Geotechnical Subsurface Data Report (GSDR), Revision 1

US Highway 21 Bridge over Norfolk Southern Railroad
Interstate 77 Exit 26 – Scout Interchange
Blythewood, Richland County, South Carolina
SCDOT Project ID P042443
S&ME Project No. 23610178A

PREPARED FOR:
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February 5, 2024

February 5, 2024

RS&H, Inc.
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Charlotte, North Carolina 28203

Attention: Mrs. Jennifer Farino, P.E.

Reference: **Geotechnical Subsurface Data Report (GSDR), Revision 1**
US Highway 21 Bridge over Norfolk Southern Railroad
Interstate 77 Exit 26 – Scout Interchange
SCDOT Project ID P042443
Blythewood, Richland County, South Carolina
S&ME Project No. 23610178A

Dear Mrs. Farino:

The purpose of this report is to convey geotechnical information to RS&H and the South Carolina Department of Transportation (SCDOT) for use by a contractor and is typically used with design-build projects. Our services were performed in general accordance with the *Subcontract for Professional Services* between RS&H and S&ME, Inc. dated May 1, 2023, including the associated scope of services for geotechnical investigations in general accordance with the SCDOT *Geotechnical Design Manual* (GDM), dated January 2022.

S&ME, Inc. appreciates this opportunity to work with you as your geotechnical engineering consultant on this project. Please contact us at (803) 561-9024 if you have questions or need additional information regarding this report.

Sincerely,

S&ME, Inc.

John Lewis, P.E.
Project Engineer

Matt Cooke, P.G., P.E.
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1.0 Introduction

This report summarizes the results of the geotechnical investigation conducted for the proposed US-21 (Wilson Boulevard) bridge over a Norfolk Southern Railroad portion of the overall Interstate 77 Exit 26 – Scout Interchange project. The general vicinity of the bridge is shown on the *Site Location Plan*, attached as Figure 1 in Appendix I. Our scope of work relevant to the bridge and bridge embankment portion of the project included:

- Visits to the site by geotechnical personnel,
- Coordinating clearing activities for drill rig access,
- Coordinating drilling and coring activities,
- Performing geotechnical and geophysical subsurface investigations,
- Conducting laboratory testing,
- Preparing this report conforming to Section 21 of the GDM.

2.0 Project Description

Our understanding of the project is based on review of the following reports and drawings for the project provided by RS&H:

- Microstation file: P042443_DSN_LCS.dgn, dated June 12, 2023
- *Conceptual Roadway Plans Alternate 3,* prepared by RS&H, dated August 30, 2023
- Google Earth kmz file: P042443_DSN_ALT03_LCS.kmz, dated September 11, 2023
- *Conceptual US 21 BRO NSR Roadway Profile,* prepared by RS&H, dated August 30, 2023
- *I-77 Interchange and Connector Roads Construct US-21 Bridge over Palmetto Railroad/NSRR Spur*, Conceptual Bridge Plans, prepared by RS&H, dated December 11, 2023

From our review of the provided information, we understand the proposed US-21 bridge will be an approximately 135-foot long, single-span structure supported on two end bents. Driven steel H-piles are planned for support of the end bents. Due to the roughly 36 feet of fill necessary to raise the roadway alignment above the railroad alignment, mechanically stabilized earth (MSE) retaining walls of roughly 26 feet tall will support the bridge abutment embankments. The finished roadway configuration, consisting of the realigned US-21 (Wilson Boulevard), will consist of two outside shoulders, two travel lanes, one two-way left turn lane, and vertical barrier walls.

3.0 Objective

The objective of this project was to explore the subsurface conditions along the proposed bridge alignment as they pertain to the proposed improvements, and in conjunction with field and laboratory testing, to provide geotechnical data to be utilized for project design.

4.0 Subsurface Exploration Procedures

As requested, representatives of S&ME were present at the above-referenced site between July 19 and August 10, 2023, to conduct field activities for the project. The exploration included the following:

- Eighteen (18) Standard Penetration Test (SPT) borings – EB-1W through EB-4W, IB-1W through IB-4W, W-17 through W-24, EM-5, and EM-6, and
- One (1) Down-Hole Shear Wave Velocity Test – conducted in Boring EB-1W.

Testing was conducted at or near the proposed locations shown in the *Testing Location Plan* provided in Appendix I. Testing locations were modified as necessary due to utilities, terrain, to minimize traffic control impacts, and to facilitate safe working conditions.

4.1 Test Locations

The test locations were initially established in the field by representatives of S&ME using our handheld sub-meter GPS unit.

As-built survey of the testing locations was performed by CES Group Engineers, LLC (CES) under subcontract to RS&H. The approximate testing locations are shown on the *Testing Location Plan,* included as Figure 2 Appendix I. A summary of testing locations, including coordinates, elevation, alignment, station and offset are presented in Table 1, *Test Location Summary*, in Appendix II. Surveyed coordinates are tabulated in decimal degree latitude and longitude as well as South Carolina State Plan northing and easting.

It is important to note that the field boring layout was originally based on a three-span bridge structure with two interior bents. As the project evolved during and after our field exploration activities, the conceptual design is currently a single span structure as described above and as shown in the Conceptual Bridge Plans, dated December 11, 2023.

5.0 Exploration Procedures

The subsurface exploration for this project to date has included SPT borings, wireline rock coring and downhole shear wave velocity testing. The following sections summarize the general outline of each test. The field testing data is organized into appendices of this report as follows:

- Appendix III – Soil Test Boring and Rock Core Records
- Appendix IV – Rock Core Photographs
- Appendix V – Downhole Shear Wave Velocity Test Results
- Appendix X – SPT Hammer Energy Reports

5.1 Site Clearing

Clearing was performed by Palmetto State Land Management. under subcontract to S&ME, using a skid steer-mounted forestry grinder to create drill rig access pathways to several of the boring locations located in overgrown fields and wooded areas. Trails of approximately 12 to 15 feet wide were cleared with trees chipped in-place. No attempt was made to stack or remove downed trees from the site. Care was taken to limit site disturbance during this process.

5.2 Standard Penetration Test (SPT) Borings

Eighteen (18) soil test borings with SPT sampling were performed for the project using three (3) drill rigs during the exploration, as follows.

Table 5-1 – S&ME Drilling Equipment Summary

Rig Make/Model	Serial No.	Carrier Type	Average SPT Energy Transfer Ratio (ETR), %
CME-550X	290593	ATV	91.6%
CME-550X	293193	ATV	87.6%
CME-750X	322938	ATV	81.6%

SPT hammer energy measurements with a Pile Driving Analyzer (PDA) were performed by S&ME at off-site locations for the drill rigs used on the project in general accordance with ASTM D4633 *Standard Test Method for Energy Measurement for Dynamic Penetrometers*. The SPT Energy test results are provided in Appendix X. The N-values indicated on the logs are field values and were not corrected for overburden stress, rod length, borehole diameter or hammer efficiency. Hammer energy ratios are provided on the individual soil test boring records in Appendix III.

Soil test borings with SPT sampling were performed using mud rotary drilling techniques. The borings were performed to termination or drill bit refusal depths ranging from approximately 28.8 to 98.9 feet below the existing ground surface, followed by wireline rock coring where applicable.

Table 5-2 – SPT Boring Summary

Boring No.	Purpose
EB-1W	End Bent 1 Northbound
EB-2W	End Bent 1 Southbound
EB-3W	End Bent 2 Northbound
EB-4W	End Bent 2 Southbound
EM-5	East Roadway Embankment Northbound
EM-6	West Roadway Embankment Southbound
IB-1W	End Bent 2 Southbound
IB-2W	End Bent 2 Northbound
IB-3W	End Bent 1 Southbound
IB-4W	End Bent 1 Northbound
W-17	MSE Abutment Retaining Wall No. 1 Northbound
W-18	MSE Abutment Retaining Wall No. 1 Northbound
W-19	MSE Abutment Retaining Wall No. 1 Southbound
W-20	MSE Abutment Retaining Wall No. 1 Southbound

Boring No.	Purpose
W-21	MSE Abutment Retaining Wall No. 2 Northbound
W-22	MSE Abutment Retaining Wall No. 2 Northbound
W-23	MSE Abutment Retaining Wall No. 2 Southbound
W-24	MSE Abutment Retaining Wall No. 2 Southbound

Soil sampling and penetration testing were performed in general accordance with ASTM D1586 *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. SPT was performed continuously in the upper 10 feet in each end bent, abutment wall, and embankment boring, followed by approximate 5-foot centers, thereafter. The split-barrel sampler was opened at the drill site and sloughed material was identified and separated from the recovered sample. The recovered sample was visually described and classified by S&ME's rig geologist or engineer. A selected portion of the sample was placed in a sealed moisture-proof container. Where materials changed over the sample drive length, a sample of each material was retained. The containers were labeled and transported to the S&ME Columbia Office at the end of each workday.

Water level measurements were attempted immediately after completion of drilling and, where feasible, were repeated after a period of roughly 24 hours. We note that due to the use of drilling fluid additives in mud rotary borings, the water level readings recorded in the soil borings may not accurately reflect the ground water conditions at the site. Ground water readings were conducted in general accordance with ASTM D4750 *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*.

After ground water measurements were complete, the borings were backfilled with bentonite chips, auger cuttings, or clean fill to within 20 feet of the existing ground surface then abandoned with Portland cement/bentonite grout to the existing ground surface. Grout quantities were recorded, and grout logs are available upon request.

5.3 Wireline Rock Coring

At bridge boring location EB-1W, wireline rock coring was performed to a termination depth of 89.6 feet below the existing ground surface to explore the refusal materials in general accordance with ASTM D2113 *Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration*. Rock coring was performed using an NQ-size core barrel and wireline retrieval system. The recovered rock cores were visually logged by the S&ME rig geologist or engineer. The rock core samples were placed in cardboard core boxes and the boxes were labeled. Completed core boxes were transported to the S&ME Columbia Office at the end of each workday. The rock cores were preserved, handled, and transported in general accordance with ASTM D5079.

5.4 Shear Wave Velocity Test by Downhole Method

Upon completion of drilling activities for bridge boring EB-1W, flush-threaded schedule 40 PVC casing was installed, and the annulus grouted in place using a cement/bentonite grout mixture to support shear wave velocity testing.

On July 25, 2023, we performed a downhole seismic survey within boring EB-1W in general accordance with ASTM D7400 *Standard Test Methods for Downhole Seismic Testing*, using a Geometrics seismograph and 14 Hz downhole

triaxial geophone. Energy for the seismic survey was generated by a 16-pound sledgehammer striking the end of a wooden plank. Seismic velocities were obtained to a depth of about 85 feet using recorded depth intervals of 3 feet. Data analysis was conducted using the OYO Corporation's SeisImagerTM/SW software (PickwinTM) and the resulting shear wave velocity profile for EB-1W is presented in Appendix V. After completion of downhole shear wave velocity testing, the top of the PVC casing was cut flush with the ground surface and tremie grouted to the ground surface.

The results of the downhole testing at this bridge, as well as testing conducted at the Connector Road and Ramp BA bridges over I-77 were provided to the SCDOT Design/Build RPG for the purposes of establishing seismic design parameters for the overall project. The 3-Point Acceleration Design Response Spectrum (ADRS) provided by the SCDOT is included as Appendix IX.

Geophysical Limitations

Regardless of the thoroughness of a geophysical survey, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the method used and the method's limitations and data coverage. In addition, site activity (e.g., heavy traffic, etc.) and overhead powerlines can cause noise/interference in downhole seismic data sets.

6.0 Classification of Recovered Soil Samples

Recovered split-spoon samples were initially classified in general accordance with ASTM D2488 *Standard Practice for Description and Identification of Soils (Visual-Manual Method)*. After laboratory testing was completed, provisional field classifications were revised as necessary to provide a soil description that generally follows the terminology given by ASTM D2487 *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)* and AASHTO M145 *Recommended Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes*.

Interpreted subsurface conditions encountered by the SPT borings are shown on the boring records in Appendix III. These records represent our interpretation of the subsurface conditions based on the test data. Stratification lines on the boring records represent approximate boundaries between soil types; however, the actual transition may be gradual, and the thicknesses of the strata will vary across the site. The soil samples will be retained at our laboratory for a period of seven years, or until completion of substructure installation, whichever is earlier.

7.0 Classification of Recovered Rock Samples

Recovered rock core samples were reviewed and classified in general accordance with the SCDOT GDM Chapter 6, Section 6.3. Upon return to our laboratory, the rock core samples were reviewed and classified by a Professional Geologist (PG). Recovered cores examined in the laboratory were assigned descriptive terms using Tables 6-16 through 6-24 of the GDM where applicable to the rock type. Rock lithologic descriptions, and applicable descriptive information are included on the Soil Test Boring Records in Appendix III. Discontinuities in the recovered cores were evaluated using the terminology in GDM Tables 6-25 through 6-31. The results of the discontinuity examination are tabulated on the Soil Test Boring Records included in Appendix III. After logging, selected sections of rock core were removed and prepared for laboratory compressive strength testing. Photographs of the rock core are included in Appendix IV.

After laboratory testing was completed, the Geological Strength Index (GSI) and Rock Mass Rating (RMR) were computed in general accordance with Section 6.3.11 and 6.3.12 of the GDM. A summary of the rock core is tabulated on the gINT *Rock Coring Summary*, in Appendix II.

Interpreted subsurface conditions encountered during rock coring activities are shown on the boring records in Appendix III. These records represent our interpretation of the subsurface conditions based on the test data. Stratification lines on the boring records represent approximate boundaries between rock types; however, the actual transition may be gradual, and the thicknesses of the strata will vary across the site. The rock samples will be retained at our laboratory for a period of seven years, or until completion of substructure installation, whichever is earlier.

8.0 Laboratory Physical Tests

Laboratory testing consisting of index property testing and corrosion series testing was performed on selected split-spoon samples, while unconfined compressive strength testing was performed on selected rock core samples. The testing was performed in general accordance with ASTM or AASHTO test procedures as follows:

- Atterberg limits – ASTM D4318
- Particle-size distribution – ASTM D6913
- Percent-finer 200 sieve – ASTM D1140
- Natural moisture content – ASTM D2216
- Corrosion Series:
  - pH – AASHTO T289
  - Chloride – AASHTO T291
  - Sulfate – AASHTO T290
  - Resistivity – AASHTO T288
- Unconfined Compression – ASTM D7012

Tables summarizing the laboratory test results are provided in Appendix II as follows:

- gINT Summary of Laboratory Test Results
- gINT Rock Coring Summary

The laboratory test data sheets are organized into appendices of this report as summarized below:

- Appendix VI: Laboratory Test Data Sheets – Split-Spoon Samples (includes gINT Index Properties vs. Depth, Grain Size Distribution, and Atterberg Limits Results)
- Appendix VII: Laboratory Test Data Sheets – Rock Cores
- Appendix VIII: Laboratory Test Data Sheets – Corrosion Series Testing

Electronic data files, including gINT project files and the downhole seismic velocity data are included as Appendix XI.

9.0 Closing

This data report has been prepared in general accordance with procedures in SCDOT GDM Chapter 21 and with generally applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

We relied on project information given to us to develop our exploration program. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes.

This report presents data from a limited field exploration program. Subsurface conditions will vary widely between explored areas. Some variations may not become evident until further exploration or construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants or presence of any biological materials (mold, fungi, bacteria). If there is a concern about these items, other studies should be performed.

Appendices

Appendix I – Figures

SOURCE: USGS National Map

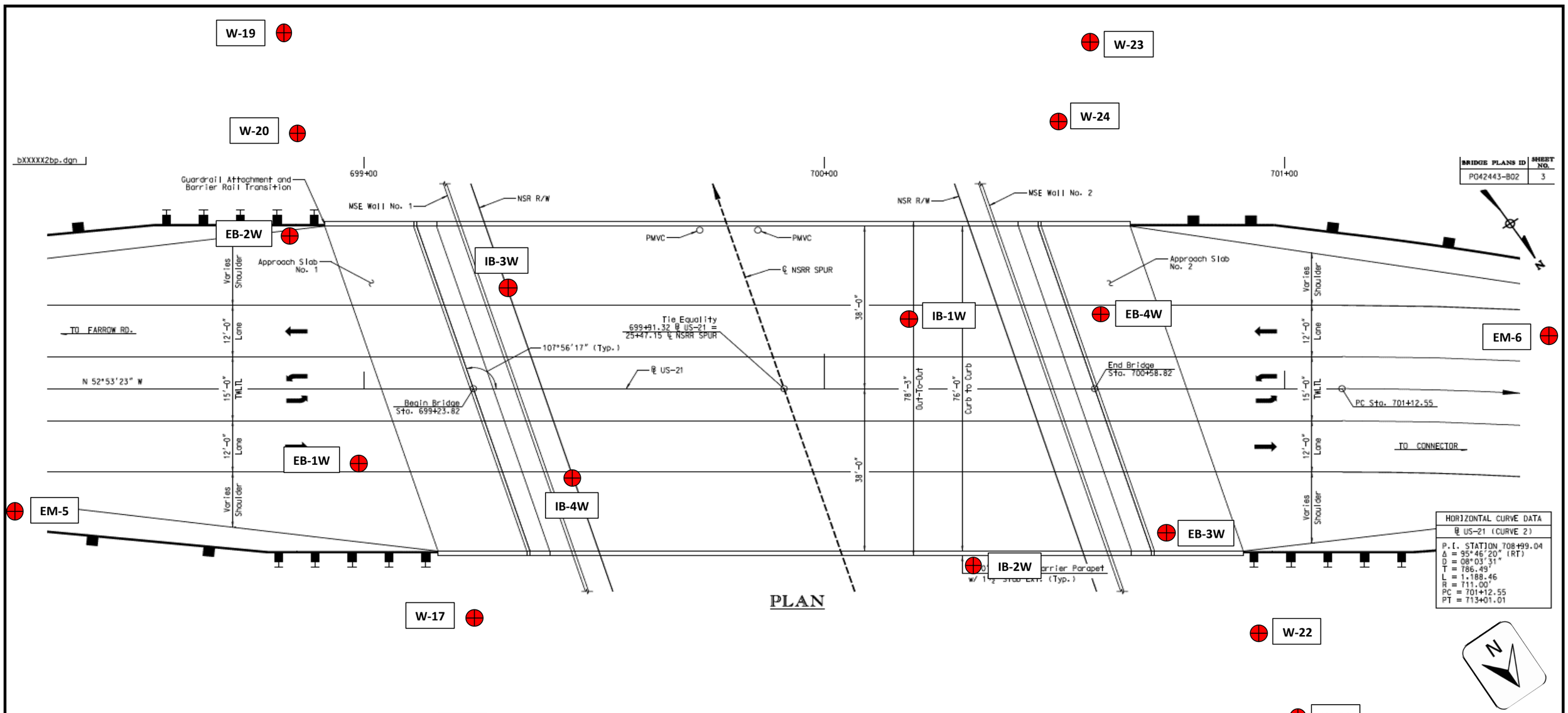
SITE LOCATION PLAN

JOB NAME:	US 21 Bridge over Norfolk Southern Railroad I-77 Exit 26 - Scout Interchange
CITY, STATE:	Blythewood, Richland County, South Carolina
S&ME PROJECT NO.:	23610178A

SCALE:	NTS	CHECKED BY:	JPL
DATE:	12/7/2023	DRAWN BY:	HMS

FIGURE NO.

1



PLAN

SPT Soil Test Boring - Approximate Location

SOURCE: Google Earth KMZ File: P042443_DSN_ALT03_LCS.kmz, dated 9/11/23 provided by RS&H, Inc.
Proposed Plans Construct US-21 Bridge over Palmetto Railroad/NSRR Spur, dated 12/11/2023, provided by RS&H, Inc.

Test Location Plan

JOB NAME:	US 21 Bridge over Norfolk Southern Railroad I-77 Exit 26 Interchange		FIGURE NO.
CITY, STATE:	Blythewood, Richland County, South Carolina		2
S&ME JOB NO.:	23610178A		
SCALE: NTS		CHECKED BY: JPL	
DATE: 1/10/2024		DRAWN BY: HMS	

Appendix II – Tables

Table 1: Boring Location Summary

Test ID	SC State Plane Northing (ft.)	SC State Plane Easting (ft.)	Latitude (degrees)	Longitude (degrees)	Elevation (ft-NAVD88)	Alignment	Station	Offset (ft)
EB-1W	857388.0	2008869.8	34.18986	-80.97067	445.3	US 21	698+96.89	16.3
EB-2W	857350.1	2008852.7	34.18976	-80.97073	445.0	US 21	698+87.73	-24.3
EB-3W	857496.8	2008738.7	34.19016	-80.97110	444.1	US 21	700+67.18	24.0
EB-4W	857457.8	2008721.5	34.19005	-80.97116	441.6	US 21	700+57.37	-17.5
IB- 1W	857433.1	2008758.2	34.18999	-80.97104	442.5	US 21	700+13.18	-15.1
IB- 2W	857481.5	2008774.8	34.19012	-80.97098	443.3	US 21	700+29.14	33.5
IB- 3W	857377.8	2008819.8	34.18983	-80.97083	443.7	US 21	699+30.66	-22.0
IB- 4W	857421.7	2008833.8	34.18996	-80.97079	443.7	US 21	699+46.01	21.4
EM- 5	857372.4	2008905.1	34.18982	-80.97055	446.0	US 21	698+59.42	25.1
EM- 6	857497.9	2008674.9	34.19016	-80.97131	444.1	US 21	701+18.53	-13.7
W-17	857428.4	2008875.9	34.18997	-80.97065	445.2	US 21	699+16.49	52.1
W-18	857454.4	2008881.8	34.19005	-80.97063	445.0	US 21	699+27.47	76.4
W-19	857302.3	2008827.9	34.18963	-80.97081	445.0	US 21	698+78.65	-77.3
W-20	857325.4	2008840.3	34.18969	-80.97077	445.4	US 21	698+82.72	-51.4
W-21	857550.8	2008740.4	34.19031	-80.97110	444.6	US 21	700+98.37	68.0
W-22	857531.2	2008739.2	34.19026	-80.97110	445.0	US 21	700+87.52	51.7
W-23	857411.8	2008681.3	34.18993	-80.97129	442.2	US 21	700+61.62	-78.5
W-24	857429.8	2008707.0	34.18998	-80.97121	442.2	US 21	700+52.06	-48.6

Notes: As-built coordinates and elevation provided by CES.
NA = NOT AVAILABLE

SUMMARY OF LABORATORY RESULTS

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
EB-1W	0.0	NP	NP	NP	4.75	19	SM	8.2			
EB-1W	2.0	46	36	10	4.75	37	SM	17.4			
EB-1W	4.0				4.75	30		17.3			
EB-1W	18.5	31	23	8	0.075	88	ML	14.6			
EB-1W	43.5	76	50	26	0.075	71	MH	31.3			
EB-1W	48.5				0.075	79		36.7			
EB-2W	0.0				4.75	16		7.6			
EB-2W	2.0	38	27	11	4.75	35	SM	15.9			
EB-2W	4.0				4.75	31		17.6			
EB-2W	8.0	26	17	9	4.75	20	SC	13.2			
EB-2W	18.5	28	16	12	0.075	81	CL	15.9			
EB-2W	43.5	72	47	25	0.075	89	MH	35.4			
EB-3W	0.0				9.5	19		8.7			
EB-3W	2.0	23	16	7	4.75	26	SC-SM	10.4			
EB-3W	18.5				9.5	12		22.4			
EB-3W	23.5				2	18		24.5			
EB-3W	28.5				2	23		31.3			
EB-4W	0.0				9.5	19		8.7			
EB-4W	2.0	30	18	12	9.5	27	SC	15.4			
EB-4W	4.0				4.75	25		14.5			
EB-4W	23.5				9.5	22		22.9			
EM- 5	0.0				4.75	16		6.6			
EM- 5	4.0	54	32	22	4.75	31	SM	16.7			
EM- 5	18.5				4.75	16		19.6			
EM- 6	0.0				9.5	16		7.4			
EM- 6	4.0	36	21	15	4.75	25	SC	17.1			
EM- 6	18.5	27	21	6	4.75	17	SC-SM	15.1			
EM- 6	23.5	37	27	10	2	49	SM	22.1			
IB- 1W	0.0	18	14	4	4.75	17	SC-SM	12.7			
IB- 1W	2.0				4.75	25		16.6			
IB- 1W	4.0				4.75	23		16.1			
IB- 1W	8.0				9.5	16		18.4			
IB- 1W	18.5	35	23	12	2	53	CL	23.1			
IB- 1W	68.5	55	33	22	0.075	78	MH	31.4			
IB- 2W	0.0				9.5	22		9.6			
IB- 2W	2.0	33	18	15	4.75	25	SC	13.9			
IB- 2W	4.0				4.75	21		16.8			
IB- 2W	13.5				9.5	12		18.3			
IB- 2W	19.3	40	24	16	4.75	57	CL	26.4			
IB- 2W	23.5	39	24	15	0.075	76	CL	23.1			
IB- 2W	63.5	62	36	26	0.075	75	MH	25.3			
IB- 3W	0.0				9.5	16		7.2			
IB- 3W	2.0	44	27	17	4.75	28	SM	15.8			

SUMMARY OF LABORATORY RESULTS

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
IB- 3W	4.0				4.75	19		15.2			
IB- 3W	6.0				4.75	32		15.9			
IB- 3W	8.0	NP	NP	NP	4.75	15	SM	18.2			
IB- 3W	13.5				4.75	13		18.1			
IB- 3W	43.5	69	38	31	0.075	86	MH	37.8			
IB- 3W	48.5				0.075	83		38.6			
IB- 4W	0.0				4.75	16		7.3			
IB- 4W	2.0	28	16	12	4.75	26	SC	14.0			
IB- 4W	4.0				4.75	29		13.7			
IB- 4W	6.0				4.75	25		12.3			
IB- 4W	8.0				4.75	30		16.9			
IB- 4W	13.5				9.5	17		17.3			
W-17	0.0				4.75	29		15.8			
W-17	2.0	48	33	15	0.075	34	SM	18.7			
W-17	8.0	24	17	7	0.075	14	SC-SM	15.3			
W-17	18.5	39	26	13	0.075	95	ML	18.2			
W-18	0.0				4.75	29		17.2			
W-18	2.0	39	25	14	0.075	27	SC	20.1			
W-18	8.0	33	19	14	0.075	42	SC	21.1			
W-18	13.5	45	29	16	0.075	54	ML	26.5			
W-19	0.0				4.75	17		7.5			
W-19	2.0	41	27	14	9.5	23	SM	10.7			
W-19	4.0				9.5	16		12.9			
W-20	0.0				4.75	16		5.6			
W-20	2.0				4.75	28		13.0			
W-20	13.5				4.75	37		20.7			
W-20	18.5	33	19	14	0.075	87	CL	16.7			
W-21	0.0				4.75	19		7.0			
W-21	4.0	30	21	9	0.075	31	SC	13.1			
W-21	8.0				9.5	14		15.3			
W-22	0.0				4.75	19		6.5			
W-22	4.0	45	23	22	0.075	25	SC	13.3			
W-22	18.5	53	30	23	9.5	17	SM	20.9			
W-23	0.0				4.75	14		6.2			
W-23	4.0	44	23	21	4.75	24	SC	12.5			
W-23	13.5				9.5	18		17.5			
W-24	0.0				4.75	14		7.0			
W-24	2.0	33	17	16	4.75	27	SC	14.0			
W-24	18.5				2	29		26.6			

Rock Coring Summary

PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

Borehole	Core Run Number	Core Run Top Depth	REC (%)	RQD (%)	q_u (psi)	Poisson's Ratio	Secant Modulus (ksi)	Unit Weight (pcf)	RMR	GSI
EB-1W	RC-1	71.6	90	43						
EB-1W	RC-2	74.6	54	22						
EB-1W	RC-3	79.6	100	64	6680	0.16	1790	155	30	25
EB-1W	RC-4	84.6	100	54	1204	0.56	2950	155	27	25

Appendix III – Soil Test Borings and Rock Core Records

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)

Fill

Asphalt

Concrete

Topsoil

Gravel

Sand

Silt

Clay

Organic

Silty Sand

Clayey Sand

Sandy Silt

Clayey Silt

Sandy Clay

Silty Clay

Partially Weathered Rock

BEDROCK

WATER LEVELS

(Shown in Water Level Column)

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

CONSISTENCY OF COHESIVE SOILS

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

RELATIVE DENSITY OF COHESIONLESS SOILS

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

TERMS

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

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

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

SCDOT Soil Test Log Descriptors

k **Rock Type**
Indicate type of rock encountered (i.e. granite, limestone, shale, slate, etc.)

l **Color**
Describe the sample color while sample is still moist, using Munsell color chart.

m **Texture**
Describe the nonfracture structural features. Stratification is the layering of sedimentary rock and foliation is the layering of metaphoric rock

Descriptive Term	Criteria
Very Thickly Bedded	> 1.0 m
Thickly Bedded	0.5 to 1.0 m
Thinly Bedded	50 to 500 mm
Very Thinly Bedded	10 to 50 mm
Laminated	2.5 to 10 mm
Thinly Laminated	< 2.5 mm

n **Grain Size and Shape**
Describe the size and shape of all visible grains, typically used on sedimentary rock.

Size

Descriptor	mm	Sieve size
Very coarse grained	> 4.75	Grain sizes greater than popcorn kernels
Coarse grained	2.00 – 4.75	Individual grains easy to distinguish by eye
Medium grained	0.425 – 2.00	Individual grains distinguished by eye
Fine grained	0.075 – 0.425	Individual grains distinguished with difficulty
Very Fine grained	< 0.075	Individual grains cannot be distinguished by unaided eye

Shape

Descriptive Term	Criteria
Angular	Shows little wear: edges and corners are sharp
Subangular	Shows definite effects of wear; edges and corners are slightly rounded off
Subrounded	Shows considerable wear; edges and corners are rounded to smooth curves
Rounded	Shows extreme wear; edges and corners are smoother to broad curves
Well-rounded	Completely worn; edges and corners are not present

o **Weathering / Alteration**
Weathering is the physical disintegration of the minerals by atmospheric processes. Alteration is disintegration of the minerals by geothermal processes.

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

Figure 6-16, SCDOT Soil Test Log Descriptors – Rock

SCDOT Soil Test Log Descriptors

p **Rock Strength**

Provide a qualitative assessment of the rock strength using either a geologic hammer or knife.

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

q **Strike and Dip**

Dip of fracture surface measured relative to horizontal with bearing and direction (i.e. N30°down, etc.)

r **Discontinuity Type**

F	-	Fault
J	-	Joint
Sh	-	Shear
Fo	-	Foliation
V	-	Vein
B	-	Bedding

s **Discontinuity Width (millimeters)**

W	-	Wide (12.5 – 50)
MW	-	Moderately Wide (2.5 – 12.5)
N	-	Narrow (1.25 – 2.5)
VN	-	Very Narrow (< 1.25)
T	-	Tight (0)

t **Amount of Infilling**

Su	-	Surface Stain
Sp	-	Spotty
Pa	-	Partially Filled
Fi	-	Filled
No	-	None

u **Type of Infilling**

Cl	-	Clay
Ca	-	Calcite
Ch	-	Chloride
Fe	-	Iron Oxide
Gy	-	Gypsum/Talc
H	-	Healed
No	-	None
Py	-	Pyrite
Qz	-	Quartz
Sd	-	Sand

v **Surface Shape of Joint**

Wa	-	Wavy
Pl	-	Planar
St	-	Stepped
Ir	-	Irregular

w **Discontinuity Spacing (feet)**

EW	Extremely Wide (> 65)
W	Wide (22 – 65)
M	Moderate (7.5 – 22)
C	Close (2 – 7.5)
VC	Very Close (< 2)

x **Roughness of Surface**

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

Figure 6-17, SCDOT Soil Test Log Descriptors – Rock (con't)

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**	698+96.89	**Offset:**	16.3	**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**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
	0.0	Field								
	0.5	**SURFACE MATERIAL** - TOPSOIL - 6 inches.		0.0	SS-1	1	1	2	4	3
		COASTAL PLAIN - very loose, moist, light reddish brown, Silty fine to medium SAND (SM) (A-2-4), little nonplastic fines, 5YR6/4. LL=NP, PL=NP, PI=NP, NMC=8%, %#200=19		2.0	SS-2	3	3	6	7	9
440.3		@1.8 feet - loose, yellowish red with light gray, (A-5(0)), some low plasticity fines, 5YR5/8, 5YR7/1. LL=46, PL=36, PI=10, NMC=17%, %#200=37		4.0	SS-3	3	5	7	13	12
		@4 feet - medium dense.		6.0	SS-4	16	19	18	25	37
		@6 feet - dense, yellowish red, 5YR5/8.								
		@7.2 feet - reddish yellow with pinkish gray, 7.5YR6/6, 7.5YR7/2.		8.0	SS-5	7	16	17	20	33
435.3		@9.2 feet - pink, 7.5YR8/4.								
		@12 feet - pinkish white, fine to coarse, 7.5YR8/2.								
	13.7			13.5						
	14.2	Hard, moist, pinkish white, Fat CLAY (CH), few fine to medium sands, 7.5YR8/2.			SS-6	10	16	17		33
430.3		Dense, wet, reddish yellow, Silty fine to coarse SAND (SM), some low plasticity fines, 7.5YR7/6.								
	17.0	@14.5 feet - white with reddish yellow, 7.5YR8/1, 7.5YR7/6.								
		Very stiff, moist, white with reddish yellow, SILT (ML) (A-4(7)), few fine to medium sands, 7.5YR8/1, 7.5YR6/8. LL=31, PL=23, PI=8, NMC=15%, %#200=88		18.5	SS-7	11	12	17		29
425.3										
				23.5						
	24.2				SS-8	22	50/5"			50/5"
420.3		Very dense, wet, white to reddish yellow, Silty fine to medium SAND (SM), some low plasticity fines, 5YR8/1, 5YR7/8.								

SPT N VALUE ● PL × MC ○ LL ×
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

Continued Next Page

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**	698+96.89	**Offset:**	16.3	**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**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
				28.5	SS-9	50/3"				50/3"
415.3										
	33.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, moist to wet, reddish yellow with pinkish white, SILT with Sand (ML), little fine to medium sands, 5YR7/8, 5YR8/2.		33.5	SS-10	20	33	50/4"		50/4"
410.3										
		@38.5 feet - reddish yellow with pinkish white and pale yellow, 5YR7/8, 5YR8/2, 2.5Y8/2.		38.5	SS-11	17	36	50/3"		50/3"
405.3										
	43.5	**PIEDMONT RESIDUUM** - very stiff, moist, reddish yellow with pale yellow, Sandy Elastic SILT (MH) (A-7-5(23)), some fine to medium sands, trace fine rock fragments, 5YR7/8, 2.5Y8/2. LL=76, PL=50, PI=26, NMC=31%, %#200=71		43.5	SS-12	5	8	11		19
400.3										
		@48.5 feet - stiff.		48.5	SS-13	4	6	8		14
395.3										
		@53.5 feet - hard, strong brown with light		53.5						

SPT N VALUE ● PL × MC ○ LL ×
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**	698+96.89	**Offset:**	16.3	**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**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
390.3		brown, 7.5YR4/6, 7.5YR6/8.			SS-14	10	18	25		43
	58.5			58.5						
		Dense, moist, greenish gray, Silty fine SAND (SM), some low plasticity fines, 10BG5/1.			SS-15	8	17	25		42
385.3										
	62.0	**PARTIALLY WEATHERED ROCK (PWR)** - very dense, moist, greenish gray, Silty fine to coarse SAND (SM), some low plasticity fines, 10BG5/1.		63.5	SS-16	50/5"				50/5"
380.3										
				68.5	SS-17	50/3"				50/3"
375.3										
	71.6	Tri-Cone Bit Refusal at 71.6 feet. Install casing to 60 feet for coring.		71.6						
		METAMORPHIC BEDROCK - ARGILLITE - light greenish gray with dark bluish gray, laminated, very fine grained, moderately weathered, weak to medium strong rock, 70ºdown, Sh, VN, Su, No, St-Ir, VC, R, 10G7/1, 10B4/1. Hardness: 2.5			RC-1					
	74.6			74.6						
370.3		@ 72.14 feet - mechanical break								
	75.9	@72.2 feet - quartz interbedding.			RC-2					
		@ 72.35 feet - joint: 135° down								
		@72.5 feet - absent quartz interbedding.								
		From 73.35 - 73.9 feet - joint: 93° down		79.6						
365.3		@ 73.9 feet - mechanical break								
		@ 74.05 feet - joint: 98° down								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

>>

>>

%REC=90, RQD=43, GSI=15-35

%REC=54, RQD=21, GSI=10-30

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**	698+96.89	**Offset:**	16.3	**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**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 / FINES CONTENT (%) / RQD (%) / REC (%)
		PARTIALLY WEATHERED ROCK (PWR) - very dense, dry to moist, light greenish gray and yellowish brown, Silty fine to coarse SAND with Gravel (SM), little fine to coarse gravel, little low plasticity fines, 10BG5/1 10YR5/8.			RC-3			%REC=100, RQD=64, GSI=25-40
360.3		**METAMORPHIC BEDROCK** - ARGILLITE - light greenish gray with dark bluish gray, laminated, very fine grained, moderately weathered, weak to medium strong rock, joint: 70° down, Sh, VN, Su, No, St-Ir, VC, R, 10G7/1, 10B4/1. Hardness: 2.5		84.6				
		@ 76.05 feet - joint: 135° down			RC-4			%REC=100, RQD=[illegible], GSI=25-35
		@ 76.65 feet - mechanical break						
		@ 76.85 feet - mechanical break						
	89.6	From 77.1 - 77.35 feet - mechanically broken						
355.3		@ 77.65 feet - joint: 121° down						
		From 77.8 - 78.1 feet - joints: 118°,109°,112° down						
		@ 78.1 feet - mechanical break						
		@79.6 feet - joint: 110° down, Qz, Sd, Pl-Ir.						
		@ 81.08 feet - mechanical break						
350.3		@ 81.25 feet - mechanical break						
		@ 82.2 feet - joint: 105° down						
		@ 82.4 feet - joint: 112° down						
		@ 83.8 feet - joint: 120° down						
		@ 84.3 feet joint: 116° down						
		@84.6 feet - No, Pl-Wa.						
		@ 84.8 feet - mechanical break						
345.3		@ 85 feet - mechanical break						
		@ 85.45 feet - mechanical break						
		@ 85.7 feet - joint: 109° down						
		@ 86.3 feet - joint: 114° down						
		@ 86.5 feet - joint: 115° down						
		@ 86.75 feet - mechanical break						
		@ 86.9 feet - joint: 121° down						
		@ 87.1 feet - mechanical break						
340.3		@ 87.5 feet - joint: 119° down						
		@ 88.25 feet - joint: 120° down						
		@ 88.5 feet - mechanical break						
		@ 88.75 feet - mechanical break						

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**	698+96.89	**Offset:**	16.3	**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**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 / FINES CONTENT (%) / RQD (%) / REC (%) (0 10 20 30 40 50 60 70 80 90)
		@ 88.75 feet - mechanical break @ 89.15 feet - mechanical break @ 89.5 feet - multiple mechanical breaks						
335.3		Boring Terminated at 89.6 feet.						
330.3								
325.3								
320.3								
315.3								

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+87.73	**Offset:**	-24.3	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 3 inches.		0.0	SS-1	1	2	1	2	3
		COASTAL PLAIN - very loose, moist, brown to light brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace roots, 7.5YR4/3, 7.5YR6/4. NMC=8%, %#200=16		2.0	SS-2	2	2	3	5	5
440.0		@2.5 feet - loose, moist to wet, brown with yellowish red and light gray, (A-2-6), some low plasticity fines, 7.5YR4/5, 5YR5/8, 5YR7/1. LL=38, PL=27, PI=11, NMC=16%, %#200=35		4.0	SS-3	2	4	6	9	10
	6.0	@4 feet - brown, light gray and yellowish red, (A-2-4), 7.5YR4/5, 5YR7/1, 5YR5/8. NMC=18%, %#200=31		6.0	SS-4	11	12	13	14	25
	8.0	Medium dense, moist to wet, layered brown with yellowish red and light gray, fine to medium SAND with Clay (SP-SC), few medium plasticity fines, 7.5YR4/5, 5YR5/8, 5YR7/1.		8.0	SS-5	9	5	10	16	15
435.0										
	13.5	Medium dense, moist to wet, light gray with very pale brown mottles, Clayey fine to medium SAND (SC) (A-2-4), little medium plasticity fines, 10YR7/2, 10YR8/4. LL=26, PL=17, PI=9, NMC=13%, %#200=20		13.5	SS-6	16	17	14		31
430.0		Dense, moist to wet, light gray and white, Poorly Graded fine to coarse SAND with Silt (SP-SM), few low plasticity fines, 10YR7/2, 10YR8/1.								
	18.5			18.5	SS-7	2	5	9		14
425.0		Stiff, moist, light gray with brownish yellow mottles, Lean CLAY with Sand (CL) (A-6(8)), little fine sands, 10YR7/2, 10YR6/8. LL=28, PL=16, PI=12, NMC=16%, %#200=81								
	23.5			23.5	SS-8	12	25	50/5"		50/5"
420.0		Very hard, dry to moist, light gray with brownish yellow, SILT (ML), trace fine to medium sands, 10YR7/2, 10YR6/8.								

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+87.73	**Offset:**	-24.3	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	28.5			28.5						
415.0		Very dense, moist to wet, light gray with brownish yellow mottles, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR7/2, 10YR6/8.			SS-9	29	33	50		83
	33.5			33.5						
410.0		**PIEDMONT RESIDUUM** - very hard, dry to moist, laminated yellow with white and very pale brown layers, Elastic SILT (MH), few fine to medium sands, 10YR8/6, 10YR8/1, 10YR8/3.			SS-10	13	26	48		74
		@38.5 feet - hard, dry, relict rock structure.		38.5	SS-11	9	14	20		34
405.0										
		@43.5 feet - very stiff, laminated brownish yellow with white mottles and very pale brown, (A-7-5(31)), 10YR6/8, 10YR8/1, 10YR8/3. LL=72, PL=47, PI=25, NMC=35%, %#200=89		43.5	SS-12	4	7	12		19
400.0										
		@48.5 feet - laminated red, strong brown and brownish yellow, 2.5YR4/6, 7.5YR5/8, 10YR6/8.		48.5	SS-13	7	10	14		24
395.0										
		@53.5 feet - dry to moist, few fine to coarse		53.5						

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+87.73	**Offset:**	-24.3	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	SPT N VALUE / PL MC LL / FINES CONTENT (%) / RQD (%) / REC (%) (0 10 20 30 40 50 60 70 80 90)
		sands.			SS-14	7	10	14		24	●
390.0											
	58.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, brownish yellow and strong brown laminated, SILT with Sand (ML), few fine to coarse sands, trace fine rock fragments, relict rock structure, 10YR6/8, 7.5YR5/8.		58.5	SS-15	49	50/3"			50/3"	>>
385.0											
		@63.5 feet - brownish yellow, gray and dark gray laminated, trace fine to coarse rock fragments, 10YR6/8, 7.5YR6/1, 7.5YR4/1.		63.5	SS-16	22	29	50/5"		50/5"	>>
380.0											
	68.5	Very hard, dry, laminated very dark gray, very dark greenish gray and yellowish brown, Sandy SILT (ML), some fine to medium sands, trace fine rock fragments, 10YR3/1, 10Y3/1, 10YR5/4.		68.5	SS-17	39	50/4"			50/4"	>>
375.0											
	73.5	Very hard, dry, dark greenish gray with dark gray and white mottles, Sandy SILT with gravel (ML), some fine to medium sands, little fine gravel, 10Y4/1, 4/N, 10YR8/1.		73.5	SS-18	36	50/5"			50/5"	>>
370.0											
				78.5	SS-19	50/3"				50/3"	>>
365.0											

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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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+87.73	**Offset:**	-24.3	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" / 2nd 6" / 3rd 6" / 4th 6"	N Value
360.0				83.5	SS-20	50/5"	50/5"
				88.5	SS-21	50/5"	50/5"
355.0		@88.5 feet - little fine to coarse rock fragments.					
				93.5	SS-22	50/2"	50/2"
350.0							
	98.5			98.5	SS-23	50/3"	50/3"
	98.8	Very dense, dry to moist, dark greenish gray with dark gray and white, Silty fine to coarse SAND with Gravel (SM), some low plasticity fines, little fine gravel, 10Y4/1, 4/N, 10YR8/1.					
345.0		Boring Terminated at 98.8 feet.					
340.0							

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+67.18	**Offset:**	24.0	**Alignment:**	Proposed
Elev.:	444.1 ft	**Latitude:**	34.19016206	**Longitude:**	-80.9711029	**Date Started:**	7/25/2023
Total Depth:	98.9 ft	**Soil Depth:**	98.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.6 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Wooded								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 3 inches.		0.0	SS-1	1	2	2	3	4
	2.0	**COASTAL PLAIN** - loose, dry to moist, light olive brown, Silty fine to medium SAND (SM), some low plasticity fines, trace roots, 2.5Y5/4.		2.0	SS-2	3	6	8	10	14
	4.0	Medium dense, dry to moist, light olive brown, Silty, Clayey fine to medium SAND (SC-SM) (A-2-4), some medium plasticity fines, 2.5Y5/6, 2.5Y5/4. LL=23, PL=16, PI=7, NMC=10%, %#200=26		4.0	SS-3	3	12	18	21	30
439.1		Dense, moist, mottled light gray, yellow and olive brown, Silty fine to medium SAND (SM), little low plasticity fines, trace fine gravel, 2.5Y7/2, 2.5Y8/6, 2.5Y4/4.		6.0	SS-4	13	21	28	37	49
		@6 feet - dense, moist to wet, pale brown, absent gravel, 2.5Y8/2, 2.5Y8/4.		8.0	SS-5	5	24	28	29	52
434.1		@8 feet - very dense, white, pale brown and brownish yellow, 2.5Y8/1, 2.5Y8/3, 10YR6/8.								
		@13.5 feet - dense, brownish yellow and yellow, fine to coarse, 10YR6/8, 2.5Y8/6.		13.5	SS-6	17	18	23		41
429.1										
		@18.5 feet - medium dense, wet, white, fine to medium, trace fine gravel, trace mica, 2.5Y8/1.		18.5	SS-7	8	13	11		24
424.1										
		@23.5 feet - moist to wet, micaceous, absent gravel.		23.5	SS-8	5	9	9		18
419.1										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+67.18	**Offset:**	24.0	**Alignment:**	Proposed
Elev.:	444.1 ft	**Latitude:**	34.19016206	**Longitude:**	-80.9711029	**Date Started:**	7/25/2023
Total Depth:	98.9 ft	**Soil Depth:**	98.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.6 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
				28.5						
					SS-9	4	6	10		16
414.1										
				33.5						
		@33.5 feet - dense, wet, yellow, brownish yellow and white, fine to coarse, absent mica, 10YR8/8, 10YR6/8, 10YR8/1.			SS-10	24	17	21		38
409.1										
	38.5			38.5						
		PARTIALLY WEATHERED ROCK (PWR) - very dense, dry, pale brown, white and yellow, Silty fine to medium SAND (SM), some low plasticity fines, 2.5Y8/2, 2.5Y8/1, 2.5Y8/8.			SS-11	17	50/4"			50/4"
404.1										
				43.5						
		@43.5 feet - pale brown, yellow and dark olive brown, fine to coarse, 2.5Y8/2, 2.5Y8/8, 2.5Y3/3.			SS-12	17	38	50/3"		50/3"
399.1										
				48.5						
		@48.5 feet - pale brown and yellow, 2.5Y8/2, 2.5Y8/6.			SS-13	14	31	50/4"		50/4"
394.1										
				53.5						
		@53.5 feet - yellow, olive yellow and dark								

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

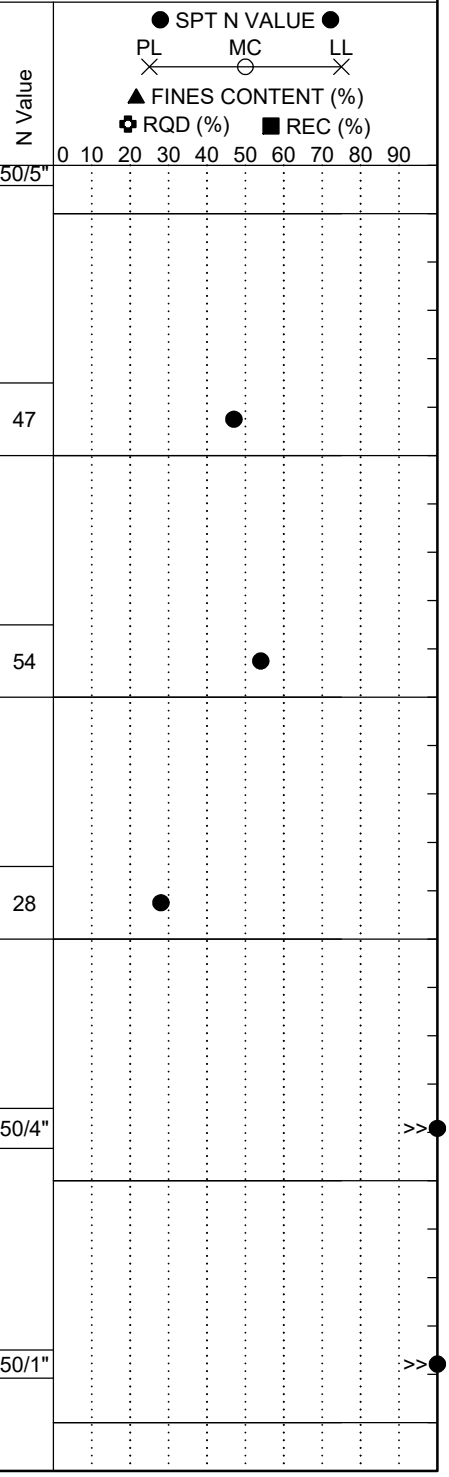
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+67.18	**Offset:**	24.0	**Alignment:**	Proposed
Elev.:	444.1 ft	**Latitude:**	34.19016206	**Longitude:**	-80.9711029	**Date Started:**	7/25/2023
Total Depth:	98.9 ft	**Soil Depth:**	98.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.6 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
		gray, 2.5Y8/6, 2.5Y6/8, 2.5Y4/1.			SS-14	21 50/5"	50/5"
389.1							
	58.5	**PIEDMONT RESIDUUM** - dense, dry, red and olive yellow, Silty fine to coarse SAND (SM), some low plasticity fines, 2.5Y5/6, 2.5Y6/8.		58.5	SS-15	10 19 28	47
384.1							
	64.0	Very hard, dry, brownish yellow with white and dark yellowish brown mottles, Sandy SILT (ML), some fine to medium sands, 10YR6/8, 10YR8/1, 10YR4/4.		63.5	SS-16	16 21 33	54
379.1							
	68.5	Very stiff, dry to moist, light gray, SILT with Sand (ML), little fine to medium sands, 5Y7/1.		68.5	SS-17	7 12 16	28
	69.5						
374.1		Very stiff, dry, light gray, Sandy SILT (ML), some fine to medium sands, 5Y7/1.					
	73.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, gray, Sandy SILT (ML), some fine to medium sands, trace mica, 5Y6/1.		73.5	SS-18	42 50/4"	50/4"
369.1							
	78.5	Very dense, dry to moist, olive, Silty fine to coarse SAND (SM), some low plasticity fines, few fine to coarse weathered rock fragments, 5Y4/3.		78.5	SS-19	31 50/1"	50/1"
364.1							



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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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+67.18	**Offset:**	24.0	**Alignment:**	Proposed
Elev.:	444.1 ft	**Latitude:**	34.19016206	**Longitude:**	-80.9711029	**Date Started:**	7/25/2023
Total Depth:	98.9 ft	**Soil Depth:**	98.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.6 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
		@83.5 feet - gray and olive gray, 5Y6/1, 5Y5/2, poor recovery.		83.5	SS-20	50/1"				50/1"
359.1										
				88.5	SS-21	50/2"				50/2"
354.1										
	93.5	**PIEDMONT RESIDUUM** - very dense, dry to moist, olive and dark gray, Silty fine to coarse SAND with Gravel (SM), some low plasticity fines, little fine to coarse rock fragments, 5Y4/4, 5Y4/1.		93.5	SS-22	24	32	45		77
349.1										
	98.5			98.5	SS-23	50/5"				50/5"
	98.9	**PARTIALLY WEATHERED ROCK (PWR)** - very dense, dry, olive and dark gray, Silty fine to coarse SAND (SM), some low plasticity fines, few fine weathered rock fragments, 5Y4/4, 5Y4/1.								
344.1		Boring Terminated at 98.9 feet.								
339.1										

SPT N VALUE: PL, MC, LL
FINES CONTENT (%)
RQD (%) REC (%)
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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+57.37	**Offset:**	-17.5	**Alignment:**	Proposed
Elev.:	441.6 ft	**Latitude:**	34.19005493	**Longitude:**	-80.97115981	**Date Started:**	7/26/2023
Total Depth:	98.7 ft	**Soil Depth:**	98.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/27/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Wooded								
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1 inch.		0.0	SS-1	1	2	2	3	4
	2.5	**COASTAL PLAIN** - very loose, dry to moist, very pale brown, Silty fine to medium SAND (SM), little low plasticity fines, trace organics, 10YR7/3.		2.0	SS-2	2	1	3	5	4
436.6		Loose, moist to wet, yellowish brown and light gray, Clayey fine to medium SAND (SC) (A-2-6), some low plasticity fines, 10YR5/6, 10YR7/1. LL=30, PL=18, PI=12, NMC=15%, %#200=27		4.0	SS-3	5	6	9	16	15
	6.0	@4 feet - medium dense, moist, light gray and yellowish brown, absent organics, 10YR7/1, 10YR5/6.		6.0	SS-4	28	43	50/5"		50/5"
		Very dense, moist to wet, yellow and brownish yellow, Silty fine to coarse SAND (SM), little low plasticity fines, 10YR7/8, 10YR6/8.		8.0	SS-5	13	18	18	20	36
431.6		@8 feet - dense, very pale brown and yellow, fine to coarse, 10YR7/4, 10YR7/6.								
		@13.5 feet - yellow, 10YR8/8, 10YR7/8.		13.5	SS-6	11	17	19		36
426.6										
		@18.5 feet - medium dense, wet, mottled very pale brown and yellow, trace mica, 10YR8/2, 10YR8/6.		18.5	SS-7	6	12	14		26
421.6										
	23.5			23.5						
	24.0	Medium dense, wet, white, Silty fine to coarse SAND with Gravel (SM) (A-2-4), little fine gravel, little low plasticity fines, trace mica, 10YR8/1. NMC=23%, %#200=22			SS-8	6	5	6		11
416.6		Medium dense, dry to moist, white, Silty								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90 >>

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+57.37	**Offset:**	-17.5	**Alignment:**	Proposed
Elev.:	441.6 ft	**Latitude:**	34.19005493	**Longitude:**	-80.97115981	**Date Started:**	7/26/2023
Total Depth:	98.7 ft	**Soil Depth:**	98.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/27/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
		fine SAND (SM), little low plasticity fines, micaceous, 10YR8/1.								
	28.5			28.5	SS-9	50/3"				50/3"
411.6		Very hard, dry to moist, mottled very pale brown and yellow, Sandy Silt (ML), some fine to medium sands, 10YR8/2, 10YR8/8.								
	33.5			33.5	SS-10	50/5"				50/5"
406.6		Very dense, wet, very pale brown and yellow, Silty fine to coarse SAND (SM), some low plasticity fines, 10YR8/2, 10YR8/6.								
	38.5			38.5	SS-11	12	28	50/3"		50/3"
401.6		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, white, very pale brown and yellow, Sandy SILT (ML), some fine to medium sands, 10YR8/1, 10YR8/2, 2.5Y8/6.								
	43.5			43.5	SS-12	22	50/4"			50/4"
396.6		Very dense, dry to moist, white, very pale brown and yellow, Silty fine to coarse SAND (SM), some low plasticity fines, 10YR8/1, 10YR8/2, 2.5Y8/6.								
		@48.5 feet - dry.		48.5	SS-13	18	50	50/2"		50/2"
391.6										
				53.5						

SPT N VALUE: PL MC LL; ▲ FINES CONTENT (%); ✿ RQD (%) ■ REC (%); 0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+57.37	**Offset:**	-17.5	**Alignment:**	Proposed
Elev.:	441.6 ft	**Latitude:**	34.19005493	**Longitude:**	-80.97115981	**Date Started:**	7/26/2023
Total Depth:	98.7 ft	**Soil Depth:**	98.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/27/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
386.6					SS-14	29 50/3"	50/3"
				58.5			
		@58.5 feet - pale brown and yellow, 2.5Y8/4, 2.5Y8/6.			SS-15	47 50/2"	50/2"
381.6							
				63.5			
		@63.5 feet - pale brown and yellow, 2.5Y8/4, 2.5Y8/8.			SS-16	29 50/4"	50/4"
376.6							
	68.5			68.5			
		PIEDMONT RESIDUUM - very dense, dry, yellow, Silty fine to medium SAND (SM), some low plasticity fines, 2.5Y8/8, 2.5Y7/8.			SS-17	9 22 46	68
371.6							
				73.5			
		@73.5 feet - dense, dry to moist, yellow and white, 2.5Y8/8, 2.5Y7/8, 2.5Y8/1.			SS-18	10 17 23	40
366.6							
	78.5			78.5			
		Hard, dry, light gray and white, Sandy SILT (ML), some fine to medium sands, trace pyrite, 5Y8/1, 5Y7/2.			SS-19	10 16 24	40
361.6							

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+57.37	**Offset:**	-17.5	**Alignment:**	Proposed
Elev.:	441.6 ft	**Latitude:**	34.19005493	**Longitude:**	-80.97115981	**Date Started:**	7/26/2023
Total Depth:	98.7 ft	**Soil Depth:**	98.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/27/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.3 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
				83.5	SS-20	13 16 29	45
356.6							
	88.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, gray and light gray, Sandy SILT (ML), some fine to coarse sands, 5Y6/1, 5Y7/2.		88.5	SS-21	27 50/5"	50/5"
351.6							
	93.5	Very dense, dry to moist, light gray and pale yellow, Silty fine to coarse SAND (SM), some low plasticity fines, trace pyrite, 5Y7/2, 5Y7/4.		93.5	SS-22	17 41 50/3"	50/3"
346.6							
	98.7	@98.5 feet - white and pale yellow, 5Y8/1, 5Y8/3, 5Y8/4.		98.5	SS-23	50/2"	50/2"
341.6		Boring Terminated at 98.7 feet.					
336.6							

PL MC LL

▲ FINES CONTENT (%)

✿ RQD (%) ■ REC (%)

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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM- 5
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+59.42	**Offset:**	25.1	**Alignment:**	Proposed
Elev.:	446.0 ft	**Latitude:**	34.18981995	**Longitude:**	-80.97055295	**Date Started:**	7/28/2023
Total Depth:	28.9 ft	**Soil Depth:**	28.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/28/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 4 inches		0.0	SS-1	1	1	2	3	3
		COASTAL PLAIN - very loose, moist, light yellowish brown and brown, Silty fine to medium SAND (SM), some medium plasticity fines, trace roots, 10YR6/3, 10YR4/3.		2.0	SS-2	4	3	3	4	6
		@3 feet - loose, moist, yellowish brown, 10YR5/6.		4.0						
441.0					SS-3	4	6	8	11	14
	6.0	@4 feet - medium dense, yellowish brown, red and gray, (A-2-7(2)), some medium plasticity fines, 10YR5/6, 2.5YR5/8, 5YR6/1. LL=54, PL=32, PI=22, NMC=17%, %#200=31		6.0	SS-4	12	17	21	19	38
	8.0	Dense, moist, yellowish red, yellowish brown and gray, Poorly Graded fine to coarse SAND with Clay (SP-SC), few medium plasticity fines, 5YR5/8, 10YR5/6, 5YR6/1.		8.0	SS-5	17	19	26	28	45
436.0										
		Dense, moist, yellowish red, very pale brown and gray, Silty fine to medium SAND (SM), some low plasticity fines, 5YR5/8, 10YR7/4, 5YR6/1.		13.5						
	14.0									
	14.5	Medium dense, moist, very pale brown and pink, Clayey fine to medium SAND (SC), some medium plasticity fines, 10YR8/3, 2.5YR8/3.			SS-6	4	6	13		19
431.0	15.0									
		Very stiff, dry to moist, white with red mottles, Lean CLAY with Sand (CL), little fine sands, 5YR8/1, 10R4/6.		18.5						
		Medium dense, moist to wet, white and light gray with yellow mottles, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 10YR8/1, 10YR7/1, 10YR7/6. NMC=20%, %#200=16			SS-7	8	7	4		11
426.0										
	23.5			23.5						
		Very hard, dry, light gray with brownish yellow mottles, SILT (ML), trace fine sands, 10YR7/1, 10YR6/8.			SS-8	11	26	50/5"		50/5"
421.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

Continued Next Page

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM- 5
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+59.42	**Offset:**	25.1	**Alignment:**	Proposed
Elev.:	446.0 ft	**Latitude:**	34.18981995	**Longitude:**	-80.97055295	**Date Started:**	7/28/2023
Total Depth:	28.9 ft	**Soil Depth:**	28.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/28/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
	28.5			28.5			
	28.9	Very dense, moist to wet, light gray and dark gray with brownish yellow mottles, Silty fine to coarse SAND (SM), some low plasticity fines, 10YR7/2, 10YR4/1, 10YR6/8.			SS-9	50/5"	50/5"
416.0		Boring Terminated at 28.9 feet.					
411.0							
406.0							
401.0							
396.0							

● SPT N VALUE ●
PL MC LL
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM- 6
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	701+18.53	**Offset:**	-13.7	**Alignment:**	Proposed
Elev.:	444.1 ft	**Latitude:**	34.19016489	**Longitude:**	-80.97131374	**Date Started:**	8/2/2023
Total Depth:	28.8 ft	**Soil Depth:**	28.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/2/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	4.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.		0.0	SS-1	1	1	2	4	3
	2.5	**COASTAL PLAIN** - very loose, dry to moist, light olive brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace organics, 2.5Y5/4. NMC=7%, %#200=16		2.0	SS-2	2	4	4	5	8
439.1		Loose, dry to moist, strong brown and light olive brown, Clayey fine to medium SAND (SC), some medium plasticity fines, 7.5YR5/8, 2.5Y5/3.		4.0	SS-3	7	8	12	16	20
	6.0	@4 feet - grayish brown, strong brown and yellowish red, (A-2-6(1)), 2.5Y5/2, 7.5YR5/8, 5YR5/8. LL=36, PL=21. PI=15, NMC=17%, %#200=25		6.0	SS-4	16	30	50/5"		50/5"
				8.0						
		Very dense, moist, yellowish brown and pale brown, Silty fine to medium SAND (SM), little low plasticity fines, 10YR5/4, 10YR6/3.			SS-5	6	34	49	50/5"	83
434.1		@7.5 feet - strong brown, fine to coarse, 7.5YR5/8.								
		@8 feet - moist to wet, brownish yellow and reddish yellow, 10YR6/6, 5YR7/6.								
		@13.5 feet - dense, white, yellow and strong brown, fine to coarse, 7.5YR8/1, 10YR8/6, 7.5YR5/8.		13.5	SS-6	13	20	27		47
429.1										
	18.5	Dense, moist, white, Silty, Clayey fine to medium SAND (SC-SM) (A-1-b), little low plasticity fines, trace mica, 10YR8/1. LL=27, PL=21, PI=6, NMC=15%, %#200=17		18.5	SS-7	6	19	24		43
424.1		@19 feet - moist to wet, absent mica.								
	23.5	Medium dense, dry to moist, pale brown, Silty fine SAND (SM) (A-4(3)), some low plasticity fines, trace mica, 2.5Y8/2. LL=37, PL=27, PI=10, NMC=22%, %#200=49		23.5	SS-8	3	8	9		17
419.1		@24.5 feet - dry, pale brown with brownish yellow mottles, 2.5Y8/2, 10YR6/8.								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90 >>

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM- 6
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	701+18.53	**Offset:**	-13.7	**Alignment:**	Proposed
Elev.:	444.1 ft	**Latitude:**	34.19016489	**Longitude:**	-80.97131374	**Date Started:**	8/2/2023
Total Depth:	28.8 ft	**Soil Depth:**	28.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/2/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	4.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" / 2nd 6" / 3rd 6" / 4th 6"	N Value
	28.8	@28.5 feet - very dense, dry to moist, very pale brown, 10YR8/3.		28.5	SS-9	50/3"	50/3"
414.1		Boring Terminated at 28.8 feet.					
409.1							
404.1							
399.1							
394.1							

SPT N VALUE ● PL × MC ○ LL ×
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90 >>●

LEGEND

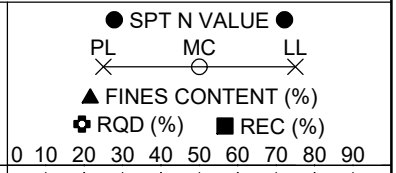
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)	**County:**	Richland	**Boring No.:**	IB- 1W		
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad			**Route:**	US-21		
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+13.18	**Offset:**	-15.1	**Alignment:**	Proposed
Elev.:	442.5 ft	**Latitude:**	34.18998697	**Longitude:**	-80.97103844	**Date Started:**	8/1/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/2/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	19.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.4	**SURFACE MATERIAL** - TOPSOIL - 5 inches.		0.0	SS-1	1	2	2	1	4
		COASTAL PLAIN - very loose, moist, dark brown and yellowish brown, Silty, Clayey fine to medium SAND (SC-SM) (A-2-4), little low plasticity fines, trace organics, 10YR3/3, 10YR5/4, 10YR5/6. LL=18, PL=14, PI=4, NMC=13%, %#200=17		2.0	SS-2	2	1	1	2	2
437.5		@2 feet - light olive brown, 2.5Y5/3. NMC= 17%, %#200=25		4.0	SS-3	2	3	4	7	7
		@4 feet - moist to wet. NMC=16%, %#200=23		6.0	SS-4	9	17	21	24	38
	8.0	@6 feet - dense, moist, light brownish gray, fine to coarse, absent organics, 2.5Y6/2.		8.0	SS-5	3	7	10	9	17
432.5		Medium dense, moist to wet, pale brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 2.5Y8/2. NMC=18%, %#200=16								
		@9.5 feet - moist, pale brown, yellow and yellowish brown, 10YR8/8, 10YR5/8, 2.5Y8/2.								
	13.5			13.5						
	14.2	Dense, moist to wet, light gray, Poorly Graded medium to coarse SAND with Silt (SP-SM), few low plasticity fines, 10YR7/2.			SS-6	7	13	23		36
427.5		Dense, moist to wet, white, Silty fine to medium SAND (SM), some low plasticity fines, trace mica, 10YR8/1.								
	18.5			18.5						
		Stiff, dry to moist, white, Sandy Lean CLAY (CL) (A-6(4)), some fine to medium sands, micaceous, 2.5Y8/1. LL=35, PL=23, PI=12, NMC=23%, %#200=53			SS-7	3	3	9		12
422.5		@19.5 feet - dry, white and olive yellow, absent mica, 2.5Y8/1, 2.5Y6/8.								
	23.5			23.5						
		Medium dense, moist, white, Silty fine to medium SAND (SM), little low plasticity fines, micaceous, 2.5Y8/1.			SS-8	4	8	12		20
417.5										



LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+13.18	**Offset:**	-15.1	**Alignment:**	Proposed
Elev.:	442.5 ft	**Latitude:**	34.18998697	**Longitude:**	-80.97103844	**Date Started:**	8/1/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/2/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	19.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
		@28.5 feet - very dense, dry to moist, yellowish brown, few fine to coarse quartz gravel, absent mica, 10YR5/8, poor recovery.		28.5	SS-9	50/2"	50/2"
412.5	33.5	**PIEDMONT RESIDUUM** - dense, dry, very pale brown, laminated yellow and brownish yellow, Silty fine to coarse SAND (SM), some low plasticity fines, trace fine weathered rock fragments, 10YR8/4, 2.5Y8/8, 10YR6/8.		33.5	SS-10	16 16 26	42
407.5	38.5	**PARTIALLY WEATHERD ROCK (PWR)** - very dense, dry, pale yellow, yellow and dark yellowish brown, Silty fine to coarse SAND (SM), some low plasticity fines, 5Y8/2, 10YR7/8, 10YR4/4.		38.5	SS-11	14 31 50/5"	50/5"
402.5		@43.5 feet - light bluish gray with olive yellow specks, 10B8/1, 2.5Y6/8.		43.5	SS-12	19 50 50/3"	50/3"
397.5		@48.5 feet - pale brown and yellow, 2.5Y8/2, 2.5Y8/8.		48.5	SS-13	20 50/4"	50/4"
392.5		@53.5 feet - laminated yellow and pale		53.5			

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+13.18	**Offset:**	-15.1	**Alignment:**	Proposed
Elev.:	442.5 ft	**Latitude:**	34.18998697	**Longitude:**	-80.97103844	**Date Started:**	8/1/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/2/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	19.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
387.5		brown, 2.5Y7/8, 2.5Y8/4.			SS-14	43	50/3"			50/3"
	58.5	**PIEDMONT RESIDUUM** - very dense, dry, laminated yellow and pale brown, Silty fine to coarse SAND (SM), some low plasticity fines, 2.5Y7/8, 2.5Y8/4		58.5	SS-15	9	21	30		51
382.5										
	63.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, brownish yellow and white, Sandy SILT (ML), some fine to medium sands, 10YR6/8, 10YR8/1.		63.5	SS-16	13	37	50/5"		50/5"
377.5										
	68.5	**PIEDMONT RESIDUUM** - stiff, dry, laminated brownish yellow and white, Elastic SILT with Sand (MH) (A-5-7(19)), little fine to medium sands, 10YR6/8, 10YR8/1. LL=55, PL=33, PI=22, NMC=31%, %#200=78		68.5	SS-17	7	6	7		13
372.5		@69.3 feet - light greenish gray, trace pyrite, 5GY8/1.								
	73.5	Very stiff, dry, olive gray, Sandy SILT (ML), some fine to medium sands, trace fine quartz weathered rock fragments, 10Y-5GY5/2.		73.5	SS-18	11	11	15		26
367.5		@74 feet - light gray, trace pyrite, absent fine weathered rock fragments, 5Y7/2.								
		@78.5 feet - very hard, light gray, 5YR7/1.		78.5	SS-19	17	22	29		51
362.5										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

Continued Next Page

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 1W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+13.18	**Offset:**	-15.1	**Alignment:**	Proposed
Elev.:	442.5 ft	**Latitude:**	34.18998697	**Longitude:**	-80.97103844	**Date Started:**	8/1/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/2/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	19.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	83.5	**PARTIALLY WEATHERED ROCK (PWR)** - very dense, dry, light gray, Silty fine to medium SAND (SM), some low plasticity fines, trace pyrite, 5YR7/1.		83.5	SS-20	50/5"				50/5"
357.5										
		@88.5 feet - greenish gray, 5GY6/1.		88.5	SS-21	46	50/3"			50/3"
352.5										
				93.5	SS-22	34	50/2"			50/2"
347.5										
	98.5			98.5	SS-23	50/1"				50/1"
	98.6	Very dense, dry, greenish gray, Silty fine to medium SAND with Gravel (SM), some fine to coarse rock fragments, little fine to medium sands, trace pyrite, 5GY6/1.								
342.5		Boring Terminated at 98.6 feet.								
337.5										

● SPT N VALUE ●
PL MC LL
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+29.14	**Offset:**	33.5	**Alignment:**	Proposed
Elev.:	443.3 ft	**Latitude:**	34.19011987	**Longitude:**	-80.97098359	**Date Started:**	7/27/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/31/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.4	**SURFACE MATERIAL** - TOPSOIL - 5 inches.		0.0	SS-1	1	2	2	2	4
	2.0	**COASTAL PLAIN** - very loose, dry to moist, light olive brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace organics, 2.5Y5/4. NMC=10%, %#200=22		2.0	SS-2	4	5	5	6	10
438.3	5.5	Loose, moist, gray, light olive brown and reddish yellow, Clayey fine to medium SAND (SC) (A-2-6(1)), little medium plasticity fines, 10YR6/1, 10YR5/4, 7.5YR6/8. LL=33, PL=18, PI=15, NMC=14%, %#200=25		4.0	SS-3	5	6	7	8	13
		@4 feet - NMC=17%, %#200=21		6.0	SS-4	46	50/5"			50/5"
		Medium dense, moist to wet, gray and brownish yellow, Silty fine to medium SAND (SM), little low plasticity fines, 10YR8/1, 10YR6/8.		8.0	SS-5	30	26	19	20	45
433.3		@6 feet - very dense, pale brown and gray, 2.5Y8/2, 2.5Y6/1.								
		@8 feet - dense, pale brown, 2.5Y8/2.								
	13.5	Medium dense, moist to wet, pale brown, Poorly Graded fine to coarse SAND with Silt (SP-SM), few low plasticity fines, few fine gravel, 2.5Y8/2. NMC=18%, %#200=12		13.5	SS-6	10	13	12		25
428.3		@14 feet - wet, fine to medium, absent gravel.								
				18.5	SS-7	3	5	11		16
	19.3	@18.5 feet - dry to moist, white and yellow, fine, micaceous, 2.5Y8/1, 2.5Y8/8.								
423.3		Very stiff, dry to moist, pale brown, Sandy Lean CLAY (CL) (A-6(7)), some fine to medium sands, 2.5Y8/3. LL=40, PL=24, PI=16, NMC=26%, %#200=57								
	23.5			23.5	SS-8	5	11	12		23
	24.8	Very stiff, dry to moist, pale brown, Lean CLAY with Sand (CL) (A-6(11)), little fine to medium sands, 2.5Y8/3. LL=39, PL=24, PI=15, NMC=23%, %#200=76								
418.3		Medium dense, wet, pale brown, Silty fine to medium SAND (SM), little low plasticity								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+29.14	**Offset:**	33.5	**Alignment:**	Proposed
Elev.:	443.3 ft	**Latitude:**	34.19011987	**Longitude:**	-80.97098359	**Date Started:**	7/27/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/31/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
		fines, trace mica, 2.5Y8/3.		28.5	SS-9	50/2"	50/2"
413.3		@28.5 feet - very dense, dry to moist, absent mica, poor recovery.					
	33.5	**PIEDMONT RESIDUUM** - very dense, dry, mottled yellow, white and light greenish gray, Silty fine to medium SAND (SM), some low plasticity fines, 10YR8/8, 10YR8/1, 10GY8/1.		33.5	SS-10	12 21 47	68
408.3							
	38.5	**PARTIALLY WEATHERED ROCK (PWR)** - very dense, dry, mottled yellow, white and light greenish gray, Silty fine to medium SAND (SM), some low plasticity fines, 10YR8/8, 10YR8/1, 10Y8/1.		38.5	SS-11	2050/5"	50/5"
403.3							
		@43.5 feet - laminated yellow and white, mottled light greenish gray and black, 10YR8/8, 10YR8/1, 10Y8/1, 10YR2/1.		43.5	SS-12	15 4750/3"	50/3"
398.3							
	48.5	**PIEDMONT RESIDUUM** - very dense, dry, mottled yellow, white, greenish gray and black, Silty fine to medium SAND (SM), some low plasticity fines, 10YR8/8, 10YR8/1, 10Y8/1, 10YR2/1.		48.5	SS-13	10 19 36	55
393.3							
		@53.5 feet - mottled yellow and black,		53.5			

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+29.14	**Offset:**	33.5	**Alignment:**	Proposed
Elev.:	443.3 ft	**Latitude:**	34.19011987	**Longitude:**	-80.97098359	**Date Started:**	7/27/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/31/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
388.3		10YR7/8, 10YR2/1, 2.5Y8/6.			SS-14	8	17	54		71
	58.5	Hard, dry, brownish yellow, white and black, Sandy SILT (ML), some fine to medium sands, 10YR6/8, 5Y8/1, 10YR2/1.		58.5	SS-15	9	18	27		54
383.3										
	63.5	Very stiff, dry, greenish gray, Elastic SILT with Sand (MH) (A-7-5(22)), little fine to medium sands, trace pyrite, 10Y6/1. LL=62, PL=36, PI=26, NMC=25%, %#200=75		63.5	SS-16	5	8	14		22
378.3										
		@68.5 feet - hard.		68.5	SS-17	11	17	22		39
373.3		@69.5 feet - dark greenish gray, 10Y4/1.								
		@73.5 feet - grayish green, 5G4/2.		73.5	SS-18	9	22	24		46
368.3										
	78.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, grayish green, SILT with Sand (ML), little low plasticity fines, trace pyrite, 5G4/2.		78.5	SS-19	22	50/4"			50/4"
363.3										

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 2W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+29.14	**Offset:**	33.5	**Alignment:**	Proposed
Elev.:	443.3 ft	**Latitude:**	34.19011987	**Longitude:**	-80.97098359	**Date Started:**	7/27/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/31/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	83.5			83.5						
358.3		Very dense, dry, very dark grayish green, Silty fine to coarse SAND (SM), some low plasticity fines, trace fine weathered rock, 10Y3/1.			SS-20	14	37	50/4"		50/4"
	88.5			88.5	SS-21	50/3"				50/3"
353.3		Very dense, dry, very dark greenish gray, Silty fine to coarse SAND with Gravel (SM), some fine to coarse rock fragments, little low plasticity fines, 10Y3/1.								
				93.5	SS-22	50/3"				50/3"
348.3										
	98.8			98.5	SS-23	50/4"				50/4"
		Boring Terminated at 98.8 feet.								
343.3										
338.3										

SPT N VALUE: PL MC LL
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+30.66	**Offset:**	-22.0	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18983494	**Longitude:**	-80.97083473	**Date Started:**	7/25/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 3 inches.		0.0	SS-1	2	2	1	3	3
		COASTAL PLAIN - very loose, moist, pale brown, Clayey fine to medium SAND (SC), little medium plasticity fines, 10YR6/3. NMC=7%, %#200=16		2.0	SS-2	3	3	6	7	9
		@1.5 feet - dark yellowish brown, 10YR4/6.		4.0	SS-3	4	7	12	18	19
438.7		@2 feet - loose, dark yellowish brown, strong brown and light gray mottles, (A-2-7(1)), 10YR4/6, 7.5YR5/8, 7.5YR7/1. LL=44, PL=27, PI=17, NMC=16%, %#200=28		6.0	SS-4	8	5	6	11	11
	7.5	@4 feet - NMC=15%, %#200=19								
	8.0	@6 feet - medium dense, white to light gray, some medium plasticity fines, 10YR8/1, 10YR7/1. NMC=16%, %#200=32		8.0	SS-5	2	5	9	11	14
433.7		Stiff, dry to moist, white to light gray, SILT (ML), trace fine to medium sands, 10YR8/1, 10YR7/1.								
		Medium dense, moist to wet, light gray with yellow and reddish yellow mottles, Silty fine to medium SAND (SM) (A-2-4), little nonplastic fines, 10YR7/1, 10YR8/6, 7.5YR7/6. LL=NP, PL=NP, PI=NP, NMC=18%, %#200=15		13.5	SS-6	8	10	8		18
428.7		@13.5 feet - (A-2-4). NMC=18%, %#200=13								
	18.5			18.5	SS-7	23	28	34		62
		Very hard, dry to moist, light gray with brownish yellow mottles, SILT (ML), trace fine to coarse sands, 10YR7/1, 10YR6/8.								
423.7				23.5	SS-8	50/5"				50/5"
418.7										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+30.66	**Offset:**	-22.0	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18983494	**Longitude:**	-80.97083473	**Date Started:**	7/25/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
	28.5			28.5						
413.7		Very dense, wet, light gray with brownish yellow mottles, Silty fine to coarse SAND (SM), little low plasticity fines, 10YR7/1,10YR6/8.			SS-9	50/5"				50/5"
	33.5			33.5						
408.7		**PIEDMONT RESIDUUM** - very hard, moist, laminated brownish yellow, light gray and white, Sandy SILT (ML), some fine to medium sands, 10YR6/8, 10YR7/1, 7.5YR8/1.			SS-10	12	22	30		52
		@38.5 feet - relict rock structure.		38.5	SS-11	30	33	33		66
403.7	43.5			43.5						
398.7		Stiff, dry to moist, laminated brownish yellow, light gray and white, Elastic SILT with Sand (MH) (A-7-5(33)), little fine to medium sands, 10YR6/8, 10YR7/1, 7.5YR8/1. LL=69, PL=38, PI=31, NMC=38%, %#200=86			SS-12	4	5	6		11
		@48.5 feet - relict rock structure. NMC=39%, %#200=83		48.5	SS-13	3	4	5		9
393.7	53.5			53.5						
		Stiff, dry, laminated brownish yellow and								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+30.66	**Offset:**	-22.0	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18983494	**Longitude:**	-80.97083473	**Date Started:**	7/25/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
388.7		light gray with dark yellowish brown mottles, SILT (ML), trace fine to medium sands, relict rock structure, 10YR6/8, 10YR7/1, 10YR4/6.			SS-14	5	6	8		14
				58.5						
		@58.5 feet - hard, trace fine to coarse sands, trace fine rock fragments, trace coarse ferrous nodules.			SS-15	13	17	21		38
383.7										
				63.5						
		@63.5 feet - dark greenish gray with yellowish brown mottles, absent rock fragments, absent ferrous nodules, 10GY4/1, 10YR6/8.			SS-16	12	14	18		32
378.7										
				68.5						
					SS-17	26	25	40		65
373.7										
	73.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry to moist, dark greenish gray and very dark greenish gray, Sandy SILT (ML), some fine to coarse sands, trace fine rock fragments, relict rock structure, 10GY4/1, 10Y3/1.		73.5	SS-18	50/2"				50/2" >>
368.7										
		@78.5 feet - little fine rock fragments, poor recovery.		78.5	SS-19	50/1"				50/1" >>
363.7										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 3W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+30.66	**Offset:**	-22.0	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18983494	**Longitude:**	-80.97083473	**Date Started:**	7/25/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/26/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
358.7		@88.5 feet - no recovery, hard drilling.		83.5	SS-20	50/1"				50/1"
353.7				88.5	SS-21	50/0"				50/0"
348.7				93.5	SS-22	50/1"				50/1"
	98.6	@98.5 feet - little fine to coarse rock fragments.		98.5	SS-23	50/1"				50/1"
343.7		Boring Terminated at 98.6 feet.								
338.7										

SPT N VALUE: PL MC LL
FINES CONTENT (%)
RQD (%) REC (%)
0 10 20 30 40 50 60 70 80 90

LEGEND

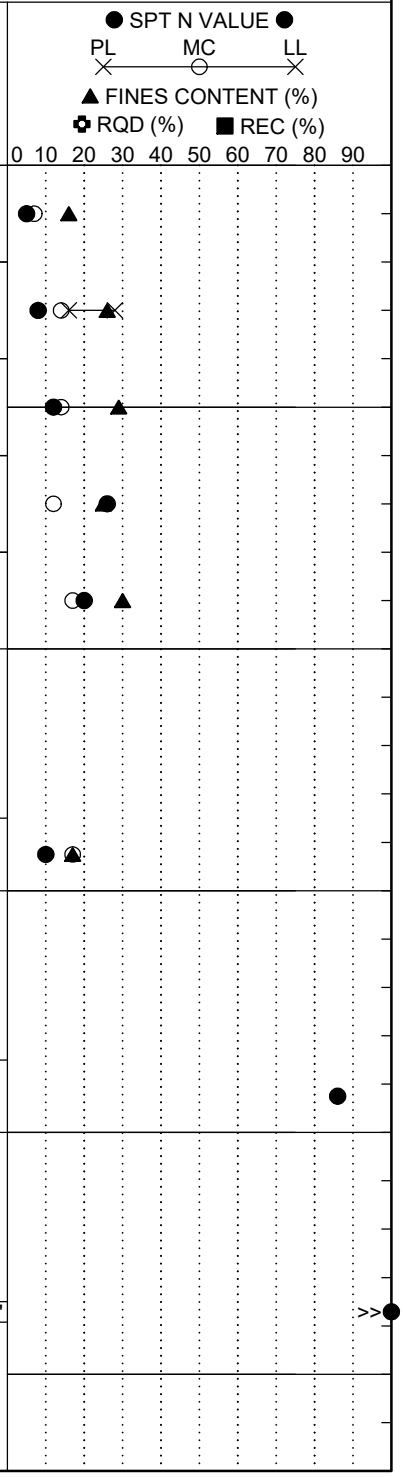
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+46.01	**Offset:**	21.4	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18995539	**Longitude:**	-80.97078867	**Date Started:**	7/27/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/28/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 4 inches.		0.0	SS-1	2	2	3	4	5
	2.0	**COASTAL PLAIN** - loose, moist, grayish brown to very pale brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 10YR5/2, 10YR8/3. NMC=7%, %#200=16		2.0	SS-2	3	3	5	5	8
438.7		Loose, moist, brownish yellow with yellowish red and light gray, Clayey fine to medium SAND (SC) (A-2-6(0)), little medium plasticity fines, 10YR5/6, 5YR5/6, 10YR7/1. LL=28, PL=16, PI=12, NMC=14%, %#200=26		4.0	SS-3	4	6	6	9	12
		@4 feet - medium dense, light gray with brownish yellow mottles, 10YR7/1, 10YR5/6. NMC=14%, %#200=29		6.0	SS-4	9	17	9	8	26
	9.5	@6 feet - NMC=12%, %#200=25		8.0	SS-5	4	9	11	14	20
433.7		@8 feet - some medium plasticity fines. NMC=17%, %#200=30								
		Medium dense, moist to wet, yellow with brownish yellow, Poorly Graded fine to medium SAND with Silt (SP-SM), few low plasticity fines, 10YR7/8, 10YR6/6.								
	13.5			13.5						
	14.5	Loose, moist to wet, light gray to very pale brown, Silty medium to coarse SAND (SM) (A-2-4), little low plasticity fines, 10YR7/2, 10YR7/3. NMC=17%, %#200=17			SS-6	4	2	8		10
428.7		Stiff, dry to moist, light gray with brownish yellow mottles, SILT with Sand (ML), little fine to medium sands, 10YR7/2, 10YR6/8.								
		@18.5 feet - hard.		18.5	SS-7	19	36	50		86
423.7										
				23.5	SS-8	50/5"				50/5"
418.7										



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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+46.01	**Offset:**	21.4	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18995539	**Longitude:**	-80.97078867	**Date Started:**	7/27/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/28/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
	28.5			28.5						
413.7		**PIEDMONT RESIDUUM** - hard, dry, yellow with white and pinkish white, SILT with Sand (ML), little fine to medium sands, relict rock structure, 10YR7/8, 10YR8/1, 2.5YR8/2.			SS-9	30	16	33		49
	33.5			33.5	SS-10	50/5"				50/5"
408.7		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, light gray and brownish yellow, SILT with Sand (ML), little fine to medium sands, relict rock structure, 10YR7/1, 10YR6/8.								
	38.5			38.5	SS-11	34	50/3"			50/3"
403.7		Very hard, dry to moist, light gray with brownish yellow and black mottles, Sandy SILT (ML), some fine to medium sands, relict rock structure, 10YR7/1, 10YR6/8, 10YR2.5/1.								
				43.5	SS-12	37	50/4"			50/4"
398.7										
				48.5	SS-13	39	50/4"			50/4"
		@48.5 feet - yellowish brown with dark yellowish brown, trace fine rock fragments, 10YR6/8, 10YR3/6.								
393.7										
	53.5			53.5						
		PIEDMONT RESIDUUM - very stiff, dry to								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

SS-9: ● at 49 | SS-10: >> at 50/5" | SS-11: >> at 50/3" | SS-12: >> at 50/4" | SS-13: >> at 50/4"

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+46.01	**Offset:**	21.4	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18995539	**Longitude:**	-80.97078867	**Date Started:**	7/27/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/28/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
388.7		moist, greenish gray and very dark greenish gray, Sandy SILT (ML), some fine to medium sands, 10YG5/1, 10YG3/1.			SS-14	6	9	13		22
				58.5						
		@58.5 feet - hard, trace fine quartz rock fragments.			SS-15	14	17	22		39
383.7										
	63.5			63.5						
		PARTIALLY WEATHERED ROCK (PWR) - very hard, dry to moist, greenish gray, Sandy SILT (ML), some fine to medium sands, trace fine rock fragments, relict rock structure, 10YG5/1.			SS-16	14	28	50/5"		50/5"
378.7										
		@68.5 feet - few fine to coarse rock fragments.		68.5	SS-17	44	50/3"			50/3"
373.7										
				73.5	SS-18	50/4"				50/4"
368.7										
				78.5	SS-19	50/3"				50/3"
363.7										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB- 4W
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	699+46.01	**Offset:**	21.4	**Alignment:**	Proposed
Elev.:	443.7 ft	**Latitude:**	34.18995539	**Longitude:**	-80.97078867	**Date Started:**	7/27/2023
Total Depth:	98.6 ft	**Soil Depth:**	98.6 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/28/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**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
358.7		@83.5 feet - greenish gray with white mottles, 10YG5/1, 2.5Y8/1.		83.5	SS-20	50/2"				50/2"
353.7				88.5	SS-21	50/1"				50/1"
348.7		@93.5 feet - greenish gray, 10YG5/1, 5GY6/1.		93.5	SS-22	50/4"				50/4"
343.7	98.5 98.6	Very dense, dry to moist, gray and greenish gray, Silty medium to coarse SAND (SM), some low plasticity fines, little fine to coarse rock fragments, relict rock structure, 5/N, 5GY5/1.		98.5	SS-23	50/0"				50/0"
338.7		Boring Terminated at 98.5 feet.								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-17
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	699+16.49	**Offset:**	52.1	**Alignment:**	Proposed
Elev.:	445.2 ft	**Latitude:**	34.18997386	**Longitude:**	-80.97064943	**Date Started:**	7/24/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/24/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	4.5 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 4 inches.		0.0	SS-1	1	2	1	2	3
		COASTAL PLAIN - very loose, dry to moist, light brown, Silty fine to medium SAND (SM) (A-2-4), some low plasticity fines, trace organics, 2.5Y5/6. NMC=19%, %#200=29		2.0	SS-2	2	3	5	6	8
		@2 feet - loose, mottled light brown, yellowish brown and reddish yellow, (A-2-7(1)), 2.5Y5/6, 10YR5/8, 7.5YR6/8.		4.0	SS-3	5	6	9	12	15
440.2	6.0	LL=48, PL=33, PI=15, NMC=19%, %#200=34		6.0	SS-4	8	8	8	7	16
		@4 feet - medium dense.		8.0	SS-5	8	7	8	10	15
		Medium dense, moist to wet, mottled olive yellow, yellowish red and light gray, Silty, Clayey fine to medium SAND (SC-SM), little low plasticity fines, 2.5Y6/6, 5YR5/8, 10YR7/1.								
435.2		@8 feet - white and yellow, fine to coarse (A-2-4), 2.5Y8/1, 2.5Y8/6. LL=24, PL=17, PI=7, NMC=15%, %#200=14								
				13.5	SS-6	7	10	9		19
		@13.5 feet - wet, yellow, trace fine gravel, 10YR7/8.								
430.2										
	18.5			18.5	SS-7	12	24	42		66
		Very hard, dry to moist, pale brown with yellow mottles, SILT (ML) (A-6(14)), trace fine to medium sands, 2.5Y7/3, 2.5Y8/6. LL=39, PL=26, PI=13, NMC=18%, %#200=95								
425.2										
				23.5	SS-8	38	50/2"			50/2"
		@23.5 feet - very hard, dry, pale brown with light olive brown speckles, 2.5Y8/2, 2.5Y5/6.								
420.2										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-17
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	699+16.49	**Offset:**	52.1	**Alignment:**	Proposed
Elev.:	445.2 ft	**Latitude:**	34.18997386	**Longitude:**	-80.97064943	**Date Started:**	7/24/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/24/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	4.5 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
		@28.5 feet - no recovery.		28.5	SS-9	50/0"				50/0"
415.2	33.5	**PARTIALLY WEATHERED ROCK** - Very hard, dry, laminated pale brown and yellow, Sandy SILT (ML), some fine to medium sands, 2.5Y8/3, 2.5Y8/8.		33.5	SS-10	15	31	50/3"		50/3"
410.2				38.5	SS-11	26	50/3"			50/3"
	39.3	Boring Terminated at 39.3 feet.								
405.2										
400.2										
395.2										

SPT N VALUE: PL, MC, LL
▲ FINES CONTENT (%)
✿ RQD (%) ■ REC (%)
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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-18
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	699+27.47	**Offset:**	76.4	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.19004531	**Longitude:**	-80.97062987	**Date Started:**	7/24/2023
Total Depth:	39 ft	**Soil Depth:**	39 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/24/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	4.4 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 4 inches.		0.0	SS-1	WOH	1	1	1	2
	1.5	**COASTAL PLAIN** - very loose, moist, light olive brown, Silty fine to medium SAND (SM) (A-2-4), some low plasticity fines, 2.5Y5/4. NMC=17%, %#200=29		2.0	SS-2	WOH	1	2	7	3
		Very loose, moist to wet, grayish brown, olive yellow and reddish yellow, Clayey fine to medium SAND (SC) (A-2-6(0)), little medium plasticity fines, 2.5Y5/2, 2.5Y6/8, 5YR6/8. LL=39, PL=25, PI=14, NMC=20%, %#200=27		4.0	SS-3	6	15	18	20	33
440.0		@4.5 feet - dense, moist, olive yellow, white and pale brown, trace roots, 2.5Y6/8, 2.5Y8/1, 2.5Y8/3.		6.0	SS-4	13	16	16	17	32
		@6 feet - strong brown, light gray and light olive brown, absent roots, 7.5YR5/8, 2.5Y7/1, 2.5Y5/6.		8.0	SS-5	2	1	2	12	3
435.0		@8 feet - very loose, moist to wet, mottled yellow, fine to coarse (A-6(0)), some medium plasticity fines, 10YR8/8, 10YR7/6, 2.5Y8/6. LL=33, PL=19, PI=14, NMC=21%, %#200=42		13.5	SS-6	2	2	5		7
	14.5	Firm, dry, white with yellow and olive yellow mottles, Sandy SILT (ML) (A-7-6(7)), some fine to medium sands, trace mica, 2.5Y8/1, 2.5Y8/6, 2.5Y6/8. LL=45, PL=29, PI=16, NMC=27%, %#200=54		18.5	SS-7	11	15	20		35
430.0										
425.0		@19 feet - hard.								
	23.5	Very hard, dry to moist, pale brown, SILT with Sand (ML), little fine to medium sands, 2.5Y8/3.		23.5	SS-8	50/5"				50/5"
420.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-18
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	699+27.47	**Offset:**	76.4	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.19004531	**Longitude:**	-80.97062987	**Date Started:**	7/24/2023
Total Depth:	39 ft	**Soil Depth:**	39 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/24/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	4.4 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
	28.5			28.5			
415.0		Very dense, moist to wet, white and pale brown, Silty fine to medium SAND (SM), little low plasticity fines, 2.5Y8/1, 2.5Y8/3.			SS-9	36 38 50/5"	50/5"
	34.0			33.5			
410.0		**PARTIALLY WEATHERED ROCK (PWR)** - very dense, dry, yellow and pale brown, Silty fine to medium SAND (SM), little low plasticity fines, 2.5Y8/8, 2.5Y8/3.			SS-10	11 29 50/3"	50/3"
	38.5			38.5			
	39.4	Very hard, dry, very pale brown and yellow, Sandy SILT (ML), some fine to medium sands, 10YR8/4, 2.5Y8/8.			SS-11	13 50/5"	50/5"
405.0		Boring Terminated at 39.4 feet.					
400.0							
395.0							

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-19
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	698+78.65	**Offset:**	-77.3	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18962752	**Longitude:**	-80.97080799	**Date Started:**	7/21/2023
Total Depth:	39.9 ft	**Soil Depth:**	39.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/21/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	5.1 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 4 inches.		0.0	SS-1	WOH	1	2	2	3
		COASTAL PLAIN - very loose, dry to moist, yellowish brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace organics, 10YR5/4. NMC=8%, %#200=17		2.0	SS-2	2	2	4	5	6
		@2 feet - loose, moist, dark yellowish brown, (A-2-7(0)), 10YR4/4. LL=41, PL=27, PI=14, NMC=11%, %#200=23		4.0	SS-3	5	8	8	13	16
440.0		@4 feet - medium dense, dry to moist, mottled very pale brown and reddish yellow, (A-2-4), 10YR7/4, 7.5YR7/8. NMC=13%, %#200=16		6.0	SS-4	13	19	20	24	39
		@6 feet - dense, moist, mottled very pale brown and brownish yellow, 10YR8/4, 10YR6/8.		8.0	SS-5	7	13	15	16	28
435.0		@8.5 feet - medium dense, moist to wet, yellowish brown, 10YR5/8.								
	14.0	Hard, dry, mottled light gray and yellow, Sandy Lean CLAY (CL), some fine to medium sands, 10YR7/2, 10YR7/8.		13.5	SS-6	4	15	18		33
430.0										
	18.5	Hard, dry, mottled brownish yellow and very pale brown, Sandy SILT (ML), some fine to medium sands, 10YR6/8, 10YR7/3.		18.5	SS-7	10	20	26		46
425.0										
		@23.5 feet - very hard, dry to moist, mottled light gray and yellowish brown, 10YR7/1, 10YR5/8.		23.5	SS-8	50/5"				50/5"
420.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

LEGEND

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

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-19
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	698+78.65	**Offset:**	-77.3	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18962752	**Longitude:**	-80.97080799	**Date Started:**	7/21/2023
Total Depth:	39.9 ft	**Soil Depth:**	39.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/21/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	5.1 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
				28.5						
		@28.5 feet - hard, dry, mottled yellow and very pale brown, 10YR7/8, 10YR8/3.			SS-9	18	14	18		32
415.0										
	33.5			33.5						
		PARTIALLY WEATHERED ROCK (PWR) - very hard, dry, laminated yellow, white and pink, Sandy SILT (ML), some fine to medium sands, 10YR8/8, 10YR8/1, 5YR8/4.			SS-10	14	30	50/3"		50/3"
410.0										
	38.5			38.5						
		Very dense, dry, mottled light gray and brownish yellow, Silty fine to coarse SAND (SM), some low plasticity fines, 10YR7/2, 10YR6/8.			SS-11	15	31	50/5"		50/5"
405.0	39.9	Boring Terminated at 39.9 feet.								
400.0										
395.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

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	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-20
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+82.72	**Offset:**	-51.4	**Alignment:**	Proposed
Elev.:	445.4 ft	**Latitude:**	34.18969102	**Longitude:**	-80.97076702	**Date Started:**	7/19/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/20/2023
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:**	87.6%
Core Size:	N/A	**Driller:**	S. Eubanks	**Groundwater:**	**TOB** N/A	**24HR**	4.9 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Field								
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.		0.0	SS-1	WOH	WOH	1	1	1
		COASTAL PLAIN - very loose, moist, yellowish brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 10YR5/4. NMC=6%, %#200=16		2.0	SS-2	1	3	4	6	7
	4.0	@2 feet - loose, yellowish brown with yellowish red mottles, some low plasticity fines, 10YR5/6, 5YR5/8. NMC=13%, #%200=28		4.0	SS-3	10	19	21	23	40
440.4	5.5									
	6.0	Dense, moist, yellowish brown with light gray and red, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR5/6, 10YR7/2, 2.5YR5/8.		6.0	SS-4	9	11	13	15	24
	8.0	Medium dense, moist, red, Silty fine to medium SAND (SM), some low plasticity fines, 2.5YR5/8.		8.0	SS-5	5	6	10	11	16
435.4		Medium dense, moist, layered yellowish brown, red and light gray, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR5/6, 10YR7/2, 2.5YR5/8.								
	13.5	Medium dense, moist, yellow with very pale brown, Poorly Graded fine to coarse SAND with Silt (SP-SM), few low plasticity fines, 10YR7/6, 10YR7/4.		13.5	SS-6	7	4	5		9
	14.5									
430.4		Loose, moist, white with light gray, Silty fine to medium SAND (SM), some low plasticity fines, 7.5YR8/1, 7.5YR7/1. NMC=21%, %#200=37								
		Stiff, dry to moist, laminated brownish yellow and light gray, SILT with Sand (ML), little fine to medium sands, 10YR6/8, 10YR7/1.		18.5	SS-7	12	22	23		45
	18.5									
425.4		Hard, dry to moist, light gray with brownish yellow, Lean CLAY with Sand (CL) (A-6(11)), little fine sands, 10YR7/1, 10YR6/8. LL=33, PL=19, PI=14, NMC=17%, %#200=87								
	23.5	Very dense, dry, light gray with very dark gray mottles, Silty fine to medium SAND (SM), little low plasticity fines, 10YR7/1, 10YR3/1.		23.5	SS-8	30	50/2"			50/2"
420.4										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

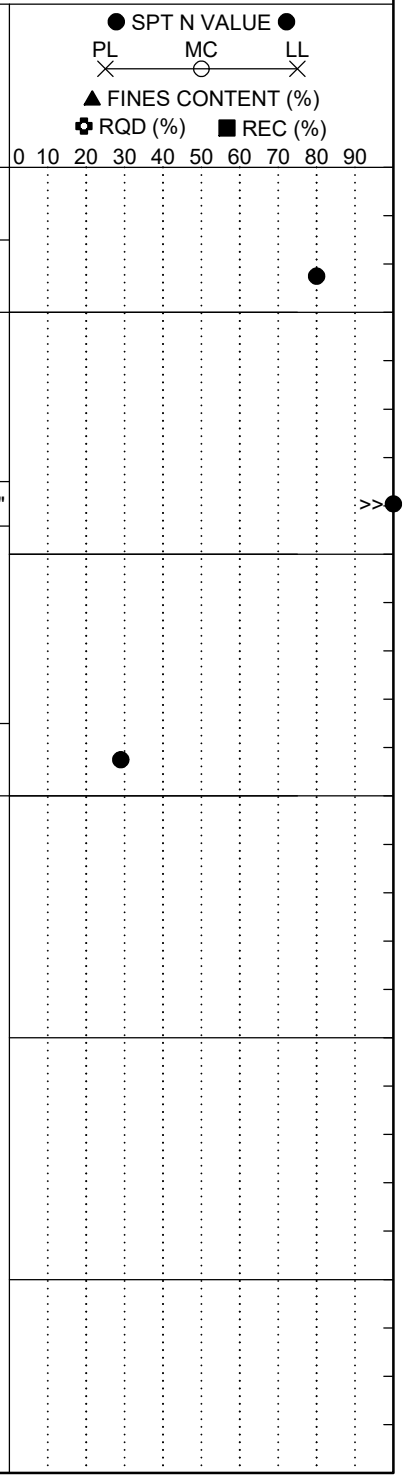
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-20
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	698+82.72	**Offset:**	-51.4	**Alignment:**	Proposed
Elev.:	445.4 ft	**Latitude:**	34.18969102	**Longitude:**	-80.97076702	**Date Started:**	7/19/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/20/2023
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:**	87.6%
Core Size:	N/A	**Driller:**	S. Eubanks	**Groundwater:**	**TOB** N/A	**24HR**	4.9 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
				28.5						
		@28.5 feet - wet, yellow, fine to coarse, 10YR8/8.			SS-9	46	38	42		80
415.4										
	33.5			33.5						
		PARTIALLY WEATHERED ROCK (PWR) - very hard, dry, mottled yellow and pale yellow, Sandy SILT (ML), some fine to medium sands, 10YR8/4, 10YR8/2.			SS-10	29	50/3"			50/3"
410.4										
	38.5			38.5						
		PIEDMONT RESIDUUM - very stiff, dry, mottled yellow, pale yellowish green and greenish gray, SILT with Sand (ML), little fine to medium sands, few mica, 10YR8/6, 5GY6/4, 10Y6/1.			SS-11	4	10	19		29
405.4	40.0	Boring Terminated at 40 feet.								
400.4										
395.4										



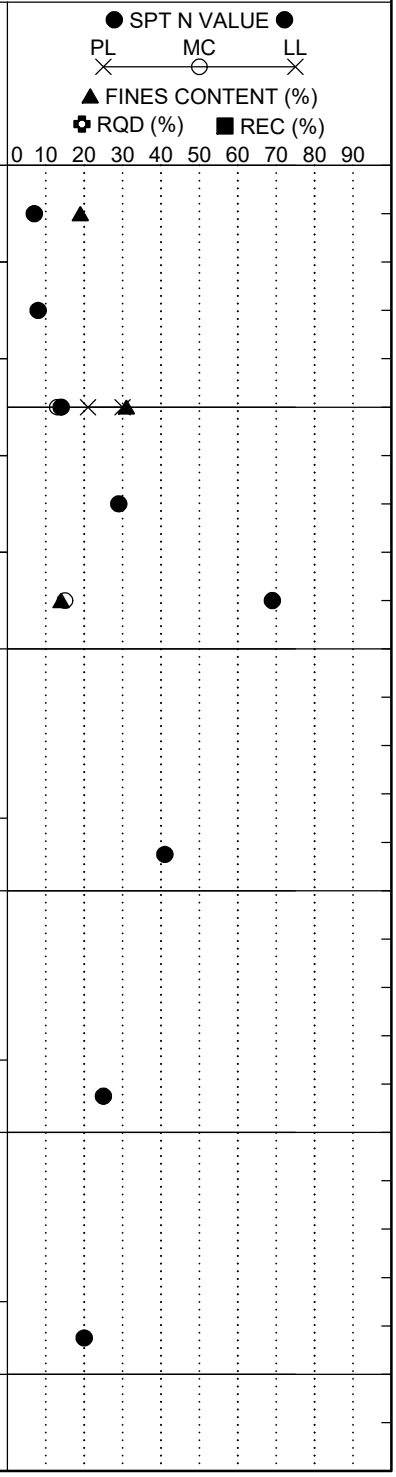
LEGEND

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

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-21
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	700+98.37	**Offset:**	68.0	**Alignment:**	Proposed
Elev.:	444.6 ft	**Latitude:**	34.19031029	**Longitude:**	-80.9710972	**Date Started:**	8/10/2023
Total Depth:	38.7 ft	**Soil Depth:**	38.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/10/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	5 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Wooded								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 4 inches.		0.0	SS-1	2	2	5	6	7
		COASTAL PLAIN - loose, moist, pale brown and grayish brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticty fines, trace roots, 10YR6/3, 10YR5/2. NMC=7%, %#200=19		2.0						
	3.0				SS-2	4	4	4	4	8
		Loose, moist, pale brown, yellowish brown and light gray, Clayey fine to medium SAND (SC), some low plasticity fines, 10YR6/3, 10YR5/8, 10YR7/1.		4.0						
439.6					SS-3	7	7	7	7	14
		@4 feet - medium dense, yellowish brown, yellowish red and light gray, (A-2-4), 10YR5/8, 2.5YR4/8, 10YR7/1. LL=30, PL=21, PI=9, NMC=13%, %#200=31		6.0						
	8.0				SS-4	7	12	17	23	29
		@6 feet - yellowish brown and light gray, fine to coarse.		8.0						
					SS-5	17	27	42	46	69
434.6		Very dense, moist to wet, very pale brown, yellow and light gray, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 10YR7/3, 10YR7/6, 10YR7/1. NMC=15%, %#200=14								
				13.5						
		@13.5 feet - dense, light gray, reddish yellow and light red, 10YR7/1, 5YR7/8, 2.5YR7/6.			SS-6	17	24	17		41
429.6										
				18.5						
		@18.5 feet - medium dense, light gray to white, brownish yellow, 10YR7/1, 10YR8/1, 10YR6/8.			SS-7	10	12	13		25
424.6										
				23.5						
		@23.5 feet - light gray to white, 10YR7/1, 10YR8/1.			SS-8	9	10	10		20
419.6										



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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-21
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	700+98.37	**Offset:**	68.0	**Alignment:**	Proposed
Elev.:	444.6 ft	**Latitude:**	34.19031029	**Longitude:**	-80.9710972	**Date Started:**	8/10/2023
Total Depth:	38.7 ft	**Soil Depth:**	38.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/10/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	5 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
		@28.5 feet - fine.		28.5	SS-9	5	4	7		11
414.6	30.0	Very dense, dry to moist, light gray and very pale brown with yellow mottles, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR7/1, 10YR8/3, 10YR7/8.		33.5	SS-10	17	41	50/3"		50/3"
409.6	35.0	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry to moist, very pale brown with yellow mottles, SILT with Sand (ML), little fine to medium sands, trace fine rock fragments, 10YR8/3, 10YR7/8.		38.5	SS-11	50/2"				50/2"
	38.7	Boring Terminated at 38.7 feet.								
404.6										
399.6										
394.6										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

SS-10: >> ● SS-11: >> ●

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	

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SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-22
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	700+87.52	**Offset:**	51.7	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.19025647	**Longitude:**	-80.97110123	**Date Started:**	7/31/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/31/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	4.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Wooded								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 3 inches.		0.0	SS-1	1	2	3	3	5
		COASTAL PLAIN - loose, moist, light yellowish brown to dark grayish brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace roots, 10YR6/4, 10YR4/2. NMC=7%, %#200=19		2.0	SS-2	2	2	3	5	5
	3.0	Loose, moist, yellowish brown, yellowish red and light gray, Clayey fine to medium SAND (SC), some medium plasticity fines, 10YR5/6, 10YR5/8, 10YR7/1.		4.0	SS-3	4	7	9	11	16
440.0		@4 feet - medium dense, yellowish brown, light gray, fine to coarse (A-2-7(1)), little high plasticity fines, 10YR5/6, 10YR7/1. LL=45, PL=23, PI=22, NMC=13%, %#200=25		6.0	SS-4	6	21	23	34	44
	8.0	@6 feet - dense.		8.0	SS-5	5	19	24	23	43
435.0		Dense, moist to wet, very pale brown, yellow and light red, Poorly Graded fine to medium SAND with Silt (SP-SM), few low plasticity fines, 10YR8/3, 10YR8/6, 2.5YR7/6.		13.5	SS-6	20	17	42		59
430.0		@13.5 feet - very dense, very pale brown and white, medium to coarse, 10YR8/3-7/3, 10YR8/1.								
	18.5	Medium dense, moist to wet, white, Clayey medium to coarse SAND (SC) (A-2-7(0)), little high plasticity fines, trace fine gravel, 10YR8/1. LL=53, PL=30, PI=22, NMC=21%, %#200=17		18.5	SS-7	8	5	10		15
425.0				23.5	SS-8	11	16	12		28
420.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-22
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**	700+87.52	**Offset:**	51.7	**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.19025647	**Longitude:**	-80.97110123	**Date Started:**	7/31/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/31/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-750X	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** N/A	**24HR**	4.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
				28.5						
		@28.5 feet - moist, white, light gray, fine to medium, 10YR8/1, 10YR7/1.			SS-9	4	6	11		17
415.0										
				33.5						
		@33.5 feet - white and light gray with very pale brown mottles, trace fine to medium mica, 10YR8/1, 10YR7/1, 10YR8/4.			SS-10	9	14	50/5"		50/5"
410.0	35.0	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry to moist, laminated very pale brown, yellow and white, SILT with Sand (ML), little fine to medium sands, relict rock structure, 10YR8/2, 10YR8/6, 10YR8/1.		38.5	SS-11	33	50/3"			50/3"
	39.3	Boring Terminated at 39.3 feet.								
405.0										
400.0										
395.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

SS-10: >> ● SS-11: >> ●

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	

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SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-23
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+61.62	**Offset:**	-78.5	**Alignment:**	Proposed
Elev.:	442.2 ft	**Latitude:**	34.18992843	**Longitude:**	-80.97129266	**Date Started:**	8/3/2023
Total Depth:	38.9 ft	**Soil Depth:**	38.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/3/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.9 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Wooded								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 3 inches.		0.0	SS-1	1	3	3	4	6
		COASTAL PLAIN - loose, dry, light olive brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 2.5Y5/4. NMC=6%, %#200=14		2.0	SS-2	3	3	5	6	8
	3.5	@2 feet - dry to moist, olive yellow, trace organics, 2.5Y6/6.		4.0	SS-3	3	9	10	12	19
437.2		Loose, dry to moist, strong brown, Clayey fine to medium SAND (SC) (A-2-7(1)), little high plasticity fines, 7.5YR4/6. LL=44, PL=23, PI=21, NMC=13%, %#200=24		6.0	SS-4	14	18	25	28	43
	6.0	@4 feet - medium dense, mottled yellowish brown, light gray, 10YR5/8, 10YR7/1.		8.0	SS-5	3	9	18	17	27
		@5 feet - light gray, 2.5Y7/2.								
432.2		Dense, dry to moist, yellow and yellow brown, Silty fine to medium SAND (SM), some low plasticity fines, 2.5Y7/8, 10YR5/6.		13.5	SS-6	8	7	15		22
		@8 feet - medium dense, moist to wet, white and strong brown, fine to coarse, 2.5Y8/1, 7.5YR5/8.								
427.2		@13.5 feet - white and pale brown, fine to coarse (A-2-4), little low plasticity fines, trace fine gravel, 2.5Y8/1, 2.5Y8/3. NMC=18%, %#200=18		18.5	SS-7	5	10	10		20
422.2		@18.5 feet - dry to moist, white, fine, micaceous, 10YR8/1.								
	23.5			23.5	SS-8	40	50/4"			50/4"
417.2		Very hard, dry to moist, light gray and brownish yellow, SILT with Sand (ML), little fine to medium sands, 2.5Y7/2, 10YR6/8.								

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-23
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+61.62	**Offset:**	-78.5	**Alignment:**	Proposed
Elev.:	442.2 ft	**Latitude:**	34.18992843	**Longitude:**	-80.97129266	**Date Started:**	8/3/2023
Total Depth:	38.9 ft	**Soil Depth:**	38.9 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/3/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.9 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	28.5			28.5						
412.2		Very dense, dry to moist, light gray and brownish yellow, Silty fine to coarse SAND (SM), some low plasticity fines, trace fine gravel, 2.5Y7/2, 10YR6/8.			SS-9	16	20	51		71
	33.5			33.5						
407.2		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry to moist, pale brown with yellow specks, Sandy SILT (ML), some fine to medium sands, 2.5Y8/2, 2.5Y8/8.			SS-10	50/5"				50/5"
	38.5			38.5						
	38.9	Very dense, dry, white with yellow mottles, Silty fine to coarse SAND (SM), some low plasticity fines, 5Y8/11, 2.5Y8/8.			SS-11	50/5"				50/5"
402.2		Boring Terminated at 38.9 feet.								
397.2										
392.2										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

SS-10 >>

SS-11 >>

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	

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SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-24
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+52.06	**Offset:**	-48.6	**Alignment:**	Proposed
Elev.:	442.2 ft	**Latitude:**	34.18997799	**Longitude:**	-80.97120787	**Date Started:**	8/3/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/3/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.4 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Wooded								
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.		0.0	SS-1	1	3	3	5	6
	2.5	**COASTAL PLAIN** - loose, dry, light olive brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace organics, 2.5Y5/4. NMC=7%, %#200=14		2.0	SS-2	2	3	2	3	5
437.2	4.0	Loose, dry to moist, grayish brown and yellowish brown, Clayey fine to medium SAND (SC) (A-2-6(1)), little medium plasticity fines, 2.5Y5/2, 10YR5/8, 2.5Y5/6. LL=33, PL=17, PI=16, NMC=14%, %#200=27		4.0	SS-3	4	5	7	11	12
		Medium dense, moist, light olive brown and light yellowish brown, Silty fine to medium SAND (SM), some low plasticity fines, 2.5Y5/4, 2.5Y6/3.		6.0	SS-4	9	10	11	12	21
	9.5	@6 feet - moist to wet, pale brown, 2.5Y7/4.		8.0	SS-5	1	9	17	18	26
432.2		@8 feet - olive yellow and light olive brown, 2.5Y6/6, 2.5Y5/3.								
		Medium dense, moist, white, Poorly Graded fine to coarse SAND with Silt (SP-SM), few low plasticity fines, 2.5Y8/1.		13.5	SS-6	8	10	14		24
	14.0	Medium dense, moist, pale brown, Silty fine to coarse SAND (SM), little low plasticity fines, 2.5Y8/2.								
427.2		@14.5 feet - strong brown, trace fine gravel, 7.5YR5/8.		18.5	SS-7	2	4	5		9
		@18.5 feet - loose, dry to moist, white, fine (A-2-4), micaceous, 2.5Y8/1. NMC=27%, %#200=29								
422.2										
	23.5	Very hard, dry to moist, light gray with brownish yellow mottles, SILT (ML), few fine sands, 2.5Y7/2, 10YR6/8.		23.5	SS-8	9	47	50/3"		50/3"
417.2										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

LEGEND

Continued Next Page

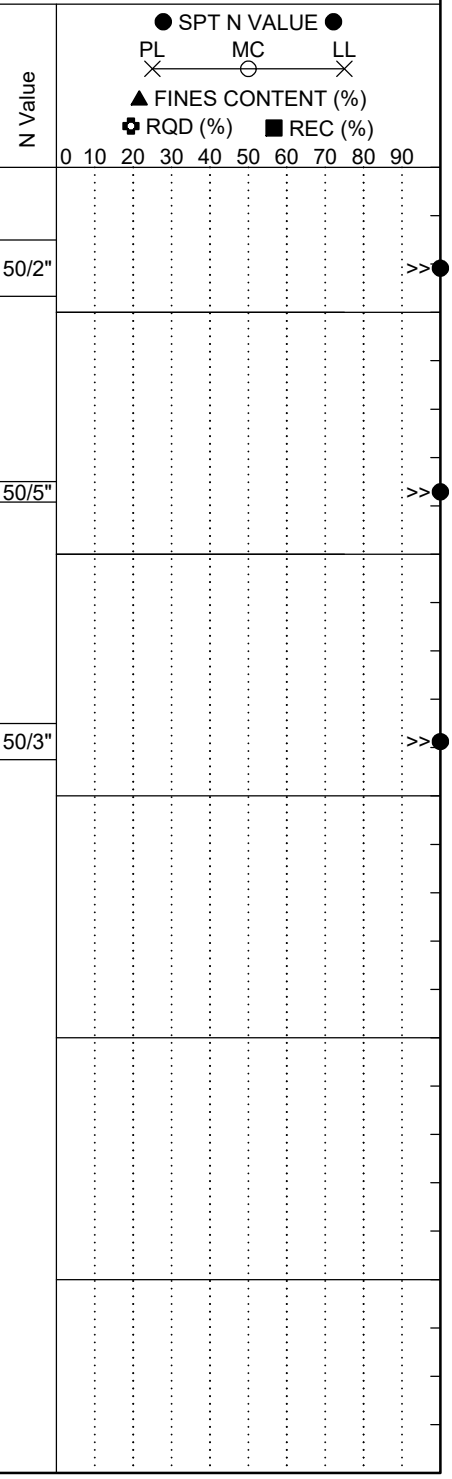
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 23610178A US 21 BRO RR.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-24
Site Description:	I-77 Exit 26 - US 21 Bridge over Railroad					**Route:**	US-21
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	700+52.06	**Offset:**	-48.6	**Alignment:**	Proposed
Elev.:	442.2 ft	**Latitude:**	34.18997799	**Longitude:**	-80.97120787	**Date Started:**	8/3/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	8/3/2023
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:**	91.6%
Core Size:	N/A	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	3.4 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" 2nd 6" 3rd 6" 4th 6"	N Value
	28.5			28.5			
412.2		Very dense, moist to wet, pale brown and light olive brown, Silty fine to medium SAND (SM), some low plasticity fines, 2.5Y7/3, 2.5Y5/4.			SS-9	34 52 50/2"	50/2"
		@29.7 feet - dark yellowish brown, fine to coarse, 10YR4/4, 10YR3/6.					
	33.5			33.5	SS-10	50/5"	50/5"
	34.5	Very dense, moist to wet, pale brown, Poorly Graded fine GRAVEL with Silt (GP-GM), few low plasticity fines, 2.5Y8/3.					
407.2		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, pale brown, yellow and light greenish gray, Sandy SILT (ML), some fine to medium sands, trace fine weathered rock fragments, 2.5Y8/3, 2.5Y8/8, 10Y8/1.		38.5	SS-11	51 50/3"	50/3"
	39.3						
402.2		Boring Terminated at 39.3 feet.					
397.2							
392.2							



LEGEND

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

Appendix IV – Rock Core Photographs

Rock Core Photo Log

Boring: EB-1W	Box: 1 of 2	Date: 7/21/2023	Driller: S. Gowan	Engineer: S. Melecosky
Run: RC-1	Length: 2.0	Depth Int: 72.6-74.6	Recovery: 90%	RQD: 43%
Run: RC-2	Length: 5.0	Depth Int: 74.6-79.6	Recovery: 54%	RQD: 22%
Run: RC-3	Length: 2.7	Depth Int: 79.6-82.3	Recovery: 100%	RQD: 64%

Boring: EB-1W	Box: 2 of 2	Date: 7/21/2023	Driller: S. Gowan	Engineer: S. Melecosky
Run: RC-3 (cont.)	Length: 2.3	Depth Int: 82.3-84.6	Recovery: 100%	RQD: 64%
Run: RC-4	Length: 5.0	Depth Int: 84.6-89.6	Recovery: 100%	RQD: 54%

Appendix V – Downhole Shear Wave Velocity Test Results

Shear Wave Velocity Calculations

I-77 Exit 26 - US 21 BRO Railroad
Blythwood, South Carolina

Boring ID: EB-1W

S&ME Project Number: **23610178A**

Casing Stickup: 2.10 Feet

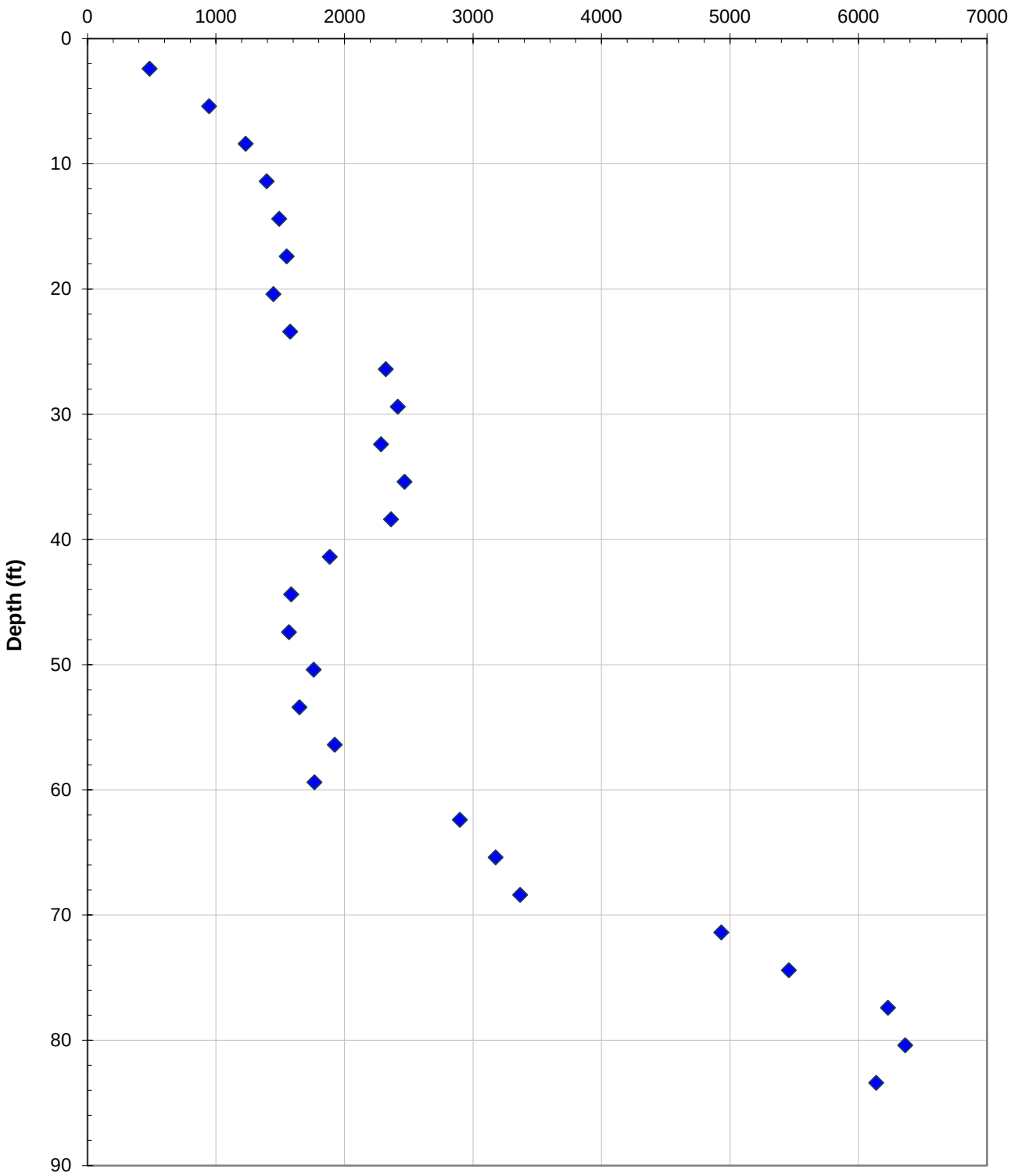
Source Offset: 8.00 Feet

Date: 25-Jul-23

Rig: CME-550X

Test Depth (feet)	Geophone Depth (feet)	Waveform Ray Path (feet)	Incremental Distance (feet)	P-WAVE Characteristic Arrival Time (seconds)	P-WAVE Incremental Time Interval (seconds)	P-WAVE Interval Velocity (ft/s)	S-WAVE Characteristic Arrival Time (seconds)	S-WAVE Incremental Time Interval (seconds)	S-WAVE Interval Velocity (ft/s)	Interval Depth (feet)	d_i/v_{si}	Poissons	Estimated Unit Weight (pcf)
0.90	0.90	8.05	8.05	0.0037			0.0106						
3.90	3.90	8.90	0.85	0.0040	0.0004	2327.4	0.0124	0.0018	483.4	2.40	0.00496	0.48	110
6.90	6.90	10.56	1.66	0.0044	0.0004	4505.0	0.0141	0.0018	947.2	5.40	0.00317	0.48	120
9.90	9.90	12.73	2.16	0.0048	0.0004	5982.9	0.0159	0.0018	1231.3	8.40	0.00244	0.48	125
12.90	12.90	15.18	2.45	0.0051	0.0004	6756.1	0.0177	0.0018	1394.7	11.40	0.00215	0.48	125
15.90	15.90	17.80	2.62	0.0055	0.0004	7426.6	0.0194	0.0018	1490.9	14.40	0.00201	0.48	125
18.90	18.90	20.52	2.72	0.0058	0.0004	7724.0	0.0212	0.0018	1550.2	17.40	0.00194	0.48	125
21.90	21.90	23.32	2.79	0.0061	0.0003	9004.5	0.0231	0.0019	1447.9	20.40	0.00207	0.49	120
24.90	24.90	26.15	2.84	0.0064	0.0003	9150.8	0.0249	0.0018	1578.2	23.40	0.00190	0.48	120
27.90	27.90	29.02	2.87	0.0068	0.0003	8461.6	0.0261	0.0012	2320.5	26.40	0.00129	0.46	130
30.90	30.90	31.92	2.89	0.0071	0.0003	9034.6	0.0273	0.0012	2414.4	29.40	0.00124	0.46	130
33.90	33.90	34.83	2.91	0.0074	0.0003	8851.3	0.0286	0.0013	2283.5	32.40	0.00131	0.46	130
36.90	36.90	37.76	2.93	0.0077	0.0003	9134.1	0.0298	0.0012	2467.0	35.40	0.00122	0.46	130
39.90	39.90	40.69	2.94	0.0081	0.0004	8184.2	0.0310	0.0012	2361.8	38.40	0.00127	0.45	130
42.90	42.90	43.64	2.95	0.0086	0.0004	6614.0	0.0326	0.0016	1885.3	41.40	0.00159	0.46	130
45.90	45.90	46.59	2.95	0.0090	0.0005	6516.1	0.0345	0.0019	1585.6	44.40	0.00189	0.47	120
48.90	48.90	49.55	2.96	0.0095	0.0005	6475.4	0.0363	0.0019	1567.2	47.40	0.00191	0.47	120
51.90	51.90	52.51	2.96	0.0099	0.0005	6361.0	0.0380	0.0017	1759.9	50.40	0.00170	0.46	120
54.90	54.90	55.48	2.97	0.0104	0.0005	6494.5	0.0398	0.0018	1649.8	53.40	0.00182	0.47	120
57.90	57.90	58.45	2.97	0.0108	0.0004	7038.7	0.0414	0.0015	1924.7	56.40	0.00156	0.46	125
60.90	60.90	61.42	2.97	0.0112	0.0003	8499.7	0.0431	0.0017	1766.0	59.40	0.00170	0.48	125
63.90	63.90	64.40	2.98	0.0114	0.0003	10358.2	0.0441	0.0010	2898.3	62.40	0.00104	0.46	130
66.90	66.90	67.38	2.98	0.0117	0.0003	10184.3	0.0450	0.0009	3176.6	65.40	0.00094	0.45	130
69.90	69.90	70.36	2.98	0.0120	0.0003	11151.6	0.0459	0.0009	3366.0	68.40	0.00089	0.45	130
72.90	72.90	73.34	2.98	0.0122	0.0002	15791.7	0.0465	0.0006	4933.1	71.40	0.00061	0.45	155
75.90	75.90	76.32	2.98	0.0124	0.0002	17887.7	0.0471	0.0005	5457.7	74.40	0.00055	0.45	155
78.90	78.90	79.30	2.98	0.0125	0.0002	17998.9	0.0475	0.0005	6228.1	77.40	0.00048	0.43	155
81.90	81.90	82.29	2.99	0.0127	0.0002	18230.3	0.0480	0.0005	6363.3	80.40	0.00047	0.43	155
84.90	84.90	85.28	2.99	0.0129	0.0002	18236.5	0.0485	0.0005	6137.9	83.40	0.00049	0.44	155

Shear Wave Velocity Profile EB-1W
I-77 Exit 26 US 21 BRO Railroad
Blythwood, South Carolina
S&ME Project: 23610178A



Appendix VI – Laboratory Test Data Sheets – Split-Spoon Samples

INDEX PROPERTIES VERSUS DEPTH

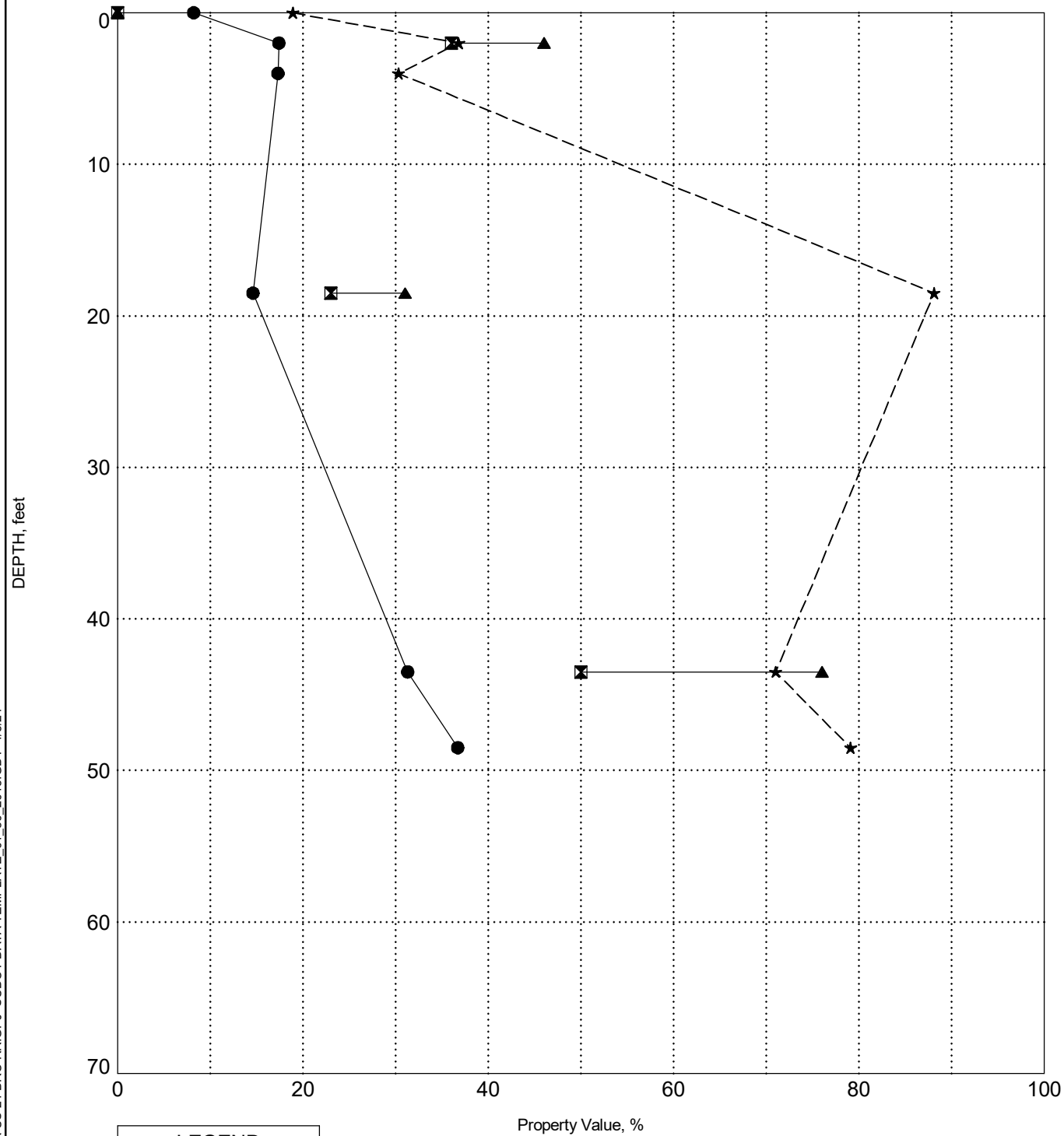
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING EB-1W

