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GEOTECHNICAL DATA REPORT

INTERSTATE 95 EMERSON MILL ROAD / B&A RAILROAD
BRIDGES NOS. 5969 AND 1430
HAMPDEN, MAINE
MAINEDOT WIN 21673.00 AND WIN 21673.10

by Haley & Aldrich, Inc.
Portland, Maine

For Maine Department of Transportation
Augusta, Maine

File No. 129380-002
February 2019

HALEY & ALDRICH, INC.
75 Washington Avenue
Suite 1A
Portland, ME 04101
207.482.4600

22 February 2019
File No. 129380-002

Maine Department of Transportation
16 State House Station
Augusta, Maine 04333-0016

Attention: Laura Krusinski, P.E.
Senior Geotechnical Engineer

Subject: Geotechnical Data Report
Interstate 95 over Emerson Mill Road/ B&A Railroad, Bridge Nos. 5969 and 1430
Hampden, Maine
MaineDOT WIN 21673.00 and WIN 21673.10

Ladies and Gentlemen:

This geotechnical data report (GDR) presents the results of subsurface investigation and geotechnical laboratory testing programs. This work has been completed in accordance with our proposal dated 10 April 2017, and your subsequent authorization.

Project Understanding

The project consists of the replacement of two existing bridges that carry Route 95 traffic northbound and southbound over Emerson Mill Road and the B&A Railroad in Hampden, Maine. Historic drawings of the existing bridges were provided by MaineDOT and are included in this report in Appendix D. The location of the proposed pair of bridges is shown on Figure 1, Project Locus, and Figure 2, Boring Location Plan.

Horizontal Coordinate System and Elevation Datum

Plan locations of test borings are reported as northing and easting coordinates relative to the Maine State Plane Coordinate System, North American Datum of 1983 (NAD 83), Maine 2000 Central Zone (refer to Table I and boring logs in Appendix A). Elevations referenced herein are in feet and reference the North American Vertical Datum of 1988 (NAVD 88).

Geologic Setting

According to Maine Geological Survey's Surficial Geology of the Bangor Quadrangle, Maine (2011), surficial geologic units mapped at the site consist of the Presumpscot Formation. Deposition of the Presumpscot Formation occurred as a result of melting glacial ice in conjunction with sea level rise during deglaciation in Late Wisconsinan time. These glaciomarine sediments typically consist of silt, clay and sand.

The historic test borings drilled at the site encountered the Presumpscot Formation (i.e., glaciomarine clays, silts and sands) overlying a glacial till (i.e. silt, sand, gravel) deposit. The recent test borings drilled at the site encountered man-placed fill overlying the Presumpscot Formation, overlying glacial till, overlying bedrock. Glacial till soils encountered typically consisted of a heterogeneous mix of silt, sand and gravel with occasional cobbles and boulders.

According to Maine Geological Survey's Bedrock Geology of the Bangor Quadrangle, Maine (2011), bedrock at the site is mapped as Silurian-Ordovician age rocks of the Vassalboro Group (Brewer Formation). Bedrock core samples collected for this site investigation consisted of metamorphic rocks composed of phyllite, slate and quartzite.

Subsurface Explorations

PRELIMINARY DESIGN PHASE EXPLORATIONS BY HALEY & ALDRICH

Haley & Aldrich conducted a preliminary design phase geotechnical exploration program at the site of the two bridges. A total of six test borings (BB-HSS-119 through BB-HSS-124) were completed to identify subsurface conditions along the proposed bridge alignment. Test borings BB-HSS-119, BB-HSS-120, BB-HSS-123, and BB-HSS-124 were drilled through the bridge approach embankments behind the existing abutments. Test boring BB-HSS-121 was drilled through the bridge deck and casing was advanced from the bridge deck to the ground surface below. Test boring BB-HSS-122 was drilled below the bridge, adjacent to Emerson Mill Road.

Boring locations were laid out in the field by taping distances from existing site features. "As-drilled" locations and ground surface elevations at boring locations were determined by MaineDOT using GPS survey methods. As-drilled boring locations are shown on Figure 2. Coordinate location data and ground surface elevations at exploration locations are provided on individual test boring logs provided in Appendix A and are summarized in Table I.

All test borings were drilled by New England Boring Contractors of Hermon, Maine using either a truck-mounted Mobile B59 drill rig or track-mounted Mobile B53 drill rigs. Test borings were drilled to depths ranging from 32.7 ft to 65.4 ft below ground surface (BGS).

Test borings were advanced using cased-wash drilling methods by either driving or spinning casing. Casing consisted of 4.0-in. (HW-size) inside diameter (ID) steel casing and/or 3.0-in. (NW-size) ID steel casing. Casing blow count data is provided on the logs in Appendix A. Soil samples were generally

collected continuously through the man-placed fill and then typically at 5-ft intervals once native soils were encountered. The test borings were extended to bedrock and collected approximately 10 ft of rock core.

Soils samples were collected by driving a 1-3/8-in. ID split-spoon sampler with a 140-lb hammer dropped from a height of 30 in., as indicated on the test boring logs. Drilling and sampling were performed in accordance with MaineDOT specifications. The drill rigs were equipped with automatic hammers calibrated annually per MaineDOT requirements (Appendix A of MaineDOT Geotechnical Drilling Contract Specifications, revised June 2007). A calculated hammer efficiency of 0.75, 0.677 and 0.869 were used for the calibrated automatic hammer system for the steel track-mounted Mobile Drill B-53 rig, the rubber track-mounted Mobile Drill B-53 rig, and the truck-mounted Mobile Drill B-59 rig, respectively.

The number of hammer blows required to advance the sampler through each 6-in. interval was recorded and is provided on the test boring logs. The uncorrected SPT N-value is defined as the total number of blows required to advance the sampler through the middle 12 in. of the 24-in. sampling interval. The energy-corrected SPT N-value (N60) is equal to the uncorrected N-value multiplied by the hammer efficiency factor divided by 0.6 (i.e., 60 percent calculated hammer efficiency). Both the raw blow count data and the corrected N-values are shown on the boring logs.

Samples of the in-situ fill soils collected during the geotechnical explorations were screened in the field with a photoionization detector (PID) to assess the presence of volatile organic compounds (VOCs). No elevated PID readings were detected during the subsurface explorations. No visual or olfactory signs of contamination/environmentally impacted soils were observed during the subsurface explorations. Refer to individual boring logs provided in Appendix A for actual PID readings.

The test borings sampled 10.0 to 11.2 ft of bedrock using a 2.0-in. (NQ-size) ID diamond-tipped core barrel. Refer to rock core photographs provided in Appendix B for detailed information on bedrock core samples collected.

All soil and bedrock samples were classified in accordance with MaineDOT classification system and were preserved in glass sample jars and wooden core boxes. The samples that were not submitted for laboratory testing are available for review upon request. Soil and bedrock samples are being stored at the Haley & Aldrich laboratory facility in Portland, Maine.

Generalized Subsurface Conditions

The subsurface conditions encountered at the site consist of the following geologic units presented in order of increasing depth below ground surface: topsoil, man-placed fill, marine deposits, glacial till and bedrock.

SOIL UNIT AND BEDROCK DESCRIPTIONS

Soil

Refer to Table I for a summary of the soil units and encountered thicknesses at each test boring location. A description of each soil unit is provided separately, below. Detailed soil descriptions are provided on the test boring logs in Appendix A. Please note that the soil descriptions provided on the test boring logs and summarized below do not represent actual field conditions other than at the specific test boring locations. The actual conditions will vary from those described and shown herein.

Unit		Approximate Range in Encountered Thickness (ft)	Generalized Description
Topsoil		0.5	Dark brown fine SAND with trace organics and roots *(encountered in BB-HSS-122, located below the existing bridge and next to Emerson Mill Road)*
Fill		8.0 to 27.2	Very loose to very dense SAND, trace gravel to gravelly, trace to little silt, occasional trace asphalt pieces (SW, SW-SM, SP); very loose to very dense SAND, trace gravel to gravelly, little to some silt, trace clay, occasional trace wood and wire (SM); very dense GRAVEL, some sand, trace silt (GW-GM); dense GRAVEL, some sand, little sand (GM); very soft to medium stiff SILT, little gravel, some sand, trace to little clay (ML); very soft to medium stiff silty CLAY, trace gravel, trace to little sand, trace organics (CL) *(encountered in all test borings)*
Marine Deposit	Clay and Silt	4.0 to 9.5	Very stiff SILT, little sand, trace to some clay, occasional trace roots, wood and organics (ML); medium stiff to very stiff silty CLAY, trace to some sand, occasional mottling, trace roots and organics (CL) *(encountered in all test borings except BB-HSS-121)*
	Sand	0.5	Medium dense SAND, little gravel, little silt (SM) *(encountered in BB-HSS-113)*
Glacial Till		1.4 to 16.4	Very dense SAND, little gravel, trace silt (SP); medium dense to very dense SAND, trace to some gravel, little silt (SM); very dense GRAVEL, some sand, trace silt (GP); medium dense GRAVEL, some sand, little silt (GM) The glacial till was moderately-bonded to well-bonded and contained occasional cobbles and boulders *(encountered in all test borings)*

Please note, test borings performed behind the abutments encountered 0.5 to 1.0 ft of bituminous concrete with a 0.6 to 1.2 ft thick concrete approach slab underlying the bituminous concrete. Test boring BB-HSS-121 was performed at the midpoint of the bridge and penetrated the concrete bridge deck, which had a thickness of 0.8 ft.

Bedrock

Bedrock was cored in each test boring. The top of the bedrock surface ranged from approximately 22.5 to 55.0 ft BGS (El. 108.8 to El. 125.9). Test borings BB-HSS-119 and BB-HSS-123 encountered 1.5 to 2.0 ft of weathered bedrock overlying the bedrock. Bedrock encountered at the site consisted of moderately hard to hard phyllite, hard to very hard quartzite and medium hard slate.

Rock quality designation (RQD) is a common parameter that is used to help assess the competency of sampled bedrock. RQD is defined as the sum of pieces of recovered bedrock greater than 4 in. in length divided by the total length of the core run. RQD values for bedrock encountered at the site ranged between 29 to 100 percent, this correlates to a Rock Mass Quality rating of poor to excellent. Refer to rock core photographs provided in Appendix B for detailed information on bedrock core samples collected.

WATER ELEVATIONS

Observation wells were not installed in any of the completed boreholes. As a result, long term static water levels at test boring locations were not determined. Water levels were taken in the completed boreholes after the casing had been extracted from the borehole and are noted on the boring logs in Appendix A. Water depths ranged from 6.0 to 23.1 ft BGS (El. 134.6 to El. 148.5). Please note that the visual observations made during drilling and water levels measured in the completed boreholes may have been affected by drilling means/methods and may not be representative of actual static water levels at the site.

In general, groundwater levels can be expected to fluctuate, subject to seasonal variation, local soil conditions, topography and precipitation. Groundwater levels encountered during construction may differ from those observed in the test borings.

Laboratory Testing Program

A preliminary design phase laboratory testing program was undertaken on soil samples collected during the field investigation to assist in soil classification/identification. In general, laboratory testing was performed on disturbed soil samples collected during SPT sampling. All laboratory soil testing was performed by GeoTesting Express, Inc. of Acton, Massachusetts. Geotechnical laboratory testing was performed in accordance with applicable American Society for Testing Materials (ASTM) testing procedures.

The preliminary design phase testing program included six grain size analyses (sieve only, no hydrometer), five Atterberg Limits analyses and four compressive strength/elastic moduli of rock analyses. A summary of laboratory test results is provided below. Refer to the laboratory test results provided in Appendix C of this report.

Laboratory Test	ASTM Test Designation	Soil Unit	No. of Tests Completed	Range in Test Results
Grain Size	ASTM D 422 (Sieve Only)	Fill	6	AASHTO Classification: A-1-a(0), A-2-4(0), A-1-b(0) USCS Classification: SM
Atterberg Limits	ASTM D 4318	Marine Clay	5	USCS Classification: CL Moisture Content: 24% to 27% Liquid Limit: 26 to 36 Plastic Limit: 18 to 21 Plasticity Index: 8 to 16
Compressive Strength / Elastic Moduli of Rock	ASTM D 7012	Bedrock	4	Peak Compressive Stress: 3,815 psi to 21,452 psi Young's Modulus: 4,600,000 psi to 9,350,000 psi Poisson's Ratio: 0.13 to 0.37

Closure

We appreciate the opportunity to provide geotechnical services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

Erin A. Force

Erin A. Force, P.E.
Project Manager

STATE OF MAINE
ERIN A. FORCE
No. 12207
LICENSED
PROFESSIONAL ENGINEER

Wayne A. Chadbourne, P.E.
Senior Associate

Enclosures:

- Table I – Summary of Subsurface Explorations
- Figure 1 – Project Locus
- Figure 2 – Boring Location Plan and Interpretive Subsurface Profile
- Appendix A – Test Boring Logs
- Appendix B – Rock Core Photographs
- Appendix C – Laboratory Test Results
- Appendix D – Historic Drawings

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References

1. Pollock, Stephen G., *Bedrock Geology of the Bangor Quadrangle, Maine*, Maine Geological Survey, Department of Conservation, Augusta, Maine, Open File Report No. 11-57, 2011.

2. Syverson, Kent M., Thompson, Andrew H. *Surficial Geology*, *Bangor Quadrangle, Maine*, Maine Geological Survey, Department of Conservation, Augusta, Maine, Open File Report No. 11-06, 2011.

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TABLES

TABLE I
Summary of Subsurface Explorations
Interstate 95 over Emerson Mill Road / B&A Railroad
Bridge Nos. 5969 and 1430
Hampden, Maine
MaineDOT WIN 21673.00 and WIN 21673.10

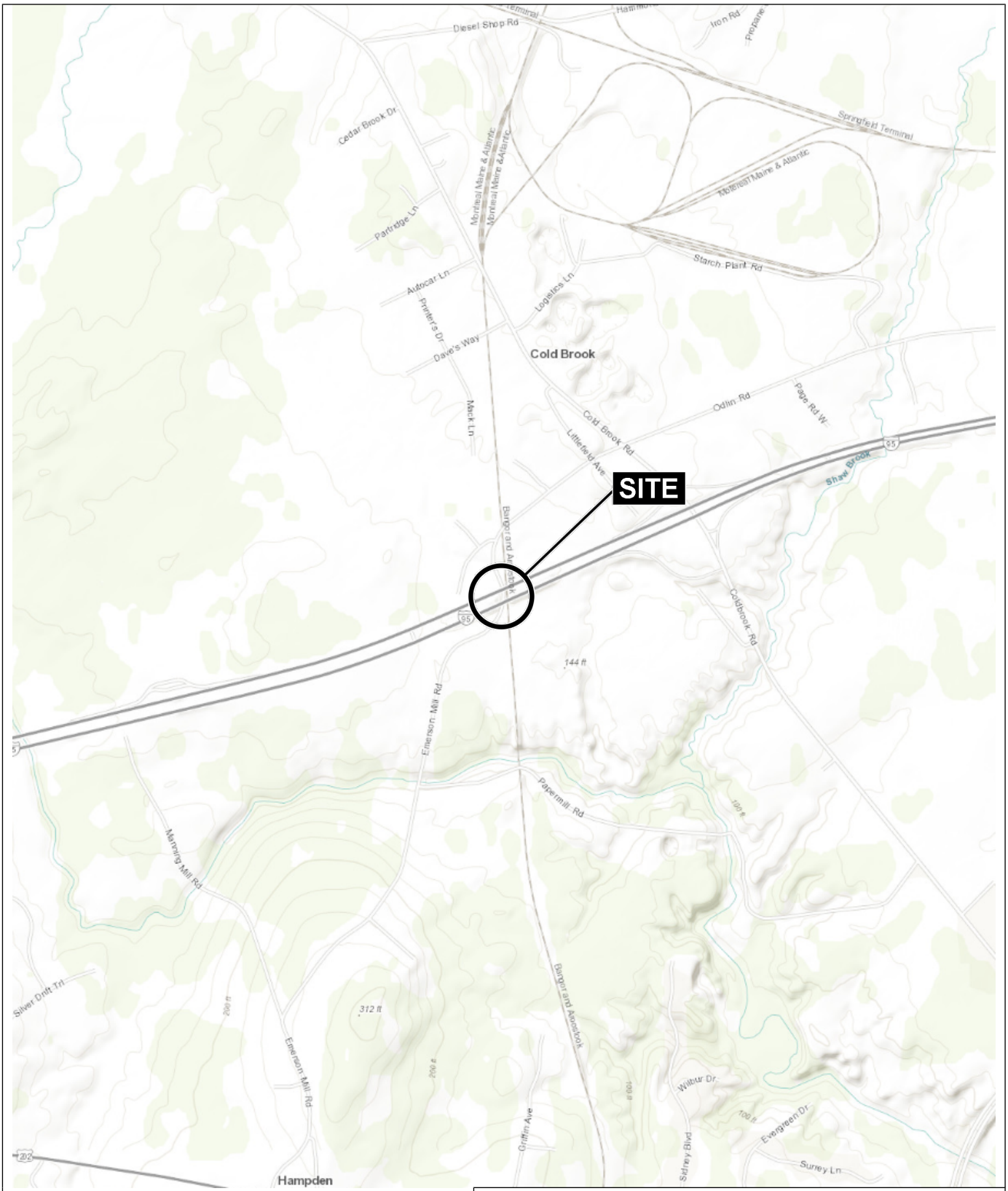
	Test Boring No.[1]	Coordinates[2] Easting	Northing
North bound	BB-HSS-120	1,706,750	463,132
	BB-HSS-122	1,706,865	463,167
	BB-HSS-124	1,706,967	463,230
South bound	BB-HSS-119	1,706,754	463,346
	BB-HSS-121	1,706,850	463,391
	BB-HSS-123	1,706,950	463,431

	Test Boring No.[1]	Ground Surface Elevation[3,4]	Approximate Strata Thickness[5] (ft) Bituminous Concrete	Topsoil	Fill	Marine Clay and Silt	Marine Sand	Glacial Till	Weathered Bedrock	Approximate Top of Bedrock Depth (ft)	Approximate Elevation of Top of Bedrock[3,4]	Approximate Top of Bedrock Depth (ft)	Approximate Elevation of Bottom of Exploration[3,4]
North bound	BB-HSS-120	163.5	1.0	NE	26.0	7.1	NE	10.2	NE	44.3	119.2	54.3	109.2
	BB-HSS-122	140.6	NE	0.5	8.0	4.0	NE	10.0	NE	22.5	118.1	32.7	107.9
	BB-HSS-124	162.8	1.0	NE	26.0	9.5	NE	1.4	NE	36.9	125.9	47.5	115.3
South bound	BB-HSS-119	163.8	0.5	NE	27.0	9.1	0.5	16.4	1.5	55.0	108.8	65.4	98.4
	BB-HSS-121	139.4	NE[6]	NE	14.3	NE	NE	14.4	NE	28.7	110.7	38.7	100.7
	BB-HSS-123	162.8	0.9	NE	27.2	9.5	NE	4.6	2.0	44.2	118.6	55.4	107.4

Notes:
[1] Test boring locations are shown on Figure 2, Boring Location Plan.
[2] As-drilled coordinates of test borings were determined by MaineDOT using GPS survey equipment and reference NAD 83, Maine 2000 Central Zone coordinate system.
[3] Ground surface elevations at as-drilled test boring locations were determined by MaineDOT using GPS survey equipment.
[4] Elevations are measured in feet and reference the National Geodetic Vertical Datum of 1988 (NAVD 88).
[5] "NE" indicates stratum was not encountered in test boring.
[6] Existing concrete bridge deck thickness encountered at BB-HSS-121 was 0.8 ft.

	Individual	Date
Prepared By:	KAR	1/11/2019
Checked By:	EAF	2/18/2019
Reviewed By:	WAC	2/21/2019

FIGURES



MAP SOURCE: ESRI

SITE COORDINATES: 44°46'14"N, 68°52'9"W

HALEY ALDRICH

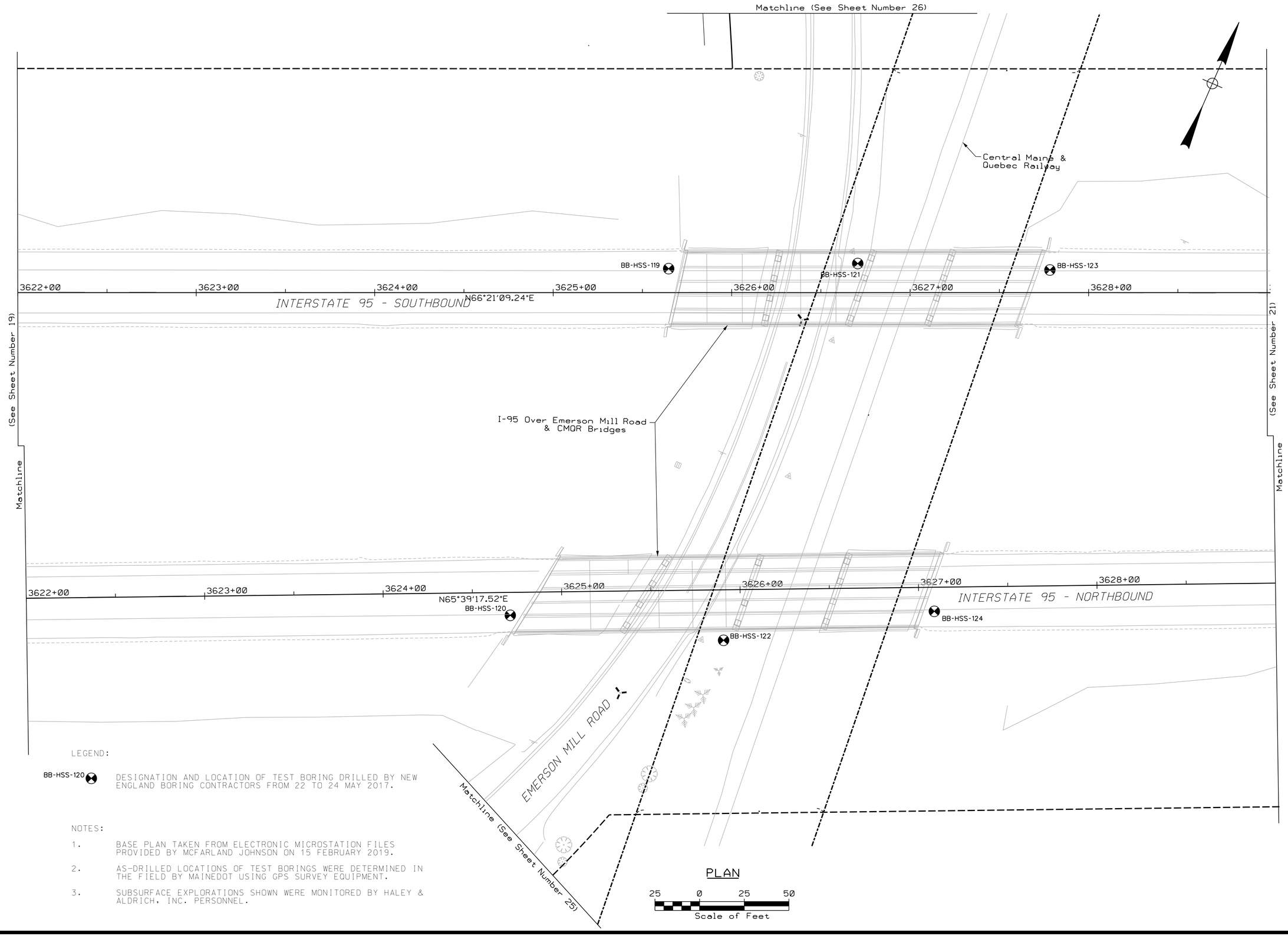
INTERSTATE 95 OVER EMERSON MILL ROAD / B&A RAILROAD
BRIDGES NOS. 5969 AND 1430
HAMPDEN, MAINE
MAINEDOT WIN 21673.00 AND WIN 21673.10

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
FEBRUARY 2019

FIGURE 1

129380-002_1_LOCUS.PDF



LEGEND:

BB-HSS-120 — DESIGNATION AND LOCATION OF TEST BORING DRILLED BY NEW ENGLAND BORING CONTRACTORS FROM 22 TO 24 MAY 2017.

