

**To:** Chris Williams, P.E., Structures, Project Manager  
MLM CEE

**From:** Marcy Meyers, Geotechnical Engineer, via Callie Ewald P.E., Senior Geotechnical Engineer

**Date:** June 6<sup>th</sup>, 2014

**Subject:** Montpelier BO 1446(36) – Geotechnical Data Report

**1.0 INTRODUCTION**

We have completed our geotechnical and geological investigation for the Montpelier BO 1446(36) project for Bridge #13 located on Cummings St. (TH 30), approximately 0.1 miles east of the junction with VT Route 12 in Montpelier, Vermont. The proposed project consists of replacing the existing bridge with a new structure. This report summarizes the boring and laboratory testing information from our subsurface investigation.

**2.0 FIELD INVESTIGATION**

The initial field investigation was conducted between May 12<sup>th</sup> and May 20<sup>th</sup>, 2014. Three standard penetration borings and nine bedrock probes were drilled to determine the soil strata and depth to bedrock for the proposed project. Boring locations were based off of the geotechnical services request form dated March 7<sup>th</sup>, 2014; however some borings locations were moved based on site access and utility locations. Two additional probes on the property at 3 Cummings St. were requested but were not able to be completed due to site restraints. Values for Northings and Eastings were collected in the field using our Trimble handheld GPS and are based on the Vermont State Plane Grid NAD 83 coordinate system. Stations, offsets, and elevations were found using the Northings and Eastings and an existing survey. Boring location information is summarized below in Table 2.1.

**Table 2.1: Boring Locations**

Boring	Drilling Method	Station (ft)	Offset (ft)	Northing (ft)	Easting (ft)	Elevation (ft)
B-101	SPT	13+94	-3.5	645682.03	1621866.67	535.2
B-102	SPT	14+88	-15.2	645735.16	1621944.70	534.1
B-103	SPT	14+85	5.1	645715.60	1621951.11	532.4
S-104	Probe	13+88	-22.6	645696.13	1621852.37	531.4
S-105	Probe	13+98	-17.1	645695.69	1621863.61	534.5
S-106	Probe	13+81	-12.4	645683.75	1621850.64	534.6
S-107	Probe	13+92	-13.8	645689.93	1621859.67	534.8
S-108	Probe	14+01	-13.0	645693.82	1621868.82	534.5
S-109	Probe	13+90	0.9	645675.85	1621864.43	535.1
S-110	Probe	13+81	9.7	645664.40	1621861.27	535.1
S-111	Probe	13+91	9.7	645668.93	1621870.17	535.0
S-112	Probe	14+01	8.5	645674.58	1621878.53	535.8

SPT = Standard Penetration Test, Probe = Performed Using Hand Steel

Borings B-101, B-102, and B-103 were performed in general accordance with AASHTO T206, *Standard Method of Test for Penetration Test and Split-Barrel Sampling of Soils*. During boring operations for B-101, split spoon samples and standard penetration tests (SPT) were taken continuously from 1 foot until auger refusal was encountered. During boring operations for B-102, split spoon samples and SPT were taken continuously from the ground surface until 20 feet, then 5 foot intervals until auger refusal was encountered. During boring operations for B-103, split spoon samples and SPT were taken continuously from 2 feet to 12 feet, then 5 foot intervals until auger refusal was encountered. When auger refusal was encountered for all three borings, an approximate 10 foot NXMDC rock core was collected to confirm the presence of bedrock.

Soil samples were visually identified in the field and SPT blow counts were recorded on the boring logs when applicable. Soil samples and rock cores were preserved and returned to the Materials and Research laboratory for testing and further evaluation. Upon completion of the laboratory testing, the boring logs were revised to reflect the results of the laboratory classification results.

The nine hand steel probe borings were completed according to AASHTO's *1988 Manual on Subsurface Investigation*, Section 7.5.3.1, which states that exploratory probing can be defined as "small diameter, flush coupled, steel rods are pushed by hand to refusal in the underlying organic soil." The 3/4 inch steel rods at this site were driven using a 10-pound sledge hammer. Exploratory probing is commonly used to determine depths to boulders or ledge in areas with easily penetrable soil.

