



Northern Utilities, Inc.
Docket No. DG 17-070
PUC Staff Information Data Request Set 5

Received: April 12, 2019
Request No. Staff 5-2

Date of Response: April 16, 2019
Witness: Kevin Sprague & Christopher LeBlanc

Request:

Ref. Staff DR 4-2 concerning the Whitehouse Rd., Rochester project:

- a) Please confirm that the \$5,500 payment to SW Cole Engineering on Testimony Attachment 5, p. 177 was for 12 test borings for this project.
- b) Please provide a linear map of the gas main showing the location of the 12 test borings in relation to the gas main and indicate the date when each test boring was taken and the depth of each boring.
- c) Please provide any written results from each of the 12 test borings.

Please indicate the minimum and maximum depth of excavation performed along the length of the project, measured from the finished grade.

Response:

- a) The \$5,500 payment to SW Cole Engineering was for the 12 test borings on the project.
- b) Please refer to Staff 5-2 Attachment 1 for a copy of the test boring results. The Company's project started to the east of Quail Drive by boring test B-1 and ended to the west of Champlin Ridge Road by boring test B-104. The test borings were done at the edge of the pavement and maintained a 3'-4' safety buffer from our existing gas main. Our new main was installed between the edge of the pavement and our existing gas main. The borings were to a depth of five feet.
- c) Please refer to Staff 5-2 Attachment 1.
- d) The Company's minimum excavation was approximately 54" for trench depth and would be typically increased to approximately 60" for bell hole welds and tie-ins.

Exhibit 14

Northwest Utilities, Inc.
Box 100, 05-1-070
P.O. Box 100, 05-1-070

Witness: John J. Sullivan & Christopher Sullivan
Date of Assessment: April 18, 2019
Reference: Staff 5-3

Response:

For Staff 5-3 concerning the Water Tower No. 100, Northwest Utilities, Inc.

a) Please confirm that the \$25,500 payment to NWU for the assessment of the Water Tower No. 100, Northwest Utilities, Inc. was for the assessment of the project.

b) Please provide a list of the items that were assessed as part of the assessment of the Water Tower No. 100, Northwest Utilities, Inc. and indicate the location of the items that were assessed as part of the assessment of the project.

c) Please provide any other information that you have regarding the assessment of the Water Tower No. 100, Northwest Utilities, Inc.

Please indicate the location of the items that were assessed as part of the assessment of the Water Tower No. 100, Northwest Utilities, Inc. and indicate the location of the items that were assessed as part of the assessment of the project.

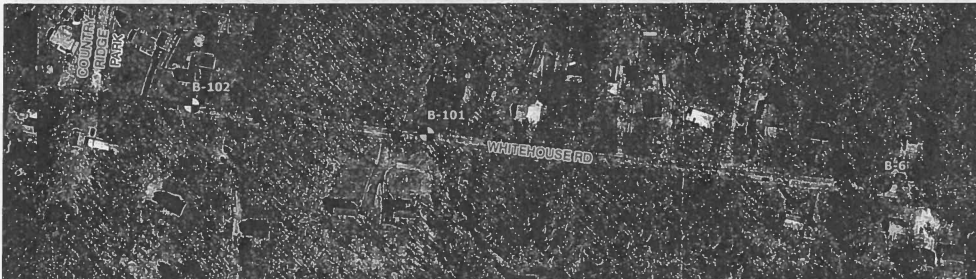
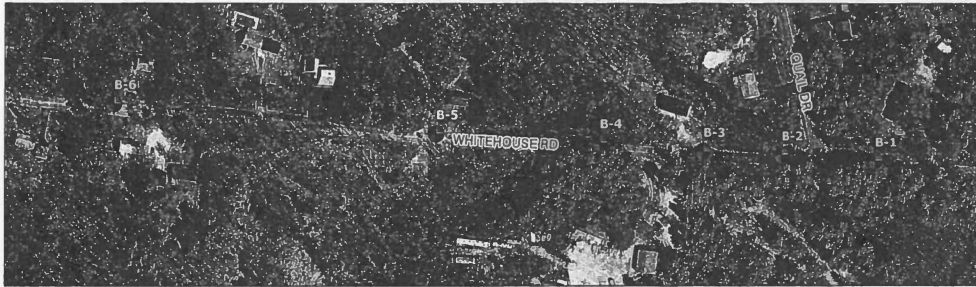
Response:

a) The \$25,500 payment to NWU for the assessment of the Water Tower No. 100, Northwest Utilities, Inc. was for the assessment of the project.

