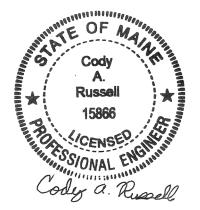
MAINE DEPARTMENT OF TRANSPORTATION HIGHWAY PROGRAM GEOTECHNICAL SECTION AUGUSTA, MAINE

GEOTECHNICAL DESIGN REPORT

For the Rehabilitation of

ROUTE 109 ACTON, MAINE

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York County WIN 20267.00 Soils Report 2024-16 Federal Project No. STP-2026(700)

July 24, 2024

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1.0 INTRODUCTION

The purpose of this Geotechnical Design Report is to present subsurface information and make geotechnical design and construction recommendations for the rehabilitation of an approximately 2.21-mile portion of Route 109 in Acton, as shown on Sheet 1 - Location Map. The project is needed to improve drainage and safety. The scope includes grading, base, pavement, drainage improvements, realignment in some areas, one (1) large culvert replacement, and a small retaining wall replacement. Route 109 is a Highway Corridor Priority 2 road.

2.0 GEOLOGIC SETTING

According to the Surficial Geology Great East Lake Quadrangle, Maine, Open File No. 97-46 (1997) published by the Maine Geological Survey (MGS), the surficial soils along the project length consist of:

- Glacial fluvial sand and gravel of the Horn Pond area.
- Glacial lacustrine deposits of the Delta of the Wilson Lake area consisting of sand and gravel.
- Glacial Till consisting of silt, sand, and gravel with cobbles and boulders.

According to the MGS map titled Bedrock Geologic Map of Maine (1985) the bedrock along the project consists of interbedded pelite and limestone and/or dolostone of the Rindgemere Formation lower member.

3.0 SUBSURFACE INVESTIGATION

Subsurface conditions at the site were explored by drilling a total of twenty (20) borings and seventy (70) probes.

Borings HB-ACT-101 through HB-ACT-110 and sixty-nine (69) unnamed probes were drilled on July 15 and 16, 2015. Borings HB-ACT-201 through HB-ACT-207, HB-ACT-209 through HB-ACT-211 and probe HB-ACT-208 were drilled on June 12, 2019 and June 17, 2019. All explorations were drilled by the MaineDOT drill crew. The borings were drilled to depths ranging from approximately 2.4 to 28.0 feet below ground surface (bgs) using solid stem auger, open hole, cased wash boring, and rock core drilling techniques. The probes were drilled to depths ranging from approximately 1.6 to 25.5 feet bgs using solid stem auger drilling techniques. Boring and probe locations are shown on Sheets 2 through 19 Boring Location Plans. The boring logs are presented in Appendix A.

Soil samples were obtained off the auger flights in nine (9) 100-series borings. Soil descriptions were recorded but no soil sampling was done in one (1) 100-series borings. Soil samples were obtained in the 200-series borings at standard 5-foot intervals using Standard Penetration Testing (SPT). No soil sampling was done in the probes and no soil descriptions were recorded.

The MaineDOT calibrated automatic hammer delivers approximately 55 percent more energy during driving than the standard rope and cathead system. All N-values discussed in this report are corrected values (N_{60}) computed by applying an average energy transfer factor of 0.928 to the raw field N-values.

Details and sampling methods used, field data obtained, and soil and groundwater conditions encountered are shown in the Boring Logs in Appendix A. The MaineDOT Geotechnical Team member selected the boring locations, drilling methods, designated type and depth of sampling, reviewed field logs for accuracy and identified field and laboratory testing requirements. A North East Transportation Training and Certification Program (NETTCP) certified subsurface inspector logged the subsurface conditions encountered. The boring and probes were located in the field by taping to site features after completion of the drilling program.

4.0 LABORATORY TESTING

A laboratory testing program was conducted on select soil samples obtained in the test borings to assist in soil classification, evaluation of engineering properties of the soils and geologic assessment of the project site. Laboratory testing consisted of twenty-seven (27) standard grain size analyses and natural water content, and one (1) loss on ignition test. The results of the laboratory tests are in Appendix B – Laboratory Test Results. Laboratory test results are also summarized on the boring logs in Appendix A.

5.0 SUBSURFACE CONDITIONS

Subsurface conditions encountered at the test borings and probe generally consisted of pavement and fill soils consisting of sand and gravel underlain by layers of native sand, silt, and sandy silt. Layers of peat and organic silt were encountered near the end of the project limits. The boring locations are shown on Sheets 2 through 19 - Boring Location Plans. The boring logs are presented in Appendix A – Boring Logs.

5.1 **Pavement and Fill Soils**

The subsurface investigations found areas of pavement and roadway fill soils along the project. Where present, the pavement thickness ranged from approximately 5.0 to 12.0 inches. The fill soils consisted of:

- Brown, damp, sandy gravel, trace silt, occasional cobble.
- Brown, damp to moist, fine to coarse sand, trace to some gravel, trace to little silt, occasional cobble.
- Brown, damp, gravelly fine to coarse sand, trace to some silt, occasional cobble.

The thickness of the fill encountered in the borings ranged from approximately 0.4 to 10.0 feet. The full thickness of the fill was not fully penetrated in all of the explorations. Eleven (11) SPT N_{60} -values obtained in the fill ranged from 5 to 34 blows per foot (bpf) indicating that the fill is loose to dense in consistency.

Water contents from samples obtained within the fill range from approximately 3.0% to 12.8%. Grain size analyses conducted on samples of the fill resulted in the soil being classified as an A-1-a. A-1-b, or A-2-4 under the AASHTO Soil Classification System and a GW-GM, SW-SM, or SM under the Unified Classification System.

5.2 Native Soils

The fill soils are underlain by layers of native soils consisting of sand, gravelly sand, silty sand, and sandy silt and three (3) areas where peat and organic silt were encountered.

5.2.1 Native Sand, Gravelly Sand, Silty Sand, and Sandy Silt

The native sand, gravelly sand, silty sand, and sandy silt encountered in the borings consisted of:

- Light brown, damp to moist, fine to coarse sand, little to some silt, trace to little gravel.
- Brown, moist, gravelly fine to coarse sand, little silt.
- Light brown, moist, silty fine to coarse sand, trace gravel, occasional cobbles.
- Grey, wet, fine to coarse sandy silt, trace gravel.

