MAINE DEPARTMENT OF TRANSPORTATION HIGHWAY PROGRAM GEOTECHNICAL SECTION AUGUSTA, MAINE

GEOTECHNICAL DATA REPORT

For Drainage Improvements on MAIN STREET WARREN, MAINE

> *Prepared by:* Cody Russell, P.E. Geotechnical Engineer



Reviewed by: Kathleen Maguire, P.E. Senior Geotechnical Engineer

Knox County WIN 25471.00 Soils Report 2023-33 October 27, 2023

INTRODUCTION

The purpose of this data report is to document subsurface information collected for drainage improvements on Maine Street in Warren beginning 0.06 of a mile east of Western Road and extending east 0.19 of a mile as shown on the attached Location Map. The project is needed to address drainage deficiencies. This report presents the results of a limited geotechnical investigation performed along the proposed drainage improvements project. Main Street is a Highway Corridor Priority 4 road.

SUBSURFACE INVESTIGATION

Two (2) borings and ten (10) probes were drilled along the roadway by the MaineDOT drill crew using a trailer mounted drill rig. Exploration locations are presented in the attached Boring Location Plans. The details and sampling methods used, field data obtained, soil conditions encountered, and exploration locations are presented in the attached Boring Logs. Probe data collected is presented on the attached Probe Summary Sheet.

A Northeast Transportation Training and Certification Program (NETTCP) certified Subsurface Inspector logged the subsurface conditions encountered. The MaineDOT geotechnical engineer selected the boring and probe locations and drilling methods, designated type and depth of sampling techniques, reviewed boring and probe logs and identified field testing requirements. The borings were located in the field by taping to site features after completion of the drilling program.

CLOSURE

This Geotechnical Data Report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed Main Street drainage improvements in Warren in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

MaineDOT conducted a limited number of soil explorations at discrete locations along the project alignment. No interpretations or conclusions have been derived from this geotechnical information. MaineDOT shall not be responsible for the Bidder's or Contractor's interpretations, estimates, or conclusions derived from the geotechnical information. Data provided may not be representative of the subsurface conditions between exploration locations.

In the event that any changes in the nature, design, or location of the proposed project are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the information presented and to modify the information as appropriate to reflect the changes in design. The information presented is based in part upon a limited subsurface investigation at discrete exploratory locations completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the information presented in this report. It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that information presented in this report is properly implemented in the design and specifications.

Attachments:

Location Map Boring Location Plans Key to Soil and Rock Descriptions and Terms Boring Logs Probe Summary Sheet







A.Ru Cody. Use GEOTECH ē dgn GEOTECHNMSTAN003_BLP2.



Username: Cody.A.Russell Date:10/24/2023

lename: ...\00\CEOTECH\MSTA\004_BLP3.dgn Division: CEOTECH

	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	25471.00 WIN 25471.00 HIGHWAY PLANS
	PROJ. MANAGER BY DATE DESIGN-DET ALED	N REVSIONS 5 1 DEFINITION PRESSIONS 1 P.E. NUMBER REVSIONS 3 2 2000 A DEFINITION PRESSIONS 4 DEFINITION DATE REV CLAMER 2 DATE
2. STORY HOUSE 193	WARREN Main Street	BORING LOCATION PLA
	SHEET	NUMBER
	لا OF	4

