SCHONEWALD
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DATA REPORT
200-SERIES GEOTECHNICAL PROGRAM
TRACY BRIDGE #2852
ROUTE 125 OVER MEADOW BROOK
DURHAM, MAINE
MAINEDOT WIN 23657.00

PREPARED FOR:

HNTB Corporation
South Portland, Maine

PREPARED BY:

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June 2022

SchonewaldEA Project No. 21-020

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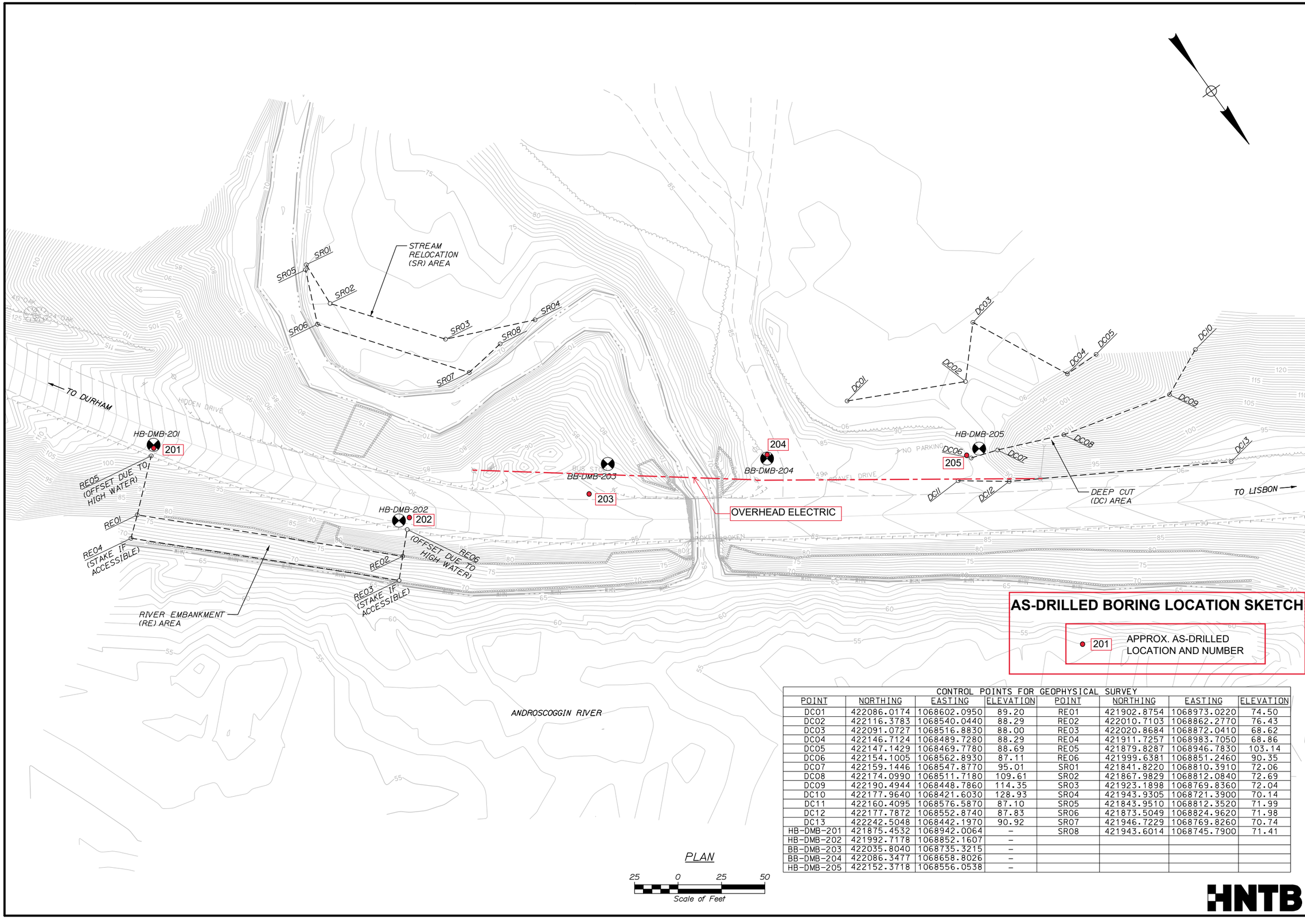
BORING LOCATION SKETCH OF 200-SERIES BORINGS

Filename: 001_General Plan 1.dgn Division: Username: Date:5/2/2022



PLAN

25 0 25 50
Scale of Feet

AS-DRILLED BORING LOCATION SKETCH

201 APPROX. AS-DRILLED LOCATION AND NUMBER

CONTROL POINTS FOR GEOPHYSICAL SURVEY

POINT	NORTHING	EASTING	ELEVATION	POINT	NORTHING	EASTING	ELEVATION
DC01	422086.0174	1068602.0950	89.20	RE01	421902.8754	1068973.0220	74.50
DC02	422116.3783	1068540.0440	88.29	RE02	422010.7103	1068862.2770	76.43
DC03	422091.0727	1068516.8830	88.00	RE03	422020.8684	1068872.0410	68.62
DC04	422146.7124	1068489.7280	88.29	RE04	421911.7257	1068983.7050	68.86
DC05	422147.1429	1068469.7780	88.69	RE05	421879.8287	1068946.7830	103.14
DC06	422154.1005	1068562.8930	87.11	RE06	421999.6381	1068851.2460	90.35
DC07	422159.1446	1068547.8770	95.01	SR01	421841.8220	1068810.3910	72.06
DC08	422174.0990	1068511.7180	109.61	SR02	421867.9829	1068812.0840	72.69
DC09	422190.4944	1068448.7860	114.35	SR03	421923.1898	1068769.8360	72.04
DC10	422177.9640	1068421.6030	128.93	SR04	421943.9305	1068721.3900	70.14
DC11	422160.4095	1068576.5870	87.10	SR05	421843.9510	1068812.3520	71.99
DC12	422177.7872	1068552.8740	87.83	SR06	421873.5049	1068824.9620	71.98
DC13	422242.5048	1068442.1970	90.92	SR07	421946.7229	1068769.8260	70.74
HB-DMB-201	421875.4532	1068942.0064	–	SR08	421943.6014	1068745.7900	71.41
HB-DMB-202	421992.7178	1068852.1607	–				
BB-DMB-203	422035.8040	1068735.3215	–				
BB-DMB-204	422086.3477	1068658.8026	–				
HB-DMB-205	422152.3718	1068556.0538	–				

HNTB

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2365700

WIN 023657.00

BRIDGE NO. 2852 BRIDGE PLANS

	BY	DATE
PROJ. MANAGER	M. KERSBERGEN	
DESIGN-DETAILED	P. McKechnie	E. Raymond 01\22
CHECKED-REVIEWED	K. Brown	L. Driscoll 01\22
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

TRACY BROOK BRIDGE
MEADOW BROOK
ANDROSCOGGIN
DURHAM

GEOPHYSICAL LAYOUT PLAN

SHEET NUMBER

1

OF 1

LOGS OF 200-SERIES BORINGS

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-201

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	103 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/9/22; 2225-5/10/22; 0415	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	102.2		10 inches HMA (0.8)	
	1D	24/17	1.0 - 3.0	4-6-8-6	14	20		101.1		Dark brown, damp, fine to coarse SAND, little to some silt, little gravel ROAD GRAVELS (1.9)	
										Changing at 1.9 ft to 1D: Tan brown, damp, fine to medium SAND, trace to little silt, trace coarse sand. MARINE SAND	
	2D	24/18	4.0 - 6.0	5-5-6-6	11	16				Tan brown, damp, medium dense, fine to medium SAND, little silt, trace coarse sand, with occasional layers Silty fine to medium SAND, trace coarse sand. MARINE SAND	
5											
	3D	24/20	9.0 - 11.0	5-5-6-8	11	16	HW			Tan brown, damp to moist, medium dense, fine to medium SAND, trace to little silt, trace coarse sand. MARINE SAND	
10							66				
							76				
							82				
							112				
	4D	24/10	14.0 - 16.0	12-11-12-12	23	33	RC			Tan brown, medium dense, fine to medium SAND, little silt, trace coarse sand. MARINE SAND	
15											
	5D	24/9	19.0 - 21.0	8-8-9-11	17	24				Tan brown, medium dense, fine to medium SAND, little silt, trace coarse sand. MARINE SAND	
20											
	6D	24/9	24.0 - 26.0	8-12-10-11	22	31				Tan brown, medium dense, fine to medium SAND, trace to little silt, trace coarse sand. MARINE SAND	
25											

Remarks:

auto hammer last calibrated on 9/20/21
location: in line with geophysical layout stake RE05; similar elevation (RE05 = 103.14 ft); offset 5.2 ft from stake into road

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-201

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	103 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/9/22; 2225-5/10/22; 0415	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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RC = Roller Cone
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WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
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$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
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C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25								76.5		26 ft: Soil in tip of spoon is grey brown, fine to medium SAND, little silt, little fine gravel, trace coarse sand.	
										26.5 ft: Change in drilling behavior noted.	
	7D	24/18	29.0 - 31.0	23-49-68-56	117	168				Grey brown, very dense, fine to medium SAND, some silt, little to some fine gravel, trace coarse sand. TILL	
30											
	8D	18/17	34.0 - 35.5	24-72-134	206	295	OPEN			Grey brown, very dense, fine to medium SAND, some gravel, some silt, trace coarse sand, trace clay; some gravel pieces partially decomposed; some zones varved. TILL	
35											
	9D	21/19	39.0 - 40.8	39-50-71-50/3"	121	173				Dark grey, very dense, Silty fine to medium SAND, trace fine gravel, trace coarse sand, trace clay. TILL	
40											
	10D	15/15	44.0 - 45.3	39-58-50/3"	>108					Dark grey, very dense, Silty fine to medium SAND, trace to little fine gravel, trace coarse sand, trace clay. TILL	
45											
	11D	24/24	49.0 - 51.0	26-39-40-55	79	113				Dark grey, very dense, Silty fine to medium SAND, trace to little fine gravel, trace coarse sand, trace clay. TILL	
50											

Remarks:

auto hammer last calibrated on 9/20/21
location: in line with geophysical layout stake RE05; similar elevation (RE05 = 103.14 ft); offset 5.2 ft from stake into road

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US CUSTOMARY UNITS

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Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-201

