Geotechnical Subsurface Data Report (GSDR), Revision 1

Ramp BA Bridge over Interstate 77
I-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**
Ramp BA Bridge over Interstate 77
I-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 traditional 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 P. Lewis, P.E.
Project Engineer

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No. C00473
CERTIFICATE OF AUTHORIZATION

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1.0 Introduction

This report summarizes the results of the geotechnical investigation conducted for the proposed Ramp BA Bridge over Interstate 77 portion of the overall Interstate 77 Exit 26 – Scout Interchange project. The general vicinity of the ramp bridge overpass is shown on the *Site Location Plan*, attached as Figure 1 in Appendix I. Our scope of work relevant to the bridge 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 plans provided by RS&H:

- Microstation file: P042443_DSN_LCS.dgn, dated June 12, 2023
- Google Earth kmz file: P042443_DSN_ALT03_LCS.kmz, dated September 11, 2023
- *Conceptual Roadway Plans Alternate 3,* prepared by RS&H, dated August 30, 2023
- *Conceptual I-77 Interchange and Connector Roads Construct Bridge on Ramp BA over I-77, Conceptual Bridge Plans,* prepared by RS&H, dated December 11, 2023

From our review of the provided information, we understand the proposed Ramp BA bridge will consist of an approximately 318-foot long, two-span structure supported on two end bents and one interior bent. Driven steel H-piles are planned for support of the end bents and drilled shafts are planned for support of the interior bent. Due to the up to roughly 34 feet of fill necessary to raise the roadway alignment above the interstate alignment, mechanically stabilized earth (MSE) retaining walls of up to roughly 28 feet tall will support the bridge abutment embankments at end bents. The finished roadway configuration will consist of one travel lane with appropriate shoulders and 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 Work

As requested, representatives of S&ME were present at the above-referenced site between October 9 and November 15, 2023, to conduct field activities for the project. The exploration included the following:

- Fourteen (14) Standard Penetration Test (SPT) borings – EB-1RB1 through EB-4RB1, IB-1RB1, IB-2RB1, W-13 through W-16, W-33, W-34, EM-15, and EM-16,
- One (1) Down-Hole Shear Wave Velocity Test – conducted in Boring EB-3RB1.

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 hand-held 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.

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 VI – SPT Hammer Energy Reports

5.1 Encroachment Permit

S&ME applied for encroachment along the Interstate 77 SCDOT right-of-way on June 27, 2023, and received the approved encroachment permit No. 269263 on July 25, 2023.

5.2 Traffic Control

Traffic control for the project was provided by Area Wide Protective (AWP), under subcontract to S&ME, for borings within the existing shoulders and median of I-77. Traffic control was performed in accordance with applicable SCDOT Standard Drawings.

5.3 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.

5.4 Standard Penetration Test (SPT) Borings

Fourteen (14) 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%
Diedrich D-50	316	Track	96.8%

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 VI. 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 29.3 to 100 feet below the existing ground surface, followed by wireline rock coring where applicable.

Table 5-2 – SPT Boring Summary

Boring No.	Purpose
EB-1RB1	End Bent 3 North
EB-2RB1	End Bent 3 South
EB-3RB1	End Bent 1 North
EB-4RB1	End Bent 1 South
EM-15	Western Bridge Embankment
EM-16	Eastern Bridge Embankment
IB-1RB1	Interior Bent 2 North
IB-2RB1	Interior Bent 2 South

Boring No.	Purpose
W-13	MSE Abutment Retaining Wall No. 2 South
W-14	MSE Abutment Retaining Wall No. 2 South
W-15	MSE Abutment Retaining Wall No. 1 North
W-16	MSE Abutment Retaining Wall No. 1 South
W-33	MSE Abutment Retaining Wall No. 2 North
W-34	MSE Abutment Retaining Wall No. 2 North

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, interior 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.

5.5 Wireline Rock Coring

At bridge boring locations EB-1RB1 and IB-1RB1, wireline rock coring was performed to termination depths of 67 and 75.2 feet, respectively, 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.

5.6 Shear Wave Velocity Test by Downhole Method

Upon completion of drilling activities for bridge boring EB-3RB1, 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 October 24, 2023, we performed a downhole seismic survey within boring EB-3RB1 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 97 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-3RB1 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 Bridge over I-77 and the US-21 Bridge over Norfolk Southern Railroad 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 X.

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 Rock Mass Rating (RMR) was computed in general accordance with the GDM and Section 10 of the 2012 AASHTO LRFD *Bridge Design Specifications*. Additionally, the Geological Strength Index (GSI) was determined in general accordance with the 2014 AASHTO LRFD *Bridge Design Specifications*. A summary of the Rock Core Testing is provided in Appendix VIII.

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

Index property testing consisting of Atterberg limits, particle-size distribution, percent fine #200 sieve, and natural moisture content tests was performed on split-spoon samples to assist in classifying the soils. Additionally, corrosion series (pH, chloride, sulfate, and resistivity) testing was performed on selected split-spoon samples. Finally, 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
- Compressive strength of rock cores – 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 VII: Laboratory Test Data Sheets – Split Spoon Samples (includes gINT Index Properties vs. Depth, Grain Size Distribution, and Atterberg Limits Results)
- Appendix VIII: Laboratory Test Data Sheets – Rock Cores
- Appendix IX: Laboratory Test Data Sheets – Corrosion Series

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.

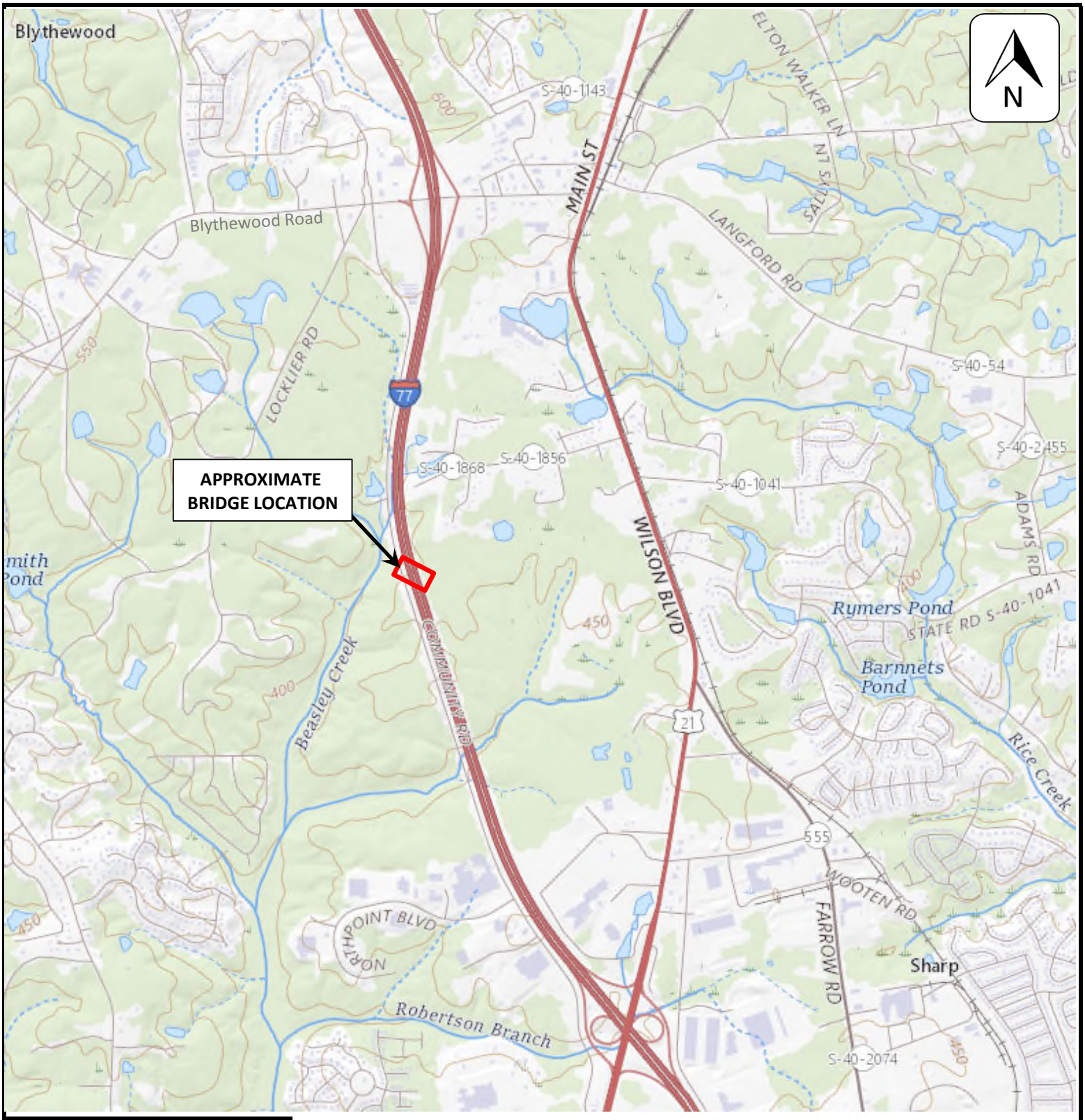
We relied on project information given to us to develop our exploration program. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes.

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

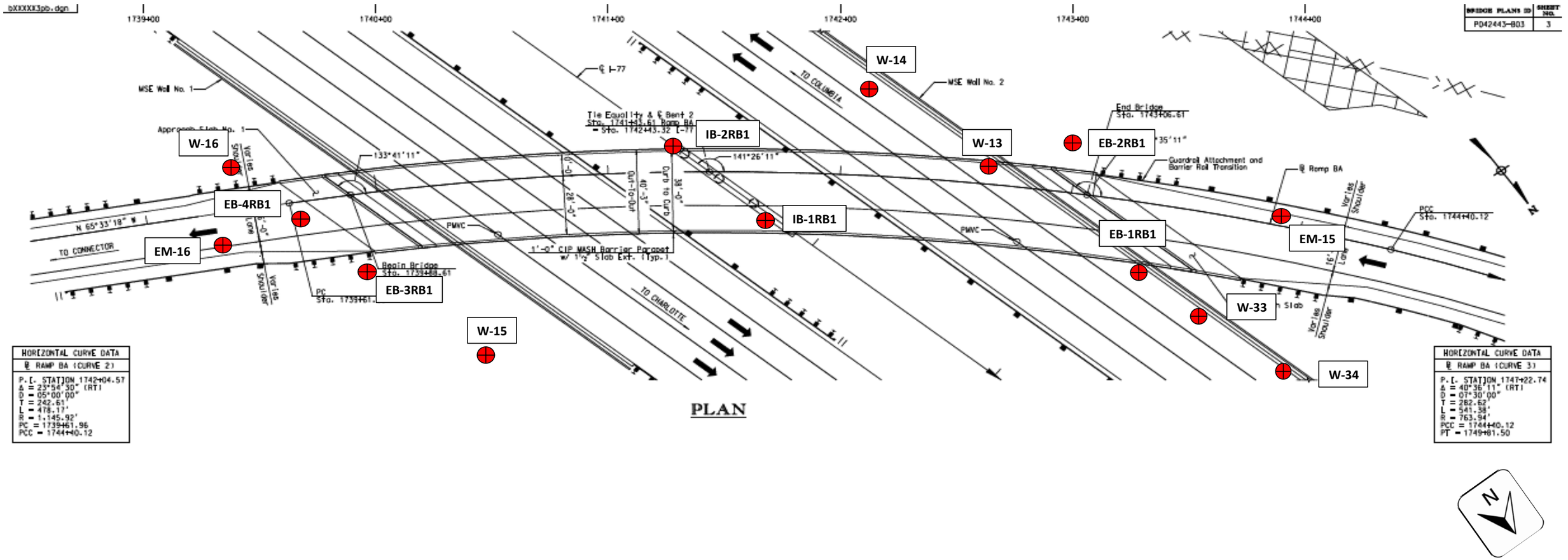
SITE LOCATION PLAN

JOB NAME:	Ramp BA Bridge over Interstate 77 I-77 Exit 26 - Scout Interchange
CITY, STATE:	Blythewood, Richland County, South Carolina
S&ME PROJECT NO.:	23610178A

SCALE:	NTS	CHECKED BY:	JPL
DATE:	1/18/2024	DRAWN BY:	HMS

FIGURE NO.

1



PLAN

SOURCE: Proposed Plans Construct Bridge on Ramp BA over I-77, dated 12/11/2023 provided by RS&H, Inc.

SPT Soil Test Boring - Approximate Location

Test Location Plan

JOB NAME:	Ramp BA Bridge over Interstate 77 I-77 Exit 26 - Scout Interchange
CITY, STATE:	Blythewood, Richland County, South Carolina
S&ME JOB NO.:	23610178A
SCALE: NTS	CHECKED BY: JPL
DATE: 1/18/2024	DRAWN BY: RZZ

FIGURE NO.

2

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-1RB1	859090.7344	2004482.974	34.19454	-80.98517	447.0	Ramp BA	1744+01.48	54.8
EB-2RB1	859025.9024	2004439.265	34.19437	-80.98532	464.8	Ramp BA	1743+84.96	-21.7
EB-3RB1	858864.7335	2004800.461	34.19392	-80.98412	465.9	Ramp BA	1739+89.14	59.4
EB-4RB1	858808.3117	2004820.384	34.19377	-80.98406	465.3	Ramp BA	1739+46.24	16.6
EM-15	859135.4332	2004405.072	34.19467	-80.98543	461.0	Ramp BA	1744+90.20	25.3
EM-16	858789.3034	2004873.156	34.19372	-80.98388	465.9	Ramp BA	1738+90.34	21.1
IB-1RB1	858930.6778	2004628.163	34.19411	-80.98470	446.6	Ramp BA	1741+78.52	28.5
IB-2RB1	858873.9002	2004644.529	34.19395	-80.98464	447.3	Ramp BA	1741+32.73	-9.3
W-13	858992.0371	2004521.053	34.19427	-80.98505	448.8	Ramp BA	1743+02.74	10.1
W-14	858923.6214	2004536.676	34.19408	-80.98500	448.4	Ramp BA	1742+47.25	-32.2
W-15	858962.3346	2004767.047	34.19419	-80.98423	466.1	Ramp BA	1740+71.08	130.1
W-16	858763.9312	2004839.449	34.19365	-80.98400	464.8	Ramp BA	1739+10.52	-15.9
W-33	859147.1937	2004469.004	34.19470	-80.98522	447.3	Ramp BA	1744+56.58	82.3
W-34	859185.0403	2004455.721	34.19480	-80.98526	447.2	Ramp BA	1744+99.39	95.7

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

SUMMARY OF LABORATORY RESULTS

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

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-1RB1	0.0	34	26	8	0.075	48	SM	9.5			
EB-1RB1	4.0	35	28	7	0.075	71	ML	13.0			
EB-1RB1	38.5	45	34	11	0.075	58	ML	29.3			
EB-2RB1	0.0				0.075	63		6.8			
EB-2RB1	4.0				9.5	18		8.6			
EB-2RB1	8.0	29	21	8	0.075	22	SC	11.6			
EB-2RB1	18.5	37	21	16	0.075	86	CL	24.2			
EB-3RB1	0.0				4.75	22		2.6			
EB-3RB1	4.0	52	26	26	0.075	32	SC	18.4			
EB-3RB1	13.5	28	15	13	0.075	85	CL	13.8			
EB-3RB1	63.5	45	33	12	0.075	70	ML	30.6			
EB-4RB1	0.0				19	25		2.8			
EB-4RB1	4.0	33	18	15	0.075	27	SC	14.3			
EB-4RB1	8.0	22	15	7	0.075	71	CL-ML	10.6			
EB-4RB1	18.5				9.5	17		11.7			
EB-4RB1	33.5	34	29	5	0.075	62	ML	21.6			
EM-15	0.0	NP	NP	NP	0.075	57	ML	5.7			
EM-15	4.0				0.075	38		10.3			
EM-15	8.0	42	18	24	0.075	55	CL	13.3			
EM-16	0.0				9.5	30		3.8			
EM-16	4.0	24	18	6	0.075	70	CL-ML	12.7			
EM-16	13.5	34	30	4	0.075	86	ML	23.0			
IB-1RB1	0.0	NP	NP	NP	0.075	30	SM	9.6			
IB-1RB1	13.5	46	30	16	0.075	86	ML	32.1			
IB-2RB1	0.0				9.5	18		6.7			
IB-2RB1	6.0	43	36	7	0.075	63	ML	23.8			
IB-2RB1	23.5	44	33	11	0.075	67	ML	26.2			
W-13	2.0	24	18	6	0.075	38	SC-SM	8.3			
W-13	8.0	35	28	7	0.075	65	ML	25.9			
W-14	2.0	NP	NP	NP	4.75	50	ML	10.7			
W-14	6.0	43	30	13	0.075	51	ML	22.1			
W-15	0.0				9.5	23		2.2			
W-15	6.0	21	15	6	0.075	80	CL-ML	12.4			
W-15	18.5	34	29	5	0.075	56	ML	23.2			
W-16	0.0				9.5	34		4.6			
W-16	2.0	34	19	15	0.075	44	SC	9.0			
W-16	6.0	22	14	8	0.075	67	CL	11.2			
W-33	2.0	34	28	6	0.075	31	SM	15.1			
W-34	0.0	NP	NP	NP	0.075	13	SM	9.0			
W-34	8.0	41	31	10	0.075	55	ML	25.2			

Rock Coring Summary

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

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-1RB1	RC-1	52.5	47	0						
EB-1RB1	RC-2	57.0	88	65						
EB-1RB1	RC-3	62.0	100	25	2738	0.94	1080	151	23	15
IB-1RB1	RC-1	49.9	75	30	2786	0.82	770	153	23	5
IB-1RB1	RC-2	54.2	68	8						
IB-1RB1	RC-3	59.2	88	26						
IB-1RB1	RC-4	64.2	86	52	5644	0.21	6180	169	36	25
IB-1RB1	RC-5	69.2	83	8						

Appendix III – Soil Test Boring 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-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+01.48	**Offset:**	54.8	**Alignment:**	Proposed
Elev.:	447.0 ft	**Latitude:**	34.194544123	**Longitude:**	-80.98517402	**Date Started:**	11/7/2023
Total Depth:	67 ft	**Soil Depth:**	52.5 ft	**Core Depth:**	67 ft	**Date Completed:**	11/15/2023
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:**	91.6%
Core Size:	NQ	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	10.6 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									
	0.1	**SURFACE MATERIALS** - TOPSOIL - 1 inch.		0.0	SS-1	4	4	9	25	13
	0.3									
	2.0	**FILL** - medium dense, dry, dark grayish brown, Silty fine to coarse SAND (SM), little low plasticity fines, trace fine to coarse crushed stone, trace roots, 2.5Y4/2.		2.0	SS-2	26	25	37	50/4"	50/4"
		PIEDMONT RESIDUUM - stiff, dry, mottled olive yellow and white, Silty fine SAND (SM) (A-4(2)), some low plasticity fines, 2.5Y6/6, 2.5Y8/1. LL=34, PL=26, PI=8, NMC=10%, %#200=48		4.0	SS-3	2	10	48	50/4"	50/4"
442.0				6.0	SS-4	24	35	50/5"		50/5"
		PARTIALLY WEATHERED ROCK (PWR) - very hard, dry, mottled olive yellow and white, SILT with Sand (ML), little fine to coarse, 2.5Y6/6, 2.5Y8/1.		8.0	SS-5	27	50/5"			50/5"
		@4 feet - laminated pale brown and yellow, (A-4(5)), 2.5Y8/2, 2.5Y7/6. LL=35, PL=28, PI=7, NMC=13%, %#200=71								
437.0		@8 feet - olive yellow, 2.5Y6/8.								
	13.5			13.5	SS-6	36	50/3"			50/3"
		Very hard, dry to moist, pale brown and yellow, SILT with Sand (ML), little fine to medium sands, 2.5Y8/2, 2.5Y8/6.		18.5	SS-7	50/2"				50/2"
432.0										
427.0										
	23.5			23.5	SS-8	50/4"				50/4"
		Very hard, dry, pale brown and yellow, Sandy SILT (ML), some fine to medium sands, 2.5Y8/2, 2.5Y7/8.								
422.0										

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:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+01.48	**Offset:**	54.8	**Alignment:**	Proposed
Elev.:	447.0 ft	**Latitude:**	34.194544123	**Longitude:**	-80.98517402	**Date Started:**	11/7/2023
Total Depth:	67 ft	**Soil Depth:**	52.5 ft	**Core Depth:**	67 ft	**Date Completed:**	11/15/2023
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:**	91.6%
Core Size:	NQ	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	10.6 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			28.5						
417.0		Very dense, dry to moist, pale brown, yellow, and light gray, Silty fine to coarse SAND (SM), some low to medium plasticity fines, trace fine weathered rock fragments, 2.5Y7/6, 2.5Y8/2, 2.5Y7/2.			SS-9	50/3"				50/3"
	33.5	**PIEDMONT RESIDUUM** - hard, moist, laminated yellowish brown and yellow, Sandy SILT (ML), some fine to coarse sands, trace fine weathered rock fragments, 2.5Y7/8, 10YR6/8.		33.5	SS-10	11	20	18		38
412.0										
		@38.5 feet - very stiff, laminated white and yellow, (A-7-5(6)), 2.5Y8/1, 2.5Y7/8. LL=45, PL=34, PI=11, NMC=29%, %#200=58		38.5	SS-11	8	7	9		16
407.0										
		@43.5 feet - laminated olive yellow and white, 2.5Y6/8, 2.5Y8/1.		43.5	SS-12	8	8	14		22
402.0										
	48.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry to moist, laminated pale brown and yellow, Sandy SILT (ML), some fine to coarse sands, 2.5Y8/1, 2.5Y7/8.		48.5	SS-13	46	50/2"			50/2"
397.0										
	52.5	**METAMORPHIC BEDROCK** - ARGILLITE - light gray and yellow, foliated, very fine grained, highly weathered, extremely weak		52.5						

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+01.48	**Offset:**	54.8	**Alignment:**	Proposed
Elev.:	447.0 ft	**Latitude:**	34.194544123	**Longitude:**	-80.98517402	**Date Started:**	11/7/2023
Total Depth:	67 ft	**Soil Depth:**	52.5 ft	**Core Depth:**	67 ft	**Date Completed:**	11/15/2023
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:**	91.6%
Core Size:	NQ	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	10.6 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	SPT N VALUE / PL MC LL / FINES CONTENT (%) / RQD (%) / REC (%) — 0 10 20 30 40 50 60 70 80 90
392.0		rock, 10YR7/1, 10YR7/6. Hardness: 1						
		From 52.6 - 52.9 feet - mechanical breaks			RC-1			%REC=47, RQD=0, GSI=5-15
		@ 53.15 feet - mechanical break						
		From 53.4 - 54.1 - completely weathered. Hardness: <1		57.0				
		@ 54.1 feet - highly weathered. Hardness: 1						
		@ 54.35 feet - mechanical break						
		From 54.55 - 57 feet - sample not recovered, possible residual soil that was washed out			RC-2			%REC=88, RQD=65, GSI=20-30
387.0		@ 57 feet - highly weathered. Hardness: 1.5						
		@ 57.1 feet - mechanical break		62.0				
		@ 57.88 feet - mechanical break						
		@ 58.2 feet - mechanical break						
		@ 58.72 feet - mechanical break			RC-3			%REC=100, RQD=25, GSI=15-35
382.0		@ 59.05 feet - mechanical break						
		@ 59.4 feet - Hardness: 2						
	67.0	From 60.11 - 61.4 feet - highly weathered. Hardness: 2						
		@ 60.65 feet - mechanical break						
		From 60.93 - 61.1 feet - completely weathered. Hardness: 1.5						
377.0		@ 62.1 feet - completely weathered, mechanical break. Hardness: <1						
		@ 62.11 feet - foliated brownish yellow to yellowish brown and light gray, highly weathered, 10YR6/8, 10YR5/8, 10YR7/1. Hardness: 2.5						
		@ 62.25 feet - joint: 122° down						
		@ 62.3 feet - mechanical break						
		@ 62.43 feet - mechanical break						
372.0		@ 62.6 feet - foliated light gray and brownish yellow 10YR7/1, 10YR6/8.						
		@ 63.1 feet - mechanical break						
		@ 63.4 feet - foliated light gray and gray, joint: 92° down, 10YR7/1, 10YR6/1.						
		@ 63.55 feet - mechanical break						
		From 63.56 - 64.55 feet - completely weathered. Hardness: <1						
367.0		@ 64.55 feet - highly weathered, joint: 94° down. Hardness: 1.5						

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-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+01.48	**Offset:**	54.8	**Alignment:**	Proposed
Elev.:	447.0 ft	**Latitude:**	34.194544123	**Longitude:**	-80.98517402	**Date Started:**	11/7/2023
Total Depth:	67 ft	**Soil Depth:**	52.5 ft	**Core Depth:**	67 ft	**Date Completed:**	11/15/2023
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:**	91.6%
Core Size:	NQ	**Driller:**	L. Shrader	**Groundwater:**	**TOB** N/A	**24HR**	10.6 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
		@ 64.83 feet - moderately weathered, mechanical break. Hardness: 2.5 @ 65.8 feet - mechanical break @ 66.21 feet - mechanical break @ 66.6 feet - joint: 127° down From 66.61 - 67 feet - mechanical breaks					
362.0		Boring terminated at 67 feet.					
357.0							
352.0							
347.0							
342.0							

● 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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1743+84.96	**Offset:**	-21.7	**Alignment:**	Proposed
Elev.:	464.8 ft	**Latitude:**	34.194365999	**Longitude:**	-80.98531859	**Date Started:**	11/1/2023
Total Depth:	99.7 ft	**Soil Depth:**	99.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/2/2023
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:**	87.6%
Core Size:	N/A	**Driller:**	S. Eubanks	**Groundwater:**	**TOB** N/A	**24HR**	32.8 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									
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1 inch.		0.0	SS-1	10	22	21	20	43
		COASTAL PLAIN - hard, dry, very pale brown with white mottles, Sandy Lean CLAY (CL), some fine to medium sands, trace roots, 10YR7/3 to 10YR7/4, 10YR8/1. NMC=7%, %#200=63		2.0	SS-2	18	16	19	26	35
	3.0									
	4.0	Dense, dry, very pale brown to light gray, Poorly Graded fine to coarse SAND with Silt (SP-SM), few low plasticity fines, 10YR7/3 to 10YR7/2.		4.0	SS-3	7	13	18	23	31
459.8				6.0	SS-4	27	34	34	37	68
		Dense, moist, reddish yellow to strong brown, Clayey fine to medium SAND (SC), little medium plasticity fines, 7.5YR6/6 to 7.5YR5/6. NMC=9%, %#200=18		8.0	SS-5	22	35	29	30	64
		@6 feet - very dense, mottled yellowish red and reddish yellow, 5YR5/8 to 5YR6/6.								
454.8		@8 feet - dry to moist, mottled red, brownish yellow and light gray, fine to coarse (A-2-4), trace fine gravel, 2.5YR5/8, 10YR6/6, 10YR7/1. LL=29, PL=21, PI=8, NMC=12%, %#200=22								
				13.5	SS-6	50/2"				50/2"
		@13.5 feet - No Recovery.								
449.8										
	18.5			18.5						
		PIEDMONT RESIDUUM - hard, dry, laminated white to light gray, Lean CLAY (CL) (A-6(14)), few fine to medium sands, relict rock structure, 10YR8/1 to 10YR7/1. LL=37, PL=21, PI=16, NMC=24%, %#200=86			SS-7	15	20	21		41
444.8										
	23.5			23.5						
		Very hard, dry, laminated white to light gray and very pale brown, SILT (ML), trace fine to medium sands, relict rock structure, 10YR8/1 to 10YR7/1, 10YR7/3 to 10YR7/4.			SS-8	13	28	50		78
439.8										

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	

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SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1743+84.96	**Offset:**	-21.7	**Alignment:**	Proposed
Elev.:	464.8 ft	**Latitude:**	34.194365999	**Longitude:**	-80.98531859	**Date Started:**	11/1/2023
Total Depth:	99.7 ft	**Soil Depth:**	99.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/2/2023
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:**	87.6%
Core Size:	N/A	**Driller:**	S. Eubanks	**Groundwater:**	**TOB** N/A	**24HR**	32.8 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			
434.8		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated light gray and gray with pale brown mottles, SILT (ML), few fine to medium sands, relict rock structure, 2.5Y7/1 to 2.5Y6/1, 2.5Y8/4.			SS-9	20 50/5"	50/5"
	33.5	**PIEDMONT RESIDUUM** - very hard, dry, laminated gray and light gray with yellow mottles, SILT (ML), few fine to medium sands, relict rock structure, 10YR6/1 to 10YR7/1, 10YR7/6.		33.5	SS-10	19 40 40	80
429.8	38.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated brownish yellow and gray, SILT (ML), trace fine sands, relict rock structure, 10YR6/8, 10YR6/1.		38.5	SS-11	15 32 50/5"	50/5"
424.8	43.5	Very hard, dry, laminated brownish yellow and gray to light gray, SILT with Sand (ML), little fine to coarse sands, relict rock structure, 10YR6/8, 10YR6/1 to 10YR7/1.		43.5	SS-12	50/3"	50/3"
419.8							
				48.5	SS-13	50/5"	50/5"
414.8							
	53.5	Very hard, dry, laminated light gray and		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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1743+84.96	**Offset:**	-21.7	**Alignment:**	Proposed
Elev.:	464.8 ft	**Latitude:**	34.194365999	**Longitude:**	-80.98531859	**Date Started:**	11/1/2023
Total Depth:	99.7 ft	**Soil Depth:**	99.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/2/2023
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:**	87.6%
Core Size:	N/A	**Driller:**	S. Eubanks	**Groundwater:**	**TOB** N/A	**24HR**	32.8 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
409.8		brownish yellow with dark brown to black mottles, SILT (ML), few fine to medium sands, relict rock structure, 10YR7/1 to 10YR6/8, 10YR3/3 to 10YR2/1.			SS-14	33 50/4"	50/4"
	58.5	**PIEDMONT RESIDUUM** - hard, dry, laminated light gray and brownish yellow to reddish yellow, SILT (ML), trace fine sands, relict rock structure, 10YR7/1, 10YR6/8 to 7.5YR6/8.		58.5	SS-15	7 23 22	45
404.8							
		@63.5 feet - very stiff, trace fine to medium sands.		63.5	SS-16	11 13 17	30
399.8							
		@68.5 feet - very hard, laminated light gray and brownish yellow, 10YR7/1, 10YR6/6 to 10YR6/8.		68.5	SS-17	14 23 32	55
394.8							
		@73.5 feet - few fine to medium sands.		73.5	SS-18	20 30 39	69
389.8							
	78.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated light gray and brownish yellow, Sandy SILT (ML), some fine to coarse sands, trace fine rock fragments, relict rock structure, 10YR7/1,		78.5	SS-19	48 50/2"	50/2"
384.8							

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-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1743+84.96	**Offset:**	-21.7	**Alignment:**	Proposed
Elev.:	464.8 ft	**Latitude:**	34.194365999	**Longitude:**	-80.98531859	**Date Started:**	11/1/2023
Total Depth:	99.7 ft	**Soil Depth:**	99.7 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/2/2023
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:**	87.6%
Core Size:	N/A	**Driller:**	S. Eubanks	**Groundwater:**	**TOB** N/A	**24HR**	32.8 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
		10YR6/8.								
		@83.5 feet - laminated light gray, 10YR7/1.		83.5	SS-20	50/1"				50/1"
379.8										
		@88.5 feet - No Recovery.		88.5	SS-21	50/1"				50/1"
374.8										
		@93.5 feet - No Recovery.		93.5	SS-22	50/1"				50/1"
369.8										
		@98.5 feet - laminated strong brown to dark yellowish brown and light gray, trace fine rock quartz rock fragments, 7.5YR4/6 to 10YR3/6, 10YR7/1.		98.5	SS-23	15	22	50/2"		50/2"
364.8	99.7	Boring Terminated at 99.7 feet.								
359.8										

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-3RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+89.14	**Offset:**	59.4	**Alignment:**	Proposed
Elev.:	465.9 ft	**Latitude:**	34.193923003	**Longitude:**	-80.984124285	**Date Started:**	10/10/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/10/2023
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**	18.1 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									
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.		0.0	SS-1	2	3	5	7	8
	2.0	**COASTAL PLAIN** - loose, dry, very pale brown to light gray, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace roots, 10YR7/3 to 10YR7/2. NMC=3%, %#200=22		2.0	SS-2	4	4	8	13	12
460.9		Medium dense, dry, mottled brownish yellow, strong brown and light gray, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR6/8, 7.5YR5/8, 10YR7/1.		4.0	SS-3	8	14	12	12	26
		@4 feet - moist, mottled brownish yellow, red and light gray, (A-2-7(3)), 10YR6/8, 2.5YR5/8, 10YR7/1. LL=52, PL=26, PI=26, NMC=18%, %#200=32		6.0	SS-4	23	20	19	30	39
	8.0	@6 feet - dense, few fine gravel.		8.0	SS-5	11	47	50/5"		50/5"
455.9		Very hard, dry, brownish yellow and light gray, SILT with Sand (ML), little fine sands, 10YR6/8, 10YR7/1.								
	13.5	Very hard, dry, light gray with yellow mottles, Lean CLAY with Sand (CL) (A-6(9)), little fine sands, 10YR7/1, 10YR7/6 to 10YR7/8. LL=28, PL=15, PI=13, NMC=14%, %#200=85		13.5	SS-6	23	33	50/3"		50/3"
450.9										
	18.5	Very dense, moist, light gray with yellow mottles, Silty fine to medium SAND (SM), some low plasticity fines, 10YR7/1, 10YR7/6 to 10YR7/8.		18.5	SS-7	50/4"				50/4"
445.9										
	23.5	**PIEDMONT RESIDUUM** - hard, dry, laminated light gray to white with yellow mottles, SILT with Sand (ML), little fine to medium sands, relict rock structure, 10YR7/1 to 10YR8/1, 10YR7/6.		23.5	SS-8	9	13	18		31
440.9										

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-3RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+89.14	**Offset:**	59.4	**Alignment:**	Proposed
Elev.:	465.9 ft	**Latitude:**	34.193923003	**Longitude:**	-80.984124285	**Date Started:**	10/10/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/10/2023
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**	18.1 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			
435.9		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated light gray with yellow mottles, SILT (ML), few fine to coarse sands, relict rock structure, 10YR7/1, 10YR7/8.			SS-9	15 44 50/3"	50/3"
				33.5	SS-10	31 50/4"	50/4"
430.9							
	38.5			38.5	SS-11	37 50/2"	50/2"
425.9		Very hard, dry, laminated light gray, white and brownish yellow, SILT with Sand (ML), little fine to coarse sands, trace fine rock fragments, relict rock structure, 10YR7/1, 10YR8/1, 10YR6/8.					
		@43.5 feet - laminated light brown and brownish yellow, absent rock fragments, 7.5YR6/3, 10YR6/8.		43.5	SS-12	50/5"	50/5"
420.9							
	48.5			48.5	SS-13	50/5"	50/5"
415.9		Very hard, dry, laminated brownish yellow and yellowish brown, SILT (ML), few fine sands, relict rock structure, 10YR6/8 to 10YR5/8.					
		@53.5 feet - laminated gray and brownish		53.5	SS-14	39 50/2"	50/2"

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.:**	EB-3RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+89.14	**Offset:**	59.4	**Alignment:**	Proposed
Elev.:	465.9 ft	**Latitude:**	34.193923003	**Longitude:**	-80.984124285	**Date Started:**	10/10/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/10/2023
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**	18.1 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
410.9		yellow with black mottles, few fine to medium sands, 10YR6/1, 10YR6/8, 10YR2/1.		58.5	SS-15	50/5"				50/5"
405.9										
	63.5	**PIEDMONT RESIDUUM** - very hard, dry, mottled yellowish brown and white with dark yellowish brown, SILT with Sand (ML) (A-7-5(9)), little fine sands, relict rock structure, 10YR5/8, 10YR8/1, 10YR4/6. LL=45, PL=33, PI=12, NMC=31%, %#200=70		63.5	SS-16	11	19	33		52
400.9										
		@68.5 feet - very stiff, laminated yellowish brown and white, 10YR5/8, 10YR8/1.		68.5	SS-17	9	11	19		30
395.9										
		@73.5 feet - very hard, laminated and mottled yellowish brown, 10YR5/6 to 10YR5/8.		73.5	SS-18	11	20	31		51
390.9										
	78.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated gray and white with brownish yellow mottles, SILT with Sand (ML), little fine to coarse sands, relict rock structure, 10YR6/1, 10YR8/1,		78.5	SS-19	6	29	50/5"		50/5"
385.9										

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-3RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+89.14	**Offset:**	59.4	**Alignment:**	Proposed
Elev.:	465.9 ft	**Latitude:**	34.193923003	**Longitude:**	-80.984124285	**Date Started:**	10/10/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/10/2023
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**	18.1 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
		10YR6/6.					
	83.5	**PIEDMONT RESIDUUM** - very hard, dry, yellowish brown with gray mottles, SILT (ML), trace fine to coarse sands, relict rock structure, 10YR5/8, 10YR6/1.		83.5	SS-20	18 23 38	61
380.9							
		@88.5 feet - laminated brownish yellow, yellow and gray, few fine to medium sands, 10YR6/8, 10YR7/8, 10YR6/1.		88.5	SS-21	17 26 33	59
375.9							
	93.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated brownish yellow to yellowish brown with dark brown mottles, SILT with Sand (ML), little fine to coarse sands, few fine rock fragments, 10YR6/8 to 10YR5/8, 10YR3/3.		93.5	SS-22	39 50/5"	50/5"
370.9							
	98.5	**PIEDMONT RESIDUUM** - hard, dry, laminated reddish yellow, strong brown and light gray, SILT with Sand (ML), little fine to coarse sands, relict rock structure, 7.5YR6/8, 7.5YR5/6 to 7.5YR5/8, 7.5YR7/1.		98.5	SS-23	14 18 24	42
365.9	100.0	Boring Terminated at 100 feet.					
360.9							

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+46.24	**Offset:**	16.6	**Alignment:**	Proposed
Elev.:	465.3 ft	**Latitude:**	34.193767963	**Longitude:**	-80.984058437	**Date Started:**	10/11/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/13/2023
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**	25.6 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									
	0.2	**SURFACE MATERIALS** - TOPSOIL - 2 inches.		0.0	SS-1	8	16	16	13	32
	2.0	**COASTAL PLAIN** - dense, dry, very pale brown to gray, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace roots, 10YR7/3, 10YR6/1. NMC=3%, %#200=25		2.0	SS-2	10	7	11	22	18
460.3		Medium dense, dry, mottled yellowish brown, yellowish red, and light gray, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR6/6, 5YR5/8, 10YR7/1.		4.0	SS-3	22	14	14	23	28
	6.0	@4 feet - moist, red with yellowish brown and light gray mottles, fine to medium (A-2-6(1)), little medium plasticity fines, 2.5YR4/8, 10YR6/6, 10YR7/1. LL=33, PL=18, PI=15, NMC=14%, %#200=27		6.0	SS-4	14	50/3"			50/3"
				8.0	SS-5	22	50/5"			50/5"
455.3		Very hard, dry, light gray and yellow, SILT with Sand (ML), little fine to medium sands, 10YR7/1, 10Y7/6.								
		@8 feet - (A-4(2)). LL=22, PL=15, PI=7, NMC=11%, %#200=71								
	13.5			13.5	SS-6	50/2"				50/2"
450.3		Very hard, dry, light gray with brownish yellow mottles, SILT (ML), few fine to medium sands, 10YR7/1, 10YR6/8.								
	18.5			18.5						
445.3		Dense, moist, light gray to white, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, trace fine gravel, 10YR7/1, 10YR8/1. NMC=12%, %#200=17			SS-7	18	22	27		49
	23.5			23.5						
440.3		**PIEDMONT RESIDUUM** - very stiff, dry, laminated and mottled yellow and very pale brown, SILT (ML), trace fine sands, relict rock structure, 10YR7/6 to 10YR7/8, 10YR8/2.			SS-8	7	13	17		30

● 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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+46.24	**Offset:**	16.6	**Alignment:**	Proposed
Elev.:	465.3 ft	**Latitude:**	34.193767963	**Longitude:**	-80.984058437	**Date Started:**	10/11/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/13/2023
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**	25.6 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 feet - hard, laminated brownish yellow, pink, and light gray, 10YR6/6, 7.5YR7/4, 10YR7/1.		28.5	SS-9	8	13	18		31
435.3	33.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated gray with yellow mottles, Sandy SILT (ML) (A-4(2)), some fine to coarse sands, relict rock structure, 10YR6/1, 10YR7/8. LL=34, PL=29, PI=5, NMC=22%, %#200=62		33.5	SS-10	22	50/2"			50/2"
430.3	38.5	Very hard, dry, laminated pink and gray with yellow mottles, SILT with Sand (ML), little fine to medium sands, relict rock structure, 7.5YR7/4, 10YR6/1, 10YR7/8.		38.5	SS-11	50/2"				50/2"
425.3										
		@43.5 feet - laminated gray and white with brownish yellow mottles, 10YR6/1, 10YR8/1, 10YR6/8.		43.5	SS-12	50/4"				50/4"
420.3										
		@48.5 feet - laminated gray and yellow, 10YR7/1, 10YR7/6 to 10YR7/8.		48.5	SS-13	32	50/3"			50/3"
415.3										
	53.5	Very hard, dry, laminated brownish yellow		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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EB-4RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+46.24	**Offset:**	16.6	**Alignment:**	Proposed
Elev.:	465.3 ft	**Latitude:**	34.193767963	**Longitude:**	-80.984058437	**Date Started:**	10/11/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/13/2023
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**	25.6 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
410.3		and light gray, SILT (ML), few fine sands, relict rock structure, 10YR6/8, 10YR7/1.			SS-14	36	50/3"			50/3"
	58.5			58.5						
		Very hard, dry, laminated light gray and brownish yellow, SILT with Sand (ML), little fine to medium sands, relict rock structure, 10YR7/1, 10YR6/8.			SS-15	36	50/5"			50/5"
405.3										
				63.5	SS-16	50/5"				50/5"
400.3										
	68.5			68.5						
		Very hard, dry, laminated brownish yellow and very pale brown, SILT (ML), few fine sands, relict rock structure, 10YR6/8, 10YR7/3.			SS-17	37	50/3"			50/3"
395.3										
				73.5						
		@73.5 feet - laminated yellow, very pale brown, and gray, few fine to medium sands, 10YR7/6, 10YR7/3, 10YR6/1.			SS-18	26	50/5"			50/5"
390.3										
	78.5			78.5						
		Very hard, dry, laminated yellow to brownish yellow and very pale brown, SILT with Gravel (ML), little fine quartz vein gravel, few fine to coarse sands, relict rock structure, 10YR7/6 to 10YR6/8, 10YR7/3.			SS-19	30	50/5"			50/5"
385.3										

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

Continued Next Page

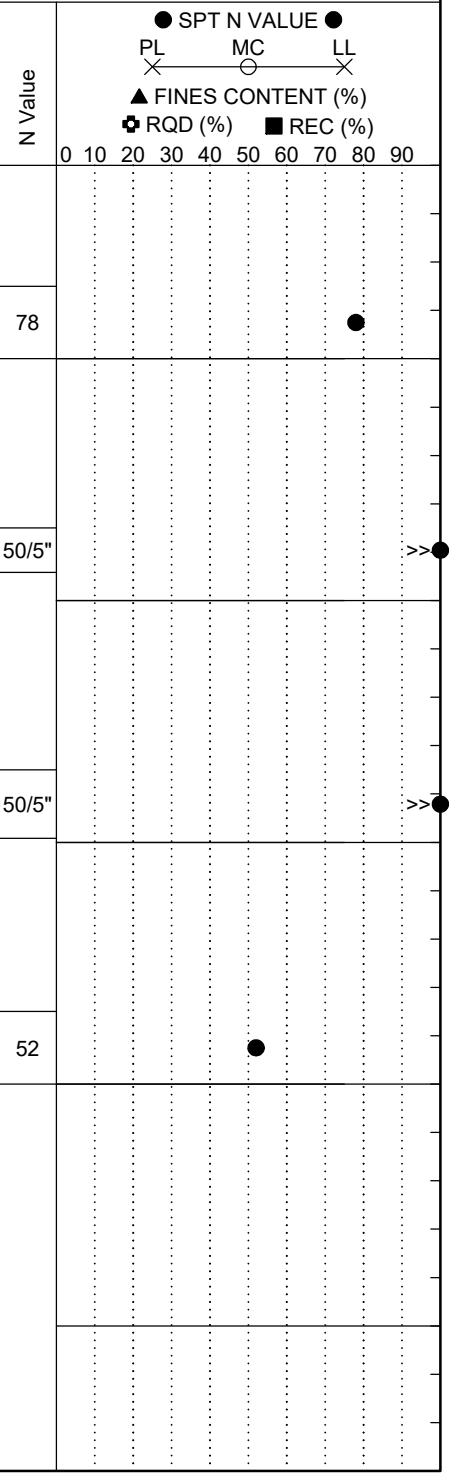
LEGEND

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-4RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+46.24	**Offset:**	16.6	**Alignment:**	Proposed
Elev.:	465.3 ft	**Latitude:**	34.193767963	**Longitude:**	-80.984058437	**Date Started:**	10/11/2023
Total Depth:	100 ft	**Soil Depth:**	100 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/13/2023
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**	25.6 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			83.5			
380.3		**PIEDMONT RESIDUUM** - very hard, dry, laminated strong brown, very pale brown, and gray, SILT (ML), few fine sands, relict rock structure, 7.5YR5/8, 10YR7/3, 10YR6/1.			SS-20	15 28 50	78
	88.5			88.5			
375.3		**PARTIALL WEATHERED ROCK (PWR)** - very hard, dry, laminated strong brown, very pale brown, and gray with black mottles, SILT (ML), few fine sands, relict rock structure, 7.5YR5/8, 10YR7/3, 10YR6/1, 7.5YR2.5/1.			SS-21	27 50/5"	50/5"
				93.5			
		@93.5 feet - laminated strong brown, gray, and dark yellowish brown, 7.5YR5/8, 10YR6/1 to 10YR5/1, 10YR4/6.			SS-22	27 30 50/5"	50/5"
370.3							
	98.5			98.5			
		PIEDMONT RESIDUUM - very hard, dry, laminated strong brown and light gray with black mottles, SILT (ML), trace fine sands, relict rock structure, 7.5YR5/8, 10YR7/1, 7.5YR2.5/1.			SS-23	17 26 26	52
365.3	100.0	Boring Terminated at 100 feet.					
360.3							



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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM-15
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1744+90.20	**Offset:**	25.3	**Alignment:**	Proposed
Elev.:	461.0 ft	**Latitude:**	34.194666973	**Longitude:**	-80.9854316	**Date Started:**	11/1/2023
Total Depth:	30 ft	**Soil Depth:**	30 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/1/2023
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**	NE

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0		0.0	SS-1	4	12	16	13	28
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1 inch.	2.0	SS-2	16	18	23	25	41
		COASTAL PLAIN - very stiff, dry, white and very pale brown, Sandy SILT (ML) (A-4(0)), some fine to coarse sands, trace roots, 7.5YR8/1, 10YR7/3 to 10YR7/4. LL=NP, PL=NP, PI=NP, NMC=6%, %#200=57	4.0	SS-3	8	12	13	11	25
456.0	4.0	@2 feet - hard, very pale brown with white mottles, poor recovery.	6.0	SS-4	11	32	14	13	46
	6.0	Medium dense, moist, mottled grayish brown and yellowish brown, Silty fine to medium SAND (SM), some low plasticity fines, 10YR5/2, 10YR5/6 to 10YR5/8. NMC=10%, %#200=38	8.0	SS-5	4	7	8	9	15
451.0	8.0	Dense, moist, mottled yellowish brown and grayish brown with light gray, Clayey fine to medium SAND (SC), some medium plasticity fines, 10YR5/8, 10YR5/2, 10YR7/1.	13.5	SS-6	27	44	50/2"		50/2"
	13.5	Stiff, moist, mottled light gray, yellowish brown and strong brown, Sandy Lean CLAY (CL) (A-7-6(10)), some fine to medium sands, trace fine gravel, 10YR7/1, 10YR5/8, 7.5YR5/8. LL=42, PL=18, NMC=13%, %#200=55	18.5	SS-7	24	50/5"			50/5"
446.0		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated yellow and very pale brown, SILT (ML), trace fine sands, relict rock structure, 10YR7/8, 10YR7/3.	23.5	SS-8	25	50/5"			50/5"
441.0		@18.5 feet - laminated very pale brown and pink, 10YR7/3, 7.5YR7/3.							
436.0		@23.5 feet - laminated white to light gray with strong brown mottles, few fine sands, 10YR8/1 to 10YR7/1, 7.5YR5/6.							

