

09021

MEMORANDUM

To: Steve Sawyer, P.E.

Project Manager

From: Ken Recker, P.E.

Geotechnical Engineering Manager

Date: November 10, 2010

Subject: General Subsurface Conditions

Bayview Road Saco, Maine

This memorandum presents the general subsurface conditions for the reconstruction of Bayview Road in Saco, Maine.

Introduction

Bayview Road is located between Ferry Road and Seaside Avenue in Saco and includes an entrance to Ferry Beach State Park. The proposed project consists of adding a sidewalk on the north side and paved shoulders (for bikes) from the entrance to Ferry Beach State Park to Seaside Avenue, a distance of about 1,900 feet. Full depth reconstruction and drainage improvements on the north side are also part of the project. Bedrock is exposed on the north and south sides of the roadway for about 50 feet just east of Bay View Terrace. Sidewalk and drainage construction will require excavation of bedrock in this area.

Subsurface Explorations

On August 20, 2010, Geologic-Earth Exploration, Inc. (Geologic) of Norfolk, Massachusetts drilled 17 probes, P1 to P13 and P3A, P5A and P13A and 13B, along the roadway and entrance to Bay View Terrace. Geologic drilled the probes to depths below ground surface varying from 0.7 foot to 13.5 feet. Sebago Technics, Inc. (Sebago Technics) monitored the probes and prepared the logs included as Appendix A. Table I summarizes the results of probes. Geologic backfilled the probes with the drilled soil and placed a bituminous concrete patch at the surface at probes in the roadway.

Probes were drilled using a 1.625-inch diameter geoprobe using direct push to advance the geoprobe. Continuous soil samples were recovered for identification and classification.

Sebago Technics estimated the locations of test probes by correlation with field conditions.

The test probe logs and related information depict subsurface conditions and water levels only at their specific locations at the time indicated on the logs. Soil conditions at other locations may differ from conditions at these locations. Also, the passage of time may result in a change in groundwater conditions at exploration locations.

Subsurface Conditions

The test probes encountered five principal soil units overlying bedrock at the site: fill, marine sand, marine clay, glacial till and weathered bedrock. Encountered thickness and generalized descriptions of the soil units are presented below in order of increasing depth below ground surface. Due to the complexity of the deposition process, strata thickness will vary and may be absent at specific locations. Bituminous concrete in the roadway varied in thickness from 5 inches to 7 inches.

Fill – Fill consists of brown to dark brown well-graded SAND with gravel (SW); to tan silty SAND with gravel (SM) in the roadway and brown silty SAND with gravel (SM); to brown to tan poorly-graded SAND (SP) at the Bay View Terrace entrance and the vicinity of the rock exposure. Encountered thickness varies from 0.6 foot to 3.0 feet.

Marine Sand - The marine sand deposit consists of gray brown to gray to rust brown to tan poorly-graded SAND (SP). Encountered thickness varies from 0.5 foot to greater than 7.0 feet.

Marine Clay – Marine clay consists of gray to gray brown mottled lean CLAY (CL). Probes penetrated up to 4.8 feet into clay.

Glacial Till – Glacial till consists of brown to gray silty SAND with gravel (SM); to brown well-graded SAND with gravel (SW); to gray brown sandy SILT (ML). Encountered thickness varies from 0.3 foot to 7.0 feet.

Weathered Bedrock – Weathered bedrock consists of bedrock that has been weathered to sand and gravel size pieces of rock. Encountered thickness varies from 0.1 foot to 1.5 feet.

Sound bedrock was encountered in the probes at depths below ground surface varying from 0.7 foot to 13.5 feet.

We mapped the exposed bedrock face approximately between Sta. 119+50 and Sta. 120+00. There is a major joint set with a strike that is approximately parallel to Bayview Road that dips into the rock face at 60 degrees to 85 degrees. The bedrock consists of fine grained, gray PHYLLITE (with muscovite-chlorite-quartz-plagioclase) interbedded with dark gray crenulated muscovite-chlorite PHYLLITE with traces of calcite and relict quartz grains.

Groundwater was encountered in the probes at depths below ground surface varying from 3.3 feet to 7.5 feet. Observations of water were made over a relatively short period of time and may not reflect the stabilized groundwater level. In addition, water levels will vary with precipitation, season, temperature and construction activity in the area. Therefore, water levels during and following construction will vary from those observed in the probes.

Geotechnical Considerations

Pavement Section

In our opinion, the existing fill and naturally deposited, inorganic soils encountered below the roadway are suitable for support of the reconstructed roadway, sidewalk and drainage improvements.

We understand that on August 12, 2010, the MaineDOT recommended a pavement section consisting of:

4 inches of hot mix asphalt placed in two layers (1.5 inches top and 2.5 inches base) 16 inches of gravel subbase, MaineDOT, Section 703.06b, Type D

We concur with this recommended pavement section.

We recommend that the sidewalk section consist of:

2 inches of hot mix asphalt 12 inches of gravel subbase, MaineDOT, Section 703.06b, Type D

Subbase course material should be placed in maximum 8-inch thick loose lifts and compacted at approximately optimum moisture content to a dry density of at least 95 percent of maximum dry density, as determined in accordance with AASHTO Test Designation T180.