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	103 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
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Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/9/22; 2225-5/10/22; 0415	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50											
								49.4		53.6	
	R1	60/60	54.4 - 59.4	RQD: 46" = 77%			NQ2			Top of bedrock at Elev. 49.4 ft. R1: Bedrock: Light and dark grey, fine to medium grained, biotite- and muscovite-rich SCHIST, with occasional quartzite inclusions, hard, typically fresh; banding beginning to form. Typically low angle, close to moderately spaced breaks; undulating, rough, typically fresh to slightly discolored, and open, with occasional mud infilling. (VASSALBORO GROUP) Core times: 3:40/ 4:00/ 3:50/ 3:25/ 4:00 min:sec/ft. ROCK QUALITY = GOOD	
55								43.6		59.4	
										Bottom of Exploration at 59.4 feet below ground surface.	
60											
65											
70											
75											

Remarks:

auto hammer last calibrated on 9/20/21
location: in line with geophysical layout stake RE05; similar elevation (RE05 = 103.14 ft); offset 5.2 ft from stake into road

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-202

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	91 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/8/22; 2310-5/9/22; 0415	**Drilling Method:**	cased wash boring	**Core Barrel:**	not applicable
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
				Sample Information							
0	1D	18/10	0.5 - 2.0	16-19-18	37	53	SSA	90.5		6 inches HMA	
										0.5	
										Brown, damp, dense, fine to coarse SAND, some gravel, trace to little silt. ROAD GRAVELS	
								87.0		4.0	
										4 ft: Change in drilling behavior and auger cuttings noted.	
5	2D	24/11	5.0 - 7.0	2-3-6-5	9	13				Tan brown, damp, loose, fine to medium SAND, trace to little silt, trace gravel, trace coarse sand. MARINE SAND	
	3D	24/15	9.0 - 11.0	5-5-7-8	12	17	HW			Tan brown, damp, medium dense, fine to medium SAND, trace gravel, trace silt, trace coarse sand. MARINE SAND	
10							97				
							101				
							88				
							92				
	4D	24/14	14.0 - 16.0	9-10-12-11	22	31	52			Tan brown, medium dense, fine SAND, little silt, trace medium to coarse sand. MARINE SAND	
15							67				
							92				
							112				
							137				
	5D	24/9	19.0 - 21.0	12-15-16-18	31	44	RC			Tan brown, dense, fine to medium SAND, trace to little silt, trace coarse sand. MARINE SAND	
20											
	6D	24/12	24.0 - 26.0	7-25-26-26	51	73				Tan brown, fine to coarse SAND, trace fine gravel, trace silt. MARINE SAND	
25											

Remarks:

auto hammer last calibrated on 9/20/21
location: in line with geophysical layout stake RE06; elevation approx. 0.6' higher at boring (RE06 = 90.4 ft); offset 7.9 ft from stake into road

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

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US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-202

WIN: 23657.00

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Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
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Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)	**Water Level*:**	
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25								65.7		25.3	
										Changing at 25.3 ft to 6D: Grey tan, Silty fine to medium SAND, little fine gravel, trace coarse sand. TILL	
	7D	24/8	29.0 - 31.0	12-21-42-16	63	90				Grey brown, very dense, fine to medium Sandy GRAVEL, little to some silt, trace coarse sand. TILL	
30											
	8D	24/9	34.0 - 36.0	25-27-30-40	57	82				Grey brown, very dense, fine to medium SAND, some gravel, little to some silt, trace coarse sand; piece of gravel in tip of spoon. TILL	
35											
	9D	18/12	39.0 - 40.5	39-74-94	168	241				Grey, very dense, Gravelly fine to medium SAND, little silt, trace coarse sand. TILL	
40											
	10D	24/16	44.0 - 46.0	8-12-12-16	24	34	OPEN			Grey, medium dense, Silty fine to medium SAND, some fine (angular) gravel, trace coarse sand. TILL	
45											
	11D	24/23	49.0 - 51.0	26-37-52-93	89	127				Dark grey, very dense, Silty fine to medium SAND, trace to little fine gravel, trace coarse sand. TILL	
50											

Remarks:

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V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50								40.0		51.0	
										Bottom of Exploration at 51.0 feet below ground surface.	
										No refusal.	
55											
60											
65											
70											
75											

Remarks:

auto hammer last calibrated on 9/20/21
location: in line with geophysical layout stake RE06; elevation approx. 0.6' higher at boring (RE06 = 90.4 ft); offset 7.9 ft from stake into road

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: BB-DMB-203

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	85 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/10/22; 2150-5/11/22; 0310	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)/ NW (3.0/3.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA			GRAVEL SHOULDER	
	1D	24/10	1.0 - 3.0	7-6-5-5	11	16				Tan brown, damp, medium dense, fine to medium SAND, little to some gravel, trace to little silt, trace coarse sand. MARINE NEARSHORE SAND & GRAVEL	
	2D	24/11	4.0 - 6.0	6-7-6-11	13	19				Tan brown, moist, medium dense, fine to medium SAND, some gravel, little silt, trace coarse sand; broken rock in tip of spoon. MARINE NEARSHORE SAND & GRAVEL	
5											
	3D	24/16	9.0 - 11.0	6-5-7-6	12	17	HW			Tan brown, damp, medium dense, fine to coarse SAND, little to some fine gravel, trace silt. MARINE NEARSHORE SAND & GRAVEL	
10							66				
							68				
							55				
							79				
	4D	24/8	14.0 - 16.0	10-11-17-31	28	40	RC			Tan brown, medium dense, fine to coarse SAND, little fine gravel, trace silt. MARINE NEARSHORE SAND & GRAVEL	
15											
	5D	24/4	19.0 - 21.0	8-13-12-10	25	36				(poor recovery) Brown, medium dense, Silty fine to coarse SAND, some fine gravel, trace clay. MARINE NEARSHORE SAND & GRAVEL	
20											
								62.5		22.5	
	6D	5/2	24.0 - 24.4	100/5"	--					(very poor recovery) Grey, silty TILL (tip of spoon split and remained in borehole; retrieved with 3-in dia.	
25											

Remarks:

auto hammer last calibrated on 9/20/21
location:
offset from centerline = 13.7 ft southerly
ties to prominent features: pole to east = 67.5 ft and sign to southwest = 15.1 ft

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: BB-DMB-203

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	85 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/10/22; 2150-5/11/22; 0310	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)/ NW (3.0/3.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MV = Unsuccessful Field Vane Shear Test Attempt
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SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25										spoon)	
	7D	24/19	29.0 - 31.0	61-39-63-94	102	146				Grey, very dense, Silty fine to medium SAND, trace fine gravel, trace coarse sand, trace clay. TILL	
30											
	8D	24/10	34.0 - 36.0	44-41-100-66	141	202				Grey, very dense, Silty fine to medium SAND, little fine gravel, trace coarse sand, trace clay; some gravel pieces decomposed; some zones varved. TILL	
35											
							NW	46.5		38.5	
	R1	60/60	39.0 - 44.0	RQD: 40" = 67%			NQ2			Top of bedrock at Elev. 46.5 ft. R1: Bedrock: Light and dark grey, fine to medium grained, biotite- and muscovite-rich SCHIST, with occasional quartzite inclusions, hard, typically fresh; banding beginning to form. Typically low angle, closely spaced breaks; undulating, rough, typically fresh to slightly discolored, and open, with occasional mud infilling. Quartzite veins at 41.6 to 41.8 and 43.6 to 44.0 ft; wide open fracture with mud and sand infilling at 43.2 ft. (VASSALBORO GROUP) Core times: 2:25/ 1:50/ 1:45/ 2:10/ 2:20 min:sec/ft. ROCK QUALITY = FAIR	
40											
	R2	60/60	44.0 - 49.0	RQD: 51" = 85%						R2: Similar to R1, except typically close to moderately spaced breaks. Quartzite inclusions at 44.2 to 44.6, 45.0 to 45.2, and 47.5 to 48.3 ft. Core times: 2:55/ 2:10/ 2:10/ 2:15/ 2:15 min:sec/ft. ROCK QUALITY = GOOD	
45											
								36.0		49.0	
50										**Bottom of Exploration at 49.0 feet below ground surface.**	

Remarks:

auto hammer last calibrated on 9/20/21
location:
offset from centerline = 13.7 ft southerly
ties to prominent features: pole to east = 67.5 ft and sign to southwest = 15.1 ft

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: BB-DMB-204

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	84 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/McDougal	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/6/22; 0825-1225	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)/ NW (3.0/3.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
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MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/13	0.0 - 2.0	3-6-6-6	12	17	HW PUSH			Brown, damp, medium dense, fine to medium SAND, some silt, trace gravel, trace coarse sand. MARINE NEARSHORE SAND & GRAVEL	
							32				
							80				
							85				
	2D	24/8	4.0 - 6.0	6-16-21-20	37	53	30			Brown, dense, Silty fine to coarse SAND, little fine gravel. MARINE NEARSHORE SAND & GRAVEL	
5							61				
							55				
							44				
							42				
	3D	24/8	9.0 - 11.0	6-7-6-6	13	19	13			Brown, medium dense, fine to coarse SAND, some gravel, trace to little silt. MARINE NEARSHORE SAND & GRAVEL	
10							37				
							48				
							60				
							58				
	4D	24/6	14.0 - 16.0	4-5-5-5	10	14	18			Brown, loose, fine to coarse SAND, little gravel, trace to little silt. MARINE NEARSHORE SAND & GRAVEL	
15							32				
							76				
							87				
							112	66.0		18.0	
	5D	24/16	19.0 - 21.0	11-18-18-18	36	52	RC			Dark grey, dense, Silty fine to medium SAND, trace to little fine gravel, trace coarse sand. TILL	
20											
25	6D	24/10	24.0 - 26.0	17-18-19-23	37	53				Grey, dense, fine to medium SAND, some silt, little gravel, trace coarse sand, with decomposed gravel throughout. TILL	

Remarks:

auto hammer last calibrated on 9/20/21
location: ties as follows:
pole = 15.1 ft; scab pole (brace) = 7.5 ft; #49 = 35.2 ft

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: BB-DMB-204

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	84 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/McDougal	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/6/22; 0825-1225	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)/ NW (3.0/3.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25											
	7D	13/9	29.0 - 30.1	34-82-50/1"	--					Dark grey, very dense, Silty fine to medium SAND, some fine gravel, trace coarse sand. TILL	
30											
								53.0		31.0	
	R1	60/60	31.0 - 36.0	RQD: 36" = 60%			NQ2			Top of bedrock at Elev. 53.0 ft. R1: Bedrock: Light and dark grey, fine to medium grained, biotite- and muscovite-rich SCHIST, with quartzite inclusions and occasional garnets, hard, fresh to slightly weathered; banding beginning to form. Horizontal to low angle, close to moderately spaced breaks; undulating, rough, typically fresh, and open, with no observed infilling. Vertical fracture 31.0 to 31.9 ft; quartzite inclusions 31.0 to 31.3, 32.7 to 33.1, and 34.7 to 36.0 ft. (VASSALBORO GROUP) Core times: 1:30/ 1:30/ 1:45/ 2:05/ 2:30 min:sec/ft. ROCK QUALITY = FAIR	
35											
	R2	60/57	36.0 - 41.0	RQD: 45" = 75%						R2: Similar to R1, except no observed garnets. Quartzite inclusion 38.8 to 39.3 ft. Core times: 1:50/ 1:40/ 2:15/ 2:00/ 1:25 min:sec/ft. ROCK QUALITY = FAIR	
40											
								43.0		41.0	
										Bottom of Exploration at 41.0 feet below ground surface.	
45											
50											

