

**MAINE DEPARTMENT OF TRANSPORTATION  
BRIDGE PROGRAM  
GEOTECHNICAL SECTION  
AUGUSTA, MAINE**

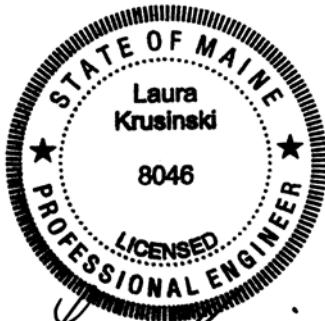
**GEOTECHNICAL DATA REPORT**

*For:*

**FLOOD BROOK BRIDGE  
STATE ROUTE 6 OVER FLOOD BROOK  
TOPSFIELD, MAINE**

*Prepared by:*

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Washington County  
WIN 21753.00

Soils Report 2018-45  
Bridge No. 2288

Fed No. STP-2175(300)  
November 15, 2018

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Appendix A – Boring Log

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## **1.0 INTRODUCTION**

The purpose of this Geotechnical Data Report is to present the results of a limited geotechnical investigation and laboratory testing program conducted by the Maine Department of Transportation (MaineDOT) at the existing Flood Brook Bridge, which carries State Route 6 over Flood Brook in Topsfield, Maine.

The existing structure was constructed in 1968 and consists of a galvanized steel pipe arch with an approximate diameter of 10 feet. According to the 2016 MaineDOT Bridge Inspection Report, the culvert has considerable damage (rating of 4) with heavy pitting and rusting of the bottom plate.

The current Flood Brook Bridge project is scoped as a culvert rehabilitation with a concrete invert lining and armoring of the culvert's outlet with a riprap apron.

## **2.0 GEOLOGIC SETTING**

Flood Brook Bridge in Topsfield, Maine carries State Route 6 over Flood Brook as shown on Sheet 1 – Location Map.

The Maine Geological Survey (MGS) Surficial Geology Map of the Fredericton 1° x 2° Quadrangle, Maine, Open-file No. 87-13 (1987), indicates the surficial soils in the vicinity of the bridge project consist of glacial till, bedrock with thin drift, and frequent bedrock outcrops nearby. Glacial till is a heterogeneous mixture of sand, silt, clay, and stones. These soils generally overly bedrock, but may overlie, or include, sand and gravel.

According to the MGS Bedrock Geology Map of the Danforth, Scraggly Lake, Forest, Waite, Vanceboro, and Kellyland 15' Quadrangles, Maine, Open-file No. 90-42 (1990), bedrock at the project site is mapped as sandstone (wacke) and slate of the Baskahegan Lake Formation.

## **3.0 SUBSURFACE INVESTIGATION**

Subsurface conditions were explored by drilling one test boring. BB-TFB-101 was drilled east of the existing structure. The exploration location is shown on Sheet 2 – Boring Location Plan with Boring Log.

The boring was drilled on June 21, 2017. The boring was performed by using a combination of solid stem auger, cased wash boring, and rock coring techniques. Soil samples were typically obtained at 5-foot intervals using Standard Penetration Test (SPT) methods. During SPT sampling, the sampler is driven 24 inches and the hammer blows for each 6-inch interval of penetration are recorded. The sum of the blows for the second and third intervals is the N-value, or standard penetration resistance. The drill rig performing the boring was equipped with an automatic hammer to drive the split spoon. The hammer was calibrated per ASTM D4633 "Standard Test Method for Energy Measurement for Dynamic Penetrometers" in April of 2017. All N-values discussed in this report are corrected values computed by applying an average energy transfer of 0.854 to the raw field N-values. This hammer

efficiency factor (0.854) and both the raw field N-value and corrected N-value ( $N_{60}$ ) are shown on the boring logs.

Bedrock was cored in the boring using an NQ-2" core barrel and the Rock Quality Designation (RQD) of the core calculated. A Northeast Transportation Technician Certification Program (NETTCP) Certified Subsurface Inspector logged the subsurface conditions encountered. The MaineDOT geotechnical engineer selected the boring location and drilling methods, designated type and depth of sampling techniques, reviewed boring logs and identified field-testing requirements. The boring was located in the field using taped measurements at the completion of the drilling program and surveyed by MaineDOT Region 5 survey personnel.

Details and sampling methods used, field data obtained, and soil conditions encountered are presented in the boring log provided in Appendix A – Boring Log and on Sheet 2 – Boring Location Plan with Boring Log.

