



April 26, 2022

Brownington STP MM19(16) – Center Road Slope Stabilization Project

Addendum #1

This addendum provides soil information not included in the project plans.

RECORD OF BORE HOLE B-101 (STA. 103+39.75, 5.41' RT.)

SHEET 1 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 49.0 ft
 LOCATION: Brownington, VT

DRILL METHOD: D+W and S+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/23/20
 DATE COMPLETED: 1/27/20

COORDS: N: 1,729,913.50 E: 844,426.60
 GS ELEVATION:
 WEATHER: Partly Cloudy
 TEMPERATURE: 17-35° F

INCLINATION: 90
 DEPTH W.L.: 16.9 ft
 ELEVATION W.L.:
 DATE W.L.: 1/24/2020
 TIME W.L.: 8:22

SOIL PROFILE				SAMPLE INFORMATION							
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description
0.0		0.0 - 0.3ft Asphalt		[Asphalt Pattern]	1.0	1	SS	50(4")	R	0.3 0.3	0.0-1.0 ft: Cored through asphalt layer and frozen soil using diamond core bit. Driller noted asphalt layer thickness of 3.5 in.
		0.3 - 4.0ft Brown, fine to coarse SAND, little fine gravel, little silt	SM	[SM Pattern]	4.0	2	SS	4-6-5-6	11	1.3 2.0	Brown, moist, very dense, fine to coarse SAND, little fine gravel, little silt, well-graded (FILL, SM). 1.0-3.0 ft: Continued to use diamond core bit to clean to 3.0 ft bgs. Drilling wash water contained brown sand.
5.0		4.0 - 12.5ft Brown, clayey SILT, little fine to coarse sand, trace fine gravel	CL-ML	[CL-ML Pattern]	9.0	3	SS	7-15-21-29	36	0.8 2.0	Brown, moist, stiff, clayey SILT, some fine to medium sand, slightly plastic (GLACIOLACUSTRINE, ML). 4.0 ft: Drove HW (4 in outside diameter) casing to 4.0 ft bgs and switched to mud wash rotary to clean borehole to 4.0 ft bgs. Drilling wash water contained brown clumps of clay with coarse material.
		12.5 - 14.5ft Boulder		[Boulder Pattern]	14.5	4	SS	10-14-12-13	26	2.0 2.0	Top 4.0 in (S3A): Brown, wet, hard, CLAY, little fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL). PP < 0.50 tsf. Middle 2.5 in (S3B): Brown, wet, dense, fine to medium SAND, trace fine gravel, trace silt, well-graded (GLACIOLACUSTRINE, SM). Bottom 3.5 in (S3C): Brown, wet, hard, clayey SILT, some fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, ML). 12.5-14.5 ft: HW casing encountered boulder at 12.5 ft bgs. The encounter bent the casing drive chute (all of the casing was taken out and pushed back into the borehole). Broke through the boulder at 14.5 ft bgs using roller cone bit.
15.0		14.5 - 19.0ft Brown, clayey SILT, little fine to coarse sand, trace fine gravel	CL-ML	[CL-ML Pattern]	19.0	5	SS	9-13-7-8	20	1.4 2.0	Brown, moist, very stiff, clayey SILT, little fine to coarse sand, trace fine gravel, slightly plastic (GLACIOLACUSTRINE, ML). Encountered brown silt lenses throughout sample.
20.0		19.0 - 34.9ft Grey, wet, very stiff, clayey SILT, little fine gravel, little fine to coarse sand	CL-ML	[CL-ML Pattern]	24.0	6	SS	9-9-13-9	22	1.3 2.0	Top 5 in (S5A): Grey, wet, very stiff, fine to medium sandy CLAY, some fine gravel, moderately plastic. Tv = 0.25, 0.35 tsf; PP = 1.25, 1.50 tsf (GLACIOLACUSTRINE, ML). Bottom 12 in (S5B): Grey, wet, very stiff, silty CLAY, trace sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Silt lensing 19.0-41.0 ft: Drilling wash water color was grey.
25.0			CL-ML	[CL-ML Pattern]	29.0	7	SS	16-23-35-32	58	1.8 2.0	Grey, wet, very stiff, clayey SILT, little fine gravel, little fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.15 tsf; PP = 1.00 tsf. Silt lensing 25.0 ft: Spun HW casing from 12.5-25.0 ft bgs (casing driving chute broken) using diamond core bit.
30.0			CL-ML	[CL-ML Pattern]	34.0	8	SS	19-50(5")	R	0.8 0.9	Grey, wet, hard, clayey SILT, little fine to coarse gravel, little fine sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.30, 0.50 tsf; PP > 4.50 tsf. Silt lensing
35.0		34.9 - 35.6ft Cobble		[Cobble Pattern]	39.0	9	SS	31-24-48-50(3")	72	1.4 1.8	Grey, moist, hard, clayey SILT, some fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Sample too dry for Tv; PP > 4.50 tsf. Silt lensing 34.9-35.6 ft: Encountered cobble at 34.9 ft bgs. Used diamond core bit to break through cobble at 35.6 ft bgs.
40.0		35.6 - 44.0ft Grey, wet, very stiff, clayey SILT, little fine gravel, little fine to coarse sand	CL-ML	[CL-ML Pattern]							Top 15 in (S9A): Grey, moist, hard, clayey SILT, some fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Sample too dry for

