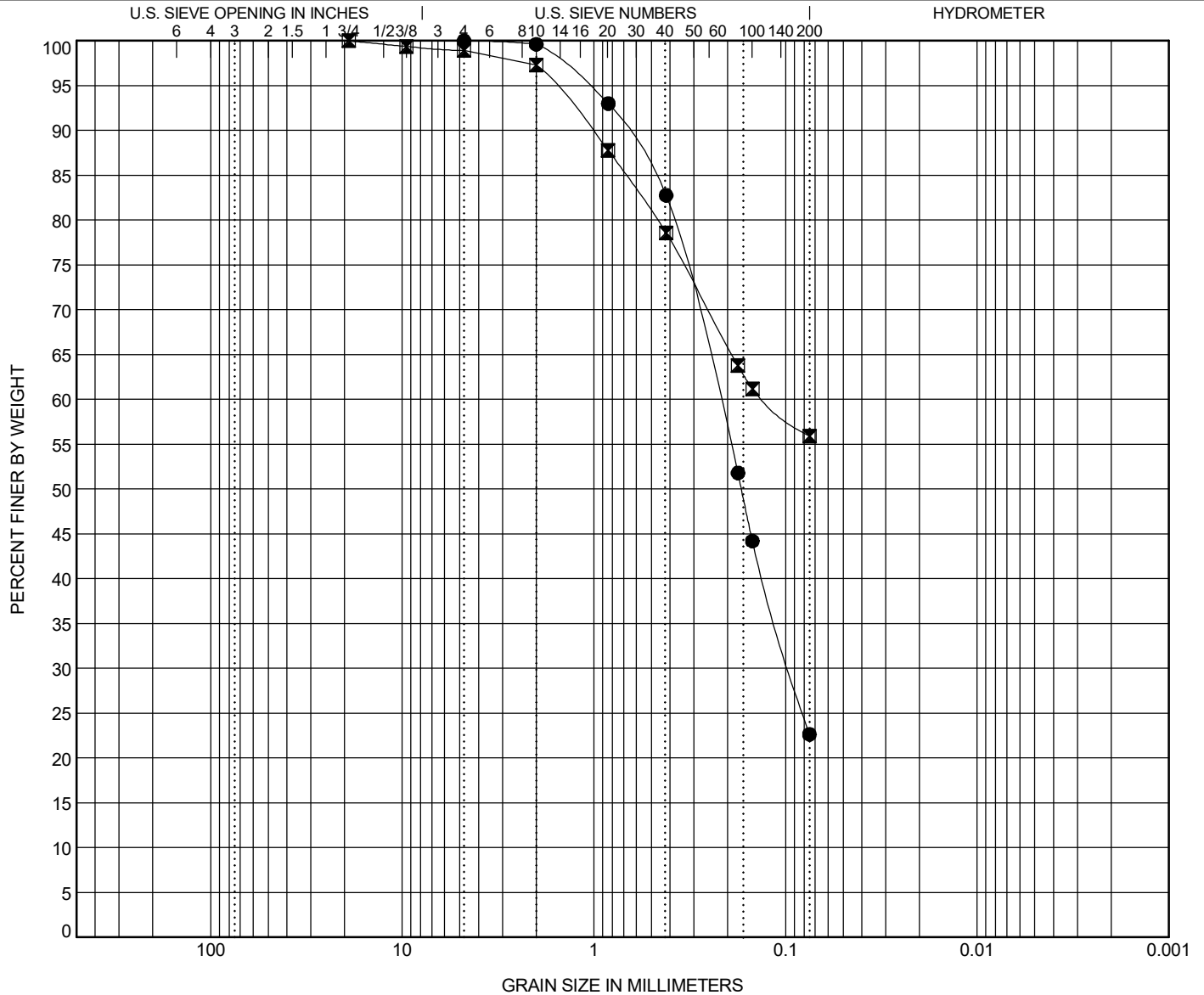


GRAIN SIZE DISTRIBUTION

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-1/DHT	60.0	CLAYEY SAND(SC)					27	19	8		
✕ B-1/DHT	65.0	SANDY LEAN CLAY(CL)					48	24	24		
BOREHOLE	DEPTH	D100	D95	D50	D10	%Gravel	%Sand	%Silt		%Clay	
● B-1/DHT	60.0	4.76	1.092	0.17		0.0	77.4	22.6			
✕ B-1/DHT	65.0	19	1.624			1.1	43.0	55.9			

F&ME CONSULTANTS, INC.**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	S-9-22 over Caw Caw Creek	SCDOT PROJECT No. :	P044267
SAMPLE NUMBER:	24-4501	DATE SAMPLE RECEIVED:	12/31/2024
DESCRIPTION OF SOIL:	Various		
TESTED BY:	Ashleigh Burgess	DATE SETUP:	1/2/2025
WEIGHED BY:	Ashleigh Burgess	DATE OF WEIGHING:	1/3/2025

BORING NO.	B-1/DHT	B-1/DHT	B-1/DHT	B-1/DHT	B-1/DHT
SAMPLE NO.	SS-4	SS-5	SS-7	SS-9	SS-10
SAMPLE DEPTH (FT.)	6.0 - 8.0	8.0 - 10.0	18.5 - 20.0	28.5 - 30.0	33.5 - 35.0
WATER CONTENT, W%	16.8	56.4	13.6	33.6	31.5

BORING NO.	B-1/DHT	B-1/DHT			
SAMPLE NO.	SS-15	SS-16			
SAMPLE DEPTH (FT.)	58.5 - 60.0	63.5 - 65.0			
WATER CONTENT, W%	30.6	43.8			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					



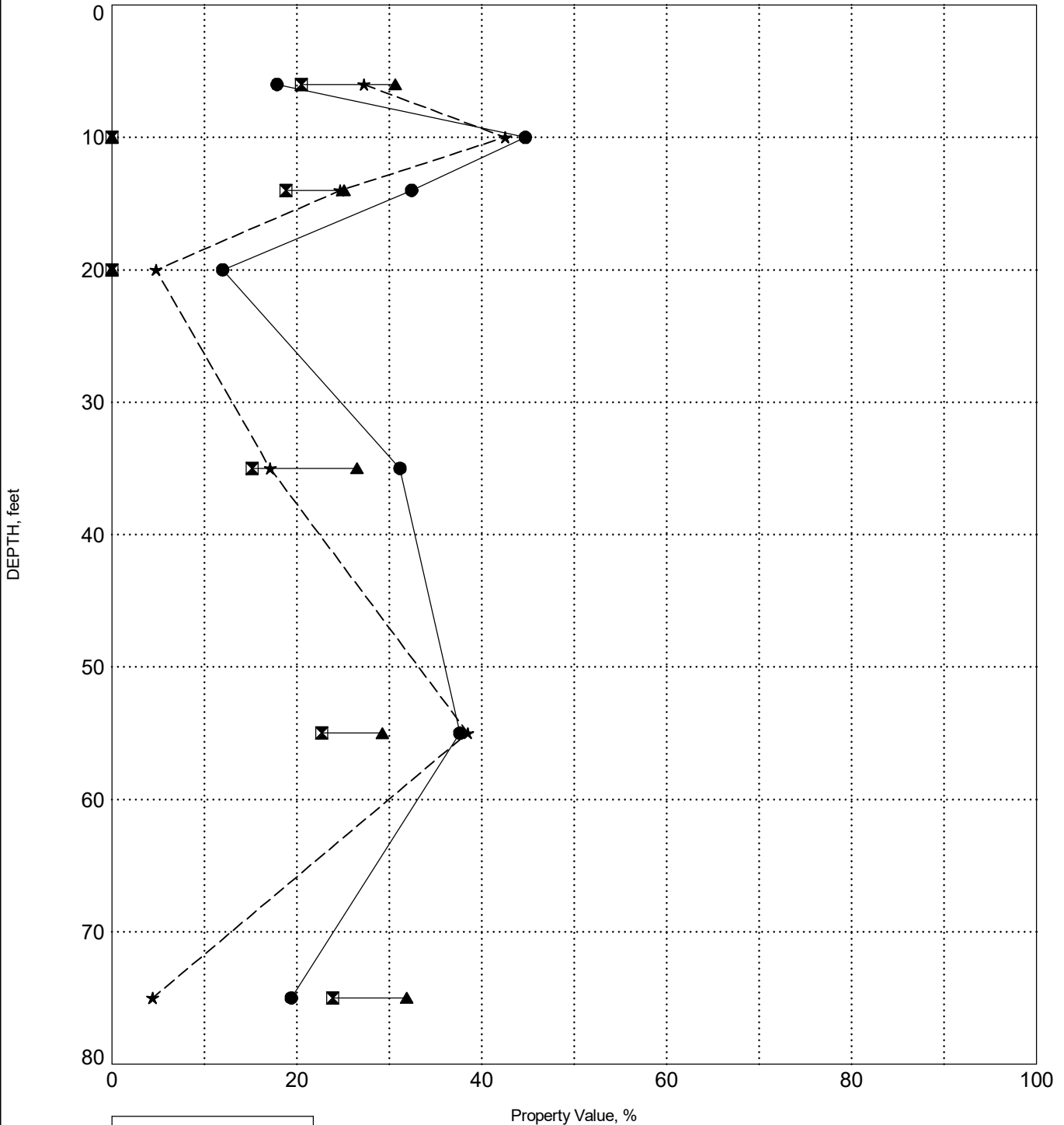
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

BORING B-2



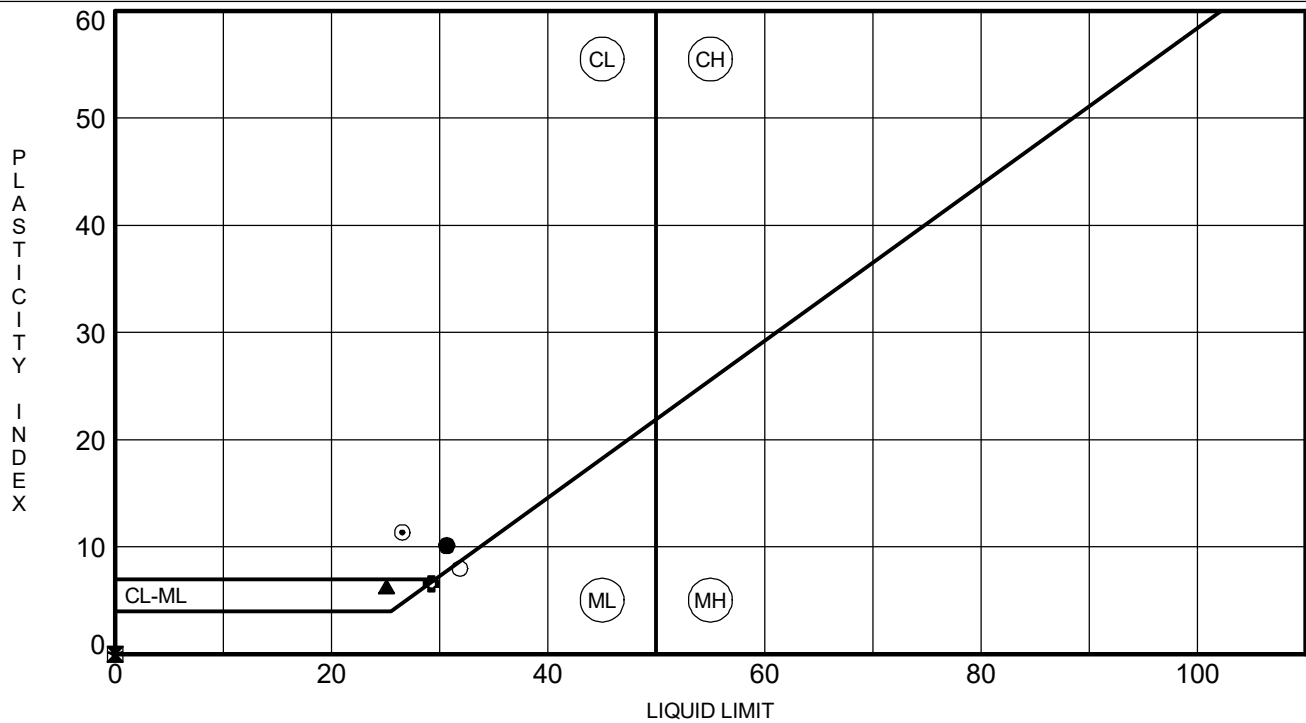
LEGEND	
●	Water Content
⊠	Plastic Limit
▲	Liquid Limit
★	Fines

ATTERBERG LIMITS' RESULTS

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

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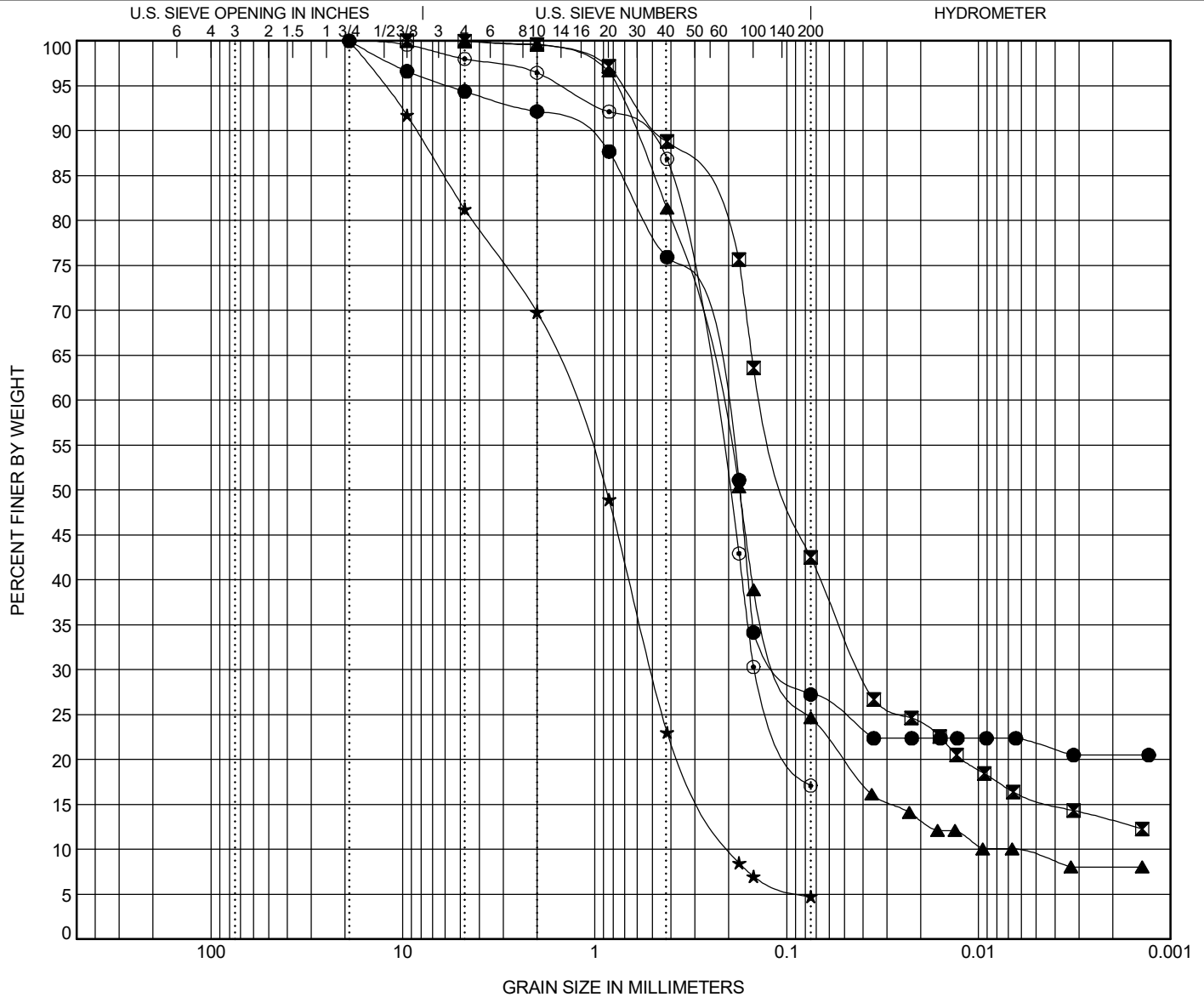


GRAIN SIZE DISTRIBUTION

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-2	6.0	CLAYEY SAND (SC/A-2-4)					31	21	10		
☒ B-2	10.0	SILTY SAND (SM/A-4)					NP	NP	NP		
▲ B-2	14.0	SILTY, CLAYEY SAND (SC-SM/A-2-4)					25	19	6	6.22	35.45
★ B-2	20.0	POORLY GRADED SAND with GRAVEL (SP/A-1-b)					NP	NP	NP	0.99	6.88
⊙ B-2	35.0	CLAYEY SAND (SC/A-2-6)					27	15	12		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt		%Clay	
● B-2	6.0	19	0.241	0.099		5.6	67.1	5.5		21.7	
☒ B-2	10.0	9.51	0.132	0.041		0.0	57.4	26.9		15.6	
▲ B-2	14.0	4.76	0.232	0.097	0.007	0.0	75.3	15.4		9.2	
★ B-2	20.0	19	1.331	0.506	0.194	18.7	76.5	4.8			
⊙ B-2	35.0	19	0.248	0.147		2.0	80.9	17.1			