b) Please refer to Staff 5-3 Assessment for a copy of the list of items that were assessed as part of the assessment of the Water Tower No. 100, Northwest Utilities, Inc. and indicate the location of the items that were assessed as part of the assessment of the project. The items that were assessed as part of the assessment of the Water Tower No. 100, Northwest Utilities, Inc. and indicate the location of the items that were assessed as part of the assessment of the project.

c) Please refer to Staff 5-3 Assessment for a copy of the list of items that were assessed as part of the assessment of the Water Tower No. 100, Northwest Utilities, Inc. and indicate the location of the items that were assessed as part of the assessment of the project.

d) The Company's assessment of the Water Tower No. 100, Northwest Utilities, Inc. was for the assessment of the project. The items that were assessed as part of the assessment of the Water Tower No. 100, Northwest Utilities, Inc. and indicate the location of the items that were assessed as part of the assessment of the project.

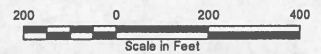


LEGEND

- ◆ APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN PREPARED FROM ORTHOPHOTOGRAPHY FROM STATE OF NEW HAMPSHIRE ENTITLED "NH 2010/2011 1-FT RGB," PROVIDED BY NH GRANIT.
2. THE EXPLORATION LOCATIONS LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. USING A RECREATIONAL GRADE GPS RECEIVER.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

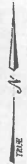
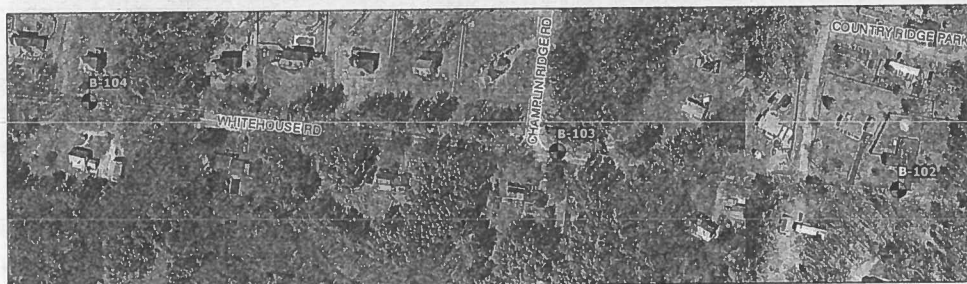


UNITIL CORPORATION

EXPLORATION LOCATION PLAN

PROPOSED GAS MAIN REPLACEMENT
WHITEHOUSE ROAD
ROCHESTER, NEW HAMPSHIRE

Job No.	17-1465	Scale	1"=200'
Date:	02/05/2018	Sheet	1

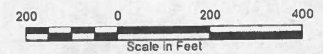


LEGEND

-  APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN PREPARED FROM ORTHOPHOTOGRAPHY FROM STATE OF NEW HAMPSHIRE ENTITLED "NH 2010/2011 1-FT RGB," PROVIDED BY NH GRANIT.
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CITY OF ROCHESTER

EXPLORATION LOCATION PLAN

PROPOSED ROADWAY IMPROVEMENTS
WHITEHOUSE ROAD
ROCHESTER, NEW HAMPSHIRE

Job No.	17-1465.1	Scale	1" = 200'
Date:	02/05/2018	Sheet	1



BORING LOG

CLIENT: Unit8 Corporation
PROJECT: Gas Main Replacement
LOCATION: Whitehouse Road, Rochester, New Hampshire

BORING NO.: B-1
SHEET: 1 of 1
PROJECT NO.: 17-1465
DATE START: 1/31/2018
DATE FINISH: 1/31/2018

Drilling Information

LOCATION: See Exploration Location Plan
DRILLING CO.: S.W. Cole Explorations, LLC
DRILLER: Scott Hollabaugh
RIG TYPE: Tract Mounted Dredish D-50
HAMMER TYPE: Automatic
HAMMER EFFICIENCY FACTOR: 1.03/2018
ELEVATION (FT): N/A
TOTAL DEPTH (FT): 7.5
LOGGED BY: Tyler Demers
DRILLING METHOD: Solid Stem Auger
AUGER ID/OD: N/A / 4 1/2 in
SAMPLER: Standard Split-Spoon
CASING ID/OD: N/A / N/A
CORE BARREL: N/A
WATER LEVEL DEPTHS (ft): 1/31/2018 No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
1. All time of Drilling
2. At Completion of Drilling
3. After Logging
4. Solid Spoon Sample
5. Thin Wall Tube Sample
6. Rock Core Sample
7. Field Vane Shear
8. Penetration Length
9. Recovery Length
10. 3000 psi Foot
11. Minute per Foot
12. WOB = Weight of Rods
13. WOBH = Weight of Hammer
14. RCD = Rock Quality Designation
15. PDI = Penetration Index
16. S_u = Field Vane Shear Strength, kips/sq ft
17. q_u = Uncorrelated Compressive Strength, kips/sq ft
18. N/A = Not Applicable