### **3.0 FIELD AND LABORATORY TESTS**

The standard penetration resistance of the in-situ soil is determined by the number of blows required to drive a 2 inch 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. During the standard penetration test (SPT), the sampler is driven for a total length of 2 feet, while counting the blows for each 6 inch increment. The SPT N-value, which is defined as the sum of the number of blows required to drive the sampler through the second and third increments, is commonly used with established correlations to estimate a number of 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 hammer on the drill rig. For this project, a CME 45C skid rig was used, with a  $C_E=1.33$ . This value, included on the boring logs, should be used in soil parameter calculations. Laboratory tests were conducted on all samples to evaluate grain size, moisture content, percent finer than No. 200 sieve, and liquid and plastic limits when applicable.

A detailed description of the rock cores is presented on the boring logs including run length, drill times, recovery, and Rock Quality Designation (RQD). Recovery is defined as the length of core obtained expressed as a percentage of the total length cored. In accordance with ASTM D6032, RQD is the total length of core pieces, 4 inches or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams, jointing and bending planes. The Rock Mass Rating (RMR) is also included on

the logs. RMR is AASHTO's (LRFD Bridge Design Specification) recommended method of classifying rock, and is based on five different parameters that all have relative ratings which combine to form the RMR. These parameters include rock strength, RQD, joint spacing, joint condition, and groundwater (AASHTO Section 10.4.6.4).

#### 4.0 SOIL AND ROCK PROFILE

Review of the laboratory data, boring logs, and geologist's report revealed the following information pertaining to the soil strata. It should be noted that groundwater elevations are subject to change given the fact that the boreholes were generally left open for a short period of time and groundwater readings were typically collected during the same day as drilling. Because groundwater elevations can fluctuate seasonally and are effected by temperature and precipitation, groundwater may be encountered during construction even when not previously noted on the boring logs.

##### 4.1 Depths to Bedrock

The depth to bedrock and pavement thicknesses (if applicable) encountered using both auger and hand steel operations are summarized below. A boring location plan is also attached.

Boring	Pavement Thickness (ft)	Depth to Bedrock (ft)	Approx. Top of Bedrock Elevation (ft)
B-101	0.48	13.0	522.2
B-102	N/A	44.4	489.7
B-103	0.8	37.6	494.8
S-104	N/A	12.3	519.1
S-105	N/A	10.0	524.5
S-106	N/A	10.8	523.8
S-107	N/A	10.9	523.9
S-108	N/A	5.3	529.2
S-109	0.45	10.9	524.2
S-110	0.50	8.9	526.2
S-111	0.60	9.3	525.7
S-112	0.58	6.0	529.8

It should be noted that S-108 and S-112 were sampled within close proximity to the existing abutment. As a result, refusal during hand steel operations may be indicative of top of footing. In order to distinguish between top of footing and top of bedrock, coring operations would need to be performed.

Encountering boulders and/or rocks during hand steel operations may render a falsified bedrock elevation. As a result, the depth of bedrock provided is estimated to the best ability based on the methodology employed.

##### 4.2 Boring B-101

The ground surface elevation at B-101 was 535.2 feet. Groundwater was encountered at 1.1 feet below the ground surface during drilling operations. Auger refusal was encountered at

approximately 9.3 feet below the ground surface and a 10 foot NXMDC core was sampled beginning at 13.0 feet until 23.0 feet.

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 9 feet	Loose to Dense Silty Sandy Gravel
9 – 13 feet	Broken Rock
> 13 feet	Bedrock

**4.3 Boring B-102**

The ground surface elevation at B-102 was 534.1 feet. Groundwater was encountered at 10.1 feet below the ground surface after the borehole was left open over night. Auger refusal was encountered at 44.4 feet below the ground surface and a 10 foot NXMDC core was sampled beginning at 44.4 feet until 54.4 feet.