SURFACE ELEVATION: 445.3



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

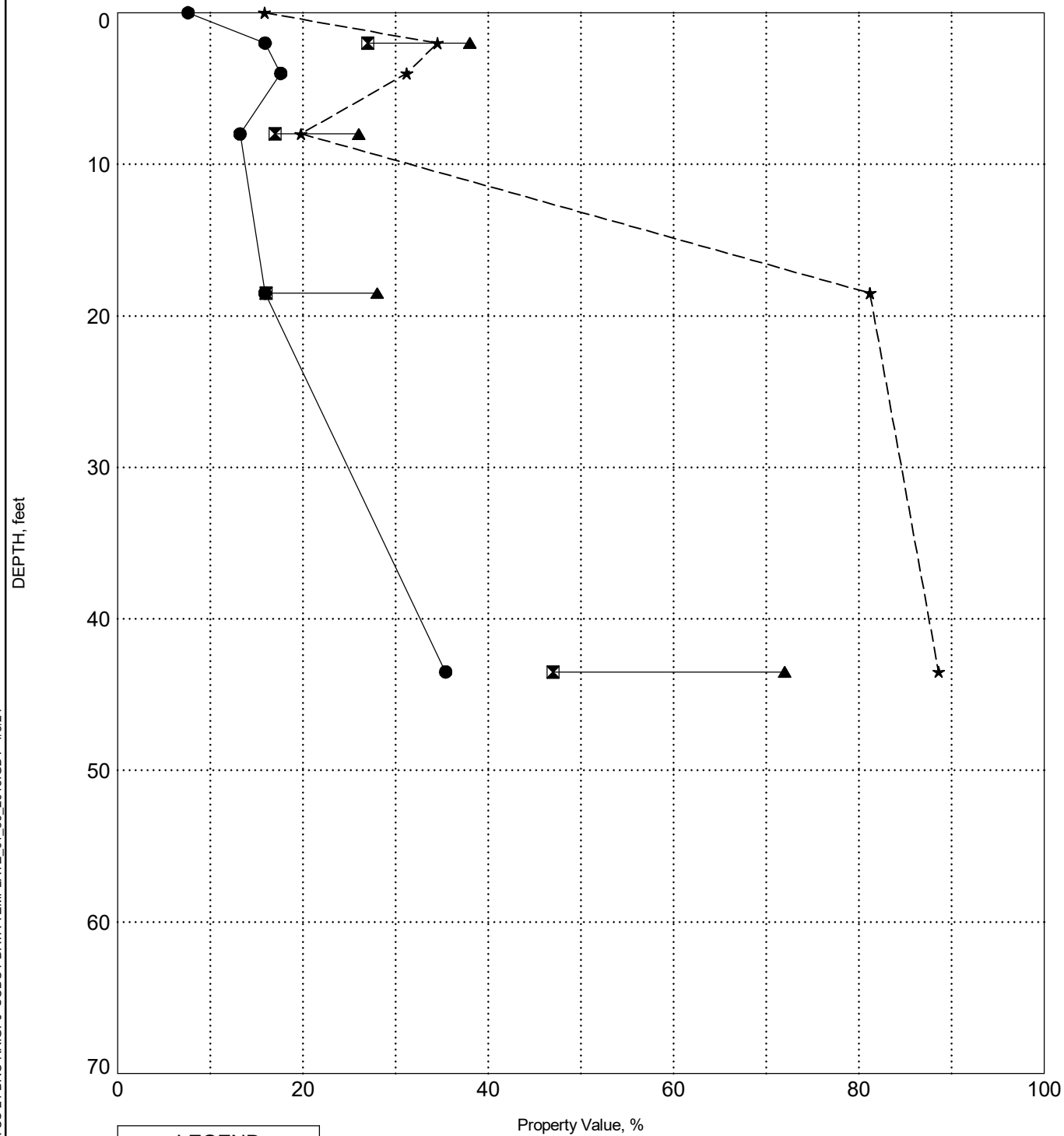
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING EB-2W

SURFACE ELEVATION: 445.0



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

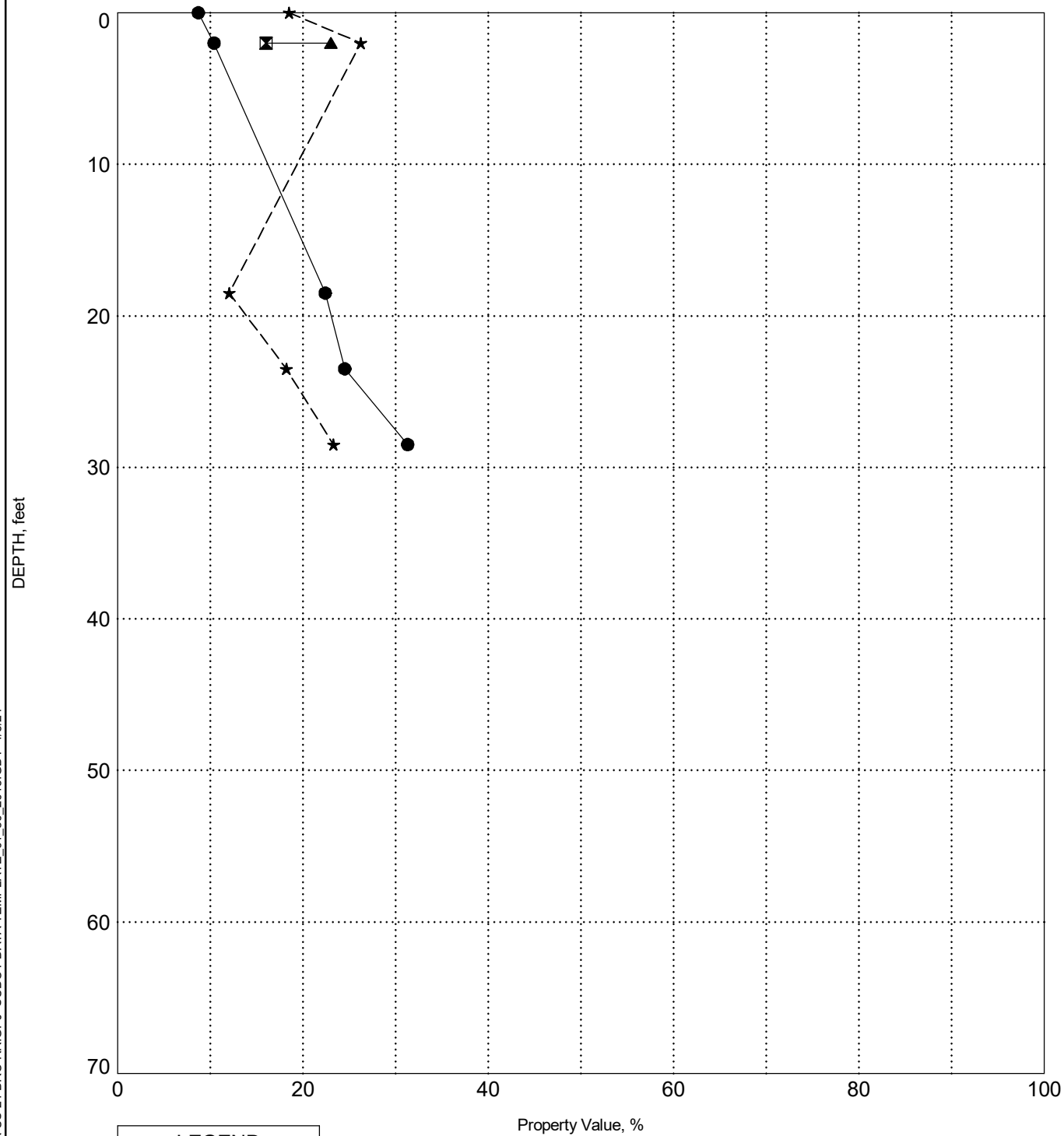
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING EB-3W

SURFACE ELEVATION: 444.1



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING EB-4W

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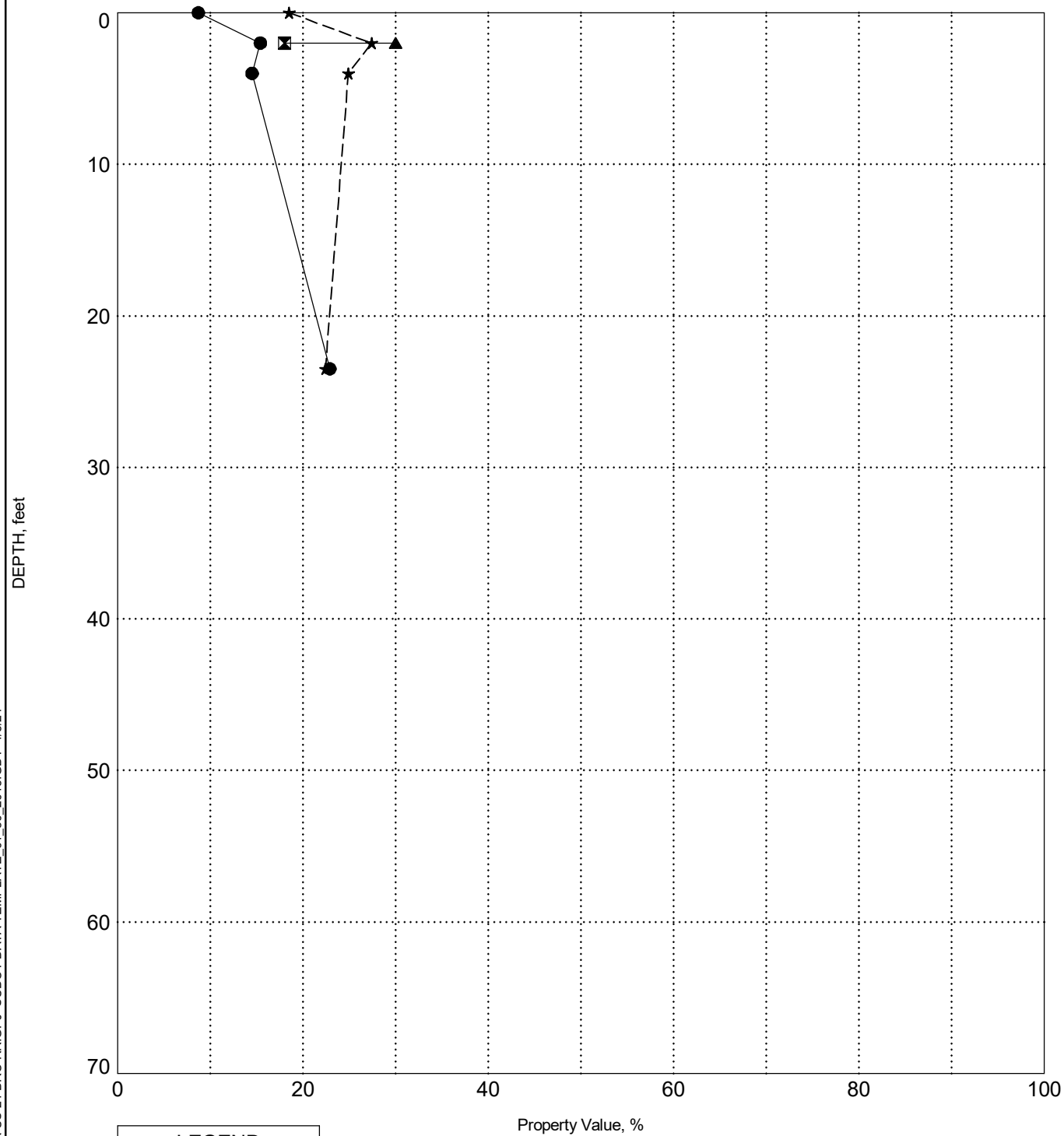


LEGEND
● Water Content
⊠ Plastic Limit
▲ Liquid Limit
★ Fines

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

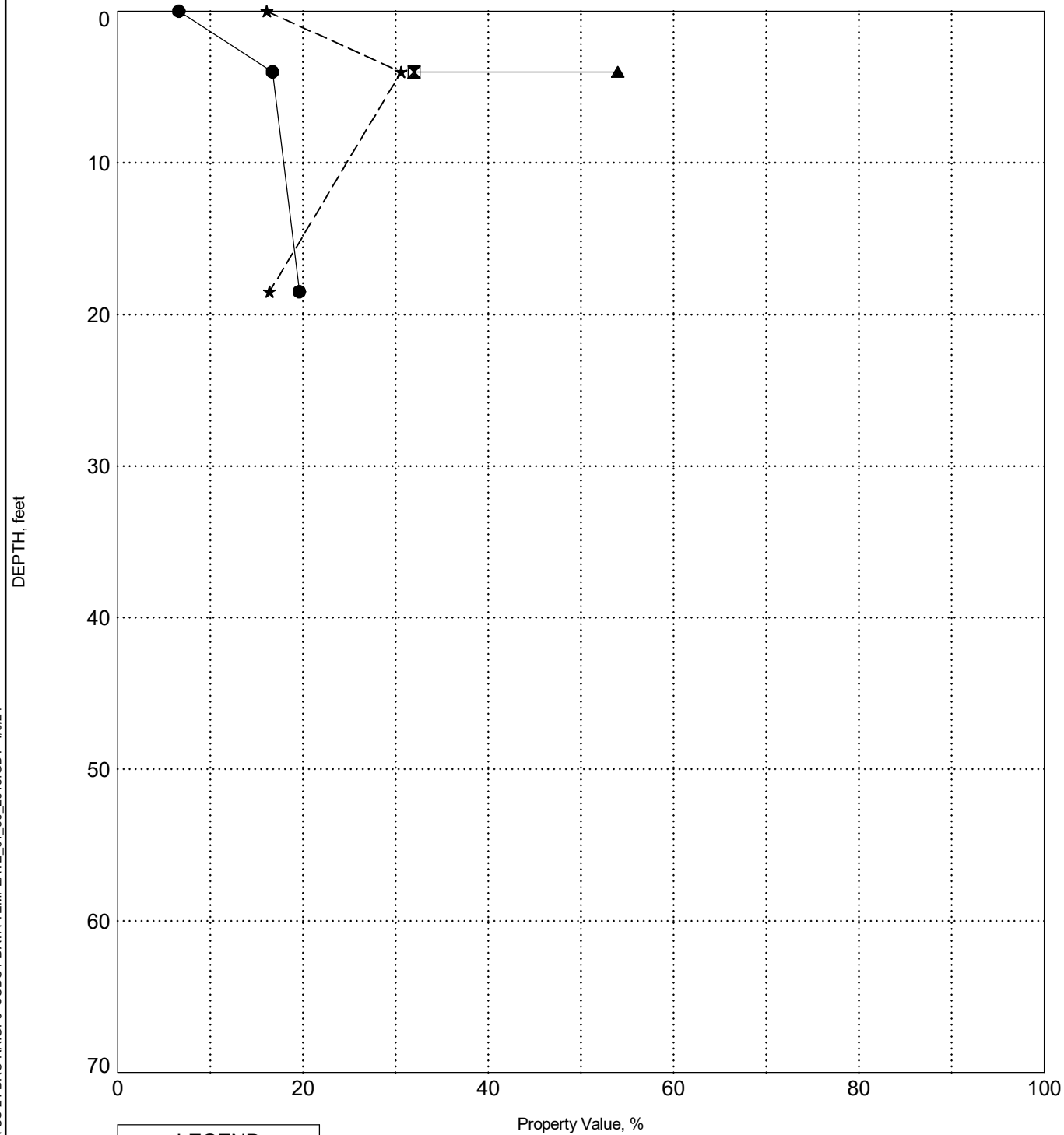
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING EM- 5

SURFACE ELEVATION: 446.0



INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

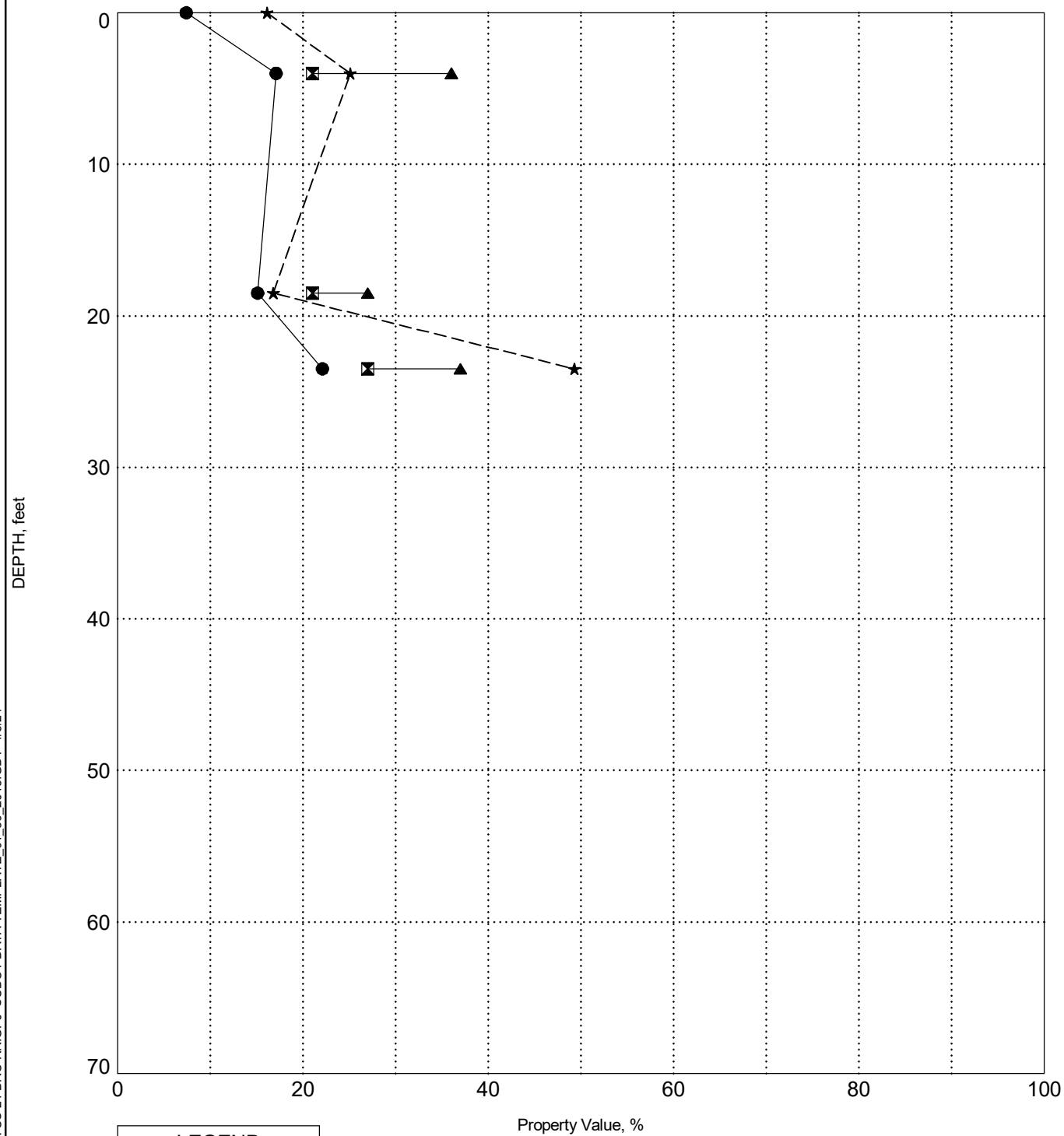
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING EM- 6

SURFACE ELEVATION: 444.1



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

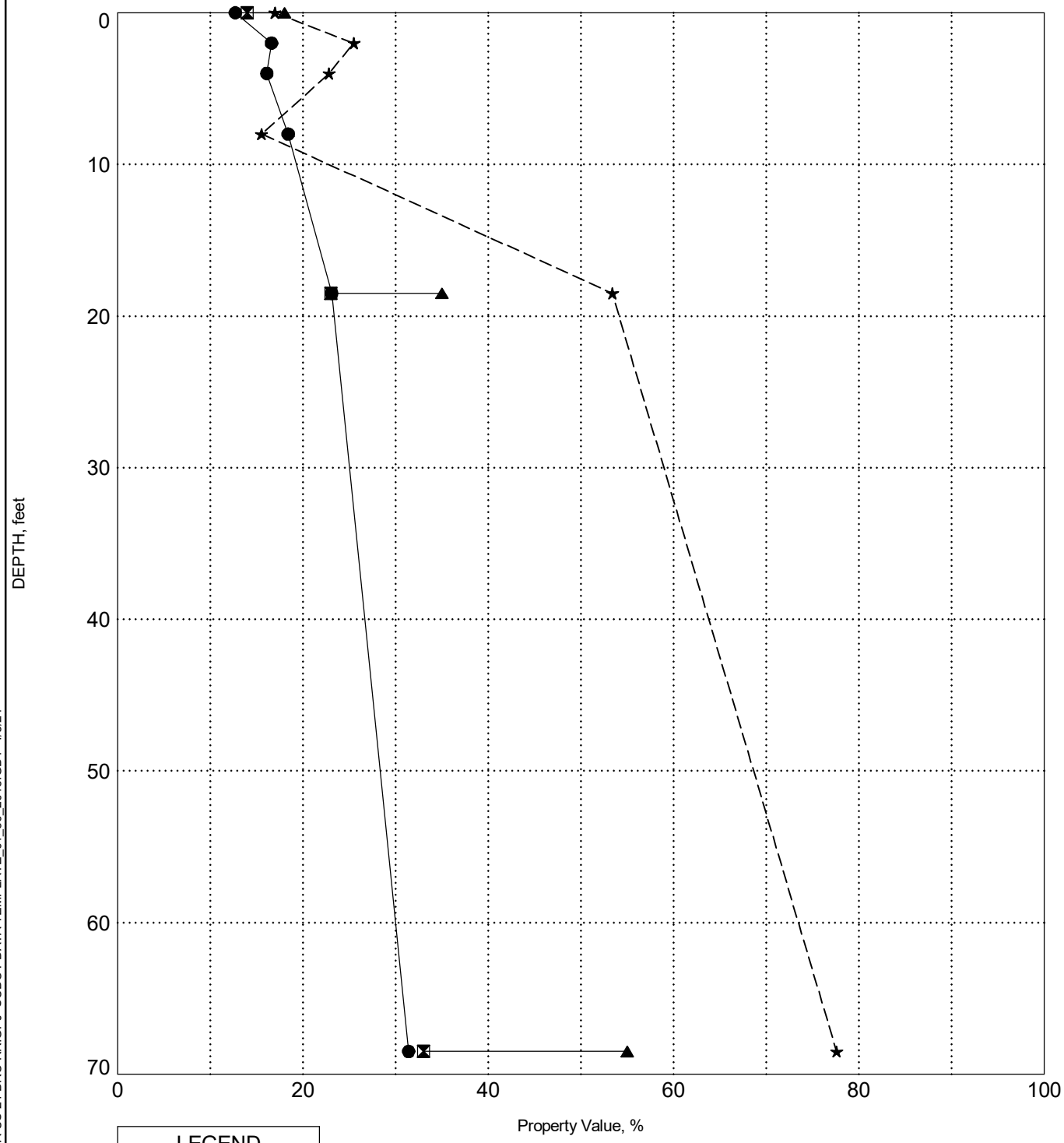
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING IB- 1W

SURFACE ELEVATION: 442.5



INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

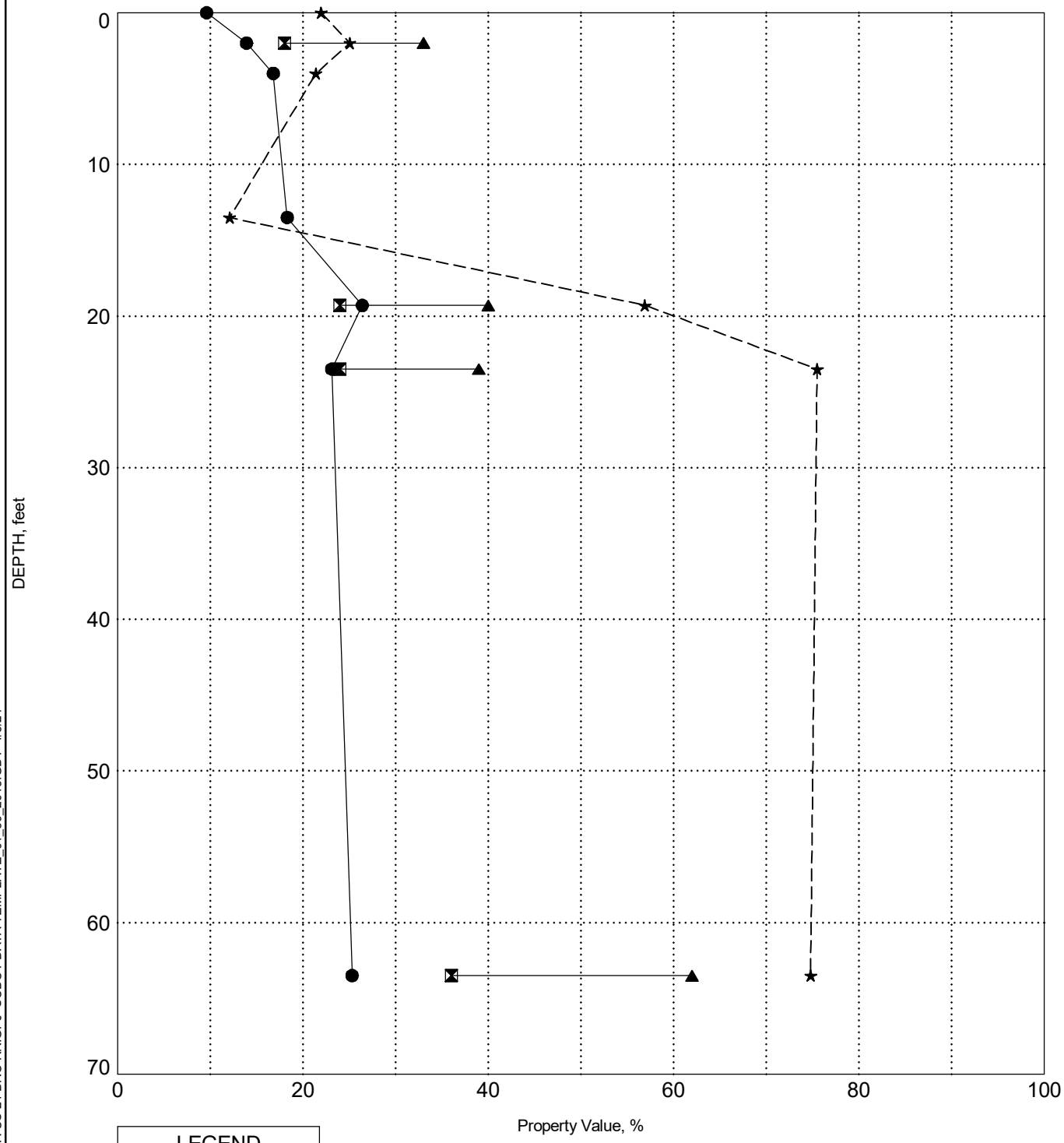
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING IB- 2W

SURFACE ELEVATION: 443.3



INDEX PROPERTIES VERSUS DEPTH

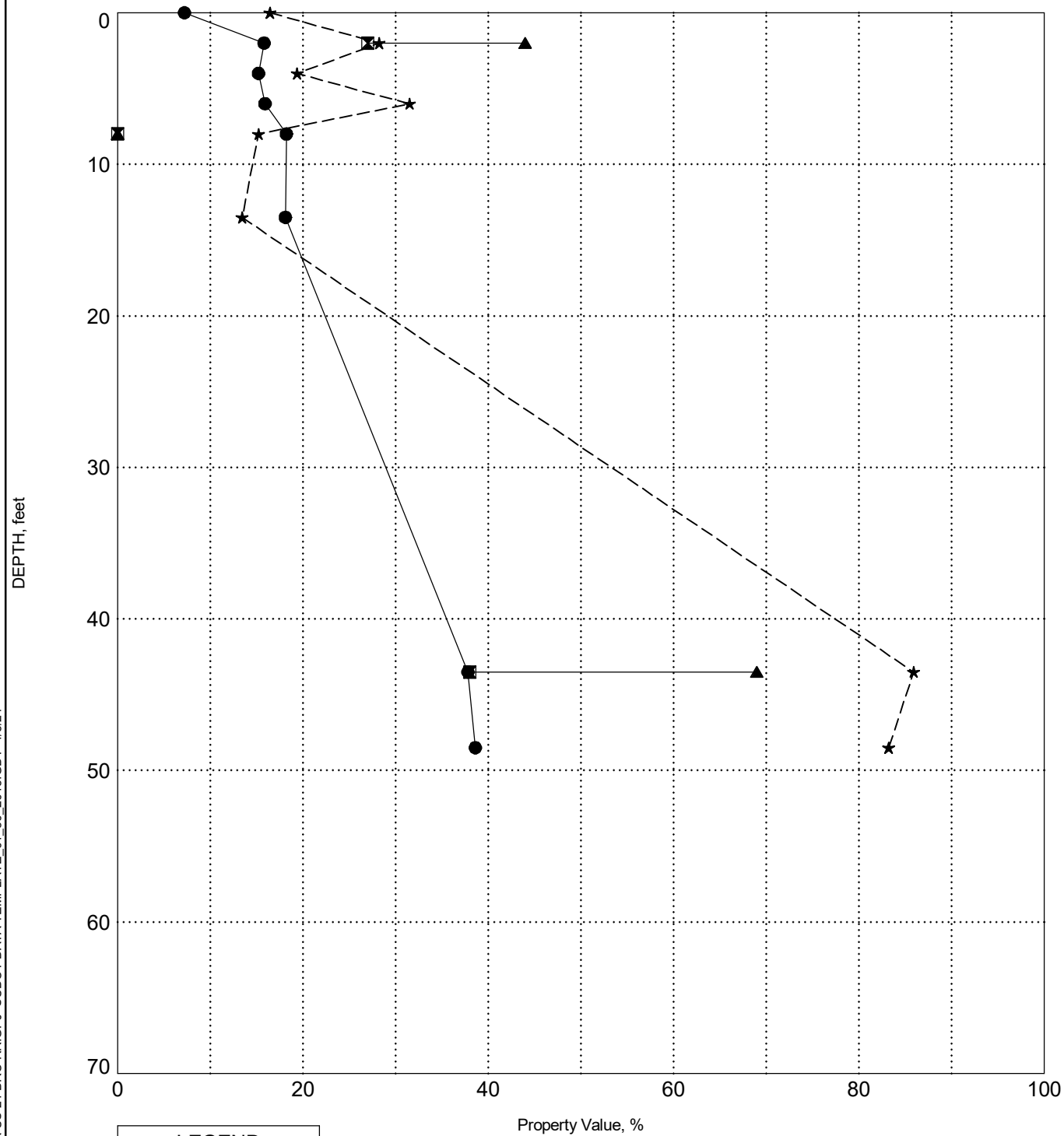
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING IB- 3W

SURFACE ELEVATION: 443.7



INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

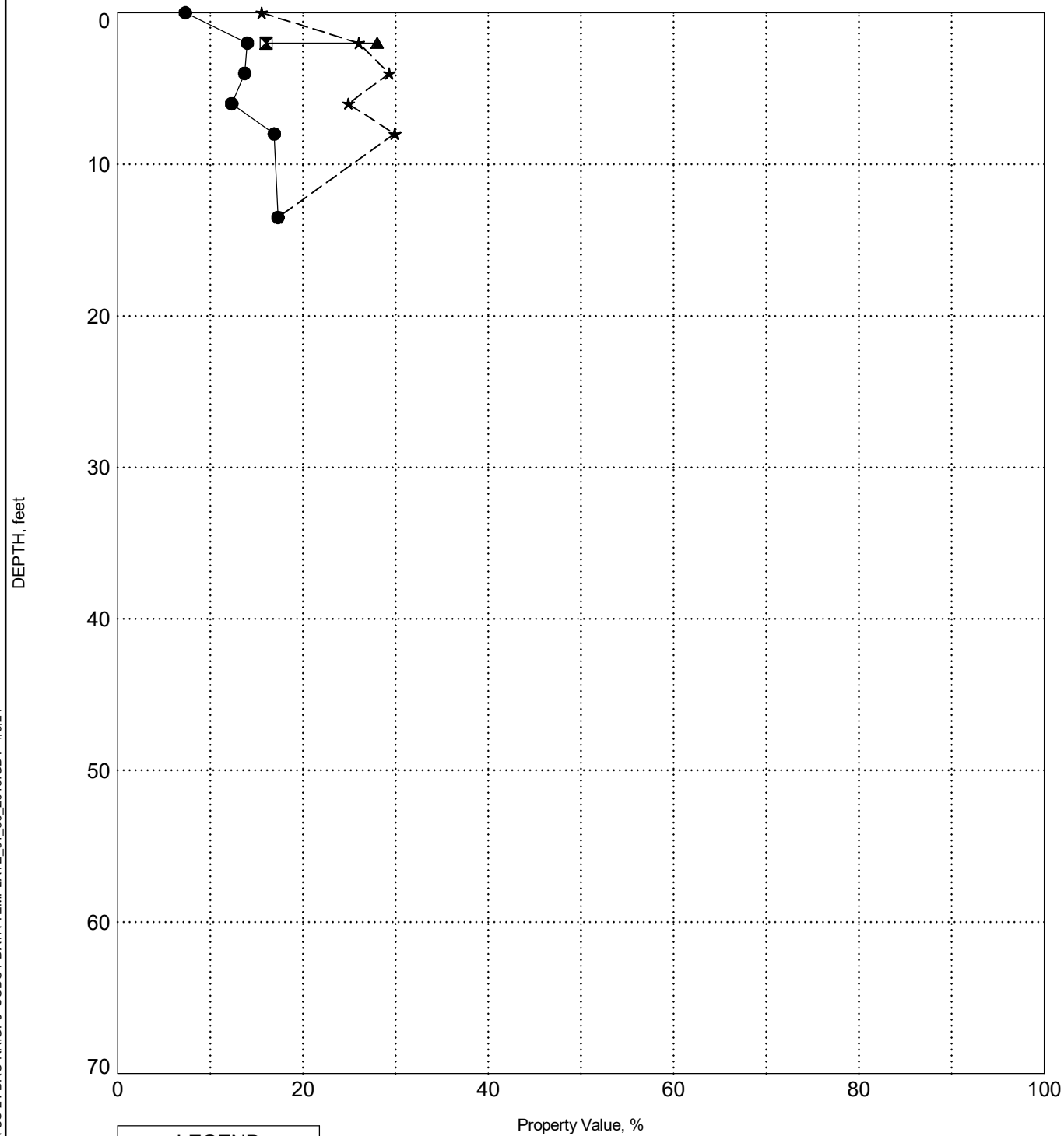
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING IB- 4W

SURFACE ELEVATION: 443.7



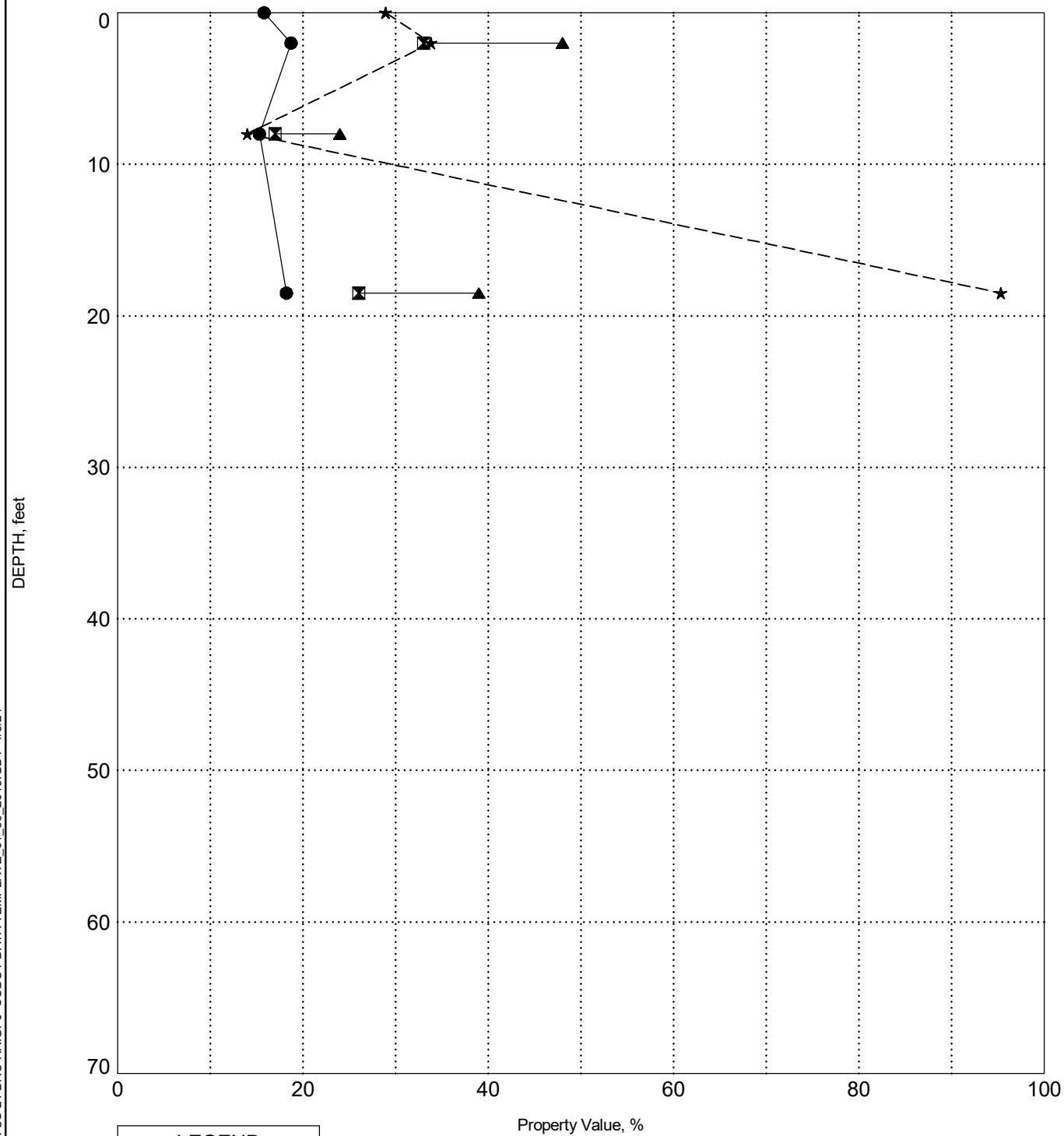
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-17

SURFACE ELEVATION: 445.2



INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

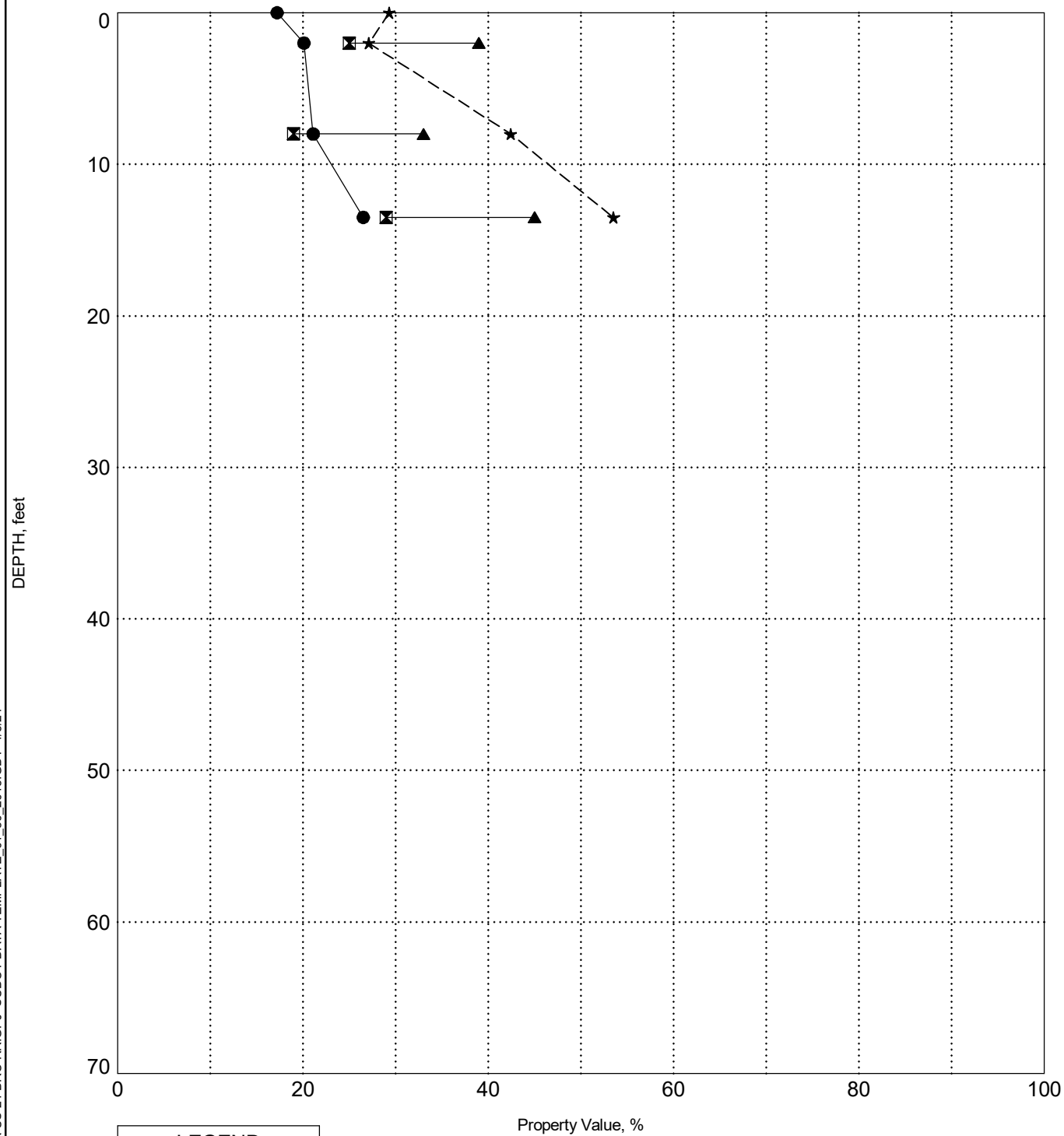
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-18

SURFACE ELEVATION: 445.0



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

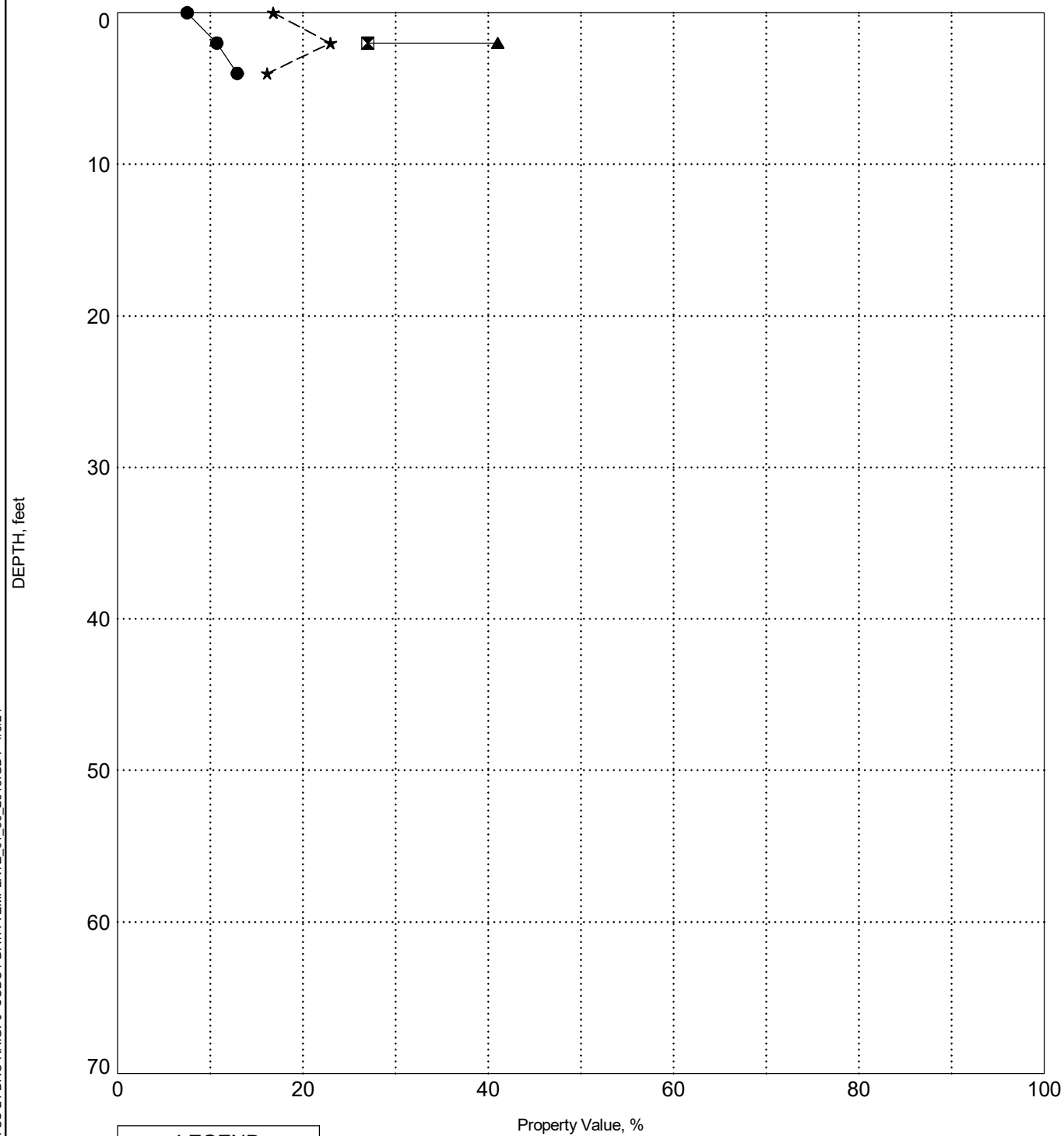
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-19

SURFACE ELEVATION: 445.0



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

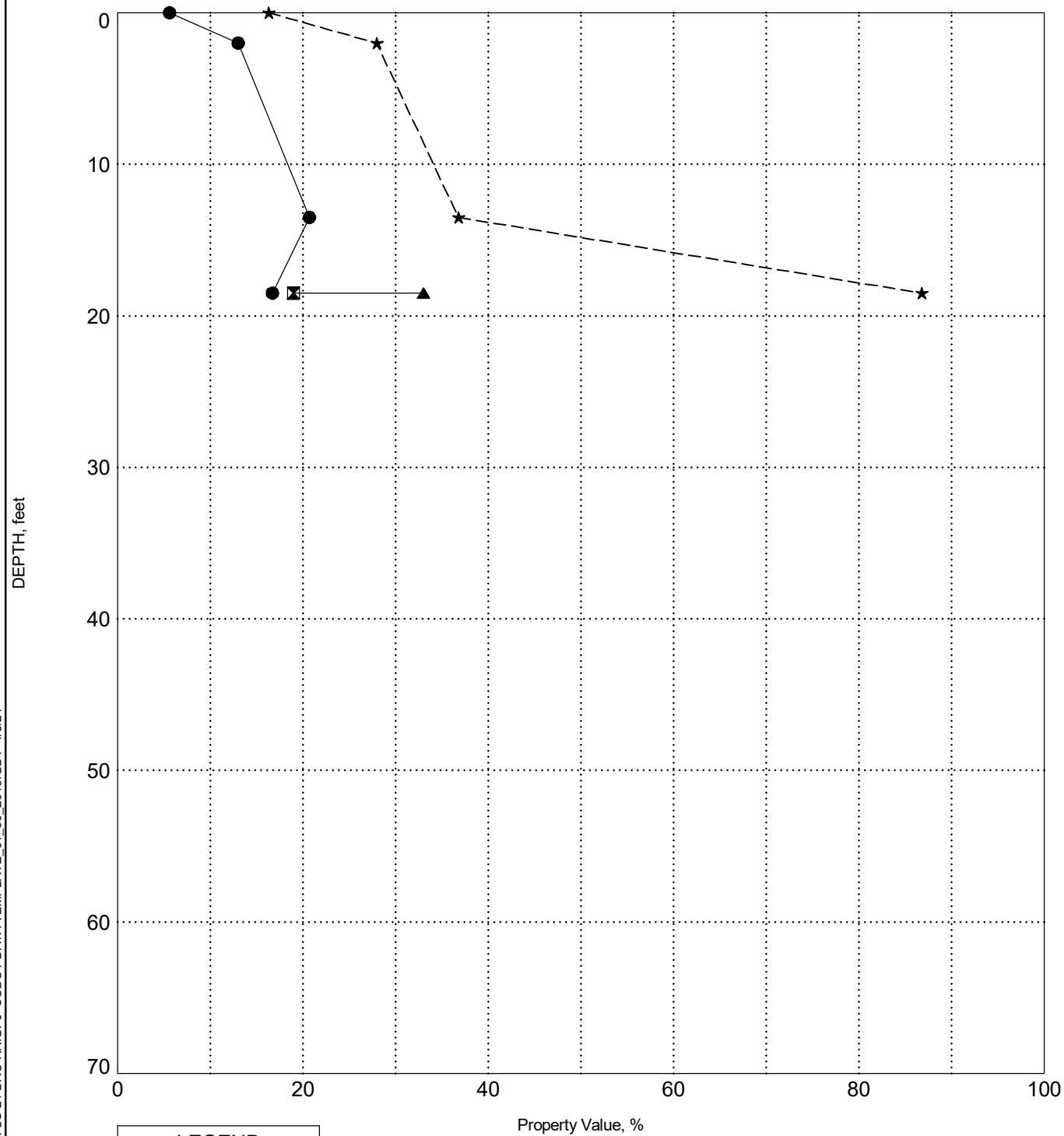
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-20

SURFACE ELEVATION: 445.4



INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

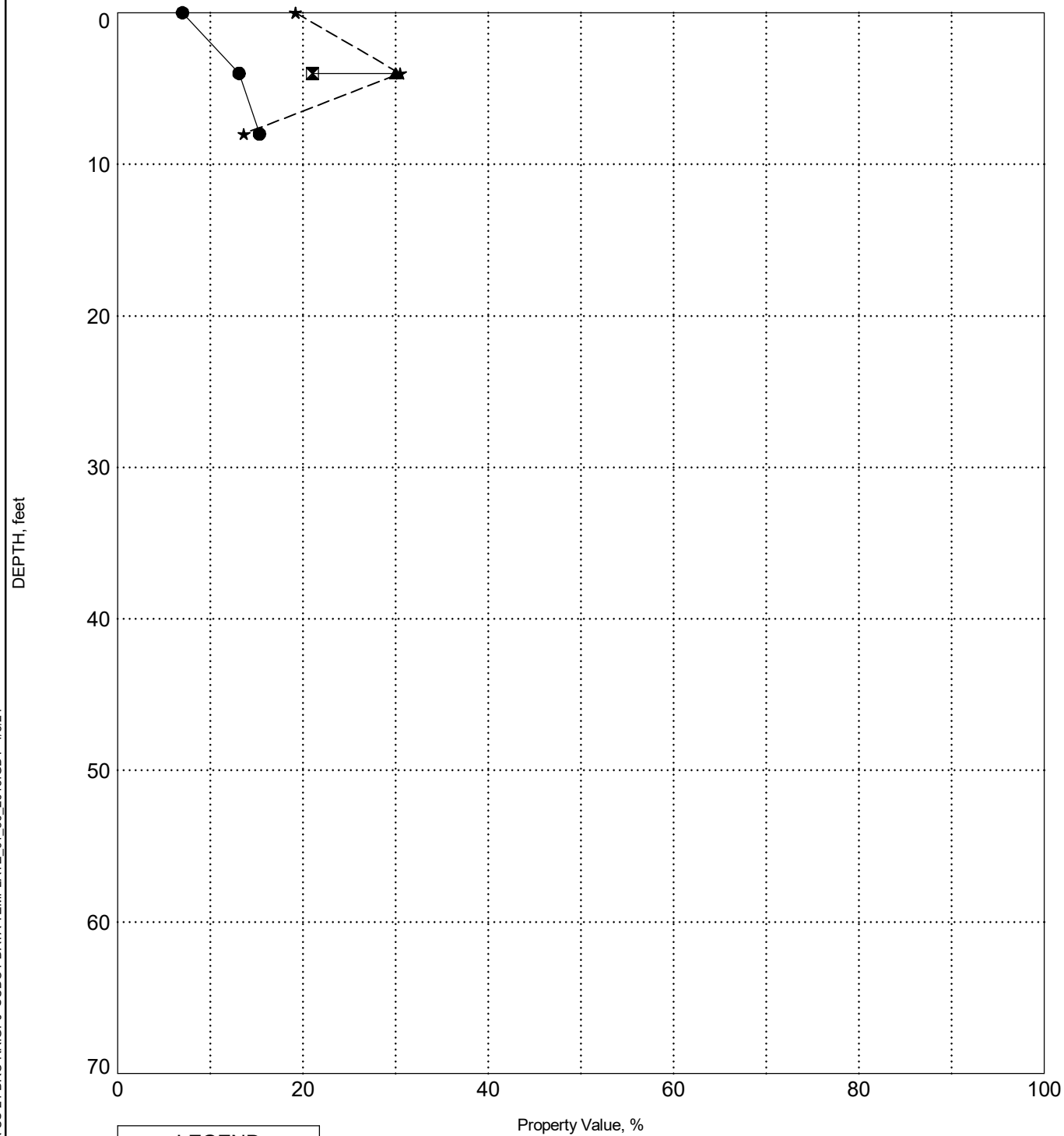
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-21

SURFACE ELEVATION: 444.6



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

INDEX PROPERTIES VERSUS DEPTH

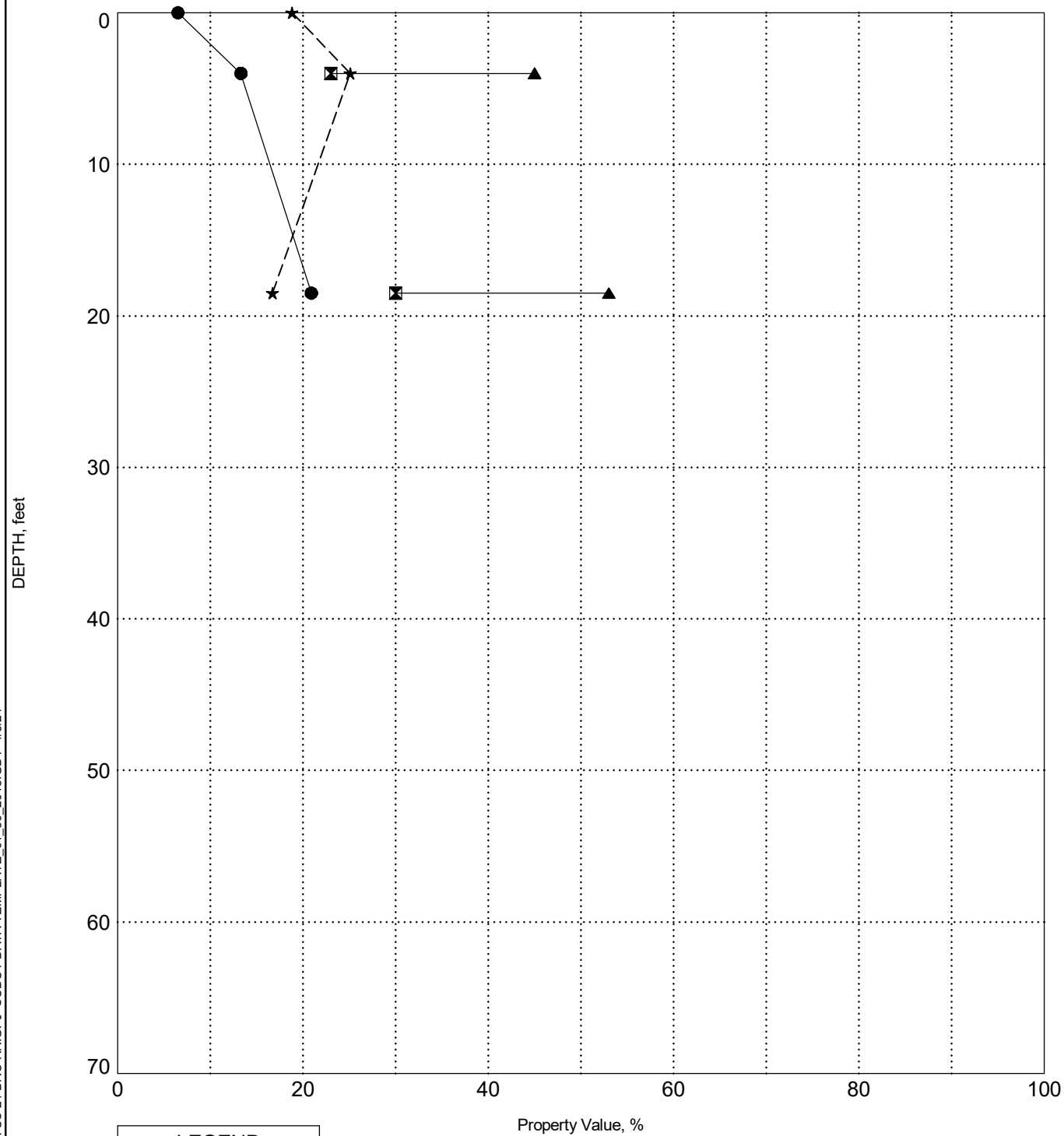
PROJECT ID P042443 (S&ME 23610178A)

PROJECT NAME I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-22

SURFACE ELEVATION: 445.0



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

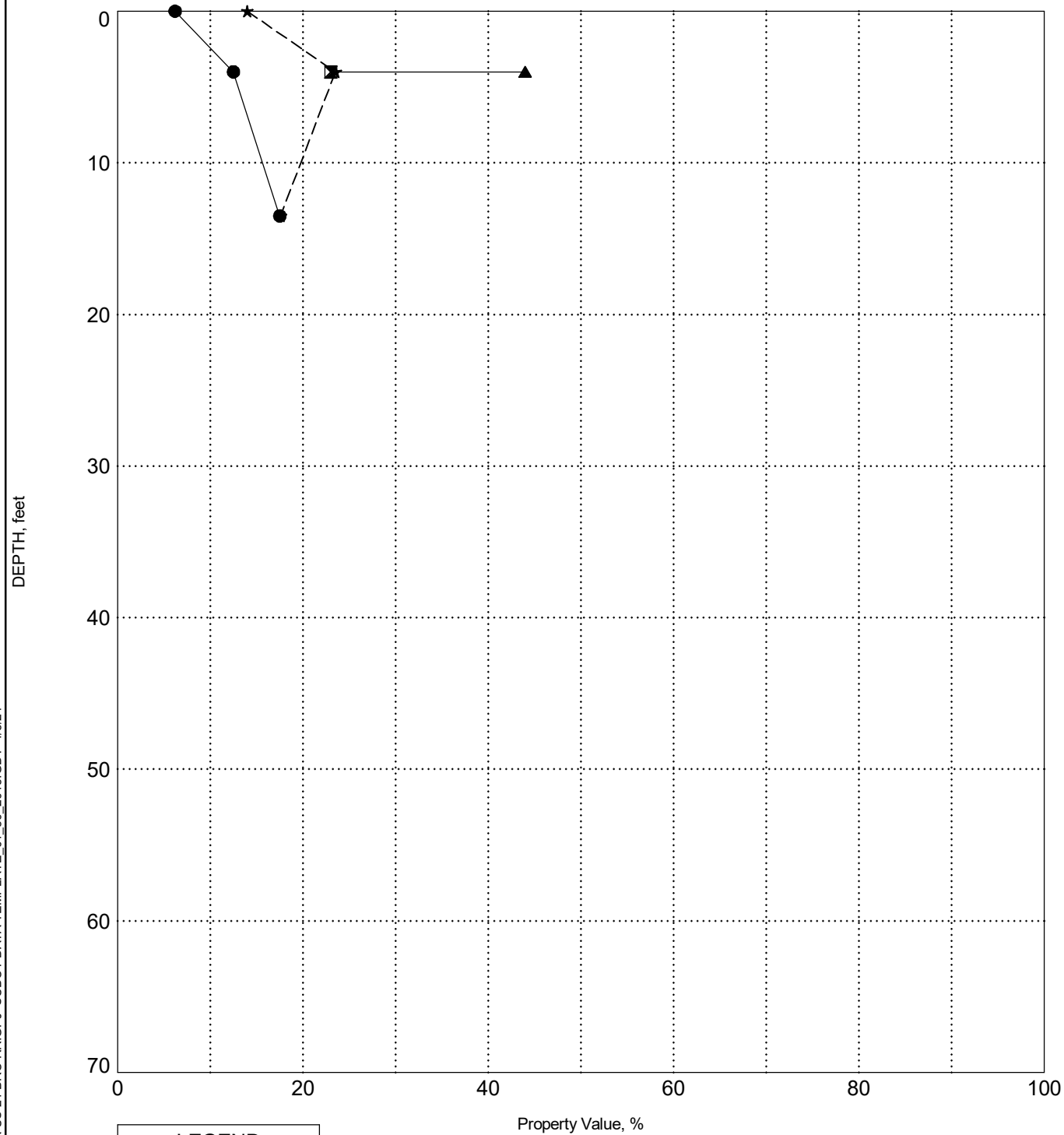
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-23

SURFACE ELEVATION: 442.2



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

INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

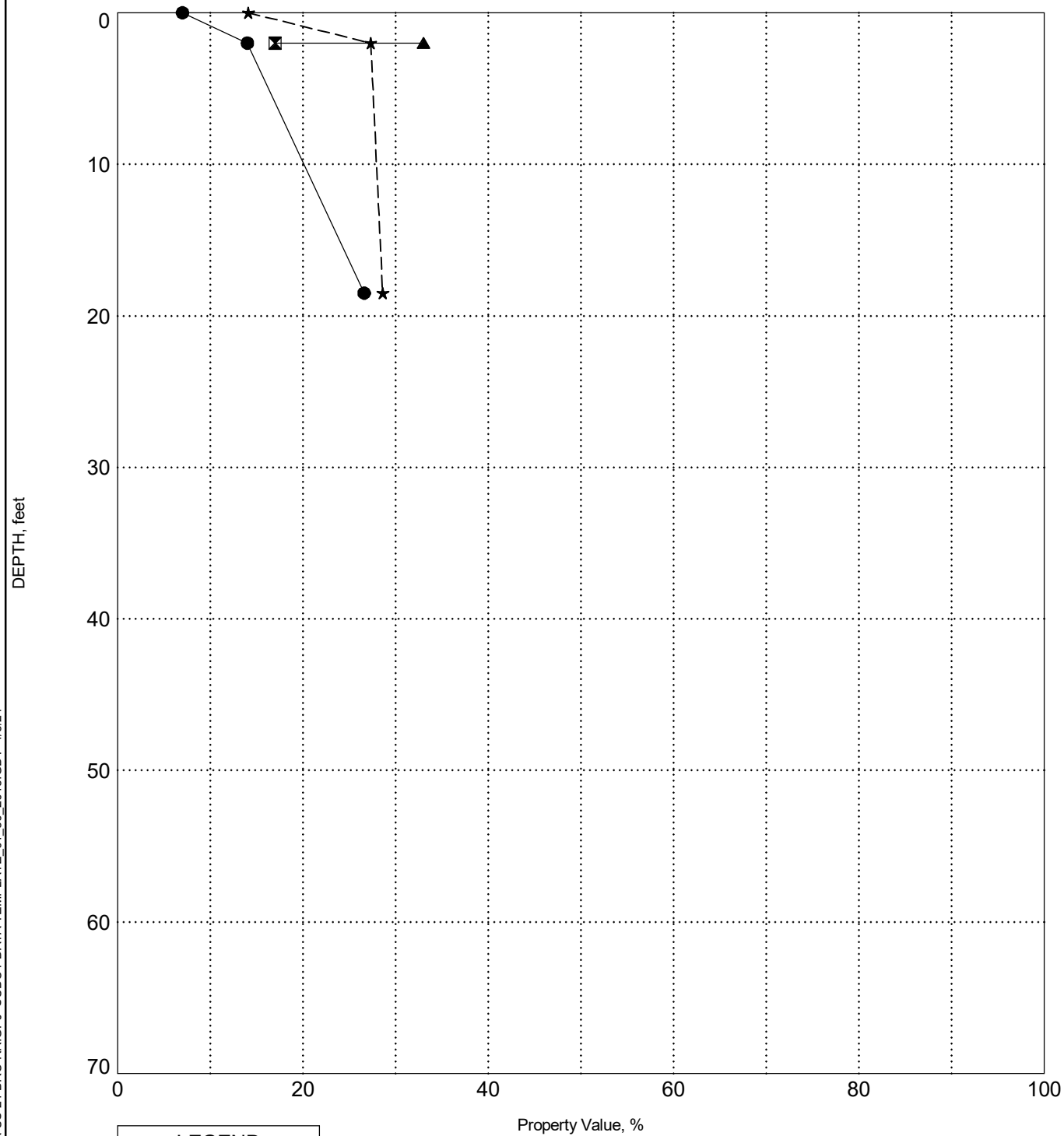
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland

BORING W-24

SURFACE ELEVATION: 442.2

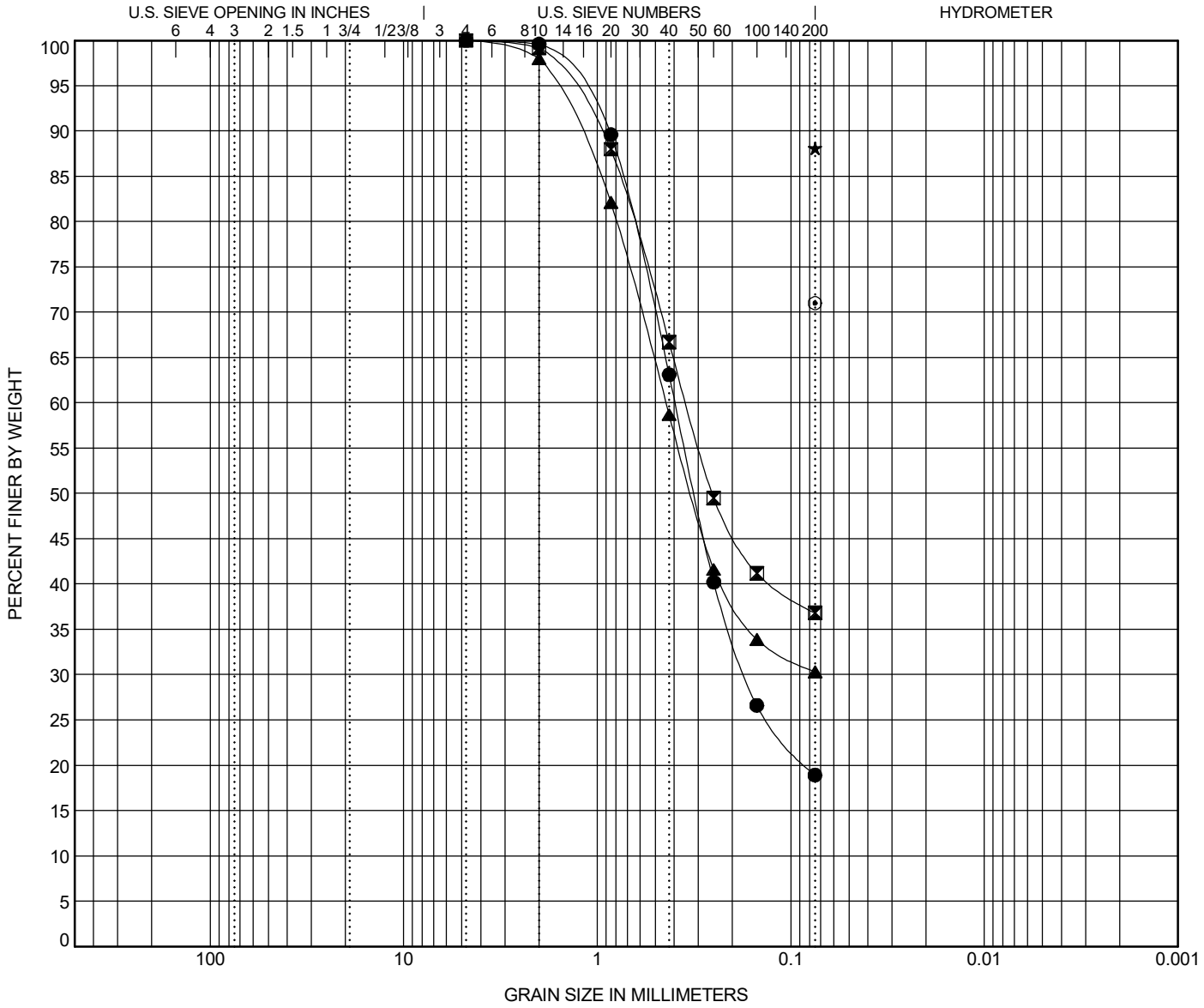


INDEX PROPS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	EB-1W	0.0	Silty SAND (SM)	NP	NP	NP		
⊠	EB-1W	2.0	Silty SAND (SM)	46	36	10		
▲	EB-1W	4.0	Clayey SAND (SC)					
★	EB-1W	18.5	Lean CLAY (CL)	31	23	8		
⊙	EB-1W	43.5	Sandy Elastic SILT (MH)	76	50	26		