NOTES:

1. BASE PLAN TAKEN FROM ELECTRONIC MICROSTATION FILES PROVIDED BY MCFARLAND JOHNSON ON 15 FEBRUARY 2019.
2. AS-DRILLED LOCATIONS OF TEST BORINGS WERE DETERMINED IN THE FIELD BY MAINEDOT USING GPS SURVEY EQUIPMENT.
3. SUBSURFACE EXPLORATIONS SHOWN WERE MONITORED BY HALEY & ALDRICH, INC. PERSONNEL.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

BRIDGE NOS. 5969 & 1430 WIN 21673.00 - 21673.10 BRIDGE PLANS

		BY	DATE
PROJ. MANAGER	E. FORCE		
DESIGN-DETAILED	K. POST	K. POST	02-21-19
CHECKED-REVIEWED	E.FORCE	E.FORCE	02-21-19
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

HAMPDEN BRIDGE BUNDLE
INTERSTATE 95
HAMPDEN, MAINE PENOBSCOT COUNTY

BORING LOCATION PLAN

SHEET NUMBER
2
OF 2

APPENDIX A

Test Boring Logs

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-119
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	163.8	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-23-17/5-24-17	**Drilling Method:**	HW Drive/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430: E1706754; N463346	**Casing ID/OD:**	HW-4.0 in. ID/NW-3.0 in. ID	**Water Level*:**	Not observed
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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

Sample Information

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	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	163.3		-BITUMINOUS CONCRETE- 0.5	
	1D	6/6	1.0 - 1.5	12/17(0.0)				162.3		Note: Description from auger cuttings: Brown, dry, fine to coarse SAND and GRAVEL	
								161.1		Brown, dry, medium dense, fine to coarse SAND, some gravel, trace silt, well graded, contains asphalt fragments -FILL-(SW) PID=0.0 ppm 1.5	
	2D	24/17	3.0 - 5.0	11/9/9/15	18	26				-CONCRETE- 2.7	
							▽			Brown, dry, medium dense, fine to coarse SAND, some gravel, trace silt, well graded, 1-in. silt nodule -FILL-(SW-SM) PID=0.0 ppm	
5	3D	24/17	5.0 - 7.0	13/10/8/13	18	26	18			Brown, dry, medium dense, fine to coarse SAND (2-in. silt nodule), little gravel, trace silt, well graded -FILL-(SW-SM) PID=0.0 ppm	
							10			Brown, dry, medium dense, fine to coarse SAND, little gravel, trace silt, well graded -FILL-(SW) PID=0.0 ppm	
	4D	24/18	7.0 - 9.0	15/10/8/11	18	26	11			Brown, dry, medium dense, fine to coarse SAND, little gravel, trace silt, well graded, 4-in. clay nodule -FILL-(SW-SM) PID=0.0 ppm	
							10			Brown, dry, dense, fine to coarse SAND, some gravel, trace silt, well graded -FILL-(SW-SM) PID=0.1 ppm	
	5D	24/18	9.0 - 11.0	7/3/10/32	13	19	10			Note: Drill action indicates gravel/cobbles from 12.5 to 14.0 ft while washing out casing.	
10							16			Brown, dry, dense, fine to medium SAND, little gravel, little silt, trace coarse sand -FILL-(SM) PID=0.2 ppm	
	6D	24/18	11.0 - 13.0	39/22/21/19	43	62	94			Brown, moist to wet, medium dense, fine to medium SAND, little gravel, little silt, trace coarse sand -FILL-(SM) PID=0.0 ppm	
							120(5.0) 43(7.0)			Brown, wet, very dense, fine to coarse SAND, little gravel, little silt, trace coarse sand -FILL-(SM) PID=0.0 ppm	
	7D	24/16	13.0 - 15.0	16/12/19/19	31	45	94			Note: Washed ahead of casing 19.0 to 21.0 ft.	
							111			Brown, wet, dense, GRAVEL, some medium to coarse sand, little silt, trace fine sand -FILL-(GM) PID=0.1 ppm	
15	8D	24/16	15.0 - 17.0	17/14/16/25	30	43	105			Brown, wet, very dense, GRAVEL, some medium to coarse sand, little silt, trace fine sand -FILL-(GM) PID=0.1 ppm	
							100			Brown, wet, dense, fine to medium SAND, some gravel, little silt, trace coarse sand -FILL-(SM) PID=0.1 ppm	
	9D	24/18	17.0 - 19.0	34/26/27/40	53	77	150				
							146				
	10D	24/12	19.0 - 21.0	16/24/24/24	48	70	36				
20							30				
	11D	24/14	21.0 - 23.0	23/18/25/40	53	77	41				
							100				
	12D	24/13	23.0 - 25.0	24/26/19/15	45	65	158				
25							147				

Remarks:

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.: BB-HSS-119

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-119
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	163.8	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-23-17/5-24-17	**Drilling Method:**	HW Drive/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430: E1706754; N463346	**Casing ID/OD:**	HW-4.0 in. ID/NW-3.0 in. ID	**Water Level*:**	Not observed
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
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WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	13D	24/16	25.0 - 27.0	18/16/11/9	27	39	-		Brown, wet, medium dense, fine to medium SAND, trace coarse sand, trace fine gravel, little silt, trace clay -FILL-(SM) PID=0.0 ppm	
							-			
	14D	24/16	27.0 - 29.0	13/10/15/12	25	36	-	136.3	27.5	
							-	135.8	Brown-grey, wet, medium dense, fine SAND, little medium sand, little fine gravel, little silt -MARINE DEPOSIT-(SM)	
	15D	24/18	29.0 - 31.0	5/7/11/14	18	26	-		28.0 Brown grading to grey, moist, very stiff, SILT, trace clay, trace rootlets, trace organics -MARINE DEPOSIT-(ML)	
30							-		Grey-brown, moist, very stiff, SILT (ML), some clay -MARINE DEPOSIT-(ML)	
								129.8	34.0	
	16D	24/23	34.0 - 36.0	3/4/4/5	8	12	-		Olive-brown, moist, medium stiff, silty CLAY -MARINE DEPOSITS-(CL)	G#426850 A-6 CL WC=26% LL=35, PL=20 PI=15
35							50			
							41			
							68	126.7	37.1	
							80			
	17D	24/18	39.0 - 41.0	33/45/42/49	87	126	90		Brown to grey, wet, very dense, fine to medium SAND, some gravel, little coarse sand, little silt, well bonded -GLACIAL TILL-(SM)	
40							NW Drive			
	18D	24/15	44.0 - 46.0	20/24/24/22	48	70	7		Brown-grey, wet, dense, medium SAND, little coarse and fine sand, little silt, little gravel, well bonded -GLACIAL TILL-(SM)	
45							42			
							72		Note: Drill action indicates cobble at 46.6 to 47.0 ft.	
							54			
							66			
50	19D	24/10	49.0 - 51.0	4/8/9/16	17	25	76		Grey, wet, medium dense, GRAVEL, some medium to coarse sand, little silt, trace fine sand	

Remarks:

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

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Boring No.: BB-HSS-119

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-119
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	163.8	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-23-17/5-24-17	**Drilling Method:**	HW Drive/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430: E1706754; N463346	**Casing ID/OD:**	HW-4.0 in. ID/NW-3.0 in. ID	**Water Level*:**	Not observed
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
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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 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50							77		-GLACIAL TILL-(GM)	
							60			
							107		Note: Advanced rollerbit ahead of casing through cobble from approximately 52.5 to 53.5 ft.	
							-	110.3	53.5	
	20D	1/1	54.0 - 54.1	58(1.0)			-		-WEATHERED BEDROCK- Note: Split spoon refusal at 54.1 ft. 1-in. weathered rock recovered in spoon tip.	
55	R1	54/53	55.0 - 59.5	RQD = 80%			NQ Core	108.8	Note: Advance rollerbit through weathered rock to 55.0 ft, begin NQ rock core.	qp=3,815 psi
									55.0	
									Top of Bedrock at El.108.8	
									R1: Dark grey, fine grained to aphanitic, PHYLLITE, medium hard, fresh. Joints steeply to moderately dipping, moderately spaced, tight to open, planar and rough, fresh joint surfaces. Occasional quartz veins. Distinct moderate to high angle foliation.	
									Rock Mass Quality=Good	
	R2	30/30	59.5 - 62.0	RQD = 60%					Recovery=98%	
60									R1 Core Times (min:sec): 55.0-56.0' (3:01); 56.0-57.0' (2:30); 57.0-58.0' (2:05); 58.0-59.0' (2:10); 59.0 to 59.5' (1:38)	
									R2: Dark grey, fine grained to aphanitic, PHYLLITE, medium hard, fresh. Joints steeply to moderately dipping, moderately spaced, tight to open, planar to stepped, fresh joint surfaces. Occasional quartz veins. Distinct moderate to high angle foliation.	
	R3	41/38	62.0 - 65.4	RQD = 71%					Rock Mass Quality=Fair	
									Recovery=100%	
									R2 Core Times (min:sec): 59.5-60.5' (2:02); 60.5-61.5' (2:21); 61.5-62.0' (1:32)	
65								98.4	R3: Dark grey, fine grained to aphanitic, PHYLLITE, medium hard, fresh. Joints steeply to moderately dipping, close, tight to open, planar, smooth to rough, fresh joint surfaces. One silt coating, frequent calcite veins.	
									Rock Mass Quality=Fair	
									Recovery=93%	
									Note: R3 core times (min:sec) not observed.	
									65.4	
									Bottom of Exploration at 65.4 feet below ground surface.	
70										
75										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-120
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	163.5	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706750; N463132	**Casing ID/OD:**	HW-4.0 in. ID	**Water Level*:**	15.0 ft
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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R = Rock Core Sample
SSA = Solid Stem Auger
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WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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

Sample Information

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA		-BITUMINOUS CONCRETE- Note: Observed from auger cuttings. (1.0)	
								162.5		
								162.0	-CRUSHED STONE- (1.5)	
								161.7		
								161.0	Note: Observed from auger cuttings: Brown, fine to coarse SAND and GRAVEL -FILL-(SW) PID=0.0 ppm (1.8) -CONCRETE- (2.5)	
	1D	24/14	3.0 - 5.0	7/8/10/8	18	26				
5	2D	24/14	5.0 - 7.0	6/6/8/5	14	20	HW Drive		Brown, dry, medium dense, fine to coarse SAND, little gravel, trace silt -FILL-(SW) PID=0.0 ppm	G#426855 A-1-b (0) SM
	3D	24/14	7.0 - 9.0	8/8/11/12	19	28			Brown, dry, medium dense, fine to coarse SAND, some gravel, little silt -FILL-(SM) PID=0.0 ppm	
	4D	24/15	9.0 - 11.0	9/10/11/11	21	30			Brown, dry to moist, medium dense, fine to coarse SAND, some gravel, trace silt, well graded -FILL-(SW-SM) PID=0.0 ppm	
10	5D	24/18	11.0 - 13.0	11/17/14/13	31	45			Brown, dry to moist, medium dense, fine to coarse SAND, some gravel, trace silt -FILL-(SW-SM) PID=0.0 ppm	
	6D	24/18	13.0 - 15.0	35/18/24/30	42	61			Brown, moist, dense, fine to medium SAND, little silt, trace coarse sand, trace gravel -FILL-(SW-SM) PID=0.0 ppm	
15	7D	24/10	15.0 - 17.0	23/28/28/56	56	81			Brown, moist, dense, fine to coarse SAND, little gravel, little silt -FILL-(SW-SM) PID=0.0 ppm	
	8D	24/22	17.0 - 19.0	77/55/35/27	90	130			Brown, wet, very dense, fine to coarse SAND, some gravel, little silt -FILL-(SM) PID=0.0 ppm	
								145.5	(18.0)	
20	9D	24/17	20.0 - 22.0	14/24/30/40	54	78	36		Brown to grey-brown, wet, very dense, GRAVEL, little coarse sand, trace fine to medium sand, trace silt, well bonded (Reworked Glacial Till) -FILL-(GW-GM) PID=0.0 ppm Brown, wet, very dense, fine to coarse SAND, some gravel, some silt, well bonded (Reworked Glacial Till) -FILL-(SM) PID=0.0 ppm	G#426856 A-1-b (0) SM
							68			
							124			
							157			
25										

Remarks:

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Boring No.: BB-HSS-120

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-120
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	163.5	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706750; N463132	**Casing ID/OD:**	HW-4.0 in. ID	**Water Level*:**	15.0 ft
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	10D	24/5	25.0 - 27.0	4/2/3/7	5	7	HW Drive		Brown, wet, loose, fine to coarse SAND, some gravel, some silt, well bonded (Reworked Glacial Till) -FILL-(SM) PID=0.0 ppm	
								137.0	26.5	
	11D	24/24	27.0 - 29.0	5/6/10/12	16	23		136.5	Grey-brown, moist, medium stiff, SILT, little clay (Reworked Marine Deposit) -FILL-(ML) PID=0.0 ppm	
									27.0	
									Olive-brown to grey, moist, very stiff, silty CLAY (CL) -MARINE DEPOSIT-(CL)	
30	12D	24/24	30.0 - 32.0	2/4/6/7	10	14			Olive-brown to grey, moist to wet, stiff, silty CLAY -MARINE DEPOSIT-(CL)	G#426851 A-6 CL WC=25% LL=36, PL=20 PI=16
								129.4	34.1	
35	13D	24/16	35.0 - 37.0	18/30/25/19	55	80			Olive-brown, moist to wet, very dense, fine to coarse SAND, some gravel, little silt -GLACIAL TILL-(SM)	
40	14D	24/15	40.0 - 42.0	16/11/10/8	21	30			Olive-brown, moist to wet, medium dense, fine to coarse SAND, some gravel, little silt -GLACIAL TILL-(SM)	
							NQ Core	121.3	42.2	
	R1	7/3	43.2 - 43.8						Note: Advanced rollerbit from 42.2 ft to 43.2 ft. Begin NQ rock core at 43.2 ft. R1: Recovered 3 in. cobble R1 Core Times (min:sec): 43.2-43.8' (5:12)	
	R2	6/4	43.8 - 44.3						R2: Recovered 4 in. cobble R2 Core Times (min:sec): 43.8-44.3' (2:48)	
	R3	60/60	44.3 - 49.3	RQD = 82%				119.2		
45									44.3	
									Top of Bedrock at El. 119.2 R3: Grey, fine grained to aphanitic, PHYLLITE, moderately hard, fresh. Joints moderately dipping parallel to foliation, close to moderately close, open, one silt coated joint surface at approximately 47.1 ft - slightly weathered joint surface. Occasional quartz stringers/ veins. Rock Mass Quality=Good Recovery=100% R3 Core Times (min:sec): 44.3-45.3' (2:12); 45.3-46.3' (1:16);	qp=20,734 psi
								115.9		
50	R4	60/60	49.3 - 54.3	RQD = 95%						

Remarks:

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Boring No.: BB-HSS-120

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-120
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	163.5	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706750; N463132	**Casing ID/OD:**	HW-4.0 in. ID	**Water Level*:**	15.0 ft
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 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	Laboratory Testing Results/ AASHTO and Unified Class.
50							NQ Core	113.6		46.3-47.3' (1:29); 47.3-48.3' (1:43); 48.3-49.3' (2:00)	
										47.6	
										Black, aphanitic, SLATE, moderately hard, fresh. Joints moderate to steeply dipping, close, tight.	
										49.9	
										R4: Greenish-grey, fine grained, QUARTZITE, hard, fresh to slightly weathered. Joints moderately to steeply dipping, close to moderately close, tight to open. Quart intrusions from approximately 52.0 to 53.7 ft, and quartz veins, 0.5 in. diameter vugs within intrusions.	
								109.8			
								109.2		Rock Mass Quality=Excellent Recovery=100% R4 Core Times (min:sec): 49.3-50.3' (1:35); 50.3-51.3' (1:56); 51.3-52.3' (2:20); 52.3'-53.3' (3:25); 53.3-54.3' (2:59)	
55										53.7	
										Dark grey to black, aphanitic, SLATE, moderately hard, fresh to slightly weathered on joint surfaces, tight to open.	
										54.3	
										Bottom of Exploration at 54.3 feet below ground surface.	
60											
65											
70											
75											

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-121
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	139.4	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-24-17/5-24-17	**Drilling Method:**	HW/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430; E1706850; N463391	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
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Sample Information

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/3	0.0 - 2.0	WOR/WOH/WOH/ WOH			HW Drive		Note: Bridge deck thickness 9-in., bridge deck to ground surface 24.3 ft. All samples are referenced to depth from ground surface. Brown, moist, very loose, fine to medium SAND, little silt, trace fine gravel -FILL-(SM) PID=0.0 ppm	
	2D	24/2	2.0 - 4.0	WOH/WOH/1/1	1	1			Brown, moist, very loose, fine to medium SAND, little silt, trace fine gravel -FILL-(SM) PID=0.0 ppm	
	3D	24/16	4.0 - 6.0	WOR/1/WOH/WOH	2	3			Brown, moist, very loose, fine to coarse SAND, some silt, little gravel -FILL-(SM) PID=0.0 ppm	G#426857 A-2-4 (0) SM
5	4D	24/10	6.0 - 8.0	WOH/WOH/15/36	15	22			Brown, moist, very loose to medium dense, fine to medium SAND, trace silt, little coarse sand, little fine to coarse gravel -FILL-(SW-SM) PID=0.0 ppm	
	5D	24/4	8.0 - 10.0	4/WOH/1/1	1	1			Brown, wet, very loose, fine to medium SAND, some gravel, little coarse sand, little silt -FILL-(SM) PID=0.0 ppm	G#426858 A-1-b (0) SM
10	6D	24/0	10.0 - 12.0	1/WOH/WOH/WOH	2	3			No recovery	
	7D	24/1	12.0 - 14.0	WOH/1/1/5	2	3			Grey, wet, very soft, SILT, trace clay, little fine sand and fine gravel, trace medium to coarse sand -FILL-(ML) PID=0.0 ppm	
	8D	4/2	14.0 - 14.3	100(4.0)				125.1	Brown-grey, wet, very dense, fine to coarse SAND, little silt, trace gravel, well graded, contains wood and wire -FILL-(SM) PID=0.1 ppm	
15	9D	24/20	15.5 - 17.5	37/33/47/55	80	116			14.3	
									Note: Advanced rollerbit through cobble at 14.5 to 15.5 ft. Brown, wet, very dense, fine to coarse SAND, little silt, trace fine to coarse gravel, well graded -GLACIAL TILL-(SM)	
								122.4	17.0	
20	10D	24/10	20.5 - 22.5	17/16/17/16	33	48	NW Drive		Brown to grey, wet, dense, fine to coarse SAND, little silt, trace fine to coarse gravel, well graded -GLACIAL TILL-(SM)	
25										

Remarks:

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

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Boring No.: BB-HSS-121

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-121
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	139.4	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	M.Snow/C.Simmons	**Rig Type:**	Mobile Drill B-59	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-24-17/5-24-17	**Drilling Method:**	HW/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430; E1706850; N463391	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	
Hammer Efficiency Factor:	0.869	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	11D	24/7	25.5 - 27.5	16/13/13/13	26	38	NW Drive		Brown to grey, wet, medium dense, fine to coarse SAND, little coarse gravel, trace fine gravel, little silt -GLACIAL TILL-(SM)	
	R1	60/59	28.7 - 33.7	RQD = 80%			NQ Core	110.7	28.7 Top of Bedrock at El.110.7 R1: Grey, fine grained to aphanitic, PHYLLITE, medium hard, fresh to slight weathering. Joints moderate to steeply dipping, close to wide, open, planar, smooth to rough, fresh to slightly oxidized. Quartz vein from 33.9 to 34.4 ft, frequent calcite/quartz veins. Rock Mass Quality=Good Recovery=98% R1 Core Times (min:sec): 28.7-29.7' (1:44); 29.7-30.7' (1:20); 30.7-31.7' (1:41); 31.7-32.7' (1:49); 32.7-33.7' (1:36)	
30										
	R2	60/59	33.7 - 38.7	RQD = 98%					R2: Grey, fine grained to aphanitic, PHYLLITE, hard, fresh. Joints moderate to steeply dipping, close to wide, open, planar, smooth to rough, fresh to slightly oxidized. Quartz veins frequent. Rock Mass Quality=Excellent Recovery=98% R2 Core Times (min:sec): 33.7-34.7' (1:40); 34.7-35.7' (1:39) 35.7-36.7' (1:33); 36.7-37.7' (1:26); 37.7-38.7' (1:22)	
35								100.7	38.7 **Bottom of Exploration at 38.7 feet below ground surface.**	
40										
45										
50										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-122
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	140.6	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	T.Snow	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706865; N463167	**Casing ID/OD:**	HW-4.0 in. ID	**Water Level*:**	6.0 ft
Hammer Efficiency Factor:	0.677	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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

Sample Information

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/4	0.0 - 2.0	2/1/2/2	3	3	SSA	140.1	-TOPSOIL- 0.5	
	2D	24/19	2.0 - 4.0	2/2/5/6	7	8			Olive-brown, moist, soft, silty CLAY, trace fine to coarse sand, trace organics -FILL-(CL)	
	3D	24/14	4.0 - 6.0	4/3/3/4	6	7			Olive-brown, moist, medium stiff, silty CLAY, little fine to coarse sand, trace gravel, trace organics -FILL-(CL)	
5							HW Drive			
	4D	24/-	6.0 - 8.0	3/3/3/5	6	7			Olive-brown, wet, medium stiff, silty CLAY, little fine to coarse sand, trace gravel, trace organics -FILL-(CL)	
							-			
	5D	24/24	8.0 - 10.0	2/3/2/3	5	6	9	132.1	8.5 Olive-brown, wet, medium stiff, silty CLAY, trace fine sand, trace organics -MARINE DEPOSIT-(CL)	G#426852 A-6 CL WC=25% LL=27, PL=18 PI=9
							13			
10							10			
							12			
							11	128.1	Note: Drill action indicates strata change at 12.5 ft. 12.5	
	6D	24/14	13.0 - 15.0	27/29/25/21	54	61	-		Grey-brown, wet, very dense, fine to coarse SAND and GRAVEL, some coarse sand, little fine sand, trace silt -GLACIAL TILL-(SP/GP)	
							-			
15	7D	24/8	15.0 - 17.0	11/28/34/25	62	70	-		Grey-brown, wet, very dense, fine to coarse SAND, little gravel, some coarse sand, little fine sand, trace silt -GLACIAL TILL-(SP)	
							-			
							-			
							-			
							-			
20	8D	24/19	20.0 - 22.0	22/22/28/23	50	56	38		Grey, wet, very dense, GRAVEL, some medium sand, little fine to coarse sand, trace silt -GLACIAL TILL-(GP)	
							73			
	R1	38/38	22.5 - 25.7	RQD = 71%			136	118.1	22.5 Top of Bedrock at El. 118.1 R1: Grey, fine grained to aphanitic, PHYLLITE with quartz veins (0.5 to 3 in. thickness), hard, slightly weathered joint surfaces. Primary joints high angle, very close to close, open to tight, smooth. Secondary joints horizontal, very close to close, open, smooth to rough, slightly	
							NQ Core			
25										

Remarks:

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Boring No.: BB-HSS-122

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-122
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	140.6	**Auger ID/OD:**	--
Operator:	B. Enos	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	T.Snow	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706865; N463167	**Casing ID/OD:**	HW-4.0 in. ID	**Water Level*:**	6.0 ft
Hammer Efficiency Factor:	0.677	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 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	Laboratory Testing Results/ AASHTO and Unified Class.
25	R2	36/36	25.7 - 28.7	RQD = 86%			NQ Core			undulating. Rock Mass Quality=Fair Recovery=100% R2: Grey, fine grained to aphanitic, PHYLLITE with few quartz veins, hard, slightly weathered joint surfaces. Primary joints dipping at moderate to high angles, very close to close, open to tight, smooth. Secondary joints horizontal, very close to close, open, smooth to rough, slightly undulating. Recovery=100% R3: Grey, fine grained to aphanitic, PHYLLITE with few quartz veins, hard, slightly weathered joint surfaces. Primary joints dipping at moderate to high angles, very close to close, open to tight, smooth. Secondary joints horizontal, very close to close, open, smooth to rough, slightly undulating. Moderately weathered joint at approximately 30.5 ft, occasional 2-in. quartz veins. Recovery=100% Note: Core run times not observed.	
	R3	48/48	28.7 - 32.7	RQD = 79%							
30								107.9			
35											
40											
45											
50											

32.7

Bottom of Exploration at 32.7 feet below ground surface.