Rock Excavation

Based on our observation of the exposed bedrock, it is our opinion that rock excavation will require systematic drilling and blasting for rock removal. Based on the observed strike and dip of the bedrock in the exposed face between Sta. 119+50 and 120+00, we anticipate that bedrock will break along joints that are approximately parallel to Bayview Road and dip into the excavation at relatively high angles. This will likely create unacceptable overhangs in the rock face. We recommend the rock be excavated using controlled blasting techniques such as line drilling the rock to be removed at an angle of 1 horizontal to 4 vertical back from the roadway. We anticipate that drill holes should be spaced at 12 inches to 18 inches on center. We recommend that the contractor prepare a blasting plan for rock excavation and submit to the MaineDOT for review and comment prior to the start of blasting.

The contractor should conduct all blasting activities in accordance with Section 105.2.6 of the Standard Specifications. In addition, the contractor should conduct all blasting activities in such a manner that the peak particle velocity of ground vibration measured at the location of the nearest structures to the blast does not exceed the "safe limits" recommended by the U.S. Bureau of Mines as presented in Figure B-1 in Appendix B of BUMINES RI 8507 and the peak airblast overpressure measured at the location of the nearest aboveground occupied structures to the blast (considering wind direction) does not exceed 0.014 pounds per square inch. The contractor should control flyrock with the use of blasting mats.

If you have questions or need more information, please contact me.

APPENDIX A

Logs of Test Probes

TABLE I SUMMARY OF PROBES BAYVIEW ROAD SACO, MAINE

	Locat	ion			Depth			S	trata Th	ickness (Ft	:)		Approx.
				GS	to								El. Top
Probe			Depth	El.	Water	Bit.				Glacial	Weathered		of Rock
No.	Station	Offset	(Ft)	(Ft)	(Ft)	Concrete	Fill	Sand	Clay	Till	Bedrock	Bedrock	(Ft)
P1	102+28	5 LT	4.8	21.5	NE	0.4	2.6			0.3	1.5	0.0*	16.7
P2	105+12	5 LT	10.0	19.8	3.3	0.6	1.4	6.8	1.2*				
P3	108+32	5 LT	3.9	21.8	NE	0.4	2.1	1.4*		-			
P3A	108+32	6.5 LT	6.1	21.8	NE	0.4	2.1	3.2		0.4*			
P4	111+27	5 LT	10.0	21.5	6.0	0.5	2.0	5.5	2.0*	-			
P5	114+07	7 LT	3.5	18.2	NE	0.4	2.6	0.5*		1			
P5A	114+07	9 LT	10.0	18.7	4.0	0.4	2.6	7.0*		1			
P6	117+13	7 LT	13.5	18.7	7.5	0.4	0.4	5.7		7.0		0.0*	5.2
P7	120+25	5 LT	9.8	14.0	NE	0.5	2.5	2.0	4.8*	1			
P8	122+84	5 LT	3.3	10.7	NE	0.4	2.2	0.7*		1			
P9	118+64	29 LT	4.0	18.5	NE		3.0	1.0*		1			
P10	118+87	27 LT	8.5	19.0	NE		3.0	1.0		4.5*			
P11	119+17	24 LT	8.1	18.0	NE		3.0	5.0		1	0.1	0.0*	9.9
P12	119+37	25 LT	2.6	18.0	NE		0.6	2.0*		1			
P13	119+98	22 LT	0.7	15.0	NE		0.7			-		0.0*	14.3
P13A	119+98	20 LT	1.5	15.0	NE		1.0	0.5				0.0*	13.5
P13B	119+95	21 LT	1.5	15.0	NE		1.0	0.5				0.0*	13.5

NOTES:

- 1. NE INDICATES GROUNDWATER NOT ENCOUNTERED WITHIN DEPTH OF PROBE.
- 2. -- INDICATES STRATUM NOT ENCOUNTERED WITHIN DEPTH OF PROBE.
- 3. * INDICATES DEPTH OF PENETRATION INTO STRATUM.