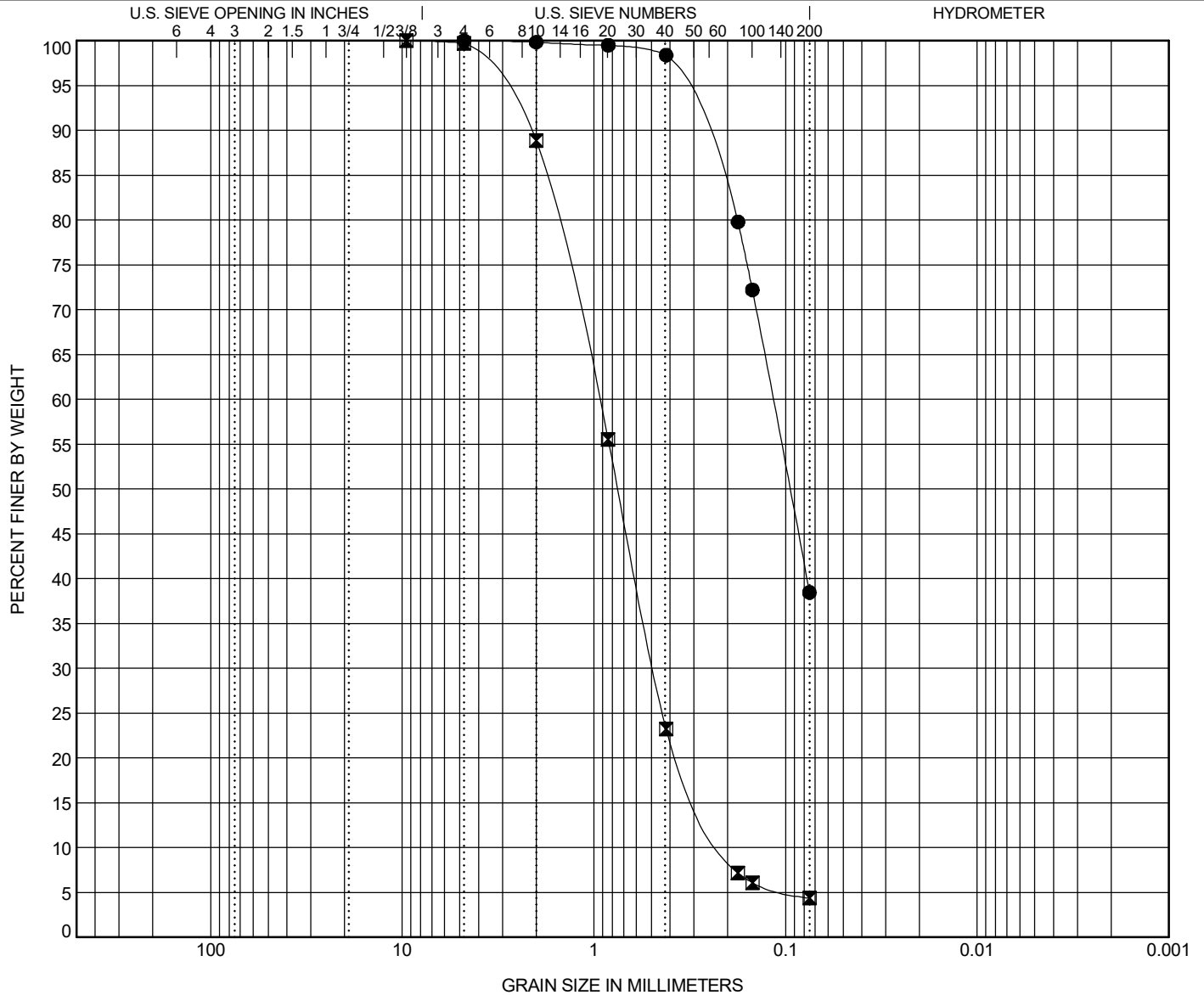


GRAIN SIZE DISTRIBUTION

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun



F&ME CONSULTANTS, INC.**MOISTURE CONTENT DETERMINATION
(AASHTO T265)****PROJECT:** S-9-22 over Caw Caw Creek**SCDOT PROJECT No. :** P044267**SAMPLE NUMBER:** 24-4500**DATE SAMPLE RECEIVED:** 1/2/2025**DESCRIPTION OF SOIL:** Various**TESTED BY:** Ashleigh Burgess**DATE SETUP:** 1/2/2025**WEIGHED BY:** Ashleigh Burgess**DATE OF WEIGHING:** 1/3/2025

BORING NO.	B-2	B-2	B-2	B-2	B-2
SAMPLE NO.	SS-3	SS-5	SS-7	SS-10	SS-13
SAMPLE DEPTH (FT.)	4.0 - 6.0	8.0 - 10.0	12.0 - 14.0	18.0 - 20.0	33.5 - 35.0
WATER CONTENT, W%	17.8	44.7	32.4	12.0	31.2

BORING NO.	B-2	B-2			
SAMPLE NO.	SS-17	SS-21			
SAMPLE DEPTH (FT.)	53.5 - 55.0	73.5 - 75.0			
WATER CONTENT, W%	37.6	19.4			

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 LABORATORY TEST RESULTS
SECTION 5B BULK SOIL SAMPLES (BS)



SUMMARY OF LABORATORY RESULTS

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Orangeburg

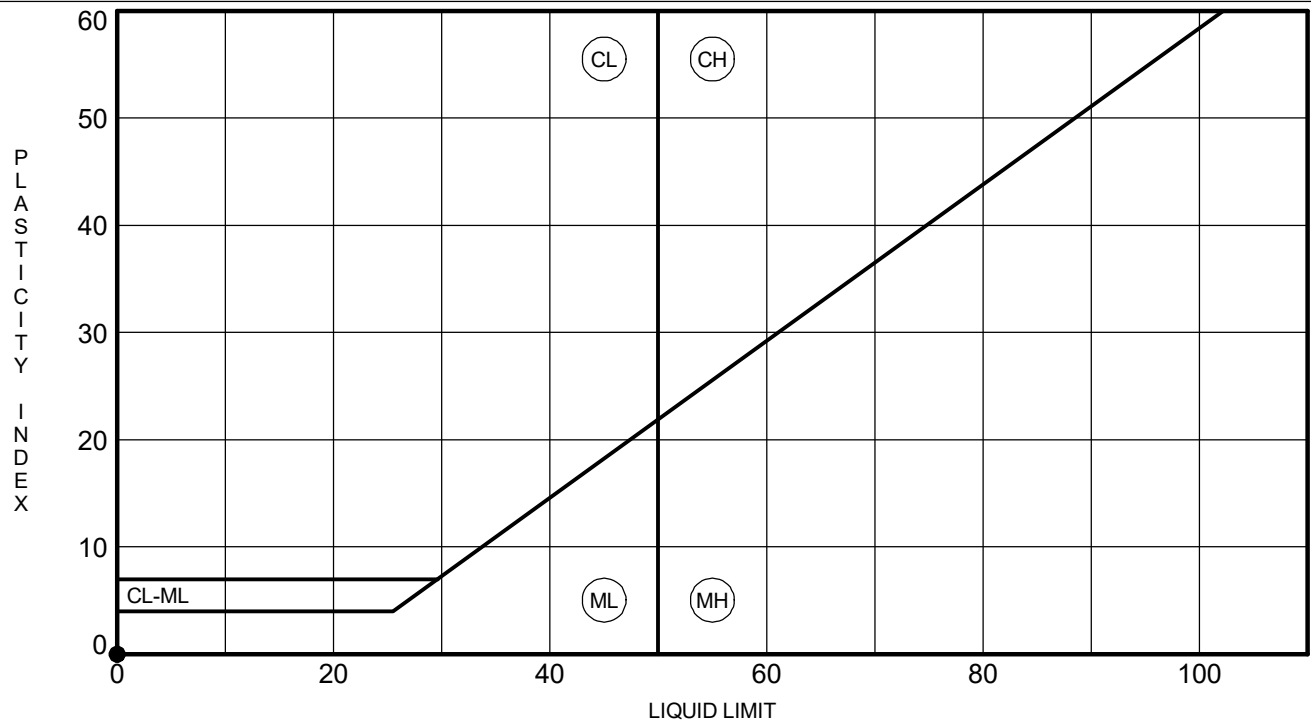
Boring No.	Sample Depth (ft.)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Soil Classification	Moisture Content (%)	Max Dry Density (PCF)	Optimum Moisture Content (%)	C (psi)	ϕ (Degrees)	C' (psi)	ϕ' (Degrees)
BS-1	0.0 – 5.0	NP	NP	NP	21.5	SM	13.1	123.1	10.4	--	--	5.48	30.4
BS-2	0.0 – 6.0	21	15	6	23.1	SC-SM	11.6	123.2	10.7	--	--	--	--



PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

[illegible]

GRAIN SIZE DISTRIBUTION

F&ME CONSULTANTS, INC.**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	S-9-22 over Caw Caw Creek	SCDOT PROJECT No. :	P044267
SAMPLE NUMBER:	24-4490	DATE SAMPLE RECEIVED:	1/2/2025
DESCRIPTION OF SOIL:	Silty SAND (SM/A-2-4)		
TESTED BY:	Ashleigh Burgess	DATE SETUP:	1/2/2025
WEIGHED BY:	Ashleigh Burgess	DATE OF WEIGHING:	1/3/2025

BORING NO.	BS-1				
SAMPLE NO.	--				
SAMPLE DEPTH (FT.)	0.0 - 5.0				
WATER CONTENT, W%	13.1				

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

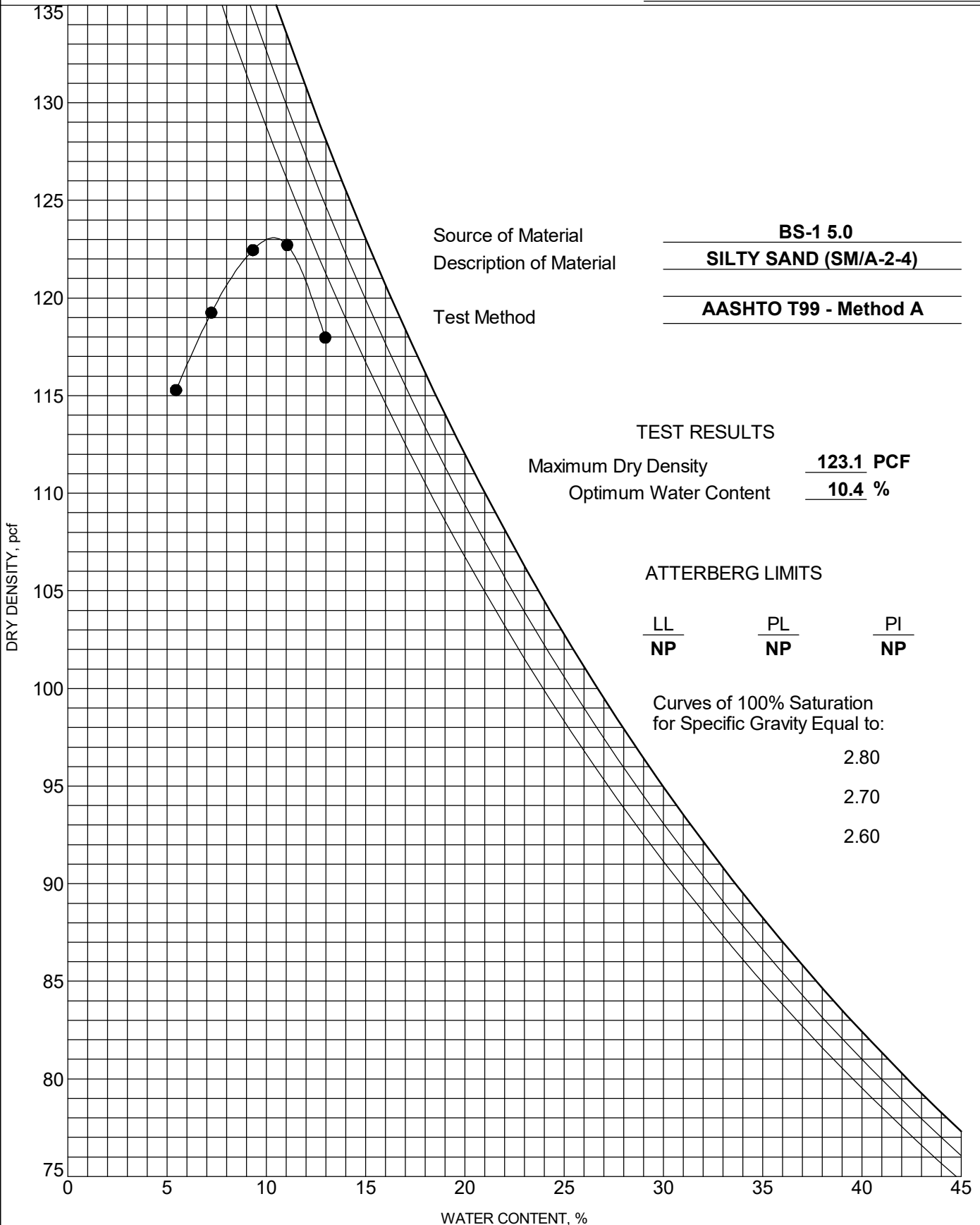


MOISTURE-DENSITY RELATIONSHIP

PROJECT ID P044267

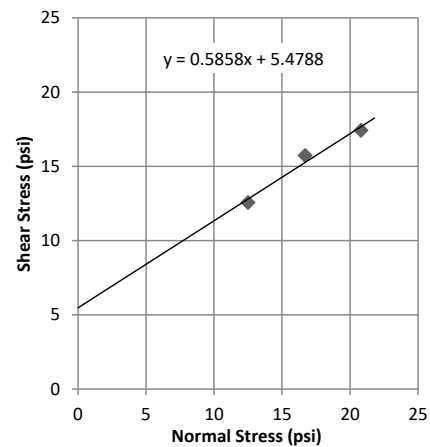
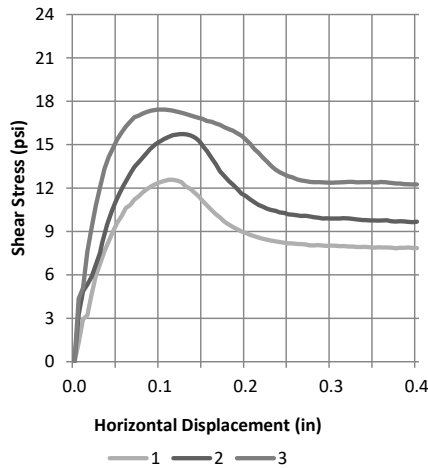
PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun



DIRECT SHEAR TEST REPORT

ASTM - D3080 / AASHTO T236



Sample 1	
Normal Stress (psi)	12.5
Speed (in./min.)	0.01
Sample Width (in.)	4.00
Percent Moisture	9.4%
Wet Density (pcf)	131.8
Dry Density (pcf)	120.5
t ₅₀ (min.)	0.2
Saturation (%)	66.7%
Horizontal Displacement (in.)	Shear Stress (psi)
0.000	0.00
0.005	1.30
0.010	2.94
0.015	3.20
0.020	4.66
0.030	6.78
0.040	8.34
0.050	9.61
0.060	10.63
0.070	11.21
0.080	11.73
0.090	12.13
0.100	12.41
0.125	12.41
0.150	11.09
0.175	9.68
0.200	8.90
0.225	8.42
0.250	8.18
0.300	8.03
0.350	7.89
0.400	7.86
Max Shear Stress	12.57

Sample 2	
Normal Stress (psi)	16.7
Speed (in./min.)	0.01
Sample Width (in.)	4.00
Percent Moisture	9.5%
Wet Density (pcf)	132.3
Dry Density (pcf)	120.8
t ₅₀ (min.)	0.2
Saturation (%)	68.2%
Horizontal Displacement (in.)	Shear Stress (psi)
0.000	0.00
0.005	3.26
0.010	4.87
0.015	5.33
0.020	5.87
0.030	7.54
0.040	9.84
0.050	11.33
0.060	12.46
0.070	13.46
0.080	14.14
0.090	14.78
0.100	15.23
0.125	15.73
0.150	14.91
0.175	12.84
0.200	11.46
0.225	10.58
0.250	10.19
0.300	9.90
0.350	9.77
0.400	9.68
Max Shear Stress	15.73

Sample 3	
Normal Stress (psi)	20.8
Speed (in./min.)	0.01
Sample Width (in.)	4.00
Percent Moisture	9.5%
Wet Density (pcf)	131.5
Dry Density (pcf)	120.2
t ₅₀ (min.)	0.2
Saturation (%)	66.6%
Horizontal Displacement (in.)	Shear Stress (psi)
0.000	0.00
0.005	4.36
0.010	5.08
0.015	7.60
0.020	9.27
0.030	12.08
0.040	14.15
0.050	15.38
0.060	16.25
0.070	16.90
0.080	17.16
0.090	17.36
0.100	17.42
0.125	17.20
0.150	16.77
0.175	16.21
0.200	15.36
0.225	13.83
0.250	12.81
0.300	12.37
0.350	12.39
0.400	12.26
Max Shear Stress	17.43

Project Name S-9-22 over Caw Caw Creek

F&ME Project No. G7100.009 Date 2/10/2025

SCDOT Project No. P044267

Location/Sample BS-1 / Sample No. 24-4490

Depth/Elevation 0' - 5'

Type of Test : Direct Shear - 4" by 4" Square Shear Box

Sample Type : Remolded 1" Thick, Non-Innundated

Description: Brown Silty Fine to Medium SAND (SM/A-2-4)

PI= NP % Fines= 21.5

SG= 2.65 Box Gap= 2.5 mm

ϕ = 30.4° C_{apparent} = 5.48 psi



211 Business Park Blvd. Columbia, SC 29203

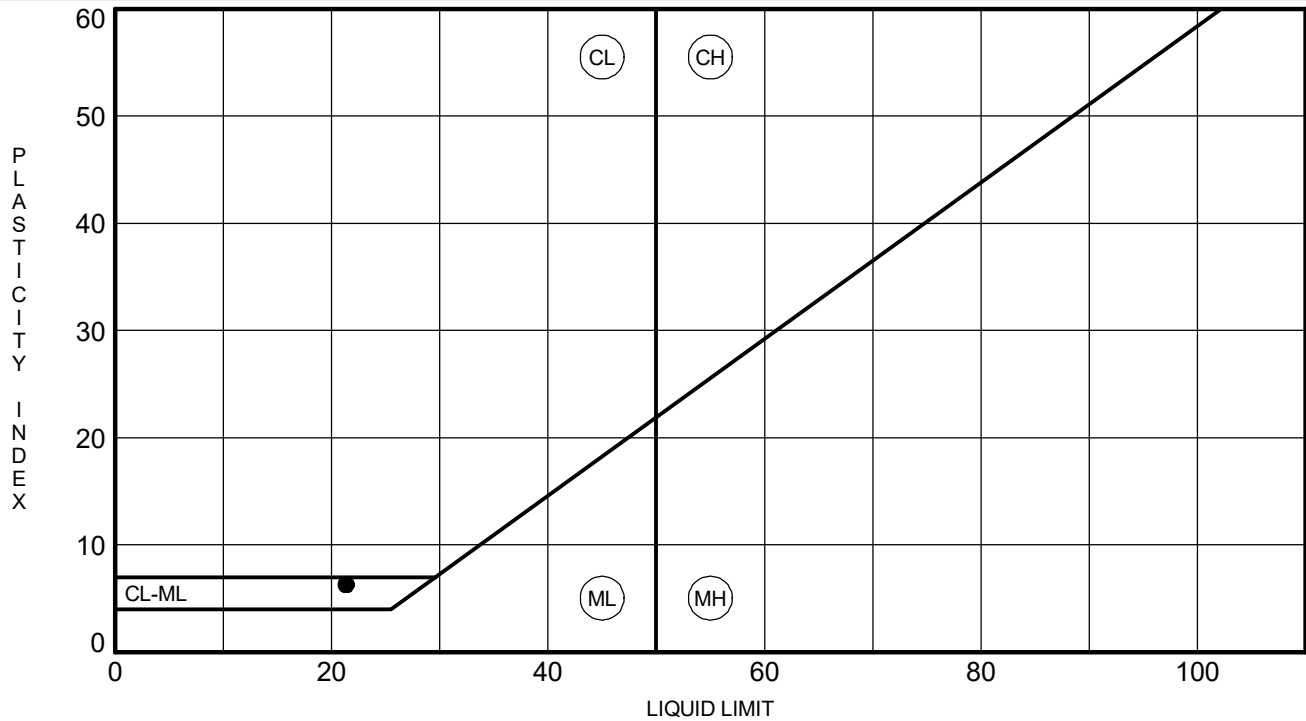
Geotechnical · Environmental · Materials