	UNIFIE	ED SOIL C	LASSIFIC	CATION SYSTEM	MODIFIED BURMISTER SYSTEM									
NA A			GROUP											
MAJ	JOR DIVISIO	JNS	SYMBOLS	TYPICAL NAMES	Descrip	tive Term	Port	ion of Total (%)						
COARSE-		CLEAN	GW	Well-graded gravels, gravel-	tr	ace	<u></u>	0 - 10						
GRAINED	GRAVELS	GRAVELS		sand mixtures, little or no fines.	l	ittle		11 - 20						
SOILS	. 4	(little or no	GP	Poorly-graded gravels gravel	adiective (e g	ome Sandy Clavev)		21 - 35 36 - 50						
	n No	fines)	0	sand mixtures, little or no fines.	adjeolive (e.g.	Gandy, Glaycy)		00 - 00						
	fof (rtha ize)					TERM	S DESCRIBIN	G						
	arge ve si					DENSIT	Y/CONSISTEN	ICY						
	thar is lá sie	GRAVEL	GM	Silty gravels, gravel-sand-silt	Coarse-grained	soils (more than half	of material is larger t	han No. 200						
L	ctior	WITH		mixtures.	sieve): Includes (1) clean gravels; (2) Silty or Clayey gravels; and (3) Silty,									
argei	(n fra	(Appreciable	GC	Clayey gravels, gravel-sand-clay	penetration resista	ance (N-value).	lied according to star	luaru						
is la Ze)		amount of		mixtures.										
erial ve s		fines)			Den Cobesio	<u>isity of</u> pless Soils	Standard Po N-Value	enetration Resistance						
mat) sie					Very	/ loose	<u>11-Valu</u>	0 - 4						
alf of . 200	0.000	CLEAN	SW	Well-graded sands, Gravelly	Lo	oose		5 - 10						
n ha	SANDS	SANDS		sands, little or no fines	Mediur	m Dense		11 - 30 31 - 50						
e tha	е 4	(little or no	SP	Poorly-graded sands, Gravelly	Very	Dense		> 50						
more	oars n Nc	fines)		sand, little or no fines.	5									
Ŭ	fofc rtha ze)				Fine-grained soi	Is (more than half of r	naterial is smaller the	an No. 200						
	half nalle e sij	SANDS	SM	Silty sands. sand-silt mixtures	or Silty clays; and	 inorganic and organic (3) Clavev silts. Con 	sistency is rated acc	ording to undrained shear						
	s srr s srr siev	WITH			strength as indica	ted.	5	3						
	ore t ion i	FINES	80				Approximate							
	fract (m	(Appreciable amount of	30	mixtures.	Consistency of	SPT N-Value	Shear	Field						
	-	fines)			Cohesive soils	(blows per foot)	Strength (psf)	Guidelines						
			M	Increasing office and your fine	Very Soft	WOH, WOR,	0 - 250	Fist easily penetrates						
			IVIL	sands, rock flour. Silty or Clavey	Soft	2 - 4	250 - 500	Thumb easily penetrates						
	SILTS AND CLAYS			fine sands, or Clayey silts with	Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with						
				slight plasticity.	C+iff	0 15	1000 2000	moderate effort						
FINE-			CL	Inorganic clays of low to medium	Sun	9 - 15	1000 - 2000	areat effort						
GRAINED				plasticity, Gravelly clays, Sandy	Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail						
SOILS				clays, Silty clays, lean clays.	Hard	>30	over 4000	Indented by thumbnail						
	(liquid limit l	OL Organic silts a clays of low p			Back Quality Day			with difficulty						
				Organic silts and organic Silty clavs of low plasticity.	ROD (%) =	sum of the lengths	of intact pieces of	core* > 4 inches						
s ze)							length of core a	dvance						
ve si			мн	Inorganic silts micaceous or		*Minimu	um NQ rock core (1.88 in. OD of core)						
nate		TS AND CLAYS		diatomaceous fine Sandy or		Rock Quality Ba	ased on RQD							
f of r 200	SILTS AN			Silty soils, elastic silts.		Rock Quality RQD (%)								
No.			СН	Inorganic clave of high		Very Poor	≤25 26 - 50							
thar than			OII	plasticity, fat clays.	Fair 51 - 75									
aller	(liquid limit greater than 50)		(liquid limit greater than 50)		(liquid limit greater than 50) OH		(liquid limit grapter than 50)			Good 76 - 90 Excellent 91 100				
n) sme							ОН	Organic clays of medium to high plasticity, organic silts	Desired Rock C	Excellent	91 - 100 his order, if appli	cable):		
					Color (Munsell	color chart)								
			D'	Dest and other 12.11	Texture (aphan	itic, fine-grained, el	ic.)							
	HIGHLY	ORGANIC	Pt	Peat and other highly organic soils.	Hardness (verv	hard, hard, mod h	one, etc.) ard. etc.)							
					Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)									
Desired So	il Observa	tions (in thi	s order, if	applicable):	Geologic discor	ntinuities/jointing:								
Color (Muns	sell color ch	art)		_		-dip (horiz - 0-5 de	g., low angle - 5-3	5 deg., mod. dipping -						
Moisture (di	ry, damp, m	oist, wet) om abovo ri	aht hand a	side)		35-55 deg., ste	ep - 55-85 deg., ve	ertical - 85-90 deg.)						
Texture (fin	e. medium	coarse. etc	911. Hallu S)	side j		close - 1-3 feet	wide - $3-10$ feet	- 2-12 mon, mou. verv wide >10 feet)						
Name (San	d, Silty San	d, Clay, etc.	, including	portions - trace, little, etc.)		-tightness (tight, or	pen, or healed)	,						
Gradation (well-graded	, poorly-grad	ded, unifor	m, etc.)		-infilling (grain size	, color, etc.)	``						
Plasticity (n	on-plastic, s	sugntly plast	ic, modera	ately plastic, highly plastic)	Formation (Wat	erville, Ellsworth, C	ape Elizabeth, etc	c.) etc.)						
Bondina (w	ell, moderat	ely, looselv	etc)		ref: ASTM D6	032 and FHWA NH	H-16-072 GEC 5 -	Geotechnical						
Cementatio	n (weak, mo	oderate, or s	strong)		Site Characte	rization, Table 4-12	2							
Geologic O	rigin (till, ma	rine clay, al	luvium, et	c.)	Recovery (inch/	inch and percentag	ge)							
Groundwate	er level		<u></u>		Rock Core Rate	e (X.X ft - Y.Y ft (mi	n:sec))							
	Maina	Jonartma	nt of T-	ansportation	Sample Cont	ainer Labeling I	Requirements:							
	wante L	Geotoch	nical So	ansportation ction	WIN	-	Blow Counts							
Ko	to Soil ·	and Rock	Descrir	ations and Terms	Bridge Name	/ Iown	Sample Recov	ery						
(Ne)	Fiel	d Identific	ation Inf	ormation	Sample Numb	oer	Personnel Initia	als						
				Sindion	Sample Depth	า								

