August 23, 2019
19066

Matthew Sturgis, Town Manager
Town of Cape Elizabeth
320 Ocean House Road
P.O. Box 6260
Cape Elizabeth, Maine 04107

Subject: **Shore Road Rehabilitation Study**

Dear Matt:

We have completed our investigation associated with Shore Road in Cape Elizabeth in accordance with our proposal dated March 8, 2019. In this regard, we have attached the following:

- A 25-scale rendered aerial plan set (8 Sheets) that illustrates both existing conditions and our suggestions for the scope of construction that would be associated with the rehabilitation of Shore Road. This single plan set serves multiple purposes in relation to various levels of construction which will become evident when you review the other materials provided herein.

- Cost estimates for three construction options provided in 2019 dollars:
    1. A combination of full depth reconstruction and 2-inch mill (i.e., to mechanically break up and the existing surface layer of pavement and remove it) and overlay a new pavement surface;
    2. Full depth reconstruction (i.e., remove existing pavement and underlying materials and replace with new roadway gravel and pavement layers) for entirety of project;
    3. Complete a 2-inch mill and overlay for entirety of project

In preparing this information we undertook the following activities:

- Engaged with the geotechnical firm of S. W. Cole Engineering to provide subsurface borings throughout the corridor, which informed us as to the existing pavement and base gravel depths in Shore Road. A summary of this subsurface investigation is included with this study report. This data was useful in determining what the Town's options were related to this rehabilitation. A summary of this subsurface investigation is included with this study report.
- Met with the Portland Water District (Sanitary Sewer and Water Departments) to discuss their future intentions with regard to their existing infrastructure within Shore Road. It appears that the Sewer Department has no plans for system upgrades, however, the Water District would like to renew the water mains in the roadway given the age of their existing lines. This information was helpful in evaluating the Town's options.
- Walked the corridor with Town Staff to review the existing conditions and understand areas of concern as well as preferences for the finished product.
- Reviewed MaineDOT's and PACTS' current data regarding this roadway, including the roadway's classification, traffic volumes, crashes, and pavement condition to understand how this section of road compares to others within this region and also what sources of funding may be available to the Town.

In conclusion, we offer the following findings for your consideration:

1. While Shore Road is an important roadway within Cape Elizabeth for several reasons, including its access to Fort Williams Park and acting as a gateway to the Town, MaineDOT classifies it as a Priority 4 roadway with traffic volumes that range from 4,000 to 6,000 vehicles on an average day. MaineDOT's ranking system starts with the highest Priority 1 roads and ends with the lowest Priority 6 roads, thus classifying Shore Road lower on their spectrum.
2. PACTS, the Greater Portland Region's transportation planning agency, did a Collector Road Study in 2018 that included Shore Road and it concluded that given this road's current pavement condition rating a 2-inch mill and overlay project should be undertaken for its rehabilitation.
3. The Portland Water District (PWD) would like to replace their existing water main in Shore Road prior to any rehabilitation being completed.
4. Sebago has developed a program for updating Shore Road that includes: new sidewalks to enhance pedestrian traffic and safety, narrower pavement for traffic calming, improved crosswalks at key locations, new subsurface drainage, access management in several areas, and new pedestrian-scale lighting in the business district near the South Portland municipal boundary. All of these improvements can be made with one of three (3) options for the road's rehabilitation to result in combined program for the Town's consideration.

    Option 1 (A combination of full depth construction and 2-inch mill and overlay) with an estimated pre-design cost of $3.45M.

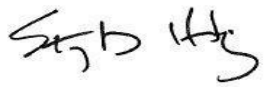
    Option 2 (Full depth reconstruction through entirety of project) with an estimated pre-design cost of $5.18M.

    Option 3 (A complete 2-inch mill and overlay for entirety of project) with an estimated pre-design cost of $2.67M.

The decision on which of the above options to pursue is a matter of priorities. Option 3 is the least expensive and should yield the Town an improved roadway for the next 10-15 years. Option 2 is the most expensive and would have a design life exceeding 20 years. Option 1, being a combination of the other two options, provides a product and expense between that of Options 2 and 3.

We understand that we will be presenting our findings to the Council in the near future and look forward to discussing this project with them and the Town in further detail. In the meantime, should there be any questions or comments regarding this study, please do not hesitate to contact us.

Sincerely,
SEBAGO TECHNICS, INC.



Stephen D. Harding, P.E.
Town Engineer

SDH:ns
Enclosures

cc: Maureen O'Meara, Cape Elizabeth Town Planner
Bob Malley, Cape Elizabeth Public Works Director

Project: 19066
By: NLS
Checked: SSS
Date: August 20, 2019

19066 Shore Road Pre-Design Estimate
Cape Elizabeth
Option 1 - Full Depth and Mill & Overlay

2" Mill and overlay of the roadway (STA. 101+04 to 139+00 -3796 LF) and full depth roadway reconstruction (STA. 139+00 to 151+70 - 1270 LF)

ITEM NO.	ITEM DESCRIPTION	UNIT	AVERAGE UNIT COST	QUANTITY	COST
202.20	Removing Pavement Surface	SY	$ 5.00	15000	$75,000.00
203.2001	Common Excavation	CY	$ 35.00	7000	$245,000.00
304.104	Aggregate Subbase Course Gravel	CY	$ 45.00	5500	$247,500.00
403.21	HMA 12.5 MM Surface	T	$ 100.00	2600	$260,000.00
403.21	HMA 12.5 MM Base	T	$ 100.00	1000	$100,000.00
409.15	Bituminous Tack Coat Applied	GAL	$ 10.00	1100	$11,000.00
603.00	Storm Drain Pipe	LF	$ 80.00	2300	$184,000.00
604.00	Catch Basin	EA	$ 4,500.00	28	$126,000.00
608.08	4" Reinforced Concrete Sidewalk	SY	$ 110.00	2700	$297,000.00
608.26	Curb Ramp Detectable Warning Field	SF	$ 90.00	210	$18,900.00
609.00	Vertical Curb Type 1	LF	$ 50.00	6200	$310,000.00
615.07	Loam (Plan Quantity)	CY	$ 60.00	375	$22,500.00
618.13	Seeding Method Number 1 - (Plan Quantity)	UN	$ 100.00	30	$3,000.00
619.12	Mulch (Plan Quantity)	UN	$ 100.00	30	$3,000.00
621.00	Landscaping	LS	$ 30,000.00	1	$30,000.00
627.73	4" White or Yellow Painted Pavement Marking Line	LF	$ 1.00	16000	$16,000.00
627.75	White or Yellow Pavement & Curb Marking	SF	$ 3.00	500	$1,500.00
634.00	Lighting	EA	$ 15,000.00	7	$105,000.00
643.62	Solar Powered Rapid Rectangular Flashing Beacon (Pair)	EA	$ 17,000.00	1	$17,000.00
652.36	Traffic Control	LS	$ 110,000.00	1	$110,000.00
656.75	Temporary Soil Erosion & Water Pollution Control	LS	$ 25,000.00	1	$25,000.00
659.10	Mobilization and General Conditions (7%)	LS	$ 154,518.00	1	$154,518.00