The thickness of the native sand and gravelly sand ranged from approximately 2.6 to 17.0 feet. The full depth of the native sand and gravelly sand was not encountered or fully penetrated in all of the explorations. Sixteen (16) SPT N₆₀-values obtained in the native sand and gravelly sand ranged from 5 to 79 bpf indicating that the native sand and gravelly sand are loose to very dense in consistency. The thickness of the silty sand ranged from approximately 2.5 to 6.0 feet where encountered. One (1) SPT N₆₀ value obtained in the silty sand layer was >50 bpf but was likely influenced by the presence of cobbles. The thickness of the sandy silt was approximately 3.0 feet where encountered. One (1) SPT N₆₀-value obtained in the sandy silt was 6 bpf, indicating that the sandy silt is medium stiff in consistency.

Water contents from samples obtained within the native sand and gravelly sand range from approximately 7.2% to 37.8%. Grain size analyses conducted on samples of the native sand and gravelly sand resulted in the soil being classified as an A-1-b or A-2-4 under the AASHTO Soil Classification System and an SM or SW under the Unified Classification System. Water contents from samples obtained within the silty sand range from approximately 11.1% to 20.1%. Grain size analysis conducted on two (2) samples of silty sand resulted in the soil being classified as an A-4 under the AASHTO Soil Classification System and a SM under the Unified Classification System One (1) water content from a sample obtained within the sandy silt was approximately 41.4% Grain size analysis conducted on one (1) sample of sandy silt resulted in the soil being classified as an A-4 under the AASHTO Soil Classification System and a CL under the Unified Classification System

5.3 Organic Silt and Peat

Layers of organic silt and peat were encountered in three (3) of the borings. The layers identified in the field consisted of:

- Black or dark brown organic silt, trace to some fine sand.
- Dark brown peat.

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The following table summarizes the locations and elevations were the organic silt and peat were encountered:

Boring Number / Approximate Station Location	Approximate thickness of Organic Silt and/or Peat Layer (feet)	Approximate Elevation of Top of Layer (feet)
HB-ACT-207 / 156+10	1.0	577.0
HB-ACT-209 / 169+50	1.0	575.3
HB-ACT-210 / 171+00	1.3	571.3

No SPT N₆₀-values were obtained in the organic silt or peat layers.

A loss on ignition test was conducted on one (1) sample of peat resulting in a 4.7% loss on ignition.

Water contents from two (2) samples obtained within the organic silt and peat were approximately 45.3% and 172.4%. Grain size analyses conducted on one (1) sample of organic silt resulted in the soil being described as sand, some gravel, little silt and classified as an A-1-b under the AASHTO Soil Classification System and an SM under the Unified Classification System.

5.4 Bedrock and Refusal Surfaces

Refusal surfaces were encountered at varying depths along the project. Refusal of the drilling tools varied from a depth of approximately 1.6 feet to 9.9 feet bgs. The table below summarizes the refusal surfaces encountered.

Approximate Station/Offset	Approximate Elevation of Top of Refusal Surface (feet)
98+75/12.0 ft RT	712.8 (bedrock cored)
99+40/9.5 ft LT	714.4 (bedrock cored
105+50/9.0 ft RT	738.4
109+00/8.0 ft RT	730.6
109+00/7.0 ft LT	735.5
110+00/9.0 ft RT	734.4
110+00/8.0 ft LT	734.6
111+00/9.0 ft RT	733.2
112+00/7.0 ft RT	733.0
112+00/12.0 ft LT	732.5
113+00/7.0 ft RT	725.7
113+00/12.5 ft LT	725.6
113+75/15.0 ft LT	716.1 (bedrock cored)
118+00/10.5 ft RT	703.7
118+00/9.0 ft RT	702.5
119+00/10.0 ft RT	702.2
119+00/9.0 ft LT	701.0
120+00/7.0 ft RT	702.1
120+00/8.0 ft LT	702.4
121+00/12.0 ft RT	691.4
121+00/9.0 ft LT	687.8
122+00/8.5 ft RT	683.4
145+00/8.0 ft RT	621.4
146+00/11.0 ft LT	619.5
148+00/9.0 ft LT	616.8
152+00/9.4 ft RT	603.4
184+15/4.9 ft RT	579.5
184+15/15.0 ft LT	579.9
185+15/5.0 ft RT	585.4
185+15/15.2 ft LT	584.2
186+15/9.0 ft RT	586.9
186+15/10.5 ft LT	585.7
187+15/10.1 ft RT	588.9
187+15/10.9 ft LT	585.1
188+15/10.1 ft RT	583.3
189+15/8.9 ft LT	575.7
194+15/10.5 ft RT	559.4

Bedrock was cored in three (3) of the borings where refusal was encountered. The exact nature of the refusal surface was not determined in the remaining explorations.

The bedrock consists of interbedded pelite and limestone and/or dolostone of the Sangerville Formation. The Rock Quality Designation (RQD) of the bedrock was determined to range from 58% to 67%, correlating to a Rock Quality of Fair. The approximate elevations of the top of bedrock or the refusal surface encountered at the boring locations are presented on the Boring Logs in Appendix A.

5.5 Groundwater

Groundwater level was observed in eight (8) borings at depths ranging from approximately 1.9 to 12.0 feet bgs. The water levels observed are indicated on the boring logs in Appendix A. Groundwater levels can be expected to fluctuate subject to seasonal variations, local soil conditions, topography, precipitation, and construction activity.

6.0 GEOTECHNICAL RECOMMENDATIONS

The following sections discuss the geotechnical-related design features of this project. Areas of geotechnical concern include the Wilson Lake Bridge box culvert, the proposed oversteepened slope from approximate stations 166+50 to 168+50, and a proposed retaining wall in the vicinity of Station 190+50.

6.1 Wilson Lake Bridge (Bridge #6700) at approximate Station 156+30

6.1.1 General Information

The existing structure at approximate Station 156+25 is a 28-inch diameter, approximately 61-foot long corrugated metal pipe (CMP) culvert. The proposed replacement structure is a 12-foot span, 8-foot rise, 94-foot long precast concrete box culvert on an approximately 17-degree skew to the roadway centerline with an inlet elevation of approximately 573.70 feet and an outlet elevation of approximately 572.66 feet.