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Hammer Fa	Sampler	Sample No. & Recovery	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)		Visual-M (density/consistency, colo	Cutting Head **Annual Identification & Deor, GROUP NAME & SYMBO sture, optional descriptions, g	Drilling Notes: escription b., maximum particle size*,		None avel		and Wedium Wediu	% Fines	Dilatancy Toughness	d Tes	
_ 0 _		(in.)			0.4	SM		-BITUMINOUS CONCRET		%			0 15		Dila	Plax	Stre
					3.0 3.3 3.9	SM		-FILL- mps = 0.3 in., damp -GLACL silty sand, damp -W. BEDR		<u> </u>	10	20 1:	5 40	15		<u> </u>	
– 5 –					4.8		Gray weathered rock fragm Geoprobe refusal at 4.8 ft.	ents, dry -WEATHERED BEDROCK likely on bedrock.		+			+			Ė	
							Bottom of exploration at 4.	8 ft. below ground surtace									
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- 0 -					0.6	SW	Brown and gray-brown we	-BITUMINOUS CONCRET		10	5	35 2	0 25	5	H	+	+
					2.0		concrete fragments, mps =		,							_	\blacksquare
						SP	Gray-brown poorly-graded	d SAND (SP), mps = 0.1 in., o -MARINE DEPOSITS-	lamp			1	0 90				\vdash
					3.8	SP	Gray poorly-graded SANI occasional clay varves to s	O (SP), mps = 0.1 in., trace or	ganics, wet,			5	90	5		1.	\equiv
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					7.7	SP	Rust-brown poorly-graded	SAND (SP), mps = 0.1 in., v	vet			5	95			-	-
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				3.5	3.3	Ğ	Geoprobe	△▼ Concrete Bentonite Seal	PROBE NO.				P	2			
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_ 0 _					0.4	SW	Brown well-graded SANI	-BITUMINOUS CONCRET O with gravel (SW), mps = 1.0		10	5	35 20	25	5		<u></u>	
					2.5	SP	Rust-brown to red-brown	-FILL- poorly-graded SAND (SP), m -MARINE DEPOSITS-	ps = 0.1 in., dry			10	90			$ \pm $	
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- 0 -					2.5	SW	Brown well-graded SAND	-BITUMINOUS CONCRET with gravel (SW), mps = 1.0 -FILL-	in., dry	10		35 2	0 25			
_ 5 _					4.0 5.0 5.7	SP SP SP SW	Brown poorly-graded SAN damp Gray-brown poorly-graded	oorly-graded SAND (SP), m -MARINE DEPOSITS- D (SP), slight organic odor, MARINE DEPOSITS- SAND (SP), mps = 0.1 in., with gravel (SW), mps = 1.5	mps = 0.1 in., damp in., wet	10	5	10	0 90 0 90 5 95 0 65			
					6.1		Geoprobe refusal at 6.1 ft.	-GLACIAL TILL DEPOSIT								
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Date	Time	Water Le Elapsed Time (hr.)	Bottom of Casing	Bottom of Hole	Water Dry	O T U S G	Sample ID Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample Geoprobe	Well Diagram Riser Pipe Screen Filter Sand Grout Grout Concrete	Overburden (Linea Rock Cored (Linea Number of Sample PROBE NO.	r ft.)	Su	ımma		6.1		
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					1.0	sw	Black well-graded SAND fragments, mps = 1.5 in.,	with gravel (SW), bituminous dry -FILL-	concrete	10		25 25	5 30	5	$\exists \bot$	+	1
					2.5	sw		D (SW), bituminous concrete fr -FILL-	agments, mps =	5	5 3	30 25	5 30	5	_	#	Τ.
					۷.3	SP		-FILL- O (SP), mps = 0.1 in., rusty disc	colorations			5	95		\mp	\ddagger	‡
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					6.0	SP	Light gray poorly-graded	SAND (SP), mps = 0.1 in., da	mp	-		5	95	 	_	‡	<u>.</u>
					0.0			-MARINE DEPOSITS-					\pm		#	\pm	
					8.0	CL		occasional sand seams and silt v	arves, mps = 0.02	- +	}	<u></u>	10	90	N M	1 M	+
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Inside Dian Hammer W		+	1.625	5	A1		Geoprobe Air Track	Winch Roller Bit	Doughnut Automatic	_	Polym None		Dire	ect pus	h/3.5	_	
Hammer Fa			ightharpoonup		Sk		 	Cutting Head	Drilling Notes:	Gra		San	_	\equiv	- Fie	eld Te	304
Depth (ft.)	Sampler Blows per 6 in.		Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, co	-Manual Identification & De olor, GROUP NAME & SYMBO oisture, optional descriptions, g	L, maximum particle size*,	98	% Coarse			% Fines		Toughness Plasticity	
0 —					0.4	SW SW		-BITUMINOUS CONCRET (SW), mps = 0.4 in., dry -FII SAND with gravel (SW), mps	LL-	15	10 30 15 30	15 0 10	55 20	10	_	+	+
					3.0		bituminous concrete, dry	-FILL-								⇟	
					3.5	SP		ed SAND (SP), mps = 0.1 in., of codor, wet -MARINE DEPC t. possibly on boulder.		+	#	5	95		\pm	#	#
5								3.5 ft. below ground surface								#	
																#	
— 10 —																#	
																+	
												F					-
– 15 –												#				#	#
																ŧ	#
— 20 —																#	+
																Ŧ	
																Ŧ	
— 25 —																#	\pm
		+														#	
— 30 —																#	\pm
		Water L	evel Data			<u> </u>	Sample ID	Well Diagram	<u></u>	<u> </u>	Sum	nmary	ᆜ		<u></u>	_	<u> </u>
Date	Time	Elapsed Time (hr.)	Dottom of	Bottom of Hole	to: Water	O T U S	Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample	Riser Pipe Screen Filter Sand Cuttings Grout	Overburden (Line Rock Cored (Line Number of Sampl	ar ft.)				3.5		_ _	
Field	d Tests	Dilatancy:		apid S - Slov		G ne	Geoprobe Plasticity:	Concrete Bentonite Seal N - Nonplastic L	PROBE NO.				P5			_	
		Toughness	*N0		um Particle	Size is det	termined by direct obse	I - None L - Low M - M ervation within the limitation USCS system as practice	ons of sampler size.		iign	_	_			<u>=</u>	