Maine Department of Transportation					ation	Projec	t: Main	Street	Drainage Improvements	Boring No.:	HB-W.	AR-101	
Soil/Rock Exploration Log US CUSTOMARY UNITS					Locatio	on: Wa	rren, N	aine	WIN:	2547	71.00		
Drill	er:		MaineDOT		Elevatio	 n (ft)	124	6		Auger ID/OD:	5" Dia		
Ope	rator:		Daggett/Jay		Datum:		NA	.0 VD88		Sampler:	Standard Split	Spoon	
Loa	aed Bv:	By: B. Wilder Rig Type: CME 45C			Hammer Wt./Fall:	140#/30"	opeen						
Date	Date Start/Finish: 6/15/2022: 09:00-10:00 Drilling Meth		Method:	Sol	id Sten	Auger	Core Barrel:	N/A					
Boring Location: 15+75, 5.0 ft Rt.		Casing I	D/OD:	N/A	1		Water Level*:	10.5 ft bgs.					
Ham	mer Effi	ciency F	actor: 0.974		Hammer	r Type:	Auton	atic 🖂	Hydraulic 🗆	Rope & Cathead □			
Definitions: R = Rock Cor D = Split Spoon Sample SSA = Solid S MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow U = Thin Wall Tube Sample RC = Roler C MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weig V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = We MV = Unsuccessful Field Vane Shear Test Attempt WO1P = Weig						ammer or Casing erson	S _u S _u S _{u(} q _p = N-u Har N ₆₀ N ₆₀	= Peak/F ab) = La Unconf correctone mer Eff = SPT I = (Ham	emolded Field Vane Undrained She b Vane Undrained Shear Strength (ned Compressive Strength (ksf) d = Raw Field SPT N-value ciency Factor = Rig Specific Annua I-uncorrected Corrected for Hammore Efficiency Factor/60%)*N-unco	ear Strength (psf) T _V = (psf) WC = LL = PL = I Calibration Value PI = er Efficiency G = (rrected C = (Pocket Torvane Shea Water Content, pero Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	ar Strength (psf) cent	
			6	Sample Information	σ		1	-				Laboratory	
Depth (ft.)	Sample No.	Pen./Rec. (in.	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrecte N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks			Testing Results/ AASHTO and Unified Class.	
0						SSA	125.		6½" HMA.				
	1D/A	24/18	1.50 - 3.50	3/5/6/5	11 18				1D (1.5-2.5 ft bgs.) Brown, SAND, little gravel, trace s	, damp, medium dense, fir ilt, (Fill).	e to coarse		
							- 123.		1D/A (2.5-3.5 ft bgs.) Olive SAND, little gravel.	e, moist, medium dense, S	ilty fine to coarse		
- 5 -	20	24/24	5.00 7.00	6/11/15/16	26 42				Olive, moist, dense, Silty fi	t, dense, Silty fine to coarse SAND, little gravel.			
		24/24	3.00 - 7.00	0/11/13/10	20 42								
							117						
						++/					8.3		
- 10 -	3D	24/19	10.00 - 12.00	11/11/20/21	31 50				Brown, wet, dense, fine to occasional cobble.	coarse SAND, some grave	el, little silt,		
							- 113. -	5	Bottom of Exploration	n at 12.0 feet below grou	nd surface.		
- 15 -													
							-						
- 20 ·													
]						
25 <u>Rem</u>	l arks:				I				<u> </u>				
Stratit	fication line	s represent	approximate bou	indaries between soil types; t	ransitions may	be gradual				Page 1 of 1			
* Wat thar	er level rea 1 those pres	dings have sent at the ti	been made at tim me measuremen	nes and under conditions stat nts were made.	ed. Groundwa	ter fluctuati	ons may	occur dı	e to conditions other	Boring No.	: HB-WAR	-101	