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 10 feet	Loose to Dense Silty Gravelly Sand
10 – 16 feet	Loose Silty Sand
16 – 20 feet	Loose Sandy Gravel
20 – 42 feet	Medium Dense Silt, Sand, and Gravel
42 – 44.4 feet	Broken Rock
> 44.4 feet	Bedrock

**4.4 Boring B-103**

The ground surface elevation at B-103 was 532.4 feet. Groundwater was encountered at 6.1 feet below the ground surface after drilling operations were complete. Auger refusal was encountered at 37.6 feet below the ground surface and an 8.3 foot NXMDC core was sampled beginning at 37.6 feet until 45.9 feet.

Depth (Below Ground Surface Elevation)	Soil Profile
0 – 9 feet	Loose Gravelly Sand
9 – 11 feet	Concrete Footing
11 – 37.6 feet	Loose to Medium Dense Gravelly Sand
> 37.6 feet	Bedrock

A summary of the rock core findings is listed in Table 4.1 and results are also available in the attached boring logs. A summary of the results indicates the rock to be present at the site can be described as dark gray to silvery-gray, lustrous phyllite and slate, moderately hard, and unweathered with an average RMR of 62 indicating good rock.

**Table 4.1: Rock Core Sample Results**

Boring	Run Number	Core Size	Depth (Below GSE)	Recovery (%)	RQD (%)	Dip (degrees)	Lithologic Description	RMR
B-101	1	NXMDC	13.0 – 18.0 ft	98	34	70	Dark gray to silvery gray, lustrous phyllite & slate, moderately hard, unweathered	59
	2	NXMDC	18.0 – 23.0 ft	100	54	70	Dark gray to silvery gray, lustrous phyllite & slate, moderately hard unweathered	64
B-102	1	NXMDC	44.4 – 49.4 ft	100	76	60	Dark gray to silvery gray, lustrous phyllite & slate, moderately hard, unweathered	68
	2	NXMDC	49.4 – 54.4 ft	100	46	60	Dark gray to silvery gray, lustrous phyllite & slate, with quartz veins, moderately hard, unweathered	59
B-103	1	NXMDC	37.6 – 42.6 ft	100	48	60	Dark gray to silvery gray, lustrous phyllite & slate, with quartz vein from 39.4' to 40.8', moderately hard, unweathered	59
	2	NXMDC	42.6 – 45.9 ft	97	61	80	Dark gray to silvery gray, lustrous phyllite & slate, moderately hard, unweathered	64

