

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 predesign 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.

SET His

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	Т	\$ 100.00	2600	\$260,000.00
403.21	HMA 12.5 MM Base	Т	\$ 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
Contingencies (25%)	\$590,479.50
Ledge Removal Allowance	\$100,000.00
Construction Administration & Inspection	\$200,000.00
Engineering and Design Fees	\$200,000.00
	\$2,501,916.00

TOTAL PROJECT COST (2019 DOLLARS)

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	
203.2001	Common Excavation	CY	\$ 35.00	20000	\$70
304.104	Aggregate Subbase Course Gravel	CY	\$ 45.00	16000	\$72
403.21	HMA 12.5 MM Surface	Т	\$ 100.00	3400	\$34
403.21	HMA 12.5 MM Base	Т	\$ 100.00	3400	\$34
409.15	Bituminous Tack Coat Applied	GAL	\$ 10.00	1250	\$12
603.00	Storm Drain Pipe	LF	\$ 80.00	2300	\$18
604.00	Catch Basin	EA	\$ 4,500.00	28	\$12
608.08	4" Reinforced Concrete Sidewalk	SY	\$ 110.00	2700	\$29
608.26	Curb Ramp Detectable Warning Field	SF	\$ 90.00	210	\$1
609.00	Vertical Curb Type 1	LF	\$ 50.00	6200	\$31
615.07	Loam (Plan Quantity)	CY	\$ 60.00	375	\$22
618.13	Seeding Method Number 1 - (Plan Quantity)	UN	\$ 100.00	30	\$3
619.12	Mulch (Plan Quantity)	UN	\$ 100.00	30	\$3
621.00	Landscaping	LS	\$ 30,000.00	1	\$3
627.73	4" White or Yellow Painted Pavement Marking Line	LF	\$ 1.00	16000	\$1
627.75	White or Yellow Pavement & Curb Marking	SF	\$ 3.00	500	\$1
634.00	Lighting	EA	\$ 15,000.00	7	\$10
643.62	Solar Powered Rapid Rectangular Flashing Beacon (Pair)	EA	\$ 17,000.00	1	\$1
652.36	Traffic Control	LS	\$ 150,000.00	1	\$15
656.75	Temporary Soil Erosion & Water Pollution Control	LS	\$ 30,000.00	1	\$3
659.10	Mobilization and General Conditions (7%)	LS	\$ 239,848.00	1	\$23

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

TOTAL PROJECT COST (2019 DOLLARS)

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

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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	AV	/ERAGE 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	Т	\$	100.00	2500	\$250,000.00
403.21	HMA 12.5 MM Base	Т	\$	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 <i>,</i> 000.00

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

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





Date:







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















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.

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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



Job No. Date:





NOT TO BE USED FOR CONSTRUCTION.

Date:

S.W.COLE ENGINEERING, INC. 19-0268 SHORE ROAD, CAPE ELIZABETH, ME

EXPLORATION SUMMARY TABLE

Boring Exploration Weather		Depth to Weathered	Refusal	Approx.	Appro	oximate Pav	ement Thic	kness	Subgrade Description	Commonto
Number	Depth (ft)	Bedrock (ft)	Depth (ft)	Water (ft)	HMA (in)	Macadam (in)	Subbase Tot (in) (ir		Subgrade Description	comments
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

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	-		1D	1.2-3.2	24/18	7-12-			some silt, with silty seams (Fill)	-,	
	-					12-12	w =5.3 %				
	-		2D	3.2-5.2	24/18	10-9-7 8	-		3.5 Medium dense, orange-brown, gravelly		
	-								medium to coarse SAND, trace sit		
	- 5		3D	5.2-7.2	24/22	25-17- 18-15			5.0 Dense, layered, SAND and GRAVEL, some silt		
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									7.75" Asp	halt Pavement			
	-		1D	0.8-2.8	24/18	16-13- 17-13			0.7 Medium d some silt (lense, brown, SAND and GRA' (Fill)	/EL,	-	
	-		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 d gravel	lense, brown, silty SAND, som	e	-	
	-								Bo	ttom of Exploration at 6.8 feet			
Stratifica boundar be gradu made at Fluctuati	ation lines y betwee ual. Wate times an ions of gr	s represent n soil ty r level re roundwa	ent approxim pes, transitio eadings have conditions s tter may occu	ate ns may been tated. r due to									