Maine Department of Transporta				ation	ion Project: Main Street Drainage Improvements					Boring No.:	HB-W.	AR-102	
Soil/Rock Exploration Log US CUSTOMARY UNITS					L	ocatio	n: War	ren, Ma	aine	WIN:	2547	71.00	
Drill	er:		MaineDOT		Elevatio	on (i	ft.)	107.	6		Auger ID/OD:	5" Dia.	
Ope	rator:		Daggett/Jay		Datum:		,	NAV	/D88		Sampler:	Standard Split	Spoon
Log	aed By:		B Wilder		Rig Tyr	ne:		CMI	E 45C		Hammer Wt./Fall:	140#/30"	
Date	Start/Fi	nish [.]	6/15/2022:10	.00-10.45	Drilling	Me	thod:	Solio	1 Stem	Auger	Core Barrel	N/A	
Bori	ngloca	tion	19+50 5 0 ft l	Rt	Casing		חכ.	N/A	. oteni		Water Level*	10.0 ft bos	
Ham	mer Fffi	ciency F	actor: 0.974		Hamme	er Tv	/pe:	Autom	utic 🕅	Hydraulic 🗆	Rope & Cathead □	1010 11 0501	
Definitions: R = Rock Cor D = Split Spoon Sample SSA = Solid S MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow U = Thin Wall Tube Sample RC = Roller C MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weig V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = We MV = Unsuccessful Field Vane Shear Test Attempt WOTP = Weig						er Hamr s or C <u>Perso</u>	mer asing n	S _u = S _{u(la} q _p = N-un Ham N ₆₀ : N ₆₀ :	Peak/Re b) = Lab Unconfin correcte mer Effic = SPT N = (Hamn	emolded Field Vane Undrained She Vane Undrained Shear Strength (hed Compressive Strength (ksf) d = Raw Field SPT N-value tiency Factor = Rig Specific Annual -uncorrected Corrected for Hamme ter Efficiency Factor/60%)*N-uncor	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	Pocket Torvane She = Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	ar Strength (psf) cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	00.	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	107.1		6" HMA.		0.5	
	1D	24/10	1.00 - 3.00	3/3/3/3	6 10	0				Brown, damp, loose, fine to (Fill).	o coarse SAND, some gr	0.5- avel, trace silt,	
- 5 -								104.1		Olive brown, moist, very st	iff, Clayey SILT, trace fi	ne sand.	
	2D	24/24	5.00 - 7.00	5/5/8/9	13 21	1					, , , ,		
10							\forall	99.6					
- 10 -	3D/A	24/19	10.00 - 12.00	3/7/9/9	16 20	6		97.1		3D (10.0-10.5 ft bgs) Grey, SAND, some silt. 3D/A (10.5-12.0 ft bgs.) Gr	wet, medium dense, fine	to medium 10.5- ine to coarse	
								95.6		SAND, little gravel, little si Bottom of Exploration NO REFUSAL	ilt. n at 12.0 feet below grou	12.0- Ind surface.	
- 15 -													
- 20 -													
25													
Rem	arks:									1			
Stratif	ication line	s represent	approximate bou	ndaries between soil types; t	ransitions ma	y be g	gradual.				Page 1 of 1		
* Wate than	er level rea	dings have sent at the ti	been made at tim me measuremen	es and under conditions stat ts were made.	ed. Groundw	/ater f	fluctuatio	ns may o	ccur due	to conditions other	Boring No	.: HB-WAR	-102

State of Maine - Department of Transportation <u>Probe Summary Sheet</u>

Town(s): Warren

Work Number: 25471.00

Station	Offset	Weathered Rock	Weathered Rock	Refusal	No Refusal	Bottom of Boring	Comments
(Feet)	(Feet)	(Feet)	Elevation	(Feet)	(Feet)	Elevation	6/15/2022
13+00	5.0 Rt.				10.0	129.7	
14+00	4.0 Rt.				10.0	126.7	
15+00	4.5 Rt.			8.1		122.7	*see below
16+10	5.5 Rt.				10.0	113.2	
16+50	5.5 Rt.				10.0	110.7	
17+48	5.5 Rt.				10.0	106.0	
18+50	5.5 Rt.				10.0	102.3	
19+30	5.0 Rt.				10.0	98.5	
21+50	5.0 Rt.				10.0	92.0	
22+95	5.0 Rt.				10.0	91.9	
* Cobbl	e from 4.8-5	5.5' and 6.5-7.1'.	Drill Rig broke at	8.1'. Pres	sence of Re	fusal Surface unco	onfirmed.
	L			L			
L	L			L			
	L			L			
	L			L			
	L			L			