SEBAGO TECHNI INC.						PR	OBE REPO	RT							ве N 25 A		
PROJECT LOCATION CLIENT CONTRAC DRILLER	N	-	INE EPARTMENT C-EARTH EX	Γ OF TRANS! XPLORATIO		N			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. E	21 RECK	EPHE 0	NSON		of	
Elevation Item	18.7	7 ft. Casing	Datum Samp	ler Core Ba		Location			Hammer Type	Dril	ling l	Mud	Ŧ	Casi	ng Ad	lvanc	e
Type Inside Dian	neter (in.)		G 1.62:		Tr	uck	Tripod [Cat-Head Winch	Safety [Doughnut	7	_	tonite		Type I	Metho	d De	
Hammer W	eight (lb.)		1.0-	,	☐ Tr	ack [Roller Bit	Automatic	7	Non	е		tti p	di iv.		
Hammer Fa		Sample	 		Sk	id _		Cutting Head	Drilling Notes: 2.0 ft.		of P5 avel		and	T	Fie	eld To	est
Depth (ft.)	Sampler Blows per 6 in.	No &	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, col	Manual Identification & De lor, GROUP NAME & SYMBOI isture, optional descriptions, ge	L, maximum particle size*,	% Coarse	% Fine	% Coarse	% Medium % Fine	% Fines		Toughness	
- 0 -					0.4	SW SW	Black well-graded SAND (Gray-brown well-graded S	-BITUMINOUS CONCRETI (SW), mps = 0.4 in., dry -FII AND with gravel (SW), mps =	LL-	15			15 55 10 20				-
					3.0	SP		-FILL- SAND (SP), mps = 0.1 in., b	lack organic seam			5	5 95				
_ 5 _					4.0	SP	from 3.4 to 3.9 ft., wet -N Brown poorly-graded SAN			 		5	5 95	<u> </u>		+-	
								-MARINE DEPOSITS-									
					8.5	SW		AND with gravel (SW), mps = -GLACIAL TILL DEPOSITS		5	10	25 2	20 40			+	
— 10 —							Bottom of exploration at 10 No refusal	0.0 ft. below ground surface		†-			_			<u>-</u>	
– 15 –																	
20																	
— 25 —																	
20																	
— 30 —		Water L	evel Data				Sample ID	Well Diagram				ımma				工	工
Date	Time	Elapsed Time (hr.)		Bottom of Hole	Water	0 T U S	Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample	Riser Pipe Screen Filter Sand Cuttings Grout	Overburden (Linear Rock Cored (Linear Number of Samples	ft.)	5 u	imma	iry	10.0			
Field	d Tests	Dilatancy:	R - Ra	pid S - Slov	w N - Non-	G e	Geoprobe Plasticity:	Concrete Bentonite Seal N - Nonplastic L -	PROBE NO.				P5	δA			
		Toughness	*N(ım Particle	Size is det	ermined by direct obse	 None L - Low M - Me rvation within the limitation JSCS system as practiced 	ons of sampler size.		ngH		_			_	_

SEBAGO TECHNI						PR	OBE REPO	RT							ве NC Р6).	
INC. PROJECT LOCATION CLIENT CONTRAC DRILLER	N		INE EPARTMENT C-EARTH EX			V			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B	21 RECKI	PHE	NSON			1
Elevation Item Type Inside Diam Hammer We			Datum		Boring arrel Rig Mal Tru ATV	ıck _ V ✓	el Geoprobe GH-41 Tripod Geoprobe	Cat-Head Winch Roller Bit	Hammer Type Safety Doughnut Automatic		ling N	Mud tonite mer		Type I	ng Adv Method sh/13.5		
Hammer Fa		Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	_	Visual-I	Cutting Head Manual Identification & Dolor, GROUP NAME & SYMBO isture, optional descriptions, g	L, maximum particle size*,	Coarse	avel	% Coarse		% Fines	Dilatancy Toughness	Plasticity Plasticity	
_ 0 _					0.4	SW	Dark brown to black well- mps = 0.4 in. Tan poorly-graded SAND	-BITUMINOUS CONCRET graded SAND (SW), bitumine -FILL- (SP), mps = 0.1 in., dry		%		30 20	0 25	10		<u> </u>	Ö
- 5 -								-MARINE DEPOSITS-									
					6.5	ML	Gray-brown sandy SILT (ft., trace clay, mps = 0.2 in	ML), trace clay, coarse sand s	eam 6.5 to 6.7			5	35	60			
_ 10 _								-GLACIAL TILL DEPOSIT	S-								
					12.0	SM	Gray silty SAND with gra	vel (SM), bonded, mps = 1.5 -GLACIAL TILL DEPOSIT		15	10	20 10	30	15			
— 15 —							Geoprobe refusal at 13.5 f Bottom of exploration at 1	t. 3.5 ft. below ground surface									
_ 20 _																	
_ 25 _																	
																#	
30		Water L	evel Data				Sample ID	Well Diagram	ı		Su	mmai		上	Ш	工	L
Date	Time	Elapsed Time (hr.)		Bottom of Hole	Water	O T U S G	Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample Geoprobe	Riser Pipe Screen Filter Sand Cuttings Grout Variable Concrete	Overburden (Linea Rock Cored (Linea Number of Sample PROBE NO.	r ft.)		filina		13.5			- - -
Field	d Tests	Dilatancy: Toughness	s: L-Low *NO		m H - High ım Particle S	e n Size is det	Plasticity: Dry Strength: Nermined by direct obse	Bentonite Seal	- Low M - Medium H edium H - High V - Vons of sampler size.	Very I			P	3	_		