										BORIN	NG LOG		BORING NO	.: B- 5 1 of 1
		S	λ				- C	LIENT: Seba	ago T	Technics, Ind	D		PROJECT N	O. <u>19-0268</u>
							F	ROJECT: Pr	opos	sed Road Re	econstruction		DATE STAR	T: 5/21/2019
		ΓEΝ	GINI	ΕĔ	<u>s k i N</u>	G, IN (- ·] L	OCATION: S	shore	e Road, Cap	e Elizabeth, Maine]	DATE FINISI	H: 5/21/2019
Drillin LOCAT DRILLI RIG TY HAMM HAMM WATE GENEI	ng Info TION: <u></u> ING CO YPE: <u>T</u> IER TYP IER EFF R LEVEI RAL NOT	rmati Gee Ex : <u>S. V</u> ruck M E: <u>Au</u> ICIENC L DEP1 TES:	on ploration V. Cole E ounted Di itomatic CY FACTO THS (ft):	Loc xplo iedr	ation Pla prations, ich D-50 No Free	IN E	ELEVATI DRILLER AUGER II IAMMEF DServed	ON (FT):N/A ::Cory Culligar D/OD:N/A / 4 R WEIGHT (Ibs): R DROP (inch):	n <u>1/2 i</u> <u>14</u> 30	n 10	TOTAL DEPTH (FT): 3.0 DRILLING METHOD: Solid S SAMPLER: Standard Split-S CASING ID/OD: N/A /N/A	LO Stem Aug poon CO	GGED BY: <u>E</u> ger RE BARREL:	van Walker
AND S	YMBOLS:	<u>vvate</u> ⊻ At ⊻ At ⊻ At	time of Dr Completic	illing on of	g f Drilling	U = Split SU = Thin VR = Rock (V = Field V	Valled Tub Core Sam /ane Shea	ple Pen. = ple Sample Rec. = ple bpf = E ar mpf =	Rec Blows Minu	overy Length overy Length over Foot te per Foot	WOR = Weight of Homs WOH = Weight of Hammer RQD = Rock Quality Designation PID = Photoionization Detector	$g_v = Field q_u = Unco Ø = Fricti N/A = No$	onfined Compression Angle (Estimation Angle)	engun, kips/sq.ft. ssive Strength, kips/sq.f ated)
					SAMPL	E INFO	RMATIC	DN	ō					
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Lo		Sample Description & Classification		H ₂ 0 Depth	Remarks
			1							7.5"	Asphalt Pavement			
	_		1D		0.8-2.8	24/22	9-7-14- 30			0.6 Med with	ium dense, brown, silty gravelly coal pieces (Fill)	SAND,		
										2.5 Prot	able Weathered Bedrock			
										· .	Refusal at 3.0 feet Probable Bedrock			
Stratific bounda be grad made a Fluctua	ation lines ry betwee ual. Wate t times an tions of gr	s repres n soil ty r level r d under oundwa	ent approx pes, transi eadings ha conditions ater may oc	timat itions ave b s sta	te s may been ated. due to									
otner fa measur	ctors than ements w	ere ma	present at t de.	ine t	ime								BORING NO	.: B-5

		1							BORING LOG	BORING NO .:	B-6
Æ		C	W	CC	I F		CLIENT: Seb	ado .	echnics. Inc.	PROJECT NO.	19-0268
	7		.VV.				PROJECT: PI	ropos	ed Road Reconstruction	DATE START:	5/21/2019
		ΙΕΝ	GINE	ERIN	G, IN C	<u> </u>	LOCATION:	Shor	e Road, Cape Elizabeth, Maine	DATE FINISH:	5/21/2019
Drillin LOCA	n g Info TION:	r matio See Exp	on	ocation Pla	n E		ION (FT): N/A	١	TOTAL DEPTH (FT): 5.0 LC	GGED BY: Evar	n Walker
DRILL	ING CO.	S. V	/. Cole Ex	plorations,		DRILLEF	R: Cory Culliga	n	DRILLING METHOD: Solid Stem Au	ger	
RIGT			ounted Die	edrich D-50	A		ID/OD: <u>N/A / 4</u>	1/2	n SAMPLER: Standard Split-Spoon		
HAMM	IER EFF		Y FACTO	R:	「 		R DROP (inch):	: <u>1</u> 2 30		RE DARREL:	
WATE	R LEVEI	DEPT	HS (ft):	No Free	Water Ob	oserved					
GENE	RAL NO	TES:									
AND S	D NOTES YMBOLS:	<u>Wate</u> ∑ At ∑ At ∑ Af	time of Drill Completion ter Drilling	ling 1 of Drilling	D = Split S U = Thin W R = Rock (V = Field V	alled Tu Core San Ane She	mple Pen. = be Sample Rec. = nple bpf = ear mpf =	= Pen = Rec Blows Minu	tration Length WOR = Weight of Rods $S_v = Hei overy Length WOH = Weight of Hammer q_u = Uncper Foot RQD = Rock Quality Designation \emptyset = Frice per Foot PID = Photoionization Detector N/A = Ne$	d Vane Shear Streng onfined Compressiv ion Angle (Estimated of Applicable	gth, kips/sq.ft. e Strength, kips/sq.ft. d)
				SAMPL	E INFOR	RMATIO	NC	b			
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	e Depth É (ft)	Pen./ Rec. (in)	Blow Count or ROD	t Field / Lab Test Data	Graphic Lo	Sample Description & Classification	H ₂ 0 Depth	Remarks
						TIQE			5.5" Asphalt Pavement		
			1D	0.5-2.5	24/20	5-11-9 8	-		0.5 Medium dense, brown, GRAVEL and SAND some silt (Fill)	,	
	-			M			w =3.6 %				
				VI							
				۸I							
	-			Μ							
			2D	2.5-4.5	24/20	5-7-8-9	9		2.7 Medium danage dark brown to brown group	by .	
	-			VI.					silty SAND, with weathered bedrock	iy	
				VI					fragments		
				λI							
	-			Μ							
			3D	4.5-5	6/6	50/6"			4.5 Weathered Bedrock		
	5			\wedge							
									Probable Bedrock		
Stratific	ation lines	s repres	ent approxin	nate							
be grad	lual. Wate	r level re d under	eadings have	e been stated.							
Fluctua other fa	tions of gr	oundwa those r	ter may occ present at th	e time							DC
measur	ements w	ere mad	le.							BURING NO .:	B- 0