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-123
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	162.8	**Auger ID/OD:**	--
Operator:	M. Porter	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	K. Russ	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-24-17/5-24-17	**Drilling Method:**	HW Drive/NW Spun	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430: E1706950; N463431	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	23.1 ft
Hammer Efficiency Factor:	0.750	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
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S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
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q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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

Sample Information

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	Laboratory Testing Results/ AASHTO and Unified Class.
0							7			-BITUMINOUS CONCRETE-	
								161.9		0.9	
	1D	8/7	1.0 - 1.7	19/50(2.0)			39	161.1		Brown, dry, very dense, fine to coarse SAND, little fine gravel, trace silt and coarse gravel, well graded	
	2D	24/13	2.5 - 4.5	6/6/7/9	13	16	123	160.5		-FILL-(SW) PID=0.0 ppm	
										1.7	G#426859
							6			-CONCRETE-	A-1-b (0)
										2.3	SM
	3D	24/14	4.5 - 6.5	8/12/7/8	19	24	7			Brown, dry, medium dense, fine to coarse SAND, little gravel, little silt	
5							13			-FILL-(SM) PID=0.0 ppm	
										Note: Advanced Split spoon to 8.5 ft, drove HW to 10.5 ft.	
	4D	24/13	6.5 - 8.5	9/7/9/6	16	20	34			Brown, dry, medium dense, fine to coarse SAND, little fine gravel and silt, trace coarse gravel, well graded, several silt chunks	
										-FILL-(SM) PID=0.0 ppm	
							35			Brown, dry, medium dense, fine to medium SAND, little coarse SAND, trace silt and fine to coarse gravel, well graded	
										-FILL-(SW) PID=0.0 ppm	
	5D	24/16	8.5 - 10.5	6/9/8/9	17	21	38			Brown, dry, medium dense, fine to coarse SAND, some gravel, trace silt, well graded	
							61			-FILL-(SW-SM) PID=0.0 ppm	
10	6D	24/12	10.5 - 12.5	10/12/11/10	23	29	11			Brown, wet, medium dense, fine to coarse SAND, little silt, little gravel, well graded	
							21			-FILL-(SM) PID=0.0 ppm	
	7D	24/16	12.5 - 14.5	17/18/17/19	35	44	37			Brown, wet), dense, fine to coarse SAND, trace silt and gravel, well graded	
							67			-FILL-(SW) PID=0.0 ppm	
	8D	24/13	14.5 - 16.5	14/18/19/21	37	46	64			Brown, wet, dense, fine to coarse SAND, trace silt and gravel, well grade	
15							47			-FILL-(SW) PID=0.0 ppm	
	9D	24/14	16.5 - 18.5	18/16/16/23	32	40	57				
							61				
								145.0		17.8	
	10D	24/8	18.5 - 20.5	25/40/38/44	78	98	94	144.7		Brown, wet, dense, fine SAND, trace silt and medium to coarse sand, poorly graded	
							83			-FILL-(SP) PID=0.0 ppm	
										18.1	
20	11D	24/15	20.5 - 22.5	20/26/21/24	47	59	50			Brown, wet, very dense, fine to coarse SAND, little gravel, trace silt, well graded	
							48			-FILL-(SW) PID=0.0 ppm	
										Brown, wet, dense, fine to medium SAND, little coarse sand, little gravel, trace silt, poorly graded	
	12D	24/14	22.5 - 24.5	21/20/19/19	39	49	60			-FILL-(SP) PID=0.0 ppm	
										Brown, wet, dense, coarse SAND, little gravel, trace silt, well graded	
							80			-FILL-(SW-SM) PID=0.0 ppm	
25	13D	24/14	24.5 - 26.5	12/12/21/21	33	41	92			Brown, wet, dense, fine to coarse sand, trace silt and fine gravel, well	

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-123
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	162.8	**Auger ID/OD:**	--
Operator:	M. Porter	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	K. Russ	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-24-17/5-24-17	**Drilling Method:**	HW Drive/NW Spun	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430: E1706950; N463431	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	23.1 ft
Hammer Efficiency Factor:	0.750	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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N-uncorrected = Raw Field SPT N-value
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N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
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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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25							68		graded -FILL-(SW) PID=0.0 ppm	
	14D	24/18	26.5 - 28.5	23/26/16/9	42	53	73		Brown, wet, dense, fine to coarse SAND, trace silt and coarse gravel, well graded -FILL-(SW) PID=0.0 ppm	
							71			
							41	134.7	28.1 Olive-grey, moist, very stiff SILT, little fine sand, contains roots and single piece of decomposed wood -MARINE DEPOSIT-(ML)	
							49			
30	15D	24/23	30.0 - 32.0	4/8/9/12	17	21	60	132.8	30.0 Olive-brown, moist, very stiff, silty CLAY, trace fine sand, contains roots, mottled -MARINE DEPOSIT-(CL)	
							69			
							89			
							102			
							114			
35	16D	24/24	35.0 - 37.0	2/3/3/3	6	8	65		Olive-brown, wet, medium stiff, silty CLAY, some fine sand -MARINE DEPOSIT-(CL)	G#426853 A-6 CL WC=24% LL=26, PL=18 PI=8
							73			
							154	125.2	37.6 Note: Drill wash water contents indicate strata change at 37.6 ft.	
							181			
							222			
40	17D	24/12	40.0 - 42.0	15/22/20/18	42	53	NW Spun		Olive-brown, wet, dense, medium to coarse SAND, little silt, little gravel, trace fine sand, poorly graded, moderately bonded, contains highly weathered bedrock -GLACIAL TILL-(SM)	
								120.6	42.2 Note: Drill wash contents indicate weathered bedrock from 42.2 to 44.2 ft. Note: Set NW casing at 42.7 ft. Initial attempt for R1 encountered soft zones, stopped coring and removed weathered bedrock from core. Begin NQ rock core at 44.2 ft.	
							NQ Core			
	R1	48/43	44.2 - 48.2	RQD = 77%				118.6	-WEATHERED BEDROCK- 44.2	
45									Top of Bedrock at El.118.6 R1: Grey, fine grained, QUARTZITE, very hard, fresh to moderately weathered. Joints dipping at low angles, very close to wide, open, planar, rough, slightly oxidized joint surfaces. Rock Mass Quality=Good Recovery=90% Note: R1 core times (min:sec) not observed.	qp=21,452 psi
	R2	31/31	48.2 - 50.8	RQD = 100%					R2: Grey, fine grained, QUARTZITE, very hard, fresh. Joints dipping at low to moderate angles, close to wide, tight to open, planar, rough,	
50										

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-123
WIN: 21673.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	162.8	**Auger ID/OD:**	--
Operator:	M. Porter	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	K. Russ	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-24-17/5-24-17	**Drilling Method:**	HW Drive/NW Spun	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #1430: E1706950; N463431	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	23.1 ft
Hammer Efficiency Factor:	0.750	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 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	Laboratory Testing Results/ AASHTO and Unified Class.
50	R3	55/55	50.8 - 55.4	RQD = 96%			NQ Core			slightly oxidized joint surfaces. Rock Mass Quality=Excellent Recovery=100% Note: R2 core times not observed. R3: Grey, fine grained, QUARTZITE, very hard, fresh. Joints dipping at low to moderate angles, close to wide, tight, planar, rough, slightly oxidized joint surfaces. Rock Mass Quality=Excellent Recovery=100% R3 Core Times (min:sec): 50.8-51.8' (1:03); 51.8-52.8' (1:23); 52.8-53.8' (1:12); 53.8-54.8' (1:17); 54.8-55.4' (1:21)	
55								107.4		55.4 **Bottom of Exploration at 55.4 feet below ground surface.**	
60											
65											
70											
75											

Remarks:

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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-124
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	162.8	**Auger ID/OD:**	--
Operator:	M. Porter	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	K. Russ	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706967; N463230	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	15.5 ft
Hammer Efficiency Factor:	0.750	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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

Sample Information

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	Laboratory Testing Results/ AASHTO and Unified Class.
0							2			-BITUMINOUS CONCRETE-	
								161.8		1.0	
	1D	10/7	1.0 - 1.8	13/50(4.0)			5	161.0		Brown, dry, very dense, fine to medium SAND, some gravel, trace silt and coarse sand, well graded -FILL-(SW) PID=0.0 ppm	
							26	160.4		1.8	
	2D	24/13	3.5 - 5.5	12/8/6/6	14	18	13			-CONCRETE- 2.4	
							29			Brown, dry, medium dense, gravelly SAND, little silt -FILL-(SM) PID=0.0 ppm	G#426860 A-1-a (0) SM
5	3D		5.5 - 7.5	11/10/14/10	24	30	31			Brown, dry, medium dense, gravelly fine to coarse SAND, well graded -FILL-(SW) PID=0.0 ppm	
							43				
	4D	24/14	7.5 - 9.5	12/13/10/9	23	29	49			Brown, dry, medium dense, fine to coarse SAND, little fine gravel, trace silt and coasre gravel, well graded, contains several 1-in. balls of reworked native silt -FILL-(SW-SM) PID=0.0 ppm	
							60				
	5D	24/14	9.5 - 11.5	6/10/13/14	23	29	58			Brown, moist, medium dense, fine to coarse SAND, little fine gravel, trace silt and coarse gravel, well graded -FILL-(SW) PID=0.0 ppm	
10							27				
	6D	24/15	11.5 - 13.5	16/16/22/21	38	48	48			Brown, moist, dense, fine to coarse SAND, trace silt and gravel, well graded -FILL-(SW-SM) PID=0.0 ppm	
							86				
							98				
							84				
15	7D	24/14	15.0 - 17.0	3/18/17/24	35	44	19	147.3		Brown, moist, dense, fine to coarse SAND, trace silt and gravel, well graded -FILL-(SW-SM) PID=0.0 ppm	
							12			15.5	
	8D	24/18	17.0 - 19.0	23/30/30/32	60	75	6			Brown, wet, dense, medium to coarse SAND, some gravel, little silt, trace fine sand, well bonded (Reworked Glacial Till) -FILL-(SM) PID=0.0 ppm	
							23			Brown, wet, very dense, medium to coarse SAND, some gravel, little silt, trace fine sand, well bonded (Reworked Glacial Till) -FILL-(SM) PID=0.0 ppm	
	9D	24/14	19.0 - 21.0	9/18/39/34	57	71	110			Brown, wet, very dense, fine to coarse SAND, some gravel, little silt (Reworked Glacial Till) -FILL-(SW) PID=0.0 ppm	
20							16				
							9				
							16				
							21				
25							22				

Remarks:

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.: BB-HSS-124

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-124
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	162.8	**Auger ID/OD:**	--
Operator:	M. Porter	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	K. Russ	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706967; N463230	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	15.5 ft
Hammer Efficiency Factor:	0.750	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	10D	24/14	25.0 - 27.0	1/1/11/5	12	15	22	137.8	Olive-brown, moist, very soft silty CLAY, trace fine sand (Reworked Native Soil) -FILL-(CL) PID=0.0 ppm — 25.0	
							42	136.8		
							61		Olive-brown, moist, very stiff, silty CLAY, trace fine sand, mottled -MARINE DEPOSIT-(CL) — 26.0	
							76			
							86			
30	11D	24/9	30.0 - 32.0	6/6/7/9	13	16	71		Olive-brown, moist, stiff, silty CLAY, trace fine sand, mottled -MARINE DEPOSIT-(CL)	G#426854 A-6 CL WC=27% LL=36, PL=21 PI=15
							77			
							83			
							88			
							86			
35	12D	23/14	35.0 - 36.9	13/19/13/50(5.0)	32	40	NQ Core	127.3	Olive-brown, wet, dense, fine to medium SAND, some gravel, little silt, trace coarse sand, moderately bonded -GLACIAL TILL-(SM) — 35.5	
								125.9		
	R1	60/55	37.5 - 42.5	RQD = 87%					Top of Bedrock at El. 125.9 — 36.9	
									Note: Advanced rollerbit to 37.5 ft, set NW casing to 37.5 ft, begin NQ rock core.	qp=13,492 psi
									R1: Dark grey, fine grained, QUARTZITE, very hard, fresh. Joints dipping at low angles, close to moderately close, tight, planar, rough, slight oxidation on joint surfaces. Single 0.125-in. quartz vein at 39.5 ft. Frequent 0.0625-in. thick biotite bands. Rock Mass Quality=Good Recovery=92% R1 Core Times (min:sec): 37.5-38.5' (4:03); 38.5-39.5' (4:11); 39.5-40.5' (4:45); 40.5-41.5' (4:50); 41.5-42.5' (5:23)	
40										
	R2	36/36	42.5 - 45.5	RQD = 78%					R2: Dark grey, fine grained, QUARTZITE, very hard to hard, fresh to slightly weathered. Joints dipping at moderate to low angles, close to very close, tight to open, rough to smooth, planar, slightly oxidized joint surfaces. Several 0.125-in. quartz veins, frequent 0.0625-in. biotite bands. Rock Mass Quality=Good Recovery=100% R2 Core Times (min:sec): 42.5-43.5' (6:37); 43.5-44.5' (5:31); 44.5-45.5' (2:45)	
45	R3	24/15	45.5 - 47.5	RQD = 29%				115.3	R3: Dark grey, fine grained, QUARTZITE, very hard to hard, slightly weathered. Primary joints horizontal to moderately dipping, very close to close, open, rough, planar, slightly oxidized joint surfaces. Secondary joint dipping at high angle, widely spaced, tight, smooth, planar, slightly oxidized joint surfaces. Occasional 0.125-in. quartz veins, frequent 0.0625-in. biotite bands. Note: Low recovery due to core catcher releasing.	
50										

Remarks:

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* 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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Emerson Mill Road/B&A Railroad Bridges
Location: Hampden, Maine

Boring No.: BB-HSS-124
WIN: 21673.10

Driller:	New England Boring Contractors	**Elevation (ft.)**	162.8	**Auger ID/OD:**	--
Operator:	M. Porter	**Datum:**	NAVD 88	**Sampler:**	Split Spoon-1.375 in. ID
Logged By:	K. Russ	**Rig Type:**	Mobile Drill B-53	**Hammer Wt./Fall:**	SS-140#/30;HW/NW-300#/16
Date Start/Finish:	5-22-17/5-23-17	**Drilling Method:**	HW Drive/NW Drive	**Core Barrel:**	NQ-2.0 in. ID
Boring Location:	Bridge #5969: E1706967; N463230	**Casing ID/OD:**	HW-4.0 in. ID;NW-3.0 in. ID	**Water Level*:**	15.5 ft
Hammer Efficiency Factor:	0.750	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
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R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = 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 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	Laboratory Testing Results/ AASHTO and Unified Class.
50										Rock Mass Quality=Poor Recovery=63% R3 Core Times (min:sec): 45.5-46.5' (3:07); 46.5-47.5' (4:15)	
										47.5	
										Bottom of Exploration at 47.5 feet below ground surface.	
55											
60											
65											
70											
75											

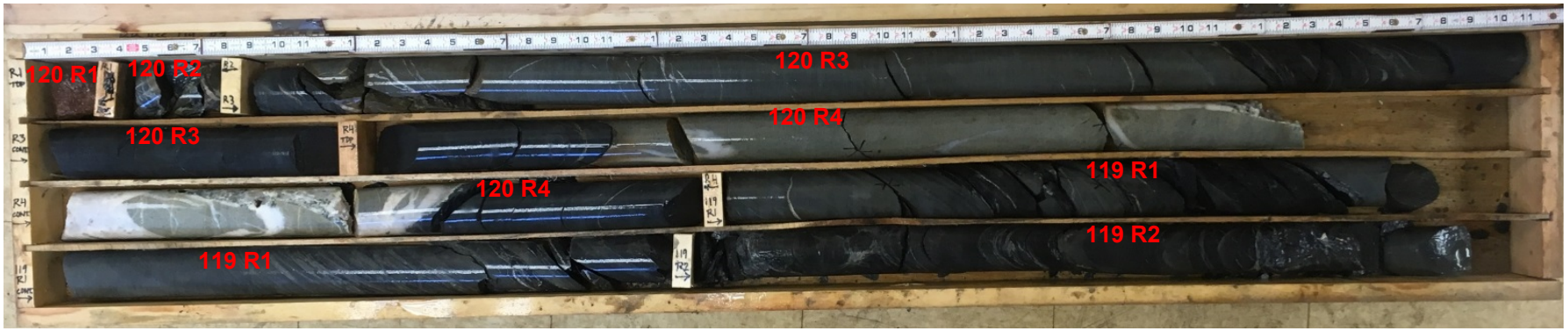
Remarks:

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.

APPENDIX B

Rock Core Photographs



BORING ID	CORE ID	CORE RUN DEPTH (FT)	CORE RUN EL.[NOTE 1]	RECOVERY		RQD[NOTE 2]	
				IN.	%	IN.	%
BB-HSS-120	R1 (cobble)	43.2 to 43.8	120.3 to 119.7	NA	NA	NA	NA
BB-HSS-120	R2 (cobble)	43.8 to 44.3	119.7 to 119.2	NA	NA	NA	NA
BB-HSS-120	R3	44.3 to 49.3	119.2 to 114.2	60	100	49	82
BB-HSS-120	R4	49.3 to 54.3	114.2 to 109.2	60	100	57	95
BB-HSS-119	R1	55.0 to 59.5	108.8 to 104.3	53	98	43	80
BB-HSS-119	R2	59.5 to 62.0	104.3 to 101.8	30	100	18	60

NOTES:

1. ELEVATIONS ARE MEASURED IN FEET AND REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. "RQD" INDICATES ROCK QUALITY DESIGNATION (PERCENT OF ROCK PIECES RECOVERED EQUAL TO OR GREATER THAN 4 IN. IN LENGTH).

HALEY ALDRICH

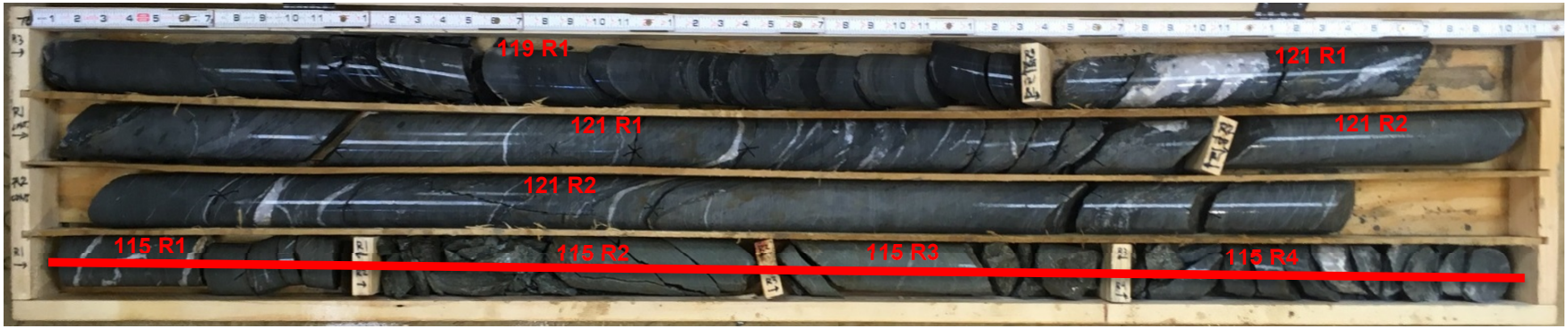
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

INTERSTATE 95 OVER EMERSON MILL ROAD/B&A RAILROAD
BRIDGE NOS. 5696 AND 1430
HAMDEN, MAINE
MAINEDOT WIN 21630.00 AND WIN 21673.10

PHOTOGRAPH OF BEDROCK CORE BORING: BB-HSS-120 AND BB-HSS-119

FILE NO. 129380-002

February 2019



BORING ID	CORE ID	CORE RUN DEPTH (FT)	CORE RUN EL.[NOTE 1]	RECOVERY		RQD[NOTE 2]	
				IN.	%	IN.	%
BB-HSS-119	R3	62.0 to 65.4	101.8 to 98.4	38	93	29	71
BB-HSS-121	R1	28.7 to 33.7	110.7 to 105.7	59	98	48	80
BB-HSS-121	R2	33.7 to 38.7	105.7 to 100.7	59	98	59	98
~~BB-HSS-115~~	~~R1~~	~~2.6 to 4.5~~	~~110.7 to 108.8~~	~~12~~	~~52~~	~~NA~~	~~NA~~
~~BB-HSS-115~~	~~R2~~	~~7.0 to 8.7~~	~~106.3 to 104.6~~	~~15~~	~~75~~	~~8~~	~~40~~
~~BB-HSS-115~~	~~R3~~	~~8.7 to 12.6~~	~~104.6 to 100.7~~	~~13~~	~~28~~	~~8~~	~~17~~
~~BB-HSS-115~~	~~R4~~	~~12.6 to 14.2~~	~~100.7 to 99.1~~	~~15~~	~~79~~	~~0~~	~~0~~

NOTES:

1. ELEVATIONS ARE MEASURED IN FEET AND REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. "RQD" INDICATES ROCK QUALITY DESIGNATION (PERCENT OF ROCK PIECES RECOVERED EQUAL TO OR GREATER THAN 4 IN. IN LENGTH).
3. RED LINES DRAWN THROUGH ROCK CORE PHOTOGRAPHS/TABLE INDICATE THAT ROCK CORE WAS COLLECTED FROM AN ADJACENT BRIDGE STRUCTURE. REFER TO OTHER BRIDGE REPORTS.

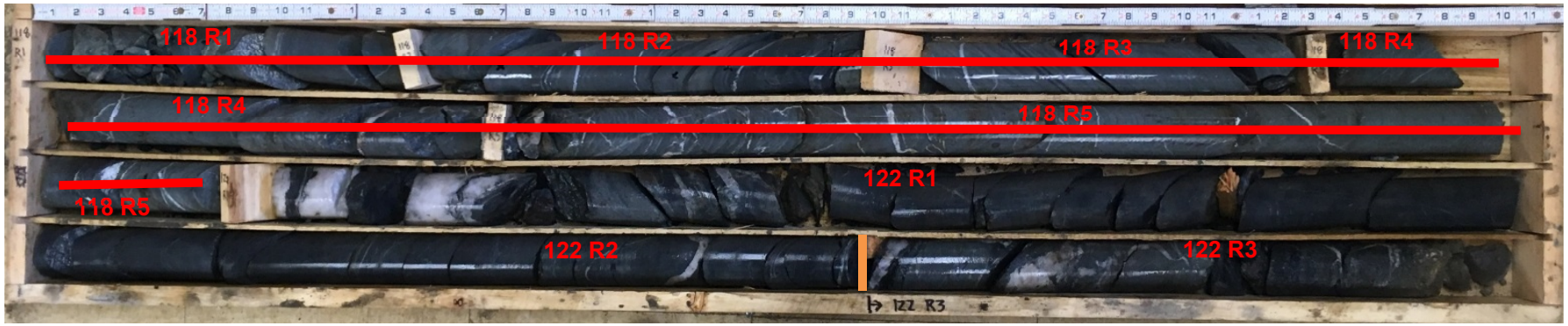
HALEY ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

INTERSTATE 95 OVER EMERSON MILL ROAD/B&A RAILROAD
BRIDGE NOS. 5696 AND 1430
HAMDEN, MAINE
MAINEDOT WIN 21630.00 AND WIN 21673.10

PHOTOGRAPH OF BEDROCK CORE BORING: BB-HSS-119 AND BB-HSS-121

FILE NO. 129380-002 February 2019



BORING ID	CORE ID	CORE RUN DEPTH (FT)	CORE RUN EL.[NOTE 1]	RECOVERY		RQD[NOTE 2]	
				IN.	%	IN.	%
~~BB-HSS-118~~	~~R1~~	~~22.5 to 23.2~~	~~112.1 to 111.4~~	~~8~~	~~100~~	~~0~~	~~0~~
~~BB-HSS-118~~	~~R2~~	~~23.2 to 25.0~~	~~111.4 to 109.6~~	~~18~~	~~85~~	~~16~~	~~88~~
~~BB-HSS-118~~	~~R3~~	~~25.0 to 25.9~~	~~109.6 to 108.7~~	~~11~~	~~100~~	~~9~~	~~81~~
~~BB-HSS-118~~	~~R4~~	~~25.9 to 27.9~~	~~108.7 to 106.7~~	~~20~~	~~83~~	~~15~~	~~75~~
~~BB-HSS-118~~	~~R5~~	~~27.9 to 32.2~~	~~106.7 to 102.4~~	~~49~~	~~90~~	~~39~~	~~79~~
BB-HSS-122	R1	22.5 to 25.7	118.1 to 114.9	38	100	27	71
BB-HSS-122	R2	25.7 to 28.7	114.9 to 111.9	36	100	31	86
BB-HSS-122	R3	28.7 to 32.7	111.9 to 107.9	48	100	38	79

NOTES:

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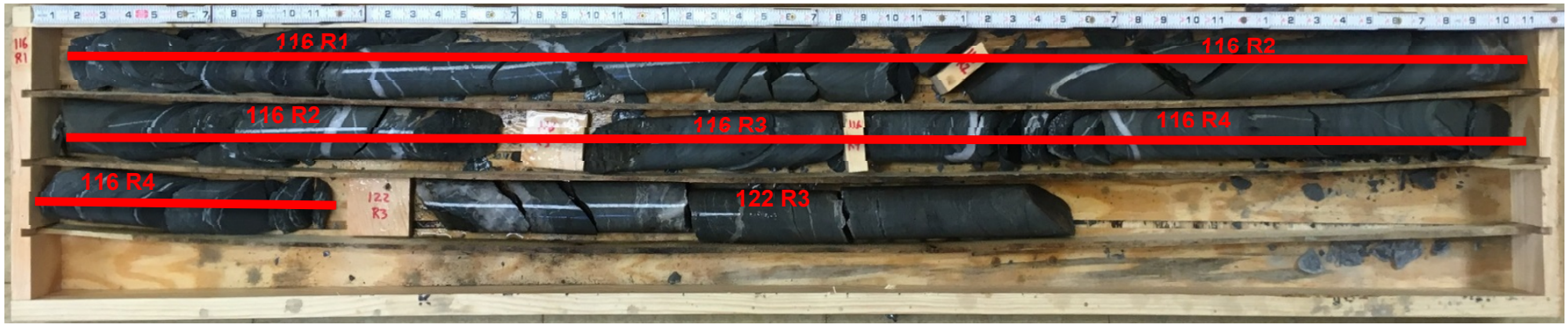
BRIDGE NOS. 5696 AND 1430
HAMDEN, MAINE
MAINEDOT WIN 21630.00 AND WIN 21673.10

PHOTOGRAPH OF BEDROCK CORE BORING: BB-HSS-122

FILE NO. 129380-002

February 2019

G:\PROJECTS\129380 - hampden bridges\002\Deliverables\PGDR - Emerson\Appendix B - Rock Core Photographs\[2019-0221-R



BORING ID	CORE ID	CORE RUN DEPTH (FT)	CORE RUN EL.[NOTE 1]	RECOVERY		RQD[NOTE 2]	
				IN.	%	IN.	%
~~BB-HSS-116~~	~~R1~~	~~22.0 to 25.0~~	~~112.8 to 109.8~~	~~36~~	~~100~~	~~15~~	~~41~~
~~BB-HSS-116~~	~~R2~~	~~25.0 to 28.2~~	~~109.8 to 106.6~~	~~39~~	~~100~~	~~13~~	~~33~~
~~BB-HSS-116~~	~~R3~~	~~28.2 to 29.0~~	~~106.6 to 105.8~~	~~10~~	~~100~~	~~6~~	~~60~~
~~BB-HSS-116~~	~~R4~~	~~29.0 to 32.0~~	~~105.8 to 102.8~~	~~36~~	~~100~~	~~25~~	~~69~~
BB-HSS-122	R3 cont.	28.7 to 32.7	111.9 to 107.9	48	100	38	79

NOTES:

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INTERSTATE 95 OVER EMERSON MILL ROAD/B&A RAILROAD
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PHOTOGRAPH OF BEDROCK CORE BORING: BB-HSS-122

FILE NO. 129380-002

February 2019

BORING ID	CORE ID	CORE RUN DEPTH (FT)	CORE RUN EL.[NOTE 1]	RECOVERY		RQD[NOTE 2]	
				IN.	%	IN.	%
BB-HSS-124	R3	45.5 TO 47.5	117.3 to 115.3	15	63	7	29
BB-HSS-123	R1	44.2 TO 48.2	118.6 to 114.6	43	90	37	77
BB-HSS-123	R2	48.2 TO 50.8	114.6 to 112.0	31	100	31	100
BB-HSS-123	R3	50.8 TO 55.4	112.0 to 107.4	55	100	53	96

NOTES:

1. ELEVATIONS ARE MEASURED IN FEET AND REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. "RQD" INDICATES ROCK QUALITY DESIGNATION (PERCENT OF ROCK PIECES RECOVERED EQUAL TO OR GREATER THAN 4 IN. IN LENGTH).