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM-15
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1744+90.20	**Offset:**	25.3	**Alignment:**	Proposed
Elev.:	461.0 ft	**Latitude:**	34.194666973	**Longitude:**	-80.9854316	**Date Started:**	11/1/2023
Total Depth:	30 ft	**Soil Depth:**	30 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/1/2023
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**	NE

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						
431.0	30.0	**PIEDMONT RESIDUUM** - very hard, dry, laminated light gray to white, SILT (ML), few fine sands, relict rock structure, 7/N to 10YR7/1, 10YR8/1.			SS-9	38	46	50		96
		Boring Terminated at 30 feet.								
426.0										
421.0										
416.0										
411.0										

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM-16
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1738+90.34	**Offset:**	21.1	**Alignment:**	Proposed
Elev.:	465.9 ft	**Latitude:**	34.19371571	**Longitude:**	-80.983883944	**Date Started:**	10/9/2023
Total Depth:	29.4 ft	**Soil Depth:**	29.4 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/9/2023
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**	19.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0									
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.		0.0	SS-1	1	4	5	5	9
	2.0	**COASTAL PLAIN** - loose, dry, very pale brown to light gray, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, few roots, 10YR7/3 to 10YR7/2. NMC=4%, %#200=30		2.0	SS-2	7	10	9	10	19
460.9	4.0	Medium dense, dry, mottled brownish yellow, strong brown and light gray, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR6/6, 7.5YR5/8, 10YR7/1.		4.0	SS-3	4	22	50/4"		50/4"
	8.0	Very hard, dry, mottled light gray, brownish yellow and red, Silty Lean CLAY with Sand (CL-ML) (A-4-2), little fine to medium sands, 10YR7/1, 10YR5/8, 2.5YR4/8. LL=24, PL=18, PI=6, NMC=13%, %#200=70		6.0	SS-4	50/3"				50/3"
455.9		Very hard, dry to moist, light gray with yellow mottles, Sandy Lean CLAY (CL), some fine to medium sands, 10YR7/1, 10YR7/6 to 10YR7/8.		8.0	SS-5	50/3"				50/3"
	13.5	**PIEDMONT RESIDUUM** - hard, dry, laminated white to light gray with yellow mottles, SILT (ML) (A-4(4)), few fine sands, relict rock structure, 10YR8/1 to 10YR7/1, 10YR7/6. LL=34, PL=30, PI=4, NMC=23%, %#200=86		13.5	SS-6	13	18	21		39
450.9				18.5	SS-7	14	20	30		50
445.9										
	23.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, laminated white to light gray with yellow mottles, SILT (ML), few fine sands, relict rock structure, 10YR8/1 to 10YR7/1, 10YR7/6.		23.5	SS-8	25	50/5"			50/5"
440.9										

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	EM-16
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1738+90.34	**Offset:**	21.1	**Alignment:**	Proposed
Elev.:	465.9 ft	**Latitude:**	34.19371571	**Longitude:**	-80.983883944	**Date Started:**	10/9/2023
Total Depth:	29.4 ft	**Soil Depth:**	29.4 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/9/2023
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**	19.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" / 2nd 6" / 3rd 6" / 4th 6"	N Value
	28.5			28.5			
	29.4	Very hard, dry, laminated light gray with yellow mottles, SILT (ML), trace fine sands, relict rock structure, 10YR7/1, 10YR7/8.			SS-9	20 50/5"	50/5"
435.9		Boring Terminated at 29.4 feet.					
430.9							
425.9							
420.9							
415.9							

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

LEGEND

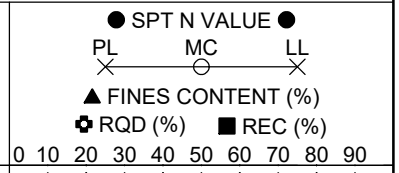
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+78.52	**Offset:**	28.5	**Alignment:**	Proposed
Elev.:	446.6 ft	**Latitude:**	34.1941104	**Longitude:**	-80.98469525	**Date Started:**	11/6/2023
Total Depth:	75.2 ft	**Soil Depth:**	49.9 ft	**Core Depth:**	75.2 ft	**Date Completed:**	11/6/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	NQ	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	6.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0	**SURFACE MATERIAL** - TOPSOIL - 0.5 inches.		0.0	SS-1	4	8	10	13	18
	2.0	**COASTAL PLAIN** - medium dense, dry to moist, yellow and very pale brown, Silty fine to medium SAND (SM) (A-2-4), some nonplastic fines, trace organics, 10YR7/8, 10YR8/3. LL=NP, PL=NP, PI=NP, NMC=10%, %#200=30		2.0	SS-2	6	8	9	10	17
441.6		**PIEDMONT RESIDUUM** - very stiff, moist, laminated yellow and very pale brown, SILT with Sand (ML), little fine to medium sands, 10YR7/8, 10YR8/8, 10YR8/3.		4.0	SS-3	7	8	11	13	19
		@4 feet - laminated reddish yellow, pink and white, 7.5YR8/6, 7.5YR8/3, 7.5YR8/1.		6.0	SS-4	5	9	14	15	23
		@6 feet - pink, reddish yellow and brownish yellow, 7.5YR8/4, 7.5YR8/6, 10YR6/8.		8.0	SS-5	18	21	21	23	42
436.6		@8 feet - hard, pink and reddish yellow, 7.5YR8/4, 7.5YR7/8, 7.5YR6/8.								
	13.5	Very stiff, moist, gray, yellow and white, SILT with Sand (ML) (A-7-5(16)), little fine to medium sands, 10YR5/1, 10YR8/8, 10YR8/1. LL=46, PL=30, PI=16, NMC=32%, %#200=86		13.5	SS-6	5	10	11		21
431.6										
	18.5	Hard, moist, gray, dark grayish brown, dark yellowish brown and yellow, Sandy Lean CLAY (CL), some fine to medium sands, 10YR5/1, 10YR4/2, 10YR4/6, 10YR7/8.		18.5	SS-7	13	19	21		40
426.6										
				23.5	SS-8	5	7	9		16
		@23.5 feet - very stiff, gray with yellow and white laminations, 10YR5/1, 10YR7/8, 10YR8/8, 10YR8/1.								
421.6										



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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.:**	IB-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+78.52	**Offset:**	28.5	**Alignment:**	Proposed
Elev.:	446.6 ft	**Latitude:**	34.1941104	**Longitude:**	-80.98469525	**Date Started:**	11/6/2023
Total Depth:	75.2 ft	**Soil Depth:**	49.9 ft	**Core Depth:**	75.2 ft	**Date Completed:**	11/6/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	NQ	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	6.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
		@28.5 feet - some fine to coarse sands.		28.5	SS-9	5	9	13		22
416.6	33.5	Stiff, moist, laminated gray, yellow, white and strong brown, Sandy SILT (ML), some fine to coarse sands, 10YR6/1, 10YR7/8, 10YR8/1, 7.5YR5/6.		33.5	SS-10	3	7	8		15
411.6										
		@38.5 feet - hard.		38.5	SS-11	14	23	27		50
406.6										
		@43.5 feet - dark grayish green and grayish green, slightly concreted, 5GY4/2, 5GY5/2.		43.5	SS-12	10	21	24		45
401.6										
				48.5	SS-13	28	23	16		39
396.6	49.9	NQ rock coring start at 49.9 feet. Installed casing to 50.7 feet.		49.9						
		METAMORPHIC BEDROCK - ARGILLITE - dark gray to gray, foliated, very fine grained, completely weathered, extremely weak rock, 10YR4/1 to 10YR5/1. Hardness: 1.5			RC-1					

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

0 10 20 30 40 50 60 70 80 90

%REC=75 ✿RQD=30, GSI=5 ■5

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-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+78.52	**Offset:**	28.5	**Alignment:**	Proposed
Elev.:	446.6 ft	**Latitude:**	34.1941104	**Longitude:**	-80.98469525	**Date Started:**	11/6/2023
Total Depth:	75.2 ft	**Soil Depth:**	49.9 ft	**Core Depth:**	75.2 ft	**Date Completed:**	11/6/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	NQ	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	6.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" / 2nd 6" / 3rd 6" / 4th 6"	N Value	SPT N VALUE / PL MC LL / FINES CONTENT (%) / RQD (%) / REC (%) (0 10 20 30 40 50 60 70 80 90)
391.6		From 50 - 50.2 feet- completely weathered to residual soil, mechanically broken. Hardness: 1		54.2				
		@ 50.21 feet - highly weathered, joint: 130° down, very weak rock. Hardness: 2.5			RC-2			%REC=68, RQD=8, GSI=■-15
		@ 50. 58 feet - mechanical break						
		@ 50.75 feet - joint: 118° down						
		@ 50.95 feet - joint: 106° down						
		@ 51.1 feet - mechanical beak		59.2				
386.6		@ 51.68 feet - mechanical break						
		@ 51.75 feet - joint: 115° down						
		From 52.1- 52.4 feet - mechanical break, completely weathered, extremely weak rock. Hardness: 1			RC-3			%REC=8✿, RQD=26, GSI=10-20 ■
		@ 52.41 feet - moderately weathered, very weak rock. Hardness: 2.5						
		@ 52.97 - mechanical break		64.2				
381.6		From 52.98 - 54.2 feet - completely weathered, mechanically broken, extremely weak rock. Hardness: 1						
		From 54.2 - 56 feet - completely weathered, mechanically broken, very weak rock. Hardness: 2.5			RC-4			%REC=86, RQD=5✿, GSI=25-35■
		@ 56.15 feet - moderately weathered, joint: 144° down. Hardness: 2.5						
		@ 56.35 feet - joint: 158° down		69.2				
376.6		From 56.9 - 57.55 feet - completely weathered, mechanically broken, very weak rock. Hardness: 2						
		From 57.56- 59.2 - moderately weathered, weak rock, joint: 92° down. Hardness: 2.5			RC-5			%REC=83, RQD=8, GSI=30-45■
		@ 59.2 feet - mechanical break, joint: 93° down						
		@ 59.4 feet - mechanical break, joint: 88° down						
371.6	75.2	@ 60.3 feet - mechanical break, joint: 94° down						
		@ 61.2 feet - moderately weathered, medium strong rock. Hardness: 4.5						
		@ 61.7 feet - mechanical break, joint: 116° down						
		@ 62.3 feet - mechanical break						
		@ 62.8 feet - joint: 114° down						
366.6		@ 63.1 feet - dark gray to dark bluish gray 10YR4/1 to 4/10B						

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-1RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+78.52	**Offset:**	28.5	**Alignment:**	Proposed
Elev.:	446.6 ft	**Latitude:**	34.1941104	**Longitude:**	-80.98469525	**Date Started:**	11/6/2023
Total Depth:	75.2 ft	**Soil Depth:**	49.9 ft	**Core Depth:**	75.2 ft	**Date Completed:**	11/6/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW/RC	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	NQ	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	6.7 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6" / 2nd 6" / 3rd 6" / 4th 6"	N Value	● SPT N VALUE ● PL MC LL ▲ FINES CONTENT (%) ✿ RQD (%) ■ REC (%) 0 10 20 30 40 50 60 70 80 90
		@ 63.35 feet - mechanical break @ 63.85 feet - joint: 135° @ 64.2 feet - mechanical break From 64.5 - 64.9 feet - mechanical breaks around joint: 113° down @ 65.05 feet - mechanical break						
361.6		From 65.63 - 66.15 feet - mechanical breaks around joint: 132° down @ 66.55 feet - mechanical break @ 66.85 feet - joint: 131° down @ 66.85 feet - mechanical breaks @ 67.25 feet - joint: 112° down @ 67.9 feet - mechanical break @ 68.2 feet - mechanical break						
356.6		From 69.2 - 70.28 - mechanical breaks around joint: 95° down From 70.55 - 71.4 feet - mechanical breaks around joint: 100° down From 71.42 - 72.58 feet - mechanical breaks around joint: 97° down @ 72.59 feet - mechanical break @ 73.1 feet - mechanical break						
351.6		@ 73.5 feet - joint: 112° down @ 73.27 feet - joint: 112° down @ 73.48 feet - joint: 116° down From 73.49 - 73.68 feet - mechanical breaks @ 73.9 feet - joint: 125° down @ 74.4 feet - mechanical break						
346.6		@ 74.64 feet - mechanical breaks around joint: 103° down Boring terminated at 75.2 feet.						
341.6								

LEGEND

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

SC_DOT 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/11/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+32.73	**Offset:**	-9.3	**Alignment:**	Proposed
Elev.:	447.3 ft	**Latitude:**	34.193948255	**Longitude:**	-80.98463991	**Date Started:**	11/8/2023
Total Depth:	98.5 ft	**Soil Depth:**	98.5 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/9/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	N/A	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	12 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	**SURFACE MATERIALS** - TOPSOIL - 0.5 inches.		0.0	SS-1	8	14	20	21	34
	2.0	**COASTAL PLAIN** - dense, moist, yellow and very pale brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, 10YR7/8, 10YR8/4. NMC=7%, %#200=18		2.0	SS-2	19	21	32	43	53
	4.0	**PIEDMONT RESIDUUM** - very hard, moist, laminated yellow and very pale brown, SILT with Sand (ML), little fine to medium sands, trace fine to coarse quartz rock fragments, 10YR8/6, 10YR7/8, 10YR8/3.		4.0	SS-3	4	1	50/5"		50/5"
442.3				6.0	SS-4	2	7	50/5"		50/5"
		PARTIALLY WEATHERED ROCK (PWR) - very hard, moist, laminated yellow, very pale brown, and white, Sandy SILT (ML), some fine to medium sands, 10YR8/6, 10YR7/8, 10YR8/3, 10YR8/1.		8.0	SS-5	4	6	50/2"		50/2"
437.3		@6 feet - laminated reddish yellow and pink, (A-5(5)), 7.5YR8/6, 7.5YR7/8, 7.5YR8/4. LL=43, PL=36, PI=7, NMC=24%, %#200=63								
		@8 feet - some fine to coarse sands.		13.5	SS-6	3	3	50/3"		50/3"
432.3										
		@18.5 feet - white with brownish yellow and yellow speckles, some fine to medium sands, 10YR8/1, 10YR6/8, 10YR8/8.		18.5	SS-7	15	32	50/5"		50/5"
427.3										
	23.5	**PIEDMONT RESIDUUM** - very hard, moist, white, brownish yellow, yellow, and reddish yellow, Sandy SILT (ML) (A-7-5(8)), some fine to medium sands, 10YR8/1, 10YR6/8, 10YR8/8, 10YR7/8, 7.5YR8/6. LL=44, PL=33, PI=11, NMC=26%, %#200=67		23.5	SS-8	15	18	34		52
422.3										

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-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+32.73	**Offset:**	-9.3	**Alignment:**	Proposed
Elev.:	447.3 ft	**Latitude:**	34.193948255	**Longitude:**	-80.98463991	**Date Started:**	11/8/2023
Total Depth:	98.5 ft	**Soil Depth:**	98.5 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/9/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	N/A	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	12 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 - laminated reddish yellow and pink, some fine to coarse sands, 7.5YR8/6, 7.5YR8/4, 7.5YR8/3.			SS-9	10	20	32		52
417.3										
				33.5						
		@33.5 feet - laminated yellow, very pale brown, and brownish yellow, 10YR8/8, 10YR8/4, 10YR6/6.			SS-10	12	21	34		55
412.3										
				38.5						
		@38.5 feet - hard, reddish yellow with white and strong brown mottles, trace fine rock fragments, 7.5YR7/8, 7.5YR8/6, 7.5YR8/1, 7.5YR4/6.			SS-11	4	15	19		34
407.3										
				43.5						
		@43.5 feet - very stiff, trace fine to coarse rock fragments.			SS-12	7	9	10		19
402.3										
				48.5						
		@49 feet - laminated greenish gray and light greenish gray, some fine to medium sands, trace mica, absent rock fragments, 5BG6/1, 10BG7/1.			SS-13	10	14	14		28
397.3										
				53.5						
		@53.5 feet - trace fine to coarse rock								

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-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+32.73	**Offset:**	-9.3	**Alignment:**	Proposed
Elev.:	447.3 ft	**Latitude:**	34.193948255	**Longitude:**	-80.98463991	**Date Started:**	11/8/2023
Total Depth:	98.5 ft	**Soil Depth:**	98.5 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/9/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	N/A	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	12 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
		fragments.			SS-14	6	14	16		30
392.3										
	58.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, moist, laminated greenish gray and light greenish gray, Sandy SILT (ML), some fine to medium sands, trace mica, 5BG6/1, 10BG7/1.		58.5	SS-15	50/5"				50/5"
387.3										
		@63.5 feet - light bluish gray and light greenish gray, some fine to coarse sands, 5B8/1, 5BG7/1.		63.5	SS-16	50/4"				50/4"
382.3										
				68.5	SS-17	50/2"				50/2"
377.3										
		@73.5 feet - greenish gray and light greenish gray, trace fine weathered rock fragments, 5BG6/1, 10BG8/1.		73.5	SS-18	50/3"				50/3"
372.3										
	78.5			78.5	SS-19	50/3"				50/3"
		Very dense, moist, greenish gray, light greenish gray, and light bluish gray, Silty fine to coarse SAND (SM), some low plasticity fines, trace fine weathered rock fragments, 5BG6/1, 10BG8/1, 5PB8/1.								
367.3										

● 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	

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	IB-2RB1
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	H. Skerkis	**Boring Location:**	1741+32.73	**Offset:**	-9.3	**Alignment:**	Proposed
Elev.:	447.3 ft	**Latitude:**	34.193948255	**Longitude:**	-80.98463991	**Date Started:**	11/8/2023
Total Depth:	98.5 ft	**Soil Depth:**	98.5 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/9/2023
Bore Hole Diameter (in):	4	**Sampler Configuration**		**Liner Required:**	Y (N)	**Liner Used:**	Y (N)
Drill Machine:	D-50 Turbo	**Drill Method:**	RW	**Hammer Type:**	Automatic	**Energy Ratio:**	96.8%
Core Size:	N/A	**Driller:**	F. Crane	**Groundwater:**	**TOB** N/A	**24HR**	12 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
362.3		@83.5 feet - bluish gray and greenish gray, some low to medium plasticity fines, few fine to coarse weathered rock fragments, 10B5/1, 5BG6/1.		83.5	SS-20	50/5"				50/5"
357.3				88.5	SS-21	50/1"				50/1"
352.3				93.5	SS-22	50/1"				50/1"
347.3	98.5	Boring Terminated at 98.5 feet.		98.5	SS-23	50/0"				50/0"
342.3										

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-13
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1743+02.74	**Offset:**	10.1	**Alignment:**	Proposed
Elev.:	448.8 ft	**Latitude:**	34.194272914	**Longitude:**	-80.98504815	**Date Started:**	11/6/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	12.6 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0		0.0	SS-1	15	8	5	5	13
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1 inch.							
	1.0	**FILL** - medium dense, dry, black gray and grayish brown, Silty fine to coarse SAND with Gravel (SM), some low plasticity fines, little fine coarse crushed stone, 10YR2/1 to 10YR5/1 to 10YR5/2.	2.0	SS-2	6	32	50/5"		50/5"
	2.0								
	4.0		4.0						
443.8		**COASTAL PLAIN** - stiff, dry, white and brownish yellow, Lean CLAY with Sand (CL), little fine to medium sands, 10YR8/1 to 10YR6/6.		SS-3	10	17	20	22	37
	6.0		6.0	SS-4	19	32	50/5"		50/5"
		PARTIALLY WEATHERED ROCK (PWR) - very dense, dry, mottled light gray and brownish yellow, Silty, Clayey fine to medium SAND (SC-SM) (A-4(0)), some low to medium plasticity fines, 10YR7/1 to 10YR6/6 to 10YR6/8. LL=24, PL=18, PI=6, NMC=8%, %#200=38	8.0	SS-5	26	50/5"			50/5"
438.8		**PIEDMONT RESIDUUM** - hard, dry, laminated yellow with white mottles, SILT (ML), few fine to medium sands, relict rock structure, 10YR7/8, 10YR8/1.							
		PARTIALLY WEATHERED ROCK (PWR) - very hard, dry, laminated white to light gray and yellow, Sandy SILT (ML), some fine sands, trace fine rock fragments (quartz), relict rock structure, 10YR8/1 to 10YR7/1 to 10YR7/8.	13.5	SS-6	50/2"				50/2"
433.8		@8 feet - laminated white to light gray, (A-4(4)), 10YR8/1 to 10YR7/1. LL=35, PL=28, PI=7, NMC=26%, %#200=65							
		@13.5 feet - laminated light gray to white, 10YR7/1 to 10YR8/1.	18.5	SS-7	50/2"				50/2"
428.8									
		@23.5 feet - laminated gray and white with brownish yellow mottles, 10YR5/1, 10YR8/1, 10YR6/8.	23.5	SS-8	23	50/3"			50/3"
423.8									

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-13
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1743+02.74	**Offset:**	10.1	**Alignment:**	Proposed
Elev.:	448.8 ft	**Latitude:**	34.194272914	**Longitude:**	-80.98504815	**Date Started:**	11/6/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	12.6 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			
		@28.5 feet - laminated white to gray with brownish yellow mottles, 10YR8/1, 10YR6/1, 10YR6/6.			SS-9	18 37 50/2"	50/2"
418.8							
				33.5			
		@33.5 feet - laminated gray and brownish yellow, 10YR6/1, 10YR6/6.			SS-10	50/3"	50/3"
413.8							
				38.5			
	39.3	@38.5 feet - laminated yellow to brownish yellow, 10YR7/8 to 2.5Y7/8, 10YR6/8.			SS-11	12 50/4"	50/4"
408.8		Boring Terminated at 39.3 feet.					
403.8							
398.8							

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

0 10 20 30 40 50 60 70 80 90

>>

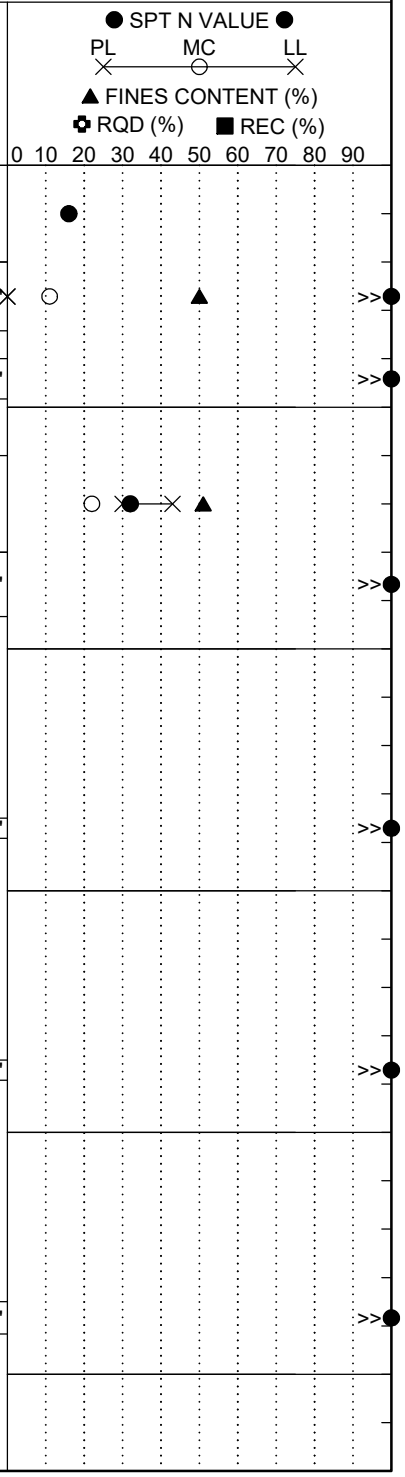
LEGEND

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	

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-14
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1742+47.25	**Offset:**	-32.2	**Alignment:**	Proposed
Elev.:	448.4 ft	**Latitude:**	34.194084919	**Longitude:**	-80.98499652	**Date Started:**	11/6/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	10.9 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0		0.0	SS-1	3	9	7	11	16
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1.5 inches.							
	1.0	**FILL** - medium dense, dry, black, grayish brown and gray, Silty fine to coarse SAND with Gravel (SM), some low plasticity fines, little fine to coarse crushed stone, 10YR2/1 to 10YR5/2 to 10YR5/1.	2.0	SS-2	15	29	50/5"		50/5"
443.4	4.0	**COASTAL PLAIN** - very stiff, dry, mottled white and brownish yellow, Lean CLAY with Sand (CL), little fine to medium sands, 10YR8/1, 10YR6/6.	4.0	SS-3	44	50/4"			50/4"
	6.0	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry to moist, white with yellow mottles, Sandy SILT (ML) (A-4(0)), some fine sands, 10YR8/1, 10YR7/6. LL=NP, PL=NP, PI=NP, NMC=11%, %#200=50	6.0	SS-4	11	13	19	24	32
	8.0	@4 feet - mottled light gray and brownish yellow, some fine to medium sands, 10YR7/1, 10YR6/6.	8.0	SS-5	12	30	50/4"		50/4"
438.4		**PIEDMONT RESIDUUM** - hard, dry, laminated very pale brown and brownish yellow, Sandy SILT (ML) (A-7-5(5)), some fine to medium sands, relict rock structure, 10YR7/3, 10YR6/6. LL=43, PL=30, PI=13, NMC=22%, %#200=51	13.5	SS-6	50/5"				50/5"
433.4		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated brownish yellow and very pale brown, SILT (ML), few fine to coarse sands, relict rock structure, 10YR6/6, 10YR7/3.	18.5	SS-7	50/5"				50/5"
428.4		@18.5 feet - laminated brownish yellow to yellow with gray mottles, 10YR6/6 to 10YR7/8, 10YR6/1.	23.5	SS-8	42	50/2"			50/2"
423.4		@23.5 feet - laminated brownish yellow to yellowish brown with gray mottles, trace fine sands, 10YR6/8 to 10YR5/8, 10YR6/1.							



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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-14
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1742+47.25	**Offset:**	-32.2	**Alignment:**	Proposed
Elev.:	448.4 ft	**Latitude:**	34.194084919	**Longitude:**	-80.98499652	**Date Started:**	11/6/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	10.9 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						
418.4		**PIEDMONT RESIDUUM** - very stiff, dry, laminated light gray and brownish yellow with gray mottles, SILT (ML), few fine to medium sands, relict rock structure, 10YR7/1 to 10YR6/8, 10YR6/1.			SS-9	8	10	17		27
				33.5						
413.4		@33.5 feet - laminated gray and dark yellowish brown, trace fine to coarse sands, few fine rock fragments, 10YR6/1, 10YR4/6 to 10YR3/6.			SS-10	8	11	11		22
	38.5			38.5						
408.4	40.0	Very hard, dry, laminated dark yellowish brown and gray, SILT with Sand (ML), little fine to medium sands, relict rock structure, 10YR4/6, 10YR6/1.			SS-11	13	23	45		68
		Boring Terminated 40 feet.								
403.4										
398.4										

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-15
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1740+71.08	**Offset:**	130.1	**Alignment:**	Proposed
Elev.:	466.1 ft	**Latitude:**	34.194191199	**Longitude:**	-80.984234729	**Date Started:**	10/9/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/9/2023
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**	23 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									
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1 inch.		0.0	SS-1	2	9	11	15	20
	2.0	**COASTAL PLAIN** - medium dense, dry, very pale brown, Silty fine to medium SAND (SM) (A-2-4), little low plasticity fines, few roots, 10YR7/3. NMC=2%, %#200=23		2.0	SS-2	15	12	13	22	25
	4.0	Medium dense, dry, very pale brown and strong brown, Clayey fine to coarse SAND (SC), some medium plasticity fines, 10YR7/3, 7.5YR5/8.		4.0	SS-3	11	45	30	18	75
461.1	6.0	Very dense, dry to moist, light gray with yellow mottles, Silty fine to coarse SAND (SM), some low plasticity fines, 10YR7/1, 10YR7/6.		6.0	SS-4	1	4	20	24	24
	8.0	Very stiff, dry to moist, light gray with yellow mottles, Silty Lean CLAY with Sand (CL-ML) (A-4(2)), little fine to medium sands, 10YR7/1, 10YR7/6. LL=21, PL=15, PI=6, NMC=12%, %#200=80		8.0	SS-5	3	12	50/5"		50/5"
456.1		Very hard, dry, light gray with brownish yellow and yellowish red mottles, SILT (ML), few fine to medium sands, 10YR7/1, 10YR6/6, 7.5YR6/8.								
	13.5	Very dense, moist, yellowish brown to dark yellowish brown, Silty fine to medium SAND (SM), some low plasticity fines, 10YR5/8 to 10YR4/6.		13.5	SS-6	3	4	50/5"		50/5"
451.1										
	18.5	**PIEDMONT RESIDUUM** - hard, dry, laminated very pale brown with light gray and yellow mottles, Sandy SILT (ML) (A-4(2)), some fine to medium sands, relict rock structure, 10YR8/2, 10YR7/1, 10YR7/6. LL=34, PL=29, PI=5, NMC=23%, %#200=56		18.5	SS-7	12	17	22		39
446.1										
	23.5	Hard, dry, laminated very pale brown and white, SILT (ML), trace fine to medium sands, relict rock structure, 10YR7/3, 10YR8/1.		23.5	SS-8	12	22	28		50
441.1										

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.:**	W-15
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1740+71.08	**Offset:**	130.1	**Alignment:**	Proposed
Elev.:	466.1 ft	**Latitude:**	34.194191199	**Longitude:**	-80.984234729	**Date Started:**	10/9/2023
Total Depth:	40 ft	**Soil Depth:**	40 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/9/2023
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**	23 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 - laminated very pale brown and yellow, 10YR7/3, 10YR7/6 to 10YR7/8.			SS-9	11	19	22		41
436.1										
				33.5						
		@33.5 feet - laminated yellow and very pale brown, 10YR7/6 to 10YR7/8, 10YR7/3.			SS-10	8	20	28		48
431.1										
	38.5			38.5						
		Very hard, dry, laminated yellowish brown and dark gray, SILT with Sand (ML), little fine to coarse sands, trace fine rock fragments, relict rock structure, 10YR5/8 to 10YR5/6, 10YR4/1.			SS-11	13	24	38		62
426.1	40.0	Boring Terminated at 40 feet.								
421.1										
416.1										

● 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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-16
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+10.52	**Offset:**	-15.9	**Alignment:**	Proposed
Elev.:	464.8 ft	**Latitude:**	34.193646009	**Longitude:**	-80.983995416	**Date Started:**	10/9/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/9/2023
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**	21.8 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									
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.		0.0	SS-1	4	6	6	6	12
	2.0	**COASTAL PLAIN** - medium dense, dry, pale brown to brownish yellow, Silty fine to medium SAND (SM) (A-2-4), some low plasticity fines, trace coarse sands, trace roots, 10YR7/3 to 10YR6/6. NMC=5%, %#200=34		2.0	SS-2	4	5	6	8	11
	4.0			4.0	SS-3	7	17	50/3"		50/3"
459.8		Medium dense, dry, brownish yellow and pale brown, Clayey fine to coarse SAND (SC) (A-6(3)), some medium plasticity fines, 10YR6/6 to 10YR7/3. LL=34, PL=19, PI=15, NMC=9%, %#200=44		6.0	SS-4	3	5	50/4"		50/4"
	8.0	Very hard, dry to moist, light gray with brownish yellow and yellowish red mottles, Sandy Lean CLAY (CL), some fine sands, 10YR7/1, 10YR6/6, 5YR5/8.		8.0	SS-5	31	48	50/3"		50/3"
454.8		@6 feet - (A-4(2)). LL=22, PL=14, PI=8, NMC=11%, %#200=67								
		Very dense, dry to moist, light gray and yellowish red, Clayey fine to medium SAND (SC), some medium plasticity fines, 10YR7/1, 5YR5/8.								
	13.5	**PIEDMONT RESIDUUM** - very hard, dry, laminated light gray and yellow, SILT (ML), few fine to medium sands, relict rock structure, 10YR7/1, 10YR7/6.		13.5	SS-6	10	22	50		72
449.8										
	18.5	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated light gray and yellow, SILT (ML), few fine to medium sands, relict rock structure, 10YR7/1, 10YR7/6.		18.5	SS-7	40	50/4"			50/4"
444.8		▼								
		@23.5 feet - laminated very pale brown and light gray with yellow mottles, few fine to coarse sands, trace fine rock fragments, 10YR8/3 to 10YR7/1, 10YR7/6.		23.5	SS-8	38	50/2"			50/2"
439.8										

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-16
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	Z. Zelaya	**Boring Location:**	1739+10.52	**Offset:**	-15.9	**Alignment:**	Proposed
Elev.:	464.8 ft	**Latitude:**	34.193646009	**Longitude:**	-80.983995416	**Date Started:**	10/9/2023
Total Depth:	39.3 ft	**Soil Depth:**	39.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	10/9/2023
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**	21.8 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	SS-9	50/5"	50/5"
434.8		Very hard, dry, laminated very pale brown and light gray, SILT with Sand (ML), little fine to coarse sands, relict rock structure, 10YR8/3, 10YR7/1.					
	33.5			33.5	SS-10	20 50/5"	50/5"
429.8		Very hard, dry, pink with light gray mottles, SILT (ML), few fine to medium sands, relict rock structure, 7.5YR7/4, 10YR7/1.					
	38.5			38.5	SS-11	49 50/3"	50/3"
	39.3	Very hard, dry, laminated light gray, gray and weak red, SILT with Sand (ML), little fine to coarse sands, trace fine quartz rock fragments, relict rock structure, 10YR7/1, 10YR6/1, 10R5/4.					
424.8		Boring Terminated at 39.3 feet.					
419.8							
414.8							

● 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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-33
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+56.58	**Offset:**	82.3	**Alignment:**	Proposed
Elev.:	447.3 ft	**Latitude:**	34.194699263	**Longitude:**	-80.98522019	**Date Started:**	11/6/2023
Total Depth:	29.3 ft	**Soil Depth:**	29.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	17.9 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									
	0.1	**SURFACE MATERIAL** - TOPSOIL - 1 inch.		0.0						
	1.0				SS-1	5	9	7	13	16
	2.0	**FILL** - medium dense, dry, grayish brown and light olive brown, Silty fine to coarse SAND (SM), little low to medium plasticity fines, few mica, few fine crushed stone, trace roots, 2.5Y5/2, 2.5Y5/4.		2.0	SS-2	26	36	50/5"		50/5"
				4.0	SS-3	50/5"				50/5"
442.3		**PIEDMONT RESIDUUM** - very stiff, dry, yellow, white and light olive brown, Sandy SILT (ML), some fine sands, 2.5Y7/8, 2.5Y8/1, 2.5Y5/4.		6.0	SS-4	4	1	50/3"		50/3"
		PARTIALLY WEATHERED ROCK (PWR) - very hard, dry, olive yellow and pale brown, Silty fine to medium SAND (SM) (A-2-4), some low plasticity fines, 2.5Y6/6, 2.5Y8/4. LL=34, PL=28, PI=6, NMC=15%, %#200=31		8.0	SS-5	4	4	50/1"		50/1"
437.3		@6 feet - very dense, olive yellow, fine to coarse, some low to medium plasticity fines, 2.5Y6/6.								
		@8 feet - laminated olive yellow and pale brown, 2.5Y6/8, 2.5Y7/3.								
	13.5			13.5	SS-6	50/4"				50/4"
432.3		Very hard, dry, laminated pale brown and yellowish brown, Sandy SILT (ML), some medium to coarse sands, 2.5Y7/3, 10YR5/6.								
	18.5			18.5	SS-7	50/5"				50/5"
427.3		Very hard, dry, pale brown, SILT (ML), few fine sands, 2.5Y7/3.								
	23.5			23.5	SS-8	50/5"				50/5"
422.3		Very hard, dry, mottled light gray and olive yellow, Sandy SILT (ML), some fine to medium sands, 2.5Y7/2, 2.5Y6/6.								

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.:**	W-33
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+56.58	**Offset:**	82.3	**Alignment:**	Proposed
Elev.:	447.3 ft	**Latitude:**	34.194699263	**Longitude:**	-80.98522019	**Date Started:**	11/6/2023
Total Depth:	29.3 ft	**Soil Depth:**	29.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	17.9 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	SS-9	3150/3"	50/3" >>
	29.3	Boring Terminated at 29.3 feet.					
417.3							
412.3							
407.3							
402.3							
397.3							

● 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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-34
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+99.39	**Offset:**	95.7	**Alignment:**	Proposed
Elev.:	447.2 ft	**Latitude:**	34.194803261	**Longitude:**	-80.9852641	**Date Started:**	11/6/2023
Total Depth:	29.3 ft	**Soil Depth:**	29.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	15.8 ft

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	4th 6"	N Value
	0.0								
	0.2	**SURFACE MATERIAL** - TOPSOIL - 2 inches.	0.0	SS-1	9	11	8	6	19
	2.0	**FILL** - medium dense, dry, brown and dark grayish brown, Silty fine to coarse SAND (SM) (A-2-4), little nonplastic fines, few fine to coarse crushed stone, few mica, trace roots, 10YR5/3, 10YR4/2. LL=NP, PL=NP, PI=NP, NMC=9%, %#200=13	2.0	SS-2	9	18	27	41	45
	4.0		4.0	SS-3	27	36	50/5"		50/5"
442.2		**PIEDMONT RESIDUUM** - hard, dry, laminated white and yellow, Sandy SILT (ML), some fine to medium sands, 10YR8/1, 10YR7/8.	6.0	SS-4	19	34	50/5"		50/5"
	8.0	**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated white and yellow, Silty fine to coarse SAND (SM), some low plasticity fines, trace fine weathered rock fragments, 10YR8/1, 10YR7/8.	8.0	SS-5	13	18	34	50/4"	52
437.2		@6 feet - absent weathered rock fragments.							
		PIEDMONT RESIDUUM - very hard, dry, laminated white and yellow, Silty fine to coarse SAND (SM) (A-5(4)), some low plasticity fines, 10YR8/1, 10YR7/8. LL=41, PL=31, PI=10, NMC=25%, %#200=55							
	13.5		13.5	SS-6	17	50/5"			50/5"
432.2		**PARTIALLY WEATHERED ROCK (PWR)** - very hard, dry, laminated reddish yellow and white, Silty fine to coarse SAND (SM), some low plasticity fines, trace fine weathered rock fragments, 7.5YR7/8, 7.5YR8/1.							
			18.5	SS-7	33	50/3"			50/3"
		@18.5 feet - dry to moist, laminated white, 2.5Y8/1.							
427.2									
			23.5	SS-8	50/4"				50/4"
		@23.5 feet - laminated white and yellow, 2.5Y8/1, 2.5Y8/6.							
422.2									

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 RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

SCDOT Soil Test Log

Project ID:	P042443 (S&ME 23610178A)			**County:**	Richland	**Boring No.:**	W-34
Site Description:	I-77 Exit 26 Phase I					**Route:**	Ramp Bridge
Eng./Geo.:	E. Eastabrooks	**Boring Location:**	1744+99.39	**Offset:**	95.7	**Alignment:**	Proposed
Elev.:	447.2 ft	**Latitude:**	34.19480326	**Longitude:**	-80.9852641	**Date Started:**	11/6/2023
Total Depth:	29.3 ft	**Soil Depth:**	29.3 ft	**Core Depth:**	N/A ft	**Date Completed:**	11/6/2023
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**	15.8 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						
	29.3	@28.5 feet - trace fine quartz weathered rock fragments.			SS-9	28	50/4"			50/4"
417.2		Boring Terminated at 29.3 feet.								
412.2										
407.2										
402.2										
397.2										

● 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	

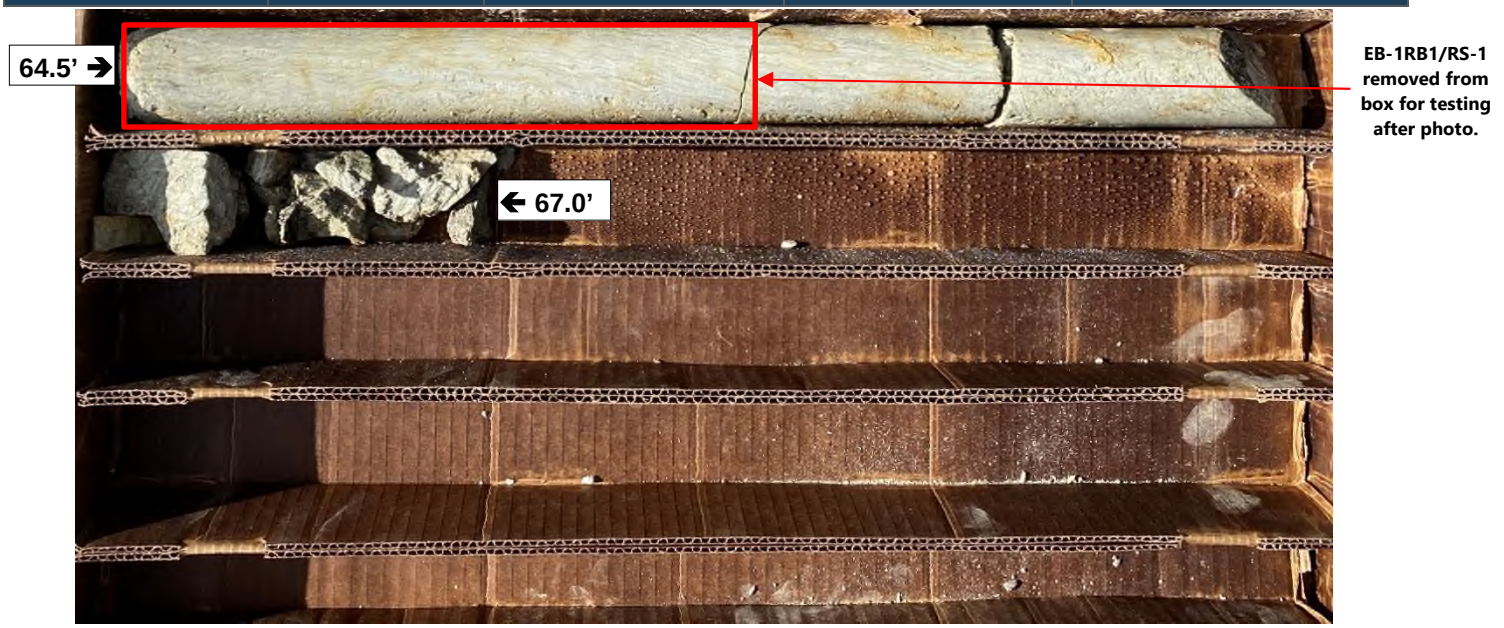
SC_DOT 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT_DATATEMPLATE.GDT 1/10/24

Appendix IV – Rock Core Photographs

Rock Core Photo Log

Boring: EB-1RB1	Box: 1 of 2	Date: 11/13/2023	Driller: L. Shrader	Geologist: Z. Zelaya
Run: RC-1	Length: 4.5	Depth Int: 52.5-57.0	Recovery: 47%	RQD: 0%
Run: RC-2	Length: 5.0	Depth Int: 57.0-62.0	Recovery: 88%	RQD: 65%
Run: RC-3	Length: 5.0	Depth Int: 62.0-67.0	Recovery: 100%	RQD: 25%

Boring: EB-1RB1	Box: 2 of 2	Date: 11/13/2023	Driller: L. Shrader	Geologist: Z. Zelaya
Run: RC-3 (cont.)	Length: 5.0	Depth Int: 62.0-67.0	Recovery: 100%	RQD: 25%



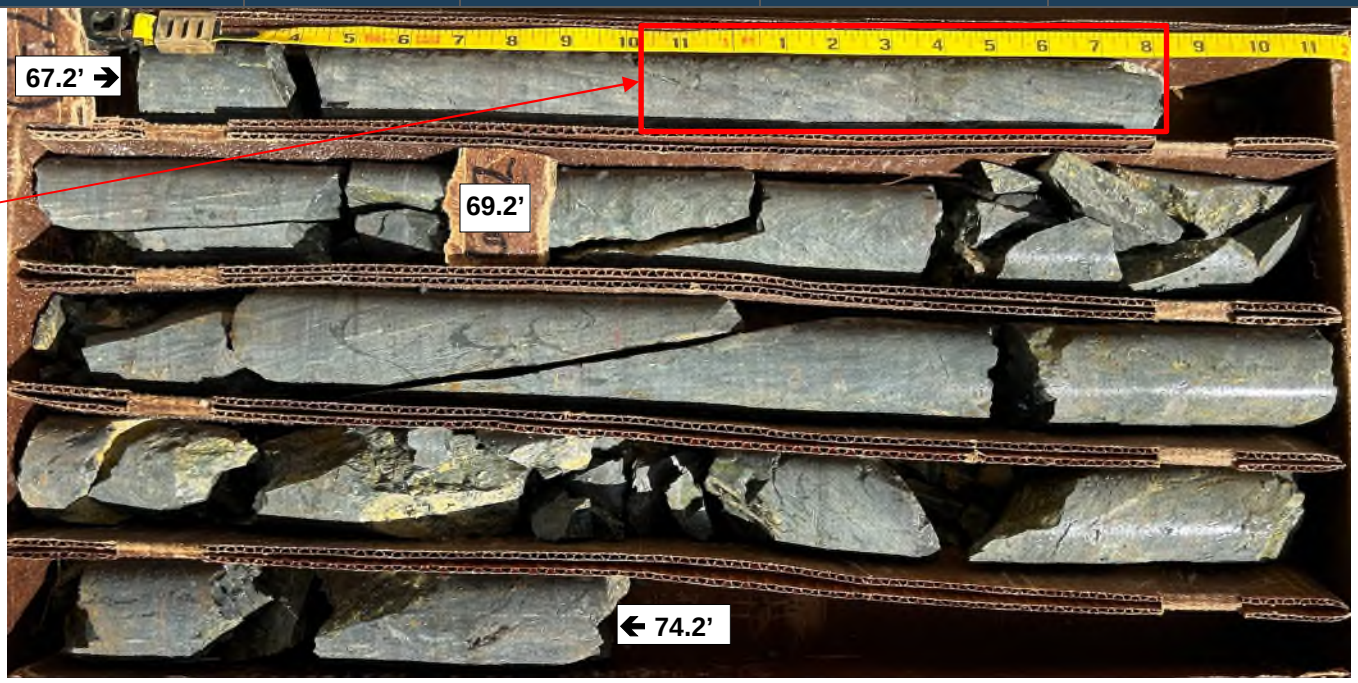
Rock Core Photo Log

Boring: IB-1RB1	Box: 1 of 3	Date: 11/8/2023	Driller: F. Crane	Geologist: Z. Zelaya
Run: RC-1	Length: 4.3	Depth Int: 49.9-54.2	Recovery: 74%	RQD: 30%
Run: RC-2	Length: 5.0	Depth Int: 54.2-59.2	Recovery: 68%	RQD: 8%
Run: RC-3	Length: 5.0	Depth Int: 59.2-64.2	Recovery: 88%	RQD: 26%

Boring: IB-1RB1	Box: 2 of 3	Date: 11/8/2023	Driller: F. Crane	Geologist: Z. Zelaya
Run: RC-3 (cont.)	Length: 5.0	Depth Int: 59.2-64.2	Recovery: 88%	RQD: 26%
Run: RC-4	Length: 5.0	Depth Int: 64.2-69.2	Recovery: 86%	RQD: 52%