Log continued on next page

Asphalt
 Fill (made ground)
 Clayey Silt
 Boulders or Cobbles
 Slate/Phyllite

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 1/31/20



003B MANCHESTER NH GEOTECH SOILRX LOGO - 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ - GOLDER NH 2011.GDT 4/25/22

RECORD OF BORE HOLE B-101 (STA. 103+39.75, 5.41' RT.)



SHEET 2 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 49.0 ft
 LOCATION: Brownington, VT

DRILL METHOD: D+W and S+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/23/20
 DATE COMPLETED: 1/27/20

COORDS: N: 1,729,913.50 E: 844,426.60
 GS ELEVATION:
 WEATHER: Partly Cloudy
 TEMPERATURE: 17-35° F

INCLINATION: 90
 DEPTH W.L.: 16.9 ft
 ELEVATION W.L.:
 DATE W.L.: 1/24/2020
 TIME W.L.: 8:22

SOIL PROFILE					SAMPLE INFORMATION						
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description
40.0			CL-ML			9	SS		72		Tv; PP = 4.50 tsf. Bottom 2 in (S9B): Grey, moist, hard, fine to coarse GRAVEL, trace clay (GLACIOLACUSTRINE, GC). Silt lensing
45.0		44.0 - 49.0ft Gray, fine-grained, PHYLLITE, with intermingled quartz veins			44	R1	NX	RQD = 50%		3.0 3.3	Gray, fine-grained, fresh (W1), very strong (R5), GNEISS with intermingled quartz veins, throughout (1/64 in thick), discontinuities steep to vertical (70-90°), very close to closely sapce (0.1-0.6 ft). 44.0 ft: Encounter bedrock surface at 44 ft bgs using roller cone bit.
					47.3	R2	NX	RQD = 76%		1.5 1.7	Gray, fine-grained, fresh (W1), very strong (R5), GNEISS intermingled quartz veins throhgout (1/32 in), discontinuities steep (70-75°), very close to closely spaced (0.1-0.5 ft).

Boring completed at 49.0 ft

008B MANCHESTER NH GEOTECH SOIL/RX LOGO - 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ - GOLDER NH 2011.GDT - 4/25/22

Asphalt
 Fill (made ground)
 Clayey Silt
 Boulders ord Cobbles
 Slate/Phyllite

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 1/31/20



RECORD OF BORE HOLE B-102 (STA. 104+24.32, 4.59' RT.)