One (1) boring (HB-ACT-207) and (1) probe (HB-ACT-208) were drilled in the roadway on each side of the proposed structure. The boring locations and the interpretive subsurface profile are shown on Sheet 20 - Boring Location Plan & Interpretive Subsurface Profile with Boring Logs. The boring logs are also provided in Appendix A – Boring Logs.

Boring HB-ACT-207 was drilled to a depth of approximately 28.0 feet bgs without encountering a refusal surface. The subsurface conditions encountered in the boring consisted of fill consisting of sand underlain by a 1-foot layer of peat, underlain by native sand. One SPT N₆₀-value obtained in the peat was 12 bpf indicating that the peat is mixed with sand and is medium dense in consistency. Two (2) SPT N₆₀-values obtained in the fill were 5 bpf and 22 bpf indicating that the fill is loose to medium dense in consistency. Two (2) SPT N₆₀-values obtained in the native sand were 62 bpf and 73 bpf indicating that the native sand is very dense in consistency. Probe HB-

ACT-208 was drilled to a depth of approximately 25.5 feet bgs without encountering a refusal surface.

6.1.2 Design and Construction – The proposed precast concrete box culvert shall be constructed in accordance with MaineDOT Standard Specification Section 534 and the Contract Plans. To facilitate fish passage, Habitat Connectivity Design elements will be used inside the proposed precast concrete box culvert as shown on the Special Details sheet in the Contract Plans.

The proposed precast concrete box culvert can be bedded on a 1-foot thick layer of Granular Borrow, Material for Underwater Backfill (MaineDOT Item 203.25, Granular Borrow). The bedding material should be placed in lifts of 6 to 8 inches loose measure and compacted to at least 95 percent of the AASHTO T-180 maximum dry density. The exposed subgrade shall be free of ponded water so that bedding material placement and compaction can be completed in the dry. The soils at the bedding elevation shall be excavated using a smooth-edged backhoe bucket to limit disturbance. Any disturbed soils at the bedding elevation resulting from excavation activities shall be removed by hand prior to placement of the bedding material. All subgrade surfaces should be protected from construction traffic in order to limit disturbance. Groundwater and surface water levels shall be depressed sufficiently to allow work in the dry.

The full nature of the culvert bearing surface will not become evident until the culvert excavation is made. The bottom elevation of the excavation shall take into account the wall thickness of the precast concrete box culvert and the required 1-foot layer of bedding material. Any loose or soft soils (peat or organic materials) in the excavations shall be removed and replaced with Granular Borrow Material for Underwater Backfill (MaineDOT 703.19) or Crushed Stone ³/₄-Inch (MaineDOT 703.13). Any cobbles or boulders encountered in excess of 6 inches shall be removed and replaced with compacted Granular Borrow Material for Underwater Backfill or Crushed Stone ³/₄-Inch.

The soil envelope and backfill shall consist of Granular Borrow (703.19) with a maximum particle size of 4 inches. The granular borrow backfill material shall be placed in lifts of 6 to 8 inches loose measure and compacted to the manufacturer's specifications or, in the absence of manufacturer's specifications, the bedding and backfill soil shall be compacted to at least 92 percent of the AASHTO T-180 maximum dry density.

6.1.3 Bearing Resistance

The factored bearing resistances for the precast concrete box culvert bearing on compacted granular bedding material placed on native soils at the service and strength limit states are presented in the table below. Supporting calculations in accordance with AASHTO LRFD Bridge Design Specifications 9th Edition 2020 (LRFD) are provided in Appendix C – Calculations.

Limit State	Resistance Factor	AASHTO LRFD	Factored Bearing
	Фb	Reference	Resistance (ksf)
Service	1.0	Article 10.5.5.1	6.0
Strength	0.45	Table 10.5.5.2.2-1	9.0

6.1.4 Modulus of Subgrade Reaction

A modulus of subgrade reaction (ks) equal to 140 pounds per cubic inch shall be used for the structural design of the box culvert's base slab. Calculations are included in Appendix C – Calculations.

6.1.5 Scour and Riprap

Both the inlet and outlet of the proposed precast concrete box culvert shall be armored with riprap conforming to MaineDOT Standard Specification Section 703.26 Plain and Hand Laid Riprap. Riprap slopes shall not be steeper than 2H:1V. The riprap on the slopes shall be underlain by a 1-foot layer of protective aggregate cushion conforming to MaineDOT Standard Specification 703.19 Granular Borrow Material for Underwater Backfill that is underlain by a non-woven Class 1 erosion control geotextile that meets the requirements for MaineDOT Standard Specification 722.03.

6.1.3 Seismic Design Considerations

In conformance with LRFD Article 3.10.1, seismic analysis is not required for buried structures, except where they cross active faults. There are no known active faults in Maine; therefore, seismic analysis is not required.

6.2 Oversteepened Slopes from Stations 166+50 to 168+50

A 1.5H:1V cut slope is proposed from Stations 166+50 to 168+50. In accordance with AASHTO LRFD Bridge Design Specifications 9th Edition 2020 (LRFD) Article 11.6.3.7 evaluation of earth slopes that do not support or contain a structural element should achieve a factor of safety of 1.3 (equivalent to a resistance factor of 0.75). Analysis of the proposed 1.5H:1V slopes using Geostudio Slope/W software determined that riprap armor was necessary for the slopes to achieve a factor of safety of 1.3 or greater. The critical slope was analyzed assuming 3-feet of plain riprap will armor the full height of the slope. The analysis of the proposed slope resulted in an acceptable factor of safety of 1.315. Appendix D – Slope Stability Analyses presents the stability results from this analysis. The stability analyses based on subsurface conditions encountered in borings drilled in the vicinity of the slopes.

The slope shall be armored with 3 feet of riprap conforming to MaineDOT Standard Specification Section 703.26 Plain Riprap and Hand Laid Riprap underlain by a 1-foot layer of protective aggregate cushion conforming to MaineDOT Standard Specification 703.19 Granular Borrow Material for Underwater Backfill that is underlain by a non-woven Class 1 erosion control geotextile that meets the requirements for MaineDOT Standard Specification 722.03.

6.3 Wet Cast Small Landscape Block Wall in the Vicinity of Station 190+50

The proposed replacement retaining wall shall be constructed as shown on the Contract Plans and shall meet the requirements of Standard Specification 673 Wet Cast Small Landscape Block Wall.