Rock Core Photo Log

Boring: IB-1RB1	Box: 3 of 3	Date: 11/8/2023	Driller: F. Crane	Geologist: Z. Zelaya
Run: RC-4 (cont.)	Length: 5.0	Depth Int: 64.2-69.2	Recovery: 86%	RQD: 52%
Run: RC-5	Length: 5.0	Depth Int: 69.2-74.2	Recovery: 83%	RQD: 8%



Appendix V – Downhole Shear Wave Velocity Test Results

Shear Wave Velocity Calculations

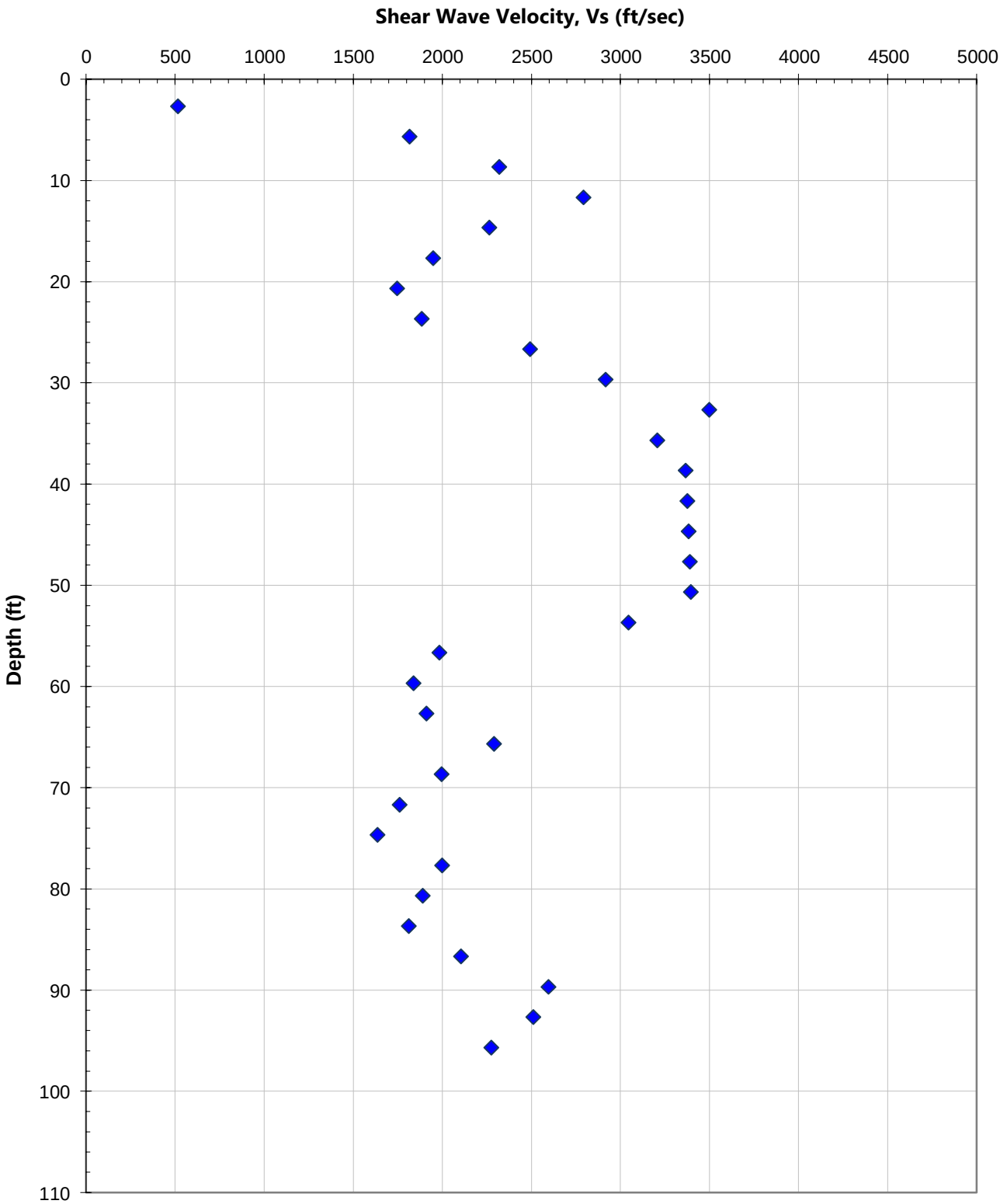
I-77 Exit 26 Phase I
Blythwood, South Carolina

Sounding ID: EB-3RB1 S&ME Project Number: **23610178A**

Casing Stickup: 1.83 Feet Date: 24-Oct-23
Source Offset: 8.00 Feet Rig: CME-550X

Test Depth (feet)	Geophone Depth (feet)	Waveform Ray Path (feet)	Incremental Distance (feet)	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
1.17	1.17	8.09	8.09	0.0060					
4.17	4.17	9.02	0.94	0.0078	0.0018	516.5	2.67	0.00517	0.35
7.17	7.17	10.74	1.72	0.0088	0.0009	1817.2	5.67	0.00165	0.23
10.17	10.17	12.94	2.20	0.0097	0.0009	2319.0	8.67	0.00129	0.27
13.17	13.17	15.41	2.47	0.0106	0.0009	2793.3	11.67	0.00107	0.33
16.17	16.17	18.04	2.63	0.0118	0.0012	2263.4	14.67	0.00133	0.40
19.17	19.17	20.77	2.73	0.0132	0.0014	1949.4	17.67	0.00154	0.41
22.17	22.17	23.57	2.80	0.0148	0.0016	1746.8	20.67	0.00172	0.43
25.17	25.17	26.41	2.84	0.0163	0.0015	1885.1	23.67	0.00159	0.42
28.17	28.17	29.28	2.87	0.0174	0.0012	2492.1	26.67	0.00120	0.38
31.17	31.17	32.18	2.90	0.0184	0.0010	2917.1	29.67	0.00103	0.39
34.17	34.17	35.09	2.91	0.0193	0.0008	3498.4	32.67	0.00086	0.34
37.17	37.17	38.02	2.93	0.0202	0.0009	3206.5	35.67	0.00094	0.39
40.17	40.17	40.96	2.94	0.0210	0.0009	3365.5	38.67	0.00089	0.37
43.17	43.17	43.90	2.95	0.0219	0.0009	3375.2	41.67	0.00089	0.38
46.17	46.17	46.86	2.95	0.0228	0.0009	3383.0	44.67	0.00089	0.39
49.17	49.17	49.82	2.96	0.0237	0.0009	3389.4	47.67	0.00089	0.38
52.17	52.17	52.78	2.96	0.0245	0.0009	3394.8	50.67	0.00088	0.37
55.17	55.17	55.75	2.97	0.0255	0.0010	3045.8	53.67	0.00098	0.31
58.17	58.17	58.72	2.97	0.0270	0.0015	1983.9	56.67	0.00151	0.40
61.17	61.17	61.69	2.97	0.0286	0.0016	1838.4	59.67	0.00163	0.42
64.17	64.17	64.67	2.98	0.0302	0.0016	1910.8	62.67	0.00157	0.42
67.17	67.17	67.64	2.98	0.0315	0.0013	2290.7	65.67	0.00131	0.43
70.17	70.17	70.62	2.98	0.0330	0.0015	1996.3	68.67	0.00150	0.46
73.17	73.17	73.61	2.98	0.0347	0.0017	1761.0	71.67	0.00170	0.47
76.17	76.17	76.59	2.98	0.0365	0.0018	1637.4	74.67	0.00183	0.48
79.17	79.17	79.57	2.98	0.0380	0.0015	1998.7	77.67	0.00150	0.46
82.17	82.17	82.56	2.99	0.0396	0.0016	1890.5	80.67	0.00159	0.46
85.17	85.17	85.54	2.99	0.0412	0.0016	1812.4	83.67	0.00166	0.45
88.17	88.17	88.53	2.99	0.0426	0.0014	2105.7	86.67	0.00142	0.44
91.17	91.17	91.52	2.99	0.0438	0.0012	2596.0	89.67	0.00116	0.43
94.17	94.17	94.51	2.99	0.0450	0.0012	2510.7	92.67	0.00119	0.43
97.17	97.17	97.50	2.99	0.0463	0.0013	2274.3	95.67	0.00132	0.45

Shear Wave Velocity Profile EB-3RB1
I-77 Exit 26 Phase-I
Blythwood, South Carolina
S&ME Project: 23610178A



Appendix VI – SPT Hammer Energy Measurements

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

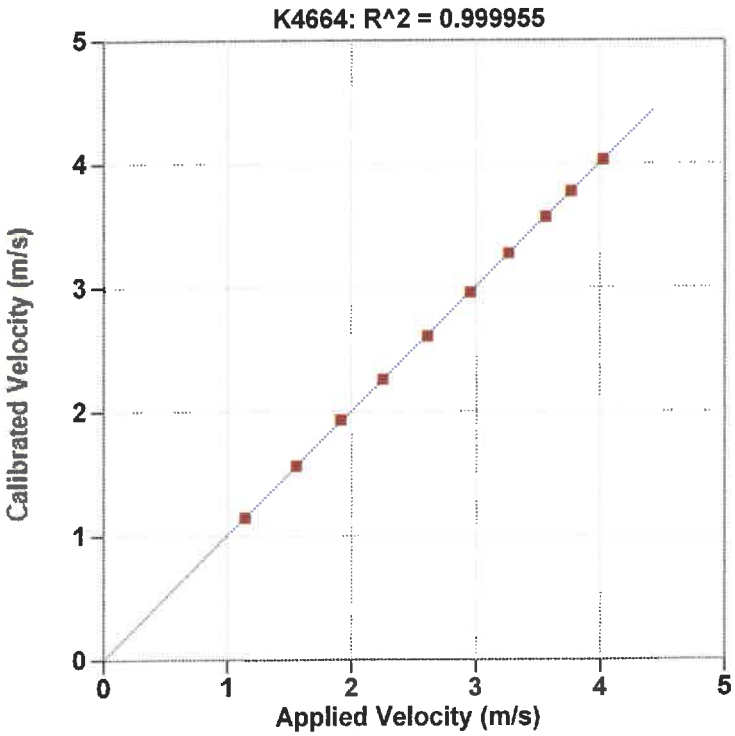
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

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

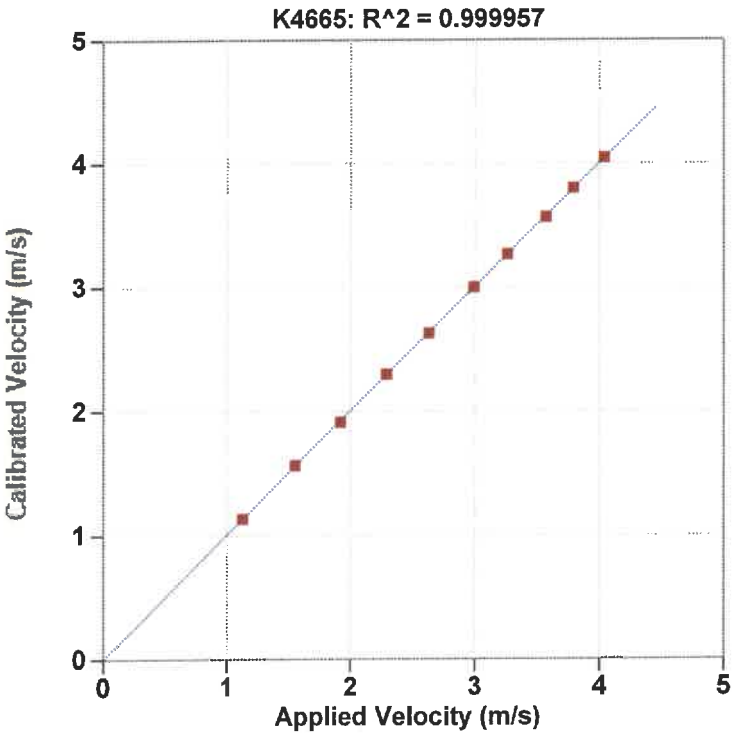
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

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

Operator: William Johnson

Signed



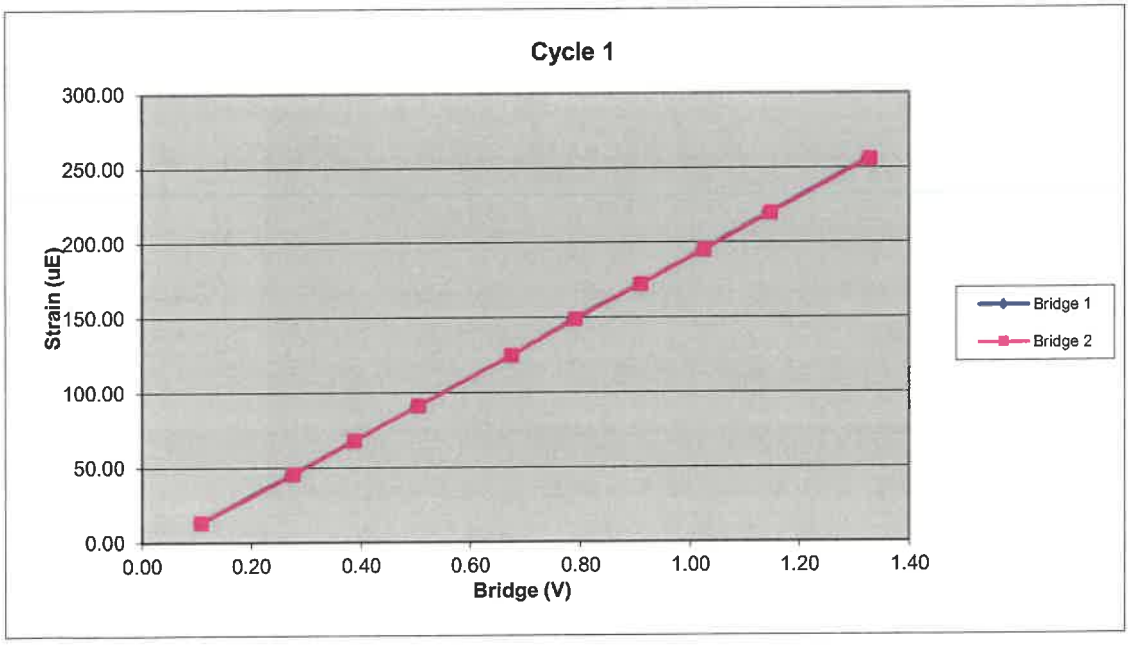
Reference Velocity	S/N K4665 Velocity
m/s	m/s
1.129	1.131
1.555	1.560
1.922	1.910
2.291	2.295
2.633	2.627
2.994	2.999
3.262	3.264
3.573	3.564
3.791	3.797
4.038	4.041

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

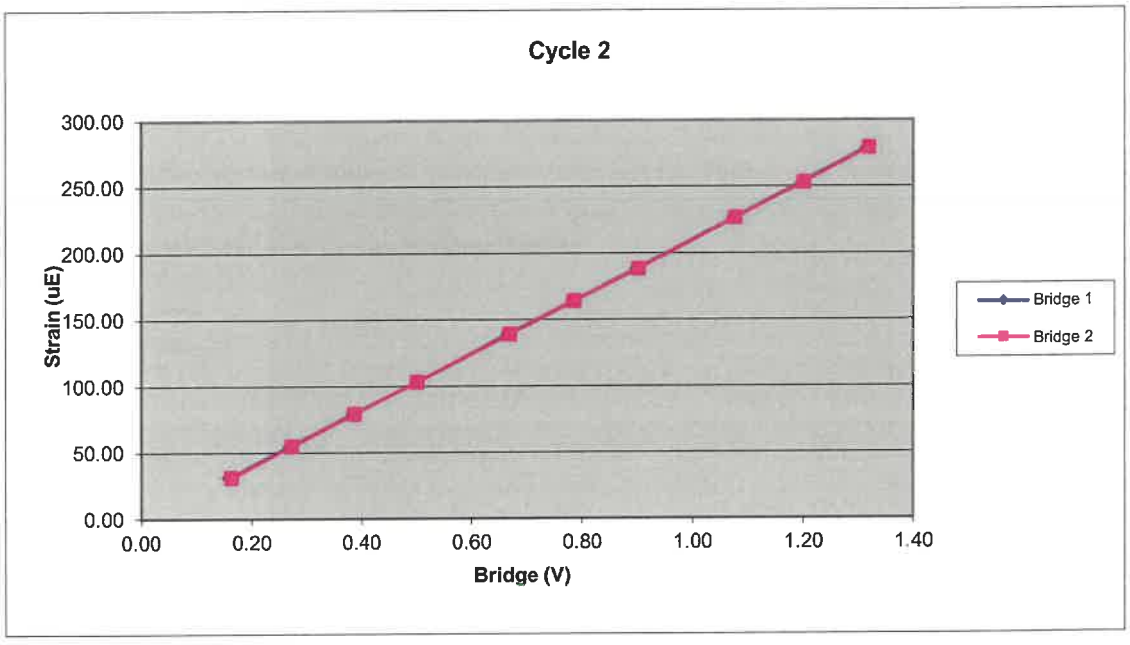
Force Strain Calibration	
EA (Kips)	**37982.46**
Offset	356.04
Correlation	0.999980



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**

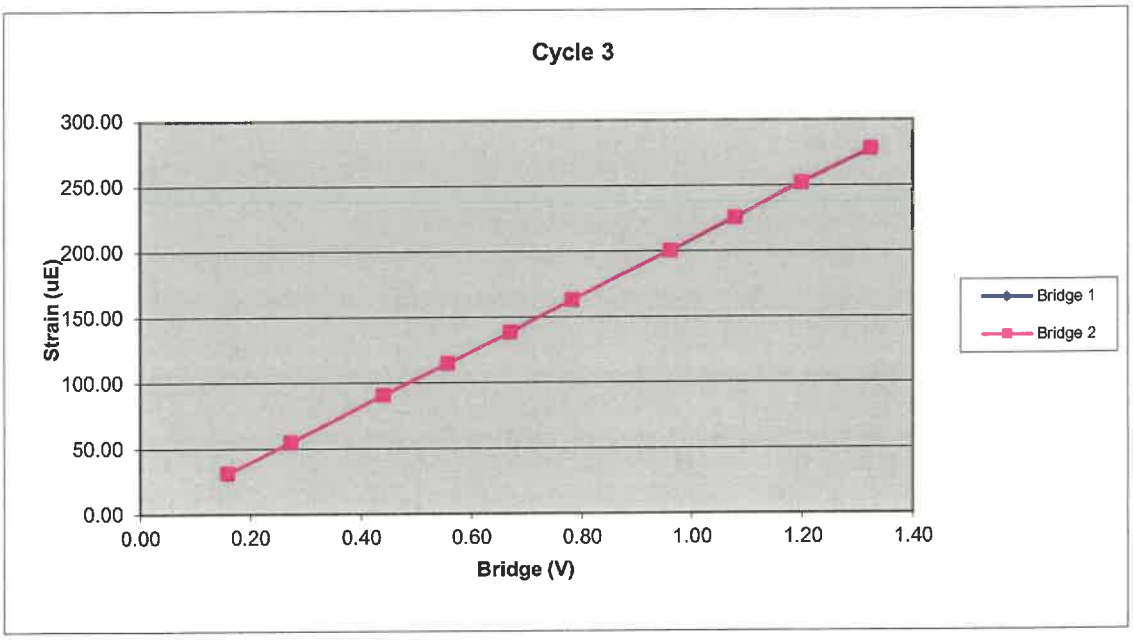
Force Strain Calibration	
EA (Kips)	**35621.25**
Offset	**134.95**
Correlation	**0.999985**



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

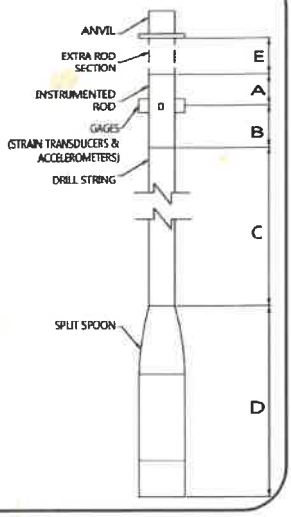
Drilling Company: SME
Rig Operator: L. SPRADER
Engr/Geologist: N/A
Client Rep.: N/A
Analyzer Oper.: J. WILLIAMSON

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

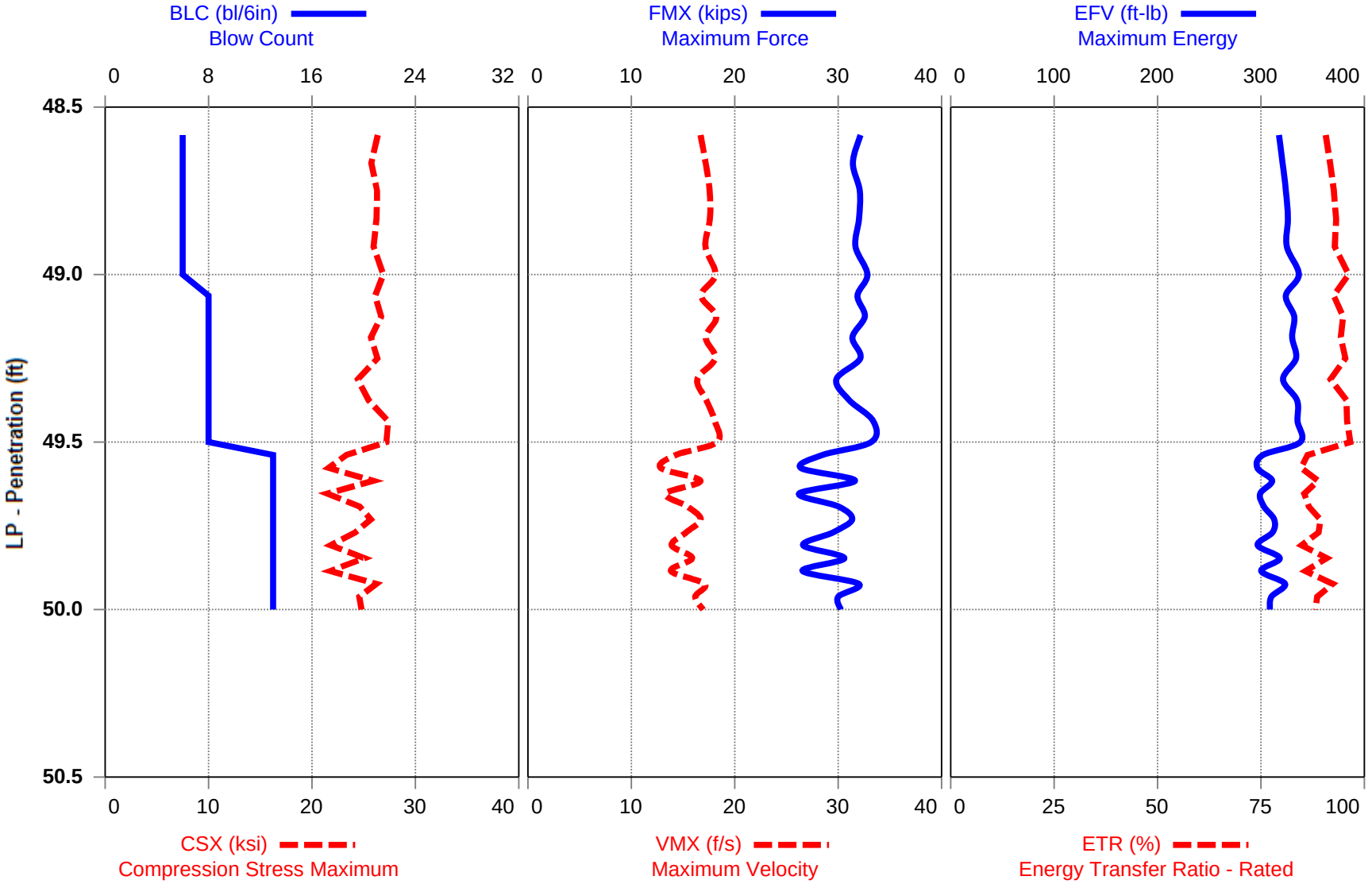
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 48.5-50.0 FEET

TEST HOLE A



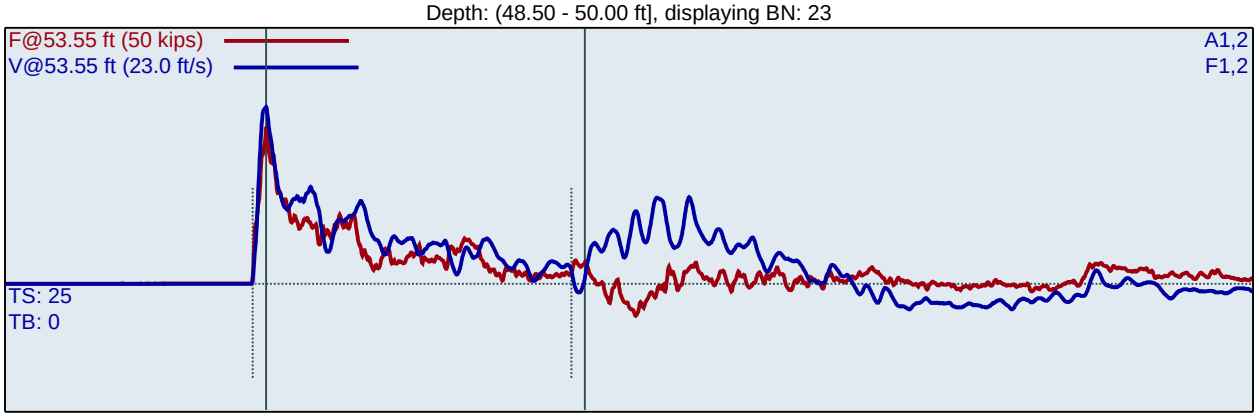
CME-550X SN 290593
JRW
TEST HOLE A

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.

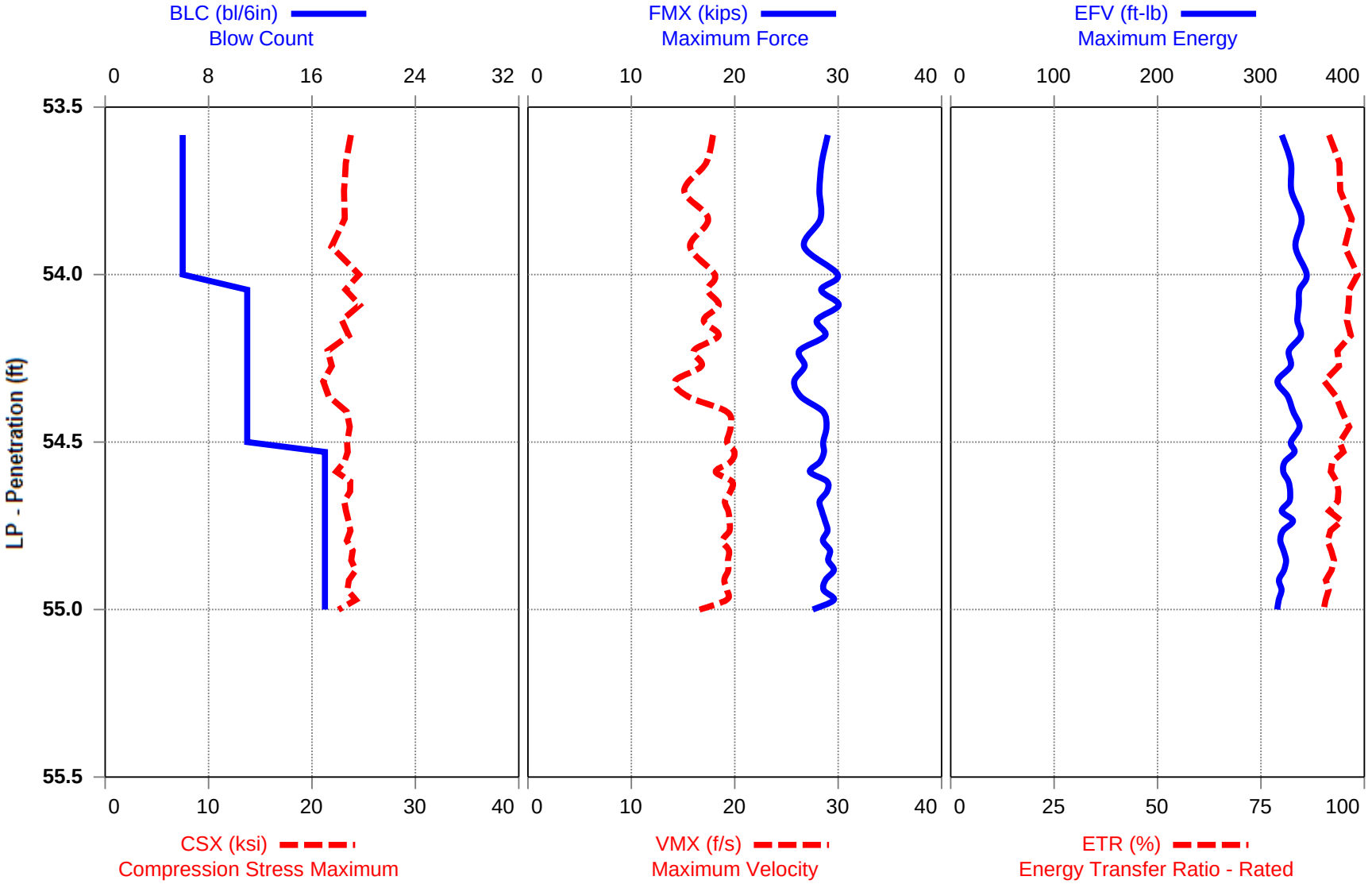
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 53.5-55.0 FEET

TEST HOLE A



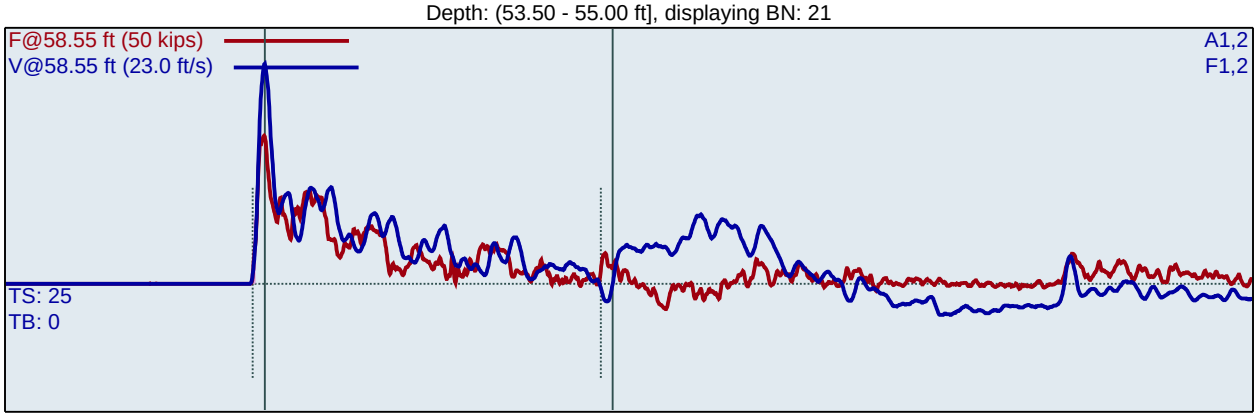
CME-550X SN 290593
JRW
TEST HOLE A

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.

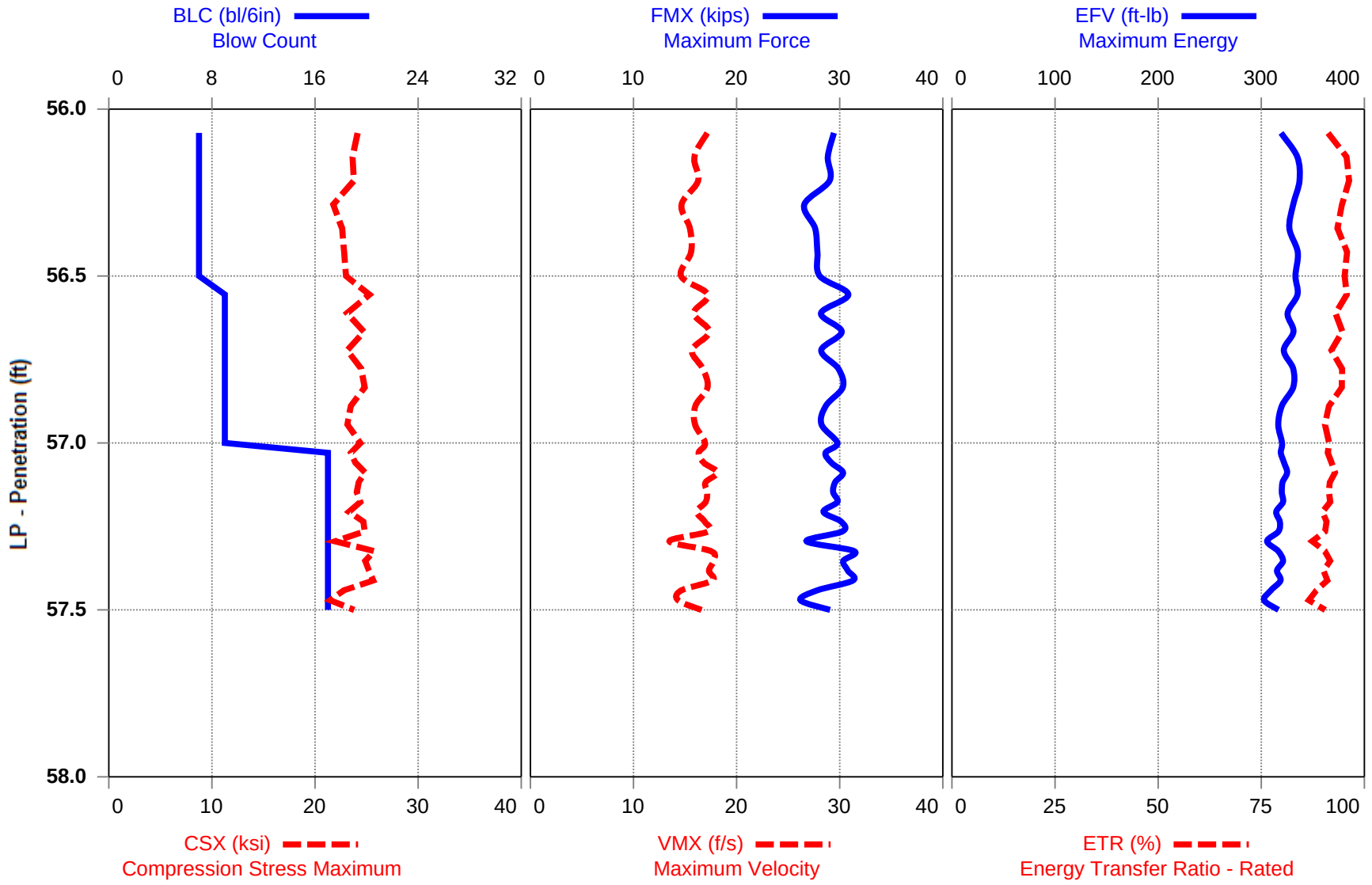
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 56.0-57.5 FEET

TEST HOLE A



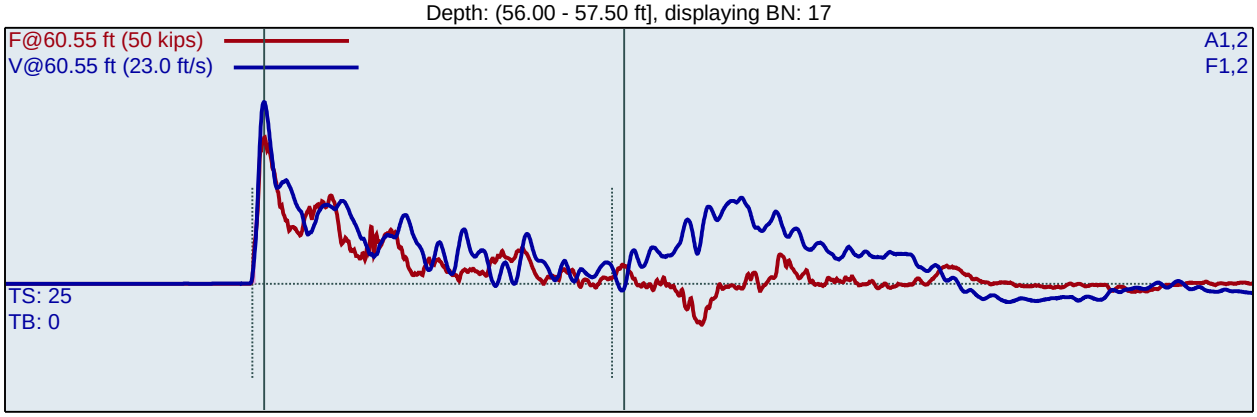
CME-550X SN 290593
JRW
TEST HOLE A

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.

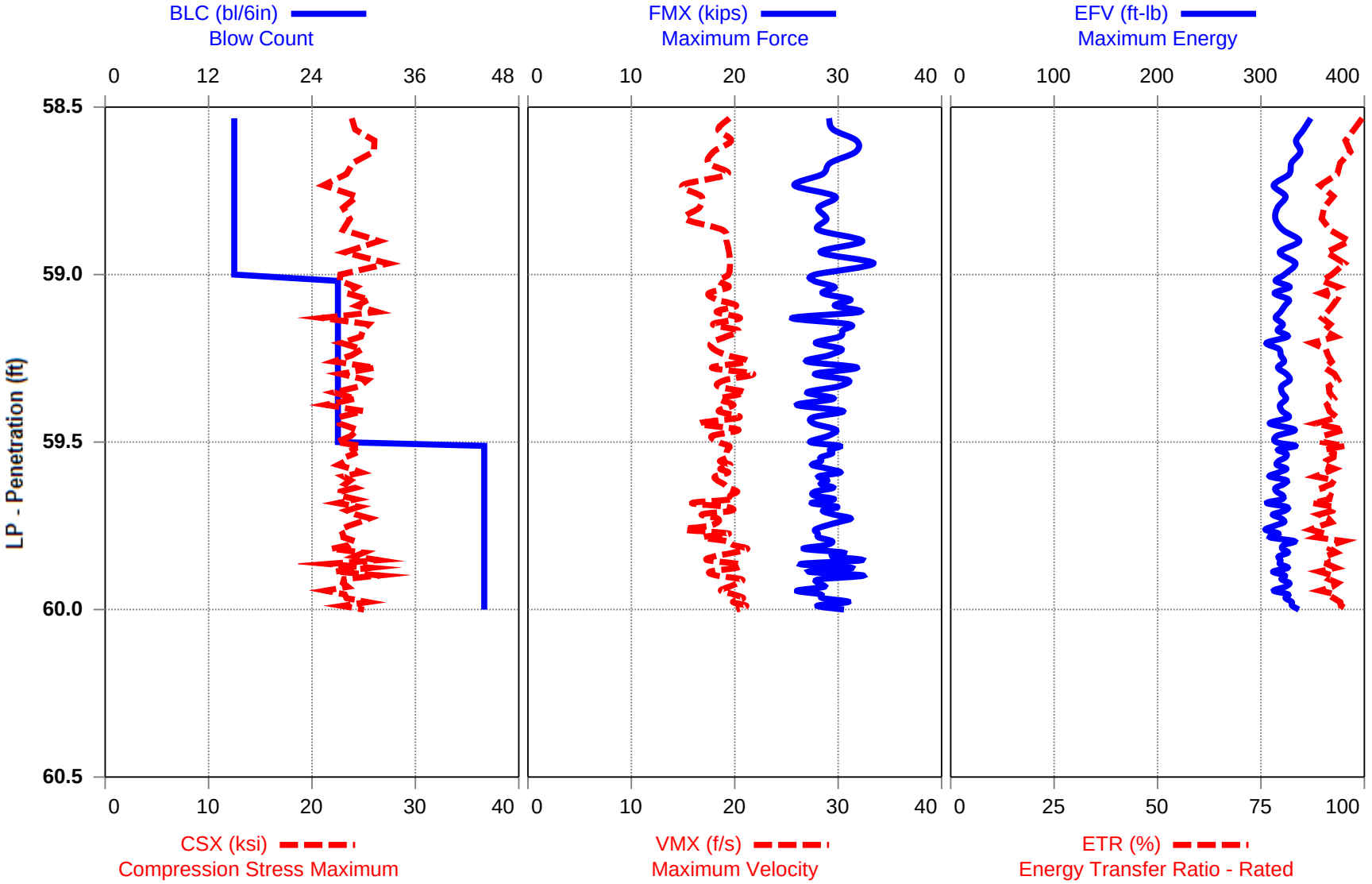
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 20-December-2023

Test started: 17-November-2023

CME-550X SN 290593 - 58.5-60.0 FEET

TEST HOLE A



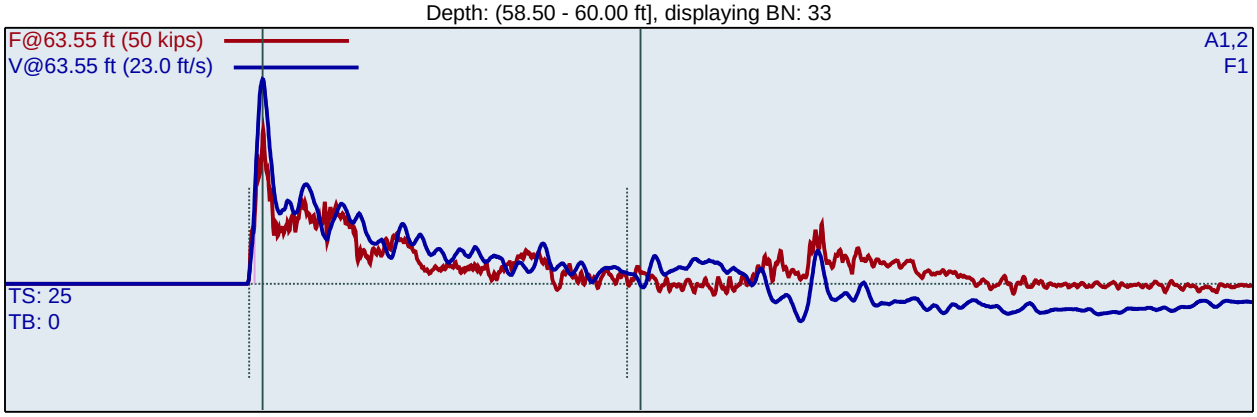
CME-550X SN 290593
JRW
TEST HOLE A

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

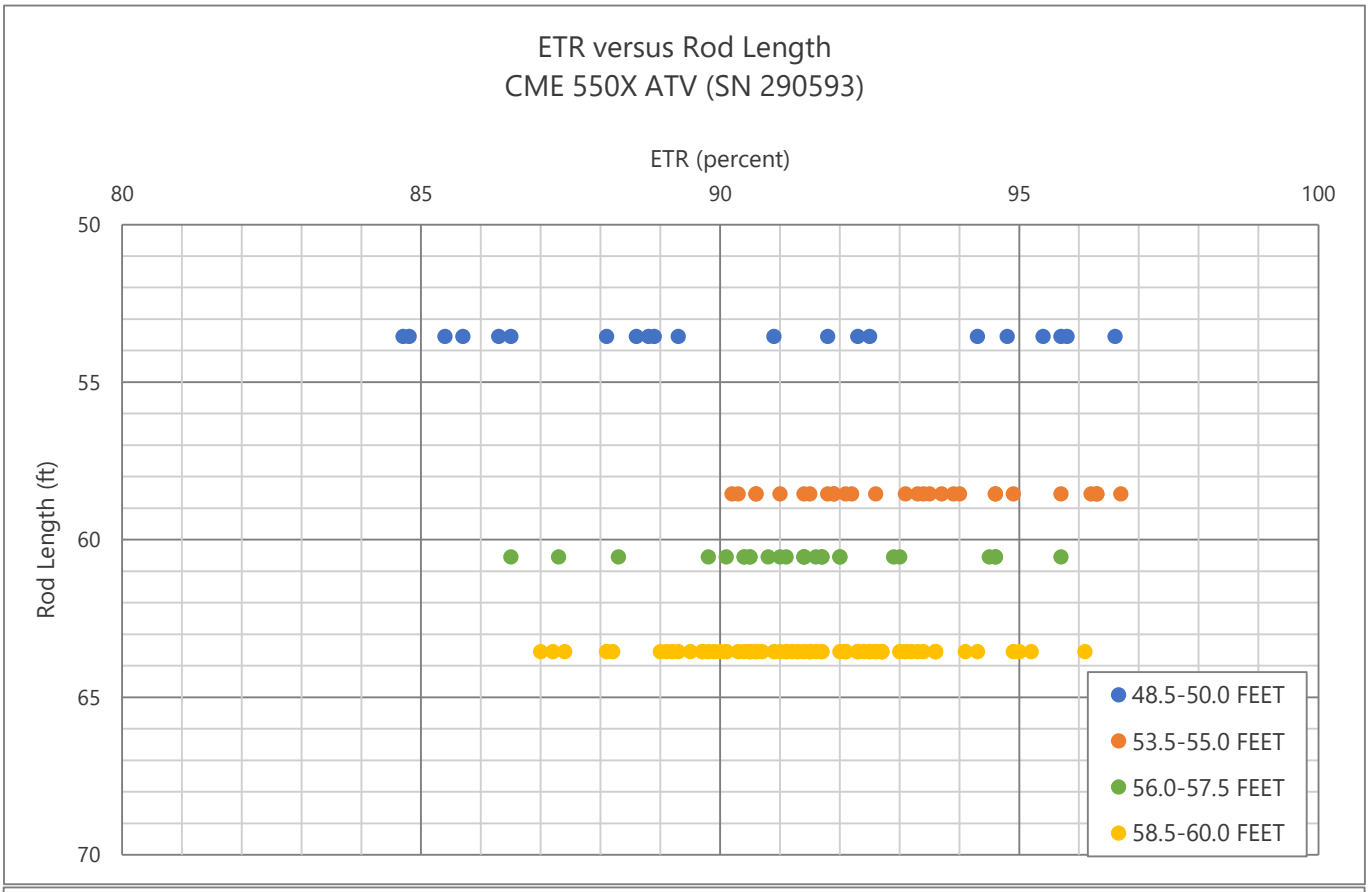
Sample Interval Time: 86.68 seconds.

