

To: Cory Burrall, P.E., Structures Project Manager
AJA
From: August Arles, Geotechnical Engineer
Date: May 12th, 2025
Subject: Reading ER P23-1(404) Geotechnical Data Report

1.0 INTRODUCTION

As requested, we have completed our geotechnical and geological subsurface investigation for the proposed replacement of Bridge No. 12 carrying VT Route 106 over the North Branch of the Black River in the town of Reading, Vermont. Bridge 12 is located approximately 1.2 miles south of the intersection of VT 106 and VT 44. The borings were completed to determine the soil strata and depth to bedrock to aid in design of a replacement substructure as part of the Reading ER P23-1(404) project. Contained herein are the results of our field sampling and testing, laboratory analyses of soil and rock samples, as well as attached boring logs.

2.0 FIELD INVESTIGATION

The field investigation was conducted between March 21st and April 14th, 2025. The boring locations were provided by Fianna Barrows in a Geotechnical Request Form, dated October 4th, 2024, and laid out in the field by members of the Geotechnical Engineering Section using the Geotechnical Section's handheld Trimble TDC600 and Trimble DA2 GNSS GPS receiver with submeter accuracy. A summary of the final location of each boring and corresponding ground surface elevation can be found in Table 2.1 and the attached boring location plan. The values for the Northings and Eastings are based on the Vermont State Plane Grid Coordinate System NAD 83. The elevations for the borings, based on the North American Vertical Datum, NAVD 88, were estimated using the design file s23b770sv.dgn, dated January 2024. The locations and elevations for the borings should be considered accurate only to the degree implied by the method used to determine them.

Table 2.1: Boring Locations

Boring	Northing (ft)	Easting (ft)	Elevation (ft)	Approximate Bedrock Elevation (ft)
B-101	347125.5	1630434.5	728.2	703.1
B-102*	347232.2	1630426.3	728.5	N.A.
B-102a	347231.3	1630432.2	728.4	706.4
B-103	347140.5	1630419.2	728.1	698.1
B-104	347204.9	1630448.2	728.5	703.5

**B-102 was abandoned and did not reach bedrock*

The borings were performed in general accordance with AASHTO T206, *Standard Method of Test for Penetration Test and Split-Barrel Sampling of Soils*. During the boring operations for B-101 split spoon samples and standard penetration tests (SPT) were taken continuously to 16.5 feet (ft) below ground surface (bgs), and then at 24 ft bgs where refusal was encountered. For B-102a, samples and SPT tests were taken continuously from 4 ft bgs to 18 ft bgs where refusal was

encountered. For B-103 and B-104, casing was advanced to refusal without sampling. When refusal was encountered in B-101, two NX cores, totaling 10 ft, were conducted to confirm bedrock, based on analysis from the State Geologist, bedrock was determined to start at 25.1 ft bgs with 1.1 ft of boulder directly above bedrock. For B-102a, three NX core runs, totaling 9 ft were conducted to confirm bedrock, based on the analysis from the State Geologists, bedrock was determined to start at 22.0 ft bgs with 4 ft of boulder directly above bedrock. When refusal was encountered in B-103 and B-104, three NX cores, totaling 15 ft, were conducted to confirm the presence of bedrock. Bedrock was encountered in B-103 and B-104 at a depth of 30 ft and 25 ft, respectively.

Soil samples were visually identified in the field and SPT blow counts were recorded on the boring logs when applicable. Soil samples were preserved and returned to the VTrans Construction and Materials Bureau Laboratory for testing and further evaluation. Upon completion of the laboratory testing of select representative samples, the borings logs were revised to reflect the results of the laboratory classification analysis. The attached boring logs display the types of soil strata encountered and include the laboratory test data, SPT data, and any pertinent observations made by the drilling crew.

Details of the bedrock coring were recorded on the boring logs when applicable. Cores were then placed in core boxes and returned to the VTrans Construction and Materials Bureau Laboratory for further evaluation and testing, where applicable. The boring logs were revised to reflect the classification and description of the bedrock cores.