SEBAGO TECHNI						PR	OBE REPO	RT							ве NO Р 7) .	
INC. PROJECT LOCATION CLIENT CONTRAC DRILLER	N		INE EPARTMENT C-EARTH EX	Γ OF TRANSI KPLORATIO		ı			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B	21 RECK	EPHEI	NSON		<u></u>	1
Elevation Item Type Inside Diam Hammer Wo	eight (lb.)	ft. Casing	Sampl G 1.625		Arrel Rig Ma	ck V ck	el Geoprobe GH-41 Tripod Geoprobe	_		Dril		tonite mer			ng Adv Method sh/9.8		
Hammer Fa	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, colo	Cutting Head lanual Identification & Department of the Department of the Country	L, maximum particle size*,	% Coarse	evel %		w Medium % Fine	% Fines	Dilatancy Jai	Plasticity Last	
0 -					0.5	SW SW	Gray well-graded SAND w	BITUMINOUS CONCRET ith gravel (SW), mps = 0.75 i with gravel (SW), mps = 1.5	n., dry -FILL-	10			0 40				
_ 5 _					5.0	SP		SP), mps = 0.1 in., dry -MARINE DEPOSITS- LAY (CL), frequent sand sea trace rock fragments at 9.8 ft	<u> </u>			1	10		N M	M	
					9.8			-MARINE DEPOSITS-									
10					,,,		Geoprobe refusal at 9.8 ft. Bottom of exploration at 9.	8 ft. below ground surface									
— 15 —																	
20																	
25																	
— 30 —																	
Date	Time	Water Le Elapsed Time (hr.)	Bottom of Casing	Bottom of Hole	Water Dry	O T U S G	Sample ID Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample Geoprobe	Well Diagram ☐ Riser Pipe ☐ Screen ☐ Filter Sand ☐ Cuttings ☐ Grout ☐ Concrete	Overburden (Linea Rock Cored (Linea Number of Sample PROBE NO.	r ft.)	Su	imma		9.8			 -
Field	l Tests	Dilatancy: Toughness	s: L - Low *NO		m H - High ım Particle S	ize is det	Plasticity: Dry Strength: Nermined by direct obser	Bentonite Seal	Low M - Medium H edium H - High V - Yons of sampler size.	Very I			P	7		_ _	_ _

SEBAGO TECHNI						PR	OBE REPO	RT				Ī			BE NO P8).	
INC. PROJECT LOCATION CLIENT CONTRAC DRILLER	N		INE EPARTMENT C-EARTH EX	T OF TRANSI XPLORATIO!		4			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B	21 RECK	EPHEN	NSON	of		1
Elevation Item Type Inside Diam Hammer We			Datum		Boring arrel Rig Mal Tru ATV	uck _	Geoprobe GH-41 Tripod Geoprobe	Cat-Head Winch Roller Bit		Dril	lling I	Mud tonite /mer			ng Adva Method sh/3.3		
Hammer Fa	Sampler	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, col	Cutting Head Manual Identification & D lor, GROUP NAME & SYMBC isture, optional descriptions, g	L, maximum particle size*,	% Coarse	avel %		Medium Wedium % Fine	% Fines	Dilatancy Jej J	d Te:	
- 0 -					0.4	GW SW	Gray well-graded GRAVE	-BITUMINOUS CONCRET L with sand (GW), mps = 1.5 with gravel (SW), mps = 1.5 -FILL-	5 in., dry -FILL-				5 30				8
5 <u> </u>					3.3	SP	Geoprobe refusal at 3.3 ft.	graded SAND (SP), mps = 0. -MARINE DEPOSITS- possibly on boulder. .3 ft. below ground surface	I in., damp			10	0 90				
5 -																	
_ 10 _																	
— 15 —																	
20																	
25																	
_ 30 _		Water L	evel Data				Sample ID	Well Diagram			Su	ımmaı	ry				
Date	Time	Elapsed Time (hr.)		Bottom of Hole	Water Dry	0 T U S G	Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample Geoprobe	Riser Pipe Screen Filter Sand Cuttings Grout Concrete	Overburden (Linea Rock Cored (Linea Number of Sample	ar ft.)	- - -			3.3			- - - -
Field	d Tests	Dilatancy: Toughness	s: L-Low *NO		ım H - High um Particle S	e n Size is det	Plasticity: Dry Strength: N	Bentonite Seal	- Low M - Medium H ledium H - High V - ions of sampler size.	Very			P	<u>-</u>			_ _