SHEET 1 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 65.0 ft
 LOCATION: Brownington, VT

DRILL METHOD: D+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/21/20
 DATE COMPLETED: 1/24/20

COORDS: N: 1,729,967.00 E: 844,492.10
 GS ELEVATION:
 WEATHER: Partly Cloudy
 TEMPERATURE: 9-13° F

INCLINATION: 90
 DEPTH W.L.: 17.5 ft
 ELEVATION W.L.:
 DATE W.L.: 1/23/2020
 TIME W.L.: 8:28

SOIL PROFILE				SAMPLE INFORMATION							
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description
0.0		0.0 - 0.4ft Asphalt			0.0	1	SS	159-160-199-147	359	2.0 2.0	Brown, frozen, very dense, fine to coarse SAND, little fine gravel (asphalt), little silt (FILL, SM) 0.0-0.3 ft: Driller noted asphalt layer thickness of 3.0 in.
		0.4 - 7.0ft Brown, fine to coarse SAND, little fine gravel (asphalt), little silt	SM		4.0	2	SS	5-4-5-6	9	0.1 2.0	Brown, moist, loose, fine to medium SAND, poorly-graded (wash material from drilling).
		7.0 - 18.0ft Brown, clayey SILT, some fine to coarse sand			9.0	3	SS	10-13-13-19	26	1.4 2.0	6.0 ft: Driller noted groundwater level at 3.4 ft bgs at 15:22 on January 21, 2020 (bottom of borehole at 6 ft bgs and no HW casing inserted into the borehole). 7.0 ft: Wash started brown with sand, noticed wash color is darker brown around 7 ft bgs. 7.5 ft: Clay clumps in wash around 7.5 ft bgs.
			CL-ML		14.0	4	SS	9-9-8-8	17	2.0 2.0	Brown, moist, very stiff, clayey SILT, some fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.25, 0.20, 0.25 tsf; PP = 1.50, 2.25, 3.50 tsf.
					16.0	5	SS	12-14-22-21	36	2.0 2.0	Top 6 in (SSA): Brown, wet, hard, fine gravelly SILT, some clay, slightly plastic (GLACIOLACUSTRINE, CL-ML). Bottom 18 in (SSB): Brown, wet, hard, clayey SILT, trace fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.15, 0.15, 0.30 tsf; PP = 2.25, 2.00 tsf.
		18.0 - 37.5ft Grey, clayey SILT, some fine to coarse sand, little fine gravel			18.0	6	SS	11-11-15-15	26	0.6 2.0	17.0 ft: Wash color is gray. Grey, wet, very stiff, clayey SILT, some fine to coarse sand, little fine gravel, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.45, 0.55 tsf; PP = 2.50, 2.00 tsf.
					20.0	7	SS	9-10-11-11	21	2.0 2.0	18.0 ft: Test at 18 ft mv1 can't push (55x110 mm) torque (in-lbs). Torque to fail. Grey, wet, very stiff, clayey SILT, some fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.45, 0.55 tsf; PP = 2.50, 2.00 tsf.
			CL-ML		24.0	8	SS	5-4-4-7	8	1.8 2.0	Grey, wet, medium stiff, clayey SILT, some fine to coarse sand, little fine gravel, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.35, 0.15 tsf; PP = 2.50, <0.50 tsf.
					29.0	9	SS	9-8-8-8	16	1.4 2.0	Grey, wet, very stiff, clayey SILT, some fine to coarse sand, little fine gravel, moderately plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.45, 0.45 tsf; PP = 2.25, 1.50 tsf. 29.0 ft: Test at 29 ft can't push mv2 (55x110mm).
					34.0	10	SS	17-18-24-19	42	1.4 2.0	Grey, dry to moist, hard, clayey SILT, trace fine gravel, trace fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Sample too dry for Tv; PP = 4.50, 4.00 tsf.
		37.5 - 41.5ft Boulder	CL-ML		37.5	R1	NX	RQD = 0%		NA 4.0	Boulder, which was thought to be bedrock 37.5 ft: Driller notes hard material (prehaps boulder). Can't get though material will core starting at 39.0 ft bgs.

Log continued on next page

Asphalt
 Fill (made ground)
 USCS Low Plasticity Silty Clay (CL-ML)
 Boulders ord Cobbles
 Slate/Phyllite

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 1/31/20



008B MANCHESTER NH GEOTECH SOILRX LOGO 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ GOLDBER NH 2011.GDT 4/25/22

RECORD OF BORE HOLE B-102 (STA. 104+24.32, 4.59' RT.)

