PORTLAND AREA WIDENING & SAFETY IMPROVEMENTS

Portland, Maine

Geotechnical Design Report

FEBRUARY 7, 2020

PREPARED FOR

The Maine Turnpike

2360 Congress Street Portland, ME 04102

PREPARED BY

HNTB Corporation

9 Entin Road, Suite 202 Parsippany, NJ 07054 Phone: (973) 434-3100



GEOTECHNICAL DESIGN REPORT PORTLAND AREA WIDENING & SAFETY IMPROVEMENTS

PORTLAND, MAINE

TABLE OF CONTENTS

1.0		PROJ	ECT DESCRIPTION AND SCOPE	I
	1.1	In	troduction	1
	1.2	Se	cope of Services	1
	1.3	Pı	roposed Improvements and Project Construction Contracts	2
	1.4	Pı	oject Controls and Design Criteria	3
2.0		GEOL	OGY AND SITE CONDITIONS	4
	2.1	Si	te Geology	4
3.0		SUBSI	URFACE EXPLORATIONS	4
	3.1	G	eneral	4
	3.2	G	eotechnical Subsurface Exploration	5
	3.3	G	eophysical Investigation	12
4.0		LABO	PRATORY TEST RESULTS	. 13
5.0		Cupa	URFACE CONDITIONS	1.
5.0	- 1			
	5.1		eneralized Subsurface Stratification	
	5.2		roundwater	
6.0		ROAD	WAY AND STRUCTURE GEOTECHNICAL ANALYSIS	. 20
	6.1	P	roposed Improvements and Design	20
	6.2	R	esistance Factors	20
	6.3	Pı	reliminary Subsurface Material Properties	21
	6.4	E	mbankment Geotechnical Design and Recommendations	
		6.4.1	Global Stability Analysis	. 22
		6.4.2	Settlement Analysis	. 23
	6.5	St	ructure Geotechnical Foundation Assessment	24
		6.5.1	Utility Vault	. 24
		6.5.2	Culvert Extensions Wingwalls	. 25
		6.5.3	Earth Retaining Structures	. 26
		6.5.4	Utilities	. 27
		6.5.5	Sign Structures	. 28



7.0		PAVE	MENT DESIGN	30
	7.1	Ty	ypical Pavement Sections	31
	7.2	Pa	vement Assessment	31
	7.3	D	esign Traffic Information	35
		7.3.1	Traffic Data	35
		7.3.2	18-kip Equivalency Factors	36
	7.4	D	esign Data for Empirical Design	36
		7.4.1	Subgrade Material	36
		7.4.2	Seasonal Adjustments for Subgrade	37
		7.4.3	Serviceability Index	37
		7.4.4	Seasonal Adjustments for Serviceability	37
		7.4.5	Overall Standard Deviation	37
		7.4.6	Reliability	37
		7.4.7	Lane Distribution Factor	38
		7.4.8	Structural Layer Coefficients	38
		7.4.9	Drainage Coefficients	38
	7.5	D	esign of Structural Section of the Pavement	39
		7.5.1	Shoulders Outside the Crosby Area	39
		7.5.2	Southbound Shoulders Within the Crosby Area	40
		7.5.3	Southbound Mainline Lanes Within the Crosby Area	40
	7.6	Co	onstruction Considerations	42
		7.6.1	Pavement Overlay	42
		7.6.2	Full Depth Replacement	42
	7.7	Re	ecommendations	42
		7.7.1	Shoulders Outside the Crosby Area	42
		7.7.2	Southbound Mainline Lanes and Shoulders Within the Crosby Area	43
		<i>7.7.3</i>	Pavement Widening Areas	43
8.0		Rock	SLOPE EXCAVATION	43
	8.1	Pr	roposed Excavation	43
	8.2		te Geology for Rock Excavation	
	8.3		xisting Site Conditions Within Rock Excavation Limits	
		8.3.1	Location 1	
		8.3.2	Location 2	
		8.3.3	Location 3	
		8.3.4	Location 4	
	8.4	Ro	ock Quality	45



100 1	Deeedences	10
9.0	LIMITATIONS OF REPORT	48
8.8	Rock Slope Conclusions and Construction Recommendations	48
8.7	Rock Fall Mitigation	47
8.6	Rock Slope Engineering	46
8.5	Laboratory Test Results of Rock	46





INDEX OF TABLES

Table 1-1: Summary of Proposed Embankment Widening and Structures
Table 3-1: Summary of Subsurface Exploration
Table 3-2: Summary of In-Situ Vane Shear Tests
Table 3-3: Geophysical Investigation Survey Areas
Table 4-1: Summary of Identification Tests Results
Table 5-1: Approximate Top of Bedrock Elevation
Table 5-2: Groundwater Elevation
Table 6-1: Resistance Factors
Table 6-2: Engineering Parameters of Subsurface Materials
Table 6-3: Results of Global Stability Analysis
Table 6-4: Results of Settlement Analysis Along Pavement
Table 6-5: Results of Bearing Resistance at Utility Vault at Station 2360+0024
Table 6-6: Results of Bearing Resistance at Red Brook Culvert
Table 6-7: Results of Bearing Resistance at Loong Creek Culvert
Table 6-8: Results of Settlement Analysis at Utilities
Table 6-9: Design Loads for the Overhead Sign Structure Foundation – Station 2133+1429
Table 6-10: Summary of Pile Group Design for the Support of Overhead Sign Structure – Station 2133+14
Table 6-11: Foundation Recommendation for the Support of Overhead Sign Structure – Station 2133+1430
Table 7-1: Summary of Borings Performed on Pavement Shoulders outside of the Crosby Pavements
Table 7-2: Summary of Borings Performed on Southbound Pavement Shoulders within the Crosby Pavements
Table 7-3: Summary of Borings Performed on Southbound Mainline Pavement within Crosby33
Table 7-4: Summary of Lab Results for Granular Base Courses and Subgrade outside of the Crosby Pavements
Table 7-5: Summary of Lab Results for Granular Base Courses and Subgrade within Crosby Pavements
Table 7-6: Annual Average Daily Traffic-Northbound
Table 7-7: Annual Average Daily Traffic- Southbound
Table 7-8: 18-kip Equivalency Factors



Table 7-9: Seas	sonal Adjustments for Subgrade	37
Table 7-10: Re	maining Pavement Life for Outside of Crosby Southbound Area Shoulders	39
Table 7-11: Mi	ill and Overlay Options for Outside of Crosby Southbound Area Shoulders	40
Table 7-12: Me	echanistic Design Summary for Crosby Southbound Area Travel Lanes	41
Table 8-1: Roc	k Slope Limits	44
Table 8-2: Bor	ings Taken in the Vicinity of the Proposed Rock Cut	45
Table 8-3: Sun	nmary of Stereographic Analysis	47
	INDEX OF FIGURES	
Figure 1	Project Site Location Map	
Figure 2	Surficial Geology Map	
Figure 3	Bedrock Geology Map	
Figure 4	Subsurface Profile	
	ATTACHMENTS	
Appendix A	Geotechnical Data Report	
Appendix B	Hager-Richter Geoscience Geophysical Report	
Appendix C	Pavement Distress Preliminary Investigation Report by Schonewald Associates. Inc	



1.0 PROJECT DESCRIPTION AND SCOPE

1.1 Introduction

HNTB Corporation has been retained by the Maine Turnpike Authority (MTA) to design and provide recommendations associated with the Portland Area Widening and Safety Improvements project in Portland, Maine (see **Figure 1** – Project Site Location Map). The following represents the results of the final geotechnical assessment prepared by HNTB for this project. The general limits for the project begin at Holmes Road approximately 0.5 miles south of Exit 44 and extends 5.6 miles north to the southern terminus of the Warren Avenue Bridge Replacement Project. The improvements consist of the addition of a third lane along the Northbound and Southbound barrels of the existing mainline, shoulder widening, median improvements, drainage improvements and stormwater best management practices. The project will be divided into two Contracts; Portland Area Widening and Safety Improvements 2020.03 (PAW1) and Portland Area Widening and Safety Improvements 2020.04 (PAW2). A single geotechnical report will be prepared for roadways, embankments and structures included in both Contracts.

The project scope requires extension of existing culverts, assessment of existing utilities and pavement performance, and subsequently design of each of the above-mentioned elements. The following components have been assessed through geotechnical analysis with results and recommendations included in this report:

- Embankment global stability
- Embankment settlement
- Settlement of existing utilities
- Utility vault foundations
- Structure foundation for the retaining walls at Red Brook and Long Creek culvert extension
- Sign structure foundations
- Conditions of existing pavement
- New pavement
- Rock excavation

1.2 Scope of Services

In completing this report, HNTB has performed the following scope of services:

- Reviewed available geotechnical data for the project site.
- Developed and implemented a subsurface investigation including a geotechnical boring, geophysical survey, and laboratory testing program.
- Analyzed the resulting data collected to identify subsurface conditions that impact the design and construction of the project.



- Prepared a geologic subsurface profile at locations where fill will be placed and analysis required.
- Established geotechnical engineering design parameters based on the available subsurface information.
- Conducted geotechnical analyses and provided recommendations and for the support of the proposed embankment and structures.
- Conducted assessment of existing pavement conditions and performed pavement analyses based on available traffic data.
- Provided pavement recommendations for the extent of the project.
- Assessed rock slope conditions and provided recommendations on the proposed rock slopes along the widening.

1.3 Proposed Improvements and Project Construction Contracts

The project begins approximately at Station 2121+50 with median reconstruction with barrier; the embankment widening starts approximately the Exit 44 NB off-ramp to I-295 at about Station 2190+50 and ends at the southern terminus of the Warren Avenue Bridge Replacement Project at Station 2427+50. The existing mainline runs N-S and consist of two 12-foot-wide lanes and a shoulder in each direction with a 26-foot-wide median between the two barrels. The proposed improvements consist of adding a new 12-foot-wide travel lane to the east and west of the mainline. In addition, multiple existing culverts will need to be extended and new wingwalls installed to accommodate the widening at some locations. Two sign structures will be constructed; one overhead and one post/frame. In addition, there are two existing utility vaults which will be extended as part of this contract. Single slope concrete pier protection barriers will be installed around all piers that are located inside the required roadway clear zone.

All the overpass and underpass bridges within the project limits were designed to accommodate the future widening and have been modified in support of the widening as standalone contracts.

At this time (2/7/20) this geotechnical report presents final conclusions for the widening and structures located within PAW1 limits and interim recommendations for widening and structures within PAW2 limits. This report will be amended to include the final recommendations for the widening within PAW2 limits as part of a future submission. Information pertaining to the proposed structures is provided in Table 1-1.



Table 1-1: Summary of Proposed Embankment Widening and Structures

Contract	Proposed Feature	Designation	Station Limits/Station
	Embankment/	NB Mainline	2190+50 to 2294+00
	Pavement	SB Mainline	2169+00 to 2292+00
	Culverts	Red Brook	2197+50+/-
	Curverts	Long Creek	2272+69+/-
		Portland Water District (PWD) - Water Line	2176+40
		PWD - Water Line	2210+00
	Utilities	Ocean Properties – Sewer Line	2251+70
		Unitil Corporation (UC) - Gas Line	2274+75
PAW1		Dead River Properties (DRP) - Sewer Line	2237+50
	C: C11	Holmes Rd	2133+14
	Sign Structures	Crosby Area	2266+50
		SB Mainline and Gorham Road (Gorham Road)	
	Earth Retaining	SB Mainline and I-295 (I-295)	2190+50 to 2192+92
	Structures	NB Mainline and I-295 (I-295)	2193+25 to 2196+00
		NB Mainline and Running Hill Road (Running Hill Road)	2250+04 to 2251+50
	Embankment/	NB Mainline	2294+00 to 2425+50
	Pavement	SB Mainline	2292+00 to 2427+50
	Hility Vaulta	TBD	2340+02.81
	Utility Vaults	TBD	2360+00
PAW2	Culverts	TBD	TBD
	Utilities	TBD	TBD
	Sign Structures	Brighton Rd	TBD
	Earth Retaining Structures	TBD	TBD

^{* -} Further information is provided in Section 6.5.5.

TBD - To Be Determined

1.4 Project Controls and Design Criteria

This Geotechnical Report has been prepared to accompany the 100% Design Submittal. The design and recommendations included herein are based upon and consistent with the drawings prepared for this submittal dated February 7, 2020.



All design for the Portland Area Widening and Safety Improvements project is in accordance with the AASHTO LRFD Bridge Design Specifications, 8th Edition (AASHTO). Additional design references are indicated within the report where applicable.

All elevations presented in this report are provided in feet and refer to the North American Vertical Datum of 1988 (NAVD 88). Horizontal coordinates are provided in feet and refer to the North American Datum of 1983 (NAD 83). Boring locations were field located with elevations estimated based on topographic survey data.

2.0 GEOLOGY AND SITE CONDITIONS

2.1 Site Geology

The project is located within the Portland West 7.5-minute quadrangle in the coastal lowland of southwestern Maine. The region has been subjected to recent glaciation within the last 25,000 years (late Wisconsin glaciation) resulting in a physiographic surficial geology primarily composed of unconsolidated sediments such as sand and gravel of glacial origin. The bedrock geology of the southwestern part of the physiographic region is underlain by metamorphic rock formations of the Casco Bay Group which are characteristically composed of fine grained, thinly laminated gneiss, schist, marble and quartzite with north-northeast trending upright folds.

Existing geologic mapping utilized for this assessment includes bedrock and surficial geology mapping prepared by the Maine Geological Survey (MGS) for the Portland West quadrangle. Excerpts from the surficial and bedrock geology mapping are included in **Figure 2** and **Figure 3**, respectively.

According to the "Surficial Geology, Portland West Quadrangle, Maine, published by the Maine Geological Survey most of the alignment is underlain by the Presumpscot Formation which is comprised of silt, clay and minor sand deposited on the sea floor during the late-glacial marine submergence.

The surficial geology map indicates that the Southbound lane, from Station 2254+10 to 2260+00 and Northbound lane from station 2305+50 to 2314+00, is underlain by till. This material is composed of dense sand, silt and gravel size rock debris deposited directly from glacial ice.

Areas along the mainline from south end of the project to about station 2175+00, from Station 2317+50 to 2322+00, and from Station 2363+00 to 2380+50 are underlain by urban fill associated with the roadway construction.

3.0 Subsurface Explorations

3.1 General

A multiphase subsurface investigation was developed by HNTB and executed by



Schonewald Engineering Associates, Inc (SEA) of Cumberland Maine, under the direction of HNTB, which included 37 borings, and 11 pavement cores. The borings are identified as HB-PAMI-101 through HB-PAMI-127, HB-PAMI-201 through HB-PAMI-205, HB-PAMI-301, HB-PAMI-401, HB-VMS-101 to HB-VMS-103 and HB-VMS-201 to HB-VMS-202. The pavement cores are identified as HB-PCORE-101 to HB-PCORE-105, HB-CORE-201, HB-CORE-202 and, HB-PAVE-101 to HB-PAVE-105. The HB-PAVE series were performed in 2017 and the remainder of the borings were performed throughout 2019. The HB-PAVE borings were advanced using hollow stem augers from a Mobile drill rig. The remainder of the borings were advanced using cased wash boring methods from a Mobile drill rig using 4.0 inch (HW-size) and 3.0 inch (NW-size) inside diameter steel casing. Standard Penetration Testing (SPT) was performed in general accordance with ASTM D1586 by driving a 1-3/8-inch ID split spoon sampler with a 140-lb hammer dropped 30 inches to obtain samples continuously or at approximately 5-foot intervals.

Each sample was removed from the sampler in the field, examined, and classified. The number of hammer blows required to advance the sampler through each six-inch interval was recorded and is provided on each boring log. The SPT N-value is defined as the total number of blows required to advance the sampler through the second and third six-inch interval of any given 24-inch sampling interval. All SPT N-values discussed in this report have been corrected to account for hammer efficiency and overburden stress ($N1_{60}$). The subsurface investigation plan depicting the location of the borings and the pavement cores is included in **Appendix A**.

In-situ vane shear testing was completed in accordance with the requirements detailed in ASTM D 2573 and are outlined below. In situ vane shear testing involves using a four-bladed vane of specified dimensions in undisturbed soil to determine the torque required to shear a cylindrical surface to evaluate undrained shear strengths (Su) and remolded shear strengths (Sr) in soft to stiff clays (FHWA-NHI-16-072 G.E.C. No. 5). The vane is advanced into the test soil and the blade is rotated at a maximum rate of six degrees per minute until failure of the soil occurs while the resulting torque measurement is recorded. This first test is used to approximate the undrained shear strength of the soil. Following the initial test, the remolded strength of the soil is measured after 10 rapid turns of the vane (FHWA-INHI-16-072 G.E.C. No. 5).

3.2 Geotechnical Subsurface Exploration

A summary of the borings indicating associated design feature, boring locations and depths of exploration are included in **Table 3-1**. All the pavement cores were sampled for several feet below the pavement box and as such they were also utilized for the interpretation of the subsurface conditions. HB-PAMI-200 series borings were performed to assess the depth of bedrock within the Crosby area where pavement distress has been observed over time. In order to assess the pavement conditions within this area, the HBPAVE and PCORE series pavement cores/borings were performed. Section 7 of this report provides the limits and a detailed description of the Crosby Area conditions and recommendations. In-situ vane shear testing results are reported in **Table 3-2**.



Table 3-1: Summary of Subsurface Exploration

Design Feature	Boring No.	Approximate Station	Offset (feet)	Ground Elevation (feet)	Depth of Boring (feet)	Bottom of Exploration Elevation (feet)
Embankment	HB-PAMI-101	2172+50	65L	50	21.0	29.0
Red Brook	HB-PAMI-102	2196+75	60L	65	50.5	14.5
Culvert	HB-PAMI-103	2198+50	75R	62	49.7	12.3
	HB-PAMI-104	2216+10	65R	63	21.0	42.0
	HB-PAMI-105	2236+45	95R	58	21.0	37.0
Embankment	HB-PAMI-106	2243+05	65R	61	24.2	36.8
	HB-PAMI-107	2256+35	90R	63	25.7	37.3
	HB-PAMI-108	2266+25	65R	58	21.0	37.0
Long Crook	HB-PAMI-109	2270+90	95L	54	18.5	35.5
Long Creek Culvert	HB-PAMI-109B	2272+90	55L	54	25.5	28.5
Curvert	HB-PAMI-110	2272+95	75R	45	19.0	26.0
	HB-PAMI-111	2278+15	120R	64	16.0	48.0
	HB-PAMI-112	2288+65	105R	72	12.1	59.9
Embankment	HB-PAMI-113	2307+70	70R	82	4.5	77.5
	HB-PAMI-114	2323+00	90R	36	61.0	-25.0
	HB-PAMI-115	2327+20	90R	50	26.0	24.0
Hility Vault	HB-PAMI-116	2340+80	80R	59	70.6	-11.6
Utility Vault	HB-PAMI-117	2340+00	95L	67	90.0	-23.0
Utility Vault	HB-PAMI-118	2359+20	70L	61	47.3	13.7
Othity vauit	HB-PAMI-119	2360+50	100R	60	43.1	16.9
	HB-PAMI-120	2369+05	95L	59	36.0	23.0
	HB-PAMI-121	2371+70	100R	60	56.0	4.0
	HB-PAMI-122	2371+80	100L	62	51.0	11.0
Embankment	HB-PAMI-123	2375+05	110L	71	63.0	8.0
Eliloalikillelit	HB-PAMI-124	2283+00	95R	107	14.5	92.5
	HB-PAMI-125	2402+05	75R	74	21.0	53.0
	HB-PAMI-126	2408+30	95R	72	26.0	46.0
	HB-PAMI-127	2420+80	100R	54	104	50.0
	HB-PAMI-201	2258+57	1.3R	69.5	10.0	59.5
	HB-PAMI-202	2259+57	0.9R	68.5	7.7	60.8
Pavement	HB-PAMI-203	2260+56	1.1R	67.5	7.4	60.1
	HB-PAMI-204	2261+58	0.8R	66.5	9.0	57.5
	HB-PAMI-205	2262+57	1.4R	65.0	10	55.0
DRP Sewer Line	HB-PAMI-301	2238+30	69L	60.5	32	28.5
UC Gas Line	HB-PAMI-401	2275+44	93L	50	15.8	34.2



Design Feature	Boring No.	Approximate Station	Offset (feet)	Ground Elevation (feet)	Depth of Boring (feet)	Bottom of Exploration Elevation (feet)
	HB-VMS-101	2123+03	78.8R	52.8	111.2	-59.2
	HB-VMS-102	2121+11	9.4L	56	113.6	-57.6
Sign Structures	HB-VMS-103	2125+10	0	52.5	125.4	-72.9
	HB-VMS-201	2133+14	112.9L	44.5	93.0	-48.5
	HB-VMS-202	2392+00	97L	86.5	20.2	66.3
	HB-PCORE-101	2253+25	2.4R	69.5	5.2	64.3
	HB-PCORE-102	2255+30	2.4R	70.0	5.2	64.8
	HB-PCORE-103	2261+65	2.2R	66.5	5.2	61.3
	HB-PCORE-104	2263+05	2.7R	64.5	5.2	59.3
	HB-PCORE-105	2265+80	2.8R	60.5	5.1	55.4
	HB-PCORE-201	2250+22	2.1R	68	5.0	63.0
Pavement	HB-PCORE-202	2250+90	1.8R	68	4.9	63.1
	HB-PAVE-101	2266+50	9.8L	59.5	13.4	46.1
	HB-PAVE-102	2264+50	9.1L	62	12	50
	HB-PAVE-103	2260+00	7.4L	68	5.2	62.8
	HB-PAVE-103A	2260+00	3.0R	68.5	4.8	63.7
	HB-PAVE-104	2252+85	9.0L	68	14.0	54.0
	HB-PAVE-105	2248+75	9.6L	67	16.0	51.0

Note: All borings are used for embankment design in addition to the structures noted.

Subsurface condition as shown in Figure 4 is used for the earth retaining structures and PWD water line.

Table 3-2: Summary of In-Situ Vane Shear Tests

Boring No.	Test No.	Test Depth (feet)	Test Elevation (feet)	Undrained Shear Strength (psf)	Remolded Shear Strength (psf)
HB-PAMI-102	V1	19.8	45.2	426	55
HB-PAMI-102	V2	20.8	44.2	371	55
HB-PAMI-102	V3	24.8	40.2	508	55
HB-PAMI-102	V4	25.8	39.2	385	27
HB-PAMI-102	V5	29.8	35.2	398	14
HB-PAMI-102	V6	30.8	34.2	330	0
HB-PAMI-102	V7	34.8	30.2	398	14
HB-PAMI-102	V8	35.8	29.2	357	0
HB-PAMI-102	V9	39.8	25.2	536	27
HB-PAMI-102	V10	40.8	24.2	398	0



Boring No.	Test No.	Test Depth (feet)	Test Elevation (feet)	Undrained Shear Strength (psf)	Remolded Shear Strength (psf)
HB-PAMI-103	V1	19.8	42.2	316	27
HB-PAMI-103	V2	20.8	41.2	302	27
HB-PAMI-103	V3	29.3	32.7	343	14
HB-PAMI-103	V4	30.3	31.7	385	27
HB-PAMI-106	V1	19.8	41.2	1016	137
HB-PAMI-106	V2	20.8	40.2	920	137
HB-PAMI-107	V1	19.8	43.2	549	69
HB-PAMI-107	V2	20.8	42.2	467	27
HB-PAMI-108	V1	14.8	43.2	659	110
HB-PAMI-108	V2	15.8	42.2	591	82
HB-PAMI-108	V3	19.8	38.2	412	41
HB-PAMI-108	V4	20.8	37.2	577	55
HB-PAMI-114	V1	19.8	16.2	618	82
HB-PAMI-114	V2	20.8	15.2	494	55
HB-PAMI-114	V3	26.8	9.2	398	27
HB-PAMI-114	V4	27.8	8.2	453	0
HB-PAMI-114	V5	29.8	6.2	494	0
HB-PAMI-114	V6	30.8	5.2	440	0
HB-PAMI-114	V7	34.8	1.2	481	14
HB-PAMI-114	V8	35.8	0.2	536	14
HB-PAMI-114	V9	44.8	-8.8	673	0
HB-PAMI-114	V10	45.8	-9.8	522	0
HB-PAMI-114	V11	49.8	-13.8	591	0
HB-PAMI-114	V12	50.8	-14.8	742	0
HB-PAMI-114	V13	54.8	-18.8	838	0
HB-PAMI-117	V1	19.8	47.2	385	27
HB-PAMI-117	V2	20.8	46.2	302	14
HB-PAMI-117	V3	24.8	42.2	357	0
HB-PAMI-117	V4	25.8	41.2	275	0
HB-PAMI-117	V5	34.8	32.2	357	0
HB-PAMI-117	V6	35.8	31.2	343	0
HB-PAMI-118	V1	16.8	44.2	467	55
HB-PAMI-118	V2	17.8	43.2	412	27
HB-PAMI-118	V3	24.8	36.2	316	14
HB-PAMI-118	V4	25.8	35.2	302	0
HB-PAMI-118	V5	29.8	31.2	302	14



Boring No.	Test No.	Test Depth (feet)	Test Elevation (feet)	Undrained Shear Strength (psf)	Remolded Shear Strength (psf)
HB-PAMI-118	V6	30.8	30.2	275	0
HB-PAMI-119	V1	14.8	45.2	563	55
HB-PAMI-119	V2	15.8	44.2	522	27
HB-PAMI-119	V3	19.8	40.2	426	14
HB-PAMI-119	V4	20.8	39.2	371	14
HB-PAMI-120	V1	14.8	44.2	742	124
HB-PAMI-120	V2	15.8	43.2	632	96
HB-PAMI-120	V3	19.8	39.2	467	41
HB-PAMI-120	V4	20.8	38.2	385	14
HB-PAMI-121	V1	21.8	38.2	659	69
HB-PAMI-121	V2	22.8	37.2	563	55
HB-PAMI-121	V3	24.8	35.2	426	41
HB-PAMI-121	V4	25.8	34.2	440	27
HB-PAMI-121	V5	29.8	30.2	522	27
HB-PAMI-121	V6	30.8	29.2	591	55
HB-PAMI-121	V7	36.8	23.2	467	55
HB-PAMI-121	V8	37.8	22.2	467	55
HB-PAMI-121	V9	39.8	20.2	508	69
HB-PAMI-121	V10	40.8	19.2	467	69
HB-PAMI-121	V11	44.8	15.2	989	-
HB-PAMI-122	V1	24.8	37.2	563	55
HB-PAMI-122	V2	25.8	36.2	494	41
HB-PAMI-122	V3	29.8	32.2	494	27
HB-PAMI-122	V4	30.8	31.2	536	27
HB-PAMI-122	V5	37.8	24.2	440	55
HB-PAMI-122	V6	38.8	23.2	494	55
HB-PAMI-122	V7	44.8	17.2	659	137
HB-PAMI-123	V1	24.8	46.2	426	41
HB-PAMI-123	V2	25.8	45.2	371	41
HB-PAMI-123	V3	31.8	39.2	357	14
HB-PAMI-123	V4	32.8	38.2	385	14
HB-PAMI-123	V5	34.8	36.2	536	14
HB-PAMI-123	V6	35.8	35.2	440	14
HB-PAMI-123	V7	41.8	29.2	412	41
HB-PAMI-123	V8	42.8	28.2	343	41



Boring No.	Test No.	Test Depth (feet)	Test Elevation (feet)	Undrained Shear Strength (psf)	Remolded Shear Strength (psf)
HB-PAMI-123	V9	46.8	24.2	494	55
HB-PAMI-123	V10	47.8	23.2	440	69
HB-PAMI-123	V11	51.8	19.2	494	82
HB-PAMI-126	V1	14.8	57.2	343	27
HB-PAMI-126	V2	15.8	56.2	357	14
HB-PAMI-126	V3	19.8	52.2	302	27
HB-PAMI-126	V4	20.8	51.2	302	27
HB-PAMI-126	V5	24.8	47.2	275	14
HB-PAMI-126	V6	25.8	46.2	275	14
HB-PAMI-127	V1	9.8	44.2	302	14
HB-PAMI-127	V2	10.8	43.2	233	0
HB-PAMI-127	V3	19.8	34.2	206	0
HB-PAMI-127	V4	20.8	33.2	233	0
HB-PAMI-127	V5	24.8	29.2	206	14
HB-PAMI-127	V6	25.8	28.2	233	0
HB-PAMI-127	V7	34.8	19.2	343	0
HB-PAMI-127	V8	35.8	18.2	343	0
HB-VMS-101	V1	35.8	21.2	522	14
HB-VMS-101	V2	36.8	20.2	508	0
HB-VMS-101	V3	40.8	16.2	508	14
HB-VMS-101	V4	41.8	15.2	398	0
HB-VMS-101	V5	45.8	11.2	494	14
HB-VMS-101	V6	46.8	10.2	440	0
HB-VMS-101	V7	50.8	6.2	494	27
HB-VMS-101	V8	51.8	5.2	481	27
HB-VMS-101	V9	55.8	1.2	536	0
HB-VMS-101	V10	56.8	0.2	549	0
HB-VMS-101	V11	60.8	-3.8	604	14
HB-VMS-101	V12	70.8	-13.8	865	0
HB-VMS-101	V13	71.8	-14.8	742	0
HB-VMS-102	V1	30.8	25.2	742	27
HB-VMS-102	V2	31.8	24.2	563	27
HB-VMS-102	V3	35.8	20.2	494	14
HB-VMS-102	V4	36.8	19.2	481	0
HB-VMS-102	V5	40.8	15.2	398	0
HB-VMS-102	V6	41.8	14.2	426	14



Boring No.	Test No.	Test Depth (feet)	Test Elevation (feet)	Undrained Shear Strength (psf)	Remolded Shear Strength (psf)
HB-VMS-102	V7	45.8	10.2	444	14
HB-VMS-102	V8	46.8	9.2	426	14
HB-VMS-102	V9	50.8	5.2	536	14
HB-VMS-102	V10	51.8	4.2	536	14
HB-VMS-102	V11	60.8	-4.8	604	27
HB-VMS-102	V12	61.8	-5.8	549	0
HB-VMS-103	V1	20.8	31.7	357	27
HB-VMS-103	V2	21.8	30.7	453	14
HB-VMS-103	V3	25.8	26.7	536	41
HB-VMS-103	V4	30.8	21.7	481	14
HB-VMS-103	V5	31.8	20.7	481	14
HB-VMS-103	V6	35.8	16.7	412	27
HB-VMS-103	V7	40.8	11.7	426	14
HB-VMS-103	V8	41.8	10.7	426	14
HB-VMS-103	V9	45.8	6.7	440	27
HB-VMS-103	V10	46.8	5.7	398	14
HB-VMS-103	V11	65.8	-13.3	549	27
HB-VMS-103	V12	66.8	-14.3	591	0
HB-VMS-103	V13	70.8	-18.3	604	14
HB-VMS-103	V14	71.8	-19.3	618	14
HB-VMS-103	V15	75.8	-23.3	659	0
HB-VMS-103	V16	76.8	-24.3	646	0
HB-VMS-103	V17	80.8	-28.3	879	27
HB-VMS-103	V18	81.8	-29.3	646	0
HB-VMS-201	V1	15.8	28.7	522	14
HB-VMS-201	V2	16.8	27.7	536	27
HB-VMS-201	V3	20.8	23.7	426	14
HB-VMS-201	V4	21.8	22.7	508	14
HB-VMS-201	V5	25.8	18.7	618	27
HB-VMS-201	V6	30.8	13.7	522	0
HB-VMS-201	V7	31.8	12.7	618	0
HB-VMS-201	V8	35.8	8.7	385	0
HB-VMS-201	V9	36.8	7.7	467	0
HB-VMS-201	V10	40.8	3.7	398	14
HB-VMS-201	V11	41.8	2.7	522	0
HB-VMS-201	V12	45.8	-1.3	453	0



Boring No.	Test No.	Test Depth (feet)	Test Elevation (feet)	Undrained Shear Strength (psf)	Remolded Shear Strength (psf)
HB-VMS-201	V13	46.8	-2.3	481	0
HB-VMS-201	V14	50.8	-6.3	522	14
HB-VMS-201	V15	51.8	-7.3	536	0

Boring HB-PAMI-301 and laboratory test results associated with this boring are not included in this report. See section 6.5.4 for further information.

3.3 Geophysical Investigation

To delineate the anticipated bedrock surface in areas where rock excavation is anticipated and where shallow rock is expected to impact pavement performance HNTB developed a geophysical survey program using Ground Penetrating Radar (GPR) methods to delineate rock surface in critical areas of the site. GPR uses a high frequency electromagnetic pulse, transmitted from a radar antenna to probe the near surface ground conditions. The transmitted radar signals are reflected from subsurface interfaces of materials with contrasting electrical properties. Travel times of the radar signal can be converted to approximate depth below the surface by correlation with targets of known depths and by a curve matching routine.

Hager-Richter Geoscience, Inc of Salem, New Hampshire, under the direction of HNTB, performed the geophysical survey along three areas within the extent of PAW1 and PAW2. GPR data were acquired along traverses oriented parallel to the travel lanes. GPR traverses located in the highway shoulder were spaced a few feet apart and the GPR traverses located in the outer portions of the right of way were spaced 10-20 feet apart.

Due to the limited accessibility, the GPR survey was performed along the shoulder and outside of the current roadway within the proposed widening footprint. A copy of the report prepared by Hager-Richter is included in **Appendix B**. The surveyed areas encompassed are presented in **Table 3-3**.

Table 3-3: Geophysical Investigation Survey Areas

Limits of Survey	Bound
2406+50 to 2381+00	South
2378+50 to 2402+50	North
2301+00 to 2313+00	South
2301+00 to 2316+00	North



Limits of Survey	Bound	
2245+00 to 2270+50	South	
2252+00 to 2268+50	North	

4.0 LABORATORY TEST RESULTS

Upon completion of the subsurface investigation program, a laboratory testing program was performed to verify the visual-manual field classifications and to aid in determination of the engineering soil and rock properties. Laboratory soil testing was performed by R.W. Gillespie & Associates, Inc. of Saco, Maine.

Laboratory soil testing consisted of grain size analyses, percent passing #200, Atterberg limit tests with natural moisture content and consolidation testing.

A summary of the laboratory tests to determine index properties are presented in the following sections. The complete laboratory results are presented in **Appendix A**. The soil testing was performed in general accordance with the following ASTM Standards:

Natural Moisture Content	ASTM D2216
Atterberg Limits	ASTM D4318
Grain Size Analysis	ASTM D422
Percent Passing No. 200 Sieve	ASTM D1140
Consolidation	ASTM D2435

Laboratory soil testing results are summarized below in **Table 4-1**. Additionally, laboratory test results have been summarized and presented on the boring logs also provided in **Appendix A**.

Table 4-1: Summary of Identification Tests Results

	Sample	Depth	Water Limits Particle Distrib			Limits		oution	
Boring No.	No.	(feet)	Content (%)	LL	PL	PI	Gravel	Sand	Fines
HB-PAMI-101	3D	9-11	31.0	22.8	15.1	7.7	-	22.3	77.7
HB-PAMI-101	4D	14-16	32.3	24.4	16.4	8.0	-	-	-
HB-PAMI-102	5D	19-20	39.3	35.5	19.0	16.5	-	-	98.6



Daving Ma	Sample	TAT - 4 - 11							Water Limits (%)	Distril	oution
Boring No.	No.	(feet)	(%)	LL	PL	PI	Gravel	Sand	Fines		
HB-PAMI-103	6D	28.5- 30.5	35.0	42.6	20.8	21.8	-	-	99.1		
HB-PAMI-103	U2	35-37	44.7	39.9	19.7	20.2	-	-	-		
HB-PAMI-106	3D	9-11	31.3	47.9	21.1	26.8	-	-	99.2		
HB-PAMI-106	5D	19-21	36.1	39.7	19.1	20.6	0.2	3.1	96.7		
HB-PAMI-107	5D	19-21	38.5	36.8	18.1	18.7	-	-	96.9		
HB-PAMI-109	2D	9-11	31.4	39.4	18.6	20.8	-	2.2	97.8		
HB-PAMI-109B	3D	9-11	24.0	25.9	15.9	10.0		12.2	87.8		
HB-PAMI-110	3D	9-11	30.4	27.6	18.7	8.9	-	22.6	77.4		
HB-PAMI-114	4D	14-16	37.0	45.0	22.7	22.3	-	-	94.6		
HB-PAMI-114	U1	24-26	46.3	50.0	22.9	27.1	-	-	-		
HB-PAMI-114	7D	34-36	36.0	40.4	20.3	20.1	-	-	94.2		
HB-PAMI-115	3D	9-11	34.2	48.8	22.3	26.5	-	-	98.8		
HB-PAMI-117	8D	29-31	38.0	41.2	22.2	19.0	-	-	-		
HB-PAMI-118	3D	9-11	29.1	46.2	22.1	24.1	-	-	-		
HB-PAMI-119	5D	19-21	38.4	38.9	19.9	19.0	-	-	94.7		
HB-PAMI-120	4D	14-16	29.1	40.8	23.0	17.8	-	-	99.1		
HB-PAMI-121	4D	14-16	28.9	47.1	25.9	21.2	-	-	99.1		
HB-PAMI-121	7D	29-31	36.9	44.1	21.9	22.2	-	-	94.8		
HB-PAMI-121	U2	34-36	45.3	44.5	23.5	21.0	-	-	-		
HB-PAMI-122	6D	24-26	30.8	42.4	22.6	19.8	-	-	94.3		
HB-PAMI-122	U1	34-36	43.9	44.1	22.1	22.0	-	-	-		
HB-PAMI-123	U1	29-31	-	41.0	20.9	20.1	-	-	-		
HB-PAMI-123	7D	31-33	49.2	61.8	24.4	37.4	-	-	98.1		
HB-PAMI-126	4D	14-16	45.9	46.3	20.9	25.4	-	-	97.1		
HB-PAMI-127	1D	2-4	26.8	24.0	20.1	3.9	-	-	-		
HB-PAMI-127	3D	9-11	31.9	26.7	17.7	9.0	-	-	98.2		
HB-PAMI-127	U1	14-16	-	39.7	22.0	17.7	-	-	-		
HB-PAMI-127	6D	34-36	49.1	37.1	21.7	15.4	-	-	-		



			Water		tterbe: Limits	_	Particle	Distril	bution
Boring No.	Sample No.	Depth (feet)	Content (%)	LL	PL	PI	Gravel	Sand	Fines
HB-PAMI-201	2D	2-3.7	13.4				2.6	85.2	12.2
HB-PAMI-201	2D-A	3.7-4	7.6				21.6	60.4	18.0
HB-PAMI-201	3D	5.1-6	28.6				-	4.4	95.6
HB-PAMI-202	1D	1.3-2	14.4				7.1	77.2	15.7
HB-PAMI-202	2D	2-4	11.5				10.2	77.9	11.9
HB-PAMI-202	3D	4-4.4	12.2				10.3	68.8	20.9
HB-PAMI-202	4D	6-7.7	14.7	NP	NP	NP			26.4
HB-PAMI-203	1D	1.4-2	12.4				4.1	77.1	18.8
HB-PAMI-203	2D	2-3.2	12.4				2.4	83.6	14.0
HB-PAMI-203	3D	4-5.3	11.3				38.4	38.3	23.3
HB-PAMI-204	2D	2-4	11.3				3.9	85.8	10.3
HB-PAMI-204	3D	4-6	12.8				6.8	64.8	28.4
HB-PAMI-204	4D	6-8	11.9				8.5	52.6	38.9
HB-PAMI-205	2D	2-3.3	8.9				1.1	90	8.9
HB-PAMI-205	2D-A	3.3-4	23.1	42.6	23.1	19.5	-	13.4	86.6
HB-PAMI-205	4D	6-8	28.2	46	24.2	21.8	-	0.6	99.4
HB-VMS-101	1D	5-7	25.5				1.3	74.3	24.4
HB-VMS-101	3D	15-17	29.0				-	65.3	34.7
HB-VMS-101	4D	20-22	38.6	34.2	18.4	15.8	-	8.7	91.3
HB-VMS-101	7D	35-37	34.9	31.3	18.9	12.4			97.5
HB-VMS-101	8D	40-42	31.8	29.8	19.4	10.4			98.1
HB-VMS-102	1D	5-7	19.9				8.0	82.3	9.7
HB-VMS-102	3D	15-17	23.4				-	96.8	3.2
HB-VMS-102	5D	25-27	32.4	29.6	19.1	10.5			98.0
HB-VMS-102	6D	30-32	31.9	27.5	18.2	9.3			96.0
HB-VMS-102	7D	35-37	32.9	30.4	20.4	10.0			97.4
HB-VMS-103	2D	10-12	18.1				0.9	95	4.1
HB-VMS-103	3D	15-17	36.2	31.5	19.5	12		1.8	98.2
HB-VMS-103	4D	20-22	37.4	31.5	19.8	11.7			97.9



	Sample	Depth	Water	Limits		_	Particle Distribution (%)		
Boring No.	No.	(feet)	Content (%)	LL	PL	PI	Gravel	Sand	Fines
HB-VMS-103	5D	25-27	34.0	32.7	20.1	12.6			97.7
HB-VMS-103	6D	30-32	27.3	25	18.4	6.6			97.5
HB-PCORE-101	2D	3.2-5.2	15.8				1.5	89.4	9.1
HB-PCORE-102	1D	1.2-3.2	13.8				0.8	85.4	13.8
HB-PCORE-102	2D	3.5-5.2	12.8				1.8	79.2	19.0
HB-PCORE-103	1D	1.2-3.2	10.8				7.2	70.8	22.0
HB-PCORE-103	2D	3.2-5.2	25.5	37.8	22.8	15.0	-	16.9	83.1
HB-PCORE-104	1D	1.2-3.2	12.6				3.5	81.5	15.0
HB-PCORE-104	2D	3.2-5.2	26.5	38	20.8	17.2	-	11.7	88.3
HB-PCORE-105	1D	1.2-3.2	11.5				24.9	57.9	17.2
HB-PCORE-105	1D-A	3.1-5.1	17.6				1.1	87.8	11.1
HB-PAVE-103	1D	1-3	6.1	-	_	-	4.0	80.1	15.9

5.0 Subsurface Conditions

5.1 Generalized Subsurface Stratification

The interpretation of soil and groundwater conditions within the project are based on information obtained at the boring locations only. This information has been used as the basis for the conclusions and recommendations contained in this report. Significant variations at areas not explored by the project borings may require reevaluation of the findings and conclusions contained herein if found during construction.

A generalized interpretive subsurface profile is included as **Figure 4** and is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed through interpretations of widely spaced borings and samples. Actual soil transitions included in the subsurface profile may vary and may be more erratic than indicated. Borings performed by others are used for the development of the subsurface profile and to aid in the interpretation between the HB series subsurface information.

Subsurface conditions encountered in the test borings generally consist of medium dense to dense granular fill overlying a stiff marine silt-clay crust layer. Beneath the stiff marine silt-clay crust, the borings encountered either soft marine silt-clay or loose marine sand and silt, both of which are underlain by dense glacial till. The glacial till overlies bedrock. In some areas along the corridor the bedrock is encountered at the ground surface.



Stratum 1: Fill

The test borings HB-PAMI-100, 200, 300 and 400 series performed along the Maine Turnpike encountered medium dense granular fill from existing grade to elevations ranging between 102 feet and 23 feet. The medium dense granular fill generally consists of fine to medium sand with trace to some gravel, trace to some silt, and trace coarse sand. The SPT $N1_{60}$ average value for the fill is 19 blows per foot (bpf).

Stratum 2: Marine Silt-Clay Crust

A marine silt-clay crust stratum was encountered immediately below the fill in most test borings. This material was encountered to elevations ranging between 62 feet and 18 feet, and consists primarily of silt, organic silt, clayey silt, silt and clay, and clay and silt, with trace amounts gravel and fine sand. The SPT N160 average value for this stratum is 17 bpf.

Thirteen (13) Atterberg limit tests were performed yielding an average liquid limit of 42, average plastic limit of 22, and average natural moisture content of 31 percent. The Atterberg limits were accompanied with percent passing #200 tests. Results of the analyses show that the amount of sample finer than the #200 sieve ranges between approximately 83 to 99 percent.

Stratum 3a: Soft Marine Silt-Clay

Soft marine silt-clay was generally encountered immediately below the marine silt-clay crust. This material was encountered directly below the fill at boring HB-PAMI-111, HB-PAMI-115 and HB-PAMI-127. The stratum is encountered at elevations ranging between 18 feet and 50 feet. The soft marine silt-clay consists primarily of clay and silt, silty clay, and silty sand.

One hundred fifty-six (156) field vane shear tests were performed with an average undrained shear strength (Su) value of 480 psf. Twenty-seven (27) Atterberg limit tests were performed yielding an average liquid limit of 38, average plastic limit of 21, and average natural moisture content of 38 percent. Eighteen (18) standard grain size and percent passing #200 analyses were performed. Results of the sieve analysis indicate that the amount of sample finer than the #200 sieve ranges between approximately 94 and 99 percent.

Stratum 3b: Marine Interbedded Sand & Silt

In the southern portion of the project, dense marine interbedded sand and silt was encountered immediately below the fill with elevations ranging between 59 feet and 35.7 feet. Beneath the dense marine interbedded sand and silt, loose marine interbedded sand and silt was encountered.



Stratum 3c: Loose Marine Sand & Silt

In the northern portion of the project, at Station 2273+00, loose marine sand was encountered immediately below the fill with elevations ranging between 60 and 32 feet. The loose marine sand and silt consists primarily of silty sand and silt.

Results of the sieve analyses for marine interbedded sand and silt and loose marine sand and silt show that the amount of sample finer than the #200 sieve ranges between approximately 34.7 and 78 percent.

Stratum 4: Till

The till stratum was encountered throughout the site at elevations ranging between -25 feet and 77.5 feet. The till consisted of fine to coarse sand and gravel with trace to some silt. The SPT $N1_{60}$ average value for this stratum is 38 bpf. The till overlies the granofels and metasandstone bedrock.

Stratum 5: Bedrock

Bedrock was sampled at five borings and the top of bedrock elevation encountered at each location is provided in **Table 5.1**.

 Boring
 Elevation of Top of Rock

 HB-PAMI-109
 40.8

 HB-PAMI-109B
 33.5

 HB-PAMI-110
 32.5

 HB-PAMI-112
 59.9

 HB-PAMI-113
 78.8

 HB-PAMI-124
 97.9

Table 5-1: Approximate Top of Bedrock Elevation

Bedrock encountered at the site generally consists of hard, typically fresh to slightly weathered, aphanitic to fine grained, grey and brown grey Granofels and Metasandstone bedrock with calculate veins.

Rock quality designation (RQD) is a common parameter that is used to help assess the competency of the sampled bedrock. RQD is defined as the sum of the pieces of recovered bedrock greater than 4 inches in length divided by the total length of cored bedrock. RQD values of the bedrock that were encountered on site range from 50 to 82 percent, with an average of approximately 72 percent.



Based on the geophysical and geotechnical investigation the bedrock generally dips from the West to the East. The bedrock is encountered at shallow depths along the Southbound barrel between approximately the following Stations: 2243+50 to 2249+00, 2254+50 and 2309+00 to 2315+00, 2383+50 to 2404+50. The bedrock is encountered at shallow depths along the Northbound barrel between Station 2304+00 to 2315+00 and 2383+50 to 2396+00.

5.2 Groundwater

Groundwater was encountered and recorded during the geotechnical investigation and the elevations are reported in **Table 5-2**.

Table 5-2: Groundwater Elevation

Boring No.	Elevation of Groundwater
HB-PAMI-101	49.1
HB-PAMI-102	54.6
HB-PAMI-104	60.3
HB-PAMI-105	49.0
HB-PAMI-109B	42.5
HB-PAMI-112	61.9
HB-PAMI-113	81.5
HB-PAMI-115	50.0
HB-PAMI-116	55.8
HB-PAMI-117	59.4
HB-PAMI-118	56.6
HB-PAMI-119	49.1
HB-PAMI-121	57.4
HB-PAMI-122	55.8
HB-PAMI-123	66.1
HB-PAMI-124	103.0
HB-PAMI-125	60.2
HB-PAMI-127	50.0
HB-PAMI-202	65.3
HB-PAMI-203	64.1
HB-PAMI-204	60.8



Boring No.	Elevation of Groundwater
HB-PAMI-401	48.7
HB-VMS-101	50.8
HB-VMS-102	49.6
HB-VMS-103	46.9
HB-VMS-201	42.3
HB-VMS-202	77.5

The groundwater used for design was based on the level encountered at the nearby boring where analysis was performed. Groundwater reported is the elevation as encountered during the drilling process and elevations will fluctuate seasonally following events of precipitation.

6.0 ROADWAY AND STRUCTURE GEOTECHNICAL ANALYSIS

6.1 Proposed Improvements and Design

As indicated in Section 1.3, the improvements include embankment widening, culvert extensions, utility vault construction, sign structures and concrete barrier walls. The methodology of design for each of the improvements is described in the below sections.

6.2 Resistance Factors

All foundations were designed and assessed under service, strength and extreme limit state load combinations in accordance with AASHTO LRFD Sections 3, 6, 10 and 11. The resistance factors used for the design are provided in **Table 6-1**.

Table 6-1: Resistance Factors

	Resistance Factor				
	Service	Strength	Extreme		
	Limit State	Limit State	Limit State		
Shallow Foundation					
Bearing Resistance		0.45	1		
Settlement	1				
Pile Foundation					
Axial Compression Resistance	-	0.6	1.0		
Uplift Resistance	-	0.5	0.8		
Lateral Resistance	1.0	-	-		
Drivability	-	0.65	-		
Global Stability					
Foundation/Structures	0.65	-	-		
Slope/Embankments	0.75	-	-		



6.3 Preliminary Subsurface Material Properties

Geotechnical design parameters for soil and rock were developed for each stratum based on material descriptions, standard published correlations, results from laboratory testing, and engineering judgment. A summary of soil design properties is provided below in **Table 6-2**.

Table 6-2: Engineering Parameters of Subsurface Materials

	Strata							
Soil Properties	Embankment Fill	ent Marine Silt-Clay Soft Marine Silt- Crust Clay		Marine Interbedded Sand & Silt	Till			
γ (pcf)	117	112	112	100	117			
φ' (deg)	34	26	23-28	23	34			
c' (psf)	-	220*-500	220*-500 1500		1			
E _s (ksi)	6.9	-	-	2.1	4.2			
C_{ce}	-	0.12	0.25-0.3	-	-			
C_{re}	-	0.02	0.03-0.05	-	-			
OCR	-	-	1**	-	-			
Pc (ksf)	-	6.0	-	-	-			
C _v (ft²/day)	-	0.3	0.3	-	-			
$C_{lpha \epsilon}$	-	0.007	0.005-0.007	-	-			

Note: The consolidation properties are derived from consolidation lab test results.

- This value is used for global stability at Station 2225+50 and the layer is modeled with an increasing rate of undrained shear strength with depth from 220 psf to 824 psf.
 - ** Based on consolidation test data of the borings performed for Cumming Road project, OCM = 600 psf (OCM = $Pc-\sigma'$) is used for calculation of the settlement at Red Brook Culvert

Note: The consolidation properties are derived from consolidation lab test results.

Where: $\overline{\gamma} = \text{Total unit weight of soil - correlated.}$

 φ' = Internal friction angle of drained soil, per multiple SPT-N value correlations.

 $k \hspace{-0.8cm}=\hspace{-0.8cm} Subgrade\ modulus\ - \ correlated\ (above\ WT\ /\ below\ WT).$

c'= Undrained shear strength for undrained soil based on in-situ vain shear testing.

 $Es {=} \quad Modulus \ of \ elasticity - correlated.$

Cce= Compression Index, strain based

Cre= Recompression Index, strain based

OCR= Overconsolidation ratio

C_v= Coefficient of consolidation

 C_{ae} = Secondary compression index, strain based



6.4 Embankment Geotechnical Design and Recommendations

6.4.1 Global Stability Analysis

The project scope includes widening the existing embankment from Station 2169+00 to 2427+50. The height of the proposed fill at the toe of the existing embankment varies from 3 feet to 9 feet. The width of the widening is up to 12 to 17 feet from the crest of the existing embankment. The slope of the proposed embankment varies from 6H:1V to 2H:1V. The highway cross sections along with the subsurface conditions at each location were reviewed. Given the presence of the soft sensitive material, critical sections were selected to perform global stability calculations using limit equilibrium analysis and settlement analysis.

Global stability limit equilibrium analysis was performed of the embankment sections at Station 2225+50, 2273+00, 2421+50 as controlling sections. Given the conditions along the mainline it is anticipated that the factors of safety at other areas along the alignment will be higher or equal to the analyzed sections.

Spencer's Method of analysis was used to perform all global stability analyses and satisfies both force and moment equilibrium and meets the requirements prescribed by AASHTO LRFD Article C11.6.2.2.

Global stability analyses were performed for long term loading conditions using drained soil strength design parameters and short-term loading conditions using undrained soil strength design parameters specified in **Table 6-3**. Subsurface conditions for global stability analyses at each approach were selected based on the review and interpretation of the available borings. Additionally, a surcharge load of 250 psf was applied to the approach embankment to simulate the vehicular live load, as per Section 3.11.6.4 of AASHTO.

A global stability resistance factor of 0.75 is required when embankments are not supporting or contain structural elements (such as an abutment). This resistance factor translates to a minimum required factor of safety of approximately 1.33. **Table 6-3** presents the results of the global stability analysis.

 Station
 Factor of Safety

 Drained
 Undrained

 2225+50
 2.1
 1.9

 2273+00
 1.5
 1.3

1.4

2421+50

Table 6-3: Results of Global Stability Analysis

The results indicate that the factor of safety for the global stability in the short-term undrained conditions and in the long-term conditions satisfy the AASHTO requirement.

1.8



6.4.2 Settlement Analysis

Settlement induced by the proposed embankment fills was analyzed utilizing Settle3D v4.0 by Rocscience. A settlement analysis was performed at Stations, 2169+50 SB, 2227+00 SB, 2284+00 NB, 2410+00 NB, 2421+50 SB. The analysis is performed to assess the magnitude of settlement using regular weight fill. The critical stations were chosen given the shallow depth from bottom of the embankment to the top of the soft compressible materials encountered, thickness of the soft compressible material and amount of fill placed.

The deformation values reported herein consist of consolidation settlement after the widened embankment is placed. The immediate settlement occurs in the upper cohesionless materials overlying the soft clay and is negligible (less than 5% of total settlement) when compared to the settlement from the underlying sensitive clay, and therefore has not been reported.

The results of the settlement analysis are included in **Table 6-4**. These values are taken at the proposed guardrail location and represent the maximum total settlement in the transverse and longitudinal direction given the subsurface condition information to date. Settlements are reported at the 15-year mark after the construction that corresponds with the approximate 12-year resurfacing cycle frequency carried out by the Maine Turnpike Authority.

The results indicate that areas around Station 2169+50 SB will need a more frequent repaving cycle than the typical 12 years typically set by the Maine Turnpike Authority. Results at Station 2421+50 SB indicate that the settlements are in excess of what can be addressed with an increase in paving frequency. To mitigate the settlement around this area, that extends from Station 2421+50 SB to 2423+50 SB, the use of lightweight fill is recommended. Due to the generally small volume of the required fill, the use of geofoam is not practical at this location. Lightweight fill aggregates such expanded shale aggregate is best suited and can be placed with the same equipment as standard fill, other lightweight materials may be substituted such as foamed glass. The analysis at this section using the lightweight fill aggregate will be finalized as the design is moved forward for PAW2 submission.

Table 6-4: Results of Settlement Analysis Along Pavement

Station	6 months (inches)	15 years (inches)	100 years (inches)	
2169+50 SB	1.3	5.1	7.1	
2227+00 SB	0.8	4.2	6.3	
2284+00 NB	< 0.5	1.2	5.5	
2410+00 NB	1.3	3.7	5.3	
2421+50 SB	2.9	9.9	15.7	



6.5 Structure Geotechnical Foundation Assessment

6.5.1 Utility Vault

Two utility vaults cross the mainline at Stations 2340+02.81 and 2360+00. The subsurface conditions at the structure located at 2340+02.81 consist of fill up to about elevation 62, underlain by loose to medium dense marine sands to about elevation 52. The soft marine silt-clay extends from about elevation 52 to about elevation -7. Glacial till underlies the marine silt clay that consist of very dense cohesionless material. Based on the as-built drawings the existing structure that underlies the embankment is supported on 2 rows of HP12x53 driven steel piles. The width of the vault is 11.1 feet and the height is 9.6 feet. The elevation of the bottom of the pile cap is about elevation 52.1. The structure will need to be extended by approximately 11 feet to the west of the mainline and approximately 23 feet to the east of the mainline. Given the existing structure is supported on piles, it is recommended that the proposed extensions also be supported on piles. It is anticipated that the same pile size and spacing as the existing footprint will be used for the support of the widened vaults. The bottom of the pile caps for the extensions will match the existing bottom of cap elevation. The piles would need to be driven into the very dense glacial till material in order to resist the required loads. The analysis of the pile layout will be performed as the design is finalized for PAW2 submission.

The subsurface conditions at the utility vault located at Station 2360+00 consist of fill to about elevation 52, underlain by stiff marine silt clay crust to elevation 48. The soft marine silt clay extends from elevation 48 to about elevation 12. Glacial till underlies the marine clay. Based on the as-built drawings the existing utility is supported on shallow foundation at about elevation 48.4. The width of the vault is approximately 11 feet and the height is 10.5 feet. The structure will need to be extended to the east by 12.5 feet to the east of the existing vault.

The loads were determined by the structural group and a pressure demand is provided. The resistance of the bearing materials is calculated based on Equation 10.6.3.1.2a of AASHTO LRFD. The results of the analysis are provided below:

Table 6-5: Results of Bearing Resistance at Utility Vault at Station 2360+00

Factored Pressure	Nominal Bearing	Factored Bearing
Demand (ksf)	Resistance (ksf)	Resistance (ksf)
1.3	3.3	1.5

A settlement analysis was also performed at this location in accordance to Equation 10.6.2.4.3-5 and 10.6.2.4.3-9 of AASHTO LRFD. The results indicate that the primary settlement will be about 1 inch and the secondary settlement will be about 3 inches. The primary settlement will occur over a period of approximately 11 years and the secondary settlement is calculated for a period of 50 years. This information is currently under review



and the potential for a deep foundation will be determined upon establishing settlement criteria for the facility.

6.5.2 Culvert Extensions Wingwalls

The Red Brook Culvert and the Long Creek Culvert will need to be extended to accommodate the widening. An assessment for the type of wall at each location has been performed based on the height of the wall and bearing materials.

6.5.2.1.1. Red Brook Culvert

The existing Red Brook Culvert is an approximate 10'-11" by 12'-0" corrugated elliptical pipe with an existing inlet at about elevation 50. This culvert will be extended approximately 9 feet to the east of the Northbound mainline. The plans indicate that the west end of the culvert will require a headwall and two wingwalls. At the east extension the soil will the slopped on a 2:1 above and around the culvert and no walls are needed. The subsurface conditions at this location consist of medium dense fill extending to elevation 50, underlaying by marine silty clay to elevation 25. The borings at this location are terminated about 10 feet into the glacial till that is encountered below the marine silty clay. The 100-year flood elevation at the culvert is 55.4.

The plans call for the bottom of the footing for the headwall at elevation 45.6 and the height of the wall from 16.5 feet at the culvert location flaring down to 9 feet at the end of the wingwall. The wingwalls are approximately 25 and 45 feet long. A prefabricated modular concrete gravity type wall has been assessed at this location. The wall was designed for the active pressure of the backfill behind it and the lateral pressure of the live load surcharge. Due to the bottom of the wall bearing on the soft clay material, the high groundwater table and the relatively high pressure imparted by the regular fill behind the wall, a gravity wall with the typical B/H ratio, is not feasible. at this location. To alleviate the loads exerted onto the wall, AASHTO A57 will be placed within the wall and within the active wedge behind the wall, from the bottom to 5 feet below the top of wall. Lightweight fill will be placed within the top 5 feet behind and within the wall.. To satisfy sliding, eccentricity and bearing resistance the width of the wall will need to be minimum 10 feet. Foamed glass aggregate is considered as a feasible lightweight fill option for use at this location. The material is produced from 100% post-consumer recycled glass and is characterized by highly frictional surface and a low unit weight. A separation geotextile will be placed at the face of the excavation of the active wedge, between the natural materials and the new backfill materials. A settlement of less than 1 inch is anticipated for the above-mentioned layout. **Table 6-6** presents a summary of the results of the analysis.



2.8

2.5

Table 6-6: Results of Bearing Resistance at Red Brook Culvert **Factored Pressure Nominal Bearing Factored Bearing**

Demand (ksf) Resistance (ksf) Resistance (ksf)

5.1

2.8

Extreme

Strength

Limit State

6.5.2.1.2. Long Creek Culvert

2.0

2.4

The existing Long Creek Culvert is a 78-inch diameter reinforced concrete pipe with an existing inlet elevation at about 34.25. The culvert will be extended by about 8 feet to the west with a headwall. To the east of the Northbound mainline a headwall and wingwalls will be placed above the culvert to hold the widened embankment back. The subsurface conditions at this location consist of medium dense fill extending to elevation 46, underlain by marine sands to elevation 37. The borings at this location were drilled through the till underlaying the marine sands are terminated into the bedrock that is encountered below the marine sands at elevation 33.5. The 100 year flood elevation at the culvert is 43.07.

The plans call for the bottom of the footing for the headwall at elevation 38.06 and the height of the wingwall from 11.5 feet at the highest point adjacent to the culvert and diminishing toward the end of the wall. The wingwalls are 25 feet long each. Given the presence of the shallow bedrock a prefabricated modular concrete gravity type wall is feasible at this location. The wall would be supported at the top of bedrock providing sufficient bearing resistance to handle the required loads. Similar to Red Brook, the wall is designed to withstand the active earth pressure from the embankment fill behind it and the lateral pressure from the live load surcharge. Sliding, eccentricity and bearing resistance are satisfied for a minimum width of 7.5 feet. Table 6-7 presents the results of the analysis.

Table 6-7: Results of Bearing Resistance at Loong Creek Culvert

Limit State	Factored Pressure Demand (ksf)	Nominal Bearing Resistance (ksf)	Factored Bearing Resistance (ksf)	
Strength	4.7	11.0	6.1	
Extreme	3.3	7.2	6.5	

6.5.3 **Earth Retaining Structures**

Earth retaining structures are proposed at Gorham Road, I-295 and Running Hill Road Intersections with the mainline. The purpose of the structures is to provide the necessary space to accommodate the widening underneath the above-mentioned structures. The earth retaining structures are typically 7.8 feet high and have a moment slab where the



foundation is embedded underneath the roadway. The structures are designed for the active earth pressure that is exerted from the slopped fill behind it for strength limit state; and for service limit state consisted of assessing settlement. Primary settlement is anticipated to be less than 1 inch that will occur over the period of 3.5 years and secondary settlement is estimated to be 2.5 inches to occur for the remainder of 100 years. Designed for strength limit state that consisted of sliding, eccentricity and bearing resistance. No seismic design was performed as per section 11.5.4.2 of AASHTO.

6.5.4 Utilities

Existing utilities along the PAW1 project limits have been assessed for settlement. The assessment took into consideration the location of the utility, amount of fill to be placed and subsurface conditions. Two locations have been considered suspectable to settlement; water line at station 2210+00 and 8-inch diameter gas line at station 2274+75. In addition, two locations have been requested to be assessed; the sewer line at Station 2251+70 and the water line at 2176+40.

6.5.4.1.1. Sewer Line at Station 2176+40

Existing borings which were performed for the Gorham Road intersection with the Turnpike were used for the assessment of the settlement at this location. The subsurface conditions consist of fill to about elevation 49 underlain by soft marine silty clay to about elevation 3. The marine silty clay is underlain by till. Based on the highway sections, about 20 feet wide and 3 feet of fill will be placed to the east of the mainline and about 10 feet wide and 3 feet height of fill will be placed to the west of the mainline. The bottom of the new fill will be at about elevation 57. Due to the minimal amount of fill and the relatively deep top elevation of the marine silty clay layer, the settlement at this location is estimated 2 inch in 50 years.

6.5.4.1.2. Water Line at Station 2210+00

The settlement analyses at the water line has been performed based on the borings performed for the Cummings Road project. The subsurface conditions consist of fill extending to about elevation 55, underlain by interbedded sand and silt extending to about elevation 36, underlain by marine silt and clay to about elevation 21. Glacial till is encountered below the marine silt and clay. The amount of fill to be placed to the east of Northbound mainline along the Exit 45 NB off ramp is minimal and settlement is not considered to be a concern. The amount of fill to be placed to the west of the mainline along Exit 45 SB on ramp is about 17 feet wide and 2.5 feet high with the bottom elevation of about 62.5. The settlement of the sewer is estimated along the west of the Southbound mainline and the results are reported in **Table 6-8**.

6.5.4.1.3. Sewer Line at Station 2251+70

Several borings were performed in the vicinity of the utility. Due to potential variation of the subsurface conditions between the North Bound and the South Bound the conditions at the sewer line are based on interpretation and may vary slightly. The subsurface



conditions consist of fill extending to about elevation 63 and overlying marine silt clay crust to elevation 52. The crust is underlain by a stratum of soft marine clay that extends to about elevation 50. Glacial till underlies below the soft marine clay. The impacts to the sewer will arise from the placement of two new wedges of embankment fill on either side of the mainline. The top of the existing embankment is at about elevation +68 and the toe is at about elevation +65. There is about 3 feet of fill being placed along the edges of the existing embankment in order to accommodate the widening.

Due to the low height of the new embankment fill and the relative minimal thickness of the Marine Clay, it is anticipated that the settlements of the sewer will be 1.5 inches over the course of 50 years.

6.5.4.1.4. Gas Line at Station 2274+50

The settlement analyses at the gas line was performed based on the subsurface conditions encountered at boring HB-PAMI-401. Very dense fill was encountered to about elevation 46, underlain by loose to medium dense marine sediment, underlain by marine silt clay crust to about elevation 35.7. Glacial till was encountered below elevation 35.7. The amount of fill to the east to be placed of the Northbound mainline is considered minimal and settlement is not a concern. The amount of fill to be placed to the west is about 25 feet wide, 3.5 feet high with the bottom at about elevation 45. The settlement of the gas line is estimated along the west of the mainline and it is reported in **Table 6-8**.

Time	Utility at station 2210+00	Utility at station 2274+75		
1 Year	<1	<1		
10 Years	0.9-1.1	1.1-1.4		
30 Years	1.1-1.6	1.3-1.6		
50 Years	1.1-1.6	1.4-1.7		

Table 6-8: Results of Settlement Analysis at Utilities

The sewer line crossing the mainline at station 2237+50 was also considered for settlement analysis. The assessment related to this utility has been performed as part of the MTA Exit 45 project and included in a memorandum prepared by the geotechnical group and forwarded to the Exit 45 HNTB project management in Portland, Maine.

6.5.5 Sign Structures

Three sign structures are proposed as part of the project, north of Holmes Road, over the Southbound barrel, in close proximity of the entrance to the Crosby Maintenance Yard and one in the vicinity of Brighton Road. The design of the foundation for the support of the sign structures is performed based on LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 2015 with 2018 Interim revisions.



6.5.5.1.1. Overhead Sign Structure at Station 2133+14

Boring HB-VMS-201 is performed in the vicinity of the sign structure near Holmes Road, at station 2133+14.22. This boring encountered fill to elevation 42.5, underlain by loose interbedded marine silt and sands to elevation 36, underlain by soft marine silt clay to the bottom of the boring, elevation –48.5. The proposed sign structure will be overhead. The right side will the supported on 34 feet long, 10 feet wide, and 3 feet thick concrete cap that will connect a 2x5 array of HP12x74 piles. The left side will be supported on 13 feet long, 10 feet wide and 3 feet thick concrete cap that will connect a 2x3 array of HP12x74. Design loading information was provided by the structural engineer. The group pile behavior of the foundation was modeled using FB Multipier, version 5.5. The piles were analyzed using a pinned head connection. The piles have been modeled with yield strength of 50ksi. The factored and nominal structural resistance of the HP12x74 is 654 kips and 1090 kips, respectively. The design is performed using HP12x63, however to account for the wetting and drying effects, the next pile size is recommended for construction. **Table 6-9** provides the design loads and **table 6-10** presents the summary of the pile group design.

Table 6-9: Design Loads for the Overhead Sign Structure Foundation – Station 2133+14

Side	Limit State	X (kip)	Y (kip)	Z (kip)	Mx (kip.ft)	My (kip.ft)	Mz (kip.ft)
Right	Service	13	47	171	1,479	503	
	Strength	0	0.0	214	0	223	
	Extreme 1	13	47	188	1,479	521	
	Extreme 2	13	47	154	1,479	485	
	Extreme 3	124	41	221	287	953	
Left	Service	13	47	48	1,479	503	
	Strength	0	0	60	0	222	
	Extreme 1	13	47	53	1,479	521	
	Extreme 2	13	47	43	1,479	485	

Table 6-10: Summary of Pile Group Design for the Support of Overhead Sign Structure – Station 2133+14

Side	Limit State	Axial Deman	d (kip) Maximum Moment (kip.ft)		Depth to Maximum Moment	Maximum Lateral Deflection	D/C
		Compression	Uplift	(Kip.it)	(ft)	(in)	
Right	Service	50	22	17	3	0.2	0.1
	Strength	44	<1	0	0	-	0.1
	Extreme	61	13	52	8	0.6	0.3
Left	Service	133	58	32	8	0.3	0.2
	Strength	29	0	0	0	-	< 0.1
	Extreme	118	52	32	8	0.3	0.2

Depth to maximum moment from bottom of pile cap.



A static axial analysis is performed using DrivenPiles, version 1.3.7. Based on the analysis required, axial resistances can be achieved within the soft marine clay material. However due to the cyclic nature of loading and the sensitivity nature of the clays in the area, a loss of undrained shear strength starting at the top of the layer could occur. As such it is recommended that the piles be driven to minimum the top of the glacial till. One pile dynamic analyzer (PDA) test is recommended to be performed for both foundations. Based on borings performed nearby the sign structure the top of the glacial till is anticipated to be at elevation -53. The length of the test pile should be 10 feet longer than the estimated length provided herein and the order length of the production piles will be determined once the test pile is driven to glacial till and required capacities are achieved.

Table 6-11: Foundation Recommendation for the Support of Overhead Sign Structure
- Station 2133+14

Factored Geote Resistance (I		Nominal Geotechnical Resistance (kips)		Resistance (kips)		Estimated Pile Tip Elevation
Compression	Uplift	Compression	Uplift	Elevation		
135	52	135	65	-53.0	-58.0	

Design governed by the extreme limit state of the left side foundation and axial analysis.

6.5.5.1.2. Sign Structure at Station 2266+50

Boring HB-PAMI-108 is performed in the vicinity of this sign structure at Station 2266+25. The subsurface conditions at this location consist of marine silty clay crust to elevation 45.5 underlain by soft marine silty clay to the bottom of the boring at elevation 37. The sign structure will be supported through posts in two 30-inch diameter drilled shafts. The top of the drilled shaft will be at about the ground surface, elevation 58.5. Design loads are provided by the structural engineer per shaft and applied at the top of the shaft. The design of the shaft is controlled by the short column behavior of the foundation. The embedment depth of the shaft will be 12 feet setting the drilled shaft tip elevation to 46.5.

Boring HB-VMS-202 is performed in the vicinity of the sign structure near Brighton Road. This boring encountered fill to elevation 80.9, underlain by glacial till terminating in this layer at elevation 66.3. The proposed sign structure will be supported on a single post supported on a drilled shaft. Further details on the sign structure support will be finalized for the submission of PAW2 Contract.

7.0 PAVEMENT DESIGN

The existing mainline runs N-S and consist of two 12 feet wide lanes and a 8-10 feet wide shoulder in each direction with a 26-foot-wide median between the two travel ways. The proposed improvements consist of adding a new 12 feet wide travel lane and 12-14 feet wide shoulder to the east and west of the Turnpike mainline. The existing 8-foot wide shoulder will be widened for a new travel lane and a new shoulder will be constructed.



The purpose of this report is to analyze and develop pavement rehabilitation options for:

- 1. reuse design for a 6 feet wide existing shoulder for a future travel lane, with the remaining 2-4 feet removed,
- 2. a pavement design of the Crosby area travel lane, and
- 3. a pavement design of the Crosby area shoulder

Pavement rehabilitation options such as overlay or mill and overlay were considered as the preferred option over a full depth replacement wherever possible to achieve a typical 12-year pavement life. The project is grouped into several sections based on the pavement sections, conditions, drainage, and past performance. The structural strength of the existing shoulder pavement sections was evaluated to perform as a travel lane and necessary pavement rehabilitation techniques were proposed to extend the pavement life in areas of poor pavement performance.

High severity distresses including surface raveling, transverse, longitudinal and alligator cracking and water bleeding and pumping has been observed along the southbound roadway in the proximity of Running Hill Road between Sta. 2255+00 to Sta. 2266+00 denoted herein as "Crosby Pavements". Poor pavement performance within this section has resulted in a history of more frequent rehabilitations. These pavements sections were analyzed separately.

7.1 Typical Pavement Sections

Typical Turnpike flexible pavement section consists of 10-inch thick bituminous pavement, 4-inch thick aggregate base course, 8-inch thick aggregate subbase course, and 19-inch thick granular borrow.

7.2 Pavement Assessment

During subsurface explorations, several borings were performed on the roadway. Details of the explorations are provided in Section 3. Pavement coring was performed on these borings and followed by the soil sampling in the granular base, subbase, and subgrade materials. Based on the pavement thickness and quality of the granular materials, the borings were grouped into three categories as follows:

- Borings performed on Pavement Shoulders outside of the Crosby Pavements.
- Borings performed on Southbound Pavement Shoulders within the Crosby Pavements.
- Borings performed on Southbound Mainline Pavement within the Crosby Pavements.



Table 7-1: Summary of Borings Performed on Pavement Shoulders outside of the Crosby Pavements

Southbound Shoulder				Northbound Shoulder			
Pavement Core	Station	Offset	Pavement Depth (in)	Pavement Core	Station	Offset	Pavement Depth (in)
MTA-1S1	2171+00	9' Lt.	10	MTA-1N1	2171+00	9' Rt.	9
MTA-2S1	2192+12	9' Lt.	13	MTA-2N1	2192+12	9' Rt.	13
MTA-3S1	2234+36	9' Lt.	9	MTA-3N1	2229+08	9' Rt.	11
MTA-4S1	2249+00	9' Lt.	8	MTA-4N1	2249+00	9' Rt.	14
MTA-5S1	2287+00	9' Lt.	8	MTA-6N1	2312+00	9' Rt.	8
MTA-6S1	2308+28	9' Lt.	7	MTA-7N1	2329+40	9' Rt.	10
MTA-7S1	2329+40	9' Lt.	11	MTA-8N1	2349+00	9' Rt.	8
MTA-8S1	2355+80	9' Lt.	9	MTA-9N1	2382+20	9' Rt.	11
MTA-9S1	2382+20	9' Lt.	10	MTA-10N1	2408+60	9' Rt.	10
MTA-10S1	2408+60	9' Lt.	11	MTA-11N1	2435+00	9' Rt.	10
MTA-11S1	2435+00	9' Lt.	10	MTA-1N2	2171+00	43' Rt.	11
MTA-1S2	2171+00	43' Lt.	7	MTA-2N2	2192+12	43' Rt.	13
MTA-2S2	2192+12	43' Lt.	9	MTA-3N2	2229+08	43' Rt.	7.5
MTA-3S2	2234+36	43' Lt.	8	MTA-4N2	2249+00	43' Rt.	14.5
MTA-4S2	2249+00	43' Lt.	6	MTA-6N2	2312+00	43' Rt.	10
MTA-5S2	2287+00	43' Lt.	7	MTA-7N2	2329+40	43' Rt.	10
MTA-6S2	2308+28	43' Lt.	9	MTA-8N2	2349+00	43' Rt.	8
MTA-7S2	2329+40	43' Lt.	8	MTA-9N2	2382+20	43' Rt.	9.5
MTA-8S2	2355+80	43' Lt.	10	MTA-10N2	2408+60	43' Rt.	7
MTA-9S2	2382+20	43' Lt.	9	MTA-11N2	2435+00	43' Rt.	7
MTA-10S2	2408+60	43' Lt.	11	NB-1	2198+00	NA	13
MTA-11S2	2435+00	43' Lt.	5	NB-3	2308+75	NA	8.4
SB-1	2198+00	NA	12	NB-4	2321+40	NA	7.2
SB-3	2308+75	NA	9.6	NB-5	2430+20	NA	9.6
SB-4	2321+40	NA	6	NB-2	2254+00	-	9.6
SB-5	2430+20	NA	14.4	MTA-5N1	2271+32	9' Rt.	8.0
				MTA-5N2	2271+32	43' Rt.	11.0
Minimum	Minimum Thickness (in)		5.0	Minimum Thickness (in)		7.0	
Maximum	Thickness	(in)	14.4	Maximum Thickness (in)			14.5
Average '	Thickness (in)	9.1	Average	Thickness	(in)	10.0



Table 7-2: Summary of Borings Performed on Southbound Pavement Shoulders within the Crosby Pavements

Pavement Core	Station	Offset	Pavement Depth (in)
HB-PAVE-101	2266+50	9.8' Lt. *	5.0
HB-PAVE-103	2260+00	7.4' Lt. *	6.0
HB-PAMI- 109B	2272+90	50' Lt	8.0
SB-2	2254+00	-	9.6
Minimu	5.0		
Maximu	9.6		
Averag	ge Thickness (in)		7.2

Note: * - Offset was measured from the right edge of right travel lane.

Table 7-3: Summary of Borings Performed on Southbound Mainline Pavement within Crosby

Pavement Core	Station	Offset	Pavement Depth (in)
HB-PCORE-101	2253+25	2.4ft Rt of SB White Line (right wheel rut)	12.5
HB-PCORE-102	2255+30 2.4 Rt of SB white line (right wheel rut)		7.2
HB-PCORE-103	2261+65	2.2 ft Rt of SB white line (right wheel rut)	13.5
HB-PCORE-104	2263+05	2.7 ft Rt of SB white line (right wheel rut)	9.0
HB-PCORE-105	2265+80	2.8 ft Rt of SB white line	9.5
HB-PAVE-103A	2260+00	3.0' Rt of White Line (travel lane outside wheel rut)	13.0
Mi	7.2		
Ma	13.5		
A	verage Thi	ckness (in)	10.8

In addition to the pavement cores a number of soil borings were advanced and utilized for this assessment. A laboratory testing program was performed to verify the visual-manual field classifications and to aid in determination of the engineering soil properties. The soil samples tested from the top two samples were utilized to evaluate the granular base courses and subgrade materials. **Tables 7-4 and 7-5** detail the results of these tests.



Table 7-4: Summary of Lab Results for Granular Base Courses and Subgrade outside of the Crosby Pavements

Location		Boring No.	Sample Depth below Asphalt (ft)	Fines Content (%)	Classification
		SB-1	2-4	5.2	SP
	SB	SB-3	2-4	6.9	SP-SM
Outside	Shoulder	SB-4	0-2	7.0	SP-SM
of		SB-5	2-4	6.2	SW-SM
Crosby		NB-1	0-2	3.5	SP-SM
Crosby	NB	NB-3	0-2	4.5	SP
	Shoulder	NB-5	2-4	5.0	SW-SM
		NB-2	0-2	8.9	SP-SM

Table 7-5: Summary of Lab Results for Granular Base Courses and Subgrade within Crosby Pavements

Location		Boring No.	Sample Depth below Asphalt (ft)	Fines Content (%)	Classification
	SB	HB-PAVE-103	0-2	15.9	SM
	Shoulder	SB-2	0-2	9.8	SW-SM
		HB-PCORE-	0-2	15.6	SM
		101	2-4	9.1	SP-SM
Within		HB-PCORE-	0-2	13.8	SM
Crosby	SB Lane	102	2-4	19.0	SM
	SD Lane	HB-PCORE-	0-2	22.0	SM
		103	2-4	83.1	CL
		HB-PCORE-	0-2	15.0	SM
		104	2-4	88.3	CL

The soil samples tested within the first 2 feet below the asphalt pavement represent the aggregate base course, subbase course, and granular borrow of the existing pavement box. The materials tested form 2 feet to 4 feet below the asphalt represents the subgrade materials. The materials tested outside of the Crosby satisfy the requirement for the maximum fines content. The materials tested within the Crosby do not satisfy the gradation requirements for granular aggregates and the subgrade materials were silty sand to clays as summarized in **Table 7-5**. These subgrades are in poor condition and not suitable for drainage.



In addition, shallow bedrock was encountered in Borings HB-PAVE-103 and 103A. The other borings, outside of shallow rock area, indicate an impervious layer of clay exists approximately 3 to 4 feet below the roadway surface. At the locations where the top of rock is shallow, the rock is behaving as the impervious layer and restricting infiltration and where rock is at depth there is also a clay layer adversely impacting drainage. These conditions likely resulted in water ponding below the pavement box leading to pumping and bottom up cracking.

The gradation for the aggregate base course, aggregate subbase course, and the granular borrow materials are specified in the Standard Specifications. These materials are specified as the Coarse Aggregates Type A, B, C, or D consist of significant amount of gravels (classified as GW or GP in accordance with USCS Classification system) with limiting the fines to 8 percent. The aggregates encountered below the asphalt pavements (classified as SP, SW, SP-SM, SW-SM, or SM in accordance with USCS Classification system) do not conform to the Maine DOT Standard Specifications. These substandard aggregates are not suitable for providing adequate drainage and structural strength.

7.3 Design Traffic Information

7.3.1 Traffic Data

Annual average daily traffic (AADT) data for each Turnpike (I-95) segment from Exit 44 through Exit 48 were collected by the Turnpike Authority automated system and are provided in **Tables 7-6** and **7-7** for Northbound and Southbound directions, respectively. The volumes are broken out by Turnpike vehicle classes.

2018 AADTs -- Northbound 2-axle 2 axles, 2-axle car All Limits 3 axles 4 axles 5 axles 6 axles car 6 tires w/ trailer Classes Cl1 Cl2 Cl3 Cl4 Cl5 Cl6 C17&8 Total Ex44-45 24,517 503 171 209 1,508 237 313 27,459 Ex45-46 22,689 546 186 237 1,342 280 315 25,595 Ex46-47 24,444 562 185 226 1,297 282 324 27,320 Ex47-48 22,774 519 177 223 1,250 275 320 25,538

Table 7-6: Annual Average Daily Traffic-Northbound

Table 7-7: Annual Average Daily Traffic- Southbound

	2018 AADTs Southbound								
Limits	2-axle car	2 axles, 6 tires	3 axles	4 axles	5 axles	6 axles	2-axle car w/ trailer	All Classes	



	Cl1	Cl2	Cl3	Cl4	Cl5	Cl6	Cl7&8	Total
Ex44-45	22,157	526	209	215	1,514	213	302	25,135
Ex45-46	23,750	580	226	261	1,425	253	332	26,827
Ex46-47	26,760	615	212	245	1,400	274	351	29,856
Ex47-48	24,613	546	198	231	1,350	266	342	27,547

7.3.2 18-kip Equivalency Factors

The 18-kip Equivalency Factors obtained from the AASHTO Guide for "Design of Pavement Structures", 1993 for interstate highways are as follows:

Vehicle **FHWA** 18-kip Equivalency Vehicle Description Class Class Factor C11 2 2-axle car 0.002 C12 5 2-axle, 6 tire 0.25 C13 3-axle 6 0.80 8 4-axle C14 4.50 C15 10 5-axle 2.30 C16 11 6-axle 1.30 2-axle car with trailer C17&8 12 1.00

Table 7-8: 18-kip Equivalency Factors

7.4 Design Data for Empirical Design

7.4.1 Subgrade Material

The soils considered in design are silty sand to silts and clays, which are predominate in the area. Therefore, the drainage in the existing subgrade is considered to be poor. The pavement sections were designed using roadbed soil resilient moduli (MR = 1500 CBR) of 6,000 psi based on a CBR value of 4 for the Crosby Area and 12,000 psi based on CBR of 8 for Outside of Crosby.



7.4.2 Seasonal Adjustments for Subgrade

The M_R values were seasonally adjusted. The seasonal adjustment values were estimated (AASHTO, 1993) as follows (**Table 7-9**):

SeasonClimate ConditionAdjusted M_R (M_{RM})FallWet $1.0 M_R$ WinterFrozen $2.0 M_R$ limited to 30,000 psiSpringWet $0.8 M_R$ SummerDry $1.0 M_R$

Table 7-9: Seasonal Adjustments for Subgrade

As described in Page II-12 of AASHTO (1993), relative damage (u_f) calculated for each climate condition and the average of the relative damage (u_{fa}) is used to calculate the seasonally adjusted roadbed soil resilient modulus (M_{RA}) using the following expressions:

$$u_f = 1.18x10^8 M_{RM}^{-2.32}$$

$$M_{RA} = \left[\frac{u_{fa}}{1.18x10^8} \right]^{-0.431}$$

7.4.3 Serviceability Index

The following initial and terminal serviceability indices are recommended for the Interstate Highways:

Initial Serviceability Level = 4.2 Terminal Serviceability Level = 3.0

7.4.4 Seasonal Adjustments for Serviceability

The freezing index values were used in estimating the maximum serviceability loss due to frost heave. The maximum serviceability loss due to frost heave is estimated as 2.0 from Figure G.7 of AASHTO Guide for "Design of Pavement Structures", 1993 (AASHTO 1993). The serviceability loss due to frost heave is estimated to be 0.45 from Figure G.8 of AASHTO (1993). A frost penetration depth of 5.5 feet was used for the design. A frost rate of 10 mm/day was used in the design.

7.4.5 Overall Standard Deviation

Overall Standard Deviation (S_0) of 0.45 is recommended for the flexible pavements.

7.4.6 Reliability

The reliability percentage accounts for the variability and degree of uncertainty associated with pavement design to ensure that the design will last through the



design period. According to AASHTO (1993), 90 percent reliability is used for the Interstate Highways.

7.4.7 Lane Distribution Factor

The Lane Distribution Factor is defined as the percent of all trucks in the design lane. According to AASHTO (1993), the percent of all trucks in the design lane is:

- 100 percent for highways with two-lane (one-lane each direction)
- 90 percent for highways with four-lane (two-lane each direction)
- 80 percent for highways with six-lane or more (three-lane each direction).

A Lane Distribution Factor of 80 percent is used for Turnpike, which will consist of three lanes in each direction after the proposed improvement.

7.4.8 Structural Layer Coefficients

In accordance with AASHTO (1993) the following structural coefficients are used for flexible pavements:

$a_1 = 0.44$	New Asphalt Pavements
$a_2 = 0.30$	Existing Asphalt Pavements
$a_3 = 0.11 - 0.14$	Aggregate Base Course and Aggregate Subbase Course
$a_4 = 0.06 - 0.09$	Granular Borrow

The layer coefficients for Aggregate Base Course, Aggregate Subbase Course, and Granular Borrow depend on the resilient modulus of the layer. Typical range for aggregates varies from 0.11 to 0.20 for the resilient modulus range of 25,000 to 50,000 psi. The samples collected and tested during the subsurface exploration indicate that the aggregate courses are finer than the gradation specified in the standard specifications. Based on the lab test results, layer coefficient of 0.11 is recommended for the aggregate courses. The layer coefficient for granular borrow material varies from 0.06 to 0.11 for a resilient modulus range of 9,000 to 15,000 psi. The layer coefficient of 0.08 and 0.09 is recommended for the granular borrows encountered with in the Crosby Area and Outside of Crosby, respectively.

7.4.9 Drainage Coefficients

The subgrade soils encountered during subsurface exploration, consist of low to very low permeability silts and clays, are considered as not adequate to provide drainage. In addition, existing drainage ditch running parallel to the roadway is filled with fine grained soils and obstructing the drainage of water collected underneath the pavement box. The ditch will be widened and deepened during construction to improve the drainage. However, the permeability is expected to be low for the subgrades. Therefore, the drainage in the existing subgrade is considered to be poor with the drainage coefficient of 1.0.



7.5 Design of Structural Section of the Pavement

The proposed roadway improvements will increase the roadway profile by 1.5 inches, after 1.5 inch overlay contract (2021.##) is complete. Several pavement section combinations were considered to adequately satisfy the minimum Structure Number (SN) requirement. As mentioned in the beginning of this section, pavement rehabilitation options such as overlay or mill and overlay were considered as the preferred option than full depth replacement. The roadway was split into three zones for the pavement design based on the existing pavement sections, quality of the subgrade, drainage conditions, and past performance of existing pavements as described below:

7.5.1 Shoulders Outside the Crosby Area

The majority of the pavement cores indicate that the asphalt pavement thickness for the shoulder pavement vary from 7 inches to 14.5 inches except isolated locations spotted with thicknesses as low as 5 inches. The aggregate courses and subgrade materials are relatively good. No major issues regarding the performance of the pavement sections or distresses were reported in this area.

The remaining design life of existing shoulder pavements including the additional 1.5 inches of overlay was estimated as follows:

Table 7-10: Remaining Pavement Life for Outside of Crosby Southbound Area Shoulders

Existing Pavement Thickness (inches)	Overlay Thickness (inches)	Remaining Pavement Life (years)
>10	1.5	20
>8.5	1.5	12
8.0	1.5	11
7.5	1.5	10
7.0	1.5	8
6.5	1.5	7
6.0	1.5	6
5.0	1.5	4

The pavement sections with remaining life less than 12 years were analyzed for mill and overlay options to maintain a design life of 12 years and the results are shown below. The net change in roadway profile is maintained at 1.5 inches in the results shown below. The results shown in **Table 7-11** are only based on the structural strength required for a design life of 12 years and a cost analysis or a life cycle cost



analysis was not performed. Due to the variation of the milling thickness and the unknown amount of macadam within the pavement box, full depth replacement is recommended.

Table 7-11: Mill and Overlay Options for Outside of Crosby Southbound Area Shoulders

Asphalt Thickness (inch)								
Existing Pavement	Mill	Overlay						
>8.5	0.0	1.5						
8.0	1.0	2.5						
7.5	2.0	3.5						
7.0	3.0	4.5						
	Full Depth Pavemer	nt Replacement						
<7.0	Recommended; Mill	& Overlay Not						
	Recomme	nded						

7.5.2 Southbound Shoulders Within the Crosby Area

Based on the four pavement cores obtained in this zone, the asphalt pavement thickness for the shoulder pavement varies from 5 inches to 9.5 inches with an average of 7 inches. The granular base, subbase, and granular borrow materials are not in conformance with the standards and the subgrade is not adequate to satisfy the drainage requirements. Severe pavement distresses as indicated in Section 7.0 were observed in this area and have resulted in more frequent repairs and repaying.

The remaining design life of existing shoulder pavement including the additional 1.5 inches of overlay was estimated as 4 years for the highest asphalt thickness pavement. Therefore, full depth pavement replacement is recommended. The station limits are provided in Section 7.0.

7.5.3 Southbound Mainline Lanes Within the Crosby Area

Based on the six pavement cores obtained in this zone, the asphalt pavement thickness for the mainline pavement vary from 7 inches to 13.5 inches with an average of 11 inches. The granular base, subbase, and granular borrow materials are not in conformance with the standards and the subgrade is not adequate to satisfy the drainage requirements. Severe pavement distresses as indicated in Section 7.0 were observed in this area and resulted with more frequent repairs and repaving.

The remaining design life of existing mainline pavement including the additional 1.5 inches of overlay was estimated as 7 years for the average asphalt thickness and 11 years for the highest asphalt thickness. Based on the analysis, the thickest pavement section with additional 1.5 inches of overlay is inadequate to provide



structural strength. Therefore, full depth pavement replacement is recommended for this entire area.

In order to further study the failure mechanisms and validate the results obtained from the empirical flexible pavement design based on AASHTO (1993), Mechanistic-Empirical Pavement Design was performed using AASHTOWare Pavement ME Design Software (Version 2.5.5). The analysis was performed using the average existing asphalt thickness of 11 inches and additional overlay thickness of 1.5 inches. The underlying soil models for granular base and subgrade materials were selected based on the available gradation data from the lab testing. The hourly climate data for the past 10 years for obtained from nearby station located in Naples, Maine. The results indicate that high severity distresses such as fatigue cracking, bottom-up cracking, and permanent deformations are expected within the service life of less than 5 years. The summary of the results is provided below:

Table 7-12: Mechanistic Design Summary for Crosby Southbound Area Travel Lanes

Distress Type	Distress at Specified Reliability		Reliability (%)		Expected Pavement Life	Criterion Satisfied?
	Target	Predicted	Target	Achieved	(Years)	,
Terminal IRI (in/mile)	172	212.74	90.00	61.51	5	Fail
Permanent deformation - total pavement (in)	0.75	1.02	90.00	23.00	4	Fail
AC total fatigue cracking: bottom up + reflective (% lane area)	25.00	100.00	90.00	0.00	2	Fail
AC total transverse cracking: thermal + reflective (ft/mile)	2500	333.20	90.00	100.00	12	Pass
Permanent deformation - AC only (in)	0.25	0.49	90.00	15.42	-	Fail
AC bottom-up fatigue cracking (% lane area)	25.00	25.40	50.00	34.46	-	Fail
AC thermal cracking (ft/mile)	1000	15.00	50.00	100.00	12	Pass
AC top-down fatigue cracking (ft/mile)	2000	13800	90.00	0.03	1	Fail

Full depth pavement option was reanalyzed using Tensar SPECTRAPAVE software (Version 4.7) to optimize the thickness of the granular borrow. Based on the analysis, the 19-inch thick granular borrow can be eliminated by adding a layer of geogrid and a layer of geotextile without affecting the performance and design life. However, this option is not the preferred alternative due to a high freezing index in the area.



7.6 Construction Considerations

7.6.1 Pavement Overlay

- 1. Wherever only the pavement overlay is constructed, a layer of tack coat shall be applied prior to the overlay.
- 2. At the locations where mill and overlay is recommended, tack coat shall be applied before paving each lift.

7.6.2 Full Depth Replacement

- 1. Where unsuitable subgrade consisting of soft cohesive layers are encountered below the bottom of the Granular Borrow, one of the alternatives specified below shall be considered:
 - a. Over excavate to a minimum of 2 feet below the bottom of the proposed Granular Borrow and replace with an additional 2 feet Granular Borrow with separation geotextile placed between the additional granular borrow and 19 inches of Granular Borrow below the pavement box.
 - b. Place two layers of geogrid. One layer of geogrid shall be placed at the bottom of the Granular Borrow and another layer of geogrid shall be placed 6 inches above the first geogrid..
- 2. If bedrock is encountered at the bottom of the Granular Borrow, over excavate the rock up to 1 foot below the bottom of the Granular Borrow and backfill with Granular Borrow.
- 3. The subgrade will serve as both a foundation for the pavement structure and a working platform to support construction equipment, and it should be compacted and graded properly and uniformly.
- 4. In order to facilitate drainage, the subgrade shall be prepared with 2 percent slope towards the drainage ditch and daylighted at least 1-foot above the bottom of the ditch. The subgrade shall be continuous across the roadway.
- 5. All pavement layers should be constructed with an adequate cross slope so as to promote drainage of the pavement.
- 6. Materials, Equipment, and Paving techniques shall confirm to Maine DOT Standard Specifications.
- 7. Tack coat shall be applied in between each asphalt lifts.

7.7 Recommendations

7.7.1 Shoulders Outside the Crosby Area

Due to the potential variation of thickness of pavement and unknown thickness of macadam, as indicated in **Table 7-11**, it is recommended to remove the existing shoulder pavement along the limits of the project and replace with full depth pavement. The shoulder pavement should be saw cut at the existing edge of travel way; approximately 37 feet Lt. and Rt.



The full depth asphalt section should include the following:

1.5 inch thick Bituminous Overlay (Contract 2021.##)

8.5-inch thick Bituminous Pavement

4-inch thick Aggregate Base Course

7.7.2 Southbound Mainline Lanes and Shoulders Within the Crosby Area

Full depth pavement replacement is recommended for the Crosby Area Southbound, Sta. 2255+00 to Sta. 2266+00, mainline travel lanes and shoulders. It is recommended that the full depth Maine Turnpike Standard Pavement Section be utilized.

Standard Pavement Section

1.5 inch thick Bituminous Overlay (Contract 2021.##)

8.5-inch thick Bituminous Pavement

4-inch thick Aggregate Base Course

8-inch thick Aggregate Subbase Course

19-inch thick Granular Borrow

Separation Geotextile

During the construction of the drainage ditch, if rock is observed within 1 foot below the bottom of the proposed pavement box, then over excavate 1 foot below the pavement box and backfill with granular borrow.

7.7.3 Pavement Widening Areas

New full depth pavement is recommended for the widened portion of the roadways. The standard full depth pavement section specified is Section 7.7.2 can be utilized.

8.0 ROCK SLOPE EXCAVATION

8.1 Proposed Excavation

The proposed excavation required for the widening of the Main Turnpike is anticipated to encounter rock at the following locations:



Maximum Location Start End Description of **Proposed Cut** Approx. Roadway No. Station Station Location Slope Height Length (ft) (ft) North of Running Hill 1 2257+50 2260+50SB Road Underpass MM 18 300 45.4 South of Exit 46 NB On 2290+00 7 2 2289+50 NB 50 Ramp North of Congress 3 SB Street Underpass MM 16 2304+50 2307+00250 46.4 South of Brighton NB Avenue Underpass 4 2392+00 2394+50 13 250 MM 48.3

Table 8-1: Rock Slope Limits

The following describes general site geology, existing site conditions, design selection of the proposed rock cut slope inclination and rockfall catchment width, and construction recommendations for the proposed rock cuts.

8.2 Site Geology for Rock Excavation

The site is located in the Appalachian Region, New England Physiographic Province, Seaboard Lowland Section. Bedrock at the proposed rock cut is Silurian-Ordovician age stratified rocks of the Merrimack Group including the Berwick Formation (SOb) and Eliot Formation (SOe). The Berwick Formation is described as fine-grained medium gray migmatized and non-migmatized quartz-plagioclase biotite gneiss and granofels with minor light medium gray calc-silicate gneiss or granofels. The Berwick Formation outcrops along the Maine Turnpike at Location 4 and is also exposed in the adjacent Blue Rock Quarry located to the West of the Maine Turnpike. The Eliot Formation is described as fine-grained buff-weathering, medium-gray quartz-plagioclase-biotite phyllite with interlayered dark gray phyllite and is reported to be strongly sheared throughout the formation. The Elliot Formation is present at Locations 1, 2, and 3. The geologic origin of both formations is deep ocean sediments, which formed sandstone and shale, and were later metamorphosed during the Acadian Orogeny during the early to middle Devonian time, which caused complex folding. Igneous intrusive sills are also present in the surrounding region.

8.3 Existing Site Conditions Within Rock Excavation Limits

8.3.1 Location 1

Rock cut slope Location 1 is bound between Running Hill Road to the South and an existing Maine Turnpike Authority Maintenance Building to the North and is proposed to extend approximately 300 feet in length, to the west of the Southbound Maine Turnpike. The existing Running Hill Road bridge structures, Maintenance Buildings, and commercial building east of the Maine Turnpike are located



within a 500-foot radius of the proposed rock cut. The maximum proposed cut slope height at Location 1 is 18 feet. The Ground Penetrating Radar (GPR) data indicates the existing rock surface slope varies from roughly 19 to 24 degrees above horizontal as shown on the attached cross sections.

8.3.2 Location 2

Rock cut slope Location 2 is bound between Skyway Drive to the South and Congress Street to the North and proposed to extend approximately 50 feet in length, to the east of the Northbound Maine Turnpike. A sign structure to the Southwest and toll plaza to the Northeast are the closest structures. The maximum proposed cut slope height at Location 2 is 7 feet. The GPR data indicates the existing rock surface slope varies from roughly 14 to 22 degrees above horizontal as shown on the attached cross sections.

8.3.3 Location 3

Rock cut slope Location 3 is bound between Congress Street to the South and the Stroudwater Trail to the North and is proposed to extend approximately 250 feet in length, to the West of the Southbound Maine Turnpike. Roughly 4 commercial buildings and gas and electrical utilities are located within a 500-foot radius of the proposed rock cut. The maximum proposed cut slope height at Location 3 is 16 feet. The GPR data indicates the existing rock surface slope varies from roughly 16 to 39 degrees above horizontal.

8.3.4 Location 4

Rock cut slope Location 4 is bound between the Main Central Railroad to the South and Brighton Avenue to the North and is proposed to extend approximately 250 feet in length, to the West of the Southbound Maine Turnpike. Several commercial buildings, the Main Central Railroad, Brighton Avenue Bridge Structure, and the Blue Rock Quarry are located within a 500-foot radius of the proposed rock cut. The maximum proposed cut slope height at Location 4 is 13 feet. The GPR data indicates the existing rock surface slope varies from roughly 12 to 29 degrees above horizontal.

8.4 Rock Quality

The following borings were taken in the vicinity of the proposed rock cut slope locations:

Rock Location Nearest Core Subsurface Profile Sheet* No. Boring Taken HB-PAVE-103 No 1 8 - Sta. 2247+00 to 2260+00 2 HB-PAMI-112 No 11 - Sta. 2288+00 to 3202+00 3 HB-PAMI-113 No 12 - Sta. 2302+00 to 2316+00 4 17 - Sta. 2370+00 to 2383+00 HB-PAMI-124 Yes 5'

Table 8-2: Borings Taken in the Vicinity of the Proposed Rock Cut



 $^{^\}star$ The subsurface profile is included as Figure 4 in the Geotechnical Design Report.

Rock was encountered at Elevation 97.9 in Boring HB-PAMI-124, and five feet of rock core was taken. The rock core run returned 100% recovery with a Rock Quality Designation (RQD) of 50%. The rock was classified as Phyllite, rather than Granofels or Gneiss, which are reported on the geologic map.

The geophysical survey conducted by HGR is provided in Section 3.3.

8.5 Laboratory Test Results of Rock

Typical values for uniaxial compressive strength from AASHTO, Table 4.4.8.1.2B vary from 3,500 to 35,000 psi for Phyllite and 3,500 to 45,000 psi for Gneiss were utilized for this exercise.

Uniaxial compressive strength tests results on five (5) rock core samples taken from the nearby Stroudwater Bridge Project ranged from 2,511 to 6,954, with an average of 4,720 psi. The rock for Stroudwater Bridge Project was classified as metapelite, with calculate veins.

Uniaxial compressive strength tests results on six (6) rock core samples taken from the MCRR Bridge Project ranged from 4,564 to 12,682, with an average of 6,813 psi. The rock for MCRR Bridge Project was classified as granofels and metasandstone with calcsilicate veins.

8.6 Rock Slope Engineering

HNTB performed a desk study review of available geologic maps, soil boring logs, laboratory testing results, geophysical survey results, and site photos from Google Street view. The only visible exposed rock from Google Street view was observed at Location 3, where the rock appears to be lite gray in color and blocky, with three sets of roughly orthogonal discontinuities (one nearly horizontal, one nearly vertical striking roughly perpendicular to the roadway, and one nearly vertical striking roughly parallel to the roadway). Much of the rock cut slope is obscured by vegetation. Existing available geologic structure data was obtained from the bedrock geology map as described above.

Rock mass strength could behave in three distinct ways:

- Massive rock is controlled by the rock's intact strength obtained from uniaxial compressive strength tests on rock core specimen or from typical values in the absence of site-specific data.
- Jointed rock, with one or more sets of discontinuities, is generally controlled by the shear strength of the discontinuity, which is ideally derived from a basic friction angle obtained from direct shear testing on saw cut rock core samples and adjusted for joint roughness and infill conditions. The shear strength of a discontinuity is generally lower strength than the rock's intact strength. In the absence of lab data, typical values of basic friction angle can be obtained based on rock type / grain size.
- Highly fractured or very weak or weathered rock behaves as a rock mass, which are estimate using the Hoek and Brown failure criterion.

Considering the uniaxial compressive strength values reported above, the intact strength is not assumed to control the overall strength of the rock mass. Since direct shear testing was not performed for this project, a basic friction angle for rock discontinuities was assumed to be 27 degrees based on AASHTO,



Table 10.4.6.4-1 and joint roughness was assumed to be 0 degrees. Therefore, the total friction angle of discontinuities used in the analysis was 27 degrees.

Stereographic analysis was performed using RocSciences's DIPS version 7, to evaluate the kinematic viability of the planar sliding, wedge sliding and toppling. The stereographic analysis was performed using the geologic mapping data obtained for the bedrock geology map, assuming the proposed rock cut slope would be parallel to the roadway alignment and using the discontinuity shear strength (friction angle only) described above.

Location No.	Trend of Rock Cut	Proposed Rock Cut Slope Inclination from Horizontal (Degrees)	Poles Resulting in Planar Sliding (%)	Intersections Resulting in Wedge Sliding (%)	Intersections Resulting in Direct Toppling (%)	Intersections Resulting in Oblique Direct Toppling (%)	Poles Resulting in Flexural Toppling (%)
1	N35°E	53	0	0	0	0	0
2	S05°W	53	0	0	0	30	0
3	N00°E	53	0	0	0	33	0
4	S18°W	53	0	0	0	40	60

Table 8-3: Summary of Stereographic Analysis

Notes:

- 1. Given the small number of data points, one point could result in a significant percent.
- 2. Geologic mapping not performed. Results are based solely on data points obtained from bedrock geologic map,
- 3. Oblique toppling is not anticipated to occur due to lateral restraint.
- 4. Alternatively, given the large catchment available and low consequence of a rockfall event, dowels may be omitted from the

Given the character of the rock as understood from the information available, the stability was also assessed assuming the rock is weathered or highly fractured, which may be an underprediction of the actual rock strength conditions. The analysis indicated that the factors of safety are satisfactory for a proposed cut angle of 53 degrees (0.75H:1V). Therefore, A 0.75H:1V slope is proposed. A constructability level blast design was not performed for this project.

8.7 Rock Fall Mitigation

The drainage ditch width proposed is generally 30 feet or wider, which is considerably wider than required to retain rockfall. Based on the FHWA Rockfall Catchment Ditch Design Guide, a 40 tall 0.75H:1V slope with a 6H:1V ditch slope can retain 95% of rockfall within 15 feet. Considering the maximum slope height is only 18 feet, the catchment width is considerably more than adequate to retain rockfall. Therefore, no site specific rockfall simulation modeling was performed.



8.8 Rock Slope Conclusions and Construction Recommendations

A 0.75H:1V slope is proposed for the four rock cut slopes, with the cut made parallel to the existing roadway. More than 30 feet of catchment width is shown on the cross sections to accommodate drainage ditches and is much greater than the width required for rockfall catchment.

The following provisions should be added to the Contract Documents for improved safety, reduced risk of longer roadway closures, and a better-quality cut slope:

- Limit pre-split drill holes to 3-inch diameter (Blast hole diameter is limited to 3-inches in the specifications already, but no requirement is provided for pre-split holes).
- Set maximum presplit spacing to 24 inches or less for a more uniform face (No pre-split maximum spacing requirement was provided in the specifications).
- Require a minimum 25 millisecond delay between presplit holes and production hole.
- Require the blast design keep the direction of the shot parallel to the roadway to minimize flyrock.
- Elaborate on well water quality tests in Specification Section 105.2.6.
- Special notification or monitoring requirements for Maine Central Railroad.

The following pay items will need to be quantified and accounted for in the Contract Documents:

- 203.21 Rock Excavation per Cubic Yard
 - o Measured and paid as the plan quantity
 - o Calculate using average end area method
- 203.211 Presplitting Rock per Linear Foot
 - o Presplit is measured from top or rock elevation to toe of slope elevation
 - o Assume pre-split holes are spaced every 24 inches to calculate number of holes

9.0 LIMITATIONS OF REPORT

The conclusions and recommendations contained in this report are based upon the subsurface data obtained during this investigation and on details stated in this report. The validity of the conclusions and recommendations contained in this report are necessarily limited by, among other things, the scope of field investigation and by the number of borings. Therefore, given the nature of this subsurface study, there is a possibility that actual conditions encountered will differ from those discussed in this report. Should conditions arise which differ from those described in this report, HNTB should be notified immediately and provided with all information when available regarding subsurface conditions.

As part of the geotechnical recommendations presented in this report, HNTB makes no warranty as to the absence or presence of any environmental hazard or waste present on any property evaluated hereunder and all reports generated here to are qualified as being based upon existing data reasonably available to HNTB and not subject to independent verification. HNTB is not responsible for any latent defects that could not be reasonably discovered during the performance of its services and makes no legal representations whatsoever concerning any matter, including but not limited to, the ownership of any property or the interpretation of any law. These limitations form a material part of this

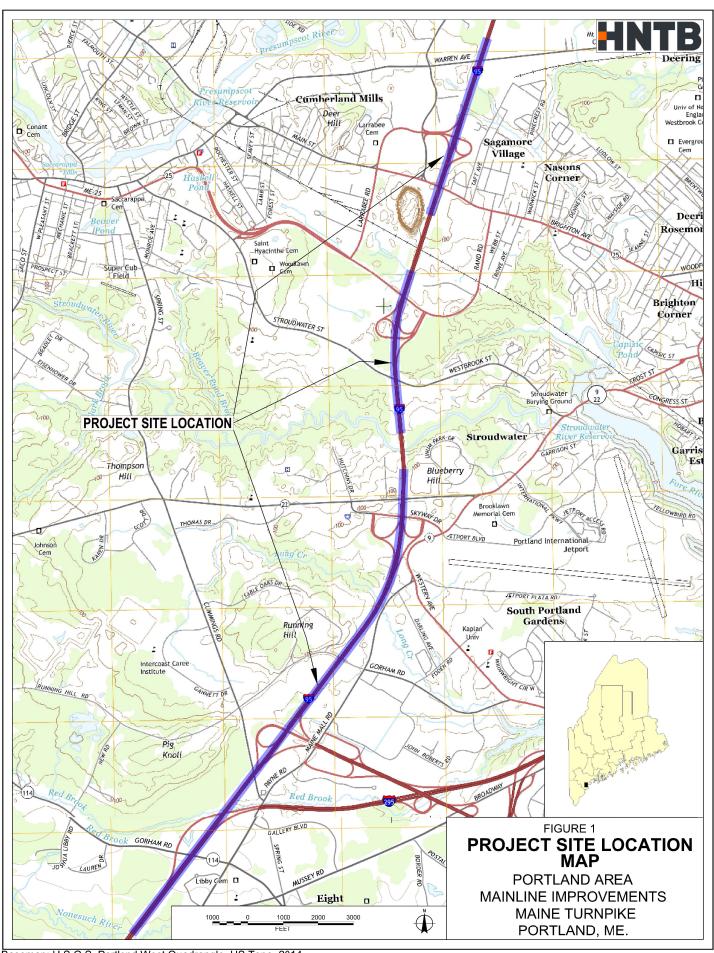


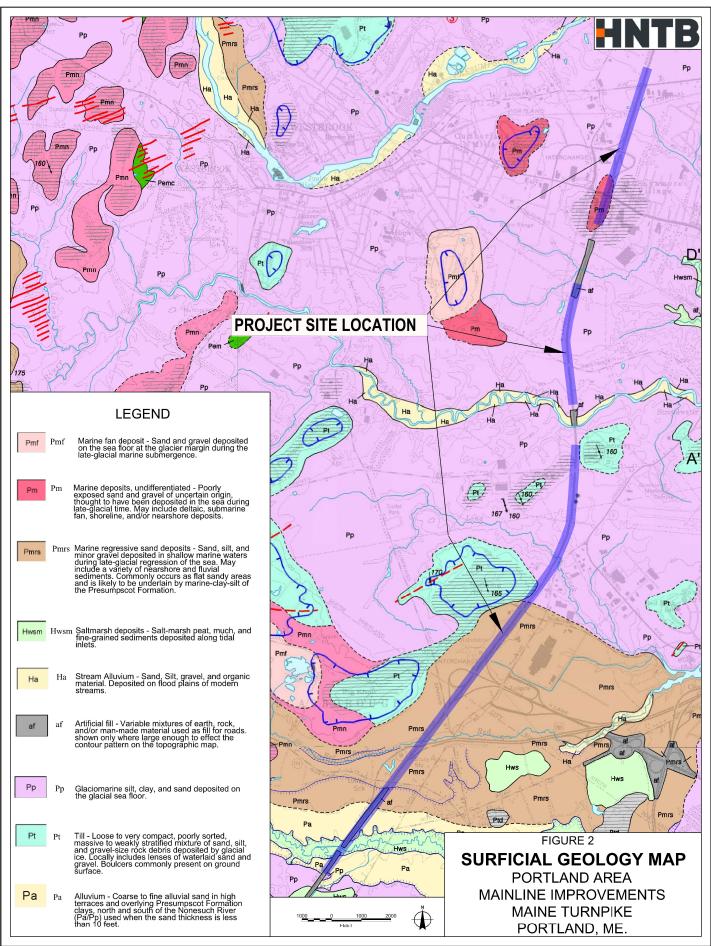
report and are considered incorporated by reference therein. No warranty for the contents of this report, neither expressed nor implied, is made except that professional services were performed in accordance with generally accepted principles and practices.

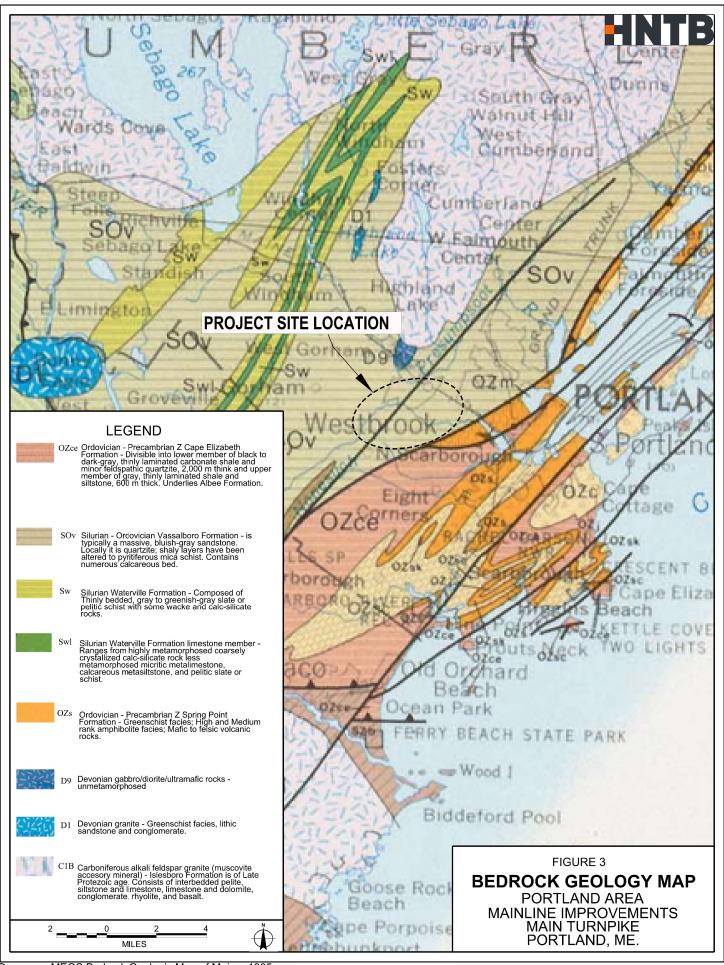
10.0 REFERENCES

- 1. USGS Portland West Quadrangle, US Topo, 2014
- 2. MEGS Surficial Geologic Map, West Portland Quadrangle, 2008
- 3. MEGS Bedrock Geologic Map of Maine, 1985
- 4. AASHTO. "LRFD Bridge Design Specifications" 7th Edition, 2014
- 5. AASHTO. "Standard Specifications for Highway Bridges" 17th Edition, 2002.
- 6. FHWA, "Evaluation of Soil and Rock Properties," Geotechnical Engineering Circular No. 5, FHWA-IF-02-034, 2002.
- 7. MaineDOT, "Bridge Design Guide", Maine Department of Transportation, Prepared by Guertin Elkerton & Associates, August 2003 with 2014 updates.
- 8. AASHTO, Guide for Design of Pavement Structures. 1993.
- 9. AASHTO, AASHTOWare^R Pavement ME DesignTM, Software Help Manual, Version 3.0.2, 2016.
- 10. FHWA, Publication No. FHWA-RD-03-031 Distress Identification Manual for the Long-Term Pavement Performance Program. June 2003.
- 11. NCHRP, Guide for Mechanistic-Empirical Design of New and Rehabilitated Pavement Structures, "Appendix CC-1: Correlation of CBR Values with Soil Index Properties". March 2001.
- 12. Tensar, SpectraPaveTM, Software User Manual, Version 4.7, 2019.
- 13. FHWA. *Rockfall Catchment Area Design Guide*, Final Report, SPR-3(032), Oregon Department of Transportation, FHWA-OR-RD-02-04, January. 2002.
- 14. FHWA. *Rock Slopes: Design, Excavation, Stabilization*, FHWA-TS-89-045, September. 1989.
- 15. Hoek, Evert. *Hoek-Brown Failure Criterion 2002 Edition*.
- 16. Main Turnpike Authority. Standard Specifications. 2014.
- 17. Maine Turnpike Authority. Supplemental Specifications. 2016.
- 18. Maine Geological Survey. *Bedrock Geology of the Portland West 7.5' Quadrangle, Cumberland County, Maine, 2003.*
- 19. Nunnally, S.W. Construction Methods and Management. 6th Ed. 2004.
- 20. Rocscience. Dips Version 6.0 Help Manual. Dips Manual. March 2015.
- 21. Transportation Research Board. Rockfall Characterization and Control. 2012.
- 22. USBM. Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting. 1989.
- 23. USGS. https://pubs.usgs.gov/ha/ha730/ch m/gif/M002.GIF
- 24. Wyllie, D.C. Foundations on Rock. 2nd Ed. 1999.
- 25. Wyllie, D.C., Mah, C.W. Rock Slope Engineering Civil and Mining. 4th Edition. 2004.









CONTRACT DOCUMENT.

2 () E

Scale:

2. THE DEPTH AND THICKNESS OF SUBSURFACE STRATA INDICATED ON THE PROFILE WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORING LOCATIONS. THE TRANSITION BETWEEN MATERIALS MAY BE MORE OR LESS GRADUAL THAN INDICATED.