		1								BORING LOG	BORING NO .:	B- 7
F		C	XX7	11	$\neg \frown$		7 1				SHEET:	1 of 1
	=	J	. W		し	ノーロ		PROJECT P	rono	ed Road Reconstruction	DATE START	5/22/2019
		ΕN	IGINI	ΕE	ERIN	G,IN(С.		Shor	Road, Cape Elizabeth, Maine	DATE FINISH:	5/22/2019
Drilli	ng Info	rmati	on								2/11211110111	
LOCA		See Ex	ploration	Loc	ation Pla	an E	ELEVAT	ION (FT): N/A	۸	TOTAL DEPTH (FT): <u>6.4</u> LC	GGED BY: Eval	n Walker
	ING CO. VDE: T	: <u>S. V</u>	V. Cole E	:xplo iodr	orations,				n 1/2	DRILLING METHOD: Solid Stem Au	iger	
HAMN		E: AL	Itomatic	leui		^^ ۱	HAMME	R WEIGHT (lbs)	: 14	0 CASING ID/OD: N/A /N/A CO	ORE BARREL:	
HAMN	IER EFF		Y FACTO	OR:		H	НАММЕ	R DROP (inch):	30		_	
WATE	R LEVE	L DEPT	THS (ft):		All Soils	Damp						
GENE	RAL NO	TES:					Cases Ca	mala Dan	- Den	stration Longth WOR - Weight of Dada 0 - Fig	d Vana Chaar Stran	ath king (og ft
AND S	YMBOLS	⊻ At ⊈ At ⊈ At	time of Dr Completio	rilling on o	g f Drilling	U = Thin V R = Rock V = Field V	Valled Tu Core San Vane She	be Sample Rec. nple bpf = ear mpf =	= Rec Blows Minu	WOR Work Work <th< td=""><td>confined Compressiv tion Angle (Estimate ot Applicable</td><td>e Strength, kips/sq.ft. d)</td></th<>	confined Compressiv tion Angle (Estimate ot Applicable	e Strength, kips/sq.ft. d)
					SAMPL	E INFO	RMATI	ON	0			
Flev	Denth	Casing					Blow		- Č	Sample	H ₂ 0	
(ft)	(ft)	Pen. (bpf)	Sample	ype	Depth	Pen./	Coun	t Field / Lab	aphi	Description & Classification	Depth	Remarks
			INO.	F	(11)	(in)	RQD	Test Data	ڻ ا	Classification		
										4" Asphalt Pavement		
									-	0.3 6" Relic Macadam Pavement		
	-		10	Н	10	04/10	11 10			0.9 Dense, brown, SAND and GRAVEL, some		
				M	1-3	24/18	15-24	-		silt (Fill)		
				M								
	Γ											
				\mathbb{N}								
	-		2D	Н	3-5	24/20	13-15	_				
				M	00	2	17-17	,				
				M						^{3.5} Dense, brown, gravelly silty SAND (Fill)		
				IVI								
										4.3		
										^{4.3} Dense, orange-brown, silty SAND, trace		
										graver		
	- 5		3D	\square	5-6.4	17/16	19-26	-		5.0 Dense, brown, gravelly silty SAND (Till)		
				M			50/5"					
				X								
	-			M								
				$ \rangle$						6.3 _ Brobable Weathered Redrock		
										Refusal at 6.4 feet	/	
										Probable Bedrock		
5												
5												
2												
Stratific	ation line	s repres	ent approx	ima	te							
be grad	ual. Wate	er level re	pes, transi eadings ha	ave t	been							
Fluctua	tions of g	roundwa	ater may or	S STA	due to							
other fa	ctors that	i those p	present at de	ıne t	ume	1					BORING NO .:	B-7

BORING / WELL 19-0268.GPJ SWCE TEMPLATE.GDT 6/6/19

E		C	W	(I IENT: Saba			IG LOG	BOR SHE	RING NO.: ET:	B-8 1 of 1
K	フ	S EN	.VV.	E	RIN	G,ING			opos	sed Road Re	construction	DAT		5/21/2019
Drillin	na Infoi	rmatio	on					UCATION: _3		e Roau, Cap		DAI		5/21/2019
LOCAT DRILLI RIG TY HAMM	10N: NG CO.: /PE: ER TYPI	See Exp : _S. V ruck Mo E: _Au	oloration L V. Cole Ex ounted Die	oca plo edri	ation Pla rations, ch D-50	n E LLC E A	ELEVATI DRILLER AUGER I IAMMEF	ON (FT):N/A t:Cory Culligar D/OD:N/A / 4 R WEIGHT (Ibs):	ו 1/2 i 14	in 40	TOTAL DEPTH (FT): 6.8 Letter (FT): DRILLING METHOD: Solid Stem A SAMPLER: Standard Split-Spoon CASING ID/OD: N/A /N/A C	OGGEI uger ORE B	DBY: <u>Evan</u>	Walker
HAMM WATE	er effi R level	CIENC	Y FACTO	R: ⊻	2.6 ft S	H Soils Wet	to Satur	ated Below 2.5	30 +/-					
GENER KEY TO AND SY	RAL NOT	TES: <u>Wate</u> ⊈ At ⊈ At ⊈ Af	er <u>Level</u> time of Drill Completion ter Drilling	ling n of	Drilling	D = Split S U = Thin V R = Rock (V = Field \	poon Sar Valled Tul Core Sam Vane Shea	nple Pen. = be Sample Rec. = ple bpf = E ar mpf =	Pen Rec Blows Minu	etration Length covery Length s per Foot ute per Foot	$\label{eq:WOR} \begin{array}{llllllllllllllllllllllllllllllllllll$	eld Vane iconfined ction An lot Appli	Shear Strengtl d Compressive gle (Estimated) icable	h, kips/sq.ft. Strength, kips/sq.
					SAMPL	E INFO	RMATIC	DN .	bo					
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic L		Sample Description & Classification	C	H₂0 Depth	Remarks
										5" A:	sphalt Pavement			
										0.4 <u>2" Bi</u> 0.6 4" R	own, gravelly SAND, some silt elic Macadam Pavement			
	-		1D	V	0.8-2.8	24/16	17-40- 16-12			0.9 Med GRA	um dense, brown, silty SAND and VEL (Fill)			
	-									2.5 Med	um dense, brown and dark brown, silt	y -	∑	
	-		20		2.8-4.8	24/14	10-9-7- 7	-						
	- 5		3D	\ \ \	4.8-6.8	24/18	5-9-10- 11	-		5.0 Med	um dense, brown and dark brown, silt	y		
	_									grav	elly SAND			
											Bottom of Exploration at 6.8 feet			
Stratifica boundar be gradu made at Fluctuat	ation lines y betweet ual. Wate t times an ions of on	s represe n soil ty r level re d under oundwa	ent approxin pes, transiti eadings hav conditions ter may occ	nate ons e be stat	e may een eed. due to									
other fac	ctors than ements w	those p ere mad	present at th	ie tii	me							BOR	RING NO.:	B- 8