HALEY ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

INTERSTATE 95 OVER EMERSON MILL ROAD/B&A RAILROAD
BRIDGE NOS. 5696 AND 1430
HAMDEN, MAINE
MAINEDOT WIN 21630.00 AND WIN 21673.10

PHOTOGRAPH OF BEDROCK CORE BORING: BB-HSS-124 AND BB-HSS-123

FILE NO. 129380-002

February 2019

BORING ID	CORE ID	CORE RUN DEPTH (FT)	CORE RUN EL.[NOTE 1]	RECOVERY		RQD[NOTE 2]	
				IN.	%	IN.	%
~~BB-HSS-114~~	~~R1~~	~~21.6 to 23.2~~	~~113.1 to 111.5~~	~~20~~	~~100~~	~~20~~	~~100~~
~~BB-HSS-114~~	~~R2~~	~~23.2 to 28.1~~	~~111.5 to 106.6~~	~~57~~	~~97~~	~~34~~	~~58~~
~~BB-HSS-114~~	~~R3~~	~~28.1 to 33.4~~	~~106.6 to 101.3~~	~~54~~	~~90~~	~~42~~	~~70~~
BB-HSS-124	R1	37.5 to 42.5	125.3 to 120.3	55	92	52	87
BB-HSS-124	R2	42.5 to 45.5	120.3 to 117.3	36	100	28	78

NOTES:

1. ELEVATIONS ARE MEASURED IN FEET AND REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. "RQD" INDICATES ROCK QUALITY DESIGNATION (PERCENT OF ROCK PIECES RECOVERED EQUAL TO OR GREATER THAN 4 IN. IN LENGTH).
3. RED LINES DRAWN THROUGH ROCK CORE PHOTOGRAPHS/TABLE INDICATE THAT ROCK CORE WAS COLLECTED FROM AN ADJACENT BRIDGE STRUCTURE. REFER TO OTHER BRIDGE REPORTS.

HALEY ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

INTERSTATE 95 OVER EMERSON MILL ROAD/B&A RAILROAD
BRIDGE NOS. 5696 AND 1430
HAMDEN, MAINE
MAINEDOT WIN 21630.00 AND WIN 21673.10

PHOTOGRAPH OF BEDROCK CORE BORING: BB-HSS-124

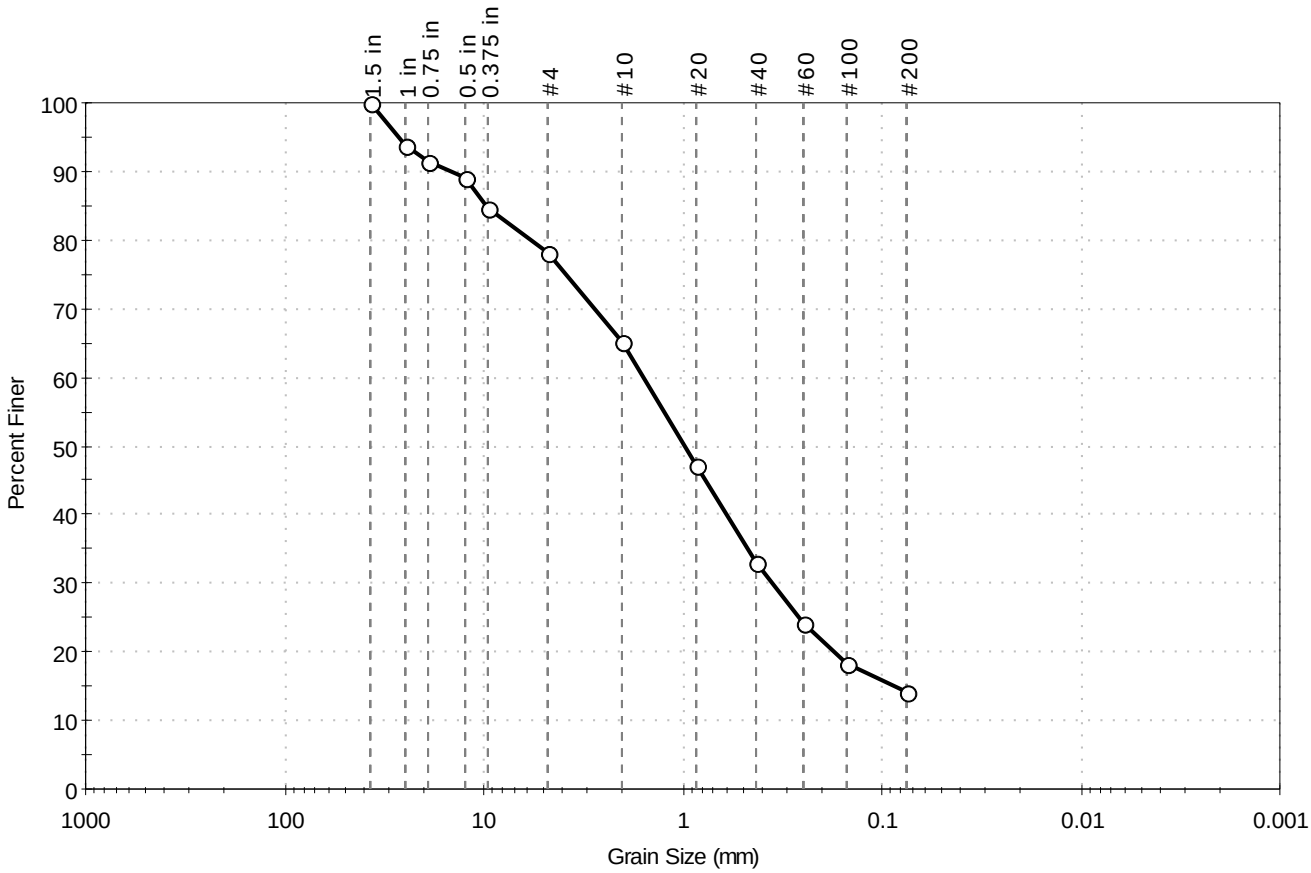
FILE NO. 129380-002 February 2019

APPENDIX C

Laboratory Test Results

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-120	Sample Type:	jar	Tested By:	jbr
Sample ID:	2D	Test Date:	10/05/17	Checked By:	emm
Depth :	5.0-7.0 ft	Test Id:	426855		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	22.0	63.8	14.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	94		
0.75 in	19.00	92		
0.5 in	12.50	89		
0.375 in	9.50	85		
#4	4.75	78		
#10	2.00	65		
#20	0.85	47		
#40	0.42	33		
#60	0.25	24		
#100	0.15	18		
#200	0.075	14		

Coefficients

D_{85} = 9.7355 mm D_{30} = 0.3550 mm

D_{60} = 1.5563 mm D_{15} = 0.0858 mm

D_{50} = 0.9676 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

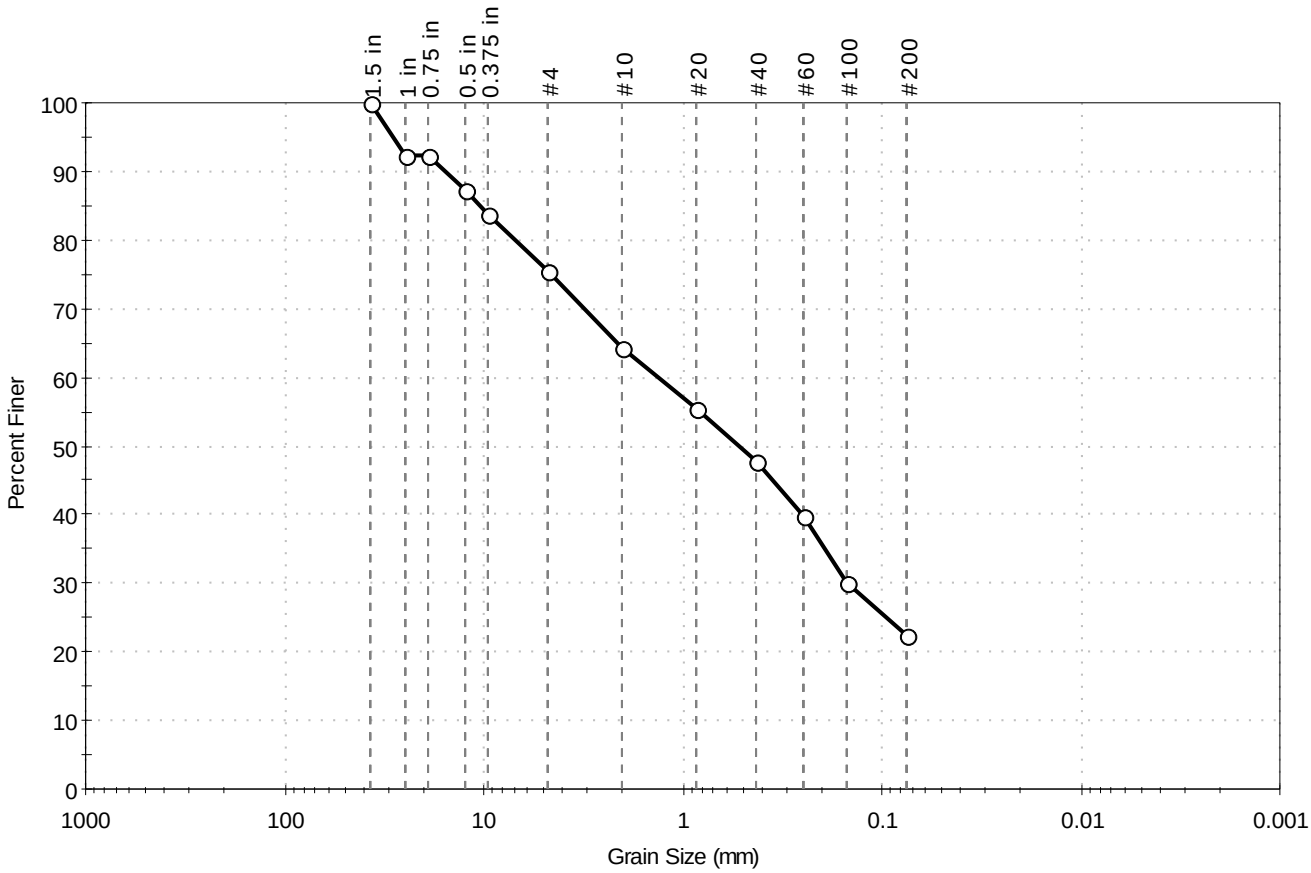
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-120	Sample Type:	jar	Tested By:	jbr
Sample ID:	9D	Test Date:	10/05/17	Checked By:	emm
Depth :	20.0-22.0 ft	Test Id:	426856		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	24.6	53.1	22.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	92		
0.75 in	19.00	92		
0.5 in	12.50	87		
0.375 in	9.50	84		
#4	4.75	75		
#10	2.00	64		
#20	0.85	55		
#40	0.42	48		
#60	0.25	40		
#100	0.15	30		
#200	0.075	22		

Coefficients

D_{85} = 10.3823 mm D_{30} = 0.1484 mm

D_{60} = 1.3175 mm D_{15} = N/A

D_{50} = 0.5229 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

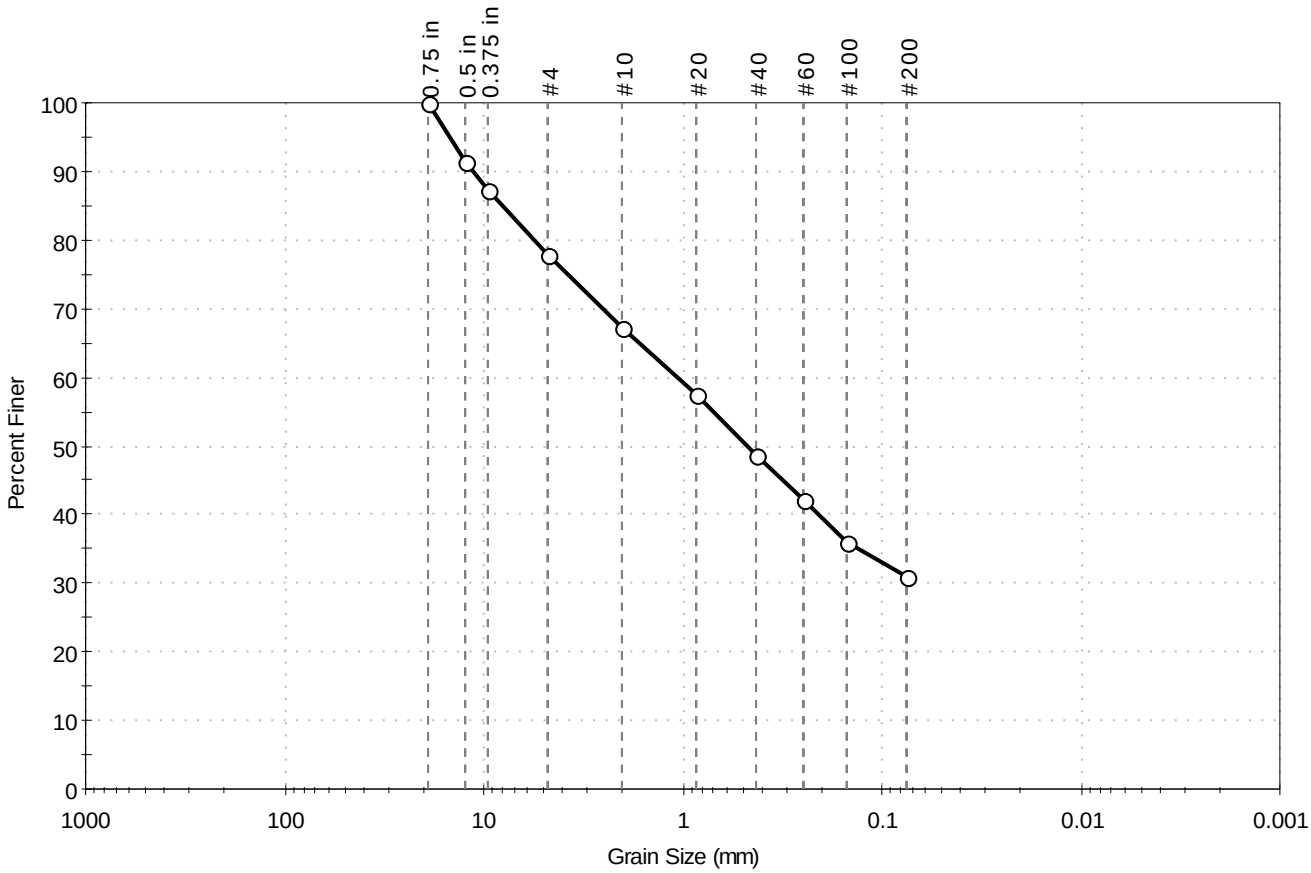
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-121	Sample Type:	jar	Tested By:	jbr
Sample ID:	3D	Test Date:	10/05/17	Checked By:	emm
Depth :	4.0-6.0 ft	Test Id:	426857		
Test Comment:	---				
Visual Description:	Moist, brown clayey sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	22.0	47.1	30.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	91		
0.375 in	9.50	87		
#4	4.75	78		
#10	2.00	67		
#20	0.85	57		
#40	0.42	49		
#60	0.25	42		
#100	0.15	36		
#200	0.075	31		

Coefficients

D_{85} = 8.0383 mm D_{30} = N/A

D_{60} = 1.0661 mm D_{15} = N/A

D_{50} = 0.4730 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

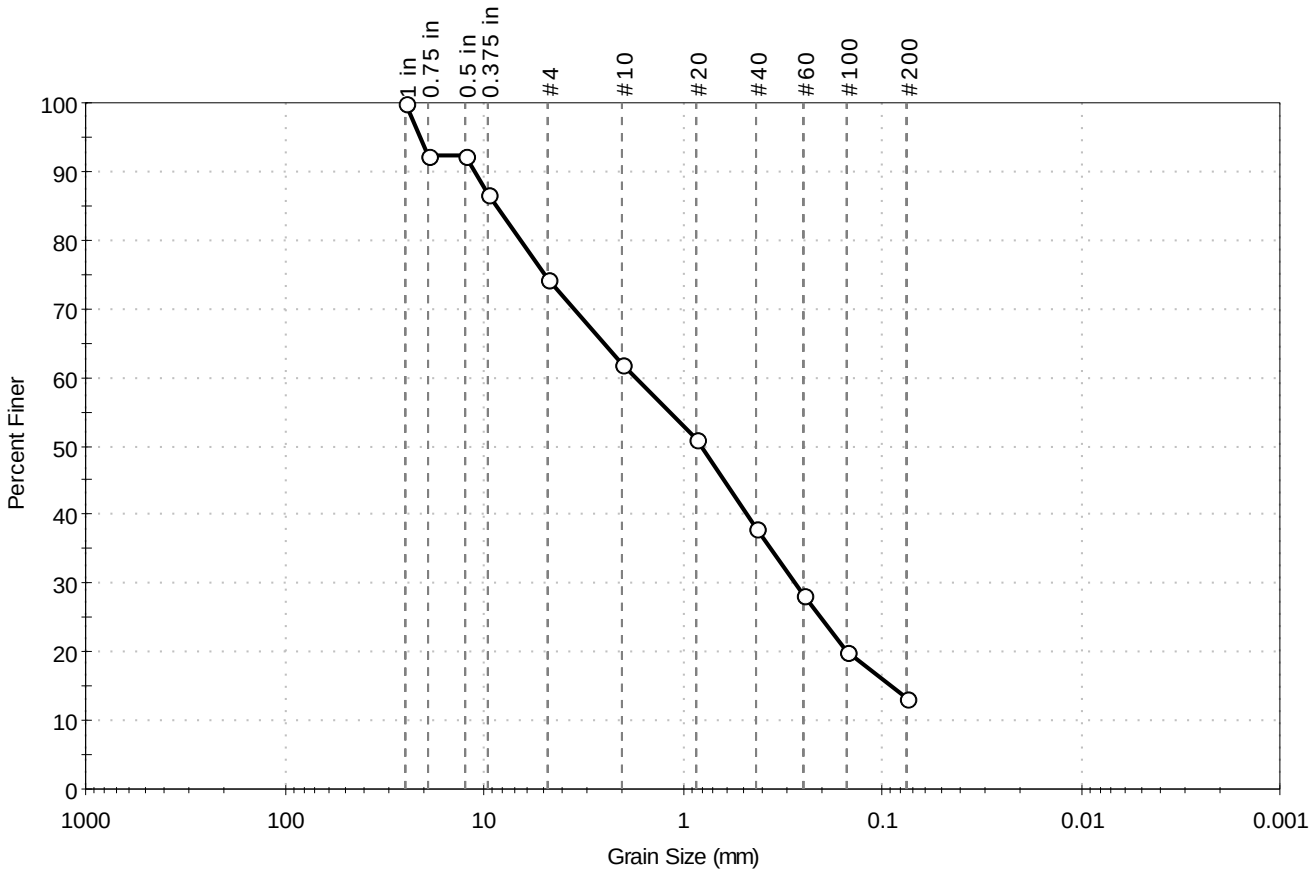
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-121	Sample Type:	jar	Tested By:	jbr
Sample ID:	5D	Test Date:	10/05/17	Checked By:	emm
Depth :	8.0-10.0 ft	Test Id:	426858		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	25.8	60.8	13.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	92		
0.5 in	12.50	92		
0.375 in	9.50	87		
#4	4.75	74		
#10	2.00	62		
#20	0.85	51		
#40	0.42	38		
#60	0.25	28		
#100	0.15	20		
#200	0.075	13		

Coefficients

D_{85} = 8.6753 mm D_{30} = 0.2728 mm

D_{60} = 1.7215 mm D_{15} = 0.0883 mm

D_{50} = 0.8084 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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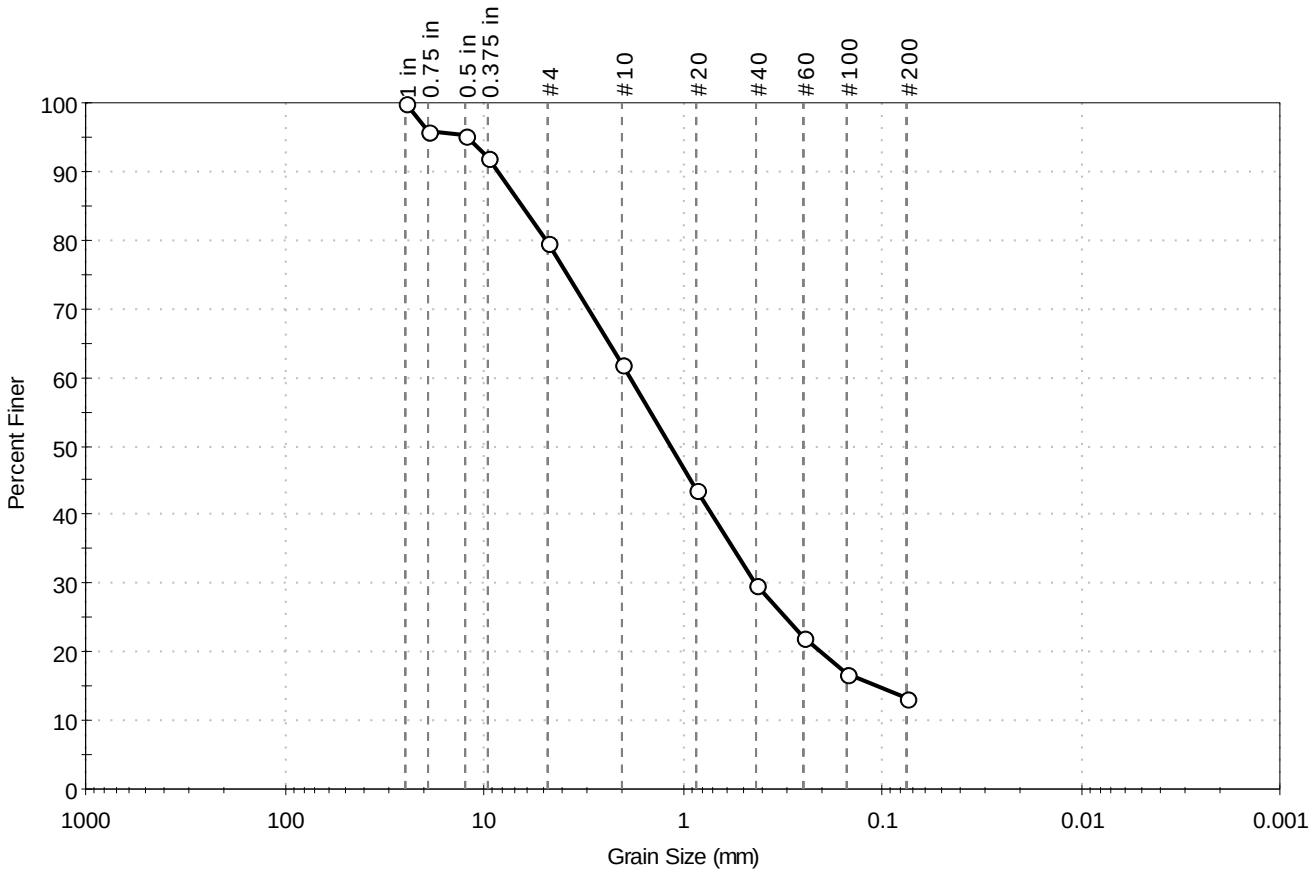
Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-123	Sample Type:	jar	Tested By:	jbr
Sample ID:	2D	Test Date:	10/05/17	Checked By:	emm
Depth :	2.5-4.5 ft	Test Id:	426859		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	20.2	66.4	13.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	95		
0.375 in	9.50	92		
#4	4.75	80		
#10	2.00	62		
#20	0.85	44		
#40	0.42	30		
#60	0.25	22		
#100	0.15	17		
#200	0.075	13		