Remarks:

auto hammer last calibrated on 9/20/21
location: ties as follows:
pole = 15.1 ft; scab pole (brace) = 7.5 ft; #49 = 35.2 ft

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-205

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	87 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm/ McDougal	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/5/22; 1410 - 5/6/22; 0815	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)/ NW (3.0/3.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
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SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
				Sample Information							
0	1D	24/9	0.0 - 2.0	WOH-1-6-5	7	10	HW PUSH			Brown, damp, loose, fine to coarse SAND, little to some silt, trace gravel. MARINE NEARSHORE SAND & GRAVEL	
							PUSH				
							34				
							53				
	2D	24/9	4.0 - 6.0	10-13-14-13	27	39	21			Tan brown, medium dense, fine to coarse SAND, little fine gravel, little silt. MARINE NEARSHORE SAND & GRAVEL	
5							56				
							70				
							75				
							98				
	3D	24/8	9.0 - 11.0	12-13-12-12	25	36	25			Tan brown, medium dense, fine to coarse SAND, little fine gravel, trace to little silt. MARINE NEARSHORE SAND & GRAVEL	
10							56				
							70				
							88				
							90				
	4D	24/8	14.0 - 16.0	12-16-18-17	34	49	35			Tan brown, dense, fine to coarse SAND, little to some fine gravel, trace to little silt. MARINE NEARSHORE SAND & GRAVEL	
15							85				
							77				
							74				
							83				
	5D	24/8	19.0 - 21.0	13-17-35-25	52	74	RC			Tan brown, fine to coarse SAND, little silt, trace to little fine gravel. MARINE NEARSHORE SAND & GRAVEL	
20											
								66.3		20.7	
										Changing at 20.7 ft to 5D: Tan brown, Silty GRAVEL, some fine to coarse sand. TILL	
25	6D	24/9	24.0 - 26.0	22-43-49-21	92	132				Tan brown, very dense, Silty fine to medium SAND, little to some fine gravel, trace coarse sand. TILL	

Remarks:

auto hammer last calibrated on 9/20/21
location: ties to geophysical layout stakes:
DC06 = 3.0 ft; DC11 = 14.9 ft; DC12 = 28.8 ft

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Tracy Bridge #2852
Route 125 over Meadow Brook
Location: Durham, ME

Boring No.: HB-DMB-205

WIN: 23657.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	87 ft (est'd)	**Auger ID/OD:**	SSA (4.5" OD)
Operator:	Enos/ Gomm/ McDougal	**Datum:**	NGVD 88	**Sampler:**	Standard Split-Spoon
Logged By:	Schonewald	**Rig Type:**	Mobile Drill B-53 track (NEBC-23)	**Hammer Wt./Fall:**	140 lbs/ 30 in
Date Start/Finish:	5/5/22; 1410 - 5/6/22; 0815	**Drilling Method:**	cased wash boring	**Core Barrel:**	NQ2
Boring Location:	see remarks	**Casing ID/OD:**	HW (4.0/4.5)/ NW (3.0/3.5)	**Water Level*:**	
Hammer Efficiency Factor: 0.859		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
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WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
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N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25											
	7D	24/15	29.0 - 31.0	50-62-57-76	119	170				Dark grey, very dense, Silty fine to medium SAND, little to some fine gravel, trace coarse sand. TILL	
30											
							NW	53.3		33.7	
	R1	60/60	34.1 - 39.1	RQD: 49" = 82%			NQ2			Top of bedrock at Elev. 53.3 ft R1: Bedrock: Light and dark grey, fine to medium grained, biotite- and muscovite-rich SCHIST, hard, fresh to slightly weathered; banding beginning to form. Typically low angle, closely spaced breaks; undulating, rough, typically fresh, and open, with no observed infilling. (VASSALBORO GROUP) Core times: 1:55/ 1:40/ 1:50/ 1:45/ 1:40 min:sec/ft. ROCK QUALITY = GOOD	
35											
								47.9		39.1	
40										**Bottom of Exploration at 39.1 feet below ground surface.**	
45											
50											

Remarks:

auto hammer last calibrated on 9/20/21
location: ties to geophysical layout stakes:
DC06 = 3.0 ft; DC11 = 14.9 ft; DC12 = 28.8 ft

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

PHOTOGRAPHS OF BEDROCK CORE OBTAINED IN 200- SERIES BORINGS

Core box containing dried core from test borings HB-DMB-201 and BB-DMB-203 (Box 1 of 1); left side of core box (top portion of cores). Slots from top to bottom:
1) HB-DMB-201, R1;
2) BB-DMB-203, R1;
3) BB-DMB-203, R2;
4) empty.

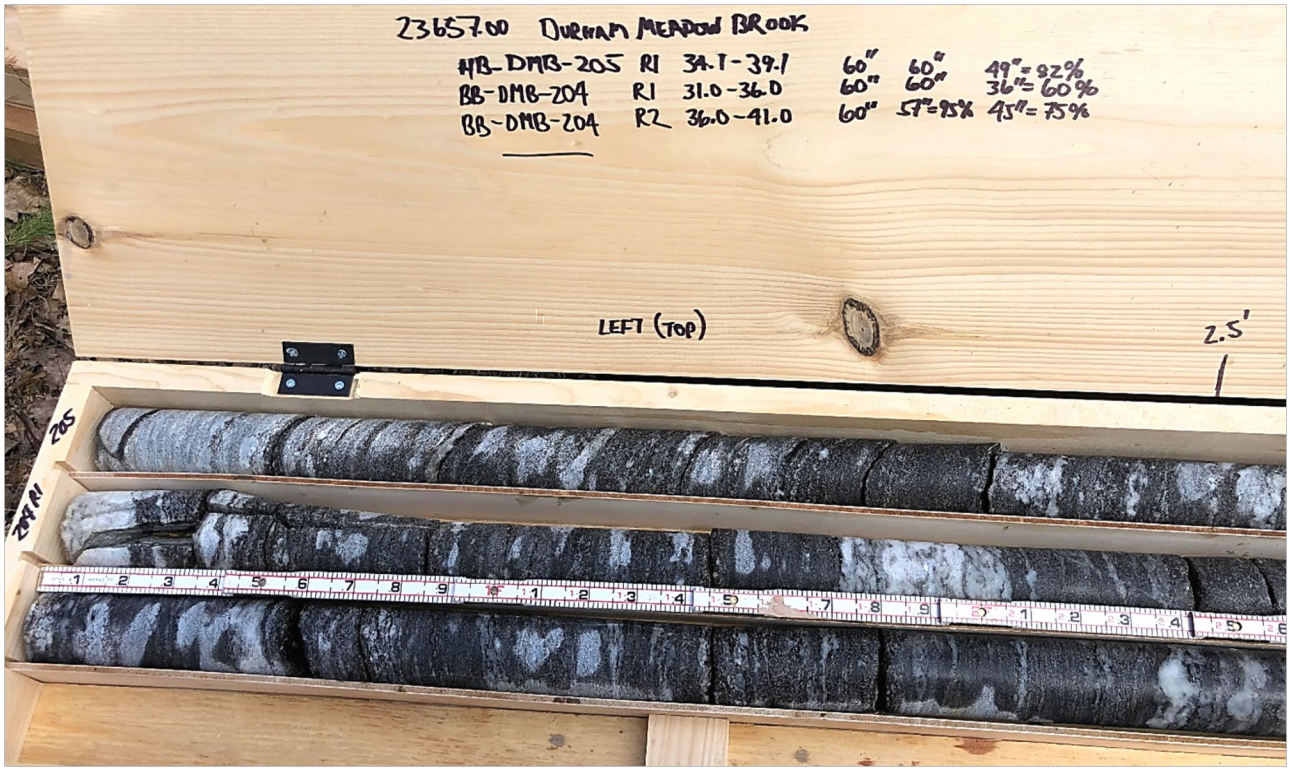
Core box containing dried core from test borings HB-DMB-201 and BB-DMB-203 (Box 1 of 1); right side of core box (bottom portion of cores). Slots from top to bottom:
1) HB-DMB-201, R1;
2) BB-DMB-203, R1;
3) BB-DMB-203, R2;
4) empty.

SCHONEWALD ENGINEERING ASSOCIATES, INC.

ROCK CORE PHOTOGRAPHS
TRACY BRIDGE #2852
ROUTE 125 OVER MEADOW BROOK
DURHAM, MAINE
MAINEDOT WIN 23657.00

Sheet No.:

1 of 2



Core box containing wetted core from test borings HB-DMB-205 and BB-DMB-204 (Box 1 of 1); left side of core box (top portion of cores). Slots from top to bottom:

1) HB-DMB-205, R1;
2) BB-DMB-204, R1;
3) BB-DMB-204, R2;
4) empty.

Core box containing wetted core from test borings HB-DMB-205 and BB-DMB-204 (Box 1 of 1); right side of core box (bottom portion of cores). Slots from top to bottom:

1) HB-DMB-205, R1;
2) BB-DMB-204, R1;
3) BB-DMB-204, R2;
4) empty.

SCHONEWALD ENGINEERING ASSOCIATES, INC.

ROCK CORE PHOTOGRAPHS
TRACY BRIDGE #2852
ROUTE 125 OVER MEADOW BROOK
DURHAM, MAINE
MAINEDOT WIN 23657.00

Sheet No.:

2 of 2

HRGS' GEOPHYSICAL REPORT

SURFACE GEOPHYSICAL SURVEYS
ROUTE 125 BRIDGE OVER
TRACY BROOK/MEADOW BROOK
DURHAM, MAINE

Prepared for:

Schonewald Engineering Associates, Inc.
129 Middle Road
Cumberland, Maine 04021

RECEIVED 6/22/22

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 22J03
June 2022

HAGER-RICHTER
GEOSCIENCE, INC.