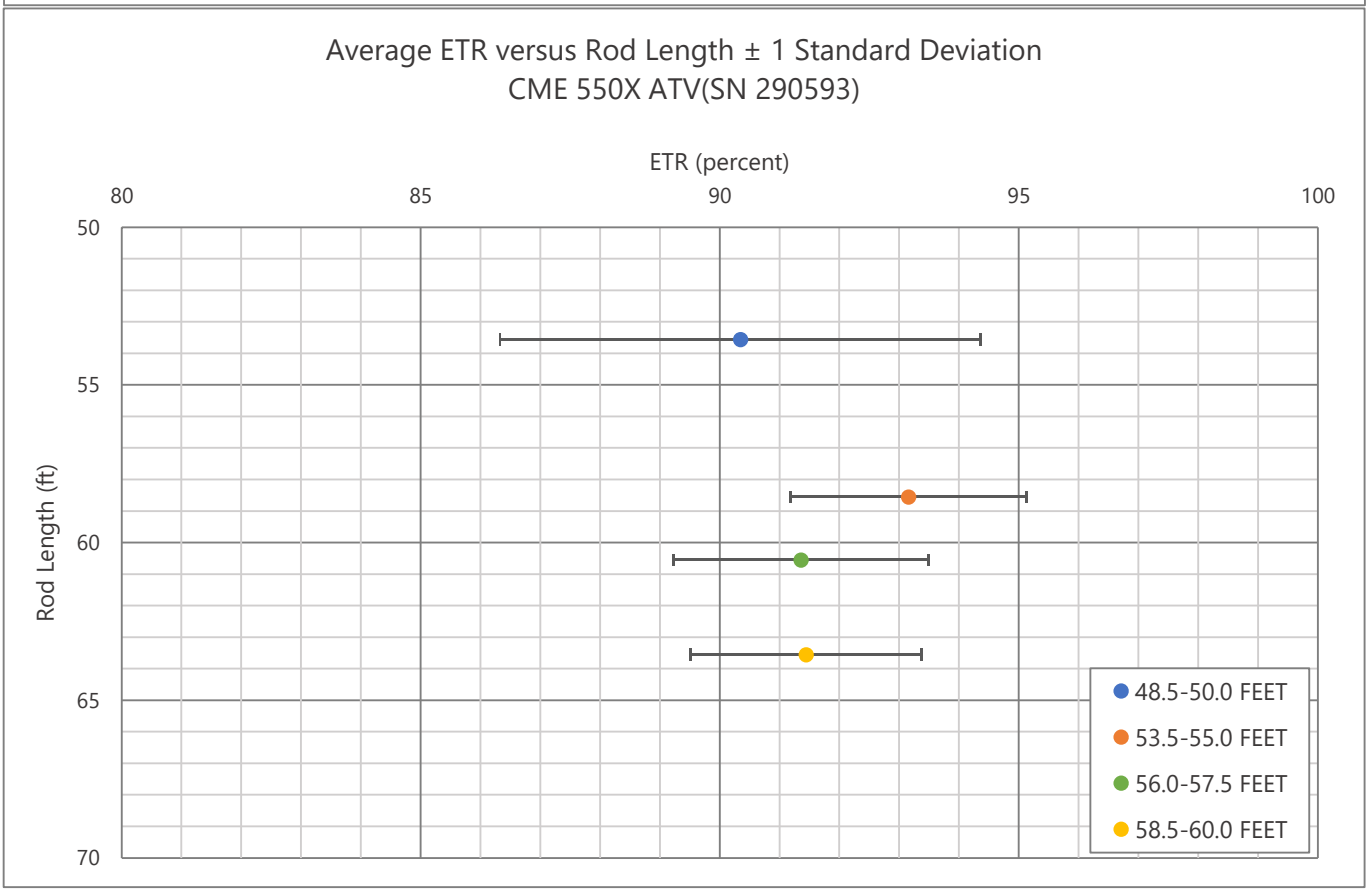
Summary of SPT Test Results

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

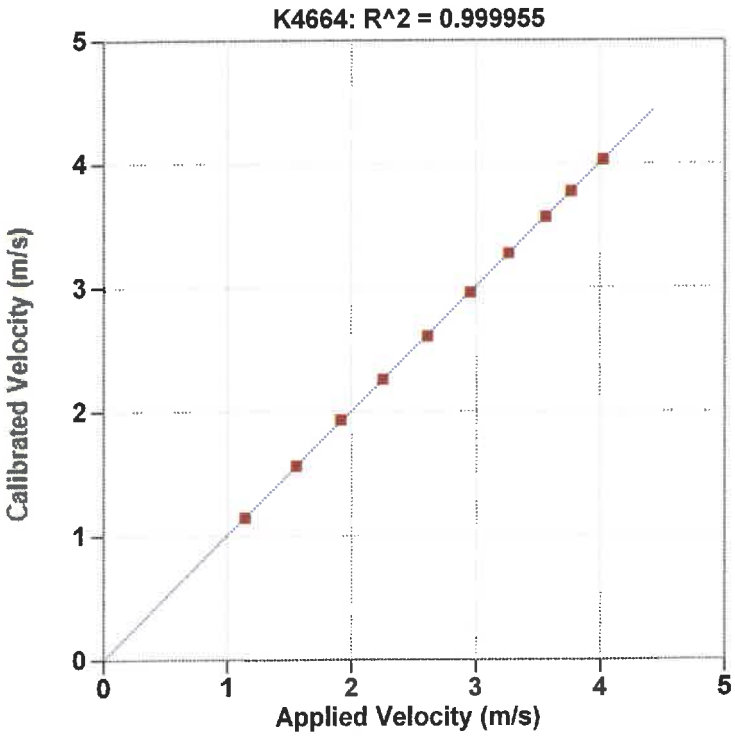
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

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

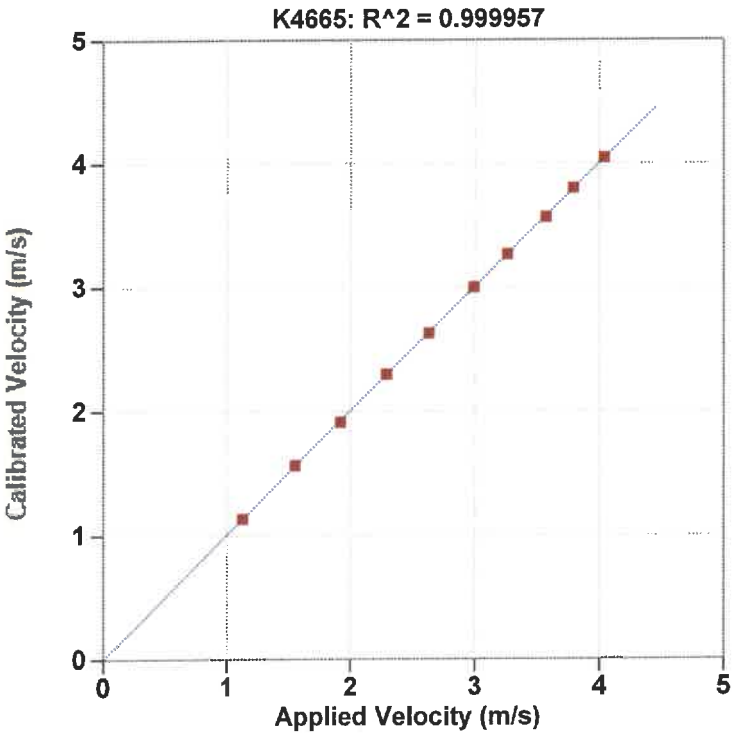
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

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

Operator: William Johnson

Signed



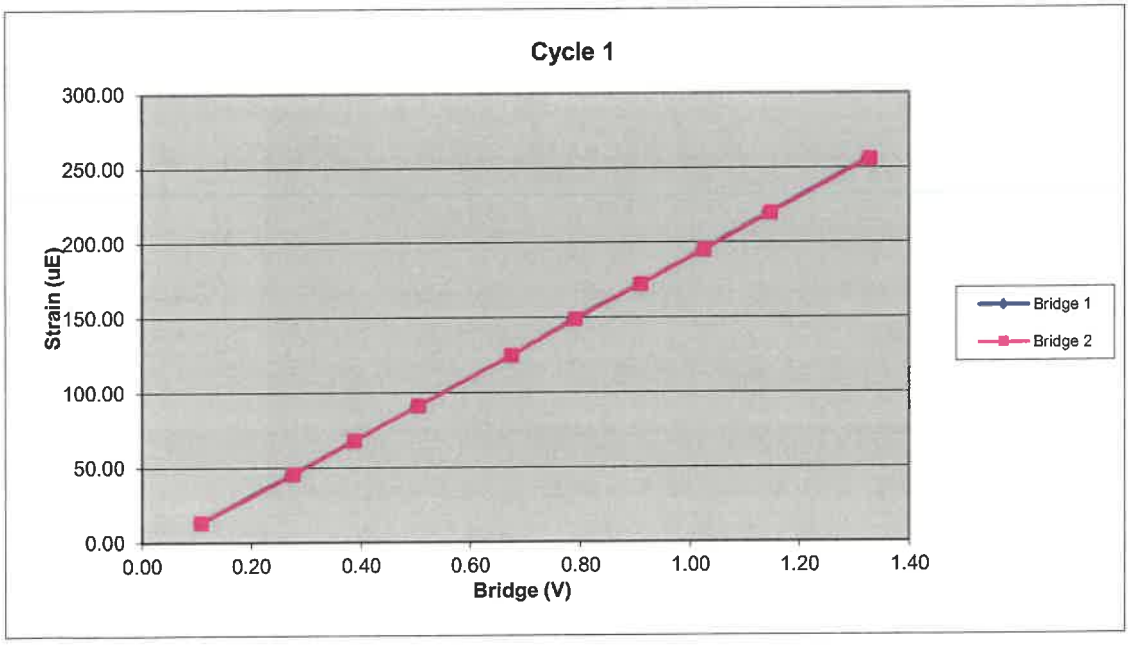
Reference Velocity	S/N K4665 Velocity
m/s	m/s
1.129	1.131
1.555	1.560
1.922	1.910
2.291	2.295
2.633	2.627
2.994	2.999
3.262	3.264
3.573	3.564
3.791	3.797
4.038	4.041

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

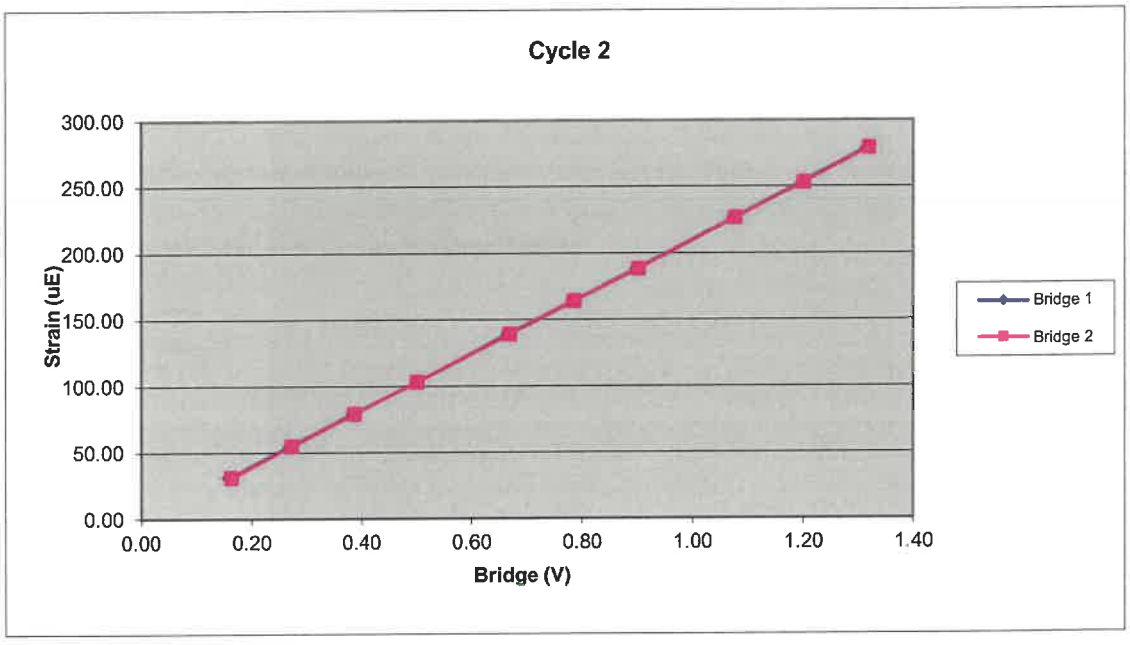
Force Strain Calibration	
EA (Kips)	**37982.46**
Offset	356.04
Correlation	0.999980



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**

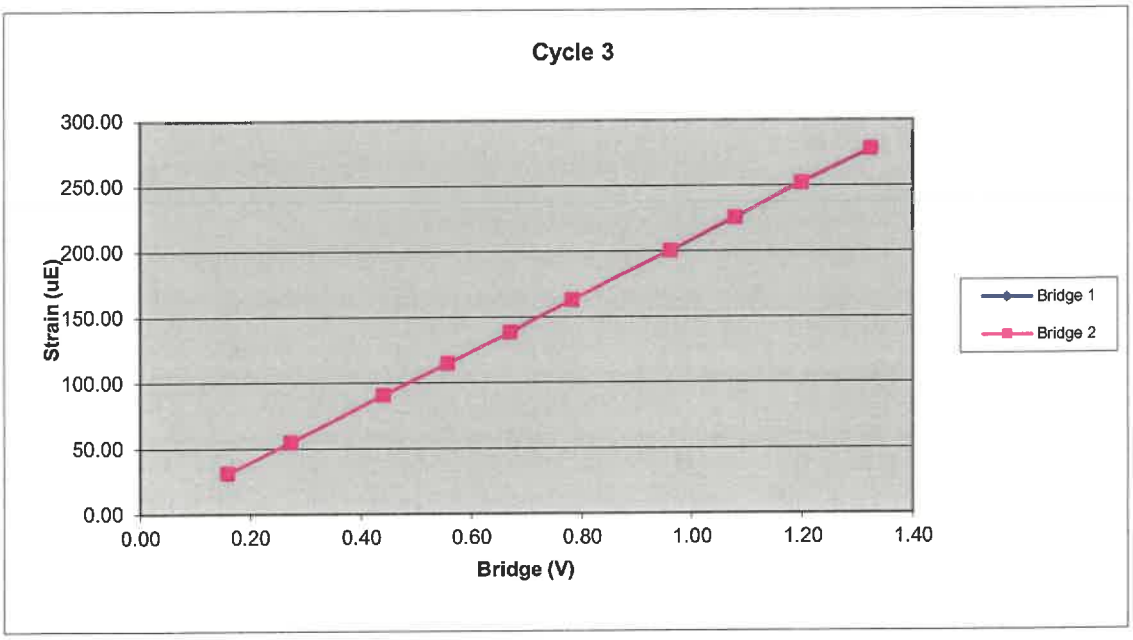
Force Strain Calibration	
EA (Kips)	**35621.25**
Offset	**134.95**
Correlation	**0.999985**



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

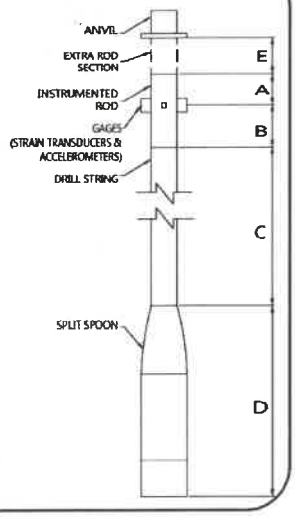
Drilling Company: SME
Rig Operator: S. EUBANKS
Engr/Geologist: N/A
Client Rep.: N/A
Analyzer Oper.: S. WILLIAMSON

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

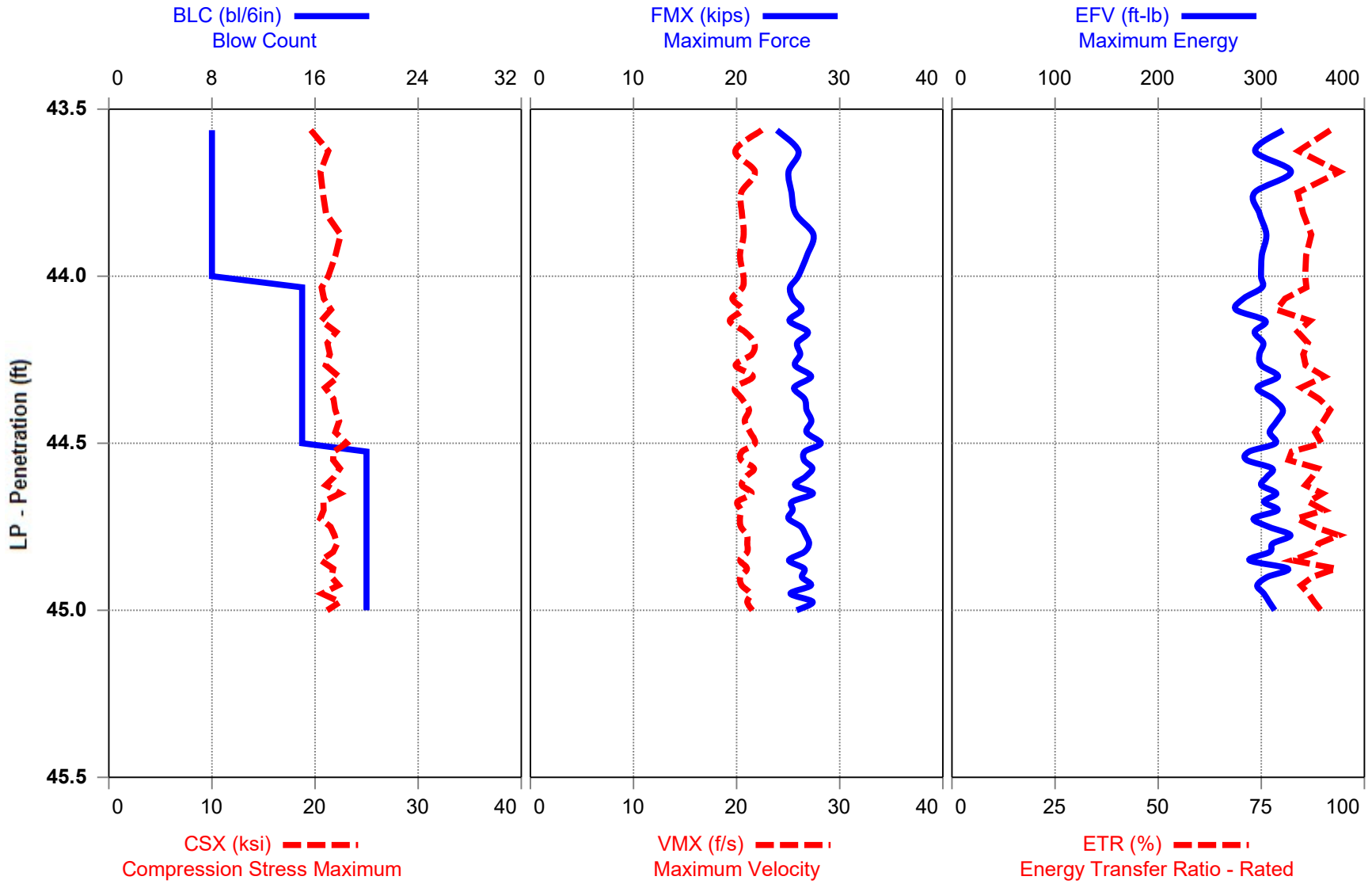
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 14-December-2023

Test started: 17-November-2023

CME-550X SN 293193 - 43.5-45.0 FEET

TEST HOLE B



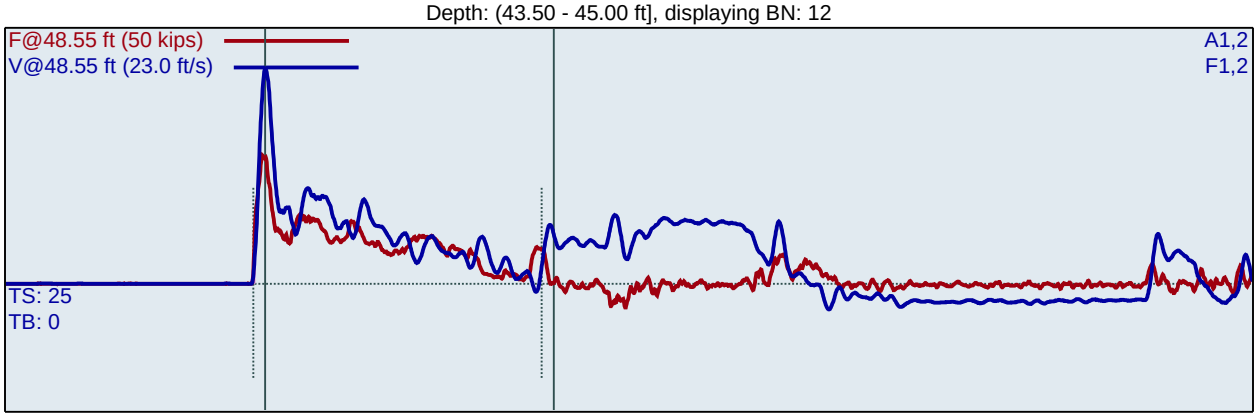
CME-550X SN 293193
JRW
TEST HOLE B

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.

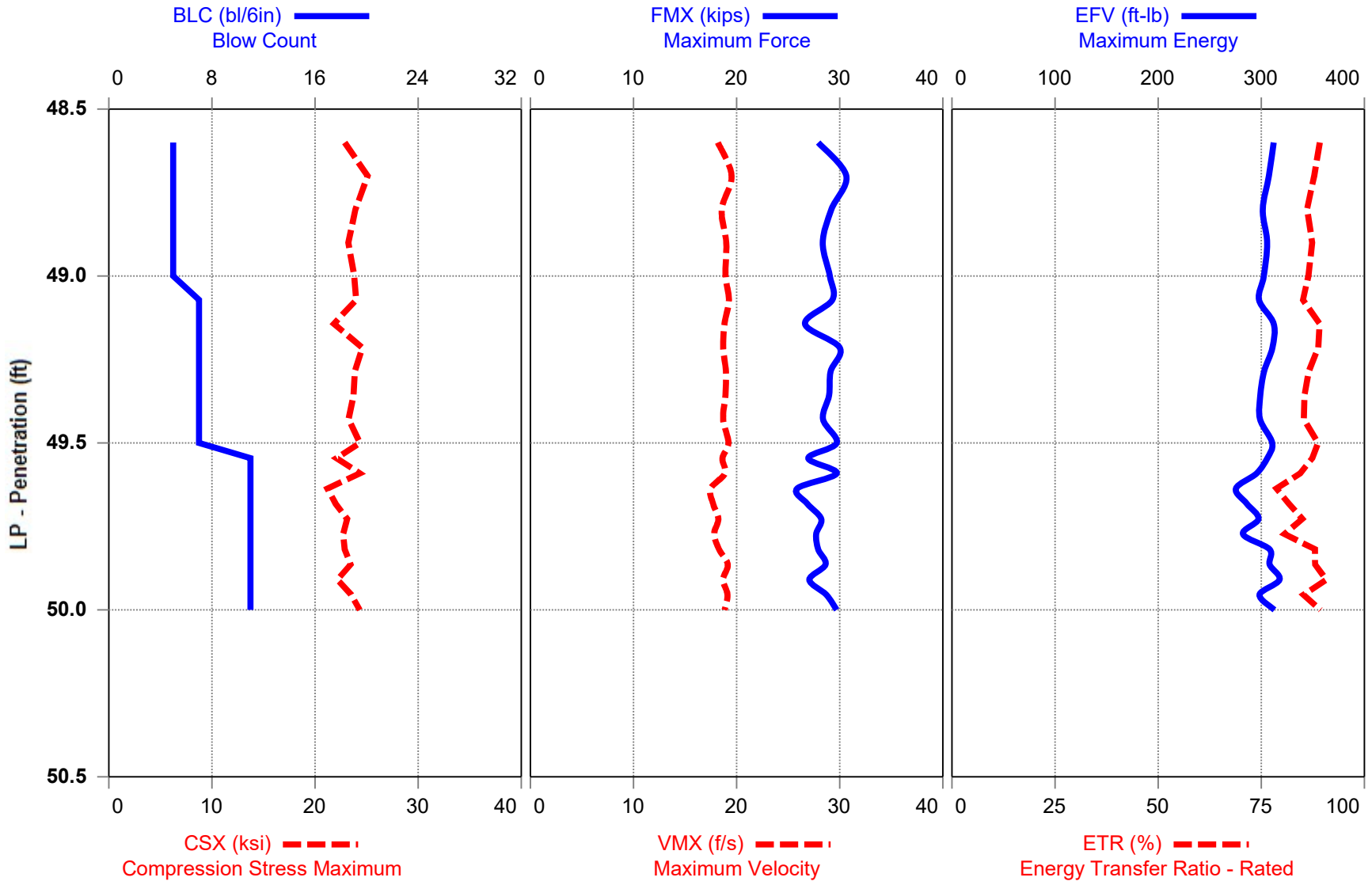
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 14-December-2023

Test started: 17-November-2023

CME-550X SN 293193 - 48.5-50.0 FEET

TEST HOLE B



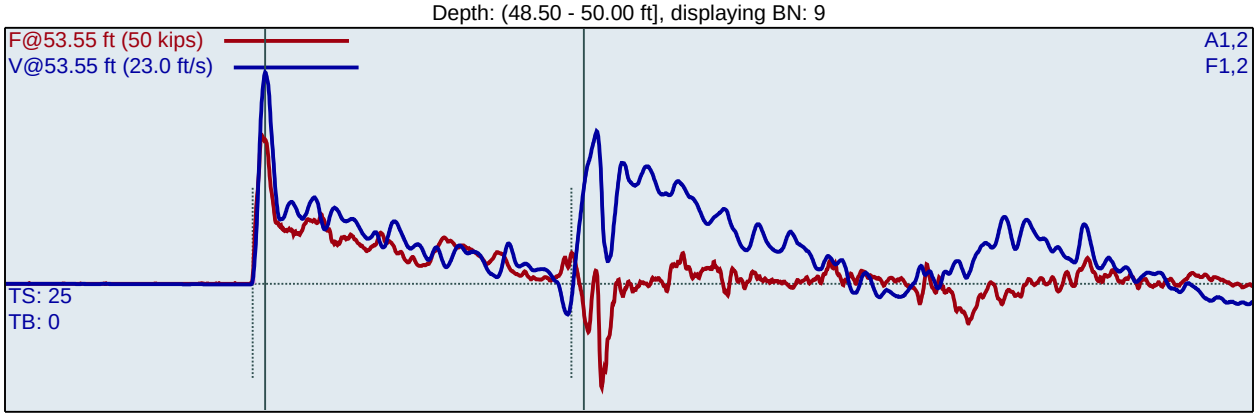
CME-550X SN 293193
JRW
TEST HOLE B

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.

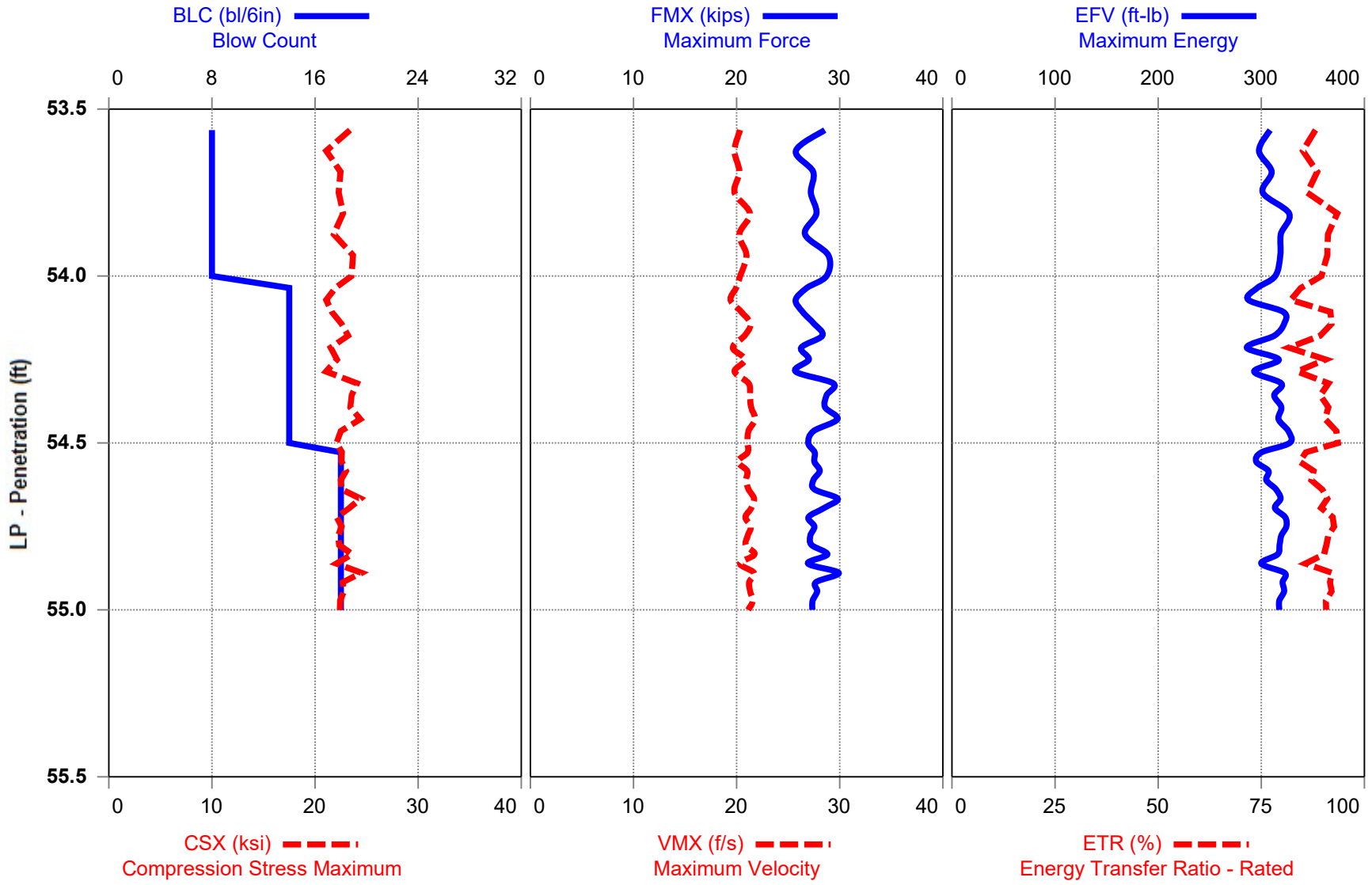
Pile Dynamics, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 14-December-2023

Test started: 17-November-2023

CME-550X SN 293193 - 53.5-55.0 FEET

TEST HOLE B



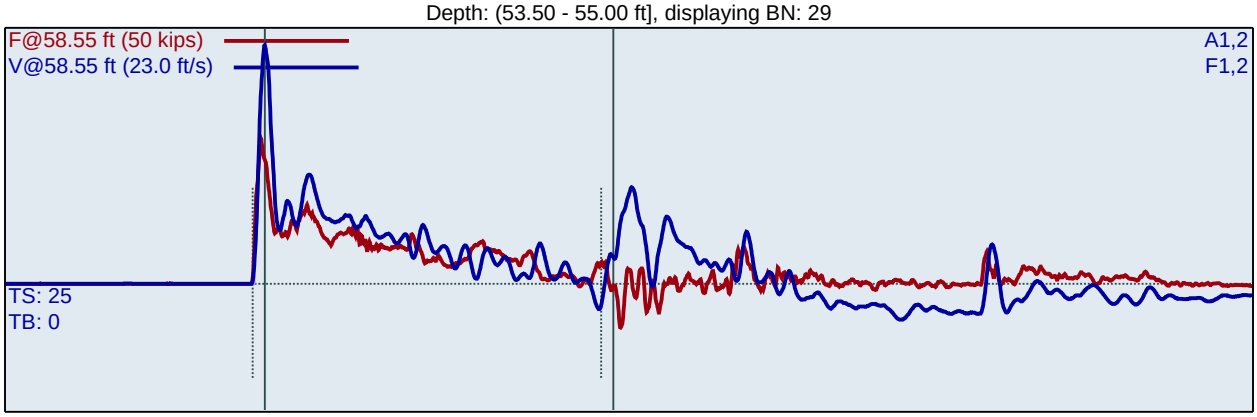
CME-550X SN 293193
JRW
TEST HOLE B

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					

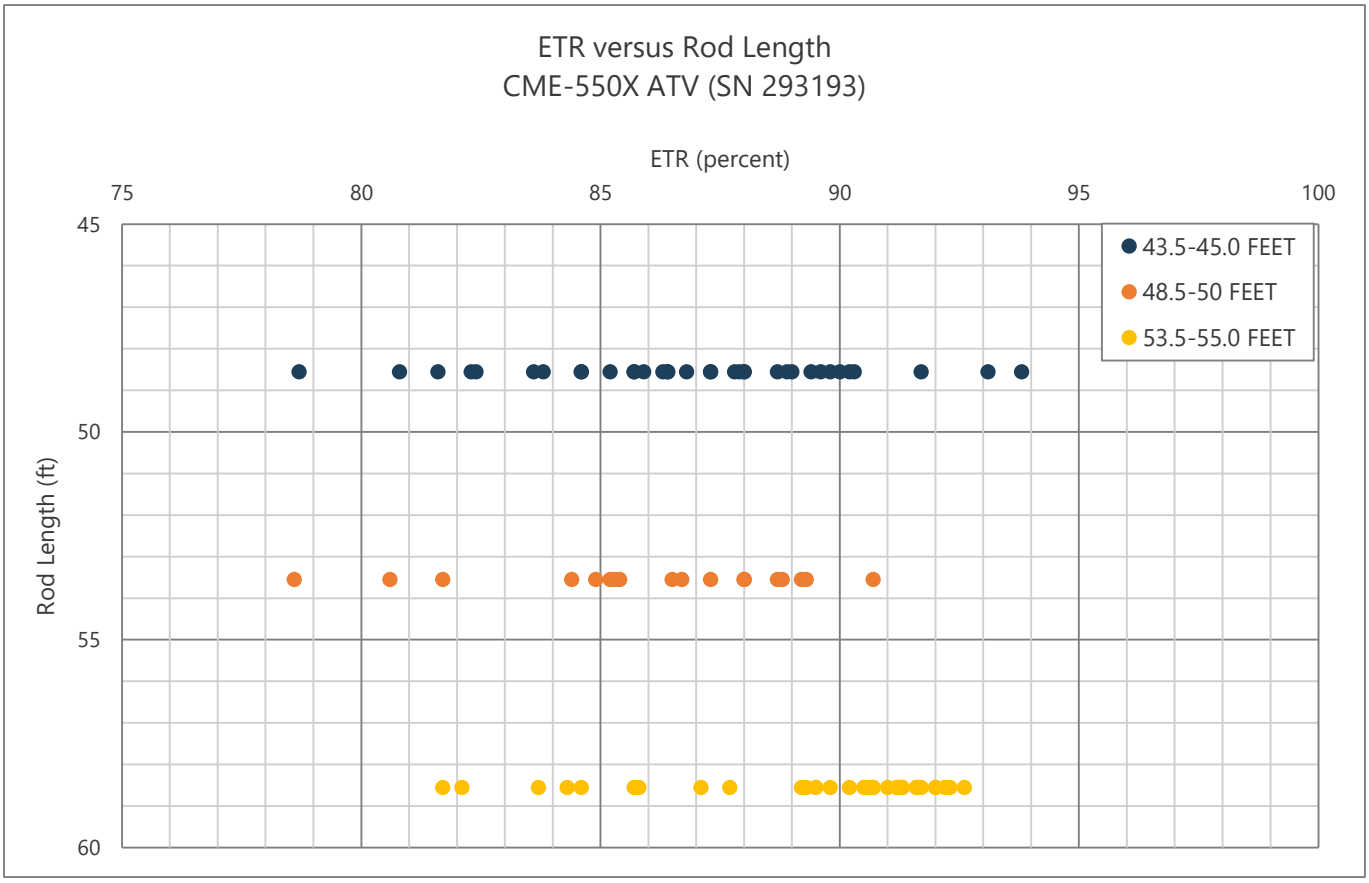
Sample Interval Time: 42.36 seconds.

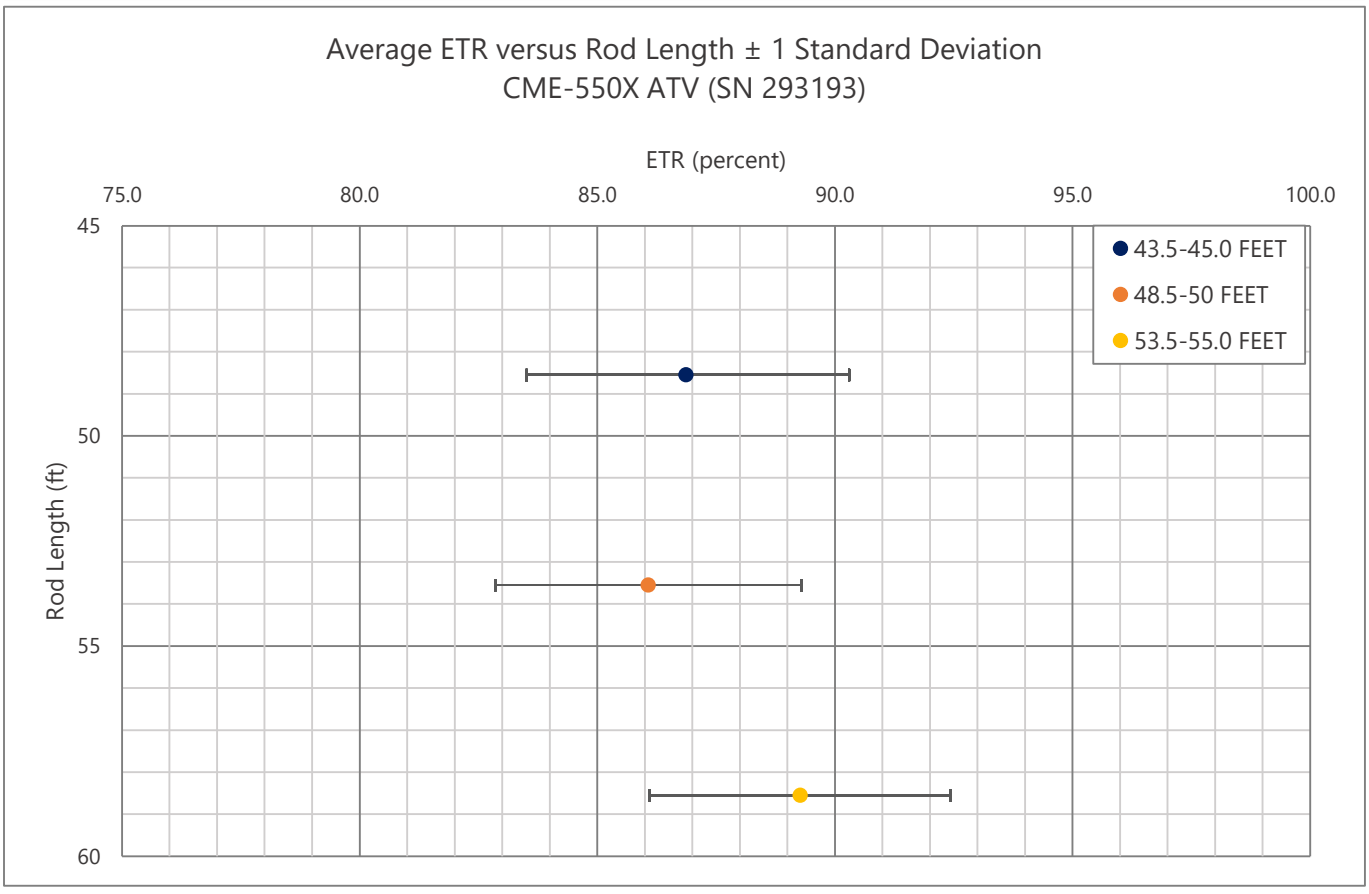
Summary of SPT Test Results

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

Memorandum

To: File – S&ME Project No.: 22350835A – TVA CRN Geotechnical Investigation, Oak Ridge, TN

From: Joseph R. Williamson, P.E. (NC & SC) and Jason S. Reeves, P.E. 6/14/23

Cc: Julie P. Robertson, P.G. 6/14/23

Date: June 14, 2023

Subject: Summary of SPT Energy Measurements – S&ME Diedrich D-50 Track (Serial No. 316) – Tested 6/8/23

♦ Purpose

In accordance with the project specifications, we have completed the Standard Penetration Test (SPT) energy measurements on the automatic hammer used with our Diedrich D-50 track-mounted drill rig (Serial No. 316). This testing was performed prior to the beginning of our field exploration services for this project. This service was performed by Mr. Joseph Williamson, P.E. (NC and SC) of S&ME on June 8, 2023, in general accordance with ASTM D4633. 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 the attachments. The testing procedures, equipment used during testing, and detailed results are presented in this memorandum.

♦ 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 the attachments. The instrumented AWJ drill rod has a cross-sectional area of 1.21 square inches (verified during equipment calibration) and an outside diameter of approximately 1-⅞ inches. Therefore, we calculate the inside diameter to be approximately 1.23 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.

♦ Testing and Observations

S&ME personnel were on site June 8, 2023, to observe and perform high-strain dynamic testing during SPT sampling on the Diedrich D-50 track-mounted drill rig operated by Frank Crane of S&ME. The measurements were taken during drilling and sampling of a test hole (Test Hole 2) at our office in Louisville, Tennessee. SPT energy measurements were recorded during four sample intervals that met the N-value requirements of ASTM D4633. The information presented in the tables below summarizes the equipment and tooling used during the SPT energy measurements. The SPT Energy Evaluation Form is included in the attachments.

Table 1: Drill Rig Information

Manufacturer	Diedrich
Model	D-50
Serial Number	316
Operator	F. Crane
Carrier	Track

Table 2: Hammer Information

Type / Model	Auto / Diedrich
Drop Height from Calibration Record (inches)	30.0
Calibration Hammer Weight (pounds)	139.66

Table 3: Drilling and Instrumented Rod Information

Drill Rod Type	AWJ
OD (inches)[1]	1.75
ID (inches)[1]	1.25
Cross-Sectional Area (in²)[2]	1.18
Typical Lengths (feet)	5
Instrumented Rod Type	AWJ (Serial No. 203)
OD (inches)[3]	1-⅞
ID (inches)[4]	1.23
Cross-Sectional Area (in²)[5]	1.21
Total Instrumented Rod Length (feet)[3]	2.0
Length Below Gages (feet)[3]	0.75
Split-Spoon Length (feet)[3]	2.84

[1] Per manufacturer's specifications.
[2] Calculated using OD and ID from manufacturer's specifications.
[3] Measured with engineer's tape measure at top of instrumented rod.
[4] Calculated using typical drill rod OD and Area from instrument rod calibration record.
[5] From instrument rod calibration record.

♦ Dynamic Testing Results

The total rod length from the instrumentation to the tip of the split-spoon sampler was determined by adding 3.59 ft to the drill rod length at each sample depth. The SPT Energy Measurement Data Summary tables in the attachments 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 4. Based on the test data, the automatic hammer on the Diedrich D-50 operated at an average rate of about 51 blows per minute (bpm) during dynamic testing. The measured average transferred hammer energy (EFV) of the four sample intervals tested ranged from 335 to 344 ft-lbs, which corresponds to Energy Transfer Ratio (ETR) values of 95.7 to 98.2%, respectively, based on a typical theoretical 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[6]
- Penetration vs. FMX[7]
- Penetration vs. EFV[8]
- Penetration vs. CSX[9]
- Penetration vs. VMX[10]
- Penetration vs. ETR[11]
- ETR vs. Rod Length
- Average ETR vs. Rod Length

Table 4: 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 (Residual)	Avg. BPM	Avg. EFV (ft-lbs)	Avg. ETR (%)
1	31.0 – 32.5	32.0	35.59	5-14-19 / **33**	Lean Clay	50.2	340	97.2
2	33.5 – 35.0	34.0	37.59	4-11-16 / **27**	Lean Clay	50.4	336	96.1
3	36.0 – 37.5	36.0	39.59	7-12-19 / **31**	Lean Clay	50.7	344	98.2
4	38.5 – 40.0	39.0	42.59	5-11-17 / **28**	Lean Clay	50.7	335	95.7
					Overall Average	**50.5**	**339**	**96.8**

The overall average transferred hammer energy for the automatic hammer on the Diedrich D-50 track-mounted drill rig was 339 foot-pounds, with an average ETR of 96.8%.

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

Attachments

Certificate of Proficiency

Instrumented Rod and Accelerometer Calibration Sheets

SPT Energy Evaluation Form

Diedrich D-50 Track (SN 316) SPT Energy Measurements Summary Plots and Tables

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

Certificate of Calibration

Pile Dynamics, Inc. certifies that the

Pile Driving Analyzer®, Model PAX

Serial Number: 3733L

was calibrated on 22 MAY 2023

using a PDA Calibration Box whose output was calibrated with test equipment traceable to NIST.

This certificate is valid for 2 years from above date.

PILE DYNAMICS, INC. CORPORATE SEAL 1972 OHIO

Tested by: [signature]

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

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

Reviewed 6/5/2023

PDI Certificate of Calibration

PDI PDA Model PAX Serial # 3733L

Cal Date: May 19, 2023

Cal Due: May 18, 2025

Temperature: 74 deg. F

Humidity: 43%

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

Manufactured by Pile Dynamics, Inc.

Procedure used: PDA Calibration Procedure 2016-2, Revision 20160422
Actual Measurements: Attach PDA Calibration Data Sheet

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

Calibration Standards Utilized

PDA Cal Box serial 000002, verified on 21June2022.

Calibration performed by:

Marcus Johnson, Technician

Reviewed by:

Bob Sprenger, Product Support Manager

PDA CC-9 Issued 20160422

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

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

PDA Calibration Data Sheet Revision number 20160422
Use Calibration Procedure Number 2016-2, Revision 20160422

Reviewed 6/5/2023 AMP

PDI PDA Model PAX Serial # 3733L Cal Date: May 19, 2023

Reference Notes: Connect PDA Cal box to PDA sensor inputs. Set F3 & F4 to 147.5 and A3 & A4 to 1000. PDA to display the quantities FMX, VMX, and EMX. Select metric units. Set AREa = 244 cm^2 . Set EM = 2100 tonnes/cm^2 . Set FRequency to 50000HZ. Record actual value displayed:

Channel 3 (F3 & V3)

Calculation	Expected	Acceptable Range	Measured	Acceptable	Not Acceptable
FMX	378 tonnes	370 to 386	376	X	_____
VMX (PR)	4.21 m/sec.	4.13 to 4.29	4.15	X	_____
EMX (PR)	7.94 tonnes m	7.62 to 8.26	7.83	X	_____

Channel 4 (F4 & V4)

Calculation	Expected	Acceptable Range	Measured	Acceptable	Not Acceptable
FMX	378 tonnes	370 to 386	374	X	_____
VMX (PR)	4.21 m/sec.	4.13 to 4.29	4.13	X	_____
EMX (PR)	7.94 tonnes m	7.62 to 8.26	7.75	X	_____

Calibration performed by:

MCJ

Marcus Johnson, Technician

Reviewed by:

Bob Sprenger, Product Support Manger

PDA DS-10 Issued 20160422

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Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

Reviewed TND 6/5/2023

PDI Certificate of Calibration

PDI SPT Drill Rod Serial # 203AWJ

Cal Date: May 23, 2023 Cal Due: May 22, 2025

Temperature: 74 deg. F Humidity 42%

Manufactured by Pile Dynamics, Inc.
Calibrated at: Pile Dynamics, Inc., 30725 Aurora Road, Cleveland, OH 44139
Procedure used: SPT Drill Rod Calibration Procedure 2016-4, Revision 20160422
Calibration Data: Attach SPT Rod Data Sheet DS-17

Equipment was found to be

X in tolerance As Received _____ out of tolerance As Received

X in tolerance As Returned _____ out of tolerance As Returned

Calibration Standards Utilized

1. PDI SPT Calibration Signal Conditioning Unit #000001, verified on 20220909
2. PDI Load Cell #75, Certificate # 22005433-181-00675
3. Capacitec Displacement Sensor #2034, Certificate # 22005433-177-00618
4. Capacitec Displacement Sensor #2040, Certificate # 22005433-177-00618
5. Capacitec Displacement Mainframe #4004-671, Certificate # 22005433-177-00618
7. National Instruments USB-6210 DAQ serial number 159AFDE, Certificate # 22005433-177-00617

Calibration performed by:

Sean Bonner, Technician

Reviewed by:

Robert Sprenger, Product Support Manager

SPT CC-16 Issued 20160425

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

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

SPT Calibration Data Sheet Revision number 20160426
Use Calibration Procedure Number 2016-6, Revision 20160422

SPT Drill Rod Data

Serial Number: 203AWJ Calibration Date: May 23, 2023

Temperature: 74 Deg F Humidity: 42%

Calibration performed in accordance with PDI SPT Calibration Procedure 2016-4, Revision 20160422

As Received (circle one): (Operational) - Malfunctioning - Damaged

Calibration data
Pre-Load: 1. 7226 lbs. 2. 7257 lbs. 3. 7245 lbs.
Total Load: 1. 18750 lbs. 2. 18900 lbs. 3. 18400 lbs.