SAMPLE INFORMATION									
Elev. (ft)	Depth (ft)	Coring Pen. (ft)	Sample No.	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification
			1D	0.4-2.4	24/12	17-24-20-17			0.4' 6" ASPHALT concrete pavement
			2D	2.4-4.2	21/14	14-17-35-500*			Dense, brown, gravelly SAND some silt (FILL)
			3D	5-5.8	10/8	56-504*			5.0' Probable boulder
									8.0' Probable GLACIAL TILL or weathered BEDROCK
									7.5' Refusal at 7.5 feet (Probable BEDROCK)

17-1465.DPJ / S.W.C. TEMPLATE LOG 2/7/18
Elevation lines represent approximate boundary between soil types; transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurement was made.

BORING NO.: B-1

BORING LOG		BORING NO.:	B-2
		SHEET:	1 of 1
CLIENT: <u>Unifit Corporation</u>		PROJECT NO.	17-1465
PROJECT: <u>Gas Main Replacement</u>		DATE START:	1/31/2018
LOCATION: <u>Whitehouse Road, Rochester, New Hampshire</u>		DATE FINISH:	1/31/2018

Drilling Information			
LOCATION: See Exploration Location Plan	ELEVATION (FT): N/A	TOTAL DEPTH (FT): 9.9	LOGGED BY: Tyler Demers
DRILLING CO.: S. W. Woods Enterprises, LLC	DRILLER: Scott Houghton	DRILLING METHOD: Std 4" Stem Auger	
RIG TYPE: Track Mounted Ditch-D-50	AUGER ID: N/A 4 1/2 in	SAMPLER: Standard Split Spill	
HAMMER TYPE: Automatic	HAMMER WEIGHT (PDL): 140	CASINO ID#: N/A N/A	CORE BARREL: N/A
HAMMER EFFICIENCY FACTOR:	HAMMER DROP (Inch): 39		
WATER LEVEL CORRECTION: 0.0/2018 No firm water observed.			

GENERAL NOTES:					
KEY TO NOTES AND SYMBOLS:	Yield Level	D = Split Spoon Sample	Pen. = Penetration Length	WOR = Weight of Rods	
	At time of Drilling	U = Thin Wallied Tube Stringing	Rac = Recovery Length	WH = Weight of Hammer	Field Vane Shear Strength, kips/sq.ft.
	At Completion of Drilling	R = Rock Core Sample	bpf = Blows per Foot	RID = Rock Quality Designation	σ_c = Unconfined Compressive Strength, kips/sq.ft.
	After Drilling	V = Field Vane Shear	mpt = Minutes per Foot	PH = PhotoLization Detector	NA = Not Applicable

SAMPLE INFORMATION							Graphic Log	Sample Description & Classification	1/4" Depth	Remarks
Elev. (ft)	Depth (ft)	Cast/Pen (sp)	Sample No.	Depth (ft)	Pen / Rec. (psi)	Blow Count or RQD				
5			1D	0-5-2.5	24/14	20-18-20-23		0.5'	6" ASPHALT concrete pavement	
	2D		2.5-4.5	24/18	13-4-6-7		3.0'	Medium dense brown, silty fine to medium SAND (FIL)		
	3D		5-7	24/22	2-4-0-27		5.0'	Medium dense, gray-brown, silty fine to medium SAND trace gravel (GLACIAL TILL)		

Refusal at 9.0 feet
(Probable BEDROCK)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-2



BORING LOG

CLIENT: Unilab Corporation

PROJECT: Gas Main Replacement

LOCATION: Whittet-house Road, Rochester, New Hampshire

BORING NO.: B-3

SHEET: 1 of 1

PROJECT NO: 17-1465

DATE START: 1/31/2018

DATE FINISH: 1/31/2018

Drilling Information

LOCATION: See Exploration Location Plan

DRILLING CO.: S.W. Cole Explorations, LLC

RIG TYPE: Track Mounted Dreditch D-59

HAMMER TYPE: Automatic

HAMMER EFFICIENCY FACTOR: 1/31/2018

WATER LEVEL DEPTHS (ft): 1/31/2018

ELEVATION (FT): N/A

DRILLER: Scott Hollabaugh

AUGER ID/DI: 16A / 4 1/2 in

HAMMER WEIGHT (lbw): 140

HAMMER DROP (inch): 30

Soils appear saturated below 6 feet.