#### **4.0 LABORATORY TESTING**

A laboratory testing program was conducted on selected soil samples recovered from the test boring to assist in soil classification, evaluation of engineering properties of the soils, and geologic assessment of the project site. Laboratory testing consisted of three standard grain size analyses with natural water content. Results of the soil tests are included in Appendix B – Laboratory Test Results. Moisture content information and other soil test results are also shown on the boring log provided in Appendix A – Boring Log and on Sheet 2 – Boring Location Plan with Boring Log.

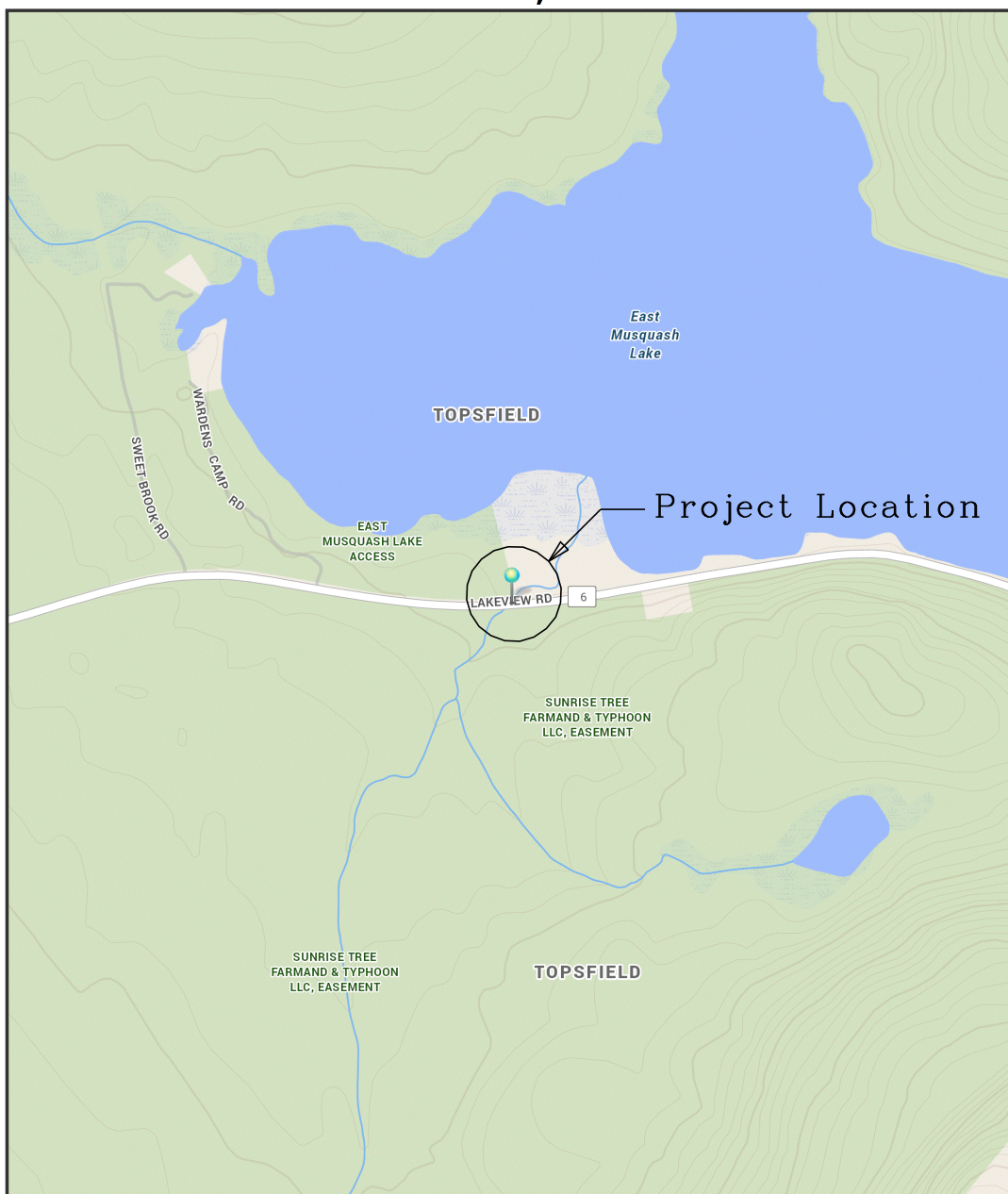
#### **5.0 CLOSURE**

This Geotechnical Data Report has been prepared for the use of the MaineDOT Bridge Program for specific application to the proposed invert lining project at the Flood Brook Bridge in Topsfield, Maine. The report was prepared 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 near the existing bridge and a limited number of laboratory tests. 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 boring locations.