ATTERBERG LIMITS' RESULTS

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

[illegible]

F&ME CONSULTANTS, INC.**MOISTURE CONTENT DETERMINATION
(AASHTO T265)**

PROJECT:	S-9-22 over Caw Caw Creek	SCDOT PROJECT No. :	P044267
SAMPLE NUMBER:		DATE SAMPLE RECEIVED:	1/2/2025
DESCRIPTION OF SOIL:	Silty, Clayey SAND (SC-SM/A-2-4)		
TESTED BY:	Ashleigh Burgess	DATE SETUP:	1/2/2025
WEIGHED BY:	Ashleigh Burgess	DATE OF WEIGHING:	1/3/2025

BORING NO.	BS-2				
SAMPLE NO.	--				
SAMPLE DEPTH (FT.)	0.0 - 6.0				
WATER CONTENT, W%	11.6				

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

BORING NO.					
SAMPLE NO.					
SAMPLE DEPTH (FT.)					
WATER CONTENT, W%					

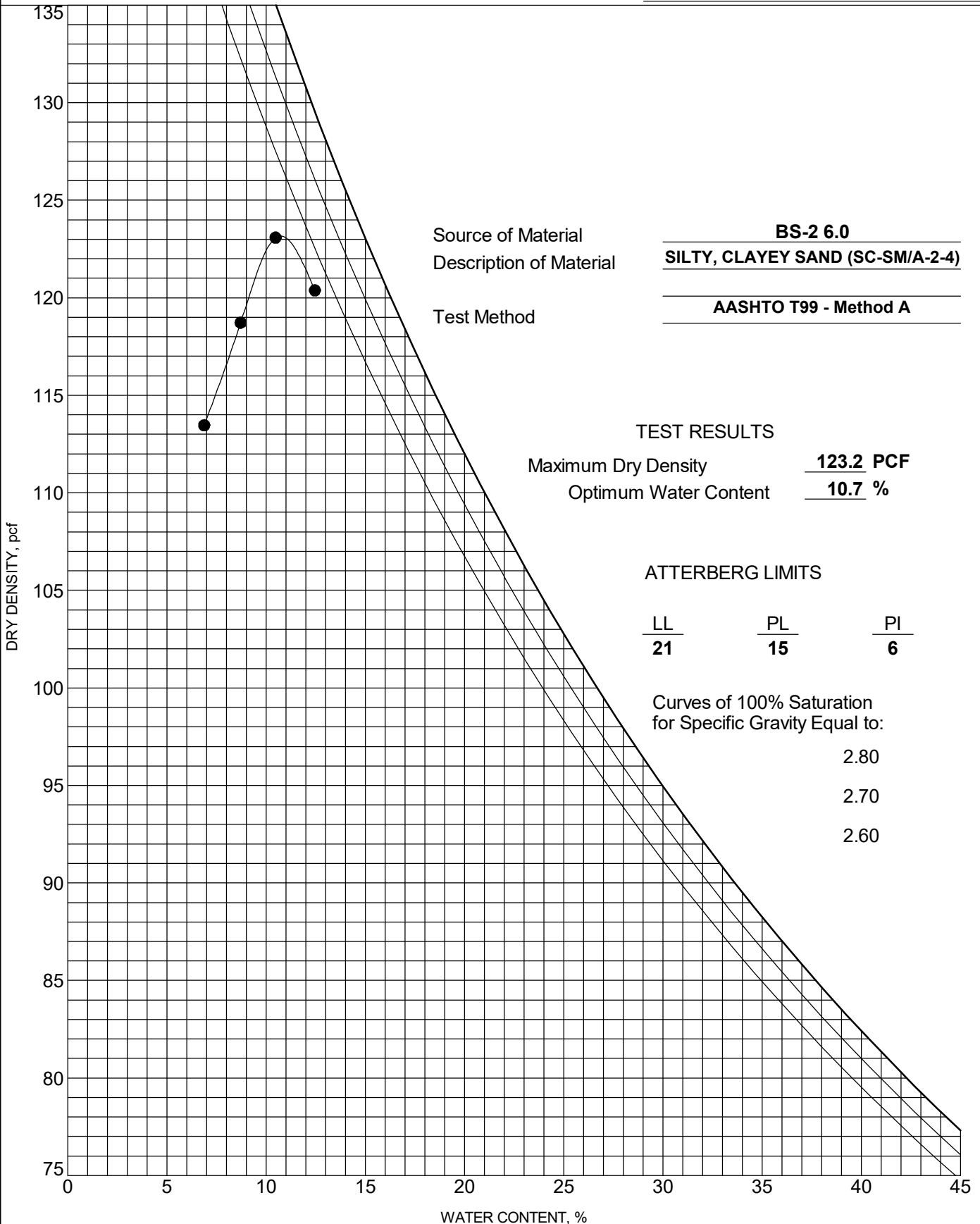


MOISTURE-DENSITY RELATIONSHIP

PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun



CALIFORNIA BEARING RATIO (CBR) AASHTO T193

SAMPLE INFORMATION

Project Name	S-9-22 over Caw Caw Creek			Project No.	G7100.009 - Task 00010
Sample Location	BS-2			FME Lab ID	24-4491
Soil Description	Silty Clayey SAND (SC-SM/A-2-4)			Depth/Elev.	0.0 - 6.0
Date Sampled	--	Sampled By:	F&ME	Date Received	1/3/2025
Date Test Began	1/10/2025	Date Completed	1/14/25	Tested By	DH/LJ

MOLDING CHARACTERISTICS

Method	AASHTO T99 - Method A	% Retained on 3/4" Sieve	0%
Max Dry Density (lb/ft ³)	123.2	Optimum Moisture Content (%)	10.7
Soak Time (hr)	96	Surcharge Weight (lb)	10.0

TESTING RESULTS

CBR at 0.10-inch penetration		CBR at 0.20-inch penetration	
9.4		9.0	
<p>The graph plots Stress (psi) on the y-axis (0 to 250) against Strain (inches) on the x-axis (0.00 to 0.50). A blue curve represents the test data, with a red dot at 0.20 inches strain and 135 psi stress. The curve passes through approximately (0.10, 95), (0.15, 115), (0.20, 135), (0.30, 165), (0.40, 190), and (0.50, 210).</p>			
Before Soaking		After Soaking	
Dry Density (lb/ft ³)	110.9	Dry Density (lb/ft ³)	112.9
Moisture Content	10.8%	Moisture Content (Top 1")	12.9%
Percent Compaction	90.1%	Percent Compaction	91.7%
Percent Shrink/Swell	--	Percent Shrink/Swell	0.0%

ADDITIONAL COMMENTS

Target %Compaction = 90%

	F&ME Consultants, Inc. 211 Business Park Blvd., Columbia, South Carolina 29203		1/27/25
			Date

CALIFORNIA BEARING RATIO (CBR) AASHTO T193

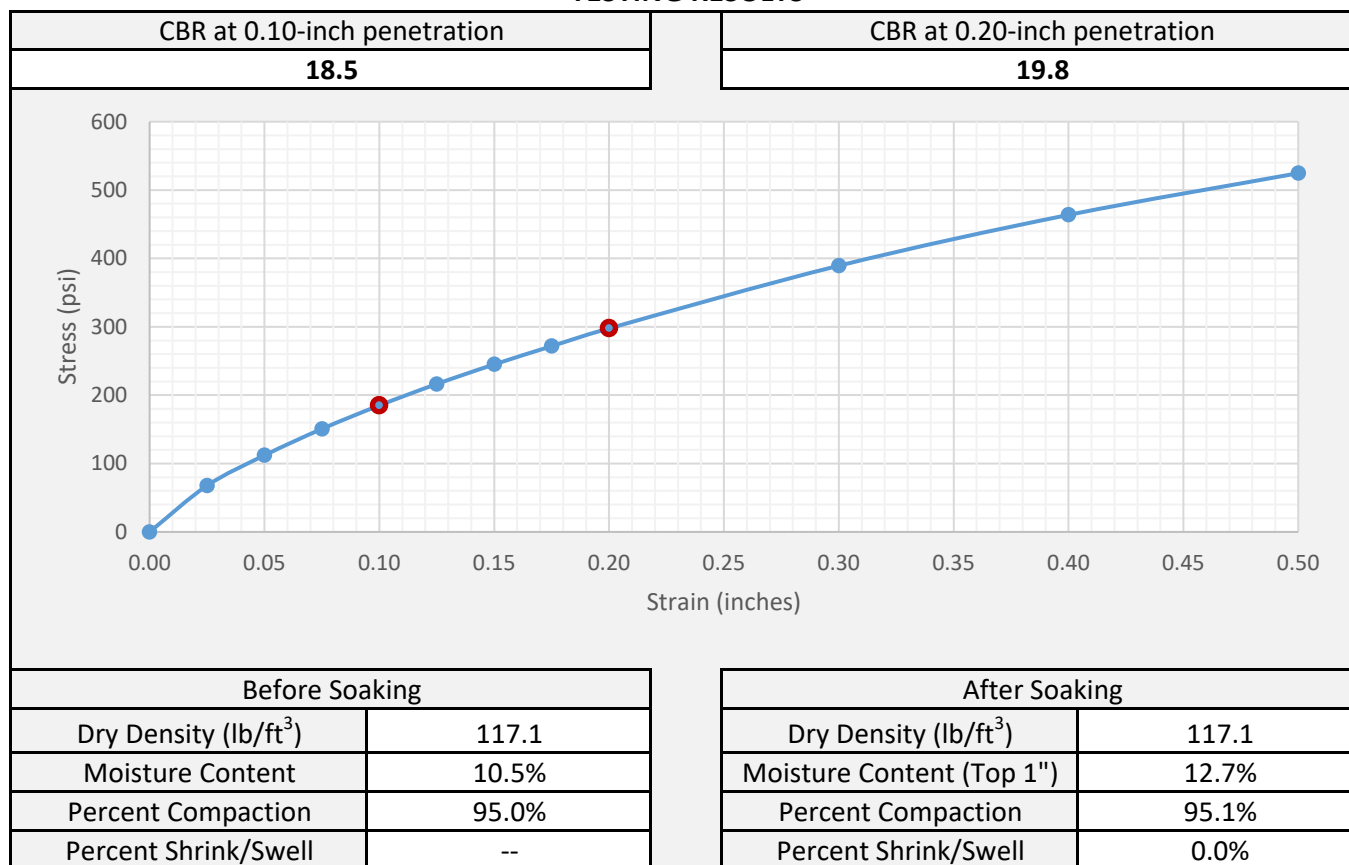
SAMPLE INFORMATION

Project Name	S-9-22 over Caw Caw Creek			Project No.	G7100.009 - Task 00010
Sample Location	BS-2			FME Lab ID	24-4491
Soil Description	Silty Clayey SAND (SC-SM/A-2-4)			Depth/Elev.	0.0 - 6.0
Date Sampled	--	Sampled By:	F&ME	Date Received	1/3/2025
Date Test Began	1/10/2025	Date Completed	1/14/25	Tested By	DH/LJ

MOLDING CHARACTERISTICS



Method	AASHTO T99 - Method A	% Retained on 3/4" Sieve	0%
Max Dry Density (lb/ft ³)	123.2	Optimum Moisture Content (%)	10.7
Soak Time (hr)	96	Surcharge Weight (lb)	10.0

TESTING RESULTS



ADDITIONAL COMMENTS

Target %Compaction = 95%

	F&ME Consultants, Inc. <small>211 Business Park Blvd., Columbia, South Carolina 29203</small>	 <hr/> Reviewed By	<hr/> 1/27/25 Date
---	---	---	-----------------------

CALIFORNIA BEARING RATIO (CBR) AASHTO T193

SAMPLE INFORMATION

Project Name	S-9-22 over Caw Caw Creek			Project No.	G7100.009 - Task 00010
Sample Location	BS-2			FME Lab ID	24-4491
Soil Description	Silty Clayey SAND (SC-SM/A-2-4)			Depth/Elev.	0.0 - 6.0
Date Sampled	--	Sampled By:	F&ME	Date Received	1/3/2025
Date Test Began	1/10/2025	Date Completed	1/14/25	Tested By	DH/LJ

MOLDING CHARACTERISTICS

Method	AASHTO T99 - Method A	% Retained on 3/4" Sieve	0%
Max Dry Density (lb/ft ³)	123.2	Optimum Moisture Content (%)	10.7
Soak Time (hr)	96	Surcharge Weight (lb)	10.0

TESTING RESULTS

CBR at 0.10-inch penetration		CBR at 0.20-inch penetration	
34.3		41.9	
Before Soaking		After Soaking	
Dry Density (lb/ft³)	123.9	Dry Density (lb/ft³)	123.9
Moisture Content	10.4%	Moisture Content (Top 1")	11.4%
Percent Compaction	100.5%	Percent Compaction	100.6%
Percent Shrink/Swell	--	Percent Shrink/Swell	0.0%

ADDITIONAL COMMENTS

Target %Compaction = 100%

	F&ME Consultants, Inc. 211 Business Park Blvd., Columbia, South Carolina 29203		1/27/25
			Date

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 5 LABORATORY TEST RESULTS

SECTION 5C CORROSION SERIES TESTING

CORROSION SERIES SUMMARY

PAGE 1 OF 1



PROJECT ID P044267

PROJECT NAME S-9-22 over Caw Caw Creek

PROJECT COUNTY Calhoun

Borehole	Sample No.	Sample Depth (ft.)	pH of Soil in Distilled Water	Electrical Resistivity (Ω -cm)	Chloride Content (mg/kg (ppm))	Sulfate Content (mg/kg (ppm))
B-1/DHT-1	SS-2/SS-3	2.0 – 6.0	5.35	32,629	3.19	44.0
B-2	SS-1/SS-2	0.0 – 4.0	5.78	41,875	2.89	44.1

**pH DETERMINATION
(AASHTO T289)**

Project Name:	S-9-22 over Caw Caw Creek	SCDOT Project Number:	P044267
FME Project Number:	G7100.009 - Task 00010	FME Lab ID No.:	24-4501
Description of Sample:	Various	Date Received	--
Tested By:	LJ/JM	Date Tested:	1/3/2025

Boring ID	B-1/DHT
Sample ID	SS-2/SS-3
Sample Depth	2.0 - 6.0
pH Value	5.35
Temperature (°C)	19.7

Date Reviewed: 1/3/2025Reviewed By: A. Abernethy

**SOIL RESISTIVITY
(AASHTO T288)**

Project Name:	S-9-22 over Caw Caw Creek	SCDOT Project ID:	P044267
Location:	B-1	FME Lab ID No.:	24-4501
Sampled By:	Trey Peterson	Date Sampled:	--
Soil Description:	Various	Date Received:	12/31/2024
Tested By:	AGB	Date Tested:	1/7/2025

Sample Number	Sample Depth (ft.)	Minimum Soil Resistivity, Ω -cm
SS-2/ SS-3	2.0 - 6.0	32,629

Date Reviewed: 1/8/2025 Reviewed By: A. Abernethy

CHLORIDE ION CONTENT IN SOILS

AASHTO T 291 - 94 (2018) (Method B)

Client: F&ME Consultants, Inc.
 Client Reference: S-9 Caw Caw Cr. G7100.009
 Project No.: 2025-008-001
 Lab ID: 2025-008-001-001

Boring No.: B-1/DHT
 Depth (ft): 2.0-6.0'
 Sample No.: SS-2/SS-3
 Description: Brown

(- # 10 Sieve material)

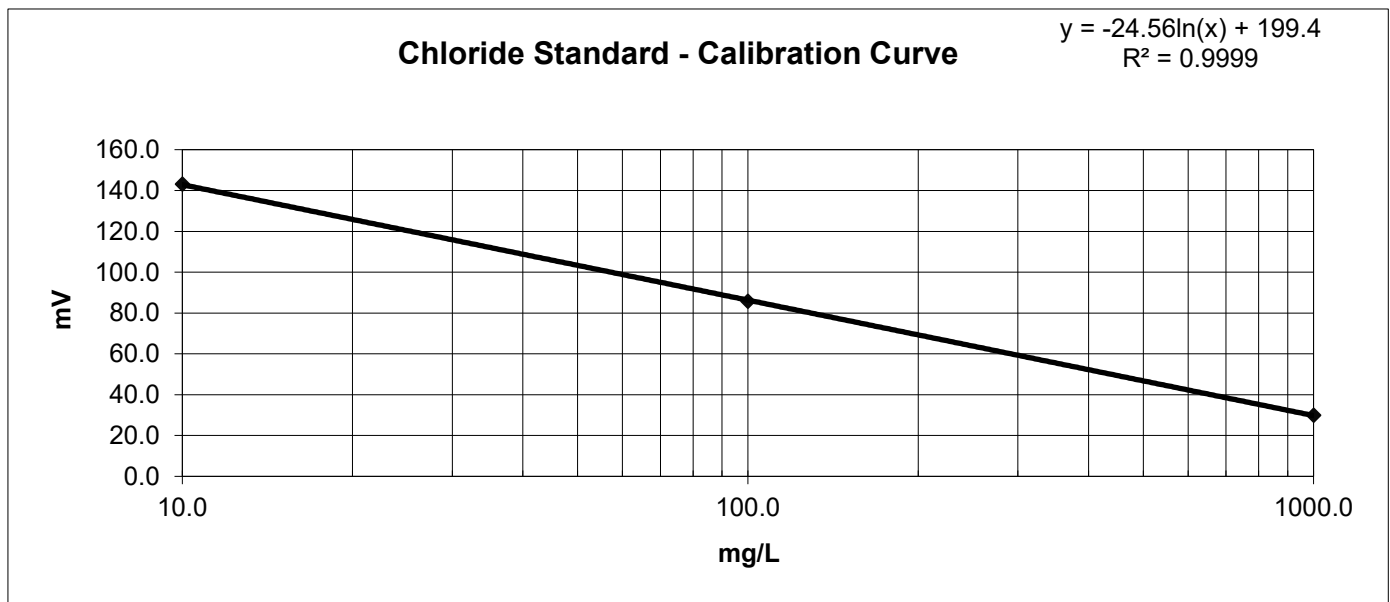
CHLORIDE STANDARD: CALIBRATION CURVE

STANDARD	MILLIVOLTS (mV)
10.0 mg/L	143.1
100.0 mg/L	85.8
1000.0 mg/L	30.0

MEASUREMENT OF CHLORIDES

Sample Weight (g):	100.0	CONCENTRATION	CONCENTRATION
Water added to Sample (ml):	100.0	(mg/L)	(mg/kg)
Size of Sample Aliquot (ml):	25.0		
Sample Reading (mV):	170.9	3.19	3.19

Notes: 1) Samples and standards were buffered by the addition of an equal volume of the 0.2 M KNO₃ solution (1:1 volume).
 2) Samples were dried for a minimum of 12 hours at 110 ± 5°C.