TOTAL DEPTH (FT): 8.0

LOGGED BY: Tyler Damers

DRILLING METHOD: Solid Stem Auger

SAMPLER: Standard Split-Spoon

CASING ID/DI: N/A / N/A

CORE BARREL: N/A

KEY TO NOTES AND SYMBOLS:

W = Water Level

U = At time of Drilling

A = After Drilling

D = Split Spoon Sample

U = Thin Waller Tube Sample

R = Rock Core Sample

V = Fluid Vane Shear

Pen. = Penetration Length

Rec. = Recovery Length

1st = Blows per Foot

1st = Minute per Foot

WOF = Weight of Rods

WOF = Weight of Hammer

RCD = Rock Quality Designation

RD = Photo/Video Recorder

S = Field Vane Shear Strength, kips/sq.ft.

q_u = Unconfined Compressive Strength, kips/sq.ft.

N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (ft)	SAMPLE INFORMATION				Field / Lab Test Data	Sample Description & Classification	+ft Depth	Remarks
			Sample No.	Depth (ft)	Pen. / Rec. (ft)	Blow Count or RCD				
5	0.4		1D	0.4-2.4	24/10	35-49-33-19	0.4	5" ASPHALTY concrete pavement		
	2.4		2D	2.4-4.4	24/12	17-12-16-16		Dense, brown, gravelly SAND some silt (FILL)		
	5.0		3D	5-6.8	22/4	3-2-2-50/4"	5.0	Loose, brown, gravelly fine to medium SAND some silt		
	6.0						6.0	Probable GLACIAL TILL or weathered BEDROCK		
	8.0						8.0	Refused at 8.0 feet (Probable BEDROCK)		

17-1465.DPJ 1 INCH TEMPLATE LOT 27118

Termination lines represent approximate boundary between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Purchasers of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-3



BORING LOG

CLIENT: Unill Corporation
PROJECT: Gas Main Replacement
LOCATION: Whitehouse Road, Rochester, New Hampshire

BORING NO.: B-4
SHEET: 1 of 1
PROJECT NO.: 17-1455
DATE START: 12/1/2018
DATE FINISH: 12/1/2018

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 14.5 LOGGED BY: Tyler Demers
DRILLING CO.: S. W. Cole Explorations, LLC DRILLER: Scott Holtebaugh DRILLING METHOD: Solid Stem Auger
RIG TYPE: Truck Mounted Ditcher D-50 AUGER ID/OD: N/A 1.4 1/2 in SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic HAMMER WEIGHT (lb): 140 CASING ID/OD: N/A N/A CORE BARREL: N/A
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): 30
WATER LEVEL DEPTHS (ft): 12/1/2018 No free water observed.

GENERAL NOTES:

KEY TO NOTES: Water Level O = Solid Spoon Sample Pen = Penetration Length WGR = Weight of Rods S = Field Vane Shear Strength - kips/sq ft
AND SYMBOLS: 1. At Base of Drilling U = Thin Vertical Tube Sample Rate = Recovery Length WGR = Weight of Hammer S = Field Vane Shear Strength - kips/sq ft
2. At Completion of Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Cu = Unclassified Compressive Strength - kips/sq ft
3. After Drilling V = Field Vane Shear mpt = Minutes per Foot PID = Photoacoustic Detector N/A = Not Applicable

SAMPLE INFORMATION										Sample Description & Classification	Log Depth	Remarks
Elev. (ft)	Depth (ft)	Coring Pch (in)	Sample No.	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log				
			1D	0.5-2.5	24/12	24-14-25-13			0.5	6" ASPHALT concrete pavement		
			2D	2.5-4.5	24/4	13-9-7-8			1.0	Dark brown-black, silty gravelly SAND (FILL)		
			3D	5-7	24/10	11-31-15-4			5.0	Medium dense, brown, gravelly SAND some silt (FILL)		
			4D	10-11.5	18" 6	23-35-50			10.0	Very dense, gray-brown, silty gravelly SAND (GLACIAL TILL)		
									14.5	Refusal at 14.5 feet (Probable Boulder or BEDROCK)		

17-1455.GPJ - BNC - TEMPLATE.dwg 2/1/19
Drilling lines represent approximate boundary between soil types. Fluctuations may be noted. Water level readings have been made at times and under conditions listed. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-4