Project Construction Total	$2,361,918.00
Engineering and Design Fees	$200,000.00
Construction Administration & Inspection	$200,000.00
Ledge Removal Allowance	$100,000.00
Contingencies (25%)	$590,479.50
TOTAL PROJECT COST (2019 DOLLARS)	**$3,452,397.50**

Estimate Assumptions:
Area calculations are plan quantity measured from the pre-design plans completed on aerial base mapping
Roadway full depth construction based on a cross section of 24" subbase and 6" pavement
Sidewalk construction based on cross section of 12" subbase, 4" concrete
Drainage scope assumes existing drainage within the roadway to be replaced in kind

Project: 19066
By: NLS
Checked: SSS
Date: August 20, 2019

19066 Shore Road Pre-Design Estimate
Cape Elizabeth
Option 2 - Full Depth Reconstruction

Full depth reconstruction of the roadway for the entirety of project limits (STA. 101+04 to 151+70 - 5066 LF)

ITEM NO.	ITEM DESCRIPTION	UNIT	AVERAGE UNIT COST	QUANTITY	COST
203.2001	Common Excavation	CY	$ 35.00	20000	$700,000.00
304.104	Aggregate Subbase Course Gravel	CY	$ 45.00	16000	$720,000.00
403.21	HMA 12.5 MM Surface	T	$ 100.00	3400	$340,000.00
403.21	HMA 12.5 MM Base	T	$ 100.00	3400	$340,000.00
409.15	Bituminous Tack Coat Applied	GAL	$ 10.00	1250	$12,500.00
603.00	Storm Drain Pipe	LF	$ 80.00	2300	$184,000.00
604.00	Catch Basin	EA	$ 4,500.00	28	$126,000.00
608.08	4" Reinforced Concrete Sidewalk	SY	$ 110.00	2700	$297,000.00
608.26	Curb Ramp Detectable Warning Field	SF	$ 90.00	210	$18,900.00
609.00	Vertical Curb Type 1	LF	$ 50.00	6200	$310,000.00
615.07	Loam (Plan Quantity)	CY	$ 60.00	375	$22,500.00
618.13	Seeding Method Number 1 - (Plan Quantity)	UN	$ 100.00	30	$3,000.00
619.12	Mulch (Plan Quantity)	UN	$ 100.00	30	$3,000.00
621.00	Landscaping	LS	$ 30,000.00	1	$30,000.00
627.73	4" White or Yellow Painted Pavement Marking Line	LF	$ 1.00	16000	$16,000.00
627.75	White or Yellow Pavement & Curb Marking	SF	$ 3.00	500	$1,500.00
634.00	Lighting	EA	$ 15,000.00	7	$105,000.00
643.62	Solar Powered Rapid Rectangular Flashing Beacon (Pair)	EA	$ 17,000.00	1	$17,000.00
652.36	Traffic Control	LS	$ 150,000.00	1	$150,000.00
656.75	Temporary Soil Erosion & Water Pollution Control	LS	$ 30,000.00	1	$30,000.00
659.10	Mobilization and General Conditions (7%)	LS	$ 239,848.00	1	$239,848.00

Project Construction Total	$3,666,248.00
Engineering and Design Fees	$250,000.00
Construction Administration & Inspection	$250,000.00
Ledge Removal Allowance	$100,000.00
Contingencies (25%)	$916,562.00
TOTAL PROJECT COST (2019 DOLLARS)	**$5,182,810.00**

Estimate Assumptions:
Area calculations are plan quantity measured from the pre-design plans completed on aerial base mapping
Roadway full depth construction based on a cross section of 24" subbase and 6" pavement
Sidewalk construction based on cross section of 12" subbase, 4" concrete
Drainage scope assumes existing drainage within the roadway to be replaced in kind
Scope does not include costs to obtain right-of-way if deemed necessary

Project: 19066
By: NLS
Checked: SSS
Date: August 20, 2019

19066 Shore Road Pre-Design Estimate
Cape Elizabeth
Option 3 - Mill & Overlay

2" Mill and overlay entirety of project (STA. 101+04 to 151+70 - 5066 LF) + full depth construction of Little League Drive

ITEM NO.	ITEM DESCRIPTION	UNIT	AVERAGE UNIT COST	QUANTITY	COST
202.20	Removing Pavement Surface	SY	$ 5.00	19500	$97,500.00
203.2001	Common Excavation	CY	$ 35.00	2000	$70,000.00
304.104	Aggregate Subbase Course Gravel	CY	$ 45.00	1350	$60,750.00
403.21	HMA 12.5 MM Surface	T	$ 100.00	2500	$250,000.00
403.21	HMA 12.5 MM Base	T	$ 100.00	150	$15,000.00
409.15	Bituminous Tack Coat Applied	GAL	$ 10.00	1050	$10,500.00
603.00	Storm Drain Pipe	LF	$ 80.00	2300	$184,000.00
604.00	Catch Basin	EA	$ 4,500.00	28	$126,000.00
608.08	4" Reinforced Concrete Sidewalk	SY	$ 110.00	2700	$297,000.00
608.26	Curb Ramp Detectable Warning Field	SF	$ 90.00	210	$18,900.00
609.00	Vertical Curb Type 1	LF	$ 50.00	6200	$310,000.00
615.07	Loam (Plan Quantity)	CY	$ 60.00	375	$22,500.00
618.13	Seeding Method Number 1 - (Plan Quantity)	UN	$ 100.00	30	$3,000.00
619.12	Mulch (Plan Quantity)	UN	$ 100.00	30	$3,000.00
621.00	Landscaping	LS	$ 30,000.00	1	$30,000.00
627.73	4" White or Yellow Painted Pavement Marking Line	LF	$ 1.00	16000	$16,000.00
627.75	White or Yellow Pavement & Curb Marking	SF	$ 3.00	500	$1,500.00
634.00	Lighting	EA	$ 15,000.00	7	$105,000.00
643.62	Solar Powered Rapid Rectangular Flashing Beacon (Pair)	EA	$ 17,000.00	1	$17,000.00
652.36	Traffic Control	LS	$ 75,000.00	1	$75,000.00
656.75	Temporary Soil Erosion & Water Pollution Control	LS	$ 20,000.00	1	$20,000.00
659.10	Mobilization and General Conditions (7%)	LS	$ 121,285.50	1	$121,285.50