The proposed wall shall be supplier designed in accordance with AASHTO LRFD Bridge Design Specifications (LRFD) 9th Edition 2020 and Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Slopes (FHWA-NHI-10-024 and FHWA-NHI-10-025, March 2012).

The proposed retaining wall shall be designed to withstand lateral earth pressures. Earth loads may be calculated using an active earth pressure coefficient, K_a, calculated using Rankine or Coulomb Theory. Refer to LRFD Article 3.11.5.3 and Equations 3.11.5.3-1 and -2 for calculating Coulomb active earth pressure coefficient. Lateral earth pressure distributions for design of MSE walls are provided in LRFD Figures 3.11.5.8.1-1, -2 and -3. Passive earth pressure in front of the wall shall be neglected in the design.

The factored bearing resistances for the retaining wall bearing on a concrete leveling pad on native soils at the service and strength limit states are presented in the table below. No borings were drilled in the vicinity of the proposed retaining walls. Bearing resistance calculation assume medium dense sand as the foundation material. In no instance shall the bearing stress exceed the nominal resistance of the structural concrete which may be taken as 0.3f'c.

Limit State	Resistance Factor	AASHTO LRFD	Factored Bearing
	Фb	Reference	Resistance (ksf)
Service	1.0	Article 10.5.5.1	5.0
Strength	0.45	Table 10.5.5.2.2-1	3.5

The following additional considerations should be addressed in the wall design:

- Traffic will be required in the design of the wall.
- Piped drainage shall be included in the design of the wall.
- A minimum embedment of 2.0 feet below finished grade is required for the wall design.
- The retaining wall design shall include a drainage system (swale) at the top of the wall to carry surface water runoff away from the face of the wall.

6.4 Settlement

No settlement issues are anticipated for either the roadway or the proposed precast concrete culvert. The installation of the proposed precast concrete box culvert will result in a net unloading of the site soils at the proposed structure location. Placement of fill soils at the location of the existing structure to be removed and in areas where the proposed roadway grade is higher than existing grades are not anticipated to exceed the past loading condition of the site soils.

6.5 Bedrock Removal

Refusal of the drilling tools was encountered in multiple borings and probes along the project (see Section 5.4). Bedrock removal is anticipated for drainage and subgrade installation near these locations. Additional shallow bedrock should be expected during construction at other locations.

Blasting, if required, shall be conducted in accordance with MaineDOT Standard Specifications Sections 105.2.7 and 203. The Contractor is required to conduct pre- and post-blast surveys, as

well as blast vibrations monitoring at nearby structures in accordance with industry standards at the time of the blast.

6.6 Additional Construction Considerations

Construction of the precast concrete box culvert will require soil excavation. Earth support systems will be required if laying back slopes is not feasible. Regardless of the method of excavation, all excavations and earth support systems shall meet all applicable OSHA regulations.

If organic silt or peat is encountered in the project excavations, the materials should be over excavated to be completely removed and replaced with Granular Borrow, Material for Underwater Backfill or Crushed Stone, ³/₄-Inch.

The Contractor shall control groundwater and surface water infiltration using temporary ditches, sumps, granular drainage blankets, stone ditch protection or hand-laid riprap with geotextile underlayment to divert groundwater and surface water to allow construction in the dry.

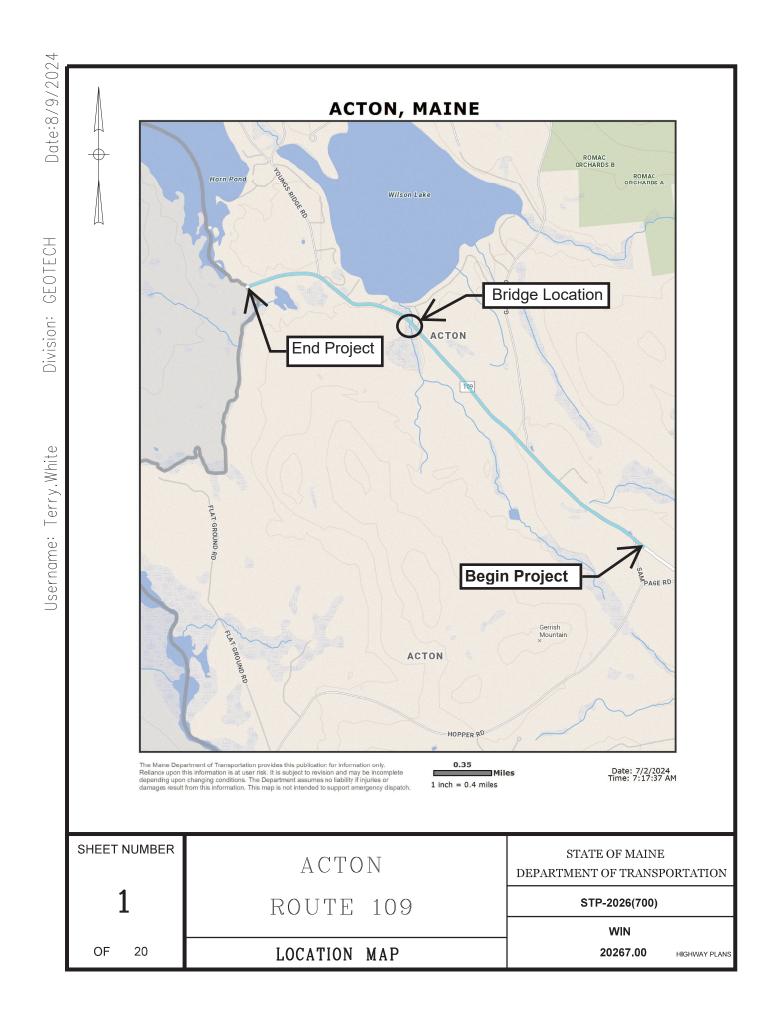
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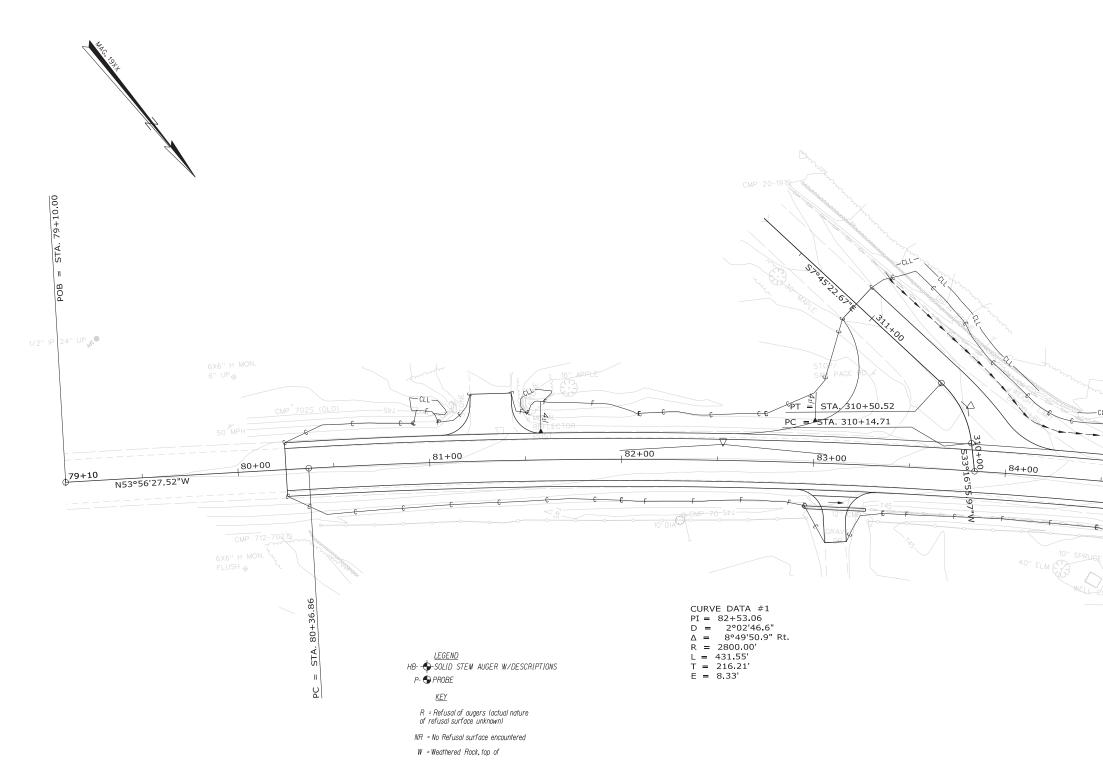
This report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed rehabilitation of Route 109 in Acton, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