3.0 FIELD AND LABORATORY TESTINGS

The standard penetration resistance of the in-situ soil is determined by the number of blows required to drive a 2-inch outside diameter (OD) split-barrel sampler into the soil with a 140-pound hammer dropped from a height of 30 inches, in accordance with procedures specified in AASHTO T206. The number of blows required to drive the sampler each 6-inch increment is recorded, and the Standard Penetration Resistance (N-Value) is calculated as the sum of the blows over the second and third 6-inch intervals. The SPT N-value is commonly used with established correlations to estimate several soil parameters, particularly the shear strength and density of cohesionless soils. The N-values provided on the boring logs are raw values and have not been corrected for energy, borehole diameter, rod length, or overburden pressure

The VT Agency of Transportation has determined a hammer correction value, C_E , to account for the efficiency of the SPT hammers on its drill rigs. A Diedrich D-25 was used for all borings. Due to this drill rig being new, an energy efficiency factor has not been calibrated for hammer correction, therefore a conservation value of 1.45 should be used in all soil parameter calculations. This value, included on the boring logs, should be used in calculations to estimate soil parameters.

Geotechnical laboratory tests were performed on samples to assist with soil classification and evaluate engineering properties of the soil. Grain size analyses were performed on soil samples in accordance with AASHTO T 88, *Standard Method of Test for Particle Size Analysis of Soils*. Results from this testing can be found on the attached boring logs.

4.0 SOIL PROFILE

Review of the laboratory data, field testing, and boring logs revealed the following information pertaining to the soil strata. It should be noted that groundwater elevations are subject to change.

Because groundwater elevations can fluctuate seasonally and are affected by temperature and precipitation, groundwater may be encountered during construction when not previously noted in the logs.

4.1 Boring B-101

The ground surface elevation at B-101 is approximately 728.2 ft. Groundwater was measured after drilling on April 1st, 2025, at a depth of 11.7 ft bgs corresponding to an elevation of 717.1 ft. Bedrock was encountered at a depth of 25.4 ft bgs, corresponding to an approximate elevation of 703.1 ft.

Table 4.1: B-101

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 0.5 ft	Asphalt
0.5 – 12.5 ft	Medium Dense to Dense SAND and GRAVEL, trace Silt
12.5 – 24.0 ft	Dense SAND, some Gravel, little Silt
24.0 – 25.1 ft	Apparent Boulders
>25.1 ft	Bedrock (GNEISS)

4.2 Boring B-102/B-102a

The ground surface elevation at B-102a is approximately 728.4 ft. Groundwater was encountered after drilling operations on April 8th, 2025, at a depth of 6.3 ft bgs corresponding to an approximate groundwater elevation of 722.1 ft. Bedrock was encountered at a depth of 22.0 ft bgs, corresponding to an approximate elevation of 706.4 ft. Two cores were conducted started at 18 ft bgs, suspecting bedrock. After geologist analysis it was determined that from 18 ft to 22 ft the refusal encountered during drilling was most likely a boulder.

Table 4.2: B-102/B-102a Soil Strata

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 0.5 ft	Asphalt
0.5 – 18 ft	Medium Dense to Dense SAND and GRAVEL, trace Silt
18 – 22 ft	Fine grained Boulder
22 – 27 ft	Bedrock (GNEISS)

4.3 Boring B-103

The ground surface elevation at B-103 is approximately 728.1 ft. Groundwater was not measured during drilling operations. Bedrock was encountered at a depth of 30.0 ft bgs, corresponding to an approximate elevation of 698.1 ft.

Table 4.3: B-103 Soil Strata

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 30 ft	Not Sampled (Assumed fine SAND and GRAVEL)
> 30 ft	Bedrock (GNEISS)

4.4 Boring B-104

The ground surface elevation at B-104 is approximately 728.5 ft. Groundwater was not measured during drilling operations. Bedrock was encountered at a depth of 25.0 ft bgs, corresponding to an approximate elevation of 703.5 ft.