Common typical theoretical EA values based on SPT Rod Type:
AW: 35400 NW: 43100 or 68100 N3: 70800 BW:52344

EA Theoretical 35400 EA Measured 35236.75 Error 0.46%
Within 4% Tolerance: **Y** / N

Alternative EA verification: Measure wall thickness, calculate area and multiply by 30000. (Use spreadsheet for calculation)

Calibration values

Channel 1:	As Found: (last cal): 213.1	As Left: 210.82	Within 5% Tolerance: **Y** / N
Channel 2:	As Found: (last cal): 212.91	As Left: 210.55	Within 5% Tolerance: **Y** / N
EA:	As Found: (last cal): 35691.1	As Left: 36210.02	Difference: 1.45%

Calibration performed by:

Sean Bonner

Sean Bonner, Technician

Reviewed by:

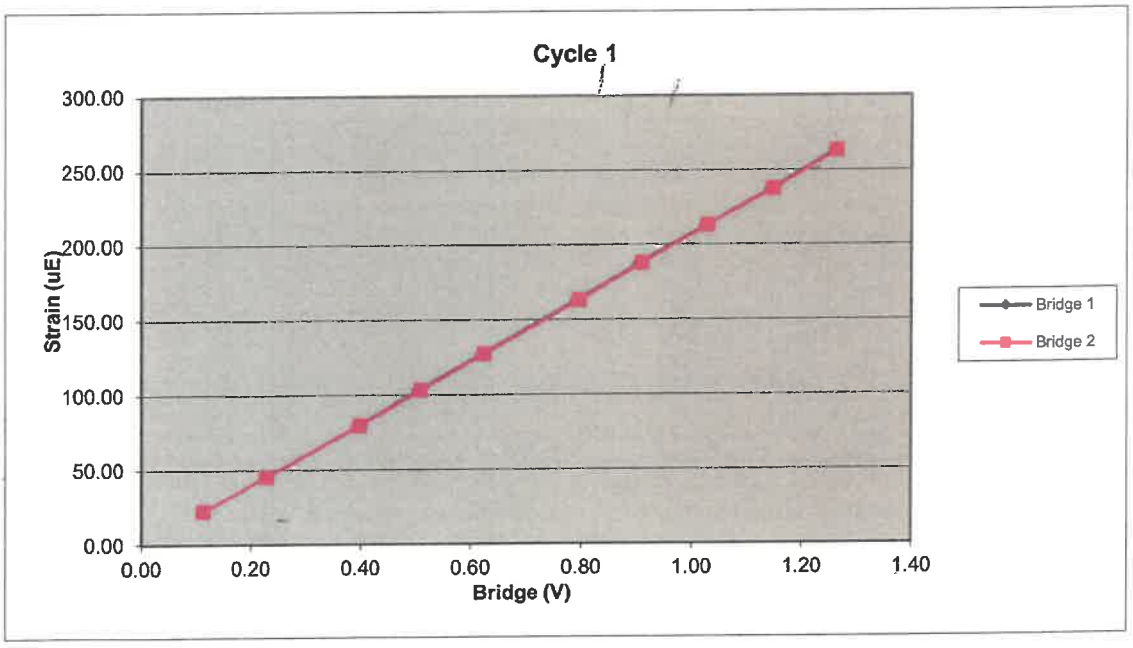
Robert Sprenger, Product Support Manager

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

203AWJ		Cycle 1		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	865.79	21.69	0.11	0.11
3	1747.56	44.88	0.23	0.23
4	3032.21	79.18	0.40	0.40
5	3859.50	102.90	0.51	0.51
6	4747.02	127.03	0.62	0.62
7	6064.42	163.03	0.79	0.80
8	6930.50	187.70	0.91	0.91
9	7843.76	212.75	1.03	1.03
10	8759.06	237.12	1.15	1.15
11	9650.58	262.68	1.26	1.26

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7640.67**	**Force Calibration (lb/V)**	**7626.60**
Offset	3.38	Offset	-0.21
Correlation	0.999999	Correlation	0.999997
Strain Calibration (µE/V)	**209.98**	**Strain Calibration (µE/V)**	**209.60**
Offset	-3.04	Offset	-3.14
Correlation	0.999976	Correlation	0.999971

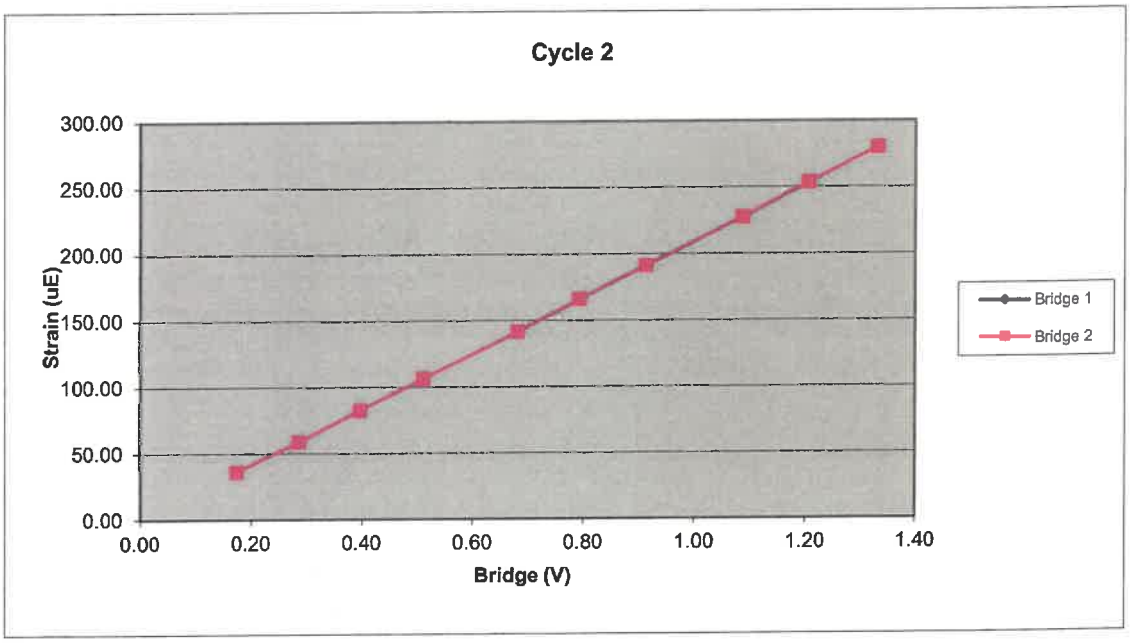
Force Strain Calibration	
EA (Kips)	**36385.07**
Offset	114.40
Correlation	0.999973



203AWJ		Cycle 2		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	1314.77	35.40	0.17	0.17
3	2166.52	58.06	0.28	0.28
4	3009.50	81.68	0.40	0.39
5	3885.33	105.73	0.51	0.51
6	5194.73	140.93	0.68	0.68
7	6053.99	165.43	0.79	0.79
8	6954.28	190.27	0.91	0.91
9	8292.35	226.71	1.09	1.09
10	9204.43	252.85	1.21	1.21
11	10152.30	279.20	1.33	1.33

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7627.71**	**Force Calibration (lb/V)**	**7632.02**
Offset	**-7.28**	Offset	**-3.86**
Correlation	**0.999999**	Correlation	**0.999999**
Strain Calibration (µE/V)	**210.48**	**Strain Calibration (µE/V)**	**210.60**
Offset	**-1.73**	Offset	**-1.64**
Correlation	**0.999979**	Correlation	**0.999984**

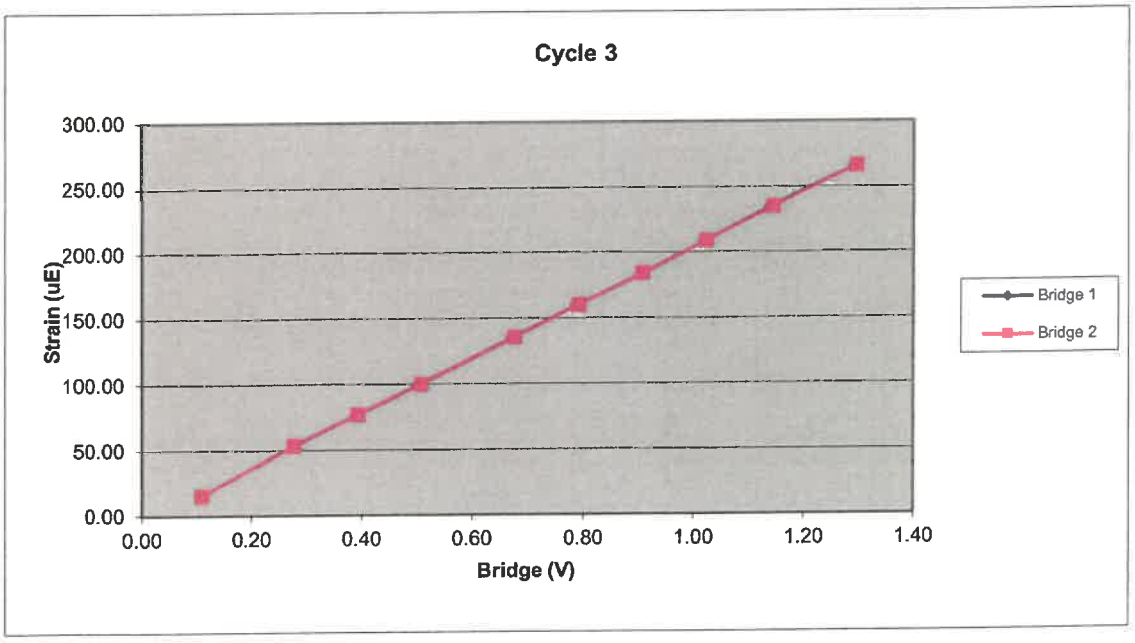
Force Strain Calibration	
EA (Kips)	**36237.46**
Offset	**55.75**
Correlation	**0.999983**



203AWJ		Cycle 3		
Sample	**Force (lb)**	**Strain (µE)**	**Bridge 1 (V)**	**Bridge 2 (V)**
1	0.00	0.00	0.00	0.00
2	816.08	14.67	0.11	0.11
3	2104.72	52.88	0.28	0.28
4	2987.66	76.61	0.39	0.39
5	3851.02	99.83	0.50	0.51
6	5140.54	135.37	0.67	0.67
7	6035.47	159.90	0.79	0.79
8	6921.92	183.83	0.91	0.91
9	7791.12	208.45	1.02	1.02
10	8726.70	234.43	1.14	1.14
11	9881.90	265.78	1.30	1.30

Bridge 1		**Bridge 2**	
Force Calibration (lb/V)	**7634.36**	**Force Calibration (lb/V)**	**7626.44**
Offset	**-0.70**	Offset	**-7.63**
Correlation	**0.999997**	Correlation	**0.999999**
Strain Calibration (µE/V)	**210.43**	**Strain Calibration (µE/V)**	**210.21**
Offset	**-6.40**	Offset	**-6.59**
Correlation	**0.999951**	Correlation	**0.999954**

Force Strain Calibration	
EA (Kips)	**36276.49**
Offset	**231.85**
Correlation	**0.999963**



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

Calibration Factors	203AWJ		
Bridge 1 (µE/V)	210.30	Bridge 2 (µE/V)	210.14
EA Factor (Kips)	36299.67	Area (in^2)	1.21

Calibrated by: Sean Bonner
Calibrated Date: 5/23/2023

Pile Dynamics Inc
30725 Aurora Rd
Solon, OH 44139

Traceable to N.I.S.T.

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

PDI Certificate of Calibration

Reviewed 6/5/2023

PDI Accelerometer Calibration

Model Kicher Serial # K4664

Cal Date: 24May2023 Cal Due: 23May2025

Temperature: 73.4 deg. F Humidity 41%

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

Manufactured by Pile Dynamics, Inc.

Procedure used: MAC Accelerometer Calibration Procedure 8G-4 Revision # 20210801

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: 371.8 mv/5000g

Calibration Standards Utilized

MAC PDA 8G, serial number 5161 LE, verified on 22 December 2022

Calibration performed by:

William Johnson, Technician

Reviewed by:

Bob Sprenger, Product Support Manager

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

Accelerometer Calibration Certificate
Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc.
Calibration performed on 24May2023

Serial No:	K4664	**Temperature:**	73.4 °C
Model:	PR	**Humidity:**	41%
Calibrated on:	Channel 3 on 8G 5161 LE		
Ref Acc 1:	72517! 1049 g's/volt	**Cal on:**	24Mar2022
Ref Acc 2:	72505! 1035 g's/volt	**Cal on:**	24Mar2022

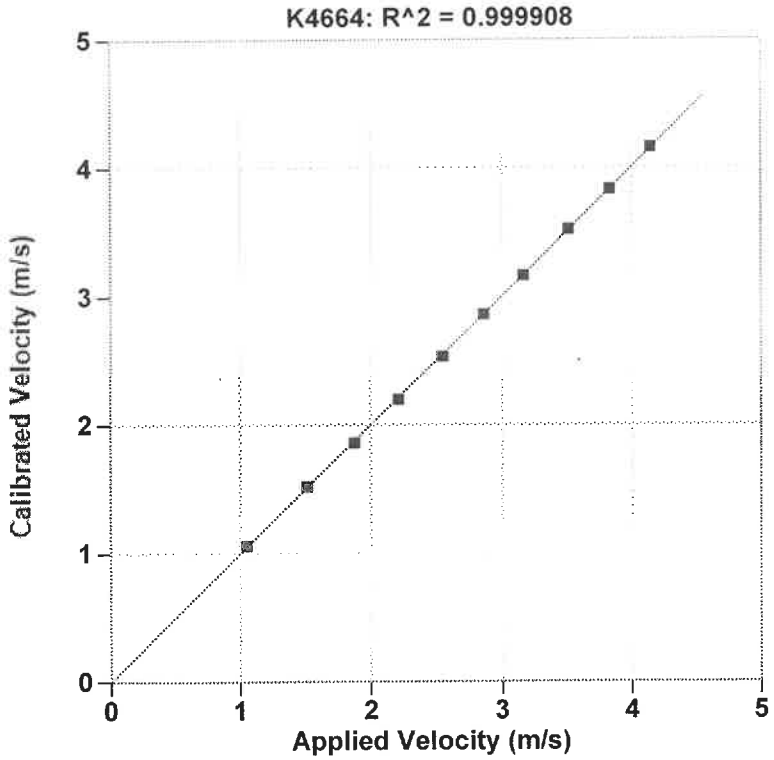
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

371.8 mv/5000g
(74.4 µv/g)
R^2: 0.999908 [Chip programmed]

Operator: William Johnson

Signed



Reference Velocity	S/N K4664 Velocity
m/s	m/s
1.050	1.058
1.517	1.521
1.873	1.860
2.209	2.198
2.548	2.532
2.860	2.859
3.163	3.161
3.512	3.521
3.832	3.832
4.145	4.157

Maximum Acceleration: 913 g's

Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

PDI Certificate of Calibration

Reviewed 6/5/2023

PDI Accelerometer Calibration

Model Kicher Serial # K4665

Cal Date: 24May2023 Cal Due: 23May2025

Temperature: 73.4 deg. F Humidity 41%

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

Manufactured by Pile Dynamics, Inc.

Procedure used: MAC Accelerometer Calibration Procedure 8G-4 Revision # 20210801

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: 371.2 mv/5000g

Calibration Standards Utilized

MAC PDA 8G, serial number 5161 LE, verified on 22 December 2022

Calibration performed by:

William Johnson, Technician

Reviewed by:

Bob Sprenger, Product Support Manager

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

Accelerometer Calibration Certificate
Pile Dynamics, Inc.

Calibrated by Pile Dynamics, Inc.
Calibration performed on 24May2023

Serial No:	K4665	**Temperature:**	73.4 °C
Model:	PR	**Humidity:**	41%
Calibrated on:	Channel 3 on 8G 5161 LE		

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

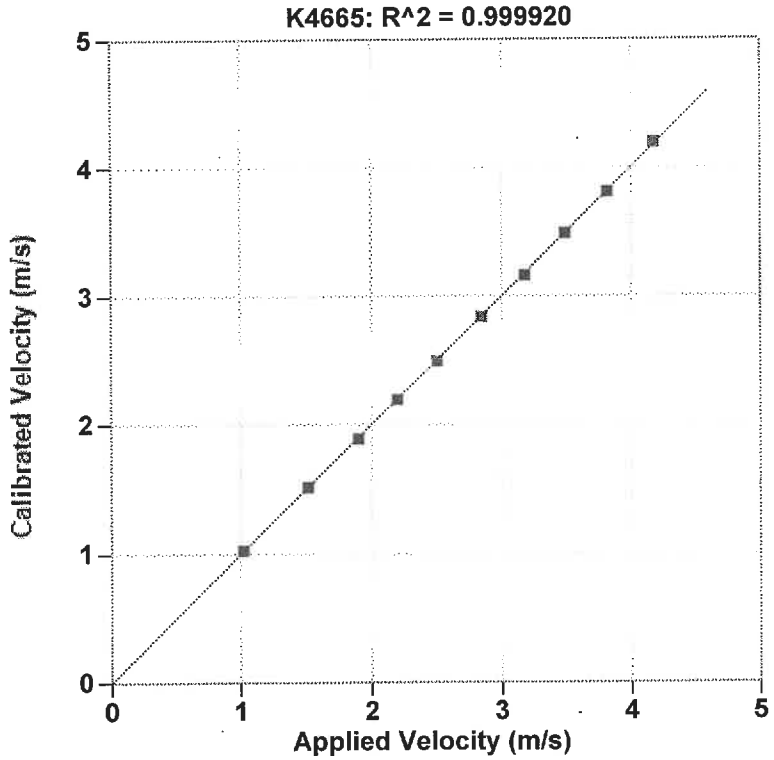
Reference accelerometer calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

PDA CALIBRATION FACTOR

371.2 mv/5000g
(74.2 µv/g)
R^2: 0.999920 [Chip programmed]

Operator: William Johnson

Signed



Reference Velocity	S/N K4665 Velocity
m/s	m/s
1.019	1.030
1.514	1.517
1.897	1.888
2.196	2.194
2.500	2.495
2.845	2.840
3.176	3.164
3.488	3.490
3.815	3.813
4.176	4.195

Maximum Acceleration: 918 g's

Form No. QA-SPTEEVAL-CRN-01
Revision No. : 0
Revision Date:6/8/2023

SPT Energy Evaluation Form

Document Control Number: CRN-23-0040-00

Project: TVA CRN GEOTECHNICAL INV. OAK RIDGE, TN **Date (s):** 6/8/23
Project No.: 22350835A **Weather:** CLEAR 70's
Boring No.: TEST HOLE 2 **Drill Rod Type:** 5' LONG AWS

On-site Personnel 6/8/23

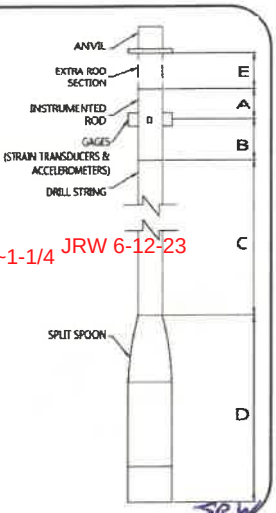
Drilling Company: ~~FE~~ SRW SE, ME
Rig Oper./Helper: F. CRANE / A. BLANKENSHIP
Engr/Geologist: J. BAINES
PDA Operator: J. WILLIAMSON

Rig/Hammer Info

Drill Rig Make/Model: DIEDRICH D-50
Carrier Type: TRACK
Rig Serial No.: 316
Hammer Type/Model: AUTO / DIEDRICH
Hammer Serial No.: ~~316~~ 316 SRW
Hammer Drop System: CHAIN LIFT W/ FREE FALL
Lubrication Condition: GREASED PER MAN. RECS.
Manufacturer Recommended Operation Rate (bpm): 50-55
Drop Height from calibration record (in.): 30.0 JRW 6/12/23
Calibration hammer weight ~~(kips)~~ (lbs) 139.66 JRW 6/12/23
Anvil Dimension ~~(in.)~~ (ft) 2.4 JRW 6/12/23
Drilling Method: 3-¼" HSA

Rod Info

(E) Rod Length Above Instr. Rod (if applicable): 0.40 ft
(A) + (B) Instr. Rod Length: 2.0 ft
(A + E) Impact to Gages: ~~1.65~~ 2.40 ft 6/12/23 SRW
(B) Instr. Rod Below Gages: 0.75 ft
(D) Spoon Length: 2.84 ft
Instr. Rod Inside Dia.: ~~1-½~~ ~1-1/4 in. JRW 6-12-23
Instr. Rod Outside Dia.: 1-7/8 in.
Instr. Rod Area: 1.21 in²
Instr. Rod S/N: 203 AWS
PDA Make/Model: PDI / PAX
PDA Serial No.: 3733L
6/8/23 Calib. Pulse Test (y/n): Y



SRW 6/8/23

Gage Information

FACTOR

Gage		Serial No.	Calibration ~~Date~~
Accel.	A3	K4664	371.8
	A4	K4665	371.2
Strain	F3	203 AWS-1	210.30
	F4	203 AWS-2	210.14

Date of Test	Test Depth Increment (ft)	Test Time Start / Stop (Military)	Length of Drill String (ft) (C)	(LE) Length Below Gages (ft) (B)+(C)+(D)	Avg. Meas. Rate (BPM)	SPT Blow Counts 6 in.	12 in.	18 in.	extra	N-value	Drop Height in Tolerance (y/n)
6/8/23	~~28.5-30.0~~ 28.5-30.0 (Sub FT)	11:57	30	~~33.59~~ 33.59	~50	11	17	21	1	38	y
	31.0-32.50	12:09	32 SRW	35.59	~50	5	14	19	0	33	y
	~~33.50-35.00~~	SRW 6/8/23	~~35~~ 34	~~38.59~~ 37.59							
	33.50-35.00	13:12		37.59	~50	4	11	16	0	27	y
	36.00-37.50	13:22	36 SRW	39.59	~50	7	12	19	0	31	y
	38.5-40.0	13:37	~~38~~ 39 6/12/23	42.59	~51	5	11	17	0	28	y

JRW 6/9/23 See note below.

Comments: (1) If **there are any nonconformances or deficiencies identified during the testing, immediately pause the drilling and testing activities and notify the Site Manager** and describe them in the space below; (2) Note any unusual hammer operating conditions that affect the hammer performance, or changes in operating conditions (e.g. verticality, weather, or lubrication between trials); (3) Note any changes in rod diameter along drill string and record locations of short rod sections; (4) Prepare a sketch or take a picture of the instrumented drill rod assembly and indicate the relative location and orientation of the strain gauges, accelerometers, and LE Datum; (5) Note: Identify all attached pages, including photographs, with the Project No., Boring No., and date.

28.5-30.0 FT SAMPLE - FIRST SEVERAL BLOWS HAD LOW ENERGY (50-60%) REMAINING BLOWS OF ALL OTHER DATA HAD ~~ENERGY~~ ENERGY VALUES RANGING FROM APPROX. 85-95% SRW 6/8/23
DRILLER STATED THIS IS LIKELY DUE TO HYDRAULIC FLUID IN HAMMER WARMING UP, RIG ~~ALSO~~ ALSO HAD RECENT MAINTENANCE, SYSTEM COULD HAVE HAD AIR JRW 6/8/23 SRW 6/8/23 ~~BUBBLES~~ BUBBLES THAT WORKED ITSELF OUT. EACH SAMPLE CLASSIFIED AS A LEAN CLAY (CL).

Note: Measurements shall be made to nearest 0.01 ft or 1/8 in. as applicable.

Joseph Williamson — Prepared By (print/signature) SPT Energy Lead — 6/13/23 Date

Reviewed By (print/signature) Site Manager — 06/14/2023 Date

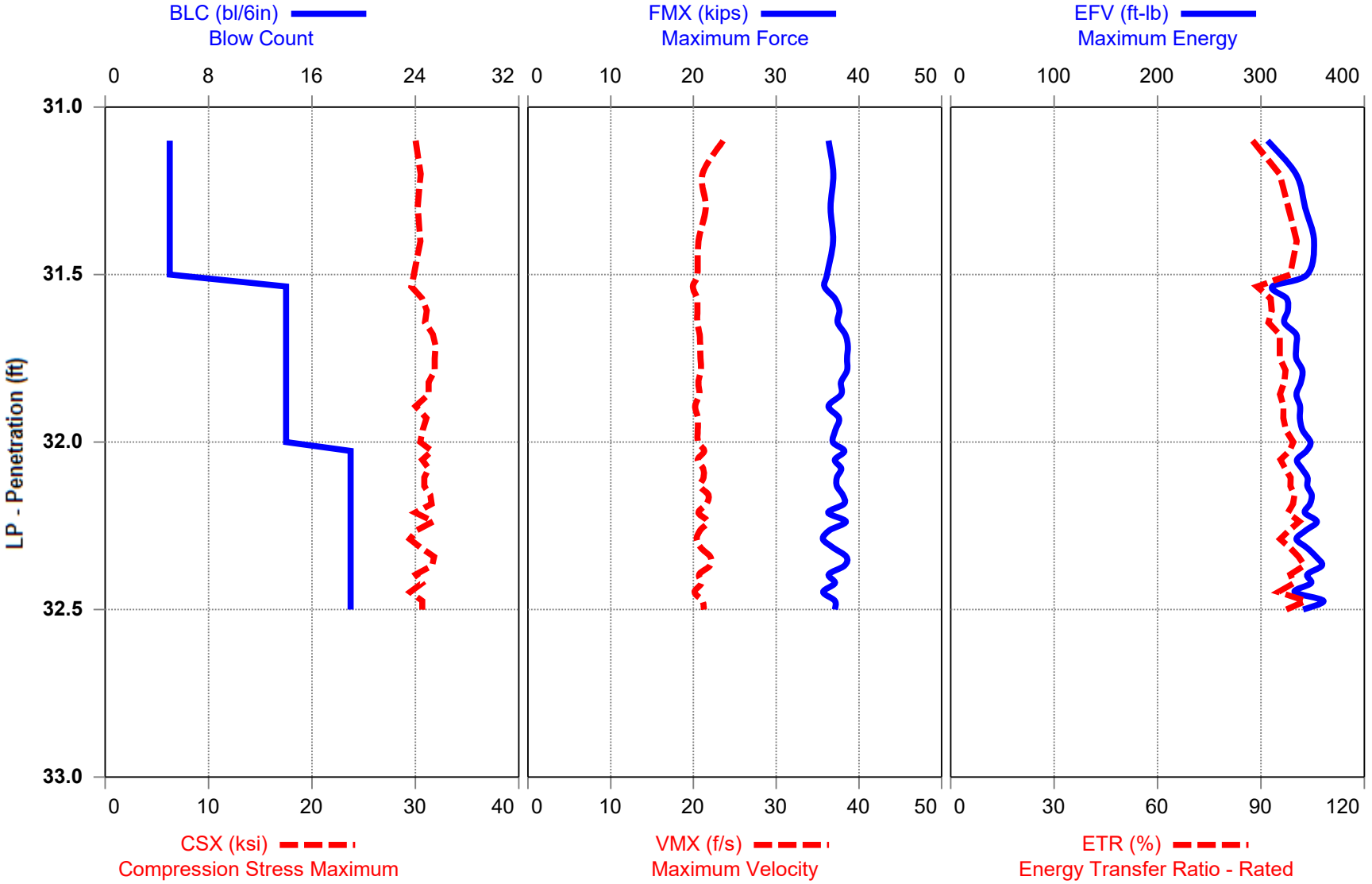
S&ME, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 13-June-2023

Test started: 08-June-2023

DIEDRICH D-50 (SN 316) - 31.0-32.5 FEET

TEST HOLE 2



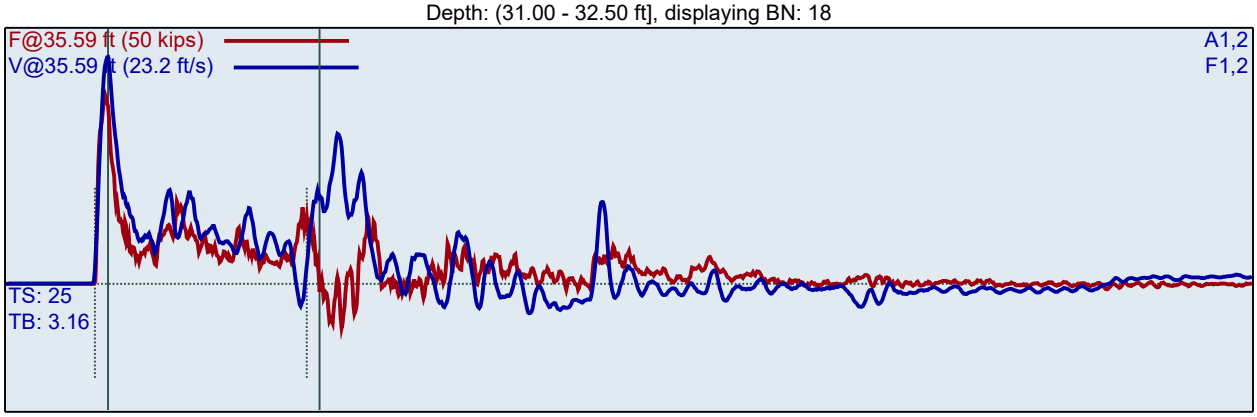
DIEDRICH D-50 (SN 316)
JRW
TEST HOLE 2

SN 316 SPT Energy Measurements
Interval start: 6/8/2023

AR: 1.21 in^2
LE: 35.59 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (31.00 - 32.50 ft], displaying BN: 18



F1 : [203 AWJ-1] 210.3 PDICAL (1) FF1
F2 : [203 AWJ-2] 210.14 PDICAL (1) FF1

A1 (PR): [K4664] 371.8 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 371.2 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#	BC /6"	LP ft	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
1	5	31.10	1.9	36	23.6	1.88	30.0	1.22	306	87.5
2	5	31.20	49.3	37	21.1	1.24	30.5	1.20	334	95.4
3	5	31.30	49.9	37	21.5	1.22	30.2	1.20	343	97.9
4	5	31.40	50.8	37	20.6	1.20	30.5	1.19	351	100.4
5	5	31.50	51.0	36	20.5	1.20	29.9	1.20	345	98.4
6	14	31.54	50.2	36	19.9	0.63	29.6	0.42	311	88.8
7	14	31.57	50.4	37	20.5	0.57	30.7	0.43	325	92.8
8	14	31.61	50.5	38	20.5	0.53	31.1	0.43	326	93.1
9	14	31.64	50.3	37	20.5	0.50	30.9	0.43	323	92.2
10	14	31.68	50.0	38	20.7	0.51	31.7	0.43	334	95.4
11	14	31.71	50.4	39	20.8	0.47	32.0	0.41	334	95.4
12	14	31.75	50.3	39	20.9	0.44	31.9	0.43	334	95.4
13	14	31.79	50.1	39	20.9	0.46	31.9	0.43	340	97.1
14	14	31.82	50.0	38	20.6	0.46	31.3	0.39	339	96.7
15	14	31.86	50.8	38	20.7	0.45	31.3	0.44	334	95.5
16	14	31.89	50.3	36	20.2	0.46	30.0	0.39	338	96.5
17	14	31.93	51.0	38	20.5	0.44	31.1	0.43	338	96.4
18	14	31.96	49.6	37	20.5	0.44	30.7	0.42	340	97.2
19	14	32.00	50.5	37	20.6	0.46	30.5	0.43	348	99.3
20	19	32.03	50.1	38	21.3	0.41	31.6	0.32	344	98.2
21	19	32.05	50.8	37	20.5	0.41	30.7	0.32	335	95.6
22	19	32.08	49.8	38	21.2	0.42	31.3	0.31	339	97.0
23	19	32.11	50.9	37	21.2	0.42	30.9	0.32	345	98.6
24	19	32.13	49.2	37	20.8	0.44	30.9	0.31	345	98.5
25	19	32.16	50.2	38	21.8	0.40	31.4	0.32	349	99.7
26	19	32.18	50.2	38	21.6	0.40	31.6	0.32	347	99.3
27	19	32.21	50.3	36	20.6	0.41	30.0	0.31	342	97.8

28	19	32.24	49.5	38	21.7	0.40	31.7	0.32	354	101.1
29	19	32.26	50.3	36	20.8	0.41	30.1	0.31	344	98.1
30	19	32.29	50.5	36	20.4	0.39	29.5	0.31	334	95.5
31	19	32.32	49.6	37	20.9	0.40	30.5	0.32	345	98.5
32	19	32.34	50.7	38	22.0	0.40	31.8	0.32	353	100.9
33	19	32.37	49.9	38	22.0	0.40	31.6	0.32	359	102.5
34	19	32.39	50.3	36	20.7	0.39	30.0	0.31	345	98.5
35	19	32.42	50.0	37	21.0	0.38	30.7	0.32	348	99.5
36	19	32.45	50.6	36	20.1	0.37	29.5	0.32	333	95.0
37	19	32.47	49.8	37	21.1	0.40	30.7	0.32	360	102.9
38	19	32.50	49.8	37	21.3	0.36	30.7	0.32	341	97.3
		Average	50.2	37	20.9	0.44	30.9	0.36	340	97.2
		Std Dev	0.4	1	0.5	0.06	0.7	0.05	10	2.9
		Maximum	51.0	39	22.0	0.63	32.0	0.44	360	102.9
		Minimum	49.2	36	19.9	0.36	29.5	0.31	311	88.8
					N-value: 33					

Sample Interval Time: 44.14 seconds.

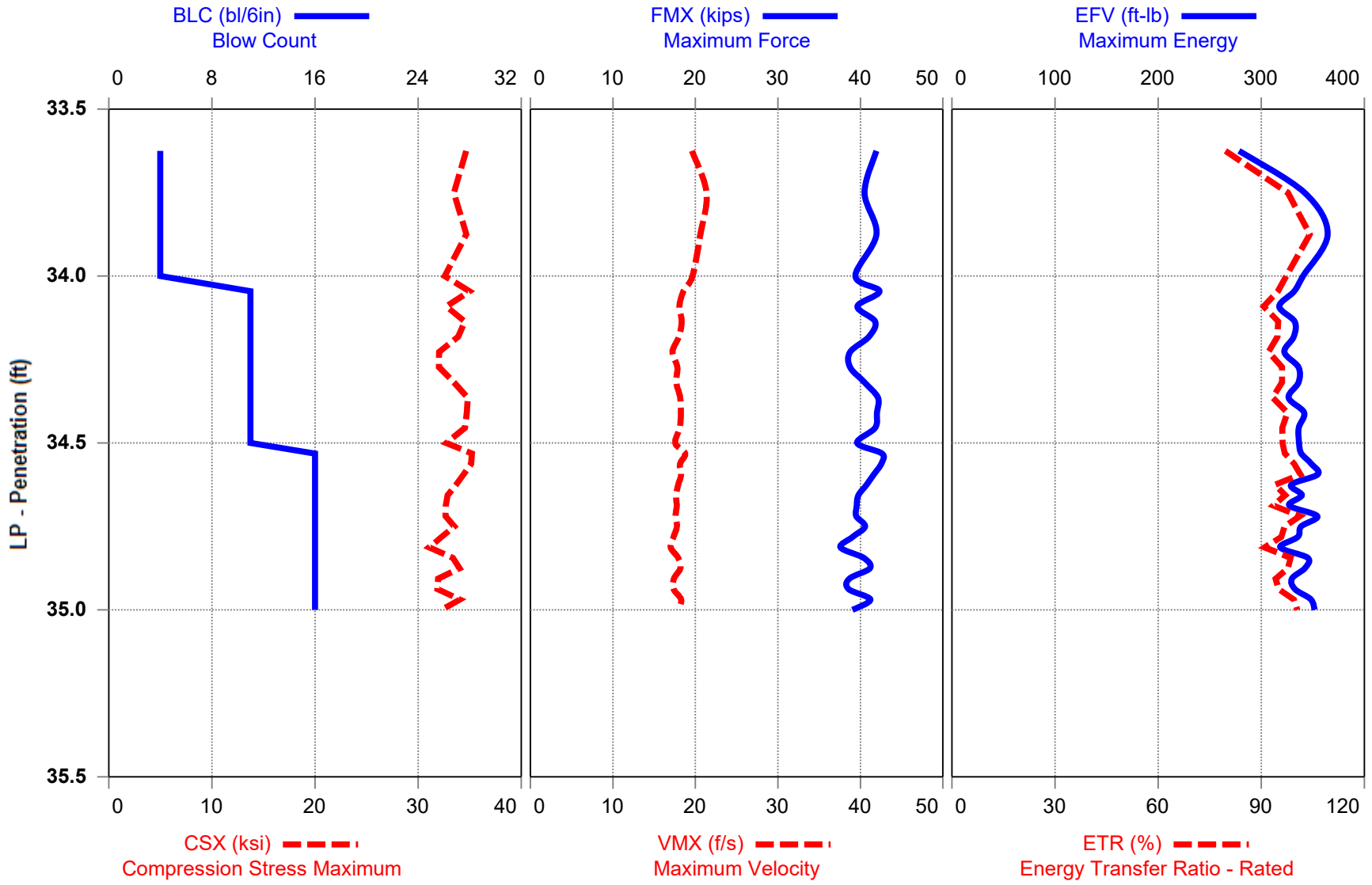
S&ME, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 13-June-2023

Test started: 08-June-2023

DIEDRICH D-50 (SN 316) - 33.5-35.0 FEET

TEST HOLE 2



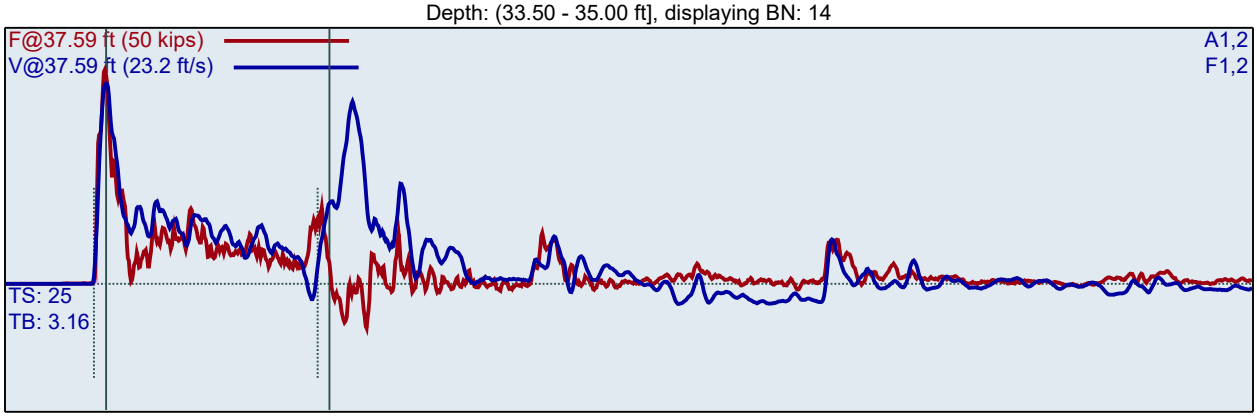
DIEDRICH D-50 (SN 316)
JRW
TEST HOLE 2

SN 316 SPT Energy Measurements
Interval start: 6/8/2023

AR: 1.21 in^2
LE: 37.59 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (33.50 - 35.00 ft], displaying BN: 14



F1 : [203 AWJ-1] 210.3 PDICAL (1) FF1
F2 : [203 AWJ-2] 210.14 PDICAL (1) FF1

A1 (PR): [K4664] 371.8 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 371.2 mv/6.4v/5000g (1) VF1

BL#	BC /6"	LP ft	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
1	4	33.63	1.9	42	19.6	1.65	34.7	1.48	278	79.5
2	4	33.75	50.3	40	21.4	1.50	33.5	1.50	342	97.7
3	4	33.88	51.2	42	20.6	1.50	34.7	1.50	364	104.1
4	4	34.00	50.7	39	19.7	1.50	32.6	1.50	340	97.2
5	11	34.05	50.4	42	18.5	0.64	35.0	0.55	332	94.8
6	11	34.09	50.7	40	18.1	0.64	32.8	0.55	317	90.7
7	11	34.14	50.4	42	18.3	0.63	34.5	0.54	332	94.9
8	11	34.18	50.4	41	18.0	0.63	33.9	0.54	331	94.7
9	11	34.23	51.3	39	17.2	0.64	32.0	0.55	322	92.1
10	11	34.27	49.7	39	17.8	0.61	32.0	0.55	336	96.0
11	11	34.32	50.8	41	17.7	0.58	33.5	0.54	336	96.0
12	11	34.36	50.9	42	18.2	0.56	34.8	0.54	326	93.2
13	11	34.41	50.0	42	18.2	0.57	34.7	0.54	341	97.6
14	11	34.45	50.6	42	18.1	0.55	34.5	0.54	336	96.1
15	11	34.50	51.2	40	17.6	0.62	32.7	0.55	337	96.2
16	16	34.53	49.6	43	18.8	0.52	35.2	0.37	339	96.8
17	16	34.56	50.4	43	18.1	0.54	35.1	0.37	349	99.6
18	16	34.59	50.3	42	18.3	0.53	34.4	0.37	355	101.4
19	16	34.63	50.7	41	17.9	0.45	33.7	0.38	329	94.0
20	16	34.66	50.7	40	17.7	0.49	32.9	0.37	339	96.9
21	16	34.69	50.0	40	17.7	0.45	32.7	0.37	327	93.5
22	16	34.72	50.3	40	17.6	0.49	32.7	0.38	354	101.2
23	16	34.75	50.4	41	17.8	0.48	33.5	0.37	339	96.7
24	16	34.78	50.6	39	17.4	0.48	32.3	0.37	335	95.8
25	16	34.81	51.1	38	17.0	0.46	31.1	0.37	318	91.0
26	16	34.84	50.0	40	17.9	0.49	33.4	0.37	345	98.5
27	16	34.88	50.8	41	18.2	0.47	34.0	0.37	342	97.7
28	16	34.91	50.3	39	17.4	0.43	31.9	0.37	330	94.2
29	16	34.94	49.7	39	17.4	0.42	31.9	0.37	333	95.0
30	16	34.97	50.7	41	18.3	0.44	34.1	0.37	348	99.5
31	16	35.00	50.1	39	18.0	0.44	32.3	0.37	352	100.5

Average	50.4	40	17.9	0.53	33.4	0.44	336	96.1
Std Dev	0.4	1	0.4	0.07	1.2	0.08	10	2.8
Maximum	51.3	43	18.8	0.64	35.2	0.55	355	101.4
Minimum	49.6	38	17.0	0.42	31.1	0.37	317	90.7

N-value: 27

Sample Interval Time: 35.60 seconds.

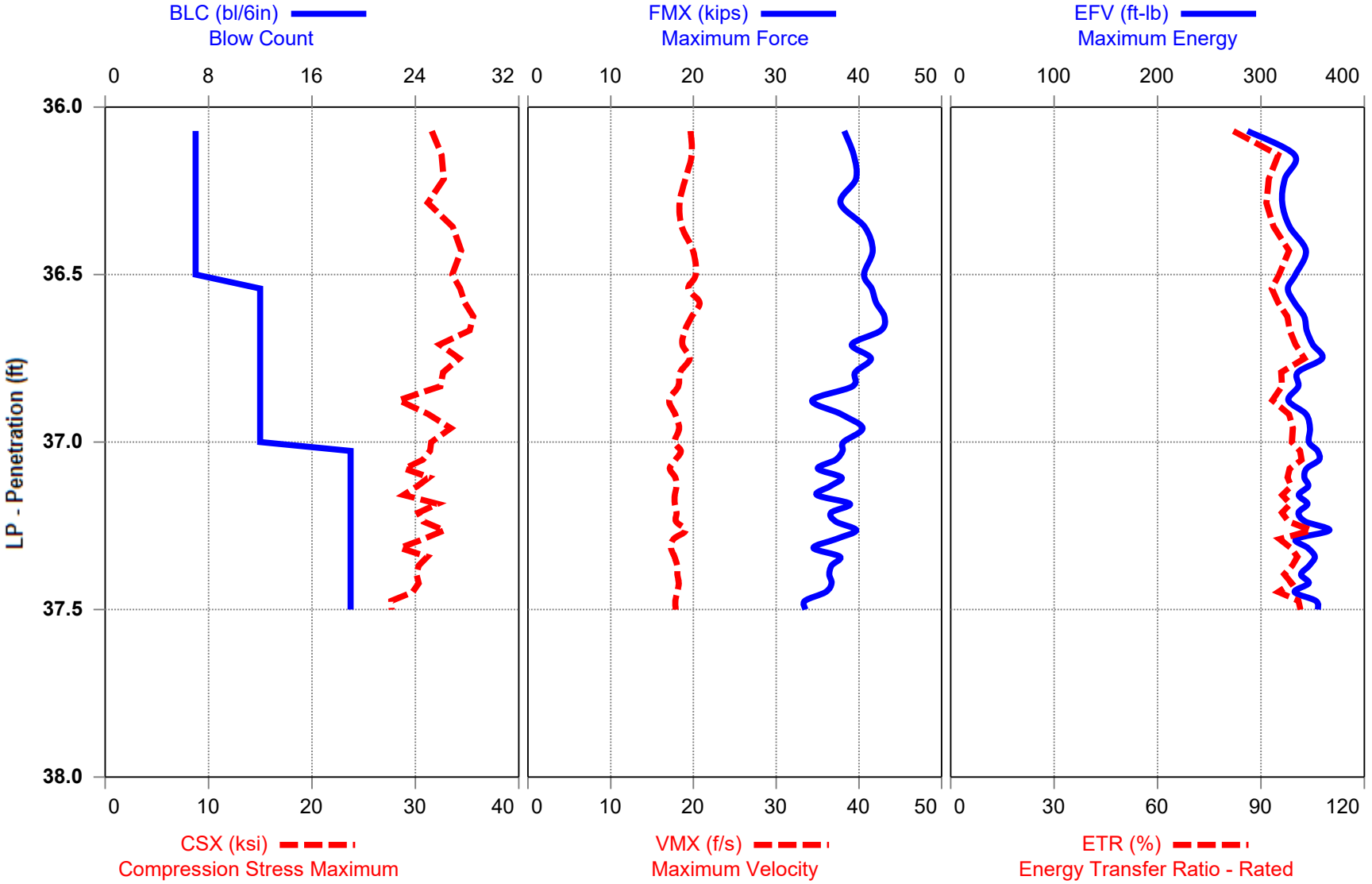
S&ME, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 13-June-2023

Test started: 08-June-2023

DIEDRICH D-50 (SN 316) - 36.0-37.5 FEET

TEST HOLE 2



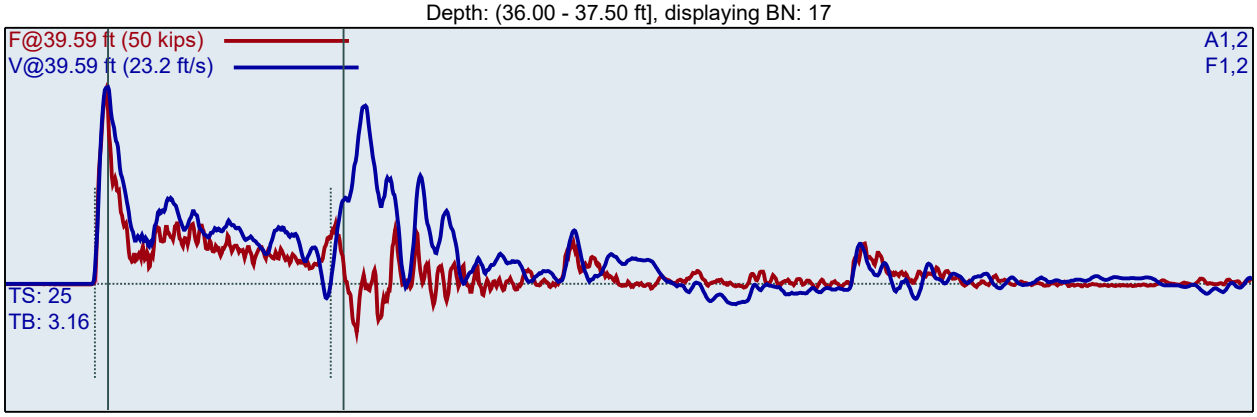
DIEDRICH D-50 (SN 316)
JRW
TEST HOLE 2

SN 316 SPT Energy Measurements
Interval start: 6/8/2023

AR: 1.21 in^2
LE: 39.59 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (36.00 - 37.50 ft], displaying BN: 17



F1 : [203 AWJ-1] 210.3 PDICAL (1) FF1
F2 : [203 AWJ-2] 210.14 PDICAL (1) FF1

A1 (PR): [K4664] 371.8 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 371.2 mv/6.4v/5000g (1) VF1

BL#	BC /6"	LP ft	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
1	7	36.07	1.9	38	19.7	1.10	31.6	0.86	287	82.0
2	7	36.14	50.6	39	19.8	0.97	32.5	0.86	332	95.0
3	7	36.21	51.8	40	19.0	0.88	32.8	0.86	323	92.3
4	7	36.29	49.9	38	18.3	0.87	31.2	0.86	320	91.6
5	7	36.36	50.7	41	18.6	0.86	33.6	0.86	328	93.6
6	7	36.43	50.5	42	20.0	0.86	34.4	0.86	343	98.1
7	7	36.50	50.9	41	20.3	0.86	33.6	0.86	333	95.2
8	12	36.54	50.9	42	19.4	0.63	34.3	0.50	326	93.1
9	12	36.58	50.3	42	20.7	0.71	34.8	0.50	332	94.9
10	12	36.63	50.6	43	19.8	0.74	35.6	0.50	342	97.6
11	12	36.67	50.8	43	19.0	0.72	35.3	0.50	344	98.3
12	12	36.71	50.8	39	18.7	0.70	32.4	0.50	350	100.0
13	12	36.75	49.7	41	19.5	0.68	34.3	0.50	359	102.6
14	12	36.79	51.4	40	18.4	0.65	32.7	0.50	335	95.8
15	12	36.83	51.1	39	18.2	0.68	32.4	0.50	336	96.0
16	12	36.88	50.2	34	17.1	0.58	28.4	0.50	326	93.3
17	12	36.92	50.5	38	17.8	0.64	31.3	0.50	343	98.1
18	12	36.96	50.7	40	18.3	0.57	33.4	0.50	347	99.2
19	12	37.00	51.0	38	17.7	0.62	31.5	0.50	346	98.9
20	19	37.03	50.1	38	18.5	0.55	31.4	0.32	355	101.3
21	19	37.05	51.0	37	17.8	0.54	30.7	0.32	356	101.8
22	19	37.08	51.6	35	17.1	0.58	28.9	0.32	344	98.3
23	19	37.11	50.1	38	17.8	0.51	31.3	0.32	342	97.7
24	19	37.13	50.6	37	18.0	0.53	30.2	0.32	346	98.7
25	19	37.16	50.7	35	17.7	0.49	28.9	0.32	336	96.1
26	19	37.18	50.7	39	17.7	0.48	32.2	0.32	345	98.5
27	19	37.21	51.1	37	18.0	0.45	30.3	0.32	336	96.0
28	19	37.24	50.5	37	17.9	0.46	30.8	0.32	343	98.0
29	19	37.26	49.9	40	19.1	0.50	32.8	0.32	366	104.6
30	19	37.29	51.7	37	17.6	0.44	30.8	0.32	334	95.4
31	19	37.32	50.2	35	17.3	0.46	28.5	0.32	345	98.7

32	19	37.34	50.1	38	17.7	0.47	31.2	0.32	352	100.5
33	19	37.37	51.1	37	18.0	0.44	30.3	0.32	347	99.0
34	19	37.39	50.1	36	18.1	0.38	30.1	0.31	339	96.7
35	19	37.42	51.0	37	18.2	0.45	30.3	0.32	346	98.9
36	19	37.45	50.3	36	18.1	0.38	29.7	0.31	333	95.0
37	19	37.47	50.8	33	17.8	0.54	27.7	0.32	353	100.9
38	19	37.50	51.2	34	17.9	0.53	27.7	0.32	355	101.4
		Average	50.7	38	18.2	0.55	31.3	0.39	344	98.2
		Std Dev	0.5	3	0.8	0.10	2.1	0.09	9	2.6
		Maximum	51.7	43	20.7	0.74	35.6	0.50	366	104.6
		Minimum	49.7	33	17.1	0.38	27.7	0.31	326	93.1
					N-value: 31					

Sample Interval Time: 43.73 seconds.