SHEET 2 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 65.0 ft
 LOCATION: Brownington, VT

DRILL METHOD: D+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/21/20
 DATE COMPLETED: 1/24/20

COORDS: N: 1,729,967.00 E: 844,492.10
 GS ELEVATION:
 WEATHER: Partly Cloudy
 TEMPERATURE: 9-13° F

INCLINATION: 90
 DEPTH W.L.: 17.5 ft
 ELEVATION W.L.:
 DATE W.L.: 1/23/2020
 TIME W.L.: 8:28

SOIL PROFILE				SAMPLE INFORMATION								
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description	
40.0		37.5 - 54.0ft Grey, clayey SILT, some fine to coarse sand, little fine gravel		CL-ML		R1	NX	RQD = 0%		NA 4.0		
					42.0	11	SS	7-12-14-12	26	0.9 2.0	41.5 ft: Broke through boulder. SPT below count disturbance due to vane test attempt.	
					44.0	12	SS	10-25-40-35	65	1.3 2.0	Grey, wet, very stiff, clayey SILT, little fine gravel, some fine to coarse sand, slightly plastic (GLACIOLACUSTRINE, CL-ML). Tv = 0.35 tsf; PP = 2.00 tsf.	
45.0											Grey, dry, hard, CLAY, trace fine gravel, trace coarse sand, silt lense, slightly plastic (GLACIOLACUSTRINE, CL). Tv = 0.35, 0.45 tsf; PP > 4.50, > 4.50 tsf.	
					49.0	13	SS	12-16-25-31	41	1.6 2.0	Grey, moist, hard, clayey SILT, trace fine sand (GLACIOLACUSTRINE, CL-ML). Tv = 0.35, 0.40 tsf; PP = 1.75 tsf.	
											53.0 ft: Brown red fine sand silt lense in samples. 54.0 ft: Wash color is still gray. Brown red fine sand silt lense in samples.	
55.0		54.0 - 59.0ft Gray, fine-grained, PHYLLITE, with intermingled quartz veins			55 55	R2 R2	NX NX	RQD = 62%	R R	5.0 5.0 5.0 5.0	Gray, fine-grained, fresh (W1), very strong (R5) GNEISS, with intermingled quartz viens throughout (1/32 in-1/2 in thick), discontinuites steep to vertical (55-90°), very close to closely spaced (0.1-0.8 ft). 55.0 ft: Brown red fine sand silt lense in samples. Roller bit at 55 ft to make sure hard material is not a boulder. Noticed loss of water to formation at 50 ft bgs.	
60.0					60 60.9	R3 R4	NX NX	RQD = 0%		0.7 0.9 4.1 4.1	Gray, fine-grained GNEISS, discontinuites vertical (90°), closely spaced (0.3 ft). 60.0 ft: Run 3 rock core interrupted because barrel was plugged up. Note drill rig was shaking alot during rock coring (driller needed to stop alot) could have led to fractures in rock cores. Gray, fine-grained, fresh (W1), very strong (R5), GNEISS, intermingled quartz, veins throughout (1/32 in-1/4 in thick), discontinuites steep to vertical (75-90°), closely spaced (0.1-0.8 ft).	
65.0		Boring completed at 65.0 ft										

008B MANCHESTER NH GEOTECH SOILRX LOGO 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ GOLDBER NH 2011.GDT 4/25/22

Asphalt
 Fill (made ground)
 USCS Low Plasticity Silty Clay (CL-ML)
 Boulders ord Cobbles
 Slate/Phyllite

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 1/31/20



RECORD OF BORE HOLE B-103 (STA. 201+47.02, 6.08' LT.)