GEOPHYSICS FOR THE ENGINEERING COMMUNITY
SALEM, NEW HAMPSHIRE
Tel: 603.893.9944
FORDS, NEW JERSEY
Tel: 732.661.0555

June 14, 2022
File 22J03

Isabel V. (Be) Schonewald, P.E.
Schonewald Engineering Associates, Inc.
129 Middle Road
Cumberland, Maine 04021

Dir: 207.829.5226
Cell: 207.272.9879
Email: Be@SchonewaldEngineering.com

RE: Surface Geophysical Surveys
Route 125 Bridge over
Tracy Brook/Meadow Brook
Durham, Maine

Dear Ms. Schonewald:

In this report, we summarize the results of a seismic survey conducted by Hager-Richter Geoscience, Inc. (HRGS) in support of a geotechnical investigation at the above referenced site located in Durham, Maine for Schonewald Engineering Associates, Inc. (SchonewaldEA), in May 2022. The scope of work and areas of interest were specified by SchonewaldEA.

INTRODUCTION

The site for the geophysical survey is the area around the existing bridge carrying Route 125 over Tracy Brook/Meadow Brook in Durham, Maine. Figure 1 shows the general location of the Site. As part of a geotechnical investigation being conducted in support of the design of bridge replacement, SchonewaldEA requested a Seismic Refraction and Horizontal/Vertical Spectral Ratio (H/V) testing surveys to determine the depth and configuration of the bedrock in the area around the existing bridge and roadway.

SchonewaldEA specified five (5) transects for seismic refraction surveying located south of the Route 125 and along the banks of Tracy Brook/Meadow Brook. H/V data was acquired along transects located next to the immediate roadway shoulder and along the steep banks of the Androscoggin River. The locations of the seismic transects and H/V points in the area of interest are shown in Figure 2.

Based on information for borings HB-DMB-201 through HB-DMB-205, provided by SchonewaldEA, copy attached in Appendix 1, the subsurface stratigraphy consists of approximately 18 to 24 feet of sand and gravel, overlaying 13 to 25 feet of till. Competent bedrock was sampled in 4 of the 5 borings, and the bedrock depths reported in the boring

summary range from approximately 31 feet to 53 feet below ground surface. The locations of the borings are shown in Figure 2.

OBJECTIVE

The objective of the seismic survey was to determine the depth and configuration of the bedrock surface in the vicinity of the Route 125 Bridge over Tracy Brook/Meadow Brook in Durham, Maine.

THE SURVEY

HRGS personnel conducted the geophysical survey on May 12 - 13, 2022. Jeff Reid, P.G., Vanja Dezelic, Ph.D., and Tim Williams conducted the seismic survey. The project was coordinated with Be Schonewald, P.E. of SchonewaldEA, who was on-site for the beginning of the geophysical survey. Original data and field notes reside in the HRGS files and will be retained for a minimum of three years.

The survey was conducted using the seismic refraction method along five seismic lines, designated as Seismic Lines 1 – 5, and fifteen H/V points designated H/V 1 - 15. Photo 1, below, shows the site conditions at the time of the survey along Seismic Line 1. For all seismic lines, geophones were located on soil. The positions of the start and end points of the seismic transects and the H/V points, as well as the locations of existing and proposed borings and other site features were recorded with GPS. The locations of the seismic lines and H/V points are shown in Figure 2.

Photo 1. Looking northeast along Seismic Line 1on the south side of Route 125.

EQUIPMENT AND PROCEDURES

Seismic Refraction. The seismic refraction survey was conducted using our 24-channel seismograph (one 24-channel Geometrics Geode) coupled to 24 14-Hz geophones. An 8-foot geophone spacing was used for Seismic Lines 1 and 2, a 4-foot spacing was used for Line 3, and a 5-foot spacing for Lines 4 and 5. A 12-pound sledgehammer was used as the energy source. Four to five shot points were used per seismic spread - two located internal to the spread, one at each end of the spread, and offset shots located in-line but outside of each end of the geophone spread as space allowed. The seismograph was connected to, and controlled by, a notebook PC computer. The software provides for the acquisition, display, plotting, filtering, and storage of seismic data.

The seismic refraction data were interpreted with the Generalized Reciprocal Method (GRM) For the GRM interpretation, we used IXRefraX, commercially licensed software from Interpex Limited. GRM allows the depth to bedrock to be determined for *each* geophone location, rather than only at the shot points as for most other methods, and it is less sensitive to the presence of dipping interfaces and hidden layers. The GRM method requires at least one shot at each end of the cable. This configuration provides reversed profiles.

H/V. We used a Tromino Zero system developed by Moho Science & Technology, located in Venice, Italy. The system is a seismometer capable of recording seismic noise motion on three main orthogonal directions, (North-South, East-West and Up-Down), and allows for the identification of resonance frequencies of subsoils in a passive, non-intrusive way.

The locations of the 15 data stations are shown in Figure 2. The H/V data were acquired using a recording time of 15 minutes per station, and with the instrument north axis oriented orthogonal to Route 125. The site is characterized by rocky and not level terrain. The seismic lines and the locations of the 15 data stations were tied to the boring and stake locations previously surveyed by SchonewaldEA and provided to us in an AutoCAD plan.

LIMITATIONS OF THE METHOD

HAGER-RICHTER GEOSCIENCE, INC. MAKES NO GUARANTEE THAT THE DEPTH OF BEDROCK WAS ACCURATELY DETERMINED IN THIS SURVEY. HAGER-RICHTER GEOSCIENCE, INC. IS NOT RESPONSIBLE FOR DETERMINING THE DEPTH OF BEDROCK WHERE THE INTERFACE CANNOT BE DETECTED BECAUSE OF SITE CONDITIONS.

IN GENERAL, THE ACCURACY (STANDARD DEVIATION) OF THE APPARENT DEPTHS OF RELATIVELY COMPETENT BEDROCK DETERMINED BY THE SEISMIC REFRACTION METHOD IS ABOUT ± 10% OF THE APPARENT DEPTH OF BEDROCK, OR ± 2 FEET, WHICHEVER IS GREATER. THE BEDROCK MODEL SHOWN AS A PROFILE OR LISTED AS

TABULAR DATA SHOULD NOT BE USED SOLELY FOR CONTRACT BEDROCK REMOVAL QUANTITIES.

Seismic Refraction. As with all geophysical methods, the seismic refraction method assumes that the local geology is relatively uncomplicated. In particular, the seismic refraction method assumes that interfaces between geologic materials correlate with sharp increases in seismic velocity and that the interfaces between geologic units are relatively flat lying. The method is not very sensitive to lateral variations within layers, and relatively subtle features such as fracture zones within bedrock generally cannot be detected unless there is a topographic expression of the feature and/or a significant drop in bedrock velocity. The accuracy of the method is degraded in areas with strong topographic relief and/or where the interfaces have apparent dips greater than about 20°. ***In general, the accuracy of depths determined is estimated to be about 10% or 2 feet, whichever is greater. The results of this survey should not be relied upon for contract bedrock removal quantities.***

Where two materials do not exhibit contrasting velocities, or where velocities gradually increase with depth, a clear refracted signal is not generated, and the seismic refraction method cannot be used to distinguish the two materials. In some cases, the "geophysical contact" between materials with contrasting velocities does not correlate exactly with the "geologic contact." For example, where a highly weathered bedrock is overlain by a dense material such as till, the velocity range of the weathered bedrock might overlap or approach the velocity range of the till, and the two materials cannot be distinguished seismically. In such cases, the depth determined by seismic refraction is the depth of *competent* bedrock, which might be located at some depth below the geologic contact.

The depth relations of the water table and bedrock may constitute a significant problem for the seismic refraction technique. This problem is that of a "blind layer." A blind layer occurs where the thickness of the saturated overburden is less than about half the depth of bedrock. In such cases, the water-saturated material immediately above bedrock is "blind" in the sense that no refracted seismic energy from it will be received as a first arrival of seismic energy, and all methods used to reduce the seismic data to determine the depth of bedrock, the objective of this survey, use *only* first arrivals. Thus, the saturated layer will not be detected where it is close to bedrock, and most methods of seismic data reduction will indicate that bedrock is considerably shallower than it is. Although GRM, the method used by HRGS to reduce the seismic refraction data, does not use first arrivals through the water saturated zone (because there is none to use) in such cases, GRM determines the depth of bedrock correctly by using the *average* velocity of the saturated and unsaturated zones.

A "hidden layer" occurs where a lower velocity material underlies a higher velocity material, a common situation in stratified sediments. An example is where sands are present under layers of clay or till. As in the case of a "blind layer," most methods of seismic refraction data reduction will indicate that bedrock is deeper than it is if a hidden layer is present but not detected. Internal

tests in the seismic refraction data reduction software that we use (IXRefraX by Interpex) indicate that such layers might be present, and an average velocity of the two layers is used to determine the depth of bedrock.

H/V. As with all geophysical measurements, there is error in the estimation of thickness/velocity using the H/V spectral method. In general, geologic conditions that may adversely impact the error in the determination of overburden thickness include acquiring data near the edges of sedimentary basins, acquiring data in narrow basins, and acquiring data in areas of highly variable bedrock topography with thick/weathered bedrock.

The quality of the data depends largely on the coupling between the measurement unit and the ground. The unit must be leveled and should always be set on natural ground, avoiding loose soil and rocks, concrete, asphalt, etc. General estimates of error for the calculation of overburden thickness range from 10% under optimum conditions, increasing to as much as 50% where several complicating geologic factors, as listed above, are present[1].

RESULTS

General. The seismic refraction survey consisted of five seismic lines identified as Seismic Lines 1 – 5, and fifteen H/V points identified as H/V 1 - 15. The locations of the seismic lines, H/V points, and borings installed by SchonewaldEA are shown in Figure 2. The results of the seismic refraction survey are shown in profile form in Figure 3 - 5 and are listed in Table 1. The results of H/V data are listed in Table 2. Boring 203 was shifted towards Rt. 125 as noted on the summary table.

Data Quality. The quality of the seismic refraction data ranges was good. A measure of the accuracy of the data can be obtained by comparing the seismically determined depths with depths of rock recorded in nearby borings and by comparing the results at seismic line intersections. For the area of interest, no borings were close enough to the seismic lines (i.e., closer than about 20 feet) for direct comparison. Lines 3 and 4 intersected with Line 5, although, as discussed below, bedrock depths could not be determined for such lines. Determination of the top of till at the intersection of Lines 3 and 4 with 5 agree within a few feet.

As noted above, bedrock depths determined by seismic refraction are the depths of relatively *competent* bedrock, which might be located at a depth somewhat below the depth of drilling refusal. As indicated in the limitations section, the accuracy of depths determined from seismic refraction is estimated to be in general about 10% or 2 feet, whichever is greater.