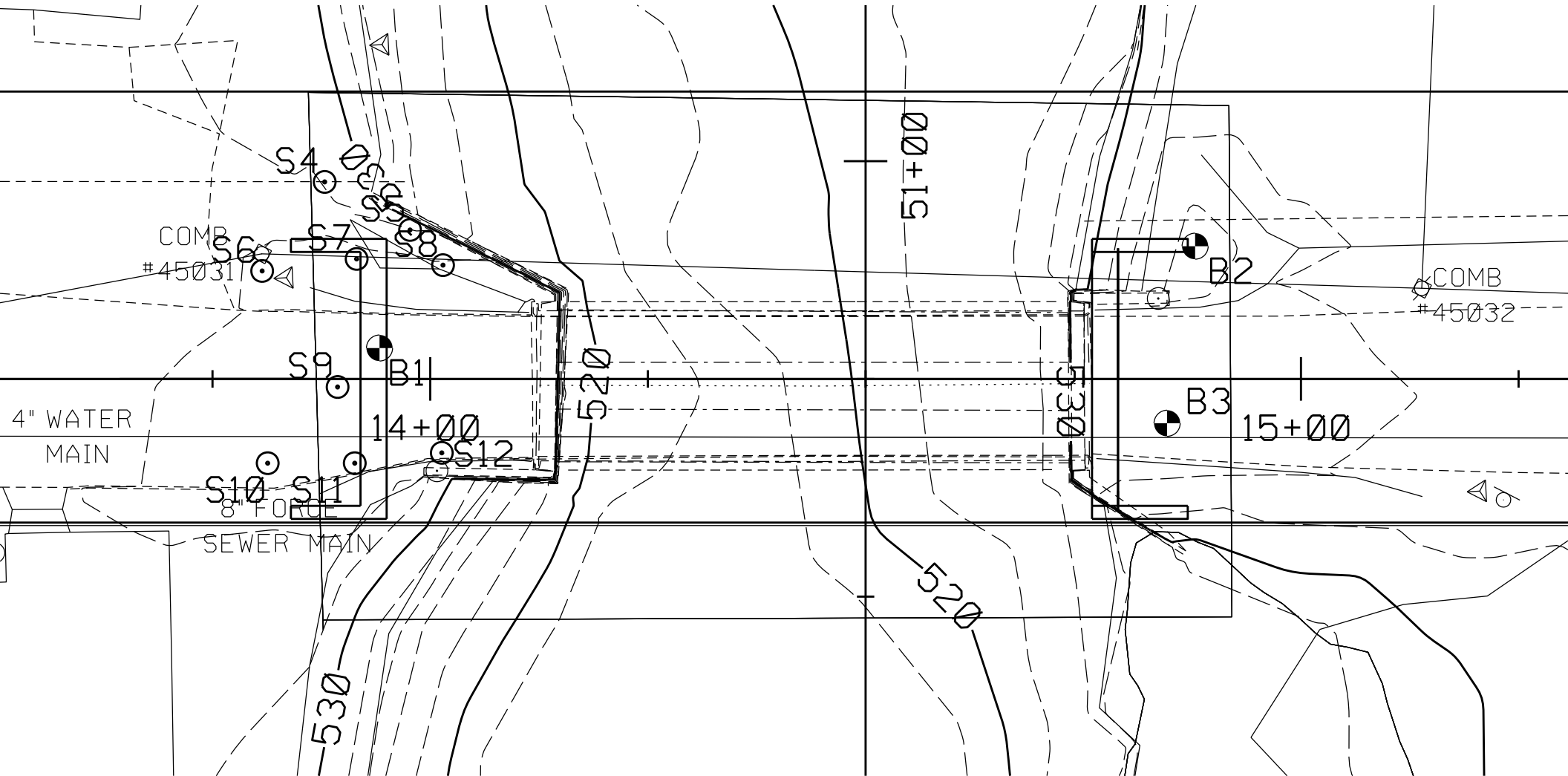
## 5.0 CONCLUSION

Once further information becomes available, we would be happy to assist in the analysis and design of components of the substructure. Please feel free to contact us at (802) 828-2561 if you have any questions, or you would like to further discuss this report. Typed boring logs are attached and are available in the CADD design files:

M:\Projects\13J082\Materials&Research

Enclosures: Boring Location Plan (1 Page)  
Boring Logs (4 Pages)

cc: Read File/WEA  
Project File/CCB  
MLM





STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIALS & RESEARCH SECTION  
SUBSURFACE INFORMATION

BORING LOG

**MONTPELIER**  
**BO 1446(36)**  
**TH-130 BR-13**

Boring No.: **B-101**  
Page No.: 1 of 1  
Pin No.: 13J082  
Checked By: MLM

Boring Crew: DAIGNEAULT, NIETO, MEYERS  
Date Started: 5/12/14 Date Finished: 5/12/14  
VTSPG NAD83: N 645682.03 ft E 1621866.67 ft  
Station: 13+94 Offset: -3.50  
Ground Elevation: 535.2 ft

Casing: WB Sampler: SS  
Type: WB  
I.D.: 4 in 1.5 in  
Hammer Wt: N.A. 140 lb.  
Hammer Fall: N.A. 30 in.  
Hammer/Rod Type: Auto/AWJ  
Rig: CME 45C SKID  $C_F = 1.33$