1. THIS SUBSURFACE PROFILE REPRESENTS THE INTERPRETATION OF THE CONDITIONS ALONG THE CENTERLINE OF THE MAINLINE.

TEST BORINGS DATA AND SHOULD NOT BE USED AS PART OF THE

THE PROFILE CONTAINS INTERPRETATIONS OF WIDELY SPACED

- 3. THE HB-PAMI BORING ELEVATIONS ARE APPROXIMATE AND ESTIMATED BASED ON THE AVAILABLE TOPOGRAPHY MAPS. THE ELEVATIONS REFER TO NAVD 88 VERTICAL DATUM.
- 4. THE ELEVATIONS OF BORINGS PERFORMED BY OTHERS ARE TAKEN FROM THE LOGS PUBLISHED IN THE CONTRACT DOCUMENTS OF THE RESPECTIVE PROJECT.
- 5. AT LOCATIONS WHERE THE SUBSURFACE CONDITIONS VARY WIDELY BETWEEN THE NORTHBOUND AND SOUTHBOUND. THE BORING INFORMATION IS SCREENED.
- 6. N* INDICATES THAT SPT N VALUES ARE REPORTED DUE TO MISSING INFORMATION OF HAMMER EFFICIENCY. N INDICATED THAT THE SPT N VALUES ARE CORRECTED FOR HAMMER EFFICIENCY.
- 7. GROUNDWATER REPORTED REPRESENTS WATER LEVEL ENCOUNTERED DURING DRILLING. THE GROUNDWATER IS ANTICIPATED TO FLUCTUATE SEASONALLY AND FOLLOWING EVENTS OF PRECIPITATION.
- 8. AT BRIDGE LOCATIONS, ONE BORING IS USED AND SHOWN AS A REPRESENTATION OF THE SUBSURFACE CONDITIONS,

LEGEND:

ALLUVIUM

FILL

MARINE SILT-CLAY
CRUST

MARINE INTERBEDDED SAND AND SILT UPPER

MARINE INTERBEDDED SAND AND SILT LOWER

MARINE SAND

MARINE SILT-CLAY

GLACIAL TILL

ROCK

WATER

APPROXIMATE AS DRILLED LOCATION OF BORINGS PERFORMED BY SCHONEWALD ENGINEERING ASSOCIATES INC IN 2019

APPROXIMATE AS-DRILLED LOCATION OF BORINGS PERFORMED BY OTHERS

APPROXIMATE AS-DRILLED LOCATION OF PAVEMENT CORES PERFORMED BY THE MAINE TURNPIKE AUTHORITY

APPROXIMATE AS-DRILLED LOCATION OF PAVEMENT CORE BORINGS PERFORMED BY SHONEWALD ENGINEERING ASSOCIATES INC IN 2019

APPROXIMATE AS-DRILLED LOCATION OF PAVEMENT CORE BORINGS PERFORMED BY S.W. COLE ENGINEERING INC IN 2018

APPROXIMATE AS-DRILLED LOCATION OF PAVEMENT CORE BORINGS PERFORMED BY SCHONEWALD ENGINEERING INC IN 2017

GROUNDWATER OBSERVED DURING DRILLING

= SPT-N VALUE (SEE NOTE 6)

MTA PROJECT MANAGER

Su=(#)psf + = UNDRAINED STRENGTH IN SITU

VANE SHEAR/UNDRAINED STRENGTH
REC:XX% + = ROCK CORE RECOVERY

REQ:XX% = ROCK QUALITY DESIGNATION

FIGURE 4-1

Scale of Feet

No. Revision

By Date

CONSULTANT PROJECT MANAGER: \$CONSULTANTPM\$

By Date

By Date

By Date

Designed HJ 4/14 Checked 4/14

Drawn TAH 4/14 In Charge of MDR 4/14

Designed by:

HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

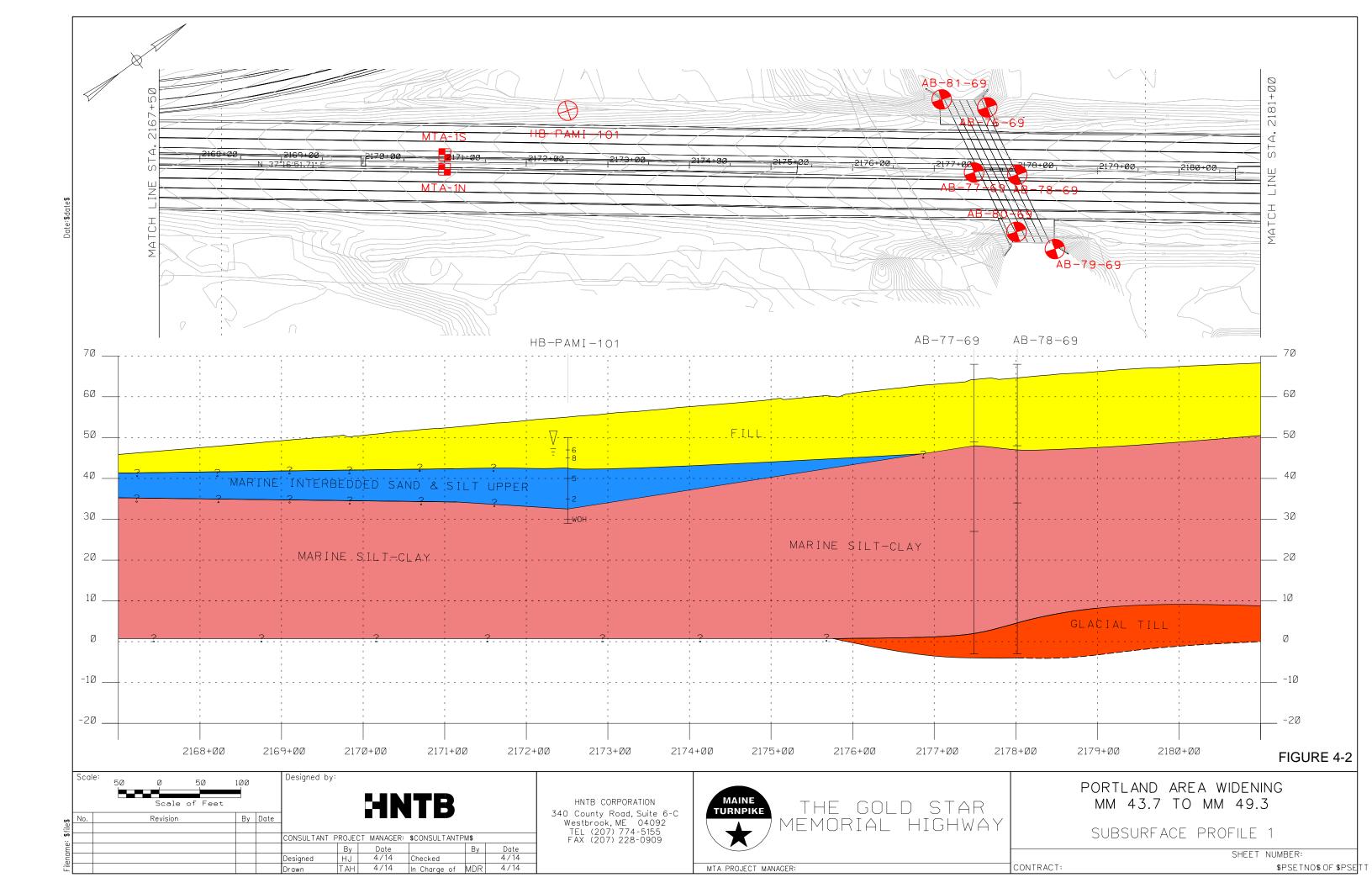


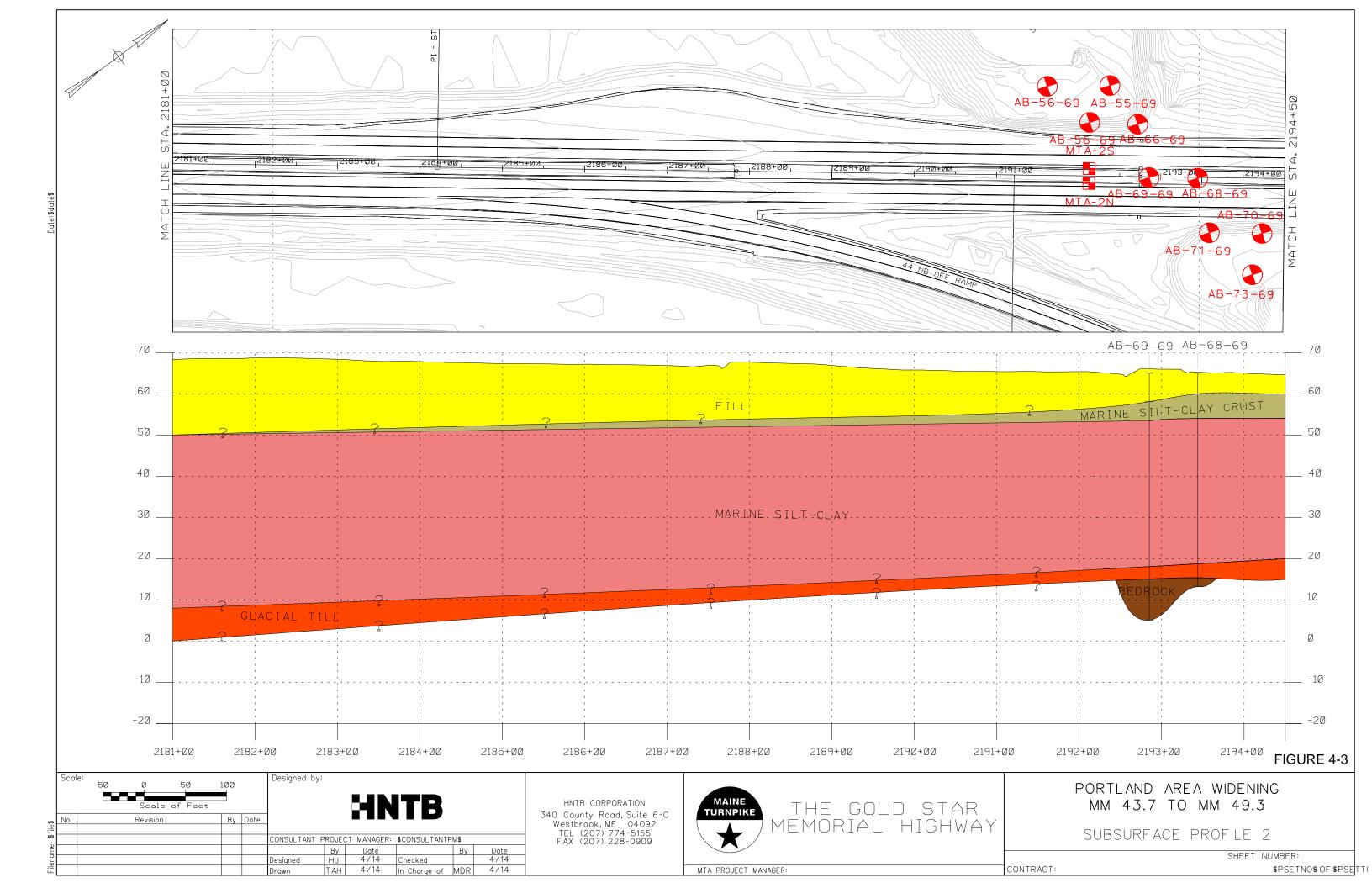
PORTLAND AREA WIDENING MM 43.7 TO MM 49.3

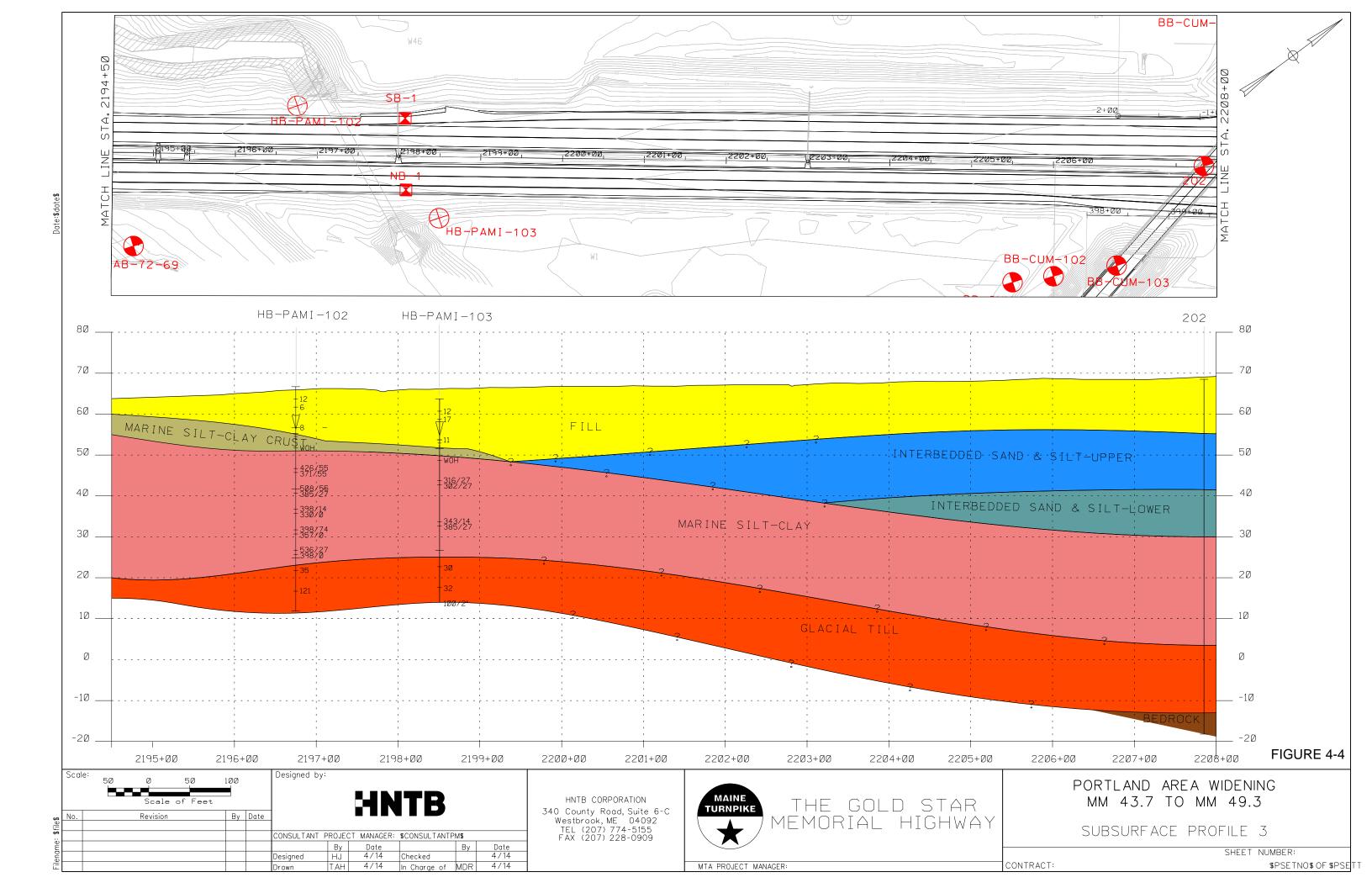
SUBSURFACE PROFILE NOTES

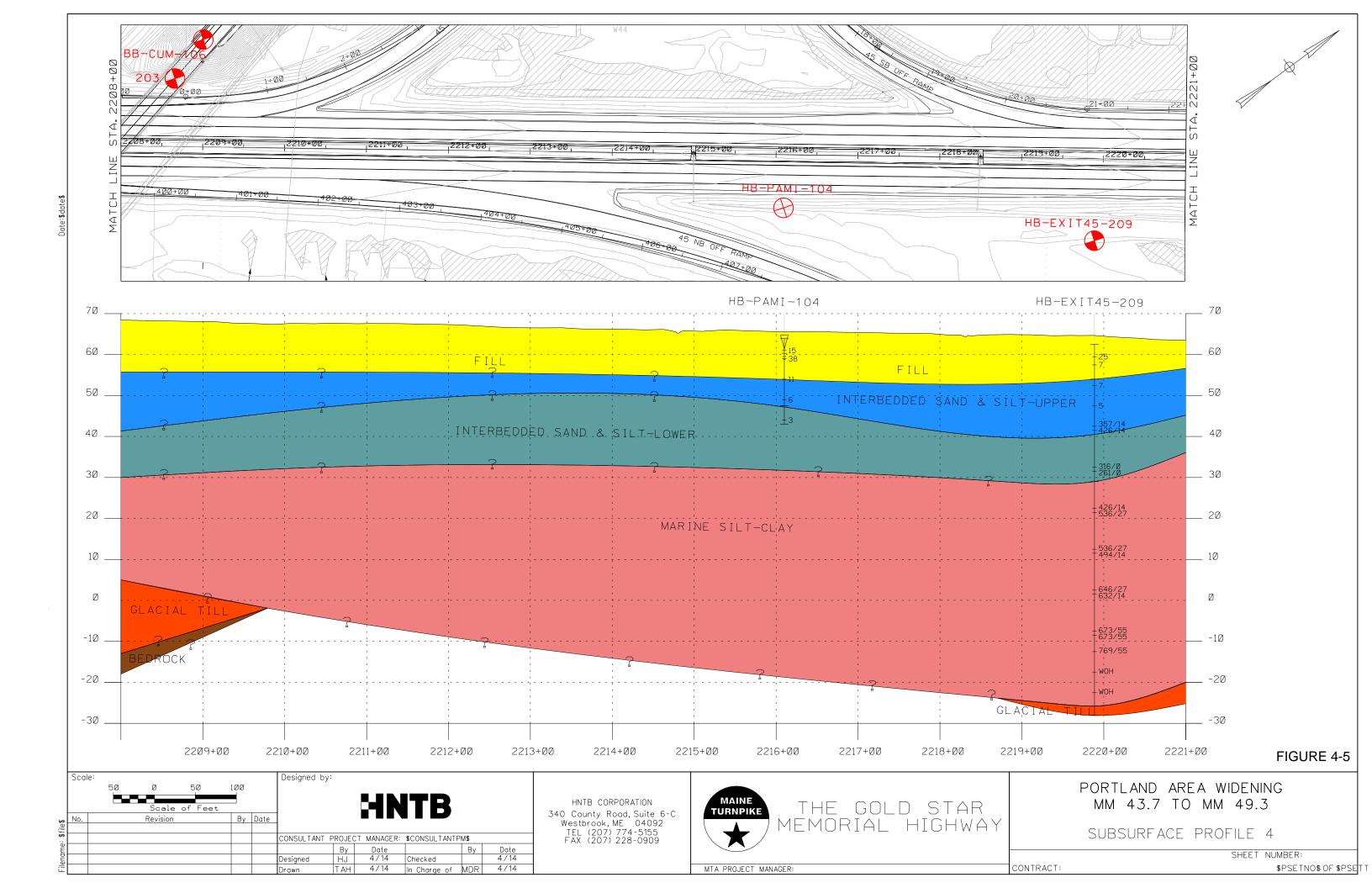
SHEET NUMBER:

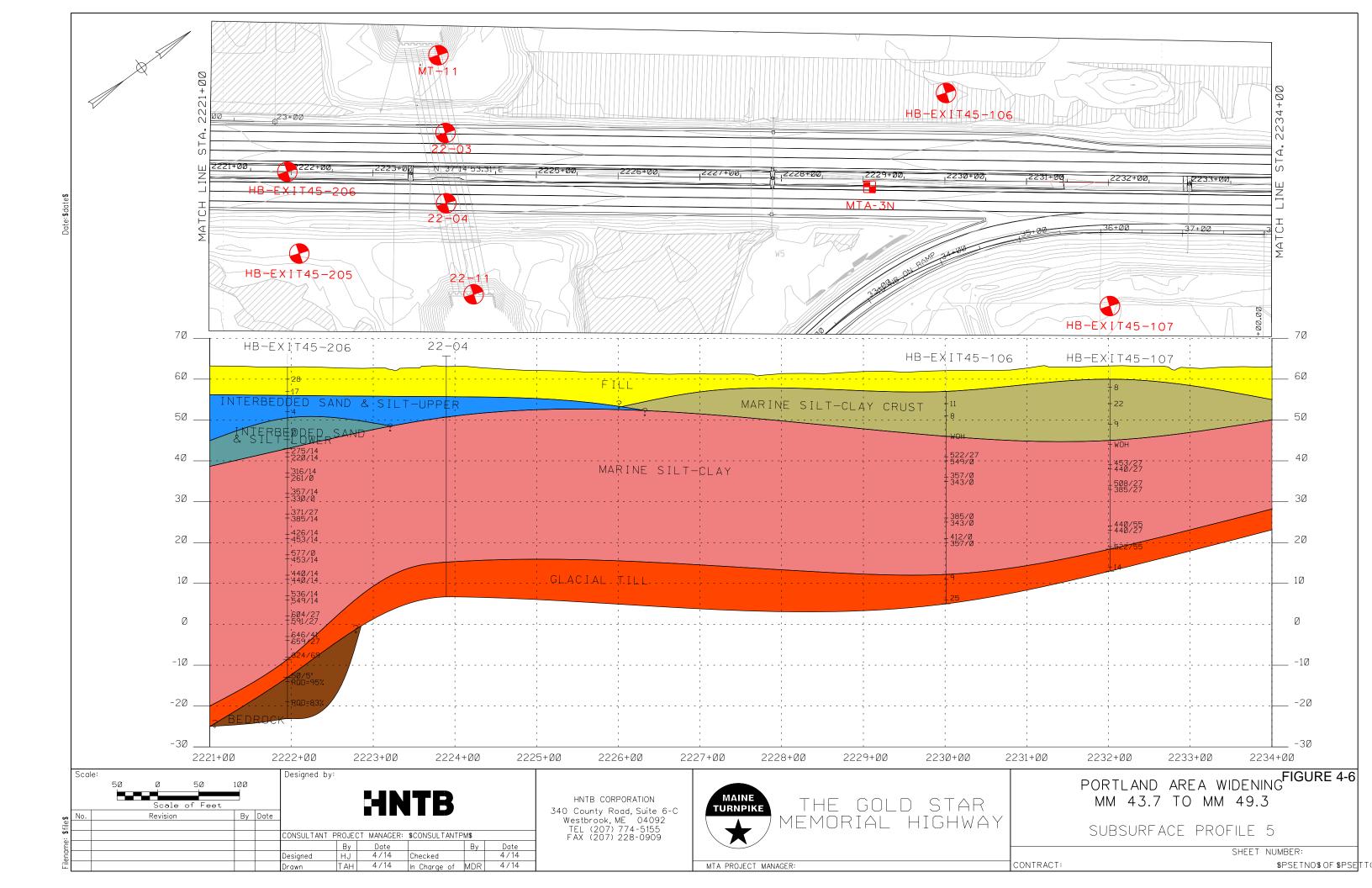
CONTRACT: \$PSETNOSOF \$PSET

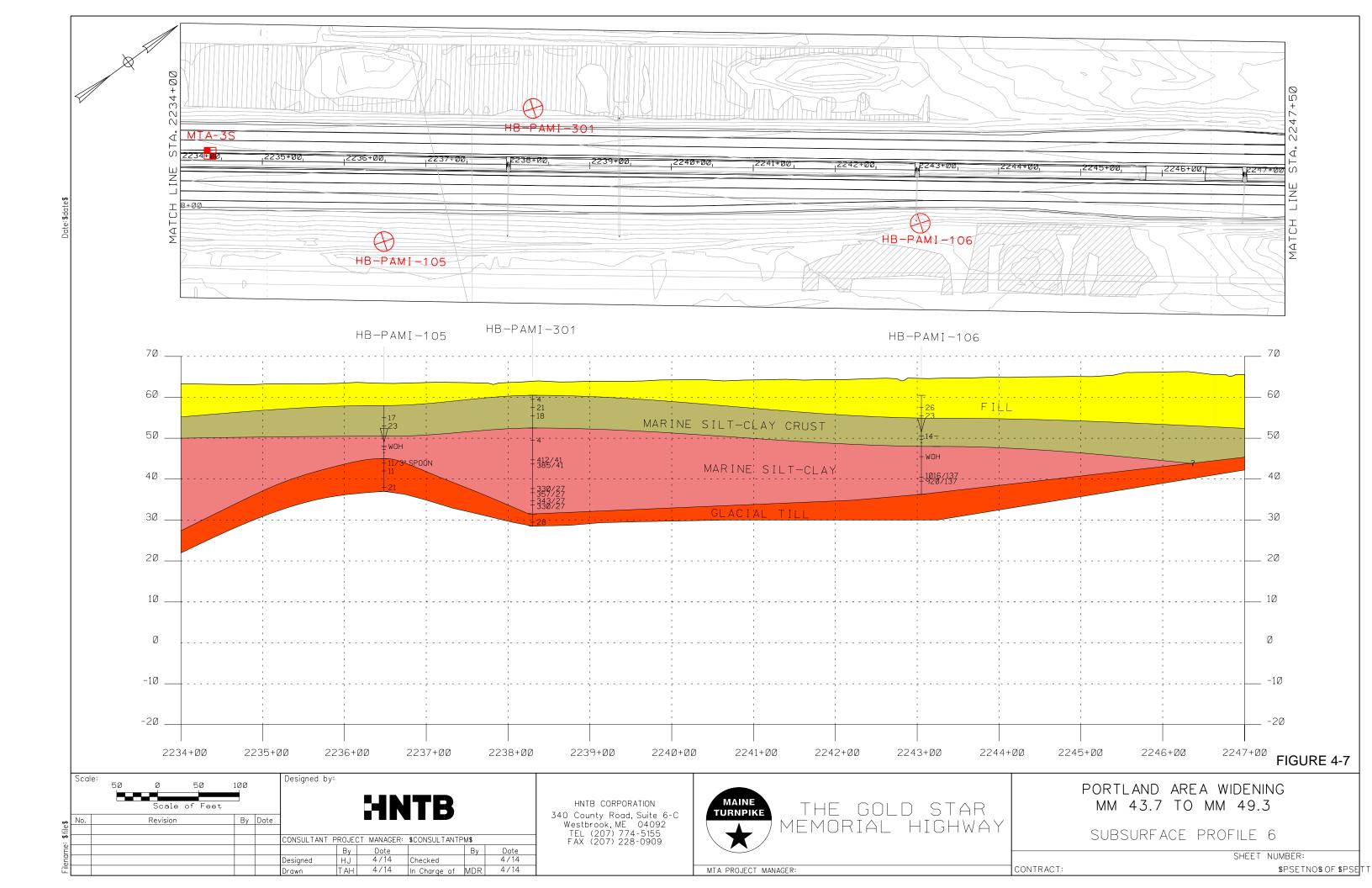


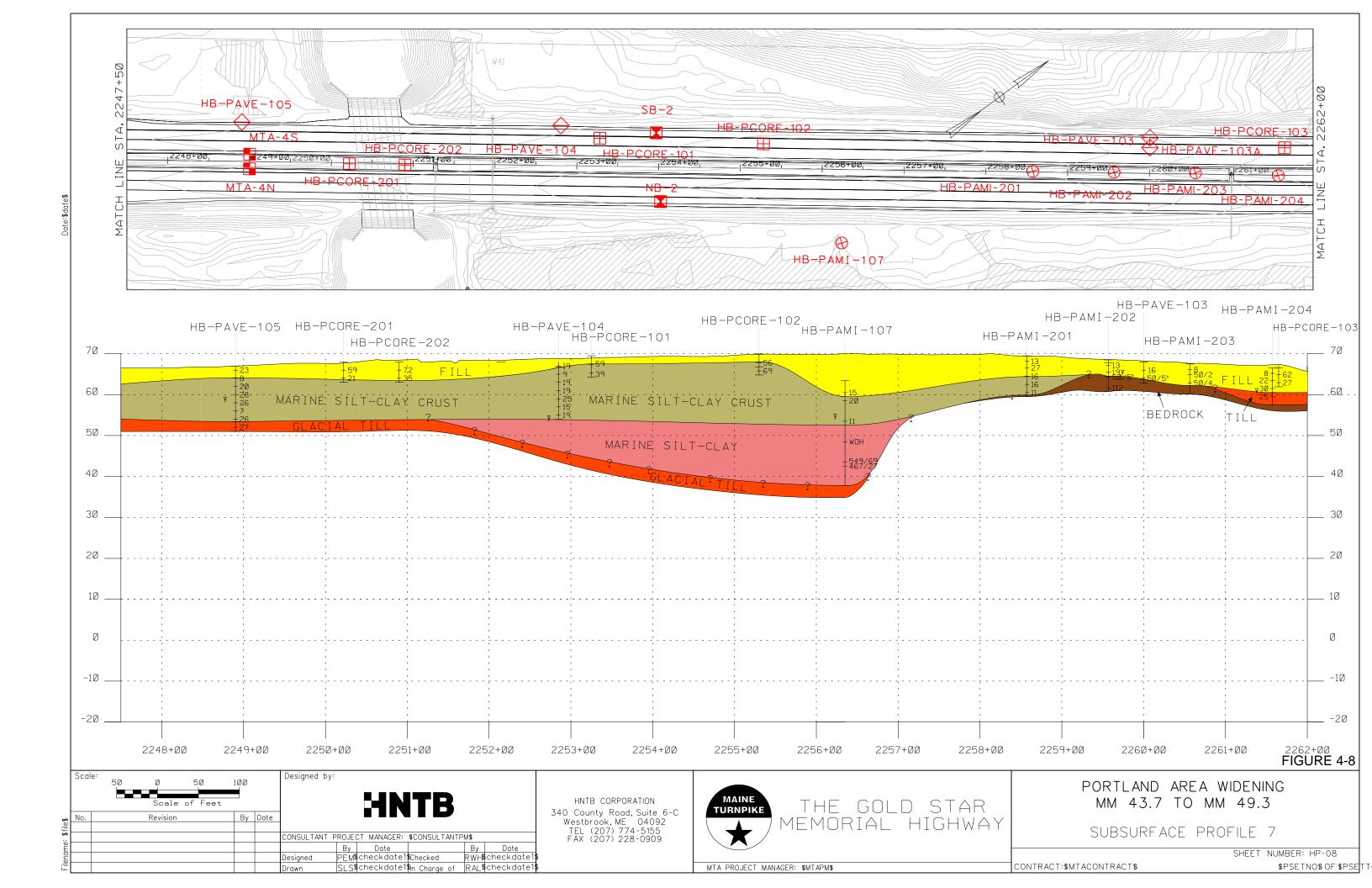


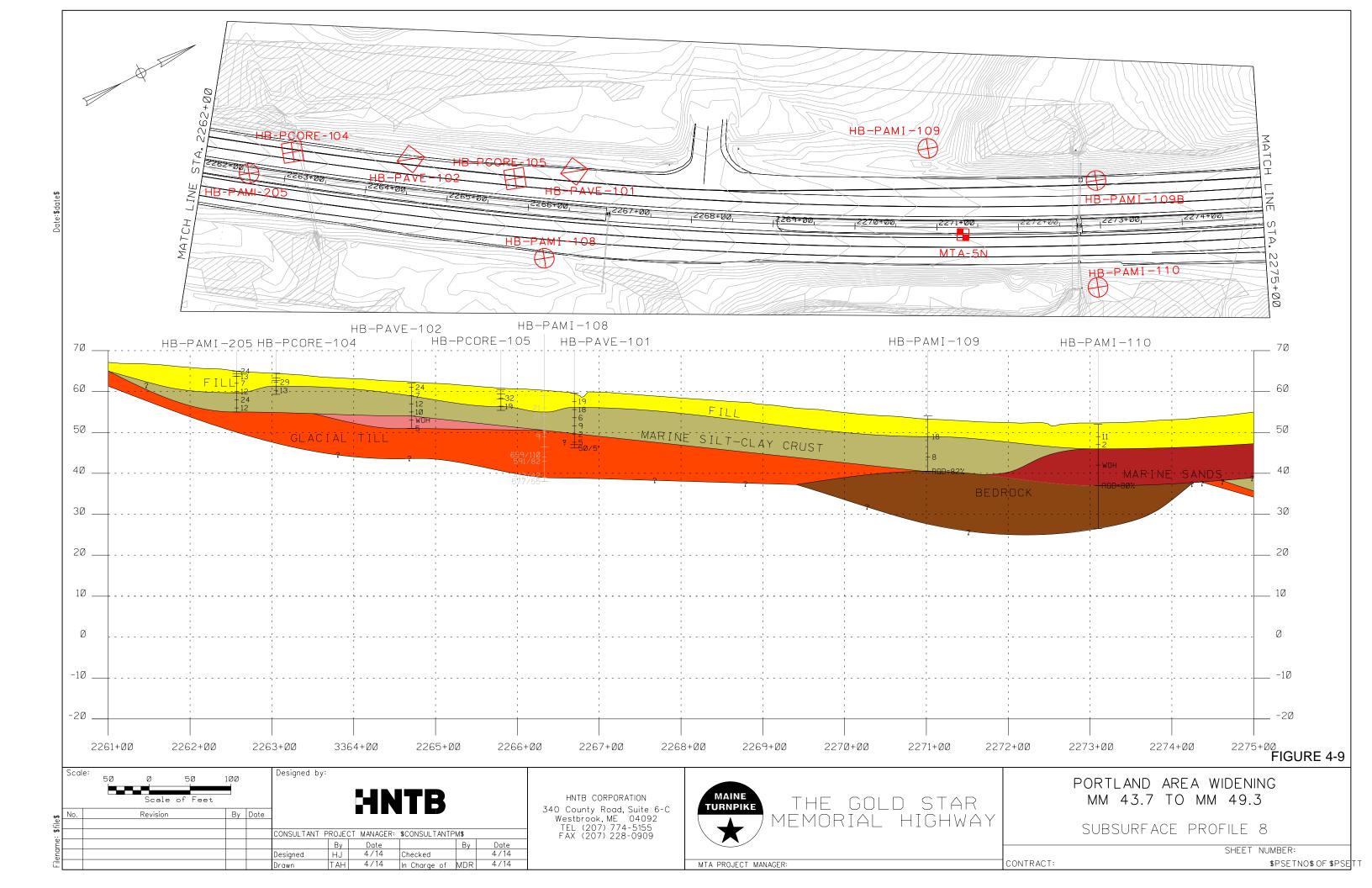


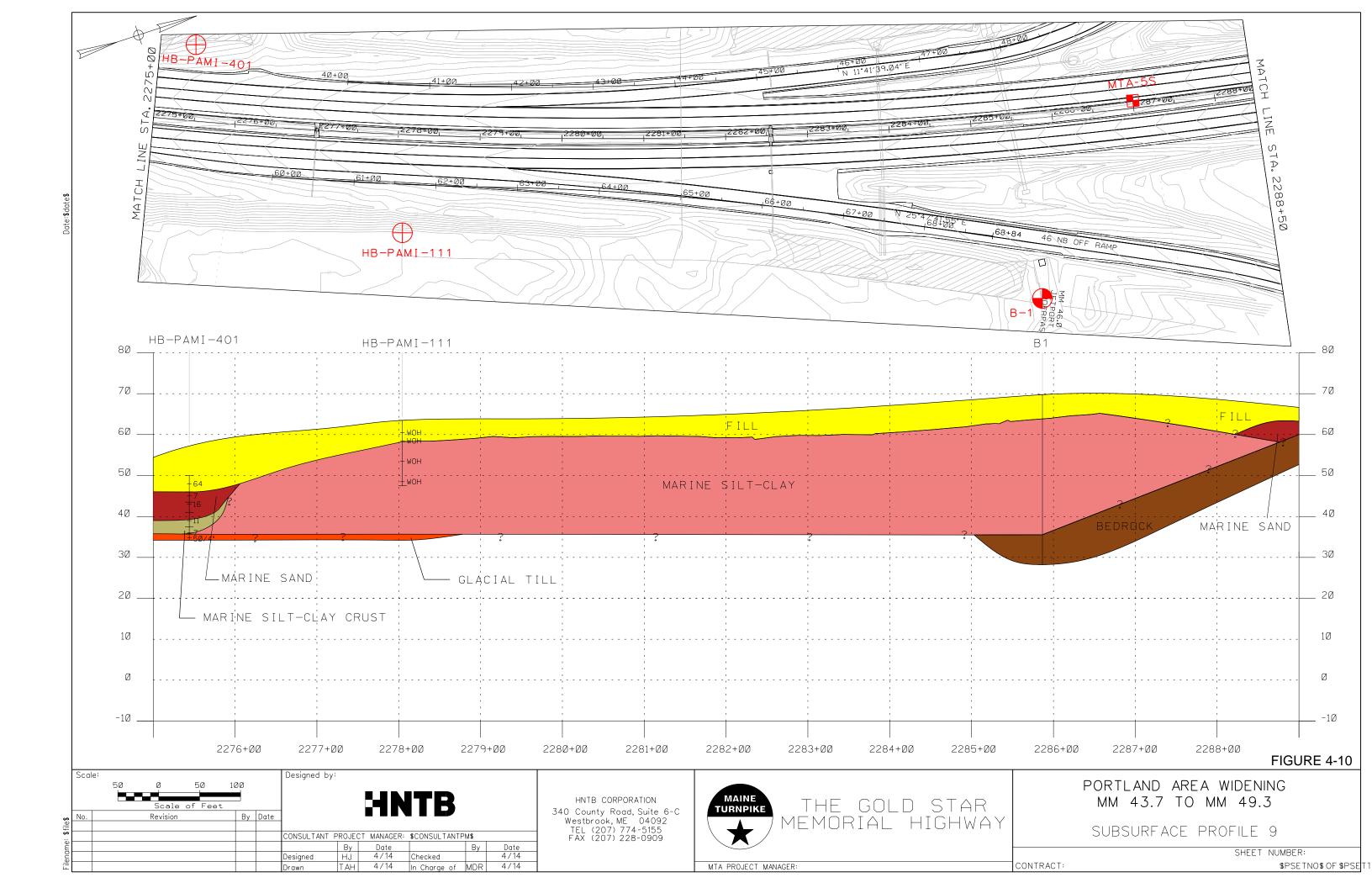


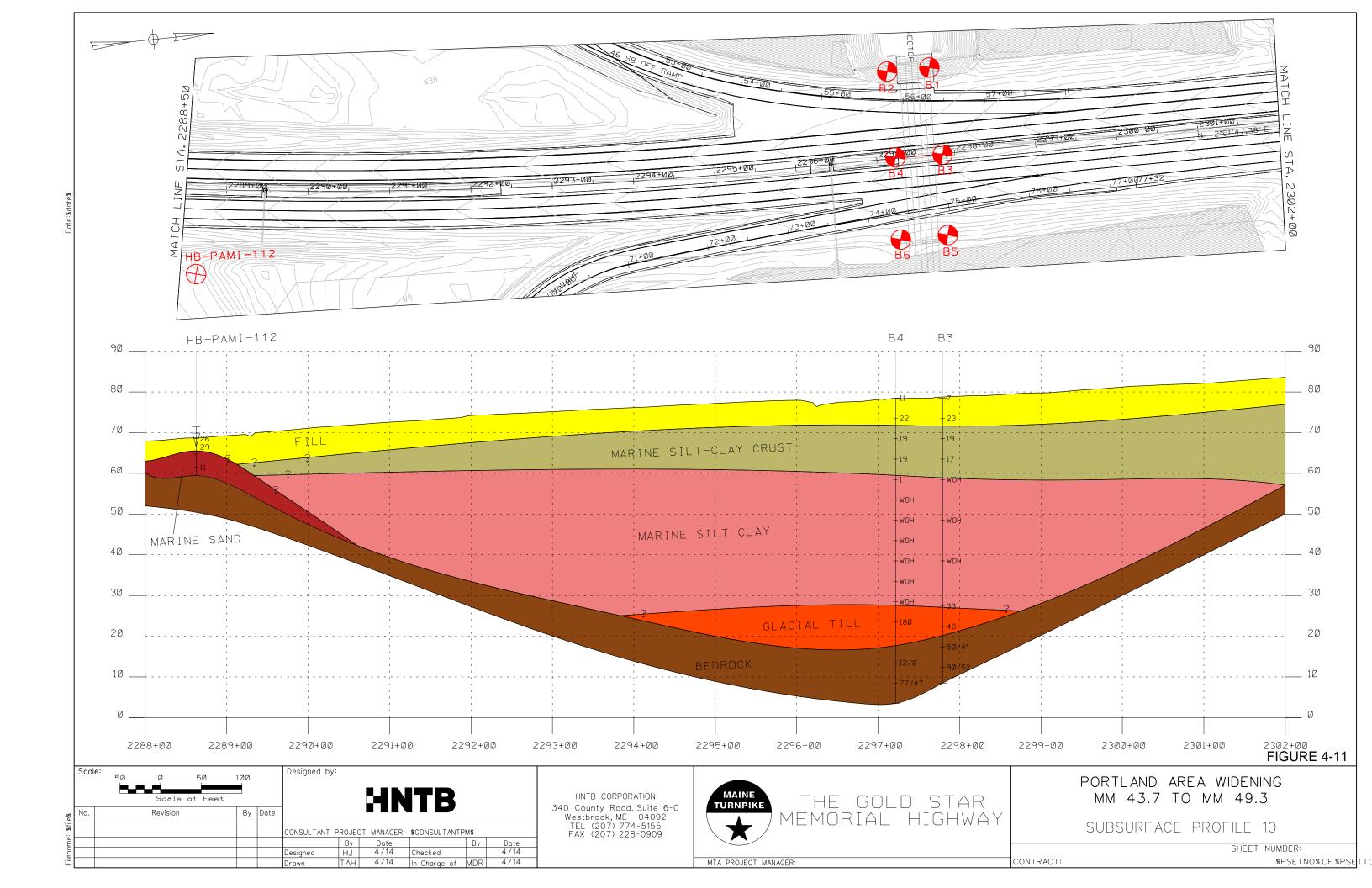


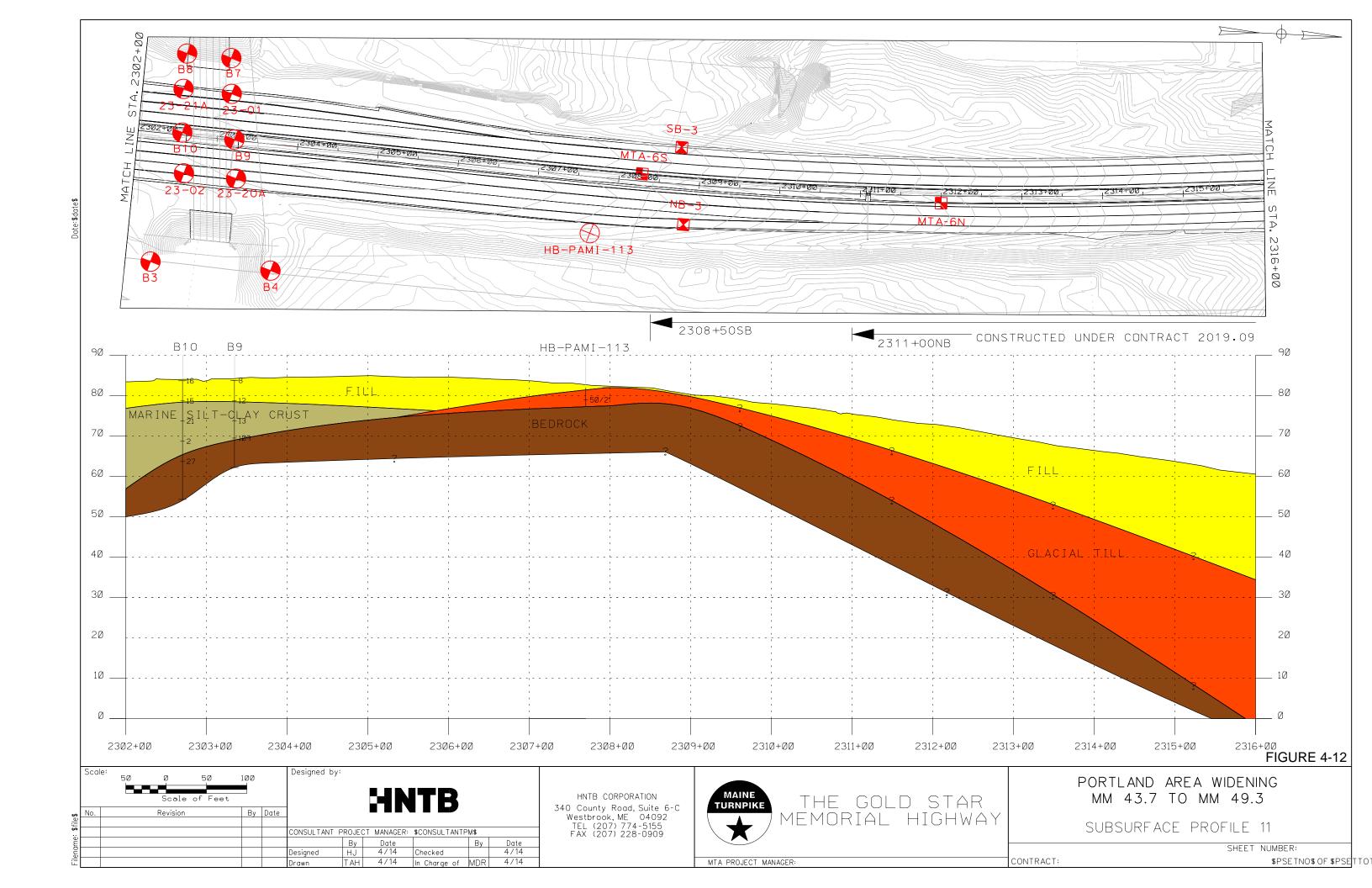


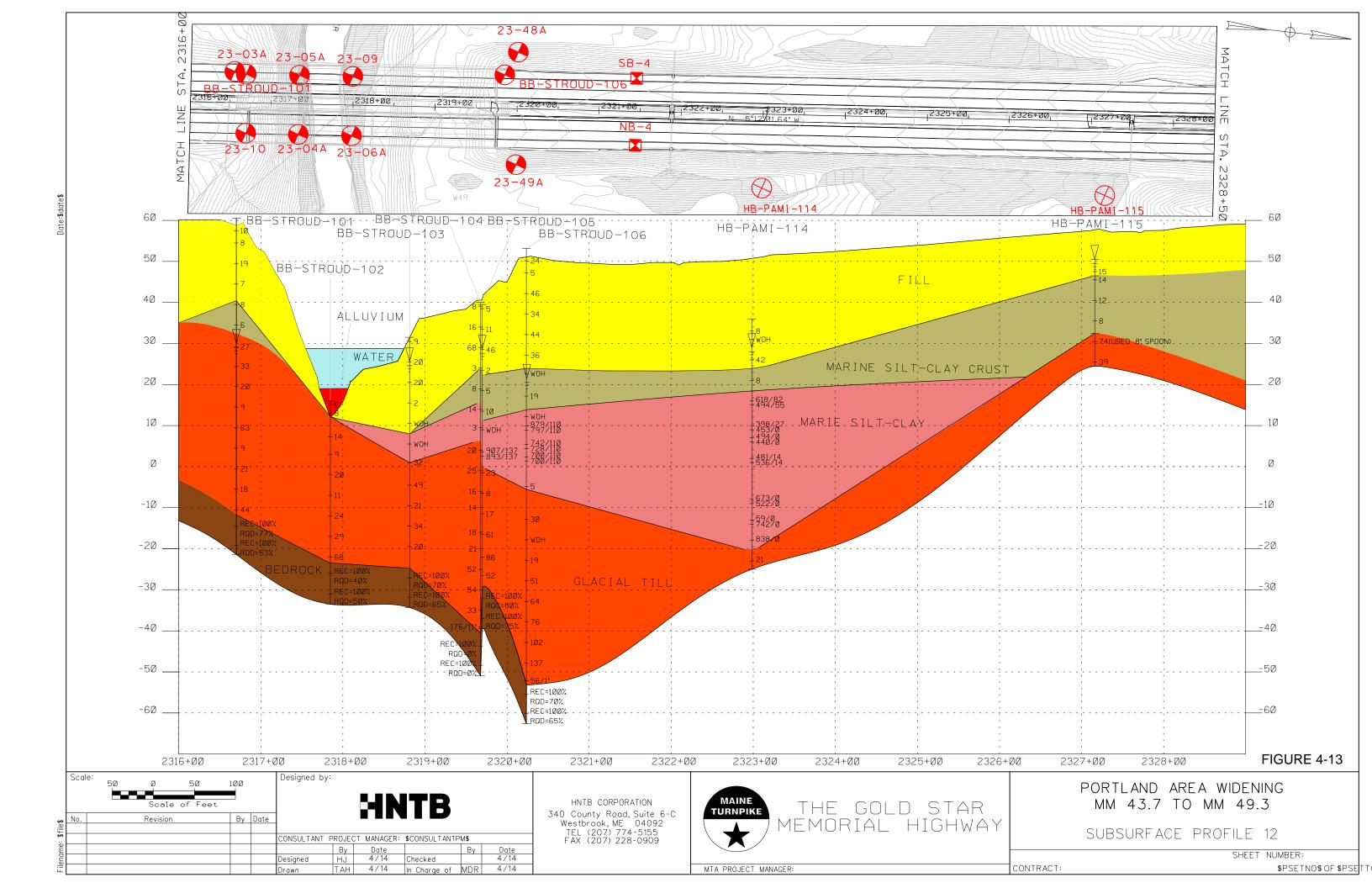


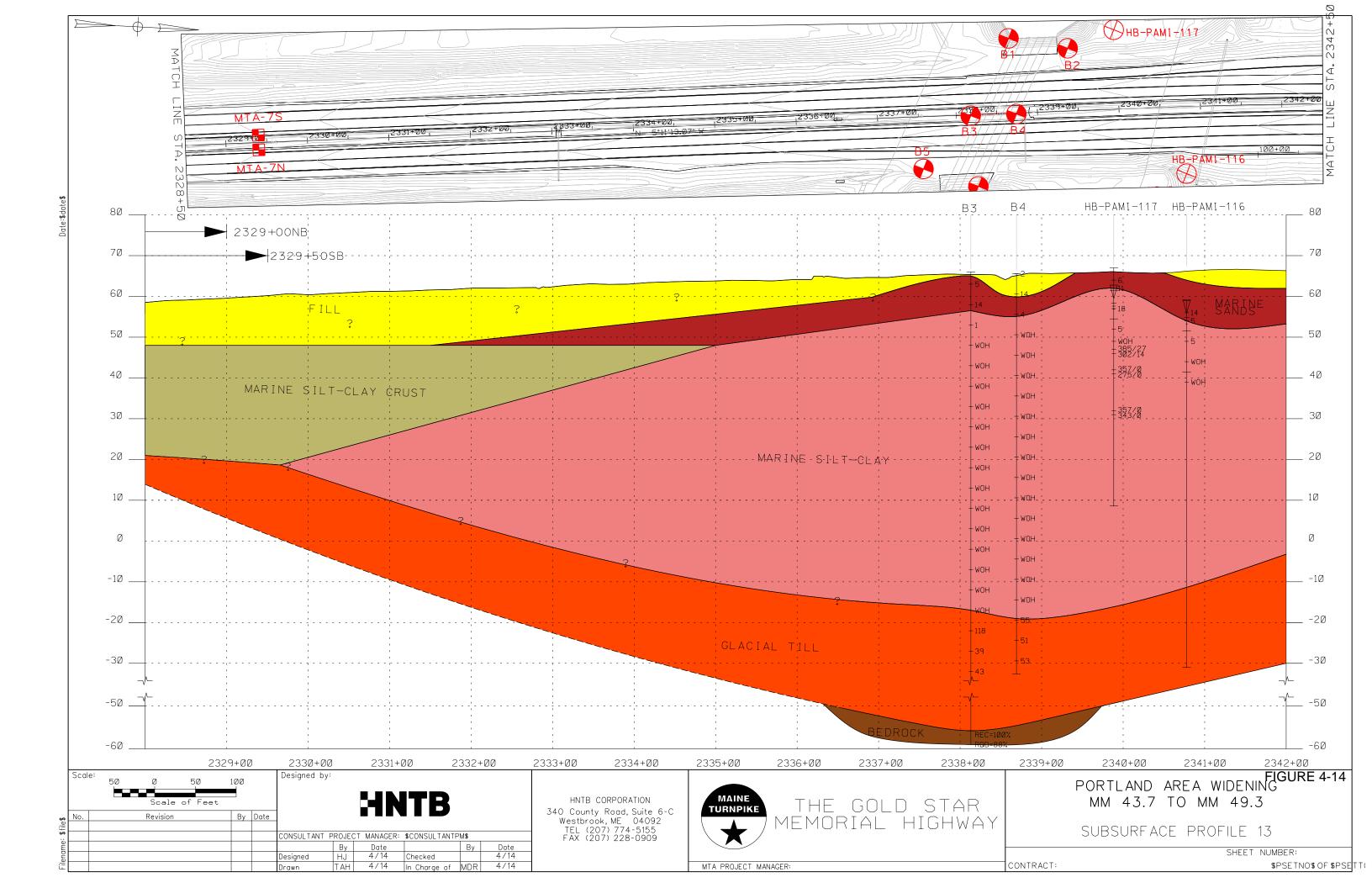


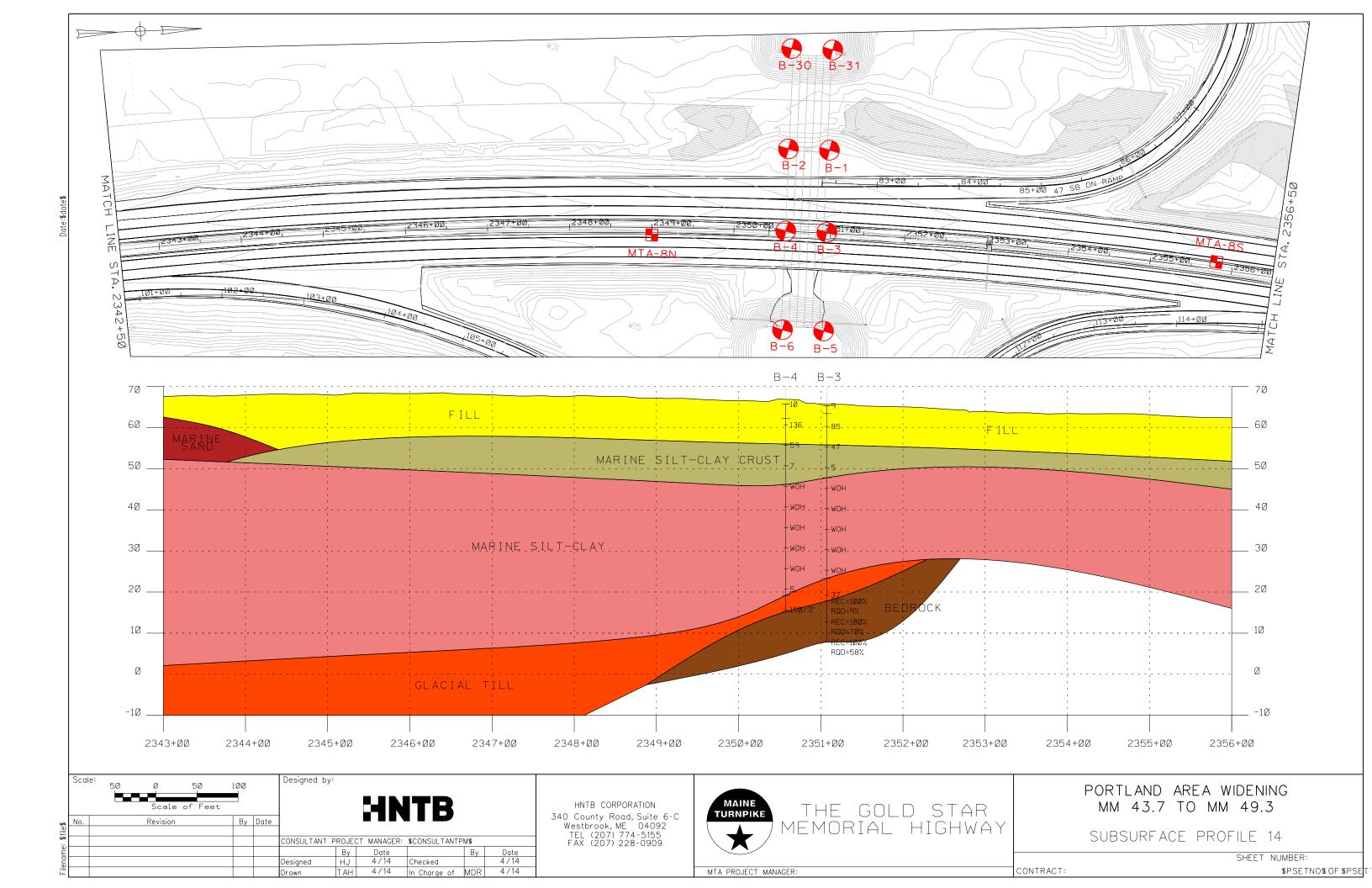


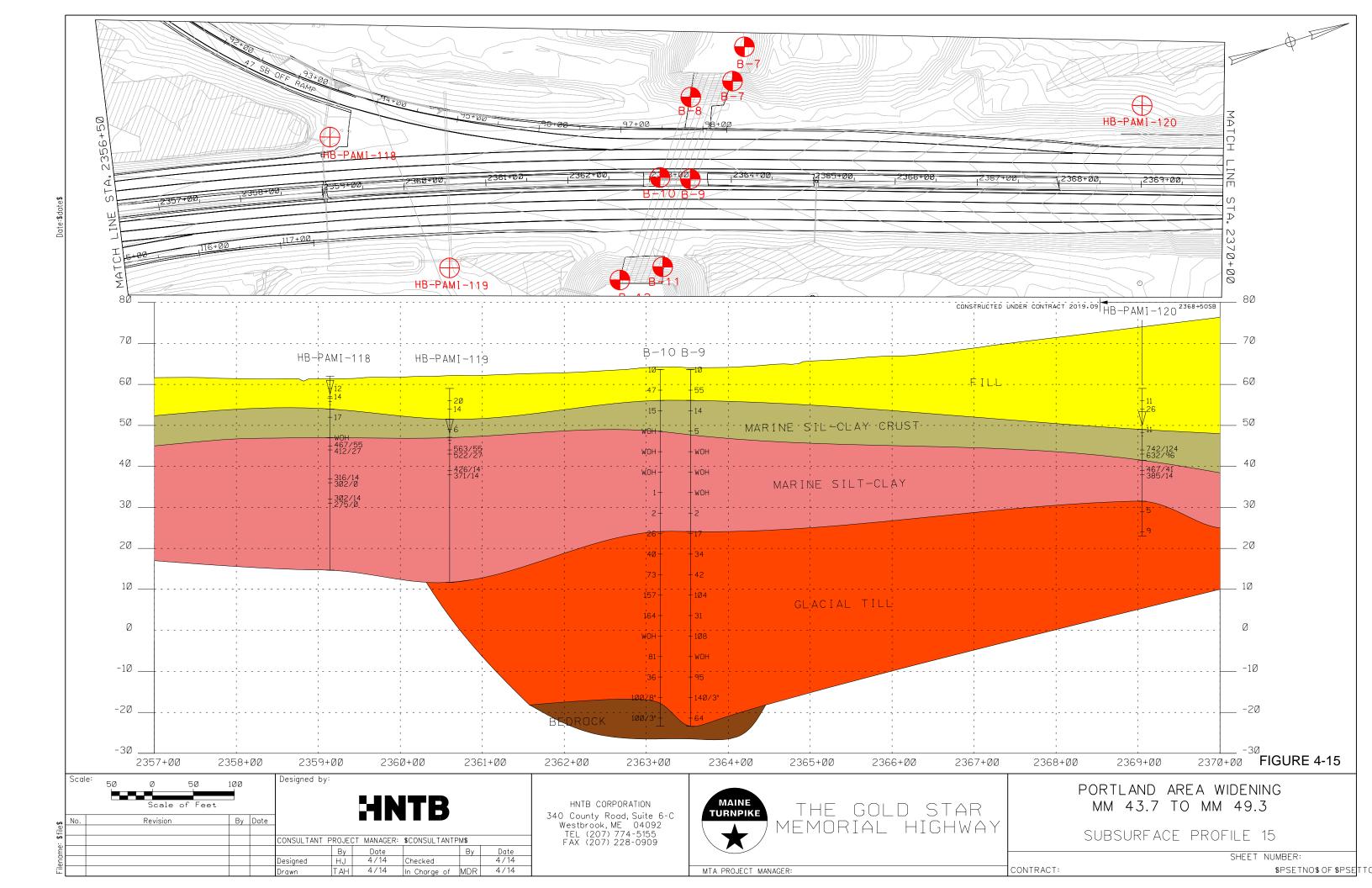


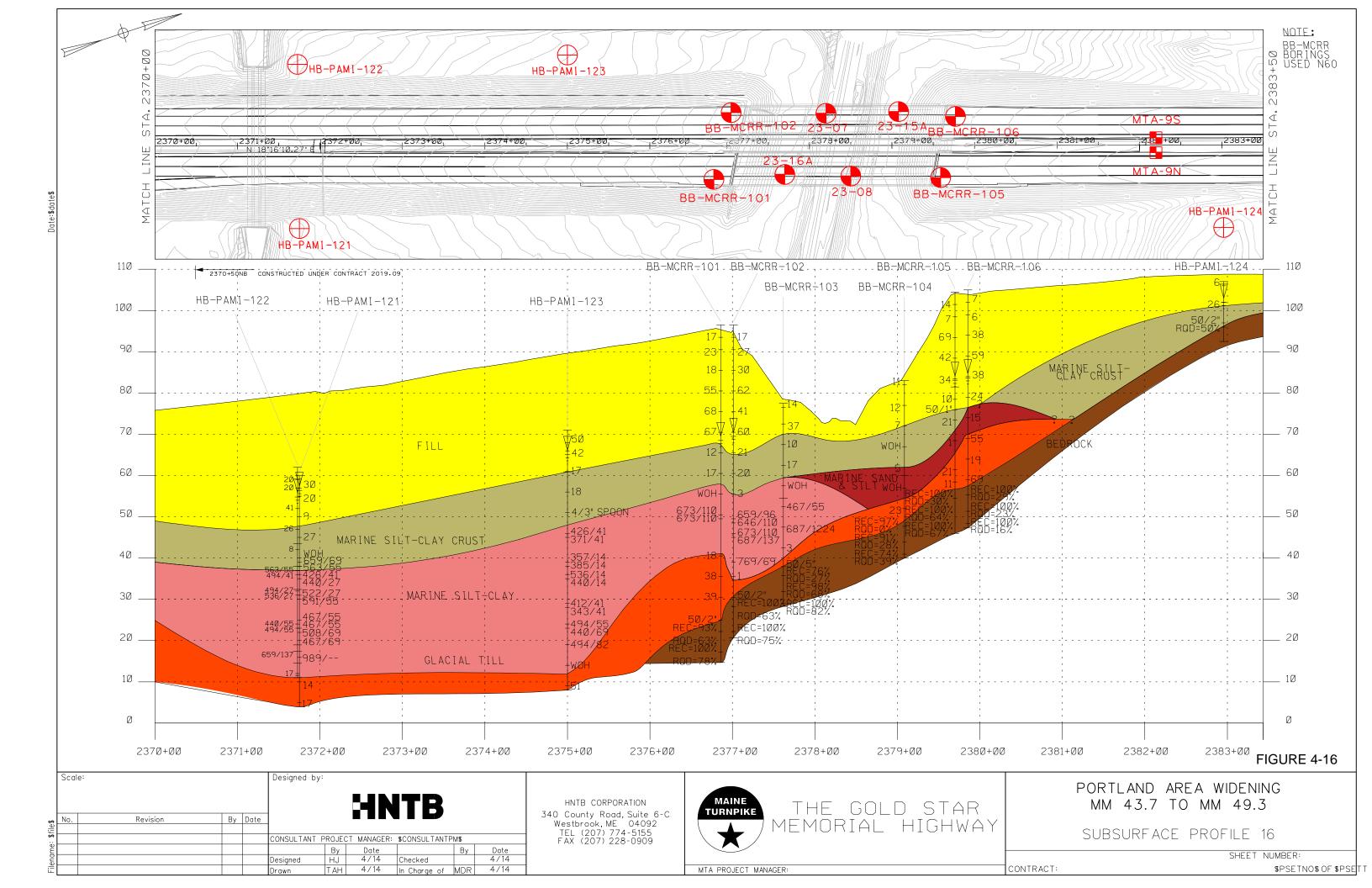


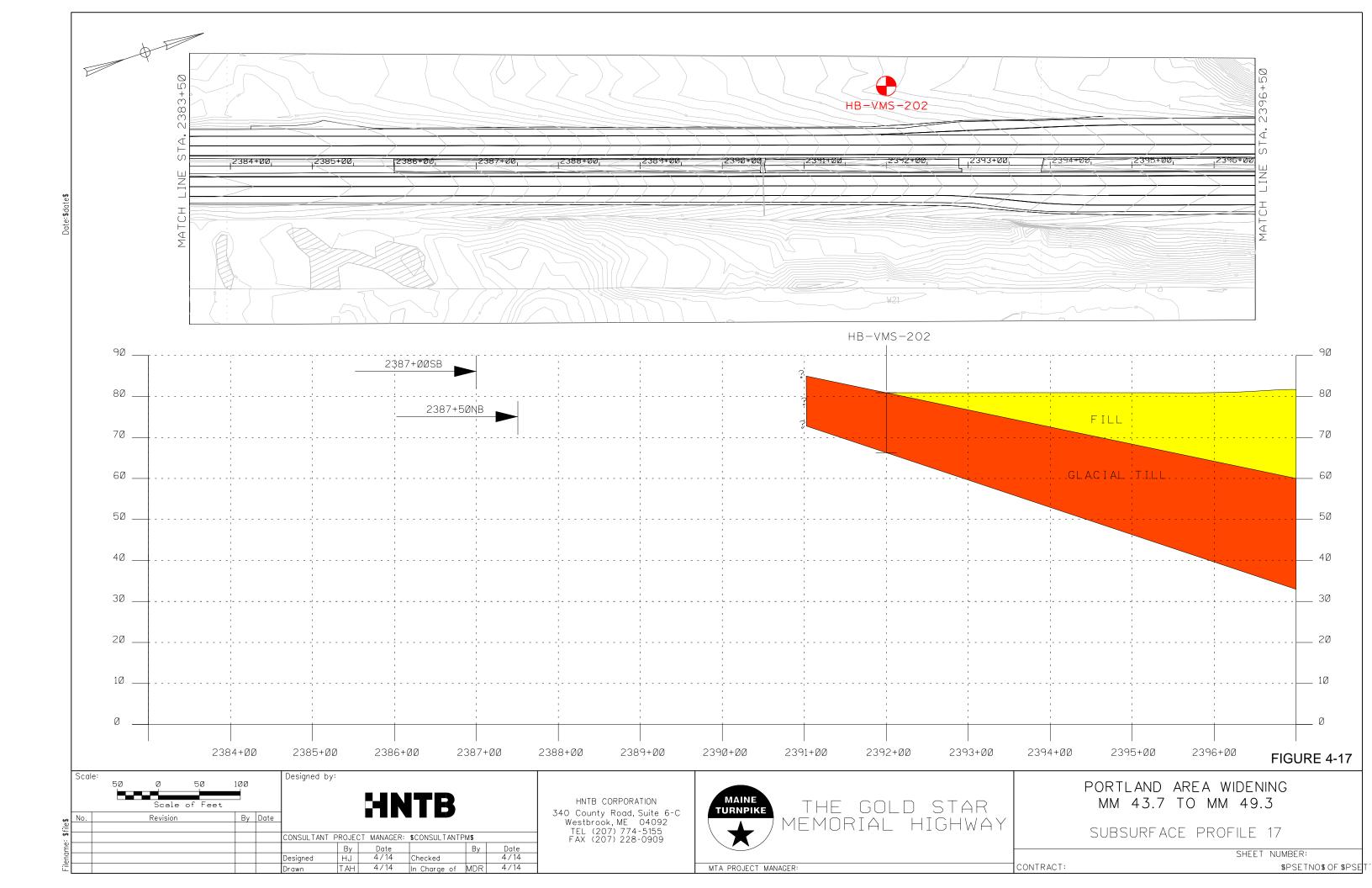


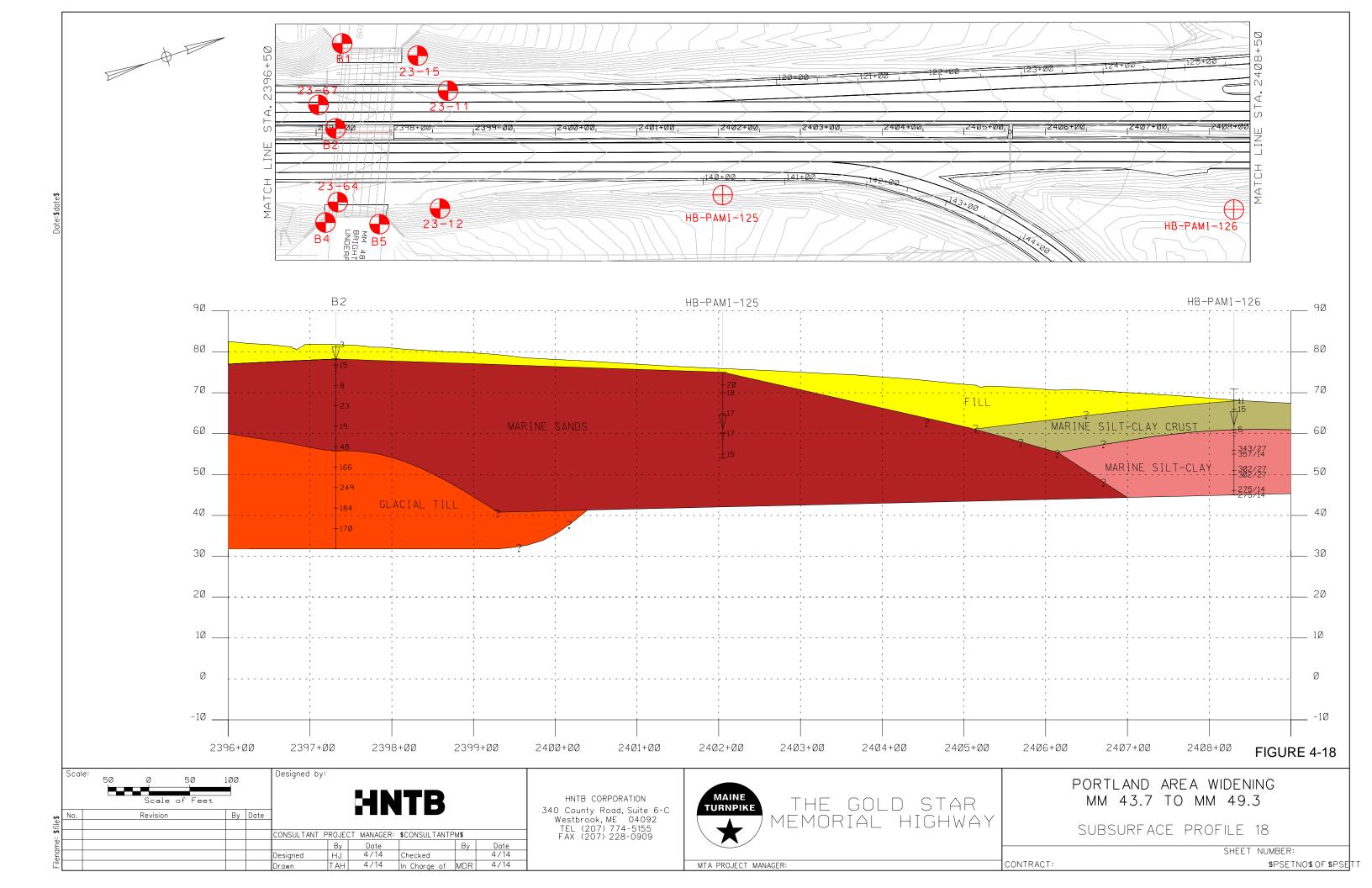


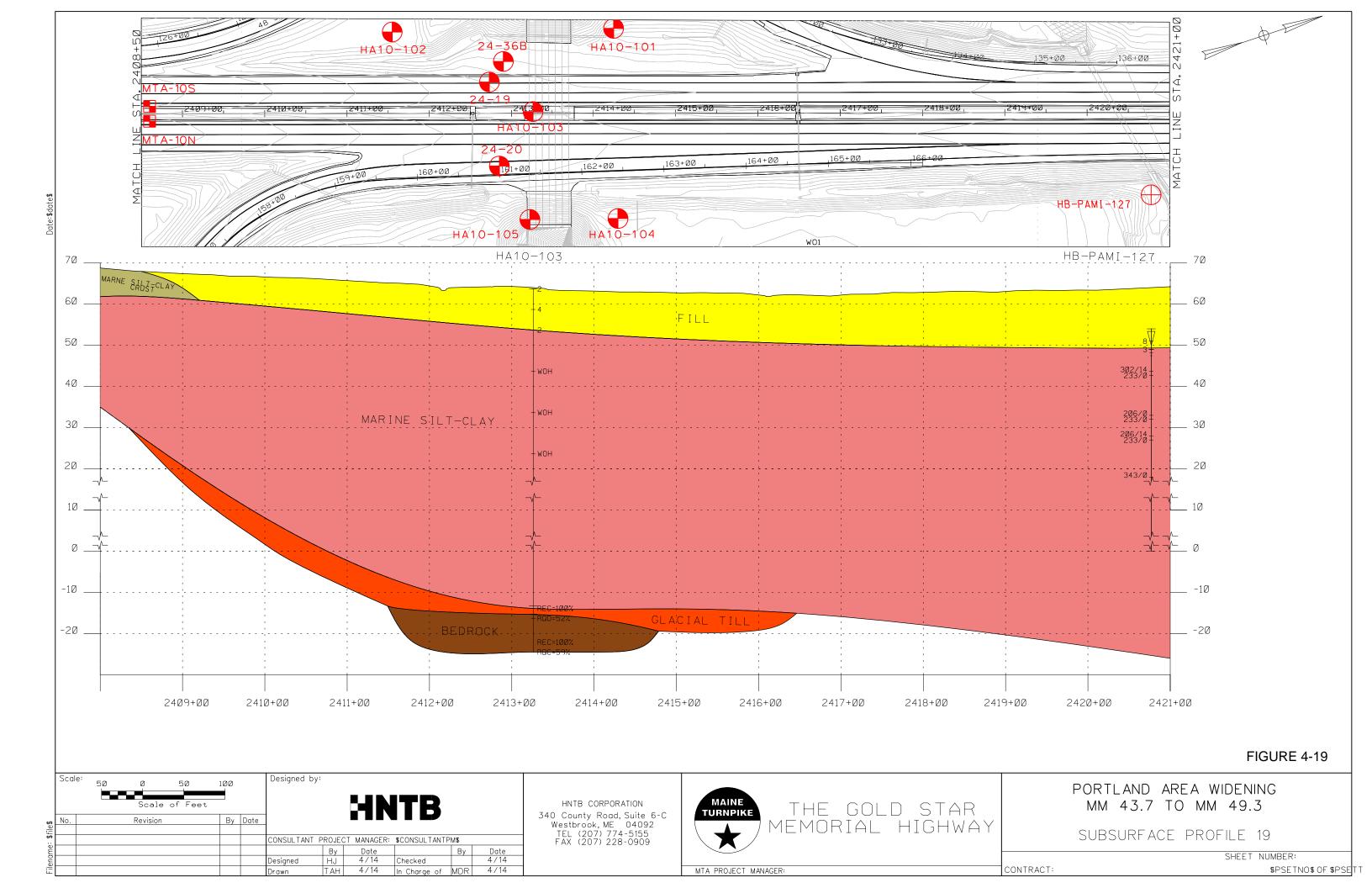












APPENDIX A

Geotechnical Data Reports



APPENDIX A

Data Reports

Borings HB-PAMI-101 through HB-PAMI-127





FIELD AND LABORATORY DATA REPORT PRELIMINARY GEOTECHNICAL PROGRAM PORTLAND AREA MAINLINE IMPROVEMENTS MAINE TURNPIKE MM 43.7 TO 49.3 SCARBOROUGH TO PORTLAND, MAINE

PREPARED FOR:

HNTB Corporation Westbrook, Maine

PREPARED BY:

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

Jack Volaham

March 28, 2019

SchonewaldEA Project No. 18-017



FIELD AND LABORATORY DATA REPORT PRELIMINARY GEOTECHNICAL PROGRAM PORTLAND AREA MAINLINE IMPROVEMENTS MAINE TURNPIKE MM 43.7 TO 49.3 SCARBOROUGH TO PORTLAND, MAINE

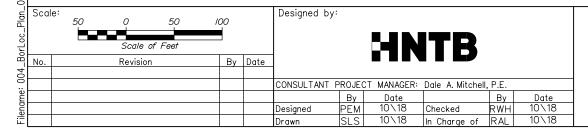
TABLE OF CONTENTS

DESCRIPTION	PAGES
SUBSURFACE EXPLORATION LOCATION PLANS	2 - 22
LOGS OF 100-SERIES SUBSURFACE EXPLORATIONS	24 - 80
PHOTOGRAPHS OF ROCK CORE OBTAINED IN 100-SERIES SUBSURFACE EXPLORATIONS	82
RESULTS OF LABORATORY TESTS COMPLETED BY RWG&A ON SPLIT- SPOON AND UNDISTURBED TUBE SOIL SAMPLES	84 - 152



SUBSURFACE EXPLORATION LOCATION PLANS

DRAFT PDR October 26, 2018 N 37°16'51.71" E 0+00 2157+00



HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

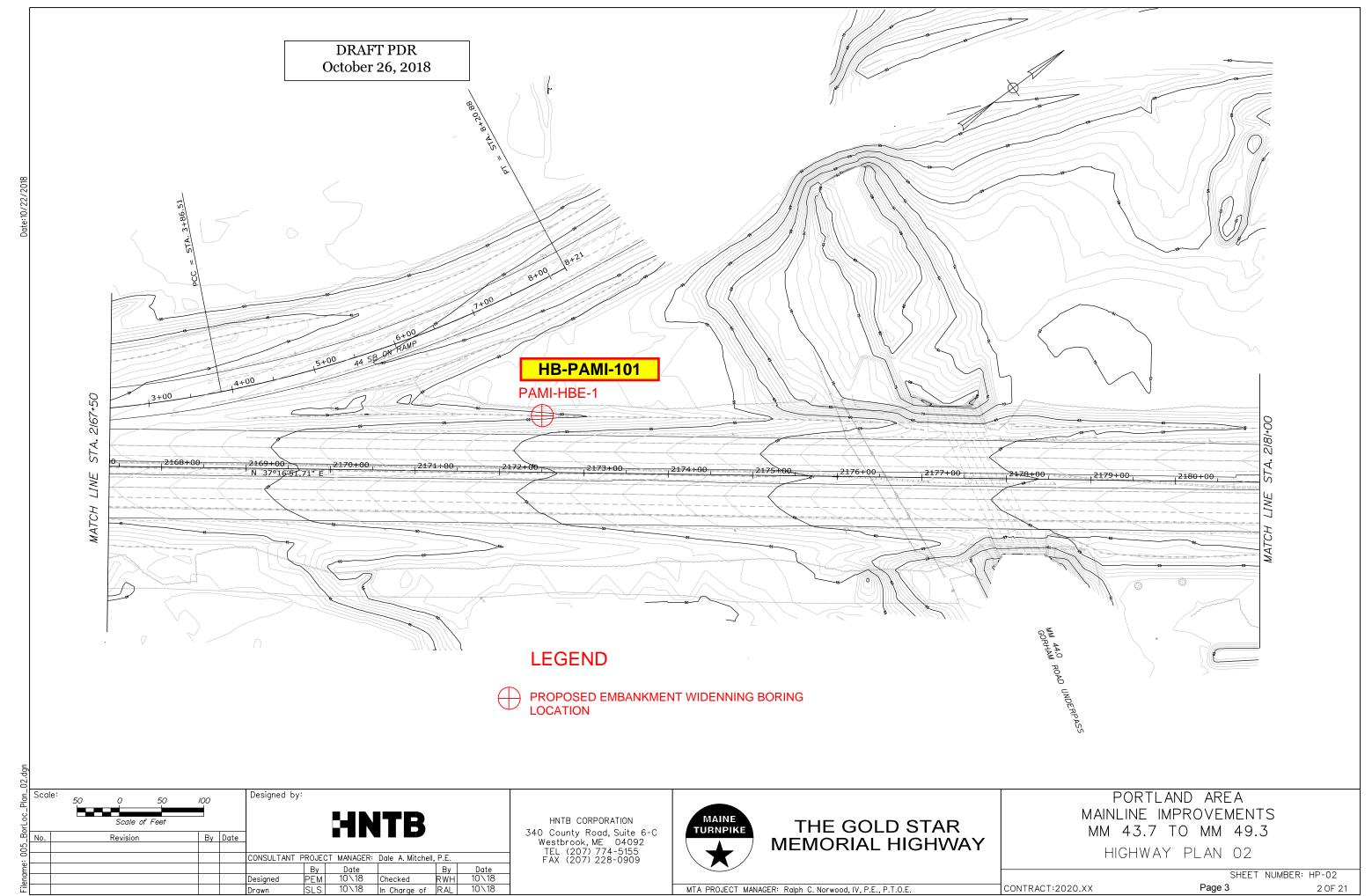


THE GOLD STAR MEMORIAL HIGHWAY PORTLAND AREA
MAINLINE IMPROVEMENTS
MM 43.7 TO MM 49.3
HIGHWAY PLAN 01

SHEET NUMBER: HP-01

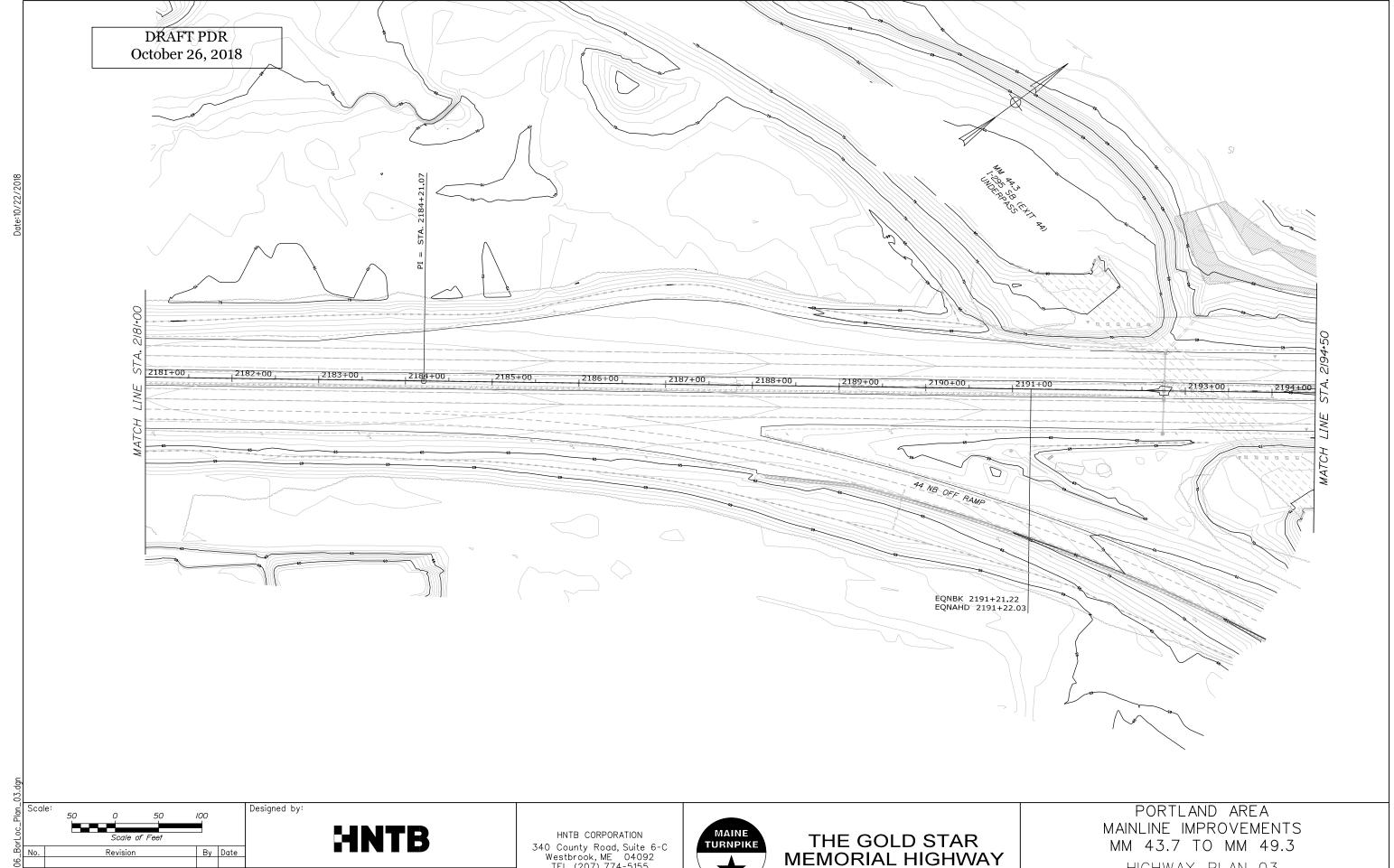
CONTRACT:2020.XX Page 2 10F 2

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.



MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

Page 3 CONTRACT:2020.XX



CONSULTANT PROJECT MANAGER: Dale A. Mitchell, P.E
 Date
 By

 10\18
 Checked
 RWH

 10\18
 In Charge of
 RAL

HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

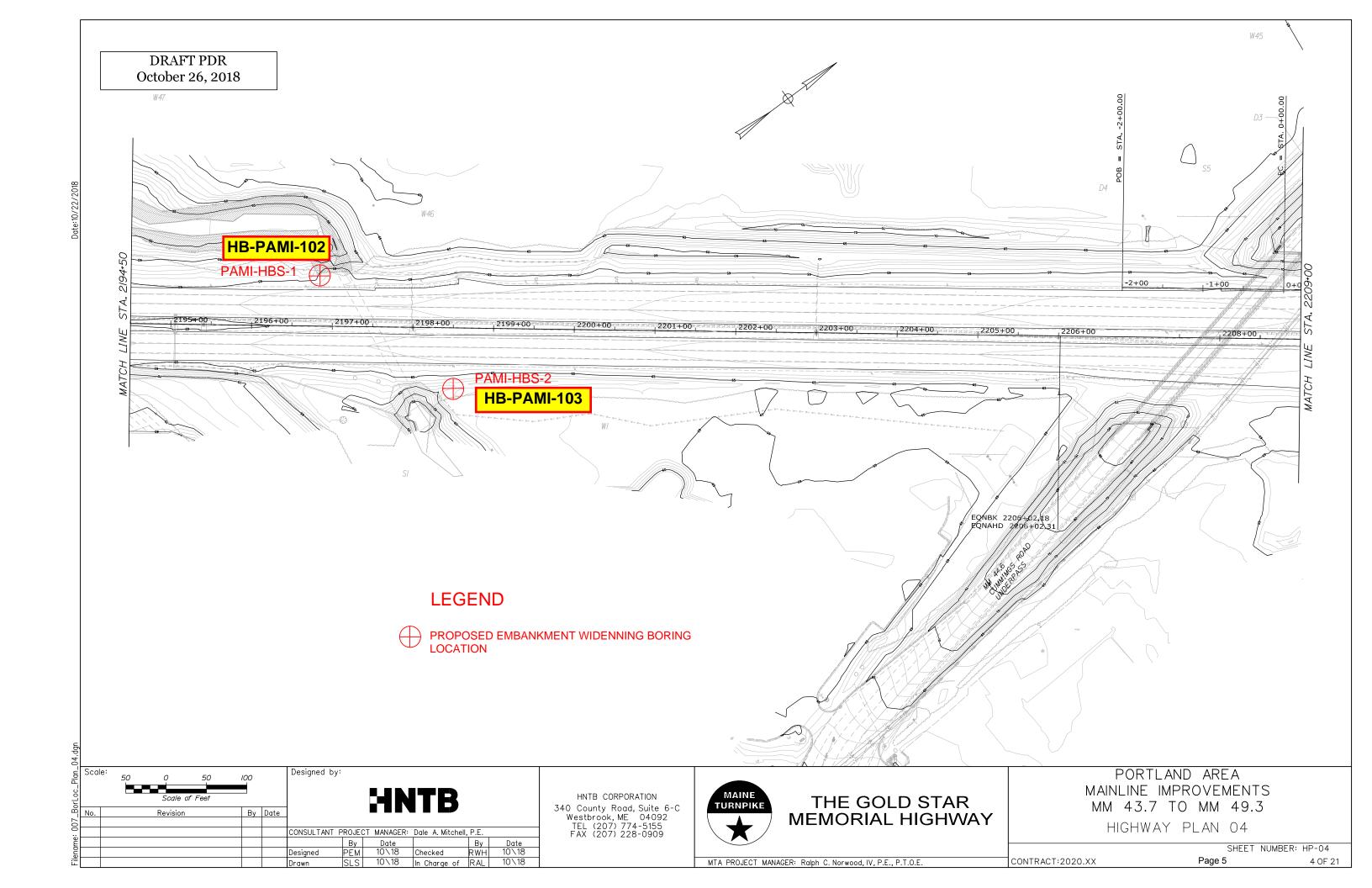


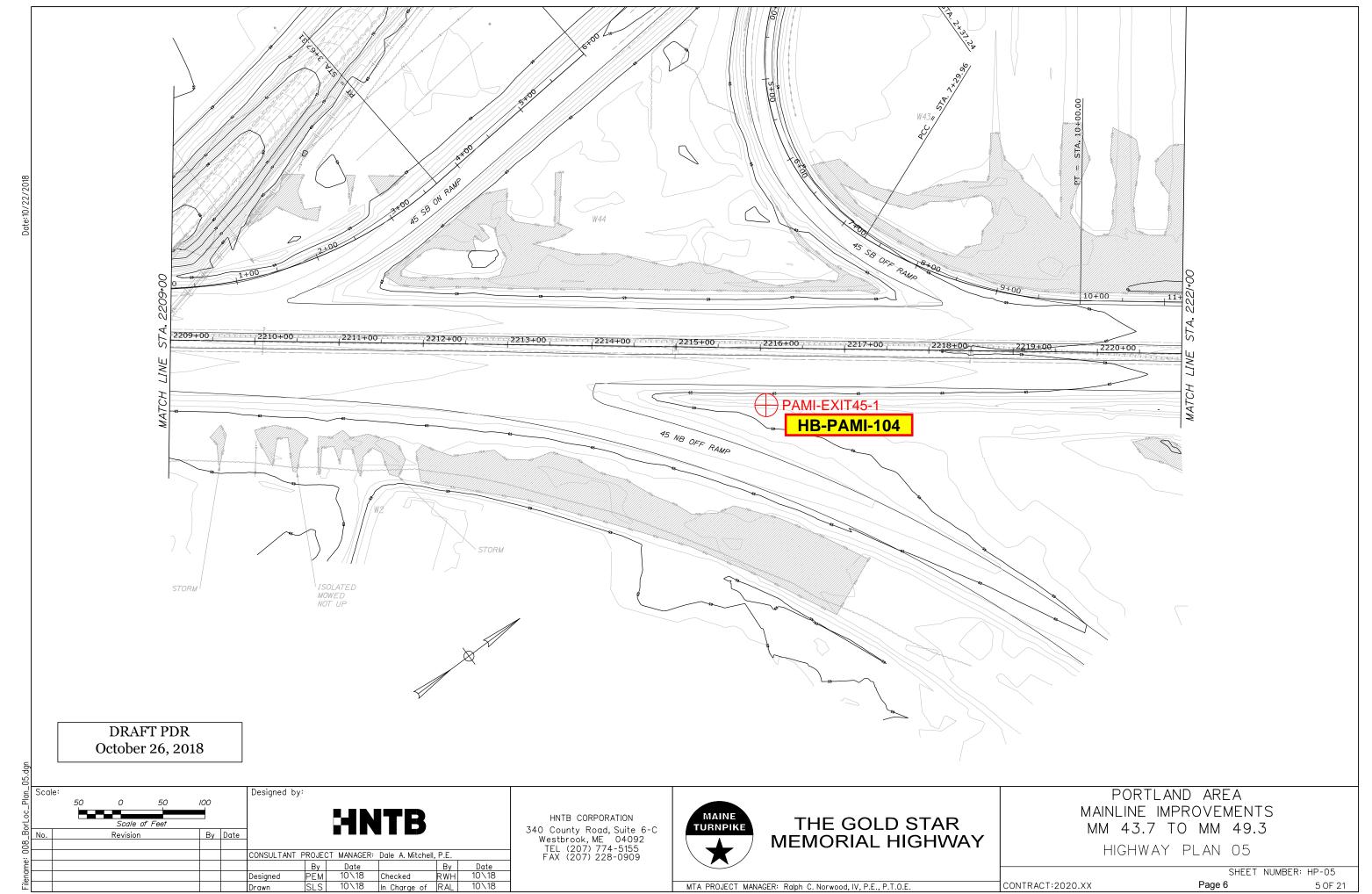
HIGHWAY PLAN 03

SHEET NUMBER: HP-03

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

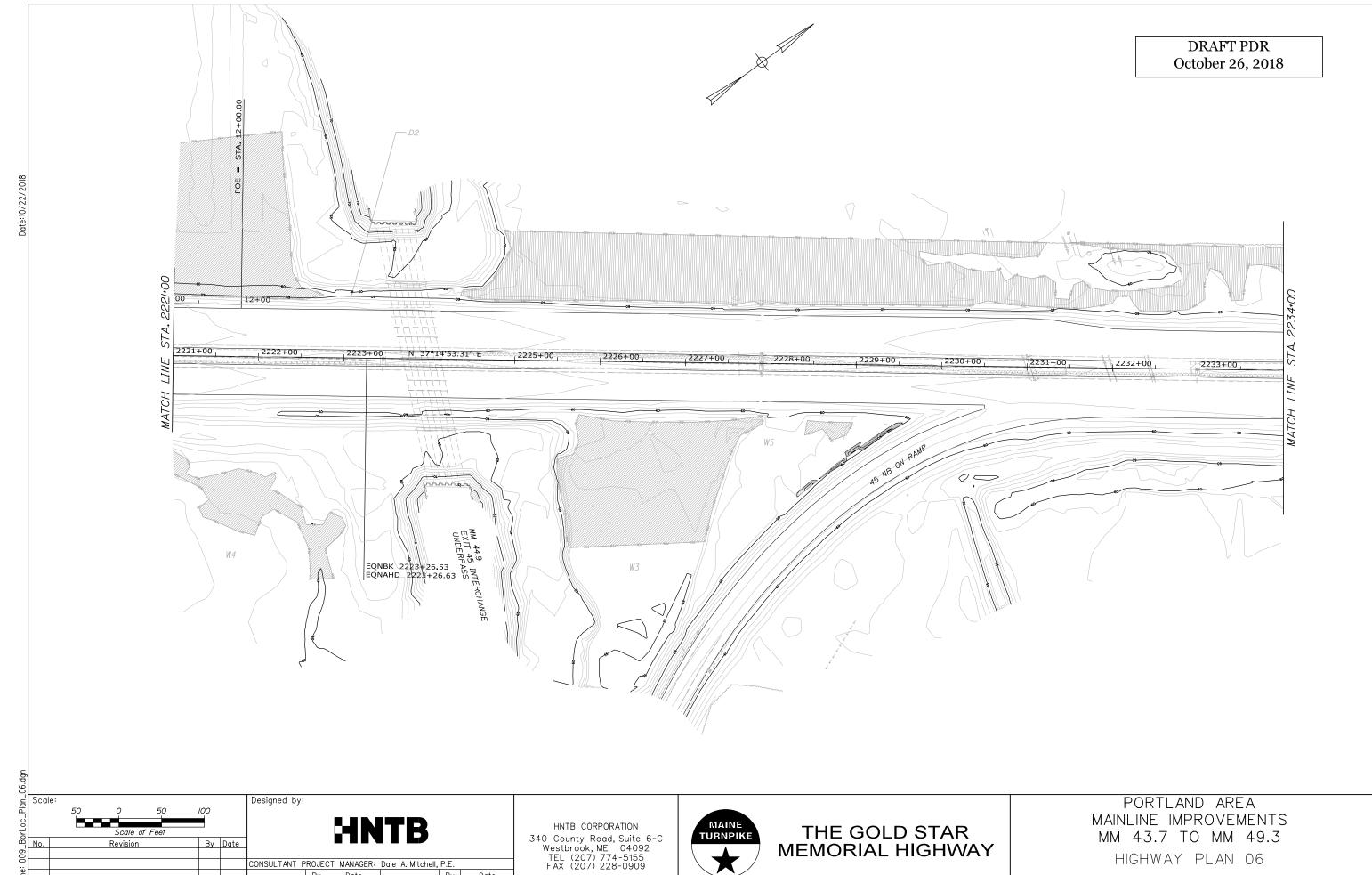
Page 4 CONTRACT:2020.XX





MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

CONTRACT:2020.XX



CONSULTANT PROJECT MANAGER: Dale A. Mitchell, P.E
 Date
 By

 10\18
 Checked
 RWH

 10\18
 In Charge of
 RAL



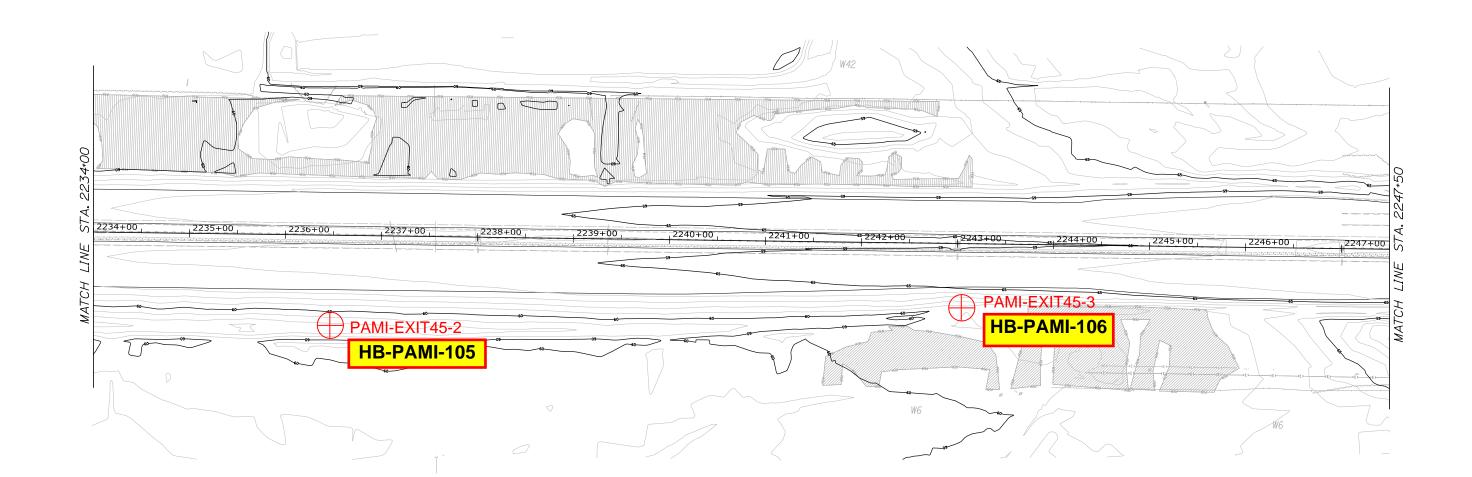
MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

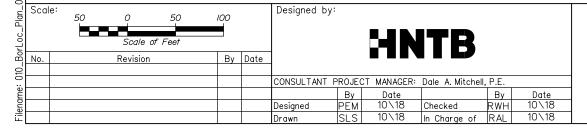
HIGHWAY PLAN 06

SHEET NUMBER: HP-06 CONTRACT:2020.XX

DRAFT PDR October 26, 2018







HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

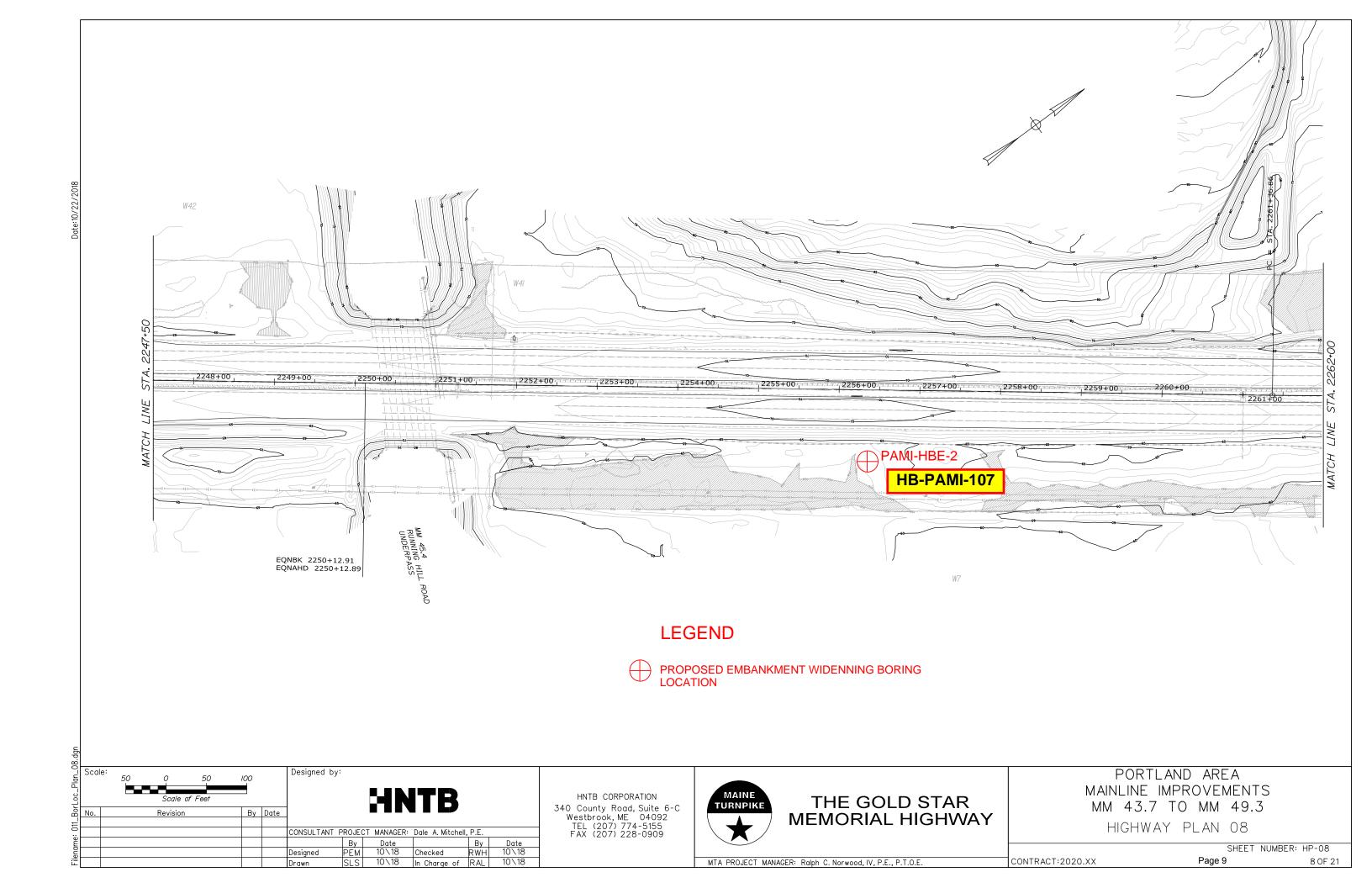


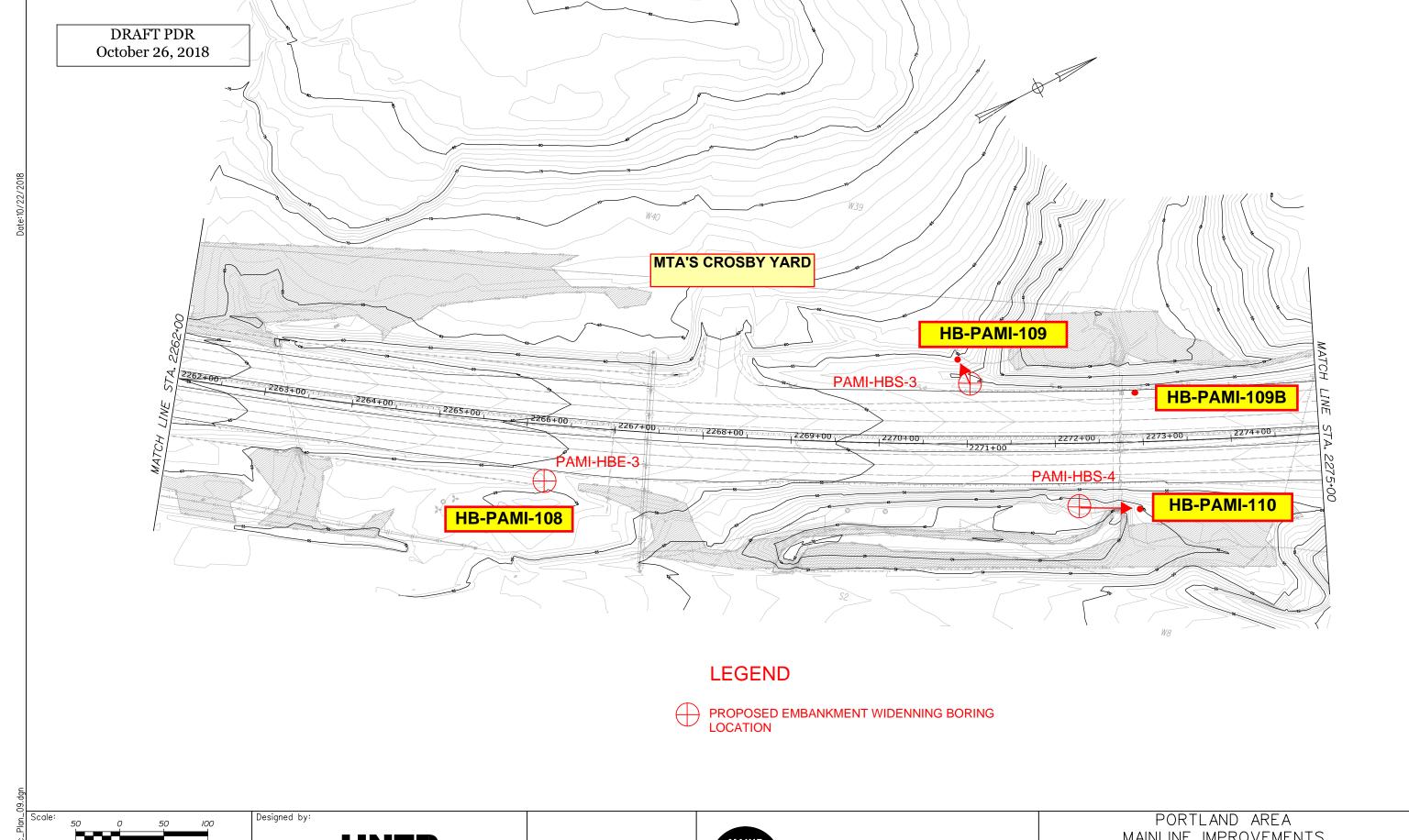
PORTLAND AREA MAINLINE IMPROVEMENTS MM 43.7 TO MM 49.3

HIGHWAY PLAN 07

SHEET NUMBER: HP-07 Page 8 CONTRACT:2020.XX

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.





By Date CONSULTANT PROJECT MANAGER: Dale A. Mitchell, P.E

HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

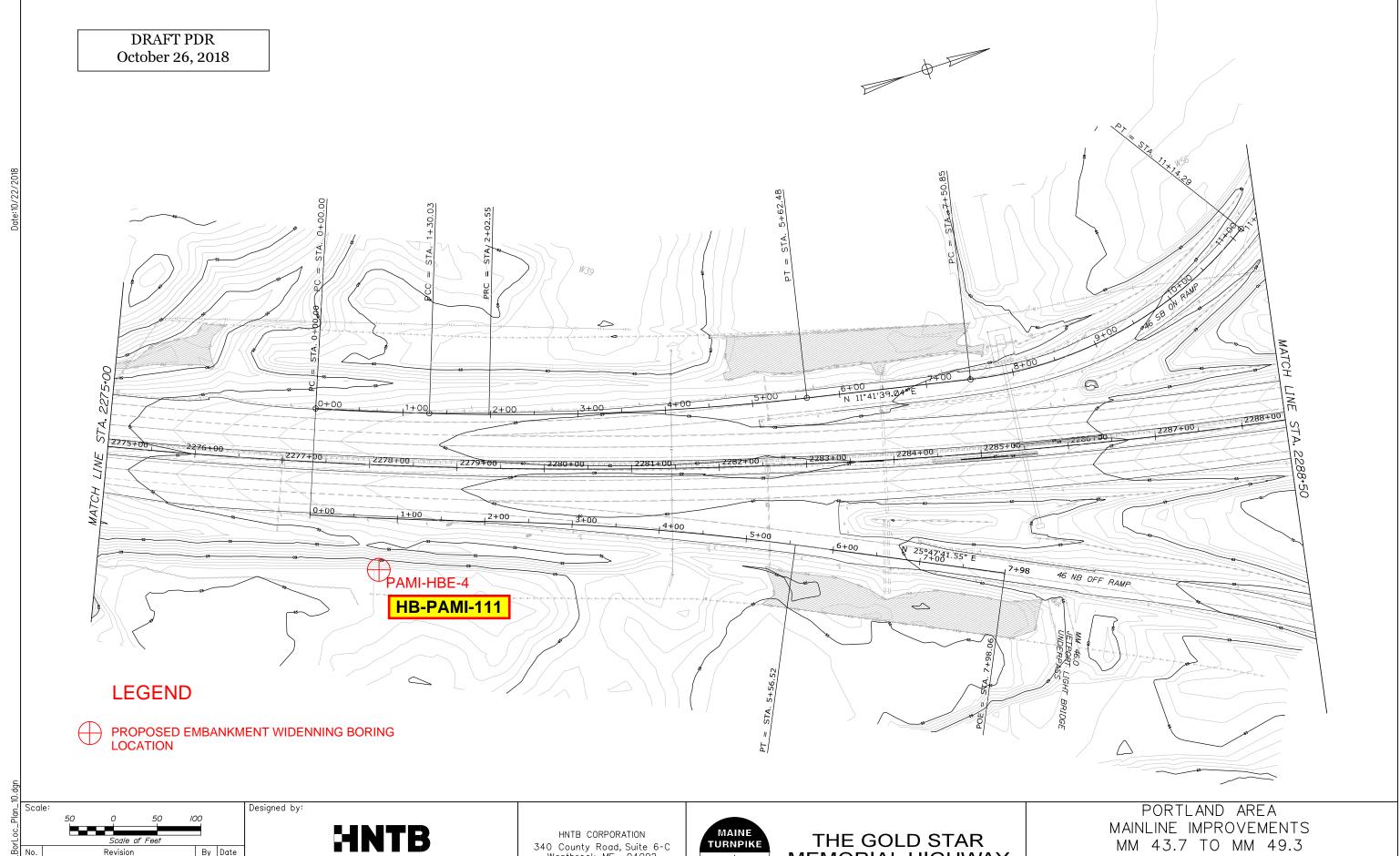


MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

THE GOLD STAR **MEMORIAL HIGHWAY** MAINLINE IMPROVEMENTS MM 43.7 TO MM 49.3

HIGHWAY PLAN 09

SHEET NUMBER: HP-09 CONTRACT:2020.XX Page 10



By Date CONSULTANT PROJECT MANAGER: Dale A. Mitchell, P.E
 Date
 By

 10\18
 Checked
 RWH

 10\18
 In Charge of
 RAL

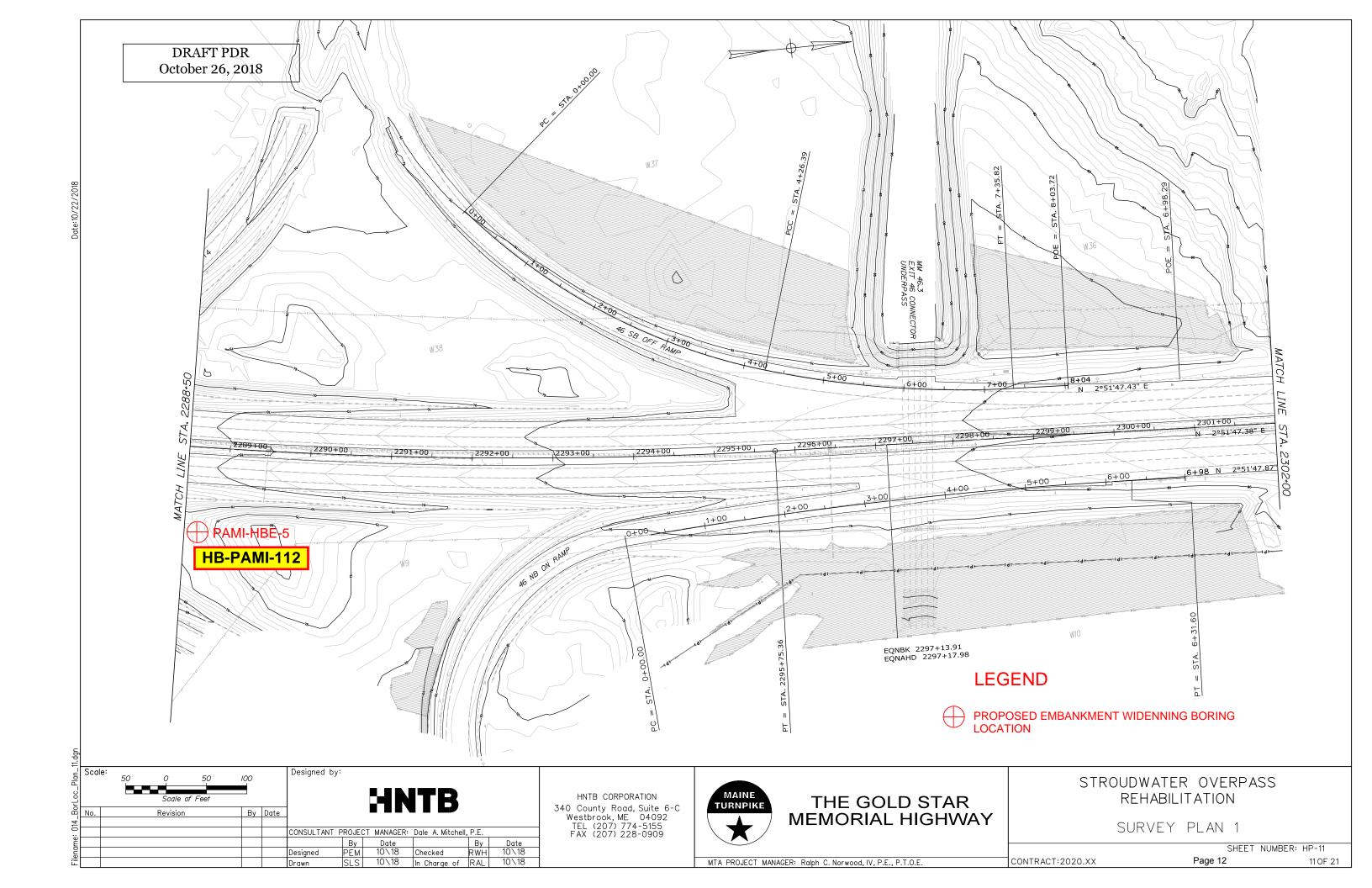
HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

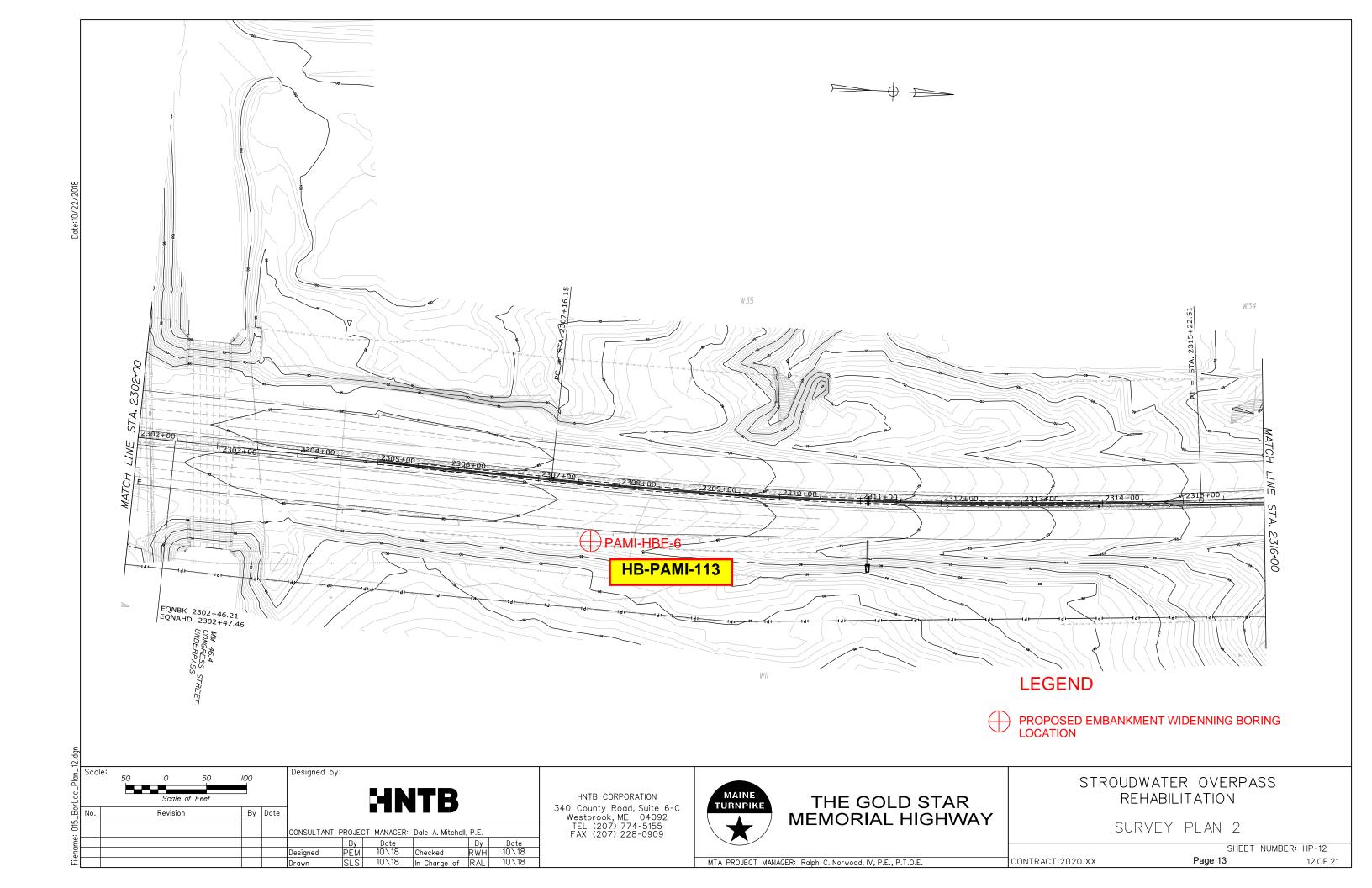


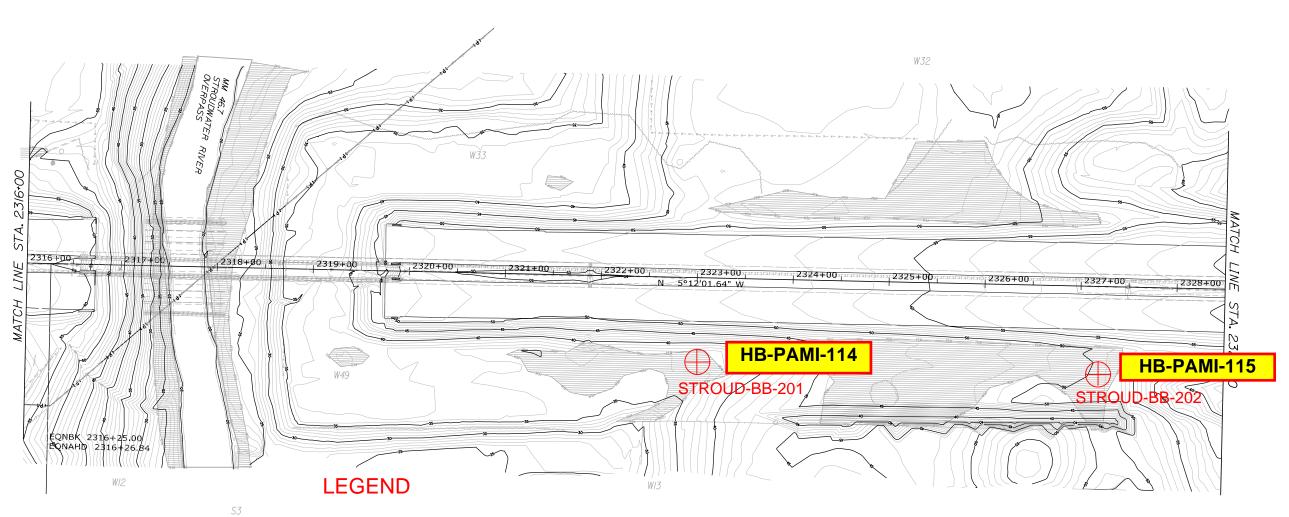
MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

HIGHWAY PLAN 10

SHEET NUMBER: HP-10 CONTRACT:2020.XX Page 11







PROPOSED EMBANKMENT WIDENNING BORING LOCATION

Designed by: Scale: By Date CONSULTANT PROJECT MANAGER: Dale A. Mitchell, P.E
 Date
 By

 10\18
 Checked
 RWH

 10\18
 In Charge of
 RAL

HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909



THE GOLD STAR **MEMORIAL HIGHWAY**

SURVEY PLAN 3

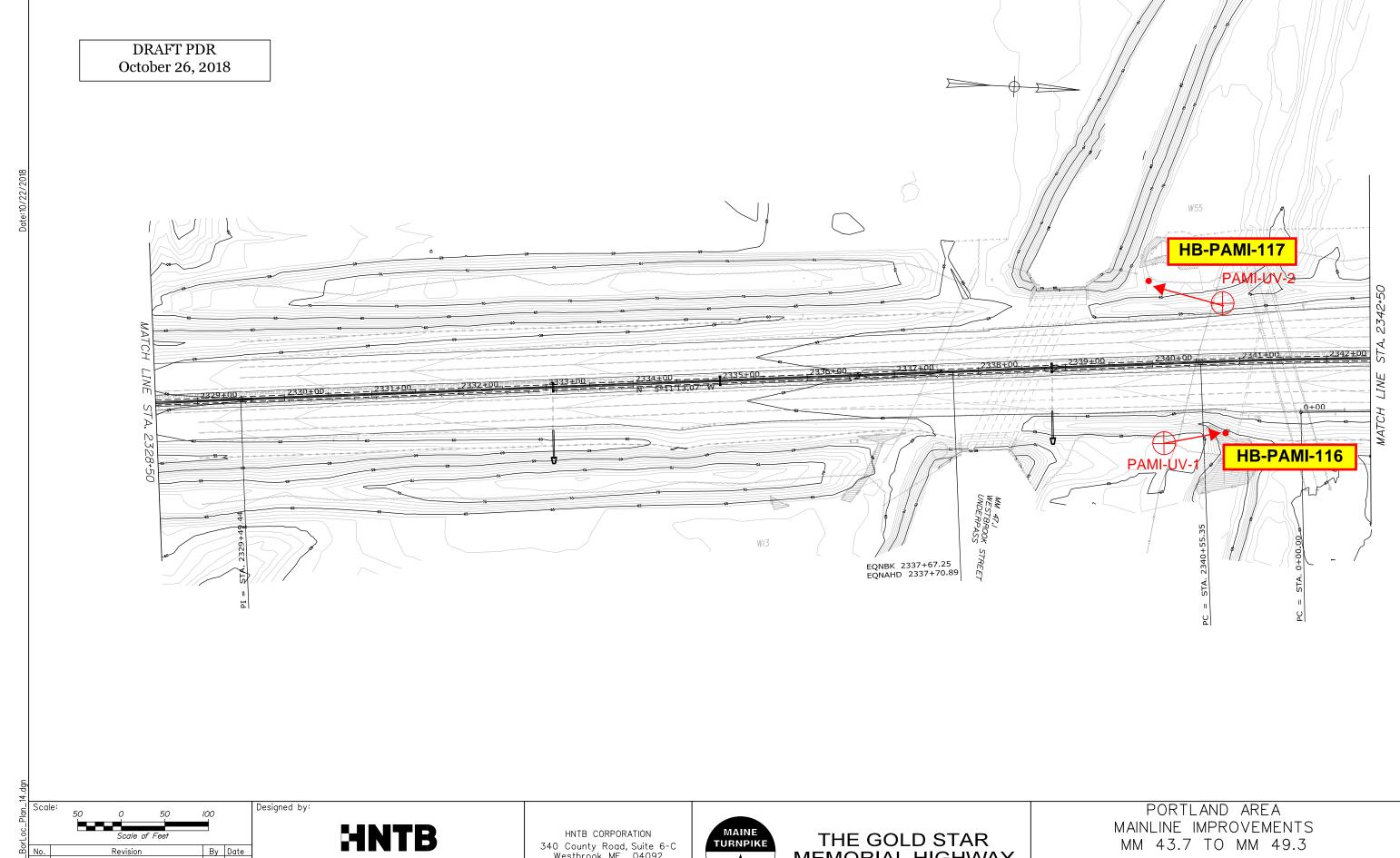
STROUDWATER OVERPASS

REHABILITATION

SHEET NUMBER: HP-13 Page 14

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

CONTRACT:2020.XX



By Date CONSULTANT PROJECT MANAGER: Dale A. Mitchell, P.E
 Date
 By

 10\18
 Checked
 RWH

 10\18
 In Charge of
 RAL

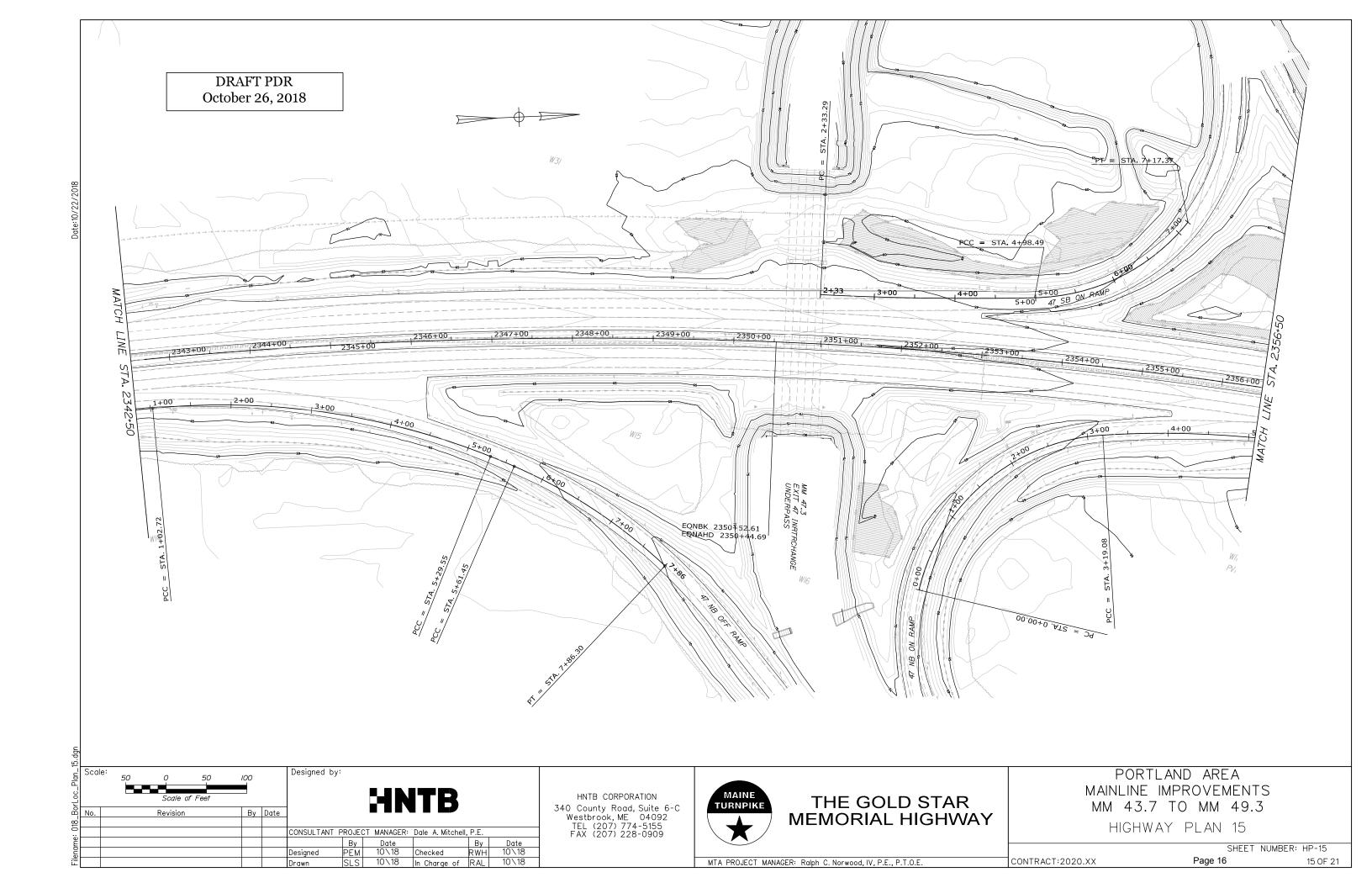
340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

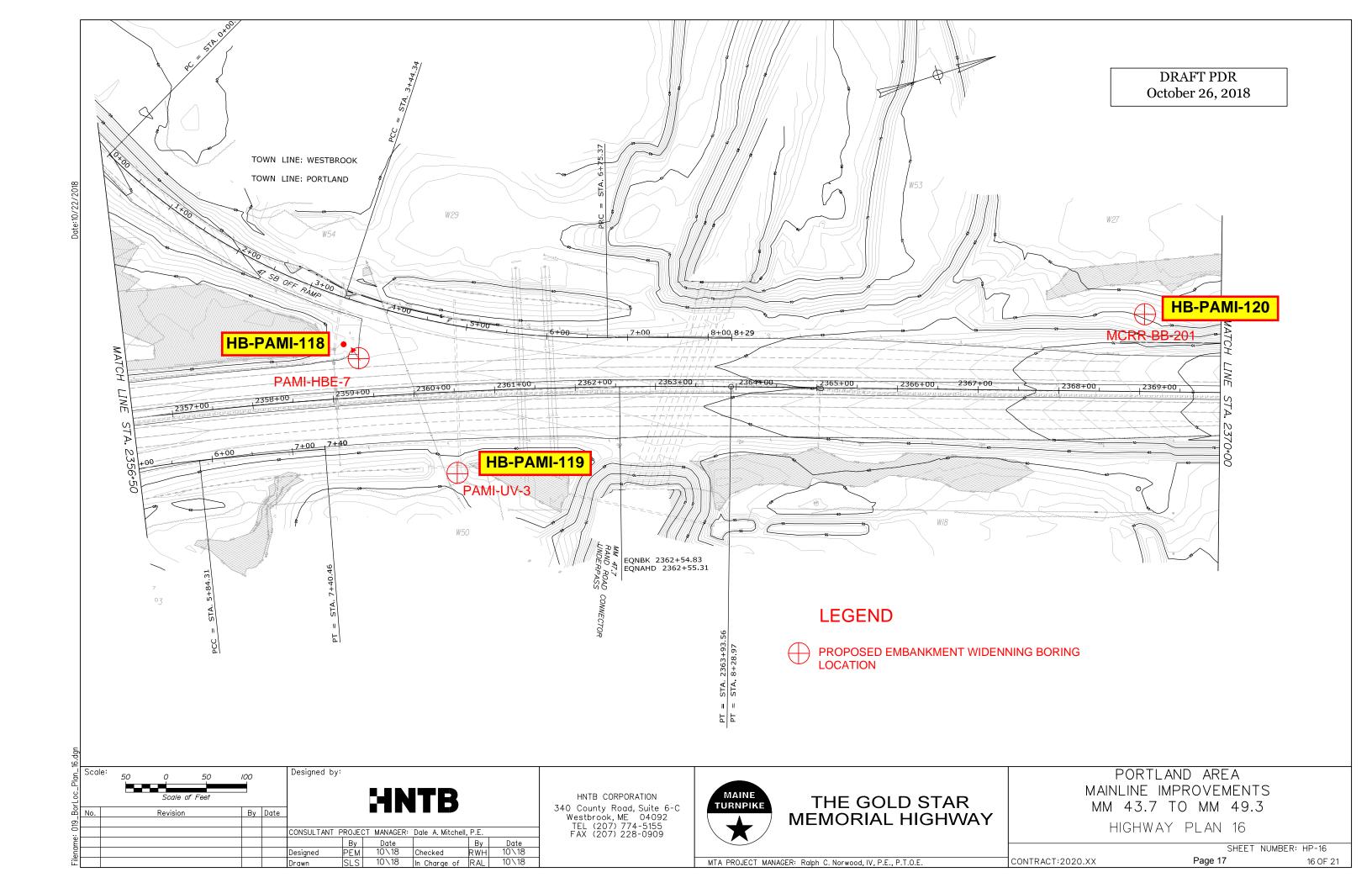


HIGHWAY PLAN 14

SHEET NUMBER: HP-14

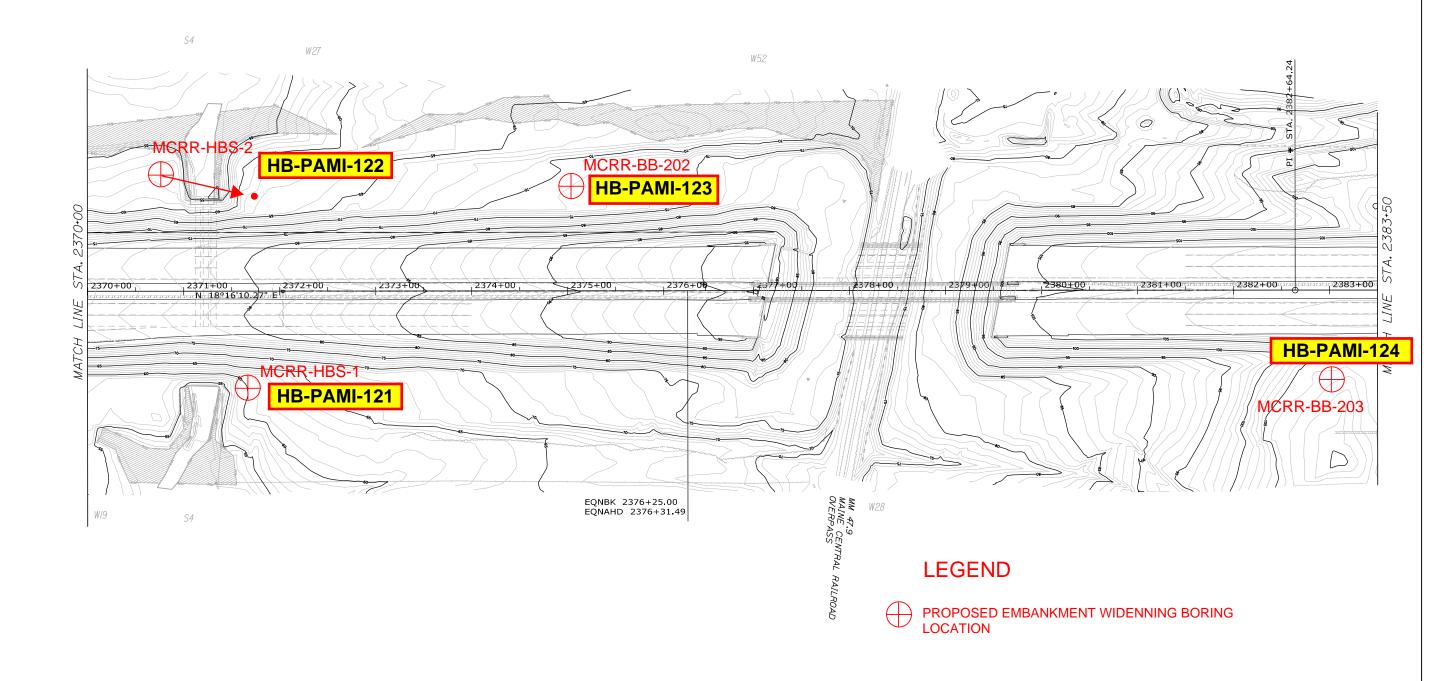
Page 15 MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E. CONTRACT:2020.XX

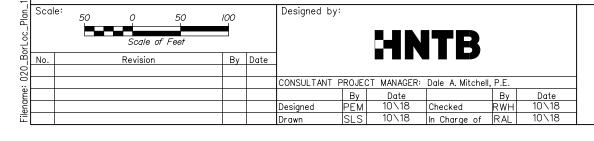




DRAFT PDR October 26, 2018







HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909

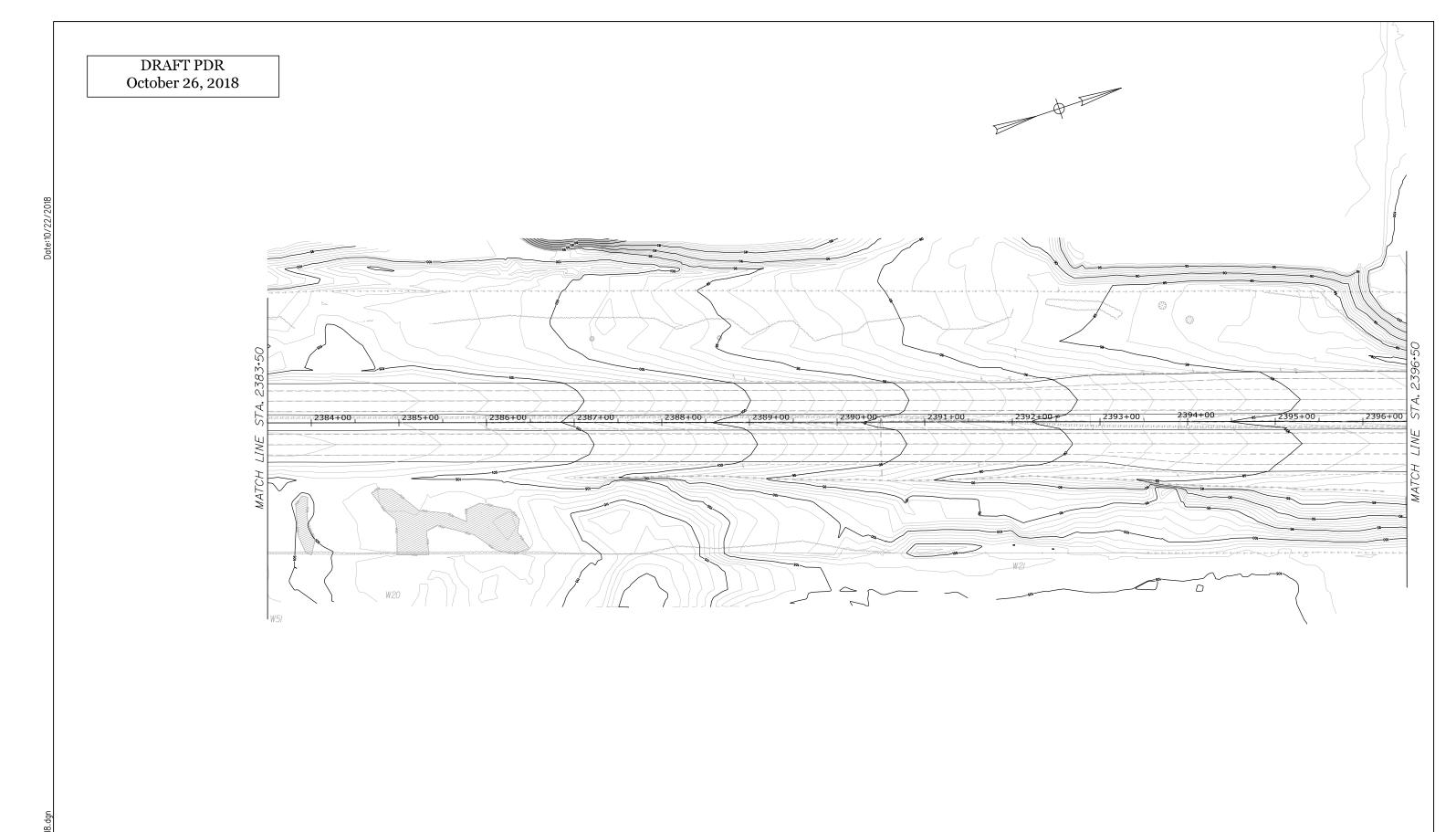


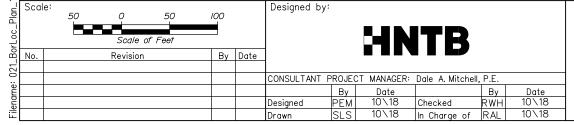
MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

THE GOLD STAR MEMORIAL HIGHWAY PORTLAND AREA
MAINLINE IMPROVEMENTS
MM 43.7 TO MM 49.3

HIGHWAY PLAN 17

SHEET NUMBER: HP-17
CONTRACT:2020.XX
Page 18
17 OF 21





HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909



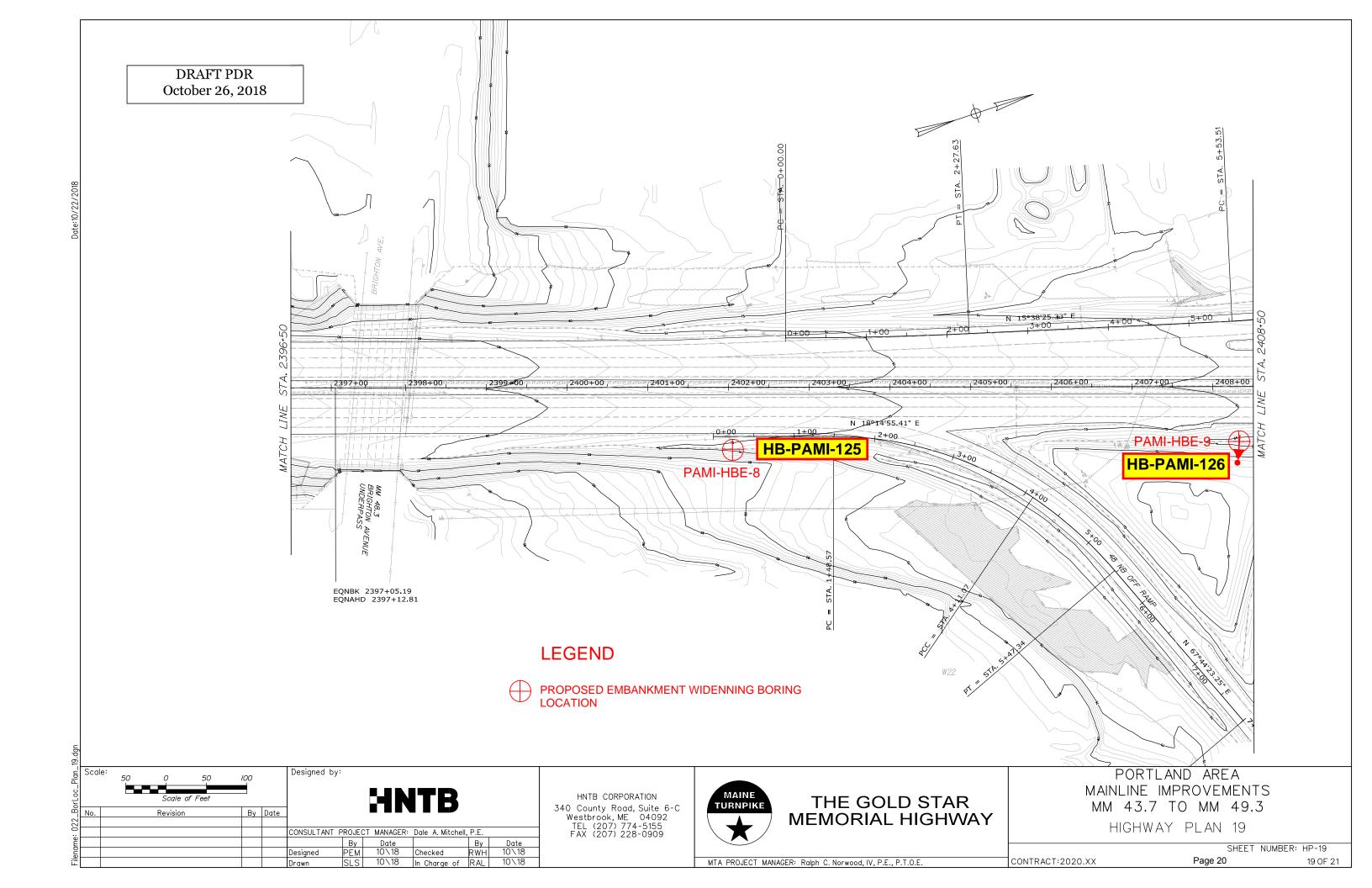
THE GOLD STAR MEMORIAL HIGHWAY

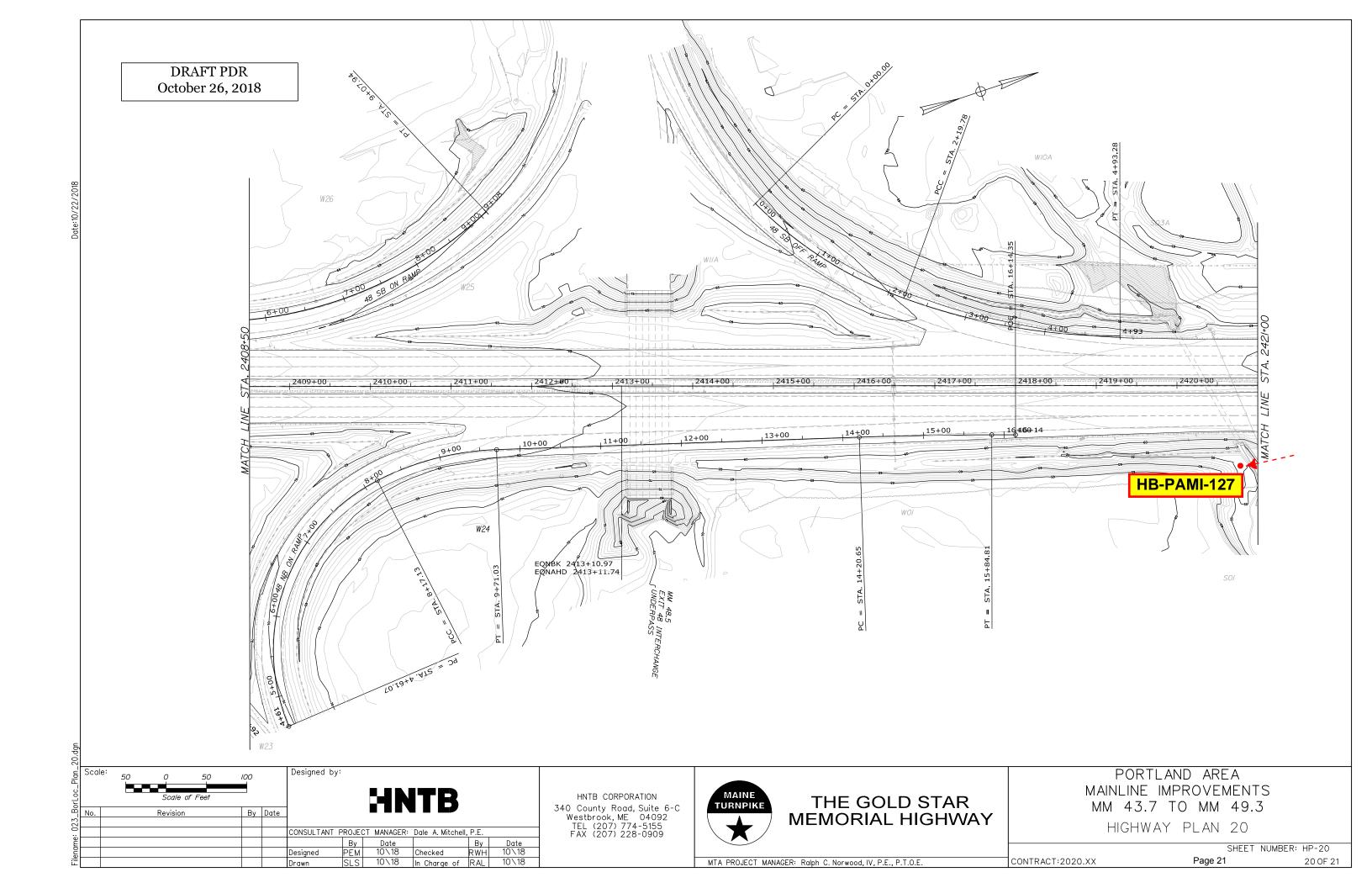
PORTLAND AREA
MAINLINE IMPROVEMENTS
MM 43.7 TO MM 49.3

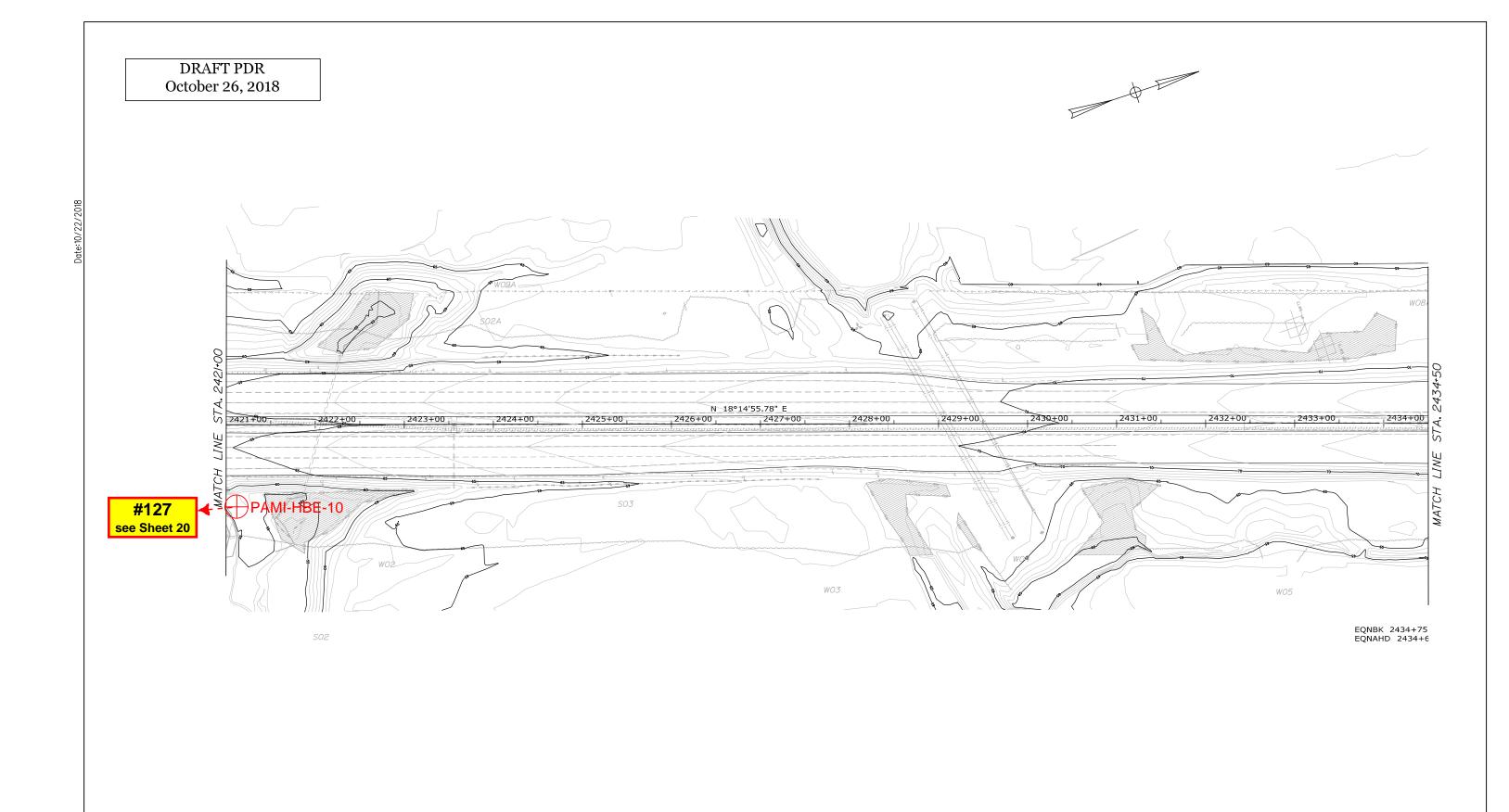
HIGHWAY PLAN 18

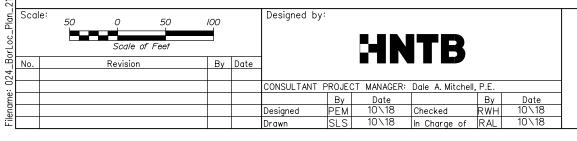
SHEET NUMBER: HP-18
CONTRACT:2020.XX Page 19 18 OF 21

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.