Project Construction Total	$1,853,935.50
Engineering and Design Fees	$150,000.00
Construction Administration & Inspection	$150,000.00
Ledge Removal Allowance	$50,000.00
Contingencies (25%)	$463,483.88
TOTAL PROJECT COST (2019 DOLLARS)	**$2,667,419.38**

Estimate Assumptions:
Area calculations are plan quantity measured from the pre-design plans completed on aerial base mapping
Roadway full depth construction based on a cross section of 24" subbase and 6" pavement
Sidewalk construction based on cross section of 12" subbase, 4" concrete
Drainage scope assumes existing drainage within the roadway to be replaced in kind
Scope does not include costs to obtain right-of-way if deemed necessary

Match Sheet No.

Match Sheet No. 2

NOTES:

1. EXPLORATION LOCATION PLAN PREPARED FROM IMAGERY FROM ESRI ARCGIS ONLINE AND DATA PARTNERS, INCLUDING ESRI, I-CUBED, USDA, USGS, AEX, GEOEYE, GETMAPPING, AEROGRID, IGN, IGP, AND THE GIS USER COMMUNITY.

2. THE EXPLORATIONS WERE LOCATED IN THE FIELD BY MEASUREMENTS FROM EXISTING SITE FEATURES.

3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. EXPLORATION DATA.

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.

LEGEND

APPROXIMATE BORING LOCATION

0 20 40 80 120 Feet

S.W.COLE ENGINEERING, INC.

SEBAGO TECHNICS, INC.

EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
Date:	05/29/2019	Sheet	1

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Match Sheet No. 1

Match Sheet No. 3

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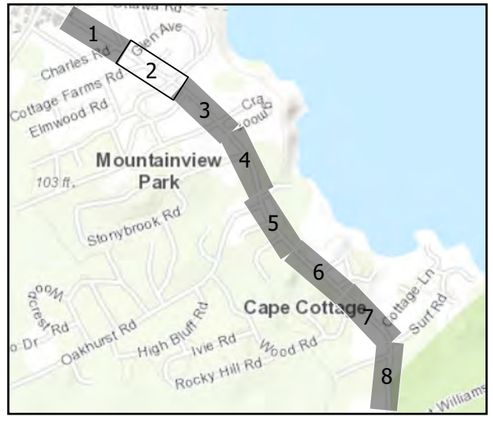

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S.W.COLE ENGINEERING, INC.

SEBAGO TECHNICS, INC.

EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
Date:	05/29/2019	Sheet	2

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S.W.COLE ENGINEERING, INC.

SEBAGO TECHNICS, INC.

EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
Date:	05/29/2019	Sheet	3

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SEBAGO TECHNICS, INC.

EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
Date:	05/29/2019	Sheet	4

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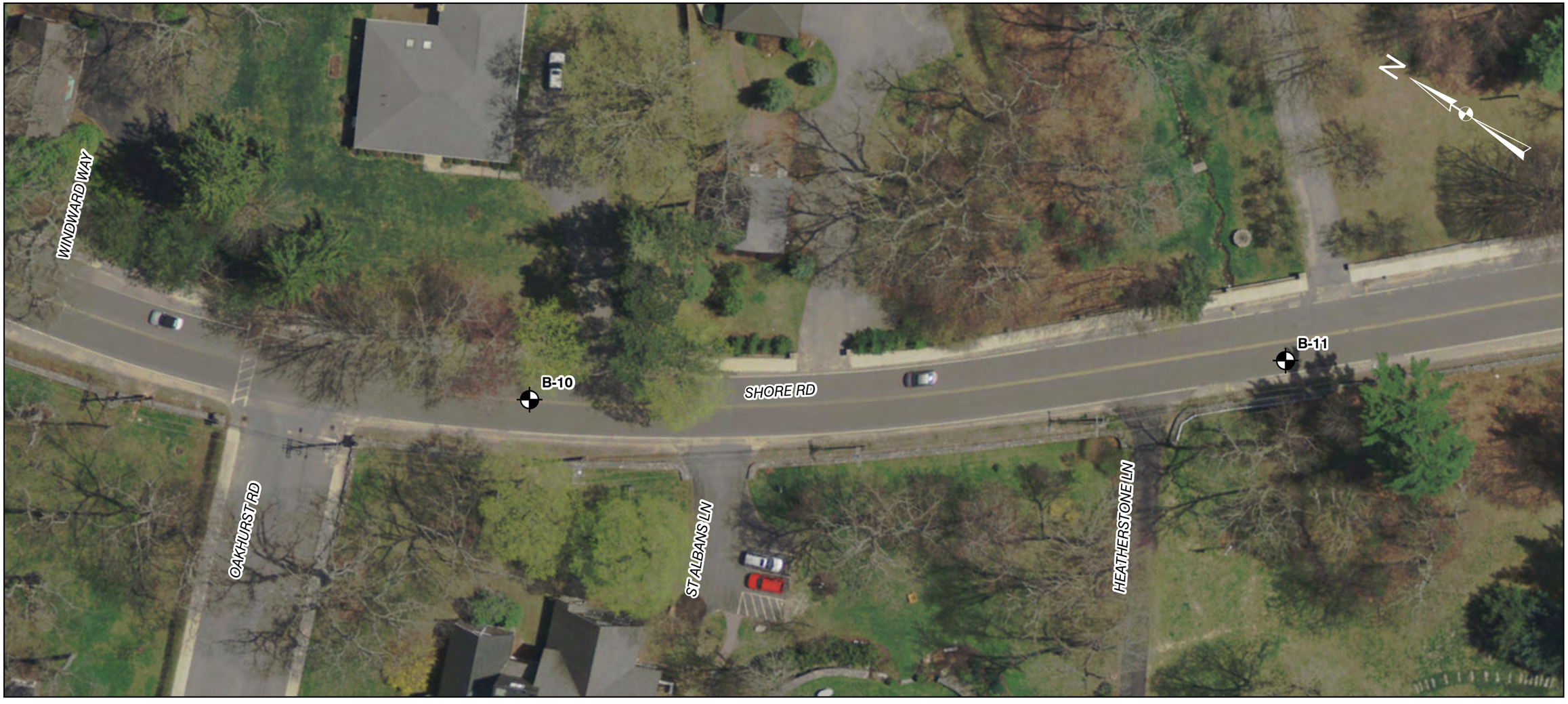

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EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

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EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
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APPROXIMATE BORING LOCATION

Feet
0 20 40 80 120

S.W.COLE ENGINEERING, INC.