		1								BORIN	NG LOG		BC	DRING NO.:	<u> </u>
E		C	X	10	$\overline{)}$	N E		LIENT: Seba	ado -	Technics. Inc	2.		SH PR		<u>1 of 1</u>). 19-0268
		\mathbf{O}	. V					ROJECT: Pr	opos	sed Road Re	econstruction			TE STAR	r: 5/21/201
		EN	GIN	ΕĿ	<u>ERIN</u>	G,IN(C. L	OCATION:	Shore	e Road, Cap	e Elizabeth, Maine		DA	TE FINISH	: 5/21/201
Drillin Locat Drilli Rig Ty Hammi Hammi	Ig Infoi 10N: _ <u>\$</u> NG CO.: PE: _ <u>T</u> ER TYPI ER EFFI	rmatic See Exp : _S. V ruck Mo E: _Au ICIENC	Dioration V. Cole ounted itomatic	n Loc Explo Diedr	cation Pla orations, rich D-50	in E LLC [/ 	Elevati Driller Auger II Hammer Hammer	ON (FT):	n 1/2 i : <u>1</u> 4 30	in 40	TOTAL DEPTH (FT): DRILLING METHOD SAMPLER: <u>Stand</u> CASING ID/OD: <u>N/</u>		LOGG tem Auger boon CORE	ED BY: Ev BARREL:	an Walker
		L DEPT	'HS (ft):		No Free	Water Ol	oserved								
KEY TO AND SY	NOTES MBOLS:	<u>Wate</u> ⊻ At ¥ At ¥ Af	er <u>Level</u> time of I Comple ter Drillir	Drilling tion of	g f Drilling	D = Split S U = Thin V R = Rock V = Field V	Spoon San Valled Tub Core Sam Vane Shea	nple Pen. = be Sample Rec. = ple bpf = ar mpf =	= Pen = Rec Blows Minu	etration Length overy Length s per Foot te per Foot	WOR = Weight of Rod WOH = Weight of Han RQD = Rock Quality D PID = Photoionization	ls s nmer d esignation s Detector l	S _v = Field Va q _u = Unconfi Ø = Friction / N/A = Not Ap	ne Shear Stre ned Compress Angle (Estimatoplicable	ength, kips/sq.ft. sive Strength, kips ted)
					SAMPL	E INFO	RMATIC	N	g						
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Samp No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Lo		Sample Descriptic Classifica	e on & tion		H₂0 Depth	Remarks
										5" A:	sphalt Pavement				
										0.4 Brov	vn SAND, some grave	el, some silt		-	
	-		1D	H	0.9-1 9	12/12	7-50/6"	,	-	4" R 0.9 Med	ium dense, brown sill	ent tv gravellv !	SAND	_	
				M	0.0 1.0		1 00/0			(Fill)		ly gravony (57 u v E		
				M					-	1.6 Proh	able Weathered Bedr	rock			
				$ \rangle$							Defined at 1	0 feet			
I															
Stratifica	ation lines	s repres	ent appro	byimal	te										
3tratifica youndan ye gradu nade at "luctuati	ation lines y between ral. Wate times an ons of gr	s represe n soil ty r level re id under oundwa	ent appropries, transadings i conditio	oximai sition: nave b ns sta occur	te s may been ated. due to										