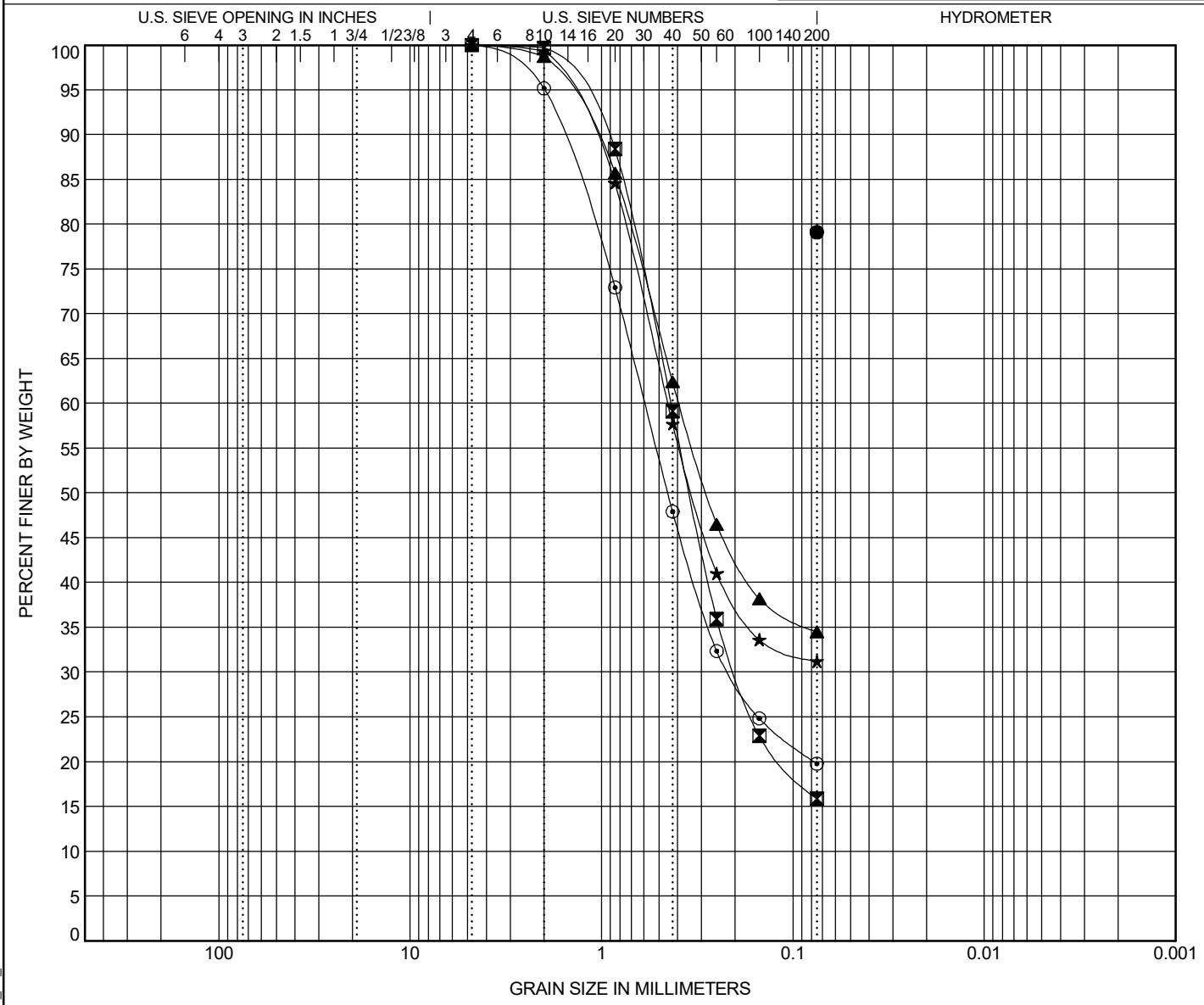
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	EB-1W	0.0	4.75	0.396	0.17		0.0	81.1	18.9	
⊠	EB-1W	2.0	4.75	0.346			0.0	63.2	36.8	
▲	EB-1W	4.0	4.75	0.442			0.0	69.7	30.3	
★	EB-1W	18.5	0.075						88.1	
⊙	EB-1W	43.5	0.075						71.0	

GRAIN SIZE 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-1W**	**48.5**	**Sandy Elastic SILT (MH)**					
⊠	**EB-2W**	**0.0**	**Silty SAND (SM)**					
▲	**EB-2W**	**2.0**	**Silty SAND (SM)**	**38**	**27**	**11**		
★	**EB-2W**	**4.0**	**Silty SAND (SM)**					
⊙	**EB-2W**	**8.0**	**Clayey SAND (SC)**	**26**	**17**	**9**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-1W**	**48.5**	**0.075**						**79.1**	
⊠	**EB-2W**	**0.0**	**4.75**	**0.434**	**0.198**		**0.0**	**84.2**	**15.8**	
▲	**EB-2W**	**2.0**	**4.75**	**0.392**			**0.0**	**65.5**	**34.5**	
★	**EB-2W**	**4.0**	**4.75**	**0.451**			**0.0**	**68.8**	**31.2**	
⊙	**EB-2W**	**8.0**	**4.75**	**0.594**	**0.213**		**0.0**	**80.2**	**19.8**	

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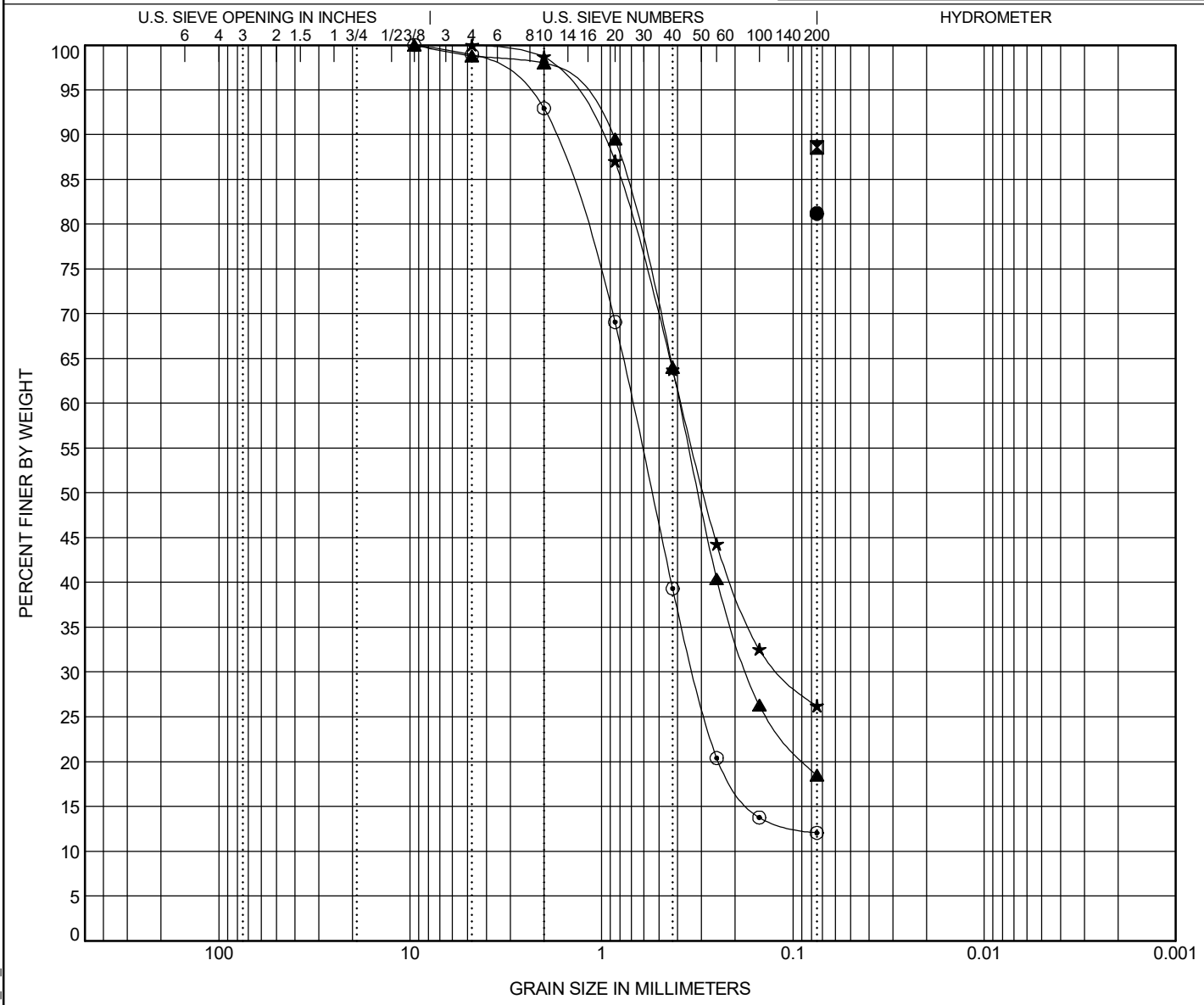

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-2W**	**18.5**	**Lean CLAY with Sand (CL)**	**28**	**16**	**12**		
⊠	**EB-2W**	**43.5**	**Elastic SILT (MH)**	**72**	**47**	**25**		
▲	**EB-3W**	**0.0**	**Silty SAND (SM)**					
★	**EB-3W**	**2.0**	**Clayey SAND (SC)**	**23**	**16**	**7**		
⊙	**EB-3W**	**18.5**	**Silty SAND (SM)**				**4.74**	**20.94**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-2W**	**18.5**	**0.075**						**81.2**	
⊠	**EB-2W**	**43.5**	**0.075**						**88.6**	
▲	**EB-3W**	**0.0**	**9.5**	**0.388**	**0.172**		**1.2**	**80.3**	**18.5**	
★	**EB-3W**	**2.0**	**4.75**	**0.384**	**0.114**		**0.0**	**73.8**	**26.2**	
⊙	**EB-3W**	**18.5**	**9.5**	**0.688**	**0.327**		**1.1**	**86.9**	**12.0**	

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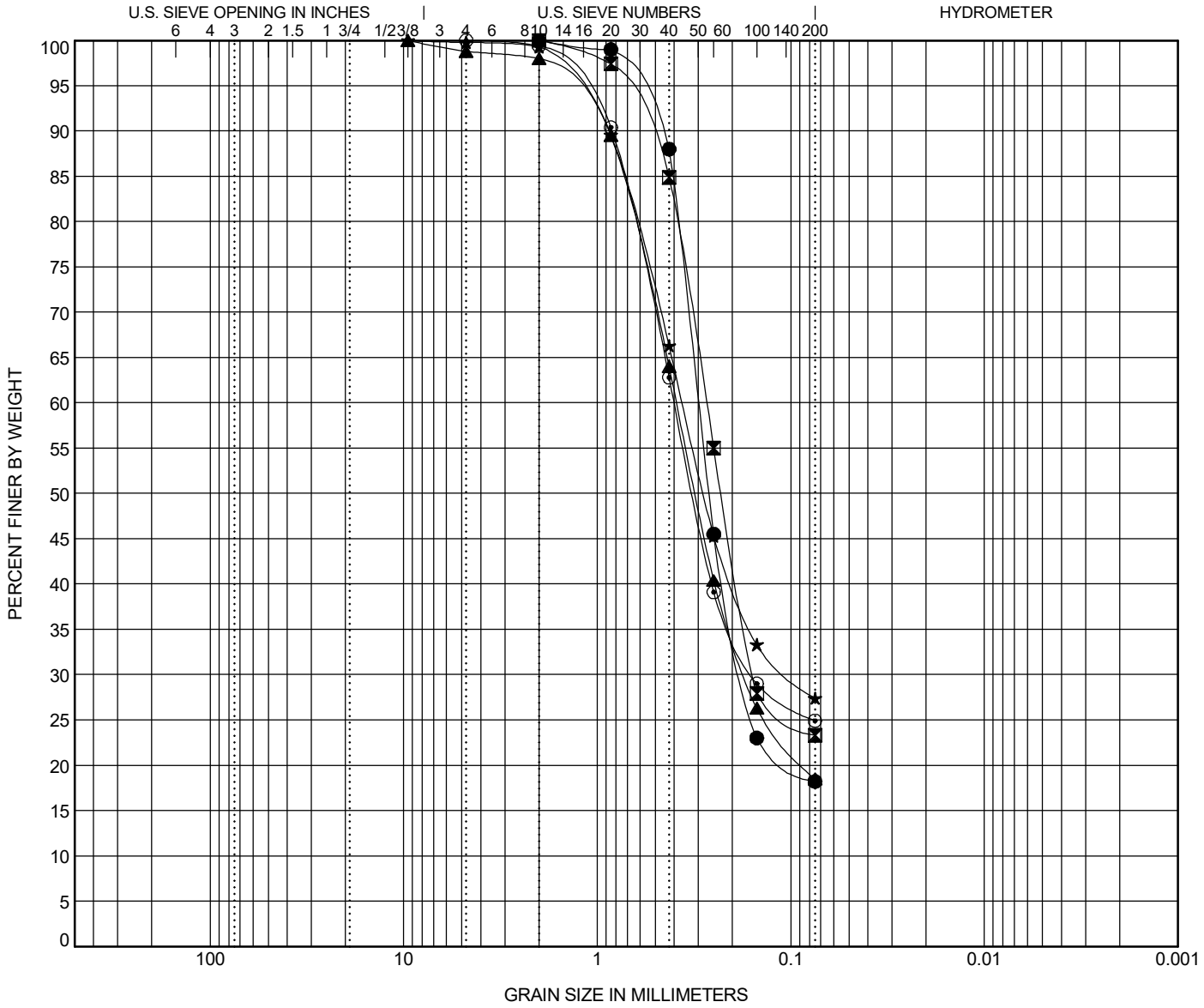

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-3W**	**23.5**	**Silty SAND (SM)**					
⊠	**EB-3W**	**28.5**	**Silty SAND (SM)**					
▲	**EB-4W**	**0.0**	**Silty SAND (SM)**					
★	**EB-4W**	**2.0**	**Clayey SAND (SC)**	**30**	**18**	**12**		
⊙	**EB-4W**	**4.0**	**Clayey SAND (SC)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-3W**	**23.5**	**2**	**0.3**	**0.176**		**0.0**	**81.8**	**18.2**	
⊠	**EB-3W**	**28.5**	**2**	**0.273**	**0.156**		**0.0**	**76.7**	**23.3**	
▲	**EB-4W**	**0.0**	**9.5**	**0.388**	**0.172**		**1.2**	**80.3**	**18.5**	
★	**EB-4W**	**2.0**	**9.5**	**0.362**	**0.102**		**0.2**	**72.4**	**27.4**	
⊙	**EB-4W**	**4.0**	**4.75**	**0.399**	**0.158**		**0.0**	**75.1**	**24.9**	

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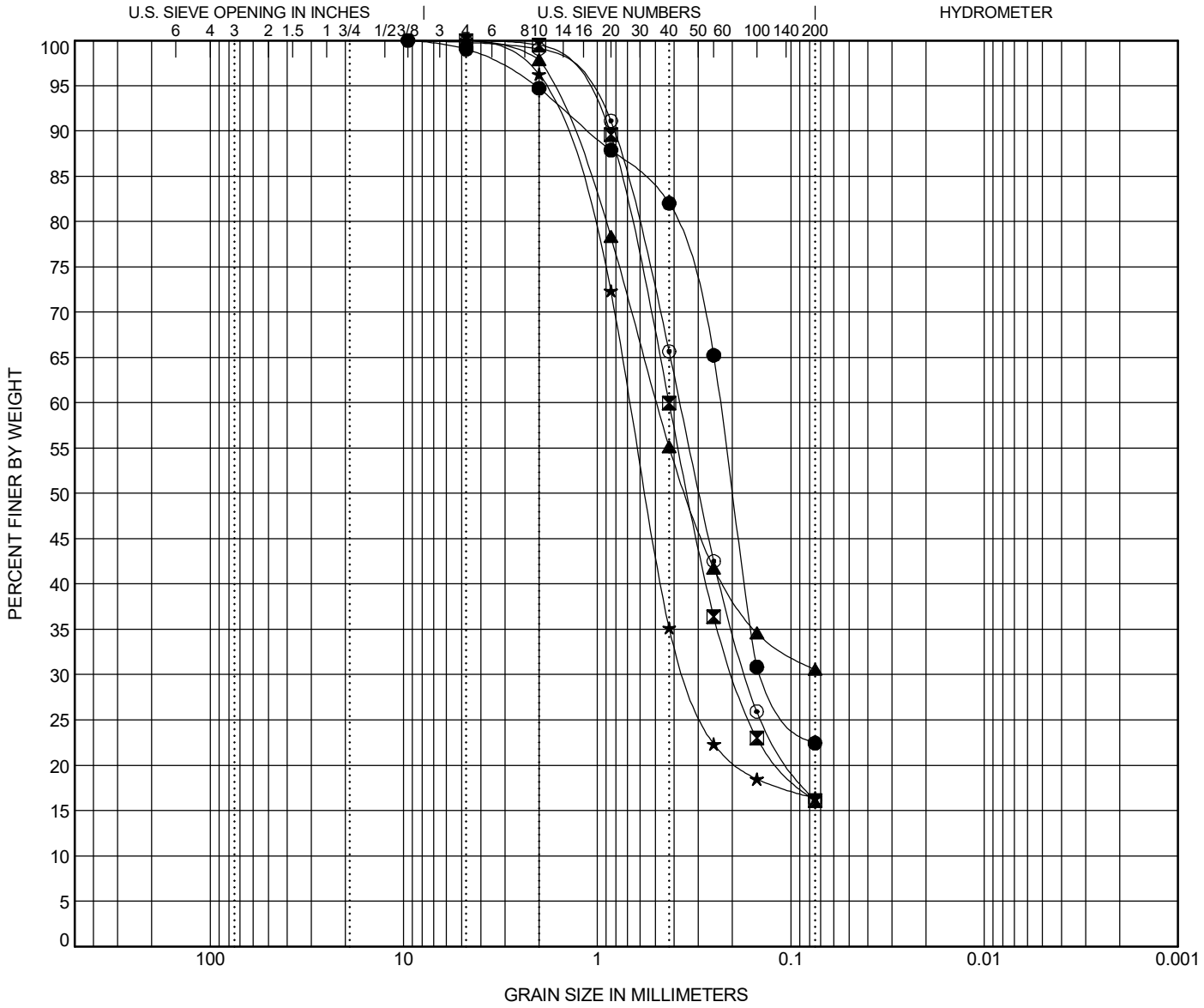

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-4W**	**23.5**	**Silty SAND (SM)**					
⊠	**EM- 5**	**0.0**	**Silty SAND (SM)**					
▲	**EM- 5**	**4.0**	**Silty SAND (SM)**	**54**	**32**	**22**		
★	**EM- 5**	**18.5**	**Silty SAND (SM)**					
⊙	**EM- 6**	**0.0**	**Silty SAND (SM)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-4W**	**23.5**	**9.5**	**0.231**	**0.14**		**1.0**	**76.6**	**22.4**	
⊠	**EM- 5**	**0.0**	**4.75**	**0.425**	**0.196**		**0.0**	**83.9**	**16.1**	
▲	**EM- 5**	**4.0**	**4.75**	**0.492**			**0.0**	**69.4**	**30.6**	
★	**EM- 5**	**18.5**	**4.75**	**0.675**	**0.343**		**0.0**	**83.6**	**16.4**	
⊙	**EM- 6**	**0.0**	**9.5**	**0.373**	**0.17**		**0.2**	**83.7**	**16.1**	

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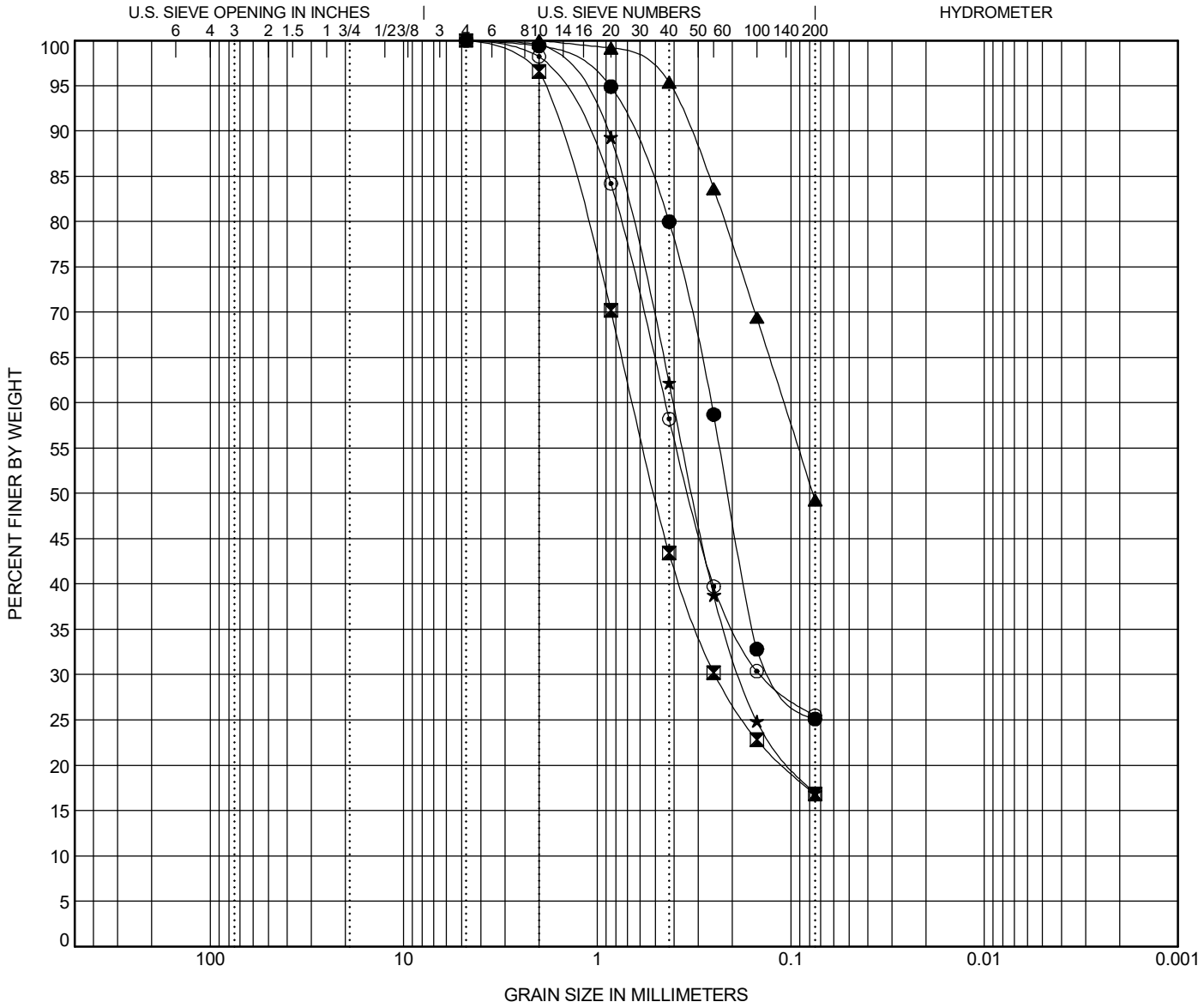

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EM- 6**	**4.0**	**Clayey SAND (SC)**	**36**	**21**	**15**		
⊠	**EM- 6**	**18.5**	**Silty-Clayey SAND (SC-SM)**	**27**	**21**	**6**		
▲	**EM- 6**	**23.5**	**Silty SAND (SM)**	**37**	**27**	**10**		
★	**IB- 1W**	**0.0**	**Silty, Clayey SAND (SC-SM)**	**18**	**14**	**4**		
⊙	**IB- 1W**	**2.0**	**Silty, Clayey SAND (SC-SM)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EM- 6**	**4.0**	**4.75**	**0.258**	**0.117**		**0.0**	**74.9**	**25.1**	
⊠	**EM- 6**	**18.5**	**4.75**	**0.653**	**0.247**		**0.0**	**83.2**	**16.8**	
▲	**EM- 6**	**23.5**	**2**	**0.108**			**0.0**	**50.7**	**49.3**	
★	**IB- 1W**	**0.0**	**4.75**	**0.404**	**0.181**		**0.0**	**83.0**	**17.0**	
⊙	**IB- 1W**	**2.0**	**4.75**	**0.446**	**0.142**		**0.0**	**74.5**	**25.5**	

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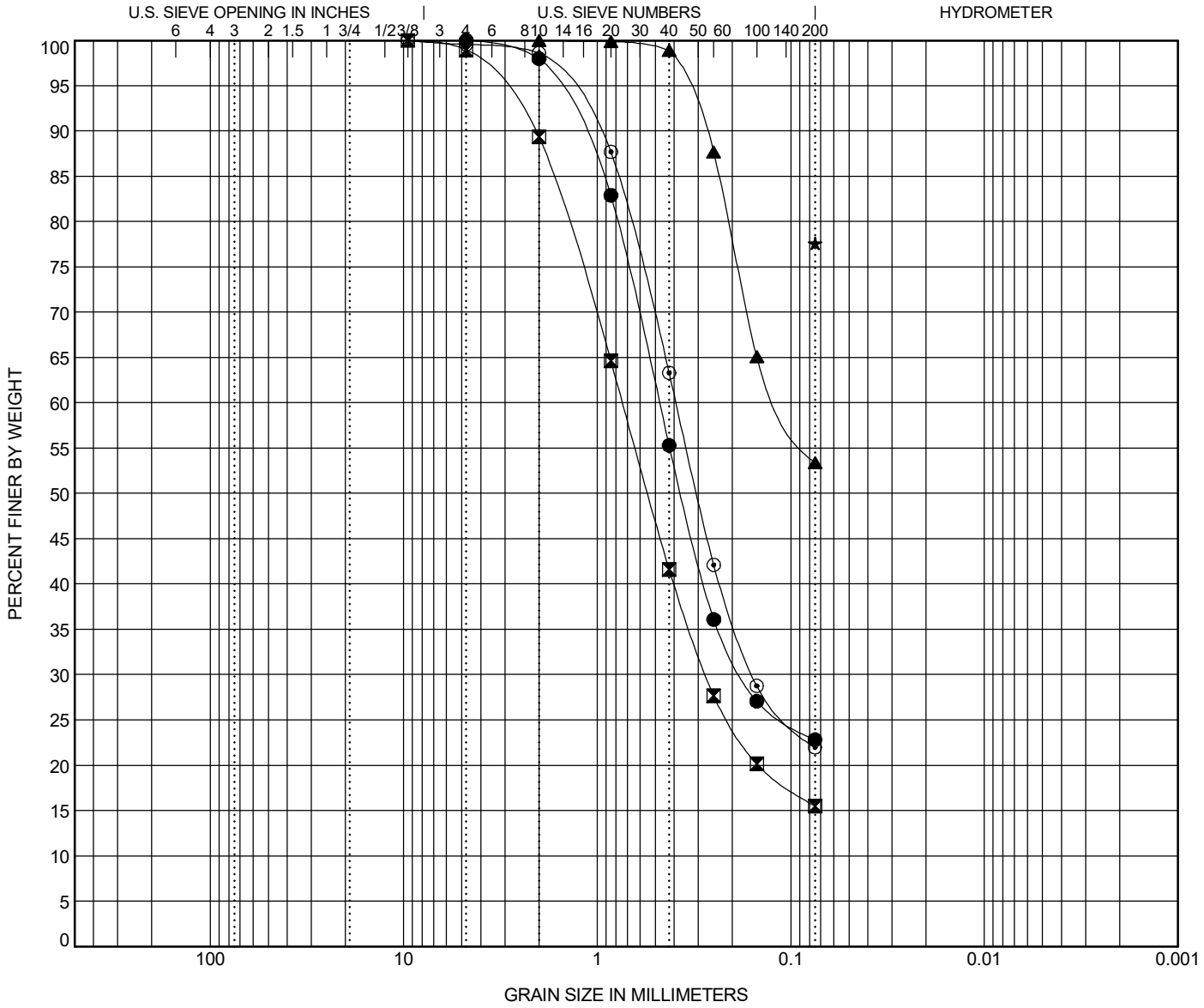

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	IB- 1W	4.0	Silty, Clayey SAND (SC-SM)					
⊠	IB- 1W	8.0	Silty SAND (SM)					
▲	IB- 1W	18.5	Sandy Lean CLAY (CL)	35	23	12		
★	IB- 1W	68.5	Elastic SILT with Sand (MH)	55	33	22		
⊙	IB- 2W	0.0	Silty SAND (SM)					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	IB- 1W	4.0	4.75	0.478	0.177		0.0	77.2	22.8	
⊠	IB- 1W	8.0	9.5	0.739	0.273		1.0	83.4	15.5	
▲	IB- 1W	18.5	2	0.111			0.0	46.6	53.4	
★	IB- 1W	68.5	0.075						77.6	
⊙	IB- 2W	0.0	9.5	0.391	0.157		0.4	77.6	22.0	

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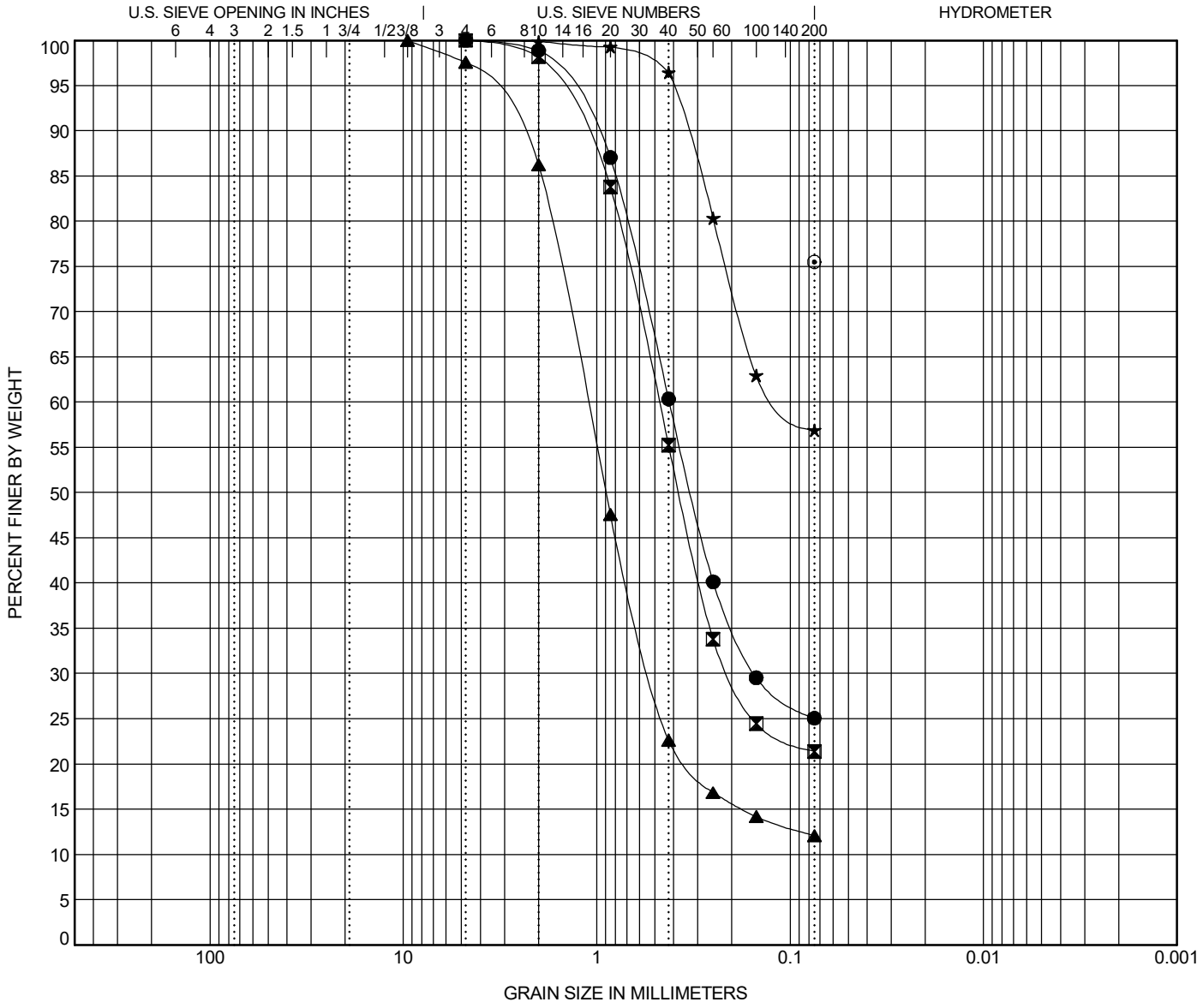

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	IB- 2W	2.0	Clayey SAND (SC)	33	18	15		
⊠	IB- 2W	4.0	Clayey SAND (SC)					
▲	IB- 2W	13.5	Silty SAND (SM)				6.48	29.79
★	IB- 2W	19.3	Sandy Lean CLAY (CL)	40	24	16		
⊙	IB- 2W	23.5	Lean CLAY with Sand (CL)	39	24	15		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	IB- 2W	2.0	4.75	0.421	0.154		0.0	74.9	25.1	
⊠	IB- 2W	4.0	4.75	0.477	0.203		0.0	78.6	21.4	
▲	IB- 2W	13.5	9.5	1.119	0.522		2.4	85.5	12.1	
★	IB- 2W	19.3	4.75	0.107			0.0	43.1	56.9	
⊙	IB- 2W	23.5	0.075						75.5	

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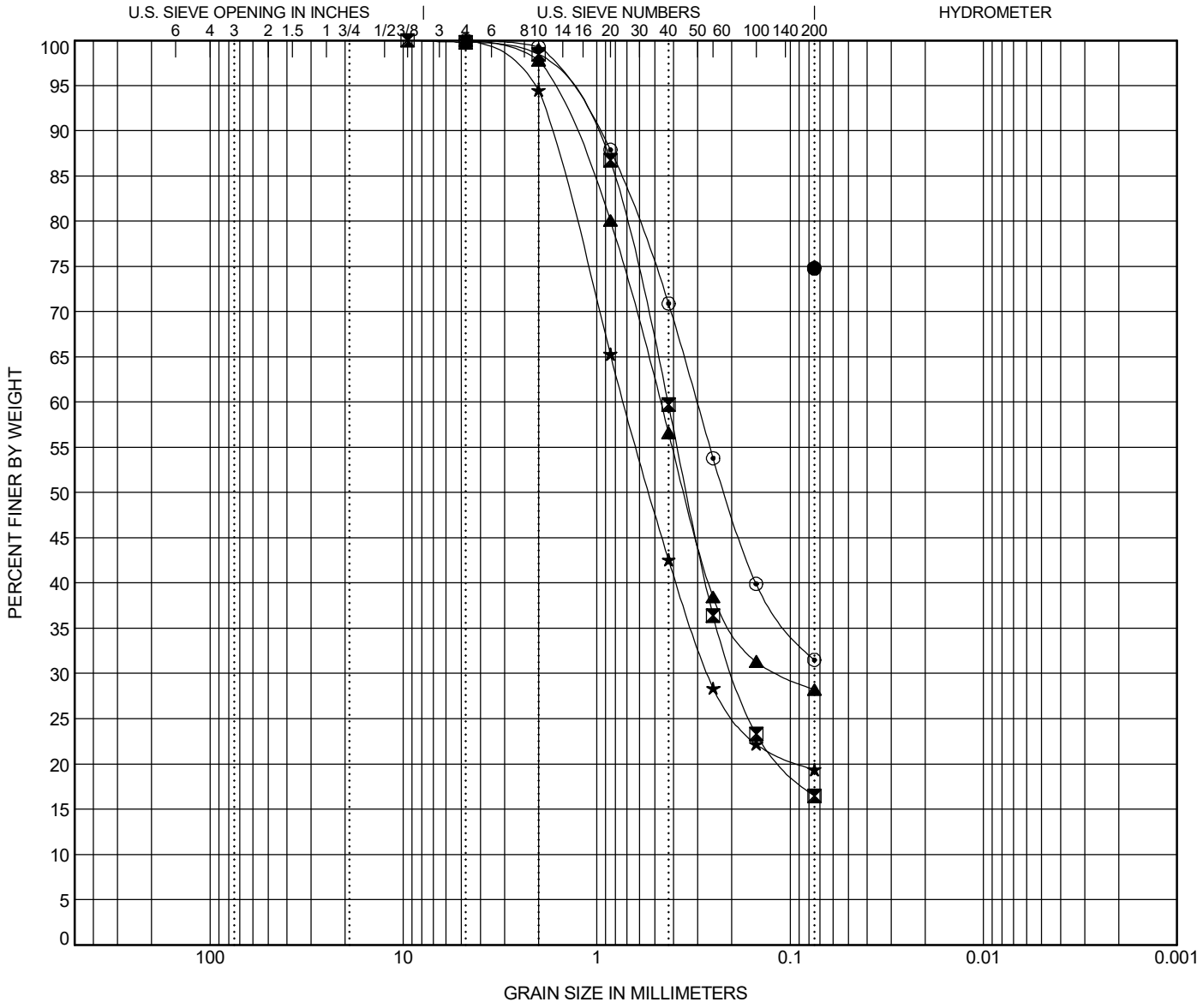

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	IB- 2W	63.5	Elastic SILT with Sand (MH)	62	36	26		
⊠	IB- 3W	0.0	Clayey SAND (SC)					
▲	IB- 3W	2.0	Clayey SAND (SC)	44	27	17		
★	IB- 3W	4.0	Clayey SAND (SC)					
⊙	IB- 3W	6.0	Clayey SAND (SC)					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	IB- 2W	63.5	0.075						74.8	
⊠	IB- 3W	0.0	9.5	0.428	0.195		0.2	83.4	16.4	
▲	IB- 3W	2.0	4.75	0.47	0.112		0.0	71.8	28.2	
★	IB- 3W	4.0	4.75	0.723	0.266		0.0	80.6	19.4	
⊙	IB- 3W	6.0	4.75	0.303			0.0	68.5	31.5	

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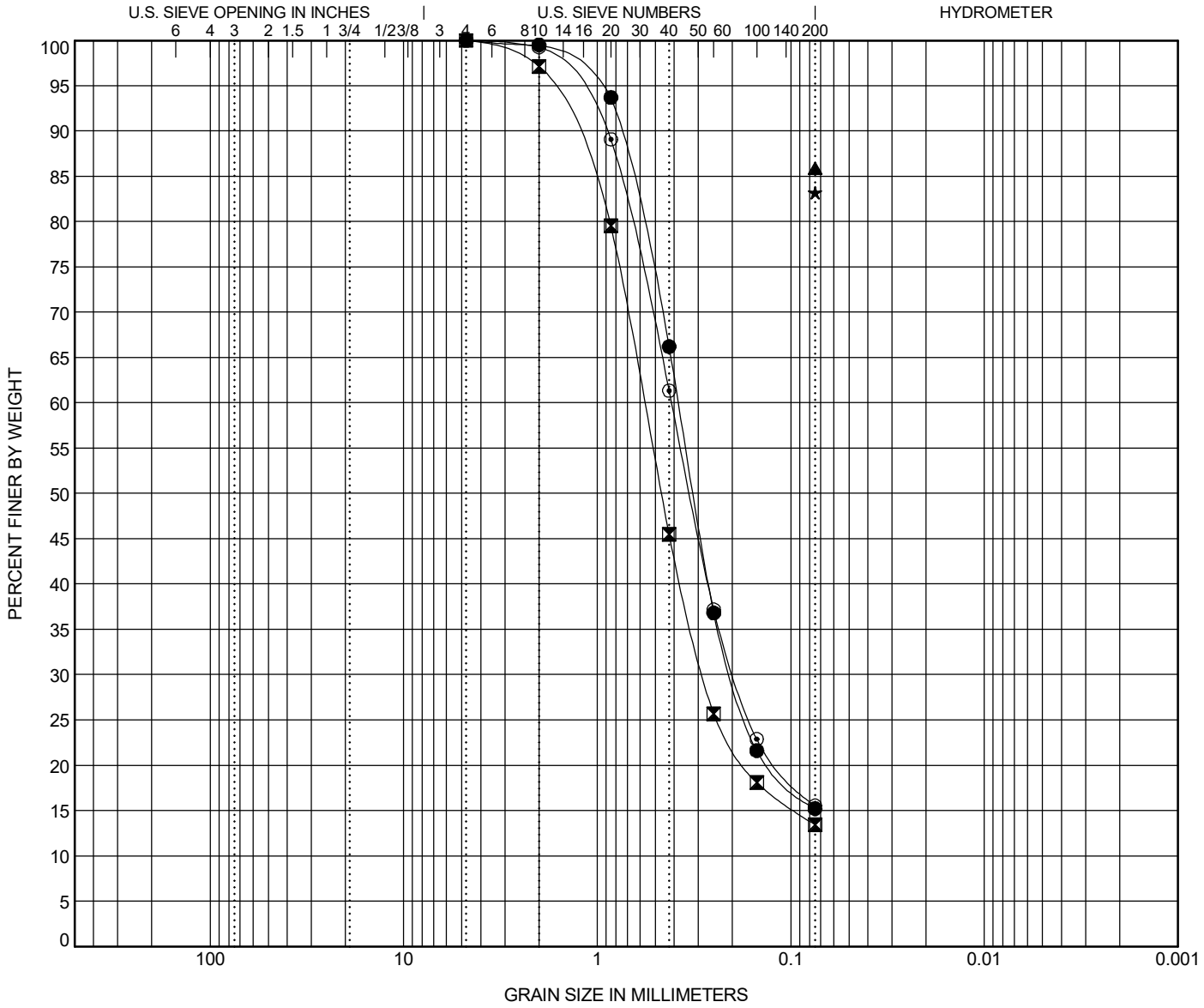

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**IB- 3W**	**8.0**	**Silty SAND (SM)**	**NP**	**NP**	**NP**		
⊠	**IB- 3W**	**13.5**	**Silty SAND (SM)**					
▲	**IB- 3W**	**43.5**	**Elastic SILT (MH)**	**69**	**38**	**31**		
★	**IB- 3W**	**48.5**	**Elastic SILT with Sand (MH)**					
⊙	**IB- 4W**	**0.0**	**Silty SAND (SM)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**IB- 3W**	**8.0**	**4.75**	**0.38**	**0.199**		**0.0**	**84.8**	**15.2**	
⊠	**IB- 3W**	**13.5**	**4.75**	**0.571**	**0.281**		**0.0**	**86.6**	**13.4**	
▲	**IB- 3W**	**43.5**	**0.075**						**85.9**	
★	**IB- 3W**	**48.5**	**0.075**						**83.2**	
⊙	**IB- 4W**	**0.0**	**4.75**	**0.413**	**0.193**		**0.0**	**84.5**	**15.5**	

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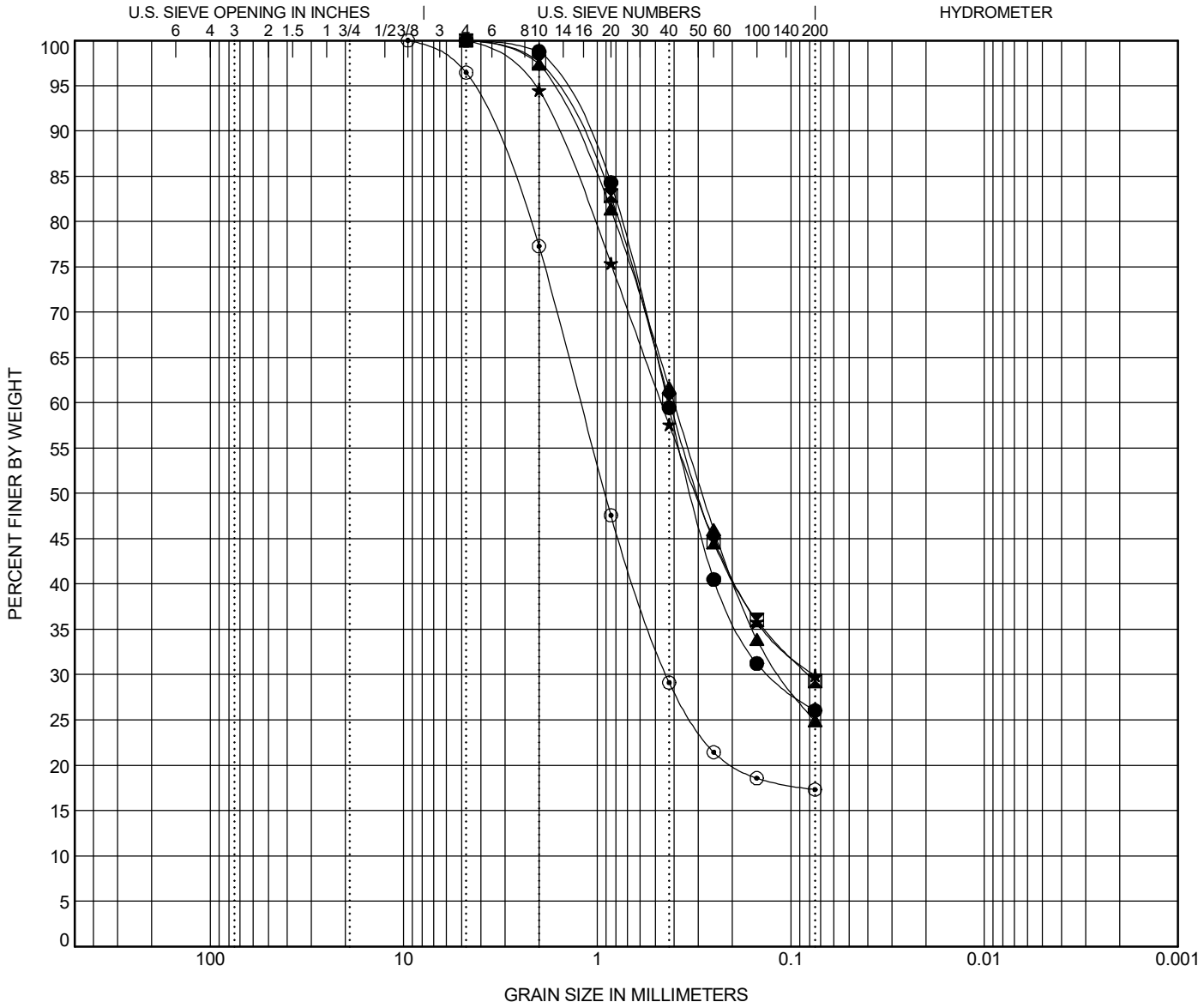

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	IB- 4W	2.0	Clayey SAND (SC)	28	16	12		
⊠	IB- 4W	4.0	Clayey SAND (SC)					
▲	IB- 4W	6.0	Clayey SAND (SC)					
★	IB- 4W	8.0	Clayey SAND (SC)					
⊙	IB- 4W	13.5	Silty SAND (SM)					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	IB- 4W	2.0	4.75	0.432	0.127		0.0	74.0	26.0	
⊠	IB- 4W	4.0	4.75	0.421	0.081		0.0	70.7	29.3	
▲	IB- 4W	6.0	4.75	0.401	0.111		0.0	75.1	24.9	
★	IB- 4W	8.0	4.75	0.467	0.076		0.0	70.1	29.9	
⊙	IB- 4W	13.5	9.5	1.216	0.439		3.6	79.1	17.3	

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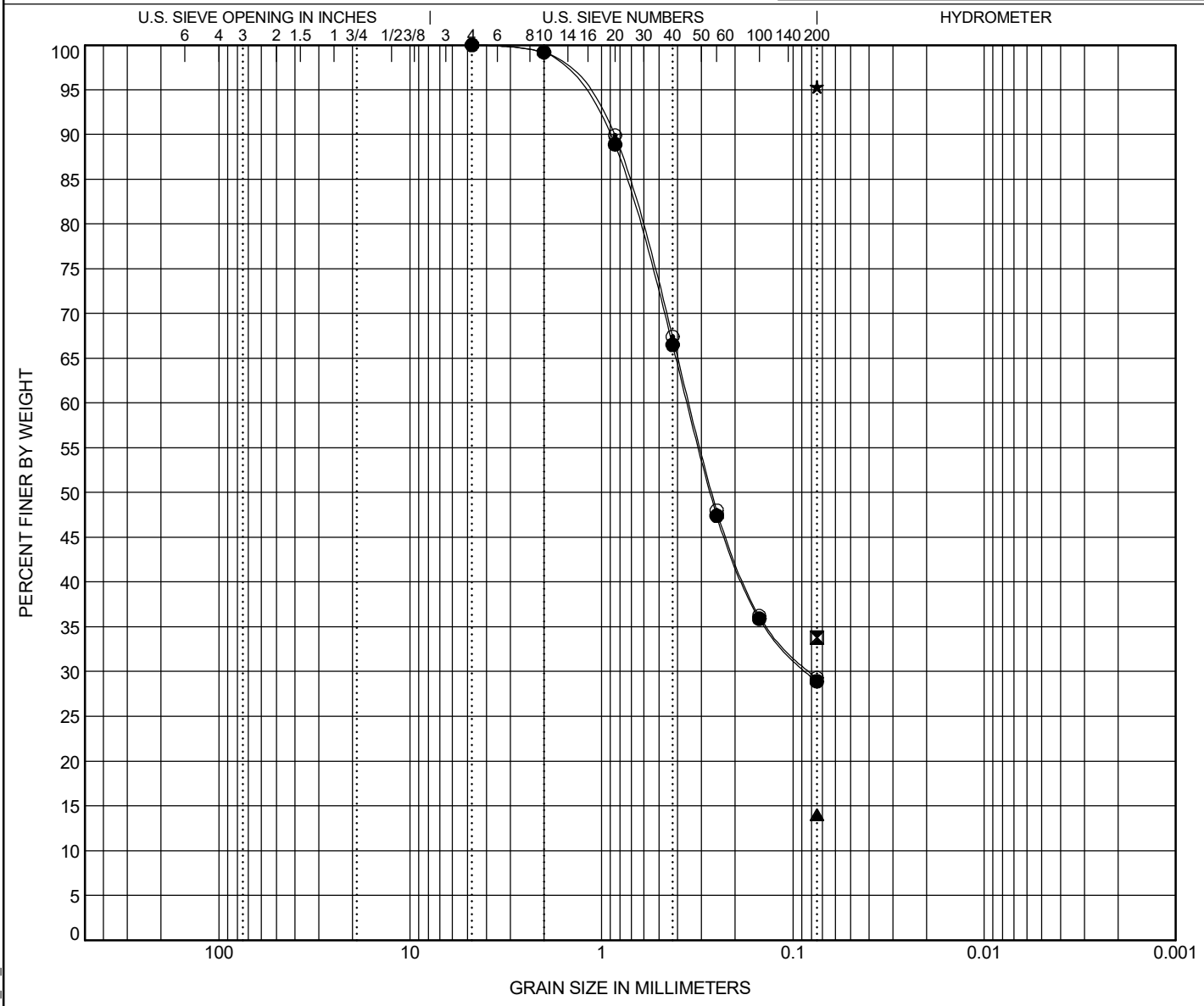

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-17**	**0.0**	**Silty SAND (SM)**					
⊠	**W-17**	**2.0**	**Silty SAND (SM)**	**48**	**33**	**15**		
▲	**W-17**	**8.0**	**Silty Clayey SAND (SC-SM)**	**24**	**17**	**7**		
★	**W-17**	**18.5**	**SILT (ML)**	**39**	**26**	**13**		
⊙	**W-18**	**0.0**	**Silty SAND (SM)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-17**	**0.0**	**4.75**	**0.355**	**0.084**		**0.0**	**71.1**	**28.9**	
⊠	**W-17**	**2.0**	**0.075**						**33.8**	
▲	**W-17**	**8.0**	**0.075**						**14.0**	
★	**W-17**	**18.5**	**0.075**						**95.3**	
⊙	**W-18**	**0.0**	**4.75**	**0.347**	**0.08**		**0.0**	**70.7**	**29.3**	

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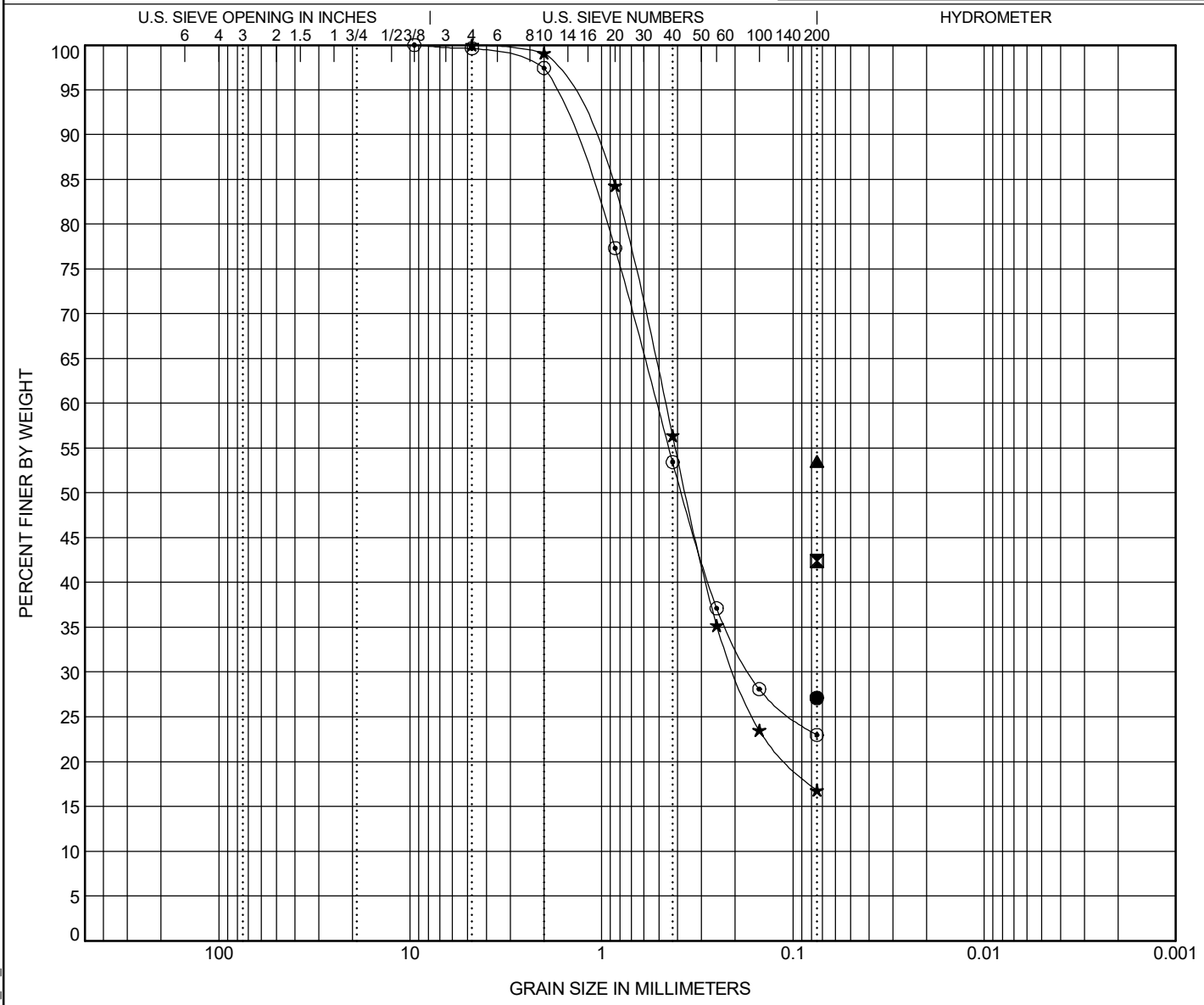

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	W-18	2.0	Clayey SAND (SC)	39	25	14		
⊠	W-18	8.0	Clayey SAND (SC)	33	19	14		
▲	W-18	13.5	Sandy SILT (ML)	45	29	16		
★	W-19	0.0	Silty SAND (SM)					
⊙	W-19	2.0	Silty SAND (SM)	41	27	14		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	W-18	2.0	0.075						27.1	
⊠	W-18	8.0	0.075						42.4	
▲	W-18	13.5	0.075						53.5	
★	W-19	0.0	4.75	0.465	0.199		0.0	83.2	16.8	
⊙	W-19	2.0	9.5	0.514	0.167		0.4	76.7	23.0	

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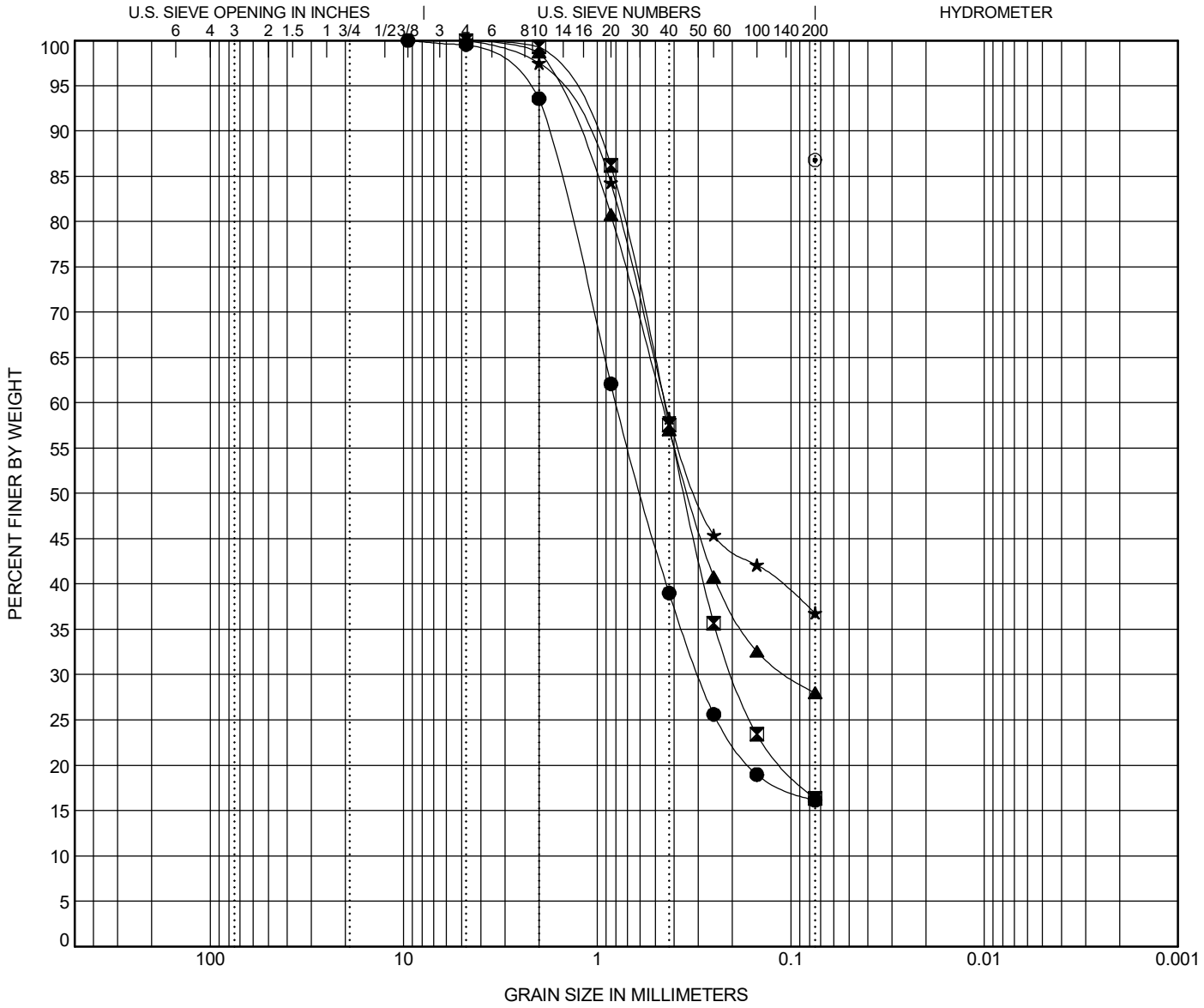
PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-19**	**4.0**	**Silty SAND (SM)**					
⊠	**W-20**	**0.0**	**Silty SAND (SM)**					
▲	**W-20**	**2.0**	**Silty SAND (SM)**					
★	**W-20**	**13.5**	**Silty SAND (SM)**					
⊙	**W-20**	**18.5**	**Lean CLAY (CL)**	**33**	**19**	**14**		

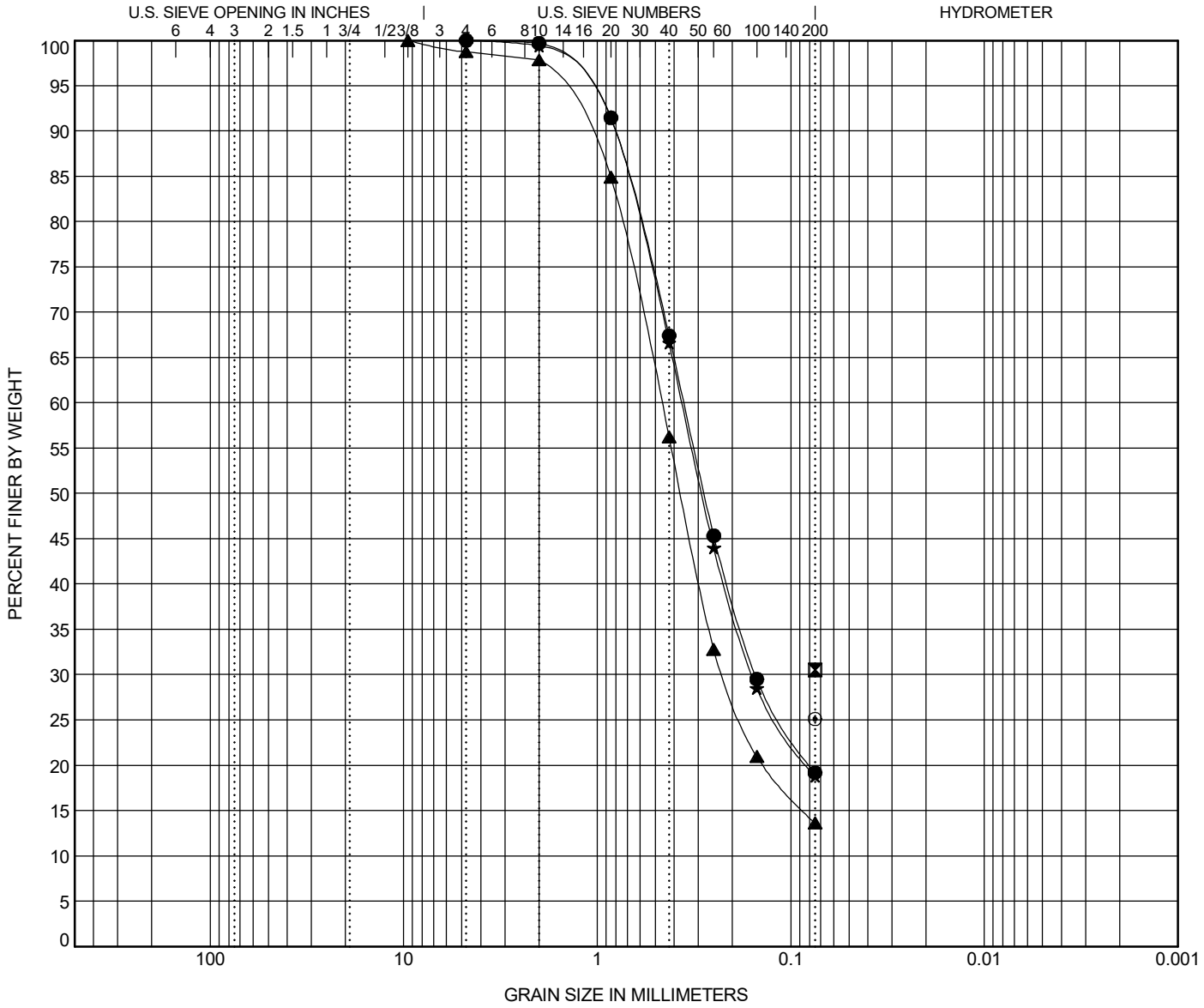
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-19**	**4.0**	**9.5**	**0.798**	**0.298**		**0.4**	**83.4**	**16.1**	
⊠	**W-20**	**0.0**	**4.75**	**0.451**	**0.197**		**0.0**	**83.7**	**16.3**	
▲	**W-20**	**2.0**	**4.75**	**0.463**	**0.102**		**0.0**	**72.0**	**28.0**	
★	**W-20**	**13.5**	**4.75**	**0.445**			**0.0**	**63.2**	**36.8**	
⊙	**W-20**	**18.5**	**0.075**						**86.8**	

GRAIN SIZE 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-21**	**0.0**	**Silty SAND (SM)**					
⊠	**W-21**	**4.0**	**Clayey SAND (SC)**	**30**	**21**	**9**		
▲	**W-21**	**8.0**	**Silty SAND (SM)**					
★	**W-22**	**0.0**	**Silty SAND (SM)**					
⊙	**W-22**	**4.0**	**Clayey SAND (SC)**	**45**	**23**	**22**		

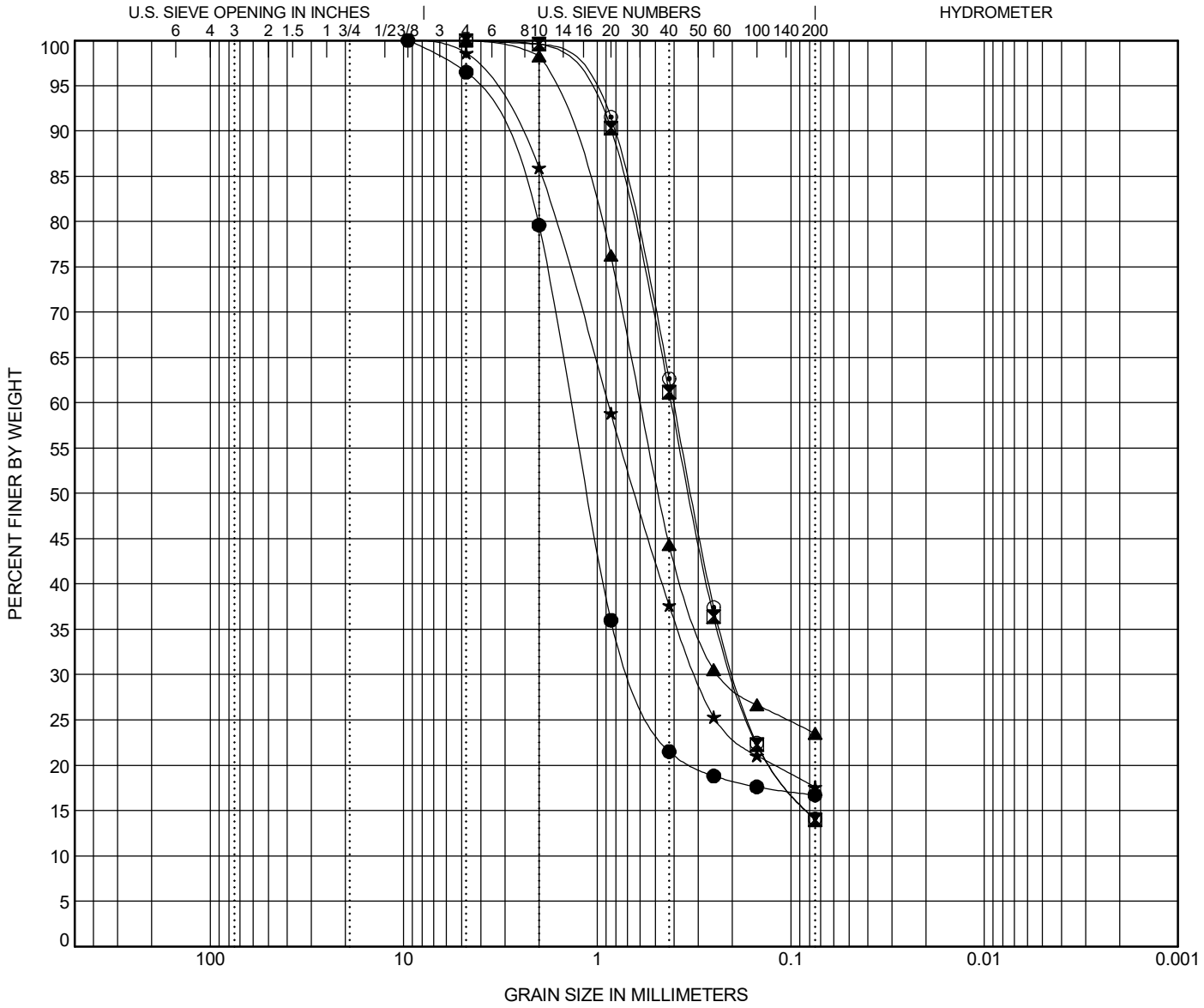
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-21**	**0.0**	**4.75**	**0.356**	**0.152**		**0.0**	**80.8**	**19.2**	
⊠	**W-21**	**4.0**	**0.075**						**30.5**	
▲	**W-21**	**8.0**	**9.5**	**0.465**	**0.222**		**1.2**	**85.1**	**13.6**	
★	**W-22**	**0.0**	**4.75**	**0.364**	**0.158**		**0.0**	**81.2**	**18.8**	
⊙	**W-22**	**4.0**	**0.075**						**25.1**	