Groundwater Observations

Date	Depth (ft)	Notes
05/12/14	1.1	While drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. (% RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Asphalt Pavement, 0.0 ft - 0.48 ft								
		A-1-b, SaGr, Lt/gry, Moist, Rec. = 0.7 ft, Lab Note: Various types of Broken Rock were within sample. Roller coned and cleaned out casing.				11-12-23-11 (35)	11.0	46.3	37.2	16.5
		A-2-4, SiGrSa, brn, MTW, Rec. = 0.4 ft, Lab Note: Broken Rock was within sample. Roller coned and cleaned out casing.				1-4-5-4 (9)	16.4	32.4	39.5	28.1
5		A-4, SiSa, brn, MTW, Rec. = 1.2 ft, Roller coned and cleaned out casing.				6-1-4-1 (5)	25.7	10.3	45.1	44.6
		A-2-4, SiSa, brn, MTW, Rec. = 1.6 ft				4-2-1-1 (3)	26.6	9.4	60.0	30.6
10		Lab Note, Mostly flat brittle fragments of broken rock (Slate), gry-brn, Moist, Rec. = 0.9 ft				2-18-12-R@3.5" (30)	13.8	50.2	30.7	19.1
		Field Note:, NXDC								
		Field Note:, Mostly flat brittle fragments of broken rock (Slate), gry, Moist, Rec. = 0.2 ft				R@2.5" (R)	9.2	64.5	17.8	17.7
		Field Note:, NXDC								
15		13.0 ft - 18.0 ft, Dark-gray to silvery-gray, lustrous Phyllite & Slate, Moderately hard, Unweathered, Fair rock, NXMDC, RMR = 59	1 (70)	98 (34)	6					
					5					
					10					
					5					
					7					
20		18.0 ft - 23.0 ft, Dark-gray to silvery-gray, lustrous Phyllite & Slate, Moderately hard, Unweathered, Good rock, NXMDC, RMR = 64	2 (70)	100 (54)	10					
					5					
					5					
					8					
					12					
		Hole stopped @ 23.0 ft								
25		Remarks: Hole collapsed at 4.6 ft.								

BORING LOG 2 MONTPELIER BO 1446(36).GPJ VERMONT AOT.GDT. 6/3/14

Notes: 1. Stratification lines represent approximate boundary between material types. Transition may be gradual.  
2. N Values have not been corrected for hammer energy.  $C_F$  is the hammer energy correction factor.  
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.



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BORING LOG

**MONTPELIER**  
**BO 1446(36)**  
**TH-130 BR-13**

Boring No.: **B-102**  
Page No.: **1 of 2**  
Pin No.: **13J082**  
Checked By: **MLM**

Boring Crew: DAIGNEAULT, NIETO  
Date Started: 5/13/14 Date Finished: 5/14/14  
VTSPG NAD83: N 645735.16 ft E 1621944.70 ft  
Station: 14+88 Offset: -15.20  
Ground Elevation: 534.1 ft

Casing Type: WB Sampler: SS  
I.D.: 4 in 1.5 in  
Hammer Wt: N.A. 140 lb.  
Hammer Fall: N.A. 30 in.  
Hammer/Rod Type: Auto/AWJ  
Rig: CME 45C SKID  $C_F = 1.33$