Notes:

Tested By JAM Date 1/14/25 Checked By EG Date 1/15/25

Water-Soluble Sulfate Ion Content in Soil

AASHTO T 290-95 (2020)

Client: F&ME Consultants, Inc.
 Client Reference: S-9 Caw Caw Cr. G7100.009
 Project No.: 2025-008-001
 Lab ID: 2025-008-001-001

Boring No.: B-1/DHT
 Depth (ft): 2.0-6.0'
 Sample No.: SS-2/SS-3
 Soil Description: Brown

Sulfate Standard - Calibration Curve Spectrophotometer Readings

<u>Sulfate Ion Concentrations (mg/L)</u>								
0.0	4.0	10.0	20.0	30.0	40.0	60.0	80.0	100.0
<u>Spectrophotometer Readings (FAU)</u>								
Underrange	Underrange	7	20	42	63	112	163	243

Measurement of Barium Chloride Turbidity

(Sample contains 5.0 mL NaCl solution and 0.3 g BaCl₂·2H₂O)

Sample Weight (g): 100.0
 Water added to Sample (mL): 300.0
 Size of Sample Aliquot (mL): 50.0
 Sample Reading (FAU): 5

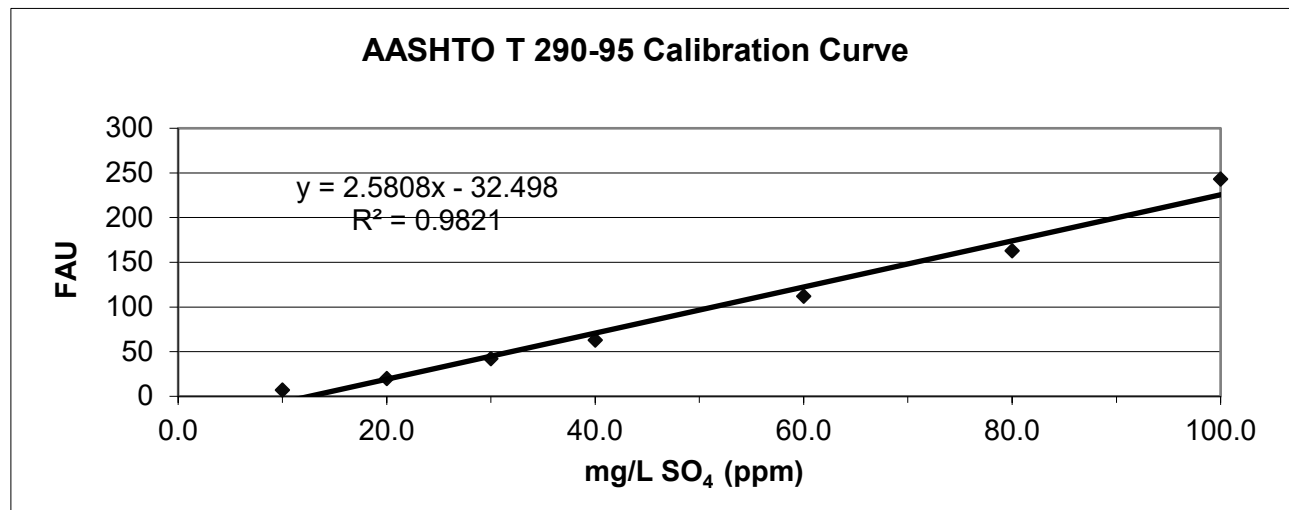
Sample Diluted: No

Sulfate Solution Added (ml): 0

Sample Moisture Content

Tare Number: 483
 Weight of Tare & Wet Sample (g): 207.83
 Weight of Tare & Dry Sample (g): 206.76
 Weight of Tare (g): 97.29
 Weight of Water (g): 1.07
 Weight of Dry Sample (g): 109.47
 Moisture Content (%): 0.98

Sample Sulfate Ion Concentration:	14.53	mg/L SO ₄ (ppm)
Sample Sulfate Ion Content:	43.6	mg/Kg SO ₄ (not corrected for moisture)
Sample Sulfate Ion Content:	44.0	mg/Kg SO ₄ (corrected for moisture)



Tested by: JAM Date: 11/14/25 Checked by: EG Date: 1/15/2025

**pH DETERMINATION
(AASHTO T289)**

Project Name:	S-9-22 over Caw Caw Creek	SCDOT Project Number:	P044267
FME Project Number:	G7100.009 - Task 00010	FME Lab ID No.:	24-4500
Description of Sample:	Various	Date Received	--
Tested By:	LJ/JM	Date Tested:	1/3/2025

Boring ID	B-2
Sample ID	SS-1/SS-2
Sample Depth	0.0 - 4.0
pH Value	5.78
Temperature (°C)	19.7

Date Reviewed: 1/3/2025Reviewed By: A. Abernethy

**SOIL RESISTIVITY
(AASHTO T288)**

Project Name:	S-9-22 over Caw Caw Creek	SCDOT Project ID:	P044267
Location:	B-2	FME Lab ID No.:	24-4500
Sampled By:	Grace Cantele	Date Sampled:	--
Soil Description:	Various	Date Received:	12/31/2024
Tested By:	AGB	Date Tested:	1/7/2025

Sample Number	Sample Depth (ft.)	Minimum Soil Resistivity, Ω -cm
SS-1/SS-2	0.0 - 2.0	41,875

Date Reviewed: 1/8/2025 Reviewed By: A. Abernethy

CHLORIDE ION CONTENT IN SOILS

AASHTO T 291 - 94 (2018) (Method B)

Client: F&ME Consultants, Inc.
 Client Reference: S-9 Caw Caw Cr. G7100.009
 Project No.: 2025-008-001
 Lab ID: 2025-008-001-002

Boring No.: B-2
 Depth (ft): 0.0-4.0'
 Sample No.: SS-1/SS-2
 Description: Brown

(- # 10 Sieve material)

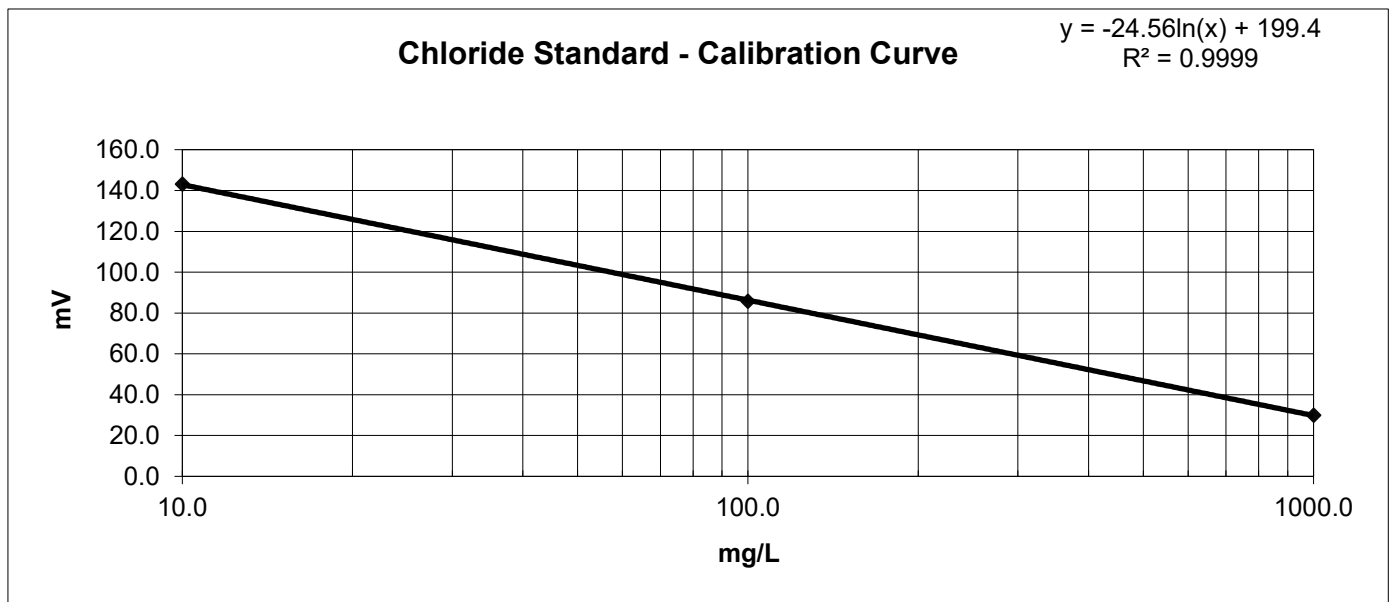
CHLORIDE STANDARD: CALIBRATION CURVE

STANDARD	MILLIVOLTS (mV)
10.0 mg/L	143.1
100.0 mg/L	85.8
1000.0 mg/L	30.0

MEASUREMENT OF CHLORIDES

Sample Weight (g):	100.0	CONCENTRATION	CONCENTRATION
Water added to Sample (ml):	100.0	(mg/L)	(mg/kg)
Size of Sample Aliquot (ml):	25.0		
Sample Reading (mV):	173.3	2.89	2.89

Notes: 1) Samples and standards were buffered by the addition of an equal volume of the 0.2 M KNO₃ solution (1:1 volume).
 2) Samples were dried for a minimum of 12 hours at 110 °F. 5°C.



Notes:

Tested By JAM Date 1/14/25 Checked By EG Date 1/15/25

Water-Soluble Sulfate Ion Content in Soil

AASHTO T 290-95 (2020)

Client: F&ME Consultants, Inc.
 Client Reference: S-9 Caw Caw Cr. G7100.009
 Project No.: 2025-008-001
 Lab ID: 2025-008-001-002

Boring No.: B-2
 Depth (ft): 0.0-4.0'
 Sample No.: SS-1/SS-2
 Soil Description: Brown

Sulfate Standard - Calibration Curve Spectrophotometer Readings

<u>Sulfate Ion Concentrations (mg/L)</u>								
0.0	4.0	10.0	20.0	30.0	40.0	60.0	80.0	100.0
<u>Spectrophotometer Readings (FAU)</u>								
Underrange	Underrange	7	20	42	63	112	163	243

Measurement of Barium Chloride Turbidity

(Sample contains 5.0 mL NaCl solution and 0.3 g BaCl₂·2H₂O)

Sample Weight (g): 100.0
 Water added to Sample (mL): 300.0
 Size of Sample Aliquot (mL): 50.0
 Sample Reading (FAU): 5

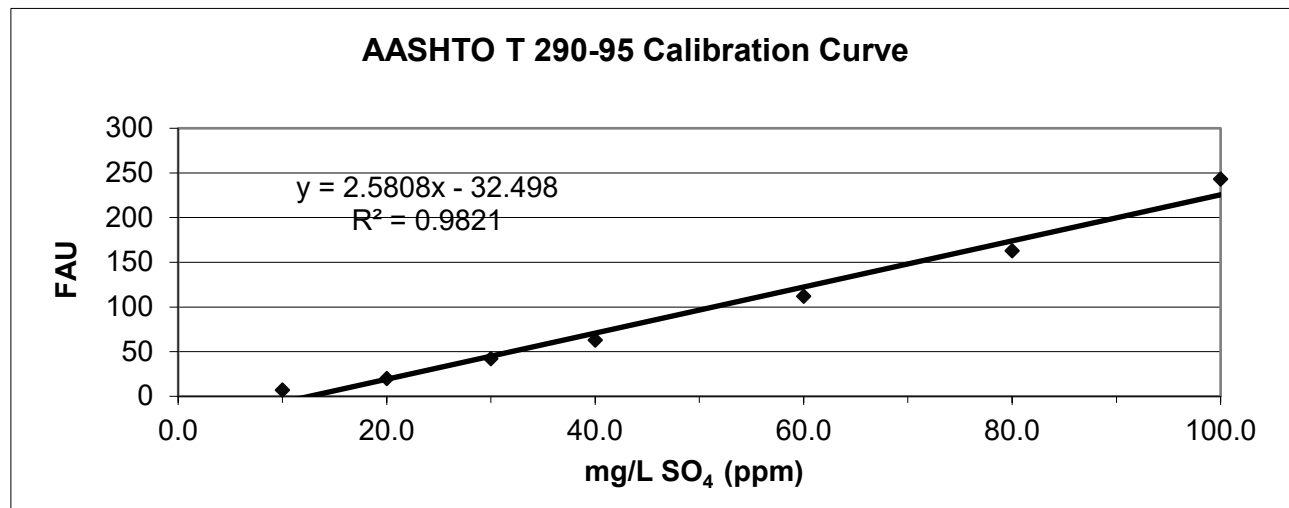
Sample Diluted: No

Sulfate Solution Added (ml): 0

Sample Moisture Content

Tare Number: 442
 Weight of Tare & Wet Sample (g): 204.50
 Weight of Tare & Dry Sample (g): 203.29
 Weight of Tare (g): 98.55
 Weight of Water (g): 1.21
 Weight of Dry Sample (g): 104.74
 Moisture Content (%): 1.16

Sample Sulfate Ion Concentration:	14.53	mg/L SO ₄ (ppm)
Sample Sulfate Ion Content:	43.6	mg/Kg SO ₄ (not corrected for moisture)
Sample Sulfate Ion Content:	44.1	mg/Kg SO ₄ (corrected for moisture)