GRAIN SIZE 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-22**	**18.5**	**Silty SAND (SM)**	**53**	**30**	**23**		
⊠	**W-23**	**0.0**	**Silty SAND (SM)**					
▲	**W-23**	**4.0**	**Clayey SAND (SC)**	**44**	**23**	**21**		
★	**W-23**	**13.5**	**Silty SAND (SM)**					
⊙	**W-24**	**0.0**	**Silty SAND (SM)**					

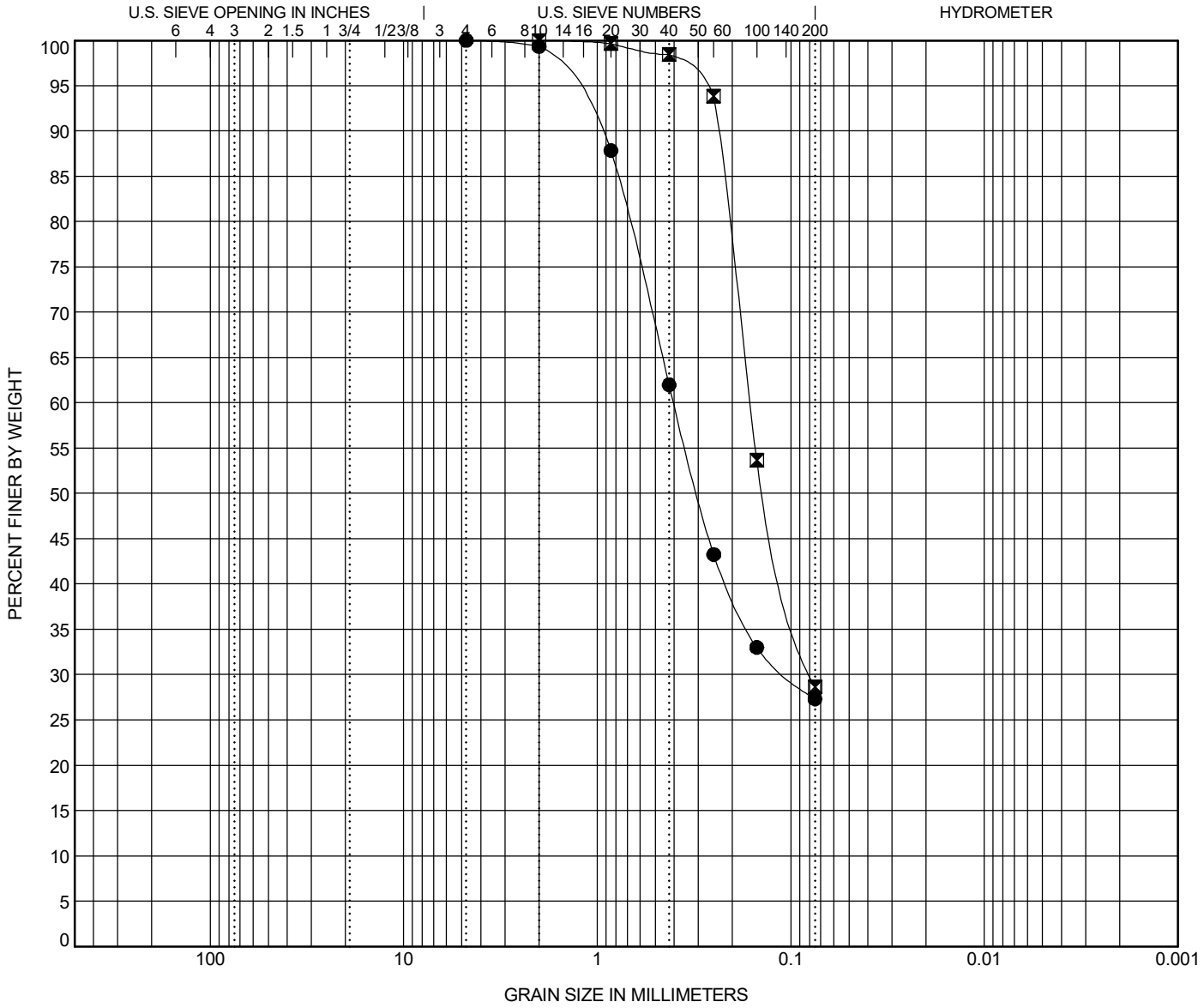
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-22**	**18.5**	**9.5**	**1.361**	**0.638**		**3.5**	**79.8**	**16.7**	
⊠	**W-23**	**0.0**	**4.75**	**0.414**	**0.199**		**0.0**	**86.0**	**14.0**	
▲	**W-23**	**4.0**	**4.75**	**0.597**	**0.233**		**0.0**	**76.5**	**23.5**	
★	**W-23**	**13.5**	**9.5**	**0.881**	**0.306**		**1.4**	**81.0**	**17.6**	
⊙	**W-24**	**0.0**	**4.75**	**0.402**	**0.194**		**0.0**	**85.9**	**14.1**	

GRAIN SIZE 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

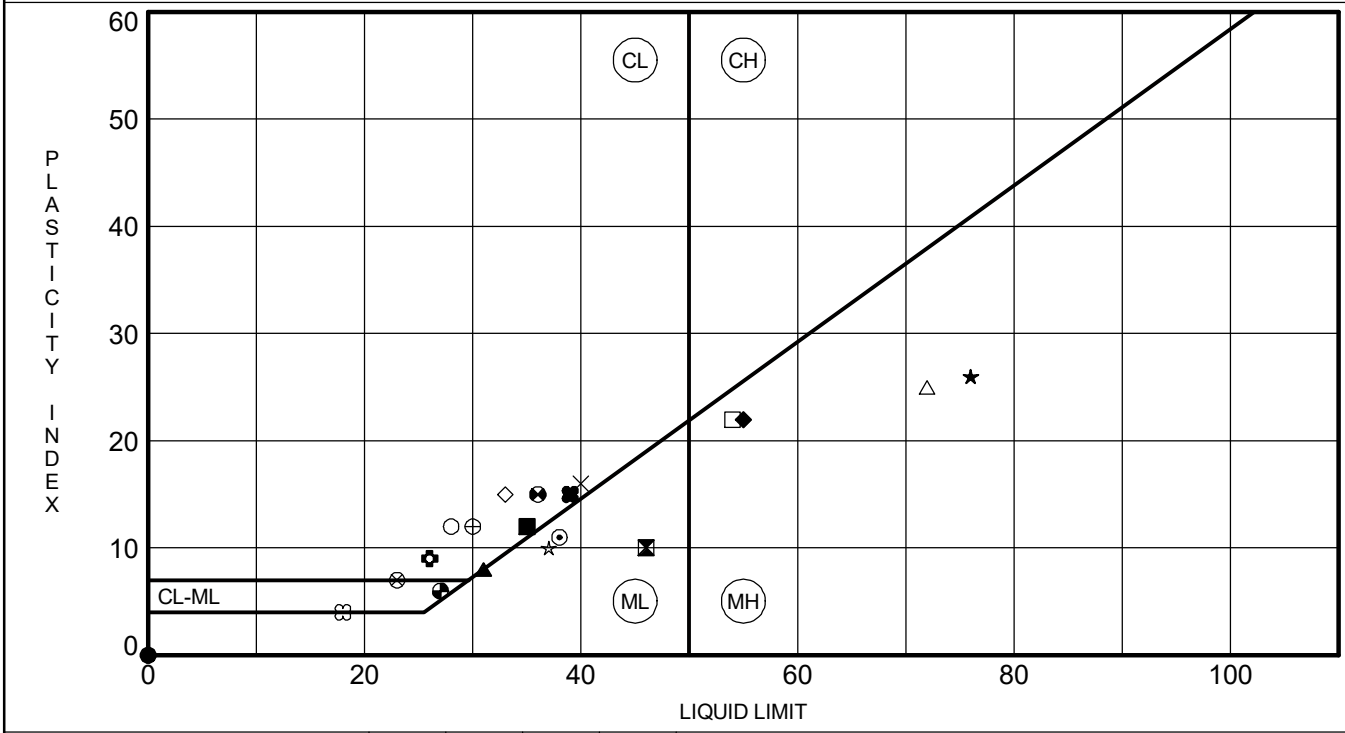
	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-24**	**2.0**	**Clayey SAND (SC)**	**33**	**17**	**16**		
⊠	**W-24**	**18.5**	**Silty SAND (SM)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-24**	**2.0**	**4.75**	**0.402**	**0.104**		**0.0**	**72.7**	**27.3**	
⊠	**W-24**	**18.5**	**2**	**0.163**	**0.078**		**0.0**	**71.4**	**28.6**	

ATTERBERG LIMITS' RESULTS

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



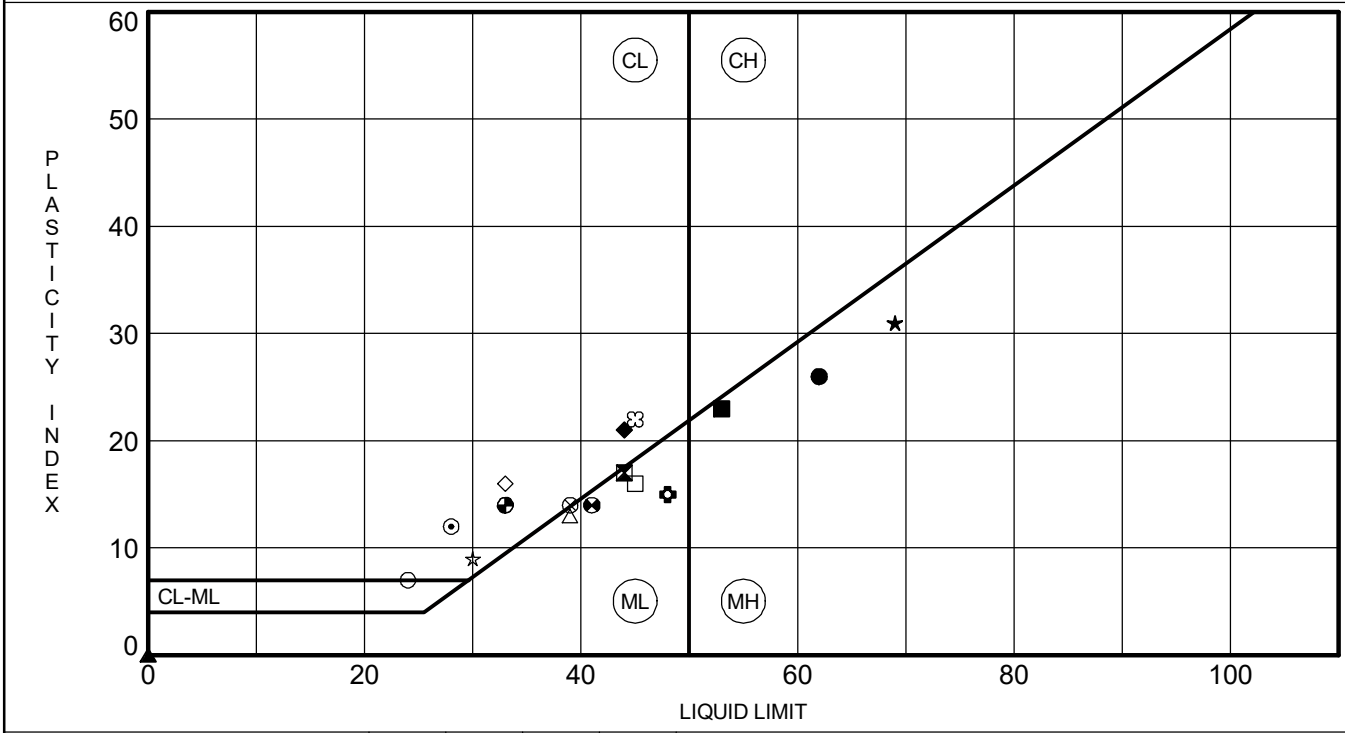
	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	EB-1W	0.0	NP	NP	NP	19	Silty SAND (SM)
⊠	EB-1W	2.0	46	36	10	37	Silty SAND (SM)
▲	EB-1W	18.5	31	23	8	88	Lean CLAY (CL)
★	EB-1W	43.5	76	50	26	71	Sandy Elastic SILT (MH)
⊙	EB-2W	2.0	38	27	11	35	Silty SAND (SM)
✿	EB-2W	8.0	26	17	9	20	Clayey SAND (SC)
○	EB-2W	18.5	28	16	12	81	Lean CLAY with Sand (CL)
△	EB-2W	43.5	72	47	25	89	Elastic SILT (MH)
⊗	EB-3W	2.0	23	16	7	26	Clayey SAND (SC)
⊕	EB-4W	2.0	30	18	12	27	Clayey SAND (SC)
□	EM- 5	4.0	54	32	22	31	Silty SAND (SM)
⊛	EM- 6	4.0	36	21	15	25	Clayey SAND (SC)
◒	EM- 6	18.5	27	21	6	17	Silty-Clayey SAND (SC-SM)
☆	EM- 6	23.5	37	27	10	49	Silty SAND (SM)
⊠	IB- 1W	0.0	18	14	4	17	Silty, Clayey SAND (SC-SM)
■	IB- 1W	18.5	35	23	12	53	Sandy Lean CLAY (CL)
◆	IB- 1W	68.5	55	33	22	78	Elastic SILT with Sand (MH)
◇	IB- 2W	2.0	33	18	15	25	Clayey SAND (SC)
×	IB- 2W	19.3	40	24	16	57	Sandy Lean CLAY (CL)
⊠	IB- 2W	23.5	39	24	15	76	Lean CLAY with Sand (CL)

ATTERBERG LIMITS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

ATTERBERG LIMITS' RESULTS

PROJECT ID P042443 (S&ME 23610178A) **PROJECT NAME** I-77 Exit 26 - US 21 Bridge over Railroad

PROJECT COUNTY Richland



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**IB- 2W**	**63.5**	**62**	**36**	**26**	**75**	**Elastic SILT with Sand (MH)**
⊠	**IB- 3W**	**2.0**	**44**	**27**	**17**	**28**	**Clayey SAND (SC)**
▲	**IB- 3W**	**8.0**	**NP**	**NP**	**NP**	**15**	**Silty SAND (SM)**
★	**IB- 3W**	**43.5**	**69**	**38**	**31**	**86**	**Elastic SILT (MH)**
⊙	**IB- 4W**	**2.0**	**28**	**16**	**12**	**26**	**Clayey SAND (SC)**
✿	**W-17**	**2.0**	**48**	**33**	**15**	**34**	**Silty SAND (SM)**
○	**W-17**	**8.0**	**24**	**17**	**7**	**14**	**Silty Clayey SAND (SC-SM)**
△	**W-17**	**18.5**	**39**	**26**	**13**	**95**	**SILT (ML)**
⊗	**W-18**	**2.0**	**39**	**25**	**14**	**27**	**Clayey SAND (SC)**
⊕	**W-18**	**8.0**	**33**	**19**	**14**	**42**	**Clayey SAND (SC)**
□	**W-18**	**13.5**	**45**	**29**	**16**	**54**	**Sandy SILT (ML)**
⊛	**W-19**	**2.0**	**41**	**27**	**14**	**23**	**Silty SAND (SM)**
◒	**W-20**	**18.5**	**33**	**19**	**14**	**87**	**Lean CLAY (CL)**
☆	**W-21**	**4.0**	**30**	**21**	**9**	**31**	**Clayey SAND (SC)**
⊠	**W-22**	**4.0**	**45**	**23**	**22**	**25**	**Clayey SAND (SC)**
■	**W-22**	**18.5**	**53**	**30**	**23**	**17**	**Silty SAND (SM)**
◆	**W-23**	**4.0**	**44**	**23**	**21**	**24**	**Clayey SAND (SC)**
◇	**W-24**	**2.0**	**33**	**17**	**16**	**27**	**Clayey SAND (SC)**

ATTERBERG LIMITS 23610178A US 21 BRO RR.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

Appendix VII – Laboratory Test Data Sheets – Rock Cores

UNCONFINED COMPRESSION
(ASTM D7012 Method C&D)

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

Project Name: I-77 Exit 26 Interchange
Project Number: 23610178A

Report Date: October 4, 2023
Reviewed By: Victoria Igoe

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in^2)	Unit Weight (lbs/ft^3)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
EB-1W	RS-2	81.4 - 81.8	4.50	1.98	A	3.08	154.9	50	20,573	6,680	2.1
EB-1W	RS-3	87.4 - 87.8	4.42	1.98	A	3.08	154.6	46	3,707	1,204	1.9

NOTES:

Effective (as received) unit weight as determined by RTH 109-93.

Loading rates were selected to target reaching failure between 2 and 15 minutes.

Test results for specimens not meeting the requirements of ASTM D4543-19 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-19 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial and error that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

A Test specimen measurements met the desired shape tolerances of ASTM D4543-19 (side straightness, end flatness & parallelism, and end perpendicularity to axis)

B Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.

C Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.

D Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.

E Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

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

PREPARING ROCK CORE AS CYLINDRICAL TEST SPECIMENS AND VERIFYING CONFORMANCE TO DIMENSIONAL AND SHAPE TOLERANCES (ASTM D4543)

1413 Topside Road, Louisville, TN 37777

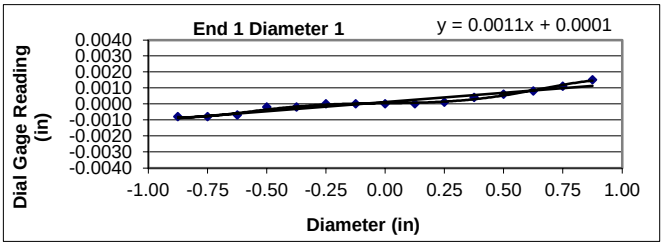
Project:	I-77 Exit 26 Interchange	**Diameter (in):**	1.98	**Date:**	9/27/2023
Project No.:	23610178A	**Length (in):**	4.42	**Tested by:**	Ryan Skinner
Boring Id:	EB-1W	**Unit Weight (pcf):**	154.6	**Reviewed by:**	Victoria Igoe
Sample No.:	RS-3	**Moisture Content (%):**	1.9		
Depth (ft):	87.4 - 87.8				

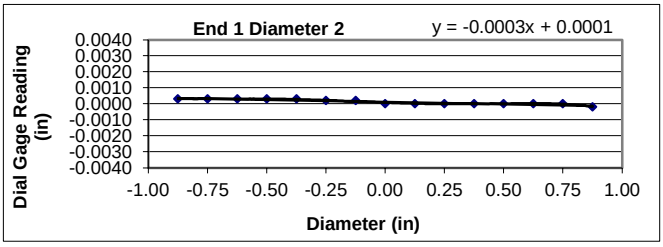
Deviation From Straightness (Procedure S1)

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

End Flatness and Parallelism Readings (Procedure FP1)

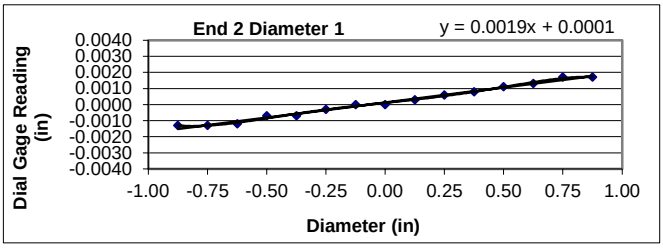
Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0008	0.0003	-0.0013	0.0003
- 6/8	-0.0008	0.0003	-0.0013	0.0003
- 5/8	-0.0007	0.0003	-0.0012	0.0003
- 4/8	-0.0002	0.0003	-0.0007	0.0002
- 3/8	-0.0002	0.0003	-0.0007	0.0002
- 2/8	0.0000	0.0002	-0.0003	0.0001
- 1/8	0.0000	0.0002	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0003	-0.0001
2/8	0.0001	0.0000	0.0006	-0.0002
3/8	0.0004	0.0000	0.0008	-0.0004
4/8	0.0006	0.0000	0.0011	-0.0005
5/8	0.0008	0.0000	0.0013	-0.0005
6/8	0.0011	0.0000	0.0017	-0.0005
7/8	0.0015	-0.0002	0.0017	-0.0007

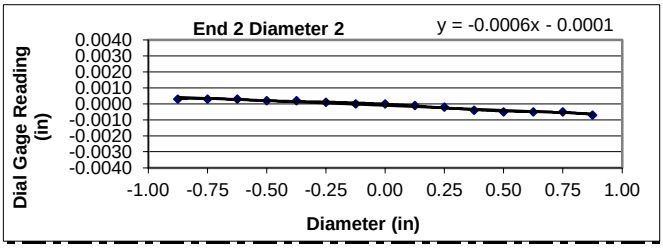




Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? **YES**





Parallelism is met when the angular difference between best fit lines on opposing ends is ≤ 0.25°.

Parrallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00115
	Angle of Best Fit Line:	0.06581
End 2:	Slope of Best Fit Line:	0.00187
	Angle of Best Fit Line:	0.10690
	Max Angular Difference:	**-0.04**

Parrallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00027
	Angle of Best Fit Line:	-0.01555
End 2:	Slope of Best Fit Line:	-0.00060
	Angle of Best Fit Line:	-0.03454
	Max Angular Difference:	**0.02**

Parallelism Tolerance Met? **YES**

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

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0023	0.0012	**YES**
End 1 Diam 2	0.0005	0.0003	**YES**
End 2 Diam 1	0.0030	0.0015	**YES**
End 2 Diam 2	0.0010	0.0005	**YES**

Perpendicularity Tolerance Met? **YES**

PREPARING ROCK CORE AS CYLINDRICAL TEST SPECIMENS AND VERIFYING CONFORMANCE TO DIMENSIONAL AND SHAPE TOLERANCES (ASTM D4543)

1413 Topside Road, Louisville, TN 37777

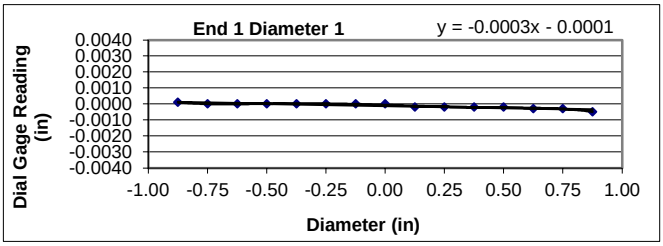
Project:	I-77 Exit 26 Interchange	**Diameter (in):**	1.98	**Date:**	9/28/2023
Project No.:	23610178A	**Length (in):**	4.5	**Tested by:**	Ryan Skinner
Boring Id:	EB-1W	**Unit Weight (pcf):**	154.9	**Reviewed by:**	Victoria Igoe
Sample No.:	RS-2	**Moisture Content (%):**	2.1		
Depth (ft):	81.4 - 81.8				

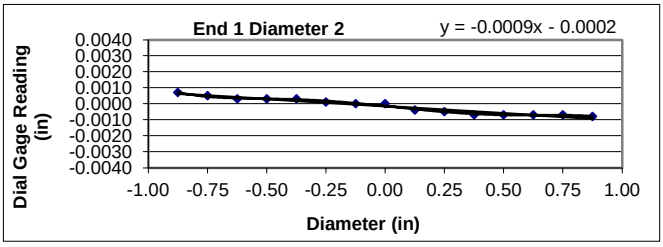
Deviation From Straightness (Procedure S1)

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

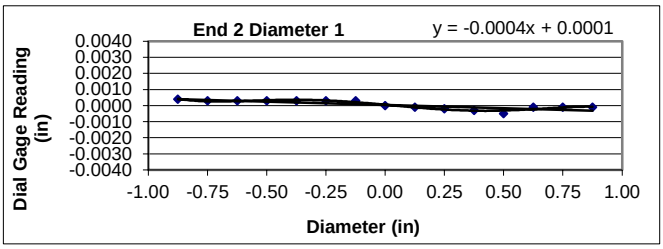
End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0001	0.0007	0.0004	0.0018
- 6/8	0.0000	0.0005	0.0003	0.0012
- 5/8	0.0000	0.0003	0.0003	0.0008
- 4/8	0.0000	0.0003	0.0003	0.0005
- 3/8	0.0000	0.0003	0.0003	0.0000
- 2/8	0.0000	0.0001	0.0003	0.0000
- 1/8	0.0000	0.0000	0.0003	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0002	-0.0004	-0.0001	0.0000
2/8	-0.0002	-0.0005	-0.0002	-0.0003
3/8	-0.0002	-0.0007	-0.0003	-0.0008
4/8	-0.0002	-0.0007	-0.0005	-0.0011
5/8	-0.0003	-0.0007	-0.0001	-0.0015
6/8	-0.0003	-0.0007	-0.0001	-0.0018
7/8	-0.0005	-0.0008	-0.0001	-0.0020

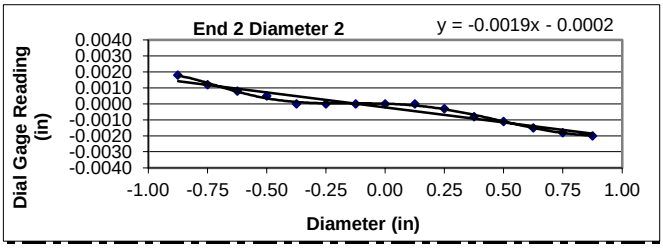




Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.



Flatness Tolerance Met? **YES**



Parallelism is met when the angular difference between best fit lines on opposing ends is ≤ 0.25°.

Parrallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00027
	Angle of Best Fit Line:	-0.01555
End 2:	Slope of Best Fit Line:	-0.00041
	Angle of Best Fit Line:	-0.02341
	Max Angular Difference:	**0.01**

Parrallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00089
	Angle of Best Fit Line:	-0.05124
End 2:	Slope of Best Fit Line:	-0.00187
	Angle of Best Fit Line:	-0.10722
	Max Angular Difference:	**0.06**

Parallelism Tolerance Met? **YES**

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

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0006	0.0003	**YES**
End 1 Diam 2	0.0015	0.0008	**YES**
End 2 Diam 1	0.0009	0.0005	**YES**
End 2 Diam 2	0.0038	0.0019	**YES**

Perpendicularity Tolerance Met? **YES**

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

1413 Topside Road, Louisville, TN 37777

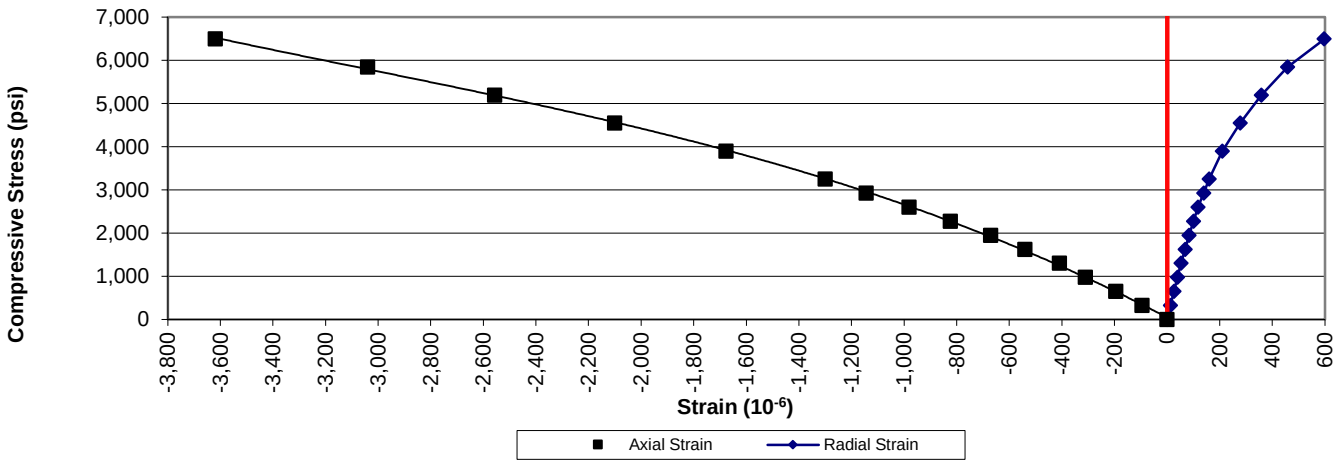
Project:	I-77 Exit 26 Interchange	**Diameter, in.:**	1.98	**Date:**	10/4/2023
Project No.:	23610178A	**Length, in.:**	4.50	**Tested by:**	Ryan Skinner
Boring Id:	EB-1W	**Unit Weight, pcf:**	154.9	**Reviewed by:**	Victoria Igoe
Sample No:	RS-2	**Moisture Content, %:**	2.1		
Depth (ft):	81.4 - 81.8	**Load Rate, psi/sec:**	50		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10^6 (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0	0	0	0	0.00	0.00	
2	-95	13	1,000	325	3.42	0.14	
3	-195	26	2,000	649	3.33	0.13	
4	-311	40	3,000	974	3.13	0.13	
5	-409	53	4,000	1,299	3.18	0.13	
6	-541	69	5,000	1,623	3.00	0.13	
7	-671	84	6,000	1,948	2.90	0.13	
8	-824	101	7,000	2,273	2.76	0.12	
9	-981	118	8,000	2,597	2.65	0.12	
10	-1,144	139	9,000	2,922	2.55	0.12	
11	-1,300	160	10,000	3,247	2.50	0.12	
12	-1,677	210	12,000	3,896	2.32	0.13	
13	-2,101	278	14,000	4,545	2.16	0.13	
14	-2,557	359	16,000	5,195	2.03	0.14	
15	-3,040	458	18,000	5,844	1.92	0.15	
16	-3,619	597	20,000	6,494	1.79	0.16	
17			20,573	6,680			Failure

TNR - Test Not Requested

Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-19 (side straightness, end flatness & parallelism, and end perpendicularity to axis)

Stress vs. Strain



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

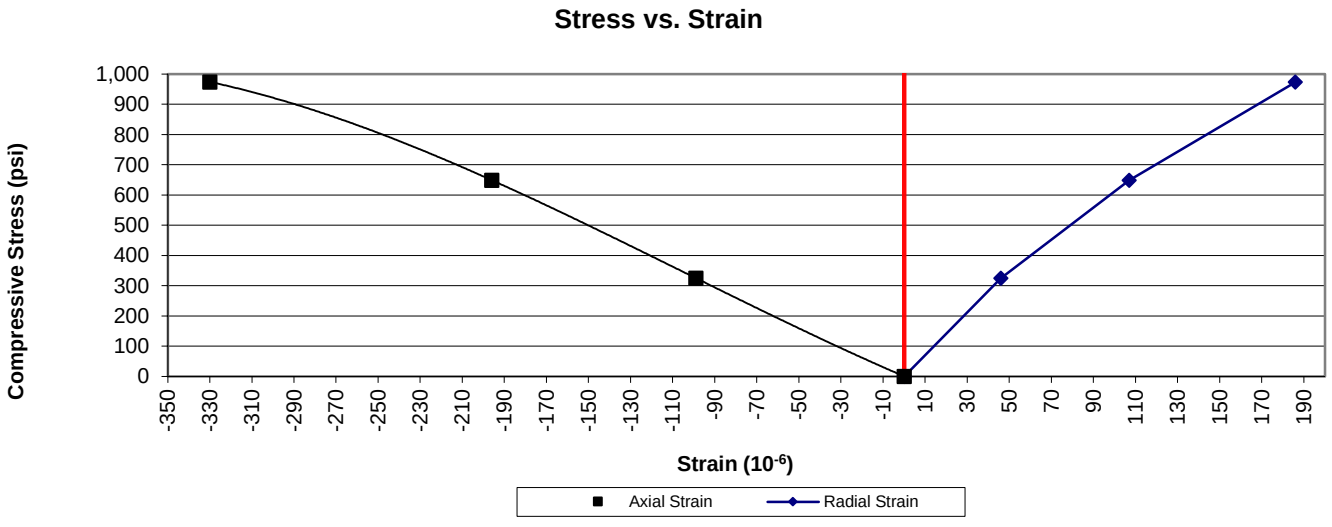
1413 Topside Road, Louisville, TN 37777

Project:	I-77 Exit 26 Interchange	**Diameter, in.:**	1.98	**Date:**	10/4/2023
Project No.:	23610178A	**Length, in.:**	4.42	**Tested by:**	Ryan Skinner
Boring Id:	EB-1W	**Unit Weight, pcf:**	154.6	**Reviewed by:**	Victoria Igoe
Sample No:	RS-3	**Moisture Content, %:**	1.9		
Depth (ft):	87.4 - 87.8	**Load Rate, psi/sec:**	46		

Data Point	Strain (10^{-6})		Load (lb)	Compressive Stress (psi)	Secant Modulus x 10^6 (psi)	Poisson's Ratio	Remarks Failure
	axial	radial					
1	0	0	0	0	0.00	0.00	
2	-99	46	1,000	325	3.28	0.46	
3	-196	107	2,000	649	3.31	0.55	
4	-330	186	3,000	974	2.95	0.56	
5			3,707	1,204			Failure

TNR - Test Not Requested

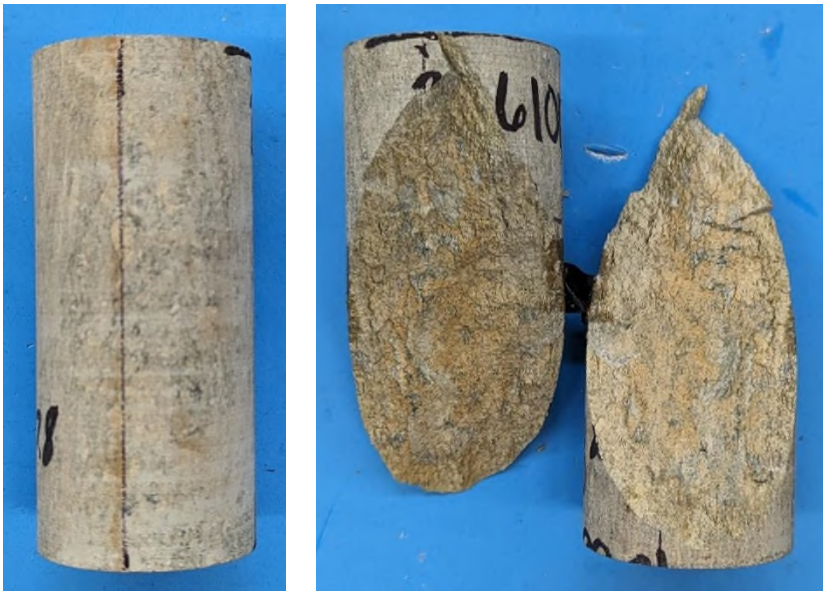
Comments: Loading rate was selected to target reaching failure between 2 and 15 minutes.
Test specimen measurements met the desired shape tolerances of ASTM D4543-19 (side straightness, end flatness & parallelism, and end perpendicularity to axis)



Date: 10/4/2023

Photographer: Ryan Skinner

1	**Location / Orientation**	EB-1W, RS-2 (81.4' – 81.8')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C&D)



Date: 10/4/2023

Photographer: Ryan Skinner

2	**Location / Orientation**	EB-1W, RS-3 (87.4' – 87.8')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C&D)

Appendix VIII – Laboratory Test Data Sheets – Corrosion Series Testing

Results Only Soil Testing for I-77 Exit 26 Interchange

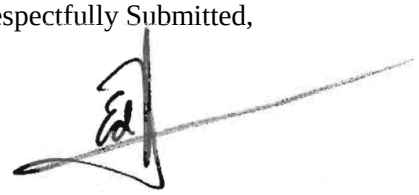
August 16, 2023

Prepared for:

Matt Cooke
S&ME, Inc.
134 Suber Road
Columbia, SC 29210
mcooke@smeinc.com

Project X Job#: S230816B
Client Job or PO#: 23610178A

Respectfully Submitted,



Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com

Soil Analysis Lab Results

Client: S&ME, Inc
Job Name: I-77 Exit 26 Interchange
Client Job Number: 23610178A
Project X Job Number: S230816B
August 16, 2023

	Method	AASHTO T290		AASHTO T291		AASHTO T288		AASHTO T289
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)	
EB-2W SS-4	6-8	54.3	0.0054	28.0	0.0028	140,700	87,100	7.5
EB-3W SS-3	4-6	39.1	0.0039	21.8	0.0022	107,200	54,940	8.4
IB-1W S-8	23.5-25	12.0	0.0012	9.5	0.0010	60,970	55,610	8.7
IB-3W SS-10	33.5-35	38.3	0.0038	28.1	0.0028	13,400	11,390	7.8

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

Project X
Corrosion Engineering
Corrosion Control - Soil, Water, and Metallurgy Labs

Lab Request Sheet Chain of Custody
Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com

Ship Samples To: 29990 Technology Dr, Suite 13, Murrieta, CA 92563

Project X Job Number: S23081L6B SME-SC 23610178A I-77 4 QUAD · AASHTO

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Company Name:	S&ME, Inc.	**Contact Name:**	Matt Cooke
Phone No:	803-260-9849		
Mailing Address:	134 Suber Road, Columbia, SC 29210	**Contact Email:**	mcooke@smeinc.com
Accounting Contact:	Kathryn Friedrichs	**Invoice Email:**	smeinc_invoice@concursolutions.com
Client Project No:	23610178A	**Project Name:**	I-77 Exit 26 Interchange
P.O. #:	23610178A		

3-5 Day Standard ✔ | **3 Day Guarantee** 50% mark-up | **24 Hr RUSH** 100% mark-up

(Business Days) Turn Around Time:

Results By: ☐ Phone ☐ Fax ☐ Email

Date & Received by :

Special Instructions:
USE THE FOLLOWING TEST METHODS:
pH: ASTM G51 or AASHTO T289
Resistivity: ASTM G57 or AASHTO T28
Choride: AASHTO T291
Sulfate: ASTM C1580 or AASHTO T290

ANALYSIS REQUESTED (Please circle)

SEE SPECIAL INSTRUCTIONS ON TEST METHODS

	SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED
283	1 EB-2W	SS-4	6-8	
284	2 EB-3W	SS-3	4-6	
285	3 IB-1W	SS-8	23.5-25	
286	4 IB-3W	SS-10	33.5-35	
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			

Default Method	Geo Quad	Full Corrosion Series																		Full Corrosion Series	Reports											
	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	Sulfide	Ammonia	Nitrate	Flouride	Phosphate	Lithium	Sodium	Potassium	Magnesium	Calcium	Bicarbonate					Soil Corrosivity Evaluation Report	Water Corrosivity Mini Report	Moisture Content	Total Alkalinity	Thermal Resistivity	Metallurgical Analysis	Langelier Index	Puckorius Index	XRF Elemental Analysis	Water Hardness		
ASTM G187	X	X	X	X																												
ASTM G51	X	X	X	X																												
ASTM D4327	X	X	X	X																												
ASTM D4327	X	X	X	X																												
ASTM G200	X	X	X	X																												
SM 4500-S2	X	X	X	X																												
ASTM D6919	X	X	X	X																												
ASTM D4327	X	X	X	X																												
ASTM D6919	X	X	X	X																												
ASTM D6919	X	X	X	X																												
ASTM D6919	X	X	X	X																												
ASTM D6919	X	X	X	X																												
SM 2320B	X	X	X	X																												

*Req: Min. 3 Samples, site map, and groundwater info

ASTM D2216	SM 2520B								

Appendix IX – 3-Point ADRS Curve

3-Point Acceleration Design Response Spectrum

SCDOT v3.2 - 12/12/2023

Project ID:	P042443			Latitude:	34.1939
Route:	I-77	County:	40 - Richland	Longitude:	80.9843
Project:	New Exit 26 Interchange				

Designer:	N. Harman - Support
Date:	12/12/2023

Design EQ	PGA	S_{DS}	S_{D1}	M_W	R	PGV	$D_{a5\text{-}95}$	T'_o
	g	g	g	-	km	inches/sec	sec	sec
FEE	0.20	0.32	0.06	7.30	126.93	2.14	37.10	0.17
SEE	0.41	0.77	0.16	7.28	125.90	6.06	36.64	0.16

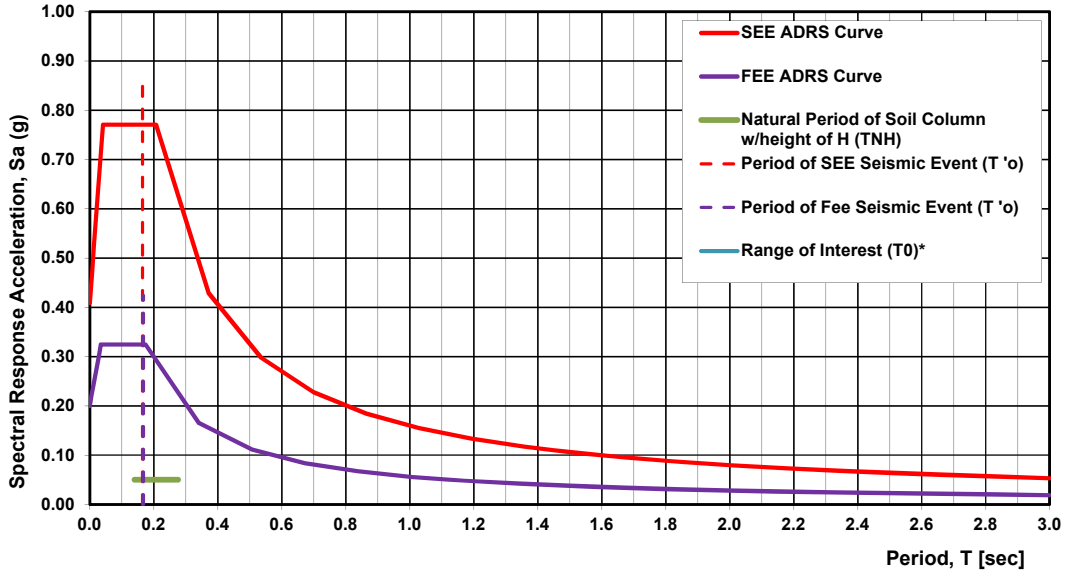
Fundamental Period of Structure, T_0^*	Range of Interest sec		$V^*_{s,H}$	H	T_{NH} sec	
sec	$0.5*T_0$	$2.0*T_0$	ft/sec	ft	$(4*H)/V^*_{s,H}$	$(6*H)/V^*_{s,H}$
0.00	0.00	0.00	2101.56	96.70	0.14	0.28
0.00	0.00	0.00	H = B-C Boundary			

Damping:	5%
Geologic Condition:	Geologically Realistic (Q = 100)*
	SCP
ADRS Location within Soil Column:	At Ground Surface

South Carolina Piedmont

*Same Geologic Condition as used in SCENARIO_PC (2006)

SC Seismic ADRS Curve



	FEE Data			SEE Data	
	T	S_a		T	S_a
	0.00	0.200		0.00	0.409
	0.01	0.221		0.01	0.469
	0.01	0.241		0.01	0.530
	0.02	0.262		0.02	0.590
	0.02	0.283		0.03	0.650
	0.03	0.304		0.03	0.710
To	0.03	0.324	To	0.04	0.771
	0.05	0.324		0.06	0.771
	0.06	0.324		0.07	0.771
	0.07	0.324		0.08	0.771
	0.08	0.324		0.10	0.771
	0.09	0.324		0.11	0.771
	0.10	0.324		0.12	0.771
	0.12	0.324		0.14	0.771
	0.13	0.324		0.15	0.771
	0.14	0.324		0.17	0.771
	0.15	0.324		0.18	0.771
	0.16	0.324		0.19	0.771
Ts	0.17	0.324	Ts	0.21	0.771
	0.34	0.166		0.37	0.430
	0.51	0.111		0.54	0.298
	0.67	0.084		0.70	0.228
	0.84	0.067		0.86	0.185
	1.01	0.056		1.03	0.155
	1.17	0.048		1.19	0.134
	1.34	0.042		1.36	0.118
	1.50	0.038		1.52	0.105
	1.67	0.034		1.69	0.095
	1.84	0.031		1.85	0.086
	2.00	0.028		2.01	0.079
	2.17	0.026		2.18	0.073
	2.34	0.024		2.34	0.068
	2.50	0.023		2.51	0.064
	2.67	0.021		2.67	0.060
	2.83	0.020		2.84	0.056
	3.00	0.019		3.00	0.053

Appendix X – SPT Hammer Energy Measurements

Report of SPT Energy Measurements
S&ME CME-750X ATV (Serial No. 322938)
Columbia, South Carolina
S&ME Project No. 1535-22-200

PREPARED FOR:

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

PREPARED BY:

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273

December 23, 2022

December 23, 2022

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

Attention: Mr. Greg Bodenheimer, P.E.

Cc: Ms. Cheryl A. Youngblood, L.G.
Ms. Christina M. Bruinsma, L.G.

Reference: **Report of SPT Energy Measurements**
S&ME CME-750X ATV (Serial No. 322938)
Columbia, South Carolina
S&ME Project No. 1535-22-200
NC PE Firm License No. F-0176

Dear Mr. Bodenheimer:

We have completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer used with our CME-750X ATV-mounted drill rig (Serial No. 322938). This service was performed by Mr. Joseph Williamson, P.E. of our firm on November 10, 2022, in general accordance with ASTM D4633 and the most recent revision of the North Carolina Department of Transportation (NCDOT) Geotechnical Engineering Unit's requirements. Review of the data quality and analyses was performed by Mr. Williamson. A copy of the Certificate of Proficiency issued by Pile Dynamics based on the Dynamic Measurement and Analysis Proficiency Test for Mr. Williamson is included in Appendix I. The testing procedures, equipment used during testing, and detailed results are presented in this report.

1.0 Dynamic Testing Methodology

Testing was performed using a model PAX (Serial No. 3733L) Pile Driving Analyzer™ (PDA) manufactured by Pile Dynamics, Inc. The PDA was used to record and interpret data from two piezoresistive accelerometers (Serial Nos. K4664 and K4665) bolted to a 2.0-foot long AWJ drill rod (Serial No. 203) internally instrumented with two strain transducers. Calibration sheets for the accelerometers and the instrumented rod are included in Appendix II. The instrumented AWJ drill rod has a cross-sectional area of 1.19 square inches and an outside diameter of approximately 1.75 inches. Therefore, we calculate the inside diameter to be approximately 1.25 inches at the gauge location. The accelerometers and strain gauges, which are diametrically opposed 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.

2.0 Testing and Observations

S&ME personnel were on site November 10, 2022, to observe and perform high-strain dynamic testing during SPT sampling on the CME-750X ATV-mounted drill rig operated by Sam Gowan of S&ME. The measurements were taken during drilling and sampling of a soil test boring performed on an S&ME project site in Columbia, South Carolina. SPT energy measurements presented herein were recorded during three sampling intervals that satisfied the NCDOT required blow count criteria. The information presented in the tables below summarizes the equipment and tooling used during the SPT energy measurements. The Boring Log and SPT Energy Evaluation Form is included in Appendix III.

Table 2-1: Drill Rig Information

Manufacturer	CME
Model	750X
Serial Number	322938
Operator	S. Gowan
Carrier	ATV

Table 2-2: Hammer Information

Model / Type	CME / Auto
Typical Drop Height (inches)	30
Typical Ram Weight (pounds)	140

Table 2-3: Drilling and Instrumented Rod Information

Drill Rod Type	AWJ
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in^2)	1.19
Typical Lengths (feet)	5
Instrumented Rod Type	AWJ (Serial No. 203)
OD (inches)	1.75
ID (inches)	1.25
Cross-Sectional Area (in^2)	1.19
Total Instrumented Rod Length (feet)	2.0
Length Below Gages (feet)	0.8
Split-Spoon Length (feet)	2.85

3.0 Dynamic Testing Results

The total rod length from the instrumentation to the tip of the split-spoon sampler was determined by adding 3.65 ft to the drill rod length at each sample depth. The SPT Energy Measurement Data Summary tables in Appendix IV present the test data from every hammer blow at each sampling interval, along with representative force and velocity traces for each test interval. Within some of the strain gauge (F2) records, electrical noise or "spikes" relatively late in the record (i.e., after 2L/c) were observed However, hammer impacts were relatively uniform and any bending appeared to be minor. Therefore, data collected from the F2 channel was excluded from the calculations when this phenomemon was observed. Per ASTM D4633, only the blows from the final foot of each sample interval (i.e. the blows that determine the N-value) are considered when computing the average measurement values of each test interval.

The reported blow counts obtained by the drill rig personnel, a summary of the test data, and average computed hammer energy and transfer ratio values are provided in Table 3-1. Based on the test data, the automatic hammer on the CME-750X operated at an average rate of about 53 blows per minute (bpm) during dynamic testing. The measured average transferred hammer energy (EFV) of the three sample intervals tested ranged from 281 to 291 ft-lbs, which corresponds to Energy Transfer Ratio (ETR) values of 80.4 to 83.2%, respectively, based on an assumed maximum energy of 350 ft-lbs. Plots and tables of the following are also included in the Appendix and present the test data with depth for each test interval:

- Penetration vs. BLC[1]
- Penetration vs. FMX[2]
- Penetration vs. EFV[3]
- Penetration vs. CSX[4]
- Penetration vs. VMX[5]
- Penetration vs. ETR[6]
- ETR vs. Rod Length
- Average ETR vs. Rod Length

.

[1] BLC - Blow Count per 6-in. increment
[2] FMX - Maximum Compressive Force
[3] EFV – Maximum Transferred Energy
[4] CSX – Maximum Compressive Stress
[5] VMX – Maximum Velocity
[6] ETR – Energy Transfer Ratio – Ratio of Calculated Energy to Theoretical Energy of 140 lb hammer falling 30 inches

Table 3-1: Summary of Dynamic Testing Results

Data Set ID	Sample Depth (ft)	Drill Rod Length (ft)	Instrumentation to Sampler Tip Length (ft)	Blows per 6" Increment / N-value	Soil Sample Description	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (%)
1	43.5 – 45	45	48.65	3-4-4 / **8**	Poorly Graded Sand with Silt[A]	53.4	291	83.2
2	48.5 – 50	50	53.65	8-19-27 / **46**	Lean Clay[CP]	53.2	287	82.0
3	53.5 – 55	55	58.65	6-11-12 / **23**	Silty Sand & Sandy Lean Clay[CP]	53.3	281	80.4
					Overall Average	**53.2**	**286**	**81.6**

[A] – Alluvium Soil Deposit; [CP] – Coastal Plain Soil Deposit

The overall average transferred hammer energy for the automatic hammer on the CME-750X ATV-mounted drill rig was 286 foot-pounds, with an average ETR of 81.6%.

4.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

5.0 Closing

S&ME appreciates the opportunity to provide this report to the North Carolina Department of Transportation, Geotechnical Engineering Unit. Please let us know if you have any questions concerning this report.

Sincerely,

S&ME, Inc.

Joseph R. Williamson, P.E.
Project Manager
N.C. Registration No. 42168

Gregory J. Canivan, P.E.
Technical Principal

Appendices:

- Appendix I - Certificate of Proficiency
- Appendix II - Instrumented Rod and Accelerometer Calibration Sheets
- Appendix III – Boring Log B-2 and SPT Energy Evaluation Form (Field Log)
- Appendix IV - CME-750X ATV (SN 322938) SPT Energy Measurements Summary Plots and Tables

Appendices

Appendix I

PDCA
PILE DRIVING CONTRACTORS ASSOCIATION

Pile Dynamics, Inc.

This documents that

Joseph Williamson
S&ME, Inc.

has on March 16, 2022 achieved the rank of

MASTER

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 Master level seek to attain Expert level through additional study within eight 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. 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. This certificate can be verified at www.PDAproficiencytest.com.

Frank T. Peters, Executive Director
Pile Driving Contractors Association

SEAL
OHIO

Garland Likins, Senior Partner
Pile Dynamics, Inc.

No. 3251

Appendix II

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI Accelerometer Calibration

Model PR-K Serial # K4664

Cal Date: OCT 16, 2021 Cal Due : OCT 15, 2023

Temperature: 72 deg. F Humidity 65 %

Calibrated at
Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, OH 44139

Manufactured by Pile Dynamics, Inc.

Procedure used: PDA Accelerometer Calibration Procedure 2016-6, Revision 20160422

Equipment was found to be

X in tolerance As Received _____ out of tolerance As Received

X in tolerance As Returned _____ out of tolerance As Returned

PDI Calibration: 380 mv/5000g

Calibration Standards Utilized
Hopkinson Bar Force Calibration F2, verified on July 28, 2021

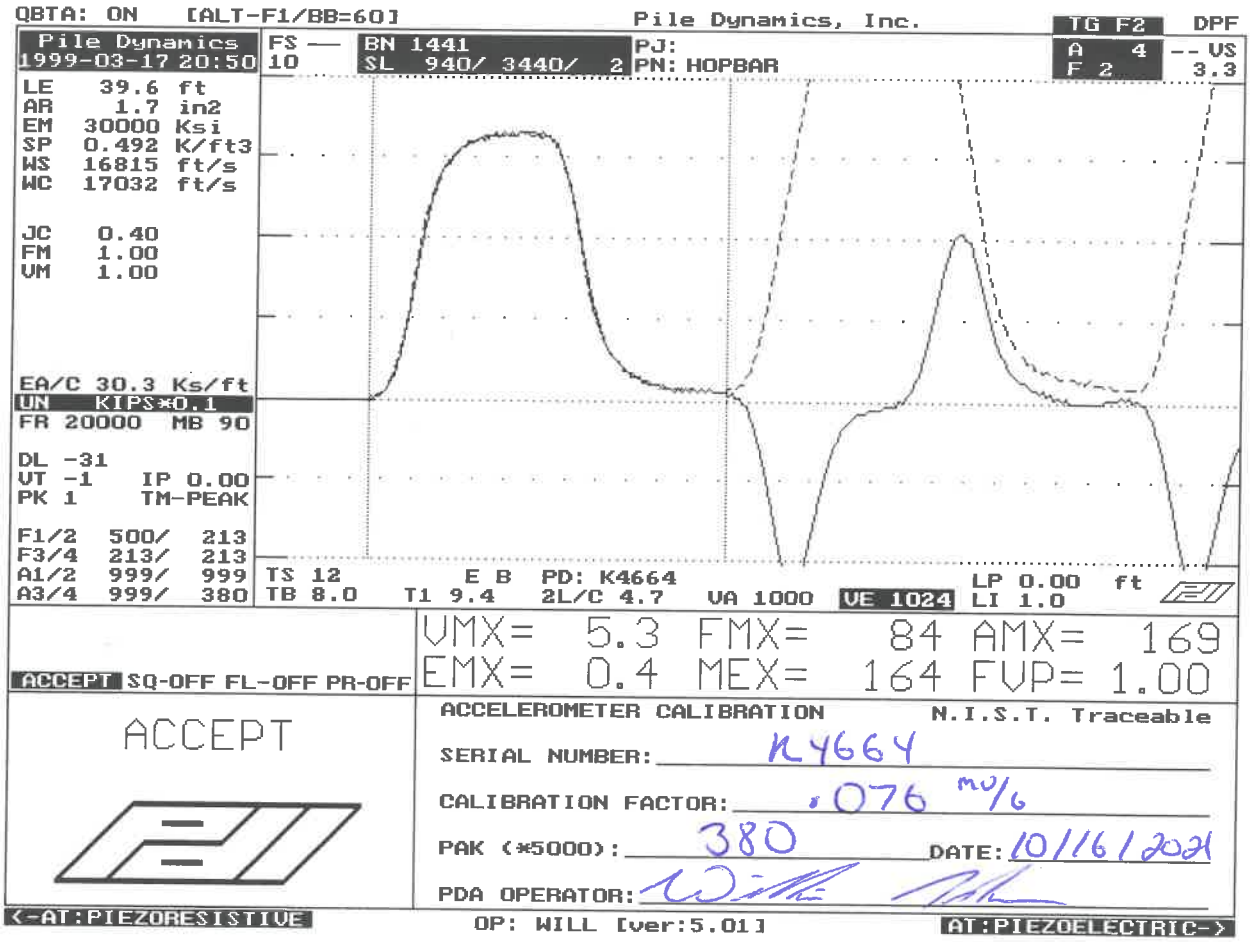
PDI HopBar DOS PAK, serial number 1273K, verified on July 19, 2021

Calibration performed by: _____
William johnson, Technician

Reviewed by: _____
Robert Sprenger, Production Manager

Accelerometer CC-5 Issued 20160426

30725 Aurora Road • Cleveland, Ohio 44139 USA • +1-216-831-6131 • Fax +1-216-831-0916
E-mail: info@pile.com • www.pile.com


QBTA: ON [ALT-F1/BB=60]
Pile Dynamics, Inc.
TG F2
DPF
Pile Dynamics
1999-03-17 20:50
FS 10
BN 1441
SL 940/ 3440/ 2
PJ:
PN: HOPBAR
A 4
F 2
-- VS
3.3
LE 39.6 ft
AR 1.7 in2
EM 30000 Ksi
SP 0.492 K/ft3
WS 16815 ft/s
WC 17032 ft/s
JC 0.40
FM 1.00
VM 1.00
EA/C 30.3 Ks/ft
UN KIPS*0.1
FR 20000 MB 90
DL -31
VT -1 IP 0.00
PK 1 TM-PEAK
F1/2 500/ 213
F3/4 213/ 213
A1/2 999/ 999
A3/4 999/ 380
TS 12 E B PD: K4664
TB 8.0 T1 9.4 2L/C 4.7 VA 1000 VE 1024
LP 0.00 ft
LI 1.0
VMX= 5.3 FMX= 84 AMX= 169
EMX= 0.4 MEX= 164 FVP= 1.00
ACCEPT SQ-OFF FL-OFF PR-OFF
ACCEPT
ACCELEROMETER CALIBRATION
N.I.S.T. Traceable
SERIAL NUMBER: K4664
CALIBRATION FACTOR: .076 mV/6
PAK (*5000): 380
DATE: 10/16/2021
PDA OPERATOR: Will
<-AT:PIEZORESISTIVE
OP: WILL [ver:5.01]
AT:PIEZOELECTRIC->
Smart Sensor
Programmed By: WJ
CRC Value 4898

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

PDI Certificate of Calibration

PDI Accelerometer Calibration

Model PR-1K Serial # 1K4665

Cal Date: AUG 10, 2021 Cal Due : AUG 9, 2023

Temperature: 72 deg. F Humidity 70 %

Calibrated at
Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, OH 44139

Manufactured by Pile Dynamics, Inc.