[1] Guéguen, P., Cornou, C., Garambois, S. et al. On the Limitation of the H/V Spectral Ratio Using Seismic Noise as an Exploration Tool: Application to the Grenoble Valley (France), a Small Apex Ratio Basin. Pure appl. geophys. 164, 115–134 (2007)

Interpretation of Velocities. Materials with two distinct velocities were detected for Seismic Lines 1 and 2. The upper material exhibits a compressional wave velocity range of about 1,100 feet per second (ft/sec) to 1,750 ft/sec and is interpreted to consist of mostly unsaturated soils. The lower material exhibits a compressional wave velocity range of about 9,700 ft/sec to 18,800 ft/sec and is interpreted to consist of competent bedrock.

Materials with two distinct velocities were also detected for Seismic Lines 3 through 5. The upper material exhibits a compressional wave velocity range of about 750 feet per second (ft/sec) to 1,200 ft/sec and is interpreted to consist of mostly unsaturated soils. The lower material exhibits a compressional wave velocity range of about 6,400 ft/sec to 9,450 ft/sec and is interpreted to consist of till. Due to spatial constraints, Lines 3 through 5 were not long enough to receive refracted wave energy from the top of bedrock profile and therefore the top of rock could not be determined for Lines 3 through 5.

Bedrock Depths and Configuration. The results of the seismic refraction survey are shown in profile form in Figures 3 - 5 and are listed in Table 1. Note that spatial constraints prevented seismic lines that were long enough to accurately determine the bedrock depth for Lines 3 through 5. The depths shown in Table 1 for Lines 3 through 5 are the depth and elevation of the till layer.

The depth of seismically determined bedrock along Line 1 and 2 south of the roadway varies between about 23 and 33 feet below ground surface. The seismically determined elevation of the bedrock surface varies between about 61 and 77 feet above sea level, for a total relief of 16 feet. The profile forms of Line 1 and Line 2 are shown in Figures 2 and 3, respectively.

Note that borings HB-DMB-201 through HB-DMB-205, provided by SchonewaldEA, copy attached in Appendix 1, show that the subsurface stratigraphy consists of approximately 18 to 24 feet of sand, gravel, overlaying 13 to 25 feet of till. Competent bedrock was sampled in 4 of the 5 borings, and the bedrock depths reported in the boring summary range from approximately 31 feet to 53 feet below ground surface. The borings were located greater than about 50 feet from any of the seismic lines.

The results of the H/V survey are listed in Table 2. The depth of determined bedrock along the roadway measured from H/V points 6 – 10, varies between about 31 and 37 feet below ground surface. The determined elevation of the bedrock surface varies between about 51 and 58 feet above sea level, for a total relief of 7 feet. The depth of determined bedrock along the river bank measured from H/V points 11 – 15, varies between about 47 and 50 feet below ground surface. The determined elevation of the bedrock surface varies between about 17 and 21 feet above sea level, for a total relief of 4 feet.

An examination of the determined bedrock depth along the roadway and the river bank indicate that the bedrock is dipping steeply towards the northeast.

CONCLUSIONS

Based on the seismic surveys conducted at the bridge carrying Route 125 over the Tracy Brook/Meadow Brook in Durham, Maine by Hager-Richter Geoscience, Inc. in support of a geotechnical investigation by SchonewaldEA in June 2022, we conclude the following:

- The depth of competent bedrock determined by seismic refraction along Seismic Lines 1 and 2 south of the roadway varies between approximately 23 and 33 feet below ground surface.

- The elevation of competent bedrock determined by seismic refraction along Seismic Lines 1 and 2 varies between approximately 61 and 77 feet above sea level, for a total relief of 16 feet.

- The depth of till determined by seismic refraction along Seismic Lines 3 through 5 along Tracy Brook/Meadow Brook varies between approximately 23 and 30 feet below ground surface.

- The elevation of till determined by seismic refraction along Seismic Lines 3 through 5 along Tracy Brook/Meadow Brook varies between approximately 61 and 70 feet above sea level, for a total relief of 9 feet.

- The depth of determined bedrock along the roadway measured from H/V points varies between about 31 and 37 feet below ground surface.

- The elevation of the bedrock surface determined by H/V points varies between about 51 and 58 feet above sea level, for a total relief of 7 feet.

- The depth of determined bedrock along the riverbank measured from H/V varies between about 47 and 50 feet below ground surface.

- The elevation of the bedrock surface determined by H/V points varies between about 17 and 21 feet above sea level, for a total relief of 4 feet.

- Based on combined seismic data, total elevation of bedrock surface varies between 17 and 75 feet above sea level, for a total relief of 58 feet and dipping towards the northeast.

LIMITATIONS ON USE OF THE REPORT

This Report was prepared for the exclusive use of MaineDOT, HNTB and SchonewaldEA (Client). No other party shall be entitled to rely on this Report or any information, documents, records, data, interpretations, advice or opinions given to Client by Hager-Richter Geoscience, Inc. (HRGS) in the performance of its work. The Report relates solely to the specific project for which HRGS has been retained and shall not be used or relied upon by Client or any third party for any variation or extension of this project, any other project or any other purpose without the express written permission of HRGS. Any unpermitted use by Client or any third party shall be at Client's or such third party's own risk and without any liability to HRGS.

HRGS has used reasonable care, skill, competence, and judgment in the preparation of this Report consistent with professional standards for those providing similar services at the same time, in the same locale, and under like circumstances. Unless otherwise stated, the work performed by HRGS should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

Except as expressly provided in this limitations section, HRGS makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed.

If you have any questions or comments on this report, please contact us at your convenience. It has been a pleasure to work with you on this project.

Sincerely,
HAGER-RICHTER GEOSCIENCE, INC.

Vanja Dezelic, Ph.D.
Geophysicist

Jeffrey Reid, P.G.
Owner / Principal Geophysicist

Attachments: Tables 1 & 2
Figures 1 – 5
Appendix 1

TABLE 1
SEISMIC REFRACTION RESULTS
ROUTE 125 BRIDGE OVER TRACY BROOK/MEADOW BROOK
DURHAM, MAINE

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Depth (ft)	Elevation (ft)
1	0+00	1058553.2	415265.4	90	27	63
1	0+08	1058558.4	415259.3	90	27	63
1	0+16	1058563.6	415253.2	90	27	62
1	0+24	1058568.8	415247.1	90	27	62
1	0+32	1058574	415241	90	27	62
1	0+40	1058579.1	415234.9	90	28	62
1	0+48	1058584.4	415228.8	89	27	63
1	0+56	1058589.5	415222.7	89	27	63
1	0+64	1058594.6	415216.6	89	28	61
1	0+72	1058599.9	415210.5	89	28	61
1	0+80	1058605	415204.4	89	27	62
1	0+88	1058610.2	415198.3	89	27	62
1	0+96	1058615.4	415192.2	89	27	62
1	1+04	1058620.6	415186.1	89	26	62
1	1+12	1058625.8	415180	89	27	61
1	1+20	1058631	415173.9	88	24	65
1	1+28	1058636.1	415167.8	88	23	65
1	1+36	1058641.2	415161.7	88	24	64
1	1+44	1058646.5	415155.6	88	24	64
1	1+52	1058651.6	415149.5	88	24	64
1	1+60	1058656.9	415143.4	88	23	65
1	1+68	1058662	415137.3	88	23	64
1	1+76	1058667.2	415131.2	88	23	64
1	1+84	1058672.4	415125.1	88	23	64
2	0+00	1058450.9	415378.8	105	28	77
2	0+08	1058458.1	415374.7	104	28	76
2	0+16	1058465.2	415370.6	103	28	75
2	0+24	1058472.5	415366.5	102	28	74
2	0+32	1058479.6	415362.4	101	28	73
2	0+40	1058486.9	415358.3	100	28	72
2	0+48	1058494	415354.2	99	28	71
2	0+56	1058501.2	415350.1	98	28	70
2	0+64	1058508.4	415346	97	28	69
2	0+72	1058515.4	415342	97	28	69
2	0+80	1058522.1	415338.1	99	28	71
2	0+88	1058528.9	415334.2	100	28	72
2	0+96	1058535.5	415330.3	102	28	73
2	1+04	1058542.2	415326.4	103	32	71

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here for Seismic Lines 1 and 2 are for competent bedrock. Note that spatial constraints for Lines 3 through 5 prevented the accurate determination of bedrock depths and elevations. Values shown in grey and in italics for Lines 3 through 5 are for the top of till. The easting and northing coordinates are relative to Maine State Plane NAD83 in US survey feet. Elevations along the seismic lines were determined from plans provided by SchonewaldEA.

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Depth (ft)	Elevation (ft)
2	1+12	1058549	415322.5	104	32	72
2	1+20	1058555.8	415318.6	106	32	74
2	1+28	1058562.5	415314.7	107	33	74
2	1+36	1058569.5	415310.8	107	33	75
2	1+44	1058576.4	415306.8	108	33	75
2	1+52	1058583.4	415302.9	108	33	75
2	1+60	1058590.2	415299.1	108	33	75
2	1+68	1058597	415295.2	108	33	75
2	1+76	1058603.9	415291.4	107	33	75
2	1+84	1058610.6	415287.6	107	33	74
3	0+00	1058853.5	415065.2	*71*	*7*	*64*
3	0+04	1058855.9	415062	*71*	*7*	*64*
3	0+08	1058858.2	415058.8	*71*	*8*	*64*
3	0+12	1058860.8	415055.7	*71*	*8*	*63*
3	0+16	1058863.1	415052.5	*71*	*9*	*63*
3	0+20	1058865.5	415049.3	*71*	*9*	*63*
3	0+24	1058867.9	415046.1	*71*	*9*	*62*
3	0+28	1058870.4	415042.9	*71*	*10*	*62*
3	0+32	1058872.8	415039.8	*71*	*10*	*62*
3	0+36	1058875.1	415036.6	*71*	*10*	*62*
3	0+40	1058877.5	415033.4	*71*	*10*	*62*
3	0+44	1058879.9	415030.2	*72*	*10*	*62*
3	0+48	1058882.4	415027	*72*	*10*	*62*

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Depth (ft)	Elevation (ft)
3	0+52	1058884.8	415023.8	*72*	*10*	*61*
3	0+56	1058887.1	415020.7	*72*	*10*	*62*
3	0+60	1058889.5	415017.5	*72*	*10*	*61*
3	0+64	1058891.9	415014.3	*72*	*10*	*62*
3	0+68	1058894.4	415011.1	*72*	*9*	*63*
3	0+72	1058896.8	415007.9	*72*	*9*	*63*
3	0+76	1058899.1	415004.7	*72*	*9*	*63*
3	0+80	1058901.5	415001.6	*72*	*9*	*63*
3	0+84	1058904	414998.4	*72*	*9*	*63*
3	0+88	1058906.4	414995.2	*72*	*9*	*63*
3	0+92	1058908.8	414992	*72*	*9*	*63*
4	0+00	1058835	415065.9	*70*	*8*	*62*
4	0+05	1058838	415061.9	*70*	*8*	*62*
4	0+10	1058841.1	415057.9	*70*	*8*	*63*
4	0+15	1058844.1	415054	*70*	*7*	*63*
4	0+20	1058847.1	415050	*70*	*8*	*63*
4	0+25	1058850.2	415046	*71*	*8*	*62*
4	0+30	1058853.2	415042.1	*71*	*9*	*62*
4	0+35	1058856.2	415038.1	*71*	*9*	*62*
4	0+40	1058859.4	415034.1	*71*	*9*	*62*
4	0+45	1058862.4	415030.2	*71*	*10*	*61*
4	0+50	1058865.5	415026.2	*71*	*10*	*61*
4	0+55	1058868.5	415022.2	*71*	*10*	*61*

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here for Seismic Lines 1 and 2 are for competent bedrock. Note that spatial constraints for Lines 3 through 5 prevented the accurate determination of bedrock depths and elevations. Values shown in grey and in italics for Lines 3 through 5 are for the top of till. The easting and northing coordinates are relative to Maine State Plane NAD83 in US survey feet. Elevations along the seismic lines were determined from plans provided by SchonewaldEA.