			and the second second second						BORIN	NG LOG			0.: _	B-10
E		C	XX/	$\cap \cap$	I E		LIENT: Seba	ado 1	Technics Inc	2		PROJECT	NO.	19-0268
	-	\mathbf{O}	.VV.			- PI	ROJECT: Pr	opos	ed Road Re	construction		DATE STA	RT:	5/22/2019
		ΕN	GINE	ERIN	G, IN C	- L		Shore	e Road, Cap	e Elizabeth, Maine		DATE FINI	SH: _	5/22/2019
Drillin LOCA DRILLI RIG TY HAMM	ng Infoi FION: <u></u> ING CO.: (PE: <u>T</u> I IER TYP	Ere Exp See Exp S. W Tuck Mo E: Au	DIDIDIDIDIDIDIDIDIDIDIDIDIDIDIDIDIDIDI	ocation Pla plorations, drich D-50	n El LLC Di Al	LEVATIC RILLER: UGER ID AMMER	DN (FT):	n 1/2 i : <u>14</u> 30	n	TOTAL DEPTH (FT):	LO Stem Au Spoon	GGED BY: ^{ger} RE BARREL	<u>Evan \</u>	Nalker
WATE	R LEVEL	. DEPT	HS (ft):	No Free	Water Obs	served		- 50						
GENE	RAL NO	ES:												
KEY TO AND S	O NOTES YMBOLS:	<u>Wate</u> ⊻ At ⊻ At ⊻ Af	<u>er Level</u> time of Drill Completion ter Drilling	ing of Drilling	D = Split Sp U = Thin Wa R = Rock C V = Field Va	ooon Sam alled Tube ore Samp ane Shear	ple Pen. = e Sample Rec. = ole bpf = 1 r mpf =	= Pene = Reco Blows Minu	etration Length overy Length per Foot te per Foot	WOR = Weight of Rods WOH = Weight of Hammer RQD = Rock Quality Designation PID = Photoionization Detector	S _v = Field q _U = Unc Ø = Fricti N/A = No	d Vane Shear S onfined Compi ion Angle (Esti it Applicable	Strength ressive mated)	ı, kips/sq.ft. Strength, kips/sq.ft.
				SAMPL	E INFOR	MATIO	N	bc						
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	e Depth - (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Lo		Sample Description & Classification		H ₂ 0 Depth		Remarks
									7" A:	sphalt Pavement				
								\vdash	0.6 4" R	elic Macadam Pavement		_		
	-								0.9 Brow	n, silty gravelly SAND (Fill)				
							w -3.0 %		1.2 Prob	able Weathered Bedrock				
										Refusal at 1.4 feet				
Stratific bounda be grad made a	ation lines ry betwee ual. Wate t times an	represent n soil type r level re d under	ent approxim pes, transitio adings have conditions s	nate ons may e been stated.										
other fa	ctors of gr ctors than ements w	those p ere mad	resent at the	e time							Γ	BORING N	0.:	B-10

										BORING LOG	BORING NO .:	B-11
VE		C	W	(TE		LIENT: Seb	ado	echnics. Inc.	PROJECT NO	<u> </u>
	-	C	. VV.				- PF	ROJECT: Pr	ropo	ed Road Reconstruction	DATE START	5/21/2019
		EN	GINE	ΞE	RIN	G, IN (C. L		Shor	e Road, Cape Elizabeth, Maine	DATE FINISH	5/21/2019
Drillir LOCAT DRILLI RIG TY HAMM HAMM	ng Info TION: ING CO. YPE: IER TYP IER EFF R LEVE	rmati See Ex : _S. V ruck M ?E: _Au ICIENC L DEP1	on ploration I V. Cole Es ounted Di- itomatic CY FACTO CHS (ft):	Loc xplo edr	ation Pla prations, ich D-50 	in E LLC I 	ELEVATIC DRILLER: AUGER ID HAMMER HAMMER	DN (FT):	n 1/2 : <u>1</u> 4 30	TOTAL DEPTH (FT): 6.6 LC DRILLING METHOD: Solid Stem Au n SAMPLER: Standard Split-Spoon 0 CASING ID/OD: N/A /N/A CC	DGGED BY: <u>Eva</u> Iger DRE BARREL:	an Walker
GENE KEY TO AND S	RAL NO D NOTES YMBOLS:	TES: <u> </u>	er Level time of Dri Completio ter Drilling	lling n of) Drilling	D = Split S U = Thin V R = Rock V = Field V	Spoon Sam Valled Tube Core Samp Vane Shear	ple Pen. = e Sample Rec. = le bpf = mof =	= Per = Rec Blow	tration Length WOR = Weight of Rods S_v = Fie overy Length WOH = Weight of Hammer q_u = Unic per Foot RQD = Rock Quality Designation Ø = Fric e per Foot PID = Photoionization Detector N/A = N	Id Vane Shear Stre confined Compress tion Angle (Estimat	ngth, kips/sq.ft. ive Strength, kips/sq.ft ed)
		- Ŧ / "			SAMPI		RMATIO	N	<u> </u>			
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	H₂0 Depth	Remarks
										6" Asphalt Pavement		
	_		1D	V	0.6-2.6	24/22	9-13- 18-16			0.5 Dense, brown, gravelly SAND, some silt (Fi	11)	
	-		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			^{14.5} Medium dense to loose, brown, silty SAND, trace gravel, with asphalt pieces (Fill)		
	_									Bottom of Exploration at 6.6 feet		
Stratific	ation line:	s repres	ent approxi	mat	e							
bounda be grad made a Fluctua other fa measur	ry betwee lual. Wate it times ar tions of gr ictors than rements w	en soil ty er level n nd under roundwa n those p vere ma	pes, transit eadings have conditions iter may oc present at the de.	ions ve b sta cur he t	s may been ited. due to ime						BORING NO.:	B-11