Procedure used: PDA Accelerometer Calibration Procedure 2016-6, Revision 20160422

Equipment was found to be

X in tolerance As Received _____ out of tolerance As Received

X in tolerance As Returned _____ out of tolerance As Returned

PDI Calibration: 365 mv/5000g

Calibration Standards Utilized
Hopkinson Bar Force Calibration F2, verified on July 28, 2021

PDI HopBar DOS PAK, serial number 1273K, verified on July 19, 2021

Calibration performed by: William Johnson

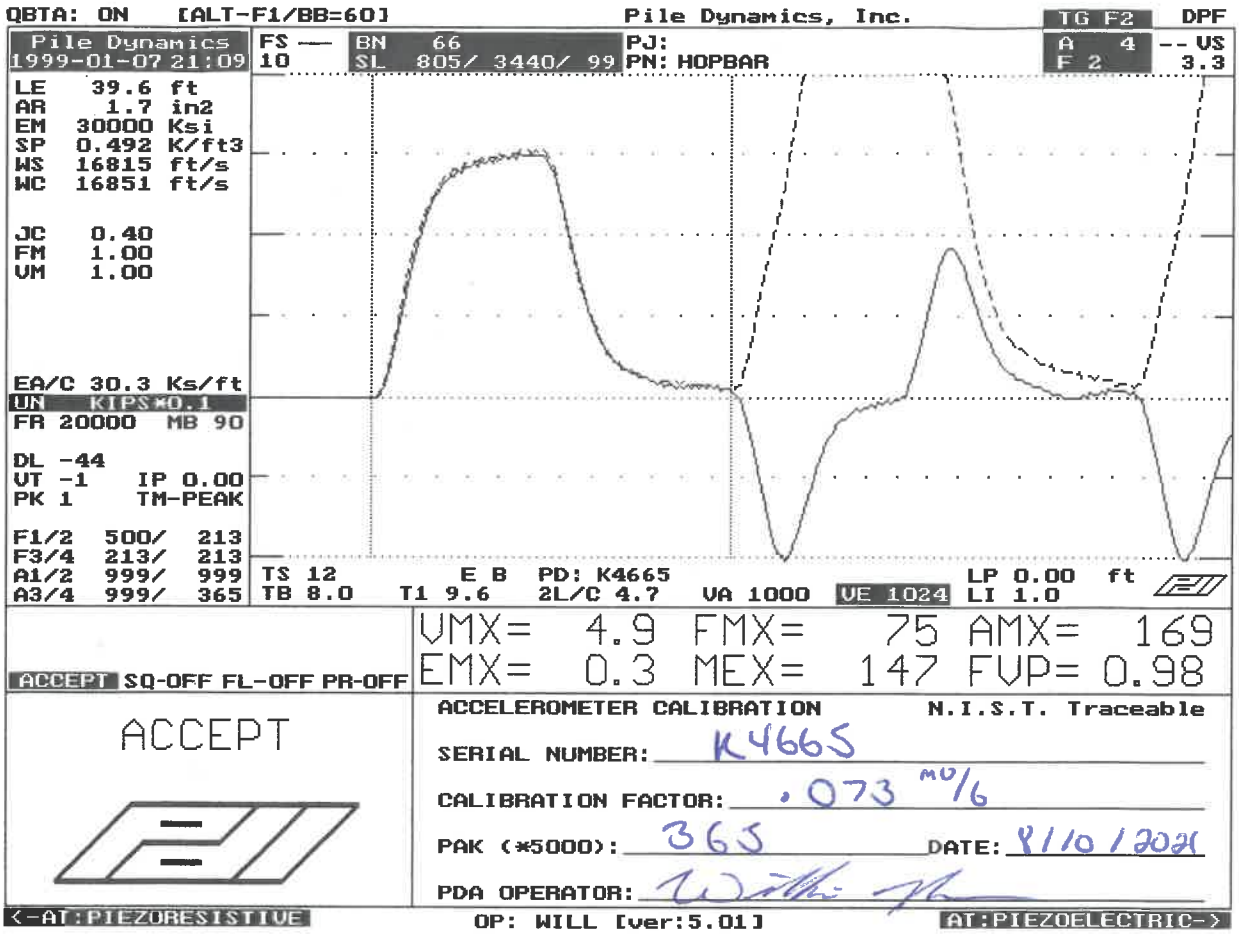
William Johnson, Technician

Reviewed by: Bob Sprenger

Bob Sprenger, production Manager

Accelerometer CC-5 Issued 20160426

30725 Aurora Road • Cleveland, Ohio 44139 USA • +1-216-831-6131 • Fax +1-216-831-0916
E-mail: info@pile.com • www.pile.com



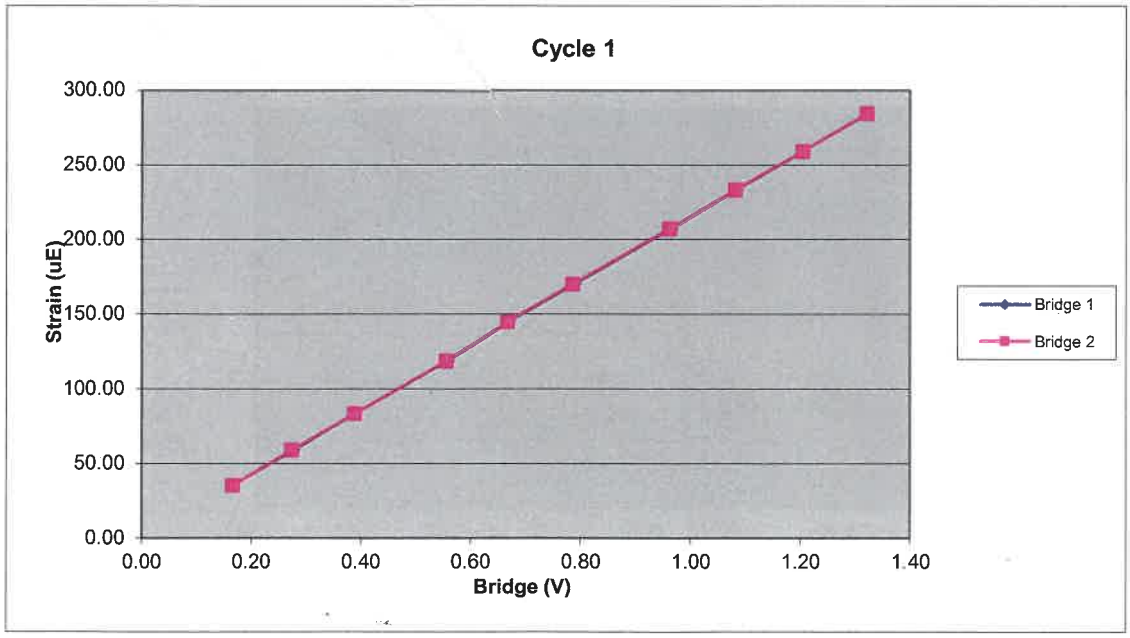
Smart Sensor

Programmed By: WJ CRC Value C59F

203AWJ		Cycle 1		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1246.03	34.91	0.17	0.17
3	2081.11	58.65	0.28	0.27
4	2941.63	83.02	0.39	0.39
5	4214.76	118.53	0.56	0.56
6	5056.27	144.80	0.67	0.67
7	5965.04	170.09	0.79	0.79
8	7294.42	207.16	0.96	0.96
9	8206.79	233.22	1.08	1.08
10	9138.76	259.03	1.21	1.20
11	10040.70	284.32	1.32	1.32

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7599.69**	**Force Calibration (lb/V)**	**7601.86**
Offset	-24.15	Offset	-17.41
Correlation	0.999998	Correlation	0.999998
Strain Calibration (µE/V)	**215.94**	**Strain Calibration (µE/V)**	**216.00**
Offset	-0.96	Offset	-0.77
Correlation	0.999977	Correlation	0.999970

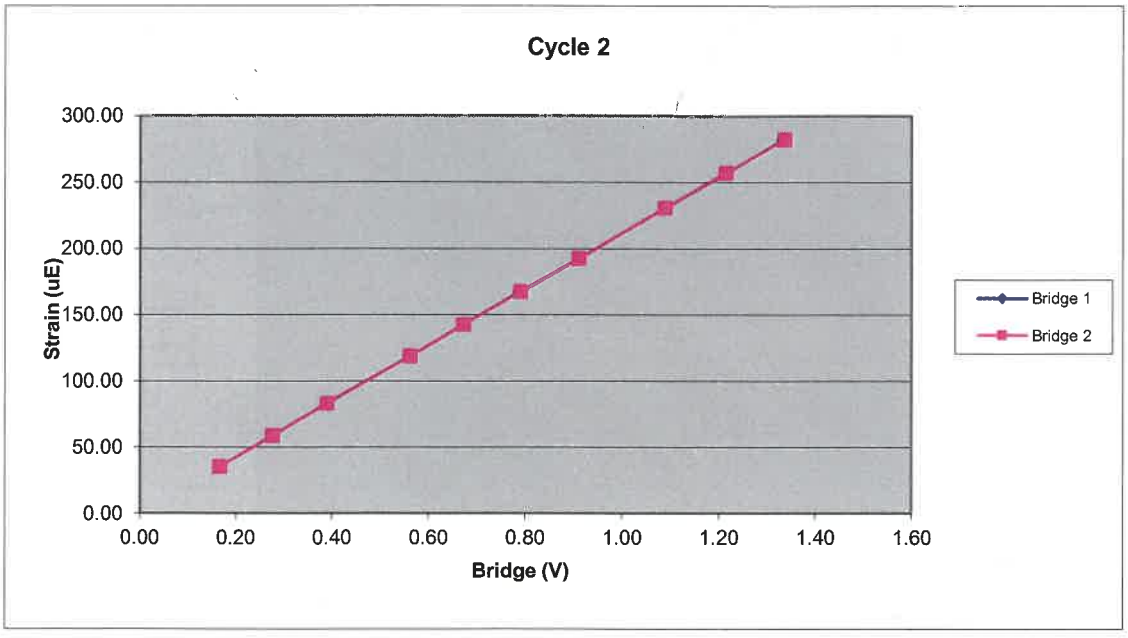
Force Strain Calibration	
EA (Kips)	**35191.11**
Offset	10.07
Correlation	0.999966



203AWJ		Cycle 2		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1258.51	34.91	0.17	0.17
3	2095.24	58.34	0.28	0.28
4	2959.17	82.77	0.39	0.39
5	4259.41	118.34	0.56	0.56
6	5099.16	142.25	0.67	0.67
7	6003.44	167.19	0.79	0.79
8	6914.94	192.10	0.91	0.91
9	8280.29	230.44	1.09	1.09
10	9224.63	256.64	1.22	1.21
11	10143.64	281.95	1.33	1.34

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7599.73**	**Force Calibration (lb/V)**	**7596.59**
Offset	**-6.06**	Offset	**-5.65**
Correlation	**0.999998**	Correlation	**0.999998**
Strain Calibration (µE/V)	**211.24**	**Strain Calibration (µE/V)**	**211.15**
Offset	**0.01**	Offset	**0.02**
Correlation	**0.999992**	Correlation	**0.999991**

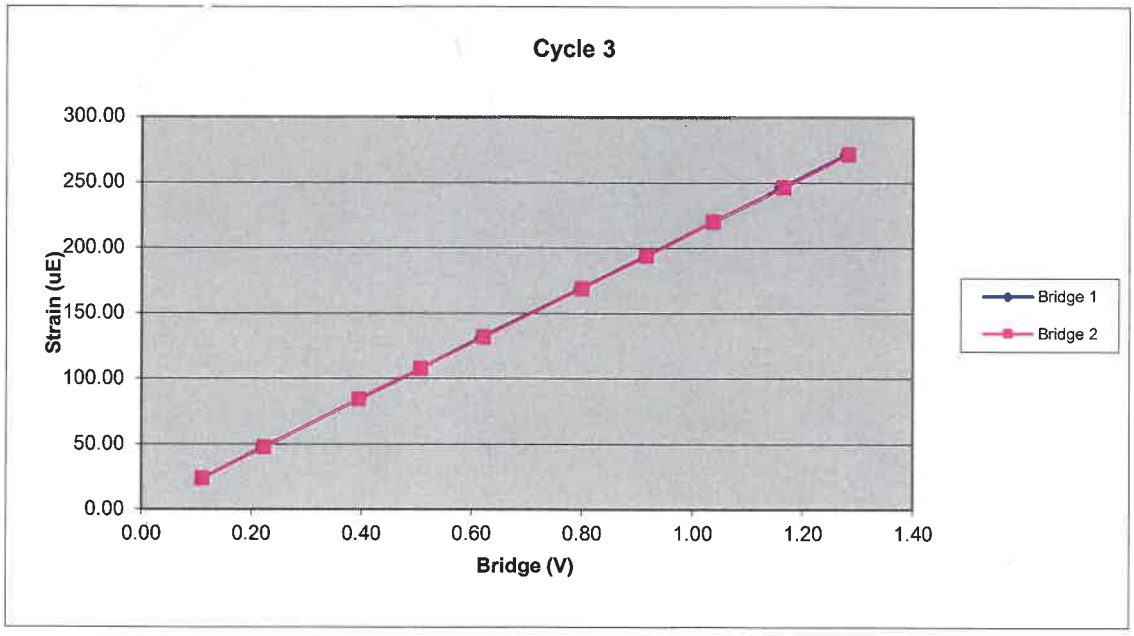
Force Strain Calibration	
EA (Kips)	**35976.99**
Offset	**-6.36**
Correlation	**0.999996**



203AWJ		Cycle 3		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	846.19	23.53	0.11	0.11
3	1695.30	47.55	0.22	0.22
4	3007.23	84.21	0.40	0.40
5	3855.56	107.72	0.51	0.51
6	4714.72	131.93	0.62	0.62
7	6082.40	169.34	0.80	0.80
8	6969.72	194.06	0.92	0.92
9	7881.90	220.26	1.04	1.04
10	8834.83	246.28	1.16	1.17
11	9750.91	271.69	1.28	1.28

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7615.81**	**Force Calibration (lb/V)**	**7596.50**
Offset	**-9.63**	Offset	**-6.69**
Correlation	**0.999996**	Correlation	**0.999998**
Strain Calibration (µE/V)	**212.11**	**Strain Calibration (µE/V)**	**211.57**
Offset	**0.00**	Offset	**0.08**
Correlation	**0.999995**	Correlation	**0.999995**

Force Strain Calibration	
EA (Kips)	**35905.21**
Offset	**-9.52**
Correlation	**0.999994**



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

Calibration Factors	203AWJ		
Bridge 1 (µE/V)	213.10	Bridge 2 (µE/V)	212.91
EA Factor (Kips)	35691.10	Area (in^2)	1.19

Calibrated by: _____
Calibrated Date: 3/25/2021

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Appendix III

PROJECT:	**12th St. Extension - Ph III** **West Columbia, SC** **S&ME Project No. 22610494**	**BORING LOG B-2**
DATE DRILLED: **11/10/22**	ELEVATION: **141.0 ft**	**NOTES:** As-Drilled Northing/Easting Coordinates, and Elevation surveyed by Survey One.
DRILL RIG: **CME 750**	BORING DEPTH: **60.0 ft**	
DRILLER: **S Gowan**	WATER LEVEL: **5.4' 24 hr**	
HAMMER TYPE: **Auto**	LOGGED BY: **M. Cooke**	
SAMPLING METHOD: **Split spoon**	NORTHING: **746269**	EASTING: **1989870**
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SURFACE MATERIALS- TOPSOIL - 4 inches							
	ALLUVIUM - CONGAREE RIVER FLOODPLAIN - CLAYEY SAND (SC) - mostly fine to medium sand, some high plasticity fines, moist, gray, loose.							
5	**FAT CLAY (CH)** - mostly high plasticity fines, trace fine to medium sands, light gray, moist, stiff.	136.0	SS-1		3	2	4	6
			SS-2		3	4	5	9
	CLAYEY SAND (SC) - mostly fine to medium sands, some high plasticity fines, wet, gray, loose.		SS-3		3	1	4	5
10	**ORGANIC SOIL (OH)** - mostly high plasticity organic fines, trace fine to medium sands, very dark brown to black, moist to wet, very soft.	131.0	SS-4		WOH	WOH	WOH	WOH
15	**LEAN CLAY (CL)** - mostly medium plasticity fines, trace fine to medium sands, gray, moist, firm	126.0	SS-5		2	3	3	6
20	**FAT CLAY (CH)** - mostly high plasticity fines, trace fine to medium sands, dark gray, wet, soft.	121.0	SS-6		WOH	WOH	3	3
25	**CLAYEY SAND (SC)** - mostly fine sands, some high plasticity fines, light gray, wet, very loose.	116.0	SS-7		WOH	WOH	2	2
30	**POORLY GRADED SAND WITH SILT (SP-SM)** - mostly fine to medium sand, few non plastic fines, trace fine subrounded quartz gravels, light gray to white, wet, very loose.	111.0	SS-8		2	1	2	3
			SS-9		7	7	5	12

WATER LEVEL: ▼ at 5; HC at 25

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS — 10 20 30 60 80

S&ME BORING LOG 22610494 BORING LOGS.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 12/21/22

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT:	12th St. Extension - Ph III West Columbia, SC S&ME Project No. 22610494	BORING LOG B-2
DATE DRILLED: **11/10/22**	ELEVATION: **141.0 ft**	**NOTES:** As-Drilled Northing/Easting Coordinates, and Elevation surveyed by Survey One.
DRILL RIG: **CME 750**	BORING DEPTH: **60.0 ft**	
DRILLER: **S Gowan**	WATER LEVEL: **5.4' 24 hr**	
HAMMER TYPE: **Auto**	LOGGED BY: **M. Cooke**	
SAMPLING METHOD: **Split spoon**	NORTHING: **746269**	EASTING: **1989870**
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
	SILTY SAND WITH GRAVEL (SM) - mostly fine to coarse sands, subrounded gravels, low plasticity fines, reddish-brown, wet, medium dense. *(continued)*								
40	**POORLY GRADED SAND WITH SILT (SP-SM)** - mostly fine to coarse sands, few low plasticity fines, few coarse subrounded quartz gravels, light brown, wet, loose.	101.0	SS-10		6	5	4		9
45		96.0	SS-11		3	4	4		8
50	**COASTAL PLAIN- LEAN CLAY (CL)** - mostly medium pasticity fines, trace fine sands, gray and light brown, moist, hard.	91.0	SS-12		8	19	27		46
55	**SILTY SAND (SM)** - mostly fine to medium sand, little low plasticity fines, light gray and purple, wet, medium dense.	86.0	SS-13		6	11	12		23
	SANDY LEAN CLAY (CL) - mostly medium plasticity fines, some fine to medium sand, light gray and pink, moist, very hard.								
60	Boring terminated at 60 ft	81.0	SS-14		15	25	33		58

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10 20 30 60 80

S&ME BORING LOG 22610494 BORING LOGS.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 12/2/22

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

SPT Energy Evaluation Form

Project:	ANNUAL SPT ENERGY MEASUREMENT	**Date:**	11/10/2022
Project No.:	1535-22-200	**Weather:**	OVERCAST 60's
Boring No.:	B-2	**Drill Rod Type:**	5-FT LONG AWJ

On-site Personnel

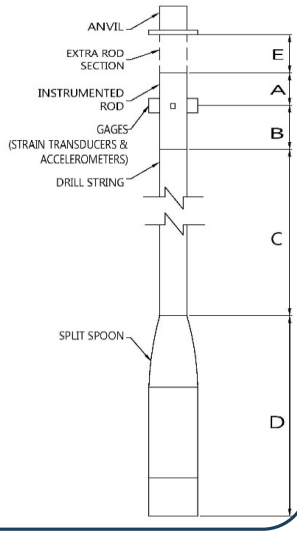
Drilling Company:	S&ME
Rig Operator:	S. GOWAN
Engr/Geologist:	N/A
Client Rep.:	N/A
Analyzer Oper.:	J. WILLIAMSON

Rig/Hammer Info

Drill Rig Make/Model:	CME-750X
Carrier Type:	ATV
Rig Serial No.:	322938
Hammer Type/Model:	CME / AUTO
Hammer Serial No.:	N/A
Hammer Drop System:	CHAIN DRIVE
Lubrication Condition:	PER MANUFACTURERS RECS
Manufacturer Recommended Operation Rate (bpm):	50-55
Typical Drop Height (in.):	30
Typical Hammer Weight (lbs):	140
Anvil Dimension (in.):	12
Drilling Method:	MUD ROTARY w/ 2-7/8" DRAG BIT
Drop Height in Tolerance (y/n)	YES

Rod Info

(A)* + *(B) Instr. Rod Length:	2.0	ft
(B) Instr. Rod Length below Gages:	0.8	ft
(D) Spoon Length:	2.85	ft
(E) Rod Length Above Instr. Rod (if applicable):	-	ft
(B)+(C)+(D) (LE) - Length Below Gauges	**(C)** +3.65	ft
Instr. Rod S/N:	203AWJ	
Instr. Rod Outside Dia.:	1.75	in.
Instr. Rod Area:	1.19	in^2
PDA Make/Model:	PDI / PAX	
PDA Serial No.:	3733L	
Calib. Pulse Test (y/n):	YES	



Gage Info

Gage		Serial No.	Calibration No.
Accel.	A1	K4664	380.0
	A2	K4665	365.0
Strain	F1	203AWJ-1	213.10
	F2	203AWJ-2	212.91

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						AASHTO / USCS Classification
						Total Blows by PDA	6"	12"	18"	N-Value	Extra Blows	
11/10/2022	28.5 - 30	10:21	30	33.65	53	5	2	1	2	**3**	0	SP-SM
	33.5 - 35	10:28	35	38.65	53	18	7	7	5	**12**	0	SM
	38.5 - 40	10:36	40	43.65	53	17	6	5	4	**9**	0	SP-SM
	43.5 - 45	10:56	45	48.65	53	11	3	4	4	**8**	0	SP-SM
	48.5 - 50	11:07	50	53.65	53	56	8	19	27	**46**	2	CL
	53.5 - 55	11:18	55	58.65	53	29	6	11	12	**23**	0	SM
	58.5 - 60	11:28	60	63.65	53	73	15	25	33	**58**	0	CL

Notes: 33.5-35 ft - PDA missed 1 blow plus 1 bad blow = 2 missed blows.
38.5 - 40 ft - Bad Data from PDA. Switched pig tail & main cable & reconfigured wire attachments.
F2 gauge spiking after 2L/c in various blows in all data sets.

NOTE: (1) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. veritcality, weather, or lubrication between trials). (2) Note any changes in rod diameter along drill string and record locations of short rod sections.

Joseph Williamson — 11/10/2022

Prepared By (print/signature) — Date

Appendix IV

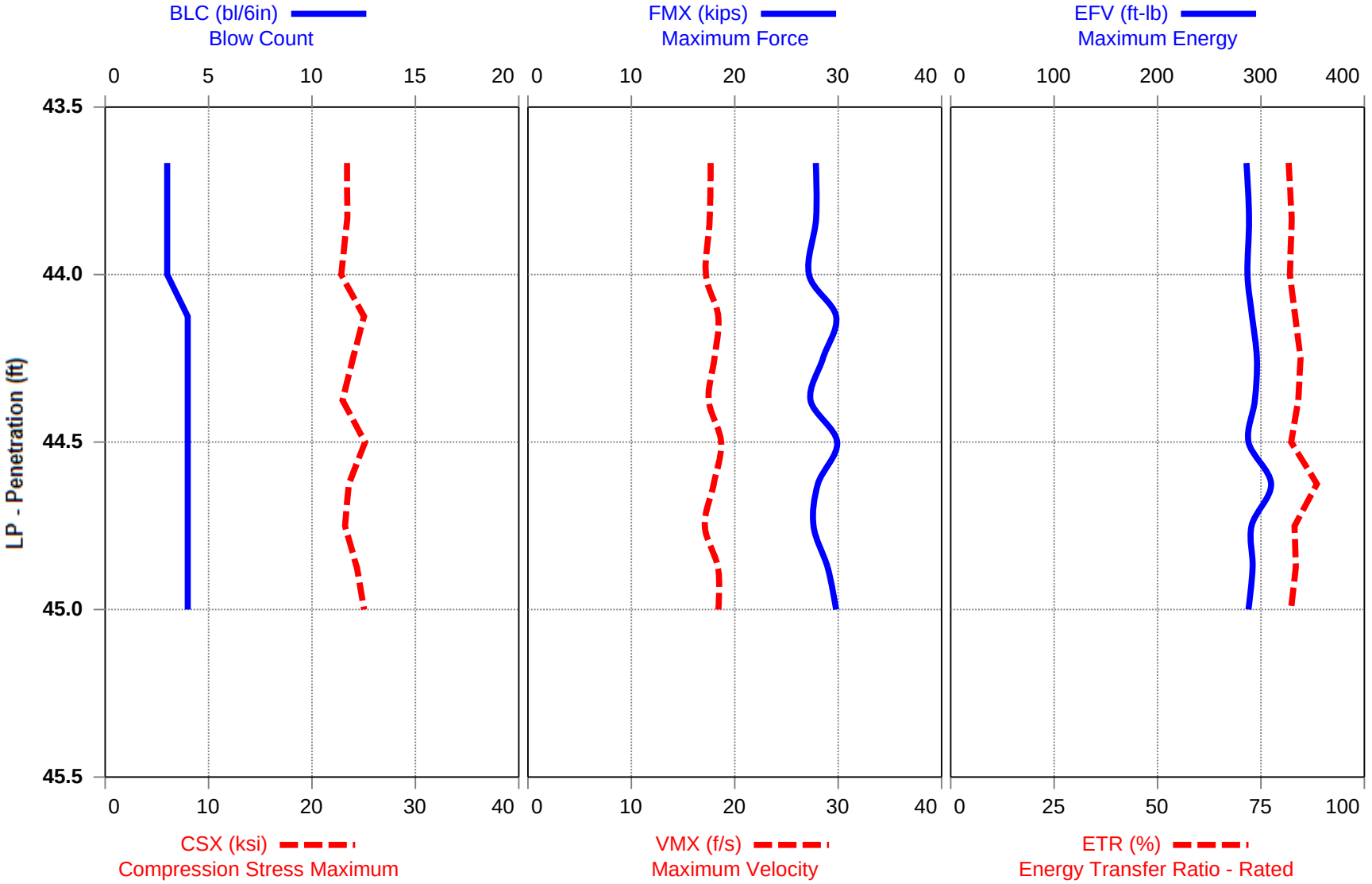
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 15-December-2022

Test started: 10-November-2022

CME-750X (SN 322938) - 43.5-45.0 FEET

B-2



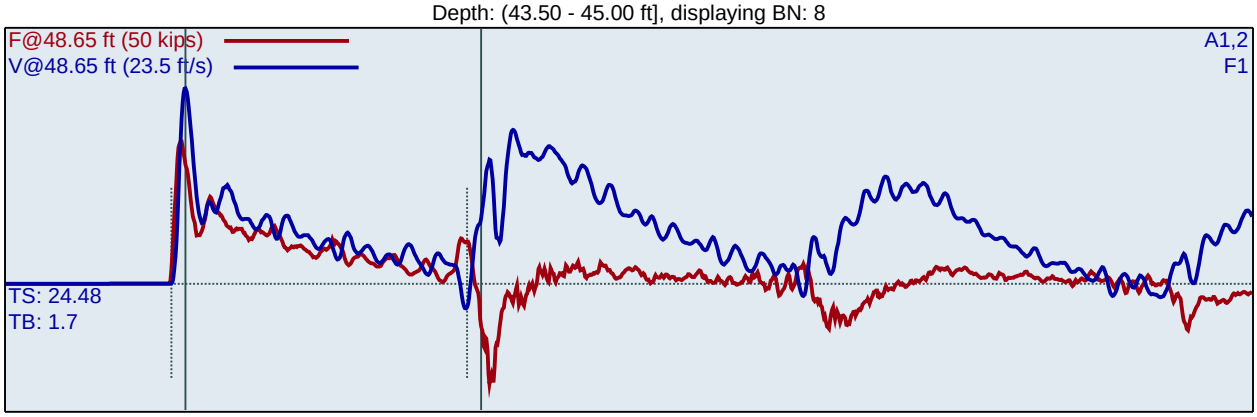
CME-750X (SN 322938)
JRW
B-2

Annual Energy Measurements
Interval start: 11/10/2022

AR: 1.19 in^2
LE: 48.65 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (43.50 - 45.00 ft], displaying BN: 8



F1 : [203 AWJ-1] 213.1 PDICAL (1) FF1
F2 : [203 AWJ-2] 212.91 PDICAL (1) FF1

A1 (PR): [K4664] 380 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 365 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

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	43.67	3	1.9	28	17.7	2.00	23.4	2.00	286	81.7
2	43.83	3	53.5	28	17.6	2.00	23.4	2.00	288	82.4
3	44.00	3	53.7	27	17.2	2.00	22.8	2.00	287	82.0
4	44.13	4	53.5	29	18.4	1.67	24.5	1.50	291	83.3
5	44.25	4	53.2	29	18.0	1.54	24.0	1.50	296	84.6
6	44.38	4	53.3	27	17.5	1.50	23.0	1.50	294	84.0
7	44.50	4	53.6	29	18.7	1.50	24.6	1.50	288	82.4
8	44.63	4	53.4	28	18.0	1.52	23.4	1.50	291	83.2
9	44.75	4	53.2	27	17.1	1.77	22.9	1.50	290	82.8
10	44.88	4	53.3	29	18.4	1.60	24.4	1.50	292	83.4
11	45.00	4	53.4	30	18.4	1.50	25.0	1.50	288	82.2
		Average	53.4	29	18.1	1.58	24.0	1.50	291	83.2
		Std Dev	0.1	1	0.5	0.09	0.8	0.00	3	0.7
		Maximum	53.6	30	18.7	1.77	25.0	1.50	296	84.6
		Minimum	53.2	27	17.1	1.50	22.9	1.50	288	82.2

N-value: 8

Sample Interval Time: 11.22 seconds.

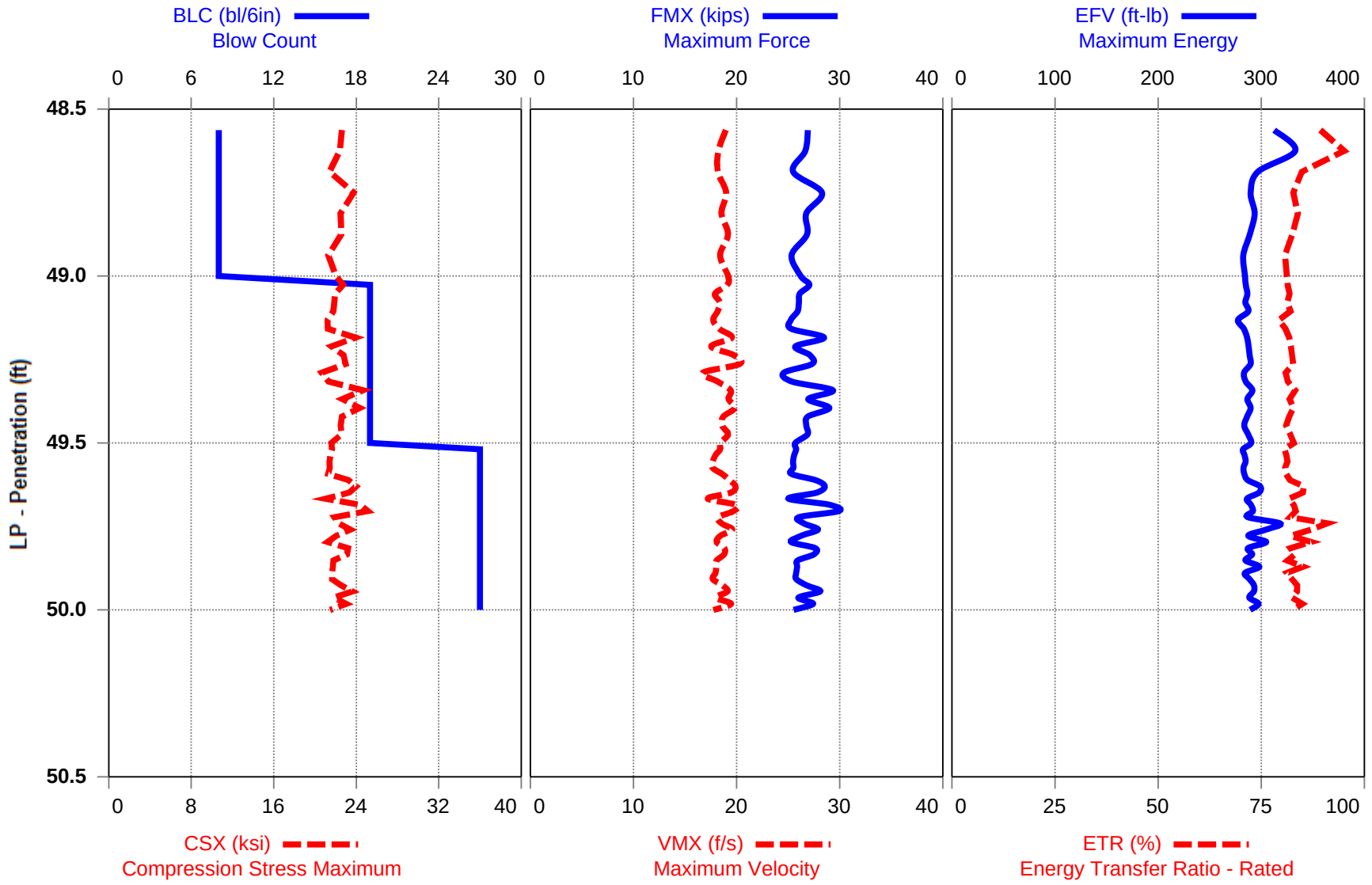
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 15-December-2022

Test started: 10-November-2022

CME-750X (SN 322938) - 48.5-50.0 FEET

B-2



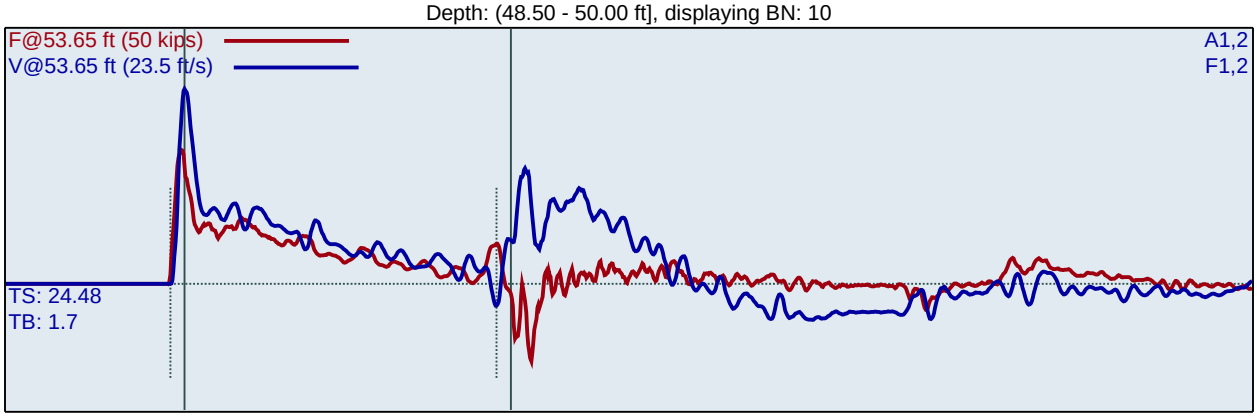
CME-750X (SN 322938)
JRW
B-2

Annual Energy Measurements
Interval start: 11/10/2022

AR: 1.19 in^2
LE: 53.65 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (48.50 - 50.00 ft], displaying BN: 10



F1 : [203 AWJ-1] 213.1 PDICAL (1) FF1

A1 (PR): [K4664] 380 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 365 mv/6.4v/5000g (1) VF1

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
1	48.56	8	1.9	27	19.0	1.18	22.6	0.75	296	84.5
2	48.63	8	42.7	27	18.2	0.99	22.3	0.75	290	82.7
3	48.69	8	54.0	25	18.2	0.79	21.3	0.75	282	80.5
4	48.75	8	53.3	28	19.0	0.75	23.2	0.75	291	83.1
5	48.81	8	53.5	26	18.5	0.75	22.3	0.75	290	82.9
6	48.88	8	53.3	27	19.2	0.75	22.3	0.75	287	81.9
7	48.94	8	53.5	25	18.4	0.75	21.1	0.75	283	80.8
8	49.00	8	53.5	26	19.2	0.75	21.9	0.75	284	81.2
9	49.03	19	53.2	27	19.1	0.56	22.5	0.32	286	81.7
10	49.05	19	53.6	26	17.9	0.56	22.0	0.32	286	81.8
11	49.08	19	53.2	26	18.4	0.54	21.8	0.32	285	81.4
12	49.11	19	53.3	26	18.2	0.54	21.6	0.32	288	82.2
13	49.13	19	53.8	25	17.7	0.52	21.2	0.32	277	79.2
14	49.16	19	53.2	25	18.3	0.51	21.2	0.32	283	80.8
15	49.18	19	53.4	28	19.5	0.50	23.7	0.32	283	81.0
16	49.21	19	53.1	24	17.5	0.51	20.6	0.32	287	81.9
17	49.24	19	53.1	27	19.7	0.51	22.7	0.32	288	82.2
18	49.26	19	53.1	28	20.3	0.49	23.1	0.32	289	82.5
19	49.29	19	53.0	24	16.7	0.49	20.2	0.32	283	80.9
20	49.32	19	53.2	25	18.1	0.48	21.1	0.32	285	81.5
21	49.34	19	53.1	29	19.4	0.48	24.3	0.32	292	83.3
22	49.37	19	52.8	27	19.2	0.46	22.4	0.32	287	82.0
23	49.39	19	53.8	29	19.8	0.46	24.0	0.32	290	82.9
24	49.42	19	53.2	27	18.7	0.45	22.6	0.32	287	81.9
25	49.45	19	53.1	27	18.6	0.44	22.5	0.32	284	81.0
26	49.47	19	53.0	27	19.2	0.44	22.5	0.32	286	81.8
27	49.50	19	53.3	26	18.4	0.44	22.0	0.32	289	82.7
28	49.52	27	53.1	26	18.4	0.42	21.5	0.22	282	80.6
29	49.54	27	52.9	26	17.9	0.43	21.4	0.22	284	81.2
30	49.56	27	53.4	25	17.7	0.43	21.2	0.22	285	81.5
31	49.57	27	53.1	25	17.7	0.42	21.3	0.22	283	80.9

32	49.59	27	52.9	25	18.6	0.41	21.2	0.22	283	80.8
33	49.61	27	53.2	27	19.3	0.41	23.1	0.22	286	81.7
34	49.63	27	52.9	28	19.9	0.41	23.8	0.22	287	82.0
35	49.65	27	53.3	28	19.5	0.43	23.2	0.22	291	83.3
36	49.67	27	53.1	25	17.2	0.41	20.9	0.22	286	81.7
37	49.69	27	53.2	29	20.0	0.41	24.0	0.22	289	82.7
38	49.70	27	52.9	30	19.7	0.41	24.9	0.22	291	83.3
39	49.72	27	53.2	26	18.2	0.41	22.1	0.22	287	82.0
40	49.74	27	53.2	27	18.5	0.41	22.6	0.22	290	82.9
41	49.76	27	53.2	28	19.6	0.41	23.4	0.22	289	82.5
42	49.78	27	53.0	26	18.4	0.41	22.3	0.22	287	82.1
43	49.80	27	53.2	25	18.1	0.40	21.4	0.22	286	81.6
44	49.81	27	53.1	28	18.8	0.39	23.4	0.22	286	81.7
45	49.83	27	52.9	28	18.8	0.40	23.3	0.22	290	82.8
46	49.85	27	53.2	26	18.1	0.39	21.8	0.22	285	81.3
47	49.87	27	53.1	26	18.0	0.39	21.6	0.22	288	82.2
48	49.89	27	53.2	26	17.9	0.39	21.6	0.22	285	81.3
49	49.91	27	52.9	26	17.7	0.39	21.5	0.22	288	82.3
50	49.93	27	53.1	27	18.6	0.39	23.0	0.22	291	83.2
51	49.94	27	52.9	28	19.1	0.39	23.6	0.22	292	83.4
52	49.96	27	53.1	26	18.0	0.38	21.8	0.22	288	82.3
53	49.98	27	53.2	27	19.5	0.40	23.1	0.22	294	84.1
54	50.00	27	53.2	25	17.8	0.39	21.4	0.22	288	82.3
		Average	53.2	27	18.6	0.44	22.3	0.26	287	82.0
		Std Dev	0.2	1	0.8	0.05	1.1	0.05	3	0.9
		Maximum	53.8	30	20.3	0.56	24.9	0.32	294	84.1
		Minimum	52.8	24	16.7	0.38	20.2	0.22	277	79.2

N-value: 46

Sample Interval Time: 59.96 seconds.

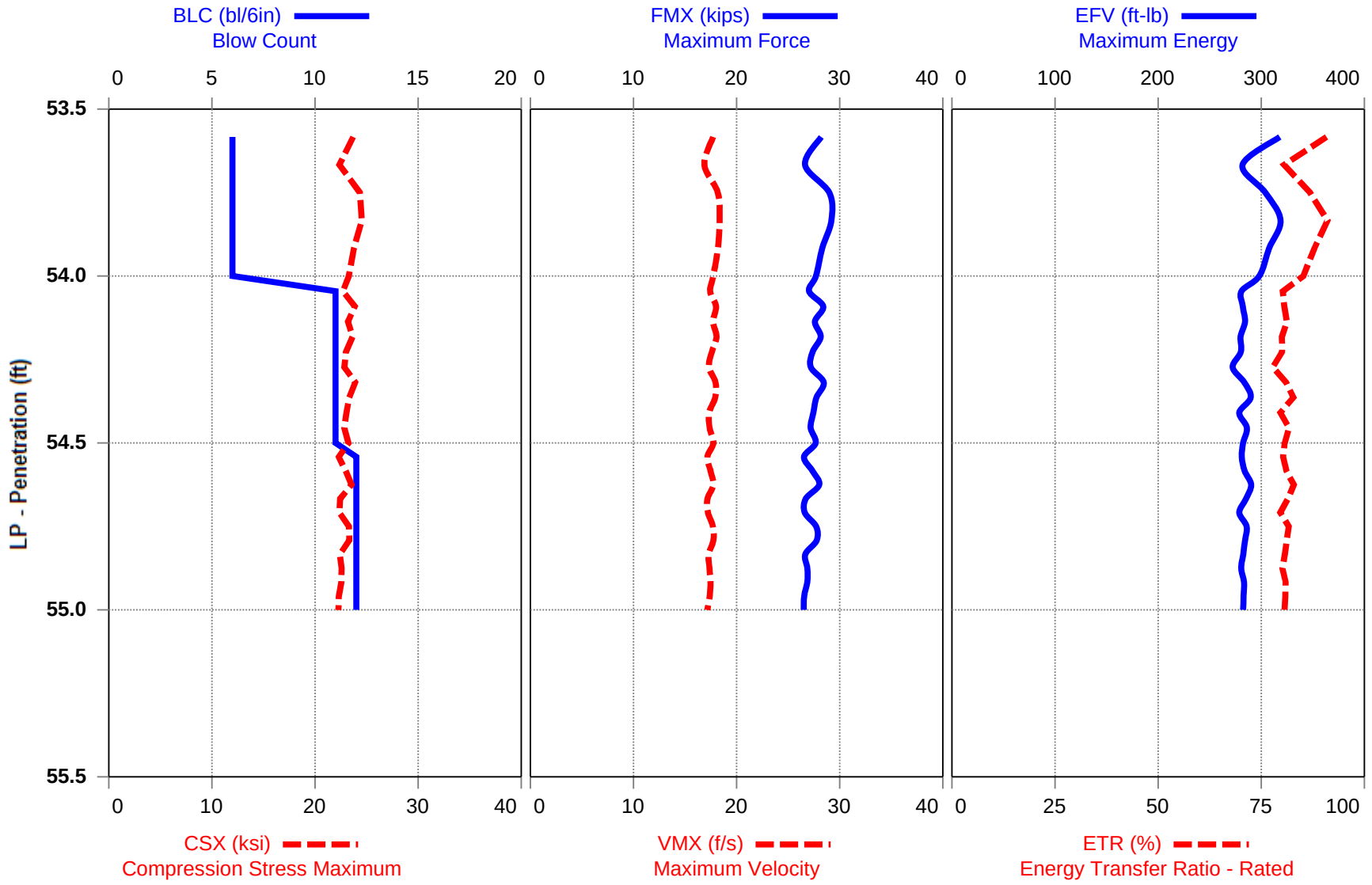
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 15-December-2022

Test started: 10-November-2022

CME-750X (SN 322938) - 53.5-55.0 FEET

B-2



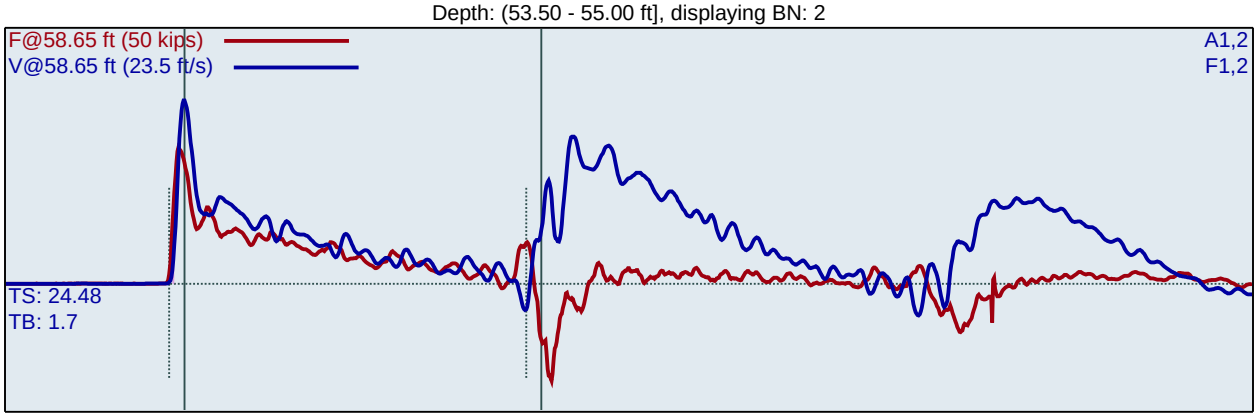
CME-750X (SN 322938)
JRW
B-2

Annual Energy Measurements
Interval start: 11/10/2022

AR: 1.19 in^2
LE: 58.65 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (53.50 - 55.00 ft], displaying BN: 2



F1 : [203 AWJ-1] 213.1 PDICAL (1) FF1

A1 (PR): [K4664] 380 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 365 mv/6.4v/5000g (1) VF1

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	53.58	6	1.9	28	17.7	1.41	23.4	1.00	296	84.6
2	53.67	6	55.5	27	16.9	1.15	22.4	1.00	282	80.5
3	53.75	6	53.3	28	18.2	1.00	23.8	1.00	288	82.2
4	53.83	6	53.2	28	18.3	1.00	23.9	1.00	289	82.7
5	53.92	6	53.4	28	18.2	1.00	23.5	1.00	287	82.1
6	54.00	6	53.4	28	17.7	1.00	23.2	1.00	291	83.3
7	54.05	11	53.5	27	17.4	0.61	22.6	0.55	281	80.2
8	54.09	11	53.0	29	18.0	0.57	24.1	0.55	280	80.1
9	54.14	11	53.5	28	17.7	0.60	23.1	0.55	283	80.9
10	54.18	11	53.3	28	18.0	0.58	23.9	0.55	278	79.5
11	54.23	11	53.6	27	17.6	0.58	22.9	0.55	277	79.0
12	54.27	11	53.2	27	17.3	0.57	22.5	0.55	271	77.6
13	54.32	11	53.4	28	18.0	0.57	23.3	0.55	282	80.4
14	54.36	11	53.2	27	17.9	0.58	22.5	0.55	283	80.8
15	54.41	11	53.5	27	17.3	0.58	22.4	0.55	278	79.4
16	54.45	11	53.0	27	17.4	0.59	22.3	0.55	284	81.1
17	54.50	11	53.4	27	17.7	0.56	22.8	0.54	281	80.4
18	54.54	12	53.2	26	17.2	0.57	21.9	0.50	281	80.4
19	54.58	12	53.4	27	17.5	0.56	22.6	0.50	283	80.8
20	54.63	12	53.2	27	17.7	0.60	22.9	0.50	290	82.7
21	54.67	12	53.1	26	17.2	0.58	22.2	0.50	285	81.3
22	54.71	12	53.5	26	17.2	0.57	22.1	0.50	279	79.6
23	54.75	12	53.2	27	17.7	0.57	23.0	0.50	284	81.2
24	54.79	12	53.4	27	17.7	0.59	22.9	0.50	284	81.1
25	54.83	12	53.4	26	17.3	0.59	22.1	0.50	282	80.6
26	54.88	12	53.4	26	17.4	0.58	22.2	0.50	280	80.1
27	54.92	12	53.0	27	17.5	0.57	22.4	0.50	282	80.6
28	54.96	12	53.2	26	17.4	0.58	22.1	0.50	282	80.6
29	55.00	12	53.4	27	17.2	0.58	22.3	0.50	281	80.3

Average	53.3	27	17.5	0.58	22.7	0.52	281	80.4
Std Dev	0.2	1	0.3	0.01	0.5	0.02	3	1.0
Maximum	53.6	29	18.0	0.61	24.1	0.55	290	82.7
Minimum	53.0	26	17.2	0.56	21.9	0.50	271	77.6

N-value: 23

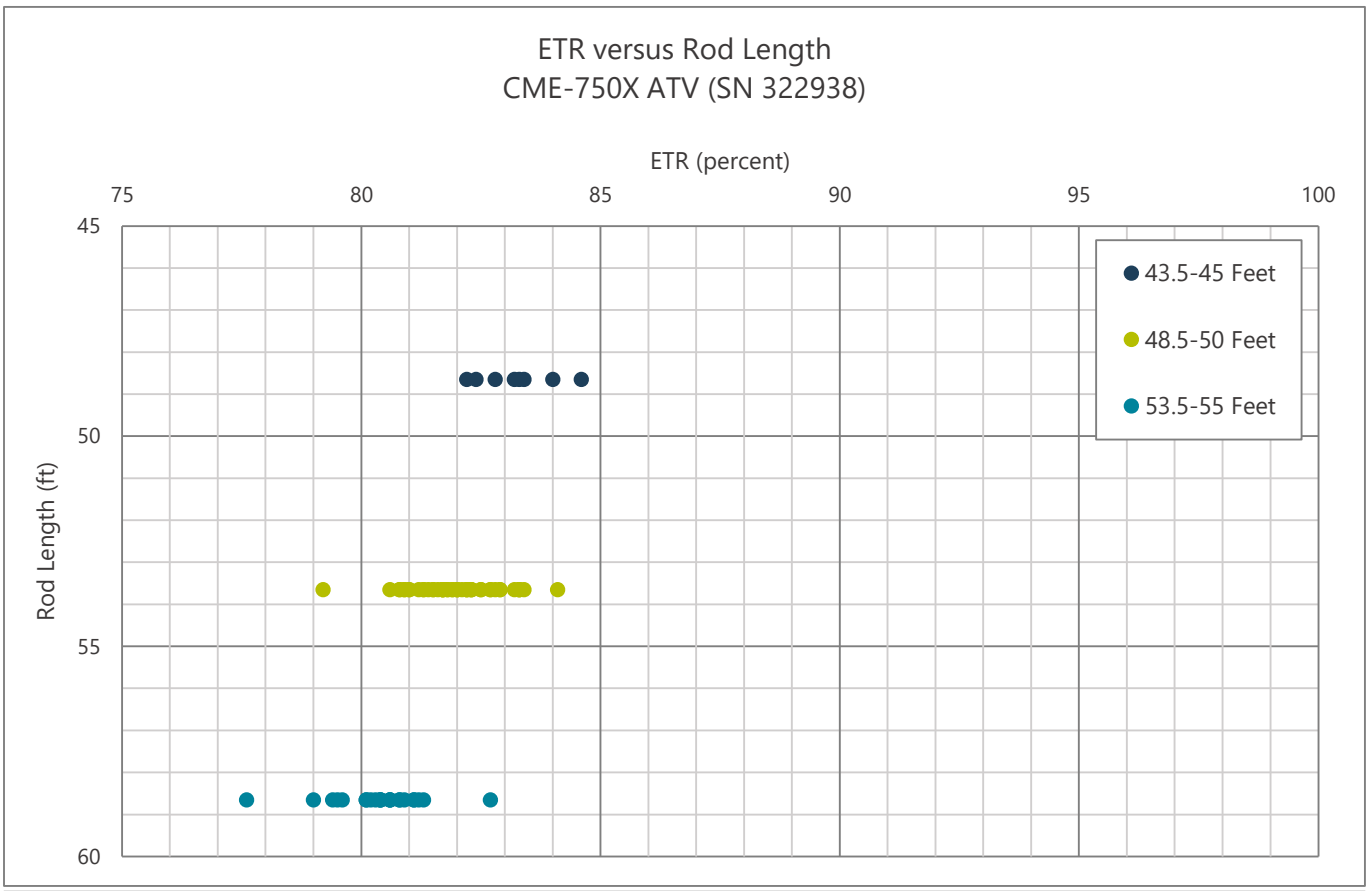
Sample Interval Time: 31.43 seconds.

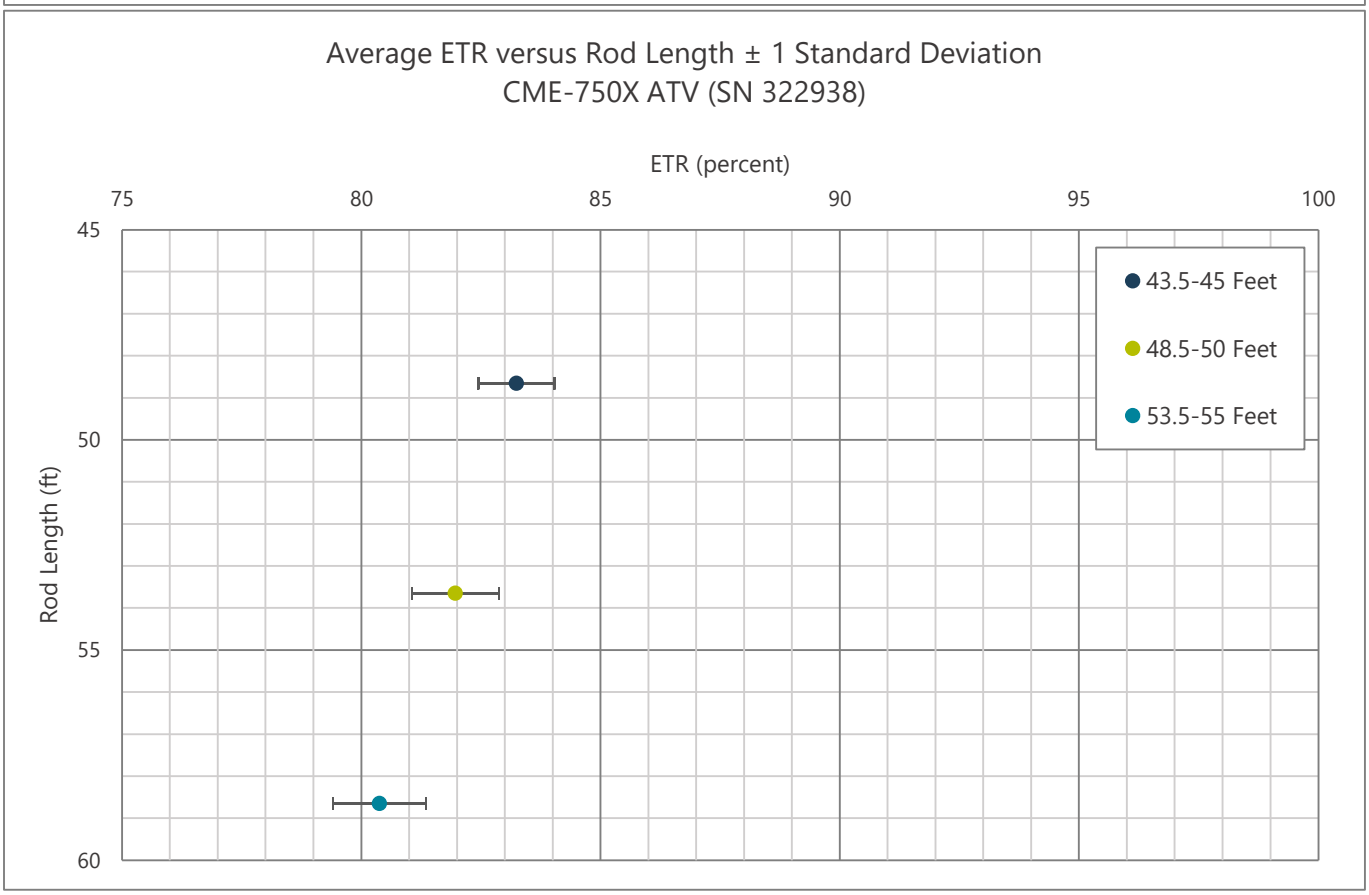
Summary of SPT Test Results

Project: CME-750X (SN 322938), Test Date: 11/10/2022

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

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 %
48.65	43.50	45.00	**3-4-4**	**8**	**10**	53.4	29	18.1	1.58	24.0	1.50	291	83.2
53.65	48.50	50.00	**8-19-27**	**46**	**62**	53.2	27	18.6	0.44	22.3	0.26	287	82.0
58.65	53.50	55.00	**6-11-12**	**23**	**31**	53.3	27	17.5	0.58	22.7	0.52	281	80.4
				Overall Average Values:		53.2	27	18.2	0.60	22.6	0.47	286	81.6
				Standard Deviation:		0.2	1	0.8	0.34	1.0	0.37	4	1.3
				Overall Maximum Value:		53.8	30	20.3	1.77	25.0	1.50	296	84.6
				Overall Minimum Value:		52.8	24	16.7	0.38	20.2	0.22	271	77.6


ETR versus Rod Length
CME-750X ATV (SN 322938)
ETR (percent)
75
80
85
90
95
100
45
50
55
60
Rod Length (ft)
43.5-45 Feet
48.5-50 Feet
53.5-55 Feet


Average ETR versus Rod Length ± 1 Standard Deviation
CME-750X ATV (SN 322938)
ETR (percent)
75
80
85
90
95
100
45
50
55
60
Rod Length (ft)
43.5-45 Feet
48.5-50 Feet
53.5-55 Feet

Report of SPT Energy Measurements
S&ME CME-550X ATV
(Serial No. 290593)
Blythewood, South Carolina

PREPARED FOR:

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

PREPARED BY:

S&ME, Inc.
8848 Red Oak Boulevard, Suite A
Charlotte, North Carolina 28217

December 27, 2023

December 27, 2023

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

Attention: Mr. Greg Bodenheimer, P.E.

Cc: Ms. Cheryl A. Youngblood, L.G.
Ms. Christina M. Bruinsma, L.G.

Reference: **Report of SPT Energy Measurements**
S&ME CME-550X ATV (Serial No. 290593)
Blythewood, South Carolina
NC PE Firm License No. F-0176

Dear Mr. Bodenheimer:

We have completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer used with our CME-550X ATV-mounted drill rig (Serial No. 290593). This service was performed by Mr. Joseph Williamson, P.E. of our firm on November 17, 2023, in general accordance with ASTM D4633 and the most recent revision of the North Carolina Department of Transportation (NCDOT) Geotechnical Engineering Unit's requirements. Review of the data quality and analyses was performed by Mr. Williamson. A copy of the Certificate of Proficiency issued by Pile Dynamics based on the Dynamic Measurement and Analysis Proficiency Test for Mr. Williamson is included in Appendix I. The testing procedures, equipment used during testing, and detailed results are presented in this report.

1.0 Dynamic Testing Methodology

Testing was performed using a model PAX (Serial No. 3726L) Pile Driving Analyzer ™ (PDA) manufactured by Pile Dynamics, Inc. The PDA was used to record and interpret data from two piezoresistive accelerometers (Serial Nos. K4664 and K4665) bolted to a 2.0-foot long AWJ drill rod (Serial No. 203) internally instrumented with two strain transducers. Calibration sheets for the accelerometers and the instrumented rod are included in Appendix II. The instrumented AWJ drill rod has a cross-sectional area of 1.22 square inches and an outside diameter of approximately 1¾ inches. Therefore, we calculate the inside diameter to be approximately 1¼ inches at the gauge location. The accelerometers and strain gauges, which are diametrically opposed 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.

2.0 Testing and Observations

S&ME personnel were on site November 17, 2023, to observe and perform high-strain dynamic testing during SPT sampling on the CME-550X ATV-mounted drill rig operated by Larry Shrader of S&ME. The measurements were taken during drilling of a test hole adjacent to a previous soil test boring at an S&ME project site in Blythewood, South Carolina. SPT energy measurements were recorded during four sampling intervals that generally met the NCDOT testing requirements. Two of the samples do not specifically meet the required N-value or rod length interval. However, analysis of the test data indicates the data from these samples generally agrees with the two samples that do meet the testing requirements. Preliminary test results were shared with Mr. Bodenheimer on December 19, 2023 for review. Mr. Bodenheimer agreed that, collectively the four samples provide an appropriate evaluation of the hammer energy transfer. The information presented in the tables below summarizes the equipment and tooling used during the SPT energy measurements. The SPT Energy Evaluation Form and the Soil Test Boring Log from the adjacent boring are included in Appendix III.

Table 2-1: Drill Rig Information

Manufacturer	CME
Model	550X
Serial Number	290593
Operator	L. Shrader
Carrier	ATV

Table 2-2: Hammer Information

Model / Type	CME / Auto
Serial Number	290593
Typical Drop Height (inches)	30
Typical Ram Weight (pounds)	140
Ram Serial Number	N/A

Table 2-3: Drilling and Instrumented Rod Information

Instrumented Rod Type	AWJ (Serial No. 203)
OD (inches)[1]	1¾
ID (inches)[2]	1¼
Cross-Sectional Area (in²)[3]	1.22
Total Instrumented Rod Length (feet)[1]	2.0
Length Below Gages (feet)[1]	0.7
Typical Rod Lengths (feet)	5
Split-Spoon Length (feet)[1]	2.85

3.0 Dynamic Testing Results

The total rod length from the instrumentation to the tip of the split-spoon sampler was determined by adding 3.55 ft to the drill rod length at each sample depth. The SPT Energy Measurement Data Summary tables in Appendix IV present the test data from every hammer blow at each sampling interval, along with representative force and velocity traces for each test interval. Per ASTM D4633, only the blows from the final foot of each sample interval (i.e. the blows that determine the N-value) are considered when computing the average measurement values of each test interval.

The reported blow counts obtained by the drill rig personnel, a summary of the test data, and average computed hammer energy and transfer ratio values are provided in Table 3-1. Based on the test data, the automatic hammer on the CME-550X operated at an average rate of about 59 blows per minute (bpm) during dynamic testing. The measured average transferred hammer energy (EFV) of the four sample intervals tested ranged from 316 to 326 ft-lbs, which corresponds to Energy Transfer Ratio (ETR) values of 90.3 to 93.2%, respectively. Plots and tables of the following are also included in the Appendix and present the test data with depth for each test interval:

- Penetration vs. BLC[4]
- Penetration vs. FMX[5]
- Penetration vs. EFV[6]
- Penetration vs. CSX[7]
- Penetration vs. VMX[8]
- Penetration vs. ETR[9]
- ETR vs. Rod Length
- Average ETR vs. Rod Length

[1] Measured with engineer's tape measure.
[2] Calculated using measured OD and Area from instrument rod calibration record.
[3] From instrument rod calibration record.
[4] BLC - Blow Count per 6-in. increment
[5] FMX - Maximum Compressive Force
[6] EFV – Maximum Transferred Energy
[7] CSX – Maximum Compressive Stress
[8] VMX – Maximum Velocity
[9] ETR – Energy Transfer Ratio – Ratio of Calculated Energy to Theoretical Energy of 140 lb hammer falling 30 inches

Table 3-1: Summary of Dynamic Testing Results

Data Set ID	Sample Depth (ft)	Drill Rod Length (ft)	Instrumentation to Sampler Tip Length (ft)	Blows per 6" Increment / N-value	Soil Sample Description (Piedmont Residual)	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (%)
1	48.5 – 50.0	50.0	53.55	6-8-13 / **21**	SANDY SILT	58.6	316	90.3
2	53.5 – 55.0	55.0	58.55	6-11-17 / **28**	SANDY SILT	58.7	326	93.2
3	56.0 – 57.5	57.5	60.55	7-9-17 / **26**	SANDY SILT	58.6	320	91.3
4	58.5 – 60.0	60.0	63.55	15-27-44 / **71**	SANDY SILT	58.8	320	91.4
					Overall Average	**58.7**	**321**	**91.6**

The overall average transferred hammer energy for the automatic hammer on the CME-550X ATV-mounted drill rig (SN 290593) was 321 foot-pounds, with an average ETR of 91.6%.

4.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

5.0 Closing

S&ME appreciates the opportunity to provide this report to the North Carolina Department of Transportation, Geotechnical Engineering Unit. Please let us know if you have any questions concerning this report.

Sincerely,

S&ME, Inc.

Joseph R. Williamson, P.E.
Project Manager
N.C. Registration No. 42168

Gregory J. Canivan, P.E.
Technical Principal

Appendices:

- Appendix I - Certificates of Proficiency
- Appendix II - Instrumented Rod and Accelerometer Calibration Sheets
- Appendix III - SPT Energy Evaluation Form (Field Log)
- Appendix IV - CME-550X ATV (SN 290593) SPT Energy Measurements Summary Plots and Tables

Appendices

Appendix I- Certificate of Proficiency

PDCA
PILE DRIVING CONTRACTORS ASSOCIATION

Pile Dynamics, Inc.

This documents that

Joseph Williamson
S&ME, Inc.

has on March 16, 2022 achieved the rank of

MASTER

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 Master level seek to attain Expert level through additional study within eight 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. 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. This certificate can be verified at www.PDAproficiencytest.com.

Frank T. Peters, Executive Director
Pile Driving Contractors Association

SEAL
OHIO

Garland Likins, Senior Partner
Pile Dynamics, Inc.