HNTB CORPORATION 340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909



THE GOLD STAR **MEMORIAL HIGHWAY**

PORTLAND AREA MAINLINE IMPROVEMENTS MM 43.7 TO MM 49.3

HIGHWAY PLAN 21

SHEET NUMBER: HP-21

MTA PROJECT MANAGER: Ralph C. Norwood, IV, P.E., P.T.O.E.

CONTRACT:2020.XX

Page 22



LOGS OF 100-SERIES SUBSURFACE EXPLORATIONS

Driller : New England Sorring Contribution Blevellon (RL) So R period Contribution Sorring Sorring Contribution Sorrivania Standard spite-doctors Sorrivania Sorrivani				SCHONEWALI		PROJ	ECT:					ne Improvements	Boring No.: HB-F	PAMI-101	
Deliver New England Sorring Control-stollar Deliver Delive							TION.	Maine Turnpike MM 43.7 to 49.3					Proj. No.:1	8-017	
Depting Depting Depting Suppose	, 1200,111										Core Barrel: n/a				
Design Part							+		(141)		• /	'		olit-spoon	
Date State/Fire 127716 1.105 1235	· ·					_			Mob	ile Drill	B-53 (rubber track ATV)		<u> </u>		
Note Auger DOC SAN 0 of 11	Date Start/Finish: 12/7/18: 1105-1235						-						Hammer Type: calibrated aut	to-hammer	
No. Procedure	Boring Location: Sta 2172+50, 65 LT (approx)											14 ft	Hammer Efficiency: 0.906		
Display Disp									OD:	SSA	to 2 ft		Water Level*: 0.9 ft		
10 2417 22-46 2-247 2-247 2-247	D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Spo be Sample ful Thin Wa shear Test	oon Sample attem Il Tube Sample a ne Shear Test at	npt ttempt tempt	N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu I R = Rock C RQD = Roc	ed = N v ue corre ciency = Field Var ore Sam k Quality	alue cted for ha calculated ne Shear S ple	d hammer Strength (p	efficienc	WO WO sy = BO I SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger	AASHTO / USCS soil classification: #200 = percent fines WC = wat CONSOL= 1-D consolidation test IODS: UU=Unconsolidated undrained trias LL=Liquid Limit / PL=Plastic Limit /	ter content (%) xial test PI=Plasticity Index	
10 2012 20 40 2222 4 6 PUSH 10 2014 20 249 48 60 1225 5 8 5 5 20 249 48 60 1225 5 8 5 5 20 249 49 60 1225 5 8 5 5 20 20 20 20 20 20		Sample No. Sample Depth (ft.) Sample Depth (ft.) Sample Depth (ft.) Shear Strength psf) or RQD (%)						N-uncorrected N-60 Casing Blows			Graphic Log	Visual D	Testing		
trace Sitt. GRANULAR FILL 20	0								S\$A						
trace Sitt. GRANULAR FILL 20											蘳				
trace Sitt. GRANULAR FILL 20												1D: Brown, wet, v. loose	e. fine to coarse SAND. little fine Gr	ravel.	
20 246 40-60 1-2-35 5 5 5 5 5 5 5 5 5		1D	24/12	2.0 - 4.0	2-2	2-2-2	4	6	PUSH					,	
20 246 40-60 1-2-35 5 5 5 5 5 5 5 5 5															
10 34 42.5		2D	24/9	4.0 - 6.0	1-2	2-3-5	5	8	5				i fine to		
10	- 5 -											medium Sana, some Sii	t in tip of spoon.		
10									27						
3D: Grey, Interbedded, v. loose, fine SAND, trace Silt; Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 10 4D: 24/14 9011.0 4-2-1/12' 3 5 36 10 10 10 10 10 10 10 115 4D 24/20 14.0-10.0 1-1/19' 1 2 OPEN 10 20 20 20 115 4D 24/20 14.0-10.0 1-1/19' 1 2 OPEN 116 5D 24/24 18.0-21.0 WOR/18'-3 -									34		爨	5 5			
3D 24/14 80-110 42-1/12 3 5 36 10 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 11 12 29 11 15 4D 24/20 14.0-16.0 1-1/16 1 2 0PEN 15 24/24 18.0-21.0 WOR18-3 -									67	42.	5		 7.5-		
3D 24/14 80-110 42-1/12 3 5 36 10 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 24/14 80-110 42-1/12 3 5 36 11 11 12 29 11 15 4D 24/20 14.0-16.0 1-1/16 1 2 0PEN 15 24/24 18.0-21.0 WOR18-3 -									54						
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. 10			0444	00.440		4/40"		+_							
4D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 4D: 24/20 14.0 - 16.0 1 - 1/18" 1 2 OPEN and fine SAND, some Silt. 4D: 33 33 34 4D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 5D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual.	- 10 -	3D	24/14	9.0 - 11.0	4-2-	1/12"	3	5	36						
## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. ## AD: Grey, interbedded, v.									26					LL=23	
4D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 4D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 5D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 5D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 8D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 8D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 8D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 9D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sandy Silty CLAY, trace very fin									29						
4D 24/20 14.0-16.0 1-1/18* 1 2 OPEN 4D 24/20 14.0-16.0 1-1/18* 1 2 OPEN 4D Sary, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 4D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 5D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 5D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 8D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 90.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Page 1 of 1									33						
4D 24/20 14.0-16.0 1-1/18* 1 2 OPEN 4D 24/20 14.0-16.0 1-1/18* 1 2 OPEN 4D Sary, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 4D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine SAND, some Silt. 5D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 5D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 8D Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy Silt. 90.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Page 1 of 1									24						
40 24/20 14.0-16.0 1-1/18" 1 2 OPEN and fine SAND, some Sitt. WC-32', PL=16 PL=8 5D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy SiLT. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									31			4D: Grey interhedded y	v soft Silty CLAY trace very fine S	Sand: CI	
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. PL=16	- 15 -	4D	24/20	14.0 - 16.0	1-1	/18"	1	2	OPEN					WC=32%	
5D: Grey, interbedded, v. soft, Silty CLAY, trace very fine Sand; and fine Sandy SILT. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1	"														
20 50 24/24 19.0 - 21.0 WOR/18*3 - 21.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
20 50 24/24 19.0 - 21.0 WOR/18*3 - 21.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
20 50 24/24 19.0 - 21.0 WOR/18*3 - 21.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
20 50 24/24 19.0 - 21.0 WOR/18*3 - 21.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. 29.0 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1									$ \bigvee $						
20 Bottom of Exploration at 21.0 feet below ground surface. No refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1		5D	24/24	19.0 - 21.0	WOR	2/18"-3							v. soft, Silty CLAY, trace very fine S	Sand;	
Bottom of Exploration at 21.0 feet below ground surface. No refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1	- 20 -											and into Sandy Size.			
No refusal. 25 Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1										29.	0				
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1													n at 21.0 feet below ground surfa	ice.	
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1															
*Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those			s represent	approximate bou	indaries betw	een soil types	; transitic	ons may be	e gradual.				Page 1 of 1		
	* Wate	er level rea	dings have	been made at tim	nes and unde	r conditions st	ated. Gr	oundwate	r fluctuatio	ons may	occur du	e to conditions other than those	Boring No · HR-P	AMI-101	

			SCHONE -									Daring No.		102	
Schonewald PROJE Engineering		ECT:					Improvements	Boring No.: _							
ASSOCIATES, INC. LOCATIO				ION:					3.7 to 49.3	Proj. No.:	18-017	7			
Driller: New England Boring Contractors					evation		65 ft (e		iu, ivi⊏	Core Barrel:	n/a				
-	ator:		Enos/ Share	Borning Gor	THE GOLOTO	-	tum:	(14.)	NAVD8	,		Sampler:	standard split-spoo	nn .	
Logged By: Schonewald				+					-53 (rubber track ATV)	Hammer Wt./Fall:		211			
Date Start/Finish: 12/5/18; 1155-12/7/18; 1025					_	Drilling Method: cased				,	Hammer Type:	calibrated auto-hamm	ner		
Boring Location: Sta 2196+75, 60 LT (approx)						+-	sing ID			4") to 19	<u> </u>	Hammer Efficienc			
	.g			(-1-1	,	+-	ger ID/		SSA to			Water Level*:	10.4 ft (open, end)		
D = Sp MD = U	lit Spoon S Jnsuccess	Sample	TESTING:		ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic	DEFINI ed = N value correct	TIONS: alue cted for ha	ammer effi	ciency	WOH WOR	DNAL DEFINITIONS: = weight of 140lb. hammer = weight of rods t recorded	LABORATORY TEST AASHTO / USCS s	RESULTS: oil classifications es WC = water conte		
MU = U V = Ins	Jnsuccess itu Vane S	ful Thin W Shear Test	all Tube Sample at ane Shear Test att	empt	S _u = Insitu F R = Rock Co RQD = Rock	ield Van re Sam	e Shear S ole	Strength (p		BORE SSA/H	HOLE ADVANCEMENT METH ISA=solid/hollow stem auger iller cone/OPEN/PUSH=hydraul	ODS: UU=Unconsolidate LL=Liquid Limit / Pl	d undrained triaxial test .=Plastic Limit / PI=Plasti		
				•	formation		1	1							
Depth (ft.)	Sample No.	Pen./Rec. (in.)					N-uncorrected N-60 Casing Blows			Graphic Log	Visual Description and Remarks			Lab. Testing Results	
0								S\$A							
							1D: Brown damp loose fine to					. fine to medium SANI	to medium SAND, trace to little Silt,		
	1D	24/13	2.0 - 4.0	4-4	-4-3	8	12	12 trace coarse Sand. GR							
	2D	24/8	4.0 - 6.0	2.2	!-2-2	4	6	19			2D: Brown, damp, v. loo	ND, trace to little			
- 5 -	20	24/0	4.0 - 0.0	2-2	-2-2	-	"	19			Silt, trace coarse Sand.				
								11		霻					
								12							
								40		囊					
								12		氢					
								14							
	3D	24/7	9.0 - 11.0	1-3	-2-2	5	8	8			3D: Brown, loose, fine to Clay in tip of spoon.	coarse SAND, trace	coarse SAND, trace Silt. Olive grey, Silt-		
- 10 -								6		蹇	olay in up of spoon.				
								8	54.0		MARINE SILT-CLAY CF	RUST	11.0-		
								10							
								10	51.0				14.0-		
	4D	24/14	14.0 - 16.0	WOR	H/24"			WOH	51.0		4D: Grey, v. soft, Silty C	LAY. MARINE SILT-C	LAY		
- 15 -								woн							
								7							
								13							
								22			SD. Dade and with a con-	-:	V 4	CI	
	5D V1	24/24	19.0 - 21.0 19.6 - 20.0	VANE IN	NTERVAL 6/55 psf			OPEN			5D: Dark grey with occas Sand.			CL -#200=99%	
- 20 -	V2		20.6 - 21.0		1/ 55 psf						V1: Tu=15.5 / Tr=2 ft-lbs	•	ŕ	WC=39% LL=36	
											V2: Tu=13.5 / Tr=2 ft-lbs	s (65 mm x 130 mm va	ne)	PL=19 <u>PI=17</u>	
									ļ		6D: Dark grey with occa	sional black. Silty CLA	Y. trace very fine		
25	6D V3	24/10	24.0 - 26.0 24.6 - 25.0	VANE IN Su= 508	NTERVAL 8/ 55 psf						Sand.	,,,,	,		
	arks:		'		,										
Stratifi	cation line	s renrecer	nt approximate bour	ndaries heter	een soil types:	transitio	ns mau h	e aradual				Page 1 of 3			
١.							-	-	ne may ca	nour duc 4	a conditions other than these				
pres	ent at the t	time meas	e been made at tim urements were mad	es and under de.	conditions sta	ileu. Gr	ounawate	ii iiuctuatio	лів іпаў ос	cur aue t	o conditions other than those	Boring No	.: HB-PAMI-	102	

			Schonewald)	PROJE	CT:	Portl	and /		Mainlin	e Improvements	Boring No.: HB-PAMI	-102		
l		==	Engineering				Main	e Tur	rnpik	e MM 4	3.7 to 49.3	Proj. No.: 18-01			
			Associates, In		LOCATI				_		and, ME	-			
Drille			New England I	Boring Co	ntractors	+-	vation	(ft.)		ft (est'd)		Core Barrel: n/a			
Oper			Enos/ Share			+	tum:			VD88		Sampler: standard split-spo	on		
	ged By:		Schonewald			+	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches			
	Start/Fi		12/5/18; 1155-			+	Drilling Method: cased				boring	Hammer Type: calibrated auto-hamn	ner		
Borin	ng Loca	tion:	Sta 2196+75, 60	LT (approx	:)	+	sing ID			V (4") to 1	19 ft	Hammer Efficiency: 0.906			
IN-SITI	I CAMPII	ING AND	TESTING:		ADDITIONAL D		ger ID/	OD:	SS	SA to 4 ft	TIONAL DEFINITIONS:	Water Level*: 10.4 ft (open, end) LABORATORY TEST RESULTS:)		
D = Spl MD = U U = Thi MU = U V = Insi	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane S	Sample Iful Split Sp be Sample Iful Thin Wa Shear Test	poon Sample attem e /all Tube Sample att t /ane Shear Test atte	npt ttempt tempt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fie R = Rock Core RQD = Rock (d = N val e correct iency = c eld Vane re Sampl	alue sted for ha calculated e Shear S ale	d hamme Strength	er efficie	WOH WOF ency= r BOR SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines	ticity Index		
					nformation		ı	г —	1						
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected Casing Casing Casing Casing Casing Caphic Log Gaphic Log				·	Lab. Testing Results				
25	V4	_	25.6 - 26.0		85/ 27 psf			\Box]		V3: Tu=18.5 / Tr=2 ft-lbs V4: Tu=14 / Tr=1 ft-lbs (s (65 mm x 130 mm vane) (65 mm x 130 mm vane)			
									_						
20	7D V5	24/24	29.0 - 31.0 29.6 - 30.0	VANE II Su= 39	NTERVAL 98/ 14 psf			\vdash	-			7D: Dark grey, Silty CLAY. V5: Tu=14.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)			
- 30 -	V6		30.6 - 31.0		30/ 0 psf				1			V6: Tu=12 / Tr=0 ft-lbs (65 mm x 130 mm vane)			
											, , , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , ,			
		<u> </u>		 				\sqcup	-						
		<u> </u>		<u> </u>				\sqcup	_		OD: Dork grov black Sill	ty CLAY with nodules throughout.			
- 35 -	8D V7	24/24	34.0 - 36.0 34.6 - 35.0	VANE IN Su= 39	NTERVAL 98/ 14 psf			\sqcup	_		V7: Tu=14.5 / Tr=0.5 ft-l				
	V8		35.6 - 36.0	Su= 35	57/ 0 psf			\vdash	-		V8: Tu=13 / Tr=0 ft-lbs ((65 mm x 130 mm vane)			
											CO: Destruction Cills Cl	N. W. and date throughout			
- 40 -	9D V9	24/3	39.0 - 41.0 39.6 - 40.0	VANE IN Su= 53	NTERVAL 36/ 27 psf			Ш				AY with nodules throughout. s (65 mm x 130 mm vane)			
	V10		40.6 - 41.0	Su= 39	98/ 0 psf			igwdapper	-		V10: Tu=14.5 / Tr=0 ft-lb	bs (65 mm x 130 mm vane)			
											41.7 ft: Gravelly materia	Il noted; possible concretion.			
	10D	24/9	44.0.46.0		15.40	23	35	$\vdash \vdash$	2	1.5		ilty fine to coarse SAND, some Gravel.			
- 45 -	IOD	24/8	44.0 - 46.0		-15-16		30		-		TILL				
-									-						
Ī									1		48 to 49 ft: Roller cone t	through boulder.			
50	11D	18/10	49.0 - 50.5	22-:	37-43	80	121		_		11D: Grey, v. dense, Sil	ty GRAVEL, some fine to coarse Sand.			
Rema		s represer	nt approximate bour	Indaries betw	veen soil types; ti	ransitior	ns may be	e gradua	al.			Page 2 of 3			
* Wate	r level read	dings have	e been made at time surements were made	es and unde	r conditions state	.ed. Gro	oundwate	r fluctuat	tions ma	ay occur due	e to conditions other than those	Boring No.: HB-PAMI-	102		

			Schonewald Engineering		PROJE	CT:					Boring No.: HB-PAMI 43.7 to 49.3 Proi No.: 18-01	
			Associates, I		LOCATION	ON:						/
Drille	er:		New England	Boring Co			vation		65 ft (
Ė	ator:		Enos/ Share			+	tum:		NAVD8		Sampler: standard split-spc	on
	ed By:		Schonewald			+ -	Type:				B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/5/18; 1155-			+	lling Me				n boring Hammer Type: calibrated auto-hami	ner
Borii	ng Locat	tion:	Sta 2196+75, 60) LT (approx)	+	sing ID/		HW (4			,
IN-SIT	U SAMPLI	NG AND	TESTING:		ADDITIONAL D		ger ID/0	DD:	SSA to		Water Level*: 10.4 ft (open, end tional definitions: LABORATORY TEST RESULTS:)
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane Sl	Sample ful Split Sp pe Sample ful Thin W hear Test	oon Sample attem all Tube Sample at ane Shear Test att	tempt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fiel R = Rock Core RQD = Rock C	= N val correct ncy = o ld Vane Sampl	lue ted for ha calculated e Shear S le	hammer trength (p	efficiency	WO WO = BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METHODS: VHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraulic push AASHTO / USCS soil classifications +#200 = percent fines WC = water cont ONSOL = 1-10 consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plast UCT qp = peak compressive strength of rout	ticity Index
					formation	_ 1						
S Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
30									14.5		50.5 Bottom of Exploration at 50.5 feet below ground surface.	-
- 55 -											No refusal.	
- 60 -												
- 65 -												
- 70 -												
. 75												
Stratifi			it approximate bou				-	-	ing may on	our di	Page 3 of 3	
pres	ent at the ti	unigs nave ime meas	e been made at tim urements were ma	ies and unde de.	conuitions state	u. Gro	unuwater	nuctuatio	ııs may oc	сиг аи	e to conditions other than those Boring No.: HB-PAMI-	102

$\overline{}$			C									Danisa Na	LID DAMI	100
			SCHONEWALE		PROJE	CT:					e Improvements	Boring No.: _	HB-PAMI-	103
			Engineering								3.7 to 49.3	Proj. No.:	18-017	7
			Associates, I		LOCATION						and, ME			
Drille	er:		New England	Boring Cont	ractors	Ele	vation	(ft.)	62 ft	(est'd)		Core Barrel:	n/a	
Oper	rator:		Enos/ Share			Da	tum:		NAV	D88		Sampler:	standard split-spoo	n
Logg	ged By:		Schonewald			Riç	Type:		Mob	ile Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/F	inish:	12/10/18; 095	5-12/11/18;	1125	Dri	lling M	ethod:	case	d wash	boring	Hammer Type:	calibrated auto-hamm	ier
Bori	ng Loca	tion:	Sta 2198+50, 75	RT (approx)		Ca	sing ID	/OD:	HW	(4") to	19 ft	Hammer Efficiency	y: 0.906	
						Au	ger ID/	OD:	SSA	to 9 ft		Water Level*:	none observed abo	ove 9 ft
			TESTING:		DDITIONAL D						TIONAL DEFINITIONS:	LABORATORY TEST		
	lit Spoon S		ooon Sample attem		N-uncorrected N ₆₀ = N value			mmer effi	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS so -#200 = percent fine	oil classifications es WC = water conte	nt (%)
U = Th	in Wall Tu	be Sample			hammer efficie	ency =	calculated	d hammer	efficienc	y=	not recorded	CONSOL= 1-D con	solidation test	(/-/
		itul Thin W Shear Test	all Tube Sample at		S _u = Insitu Fie R = Rock Core			Strength (p	ist)		REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger		d undrained triaxial test .=Plastic Limit / PI=Plasti	city Index
MV = L	Insuccess	ful Insitu V	ane Shear Test att		RQD = Rock C	Quality	Designati	on (%)		RC=	roller cone/OPEN/PUSH=hydraul	ic push UCT qp = peak con	pressive strength of rock	(
		_		Sample Info			1			-				
	·	(in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength		N-uncorrected				g				Lab.
(;)	ž		ا م	19/	%	ше			ou	1 2	Visual D	escription and Remark	(S	Testing
Ę.) ble	<u> </u>) Jdu	ws (g l	ည	0	ing vs	/ati	Phic				Results
Depth (ft.)	Sample No.	Pen./Rec.	San (ft.)	Blo She Stre	psf or R	Ž	09-N	Casing Blows	Elevation (ft.)	Graphic Log				
0										252				
								SSA						
											1D: Brown, damp, loose	, fine to coarse SAND,	trace fine Gravel,	
	1D	24/13	2.0 - 4.0	4-4-4-	-5	8	12				trace Silt. GRANULAR F	FILL		
										囊				
										法	2D: Brown, damp, m. de	ense, fine to coarse SA	ND. trace fine	
_	2D	24/13	4.0 - 6.0	4-5-6-	-5	11	17				Gravel, trace Silt.	,	,	
- 5 -														
										靐				
								$ \cdot $						
								V			3D: Brown, damp to moi	ist, loose, fine to coars	e SAND, trace fine	
- 10 -	3D	24/13	9.0 - 11.0	4-4-3-	-2	7	11	28			Gravel, trace Silt, with ru		of sample. Grey	
10								26			Silt-Clay in tip of spoon.			
								21	50.				- — — — —12.0-	
								19	00.				12.0	
								21						
	4D	24/24	14.5 - 16.5	WOR/1	8"-2			PUSH			4D. Crov. v. aaft Cilty C	I AV trace very fine C	and MADINE	
- 15 -											4D: Grey, v. soft, Silty C SILT-CLAY	LAY, trace very line S	and. MARINE	
											17 to 19 ft: Possible sar	nd seams		
											17 to 19 it. 1 093ible 3ai	ia scairis.		
								$\perp \vee$			ED: Dork grov Cilty CLA	V		
	5D V1	24/24	19.0 - 21.0 19.6 - 20.0	VANE INTE	ERVAL			OPEN			5D: Dark grey, Silty CLA V1: Tu=11.5 / Tr=1 ft-lbs		no)	
- 20 -											V1. 1u=11.57 11=11t-108	5 (05 IIIII X 150 IIIII VA	ne)	
	V2		20.6 - 21.0	Su= 302/	27 pst						V2: Tu=11 / Tr=1 ft-lbs (65 mm x 130 mm vane	e)	
											MU: No recovery; sampl	le slid out of tube wher	brought to	
25	MU	24/0	24.0 - 26.0	HYD PL	JSH						surface.			
	arks:		'							VIV E A				
l														
l														
l														
Stratifi	cation line	s represer	nt approximate bou	ndaries betwee	n soil types; tr	ansitio	ns may be	e gradual.				Page 1 of 3		
١.		-					-	-	ns may	occur du	e to conditions other than those			
pres	ent at the	time meas	urements were ma	de.		-u. Oil	wait	oudall	may	_oour uul	50	Boring No	.: HB-PAMI-	103

			-		_							1 =		
			SCHONEWALE		PROJ	ECT:					ine Improvements	Boring No.:	HB-PAMI-	-103
			Engineering								43.7 to 49.3	Proj. No.:	18-017	7
			Associates, I						ugh to	Po	tland, ME			
Drille	er:		New England	Boring Co	ontractors	El	evation	(ft.)	62	ft (est	d)	Core Barrel: n/	a	
Oper	rator:		Enos/ Share			Da	atum:		NA'	/D88		Sampler: st	andard split-spoo	on
Logg	ged By:		Schonewald			Ri	g Type:	;	Мо	bile D	ill B-53 (rubber track ATV)	Hammer Wt./Fall: 14	0 lbs/30 inches	
Date	Start/Fi	nish:	12/10/18; 095	5-12/11/18	8; 1125	Dr	rilling M	lethod	: cas	ed w	sh boring	Hammer Type: ca	librated auto-hamm	ner
Boriı	ng Loca	tion:	Sta 2198+50, 75	RT (approx	x)	Ca	asing IC	/OD:	HV	/ (4")	o 19 ft	Hammer Efficiency:	0.906	
						Αι	uger ID/	OD:	SS	A to 9	ft	Water Level*: no	one observed abo	ove 9 ft
			TESTING:		ADDITIONAL	DEFINI	ITIONS:				DITIONAL DEFINITIONS:	LABORATORY TEST RES		
MD = l U = Th MU = l	in Wall Tul	ful Split Sp be Sample ful Thin W	all Tube Sample at		N-uncorrect N ₆₀ = N va hammer eff S _u = Insitu R = Rock C	lue corre iciency = Field Var	cted for had calculate ne Shear !	d hamm	er efficie	ncy - I	OH = weight of 140lb. hammer OR = weight of rods = not recorded OREHOLE ADVANCEMENT METH	CONSOL= 1-D consolid IODS: UU=Unconsolidated un	WC = water conter dation test adrained triaxial test	
			ane Shear Test at	tempt	RQD = Roc	k Quality	/ Designat	ion (%)			SA/HSA=solid/hollow stem auger C=roller cone/OPEN/PUSH=hydrau	LL=Liquid Limit / PL=Pl lic push UCT qp = peak compre		
				Sample In	nformation									
		(in.)	듄	<u> </u>		eq								Lab.
Depth (ft.)	Sample No.	Pen./Rec. (Sample Depth (ft.)	Blows (/6 ir	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Elevation	(IL.)	Visual D	escription and Remarks		Testing Results
25		_	., .				╅	 	+-	1	%			
							1		_					
	U1	24/24	26.5 - 28.5	HYD	PUSH						U1: Dark grey, Silty CLA	AY.		
							1		1	7	3 3.2,7, 3, 3.2,7		ļ	
							1		4	V.			ļ	
	6D	24/24	28.5 - 30.5	VANE II	NTERVAL						6D: Dark grey, Silty CLA	AY.		CL
	1/0		20.4.20.5		10/11				1	7	7/1	bs (65 mm x 130 mm van	ıe)	-#200=99% WC=35%
- 30 -	V3		29.1 - 29.5	Su= 34	43/ 14 psf				4	E.				LL=43
	V4		30.1 - 30.5	Su= 38	35/ 27 psf						V4: Tu=14 / Tr=1 ft-lbs ((65 mm x 130 mm vane)		PL=21 <u>Pl=22</u>
									1	1				
							_	ш	4	1				
										1/2				
									1	12				
									-					
- 35 -														
- 35 -	U2	24/21	35.0 - 37.0	HYD	PUSH					1	U2: Dark grey, Silty CLA	AY, with fine Sand on bott	om of sample.	CONSOL (Cv, Cα)
									-					WC=42% LL=40
									∐ ₂₅				37.0-	PL=20
									-	Ŭ	37.0 ft: Gravelly materia	I noted.	07.0	<u>PI=20</u>
							+		-					
								₹				0:11 0000/51 5		
	7D	24/8	39.0 - 41.0	11-9	9-11-8	20	30	80		4	Sand. TILL	e, Silty GRAVEL, some fir	ie to coarse	
- 40 -								66			1			
								1						
								44						
								41						
								 _ _	1					
								54			0D. Dadi 2000 - dana	. O f		
	8D	24/12	44.0 - 46.0	5-6-	-15-17	21	32	OPE	N	*	Sand.	e, Gravelly SILT, some fin	e to coarse	
- 45 -									1					
									4					
											H.			
									4		Ų.			
								$ \mathbf{N} $	′					
	9D	8/5	49.0 - 49.7	56-1	100/2"			1 *	1		9D: Dark grey, Gravelly	SILT, some fine to coarse		
_ 50 _	arks:	0,0	10.0 10.1		100/2				12	.3	15		49.7	
		s represen	nt approximate bou	Indaries betw	veen soil types	; transitio	ons may b	e gradua	al.			Page 2 of 3		
١.		•	• •				-	-			due to conditions other the the			
Wate pres	er level rea ent at the t	uings have ime measi	e been made at tim urements were ma	nes and unde ide.	er conditions st	ated. G	roundwate	er fluctua	tions ma	y occur	due to conditions other than those	Boring No.:	HB-PAMI-1	103

			Schonewald Engineering		PROJE	CT:					e Improvements	Boring No.: HB-PAMI- Proj. No.: 18-017	_
			Associates, I	NC.	LOCATION	<u> NÇ</u>							
Drille			New England	Boring Co	ntractors	-	vation	(ft.)	62 ft (_		Core Barrel: n/a	
Oper			Enos/ Share			+-	tum:		NAVD8			Sampler: standard split-spoo	on
	jed By:		Schonewald			+	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/10/18; 095			+	lling M				boring	Hammer Type: calibrated auto-hamm	ner
Borii	ng Locat	tion:	Sta 2198+50, 75	RT (approx	()	_	sing ID		HW (4		19 ft	Hammer Efficiency: 0.906	
IN-SIT	U SAMPLII	NG AND 1	FSTING:		ADDITIONAL D		ger ID/0	OD:	SSA t		TIONAL DEFINITIONS:	Water Level*: none observed about the LABORATORY TEST RESULTS:	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessfin Wall Tub Jnsuccessfitu Vane St	sample ful Split Sp pe Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample at ane Shear Test att	npt ttempt tempt	N-uncorrected N ₆₀ = N value hammer efficie S _u = Insitu Fiel R = Rock Core RQD = Rock C	= N va correct ncy = old Id Vand	lue ted for ha calculated e Shear S le	hammer trength (p	efficiency	WOF WOF = I BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water content CONSOL= 1-D consolidation test	city Index
					formation								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log		escription and Remarks	Lab. Testing Results
50											Bottom of Exploratio No refusal.	n at 49.7 feet below ground surface.	
- 55 -													
00													
- 60 -													
- 65 -													
00													
			+										
- 70 -													
			+										
7.													
75 Rem	arks:	I	1								l		
Char Life	ontion Par		t opprovimets b	ndarios hat	oon gall by	anci#:-	no mouth	gradual				Page 3 of 2	
			t approximate bou				-	_				Page 3 of 3	
* Wate	er level read ent at the ti	dings have ime measi	been made at tim urements were ma	nes and under de.	r conditions state	d. Gro	oundwater	fluctuation	ns may oc	cur due	e to conditions other than those	Boring No.: HB-PAMI-	103

			Schonewald Engineering				Main	e Turr	npike N	MM 4	e Improvements 3.7 to 49.3	Boring No.: HB-PAMI- Proj. No.: 18-017	
Drille			Associates, In New England		LOCAT		Scar vation				and, ME	Core Barrel: n/a	
	rator:		Enos/ Share	Bonng Co	TILIACIOIS		tum:	(11.)	63 ft (Sampler: standard split-spoo	ın
<u> </u>	ged By:		Schonewald			_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/11/18; 115	5-1325			Iling M				boring	Hammer Type: calibrated auto-hamm	er
	ng Loca		Sta 2216+10, 65		()		sing ID		HW (4		_	Hammer Efficiency: 0.906	
							ger ID/		SSA t			Water Level*: 2.7 ft (open)	
	U SAMPLI		ESTING:		ADDITIONAL N-uncorrecte						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
MD = I U = Th MU = I V = Ins	Jnsuccessi in Wall Tub Jnsuccessi situ Vane S	ful Split Sp be Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample at ane Shear Test att	tempt	N-diffeorecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Co RQD = Rock	e correctiency = of the correct tenth in the correc	ted for ha calculated e Shear S le	d hammer Strength (p	efficiency	WO = BOF SSA	R = weight of rods not recorded REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger	-#200 = percent fines WC = water conter CONSOL= 1-D consolidation test	city Index
				Sample In	formation								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
0								SSA		\bowtie			
									1	₩			
											1D: Brown moist loose	, fine to coarse SAND, some Silt, little	
	1D	24/3	2.0 - 4.0	4-4-	-6-18	10	15				Gravel; appears reworke		
								\ /		\bowtie			
	20	04/46	40.00	40.42	140.40	25	20	20	59.0	***		. — — — — — — — — — — —4.0- ., m. dense, fine to coarse SAND, trace	
- 5 -	2D	24/16	4.0 - 6.0	10-13	3-12-12	25	38	28				opears undisturbed. CLEAN SANDS	
								46					
								53	1				
								50					
								57					
	3D	24/6	9.0 - 11.0	3-4	l-3-4	7	11	18			3D: Tan brown, loose, fii trace Silt.	nd to coarse SAND, little fine Gravel,	
- 10 -								25					
								44					
								81					
								101	50.0			13.0-	
	4D	24/9	14.0 - 16.0	2-1	-3-5	4	6	35			4D: Grey, v. loose, fine t fine Gravel. MARINE SII	o medium SAND, little to some Silt, trace	
- 15 -								36			IIIIe Glavei. MARINE SII	LIT FINE SANDS	
								83					
								65	45.5				
								82	•				
	5D	24/24	19.0 - 21.0	1-1-	1/12"	2	3		•			edded, Silty CLAY, trace very fine Sand; FERBEDDED MARINE FINE SANDS	
- 20 -											AND SILT		
									42.0	· جدرت	Bottom of Exploration No refusal.	21.0- n at 21.0 feet below ground surface.	
									1				
25 Pom	arks:						<u> </u>						
		s represen	t approximate bou	ndaries betw	een soil types;	transition	ns may be	e gradual.				Page 1 of 1	
* Wate	er level readent at the t	dings have ime measu	been made at tim urements were made	es and unde de.	r conditions sta	ted. Gro	oundwate	r fluctuation	ons may o	ccur du	e to conditions other than those	Boring No.: HB-PAMI-1	104

			SCHONEWALE Engineering		PROJE	CT:						Boring No.: HB-PAMI-	
		==	Associates, I		LOCAT	ON:					3.7 to 49.3 nd. ME	Proj. No.: 18-017	7
Drille	er:	l	New England	Boring Co			vation		58 ft (Core Barrel: n/a	
Oper	ator:	l	Enos/ Share			Da	tum:		NAVD	88		Sampler: standard split-spoo	n
	jed By:		Schonewald			+	Type:				` '	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/12/18; 095			+-	lling M					Hammer Type: calibrated auto-hamm	er
Borir	ng Loca	tion:	Sta 2236+45, 95	RT (approx	()	+	sing ID			4") to 1		Hammer Efficiency: 0.906	
IN-SIT	U SAMPLI	ING AND T	ESTING:		ADDITIONAL I		ger ID/	OD:	SSA		IONAL DEFINITIONS:	Water Level*: 9 ft (open) LABORATORY TEST RESULTS:	
D = Spi MD = U U = Thi MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Spo be Sample ful Thin Wa shear Test	oon Sample attem Il Tube Sample at	pt tempt <u>empt</u>	N-uncorrecte N ₆₀ = N valu hammer effic S _U = Insitu Fi R = Rock Correct RQD = Rock	d = N va e correct iency = eld Van re Samp	alue sted for ha calculated e Shear S ale	d hammer Strength (p	efficiency	WOF WOF = r BOR SSA	I = weight of 140lb. hammer = weight of rods ot recorded EHOLE ADVANCEMENT METHOD HSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water content CONSOL= 1-D consolidation test	city Index
		·		•	formation		1	1	l	.			
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log	Visual Des	cription and Remarks	Lab. Testing Results
0								S\$A		\bowtie			
										₩			
	1D	24/24	2.0 - 4.0	2-4	l-7-8	11	17					slightly desiccated, stiff, Clayey SILT, ars disturbed. SILT-CLAY FILL	
- 5 -	2D	24/24	4.0 - 6.0	4-7	7-8-9	15	23		54.0		2D: Olive brown, slightly m fine Sand. MARINE SILT-C		
								\bigvee	50.0		3D: Dark grov CLAV & SII		
10	3D	24/24	9.0 - 11.0	WO	H/24"			PUSH			fine Sand. MARINE SILT-C	LT grading to Silty CLAY, trace very CLAY	
- 10 -								38					
								30					
	MU 4D	24/11	13.0 - 15.0	4-4	I-7-3	3"dia		29	45.0		MU: Attempt tube sample a	at 13.0 ft; piston sampler not extend;	
			10.0 10.0			3 414		31			4D: Grey, Silty GRAVEL, s		
- 15 -	5D	24/16	15.0 - 17.0	WOH	I-4-3-3	7	11	24			Grey, Silty fine to coarse S at 16.4 ft to:	SAND, little to some Gravel. Changing	
								33			5D: Brown, fine to medium Sand.	SAND, trace to little Silt, trace coarse	
								41			Guriu.		
								55			6D: Grey. m. dense. Silty fi	ine to medium SAND, some Gravel,	
- 20 -	6D	24/16	19.0 - 21.0	8-7-	-7-11	14	21				trace coarse Sand.		
									37.0		Bottom of Exploration a No refusal.	21.0- at 21.0 feet below ground surface.	
25 Rem	arks:								<u> </u>				
Stratifi	cation line	s represent	approximate bou	ndaries betw	een soil types; t	ransitio	ns may be	e gradual.				Page 1 of 1	
* Wate prese	er level rea ent at the t	dings have ime measu	been made at tim rements were ma	es and unde de.	r conditions stat	ted. Gro	oundwate	r fluctuatio	ons may o	ccur due	to conditions other than those	Boring No.: HB-PAMI-	105

			Schonewale)	DDO II	ECT.	Dort	and A	roo M	oinlin	e Improvements	Boring No.:	HB-PAMI-	-106
			Engineering		PROJ	LCI.					3.7 to 49.3	Proj. No.:	18-017	
			Associates, I	NC.	LOCAT	ION:						F10J. No	10-017	
Drille	er:		New England	Boring Co	ntractors	Ele	evation	(ft.)	61 ft	(est'd)		Core Barrel: n/a		
Oper	ator:		Enos/ Share			Da	tum:		NAVI	88		Sampler: stand	dard split-spoo	on
Logg	ged By:		Schonewald			Rig	g Type:		Mob	le Drill	B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lb	s/30 inches	
Date	Start/Fi	nish:	12/12/18; 121	0-1335		Dri	illing M	ethod:	case	d wash	n boring	Hammer Type: calibra	ated auto-hamm	ier
Borii	ng Loca	tion:	Sta 2243+05, 65	RT (approx	:)	Ca	sing ID	/OD:	HW	(4") to	14 ft	Hammer Efficiency: 0.90	16	
							ger ID/	OD:	SSA	to 9 ft			observed abo	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Spot Sample ful Thin Withear Test	'all Tube Sample at 'ane Shear Test at	npt ttempt tempt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _U = Insitu F R = Rock Co	ed = N va ue correct ciency = field Van ore Samp	alue cted for ha calculate e Shear S ble	d hammer Strength (p	efficienc	WOI WOI y = 1 BOF SSA	ITIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH I/HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LABORATORY TEST RESUL AASHTO / USCS soil class -#200 = percent fines V CONSOL= 1-D consolidatio IODS: UU=Unconsolidated undrai LL=Liquid Limit / PL=Plastiic push UCT qp = peak compressiv	sifications VC = water conter on test ined triaxial test c Limit / PI=Plastio	city Index
					formation		1	1		+				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strengtn (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks		Lab. Testing Results
0								SSA		\bowtie				
											1D: Olive brown, mottle	d, desiccated, v. stiff, Clayer	V SILT trace	
	1D	24/24	2.0 - 4.0	4-6-1	11-13	17	26			\bowtie	fine Sand; appears rewo		, OILT, trace	
	ap.	24/24	40.00	5.0	0.40	45	22		1			mottled, stiff, Clayey SILT,	trace fine	
- 5 -	2D	24/24	4.0 - 6.0	5-0-	9-10	15	23			\bowtie	Sand; appears possibly	reworked.		
													0.0	
									55.0				— — 6.0-	
									1					
								$ \cdot / \cdot $						
	3D	24/24	9.0 - 11.0	3.4	-5-6	9	14	PUSH			3D: Olive grey, stiff, CLA	AY & SILT. MARINE SILT-CI	_AY CRUST	CL -#200=99%
- 10 -	30	24/24	9.0 - 11.0	3-4	-5-0		14	F 0311						WC=31%
														LL=48 PL=21
														<u>PI=27</u>
									10,	.///			40.5	
									48.5				— — —12.5-	
	MV										14.8 ft: Unable to nush v	vane helow 14 8 feet		
	4D	24/24	14.0 - 16.0	(/12")-\	NOH/12"			OPEN	1		4D: Dark grey with occa	sional black, v. soft, Silty CL	AY, with one	
- 15 -									-		Slity fine to medium Sar	nd seam. MARINE SILT-CLA	.Υ	
								V						
	5D V1	24/24	19.0 - 21.0 19.6 - 20.0	VANE IN	ITERVAL						5D: Dark grey, Silty CLA Sandy SILT seams.	AY, trace very fine Sand with	two fine	CL A-6(21)
- 20 -	V2		20.6 - 21.0		6/137 psf 1/137 psf						V1: Tu=37 / Tr=5 ft-lbs (65 mm x 130 mm vane)		-#200=97% WC=36%
	VZ		20.0 - 21.0	3u-920	7137 psi				-			s (65 mm x 130 mm vane)		LL=40 PL=19
											21.0 ft: Hydraulically pus	sii rou probe.		PI=21
									-		00.0 % 0 1			
											23.3 ft: Sand seams not	ea.	04.0	
25									36.8	,	Bottom of Exploratio	n at 24.2 feet below ground	24.2- d surface.	
	arks:		ı	1						1	<u>. </u>			I
Chrotifi	action line		at an accimulate hou	adarias bahwa		tronoitio	no movi h	o gradual				Page 1 of 2		
			nt approximate bou				-	-				Page 1 of 2		
* Wate prese	er level rea	dings hav	e been made at tim urements were ma	nes and under ide.	conditions sta	ated. Gro	oundwate	er fluctuation	ons may	occur due	e to conditions other than those	Boring No.: ⊢	IB-PAMI-1	106

			Schonewald Engineering				Main	e Turr	npike N	/M 4	ne Improvements 13.7 to 49.3	Boring No.: HB-PAMI- Proj. No.: 18-017	_
			Associates, I		LOCATION								
Drille			New England	Boring Co	ntractors	_	vation	(ft.)	61 ft (_		Core Barrel: n/a	
Ŀ	rator:		Enos/ Share			+	um:		NAVD8		D 50 / 11 / 1 ATIV	Sampler: standard split-spoo	on
	ged By:		Schonewald			_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/12/18; 1210			-	ling Me				n boring	Hammer Type: calibrated auto-hamm	ner
Bori	ng Locat	tion:	Sta 2243+05, 65	RT (approx	()	 	ing ID		HW (4			Hammer Efficiency: 0.906	
IN CIT	U SAMPLI	NC AND	TECTING.		ADDITIONAL D		ger ID/O	DD:	SSA to		TIONAL DEFINITIONS:	Water Level*: none observed about LABORATORY TEST RESULTS:	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	olit Spoon S Unsuccessf iin Wall Tub Unsuccessf situ Vane Sl	Sample ful Split Sp pe Sample ful Thin W hear Test	ooon Sample attem all Tube Sample at ane Shear Test att	tempt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fiel R = Rock Core RQD = Rock C	= N val correct ncy = c d Vane Sampl	ue ed for ha alculated Shear S e	hammer trength (p	efficiency	WOF WOF = r BOR SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte CONSOL= 1-D consolidation test	city Index
					formation	1							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log		escription and Remarks	Lab. Testing Results
25											24.2 ft: Rod probe fetche Marine Silt-Clay; bottom	es up; stands rig; inferred bottom of of boring; no refusal.	
- 30 -													
- 35 -													
- 40 -													
- 45 - 50													
Stratifi	er level read	dings have	it approximate bou e been made at tim urements were ma	nes and unde			-	-	ons may oc	cur due	e to conditions other than those	Page 2 of 2 Boring No.: HB-PAMI-	106

			CHONEWALE		PROJ	JECT:					e Improvements 3.7 to 49.3	Boring No.: _		
		==	Associates, I		LOCA	TION:					and, ME	Proj. No.:	18-017	<u>/</u>
Drille	r:	ا	New England	Boring Co	ntractors	Ele	vation	(ft.)	63 ft	(est'd)		Core Barrel:	n/a	
Oper	ator:	[Enos/ Share			Da	tum:		NAVE	88		Sampler:	standard split-spoo	on
	ed By:		Schonewald			-	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		12/13/18; 093		,	_		ethod:			boring	Hammer Type:	calibrated auto-hamm	ner
Borir	ng Loca	tion:	Sta 2256+35, 90	RI (approx	()	_	sing ID ger ID/			4") to 9 to 9 ft	Σ π	Hammer Efficienc Water Level*:	y: 0.906 none observed ab	ovo O ft
		NG AND TI	ESTING:		ADDITIONA	L DEFINIT	IONS:	OD.	334		TIONAL DEFINITIONS:	LABORATORY TEST	RESULTS:	ove a ii
MD = U U = Thi MU = U V = Insi	n Wall Tub Insuccessi itu Vane S	ful Split Spo be Sample ful Thin Wal hear Test	oon Sample attem Il Tube Sample at ne Shear Test att	tempt	N-uncorrect N ₆₀ = N va hammer eff S _u = Insitu R = Rock C RQD = Roc	alue correct ficiency = Field Van Core Samp	ted for ha calculated e Shear S le	d hammer Strength (p	efficiency	WOF = 1 BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / Pl	es WC = water conte solidation test d undrained triaxial test =Plastic Limit / PI=Plasti	icity Index
		_		•	formation	1	1			-				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarl	KS	Lab. Testing Results
0								S\$A						
ŀ										\bowtie				
											1D: Olive brown, mottled	d, desiccated, stiff, Cla	vev SILT, trace	
	1D	24/24	2.0 - 4.0	2-4	l-6-6	10	15			\bowtie	fine Sand; appears rew	orked. SILT-CLAY FIL	Ĺ	
										\bowtie				
	2D	24/24	4.0 - 6.0	4-5	5-8-9	13	20		59.0		2D: Olive brown, slightly			
- 5 -											SILT & CLAY; appears to CRUST	undisturbed. MARINE	SILT-CLAY	
									1					
								 \ 						
								L V			3D: Olive brown, m. stiff	SILT & CLAV with or	casional seams	
10	3D	24/24	9.0 - 11.0	2-4	-3-5	7	11	OPEN			fine Sand, grading to CL		casional scams	
- 10 -									1					
									52.0	11/10			- — — —11.0-	
	4D	24/24	14.0 - 16.0	WO	H/24"	<u> </u>					4D: Dark grey, v. soft, S	Silty CLAY. MARINE S	ILT-CLAY	
- 15 -	40	24/24	14.0 - 16.0	WOI	H/24									
-														
								 						
								\square						
	5D V1	24/24	19.0 - 21.0 19.6 - 20.0	VANE IN	NTERVAL 9/ 69 psf						5D: Dark grey with occa Sand.	sional black, Silty CLA	Y, trace very fine	CL -#200=97%
- 20 -	V2		20.6 - 21.0		7/ 27 psf						V1: Tu=20 / Tr=2.5 ft-lbs	s (65 mm x 130 mm va	ne)	WC=39% LL=37
	V2		20.0 - 21.0		17 21 poi						V2: Tu=17 / Tr=1 ft-lbs (21.0 ft: Hydraulically pus		e)	PL=18 PI=19
											21.0 It. Hydraulically pus	sirrou probe.		
•														
-											04.0 % 0			
25											24.2 ft: Sand seams not	ea.		
Rema	arks:													
Stratific	cation lines	s represent	approximate bou	ndaries betwe	een soil types	s; transitio	ns may b	e gradual.				Page 1 of 2		

			SCHONEWALD		PROJE	CT:					ne Improvements	Boring No.: HB-PAMI-	_
			Associates, It		LOCATION	ON:					13.7 to 49.3 and. ME	Proj. No.: 18-017	7
Drille	er:		New England	Boring Co			vation		63 ft (Core Barrel: n/a	
Oper	ator:		Enos/ Share			Dat	tum:		NAVD8	38		Sampler: standard split-spoo	on
Logg	jed By:		Schonewald			Rig	туре:		Mobile	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
Date	Start/Fi	nish:	12/13/18; 0930	0-1055		Dri	lling M	ethod:	cased	wash	n boring	Hammer Type: calibrated auto-hamm	ner
Boriı	ng Locat	tion:	Sta 2256+35, 90	RT (approx	()	Cas	sing ID	OD:	HW (4	1") to 9	9 ft	Hammer Efficiency: 0.906	
						Aug	ger ID/0	DD:	SSA t	o 9 ft		Water Level*: none observed abo	ove 9 ft
	U SAMPLII lit Spoon S		TESTING:		ADDITIONAL D N-uncorrected						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
MD = L	Jnsuccessf	ful Split Sp	ooon Sample attem	pt	N ₆₀ = N value	correct	ted for ha			WOI	R = weight of rods	-#200 = percent fines WC = water content CONSOL= 1-D consolidation test	nt (%)
MU = U		ful Thin W	all Tube Sample at	tempt	hammer efficie S _u = Insitu Fie	ld Vane	e Shear S			BOF	not recorded REHOLE ADVANCEMENT METH	IODS: UU=Unconsolidated undrained triaxial test	
	itu Vane SI Insuccessf		ane Shear Test att	empt	R = Rock Core RQD = Rock C	Samp Quality [le Designation	on (%)		SSA RC=	NHSA=solid/hollow stem auger <u>-roller cone/OPEN/PUSH=hydraul</u>	LL=Liquid Limit / PL=Plastic Limit / PI=Plasti lic push UCT qp = peak compressive strength of rock	city Index
				Sample In	formation								
		(in.)	pt f	<u> </u>		ted							Lab.
ft.)	Sample No.))	De	/6 ir	_ (%)	N-uncorrected			LC	Graphic Log	Visual D	escription and Remarks	Testing
Depth (ft.)	nple	Pen./Rec.	l pldu	ws (angti	ncol		ing ws	/atio	phic			Results
Dep	San	Per	Sample Depth (ft.)	She	Strength (psf) or RQD (%)	N	N-60	Casing Blows	Elevation (ft.)	Gra			
25										M			
									37.3	رمدري	Bottom of Exploration	25.7- n at 25.7 feet below ground surface.	
											25.7 ft: Rod probe fetche	es up; stands rig; inferred bottom of	
											Marine Silt-Clay; bottom	i oi boilig, no reiusal.	
- 30 -													
0.5													
- 35 -													
- 40 -													
- 45 -													
					+								
50													
Rem	arks:		1		I						1		
Ct	natio = "		at anner de la 1	ndori' '	oon oell to	onc:4.		are di 1				Page 2 of 2	
		-	nt approximate bour				-	_			4	Page 2 of 2	
Wate	er level read ent at the ti	aings havi ime meas	e been made at tim urements were mad	es and unde de.	r conditions state	d. Gro	oundwater	fluctuation	ns may o	ccur due	e to conditions other than those	Boring No.: HB-PAMI-	107

			Schonewale Engineering				Main	еΤι	ırnp	oike N	ЛМ 4	e Improvements 3.7 to 49.3	Boring No.: <u>HB-PAMI-</u> Proj. No. : 18-017	
D.::!!			Associates, I		LOCATI	$\overline{}$			ougl			nd, ME	Corre Borresto	_
Drille			New England	Boring Co	ntractors	+	vation	(π.)		58 ft (_		Core Barrel: n/a	
·	ator:		Enos/ Share			+	tum:			NAVD		D. F.O. (. I	Sampler: standard split-spoo	on
	ed By:		Schonewald	- 1010		+	Type:					B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
_	Start/Fi		12/13/18; 113			+-	lling M		d:			boring	Hammer Type: calibrated auto-hamm	er
Borii	ng Loca	tion:	Sta 2266+25, 65	RT (approx	()	Ca	sing ID	/OD:		HW (4	1") to 9	ft	Hammer Efficiency: 0.906	
							ger ID/	OD:		SSA t			Water Level*: none observed abo	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	in Wall Tub Insuccessl itu Vane S	Sample ful Split Sp pe Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample at ane Shear Test att	tempt empt	N-uncorrected N-uncorrected N60 = N value hammer effici Su = Insitu Fic R = Rock Cor RQD = Rock	d = N va e correct ency = o eld Vano e Samp	alue sted for ha calculated e Shear S ale	d hamn Strengti	ner ef h (psf	ficiency	WOF WOF = r BOR SSA	IONAL DEFINITIONS: I = weight of 140lb. hammer = weight of rods tot recorded EHOLE ADVANCEMENT METH HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraul	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications #200 = percent fines WC = water conter CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plasti lic push UCT qp = peak compressive strength of rock	city Index
		_		•	formation									
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strengtn (psf) or RQD (%)	N-uncorrected	N-60	Casing	Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
0								S\$/	A		⋘			
	1D	24/24	2.0 - 4.0	5-6	-8-9	14	21					1D: Olive brown grey, m with rust fine Sand at bo	nottled, desiccated, stiff, SILT-CLAY FILL stitom of sample.	
- 5 -	2D	24/24	4.0 - 6.0	4-6	-8-8	14	21			54.0		SILT & CLAY; appears to	· · · · · · · · · · · · · · · · · · ·	
- 10 -	3D	24/24	9.0 - 11.0	2.3	-3-5	6	9	OPE		45.5		CRUST 3D: Olive grey, slightly n 4-inch seam grey Silty fi	nottled, m. stiff, CLAY & SILT with one 1/ine SAND.	
- 15 -	4D V1	24/24	14.0 - 16.0 14.6 - 15.0	VANE IN Su= 659	ITERVAL // 110 psf							4D: Dark grey, Silty CLA V1: Tu=24 / Tr=4 ft-lbs (AY, trace very fine Sand.	
'3	V2		15.6 - 16.0	Su= 59	1/ 82 psf							VO: T::=04.5 / T - 0.5 "	(05 100	
									-			V2. Tu=21.57 TI=3 II-IDS	s (65 mm x 130 mm vane)	
		04/04	10.0.01.0	1/45/5 **	ITED\/^1				\dashv			5D: Dark grey, Silty CLA	AY with nodules throughout.	
- 20 -	5D V3	24/24	19.0 - 21.0 19.6 - 20.0	VANE IN Su= 41	ITERVAL 2/ 41 psf				_			V3: Tu=15 / Tr=1.5 ft-lbs	s (65 mm x 130 mm vane)	
	V4		20.6 - 21.0	Su= 57	7/ 55 psf							\/4: Tu=21 / Tr=2 ft lbo /	GE mm v 130 mm vana)	
									37.0	<i>2.3 2%</i>	V4: Tu=21 / Tr=2 ft-lbs (Bottom of Exploration No refusal.	21.0- n at 21.0 feet below ground surface.		
25 Pom	arke:													
Stratifi	er level rea	dings have	t approximate boul	es and unde			-	-		s may o	ccur due	to conditions other than those	Page 1 of 1 Boring No.: HB-PAMI-1	108

			2											I		100
			SCHONEWALE		PI	ROJE	CT:						e Improvements	Boring No.:	HB-PAMI-	-109
			Engineering		l								13.7 to 49.3	Proj. No.:	18-017	7
			Associates, I		_								and, ME			
Drille	er:		New England	Boring Co	ntract	ors	Ele	vation	(ft.)	5-	4 ft	(est'd)		Core Barrel:	NQ2	
Oper	ator:		Enos/ Share				Da	tum:		N	AVD	88		Sampler:	standard split-spoo	on
Logg	jed By:		Schonewald				Rig	Type:		N	lobil	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall	: 140 lbs/30 inches	
Date	Start/Fi	inish:	1/9/19; 0930-1	125			Dri	Iling M	ethod	d: c	ased	d wash	n boring	Hammer Type:	calibrated auto-hamm	ner
Bori	ng Loca	tion:	Sta 2270+90, 95	LT (approx	()		Ca	sing ID	/OD:	Н	W (4") to	9 ft; NW (3") to 13.5 ft	Hammer Efficien	cy: 0.906	
							Au	ger ID/	OD:	S	SA	to 9 ft		Water Level*:	none observed abo	ove 9 ft
	U SAMPL		TESTING:			ONAL D							TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TES	T RESULTS: soil classifications	
MD = U U = Th	Insuccess in Wall Tul	ful Split S be Sample	poon Sample attem e Vall Tube Sample at		N ₆₀ : hamr	N value er efficie Insitu Fie	correc	ted for ha	d hamn	ner effic		WO	n – weight of 140b. Hamilier R = weight of rods not recorded REHOLE ADVANCEMENT METH	-#200 = percent f CONSOL= 1-D or	ines WC = water conter	nt (%)
V = Ins	itu Vane S	Shear Test	t '		R = F	lock Core	Samp	ole		i (psi)		SSA	/HSA=solid/hollow stem auger	LL=Liquid Limit /	PL=Plastic Limit / PI=Plasti	icity Index
MV = C	Insuccess	tui insitu \	/ane Shear Test att	empt Sample Ir		= Rock C	Quality	Designat	ion (%)			RC=	roller cone/OPEN/PUSH=hydraul	iic push UCT qp = peak c	mpressive strength of rock	<u>K</u>
		·		•			ъ					1				
	<u>.</u> 0	. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	(6	N-uncorrected					go.	.,,			_Lab.
Depth (ft.)	Sample No.	Pen./Rec.	e l	9/) :	£ å	ב	OTTE		_ Б	. ig	(ft.)	Graphic Log	Visual D	escription and Rema	rks	Testing Results
epth	mr	l "	l m	ows	eng St. Cr	2	un C	09-N	Casing	% % 6 %	_	aph				
	Sa	a a	SS €	<u></u>	क्षे हैं	5	ż	ż	ပြီး		₩.	ট				
0									SSA	۸		\bowtie				
										-		\bowtie				
												\bowtie				
												\bowtie				
										-		\bowtie				
												\bowtie				
	1D	24/24	4.0 - 6.0	3-5	5-7-8		12	18				\bowtie	1D: Olive brown, mottled			
- 5 -									Н	⊣ ∠	49.0	$\gg \sim$	fine Sand; appears rewo		5.0 -	
													1D (cont'd): Olive brown Sand; possibly undisturb			
													Sand, possibly undistant	Ded. WARINE SILT-C	LAT CROST	
										_						
										/						
									LΥ	4			2D: Olive grey, m. stiff, (CLAV & SILT trace f	ing Sand with four	CL
	2D	24/24	9.0 - 11.0	WOH	1-2-3-2		5	8	OPE	N.			seams of fine Sandy SIL	LT.	The Sand With Iour	A-6(21)
- 10 -																-#200=98% WC=31%
										_			1			LL=39 PL=19
																PI=21
									$\vdash \downarrow$	4,	10.8				13.2-	
	R1	60/60	13.5 - 18.5	RQD: 4	19" = 82%	6					+0.0		13.2 ft: Roller cone grind	ding; able to penetrat	e to 13.5 ft.	
													R1: Hard, fresh, aphanit highly undulating remna	tic to fine grained, gre	ey PHYLLITE with	
- 15 -													veins. Moderately space	ed, low angle and mo	derately dipping	
													breaks; undulating, roug		d open; shiny. Core	
													times: 2:40/ 3:00/ 3:35/ GOOD ROCK QUALITY			
										_						
										Π,	35.5				18.5-	
										╣`	55.5		Bottom of Exploratio	n at 18.5 feet below		
- 20 -																
										4						
										1						
										1						
25																
Rem	arks:															
Loc	ated app	oroxima	tely 180 ft SB o	f inlet end	l of Lo	ng Cree	ek cul	vert; in	vert in	eleva	ition	appro	eximately 38 to 40 ft.			
												•				
L																
Stratifi	cation line	s represe	nt approximate bou	ndaries betw	een soi	types; tra	ansitio	ns may b	e gradu	ıal.				Page 1 of 1		
* Wate	r level rea	dings hav	e been made at tim	es and unde	er condit	ions state	ed. Gro	oundwate	r fluctu	ations n	nay o	ccur du	e to conditions other than those	Boring N	O LID DAMI	100
pres	ent at the t	time meas	surements were ma	ae.										DUTTING N	o.: HB-PAMI- ²	108

			C		1							I D. J. M. LID DAMI	400D
			SCHONEWALD		PROJ	ECT:					ne Improvements	Boring No.: HB-PAMI	
			Associates, I			FIONI.					43.7 to 49.3	Proj. No.: 18-01	17
Drille			New England				evation		_	(est'd)	and, ME	Core Barrel: NQ2	
—			Enos/ Share	Borning Co	TILIACIOIS	-	atum:	(11.)	NAV	•)		000
Oper			Schonewald			_	g Type:				I B-53 (rubber track ATV)	Sampler: standard split-sp Hammer Wt./Fall: 140 lbs/30 inches	JUI1
	ed By: Start/Fi	nioh	1/15/19; 1020-	1210		-	rilling M				h boring	Hammer Type: calibrated auto-ham	mor
	ng Loca		Sta 2272+90, 55		۸	-	asing IC					Hammer Efficiency: 0.906	IIICI
BOIII	ig Loca	tion.	3ta 2272+90, 55	ст (арргох	.)	-	uger ID/			to 9 ft	14 ft; NW(3") to 20.5 ft	Water Levei*: 11.5 (end, open)	
IN-SIT	U SAMPL	ING AND	TESTING:		ADDITIONAL			ОВ.	007		ITIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	
MD = U U = Th MU = U V = Ins	in Wall Tul Insuccess itu Vane S	ful Split S be Sample ful Thin W shear Test	Vall Tube Sample at t Vane Shear Test att	tempt	N-uncorrect N ₆₀ = N val hammer eff S _u = Insitu I R = Rock C RQD = Roc	ue corre iciency = Field Var ore Sam k Quality	cted for had calculate ne Shear sple	d hammer Strength (p	efficienc	WC y = BO SSA	IH = weight of 140lb. hammer IR = weight of rods not recorded REHOLE ADVANCEMENT METH A/HSA=solid/hollow stem auger =roller cone/OPEN/PUSH=hydraul T	AASHTO / USCS soil classifications #200 = percent fines WC = water con CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial tes LL=Liquid Limit / PL=Plastic Limit / PI=Pla lic push UCT qp = peak compressive strength of re	t sticity Index
		·					1			1			
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
0								SSA			8 inches HMA		
								-	53.			0.	/1
	1D	24/14	2.0 - 4.0	17-17	7-15-14	32	48				\$	nse, fine to coarse SAND, some fine t. GRANULAR FILL	
- 5 -	2D	24/11	4.0 - 6.0	19-43	3-41-40	84	127				2D: Grey brown, dry, v. some fine Gravel. 5 ft: Boney based on dri	dense, fine to coarse SAND, some Silt, lling behavior.	
									46.		8 ft: SILT-CLAY on auge	- — — — — — — — — — — — — — — — — — — —	0-
								+V		\bowtie	9 -	to moist, loose, mix of Silty fine to	CL
- 10 -	3D	24/18	9.0 - 11.0	2-3	3-2-3	5	8	47				SILT, little to some fine Sand; and fine	A-4(7) -#200=88% WC=24%
								43					LL=26 PL=16 PI=10
								45					
								58					
45	4D	24/11	14.0 - 16.0	1-2	2-1-3	3	5	OPEN			4D: Olive brown grey, so coarse Sand, little fine G	oft, SILT & CLAY, little to some fine to Gravel. FILL	
- 15 -													
									37.	, <u>XX</u>			0-
											17 ft: Possible transition		
											5D: Grey with rust staini	ing, Silty GRAVEL, some fine to coarse	
- 20 -	5D	8/5	19.0 - 19.7		60/2"						Sand; TILL with weather	red rock.	_
	R1	60/57	20.5 - 25.5	RQD: 4	5" = 75%				33.		PHYLLITE with highly u occasional calcsilicate v angle and moderately di	, aphanitic to fine grained, grey ndulating remnant bedding and eins. Close to moderately spaced, low ipping breaks; undulating, rough, typicall	
												Open fracture zone from 23.6 to 23.9 ft. 3:00/ 3:05/ 2:45 min:sec/ft. QUALITY	
25													
25 Rem	arks:		1	I			1			וואוו	- A		
			ulder, approxima	-					n eleva	tion ap	oproximately 38 to 40 ft.	Page 1 of 2	
١.							-	-	one mov	occur d.	ie to conditions other than these		
pres	ent at the t	ungs nav ime meas	ve been made at tim surements were ma	ies and unde de.	i conditions st	atett. Gi	ounawate	ii iiuctuatii	ліѕ тау	occur ar	e to conditions other than those	Boring No.: HB-PAMI	-109B

		=	Schonewale		PROJE	CT:					ne Improvements Boring No.: HB-PAMI-1	09B
			Engineering Associates, ^I		LOCATION	ON:					43.7 to 49.3 Proj. No.: 18-017	,
Drille	er:		New England	Boring Co			vation		54 ft (
Oper	ator:		Enos/ Share			Dat	tum:		NAVD8	88	Sampler: standard split-spoo	n
Logg	ed By:		Schonewald			Rig	Type:		Mobile	Drill	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
Date	Start/Fi	nish:	1/15/19; 1020	-1310		Dri	lling Me	ethod:	cased	wash	h boring Hammer Type: calibrated auto-hamme	er
Borii	ng Locat		Sta 2272+90, 55)	Cas	sing ID/	OD:	HW(4'	') to 1	4 ft; NW(3") to 20.5 ft Hammer Efficiency: 0.906	
						+	ger ID/0		SSA to	_		
	U SAMPLII		TESTING:		ADDITIONAL D	EFINIT	IONS:				TIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
	lit Spoon Sa Insuccessfi		oon Sample attem	npt	N-uncorrected N ₆₀ = N value			mmer effic	ciency		H = weight of 140lb. hammer AASHTO / USCS soil classifications R = weight of rods #200 = percent fines WC = water conten	t (%)
	in Wall Tub		all Tube Sample at	ttemnt	hammer efficie S _{II} = Insitu Fie						not recorded CONSOL= 1-D consolidation test REHOLE ADVANCEMENT METHODS: UU=Unconsolidated undrained triaxial test	
V = Ins	itu Vane Sh	hear Test	•		R = Rock Core	Samp	le		31)	SSA	VHSA=solid/hollow stem auger LL=Liquid Limit / PL=Plastic Limit / Pl=Plastic	ity Index
IVIV = C	insuccessii	ui insitu v	ane Shear Test att		RQD = Rock C	<u>quality t</u>	Designation	on (%)		RC=	eroller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of rock	
		<u>.</u>				ō						
(9	:. (in.)	Sample Depth (ft.)	ï	Strength (psf) or RQD (%)	N-uncorrected			_	o-	Vigual Description and Remarks	Lab.
ι (ff.	Je Z	Rec] e	9) [gt G	COLLE		و «	ıtior	je L	Visual Description and Remarks	Testing Results
Depth (ft.)	Sample No.	Pen./Rec.	amp (:	lows	st) St)	μη	N-60	Casing Blows	Elevation (ft.)	Graphic Log		
25	Ø	ď	Ω €	<u> </u>	<u>v e e</u>	Ż	Ż	OB	Шŧ	() (//)X(/		
23									28.5		25.5	
											Bottom of Exploration at 25.5 feet below ground surface.	
30												
- 30 -												
30												
- 35 -												
- 40 -												
- 45 -												
					+							
50												
	arks:											
Loc	ated in S	B shou	lder, approxima	ately 20 ft	NB of Long C	reek	culvert;	invert ir	n elevati	on ap	proximately 38 to 40 ft.	
											T 2 2 2 2	
Stratifi	cation lines	s represer	t approximate bou	ndaries betw	een soil types; tra	ansitior	ns may be	gradual.			Page 2 of 2	
* Wate pres	r level read ent at the ti	dings have ime meas	e been made at tim urements were ma	nes and unde ide.	r conditions state	d. Gro	oundwater	fluctuatio	ns may oc	cur du	e to conditions other than those Boring No.: HB-PAMI-1	09B

													1 =		
			SCHONEWALE		PRO	JEC.						e Improvements	Boring No.:	HB-PAMI	-110
			Engineering									13.7 to 49.3	Proj. No.:	18-017	7
			Associates, I			TIQ	N: Sca	rbor	oug	gh to I	ortla	and, ME	-		
Drille	er:		New England	Boring Co	ontractors		Elevatio	າ (ft.)		45 ft	(est'd)		Core Barrel:	NQ2	
Oper	ator:		Enos/ Share				Datum:			NAVD	88		Sampler:	standard split-spoo	on
Logg	jed By:		Schonewald				Rig Type	:		Mobil	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/Fi	inish:	12/13/18; 1340	0- 12/14/1	8; 1035		Drilling N	/letho	od:	case	d wash	n boring	Hammer Type:	calibrated auto-hamm	ner
Borii	ng Loca	tion:	Sta 2272+95, 75	RT (approx	x)		Casing II	D/OD	:	HW(4	") to 1	4 ft; NW(3") to 14 ft	Hammer Efficience	cv: 0.906	
					,	-	Auger ID				to 9 ft	, , ,	Water Level*:	none observed abo	ove 9 ft
			TESTING:		ADDITION	AL DEF	INITIONS:				ADDI	TIONAL DEFINITIONS:	LABORATORY TEST	RESULTS:	
MD = l U = Th MU = l	in Wall Tul Insuccess	ful Split Sp be Sample	all Tube Sample at	•	hammer e	alue co efficienc u Field \	rrected for h y = calculate Vane Shear	ed ham	nmer	efficiency	WO = BO F	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger	CONSOL= 1-D co IODS: UU=Unconsolidate	nes WC = water conte	
			ane Shear Test att		RQD = R	ock Qua	lity Designa	ition (%	6)			roller cone/OPEN/PUSH=hydraul			
		_		Sample Ir			1	-			-				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	slows (/6 in.) shear	Strength (psf) or RQD (%)	Catcanocal	09-N	Casing	slows	Elevation (ft.)	Graphic Log	Visual D	escription and Remar	rks	Lab. Testing Results
0	0)	<u> </u>	00 €	шо	<i>w & o</i>		+-	SS		ш€					
											\bowtie				
											\bowtie				
	1D	24/7	2.0 - 4.0	5-4	4-3-3	7	11				\bowtie	1D: Brown, loose MISC and root mat, and silty g		ed gravei, topsoii	
											\bowtie		,		
										41.0	\bowtie				
	2D	24/18	4.0 - 6.0	WOH/	/12"-1-1	1	2					2D: Brown, v. loose, fine		to grey at bottom	
- 5 -												of sample. MARINE SIL	IY FINE SANDS		
									١, ١						
								TT	71						
								+	\Box			3D: Grey, v. loose, SILT	some fine Sand		CL
- 10 -	3D	24/21	9.0 - 11.0	WOR-V	WOH/18"	-		1	4			ob. Grey, v. 18888, GIET	, come inte cana.		A-4(5) -#200=77%
								2	0						WC=30% LL=28 PL=19
								2	1						<u>PI=9</u>
								50 R	/6"	32.5	(/X			— — — —12.5 ⁻	
								⊢R	c			12.5 ft: Casing refusal; a	able to roller cone to 1	4.0 ft with effort.	
												54.11.1.6.1.1.11		. 5.04.1.	
	R1	60/60	14.0 - 19.0	RQD: 4	18" = 80%							R1: Hard, fresh, aphanit with highly undulating re	ic to fine grained, ligh emnant bedding and o	t grey, PHYLLITE	
- 15 -								1	\dashv			high angle, thin calcsilic	ate veins. Moderately	spaced, low angle	
												to moderately dipping by and open with occasions		gh, typically fresh,	
												Core times: 3:05/ 2:35/ 2		ec/ft	
												GOOD ROCK QUALITY	,		
								-	_	26.0				19.0-	
00												Bottom of Exploratio	n at 19.0 feet below	ground surface.	
- 20 -															
								-							
								-							
								1							
25															
	arks: ated app	oroximat	ely 25 ft NB of	outlet end	d of Long	Creek	culvert; ii	nvert	out (elevatio	n app	roximately 38 to 40 ft.			
Stratifi	cation line	s represer	nt approximate bou	ndaries betw	veen soil type	es; trans	sitions may	be grad	dual.				Page 1 of 1		
* Wate	er level rea	dings have	e been made at tim	nes and unde	er conditions	stated.	Groundwat	er fluct	tuatio	ns may o	ccur du	e to conditions other than those	Boring Na	o.: HB-PAMI-	110
pres	ent at the t	une meas	urements were ma	ue.									I Politing IN	ייי ווט-ו ה\\livil-	110

			Schonewali		PROJ	ECT:	Portl	and A	\rea	Mai	inlin	e Improvements	Boring No.: _	HB-PAMI-	-111
			Engineering				Main	e Tui	npik	е М	IM 4	3.7 to 49.3	Proj. No.:	18-017	7
			Associates, I		LOCAT							and, ME	2 7 1	,	
Drille			New England Enos/ Share	Boring Co	ntractors	-	evation tum:	(π.)		π (e VD88	st'd)		Core Barrel:	n/a	
H	rator: ged By:		Schonewald			_	Type:					B-53 (rubber track ATV)	Sampler: Hammer Wt./Fall:	standard split-spoo	<u>)11</u>
	Start/Fi		12/14/18; 104	5_1140		_	illing M				boring	,	Hammer Type:	calibrated auto-hamm	
	ng Loca		Sta 2278+15, 12		ox)	-	sing ID		. au	ger i	001111	9	Hammer Efficiency		-
				. (,	-	ger ID/		SS	A to	14 ft	t	Water Level*:	none observed	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tu Jnsuccess situ Vane S	ful Split Sp be Sample ful Thin Wa Shear Test	oon Sample atten	npt ttempt	N-uncorrecte N ₆₀ = N valu hammer effit S _u = Insitu F R = Rock Co	DEFINITION DEFINI	FIONS: alue cted for ha calculated e Shear Sole	ammer e d hamme Strength	er efficie		WOF WOF = r BOR SSA	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded IEHOLE ADVANCEMENT METH (HSA=solid/hollow stem auger	LL=Liquid Limit / PL	oil classifications es WC = water content solidation test I undrained triaxial test =Plastic Limit / PI=Plastic	city Index
MV = U	Jnsuccess	tui insitu Va	ane Shear Test at		RQD = Rock	Quality	Designat	ion (%)		T	RC=	roller cone/OPEN/PUSH=hydrauli	ic push UCT qp = peak com	pressive strength of rock	<u>:</u>
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	· ·	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation	(ff.)	Graphic Log	Visual D	escription and Remark	s	Lab. Testing Results
0								SSA							
									+			1D: Olive grey, slightly n	nottled, v. soft, CLAY &	SILT, trace very	
	1D	24/24	2.0 - 4.0	wo	H/24"				_			fine Sand with few organ	nics. MARINE SILT-CL	AY	
	2D	24/21	4.0 - 6.0	wo	H/24"							2D: Olive grey, v. soft, S	ilty CLAY, trace very fi	ne Sand.	
- 5 -									1						
									-						
									1						
									-			3D: Olive grey with occa	sional black v soft Si	ilty CLAY trace	
- 10 -	3D	24/24	9.0 - 11.0	wo	H/24"							very fine Sand.	olonal black, v. cort, ol	ity 02/11, ilu00	
10															
									1						
								. .	-						
								$\Box \Box /$							
								$I \ \mathbb{V}$							
	4D	24/24	14.0 - 16.0	wo	H/24"			T *				4D: Dark grey black, v. s	soft, Silty CLAY with or	ne 1/8-inch seam of	
- 15 -									+			broken shells.			
									48	3.0				16.0-	
									``			Bottom of Exploration No refusal.	n at 16.0 feet below g		
												140 Tordoui.			
									1						
20 -															
- 20 -															
									1						
25 Rem	arks:														
1.0	<u>u.1.0.</u>														
Stratif	ication line	s renrecen	t approximate bou	ındaries hetu	een soil types	transitio	ns may h	e dradua	ı				Page 1 of 1		
		•					-	-		av 000	ur dus	e to conditions other than these			
pres	ent at the	time meast	been made at tin irements were ma	ies and unde ide.	i conditions sta	ated. GN	ounawate	nuctua	ions ma	y occ	ur due	e to conditions other than those	Boring No	.: HB-PAMI-	111

			CHONEWALD		PROJE	CT:	Portl	and A	rea M	ainlin	ne Improvements	Boring No.: HB-PAMI-	·112
			NGINEERING				Main	e Turi	npike l	MM 4	13.7 to 49.3	Proj. No. : 18-017	7
			Associates, It		LOCATI								
Drill			New England	Boring Co	ntractors	+	vation	(ft.)		(est'd)		Core Barrel: n/a	
<u> </u>	rator:		Enos/ Share			+	tum:		NAVD		D. F.2 (multiple at track ATV)	Sampler: standard split-spoo	on
	ged By:		Schonewald	1200		+-	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/14/18; 1220			+	lling M		auge	r borin	lg	Hammer Type: calibrated auto-hamm	er
BOII	ng Loca	tion:	Sta 2288+65, 10	5 KT (appro	JX)	+	sing ID ger ID/		664	to 12.1	1 ft	Hammer Efficiency: 0.906 Water Level*: 10.1 ft (end, open)	
IN-SIT	U SAMPLI	NG AND T	ESTING:		ADDITIONAL D			OD.	JJA		TIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	
	olit Spoon S Unsuccessf		oon Sample attem	pt	N-uncorrected N ₆₀ = N value			ımmer eff	iciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines	nt (%)
U = Th	nin Wall Tub	oe Sample	Il Tube Sample at		hammer effici	ency =	calculated	d hammer	efficiency	/=	not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test	(,,,,
V = Ins	situ Vane S	hear Test	•	•	R = Rock Cor	e Samp	le		usi)	SSA	VHSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plastic	city Index
MV = U	Unsuccessi	ui insitu va	ine Shear Test att		RQD = Rock (Juality	Designati	on (%)		RC=	Froller cone/OPEN/PUSH=nydrauli	lic push UCT qp = peak compressive strength of rock	(
		<u>:</u>		•						1			
<u> </u>	9	; (in.)	Sample Depth (ft.)	Ë	Strength (psf) or RQD (%)	N-uncorrected			_ ا	-og	Vieual D	escription and Remarks	Lab. Testing
h (ft	ple l	, %	l e l	s ()	gth	COL		gu s	atio	hic	Visual D	escription and itemates	Results
Depth (ft.)	Sample No.	Pen./Rec.	t.)	low	osf)	크	N-60	Casing Blows	Elevation (ft.)	Graphic Log			
-	0)	п.	00 €	шоо	<i>y</i> = 0				шъ	XXX	3		
								S\$A		\bowtie			
		04/6:	20.15		40.45	47			1			t, damp, m. dense, Silty fine to coarse	
	1D	24/24	2.0 - 4.0	3-5-	12-15	17	26		1	\bowtie	SAND, little Gravel. MIS	C FILL	
	2D	24/24	4.0 - 6.0	7-8-	11-12	19	29		1	\bowtie		m. dense, Silty fine to coarse SAND,	
- 5 -			1.0 0.0					\vdash	-	\bowtie	trace to little Gravel; app	pears reworked. MISC FILL	
									66.0	\bowtie			
									00.0				
									1				
	3D	24/21	9.0 - 11.0	2-3	3-4-4	7	11		1			, loose, fine to medium Sandy SILT, trace	
- 10 -	- 55		0.0 11.0					\vdash	-		SANDS	e coarse Sand. MARINE SILTY FINE	
								\ /	60.9		11.1 ft: Grinding on hard	11.1 I surface.	
								 	59.9	-	Dettem of Evaleration	12.1- n at 12.1 feet below ground surface.	
									-		Auger refusal.	n at 12.1 leet below ground surface.	
- 15 -									1				
									1				
									1				
- 20 -									1				
									-				
									1				
									1				
25													
25 Rem	narks:		1 1							1	ı		
												David 444	
			approximate bour					_				Page 1 of 1	
* Wate pres	er level read sent at the ti	dings have ime measu	been made at tim rements were made	es and unde de.	r conditions stat	ed. Gro	oundwate	r fluctuation	ons may c	ccur du	e to conditions other than those	Boring No.: HB-PAMI-	112

ASSOCIATES, INC. LOCATION: Scarborough to Portland, ME Driller: New England Boring Contractors Elevation (ft.) 82 ft (est'd) Core Barrel: n/a Operator: Enos/ Share Datum: NAVD88 Sampler: standard split-spoon Logged By: Schonewald Rig Type: Mobile Drill B-53 (rubber track ATV) Hammer Wtt./Fall: 140 lbs/30 inches Date Start/Finish: 12/18/18; 0950-1030 Drilling Method: auger boring Hammer Type: calibrated auto-hammer Boring Location: Sta 2307+70, 70 RT (approx) Casing ID/OD: Hammer Efficiency: 0.906 Nauger ID/OD: SSA to 4.5 ft Water Level*: 0.5 ft (open) IN-SITU SAMPLING AND TESTING: ADDITIONAL DEFINITIONS: Not always a corrected = N value Not always a corrected = N value Not always a corrected = N value Not always a corrected for hammer efficiency hammer efficiency a lambda of the standard split-spoon NG0 = N value corrected for hammer efficiency hammer efficiency a lambda of the standard split-spoon NG0 = N value corrected for hammer efficiency hammer efficiency a lambda of the standard split-spoon NG0 = N value corrected for hammer efficiency hammer efficiency hammer efficiency a lambda of the standard split-spoon NG0 = N value corrected for hammer efficiency hammer efficiency hammer efficiency hammer efficiency hammer efficiency and shear Test attempt NG0 = N value corrected for hammer efficiency hammer effici				Schonewale Engineering		PROJE	CT:					e Improvements	Boring No.: HB-PAMI- Proj. No.: 18-017	
Operation								Scar	boroι				F10J. No.: 16-017	
Logged By Schonward Start Finish: 12/18/16, 0950-1030 Ording Method: auger horing Mammer Fine: calebase auto-harmes Start Finish: 12/18/16, 0950-1030 Ording Method: auger horing Mammer Fine: calebase auto-harmes Mammer Finish: 1996 Ording Method: 0.000 Ording Meth					Boring Co	ntractors	_		(ft.)				Core Barrel: n/a	
Date Sart/Final No. 12/18/18/18/0950-1030 Drilling Methods Buyer brong Hammer Type:	<u> </u>						_							n
Searing Location: Sus 2007-10, 78 PT (approx)							_							
Margin January Marg										auge	borin	g		er
NASTING AMENING AND TESTING: Solid Spoon Social Section of the Committee of Management	Borii	ng Locat	tion:	Sta 2307+70, 70	RT (approx	()	_							
D - Solit Sporo Sample Note: The Control of Nation Note: Interactional Sport Sporo Sample altering Note: Interactional Sport Sporo Sample altering Note: Interactional Sporo Sample altering Note: Interaction Sporo Sample altering Note: I	IN-SIT	USAMPII	NG AND	FSTING:		ADDITIONAL			OD:	SSA			` ' '	
10 14/10 20-32 3+89/2* -	D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane Sl	ample ful Split Sp se Sample ful Thin Wa hear Test	ooon Sample atternal Tube Sample at an ane Shear Test at	ttempt tempt	N-uncorrecte N ₆₀ = N valu hammer effic S _U = Insitu Fi R = Rock Co RQD = Rock	d = N va e correctiency = o eld Vano re Samp	alue sted for ha calculated e Shear S ale	l hamme trength (r efficiency	WOI WOI = BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger	AASHTO / USCS soil classifications #200 = percent fines WC = water contei CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plasti	city Index
10			_					1	l	1	1			
10 14/10 2.0-32 34-502 - 10 18/10 14/10 2.0-32 34-502 - 10 18/10 1		Sample No.	Pen./Rec. (in.	Sample Deptf (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	Description and Remarks	Lab. Testing Results
10 14/10 20-32 36-502* -	0								S\$A					
3.2 ft. Auger grinding on solid surface. 77.5 Bottom of Exploration at 4.5 feet below ground surface. Auger refusal.		1D	14/10	2.0 - 3.2	3-6-	50/2"				78.8		Sand; decomposed rock	k in tip of spoon.	
Auger refusal	_								\downarrow	-			n solid surface. ————————————————4.5-	
- 16	5 -												on at 4.0 leet below ground surface.	
- 16														
- 15 20 25														
20	- 10 -													
20 - 20														
20 - 20														
	- 15 -													
										-				
										1				
	- 20 -													
										-				
Remarks:	25													
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. *Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made. *Boring No.: HB-PAMI-11	Stratifi	cation lines	dings have	e been made at tim	nes and unde			-	-		ccur due	e to conditions other than those		142

			C		I							B N.	LID DAMI	444
			Schonewale Engineering		PROJ	ECT					ne Improvements	Boring No.: _		
			ASSOCIATES, I			-101					43.7 to 49.3	Proj. No.:	18-017	7
Drille			New England				: Scar levation		_		and, ME	Core Barrel:	n/a	
-				Boring Co	ntractors		atum:	(11.)	NAV	(est'd))		n/a	
<u> </u>	ator:		Enos/ Share			——					D 50 (mills as too als ATM)	Sampler:	standard split-spoo	n
	ged By:		Schonewald	5 40/40/4	2 4445	-	ig Type				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		12/18/18; 114			-	rilling N				h boring	Hammer Type:	calibrated auto-hamm	ier
Borii	ng Loca	tion:	Sta 2323+00, 90	RI (approx	x)	-	asing IE			(4") to		Hammer Efficienc	-	
IN-SIT	U SAMPL	ING AND	TESTING:		ADDITIONAL		uger ID/	OD:	33 <i>F</i>	to 9 ft	TIONAL DEFINITIONS:	Water Level*: LABORATORY TEST	none observed abores	Jve 9 It
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample Iful Split S be Sample Iful Thin W Shear Test	poon Sample attem e /all Tube Sample at t /ane Shear Test att	tempt	N-uncorrect N ₆₀ = N va hammer eff S _u = Insitu R = Rock C RQD = Roc	ted = No lue corre ficiency = Field Va core Sam ck Qualit	value ected for h = calculate ane Shear a nple	d hamme Strength	er efficien	WO WO cy = BO I SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger eroller cone/OPEN/PUSH=hydraul	AASHTO / USCS s -#200 = percent fir CONSOL= 1-D cor IODS: UU=Unconsolidate LL=Liquid Limit / P	soil classifications les WC = water contei nsolidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	icity Index
		·					T							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation	Graphic Log	Visual D	escription and Remar	ks	Lab. Testing Results
0								S\$A		\otimes				
							+		+	\otimes				
							_			$\otimes\!\!\!\otimes$	1D: Grey brown, damp,	m stiff SILT CLAVE	II I with occasional	
	1D	24/22	2.0 - 4.0	2-2	2-3-3	5	8			\otimes	seams and pockets of s		LE WITH OCCASIONAL	
										\otimes				
							+		1	\otimes	2D: Brown grey, moist, v	v. soft, SILT-CLAY FIL	L with sand.	
- 5 -	2D	24/17	4.0 - 6.0	WOF	1/18"-2					\otimes				
ľ										\otimes				
							1		1	\otimes				
										\otimes				
										\otimes				
								1\1/	1	\otimes				
							_	LΨ	4	\otimes	3D: Brown grey, moist, v	, ctiff SILT CLAVEII	I : appears	
	3D	24/24	9.0 - 11.0	7-12	-16-33	28	42	OPEN	1	\otimes	reworked.	v. suii, Sili-Clai i il	.с, арреаго	
- 10 -										\otimes				
							+		-	\otimes				
										\bowtie				
									23.	5 💹			— — — —12.5-	
							+		-					
											45 01 1 17	: OLAN (A OU T : : !)	" o l ou -	01
	4D	24/24	14.0 - 16.0	2-3	3-2-2	5	8				4D: Olive brown, m. stiff seams; appears undistu	, CLAY & SILT with tw rbed. MARINE SILT-0	ofine Sandy SILT	CL -#200=95%
- 15 -														WC=37% LL=45
														PL=23 PI=22
									18.	5			— — — —17.5-	
									+ -					
	5D	24/24	19.0 - 21.0	VANE II	NTERVAL						5D: Dark grey with occa Sand. MARINE SILT-CL		AY, trace very fine	
- 20 -	V1		19.6 - 20.0		8/ 82 psf						V1: Tu=22.5 / Tr=3 ft-lbs	65 mm x 130 mm va	ane)	
	V2		20.6 - 21.0	Su= 49	94/ 55 psf						V2: Tu=18 / Tr=2 ft-lbs (65 mm x 130 mm van	e)	
							+		-					
	U1	24/24	24.0 - 26.0	HYD	PUSH						U1: Dark grey black, Sili	ty CLAY.		CONSOL (Cv, Cα)
25 Rem	arks:									V.J.D.	4			(=:, =:)
Stratifi	cation line	s represe	nt approximate bou	ndaries betw	reen soil types	s; transiti	ions may b	e gradua	I.			Page 1 of 3		
* Wate	er level rea	idings hav	e been made at tim	es and unde	er conditions s	tated. G	Groundwate	er fluctua	ions may	occur du	e to conditions other than those	Davis a N		111
pres	ent at the t	time meas	surements were ma	de.					9			Boring No	o.: HB-PAMI-	1 1 4

			Schonewale Engineering		PROJ	ECT:						e Improvements	Boring No.: _		
		==	Associates, I		LOCAT	ION:						3.7 to 49.3 and, ME	Proj. No.: _	18-017	7
Drille	er:		New England	Boring Co	ntractors	Ele	vation	(ft.)	3	6 ft (est'd)		Core Barrel:	n/a	
Oper	ator:		Enos/ Share			Da	tum:		N	IAVD8	38		Sampler:	standard split-spoo	on
Logg	ged By:		Schonewald			Rig	Type:		Ν	/lobile	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/Fi	inish:	12/18/18; 114	5-12/19/18	; 1115	Dri	Iling M	ethod:	: с	ased	wash	boring	Hammer Type:	calibrated auto-hamn	ner
Borii	ng Loca	tion:	Sta 2323+00, 90	RT (approx	:)	Ca	sing ID	/OD:	Н	IW (4	l") to 9) ft	Hammer Efficiency	v: 0.906	
111 017							ger ID/	OD:	S	SSA t	o 9 ft	TOWAL DEFINITIONS		none observed ab	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	ful Split Sp be Sample ful Thin Wa Shear Test	oon Sample atter	npt ttempt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Co RQD = Rock	ed = N va ue correct ciency = c cield Van ore Samp	alue cted for ha calculated e Shear S ble	d hamme Strength	er effic		WOF = 1 BOR SSA	IONAL DEFINITIONS:	LL=Liquid Limit / PL:	il classifications s WC = water conte colidation test undrained triaxial test =Plastic Limit / PI=Plasti	icity Index
				Sample In	formation										
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Flevation	(ft.)	Graphic Log	Visual D	escription and Remark	s	Lab. Testing Results
25															WC=53% LL=50
	V3		26.6 - 27.0	Su= 398	8/ 27 psf										PL=23 <u>PI=27</u>
					F				+			V3: Tu=14.5 / Tr=1 ft-lbs	s (65 mm x 130 mm var	ne)	
	V4		27.6 - 28.0	Su= 45	i3/ 0 psf							V4: Tu=16.5 / Tr=0 ft-lbs	65 mm x 130 mm vai	ne)	
									4			6D: Dark grey black, Silt	v CLAY		
- 30 -	6D V5	24/24	29.0 - 31.0 29.6 - 30.0	VANE IN Su= 49	ITERVAL 14/0 psf							V5: Tu=18 / Tr=0 ft-lbs (•)	
30	V6		30.6 - 31.0	Su= 44	0/ 0 psf							V6: Tu=16 / Tr=0 ft-lbs (65 mm x 130 mm vane	e)	
									1						
									-						
	7D V7	24/18	34.0 - 36.0 34.6 - 35.0	VANE IN	ITERVAL							7D: Dark grey black, Silt V7: Tu=17.5 / Tr=0.5 ft-I	•	(ana)	CL -#200=94%
- 35 -	V7		34.6 - 35.0 35.6 - 36.0		1/ 14 psf 6/ 14 psf				1			V7. Tu=17.57 TI=0.5 II-I	DS (03 IIIII X 130 IIIII V	arie)	WC=36% LL=40
	Vo		35.6 - 36.0	Su= 530	o/ 14 psi				4			V8: Tu=19.5 / Tr=0.5 ft-l	bs (65 mm x 130 mm v	ane)	PL=20 PI=20
									1						
									+			U2: Dark grey black, Silt	v CLAY.		
- 40 -	U2	24/24	39.0 - 41.0	HYD	PUSH							oz. zam groy ziacm, em	, 02		
40															
									1						
									-						
	8D	24/17	44.0 - 46.0	VANE IN	ITERVAL							8D: Dark grey black, Silt	-	-	
- 45 -	V9		44.6 - 45.0		'3/ 0 psf				\exists			V9: Tu=24.5 / Tr=0 ft-lbs	s (65 mm x 130 mm var	ne)	
	V10		45.6 - 46.0	Su= 52	2/ 0 psf				4			V10: Tu=19 / Tr=0 ft-lbs	(65 mm x 130 mm van	e)	
									1						
									4			9D: Dark grey black, Silt	v CLAY with nodules t	hroughout	
50	9D V11	24/15	49.0 - 51.0 49.6 - 50.0	VANE IN Su= 59	ITERVAL 11/0 psf							V11: Tu=21.5 / Tr=0 ft-lb			
Rem	arks:														
Stratifi	cation line	s represen	t approximate bou	ndaries betwe	een soil types;	transitio	ns may be	e gradua	ıl.				Page 2 of 3		
* Wate prese	er level rea ent at the t	idings have time measi	been made at tim urements were ma	nes and under ide.	conditions sta	ated. Gro	oundwate	r fluctuat	tions n	may oc	cur due	to conditions other than those	Boring No	.: HB-PAMI-	114

			Schonewald Engineering				Main	е Ті	urn	pike I	MM 4	13.7 to 49.3	Boring No.: HB-PAMI- Proj. No.: 18-017	
			Associates, In		LOCATIO				oug			and, ME	-	
Drille			New England I	Boring Co	ntractors	-	vation	(ft.)		36 ft			Core Barrel: n/a	
·	rator:		Enos/ Share			_	tum:			NAVD			Sampler: standard split-spoo	on
	jed By:		Schonewald			1	Type:		_			` ′	Hammer Wt./Fall: 140 lbs/30 inches	
_	Start/Fi		12/18/18; 1145			+	lling M						Hammer Type: calibrated auto-hamm	er
Bori	ng Locat	tion:	Sta 2323+00, 90	RT (approx	()	_	sing ID			HW (Hammer Efficiency: 0.906	
IN_SIT	U SAMPLI	NG AND T	ESTING:		ADDITIONAL DE		ger ID/	OD:		SSA		TIONAL DEFINITIONS:	Water Level*: none observed about LABORATORY TEST RESULTS:	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane Sl	ample ful Split Spo pe Sample ful Thin Wa hear Test	oon Sample attempall Tube Sample att	empt	N-uncorrected N ₆₀ = N value hammer efficien S _u = Insitu Fiel R = Rock Core RQD = Rock Q	= N va correct ncy = o d Vane Samp	lue ted for ha calculated e Shear S le	d hamr Strengt	mer e th (ps	efficiency	WO WO = BO I SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METHOD: VHSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water conter CONSOL= 1-D consolidation test	city Index
				•	formation	_		ı -			1			
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Desc	cription and Remarks	Lab. Testing Results
50	V12		50.6 - 51.0		12/ 0 psf							V12: Tu=27 / Tr=0 ft-lbs (65	5 mm x 130 mm vane)	
- 55 -	10D V13	24/12	54.0 - 56.0 54.6 - 55.0	VANE IN Su= 83	NTERVAL 88/ 0 psf							multiple concretions.	CLAY, with nodules throughout and	
- 55 -	MV											V13: Tu=30.5 / Tr=0 ft-lbs (pelow 55.7 ft.	
										-20.7		56.7 ft: Stratum change bas	56.7- sed on drilling behavior.	
- 60 -	11D	24/4	59.0 - 61.0	8-5-	9-10	14	21					11D: Dark grey, m. dense, to little Silt. TILL	fine to coarse Sandy GRAVEL, trace	
00										-25.0			61.0- at 61.0 feet below ground surface.	
												No refusal.		
- 65 -														
- 70 -														
			+ +				 		\dashv					
. 75														
	arks:	s represent	t approximate bour	ndaries betw	een soil types; tra	ansition	ns may be	e gradi	ual.				Page 3 of 3	
* Wate	er level read ent at the ti	dings have ime measu	been made at time irements were made	es and unde de.	r conditions state	d. Gro	undwate	r fluctu	uatio	ns may o	ccur du	e to conditions other than those	Boring No.: HB-PAMI-1	114

			Schonewale				- ·					Boring No.: _	HR DAMI	115
			Engineering		PROJ	ECI:					e Improvements 3.7 to 49.3			
			Associates, I		LOCAT	ION:						Proj. No.:	18-017	<u>/</u>
Drille			New England				evation		_	(est'd)	IIIU, IVIC	Core Barrel:	n/a	
Oper			Enos/ Share	Donnig Co	TILIACIOIS		tum:	(11.)	NAVE	· ,		Sampler:	standard split-spoo	\n
<u> </u>						+					D 52 (who are track ATV)	· · · · · · · · · · · · · · · · · · ·)II
<u> </u>	ed By:		Schonewald	0.4000			Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		12/19/18; 114			+	illing M				boring	Hammer Type:	calibrated auto-hamm	ier
Borii	ng Loca	tion:	Sta 2327+20, 90) RT (approx	K)		sing ID			4") to 9	<i>σ</i> π	Hammer Efficiency		
IN-SITI	II SAMDI I	ING AND	TESTING:		ADDITIONAL		ger ID/	OD:	SSA	to 9 ft	TIONAL DEFINITIONS:	Water Level*: LABORATORY TEST	ground surface	
D = Spi MD = U U = Thi MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Sp be Sample ful Thin Wa Shear Test	ooon Sample atternal Tube Sample at an ane Shear Test at	ttempt tempt	N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu F R = Rock Co RQD = Rocl	ed = N va ue correc ciency = Field Van ore Samp k Quality	alue cted for ha calculate e Shear S ble	d hamme Strength (r efficiency	WOH WOF = 1 BOR SSA	H = weight of 140lb. hammer R = weight of rods not recorded LEHOLE ADVANCEMENT METH (HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	AASHTO / USCS st -#200 = percent fine CONSOL= 1-D con: UU=Unconsolidated LL=Liquid Limit / PL	oil classifications es WC = water conter solidation test d undrained triaxial test =Plastic Limit / PI=Plastic	city Index
		·					ĺ			1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remark	:s	Lab. Testing Results
0								SSA		\bowtie				
									1	\bowtie				
									4	\bowtie	1D: Brown, wet, stiff, SIL	T-CLAV FILL with occ	racional coame and	
	1D	24/24	2.0 - 4.0	1-4	1-6-8	10	15			\bowtie	pockets of sand and gra			
										\bowtie				
									46.0	$\gg \sim$			— — — — <u>4.</u> 0-	
- 5 -	2D	24/24	4.0 - 6.0	4-4	1-5-7	9	14				2D: Olive brown, slightly trace fine Sand; appears	r mottlea, moist (tignt), s undisturbed. MARINE	Stiff, Clayey SIL I , Ε E SILT-CLAY	
ľ											CRUST			
									1					
								11/	1					
								$\perp \vee$			00 01 1 11		01.437.1	CL
	3D	24/24	9.0 - 11.0	2-4	1-4-5	8	12	OPEN			3D: Olive brown, moist (Sand.	tignt), m. stiff, SIL1 & 0	JLAY, trace fine	-#200=99%
- 10 -									1					WC=34% LL=49
									1					PL=22 PI=27
														11-21
									1					
	4D	24/24	14.0 - 16.0	WOF	1-2-3-2	5	8		1		4D: Olive grey brown, m	. stiff, CLAY & SILT wi	th four seams fine	
- 15 -		2-7/2-7	14.0 - 10.0	****	1-2-0-2	Ů			-		Sandy SILT.			
									1					
									-					
									32.0				10.0	
									32.0		18.0 ft: Stratum change	based on drilling beha	————18.0- vior.	
						_					5D: Brown, GRAVEL, so	ome Silt, some fine to o	coarse Sand. TILL	
- 20 -	5D	12/6	19.0 - 20.0	26	5-74	3"dia								
20														
								ļ.,	1	1. 7				
										14.5				
								₩.			6D: Grey brown, m. den	eo fino to coareo Sano	dy CDAVEL some	
25	6D	24/6	24.0 - 26.0	19-15	5-11-14	26	39				Silt.	se, fine to course our	ly Gratvee, some	
	arks:		'						•	election in				
Stratifi	cation line	s represen	t approximate bou	ndaries betw	een soil types;	transitio	ns may b	e gradual				Page 1 of 2		
* Wate	r level rea	dings have	e been made at tim	nes and unde	r conditions st	ated. Gr	oundwate	r fluctuati	ons mav	ccur due	e to conditions other than those	Daniel N	. LID DARA!	115
prese	ent at the t	time measi	urements were ma	de.		01						Boring No	.: HB-PAMI-1	115

			Schonewald		PROJE	CT:	Portla	and A	rea Ma	ainlir	e Improvements	Boring No.: HB-PAM	l-115
			Engineering				Main	e Turr	npike N	/M ∠	13.7 to 49.3	Proj. No.: 18-01	7
Drille)r:		Associates, In New England		LOCATI		Scarl evation		<u>gh to F</u> 50 ft (Core Barrel: n/a	
	ator:		Enos/ Share	Borning Co	IIIIaciois	+	tum:	(11.)	NAVD8			Sampler: standard split-spo	oon
<u> </u>	ged By:		Schonewald			_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	5011
	Start/Fi	nish:	12/19/18; 114	0-1330		_	Iling Mo	ethod:			n boring	Hammer Type: calibrated auto-ham	mer
	ng Locat		Sta 2327+20, 90		()	+	sing ID		HW (4			Hammer Efficiency: 0.906	
						+	ger ID/0		SSA t			Water Level*: ground surface	
	U SAMPLII lit Spoon S		TESTING:		ADDITIONAL D						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
MD = L	Jnsuccessfi	ul Split Sp	oon Sample attem	ıpt	N ₆₀ = N value	correc	ted for ha			WO	R = weight of rods	-#200 = percent fines WC = water cont	ent (%)
MU = U		ul Thin W	: all Tube Sample at	tempt	hammer efficie S _u = Insitu Fie	ld Van	e Shear S			BOI	not recorded REHOLE ADVANCEMENT METH		
	itu Vane Sh Insuccessfo		ane Shear Test att	tempt	R = Rock Cor RQD = Rock (on (%)		SSA RC=	/HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydrau	LL=Liquid Limit / PL=Plastic Limit / PI=Plas lic push UCT qp = peak compressive strength of ro	sticity Index ck
					formation								
		(in.)	Sample Depth (ft.)	Ü.)	Strength (psf) or RQD (%)	ted				g			Lab.
(ft.)	S S) a	i 9/)	# %	эше		_	lo	c Lo	Visual D	Description and Remarks	Testing
Depth (ft.)	Sample No.	Pen./Rec.	ld m (ows	eng RQE	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log			Results
	Sa	Pe	Sa F.	ਛੱਲ	5 G 5	ž	ž	S	Ē.	Ğ			
25									24.0				
									24.0	REAL MINES	Bottom of Exploratio	26.0 n at 26.0 feet below ground surface.	거
											No refusal.	•	
- 30 -													
- 35 -													
40													
- 40 -													
- 45 -							<u> </u>						
_50 Rem	arks:						I				I		1
0:												Dama O - 4 O	
			nt approximate bou				-	_				Page 2 of 2	
Wate pres	er level read ent at the ti	dings have ime meas	e been made at tim urements were ma	nes and unde de.	r conditions state	ed. Gro	oundwater	fluctuation	ons may o	cur du	e to conditions other than those	Boring No.: HB-PAMI	-115

			Schonewald)	DDO I	ECT:	Dortl	and A	roa M	ainlin	e Improvements	Boring No.:	HB-PAMI-	-116
			Engineering		PROJ	ECI.					3.7 to 49.3	Proj. No.:	18-017	
			Associates, I	NC.	LOCAT	ΓΙΟΝ:					and, ME	Proj. No.: _	10-017	<u>'</u>
Drille	er:		New England				evation		-	(est'd)		Core Barrel:	n/a	
Oper	ator:		Enos/ Share			Da	tum:	` '	NAVE	088		Sampler:	standard split-spoo	on .
H	ged By:		Schonewald			_	Type:		Mobi	le Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		12/20/18; 094	5-1135			illing M				boring	Hammer Type:	calibrated auto-hamm	ier
_	ng Loca		Sta 2340+80, 80		:)		sing ID			(4") to		Hammer Efficienc		
				(-,		ger ID/			to 4 ft		Water Level*:	3.2 ft	
		ING AND 1	ESTING:		ADDITIONAL	DEFINIT	TIONS:			ADDI"	TIONAL DEFINITIONS:	LABORATORY TEST	RESULTS:	
	lit Spoon S Jnsuccess		oon Sample attem	npt	N-uncorrect N ₆₀ = N va			ammer effi	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS s -#200 = percent fin		nt (%)
U = Th	in Wall Tul	be Sample	all Tube Sample at	ttemnt	hammer eff S _{II} = Insitu	iciency =	calculated	d hammer	efficienc		not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D cor	solidation test d undrained triaxial test	
V = Ins	itu Vane S	Shear Test	ane Shear Test att	·	R = Rock C RQD = Roc	ore Samp	ole	- "	,	SSA	/HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / PI	L=Plastic Limit / PI=Plasti	
IVIV - C	nisuccess	iui irisitu v		Sample In			Designati	OII (76)		T RC-	Toller Colle/OFEIN/FOSH-Hydradi	iic pusii OC i qp – peak coi	ilpressive strength of foci	
		(in.)								1				
·	Sample No.		Sample Depth (ft.)	.i.	Strengtn (psf) or RQD (%)	N-uncorrected			_	Graphic Log	Visual D	escription and Remark	ks	Lab. Testing
h (ft	ple	/Re	<u>ə</u>	, s's	mgr OC	CO		ng s	atio	hic	7,044, 2	ooonpaon and roman		Results
Depth (ft.)	Sam	Pen./Rec.	sam ft.)	Slow Shea	orrer psf) or R(丁	09-N	Casing Blows	Elevation (ft.)	Jrap				
0	0)	ш.	0, 6	шос	<i>n</i> = 0			S\$A	ш ()					
	1D	24/10	2.0 - 4.0	4-5	-4-3	9	14				1D: Brown, wet, loose, f little Silt. GRANULAR FI		ttle Gravel, trace to	
											IIIIIE SIII. GRANOLAR FI	ILL		
								$\vdash \lor \vdash$			Brown grey, wet, v. loos	e, fine to medium SAN	ID, little to some	
- 5 -	2D	24/10	4.0 - 6.0	2-2	-1-4	3	5				Silt, trace fine Gravel, tra Changing at 5.6 ft to:			
								19	53.4 53.0		¬ 2D: Grey brown, fine to ¬	medium Sandy ORGA	.NIC SILT with	
								29			brown fibrous PEAT; ap	pears to be original gr	ound. - — — — —6.0-	
								21						
								26			0D: (limitad manas) 0	6 CAN	ID 0:14	
- 10 -	3D	24/1	9.0 - 11.0	1-2	-1-1	3	5	23			3D: (limited recovery) G MARINE SILTY FINE SA		id, some Siit.	
								20						
								18						
								19	46.5				12.5-	
								20						
	4D	24/24	14.0 - 16.0	WOR/12"	-WOH/12"			OPEN			4D: Olive grey, v. soft, S SILT. MARINE SILT-CL		ams fine Sandy	
- 15 -														
	5D	24/24	19.0 - 21.0	WOR/1	8"-WOH			*			5D: Olive grey, v. soft, S SILT.	Silty CLAY with three s	eams fine Sandy	
- 20 -											0.2			
											21.0 ft: Hydraulically pus	sh rod probe.		
25 Rem	arks:									VJA.				
		s represen	t approximate bou	indaries betwe	een soil types	; transitio	ns may be	e gradual.				Page 1 of 3		
* Wate	er level rea	dings have	been made at tim	nes and under	conditions st	ated. Gr	oundwate	r fluctuatio	ons mav	occur du	e to conditions other than those	B	. UD DAM	140
pres	ent at the t	time measi	rements were ma	de.					uy (The second secon	Boring No	.: HB-PAMI-	116