Tested by: JAM Date: 11/14/25 Checked by: EG Date: 1/15/2025

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 6 ON-SITE DRILL RIG PHOTOS

Drill Rig Photos



B-1



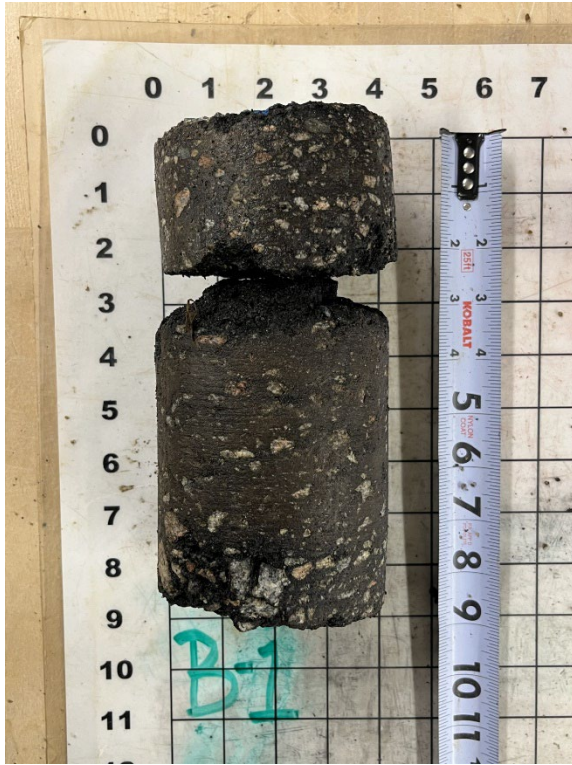
B-2

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 7 PAVEMENT CORE PHOTOS

Pavement Core Photos



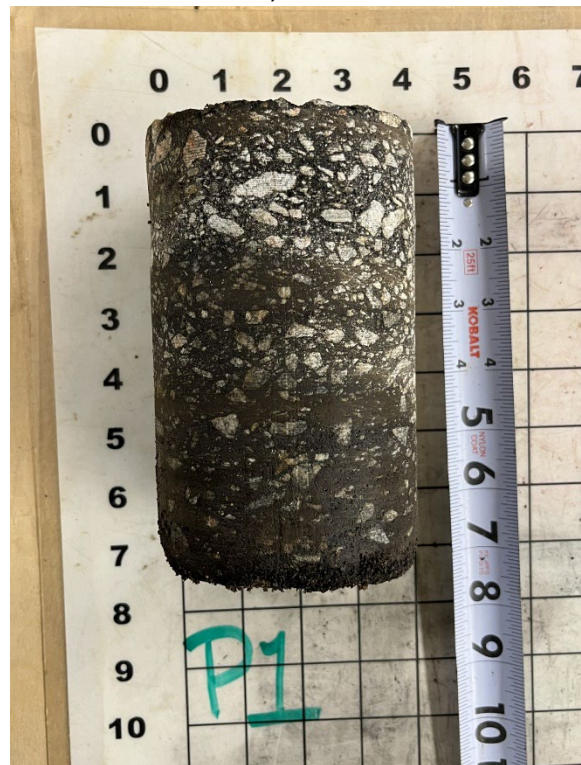
B-1, Side 1



B-1, Side 2



P-1, Side 1



P-1, Side 2

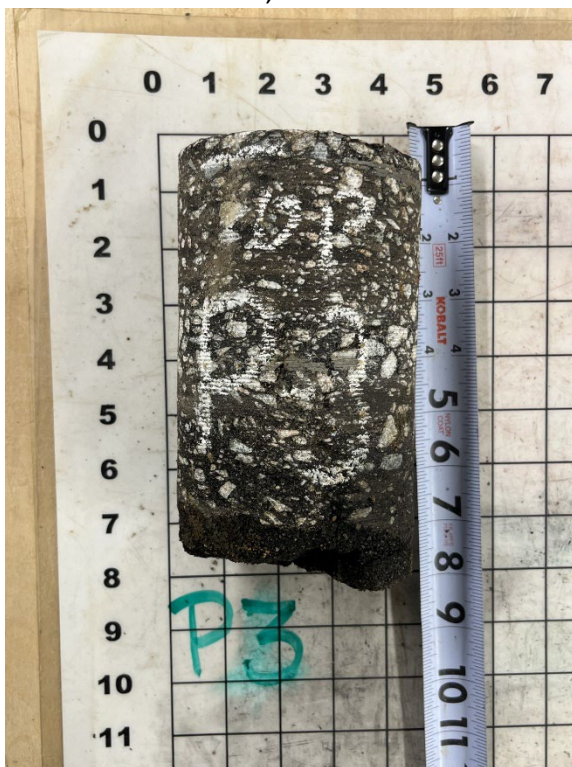
Pavement Core Photos



P-2, Side 1



P-2, Side 2

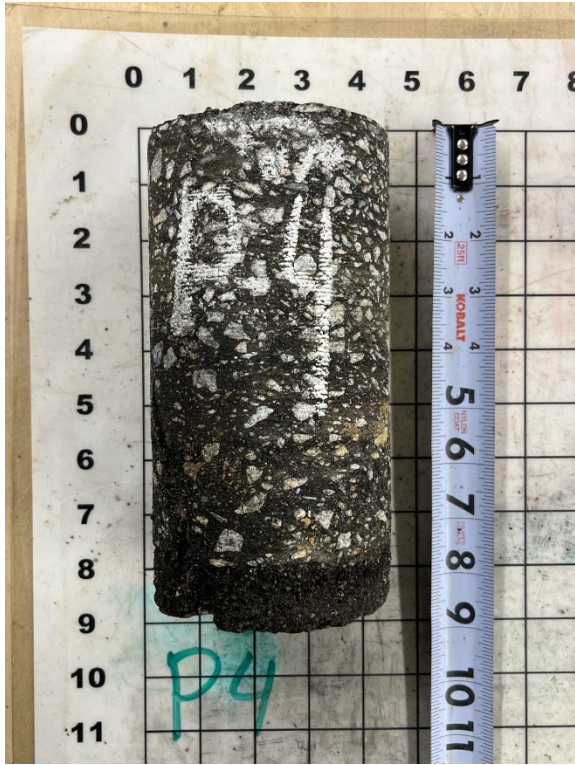


P-3, Side 1



P-3, Side 2

Pavement Core Photos



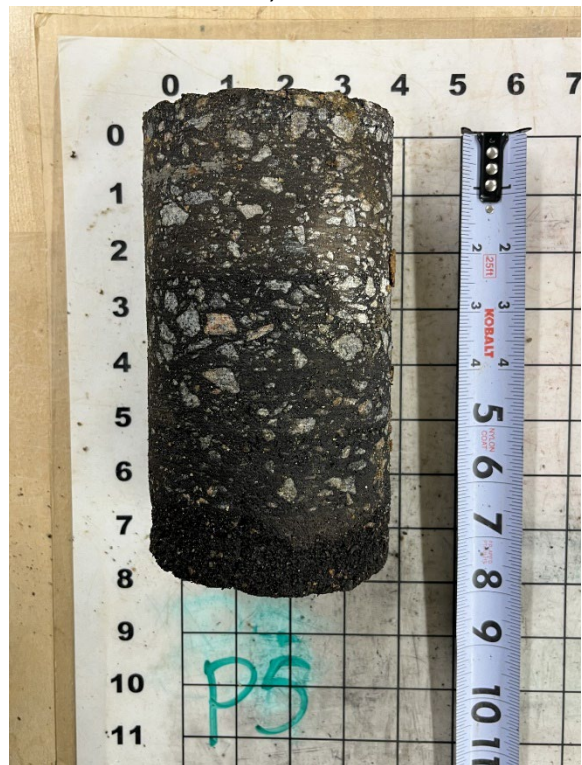
P-4, Side 1



P-4, Side 2



P-5, Side 1



P-5, Side 2

Pavement Core Photos



P-6, Side 1



P-6, Side 2

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 8 SPT HAMMER CALIBRATION

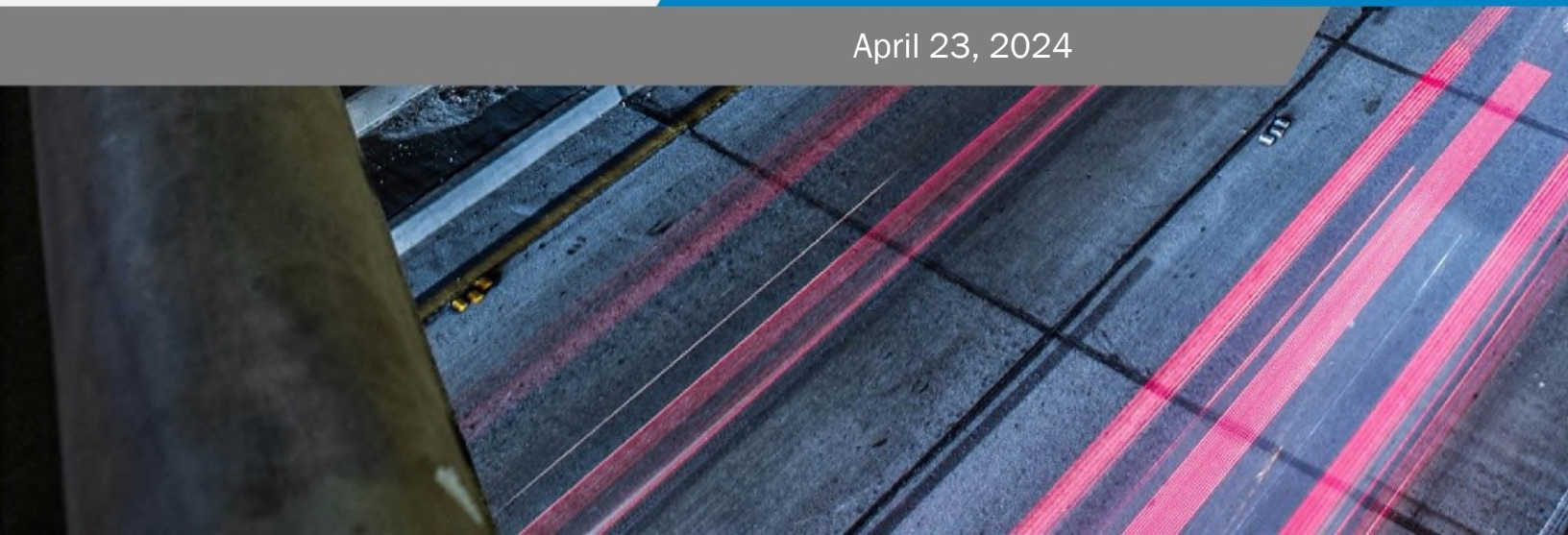


**CAROLINAS
GEOTECHNICAL
GROUP**

Report of SPT Hammer Energy

Prepared for:
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620-B Industrial Way
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April 23, 2024





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April 23, 2024

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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 12, 2024. 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 at SPT_Hammer_Energy_Submittal@ncdot.gov for review and approval no later than May 10, 2024.

DYNAMIC TESTING METHODOLOGY

Testing was performed using a model SPT (Serial No. 4553 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 728AWJ) internally instrumented with two strain transducers. The instrumented AWJ drill rod has a cross-sectional area of 1.13 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 Appendix III.

Report of SPT Hammer Energy

Chester, South Carolina

CG2 Project No.: 240021095

TESTING AND OBSERVATIONS

CG2 personnel was on site April 12, 2024 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 34.7704428, -81.2454626. 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)	1.13
Typical Lengths (feet)	5
Instrumented Rod Type	AWJ (SN 728)
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in ²)	1.13
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 52.3 to 59.6 blows per minute (BPM) during dynamic testing. The measured transferred hammer energy (EFV) ranged from 285.7 to 331.4 foot-pounds, which corresponds to Energy Transfer Ratio (ETR) values of 81.6 to 94.7%, 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 Appendix I 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 Appendix I 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	3-6-9 / 15	SA SILT	59.2	318.5	91.0
2	33½ - 35	35	38.6	2-4-6 / 10	SA SILT	54.9	300.5	85.9
3	38½ - 40	40	43.6	3-5-9 / 14	SA SILT	56.1	319.7	91.3
Overall Average						57.0	314.3	89.8

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 314.3 foot-pounds, with an average ETR of 89.8%.

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:


F926DBFBA80F4FE...
Pressley M. Perry, EIT
Staff Professional

DocuSigned by:


8AD703B2A8484F4...
Robert E. Kral, PE
Geotechnical Design Manager
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



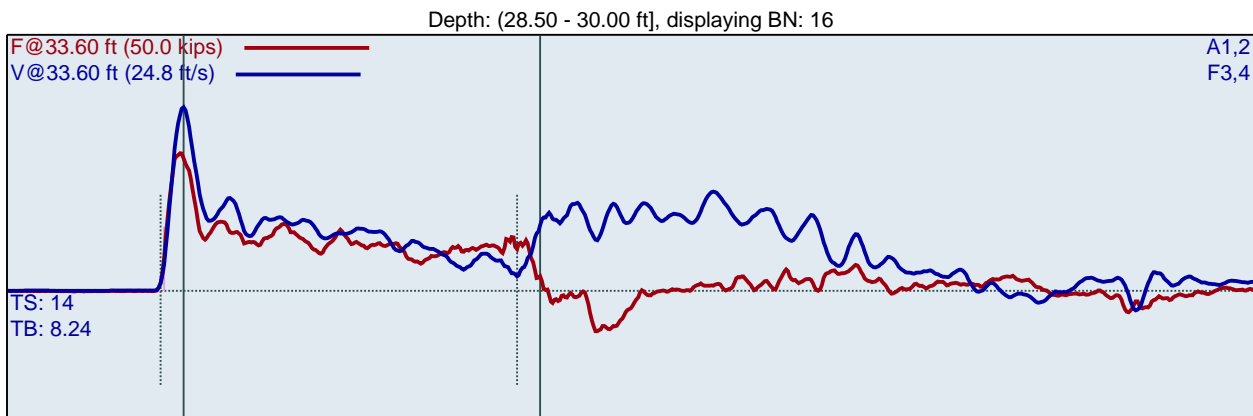
APPENDIX I

CME 550X (SN 294593)
REK
B-1

B-1
Interval start: 4/12/2024

AR: 1.13 in²
LE: 33.60 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi



F3 : [728AWJ1] 224.649 PDICAL (1) FF1
F4 : [728AWJ2] 224.139 PDICAL (1) FF1

A1 (PR): [K10959] 413.827 mv/6.4v/5000g (1) VF1
A2 (PR): [K10960] 419.894 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	%
28.67	1	3	61.3	28.2	17.7	2.0	25.0	2.0	296.2	84.6
28.83	2	3	56.1	28.3	18.4	2.0	25.1	2.0	314.9	90.0
29.00	3	3	56.9	28.5	18.4	2.0	25.2	2.0	317.3	90.7
29.08	4	6	58.7	28.7	18.6	1.2	25.4	1.0	310.7	88.8
29.17	5	6	59.0	28.7	18.5	1.2	25.4	1.0	320.5	91.6
29.25	6	6	58.8	28.8	18.7	1.2	25.5	1.0	328.6	93.9
29.33	7	6	59.1	29.1	18.4	1.1	25.7	1.0	311.1	88.9
29.42	8	6	58.9	29.0	18.3	1.1	25.7	1.0	310.6	88.8
29.50	9	6	59.4	29.1	18.3	1.0	25.8	1.0	318.2	90.9
29.56	10	9	59.2	28.8	18.3	0.9	25.4	0.7	318.6	91.0
29.61	11	9	59.1	28.1	17.9	0.8	24.9	0.7	315.6	90.2
29.67	12	9	59.5	28.1	18.1	0.9	24.9	0.7	318.1	90.9
29.72	13	9	59.0	28.2	18.0	0.8	24.9	0.7	314.6	89.9
29.78	14	9	59.4	27.9	18.0	0.9	24.7	0.7	331.4	94.7
29.83	15	9	59.2	27.7	18.3	0.8	24.5	0.7	325.5	93.0
29.89	16	9	59.6	26.9	17.8	0.8	23.8	0.7	318.9	91.1
29.94	17	9	59.0	27.0	17.9	0.7	23.9	0.7	322.3	92.1
30.00	18	9	59.5	27.2	17.8	0.7	24.1	0.7	312.8	89.4
Average			59.2	28.2	18.2	0.9	25.0	0.8	318.5	91.0
Std Dev			0.3	0.7	0.3	0.2	0.6	0.2	6.2	1.8
Maximum			59.6	29.1	18.7	1.2	25.8	1.0	331.4	94.7
Minimum			58.7	26.9	17.8	0.7	23.8	0.7	310.6	88.8

N-value: 15

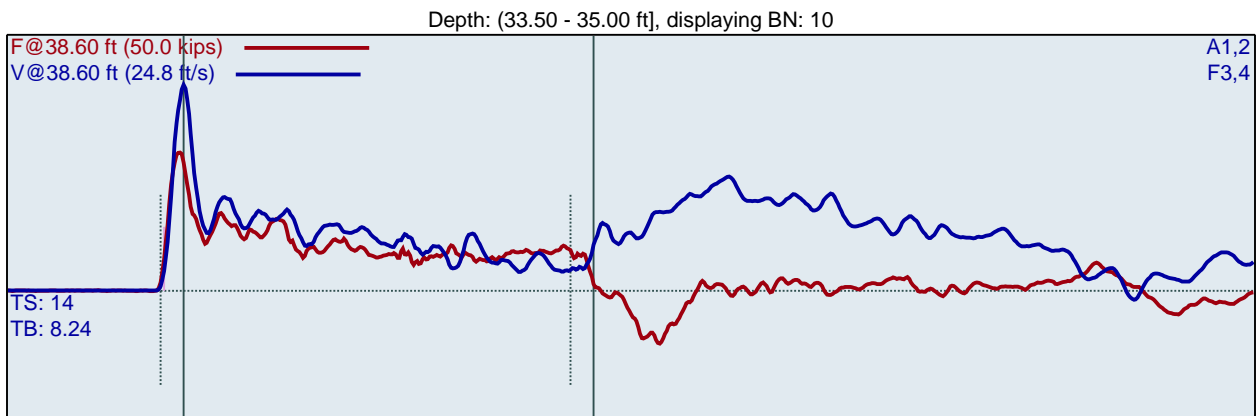
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CME 550X (SN 294593)
REK
B-1

B-1
Interval start: 4/12/2024

AR: 1.13 in²
LE: 38.60 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi



F3 : [728AWJ1] 224.649 PDICAL (1) FF1
F4 : [728AWJ2] 224.139 PDICAL (1) FF1

A1 (PR): [K10959] 413.827 mv/6.4v/5000g (1) VF1
A2 (PR): [K10960] 419.894 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 %
33.75	1	2	1.9	26.2	17.4	3.0	23.2	3.0	287.1	82.0
34.00	2	2	48.1	26.7	18.6	3.0	23.6	3.0	321.2	91.8
34.13	3	4	52.3	27.1	18.6	1.5	24.0	1.5	285.7	81.6
34.25	4	4	52.3	26.5	18.4	1.5	23.5	1.5	299.0	85.4
34.38	5	4	54.1	26.9	19.2	1.5	23.8	1.5	298.6	85.3
34.50	6	4	55.3	27.1	19.8	1.5	24.0	1.5	296.8	84.8
34.58	7	6	56.3	26.7	20.0	1.1	23.7	1.0	300.1	85.7
34.67	8	6	55.6	27.2	19.6	1.1	24.1	1.0	299.6	85.6
34.75	9	6	55.8	26.8	19.7	1.1	23.7	1.0	300.6	85.9
34.83	10	6	55.8	27.0	19.9	1.1	23.9	1.0	305.7	87.3
34.92	11	6	56.0	26.3	20.3	1.1	23.2	1.0	311.8	89.1
35.00	12	6	55.8	26.4	20.0	1.0	23.3	1.0	307.0	87.7
Average			54.9	26.8	19.6	1.3	23.7	1.2	300.5	85.9
Std Dev			1.4	0.3	0.6	0.2	0.3	0.2	6.6	1.9
Maximum			56.3	27.2	20.3	1.5	24.1	1.5	311.8	89.1
Minimum			52.3	26.3	18.4	1.0	23.2	1.0	285.7	81.6

N-value: 10

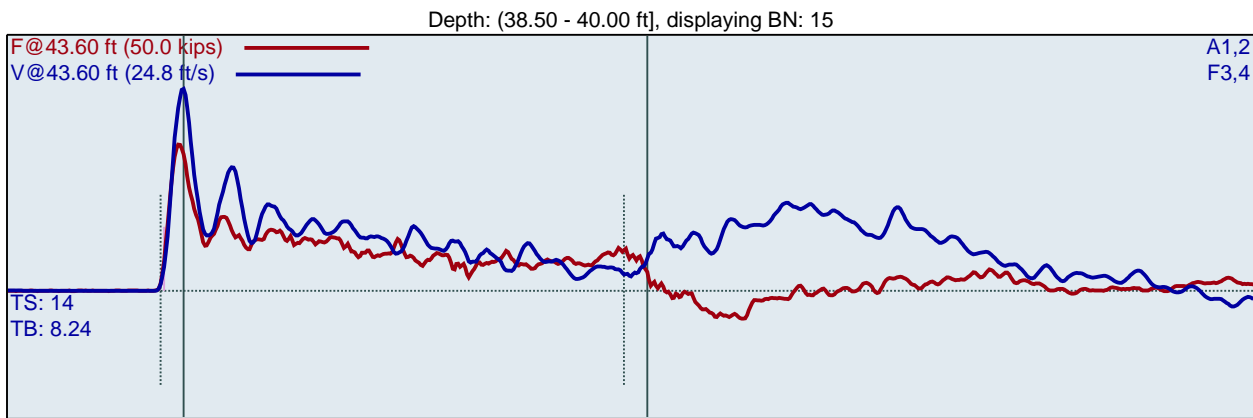
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CME 550X (SN 294593)
REK
B-1

B-1
Interval start: 4/12/2024

AR: 1.13 in²
LE: 43.60 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft³
EM: 30000 ksi



F3 : [728AWJ1] 224.649 PDICAL (1) FF1
F4 : [728AWJ2] 224.139 PDICAL (1) FF1

A1 (PR): [K10959] 413.827 mv/6.4v/5000g (1) VF1
A2 (PR): [K10960] 419.894 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 %
38.67	1	3	1.9	27.7	19.3	2.5	24.5	2.0	320.5	91.6
38.83	2	3	50.9	27.5	19.5	2.1	24.4	2.0	310.0	88.6
39.00	3	3	52.4	27.8	19.9	2.2	24.6	2.0	322.8	92.2
39.10	4	5	54.3	27.1	20.2	1.8	24.0	1.2	317.2	90.6
39.20	5	5	54.4	26.9	20.9	1.6	23.8	1.2	315.5	90.1
39.30	6	5	55.1	26.9	19.4	1.5	23.8	1.2	316.1	90.3
39.40	7	5	56.5	26.7	20.8	1.3	23.7	1.2	324.6	92.7
39.50	8	5	56.3	26.8	20.5	1.3	23.7	1.2	323.6	92.5
39.56	9	9	56.7	26.9	20.2	1.1	23.8	0.7	318.2	90.9
39.61	10	9	55.9	27.1	20.1	1.0	24.0	0.7	325.1	92.9
39.67	11	9	56.5	27.4	20.0	1.0	24.2	0.7	324.0	92.6
39.72	12	9	56.2	27.5	20.0	0.9	24.4	0.7	324.4	92.7
39.78	13	9	56.9	27.6	19.5	0.8	24.5	0.7	315.7	90.2
39.83	14	9	56.5	28.3	19.5	0.9	25.0	0.7	325.3	92.9
39.89	15	9	56.4	28.5	19.6	0.8	25.3	0.7	320.5	91.6
39.94	16	9	56.5	28.2	19.8	0.9	24.9	0.7	319.8	91.4
40.00	17	9	56.5	27.9	19.1	0.8	24.7	0.7	305.9	87.4
Average			56.1	27.4	20.0	1.1	24.3	0.9	319.7	91.3
Std Dev			0.8	0.6	0.5	0.3	0.5	0.3	5.3	1.5
Maximum			56.9	28.5	20.9	1.8	25.3	1.2	325.3	92.9
Minimum			54.3	26.7	19.1	0.8	23.7	0.7	305.9	87.4

N-value: 14

Sample Interval Time: 17.34 seconds.