Table 4.4: B-104 Soil Strata

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 25 ft	Not Sampled (Assumed fine SAND and GRAVEL)
> 25 ft	Bedrock (GNEISS)

4.5 Rock Parameters

A summary of the rock core findings are listed in Figures C.1 through C.3 attached, as well as available in the attached boring logs. Information from the cores indicate the bedrock present at the project site is hard, fresh to slightly weathered magnetite-biotite-quartz-plagioclase GNEISS. The bedrock had an average rock quality designation (RQD) of 48 and an average rock mass rating (RMR) of 54, indicating fair rock.

5.0 RECOMMENDATIONS

Based on the information gained from the subsurface investigation, the preferred possible foundation options for the replacement structure include the following:

- Integral abutments supported on a single row of H-piles driven to rock
- Integral abutments supported on micropiles drilled and cased into rock

Difficult drilling and possible boulders were encountered approximately 1 to 4 ft above bedrock in each boring. Pre-drilling may be required in order to properly drive the piles to bedrock. Depending on the proposed footing elevations and scour conditions, based on similar projects, the depth at which bedrock was encountered can prove difficult to ensure deflection of the H-piles is limited to 1.0 inch and fixity is achieved with the shorter pile lengths. In these cases, H-piles seated into pre-drilled rock sockets or micropiles cased into bedrock have been needed to provide the adequate lateral resistance to limit deflection for the Service Limit State. If H-piles or micropiles do not satisfy design, drilled shafts could be an appropriate alternative.

6.0 CONCLUSION

If you have any questions, or you would like to discuss this report, please contact us via email. Please let us know when more information is available and if you would like assistance with foundation analyses and design. Typed boring logs are attached and are available in the CADD design files: [M:\Projects\23b770\MaterialsResearch](#).

Reviewed by: Eric Denardo, P.E., Geotechnical Engineer *END*

Attachments: Appendix A: Boring Layout (1 Page)
Appendix B: Boring Logs (6 pages)
Appendix C: Rock Core Summary Tables (3 Pages)

cc: Fianna Barrows, P.E., Structures Engineer
Read File/MG
Project File/CEE
AJA

[Z:\Highways\CMB\GeotechEngineering\Projects\Reading ER P23-1\(404\)\REPORTS\Reading ER P23-1\(404\) Geotechnical Data Report.docx](#)

Appendix A

Boring Layout Plan

B-103

N: 347140.5 ft

E: 1630419.2 ft

Approx Bedrock Elevation: 698.1 ft

B-102

N: 347232.2 ft

E: 1630426.3 ft

Approx Bedrock Elevation: N.A.