Coefficients

D_{85} = 6.4015 mm D_{30} = 0.4264 mm

D_{60} = 1.8334 mm D_{15} = 0.1047 mm

D_{50} = 1.1465 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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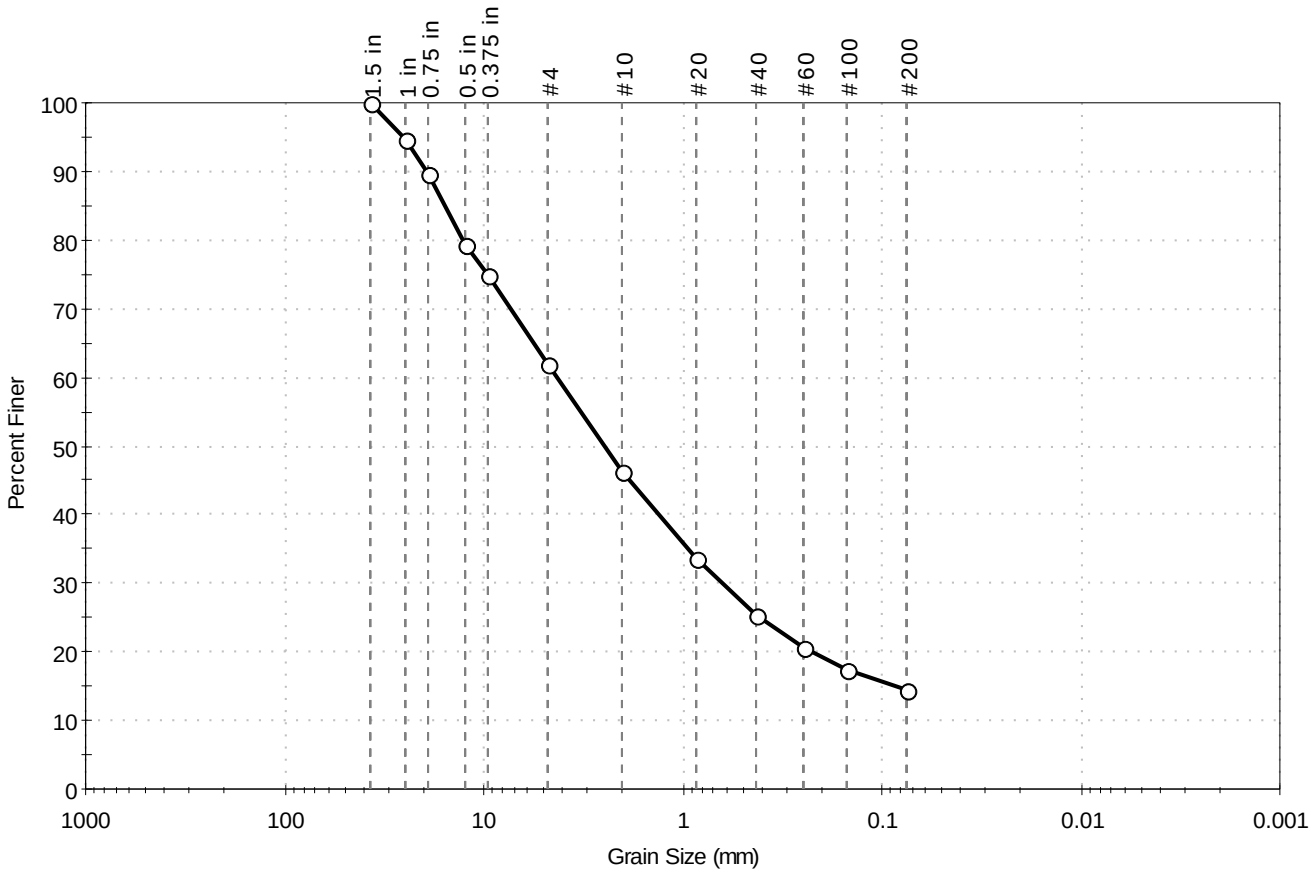
Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-124	Sample Type:	jar	Tested By:	jbr
Sample ID:	2D	Test Date:	10/05/17	Checked By:	emm
Depth :	3.5-5.5 ft	Test Id:	426860		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	38.1	47.3	14.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	95		
0.75 in	19.00	90		
0.5 in	12.50	79		
0.375 in	9.50	75		
#4	4.75	62		
#10	2.00	46		
#20	0.85	34		
#40	0.42	25		
#60	0.25	21		
#100	0.15	17		
#200	0.075	15		

Coefficients

D_{85} = 15.6934 mm D_{30} = 0.6288 mm

D_{60} = 4.2877 mm D_{15} = 0.0836 mm

D_{50} = 2.4433 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

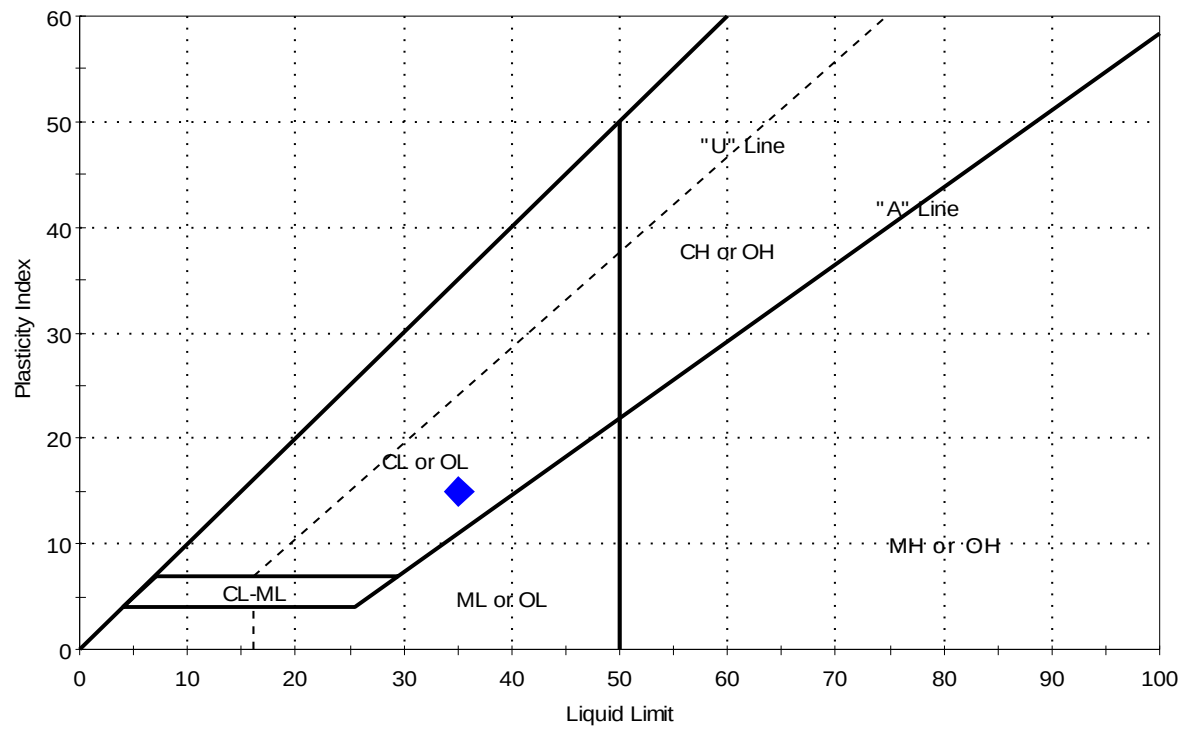
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-119	Sample Type:	jar	Tested By:	cam
Sample ID:	16D	Test Date:	10/06/17	Checked By:	emm
Depth :	34.0-36.0 ft	Test Id:	426850		
Test Comment:	---				
Visual Description:	Moist, brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	16D	B-HSS-11	34.0-36.0 ft	26	35	20	15	0.4	

Sample Prepared using the WET method

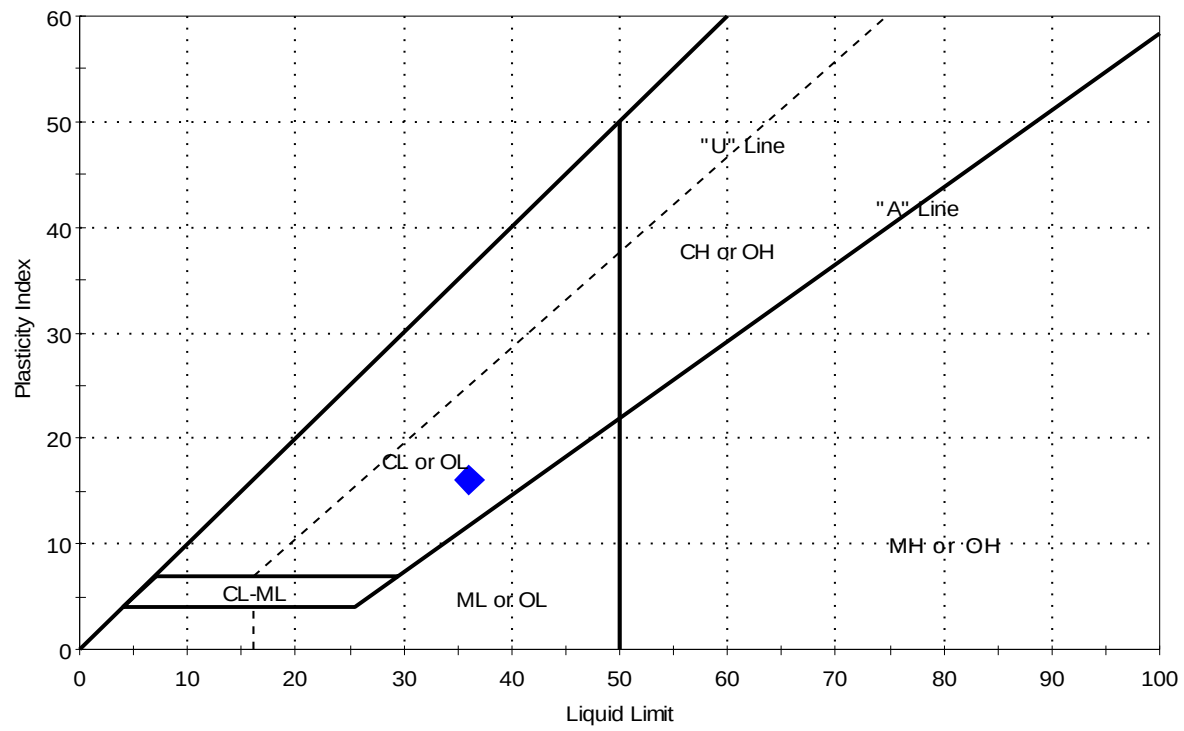
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-120	Sample Type:	jar	Tested By:	cam
Sample ID:	12D	Test Date:	10/06/17	Checked By:	emm
Depth :	30.0-32.0 ft	Test Id:	426851		
Test Comment:	---				
Visual Description:	Moist, olive clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	12D	B-HSS-12	30.0-32.0 ft	25	36	20	16	0.3	

Sample Prepared using the WET method

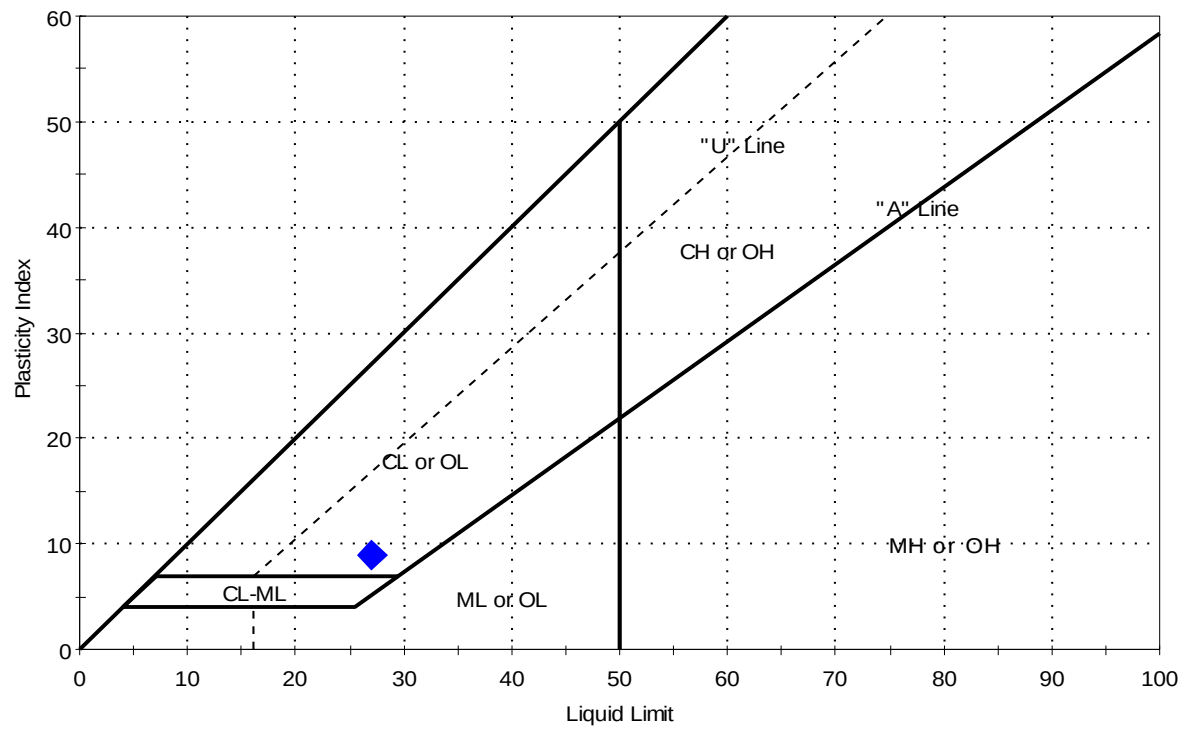
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-122	Sample Type:	jar	Tested By:	cam
Sample ID:	5D	Test Date:	10/06/17	Checked By:	emm
Depth :	8.0-10.0 ft	Test Id:	426852		
Test Comment:	---				
Visual Description:	Moist, brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	5D	B-HSS-12	8.0-10.0 ft	25	27	18	9	0.8	

Sample Prepared using the WET method

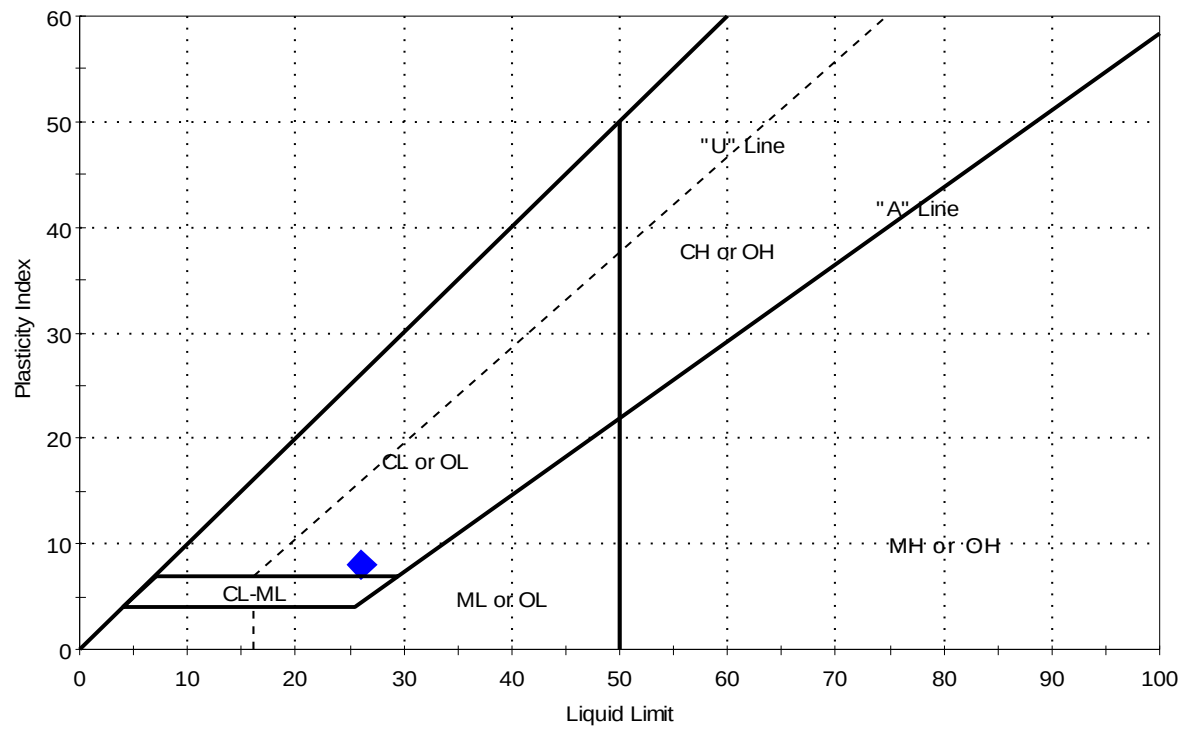
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-123	Sample Type:	jar	Tested By:	cam
Sample ID:	16D	Test Date:	10/05/17	Checked By:	emm
Depth :	35.0-37.0 ft	Test Id:	426853		
Test Comment:	---				
Visual Description:	Moist, olive brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	16D	B-HSS-12	35.0-37.0 ft	24	26	18	8	0.7	

Sample Prepared using the WET method

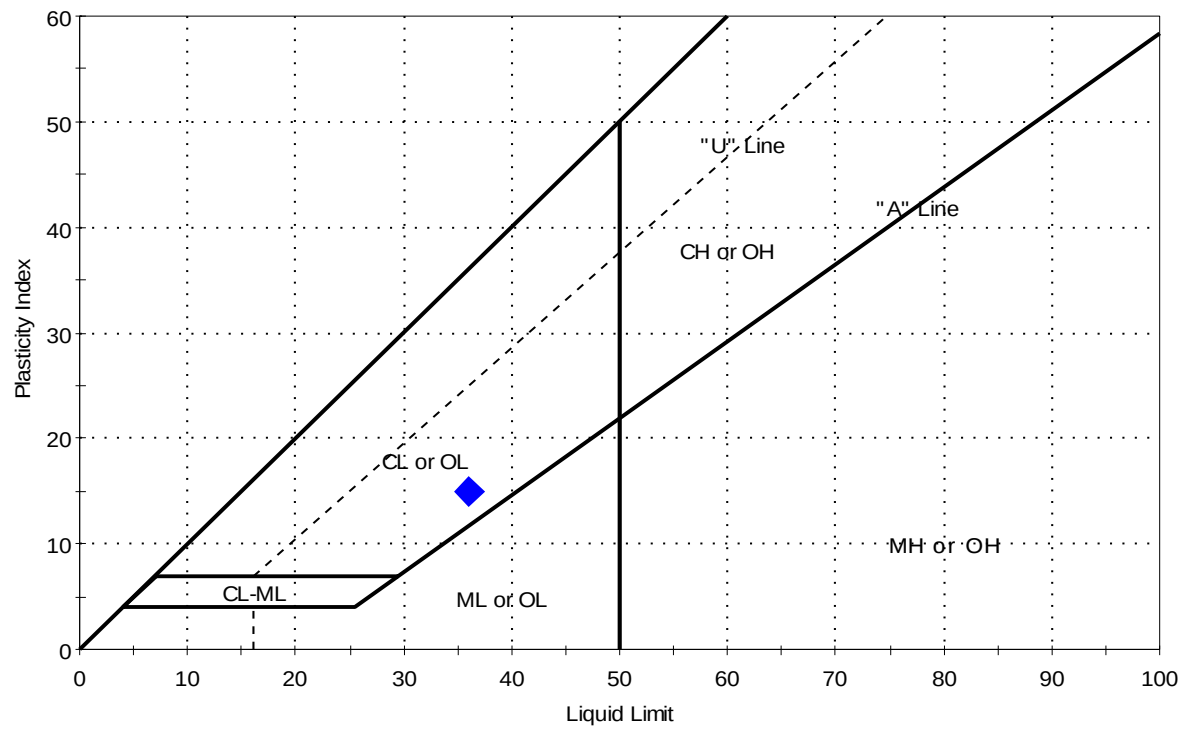
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Haley & Aldrich, Inc.				
Project:	Emerson Mill Bridge #1430 and 5969				
Location:	Hampden, ME			Project No:	GTX-307094
Boring ID:	BB-HSS-124	Sample Type:	jar	Tested By:	cam
Sample ID:	11D	Test Date:	10/06/17	Checked By:	emm
Depth :	30.0-32.0 ft	Test Id:	426854		
Test Comment:	---				
Visual Description:	Moist, olive brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	11D	B-HSS-12	30.0-32.0 ft	27	36	21	15	0.4	

Sample Prepared using the WET method

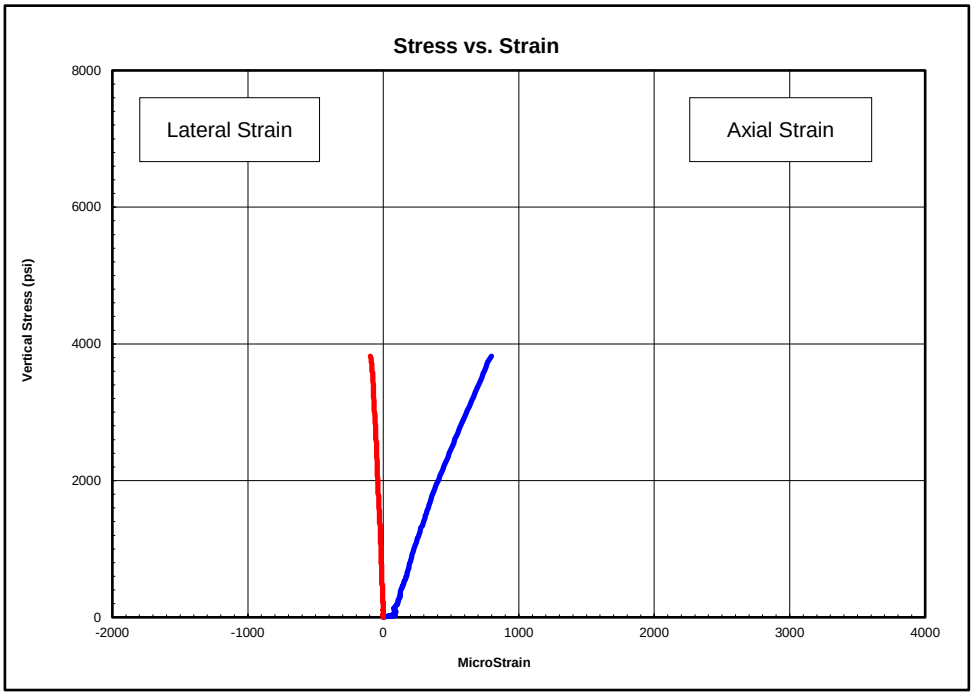
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-119
Sample ID:	R1
Depth, ft:	55.02-55.38
Sample Type:	rock core
Sample Description:	See photographs Discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 3,815 psi

One lateral strain gauge failed to record meaningful data. Poisson's Ratio reported based on results of a single lateral strain gauge.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
400-1400	6,270,000	0.13
1400-2400	5,240,000	0.13
2400-3400	4,600,000	0.13

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Haley & Aldrich, Inc.	Test Date:	10/3/2017
Project Name:	Emerson Mill Bridge #1430 and 5969	Tested By:	rlc
Project Location:	Hampden, ME	Checked By:	jsc
GTX #:	307094		
Boring ID:	BB-HSS-119		
Sample ID:	R1		
Depth:	55.02-55.38 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.36	4.36	4.36
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	605.22		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	0.00000
Diameter 2, in (rotated 90°)	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	-0.00010

Difference between max and min readings, in:

0° = 0.00020 90° = 0.00030

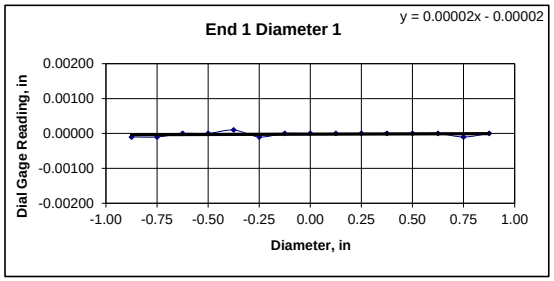
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	0.00000	0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00010	0.00000	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010

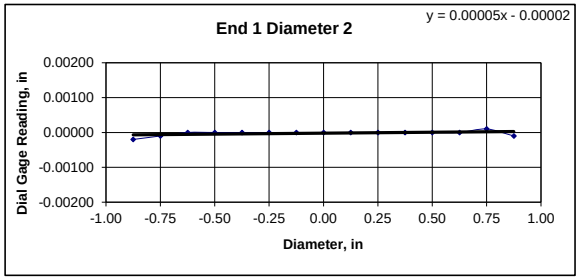
Difference between max and min readings, in:

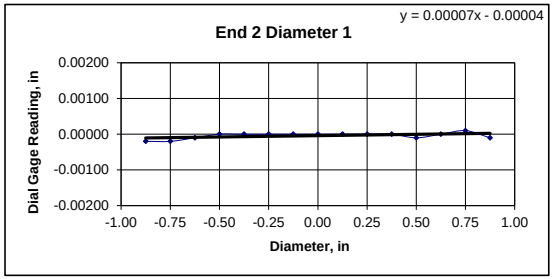
0° = 0.0003 90° = 0.0001

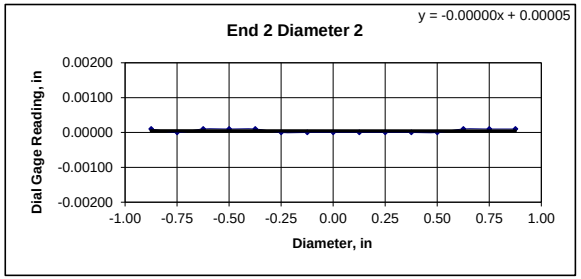
Maximum difference must be < 0.0020 in. Difference = ± 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line 0.00002

Angle of Best Fit Line: 0.00115

End 2:

Slope of Best Fit Line 0.00007

Angle of Best Fit Line: 0.00401

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line 0.00005

Angle of Best Fit Line: 0.00286

End 2:

Slope of Best Fit Line 0.00000

Angle of Best Fit Line: 0.00000

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES

Spherically Seated

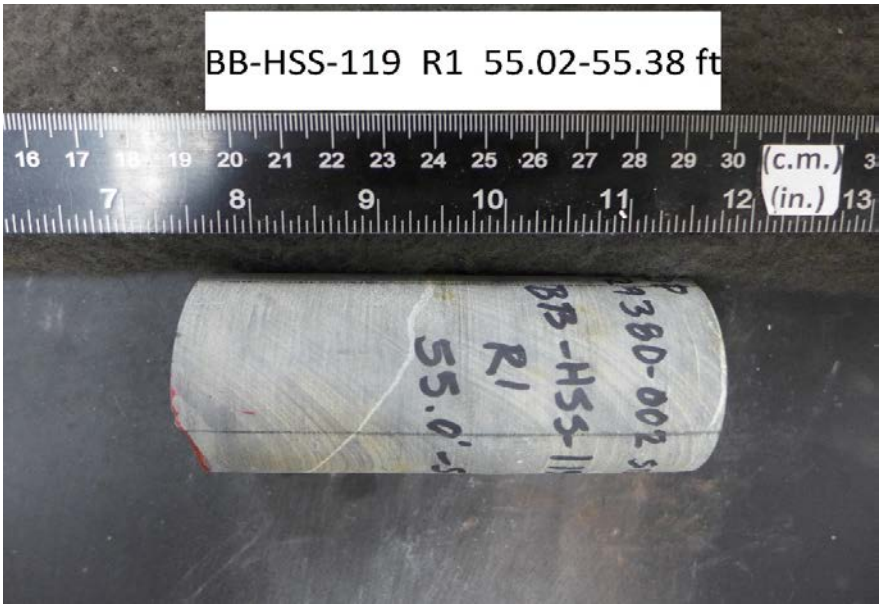
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.990	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00030	1.990	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00010	1.990	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-119
Sample ID:	R1
Depth, ft:	55.02-55.38