SEBAGO TECHNICS, INC.

EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
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S.W.COLE ENGINEERING, INC.

SEBAGO TECHNICS, INC.

EXPLORATION LOCATION PLAN

PROPOSED SHORE ROAD RECONSTRUCTION
CAPE ELIZABETH, MAINE

Job No.	19-0268	Scale	1" = 40'
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S.W.COLE ENGINEERING, INC.

19-0268 SHORE ROAD, CAPE ELIZABETH, ME

EXPLORATION SUMMARY TABLE

Boring Number	Exploration Depth (ft)	Depth to Weathered Bedrock (ft)	Refusal Depth (ft)	Approx. Depth to Water (ft)	Approximate Pavement Thickness				Subgrade Description	Comments
					HMA (in)	Macadam (in)	Subbase (in)	Total (in)		
B-1										BORING OMITTED
B-2	5.1	4.9	5.1		9		20	29	SILTY SAND, SOME GRAVEL (FILL)	
B-3	7.2			7	2	6	34	42	GRAVELLY SAND	
B-4	6.8				7.75		46	54	SILTY SAND	
B-5	3.0	2.5	3		7.5		23	30	BEDROCK	
B-6	5.0	4.5	5		5.5		26	32	GRAVELLY SILTY SAND	
B-7	6.4	6.3	6.4		4	6	31	41	GRAVELLY SILTY SAND (FILL)	
B-8	6.8			2.5	5	4	19	30	SILTY SAND AND GRAVEL (FILL)	2" OF GRAVELLY SAND BETWEEN HMA & MACADAM
B-9	1.9	1.6	1.9		5	4	8	19	BEDROCK	2" OF SAND BETWEEN HMA & MACADAM
B-10	1.4	1.2	1.4		7	4	3	14	BEDROCK	
B-11	6.6				6		20	26	SAND (FILL)	
B-12	6.6				5.5		24	30	SAND (FILL)	
B-13	7.0				5	4.5	7	18	SILTY SAND (FILL)	2" OF SAND BETWEEN HMA & MACADAM
B-14	3.2		3.2		5	4	10	19	SAND	
B-15	7.2			5	5	7	30	42	SILTY SAND WITH ORGANICS	PETROLEUM ODOR NOTED IN SUBBASE FILL
B-16	7.0			2.5	5	6	23	34	SANDY SILT	

NOTE: REFER TO BORING LOGS FOR MORE DETAILED DESCRIPTION OF SUBSURFACE FINDINGS

S.W.COLE ENGINEERING, INC.

BORING LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 2
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 5.1 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): All Soils Damp, No Free Water Observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										9" Asphalt Pavement		
			1D		0.9-2.9	24/20	12-8-7-4			0.8 Medium dense, brown, silty gravelly SAND (Fill)		
			2D		2.9-4.9	24/14	4-4-5-4			2.5 Loose, brown, silty SAND, some gravel (Probable Fill)		
	5		3D		4.9-5.1	2/2	50/2"			4.9 Weathered Bedrock		
										Refusal at 5.1 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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 3
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/22/2019
DATE FINISH: 5/22/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 7.2 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 7 ft Soils Damp Below 1.5', Wet to Saturated Below 7' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										0.2 2" Asphalt Pavement 6" Relic Macadam Pavement or Deteriorated Asphalt Pavement		
			1D		1.2-3.2	24/18	7-12-12-12	w =5.3 %		0.7 Medium dense, brown, SAND and GRAVEL, some silt, with silty seams (Fill)		
			2D		3.2-5.2	24/18	10-9-7-8			3.5 Medium dense, orange-brown, gravelly medium to coarse SAND, trace silt		
	5		3D		5.2-7.2	24/22	25-17-18-15			5.0 Dense, layered, SAND and GRAVEL, some silt		
										7.0 Dense, brown, silty gravelly SAND (Till)	▽	
										Bottom of Exploration at 7.2 feet		

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.

S.W.COLE ENGINEERING, INC.

BORING LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 4
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): N/A
TOTAL DEPTH (FT): 6.8
LOGGED BY: Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Cory Culligan
DRILLING METHOD: Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30
WATER LEVEL DEPTHS (ft): Soils Damp Below 2', No Free Water Observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										7.75" Asphalt Pavement		
			1D		0.8-2.8	24/18	16-13-17-13			0.7 Medium dense, brown, SAND and GRAVEL, some silt (Fill)		
			2D		2.8-4.8	24/18	24-17-17-12					
	5		3D		4.8-6.8	24/4	4-4-7-12			4.5 Medium dense, brown, silty SAND, some gravel		

Bottom of Exploration at 6.8 feet

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S.W.COLE ENGINEERING, INC.

BORING LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 5
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 3.0 **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Cory Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No Free Water Observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										7.5" Asphalt Pavement		
			1D		0.8-2.8	24/22	9-7-14-30			0.6 Medium dense, brown, silty gravelly SAND, with coal pieces (Fill)		
										2.5 Probable Weathered Bedrock		

Refusal at 3.0 feet
Probable Bedrock

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S.W.COLE ENGINEERING, INC.