									BORING LOG	BC		IO.: <u>B-12</u>
	S	SW) L F	C	LIENT: Seba	ago T	echnics, Inc.		OJECT	NO. 19-026
	E	NGINI	ΕE	ERIN	G,IN(C.	ROJECT: <u>Pr</u> OCATION: S	opos Shore	ed Road Reconstruction Road, Cape Elizabeth, Maine	- DA	TE STA	ART: <u>5/21/20</u> ISH: 5/21/20
rillina In	orma	tion										
OCATION: RILLING C	See E	Exploration W. Cole E		ation Pla	in I LLC I	ELEVATIO	ON (FT): N/A Corv Culliga	n	TOTAL DEPTH (FT): 6.6 DRILLING METHOD: Solid Stem	LOGG Auger	ED BY:	Evan Walker
IG TYPE:	Truck	Mounted Di	ied	rich D-50		AUGER ID	0/OD: <u>N/A / 4</u>	1/2 i	n SAMPLER: Standard Split-Spoor	า		
AMMER T` AMMER EI	(PE: _/ FICIEN	Automatic	DR:		ן <u> </u>	HAMMER HAMMER	WEIGHT (lbs): DROP (inch):	: <u>14</u> 30	0 CASING ID/OD: <u>N/A /N/A</u>	CORE	BARREL	
ATER LEV	EL DE	PTHS (ft):		Soils Da	mp Belov	v 4' +/-						
ENERAL N EY TO NOTE ND SYMBOL	OTES: S: ⊻ S: ⊻	ater Level At time of Dr At Completic	illin on o	g f Drilling	D = Split S U = Thin V R = Rock	Spoon Sam Valled Tube Core Samp	ple Pen. = e Sample Rec. = ble bpf =	= Pen = Rec Blows	etration LengthWOR = Weight of Rods $S_v =$ overy LengthWOH = Weight of Hammer $q_u =$ per FootRQD = Rock Quality Designation $Ø =$	Field Va Unconfir Friction A	ne Shear ned Comp Angle (Est	Strength, kips/sq.ft. rressive Strength, kip imated)
	¥	After Drilling		SAMPI	F INFO	RMATIO	r mpf =	Minu	e per Foot PID = Photoionization Detector N/A :	= Not Ap	plicable	
lev. Dep (ft) (ft)	h Casi Per	ng Sample	be	Depth	Pen./	Blow Count	Field / Lab	iphic Log	Sample Description &		H₂0 Depth	Remarks
	(50	/ No.	Ţ	(ft)	(in)	or RQD	Test Data	Gra	Classification			
									5.5" Asphalt Pavement			
		1D	Н	0.6-2.6	24/18	13-16-			^{0.5} Medium dense, light brown, SAND, some trace gravel, with asphalt pieces (Fill)	e silt,		
-			M			7-7						
			IV									
		2D	H	2.6-4.6	24/18	7-6-6-5			2.5 Medium dense to loose, light brown to br	own,	-	
-			M						tine to medium SAND, trace slit, trace gra with asphalt pieces (Fill)	avel,		
			W									
			Ŵ									
-			$\ $									
		20	Ц	1666	24/20	1122						
_	5	30	M	4.0-0.0	24/20	1-1-2-2						
			W									
			Ň									
-			$\ $									
								_				

		1								BORI	NG LOG			NO.: _	B-13
E			\mathbf{X}	($^{\sim}$	N F	- C	LIENT: Seba	ado -	Technics. In	С.		PROJEC	T NO.	19-0268
		U	. vv					ROJECT: Pr		sed Road Re	econstruction		DATE ST	ART:	5/21/2019
		EN	IGINI	ΕE	ERIN	G,IN(C.	OCATION: S	Shore	e Road, Cap	e Elizabeth, Maine		DATE FI	NISH:	5/21/2019
Drilli LOCA DRILL	ing Info Ation: _: Ling Co. Type: _t	rmati See Ex : <u>S. V</u> ruck M	on ploration V. Cole E ounted Di	Loc	ation Pla prations, ich D-50	an E LLC E	ELEVATIO DRILLER: AUGER ID	DN (FT):	n 1/2 i	n	TOTAL DEPTH (FT):	LO Stem Aug Spoon	GGED BY: ger	Evan	Walker
НАМІ	MER TYP	E: Au	utomatic			ł	HAMMER	WEIGHT (lbs)	14	10	CASING ID/OD: N/A /N/A	co	RE BARRI	EL:	
HAMI WATI	MER EFF ER LEVE	ICIENC	CY FACTO THS (ft):	DR:	Soils Da	h mp Below	HAMMER v 2' +/-	DROP (inch):	30						
GENE KEY 1	ERAL NO	TES: Wate	er Level			D = Split S	Spoon Sam	ple Pen. =	Pen	etration Length	WOR = Weight of Rods	S, = Field	d Vane Shea	ar Strengt	h, kips/sq.ft.
AND	SYMBOLS:	⊥ At L At L At	time of Dr Completic fter Drilling	illing on of	g f Drilling	U = Thin V R = Rock V = Field	Valled Tube Core Samp Vane Shea	e Sample Rec. = ble bpf = r mpf =	= Rec Blows Minu	overy Length s per Foot te per Foot	WOH = Weight of Hammer RQD = Rock Quality Designation PID = Photoionization Detector	q _u = Unco Ø = Fricti N/A = No	onfined Con ion Angle (E ot Applicable	pressive stimated)	Strength, kips/sq.ft.
					SAMPL	E INFO	RMATIO	N	bo-		Comple				
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic I		Description & Classification		H₂0 Depth		Remarks
										5" A	sphalt Pavement				
									F	0.4 <u>2" B</u> 0.6 <u>4.5</u> "	rown, silty SAND, some gravel Relic Macadam Pavement				
	-		1D		1-3	24/18	12-11-	w =3 %		0.9 Mec som	lium dense, brown, SAND and (le silt (Fill)	GRAVEL	,		
				M			9-4			1.5 Mec	lium dense, dark brown, silty SA	AND, trac	æ		
	-			X						grav	vel, trace brick (Fill)				
				$\left \right $											
	-		20		25	24/20	2442								
			20	M	5-5	24/20	2-4-4-3			3.2 Loo med	se, rust-brown to light brown, fin lium SAND, trace silt	ne to			
				W											
	- 5														
			3D	$\left \right $	5-7	24/22	3-3-4-3								
				W											
	F			Ŵ											
				$\left \right $											
				Ц					1		Bottom of Exploration at 7.0 t	feet			
											·				
Stratifi bound be gra	cation line ary betwee dual. Wate	s repres en soil ty er level r	ent approx pes, transi eadings ha	ima tion ive b	te s may been										
made Fluctu other f	at times ar ations of gr actors thar	nd unde roundwa n those j	r conditions ater may oc present at t	s sta ccur the t	ited. due to ime							Г	BORING	NO ·	B_1?
measu	irements w	/ere ma	ae.										DOMING		0-13