Groundwater Observations		
Date	Depth (ft)	Notes
05/14/14	10.1	AM

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. (% RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
5		A-2-4, SiGrSa with roots & wood pieces, brn, Moist, Rec. = 1.0 ft, Lab Note: Broken Rock (Slate) fragments were within sample.				1-2-2-3 (4)	12.8	31.6	41.1	27.3
		A-1-a, SaGr, brn, Moist, Rec. = 1.1 ft, Lab Note: Broken Rock was within sample.				3-4-4-6 (8)	6.6	50.9	35.4	13.7
		A-1-b, SiSaGr, Lt/brn, Moist, Rec. = 0.8 ft, Lab Note: Broken Rock was within sample.				6-4-3-4 (7)	12.3	42.2	36.9	20.9
		A-2-4, SiGrSa, Lt/brn, MTW, Rec. = 0.7 ft, NXDC, Cleaned out casing. Lab Note: Orange clay tile pieces & wood were within sample.				6-2-2-2 (4)	22.9	35.8	37.8	26.4
10		A-1-b, SiSaGr, brn, MTW, Rec. = 0.5 ft, Roller coned ahead. Lab Note: Wood pieces were within sample.				4-21-7-2 (28)	37.1	41.1	38.6	20.3
		Lab Note, Wood core (solid 9 inches), Lt/brn, MTW, Rec. = 0.75 ft, Roller coned and cleaned out casing.				2-5-4-4 (9)	47.8	4.3	45.0	50.7
		A-4, SaSi, Lt/gry, MTW, Rec. = 0.65 ft, Lab Note: Small pieces of wood were within sample.				5-4-3-3 (7)	42.2		62.2	37.8
		A-4, SiSa, gry, MTW, Rec. = 0.2 ft, Roller coned and cleaned out casing. Lab Note: Wood pieces were within sample.				6-3-4-7 (7)				
15		Field Note: No Recovery								
		A-1-a, SaGr, gry, MTW, Rec. = 0.7 ft, Roller coned and cleaned out casing. Lab Note: Wood pieces were within sample.				6-2-4-3 (6)	17.0	58.9	32.5	8.6
		Field Note: No Recovery, Roller coned and cleaned out casing.				3-2-2-4 (4)				
		Field Note: No Recovery				12-8-8-8 (16)				
25		A-2-4, SiGrSa, gry, Moist, Rec. = 0.5 ft, Lab Note: Broken Rock was within sample.				7-8-5-4 (13)	16.1	30.2	48.9	20.9

BORING LOG 2 MONTPELIER BO 1446(36).GPJ VERMONT AOT.GDT. 6/3/14

Notes: 1. Stratification lines represent approximate boundary between material types. Transition may be gradual.  
2. N Values have not been corrected for hammer energy.  $C_F$  is the hammer energy correction factor.  
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.





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BORING LOG

**MONTPELIER**  
**BO 1446(36)**  
**TH-130 BR-13**

Boring No.: B-102  
Page No.: 2 of 2  
Pin No.: 13J082  
Checked By: MLM

Boring Crew: DAIGNEAULT, NIETO  
Date Started: 5/13/14 Date Finished: 5/14/14  
VTSPG NAD83: N 645735.16 ft E 1621944.70 ft  
Station: 14+88 Offset: -15.20  
Ground Elevation: 534.1 ft

Casing Type: WB Sampler: SS  
I.D.: 4 in 1.5 in  
Hammer Wt: N.A. 140 lb.  
Hammer Fall: N.A. 30 in.  
Hammer/Rod Type: Auto/AWJ  
Rig: CME 45C SKID  $C_F = 1.33$

Groundwater Observations		
Date	Depth (ft)	Notes
05/14/14	10.1	AM

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		A-3, Sa, gry, Moist, Rec. = 0.6 ft				2-4-6-5 (10)	21.5	12.2	78.0	9.8
35		A-2-4, SiSa, gry, Moist, Rec. = 1.0 ft				4-3-4-6 (7)	22.0	0.1	70.2	29.7
40		Field Note: Roller coned and cleaned out casing. Lab Note: Wood pieces were within sample. A-3, Sa, gry, Moist, Rec. = 0.5 ft, Lab Note: Broken Rock was within sample.				3-4-5-6 (9)	19.2	7.7	82.5	9.8
		Field Note: Broken & weathered rock								
45		44.4 ft - 49.4 ft, Dark-gray to silvery-gray, lustrous Phyllite & Slate, Moderately hard, Unweathered, Good rock, NXMDC, RMR = 68	1 (60)	100 (76)	4	Top of Bedrock @ 44.4 ft				
					5					
					5					
					6					
					6					
50		49.4 ft - 54.4 ft, Dark-gray to silvery-gray, lustrous Phyllite & Slate, with quartz veins. Moderately hard, Unweathered, Fair rock, NXMDC, RMR = 59	2 (60)	100 (46)	5					
					6					
					6					
					5					
55		Hole stopped @ 54.4 ft								
		Remarks: Hole collapsed at 9.7 ft.								