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

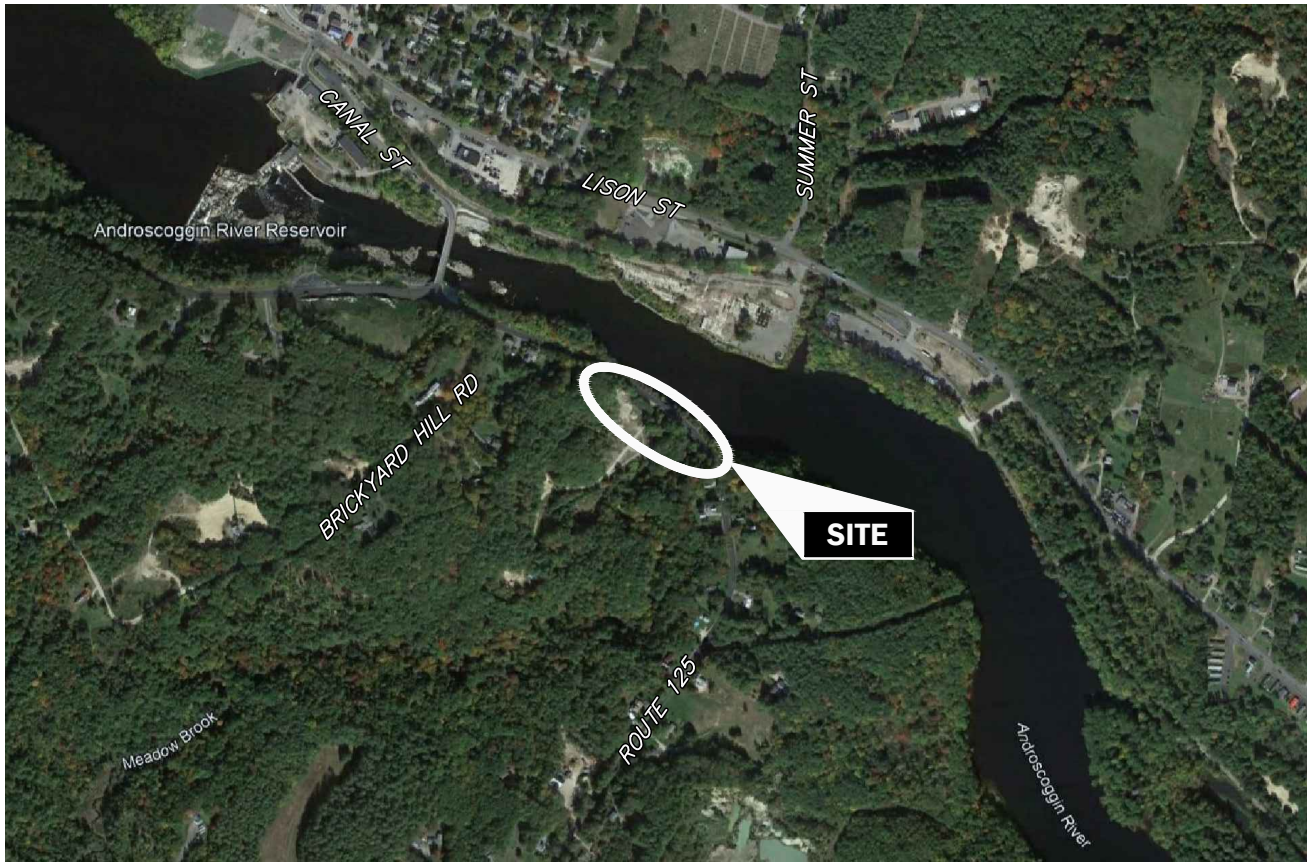
Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Depth (ft)	Elevation (ft)
4	0+60	1058871.5	415018.2	*71*	*10*	*62*
4	0+65	1058874.6	415014.3	*71*	*10*	*62*
4	0+70	1058877.6	415010.3	*71*	*9*	*62*
4	0+75	1058880.6	415006.3	*72*	*9*	*62*
4	0+80	1058883.8	415002.4	*72*	*10*	*62*
4	0+85	1058886.8	414998.4	*72*	*10*	*62*
4	0+90	1058889.8	414994.4	*72*	*11*	*61*
4	0+95	1058892.9	414990.5	*72*	*10*	*62*
4	1+00	1058895.9	414986.5	*72*	*10*	*63*
4	1+05	1058895.9	414986.5	*72*	*9*	*63*
4	1+10	1058895.9	414986.5	*72*	*9*	*63*
4	1+15	1058895.9	414986.5	*72*	*9*	*63*
5	0+00	1058863.9	415064.8	*71*	*7*	*64*
5	0+05	1058858.9	415064.5	*71*	*7*	*64*
5	0+10	1058853.9	415064.2	*71*	*7*	*64*
5	0+15	1058848.8	415063.9	*71*	*7*	*64*
5	0+20	1058843.8	415063.7	*71*	*6*	*64*
5	0+25	1058838.8	415063.4	*71*	*6*	*65*
5	0+30	1058833.8	415063.1	*71*	*5*	*65*
5	0+35	1058828.8	415062.8	*71*	*6*	*65*
5	0+40	1058823.6	415062.6	*71*	*6*	*65*
5	0+45	1058818.6	415062.3	*71*	*6*	*64*
5	0+50	1058813.6	415062	*70*	*7*	*64*

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Depth (ft)	Elevation (ft)
5	0+55	1058808.6	415061.8	*70*	*7*	*64*
5	0+60	1058803.6	415061.5	*70*	*6*	*64*
5	0+65	1058798.5	415061.2	*70*	*7*	*64*
5	0+70	1058793.5	415061	*70*	*6*	*64*
5	0+75	1058788.5	415060.7	*70*	*7*	*64*
5	0+80	1058783.5	415060.4	*70*	*7*	*63*
5	0+85	1058778.5	415060.2	*70*	*8*	*63*
5	0+90	1058773.4	415059.8	*70*	*8*	*63*
5	0+95	1058768.4	415059.5	*71*	*8*	*63*
5	1+00	1058763.4	415059.2	*72*	*8*	*64*
5	1+05	1058758.5	415058.9	*73*	*8*	*65*
5	1+10	1058753.8	415058.6	*75*	*8*	*68*
5	1+15	1058749.1	415058.4	*78*	*8*	*70*

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here for Seismic Lines 1 and 2 are for competent bedrock. Note that spatial constraints for Lines 3 through 5 prevented the accurate determination of bedrock depths and elevations. Values shown in grey and in italics for Lines 3 through 5 are for the top of till. The easting and northing coordinates are relative to Maine State Plane NAD83 in US survey feet. Elevations along the seismic lines were determined from plans provided by SchonewaldEA.

TABLE 2
H/V SURVEY RESULTS
ROUTE 125 BRIDGE OVER TRACY BROOK/MEADOW BROOK
DURHAM, MAINE

H/V Point	Surface Elevation (ft)	Bedrock Depth (m)	Bedrock Depth (ft)	Bedrock Elevation (ft)	Boring ID	Bedrock Depth from boring (ft)
1	87	10	34	53	205	34
2	85	12	39	46	203	39
3	91	15	49	42	202	>51
4	103	16	53	50	201	53
5	84	10	31	53	204	31
6	87	10	31	56		
7	88	10	33	55		
8	89	12	38	51		
9	91	12	38	53		
10	91	10	32	59		
11	69	15	48	21		
12	68	16	51	17		
13	68	16	51	17		
14	69	14	46	23		
15	69	15	49	20		



N

H-R

APPROXIMATE SCALE (feet)