			Schonewald		PROJE	СΤ٠	Portla	and Ar	ea Ma	inlin	e Improvements	Boring No.: HB-PAMI	-116
			Engineering		I KOOL	•					13.7 to 49.3	Proj. No.: 18-01	
			Associates, Inc.		LOCATION				h to F	ortla	and, ME		<u>, </u>
Drille	er:		New England Bo	oring Cor	ntractors	Ele	vation	(ft.)	59 ft (est'd)		Core Barrel: n/a	
Ope	rator:		Enos/ Share			Dat	um:		NAVD8			Sampler: standard split-spo	on
	ged By:		Schonewald			+-	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fir		12/20/18; 0945-1			+	lling Me				n boring	Hammer Type: calibrated auto-hamr	ner
Bori	ng Locat	ion:	Sta 2340+80, 80 R	T (approx)	_	sing ID		HW (4		14 ft	Hammer Efficiency: 0.906	
IN-SIT	U SAMPLIN	NG AND	TESTING:		ADDITIONAL D		ger ID/O	DD:	SSA t		TIONAL DEFINITIONS:	Water Level*: 3.2 ft LABORATORY TEST RESULTS:	
D = Sp MD = U U = Th	lit Spoon Sa Jnsuccessfu in Wall Tub	ample ul Split Sp e Sample	ooon Sample attempt		N-uncorrected N ₆₀ = N value hammer efficie S _{II} = Insitu Fie	= N val correct ncy = c	lue ted for ha calculated	hammer	efficiency	WO WO	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH	AASHTO / USCS soil classifications -#200 = percent fines	ent (%)
V = Ins	situ Vane Sh	near Test			R = Rock Core	Sampl	le	- "	,	SSA	VHSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plast lic push UCT qp = peak compressive strength of roc	icity Index
IVI V	<u> </u>	ai iiioitu v			formation	tuanty t	Scoignatio	211 (70)		110	Tolici concior Envir com myaradi	ine pastr. Oo r qp - peak compressive strength or roc	
		(in.)	the off	$\widehat{}$		eq				_			Lab
ft.)	Sample No.	(i	Sample Depth (ft.)	ni 9/	Suengin (psf) or RQD (%)	N-uncorrected			uo	Graphic Log	Visual D	Description and Remarks	Lab. Testing
Depth (ft.)	uble	Pen./Rec.	nple	ws (nco	0	sing ws	vati	phic			Results
Dep	Sar	Per	Sar (ft.)	She	pst (pst or F	Σ̈́	N-60	Casing Blows	Elevation (ft.)	Gra			
25													
20													
- 30 -													
25													
- 35 -													
											1		
- 40 -													
			+										
										YZ).			
- 45 -													
50 Rem	arks:									4.7.0°L	1		<u> </u>
Stratifi	ication lines	represer	nt approximate bounda	aries betwe	en soil types: tr	ansition	is may be	gradual				Page 2 of 3	
		-					-	-	no ma:: -	NO. 17 -1.	o to conditions other # #-		
vvate pres	ent at the ti	ııngs navı me meas	e been made at times urements were made.	and under	conditions state	u. Gro	undwater	nuctuatio	us may oc	cur du	e to conditions other than those	Boring No.: HB-PAMI-	116

			Schonewald)	PRO.IF	CT:	Portla	and Ar	ea Ma	ainlin	e Improvements	Boring No.: HB-PAMI-	-116
			Engineering		11002	•					3.7 to 49.3	Proj. No.: 18-017	_
			Associates, In		LOCATI				h to F	ortla	and, ME	•	
Drille	er:		New England I	Boring Co	ntractors	Ele	vation	(ft.)	59 ft (est'd)		Core Barrel: n/a	
Ope	rator:		Enos/ Share			Dat	tum:		NAVD			Sampler: standard split-spoo	on
Logg	ged By:		Schonewald			Rig	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
Date	Start/Fi	nish:	12/20/18; 0945	5-1135		Dri	lling M	ethod:	cased	l wash	boring	Hammer Type: calibrated auto-hamm	ner
Bori	ng Locat	ion:	Sta 2340+80, 80	RT (approx	()	+	sing ID			1") to 1	14 ft	Hammer Efficiency: 0.906	
IN CIT	U SAMPLII	NG AND	TESTING:		ADDITIONAL D		ger ID/0	DD:	SSA t		TIONAL DEFINITIONS:	Water Level*: 3.2 ft LABORATORY TEST RESULTS:	
D = Sp	lit Spoon S	ample			N-uncorrected	= N va	lue	_		WOH	H = weight of 140lb. hammer	AASHTO / USCS soil classifications	
U = Th	in Wall Tub	e Sample			N ₆₀ = N value hammer efficie	ency = c	calculated	hammer	efficiency	= r	R = weight of rods not recorded	-#200 = percent fines WC = water content CONSOL= 1-D consolidation test	nt (%)
	Jnsuccessfi situ Vane Sh		all Tube Sample att	tempt	S _u = Insitu Fie R = Rock Core			trength (p	sf)		REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger	IODS: UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plasti	city Index
			ane Shear Test atte		RQD = Rock (on (%)		RC=	roller cone/OPEN/PUSH=hydraul	lic push UCT qp = peak compressive strength of rock	<u>(</u>
					formation	_							
	ö	(in.)	Sample Depth (ft.)	i.	Strength (psf) or RQD (%)	N-uncorrected				og			Lab.
Depth (ft.)	Sample No.	Pen./Rec.	<u>e</u>	9/)	aff O	опе		б	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Testing Results
pth	dma	'n./F	d m C	ows	Pang Ral Ral	nuc	09-N	Casing Blows	eva (aph			results
50	Š	<u> </u>	SS €	面访	ಶಕ್ಷ	ż	ż	വ് ത	回馬	<u>ত</u>			
50													
- 55 -													
- 60 -													
- 65 -											65 ft: Sand seams noted	i.	
- 70 -									-11.6				
									-11.0		Bottom of Exploration	n at 70.6 feet below ground surface.	
											/0.6 ft: Rod probe fetche Marine Silt-Clay; bottom	es up; stands rig; inferred bottom of of boring; no refusal.	
			+										
_ 75 _	لـــا												
Rem	arks:												
Stratifi	ication lines	represer	nt approximate bour	ndaries betw	een soil types; tr	ansitior	ns may be	gradual.				Page 3 of 3	
* Wate	er level read	lings hav	e been made at time urements were made	es and unde	r conditions state	ed. Gro	oundwater	fluctuatio	ns may o	ccur due	e to conditions other than those	Boring No.: HB-PAMI-	116

			Schonewale Engineering		PROJ	ECT:					ine Improvements	Boring No.: _		
			Associates, I		LOCAT	ION:					43.7 to 49.3 land, ME	Proj. No.:	18-017	7
Drille	er:		New England	Boring Cor			evation		_	t (est		Core Barrel:	n/a	
Ope	rator:		Enos/ Share			Da	tum:		NAV	D88		Sampler:	standard split-spoo	on
	ged By:		Schonewald			_	Type:				ill B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/F		12/4/18; 1345				illing M				sh boring	Hammer Type:	calibrated auto-hamm	ier
Borii	ng Loca	ition:	Sta 2340+00, 95	LI (approx))		sing ID ger ID/			(4") A to 9	o 14 ft	Hammer Efficienc	y: 0.906 7.6 ft (open)	
		ING AND T	ESTING:		ADDITIONAL	DEFINIT	TIONS:	OD.	337		DITIONAL DEFINITIONS:	LABORATORY TEST	RESULTS:	
MD = l U = Th MU = l V = Ins	in Wall Tu Jnsuccess situ Vane S	ful Split Sp be Sample ful Thin Wa Shear Test	oon Sample attem all Tube Sample at	ttempt	N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu F R = Rock Co RQD = Rock	ue corrections; ciency = Field Van ore Samp	cted for ha calculated e Shear Sole	d hammer Strength (p	efficien	Cy - E	OH = weight of 140lb. hammer OR = weight of rods = not recorded DREHOLE ADVANCEMENT METH SA/HSA=solid/hollow stem auger C=roller cone/OPEN/PUSH=hydrau	LL=Liquid Limit / PL	es WC = water content solidation test d undrained triaxial test =Plastic Limit / PI=Plasti	icity Index
				Sample In	formation	1								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation	cida C	Visual C	escription and Remark	KS	Lab. Testing Results
0								SSA		\otimes				
										\otimes				
										\otimes	1D: Brown grey, damp t		ed SILTY	
	1D	24/17	2.0 - 4.0	2-2-	-2-2	4	6			畿	GRANULAR and SILT-0	CLAY FILL		
										畿				
	2D	24/16	4.0 - 6.0	2-3-	-4-2	7	11			፠	2D: Grey brown, moist, SILT-CLAY FILL	loose, layered SILTY (GRANULAR and	
- 5 -										\otimes	\aleph			
										\otimes	\aleph			
										畿	₿			
									59.	5 👺	<u> </u>	-	— — — —7.5 ⁻	
									i					
								V			語 語 3D: Olive grey grading t	o dark grey, wet, m. de	ense, Silty fine to	
- 10 -	3D	24/16	9.0 - 11.0	3-5-	-7-6	12	18	15			medium SAND, trace co			
								24						
								45						
								26						
											당 등			
								29			日 14.0 ft: Unable to push	vane.		
	4D	24/3	14.0 - 16.0	2-2-	-1-1	3	5	OPEN			4D: Dark grey, v. loose,	Silty fine to medium S	AND.	
- 15 -														
									50.	٥			- — — — —17.0-	
	5D	24/24	17.0 - 19.0	WOR/18	8"-WOH						5D: Olive grey, v. soft, S fine SAND in upper 9 in	Silty CLAY with three 1- ches of sample MARII	inch layers Silty NF SII T-CLAY	
	6D	24/24	19.0 - 21.0	VANE IN	ITERVAI						6D: Dark grey, Silty CLA			
- 20 -	V1		19.0 - 21.0 19.6 - 20.0	Su= 385	5/ 27 psf						V1: Tu=14 / Tr=1 ft-lbs ((65 mm x 130 mm vane	e)	
	V2		20.6 - 21.0	Su= 302	2/ 14 psf						V2: Tu=11 / Tr=0.5 ft-lb:	s (65 mm x 130 mm va	ine)	
									İ					
											7D: Dark grey, Silty CLA	V with occasional sma	all nodules	
25	7D V3	24/24	24.0 - 26.0 24.6 - 25.0	VANE IN Su= 35	ITERVAL 7/ 0 psf						V3: Tu=13 / Tr=0 ft-lbs (
Rem	arks:													
Stratifi	ication line	s renresen	t approximate bou	ndaries hetwe	een soil tynes	transitio	ns may h	e gradual				Page 1 of 4		
		•	• •				-	-		OCCU	lue to conditions other than those			
pres	ent at the	time meast	e been made at tim irements were ma	ics and under ide.	CONTRIBUTE ST	aleu. Gľ	ounuwate	. แนบเนสได้	nio iilay	occur	ide to conditions other than those	Boring No	.: HB-PAMI-1	117

			Schonewald Engineering				Main	e Tu	ırn	pike M	M 4	Boring No.: HB-PAMI- 3.7 to 49.3 Proj. No.: 18-01	-
			Associates, In		LOCATION				ug			nd, ME	
Drille			New England I	Boring Co	ntractors	_	vation	(ft.)		67 ft (e	_	Core Barrel: n/a	
<u> </u>	rator:		Enos/ Share			_	tum:			NAVD88		Sampler: standard split-spoo	on
	ged By:		Schonewald	40/=/40		-	Type:		_			B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
_	Start/Fi		12/4/18; 1345			_	lling M		1:	cased v			ner
Borii	ng Loca	tion:	Sta 2340+00, 95	LI (approx)	_	sing ID			HW (4"			
IN-SIT	U SAMPLI	NG AND 1	FSTING:		ADDITIONAL DI		ger ID/	:עכ		SSA to		Water Level*: 7.6 ft (open) IONAL DEFINITIONS: LABORATORY TEST RESULTS:	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane S	Sample ful Split Sp be Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample att	tempt empt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fiel R = Rock Core RQD = Rock Q	= N val correct ncy = o d Vane Sampl	lue ted for ha calculated e Shear S le	l hamm trength	ner e h (ps	iency efficiency	WOF WOR = n BOR SSA/	= weight of 140lb. hammer = weight of rods = weight of rods trecorded CONSOL= 1-D consolidation test EHOLE ADVANCEMENT METHODS: UU=Unconsolidated undrained triaxial test HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of rod	icity Index
		_			formation			1	_				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
25	V4		25.6 - 26.0	Su= 27	75/ 0 psf							V4: Tu=10 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
- 30 -	8D	24/24	29.0 - 31.0	VANE	ERROR							8D: Dark grey, Silty CLAY with occasional nodules.	CL WC=38% LL=41 PL=22
									 				<u>PI=19</u>
- 35 -	9D V5	24/24	34.0 - 36.0 34.6 - 35.0	VANE IN Su= 35	NTERVAL 57/ 0 psf			V				9D: Dark grey, Silty CLAY with nodules throughout. V5: Tu=13 / Tr=0 ft-lbs (65 mm x 130 mm vane)	
	V6		35.6 - 36.0	Su= 34	13/ 0 psf							V6: Tu=12.5 / Tr=0 ft-lbs (65 mm x 130 mm vane) 36.0 ft: Hydraulically push rod probe.	
- 40 -													
- 45 -													
_ 50 _													
Stratifi			t approximate bour				-	-				Page 2 of 4	
Wate pres	er level read ent at the ti	aıngs have ime meası	been made at time urements were mad	es and unde de.	r conditions state	d. Gro	undwate	r fluctua	ation	ns may occ	ur due	to conditions other than those Boring No.: HB-PAMI-	117

			Schonewald)	PRO.IF	СТ	Portla	and Ar	ea Ma	inlin	e Improvements	Boring No.: HB-PAMI	-117
			Engineering		I ROOL	•					13.7 to 49.3	Proj. No.: 18-01	_
			Associates, In		LOCATION				h to F	ortla	and, ME	-	<u> </u>
Drille	er:		New England I	Boring Co	ntractors	Ele	vation	(ft.)	67 ft (est'd)		Core Barrel: n/a	
<u> </u>	rator:		Enos/ Share			Dat	um:		NAVD8			Sampler: standard split-spoo	on
Logg	ged By:		Schonewald			Rig	Type:		Mobile	Drill	B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fin		12/4/18; 1345			+	lling Me				n boring	Hammer Type: calibrated auto-hamn	ner
Bori	ng Locati	on:	Sta 2340+00, 95	LT (approx)	-	sing ID		HW (4		14 ft	Hammer Efficiency: 0.906	
IN-SIT	U SAMPLIN	IG AND T	FSTING:		ADDITIONAL D		ger ID/O	DD:	SSA to		TIONAL DEFINITIONS:	Water Level*: 7.6 ft (open) LABORATORY TEST RESULTS:	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon Sa Jnsuccessfu in Wall Tube Jnsuccessfu itu Vane Sh	imple I Split Sp Sample I Thin Wa ear Test	oon Sample attemple all Tube Sample att ane Shear Test atte	pt tempt empt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fie R = Rock Core RQD = Rock C	= N val correct ency = o ld Vane Sample	lue ted for ha calculated e Shear S le	hammer trength (p	efficiency	WOI WOI = I BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte CONSOL= 1-D consolidation test	icity Index
					formation								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
50													
- 55 -													
- 60 -													
- 65 -													
- 70 -													
											1		
. 75 	orke:									77.H	1		
Stratifi		-	it approximate bour				-	-				Page 3 of 4	
* Wate	er level read	ings have	e been made at time urements were made	es and under de.	conditions state	ed. Gro	undwater	fluctuatio	ns may oc	cur due	e to conditions other than those	Boring No.: HB-PAMI-	117

			Schonewald		PROJE	CT:	Portla	and Aı	rea Ma	ainlin	e Improvements	Boring No.: HB-PAMI-	-117
			Engineering								13.7 to 49.3	Proj. No. :18-017	7
Drille	or:		Associates, In New England		LOCATIO		Scarl vation			<u>Portla</u> (est'd)		Core Barrel: n/a	
	rator:		Enos/ Share	Borning Co	IIIIaciois	+	um:	(11.)	NAVD			Sampler: standard split-spoo	nn .
·	ged By:		Schonewald			-	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	JII
	Start/Fi		12/4/18; 1345	- 12/5/18:	1110	_	lling Me	ethod:			n boring	Hammer Type: calibrated auto-hamm	ner
	ng Locat		Sta 2340+00, 95			_	sing ID/			4") to		Hammer Efficiency: 0.906	
						_	ger ID/0			to 9 ft		Water Level*: 7.6 ft (open)	
	U SAMPLII		ESTING:		ADDITIONAL D N-uncorrected						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
MD = L	Jnsuccessfi	ul Split Sp	oon Sample attem	pt	N ₆₀ = N value	correct	ted for ha			WOI	R = weight of rods	-#200 = percent fines WC = water conte	nt (%)
MU = U		ul Thin W	all Tube Sample at	tempt	hammer efficie S _u = Insitu Fiel	d Vane	Shear S			BOF	not recorded REHOLE ADVANCEMENT METH		
	situ Vane Sh Jnsuccessfu		ane Shear Test att	empt	R = Rock Core RQD = Rock C			on (%)			VHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / PL=Plastic Limit / PI=Plasti lic push UCT qp = peak compressive strength of rock	
				Sample Ir	formation								
	.	(in.)	Sample Depth (ft.)	<u>.</u>		ted				ō			Lab.
(ft.)	Sample No.		9	i 9/)	Strength (psf) or RQD (%)	N-uncorrected		_	ou	Graphic Log	Visual D	escription and Remarks	Testing
Depth (ft.)	l du	Pen./Rec.	l mg (ws	engi 10 RQE	nucc	00	Casing Blows	Elevation (ft.)	ihdi			Results
	Sa	Pe	Sa (ft.)	8 g	s o o	ž	09-N	Ca	Ele (ft.)	Ğ			
75													
- 80 -													
											83.3 ft: Sand seams not	ed.	
- 85 -													
- 90 -									-23.0	200	Bottom of Exploratio	n at 90.0 feet below ground surface.	
											90.0 ft: Rod probe fetche Marine Silt-Clay; bottom	es up; stands rig; inferred bottom of	
											waine one-clay, bollom	i of borning, no retusal.	
- 95 -													
<i>5</i> 0 -													
100	arks:												
Keili	<u>ains.</u>												
Q4mm 41 ft	iontion !!	rorre	t annrovimat - L	ndarias tt	oon goll by	nei# -	no mon- L	arod				Page 4 of 4	
		-	t approximate bou				-	-				Page 4 of 4	
"Wate pres	er level read ent at the ti	ings have me measi	been made at tim rements were ma	es and unde de.	r conditions state	d. Gro	undwater	fluctuatio	ns may o	ccur du	e to conditions other than those	Boring No.: HB-PAMI-	117

PROJECT: Portland Area Mainline Improvements Boring No.: 1HB-PAMILAR and SICHONISTRING No. 100-11 No.: 180-017 No.: 180-01	_			C		_									- · · · ·	LID DAM	440
Difference Description Des						PR	OJE	CT:							_		
Definition Def							` A TI	ON.							Proj. No.:	18-01	7
Operation: Enroy Share Datum: NAVUBLE NAVUBLE NAVUBLE Capped by Share	Drille	\r:									_			na, ivie	Coro Barrol:	n/a	
Logoed by: Schonewald Sign Type: Mobile Diff IS 3 (Judder track ATV) Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald with bring Nammer Wype: citizenes are here by: Schonewald Nammer Wype: citizenes Nammer Wype: citizenes are here by: Schonewald Nammer Wype: citizenes Nammer Wype: citizen					Borning Co	milacic	15	+		(11.)							on.
Date Start Firsteils 12/4/16, 035-145 Drilling Methods Cased wash bording Sharing Location Shari														E2 (rubbor trook AT\/)			ווט
Description Security Securi			iniohi		1115			+						,			
Name August DOI: SAN-5-16 August DOI:						۷)		-						<u> </u>			ici
Martin Amplitude And TESTING: Applitude And Service And Servic	ВОП	ig Loca	uon.	3ta 2339+20, 70	лет (арргол	^)		-						11			
No.				TESTING:				EFINIT	IONS:				ADDITI		LABORATORY TE	ST RESULTS:	
Comparison Com	MD = l U = Th MU = l V = Ins	Jnsuccess in Wall Tul Jnsuccess itu Vane S	ful Split S be Sample ful Thin W Shear Test	e /all Tube Sample at t /ane Shear Test att	tempt	N ₆₀ = hamm S _u = I R = R ₀	N value er efficie nsitu Fiel ock Core Rock C	correct ency = old Id Vand Samp	ted for hacalculate e Shear Sole	d hamme Strength (efficien	icy	WOR = no BORE SSA/H	= weight of rods of recorded EHOLE ADVANCEMENT METH HSA=solid/hollow stem auger	-#200 = percent CONSOL= 1-D of ODS: UU=Unconsolida LL=Liquid Limit /	fines WC = water conte consolidation test ated undrained triaxial test PL=Plastic Limit / PI=Plast	ticity Index
1D. Grey brown, loose, damp to moist, layered GRANULAR and SILT-CLAY FILL. 2D. 24/15			<u> </u>					ס				1					
1D. Grey brown, loose, damp to moist, layered GRANULAR and SILT-CLAY FILL. 2D. 24/15		Sample No.		Sample Dept (ft.)	Blows (/6 in.) Shear	Strength (psf) or ROD (%)		N-uncorrecte	09-N	Casing Blows	Elevation	(111.)	Graphic Log	Visual D	escription and Rem	arks	Testing
10 24/16 20-40 65-34 8 12	0									S\$A		8	\bowtie				
10 24/16 20-40 65-34 8 12											1	×	\bowtie				
10 24/16 20-40 65-34 8 12											1	Š	\bowtie	1D: Croy brown Joogs	damp to maint lavor	ad CDANIII AD and	
SILT-CLAY FILL SILT-CLAY GRUST SILT		1D	24/18	2.0 - 4.0	6-5	5-3-4		8	12			Š	\bowtie		damp to moist, layer	eu GRANOLAR anu	
SILT-CLAY FILL SILT-CLAY GRUST SILT											1	×	\bowtie				
10										¥	1	×	\bowtie	2D: Grey brown, loose, i	moist to wet, layered	GRANULAR and	
10	- 5 -	2D	24/15	4.0 - 6.0	2-3	3-6-7		9	14	28	1	×	\bowtie	SILT-CLAY FILL.			
10 3D 24/24 90-110 4-5-6-8 11 17 OPEN 3D Olive brown, slightly mottled, stiff, Clayey SiLT. MARINE CLAY CRUST C										45		Š	\bowtie				
10 30 24/24 90-11.0 4-5-6-8 11 17 OPEN 3D: Olive brown, slightly mottled, stiff, Clayey SiLT. MARINE CL. WC-20% SiLT-CLAY CRUST SiLT-CLAY CRUST SiLT-CLAY CRUST SiLT-CLAY CRUST SiLT-CLAY CRUST 46.0 SiLT-CLAY Grading to Silty CLAY. 46.0 SiLT-CLAY Grading to Silty CLAY. 46.0 Silt										32	1	×	\bowtie				
10 30 24/24 90-11.0 4-5-6-8 11 17 OPEN 3D: Olive brown, slightly mottled, stiff, Clayey SiLT. MARINE CL. WC-20% SiLT-CLAY CRUST SiLT-CLAY CRUST SiLT-CLAY CRUST SiLT-CLAY CRUST SiLT-CLAY CRUST 46.0 SiLT-CLAY Grading to Silty CLAY. 46.0 SiLT-CLAY Grading to Silty CLAY. 46.0 Silt										-	1	×					
3D 24/24 80-11.0 4-56-8 11 17 OPEN 10										64	53	٥.	XX				
10 30 24/24 90-110 4-5-8 11 17 OPEN SILT-CLAY CRUST WO-29/8 11-46 Pt-22 Pt-22 11-46 Pt-22 Pt-22 Pt-22 11-40 11-40 Pt-22										96							
15 4D 24/24 14.0 - 16.0 WOH224* - 46.0 Sur-412/27 prid 46.0 Sur-412/27 prid 47.0 - 18.0 Sur-412/27 prid 48.0 Sur-4		3D	24/24	9.0 - 11.0	4-5	5-6-8		11	17	OPEN	1				mottled, stiff, Claye	y SILT. MARINE	
4D: Olive brown grey grading to dark grey black, v. soft, SILT & CLAY grading to Silty CLAY. 15 40 24/24 16.0 15.0 50 24/24 16.0 15.0 50 24/24 16.0 15.0 50 24/24 19.0 20 40: Olive brown grey grading to dark grey black, v. soft, SILT & CLAY grading to Silty CLAY. 15.0 50: Dark grey, Silty CLAY. MARINE SILT CLAY V1: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm vane) V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) V1: Dark grey, Silty CLAY. 20 6D: Dark grey, Silty CLAY. 8D: Dark grey, Silty CLAY. 8D: Dark grey, Silty CLAY. 8D: Dark grey, Silty CLAY. Y3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Page 1 of 2	- 10 -										1			SILT-GLAT GROOT			LL=46
15											1						
15																	
15											1						
15											1						
15											1			4D. Olive harves		# OILT 0	
5D: Dark grey, Silty CLAY. MARINE SILT CLAY V1: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm vane) V2		4D	24/24	14.0 - 16.0	wo)H/24"											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. V1: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm vane) V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) V3: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) V4: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm vane) V4: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm vane) V4: Tu=15 / Tr=1 ft-	- 15 -										46	.0 K				15.0	1
V2											1			5D: Dark grey, Silty CLA	Y. MARINE SILT C	LAY	
V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm vane) U1: Dark grey, Silty CLAY. U1: Dark grey, Silty CLAY. 6D: Dark grey, Silty CLAY. V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Page 1 of 2		5D V1	24/24	16.0 - 18.0 16.6 - 17.0	VANE II Su= 46	NTERVAL 67/ 55 psf					1			V1: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm va	ane)	
U1: Dark grey, Silty CLAY. U1: Dark grey, Silty CLAY. U1: Dark grey, Silty CLAY. 6D: Dark grey, Silty CLAY. V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Page 1 of 2		V2		17.6 - 18.0	Su= 41	12/ 27 psf								V2: Tu=15 / Tr=1 ft-lbs (65 mm x 130 mm va	ane)	
20											1			(····/	
20 6D: Dark grey, Silty CLAY. 24.0 - 26.0 VANE INTERVAL 25 V3 Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.											1			U1: Dark grey, Silty CLA	ιΥ.		
6D: Dark grey, Silty CLAY. 25 V3 24/1 24.0 - 26.0 VANE INTERVAL Su= 316/14 psf Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.	- 20 -	U1	24/24	19.0 - 21.0	HYD	PUSH					1						
25 60 24/1 24.0 - 26.0 VANE INTERVAL V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.																	
25 60 24/1 24.0 - 26.0 VANE INTERVAL V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.											1						
25 60 24/1 24.0 - 26.0 VANE INTERVAL V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.											┨						
25 60 24/1 24.0 - 26.0 VANE INTERVAL V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.											1						
25 60 24/1 24.0 - 26.0 VANE INTERVAL V3: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.																	
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 2		6D	24/1	24.0 - 26.0	VANE II	NTERVAL					1						
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. **The control of the co	25 _			24.6 - 25.0	Su= 31	16/ 14 psf						2	42 A	V3: Tu=11.5 / Tr=0.5 ft-l	bs (65 mm x 130 mr	n vane)	
*Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.			-						-	_					Page 1 of 2		
	* Wate	er level rea	dings hav	e been made at tim surements were ma	nes and unde de.	er condition	ons state	d. Gro	oundwate	er fluctuati	ons may	occi	ur due t	to conditions other than those	Borina N	lo.: HB-PAMI-	118

Delian: Nove England Scring Contractors Elevation (R) Si R (safet) Scring Service S				Schonewald Engineering		PROJI	ECT:					e Improvements	Boring No.: _		
Charged System			==			LOCAT	ION:						Proj. No.:	18-017	7
Description Part	Drille	er:		New England	Boring Co	ntractors	Ele	vation	(ft.)	61 ft	(est'd)		Core Barrel:	n/a	
Date StartFirstein: 124/18 (1836-1145) Septing Location: Sep	Oper	ator:		Enos/ Share			Da	tum:		NAVE	88		Sampler:	standard split-spoo	on
Second S	Logg	ed By:		Schonewald			Rig	Type:		Mobi	le Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Martin Barrino: Appendix Ap	Date	Start/Fi	inish:	12/4/18; 0835	-1145		Dri	lling M	ethod:	case	d wash	n boring	Hammer Type:	calibrated auto-hamm	ner
INSTITUTE ANALYSIA AND TESTINGS. COST (Sing post improved in the proposal part of the propos	Borir	ng Loca	tion:	Sta 2359+20, 70) LT (approx	:)	Ca	sing ID	/OD:	HW	4") to 9	9 ft	Hammer Efficienc	y: 0.906	
Description and the control of the								_	OD:	SSA				, , ,	
The control of the	D = Spl MD = U U = Thi MU = U V = Insi	lit Spoon S Insuccess in Wall Tul Insuccess itu Vane S	Sample ful Split Sp be Sample ful Thin Wa Shear Test	oon Sample attem all Tube Sample at ane Shear Test att	npt ittempt ittempt	N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Co RQD = Rock	ed = N va ue correct ciency = Field Van ore Samp	alue eted for ha calculated e Shear S ele	d hammer Strength (p	efficienc	WOF WOF = 1 BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger	AASHTO / USCS s -#200 = percent fine CONSOL= 1-D con ODS: UU=Unconsolidate LL=Liquid Limit / Pl	oil classifications es WC = water conte solidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	icity Index
25															
V4		Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarl	ks	Testing
30	25	V4		25.6 - 26.0	Su= 30	02/ 0 psf						\/4: Tu=11 / Tr=0 ft lbs /	65 mm v 130 mm van	0)	
V6 30.6-31.0 Su-279 0 pt V6 1 30.6-31.0 Su-279 0 pt V6 1 31.0 ft. Hydraulically push rod probe. V6. Tu=10 / Tr=0 ft-bs (65 mm x 130 mm vane) 31.0 ft. Hydraulically push rod probe. 41 ft. Sand seams noted. 41 ft. Sand seams noted. 43 8 Sutom of Exploration at 47.3 feet below ground surface. 47.3 ft. Rod probe fetches up; stands rig; inferred bottom of Marine Sitt. Clay; bottom of boring; no refusal. Stratflication lines represent approximate boundaries between soil types; transitions may be gradual.														6)	
V6 30.6-31.0 Su-275/0 pirl V6. Tu=10 / Tr=0 ft-lbs (65 mm x 130 mm vane) 31.0 ft. Hydraulically push rod probe. 41 ft. Sand seams noted. 41 ft. Sand seams noted. 45 Sand seams noted. 45 Sand seams noted. 47.3 Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft. Rod probe fetches up; stands ng; inferred bottom of Marine Sitt-Clay; bottom of boring; no refusal. Strattlication lines represent approximate boundaries between soft types, transitions may be gradual.	- 30 -	7D V5	24/24	29.0 - 31.0 29.6 - 30.0	VANE IN Su= 30	NTERVAL 2/ 14 psf						V5: Tu=11 / Tr=0.5 ft-lbs	65 mm x 130 mm va	ine)	
31.0 ft. Hydraulically push rod probe. 41 ft. Sand seams noted. 41 ft. Sand seams noted. 42.3 ft. Rod probe fetches up, stands rg, inferred bottom of Marine Silt-Clay, bottom of boring, no refusal. 50 Remarks: Stratification lines represent approximate boundaries between soil types, transitions may be gradual.		V6		30.6 - 31.0	Su= 27	75/ 0 psf						V6: Tu=10 / Tr=0 ff-lbe /	65 mm v 130 mm van	۵)	
41 ft: Sand seams noted. 45 Bottom of Exploration at 47.3 feet below ground surface, 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Strattication lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2														<i>G</i>)	
41 ft: Sand seams noted. 45 Bottom of Exploration at 47.3 feet below ground surface, 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Strattication lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2												, , , , ,	·		
41 ft: Sand seams noted. 45 Bottom of Exploration at 47.3 feet below ground surface, 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Strattication lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
41 ft: Sand seams noted. 45 Bottom of Exploration at 47.3 feet below ground surface, 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Strattication lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
41 ft: Sand seams noted. 45 Bottom of Exploration at 47.3 feet below ground surface, 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Strattication lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
41 ft: Sand seams noted. 45 Bottom of Exploration at 47.3 feet below ground surface, 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Strattication lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
41 ft: Sand seams noted. 41 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 43 ft: Sand seams noted. 47 ft: Sand seams noted.	- 35 -									1					
41 ft: Sand seams noted. 41 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 43 ft: Sand seams noted. 47 ft: Sand seams noted.															
41 ft: Sand seams noted. 41 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 43 ft: Sand seams noted. 47 ft: Sand seams noted.															
41 ft: Sand seams noted. 41 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 41 ft: Sand seams noted. 43 ft: Sand seams noted. 43 ft: Sand seams noted. 47 ft: Sand seams noted.															
47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Sitt-Clay; bottom of boring; no refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2	- 40 -									İ					
47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Sitt-Clay; bottom of boring, no refusal. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2												41 ft: Sand seams noted	ſ		
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2												41 II. Gana Scams noted	··		
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2										1					
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2	- 45 -									ł					
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2															
Bottom of Exploration at 47.3 feet below ground surface. 47.3 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal. Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2				+						13.7	12/1/2			47.3	
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2												Bottom of Exploratio	n at 47.3 feet below g	round surface.	
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2														rea pollom or	
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2										i					
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 2 of 2		ouk-:								<u> </u>					
*Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those			s represen	t approximate bou	undaries betw	een soil types;	transition	ns may bo	e gradual.				Page 2 of 2		
	* Wate	r level rea	dings have	been made at tim	nes and unde	r conditions sta	ated. Gro	oundwate	r fluctuation	ons may	occur due	e to conditions other than those	Boring No	· HR-PAMI-	118

			Schonewald		PROJI	ECT:	Portl	and A	Area M	ainlir	ne Improvements	Boring No.: HB-PAMI-	-119
			ENGINEERING			101					13.7 to 49.3	Proj. No.: 18-017	7
Drille	er:		Associates, In New England I		LOCAT ntractors		Scar evation			(est'd)		Core Barrel: n/a	
	ator:		Enos/ Share	Borning Gor	THE GOLOTO	-	tum:	(14.)	NAVI			Sampler: standard split-spoo	on
	ed By:		Schonewald			Rig	Type:		Mob	ile Drill	B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi	nish:	12/20/18; 1205	5-1345		_	Iling M				n boring	Hammer Type: calibrated auto-hamm	ner
Bori	ng Loca	tion:	Sta 2360+50, 10	0 RT (appro	ox)	Ca	sing ID	/OD:	HW	(4") to	9 ft	Hammer Efficiency: 0.906	
							ger ID/	OD:	SSA	to 9 ft		Water Level*: 10.9 ft (open, end)	
D = Sp MD = U U = Th MU = U V = Ins	in Wall Tub Insuccessf itu Vane S	sample ful Split Sp pe Sample ful Thin Wa hear Test	oon Sample attem	pt tempt empt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _U = Insitu F R = Rock Cc RQD = Rock	ed = N va ue correct ciency = rield Van ore Samp	alue eted for ha calculated e Shear Sole	d hamme Strength	r efficienc	WO WO y = BO I SSA	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications #200 = percent fines WC = water conter CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plasti iic push UCT qp = peak compressive strength of rock	city Index
		·		•	formation	ъ							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strengtn (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
0								S\$A					
									1				
	1D	24/24	2.0 - 4.0	3-4-	9-10	13	20					d, slightly desiccated, damp, stiff SILT- e Sand; appears reworked.	
- 5 -	2D	24/24	4.0 - 6.0	2-3	-6-7	9	14				2D: Olive brown, mottled to little fine Sand; appea	d, damp, stiff, SILT-CLAY FILL with trace reworked.	
									-				
									52.	. 💥		- — — — — — — — — — — 7.5-	
									32.	<i>' </i>		7.5	
								$L \mathbb{V}$					
- 10 -	3D	24/24	9.0 - 11.0	2-2	-2-2	4	6	OPEN	1			r mottled, SILT & CLAY, trace fine Sand live grey, CLAY & SILT; appears ILT-CLAY CRUST	
									47.0			ty CLAY with occasional nodules.	
- 15 -	4D V1	24/24	14.0 - 16.0 14.6 - 15.0	VANE IN Su= 563	ITERVAL 3/ 55 psf						MARINE SILT-CLAY		
- 15 -	V2		15.6 - 16.0	Su= 522	2/ 27 psf						V1: Tu=20.5 / Tr=2 π-ibs V2: Tu=19 / Tr=1 ft-lbs (s (65 mm x 130 mm vane)	
											V2. 10-197 11-1 II-IDS (os min x 130 min vane)	
								$oxed{\mathbb{V}}$			55 5		<u> </u>
	5D V3		19.0 - 21.0 19.6 - 20.0	VANE IN	ITERVAL 6/ 14 psf							ty CLAY with occasional nodules. bs (65 mm x 130 mm vane)	CL -#200=95%
- 20 -	V4		20.6 - 21.0		1/ 14 psf							bs (65 mm x 130 mm vane)	WC=38% LL=39 PL=20
											21.0 ft: Hydraulically pus		<u>PI=19</u>
			+ +						-				
25											1		
	arks:	s represen	it approximate bour	ndaries betwe	een soil types;	transitio	ns may b	e gradua	I.			Page 1 of 2	
* Wate	r level readent at the ti	dings have	e been made at time urements were made	es and under	conditions sta	ated. Gr	oundwate	r fluctua	ions may	occur du	e to conditions other than those	Boring No.: HB-PAMI-	119

			Schonewald Engineering				Main	e Turr	ipike I	MM 4	e Improvements 3.7 to 49.3	Boring No.: HB-PAMI- Proj. No.: 18-017	-
			Associates, In		LOCATIO						and, ME		
Drille			New England I	Boring Co	ntractors	_	vation	(Tt.)		(est'd)		Core Barrel: n/a	
<u> </u>	rator:		Enos/ Share			_	um:		NAVD		D = 0 (11 (1 A = 10)	Sampler: standard split-spoo	on
	ged By:		Schonewald			_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		12/20/18; 1205			_	ling Me				boring	Hammer Type: calibrated auto-hamm	ier
Borii	ng Locat	tion:	Sta 2360+50, 10	0 RT (appro	ox)	_	ing ID			4") to	9 ft	Hammer Efficiency: 0.906	
IN_SIT	U SAMPLI	NG AND I	resting.		ADDITIONAL DI		ger ID/0	DD:	SSA	to 9 ft	TIONAL DEFINITIONS:	Water Level*: 10.9 ft (open, end) LABORATORY TEST RESULTS:	
D = Sp MD = U U = Th MU = U V = Ins	olit Spoon S Unsuccessf iin Wall Tub Unsuccessf situ Vane Sl	ample ful Split Sp pe Sample ful Thin Wa hear Test	oon Sample attem	tempt empt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fiel R = Rock Core RQD = Rock Q	= N val correcte ncy = c d Vane Sample	ue ed for ha alculated Shear S e	hammer trength (p	efficiency	WO WO = BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water content CONSOL= 1-D consolidation test	city Index
				•	formation	- 1				1			
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
25													
- 30 -													
- 35 -													
- 40 -									16.9		41.5 ft: Sand seams not	ed43.1-	
- 45 -									10.9		Bottom of Exploratio 43.1 ft: Rod probe fetch Marine Silt-Clay; bottom	n at 43.1 feet below ground surface. es up; stands rig; inferred bottom of	
50													
Stratifi	er level read	dings have	t approximate bour been made at tim urements were mac	es and unde			-	-	ns may o	ccur du	e to conditions other than those	Page 2 of 2 Boring No.: HB-PAMI-	119

			Schonewale	<u> </u>			\	D41	l A		\ 1 - :	11	- 1	Boring No.:	HB-PAMI-	120
			Engineering		PRC	JJEC							e Improvements 3.7 to 49.3	_		
			Associates, I		LOCA	ATIO							nd, ME	Proj. No.:	18-017	<u>/</u>
Drille	<u> </u>		New England					vation		_		st'd)	iid, WL	Core Barrel:	n/a	
Oper	ator:		Enos/ Share				_	um:	· ,		VD88			Sampler:	standard split-spoo	on
Logo	jed By:		Schonewald				Ria	Type:		Мо	bile	Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi	inish:	12/3/18; 1000	- 12/4/18:	1255		_		ethod:				boring	Hammer Type:	calibrated auto-hamm	ner
	ng Loca		Sta 2369+05, 95					sing ID				') to 3		Hammer Efficience		
	3		,	(-1-1	,			ger ID/			_	9 ft		Water Level*:	none observed abo	ove 9 ft
			TESTING:		ADDITION		FINIT	IONS:					IONAL DEFINITIONS:	LABORATORY TEST		
MD = U U = Th MU = U V = Ins	in Wall Tul Insuccess itu Vane S	ful Split Sp be Sample ful Thin W Shear Test	all Tube Sample at	ttempt tempt	N-uncorr N ₆₀ = N hammer S _u = Insi R = Rock RQD = R	value c efficien itu Field Core S cock Qu	correct acy = c d Vane Sampl	ed for ha alculate Shear S le	d hamme Strength (r efficier		WOF = r BOR SSA	I = weight of 140lb. hammer I = weight of rods tot recorded EHOLE ADVANCEMENT METH HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraul	CONSOL= 1-D cor ODS: UU=Unconsolidate LL=Liquid Limit / P	es WC = water content resolidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	city Index
				Sample In			_ 1				\dashv					
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)		N-uncorrected	09-N	Casing Blows	Elevation	(п.)	Graphic Log	Visual D	escription and Remar	ks	Lab. Testing Results
0									S\$A		8	₩				
										1	8	₩				
										-	8	₩	1D: Olive brown grey, m	attlad designated da	mn m etiff Clavov	
	1D	24/24	2.0 - 4.0	3-3	3-4-7		7	11			Š	₩	SILT, little fine Sand; ap			
											8	₩				
										-	8	₩	2D: Olive grey brown, m	ottled, moist, v. stiff, 0	Clavev SILT. trace	
- 5 -	2D	24/24	4.0 - 6.0	4-8	3-9-11		17	26			8	₩	fine Sand; appears rewo			
3											8	₩				
										+	8	₩				
											È	₩				
											8	₩				
									11/	1	8	₩				
									$\perp \vee$		8	₩				
	3D	24/24	9.0 - 11.0	2-3	3-4-5		7	11	OPEN	ı	8	₩	3D: Olive brown grey, sl grading to SILT & CLAY			
- 10 -										49	0.0		∖reworked.	,		
										4					— — — 10.0-	
										1						
										-						
	4D	24/24	14.0 - 16.0	VANE II	NTERVAL					1			4D: Olive grey, CLAY &	SILT, trace very fine S	Sand. MARINE	CL -#200=99%
- 15 -	V1		14.6 - 15.0	Su= 742	2/ 124 psf					-			SILT-CLAY CRUST V1: Tu=27 / Tr=4.5 ft-lbs	s (65 mm x 130 mm va	ane)	WC=29%
	V2		15.6 - 16.0	Su= 63	32/ 96 psf								V2: Tu=23 / Tr=3.5 ft-lbs	s (65 mm x 130 mm va	ane)	LL=41 PL=23
															,	<u>PI=18</u>
										1						
										41	.5				— — — —17.5-	
		04/04	40.0.24.0	VANE I	NITEDY/AL					1			5D: Dark grey black, Silt	y CLAY. MARINE SIL	T-CLAY	
- 20 -	5D V3	24/24	19.0 - 21.0 19.6 - 20.0	Su= 46	NTERVAL 67/41 psf					4			V3: Tu=17 / Tr=1.5 ft-lbs	s (65 mm x 130 mm va	ane)	
	V4		20.6 - 21.0	Su= 38	35/ 14 psf								V4: Tu=14 / Tr=0.5 ft-lbs	s (65 mm x 130 mm va	ane)	
										1			V 1. 14 117 11 0.0 10 10	7 (00 11111 7 100 11111 70		
										4						
										┨			U1: Dark grey, Silty CLA	ιΥ.		
25	U1	24/24	24.0 - 26.0	HYD	PUSH								3 ,, ,			
	arks:													Daniel Co.		
Stratifi	cation line	s represer	nt approximate bou	indaries betw	veen soil typ	es; trar	nsition	is may b	e gradua					Page 1 of 2		
* Wate	er level rea	dings have	e been made at tim urements were ma	nes and unde	er conditions	stated	l. Gro	undwate	r fluctuat	ions ma	у осс	cur due	to conditions other than those	Boring No	.: HB-PAMI-	120

			Schonewald		PROJ	ECT:	Portla	and A	rea M	ainlir	ne Improvements	Boring No.: _	HB-PAMI-	-120
			Engineering				Main	e Turr	npike	MM 4	43.7 to 49.3	Proj. No.:	18-017	7
D.:III			Associates, I								and, ME	0		
Drille	er: rator:		New England Enos/ Share	Boring Co	ntractors	_	evation tum:	(π.)	59 π NAVE	(est'd))	Core Barrel: Sampler:	n/a	
⊢÷-	ged By:		Schonewald			_	g Type:				I B-53 (rubber track ATV)	Hammer Wt./Fall:	standard split-spoo	лі
	Start/Fi		12/3/18; 1000	12/4/18:	1255	+	illing M	ethod:			h boring	Hammer Type:	calibrated auto-hamm	
	ng Loca		Sta 2369+05, 95				sing ID			4") to		Hammer Efficience		
-				(,	_	ger ID/			to 9 ft		Water Level*:	none observed abo	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess situ Vane S	ful Split Spo De Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample at ane Shear Test att	npt ttempt tempt	ADDITIONAL N-uncorrector N ₆₀ = N valor hammer effication Su = Insitu F R = Rock Co RQD = Rock	DEFINITION DEFINI	TIONS: alue cted for ha calculated be Shear Sole	mmer effi I hammer strength (p	ciency efficiency	WO WO WO = BO	ITIONAL DEFINITIONS: H = weight of 140lb. hammer by the weight of rods not recorded REHOLE ADVANCEMENT MET AVHSA=solid/hollow stem auger recoller cone/OPEN/PUSH=hydrau	LABORATORY TEST AASHTO / USCS si #200 = percent fine CONSOL = 1-D con IODS: UU=Unconsolidated LL=Liquid Limit / PL	RESULTS: bil classifications s WC = water content solidation test d undrained triaxial test =Plastic Limit / PI=Plasti	nt (%)
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log	Visual C	escription and Remark	KS	Lab. Testing Results
25														
- 30 -	6D	24/6	29.0 - 31.0	1-2	2-2-2	4	6	26	30.3		29.0 ft: Unable to push 6D: Grey, v. loose, fine to little Gravel. TILL	vane. to coarse SAND, little t	—28.7- o some Silt, trace	
								25						
								31						
								33						
								33						
								36						
	7D	24/7	34.0 - 36.0	2-3	3-3-3	6	9				7D: Grey, loose, fine to TILL	coarse SAND, some G	ravel, some Silt.	
- 35 -			+											
									23.0				36.0-	
											Bottom of Exploratio No refusal.	n at 36.0 feet below g	round surface.	
- 40 -														
- 45 -														
			+											
50 _														<u></u>
Stratifi			t approximate bou				-	-				Page 2 of 2		
^ Wate pres	er level rea ent at the t	dings have ime measu	been made at tim rements were ma	nes and unde ade.	r conditions sta	ated. Gr	oundwate	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring No	.: HB-PAMI-	120

			Schonewald)	PRO IF	CT.	Portl	and Δ	rea M	ainlir	ne Improvements	Boring No.:	HB-PAMI-	-121
			Engineering		I KOJL	_01.					43.7 to 49.3	Proj. No.:		
			Associates, I		LOCAT				gh to	Portla	and, ME	_	10 017	
Drille			New England	Boring Co	ntractors	_	evation	(ft.)		(est'd)			n/a	
⊢ `	rator:		Enos/ Share			+	tum:		NAVI			· · · · · · · · · · · · · · · · · · ·	standard split-spoo	n
	ged By:		Schonewald			_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/F		11/28/18; 1020			+-	illing M				h boring		calibrated auto-hamm	er
Borii	ng Loca	tion:	Sta 2371+70, 10	00 RT (appro	ox)	+-	sing ID			(4") to		Hammer Efficiency		
IN-SIT	U SAMPL	ING AND	TESTING:		ADDITIONAL		ger ID/	OD:	SSA	to 4 ft	TIONAL DEFINITIONS:	Water Level*: LABORATORY TEST F	2.6 ft (likely perche	<u>;a)</u>
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tu Jnsuccess itu Vane S	Sample Iful Split Split Split Split Iful Sample Iful Thin With Shear Test	poon Sample attem e /all Tube Sample at : /ane Shear Test att	npt ttempt tempt	N-uncorrecte N_{60} = N valu hammer effic S_{U} = Insitu Fi R = Rock Correct RQD = Rock	d = N va e correct iency = e eld Van re Samp	alue cted for ha calculated e Shear S ble	d hammer Strength (p	efficienc	WO WO y = BO SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger eroller cone/OPEN/PUSH=hydrau	AASHTO / USCS so -#200 = percent fine: CONSOL= 1-D cons IODS: UU=Unconsolidated LL=Liquid Limit / PL=	il classifications s WC = water conter olidation test undrained triaxial test =Plastic Limit / PI=Plasti	city Index
				·	formation		1	1	1	4				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remark	S	Lab. Testing Results
0								S\$A						
										\bowtie				
								\vdash		\bowtie	1D: Brown, wet, m. den	se, fine to medium SAN	D. some Silt.	
	1D	24/15	2.0 - 4.0	5-10-	10-14	20	30			\bowtie	trace coarse Sand; silt o		_,,,	
										\bowtie				
	2D	24/7	4.0 - 6.0	3.6	-7-7	13	20			\bowtie	2D: Brown, wet, m. den			
- 5 -			4.0 - 0.0		-1-1		20	<u> </u>		\bowtie	Silt, trace coarse Sand v sample. FILL	with one piece of gravei	in bottom of	
								23		\bowtie				
								34		\bowtie				
								38		\bowtie				
								30		\bowtie				
								50		\bowtie				
	3D	24/9	9.0 - 11.0	5-3	-3-3	6	9	15		$\otimes\!\!\!\otimes$	3D: Brown, loose, fine to coarse Sand, trace fine			
- 10 -								14				, 0		
										\bowtie				
								26		\bowtie				
								46	47,	.₩			40.0	
								108	47.0)			· — — —13.0-	
								0051			4D: Olive brown, slightly	mottled, Clayey SILT v	with occasional	CL
- 15 -	4D	24/24	14.0 - 16.0	6-7-1	11-11	18	27	OPEN			pockets and partings gro	ey Silt. MARINE SILT-C	CLAY CRUST	-#200=99% WC=29%
														LL=47 PL=26
														<u>PI=21</u>
	5D	24/24	19.0 - 21.0	WOH	/18"-3						5D: Olive grey brown, m	nottled, CLAY & SILT, tr	ace fine Sand.	
- 20 -														
	V1		21.6 - 22.0	Su= 659	9/ 69 psf						V1: Tu=24 / Tr=2.5 ft-lbs	s (65 mm x 130 mm var	ne)	
	V2		22.6 - 23.0	Su= 563	3/ 55 psf									
									36.5	. ///	V2: Tu=20.5 / Tr=2 ft-lbs	s (65 mm x 130 mm var	·	
									30.0		6D: Dark grey black, Sil	tv CLAY. MARINE SILT	- — — —23.5- -CLAY	
25	6D V3	24/24	24.0 - 26.0 24.6 - 25.0	VANE IN Su= 426	ITERVAL 6/41 psf						V3: Tu=15.5 / Tr=1.5 ft-	-		
	arks:	es represe	nt approximate bou	ndaries betwe	een soil tvnes: '	transitio	ns mav h	e gradual				Page 1 of 3		
l .		•					-	-			o to condition			
Wate pres	er level rea ent at the f	idings hav time meas	e been made at tim surements were ma	nes and under de.	conditions sta	ted. Gro	oundwate	r fluctuatio	ons may	occur du	e to conditions other than those	Boring No.	: HB-PAMI-	121

			C										· · · · · · · · · · · · · · · · · · ·	LID DAM	101
			SCHONEWALE		PROJ	ECT:						e Improvements	Boring No.: _	HB-PAMI	-121
			Engineering		l							3.7 to 49.3	Proj. No.:	18-01	7
<u> </u>			Associates, I		LOCAT							nd, ME			
Drille			New England	Boring Co	ntractors	_	evation	(ft.)		60 ft (Core Barrel:	n/a	
Oper	ator:		Enos/ Share			1	tum:			NAVD8	38		Sampler:	standard split-spoo	on
Logg	jed By:		Schonewald			Rig	g Type:			Mobile	Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/Fi	nish:	11/28/18; 102	0 - 11/29/1	18; 0955	Dri	illing M	ethod	:	cased	wash	boring	Hammer Type:	calibrated auto-hamn	ner
Borii	ng Loca	tion:	Sta 2371+70, 10	00 RT (appro	ox)	Ca	sing ID	/OD:		HW (4	l") to 1	4 ft	Hammer Efficience	cy: 0.906	
							iger ID/	OD:		SSA t			Water Level*:	2.6 ft (likely perche	ed)
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split S pe Sample ful Thin W hear Test	/all Tube Sample at : /ane Shear Test att	npt ttempt tempt	ADDITIONAL N-uncorrector N ₆₀ = N valor hammer efficient S _U = Insitu F R = Rock Cor RQD = Rock	ed = N va ue correc ciency = Field Van ore Samp	alue cted for ha calculated ne Shear S ple	d hamm Strength	er eff	ficiency	WOH WOF = r BOR SSA	IONAL DEFINITIONS: = weight of 140lb. hammer = weight of rods ot recorded EHOLE ADVANCEMENT METH HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / P	soil classifications nes WC = water conte nsolidation test ed undrained triaxial test 'L=Plastic Limit / PI=Plasti	icity Index
	٥.	(in.)	pth	 		ted					D O				Lab.
Depth (ft.)	Sample No.	Pen./Rec.	Sample Depth (ft.)	Blows (/6 i Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	i	Elevation (ft.)	Graphic Log	Visual D	escription and Remar	ks	Testing Results
25	V4		25.6 - 26.0	Su= 44	0/ 27 psf				-			V4: Tu=16 / Tr=1 ft-lbs (65 mm x 130 mm van	e)	
	U1	24/24	27.0 - 29.0	HYD	PUSH							U1: Dark grey, Silty CLA	AY.		
- 30 -	7D V5	24/24	29.0 - 31.0 29.6 - 30.0	VANE IN Su= 52	NTERVAL 2/ 27 psf							7D: Dark grey black, Silt V5: Tu=19 / Tr=1 ft-lbs (•	e)	CL -#200=95% WC=37%
	V6		30.6 - 31.0	Su= 59	1/ 55 psf				-			V6: Tu=21.5 / Tr=2 ft-lbs	s (65 mm x 130 mm va	ane)	LL=44 PL=22 <u>Pl=22</u>
- 35 -	U2	24/24	34.0 - 36.0	НҮД	PUSH							U2: Dark grey, Silty CLA	NY.		CONSOL (Cv, Cα) WC=45% LL=45 PL=24
	V7 V8		36.6 - 37.0 37.6 - 38.0		7/ 55 psf 7/ 55 psf							V7: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm van	e)	<u>PI=21</u>
	Vo		37.0 - 36.0	30- 40	177 99 psi							V8: Tu=17 / Tr=2 ft-lbs (65 mm x 130 mm van	ie)	
- 40 -	8D V9	24/24	39.0 - 41.0 39.6 - 40.0	VANE IN Su= 50	NTERVAL 8/ 69 psf							8D: Dark grey black, Silt V9: Tu=18.5 / Tr=2.5 ft-l	•	vane)	
	V10		40.6 - 41.0	Su= 46	7/ 69 psf							V107: Tu=17 / Tr=2.5 ft-	lbs (65 mm x 130 mm	,	
										17.5		9D: Dark grey, Silty CLA	V with two 4 inch law		
- 45 -	9D V11	24/24	44.0 - 46.0 44.6 - 45.0	(VANE/ Su= 98	/12")-2-2 39/ psf							V11: Tu=36 / Tr= ft-lbs 45.0 ft: Unable to push v	(65 mm x 130 mm va	ane)	
	10D	24/5	49.0 - 51.0	5-5	5-4-4	9	14			11.4		48.6 ft: Driller notes grav 10D: Grey, loose, fine to		48.6- e Gravel, trace Silt,	
S0 Rem	arks:	l					1		Щ						
* Wate	r level rea	dings hav	nt approximate bou e been made at tim urements were ma	nes and under			-	-		s may oc	ccur due	to conditions other than those	Page 2 of 3	o.: HB-PAMI-	121

			CHONEWALI		PROJI	ECT:					e Improvements	Boring No.: HB-PAMI-	-121
			Engineering Associates, ⁱ		LOCAT	ION:					13.7 to 49.3 and. ME	Proj. No.: 18-017	7
Drille	er:		New England				evation			(est'd)		Core Barrel: n/a	
Ope	rator:		Enos/ Share				tum:		NAVD	88		Sampler: standard split-spoo	on
Logg	ged By:		Schonewald			Rig	g Type:		Mobil	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi	inish:	11/28/18; 102	0 - 11/29/1	18; 0955	_	illing Mo				n boring	Hammer Type: calibrated auto-hamm	ner
	ng Loca		Sta 2371+70, 10			_	sing ID			4") to		Hammer Efficiency: 0.906	
				(-1-1-	,	_	ger ID/0			to 4 ft		Water Level*: 2.6 ft (likely perche	-d)
		ING AND T	ESTING:		ADDITIONAL	DEFINI	TIONS:			ADDI	TIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	/
	olit Spoon S Unsuccess		oon Sample attern	npt	N-uncorrecte N ₆₀ = N valu			mmer effi	ciencv		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte	nt (%)
U = Th	in Wall Tul	be Sample	Il Tube Sample a		hammer effic	iency =	calculated	l hammer	efficiency	=	not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test	,
V = Ins	situ Vane S	Shear Test	•	•	S _u = Insitu F R = Rock Co	re Samp	ole		151)	SSA	/HSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plasti	
MV = l	Jnsuccess	ful Insitu Va	ne Shear Test at		RQD = Rock	Quality	Designation	on (%)		RC=	roller cone/OPEN/PUSH=hydrau	lic push UCT qp = peak compressive strength of rocl	(
		· ·		· ·	nformation					1			
	<u>o</u>	Pen./Rec. (in.)	Sample Depth (ft.)	Ë.	Strength (psf) or RQD (%)	N-uncorrected				go			Lab.
Depth (ft.)	Sample No.	Sec.	e D	9) :	€ 0	опе		<u>Б</u>	Elevation (ft.)	Graphic Log	Visual D	Description and Remarks	Testing Results
pth	m d	n./F	dm (ows	ei B B	'n	90	Casing Blows	eva!	aph			resuits
	Sa	Pe	SS ≡	<u> </u>	ਰ ਦੇ ਲੋ	ž	09-N	Seg	⊞ #				
50											trace coarse Sand. TILL	-	
								+++					
	L	L	<u>L</u>								1		
								-W					
	11D	24/7	54.0 - 56.0	4-4	l-7-8	11	17					ravelly fine to coarse SAND, trace Silt.	
- 55 -			01.0 00.0				<u> </u>			11.	TILL		
									4.0		Bottom of Exploratio	n at 56.0 feet below ground surface.	
											No refusal.	· ·	
- 60 -													
- 65 -													
	L_	<u></u>					<u>L</u>						
	<u> </u>		+										
- 70													
- 70 -													
	<u> </u>		+										
	L												
	<u> </u>		+										
. 75 Rem	arks:						<u>I</u>	l	<u> </u>	1	<u> </u>		
Stratif	ication line	s represent	approximate bou	indaries betw	een soil types;	transitio	ns may be	gradual.				Page 3 of 3	
* Wate	er level rea	dings have time measu	been made at tim	nes and unde ide.	r conditions sta	ted. Gr	oundwater	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring No.: HB-PAMI-	121

			C									D. C. N.	LID DAM	400
			SCHONEWALE		PROJE	CT:					e Improvements	Boring No.: _		
			Engineering								3.7 to 49.3	Proj. No.:	18-017	7
			Associates, I		LOCATI				_		and, ME	_		
Drille	er:		New England	Boring Cor	ntractors	-	evation	(ft.)		(est'd)		Core Barrel:	n/a	
Oper	rator:		Enos/ Share			Da	tum:		NAV	D88		Sampler:	standard split-spoo	on
Logg	ged By:		Schonewald			Rig	g Type:		Mob	ile Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/F	inish:	11/30/18; 100	0 - 1445		Dri	illing M	ethod:	case	ed wash	boring	Hammer Type:	calibrated auto-hamm	ner
Bori	ng Loca	tion:	Sta 2371+80, 10	00 LT (approx	()	Ca	sing ID	/OD:	HW	(4") to	14 ft	Hammer Efficience	:y: 0.906	
						Au	iger ID/	OD:	SSA	to 9 ft		Water Level*:	6.2 ft (likely perche	ed)
			TESTING:		ADDITIONAL I						TIONAL DEFINITIONS:	LABORATORY TEST	RESULTS:	,
	lit Spoon S		ooon Sample attem	nnt	N-uncorrected N ₆₀ = N value			mmer effi	iciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS s	soil classifications les WC = water conte	nt (%)
U = Th	in Wall Tu	be Sample			hammer effici	ency =	calculated	d hammer	efficiend	y =	not recorded	CONSOL= 1-D cor	nsolidation test	(,-,
		stul Thin W Shear Test	all Tube Sample at	ttempt	S _u = Insitu Fig R = Rock Cor			Strength (p	ost)		REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger		ed undrained triaxial test L=Plastic Limit / PI=Plasti	icity Index
MV = L	Insuccess	ful Insitu V	ane Shear Test att	•	RQD = Rock	Quality	Designati	on (%)		RC=	roller cone/OPEN/PUSH=hydraul	ic push UCT qp = peak co	mpressive strength of rocl	k
		Т -		Sample In			1			-				
	·	(in.)	td	Ë	_	ted				g				Lab.
(F)	ž		ا م	9	_ %	шес			6	۲	Visual D	escription and Remar	ks	Testing
ţ.) ble	Į Ž) ble	ws (တင		ing	/ati	phic				Results
Depth (ft.)	Sample No.	Pen./Rec.	Sample Depth (ft.)	3lov She	Guerigin (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log				
0	•		., .		, , ,		+-			SEC.				
							1	S\$A						
											1D: Brown, damp to mo		oarse SAND, some	
	1D	24/13	2.0 - 4.0	3-6-	7-5	13	20				Gravel, some Silt. GRAI	NULAR FILL		
										氢	2D: Brown, moist to wet	, m. dense, fine to coa	arse SAND, some	
_	2D	24/12	4.0 - 6.0	2-9-	4-3	13	20				Gravel, some Silt. GRAI	NULAR FILL		
- 5 -														
								 						
								$ \hspace{.05cm} \hspace{.05cm} \hspace{.05cm} $						
		0.1/4.4	00.440	7.45	10.10		.	├	1		3D: Grey brown, m. den		m SAND, little	
10 -	3D	24/14	9.0 - 11.0	7-15-	12-18	27	41				Gravel, trace coarse Sa	nd. TILL FILL		
								62						
								4-7		250				
								47	50	0			12.0-	
								26						
									49.) ////			13.0-	
								89						
	4D	24/24	14.0 - 16.0	7-8-	9-12	17	26	OPEN			4D: Olive brown, mottled CLAY CRUST	d, v. stiff, Clayey SILT	. MARINE SILT-	
- 15 -											OLYT OROOT			
									1					
											5D: Olive grey brown, m	etiff CLAV & SILT W	ith few partings and	
	5D	24/24	19.0 - 21.0	1-2-	3-3	5	8				seams fine Sandy SILT.		nui iew parungs and	
20 -											-			
									38.		— — — — — — — 6D: Olive grey grading t		24.0-	CL
25	6D V1	24/	24.0 - 26.0 24.6 - 25.0	VANE IN Su= 563	TERVAL 55 psf						6D: Olive grey grading to	o dark grey, Slity CLA	Y. MARINE SILT-	-#200=94%
Rem	arks:													
1														
1														
Stratifi	cation line	es represer	nt approximate bou	ndaries betwe	en soil types; t	ransitio	ns may be	e gradual.				Page 1 of 3		
* Wate	er level rea	adings have	e been made at tim	nes and under	conditions stat	ed. Gr	oundwate	r fluctuatio	ons may	occur due	e to conditions other than those			400
pres	ent at the	time meas	urements were ma	de.		011			uy			Boring No	o.: HB-PAMI-	122

			Schonewald)	PRO.I	ECT:	Portl	and A	rea Ma	ainlin	e Improvements	Boring No.:	HB-PAMI	-122
			Engineering				Main	e Tur	npike l	MM 4	3.7 to 49.3	Proj. No.:	18-01	7
D.:III			Associates, I						_		and, ME	0	-1-	
Drille			New England Enos/ Share	Boring Co	ntractors		vation	(π.)	62 π NAVD	(est'd)		Core Barrel:	n/a	
⊢ `	rator:		Schonewald			+-	tum:				P. F2 (rubber track AT\/)	Sampler: Hammer Wt./Fall:	standard split-spoo	on
	ged By: Start/Fi	inieh:	11/30/18; 100	0 1445			g Type: illing M				B-53 (rubber track ATV) n boring	Hammer Type:	calibrated auto-hamn	nor.
	ng Loca		Sta 2371+80, 10) N		sing ID			4") to 1		Hammer Efficience		101
- Bonn	g <u></u>		0.00 207 17 00, 10	- С. (арр.с			ger ID/			to 9 ft		Water Level*:	6.2 ft (likely perche	
D = Sp MD = U U = Th MU = U	in Wall Tul	Sample ful Split Sp be Sample ful Thin W	ooon Sample attem e all Tube Sample at	npt	ADDITIONAL N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu I R = Rock Co	DEFINI ed = N va ue correc ciency = Field Van	FIONS: alue cted for ha calculated e Shear S	ammer eff d hammer	efficiency	WOF WOF = 1	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger		RESULTS: pil classifications es WC = water conte	nt (%)
			ane Shear Test att		RQD = Roc			ion (%)			roller cone/OPEN/PUSH=hydraul			
					nformation		1			1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log		escription and Remark	KS .	Lab. Testing Results
25	V2		25.6 - 26.0	Su= 49	94/ 41 psf				-		CLAY V1: Tu=20.5 / Tr=2 ft-lbs V2: Tu=18 / Tr=1.5 ft-lbs	s (65 mm x 130 mm va s (65 mm x 130 mm va	ne) ne)	WC=31% LL=42 PL=23 <u>PI=20</u>
	7D V3	24/18	29.0 - 31.0 29.6 - 30.0	VANE II	NTERVAL 04/27 psf				-		7D: Dark grey black, Sill V3: Tu=18 / Tr=1 ft-lbs (
- 30 -	V4		30.6 - 31.0		36/ 27 psf						V4: Tu=19.5 / Tr=1 ft-lbs			
- 35 -	U1	24/24	34.0 - 36.0	HYD	PUSH				-		U1: Dark grey, Silty CLA	.Y.		CONSOL (Cv, Cα) WC=43% LL=44 PL=22 PI=22
	8D V5	24/24	37.0 - 39.0 37.6 - 38.0	VANE IN Su= 44	NTERVAL 10/ 55 psf						8D: Dark grey black, Silt V5: Tu=16 / Tr=2 ft-lbs (
	V6		38.6 - 39.0	Su= 49	94/ 55 psf						V6: Tu=18 / Tr=2 ft-lbs (65 mm x 130 mm vane	e)	
- 40 -	U2	24/24	41.0 - 43.0	HYD	PUSH				-		U2: Dark grey, Silty CLA	Υ.		
- 45 -	9D V7	24/24	44.0 - 46.0 44.6 - 45.0	VANE IN Su= 659	NTERVAL 9/ 137 psf				-		9D: Dark grey, Silty CLA V7: Tu=24 / Tr=5 ft-lbs (=		
									445		45.7 ft: Unable to push v	rane below 45.7 ft.		
								\mathbb{L}^{\bigvee}	14.5		47.5 ft: Driller notes gra		· ·	
50	10D	24/12	49.0 - 51.0	5-6	6-5-7	11	17		L		10D: Grey, m. dense, fir little fine Gravel, trace co		ttle to some Silt,	
Stratifi		•	it approximate bou		-		-	-				Page 2 of 3		
* Wate	er level rea	dings have	e been made at tim urements were ma	ies and unde	er conditions st	ated. Gr	oundwate	r fluctuati	ons may o	ccur due	e to conditions other than those	Boring No	.: HB-PAMI-	122

			CHONEWALI)	PROJE	CT:	Portla	and A	rea Ma	inlin	e Improvements	Boring No.:HB-PAM	l-122
			NGINEERING				Main	e Turr	npike N	/M 4	13.7 to 49.3	Proj. No.: 18-01	7
			Associates, I		LOCATI								
Drill			New England	Boring Co	ntractors	+	vation	(ft.)	62 ft (Core Barrel: n/a	200
- i-	rator:		Enos/ Share Schonewald			+	tum:				B-53 (rubber track ATV)	Sampler: standard split-spo Hammer Wt./Fall: 140 lbs/30 inches	oon
	ged By: Start/Fi		11/30/18; 100	n - 1445		+	Type:				boring	Hammer Type: calibrated auto-ham	mer
	ng Locat		Sta 2371+80, 10		nx)	+	sing ID		HW (4			Hammer Efficiency: 0.906	illei
БОП	ilg Local		3ta 237 1 · 00, 10	оо ст (аррго	,,,	+	ger ID/0		SSA t		1710	Water Level*: 6.2 ft (likely perch	ned)
	U SAMPLI		ESTING:		ADDITIONAL I	EFINIT	IONS:		00/11	ADDI	TIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	100)
MD =		ul Split Spc	on Sample atten	npt	N-uncorrected N ₆₀ = N value			mmer effi	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines	ent (%)
	nin Wall Tub Unsuccessf		Il Tube Sample a	ttempt	hammer effici S _U = Insitu Fi	ency = o	calculated e Shear S	l hammer strength (p	efficiency osf)		not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test ODS: UU=Unconsolidated undrained triaxial test	
	situ Vane SI Unsuccessf		ne Shear Test at	tempt	R = Rock Cor RQD = Rock	e Samp Quality	ile Designation	on (%)			VHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydrau	LL=Liquid Limit / PL=Plastic Limit / PI=Plas lic push UCT qp = peak compressive strength of ro	
					nformation								
		(in.)	Sample Depth (ft.)	<u>-</u>	_	ted				D			Lab.
ft.)	Sample No.	ec. (De	/9.	Strength (psf) or RQD (%)	N-uncorrected			on	Graphic Log	Visual D	Description and Remarks	Testing
Depth (ft.)) Jdw	Pen./Rec.	m de	ws	engt JOC	DC0	0	Casing Blows	Elevation (ft.)	phic			Results
	Sai	Pel	Sal (ft.)	8 %	or F	ž	09-N	Cag	Ele (ft.)	D E			
50									11.0				
									11.0	um:19114	Bottom of Exploration	on at 51.0 feet below ground surface.)†
											No refusal.		
- 55													
- 60													
- 65													
- 70													
, 0													
. 75 Ren	arks:												l
ren	idi KS:												
										_			
Strati	ication lines	represent	approximate bou	ındaries betw	een soil types; t	ransitio	ns may be	gradual.				Page 3 of 3	
* Wat	er level read	dings have	been made at tin	nes and unde	r conditions stat	ed. Gro	oundwater	r fluctuatio	ons may oc	cur du	e to conditions other than those	Boring No.: HB-PAMI	-122

$\overline{}$			C									Davis a Na	LID DAMI	100
			SCHONEWALD		PROJE	ECT:					e Improvements	Boring No.: _		
			Engineering								3.7 to 49.3	Proj. No.:	18-017	7
			Associates, I		LOCAT				_					
Drille	er:		New England	Boring Co	ntractors	+-	vation	(ft.)		(est'd)		Core Barrel:	n/a	
Oper	ator:		Enos/ Share			Da	tum:		NAVE	88		Sampler:	standard split-spoo	on
Logg	ed By:		Schonewald			Rig	Type:		Mobi	le Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/F	inish:	11/29/18; 101	5 - 11/30/1	8; 0945	Dri	Iling M	ethod:	case	d wash	boring	Hammer Type:	calibrated auto-hamm	ier
Borii	ng Loca	tion:	Sta 2375+05, 11	0 LT (appro	x)	Ca	sing ID	/OD:	HW ((4") to	14 ft	Hammer Efficienc	y: 0.906	
						Au	ger ID/	OD:	SSA	to 9 ft		Water Level*:	4.9 ft (likely perche	ed)
			TESTING:		ADDITIONAL						TIONAL DEFINITIONS:	LABORATORY TEST		
	lit Spoon S Insuccess		ooon Sample attem	pt	N-uncorrecte N ₆₀ = N valu			ammer effi	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS s -#200 = percent fine	oil classifications es WC = water conte	nt (%)
U = Th	in Wall Tu	be Sample			hammer effic S _{II} = Insitu Fi						not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D con		
V = Ins	itu Vane S	Shear Test	•		R = Rock Co	re Samp	ole		151)	SSA	/HSA=solid/hollow stem auger	LL=Liquid Limit / PL	=Plastic Limit / PI=Plasti	
MV = L	Insuccess	ful Insitu V	ane Shear Test att	-	RQD = Rock	Quality	Designati	on (%)		RC=	roller cone/OPEN/PUSH=hydraul	lic push UCT qp = peak con	npressive strength of rock	(
				•	formation	_	1		1	1				
	ó	(jn.)	tde	<u>.</u>		N-uncorrected				g				Lab.
(ft.)	Sample No.	Pen./Rec.	ا م	9)	≘ 8	ЭЩ		_	ь	٦,	Visual D	escription and Remark	(S	Testing
th	ηdμ	, Ä	l jd	ws	gr S	υC	0	sing ws	vati	Ph.				Results
Depth (ft.)	Sar	Per	Sample Depth (ft.)	She	Strength (psf) or RQD (%)	Ž	09-N	Casing Blows	Elevation (ft.)	Graphic Log				
0								S\$A						
								JJA						
											1D: Brown, damp, dense	e, fine to medium SAN	D, trace Silt.	
	1D	24/19	2.0 - 4.0	9-17-	-16-17	33	50				GRANULAR FILL			
											2D: Brown, moist, m. de	ense, fine to medium S	AND, trace Silt.	
_	2D	24/21	4.0 - 6.0	9-13-	-15-20	28	42				, ,		,	
- 5 -										鑲				
								H-/-						
								$I \ \mathbb{V}$						
	3D	24/15	9.0 - 11.0	2.4	-7-8	11	17				Red brown, wet, fine to	medium SAND, trace t	o little Silt.	
- 10 -	30	24/15	9.0 - 11.0	2-4	-7-0	- 11	17		60.9		Changing at 10.1 ft to:		- — — — —10.1-	
								88	60.6		ackslash Dark brown grading to g	rey, ORGANIC SILT, s	some fine to	
								110			medium Sand. ORIGINA	AL GROUND Changing	g at 10.4 ft to: — — — ——10.4-	
								110			3D: Olive brown, mottled	d, Clayey SILT with po	ckets grey, fine	
								159			Sandy SILT. MARINE S	ILT-CLAY CRUST		
								400						
								193			14.0 ft: Unable to push v	/ane.		
	4D	24/24	14.0 - 16.0	4-5	i-7-9	12	18	OPEN			4D: Olive brown grey, m	ottled, stiff, SILT & CL	AY.	
- 15 -														
											19.0 ft: Unable to push	/ane.		
	5D	24/24	19.0 - 21.0	2-2	-2-3	3"dia					5D: Olive grey, CLAY &	SIL1.		
- 20 -														
										.///				
									48.5				- — — —22.5	
											6D: Dark grey, Silty CLA	Y. MARINE SILT- CLA	AY	
25	6D V1	24/24	24.0 - 26.0 24.6 - 25.0	VANE IN Su = 42	NTERVAL 6/ 41 psf						V1: Tu=15.5 / Tr=1.5 ft-l			
Rem	arks:				·							•	,	
l														
l														
Stratifi	cation line	s represer	nt approximate bou	ndaries betwe	een soil types;	transitio	ns may be	e gradual.				Page 1 of 3		
* Wate	r lovel rea	dinge have	a haan mada at tim	ies and linder	r conditions eta	ted Gr	nundwate	r fluctuatio	ne may (occur du	e to conditions other than those			
pres	ent at the	time meas	urements were ma	de.	. Jonanions Sld	.ou. UI	Januwalt	. nacidali	o may (Joour UUI	s to somethous outer than those	Boring No	.: HB-PAMI-	123

			Schonewale)	PRO.	FCT:	Portl	and A	rea M	ainlin	e Improvements	Boring No.:	HB-PAMI	-123
		=	Engineering				Main	e Tur	npike l	MM 4	3.7 to 49.3	Proj. No.:	18-01 ⁻	
			Associates, I						_		and, ME			
Drille			New England	Boring Co	ntractors	-	evation	(ft.)		(est'd)		Core Barrel:	n/a	
⊢÷-	ator:		Enos/ Share				tum:		NAVD		D 52 (withher treels ATM)	Sampler: Hammer Wt./Fall:	standard split-spo	on
	ged By: Start/Fi	nich:	11/29/18; 101:	5 - 11/30/1	18: 00/15		g Type: illing M				B-53 (rubber track ATV) n boring	Hammer Type:	calibrated auto-hamn	ner
	ng Loca		Sta 2375+05, 11				sing ID			4") to '		Hammer Efficience		
	<u> </u>			(-1-1	,		ger ID/			to 9 ft		Water Level*:	4.9 ft (likely perch	 ed)
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Sp pe Sample ful Thin W hear Test	all Tube Sample at	npt ttempt tempt	ADDITIONA N-uncorrect N ₆₀ = N va hammer eff S _u = Insitu R = Rock C RQD = Roc	ted = N va lue correct ficiency = Field Van core Samp ck Quality	alue cted for ha calculate se Shear S ole	d hammer Strength (p	refficiency	WOF WOF = 1 BOF SSA	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	CONSOL= 1-D cor ODS: UU=Unconsolidate LL=Liquid Limit / Pl	oil classifications es WC = water conte solidation test d undrained triaxial test =Plastic Limit / PI=Plast	icity Index
		·			nformation					1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remar	KS	Lab. Testing Results
25	V2		25.6 - 26.0		71/41 psf						V2: Tu=13.5 / Tr=1.5 ft-l	bs (65 mm x 130 mm	vane)	
- 30 -	U1	24/24	29.0 - 31.0	HYD	PUSH				-		U1: Dark grey, Silty CLA	Υ.		CONSOL (Cv, Ca) WC=41%
	7D V3	24/24	31.0 - 33.0 31.6 - 32.0	VANE IN	NTERVAL						7D: Dark grey with occa			LL=41 PL=21 <u>PI=20</u> CH
	V3 V4		31.6 - 32.0 32.6 - 33.0		57/ 14 psf 55/ 14 psf				1		V3: Tu=13 / Tr=0.5 ft-lbs	6 (1311111 CO) 111111 CO)	me)	-#200=98% WC=49%
			32.0 - 33.0	30 - 30	14 psi				-		V4: Tu=14 / Tr=0.5 ft-lbs	s (65 mm x 130 mm va	ne)	LL=62 PL=24 <u>PI=37</u>
- 35 -	8D V5	24/24	34.0 - 36.0 34.6 - 35.0	Su = 53	NTERVAL 66/ 14 psf						8D: Dark grey with occa V5: Tu=19.5 / Tr=0.5 ft-l			
	V6		35.6 - 36.0	Su = 44	40/ 14 psf						V6: Tu=16 / Tr=0.5 ft-lbs	s (65 mm x 130 mm va	ne)	
	U2	24/24	37.0 - 39.0	HYD	PUSH				-		U2: Dark grey, Silty CLA	Y.		
- 40 -														
	9D V7	24/24	41.0 - 43.0 41.6 - 42.0	VANE IN Su = 41	NTERVAL 2/41 psf				_		9D: Dark grey, Silty CLA V7: Tu=15 / Tr=1.5 ft-lbs		ine)	
	V8		42.6 - 43.0	Su = 34	3/41 psf						V8: Tu=12.5 / Tr=1.5 ft-l	bs (65 mm x 130 mm	vane)	
- 45 -														
+5	100	24/24	46.0 - 48.0	VANE IN	NTERVAL				-		10D: Dark grey, Silty CL			
	10D V9		46.0 - 48.0 46.6 - 47.0	Su = 49	14/ 55 psf				1		V9: Tu=18 / Tr=2 ft-lbs (65 mm x 130 mm van	e)	
	V10		47.6 - 48.0	Su = 44	0/ 69 psf				1		V10: Tu=16 / Tr=2.5 ft-lb	os (65 mm x 130 mm v	rane)	
50 _														
Rem	arks:	s represer	nt approximate bou	indaries betw	een soil types	s; transitio	ns mav b	e gradual				Page 2 of 3		
* Wate	er level rea	dings have		nes and unde			-	-		ccur due	e to conditions other than those		.: HB-PAMI-	123

			CHONEWALD		PROJE	CT:	Portl	and	Ar	ea M	lainl	ne Improvements	Boring No.: HB-PAMI	-123
			ngineering				Main	e T	urn	pike	MM	43.7 to 49.3	Proj. No.: 18-017	7
			SSOCIATES, I		LOCATION				oug					
Drille			lew England	Boring Co	ntractors	+-	vation	(ft.)			(est	1)	Core Barrel: n/a	
	rator:		nos/ Share			+-	tum:			NAVI		II D 52 (mulphor trook AT\/)	Sampler: standard split-spoo	on
	ged By: Start/Fi		Schonewald	E 11/20/1	19: 0045	+-	Type:		. d .			Il B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	nor.
	ng Loca		1/29/18; 101: sta 2375+05, 11			+	Iling M sing ID					sh boring o 14 ft	Hammer Type: calibrated auto-hamm Hammer Efficiency: 0.906	lei
БОП	ig Loca	uon. s	nta 2375+05, 11	от (аррго)X)	+	ger ID/		•		to 9		Water Level*: 4.9 ft (likely perche	2d)
		NG AND TE	STING:		ADDITIONAL D			<u> </u>		00/	AD	DITIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	, a ,
MD = U	lit Spoon S Jnsuccesst in Wall Tub	ful Split Spo	on Sample attem	pt	N-uncorrected N ₆₀ = N value hammer efficie	correc	ted for ha				W	OH = weight of 140lb. hammer OR = weight of rods = not recorded	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte CONSOL= 1-D consolidation test	nt (%)
V = Ins	itu Vane S	hear Test	Tube Sample at ne Shear Test att	·	S _u = Insitu Fie R = Rock Core RQD = Rock C	ld Van Samp	e Shear S ole	Streng	th (ps		B S	OREHOLE ADVANCEMENT METI SA/HSA=solid/hollow stem auger C=roller cone/OPEN/PUSH=hydrau	HODS: UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plast llic push UCT qp = peak compressive strength of roc	city Index
					nformation									
		(in.)	pth	<u>-</u>	_	ted					_			Lab.
ft.)	Sample No.		Sample Depth (ft.)	//e ir	Strength (psf) or RQD (%)	N-uncorrected				Б	Graphic Lod	Visual D	Description and Remarks	Testing
Depth (ft.)	mple	Pen./Rec.	m _	ws	engt SQD	ınco	0	Casing	SW.	Elevation (ft.)	j			Results
	Sar	Per	Sar (ft.)	Blo She	Stre (psi	Ž	09-N	Cas	B	Ele (#:)	. C			
50														
	440	24/24	54.0 52.0)/ANE IN	HTEDY/AL							11D: Dark grey, Silty Cl		
	11D V11	24/24	51.0 - 53.0 51.6 - 52.0	Su = 49	NTERVAL 94/ 82 psf					10	. Z	V11: Tu=18 / Tr=3 ft-lbs	s (65 mm x 130 mm vane)	
										18.8		MV: Unable to push var	- — — — — — — — — — — — — 52.2- ne below 52.2 ft.	
								Н						
- 55 -														
55								$ \cdot $	П					
	12D	24/24	EG 0 E9 0	WO	R/24"			Н	+			12D: Dark grey, Silty Cl	LAY with numerous seams and layers fine	
	120	24/24	56.0 - 58.0	WO	R/24			Ш	\perp			Sandy SILT. MARINE S	SILT AND SANDS	
								$ \cdot $				2 2		
								П						
								Н	Н					
- 60 -								$\sqcup \setminus$		11.	٥	59.5 ft: Driller notes gra	59.5- velly material; probable stratum change	
								ΙV						
	13D	24/8	61.0 - 63.0	6-14	-20-17	34	51					13D: Dark grey, dense, some Silt, trace coarse	Gravelly fine to medium SAND, little to	
												Some ont, trace coarse	Cana. Tier	
										8.0		Č	63.0-	
												Bottom of Exploration No refusal.	on at 63.0 feet below ground surface.	
												No relusal.		
- 65 -														
									\dashv					
							-		\dashv					
- 70 -									\dashv					
									\dashv					
			<u> </u>											
							\vdash		\dashv					
75														
	arks:	1	1		ı							1		
													L David C CO	
			approximate bou				-	-					Page 3 of 3	
* Wate pres	er level readent at the t	dings have b ime measur	peen made at tim ements were ma	nes and unde de.	r conditions state	ed. Gro	oundwate	r fluct	uatio	ns may	occur	ue to conditions other than those	Boring No.: HB-PAMI-	123

		S	CHONEWALI)	PROJE	CT:	Portl	and A	rea M	ainlir	ne Improvements	Boring No.: HB-PAMI	-124
			NGINEERING				Main	e Turi	npike	MM 4	43.7 to 49.3	Proj. No.: 18-017	7
			ASSOCIATES,		LOCATI				_			•	
Drille			New England	Boring Co	ntractors	+-	vation	(ft.)		t (est	d)	Core Barrel: NQ2	
	rator:		Enos/ Share			+	tum:		NAVE		ID 50 (11	Sampler: standard split-spoo	on
	ged By:		Schonewald	1015		_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		//11/19; 0845			+	Iling M				h boring	Hammer Type: calibrated auto-hamm	ner
Bori	ng Loca	tion: S	Sta 2383+00, 95	KI (approx	K)	+	sing ID			to 9 ft	9 ft; NW (3") to 9.5 ft	Hammer Efficiency: 0.906 Water Level*: 4.0 ft	
IN-SIT	U SAMPLI	NG AND TE	STING:		ADDITIONAL D		ger ID/	OD:	55A		ITIONAL DEFINITIONS:	Water Level*: 4.0 ft LABORATORY TEST RESULTS:	
	olit Spoon S Unsuccess		on Sample atten	npt	N-uncorrected N ₆₀ = N value			ımmer eff	iciencv		PH = weight of 140lb. hammer PR = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte	nt (%)
U = Th	nin Wall Tul	oe Sample	I Tube Sample a		hammer effici	ency =	calculated	d hammer	efficiency	y =	not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test	,
V = Ins	situ Vane S	hear Test	•	•	R = Rock Cor	e Samp	ole	·)3i)	SS	A/HSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plasti	icity Index
IVIV = (Jnsuccessi	rui insitu var	ne Shear Test at		RQD = Rock (Quality	Designati	on (%)		T RC	=roller cone/OPEN/POSH=nydraul	lic push UCT qp = peak compressive strength of roc	<u> </u>
		(in.)				Ď				1			
·	Š.		Sample Depth (ft.)	i.	Strength (psf) or RQD (%)	N-uncorrected			_	Graphic Log	Visual D	escription and Remarks	Lab. Testing
h (ft	ple	/Rec	ble ble	S 12	ngth CC	COL		gu s	atio	je Pic	Vioual B	ossinpuon ana remane	Results
Depth (ft.)	Sample No.	Pen./Rec.	sam ft.)	Slow Sheet	Strer psf) or R(μ	09-N	Casing Blows	Elevation (ft.)	3rap			
0									ш .	77777	Dark brown, damp, Silty	TOPSOIL. Changing at 0.8 ft to:	
	1D	24/12	0.0 - 2.0	2-2	2-2-3	4	6	S\$A	106.2	· 🔆 🔆	}		
										\bowtie	1D: Red brown, damp, f Silt. FILL	ine to coarse SAND, trace Gravel, trace	
									1		8		
	<u> </u>						-	\vdash	-	\bowtie	§		
										\bowtie			
	2D	24/20	4.0 - 6.0	3-8	-9-11	17	26		1	\bowtie	2D: Brown, damp to moi	ist, m. dense, interbedded, fine Sandy tle Silt; upper 10 inches appear reworked.	
- 5 -								\vdash	102.1			- $ -$ 4.9-	
	2D-A			AUGER (CUTTINGS						2D-A (auger cuttings 6 to fine Gravel, MARINE SI	o 9 ft): Brown, wet, Silty fine SAND, trace LTY FINE SANDS	
								$I \mathbb{V}$					
	3D	2/1	9.0 - 9.2	50	0/2"			RC	97.9	· 🔯		coarse SAND, little to some Silt, trace fine ain weathered rock fragments.	
- 10 -	R1	60/60	9.5 - 14.5	RQD: 3	0/2" 30"=50%						1	9.1-	
												ly weathered, aphanitic to fine grained, h angle remnant bedding and occasional	
											calcsilicate veins. Close	e to moderately spaced, low angle and	
											and open with occasiona	dulating, rough, typically discolored (rust), al infilling; shiny.	
											Core times: 2:30/ 1:40/ 7 POOR ROCK QUALITY	1:45/ 1:40/ 1:40 min:sec/ft.	
											1		
									92.5	, 🗱		14.5 -	
- 15 -											Bottom of Exploration	n at 14.5 feet below ground surface.	
									1				
	<u> </u>						-		-				
- 20 -					+				1				
	<u> </u>												
									1				
	<u> </u>				+		-		1				
25													
25 Rem	arks:	<u> </u>	1	I			<u> </u>		<u> </u>		1		
Stratif	ication line	s represent	approximate bou	indaries betw	een soil types; to	ansitio	ns may be	e gradual.				Page 1 of 1	
* Wate	er level rea	dings have I	been made at tin ements were ma	nes and unde	r conditions stat	ed. Gro	oundwate	r fluctuation	ons may o	occur du	e to conditions other than those	Boring No.: HB-PAMI-	124

			CHONEWALE		PROJE	CT:					ne Improvements	Boring No.: HB-PAMI-	
		==	NGINEERING ASSOCIATES, ^{II}		LOCAT	ON:					13.7 to 49.3 and. ME	Proj. No. :18-017	'
Drille	er:	N	New England	Boring Co			vation		74 ft (Core Barrel: n/a	
Ope	rator:	E	nos/ Share			Da	tum:		NAVD	38		Sampler: standard split-spoo	n
Logg	ged By:		Schonewald			Riç	Type:		Mobil	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
_	Start/Fi		/11/19; 1050-			_	lling M				n boring	Hammer Type: calibrated auto-hamm	er
Bori	ng Locat	tion: S	sta 2402+05, 75	RT (approx	()	+	sing ID		HW (4			Hammer Efficiency: 0.906	
IN-SIT	U SAMPLI	NG AND TE	STING:		ADDITIONAL		ger ID/0	OD:	SSA t		TIONAL DEFINITIONS:	Water Level*: 13.8 ft (open, end) LABORATORY TEST RESULTS:	
D = Sp	lit Spoon S	ample	on Sample attem	nt	N-uncorrecte N ₆₀ = N valu	d = N va	lue	mmer effi	ciency	WO	H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines WC = water conter	nt (%)
U = Th	in Wall Tub	oe Sample	Tube Sample at		hammer effic	ency =	calculated	l hammer	efficiency	=	not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test	it (70)
V = Ins	itu Vane Sl	hear Test	•	•	R = Rock Co	e Samp	le		151)	SSA	VHSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plastic	
IVIV - C	Jiisuccessi	ui irisitu vai	ne Shear Test att		RQD = Rock	Quality	Designation	JII (76)		RC-	-Toller colle/OPEN/POSH=Hydraul	lic push UCT qp = peak compressive strength of rock	•
		(in.)	oth	·		pa				_			
£	S O		Der	6 in	(%)	N-uncorrected			Ę	Graphic Log	Visual D	escription and Remarks	Lab. Testing
Depth (ft.)	Sample No.	Pen./Rec.	lple	ws (g G	יסטר		ing	/atic	phic		·	Results
Dep	Sar	Per	Sample Depth (ft.)	She	Strength (psf) or RQD (%)	Ξ̈	N-60	Casing Blows	Elevation (ft.)	Ga			
0								S\$A					
											1D: Tan brown damn n	n. dense, fine to coarse SAND, trace to	
	1D	24/13	2.0 - 4.0	4-7	-6-6	13	20				little Silt, trace fine Grave	el; appears undisturbed. MARINE	
								\ /			SANDS		
	2D	24/14	4.0 - 6.0		7	12	18	V_			2D: Tan brown, damp, n	n. dense, fine to coarse SAND, trace Silt.	
- 5 -	20	24/14	4.0 - 6.0	0-0	i-6-7	12	10						
								68					
								73					
								74					
								78					
		24/2	00.440				47				3D: Tan brown, m. dens	e, fine to coarse SAND, trace Silt.	
- 10 -	3D	24/8	9.0 - 11.0	5-5	i-6-7	11	17	20					
								34					
								62					
								87					
								99			4D: Tan brown m dens	e, fine to coarse SAND, trace Silt.	
- 15 -	4D	24/8	14.0 - 16.0	5-5	-6-7	11	17	38				,	
								54					
								61					
								68					
								66			5D: Tan brown, loose, fi	ne to medium SAND, trace Silt.	
- 20 -	5D	24/6	19.0 - 21.0	3-4	-6-5	10	15						
									53.0			21.0	
											Bottom of Exploration No refusal.	n at 21.0 feet below ground surface.	
25													
Rem	arks:												
			approximate bou				-	_				Page 1 of 1	
^ Wate pres	er level read ent at the ti	dings have I ime measur	peen made at tim ements were ma	es and unde de.	r conditions sta	ed. Gro	oundwater	fluctuation	ons may o	ccur du	e to conditions other than those	Boring No.: HB-PAMI-1	125

			Schonewald Engineering		PROJE	ECT:					e Improvements 13.7 to 49.3	Boring No.: _ Proj. No.:	HB-PAMI- 18-017	
			Associates, I		LOCAT		Scar	borou	gh to	Portla		_		
Drille			New England	Boring Cor	ntractors	+-	vation	(ft.)		(est'd)		Core Barrel:	n/a	
<u> </u>	ator:		Enos/ Share			+	tum:		NAVE		D 50 / 11 / 1 ATA	Sampler:	standard split-spoo	on
	ged By:	inink:	Schonewald	1115		_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi ng Loca		1/11/19; 1305 Sta 2408+30, 95		\	+	Iling M sing ID			4") to	boring	Hammer Type: Hammer Efficienc	calibrated auto-hamm	lei
Boili	ig Loca	tion.	Ota 2400100, 90	TTT (approx)	<u>'</u>	+	ger ID/			to 9 ft	5 IL	Water Level*:	none observed abo	ove 9 ft
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	ful Split Sp be Sample ful Thin Wa shear Test	oon Sample attem all Tube Sample at ane Shear Test att	npt ttempt tempt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Co RQD = Rock	DEFINITED TO SERVICE OF THE PROPERTY OF THE PR	rions: alue cted for ha calculated e Shear Sole	mmer eff I hammer Strength (iciency efficienc	WO WO WO / = BOI SSA	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LABORATORY TEST AASHTO / USCS s #200 = percent fin CONSOL = 1-D con HODS: UU=Unconsolidate LL=Liquid Limit / Pl	RESULTS: oil classifications es WC = water contel isolidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	nt (%)
				Sample Int			1	ı		-				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remark	ks	Lab. Testing Results
0								S\$A						
	1D	24/21	2.0 - 4.0	2-3-	4-4	7	11		. 68.0		1D: Olive brown, mottler SILT, little fine Sand; ap			
- 5 -	2D	24/24	4.0 - 6.0	3-4-	6-6	10	15				2D: Olive brown, mottled SILT, trace fine Sand; a CRUST			
- 10 -	3D	24/24	9.0 - 11.0	WOH-	1-2-2	3	5	OPEN	62.0		3D: Olive brown grey, sl grading to olive grey, mo	ightly mottled, moist, S oi <u>st to wet, CLAY & SI</u>	SILT & CLAY LT. - — — —10.0	
- 15 -	4D V1 V2	24/24	14.0 - 16.0 14.6 - 15.0 15.6 - 16.0	VANE IN' Su = 343 Su = 357	3/ 27 psf						4D: Dark grey black, Sill MARINE SILT-CLAY. V1: Tu=12.5 / Tr=1 ft-lbs V2: Tu=13 / Tr=0.5 ft-lbs	s (65 mm x 130 mm va	nne)	CL -#200=97% WC=46% LL=46 PL=21 <u>PI=25</u>
	5D V3	24/22	19.0 - 21.0 19.6 - 20.0	VANE IN' Su = 302	TERVAL				-		5D: Dark grey, Silty CLA V3: Tu=11 / Tr=1 ft-lbs (۵۱	
- 20 -	V3 V4		20.6 - 21.0	Su = 302					-		V4: Tu=11 / Tr=1 ft-lbs (
25	6D V5	24/24	24.0 - 26.0 24.6 - 25.0	VANE IN Su = 275	TERVAL 5/ 14 psf						6D: Dark grey black, Sill V5: Tu=10 / Tr=0.5 ft-lbs	-	-	
Stratifi	er level rea	dings have	t approximate bou been made at tim urements were ma	nes and under			-	_		occur du	e to conditions other than those	Page 1 of 2	o.: HB-PAMI-	126

	SCHONEWALD PROJECT: Portland Area Mainline Improvement									e Improvements	Boring No.: HB-PAMI	-126	
			Engineering				Main	e Turr	npike N	/M 4	3.7 to 49.3	Proj. No.: 18-017	
Drille	\r.		Associates, In New England		LOCAT		Scar evation		gh to F 72 ft (Core Barrel: n/a	
Oper			Enos/ Share	Borning Co	TILIACIOIS		tum:	(11.)	NAVD8			Sampler: standard split-spoo	nn.
<u> </u>	ed By:		Schonewald				Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	JII
	Start/Fi		1/11/19; 1305-	-1445			Iling M		cased wash boring			Hammer Type: calibrated auto-hamm	ner
	ng Locat		Sta 2408+30, 95		()	+	sing ID		HW (4") to 9 ft			Hammer Efficiency: 0.906	
						+	ger ID/0		SSA t			Water Level*: none observed ab	ove 9 ft
D = Sp MD = U U = Th	in Wall Tub	ample ul Split Sp e Sample	oon Sample attem		ADDITIONAL I N-uncorrecte N ₆₀ = N value hammer effici	d = N va e correctiency = 0	alue ted for ha calculated	l hammer	efficiency	WOI WOI	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications #200 = percent fines WC = water conte CONSOL = 1-D consolidation test	nt (%)
V = Ins	itu Vane Sh	hear Test	all Tube Sample at ane Shear Test att	•	S _u = Insitu Fi R = Rock Cor RQD = Rock	re Samp	ole		osf)	SSA	REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	IODS: UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plast lic push UCT qp = peak compressive strength of roc	icity Index k
				Sample In	formation				1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	Description and Remarks	Lab. Testing Results
25	V6		25.6 - 26.0		75/ 14 psf						V6: Tu=10 / Tr=0.5 ft-lbs	s (65 mm x 130 mm vane)	
	Bottom				Bottom of Exploratio No refusal.	26.0- n at 26.0 feet below ground surface.							
- 30 -													
- 35 -													
- 40 -													
- 45 -													
50 Pom	arks:												
Kem	<u>ui n3.</u>												
Stratifi	cation lines	represen	t approximate bou	ndaries betwe	een soil types: t	ransitio	ns mav he	gradual				Page 2 of 2	
* Wate	r level read	dings have		es and unde			-	-		cur du	e to conditions other than those	Boring No.: HB-PAMI-	126

			Schonewale)	PROJ	FCT:	Port	land Δ	rea M	ainlin	e Improvements	Boring No.:	HB-PAMI-	-127
			Engineering		1100						3.7 to 49.3	Proj. No.:		
			Associates, ¹		LOCAT				gh to	Portla	and, ME			<u>'</u>
Drille			New England	Boring Co	ntractors	-	evation	(ft.)		(est'd)		Core Barrel:	n/a	
Oper			Enos/ Share			+	tum:		NAVD			Sampler:	standard split-spoo	on
	ed By:		Schonewald			-	g Type				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		1/10/19; 0915			+		lethod:			boring	Hammer Type:	calibrated auto-hamm	ner
Borii	ng Loca	tion:	Sta 2420+80, 10	00 RT (appro	ox)	+	sing ID			4") to 9	Σ π	Hammer Efficienc		
IN-SIT	J SAMPL	ING AND	TESTING:		ADDITIONAL		Iger ID/	OD.	SSA	to 4 ft	TIONAL DEFINITIONS:	LABORATORY TEST	4.0 ft RESULTS:	
MD = U U = Thi MU = U V = Ins	n Wall Tul Insuccess itu Vane S	ful Split Sp be Sample ful Thin W shear Test	all Tube Sample at ane Shear Test att	tempt	N-uncorrector N ₆₀ = N valor hammer effic S _U = Insitu F R = Rock Co RQD = Rock	ue correction correcti	cted for h calculate ne Shear ple	d hammer Strength (efficiency	WOI = BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded KEHOLE ADVANCEMENT METH (HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	CONSOL= 1-D cor UU=Unconsolidate LL=Liquid Limit / PI	es WC = water conte solidation test d undrained triaxial test =Plastic Limit / PI=Plasti	city Index
		·			nformation	ъ	1			1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks		Lab. Testing Results	
0								SSA						
							1							
	1D	24/17	2.0 - 4.0	2-2	2-3-2	5	8				1D: Red brown grading seams Silty CLAY, little	to grey, fine Sandy SII fine Sand. FILL	T with occasional	ML to CL WC=27% LL=24 PL=20
											O 6 O 011 T 1			PL=20 <u>Pl=4</u>
	2D	24/24	4.0 - 6.0	2-1-	-1/12"	2	3	PUSH	49.4		Grey, fine Sandy SILT. I		t to: — — — — —4.6-	
- 5 -									1		2D: Grey, Silty CLAY. M	ARINE SILT-CLAY		
									1					
									1					
								H			3D: Dark grey, Silty CLA	Y, trace fine Sand.		CL
- 10 -	3D V1	24/24	9.0 - 11.0 9.6 - 10.0	VANE IN Su = 30	NTERVAL 02/ 14 psf			OPEN			V1: Tu=11 / Tr=0.5 ft-lbs	65 mm x 130 mm va	ine)	-#200=98% WC=32%
	V2		10.6 - 11.0	Su = 23	33/ 0 psf						V2: Tu=8.5 / Tr=0 ft-lbs	(65 mm x 130 mm var	ie)	LL=27 PL=18
									1		12. 14 0.07 11 0 10.00	(00 11111 7 100 11111 101	,	<u>PI=9</u>
									1					
	U1	24/24	14.0 - 16.0	HYD	PUSH				1		U1: Dark grey, Silty CLA	ΛY.		CONSOL (Cv, Cα)
- 15 -							1		1					WC=44% LL=40
														PL=22 PI=18
														<u>F1-10</u>
									1					
							-		1					
											45 5 4 6 7			
	4D V3	24/24	19.0 - 21.0 19.6 - 20.0	VANE IN	NTERVAL 06/ 0 psf						4D: Dark grey, Silty CLA V3: Tu=7.5 / Tr=0 ft-lbs	_		
- 20 -	V4		20.6 - 21.0		33/ 0 psf							•	,	
					· ·				1		V4: Tu=8.5 / Tr=0 ft-lbs	(65 mm x 130 mm var	ie)	
									1					
									1		5D: Grey, Silty CLAY.			
25	5D V5	24/24	24.0 - 26.0 24.6 - 25.0	VANE IN Su = 20	NTERVAL 06/ 14 psf					W/L	V5: Tu=7.5 / Tr=0.5 ft-lb	s (65 mm x 130 mm v	ane)	
Rema		s represer	ıt approximate bou	ndaries betw	reen soil types;	transitio	ons may b	e gradual				Page 1 of 5		
		•	• •				-	-		ccur du	e to conditions other than those			
prese	ent at the t	ime meas	urements were ma	de.	. Jonanions St	accu. Gl	oundwalt	. nucludii	ono may C	oour uu	to conditions other than those	Boring No	.: HB-PAMI-	127

			Schonewald Engineering				Main	e Tur	rnpil	ke M	M 4	e Improvements 3.7 to 49.3	Boring No.: HB-PAMI Proj. No.: 18-01	_
Drille			Associates, In New England I		LOCATIO		Scarl vation					ind, ME	Core Barrel: n/a	
			Enos/ Share	Bonng Co	TILI actors	+	tum:	(11.)		4 ft (e IAVD88	_			<u> </u>
<u> </u>	rator:					_						D. F.2 (multiple at track AT) ()	Sampler: standard split-spoo	ווכ
	ged By:		Schonewald	4005		+	Type:					B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
_	Start/Fi		1/10/19; 0915-			+	lling Mo					boring	Hammer Type: calibrated auto-hamm	ner
Borii	ng Locat	tion:	Sta 2420+80, 10	URI (appro	ox)	+	sing ID			IW (4"		π	Hammer Efficiency: 0.906	
IN_SIT	U SAMPLI	NG AND I	resting.		ADDITIONAL D	_	ger ID/0	OD:	S	SSA to		IONAL DEFINITIONS:	Water Level*: 4.0 ft LABORATORY TEST RESULTS:	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane Sl	ample ful Split Sp se Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample att	tempt empt	N-uncorrected N ₆₀ = N value hammer efficie S _U = Insitu Fie R = Rock Core RQD = Rock C	= N va correct ncy = old Id Vane Samp	lue ted for ha calculated e Shear S le	I hamme trength	er effic	су	WOF WOR = n BOR SSA/	H = weight of 140lb. hammer R = weight of rods not recorded EHOLE ADVANCEMENT METH HSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte CONSOL= 1-D consolidation test	city Index
				•	formation	_		1						
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation	(ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
25	V6		25.6 - 26.0	Su = 2:	33/ 0 psf							V6: Tu=8.5 / Tr=0 ft-lbs	(65 mm x 130 mm vane)	
- 30 -	U2	24/24	29.0 - 31.0	HYD	PUSH							U2: Grey, Silty CLAY.		
- 35 -	6D V7	24/7	34.0 - 36.0 34.6 - 35.0	VANE II Su = 3	NTERVAL 43/ 0 psf			Y				6D: Grey, SIIty CLAY wi V7: Tu=12.5 / Tr=0 ft-lbs	th nodules throughout. s (65 mm x 130 mm vane)	CL WC=49% LL=37
	V8		35.6 - 36.0	Su = 3:	43/ 0 psf							V8: Tu=12.5 / Tr=0 ft-lbs 36.0 ft: Hydraulically pus	s (65 mm x 130 mm vane) sh rod probe.	PL=22 <u>PI=15</u>
- 40 -														
- 45 -														
50 .														
Stratifi		•	t approximate bour				-	-					Page 2 of 5	
* Wate	ater level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those Boring No.: HB-PAMI-127													

			Schonewald Engineering				Main	e Turr	pike N	/M 4	e Improvements 3.7 to 49.3	Boring No.: HB-PAMI- Proj. No.: 18-017	
			Associates, It		LOCATION						and, ME		
Drille			New England	Boring Co	ntractors	_	vation	(ft.)	54 ft (Core Barrel: n/a	
	rator:		Enos/ Share			+	um:		NAVD8		D 50 (Sampler: standard split-spoo	on
	ged By:		Schonewald	100=		_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		1/10/19; 0915-			_	ling Me				boring	Hammer Type: calibrated auto-hamm	ner
Bori	ng Locat	tion:	Sta 2420+80, 10	0 RT (appro	ox)	_	sing ID/		HW (4		9 ft	Hammer Efficiency: 0.906	
IN_SIT	U SAMPLII	NG AND .	resting.		ADDITIONAL DI		ger ID/0	DD:	SSA t		TIONAL DEFINITIONS:	Water Level*: 4.0 ft LABORATORY TEST RESULTS:	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessfi in Wall Tub Jnsuccessfi situ Vane St	ample ul Split Sp e Sample ul Thin Wa hear Test	oon Sample attem all Tube Sample at ane Shear Test att	tempt empt	N-uncorrected N ₆₀ = N value hammer efficie S _u = Insitu Fiel R = Rock Core RQD = Rock Q	= N val correct ncy = c ld Vane Sampl	corrected for hammer efficiency = calculated hammer ef d Vane Shear Strength (psf			WOI WOI = I BOF SSA	H = weight of 140lb. hammer R = weight of rods nor recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte CONSOL= 1-D consolidation test	city Index
		~		•	formation	_							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Lab. Testing Results
50													
- 55 -													
- 60 -													
- 65 -													
- 70 -													
Stratif	tratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 3 of 5 Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those												

	PROJECT: Portland Area Mainline Improvement										e Improvements	Boring No.: HB-PAMI	-127
			Engineering				Main	e Turr	npike N	ИМ 4	13.7 to 49.3	Proj. No. :18-017	
Deille	N 1		Associates, I New England		LOCATIO		Scarl vation					Core Barrel: n/a	
Drille	ator:		Enos/ Share	Borning Co	IIII actors	-	tum:	(11.)	54 ft (Sampler: standard split-spo	ion
	ged By:		Schonewald			+	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches	-011
	Start/Fi	nish:	1/10/19; 0915	-1225		+	lling Me	ethod:			n boring	Hammer Type: calibrated auto-hami	ner
	ng Locat		Sta 2420+80, 10		ox)	+	sing ID/		HW (4") to 9 ft			Hammer Efficiency: 0.906	
						_	ger ID/0		SSA t			Water Level*: 4.0 ft	
	U SAMPLII lit Spoon S		TESTING:		ADDITIONAL D N-uncorrected						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
MD = L	Jnsuccessfi	ul Split Sp	oon Sample attern	pt	N ₆₀ = N value	correct	ted for ha			WO	R = weight of rods	-#200 = percent fines WC = water conte	ent (%)
MU = U		ul Thin W	: all Tube Sample at	ttempt	hammer efficie S _u = Insitu Fie	ld Vane	e Shear S	hammer trength (p	efficiency sf)	BOF	not recorded REHOLE ADVANCEMENT METH		
	itu Vane Sh Jnsuccessfu		ane Shear Test at	tempt	R = Rock Core	Samp Quality [le Designatio	on (%)		SSA RC=	VHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydrau	LL=Liquid Limit / PL=Plastic Limit / PI=Plas lic push UCT qp = peak compressive strength of roo	
				Sample In	formation								
		(in.)	Sample Depth (ft.)	Ü.		ted				ō			Lab.
(ft.)	Sample No.	ec.	e De	i 9/)	Strength (psf) or RQD (%)	N-uncorrected		_	on	Graphic Log	Visual D	Description and Remarks	Testing
Depth (ft.)	mple	Pen./Rec.	m du	ws	engi 1	ncc	00	Casing Blows	Elevation (ft.)	jhdr			Results
	Sa	Pe	Sa (#.	<u> </u>	2 S	ž	09-N	Ca Bic	Ele (ft.	ő			
75													
- 80 -													
- 85 -													
- 90 -													
- 95 -													
55													
100 . Rem	arks:									V///	4		
	<u></u>												
Stratifi	cation lines	represer	nt approximate bou	ndaries betw	een soil types; tr	ansition	ns may be	gradual.				Page 4 of 5	
* Wate	er level read	dings have	e been made at tim	nes and unde			-	_	ns may o	ccur du	e to conditions other than those		107
pres	ent at the ti	me meas	urements were ma	de.					, -			Boring No.: HB-PAMI-	121

			Schonewali	D	PROJI	ECT:	Portla	and A	rea Ma	ainlin	e Improvements	Boring No.:	HB-PAMI-	-127
			Engineering				Main	e Turr	npike I	MM 4	3.7 to 49.3	Proj. No.:	18-017	7
			Associates,		LOCAT						and, ME	-		
Drille			New England	Boring Co	ntractors		evation	(ft.)		(est'd)		Core Barrel:	n/a	
<u> </u>	rator:		Enos/ Share			+	tum:		NAVD			Sampler:	standard split-spoo	n
	ged By:		Schonewald			_	g Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		1/10/19; 0915				illing M		cased wash boring			Hammer Type:	calibrated auto-hamm	ier
Borii	ng Locat	tion:	Sta 2420+80, 1	00 RT (appro	ox)		sing ID			4") to	9 ft	Hammer Efficiend	-	
D = Sp MD = U U = Th MU = U	in Wall Tub	ample ful Split Sp be Sample ful Thin W	ooon Sample atten		ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Co	DEFINITION DEFINI	alue cted for ha calculated e Shear S	ımmer effi I hammer	efficiency	WO WO = BOF	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger		soil classifications nes WC = water conte	
			ane Shear Test at	ttempt	RQD = Rock	Quality	<u>Designati</u>	on (%)			roller cone/OPEN/PUSH=hydraul			
				I .	nformation		1		ı	-				
ODepth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.)	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remai	ks	Lab. Testing Results
- 105 -									-50.0	9.	Bottom of Exploration No rod probe refusal (ou		104.0- ground surface.	
- 110 -														
- 115 -														
- 120 -														
125 Rem	arks:			<u>I</u>			<u> </u>	l	1	<u> </u>	l			
			nt approximate bou									Page 5 of 5		
^ Wate pres	er level read ent at the ti	dings have ime meas	e been made at tir urements were ma	nes and unde ade.	r conditions sta	ated. Gro	oundwate	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring No	: HB-PAMI-	127



PHOTOGRAPHS OF ROCK CORE OBTAINED IN 100-SERIES SUBSURFACE EXPLORATIONS



Photo 1: Core box containing dried rock core from PAMI preliminary test borings; left side of core box (top portion of cores). Slots from top to bottom:

- 1) HB-PAMI-109, R1
- 2) HB-PAMI-109B, R1
- 3) HB-PAMI-110, R1
- 4) HB-PAMI-124, R1.



Photo 2: Core box containing dried rock core from PAMI preliminary test borings; right side of core box (bottom portion of cores). Slots from top to bottom:

- 1) HB-PAMI-109, R1
- 2) HB-PAMI-109B, R1
- 3) HB-PAMI-110, R1
- 4) HB-PAMI-124, R1.

ROCK CORE PHOTOGRAPHS
PORTLAND AREA MAINLINE IMPROVEMENTS
MAINE TURNPIKE MM 43.7 TO 49.3
SCARBOROUGH TO PORTLAND, MAINE

ASSOCIATES, INC.

Schonewald Engineering

Sheet No.:

1 of 1

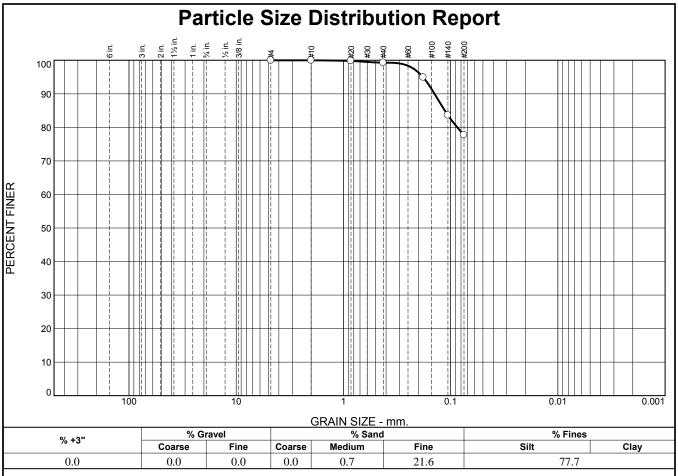


RESULTS OF LABORATORY TESTS COMPLETED BY RWG&A ON SPLIT-SPOON AND UNDISTURBED TUBE SOIL SAMPLES



LABORATORY TEST RESULTS CONTENTS

Boring No.	Sample No.	Sample Depth (ft., BGS)	Material	Tests		
HB-PAMI-101	3D	9-11	interbedded sands and silt	Atterberg Limits, grain size w/o hydrometer		
HB-PAMI-101	4D	14-16	interbedded sands and silt	Atterberg Limits		
HB-PAMI-102	5D	19-21	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-103	6D	28.5-30.5	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-103	U2	35-37	marine silt-clay	1D consolidation, Atterberg Limits		
HB-PAMI-106	3D	9-11	marine silt-clay crust	Atterberg Limits, % passing #200 sieve		
HB-PAMI-106	5D	19-21	marine silt-clay	Atterberg Limits, grain size w/o hydrometer		
HB-PAMI-107	5D	19-21	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-109	2D	9-11	marine silt-clay crust	Atterberg Limits, grain size w/o hydrometer		
HB-PAMI-109B	3D	9-11	misc fill	Atterberg Limits, grain size w/o hydrometer		
HB-PAMI-110	3D	9-11	f sandy silt	Atterberg Limits, grain size w/o hydrometer		
HB-PAMI-114	4D	14-16	marine silt-clay crust	Atterberg Limits, % passing #200 sieve		
HB-PAMI-114	U1	24-26	marine silt-clay	1D consolidation, Atterberg Limits		
HB-PAMI-114	7D	34-36	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-115	3D	9-11	marine silt-clay crust	Atterberg Limits, % passing #200 sieve		
HB-PAMI-117	8D	29-31	marine silt-clay	Atterberg Limits		
HB-PAMI-118	3D	9-11	marine silt-clay crust	Atterberg Limits		
HB-PAMI-119	5D	19-21	marine silt-clay	Atterberg Limits % passing #200 sieve		
HB-PAMI-120	4D	14-16	marine silt-clay crust	Atterberg Limits % passing #200 sieve		
HB-PAMI-121	4D	14-16	marine silt-clay crust	Atterberg Limits, % passing #200 sieve		
HB-PAMI-121	7D	29-31	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-121	U2	34-36	marine silt-clay	1D consolidation, Atterberg Limits		
HB-PAMI-122	6D	24-26	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-122	U1	34-36	marine silt-clay	1D consolidation, Atterberg Limits		
HB-PAMI-123	U1	29-31	marine silt-clay	1D consolidation, Atterberg Limits		
HB-PAMI-123	7D	31-33	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-126	4D	14-16	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-127	1D	2-4	fill	Atterberg Limits		
HB-PAMI-127	3D	9-11	marine silt-clay	Atterberg Limits, % passing #200 sieve		
HB-PAMI-127	U1	14-16	marine silt-clay	1D consolidation, Atterberg Limits		
HB-PAMI-127	6D	34-36	marine silt-clay	Atterberg Limits		
HB-PAVE-103	1D	1-3	road gravels	grain size with hydrometer		



	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	#4	100.0		
	#10	100.0		
	#20	99.8		
	#40	99.3		
	#80	94.9		
	#140	83.6		
	#200	77.7		
-	*			

Lean clay with sar	Soil Description	
PL= 15.1	Atterberg Limits LL= 22.8	PI= 7.7
D ₉₀ = 0.1412 D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = 0.1133 D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS= CL	Classification AASHT	O= A-4(4)
Moisture Content:	Remarks 31.0%	

(no specification provided)

Location: HB-PAMI-101 **Sample Number:** 3D

Depth: 9'-11'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

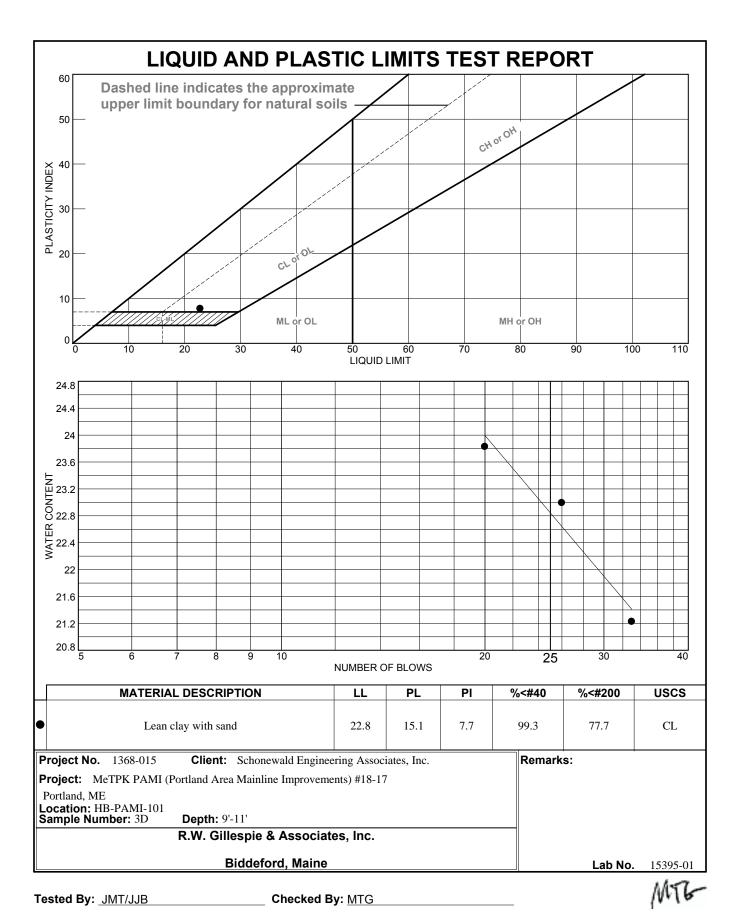
Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

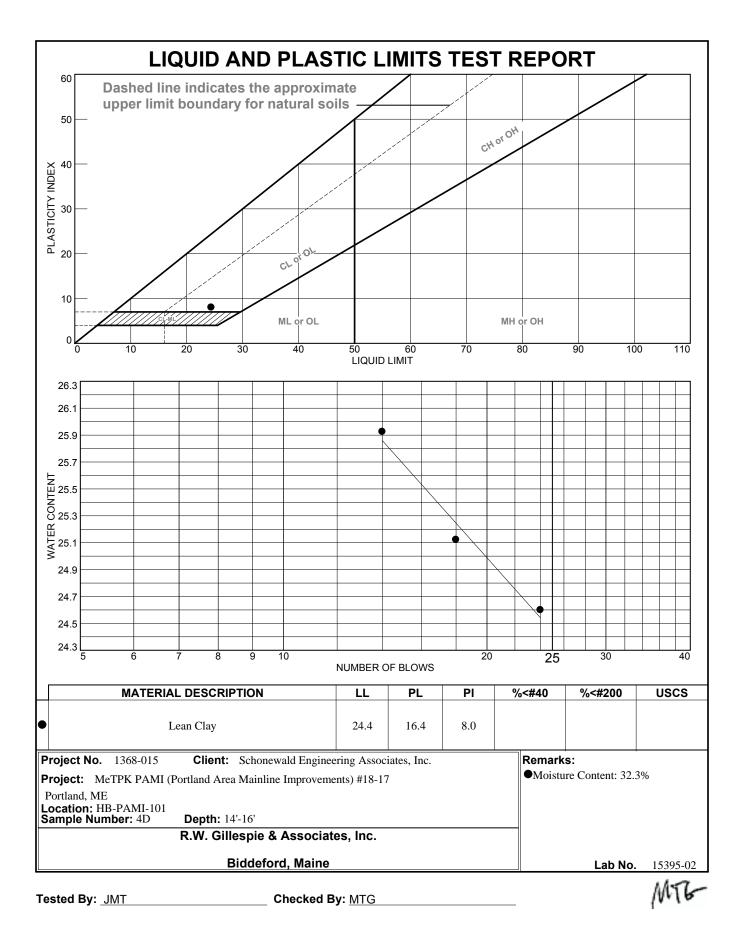
Portland, ME

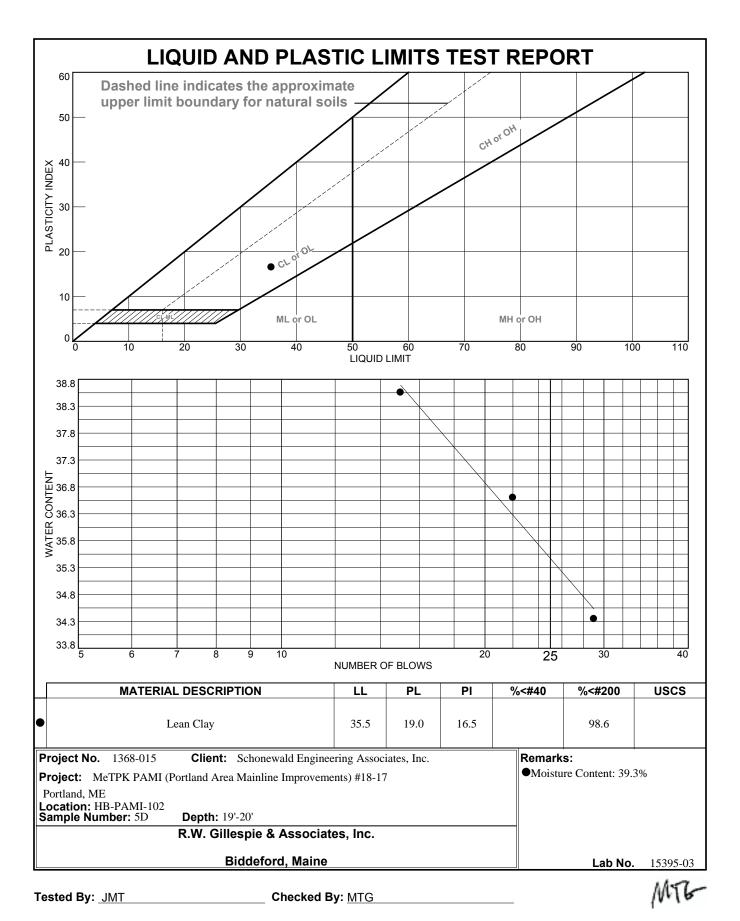
Project No: 1368-015 Lab No.