BORING LOG 2 MONTPELIER BO 1446(36).GPJ VERMONT AOT.GDT. 6/3/14

Notes: 1. Stratification lines represent approximate boundary between material types. Transition may be gradual.  
2. N Values have not been corrected for hammer energy.  $C_F$  is the hammer energy correction factor.  
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.



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BORING LOG

**MONTPELIER**  
**BO 1446(36)**  
**TH-130 BR-13**

Boring No.: **B-103**  
Page No.: 1 of 1  
Pin No.: 13J082  
Checked By: MLM

Boring Crew: DAIGNEAULT, NIETO, HOOK  
Date Started: 5/20/14 Date Finished: 5/20/14  
VTSPG NAD83: N 645715.60 ft E 1621951.11 ft  
Station: 14+85 Offset: 5.10  
Ground Elevation: 532.4 ft

Casing: WB Sampler: SS  
Type: WB  
I.D.: 4 in 1.5 in  
Hammer Wt: N.A. 140 lb.  
Hammer Fall: N.A. 30 in.  
Hammer/Rod Type: Auto/AWJ  
Rig: CME 45C SKID C<sub>F</sub> = 1.33

Groundwater Observations		
Date	Depth (ft)	Notes
05/20/14	6.1	After drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	R <sub>un</sub> (Dip deg.)	% Core Rec. (RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
10		Visual Description: Recycled Asphalt Pavement, blk, Dry, Rec. = 0.8 ft				5-8-2-3 (10)	8.1			
		A-2-4, GrSa, Dk/brn, Moist, Rec. = 1.2 ft				3-3-3-2 (6)	13.4	24.9	55.2	19.9
		A-1-b, SaGr, Dk/brn, Moist, Rec. = 0.7 ft				3-4-4-8 (8)	10.6	45.3	40.1	14.6
		Visual Description: Broken Rock with sand and asphalt pavement, Dk/brn, Moist, Rec. = 0.5 ft				2-2-3-2 (5)	5.2			
		A-2-4, GrSa, brn, Moist, Rec. = 0.5 ft				2-R@3.5" (R)	18.2	29.2	54.3	16.5
		Field Note: Concrete Footing/Granite Fill								
		Visual Description: Broken Rock with silty sand, gry, Moist, Rec. = 0.3 ft				R@3.5" (R)	12.0			
20		Field Note: NXDC				5-3-1-1 (4)	23.1	35.8	48.8	15.4
		A-2-4, GrSa, Dk/gry, Moist, Rec. = 0.6 ft								
		A-1-b, GrSa, brn, MTW, Rec. = 0.6 ft				3-3-5-6 (8)	16.1	39.0	47.8	13.2
		Field Note: NXDC								
30		A-2-4, Sa, Lt/gry, Moist, Rec. = 1.0 ft				5-3-3-4 (6)	19.9	14.5	71.9	13.6
		Field Note: No Recovery				4-3-6-9 (9)				
		A-2-4, Sa, gry, Moist, Rec. = 0.6 ft				2-4-8-8 (12)	23.9		87.3	12.7
40		37.6 ft - 42.6 ft, Dark-gray to silvery-gray, lustrous Phyllite & Slate, with quartz vein from 39.4' to 40.8'. Moderately hard, Unweathered, Fair rock, NXMDC, RMR = 59	1 (60)	100 (48)	5 6 7 9 15	Top of Bedrock @ 37.6 ft				
		42.6 ft - 45.9 ft, Dark-gray to silvery-gray, lustrous Phyllite & Slate, Moderately hard, Unweathered, Good rock, NXMDC, RMR = 64	2 (80)	97 (61)	5 6 29 17					
50		Hole stopped @ 45.9 ft								
		Remarks: Hole collapsed at 8.0 ft.								

BORING LOG 2 MONTPELIER BO 1446(36).GPJ VERMONT AOT.GDT. 6/3/14

Notes: 1. Stratification lines represent approximate boundary between material types. Transition may be gradual.  
2. N Values have not been corrected for hammer energy. C<sub>F</sub> is the hammer energy correction factor.  
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.