BORING LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 6
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 5.0 **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Cory Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No Free Water Observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										5.5" Asphalt Pavement		
			1D		0.5-2.5	24/20	5-11-9-8	w =3.6 %		0.5 Medium dense, brown, GRAVEL and SAND, some silt (Fill)		
			2D		2.5-4.5	24/20	5-7-8-9			2.7 Medium dense, dark brown to brown, gravelly silty SAND, with weathered bedrock fragments		
	5		3D		4.5-5	6/6	50/6"			4.5 Weathered Bedrock		

Refusal at 5.0 feet
Probable Bedrock

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BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 7
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/22/2019
DATE FINISH: 5/22/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 6.4 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): All Soils Damp
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										4" Asphalt Pavement		
										0.3 6" Relic Macadam Pavement		
			1D		1-3	24/18	11-18-15-24			0.9 Dense, brown, SAND and GRAVEL, some silt (Fill)		
			2D		3-5	24/20	13-15-17-17			3.5 Dense, brown, gravelly silty SAND (Fill)		
										4.3 Dense, orange-brown, silty SAND, trace gravel		
	5		3D		5-6.4	17/16	19-26-50/5"			5.0 Dense, brown, gravelly silty SAND (Till)		
										6.3 Probable Weathered Bedrock		

Refusal at 6.4 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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 8
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 6.8 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 2.6 ft Soils Wet to Saturated Below 2.5' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										5" Asphalt Pavement		
										0.4 2" Brown, gravelly SAND, some silt		
										0.6 4" Relic Macadam Pavement		
			1D		0.8-2.8	24/16	17-40-16-12			0.9 Medium dense, brown, silty SAND and GRAVEL (Fill)		
			2D		2.8-4.8	24/14	10-9-7-7			2.5 Medium dense, brown and dark brown, silty SAND and GRAVEL (Probable Fill)	▽	
	5		3D		4.8-6.8	24/18	5-9-10-11			5.0 Medium dense, brown and dark brown, silty gravelly SAND		

Bottom of Exploration at 6.8 feet

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.

S.W.COLE ENGINEERING, INC.

BORING LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B- 9
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 1.9 **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Cory Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No Free Water Observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										5" Asphalt Pavement		
										0.4 Brown SAND, some gravel, some silt		
										0.6 4" Relic Macadam Pavement		
	-		1D		0.9-1.9	12/12	7-50/6"			0.9 Medium dense, brown, silty gravelly SAND (Fill)		
										1.6 Probable Weathered Bedrock		

Refusal at 1.9 feet

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S.W.COLE ENGINEERING, INC.

BORING LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B-10
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/22/2019
DATE FINISH: 5/22/2019

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 1.4 **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Cory Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No Free Water Observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										7" Asphalt Pavement		
										0.6 4" Relic Macadam Pavement		
	-							w =3.6 %		0.9 Brown, silty gravelly SAND (Fill)		
										1.2 Probable Weathered Bedrock		
										Refusal at 1.4 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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B-11
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 6.6 **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Cory Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): Soils Damp Below 1', Moist Below 6' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										6" Asphalt Pavement		
			1D		0.6-2.6	24/22	9-13-18-16			0.5 Dense, brown, gravelly SAND, some silt (Fill)		
			2D		2.6-4.6	24/20	10-9-7-7			2.2 Dense to medium dense, brown, fine to medium SAND, some silt, trace gravel (Fill)		
	5		3D		4.6-6.6	24/16	6-5-5-4			4.5 Medium dense to loose, brown, silty SAND, trace gravel, with asphalt pieces (Fill)		

Bottom of Exploration at 6.6 feet

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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B-12
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 6.6 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): Soils Damp Below 4' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										5.5" Asphalt Pavement		
			1D		0.6-2.6	24/18	13-16-7-7			0.5 Medium dense, light brown, SAND, some silt, trace gravel, with asphalt pieces (Fill)		
			2D		2.6-4.6	24/18	7-6-6-5			2.5 Medium dense to loose, light brown to brown, fine to medium SAND, trace silt, trace gravel, with asphalt pieces (Fill)		
			3D		4.6-6.6	24/20	1-1-2-2					
	5											

Bottom of Exploration at 6.6 feet

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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B-13
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/21/2019
DATE FINISH: 5/21/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 7.0 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): Soils Damp Below 2' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
										5" Asphalt Pavement		
										0.4 2" Brown, silty SAND, some gravel		
										0.6 4.5" Relic Macadam Pavement		
			1D		1-3	24/18	12-11-9-4	w =3 %		0.9 Medium dense, brown, SAND and GRAVEL, some silt (Fill)		
										1.5 Medium dense, dark brown, silty SAND, trace gravel, trace brick (Fill)		
			2D		3-5	24/20	2-4-4-3					
										3.2 Loose, rust-brown to light brown, fine to medium SAND, trace silt		
	5		3D		5-7	24/22	3-3-4-3					
										Bottom of Exploration at 7.0 feet		

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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B-14
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/22/2019
DATE FINISH: 5/22/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 3.2 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): Soils Damp Below 1' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										5" Asphalt Pavement		
										0.4 4" Relic Macadam Pavement		
			1D		0.8-2.8	24/20	7-13-10-8			0.8 Medium dense, brown, silty gravelly SAND (Fill)		
										1.6 Medium dense, brown, SAND, some silt, some gravel		
			2D		2.8-3.1	4/4	50/4"			2.8 Medium dense, rust-brown, silty SAND, with rootlets		

Refusal at 3.2 feet
Probable Bedrock or Boulder

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 LOG

CLIENT:	Sebago Technics, Inc.
PROJECT:	Proposed Road Reconstruction
LOCATION:	Shore Road, Cape Elizabeth, Maine

BORING NO.:	**B-15**
SHEET:	1 of 1
PROJECT NO.	19-0268
DATE START:	5/22/2019
DATE FINISH:	5/22/2019

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 7.2 **LOGGED BY:** Evan Walker

DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Cory Culligan **DRILLING METHOD:** Solid Stem Auger

RIG TYPE: Truck Mounted Diedrich 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:**

HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 5 ft Soils Damp to Moist Below Pavement, Wet to Saturated Below 5' +/-

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:

Water Level
▽ At time of Drilling
▼ At Completion of Drilling
▼ After Drilling

D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear

Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot

WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector

S_v = Field Vane Shear Strength, kips/sq.ft.
q_U = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data / PID Readings	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
										5" Asphalt Pavement		
										0.4 7" Relic Macadam Pavement		
			1D		1.2-3.2	24/18	17-10-11-10	PID=192 ppm		1.0 Medium dense, gray-brown, silty gravelly SAND (Fill) *Petroleum Odor Noted*		
			2D		3.2-5.2	24/20	6-6-5-4			3.5 Medium dense to loose, gray-brown to gray, silty fine to medium SAND, trace wood pieces and roots		
	5		3D		5.2-7.2	24/20	2-3-3-2	q_P=7 ksf			▽	
										6.0 Very Stiff, gray-brown, silty CLAY		