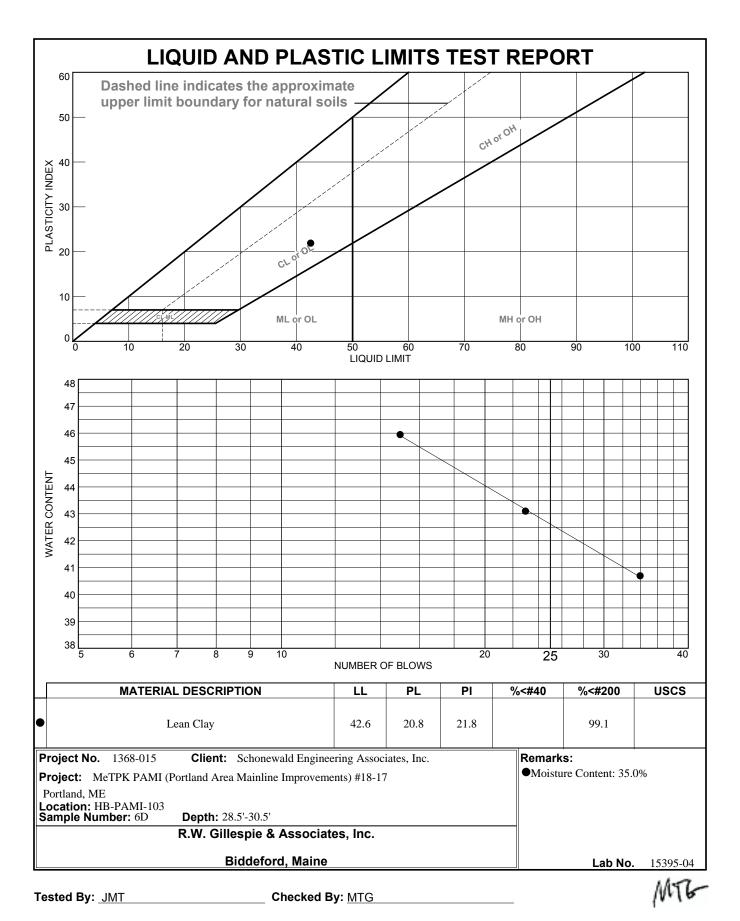
Date: 2/21/2019

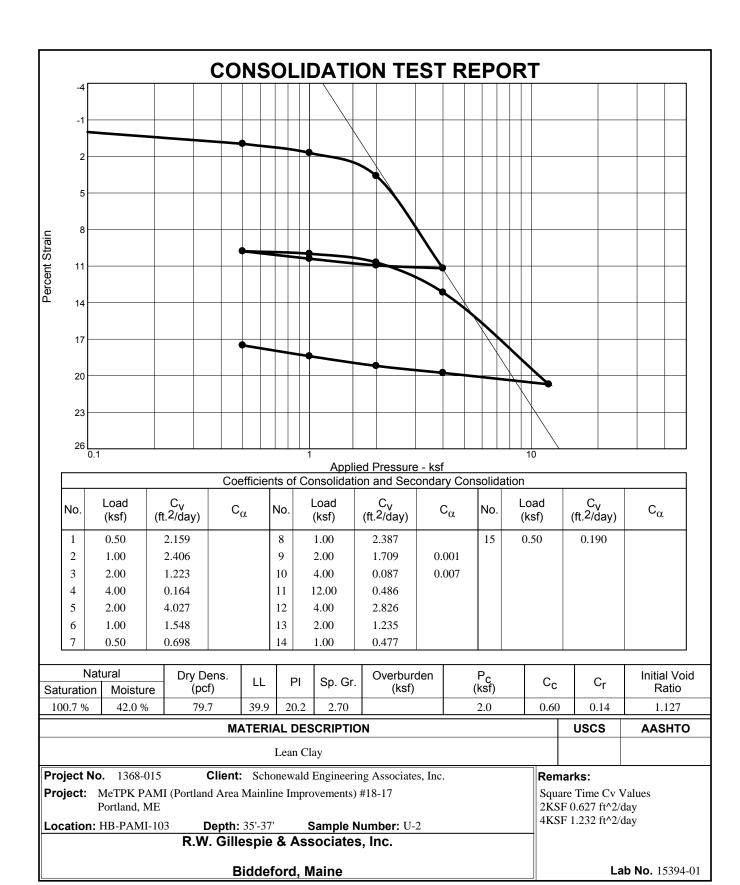
Tested By: AGS/JMT/JJB Checked By: MTG











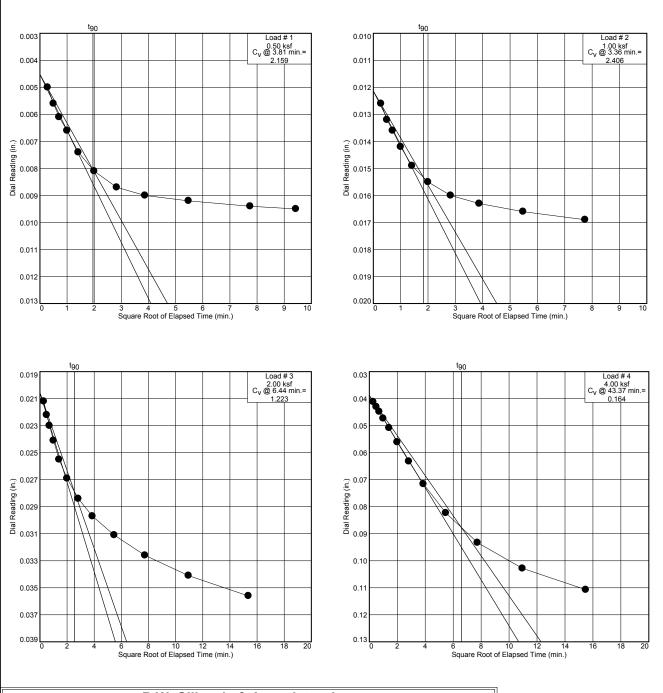
Tested By: JRF Checked By: MTG



Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-103 Depth: 35'-37' Sample Number: U-2



R.W. Gillespie & Associates, Inc.

Biddeford, Maine

Lab No. 15394-

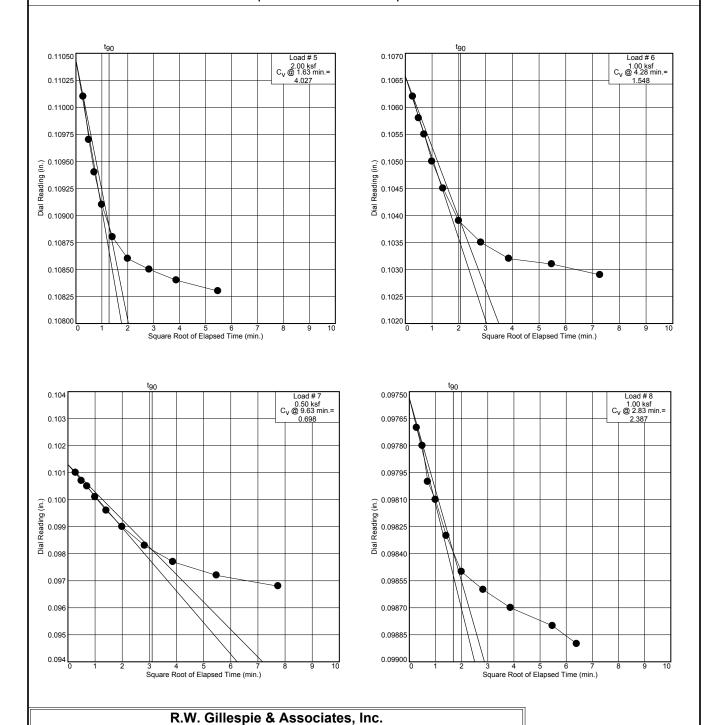


Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-103 Depth: 35'-37' Sample Number: U-2

Biddeford, Maine



MTG

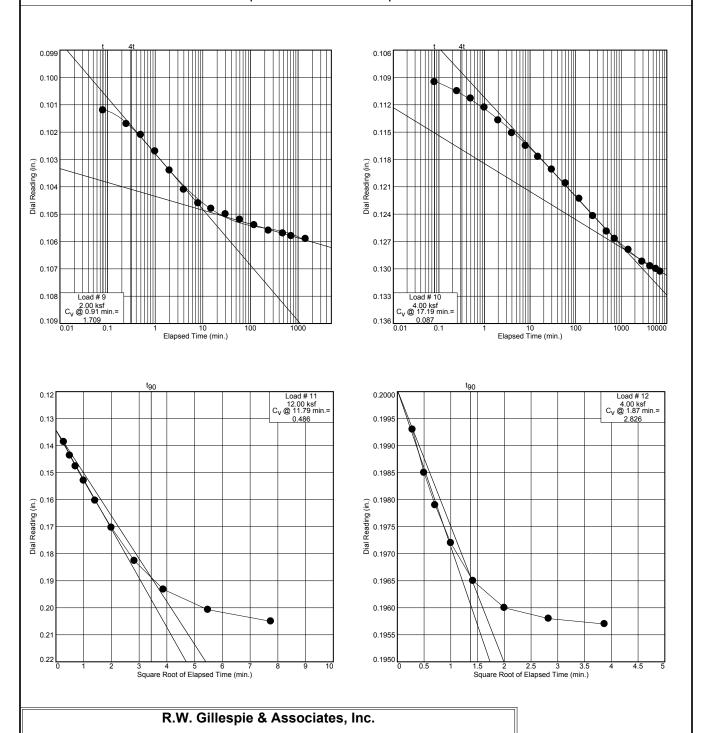
Lab No. 15394-

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-103 Depth: 35'-37' Sample Number: U-2

Biddeford, Maine



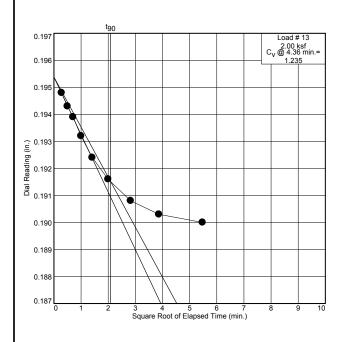
MTG

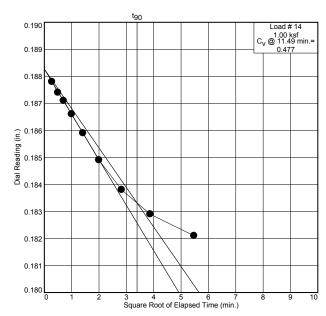
Lab No. 15394-

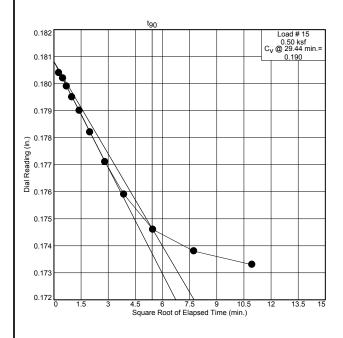
Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-103 Depth: 35'-37' Sample Number: U-2





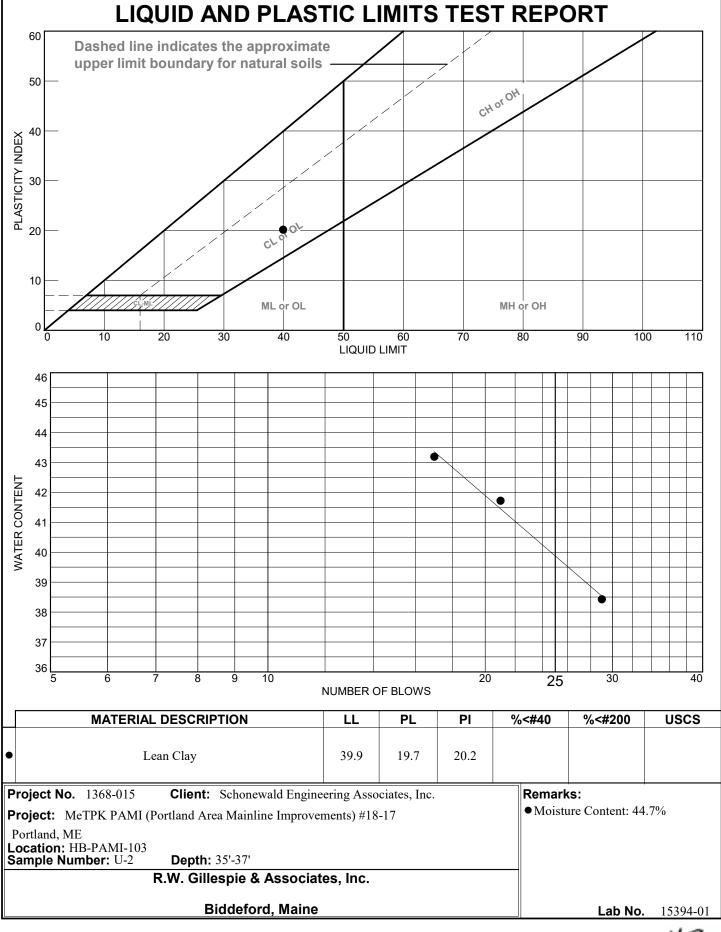


R.W. Gillespie & Associates, Inc.

Biddeford, Maine

Lab No. 15394-

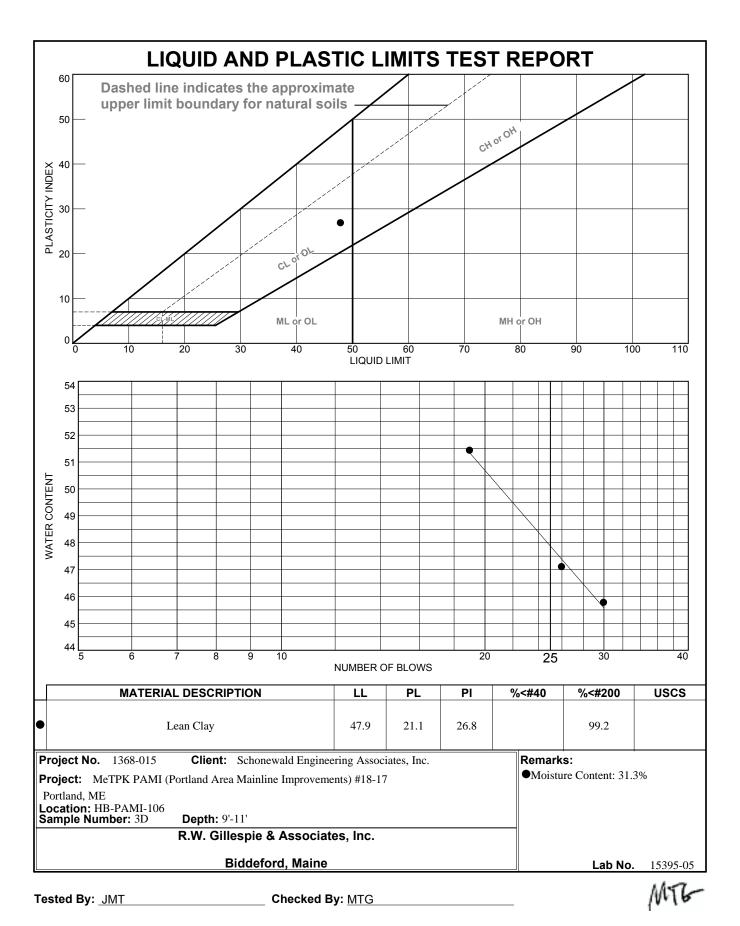
MTG

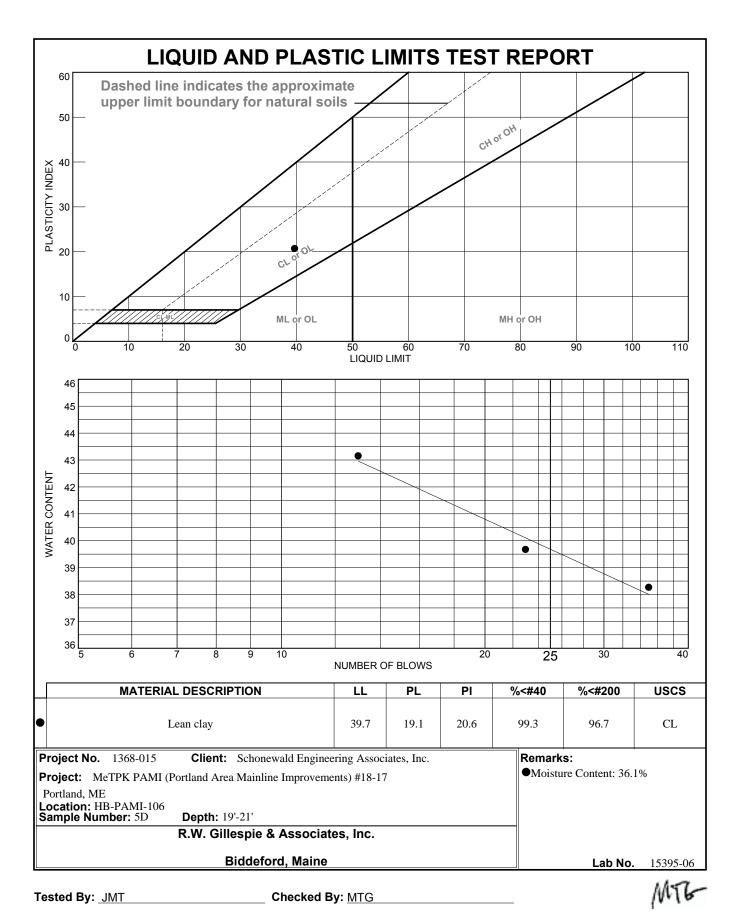


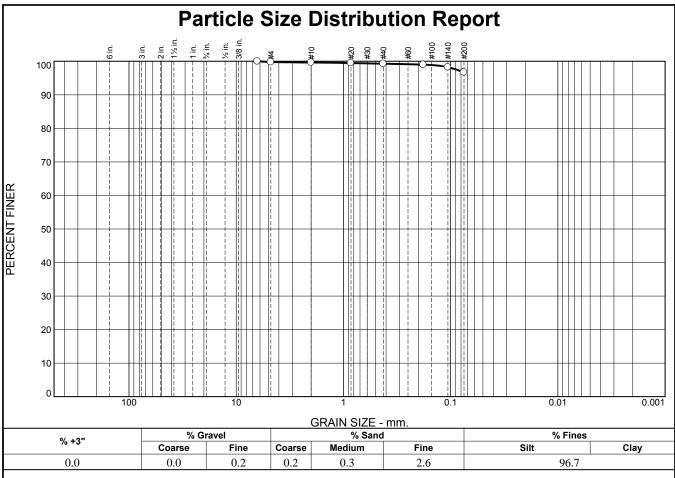
Checked By: MTG

Tested By: JMT

MTG







SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/4"	100.0		
#4	99.8		
#10	99.6		
#20	99.5		
#40	99.3		
#80	99.0		
#140	98.2		
#200	96.7		
* (igntion provided	\	

Lean clay	Soil Description	
	Atterberg Limits	
PL= 19.1	LL= 39.7	PI= 20.6
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS= CL	Classification AASHT	O= A-6(21)
Moisture Content:	Remarks 36.1%	

(no specification provided)

Location: HB-PAMI-106 **Sample Number:** 5D

Depth: 19'-21'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

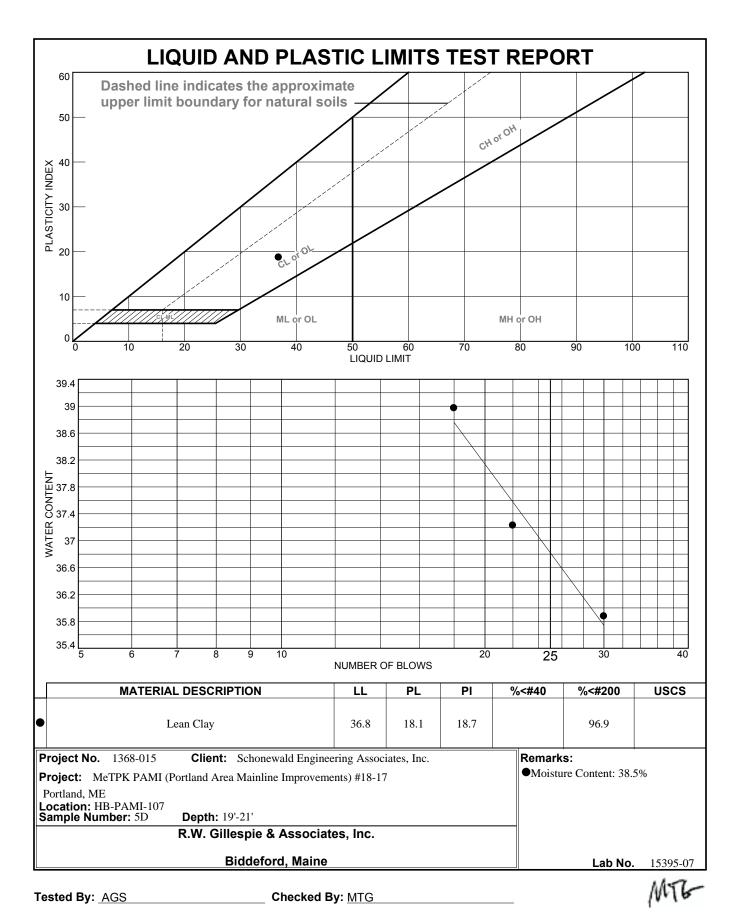
Portland, ME

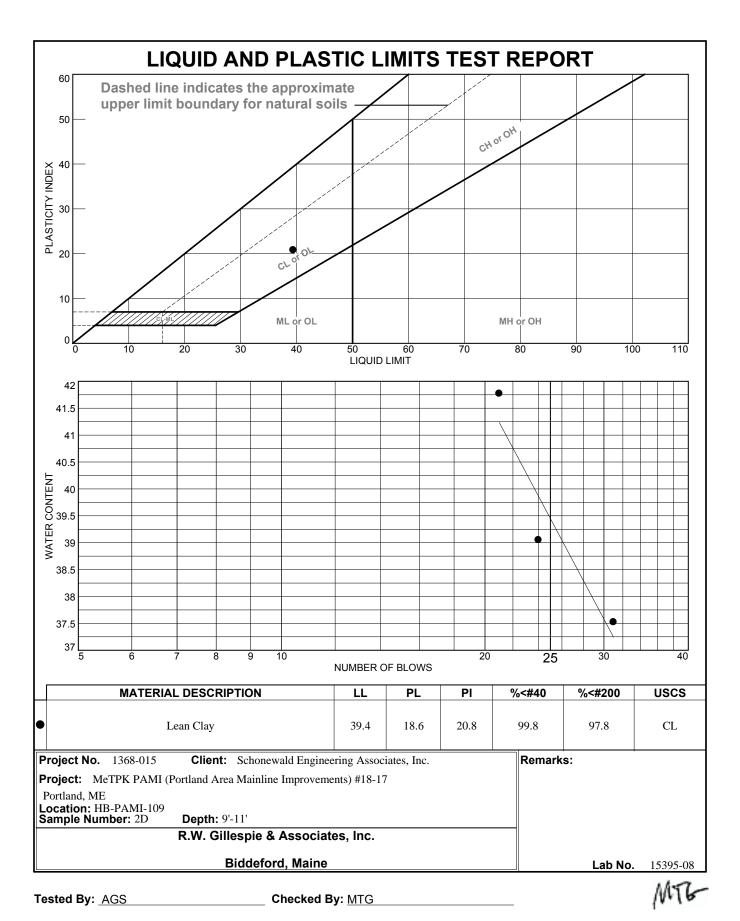
Project No: Lab No. 1368-015

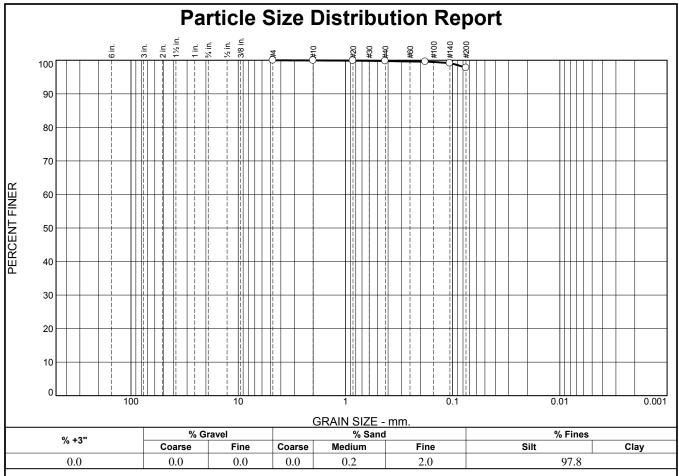
Tested By: JMT/AGS/JJB Checked By: MTG



Date: 2/21/2019







K=NO)
,

Lean Clay	Soil Description		
PL= 18.6	Atterberg Limits LL= 39.4	PI= 20.8	
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D85= D30= Cu=	D ₆₀ = D ₁₅ = C _c =	
USCS= CL	Classification AASHT	O= A-6(21)	
Remarks Moisture Content: 31.4%			

* (no specification provided)

Location: HB-PAMI-109 Sample Number: 2D

Depth: 9'-11'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Schonewald Engineering Associates, Inc.

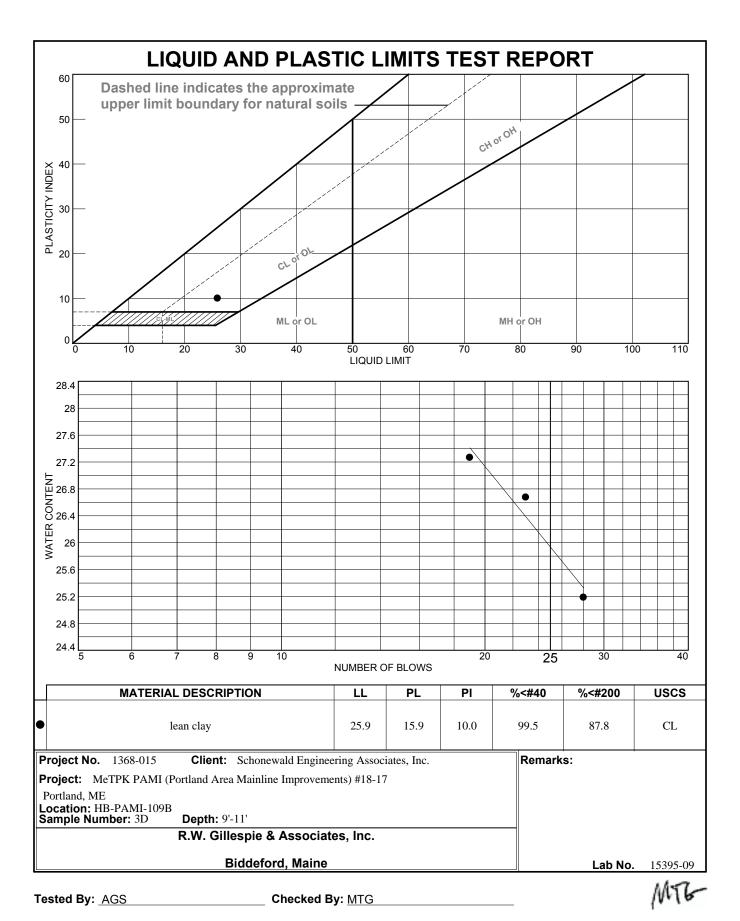
Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

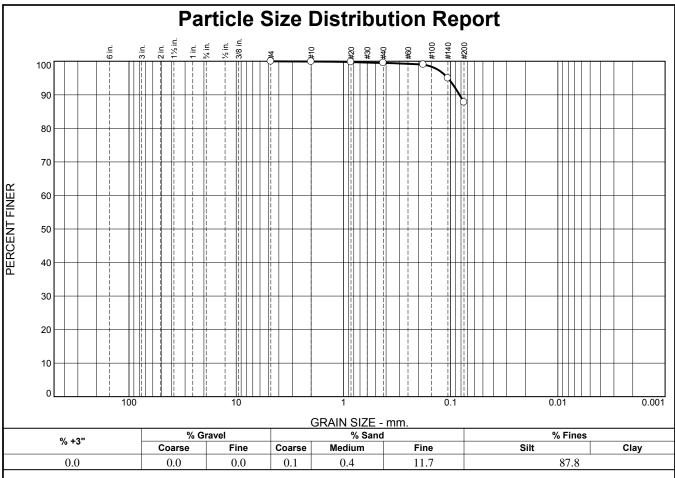
Portland, ME

Project No: 1368-015

Date: 3/19/19

Tested By: AGS Checked By: MTG Lab No.





SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#10	99.9		
#20	99.8		
#40	99.5		
#80	99.0		
#140	95.0		
#200	87.8		
 *	1	l	

lean clay	Soil Description	1	
PL= 15.9	Atterberg Limits	PI= 10.0	
D ₉₀ = 0.0825 D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =	
USCS= CL	Classification AASHT	ΓO= A-4(7)	
Remarks Moisture Content: 24.0%			

* (no specification provided)

Location: HB-PAMI-109B **Sample Number:** 3D

Depth: 9'-11'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Schonewald Engineering Associates, Inc.

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Portland, ME

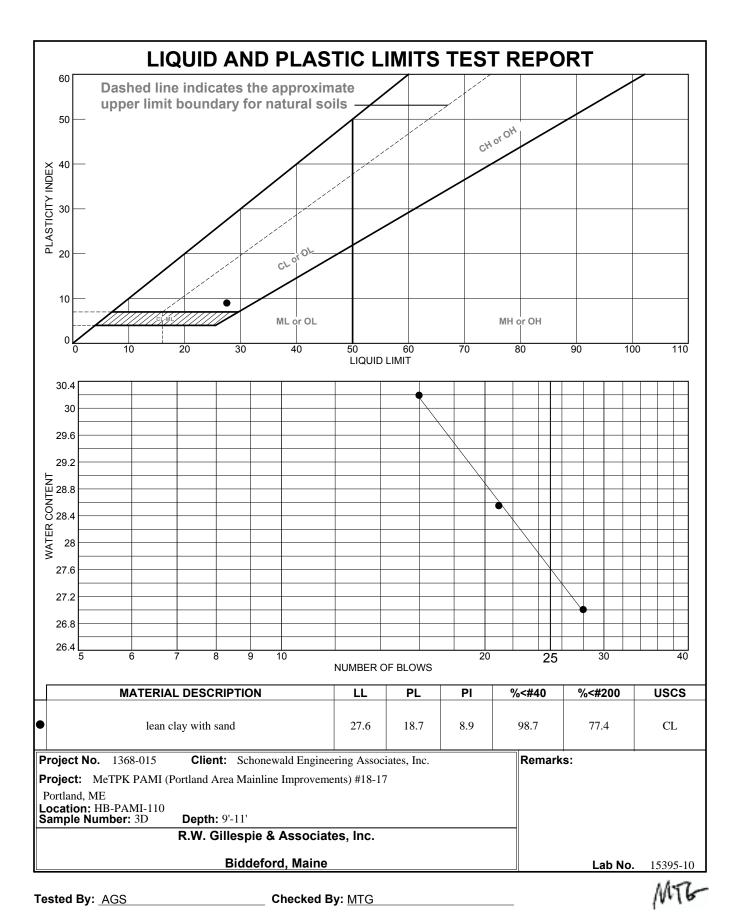
Project No: 1368-015

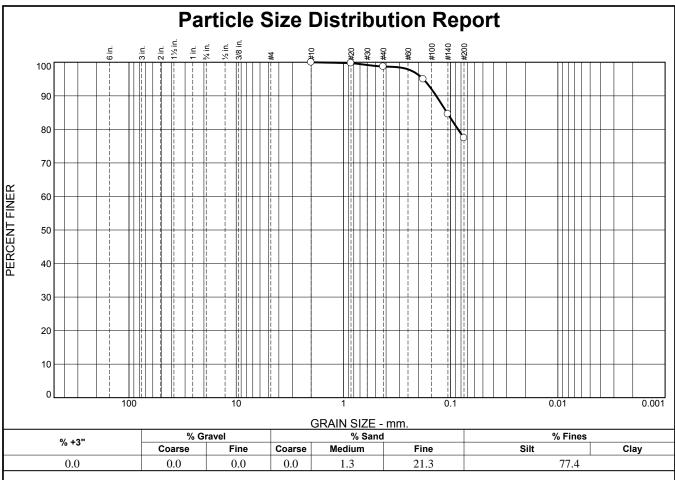
Tested By: AGS Checked By: MTG



Date: 3/19/19

Lab No.





SIEVE	PERCENT	SPEC.*	PASS?	
SIZE	FINER	PERCENT	(X=NO)	
#10	100.0			
#20	99.8			
#40	98.7			
#80	95.0			
#140	84.6			
#200	77.4			
* (* (no enacification provided)			

1.0			
lean cla	Soi y with sand	l Description	
PL= 1	8.7 Atte	erberg Limits = 27.6	PI= 8.9
D ₉₀ = (D ₅₀ = D ₁₀ =		coefficients 15= 0.1082 10=	D ₆₀ = D ₁₅ = C _c =
USCS=		assification AASHTO=	A-4(5)
Remarks Moisture Content: 30.4%			

(no specification provided)

Location: HB-PAMI-110 **Sample Number:** 3D

Depth: 9'-11'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

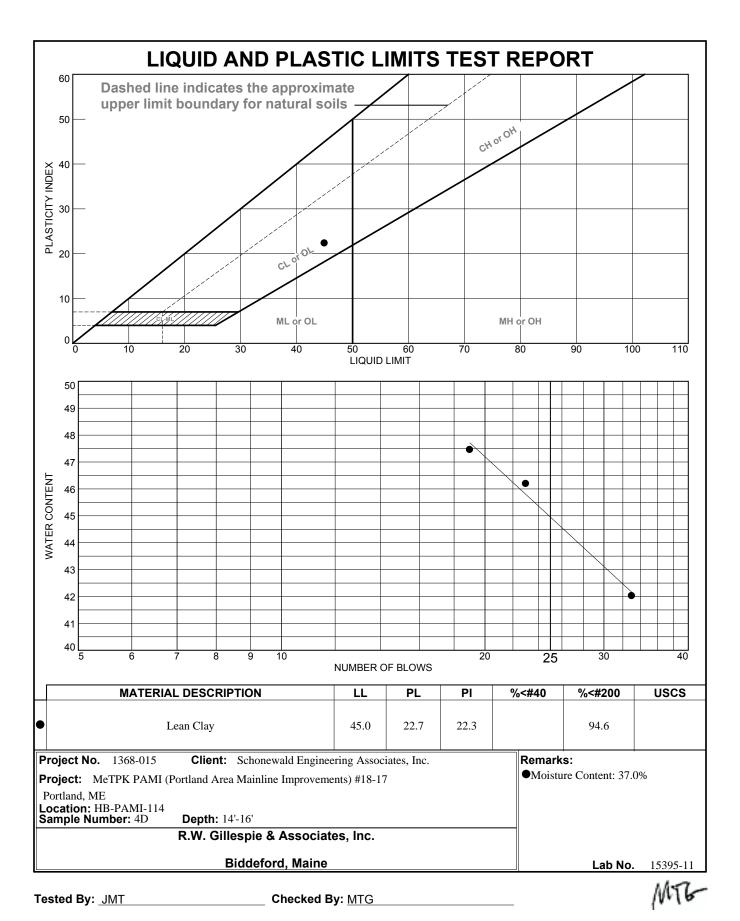
Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

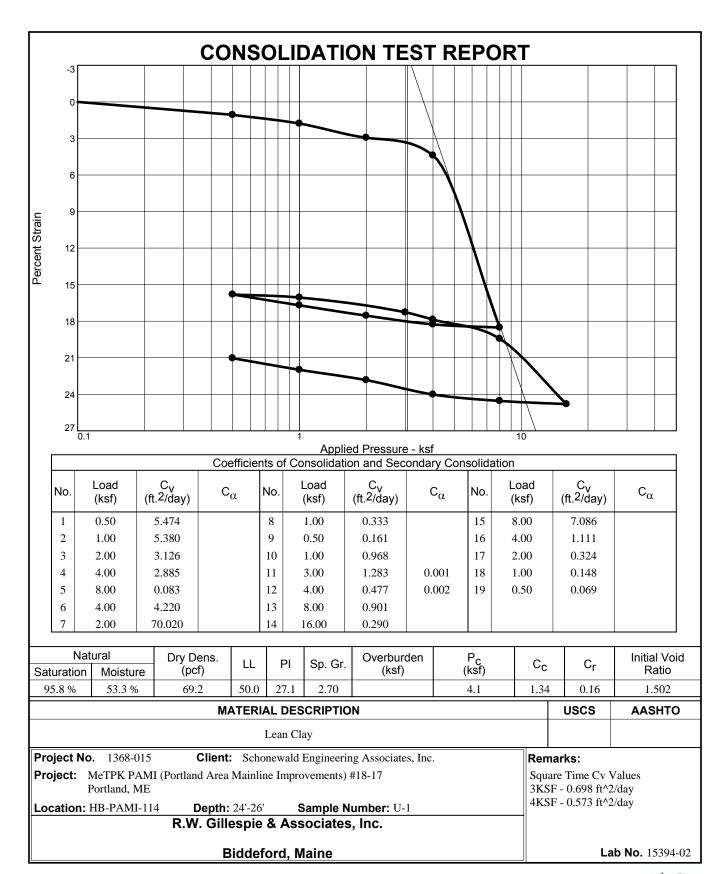
Portland, ME

Project No: 1368-015 Lab No.

Date: 3/19/19

Tested By: AGS Checked By: MTG





Tested By: JRF Checked By: MTG

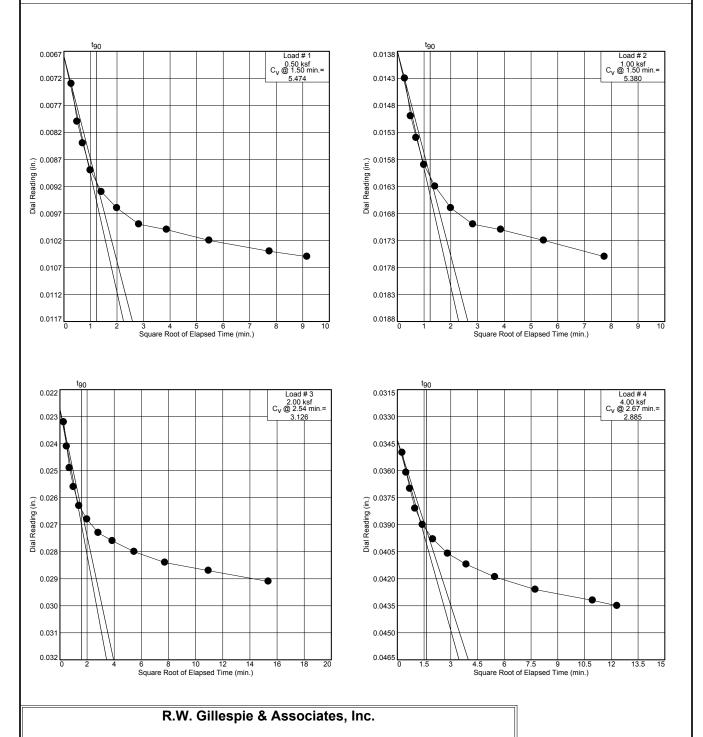


Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-114 Depth: 24'-26' Sample Number: U-1

Biddeford, Maine

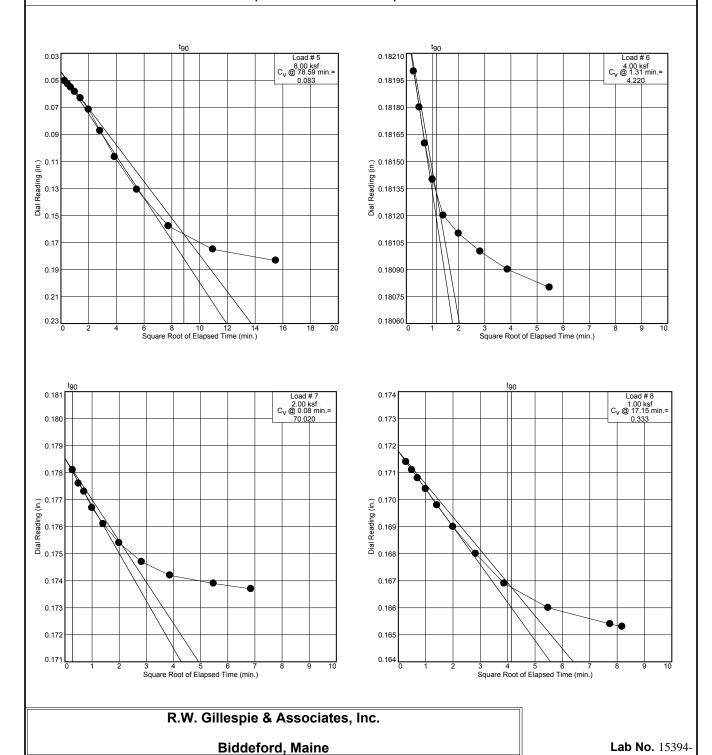




Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-114 Depth: 24'-26' Sample Number: U-1

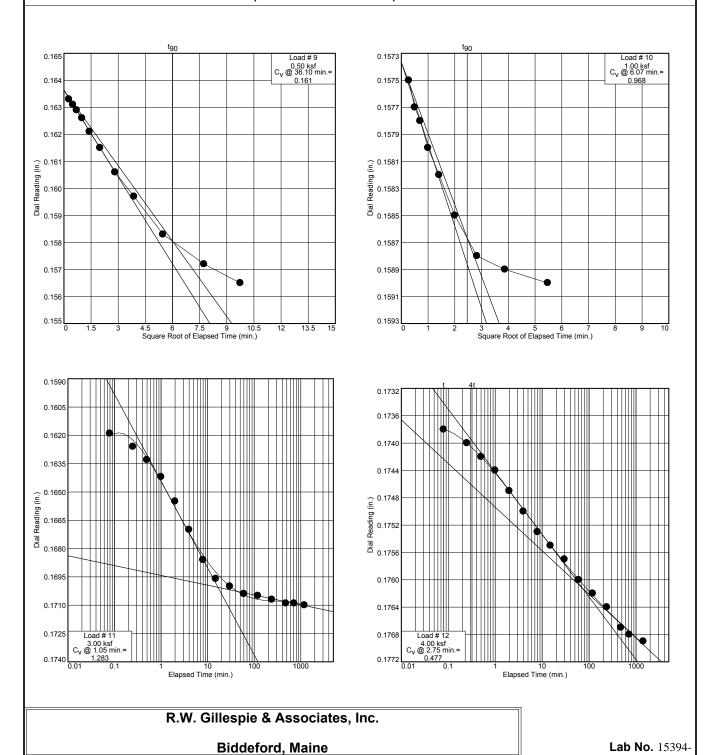


MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-114 Depth: 24'-26' Sample Number: U-1



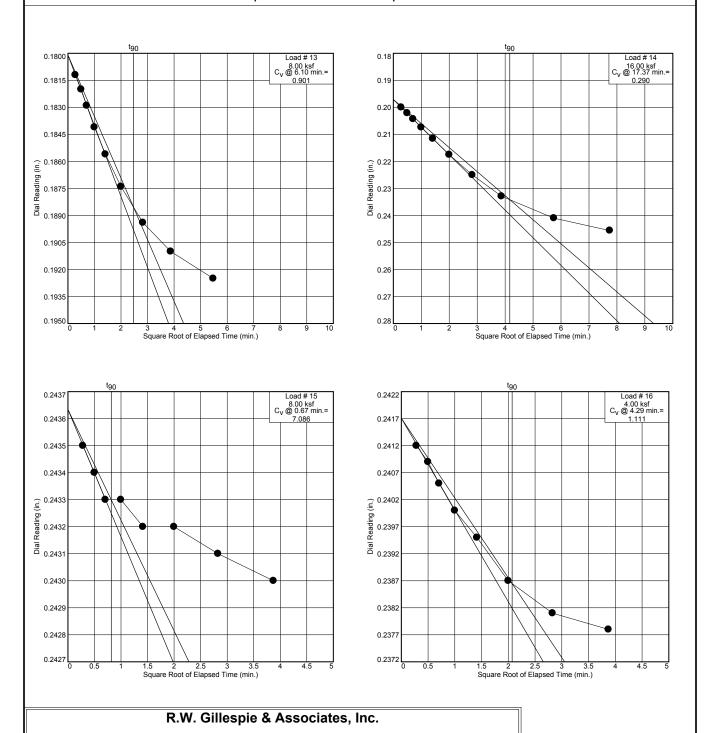


Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-114 Depth: 24'-26' Sample Number: U-1

Biddeford, Maine

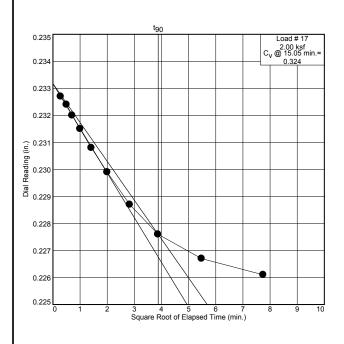


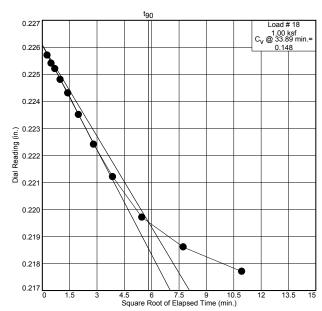


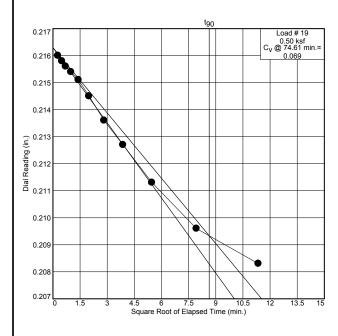
Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-114 Depth: 24'-26' Sample Number: U-1



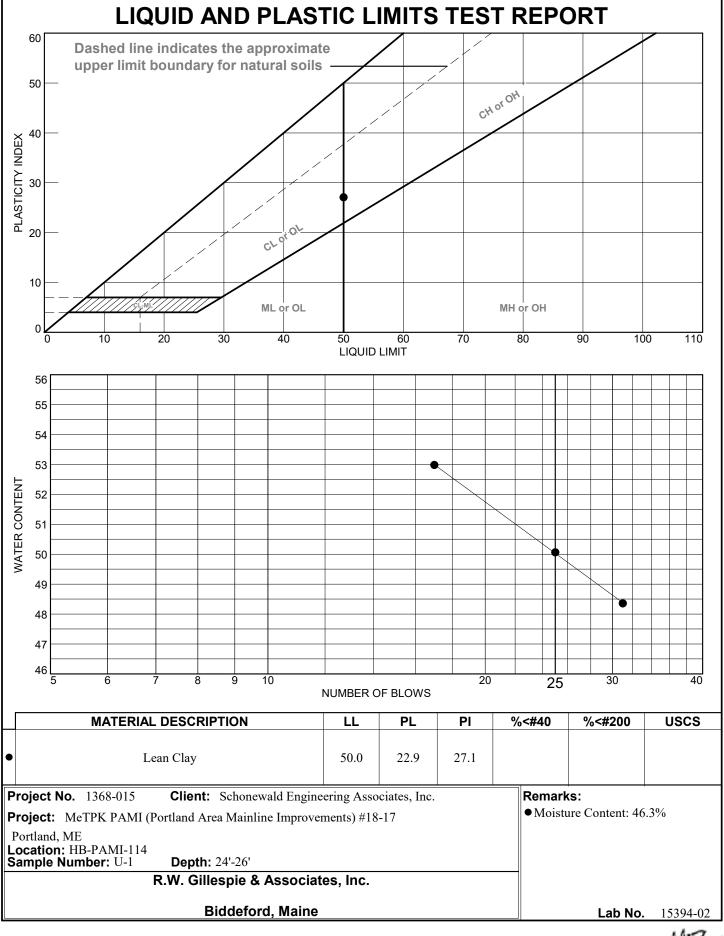




R.W. Gillespie & Associates, Inc.

Biddeford, Maine

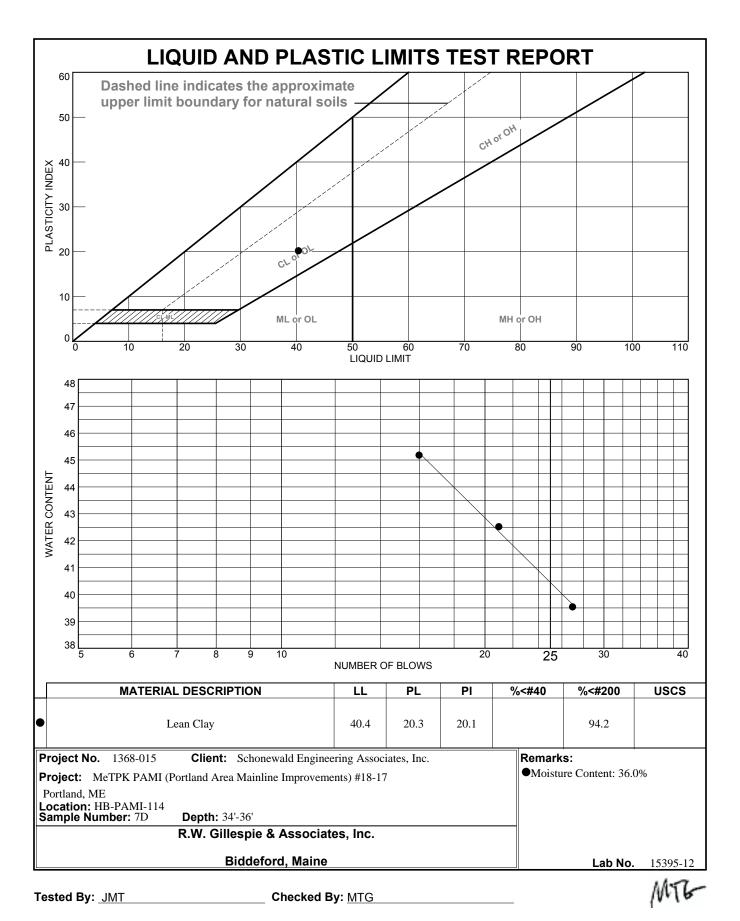


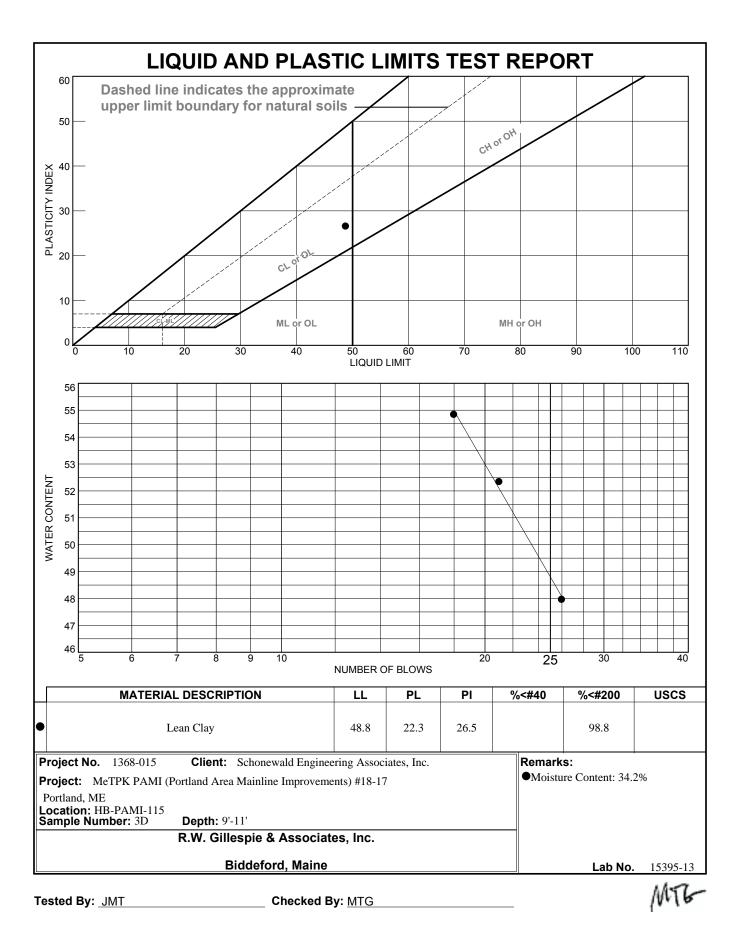


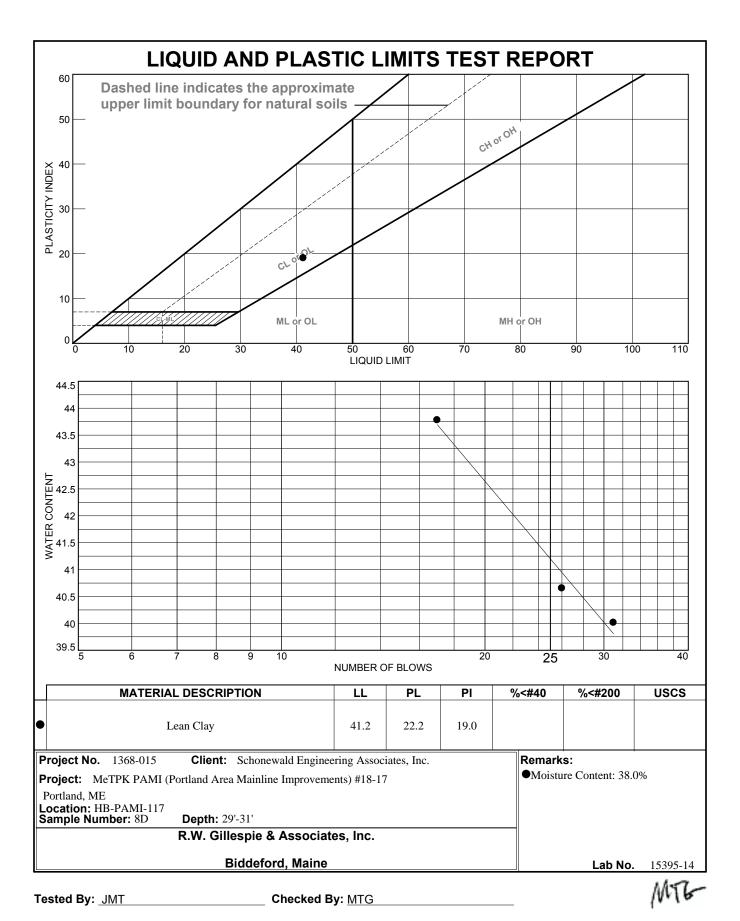
Checked By: MTG

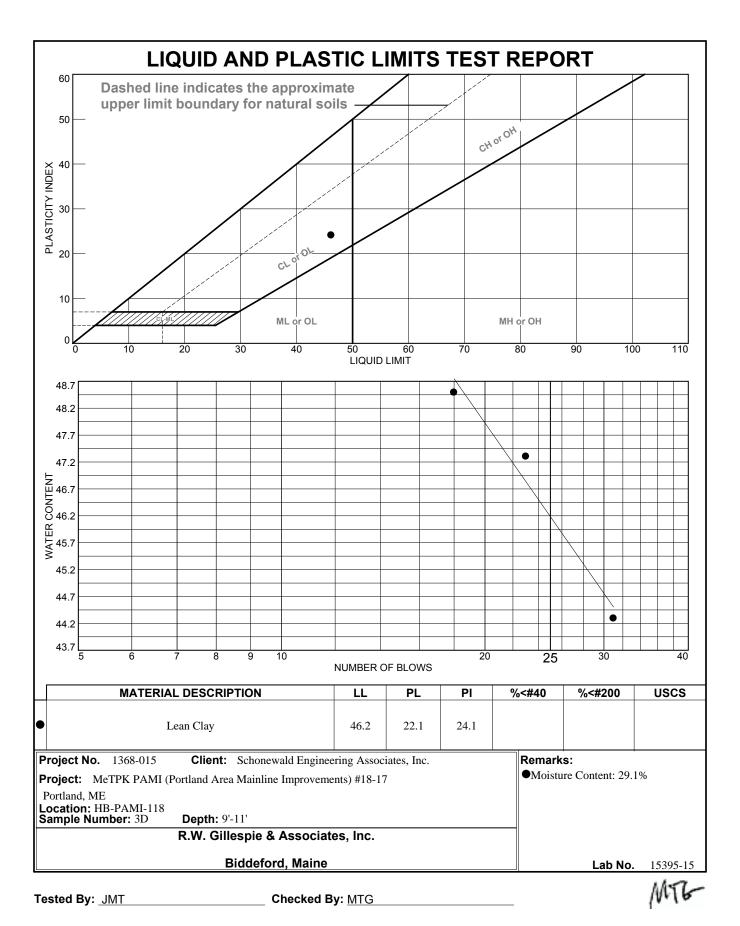
Tested By: JMT

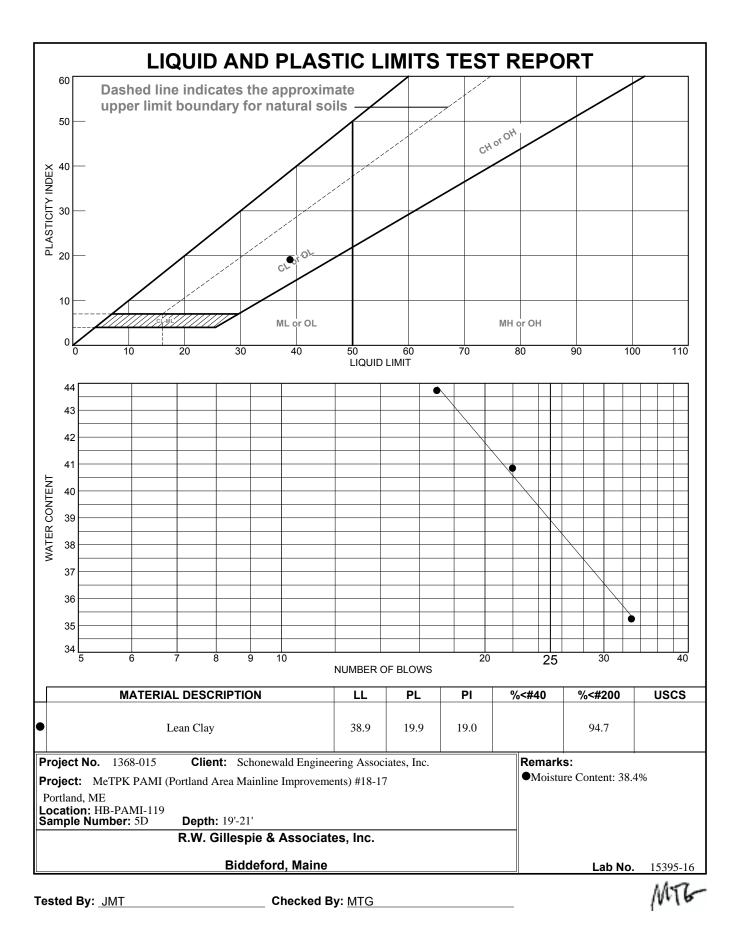
Mile

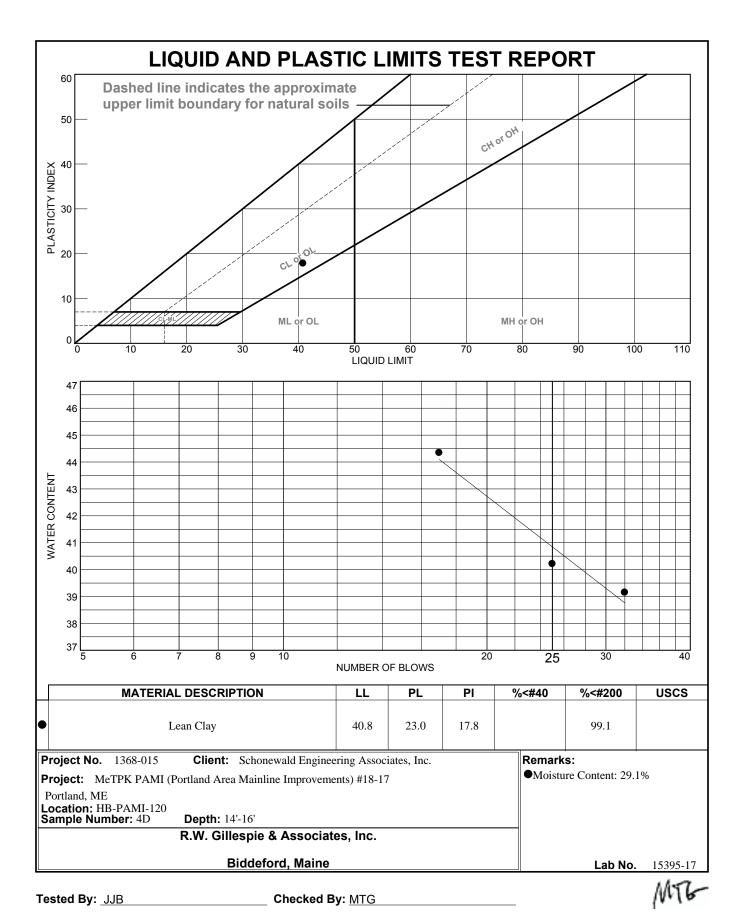


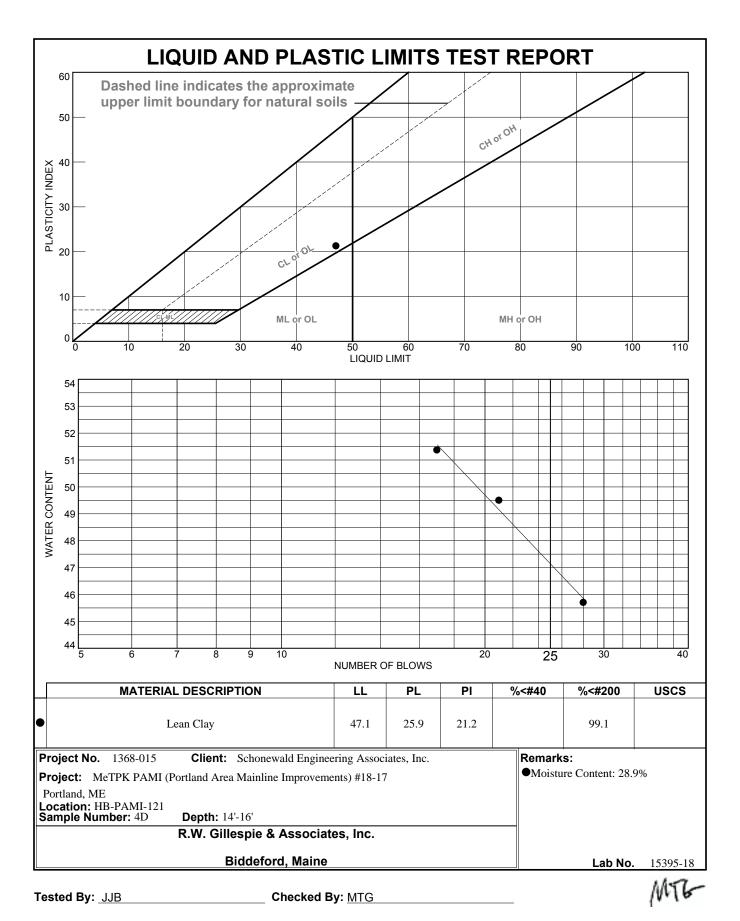


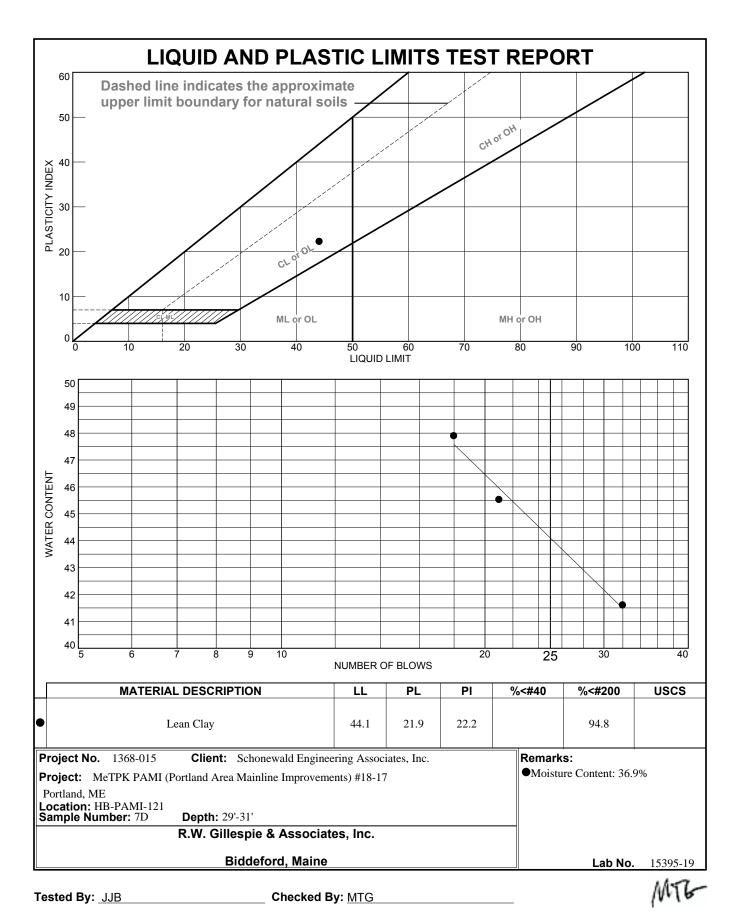


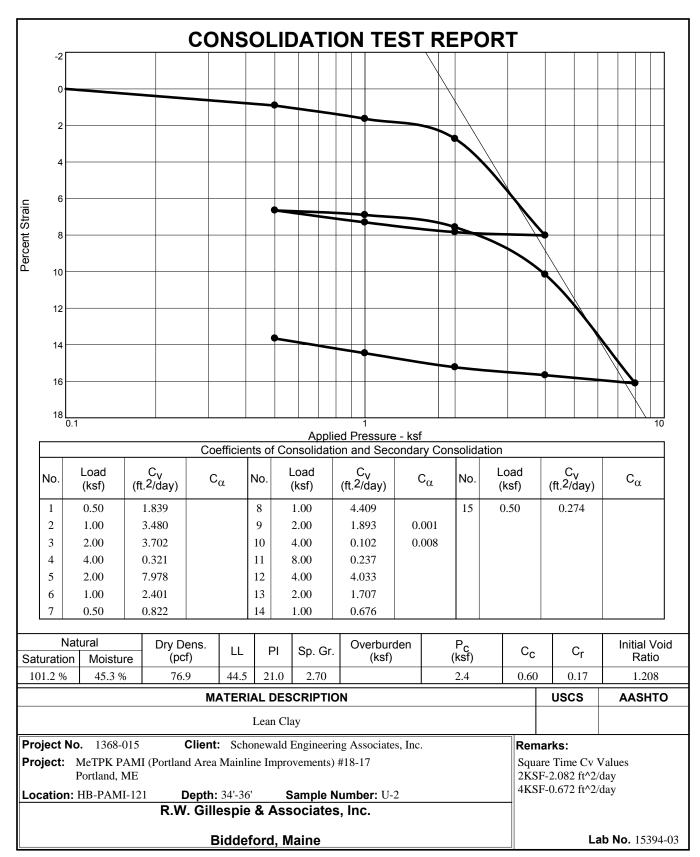












Tested By: JRF Checked By: MTG

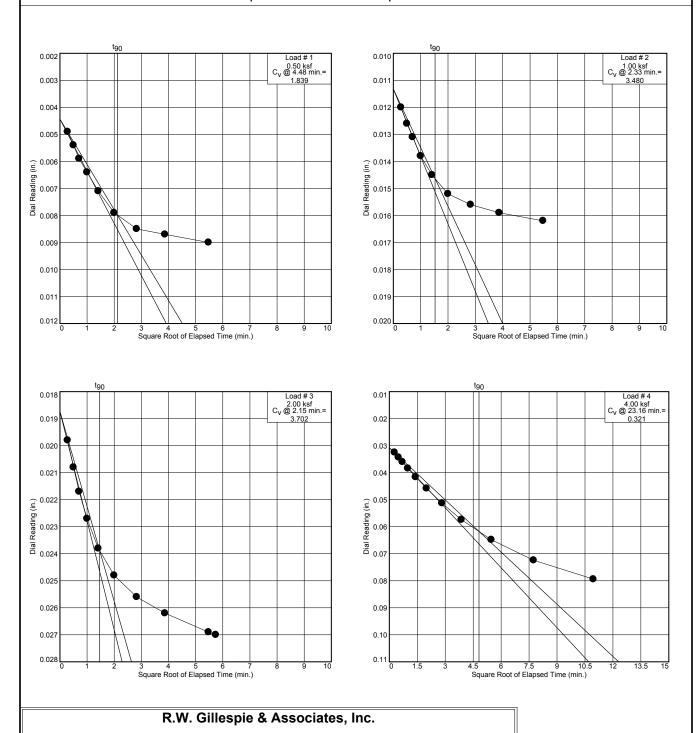
MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-121 Depth: 34'-36' Sample Number: U-2

Biddeford, Maine

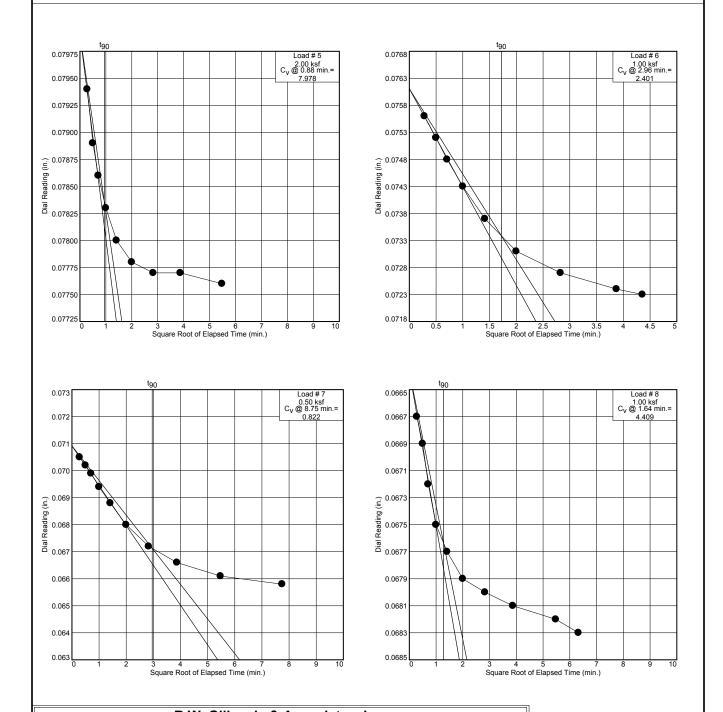




Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-121 Depth: 34'-36' Sample Number: U-2



R.W. Gillespie & Associates, Inc.

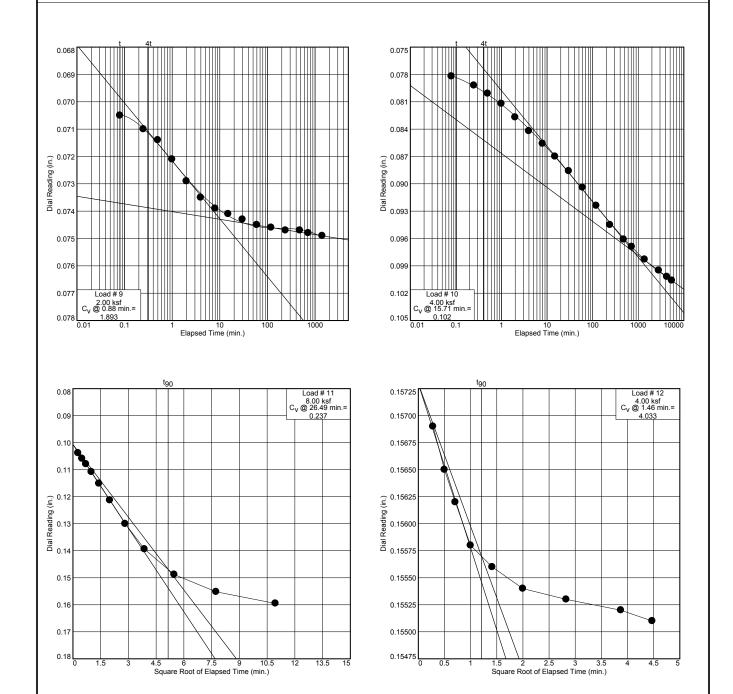
Biddeford, Maine



Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-121 Depth: 34'-36' Sample Number: U-2



R.W. Gillespie & Associates, Inc.

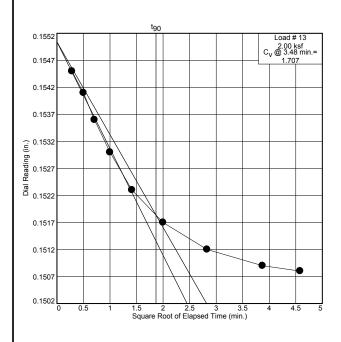
Biddeford, Maine

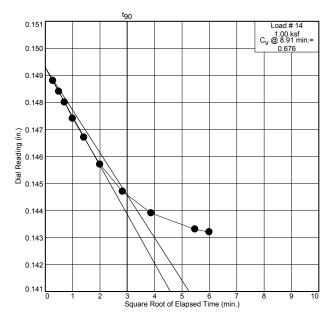


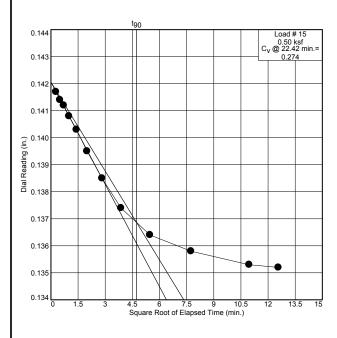
Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-121 Depth: 34'-36' Sample Number: U-2



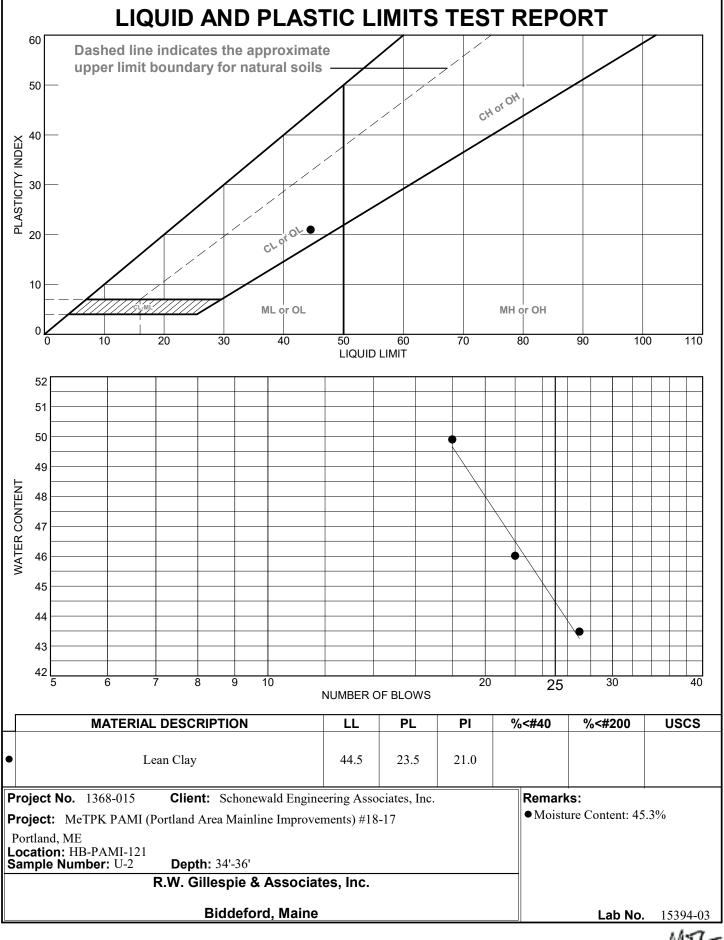




R.W. Gillespie & Associates, Inc.

Biddeford, Maine Lab No. 15394-

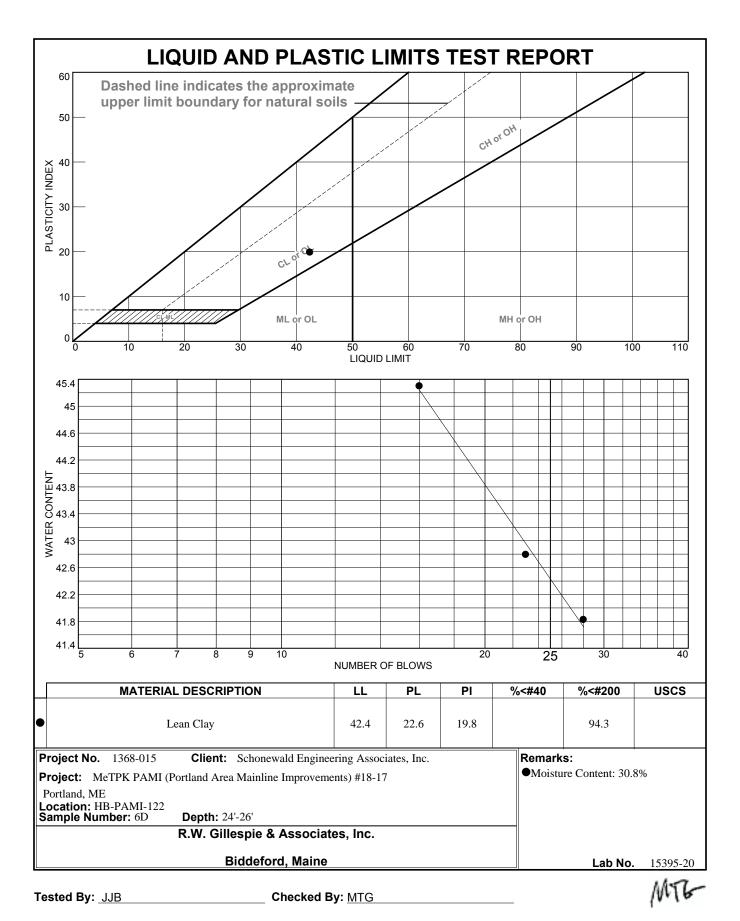
MTG

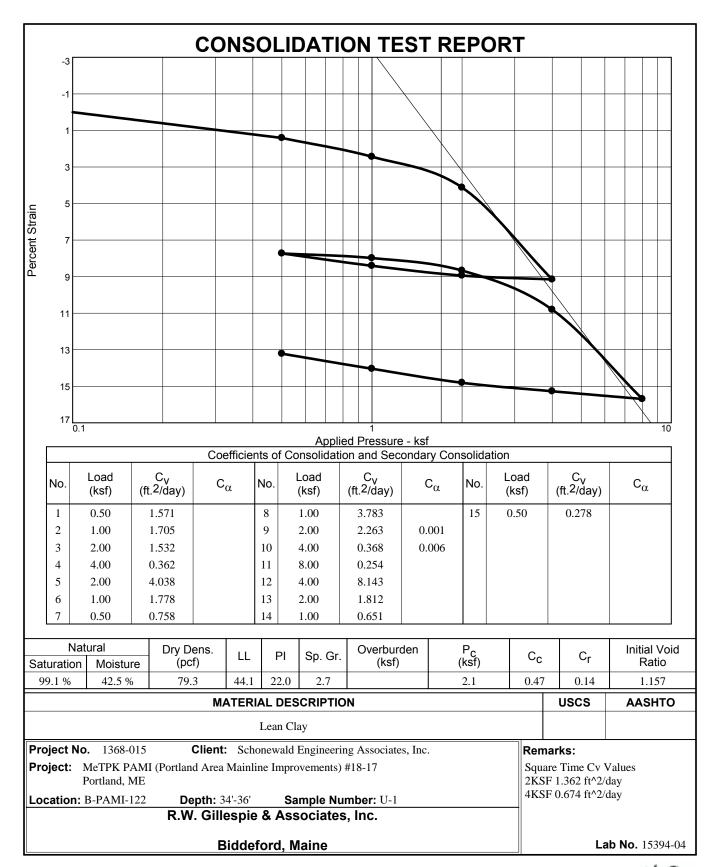


Checked By: MTG

Tested By: AGS

MTG





Tested By: JRF Checked By: MTG

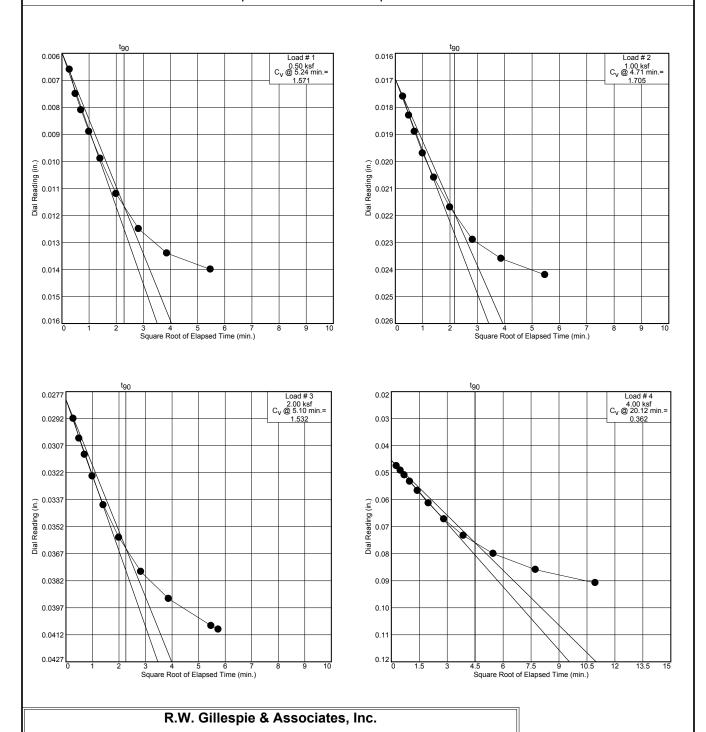
MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: B-PAMI-122 Depth: 34'-36' Sample Number: U-1

Biddeford, Maine



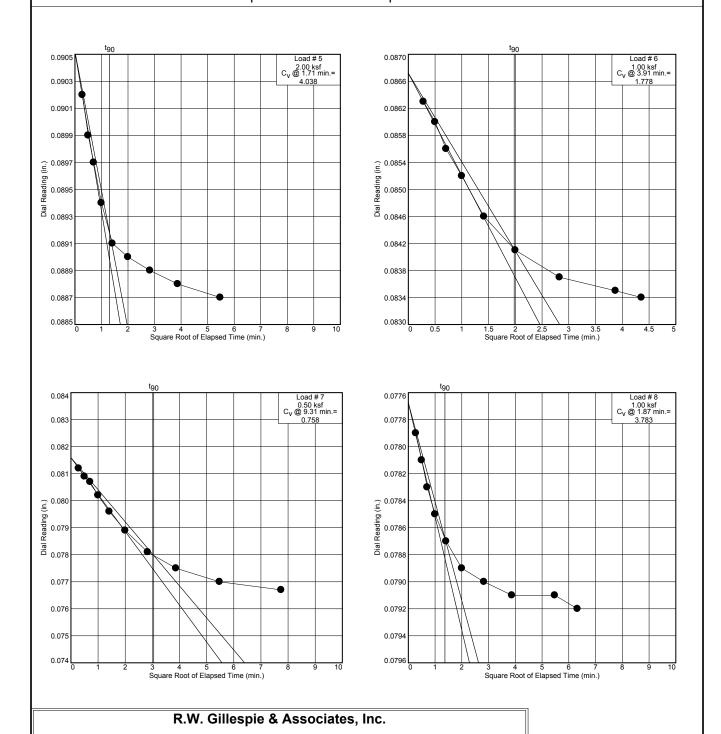
MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: B-PAMI-122 Depth: 34'-36' Sample Number: U-1

Biddeford, Maine

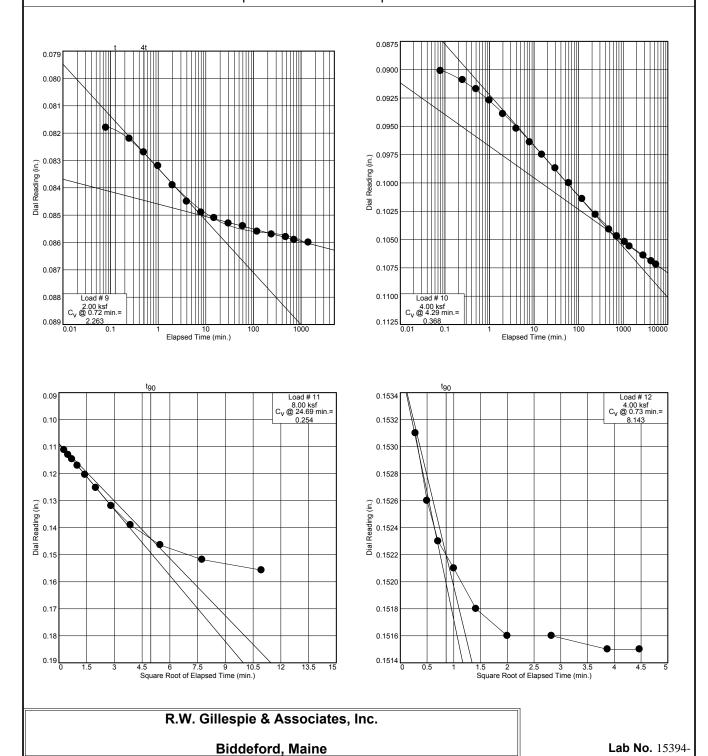


MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: B-PAMI-122 Depth: 34'-36' Sample Number: U-1

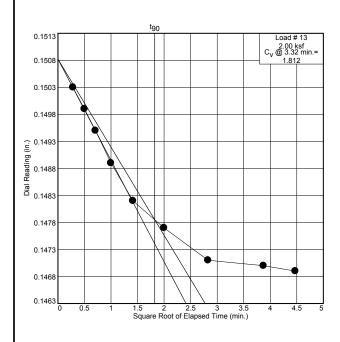


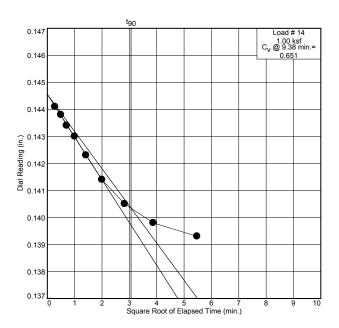


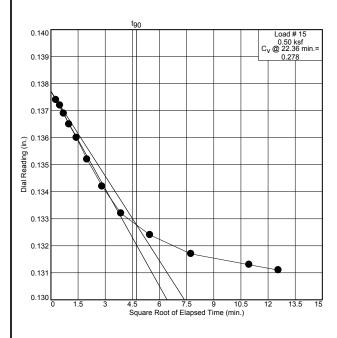
Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: B-PAMI-122 Depth: 34'-36' Sample Number: U-1



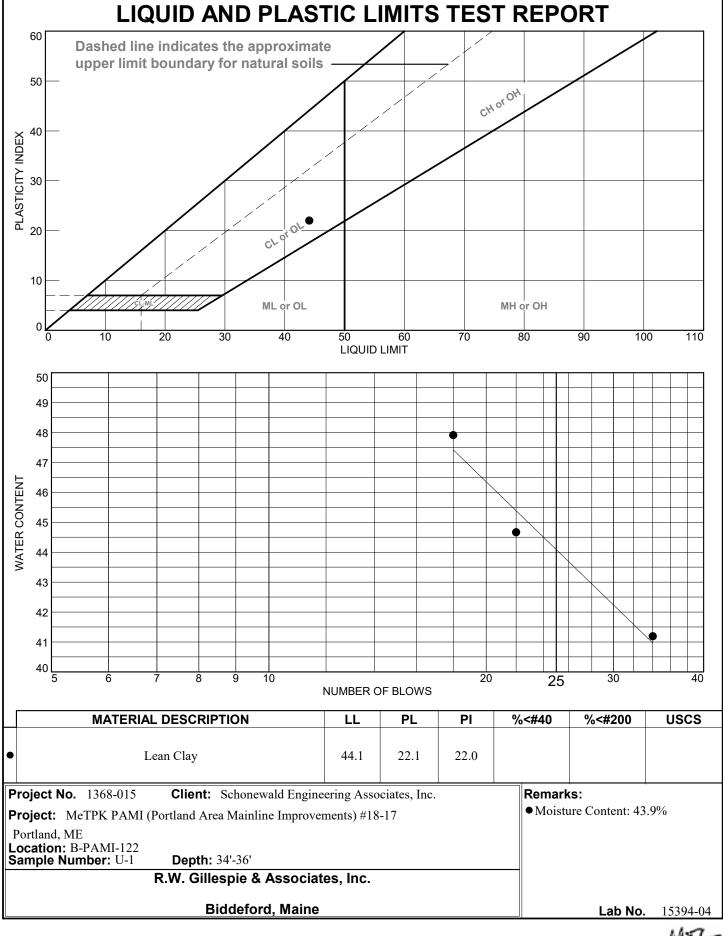




R.W. Gillespie & Associates, Inc.

Biddeford, Maine

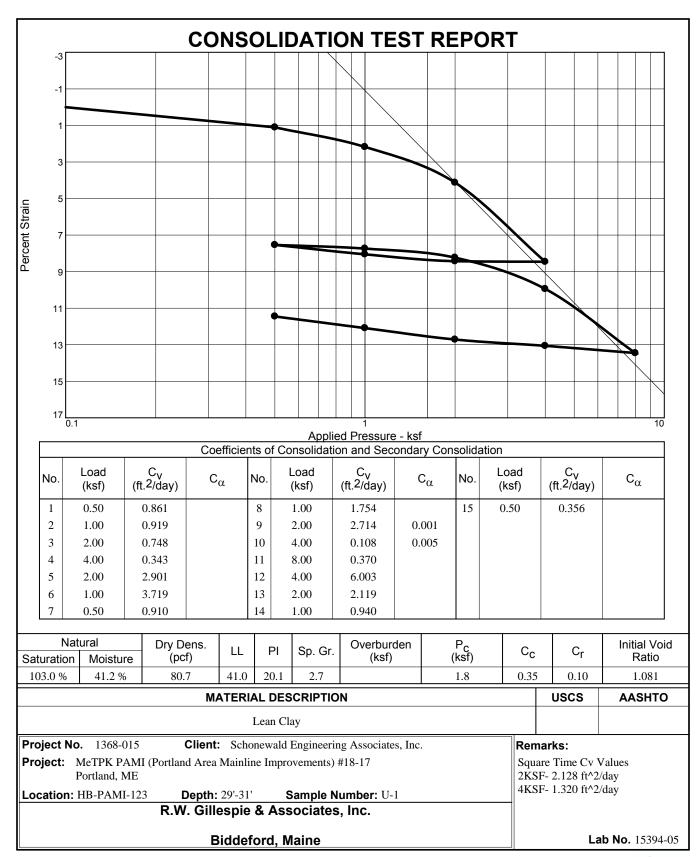




Checked By: MTG

Tested By: JJB

MTG



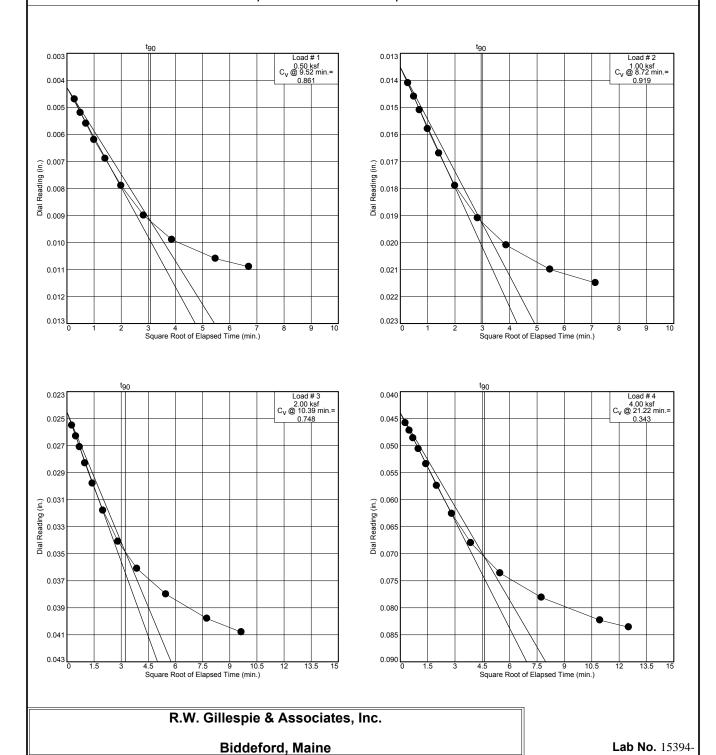
Tested By: JRF Checked By: MTG

MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-123 Depth: 29'-31' Sample Number: U-1



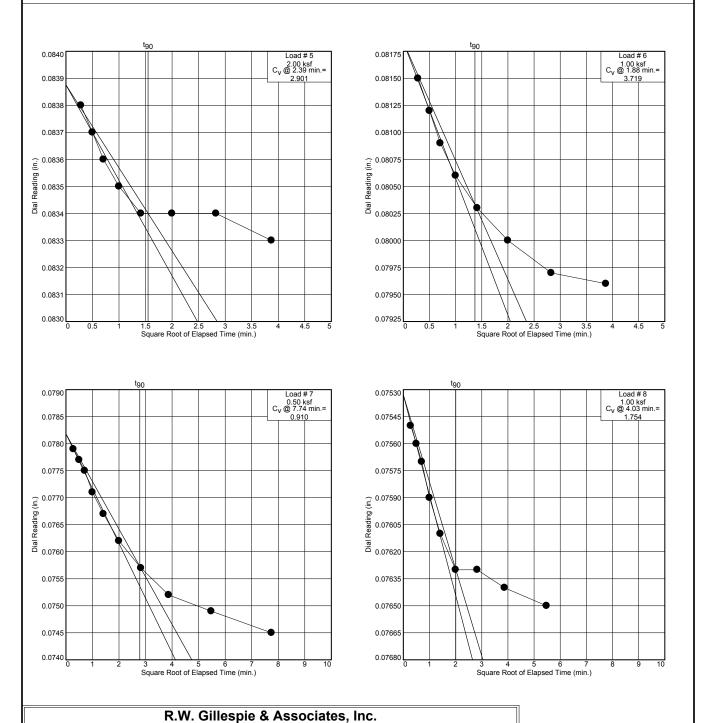


Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-123 Depth: 29'-31' Sample Number: U-1

Biddeford, Maine



Lab No. 15394-

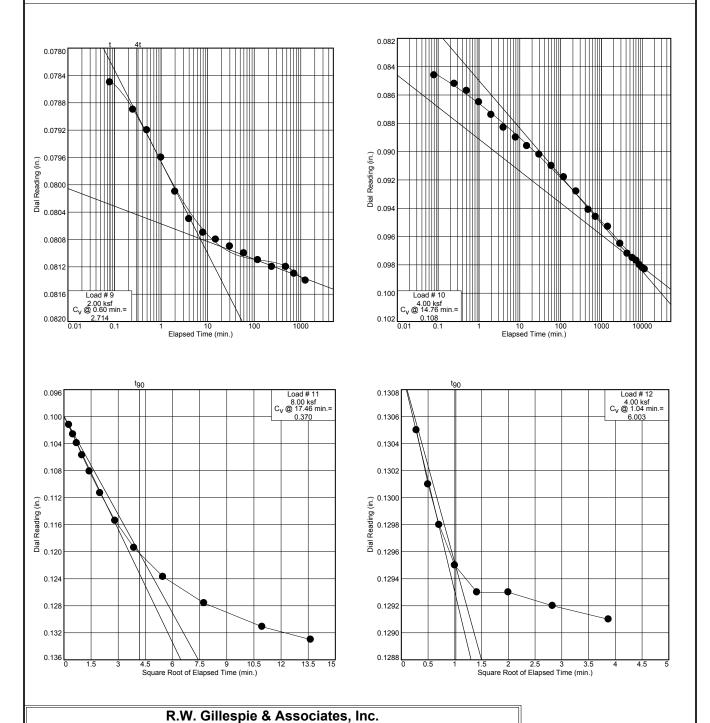
MTG

Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-123 Depth: 29'-31' Sample Number: U-1

Biddeford, Maine

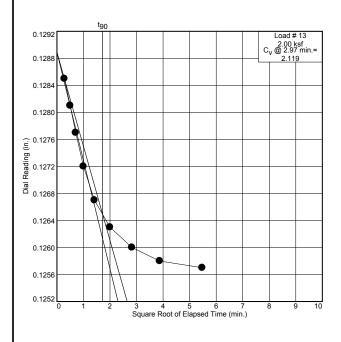


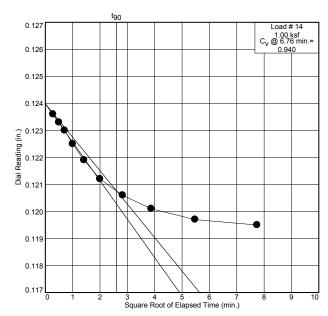


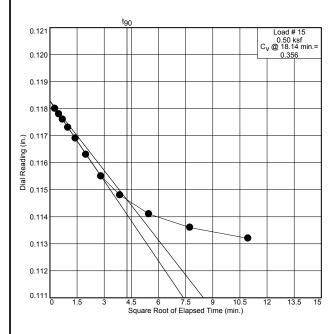
Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-123 Depth: 29'-31' Sample Number: U-1



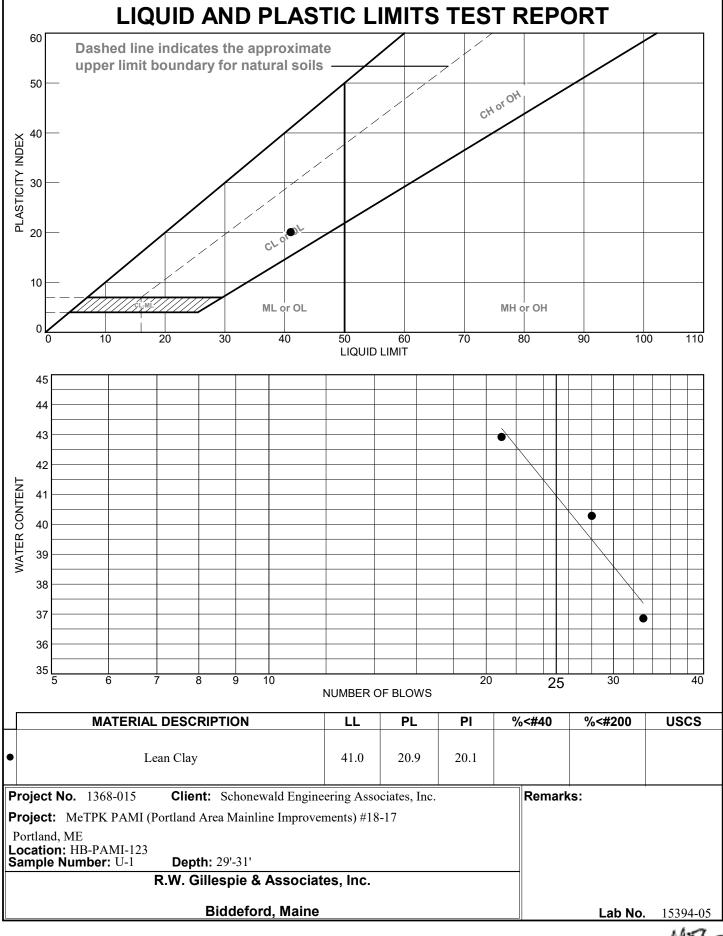




R.W. Gillespie & Associates, Inc.

Biddeford, Maine

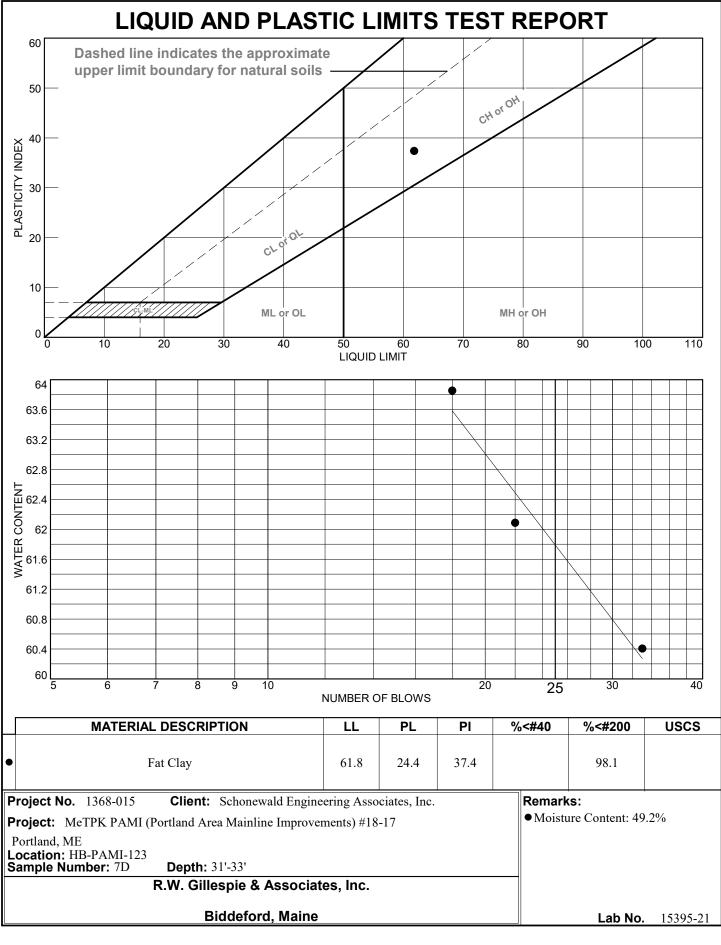




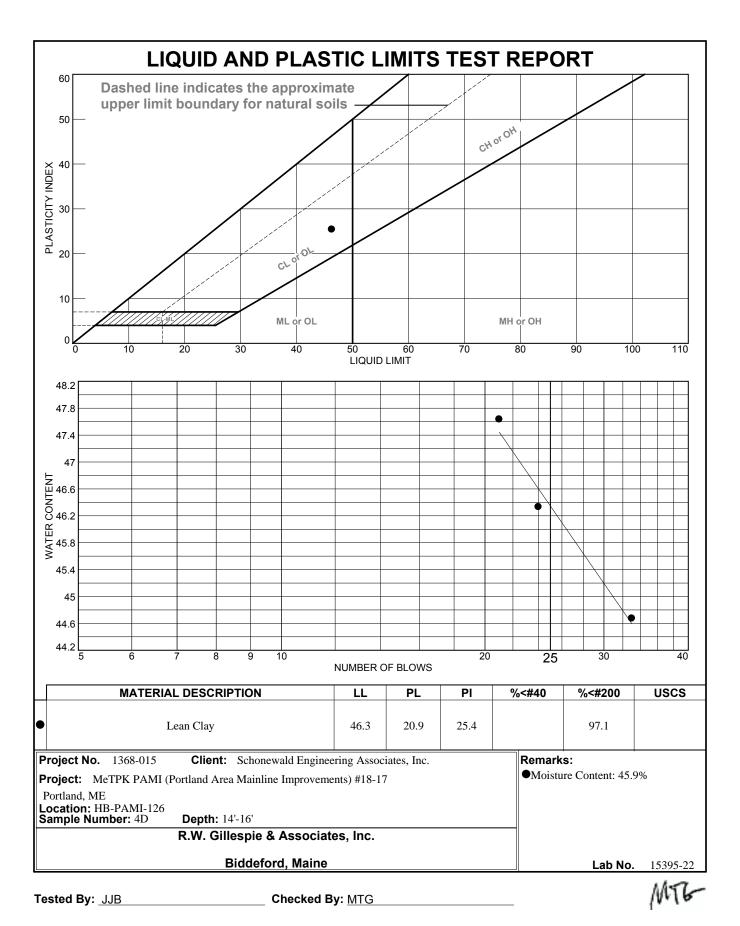
Checked By: MTG

Tested By: JJB

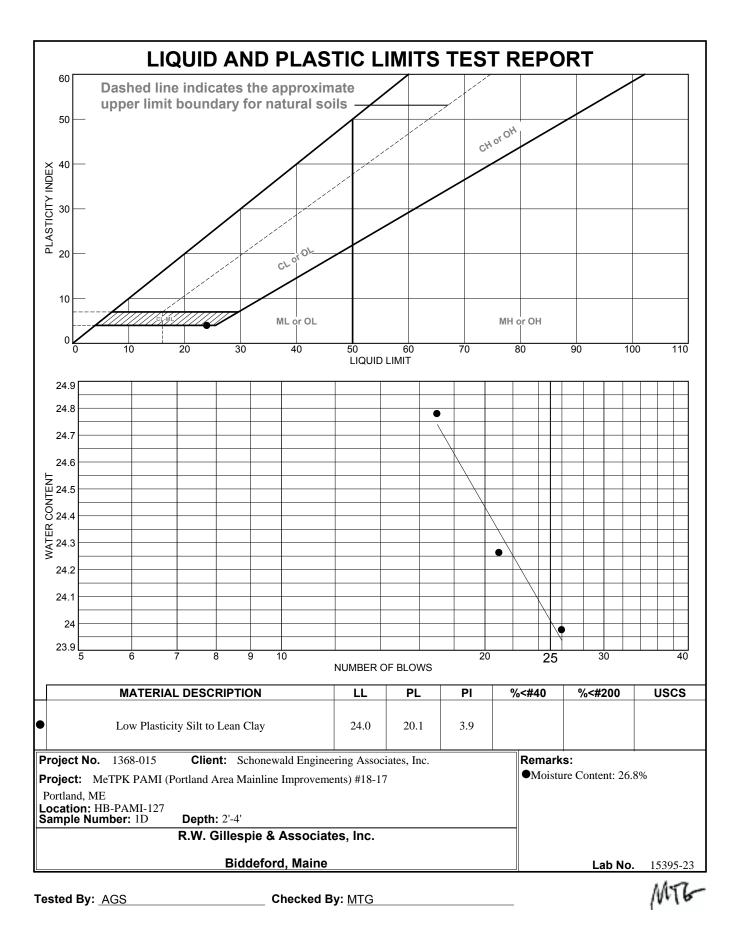
Mile



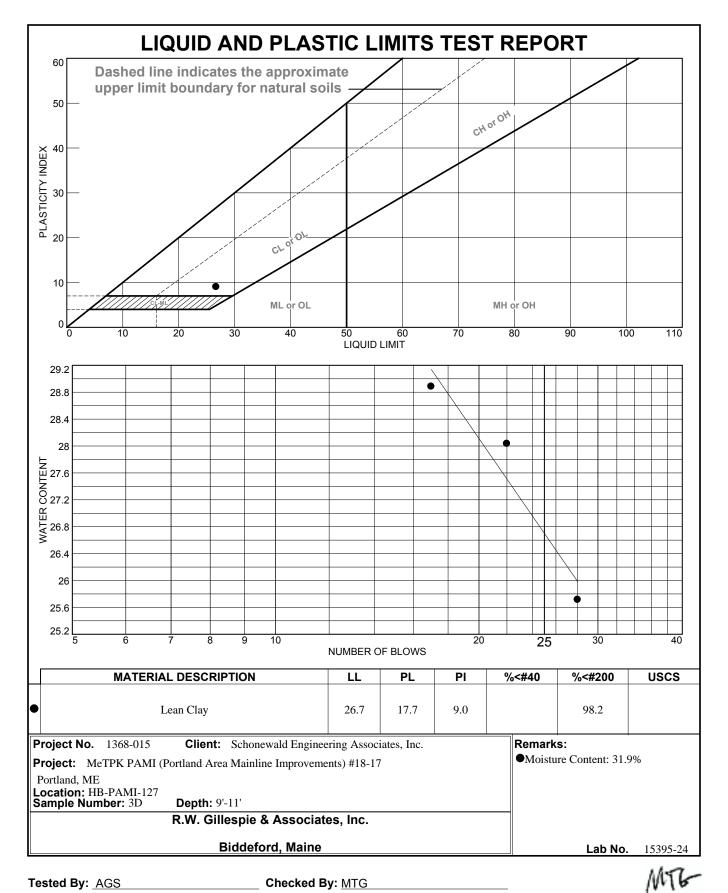
Tested By: JJB Checked By: MTG



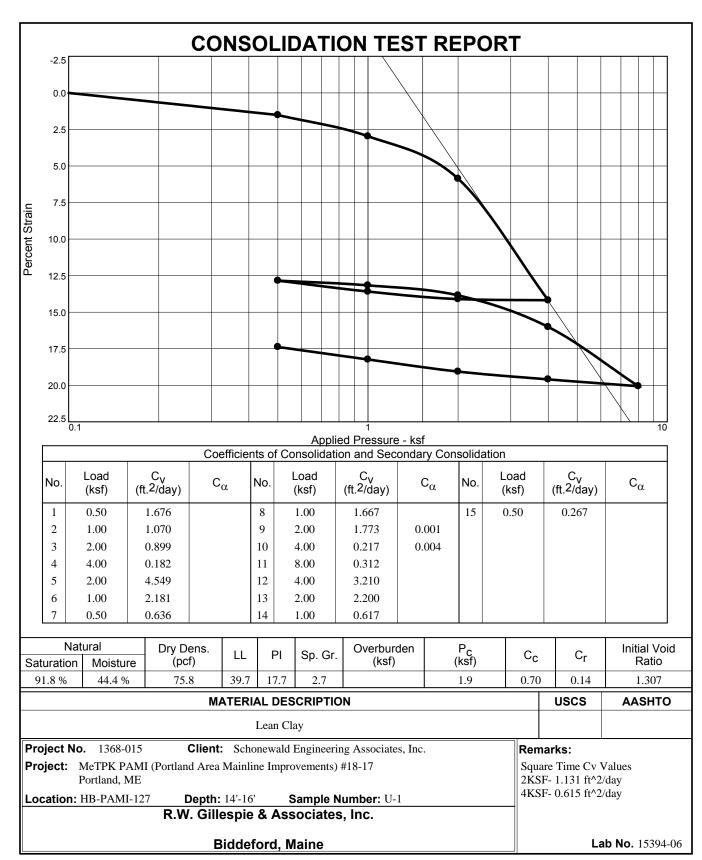
Page 142



Page 143



,



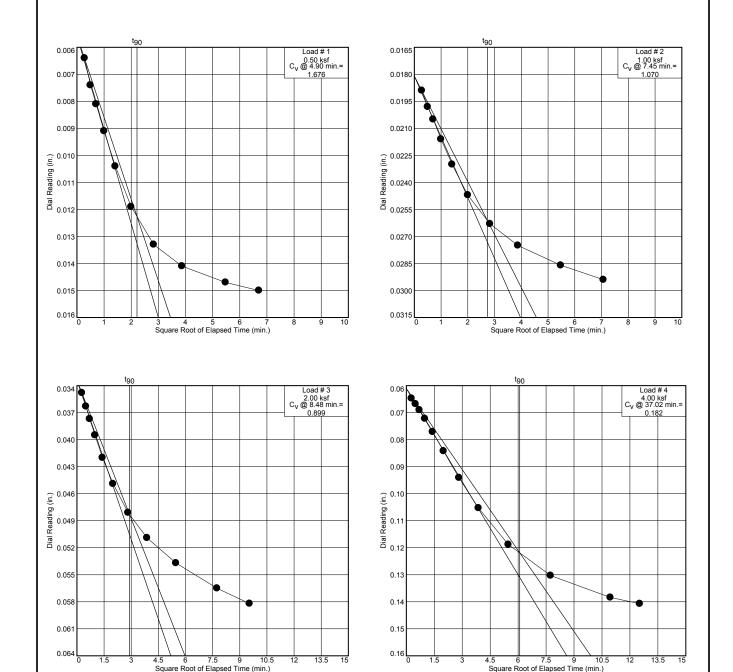
Tested By: JRF Checked By: MTG



Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-127 Depth: 14'-16' Sample Number: U-1



R.W. Gillespie & Associates, Inc.

Biddeford, Maine

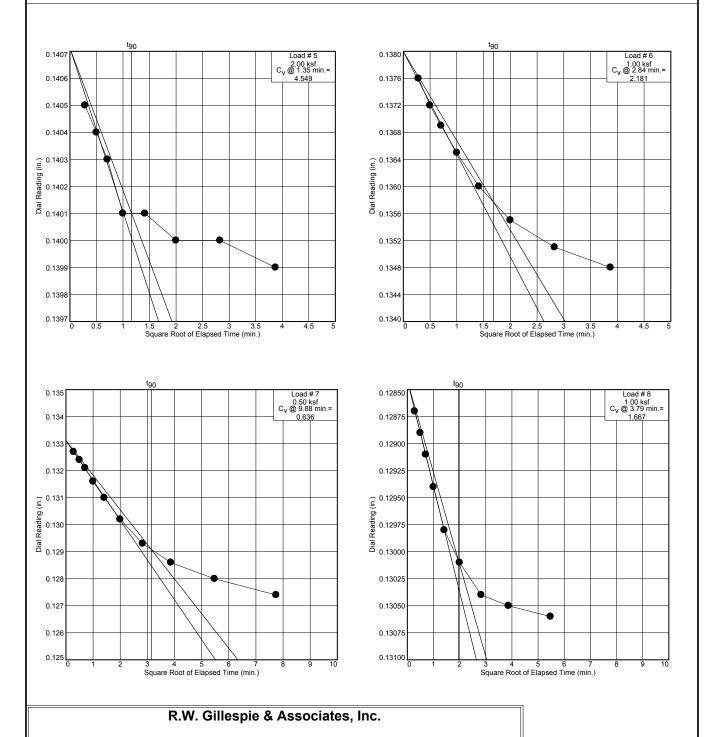


Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-127 Depth: 14'-16' Sample Number: U-1

Biddeford, Maine



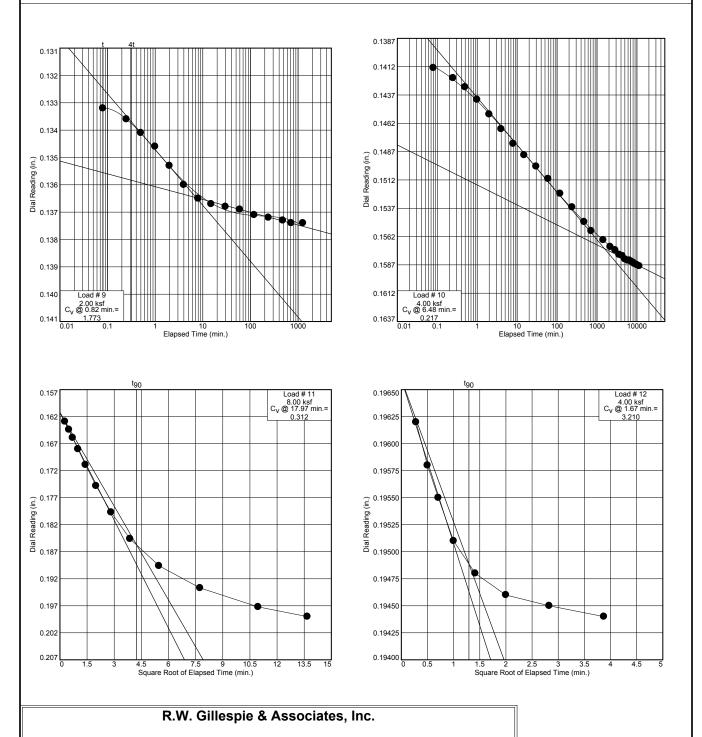


Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-127 Depth: 14'-16' Sample Number: U-1

Biddeford, Maine

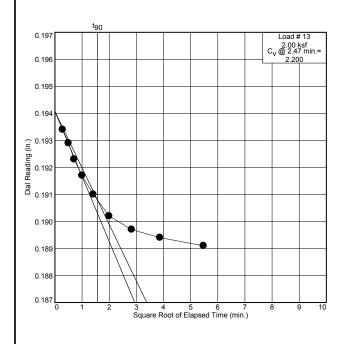


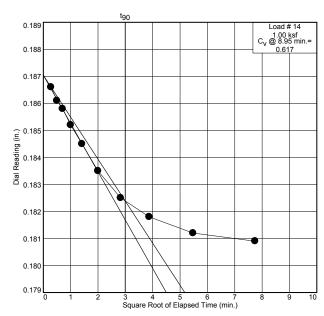


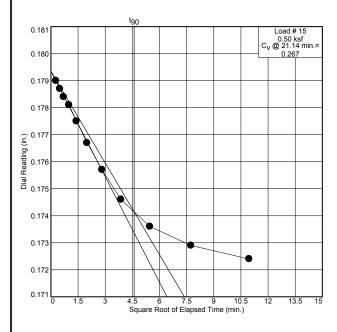
Project No.: 1368-015

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Location: HB-PAMI-127 Depth: 14'-16' Sample Number: U-1



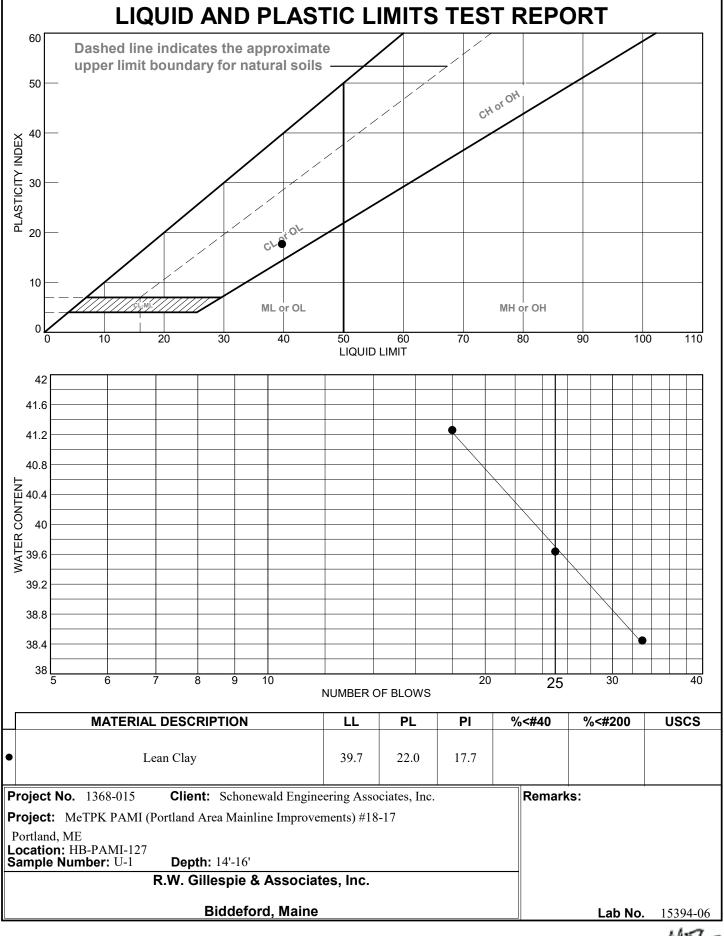




R.W. Gillespie & Associates, Inc.

Biddeford, Maine

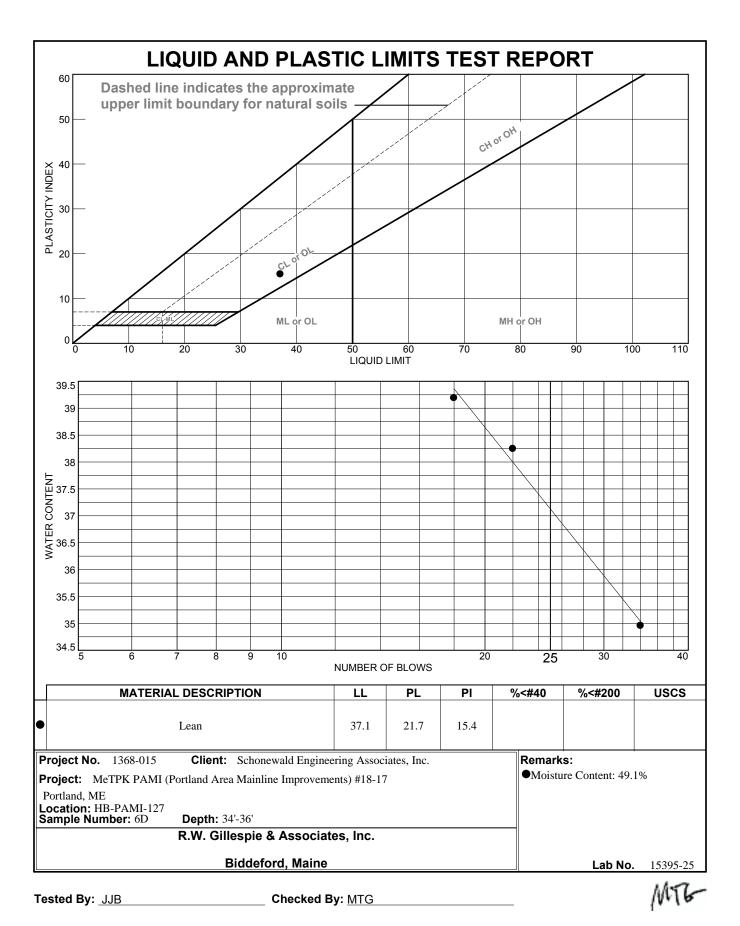




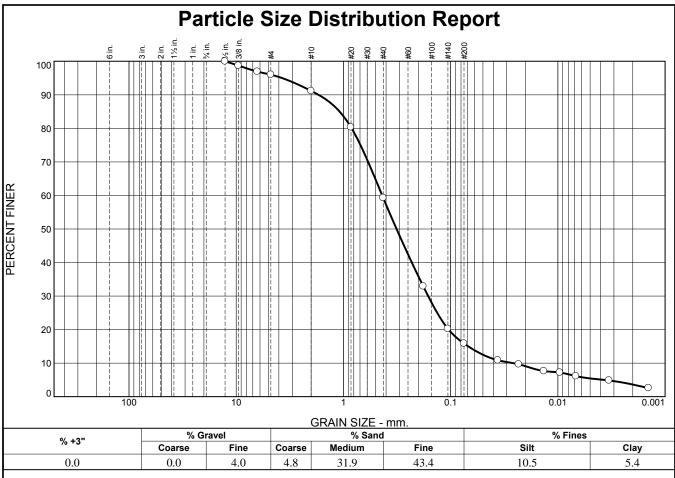
Checked By: MTG

Tested By: AGS

Mile



Page 151



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/2"	100.0		
3/8"	98.7		
1/4"	96.9		
#4	96.0		
#10	91.2		
#20	80.4		
#40	59.3		
#80	32.9		
#140	20.2		
#200	15.9		
0.0363 mm.	10.9		
0.0231 mm.	9.6		
0.0135 mm.	7.6		
0.0096 mm.	7.2		
0.0068 mm.	6.1		
0.0033 mm.	4.8		
0.0014 mm.	2.6		

	Soil Description	
silty sand		
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 1.7056 D ₅₀ = 0.3191 D ₁₀ = 0.0262	Coefficients D ₈₅ = 1.0842 D ₃₀ = 0.1620 C _u = 16.60	D ₆₀ = 0.4345 D ₁₅ = 0.0685 C _c = 2.31
USCS= SM	Classification AASHTO	O= A-2-4(0)
Moisture Content:	Remarks 6.1%	

(no specification provided)

Location: HB-PAVE-103 **Sample Number:** 1D

Tested By: JJB

Depth: 1'-3'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK PAMI (Portland Area Mainline Improvements) #18-17

Portland, ME

Project No: 1368-015

Checked By: MTG

Date: 3/12/2019

Lab No.

APPENDIX A

Data Reports

Pavement Cores/Borings HB-PCORE-101 through HB-PCORE-105 Borings HB-PAMI-201 through HB-PAMI-205 Borings HB-VMS-101 through HB-VMS-103





FIELD AND LABORATORY DATA REPORT FINAL DESIGN GEOTECHNICAL PROGRAM PORTLAND AREA WIDENING MAINE TURNPIKE MM 43.7 TO 49.3 SCARBOROUGH TO PORTLAND, MAINE

PREPARED FOR:

HNTB Corporation Westbrook, Maine

PREPARED BY:

Isabel V. (Be) Schonewald, P.E.