No. 3251

Appendix II - Calibration Sheets

Accelerometer Calibration Certificate
Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc.
Calibration performed on 17Aug2023

Serial No:	K4664	**Temperature:**	77.6 °F
Model:	PR	**Humidity:**	51%
Calibrated on:	Channel 3 on 8G 5161 LE		

Ref Acc 1:	72505! 1035 g's/volt	**Cal on:**	24Mar2022
Ref Acc 2:	72517! 1049 g's/volt	**Cal on:**	24Mar2022

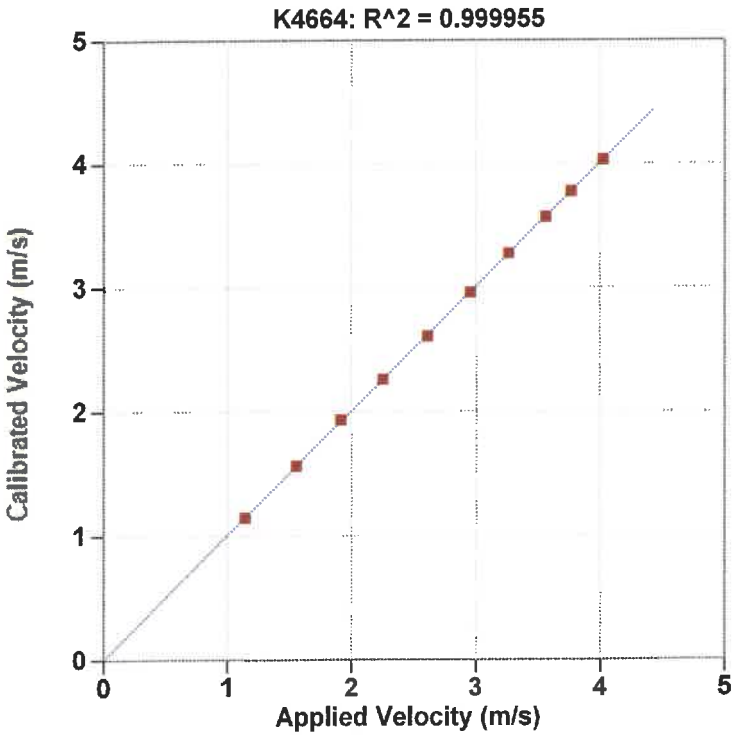
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

376.6 mv/5000g
(75.3 μv/g)
R^2: 0.999955 [Chip programmed]

Operator: William Johnson

Signed



Reference Velocity	S/N K4664 Velocity
m/s	m/s
1.146	1.143
1.560	1.559
1.915	1.932
2.255	2.258
2.612	2.606
2.962	2.958
3.270	3.273
3.569	3.566
3.772	3.773
4.030	4.027

Maximum Acceleration: 879 g's

Accelerometer Calibration Certificate
Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc.
Calibration performed on 17Aug2023

Serial No:	K4665	**Temperature:**	77.6 °F
Model:	PR	**Humidity:**	51%
Calibrated on:	Channel 3 on 8G 5161 LE		

Ref Acc 1:	72505! 1035 g's/volt	**Cal on:**	24Mar2022
Ref Acc 2:	72517! 1049 g's/volt	**Cal on:**	24Mar2022

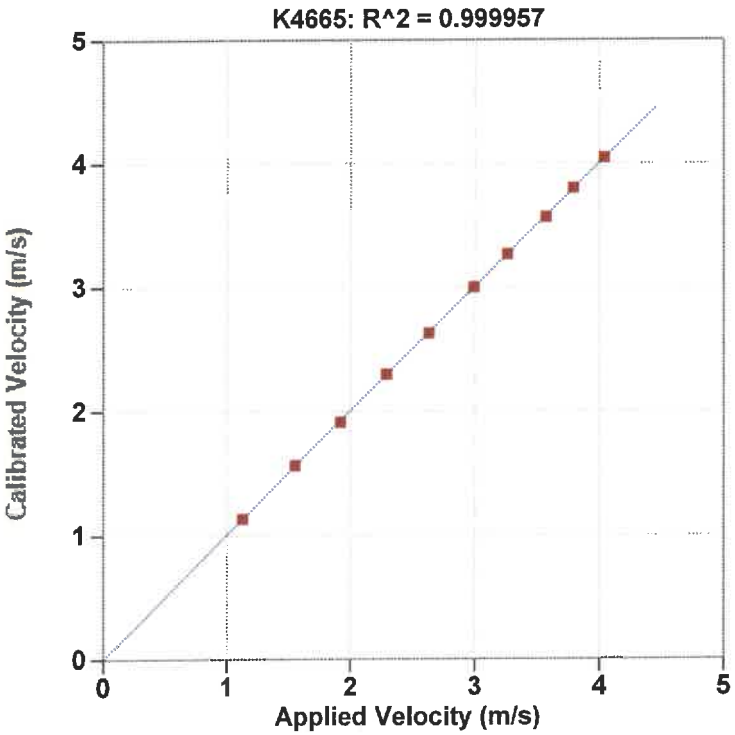
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

375.3 mv/5000g
(75.1 µv/g)
R^2: 0.999957 [Chip programmed]

Operator: William Johnson

Signed



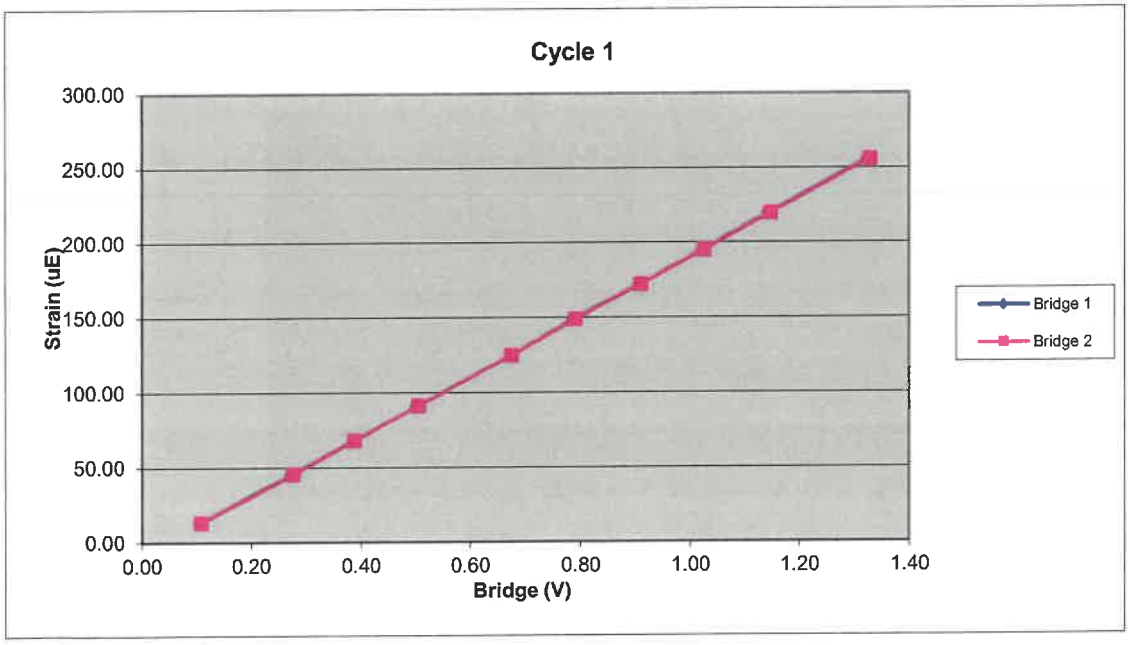
Reference Velocity	S/N K4665 Velocity
m/s	m/s
1.129	1.131
1.555	1.560
1.922	1.910
2.291	2.295
2.633	2.627
2.994	2.999
3.262	3.264
3.573	3.564
3.791	3.797
4.038	4.041

Maximum Acceleration: 880 g's

203AWJ		Cycle 1		
Sample	**Force (lb)**	**Strain (μE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	819.88	13.18	0.11	0.11
3	2100.72	45.33	0.27	0.28
4	2947.11	68.12	0.39	0.39
5	3827.72	90.98	0.50	0.51
6	5122.01	124.83	0.67	0.68
7	5996.48	148.92	0.79	0.79
8	6896.87	172.25	0.91	0.91
9	7771.24	195.27	1.02	1.03
10	8694.53	219.87	1.15	1.15
11	10075.00	255.83	1.33	1.33

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7576.32**	**Force Calibration (lb/V)**	**7575.14**
Offset	14.17	Offset	2.97
Correlation	0.999999	Correlation	0.999999
Strain Calibration (μE/V)	**199.46**	**Strain Calibration (μE/V)**	**199.43**
Offset	-9.00	Offset	-9.29
Correlation	0.999979	Correlation	0.999982

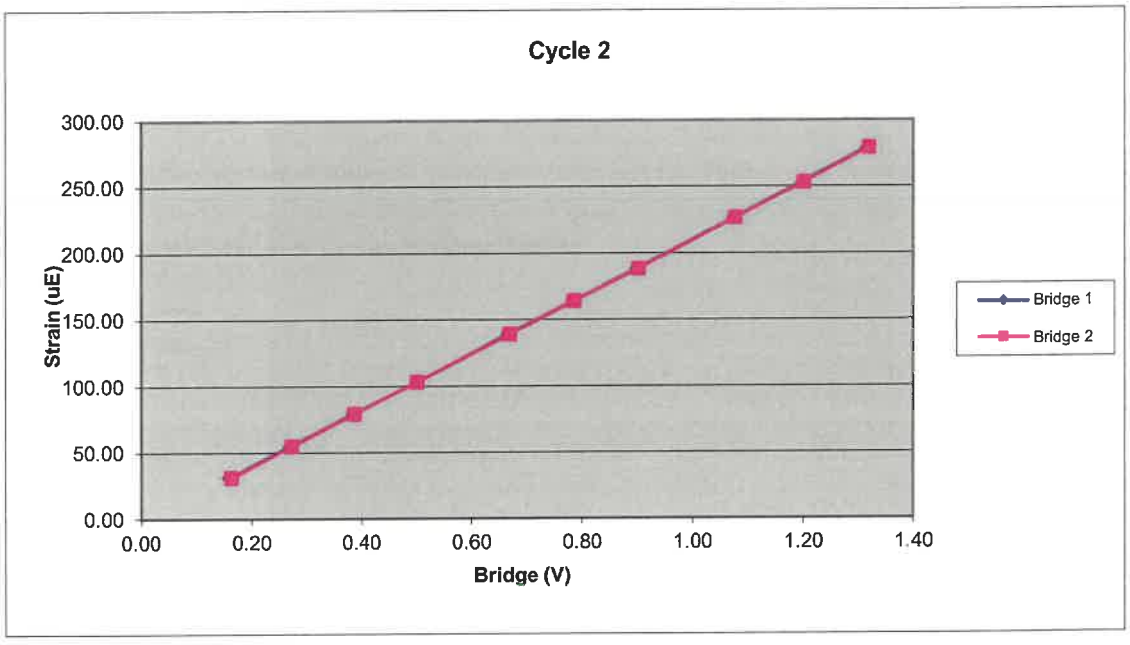
Force Strain Calibration	
EA (Kips)	**37982.46**
Offset	356.04
Correlation	0.999980



203AWJ		Cycle 2		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1217.00	30.72	0.16	0.16
3	2060.56	54.45	0.27	0.27
4	2939.22	78.94	0.39	0.39
5	3811.73	102.81	0.50	0.50
6	5082.83	138.71	0.67	0.67
7	5976.20	163.65	0.78	0.79
8	6861.10	187.95	0.90	0.90
9	8194.67	226.13	1.08	1.08
10	9130.84	252.84	1.20	1.20
11	10039.52	278.74	1.32	1.32

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7616.13**	**Force Calibration (lb/V)**	**7615.56**
Offset	**1.43**	Offset	**-11.88**
Correlation	**0.999999**	Correlation	**0.999997**
Strain Calibration (µE/V)	**213.80**	**Strain Calibration (µE/V)**	**213.79**
Offset	**-3.74**	Offset	**-4.12**
Correlation	**0.999987**	Correlation	**0.999990**

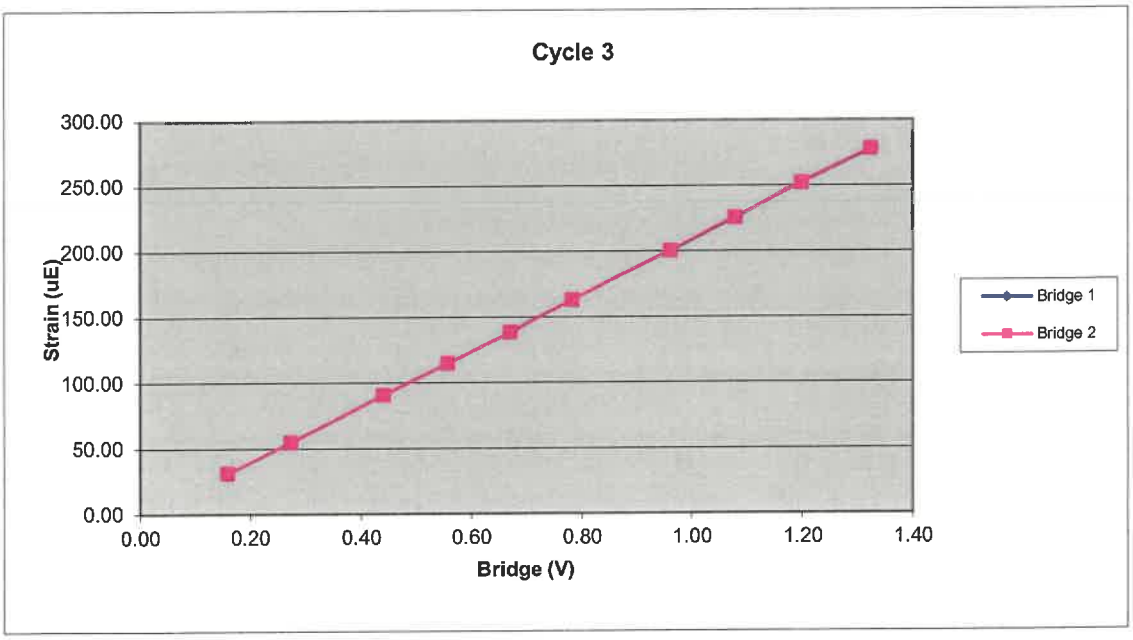
Force Strain Calibration	
EA (Kips)	**35621.25**
Offset	**134.95**
Correlation	**0.999985**



203AWJ		Cycle 3		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1216.12	31.38	0.16	0.16
3	2078.01	54.75	0.27	0.27
4	3348.13	90.71	0.44	0.44
5	4248.62	114.98	0.56	0.56
6	5110.90	138.68	0.67	0.67
7	5966.16	163.47	0.78	0.78
8	7338.73	200.80	0.96	0.96
9	8226.55	225.96	1.08	1.08
10	9144.10	252.26	1.20	1.20
11	10093.62	278.03	1.32	1.32

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7621.84**	**Force Calibration (lb/V)**	**7635.13**
Offset	**-0.64**	Offset	**-3.95**
Correlation	**0.999999**	Correlation	**0.999999**
Strain Calibration (µE/V)	**212.12**	**Strain Calibration (µE/V)**	**212.49**
Offset	**-2.91**	Offset	**-3.01**
Correlation	**0.999979**	Correlation	**0.999985**

Force Strain Calibration	
EA (Kips)	**35930.12**
Offset	**104.27**
Correlation	**0.999985**



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

Calibration Factors	203AWJ		
Bridge 1 (µE/V)	208.46	Bridge 2 (µE/V)	208.57
EA Factor (Kips)	36511.28	Area (in^2)	1.22

Calibrated by: Sean Bowers
Calibrated Date: 8/24/2023

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Appendix III – Field Log

SPT Energy Evaluation Form

Project: I-77 EXIT 26 PHASE I
Project No.: 236101784
Boring No.: TEST HOLE A

Date: 11/17/23
Weather: CLEAR 70°
Drill Rod Type: 5' LONG AW3

On-site Personnel

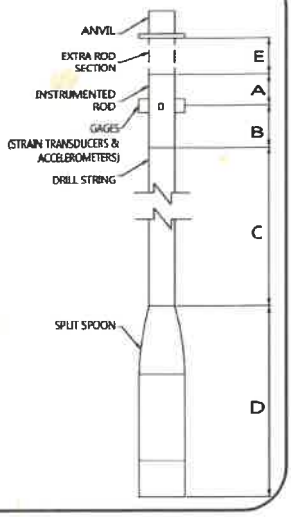
Drilling Company: SME
Rig Operator: L. SPRADER
Engr/Geologist: N/A
Client Rep.: N/A
Analyzer Oper.: J. WILLIAMSON

Rig/Hammer Info

Drill Rig Make/Model: CME-550X
Carrier Type: ATV
Rig Serial No.: 290593 (R-49)
Hammer Type/Model: AUTO / CME
Hammer Serial No.:
Hammer Drop System: CHAIN DRIVE
Lubrication Condition: PER MANUFACTURER REQ'S.
Manufacturer Recommended Operation Rate (bpm): 50-55
Typical Drop Height (in.): 30
Typical Hammer Weight (lbs): 140
Anvil Dimension (in.): 12
Drilling Method: 2 1/4" HSA
Drop Height in Tolerance (y/n): Y

Rod Info

(A) + (B) Instr. Rod Length: 7.0 ft
(B) Instr. Rod Length below Gages: 0.7 ft
(D) Spoon Length: 2.85 ft
(E) Rod Length Above Instr. Rod (if applicable): 0 ft
(B)+(C)+(D) (LE) - Length Below Gauges (C) + 3.55 ft
Instr. Rod S/N: 203 AW3
Instr. Rod Outside Dia.: 1.75 in.
Instr. Rod Area: 1.22 in²
PDA Make/Model: PDI / PAX
PDA Serial No.: 3733
Calib. Pulse Test (y/n): Y



Gage Info

Gage		Serial No.	Calibration No.
Accel.	A3	K 4664	376.6
	A4	K 4665	375.3
Strain	F3	203 AW3-1	208.46
	F4	203 AW3-2	208.57

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						AASHTO / USCS Classification
						Total Blows by PDA	6"	12"	18"	N-Value	Extra Blows	
11/17/23	38.5-40.0	11:01	39	42.55			25	26	50+	100+		
	43.5-45	11:19	45	48.55		97	14	35	50/0.3	100+		
	48.5-50.0	11:34	50	53.55		27	6	8	13	21	0	
	53.5-55.0	11:48	55	58.55		34	6	11	17	28	0	
	56.0-57.5	12:05	57	60.55		33	7	9	17	26	0	
	58.5-60.0	12:18	60	63.55		86	15	27	44	71	0	

Notes: F2 SPIKING ON FIRST SAMPLE. SWAPPED OUT PIGTAIL. ALSO SEVERAL BAD ISOLATED RECORDS B/ PDA
" " LAST SAMPLE.

NOTE: (1) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. veritcality, weather, or lubrication between trials). (2) Note any changes in rod diameter along drill string and record locations of short rod sections.

Joseph Williamson
Prepared By (print/signature)

11/17/23
Date

SCDOT Soil Test Log

Project ID:	23610178A			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 Phase I					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-550X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	NA

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Grassy							
	0.5	**SURFACE MATERIAL** - TOPSOIL - 6 inches.	0.0	SS-1	1	1	2	4	3
		COASTAL PLAIN - very loose, moist, light reddish brown, Silty fine to medium SAND (SM) (A-2-4), little nonplastic fines, 5YR6/4. LL=NP, PL=NP, PI=NP, NMC=8.2%, %#200=19	2.0	SS-2	3	3	6	7	9
440.3		@1.8 feet - loose, yellowish red with light gray, (A-5(0)), 5YR5/8, 5YR7/1. LL=46, PL=36, PI=10, NMC=17.4%, %#200=37	4.0	SS-3	3	5	7	13	12
		@4 feet - medium dense.	6.0	SS-4	16	19	18	25	37
		@6 feet - dense, yellowish red, 5YR5/8.							
		@7.2 feet - reddish yellow with pinkish gray, 7.5YR6/6, 7.5YR7/2.	8.0	SS-5	7	16	17	20	33
435.3		@9.2 feet - pink, 7.5YR8/4.							
		@12 feet - pinkish white, fine to coarse, 7.5YR8/2.	13.5	SS-6	10	16	17		33
	13.7								
	14.2	Hard, moist, pinkish white, fat CLAY (CH), 7.5YR8/2.							
430.3		Dense, wet, reddish yellow, Silty fine to coarse SAND (SM), some low plasticity fines, 7.5YR7/6.							
	17.0	@14.5 feet - white with reddish yellow, 7.5YR8/1, 7.5YR7/6.	18.5	SS-7	11	12	17		29
425.3		Very stiff, moist, white with reddish yellow, lean CLAY (CL) (A-4(7)), few fine to medium sands, 7.5YR8/1, 7.5YR6/8. LL=31, PL=23, PI=8, NMC=15%, %#200=88							
			23.5	SS-8	22	50/5"			50/5"
	24.2								
420.3		Very dense, wet, white to reddish yellow, Silty fine to medium SAND (SM), some low plasticity fines, 5YR8/1, 5YR7/8.							

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

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:	23610178A			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 Phase I					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-550X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	NA

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
				28.5	SS-9	50/3"				50/3"
415.3										
	33.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, moist to wet, reddish yellow with pinkish white, SILT with Sand (ML), little fine to medium sands, 5YR7/8, 5YR8/2.		33.5	SS-10	20	33	50/4"		50/4"
410.3										
		@38.5 feet - reddish yellow with pinkish white and pale yellow, 5YR7/8, 5YR8/2, 2.5Y8/2.		38.5	SS-11	17	36	50/3"		50/3"
405.3										
	43.5	**PIEDMONT RESIDUUM** - very stiff, moist, reddish yellow with pale yellow, Sandy elastic SILT (MH) (A-7-5(23)), some fine to medium sands, trace fine rock fragments, 5YR7/8, 2.5Y8/2. LL=76, PL=50, PI=26, NMC=31%, %#200=71		43.5	SS-12	5	8	11		19
400.3										
		@48.5 feet - stiff.		48.5	SS-13	4	6	8		14
395.3										
		@53.5 feet - hard, strong brown with light		53.5						

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

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:	23610178A			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 Phase I					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-550X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	NA

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value	SPT N VALUE / PL MC LL / FINES CONTENT (%) / RQD (%) / REC (%) (0 10 20 30 40 50 60 70 80 90)
390.3		brown, 7.5YR4/6, 7.5YR6/8.			SS-14	10	18	25		43	
	58.5			58.5							
385.3		Dense, moist, greenish gray, Silty fine SAND (SM), some low plasticity fines, 10BG5/1.			SS-15	8	17	25		42	
	62.0										
		PARTIALLY WEATHERED ROCK (PWR) - very dense, moist, greenish gray, Silty fine to coarse SAND (SM), some low plasticity fines, 10BG5/1.		63.5	SS-16	50/5"				50/5"	>>
380.3											
				68.5	SS-17	50/3"				50/3"	>>
375.3											
	71.6	Tri-Cone Bit Refusal at 71.6 feet. Install casing to 60 feet for coring.		71.6							
		METAMORPHIC BEDROCK - ARGILLITE, light greenish gray with dark bluish gray, laminated, very fine grained, moderately weathered, strong rock, 70ºdown, Sh, VN, Su, No, St-Ir, VC, R, 10G7/1, 10B4/1.			RC-1						%REC=90, RQD=43
370.3		@72.2 feet - quartz interbedding.		74.6							
		@72.5 feet - absent quartz interbedding.			RC-2						%REC=54, RQD=22
		@74.6 feet - residual soil, Sd, VR.									
		@75.9 feet - absent residual soil.		79.6							
365.3		@79.6 feet - Qz, Sd, Pl-Ir.									

LEGEND

Continued Next Page

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

SC_DOT 23610178A SCDOT BORING LOGS_NEW MASTER 8-29.GPJ SCDOT_DATATEMPLATE.GDT 10/23/23

SCDOT Soil Test Log

Project ID:	23610178A			**County:**	Richland	**Boring No.:**	EB-1W
Site Description:	I-77 Exit 26 Phase I					**Route:**	US-21
Eng./Geo.:	S. Melecosky	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.3 ft	**Latitude:**	34.18986277	**Longitude:**	-80.97066934	**Date Started:**	7/19/2023
Total Depth:	89.6 ft	**Soil Depth:**	71.6 ft	**Core Depth:**	18 ft	**Date Completed:**	7/21/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	CME-550X	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	81.6%
Core Size:	NQ	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	NA

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" / 2nd 6" / 3rd 6" / 4th 6"	N Value	SPT N VALUE / PL MC LL / FINES CONTENT (%) / RQD (%) / REC (%) (0 10 20 30 40 50 60 70 80 90)
					RC-3			%REC=100, RQD=64
360.3		@84.6 feet - No, Pl-Wa.		84.6				
		@86.6-87.7 feet - light greenish gray, absent laminations, 10G7/1.			RC-4			%REC=100, RQD=54
	89.6							
355.3		Boring Terminated at 89.6 feet.						
350.3								
345.3								
340.3								

LEGEND

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

SC_DOT 23610178A SCDOT BORING LOGS_NEW MASTER 8-29.GPJ SCDOT_DATATEMPLATE.GDT 10/23/23

Appendix IV – SPT Energy Measurement Plots and Tables

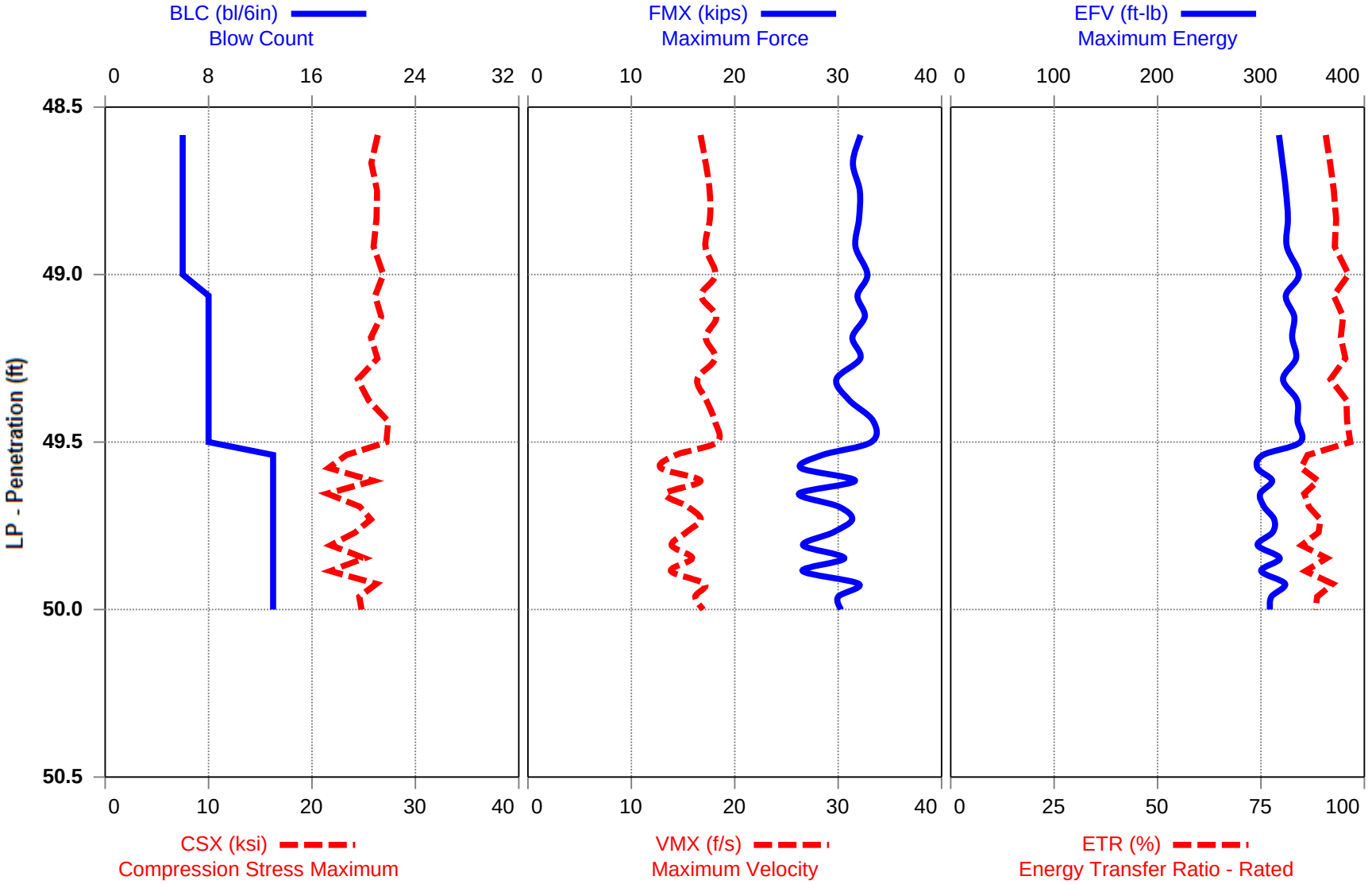
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 48.5-50.0 FEET

TEST HOLE A



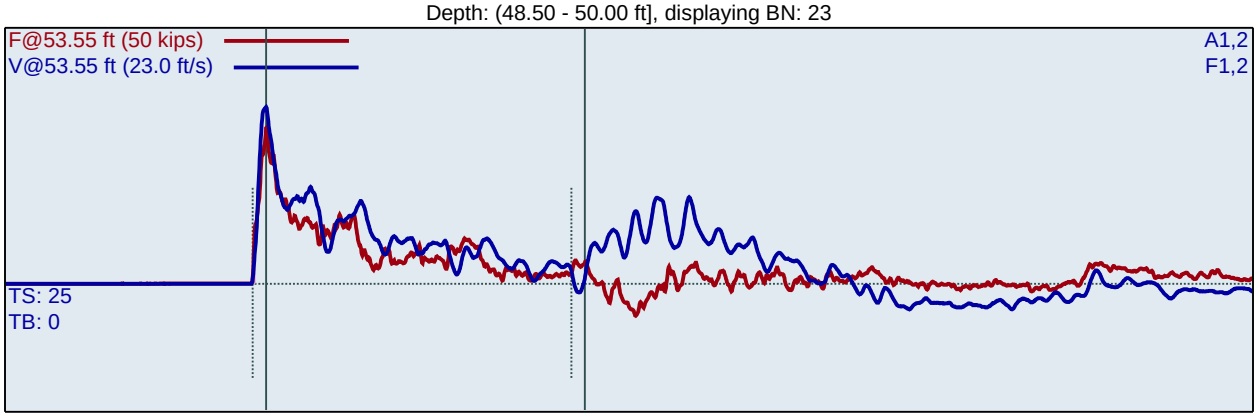
CME-550X SN 290593
JRW
TEST HOLE A

48.5-50.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 53.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (48.50 - 50.00 ft], displaying BN: 23



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 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

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	48.58	6	1.9	32	16.7	1.00	26.4	1.00	317	90.6
2	48.67	6	58.6	31	17.2	1.03	25.7	1.01	321	91.7
3	48.75	6	58.1	32	17.6	1.00	26.3	1.00	324	92.6
4	48.83	6	58.6	32	17.6	1.00	26.2	1.00	326	93.1
5	48.92	6	57.9	32	17.2	1.00	26.0	1.00	325	92.8
6	49.00	6	58.8	33	18.1	1.00	26.9	1.00	337	96.2
7	49.06	8	58.1	32	16.8	0.76	26.1	0.75	324	92.5
8	49.13	8	59.0	33	18.2	0.75	26.7	0.75	332	94.8
9	49.19	8	58.1	31	17.2	0.78	25.7	0.75	330	94.3
10	49.25	8	58.7	32	18.1	0.78	26.3	0.75	334	95.4
11	49.31	8	58.5	30	16.4	0.81	24.4	0.75	321	91.8
12	49.38	8	58.9	31	17.3	0.75	25.5	0.75	335	95.7
13	49.44	8	58.5	33	18.1	0.77	27.4	0.75	335	95.8
14	49.50	8	58.7	33	18.3	0.77	27.2	0.75	338	96.6
15	49.54	13	58.6	28	14.3	0.55	23.3	0.47	302	86.3
16	49.58	13	58.5	26	12.8	0.57	21.6	0.46	296	84.7
17	49.62	13	59.0	32	16.7	0.52	25.9	0.46	311	88.8
18	49.65	13	58.4	26	13.3	0.55	21.5	0.46	299	85.4
19	49.69	13	58.8	30	15.4	0.51	24.6	0.46	303	86.5
20	49.73	13	58.8	31	16.7	0.54	25.7	0.46	313	89.3
21	49.77	13	58.3	30	15.3	0.55	24.2	0.46	311	88.9
22	49.81	13	59.0	27	13.9	0.52	21.8	0.46	297	84.8
23	49.85	13	58.3	31	15.9	0.55	25.1	0.46	318	90.9
24	49.88	13	59.1	27	13.8	0.52	21.8	0.46	300	85.7
25	49.92	13	58.3	32	17.1	0.55	26.2	0.46	323	92.3
26	49.96	13	58.8	30	16.2	0.52	24.6	0.46	310	88.6
27	50.00	13	58.3	30	16.9	0.51	24.8	0.46	309	88.1

Average	58.6	30	16.1	0.63	24.8	0.57	316	90.3
Std Dev	0.3	2	1.6	0.12	1.8	0.14	14	3.9
Maximum	59.1	33	18.3	0.81	27.4	0.75	338	96.6
Minimum	58.1	26	12.8	0.51	21.5	0.46	296	84.7

N-value: 21

Sample Interval Time: 26.58 seconds.

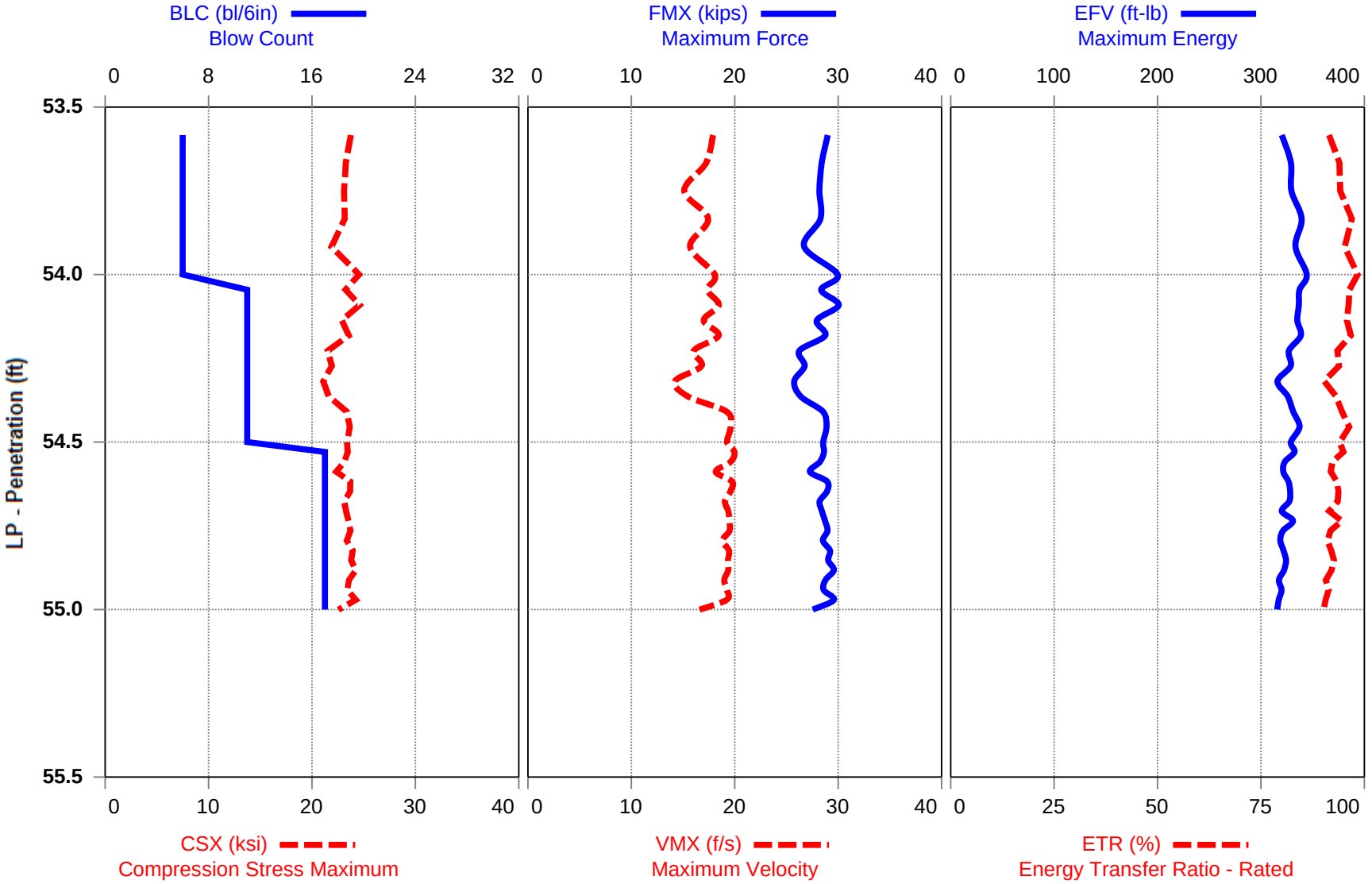
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 53.5-55.0 FEET

TEST HOLE A



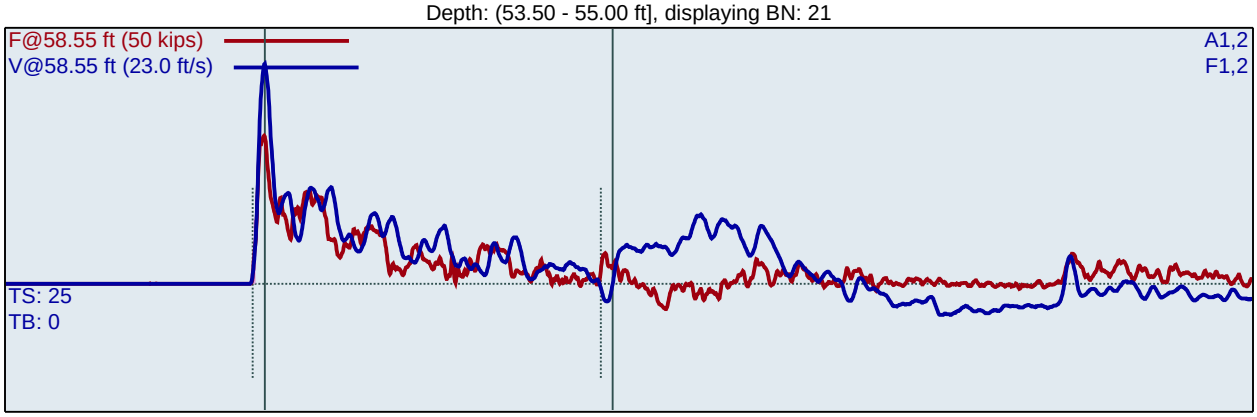
CME-550X SN 290593
JRW
TEST HOLE A

48.5-50.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 58.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (53.50 - 55.00 ft], displaying BN: 21



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 mv/6.4v/5000g (1) VF1

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	53.58	6	1.9	29	17.9	1.15	23.8	1.01	320	91.4
2	53.67	6	58.7	28	17.2	1.01	23.3	1.00	329	94.0
3	53.75	6	58.6	28	15.1	1.01	23.1	1.00	329	94.1
4	53.83	6	58.5	28	17.4	1.00	23.2	1.00	339	96.9
5	53.92	6	58.4	27	15.7	1.01	21.9	1.00	333	95.2
6	54.00	6	58.9	30	18.1	1.00	24.6	1.00	344	98.3
7	54.05	11	58.2	28	17.4	0.78	23.2	0.55	337	96.3
8	54.09	11	59.3	30	18.5	0.68	24.6	0.55	337	96.2
9	54.14	11	58.4	28	17.0	0.67	22.9	0.54	335	95.7
10	54.18	11	58.9	29	18.4	0.65	23.6	0.55	338	96.7
11	54.23	11	58.6	26	16.0	0.62	21.5	0.55	327	93.4
12	54.27	11	58.9	27	16.8	0.61	21.9	0.54	329	93.9
13	54.32	11	58.9	26	14.2	0.60	21.1	0.55	316	90.3
14	54.36	11	58.7	26	15.5	0.63	21.6	0.54	326	93.1
15	54.41	11	58.9	29	19.2	0.61	23.4	0.54	331	94.6
16	54.45	11	58.5	29	19.6	0.60	23.7	0.55	337	96.3
17	54.50	11	59.1	29	19.3	0.60	23.4	0.54	329	94.0
18	54.53	17	58.6	29	20.0	0.53	23.5	0.35	332	94.9
19	54.56	17	59.0	28	19.6	0.53	23.1	0.35	323	92.2
20	54.59	17	58.6	27	18.2	0.53	22.4	0.35	322	91.9
21	54.62	17	58.6	29	19.7	0.51	23.7	0.35	327	93.3
22	54.65	17	58.9	29	19.6	0.52	23.7	0.35	328	93.7
23	54.68	17	58.6	28	19.0	0.51	23.1	0.35	327	93.5
24	54.71	17	59.2	28	19.4	0.50	23.3	0.35	320	91.5
25	54.74	17	58.4	29	19.5	0.51	23.5	0.35	331	94.6
26	54.76	17	59.1	29	19.5	0.50	23.7	0.35	321	91.8
27	54.79	17	58.4	29	18.8	0.49	23.4	0.35	319	91.0
28	54.82	17	58.9	29	19.4	0.48	23.9	0.35	322	91.9
29	54.85	17	58.7	29	19.3	0.49	23.8	0.35	324	92.6
30	54.88	17	58.5	30	19.4	0.48	24.2	0.35	322	92.1
31	54.91	17	58.9	29	19.0	0.48	23.6	0.35	317	90.6

32	54.94	17	58.5	29	19.3	0.48	23.4	0.35	320	91.4
33	54.97	17	59.1	30	19.2	0.47	24.2	0.35	317	90.6
34	55.00	17	58.4	28	16.6	0.48	22.6	0.35	316	90.2
		Average	58.7	28	18.5	0.55	23.2	0.43	326	93.2
		Std Dev	0.3	1	1.5	0.08	0.8	0.09	7	1.9
		Maximum	59.3	30	20.0	0.78	24.6	0.55	338	96.7
		Minimum	58.2	26	14.2	0.47	21.1	0.35	316	90.2
					N-value: 28					

Sample Interval Time: 33.66 seconds.

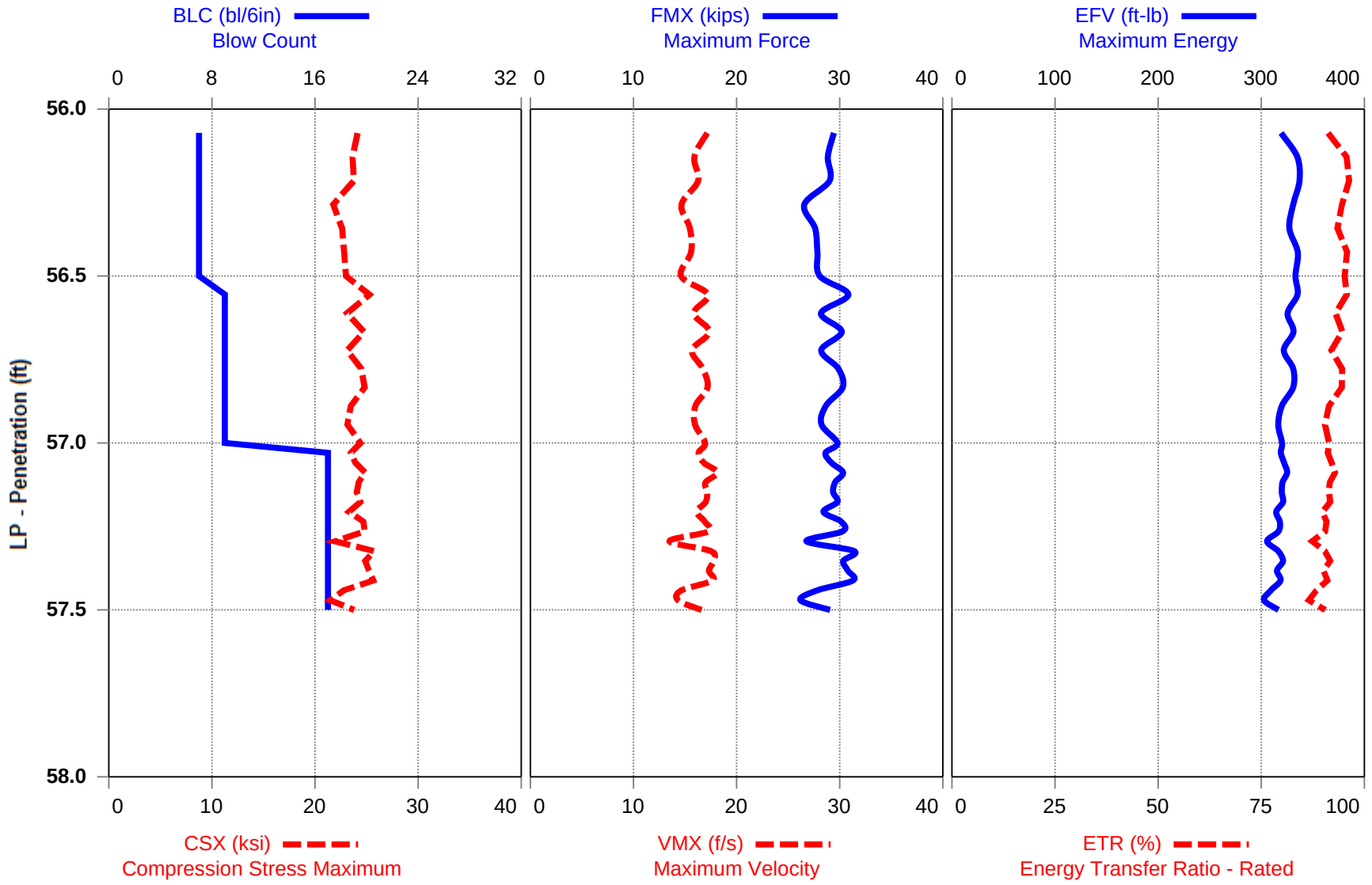
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 56.0-57.5 FEET

TEST HOLE A



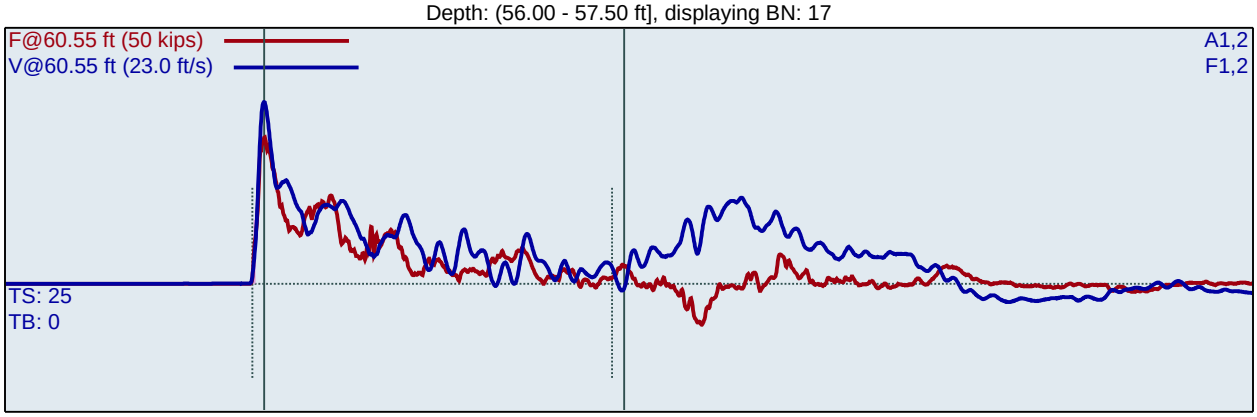
CME-550X SN 290593
JRW
TEST HOLE A

48.5-50.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 60.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (56.00 - 57.50 ft], displaying BN: 17



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 mv/6.4v/5000g (1) VF1

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	56.07	7	1.9	29	17.1	1.01	24.1	0.86	319	91.1
2	56.14	7	58.0	29	15.9	0.87	23.6	0.86	335	95.6
3	56.21	7	58.3	29	16.3	0.87	23.8	0.86	337	96.3
4	56.29	7	58.3	27	14.7	0.89	21.8	0.86	331	94.5
5	56.36	7	58.8	28	15.5	0.88	22.6	0.86	327	93.4
6	56.43	7	58.3	28	15.6	0.88	22.8	0.86	335	95.8
7	56.50	7	58.6	28	14.6	0.87	23.0	0.86	333	95.2
8	56.56	9	58.4	31	17.2	0.75	25.3	0.66	335	95.7
9	56.61	9	58.9	28	15.8	0.73	23.1	0.67	325	93.0
10	56.67	9	58.3	30	17.3	0.75	24.7	0.66	331	94.6
11	56.72	9	58.8	28	15.7	0.74	23.1	0.67	322	92.0
12	56.78	9	58.3	30	16.7	0.76	24.5	0.67	331	94.6
13	56.83	9	58.6	30	17.2	0.75	24.8	0.67	331	94.5
14	56.89	9	58.7	29	16.0	0.74	23.5	0.67	320	91.4
15	56.94	9	58.4	28	16.0	0.73	23.1	0.67	316	90.4
16	57.00	9	58.8	30	16.9	0.67	24.4	0.67	320	91.4
17	57.03	17	58.5	29	16.3	0.63	23.5	0.36	319	91.1
18	57.06	17	58.8	29	16.8	0.61	23.9	0.35	322	92.0
19	57.09	17	58.4	30	18.1	0.60	24.9	0.35	325	92.9
20	57.12	17	58.9	30	17.0	0.57	24.2	0.35	321	91.6
21	57.15	17	58.5	29	17.1	0.56	24.1	0.36	320	91.4
22	57.18	17	58.8	30	17.0	0.55	24.4	0.35	321	91.7
23	57.21	17	58.7	28	16.1	0.50	23.3	0.35	314	89.8
24	57.24	17	58.7	30	16.9	0.49	24.7	0.35	318	90.8
25	57.26	17	58.9	30	17.3	0.48	24.8	0.35	317	90.5
26	57.29	17	58.5	27	13.5	0.48	21.9	0.35	306	87.3
27	57.32	17	59.1	31	17.5	0.47	25.7	0.35	316	90.4
28	57.35	17	58.3	30	17.7	0.46	24.9	0.35	321	91.7
29	57.38	17	58.9	31	17.3	0.46	25.2	0.35	315	90.1
30	57.41	17	58.6	31	17.6	0.46	25.6	0.35	318	91.0
31	57.44	17	58.5	28	14.6	0.45	22.8	0.36	309	88.3

32	57.47	17	58.7	26	14.3	0.45	21.5	0.35	303	86.5
33	57.50	17	58.7	29	16.6	0.45	23.8	0.35	317	90.5
		Average	58.6	29	16.6	0.59	24.1	0.46	320	91.3
		Std Dev	0.2	1	1.1	0.12	1.1	0.15	7	2.1
		Maximum	59.1	31	18.1	0.76	25.7	0.67	335	95.7
		Minimum	58.3	26	13.5	0.45	21.5	0.35	303	86.5
					N-value: 26					

Sample Interval Time: 32.73 seconds.

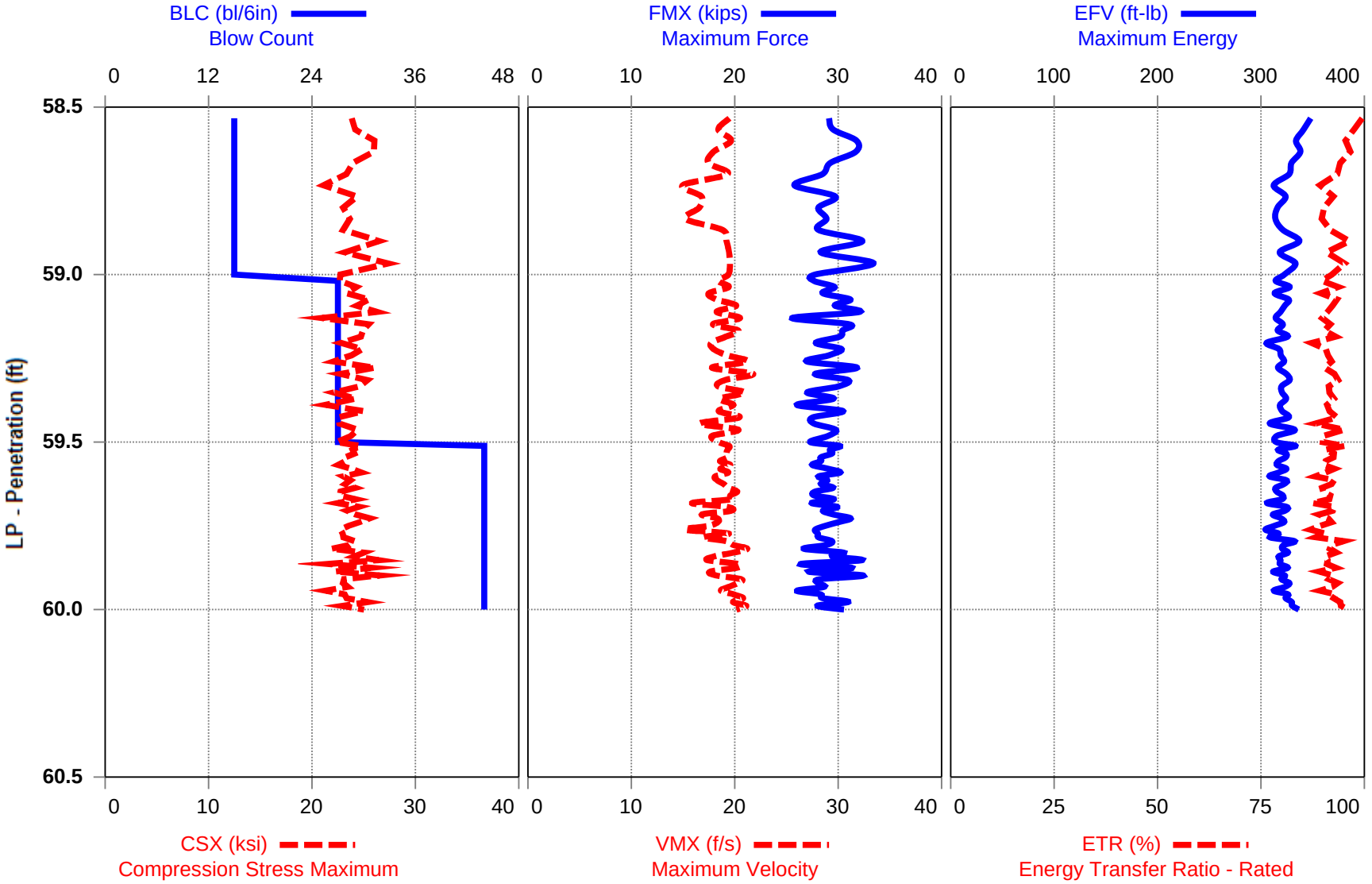
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 58.5-60.0 FEET

TEST HOLE A



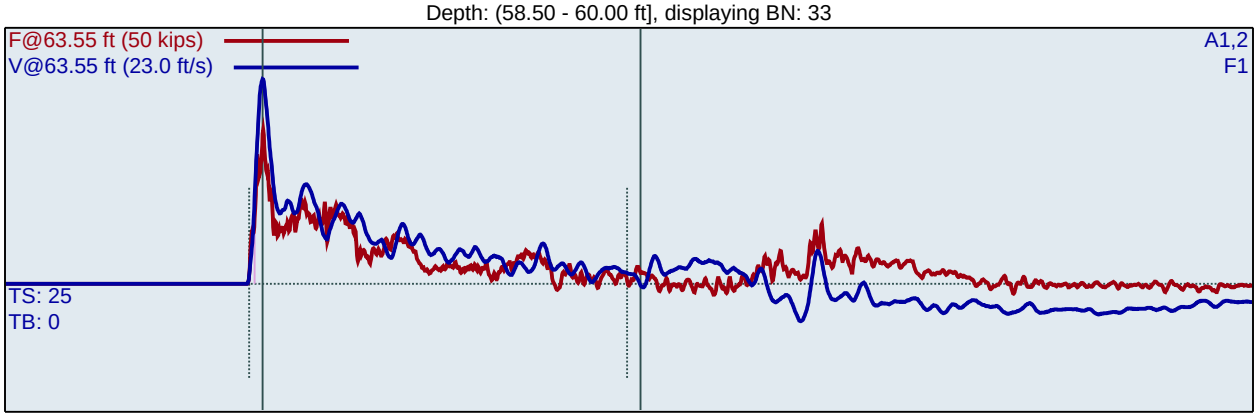
CME-550X SN 290593
JRW
TEST HOLE A

48.5-50.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 63.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (58.50 - 60.00 ft], displaying BN: 33



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 mv/6.4v/5000g (1) VF1

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	58.53	15	1.9	29	19.5	0.82	23.9	0.40	348	99.4
2	58.57	15	58.1	29	18.4	0.63	24.2	0.40	341	97.5
3	58.60	15	58.8	32	19.6	0.57	26.0	0.40	334	95.4
4	58.63	15	58.4	32	17.9	0.58	26.0	0.40	338	96.6
5	58.67	15	59.0	29	17.4	0.56	24.0	0.40	329	94.1
6	58.70	15	59.1	28	19.3	0.54	23.3	0.40	327	93.5
7	58.73	15	58.3	26	15.0	0.53	21.1	0.40	312	89.2
8	58.77	15	59.2	30	16.8	0.52	24.4	0.40	324	92.5
9	58.80	15	58.4	28	16.6	0.52	23.0	0.40	316	90.2
10	58.83	15	59.4	29	15.2	0.51	23.7	0.40	314	89.7
11	58.87	15	58.4	28	18.8	0.49	23.0	0.40	321	91.7
12	58.90	15	58.9	32	19.2	0.50	26.5	0.40	337	96.3
13	58.93	15	59.1	28	19.4	0.48	23.2	0.40	318	90.9
14	58.97	15	58.7	33	19.5	0.48	27.4	0.40	333	95.2
15	59.00	15	59.2	28	19.4	0.49	22.7	0.40	322	92.1
16	59.02	27	58.3	28	18.4	0.48	22.7	0.22	314	89.8
17	59.04	27	59.4	30	19.4	0.48	24.3	0.22	328	93.6
18	59.06	27	58.2	29	17.5	0.47	23.4	0.22	313	89.5
19	59.07	27	59.1	31	18.2	0.48	25.5	0.22	327	93.3
20	59.09	27	58.7	30	20.1	0.46	24.3	0.22	323	92.3
21	59.11	27	59.0	32	18.2	0.46	26.3	0.22	319	91.1
22	59.13	27	58.7	26	20.5	0.44	21.0	0.22	314	89.7
23	59.15	27	58.7	31	17.9	0.45	25.5	0.22	321	91.7
24	59.17	27	59.1	30	20.3	0.44	24.9	0.22	316	90.3
25	59.19	27	58.4	30	19.1	0.46	24.7	0.22	326	93.0
26	59.20	27	58.9	28	17.7	0.43	22.8	0.22	305	87.2
27	59.22	27	58.7	30	18.0	0.44	24.8	0.22	317	90.7
28	59.24	27	58.9	29	19.3	0.43	23.8	0.22	319	91.2
29	59.26	27	58.6	27	21.2	0.44	22.1	0.22	322	92.1
30	59.28	27	59.0	32	17.8	0.41	26.1	0.22	316	90.4
31	59.30	27	58.5	28	21.8	0.42	22.8	0.22	324	92.7

32	59.31	27	58.7	31	19.1	0.40	25.4	0.23	328	93.6
33	59.33	27	59.0	30	18.4	0.40	24.6	0.23	320	91.3
34	59.35	27	58.5	27	21.0	0.39	22.1	0.22	320	91.5
35	59.37	27	58.9	30	18.5	0.39	24.2	0.22	324	92.6
36	59.39	27	58.6	26	19.9	0.39	21.3	0.22	318	91.0
37	59.41	27	59.2	30	18.4	0.38	25.0	0.22	320	91.5
38	59.43	27	58.3	28	20.4	0.38	22.6	0.22	327	93.4
39	59.44	27	59.1	28	16.6	0.38	22.7	0.22	308	88.1
40	59.46	27	58.7	30	20.3	0.39	24.4	0.22	333	95.0
41	59.48	27	58.8	29	17.8	0.38	23.8	0.22	315	90.1
42	59.50	27	59.2	27	18.5	0.39	22.4	0.23	315	89.9
43	59.51	44	58.6	30	19.5	0.40	24.7	0.13	333	95.2
44	59.52	44	59.2	29	19.3	0.38	23.9	0.14	317	90.5
45	59.53	44	58.2	29	19.2	0.38	24.1	0.14	324	92.6
46	59.55	44	59.2	28	19.3	0.38	23.2	0.13	324	92.5
47	59.56	44	58.5	28	18.6	0.38	23.2	0.14	317	90.6
48	59.57	44	58.9	27	19.6	0.38	22.5	0.13	315	90.1
49	59.58	44	58.9	29	18.6	0.39	23.8	0.14	324	92.7
50	59.59	44	58.6	30	19.4	0.38	24.8	0.14	317	90.5
51	59.60	44	59.0	28	18.1	0.38	23.0	0.14	308	88.1
52	59.61	44	58.6	29	18.3	0.39	23.7	0.14	324	92.7
53	59.63	44	58.9	28	18.9	0.39	23.2	0.14	322	92.1
54	59.64	44	58.3	30	19.4	0.37	24.2	0.14	314	89.7
55	59.65	44	59.0	28	20.2	0.37	22.8	0.14	315	90.0
56	59.66	44	58.2	28	19.6	0.38	22.7	0.14	321	91.7
57	59.67	44	59.0	30	19.7	0.38	24.2	0.14	320	91.5
58	59.68	44	58.7	27	15.9	0.37	22.5	0.14	306	87.4
59	59.69	44	58.7	30	19.2	0.38	24.5	0.14	325	92.7
60	59.70	44	59.1	29	19.7	0.38	23.4	0.14	323	92.4
61	59.72	44	58.4	30	16.8	0.37	24.2	0.14	311	89.0
62	59.73	44	59.1	31	18.3	0.38	25.6	0.14	319	91.3
63	59.74	44	58.4	30	18.4	0.37	24.6	0.13	322	92.1
64	59.75	44	58.9	29	17.4	0.38	23.5	0.14	313	89.3
65	59.76	44	58.6	28	15.2	0.37	22.8	0.14	304	87.0
66	59.77	44	58.9	28	19.4	0.37	23.0	0.14	317	90.5
67	59.78	44	58.6	28	16.9	0.38	23.0	0.14	309	88.2
68	59.80	44	58.6	29	19.2	0.38	24.1	0.13	332	94.9
69	59.81	44	58.9	29	19.8	0.37	23.7	0.14	322	92.0
70	59.82	44	58.6	27	21.2	0.38	21.9	0.14	321	91.6
71	59.83	44	59.0	31	19.9	0.38	25.0	0.14	326	93.1
72	59.84	44	58.4	29	18.0	0.38	24.1	0.14	317	90.6
73	59.85	44	59.3	32	17.4	0.38	26.5	0.14	319	91.1
74	59.86	44	58.4	26	20.3	0.37	21.6	0.14	318	90.9
75	59.88	44	59.1	31	20.2	0.38	25.7	0.14	326	93.1
76	59.89	44	58.6	27	17.6	0.38	22.2	0.14	312	89.1
77	59.90	44	58.6	32	18.2	0.38	26.6	0.14	323	92.3
78	59.91	44	58.8	28	20.6	0.37	23.1	0.13	320	91.4
79	59.92	44	58.5	28	20.3	0.38	23.0	0.14	327	93.6
80	59.93	44	59.1	29	19.4	0.38	23.5	0.14	323	92.3
81	59.94	44	58.4	26	18.7	0.37	21.3	0.13	312	89.2
82	59.95	44	59.1	28	19.9	0.38	23.2	0.14	326	93.2
83	59.97	44	58.5	28	20.8	0.37	23.4	0.14	324	92.5
84	59.98	44	58.7	31	19.8	0.37	25.4	0.14	330	94.1
85	59.99	44	58.8	28	21.1	0.39	22.9	0.13	330	94.3
86	60.00	44	58.7	31	20.2	0.39	25.1	0.14	337	96.1
		Average	58.8	29	19.0	0.40	23.8	0.17	320	91.4
		Std Dev	0.3	2	1.3	0.03	1.3	0.04	7	1.9
		Maximum	59.4	32	21.8	0.48	26.6	0.23	337	96.1
		Minimum	58.2	26	15.2	0.37	21.0	0.13	304	87.0

N-value: 71

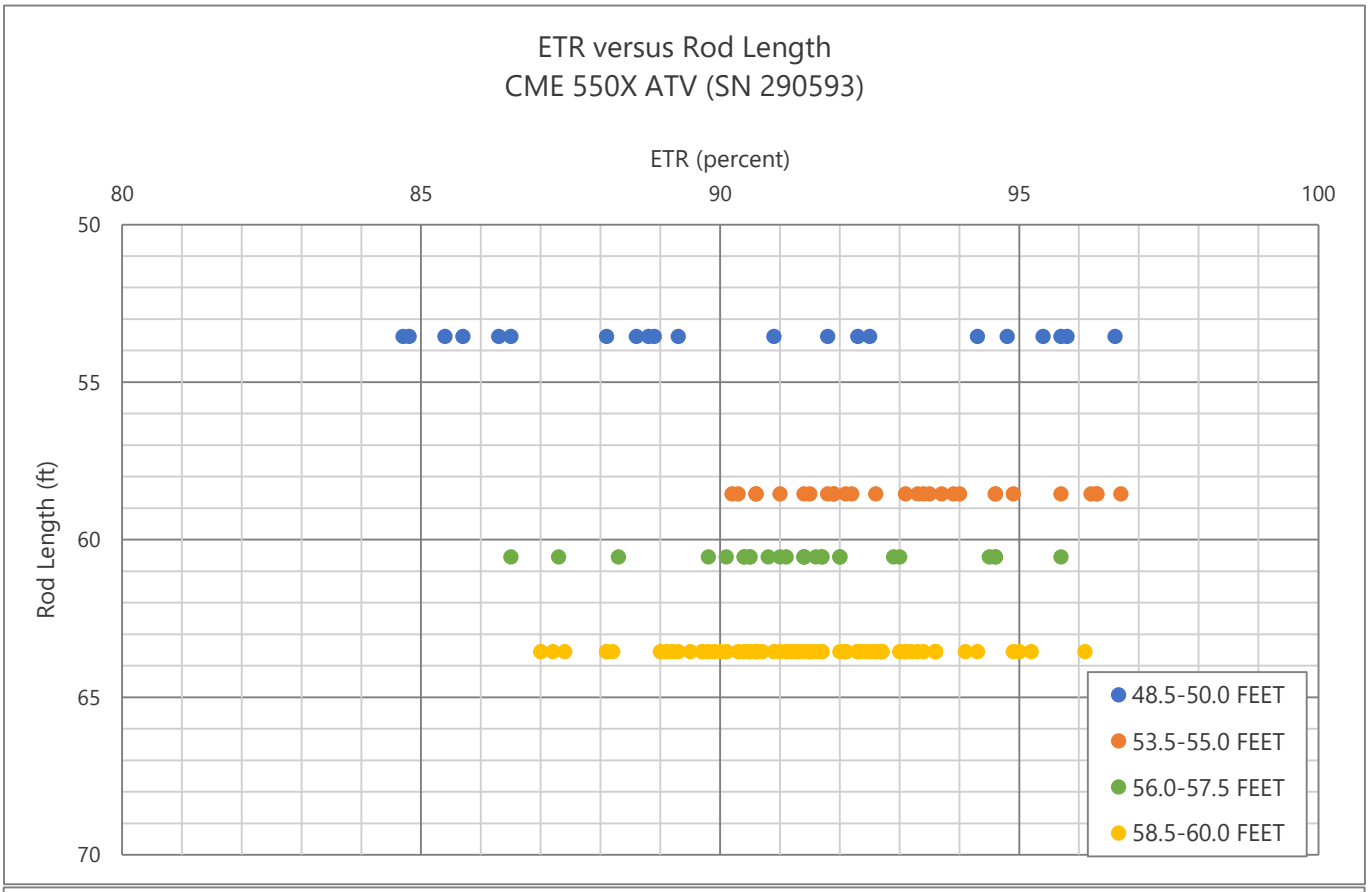
Sample Interval Time: 86.68 seconds.

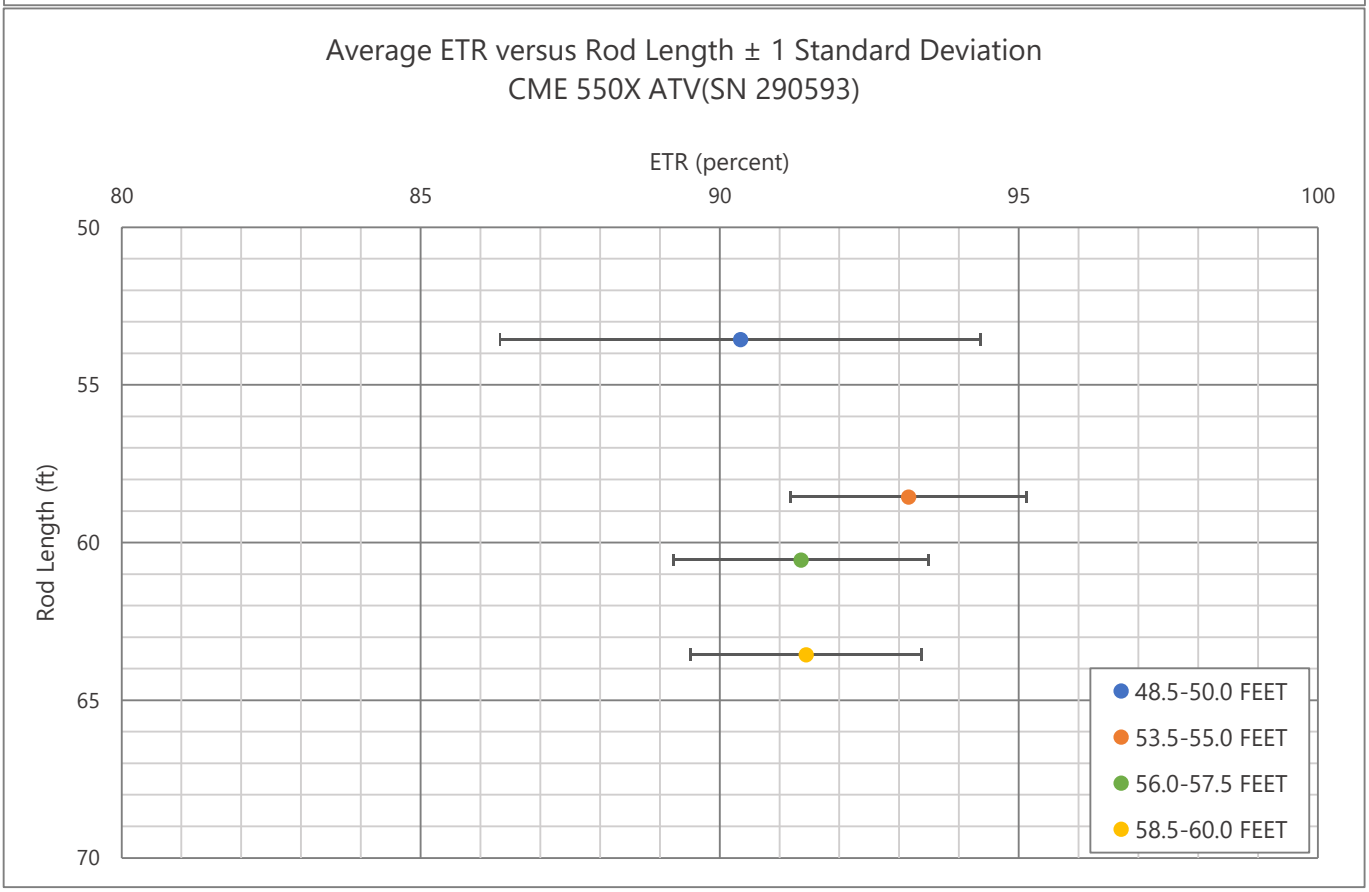
Summary of SPT Test Results

Project: CME-550X SN 290593, Test Date: 11/17/2023

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

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 %
53.55	48.50	50.00	**6-8-13**	**21**	**32**	58.6	30	16.1	0.63	24.8	0.57	316	90.3
58.55	53.50	55.00	**6-11-17**	**28**	**42**	58.7	28	18.5	0.55	23.2	0.43	326	93.2
60.55	56.00	57.50	**7-9-17**	**26**	**39**	58.6	29	16.6	0.59	24.1	0.46	320	91.3
63.55	58.50	60.00	**15-27-44**	**71**	**108**	58.8	29	19.0	0.40	23.8	0.17	320	91.4
			Overall Average Values:			58.7	29	18.1	0.49	23.9	0.33	321	91.6
			Standard Deviation:			0.3	2	1.8	0.12	1.3	0.19	9	2.5
			Overall Maximum Value:			59.4	33	21.8	0.81	27.4	0.75	338	96.7
			Overall Minimum Value:			58.1	26	12.8	0.37	21.0	0.13	296	84.7


ETR versus Rod Length
CME 550X ATV (SN 290593)
ETR (percent)
80
85
90
95
100
Rod Length (ft)
50
55
60
65
70
48.5-50.0 FEET
53.5-55.0 FEET
56.0-57.5 FEET
58.5-60.0 FEET


Average ETR versus Rod Length ± 1 Standard Deviation
CME 550X ATV(SN 290593)
ETR (percent)
80
85
90
95
100
Rod Length (ft)
50
55
60
65
70
48.5-50.0 FEET
53.5-55.0 FEET
56.0-57.5 FEET
58.5-60.0 FEET

Report of SPT Energy Measurements
S&ME CME-550X ATV Rig
(Serial No. 293193)
Blythewood, South Carolina

PREPARED FOR:

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

PREPARED BY:

S&ME, Inc.
8848 Red Oak Boulevard, Suite A
Charlotte, North Carolina 28217

December 27, 2023

December 27, 2023

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699

Attention: Mr. Greg Bodenheimer, P.E.

Cc: Ms. Cheryl A. Youngblood, L.G.
Ms. Christina M. Bruinsma, L.G.

Reference: **Report of SPT Energy Measurements**
S&ME CME-550X ATV Rig (Serial No. 293193)
Blythewood, South Carolina
NC PE Firm License No. F-0176

Dear Mr. Bodenheimer:

We have completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer used with our CME-550X ATV-mounted drill rig (Serial No. 293193). This service was performed by Mr. Joseph Williamson, P.E. of our firm on November 17, 2023, in general accordance with ASTM D4633 and the most recent revision of the North Carolina Department of Transportation (NCDOT) Geotechnical Engineering Unit's requirements. Review of the data quality and analyses was performed by Mr. Williamson. A copy of the Certificate of Proficiency issued by Pile Dynamics based on the Dynamic Measurement and Analysis Proficiency Test for Mr. Williamson is included in Appendix I. The testing procedures, equipment used during testing, and detailed results are presented in this report.

1.0 Dynamic Testing Methodology

Testing was performed using a model PAX (Serial No. 3726L) Pile Driving Analyzer ™ (PDA) manufactured by Pile Dynamics, Inc. The PDA was used to record and interpret data from two piezoresistive accelerometers (Serial Nos. K4664 and K4665) bolted to a 2.0-foot long AWJ drill rod (Serial No. 203) internally instrumented with two strain transducers. Calibration sheets for the accelerometers and the instrumented rod are included in Appendix II. The instrumented AWJ drill rod has a cross-sectional area of 1.22 square inches and an outside diameter of approximately 1¾ inches. Therefore, we calculate the inside diameter to be approximately 1¼ inches at the gauge location. The accelerometers and strain gauges, which are diametrically opposed 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.

2.0 Testing and Observations

S&ME personnel were on site November 17, 2023, to observe and perform high-strain dynamic testing during SPT sampling on the CME-550X ATV-mounted drill rig operated by Sam Eubanks of S&ME. The measurements were taken during drilling of a test hole adjacent to a previous soil test boring at an S&ME project site in Blythewood, South Carolina. SPT energy measurements were recorded during three sampling intervals that met the NCDOT required blow count criteria. The information presented in the tables below summarizes the equipment and tooling used during the SPT energy measurements. The SPT Energy Evaluation Form and the Soil Test Boring Log from the adjacent boring are included in Appendix III.