Bottom of Exploration at 7.2 feet

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 LOG

CLIENT: Sebago Technics, Inc.
PROJECT: Proposed Road Reconstruction
LOCATION: Shore Road, Cape Elizabeth, Maine

BORING NO.: B-16
SHEET: 1 of 1
PROJECT NO. 19-0268
DATE START: 5/22/2016
DATE FINISH: 5/22/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** N/A | **TOTAL DEPTH (FT):** 7.0 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Cory Culligan | **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich 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:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 2.5 ft Soils Moist Below Pavement, Wet to Saturated Below 2.5' +/-
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										5" Asphalt Pavement		
										0.4 6" Relic Macadam Pavement		
			1D		1-3	24/18	4-4-5-1	w =10.9 %		0.9 Loose, gray-brown, silty gravelly SAND (Fill)	▽	
			2D		3-5	24/20	2-2-3-2			2.8 Loose, Gray to gray-brown with black staining, sandy SILT		
	5		3D		5-7	24/18	9-3-3-4			5.0 Stiff, gray-brown to brown, clayey SILT and fine SAND, occasional sand layers with trace fine gravel		

Bottom of Exploration at 7.0 feet

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.

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to ½" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

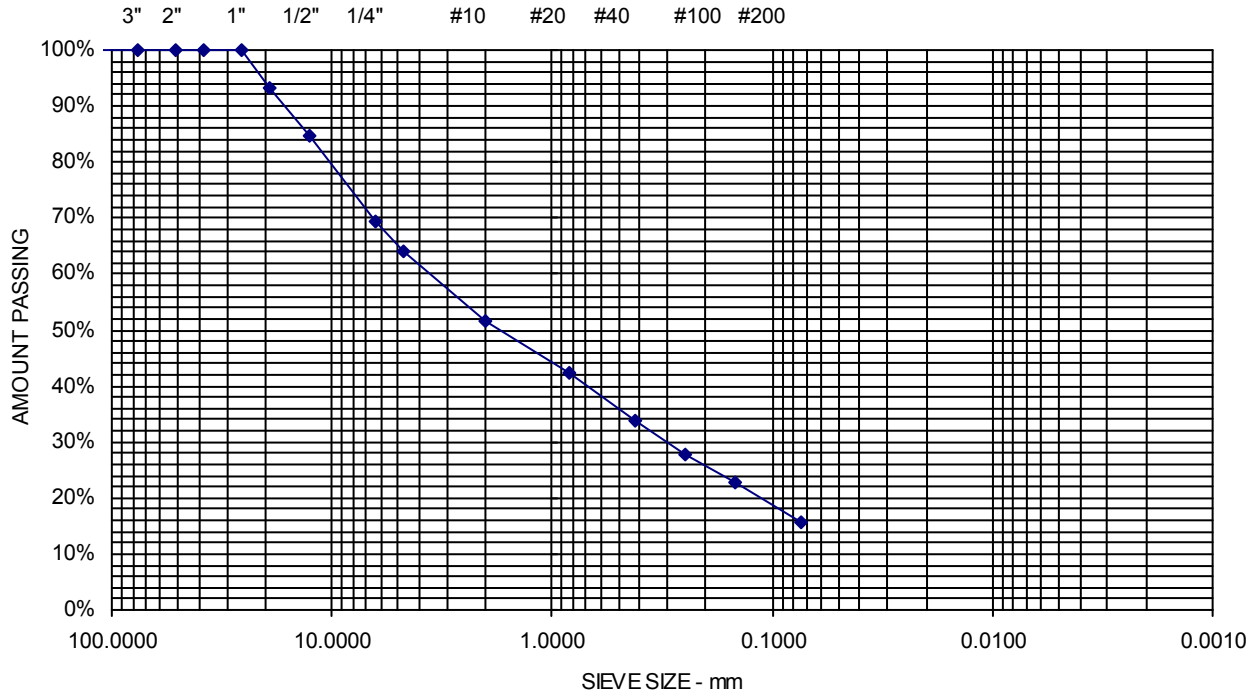
Project Name: CAPE ELIZABETH ME - SHORE ROAD PAVEMENT RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Client: SEBAGO TECHNICS, INC.

Material Source: **B-3 .7-3.2'**

Project Number: 19-0268
Lab ID: 25151G
Date Received: 5/29/2019
Date Completed: 6/3/2019
Tested By: JOSHUA MOORE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**93**	
12.5 mm	**1/2"**	**85**	
6.3 mm	**1/4"**	**69**	
4.75 mm	**No. 4**	**64**	36.1% Gravel
2.00 mm	**No. 10**	**52**	
850 um	**No. 20**	**42**	
425 um	**No. 40**	**34**	48.3% Sand
250 um	**No. 60**	**28**	
150 um	**No. 100**	**23**	
75 um	**No. 200**	**15.7**	15.7% Fines



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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

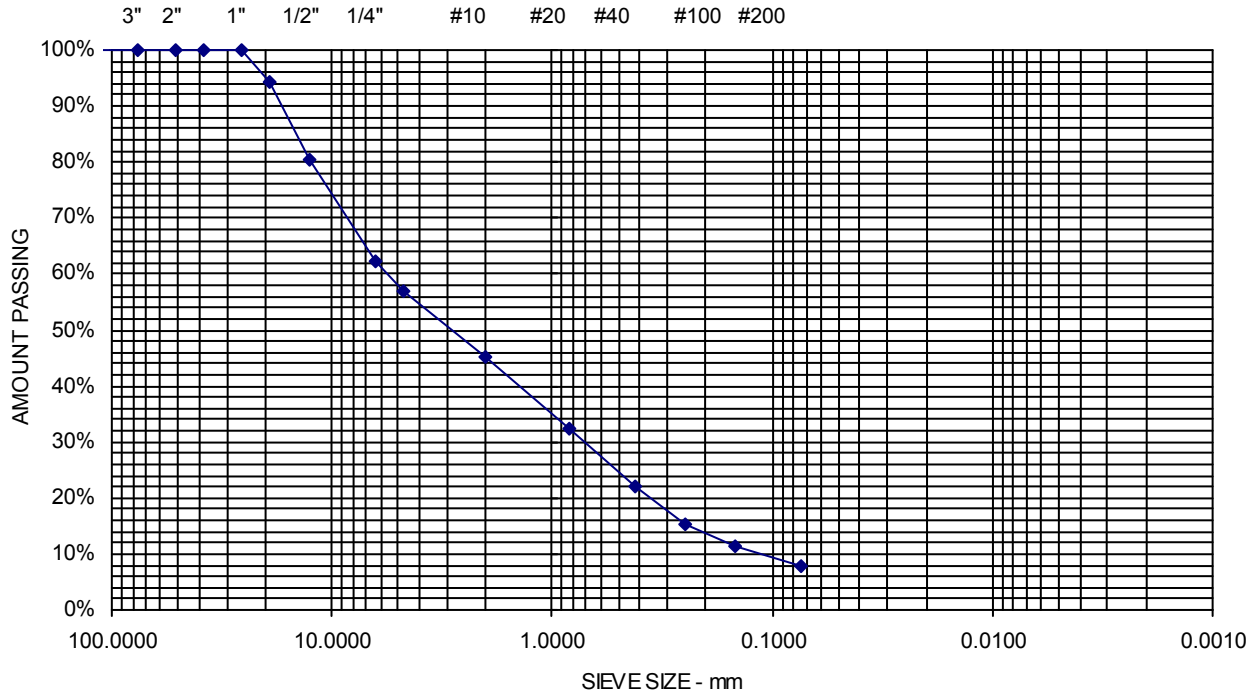
Project Name: CAPE ELIZABETH ME - SHORE ROAD PAVEMENT RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Client: SEBAGO TECHNICS, INC.