Schonewald Engineering Associates, Inc. (SchonewaldEA)

129 Middle Road

Cumberland, Maine 04021

Just volaling

Be@SchonewaldEngineering.com



FIELD AND LABORATORY DATA REPORT FINAL DESIGN GEOTECHNICAL PROGRAM PORTLAND AREA WIDENING MAINE TURNPIKE MM 43.7 TO 49.3 SCARBOROUGH TO PORTLAND, MAINE

TABLE OF CONTENTS

DESCRIPTION	PAGES
CROSBY YARD AREA PAVEMENT CORES (HB-PCORE-100s)	
TEST BORING LOGS	2-7
LABORATORY TEST REPORTS	8 - 20
CROSBY YARD AREA MEDIAN BORINGS (HB-PAMI-200s)	
TEST BORING LOGS	21 – 26
LABORATORY TEST REPORTS	27 – 46
HOLMES ROAD VMS BORINGS (HB-VMS-100s)	
TEST BORING LOGS	47 – 63
LABORATORY TEST REPORTS	64 – 81



CROSBY YARD AREA PAVEMENT CORES (HB-PCORE-100s)

TEST BORING LOGS

		TABULATION OF BORING LOC	CATIONS	
Boring No.	Station (approx)	Offset (relative to SB white line)	Elevation (est'd)	Comments
HB-PCORE-101	2253+25	2.4 ft RT	69.5 ft	SB right wheel rut
HB-PCORE-102	2255+30	2.4 ft RT	70 ft	SB right wheel rut
HB-PCORE-103	2261+65	2.2 ft RT	66.5 ft	SB right wheel rut
HB-PCORE-104	2263+05	2.7 ft RT	64.5 ft	SB right wheel rut
HB-PCORE-105	2265+80	2.8 ft RT	60.5 ft	SB right wheel rut

			CHONEWALE NGINEERING		PROJ	EC1:						Mainline Proi No.: HB-PCORE-101
		==	SSOCIATES, I	NC.	LOCAT	ION:						Proj. No.: 19-117
rille	er:	N	lew England	Boring Co			evation				ft (est	d) Core Barrel: n/a
per	ator:	Е	nos/ Share			Da	tum:			NAVE	88	Sampler: standard split-spoon
.ogg	jed By:	8	chonewald			Rig	g Type:			Mobi	le Dril	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches
ate	Start/Fi	nish: 5	/29/19; 2315	-2355		Dr	illing M	etho	od:	case	d was	boring Hammer Type: Automatic
Borii	ng Loca		tation 2253+25 f SB white line			Ca	sing ID	/OD	:			ment core Hammer Efficiency: 0.906
		0	1 SB Wille line	(ngni wneer	rui)	-	ıger ID/			n/a	-	Water Level*:
= Sp D = U = Th J = U = Ins	lit Spoon S Insuccessi in Wall Tub Insuccessi itu Vane S	ful Split Spoo be Sample ful Thin Wall hear Test	STING: on Sample attem Tube Sample at ne Shear Test att	pt tempt	ADDITIONAL N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu F R = Rock Co	ed = N va ue correction ciency = Field Van ore Samp	alue cted for ha calculated ne Shear S ple	d han Streng	nmer o	efficiency	WC WC / = BO SS/	TIONAL DEFINITIONS: LABORATORY TEST RESULTS: 1 = weight of 140lb. hammer ASHTO / USCS soil classifications +#200 = percent fines WC = water content (%) CONSOL= 1-D consolidation test UEHOLE ADVANCEMENT METHODS: UFUNCANSOLIDATION LIBERTY PROPERTY OF THE PLANT CONSOLIDATION CO
					formation						_	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks La Res
0	PC	14/14	0.0 - 1.2		. core			co	RE			Pavement Core: 14 inches total thickness; core: 3 layers (7", 2.5", and 3.5" thick) of bound material with loose (unbound) aggregate between.
	1D	24/13	1.2 - 3.2	17-19	-20-25	39	59	ОР	EN	68.3 67.5		SILTY AGGREGATE Changing at approximately 2.0 ft to: ———————————————————————————————————
3 -												1D: Grey brown grading to tan, fine to medium SAND, little silt, trace gravel, trace coarse sand. SAND FILL WASH -200 #200
	2D	24/15	3.2 - 5.2	20-16	-10-12	26	39					2D: Tan, medium dense, fine to medium SAND, trace to little silt, trace gravel, trace coarse sand. SAND FILL Changing at approximately 4.9 ft to: WC= #156 WASH A SP #200
										64.6 64.3	Y///	2D-A: Grey, Clayey SILT, little fine sand. MARINE SILT-CLAY CRUST 5.2-
6 -												Bottom of Exploration at 5.2 feet below ground surface. No refusal.
9 -												
12 -												
l5 Rem	arks:						<u> </u>	<u> </u>				

			CHONEWALE		PROJ	JECT:	_					a Mainline Boring No.: HB-PCOI	
		==	ASSOCIATES, ^I		LOCA	TION:						y Pavement Cores Proj. No. : 19-1	7
Oriller	<u></u>		New England				vation				(est'c	Core Barrel: n/a	
Opera			nos/ Share	Dorning Co.	THE GOLOTO		tum:	(11.)		NAVI	•	Sampler: standard split-sp	
•			Schonewald			+						B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	3011
	ed By:			0040			Type:					(
	Start/Fi		5/29/19; 2235- Station 2255+30		offset 2.4 ft F	эт	lling M					h boring Hammer Type: Automatic	
3orin	g Loca		f SB white line			Cas	sing ID			6" di	a pav	ment core Hammer Efficiency: 0.906	
LOITIL	04401		-071110		ADDITIONAL		ger ID/	OD:		n/a		Water Level*:	
= Split ID = Un = Thin IU = Un = Insit	t Spoon S nsuccessf wall Tub nsuccessf u Vane S	ful Split Spo be Sample ful Thin Wal hear Test	on Sample attem Tube Sample at he Shear Test att	pt tempt empt	N-uncorrect N ₆₀ = N va hammer eff S _u = Insitu R = Rock C RQD = Roc	eted = N va alue correct ficiency = of Field Vand Core Samp ck Quality	alue eted for ha calculated e Shear S ble	d han Stren	nmer o	efficienc	W W y: B (TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METHODS: I/HSA=solid/hollow stem auger I/eroller cone/OPEN/PUSH=hydraulic push L = ABORATORY TEST RESULTS: ASHTO / USCS soil classifications R #200 = percent fines	sticity Index
F		$\overline{}$		•	formation								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0	PC	14/14	0.0 - 1.2		a. core				RE			Pavement Core: 14 inches total thickness; core: upper 6 inches in 3 pieces with weathered fractures; bottom 8 inches unbound aggregate.	
	1D	24/12	1.2 - 3.2	16-16	-21-21	37	56	OF	EN	68.8	3	Grey brown, fine to coarse SAND, some gravel, some silt. SILT AGGREGATE	#15619-0
3 +										66.8		1D: Tan, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL	A-2-4(0) SM -#200=13
	2D	24/14	3.2 - 5.2	20-25	-21-18	46	69					2D: Tan grading at approximately 4.5 ft to grey, dense, fine to medium SAND, little to some silt, trace coarse sand, trace grave TILL	#15619- I. WASH SII A-2-4(0 SM -#200=19 WC=12.8
6 +										64.8	3	Bottom of Exploration at 5.2 feet below ground surface. No refusal.	2-
-													
-													
9 +													
12 -													
-													
-													
		I					I	1					1

			CHONEWALE NGINEERING		PROJ	ECT:						Mainline Pavement Cores Proj. No.: HB-PCOR	
		□	SSOCIATES, I	NC.	LOCAT	ΓΙΟΝ:						Proj. No.: 19-11	/
Driller:		N	lew England	Boring Co			evation				ft (est'	Core Barrel: n/a	
Operate	or:	E	nos/ Share			Da	tum:			NAVE	88	Sampler: standard split-spc	on
Logged	d By:	S	Schonewald			Ri	g Type:			Mobi	le Drill	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
Date St	tart/Fi		/29/19; 2150		#+ 0 0 # D		illing M	letho	d:	case	d wash	boring Hammer Type: Automatic	
Boring	Locat		itation 2261+65 f SB white line			Ca	sing ID	/OD	:	6" dia	a pave	nent core Hammer Efficiency: 0.906	
		10 AND TO			ADDITIONAL		iger ID/	OD:		n/a	4000	Water Level*:	
D = Split S MD = Unsi J = Thin V MU = Unsi / = Insitu \	Spoon Sa successfo Wall Tub successfo Vane Sh	ul Split Spoo e Sample ul Thin Wall hear Test	on Sample attem Tube Sample at ne Shear Test att	pt tempt	ADDITIONAL N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu I R = Rock C RQD = Roc	ted = N v lue corre- iciency = Field Var ore Sam	alue cted for ha calculate ne Shear S ple	d ham Streng	mer o	efficiency	WO WO / = BOF SSA	IONAL DEFINITIONS: LABORATORY TEST RESULTS: I = weight of 140lb. hammer k = weight of rods iot recorded CONSOL= 1-D consolidation test EHOLE ADVANCEMENT METHODS: INSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraulic push LABORATORY TEST RESULTS: AASHTO / USCS soil classifications #200 = percent fines WC = water control CONSOL= 1-D consolidation test UU-Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plas oller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of ror	ticity Index
				Sample In			1						
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strengtil (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0	PC	14/14	0.0 - 1.2		. core			СО	RE			Pavement Core: 14 inches total thickness; core: 3 layers (5.5", 5.5", and 2.5" thick) of bound material with weathered (unbound) aggregate between.	
	1D	24/11	1.2 - 3.2	10-26	-15-17	41	62	OP	EN	65.3		1D: Brown grey, dense, fine to coarse SAND, some silt, little gravel. SILTY AGGREGATE Grading at approximately 2.8 ft to:	2.7
3 —										63.7 63.4	63.00	Tan brown, fine to medium SAND, little silt, trace to little gravel, trace coarse sand. SAND FILL	#15619-0 WASH SIEV A-2-4(0)
	2D	24/16	3.2 - 5.2	10-8-	10-11	18	27					Olive grey, silt-clay in tip of spoon. MARINE SILT-CLAY CRUST 2D: Olive brown, mottled, very stiff, Clayey SILT, trace to little fine sand; appears undisturbed. MARINE SILT-CLAY CRUST	- SM -#200=22.0 <u>WC=10.8</u> #15619-0 WASH SIE ATTERBER
6										61.3		Bottom of Exploration at 5.2 feet below ground surface. No refusal.	A-6(13) CL -#200=83.7 WC=25.5 LL=37.8
_													PL=22.8 <u>Pl=15.0</u>
9													
12 —													
ı													

inish: 5 ini	Enos/ Share Schonewald 5/29/19; 2115- Station 2263+05 of SB white line (ESTING: on Sample attemple attemple attemple attemple attemple attemple attemple attemple Shear Test attemple She	2145 (approx.); offset 2 right wheel rut) ADDIT N-un ot N60 ham empt Su =	2.7 ft RT FIONAL DB ncorrected = = N value of mer efficier	DN: Elev Dat Rig Dril Cas Aug	Sout vation um: Type: ling M sing ID	h P (ft.) etho	ortl	64.5 NAVE Mobi	ME ft (est' 088 le Drill d wash	Proj. No.: 19-117 d) Core Barrel: n/a Sampler: standard split-spoon B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches boring Hammer Type: Automatic	
inish: 5 Station: 5 Sample full Spile Sample full Spile Spample full Thin Wall Shear Test full Insitu Var	Enos/ Share Schonewald 5/29/19; 2115- Station 2263+05 of SB white line (ESTING: on Sample attemple attemple attemple attemple attemple attemple attemple attemple Shear Test attemple She	2145 (approx.); offset 2 right wheel rut) ADDIT N-un ot N60 ham empt Su =	2.7 ft RT FIONAL DB ncorrected = = N value of mer efficier	Dat Rig Dril Cas Aug	um: Type: ling M sing ID ger ID/0	etho	od:	Mobi case	088 le Drill d wash	Sampler: standard split-spoon B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
inish: 5 ini	Schonewald 5/29/19; 2115- Station 2263+05 of SB white line (ESTING: on Sample attempt I Tube Sample attempt the Shear Test atte	(approx.); offset 2 right wheel rut) ADDIT N-un ot N60 ham empt Su = R = F	rional De ncorrected = = N value o mer efficier	Rig Dril Cas Aug FINITI	Type: ling M sing ID ger ID/	etho /OD		Mobi	le Drill d wash	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
inish: 5 inion: 5 ini	5/29/19; 2115- Station 2263+05 of SB white line (ESTING: on Sample attempt I Tube Sample attempt The Shear Test attempt State Shear Test attempt State Shear Test attempt State Shear Test attempt State Shear Test attempt	(approx.); offset 2 right wheel rut) ADDIT N-un ot N60 ham empt Su = R = F	rional De ncorrected = = N value o mer efficier	Dril Cas Aug	ling M sing ID ger ID/0	etho /OD		case	d wash	· · ·	
ING AND TE Sample ful Split Spo be Sample ful Thin Wall Shear Test ful Insitu Var	Station 2263+05 If SB white line (ESTING: on Sample attempt I Tube Sample attempt The Shear Test attempt Statempt State	(approx.); offset 2 right wheel rut) ADDIT N-un ot N60 ham empt Su = R = F	rional De ncorrected = = N value o mer efficier	Cas Auç FINITI = N val	ing ID ger ID/	/OD				boring Hammer Type: Automatic	
ING AND TE Sample ful Split Spo be Sample ful Thin Wall Shear Test ful Insitu Var	on Sample attempt Tube Sample attempt Tube Sample attempt Shear Test atte	ADDIT N-un ot N60 hamn empt Su = R = R	rional De ncorrected = = N value o mer efficier	Aug FINITI = N val	ger ID/		:	פיי או			
Sample Iful Split Spo be Sample Iful Thin Wall Iful Insitu Var	on Sample attempt Tube Sample attempt Tube Shear Test atte	$\begin{array}{c} \text{N-un} \\ \text{N}_{60} \\ \text{hamr} \\ \text{empt} \\ \text{R} = \text{F} \end{array}$	ncorrected = = N value of mer efficier	FINITI = N val		nn.		o ui	a pave	ment core Hammer Efficiency: 0.906	
Sample Iful Split Spo be Sample Iful Thin Wall Iful Insitu Var	on Sample attempt Tube Sample attempt Tube Shear Test atte	$\begin{array}{c} \text{N-un} \\ \text{N}_{60} \\ \text{hamr} \\ \text{empt} \\ \text{R} = \text{F} \end{array}$	ncorrected = = N value of mer efficier	= N val	IONS:	<u> </u>		n/a		Water Level*:	
n./Rec. (in.)		stript requ	: Insitu Field Rock Core) = Rock Q	ncy = c d Vane Sampl	ue ed for ha alculated Shear S e	d ham Streng	nmer o	efficienc	WO WO = BOI SSA	ABORATORY TEST RESULTS: A = weight of 140lb. hammer	
ın./Rec. (in.)	l €	Sample Inform									
Pe	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf)	or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks Te	Lab. esting Results
14/14	0.0 - 1.2	6" dia. core	е			СО	RE			Pavement Core: 14 inches total thickness; core: upper 9 inches sound, bonded; bottom 5 inches bonded, but weathered.	
24/13	1.2 - 3.2	15-17-12-9	9	29	44	ОР	EN		*		15619-0
								2.		trace coarse sand, trace gravel. SAND FILL Silt-clay material in tip of spoon.	SH SIE A-2-4(0) SM 00=15. C=12.6
24/14	3.2 - 5.2	5-6-7-10		13	20			61.3		2D: Olive grey grading to olive brown, Clayey SILT, little fine sand grading to Clayey SILT, trace to little fine sand. MARINE SILT-CLAY CRUST #12 WAG ATTE	15619- SH SII ERBE A-6(15 CL 00=88
								59.3		S.2 P Bottom of Exploration at 5.2 feet below ground surface.	C=26.5 L=38. PL=20. PI=17.2
									24/13 1.2 - 3.2 15-17-12-9 29 44 OPEN 62.7 24/14 3.2 - 5.2 5-6-7-10 13 20	62.7	24/13 1.2 - 3.2 15-17-12-9 29 44 OPEN 62.7 SILTY AGGREGATE Changing at approximately 1.8 ft to: 1D: Brown tan, medium dense, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL Silt-clay material in tip of spoon. 42/14 3.2 - 5.2 5-6-7-10 13 20 20: Olive grey grading to olive brown, Clayey SILT, little fine sand grading to Clayey SILT, trace to little fine sand. MARINE SILT-CLAY CRUST 42/14 59.3

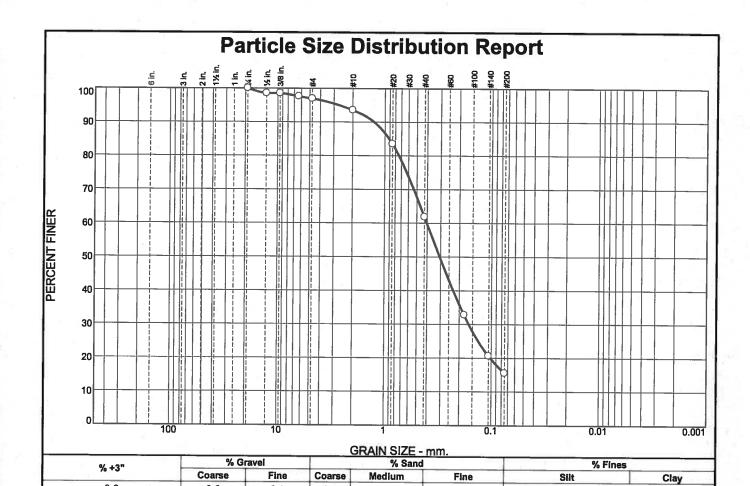
			CHONEWALD NGINEERING)	PROJ	ECT:	_				_	Mainline / Pavement Cores Boring No.: HB-PCORE-10	05
		==	ASSOCIATES, I	NC.	LOCA	ΓΙΟΝ·						Proj. No.: 19-117	
Drille			lew England				vation				ft (est	Core Barrel: n/a	
Oper			nos/ Share	Borning Go	ntractore	_	tum:	()		NAVI		Sampler: standard split-spoon	
•						-							
	ed By:		Schonewald				Type:		_			(
	Start/Fi		5/29/19; 2025- Station 2265+80		offeet 2 8 ft F	т	lling M					boring Hammer Type: Automatic	
Borin	ig Loca		f SB white line			' Ca	sing ID	/OD):	6" di	a pave	ment core Hammer Efficiency: 0.906	
							ger ID/	OD:		n/a		Water Level*:	
= Spl ID = U = Thi IU = U = Insi	it Spoon S Insuccessi n Wall Tub Insuccessi itu Vane S	ful Split Spo be Sample ful Thin Wall hear Test	on Sample attem Tube Sample at	pt tempt empt	N-uncorrect N ₆₀ = N va hammer eff S _u = Insitu R = Rock C RQD = Roc	ted = N va lue correct iciency = Field Van fore Samp k Quality	alue sted for ha calculated e Shear S ble	d han Streng	nmer gth (p	efficienc	WC WC y = BO SS	TIONAL DEFINITIONS: LABORATORY TEST RESULTS: 4 = weight of 140lb. hammer AASHTO / USCS soil classifications 4200 = percent fines	
ŀ				•	formation						-		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. estinç Result
0	PC	14/14	0.0 - 1.2		a. core				RE			Pavement Core: 13 inches total thickness; core: upper 9.5 inches sound, bonded; bottom 3.5 inches partially bonded, primarily large aggregate.	
	1D	24/15	1.1 - 3.1	13-18	-14-13	32	48	OF	EN	59.4		1D: Brown, fine to coarse SAND, some gravel, little to some silt. SILTY AGGREGATE Changing at approximately 2.3 ft to:	15619-0 SH SIE A-1-b SM
3 -										58.2		1D-A: Tan, fine to medium SAND, trace to little silt, trace gravel, trace coarse sand. SAND FILL	00=17. <u>C=11.5</u> 15619- SH SIE A-2-4(0
	2D	24/16	3.1 - 5.1	9-10)-9-9	19	29			5 0 /		SAND FILL Changing at approximately 4.2 ft to: #20	SM 00=11 C=17.
										56.3 55.4		2D: Olive brown, slightly mottled, Clayey SILT, trace fine sand with occasional partings of fine sandy silt. MARINE SILT-CLAY CRUST	
6 -												Bottom of Exploration at 5.1 feet below ground surface. No refusal.	
-													
9													
12 -													
J								1					



CROSBY YARD AREA PAVEMENT CORES (HB-PCORE-100s)

LABORATORY TEST REPORTS

		(RWG&A P	ON OF SOIL TESTING ROJECT NO. 1368-016 of test report presenta	3)
Boring No.	Sample No.	Sample Depth (ft., BGS)	RWG&A LAB NO.	Tests Completed
HB-PCORE-101	1D	1.2-3.2	#15619-1	wash sieve gradation
HB-PCORE-101	2D	3.2-5.2	#15619-2	wash sieve gradation
HB-PCORE-102	1D	1.2-3.2	#15619-3	wash sieve gradation
HB-PCORE-102	2D	3.2-5.2	#15619-4	wash sieve gradation
HB-PCORE-103	1D	1.2-3.2	#15619-5	wash sieve gradation
HB-PCORE-103	2D	3.2-5.2	#15619-6	wash sieve gradation; Atterberg Limits
HB-PCORE-104	1D	1.2-3.2	#15619-7	wash sieve gradation
HB-PCORE-104	2D	3.2-5.2	#15619-8	wash sieve gradation; Atterberg Limits
HB-PCORE-105	1D	1.1-3.1	#15619-9	wash sieve gradation
HB-PCORE-105	1D-A	3.1-5.1	#15619-10	wash sieve gradation



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
3/4"	100.0		
1/2"	98.5		
3/8"	98.5		
1/4"	97.6		
#4	96.9	1.7	
#10	93.6		
#20	83.5	0	
#40	61.9		
#80	32.8		
#140	20.7	11	
#200	15.6		
		15	
	. 11 5		

0.0

3.1

3.3

31.7

	Soil Description	
silty sand		
PL=	Atterberg Limits	PI=
	Coefficients	
D ₉₀ = 1.2593 D ₅₀ = 0.3056	$D_{95} = 0.9100$	D ₆₀ = 0.4036
D ₁₀ = 0.3036	D ₃₀ = 0.1626 C _u =	D ₁₅ = C _C =
	Classification	
USCS= SM	AASHTO	O= A-2-4(0)
	Remarks	
Moisture Content	: 10.7%	

(no specification provided)

0.0

Location: HB-PCORE-101 Portland, ME Sample Number: 1D Depth: 1.2'-3.2'

Date: 7-11-2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

46.3

Portland, ME

Project No: 1368-016

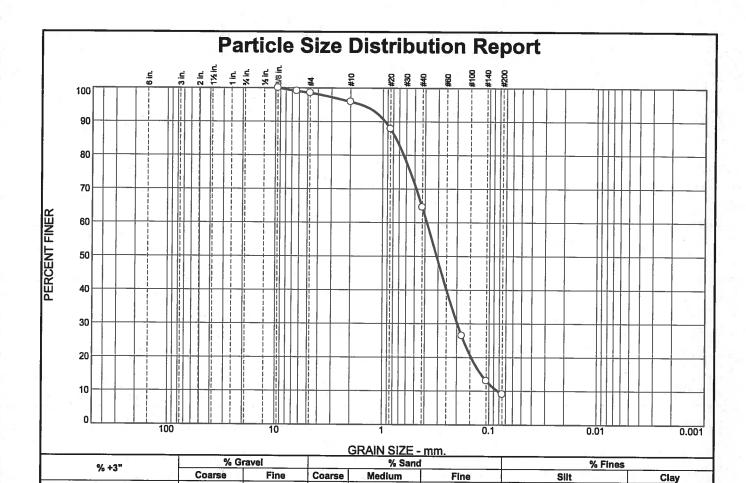
Lab No. 156

15.6

15619-01

Tested By: MSM/MCM

Checked By: MTG



SIEVE	PERCENT	SPEC.* PERCENT	PASS?
3/8"		PERCENT	(X=NO)
	100.0		
1/4"	99.1	A	
#4	98.5		
#10	95.9		
#20	87.9		
#40	64.6		
#80	26.5		
#140	13.0		
#200	9.1		
00	"		
	A		

0.0

1.5

2.6

31.3

	Soil Description	
poorly graded sar	nd with silt	
PL=	Atterberg Limits LL=	Pi=
D ₉₀ = 0.9508 D ₅₀ = 0.3099 D ₁₀ = 0.0826	Coefficients D ₈₅ = 0.7535 D ₃₀ = 0.1978 C _U = 4.65	$D_{60} = 0.3838$ $D_{15} = 0.1186$ $C_{c} = 1.23$
USCS= SP-SM	Classification AASHTO)= A-3
Moisture Content	Remarks : 15.8%	

(no specification provided)

0.0

Location: HB-PCORE-101 Portland, ME Sample Number: 2D Depth: 3.2'-5.2'

Date: 7-11-2019

9.1

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

55.5

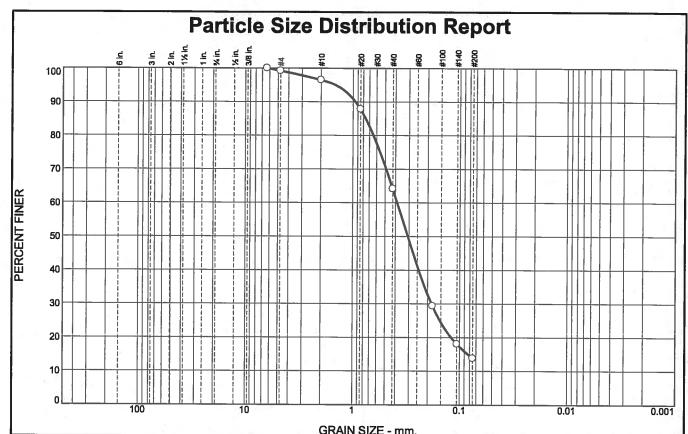
Portland, ME

Project No: 1368-016

Lab No. 15619-02

Tested By: MSM/MCM

Checked By: MTG



% +3"	% Gr	avel		% Sand		% Fine	s
70.5	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.7	32.3	50.4	13.8	- A

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
Г	1/4"	100.0		
Ш	#4	99.2		100
П	#10	96.5		
	#20	87.8		
	#40	64.2		
	#80	29.4		
	#140	18.1		
	#200	13.8		-
- [
				W .
				10
1				
Н				

	Soil Description	
silty sand		
PL=	Atterberg Limits	PI=
D ₉₀ = 0.9470 D ₅₀ = 0.3072 D ₁₀ =	Coefficients D85= 0.7592 D30= 0.1838 Cu=	D ₆₀ = 0.3857 D ₁₅ = 0.0831 C _c =
USCS= SM	Classification AASHTO)= A-2-4(0)
Moisture Content	Remarks : 13.8%	

(no specification provided)

Location: HB-PCORE-102 Portland, ME Sample Number: 1D Depth: 1.2'-3.2'

Date: 7-11-2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

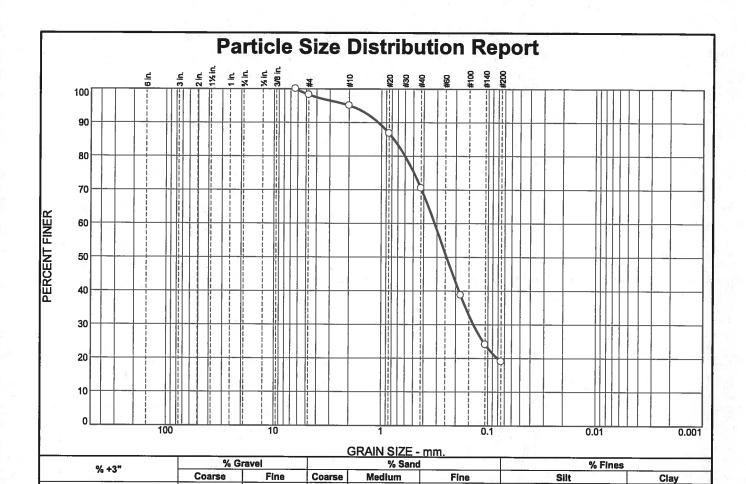
Project: Me TPK Ptld Area Widening-Phase 2 (#19-117)

Portland, ME

Project No: 1368-016

Lab No. 15619-0

Tested By: MSM/MCM Checked By: MTG



	SIEVE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
	1/4" #4 #10 #20 #40 #80 #140 #200	100.0 98.2 95.1 86.8 70.5 38.8 24.1 19.0		
7				

0.0

1.8

3.1

1.6	E1 E		
r.0	51.5	700 700	19.0
silty sand	So	il Description	
PL=	<u>Att</u> Ll	terberg Limits _=	PI=
D ₉₀ = 1.00 D ₅₀ = 0.24 D ₁₀ =	693 D 435 D	Coefficients 85= 0.7658 30= 0.1362 u=	D ₆₀ = 0.3155 D ₁₅ = C _c =
USCS=	<u>С</u> SM	lassification AASHTO=	A-2-4(0)
Moisture C	ontent: 12.89	Remarks %	
	PL= D ₉₀ = 1.00 D ₅₀ = 0.24 D ₁₀ = USCS=	PL= Att PD= 1.0693 D D50= 0.2435 D D10= C USCS= SM	PL= Atterberg Limits LL= D90= 1.0693 D85= 0.7658 D50= 0.2435 D30= 0.1362 Cu= USCS= SM Classification AASHTO=

(no specification provided)

0.0

Location: HB-PCORE-102 Portland, ME Sample Number: 2D Depth: 3.2'-5.2'

Date: 7-11-2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

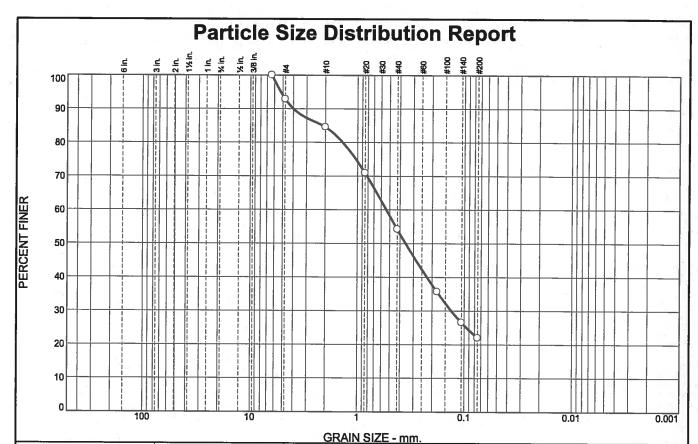
Portland, ME

Project No: 1368-016

Lab No. 15619-04

Tested By: MSM/MCM

Checked By: MTG



	% +3"		% Gr	avel	341	% Sand		% Fine	s
	78 13		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0		0.0	7.2	8.2	30.4	32.2	22.0	
٦	SIEVE	PERCENT	SPEC.	PAS	SS?		Soil D	escription	A

	SIEVE	PERCENT	SPEC.*	PASS?
I	SIZE	FINER	PERCENT	(X=NO)
ı	1/4"	100.0		
	#4	92.8		
- 1	#10	84.6		
- 1	#20	70.9		
	#40	54.2	-	
1	#80	35.7		
	#140	26.5		
	#200	22.0		
- 1				
- 1			Λ	
- 1				
		a =		

	Soil Description	
silty sand		
_ = = = =	Atterberg Limits	
PL=	LL=	PI=
D 4.0022	Coefficients	D = 0.5170
D ₉₀ = 4.0032 D ₅₀ = 0.3549 D ₁₀ =	D ₈₅ = 2.1104 D ₃₀ = 0.1317	D ₆₀ = 0.5378 D ₁₅ =
D ₁₀ =	Cu≞	C _C =
USCS= SM	Classification AASHTO=	A 2 4(0)
0000- SW	AASHIU-	A-2-4(0)
	<u>Remarks</u>	
Moisture Content:	10.8%	

(no specification provided)

Tested By: MSM/MCM

Location: HB-PCORE-103 Portland, ME Sample Number: 1D Depth: 1.2'-3.2'

R.W. Gillespie

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

Project No: 1368-016

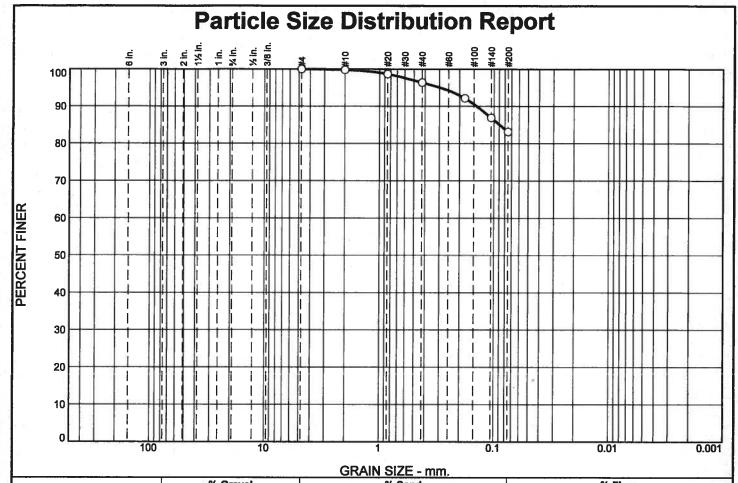
Lab No. 15619-05

Date: 7-11-2019

& Associates, Inc. Biddeford, Maine

Checked By: MTG

Ucles



% +3"		% Grav	/el	<u> </u>	% Sand			% Fines	
76 +3		Coarse	Fine	Coarse	Medium	Fine	Silt		Cla
0.0		0.0	0.0	0.2	3.4	13.3		83.1	
SIEVE	PERCENT	SPEC.*	PAS:	- ·	Lean clay	Soil	<u>Description</u>		
#4	100.0		(3.0		Loan Clay				
#10 #20	99.8 98.6	-							
#40 #80	96.4 92.2		55		PL= 22.8		berg Limits 37.8	Pi= 15.0	
#140	86.9					Co	efficients		

D₈₅= 0.0888 D₃₀= C_u= D₉₀= 0.1417 D₅₀= D₁₀=

Classification USCS= CL **AASHTO=** A-6(13)

Remarks Natural Moisture: 25.5%

(no specification provided)

Location: HB-PCORE-103 Sample Number: 2D

#200

Depth: 3.2'-5.2'

83.1

Date: 7/18/2019

R.W. Gillespie & Associates, Inc. **Biddeford, Maine**

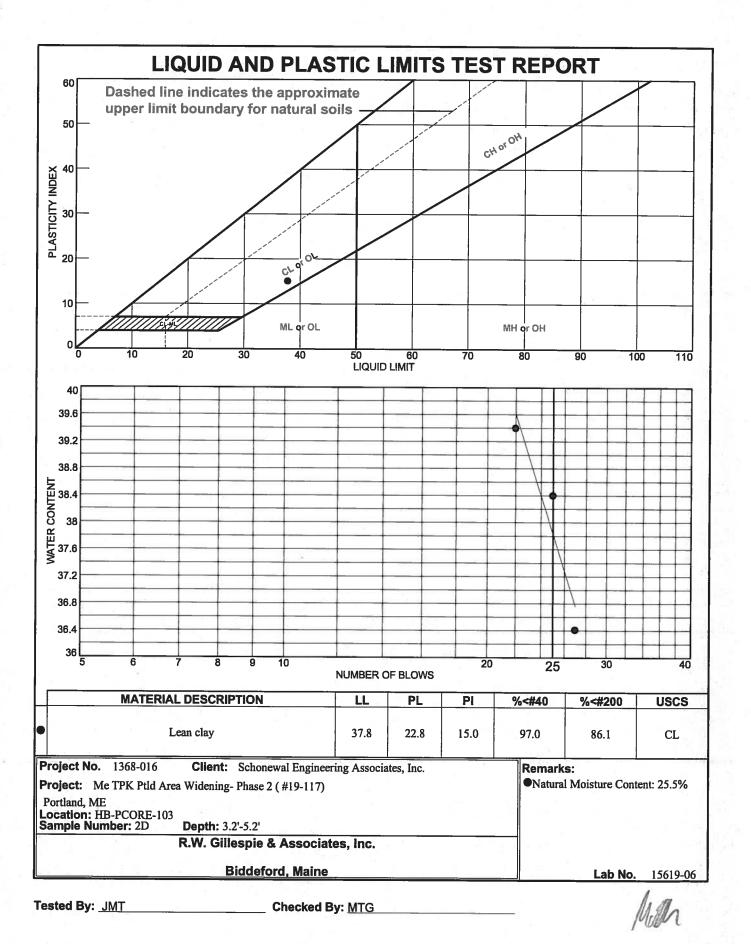
Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

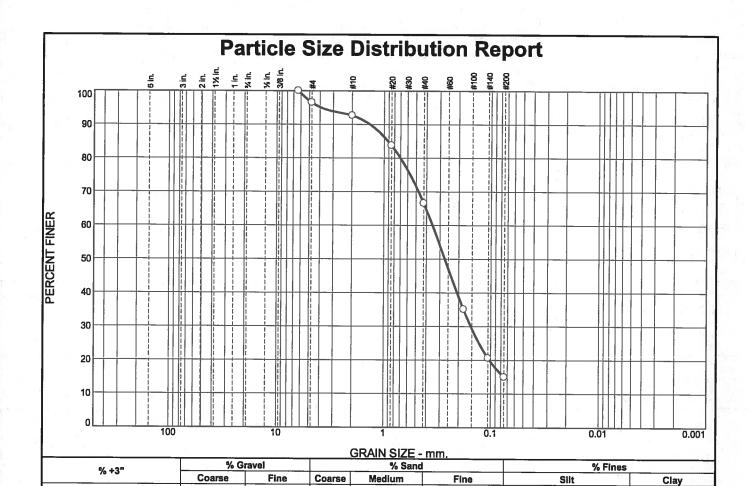
Portland, ME

Project No: 1368-016 Lab No. 15619-06

Tested By: JJB **Checked By: MTG**



Page 15



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/4"	100.0		
#4	96.5		
#10	92.7		
#20	83.8		
#40	66.6		
#80	35.1		
#140	20.6		
#200	15.0		
	55		
		,	

0.0

3.5

3.8

26,1	51.6		15.0	
Silty san		il Description	22	
PL=	Atte	erberg Limits .=	PI=	
D ₉₀ = 1 D ₅₀ = 0 D ₁₀ =	.3554 Dg 0.2696 Dg CL	coefficients 35= 0.9153 30= 0.1535	D ₆₀ = 0.3516 D ₁₅ = 0.0750 C _c =	
USCS=	SM CI	assification AASHTO=	A-2-4(0)	
Moisture	Content: 12.6%	Remarks		

(no specification provided)

0.0

Location: HB-PCORE-104 Portland, ME Sample Number: 1D Depth: 1.2'-3.2'

Date: 7-11-2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

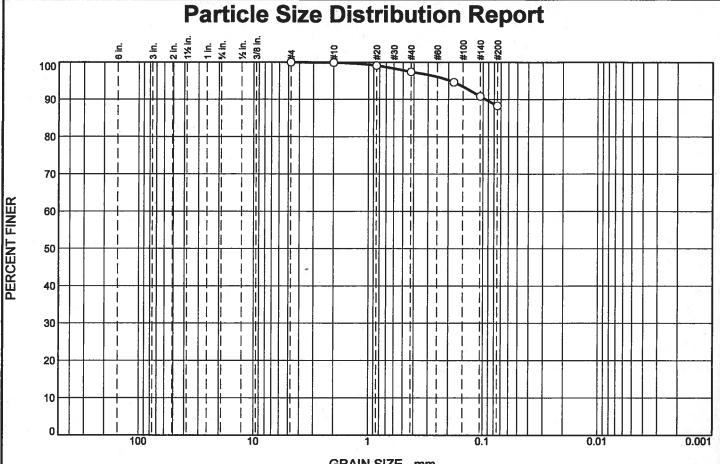
Project No: 1368-016

Lab No. 1561

Tested By: MSM/MCM

Checked By: MTG

Wille



3			G	IRAIN SIZE -	mm.		
9/ +20	% Gra	vel		% Sand		% Fine	2 \$
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.5	9.1	88.3	
SIEVE DED	CENT SDEC*	DAG					

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	#4	100.0		-22 23
	#10	99.9		
	#20	99.1		
	#40 #80	97.4 94.6	=	_
1	#80 #140	90.8		
H	#200	88.3		
- 1				
				_
1				
-	127			
- 1				

	Soil Description	19
Lean clay		
PL= 20.8	Atterberg Limits LL= 38.0	PI= 17.2
D ₉₀ = 0.0949 D ₅₀ = D ₁₀ =	Coefficients D85= D30= Cu=	D ₆₀ = D ₁₅ = C _c =
USCS= CL	Classification AASH	ΓO= A-6(15)
Natural Moisture	Remarks : 26.5%	

Location: HB-PCORE-104 **Sample Number:** 2D

Tested By: JJB

Depth: 3.2'-5.2'

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

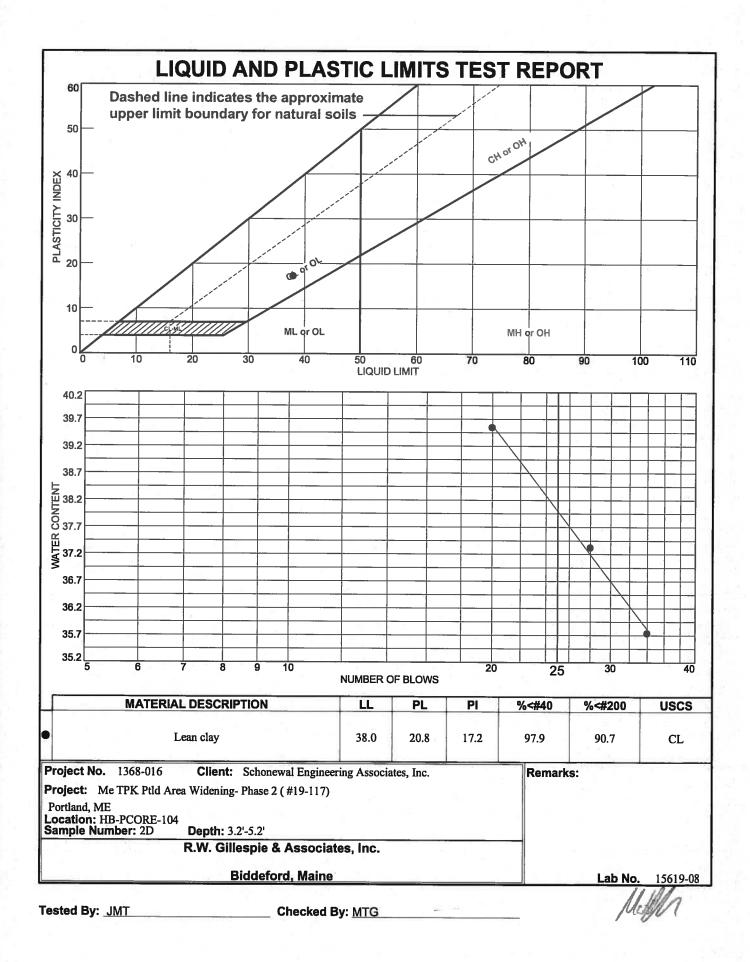
15619-08 **Project No: 1368-016** Lab No.

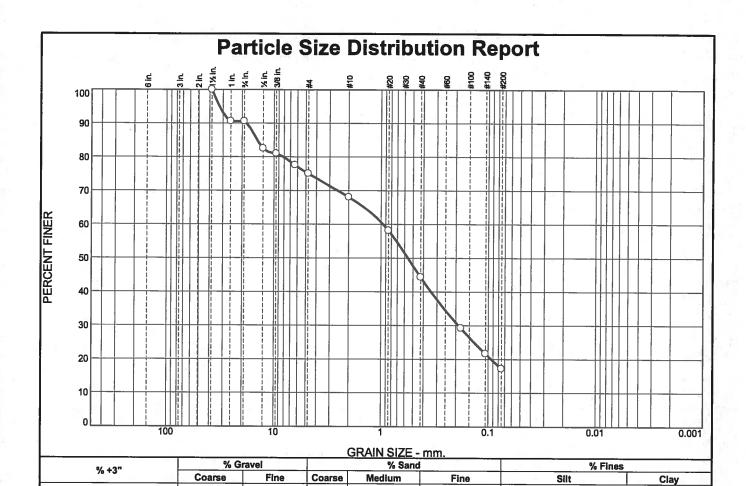
R.W. Gillespie & Associates, Inc. Biddeford, Maine

Checked By: MTG

Date: 7/18/2019

⁽no specification provided)





SIEVE SIZE	PERCENT	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		(00 00)
1"	90.6		1
3/4"	90.6		
1/2"	82.5		
3/8"	81.0		
1/4"	77.6		
#4	75.1		
#10	68.1		
#20	58.2		
#40	44.4		11
#80	29.3		
#140	21.7		5
#200	17.2		
		6 1	
		7	

9.4

15.5

	Soil Description	
Silty sand with gr	ravel	
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 18.0927 D ₅₀ = 0.5576 D ₁₀ =	Coefficients D ₈₅ = 14.4024 D ₃₀ = 0.1889 C _U =	D ₆₀ = 0.9546 D ₁₅ = C _c =
USCS= SM	Classification AASHTC)= A-1-b
Moisture Content	Remarks : 11.5%	
Moisture Content	: 11.5%	

(no specification provided)

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Location: HB-PCORE-105 Sample Number: 1D

0.0

Depth: 1.2'-3.2'

Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

27.2

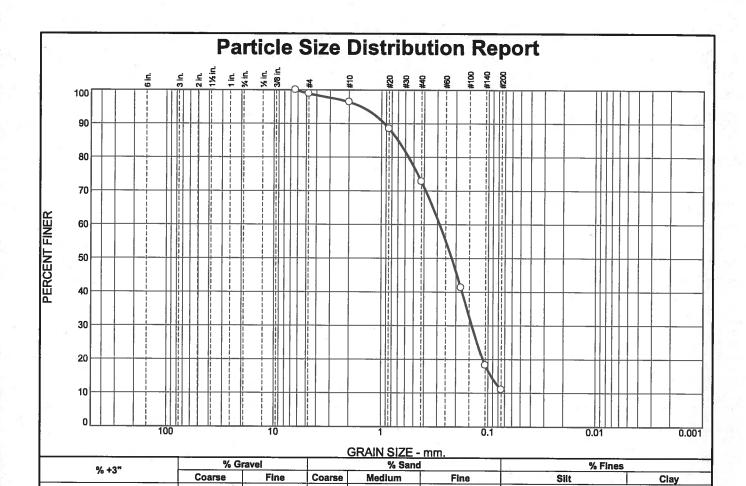
Portland, ME

Project No: 1368-016

Date: 7/11/2019

17.2

Tested By: MSM/MCM



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/4"	100.0		
#4	98.9		
#10	96.4		
#20	88.5		
#40	72.8		
#80	41.3	100	
#140	18.3		
#200	11.1		
	ř,		
		5	
	= _		
		11	

1.1

2.5

23.6	61.7		11.1
Poorly g	raded sand v	Soil Description with silt	11 e)
PL=		Atterberg Limits LL=	Pl=
D ₉₀ = 0 D ₅₀ = 0 D ₁₀ =	0.9389 0.2195	Coefficients D85= 0.7005 D30= 0.1419 Cu=	D ₆₀ = 0.2847 D ₁₅ = 0.0934 C _c =
USCS=	SP-SM	Classification AASHTO=	= A-2-4(0)
Moisture	Content: 17	Remarks 7.6%	

* (no specification provided)

Location: HB-PCORE-105 Sample Number: 1D-A

Tested By: MSM/MCM

0.0

Depth: 3.1'-5.1'

Schonewal Engineering Associates, Inc.

Me TPK Ptld Area Widening- Phase 2 (#19-117) Project:

Portland, ME

Project No: 1368-016

Lab No.

Date: 7/11/2019

& Associates, Inc. Biddeford, Maine

R.W. Gillespie



CROSBY YARD AREA MEDIAN BORINGS (HB-PAMI-200s)

TEST BORING LOGS

	TA	BULATION OF BORING LOCATI	ons	
Boring No.	Station	Offset (relative to SB yellow line)	Elevation (est'd)	Comments
HB-PAMI-201	2258+57.4	1.3 ft RT	69.5 ft	SB median
HB-PAMI-202	2259+56.8	0.9 ft RT	68.5 ft	SB median
HB-PAMI-203	2260+56.3	1.1 ft RT	67.5 ft	SB median
HB-PAMI-204	2261+57.5	0.8 ft RT	66.5 ft	SB median
HB-PAMI-205	2262+56.9	1.4 ft RT	65 ft	SB median

SITU S = Split S = Split S = Union = Thin V J = Unsi = Insitu '/ = Unsi	or: d By: tart/Fin Locati SAMPLIN Spoon Sa successfu Vall Tube successfu Vane Sh	N E E S S S S S S S S S S S S S S S S S	Enos/ Share Schonewald 5/31/19; 0020- Station 2258+57. Sellow line (media ESTING: on Sample attempt I Tube Sample attempt Shear Test atter Test	O120 4; offset 1.3 ft RT of SB an) ADDITIONAL N-uncorrect ot N ₆₀ = N vall hammer effie empt Su = Insitu F R = Rock Cc empt RQD = Rock Sample Information	Parity Draw Can Definition of	Sout evation atum: g Type: iilling M using ID uger ID/u TIONS: alue cted for ha calculated ue Shear S ple	etho /OD:	ortl	and, I 69.5 t NAVD Mobil auger n/a HSA	ME ft (est'o	Sampler: standard split-spool B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
perato oggec ate St oring SITU S = Split S = Capil S = Unit V J = Unit V J = Unit V J = Unit V	or: d By: tart/Fin Locati SAMPLIN Spoon Sa successfu Vall Tube successfu Vane Sh successfu ON 9 10 EE 00	NG AND TE ample of Spirit Spoe of This Wall linsitu Var	Enos/ Share Schonewald 5/31/19; 0020-i Station 2258+57. Tellow line (media ESTING: on Sample attemp I Tube Sample att the Shear Test atte Station O	O120 4; offset 1.3 ft RT of SB an) ADDITIONAL N-uncorrect ot N ₆₀ = N vali hammer effi empt S _u = Insitu F R = Rock Cc empt RQD = Rock Sample Information	Parity Draw Can Definition of	evation atum: g Type: illing M using ID uger ID/u TIONS: alue calculated the Shear S ple	etho /OD: OD:	r effic	Mobil auger n/a HSA	ft (est'o 88 e Drill r boring to 8 ft	Sampler: standard split-spool B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches Hammer Type: Automatic Hammer Efficiency: 0.906	n
oggec situs si	d By: tart/Fin Locati SAMPLIN Spoon Sauccessfu Wall Tube uuccessfu Vane Sh uuccessfu O U 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NG AND TE ample e Sample ul Thin Wall lear Test ul Insitu Val	Schonewald 5/31/19; 0020- Station 2258+57. Fellow line (media ESTING: on Sample attemp I Tube Sample attemp E Shear Test atte Station O	4; offset 1.3 ft RT of SB an) ADDITIONAL N-uncorrect t N ₆₀ = N vali hammer effil empt S _u = Insitu F R = Rock Co empt RQD = Rock Sample Information	Riving Property of the Cartest	g Type: illing M using ID uger ID/o TIONS: alue calculated to Shear S ple	etho /OD: OD:	r effic	Mobil auger n/a HSA	e Drill r borin to 8 ft	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches Hammer Type: Automatic Hammer Efficiency: 0.906	n
ate St oring SITU S CONTRACTOR OF THE PROPERTY OF	NG AND TE ample al Split Spore e Sample al Thin Wall lear Test al Insitu Var	5/31/19; 0020- Station 2258+57. Tellow line (media STING: on Sample attemp I Tube Sample attemp I Shear Test atter S	4; offset 1.3 ft RT of SB an) ADDITIONAL N-uncorrect t N ₆₀ = N vali hammer effil empt S _u = Insitu F R = Rock Co empt RQD = Rock Sample Information	Dr Ca Au DEFINI' ed = N v. ue correction y = Field Var ore Samp	illing Musing ID/IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	etho /OD: OD:	r effic	n/a HSA	r borin	Hammer Type: Automatic Hammer Efficiency: 0.906		
SITU S = Split S = Split S = Union = Thin V J = Unsi = Insitu '/ = Unsi	CONTRACTOR OF CO	NG AND TE ample al Split Spo e Sample al Thin Wall lear Test al Insitu Var	Station 2258+57. cellow line (media ESTING: on Sample attemp I Tube Sample att ne Shear Test atte \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	4; offset 1.3 ft RT of SB an) ADDITIONAL N-uncorrect t N ₆₀ = N vali hammer effil empt S _u = Insitu F R = Rock Co empt RQD = Rock Sample Information	Au DEFINI' ed = N viue correction y = Field Various Sample (Quality)	using ID/ User ID/O TIONS: alue cted for ha calculated he Shear S	OD:	r effic	n/a HSA	to 8 ft	Hammer Efficiency: 0.906	
SITU S SI	SAMPLIN Spoon Satuccessfu Wall Tubb Successfu Vane Sh successfu	NG AND TE ample all Split Spo e Sample all Thin Wall near Test al Insitu Var	rellow line (media	ADDITIONAL N-uncorrect N No = N val hammer eff R = Rock Cc RQD = Rock Sample Information	Au DEFINI ed = N vau ue correction of the correc	IGER ID/O TIONS: alue cted for ha calculated ne Shear S	OD: ammer d hami strengt	r effic	HSA		-	
= Split S D = Unsi = Thin V J = Unsi = Insitu '/ = Unsi	Spoon Sasuccessfu Wall Tube successfu Vane Sh uccessfu	ample ul Split Spo e Sample ul Thin Wall near Test ul Insitu Var	on Sample attempt I Tube Sample att	N-uncorrect N60 = N vali hammer effi empt S _u = Insitu F R = Rock Co empt ROD = Rock Sample Information	DEFINITION DEFINI	TIONS: alue cted for ha calculated ne Shear S	ammer d hami Strengt	mer e			Water Level*: none observed	
= Split S D = Unsi = Thin V J = Unsi = Insitu '/ = Unsi	Spoon Sasuccessfu Wall Tube successfu Vane Sh uccessfu	ample ul Split Spo e Sample ul Thin Wall near Test ul Insitu Var	on Sample attempt I Tube Sample att	N-uncorrect N60 = N vali hammer effi empt S _u = Insitu F R = Rock Co empt ROD = Rock Sample Information	ed = N volue correction of the	alue cted for ha calculated ne Shear S ple	d hami Strengt	mer e	iency		IONAL DEFINITIONS: LABORATORY TEST RESULTS:	
7		Pen./Rec. (in.)	Depth	•	ted				efficiency	WOF WOF = 1 BOF SSA	IONAL DEFINITIONS: LABORATORY TEST RESULTS: = weight of rods	city Index
7		Pen./Rec. (in.)	nple Depth	6 in.)	ted			-1		-		
	1D		San (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testin Result
\vdash		16/2	0.7 - 2.0	(5)-6-7	13	20	H\$	SA	68.8		8 inches HMA	
								\dashv	68.4		Grey brown, SILTY AGGREGATE Changing at approximately 1.1 ft to:	
\vdash								\dashv			1D: Tan, moist, fine to medium SAND, little silt, trace coarse sand. SAND FILL 2D: Tan, moist, medium dense, fine to medium SAND, little silt,	#15619-
, <u> </u>	2D	24/17	2.0 - 4.0	6-10-17-22	27	41					trace coarse sand, trace gravel. SAND FILL Changing at approximately 3.7 ft to:	WASH SI A-2-4(0 SM -#200=12
									65.8			#15619- WASH SI A-1-b
	3D	24/18	4.0 - 6.0	16-8-8-13	16	24			64.4		Grey tan, moist, fine to coarse SAND, some gravel, some silt. FILL Changing at 5.1 ft to:	SM -#200=18 <u>WC=7.</u> #15619
;											3D: Olive brown, damp (tight), Clavey SILT, trace very fine sand.	WASH SI ATTERBE A-6(19 CL
	4D	24/24	6.0 - 8.0	8-8-8-7	16	24		_			CLAY with two partings fine sandy silt. MARINE SILT-CLAY CRUST	-#200=95 WC=28. LL=39 PL=21
							$ \setminus $	\square			Olive brown, mottled, moist, stiff, CLAY & SILT, trace very fine	PI=18.
	5D	24/22	8.0 - 10.0	5-3-8-49	11	17					sand as partings. MARINE SILT-CLAY CRUST Changing at 9.6 ft to:	
									59.9 59.5	77777	9.6- 5D: Grey tan, moist, Silty GRAVEL, little fine to coarse sand; appears to be broken and weathered rock.	
											Bottom of Exploration at 10.0 feet below ground surface. No refusal.	
2 —								\dashv				
								-				
5												
emark	ks:					•	•			•	<u>,</u>	
rotific - ·	ion list:	ropres=='	approximat	ndaries between soil types;	trans!#	no ma: · i	. c	luci				

			CHONEWALD NGINEERING)	PROJ	ECT:	_					Mainline Area SB Median	Boring No.: _ Proj. No.: _	<u>HB-PAMI</u> 19-11	
		$\Box \Box A$	Associates, In	NC.	LOCA	ΓΙΟΝ:								19-11	·
Orille	r:	1	New England	Boring Co	ntractors	Ele	vation	(ft.)		68.51	ft (est'o	i)	Core Barrel:	n/a	
Oper	ator:	E	Enos/ Share			Da	tum:			NAVD	88		Sampler:	standard split-spo	on
ogg	ed By:	5	Schonewald			Rig	Type:			Mobil	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/Fi	nish: 5	5/30/19; 2325	- 5/31/19;	0015	Dri	lling M	ethod	d:	augei	borin:	3	Hammer Type:	Automatic	
Borin	g Loca		Station 2259+56 ellow line (medi		of transfer of SE	Ca	sing ID	/OD:		n/a			Hammer Efficiency	y: 0.906	
		,	Cilow iiiic (iiicui	earry.		Au	ger ID/	OD:		SSA	to 6 ft		Water Level*:	3.2 ft (open)	
= Spl ID = U = Thi IU = U = Insi	it Spoon S nsuccessf n Wall Tub nsuccessf tu Vane S	ful Split Spo be Sample ful Thin Wal hear Test	on Sample attem I Tube Sample att	pt tempt empt	ADDITIONAL N-uncorrec N ₆₀ = N va hammer eff S _u = Insitu R = Rock C RQD = Roc	ted = N value correcticiency = Field Vanore Sample Quality	alue sted for ha calculated e Shear S ble	t hamn trength	ner e h (pst	fficiency	WOR WOR = I BOR SSA	IONAL DEFINITIONS: 1 = weight of 140lb, hammer 2 = weight of rods 10 trecorded EHOLE ADVANCEMENT METHOL 11 HSA=solid/hollow stem auger 12 roller cone/OPEN/PUSH=hydraulic	LL=Liquid Limit / PL	oil classifications es WC = water conte solidation test I undrained triaxial test =Plastic Limit / PI=Plast	icity Index
ŀ		·		•					Т		1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	BIOWS	Elevation (ft.)	Graphic Log		scription and Remark	:s	Lab. Testing Results
0	1D	16/8	0.7 - 2.0	(4)	-7-6	13	20	S\$A	A	67.8		8 inches HMA		0.7	
-												Grey brown SILTY AGGR Changing at 1.3 ft to: 1D: Tan brown, damp, fine little fine gravel, trace coal 2D: Tan brown, moist, me	e to medium SAND, I rse sand. SAND FILL dium dense, fine to r	.— — — 1.3- ittle silt, trace to - nedium SAND,	#15619-1 WASH SIE A-2-4(0) SM -#200=15.7
3 -	2D	24/18	2.0 - 4.0	5-7-	12-17	19	29			64.5	KXXX	little silt, little gravel, trace sample; silt content varies			WC=14.4 #15619-1 WASH SIE A-2-4(0) SP-SM -#200=11.5
-	3D	5/5	4.0 - 4.4	50)/5"				<u> </u>			3D: Olive grey, wet, fine to gravel; gravel appears to b 4.4 ft: Able to push cobble	be broken rock. FILL		#15619- WASH SIE A-1-b SM -#200=20. WC=12.2
6 -	4D	20/15	6.0 - 7.7	20-34-7	78-50/3"	112	169	V				4D: Olive brown and grey, to some fine to coarse sar gravel appears to be broke	nd; appears to be rev	vorked; much of	#15619- -#200 SIE ATTERBEI -#200=26: WC=14.7 LL=NV
-										60.8	***	Bottom of Exploration Split-spoon refusal.	at 7.7 feet below gr	7.7- ound surface.	PL=NF <u>PI=NP</u>
9 -															
12 -															
5															
15 _ Rema	arks:														

Driller: New England Boring Contractors Elevation (ft.) 67.5 ft (est'd) Core Barrel: n/a Operator: Enos/ Share Datum: NAVD88 Sampler: standard split-spot Logged By: Schonewald Rig Type: Mobile Drill B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches Date Start/Finish: 5/30/19; 2235-2320 Drilling Method: auger boring Hammer Type: Automatic Boring Location: Station 2280+56 3: offset 1.1 ft RT of SB Salion 2280+56 3: offset 1.1 ft RT	7							MeTF	ECT:	PROJE		CHONEWALE NGINEERING			
Driller: New England Boring Contractors Elevation (ft.) 67.5 ft (est/d) Core Barrel: n/a Operator: Enox/ Share Datum: NAVD88 Sampler: standard split-spoud on the Start Core Share Standard split-spoud on the Start Core Share Standard split-spoud on the Start Finish: 5/30/19; 2235-2320 Drilling Method: auger boring Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer MT-pps: Automatic Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file in Core Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file in Core Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file properties on the Start Barrel Type: Mobile Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow file Drill 5-53 (rubber track ATV) Hammer Efficiency: 0.906 pallow fi		19-117	Proj. No.:	AIEA OD WEUIAN					ION.	LOCAT			==		
Department		n/a	Core Barrel:	d)										<u>——</u> er:	Drille
Date Start/Finish: 5/30/19; 2235-2320 Drilling Method: auger boring Hammer Wtt/Fall: 140 lbs/30 inches Boring Location: Slation 2260-7563; offset 1.1 ft RT of SB value auger boring Hammer Efficiency: 0.906 Auger ID/OD: SSA to 7.4 ft Water Level*: 3.4 ft (open, end) Auger ID/OD: SSA to 7.4 ft Water Level*: 3.4 ft (open, end) Drilling Method: auger boring Hammer Efficiency: 0.906 Auger ID/OD: SSA to 7.4 ft Water Level*: 3.4 ft (open, end) Drilling Method: auger boring Hammer Efficiency: 0.906 Auger ID/OD: SSA to 7.4 ft Water Level*: 3.4 ft (open, end) Drilling Method: 3.4 ft (open, end) Drilling Method: 3.4 ft (open, end) Drillin	on	standard split-spoc	Sampler:	,	•		<u>, </u>							rator:	Oper
Date Start/Finish:			-	B-53 (rubber track ATV)	e Drill	Mobil			-						
Salidon Zebries 3, offset 1,1ft RT of SB Casing ID/OD: n/a Mager ID/OD: SSA to 7.4 ft Water Level*: 3.4 ft (open, end)							thod:				-2320				
Auger ID/OD: SSA to 7.4 ft Water Level*: 3.4 ft (open, end) ADDITIONAL DEFINITIONS: **Spirit SamPling And Testing: **Spirit Sport Sample alternpt is Thin Wall Tube Sample alternpt is Instituted Sample information. Column Sample Information Column Sample alternpt Column Sample Information Column Sample Informati				9	20				-	1 ft RT of SB	6.3; offset 1.	tation 2260+56	tion: S		
Sample Nation Ash Diestinos Spill Spons Sample Nation				ft	0741				-		lian)	ellow line (med	<u>y</u>	ng Loou	-
1D 16/7 0.7 - 2.0 (4)-5-3 8 12 S\$A 66.8	icity Index	RESULTS: soil classifications es WC = water conten asolidation test d undrained triaxial test L=Plastic Limit / PI=Plastic	LABORATORY TEST F AASHTO / USCS so -#200 = percent fines CONSOL= 1-D cons UU=Unconsolidated LL=Liquid Limit / PL=	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods note recorded tet HOLE ADVANCEMENT MET I/HSA=solid/hollow stem auger	WOH WOF = r BOR SSA	ciency efficiency	nmer effi nammer ength (p	IONS: ue ed for han alculated Shear St e	DEFINIT ed = N va ue correction ciency = of ield Vane ore Samp	N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu Fi R = Rock Co RQD = Rock	ttempt tempt	on Sample attem Tube Sample at se Shear Test att	Sample ful Split Spoo be Sample ful Thin Wall hear Test	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane Sl	= Sp D = U = Th U = U = Ins
Section Sect											·		_		
1D 16/7 0.7 - 2.0 (4)-5-3 8 12 S\$A 66.8 66.8 66.1 Grey brown SILTY AGGREGATE Changing at 1.4 ft to: 2D 14/9 2.0 - 3.2 5-7-50/2" - 10: Olive tan, moist, fine to medium SAND, little to some silt, trace gravel, trace coarse sand. SAND FILL 2D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 3D: Olive gravel. SAND FILL 3D: Olive gravel, some silt with pockets / chunks silt-clay. FILL / REWORKED 5.3 to 7.4 ft: Auger cuttings appear to be broken rock. Bottom of Exploration at 7.4 feet below ground surface.	Lab Testir Resu	ks	escription and Remarks		Graphic Log	Elevation (ft.)	Casing Blows	09-N	N-uncorrected	Strength (psf) or RQD (%)	Blows (/6 in.) Shear	Sample Depth (ft.)	Pen./Rec. (in.)	Sample No.	
Grey brown SILTY AGGREGATE Changing at 1.4 ft to: 1.4 TD: Olive tan, moist, fine to medium SAND, little to some silt, trace gravel, trace gravel, trace gravel. SAND FILL 2D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 2D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 3D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 3D: Olive grey, wet, fine to coarse Sandy GRAVEL, some silt with pockets / chunks silt-clay. FILL / REWORKED 60.1 Bottom of Exploration at 7.4 feet below ground surface.		0.7-		8-1/2 inches HMA		66 B	S\$A	12	8	-5-3	(4)	0.7 - 2.0	16/7	1D	U
1D: Olive tan, moist, fine to medium SAND, little to some silt, trace gravel, trace gravel, trace coarse sand. SAND FILL 2D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 3D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 3D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel. SAND FILL 3D: Olive tan, moist, fine to medium SAND, little silt, trace coarse sand, trace gravel, trace gravel, trace gravel, trace coarse sand, trace gravel, trace grav		0.7	REGATE			00.0									
3	WASH S A-2-4		e sand. SAND FILL	1D: Olive tan, moist, fir trace gravel, trace coar		66.1									
3.2 to 4.0 ft: Cobble 3D: Olive grey, wet, fine to coarse Sandy GRAVEL, some silt with pockets / chunks silt-clay. FILL / REWORKED 5.3 5.3 to 7.4 ft: Auger cuttings appear to be broken rock. 60.1 Bottom of Exploration at 7.4 feet below ground surface.	-#200=1 WC=12 #15619	·								-50/2"	5-7-	2.0 - 3.2	14/9	2D	3 -
3D 16/13 4.0 - 5.3 5-34-50/4" 62.2 pockets / chunks silt-clay. FILL / REWORKED 62.2 5.3 to 7.4 ft: Auger cuttings appear to be broken rock. 60.1 Bottom of Exploration at 7.4 feet below ground surface.	A-2-4(SM -#200=1					64.3									
5.3 to 7.4 ft: Auger cuttings appear to be broken rock. 60.1 Bottom of Exploration at 7.4 feet below ground surface.	WC=12 #15619 WASH S A-1-I GM									-50/4"	5-34	4.0 - 5.3	16/13	3D	
60.1 Bottom of Exploration at 7.4 feet below ground surface.			ngs appear to be broke	5.3 to 7.4 ft: Auger cut		62.2									6 -
Bottom of Exploration at 7.4 feet below ground surface.															
			n at 7.4 feet below gro			60.1	V								
															9 -
															46
															12 -
15 Remarks:	<u> </u>													arke:	

			CHONEWALD NGINEERING)	PROJ	ECT:	_						•	HB-PAMI	
		==	Associates, It	NC.	LOCAT	ION:						P NICA OD MECHAII	roj. No.: _	19-11	/
Orille	<u> </u>		New England				vation		011		ft (est'o	() Co	ore Barrel:	n/a	
Oper	ator:		Enos/ Share			_	tum:	• ,		NAVE	•	·	ımpler:	standard split-spo	on
•	ed By:		Schonewald			Ric	Type:			Mobi	e Drill		mmer Wt./Fall:	<u> </u>	
	Start/Fi		5/30/19; 2130-	2230			lling M		q.		r borin	` '	ammer Type:	Automatic	
			Station 2261+57		B ft RT of SB	_					DOTT				
sorii	ng Loca	tion:	vellow line (medi	ian)		_	sing ID			n/a			mmer Efficienc		
= Sp	lit Spoon S		ESTING:		ADDITIONAL N-uncorrecte N ₆₀ = N vali	DEFINIT ed = N va	lue		r effic		WOI		ater Level*: ABORATORY TEST AASHTO / USCS so -#200 = percent fine	oil classifications	
U = L = Ins	Insuccessi itu Vane S	hear Test	Il Tube Sample at	•	hammer effices Su = Insitu F R = Rock Co RQD = Rock	ield Vane re Samp	e Shear S lle	Streng	th (p		BOF SSA	not recorded EHOLE ADVANCEMENT METHODS: /HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraulic push	LL=Liquid Limit / PL	l undrained triaxial test =Plastic Limit / PI=Plast	
				Sample In	formation										
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Descri _l	ption and Remark	s	Lab. Testin Resul
0	1D	17/9	0.6 - 2.0		-4-4	8	12	H\$		65.9	g-exte	7-1/2 inches HMA		0.6	
								H	\dashv	65.0		Grey brown SILTY AGGREG Changing at 1.5 ft to:	ATE _		
										00.0		1D: Tan, moist, fine to medium coarse sand. SAND FILL 2D: Tan, damp, medium dens	m SAND, little to se, fine to mediun	some silt, trace	#15619- WASH SII
3 -	2D	24/19	2.0 - 4.0	4-8-′	14-13	22	33					little silt, trace coarse sand, tr	ace gravel. SANI) FILL	A-3 SP-SN -#200=10 <u>WC=11.3</u>
	3D	24/16	4.0 - 6.0	9-12-	18-15	30	45			62.5		3D: Somewhat layered: Grey medium dense, fine to mediu trace coarse sand; appears to	m SAND, some s	ilt, trace gravel,	#15619 WASH SI A-2-4(SM -#200=28 <u>WC=12.</u>
6 -	4D	24/16	6.0 - 8.0	9-9-	16-14	25	38		_	60.5		4D: Olive tan brown, wet, mes SAND, trace to little gravel. T		— — — —6.0 fine to coarse	#15619 WASH S A-4(0 SM -#200=38 WC=11
	5D	10/10	8.0 - 8.8	7-5	0/4"				-			5D: Olive tan brown, wet, fine gravel. TILL	to coarse SAND	, some silt, little	<u> </u>
	0.2	10/10	0.0 0.0	. 0						57.7		Broken rock in tip of spoon.		8.8	
9 -										57.5		Bottom of Exploration at Auger refusal; auger walking	9.0 feet below gi right.	9.0	
12 -															
15															
lem	arks:														
_		_	approximate bour	_											

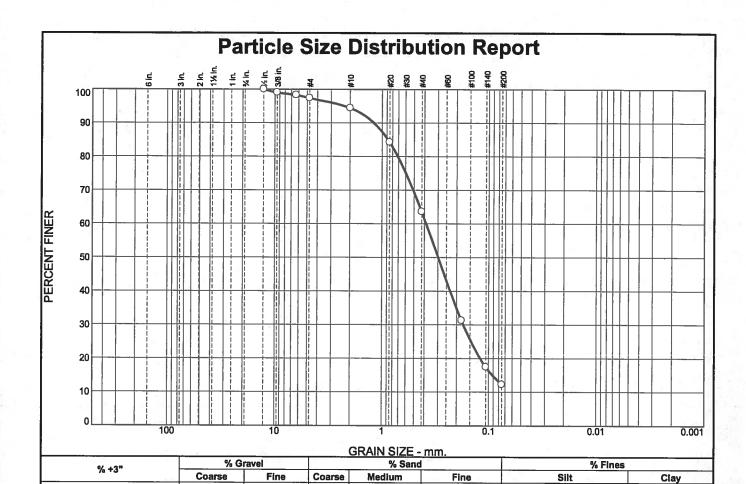
			CHONEWALD NGINEERING)	PROJ	ECT:	-					Mainline Area SB Median Proi No: 19-	
		==	ASSOCIATES, I	NC.	LOCAT	ΓΙΟΝ:						Area SB Median Proj. No.: 19-	117
Drille	er:	1	New England	Boring Co			Elevation (ft.) 65 ft (est'd)					Core Barrel: n/a	
Ope	ator:	E	Enos/ Share			Da	Datum: NAVD88				88	Sampler: standard split-	spoon
Logg	jed By:	5	Schonewald			Rig	Rig Type: Mobile Drill B-53 (rubber track ATV				le Drill	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inche	3
Date	Start/Fi		5/30/19; 2030-		4 # DT - 100		Drilling Method: auger boring				r borin	Hammer Type: Automatic	
Bori	ng Loca		Station 2262+56 ellow line (medi		4 π R I Of SB	Ca	sing ID	/OD	:	n/a		Hammer Efficiency: 0.906	
LOIT	LLCAMBLI	NO AND T	OTINO:		ADDITIONAL		ger ID/	OD:		HSA	to 8 ft	Water Level*: none observed IONAL DEFINITIONS: LABORATORY TEST RESULTS:	ı
) = Sp 1D = l I = Th 1U = l I' = Ins	lit Spoon S Jnsuccessi in Wall Tub Jnsuccessi itu Vane S	ful Split Spo be Sample ful Thin Wal hear Test	on Sample attem I Tube Sample at ne Shear Test att	tempt empt	ADDITIONAL N-uncorrect N ₆₀ = N val hammer eff S _U = Insitu R = Rock C RQD = Roc	ed = N va lue correcticiency = Field Van ore Samp k Quality	alue cted for ha calculated se Shear S ble	d ham Streng	mer o	efficiency	WO WO / = BOF SSA	IONAL DEFINITIONS: Laboral DRY TEST RESULTS: 1 = weight of 140lb. hammer R = weight of rods ot recorded EHOLE ADVANCEMENT METHODS: HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraulic push Laboral DRY TEST RESULTS: ASASTO / USCS soil classifications -#200 = percent fines	est Plasticity Index
					formation		1		_		-		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testin Resul
0	40	47/0		(5)	0.7	40	00					7 inches HMA	
	1D	17/9	/9 0.6 - 2.0	(5)	-6-7	13	20	HS	A	64.4		Grey brown SILTY AGGREGATE	0.6
										63.7		Grading at 1.3 ft to:	1.3-
											鑩	1D: Tan, moist, fine to medium SAND, little silt, trace coarse	
								Н	\dashv			sand. SAND FILL 2D: Tan, moist, loose, fine to medium SAND, trace to little silt	#15619 WASH SI
	2D	24/23	2.0 - 4.0	7-4	-3-3	7	11					trace coarse sand. SAND FILL	WASH SI A-3
3 -							1	Н	\dashv			Changing at 3.3 ft to:	SP-SN -#200=8
										61.7			3.3- <u>WC=8.9</u> ttle #15619
											\bowtie	fine sand; appears reworked. FILL / REWORKED	WASH SI
	20	24/24	40.60	4.5	7.0	10	10					3D: Olive brown, mottled, moist, stiff, Clayey SILT, trace to little fine sand; appears to be reworked to 5.3 ft. FILL / REWORKE	
	3D	24/24	4.0 - 6.0	4-5	-7-9	12	18				\bowtie		-#200=86
										59.7			WC=23. LL=42
										55.1			PL=23 PI=19
ô -								Н	\dashv			4D: Olive brown, slightly mottled, moist, very stiff, SILT & CLA	Y. #15619
	4D	24/21	6.0 - 8.0	9-12-	-12-12	24	36					MARINE SILT-CLAY CRUST	ATTERBE
						-	1	\mathbb{H}	\dashv				A-7-6(2 CL
								$ \cdot $	/				-#200=99 WC=28.
								$ \ $					LL=46
												5D: Olive brown, moist, stiff, CLAY & SILT. MARINE SILT-CL CRUST	AY PL=24 Pl=21
	5D	24/24	8.0 - 10.0	3-5	-7-7	12	18						
9 -													
										55.0			0.0-
												Bottom of Exploration at 10.0 feet below ground surface No refusal.	•
12 -													
							1		_				
15 _													
	arks:	ı	1			1	-				1		
				1 1 1 1			-					I Bone 4 see	
.i d(lf	cauon line	s represent	approximate bour	iluaries DetW	een son types	, u ansitio	ns may be	grac	ual.			Page 1 of 1	



CROSBY YARD AREA MEDIAN BORINGS (HB-PAMI-200s)

LABORATORY TEST REPORTS

	TABULATION OF SOIL TESTING (RWG&A PROJECT NO. 1368-016) (listed in order of test report presentation)							
Boring No.	Sample No.	Sample Depth (ft., BGS)	RWG&A LAB NO.	Tests Completed				
HB-PAMI-201	2D	2-3.7	#15619-11	wash sieve gradation				
HB-PAMI-201	2D-A	3.7-4	#15619-12	wash sieve gradation				
HB-PAMI-201	3D	5.1-6	#15619-13	wash sieve gradation; Atterberg Limits				
HB-PAMI-202	1D	1.3-2	#15619-14	wash sieve gradation				
HB-PAMI-202	2D	2-4	#15619-15	wash sieve gradation				
HB-PAMI-202	3D	4-4.4	#15619-16	wash sieve gradation				
HB-PAMI-202	4D	6-7.7	#15619-17	percent passing #200; Atterberg Limits				
HB-PAMI-203	1D	1.4-2	#15619-18	wash sieve gradation				
HB-PAMI-203	2D	2-3.2	#15619-19	wash sieve gradation				
HB-PAMI-203	3D	4-5.3	#15619-20	wash sieve gradation				
HB-PAMI-204	2D	2-4	#15619-21	wash sieve gradation				
HB-PAMI-204	3D	4-6	#15619-22	wash sieve gradation				
HB-PAMI-204	4D	6-8	#15619-23	wash sieve gradation				
HB-PAMI-205	2D	2-3.3	#15619-24	wash sieve gradation				
HB-PAMI-205	2D-A	3.3-4	#15619-25	wash sieve gradation; Atterberg Limits				
HB-PAMI-205	4D	6-8	#15619-26	wash sieve gradation; Atterberg Limits				



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		10000
3/8"	99.0		
1/4"	98.3		
#4	97.4		
#10	94.4		
#20	84.3		
#40	63.6		
#80	31.3		
#140	17.4		
#200	12.2	10	
	75 =		
	1.0		
		Ε	
	4.1		

2.6

3.0

30.8

Silty sand	Soil Description	
PL=	Atterberg Limits	Pl=
D ₉₀ = 1.1928 D ₅₀ = 0.2982 D ₁₀ =	Coefficients D ₈₅ = 0.8804 D ₃₀ = 0.1730 C _u =	D ₆₀ = 0.3859 D ₁₅ = 0.0916 C _c =
USCS= SM	Classification AASHTC)= A-2-4(0)
Moisture Content	Remarks :: 13.4%	

(no specification provided)

Location: HB-PAMI-201 Sample Number: 2D

0.0

Depth: 2'-3.7'

Date: 7/11/2019

12.2

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

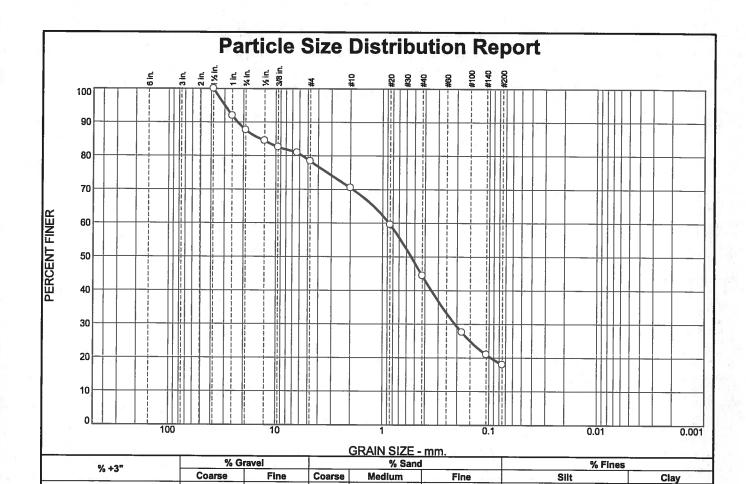
51.4

Portland, ME

Project No: 1368-016

Lab No. 15619-11

Tested By: MCM/MSM



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1 1/2"	100.0		
1"	91.9		
3/4"	87.7		
1/2"	84.5		
3/8"	82.6		
1/4"	80.9	7	
#4	78.4		
#10	70.5	- V	
#20	59.6		
#40	44.4		
#80	27.6	-	
#140	21.0	3 11	
#200	18.0		
	0		
	120	_ = =	
	72	= = =	

9.3

7.9

26.1	26.4		18.0
Silty san	Se d with gravel	oil Description	
PL=		terberg Limits L=	Pj=
D ₉₀ = 2 D ₅₀ = 0 D ₁₀ =	2.6233 E 0.5417 C	Coefficients 085= 13.6873 030= 0.2086	D ₆₀ = 0.8704 D ₁₅ = C _c =
USCS=	SM	Classification AASHTO=	A-1-b
Moisture	Content: 7.6%	Remarks	

(no specification provided)

Location: HB-PAMI-201 Sample Number: 2D-A

0.0

Depth: 3.7'-4'

Date: 7/11/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Schonewal Engineering Associates, Inc.

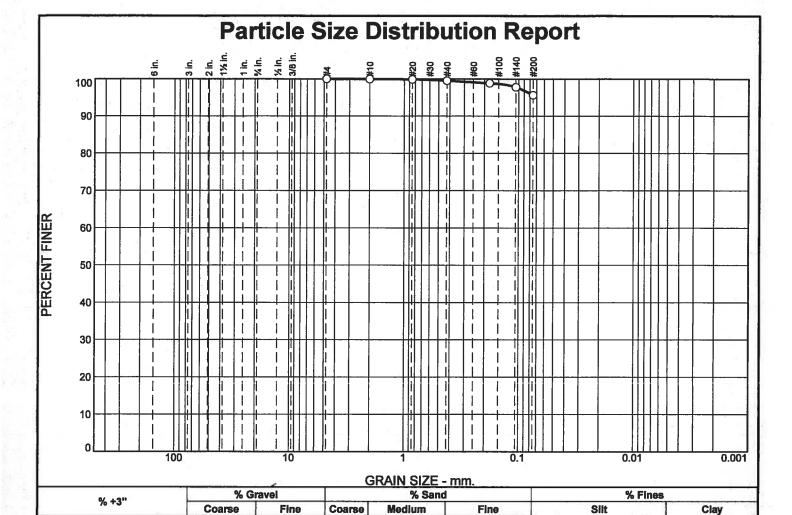
Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

Project No: 1368-016

15619-12 Lab No.

Tested By: MCM/MSM



SIEVE	PERCENT	SPEC.* PERCENT	PASS?
		PERCENT	(X=NO)
#4	100.0		
#10	100.0	.85	
#20	99.9		_
#40	99.5		
#80	98.8		
#140	97.8	18	
#200	95.6		
1			
	_ =		

Fine

0.0

Coarse

0.0

Medium

0.5

	Soil Description	
Lean clay		
	Atterberg Limits	
PL= 21.3	LL= 39.9	PI= 18.6
_ = 1:	Coefficients	_
D ₉₀ = D ₅₀ = D ₁₀ =	D ₈₅ =	D ₆₀ = D ₁₅ =
D ₁₀ =	Cu≝	Cc
	Classification	
USCS= CL	AASHT	$\Gamma O = A-6(19)$
	Remarks	
Natural Moisture	28.6%	

Location: HB-PAMI-201 Sample Number: 3D

0.0

Depth: 5.1'-6'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening-Phase 2 (#19-117)

3.9

Portland, ME

Project No: 1368-016

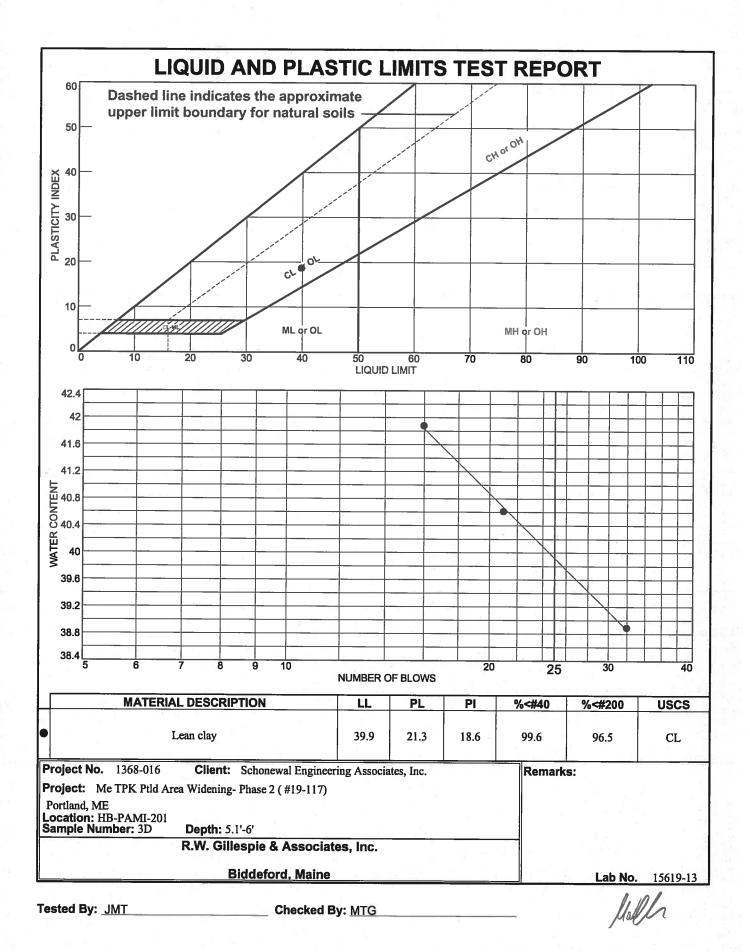
15619-13 Lab No.

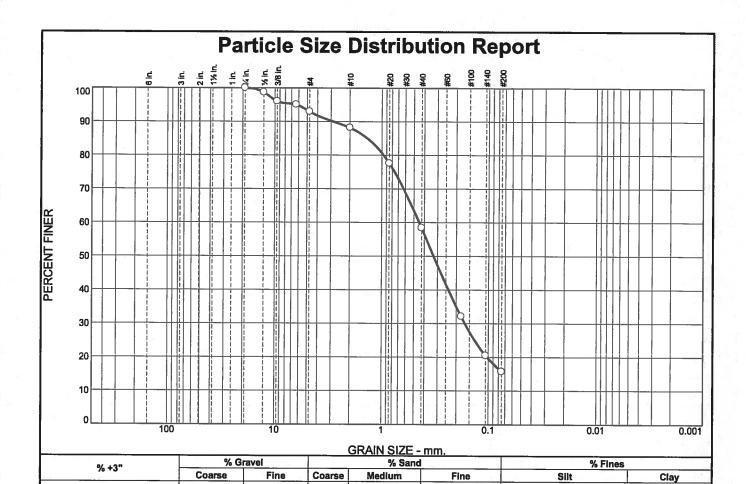
Date: 7/18/2019

95.6

Tested By: JJB

^{* (}no specification provided)





SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4" 1/2" 3/8" 1/4" #4 #10 #20 #40 #80 #140 #200	100.0 98.7 96.0 95.1 92.9 88.2 77.6 58.4 32.1 20.5 15.7		

7.1

4.7

29.8	42.7		15.7
Silty sar	ıd	Soil Description	
PL=		Atterberg Limits LL=	PI=
D ₉₀ = 2 D ₅₀ = 0 D ₁₀ =	2.8469 0.3264	Coefficients D ₈₅ = 1.3623 D ₃₀ = 0.1659 C _u =	D ₆₀ = 0.4465 D ₁₅ = C _c =
USCS=	SM	Classification AASHTO=	= A-2-4(0)
Moisture	e Content: 1	<u>Remarks</u> 4.4%	
Moisture	e Content: 1		

(no specification provided)

Location: HB-PAMI-202 **Sample Number:** 1D

0.0

Depth: 1.3'-2'

Date: 7/11/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Schonewal Engineering Associates, Inc.

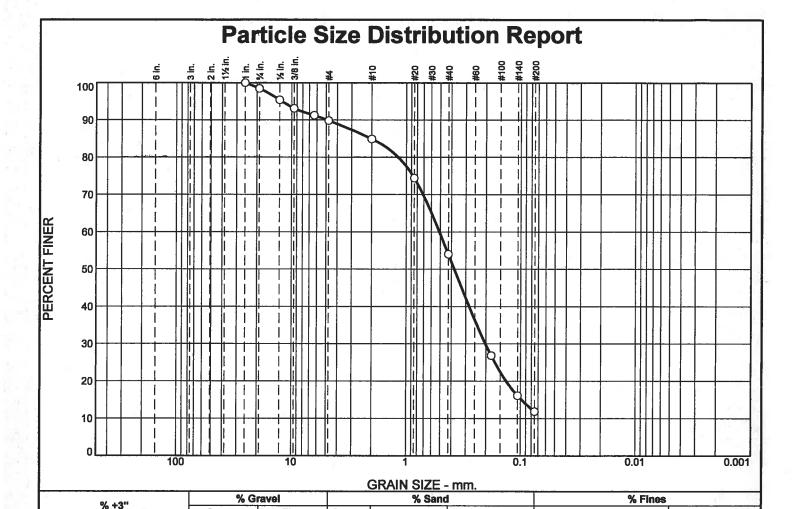
Me TPK Ptld Area Widening- Phase 2 (#19-117) Project:

Portland, ME

Project No: 1368-016

Lab No.

Tested By: MSM/MCM



PERCENT	SPEC.*	PASS?
FINER	PERCENT	(X=NO)
100.0		
98.4	_	
95.4		
93.1		
91.2		
89.8		
84.9		
74.4		
54.0		
26.9		
16.1		
11.9		
	-	
	100.0 98.4 95.4 93.1 91.2 89.8 84.9 74.4 54.0 26.9 16.1	100.0 98.4 95.4 93.1 91.2 89.8 84.9 74.4 54.0 26.9 16.1

Coarse

1.6

Fine

8.6

Coarse

4.9

Medium

30.9

Poorly graded sa	Soil Description and with silt	<u>n</u>	Ш
PL=	Atterberg Limit	<u>s</u> PI=	
D ₉₀ = 4.9070 D ₅₀ = 0.3776 D ₁₀ =	Coefficients D ₈₅ = 2.0293 D ₃₀ = 0.2022 C _u =	D ₆₀ = 0.5086 D ₁₅ = 0.0980 C _c =	10000
USCS= SP-S	Classification M AASH	TO= A-2-4(0)	
Moisture Conter	<u>Remarks</u> at: 11.5%		4

Silt

11.9

Clay

* (no specification provided)

Location: HB-PAMI-202

0.0

Sample Number: 2D Depth: 2'-4'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Fine

42.1

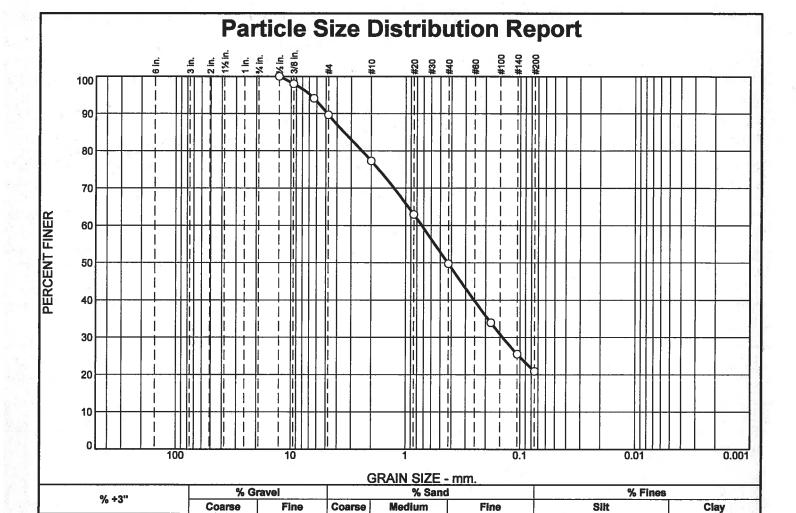
Portland, ME

Project No: 1368-016

Lab No. 15619-15

Date: 7/11/2019

Tested By: MSM/MCM



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/2"	100.0		
3/8"	98.0		
1/4"	94.1		ľ
#4	89.7		
#10	77.3		
#20	63.0		
#40	49.7		
#80	33.9		
#140	25.5		
#200	20.9		
		=_	
	120		_
	1		

10.3

12.4

27.6

Cilturand	Soil Description	1 35
Silty sand		
	Atterberg Limits	
PL=	LL=	Pl=
D ₉₀ = 4.8455 D ₅₀ = 0.4307 D ₁₀ =	Coefficients D85= 3.4559 D30= 0.1423 Cu=	D ₆₀ = 0.7255 D ₁₅ = C _c =
USCS= SM	Classification AASHTO=	= A-1-b
Moisture Content	Remarks :: 12.2%	
		1.1

0.0

Location: HB-PAMI-202 Sample Number: 3D Depth: 4'-4.4'

> R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

28.8

Portland, ME

Project No: 1368-016

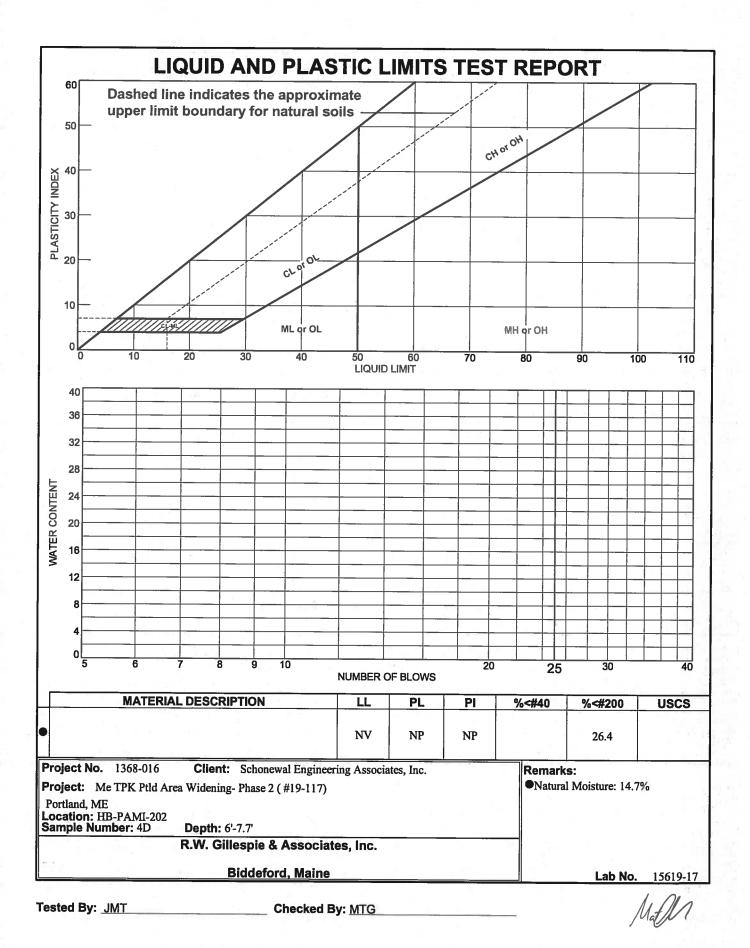
Date: 7/11/2019

20.9

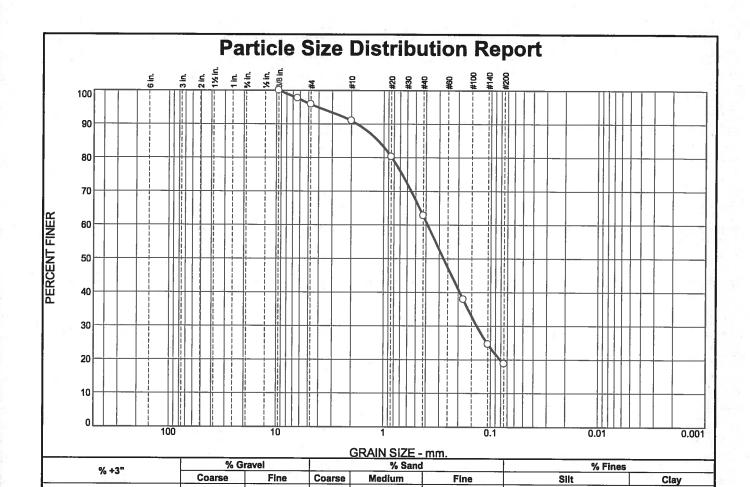
Lab No.

Tested By: JJB

⁽no specification provided)



Page 35



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
3/8"	100.0	104 0 14	
1/4"	97.7		
#4	95.9		
#10	91.0		
#20	80.3		
#40	62.8		
#80	37.9		
#140	24.6		
#200	18.8	×	
		100	
		11/7	
		211 2	
		90 IV 1/5	

Soil Description	
<u>Atterberg Limits</u> LL=	PI=
Coefficients D85= 1.1235 D30= 0.1343 Cu=	D ₆₀ = 0.3858 D ₁₅ = C _c =
Classification AASHTO	= A-2-4(0)
Remarks at: 12.4%	
	Coefficients D85= 1.1235 D30= 0.1343 Cu= Classification AASHTO Remarks

(no specification provided)

Location: HB-PAMI-203 **Sample Number:** 1D

0.0

Depth: 1.4'-2'

Date: 7/11/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

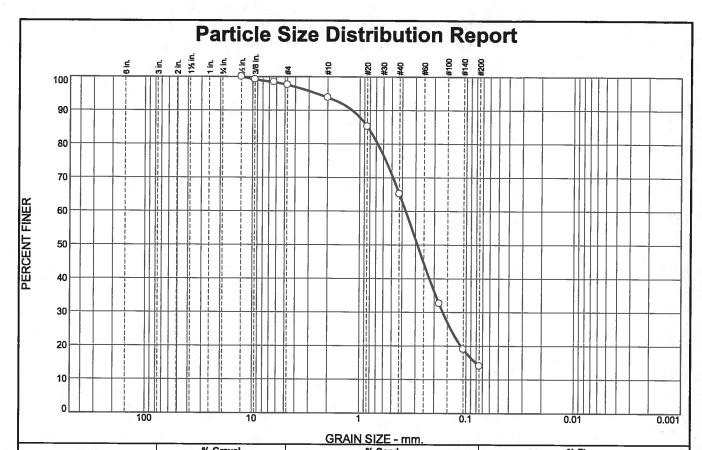
Project No: 1368-016

15619-18 Lab No.

Tested By: JJB

Checked By: MTG

4.9



	% +3"		% Grav	/ei		% Sand		% Fine	S
	78 13		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0		0.0	2.4	3.8	28.6	51.2	14.0	3 - 2 - 2
	SIEVE	PERCENT	SPEC.* PERCENT	1672	SS?	Silty san	1.0	il Description	
ľ	1/2"	100.0		<u> </u>		Dirty Buil	T *2		- W

	SIEVE	PERCENT	SPEC."	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	1/2"	100.0		
	3/8"	99.2		
_1	1/4"	98.4	J.	
	#4	97.6		
	#10	93.8		
	#20	85.2		
1	#40	65.2	11	
	#80	32.6		
1	#140	19.0		
1	#200	14.0		
1 -		II II		

Silty sand	Soil Description	
PL=	Atterberg Limits	PI=
D ₉₀ = 1.1731 D ₅₀ = 0.2874 D ₁₀ =	Coefficients D85= 0.8409 D30= 0.1659 Cu=	D ₆₀ = 0.3706 D ₁₅ = 0.0809 C _c =
USCS= SM	Classification AASHTO)= A-2-4(0)
Moisture Content:	Remarks 12.4%	

(no specification provided)

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Location: HB-PAMI-203 Sample Number: 2D

Depth: 2'-3.2'

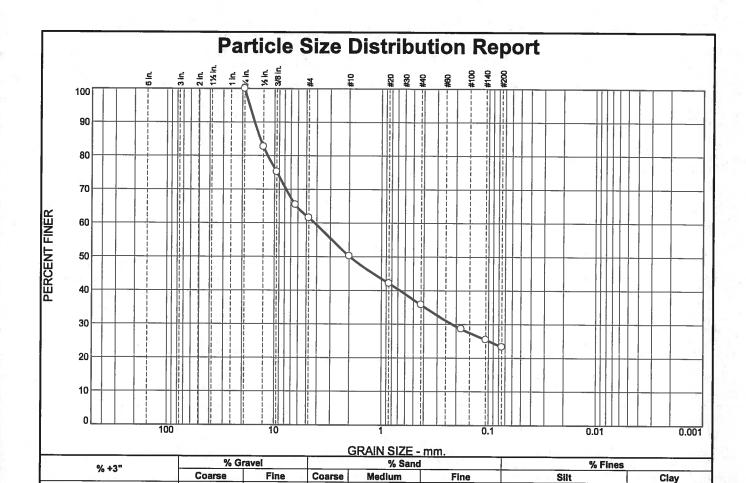
Date: 7/11/2019 Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

Project No: 1368-016 Lab No.

Tested By: MSM/MCM



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		7 1
1/2"	82.7		
3/8"	75.2		
1/4"	65.4	5 A	
#4	61.6		
#10	50.2		
#20	42.2		
#40	35.8		
#80	28.7		
#140	25.4		
#200	23.3		
	=		
		=	
		1 9	

38.4

11.4

14.4

		23.3
Silty gravel with sar	Soil Description	
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 15.3623 D ₅₀ = 1.9645 D ₁₀ =	Coefficients D85= 13.5779 D30= 0.2166 Cu=	D ₆₀ = 4.1810 D ₁₅ = C _c =
USCS= GM	Classification AASHTO=	A-1-b
Moisture Content: 1	Remarks 1.3%	

(no specification provided)

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Location: HB-PAMI-203 **Sample Number:** 3D

0.0

Depth: 4'-5.3'

Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

12.5

Portland, ME

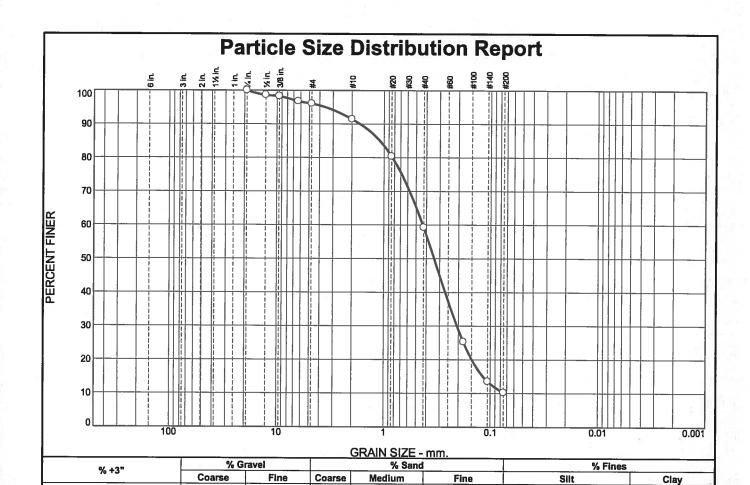
Project No: 1368-016

Lab No.

Date: 7/11/2019

23.3

Tested By: MSM/MCM



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
3/4"	100.0		
1/2"	98.6		
3/8"	98.3		
1/4"	96.8		
#4	96.1		
#10	91.5	- 12	
#20	80.4		
#40	59.3		
#80	25.3		
#140	13.5		
#200	10.3		

3.9

4.6

32.2

	Soil Description	
Poorly graded sand	with silt	
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 1.6747 D ₅₀ = 0.3382 D ₁₀ =	Coefficients D85= 1.0915 D30= 0.2065 Cu=	D ₆₀ = 0.4330 D ₁₅ = 0.1170 C _C =
USCS= SP-SM	Classification AASHTO=	= A-3
Moisture Content: 1	Remarks 1.3%	

(no specification provided)

Location: HB-PAMI-204 Sample Number: 2D

0.0

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Depth: 2'-4'

Schonewal Engineering Associates, Inc.

Me TPK Ptld Area Widening- Phase 2 (#19-117) Project:

49.0

Portland, ME

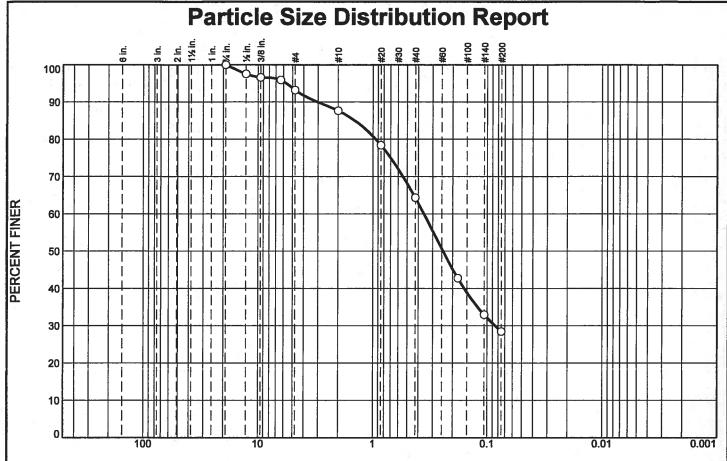
Project No: 1368-016

Lab No.

Date: 7/11/2019

10.3

Tested By: MSM/MCM



GRAIN SIZE - mm.								
% +3"	% Gravel % Sand			% Fines				
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	6.8	5.6	23.3	35.9	28.4		

ſ	SIEVE	PERCENT	SPEC.*	PASS?
1	SIZE	FINER	PERCENT	(X=NO)
	3/4"	100.0		
	1/2"	97.5	= =	
- 1	3/8"	96.6		
	1/4"	95.9		
	#4	93.2		
	#10	87.6		
	#20	78.4		
	#40	64.3		9
	#80	42.7		
	#140	32.9		
	#200	28.4	- F	
			ii.	
4				
			1. 1.	

	Soil Description	
Silty sand		
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 3.0341 D ₅₀ = 0.2433 D ₁₀ =	Coefficients D85= 1.4372 D30= 0.0853 Cu=	D ₆₀ = 0.3577 D ₁₅ = C _c =
USCS= SM	Classification AASHT	O= A-2-4(0)
Moisture Conten	Remarks t: 12.8%	

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Location: HB-PAMI-204 Sample Number: 3D

Depth: 4'-6'

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

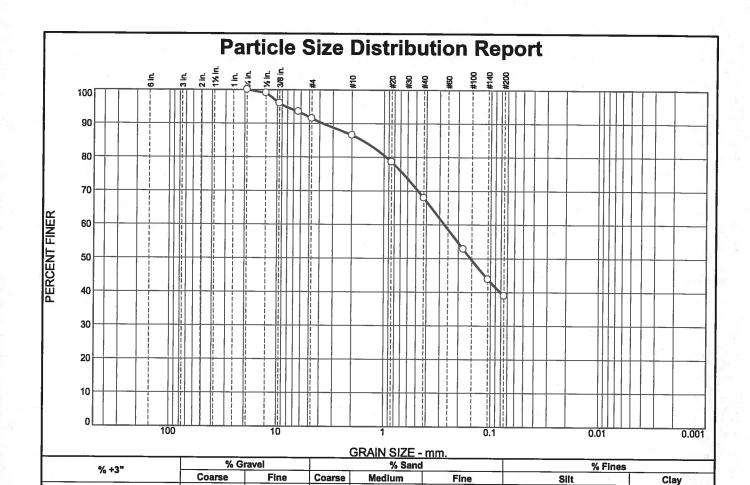
Project No: 1368-016

15619-22 Lab No.

Date: 7/11/2019

Tested By: MSM/MCM

⁽no specification provided)



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
3/4"	100.0		
1/2"	99.0		
3/8"	96.0		
1/4"	93.5		
#4	91.5		
#10	86.5		
#20	78.6		
#40	68.0		
#80	52.8		
#140	43.8		
#200	38.9		
	18		
	WE II	8	

8.5

5.0

 			- Oidy	
18.5	29.1		38.9	
Silty sand		Soil Description		
PL=	,	Atterberg Limits LL=	PI=	
D ₉₀ = 3.7 D ₅₀ = 0.7 D ₁₀ =	7404 1538	Coefficients D85= 1.6010 D30= Cu=	D ₆₀ = 0.2696 D ₁₅ = C _c =	
USCS=	SM	Classification AASHTO=	A-4(0)	
Moisture (Content: 11	Remarks .9%		
	1			

(no specification provided)

Location: HB-PAMI-204 **Sample Number:** 4D

0.0

Depth: 6'-8'

Date: 7/11/2019

R.W. Gillespie & Associates, Inc. **Biddeford, Maine**

Schonewal Engineering Associates, Inc.

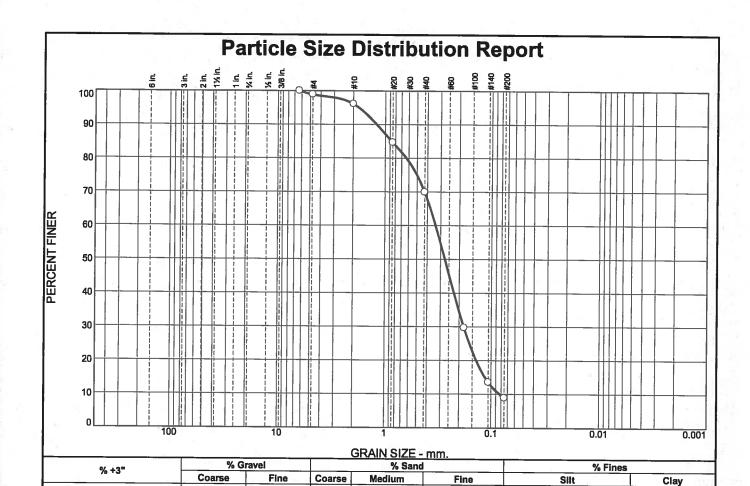
Me TPK Ptld Area Widening- Phase 2 (#19-117) Project:

Portland, ME

Project No: 1368-016

Lab No.

Tested By: MSM/MCM



SIEVE	PERCENT	SPEC.* PERCENT	PASS? (X=NO)
1/4"	100.0		T
#4	98.9		
#10	96.1		
#20	84.7		
#40	69.9		
#80	29.7		
#140	13.5		
#200	8.9		
	9		
		V	

26.2	61.0		8.9
Poorly g	raded sand	Soil Description with silt	
PL=		Atterberg Limits LL=	PI=
D ₉₀ = 1 D ₅₀ = 0 D ₁₀ = 0	.2044 .2733 .0828	Coefficients D85= 0.8681 D30= 0.1812 Cu= 4.05	D ₆₀ = 0.3348 D ₁₅ = 0.1140 C _c = 1.19
USCS=	SP-SM	Classification AASHTO)= A-3
Moisture	Content: 8	Remarks .9%	

(no specification provided)

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Location: HB-PAMI-205 **Sample Number:** 2D

0.0

Depth: 2'-3.3'

Schonewal Engineering Associates, Inc.

Me TPK Ptld Area Widening- Phase 2 (#19-117) Project:

Portland, ME

Project No: 1368-016

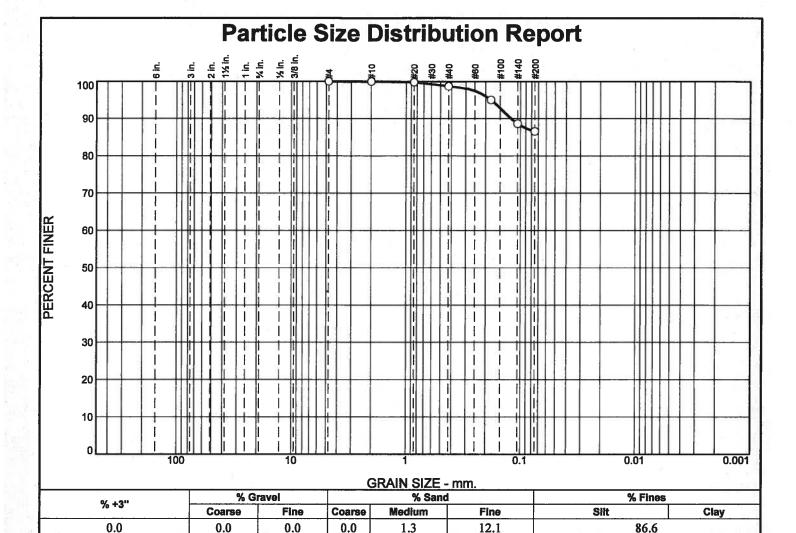
Lab No. 15619-24

Date: 7/11/2019

Tested By: MSM/MCM

Checked By: MTG

2.8



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0	7 75	
#10	100.0		
#20	99.7		
#40	98.7		
#80	95.0		
#140	88.6		
#200	86.6		
	A		
	- <		
	-		

0.0

0.0

1.3

	Soil Description	
Lean clay		
PL= 23.1	Atterberg Limits LL= 42.6	Pl= 19.5
D ₉₀ = 0.1203 D ₅₀ = D ₁₀ =	Coefficients D85= D30= Cu=	D ₆₀ = D ₁₅ = C _c =
USCS= CL	Classification AASHTO)= A-7-6(18)
Natural Moisture	Remarks e: 23.1%	

86.6

* (no specification provided)

Location: HB-PAMI-205 Sample Number: 2D-A

Depth: 3.3'-4'

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

12.1

Portland, ME

15619-25 Project No: 1368-016 Lab No.

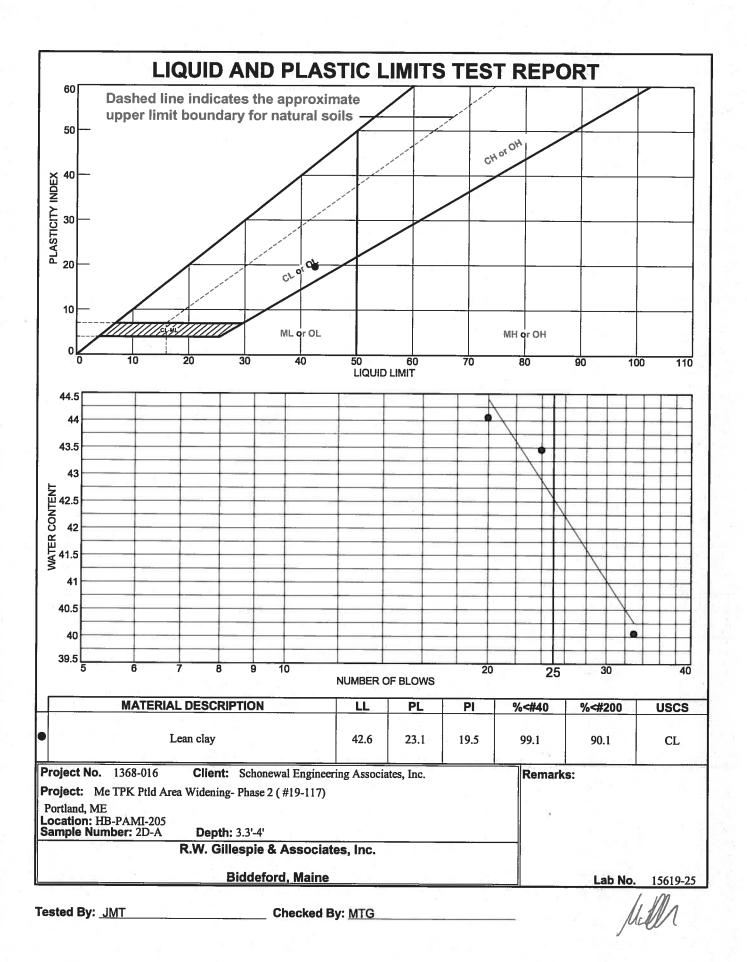
R.W. Gillespie & Associates, Inc. **Biddeford, Maine**

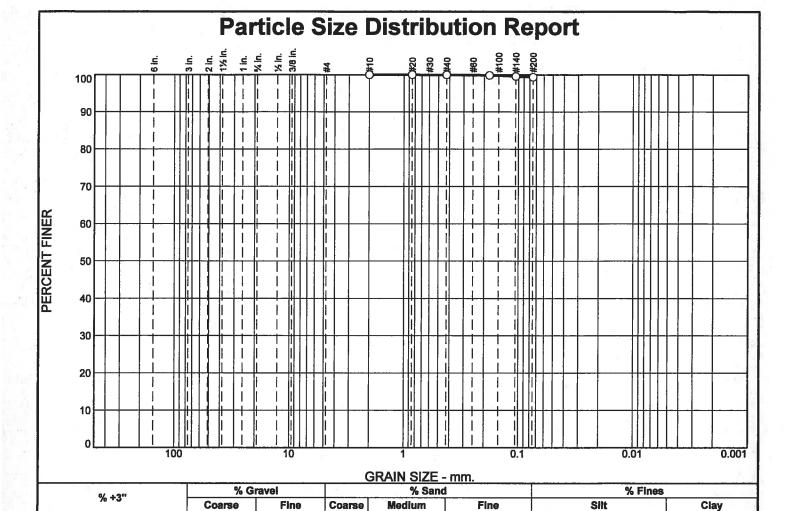
Checked By: MTG

Page 43

Date: 7/18/2019

Tested By: JJB





	SIEVE	PERCENT	SPEC.*	PASS?	
	SIZE	FINER	PERCENT	(X=NO)	
Γ	#10	100.0			•
1	#20	100.0		12	
1	#40	99.9			
П	#80	99.8	m × 2"		
П	#140	99.6	6.77		
	#200	99.4	E		
Т					
L		1			
Г			-		
		1			
				_	
1				. "	
1					
1					
L	*				

	Soil Description	
Lean clay		
PL= 24.2	Atterberg Limits LL= 46.0	PI= 21.8
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS= CL	Classification AASHT	O= A-7-6(25)
Natural Moisture	Remarks e: 28.2%	

(no specification provided)

0.0

Location: HB-PAMI-205 Sample Number: 4D Depth: 6'-8'

> R.W. Gillespie & Associates, Inc.

Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

0.5

Portland, ME

Project No: 1368-016

Date: 7/18/2019

Lab No.