SHEET 2 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 55.7 ft
 LOCATION: Brownington, VT

DRILL METHOD: SSA and S+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/28/20
 DATE COMPLETED: 1/30/20

COORDS: N: 1,730,547.90 E: 846,362.50
 GS ELEVATION:
 WEATHER: Cloudy
 TEMPERATURE: 9-25° F

INCLINATION: 90
 DEPTH W.L.: 5.4 ft
 ELEVATION W.L.:
 DATE W.L.: 1/28/2020
 TIME W.L.: 10:57

SOIL PROFILE				SAMPLE INFORMATION							
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description
45.0			ML		44.0	11	SS	14-31-33-50	64	1.3 2.0	Grey, moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.35, 0.40 tsf; PP = 4.50, 4.50, 2.00 tsf.
50.0					49.0	12	SS	20-32-40-50(5")	72	1.7 1.9	Grey, moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.75, 0.75 tsf; PP = 1.50, 3.50, >4.50 tsf.
55.0					54.0	13	SS	20-46-55-50(4")	101	1.8 1.8	Grey, moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.35, 0.55 tsf; PP = 2.75, >4.50, 3.75 tsf.

Boring completed at 55.7 ft

008B MANCHESTER NH GEOTECH SOIL/RX LOGO 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ GOLDR NH 2011.GDT 4/25/22

silty Sand
 Clayey Silt
 Silty Gravel
 Gravelly Silt

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 2/4/20



RECORD OF BORE HOLE B-104 (STA. 202+58.58, 0.27' RT.)

SHEET 1 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 66.0 ft
 LOCATION: Brownington, VT

DRILL METHOD: SSA and S+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/24/20
 DATE COMPLETED: 1/29/20

COORDS: N: 1,730,626.40 E: 846,442.40
 GS ELEVATION:
 WEATHER: Clear
 TEMPERATURE: 22-38° F

INCLINATION: 90
 DEPTH W.L.: 7.2 ft
 ELEVATION W.L.:
 DATE W.L.: 1/28/2020
 TIME W.L.: 12:59

SOIL PROFILE				SAMPLE INFORMATION							
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description
5.0 ▽	9.0	0.3 - 9.0ft Brown, fine to coarse SAND, some fine gravel, some silt.	SM		4.0	1	SS	50(1")	R	0.0 0.1	Brown, wet, very dense, fine to coarse sand, little silt, trace fine gravel (FILL, SM). 4.0 ft: Wash started clear. Notice wash color is gray but no soil material. 4.1-7.5 ft: Encountered boulder. Broke through boulder at 7.5 ft bgs. 8.0 ft: Wash color is brown (coarse sand).
					9.0	2	SS	18-29-32-36	61	1.4 2.0	Brown/grey, moist, hard, clayey SILT, trace fine gravel, trace medium, to coarse sand, slightly plastic. Sample too dry for Tv; PP = 1.50, 1.75 tsf. 9.0 ft: Wash color is gray.
		14.0	3		SS	20-31-33-41	64	1.5 2.0	Grey, moist, hard, clayey SILT, little fine to coarse sand, trace fine gravel, slightly plastic (GLACIOLACUSTRINE, ML). Sample too dry for Tv; PP = 0.75, 0.75 tsf.		
		19.0	4		SS	35-39-50(4")	R	0.8 1.3	Top 4 in (S4A): Grey, moist, very dense, fine to coarse GRAVEL, little fine to coarse sand, trace silt (GLACIOLACUSTRINE, ML). Bottom 5.5 in (S4B): Grey, moist, hard, clayey SILT, little fine to medium sand, trace fine gravel, slightly plastic (GLACIOLACUSTRINE, ML). Tv = too dry; PP = 0.15 tsf. 19.0 ft: End casing 2nd day. 21.3-22.0 ft: Encountered cobble. Broke through cobble at 22 ft bgs.		
		24.0	5		SS	45-50(5")	R	0.8 0.9	Grey, moist, hard, clayey SILT, trace fine gravel, little fine to medium sand, slightly plastic (GLACIOLACUSTRINE, ML). Sample too dry for Tv; PP = 1.25 tsf. 28.0 ft: Driller notes softer material.		
		29.0	6		SS	26-36-43-48	79	1.5 2.0	Grey, moist, hard, clayey SILT, trace fine sand, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.25, 0.20 tsf; PP = 0.50, <0.50 tsf.		
		34.0	7		SS	24-42-46-50(5")	88	1.5 1.9	Grey, moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.15, 0.25 tsf; PP = 1.25, 2.25, 1.50 tsf.		
		39.0	8		SS	24-31-50-47	81	1.7 2.0	Grey, moist, hard, clayey SILT (trace sand from wash), dark grey lensing, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.15, 0.25 tsf; PP =		