0 1000 2000

ME

LOCATION

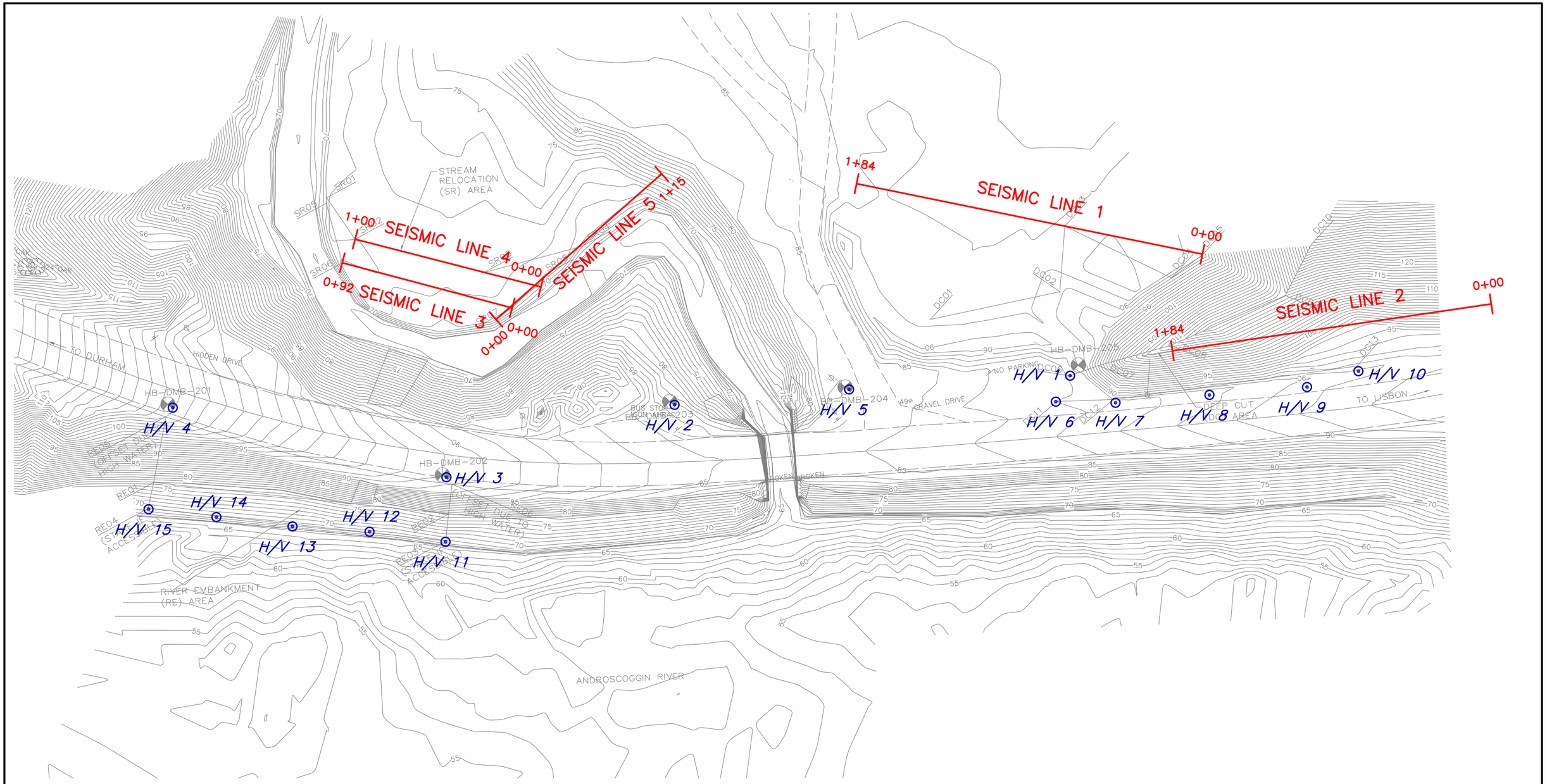
NOTE:

Modified from Google Earth Pro aerial photograph.

Figure 1
General Site Location
Route 125 Bridge over
Tracy Brook/Meadow Brook
Durham, Maine

File 22J03 | June, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ



NOTE:

Modified from site plan provided by Schonewald Engineering Associates, Inc., identified as GEOPHYSICAL LAYOUT PLAN updated.dwg.

SCALE (feet)

0 50 100

LEGEND

SEISMIC LINE

H/V POINT

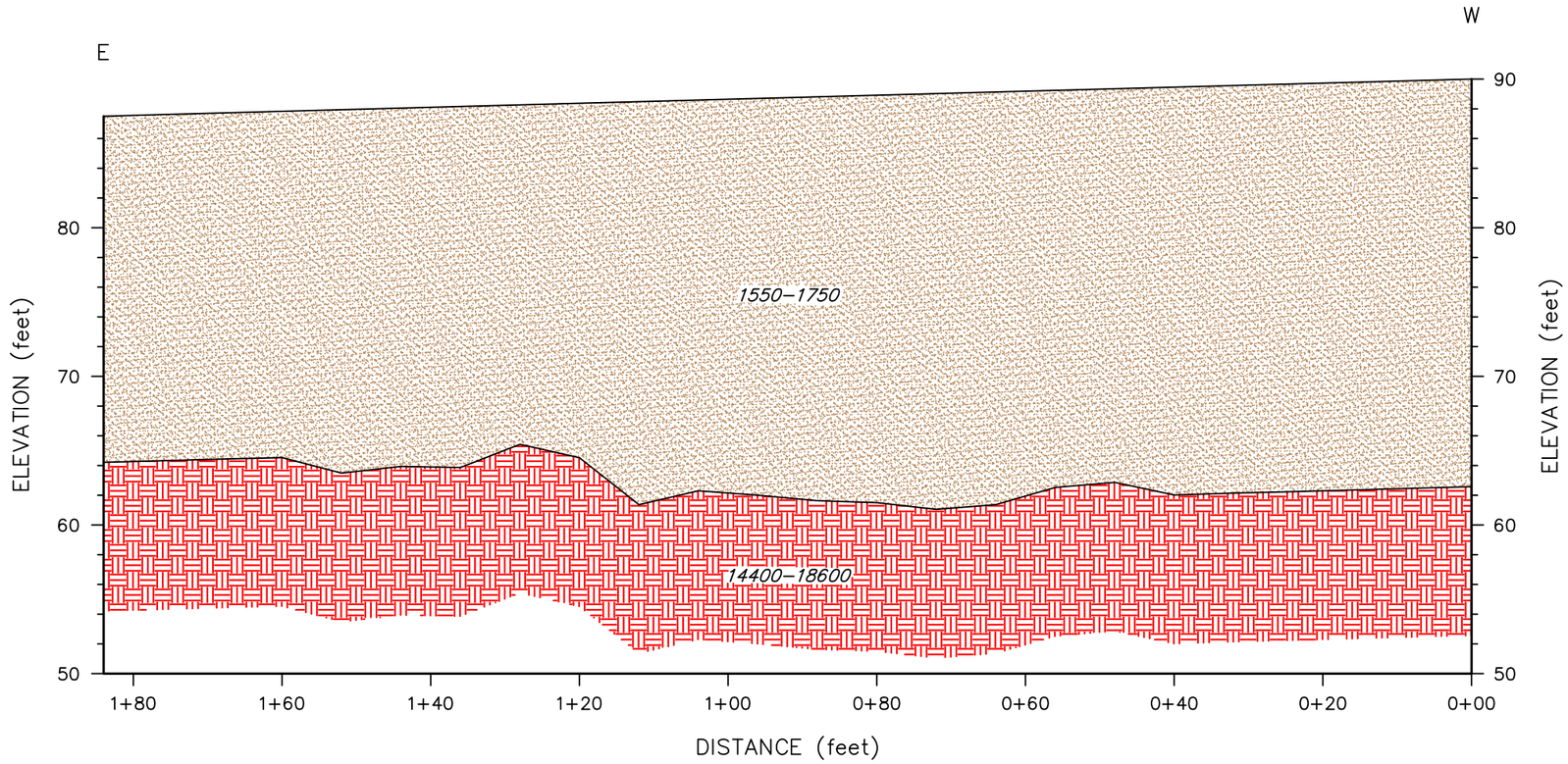
BORING

N

Figure 2
Site Plan
Route 125 Bridge over
Tracy Brook/Meadow Brook
Durham, Maine

File 22J03 | June, 2022

HAGER-RICHTER
Salem, NH | Fords, NJ



NOTES:

1. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
2. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
3. Surface elevations estimated from plans provided by Schonewald Engineering Associates, Inc.
4. Data were analyzed using the Generalized Reciprocal Method.

LEGEND

- Unsaturated soils
- Bedrock
- *14400–18600* Velocity (fps)
- Interface determined from seismic refraction data

HORIZONTAL SCALE (feet)

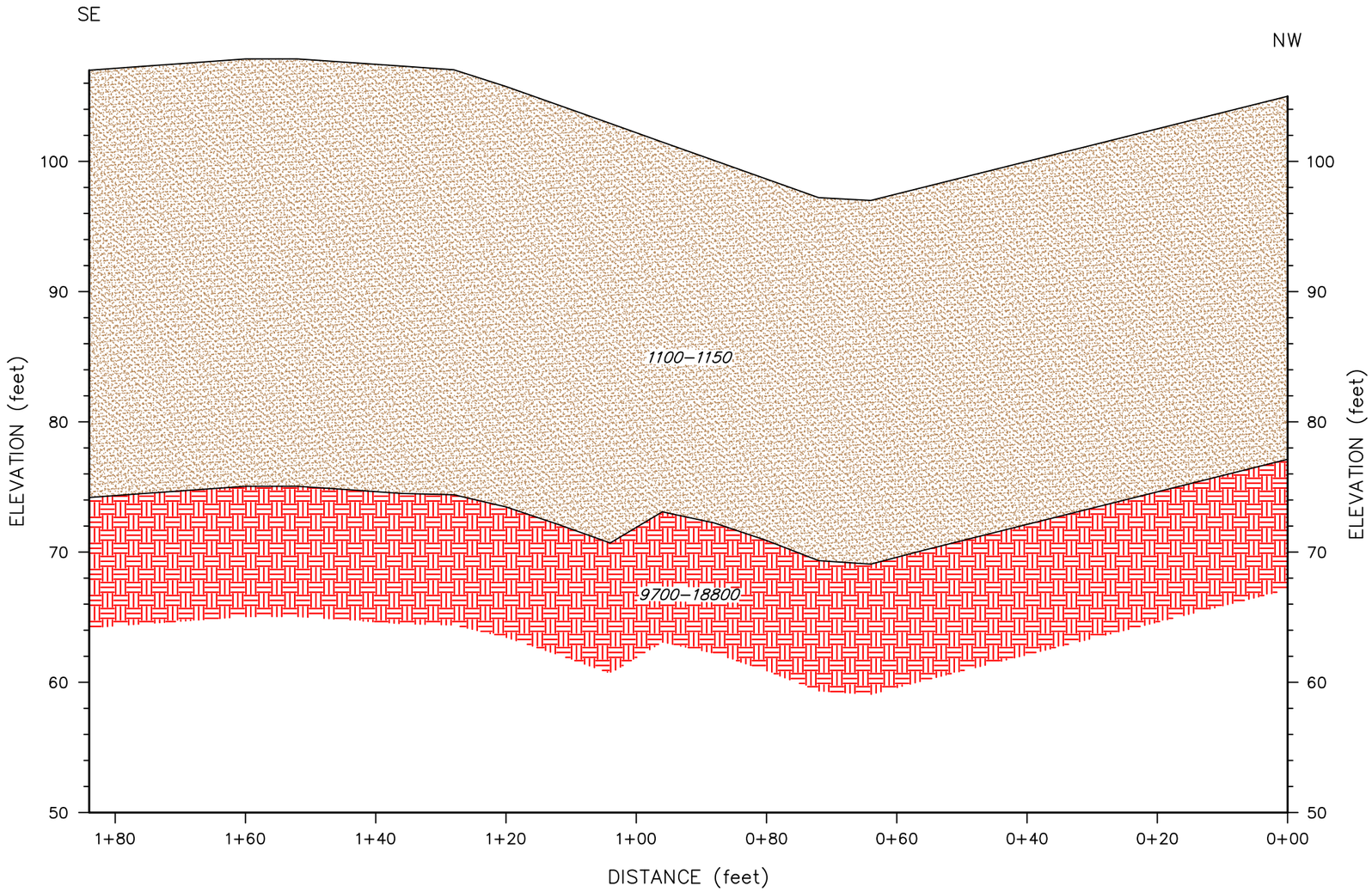
0 20 40

Vertical Exaggeration = 2X

Figure 3
Seismic Line 1
Route 125 Bridge over
Tracy Brook/Meadow Brook
Durham, Maine

File 22J03 | June, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ



NOTES:

1. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
2. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
3. Surface elevations estimated from plans provided by Schonewald Engineering Associates, Inc.
4. Data were analyzed using the Generalized Reciprocal Method.