## **Sheets**

# TOPSFIELD, MAINE

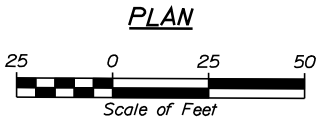


The Maine Department of Transportation provides this publication for information only. Reliance upon this information is at user risk. It is subject to revision and may be incomplete depending upon changing conditions. The Department assumes no liability if injuries or damages result from this information. This map is not intended to support emergency dispatch.

0.25 Miles  
1 inch = 0.28 miles

Date: 1/24/2018  
Time: 8:00:50 AM

<b>SHEET NUMBER</b>  <div>1</div> <b>OF 2</b>	<b>FLOOD BROOK BRIDGE</b> <b>FLOOD BROOK</b>  TOPSFIELD      WASHINGTON COUNTY	<b>STATE OF MAINE</b> <b>DEPARTMENT OF TRANSPORTATION</b>
		<b>STP-2175(300)</b>
	<b>LOCATION MAP</b>	<b>WIN</b> BRIDGE NO. 2288 <b>21753.00</b> BRIDGE PLANS



OF 2	SHEET NUMBER	FLOOD BROOK BRIDGE				PROJ. MANAGER	BY	DATE	STATE OF MAINE		
		FLOOD BROOK									
		TOPSFIELD WASHINGTON COUNTY				CHECKED-REVISED				SIGNATURE	
						DESIGN2-DETAILED2	T. WHITE	JUL 2017			
						DESIGN3-DETAILED3					P.E. NUMBER
BORING LOCATION PLAN				REVISIONS 1			DATE	STP-2175(300)			
WITH BORING LOG				REVISIONS 2							
				REVISIONS 3							
				REVISIONS 4							
				FIELD CHANGES					BRIDGE NO. 2288	WIN	21753.00

## **Appendix A**

### Boring Log



<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> Flood Brook Bridge #2288 carries Route 6 over Flood Brook <b>Location:</b> Topsfield, Maine				<b>Boring No.:</b> BB-TFB-101  <b>WIN:</b> 21753.00					
<b>Driller:</b> MaineDOT				<b>Elevation (ft.):</b> 392.8				<b>Auger ID/OD:</b> 5" Solid Stem					
<b>Operator:</b> Travis/James/Rick				<b>Datum:</b> NAVD88				<b>Sampler:</b> Standard Split Spoon					
<b>Logged By:</b> A. Bickford/B. Wilder				<b>Rig Type:</b> CME 45C				<b>Hammer Wt./Fall:</b> 140#/30"					
<b>Date Start/Finish:</b> 6/21/2017; 10:00-14:30				<b>Drilling Method:</b> Cased Wash Boring				<b>Core Barrel:</b> NQ-2"					
<b>Boring Location:</b> 8+48.4, 13.6 ft Lt.				<b>Casing ID/OD:</b> NW-3"				<b>Water Level*:</b> None Observed					
<b>Hammer Efficiency Factor:</b> 0.854				<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
Definitions: 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 R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test													
Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows						
0							SSA	392.2		7" HMA.	0.6		
5	1D	24/5	5.00 - 7.00	6/7/17/16	24	34	28			Brown, damp, dense, Sandy Gravel, little silt, (Fill).	G#304403 A-1-a, GM WC=6.2%		
							77						
							145						
							75						
							41						
10	2D	24/9	10.00 - 12.00	6/5/6/10	11	16	15			Brown, wet, medium dense, Sandy Gravel, little silt, (Fill).	G#304402 A-1-a, GM WC=10.6%		
							35						
							41						
							32						
							73						
15	3D	24/7	15.00 - 17.00	7/5/5/4	10	14	13			Brown, wet, medium dense, Gravelly fine to coarse SAND, some silt, (Fill).			
							17						
							29						
							35						
							109						
20	4D	24/15	20.00 - 22.00	42/55/32/35	87	124	64			Grey brown, wet, very dense, Sandy Gravel, little silt, (Fill). Roller Coned ahead to 23.0 ft bgs.	G#304404 A-1-a, GM WC=8.7%		
							66						
							67						
							98						
25	R1	46.8/45	24.50 - 28.40	RQD = 23%			a158	368.3	a158 blows for 0.5 ft.	24.5			
<b>Remarks:</b>													
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 1 of 2  <b>Boring No.:</b> BB-TFB-101			