MAYON MATERIAL MAYO	SEBAGO TECHNI						PR	OBE REPO	RT							ве NO Р 9).	
Continue	LOCATION CLIENT CONTRAC	N	SACO, MAI MAINE DE GEOLOGIO	INE EPARTMENT C-EARTH EX			N			PROJECT MGR. FIELD REP. DATE STARTED		K. R K. B 8/20/	21 RECKI 3. STE 0/2010	ER EPHEI				1
Sample No. A Samp	Item Type Inside Diam Hammer We	neter (in.) eight (lb.)		Sampl G		Arrel Rig Mal	ke & Mode lick	el Geoprobe GH-41 Tripod Geoprobe	Cat-Head Winch Roller Bit	Safety [Doughnut [Automatic]]] /	Bent Polyi	tonite mer		Type N	Nethod		
SM SM SM SM SM SM SM SM		Sampler Blows per 6	No. & Recovery			Stratum Change	uscs	(density/consistency, co	Manual Identification & D	escription DL, maximum particle size*,	Gra	T I			% Fines		2	
Signature State	0 -						SM	Brown silty SAND (SM),	roots, mps = 0.2 in., dry									
Section of exploration at 4.0 ft. helow ground surface							SP	Brown poorly-graded SAN	ID (SP), mps = 0.1 in., dry				10) 90				
25 - Water Level Data. Date Time Elapsed Time (Irr.) Sample D. Sample	_ 5 _									rd rock pieces.								
25 - Water Level Data. Date Time Elapsed Time (Irr.) Sample D. Sample																		
20 - 20 - Water Level Date Sample ID Sample ID Well Diagram Summary 1 1 1 1 1 1 1 1 1	— 10 —																	
25 - Water Level Data Date Time Elapsed Time (hr) Elapsed																		
Date Time Elapsed Time (hr.) Bottom of Time (hr.) Bottom of Time (hr.) Bottom of Time (hr.) Bottom of Hole Time (hr.) Bottom of Bottom of Hole Time (hr.) Time Time (hr.) Bottom of Bottom of Hole Time (hr.) Time Time (hr.) Bottom of Bottom of Hole Time (hr.) Time Time (hr.) Time Time (hr.) Time Time (hr.) Time (hr.) Time Time (hr.) Time	— 15 —																	
Date Time Elapsed Time (hr.) Bottom of Time (hr.) Bottom of Time (hr.) Bottom of Time (hr.) Bottom of Hole Time (hr.) Bottom of Bottom of Hole Time (hr.) Time Time (hr.) Bottom of Bottom of Hole Time (hr.) Time Time (hr.) Bottom of Bottom of Hole Time (hr.) Time Time (hr.) Time Time (hr.) Time Time (hr.) Time (hr.) Time Time (hr.) Time																		
Normal N	20																	
Normal N																		
Normal N	25																	
Mater Level Data																		
Mater Level Data	30																	
Pate Pipe Elapsed Time (hr.) Bottom of Casing Phole Ph	30		Water Le	evel Data				Sample ID	Well Diagram			Su	mmar	ry	ш		上	
G Geoprobe G Geoprobe G Geoprobe G Geoprobe Field Tests Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High	Date	Time	Elapsed	De Bottom of	Bottom of	Water	T U	Open End Rod Thin Wall Tube Undisturbed Sample	Riser Pipe Screen Filter Sand Cuttings	Rock Cored (Linear	ft.)	<u></u>						- - -
*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.	Field	l Tests	Dilatancy: Toughness	s: L - Low	M - Mediu	w N - None m H - High	G	Geoprobe Plasticity: Dry Strength: N	Concrete Bentonite Seal N - Nonplastic L - None L - Low M - M	- Low M - Medium H - ledium H - High V - V			_	P	9			_ _

SEBAGO TECHNI		PROBE REPORT										PROBE NO. P10 Page 1 of 1								
INC. PROJECT LOCATION CLIENT CONTRAC DRILLER	N		INE EPARTMENT C-EARTH EX	Γ OF TRANSI XPLORATIO		1			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B	21 RECKER 3. STEPHENSON 0/2010								
Elevation Item Type Inside Dian	19.0	0 ft. Casing	Sample G 1.625				el Geoprobe GH-4 ² Tripod		Hammer Type Safety Doughnut	Dril	ling N Bent Poly	tonite		Casii Type M		d De				
Hammer W Hammer Fa	eight (lb.)	+	1.02.	<u>'</u>	Tra	ick	Air Track Roller Bit Automatic Cutting Head Drilling Notes: in island							ect pa.	11/0.0					
	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, consistency, consisten	-Manual Identification & D olor, GROUP NAME & SYMBC oisture, optional descriptions, g	escription DL, maximum particle size*,		avel %	% Coarse		% Fines		Toughness Flasticity				
0 -					3.0		Brown poorly-graded SA 0.1 in., dry	, roots, mps = 0.1 in., dry -TOPSOIL/FILL- ND (SP), trace silt, brick fragu -FILL- ND (SP), mps = 0.1 in., dry	nents, mps =			10	5 80	15						
– 5 –					4.0	SP SM		ND (SP), mps = 0.1 in., dry -MARINE DEPOSITS- gravel (SM), mps = 1.5 in., dry	,	10	10	20 10	0 90				+			
					8.5			-GLACIAL TILL DEPOSIT	'S-											
— 10 —							Geoprobe refusal at 8.5 fi Bottom of exploration at	t. 8.5 ft. below ground surface												
— 15 —																				
_ 20 _																				
_ 25 _																				
— 30 —													Ŧ			#	\pm			
Date	Time	Water Le Elapsed Time (hr.)	evel Data De Bottom of Casing	Bottom of Hole	Water Dry	0 T U S G	Sample ID Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample Geoprobe	Well Diagram Riser Pipe Screen Filter Sand GO Cuttings Grout AT Concrete	Overburden (Linea Rock Cored (Linea Number of Sample PROBE NO.	near ft.)										
Field	Field Tests Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High **NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size. NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.																			