Summary of SPT Test Results

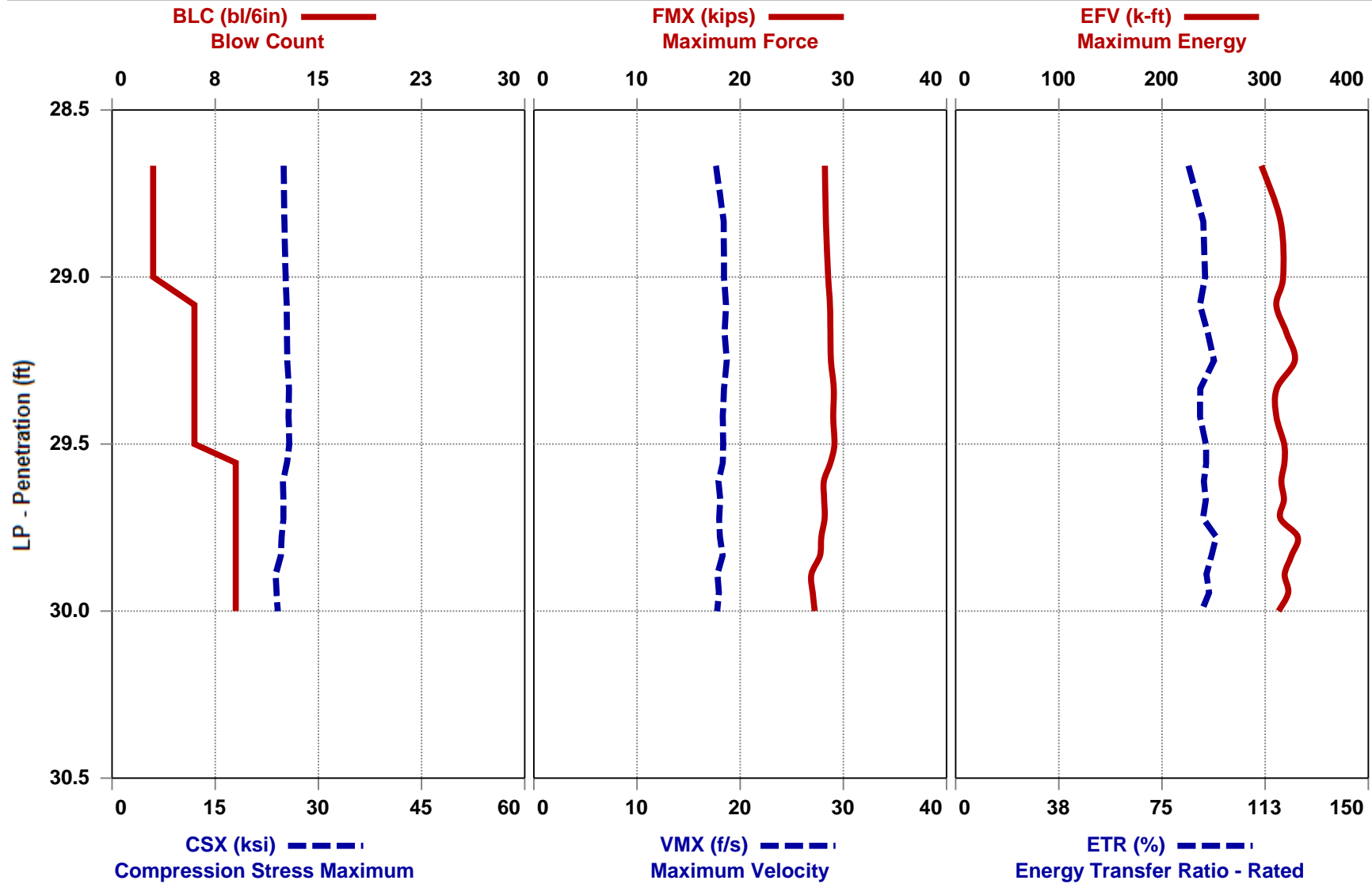
Project: CME 550X (SN 294593), Test Date: 4/12/2024

BPM: Blows/Minute											CSX: Compression Stress Maximum		
FMX: Maximum Force											DFN: Final Displacement		
VMX: Maximum Velocity											EFV: Maximum Energy		
DMX: Maximum Displacement											ETR: Energy Transfer Ratio - Rated		
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	3-6-9	15	22	59.2	28.2	18.2	0.9	25.0	0.8	318.5	91.0
38.60	33.50	35.00	2-4-6	10	14	54.9	26.8	19.6	1.3	23.7	1.2	300.5	85.9
43.60	38.50	40.00	3-5-9	14	20	56.1	27.4	20.0	1.1	24.3	0.9	319.7	91.3
Overall Average Values:						57.0	27.6	19.2	1.1	24.4	0.9	314.3	89.8
Standard Deviation:						2.0	0.8	0.9	0.3	0.7	0.3	10.1	2.9
Overall Maximum Value:						59.6	29.1	20.9	1.8	25.8	1.5	331.4	94.7
Overall Minimum Value:						52.3	26.3	17.8	0.7	23.2	0.7	285.7	81.6



CME 550X (SN 294593) - 28.5 TO 30.0

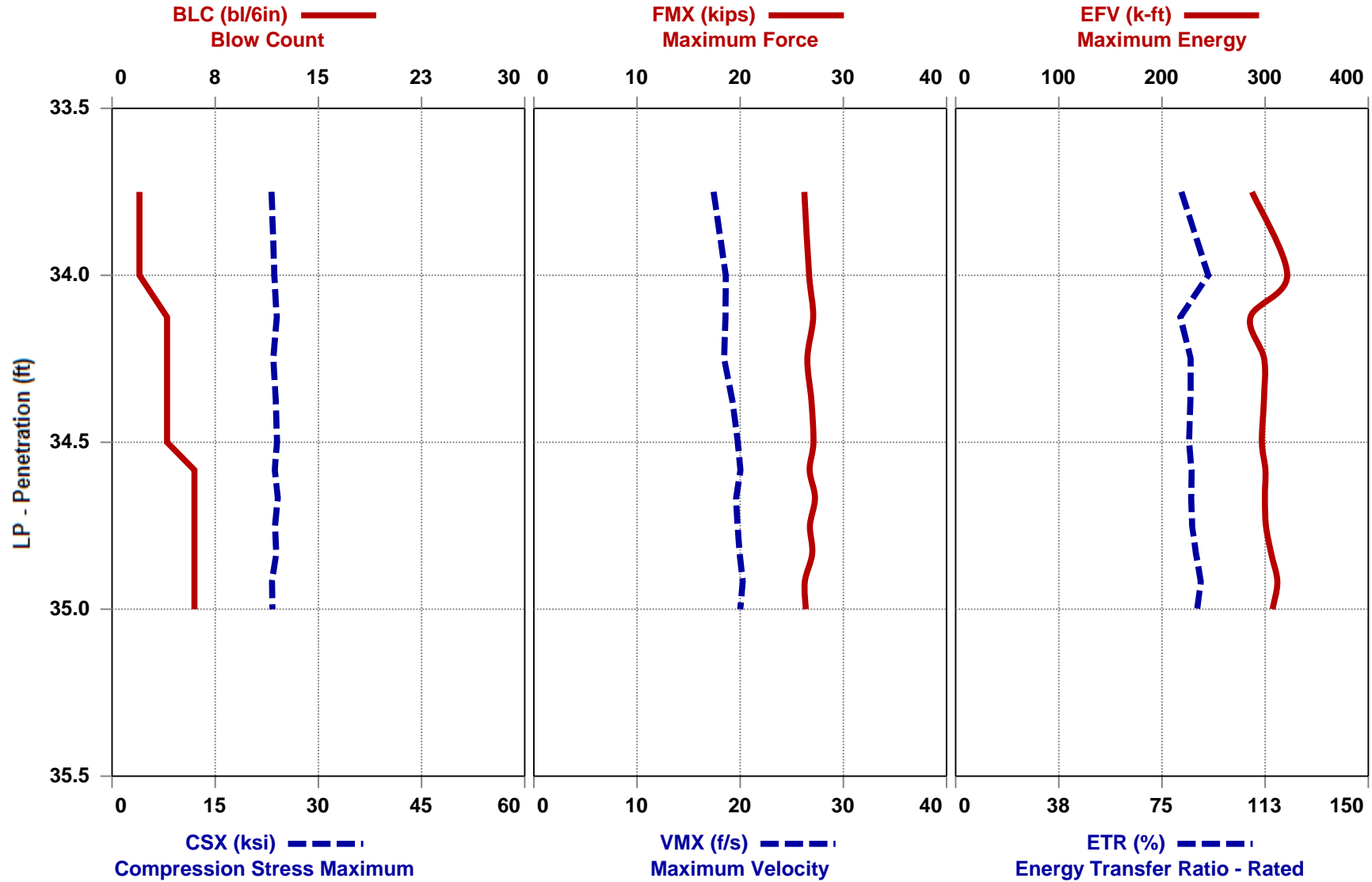
B-1





CME 550X (SN 294593) - 33.5 TO 35.0

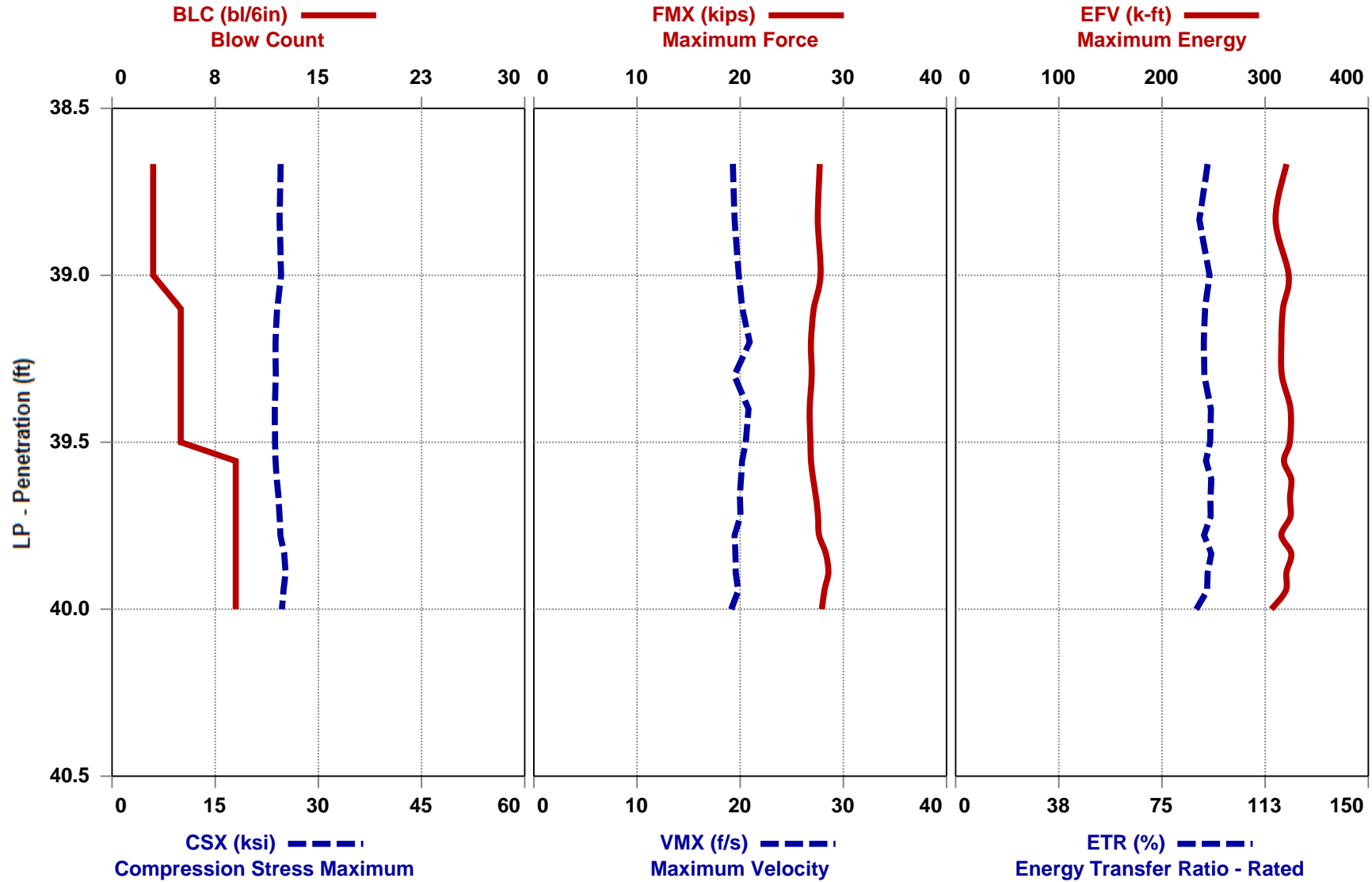
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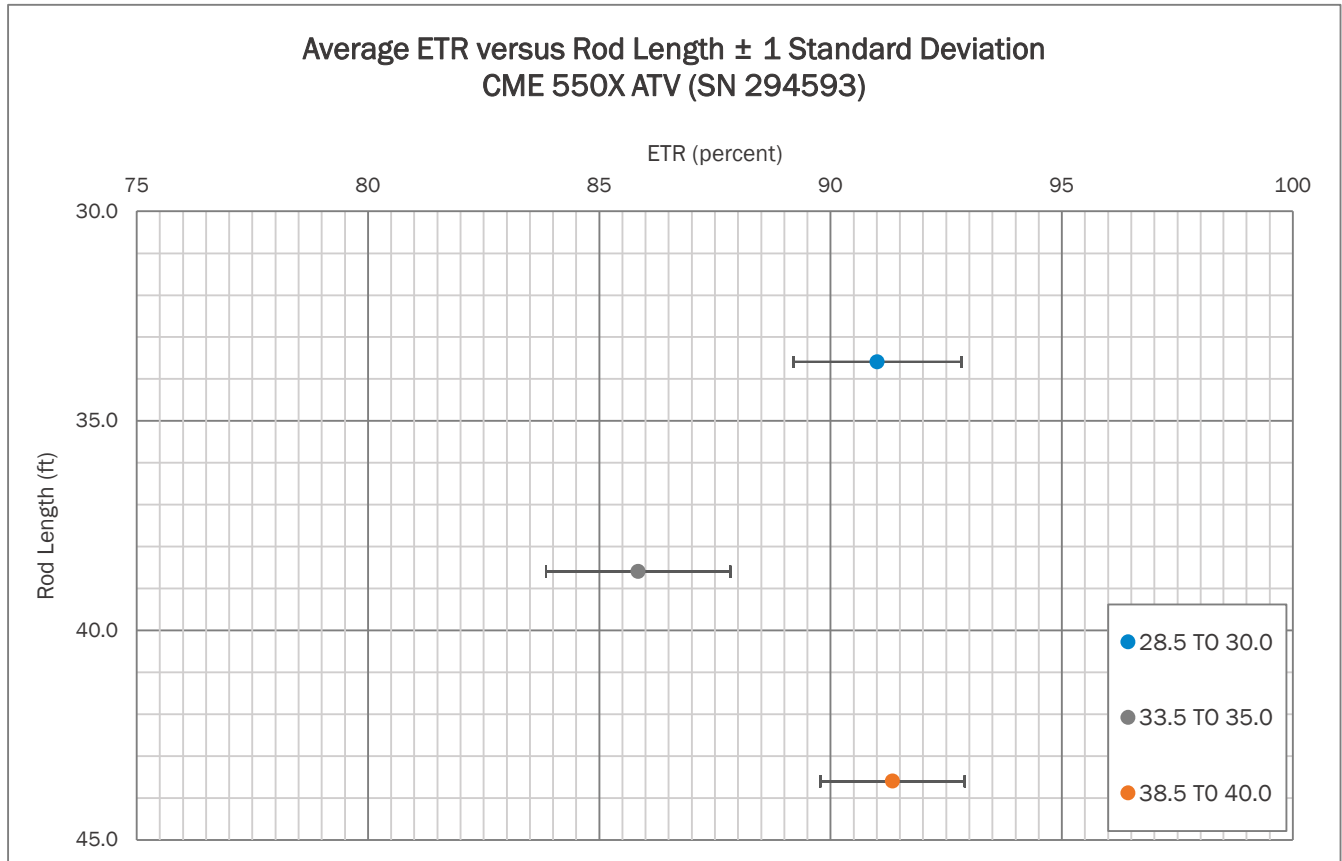
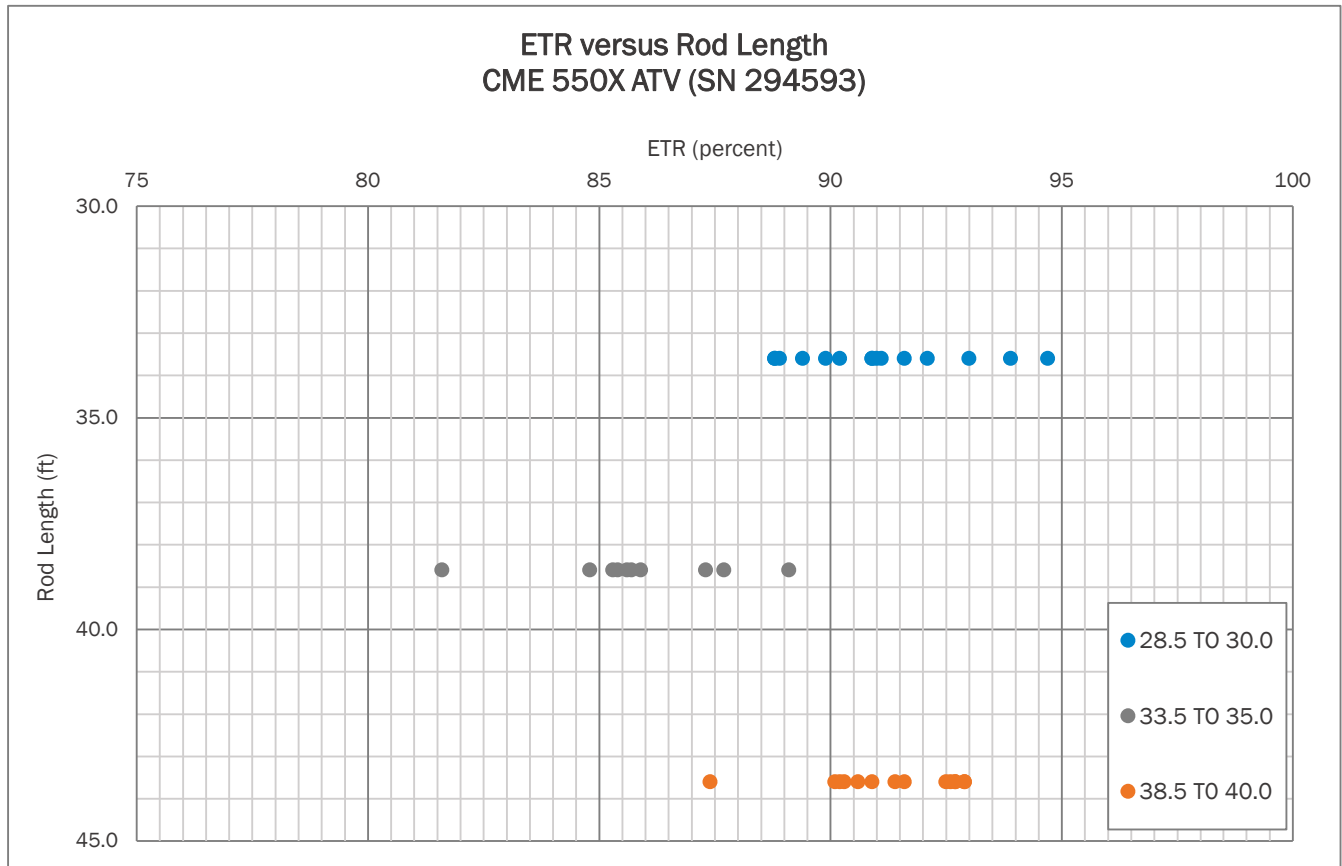