B-102a

N: 347231.3 ft

E: 1630432.2 ft

Approx Bedrock Elevation: 706.4 ft

B-104

N: 347204.9 ft

E: 1630448.2 ft

Approx Bedrock Elevation: 703.5 ft

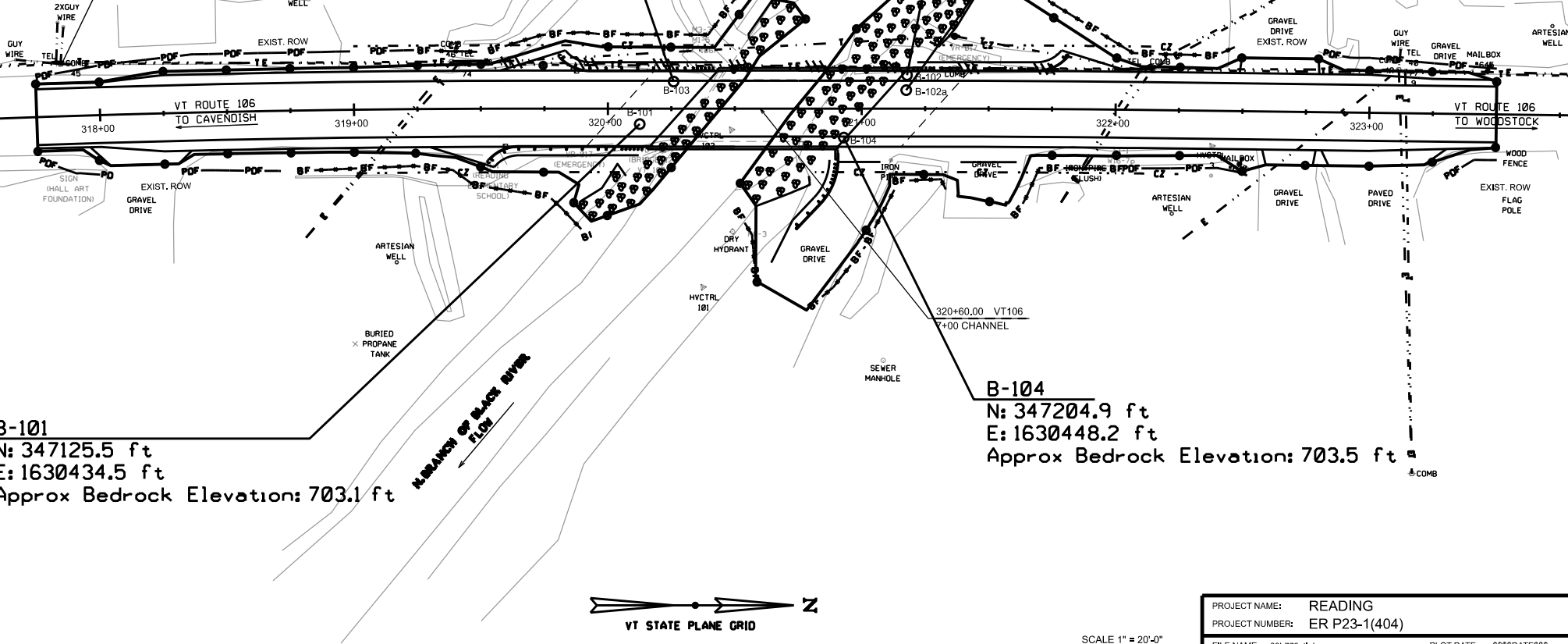
B-101

N: 347125.5 ft

E: 1630434.5 ft

Approx Bedrock Elevation: 703.1 ft

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=721.99

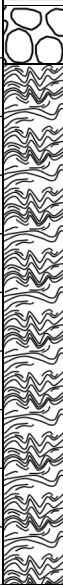


PROJECT NAME:	READING	PLOT DATE:	\$\$\$\$DATE\$\$\$
PROJECT NUMBER:	ER P23-1(404)	DRAWN BY:	M. LONGSTREET
FILE NAME:	s23b770u.dgn	CHECKED BY:	F. BARROWS
PROJECT LEADER:	C. BURRALL	SHEET	\$\$\$ OF \$\$\$
DESIGNED BY:	J. PAQUETTE	STW\$	
UTILITY LAYOUT SHEET			

Appendix B

Boring Logs

 STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS AND CONSTRUCTION BUREAU GEOTECHNICAL ENGINEERING SECTION		BORING LOG			Boring No.: <u>B-101</u> Page No.: <u>2 of 2</u> Pin No.: <u>23b770</u> Checked By: <u>Arles</u>			
		Reading ER P23-1(404) VT Route 106 Bridge No. 12						
Boring Crew: <u>Thurston, Lubas, Degener</u> Date Started: <u>03/21/2025</u> Date Finished: <u>04/01/2025</u> Coordinates: <u>N:347125.5, E:1630434.5</u> Station: <u>320+12</u> Offset: <u>6.1 ft RT</u> Ground Elevation: <u>728.2 ft</u>		Casing: <u>WB</u> I.D.: <u>4 in</u> Hammer Wt: <u>N.A.</u> Hammer Fall: <u>N.A.</u> Hammer/Rod type: <u>Auto / AWJ</u> Rig: <u>Diedrich D-25</u>		Sampler: <u>SPT</u> <u>1.5 in</u> <u>140 lb</u> <u>30 in.</u> <u>Auto / AWJ</u> <u>C_E = 1.45</u>		Groundwater Observations		
						Date	Depth (ft)	Status
						04/01/25	11.7'	After Drilling (AD)