In the event that any changes in the nature, design, or location of the proposed project are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the conclusions and recommendations and to modify the recommendations as appropriate to reflect the changes in design. These analyses and recommendations are based in part upon a limited subsurface investigation at discrete exploratory locations completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the recommendations made in this report.

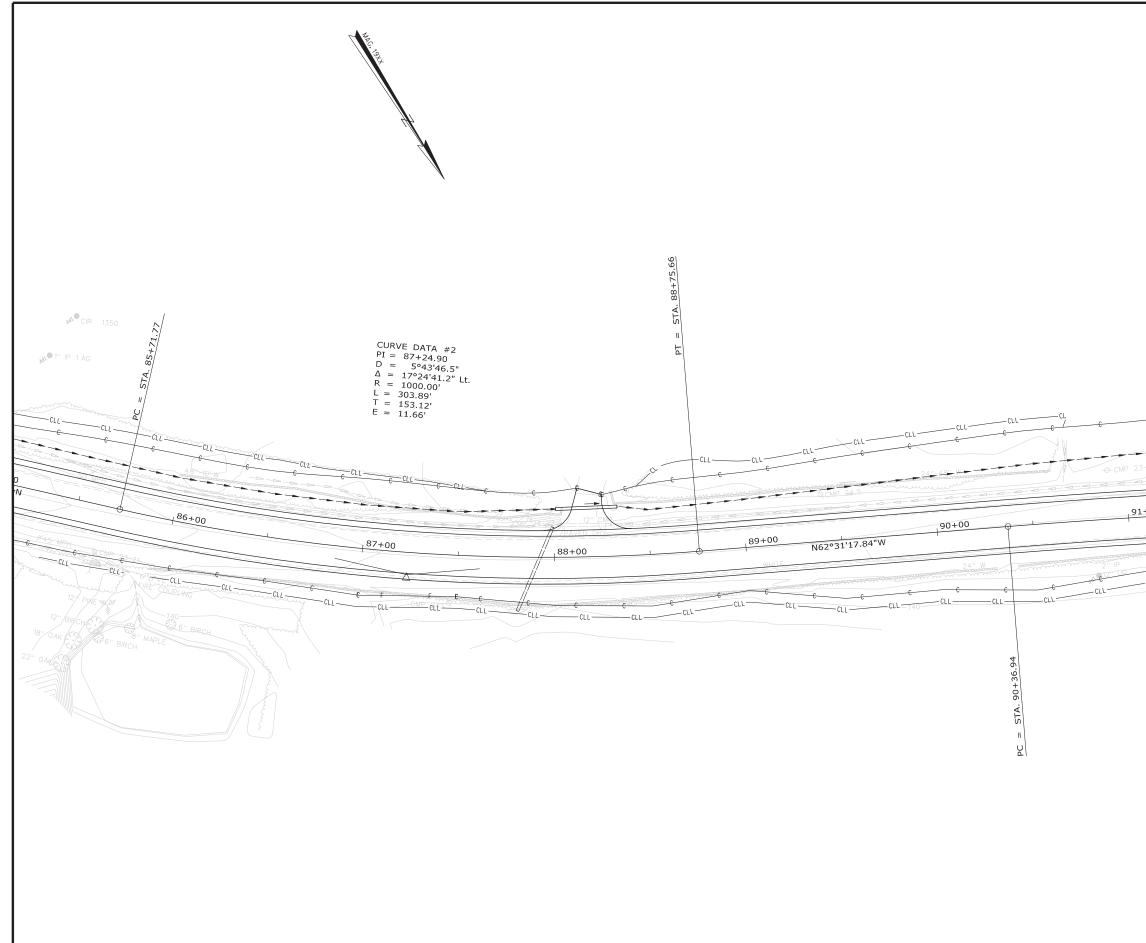
It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that the earthwork and foundation recommendations and construction considerations presented in this report are properly interpreted and implemented in the design and specifications.