CME 550X (SN 294593) - 38.5 TO 40.0

B-1







APPENDIX II

SPT Hammer Energy Field Form

Project: SPT HAMMER ENERGY
Project No.: 240021095
Boring No.: B-1

Date: 4/12/2024
Weather: 50's CLEAR
Drill Rod Type: AWJ

On-site Personnel

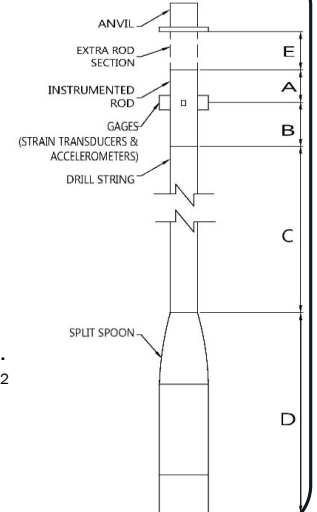
Drilling Company: BRECCIA CONSTRUCTION, LLC
 Rig Operator: L. GUEMPEL
 Engr/Geologist: N/A
 Client Rep.: N/A
 Analyzer Oper.: R. KRAL

Rig/Hammer Info

Drill Rig Make/Model: CME 550X
 Carrier Type: ATV
 Rig Serial No.: 294593
 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: 728AWJ
 Instr. Rod Outside Dia.: 1.75 in.
 Instr. Rod Area: 1.13 in²
 PDA Make/Model: SPT
 PDA Serial No.: 4553 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	728AWJ-1	224.65
	F4	728AWJ-2	224.14

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		
12-Apr	28.5 TO 30.0	0820/0821	30	33.6	59	3	6	9	15	Y	SA SI
12-Apr	33.5 TO 35.0	0825/0825	35	38.6	55	2	4	6	10	Y	SA SI
12-Apr	38.5 TO 40.0	0832/0832	40	43.6	56	3	5	9	14	Y	SA SI

Notes:

TESTING PERFORMED AT 1817 LOWRYS HIGHWAY IN CHESTER, SOUTH CAROLINA (CHESTER COUNTY). THE APPROXIMATE COORDINATES ARE 34.7704428, -81.2454626.

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)

4/12/2024
 Date



Figure No. 1: Rear View of Drill Rig



Figure No. 2: Side View of Drill Rig

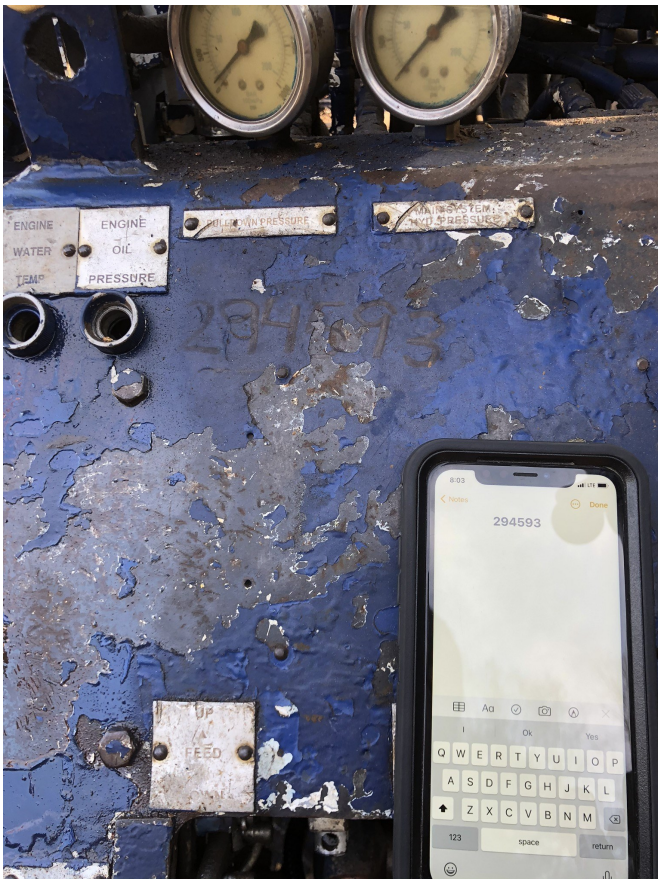


Figure No. 3: Serial Number Plate



Figure No. 4: Automatic Hammer



APPENDIX III

Certificate of Calibration

Pile Dynamics, Inc. certifies that the

Pile Driving Analyzer®, Model SPT

Serial Number: 4553 TB

was calibrated on 18 December 2023
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 [Signature]

Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, Ohio 44139 USA



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

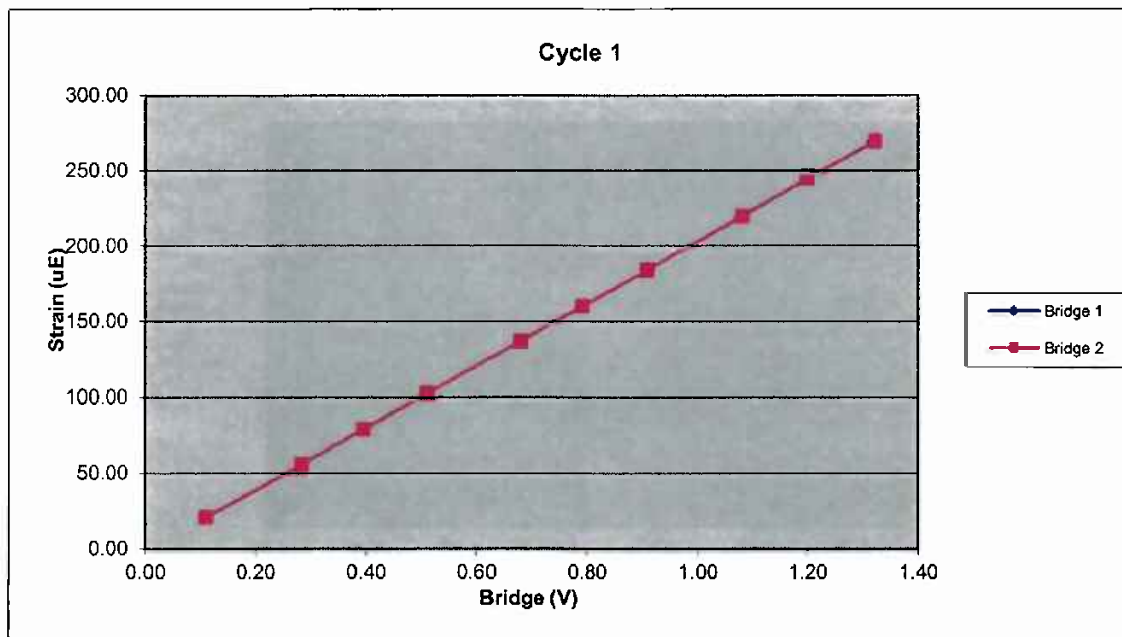


Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, Ohio 44139 USA

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 ($\mu\text{E/V}$)	205.90	Strain Calibration ($\mu\text{E/V}$)	205.73
Offset	-1.56	Offset	-1.48
Correlation	0.999995	Correlation	0.999996

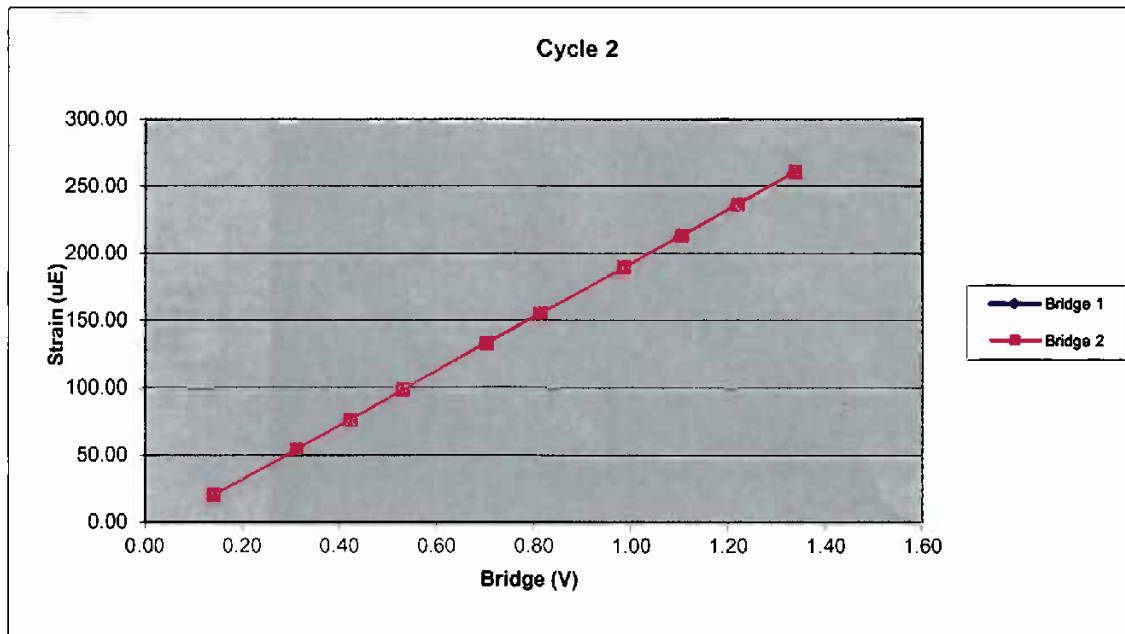
Force Strain Calibration	
EA (Kips)	35735.87
Offset	59.29
Correlation	0.999995



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 ($\mu\text{E/V}$)	200.83	Strain Calibration ($\mu\text{E/V}$)	200.40
Offset	-8.59	Offset	-8.44
Correlation	0.999997	Correlation	0.999996

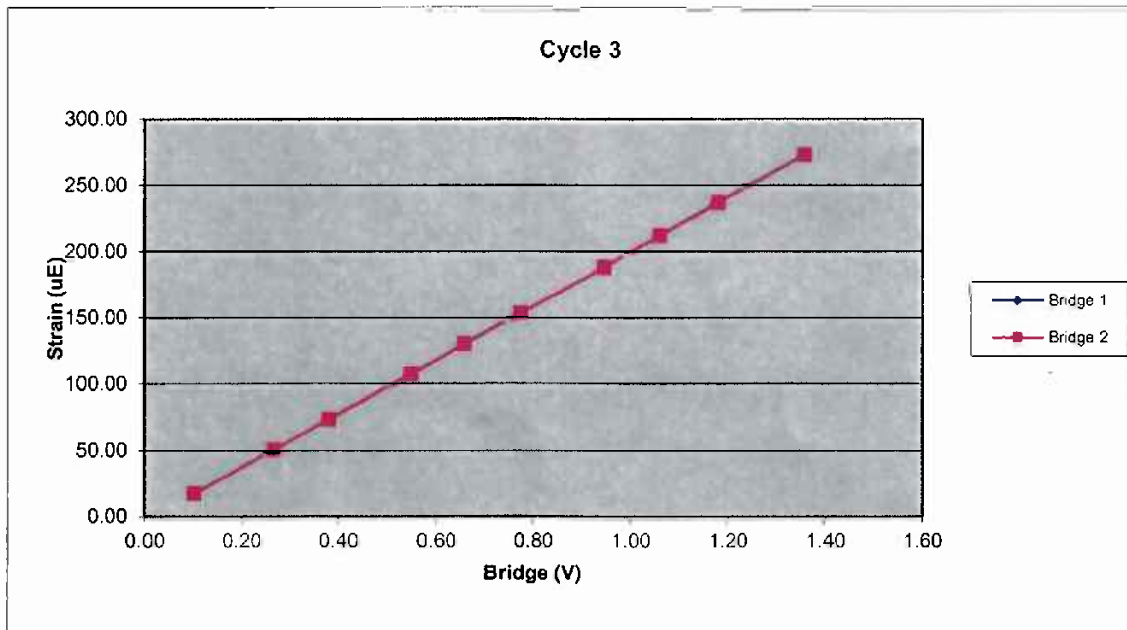
Force Strain Calibration	
EA (Kips)	36756.34
Offset	315.07
Correlation	0.999995



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 ($\mu\text{E/V}$)	203.51	Bridge 2 ($\mu\text{E/V}$)	203.28
EA Factor (Kips)	36213.85	Area (in^2)	1.21

Calibrated by:



Calibrated Date:

7/18/2022

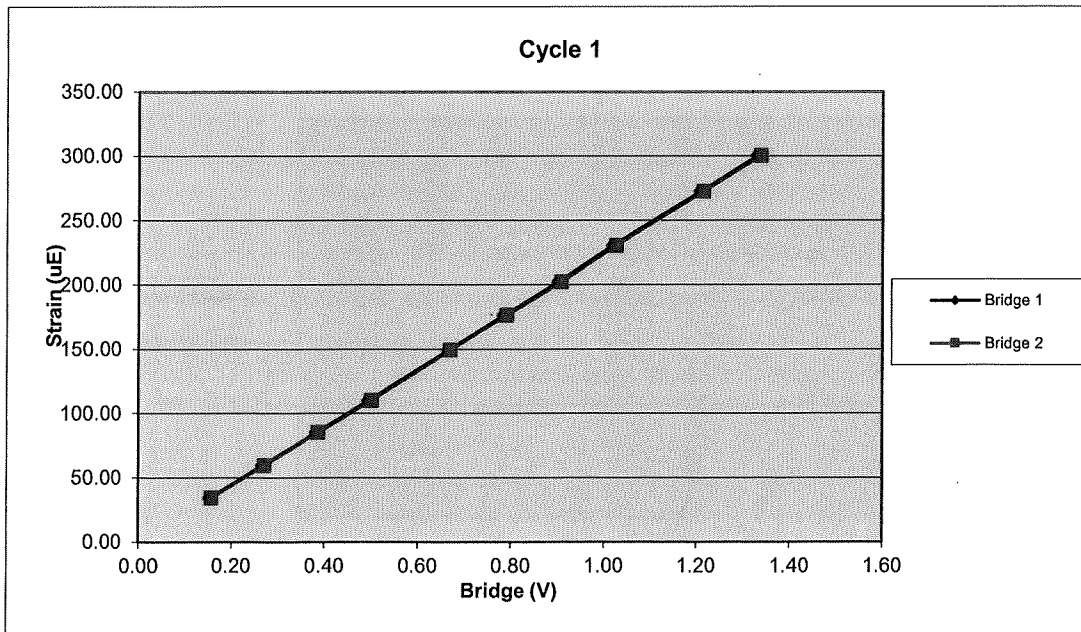
Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