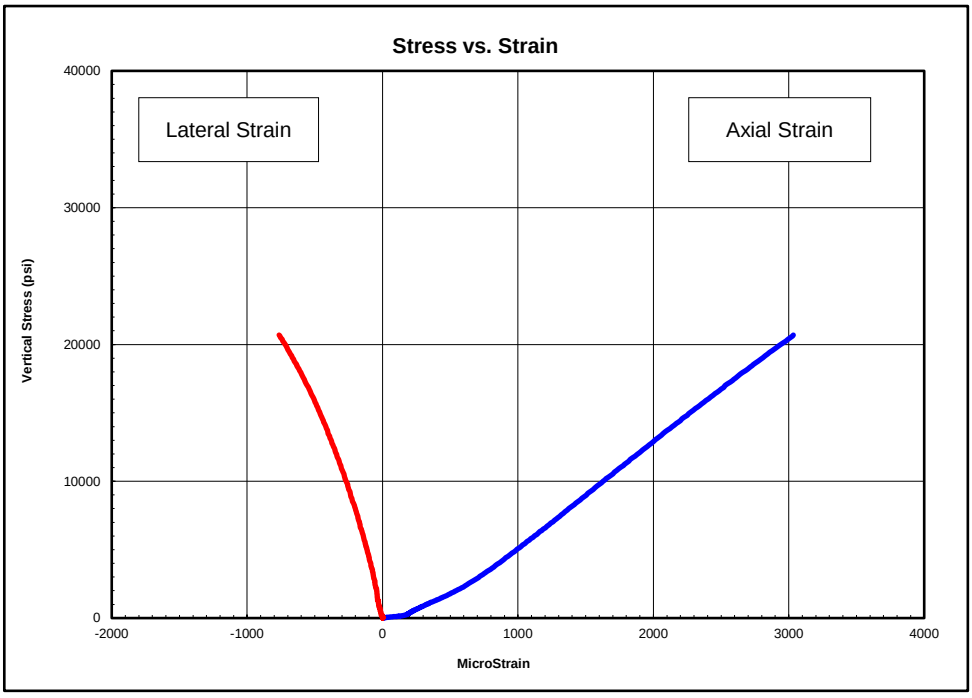


After cutting and grinding

After break

Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-120
Sample ID:	R3
Depth, ft:	45.2-45.56
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 20,734 psi

One axial strain gauge failed to record meaningful data. Young's Modulus and Poisson's Ratio reported based on results of a single axial strain gauge.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
2100-7600	7,280,000	0.19
7600-13100	7,880,000	0.28
13100-18600	7,600,000	0.35

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Haley & Aldrich, Inc.	Test Date:	10/3/2017
Project Name:	Emerson Mill Bridge #1430 and 5969	Tested By:	rlc
Project Location:	Hampden, ME	Checked By:	jsc
GTX #:	307094		
Boring ID:	BB-HSS-120		
Sample ID:	R3		
Depth:	45.2-45.56 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.29	4.29	4.29
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	596.77		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00000	0.00000

Difference between max and min readings, in:

0° = 0.00010 90° = 0.00020

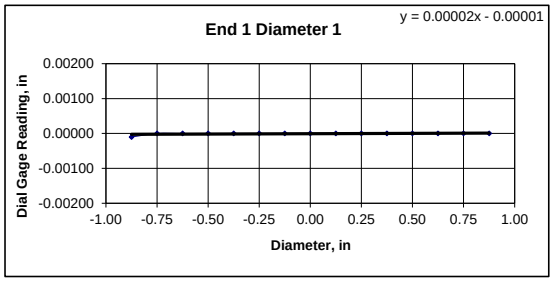
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	-0.00010	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020
Diameter 2, in (rotated 90°)	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00020

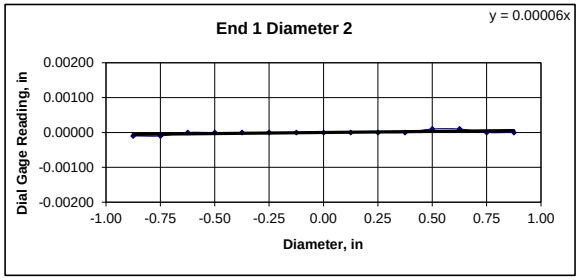
Difference between max and min readings, in:

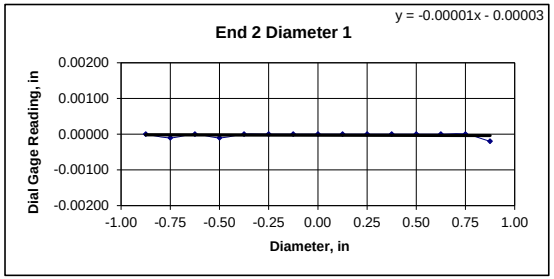
0° = 0.0002 90° = 0.0003

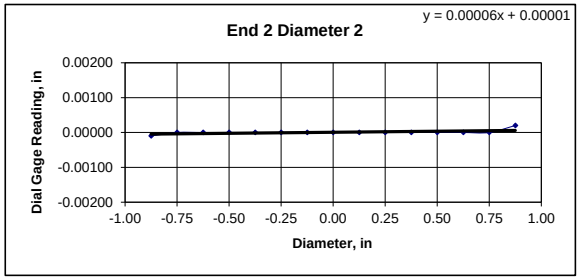
Maximum difference must be < 0.0020 in. Difference = ± 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115

End 2:

Slope of Best Fit Line	0.00001
Angle of Best Fit Line:	0.00057

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00006
Angle of Best Fit Line:	0.00344

End 2:

Slope of Best Fit Line	0.00006
Angle of Best Fit Line:	0.00344

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00020	1.990	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00020	1.990	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00030	1.990	0.00015	0.009	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

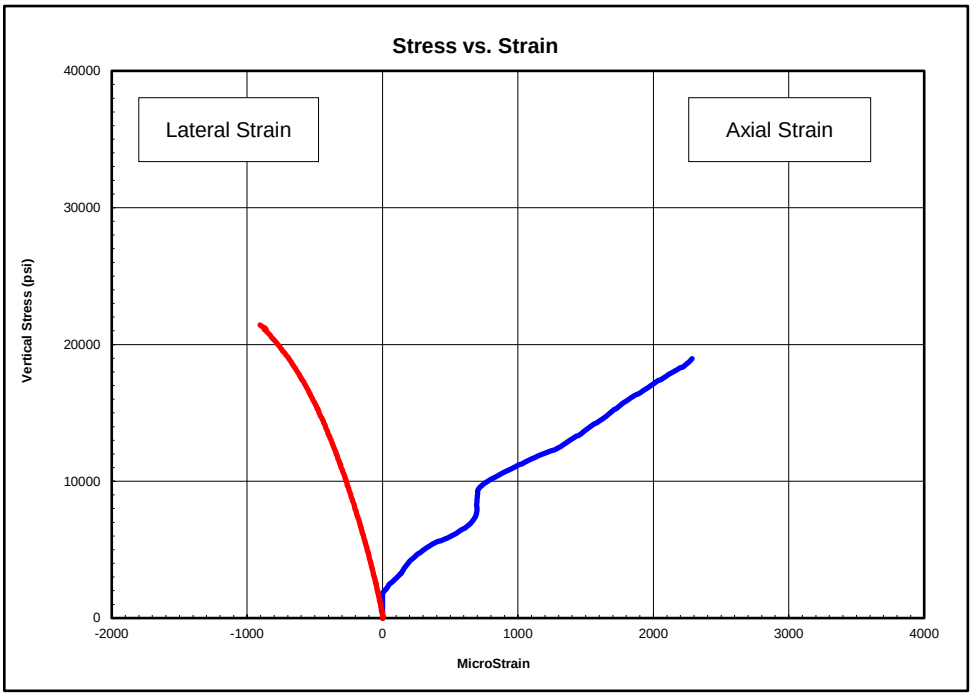
Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-120
Sample ID:	R3
Depth, ft:	45.2-45.56

After cutting and grinding

After break

Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-123
Sample ID:	R1
Depth, ft:	46.3-46.65
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 21,452 psi

One axial strain gauge failed to record meaningful data. Young's Modulus and Poisson's Ratio reported based on results of a single axial strain gauge.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
2100-7900	8,710,000	0.24
7900-13600	6,760,000	0.24
13600-19300	6,750,000	0.37

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Haley & Aldrich, Inc.	Test Date:	10/3/2017
Project Name:	Emerson Mill Bridge #1430 and 5969	Tested By:	rlc
Project Location:	Hampden, ME	Checked By:	jsc
GTX #:	307094		
Boring ID:	BB-HSS-123		
Sample ID:	R1		
Depth:	46.3-46.65 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.26	4.26	4.26
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	592.13		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.1	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010

Difference between max and min readings, in:

0° = 0.00010 90° = 0.00010

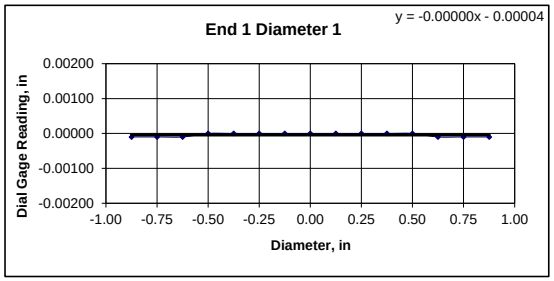
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	-0.00010	0.00000	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000

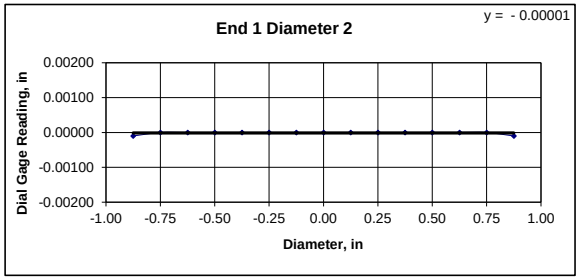
Difference between max and min readings, in:

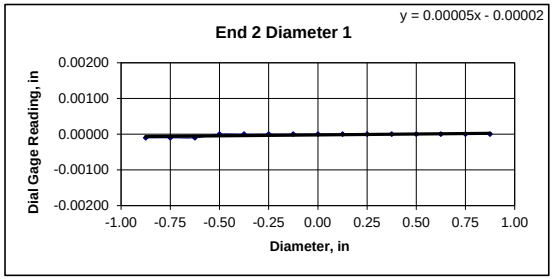
0° = 0.0001 90° = 0.0002

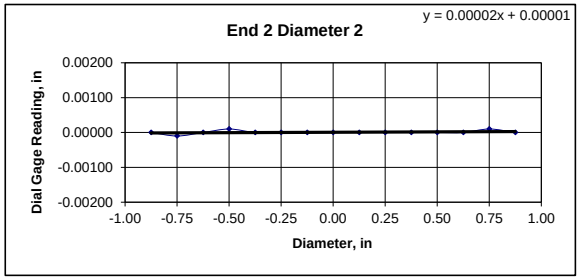
Maximum difference must be < 0.0020 in. Difference = ± 0.00010

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000

End 2:

Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00286

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00001
Angle of Best Fit Line:	0.00057

End 2:

Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00010	1.990	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00020	1.990	0.00010	0.006	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

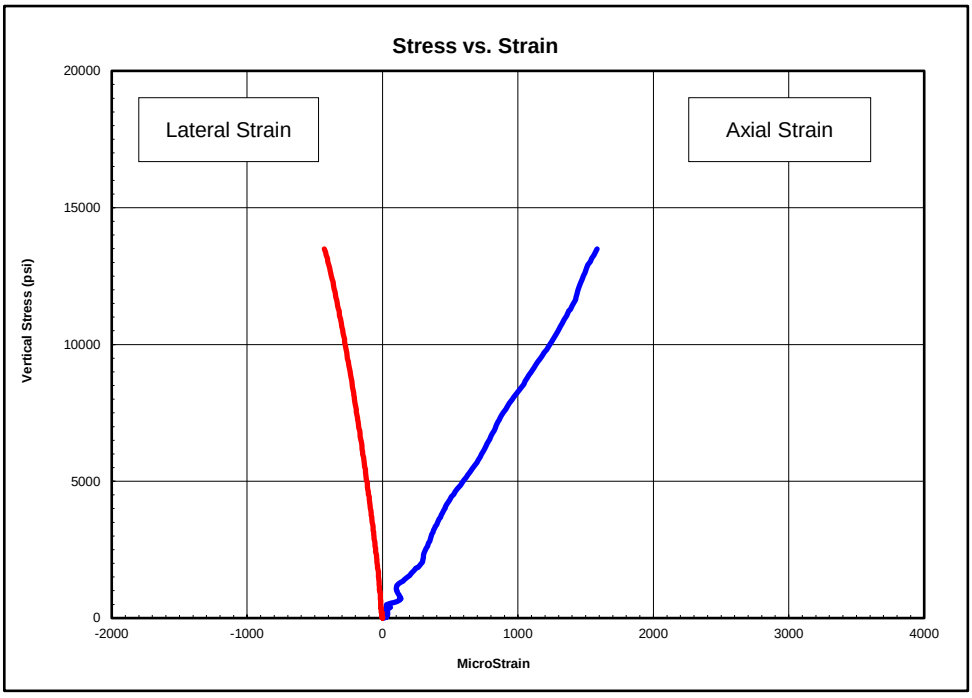
Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-123
Sample ID:	R1
Depth, ft:	46.3-46.65

After cutting and grinding

After break

Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-124
Sample ID:	R1
Depth, ft:	37.83-38.2
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 13,492 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1300-4900	9,350,000	0.23
4900-8500	8,480,000	0.26
8500-12100	8,250,000	0.31

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Haley & Aldrich, Inc.	Test Date:	10/3/2017
Project Name:	Emerson Mill Bridge #1430 and 5969	Tested By:	rlc
Project Location:	Hampden, ME	Checked By:	jsc
GTX #:	307094		
Boring ID:	BB-HSS-124		
Sample ID:	R1		
Depth:	37.83-38.2 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.31	4.31	4.31
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	598.02		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00010	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00010

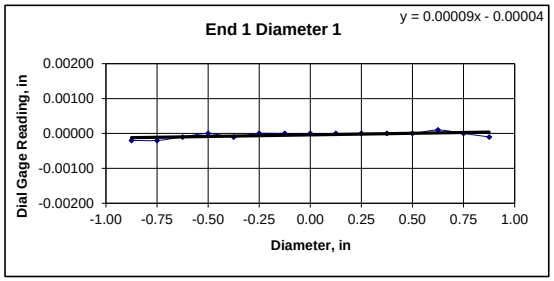
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	-0.00010	-0.00010	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020

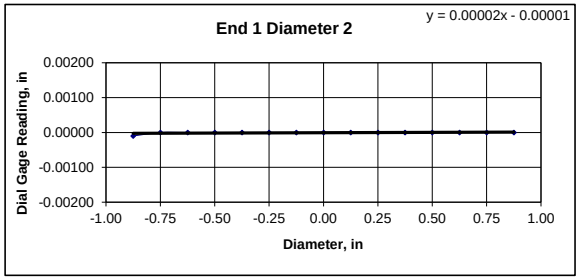
Difference between max and min readings, in:

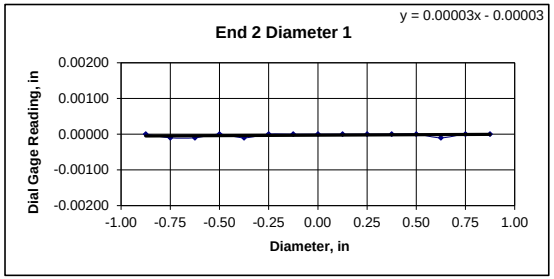
0° = 0.0001 90° = 0.0003

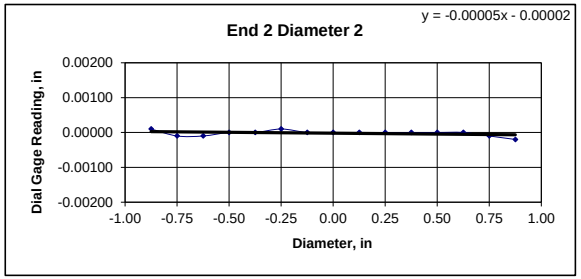
Maximum difference must be < 0.0020 in. Difference = ± 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00009
Angle of Best Fit Line:	0.00516

End 2:

Slope of Best Fit Line	0.00003
Angle of Best Fit Line:	0.00172

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115

End 2:

Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00286

Maximum Angular Difference: 0.00172

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00010	1.990	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00030	1.990	0.00015	0.009	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Haley & Aldrich, Inc.
Project Name:	Emerson Mill Bridge #1430 and 5969
Project Location:	Hampden, ME
GTX #:	307094
Test Date:	10/4/2017
Tested By:	rlc
Checked By:	jsc
Boring ID:	BB-HSS-124
Sample ID:	R1
Depth, ft:	37.83-38.2

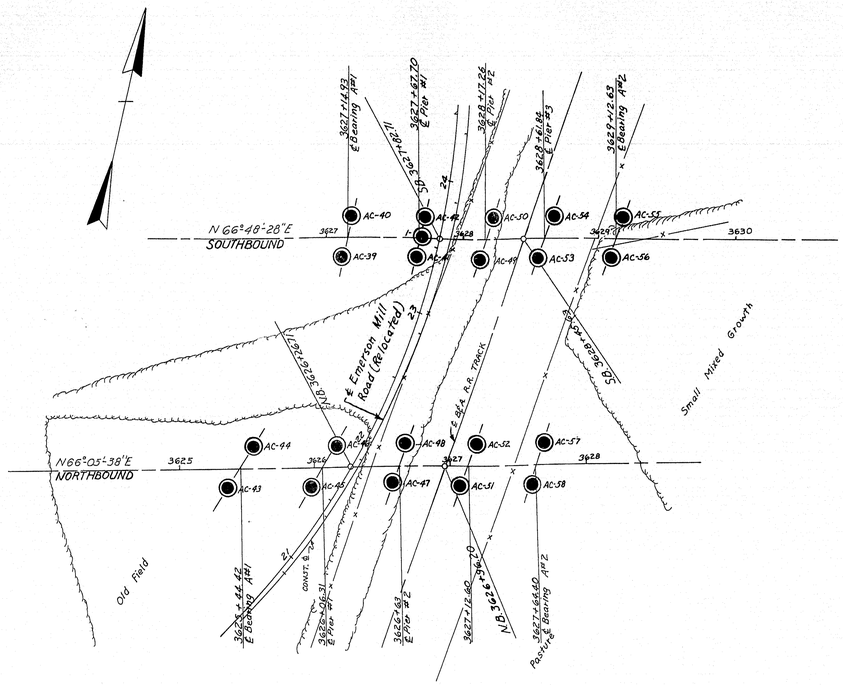
After cutting and grinding

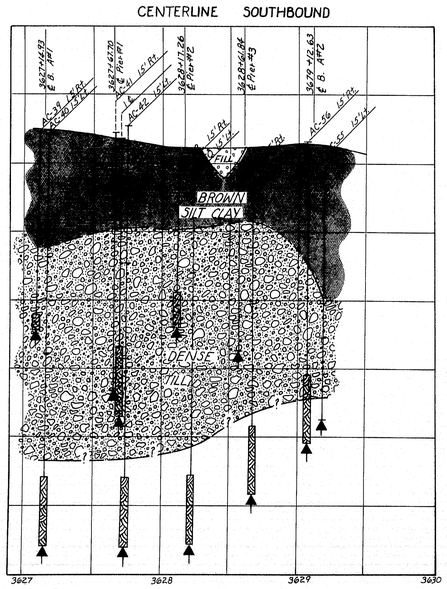
After break

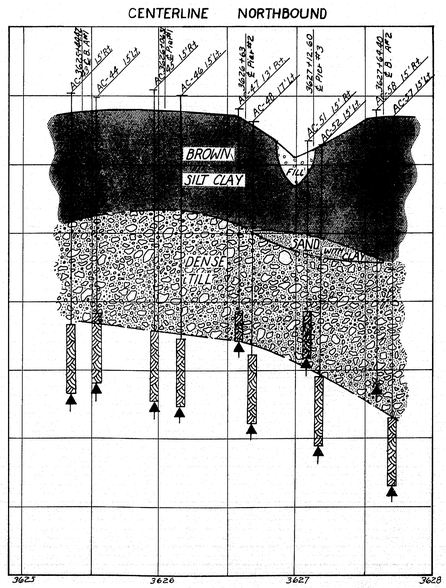
APPENDIX D

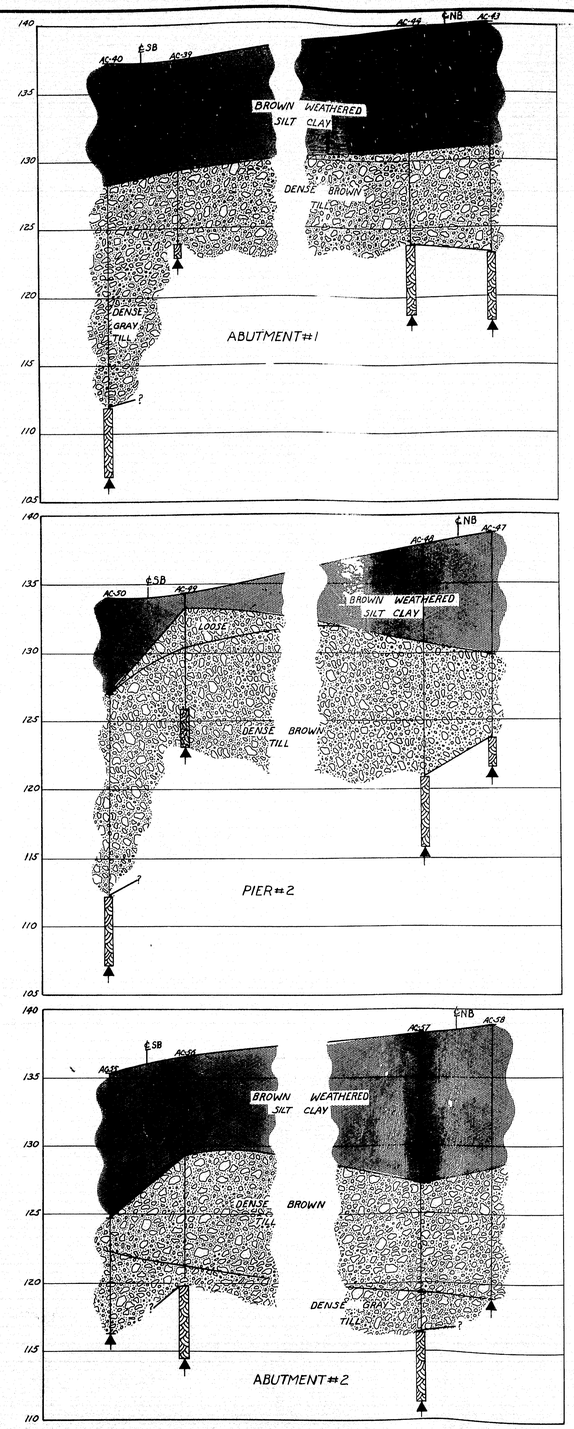
Historic Drawings

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(15)	3	25









DESIGN– TRACE– CHECK– } Soils Division

BRIDGE NO. SURVEY– PLOT–

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95
OVER
EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY

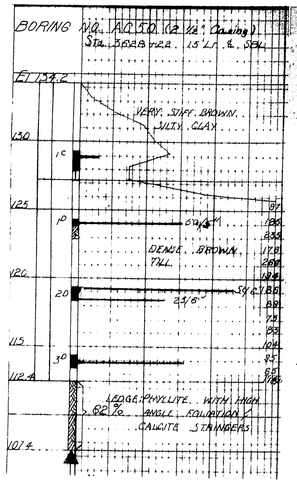
FOUNDATION SURVEY

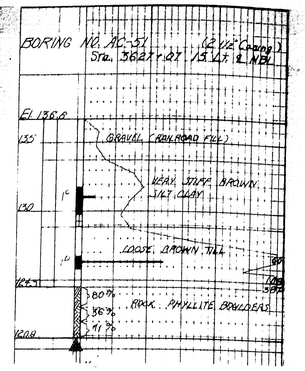
SHEET 3 OF 25 AUGUSTA, MAINE SEPT., 1961

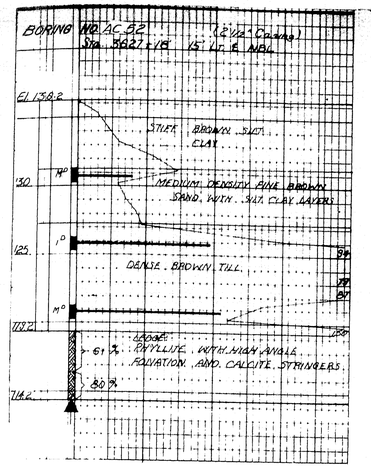
C. D. CO., NO. 370 24687

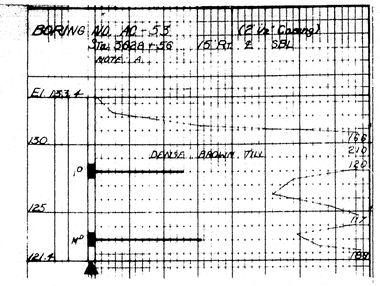
86-35

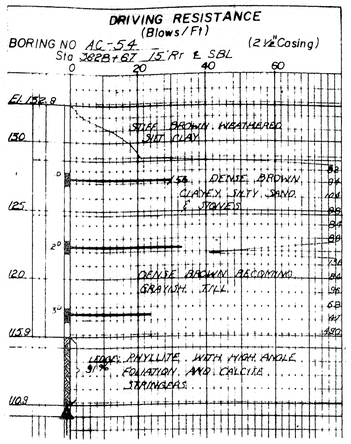
0 1 2 3 4 5 INCHES

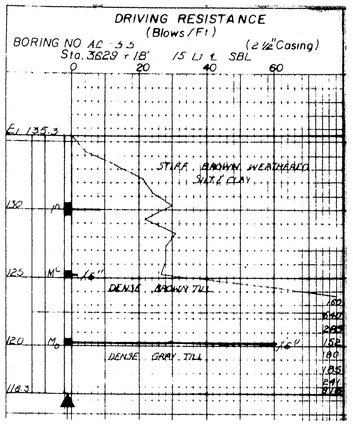


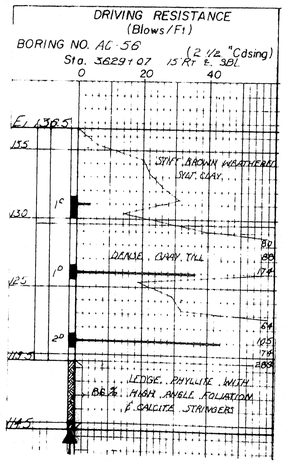


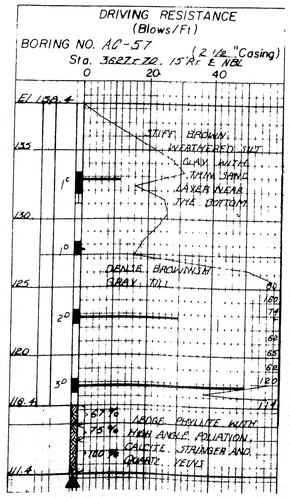


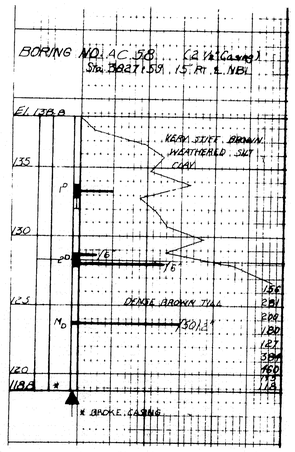












BORING NOTES

All samples and vanes are made ahead of casing

Ground water table

Number of blows required to drive extra heavy casing one foot with 400 ft. lbs. of energy per blow

Location of sample or sample attempt

Number and type of dry sample

- 8&H Sampler #1290's
- 2" O.D. 16 ga. seamless tubing
- 3½" O.D. 16 ga. seamless tubing

Wash sample and number

Unsuccessful sample attempt and type of sampler

Number of blows required to drive spoon or tubing one foot with 140 ft. lbs. of energy per blow

Sampling spoon or seamless tubing driven by static weight of drill rods and hammer

Piston sampler

Field vane test

Bottom of boring (may not be bottom of entire test)

Refusal of drill rods or casing (may not be ledge)

Locations cored by diamond bit and percent per vert. of rock

NOTE: TILL REFERS TO A MIXTURE OF SILT SAND & GRAVEL (OR STONES).