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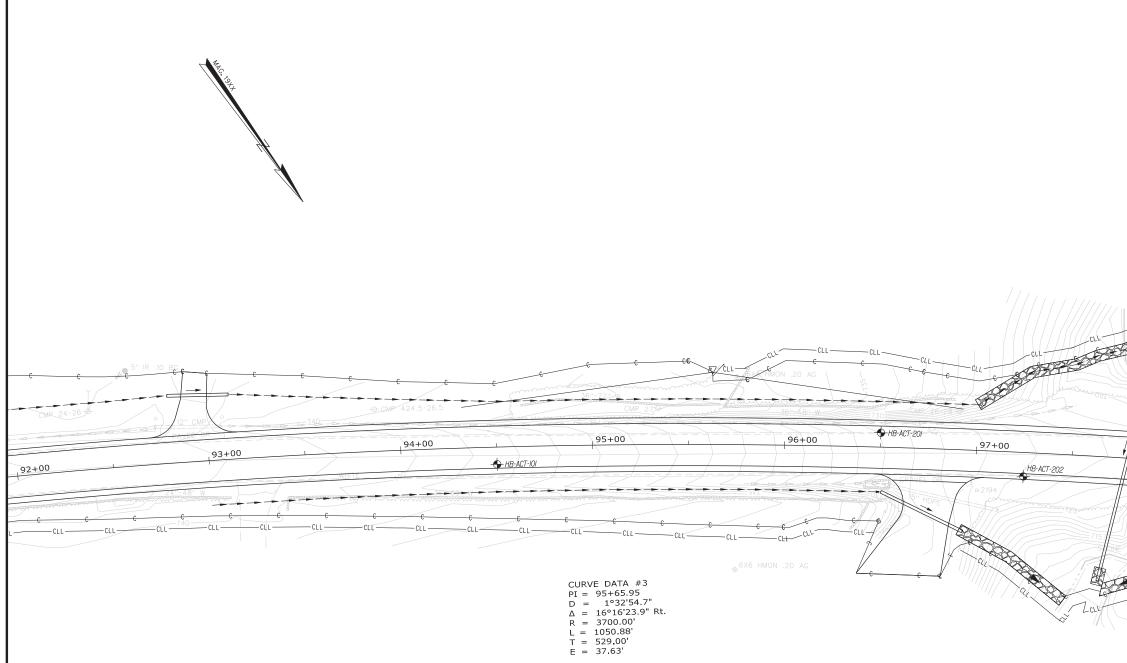
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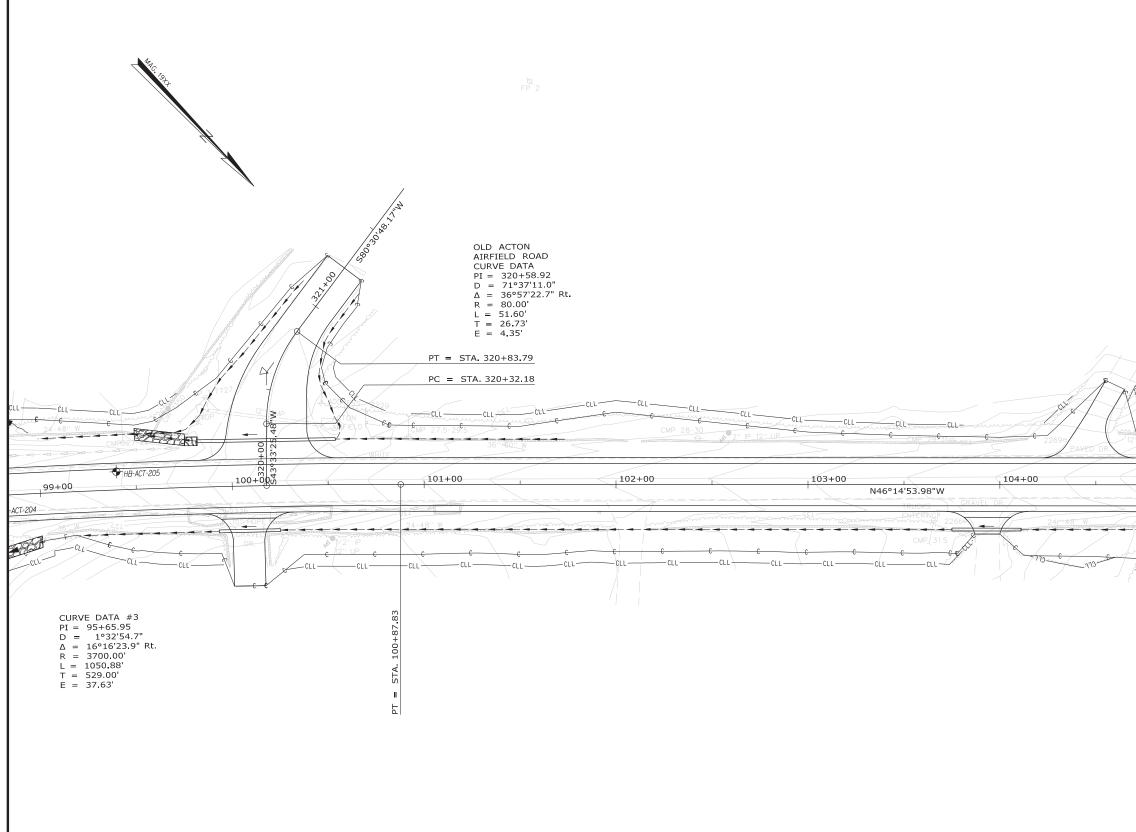