BORING LOG

CLIENT: Unitil Corporation
PROJECT: Gas Main Replacement
LOCATION: Whitehouse Road, Rochester, New Hampshire

BORING NO.: B-5
SHEET: 1 of 1
PROJECT NO.: 17-1485
DATE START: 1/31/2018
DATE FINISH: 1/31/2018

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 9.5 LOGGED BY: Tyler Demers
DRILLING CO.: S.W. Cole Explorations, LLC DRILLER: Scott Hollibaugh DRILLING METHOD: Solid Stem Auger
RIG TYPE: Track Mounted Clegg D-50 AUGER ID/OD: N/A / 4 1/2 in SAMPLER: Standards Split-Spoon
HAMMER TYPE: Automatic HAMMER WEIGHT (lbs): 140 CASING ID/OD: N/A/N/A CORE BARREL: N/A
HAMMER EFFICIENCY FACTOR: N/A HAMMER DROP (feet): 30
WATER LEVEL DEPTH (ft): 1/31/2018 No free water observed

GENERAL NOTES:

KEY TO NOTES: Water Level D = Split Spoon Sample Pen. = Penetration Length WCI = Weight of Rods S = Field Vane Shear Strength, kips/ft²
AND SYMBOLS: 1. At Time of Drilling U = Thin Wall Soil Sample Rec. = Recovery Length RCI = River Quality Investigation q_u = Unconfined Compressive Strength, kips/ft²
2. At Completion of Drilling R = Rock Core Sample RQD = Rock Quality Designation N/A = Not Applicable
3. After Drilling V = Field Vane Shear npt = Minute per Foot PID = Photo-Installation Detector

SAMPLE INFORMATION									
Elev. (ft)	Depth (ft)	Casing (ft)	Sample No.	Depth (ft)	Per / Rec (ft)	Blow Count or RQD	Field / Lab Test Data	Geotech Log	Remarks
			1D	0.7-2.7	24/20	22-18-10-6		0.7	6" ASPHALT concrete pavement
									Medium dense, brown, gravelly SAND some silt (FILL)
			2D	2.7-4.7	24/1	10-8-10-10		2.5	Medium dense brown, silty fine to medium SAND trace gravel (FILL)
								2.7	Medium dense, brown, gravelly SAND some silt (FILL)
			3D	5-7	24/8	20-13-38-20		5.0	Very dense, brown-orange, silty gravelly SAND
								9.5	Refusal at 9.5 feet (Probable Boulder or BEDROCK)

Drilling notes represent approximate boundary between soil types. Irregularities may be gradual. Water level is 2.0 ft below ground surface at time of drilling. Data values of groundwater may occur due to other factors than those present in the time measurements were made.

BORING NO.: B-5



BORING LOG

CLIENT: Unitil Corporation
 PROJECT: Gas Main Replacement
 LOCATION: Whitehouse Road, Rochester, New Hampshire

BORING NO.: B-6
 SHEET: 1 of 1
 PROJECT NO.: 17-1465
 DATE START: 1/31/2018
 DATE FINISH: 1/31/2018

Drilling Information:

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 10.0 LOGGED BY: Tyler Demers
 DRILLING CO.: S. W. Cole Explorations, LLC DRILLER: Scott Hellebaugh DRILLING METHOD: Solid Stem Auger
 RIG TYPE: Track Mounted Oidech D-50 AUGER ID/OD: N/A / 4 1/2 in SAMPLER: Standard Split-Spoon
 HAMMER TYPE: Automatic HAMMER WEIGHT (lbs): 140 CASING ID/OD: N/A / N/A CORE BARREL: N/A
 HAMMER EFFICIENCY FACTOR: _____ HAMMER DROP (inches): 30
 WATER LEVEL DEPTHS (ft): 1/31/2018 No free water observed.