Table 2-1: Drill Rig Information

Manufacturer	CME
Model	550X
Serial Number	293193
Operator	S. Eubanks
Carrier	ATV

Table 2-2: Hammer Information

Model / Type	CME / Auto
Serial Number	293193
Typical Drop Height (inches)	30
Typical Ram Weight (pounds)	140
Ram Serial Number	N/A

Table 2-3: Drilling and Instrumented Rod Information

Instrumented Rod Type	AWJ (Serial No. 203)
OD (inches)[1]	1¾
ID (inches)[2]	1¼
Cross-Sectional Area (in²)[3]	1.22
Total Instrumented Rod Length (feet)[1]	2.0
Length Below Gages (feet)[1]	0.7
Typical Rod Lengths (feet)	5
Split-Spoon Length (feet)[1]	2.85

[1] Measured with engineer's tape measure.
[2] Calculated using measured OD and Area from instrument rod calibration record.
[3] From instrument rod calibration record.

3.0 Dynamic Testing Results

The total rod length from the instrumentation to the tip of the split-spoon sampler was determined by adding 3.55 ft to the drill rod length at each sample depth. The SPT Energy Measurement Data Summary tables in Appendix IV present the test data from every hammer blow at each sampling interval, along with representative force and velocity traces for each test interval. Per ASTM D4633, only the blows from the final foot of each sample interval (i.e. the blows that determine the N-value) are considered when computing the average measurement values of each test interval.

The reported blow counts obtained by the drill rig personnel, a summary of the test data, and average computed hammer energy and transfer ratio values are provided in Table 3-1. Based on the test data, the automatic hammer on the CME-550X operated at an average rate of about 55 blows per minute (bpm) during dynamic testing. The measured average transferred hammer energy (EFV) of the three sample intervals ranged from 301 to 312 ft-lbs, which corresponds to Energy Transfer Ratio (ETR) values of 86.1 to 89.3%, respectively. Plots and tables of the following are also included in Appendix III and present the test data with depth for each test interval:

- Penetration vs. BLC[4]
- Penetration vs. FMX[5]
- Penetration vs. EFV[6]
- Penetration vs. CSX[7]
- Penetration vs. VMX[8]
- Penetration vs. ETR[9]
- ETR vs. Rod Length
- Average ETR vs. Rod Length

Table 3-1: Summary of Dynamic Testing Results

Data Set ID	Sample Depth (ft)	Drill Rod Length (ft)	Instrumentation to Sampler Tip Length (ft)	Blows per 6" Increment / N-value	Soil Sample Description	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (%)
1	43.5 – 45.0	45	48.55	8-15-20 / **35**	Elastic SILT	55.2	304	86.9
2	48.5 – 50.0	50	53.55	5-7-11 / **18**	Elastic SILT	55.2	301	86.1
3	53.5 – 55.0	55	58.55	8-14-18 / **32**	Elastic SILT	55.0	312	89.3
Overall Average						**55.1**	**307**	**87.6**

The overall average transferred hammer energy for the automatic hammer on the CME-550X ATV-mounted drill rig (SN 293193) was 307 foot-pounds, with an average ETR of 87.6%.

[4] BLC - Blow Count per 6-in. increment
[5] FMX - Maximum Compressive Force
[6] EFV – Maximum Transferred Energy
[7] CSX – Maximum Compressive Stress
[8] VMX – Maximum Velocity
[9] ETR – Energy Transfer Ratio – Ratio of Calculated Energy to Theoretical Energy of 140 lb hammer falling 30 inches

4.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

5.0 Closing

S&ME appreciates the opportunity to provide this report to the North Carolina Department of Transportation, Geotechnical Engineering Unit. Please let us know if you have any questions concerning this report.

Sincerely,

S&ME, Inc.

Joseph R. Williamson, P.E.
Project Manager
N.C. Registration No. 42168

Gregory J. Canivan, P.E.
Technical Principal

Appendices:

- Appendix I - Certificate of Proficiency
- Appendix II - Accelerometer and Instrumented Rod Calibration Sheets
- Appendix III - SPT Energy Evaluation Form (Field Log)
- Appendix IV - CME-550X ATV (SN 293193) SPT Energy Measurement Summary Plots and Tables

Appendix I- Certificate of Proficiency

PDCA
PILE DRIVING CONTRACTORS ASSOCIATION

Pile Dynamics, Inc.

This documents that

Joseph Williamson
S&ME, Inc.

has on March 16, 2022 achieved the rank of

MASTER

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 Master level seek to attain Expert level through additional study within eight 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. 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. This certificate can be verified at www.PDAproficiencytest.com.

Frank T. Peters, Executive Director
Pile Driving Contractors Association

SEAL
OHIO

Garland Likins, Senior Partner
Pile Dynamics, Inc.

No. 3251

Appendix II - Calibration Sheets

Accelerometer Calibration Certificate
Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc.
Calibration performed on 17Aug2023

Serial No:	K4664	**Temperature:**	77.6 °F
Model:	PR	**Humidity:**	51%
Calibrated on:	Channel 3 on 8G 5161 LE		

Ref Acc 1:	72505! 1035 g's/volt	**Cal on:**	24Mar2022
Ref Acc 2:	72517! 1049 g's/volt	**Cal on:**	24Mar2022

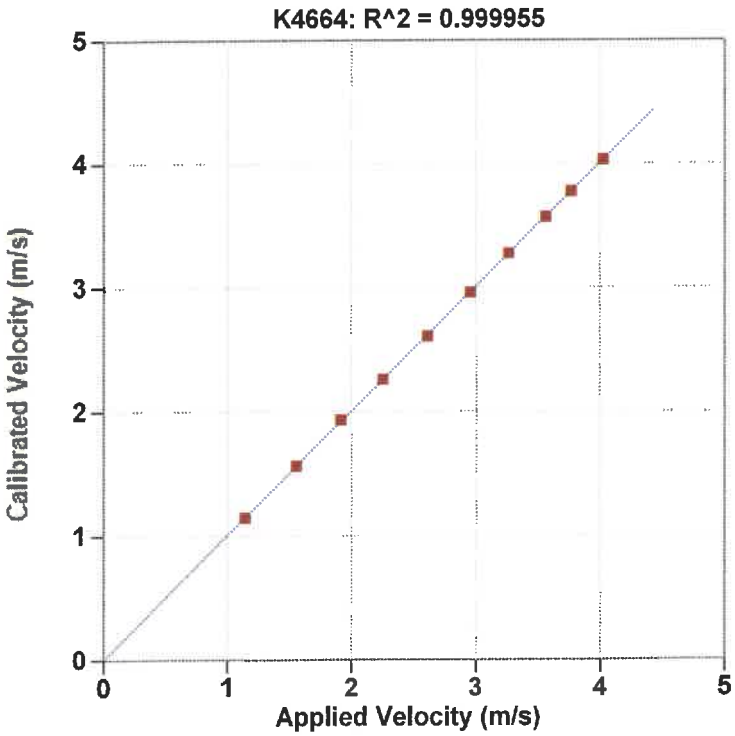
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

376.6 mv/5000g
(75.3 μv/g)
R^2: 0.999955 [Chip programmed]

Operator: William Johnson

Signed



Reference Velocity	S/N K4664 Velocity
m/s	m/s
1.146	1.143
1.560	1.559
1.915	1.932
2.255	2.258
2.612	2.606
2.962	2.958
3.270	3.273
3.569	3.566
3.772	3.773
4.030	4.027

Maximum Acceleration: 879 g's

Accelerometer Calibration Certificate
Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc.
Calibration performed on 17Aug2023

Serial No:	K4665	**Temperature:**	77.6 °F
Model:	PR	**Humidity:**	51%
Calibrated on:	Channel 3 on 8G 5161 LE		

Ref Acc 1:	72505! 1035 g's/volt	**Cal on:**	24Mar2022
Ref Acc 2:	72517! 1049 g's/volt	**Cal on:**	24Mar2022

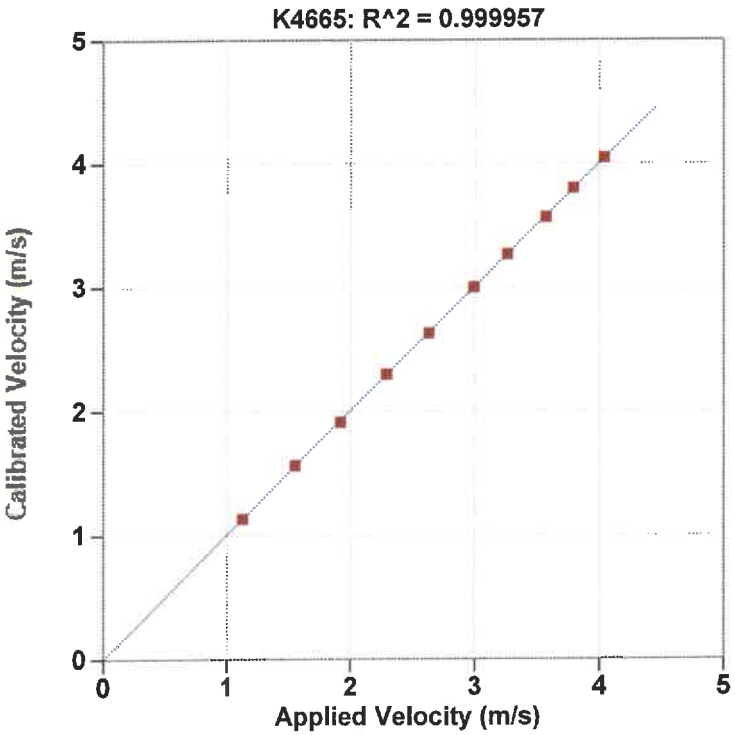
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

375.3 mv/5000g
(75.1 µv/g)
R^2: 0.999957 [Chip programmed]

Operator: William Johnson

Signed



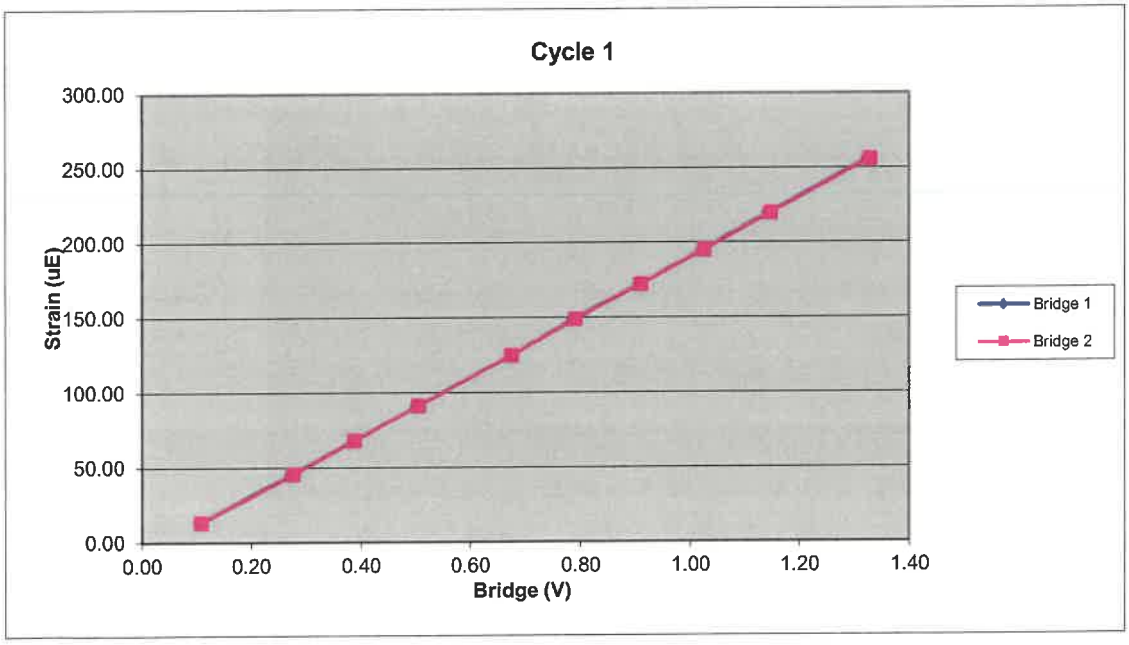
Reference Velocity	S/N K4665 Velocity
m/s	m/s
1.129	1.131
1.555	1.560
1.922	1.910
2.291	2.295
2.633	2.627
2.994	2.999
3.262	3.264
3.573	3.564
3.791	3.797
4.038	4.041

Maximum Acceleration: 880 g's

203AWJ		Cycle 1		
Sample	**Force (lb)**	**Strain (μE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	819.88	13.18	0.11	0.11
3	2100.72	45.33	0.27	0.28
4	2947.11	68.12	0.39	0.39
5	3827.72	90.98	0.50	0.51
6	5122.01	124.83	0.67	0.68
7	5996.48	148.92	0.79	0.79
8	6896.87	172.25	0.91	0.91
9	7771.24	195.27	1.02	1.03
10	8694.53	219.87	1.15	1.15
11	10075.00	255.83	1.33	1.33

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7576.32**	**Force Calibration (lb/V)**	**7575.14**
Offset	14.17	Offset	2.97
Correlation	0.999999	Correlation	0.999999
Strain Calibration (μE/V)	**199.46**	**Strain Calibration (μE/V)**	**199.43**
Offset	-9.00	Offset	-9.29
Correlation	0.999979	Correlation	0.999982

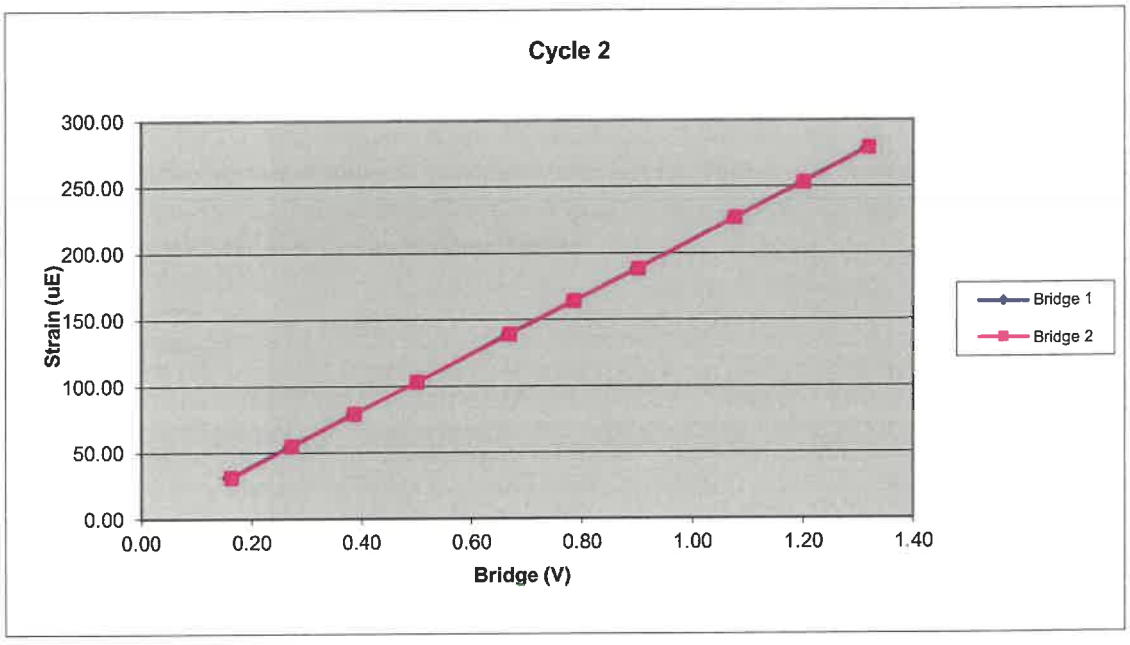
Force Strain Calibration	
EA (Kips)	**37982.46**
Offset	356.04
Correlation	0.999980



203AWJ		Cycle 2		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1217.00	30.72	0.16	0.16
3	2060.56	54.45	0.27	0.27
4	2939.22	78.94	0.39	0.39
5	3811.73	102.81	0.50	0.50
6	5082.83	138.71	0.67	0.67
7	5976.20	163.65	0.78	0.79
8	6861.10	187.95	0.90	0.90
9	8194.67	226.13	1.08	1.08
10	9130.84	252.84	1.20	1.20
11	10039.52	278.74	1.32	1.32

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7616.13**	**Force Calibration (lb/V)**	**7615.56**
Offset	**1.43**	Offset	**-11.88**
Correlation	**0.999999**	Correlation	**0.999997**
Strain Calibration (µE/V)	**213.80**	**Strain Calibration (µE/V)**	**213.79**
Offset	**-3.74**	Offset	**-4.12**
Correlation	**0.999987**	Correlation	**0.999990**

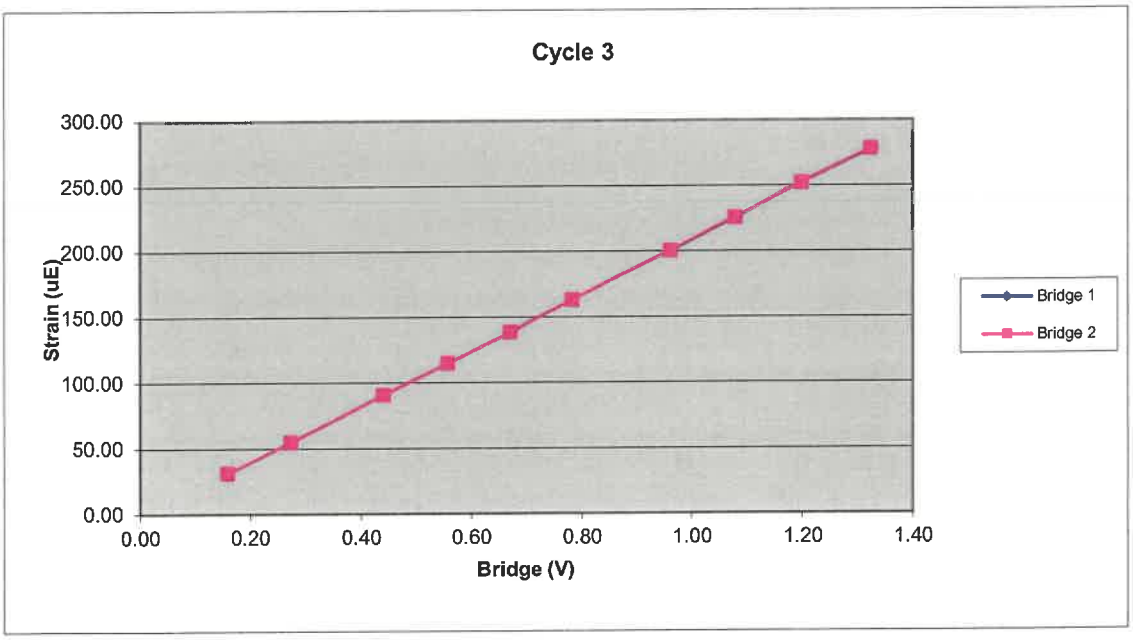
Force Strain Calibration	
EA (Kips)	**35621.25**
Offset	**134.95**
Correlation	**0.999985**



203AWJ		Cycle 3		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1216.12	31.38	0.16	0.16
3	2078.01	54.75	0.27	0.27
4	3348.13	90.71	0.44	0.44
5	4248.62	114.98	0.56	0.56
6	5110.90	138.68	0.67	0.67
7	5966.16	163.47	0.78	0.78
8	7338.73	200.80	0.96	0.96
9	8226.55	225.96	1.08	1.08
10	9144.10	252.26	1.20	1.20
11	10093.62	278.03	1.32	1.32

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7621.84**	**Force Calibration (lb/V)**	**7635.13**
Offset	**-0.64**	Offset	**-3.95**
Correlation	**0.999999**	Correlation	**0.999999**
Strain Calibration (µE/V)	**212.12**	**Strain Calibration (µE/V)**	**212.49**
Offset	**-2.91**	Offset	**-3.01**
Correlation	**0.999979**	Correlation	**0.999985**

Force Strain Calibration	
EA (Kips)	**35930.12**
Offset	**104.27**
Correlation	**0.999985**



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

Calibration Factors	203AWJ		
Bridge 1 (µE/V)	208.46	Bridge 2 (µE/V)	208.57
EA Factor (Kips)	36511.28	Area (in^2)	1.22

Calibrated by: Sean Bowers
Calibrated Date: 8/24/2023

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Appendix III – Field Log

SPT Energy Evaluation Form

Project: I-77 EXIT 26 PHASE I
Project No.: 23610178A
Boring No.: TEST HOLE B
Date: 11/17/23
Weather: CLEAR 70°
Drill Rod Type: 5' LONG AWJ

On-site Personnel

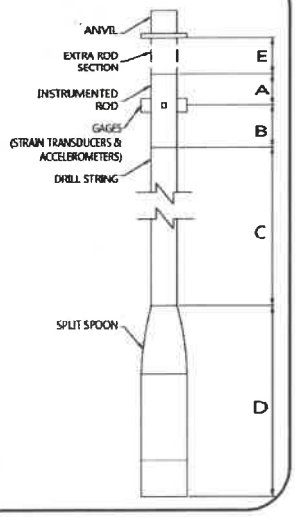
Drilling Company: SME
Rig Operator: S. EUBANKS
Engr/Geologist: N/A
Client Rep.: N/A
Analyzer Oper.: S. WILLIAMSON

Rig/Hammer Info

Drill Rig Make/Model: CME-550X
Carrier Type: ATV
Rig Serial No.: 293193 (R-46)
Hammer Type/Model: AUTO / CME
Hammer Serial No.: N/A
Hammer Drop System: CHAIN DRIVE
Lubrication Condition: PER MAN. REQ'S.
Manufacturer Recommended Operation Rate (bpm): 50-55
Typical Drop Height (in.): 30
Typical Hammer Weight (lbs): 140
Anvil Dimension (in.): 12
Drilling Method: MUD ROTARY w/ 2-9/16" DRAG BIT
Drop Height in Tolerance (y/n): Y

Rod Info

(A) + (B) Instr. Rod Length: 2.0 ft
(B) Instr. Rod Length below Gages: 0.7 ft
(D) Spoon Length: 2.85 ft
(E) Rod Length Above Instr. Rod (if applicable): 0 ft
(B)+(C)+(D) (LE) - Length Below Gauges **(C)** + 3.55 ft
Instr. Rod S/N: 203AWJ
Instr. Rod Outside Dia.: 1.75 in.
Instr. Rod Area: 1.22 in²
PDA Make/Model: PDI / PAX
PDA Serial No.: 3733L
Calib. Pulse Test (y/n): Y



Gage Info

Gage		Serial No.	Calibration No.
Accel.	A3	K4664	376.6
	A4	K4665	375.3
Strain	F3	203AWJ-1	208.46
	F4	203AWJ-2	208.57

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: Total Blows by PDA	6"	12"	18"	N-Value	Extra Blows	AASHTO / USCS Classification
11/17/23	38.5-40.0	10:46	40	43.55		93	15	28	50	78	0	
	43.5-45.0	11:11	45	48.55		43	8	15	20	35	0	
	48.5-50.0	11:24	50	53.55		23	5	7	11	18	0	
	53.5-55.0	11:38	55	58.55		40	8	14	18	32	0	
	58.5-60.0	11:55	60	63.55		86	15	32	39	71	0	

Notes: PZ SPIKING ON FIRST SAMPLE SWAPPED P.T.G TAIL.

NOTE: (1) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. veritcality, weather, or lubrication between trials). (2) Note any changes in rod diameter along drill string and record locations of short rod sections.

Joseph Williamson
Prepared By (print/signature)

11/17/23
Date

SCDOT Soil Test Log

Project ID:	23610178A	**County:**	Richland	**Boring No.:**	EB-2W		
Site Description:	I-77 Exit 26 Phase I			**Route:**	US-21		
Eng./Geo.:	Z. Zelaya	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
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:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	Grassy								
	0.3	**SURFACE MATERIAL** - TOPSOIL - 3 inches.		0.0	SS-1	1	2	1	2	3
		COASTAL PLAIN - very loose, moist, brown to light brown, Silty fine to medium SAND (SM), little low plasticity fines, trace roots, 7.5YR4/3, 7.5YR6/4. NMC=8.0%, %#200=16		2.0	SS-2	2	2	3	5	5
440.0		@2.5 feet - loose, moist to wet, brown with yellowish red and light gray, (A-2-6), 7.5YR4/5, 5YR5/8, 5YR7/1. LL=38, PL=27, PI=11, NMC=16%, %#200=35		4.0	SS-3	2	4	6	9	10
	6.0	@4 feet - brown, light gray, yellowish red, 7.5YR4/5, 5YR7/1, 5YR5/8. NMC=18%, %#200=31		6.0	SS-4	11	12	13	14	25
	8.0	Medium dense, moist to wet, layered brown with yellowish red and light gray, fine to medium SAND with Clay (SP-SC), few medium plasticity fines, 7.5YR4/5, 5YR5/8, 5YR7/1.		8.0	SS-5	9	5	10	16	15
435.0		Medium dense, moist to wet, light gray with very pale brown mottles, Clayey fine to medium SAND (SC) (A-2-4), little medium plasticity fines, 10YR7/2, 10YR8/4. LL=26, PL=17, PI=9, NMC=13%, %#200=20								
	13.5	Dense, moist to wet, light gray and white, fine to coarse SAND with Silt (SP-SM), few low plasticity fines, 10YR7/2, 10YR8/1.		13.5	SS-6	16	17	14		31
430.0										
	18.5	Medium dense, moist, light gray with brownish yellow mottles, lean CLAY with Sand (CL) (A-6(8)), little fine sands, 10YR7/2, 10YR6/8. LL=28, PL=16, PI=12, NMC=16%, %#200=81		18.5	SS-7	2	5	9		14
425.0										
	23.5	Very hard, dry to moist, light gray with brownish yellow, SILT (ML), trace fine to medium sands, 10YR7/2, 10YR6/8.		23.5	SS-8	12	25	50/5"		50/5"
420.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)
0 10 20 30 40 50 60 70 80 90

SC_DOT 23610178A SCDOT BORING LOGS_NEW MASTER 8-29.GPJ SCDOT_DATATEMPLATE.GDT 10/23/23

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:	23610178A	**County:**	Richland	**Boring No.:**	EB-2W		
Site Description:	I-77 Exit 26 Phase I			**Route:**	US-21		
Eng./Geo.:	Z. Zelaya	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
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:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	28.5			28.5						
415.0		Very dense, moist to wet, light gray with brownish yellow mottles, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR7/2, 10YR6/8.			SS-9	29	33	50		83
	33.5			33.5						
410.0		**PIEDMONT RESIDUUM** - very hard, dry to moist, laminated yellow with white and very pale brown layers, elastic SILT (MH), few fine to medium sands, 10YR8/6, 10YR8/1, 10YR8/3.			SS-10	13	26	48		74
		@38.5 feet - hard, dry, relict rock structure.		38.5	SS-11	9	14	20		34
405.0										
		@43.5 feet - very stiff, laminated brownish yellow with white mottles and very pale brown, (A-7-5(31)), 10YR6/8, 10YR8/1, 10YR8/3. LL=72, PL=47, PI=25, NMC=35%, %#200=89		43.5	SS-12	4	7	12		19
400.0										
		@48.5 feet - laminated red, strong brown and brownish yellow, 2.5YR4/6, 7.5YR5/8, 10YR6/8.		48.5	SS-13	7	10	14		24
395.0										
		@53.5 feet - dry to moist, few fine to coarse		53.5						

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

Continued Next Page

LEGEND

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

SC_DOT 23610178A SCDOT BORING LOGS_NEW MASTER 8-29.GPJ SCDOT_DATATEMPLATE.GDT 10/23/23

SCDOT Soil Test Log

Project ID:	23610178A	**County:**	Richland	**Boring No.:**	EB-2W		
Site Description:	I-77 Exit 26 Phase I			**Route:**	US-21		
Eng./Geo.:	Z. Zelaya	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
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:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
390.0		sands.			SS-14	7	10	14		24
	58.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, brownish yellow and strong brown laminated, SILT with Sand (ML), few fine to coarse sands, trace fine rock fragments, relict rock structure, 10YR6/8, 7.5YR5/8.		58.5	SS-15	49	50/3"			50/3"
385.0										
		@63.5 feet - brownish yellow, gray and dark gray laminated, trace fine to coarse rock fragments, 10YR6/8, 7.5YR6/1, 7.5YR4/1.		63.5	SS-16	22	29	50/5"		50/5"
380.0	68.5	Very hard, dry, laminated very dark gray, very dark greenish gray and yellowish brown, Sandy SILT (ML), some fine to medium sands, trace fine rock fragments, 10YR3/1, GLEY3/1, 10YR5/4.		68.5	SS-17	39	50/4"			50/4"
375.0	73.5	Very hard, dry, dark greenish gray with dark gray and white mottles, Sandy SILT with gravel (ML), some fine to medium sands, little fine gravel, 10Y4/1, 4/N, 10YR8/1.		73.5	SS-18	36	50/5"			50/5"
370.0				78.5	SS-19	50/3"				50/3"
365.0										

SPT N VALUE ● PL × MC ○ LL × ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

0 10 20 30 40 50 60 70 80 90

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:	23610178A			**County:**	Richland	**Boring No.:**	EB-2W
Site Description:	I-77 Exit 26 Phase I					**Route:**	US-21
Eng./Geo.:	Z. Zelaya	**Boring Location:**		**Offset:**		**Alignment:**	Proposed
Elev.:	445.0 ft	**Latitude:**	34.18975869	**Longitude:**	-80.97072615	**Date Started:**	7/24/2023
Total Depth:	98.8 ft	**Soil Depth:**	98.8 ft	**Core Depth:**	N/A ft	**Date Completed:**	7/25/2023
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:**	81.6%
Core Size:	N/A	**Driller:**	S. Gowan	**Groundwater:**	**TOB** NA	**24HR**	5.2 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
360.0		@88.5 feet - little fine to coarse rock fragments.		83.5	SS-20	50/5"				50/5"
				88.5	SS-21	50/5"				50/5"
355.0				93.5	SS-22	50/2"				50/2"
350.0	98.5			98.5	SS-23	50/3"				50/3"
	98.8	Very dense, dry to moist, dark greenish gray with dark gray and white, Silty fine to coarse SAND with gravel (SM), little fine gravel, 10Y4/1, 4/N, 10YR8/1.								
345.0		Boring Terminated at 98.8 feet.								
340.0										

SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%)

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	

SC_DOT 23610178A SCDOT BORING LOGS_NEW MASTER 8-29.GPJ SCDOT_DATATEMPLATE.GDT 10/23/23

Appendix IV – SPT Energy Measurement Plots and Tables

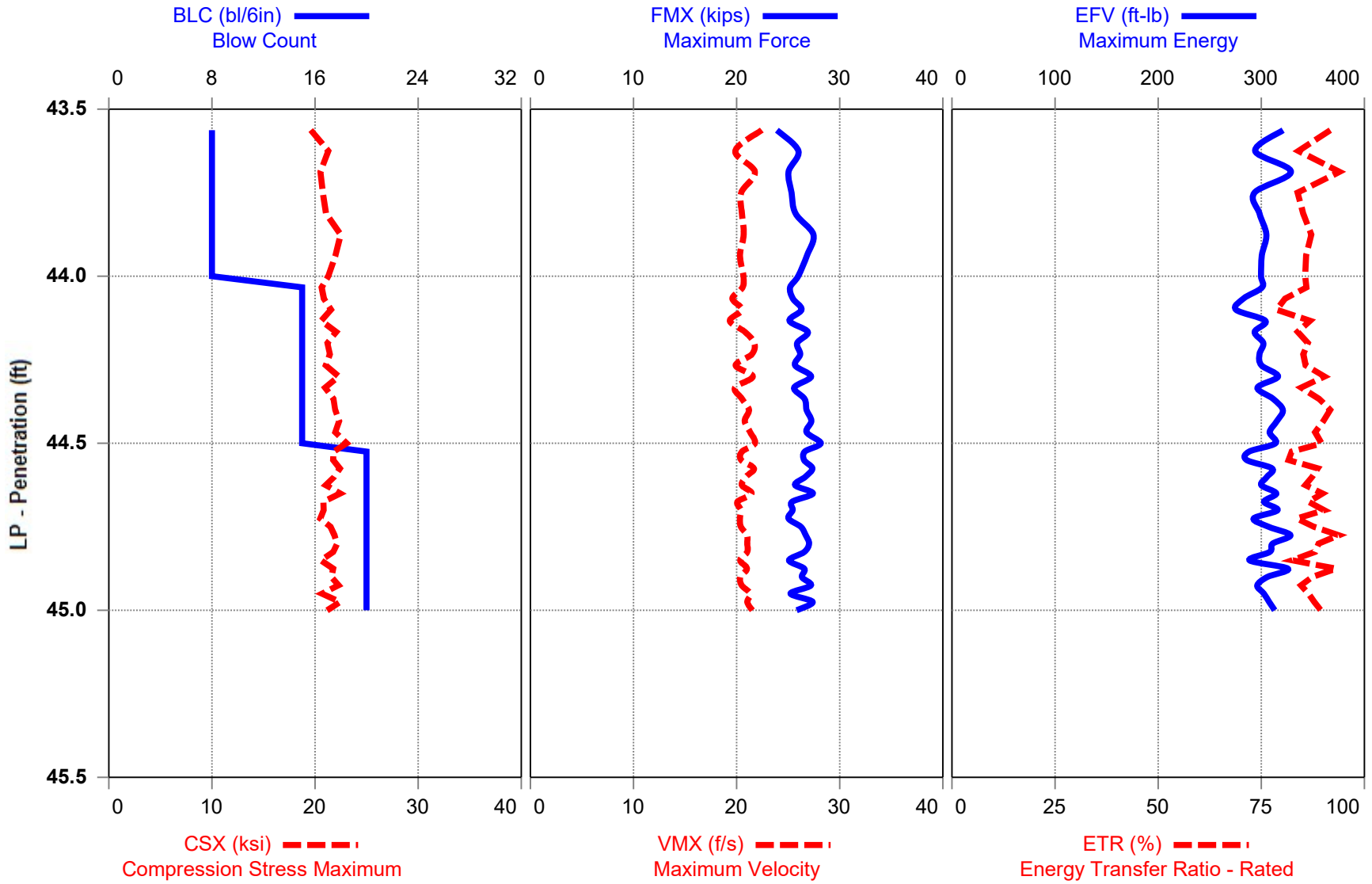
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 14-December-2023

Test started: 17-November-2023

CME-550X SN 293193 - 43.5-45.0 FEET

TEST HOLE B



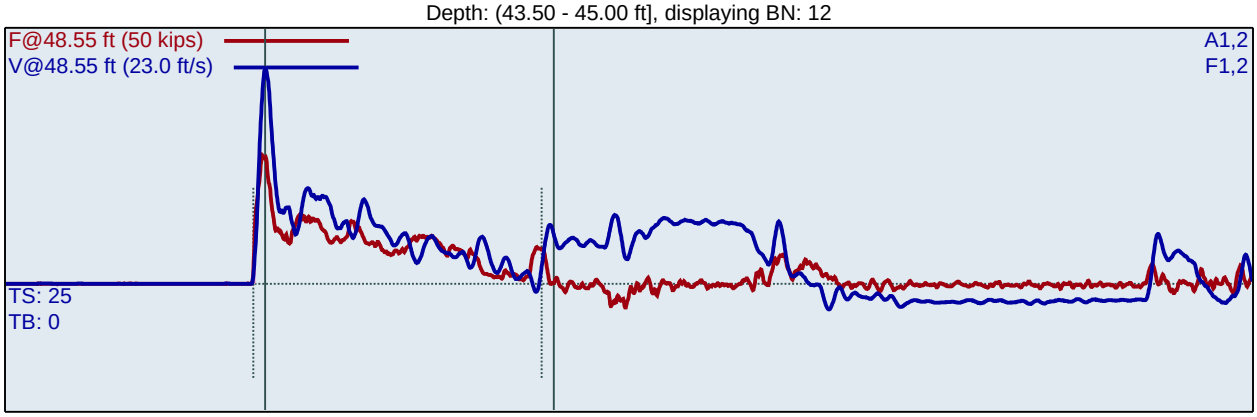
CME-550X SN 293193
JRW
TEST HOLE B

43.5-45.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 48.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (43.50 - 45.00 ft], displaying BN: 12



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 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

BL#	LP ft	BC /6"	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
1	43.56	8	1.9	24	22.4	0.96	19.6	0.75	321	91.7
2	43.63	8	56.0	26	19.9	0.75	21.3	0.75	294	84.0
3	43.69	8	55.4	25	21.8	0.91	20.5	0.75	329	93.9
4	43.75	8	55.5	25	20.4	0.75	20.8	0.75	293	83.8
5	43.81	8	55.6	26	20.5	0.75	21.1	0.75	298	85.2
6	43.88	8	55.4	27	20.7	0.75	22.5	0.75	305	87.1
7	43.94	8	55.6	27	20.3	0.75	22.0	0.75	300	85.8
8	44.00	8	55.1	26	20.7	0.75	21.3	0.75	300	85.6
9	44.03	15	55.7	25	20.6	0.64	20.6	0.40	301	85.9
10	44.07	15	55.1	25	19.6	0.54	20.9	0.40	283	80.8
11	44.10	15	57.1	26	20.5	0.50	21.6	0.40	275	78.7
12	44.13	15	55.5	25	19.3	0.60	20.6	0.40	304	86.8
13	44.17	15	53.9	27	20.8	0.52	22.1	0.40	293	83.8
14	44.20	15	55.3	26	21.7	0.53	21.2	0.40	302	86.3
15	44.23	15	55.5	26	21.5	0.50	21.4	0.40	298	85.2
16	44.27	15	55.3	26	19.9	0.51	21.1	0.40	300	85.7
17	44.30	15	55.3	27	21.6	0.48	22.3	0.40	316	90.3
18	44.33	15	55.4	26	19.8	0.46	21.0	0.40	296	84.6
19	44.37	15	57.2	27	20.5	0.46	21.8	0.40	311	89.0
20	44.40	15	53.8	27	21.2	0.45	22.0	0.40	321	91.7
21	44.43	15	55.2	27	20.8	0.44	22.3	0.40	315	90.0
22	44.47	15	55.1	27	21.3	0.46	22.0	0.40	308	88.0
23	44.50	15	55.1	28	21.8	0.42	23.1	0.40	314	89.6
24	44.53	20	55.2	27	20.5	0.38	21.8	0.30	288	82.3
25	44.55	20	55.2	27	20.4	0.37	21.8	0.30	286	81.6
26	44.58	20	54.9	27	21.7	0.41	22.4	0.30	310	88.7
27	44.60	20	55.1	27	20.9	0.40	21.9	0.30	306	87.3

28	44.63	20	55.0	26	20.5	0.39	21.0	0.30	300	85.7
29	44.65	20	55.1	27	21.5	0.42	22.4	0.30	314	89.8
30	44.68	20	55.0	25	20.1	0.40	20.8	0.30	303	86.4
31	44.70	20	55.1	25	20.4	0.43	20.8	0.30	316	90.2
32	44.73	20	54.9	25	20.3	0.39	20.5	0.30	293	83.6
33	44.75	20	55.0	26	20.4	0.41	21.5	0.30	307	87.8
34	44.78	20	55.0	27	21.0	0.44	21.9	0.30	328	93.8
35	44.80	20	55.1	27	21.0	0.41	22.1	0.30	311	88.9
36	44.83	20	54.9	27	21.0	0.40	21.8	0.30	308	88.0
37	44.85	20	56.5	25	20.3	0.39	20.6	0.30	289	82.4
38	44.88	20	53.9	27	21.0	0.44	21.8	0.30	326	93.1
39	44.90	20	54.9	26	20.3	0.41	21.6	0.30	306	87.3
40	44.93	20	54.8	27	20.5	0.38	22.3	0.30	296	84.6
41	44.95	20	56.4	25	21.3	0.41	20.7	0.30	302	86.4
42	44.98	20	53.6	27	21.0	0.39	22.4	0.30	307	87.9
43	45.00	20	54.9	26	21.5	0.41	21.2	0.30	313	89.4
		Average	55.2	26	20.8	0.45	21.6	0.34	304	86.9
		Std Dev	0.8	1	0.6	0.06	0.7	0.05	12	3.3
		Maximum	57.2	28	21.8	0.64	23.1	0.40	328	93.8
		Minimum	53.6	25	19.3	0.37	20.5	0.30	275	78.7
					N-value: 35					

Sample Interval Time: 45.56 seconds.

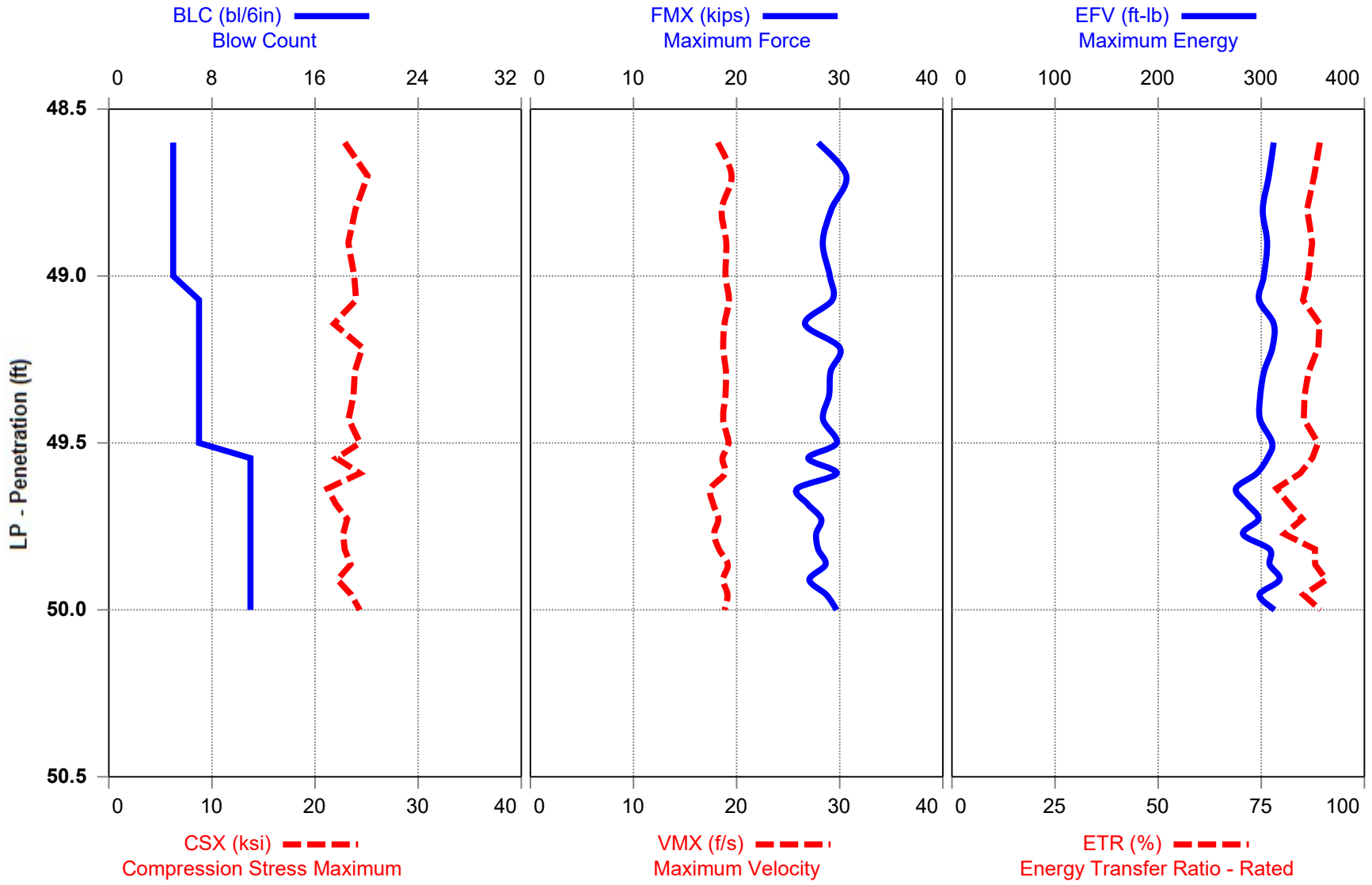
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 14-December-2023

Test started: 17-November-2023

CME-550X SN 293193 - 48.5-50.0 FEET

TEST HOLE B



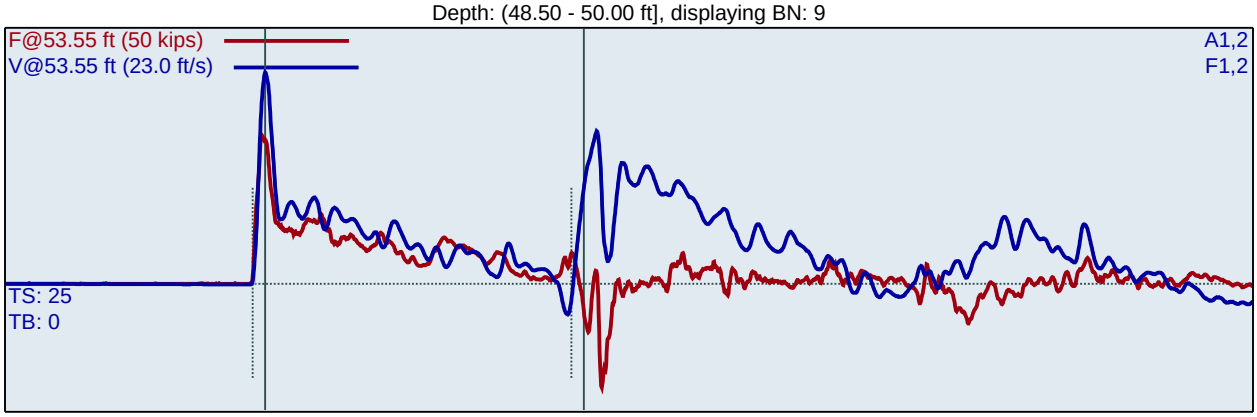
CME-550X SN 293193
JRW
TEST HOLE B

43.5-45.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 53.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (48.50 - 50.00 ft], displaying BN: 9



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 mv/6.4v/5000g (1) VF1

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	48.60	5	1.9	28	18.2	1.65	22.9	1.20	312	89.2
2	48.70	5	56.2	31	19.5	1.20	25.1	1.20	307	87.8
3	48.80	5	55.4	29	18.6	1.20	23.9	1.20	301	86.1
4	48.90	5	55.1	28	19.0	1.20	23.2	1.20	306	87.3
5	49.00	5	55.2	29	18.9	1.20	23.8	1.20	302	86.4
6	49.07	7	55.1	31	19.3	0.94	25.4	0.86	303	86.7
7	49.14	7	55.2	27	18.8	0.99	21.8	0.86	312	89.2
8	49.21	7	55.4	30	18.7	0.94	24.6	0.86	311	88.8
9	49.29	7	55.1	29	19.0	0.86	23.9	0.86	303	86.5
10	49.36	7	55.2	29	18.9	0.86	23.7	0.86	299	85.4
11	49.43	7	55.1	28	18.7	0.86	23.3	0.86	299	85.3
12	49.50	7	55.6	30	19.2	0.86	24.4	0.86	311	88.7
13	49.55	11	55.1	27	18.6	0.84	22.1	0.55	306	87.3
14	49.59	11	55.0	30	18.9	0.66	24.3	0.54	295	84.4
15	49.64	11	56.4	26	17.5	0.56	21.2	0.54	275	78.6
16	49.68	11	55.4	27	17.7	0.55	22.0	0.55	286	81.7
17	49.73	11	53.9	28	18.2	0.55	23.1	0.55	297	84.9
18	49.77	11	56.7	28	17.8	0.55	22.7	0.55	282	80.6
19	49.82	11	54.0	28	18.3	0.56	22.9	0.55	308	88.0
20	49.86	11	55.2	29	19.1	0.55	23.5	0.55	308	88.0
21	49.91	11	55.1	27	18.7	0.57	22.2	0.55	318	90.7
22	49.95	11	56.8	29	19.1	0.55	23.5	0.55	298	85.2
23	50.00	11	53.6	30	18.8	0.57	24.3	0.55	313	89.3
		Average	55.2	28	18.6	0.71	23.3	0.67	301	86.1
		Std Dev	0.8	1	0.5	0.17	1.1	0.15	11	3.1
		Maximum	56.8	31	19.3	0.99	25.4	0.86	318	90.7
		Minimum	53.6	26	17.5	0.55	21.2	0.54	275	78.6

N-value: 18

Sample Interval Time: 23.95 seconds.

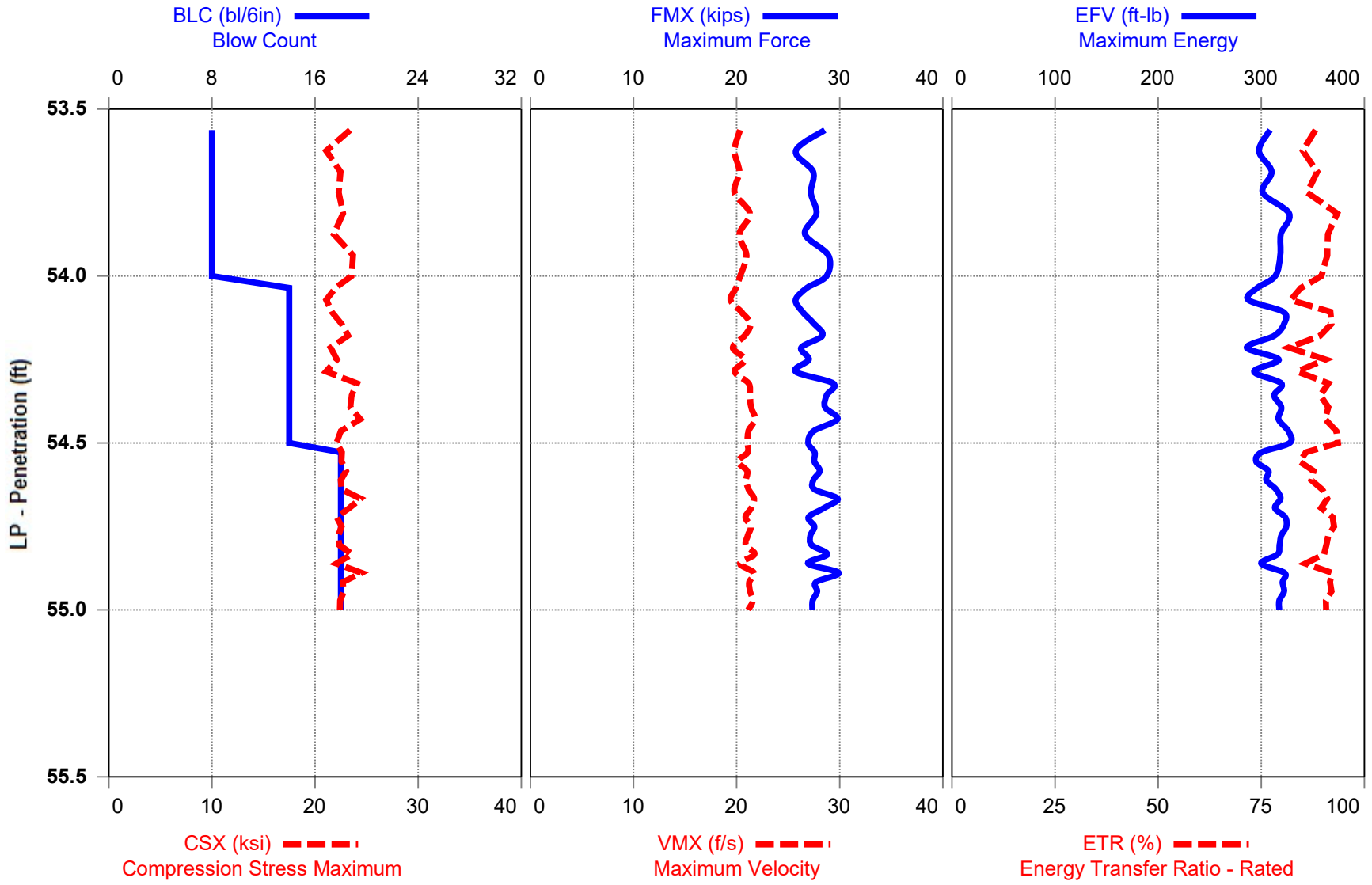
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 14-December-2023

Test started: 17-November-2023

CME-550X SN 293193 - 53.5-55.0 FEET

TEST HOLE B



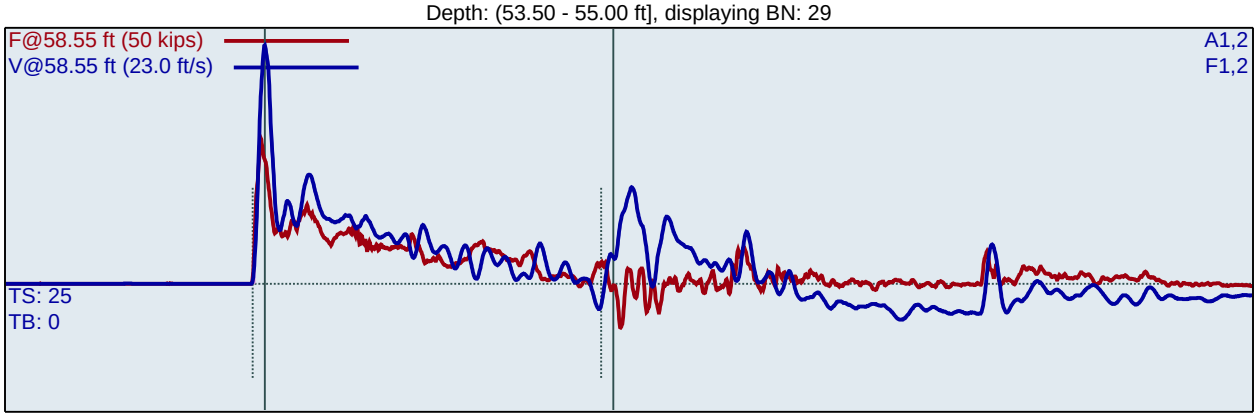
CME-550X SN 293193
JRW
TEST HOLE B

43.5-45.0 FEET
Interval start: 11/17/2023

AR: 1.22 in^2
LE: 58.55 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (53.50 - 55.00 ft], displaying BN: 29



F1 : [203 AWJ-1] 208.46 PDICAL (1) FF1
F2 : [203 AWJ-2] 208.57 PDICAL (1) FF1

A1 (PR): [K4664] 376.6 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 375.3 mv/6.4v/5000g (1) VF1

BL#	LP	BC	BPM	FMX	VMX	DMX	CSX	DFN	EFV	ETR
	ft	/6"	bpm	kips	ft/s	in	ksi	in	ft-lb	%
1	53.56	8	1.9	29	20.3	1.10	23.4	0.75	308	88.1
2	53.63	8	56.4	26	19.8	0.89	21.1	0.75	298	85.0
3	53.69	8	55.0	27	20.3	0.83	22.5	0.75	310	88.5
4	53.75	8	55.5	27	19.8	0.77	22.3	0.75	301	86.1
5	53.81	8	55.0	28	21.3	0.75	22.7	0.75	327	93.4
6	53.88	8	55.3	27	20.3	0.75	21.8	0.75	319	91.1
7	53.94	8	55.1	29	21.0	0.75	23.7	0.75	318	91.0
8	54.00	8	55.2	29	20.3	0.76	23.5	0.75	313	89.6
9	54.04	14	55.3	27	19.9	0.56	22.0	0.43	296	84.6
10	54.07	14	56.9	26	19.4	0.55	21.1	0.43	287	82.1
11	54.11	14	53.3	26	20.5	0.58	21.6	0.43	321	91.7
12	54.14	14	55.5	28	21.3	0.55	22.6	0.43	322	92.0
13	54.18	14	55.1	28	20.8	0.53	23.2	0.43	312	89.2
14	54.21	14	56.6	26	19.6	0.51	21.5	0.43	286	81.7
15	54.25	14	53.6	27	20.8	0.53	22.1	0.43	317	90.6
16	54.29	14	56.7	26	19.8	0.50	21.1	0.43	293	83.7
17	54.32	14	53.9	29	21.2	0.51	24.1	0.43	319	91.3
18	54.36	14	54.7	29	21.3	0.47	23.5	0.43	313	89.3
19	54.39	14	55.1	29	21.4	0.49	23.4	0.43	319	91.3
20	54.43	14	55.2	30	21.8	0.47	24.4	0.43	317	90.5
21	54.46	14	54.9	30	21.1	0.47	24.2	0.43	319	91.2
22	54.50	14	55.1	29	21.1	0.48	23.8	0.43	320	91.3
23	54.53	18	56.6	28	21.1	0.45	22.6	0.33	300	85.8
24	54.56	18	53.5	28	20.1	0.45	22.6	0.33	295	84.3
25	54.58	18	55.1	28	21.0	0.46	23.0	0.33	307	87.7
26	54.61	18	55.1	27	20.9	0.44	22.5	0.33	305	87.1
27	54.64	18	55.0	28	21.2	0.46	22.6	0.33	314	89.8
28	54.67	18	55.1	30	21.7	0.47	24.4	0.33	319	91.0
29	54.69	18	55.1	28	21.4	0.46	23.3	0.33	313	89.5
30	54.72	18	54.8	27	20.9	0.48	22.1	0.33	323	92.3
31	54.75	18	55.1	28	21.4	0.48	22.6	0.33	324	92.6

32	54.78	18	55.1	27	21.1	0.46	22.3	0.33	319	91.2
33	54.81	18	54.9	29	20.9	0.45	23.8	0.33	321	91.6
34	54.83	18	55.0	29	21.7	0.46	23.6	0.33	316	90.2
35	54.86	18	55.0	27	20.3	0.42	22.1	0.33	300	85.7
36	54.89	18	54.9	30	21.7	0.44	24.5	0.33	323	92.2
37	54.92	18	55.1	28	21.2	0.44	22.7	0.33	321	91.6
38	54.94	18	54.7	28	21.3	0.42	22.8	0.33	322	92.0
39	54.97	18	54.8	27	21.6	0.41	22.4	0.33	317	90.7
40	55.00	18	54.6	27	21.1	0.42	22.4	0.33	317	90.7
		Average	55.0	28	21.0	0.48	22.8	0.38	312	89.3
		Std Dev	0.8	1	0.6	0.04	0.9	0.05	11	3.1
		Maximum	56.9	30	21.8	0.58	24.5	0.43	324	92.6
		Minimum	53.3	26	19.4	0.41	21.1	0.33	286	81.7
					N-value: 32					

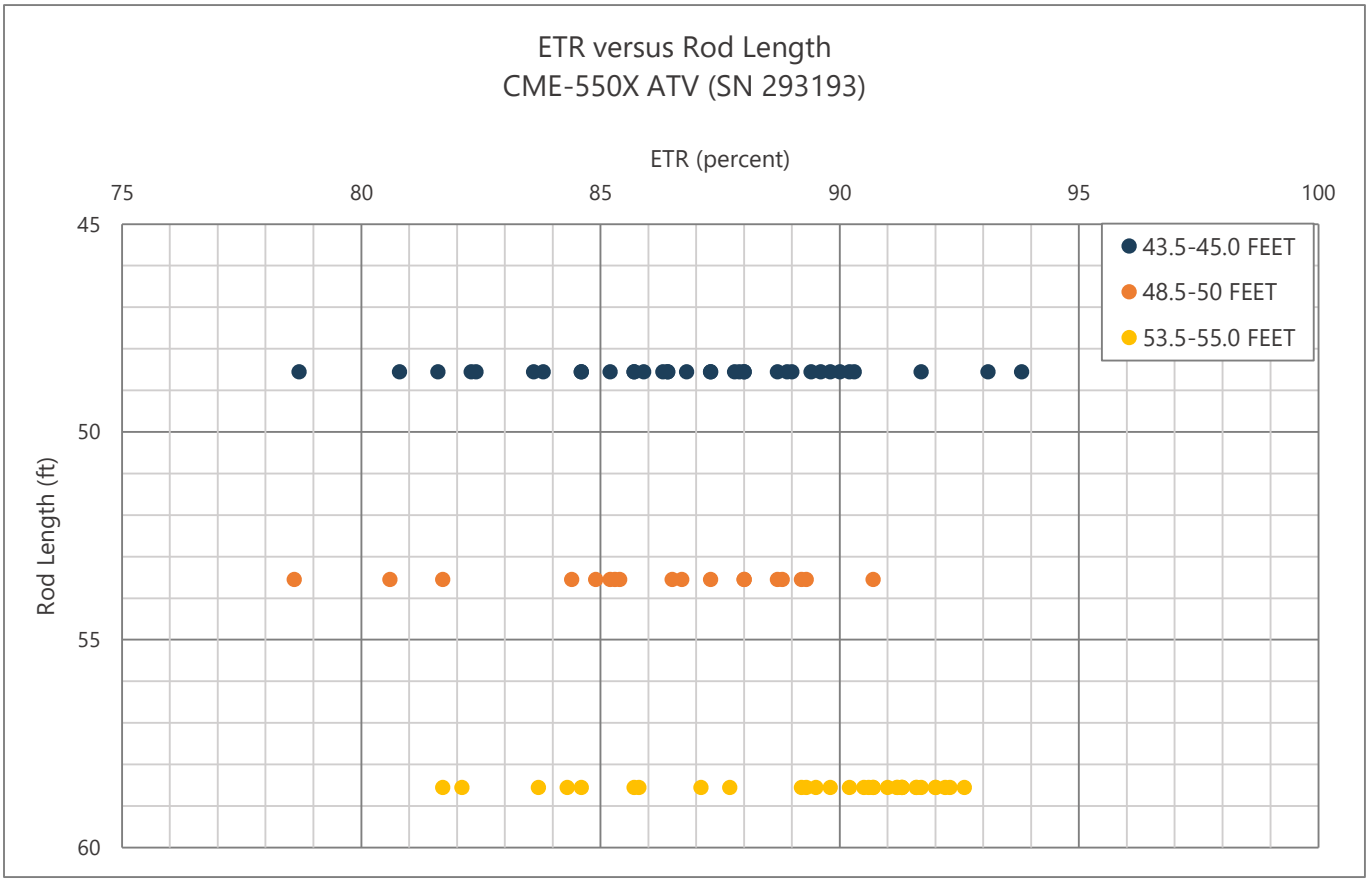
Sample Interval Time: 42.36 seconds.

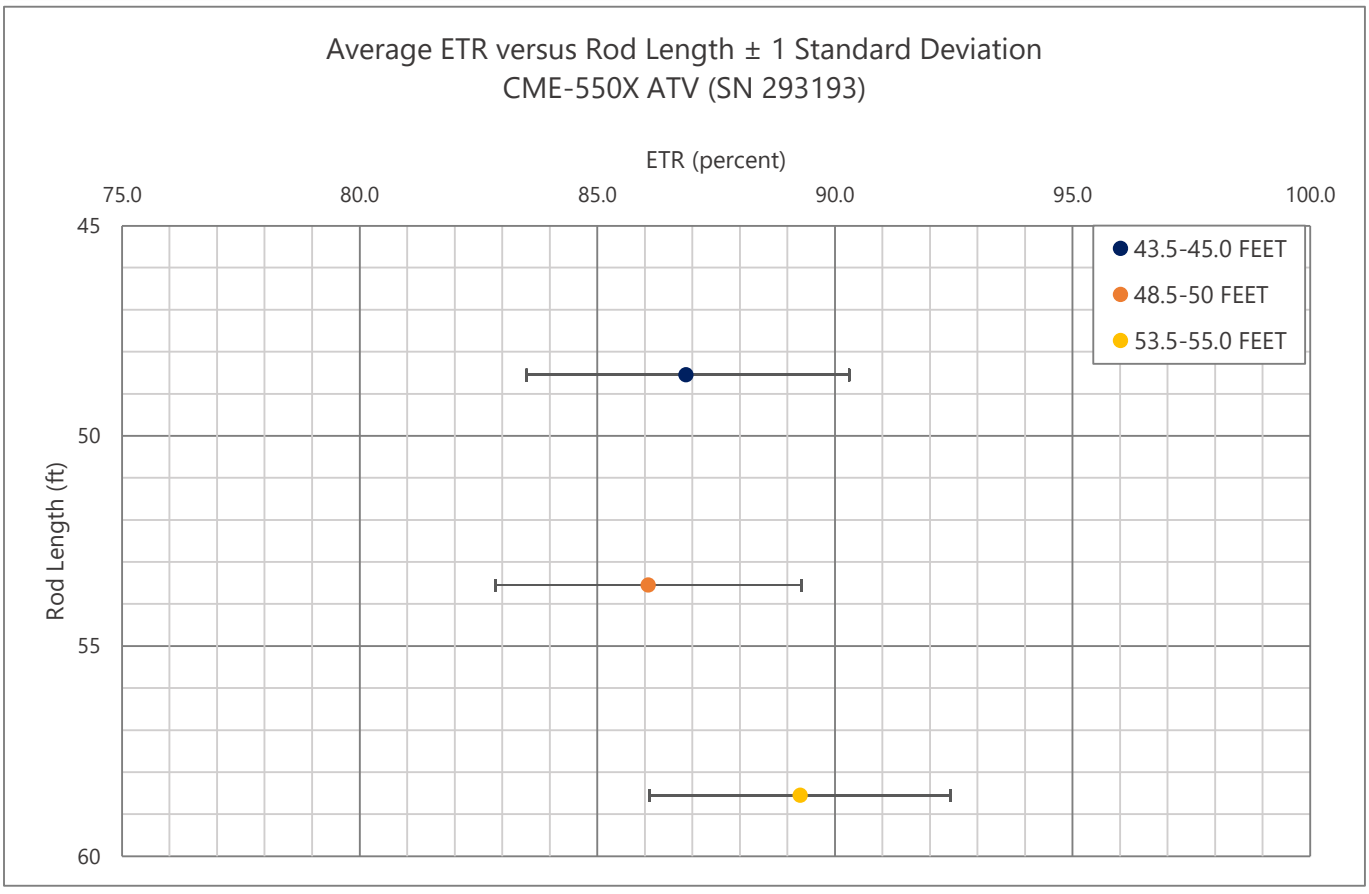
Summary of SPT Test Results

Project: CME-550X SN 293193, Test Date: 11/17/2023

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

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 %
48.55	43.50	45.00	**8-15-20**	**35**	**51**	55.2	26	20.8	0.45	21.6	0.34	304	86.9
53.55	48.50	50.00	**5-7-11**	**18**	**26**	55.2	28	18.6	0.71	23.3	0.67	301	86.1
58.55	53.50	55.00	**8-14-18**	**32**	**46**	55.0	28	21.0	0.48	22.8	0.38	312	89.3
			Overall Average Values:			55.1	27	20.4	0.51	22.4	0.42	307	87.6
			Standard Deviation:			0.8	1	1.1	0.14	1.1	0.15	12	3.5
			Overall Maximum Value:			57.2	31	21.8	0.99	25.4	0.86	328	93.8
			Overall Minimum Value:			53.3	25	17.5	0.37	20.5	0.30	275	78.6


ETR versus Rod Length
CME-550X ATV (SN 293193)
ETR (percent)
75
80
85
90
95
100
Rod Length (ft)
45
50
55
60
43.5-45.0 FEET
48.5-50 FEET
53.5-55.0 FEET


Average ETR versus Rod Length ± 1 Standard Deviation
CME-550X ATV (SN 293193)
ETR (percent)
75.0
80.0
85.0
90.0
95.0
100.0
Rod Length (ft)
45
50
55
60
43.5-45.0 FEET
48.5-50 FEET
53.5-55.0 FEET

Appendix XI – Electronic Data Files

gINT® Project Files

Excel® Downhole Seismic Velocity File