Material Source: **B-6 1D .5-2.5'**

Project Number: 19-0268
Lab ID: 25152G
Date Received: 5/29/2019
Date Completed: 6/3/2019
Tested By: JOSHUA MOORE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**94**	
12.5 mm	**1/2"**	**80**	
6.3 mm	**1/4"**	**62**	
4.75 mm	**No. 4**	**57**	43.1% Gravel
2.00 mm	**No. 10**	**45**	
850 um	**No. 20**	**32**	
425 um	**No. 40**	**22**	49.1% Sand
250 um	**No. 60**	**15**	
150 um	**No. 100**	**12**	
75 um	**No. 200**	**7.7**	7.7% Fines



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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

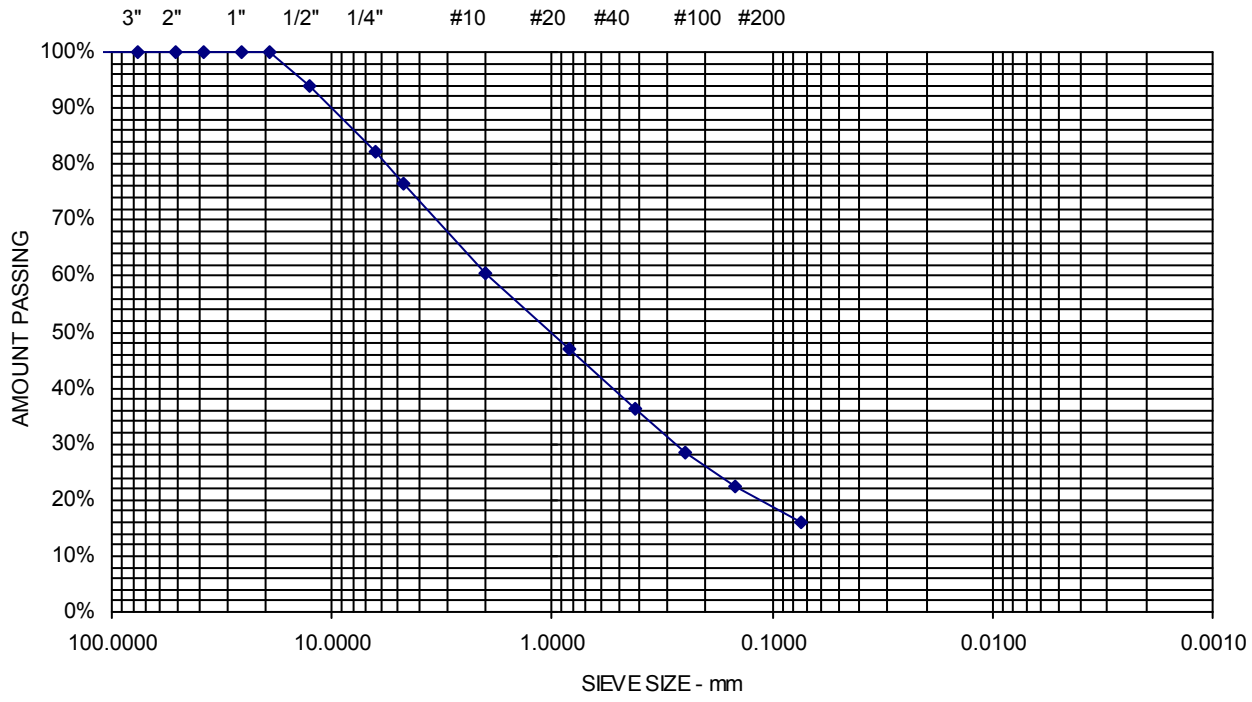
Project Name: CAPE ELIZABETH ME - SHORE ROAD PAVEMENT RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Client: SEBAGO TECHNICS, INC.

Material Source: **B-10 .9-1.2'**

Project Number: 19-0268
Lab ID: 25150G
Date Received: 5/29/2019
Date Completed: 6/3/2019
Tested By: CALEB BOOTH

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**94**	
6.3 mm	**1/4"**	**82**	
4.75 mm	**No. 4**	**76**	23.6% Gravel
2.00 mm	**No. 10**	**61**	
850 um	**No. 20**	**47**	
425 um	**No. 40**	**36**	60.4% Sand
250 um	**No. 60**	**29**	
150 um	**No. 100**	**22**	
75 um	**No. 200**	**16.0**	16% Fines



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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