						-				BORING LOG	BORING NO.	: B-14
		S	\mathbf{N}	(CLIENT: Seba	go -	echnics, Inc.	PROJECT NO	D. <u>19</u> -0268
	7						_ F	PROJECT: Pro	opos	ed Road Reconstruction	DATE STAR	T: 5/22/2019
		ΓEΙΝ	GINI	ΕĔ	- K I N	G, IN (- ·]	OCATION: S	hore	e Road, Cape Elizabeth, Maine	DATE FINISH	: 5/22/2019
Drillin LOCA DRILL RIG T HAMM HAMM WATE GENE	ng Info TION: _ ING CO. YPE: _T MER TYP MER EFF R LEVEI RAL NO	rmation See Exp : <u>S. V</u> ruck M E: <u>Au</u> E: <u>Au</u> ICIENC L DEPT TES:	on ploration V. Cole E ounted Di itomatic CY FACTO THS (ft):	Loc ixplo iedr	ation Pla prations, ich D-50 Soils Da	IN E	Elevat Drillef Auger I Hammei Hammei	ION (FT):	1/2 i 1/2 i 14 30	TOTAL DEPTH (FT): 3.2 LC DRILLING METHOD: Solid Stem At n SAMPLER: Standard Split-Spoon 0 CASING ID/OD: N/A /N/A CO	DGGED BY: E	van Walker
KEY T AND S	UNOTES	<u>Wate</u> ⊻ At ⊻ At ⊻ Af	er Level time of Dr Completic ter Drilling	illing on of) Drilling	D = Split S U = Thin W R = Rock (V = Field \	poon Sar Valled Tu Core Sarr /ane She	mple Pen. = be Sample Rec. = nple bpf = E ar mpf =	Pen Rec Blows Minu	erration Length W UR = Weight of Rods S_v = Fie overy Length WOH = Weight of Hammer q_u = Un per Foot RQD = Rock Quality Designation \emptyset = Fric e per Foot PID = Photoionization Detector N/A = N	a Vane Shear Stro confined Compres tion Angle (Estima ot Applicable	ength, kips/sq.ft. sive Strength, kips/sq. ated)
					SAMPL	E INFOR	RMATIC	ON	ğ			
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Lo	Sample Description & Classification	H ₂ 0 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	X	2.8-3.1	4/4	50/4"			2.8 Medium dense, rust-brown, silty SAND, with	1	
										Refusal at 3.2 feet Probable Bedrock or Boulder		
Stratific bounda be grac made a Fluctua	cation lines ary betwee lual. Wate at times ar itions of gr	s repres in soil ty ir level re ind under roundwa	ent approx pes, transi eadings ha conditions tter may oc	timat itions ave b s sta ccur	e s may been ted. due to							
other fa measu	actors than rements w	those p rere mai	present at t de.	the t	ime						BORING NO.	: B-14

			TT.	T		I.I				BORING LOG	BORING NO.:	B-15 1 of 1
	=	S	\mathbf{W}	()LL		CLIENT: Seb	ago ⁻	echnics, Inc.	PROJECT NO.	<u>19-0268</u> 5/22/2019
		ΕN	IGIN	ΕI	ERIN	G,IN	С.		Shor	e Road, Cape Elizabeth, Maine	DATE FINISH:	5/22/2019
Drillin LOCA	ng Info	ormati See Ex	on ploration	n Lo	cation Pla	an l	ELEVAT	ION (FT): <u>N</u> /A	<u>۸</u>	TOTAL DEPTH (FT): LO	GGED BY: Evar	n Walker
DRILL		: <u>S.</u> V	V. Cole I	Expl	orations,	LLC	DRILLEF	R: Cory Culliga	n	DRILLING METHOD: Solid Stem Au	ger	
HAMM	IER TYF	PE: AL	ounted L Itomatic	Jied	rich D-50	/	HAMME	ID/OD: <u>N/A / 4</u> R WEIGHT (Ibs)	: 1/2 : 14	0 CASING ID/OD: N/A /N/A CC	RE BARREL:	
HAMM	IER EFF	ICIENC	Y FACT	OR:		I	HAMME	R DROP (inch):	30		_	
GENE	R LEVE RAL NO	L DEP1 TES:	THS (ft):		⊈5ftSo	oils Damp	o to Mois	t Below Paveme	nt, V	et to Saturated Below 5' +/-		
KEY TO AND S	O NOTES YMBOLS	<u>Wate</u> ⊻At ⊻At ⊻At	er <u>Level</u> time of D Completi ter Drilling	Drillin ion c g	g f Drilling	D = Split S U = Thin V R = Rock V = Field	Spoon Sa Walled Tu Core San Vane She	mple Pen. = be Sample Rec. = nple bpf = ear mpf =	= Pen = Rec Blows Minu	$\begin{array}{llllllllllllllllllllllllllllllllllll$	d Vane Shear Streng onfined Compressiv ion Angle (Estimated ot Applicable	gth, kips/sq.ft. e Strength, kips/sq.ft. d)
					SAMPL	E INFO	RMATIC	ON	D			
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data / PID Readings	Graphic Lo	Sample Description & Classification	H₂0 Depth	Remarks
										5" Asphalt Pavement		
										0.4 7" Relic Macadam Pavement		
	_		1D		1.2-3.2	24/18	17-10-	- PID=192 ppm		1.0 Medium dense, gray-brown, silty gravelly SAND (Fill)		
				W			11-10			*Petroleum Odor Noted*		
				X								
	_											
			2D	M	3.2-5.2	24/20	6-6-5-4	4		3.5 Medium dense to loose, gray-brown to gray, sitty fine to medium SAND, trace wood niece		
	-			X						and roots		
	- 5			$\left \right $							⊻	
			3D		5.2-7.2	24/20	2-3-3-2	2 q _P =7 ksf				
	-			W						6.0 Vary Stiff army brown sith CLAV		
				Ŵ						Very Sun, gray-brown, sing CLAT		
	_									Bottom of Exploration at 7.2 feet		
						1						
Stratific bounda be grad made a	ation line ry betwee ual. Wate t times at	s repres en soil ty er level r nd under	ent appro pes, trans eadings h condition	sitior ave ns st	ate is may been ated.							
other fa	ctors that ements v	n those p vere ma	present at	the	time						BORING NO .:	B-15