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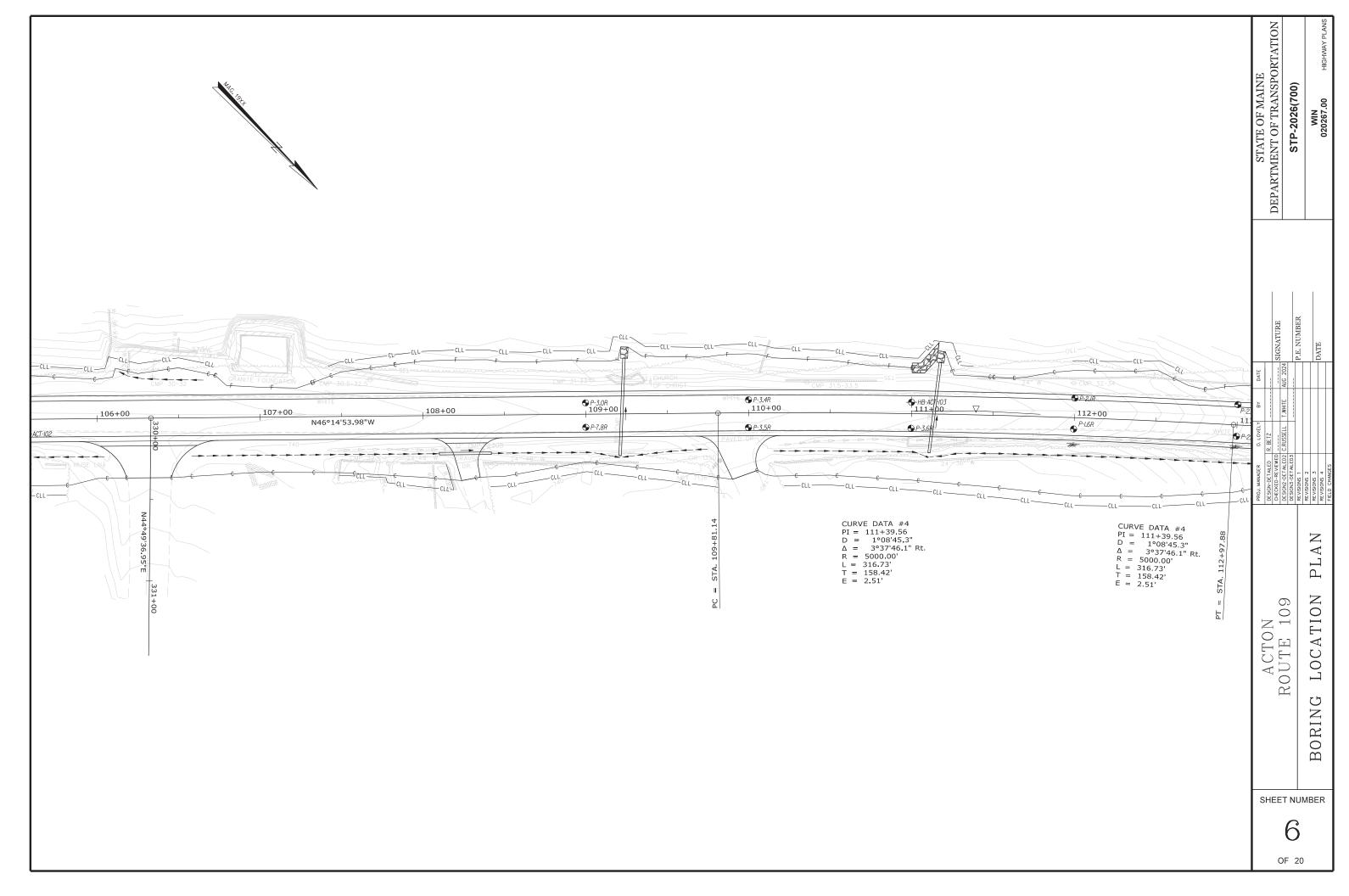
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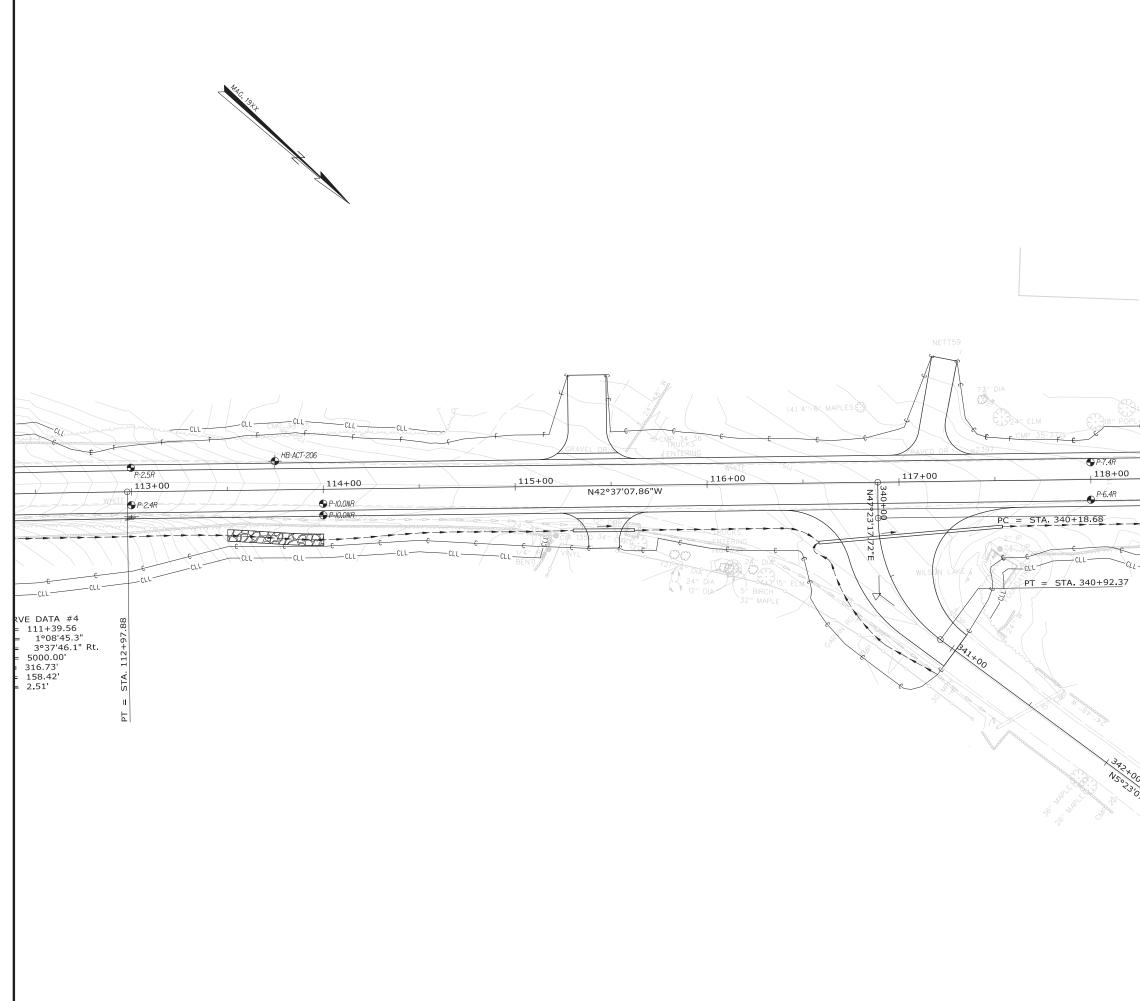