Log continued on next page

Sand
 Clayey Silt
 Gravel

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 2/4/20



008B MANCHESTER NH GEOTECH SOILRX LOGO - 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ - GOLDER NH 2011.GDT - 4/25/22

RECORD OF BORE HOLE B-104 (STA. 202+58.58, 0.27' RT.)

SHEET 2 of 2

PROJECT: Brownington Slope Repairs
 PROJECT NUMBER: 19132008
 DRILLED DEPTH: 66.0 ft
 LOCATION: Brownington, VT

DRILL METHOD: SSA and S+W
 HAMMER TYPE: Auto
 DATE STARTED: 1/24/20
 DATE COMPLETED: 1/29/20

COORDS: N: 1,730,626.40 E: 846,442.40
 GS ELEVATION:
 WEATHER: Clear
 TEMPERATURE: 22-38° F

INCLINATION: 90
 DEPTH W.L.: 7.2 ft
 ELEVATION W.L.:
 DATE W.L.: 1/28/2020
 TIME W.L.: 12:59

SOIL PROFILE				SAMPLE INFORMATION							
DEPTH ft	ELEVATION ft	LITHOLOGY DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE DEPTH	NUMBER	SAMPLE TYPE	BLOWS per 6 in or RQD (%)	N	REC ATT	Sample Description
				ML		8	SS	24-31-50-47	81		2.25, 2.5 tsf.
45.0					44.0	9	SS	23-38-46-48	84	1.7 2.0	Gray, moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv=0.40, 0.35 tsf; PP = 1.50 tsf.
50.0					49.0	10	SS	18-26-32-41	58	1.8 2.0	Gray moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.15, 0.45 tsf; PP = 4.50, 1.50 tsf.
55.0					54.0	11	SS	19-24-34-39	58	1.9 2.0	Gray, moist, hard, clayey SILT, slightly plastic (GLACIOLACUSTRINE, ML). Tv = 0.40, 0.35 tsf; PP = 4.25, 2.25 tsf.
60.0											
65.0											64.0 ft: S12 taken to confirm consistent material throughout borehole.

Boring completed at 66.0 ft

003B MANCHESTER NH GEOTECH SOIL/RX LOGO 2020.02.25 BROWNINGTON SLOPE REPAIR LOGS ADJUSTED WITH LAB RESULTS.GPJ GOLDR NH 2011.GDT 4/25/22

Sand
 Clayey Silt
 Gravel

D+W: Drive and Wash SH: Shelby Tube SSA: Solid Stem Auger AUG: Auger Cuttings PP: Pocket Penetrometer TV: Torvane

DRILLING COMPANY: Atlantic Testing Laboratories
 DRILLER: Brad Perry
 DRILL RIG: CME 75