728AWJ		Cycle 1		
Sample	Force (lb)	Strain (μ E)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	1199.06	34.33	0.16	0.16
3	2052.76	59.72	0.27	0.27
4	2924.20	85.27	0.38	0.39
5	3782.68	110.02	0.50	0.50
6	5074.34	149.22	0.67	0.67
7	5985.06	176.19	0.79	0.79
8	6869.47	202.19	0.90	0.91
9	7768.10	230.48	1.02	1.03
10	9202.28	272.31	1.21	1.22
11	10126.06	300.27	1.33	1.34

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7583.03	Force Calibration (lb/V)	7557.58
Offset	20.67	Offset	0.95
Correlation	1.000000	Correlation	0.999999
Strain Calibration (μ E/V)	226.02	Strain Calibration (μ E/V)	225.27
Offset	-1.27	Offset	-1.86
Correlation	0.999984	Correlation	0.999979

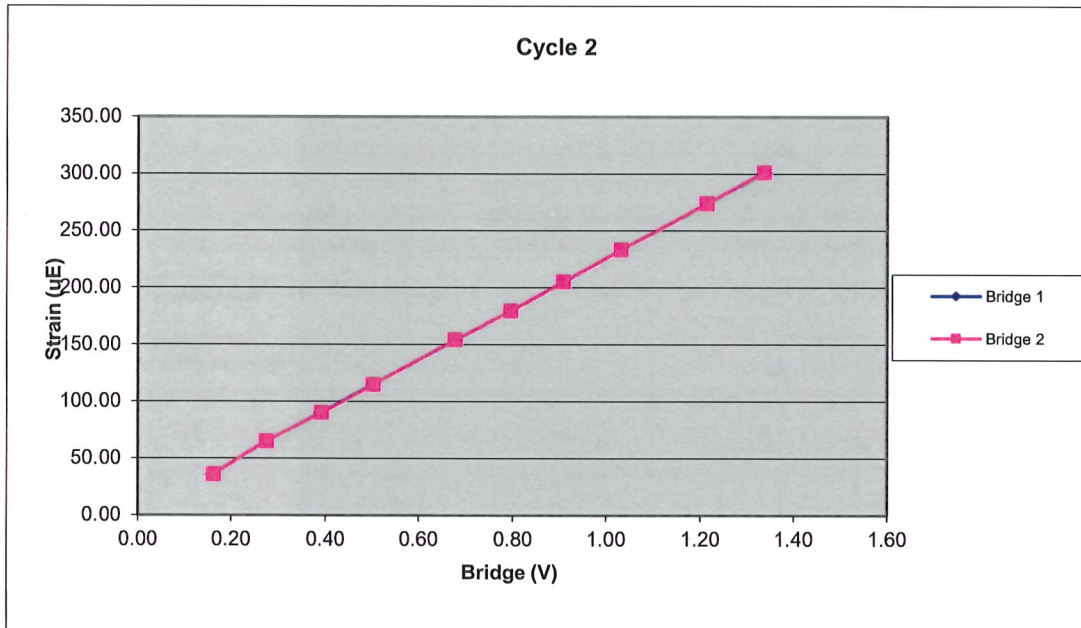
Force Strain Calibration	
EA (Kips)	33548.47
Offset	63.54
Correlation	0.999983



728AWJ		Cycle 2		
Sample	Force (lb)	Strain (μ E)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	1236.98	35.69	0.16	0.16
3	2108.61	64.71	0.28	0.28
4	2976.64	89.52	0.39	0.39
5	3811.14	114.45	0.50	0.50
6	5141.89	153.54	0.68	0.68
7	6032.24	178.92	0.80	0.80
8	6903.48	204.54	0.91	0.91
9	7825.42	232.64	1.03	1.03
10	9217.58	273.43	1.22	1.22
11	10151.02	300.79	1.34	1.34

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7561.16	Force Calibration (lb/V)	7576.28
Offset	14.33	Offset	4.68
Correlation	0.999997	Correlation	0.999995
Strain Calibration (μ E/V)	223.39	Strain Calibration (μ E/V)	223.84
Offset	1.55	Offset	1.27
Correlation	0.999945	Correlation	0.999943

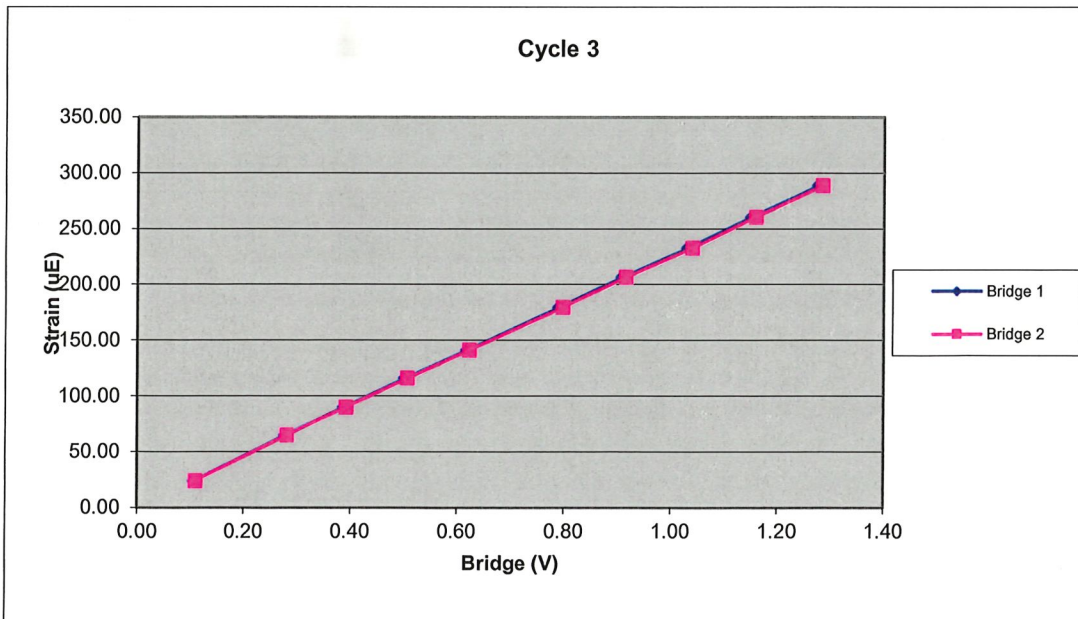
Force Strain Calibration	
EA (Kips)	33843.24
Offset	-37.68
Correlation	0.999950



728AWJ		Cycle 3		
Sample	Force (lb)	Strain (μE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	822.90	24.10	0.11	0.11
3	2132.69	64.89	0.28	0.28
4	2972.74	89.98	0.39	0.39
5	3841.65	115.75	0.50	0.51
6	4741.16	141.06	0.62	0.62
7	6043.35	179.33	0.79	0.80
8	6961.58	206.39	0.91	0.92
9	7901.94	232.60	1.03	1.04
10	8816.85	260.36	1.15	1.16
11	9759.65	288.75	1.28	1.29

Bridge 1		Bridge 2	
Force Calibration (lb/V)	7644.24	Force Calibration (lb/V)	7602.69
Offset	-5.25	Offset	-12.15
Correlation	0.999999	Correlation	0.999997
Strain Calibration ($\mu\text{E}/\text{V}$)	224.53	Strain Calibration ($\mu\text{E}/\text{V}$)	223.31
Offset	1.57	Offset	1.37
Correlation	0.999950	Correlation	0.999942

Force Strain Calibration	
EA (Kips)	34041.33
Offset	-58.11
Correlation	0.999945



Bridge Excitation (V) 5
Shunt Resistor (ohm) 60.4k

Calibration Factors	728AWJ		
Bridge 1 ($\mu\text{E/V}$)	224.65	Bridge 2 ($\mu\text{E/V}$)	224.14
EA Factor (Kips)	33811.01	Area (in^2)	1.13

Calibrated by: Sean Bannon
Calibrated Date: 2/6/2024

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]

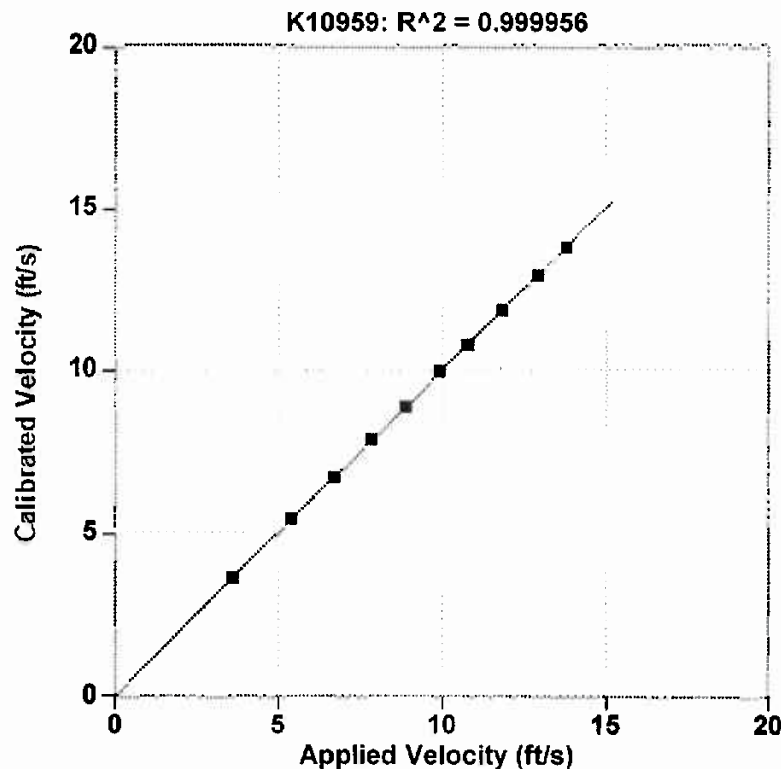
Ref Acc 1: 72517! Cal on: 24Mar2022
1049 g's/volt

Ref Acc 2: 72505! Cal on: 24Mar2022
1035 g's/volt

Operator: William Johnson


Signed

Reference accelerometer calibrations are traceable to
the United States National Institute of Standards and
Technology (NIST).



Reference Velocity	S/N K10959 Velocity
ft/s	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]

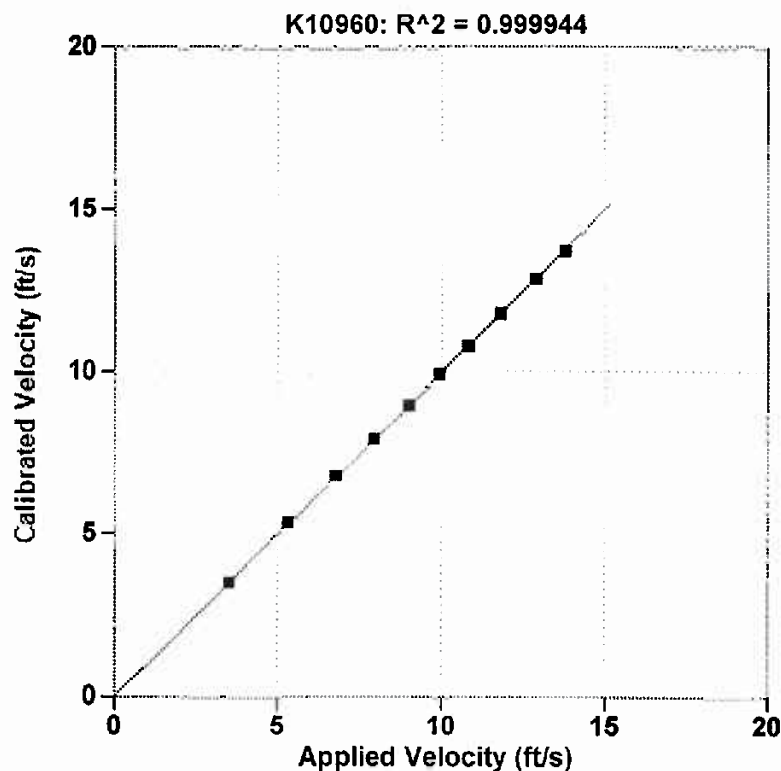
Operator: William Johnson

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	S/N K10960 Velocity
ft/s	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

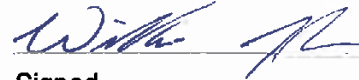
(81.9 μ v/g)

R²: 0.999919 [Chip programmed]

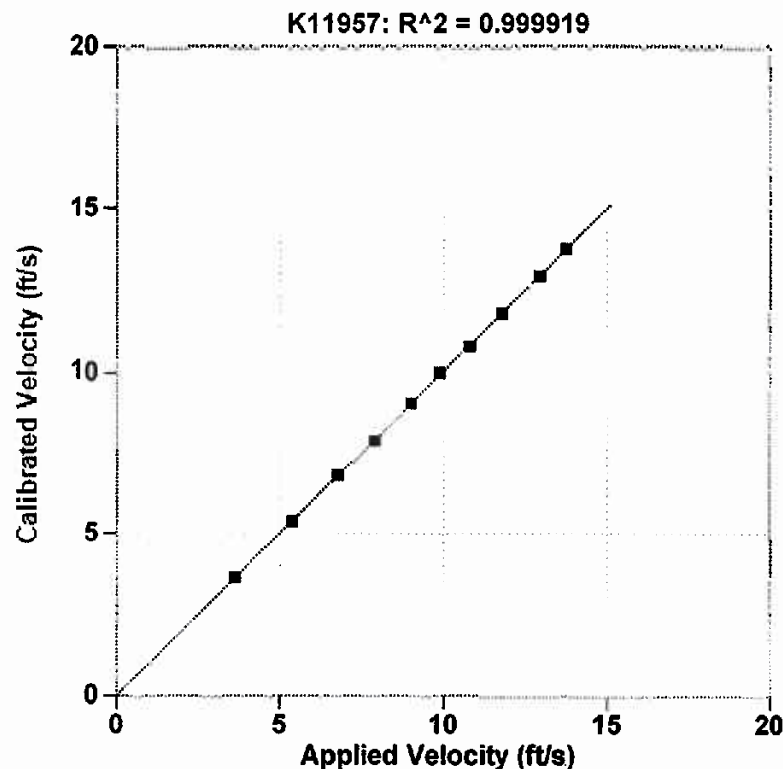
Operator: William Johnson

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 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

S-9-22 over Caw Caw Creek
Geotechnical Subsurface Data Report

APPENDIX

SECTION 9 GEOSCOPING FORM

GeoScoping Form

PROJECT INFORMATION	
Project ID: <u>NA</u>	Date of Trip: <u>12-20-12</u>
County: <u>Calhoun</u>	Location: <u>Caw Caw Swamp</u>
Rd/Route: <u>S-9-22</u>	Local Name: <u>Burke Rd.</u>
Attendees: <u>Drillers Helper Logger</u>	

EXISTING BRIDGE INFORMATION	
Bridge Length: <u>38</u>	Bridge Width:
Superstructure Type: <u>Box Culvert</u>	Substructure Type:
Begin Bridge Sta.:	End Bridge Sta.:
Begin Bridge Embankment Sta. ¹ :	End Bridge Embankment Sta. ¹ :
Structure Number: <u>970002200300</u>	Posted Weight Limit: <u>N/A</u>
Crossing:	Skew:
Latitude: <u>33.62291</u>	Longitude: <u>-80.88913</u>
Existing Fill Height:	Approximate Existing Slope Angle:

¹Begin and End Bridge Embankment 100 feet down station or up station from bridge, respectively

EXISTING ROADWAY EMBANKMENT INFORMATION	
Begin Project Sta.:	Begin Bridge Embankment Sta. ¹ :
Accessibility Issues: <u>Road Closure Signs / Blockage</u>	
Ground Cover:	
Existing Fill Height: <u>~6'</u>	Approximate Existing Slope Angle:
Local Development (undeveloped, developed residential, developed commercial, developed industrial, etc.): <u>undeveloped</u>	
Topography (level, flat, rolling, steep, hillside, valley, swamp, gully, etc.): <u>Swamp</u>	
Traffic Control Necessary (Y/N): <u>N</u>	
Surface Soil: <u>Y</u>	Muck (Y/N): <u>N</u>
Exposed Rock (Y/N): <u>N</u>	In Stream Bed (Y/N): <u>N</u> In Banks (Y/N): <u>N</u>
Wetlands On-Site (Y/N): <u>Y</u>	Wetlands Adjacent (Y/N):
Depth FG to Water:	Water Depth: <u>Y</u>
Depth to Existing Ground:	
Scour Condition at EB:	Scour Condition at IB:
End Bridge Embankment Sta. ¹ :	End Project Sta.:
Accessibility Issues: <u>Road Closure / Blockage</u>	
Ground Cover:	
Existing Fill Height: <u>~6'</u>	Approximate Existing Slope Angle:
Local Development (undeveloped, developed residential, developed commercial, developed industrial, etc.): <u>undeveloped</u>	
Topography (level, flat, rolling, steep, hillside, valley, swamp, gully, etc.): <u>Swamp</u>	
Traffic Control Necessary (Y/N): <u>N</u>	
Surface Soil: <u>Y</u>	Muck (Y/N): <u>N</u>
Exposed Rock (Y/N): <u>N</u>	In Stream Bed (Y/N): <u>N</u> In Banks (Y/N): <u>N</u>
Wetlands On-Site (Y/N): <u>Y</u>	Wetlands Adjacent (Y/N): <u>Y</u>
Depth FG to Water:	Water Depth:
Depth to Existing Ground:	
Scour Condition at EB:	Scour Condition at IB:

GeoScoping Form

UTILITIES INFORMATION	
Attached:	N/A
Above Ground/ Overhead:	Power
Underground:	Fiber optic / Water

COMMENTS	

Instructions:

1. Attach boring location plan for bridge and roadway.
2. Attach all photographs taken, photographs to be labeled as to direction looking in and what is being depicted.
3. Fill out GeoScoping Form as completely as possible, using additional sheets as necessary to describe site conditions.
4. If representative of GEC on site during GeoScoping, include GEC representative's name and contact number in Attendees block.

GeoScoping Photos



Buried Utilities Looking Northeast



Left Hand Side of Separated Culvert (Facing Northeast)

GeoScoping Photos



Overhead Power Lines Looking Northeast



S-9-22 Looking Northeast

GeoScoping Photos



Separated Culvert (Right Hand Side, Facing Northeast)



Separated Culvert Looking East