<div>Maine Department of Transportation</div> <div>Soil/Rock Exploration Log</div> <div>US CUSTOMARY UNITS</div>				<div>Project: Flood Brook Bridge #2288 carries Route 6 over Flood Brook</div> <div>Location: Topsfield, Maine</div>				<div>Boring No.: BB-TFB-101</div> <div>WIN: 21753.00</div>																																																																																																																																																																																																																																																																																																																																																																																		
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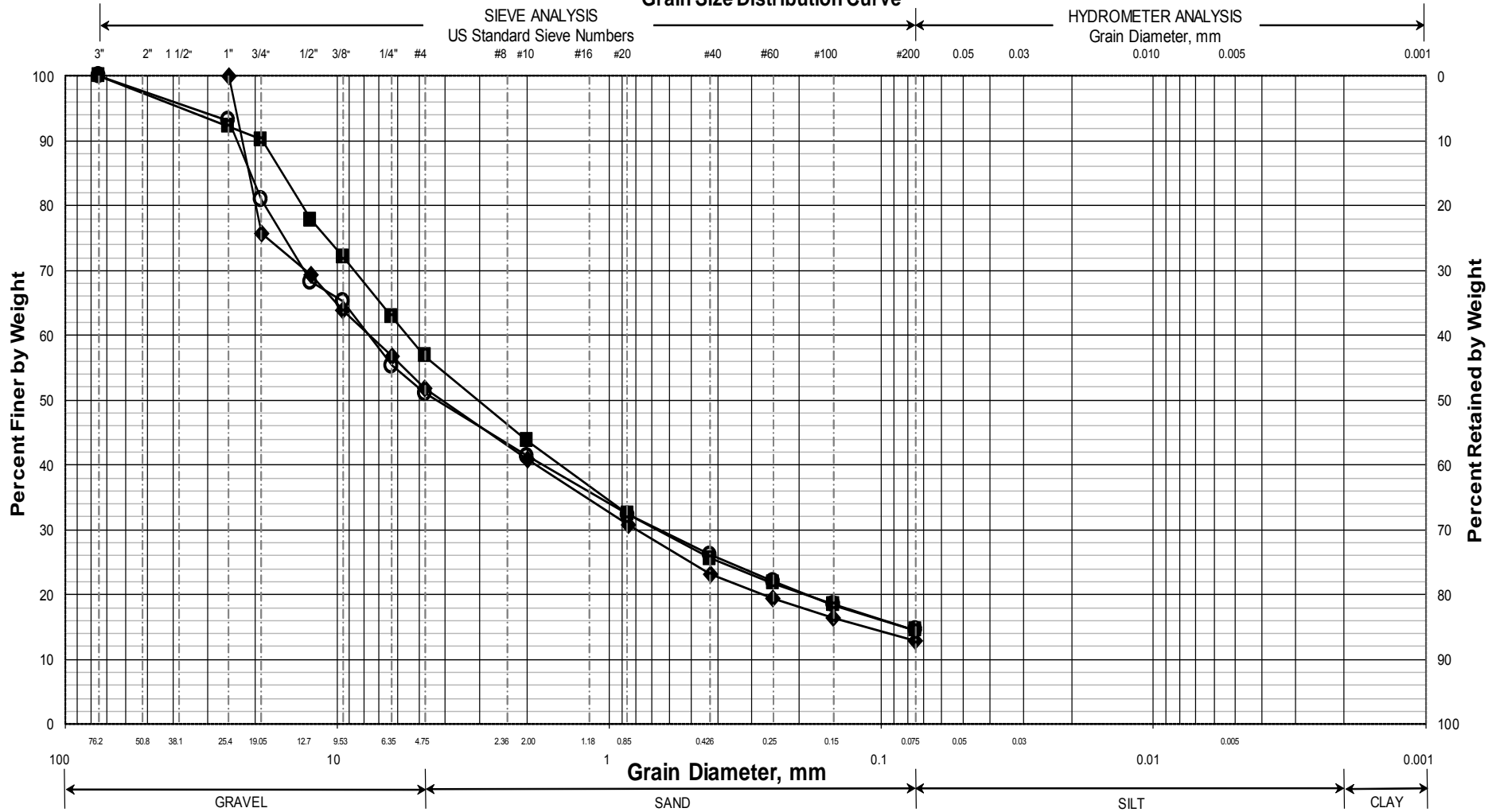
## **Appendix B**

### Laboratory Test Results

**Work Number: 21753.00**

PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

# Maine Department of Transportation Grain Size Distribution Curve



## UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	BB-TFB-101/1D	8+48.4	13.6 LT	5.0-7.0	Sandy GRAVEL, little silt.	6.2			
◆	BB-TFB-101/2D	8+48.4	13.6 LT	10.0-12.0	Sandy GRAVEL, little silt.	10.6			
■	BB-TFB-101/4D	8+48.4	13.6 LT	20.0-22.0	Sandy GRAVEL, little silt.	8.7			
●									
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WIN
021753.00
Town
Topsfield
Reported by/Date
WHITE, TERRY A 11/21/2018