LOGGED BY: SKB
 CHECKED BY: CRH
 DATE: 2/4/20



Table A-1

UNIFIED SOIL CLASSIFICATION SYSTEM				TERMS DESCRIBING DENSITY/CONSISTENCY																																									
MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES																																										
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.																																									
		(little or no fines)	GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.																																									
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.																																									
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS	SW	Well-graded sands, gravelly sands, little or no fines																																									
		(little or no fines)	SP	Poorly-graded sands, gravelly sand, little or no fines.																																									
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures																																									
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.																																										
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.																																										
		OL	Organic silts and organic silty clays of low plasticity.																																										
	SILTS AND CLAYS (liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.																																										
		CH	Inorganic clays of high plasticity, fat clays.																																										
		OH	Organic clays of medium to high plasticity, organic silts.																																										
HIGHLY ORGANIC SOILS	Pt	Peat and other highly organic soils.																																											
Desired Soil Observations: (in this order) Color (Munsell color chart) Moisture (dry, damp, moist, wet, saturated) Density/Consistency (from above right hand side) Name (sand, silty sand, clay, etc., including portions - trace, little, etc.) Gradation (well-graded, poorly-graded, uniform, etc.) Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic) Structure (layering, fractures, cracks, etc.) Bonding (well, moderately, loosely, etc., if applicable) Cementation (weak, moderate, or strong, if applicable, ASTM D 2488) Geologic Origin (till, marine clay, alluvium, etc.) Unified Soil Classification Designation Groundwater level				Coarse-grained soils (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) silty or clayey gravels; and (3) silty, clayey or gravelly sands. Consistency is rated according to standard penetration resistance. Modified Burmister System <table border="0"> <tr> <td><u>Descriptive Term</u></td> <td><u>Portion of Total</u></td> </tr> <tr> <td>trace</td> <td>0% - 10%</td> </tr> <tr> <td>little</td> <td>11% - 20%</td> </tr> <tr> <td>some</td> <td>21% - 35%</td> </tr> <tr> <td>adjective (e.g. sandy, clayey)</td> <td>36% - 50%</td> </tr> </table> <table border="0"> <tr> <td><u>Density of Cohesionless Soils</u></td> <td><u>Standard Penetration Resistance N-Value (blows per foot)</u></td> </tr> <tr> <td>Very loose</td> <td>0 - 4</td> </tr> <tr> <td>Loose</td> <td>5 - 10</td> </tr> <tr> <td>Medium Dense</td> <td>11 - 30</td> </tr> <tr> <td>Dense</td> <td>31 - 50</td> </tr> <tr> <td>Very Dense</td> <td>> 50</td> </tr> </table>		<u>Descriptive Term</u>	<u>Portion of Total</u>	trace	0% - 10%	little	11% - 20%	some	21% - 35%	adjective (e.g. sandy, clayey)	36% - 50%	<u>Density of Cohesionless Soils</u>	<u>Standard Penetration Resistance N-Value (blows per foot)</u>	Very loose	0 - 4	Loose	5 - 10	Medium Dense	11 - 30	Dense	31 - 50	Very Dense	> 50																		
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Desired Rock Observations: (in this order) Color (Geological Society of America Rock Color Chart) Texture (aphanitic, fine-grained, etc.) Strength (ISRM Classification per Table A-2) Lithology (igneous, sedimentary, metamorphic, etc.) Hardness (very hard, hard, mod. hard, etc.) Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.) Geologic discontinuities/jointing: -dip (horiz - 0-5, low angle - 5-35, mod. dipping - 35-55, steep - 55-85, vertical - 85-90) -spacing (very close - <5 cm, close - 5-30 cm, mod. close 30-100 cm, wide - 1-3 m, very wide >3 m) -tightness (tight, open or healed) -infilling (grain size, color, etc.) Formation (Waterville, Ellsworth, Cape Elizabeth, etc.) RQD and correlation to rock mass quality (very poor, poor, etc.) ref: AASHTO Standard Specification for Highway Bridges 17th Ed. Table 4.4.8.1.2A Recovery				Fine-grained soils (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) gravelly, sandy or silty clays; and (3) clayey silts. Consistency is rated according to shear strength as indicated. <table border="0"> <tr> <td><u>Consistency of Cohesive soils</u></td> <td><u>SPT N-Value blows per foot</u></td> <td><u>Approximate Undrained Shear Strength (psf)</u></td> <td><u>Field Guidelines</u></td> </tr> <tr> <td>Very Soft</td> <td>WOH, WOR, WOP, <2</td> <td>0 - 250</td> <td>Fist easily Penetrates</td> </tr> <tr> <td>Soft</td> <td>2 - 4</td> <td>250 - 500</td> <td>Thumb easily penetrates</td> </tr> <tr> <td>Medium Stiff</td> <td>5 - 8</td> <td>500 - 1000</td> <td>Thumb penetrates with moderate effort</td> </tr> <tr> <td>Stiff</td> <td>9 - 15</td> <td>1000 - 2000</td> <td>Indented by thumb with great effort</td> </tr> <tr> <td>Very Stiff</td> <td>16 - 30</td> <td>2000 - 4000</td> <td>Indented by thumbnail</td> </tr> <tr> <td>Hard</td> <td>>30</td> <td>over 4000</td> <td>Indented by thumbnail with difficulty</td> </tr> </table> Rock Quality Designation (RQD): RQD = $\frac{\text{sum of the lengths of intact pieces of core}^* > 100 \text{ mm}}{\text{length of core advance}}$ *Minimum NQ rock core (1.88 in. OD of core) Correlation of RQD to Rock Mass Quality <table border="0"> <tr> <td><u>Rock Mass Quality</u></td> <td><u>RQD</u></td> </tr> <tr> <td>Very Poor</td> <td><25%</td> </tr> <tr> <td>Poor</td> <td>26% - 50%</td> </tr> <tr> <td>Fair</td> <td>51% - 75%</td> </tr> <tr> <td>Good</td> <td>76% - 90%</td> </tr> <tr> <td>Excellent</td> <td>91% - 100%</td> </tr> </table>		<u>Consistency of Cohesive soils</u>	<u>SPT N-Value blows per foot</u>	<u>Approximate Undrained Shear Strength (psf)</u>	<u>Field Guidelines</u>	Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily Penetrates	Soft	2 - 4	250 - 500	Thumb easily penetrates	Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort	Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort	Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail	Hard	>30	over 4000	Indented by thumbnail with difficulty	<u>Rock Mass Quality</u>	<u>RQD</u>	Very Poor	<25%	Poor	26% - 50%	Fair	51% - 75%	Good	76% - 90%	Excellent	91% - 100%
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Key to Soil and Rock Descriptions
 Including Boring Log Terms and
 Field Identification Information