GENERAL NOTES:

KEY TO NOTES: Water Level D = Split-Spoon Sample Pen. = Penetration Length WOB = Weight of Blow
 AND SYMBOLS: U = Sanitized Tube Sample Rec. = Recovery Length WOB = Weight of Hammer
1 = At Completion of Drilling U = Rock Core Sample Recovery Length RDD = Rock Quality Designation UC = Unconfined Compressive Strength, kpsi/ksi
2 = After Drilling V = Field Vane Shear Recovery Length PIE = Photoacoustic Detector NA = Not Applicable

Elev. (ft)	Depth (ft)	Casing (ft)	SAMPLE INFORMATION				Blow Count or RQD	Field / Lab Test Data	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Depth (ft)	Pen./Roc. (in)	Field / Lab Test Data					
5	0.5-2.5	24/16	1D	0.5-2.5	24/16	44-35-36-13		0.5' 8" ASPHALT concrete pavement			
	2.5-4.5	24/8	2D	2.5-4.5	24/8	8-5-10-10		2.5' Medium dense, brown, gravelly SAND some silt (FILL)			
	5-7	24/12	3D	5-7	24/12	15-20-32-33		3.0' Medium dense, brown, silty gravelly SAND (FILL)			
10	10.0							Refusal at 10.0 feet (Probable Boulder or BEDROCK)			

Scale/Color lines represent approximate boundary between soil types. Variations may be gradual. Water level readings have been made at time and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time of measurements were made.

BORING NO.: B-6



BORING LOG

BORING NO.: B-101
SHEET: 1 of 1
PROJECT NO.: 17-1465.1
DATE START: 1/31/2018
DATE FINISH: 1/31/2018

CLIENT: City of Rochester
PROJECT: Roadway Reconstruction
LOCATION: Whitehouse Road, Rochester, New Hampshire

Drilling Information

LOCATION: See Elevation Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 8.5 LOGGED BY: Tyler Clemens
DRILLING CO.: S.W. Cole Engineering, LLC DRILLER: Scott Holmberg DRILLING METHOD: Solid Stem Auger
RIG TYPE: Track Mounted Ditch Witch D-50 AUGER ID: N/A 4 1/2 in SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic HAMMER WEIGHT (lbs): 140 CASING ID: N/A/N/A CORE BARREL: N/A
HAMMER EFFICIENCY FACTOR: HAMMER DROP (in): 30
WATER LEVEL DEPTHS (ft): 1/31/2018 No free water observed.

GENERAL NOTES:

KEY TO NOTES: Well Log U = Thin Wall Tube Sample Pen = Penetration Length WCH = Weight of Hole
AND SYMBOLS: A = At Base of Drilling U = Thin Wall Tube Sample Rec. = Recovery Length WCH = Weight of Hole
B = At Completion of Drilling R = Rock Core Sample Ref. = Recovery Length WCH = Weight of Hole
C = After Drilling V = Field Vane Shear RQD = Rock Quality Designation Q_u = Unconfined Compressive Strength, kips/sq. ft.
PID = Penetration Indicator N/A = Not Applicable

SAMPLE INFORMATION									
Elev. (ft)	Depth (ft)	Casing Depth (ft)	Sample No.	Depth (ft)	Pen. / Rec. (in)	Slow Count or RQD	Field / Lab Test Data	Grain Size Log	Remarks
			1D	0.5-2.5	24/12	25-14-21-9		0.5" 8" ASPHALT concrete pavement	
								1.0" Medium dense, dark brown, silty gravelly SAND (BASS)	
			2D	2.5-4.5	24/16	0-10-8-16		2.0" Medium dense, brown silty Gravelly SAND (BUBBAGE)	
								2.6" Medium dense, brown silty SAND some gravel (FLL)	
			3D	5-6.2	14/12	36-35-50-2"		5.0" Very dense, brown-orange silty SAND and GRAVEL	
								6.6" Refusal at 6.5 feet (Probable boulder or BEDROCK)	

Shallowest lines represent approximate boundary between soil types. Variations may be gradual. Water level readings have been made at times, and under conditions noted. Fluctuations of groundwater may occur due to some factors than those present at the time measurements were made.

BORING NO.: B-101

BORING LOG

CLIENT: City of Rochester
PROJECT: Roadway Reconstruction
LOCATION: Whitehouse Road, Rochester, New Hampshire

BORING NO.: B-102
SHEET: 1 of 1
PROJECT NO.: 17-1465.1
DATE START: 1/31/2018
DATE FINISH: 1/31/2018

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): N/A
TOTAL DEPTH (FT): 8.0
LOGGED BY: Tyler Demers

DRILLING CO.: S.W. Cole Explorations, LLC
DRILLER: Scott Holsbaugh
DRILLING METHOD: Solid Stem Auger

ROD TYPE: Track Mounted Dietrich D-59
AUGER ID: N/A 4 1/2 in
SAMPLER: Standard Split-Spoon

HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140
CASING ID: N/A N/A
CORE BARREL: N/A

HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inches): 30

WATER LEVEL DEPTH (ft): 1/31/2018. Water appears perched from 3.0 to 4.5 feet.