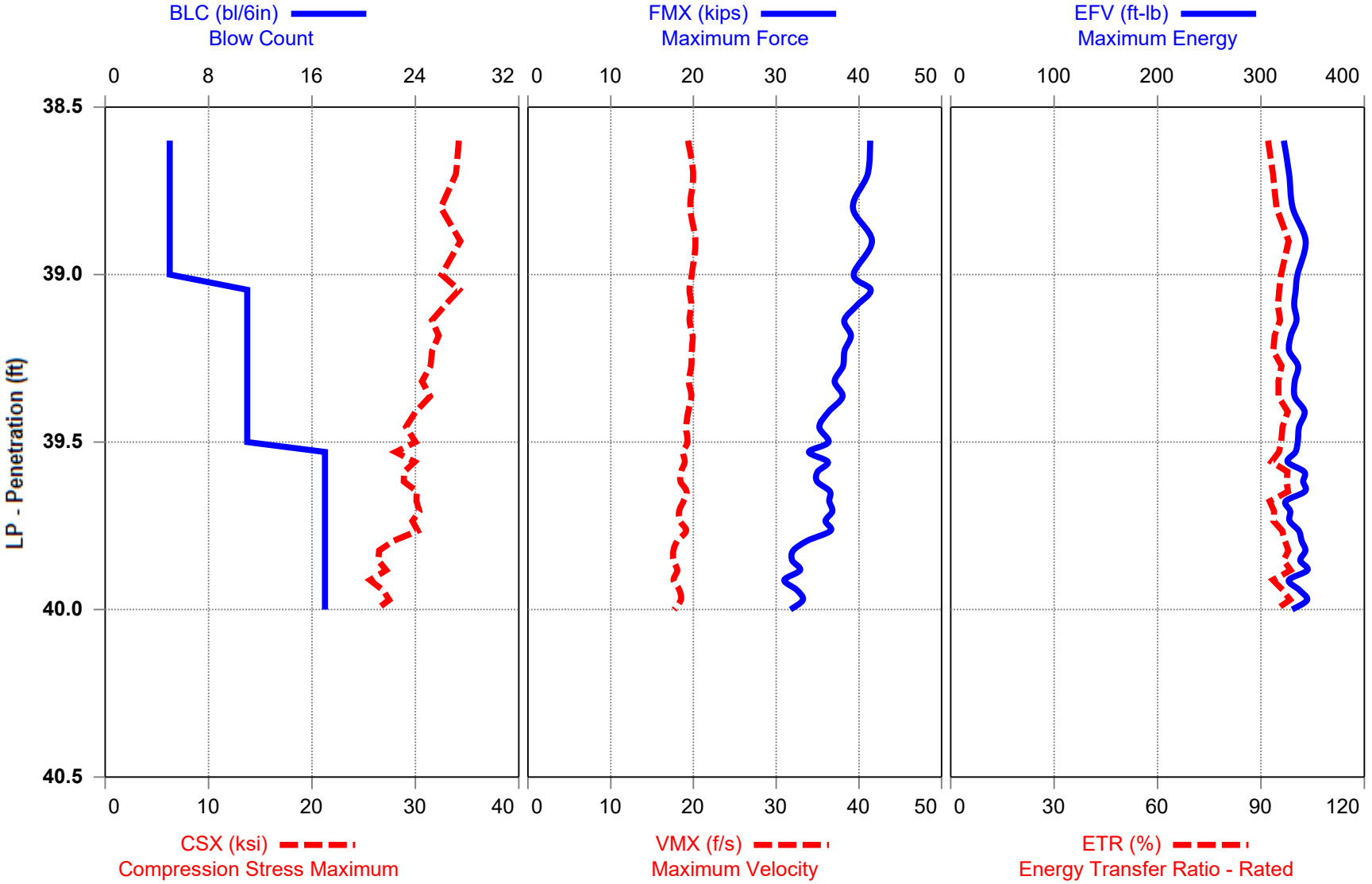
S&ME, Inc. - PDIPLOT2 Ver 2022.1.62.0 - Case Method & iCAP® Results

Printed: 13-June-2023

Test started: 08-June-2023

DIEDRICH D-50 (SN316) - 38.5-40.0 FEET

TEST HOLE 2



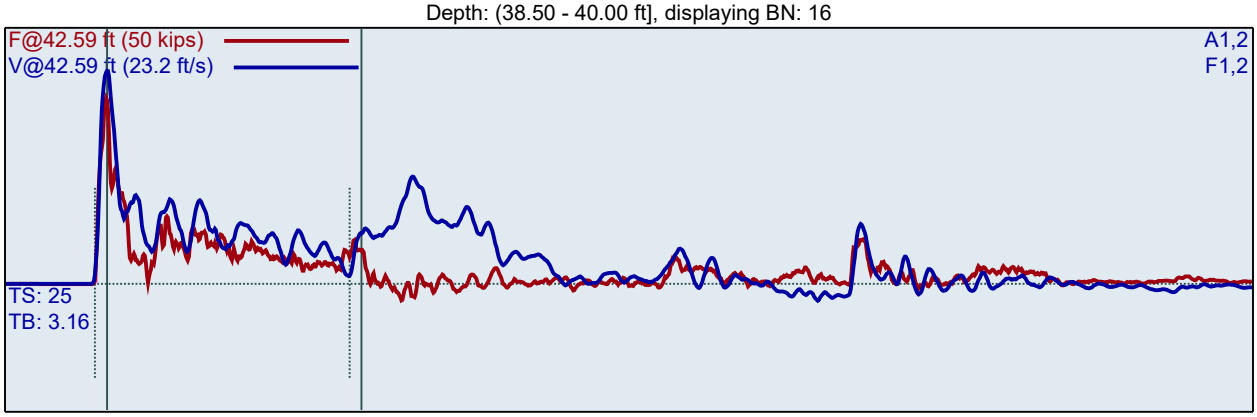
DIEDRICH D-50 (SN 316)
JRW
TEST HOLE 2

SN 316 SPT Energy Measurements
Interval start: 6/8/2023

AR: 1.21 in^2
LE: 42.59 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (38.50 - 40.00 ft], displaying BN: 16



F1 : [203 AWJ-1] 210.3 PDICAL (1) FF1
F2 : [203 AWJ-2] 210.14 PDICAL (1) FF1

A1 (PR): [K4664] 371.8 mv/6.4v/5000g (1) VF1
A2 (PR): [K4665] 371.2 mv/6.4v/5000g (1) VF1

BL#	BC /6"	LP ft	BPM bpm	FMX kips	VMX ft/s	DMX in	CSX ksi	DFN in	EFV ft-lb	ETR %
1	5	38.60	1.9	41	19.4	1.43	34.2	1.20	322	92.0
2	5	38.70	50.6	41	20.0	1.50	33.9	1.20	327	93.5
3	5	38.80	50.4	39	19.6	1.36	32.5	1.20	331	94.5
4	5	38.90	50.4	42	20.2	1.20	34.4	1.20	343	98.0
5	5	39.00	51.7	39	19.8	1.20	32.5	1.20	335	95.8
6	11	39.05	49.9	41	19.5	0.72	34.2	0.53	334	95.3
7	11	39.09	50.6	40	19.8	0.67	32.9	0.54	332	94.9
8	11	39.14	51.3	38	19.5	0.67	31.6	0.55	334	95.5
9	11	39.18	50.8	39	19.9	0.65	32.3	0.55	329	93.9
10	11	39.23	50.6	38	19.8	0.62	31.6	0.54	327	93.5
11	11	39.27	50.7	38	19.7	0.64	31.5	0.55	336	95.9
12	11	39.32	51.4	37	19.5	0.63	30.6	0.54	333	95.0
13	11	39.36	50.5	38	19.7	0.65	31.4	0.54	333	95.0
14	11	39.41	50.5	36	19.4	0.64	30.0	0.55	342	97.7
15	11	39.45	51.0	35	19.1	0.60	29.1	0.53	337	96.2
16	11	39.50	51.0	36	19.3	0.61	30.0	0.55	335	95.8
17	17	39.53	50.7	34	18.7	0.61	28.1	0.36	333	95.2
18	17	39.56	50.8	36	19.0	0.55	29.9	0.35	326	93.0
19	17	39.59	50.8	35	18.5	0.58	28.9	0.38	342	97.6
20	17	39.62	50.3	35	18.5	0.57	28.9	0.34	341	97.4
21	17	39.65	50.7	36	19.2	0.54	30.1	0.36	342	97.8
22	17	39.68	50.8	36	18.8	0.48	30.1	0.36	324	92.5
23	17	39.71	50.6	37	18.3	0.50	30.4	0.35	328	93.8
24	17	39.74	50.4	36	18.4	0.49	29.7	0.36	328	93.6
25	17	39.76	50.0	37	19.1	0.50	30.2	0.35	337	96.2
26	17	39.79	50.8	34	18.1	0.51	27.9	0.36	339	96.9
27	17	39.82	50.8	32	17.6	0.55	26.5	0.35	343	98.0
28	17	39.85	50.5	32	17.6	0.52	26.4	0.35	338	96.5
29	17	39.88	49.8	33	18.0	0.53	27.2	0.35	345	98.6
30	17	39.91	51.1	31	17.6	0.49	25.6	0.35	327	93.4
31	17	39.94	50.5	33	18.3	0.50	26.9	0.36	337	96.3

32	17	39.97	50.3	33	18.5	0.51	27.5	0.35	345	98.4
33	17	40.00	51.3	32	17.7	0.52	26.2	0.35	330	94.3
		Average	50.7	36	18.8	0.57	29.5	0.43	335	95.7
		Std Dev	0.4	3	0.7	0.07	2.1	0.09	6	1.7
		Maximum	51.4	41	19.9	0.72	34.2	0.55	345	98.6
		Minimum	49.8	31	17.6	0.48	25.6	0.34	324	92.5

N-value: 28

Sample Interval Time: 37.81 seconds.

Summary of SPT Test Results

Project: DIEDRICH D-50 (SN 316), Test Date: 6/8/2023

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	Blows Applied /6"	Start Depth ft	Final Depth ft	**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 %
35.59	**5-14-19**	31.00	32.50	**33**	**53**	50.2	37	20.9	0.44	30.9	0.36	340	97.2
37.59	**4-11-16**	33.50	35.00	**27**	**43**	50.4	40	17.9	0.53	33.4	0.44	336	96.1
39.59	**7-12-19**	36.00	37.50	**31**	**50**	50.7	38	18.2	0.55	31.3	0.39	344	98.2
42.59	**5-11-17**	38.50	40.00	**28**	**45**	50.7	36	18.8	0.57	29.5	0.43	335	95.7
			Overall Average Values:			50.5	38	19.0	0.52	31.2	0.40	339	96.8
			Standard Deviation:			0.5	3	1.3	0.09	2.1	0.09	10	2.7
			Overall Maximum Value:			51.7	43	22.0	0.74	35.6	0.55	366	104.6
			Overall Minimum Value:			49.2	31	17.0	0.36	25.6	0.31	311	88.8

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

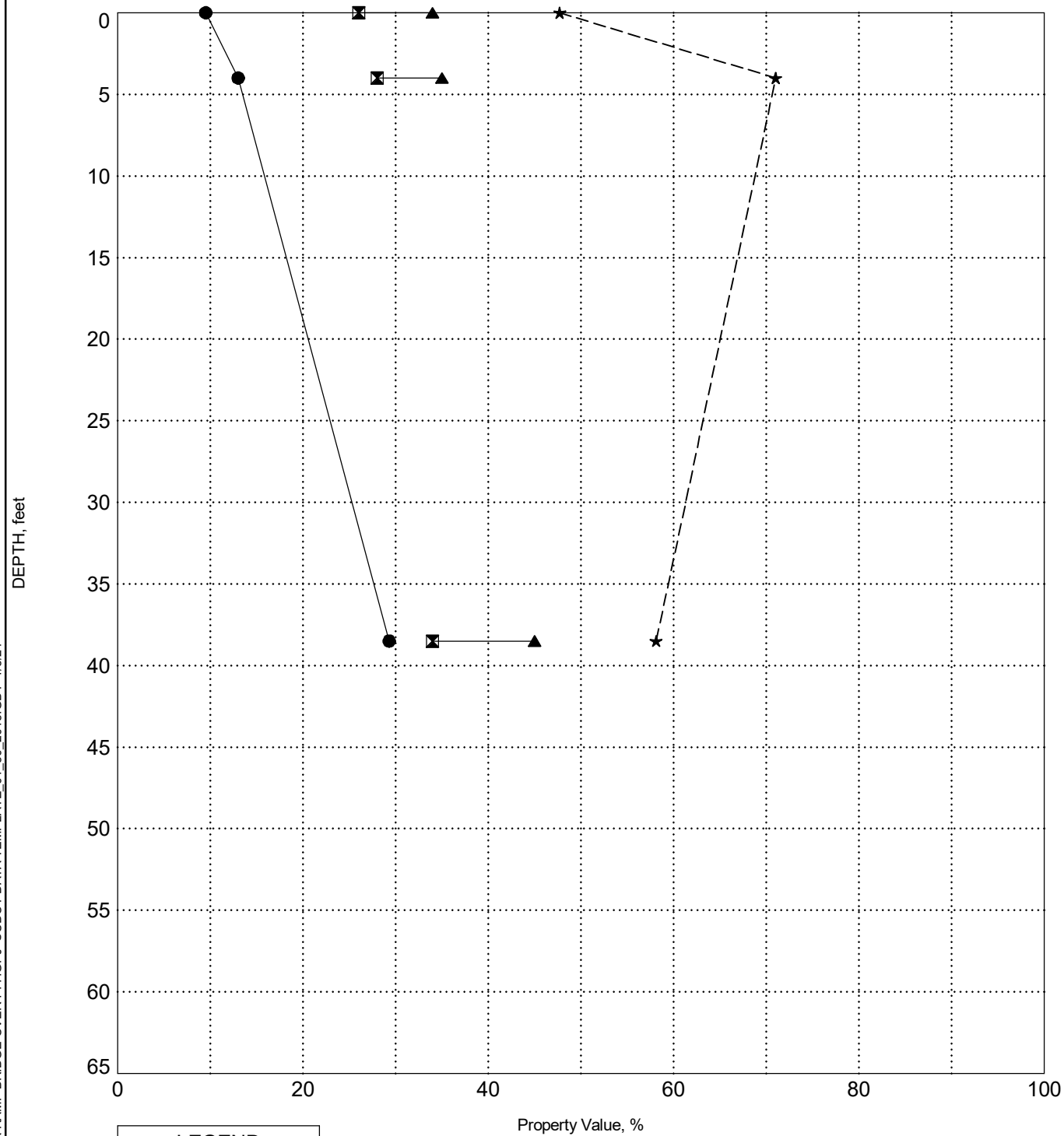
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING EB-1RB1

SURFACE ELEVATION: 447.0



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

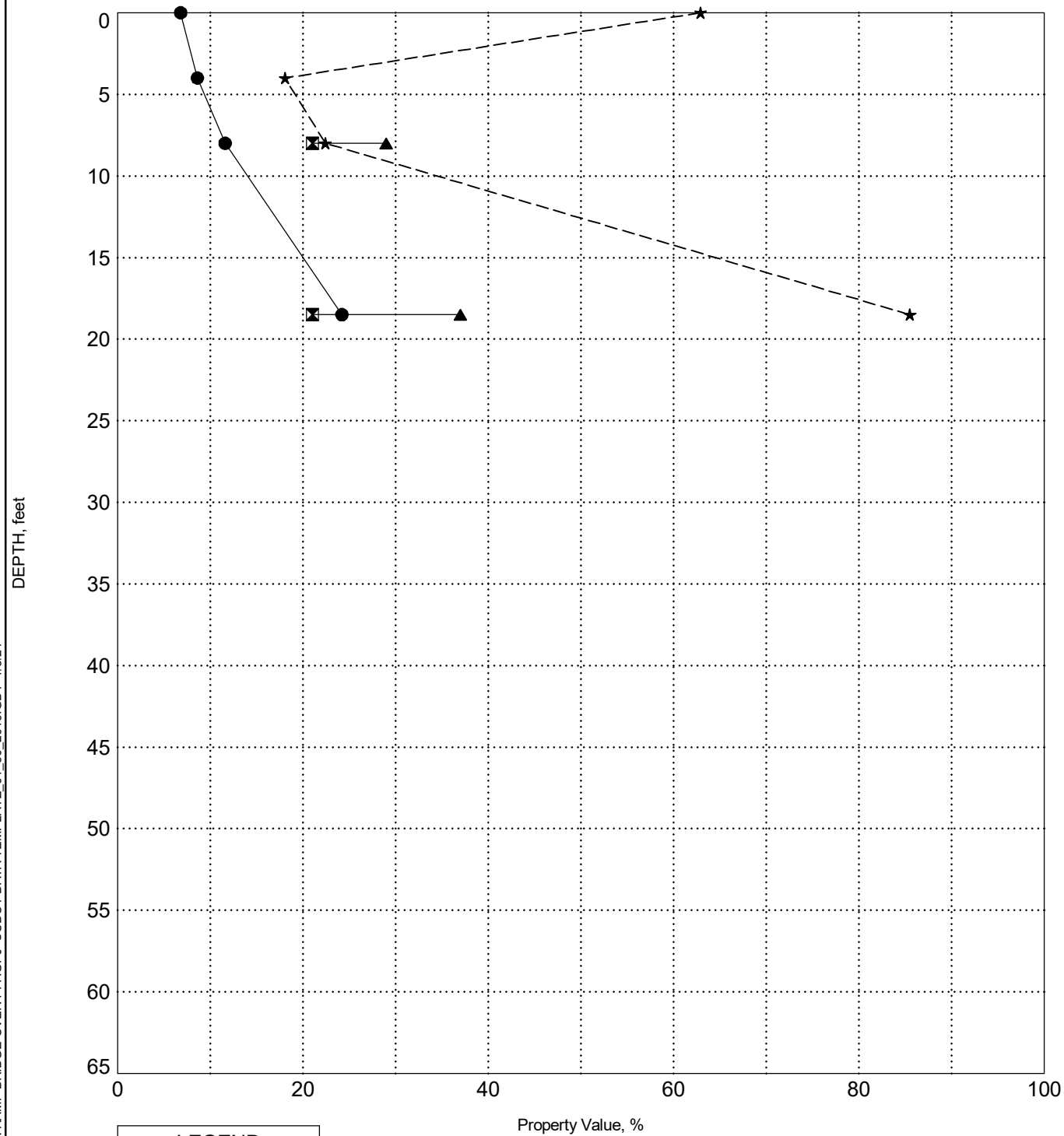
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING EB-2RB1

SURFACE ELEVATION: 464.8



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

INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

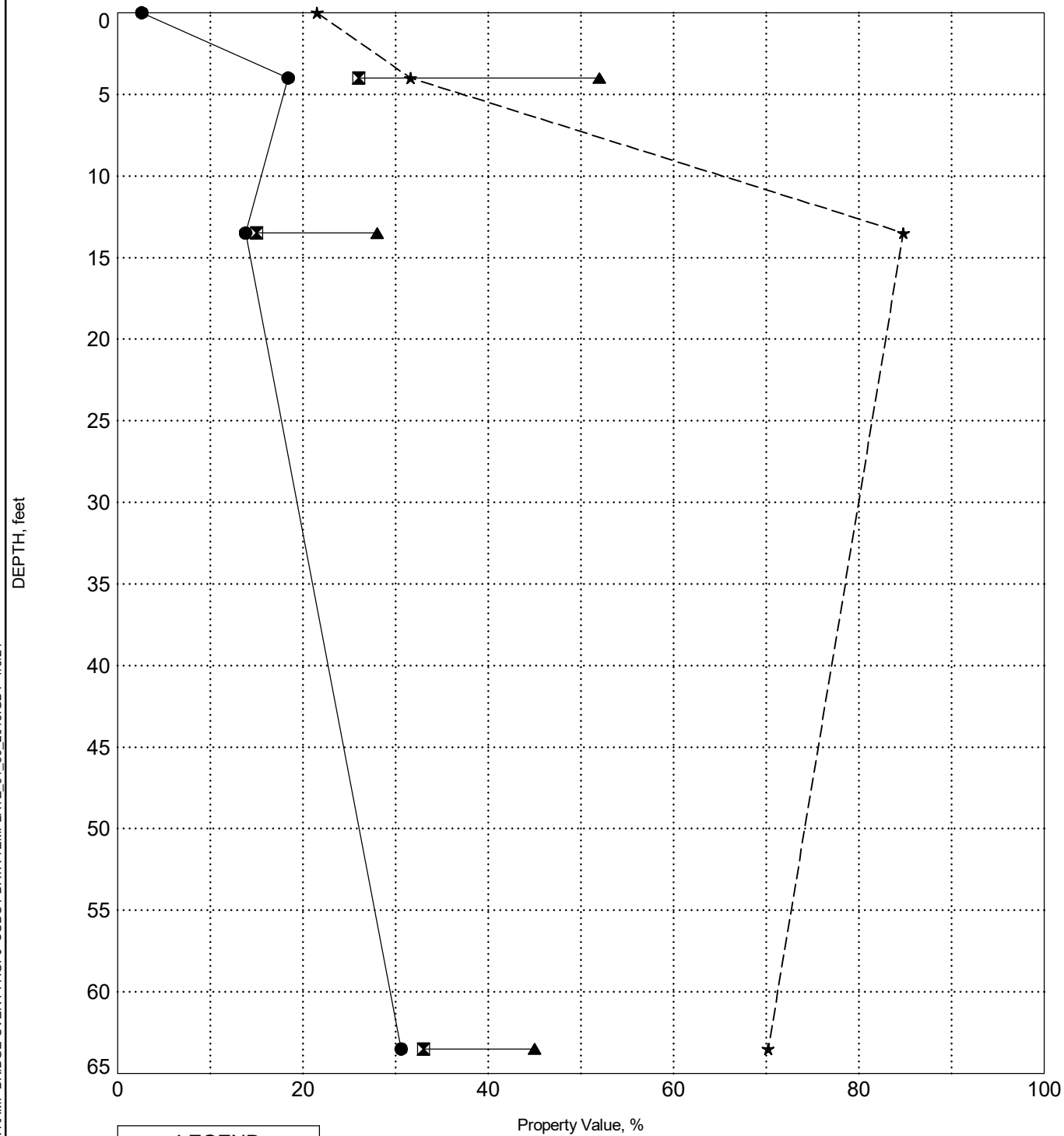
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING EB-3RB1

SURFACE ELEVATION: 462.0



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

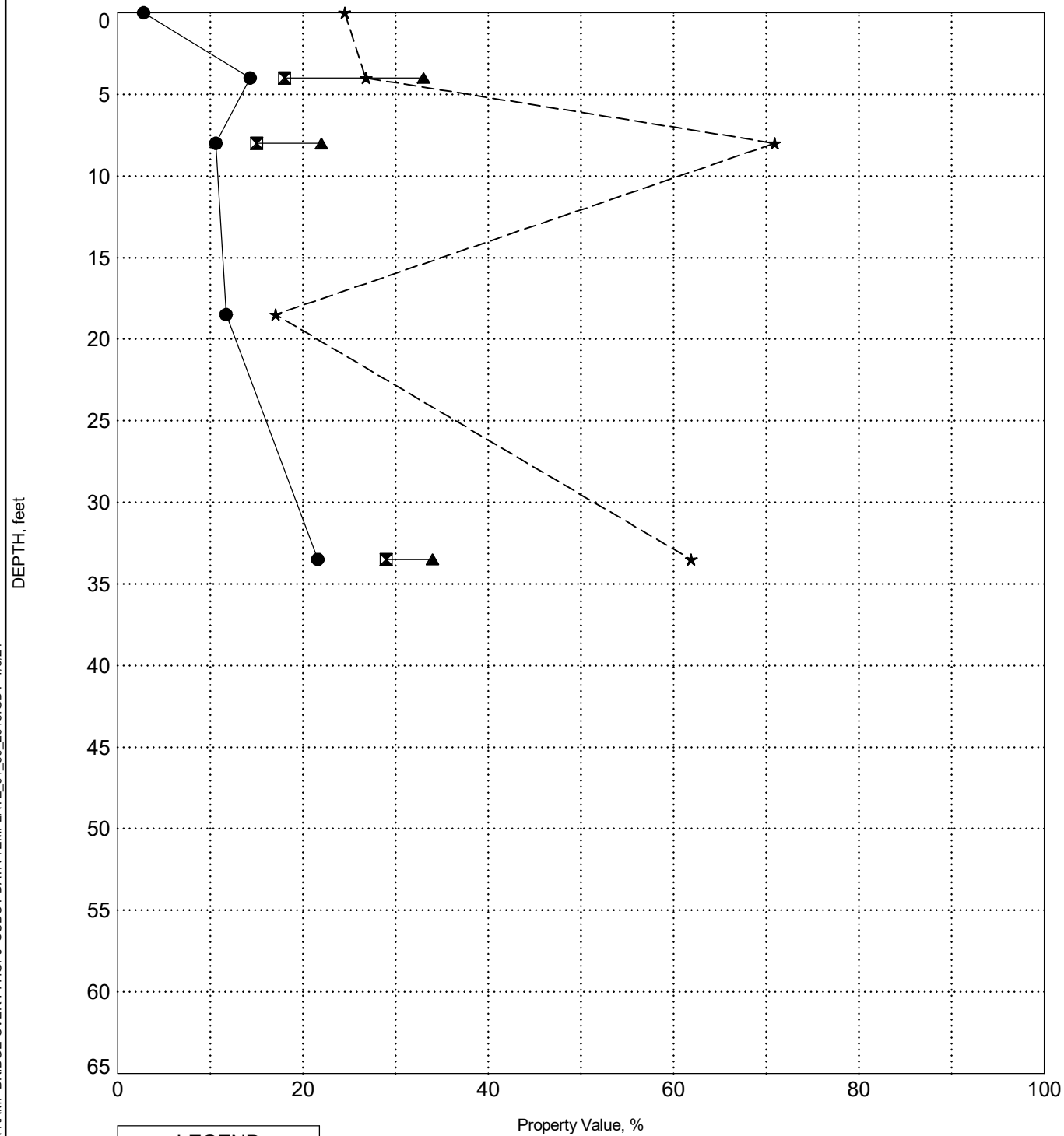
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING EB-4RB1

SURFACE ELEVATION: 461.0



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

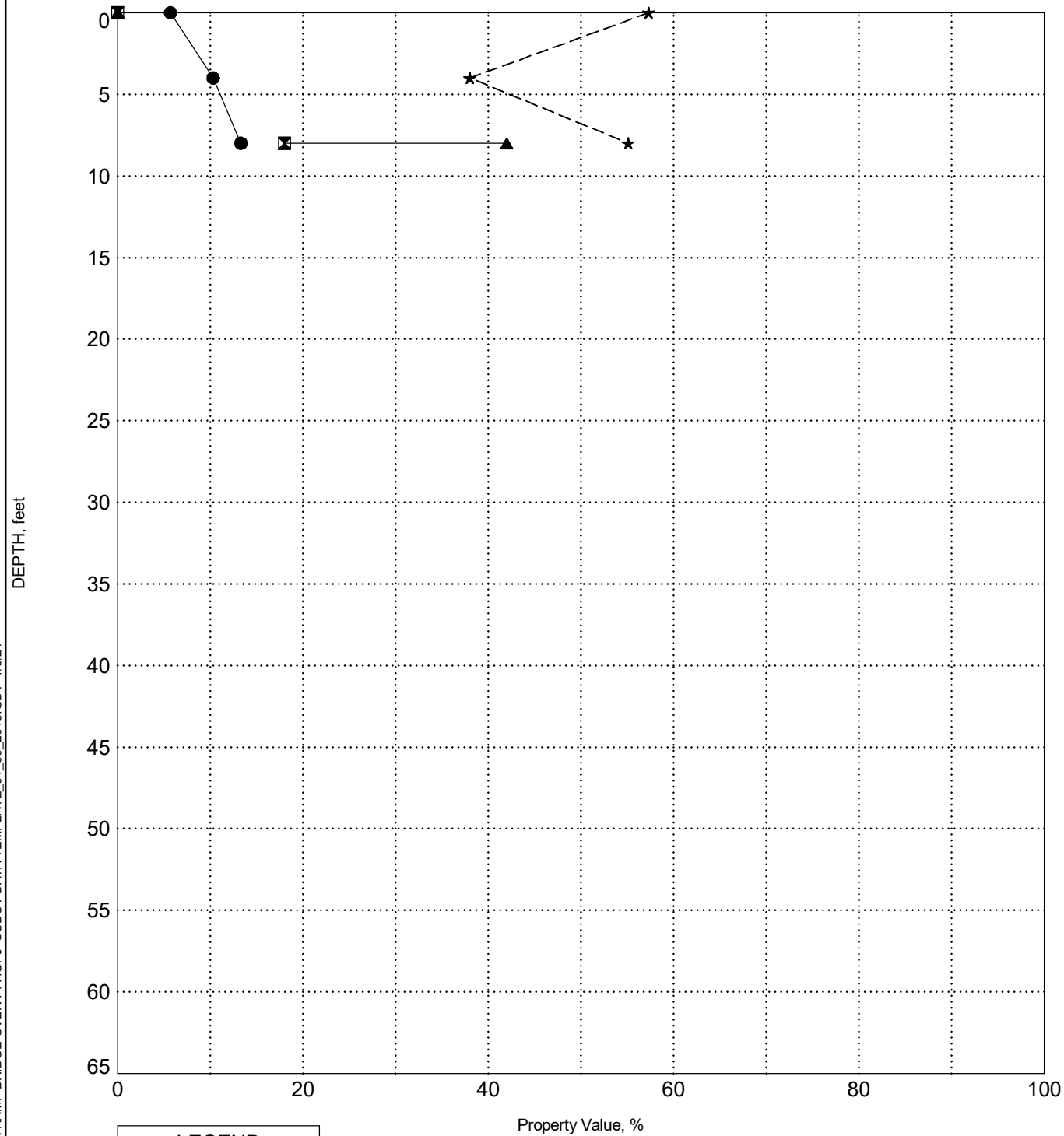
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING EM-15

SURFACE ELEVATION: 461.0



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

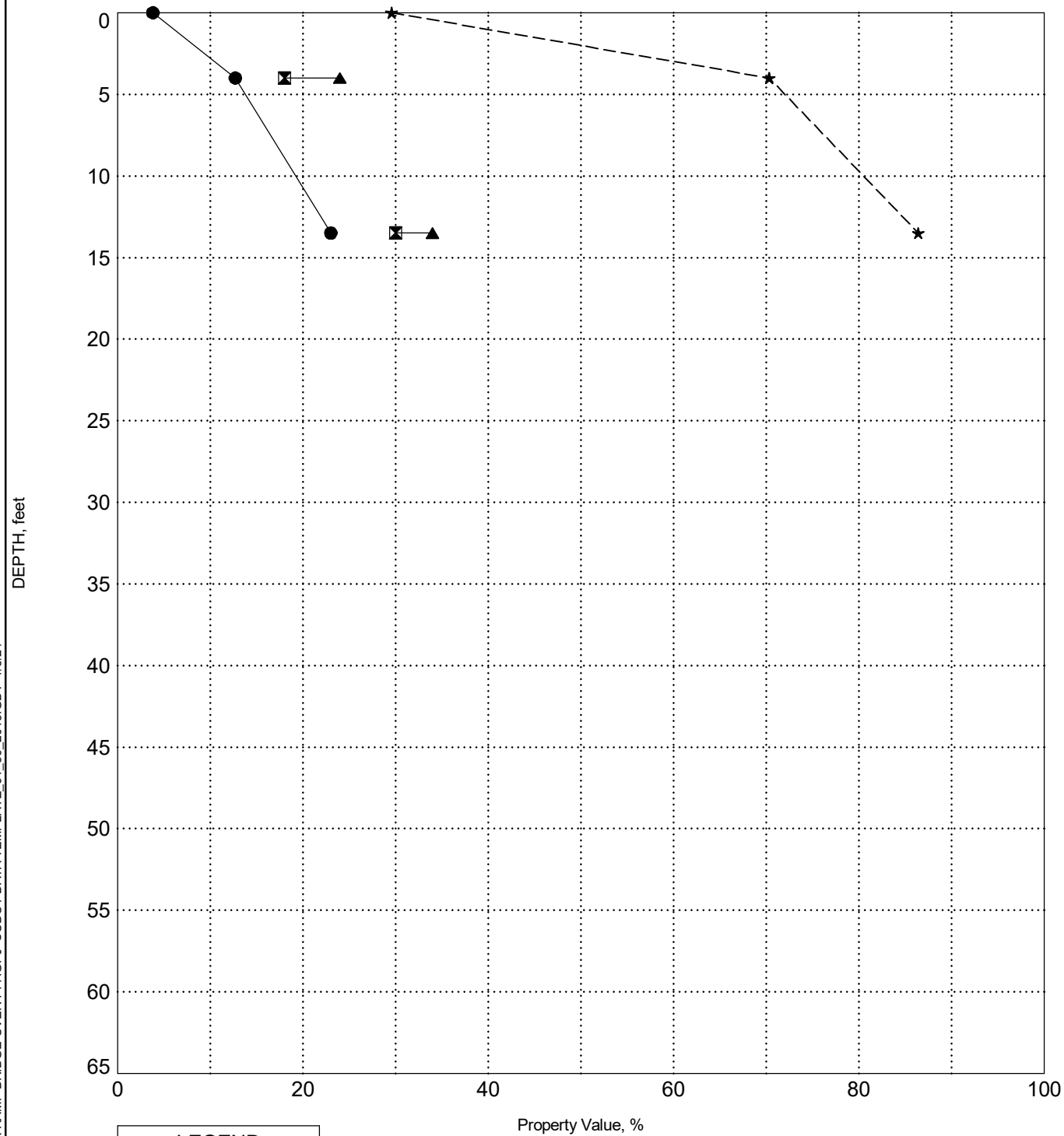
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING EM-16

SURFACE ELEVATION: 466.0



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

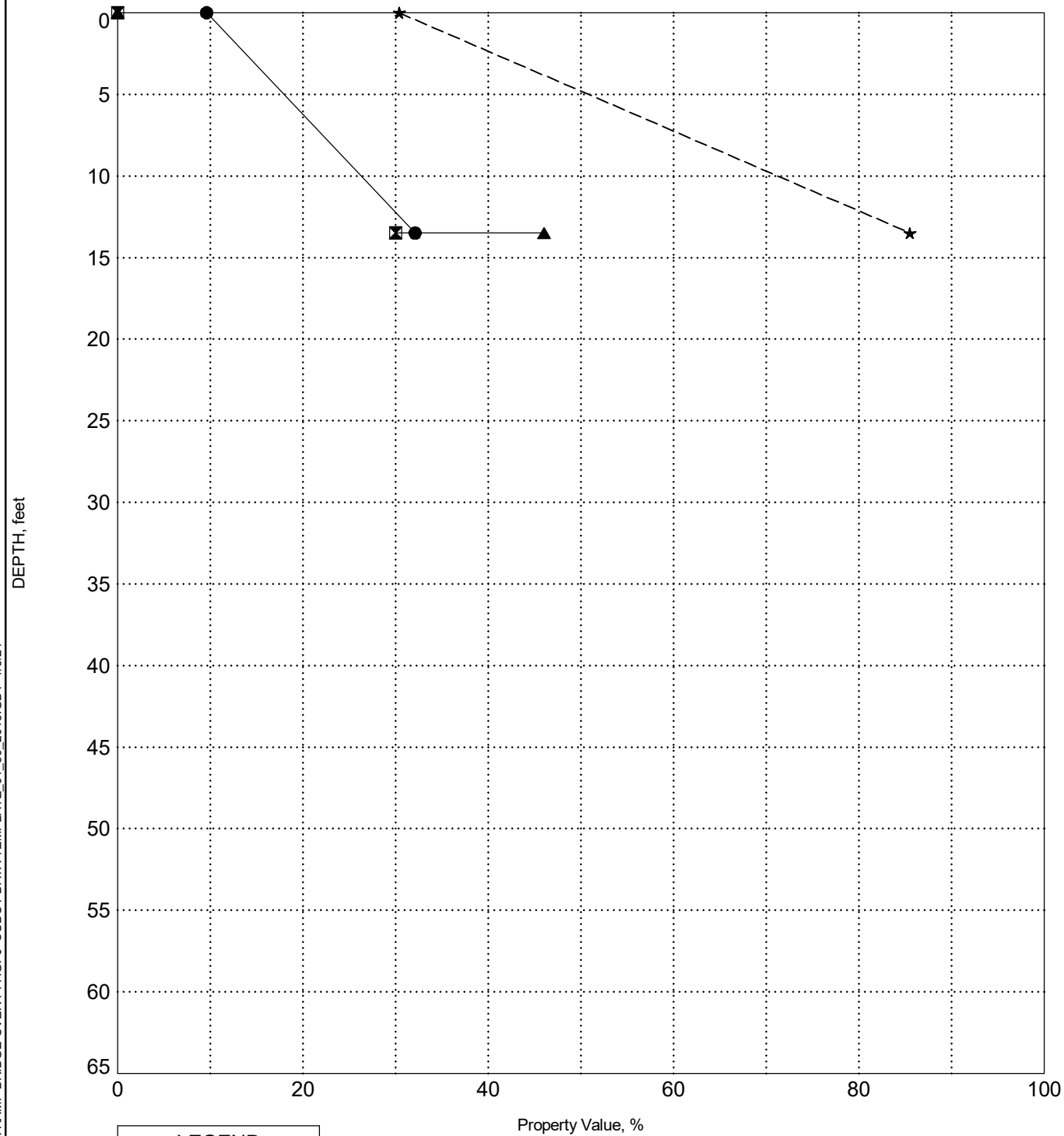
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING IB-1RB1

SURFACE ELEVATION: 446.6



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

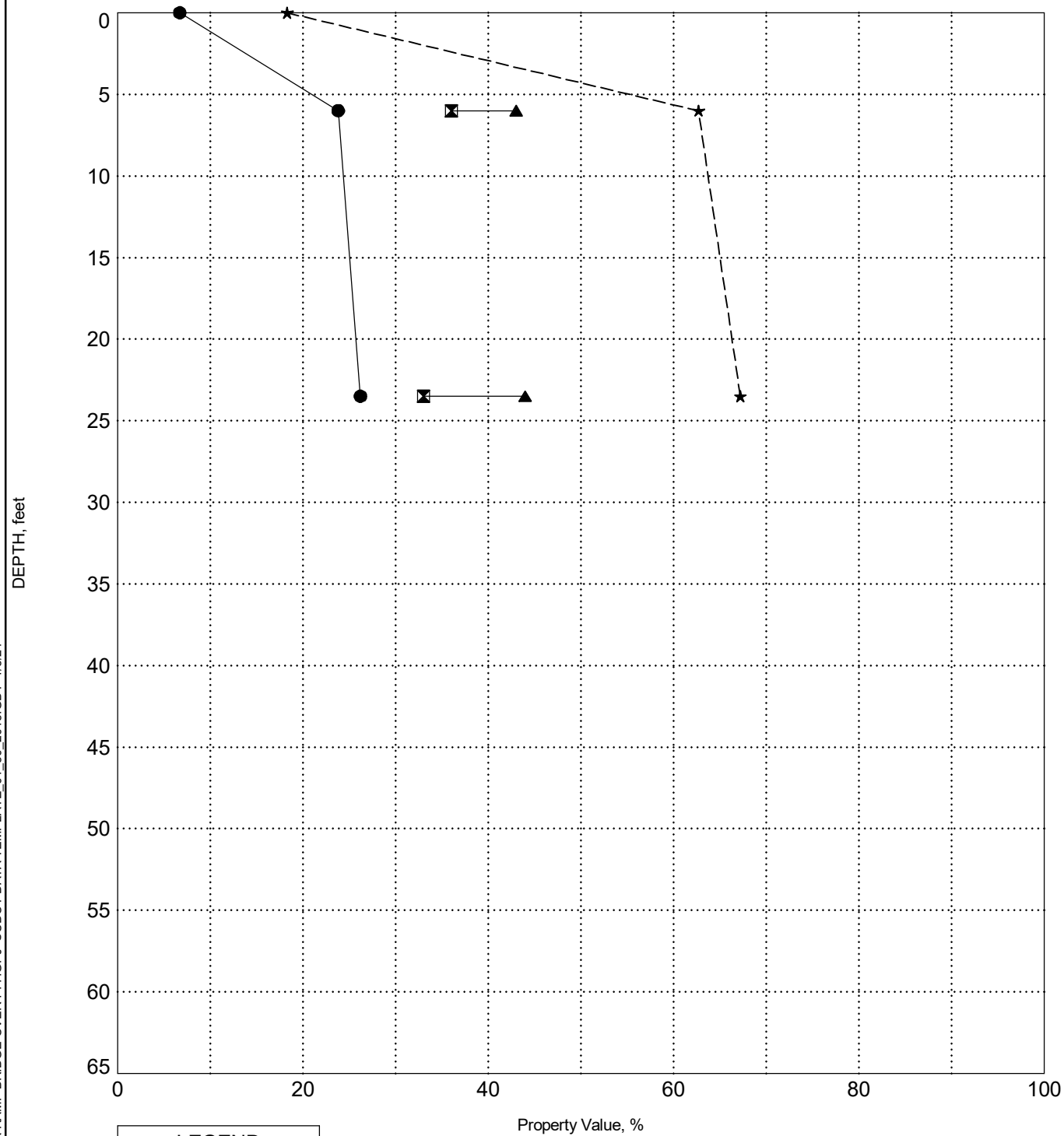
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING IB-2RB1

SURFACE ELEVATION: 447.3



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

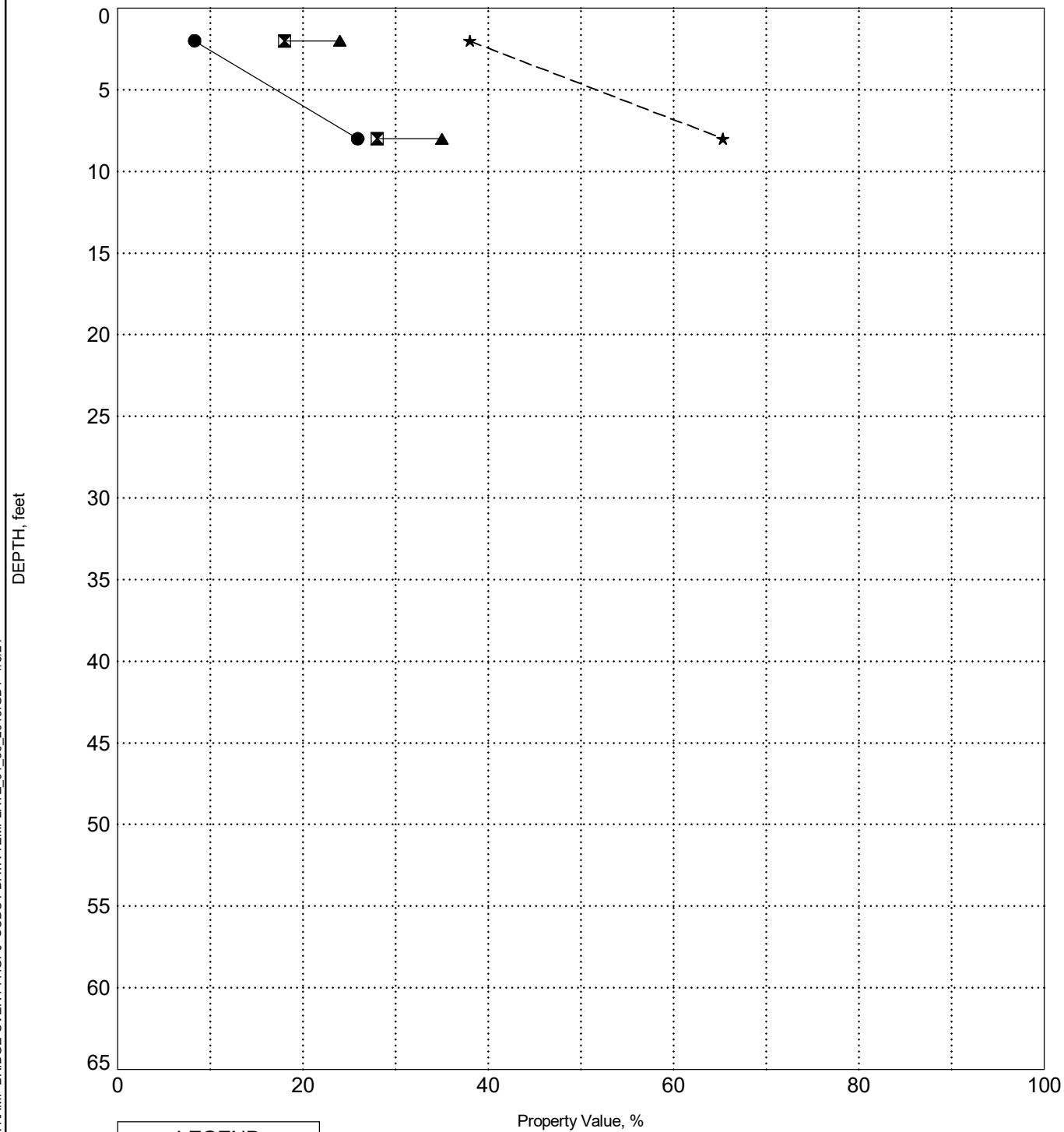
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING W-13