SEBAGO TECHNI INC.	CS,														PROBE NO. P11 Page 1 of 1							
PROJECT LOCATION CLIENT CONTRAC DRILLER	N		INE PARTMENT C-EARTH EX	OF TRANS		I			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED	09021 K. RECKER K. B. STEPHENSON 8/20/2010 8/20/2010												
Elevation	18.0		Datum			Location	Sta. 119+17, 24 LT el Geoprobe GH-41			D ::					_							
Item Type		Casing	Samp G	ler Core Ba	arrel Rig Mal	Hammer Type Safety	Drill		Mud tonite	9		sing A										
Inside Dian			1.62	5	ATV Geoprobe Winch Doughnut							mer		irect p								
Hammer W Hammer Fa			-		☐ Tra		Air Track	Roller Bit Cutting Head	Automatic Drilling Notes:	/	Non	е			—			_				
		Sample						out.ing rious	Jg . totoo.	Gra	ivel	S	and		Ш	ield	Tes	st				
Depth (ft.)	Sampler Blows per 6 in.	No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, co	Manual Identification & C lor, GROUP NAME & SYMBO isture, optional descriptions,	DL, maximum particle size*,	% Coarse	% Fine	% Coarse	% Medium	% Fines	Dilatancy	Toughness	Plasticity	Strength				
– 0 –					0.6			roots, mps = 0.1 in., dry -TC ravel (SM), mps = 1.0 in., dr		10	10	20	5 8 15 3	0 15	<u>_</u>							
					3.0			-FILL-							Ŧ							
					4.0	SP	Brown poorly-graded SAN	ND (SP), mps = 0.1 in., dry -MARINE DEPOSITS-				-	5 9:	5	Ŧ							
– 5 –						SM	Gray-brown silty SAND v seam from 7.2 to 8.0 ft., o	with gravel (SM), mps = 1.5 i damp	n., clayey sandy	10	10	30	5 2:	5 20	Ŧ							
								-GLACIAL TILL DEPOSI	ΓS-						Ė							
					8.0 8.1			-WEATHERED BEDROC	K-						Ŧ							
— 10 —							Geoprobe refusal at 8.1 ft. Bottom of exploration at 8.1 ft. below ground surface								Ŧ							
															ŧ							
_ 15 _															<u> </u>							
															Ė							
_ 20 _															Ŧ							
_ 25 _															_							
															E							
															_							
															#							
— 30 —										L					士							
Date	Time	Water Le	Bottom of	epth in feet Bottom of	to: Water	Sample ID Well Diagram Summa						ary	8.0									
		. ,	Casing	Hole	Dry	U S G	Undisturbed Sample Split Spoon Sample Geoprobe	Cuttings Grout Concrete	Number of Samples PROBE NO.		•		P									
Field	I Tests	Dilatancy: Toughness	: L - Low	pid S - Slov M - Mediu	m H - High				- Low M - Medium H - Nedium H - High V - V						<u> </u>							
									ed by Sebago Technics,	inc.					—			_				

	SEBAGO TECHNICS, INC. PROBE REPORT											Pa	O. of	1			
PROJECT LOCATION CLIENT CONTRAC DRILLER	N	GEOLOGIC J. FERREIR	INE EPARTMENT C-EARTH EX RA	T OF TRANSI KPLORATIO		1			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		09021 K. RE K. B. 8/20/2 8/20/2	ECKEI STEP 2010	R	SON			
Elevation Item Type Inside Diam		0 ft. Casing	Sample G 1.625		Arrel Rig Mal	/ [□	Tripod Geoprobe	Cat-Head Winch	Hammer Type Safety Doughnut		ling Mu Bento Polym	nite	Т		ng Adv Method h/2.6		
Hammer We Hammer Fa	<u> </u>				☐ Tra		Air Track	Roller Bit Cutting Head	Automatic Drilling Notes: 12.0 ft.		None h of nor	rth eds	re of I	navem	ent	_	
	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)					San Wedium %	d			Plasticity Dlasticity	
0 -					0.6	SM SP		roots, mps = 0.1 in., dry -TOF (SP), mps = 0.02 in., dry, rusi -MARINE DEPOSITS-				5		15 10			
					2.6		Geoprobe refusal at 2.6 ft. Bottom of exploration at 2										
_ 5 _																	
10																	
— 15 —																	
20																	
25																	
_ 30 _		Water Lo	evel Data				Sample ID	Well Diagram	T		Sum	nmary					
Date	Time	Elapsed Time (hr.)	Bottom of Casing	Bottom of Hole	Water Dry	0 T U S G	Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample	Riser Pipe Screen Filter Sand Cuttings Grout	Overburden (Linear Rock Cored (Linear Number of Samples	ft.)				2.6			
Field	I Tests	Signature Seal P12											<u> </u>				