GENERAL NOTES:

KEY TO NOTES

Water Level
1" = 1 foot of casing
2" = At Completion of Drilling
3" = After Drilling

D = Split Spoon Sample
L = Thin Wall Tube Sample
R = Rock Core Sample
V = Field Vane Shear

Pen. = Penetration Length
Rec. = Recovery Length
Bpl = Blows per Foot
Mpf = Minutes per Foot

WCH = Weight of Hammer
WCH = Weight of Hammer
RQD = Rock Quality Designation
PDS = Photo-Documentation

SL = Field Vane Shear Strength, kN/m²
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Elev. (ft)	Depth (ft)	Casing (ft)	Sample No.	Depth (ft)	Pen./ Rec. (ft)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	4.0 inch	Remarks
			1D	0.8-2.5	24/24	36-15-13-6			6" ASPHALT concrete pavement		
									Medium dense, dark brown silty gravelly SAND (BASE)		
			2D	2.5-4.5	24/15	3-3-0-0			Medium dense, brown, SAND some gravel trace silt (SUBBASE)		
									Loose, brown, silty fine to medium SAND trace gravel		
			3D	5-7	24/22	12-22-20-18			...becoming medium dense		
									Dense, brown, silty gravelly SAND		
									Refusal at 8.0 feet (Probable boulder or BEDROCK)		

correlation lines represent approximate boundary between soil types. Variations may be greater. Water level readings have been made at times and under conditions stated. Actual borehole groundwater may occur due to other factors than those given in the time measurements were made.

BORING NO.: B-102

BORING LOG

CLIENT: City of Rochester

PROJECT: Roadway Reconstruction

LOCATION: Whitehouse Road, Rochester, New Hampshire

BORING NO.: B-103

SHEET: 1 of 1

PROJECT NO.: 17-1465.1

DATE START: 1/31/2018

DATE FINISH: 1/31/2018

Drilling Information

LOCATION: See Exploration Location Plan

DRILLING CO.: S.W. Cole Explorations, LLC

RSD TYPE: Track Mounted Dreditch D-56

HAMMER TYPE: Automatic

HAMMER EFFICIENCY FACTOR: 1.0

WATER LEVEL DEPTHS (ft): 1/31/2018 No free water observed.

ELEVATION (FT): N/A

DRILLER: Scott Holladay

AUGER IDOD: N/A 1.4 12 in

HAMMER WEIGHT (lbs): 140

HAMMER DROP (inch): 30

TOTAL DEPTH (FT): 17.0

DRILLING METHOD: Solid Stem Auger

SAMPLER: Standard Split-Spoon

CASING IDOD: N/A N/A

CORE BARREL: N/A

LOGGED BY: Tyler Osmers

GENERAL NOTES:

1. All data is preliminary and subject to change.

2. All data is preliminary and subject to change.

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Elev. (ft)	Depth (ft)	Sample No.	Depth (ft)	Pen. (ft)	Blow Count or RCD	Field / Lab Test Data	Sample Description & Classification	Np Depth	Remarks
		1D	0.3-2.3	24/8	26-21-14-12		0.3' 4" ASPHALT concrete pavement Medium dense, brown, SAND and GRAVEL some silt (BASE)		
		2D	2.3-4.3	24/22	8-11-8-6		3.0' Medium dense, brown, silty fine to medium SAND some gravel		
		3D	5-7	24/24	5-8-10-12				
		4D	10-12	24/24	11-15-15-21		10.0' Medium dense, gray-brown, gravelly silty SAND (GLACIAL TILL)		
		5D	15-17	24/24	8-11-12-19				
	17.0						Bottom of Exploration at 17.0 feet		

17-1465.1 BPT BORE TEMPLATE.DOT 2018

Simulation lines represent approximate boundary between soil types. Variations may be gradual. Water level readings have been made at times and under conditions noted. Fluctuations of groundwater may occur due to other factors than those noted at the time measurements were made.