SURFACE ELEVATION: 448.8



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

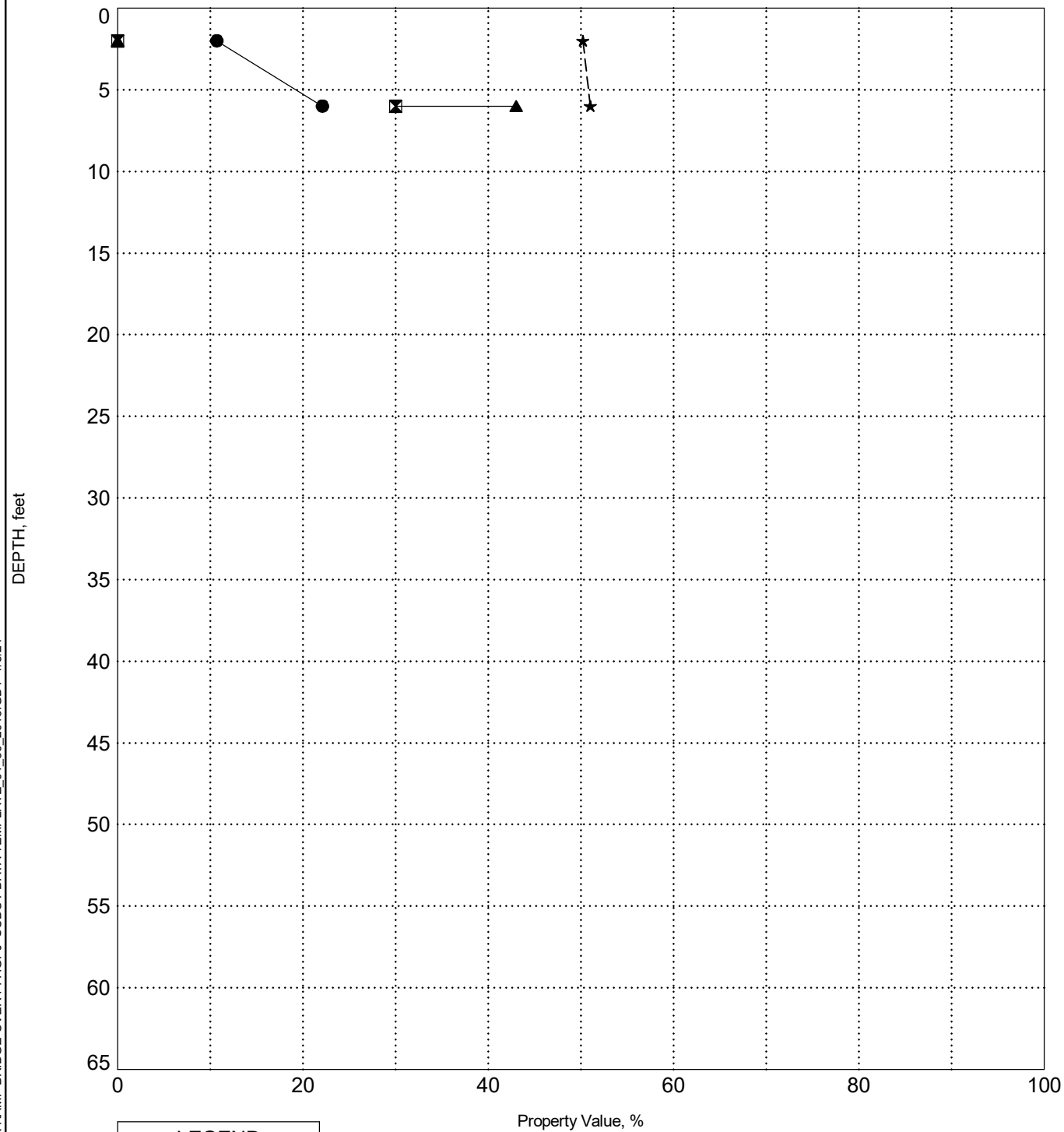
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING W-14

SURFACE ELEVATION: 448.4



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

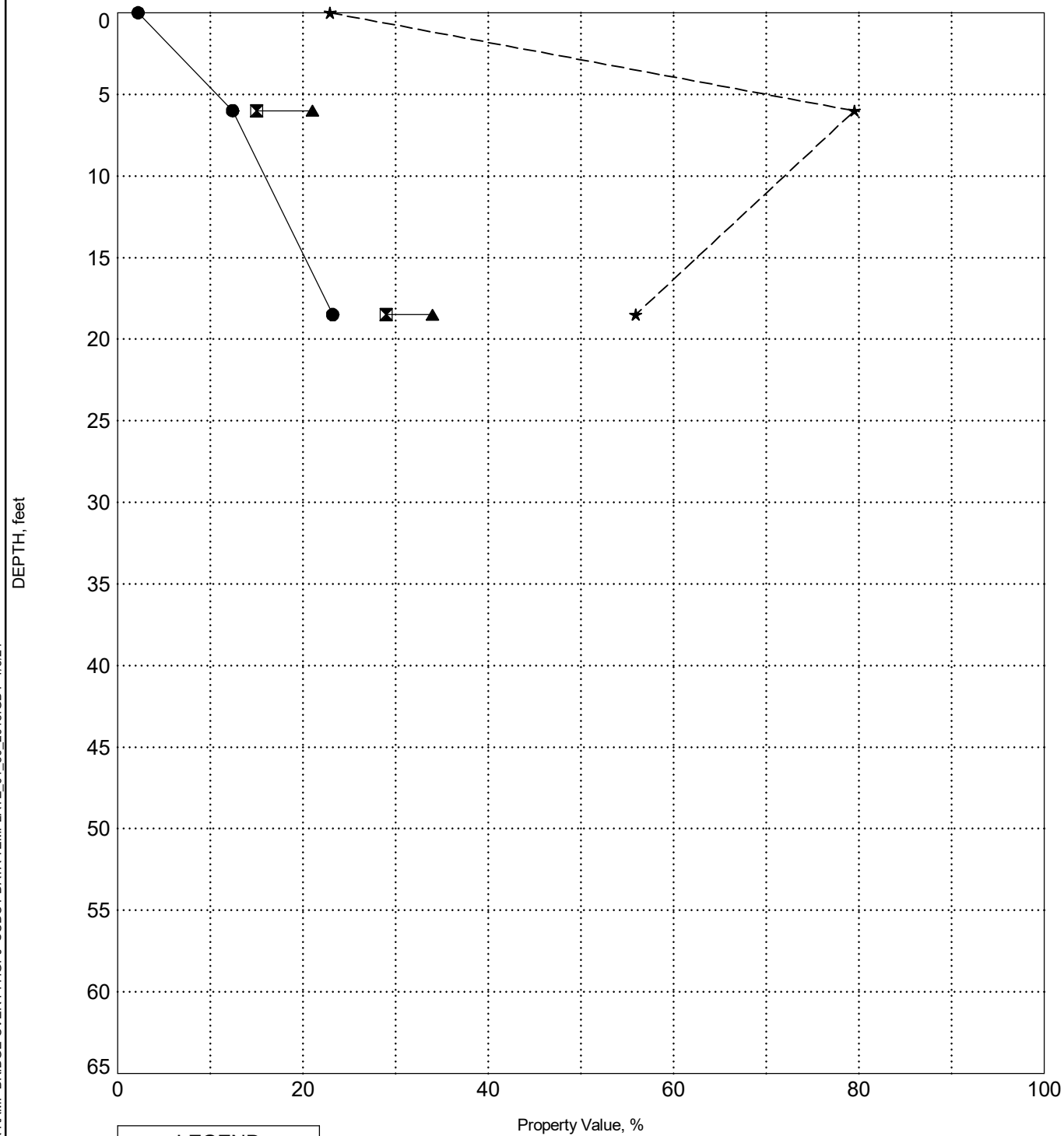
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING W-15

SURFACE ELEVATION: 449.0



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

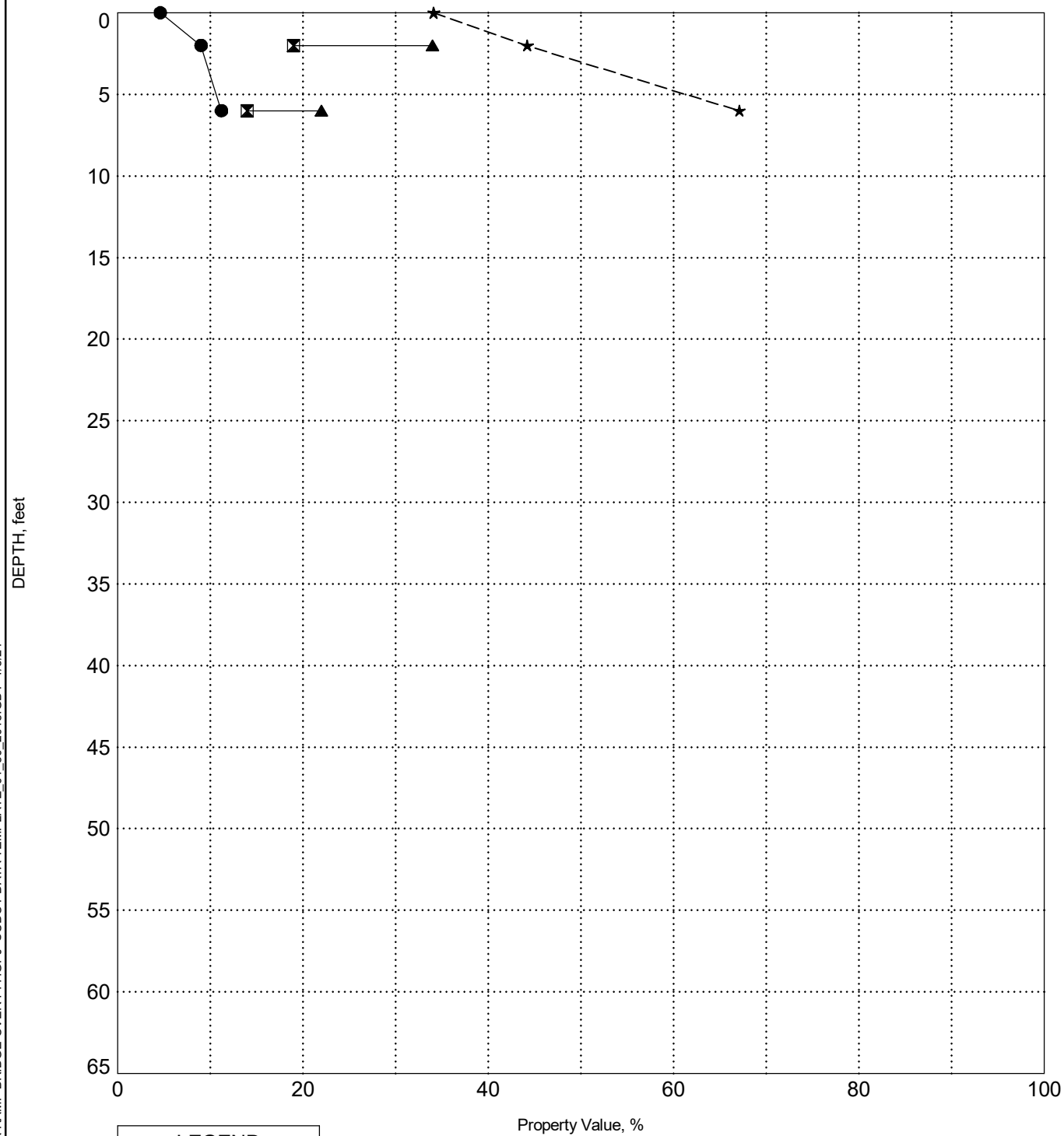
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING W-16

SURFACE ELEVATION: 450.0



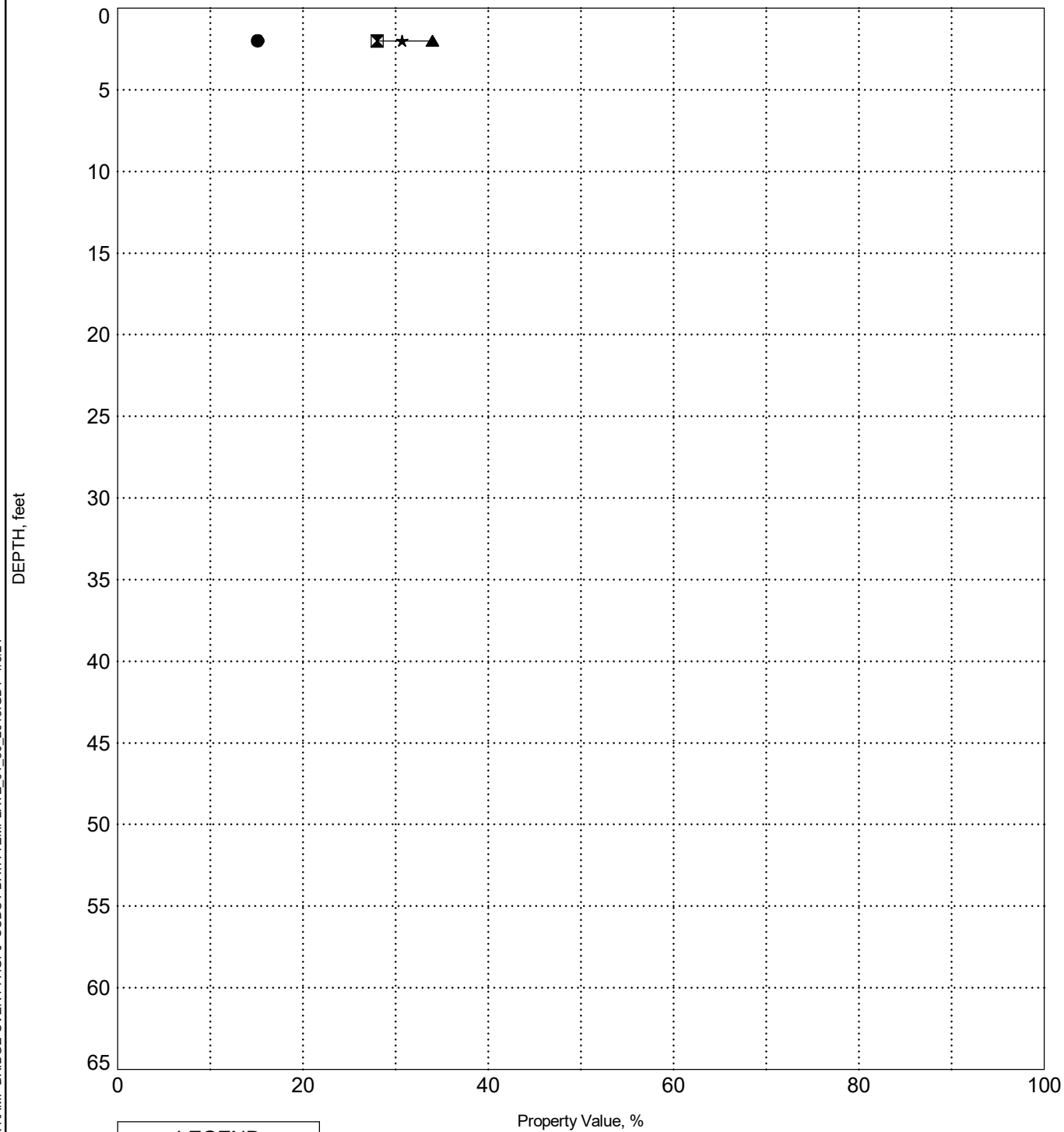
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING W-33

SURFACE ELEVATION: 447.3



INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

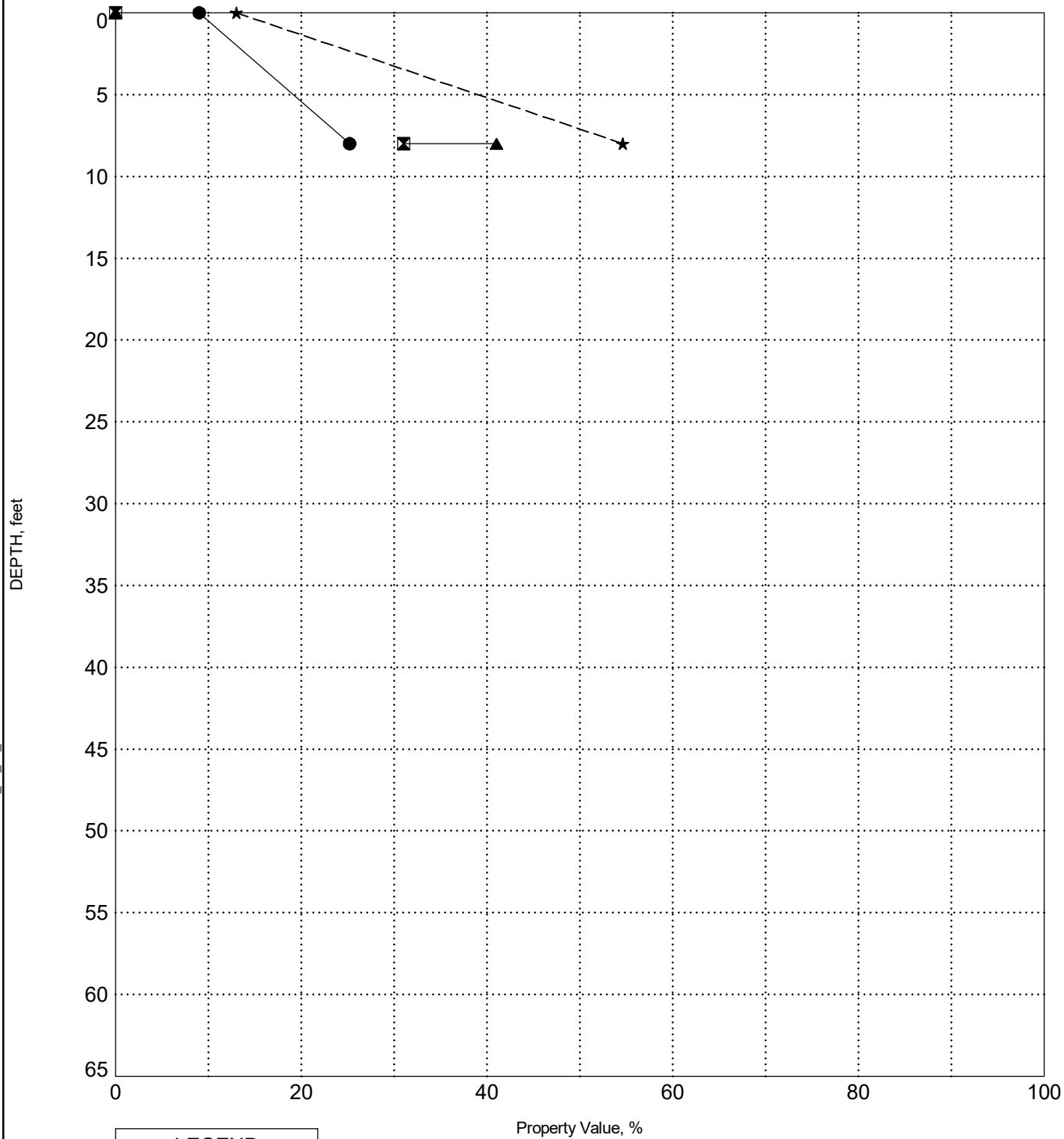
INDEX PROPERTIES VERSUS DEPTH

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

BORING W-34

SURFACE ELEVATION: 447.2

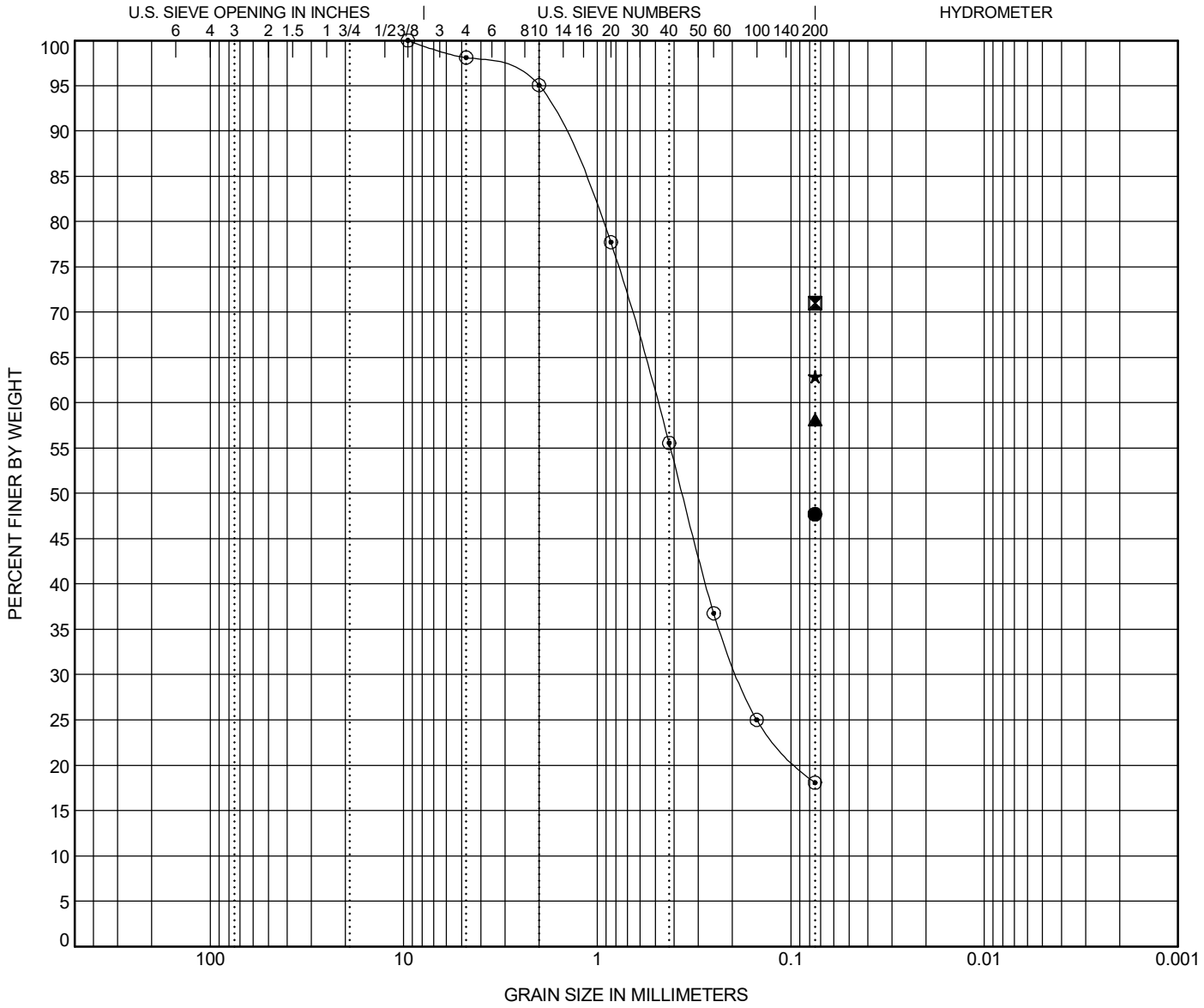


INDEX PROPS 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

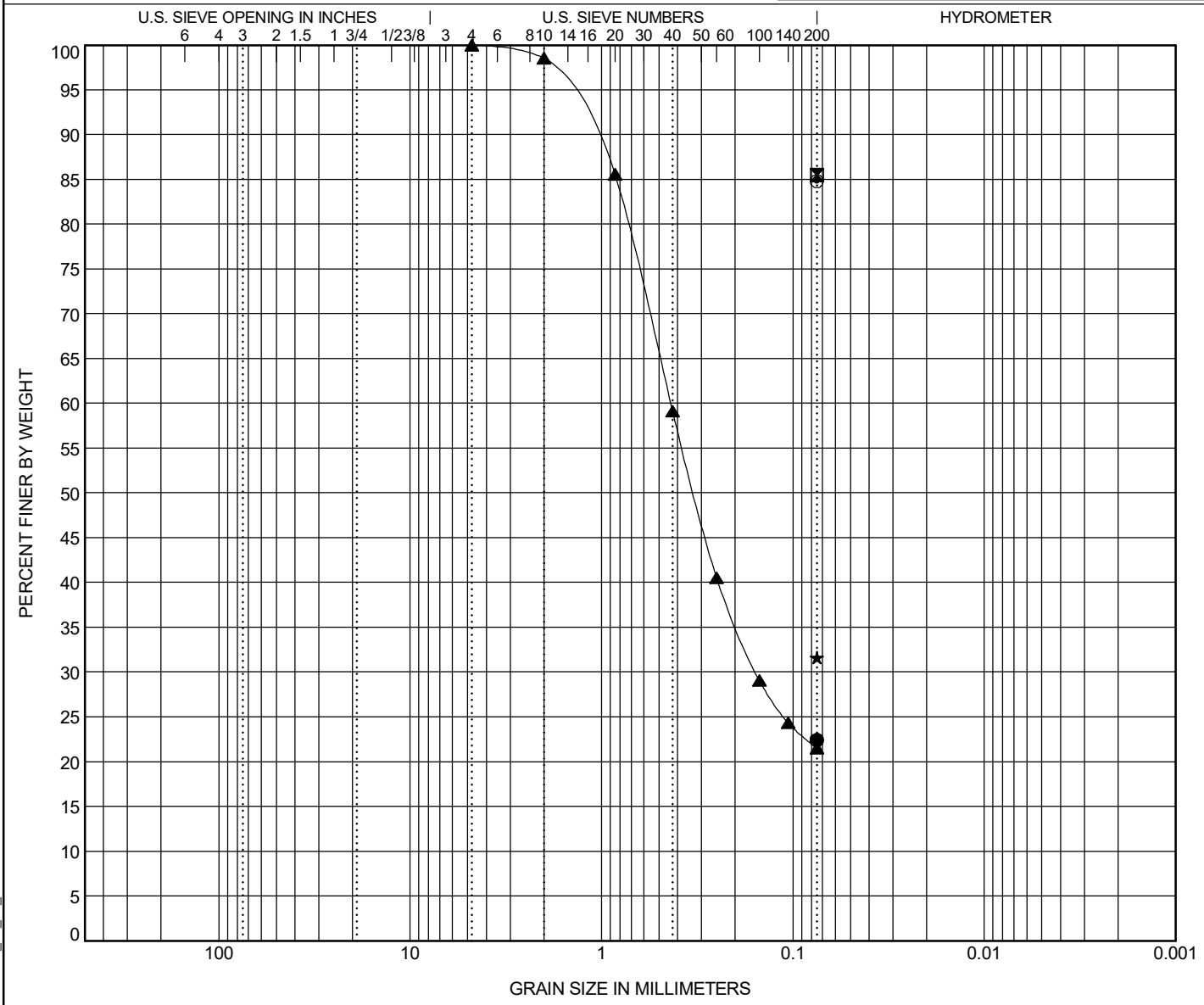
	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-1RB1**	**0.0**	**Silty SAND (SM)**	**34**	**26**	**8**		
⊠	**EB-1RB1**	**4.0**	**SILT with Sand (ML)**	**35**	**28**	**7**		
▲	**EB-1RB1**	**38.5**	**Sandy SILT (ML)**	**45**	**34**	**11**		
★	**EB-2RB1**	**0.0**	**Sandy Lean CLAY (CL)**					
⊙	**EB-2RB1**	**4.0**	**Clayey SAND (SC)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-1RB1**	**0.0**	**0.075**						**47.7**	
⊠	**EB-1RB1**	**4.0**	**0.075**						**71.0**	
▲	**EB-1RB1**	**38.5**	**0.075**						**58.1**	
★	**EB-2RB1**	**0.0**	**0.075**						**62.9**	
⊙	**EB-2RB1**	**4.0**	**9.5**	**0.488**	**0.186**		**1.9**	**80.0**	**18.1**	

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-2RB1**	**8.0**	**Clayey SAND (SC)**	**29**	**21**	**8**		
⊠	**EB-2RB1**	**18.5**	**Lean CLAY (CL)**	**37**	**21**	**16**		
▲	**EB-3RB1**	**0.0**	**Silty SAND (SM)**					
★	**EB-3RB1**	**4.0**	**Clayey SAND (SC)**	**52**	**26**	**26**		
⊙	**EB-3RB1**	**13.5**	**Lean CLAY with Sand (CL)**	**28**	**15**	**13**		

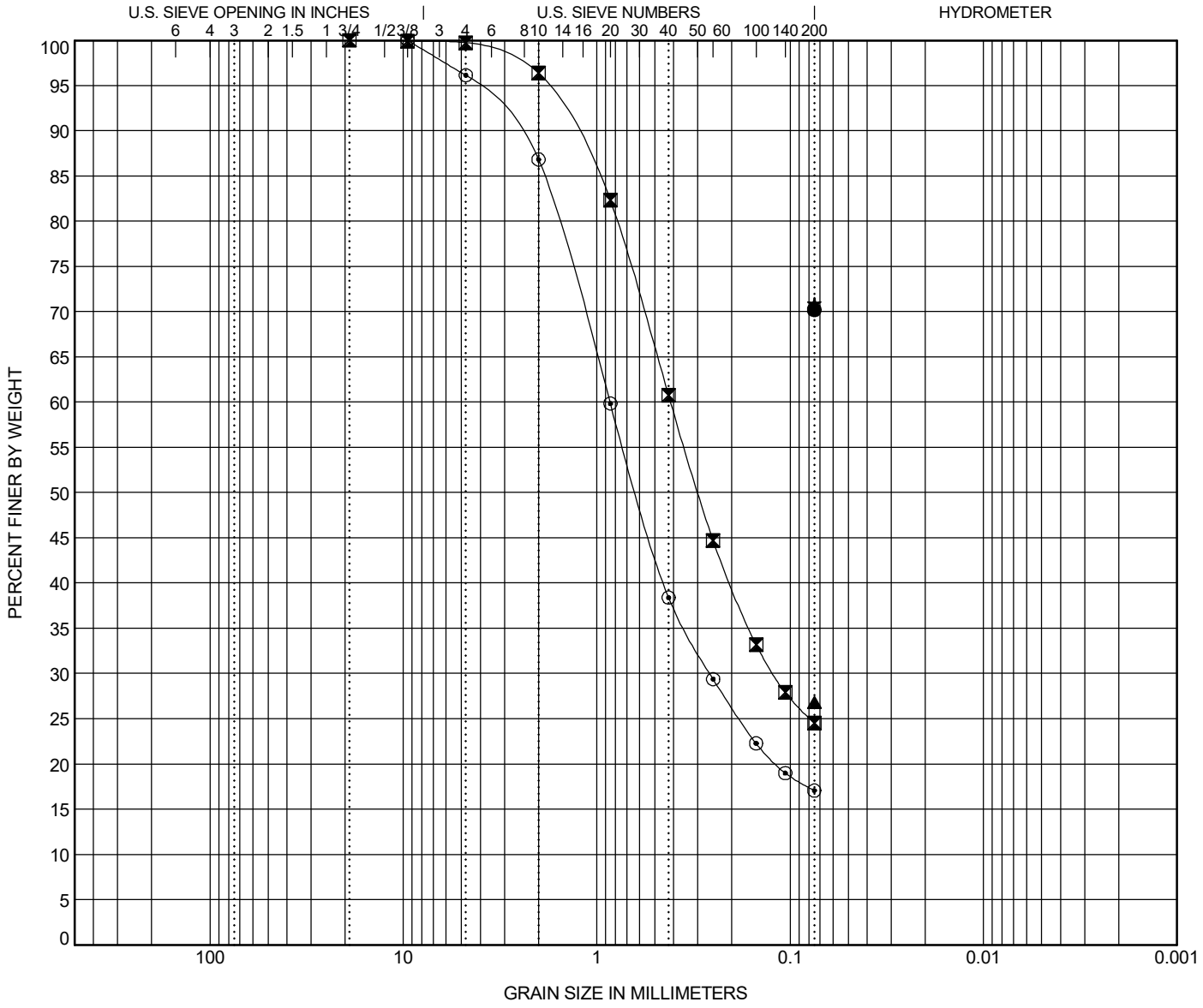
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-2RB1**	**8.0**	**0.075**						**22.4**	
⊠	**EB-2RB1**	**18.5**	**0.075**						**85.5**	
▲	**EB-3RB1**	**0.0**	**4.75**	**0.435**	**0.156**		**0.0**	**78.5**	**21.5**	
★	**EB-3RB1**	**4.0**	**0.075**						**31.6**	
⊙	**EB-3RB1**	**13.5**	**0.075**						**84.8**	

GRAIN SIZE 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-3RB1**	**63.5**	**SILT with Sand (ML)**	**45**	**33**	**12**		
⊠	**EB-4RB1**	**0.0**	**Silty SAND (SM)**					
▲	**EB-4RB1**	**4.0**	**Clayey SAND (SC)**	**33**	**18**	**15**		
★	**EB-4RB1**	**8.0**	**SILT with Sand (ML)**	**22**	**15**	**7**		
⊙	**EB-4RB1**	**18.5**	**Silty SAND (SM)**					

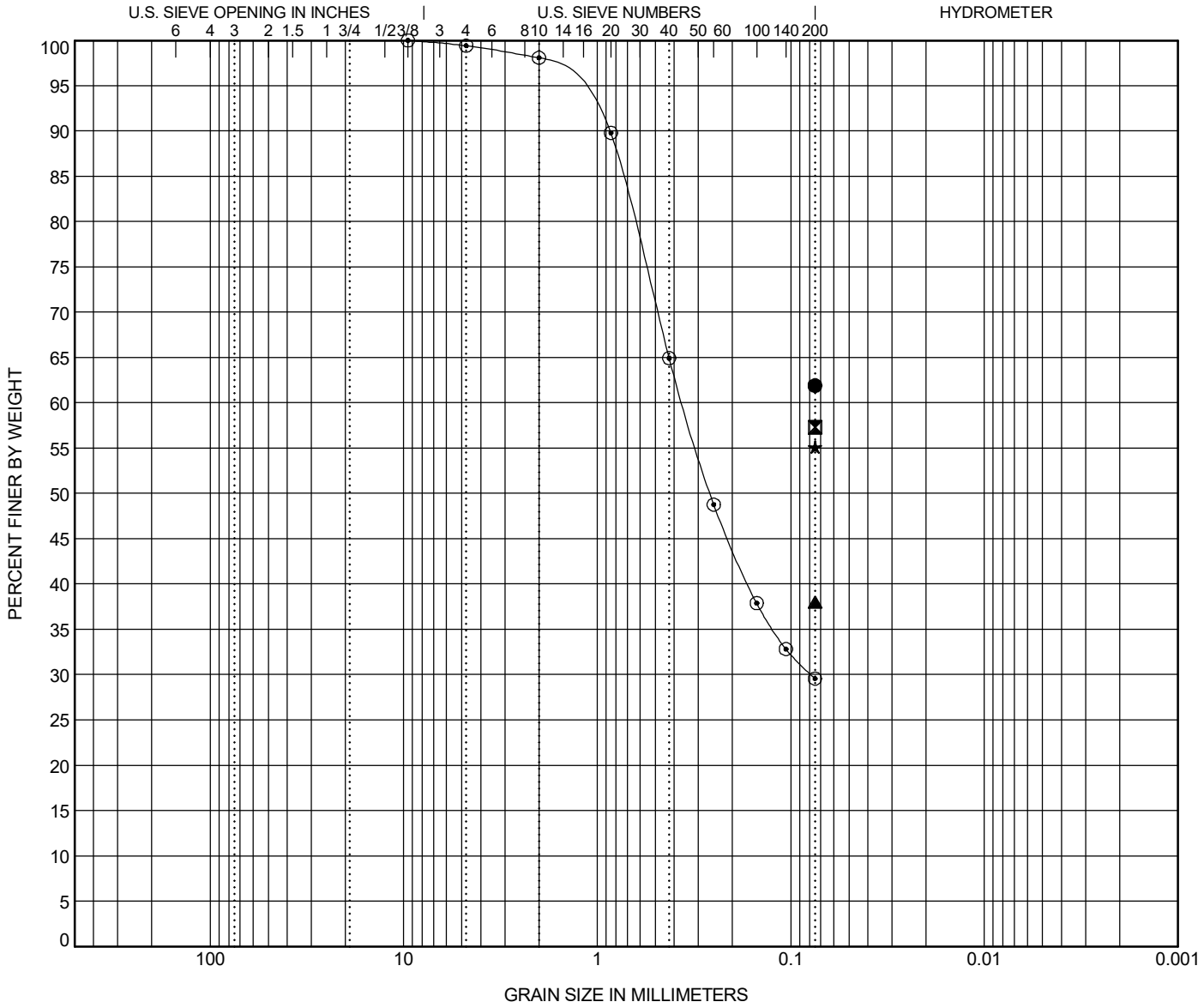
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-3RB1**	**63.5**	**0.075**						**70.2**	
⊠	**EB-4RB1**	**0.0**	**19**	**0.415**	**0.122**		**0.2**	**75.2**	**24.5**	
▲	**EB-4RB1**	**4.0**	**0.075**						**26.8**	
★	**EB-4RB1**	**8.0**	**0.075**						**70.9**	
⊙	**EB-4RB1**	**18.5**	**9.5**	**0.854**	**0.26**		**3.9**	**79.1**	**17.0**	

GRAIN SIZE 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

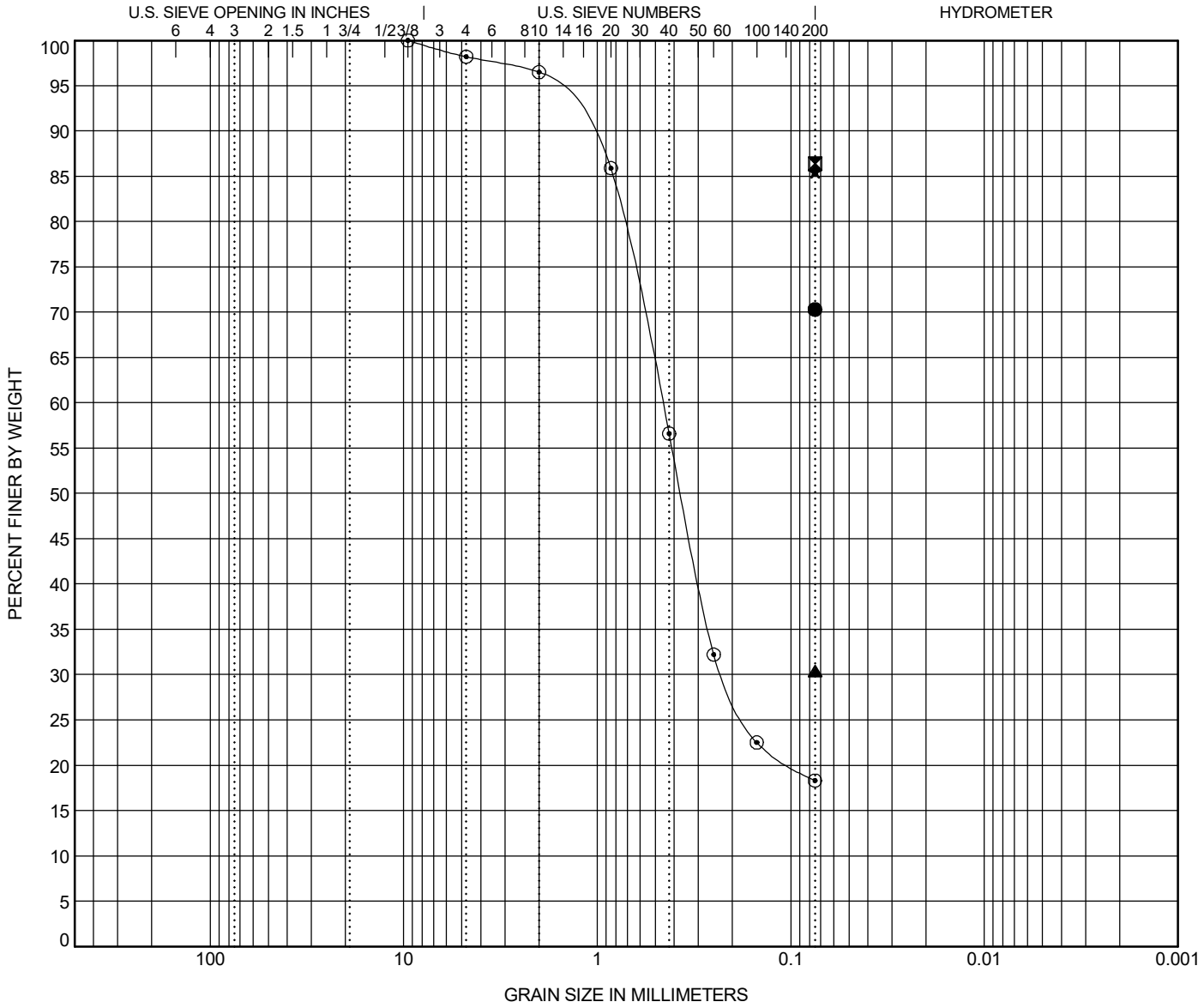
	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EB-4RB1**	**33.5**	**Sandy SILT (ML)**	**34**	**29**	**5**		
⊠	**EM-15**	**0.0**	**Sandy SILT (ML)**	**NP**	**NP**	**NP**		
▲	**EM-15**	**4.0**	**Silty SAND (SM)**					
★	**EM-15**	**8.0**	**Sandy Lean CLAY (CL)**	**42**	**18**	**24**		
⊙	**EM-16**	**0.0**	**Silty SAND (SM)**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EB-4RB1**	**33.5**	**0.075**						**61.9**	
⊠	**EM-15**	**0.0**	**0.075**						**57.3**	
▲	**EM-15**	**4.0**	**0.075**						**38.0**	
★	**EM-15**	**8.0**	**0.075**						**55.1**	
⊙	**EM-16**	**0.0**	**9.5**	**0.362**	**0.079**		**0.6**	**69.9**	**29.6**	

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**EM-16**	**4.0**	**Silty Lean CLAY with Sand (CL-ML)**	**24**	**18**	**6**		
⊠	**EM-16**	**13.5**	**SILT (ML)**	**34**	**30**	**4**		
▲	**IB-1RB1**	**0.0**	**Silty SAND (SM)**	**NP**	**NP**	**NP**		
★	**IB-1RB1**	**13.5**	**SILT with Sand (ML)**	**46**	**30**	**16**		
⊙	**IB-2RB1**	**0.0**	**Silty SAND (SM)**					

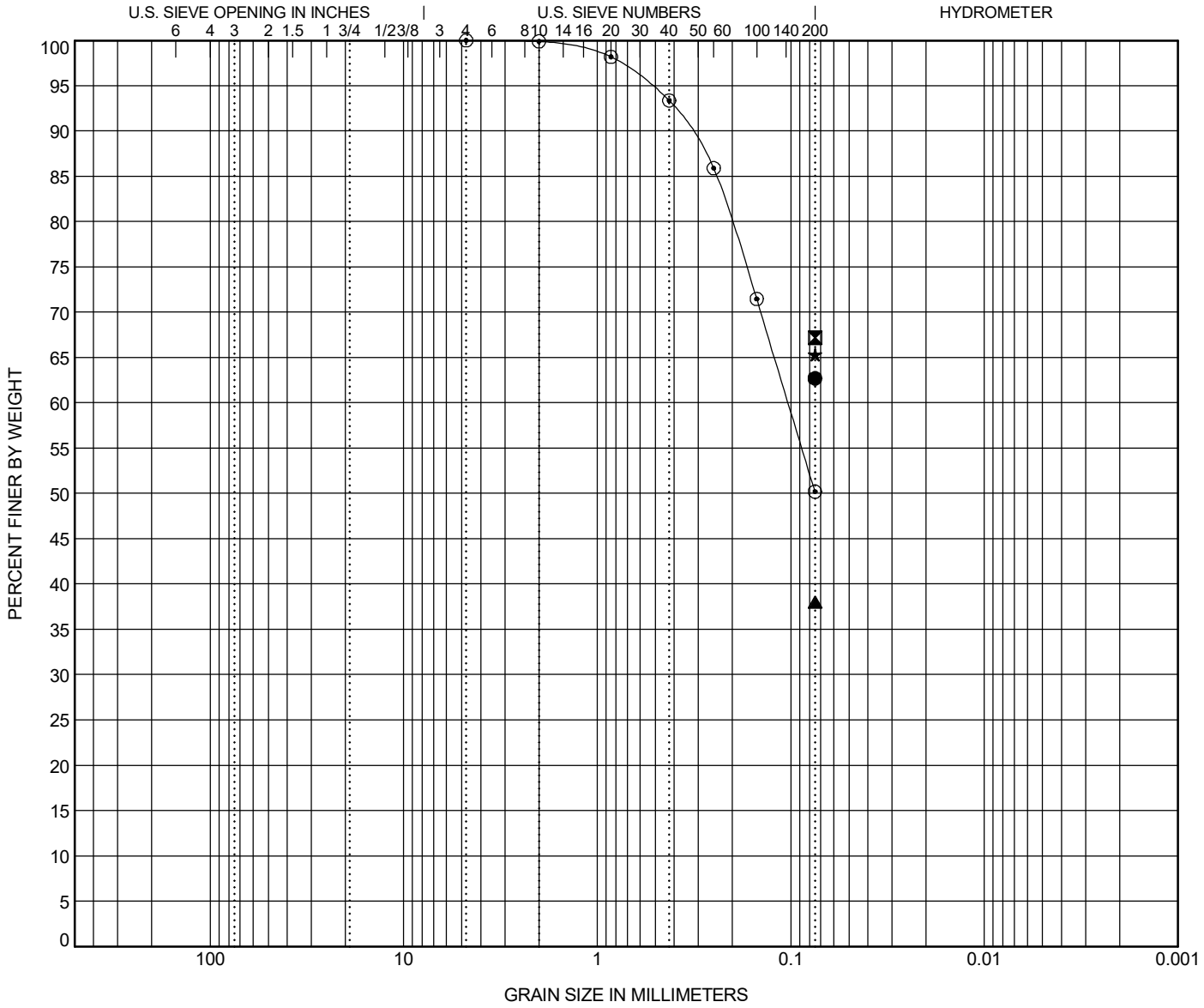
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**EM-16**	**4.0**	**0.075**						**70.3**	
⊠	**EM-16**	**13.5**	**0.075**						**86.4**	
▲	**IB-1RB1**	**0.0**	**0.075**						**30.4**	
★	**IB-1RB1**	**13.5**	**0.075**						**85.5**	
⊙	**IB-2RB1**	**0.0**	**9.5**	**0.461**	**0.223**		**1.8**	**79.9**	**18.3**	

GRAIN SIZE 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● IB-2RB1	6.0	Sandy SILT (ML)	43	36	7		
⊠ IB-2RB1	23.5	Sandy SILT (ML)	44	33	11		
▲ W-13	2.0	Clayey-Silty SAND (SC-SM)	24	18	6		
★ W-13	8.0	Sandy SILT (ML)	35	28	7		
⊙ W-14	2.0	Sandy SILT (ML)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● IB-2RB1	6.0	0.075						62.7	
⊠ IB-2RB1	23.5	0.075						67.2	
▲ W-13	2.0	0.075						38.0	
★ W-13	8.0	0.075						65.3	
⊙ W-14	2.0	4.75	0.103			0.0	49.8	50.2	