TECHNI	SEBAGO TECHNICS, NC. PROBE REPORT												PROBE NO. P13 Page 1 of								
PROJECT LOCATION CLIENT CONTRAC DRILLER	N	GEOLOGIO J. FERREIR	INE PARTMENT C-EARTH EX A	OF TRANS		1			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B.		R								
Elevation Item Type Inside Dian		Casing	Samp G 1.62		Arrel Rig Mal	√ [<u>-</u>	del Geoprobe GH-41 Hammer Type ☐ Tripod ☐ Cat-Head ☐ Safety ☐ ☑ Geoprobe ☐ Winch ☐ Doughnut ☐					flud onite mer	Т	Casir Type N							
Hammer W Hammer Fa		<u> </u>			☐ Tra		Air Track Roller Bit Cutting Head		Automatic Drilling Notes:	√	None	-	<u> </u>								
	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)					% Coarse % Medium		% Fines	Dilatancy Touchness	l ougnness Plasticity					
- 0 -					0.7	SM	Brown silty SAND with gra	avel (SM), roots, mps = 1.0 in -FILL-	., dry	10	10	10 5	50	15		-					
_ 5 _							Geoprobe refusal at 0.7 ft. l Bottom of exploration at 0.7														
10																					
— 15 —																					
_ 20 _																					
25																					
— 30 —		Weterl					Committe ID	Well Discussion			Щ		ш		丄	丄					
Date	Time	Elapsed Time (hr.)	Bottom of Casing	Bottom of Hole	Water Dry	O T U S G	Sample ID Open End Rod Thin Wall Tube Undisturbed Sample Split Spoon Sample Geoprobe	Well Diagram Riser Pipe Screen Filter Sand GO Cuttings Grout V Concrete	Overburden (Linea Rock Cored (Linea Number of Sample PROBE NO.	d (Linear ft.) Samples											
Field	Field Tests Dilatancy: R - Rapid S - Slow N - None Plasticity: N - Nonplastic L - Low M - Medium H - High Toughness: L - Low M - Medium H - High TNOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size. NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.																				

SEBAGO TECHNICS, INC. PROBE REI								RT		PROBE NO. P13A Page 1 of 1								
PROJECT LOCATION CLIENT CONTRAC DRILLER	N	GEOLOGIO J. FERREIR	INE PARTMENT C-EARTH EX A	OF TRANSI		N			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B	21 ECKI	ER EPHEN	NSON				
Elevation Item Type Inside Dian	15.0 neter (in.)	Casing	Samp G 1.62:				Tripod	Cat-Head Winch	Hammer Type Safety Doughnut	Dril	ling I Bent Poly	tonite		Casir Type N				
Hammer We Hammer Fa					☐ Tra		Air Track	Roller Bit Cutting Head	Automatic Drilling Notes: 10.5 ft.	/ port	Non		dge of	noven	ont			
	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)						ınd			Plasticity Dla		
0 -					1.0	SM SP		ravel (SM), roots, mps = 1.0 ir -FILL- ND (SP), mps = 0.1 in., dry -M		10	10		5 50 0 90	15		_		
							Geoprobe refusal at 1.5 ft.											
_ 5 _																		
— 10 —																		
— 15 —																		
— 20 —																		
— 25 —																		
— 30 —																		
Date	Time	Elapsed Time (hr.)	Bottom of Casing	Bottom of Hole	Water	0 T U	Open End Rod Thin Wall Tube Undisturbed Sample	Well Diagram Riser Pipe Screen Filter Sand Cuttings Cuttings	Overburden (Linear Rock Cored (Linear Number of Samples	red (Linear ft.)								
Field	I Tests	Dilatancy: Toughness		pid S - Slov M - Mediu			Split Spoon Sample Geoprobe Plasticity: Dry Strength: N	Grout Grout Grout Grout Grout Grout Fraction Grout	PROBE NO. Low M - Medium H - edium H - High V - V				P13	3A				
		J - 70	*N(OTE: Maximu	ım Particle S	Size is det	ermined by direct obse	ervation within the limitation	ons of sampler size.				_	_		_	_	

SEBAGO TECHNICS, INC. PROBE REPORT										PROBE NO. P13B Page 1 of 1										
PROJECT LOCATION CLIENT CONTRAC DRILLER	N	_	INE PARTMENT C-EARTH EX	F OF TRANSI KPLORATIO		1			STI JOB NO. PROJECT MGR. FIELD REP. DATE STARTED DATE FINISHED		K. B		ER PHEN	ISON		<u></u>				
Elevation Item Type	15.0	ft. Casing	Datum Sampl	ler Core Ba		Location ke & Mode			Hammer Type Safety	Dril	ling N	/lud	_ _		ng Adv					
Inside Dian Hammer W Hammer Fa	eight (lb.)		1.62:	5	Tra	V ☑ ck ☐	Geoprobe	Winch Roller Bit Cutting Head	Doughnut Automatic Drilling Notes: 12.0 ft.	nort	Poly None	е		ect pus pavem						
	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	(density/consistency, co	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)								Plasticity earlies				
0 —					1.0	SM SP		ravel (SM), roots, mps = 1.0 in -FILL- ND (SP), mps = 0.1 in., dry -N		10		% Coarse				-				
					1.5	51	Geoprobe refusal at 1.5 ft		ARINE DEL.							İ				
_ 5 _							Note: rock fragments 1.4 t	to 1.5 ft.								_				
— 10 —																				
– 15 –																				
— 20 —																+				
— 25 —																+				
																+				
																+				
30		W-tI	evel Data				Sample ID	Wall Diagram					Ε							
Date	Time	Elapsed Time (hr.)		Bottom of Hole	Water	0 T U	Open End Rod Thin Wall Tube Undisturbed Sample	Well Diagram Riser Pipe Screen Filter Sand Cuttings		verburden (Linear ft.) ock Cored (Linear ft.) umber of Samples						;				
Field	d Tests	Dilatancy:	R - Ra	pid S - Slov	Dry v N - None	S G	Split Spoon Sample Geoprobe Plasticity:	Grout Concrete Bentonite Seal N - Nonplastic L -												
	Toughness: L - Low M - Medium H - High Dry Strength: N - None L - Low M - Medium H - High V - Very High *NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size. NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.																			