DESIGN TRACE · DETAIL · CHECK } Soils Division | BRIDGE NO. SURVEY

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

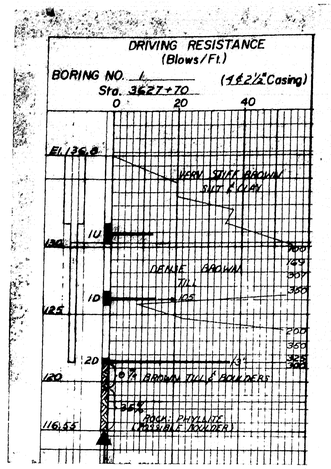
INTERSTATE 95
OVER
EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY
BORING DETAILS

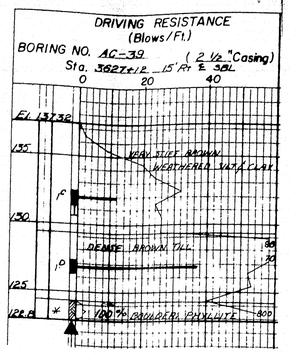
SHEET 4 OF 25 AUGUSTA, MAINE SEPT., 1961

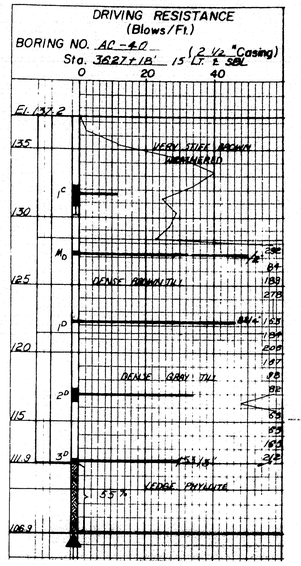
86-36

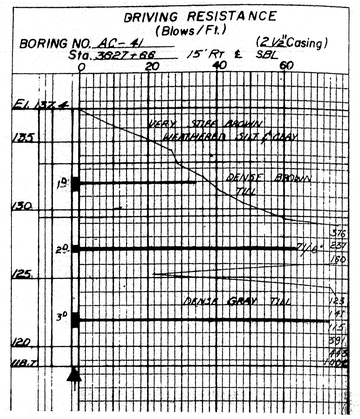
0 1 2 3 4 5 INCHES

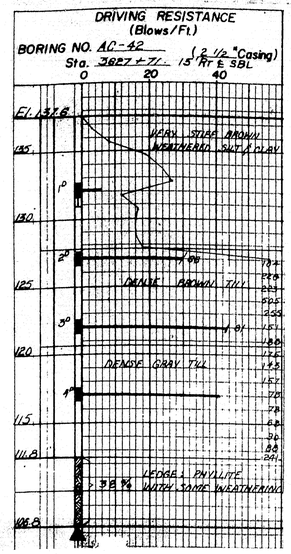
B P R REG. NO	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-16-95-7(15)	5	25

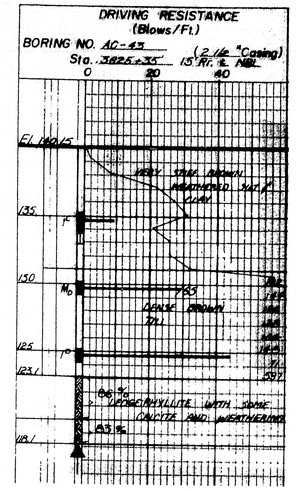


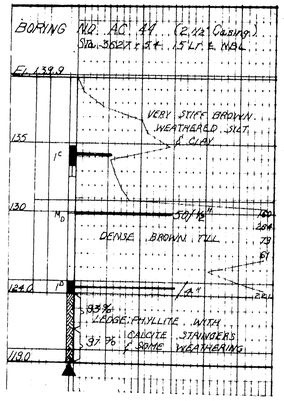


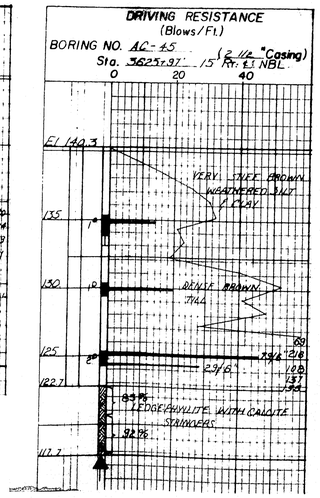


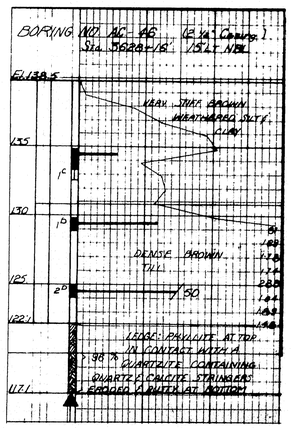


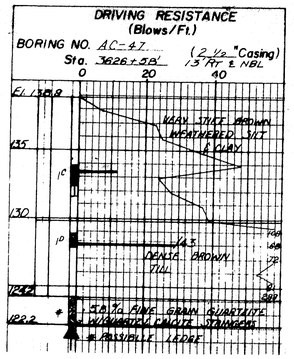


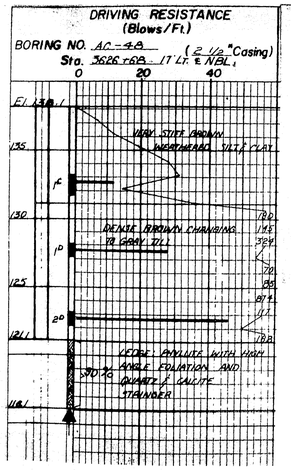


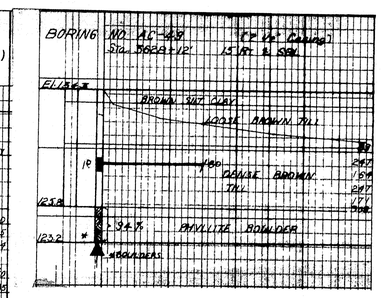












DESIGN — TRACE - DETAIL CHECK	Soils Division	BRIDGE NO SURVEY - PLOT

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

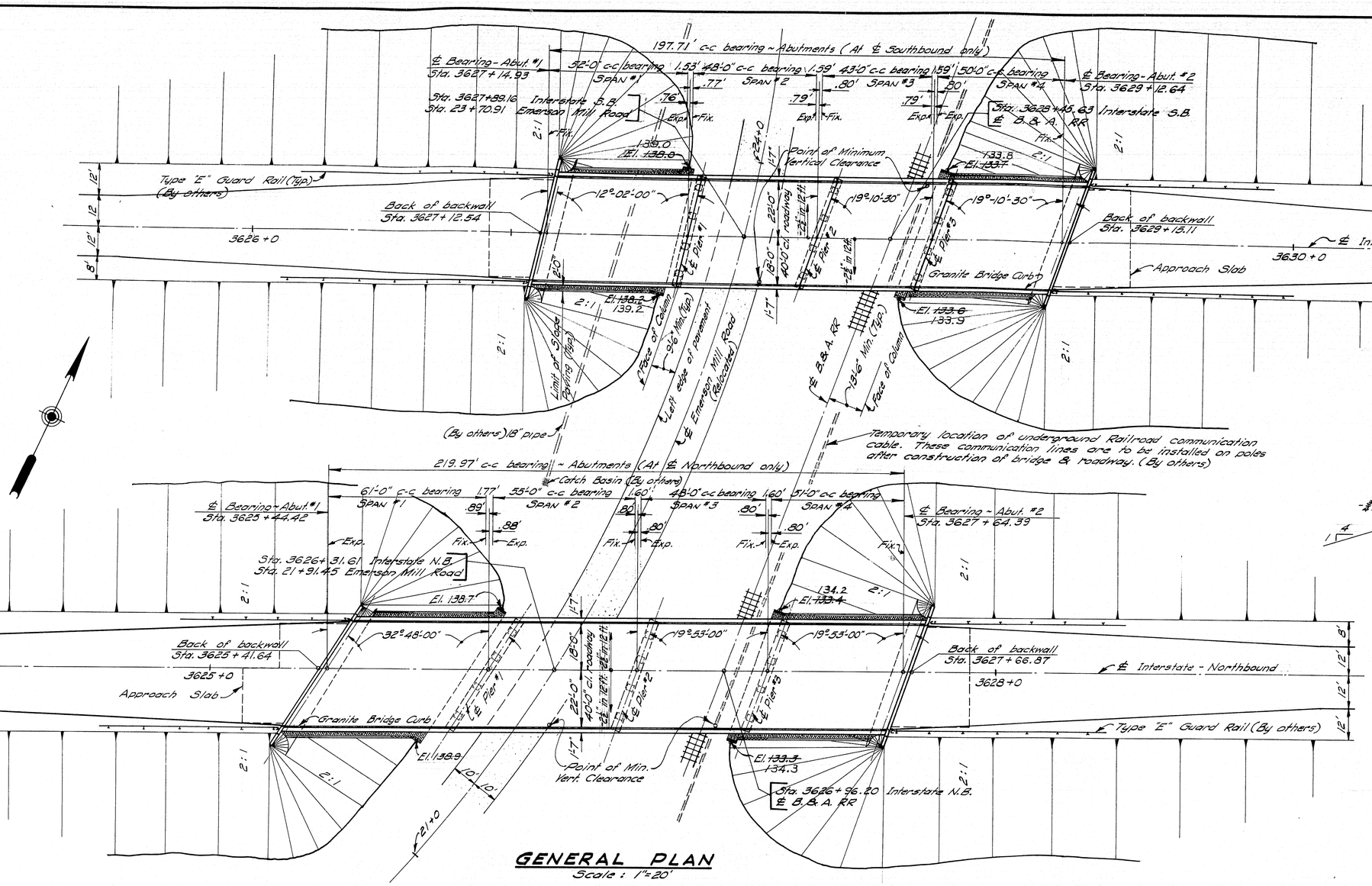
INTERSTATE 95
OVER
EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY
BORING DETAILS

SHEET 5 OF 25 AUGUSTA, MAINE SEPT., 1961

86-37

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(15)	6	25



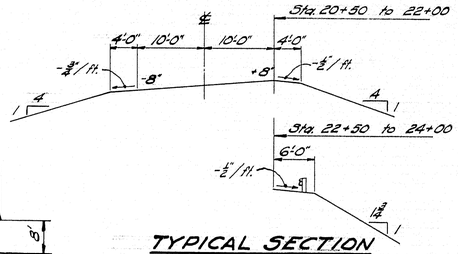
GENERAL PLAN

Scale : 1" = 20'

CURVE DATA

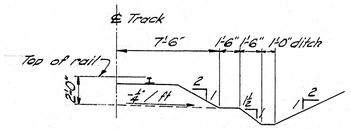
℄ Emerson Mill Road (Relocated)

P.I.	Sta. 22 + 08.17
Δ	99°-21'-22" Left
D	10°-00' (Arc)
T	675.08'
L	993.56'
R	572.958'
E	312.49'



TYPICAL SECTION

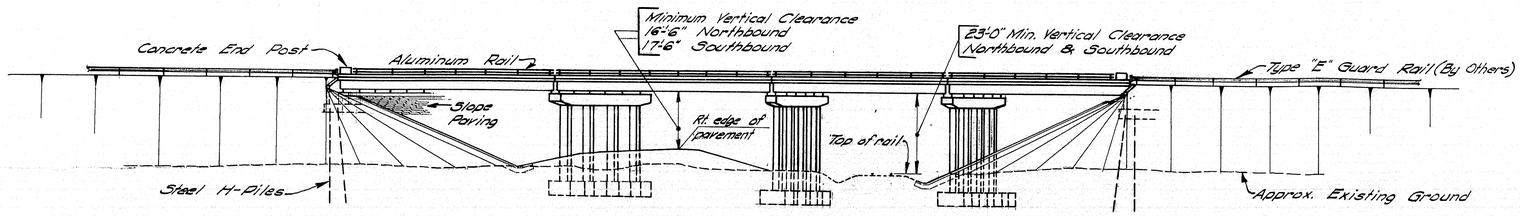
Emerson Mill Road (Relocated)
(By others)



TYPICAL HALF SECTION

Existing Railroad

NOTE: Plan shows ultimate construction. Approach Pavement not part of this contract.



ELEVATION

DESIGN- C.D.H. TRACE- G.W.C. CHECK- R.E.P.	BRIDGE NO. SURVEY- PLOT-

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95

OVER

EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD

IN THE TOWN OF

HAMPDEN
PENOBSCOT COUNTY

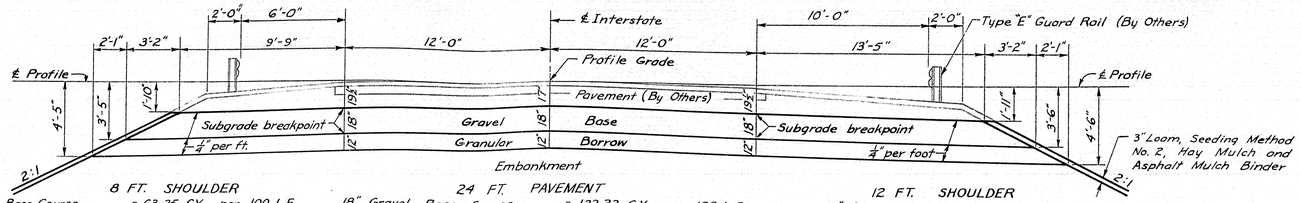
GENERAL PLAN & ELEVATION

SHEET 6 OF 25 AUGUSTA, MAINE SEPT., 1961

K+E 359 IMPERIAL TRACING CLOTH 5.H. D. L. M. INC. 67971

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(18)	7	25



8 FT. SHOULDER
18" Gravel Base Course = 63.25 C.Y. per 100 L.F.
12" Granular Borrow Subbase = 50.57 C.Y. per 100 L.F.

24 FT. PAVEMENT
18" Gravel Base Course = 133.33 C.Y. per 100 L.F.
12" Granular Borrow Subbase = 88.89 C.Y. per 100 L.F.

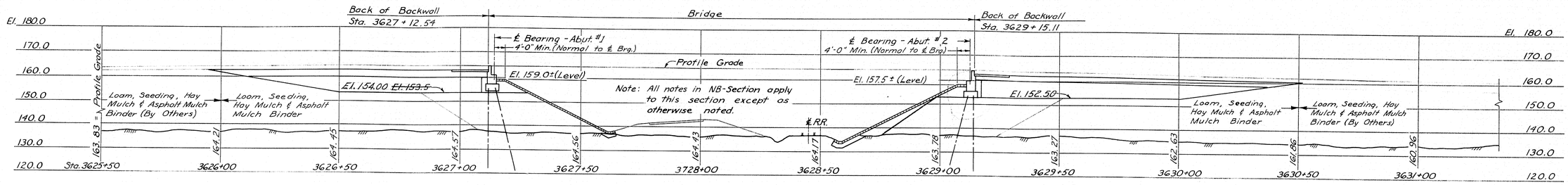
12 FT. SHOULDER
18" Gravel Base Course = 83.69 C.Y. per 100 L.F.
12" Granular Borrow Subbase = 63.83 C.Y. per 100 L.F.

NORTH BOUND (12' SHOULDER RT. - 8' SHOULDER LT.)
SOUTH BOUND (8' SHOULDER RT. - 12' SHOULDER LT.)

TYPICAL INTERSTATE ROADWAY SECTION

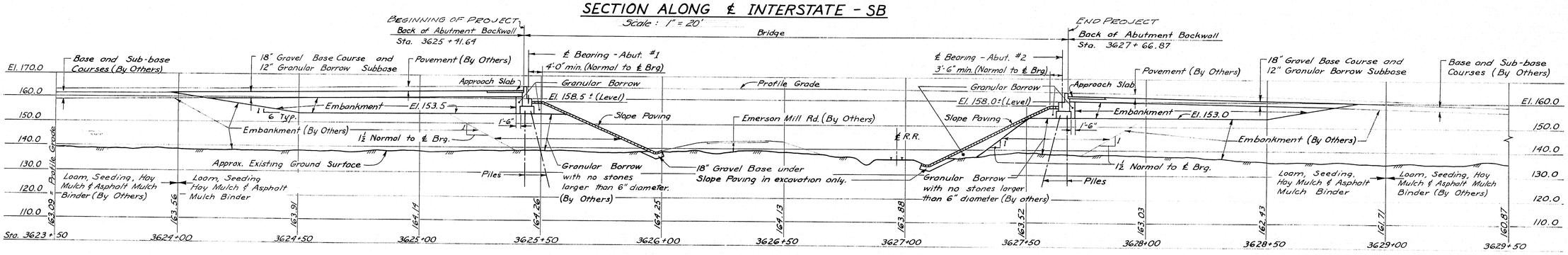
NOTE

Guard Rails & Shoulders shall be Flared 5½", starting 50' from the Bridge, to bring the inside face of the Guard Rail in line with the inside face of the bridge Concrete End Post.



SECTION ALONG ℄ INTERSTATE - SB

Scale : 1" = 20'

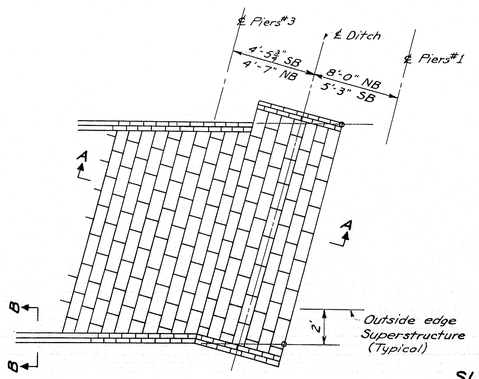


SECTION ALONG ℄ INTERSTATE - NB

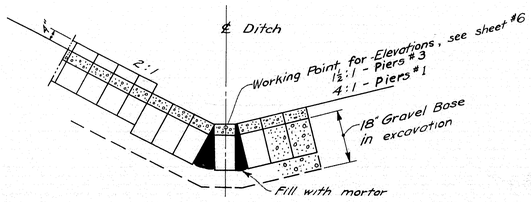
Scale : 1" = 20'

Before piles are driven, granular borrow shall be placed and compacted to bottom of footing elevation.

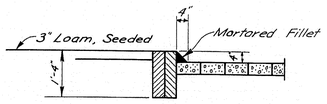
The controlled density method shall be used for placing embankment and granular borrow under this Contract.



PLAN



SECTION A-A



SECTION B-B

SLOPE PAVING

Solid Concrete Blocks 8"x16"x4"
Mortared Joints

The 18" Gravel Base under Slope Paving may be reduced or omitted, if in the opinion of the Engineer the existing material is suitable. Payment for excavation for Gravel Base under Slope Paving to be made under Item 204-14, Structural Earth Excavation - Piers.

DESIGN- C.D.H. TRACE- J.W.M. CHECK- H.C.P.	BRIDGE NO. SURVEY- PLOT-

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95
OVER
EMERSON MILL ROAD &
BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY

ROADWAY WORK AND SLOPE PAVING

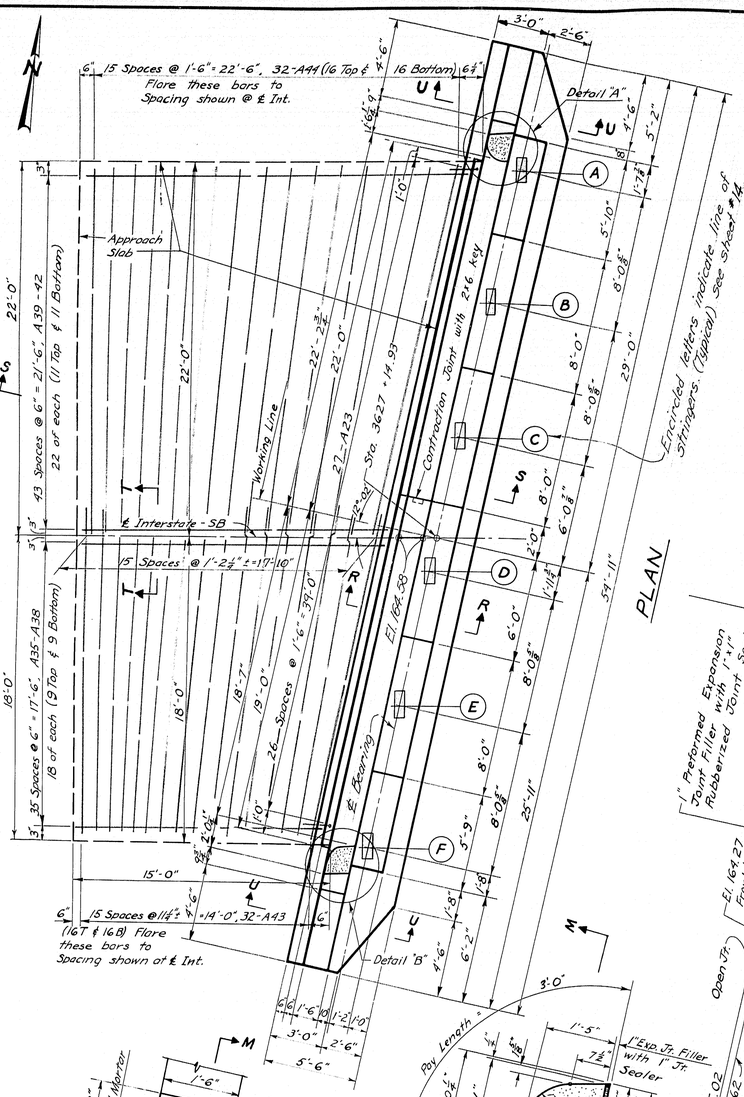
SHEET 7 OF 25 AUGUSTA, MAINE SEPT., 1961

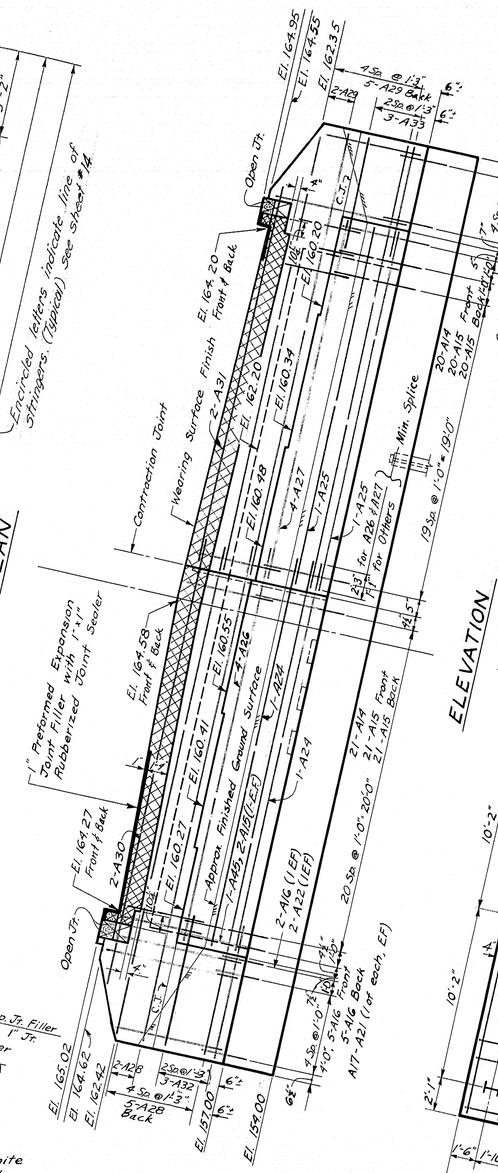
86-39

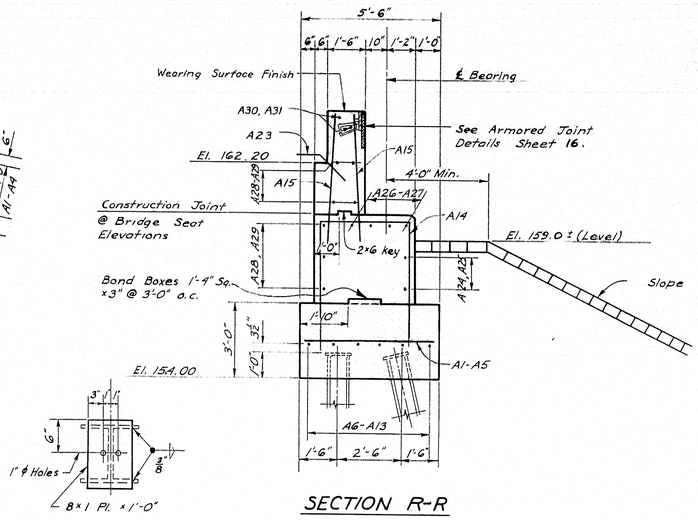
K+E 186 IMPERIAL TRACING CLOTH 10 X 14. D. L. M. INC. 63931

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(15)	8	25







PILE NOTES

1. All piles to be 10BP42# Steel "H" piles.
2. Maximum Pile Load = 37 tons.
3. Piles marked thus ⊢⊣ to be battered 3 inches per foot in the direction of the arrow.
4. Piles are to be driven to refusal or practical refusal in order to develop end bearing.
5. All piles are to have a pile cap.
6. Estimated length of piles:
   Southbound Abut. #1 = 35'
   Abut. #2 = 7@30' & 8@35'
   Northbound Abut. #1 = 30'
   Abut. #2 = 40'

GENERAL ABUTMENT NOTES

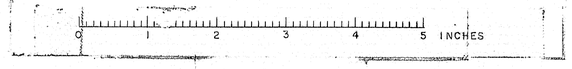
1. Place reinforcing steel in bridge seats to clear anchor bolts.
2. Dress shaded bearing areas 1" larger all around than size of masonry plates.
3. Cover horizontal construction joints and vertical contraction joints on the back with two layers of heavy roofing 10" wide. Cover the surface of the concrete and the back side of each layer as applied with a suitable grade of roofing cement. The area to be covered shall be recessed ¼ inch.
4. Break bond with a suitable grade of asphalt paint at the vertical contraction joints.
5. Preformed Expansion Joint filler shall be the non-bituminous type.
6. Chamfer all exposed edges of concrete ¾".
7. Concrete in the approach slabs to be paid for under Item 701-40, Portland Cement Concrete, Roadway and Sidewalk Slabs on Steel Bridges.
8. For Roadway Work and Slope Paving at abutments refer to sheet 7.
9. E.F. = Each Face.
10. Payment for drilling backwalls & grouting bars for Granite Bridge Curb shall be considered as incidental to Item 705-14, "Reinforcing Steel, Placing".
11. Minimum cover 2" for reinforcing steel, unless noted.