Depth (ft)	Graphic Log	AASHTO Classification	Material Description and Notes	Field Data			Lab Data			
				Recovery (ft) (%)	Blow Counts (N-Value)	Run Number	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)
25 30			24.0 ft - 24.1 ft, Field Note: NO RECOVERY, Refusal @ 24.1 ft, 10 blows no movement 24.1 ft - 25.1 ft, Field Note: fine grained BOULDER 25.1 ft - 29.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, foliated, hard, fresh/unweathered, Joint surfaces are rough, some rust staining along joints. NX	4.8 (96%)		R-1				
		29.0 ft - 34.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, foliated, hard, fresh to very slightly weathered, Joint surfaces are rough. NX	2.9 (58%)		R-2					
End of Boring at 34 ft Hole Collapse at 2.8 ft										

Notes:

- Stratification lines represent approximate boundary between material types. Transition may be gradual.
- N-values have not been corrected for hammer energy. CE is the hammer energy correction factor.
- Water level readings have been made at times and under conditions stated. Water levels are likely to vary.

			STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS AND CONSTRUCTION BUREAU GEOTECHNICAL ENGINEERING SECTION			SOIL BORING Reading ER P23-1(404) VT Route 106 Bridge No. 12		Boring No.: B-102 Page No.: 1 of 1 Pin No.: 23b770 Checked By: Arles														
Boring Crew: Thurston, Lubas, Degener Date Started: 04/02/2025 Date Finished: 04/02/2025 Coordinates: N:347232.2, E:1630426.3 Station: 321+18 Offset: 13.2 ft LT Ground Elevation: 728.5 ft			Type: WB I.D.: 4 in Hammer Wt: N.A. Hammer Fall: N.A. Hammer/Rod type: Auto / AWJ Rig: Diedrich D-25			Sampler: SPT 1.5 in 140 lb 30 in. CE = 1.45		Groundwater Observations <table><tr><th>Date</th><th>Depth (ft)</th><th>Status</th></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></table>			Date	Depth (ft)	Status									
Date	Depth (ft)	Status																				
Depth (ft)	Graphic Log	AASHTO Classification	Material Description and Notes	Field Data		Lab Data																
				Recovery (ft) (%)	Blow Counts (N-Value)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)													
5			0.0 ft - 0.5 ft, Field Note: ASPHALT																			
			0.5 ft - 2.5 ft, Field Description: Dry to Moist, Gray, GRAVEL, some Sand		12-10-8-8 (18)																	
			2.5 ft - 4.5 ft, Field Description: Dry to Moist, Gray, SAND and GRAVEL, wood in sample		6-11-21-18 (32)																	
			4.5 ft - 5.7 ft, Field Description: Dry to Moist, Gray, SAND and GRAVEL, Refusal at 5.7 ft		13-24-50/2" (R)																	
			5.0 ft - 6.5 ft, Field Note: Casing would not advance past 5.0 ft, NX Cleanout 5 ft - 6.5 ft																			
			6.5 ft - 11.5 ft, Field Note: NO RECOVERY, 5 ft core run. Assumed cobbles and boulders																			
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR												
Hole abandoned at 11.5 ft Water Table not measured during drilling																						
Notes:		1. Stratification lines represent approximate boundary between material types. Transition may be gradual. 2. N-values have not been corrected for hammer energy. CE is the hammer energy correction factor. 3. Water level readings have been made at times and under conditions stated. Water levels are likely to vary.:																				