Table A-2**Classification of Rock Material Strengths¹**

Grade	Description	Field Identification	Approx. Range of Uniaxial Compressive Strength	
			MPa	psi
S1	Very soft clay	Easily penetrated several inches by fist	<0.025	<4
S2	Soft clay	Easily penetrated several inches by thumb	0.025-0.05	4-7
S3	Firm clay	Can be penetrated several inches by thumb with moderate effort	0.05-0.10	7-15
S4	Stiff clay	Readily indented by thumb but penetrated only with great effort	0.10-0.25	15-35
S5	Very stiff clay	Readily indented by thumbnail	0.25-0.50	35-70
S6	Hard clay	Indented with difficulty by thumbnail	>0.50	>70
R0	Extremely weak rock	Indented by thumbnail	0.25-1.0	35-150
R1	Very weak rock	Crumbles under firm blows with point of geological hammer; can be peeled by a pocket knife	1-5	150-725
R2	Weak rock	Can be peeled by a pocket knife with difficulty; shallow indentations made by firm blow with point of geological hammer	5-25	725-3,500
R3	Medium strong rock	Cannot be scraped or peeled with a pocket knife; specimen can be fractured with single firm blow of geological hammer	25-50	3,500-7,000
R4	Strong rock	Specimen requires more than one blow of geological hammer to fracture it	50-100	7,000-15,000
R5	Very strong rock	Specimen requires many blows of geological hammer to fracture it	100-250	15,000-36,000
R6	Extremely strong rock	Specimen can only be chipped with geological hammer	>250	>36,000

Note: Grades S1 to S6 apply to cohesive soils, for example clays, silty clays, and combinations of silts and clays with sand, generally slow draining. Discontinuity wall strength will generally be characterized by grades R0-R6 (rock) while S1-S6 (clay) will generally apply to filled discontinuities.

¹ International Society for Rock Mechanics (ISRM), Commission on standardization of laboratory and field tests (1978): Suggested methods for the quantitative description of discontinuities in rock masses. Int. J. Rock Mech. Min. Sci. & Geomech. Abstr., Vol. 15, No. 6, pp. 319-368.