		S	S.W NGINI	(E E	CC) LE g,ing		CLIENT: Seb PROJECT: P LOCATION: S	ago ropo: Shor	BORING LOG echnics, Inc. ed Road Reconstruction Road, Cape Elizabeth, Maine	BORING NO.: SHEET: PROJECT NO. DATE START: DATE FINISH:	B-16 1 of 1 19-0268 5/22/2016 5/22/2019
DTIIII LOCA DRILL RIG T HAMM HAMM WATE GENE	TION: ING CO YPE: IER TYF IER EFF R LEVE RAL NC	See Ex See Ex Fruck M PE: <u>A</u> FICIENC L DEP DTES:	ploration N. Cole E lounted D utomatic CY FACT(THS (ft): <u>er Level</u>	Loc Explo iedr DR:	eation Pla prations, rich D-50 2 2.5 ft S	n LLC 	ELEVATI DRILLER AUGER I HAMMER HAMMER St Below	ION (FT):N/A t: _Cory Culliga D/OD:N/A / 4 R WEIGHT (lbs) R DROP (inch): Pavement, Wei mple Pen. Pace Sample Pen.	$\frac{A}{4 + 1/2}$ $\frac{1}{30}$ $\frac{1}{5 + 1/2}$ $\frac{1}{5 + 1/2}$ $\frac{1}{5 + 1/2}$	TOTAL DEPTH (FT): 7.0 LC DRILLING METHOD: Solid Stem And SAMPLER: Standard Split-Spoon O CASING ID/OD: N/A /N/A Cd turated Below 2.5' +/- Cd Cd stration Length WOR = Weight of Rods S _v = Fie	DGGED BY: Evan Iger DRE BARREL: Id Vane Shear Strem- confined Compression	n Walker
	T M DOLO	. ⊻ A ⊻ A ⊻ A	t Completion fter Drilling	on of	g f Drilling	R = Rock V = Field	Core Sam Vane She	ar mpf =	Blow: Minu	very Lengthword – weight of Hammer q_0 – onper FootRQD = Rock Quality DesignationØ = Frice per FootPID = Photoionization DetectorN/A = N	tion Angle (Estimate ot Applicable	d)
					SAMPL	E INFO	RMATIC	ON	D			
Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Lo	Sample Description & Classification	H ₂ 0 Depth	Remarks
	- 5		1D 2D 3D		1-3 3-5 5-7	24/18 24/20 24/18	4-4-5-1 2-2-3-2 9-3-3-4	w =10.9 %		 5" Asphalt Pavement 0.4 6" Relic Macadam Pavement 0.9 Loose, gray-brown, silty gravelly SAND (Fil 2.8 Loose, Gray to gray-brown with black staining, sandy SILT 5.0 Stiff, gray-brown to brown, clayey SILT and fine SAND, occasional sand layers with trac fine gravel) ⊻ æ	
Stratific bounda be grac Fluctua	ation line ry betwe lual. Wat it times a fectors tha	es repres en soil ty er level r nd unde groundwa n those	sent approx rpes, transi eadings har r condition ater may ou present at	kimat ition: ave b s sta ccur the t	te s may jeen ated. due to ime					Bottom of Exploration at 7.0 reet	BORING NO.:	B-16

• 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)
- qu 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

 $\gamma_{\rm B}$ - buoyant soil weight

Descriptio	n of Proportions:	Description	of Stratified Soils
Trace: Some: "Y" And	0 to 5% 5 to 12% 12 to 35% 35+%	Parting: Seam: Layer: Varved: Occasional: Frequent:	0 to 1/16" thickness 1/16" to ½" thickness ½" to 12" thickness Alternating seams or layers one or less per foot of thickness more than one per foot of thickness

REFUSAL: <u>Test Boring Explorations</u> - 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: <u>Test Pit Explorations</u> - 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.

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

<u>STANDARD</u> DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	L
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

ASTM C-117 & C-136

Project Name	CAPE ELIZABETH ME - SHORE ROAD PAVEMENT
	RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES
Client	SEBAGO TECHNICS, INC.

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

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

<u>STANDARD</u> 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

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

<u>STANDARD</u> DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	1
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

ASTM C-117 & C-136

Project Name	CAPE ELIZABETH ME - SHORE ROAD PAVEMENT
	RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES
Client	SEBAGO TECHNICS, INC.

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

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

<u>STANDARD</u> DESIGNATION (mm/µm)	<u>SIEVE SIZE</u>	AMOUNT PASSING (%)	l
1-0			
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

ASTM C-117 & C-136

Project Name	CAPE ELIZABETH ME - SHORE ROAD PAVEMENT
	RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES
Client	SEBAGO TECHNICS, INC.

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

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

<u>STANDARD</u> DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	1
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