99.4

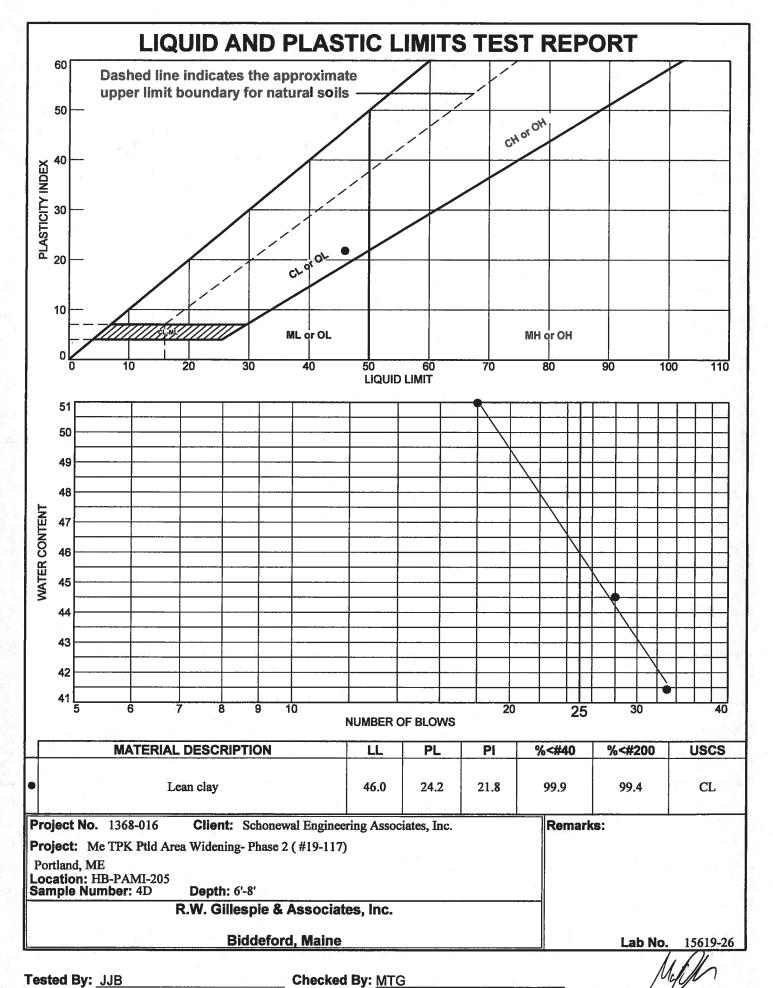
15619-26

Tested By: JJB Checked By: MTG

0.0

0.0

0.1



Page 46



HOLMES ROAD VMS BORINGS (HB-VMS-100s)

TEST BORING LOGS

	TABULATION OF BORING LOCATIONS										
Boring No.	Station	Offset	Elevation (est'd)	Comments							
HB-VMS-101	tbd	tbd	57 ft	NB sign, outboard upright							
HB-VMS-102	2121+11.1	7 ft LT	56 ft	NB sign, median upright							
HB-VMS-103	2125+10.4	CL	52.5 ft	SB sign, median upright							

			CHONEWALE		PROJ	ECT:						a Mainline Boring No.: HB-VMS-1	101
		==	NGINEERING									y Area SB Median Proj. No.: 19-117	
Drille			ASSOCIATES, ^I New England		LOCAT				orti			Core Barrel: N/A	
	rator:		Enos/ Share	Boring Cor	iliaciois	-	vation tum:	(11.)		57 ft (<u> </u>
	ged By:		Schonewald			_	Type:					Sampler: standard split-spoor B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	11
	Start/Fi		5/22/19; 1445	- 5/23/10·	1030	_	lling M		٩.			boring Hammer Type: Automatic	
	ng Loca		722/10, 1440	0/20/10,	1000	-	sing ID			HW (4			
						-	ger ID/			SSA t		Water Level*: 6.2 ft BGS (open, pe	erched?)
D = Sp MD = U U = Th MU = U V = Ins	olit Spoon S Jnsuccessi in Wall Tub Jnsuccessi situ Vane S	ful Split Spo be Sample ful Thin Wal hear Test	on Sample attem I Tube Sample at ne Shear Test att	pt tempt empt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Cc RQD = Rock	ed = N va ue correct ciency = c rield Van ore Samp	ilue ted for ha calculated e Shear S ile	d hami Strengt	mer o	ciency efficiency	WC WC = BO SS/	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods H=200 = percent fines CONSOL= 1-D consolidation test WHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraulic push LABORATORY TEST RESULTS: AASHTO / USCS soil classifications #200 = percent fines CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / PI=Plastic UCT qp = peak compressive strength of rock	
		$\overline{}$		Sample In		-			_				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	Strengtil (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0					-			SS	П				
									$\overline{/}$				
5 -	1D	24/15	5.0 - 7.0	6-7-	-6-6	13	20	46	<u></u>			1D (composite sample): Grey tan, moist, medium dense, Silty	#15619-27 WASH SIEVE
	"	21/10	0.0 7.0						\dashv			fine SAND, trace medium to coarse sand. Grading to red tan, wet, fine to coarse SAND, trace to little silt, trace gravel. SAND	A-2-4(0) SM
								42	2				-#200=24.4%
								32	2				WC=25.5%
								29	9	48.5			
									=	10.0		0.0	
10 -								34	1			2D (composite sample: Grey, very loose, fine SAND, little silt,	
	2D	24/11	10.0 - 12.0	2-2-	-1-2	3	5	7				trace medium to coarse sand. Grading to fine Sandy SILT.	
								8				INTERBEDDED MARINE SILT AND SANDS	
								6	\exists				
									\dashv				
								17	7				
								14	4				
15 -	3D	24/12	15.0 - 17.0	2-3-	-1-2	4	6	18	3			3D (composite sample): Very loose, interbedded, orange tan, fine SAND, trace to little silt; grey tan, fine to medium SAND, some	#15619-28 WASH SIEVE
								40	\exists			silt; and grey, fine Sandy SILT. INTERBEDDED MARINE SILT	A-2-4(0) SM
								19	_			AND SANDS	-#200=34.7% WC=29.0%
								20)				110 20.070
								25	5				
								34	一				
20 -									-			Olive tan, very loose, fine to medium SAND, little to some silt.	
	4D	24/14	20.0 - 22.0	2-2-2	2/12"	4	6	13	3			INTERBEDDED MARINE SILT AND SANDS	
								23	3	35.7		— — — — — — — — — — — — — — — — — — —	#15619-29 WASH SIEVE
								29	9				ATTERBERGS A-6(14)
								49	9				CL -#200=91.3%
								46	3				WC=38.6% LL=34.2 PL=18.4
25 Rem	arks:	<u> </u>					L	<u> </u>			////		1 = 10.4
Stratifi	ication lines	s represent	approximate bou	ndaries betwe	en soil types;	transitio	ns may be	e grad	ual.			Page 1 of 5	

Schonewald PROJ				ECT:						Mainline	Boring No.: HB-VMS-				
			Associates, I	NC.	LOCAT	ION:						Area SB Median Proj. No.: 19-2			7
Drille	<u> </u>		New England	-			vation				est'd)		Core Barrel:	N/A	
Operator: Enos/ Share				_	um:	()		VD8			Sampler:	standard split-spo	on		
•	Logged By: Schonewald						Type:		Мс	bile	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Date Start/Finish: 5/22/19; 1445 - 5/23/19; 1030						lling M	ethod		cased wash boring			Hammer Type:	Automatic	
Borir	oring Location:						Casing ID/OD:				") to 2	25 ft	Hammer Efficien	cy: 0.906	
						Aug	Auger ID/OD:				o 5 ft		Water Level*:	6.2 ft BGS (open,	perched?)
0 = Spl MD = U J = Thi MU = U / = Insi	it Spoon S Insuccessi n Wall Tut Insuccessi itu Vane S	ful Split Spo be Sample ful Thin Wa hear Test	oon Sample attem Ill Tube Sample at ane Shear Test att	pt tempt empt	N-uncorrected Non-uncorrected	ed = N va ue correct ciency = c ield Vane ore Sample	lue ted for ha calculated e Shear S le	hamme trength	er efficie		WOF = 1 BOF SSA	"IONAL DEFINITIONS: 1 = weight of 140lb. hammer ≥ weight of rods not recorded ICHE ADVANCEMENT METH' (I/HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydrauli	-#200 = percent fi CONSOL= 1-D co ODS: UU=Unconsolidat LL=Liquid Limit / F	soil classifications nes WC = water conte nsolidation test ed undrained triaxial test PL=Plastic Limit / PI=Plast	icity Index
ŀ				Sample Inf	ormation				1						
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation	(ff.)	Graphic Log	Visual De	escription and Rema	rks	Lab. Testing Results
25	5D	24/19	25.0 - 27.0	3-1/1.		1	2	HW OPEN				5D: Olive brown, very so one 3-inch layer and one SAND at top and bottom	<u>PI=15.8</u>		
-	MV								1			MAY Charles to accept comme	- d		
30	6D	24/23	30.0 - 32.0	WOR-W	OH/18"	-						MV: Unable to push vane deeper than 30.8 ft. 6D: Olive grey, very soft, CLAY & SILT, trace very fine sand with multiple seams fine sandy silt partings. MARINE SILT-CLAY CRUST			
													32.0		
Ī									7 2	5.0				— — — — 32.0-	1
ŀ								\vdash	-						
35	7D	24/24	25.0.27.0	nuch thr	TI VODO			1			7D: Olive grey with dark			#15619-30	
-	7D 	24/24	35.0 - 37.0 35.6 - 36.0	push thr Su = 522					4			trace very fine sand with partings. MARINE SILT-		and fine sandy silt	-#200 SIEV ATTERBER
	V2		36.6 - 37.0	Su = 508	8/ 0 psf							V1: 19 / 0.5 ft-lbs (65 mn V2: 18.5 / 0 ft-lbs (65 mn	n x 130 mm vane rav	v torque readings)	-#200=97.5 WC=34.99
												V2. 10.07 0 10 103 (00 1	i x 100 min vane tav	LL=31.3 PL=18.9	
ŀ									\dashv						PI=12.4
40	8D	24/24	40.0 - 42.0	push thr	u vane				1			8D: Olive grey grading to		#15619-31	
ŀ	V3	2-1/2-1	40.6 - 41.0	Su = 508	3/ 14 psf				4			CLAY, trace very fine sand with occasional nodules and fine sandy silt partings. MARINE SILT-CLAY			-#200 SIEVE
	V4		41.6 - 42.0	Su = 398	8/ 0 psf								5 mm x 130 mm vane raw torque readings) nm x 130 mm vane raw torque readings)		-#200=98.1 WC=31.89
												(11		3.,	LL=29.8 PL=19.4
ŀ									1						<u>PI=10.4</u>
ļ								\vdash	4						
45 -															
+0]	9D	24/24	45.0 - 47.0	push thr								9D: Dark grey, soft, Silty occasional nodules and f			
ŀ	V5		45.6 - 46.0	Su = 494	'			\vdash	1			CLAY	, ,		
	V6		46.6 - 47.0	Su = 440	u/ u pst				4			V5: 18 / 0.5 ft-lbs (65 mm) V6: 16 / 0 ft-lbs (65 mm)	x 130 mm vane raw t	orque readings)	
İ									1						
ł								\vdash	1						
50											1////				
rema	arks:														

				l l									
			Engineering Associates, ^I '	۷C.	СДТІ	ON.						Area SB Median Proj. No.: 19-11	7
rille	<u>——</u>			Boring Contracto		ON: South Portland, ME Elevation (ft.) 57 ft (est'd)						Core Barrel: N/A	
pera	ator:		Enos/ Share	<u> </u>		Dat	tum:	` '		NAVD	, ,	Sampler: standard split-spo	on
ogg _ʻ	ed By:		Schonewald			Rig	Type:			Mobil	e Drill	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	
Oate Start/Finish: 5/22/19; 1445 - 5/23/19; 1030						+-	lling M	etho	od:			boring Hammer Type: Automatic	
oring Location:						Casing ID/OD: HW (4") to 2						<u> </u>	
						Au	ger ID/	OD:		SSA	to 5 ft	Water Level*: 6.2 ft BGS (open,	perched'
= Split D = Ur = Thir U = Ur = Insit	t Spoon S nsuccessf n Wall Tub nsuccessf tu Vane Sl	ful Split Spo be Sample ful Thin Wa hear Test	oon Sample attem Il Tube Sample at	$\begin{array}{cc} & \text{N-unc} \\ \text{pt} & \text{N}_{60} = \\ \text{hamn} \\ \text{tempt} & \text{S}_{\text{U}} = \\ \text{R} = \text{R} \\ \text{empt} & \text{RQD} \end{array}$	ner efficion Insitu Fie ock Coro = Rock (d = N va e correct ency = d eld Vane e Samp	lue ted for ha calculated Shear S	d han Streng	mer jth (p	efficiency	WOH WOF =r BOR SSA	IONAL DEFINITIONS: I = weight of 140lb. hammer R = weight of rods tot recorded EHOLE ADVANCEMENT METHODS: HSA=solid/hollow stem auger coller cone/OPEN/PUSH=hydraulic push LABORATORY TEST RESULTS: ASHTO / USCS soil classifications -#200 = percent fines	ticity Index
-		_		Sample Informa	ation	_					-		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf)	(a/) 2 (a/)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab Testir Resu
50 T	10D	24/24	50.0 - 52.0	push thru var								10D: Dark grey, soft, Silty CLAY, little very fine sand with occasional nodules and fine sandy silt partings. MARINE SILT-	
ı	V7 V8		50.6 - 51.0 51.6 - 52.0	Su = 494/ 27 Su = 481/ 27								CLAY	
-			01.0 02.0	Gu = 40 // 27	551							V7: 18 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V8: 17.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings)	
55 +												11D: Dark grey with occasional black, medium stiff, Silty CLAY,	
	11D	24/24	55.0 - 57.0	push thru var								trace to little very fine sand with occasional nodules and fine	
Ī	V9 V10		55.6 - 56.0 56.6 - 57.0	Su = 536/ 0 p Su = 549/ 0 p								sandy silt partings. MARINE SILT-CLAY V9: 19.5 / 0 ft-lbs (65 mm x 130 mm vane raw torque readings)	
-	V 10		30.0 - 37.0	3u - 349/ 0 p	131							V10: 20 / 0 ft-lbs (65 mm x 130 mm vane raw torque readings)	
ı													
-													
,													
60 +	12D	24/24	60.0 - 62.0	push thru var	ne							12D: Dark grey with occasional black, medium stiff, Silty CLAY, trace very fine sand with nodules throughout and occasional fine	
-	V11		60.6 - 61.0	Su = 604/ 14	osf							sandy silt partings. MARINE SILT-CLAY	
ļ	MV											V11: 22 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) MV: Unable to push vane deeper than 61.3 ft.	
H													
ļ													
								١	П				
35 +								\dagger	\top				
-								Н	\perp				
									Ш				
ı													
-			-					\vdash	\vdash				
Ī													
70 🕂					+				Н			13D: Dark grey black, medium stiff, Silty CLAY, trace very fine	
L	13D V12	24/24	70.0 - 72.0 70.6 - 71.0	push thru var Su = 865/ 0 p								sand with nodules throughout. MARINE SILT-CLAY V12: 31.5 / 0 ft-lbs (65 mm x 130 mm vane raw torque readings)	
	V13		71.6 - 72.0	Su = 742/ 0 p								,	
			+	<u>'</u>								V13: 27 / 0 ft-lbs (65 mm x 130 mm vane raw torque readings) 72.0 ft: Hydraulically push rod probe.	
ļ								N-R PR()BE			,	
f													
75 Rema	ada c										177		
.unia													
e.c				ndaries between soil		4.1						Page 3 of 5	

			Schonewali	<u> </u>								Barina Na I	LID V/MC	101
		_	Engineering		PROJE	ECT:					a Mainline y Area SB Median	Boring No.: <u>HB-VMS-101</u> Proj. No.: 19-117		
			Associates, I	ION:			land,		y 7 (rea OB Median	Proj. No.:19-1		17		
Drille	r:		New England	Boring Co	ntractors	Ele	vation	(ft.)	57 ft	(est'd)		Core Barrel: N/A		
	Operator: Enos/ Share			-	tum:		NAVD			Sampler: standard split-spoon		on		
	Logged By: Schonewald Date Start/Finish: 5/22/19; 1445 - 5/23/19; 1030				+	Rig Type:				B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches			
	Start/Fin		5/22/19; 1445	- 5/23/19;	1030	_	Iling M sing ID			d wasr 4") to	n boring	Hammer Type: Hammer Efficiency	Automatic	
БОП	ig Locati	OII.				_	ger ID/			to 5 ft	25 1(6.2 ft BGS (open,	nerched?)
D = Spl MD = U U = Thi MU = U V = Insi	n Wall Tube nsuccessfu tu Vane Sh	imple I Split Sport Sample I Thin Water Test	oon Sample atten all Tube Sample a ane Shear Test at	mpt attempt ttempt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu Fi R = Rock Coi RQD = Rock	DEFINIT ed = N va le correctiency = o ield Vand life Samp	TIONS: ilue ted for ha calculated e Shear S le	ımmer eff I hammer strength (p	iciency efficiency	WO WO WO BOI	TIONAL DEFINITIONS: H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LABORATORY TEST I AASHTO / USCS so -#200 = percent fine CONSOL= 1-D cons IODS: UU=Unconsolidated LL=Liquid Limit / PL	RESULTS: iil classifications s WC = water conte solidation test undrained triaxial test =Plastic Limit / PI=Plast	ent (%)
		·		Sample In		т				1				
Sp. Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remark	s	Lab. Testing Results
-														
- 80 -														
- 85 -														
- 90 -														
- 95 -														
100														
l	cation lines	-	t approximate bou				-	-		ccur du	e to conditions other than those	Page 4 of 5	.: HB-VMS-1	

			Schonewal	D	DDO II	-ст.	Mati		rtland	l Aro	a Mainline	Boring No.: HB-VM	S-101
	Engineering		<u>-</u> C1:					a Mairille y Area SB Median	Proj. No.: 19-117				
			Associates,		LOCAT		Sout	h Port	land,	ME		-	17
Drille			New England	Boring Co	ntractors	-	vation	(ft.)		(est'd)	Core Barrel: N/A	
	rator:		Enos/ Share			+	tum:		NAVI		ID 50 / 11 / 1 AT 0	Sampler: standard split-s	poon
	Logged By: Schonewald				_	Type:				I B-53 (rubber track ATV)	Hammer Wt./Fall: 140 lbs/30 inches		
	Oate Start/Finish: 5/22/19; 1445 - 5/23/19; 1030 Boring Location:					-	lling M				h boring	Hammer Type: Automatic Hammer Efficiency: 0.906	
BOTH	ng Local	ion:				-	sing ID ger ID/			(4") to to 5 ft		Water Level*: 6.2 ft BGS (ope	n norchod2)
D = Sp MD = U U = Th MU = U V = Ins	in Wall Tub Jnsuccessfo situ Vane Sh	ample ul Split Sp e Sample ul Thin Wa near Test	oon Sample atter	mpt attempt ttempt	N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu Fi R = Rock Cor RQD = Rock	DEFINIT d = N va e correct iency = dield Vandre re Samp	rions: alue eted for ha calculated e Shear Sole	ımmer eff I hammer strength (p	iciency efficienc	### ADD WC WC WC WC WC WC WC	ITIONAL DEFINITIONS: DH = weight of 140lb. hammer DR = weight of rods not recorded REHOLE ADVANCEMENT METH A/HSA=solid/hollow stem auger	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications -#200 = percent fines WC = water cc CONSOL= 1-D consolidation test	ntent (%) st asticity Index
		·		Sample In		то							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	Description and Remarks	Lab. Testing Results
- 105 - - 110 -									-54.2		108.3 ft: Resistance not Bottom of Exploration 111.2 ft: Rod probe fetc Marine Silt-Clay; bottom	—111 n at 111.2 feet below ground surface. hes up; stands rig; inferred bottom of	
- 115 -													
- 120 -													
Rem		dings have	t approximate bo	mes and under			-	-		occur du	ue to conditions other than those	Page 5 of 5 Boring No.: HB-VMS	101

			CHONEWALD		PROJ	ECT:						Mainline Boring No.: HB-VMS	-102
			NGINEERING									Area SB Median Proj. No.: 19-11	7
rille			ASSOCIATES, ^I New England		LOCAT		Sout evation				<u>ИL</u> ′est'd)	Core Barrel: N/A	
	ator:		Enos/ Share	Borning Cor	illaciois	-	tum:	(11.)		NAVD	,	Sampler: standard split-spc	on
<u> </u>	ed By:		Schonewald			+	g Type:					B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	1011
	Start/Fi		5/21/19; 1255	- 5/22/19·	1350	_	illing M		oq.			boring Hammer Type: Automatic	
	ng Loca	tion:	Station 2121+11			ı e	sing ID				4") to 2		
	.g <u></u>		SB yellow line)			-	ger ID/		_		to 5 ft	Water Level*: 6.4 ft BGS (open)	
= Spi D = U = Thi J = U = Ins	it Spoon S Insuccessi n Wall Tut Insuccessi itu Vane S	ful Split Spo be Sample ful Thin Wal hear Test	ESTING: on Sample attem I Tube Sample at ne Shear Test att	ipt Itempt	ADDITIONAL N-uncorrecte N ₆₀ = N vale hammer effie Su = Insitu F R = Rock Co RQD = Rock	DEFINITION DEFINI	TIONS: alue cted for ha calculated se Shear Sole	amme d ham Streng	mer e jth (ps	iency efficiency	WOR WOR = 1 BOF SSA	IONAL DEFINITIONS: LABORATORY TEST RESULTS: AASHTO / USCS soil classifications -#200 = percent fines	ent (%)
				Sample In			1	_			-		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	strengtri (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0								SS					
5 -												1D: Dark rad brown maint to wat madium dance fine to madium	#15619-3
	1D	24/12	5.0 - 7.0	2-6-	10-8	16	24	2	6			1D: Dark red brown, moist to wet, medium dense, fine to medium SAND, little silt, trace coarse sand, trace gravel. FILL	WASH SIE
								5	5				SW-SN
								_	\dashv		\bowtie		-#200=9.7 WC=19.9
								4	1		\bowtie		
								4	9		\bowtie		
								4	8		\bowtie		
0 -		0.4/5	100 100						_		\bowtie	2D: Brown, loose, fine to coarse SAND, trace gravel, trace silt.	
	2D	24/5	10.0 - 12.0	3-3-	-3-4	6	9	2	1			FILL	
								2	4	44.0		40.6	
								4:	2	44.0			1
								-					
								5	4				
5 -								6	7				
٦	3D	24/14	15.0 - 17.0	3-4-	-4-5	8	12	3:	2			3D: Red tan grading to grey tan, loose, fine SAND, trace silt, trace medium to coarse sand. SAND	#15619-3 WASH SIE
								3:					A-3 SP
								٥.	<u>-</u>				-#200=3.2 WC=23.4
								5	0				
								6	9				
								7	=				
20 -												4D: Tan, loose, fine to medium SAND, some silt with one 1/2-incl	
	4D	24/15	20.0 - 22.0	3-3-	-3-4	6	9	5	1			seam rust, fine to medium sand, trace to little silt. SAND	
								34	4				
								6	4				
							-						
								8:	3				
		1						6	6	31.5	##	24.5	;-

			C		ı								115 \ /\	100
			Schonewali Engineering		PROJE	CT:					Mainline	Boring No.:		
1		==	engineering Associates, ⁱ		LOCATI	ON.					y Area SB Median	Proj. No.:	19-11	7
Drille			New England		LOCATI ntractors		vation			ivi⊏ (est'd)		Core Barrel:	N/A	
\vdash	ator:		Enos/ Share	Borning CO	Hitactors	+	tum:	(14.)	NAVI	, ,		Sampler:	standard split-spo	
⊢÷-	ged By:		Schonewald			+	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:	<u> </u>	<u> </u>
H	Start/Fi		5/21/19; 1255	- 5/22/19:	1350	+-	lling M				n boring	Hammer Type:	Automatic	
	ng Loca		Station 2121+11			+	sing ID			(4") to		Hammer Efficien		
- Boil	ig Loca		SB yellow line)			-	ger ID/			to 5 ft	20 11	Water Level*:	6.4 ft BGS (open)	
	U SAMPLI		ESTING:		ADDITIONAL D	DEFINIT	IONS:	<u>. </u>	00/	ADDI	TIONAL DEFINITIONS:	LABORATORY TES	T RESULTS:	
MD = U U = Th MU = U V = Ins	in Wall Tul Jnsuccess itu Vane S	ful Split Sp be Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample a ane Shear Test at	ttempt	N-uncorrected N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock	e correct ency = c eld Vane e Samp	ted for ha calculated e Shear S le	d hamme Strength (r efficienc	WO y = BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH //HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydrauli	-#200 = percent fi CONSOL= 1-D co ODS: UU=Unconsolidat LL=Liquid Limit / F	nsolidation test ed undrained triaxial test PL=Plastic Limit / PI=Plast	icity Index
					formation									
·	No.	c. (in.)	Depth	3 in.)	(%	ected			ا د	Log	Vigual D	escription and Rema	rke	Lab. Testing
Depth (ft.)	Sample No.	Pen./Rec.	Sample I (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	phic	Visual D	escription and ixema	100	Results
25	5D	24/24	25.0 - 27.0	1/12"	-1/12"	-		HW OPEN			5D: Grey, very soft, Silty inch layer and multiple s SILT-CLAY			#15619-34 -#200 SIEVE ATTERBERGS -#200=98.0% WC=32.4%
									-					LL=29.6 PL=19.1 <u>Pl=10.5</u>
- 30 -	6D V1	24/24	30.0 - 32.0 30.6 - 31.0		nru vane 2/ 27 psf						6D: Olive grey grading to stiff, Silty CLAY, trace ve	ery fine sand with one		#15619-35 -#200 SIEVE
	V2		31.6 - 32.0		3/ 27 psf						silt at top of sample. MA V1: 27 / 1 ft-lbs (65 mm: V2: 20.5 / 1 ft-lbs (65 mr	x 130 mm vane raw t		ATTERBERGS -#200=96.0% WC=31.9% LL=27.5
														PL=18.2 <u>PI=9.3</u>
- 35 -														
	7D 	24/24	35.0 - 37.0 35.6 - 36.0	Su = 49	nru vane 4/ 14 psf						7D: Grey with occasiona very fine sand with nodu sandy silt. MARINE SILT	les throughout and m G-CLAY	nultiple seams fine	#15619-36 -#200 SIEVE ATTERBERGS -#200=97.4%
	V4		36.6 - 37.0	Su = 48	31/ 0 psf				-		V3: 18 / 0.5 ft-lbs (65 mr V4: 17.5 / 0 ft-lbs (65 mr	n x 130 mm vane rav	v torque readings) v torque readings)	WC=32.9% LL=30.4 PL=20.4 PI=10.0
- 40 -	8D V5	24/24	40.0 - 42.0 40.6 - 41.0	push th	nru vane						8D: Dark grey with occa trace very fine sand with			
	V6		41.6 - 42.0		6/ 14 psf						CLAY V5: 14.5 / 0 ft-lbs (65 mr V6: 15.5 / 0.5 ft-lbs (65 r			
									-					
- 45 -											9D: Dark grey black, sof	t, Silty CLAY, trace v	ery fine sand with	
	9D 	24/21	45.0 - 47.0 45.6 - 46.0 46.6 - 47.0	Su = 44	1ru vane 4/ 14 psf 6/ 14 psf						occasional nodules. MAI V7: 16 / 0.5 ft-lbs (65 mr V8: 15.5/ 0.5 ft-lbs (65 m	RINE SILT-CLAY n x 130 mm vane rav	v torque readings)	
											(
50														
	arks:		1					•		VIV V A	•			
			t approximate bou				-	-		occur du	e to conditions other than those	Page 2 of 5	115 1 2 2 2	
			irements were ma		,J						The sales and those	Boring N	o.: HB-VMS-1	U2

			CHONEWALE		PROJ	ECT:						Mainline	Boring No.:		
			NGINEERING ASSOCIATES, I		LOCAT	ION.						Area SB Median	Proj. No.:	19-117	7
rille			New England				Sout evation				<u>vı⊏</u> (est'd)		Core Barrel:	N/A	
_	ator:		Enos/ Share				tum:	()		NAVD	, ,		Sampler:	standard split-spoo	on
_	ed By:		Schonewald				Type:			Mobil	e Drill	B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi	nish: 5	5/21/19; 1255	- 5/22/19;	1350	-	lling M		od:			boring	Hammer Type:	Automatic	
Borin	g Locat	tion:	Station 2121+11 SB vellow line)			₹ .	sing ID				4") to 2	ű	Hammer Efficien	cy: 0.906	
			oo yellow line)			Au	ger ID/	OD:		SSA	to 5 ft		Water Level*:	6.4 ft BGS (open)	
= Spli ID = U = Thii IU = U = Insi	it Spoon S nsuccessf n Wall Tub nsuccessf tu Vane Sl	ul Split Spo be Sample ul Thin Wal hear Test	ESTING: on Sample attem I Tube Sample at ne Shear Test att	pt tempt	ADDITIONAL N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu F R = Rock Co	ed = N va ue correc ciency = Field Van ore Samp	alue eted for ha calculated e Shear S ble	d ham Streng	mer o	efficiency	WOH WOF =r BOR SSA	IONAL DEFINITIONS: 1 = weight of 140lb. hammer 2 = weight of rods not recorded EHOLE ADVANCEMENT METH #ISA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	-#200 = percent fi CONSOL= 1-D co ODS: UU=Unconsolidat LL=Liquid Limit / F	soil classifications nes WC = water conte nsolidation test ed undrained triaxial test PL=Plastic Limit / PI=Plasti	icity Index
				•	formation						- 1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strengtn (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Rema	rks	Lab Testir Resul
50	10D	24/22	50.0 - 52.0		ru vane							10D: Dark grey black, m			
ŀ	V9		50.6 - 51.0		6/ 14 psf							V9: 19.5 / 0.5 ft-lbs (65 r			
	V10		51.6 - 52.0	5u = 530	6/ 14 psf							V10: 19.5 / 0.5 ft-lbs (65	mm x 130 mm vane	raw torque	
												readings)			
ŀ															
55 +															
								1	П						
-								\vdash	+						
								\sqcup	Ш						
									П						
Ī									П						
30 												11D: Dark grey, medium			
	11D V11	24/24	60.0 - 62.0 60.6 - 61.0		ru vane 4/ 27 psf							with nodules throughout SILT-CLAY	and one seam silty fi	ne sand. MARINE	
	V12		61.6 - 62.0	Su = 54	19/ 0 psf							V11: 22 / 1 ft-lbs (65 mm V12: 20 / 0 ft-lbs (65 mm	x 130 mm vane raw	torque readings)	
Ī								N-R	OD			62.0 ft: Hydraulically pus	sh rod probe.	torque readings)	
-									BE						
55 †															
- }															
ŀ															
- 1															
70 +															
'															
-									\vdash						
-															
- }								H	\dashv						
75	ırks:														

			Engineering	;	PROJ								oj. No.:		-102 7
			Associates,	Inc.	LOCAT		Sout	h P	ort			FII	oj. 140	13-11	
Drille	er:		New England	Boring Co	ntractors	Ele	vation	(ft.)		56 ft	(est'd)	Cor	e Barrel:	N/A	
Oper	rator:		Enos/ Share			Da	tum:			NAVD	88	San	npler:	standard split-spo	on
Logg	ged By:		Schonewald			Rig	g Type:			Mobil	e Drill	B-53 (rubber track ATV) Han	nmer Wt./Fall:	140 lbs/30 inches	
Date	Start/Fi	nish:	5/21/19; 1255				illing M	etho	od:	case	d wash	boring Han	nmer Type:	Automatic	
Boriı	ng Loca	tion:	Station 2121+17 SB vellow line)	1.1; 7 ft LT (d	o/s 6.4 ft RT c	f Ca	sing ID	/OD	:	HW (4") to 2	5 ft Han	nmer Efficienc	y: 0.906	
			,				ger ID/	OD:		SSA	to 5 ft		ter Level*:	6.4 ft BGS (open)	
) = Sp MD = U J = Th MU = U / = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf situ Vane S	ample ful Split S be Sample ful Thin W hear Test	all Tube Sample a	ttempt	ADDITIONAL N-uncorrecte N ₆₀ = N vale hammer effi S _u = Insitu F R = Rock Co RQD = Rock	ed = N va ue correctioncy = field Van ore Samp	alue cted for ha calculated e Shear S ble	d han Streng	nmer gth (p	efficiency	WOR WOR = I BOR SSA	= weight of 140lb. hammer = weight of rods ot recorded EHOLE ADVANCEMENT METHODS:	LL=Liquid Limit / PI	oil classifications es WC = water conte solidation test d undrained triaxial test L=Plastic Limit / PI=Plast	icity Index
				T .	formation		1								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Descript	iion and Remarl	ks	Lab. Testin Resul
75											13/1				
80 -															
- ٥٥															
85 -															
00															
90 -															
95 -															
			1	-					\vdash						
100	arks:										177.J				
	<u></u>														

			Schonewale		PROJE	CT:						oring No.: HB-VMS	-102
			ENGINEERING								y Area SB Median F	Proj. No.:19-11	7
Drille			Associates, I		LOCAT		Sout evation					Core Barrel: N/A	
			New England	Boring Co	ntractors	-		(π.)		(est'd)			
	rator:		Enos/ Share			_	tum:		NAVI			Sampler: standard split-spo	on
	ged By:		Schonewald			_	Type:				,	Hammer Wt./Fall: 140 lbs/30 inches	
	Start/Fi		5/21/19; 1255 Station 2121+11			_	lling M					Hammer Type: Automatic	
Bori	ng Loca	tion:	SB yellow line)	1.1, 7 10 21 (0	3/0 O.4 ICTCT O	Ca	sing ID			(4") to		Hammer Efficiency: 0.906	
D = Sp	lit Spoon S	ample	TESTING:		ADDITIONAL I	DEFINIT d = N va	alue			WO	TIONAL DEFINITIONS: H = weight of 140lb. hammer	Water Level*: 6.4 ft BGS (open) LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
U = Th MU = U V = Ins	in Wall Tub Insuccessi situ Vane S	oe Sampl ful Thin W hear Tes	/all Tube Sample at	ttempt	N ₆₀ = N value hammer effici S _u = Insitu Fi R = Rock Cor RQD = Rock	ency = eld Vane eld Samp	calculated e Shear S ble	f hammer Strength (p	efficienc	y = BOI SSA	R = weight of rods not recorded REHOLE ADVANCEMENT METHODS VHSA=solid/hollow stem auger Froller cone/OPEN/PUSH=hydraulic pus	-#200 = percent fines WC = water conte CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plas sh UCT qp = peak compressive strength of roc	ticity Index
					formation								
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Descr	ription and Remarks	Lab. Testing Results
- 105 -													
- 110 -											110.7 ft: Resistance noted.		
- 115 -								\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-57.6		Bottom of Exploration at 113.6 ft: Rod probe fetches Marine Silt-Clay; bottom of b	—113.6 feet below ground surface. up; stands rig; inferred bottom of boring; no refusal.	
- 120 -													
Rem			nt approximate bou		•		-	-		occur du	e to conditions other than those	Page 5 of 5 Boring No. : HB-VMS-	102

			Schonewale)	PROJE	ECT:	MeTI	PK Po	rtland	Area	a Mainline	Boring No.: _	HB-VMS-	-103
		==	Engineering				Impro	oveme	ents-C	rosb	y Area SB Median	Proj. No.:	19-11 ⁻	
			Associates, I		LOCAT				land,	ME				•
Drille	er:		New England	Boring Cor	ntractors	Ele	vation	(ft.)		ft (est'	d)	Core Barrel:	N/A	
Ope	rator:		Enos/ Share			Da	tum:		NAVD			Sampler:	standard split-spo	on
	ged By:		Schonewald			_	Type:				B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		5/20/19; 1040 Station 2125+10			+-	lling M				boring	Hammer Type:	Automatic	
Bori	ng Loca		median guardrai			+-	sing ID			4") to 2		Hammer Efficiend		
IN-SIT	USAMPLI	NG AND T	FSTING:		ADDITIONAL I		ger ID/0	DD:	SSA	to 10 f	TIONAL DEFINITIONS:	Water Level*: LABORATORY TEST	5.6 ft BGS (open)	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Spo be Sample ful Thin Wa hear Test	oon Sample attem Il Tube Sample at	pt tempt <u>empt</u>	N-uncorrecte N ₆₀ = N valu- hammer effici S _u = Insitu Fi R = Rock Cor RQD = Rock	d = N va e correctiency = i ield Van re Samp	ilue ted for ha calculated e Shear S ile	hammer trength (p	efficiency	WOI WOI = BOF SSA	H = weight of 140lb. hammer R = weight of rods note recorded REHOLE ADVANCEMENT METH /HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydrau	AASHTO / USCS: -#200 = percent fir CONSOL= 1-D co HODS: UU=Unconsolidate LL=Liquid Limit / F	soil classifications nes WC = water conte nsolidation test ed undrained triaxial test PL=Plastic Limit / PI=Plast	icity Index
		$\overline{}$		•	formation				l	1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log	Visual C	escription and Remar	rks	Lab. Testing Results
0								S\$A						
. 5 -	1D	24/19	5.0 - 7.0	8-19-	33-38	52	79				1D: Brown, wet, very de silt. FILL	ense, fine to coarse SA	AND, little to some	
]	\bowtie				
										\bowtie				
										\bowtie				
								4/		\bowtie				
								$ \ \ \ \ \ $		\bowtie				
10 -	2D	24/11	10.0 - 12.0	4-11-	11-11	22	33			\bowtie	2D: Grey, wet, medium FILL	dense, fine to coarse	SAND, trace silt.	#15619-37 WASH SIEVI
		- " "	10.0							\bowtie	FILL			A-1-b SP
								30		\bowtie				-#200=4.1%
								68		\bowtie				WC=18.1%
								100	39.0	\bowtie			— — — —13.5-	
								100	39.0				13.3	
15 -								86						
10	3D	24/20	15.0 - 17.0	WOR-W	/OH-1-2	1	2	33			3D: Grey, very soft, CLA multiple seams of fine s	AY & SILT, trace very andy silt. MARINE SIL	fine sand with _T-CLAY CRUST	#15619-38 WASH SIEV ATTERBERG A-6(12)
								35						CL -#200=98.2%
								36						WC=36.2% LL=31.5
								29	34.0		L		— — — — —18.5 ⁻	DI -10 5
								25						1-1-12.0
20 -								25			4D: Grey, Silty CLAY, tr	ace very fine sand M	ARINE SILT.CLAV	#15619-39
	4D V1	24/24	20.0 - 22.0 20.6 - 21.0		ru vane 7/ 27 psf			HW OPEN			V1: 13 / 1 ft-lbs (65 mm	=		-#200 SIEVE
	V2		21.6 - 22.0		7/ 2/ psi 3/ 14 psf			O. LIN			,			-#200=97.9%
					·						V2: 16.5 / 0.5 ft-lbs (65 partings noted during pu		aw torque readings);	LL=31.5
											- 01			PL=19.8 <u>Pl=11.7</u>
									1					
25 Rem	arke:								<u> </u>	V.S.D.				<u> </u>
Rem	arks:	s represent	approximate bou	ndarios heturo	oon soil turos:	transition		gradual		sæ Hl		Page 1 of 6		
	cation line	s represent	approximate bou	nagrice hotwa										

			CHONEWALD)	PROJI	ECT:						Mainline Boring No.: HB-VMS-	
		==	NGINEERING ASSOCIATES, ^I	NC.	1004	101-						Area SB Median Proj. No.: 19-117	7
Orille	<u> </u>		ASSOCIATES, " New England		LOCAT		Sout vation		<u>ortl</u>		ME ft (est'o	Core Barrel: N/A	
Opera			Enos/ Share	Borning Cor	illaciois	_	tum:	(11.)		NAVD	•	Sampler: standard split-spoo	nn.
•	ed By:		Schonewald			+-	Type:					3-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	111
	Start/Fi		5/20/19; 1040	- 5/21/19·	1215	_	lling M		ıq.			boring Hammer Type: Automatic	
	g Local	tion	Station 2125+10	.4; CL (o/s 2		_	sing ID				4") to 2	• •	
	9 2000	tioni r	nedian guardrai	I face)		-	ger ID/				to 10 f		
= Spli ID = U = Thir IU = U = Insi	t Spoon S nsuccessf n Wall Tub nsuccessf tu Vane Si	ful Split Spo be Sample ful Thin Wal hear Test	on Sample attem I Tube Sample at ne Shear Test att	pt tempt empt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _U = Insitu F R = Rock Cc RQD = Rock	DEFINIT ed = N va le correctiency = o ield Vand line Samp	TIONS: llue ted for ha calculated e Shear S le	amme d ham Streng	mer o	ciency efficiency	WOH WOF WOF = 1 BOF SSA	IONAL DEFINITIONS: = weight of 140lb. hammer = weight of rods ct recorded EHOLE ADVANCEMENT METHODS: HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraulic push Laboratory Test Results: AASHTO / USCS soil classifications #200 = percent fines WC = water context CONSOL= 1-D consolidation test UD=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plastic oller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of rock	city Index
		·		Sample In	iormation	т			1		1		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
25	5D	24/24	25.0 - 27.0	(vane/12	2")-1/12"	-						5D: Olive grey grading to grey with occasional black streaks,	#15619-4 -#200 SIE
-	MV		25.6 - 26.0	Šu = 53€								medium stiff, Silty CLAY, trace very fine sand with multiple seams of fine sandy silt. MARINE SILT-CLAY V3: 19.5 / 1.5 ft-lbs (65 mm x 130 mm vane raw torque readings) MV: Unable to push vane deeper than 26.0 ft.	#200 97.7 #200 97.7 #C=34.0 UC=34.0 LL=32.7 PL=20.1 PI=12.6
30 +	6D	24/24	30.0 - 32.0	push th	ru vane				_			6D: Grey with black streaks, soft, Silty CLAY, trace very fine sand	#15619-4 -#200 SIEV
-	V4	24/24	30.6 - 31.0		1/ 14 psf				\dashv			with multiple partings and seams of fine sandy silt. MARINE SILT-CLAY	ATTERBER
	V5		31.6 - 32.0	Su = 48	1/ 14 psf							V4: 17.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings)	-#200=97. WC=27.3
												V5: 17.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings)	LL=25.0 PL=18.4 <u>PI=6.6</u>
35	7D	24/24	35.0 - 37.0	(\u00aaaaaa)19	B")-WOR							7D: Grey, soft, Silty CLAY, trace very fine sand with multiple	
		24/24	35.6 - 36.0	Su = 412								partings fine sandy silt and occasional shells. MARINE SILT- CLAY V6: 15 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings)	
												MV: Unable to push vane deeper than 36.7 ft.	
40 												OD: Croy poff City OLAV trace very fine and with accessional	
1	8D	24/24	40.0 - 42.0 40.6 - 41.0	push th	ru vane							8D: Grey, soft, Silty CLAY, trace very fine sand with occasional nodules and partings of fine sandy silt. MARINE SILT-CLAY	
	V7 V8		41.6 - 42.0		6/ 14 psf 6/ 14 psf							V7: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V8: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings)	
-									\dashv				
45 +	9D	24/24	45.0 - 47.0	push th					\dashv			9D: Grey with occasional black streaks, soft, Silty CLAY, trace very fine sand; coarse sand on bottom of sample. MARINE SILT-	
	V9 V10		45.6 - 46.0 46.6 - 47.0		0/ 27 psf 8/ 14 psf				ᅦ			CLÁY V9: 16 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings)	
-			13.5 11.0					H	\dashv			V10: 14.5/ 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings)	
-								H	\dashv				
- }									\dashv				
,								ı			1778		

Test Section	Date : Date :	ator: ged By: Start/Fi ng Loca J SAMPLI it Spoon S Insuccess n Wall Tul Insuccess ittu Vane S	nish: 5 tion: r NG AND TI sample full Split Spce e Sample	ASSOCIATES, In New England Enos/ Share Schonewald 5/20/19; 1040 Station 2125+10	Boring Contractors - 5/21/19; 1215	EI Di	Sout evation atum:	h P	ort	1and, 1 52.5 1	ME	110). 110	117
Filter: New England Sorng Contractors	Opera Ogge Oate Sorin I-SITU = Spli D = U = Thir U = U = Insit	ator: ged By: Start/Fi ng Loca J SAMPLI it Spoon S Insuccess n Wall Tul Insuccess ittu Vane S	nish: 5 tion: 7 NG AND TI sample ful Split Spc be Sample	New England Enos/ Share Schonewald 5/20/19; 1040 Station 2125+10	Boring Contractors - 5/21/19; 1215	EI Di	evation atum:			52.5 1		Core Barrel: N/A	
perator: Enros Sture Schonevasid Sopred By: Schonevasid No Schonevasid Sopred Sture Socionevasid	Opera Ogge Oate Sorin Sorin Sorin Sorin U = Ui = Thir U = Ui = Insit	ator: ged By: Start/Fi ng Loca J SAMPLI it Spoon S Insuccess n Wall Tul Insuccess ittu Vane S	nish: { tion: } NG AND TI sample ful Split Spo	Enos/ Share Schonewald 5/20/19; 1040 Station 2125+10	- 5/21/19; 1215	D	atum:	(,			11 (0011	, 5516 2411611	
Schoenward Schoenward	oggo oate Sorin So	Start/Fing Loca J SAMPLI it Spoon Sommer of Wall Tul	nish: 5 tion: 5 NG AND TI sample ful Split Spo	Schonewald 5/20/19; 1040 Station 2125+10						NAVD	88	Sampler: standard split.	snoon
also Startfrisher: \$20719.1.040 - 321/15.125 Dritting Method: Cased weak boring Hammer Type: Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation particles Autoratic formation Autoratic forma	Sorin Sorin	Start/Fing Loca J SAMPLI it Spoon S Insuccess in Wall Tul Insuccess itu Vane S	nish: { tion: NG AND TI sample ful Split Spo pe Sample	5/20/19; 1040 Station 2125+10									•
Silicon 175-114. CL 982 25 BT 67 Casing 10/10. My (4") to 20 ft. Hammer Efficiency: 0.906 Augur ID/00. Augur ID/00. Augur ID/00. SA to 10 ft. Water Lawy III Set East Set	I-SITU = Spli D = U = Thir U = U	J SAMPLI it Spoon S Insuccess n Wall Tul Insuccess itu Vane S	NG AND TI Sample ful Split Spo	Station 2125+10		ام ا			-d·			, , , , , , , , , , , , , , , , , , , ,	
Auger IDIOD: SSA to 10 ft Water Levid State 1 Set BGS (open) - Solid Spore Sergis South Sergis Sergi	N-SITU = Spli ID = U = Thir IU = U = Insit	J SAMPLI it Spoon S Insuccess n Wall Tul Insuccess itu Vane S	NG AND TI Sample ful Split Spo pe Sample	nedian guardrail									
Set Spora Sparse Spora Sparse set Spora Sparse Sparse Spora Sparse Sparse Sparse Spora Sparse Spars	= Spli D = U = Thir U = U = Insit	it Spoon S Insuccess n Wall Tul Insuccess itu Vane S	Sample ful Split Spo pe Sample		face)							-	.on)
100 24/24 50.0 - 52.0 WOR/12*-1/12* -	İ		hear Test	oon Sample attem Il Tube Sample at ne Shear Test att	N-uncorre pt	AL DEFIN ected = N value corre efficiency = u Field Va Core Sam ock Quality	ITIONS: /alue ected for ha calculate ne Shear S	amme d han Strenç	er effic nmer gth (p	ciency efficiency	WOH WOF = r BOR SSA	IONAL DEFINITIONS: = weight of 140lb. hammer	content (%) test Plasticity Index
Res	- 1		<u> </u>										
10D 24/24 50.0 - 52.0 WOR/24* - Very fine sand with occasional nodules. MARINE SILT-CLAY very fine sand with occasional nodules. MARINE SILT-CLAY very fine sand with occasional black streaks, Silty CLAY, trace very fine sand with nodules and multiple seams silty fine sand. MARINE SILT-CLAY 11D: Dark grey with occasional black streaks, Silty CLAY, trace very fine sand with nodules and multiple seams silty fine sand. MARINE SILT-CLAY 12D: Dark grey black, Silty CLAY, trace very fine sand with nodules throughout and occasional pockets and one seam silty fine sand. MARINE SILT-CLAY 13D: Dark grey black, Silty CLAY, trace very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. MARINE SILT-CLAY virture very fine sand with nodules throughout. Silt virture very fine sand with nodules throughout. Silt virture very fine sand with nodules throughout. Silt virture very fine sand with nodules throughout. Silt virture very fine sand with nodules througho	Depth (ft.)	Sample No.		Sample Dep((ft.)	Blows (/6 in. Shear Strength (psf) or RQD (%)	N-uncorrecte	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lat Testi Resu
11D 24/24 55.0 - 57.0 WOR/12*-1/12* - WOR/12*-1/12*-1/12* - WOR/12*-1/12*-	50 -	10D	24/24	50.0 - 52.0		-							ce
12D 24/24 60.0 - 62.0 WOR/24" - 12D Joseph Library	55 - -	11D	24/24	55.0 - 57.0	WOR/12"-1/12"	-						very fine sand with nodules and multiple seams silty fine sand	
13D 24/24 65.0 - 67.0 push thru vane	- 60 - -	12D	24/24	60.0 - 62.0	WOR/24"	-						nodules throughout and occasional pockets and one seam sil	ty
14D 24/24 70.0 - 72.0 push thru vane	- 65 - -	V11	24/24	65.6 - 66.0	Su = 549/ 27 psf							sand with nodules throughout. MARINÉ SILT-CLAY V11: 20 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings)
V13	70 +	140	24/24	70.0 72.0	nuch thru years								e
V14 71.6 - 72.0 Su = 618/ 14 psf V14: 22.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings)	ļ		24/24					1				sand with nodules throughout. MARINE SILT-CLAY V13: 22 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque reading	as)
readings)		V14		71.6 - 72.0	Su = 618/ 14 psf							· ·	· /
	ŀ						1		\vdash				
	ļ					1	1		Ш				
	ŀ							+	H		PAR A		
	<u>75</u>												
	75 Rema	arks:					<u> </u>				<i>VIII</i>		

	r:		ngineering Associates, ^I		l		Impr	ove	me	nts-C	rosby	Area SB Median	Droi No.	10 11	7
Opera Logg	r:	<u> </u>	AND CLATES I		. ~~ -								Proj. No.:	19-11 [°]	<u>/</u>
Opera Logg	r:		,		LOCA1							N	Com Bound	NI/A	
.ogg	oto		New England	DOTING CO	nuactors	-	vation	(π.)			t (est'c	')	Core Barrel:	N/A	on
			Enos/ Share				tum:			NAVD		D 50 /	Sampler:	standard split-spo	on
Jate :	ed By:		Schonewald	F/0.1.1.5	1015		Type:		_			B-53 (rubber track ATV)	Hammer Wt./Fall:		
	Start/Fi		5/20/19; 1040 Station 2125+10			_	Iling M					boring	Hammer Type:	Automatic	
3orin	g Locat		nedian guardrai				sing ID				4") to 2		Hammer Efficiend		
I-SITI	ISAMDIII	NG AND TE	STING:		ADDITIONAL		ger ID/	OD:		SSA	to 10 ft	IONAL DEFINITIONS:	Water Level*: LABORATORY TEST	5.6 ft BGS (open)	
= Spli ID = U = Thir IU = U = Insit	it Spoon S nsuccessf n Wall Tub nsuccessf tu Vane Sl	ample ful Split Spo be Sample ful Thin Wal hear Test	on Sample attem I Tube Sample at ne Shear Test att	tempt empt	N-uncorrect N ₆₀ = N val hammer effi S _u = Insitu I R = Rock Co RQD = Rock	ed = N va ue correc ciency = c Field Vane ore Samp k Quality I	llue ted for ha calculated e Shear S le	d ham Streng	nmer o	efficiency	WOF WOF = r BOR SSA	= weight of 140lb. hammer = weight of rods trecorded EHOLE ADVANCEMENT METH HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydrau	AASHTO / USCS -#200 = percent fir CONSOL= 1-D co HODS: UU=Unconsolidate LL=Liquid Limit / F	soil classifications nes WC = water conte nsolidation test ed undrained triaxial test PL=Plastic Limit / PI=Plast	icity Index
		$\widehat{}$			formation						1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual D	Description and Reman	rks	Lab. Testin Resul
75	15D	24/24	75.0 - 77.0		ıru vane							15D: Dark grey black, m		Y with nodules	
-	V15		75.6 - 76.0	Su = 65	59/ 0 psf			\mathbb{H}	\mathbb{H}			throughout. MARINE SI V15: 24 / 10 ft-lbs (65 m		w torque readings)	
	V16		76.6 - 77.0	Su = 64	16/ 0 psf				Ш			V16: 23.5 / 0 ft-lbs (65 n			
}								H	H						
]								\sqcup	Щ						
80 +	V17		80.6 - 81.0	Su = 97	9/ 27 psf				닉						
-	V 1 /		00.0 - 01.0	Ju - 67	01 21 H21			\vdash	_			V17: 32 / 1 ft-lbs (65 mm	n x 130 mm vane raw	torque readings)	
	V18		81.6 - 82.0	Su = 64	16/ 0 psf							V18: 23.5 / 0 ft-lbs (65 n	nm x 130 mm vane ra	w torque readings)	
İ								N-R	OD			82.0 ft: Hydraulically pu		torquo rouugo,	
ŀ								PRO							
85 🕇															
ļ															
ŀ								H							
ŀ															
90 🖁								\vdash							
j															
}								\vdash							
Ĺ															
ſ															
								\vdash	\vdash						
95 															
ا "															
ŀ								H	\vdash						
ļ															
f								Ħ							
}								\vdash	Ш						
100															
Rema	arks:	·				1		_	ш		VIVEA				
	cation lines	represent	approximate bou	ndaries hetwe	een soil tynes	transition	ne may he		de cont				Page 4 of 6		

			Schonewali Engineering		PROJ	ECT:						Mainline Boring No.: HB-VM	
			Engineering Associates, ⁱ		LOCAT	ION:						Area SB Median Proj. No.: 19-1	17
rille			New England				vation		Orti		<u>vı⊏</u> t (est'o) Core Barrel: N/A	
pera			Enos/ Share	Borning Co	THE GOLOTO		tum:	(,		NAVD	-	Sampler: standard split-s	noon
•	d By:		Schonewald			+	Type:					B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches	20011
	Start/Fini		5/20/19; 1040	- 5/21/19·	1215	-	lling Mo	otho	ų.			boring Hammer Type: Automatic	
	Locatio	n.	Station 2125+10	0.4; CL (o/s 2		_	sing ID				4") to 2		
	<u></u>		median guardra	il face)		_	ger ID/0				to 10 f	1	n)
= Splii D = Ur = Thir U = Ur = Insit	Wall Tube successful Vane She	nple Split Spe Sample Thin Wa ar Test	oon Sample atternall Tube Sample at	npt ttempt tempt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Cc RQD = Rock	DEFINIT ed = N va ue correctiency = of ield Vand ore Samp	TIONS: llue ted for ha calculated e Shear S le	mme ham treng	mer th (p	ciency efficiency	WOH WOF = r BOR SSA	IONAL DEFINITIONS: = weight of 140lb. hammer = weight of rods of recorded EHOLE ADVANCEMENT METHODS: HSA=solid/hollow stem auger oller cone/OPEN/PUSH=hydraulic push LABORATORY TEST RESULTS: AASHTO / USCS soil classifications #200 = percent fines WC = water cc CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial te LL=lquid Limit / PL=Plastic Limit / PI=Plotter cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of	ntent (%)
H		·			formation	- 70							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab Testir Resu
00													
)5 —													
-													
0													
15 -													
-													
-													
20 +								+	$ \downarrow $				
-									\parallel			121.7 ft: Resistance noted.	
+			+					\dashv	\vdash				
- 1													

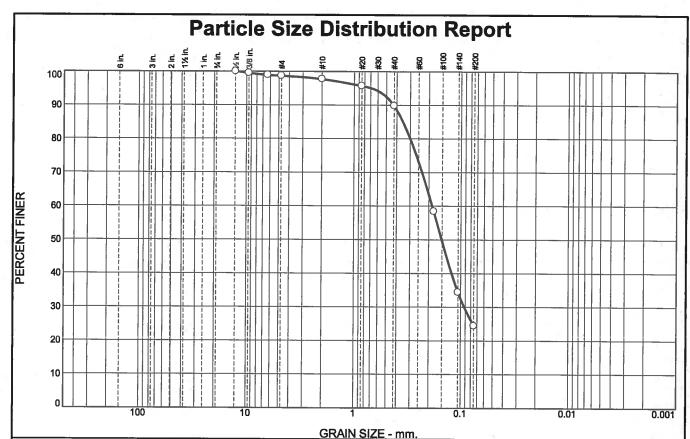
ASSC New Enos Scho inish: 5/20/ station: Statio media ING AND TESTIN Sample full Split Spoon Sa be Sample	esample attempt ear Test attempt Sample	9; 1215 s 2.5 ft LT of ADDITIONAL E N-uncorrectee N60 = N value hammer effici Su = Insitu Fie R = Rock Cor RQD = Rock	Datu Rig Drill Cas Aug DEFINITION	South vation um: Type: ling Me ing ID/ ger ID/C ONs: ue ed for hai	h Port (ft.) ethod:	S2.5 f NAVD Mobil cased	ME ft (est'one 88 e Drill d wash 4") to 2	Sampler: standard split-spot B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches boring Hammer Type: Automatic	
New Enos Scho inish: 5/20/ ition: Statio media ING AND TESTIN sample full Split Spoon Sa be Sample full Thin Wall Tub shear Test ful Insitu Vane Sh	England Boring C / Share newald 19; 1040 - 5/21/19 n 2125+10.4; CL (o/n guardrail face) IG: ample attempt ear Test attempt Sample	ADDITIONAL I N-uncorrectee N60 = N value hammer effici Su = Insitu E R = Rock Cor RQD = Rock I	Elev Datu Rig Drill Cas Aug DEFINITION 1 = N value e correcteency = correcteeld Vane	vation um: Type: ling Me ing ID/ ger ID/C ONS: ue ed for hal	ethod:	52.5 t NAVD Mobil cased HW (4	ft (est'on 88 e Drill d wash 4") to 2	Core Barrel: N/A Sampler: standard split-spo B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches boring Hammer Type: Automatic	
Enos Scho inish: 5/20/ tion: Statio media ING AND TESTIN spile ful Split Spoon Sa be Sample ful Thin Wall Tub shear Test ful Insitu Vane Sh	/ Share newald 19; 1040 - 5/21/1! newald 19; 1040 - 5/21/1! n 2125+10.4; CL (o/: n guardrail face) IG: ample attempt e Sample attempt Sample	9; 1215 s 2.5 ft LT of ADDITIONAL E N-uncorrectee N60 = N value hammer effici Su = Insitu Fie R = Rock Cor RQD = Rock	Date Rig Drill Cas Aug DEFINITE d = N value correcteency = caeld Vane	Type: ling Me ing ID/ ger ID/C ONS: ue ed for hai	ethod:	Mobil cased HW (4	88 e Drill d wash 4") to 2	Sampler: standard split-spo B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches boring Hammer Type: Automatic	pon
Scho inish: 5/20/ ition: Statio mediz ING AND TESTIN Sample Iful Split Spoon Sa be Sample Iful Thin Wall Tub shear Test Iful Insitu Vane Sh	newald 19; 1040 - 5/21/1! n 2125+10.4; CL (o/n guardrail face) IG: ample attempt e Sample attempt Sample	ADDITIONAL E N-uncorrectec N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock (Rig Drill Cas Aug DEFINITION DEFI	Type: ling Me ling ID/ ger ID/C ONS: ue ed for had	OD:	Mobil cased HW (4	e Drill d wash 4") to	B-53 (rubber track ATV) Hammer Wt./Fall: 140 lbs/30 inches boring Hammer Type: Automatic	oon
inish: 5/20/ Ition: Statio media ING AND TESTIN Sample ful Split Spoon Sa be Sample full Thin Wall Tube Shear Test ful Insitu Vane Sh	19; 1040 - 5/21/1! n 2125+10.4; CL (o/ n guardrail face) IG: ample attempt e Sample attempt Sample	ADDITIONAL E N-uncorrectec N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock (Drill Cas Aug DEFINITION D	ling Me ing ID/ ger ID/C ONS: ue ed for hai	OD:	cased HW (d wash 4") to	boring Hammer Type: Automatic	
Station: Statio media ING AND TESTIN Sample Iful Split Spoon Sabe Sample Iful Thin Wall Tube Shear Test Iful Insitu Vane Sh	n 2125+10.4; CL (of: n guardrail face) IG: ample attempt e Sample attempt ear Test attempt Sample	ADDITIONAL E N-uncorrectec N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock (Cas Aug DEFINITION DEF	ing ID/ ger ID/C ONS: ue ed for hai	OD:	HW (4") to :		
ING AND TESTIN Sample full Split Spoon Sabe Sample full Thin Wall Tube Shear Test full Insitu Vane Sh	IG: ample attempt ear Test attempt Sample	ADDITIONAL E N-uncorrected N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock (Aug DEFINITION d = N value e correcte ency = ca eld Vane	jer ID/C ONS: ue ed for hai				20 ft Hammer Efficiency: 0.906	
ING AND TESTIN Sample ful Split Spoon Sa be Sample ful Thin Wall Tub Shear Test ful Insitu Vane Sh	IG: ample attempt e Sample attempt ear Test attempt Sample	N-uncorrected N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock (DEFINITION DEFINI	ONS: ue ed for ha	DD:	SSA			
Sample ful Split Spoon Sa be Sample ful Thin Wall Tube Shear Test ful Insitu Vane Sh	esample attempt ear Test attempt Sample	N-uncorrected N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Cor RQD = Rock (DEFINITION DEFINI	ONS: ue ed for ha			to 10 f	t Water Level*: 5.6 ft BGS (open)	
Pen./Rec. (in.)				Shear St	hammer trength (p	efficiency	WO WO = BOF SSA	TIONAL DEFINITIONS: LABORATORY TEST RESULTS: H = weight of 140lb. hammer R = weight of rods -#200 = percent fines WC = water control recorded CONSOL= 1-D consolidation test REHOLE ADVANCEMENT METHODS: JHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of roc	ent (%)
Pen./Rec. (in	ğ Ç		-B				1		
<u> </u>	Sample Depth (ft.) Blows (/6 in.)	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Result
						-72.9		Bottom of Exploration at 125.4 feet below ground surface. 125.4 ft: Rod probe fetches up; stands rig; inferred bottom of Marine Silt-Clay; bottom of boring; no refusal.	ŀ
						<u> </u>			



HOLMES ROAD VMS BORINGS (HB-VMS-100s)

LABORATORY TEST REPORTS

		(RWG&	LATION OF SOIL TESTIN A PROJECT NO. 1368-01 der of test report presen	(6)
Boring No.	Sample No.	Sample Depth (ft., BGS)	RWG&A LAB NO.	Tests Completed
HB-VMS-101	1D	5-7	#15619-27	wash sieve gradation
HB-VMS-101	3D	15-17	#15619-28	wash sieve gradation
HB-VMS-101	4D	20-22	#15619-29	wash sieve gradation; Atterberg Limits
HB-VMS-101	7D	35-37	#15619-30	percent passing #200; Atterberg Limits
HB-VMS-101	8D	40-42	#15619-31	percent passing #200; Atterberg Limits
HB-VMS-102	1D	5-7	#15619-32	wash sieve gradation
HB-VMS-102	3D	15-17	#15619-33	wash sieve gradation
HB-VMS-102	5D	25-27	#15619-34	percent passing #200; Atterberg Limits
HB-VMS-102	6D	30-32	#15619-35	percent passing #200; Atterberg Limits
HB-VMS-102	7D	35-37	#15619-36	percent passing #200; Atterberg Limits
HB-VMS-103	2D	10-12	#15619-37	wash sieve gradation
HB-VMS-103	3D	15-17	#15619-38	wash sieve gradation; Atterberg Limits
HB-VMS-103	4D	20-22	#15619-39	percent passing #200; Atterberg Limits
HB-VMS-103	5D	25-27	#15619-40	percent passing #200; Atterberg Limits
HB-VMS-103	6D	30-32	#15619-41	percent passing #200; Atterberg Limits



% +3"			% Grav	rei .		% Sand	Fi	% Fine	es
			Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0		0.0	1.3	1.0	7.9	65.4	24.4	19
	SIEVE	PERCENT	SPEC.*	PAS		534		escription	

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	1/2"	100.0		TO TO
	3/8"	99.5	_	
	1/4"	98.9		
	#4	98.7		
_ [#10	97.7	-	
	#20	95.7		
	#40	89.8	-	
	#80	58.4		
	#140	34.4		
- 1	#200	24.4		
-1				
ı		<		
	11			+

_4	Soil Description	
Silty sand		
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 0.4292 D ₅₀ = 0.1513 D ₁₀ =	Coefficients D85= 0.3497 D30= 0.0924 Cu=	D ₆₀ = 0.1860 D ₁₅ = C _c =
USCS= SM	Classification AASHTO	O= A-2-4(0)
Moisture Content:	Remarks 25.5%	

(no specification provided)

Location: HB-VMS-101 Sample Number: 1D

Depth: 5'-7'

Date: 7/11/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

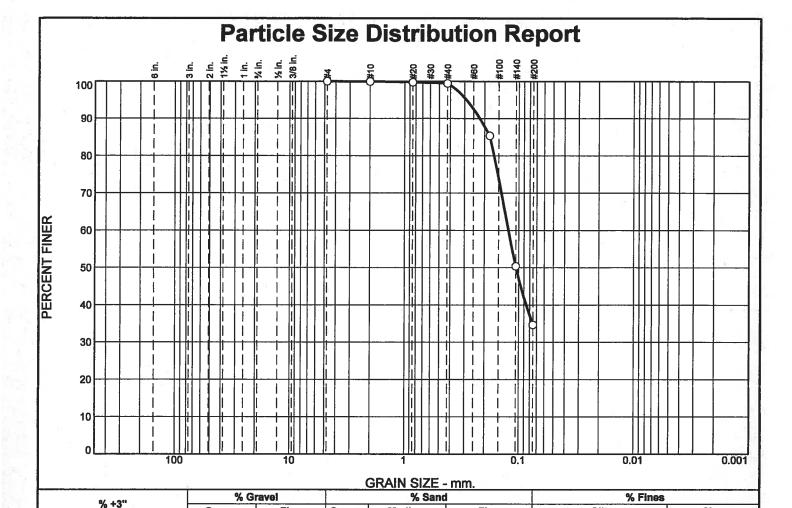
Portland, ME

Project No: 1368-016

Lab No.

15619-27

Tested By: MSM/MCM



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#10	99.9		
#20	99.7		
#40	99.4		
#80	85.4		
#140	50.4		
#200	34.7		
		_	
	1		
	†		
		-	

Coarse

0.0

Fine

0.0

Coarse

0.1

Medium

	Soil Description	
Silty sand		
PL=	Atterberg Limits LL=	Pi=
D 0.2100	Coefficients	D 0.1021
D ₉₀ = 0.2199 D ₅₀ = 0.1054 D ₁₀ =	D ₈₅ = 0.1788 D ₃₀ =	D ₆₀ = 0.1231 D ₁₅ =
D ₁₀ =	~u−	C _C =
USCS= SM	Classification AASHT	O= A-2-4(0)
	Remarks	
Moisture Content		

Silt

34.7

Location: HB-VMS-101

Sample Number: 3D

0.0

Depth: 15'-17'

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Fine

64.7

Portland, ME

Project No: 1368-016

Date: 7/11/2019

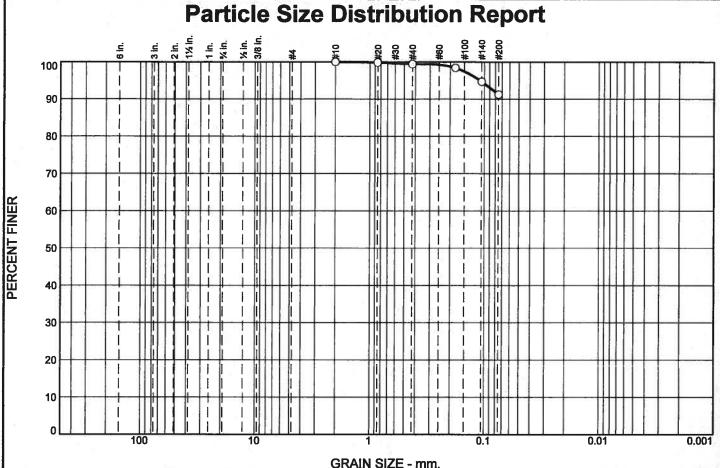
Clay

R.W. Gillespie & Associates, Inc. **Biddeford, Maine**

15619-28 Lab No.

Tested By: MSM/MCM

⁽no specification provided)



% +3"	% Gr	% Gravel				% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	8.2	91.3	

-	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	#10	100.0	-	
	#20	99.9		
	#40	99.5		
	#80	98.4		_
	#140	94.7	= =	
	#200	91.3		
	II.			
			L	
		6		
			= =	

	Soil Description	<u>n</u>
Lean clay		
PL= 18.4	Atterberg Limits LL= 34.2	<u>s</u> Pi= 15.8
Doo=	Coefficients	Doo=
D ₉₀ = D ₅₀ = D ₁₀ =	D ₈₅ = D ₃₀ =	D ₆₀ = D ₁₅ = C-=
J10	Classification	C
USCS= CL	AASH	TO= A-6(14)
	Remarks	
Natural Moisture	38.6%	

(no specification provided)

Location: HB-VMS-101 Sample Number: 4D

Depth: 20'-22'

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

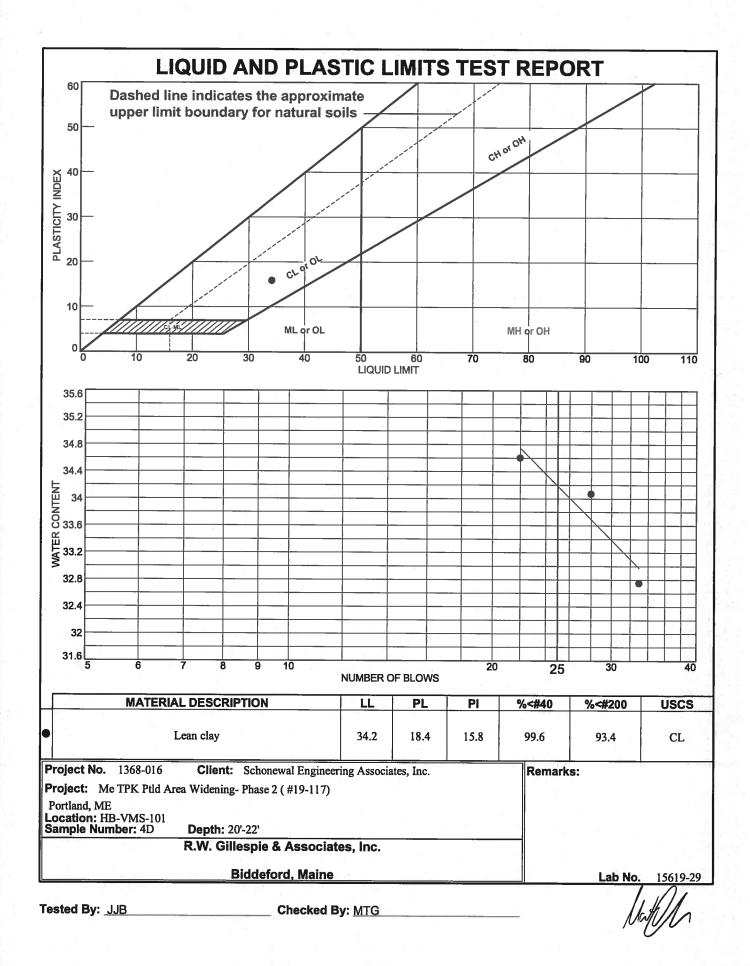
Portland, ME

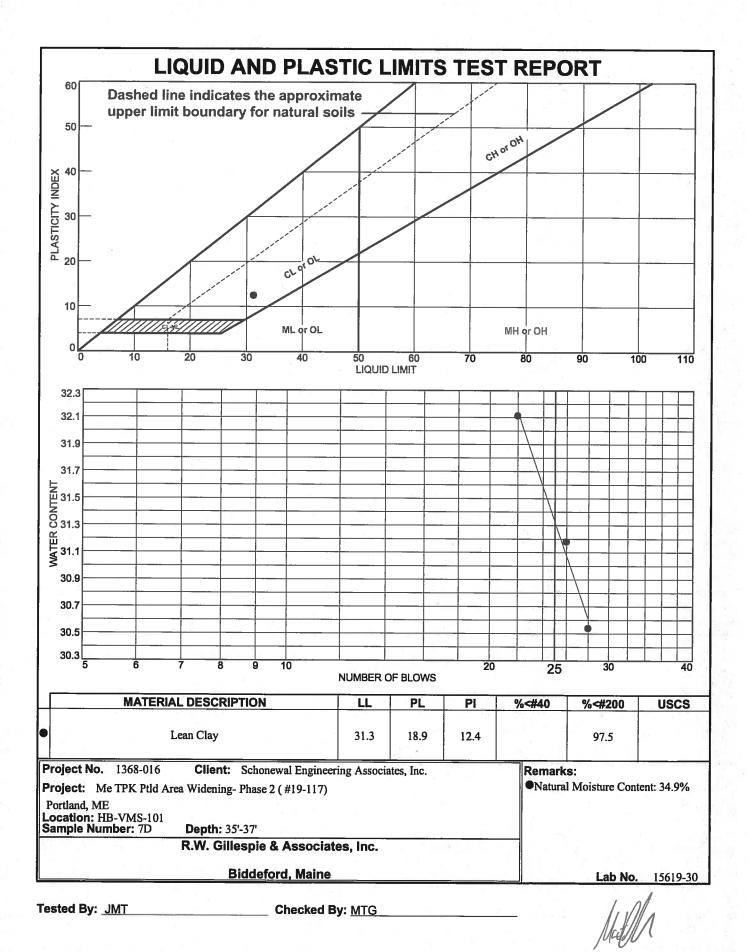
Date: 7/18/2019

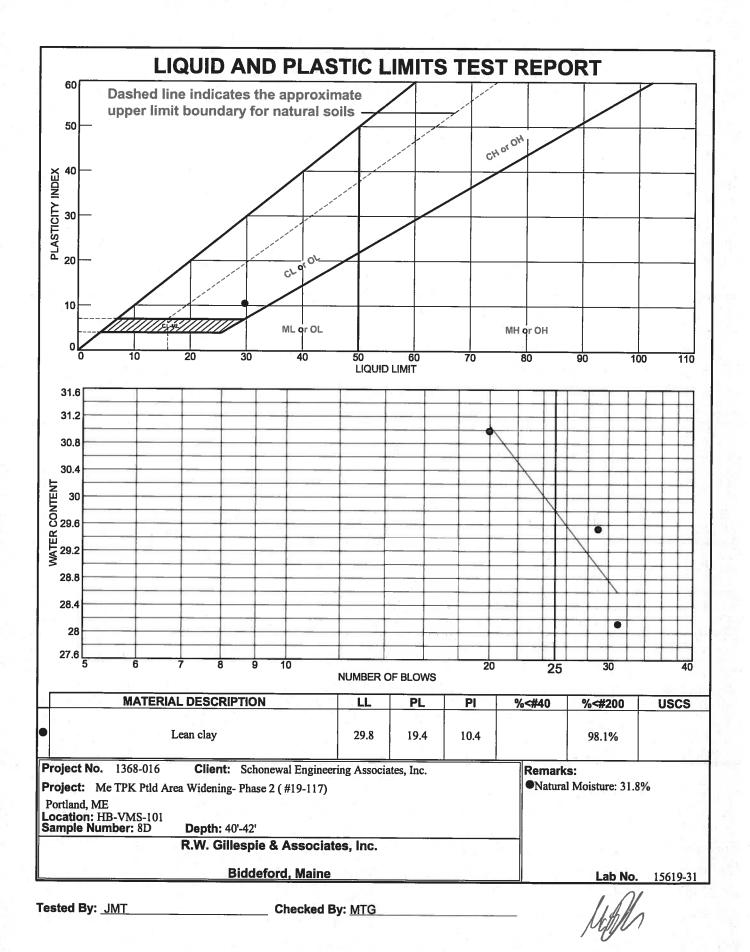
R.W. Gillespie & Associates, Inc. Biddeford, Maine

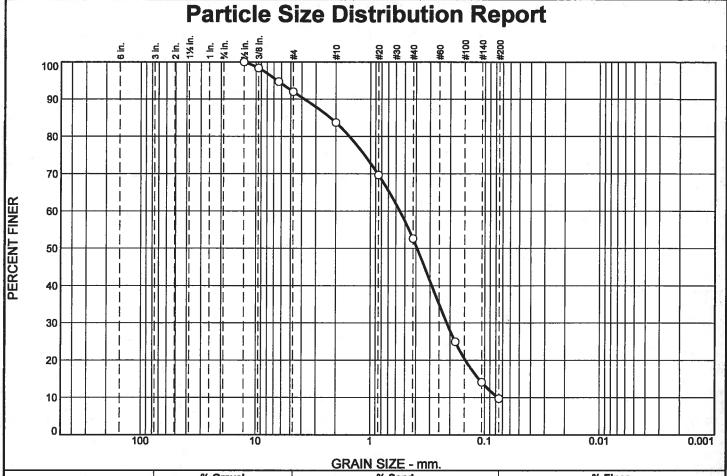
Lab No. 15619-29 **Project No:** 1368-016

Tested By: JJB Checked By: MTG









GRAIN SIZE - mm.								
% +3"	% Gi	avel	% Sand			% Fines		
76 T3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	8.0	8.3	31.1	42.9	9.7		

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
i	1/2"	100.0	= =	**
	3/8"	98.4		
	1/4"	94.7		
	#4	92.0		
	#10	83.7		## F
	#20	69.7		
	#40	52.6		
	#80	24.9		
	#140	14.1		
	#200	9.7		
		0		*
		E	5.,	
	71			

	Soil Description	
well-graded sand v	vith silt	
	Atterberg Limits	
PL=	LL=	PI≃
D ₉₀ = 3.7819 D ₅₀ = 0.3908 D ₁₀ = 0.0769	Coefficients D85= 2.2316 D30= 0.2141 Cu= 7.21	D ₆₀ = 0.5543 D ₁₅ = 0.1125 C _c = 1.08
USCS= SW-SM	Classification AASHT	O= A-3
	<u>Remarks</u>	
Moisture Content:	19.9	

(no specification provided)

Source of Sample: HB-VMS-102 **Sample Number:** 1D

Depth: 5'-7'

Date: 7/24/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

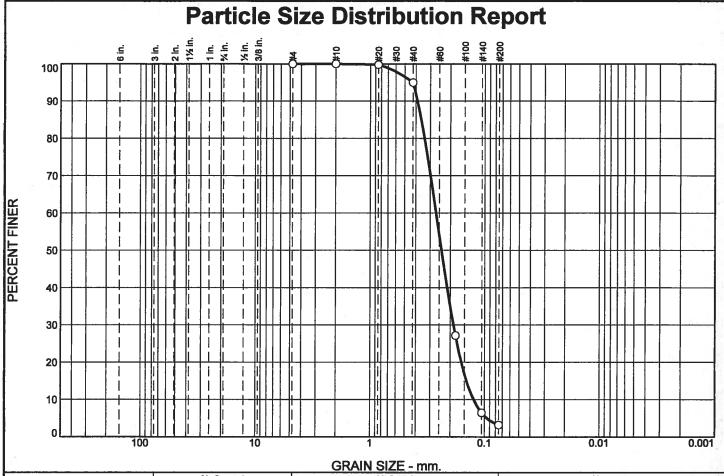
Portland, ME

Project No: 1368-016

Lab No. 15619-32

Tested By: MSM/MCM

Checked By: MTG



GRAIN SIZE - mm.									
% +3"	% G	Gravel % Sand			% Fines				
76 T3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
0.0	0.0	0.0	0.0	5.0	91.8	3.2	i notaro		

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	#4 #10	100.0 100.0		
	#20	99.8		
	#40 #80	95.0		
	#80 #140	27.1 6.4		
	#200	3.2		=
ī		,		
ž.	-	-		=
				_
		1/	0	

	Soil Description	
Poorly graded san	nd	
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 0.3873 D ₅₀ = 0.2385 D ₁₀ = 0.1245	Coefficients D85= 0.3591 D30= 0.1875 Cu= 2.14	D ₆₀ = 0.2663 D ₁₅ = 0.1438 C _c = 1.06
USCS= SP	Classification AASHT	O= A-3
Moisture Content	Remarks :: 23.4%	

Location: HB-VMS-102 **Sample Number:** 3D

Tested By: MSM/MCM

Depth: 15'-17'

Client: Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

Portland, ME

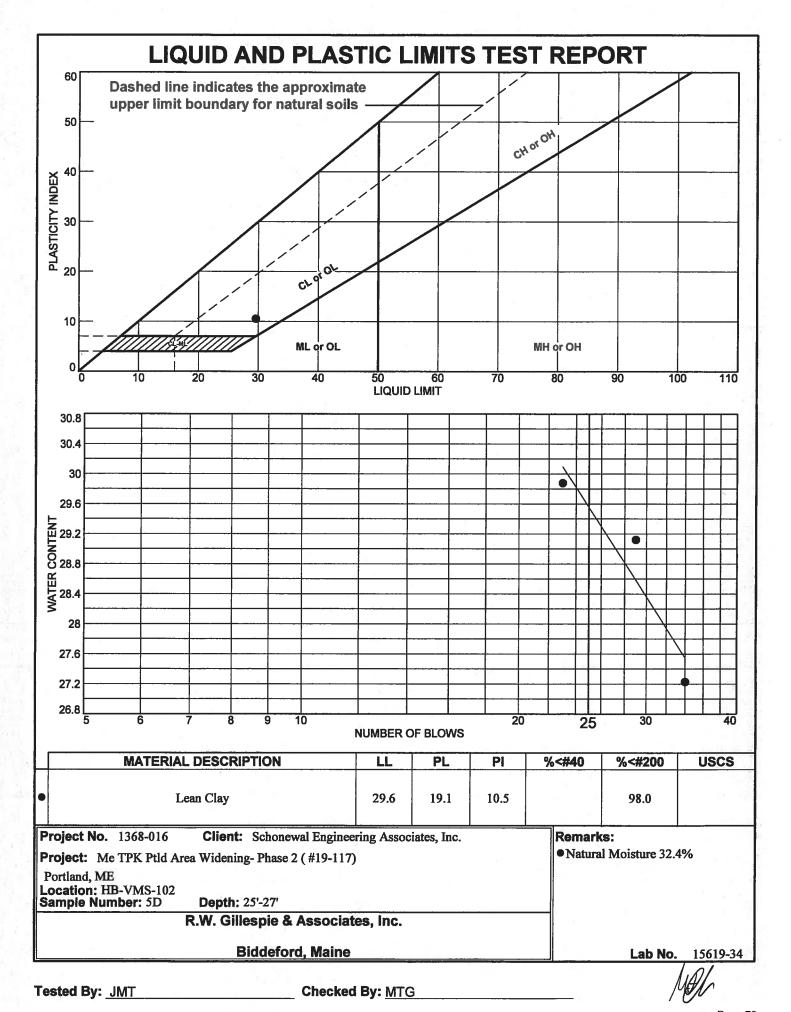
Project No: 1368-016 Lab No.

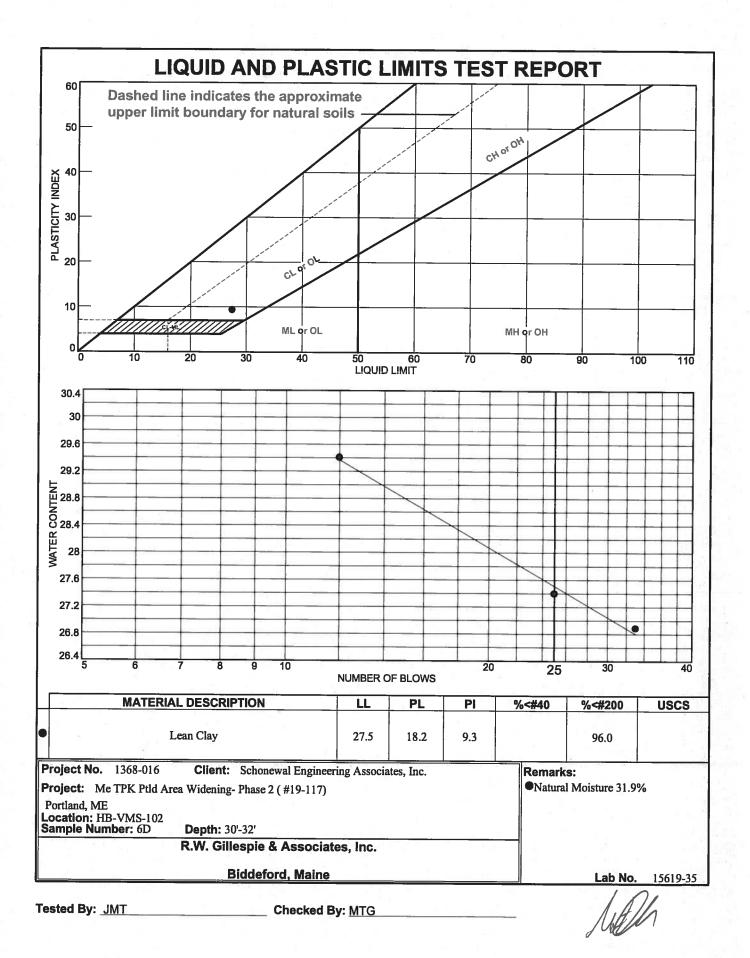
R.W. Gillespie & Associates, Inc. **Biddeford, Maine**

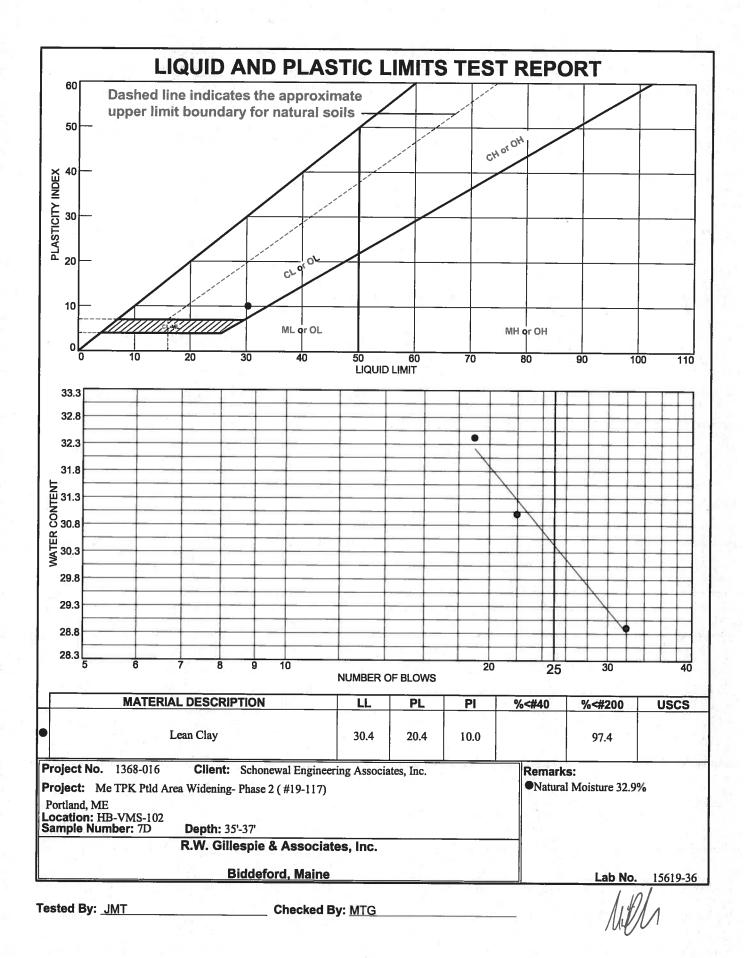
Checked By: MTG

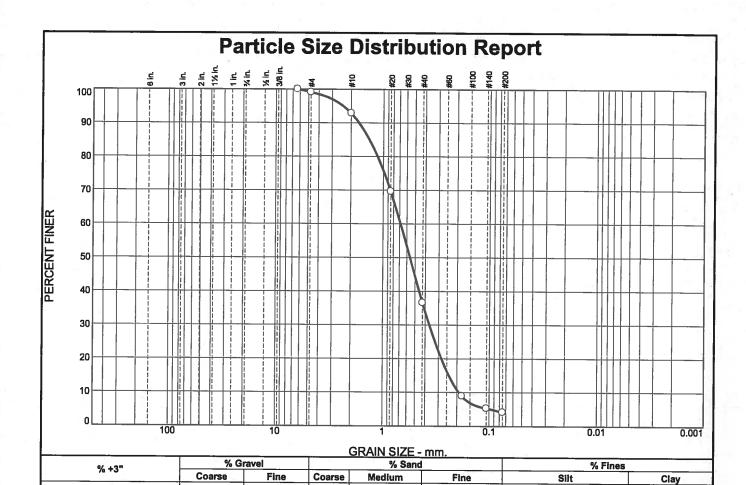
Date: 7/11/2019

⁽no specification provided)









SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/4"	100.0		П ,
#4	99.1		
#10	92.9		
#20	69.7		
#40	36.6		
#80	8.9		
#140	5.3		
#200	4.1		
	1		17
			i
		=	

0.0

0.9

32.5		4.1
	oil Description	123
		Pi=
6856 E 5599 E 1919 C	Coefficients D85= 1.3464 D30= 0.3661 Cu= 3.58	D ₆₀ = 0.6863 D ₁₅ = 0.2390 C _C = 1.02
SP	Classification AASHTO=	A-1-b
Content: 18.1	Remarks	11
	6856 [5599 [1919]	Soil Description

(no specification provided)

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Location: HB-VMS-103 Sample Number: 2D

0.0

Depth: 10'-12'

Schonewal Engineering Associates, Inc.

Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

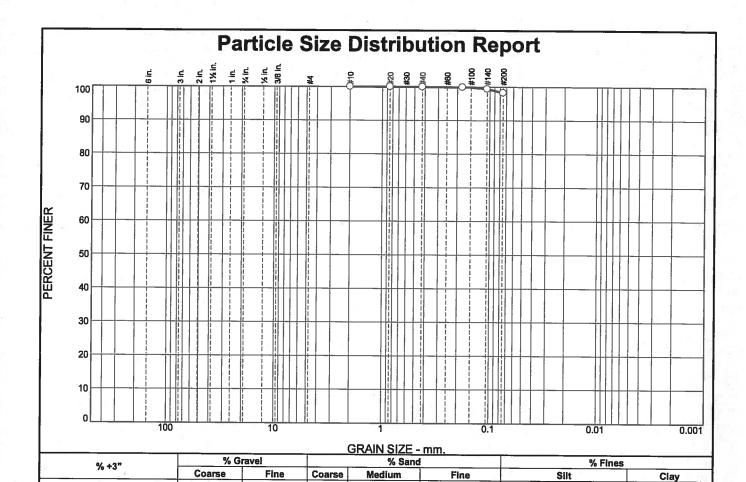
Portland, ME

Project No: 1368-016

15619-37 Lab No.

Date: 7/11/2019

Tested By: MCM/MSM



	SIEVE	PERCENT	SPEC.*	PASS?
\vdash	SIZE	FINER	PERCENT	(X=NO)
	#10	100.0		
	#20	100.0		
	#40	99.9		
	#80	99.9	_	
	#140	99.4		
-1	#200	98.2		
			5	
			_	
			4	
			_	
-1		5.5		
		=		

0.0

0.0

0.0

0.1	1.7	98.2
Lean clay	Soil D	escription
PL= 19.5	Atterb LL=	erg Limits 31.5 PI= 12.0
D ₉₀ = D ₅₀ = D ₁₀ =	<u>Coe</u> D ₈₅ = D ₃₀ = C _u =	fficients D ₆₀ ≃ D ₁₅ = C _c =
USCS=	Class CL	sification AASHTO= A-6(12)
Moisture C	Reontent: 36.2%	marks

(no specification provided)

Location: HB-VMS-103 Sample Number: 3D

0.0

Depth: 15'-17'

Date: 7/18/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Schonewal Engineering Associates, Inc.

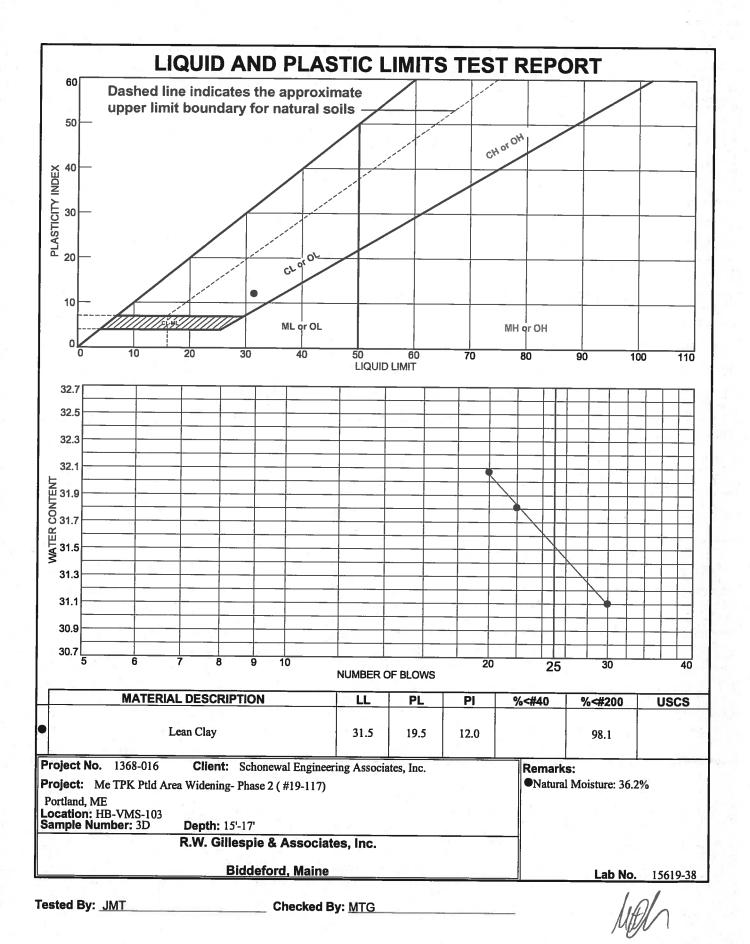
Project: Me TPK Ptld Area Widening- Phase 2 (#19-117)

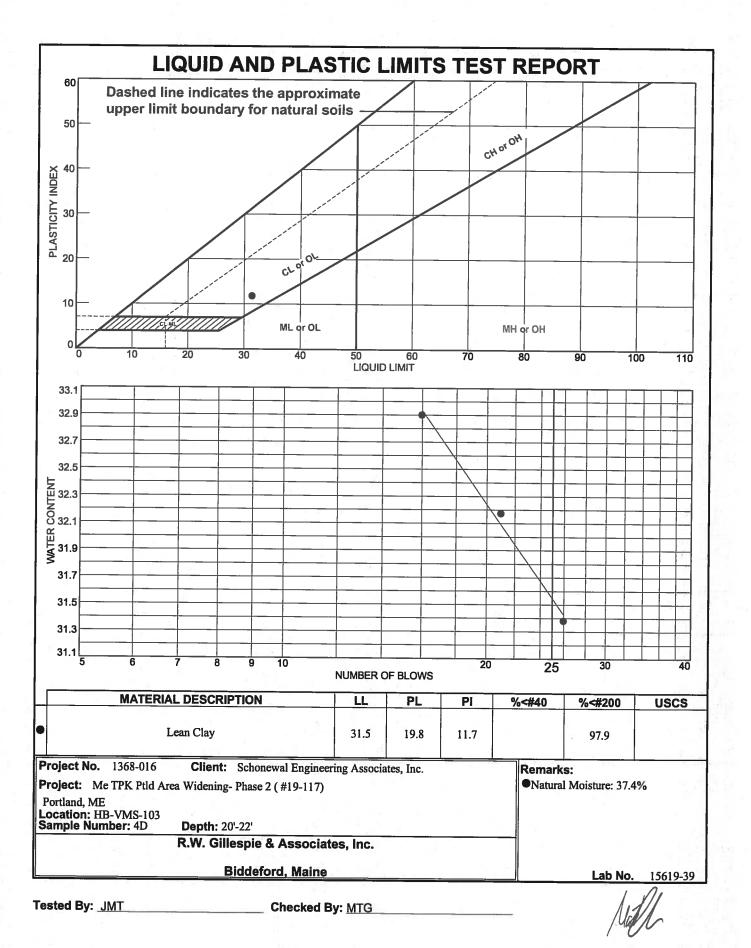
Portland, ME

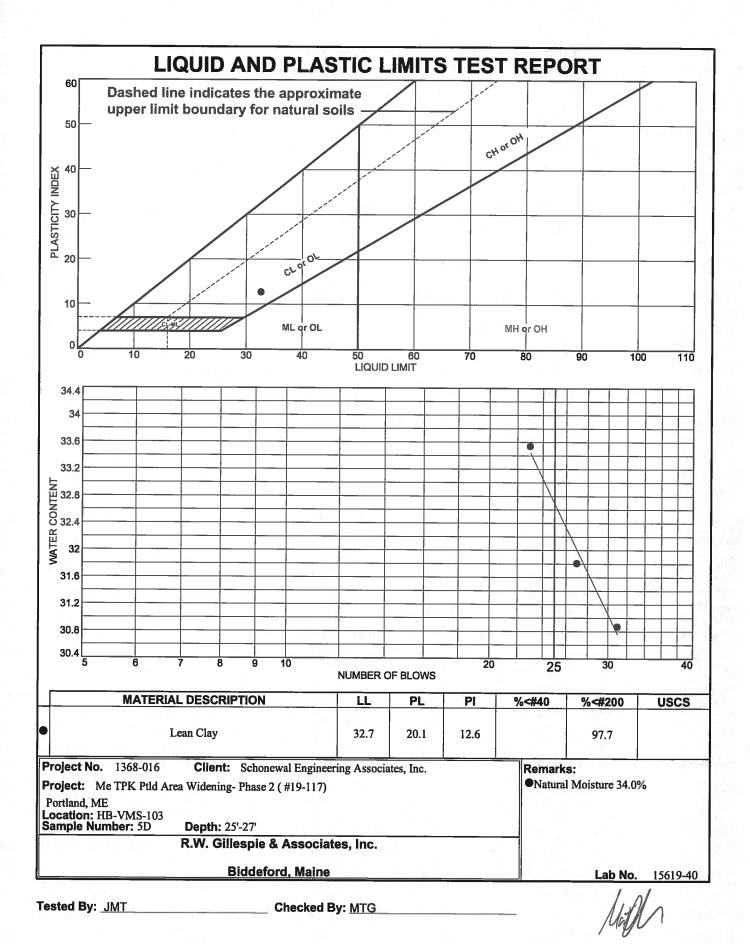
Project No: 1368-016

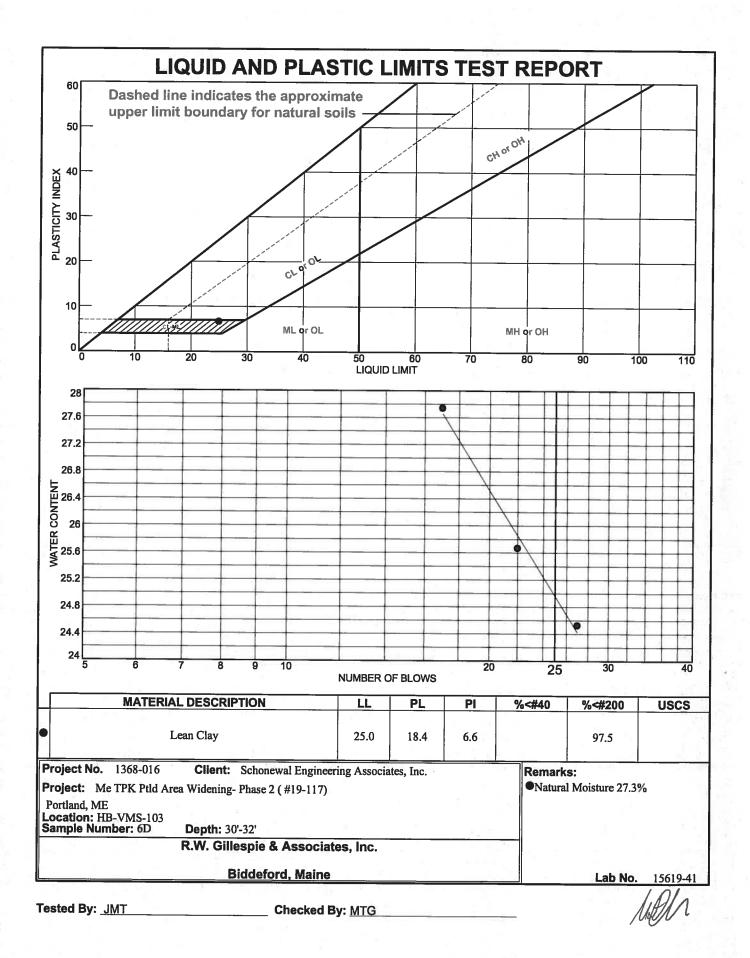
Lab No.

Tested By: JJB









APPENDIX A

Data Reports

Boring HB-PAMI-301 Pavement Cores/Borings HB-PCORE-201 and HB-PCORE-202



			SCHONEWALD		PROJE						a N	1ainlir	ne Widening / Exit 45 -	Boring No.:	HB-PA	AMI-301
			Associates, In		LOCAT		Utility C South		•		:			Proj. No.:	19-	-117
Drille	ar:		New England	d Boring (Contractors	l Fle	evation	(ft)			15	ft (est	'd\	Auger ID/OD:	/4.5 inches ((884)
-	rator:		Enos/ Share		Onliacions	_	tum:	(11.,				D88	.d)	Sampler:	standard split	,
⊢÷-	ged By:		Schonewald			_	g Type:		_				I B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inc	•
<u> </u>	Start/Fi	inish:	9/26/19; 2240		9; 0115	-	illing M		d:				h boring	Core Barrel:	N/A	
—	ng Loca		approx. Sta.			-	sing ID				_	.5 incl		Water Level*:	none observed introduced	before water
			actor: 0.842				mmer 1	Гуре):	Auto	ma	tic ⊠	Hydraulic □	Rope & Cathead □		
IN-SIT D = SI MD = U = TI MU = V = Fi	FU SAMPLI plit Spoon S Unsuccess nin Wall Tu Unsuccess eld Vane S	ING AND TI Sample sful Split Spoube Sample sful Thin Wal Shear Test,		mpt Attempt enetrometer	R = Rock Core Hammer Effici N-uncorrected N ₆₀ = Raw SF N ₆₀ = (Hamm S _U = Peak/Rei RQD = Rock C	iency Fac d = Raw F PT N Valu ner Efficie emolded F	ctor=Rig-S Field SPT ue Correc ency Facto Field Vane	N-val cted fo or/60% e Und	lue or Ha %)*N- Iraine	mmer E	Effici ecte	eiency	ADDITIONAL DEFINITION /alue WOR/C = Weight of Rods/ WOH = Weight of Hammer = Not Recorded/Applicab BOREHOLE ADVANCEME (psf) SSA/HSA = Solid/ Hollow S	S: LABORATOI Casing AASHTO / U: -#200 = perce ele CONSOL = 1 ENT METHOD: UU/CIU/etc =	it/PL=Plastic Limit/PI=Pl	ns ter content (%) trength test Plasticity Index
Γ					nformation			_	_		\exists	_				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09 _N	Casing	Blows	Elevation (ft.)	(111.)	Graphic Log		scription and Remarks		Laboratory Testing Results
0	1D	24/18	0.0 - 2.0		H-1-2-3	3	4	SS			THE		Olive grey tan, mottled, day fine sand with minor roots sand. MARINE SILT-CLA	s; grading to SILT, some		
	2D	24/24	2.0 - 4.0	4-6-	i-9-10	15	21						Olive tan, slightly mottled Clayey SILT, trace to little	, damp (tight), stiff, SIL ⁻		
	[[[CRUST			1
_	3D	24/23	4.0 - 6.0	3-5	5-8-9	13	18	PU	SH				Olive brown, slightly mottl MARINE SILT-CLAY CRU		Clayey SILT.	1
- 5 -																1
								П								1
								\prod								1
			+ +						/	52.	5				————8.0-	1
		 	+ +				-	\	\dashv							
- 10 -	4D	24/24	10.0 - 12.0	1-2	2-1-2	3	4						Olive grey grading to dark CLAY	grey, soft, Silty CLAY.	MARINE SILT-	
		 		<u> </u>				_	_							1
		 		<u> </u>				_	_							
																1
					ļ											
15 -	5D	24/24	15.0 - 17.0	push th	hru vane								Dark grey, soft, Silty CLA V1: 15 / 1.5 ft-lbs (65 mm			
	V1 V2		15.6 - 16.0 16.6 - 17.0		12/ 41 psf 35/ 41 psf		 						,		. ,	
	·-		10.0										V2: 14 / 1.5 ft-lbs (65 mm	x 130 mm vane raw to	rque readings)	
		 	+				 									1
		-	-	<u> </u>			 	-	\dashv		B					1
- 20 -		 	-	<u> </u>			 	_	\dashv				Dark grey, soft, Silty CLA	Y MARINE SILT-CLAY	<i>(</i>	LAB TESTS:
	1U	24/24	20.0 - 22.0	hydrau	ulic push			<u> </u>	_				Dain 9103, 30th, 2, 2	1. 11/1 11 11 11 11 11 11 11 11		Su-lab consol, WCn,
		<u> </u>		<u> </u>				_	_							Atts Su-lab
	V3	<u> </u>	22.6 - 23.0		30/ 27 psf		<u> </u>	_					V3: 12 / 1 ft-lbs (65 mm x	130 mm vane raw torq	ue readings)	consol, WCn Su-lab
	V4	-	23.6 - 24.0	Su= 35	57/ 27 psf		-	_	-				V4: 13 / 1 ft-lbs (65 mm x	130 mm vane raw torq	ue readings)	
25	1,										1					<u> </u>
Sar 20.0 20.1	6' Su-lab 7' 1-D co	onsol; WC	; 20.9' Su-lab= Cn=41.5%, LL= Cn=44.7%				osf									

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
U.S. CUSTOMARY UNITS
*Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Page 1 of 2

Boring No.: HB-PAMI-301

I	Maine	- 5	artment Soil/Rock Exp US CUSTOM/		ation		-	Wide	ning /	tland Area Mainline Exit 45 - Utility Crossings tland, ME	Boring No.: WIN:		MI-301 117
Drille	er.		New England	d Boring Contractors	Flore	ation	(ft)	60.4	ft (es	:t'd)	Auger ID/OD:	/4.5 inches ((SSA)
	rator:		Enos/ Share	2 Donning Contractors	Datu		(14.)		/D88	,	Sampler:	standard split	,
<u> </u>	ged By:		Schonewald		+	Type:				ill B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inc	·
	Start/Fi	nish:		0 - 9/27/19; 0115	+		ethod:			sh boring	Core Barrel:	N/A	J163
	ng Loca			2238+30, 69 ft LT		ng ID			4.5 in		Water Level*:	none observe	d before
			actor: 0.842				Гуре:	Autom			Rope & Cathead □		
Definit D = S _I MD = U = Tt MU = V = Fi	tions: plit Spoon S Unsuccess nin Wall Tu Unsuccess eld Vane S	Sample sful Split Spo be Sample sful Thin Wa shear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	R = Rock C SSA = Solic npt HSA = Hollc RC = Roller ttempt WOH = Wei netrometer WOR/C = W	ore Sampl I Stem Aug ow Stem A Cone ight of 140 Veight of R	le ger auger Ib. Ha	mmer Casing	S _u = S _{u(la} q _p = N-un Ham N ₆₀	Peak/F ab) = La Uncont correct mer Eff = SPT	temolded Field Vane Undrained She b Vane Undrained Shear Strength (bined Compressive Strength (ksf) ed = Raw Field SPT N-value ciency Factor = Rig Specific Annual N-uncorrected Corrected for Hamme mer Efficiency Factor/60%)*N-uncor	ear Strength (psf) $T_V = 1$ psf) $WC = 1$ $LL = 1$ $Calibration Value$ $PL = 1$ $Car Efficiency$ $G = 0$	Pocket Torvane Sher Water Content, perd Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	09 _N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Des	scription and Remarks		Laboratory Testing Results
25	6D	24/24	25.0 - 27.0	push thru vane						Dark grey with occasional MARINE SILT-CLAY	l black streaks, soft, Silt	y CLAY.	
	V5 V6		25.6 - 26.0 26.6 - 27.0	Su= 343/ 27 psf Su= 330/ 27 psf						V5: 12.5 / 1 ft-lbs (65 mm	x 130 mm vane raw tor	que readings)	
- 30 -			20.0 21.0	GG 666/27 pc1				31.5		V6: 12 / 1 ft-lbs (65 mm x		- — — —29.0-	
	7D	24/15	30.0 - 32.0	7-9-11-12	20	28		28.5		TILL	,	32.0-	
- 35 -										Bottom of Exploration No refusal.	at 32.0 feet below groui	d surface.	
- 45 - - 50 -													
Sar 20.0	6 [:] Su-lab	lab tests:	; 20.9' Su-lab=	=491 psf; 21.3' Su-lab=	-480 psf								

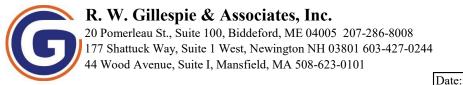
21.1' 1-D consol; WCn=44.7%

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

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

Page 2 of 2

Boring No.: HB-PAMI-301



LETTER OF TRANSMITTAL

		Date:	Project No.:					
		October 9, 2019	1368-017					
		Attention:						
			(Be@schonewaldengineering.com)					
Schonewald Engineering Associates, Inc	· <u> </u>	Re:						
		Laboratory Testing						
129 Middle Road		MeTPK PAW (3) Utility Crossing						
		Portland, Maine						
Cumberland, ME 04021								
	We are sending you attached Lab	oratory Test Results.						
Laborato	ory No. (s)	Test (s) Performed						
15745: HB-PAMI-30	01, 1U 20'-22', Portland, ME	Vane Shears, Moisture Cont Consol at 20.7', Consol at 2						
Remarks:								
Copy to:								

Laboratory Vane Shear Test Results

ASTM D4648 Standard Test Method for Laboratory Miniature Vane Shear Test for Saturated Fine-Grained Clayey Soil

Project: MeTPK PAW (3) Utility Crossing (#19-117) Location: South Portland, ME

Client: Schonewald Engineering Associates, Inc. Date: 10/2/2019

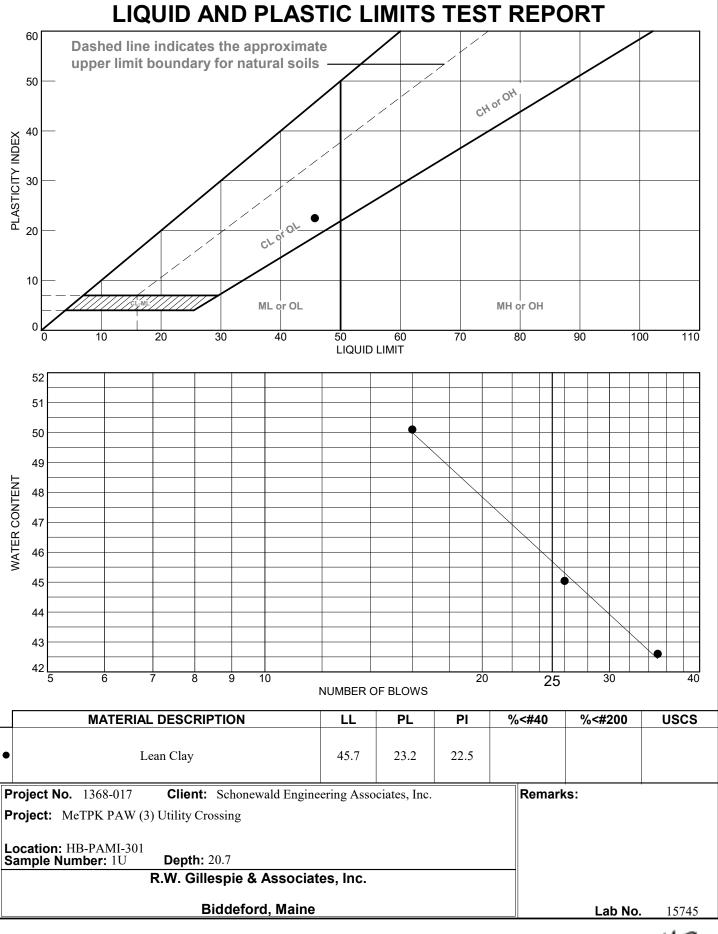
Project No.: 1368-017 Test Depth: 20.60 to 21.30

Boring/	Sample No.	HB-PAM	Lab No.	15745			
Test No.	Test Depth (ft)	Vane Size	Max. Torque (Undisturbed) (kg-cm)	Max. Torque (Remolded) (kg-cm)	Undrained Shear Strength (psf)	Undrained Shear Strength (psf)	Moisture Content
1	20.6	L	45	3	470	31	47%
2	20.9	L	47	4	491	42	47%
3	21.3	L	46	6	480	63	45%

Vane Size							
	(mm)						
S	16 x 32						
M	20 x 40						
L	24.5 x 50.8						

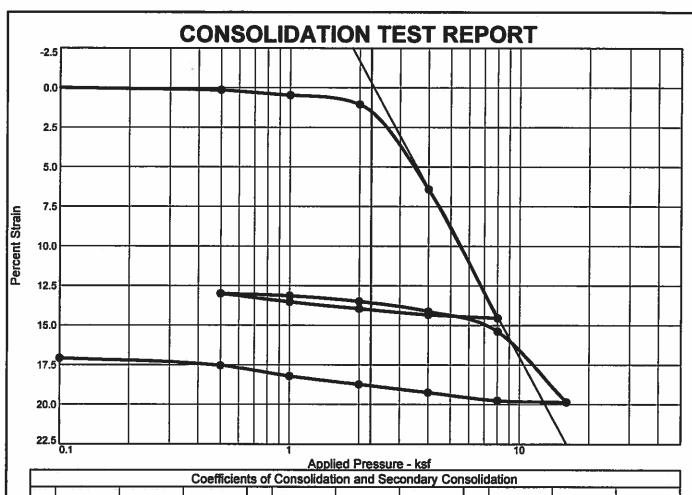
Tested By: AGS Checked By: MTG/EJW





Tested By: AGS Checked By: MTG/EJW

MITE



		,	Coefficie	nts of	Consolidat	ion and Sec	ondary Co	nsolid	ation		
No.	Load (ksf)	C _V (ft.2/day)	Cα	No.	Load (ksf)	C _V (ft.2/day)	Cα	No.	Load (ksf)	C _V (ft.2/day)	Cα
1	0.50	4.538		8	1.00	0.711		15	8.00	4.155	
2	1.00	9.989		9	0.50	0.354		16	4.00	1.581	
3	2.00	3.507		10	1.00	1.289		17	2.00	0.810	
4	4.00	0.233		11	2.00	1.301		18	1.00	0.345	
5	8.00	0.222		12	4.00	1.435		19	0.50	0.147	
6	4.00	3.448		13	8.00	1.187		20	0.10	0.084	
7	2.00	1.550		14	16.00	0.442					

Nat Saturation	ural Moisture	Dry Dens. (pcf)	ı	PÎ	Sp. Gr.	Overburden (ksf)	P _C (ksf)	Cc	Cr	Initial Void Ratio
94.4 %	41.5 %	78.7	45.7	22.5	2.7	-	2.8	0.59	0.10	1.187

MATERIAL DESCRIPTION USCS AASHTO

Lean Clay

Project No. 1368-017

Client: Schonewald Engineering Associates, Inc.

Remarks:

Project: MeTPK PAW (3) Utility Crossing

Location: HB-PAMI-301

Depth: 20.7

Sample Number: 1U

R.W. Gillespie & Associates, inc.

Biddeford, Maine

Lab No. 15745-01

Tested By: AGS

Checked By: MTG/EJW

MR

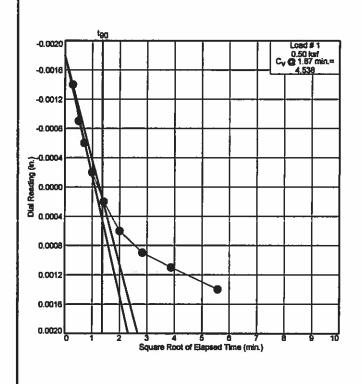
Project No.: 1368-017

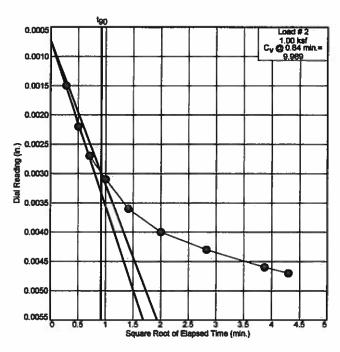
Project: MeTPK PAW (3) Utility Crossing

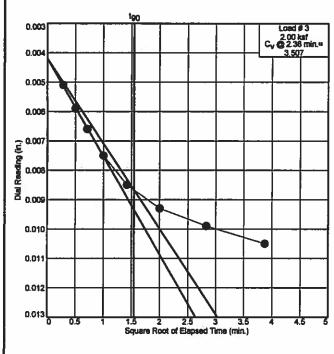
Location: HB-PAMI-301

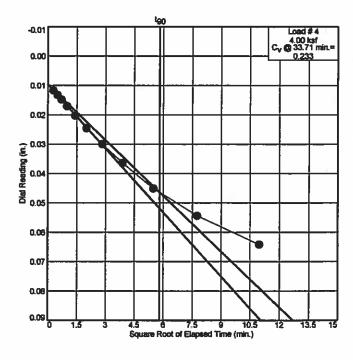
Depth: 20.7

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

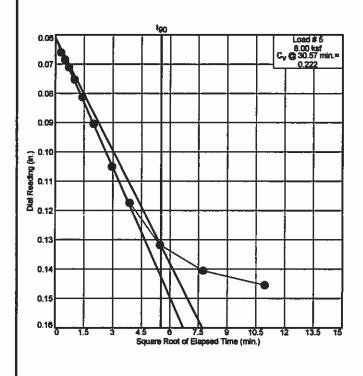
Project No.: 1368-017

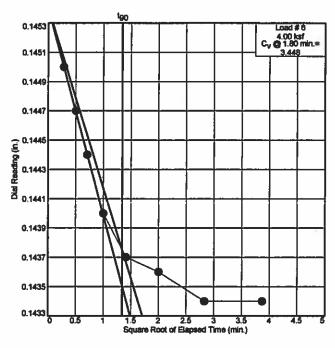
Project: MeTPK PAW (3) Utility Crossing

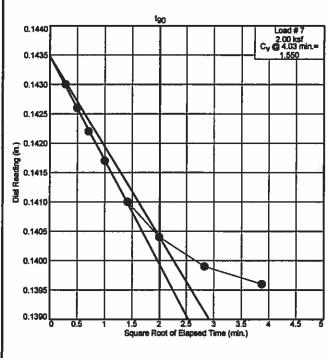
Location: HB-PAMI-301

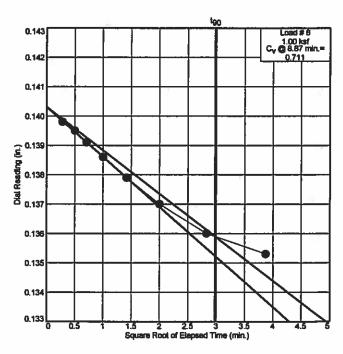
Depth: 20.7

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

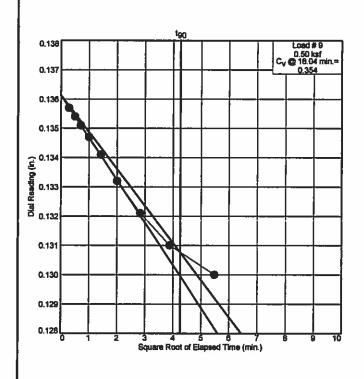
Project No.: 1368-017

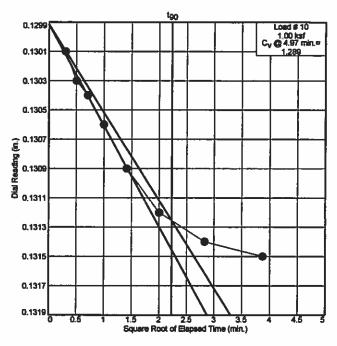
Project: MeTPK PAW (3) Utility Crossing

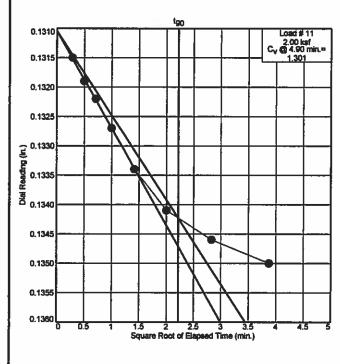
Location: HB-PAMI-301

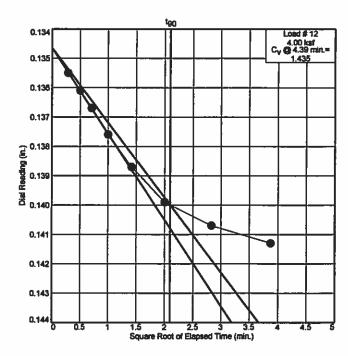
Depth: 20.7

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

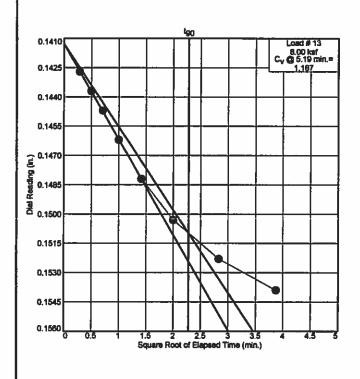
Project No.: 1368-017

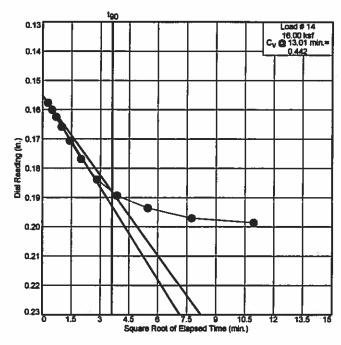
Project: MeTPK PAW (3) Utility Crossing

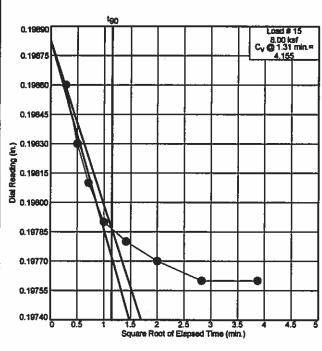
Location: HB-PAMI-301

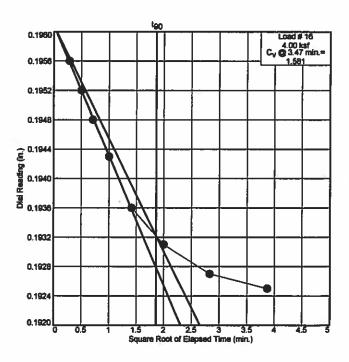
Depth: 20.7

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

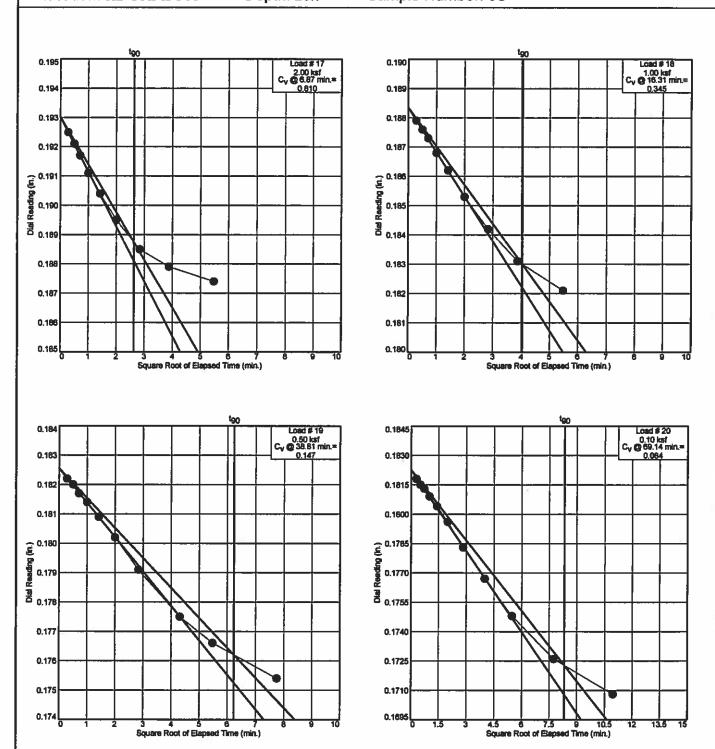
Project No.: 1368-017

Project: MeTPK PAW (3) Utility Crossing

Location: HB-PAMI-301

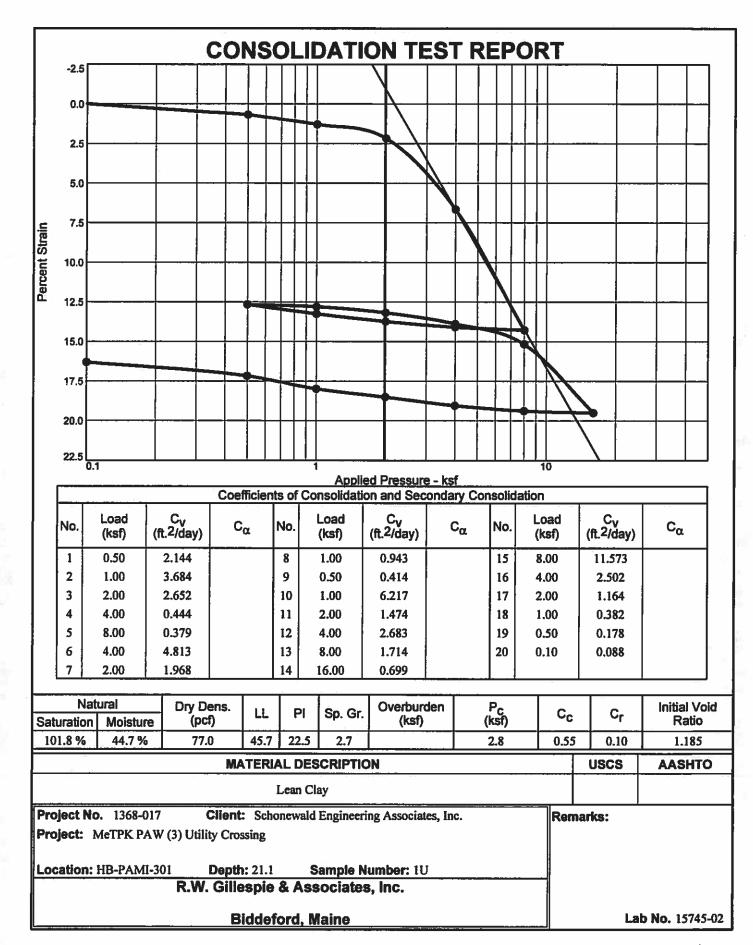
Depth: 20.7

Sample Number: 1U



R.W. Gillespie & Associates, Inc.

Biddeford, Maine



MK

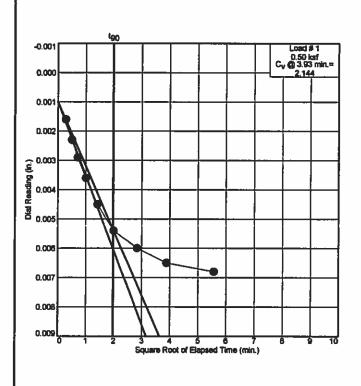
Project No.: 1368-017

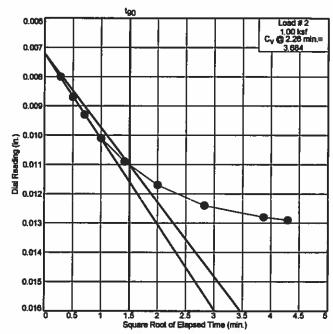
Project: MeTPK PAW (3) Utility Crossing

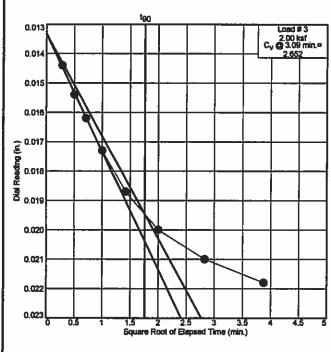
Location: HB-PAMI-301

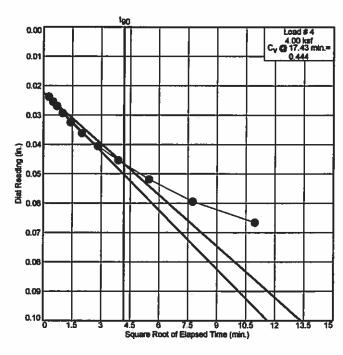
Depth: 21.1

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

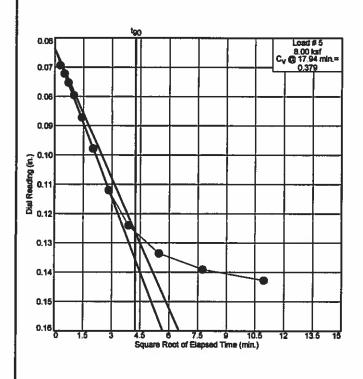
Project No.: 1368-017

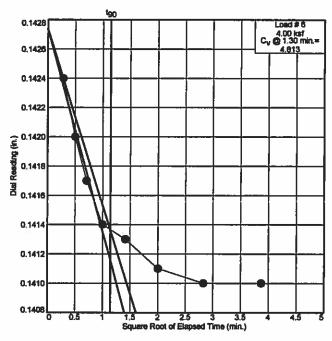
Project: MeTPK PAW (3) Utility Crossing

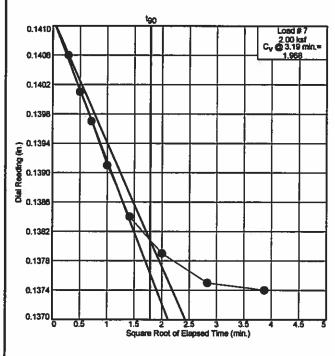
Location: HB-PAMI-301

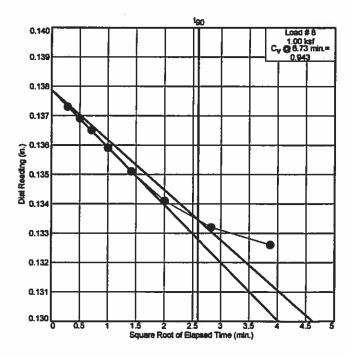
Depth: 21.1

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

Lab No. 15745-02

ME

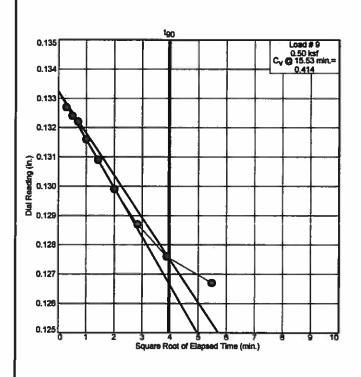
Project No.: 1368-017

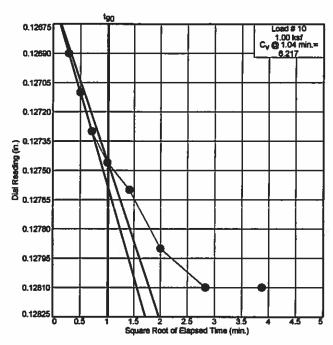
Project: MeTPK PAW (3) Utility Crossing

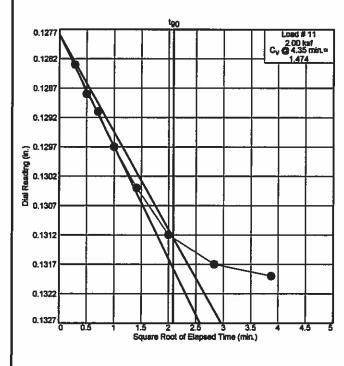
Location: HB-PAMI-301

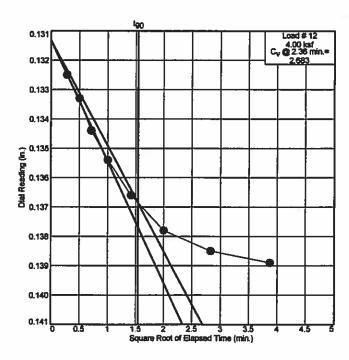
Depth: 21.1

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

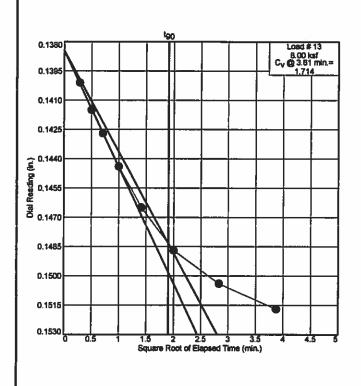
Project No.: 1368-017

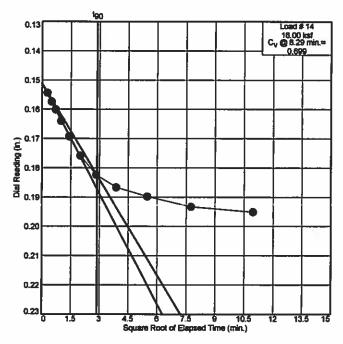
Project: MeTPK PAW (3) Utility Crossing

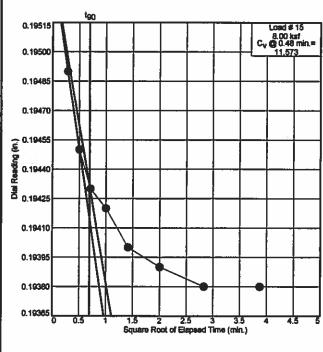
Location: HB-PAMI-301

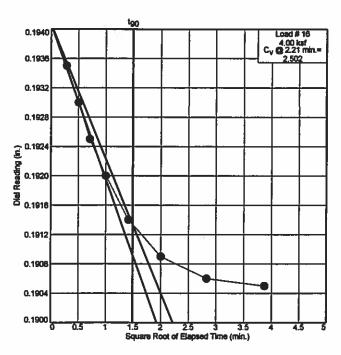
Depth: 21.1

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

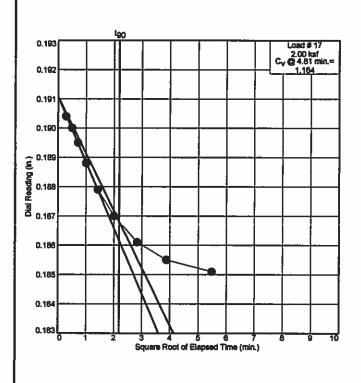
Project No.: 1368-017

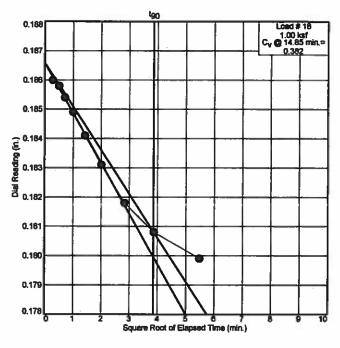
Project: MeTPK PAW (3) Utility Crossing

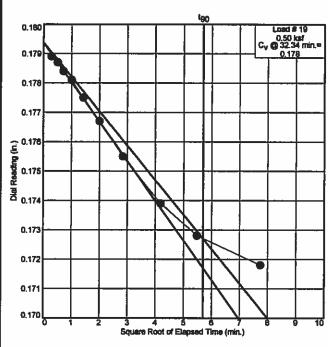
Location: HB-PAMI-301

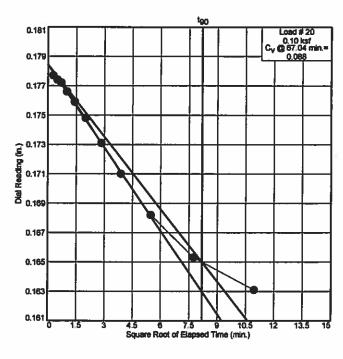
Depth: 21.1

Sample Number: 1U









R.W. Gillespie & Associates, Inc.