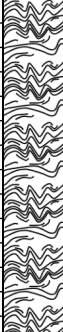
 STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS AND CONSTRUCTION BUREAU GEOTECHNICAL ENGINEERING SECTION			BORING LOG Reading ER P23-1(404) VT Route 106 Bridge No. 12			Boring No.: <u>B-102a</u> Page No.: <u>1 of 1</u> Pin No.: <u>23b770</u> Checked By: <u>Arles</u>			
Boring Crew: <u>McGinley, Lubas, Degener</u> Date Started: <u>04/07/2025</u> Date Finished: <u>04/08/2025</u> Coordinates: <u>N:347231.3, E:1630432.2</u> Station: <u>321+18</u> Offset: <u>7.3 ft LT</u> Ground Elevation: <u>728.4 ft</u>			Casing: <u>WB</u> I.D.: <u>4 in</u> Hammer Wt: <u>N.A.</u> Hammer Fall: <u>N.A.</u> Hammer/Rod type: <u>Auto / AWJ</u> Rig: <u>Diedrich D-25</u>		Sampler: <u>SPT</u> <u>1.5 in</u> <u>140 lb</u> <u>30 in.</u> <u>Auto / AWJ</u> <u>C_E = 1.45</u>		Groundwater Observations		
							Date	Depth (ft)	Status
							04/08/25	6.3'	After Drilling (AD)

Depth (ft)	Graphic Log	AASHTO Classification	Material Description and Notes	Field Data			Lab Data			
				Recovery (ft)	Blow Counts (N-Value)	Run Number	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)
			0.0 ft - 4.0 ft, Field Note: Advanced casing to 4 ft without sampling							
5			4.0 ft - 6.0 ft, Field Description: Dry to Moist, Brownish Gray, GRAVEL, some Sand	1.1	11-10-14-19 (24)					
			6.0 ft - 7.5 ft, Field Description: Dry to Moist, Brownish Gray, SAND, some Gravel, Refusal at 7.5 ft, NX Cleanout 6 ft - 8 ft	0.8	17-19-10/1" (R)					
		NR	8.0 ft - 9.4 ft, Field Description: NO RECOVERY, Refusal at 9.4 ft, Fractured Rock in end of Sampler		23-20-50/5" (R)					
10										
		A-1-b	10.0 ft - 12.0 ft, Lab Classification: Moist, Brownish Gray, SAND and GRAVEL, trace Silt	1.2	7-6-22-26 (28)		12.5	45.7	47.7	6.6
			12.0 ft - 14.0 ft, Lab Classification: Moist, Brownish Gray, SAND, some Gravel, little Silt, Metal shavings in sample	1.8	40-22-20-21 (42)		13.4	35.7	51.5	12.8
15			15.0 ft - 17.0 ft, Field Description: Moist, Brownish Gray, SAND, some Gravel	0.9	22-24-20-18 (44)					
		A-1-b	17.0 ft - 18.0 ft, Lab Classification: Dry to Moist, Brown, SAND, some Gravel, trace Silt, Refusal at 18 ft, 10 blows no movement	1	19-18-10/1" (R)		14.3	31.9	30.2	7.9
			18.0 ft - 22.0 ft, Field Note: fine grained BOULDER	0.4 (13%)		R-1				
20				0.9 (90%)		R-2				
25			22.0 ft - 27.0 ft, Magnetite-biotite-quartz-plagioclase GNEISS, hard, fresh to very slightly weathered, Joint surfaces are rough, Rust stains/oxidation along joints at 24.4 ft	4.9 (98%)		R-3				