DESIGN– C.D.H.
TRACE– J.W.M.
CHECK– R.E.C.
BRIDGE NO.
SURVEY–
PLOT–

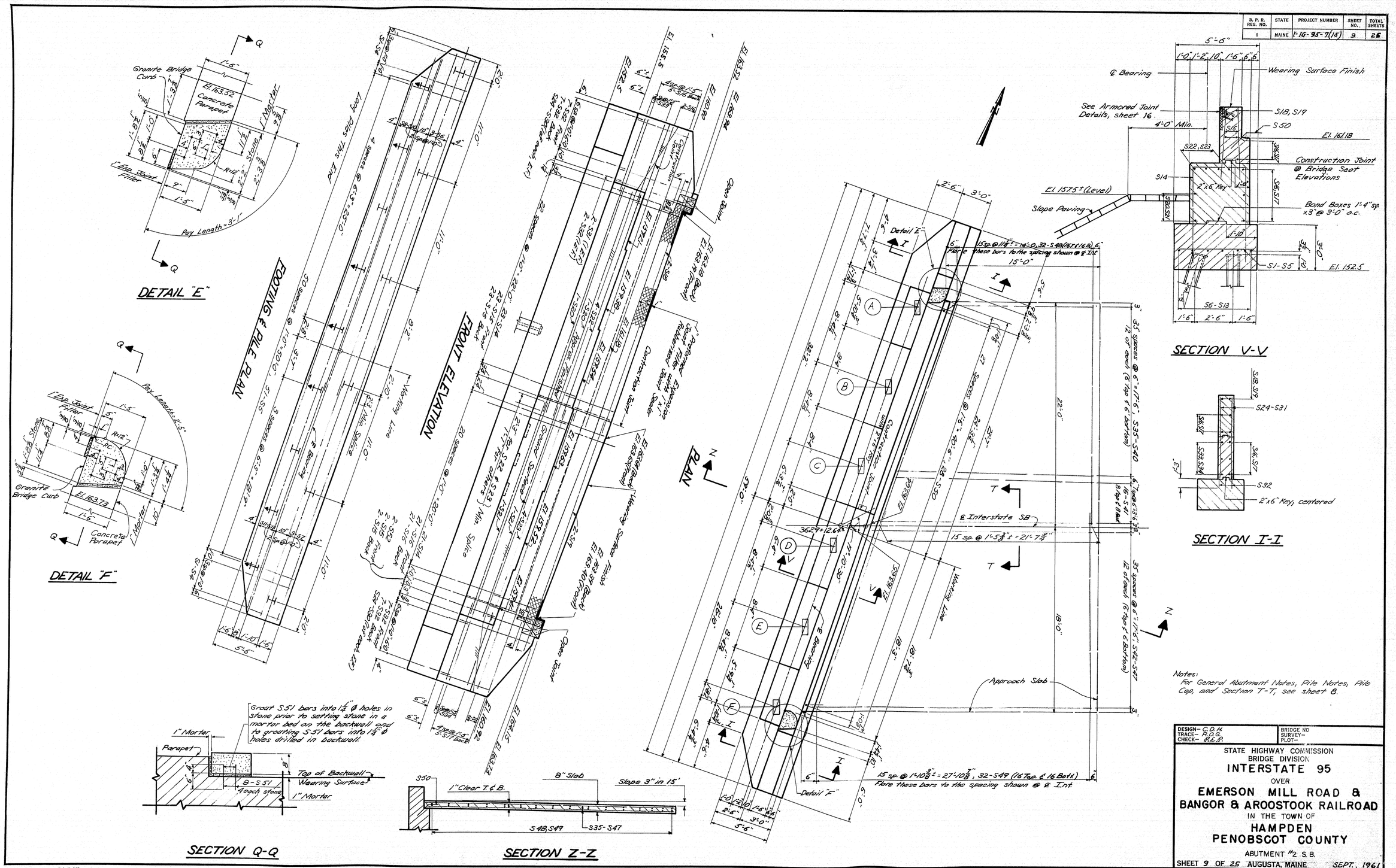
STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95
OVER
EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY
ABUT. # 1 – SB
SHEET 8 OF 25 AUGUSTA, MAINE SEPT., 1961

86-46



S. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-16-95-7(15)	9	25



DESIGN– C.D.H.
TRACE– R.O.G.
CHECK– R.E.B.

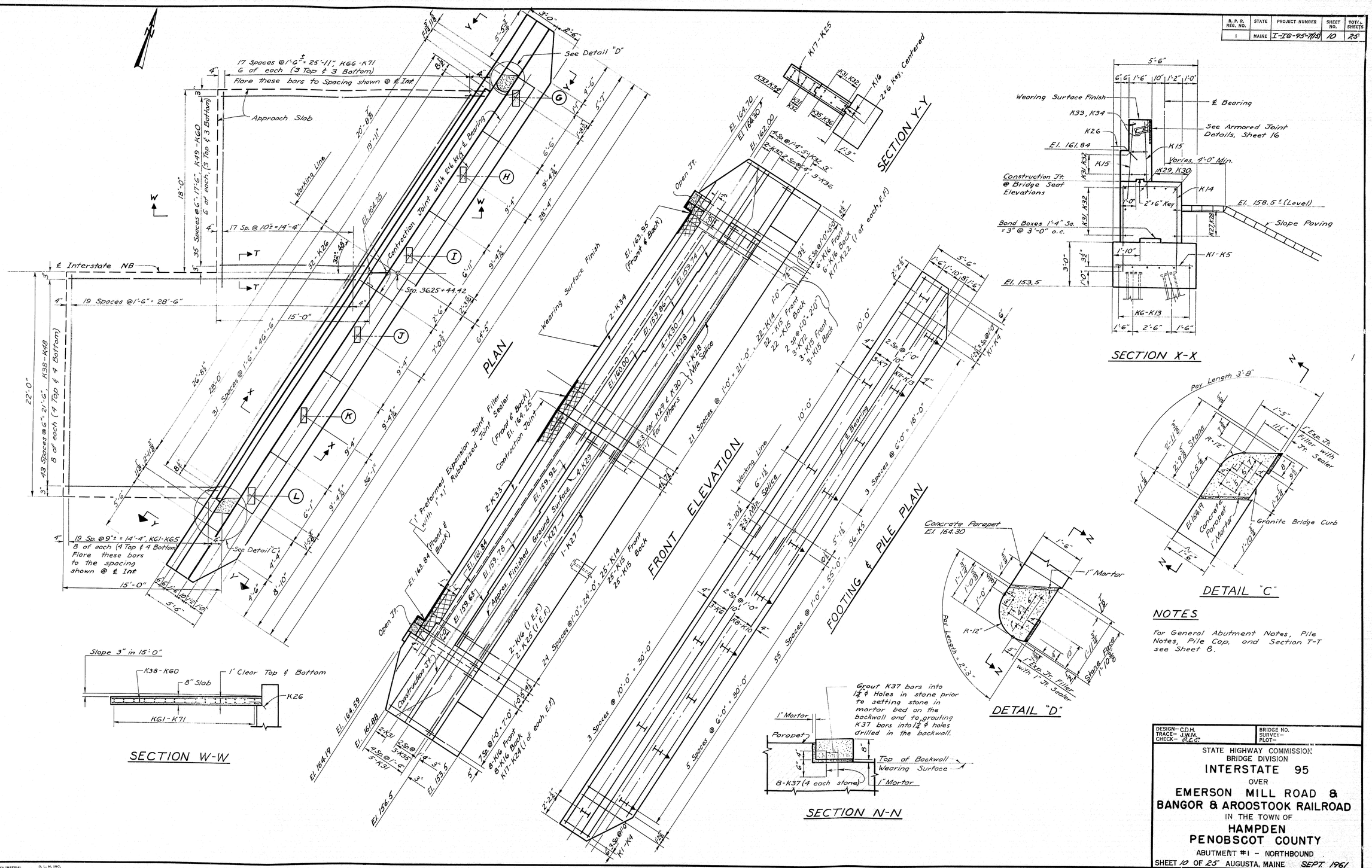
BRIDGE NO
SURVEY–
PLOT–

STATE HIGHWAY COMMISSION
BRIDGE DIVISION
INTERSTATE 95
OVER
EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY
ABUTMENT #2 S.B.

SHEET 9 OF 25 AUGUSTA, MAINE SEPT., 1961

86-41

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(10)	10	25



DESIGN– C.D.H.
TRACE– J.W.M.
CHECK– R.E.G.
BRIDGE NO.
SURVEY–
PLOT–

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95

OVER

EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD

IN THE TOWN OF

HAMPDEN
PENOBSCOT COUNTY

ABUTMENT #1 – NORTHBOUND

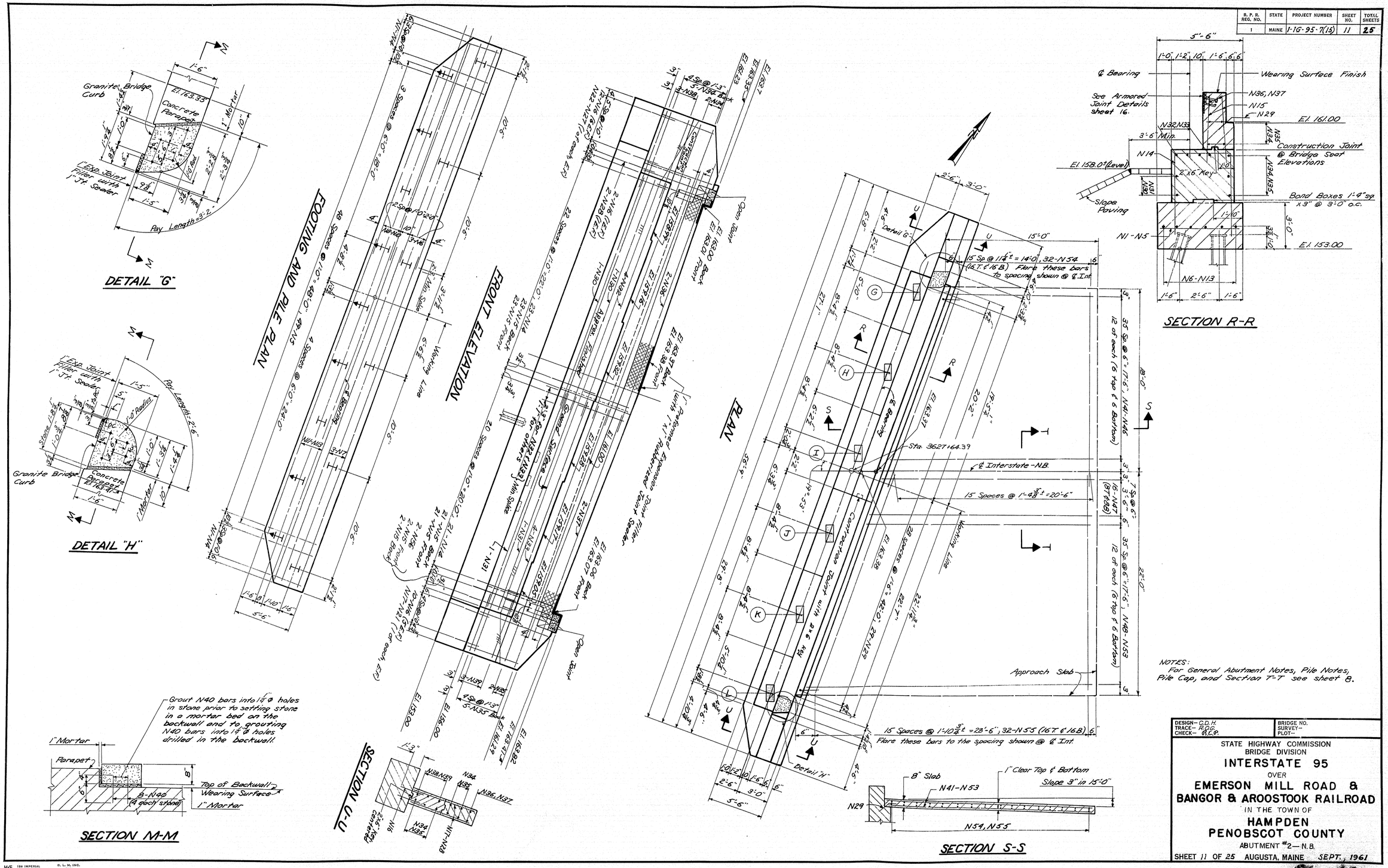
SHEET 10 OF 25 AUGUSTA, MAINE SEPT. 1961

86-42

K+E 166 IMPERIAL TRACING CLOTH 1 in. D. L. M. INC. 67973

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(15)	11	25



NOTES:
For General Abutment Notes, Pile Notes, Pile Cap, and Section T-T see sheet 8.

DESIGN- C.D.H.
TRACE- R.O.G.
CHECK- W.L.P.

BRIDGE NO.
SURVEY-
PLOT-

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95
OVER
EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD
IN THE TOWN OF
HAMPDEN
PENOBSCOT COUNTY

ABUTMENT #2— N.B.

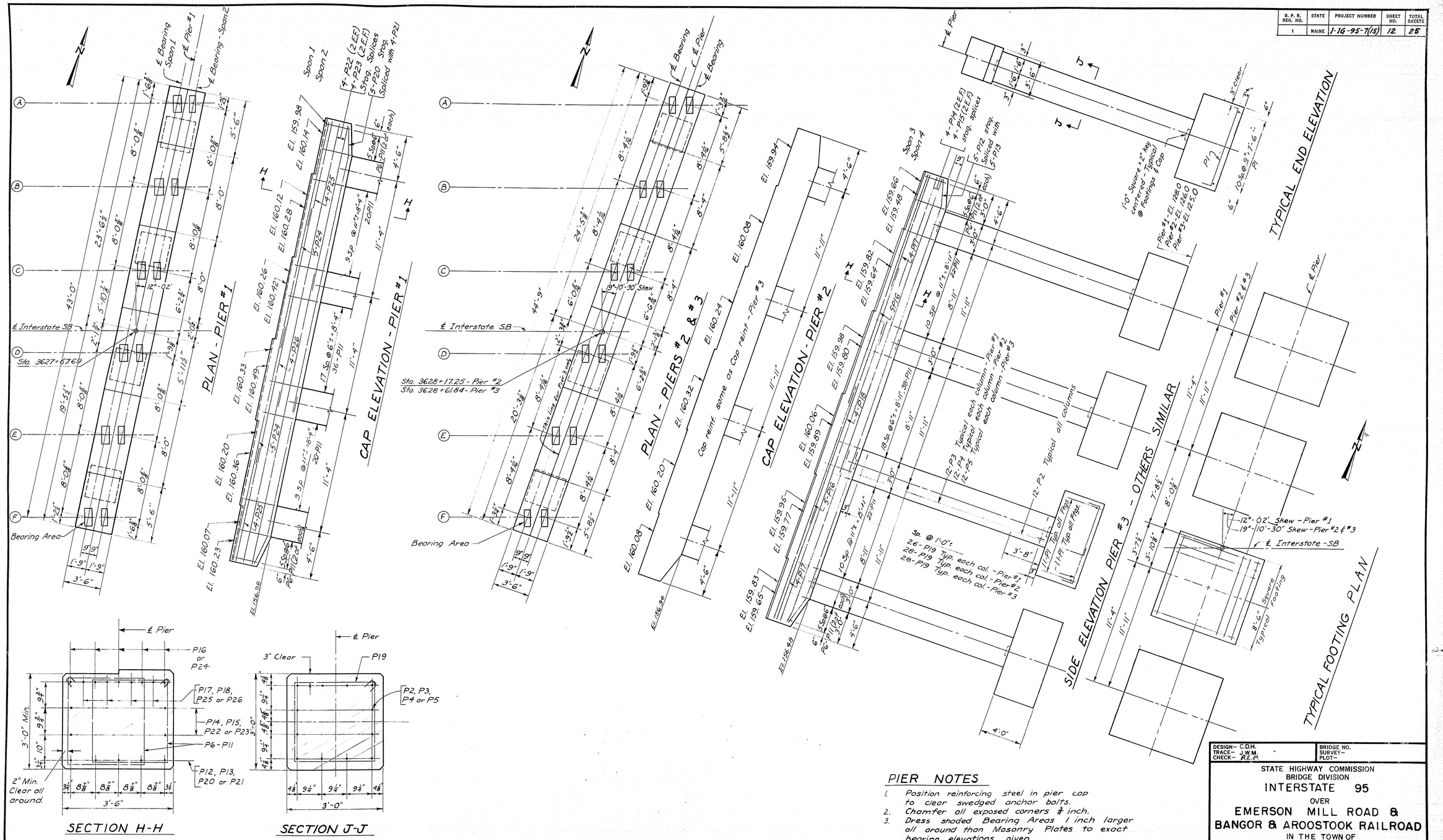
SHEET 11 OF 25 AUGUSTA, MAINE SEPT., 1961

26-43

K+E 359 IMPERIAL TRACING CLOTH 7.5 H. L. M. INC. 67921

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-16-95-7(15)	12	25



PIER NOTES

1. Position reinforcing steel in pier cap to clear swedged anchor bolts.
2. Chamfer all exposed corners ¾ inch.
3. Dress shaded Bearing Areas 1 inch larger all around than Masonry Plates to exact bearing elevations given.
4. E.F. = Each Face
5. Maximum footing pressure = 5.2 tons/sq.ft.

DESIGN– C.D.H. TRACE– J.W.M. CHECK– R.E.P.	BRIDGE NO. SURVEY– PLOT–

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95

OVER

EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD

IN THE TOWN OF

HAMPDEN
PENOBSCOT COUNTY

PIERS – SOUTHBOUND

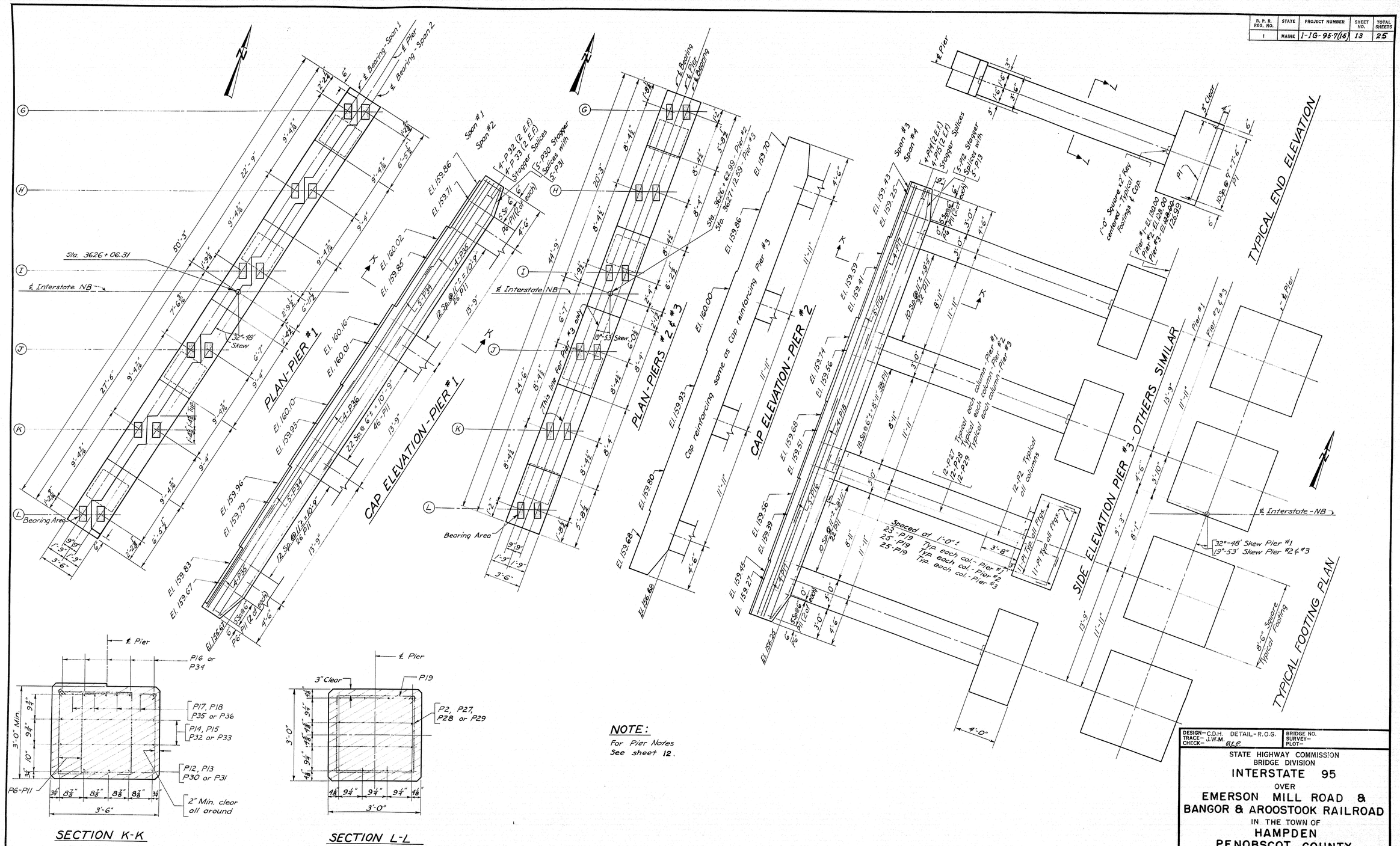
SHEET 12 OF 25 AUGUSTA, MAINE SEPT., 1961

86-44

K+E 1X5 IMPERIAL 10 X 10 TO 1 IN. D. L. M. INC. 27973

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-IG-95-7(16)	13	25



NOTE:

For Pier Notes See sheet 12.

DESIGN-C.D.H. DETAIL-R.O.G.
TRACE-J.W.M.
CHECK-
PLOT-

BRIDGE NO.
SURVEY-

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

INTERSTATE 95

OVER

EMERSON MILL ROAD & BANGOR & AROOSTOOK RAILROAD

IN THE TOWN OF

HAMPDEN

PENOBSCOT COUNTY

PIERS - NORTHBOUND

SHEET 13 OF 25 AUGUSTA, MAINE SEPT., 1961

86-45

K+E 10 X 10 IMPERIAL (IN 5 X 5 SQUARES) D. L. M. INC. 89921

0 1 2 3 4 5 INCHES