BORING NO.: B-103

BORING LOG		BORING NO.: B-104
		SHEET: 1 of 1
CLIENT: <u>City of Rochester</u>		PROJECT NO. 17-1465.1
PROJECT: <u>Roadway Reconstruction</u>		DATE START: 1/31/2018
LOCATION: <u>Whitehouse Road, Rochester, New Hampshire</u>		DATE FINISH: 1/31/2018

Drilling Information			
LOCATION: See Exploration Location Plan	ELEVATION (FT): N/A	TOTAL DEPTH (FT): 14.0	LOGGED BY: Tyler Demers
DRIILLING CO.: S.W. Cole Explorations, LLC	DRIILLER: Scott Hoffbauer	DRIILLING METHOD: Solid Stem Auger	
REG TYPE: Track Mounted Dietrich D-50	AUGER ID: N/A / 4.1 / 2 in	SAMPLER: Standard Split-Spoon	
HAMMER TYPE: Automatic	HAMMER WEIGHT (lbs): 140	CASING ID: N/A	CWRE BARREL: N/A
WATER EFFICIENCY FACTOR: N/A	HAMMER DOWN TIME: 30		
WATER LEVEL DEPTH (ft): 1/31/2018 No free water observed			

GENERAL NOTES:				
KEY TO NOTES AND SYMBOLS:	U = Split Spoon Sample U-1 = 1st Time of Drilling U-2 = 2nd Time of Drilling U-3 = 3rd Time of Drilling U-4 = 4th Time of Drilling U-5 = 5th Time of Drilling U-6 = 6th Time of Drilling U-7 = 7th Time of Drilling U-8 = 8th Time of Drilling U-9 = 9th Time of Drilling U-10 = 10th Time of Drilling U-11 = 11th Time of Drilling U-12 = 12th Time of Drilling U-13 = 13th Time of Drilling U-14 = 14th Time of Drilling U-15 = 15th Time of Drilling U-16 = 16th Time of Drilling U-17 = 17th Time of Drilling U-18 = 18th Time of Drilling U-19 = 19th Time of Drilling U-20 = 20th Time of Drilling U-21 = 21st Time of Drilling U-22 = 22nd Time of Drilling U-23 = 23rd Time of Drilling U-24 = 24th Time of Drilling U-25 = 25th Time of Drilling U-26 = 26th Time of Drilling U-27 = 27th Time of Drilling U-28 = 28th Time of Drilling U-29 = 29th Time of Drilling U-30 = 30th Time of Drilling U-31 = 31st Time of Drilling U-32 = 32nd Time of Drilling U-33 = 33rd Time of Drilling U-34 = 34th Time of Drilling U-35 = 35th Time of Drilling U-36 = 36th Time of Drilling U-37 = 37th Time of Drilling U-38 = 38th Time of Drilling U-39 = 39th Time of Drilling U-40 = 40th Time of Drilling U-41 = 41st Time of Drilling U-42 = 42nd Time of Drilling U-43 = 43rd Time of Drilling U-44 = 44th Time of Drilling U-45 = 45th Time of Drilling U-46 = 46th Time of Drilling U-47 = 47th Time of Drilling U-48 = 48th Time of Drilling U-49 = 49th Time of Drilling U-50 = 50th Time of Drilling U-51 = 51st Time of Drilling U-52 = 52nd Time of Drilling U-53 = 53rd Time of Drilling U-54 = 54th Time of Drilling U-55 = 55th Time of Drilling U-56 = 56th Time of Drilling U-57 = 57th Time of Drilling U-58 = 58th Time of Drilling U-59 = 59th Time of Drilling U-60 = 60th Time of Drilling U-61 = 61st Time of Drilling U-62 = 62nd Time of Drilling U-63 = 63rd Time of Drilling U-64 = 64th Time of Drilling U-65 = 65th Time of Drilling U-66 = 66th Time of Drilling U-67 = 67th Time of Drilling U-68 = 68th Time of 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SAMPLE INFORMATION								Grain Size Log	Sample Description & Classification	H _g Distn	Remarks
Elev. (ft)	Depth (ft)	Coring Pier (in)	Sample No.	Depth (ft)	Pen/ Rec (in)	Blow Count or ROD	Field / Lab Test Data				
			1D	0.0-2.5	24/24	21-17-10-7		0.5'	6" ASPHALT concrete pavement		
								1.0'	Dense, brown, gravelly SAND some silt (BASE)		
			2D	2.5-4.5	24/24	6-10-10-6		3.5'	Medium dense, brown, fine to medium SAND some silt (SUBBASE)		
								5.0'	Medium dense, brown, silty fine to medium SAND		
	5		3D	5-7	24/24	18-21-37-28		8.0'	Very dense, brown, silty gravelly SAND		
									Very dense, gray, gravelly silty SAND (GLACIAL TILL)		
	10		4D	10-10.1	1/1	25/1"		14.9'			

140 Refusal at 14.0 feet
(Probable BEDROCK)

FORGING / WELL 17-1665 1 GPJ SWAGE TEMPLATE GDT 2/7/18

Stratification lines represent approximate boundary between soil types; transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-104