GRAIN SIZE 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

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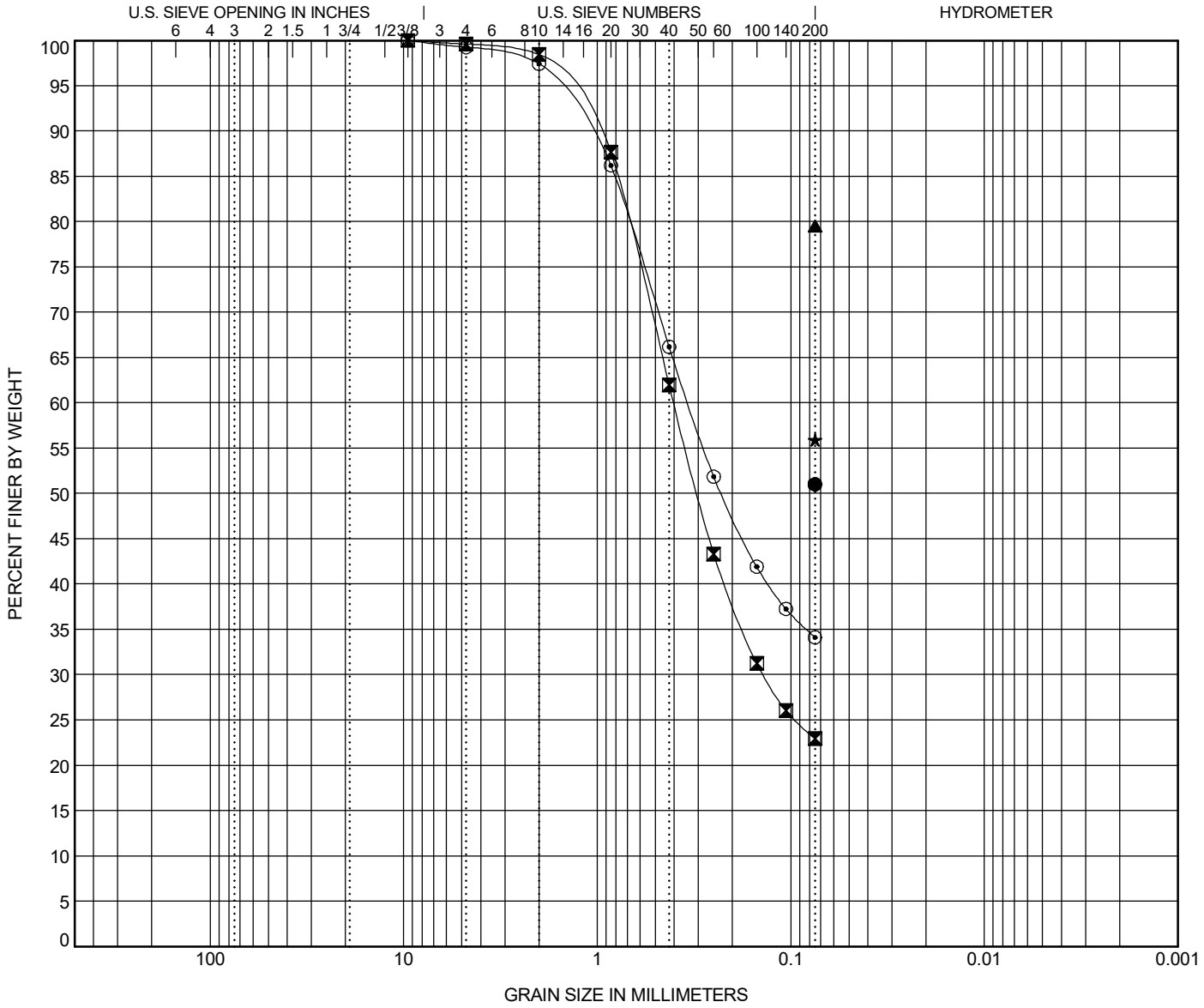
PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-14**	**6.0**	**Sandy SILT (ML)**	**43**	**30**	**13**		
⊠	**W-15**	**0.0**	**Silty SAND (SM)**					
▲	**W-15**	**6.0**	**Silty Lean CLAY with Sand (CL-ML)**	**21**	**15**	**6**		
★	**W-15**	**18.5**	**Sandy SILT (ML)**	**34**	**29**	**5**		
⊙	**W-16**	**0.0**	**Silty SAND (SM)**					

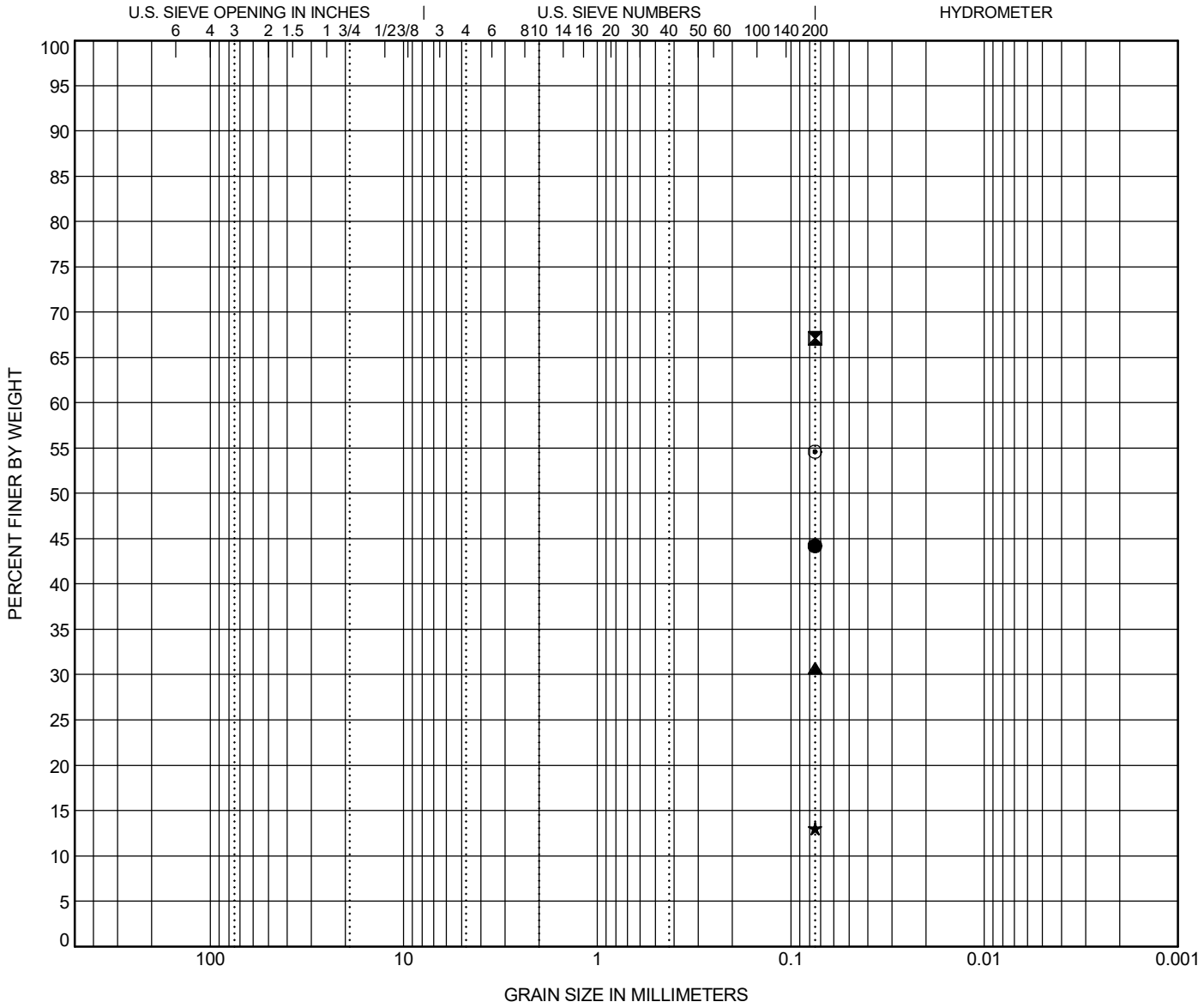
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-14**	**6.0**	**0.075**						**51.0**	
⊠	**W-15**	**0.0**	**9.5**	**0.402**	**0.138**		**0.4**	**76.7**	**22.9**	
▲	**W-15**	**6.0**	**0.075**						**79.5**	
★	**W-15**	**18.5**	**0.075**						**55.9**	
⊙	**W-16**	**0.0**	**9.5**	**0.338**			**0.7**	**65.1**	**34.1**	

GRAIN SIZE 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

GRAIN SIZE DISTRIBUTION

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**W-16**	**2.0**	**Clayey SAND (SC)**	**34**	**19**	**15**		
⊠	**W-16**	**6.0**	**Sandy Lean CLAY (CL)**	**22**	**14**	**8**		
▲	**W-33**	**2.0**	**Silty SAND (SM)**	**34**	**28**	**6**		
★	**W-34**	**0.0**	**Silty SAND (SM)**	**NP**	**NP**	**NP**		
⊙	**W-34**	**8.0**	**Sandy SILT (ML)**	**41**	**31**	**10**		

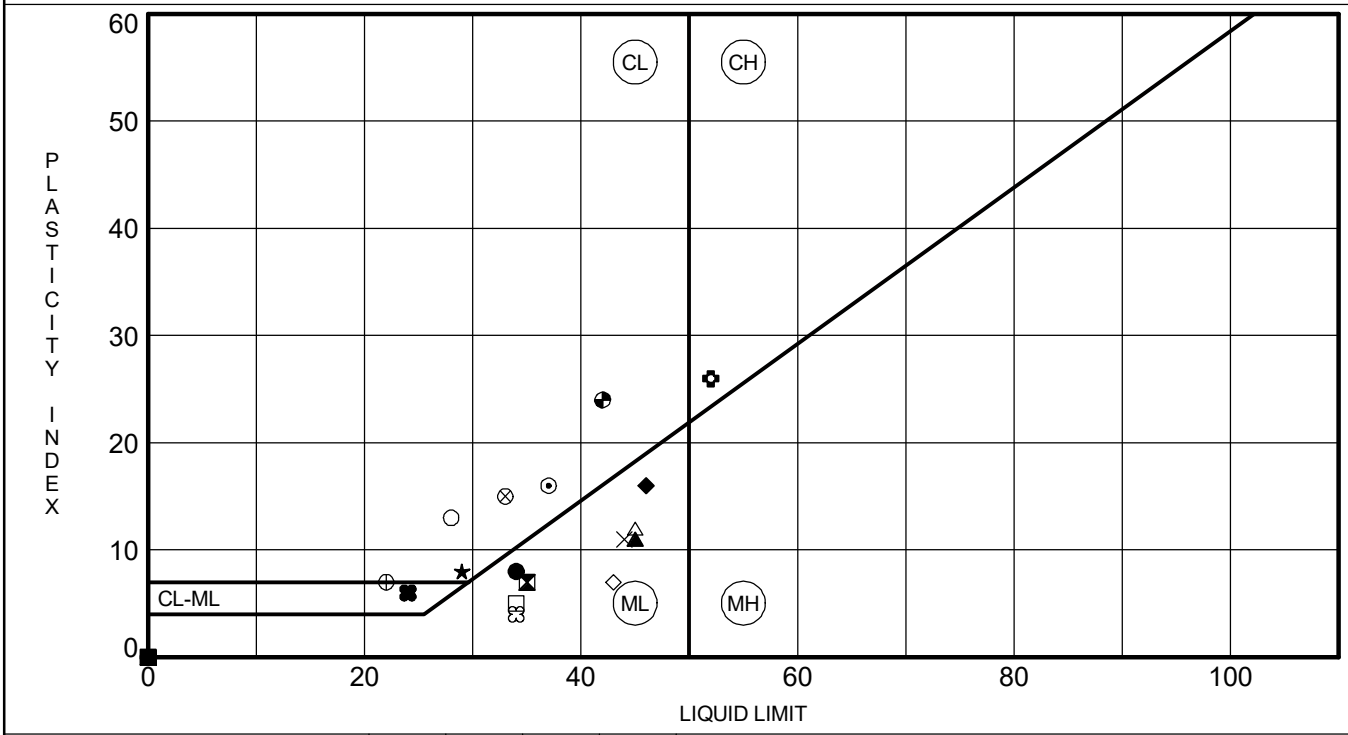
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**W-16**	**2.0**	**0.075**						**44.2**	
⊠	**W-16**	**6.0**	**0.075**						**67.1**	
▲	**W-33**	**2.0**	**0.075**						**30.7**	
★	**W-34**	**0.0**	**0.075**						**13.0**	
⊙	**W-34**	**8.0**	**0.075**						**54.6**	

GRAIN SIZE 23610178A RAMP BRIDGE OVER I-77.GPJ SCDOT DATA TEMPLATE_01_30_2015.GDT 1/5/24

ATTERBERG LIMITS' RESULTS

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland

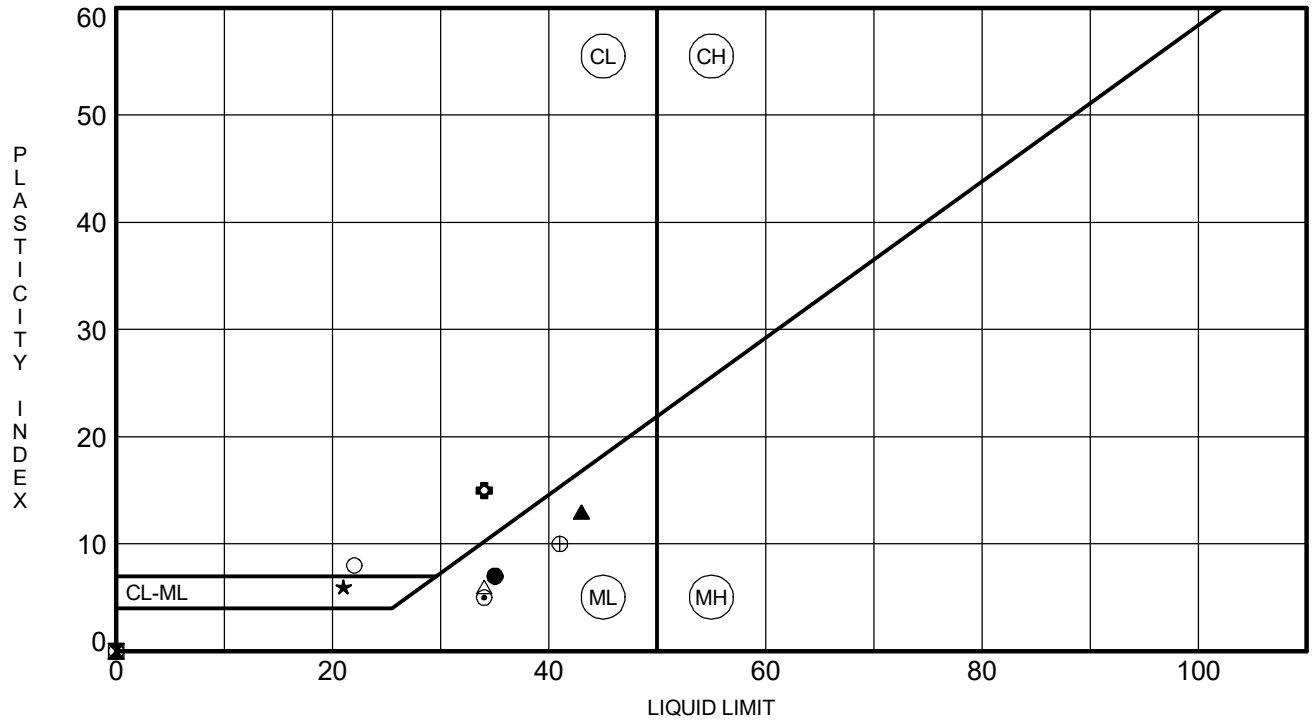


	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	EB-1RB1	0.0	34	26	8	48	Silty SAND (SM)
⊠	EB-1RB1	4.0	35	28	7	71	SILT with Sand (ML)
▲	EB-1RB1	38.5	45	34	11	58	Sandy SILT (ML)
★	EB-2RB1	8.0	29	21	8	22	Clayey SAND (SC)
⊙	EB-2RB1	18.5	37	21	16	86	Lean CLAY (CL)
✿	EB-3RB1	4.0	52	26	26	32	Clayey SAND (SC)
○	EB-3RB1	13.5	28	15	13	85	Lean CLAY with Sand (CL)
△	EB-3RB1	63.5	45	33	12	70	SILT with Sand (ML)
⊗	EB-4RB1	4.0	33	18	15	27	Clayey SAND (SC)
⊕	EB-4RB1	8.0	22	15	7	71	SILT with Sand (ML)
□	EB-4RB1	33.5	34	29	5	62	Sandy SILT (ML)
⊛	EM-15	0.0	NP	NP	NP	57	Sandy SILT (ML)
◕	EM-15	8.0	42	18	24	55	Sandy Lean CLAY (CL)
☆	EM-16	4.0	24	18	6	70	Silty Lean CLAY with Sand (CL-ML)
⊠	EM-16	13.5	34	30	4	86	SILT (ML)
■	IB-1RB1	0.0	NP	NP	NP	30	Silty SAND (SM)
◆	IB-1RB1	13.5	46	30	16	86	SILT with Sand (ML)
◇	IB-2RB1	6.0	43	36	7	63	Sandy SILT (ML)
×	IB-2RB1	23.5	44	33	11	67	Sandy SILT (ML)
⊠	W-13	2.0	24	18	6	38	Clayey-Silty SAND (SC-SM)

ATTERBERG LIMITS' RESULTS

PROJECT ID 23610178A **PROJECT NAME** I-77 Exit 26 Phase I

PROJECT COUNTY Richland



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**W-13**	**8.0**	**35**	**28**	**7**	**65**	**Sandy SILT (ML)**
⊠	**W-14**	**2.0**	**NP**	**NP**	**NP**	**50**	**Sandy SILT (ML)**
▲	**W-14**	**6.0**	**43**	**30**	**13**	**51**	**Sandy SILT (ML)**
★	**W-15**	**6.0**	**21**	**15**	**6**	**80**	**Silty Lean CLAY with Sand (CL-ML)**
⊙	**W-15**	**18.5**	**34**	**29**	**5**	**56**	**Sandy SILT (ML)**
✿	**W-16**	**2.0**	**34**	**19**	**15**	**44**	**Clayey SAND (SC)**
○	**W-16**	**6.0**	**22**	**14**	**8**	**67**	**Sandy Lean CLAY (CL)**
△	**W-33**	**2.0**	**34**	**28**	**6**	**31**	**Silty SAND (SM)**
⊗	**W-34**	**0.0**	**NP**	**NP**	**NP**	**13**	**Silty SAND (SM)**
⊕	**W-34**	**8.0**	**41**	**31**	**10**	**55**	**Sandy SILT (ML)**

Appendix VIII – Laboratory Test Data Sheets – TestingRock Cores

UNCONFINED COMPRESSION
(ASTM D7012 Method D)

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

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

Report Date: January 3, 2024
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-1RB1	RC-3	65.2 - 65.6	4.54	1.99	A	3.11	151.0	31	8,515	2,738	0.9
IB-1RB1	RC-1	51.4 - 51.8	4.07	1.95	B	2.99	152.6	39	8,329	2,786	5.4
IB-1RB1	RC-4	67.8 - 68.2	4.10	1.98	B	3.08	169.0	54	17,382	5,644	1.4

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543-19 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.

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

1413 Topside Road, Louisville, TN 37777

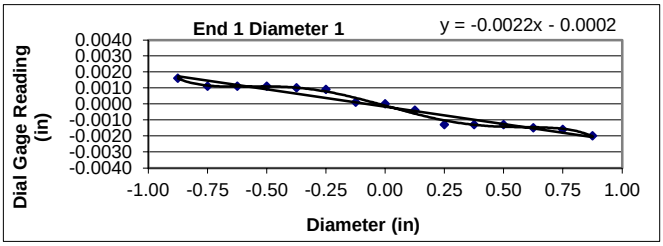
Project:	I-77 Exit 26 Interchange	**Diameter (in):**	1.99	**Date:**	12/18/2023
Project No.:	23610178A	**Length (in):**	4.54	**Tested by:**	Ryan Skinner
Boring Id:	EB-1RB1	**Unit Weight (pcf):**	151.0	**Reviewed by:**	Victoria Igoe
Sample No.:	RC-3	**Moisture Content (%):**	0.9		
Depth (ft):	65.2 - 65.6				

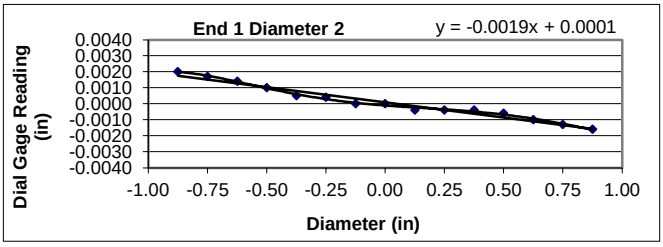
Deviation From Straightness (Procedure S1)

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

End Flatness and Parallelism Readings (Procedure FP1)

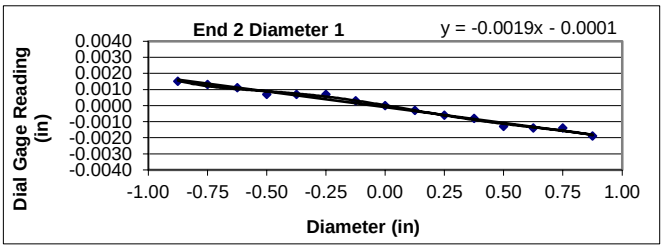
Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0016	0.0020	0.0015	0.0014
- 6/8	0.0011	0.0017	0.0013	0.0014
- 5/8	0.0011	0.0014	0.0011	0.0012
- 4/8	0.0011	0.0010	0.0007	0.0002
- 3/8	0.0010	0.0005	0.0007	0.0002
- 2/8	0.0009	0.0004	0.0007	0.0002
- 1/8	0.0001	0.0000	0.0003	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0004	-0.0004	-0.0003	-0.0003
2/8	-0.0013	-0.0004	-0.0006	-0.0004
3/8	-0.0013	-0.0004	-0.0008	-0.0010
4/8	-0.0013	-0.0006	-0.0013	-0.0017
5/8	-0.0015	-0.0010	-0.0014	-0.0019
6/8	-0.0016	-0.0013	-0.0014	-0.0020
7/8	-0.0020	-0.0016	-0.0019	-0.0021

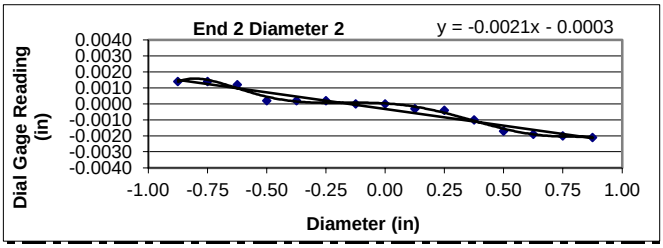




Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? **YES**





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

Parrallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00217
	Angle of Best Fit Line:	-0.12409
End 2:	Slope of Best Fit Line:	-0.00195
	Angle of Best Fit Line:	-0.11164
	Max Angular Difference:	**-0.01**

Parrallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00189
	Angle of Best Fit Line:	-0.10853
End 2:	Slope of Best Fit Line:	-0.00209
	Angle of Best Fit Line:	-0.11967
	Max Angular Difference:	**0.01**

Parallelism Tolerance Met? **YES**

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

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0036	0.0018	**YES**
End 1 Diam 2	0.0036	0.0018	**YES**
End 2 Diam 1	0.0034	0.0017	**YES**
End 2 Diam 2	0.0035	0.0018	**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

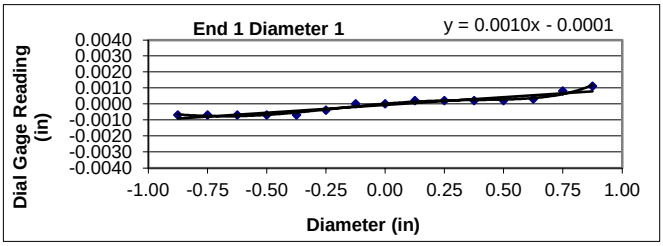
Project:	I-77 Exit 26 Interchange	**Diameter (in):**	1.95	**Date:**	12/18/2023
Project No.:	23610178A	**Length (in):**	4.07	**Tested by:**	Ryan Skinner
Boring Id:	IB-1RB1	**Unit Weight (pcf):**	152.6	**Reviewed by:**	Victoria Igoe
Sample No.:	RC-1	**Moisture Content (%):**	5.4		
Depth (ft):	51.4 - 51.8				

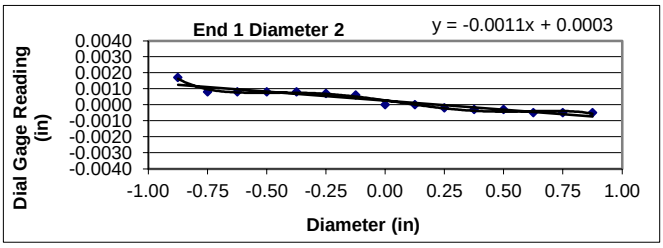
Deviation From Straightness (Procedure S1)

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

End Flatness and Parallelism Readings (Procedure FP1)

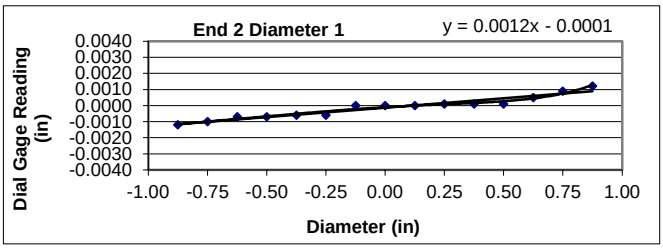
Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0007	0.0017	-0.0012	0.0020
- 6/8	-0.0007	0.0008	-0.0010	0.0018
- 5/8	-0.0007	0.0008	-0.0007	0.0018
- 4/8	-0.0007	0.0008	-0.0007	0.0018
- 3/8	-0.0007	0.0008	-0.0006	0.0015
- 2/8	-0.0004	0.0007	-0.0006	0.0009
- 1/8	0.0000	0.0006	0.0000	0.0004
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0002	0.0000	0.0000	0.0000
2/8	0.0002	-0.0002	0.0001	-0.0003
3/8	0.0002	-0.0003	0.0001	-0.0008
4/8	0.0002	-0.0003	0.0001	-0.0012
5/8	0.0003	-0.0005	0.0005	-0.0015
6/8	0.0008	-0.0005	0.0009	-0.0017
7/8	0.0011	-0.0005	0.0012	-0.0019

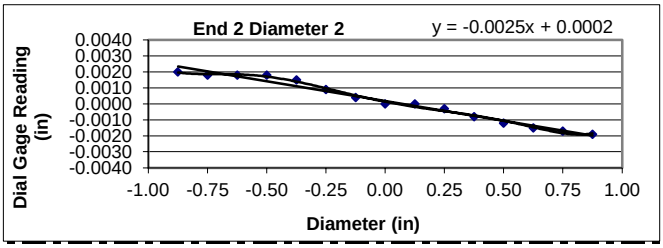




Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? **YES**





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

Parrallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00098
	Angle of Best Fit Line:	0.05615
End 2:	Slope of Best Fit Line:	0.00117
	Angle of Best Fit Line:	0.06695
	Max Angular Difference:	**-0.01**

Parrallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00114
	Angle of Best Fit Line:	-0.06515
End 2:	Slope of Best Fit Line:	-0.00247
	Angle of Best Fit Line:	-0.14160
	Max Angular Difference:	**0.08**

Parallelism Tolerance Met? **YES**

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

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0018	0.0009	**YES**
End 1 Diam 2	0.0022	0.0011	**YES**
End 2 Diam 1	0.0024	0.0012	**YES**
End 2 Diam 2	0.0039	0.0020	**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

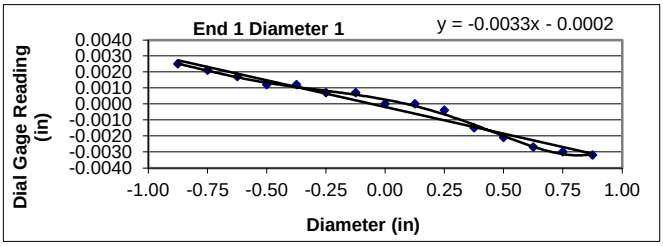
Project:	I-77 Exit 26 Interchange	**Diameter (in):**	1.98	**Date:**	12/18/2023
Project No.:	23610178A	**Length (in):**	4.1	**Tested by:**	Ryan Skinner
Boring Id:	IB-1RB1	**Unit Weight (pcf):**	169.0	**Reviewed by:**	Victoria Igoe
Sample No.:	RC-4	**Moisture Content (%):**	1.4		
Depth (ft):	67.8 - 68.2				

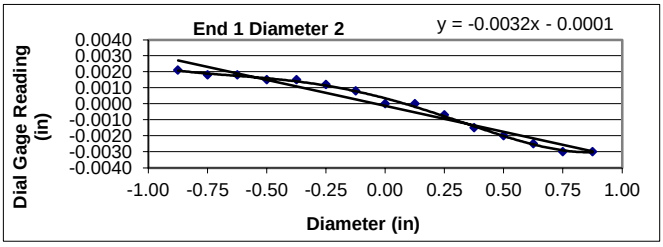
Deviation From Straightness (Procedure S1)

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

End Flatness and Parallelism Readings (Procedure FP1)

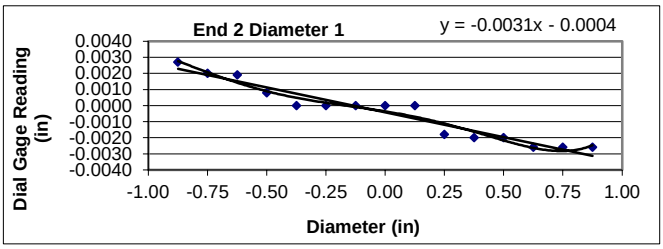
Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0025	0.0021	0.0027	0.0003
- 6/8	0.0021	0.0018	0.0020	0.0003
- 5/8	0.0017	0.0018	0.0019	0.0003
- 4/8	0.0012	0.0015	0.0008	0.0003
- 3/8	0.0012	0.0015	0.0000	0.0002
- 2/8	0.0007	0.0012	0.0000	0.0000
- 1/8	0.0007	0.0008	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	-0.0004	-0.0007	-0.0018	0.0000
3/8	-0.0015	-0.0015	-0.0020	0.0000
4/8	-0.0021	-0.0020	-0.0020	0.0000
5/8	-0.0027	-0.0025	-0.0026	-0.0002
6/8	-0.0030	-0.0030	-0.0026	-0.0003
7/8	-0.0032	-0.0030	-0.0026	-0.0003

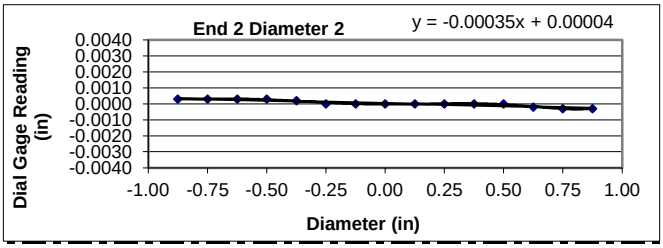




Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? **YES**





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

Parrallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00333
	Angle of Best Fit Line:	-0.19104
End 2:	Slope of Best Fit Line:	-0.00309
	Angle of Best Fit Line:	-0.17680
	Max Angular Difference:	**-0.01**

Parrallelism Diameter 2

End 1:	Slope of Best Fit Line:	-0.00325
	Angle of Best Fit Line:	-0.18597
End 2:	Slope of Best Fit Line:	-0.00035
	Angle of Best Fit Line:	-0.01981
	Max Angular Difference:	**-0.17**

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	0.0057	0.0029	**YES**
End 1 Diam 2	0.0051	0.0026	**YES**
End 2 Diam 1	0.0053	0.0027	**YES**
End 2 Diam 2	0.0006	0.0003	**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

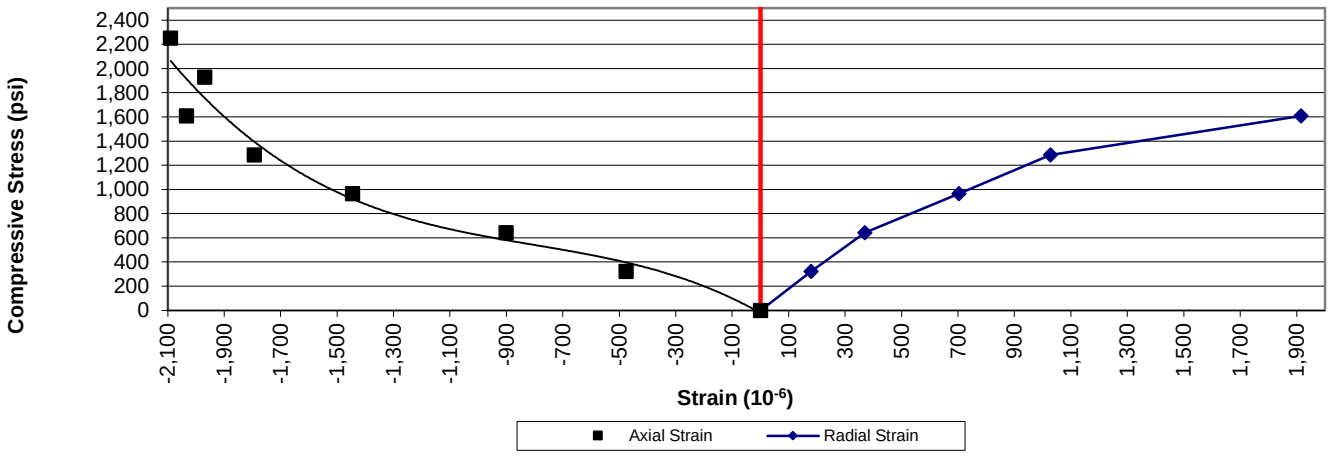
Project:	I-77 Exit 26 Interchange	**Diameter, in.:**	1.99	**Date:**	12/21/2023
Project No.:	23610178A	**Length, in.:**	4.54	**Tested by:**	Ryan Skinner
Boring Id:	EB-1RB1	**Unit Weight, pcf:**	151.0	**Reviewed by:**	Victoria Igoe
Sample No:	RC-3	**Moisture Content, %:**	0.9		
Depth (ft):	65.2 - 65.6	**Load Rate, psi/sec:**	31		

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	-476	180	1,000	322	0.68	0.38	
3	-901	370	2,000	643	0.71	0.41	
4	-1,445	703	3,000	965	0.67	0.49	
5	-1,793	1,028	4,000	1,286	0.72	0.57	
6	-2,034	1,916	5,000	1,608	0.79	0.94	
7	-1,969		6,000	1,929	0.98		Note 1
8	-2,090		7,000	2,251	1.08		
9			8,515	2,738			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)
Note 1: Radial Gauge failed prior to core failure

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

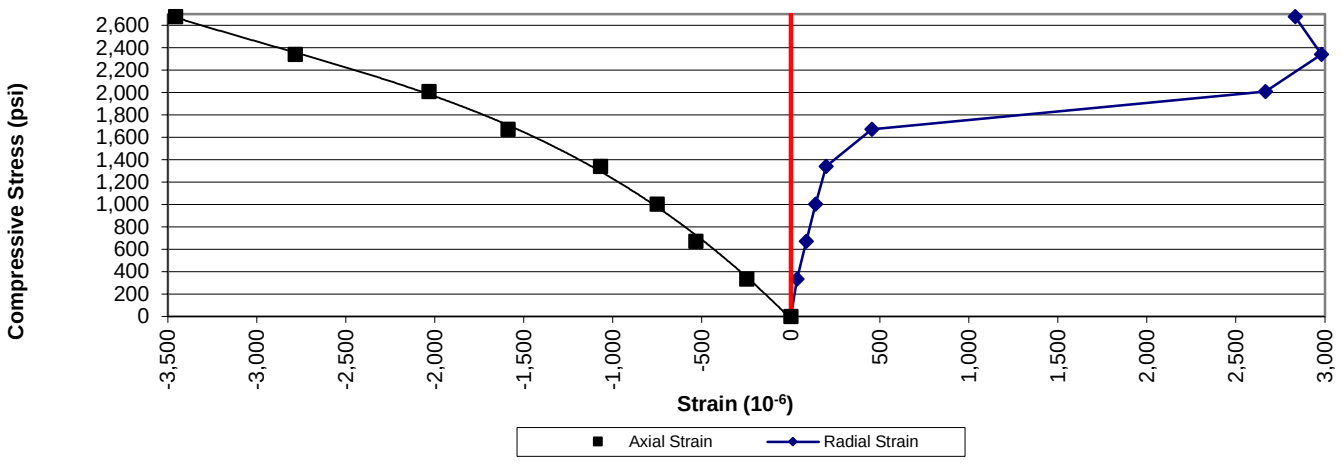
Project:	I-77 Exit 26 Interchange	**Diameter, in.:**	1.95	**Date:**	12/21/2023
Project No.:	23610178A	**Length, in.:**	4.07	**Tested by:**	Ryan Skinner
Boring Id:	IB-1RB1	**Unit Weight, pcf:**	152.6	**Reviewed by:**	Victoria Igoe
Sample No:	RC-1	**Moisture Content, %:**	5.4		
Depth (ft):	51.4 - 51.8	**Load Rate, psi/sec:**	39		

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	-248	35	1,000	334	1.35	0.14	
3	-533	87	2,000	669	1.26	0.16	
4	-750	140	3,000	1,003	1.34	0.19	
5	-1,069	199	4,000	1,338	1.25	0.19	
6	-1,589	456	5,000	1,672	1.05	0.29	
7	-2,033	2,667	6,000	2,007	0.99	1.31	
8	-2,783	2,981	7,000	2,341	0.84	1.07	
9	-3,456	2,834	8,000	2,676	0.77	0.82	
10			8,329	2,786			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 for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.

Stress vs. Strain



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

1413 Topside Road, Louisville, TN 37777

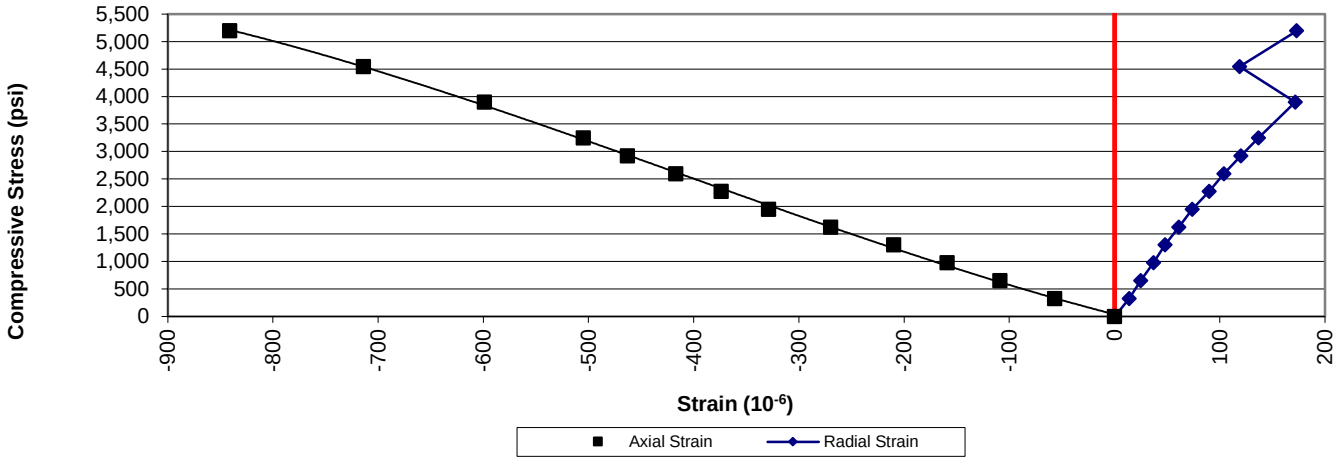
Project:	I-77 Exit 26 Interchange	**Diameter, in.:**	1.98	**Date:**	12/21/2023
Project No.:	23610178A	**Length, in.:**	4.10	**Tested by:**	Ryan Skinner
Boring Id:	IB-1RB1	**Unit Weight, pcf:**	169.0	**Reviewed by:**	Victoria Igoe
Sample No:	RC-4	**Moisture Content, %:**	1.4		
Depth (ft):	67.8 - 68.2	**Load Rate, psi/sec:**	54		

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	-57	14	1,000	325	5.70	0.25	
3	-109	25	2,000	649	5.95	0.23	
4	-159	37	3,000	974	6.13	0.23	
5	-210	48	4,000	1,299	6.19	0.23	
6	-270	61	5,000	1,623	6.01	0.23	
7	-329	74	6,000	1,948	5.92	0.22	
8	-374	90	7,000	2,273	6.08	0.24	
9	-417	104	8,000	2,597	6.23	0.25	
10	-463	120	9,000	2,922	6.31	0.26	
11	-505	137	10,000	3,247	6.43	0.27	
12	-599	172	12,000	3,896	6.50	0.29	
13	-714	119	14,000	4,545	6.37	0.17	
14	-841	173	16,000	5,195	6.18	0.21	
15			17,382	5,644			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 for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.

Stress vs. Strain



Photographer: Victoria Igoe

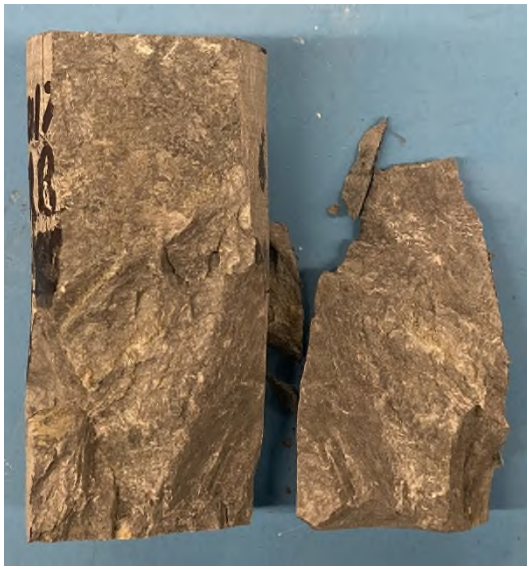
Date: 12/21/2023

1	**Location / Orientation**	EB-1RB1, RC-3 (65.2' – 65.6')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method D)

Photographer: Victoria Igoe

Date: 12/21/2023

2	**Location / Orientation**	IB-1RB1, RC-1 (51.4' – 51.8')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method D)



Date: 12/21/2023

Photographer: Victoria Igoe

3	**Location / Orientation**	IB-1RB1, RC-4 (67.8' – 68.2')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method D)

Appendix IX – Laboratory Test Data Sheets – Corrosion Series Testing

Results Only Soil Testing for I-77 Exit 26 Interchange - Ramp Bridge over I-77

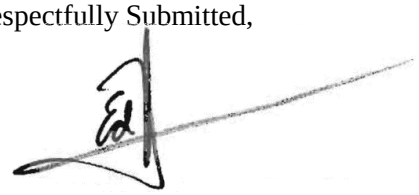
December 5, 2023

Prepared for:

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

Project X Job#: S231204G
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 - Ramp Bridge over I-77
Client Job Number: 23610178A
Project X Job Number: S231204G
December 5, 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-2-RB1 SS-10	33.5-35	26.9	0.0027	65.2	0.0065	100,500	80,400	6.6
EB-3RB1 SS-8	23.5-25	32.9	0.0033	73.8	0.0074	87,100	67,000	6.4
IB-1RB1 SS-5	8-10	8.1	0.0008	11.1	0.0011	93,800	73,700	7.0

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 Lab

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: S231204G SLME-SC 23610178A I-77 Ramp B 3 Quad · AASHTO-AST

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 — Ramp Bridge over I-77
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 :

Default Method

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

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

	SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED	Geo Quad: Soil Resistivity (ASTM G187)	Geo Quad: pH (ASTM G51)	Geo Quad: Sulfate (ASTM D4327)	Geo Quad: Chloride (ASTM D4327)	Full Corrosion Series: Redox Potential (ASTM G200)	Sulfide (SM 4500-S2)	Ammonia (ASTM D6919)	Nitrate (ASTM D4327)	Flouride (ASTM D4327)	Phosphate (ASTM D6919)	Lithium (ASTM D6919)	Sodium (ASTM D6919)	Potassium (ASTM D6919)	Magnesium (ASTM D6919)	Calcium (ASTM D6919)	BiCarbonate (SM 2320B)	Full Corrosion Series	Reports: Soil Corrosivity Evaluation Report	Reports: Water Corrosivity Mini Report	Moisture Content (ASTM D2216)	Total Alkalinity (SM 2320B)	Thermal Resistivity	Metallurgical Analysis	Langelier Index	Puckorius Index	XRF Elemental Analysis	Water Hardness
53	1	EB-2-RB1	SS-10	33.5-35	X	X	X	X																							
54	2	EB-3RB1	SS-8	23.5-25	X	X	X	X																							
55	3	IB-1RB1	SS-5	8-10	X	X	X	X																							
	4																														
	5																														
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Appendix X – 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

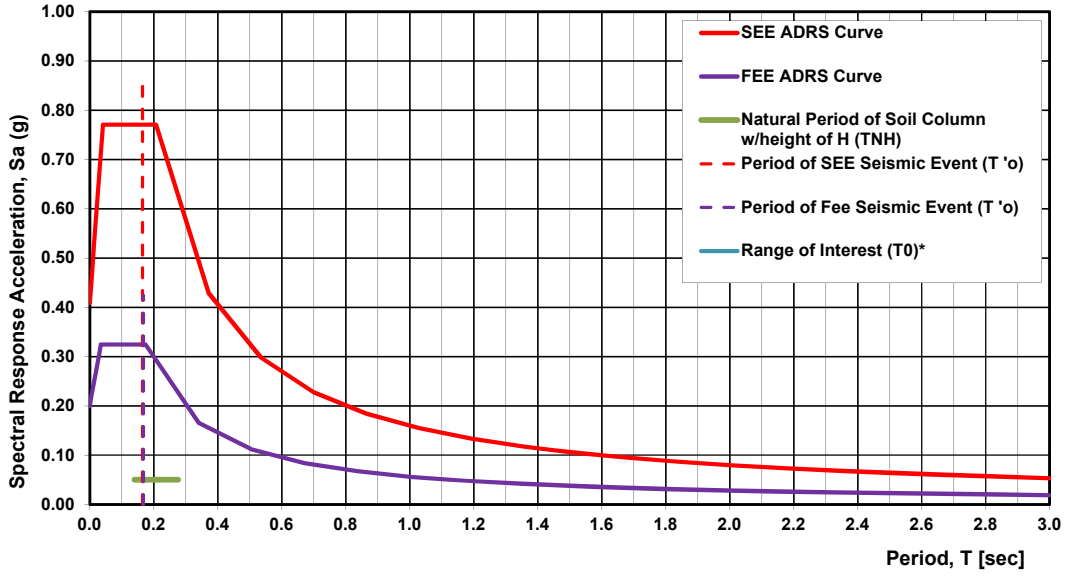
Fundamental Period of Structure, T_0^*	Range of Interest sec		$V^*_{s,H}$	H	T_{NH} sec	
sec	$0.5*T_0$	$2.0*T_0$	ft/sec	ft	$(4*H)/V^*_{s,H}$	$(6*H)/V^*_{s,H}$
0.00	0.00	0.00	2101.56	96.70	0.14	0.28
0.00	0.00	0.00	H = B-C Boundary			

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 XI – Electronic Data Files

gINT® Project Files

Excel® Downhole Seismic Velocity File