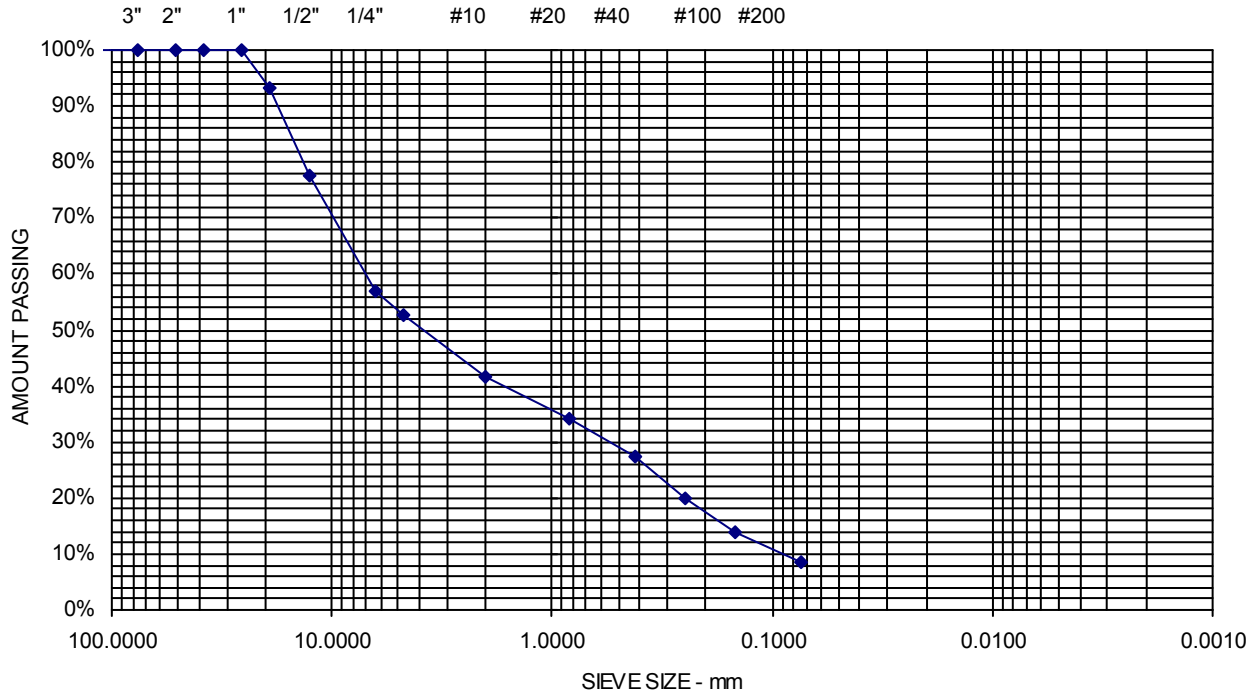
Project Name: CAPE ELIZABETH ME - SHORE ROAD PAVEMENT RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Client: SEBAGO TECHNICS, INC.

Material Source: **B-13 1D .9-1.5'**

Project Number: 19-0268
Lab ID: 25153G
Date Received: 5/29/2019
Date Completed: 6/3/2019
Tested By: JOSHUA MOORE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**93**	
12.5 mm	**1/2"**	**78**	
6.3 mm	**1/4"**	**57**	
4.75 mm	**No. 4**	**53**	47.4% Gravel
2.00 mm	**No. 10**	**42**	
850 um	**No. 20**	**34**	
425 um	**No. 40**	**27**	44.1% Sand
250 um	**No. 60**	**20**	
150 um	**No. 100**	**14**	
75 um	**No. 200**	**8.5**	8.5% Fines



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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

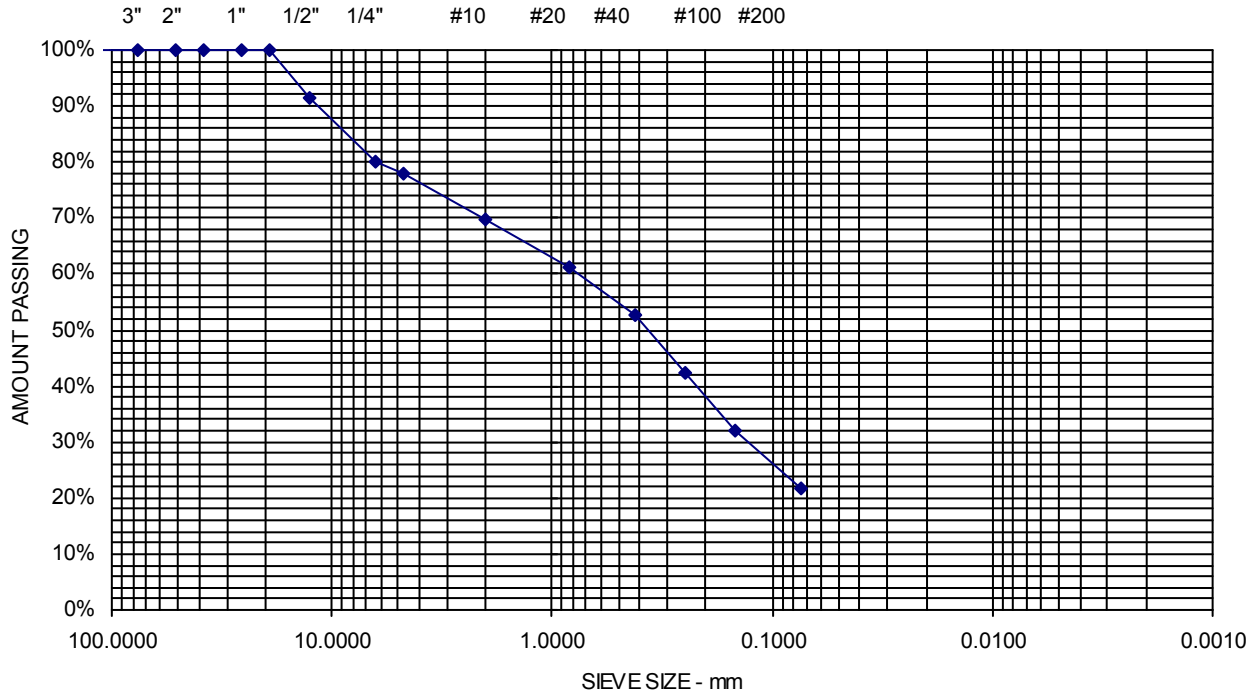
Project Name: CAPE ELIZABETH ME - SHORE ROAD PAVEMENT RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Client: SEBAGO TECHNICS, INC.

Material Source: **B-16 1D .9-2.8'**

Project Number: 19-0268
Lab ID: 25154G
Date Received: 5/29/2019
Date Completed: 6/3/2019
Tested By: JOSHUA MOORE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**91**	
6.3 mm	**1/4"**	**80**	
4.75 mm	**No. 4**	**78**	22.2% Gravel
2.00 mm	**No. 10**	**70**	
850 um	**No. 20**	**61**	
425 um	**No. 40**	**53**	56.2% Sand
250 um	**No. 60**	**42**	
150 um	**No. 100**	**32**	
75 um	**No. 200**	**21.6**	21.6% Fines



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