End of Boring at 27 ft
 Hole Collapse at 2.8 ft

Notes:	1. Stratification lines represent approximate boundary between material types. Transition may be gradual. 2. N-values have not been corrected for hammer energy. CE is the hammer energy correction factor. 3. Water level readings have been made at times and under conditions stated. Water levels are likely to vary.
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 STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS AND CONSTRUCTION BUREAU GEOTECHNICAL ENGINEERING SECTION		BORING LOG			Boring No.: <u>B-103</u> Page No.: <u>1 of 1</u> Pin No.: <u>23b770</u> Checked By: <u>Arles</u>			
		Reading ER P23-1(404) VT Route 106 Bridge No. 12						
Boring Crew: <u>Thurston, McGinley, Lubas</u> Date Started: <u>04/01/2025</u> Date Finished: <u>04/14/2025</u> Coordinates: <u>N:347140.5, E:1630419.2</u> Station: <u>320+26</u> Offset: <u>10.7 ft LT</u> Ground Elevation: <u>728.1 ft</u>		Type: <u>WB</u> I.D.: <u>4 in</u> Hammer Wt: <u>N.A.</u> Hammer Fall: <u>N.A.</u> Hammer/Rod type: <u>Auto / AWJ</u> Rig: <u>Diedrich D-25</u>		Sampler: <u>SPT</u> <u>1.5 in</u> <u>140 lb</u> <u>30 in.</u> <u>Auto / AWJ</u> <u>C_E = 1.45</u>		Groundwater Observations		
						Date	Depth (ft)	Status

Depth (ft)	Graphic Log	AASHTO Classification	Material Description and Notes	Field Data			Lab Data			
				Recovery (ft) (%)	Blow Counts (N-Value)	Run Number	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)
0			0.0 ft - 0.5 ft, Field Note: ASPHALT, Spun Casing to bedrock without sampling							
5			6.0 ft - 8.0 ft, Field Note: NX Cleanout 6 ft - 8 ft							
10										
15										
20										
25										
30			29.0 ft - 30.0 ft, Field Note: Rollercone Cleanout 29 ft - 30 ft							
35			30.0 ft - 35.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, foliated, hard, fresh to very slightly weathered, Joint surfaces are rough, Rust stains on joints 30 ft - 30.3 ft. 32.3 ft - 35 ft very micaceous/biotite, NX	4.4 (88%)		R-1				
40			35.0 ft - 40.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, hard, fresh to very slightly weathered, Occasional oxidation stains, NX	4.8 (96%)		R-2				
			40.0 ft - 43.8 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, foliated, hard, fresh to very slightly weathered, Occasional oxidation stains, NX	3.6 (72%)		R-3				
End of Boring at 43.8 ft Hole Collapse at 3.8 ft Water table not measured during drilling										
Notes:				1. Stratification lines represent approximate boundary between material types. Transition may be gradual. 2. N-values have not been corrected for hammer energy. CE is the hammer energy correction factor. 3. Water level readings have been made at times and under conditions stated. Water levels are likely to vary.						

 STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS AND CONSTRUCTION BUREAU GEOTECHNICAL ENGINEERING SECTION		BORING LOG			Boring No.: <u>B-104</u> Page No.: <u>1 of 1</u> Pin No.: <u>23b770</u> Checked By: <u>Arles</u>																			
		Reading ER P23-1(404) VT Route 106 Bridge No. 12																						
Boring Crew: <u>Thurston, Lubas, McGinley, Degener</u> Date Started: <u>04/09/2025</u> Date Finished: <u>04/09/2025</u> Coordinates: <u>N:347204.9, E:1630448.2</u> Station: <u>320+93</u> Offset: <u>11.4 ft RT</u> Ground Elevation: <u>728.5 ft</u>				Casing: <u>WB</u> I.D.: <u>4 in</u> Hammer Wt: <u>N.A.</u> Hammer Fall: <u>N.A.</u> Hammer/Rod type: <u>Auto / AWJ</u> Rig: <u>Diedrich D-25</u> $C_E = 1.45$		Sampler: <u>SPT</u> <u>1.5 in</u> <u>140 lb</u> <u>30 in.</u>		Groundwater Observations																
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">Date</th> <th style="width: 33%;">Depth (ft)</th> <th style="width: 33%;">Status</th> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>		Date	Depth (ft)	Status														
Date	Depth (ft)	Status																						
Depth (ft)	Graphic Log	AASHTO Classification	Material Description and Notes	Field Data			Lab Data																	
				Recovery (ft) (%)	Blow Counts (N-Value)	Run Number	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)														
5			0.0 ft - 25.0 ft, Field Note: Casing Advanced to rock without sampling																					
10																								
15																								
20																								
25			25.0 ft - 30.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, hard, fresh to very slightly weathered, Rust stains on joints, some oxidation stains through out	4.4 (88%)		R-1																		
30			30.0 ft - 35.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, hard, fresh to very slightly weathered	5.1 (102%)		R-2																		
35			35.0 ft - 40.0 ft, light gray Magnetite-biotite-quartz-plagioclase GNEISS, foliated, hard, fresh to very slightly weathered, Joint surfaces are rough, rust stains on joints, some oxidation stains through out	5.1 (102%)		R-3																		
40			End of Boring at 40 ft Hole Collapse at 9.1 ft Water table not measured during drilling																					
Notes:			1. Stratification lines represent approximate boundary between material types. Transition may be gradual. 2. N-values have not been corrected for hammer energy. CE is the hammer energy correction factor. 3. Water level readings have been made at times and under conditions stated. Water levels are likely to vary.																					

Appendix C

Rock Core Summary Tables

Figure C.1: Rock Core Sample Results (B-101/B-102)

Boring No.	Run Number	Core Size	Depth (ft)	Recovery (%)	RQD (%)	Dip (deg)	Lithologic Description	RMR
B-101	R-1	NX	24-29	94	51	65° From 24-25ft 0° - 10° From 25-29ft	From 24 to 25.1 ft - probable BOULDERS. 25.2 ft to 29 ft, Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Some rust staining along joints. Hard, fresh to very slightly weathered. Fair Rock	59
B-101	R-2	NX	29-34	105	32	0° - 10°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Hard, fresh to very slightly weathered. Fair Rock	56
B-102a	R-3	NX	22-27	70	62	15° - 30°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Rust stains / oxidation along joints at 24.4ft. Hard, fresh to very slightly weathered. Good Rock	64

Figure C.2: Rock Core Sample Results (B-103)

Boring No.	Run Number	Core Size	Depth (ft)	Recovery (%)	RQD (%)	Dip (deg)	Lithologic Description	RMR
B-103	R-1	NX	30-35	88	0	5° - 15°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Rust stains on joints 30ft to 30.3ft. Occasional oxidation stains from 30.3ft to 35ft. 32.3ft to 35ft very micaceous/ biotite. Hard, fresh to very slightly weathered. Fair Rock	42
B-103	R-2	NX	35-40	96	33	10° - 35°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Occasional oxidation stains. Hard, fresh to very slightly weathered. Fair Rock	47
B-103	R-3	NX	40-45	95	25	20°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Occasional oxidation stains. Hard, fresh to very slightly weathered. Fair Rock	49

Figure C.3: Rock Core Sample Results (B-104)

Boring No.	Run Number	Core Size	Depth (ft)	Recovery (%)	RQD (%)	Dip (deg)	Lithologic Description	RMR
B-104	R-1	NX	25-30	88	70	35° - 45°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Rust stains on joints, some oxidation stains throughout. Hard, fresh to slightly weathered. Fair Rock	57
B-104	R-2	NX	30-35	102	71	15° - 30°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Rust stains on joints, some oxidation stains throughout. Hard, fresh to slightly weathered. Fair Rock	55
B-104	R-3	NX	35-40	102	96	10° - 40°	Light gray to whitish-gray-weathering, magnetite-biotite-quartz-plagioclase GNEISS. Foliated, joint surfaces are rough. Rust stains on joints, some oxidation stains throughout. Hard, fresh to slightly weathered. Good Rock	62