Biddeford, Maine

			CHONEWALE		PROJE					Wider	ning-Running Hill Road	Boring No.:	HB-PC	ORE-201
			ngineering Associates, ^I		LOCAT		Paveme South					Proj. No.:	19-	-117
Drille	er:		New England	d Borina C	ontractors	l Ele	evation	(ft.)	68	ft.		Auger ID/OD:	n/a	
	rator:		Enos/ Share		Ontractoro	_	tum:	(14.)		VD88		Sampler:	standard split	-spoon
<u> </u>	ged By:		Schonewald			Rig	Type:		Мо	bile Dr	ill B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 inc	
——	Start/Fi	nish:	9/26/19; 214	0-2205			illing M		cas	ed wa	sh boring	Core Barrel:	n/a	
Borii	ng Loca	tion:	Station 2250	+22; see r	emarks	Ca	sing ID	/OD:	5" (dia pav	rement core	Water Level*:	none observed	
			actor: 0.842			Ha	mmer 7	Гуре:	Auton	natic ⊠		Rope & Cathead □		
IN-SITU SAMPLING AND TESTING: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt Nego = Raw SPT N Ng0 = (Hammer E Su = Peak/Remol WY = Unsuccessful Field Vane Shear Test Attempt Sample Information							ctor=Rig-S Field SPT ue Correct ency Facto Field Vane	N-value ted for h or/60%)* e Undrai	ammer Et	ficiency	WOH = Weight of Hammer = Not Recorded/Applicat BOREHOLE ADVANCEMI n (psf) SSA/HSA = Solid/ Hollow S	Casing AASHTO / US -#200 = perce cle CONSOL = 1- ENT METHOD: UU/CIU/etc =	PL=Plastic Limit/PI=P	ns ter content (%) trength test lasticity Index
		<u> </u>				- - 0				1				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log		scription and Remarks		Laboratory Testing Results
0	PC	11/11	0.0 - 0.9	5" dia	a. core			CORI			Pavement Core: 11 inchedistinct weathered zones material.			
	1D	24/18	1.0 - 3.0	27-23	-19-15	42	59	OPE			Dark brown black, SILTY Changing at 1.3 ft to: Bro	wn, fine to coarse SANI	1.0- - — — —1.3-), some gravel,	#15806-01
											little silt. GRANULAR FILL Changing at 1.7 ft to 1D: SAND, little silt, trace gra	Brown, moist (tight), fine		WASH SIEVE A-2-4(0)/ SM -#200=14.5%
- 3 -	2D	24/15	3.0 - 5.0	7-6-	9-12	15	21				Brown grey, wet, fine to n gravel, trace coarse sand	nedium SAND, little to		WC=13.1%
									63.9		Changing at 4.1 ft to 2D: mottled, Clayey SILT, tra			
									63.0	////	CLAY BORROW	n at 5.0 feet below groun	5.0-	
- 6 -											NO relusal.			
									-					
									-					
- 9 -									-					
									-					
									-					
- 12 -														
15 Rem	arks:	<u> </u>					1		1		I .			<u> </u>
offs	et 1.3 ft	RT of SB	BB Lane 2 (rig white line; bridge fascia	ght / travel	lane)									
U.S. C * Wate	CUSTOMAI er level rea	RY ÛNITS dings have t	approximate bou been made at tim me measuremen	nes and unde	r conditions stat		-	-		occur du	e to conditions other	Page 1 of 1 Boring No.	: HB-PCO	 RE-201

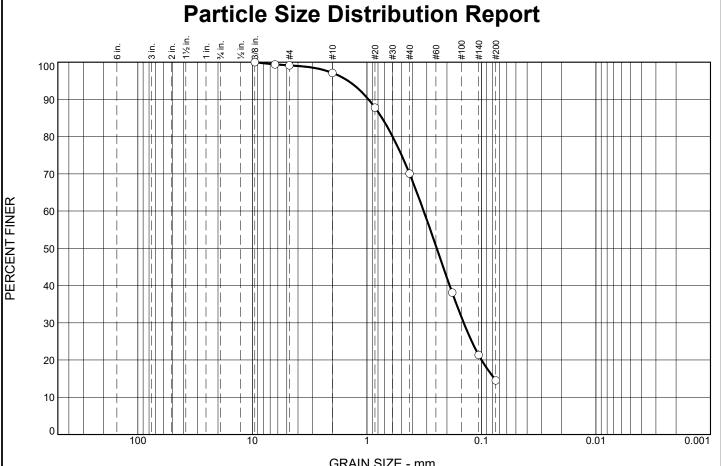
											Wider	ing-Running Hill Road	Boring No.:	HB-PC	ORE-202
			ngineering Associates, ^I		LOCAT		Paveme South						Proj. No.:	19	-117
Drille	er:		New England	d Boring C	ontractors	l Ele	vation	(ft.)		68	ft		Auger ID/OD:	n/a	
-	rator:		Enos/ Share		ontraotoro		tum:	(11.)			VD88		Sampler:	standard spli	t-spoon
H	ged By:		Schonewald			_	g Type:			Мо	bile Dr	ill B-53 (rubber track ATV)	Hammer Wt./Fall:	140 lbs/30 in	<u>'</u>
Date	Start/Fi	inish:	9/26/19; 210	0-2130		Dri	illing M	etho	d:	cas	ed wa	sh boring	Core Barrel:	n/a	
Bori	ng Loca	tion:	Station 2250)+90; see r	emarks	Ca	sing ID	/OD:	:	5" (dia pav	ement core	Water Level*:	2.7 ft (open)	
			actor: 0.842				mmer 1	Гуре	:	Auton	natic ⊠	Hydraulic □	Rope & Cathead □		
IN-SITU SAMPLING AND TESTING: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Sample Information						ency Fac = Raw F T N Vali er Efficie molded F	ctor=Rig-S Field SPT ue Correct ency Facto Field Vane	N-val sted fo or/60% e Und	lue or Har 6)*N-ı	nmer Et	ficiency cted	WOH = Weight of Hammer = Not Recorded/Applicab BOREHOLE ADVANCEME (n (psf) SSA/HSA = Solid/ Hollow S	Casing AASHTO / US -#200 = perce cle CONSOL = 1 ENT METHOD: UU/CIU/etc =	t/PL=Plastic Limit/Pl=F	ns ter content (%) t trength test Plasticity Index
		(in.)	oth	÷		pe					1 _				l
Depth (ft.)	Sample No.	Pen./Rec. (i	Sample Depth (ft.)	Blows (/6 in Shear	Strength (psf) or RQD (%)	N-uncorrected	09 _N	Casing	Blows	Elevation (ft.)	Graphic Log		scription and Remarks		Laboratory Testing Results
0	PC 1D	11/11 24/16	0.0 - 0.9 0.9 - 2.9		. core -26-24	0 51	0 72	COI		67.1		Pavement Core: 11 inche thick pieces (layers); som		approx. 3-inch	
												1D: Dark brown, SILTY A	GGREGATE		
	2D	24/12	2.9 - 4.9	18-15	-10-11	25	35			66.1		Changing at 1.9 ft to 1D-A		RFILL	WASH SIEVE A-2-4(0)/ SM
- 3 -										65.1		2D: Brown, wet, fine to m trace coarse sand. SAND			-#200=13.2% <u>WC=9.8%</u> #15806-03 #200 SIEVE
										63.4				4.6	-#200=12.7% WC=16.0%
										63.1	<i>[]]]]</i>	Changing at 4.6 ft: Olive I mottled, Clayey SILT, trad CLAY BORROW	prown grey, moist (tigh ce fine sand; appears re	t), slightly eworked. SILT-	
- 6 -												Bottom of Exploratio No refusal.	n at 4.9 feet below grour	4.9 ad surface.	
- 9 -															
- 12 -															
4.5															
15 Rem	arks:	1	1	İ			1					ı			1
offs	et 1.8 ft	RT of SB	SB Lane 2 (riç white line; bridge fascia		lane)										
Stratif	ication line	s represent	approximate bou	ındaries betw	een soil types;	transitio	ns may be	e grad	lual.				Page 1 of 1		
			been made at tim me measuremen			ted. Gro	oundwate	r fluct	uatior	ns may	occur du	e to conditions other	Boring No.	.: НВ-РСО	RE-202

R. W. Gillespie & Associates, Inc. 20 Pomerleau St., Suite 100, Biddeford, ME 04005 207-286-8008 177 Shattuck Way, Suite 1 West, Newington NH 03801 603-427-0244 44 Wood Avenue, Suite I, Mansfield, MA 508-623-0101 Date:

LETTER OF TRANSMITTAL

Project No.:

		November 15, 2019	1368-018					
		Attention:						
		Isabel V. (Be) Schonewald, P.E. (Be)	@schonewaldengineering.com)					
Schonewald Engineering	g Associates, Inc.	Re:						
		Laboratory Testing MeTPK PAW Running Hill Rd PCORE (#19-117)						
129 Middle Road								
		South Portland, Maine						
Cumberland, ME 04021								
	We are sending you attached I show	otomy Toot Dogulto						
	We are sending you attached Labora	atory Test Results.						
	Laboratory No. (s)	Test (s) Performed						
		1 000 (0) 1 011011110 0						
15806-01	: HB-PCORE-201, 1D, 1.7'-3', S.Portland, ME	Washed Gradation						
15806-02: 1	HB-PCORE-202, 1D-A, 1.9'-2.9', S.Portland, ME	Washed Gradation						
15906.02.	HB-PCORE-202, 2D, 2.9'-4.6', S.Portland, ME	Washed Over #200 Sieve						
13000-03.	TIB-FCORE-202, 2D, 2.9-4.0, S.Folualid, ME	washed Over #200 Sieve						
Remarks:								
Copy to:								



					1111111.			
% +3"	% Gı	avel		% Sand		% Fines		
% ₹3	Coarse	Fine	Coarse	Medium	Fine	Silt Clay		
0.0	0.0	0.9	2.0	27.0	55.6	14.5		

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
Ī	3/8"	100.0		
	1/4"	99.4		
	#4	99.1		
	#10	97.1		
	#20	87.8		
	#40	70.1		
	#80	38.1		
	#140	21.3		
	#200	14.5		
ı	*			

	Soil Description	
Silty sand		
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 0.9686 D ₅₀ = 0.2459 D ₁₀ =	Coefficients D ₈₅ = 0.7383 D ₃₀ = 0.1430 C _u =	D ₆₀ = 0.3195 D ₁₅ = 0.0771 C _c =
USCS= SM	Classification AASHT	O= A-2-4(0)
Moisture Conten	Remarks	

(no specification provided)

Location: HB-PCORE-201

Sample Number: 1D Depth: 1.7'-3' Date: 11/14/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

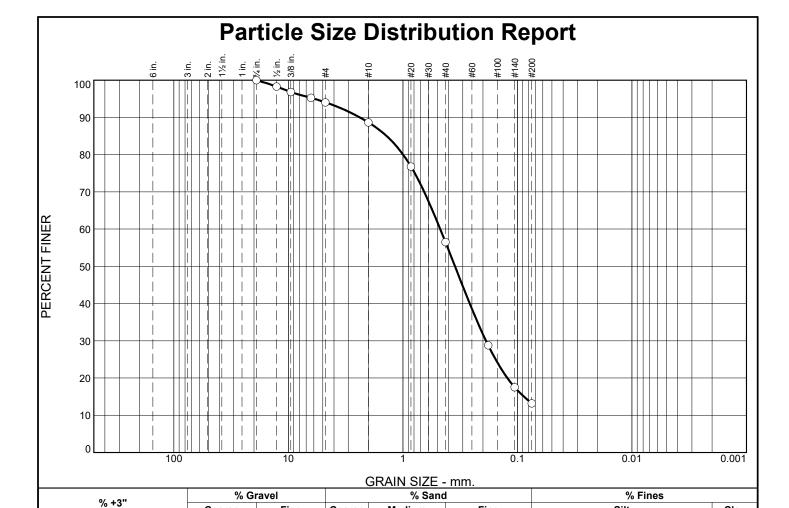
Client: Schonewald Engineering Associates, Inc.

Project: MeTPK PAW Running Hill Rd PCORE (#19-117)

South Portland, ME

Tested By: AGS Checked By: MTG





Coarse

5.4

Medium

Fine

Fine

6.0

PERCENT	SPEC.*	PASS?
FINER	PERCENT	(X=NO)
100.0		
98.3		
96.8		
95.2		
94.0		
88.6		
76.8		
56.5		
28.8		
17.5		
13.2		
	FINER 100.0 98.3 96.8 95.2 94.0 88.6 76.8 56.5 28.8 17.5	FINER PERCENT 100.0 98.3 96.8 95.2 94.0 88.6 76.8 56.5 28.8 17.5

Coarse

0.0

32.1	43.3		13.2
Silty sa		Description	
PL=	Atte	rberg Limits =	PI=
D ₉₀ = D ₅₀ = D ₁₀ =		5= 1.3882 0= 0.1882	D ₆₀ = 0.4723 D ₁₅ = 0.0878 C _c =
USCS:		assification AASHTO=	A-2-4(0)
Moistu	re Content: 9.8%	<u>Remarks</u>	

Silt

(no specification provided)

0.0

Location: HB-PCORE-202 **Sample Number:** 1D-A/1.9'-2.9'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK PAW Running Hill Rd PCORE (#19-117)

South Portland, ME

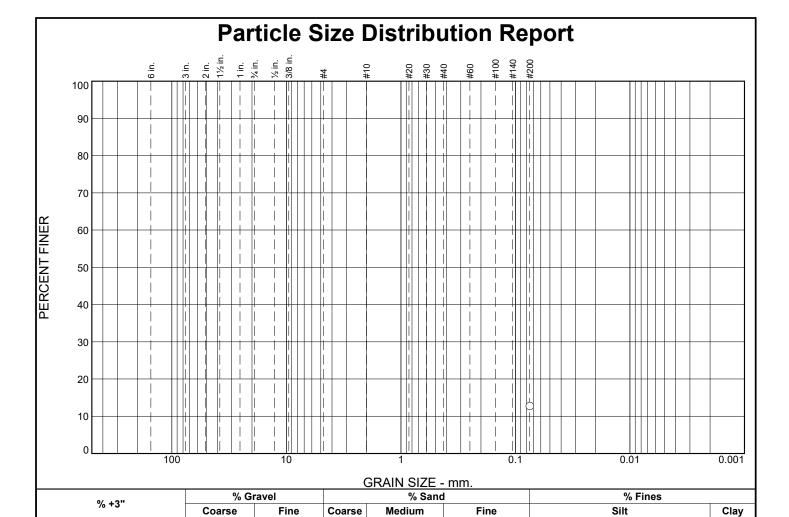
Project No: 1368-018 **Lab No.** 15806-02

Tested By: AGS Checked By: MTG



Date: 11/14/2019

Clay



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#200	12.7		
* (no specifi	cation provided	1)	

	Soil Descriptio	<u>n</u>									
Sand Fill - washed over #200 sieve only											
PL=	Atterberg Limit LL=	<u>es</u> PI=									
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =									
USCS=	Classification AASH										
Remarks Moisture Content: 16.0%											

12.7

Location: HB-PCORE-202

Sample Number: 2D Depth: 2.9'-4.6' Date: 11/14/2019

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK PAW Running Hill Rd PCORE (#19-117)

South Portland, ME

Project No: 1368-018 **Lab No.** 15806-03

Tested By: AGS Checked By: MTG



APPENDIX A

Data Reports

Boring HB-PAMI-401 Borings HB-VMS-201 and HB-VMS-202



			CHONEWALE)	PROJE				nd Are	а Ма	ainline	e Widening - Utility	Boring No.:	HB-PA	MI-401
			ngineering Associates, I		LOCAT		Crossing South	_	nd, ME				Proj. No.:	19-	117
Deille						1					-t/d\				
	Driller: New England Boring Contractors Elevation (ft.) Operator: Schaefer/ Titus Datum: Logged By: Schonewald Rig Type:									(es AVD			Auger ID/OD:	/4.5 inches	,
				us								D 52 ATV (NEDO #D 40)	Sampler:	standard split	•
			Schonewald	25 4240		_		411				B-53 ATV (NEBC #D-19)	Hammer Wt./Fall:	140 lbs/30 inc	nes
	Start/Fi		10/30/19; 10		-15		illing Me					n boring	Core Barrel:	N/A	
	Boring Location: 2275+44, 93 ft LT (est'd) Casing ID Hammer Efficiency Factor: 0.707 Hammer										5 inch		Water Level*:	1.3 ft (open, 30	min stab)
IN-SIT D = Sp MD = I U = Th MU = I V = Fie	U SAMPL blit Spoon Unsuccess in Wall Tu Unsuccess eld Vane S	ING AND T	R = Rock Cor Hammer Effic N-uncorrected N ₆₀ = Raw Si N ₆₀ = (Hamm S _u = Peak/Re RQD = Rock (I	e Sample iency Fad d = Raw F PT N Vali ner Efficie	e ctor=Rig-S Field SPT ue Correct ency Facto Field Vane	pecific / N-value ed for H r/60%)* Undrain	lammer I	alibra Efficie	ation Va	ADDITIONAL DEFINITION: alue WOR/C = Weight of Rods/ (WOH = Weight of Hammer = Not Recorded/Applicabl BOREHOLE ADVANCEME psf) SSA/HSA = Solid/ Hollow S	Casing AASHTO / US -#200 = perce CONSOL = 1: NT METHOD: UU/CIU/etc =	/PL=Plastic Limit/PI=P	er content (%) rength test lasticity Index		
		<u>-</u>				ъ				┪					
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation		Graphic Log	Visual Des	scription and Remarks		Laboratory Testing Results
0								S\$A				Dark olive grey brown, we	t Silty CDAVEL come	fine to coarse	
	1D	24/16	1.0 - 3.0	22-30)-24-25	54	64	_	-	$\overset{\otimes}{\otimes}$		sand; appears reworked.		ille to coarse	
									-	$\stackrel{\otimes}{\otimes}$		3 to 4 ft: Very boney; diffic	cult to advance boring;	oreak through at	
_	2D	24/18	4.0 - 6.0	2-2	2-4-5	6	7		46.	0		Dark olive grey, wet, ORG			
- 5 -								\bigvee		ŢĬŢŢŢ		medium sand, with three matter. ORIGINAL GROU		id organic	
	3D	24/17	6.0 - 8.0	1-6-	-8-10	14	16		43.	5			mottling (fine sand len	— — — —6.5- ses), moist	
												(tight), Organic Silty fine S to coarse sand. MARINE	SAND, little to some cla	y, trace medium	
								62	41.	٥				— — — 9.0-	
- 10 -	4D	24/12	10.0 - 12.0	15.6	5-4-6	9	11	OPEN	-			Olive grey, slightly mottled	d, moist (tight), Clayey	SILT, trace fine	
	40	24/12	10.0 - 12.0	10-0	J-4-0	3	''	OI LI				sand. MARINE SILT-CLA	Y CRUST		
									37.	5				12.5 -	
	5D	24/21	13.0 - 15.0	1-1-	-5-15	6	7					5D: Grey, Silty CLAY. Ch	anging at 14.3 ft to:		
- 15 -								\bigvee	35.	7		5D-A: Grey, fine to medium trace coarse sand: appear	m Sandy SILT, little cla	−	
	6D	4/3	15.0 - 15.3	50)/4"			RC	34.	2		Grey, GRAVEL, some silt		arse sand. TILL ———15.8-	
												Roller cone refusal.	at 13.6 feet below groun	iu surrace.	
- 20 -															
20									-						
									1						
0.5															
25 Rem	arks:	I				I	1								<u> </u>
NE	BC Rig #	D-19 aut	omatic hamm	er calibrat	ed on 7/8/1	9.									
Stratifi	cation line	s represent	approximate bou	ndaries betw	een soil types	transitio	ns may be	gradua	l.				Page 1 of 1		
vvate	r ievei rea	-	been made at tim			ated. Gro	oundwater	fluctuat	ions ma	occi	ur due	to conditions other	Boring No.	· HR-PAM	I-401

Testing Results To Sharp Shar				CHONEWALE		PROJE						Mainli	ne Improvements-Variable	Boring No.:	HB-VI	/IS-201	
Depart By Schwerzenish By Type: Motion Bit Bit Signer mounted) Hammer Will Fall 140 sold refer per control by Type: Motion Bit Bit Signer mounted) Hammer Will Fall 140 sold refer per control by Type: Motion Bit Bit Signer mounted) Hammer Will Fall 140 sold refer per control by Type: Motion Bit Bit Signer mounted) Hammer Will Fall 140 sold refer per control by Type: Motion Bit Bit Signer mounted) Hammer Will Fall 140 sold refer per control by Type: Motion Bit Bit Signer mounted) Hammer Will Fall 140 sold refer per control by Type: Motion Bit Bit Signer mounted have been per control by Type: Motion Bit Bit Signer mounted have been per control by Type: Motion Bit Signer mo						LOCAT		_		•		and, M	E	Proj. No.:	19-	117	
Logged By Schroewald Part 140 Bas05 incles Part 140 Bas05 incles Part 140 Bas05 incles Part 140 Bas05 incles Part 140 Bas05 incles Part	Drille	er:		New England	d Boring Co	ontractors	Ele	vation	(ft.)		ТВІ)		Auger ID/OD:	SSA to 5'		
Date Service Date	Oper	ator:		Schaefer/Titu	us		Dat	tum:			NA'	√D88		Sampler:	standard split	-spoon	
Being Location: See remarks Casing IDDC: NV (4*) to 30* Water Level: 2.2 ft (page) for activation of the seed of the see	Logg	ged By:		Schonewald			Rig	Type:			Mol	oile Dri	II B-53 (track mounted)	Hammer Wt./Fall:	140 lbs/30 inc	ches	
Hammer Efficiency Factors 1.077 Hammer Pyre: Automatic K Hydraulic Rope & Carbead Rope Carbead Rope R	Date	Start/F	inish:	10/15/19; 14	10-10/16/19	9; 1210	Dri	lling M	etho	od:	cas	ed was	sh boring	Core Barrel:	N/A		
Best Machine Amount Testing Per Find Core Service Per Find Core Service Per Find Core Service Per Find Core Service Per Find Core Service Per Find Per Fin	Bori	ng Loca	ition:	see remarks			Ca	sing ID	/OD):	HW	(4") tc	30'	Water Level*:	2.2 ft (open, no	stabilization)	
Do - Suppose Sample Control Control Suppose Sample Allery Language Control Control Suppose Sample Control Control Suppose Sample Control Control Suppose Sample Control Control Suppose Sample Control									Гуре	э:	Autom	atic ⊠					
Laboration Testing Results Visual Description and Remarks Laboration Testing Results Visual Description and Remarks Laboration Testing Results Visual Description and Remarks Laboration Testing Results Dark grey, moist (light), soft, interbedded, Clayey Sil. T, trace life and and Silly fine SAND. InterBeEDDED MARINE Sil. T, trace life and silly fine SAND. InterBeEDDED MARINE Sil. T, trace life and silly fine SAND. InterBeEDDED MARINE Sil. T, trace life and silly fine SAND. InterBeEDDED MARINE Sil. T, trace life and silly fine SAND. InterBeEDDED MARINE Sil. T, trace life and silly fine SAND. InterBeEDDED MARINE Sil. T, trace life and silly fine SAND. InterBeEDDED MARINE Sil. T, trace life	D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Unsuccessful Field Vane Shear Test Attempt MV = Vanical Specific Annual Calibration Value WOR/C = Weight of Rods/O WOH =										Casing AASHTO / US -#200 = perce ple CONSOL = 1- ENT METHOD: UU/CIU/etc = Stem Auger LL=Liquid Limit	SCS soil classification on times WC = wat -D consolidation test laboratory (shear) st /PL=Plastic Limit/PI=P	er content (%) rength test lasticity Index				
10 24/16 30 - 5.0 WOH-1-3-2 4 5			<u> </u>				ъ										
10 24/16 3.0 - 5.0 WOH-1-3-2 4 5		Sample No. Sample Depth (ft.) Sample Depth (ft.) Blows (/6 in.) Shear Strength (psf) or RQD (%)				N-uncorrecte	N-uncorrected N-60 Sasing		Blows	Elevation (ft.)	_	Visual Description and Remarks			Laboratory Testing Results		
Dark grey, moist (tight), soft interbedded. Clayery SiLT, trace fine sand and Silty fine SAND. INTERBEDDED MARINE SILT AND SANDS. Dark grey, moist (tight), very loose, interbedded Silty fine SAND: fine SAND. Interbedded Silty fine SAND: fine S	0																
10 24/16 3.0 - 5.0 WOH-1-3-2 4 5 20 24/13 5.0 - 7.0 WOH/12*-1-2 1 1 PUSH 20 24/13 5.0 - 7.0 WOH/12*-1-2 1 1 PUSH 20 24/13 5.0 - 7.0 WOH/12*-1-2 1 1 PUSH 20 24/13 5.0 - 7.0 WOH/12*-1-2 1 1 PUSH 21 30 24/24 10.0 - 12.0 WOH/24* — 30 24/24 10.0 - 12.0 WOH/24* — 31 30 24/24 10.0 - 12.0 WOH/24* — 32 30 24/24 10.0 - 12.0 WOH/24* — 33 30 24/24 15.0 - 17.0 push thru vane your grey, medium stiff, Silly CLAY with numerous seams fine Sandy SILT. MARINE SILT-CLAY 32 31 7 16 16 17.0 Sum 522/14 ppt 33 40 24/24 15.0 - 17.0 Sum 522/14 ppt 34 50 - 16.0 Sum 522/14 ppt 35 16 50 - 17.0 Sum 522/14 ppt 36 50 24/17 20.0 - 22.0 push thru vane your grey, soft to medium stiff, Silly CLAY, itsce very fine sand with numerous partings and seams fine Sandy SILT. MARINE SILT-CLAY 35 16 16 16 17.0 Sum 522/14 ppt 36 17 16 18 16 18 18 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19																	
2D 24/13 5.0-7.0 WOH/12*-1.2 1 1 PUSH The SAND, title sitt and Clayvy SILT, trace fine sand. INTERBEDDED MARINE SILT AND SANDS Olive grey. Sitly CLAY with numerous seams fine Sandy SILT. AD 24/24 15.0-17.0 push thru vane V1 15.6-18.0 Su=536/27 pef V2 15.6-17.0 Su=536/27 pef Olive grey. Sitly CLAY with numerous seams fine Sandy SILT. AD 24/24 15.0-17.0 push thru vane V1 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V2 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3 24/17 20.0-22.0 gush thru vane V4 21.6-22.0 Su=536/27 pef Olive grey. Soft to medium stiff, Sitly CLAY, trace very fine sand with numerous partings and seams fine Sandy SiLT. MARINE SILT-CLAY V3 15.0 seams and partings noted during push. V4 21.6-22.0 Su=536/27 pef V3 15.0 seams and partings noted during push. V4 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V5 15.0 seams and partings noted during push. V8 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V8 15.0 seams and partings noted during push. V8 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V8 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings). V9 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque reading		1D	24/16	3.0 - 5.0	WOH-	1-3-2	4	5					fine sand and Silty fine S.				
2D 24/13 5.0-7.0 WOH/12-1-2 1 1 PUSH fine SAND, little slit, and Clayey SILT, trace fine sand. INTERBEDDED MARINE SILT AND SANDS INTERBEDDED MARINE SILT AND SANDS Olive grey, Silty CLAY with numerous seams fine Sandy SILT. MARINE SILT-CLAY Olive grey, medium stiff, Silty CLAY with three seams fine Sandy SILT. MARINE SILT-CLAY V2 16.6-17.0 Sus 522/14 psi V2 15.0-17.0 Sus 522/14 psi V2 15.0-17.0 Sus 522/14 psi V2 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V4 21.6-22.0 Sus 426/14 psf V4 21.6-22.0 Sus 426/14 psf V4 21.6-22.0 Sus 588/14 psf V4 21.6-22.0 Sus 588/14 psf V5 25.0 Sus 588/14 psf V6 25.0 Sus 588/14 psf V6 25.0 Sus 588/14 psf V7 25.0 Stribe (35 mm x 130 mm vane raw torque readings) V8 25.0 Stribe (35 mm x 130 mm vane raw torque readings) V8 26.0 Stribe (35 mm x 130 mm vane raw torque readings) V8 27.0 Stribe (35 mm x 130 mm vane raw torque readings) V8 28.0 Stribe (35 mm x 130 mm vane raw torque readings) V8 29.0 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V9 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings) V8 21.5 Stribe (35 mm x 130 mm vane raw torque readings)	- 5 -									\square			Dark grey mojet (tight) v	ery loose interhedded	Silty fine SAND:		
Olive grey, Silty CLAY with numerous seams fine Sandy SiLT. AD 24/24 15.0 - 17.0 push thru vane V1 15.6 - 16.0 Su= 536/27 psf V2 16.6 - 17.0 Su= 536/27 psf Olive grey, medium stiff, Silty CLAY with three seams fine Sandy SiLT, MARINE SiLT-CLAY V1: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18/0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted dur		2D	24/13	5.0 - 7.0	WOH/1	2"-1-2	1	1	PU	SH			fine SAND, little silt, and	D, little silt; and Clayey SILT, trace fine sand.			
3D 24/24 10.0 - 12.0 WOH/24" — WOH/2												TO PL			— — — 8.5-		
3D 24/24 10.0 - 12.0 WOH/24" — WOH/2	10 -												Oli se se a Oliu Ol AV	.	01 011 T		
4D 24/24 15.0 - 17.0 push thru vane V1 15.6 - 16.0 Su= 522/14 psf V2 16.6 - 17.0 Su= 536/27 psf V1: 19 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque valu		3D	24/24	10.0 - 12.0	WOH	1/24"								tn numerous seams fine	Sandy SILT.		
4D 24/24 15.0 - 17.0 push thru vane V1 15.6 - 16.0 Su= 522/14 psf V2 16.6 - 17.0 Su= 536/27 psf V1: 19 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque valu																	
4D 24/24 15.0 - 17.0 push thru vane V1 15.6 - 16.0 Su= 522/14 psf V2 16.6 - 17.0 Su= 536/27 psf V1: 19 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque valu																	
V1: 19 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V2: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V3: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 19.5 / 1 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings note	15 -	4D	24/24	15.0 - 17.0	push thr	u vane									ams fine Sandy		
20 5D 24/17 20.0 - 22.0 push thru vane with numerous partings and seams fine Sandy SiLT. MARINE SiLT-CLAY V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings) V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push.				15.6 - 16.0		1									que readings)		
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level y line saint with numerous partings and seams fine Sandy SILT. MARINE SILT. CLAY V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other		VZ		16.6 - 17.0	Su= 530.	7 27 psi							V2: 19.5 / 1 ft-lbs (65 mm	ı x 130 mm vane raw toı	que readings)		
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level y line saint with numerous partings and seams fine Sandy SILT. MARINE SILT. CLAY V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other	20																
V4 21.6 - 22.0 Su= 508/ 14 psf V3: 15.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. V4: 18.5 / 0.5 ft-lbs (65 mm x 130 mm vane raw torque readings); seams and partings noted during push. Remarks: NEBC Rig No. D-19 auto hammer calibration on 7/8/2019 Location: SB side I-95; approx. 1,000 ft N'ly of Holmes Rd and 50 ft offset project left from guardrail face Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Page 1 of 4 "Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other	20 -		24/17	20.0 - 22.0 20.6 - 21.0	push thr Su= 426	ru vane / 14 psf							with numerous partings a				
Remarks: NEBC Rig No. D-19 auto hammer calibration on 7/8/2019 Location: SB side I-95; approx. 1,000 ft N'ly of Holmes Rd and 50 ft offset project left from guardrail face Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other		V4		21.6 - 22.0	Su= 508	/ 14 psf							V3: 15.5 / 0.5 ft-lbs (65 m readings); seams and par V4: 18.5 / 0.5 ft-lbs (65 m	rtings noted during push ım x 130 mm vane raw t	ı. orque		
Remarks: NEBC Rig No. D-19 auto hammer calibration on 7/8/2019 Location: SB side I-95; approx. 1,000 ft N'ly of Holmes Rd and 50 ft offset project left from guardrail face Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other													reaumys), scams anu pal	ranga noteu duling pusi	·		
Remarks: NEBC Rig No. D-19 auto hammer calibration on 7/8/2019 Location: SB side I-95; approx. 1,000 ft N'ly of Holmes Rd and 50 ft offset project left from guardrail face Stratification lines represent approximate boundaries between soil types; transitions may be gradual. U.S. CUSTOMARY UNITS Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other	0.5																
U.S. CUSTOMARY UNITS * Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other	Rem NEI	BC Rig I						50 ft off	fset	proj	ect left	from g	uardrail face				
than those present at the time measurements were made.	U.S. C	USTOMA er level rea	RY UNITS idings have	been made at tim	nes and under	conditions sta					ns may o	occur du	e to conditions other		• HD \/M©	201	

N	Aain	-	artment Soil/Rock Exp US CUSTOM/	•	atio	n			Imp	rovemer	tland Area Mainline nts-Variable Message Signs ugh to Portland, ME	Boring No.: WIN:		//S-201 117		
Daille			Naw Fastas	d Davis a Castronton	T =1-		/54 \					A ID/OD:	000 4- 51			
Driller: New England Boring Contractors Operator: Schaefer/Titus					+	vation	ι (π.,	1	TE	VD88		Auger ID/OD:	SSA to 5'			
	'			+	tum:					III D 52 (trook mounted)	Sampler:	standard split-spoon 140 lbs/30 inches				
	ed By:	inioh	Schonewald	10 10/16/10: 1210	+-	g Type		- d -			ill B-53 (track mounted)	Hammer Wt./Fall:		iles		
	Start/Fi		see remarks	10-10/16/19; 1210	+-	illing N sing IC		_		V (4") to	sh boring	Core Barrel: Water Level*:	N/A 2.2 ft (open, n			
			actor: 0.707		+	mmer				. ,			Z.Z it (Open, ii	0		
Definit D = Sp MD = 1 U = Th MU = 1 V = Fie	ions: olit Spoon Jnsuccess in Wall Tu Jnsuccess eld Vane S	Sample sful Split Sp ibe Sample sful Thin Wa	R = Rock C SSA = Solid npt	ore San I Stem A ow Stem Cone ight of 1	mple Auger n Auger 140 lb. Ha of Rods o	amme r Casi	·r	S _u S _u q _p N-u Ha N ₆	(lab) = Lat = Unconfi Incorrecte mmer Effi 0 = SPT N	Hydraulic ☐ emolded Field Vane Undrained She b Vane Undrained Shear Strength (in ned Compressive Strength (ksf) ed = Raw Field SPT N-value ciency Factor = Rig Specific Annual l-uncorrected Corrected for Hamme mer Efficiency Factor/60%)*N-uncor	psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit I Calibration Value PI = Plasticity Index er Efficiency G = Grain Size Analysis					
				Sample Information						_						
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	09 _N	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Des	scription and Remarks	\$	Laboratory Testing Results		
25	6D V5	24/24	25.0 - 27.0 25.6 - 26.0	push thru vane Su= 618/ 27 psf							Olive grey, medium stiff, S one 4-inch seam fine San V5: 22.5 / 1 ft-lbs (65 mm	dy SILT at 26 ft. MAR	INE SILT-CLAY			
	MV						+	1			seams and partings noted	s and partings noted during push. Inable to push vane deeper than 26.0 ft; possible sand				
							\forall	\parallel			Seam.					
							$ \cdot \rangle$	-								
30 -	7D V6	24/24	30.0 - 32.0 30.6 - 31.0	push thru vane Su= 522/ 0 psf			OF	EN			Dark olive grey black, me sand with numerous parti					
	V7		31.6 - 32.0	Su= 618/ 0 psf							MARINE SILT-CLAY V6: 19 / 0 ft-lbs (65 mm x seams and partings noted	65 mm x 130 mm vane raw torque readings); ngs noted during push.				
											V7: 22.5 / 0 ft-lbs (65 mm seams and partings noted	x 130 mm vane raw to	orque readings);			
35 -	8D	24/24	35.0 - 37.0	push thru vane							Dark olive grey black, sof	t, Silty CLAY, trace ve				
	V8	24/24	35.0 - 37.0 35.6 - 36.0	Su= 385/ 0 psf			-		-		few partings fine Sandy S SILT-CLAY					
	V9		36.6 - 37.0	Su= 467/ 0 psf							V8: 14 / 0 ft-lbs (65 mm x V9: 17 / 0 ft-lbs (65 mm x	que readings) que readings)				
40 -																
.0	9D V10	24/24	40.0 - 42.0 40.6 - 41.0	push thru vane Su= 398/ 14 psf							Dark olive grey black, soft fine sand with few parting nodules. MARINE SILT-C	loccasional				
	V11		41.6 - 42.0	Su= 522/ 0 psf							V10: 14.5 / 0.5 ft-lbs (65 r readings) V11: 19 / 0 ft-lbs (65 mm					
											(22		'9- /			
45 -	10D	24/24	45.0 - 47.0	push thru vane							Dark olive grey black, soft		ry fine sand with			
	V12 V13		45.6 - 46.0 46.6 - 47.0	Su= 453/ 0 psf Su= 481/ 0 psf							nodules throughout. MARINE SILT-CLAY V12: 16.5 / 0 ft-lbs (65 mm x 130 mm vane raw torque readir V13: 17.5 / 0 ft-lbs (65 mm x 130 mm vane raw torque readir					
								J				n x 100 mm vane raw	torque reaumgs)			
							\prod									
E0							\	V								
50 Rem	arks:	I				1		*		77 F.F.	1					
				calibration on 7/8/2019		50 ft oi	ffset	nro	ect lef	t from a	uardrail face					

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

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

Page 2 of 4

Boring No.: HB-VMS-201

Maine Department of Transportation										tland Area Mainline	Boring No.:	HB-VN	/IS-201
			Soil/Rock Exp				Locatio			nts-Variable Message Signs gh to Portland, ME			
		<u>L</u>	JS CUSTOM	ARY UNITS						g.,,	WIN:	19-	117
Drille	\r.		New England	d Boring Contractors	Flov	ation	/f+ \	TBI			Auger ID/OD:	SSA to 5'	
ů ů			Datu		(11.)		VD88		Sampler:	standard split-spoon			
	ed By:		Schonewald	uo	+	Type:				II B-53 (track mounted)	Hammer Wt./Fall:	140 lbs/30 inc	•
	Start/Fi	nish:		10-10/16/19; 1210	+		lethod:			sh boring	Core Barrel:	N/A	
	ng Loca		see remarks	·	+		O/OD:		(4") to	-	Water Level*:	2.2 ft (open, no	
			actor: 0.707		_		Туре:		atic ⊠		Rope & Cathead □		
Definit				R = Rock Co SSA = Solid						emolded Field Vane Undrained She Vane Undrained Shear Strength (ear Strength (psf) T _V =	Pocket Torvane She = Water Content, per	
MD =	Unsuccess	ful Split Spc	on Sample Atter	mpt HSA = Hollo	w Stem A			q _p =	Unconfi	ned Compressive Strength (ksf)	LL =	Liquid Limit	Jeni
MU =	Unsuccess		Il Tube Sample A		ght of 140			Ham	mer Effic	d = Raw Field SPT N-value ciency Factor = Rig Specific Annual	Calibration Value PI =	Plastic Limit Plasticity Index	
V = Fi	eld Vane S Jnsuccess	hear Test, ful Field Var	PP = Pocket Pe ne Shear Test At	netrometer WOR/C = W tempt WO1P = We	eight of F eight of O	Rods or ne Pers	Casing son	N ₆₀	= SPT N = (Hamr	-uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	er Efficiency G = 0 rected C = 0	Grain Size Analysis Consolidation Test	
				Sample Information			1						
		(in.)	Sample Depth (ft.)	<u>.</u>	ted				g				Laboratory
(ft.)	Ž	e C.	e De	(/6 i	ou l		_	on	c Lo	Visual Description and Remarks			Testing
Depth (ft.)	Sample No.	Pen./Rec. (in.)	mple (Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	0	Casing Blows	Elevation (ft.)	Graphic Log				Results
 50	Sa	Pe	Sa (ft.	Str. Str. or or str.	ž	N ₆₀	Se	E E	ő				
50	11D	24/12	50.0 - 52.0	push thru vane						Dark olive grey black, med sand with nodules through			
	V14 V15		50.6 - 51.0 51.6 - 52.0	Su= 522/ 14 psf Su= 536/ 0 psf						V14: 19 / 0.5 ft-lbs (65 mr	n x 130 mm vane raw t	orque readings)	
										V15: 19.5 / 0 ft-lbs (65 mr 52 ft: Hydraulically push re		orque readings)	
										, ,,	•		
55 -													
60 -													
65 -													
03													
70 -					-+								
					+								
75													
Rem													
				calibration on 7/8/2019 000 ft N'ly of Holmes Ro		0 ft of	fset proj	ect left	from g	uardrail face			

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

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

Page 3 of 4

Boring No.: HB-VMS-201

Maine Department of Transportation							Project			tland Area Mainline	_		/IS-201
			oloration Log		Imp				nts-Variable Message Signs ugh to Portland, ME		4.0		
			US CUSTOM.	ARY UNITS							WIN:	19-	117
Driller: New England Boring Contractors						/ation	(ft.)	TBI)		Auger ID/OD:	SSA to 5'	
Operator: Schaefer/Titus					Datu	um:	. ,	NA'	VD88		Sampler:	standard split	-spoon
Logged By: Sc			Schonewald		Rig	Type:		Mol	oile Dr	ill B-53 (track mounted)	Hammer Wt./Fall:	140 lbs/30 inches	
Date	Start/Fi	nish:	10/15/19; 14	110-10/16/19; 1210	Drill	ling M	lethod:	cas	ed was	sh boring	Core Barrel:	N/A	
Bori	ng Loca	tion:	see remarks	· ·	Cas	ing ID	/OD:	HW	(4") to	30'	Water Level*:	2.2 ft (open, r	10
		ciency l	actor: 0.707				Туре:	Autom		Hydraulic □	Rope & Cathead		
	plit Spoon S			R = Rock C SSA = Solid	Stem Au	uger		S _{u(la}	ab) = La	emolded Field Vane Undrained Sho b Vane Undrained Shear Strength (psf) WC	= Pocket Torvane She C = Water Content, per	
	Unsuccess hin Wall Tu		ooon Sample Atter	RC = Roller	Cone	-		N-ur	correcte	ned Compressive Strength (ksf) ed = Raw Field SPT N-value	PL	= Liquid Limit = Plastic Limit	
V = Fi	ield Vane S	hear Test,	all Tube Sample A PP = Pocket Pe	enetrometer WOR/C = W				Nen	= SPT N	ciency Factor = Rig Specific Annua N-uncorrected Corrected for Hamme	er Efficiency G =	= Plasticity Index = Grain Size Analysis	
MV =	Unsuccess	ful Field V	ane Shear Test At	ttempt WO1P = We Sample Information	eight of O	ne Pers	son	N ₆₀	= (Hamı	mer Efficiency Factor/60%)*N-unco	rrected C =	Consolidation Test	
		<u> </u>			ъ				ł				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks	3	Laboratory Testing Results
75	S		S E	<u> </u>	Z	Z	0 m	ШΨ	10 H				
- 80 -													
- 85 -													
			-										
90 -													
												03.0	
										Bottom of Exploration	at 93.0 feet below gro	und surface.	
			+							Rod probe not fetch up; o	out of rods; bottom of b	oring, no retusal.	
- 95 -													
			-										
100													
	arks:				-		•		•				•
				calibration on 7/8/2019		.O. #	foot - · ·	a a t 1 - 6*	fue :=:	uprdroit for			
Loc	ation: St	side I-9	ю; арргох. 1,0	000 ft N'ly of Holmes R	u and 5	υ π of	iset proj	ect left	irom g	uardraii tace			
C1	E 4: "			undaries between soil types: t	**						Page 4 of 4		
 Strafif 	ication line	: renresen	annrovimate hou	maries netween soil types: f	rangitions	: mav h	e aradual				1 PAUP 4 OT 4		

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

Boring No.: HB-VMS-201

										Mainl	ne Improvements-Variable	Boring No.:	HB-VN	MS-202
		NC.	LOCAT		Messag Scarb	•		land, N	1E	Proj. No.:	19-	117		
Driller: New England Boring Contractors				l Ele	evation	(ft.)	86	.5 (app	rox)	Auger ID/OD:	SSA to 10'			
	ator:		Schaefer/Titu			_	tum:	(-)		VD88	- ,	Sampler:	standard split	-spoon
Logg	ged By:		Schonewald			Rig	g Type:		Мо	bile Dr	ill B-53 (track mounted)	Hammer Wt./Fall:	140 lbs/30 inc	ches
Date	Date Start/Finish: 10/15/19; 0940-1305			Dri	illing M	ethod:	ca	sed wa	sh boring	Core Barrel:	N/A			
Bori	ng Loca	tion:	Station 2392-	+00, 97 ft	left (approx	(.) Ca	sing ID	OD:	Н۷	V (4") t	20'	Water Level*:	9.0 ft (open, no	stabilization)
			actor: 0.707				mmer 1	уре:	Autor	natic ⊠	<u> </u>	Rope & Cathead □		
D = Sp MD = U = Th MU = V = Fid	olit Spoon Unsuccess in Wall Tu Unsuccess eld Vane S	sful Split Spo be Sample sful Thin Wa Shear Test,	oon Sample Atternal Tube Sample At PP = Pocket Per ne Shear Test Att	npt ttempt netrometer empt	R = Rock Cor Hammer Effic N-uncorrecte N ₆₀ = Raw S N ₆₀ = (Hamn S _U = Peak/Re RQD = Rock	ciency Fac d = Raw F PT N Vali ner Efficie emolded F Quality D	ctor=Rig-S Field SPT ue Correc ency Facto Field Vane	N-value ted for Har r/60%)*N Undrain	ammer E	fficiency	WOH = Weight of Hammer = Not Recorded/Applicat BOREHOLE ADVANCEMI n (psf) SSA/HSA = Solid/ Hollow S	Casing AASHTO / US -#200 = perce consoL = 1- ENT METHOD: UU/CIU/etc =	PL=Plastic Limit/PI=P	rength test lasticity Index
		·			formation					┨				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results
0								SSA		80.9				
	1D	24/16	3.0 - 5.0	9-11	-13-9	24	28		80.9		Grey tan, damp to moist, SAND, little to some silt;			
. 5 -											FILL changing at 5.6 ft to			
	2D	24/18	5.0 - 7.0	7-9-′	10-13	19	22				2D: Grey tan, moist, med some gravel, trace to little	ium dense, fine to mediu		
	3D	24/18	8.0 - 10.0	12-12	-16-17	28	33	\			Grey tan, moist (tight), m SAND, trace to little silt, t			
- 10 -								\mathbb{V}						
10	4D	24/14	10.0 - 12.0	17-24	-23-23	47	55	29 38			Grey tan with rust layers, medium SAND, trace to li grey brown pockets that a gravel. TILL	nd; with dark		
								72						
							+	12						
								83						
								94	-					
15 -	5D	24/17	15.0 - 17.0	26-42	-53-63	95	112	RC			Grey tan, moist (tight), very dense, fine to medium SAND, some gravel, little silt, trace coarse sand. TILL			
- 20 -								\bigvee	66.3		no recovery (wash)			
	6D	2/2	20.0 - 20.2	50)/2"				-				d surface.	
25														
	<u>arks:</u> BC Rig N	No. D-19 a	auto hammer o	calibration	on 7/8/20	19								
Stratifi	cation line	s represent	approximate bour	ndaries betwe	een soil types	; transitio	ns may be	gradual				Page 1 of 1		
* Wate	er level rea	-	been made at time ime measurement			tated. Gro	oundwate	fluctuati	ons may	occur du	e to conditions other	Boring No.	: HB-VMS	-202

APPENDIX B

Hager-Richter Geoscience Geophysical Report



GEOPHYSICAL SURVEY PORTLAND AREA MAINLINE IMPROVEMENTS MAINE TURNPIKE PORTLAND, MAINE

Prepared for:

HNTB Corporation 9 Entin Road - Suite 202 Parsippany, New Jersey 07054

Prepared by:

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

File 18J95 December, 2018

© 2018 Hager-Richter Geoscience, Inc.

GEOPHYSICISTS FOR THE ENGINEERING COMMUNITY

8 INDUSTRIAL WAY - D10
SALEM, NEW HAMPSHIRE 03079-5820
TELEPHONE (603) 893-9944
FAX (603) 893-8313

December 11, 2018

File 18J95

Matthew Riegel, P.E., D.GE

Associate Vice President Tel (973) 434-3109 HNTB Corporation Cell (973) 632-7541 9 Entin Road - Suite 202 Fax (973) 434-3101 Parsippany, New Jersey 07054

RE: Geophysical Survey

Portland Area Mainline Improvements

Maine Turnpike Portland, Maine

Dear Mr. Riegel:

In this report we summarize the results of a geophysical survey conducted by Hager-Richter Geoscience, Inc. (Hager-Richter) along a portion of the Maine Turnpike (Interstate 95) in Portland, Maine for HNTB Corporation (HNTB) in October, 2018. The geophysical survey was performed in support of a geotechnical investigation for planned improvements to the Maine Turnpike.

INTRODUCTION

As part of the Portland Area Mainline Improvements (PAMI) Project for the Maine Turnpike in Portland, Maine, HNTB required information regarding the depth and configuration of the bedrock surface in three areas of the northbound and southbound sides of the proposed widening. The general locations of the project areas are shown in Figure 1. According to information provided by HNTB, the length of northbound and southbound roadway alignment requiring the geophysical survey totals approximately 7,050 feet. HNTB was interested in determining the depth and configuration of the bedrock surface where bedrock is less than about ten feet deep.

The three areas of interest for the survey are identified as the Northern Area, Central Area, and the Southern Area, and their locations are shown on Figure 1. The areas of interest extended from the breakdown lane to the limits of the right-of way. The areas included paved and gravel shoulders, ditches, and grassy and wooded areas.

Geophysical Survey
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine
File 18J95
Page 2

OBJECTIVES

The objective of the geophysical survey was to provide information, where possible, on the depth of bedrock, where the depth of bedrock is less than about ten feet, along the accessible portions of approximately 7,050 feet of proposed lane widening.

THE SURVEY

The geophysical survey was conducted using the ground penetrating radar (GPR) method. Steven Grant, P.G., and Will Orfei of Hager-Richter conducted the geophysical survey on October 23 - 26, 2018. The fieldwork was coordinated with Matthew Riegel, P.E., D.GE, of HNTB. Mr. Dale Mitchell, also of HNTB, was onsite at the beginning of the survey and walked the areas of interest with Hager-Richter personnel. Data analysis and interpretation were completed at the Hager-Richter offices. Original data and field notes will be retained in the Hager-Richter files for a minimum of three years.

GPR data were acquired along traverses oriented parallel to the travel lanes with a variable spacing. GPR traverses located in the highway shoulder areas were spaced a few feet apart and GPR traverses located in the outer portions of the right-of-way were spaced 10 to 20 feet apart, where access allowed. GPR traverses oriented perpendicular to the travel lanes and spaced 20 to 100 feet were also acquired. GPR data acquired in wooded or brushy areas were acquired along lines with multiple bend points due to access. Steep slopes and bedrock outcrops, water-filled ditches, bridge embankments, and wooded areas limited access to the areas of interest. Photograph 1 shows typical site conditions.



Photograph 1. View to the south along the Maine Turnpike, north of Running Hill Road. The GPR unit is shown in the foreground.

Geophysical Survey
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine
File 18J95
Page 3

The locations of the GPR traverses were recorded with a Trimble DGPS system as the data were acquired. Use of the DGPS system allowed the GPR survey to be conducted in "walking mode" where access was available and provided horizontal control without the need for the time and expense of establishing a staked survey grid.

EQUIPMENT

The GPR survey was conducted using a Geophysical Survey Systems, Inc. SIR 4000 digital radar system using a 350 MHz hyper-stacking antenna with 180 ns¹ time window. The system includes a survey wheel that triggers the recording of data at fixed intervals, thereby increasing the accuracy of the locations of features detected along the survey lines.

GPR uses a high-frequency electromagnetic pulse (referred to herein as "radar signal") transmitted from a radar antenna to probe the subsurface. The transmitted radar signals are reflected from subsurface interfaces of materials with contrasting electrical properties. Travel times of the radar signal can be converted to approximate depth below the surface by correlation with targets of known depths and by a curve matching routine. We monitor the acquisition of GPR data in the field and record the GPR data digitally for subsequent processing. Interpretation of the records is based on the nature and intensity of the reflected signals and on the resulting patterns.

Data from the GPR survey were processed using RADAN 7.4 GPR processing software from Geophysical Survey Systems, Inc. We reviewed profile images and created plan view time slice maps of the GPR data.

LIMITATIONS OF THE METHOD

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

¹ns, abbreviation for nanosecond, 1/1,000,000,000 second. Light and the GPR signal require about 1 ns to travel 1 ft in air. The GPR signal requires about 3.5 ns to travel 1 ft in unsaturated sandy soil.

Geophysical Survey
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine
File 18J95
Page 4

There are limitations of the GPR technique: (1) surface conditions, (2) electrical conductivity and thickness of the subsurface layers, (3) electrical properties of the target(s), and (4) spacing of the traverses. Of these restrictions, only the last is controllable by us in most cases.

The condition of the survey surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. For exterior sites, a surface covered with obstacles such as automobiles, dumpsters, thick leaf debris, materials piles, etc. limit the survey access. Similarly, for interior sites, a surface covered with obstacles such as desks, benches, laboratory equipment, etc. also limit access. Some floor coverings may limit the coupling of the GPR antenna with the subsurface.

The electrical conductivity of the subsurface determines the attenuation of the GPR signals, and thereby limits the maximum depth of exploration. The GPR signal does not penetrate clay-rich soils or soils contaminated with road salt. In some cases, the GPR signal may not penetrate below concrete pavement, and some asphalts are electrically conducting.

A strong contrast in the electrical conductivities of the ground and the target (for examples, UST, pipe, void, dry well, drum, contaminant plume) is required to obtain a reflection of the GPR signal. If the contrast is too small, then the reflection may be too weak to recognize, and the target can be missed.

Spacing of the traverses is limited by access at many sites, but where flexibility of traverse spacing is possible, the spacing is adjusted on the basis of the size of the target.

RESULTS

The geophysical survey to detect bedrock as part of the Portland Area Mainline Improvements Project along portions of the Maine Turnpike consisted of a ground penetrating radar (GPR) survey across three specified areas of interest, identified as the Northern, Central, and Southern Areas. The interpretation of the GPR data are shown in Figures 2 through 4.

Apparent GPR signal penetration was generally fair to good across much of the area of interest, with two-way traveltime reflections received for 50 to 70 ns of the 180 ns records recorded. Based on site-specific time-to-depth conversions for the GPR signal in most areas, the GPR signal penetration is estimated to have been approximately 7 to 10 feet. GPR signal penetration was limited in breakdown lanes and some shoulder areas to about 40 to 60 ns, or about 5 to 8 feet.

Geophysical Survey
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine
File 18J95
Page 5

GPR reflections consistent with those expected for the bedrock surface are evident in the records for some areas. Bedrock was detected at depths ranging from 0 feet (i.e outcrop at surface) to as deep as 10 feet (i.e. the limit of GPR penetration). In areas where GPR reflections could be reliably picked as the top of bedrock, color contour plots of bedrock depth have been generated.

In other surveyed areas, reflections consistent with the top of bedrock were not received within the zone of GPR signal penetration, and we infer that bedrock is likely deeper than about 7 to 8 feet, a conservative estimate of the depth of GPR penetration. Areas where bedrock is likely deeper than about 7 to 8 feet are shown as blue stippled areas in Figures 2 through 4.

In some surveyed areas, it was not possible to determine whether GPR reflections from bedrock were received within the zone of GPR signal penetration. Such areas are shown as red stippled areas on Figures 2 through 4. In such areas, GPR reflections were present but could be caused by features other than bedrock. Many of the areas along breakdown lanes, shoulders, and ditches fall into this category, in part due to reduced depth of GPR signal penetration and possible interference from roadbed materials.

HNTB indicated that the geophysical data contained within this report might guide future boring and test pit programs (i.e. ground truth). It would be beneficial to confirm bedrock depths in areas where bedrock depth was interpreted using the GPR, and to confirm findings where bedrock was interpreted to be deeper than the depth of bedrock penetration. The most useful areas to obtain ground truth, however, might be in locations where bedrock depths could not be determined based on the GPR data. Good examples of such locations include areas along road shoulders or in a broad area located north of Running Hill Road and west of the southbound Maine Turnpike.

The GPR method works best where the method is used to provide continuity of depths between borings. Ground truth is necessary to increase the accuracy of the estimates of depth from GPR data due to variation in the velocity of the radar wave in soils caused by changes in water content or composition. For projects such as the subject project, where data are acquired over large distances, the GPR signal propagation velocities are likely to change along the length of the alignment.

The bedrock models shown as contour plots should not be used for contract bedrock removal quantities.

Geophysical Survey
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine
File 18J95
Page 6

CONCLUSIONS

Based on the results of the geophysical survey conducted by Hager-Richter Geoscience, Inc. along specified portions of the Maine Turnpike in the vicinity of Portland, Maine in October, 2018, we conclude that:

- Results from the GPR survey can be grouped into three categories; areas where bedrock depths could be determined, areas where bedrock was likely to be deeper than about 7-8 feet, and areas where bedrock depth could not be determined.
- Where bedrock depths could be determined, the data is presented as contour plots of bedrock depth, ranging from 0 to 10 feet depth.
- Borings and test pits could help confirm findings, in particular in areas where bedrock depths could not be determined on the basis of the GPR data.

LIMITATIONS

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

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

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

Geophysical Survey
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine
File 18J95
Page 7

If you have any questions or comments on this letter report, please contact us at your convenience. It has been a pleasure to work with you on this project. We look forward to working with you again in the future.

Sincerely yours,

HAGER-RICHTER GEOSCIENCE, INC.

Steven Grant, P.G.

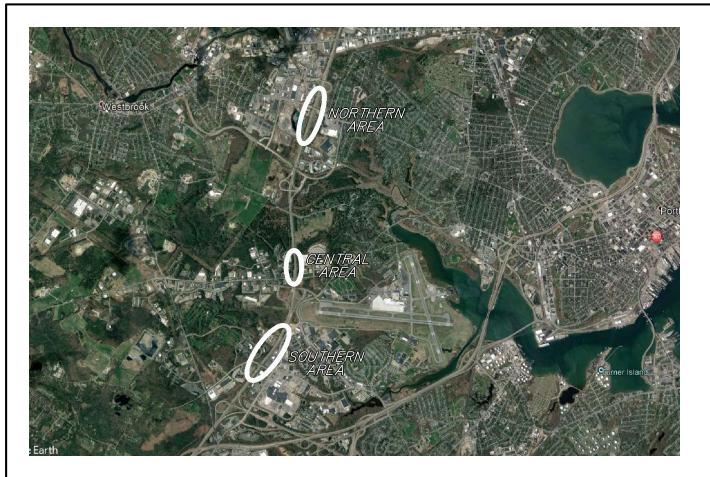
Senior Geophysicist

Jeffrey Reid, P.G.

Owner and Principal Geophysicist

Attachments: Figure 1 - General Site Location

Figure 2 - Northern Area Figure 3 - Central Area Figure 4 - Southern Area







LOCATION

NOTE:

Modified from Google Earth Pro aerial photograph.

Figure 1
General Site Location
Portland Area Mainline Improvements
Maine Turnpike
Portland, Maine

File 18J95

December, 2019

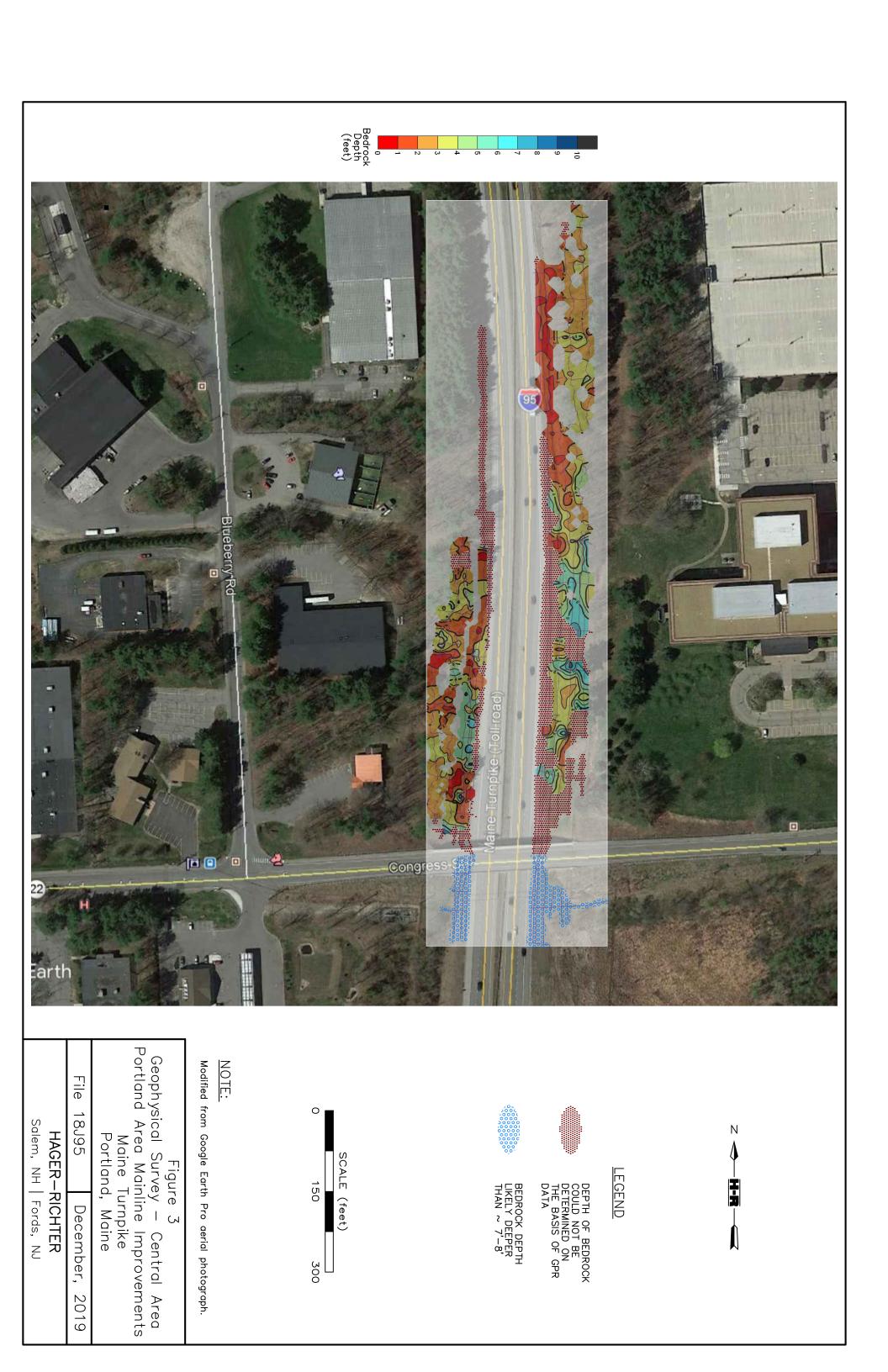
HAGER-RICHTER

Salem, NH | Fords, NJ



Modified from Google Earth

aerial photograph.



APPENDIX C

Pavement Distress Preliminary Investigation Report by Schonewald Associates Inc



■ www.SchonewaldEngineering.com ■

VIA EMAIL

DRAFT

TO: Dale Mitchell, P.E., HNTB Corporation (HNTB)

Ray Hanf, P.E., HNTB

FROM: Be Schonewald, P.E., Schonewald Engineering

Associates, Inc. (SchonewaldEA)

DATE: November 21, 2017

PROJ. NO.: 17-034

RE: Summary of Geotechnical Findings and Recommendations

Pavement Distress Evaluation

Maine Turnpike, Southbound, Crosby Maintenance Yard to Running Hill Road

South Portland, Maine

The purpose of this memorandum is to present the findings of the limited geotechnical program completed to evaluate the possible cause of and provide recommendations for mitigating the observed pavement distress in the SB barrel of the Maine Turnpike mainline between approximately MTA's Crosby Maintenance Yard and Running Hill Road in South Portland, Maine.

SchonewaldEA's work was completed in accordance with Task Order Number 908.01 dated September 13, 2017 to our Master / Task Order Agreement (HNTB Project Number 63272) that is dated February 23, 2016. This memorandum is subject to the limitations contained in the Closure section of the memorandum. A quality assurance review of the technical aspects of SchonewaldEA's work is being completed by Stephen J. Rabasca, P.E. of SoilMetrics, LLC located in Cape Elizabeth, Maine.

PROJECT UNDERSTANDING

SchonewaldEA has observed that the southbound barrel of the Maine Turnpike has experienced excessive distress along a rather isolated section from just northbound of the entrance road to the MTA's Crosby Maintenance Yard to a few hundred feet south of the Running Hill Road underpass (study area). The distress is manifested by severe cracking, as well as rutting. The distress is most pronounced in the SB travel lane and is somewhat less severe in the SB passing lane. The NB pavement in this area does not appear to be any more broken down than is typical.

GEOLOGICAL SETTING

A broad area of land adjacent to the SB barrel in this section of the Turnpike slopes towards the Turnpike, while the surrounding land slopes away from the NB barrel of the Turnpike. The westerly and uphill side of the Turnpike in the "study area" is dominated by the Running Hill glacial till and rock knob. Long Creek, a significant perennial stream, crosses under the Turnpike mainline approximately 450 feet northbound of the entrance road to Crosby Yard. The Turnpike mainline tends to act as a barrier to overland flow of surface water in the study area.

According to the geological map entitled "Surficial Geology, Portland West Quadrangle, Maine," published by the Maine Geological Survey, Open File No. 08-16, scale 1:24,000, the surficial soils are mapped as marine silt-clay (Presumpscot Formation) over much of the upgradient watershed, except for the Running Hill glacial till / rock knob. Surficial soils southbound of Running Hill Road are mapped as sands and silts that were deposited in shallow marine waters and that typical overlie marine silt-clays. Attached Figure 1 was taken from the above-referenced surficial geology map and identifies the study area.

■ www.SchonewaldEngineering.com ■

TEST BORING PROGRAM

SchonewaldEA retained New England Boring Contractors (NEBC) of Hermon, Maine to drill five test borings (HB-PAVE-101 through -105) and one test probe (HB-PAVE-103A) along the westerly side of the SB barrel of the Turnpike mainline in the study area. The borings were drilled using auger boring techniques to avoid the use of drilling water. The approximate locations of the explorations are shown on attached Figures 2 through 4. Details and sampling methods used, field data obtained, and soil and groundwater conditions encountered are provided on the boring logs attached as Appendix A. The drilling work was completed overnight on October 2nd - 3rd, 2017 and was observed and logged by SchonewaldEA.

Standard Penetration Tests (SPTs) were completed and split-spoon soil samples obtained continuously from near the ground surface to the bottom of each test boring, which was typically taken to encountering glacial till or refusal. The depth of the bottom of the borings ranged from 4.8 to 16.0 feet Below the Ground Surface (BGS). No sampling or testing was completed in the test probe; subsurface conditions were logged based on drilling behavior and observation of the auger cuttings. A shallow one-inch diameter PVC groundwater level observation well was installed in the HB-PAVE-102 borehole upon completion of the test boring. Observation well details are summarized on the HB-PAVE-102 boring log; a flush-mounted curb box was installed to complete the well installation. The boreholes were backfilled with drill cuttings supplemented by manufactured sand and gravel upon completion of the test boring; and pavement patched where applicable.

LABORATORY TESTING PROGRAM

A limited geotechnical laboratory testing program was completed. Select samples of the sand subbase and silt-clay subgrade materials that were encountered in the test borings were submitted to the R. W. Gillespie & Associates, Inc. geotechnical laboratory in Saco, Maine for gradation analyses, with and without hydrometer. The purpose of the laboratory program was to confirm the field classifications and relative fines contents of the sand subbase material and silt-clay subgrade material. The laboratory testing program is summarized in the following table.

Boring No.	Sample No.	Sample Depth	Sample Representative of: Test Performed:
HB-PAVE-102	2D	2 to 3.1 ft. BGS	sand subbase; sieve gradation test
HB-PAVE-102	2D-A	3.1 to 4 ft. BGS	silt-clay subgrade; sieve with hydrometer gradation test
HB-PAVE-104	2D	2 to 4 ft. BGS	sand subbase; sieve gradation test
HB-PAVE-104	3D	4 to 6 ft. BGS	silt-clay subgrade; sieve with hydrometer gradation test

Laboratory test results are attached as Appendix B and the results are summarized on the boring logs that are attached as Appendix A.

SUBSURFACE CONDITIONS

The generalized stratigraphy encountered in test borings HB-PAVE-101, -102, -104, and -105 consisted of a thin layer of gravelly granular fill (granular base material), underlain by clean sand with limited amounts of gravel (sand subbase), underlain by stiff grading to soft marine silt-clay (silt-clay subgrade), underlain by glacial till. Glacial till was encountered in all but HB-PAVE-104 at or above 13.6 feet BGS; HB-PAVE-104 was terminated without refusal to 14.0 feet BGS in very stiff silt-clay containing numerous sand seams. The bottom of the clean sand subbase material was observed to be saturated in most of the test borings.

DRAFT

HNTB Corporation November 21, 2017 Project No. 17-034

■ www.SchonewaldEngineering.com ■

Test boring and probe HB-PAVE-103(A) were advanced in an area where outcrop, presumably part of the Running Hill glacial till and rock knob, was observed in the westerly backslope. Granular fill and glacial till was encountered overlying weathered or broken rock in these explorations; shallow refusal (between 4.8 and 5.2 feet BGS) was believed to be on bedrock based on drilling behavior and geological setting; rock core was not obtained to confirm the nature of the refusal surface.

Descriptions of the soil samples obtained in the test borings are provided on the boring logs attached as Appendix A.

KEY FINDINGS AND CONCLUSIONS

The following summarizes the key findings from the test boring and laboratory testing programs:

- Relatively high-permeability clean subbase sand was encountered overlying relatively low-permeability silt-clay or bedrock subgrade;
- The bottom of the clean sand subbase material was observed to be saturated (wet) in many of the test borings despite a prolonged drought at the time the test borings were completed;
- A general lack of maintenance of the ditch and the strip between the edge of pavement and the ditch
 was noted, as evidenced by a windrow of winter sand along the edge of pavement that appeared to
 impede surface water runoff and saturated conditions (muck) and vegetation at the inlet to a
 significant cross-culvert located at approximately Station 2263+00; and
- The top of the low-permeability subgrade appears to be above the existing bottom of ditch at many of the test boring locations.

Based on these findings, SchonewaldEA concludes that the likely underlying cause for the pavement distress is related to the inability of water (infiltration water and, to a lesser extent, groundwater) that has collected in the clean sand subbase material to drain away from under the pavement. Attached Figure 5 illustrates this issue. The following section provides thoughts on actions that should be considered to mitigate the pavement distress issue.

GEOTECHNICAL-RELATED RECOMMENDATIONS

SchonewaldEA provides the following geotechnical recommendations for addressing the pavement distress observed in the study area.

RECOMMENDATIONS FOR SHORT TERM AND ON-GOING MAINTENANCE ACTIVITIES:

- Clean out and reshape ditch such that the ditch invert is below the observed top of silt-clay subgrade, estimated to range from 3 to 4 feet below shoulder grade;
- Check grades and regrade the ditch invert to promote flow to existing cross-culverts;
- Clean and rehabilitate as needed the inlets and outlets of cross-culverts to eliminate ponding to the extent practicable;
- To the extent practicable, clean out winter sand accumulation and other debris in the median to promote drainage to existing catchbasins;
- Complete thorough spring clean-up that includes removal of winter sand and sediment that has accumulated between the edge of pavement and outside edge of the ditch.

■ www.SchonewaldEngineering.com ■

RECOMMENDATIONS FOR LONG-TERM (RECOGNIZING PROPOSED MAINLINE WIDENING)

- Redesign (size) ditch system to "modern" standards to accommodate storm flows from the substantially more developed upgradient area;
- Incorporate a robust underdrain system into the ditch system design to address (depress) seasonal rise in groundwater levels and to remove storm water runoff more efficiently;
- Evaluate the benefit of incorporating a sheet or edge drain into the design for the proposed widening.
 This may involve a step down at the subgrade level and addition of a sheet drain header and lateral system beneath the new lane and/or shoulder; and
- Reevaluate and upgrade surface water drainage system in the median to more efficiently remove surface water runoff from the mainline pavement (e.g., permeable pavement in median overlying permeable soil that extends to below the adjacent subgrade level with the incorporation of an underdrain and more closely spaced catchbasins).

An outstanding question is whether the existing silt-clay subgrade has been disturbed and "weakened" by traffic travelling over the saturated sand subbase. If the silt-clay subgrade has been disturbed, it is likely that the existing cracks will "migrate" up through new pavement despite enhancing the drainage system as described above. Full-depth reconstruction would probably be needed to mitigate this issue. Disturbance of the subgrade surface cannot be readily assessed by completing test borings. Recognizing the maintenance of traffic challenges, one way to assess the integrity of the subgrade surface in order to evaluate the need for full-depth reconstruction would be to excavate the road section to expose subgrade in relatively large test areas (two) located in the travel lane. Since most damage to the subgrade surface would be expected to occur during spring thaw, this should be the target timeframe to complete the assessment.

CLOSURE

This memorandum has been prepared for the use of the Maine Turnpike Authority and their design consultant HNTB Corporation for specific application to mitigating the distressed pavement observed in the southbound barrel of the Maine Turnpike between approximately the Crosby Maintenance Yard and a few hundred feet southbound of Running Hill Road in South Portland, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

As HNTB Corporation's plan(s) for the mitigation of the pavement distress are developed, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the conclusions and recommendations and to modify the recommendations as appropriate to address the design details. The analyses and recommendations presented in this memorandum are based in part upon a limited subsurface investigation consisting of widely-spaced and discrete explorations completed in the study area. If variations from the conditions encountered during the investigation appear evident during design and construction activities, it may also become necessary to re-evaluate the recommendations made in this memorandum.

It is recommended that a geotechnical engineer be provided the opportunity to review the design drawings and specifications to confirm that earthwork and other geotechnical recommendations and construction considerations presented in this memorandum are properly interpreted and implemented.

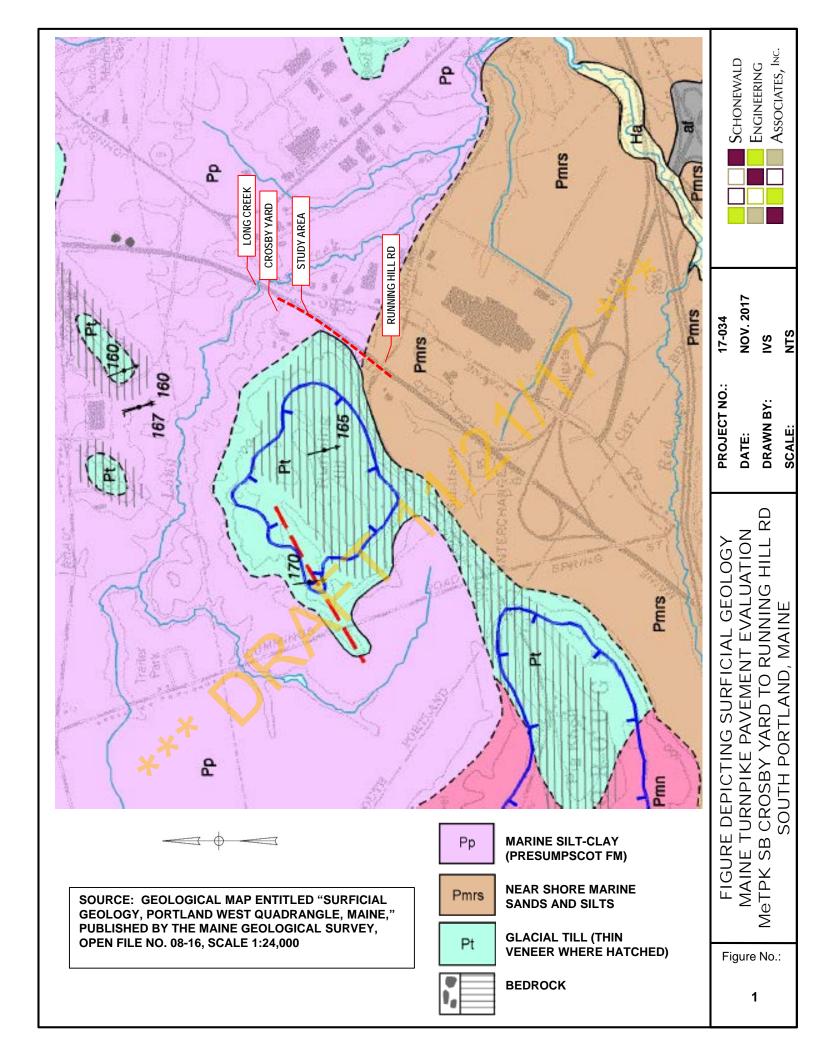
Attachments: Figures 1 through 5

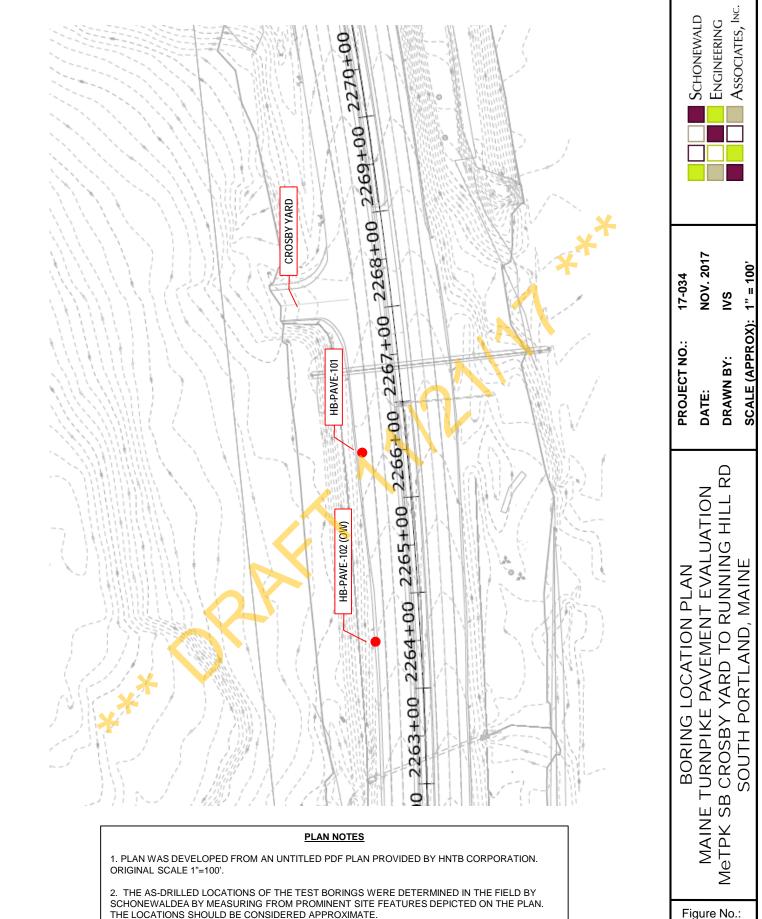
Appendix A: Boring Logs

Appendix B: Laboratory Test Results





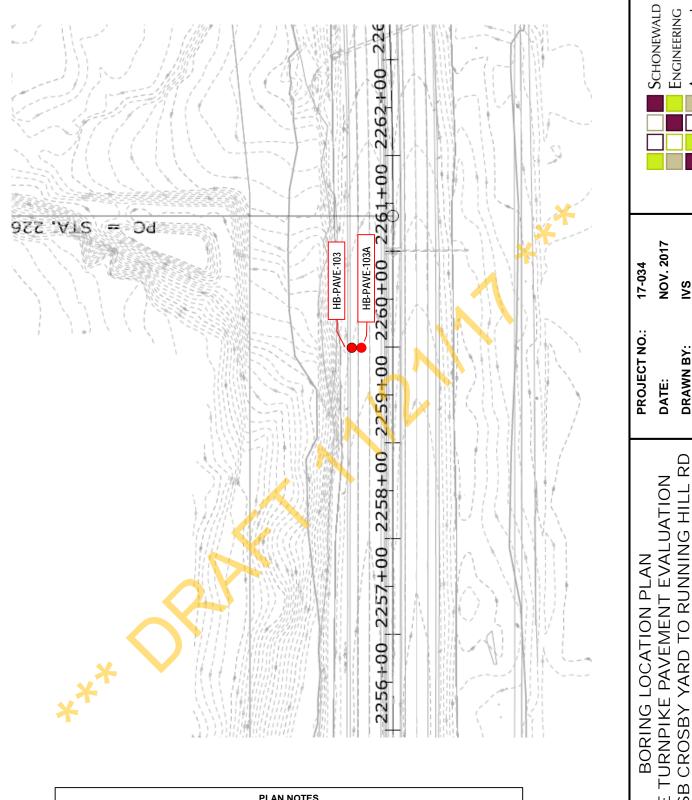




3. TEST BORINGS WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF HERMON, MAINE ON OCT. 2-3, 2017 AND WERE OBSERVED AND LOGGED BY SCHONEWALDEA. DETAILED

DESCRIPTIONS OF THE MATERIALS ENCOUNTERED ARE PROVIDED ON THE BORING LOGS.

2



PLAN NOTES

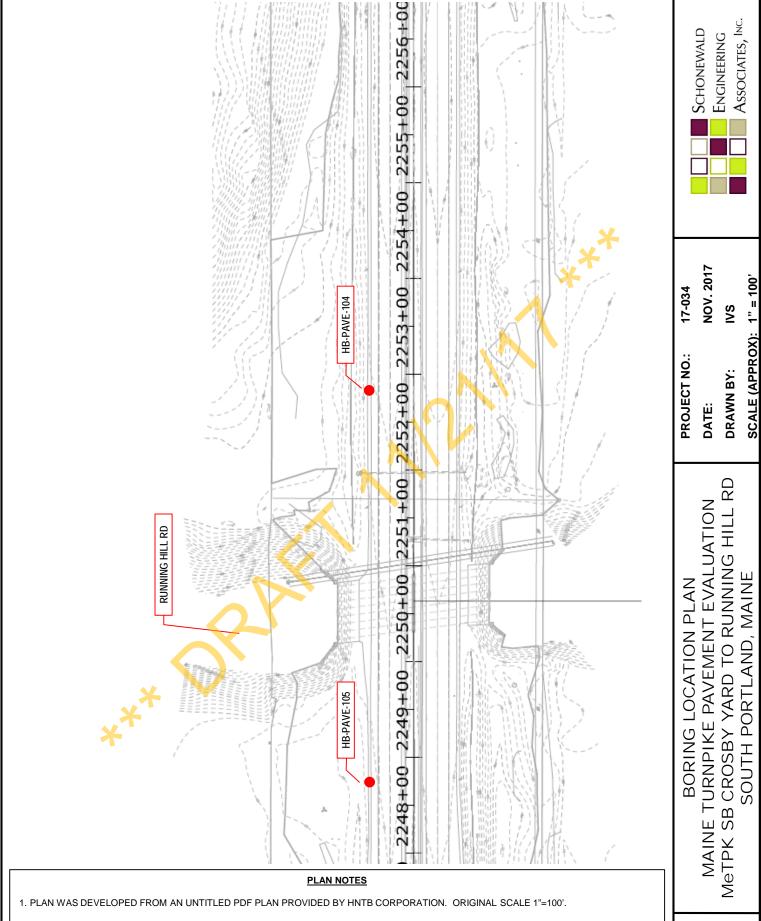
- 1. PLAN WAS DEVELOPED FROM AN UNTITLED PDF PLAN PROVIDED BY HNTB CORPORATION. ORIGINAL SCALE 1"=100'.
- 2. THE AS-DRILLED LOCATIONS OF THE TEST BORINGS WERE DETERMINED IN THE FIELD BY SCHONEWALDEA BY MEASURING FROM PROMINENT SITE FEATURES DEPICTED ON THE PLAN. THE LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
- 3. TEST BORINGS WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF HERMON, MAINE ON OCT. 2-3, 2017 AND WERE OBSERVED AND LOGGED BY SCHONEWALDEA. DETAILED DESCRIPTIONS OF THE MATERIALS ENCOUNTERED ARE PROVIDED ON THE BORING LOGS.

Metpk SB crosby yard to running HILL RD SOUTH PORTLAND, MAINE MAINE

ASSOCIATES, INC.

SCALE (APPROX):

Figure No.:



- 2. THE AS-DRILLED LOCATIONS OF THE TEST BORINGS WERE DETERMINED IN THE FIELD BY SCHONEWALDEA BY MEASURING FROM PROMINENT SITE FEATURES DEPICTED ON THE PLAN. THE LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
- 3. TEST BORINGS WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF HERMON, MAINE ON OCT. 2-3, 2017 AND WERE OBSERVED AND LOGGED BY SCHONEWALDEA. DETAILED DESCRIPTIONS OF THE MATERIALS ENCOUNTERED ARE PROVIDED ON THE BORING LOGS.

Figure No.:

4

_															
	CONCLUSION		sand subbase unable to drain	sand subbase able to drain	sand subbase unable to drain	sand subbase unable to drain	sand subbase unable to drain	sand subbase unable to drain	/		1	-ORIGINAL DITCH LINE			
	? SUBGRADE ABOVE DITCH INVERT?		ON	YES	ON	ON	ON	ON	EXISTING GROUND SURFACE			1	SUBGRADE	•	***
	TOP OF SILT-CLAY / ROCK SUBGRADE	ELEV (#)	56.0	58.9	63.7	65.1	63.8	64.1	EXISTING GF	EXISTING DITCH LINE)		TOP OF SILT-CLAY OR ROCK SUBGRADE		
	TOP OF SILT- SUBG	DEPTH (ft. BGS)	3.5	3.1	4.3	3.4	4.2	2.9					TOP OF SILT-C	SSUE	
	ADJACENT DITCH INV. ELEV	(APPROX.)	56.5	58.0	66.5	66.5	66.5	0.99		WATER FLOW PATH -			/	N OF PROBABLE ISSUE	
	GROUND SURFACE ELEV	(APPROX.) (ft)	59.5	62.0	68.0	68.5	68.0	67.0	HB-PAVE-101	/ //			•••••	ILLUSTRATION O	
*	OFFSET (FROM SB WHT LINE)		9.8 ft LT	9.1 ft LT	7.4 ft LT	3.0 ft RT	9.0 ft LT	9.6 ft LT			CLEAN SAND SUBBASE	SILT-CLAY / ROCK SUBGRADE			
	STATION	(APPROX.)	2266+50	2264+50	2260+00	2260+00	2252+85	2248+75			CLEA	SILT-CLAY/			
	TEST BORING		HB-PAVE-101	HB-PAVE-102	HB-PAVE-103	HB-PAVE-103A	HB-PAVE-104	HB-PAVE-105							

PROJECT NO.: 17-034

DATE: NOV. 2017

DRAWN BY: IVS

SCALE: NTS

ASSOCIATES, INC.

Schonewald Engineering

Figure No.:

MAINE TURNPIKE PAVEMENT EVALUATION METPK SB CROSBY YARD TO RUNNING HILL RD

SOUTH PORTLAND, MAINE

ILLUSTRATION OF KEY FINDINGS

5





			CHONEWALI		PROJE	CT:						Boring No.:		
			ngineering Associates, ^I		LOCATI	ON.		PK Ex			t 46	Proj. No.:	17-034	<u> </u>
Drille	 er:		New England				vation			(est'd)		Core Barrel: n/a		
Oper	rator:		Enos/ Royal			Dat	tum:	<u> </u>		, ,		Sampler: stan	dard split-spoo	n
Logo	ged By:		Schonewald			Ric	Type:		Mobi	le Drill	B-53	Hammer Wt./Fall: 140#		
	Start/Fi	nish: 1	0/2/17; 1935	-2055		_	lling Mo	ethod:	Hollo	w Ster	n Auger	Hammer Type: auto		
Bori	ng Loca		266+50, 9.8 ft extension - Cros			Ca	sing ID	OD:	n/a			Hammer Efficiency: 0.6	77	
	_		XIEHSIOH - CIOS	suy accelerati	on lane)	Au	ger ID/0	OD:	2.25'	ID/ 5.	88" OD	Water Level*: 12.2	!' (in augers)	
	U SAMPLI	NG AND TE	STING:	,	ADDITIONAL D						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESU AASHTO / USCS soil clas		
MD = l	Jnsuccess	ful Split Spo	on Sample atten	npt	N ₆₀ = N value	e correc	ted for ha			WO	R = weight of rods	-#200 = percent fines	WC = water conten	ıt (%)
MU = U		ful Thin Wall	I Tube Sample a	ttempt	hammer effici S _u = Insitu Fie	eld Van	e Shear S			BOF	not recorded REHOLE ADVANCEMENT METH		ained triaxial test	
	situ Vane S Unsuccessi		ne Shear Test at	tempt	R = Rock Cor RQD = Rock			on (%)			/HSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / PL=Plast lic push UCT qp = peak compress		city Index
				Sample In	formation									
		(in.)	Depth	2		ted				_ D		V	,	Lab.
Œ.	Sample No.		De	Blows (/6 in.) Shear Strength	_ (%)	N-uncorrected			5	Graphic Log	Visual D	escription and Remarks		Testing
Depth (ft.)	nple	Pen./Rec.	Sample [ws (nco	0	Casing Blows	Elevation (ft.)	phi				Results
Dep	Sar	Per	Sar (ft.)	She	(psf or F	₹	N-60	Cas	(Fle	Gra		*		
0									59.1	20 S	5 in HMA		0.4	
											1D: Brown, damp to mo	ist, m. dense, fine to mediur	0.4- n SAND,	
	1D	24/12	1.0 - 3.0	9-9-	8-7	17	19			蹇	trace to little Silt, trace fi	ne Gravel, trace coarse Sar	nd. FILL	
	2D	24/22	3.0 - 5.0	6-8-	8-9	16	18		56.0	豐		arse SAND, little Silt, trace t	o little fine	
		- "	0.0 - 0.0				"		30.0		Gravel; btm of sand wet		3.5	
- 5 -												nottled, v. stiff, Clayey SILT bed. MARINE SILT-CLAY	, trace fine	
	3D	24/24	5.0 - 7.0	2-2-	3-5	5	6					, SILT & CLAY, trace fine S	and.	
											1			
											4D: Olive brown grey m	ı. stiff, CLAY & SILT, with or	ne 1/16-in	
	4D	24/24	7.0 - 9.0	4-4-	4-5	8	9				seam grey fine Sand.	i. suii, OLAT & OILT, WILITOI	10-111	
										11/10	5D: Grey, soft, CLAY &	SILT, with few partings fine	Sandy SILT.	
10 -	5D	24/24	9.0 - 11.0	1-1-	1-1	2	2							
	6D	24/18	11.0 - 13.0	2-2-	2-2	4	5					aks, m. stiff, Silty CLAY, wit ne Sandy SILT at 12.2 ft; ch		
						-					12.6 ft to:	ne Sandy Sill at 12.2 it, G	ianging at	
	6D-A								46.9		6D-A: Grev wet fine to	coarse Sandy SILT, little fin	12.6- le Gravel	
	7D	5/0	13.0 - 13.4	50/	5"				46.1		1 TILL	•		
						Y					PHYLLITE in tip of spoo	y SILT, some Gravel with won.)		
- 15 -												n at 13.4 feet below groun	d surface.	
											Split-spoon refusal.	_		
)									
			*											
			V											
		•												
- 20 -		1												
25			<u> </u>											
	arks:				<u> </u>				_					
Adja	acent dit	ch invert	elev. 56.5 (es	st'd).										
Stratifi	ication line	s represent	approximate bou	ındaries hetwe	en soil types: to	ransitio	ns mav he	gradual				Page 1 of 1		
		•					-	_	ons may	occur du	e to conditions other than those	1	ID D	101
pres	ent at the t	ime measur	ements were ma	ide.		Ju. 010			o may (. Jour uu	2 35 Someway of the first those	Boring No.: 1	HB-PAVE-	101

			Schonewali	D	PROJE	CT:	Pave	ment	Distre	ess		Boring No.:	HB-PAVE-10	2 (OW)
			Engineering					PK Ex			it 46	Proj. No.:	17-03	4
			Associates,		LOCAT									
Drille			New England	Boring Co	ntractors	+-	vation	(ft.)	62 (6	est'd)		Core Barrel:	n/a	
Oper	rator:		Enos/ Royal			+	tum:					Sampler:	standard split-spoo	on
	ged By:		Schonewald			_	Type:				I B-53	Hammer Wt./Fall:		
-	Start/Fi		10/2/17; 2105			+-	lling M			w Ste	m Auger	Hammer Type:	auto	
Bori	ng Loca	tion:	2264+50, 9.1 ft	LT of wht line	e (off EP)	+-	sing ID		n/a			Hammer Efficiend		
D = Sp MD = U U = Th MU = U V = Ins	olit Spoon S Unsuccess In Wall Tul Unsuccess Situ Vane S	ful Split Spo be Sample ful Thin Wa hear Test	ESTING: Doon Sample atten Ill Tube Sample a ane Shear Test at	npt ttempt	ADDITIONAL I N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu Fi R = Rock Cor RQD = Rock	DEFINIT d = N va e correct iency = eld Van re Samp	alue sted for ha calculated e Shear S ale	mmer effi I hammer strength (p	iciency efficienc	ADE Wo Wo y = BC SS	.88" OD ITIONAL DEFINITIONS: DH = weight of 140lb. hammer DR = weight of rods In to recorded REHOLE ADVANCEMENT METH AHSA=solid/hollow stem auger =roller cone/OPEN/PUSH=hydrauli	LL=Liquid Limit / F	soil classifications nes WC = water conte nsolidation test ed undrained triaxial test PL=Plastic Limit / PI=Plasti	city Index
			T	Sample In	formation									
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)			escription and Rema		Lab. Testing Results
	1D	24/13	0.0 - 2.0	8-12	2-9-7	21	24		61.0	A .,	1D: Dark brown, damp, f	t to:	_ — — — —1.0-	
											little Silt, trace coarse S	and. FILL		A-3
	2D 2D-A	24/19	2.0 - 4.0	4-3	i-3-6	6	7		58.9		2D: Brown tan, moist, fin trace Silt, trace coarse S \to:		t; changing at 3.1 ft	SP-SM WC=13.9% -#200=9.0%
	3D	24/22	4.0 - 6.0	2.5	i-6-7	11	12		1		2D-A: Olive grey, mottle	d and desiccated, Cla	ayey SILT, trace fine	CL-ML WC=26.1%
- 5 -	30	24/22	4.0 - 6.0	3-3	-0-7		12				Sand; appears undisturb 3D: Olive brown, slightly seam fine Sandy SILT.	mottled, stiff, SILT &	CLAY, with one	-#200=89.2%
	4D	24/23	6.0 - 8.0	3-4	-5-6	9	10				4D: Olive brown, slightly	mottled, stiff, CLAY	& SILT.	
	5D	24/24	8.0 - 10.0	WOI	H/24"	0	0		1		Olive brown, CLAY & SII 5D: Grey, Silty CLAY, wi Sandy SILT, little to som	th one 1-inch seam of	nanging at 8.3 ft to: of fine to coarse	
- 10 -	6D	24/15	10.0 - 12.0	WOR	t-1-3-6	4	5				6D: Grey, wet, Silty CLA Sandy SILT, little to som			
						4			50.5 50.0		Grey, wet, fine to coarse	Sandy SILT, some C	— — — — —11.5- Gravel. TILL ————12.0-	
											Bottom of Exploration No refusal.	1 at 12.0 feet below		
- 15 -						<u> </u>								
			**											
- 20 -		X												
25	arks:													
Adja One 12 t	e-inch dia to 6 ft be	a. ground ntonite c	elev. 58 (est' dwater level o hips / 6 to 2 ft screen / roadb	bservation filter sand					st borir	ıg con	npletion:			
Stratifi	ication line	s represent	approximate bou	indaries hetwi	een soil tynes: t	transitio	ns may he	e gradual				Page 1 of 1		
* Wate	er level rea	dings have	been made at tin	nes and under			-	-		occur d	ue to conditions other than those			400 (0)40
pres	ent at the t	ime measu	rements were ma	ide.	. Jonaniono oldi	.50. 010	awal6	oudall	o may	Looui u	22 12 SOMEWARD OWNER WIGHT WIOSE	Boring No	o.: HB-PAVE-	102 (OW)

			SCHONEWALI		PROJE	CT:	Pave	ment	Distre	ss		Boring No.: HB-PAVE	-103
			NGINEERING						it 45 to		t 46	Proj. No.: 17-03	4
Deille			Associates,		LOCAT							Core Barrel: n/a	
Drille			New England Enos/ Royal	Boring Co	ntractors	_	vation tum:	(π.)	68 (e	sta)			on
<u> </u>	rator:		Schonewald			+-	Type:		Mobil	o Drill	D 53	Sampler: standard split-spo Hammer Wt./Fall: 140# / 30"	UII
	ged By: Start/Fi		10/2/17; 2245	S-2310		_	lling M				n Auger	Hammer Type: auto	
	ng Loca		2260+00, 7.4 ft		e (shoulder)	+-	sing ID		n/a	w Otel	II Augei	Hammer Efficiency: 0.677	
	ig Loca		2200 - 00, 7.4 10	LI OI WIICIIII	c (oriodiaci)	+	ger ID/			ID/ 5	88" OD	Water Level*: dry	
		NG AND T	ESTING:		ADDITIONAL I	DEFINIT	IONS:			ADDI	TIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	
MD = U		ul Split Spo	oon Sample atten	npt	N-uncorrecte N ₆₀ = N value			ımmer effi	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte	ent (%)
	in Wall Tub Insuccessf		II Tube Sample a	ttempt	hammer effici S _{II} = Insitu Fi						not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test IODS: UU=Unconsolidated undrained triaxial test	
V = Ins	itu Vane S	hear Test	ne Shear Test at	· ·	R = Rock Col RQD = Rock	re Samp	le		,		/HSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plast lic push UCT qp = peak compressive strength of roc	
	71104000001	ar morta va			formation	quanty					TOTOL COLLEGE	no pasiri Cori qp pouri compressivo cucingur er roc	Ì
		(in.)	bth	<u> </u>		eq						✓	Lab.
ff.	Sample No.		Sample Depth (ft.)	/6 ir	Strength (psf) or RQD (%)	N-uncorrected			5	Graphic Log	Visual D	escription and Remarks	Testing
Depth (ft.)	nple	Pen./Rec.	l ple	ws (grada GD	li CO		Casing Blows	Elevation (ft.)	phic			Results
Dep	Sar	Per	San (ft.)	She	pst pst or F	Ž	09-N	Cas	Ele (ft.)	Ga		*	
0									67.5		6 in HMA	0.5	
			+	-			-		67.5		1D: Brown tan, damp, m	0.5 n. dense, fine to medium SAND, trace to	
	1D	24/13	1.0 - 3.0	8-7-	7-19	14	16				little Silt, trace fine Grave 2.6 ft to:	el, trace coarse Sand. FILL Changing at	
									65.4			2.6	
	2D	11/9	3.0 - 3.9	14.5	50/5"				65.0		Grey, fine to coarse SAN pieces broken rock. TILL	ND, some Gravel, little to some Silt, with	
		11/3	3.0 - 0.8	14-3			-		63.7		<u> </u>		
- 5 -											Sand, trace to little Silt;	coarser fraction appears to be broken	
"									62.8	NXXX	rock. WEATHERED RO	4 3-	
											4.3 ft: Top of sound rock	based on drilling behavior.	
												on at 5.2 feet below ground surface.	
											Aug <mark>er</mark> refusal.		
										ľ			
- 10 -													
10													
								· ·					
							X						
					1								
						lacksquare							
- 15 -						1							
) '								
							<u></u>						
			*										
- 20 -		×	1										
			-	-									
						_							
			+										
. 25 	orke:												
	arks:												
Adja	acent dit	ch invert	elev. 66.5 (es	st'd); rock e	exposed in s	teep b	ackslop	e.					
1													
1													
Stratifi	cation lines	represent	approximate bou	undaries betwe	een soil types; t	transitio	ns may be	gradual.				Page 1 of 1	
* Wate	er level read	dings have	been made at tin	nes and under	conditions stat	ted. Gro	oundwate	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring No.: HB-PAVE-	103
pres	ent at the ti	me measu	rements were ma	ade.					-			BUTTING NO.: HB-PAVE-	103

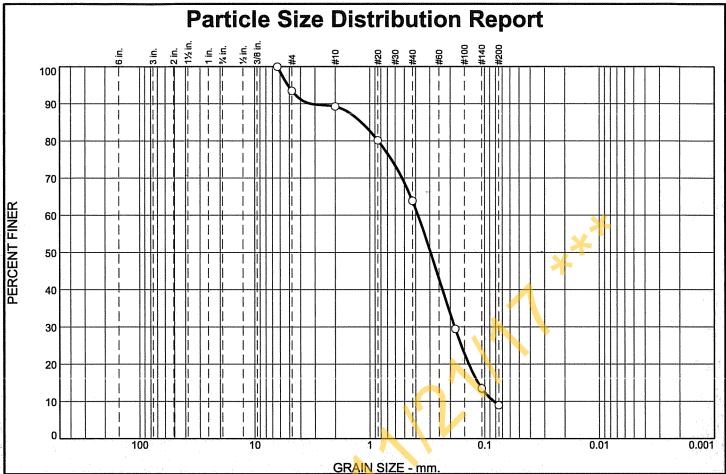
			CHONEWAL		PROJE	ECT:	Pave	ement	Distre	ss		Boring No.: _	HB-PAVE-	103A
			- NGINEERINC					PK Ex			t 46	Proj. No.:	17-034	1
			Associates,		LOCAT									
Drille			New England	Boring Co	ntractors		vation	(ft.)	68.5 ((est'd)		Core Barrel:	n/a	
⊢÷-	rator:		Enos/ Royal			_	tum:		Mahil	a Drill	D 50	Sampler: Hammer Wt./Fall:	n/a	
	ged By:		Schonewald	. 0005		_	Type:		Mobil				auto	
	Start/Fi		10/2/17; 2315 2260+00, 3.0 ft		e (travel lane,	-	Iling M			Stem	Auger Probe	Hammer Type: Hammer Efficiency		
Богіі	ng Locat	tion:	outside wheel ri	ut)		-	sing ID		n/a 4.5" (<u> </u>		Water Level*:		
IN-SIT	U SAMPLI	NG AND T	ESTING:		ADDITIONAL		ger ID/	OD.	4.5		TIONAL DEFINITIONS:	LABORATORY TEST	dry RESULTS:	
	lit Spoon S Jnsuccessf		oon Sample atter	npt	N-uncorrecte N ₆₀ = N valu			ammer effi	iciencv		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS so -#200 = percent fine		nt (%)
U = Th	in Wall Tub	e Sample	Il Tube Sample a	•	hammer efficiency	iency =	calculated	d hammer	efficiency	=	not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D cons		, ,
V = Ins	itu Vane Sl	hear Test	•	·	R = Rock Co	re Samp	ole)3i)	SSA	/HSA=solid/hollow stem auger	LL=Liquid Limit / PL	=Plastic Limit / PI=Plastic	
IVIV = C	Insuccessi	ui insitu va	ine Shear Test at		RQD = Rock formation	Quality	Designati	on (%)		RC:	roller cone/OPEN/PUSH=hydrau	iic push OCT qp = peak com	ipressive strength of rock	(
		(in.)	£	l .		D.				1				
<u></u>	S		Dep	Ë	(%	ecte			_	Log	Visual F	escription and Remark	· ·	Lab. Testing
h (ft	ple	/Rec	<u>ə</u> e	ν	mg	СОП		gu ş	atio	hic	Viouai E	coorpion and remain		Results
Depth (ft.)	Sample No.	Pen./Rec.	Sample Depth (ft.)	3low	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log		*		
0	0,		0,0	ш 07 (,, () ()		-				13 in HMA (weathered I	ayer at approx 6 in)		
									67.4	4	, , , , , , , , , , , , , , , , , , , ,		1.1-	
									67.4				1.1	
									1					
									65.6		2 0 ft: Apparant transition	on from grounder fill to a	— — — —2.9-	
									65.1		2.9 ft: Apparent transition (rock).	n nomytanuat III to N		
											3.4 ft: Top of sound rocl	 based on drilling beha	— — — ——3.4- avior.	
- 5 -									63.7			on at 4.8 feet below gr	4 .8-	
											Auger refusal.	ni at 4.0 leet below gi	ound surface.	
									1					
										"				
									•					
- 10 -														
									1					
							\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \							
- 15 -														
									1				l	
			 				-		ł				l	
			V										l	
		•											l	
- 20 -									1					
								-						
]				l	
									1				l	
													l	
25														
25 Rem	arks:		-1	1					·		1			
Adia	acent dite	ch invert	elev. 66.5 (e:	st'd); rock e	exposed in s	steep b	ackslor	e.						
									ger cutt	ings a	nd drilling behavior.			
1														
												15		
l .			approximate box				-	-				Page 1 of 1		
^ Wate	er level read ent at the ti	dings have ime measu	been made at tir rements were ma	nes and under ade.	conditions sta	ited. Gro	oundwate	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring No	.: HB-PAVE-	103A

			Schonewali Engineering		PROJE	ECT:					t 16	Boring No.: _		
			Associates, 1		LOCAT	ION:		PK Ex h Port			1 40	Proj. No.:	17-03	4
Drille	er:		New England	Boring Cor			evation		68 (e			Core Barrel:	n/a	
Oper	rator:		Enos/ Royal			Da	tum:					Sampler:	standard split-spoo	on
	ged By:		Schonewald			_	Type:			le Drill		Hammer Wt./Fall:		
	Start/F		10/2/17, 2350 2252+85, 9.0 ft			+-	illing M		Hollo n/a	w Ste	n Auger	Hammer Type: Hammer Efficienc	auto	
БОП	ng Loca	ition:	2252+65, 9.0 10	LT OF WILLIINE	(OII EP)	+-	sing ID			' ID/ 5	88" OD	Water Level*:	13.9' (open)	
			TESTING:		ADDITIONAL	DEFINIT	TIONS:	<u> </u>	2.20	ADDI	TIONAL DEFINITIONS:	LABORATORY TEST	RESULTS:	
MD = U U = Th MU = U V = Ins	iin Wall Tu Jnsuccess situ Vane S	ful Split Split Split Split Split Sample ful Thin Wishear Test	'all Tube Sample a <u>'ane Shear Test at</u>	ttempt tempt	N-uncorrecte N ₆₀ = N valu hammer effic S _U = Insitu Fi R = Rock Cor RQD = Rock	e correctiency = field Van re Samp	cted for ha calculated e Shear Sole	d hammer Strength (p	efficiency	WO / = BO SS/	H = weight of 140lb. hammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger rroller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / Pl	es WC = water contensolidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	icity Index
				Sample In	formation		1			-				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Suerigui (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log		escription and Remarl		Lab. Testing Results
0	1D	24/14	0.0 - 2.0	7-10)-7-7	17	19				1D: Dark brown, damp, to Silt; changing at 1.2 ft to		some Gravel, little	
									66.8		Brown tan, fine to mediu Gravel, trace coarse Sa	m SAND, trace to little	1.2- Silt, trace fine	
	2D	24/17	2.0 - 4.0	4-4-	4-4	8	9				2D: Brown tan, damp to to little Silt, trace Grave	wet, loose, fine to med	dium SAND, trace	A-3 SP-SM WC=14.7% -#200=10.1%
- 5 -	3D	24/22	4.0 - 6.0	3-7-1	0-12	17	19		63.8		3D: Olive brown, mottled SILT, trace fine Sand. M	d, desiccated to 4.8 ft, ARINE SILT-CLAY	v. stiff, Clayey	CL-ML WC=26.2% -#200=88.4%
	4D	24/24	6.0 - 8.0	7-8-	9-13	17	19				4D: Olive brown, mottled pockets of mica and one SAND.			
	5D	24/22	8.0 - 10.0	5-10-	12-14	22	25		1		5D: Olive brown, slightly Sand, with partings of Si		& CLAY, trace fine	
- 10 -	6D	24/21	10.0 - 12.0	3-5-1	8-10	13	15				6D: Olive brown, stiff, SI partings of Silty fine SAN		e Sand, with	
	7D	24/24	12.0 - 14.0	7-9-	-8-8	17	19		5.1.0		7D: Olive brown grey, v. partings and seams wet		D.	
- 15 -					2	X			54.0		Bottom of Exploration No Refusal.	n at 14.0 feet below g	——14.0- ground surface.	
			*											
			X											
- 20 -		7												
25														
	arks: acent di	tch inver	t elev. 66.5 (es	st'd).					•	'	•			
, rujo	acont di	on mivel	. 3.07. 00.0 (65											
Stratifi	ication line	s represer	nt approximate bou	ındaries betwe	een soil types;	transitio	ns may be	e gradual.				Page 1 of 1		
* Wate pres	er level rea	idings hav	e been made at tin urements were ma	nes and under ade.	conditions sta	ted. Gr	oundwate	r fluctuatio	ons may o	occur du	e to conditions other than those	Boring No	.: HB-PAVE-	.104

				Schonewali		PROJ	ECT:	Pave	ment	Distre	ss		Boring No.:	HB-PAVE	-105	
Driller New England Boring Contractors Elevation (t), 67 (estd) Core Barrel: n/a												t 46	Proj. No.:	17-034	1	
Departor: Enos/Royal Datum: Sampler: standard split-spoon	<u> </u>												-			
Logged By: Schonewald	_				Boring Cor	ntractors	_		(ft.)	67 (e	st'd)					
Date Start/Finish: 10/3/17, 0100-0230 Drilling Method: Hollow Stem Auger Hammer Type: auto	H						+								on	
Boring Location: 2248+75, 9.5 ft LT of whit line (off EP)	_															
Approximate August DIOD: 2.25" ID/5.88" OD Mater Level*: 8.3" (open)	-						_				w Ster	n Auger				
No. Proceeded Proceedings No. Proceedings Proc	Bori	ng Loca	tion:	2248+75, 9.6 ft	LT of wht line	e (off EP)	_							-		
D = Spill Spon Sample MOH = Weight of 15to ib. harmer MOH = Weight of 15to ib. MOH = Weight of 15to ib. harmer MOH = Weight of 15to ib. MOH = Weight of 15to ib. MOH = Weight of 15to ib. harmer MOH = Weight of 15to ib. MOH = Weight of 15	IN-SIT	TU SAMDI I	NG AND T	FSTING:		ADDITIONAL		_	UD:	2.25"				, , ,		
V = Institu Vane Shear Test Vane Shear Test alterange R = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROCk Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROP = Rock Core Sample ROCk Core Sample ROP = Rock Core Sample ROCk Core Samp	D = Sp MD = 1 U = Th	plit Spoon S Unsuccesst nin Wall Tub	Sample ful Split Spo pe Sample	oon Sample atter	npt	N-uncorrect N ₆₀ = N val hammer effi	ed = N va ue correc ciency =	ilue ted for ha calculated	d hammer	efficiency	WO WO	H = weight of 140lb. hammer R = weight of rods not recorded	AASHTO / USCS -#200 = percent fi CONSOL= 1-D co	soil classifications nes WC = water content onsolidation test	nt (%)	
Sample Information C	V = Ins	situ Vane S	hear Test			R = Rock Co	ore Samp	le		50.7	SSA	VHSA=solid/hollow stem auger	LL=Liquid Limit / F	PL=Plastic Limit / PI=Plasti		
10 24/14 0.0 - 2.0 9-10-10-8 20 23 10 24/14 0.0 - 2.0 9-10-10-8 20 23 10 24/19 2.0 - 4.0 2-3-4-6 7 8 10 24/19 2.0 - 4.0 2-3-4-6 7 8 10 24/18 4.0 - 6.0 5-9-9-14 18 20 2.9 to 1.2	1010 - 1	Orisaccessi	ui iiisitu ve				K Quality	Designati	011 (70)			Toller corter of Environmental Injuration	ост ур – реак сс	ompressive strength of rock	`	
10. Dark brown, damp, fine to coarse SAND, some Gravel, little Sitt, changing at 1.2 ft to: 10			n.))th	·		pa] _			•	1 -1-	
10 24/14 0.0 - 2.0 9-10-10-8 20 23 10 24/14 0.0 - 2.0 9-10-10-8 20 23 10 24/19 2.0 - 4.0 2-3-4-6 7 8 10 24/19 2.0 - 4.0 2-3-4-6 7 8 10 24/18 4.0 - 6.0 5-9-9-14 18 20 2.9 to 1.2	£	<u>8</u>		Deg	, w	(%)	rect			۾	Log	Visual D	escription and Rema	rks	Lab. Testing	
10 24/14 0.0 - 2.0 9-10-10-8 20 23 10 24/14 0.0 - 2.0 9-10-10-8 20 23 10 24/19 2.0 - 4.0 2-3-4-6 7 8 10 24/19 2.0 - 4.0 2-3-4-6 7 8 10 24/18 4.0 - 6.0 5-9-9-14 18 20 2.9 to 1.2	th (f	-ple	/Re	e e	vs (/		וכסר		ing	atic	hic				Results	
10. Dark brown, damp, fine to coarse SAND, some Gravel, little Sitt, changing at 1.2 ft to: 10	Dep	San	Pen	San (ft.)	Blov	or R	ا ا)9-N	Cas	Ele (#.)	Grap		*			
Brown tan, wet, fine to medium SAND, trace to little Silt, trace Gravel, trace coarse Sand. FILL Brown tan, wet, fine to medium SAND, trace to little Silt, trace Gravel, trace coarse Sand. FILL Brown tan, wet, fine to medium SAND, trace to little Silt, trace Gravel, trace coarse Sand; bottom of sand wet; changing at 2.9 ft to: 2.9 2.9 2.0: Olive brown, mottled, desiccated, Clayey SILT, trace fine Sand; appears reworked at 3.8 ft. 30: Olive brown, slightly mottled, v. stiff, Clayey SILT, trace fine Sand; appears undisturbed below 6.7 ft. MARINE SILT-CLAY 5.0: Olive brown, slightly mottled, stiff, SILT & CLAY, with multiple partings and seams of fine Sandy SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7.0: Olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7.0: Grey, Silty CLAY; changing at 13.6 ft to: 6.0: Grey, Silty GRAVEL, some fine to coarse Sand. TILL BD: Grey brown grading to red tan, wet, m. dense, Silty fine to		+										Silt; changing at 1.2 ft to		·		
64.1 Gravel, trace coarse Sand; bottom of sand wet; changing at 2.9 ft to: 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.										00.0						
2.9 2D: Olive brown, mottled, desiccated, Clayey SILT, trace fine Sand; appears reworked at 3.8 ft. 3D: Olive brown, mottled, desiccated, v. stiff, Clayey SILT, trace fine Sand; appears reworked. 4D: Olive brown, slightly mottled, v. stiff, Clayey SILT, trace fine Sand; appears undisturbed below 6.7 ft. MARINE SILT-CLAY 5D: Olive brown, slightly mottled, v. stiff, Clayey SILT, trace fine Sand; appears undisturbed below 6.7 ft. MARINE SILT-CLAY 5D: Olive brown, slightly mottled, stiff, SILT & CLAY, with multiple partings and seams of fine Sandy SILT. 6D: olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7D: Grey, Silty CLAY; changing at 13.6 ft to: 6rey, Silty GRAVEL, some fine to coarse Sand. TILL. 8D: Grey, Silty GRAVEL, some fine to coarse Sand. TILL. 8D: Grey brown grading to red tan, wet, m. dense, Silty fine to		2D	24/19	2.0 - 4.0	2-3-	-4-6	7	8		64.1	TATA.	∖ Gravel, trace coar <mark>se</mark> Sar				
Sand; appears reworked at 3.8 ft. 3D: Clive brown, mottled, desiccated, v. stiff, Clayey SILT, trace fine Sand; appears reworked. 4D: 24/24 6.0 - 8.0 9-12-13-15 25 28 5D: Olive brown, slightly mottled, v. stiff, Clayey SILT, trace fine Sand; appears undisturbed below 6.7 ft. MARINE SILT-CLAY 5D: Olive brown, slightly mottled, stiff, SILT & CLAY, with multiple partings and seams of fine Sandy SILT. 6D: olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7D: Grey, Silty CLAY; changing at 13.6 ft to: 6D: Grey, Silty GRAVEL, some fine to coarse Sand. TILL 8D: Grey brown grading to red tan, wet, m. dense, Silty fine to													d decisest-1 Ol-			
4D 24/24 6.0-8.0 9-12-13-15 25 28 4D: Olive prown, slightly mottled, v. stiff, Clayey SILT, trace fine Sand; appears undisturbed below 6.7 ft. MARINE SILT-CLAY 5D: Olive brown, slightly mottled, stiff, SILT & CLAY, with multiple partings and seams of fine Sandy SILT. 6D: olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7D: Grey, Silty CLAY; changing at 13.6 ft to: 63.4 63.4 64. Olive prown, slightly mottled, v. stiff, Clayey SILT, trace fine Sand; appears undisturbed below 6.7 ft. MARINE SILT-CLAY 5D: Olive brown, slightly mottled, v. stiff, Clayey SILT, with multiple partings and seams of fine Sandy SILT. 6D: olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7D: Grey, Silty CLAY; changing at 13.6 ft to: 63.4 63.4 63.4 64.0 65. Olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, some fine to coarse Sand. TILL SD: Grey, Silty GRAVEL, some fine to coarse Sand. TILL SD: Grey brown grading to red tan, wet, m. dense, Silty fine to	- 5 -	3D	24/18	4.0 - 6.0	5-9-	9-14	18	20				Sand; appears reworked 3D: Olive brown, mottled	at 3.8 ft. d, desiccated, v. stiff,	,		
5D: Olive brown, slightly mottled, stiff, SILT & CLAY, with multiple partings and seams of fine Sandy SILT. 6D: 24/24		4D	24/24	6.0 - 8.0	9-12-	13-15	25	28				4D: Olive brown, slightly	mottled, v. stiff, Clay			
5D 24/22 8.0 - 10.0 4-6-8-10 14 16 partings and seams of fine Sandy SILT. 6D 24/24 10.0 - 12.0 1-3-3-3 6 7 6D 24/15 12.0 - 14.0 3-3-20-8 23 26 8D 14.0 - 16.0 1-6-18-31 24 27 Fig. 24/25 8.0 - 10.0 4-6-8-10 14 16 6D: olive brown grading to grey at 11.3 ft, m. stiff, CLAY & SILT, with partings of fine Sandy SILT, grading to Silty CLAY. 7D: Grey, Silty CLAY; changing at 13.6 ft to: 53.4 Grey, Silty GRAVEL, some fine to coarse Sand. TILL 8D: Grey brown grading to red tan, wet, m. dense, Silty fine to												Sand, appears undisturb	ed below 6.7 It. MAF	RINE SILT-CLAT		
6D 24/24 10.0 - 12.0 1-3-3-3 6 7 with partings of fine Sandy SILT, grading to Silty CLAY. 7D 24/15 12.0 - 14.0 3-3-20-8 23 26 7D: Grey, Silty CLAY; changing at 13.6 ft to: 13.6- 8D 14.0 - 16.0 1-6-18-31 24 27 8D: Grey Silty GRAVEL, some fine to coarse Sand. TILL 8D: Grey prown grading to red tan, wet, m. dense, Silty fine to		5D	24/22	8.0 - 10.0	4-6-	8-10	14	16		1						
7D 24/15 12.0 - 14.0 3-3-20-8 23 26 7D: Grey, Silty CLAY; changing at 13.6 ft to: 13.6- 8D 14.0 - 16.0 1-6-18-31 24 27 8D: Grey Silty GRAVEL, some fine to coarse Sand. TILL 8D: Grey prown grading to red tan, wet, m. dense, Silty fine to	- 10 -	0.0	04/04	10.0 10.0		2.2		7.4		-		6D: olive brown grading	to grey at 11.3 ft, m.	stiff, CLAY & SILT,		
7D 24/15 12.0 - 14.0 3-3-20-8 23 26 53.4 Fig. 12.0 - 14.0 1.6-18-31 24 27 53.4 SD: Grey, Silty GRAVEL, some fine to coarse Sand. TILL 8D: Grey prown grading to red tan, wet, m. dense, Silty fine to		חס	24/24	10.0 - 12.0	1-3		0	, 'A				with partings of fine San	dy SILT, grading to S	silty CLAY.		
8D 14.0 - 16.0 1-6-18-31 24 27 Grey, Silty GRAVEL, some fine to coarse Sand. TILL 8D: Grey brown grading to red tan, wet, m. dense, Silty fine to		7D	24/15	12.0 - 14.0	3-3-	20-8	23	26				7D: Grey, Silty CLAY; ch	nanging at 13.6 ft to:			
8D 14.0 - 16.0 1.6-18-31 24 27 8D: Grey brown grading to red tan, wet, m. dense, Silty fine to										53.4		Croy Silby CDAVEL	mo fino to access O-	13.6-		
	- 15 ·	8D		14.0 - 16.0	1-6-1	18-31	24	27				8D: Grey brown grading	to red tan, wet, m. de	ense, Silty fine to		
51.0 Bottom of Exploration at 16.0 feet below ground surface. No refusal.										51.0			n at 16.0 feet below			
				*												
				*												
20	- 20 ·		+							1						
										-						
										-						
										1						
25	25															
Remarks: Adjacent ditch invert elev. 66 (est'd).			ch invert	elev. 66 (est'o	d).											
		,	,		,											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 1	Stratif	fication lines	s represent	approximate bou	ndaries betwe	een soil types;	; transitio	ns may be	e gradual.				Page 1 of 1			
*Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made. Boring No.: HB-PAVE-105	* Wate	er level readent at the t	dings have ime measu	been made at tim rements were ma	nes and under de.	conditions st	ated. Gro	oundwate	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring N	o.: HB-PAVE-	105	







% Gravel % Sand % Fines % +3" Fine Coarse Fine Coarse Medium Silt Clay 0.0 9.0 0.0 6.5 4.2 25.4 54.9

Soil Description Poorly Graded Sand with Silt

Atterberg Limits PL= LL= PI=

Coefficients D₉₀= 3.2667 D₅₀= 0.2950 D₁₀= 0.0825 D_{85} = 1.1809 D_{30} = 0.1825 C_{u} = 4.60 $D_{60} = 0.3800$ D₁₅= 0.1138 C_c= 1.06

Date: 10/16/17

Classification AASHTO= A-3 USCS= SP-SM

Moisture Content: 13.9%

Remarks

Location: HB-Pave-102 - South Portland, ME

Depth: 2'-4' (2'-3.1') Sample Number: 2D

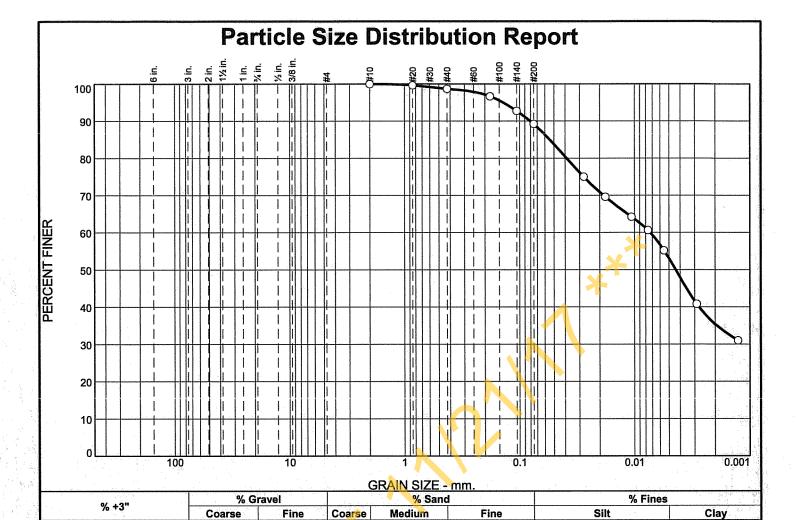
> Client: Schonewald Engineering Associates **Project:** Maine Turnpike Pavement Distress

14734a **Project No:** 1368-007 Lab No.

R.W. Gillespie & Associates, Inc. Saco, Maine

Checked By: MTG

Tested By: JJB



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2	
#20	99.7		
#40	98.7		Y
#80	96.7		
#140	92.7		
#200	89.2		
0.0275 mm.	75.0	, i	
0.0179 mm.	69.6		
0.0106 mm.	64.2		
0.0076 mm.	60.6		
0.0055 mm.	55.2		
0.0029 mm.	40.8		
0.0013 mm.	31.0		
		*	

0.0

0.0

0.0

1.3

9.5

	Soil Description	
Silty Clay		
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 0.0804 D ₅₀ = 0.0044 D ₁₀ =	Coefficients D ₈₅ = 0.0544 D ₃₀ = C _u =	D ₆₀ = 0.0073 D ₁₅ = C _c =
USCS= CL-ML	Classification AASHTO)=
Moisture Content:	Remarks 26.1%	
		*

36.1

53.1

Date: 10/16/17

* (no specification provided)

0.0

Location: HB-Pave-102 - South Portland, ME **Sample Number:** 2D-A **Depth:** 2'-4' (3.1'-4')

R.W. Gillespie & Associates, Inc. Saco, Maine

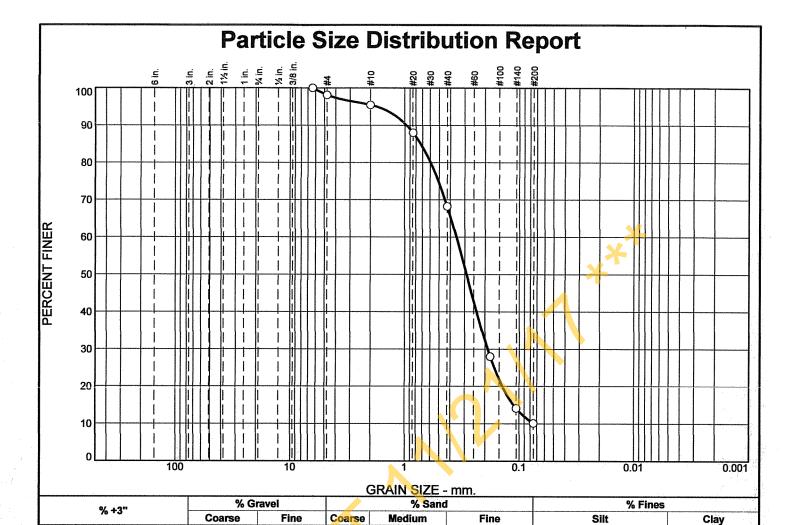
Schonewald Engineering Associates

Project: Maine Turnpike Pavement Distress

14734b Lab No. **Project No:** 1368-007

Checked By: MTG Tested By: JJB





SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/4" #4 #10 #20	100.0 98.1 95.5 88.0	~	
#40 #80 #140 #200	68.3 28.0 14.1 10.1	O,	
3			

0.0

1.9

2.6

27.2

58.2

0.0

	Soil Description		
Poorly Graded San	d with Silt		
	Atterberg Limits		
PL=	LL=	PI=	
	Coefficients		
D ₉₀ = 0.9675 D ₅₀ = 0.2891	D ₈₅ = 0.7286 D ₃₀ = 0.1893	$D_{60} = 0.3538$	
D ₅₀ = 0.2891 D ₁₀ =	$C_{11} = 0.1893$	D15= 0.1118 Cc=	
.0	Classification	Ü	
USCS= SP-SM	AASHT	O= A-3	
	Remarks		
Moisture Content:	14.7%		

10.1

Date: 10/16/17

Location: HB-Pave-104 - South Portland, ME Depth: 2'-4' Sample Number: 2D

(no specification provided)

R.W. Gillespie & Associates, Inc. Saco, Maine

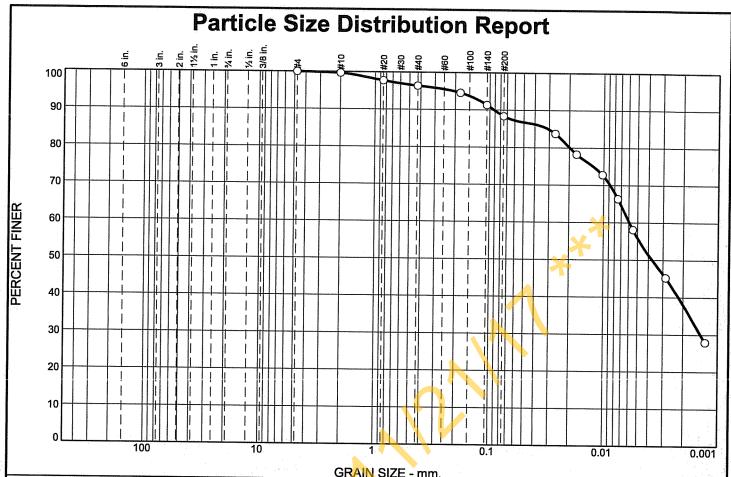
Client: Schonewald Engineering Associates

Project: Maine Turnpike Pavement Distress

Project No: 1368-007 Lab No. 14735a

Tested By: JJB Checked By: MTG





% +3"	% Gr	% Gravel		% Sand		% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	0.0	0.3	3.3	8.0	32.5	55.0	
							33.9	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#10	99.7		
#20	97.7		
#40	96.4		
#80	94.6		
#140	91.4		
#200	88.4		
0.0265 mm.	83.8		
0.0173 mm.	78.3		
0.0102 mm.	72.8		
0.0075 mm.	66.4		
0.0055 mm.	58.1		
0.0028 mm.	45.3		
0.0013 mm.	28.0		

(no specification provided)

Location: HB-Pave-104 - South Portland, ME Sample Number: 3D Depth: 4'-6'

> R.W. Gillespie & Associates, Inc. Saco, Maine

Client: Schonewald Engineering Associates **Project:** Maine Turnpike Pavement Distress

Project No: 1368-007

Lab No.

14735b

Date: 10/16/17

Tested By: JJB Checked By: MTG