LEGEND

Unsaturated soils

Bedrock

14400–18600 Velocity (fps)

Interface determined from seismic refraction data

HORIZONTAL SCALE (feet)

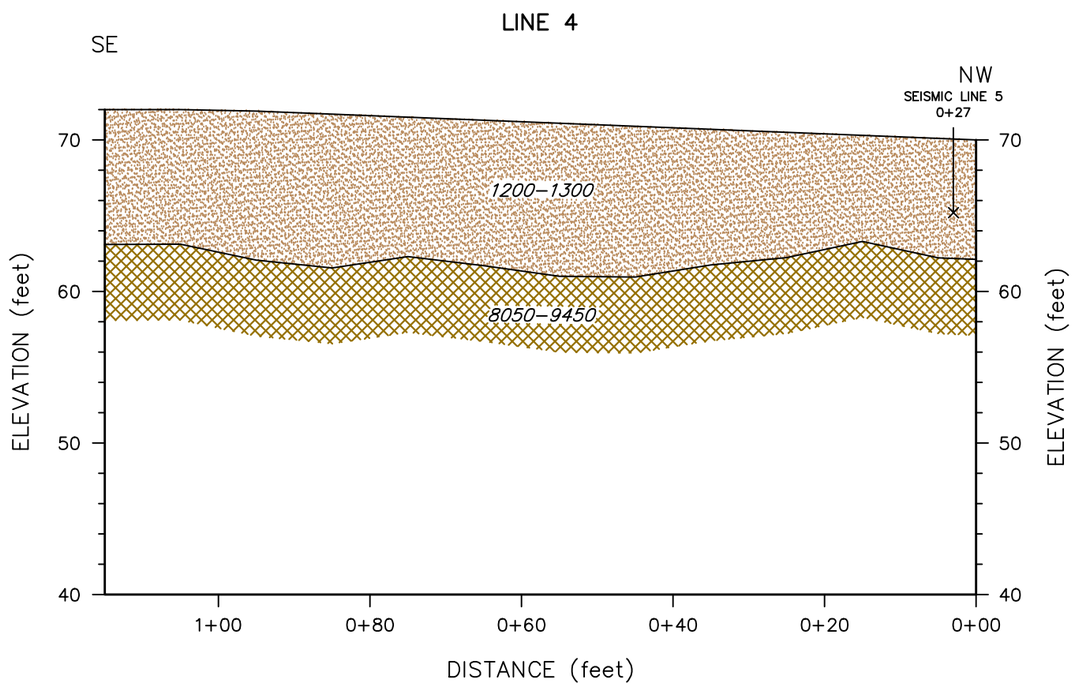
0 20 40

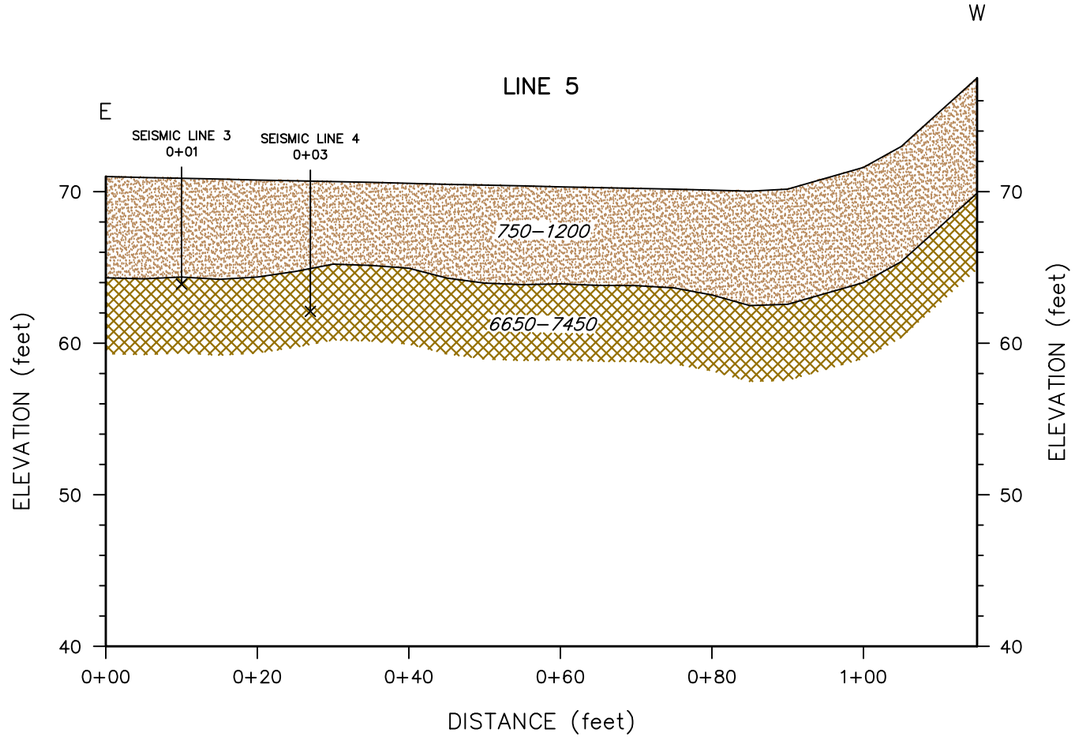
Vertical Exaggeration = 2X

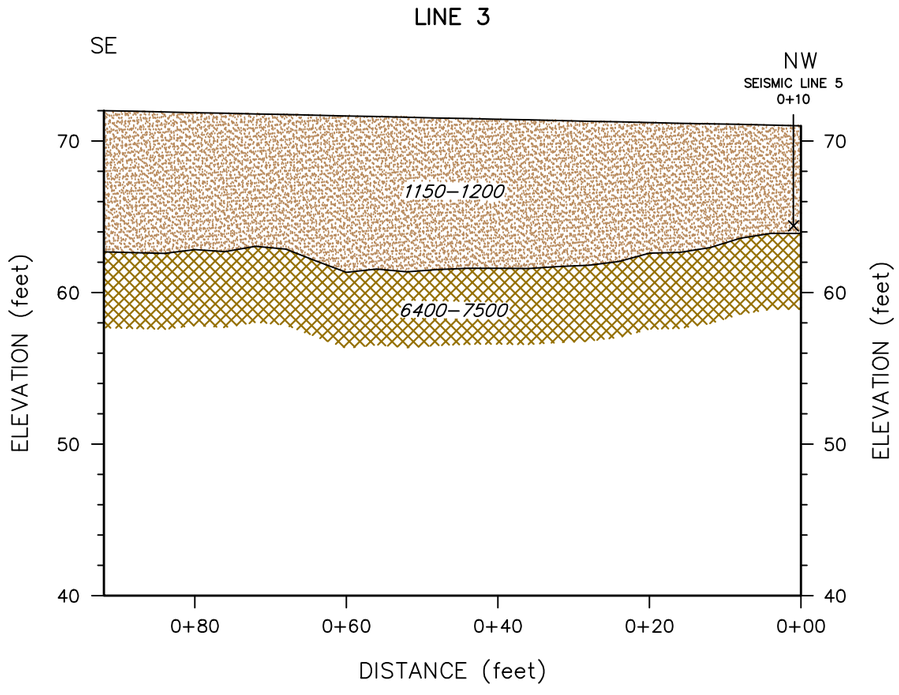
Figure 4
Seismic Line 2
Route 125 Bridge over
Tracy Brook/Meadow Brook
Durham, Maine

File 22J03 | June, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ







LEGEND

- Unsaturated soils
- Probable till
- *14400–18600* — Velocity (fps)
- Interface determined from seismic refraction data
- SEISMIC LINE 5 0+27 — Intersecting seismic line with depth of till

HORIZONTAL SCALE (feet)

0 20 40

Vertical Exaggeration = 2X

NOTES:

1. Estimated accuracy (standard deviation) of depth of till is ±10% or 2 feet, whichever is greater.
2. Surface elevations estimated from plans provided by Schonewald Engineering Associates, Inc.
3. Data were analyzed using the Generalized Reciprocal Method.

Figure 5
Seismic Lines 4, 3, & 5
Route 125 Bridge over
Tracy Brook/Meadow Brook
Durham, Maine

File 22J03 | June, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ

APPENDIX 1

Draft Boring Information Provided by SchonewaldEA

SUMMARY OF SUBSURFACE CONDITIONS
TEST BORINGS COMPLETED MAY 2022
TRACY BRIDGE #2852
ROUTE 125 OVER MEADOW BROOK
DURHAM, MAINE
MAINEDOT WIN 23657.00

BORING ID	HB-DMB-201	HB-DMB-202	BB-DMB-203	BB-DMB-204	HB-DMB-205
GROUND SURFACE ELEV ft (est'd)	103	91	85	84	87
GROUND SURFACE ELEV ESTIMATED FROM	RE05	RE06	topo	topo	DC06
ELEV TOP OF DEAD SAND or SAND AND GRAVEL ft	101.1	87	85	84	87
THICKNESS DEAD SAND or SAND AND GRAVEL ft	24.6	21.3	22.5	18	20.7
ELEV TOP OF TILL ft	76.5	65.7	62.5	66	66.3
THICKNESS TILL ft	27.1	>25.7	16	13	13
ELEV TOP OF BEDROCK ft	49.4	<40	46.5	53	53.3
BEDROCK TYPE AND RQD	Schist / 77%	no core	Schist/ 67 & 85%	Schist/ 60 & 75%	Schist/ 82%

NOTES:
1) Ground surface elevations estimated from the ground surface elevations written on nearby stakes set for the geophysical layout or, if no stake nearby, from the ground surface topography depicted on the geophysical layout plan.
2) As-drilled boring locations are approximately as shown on the geophysical layout plan, except BB-DMB-203 that was moved approximately 15 feet towards Route 125.
3) Typical soil descriptions are as follows:

DEAD SAND (encountered in 201 and 202): Medium dense, fine to medium SAND, little silt, trace coarse sand.
SAND AND GRAVEL (encountered in 203, 204, and 205): Loose to dense, fine to coarse SAND, little to some gravel, trace to little silt.
TILL (encountered in all 5 borings): Very dense, Silty fine to medium SAND, trace to little fine gravel, trace coarse sand, trace clay.