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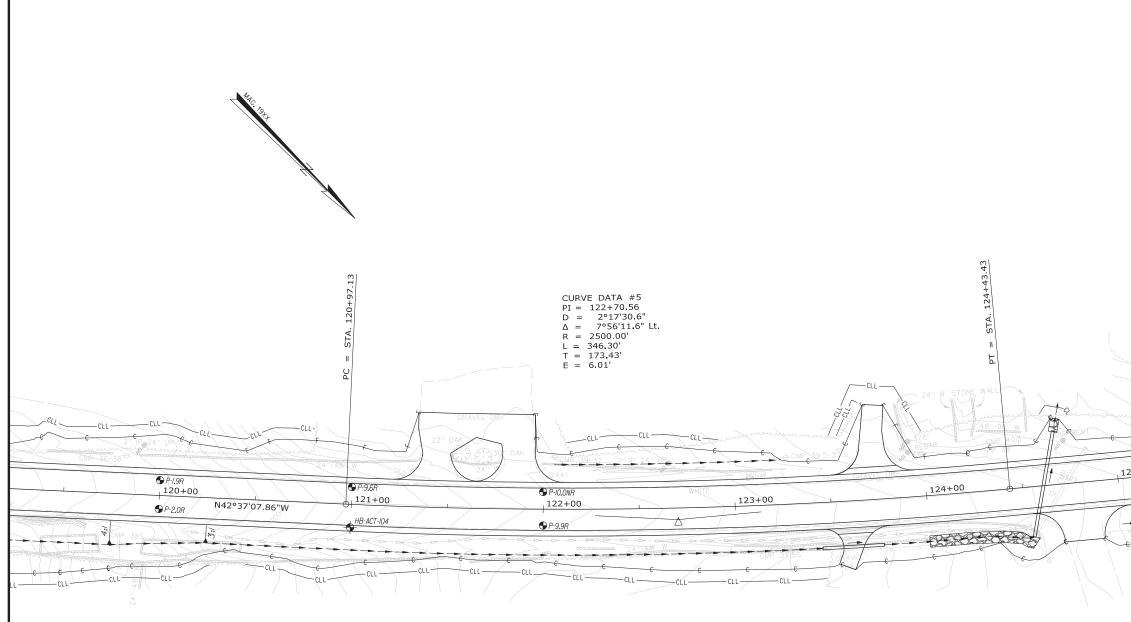
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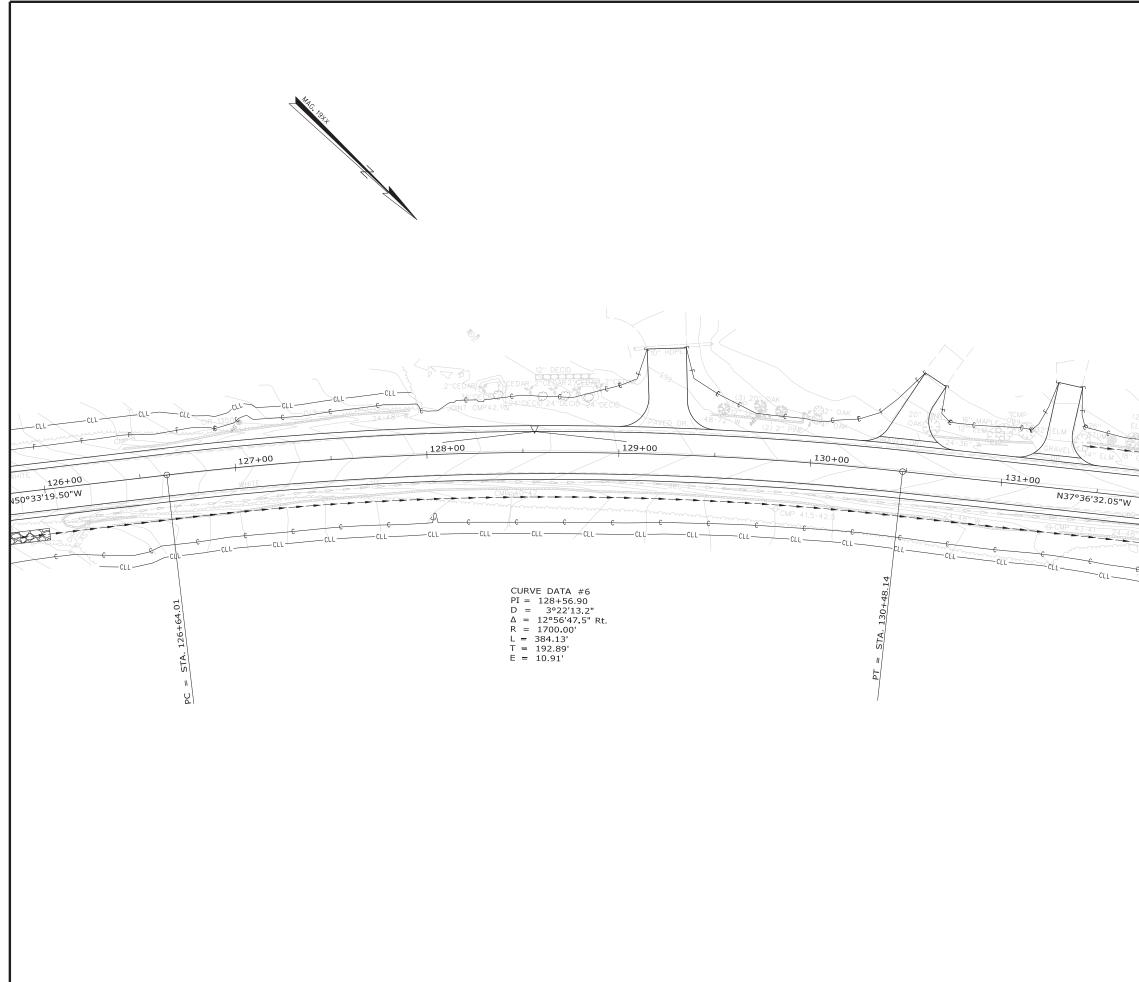


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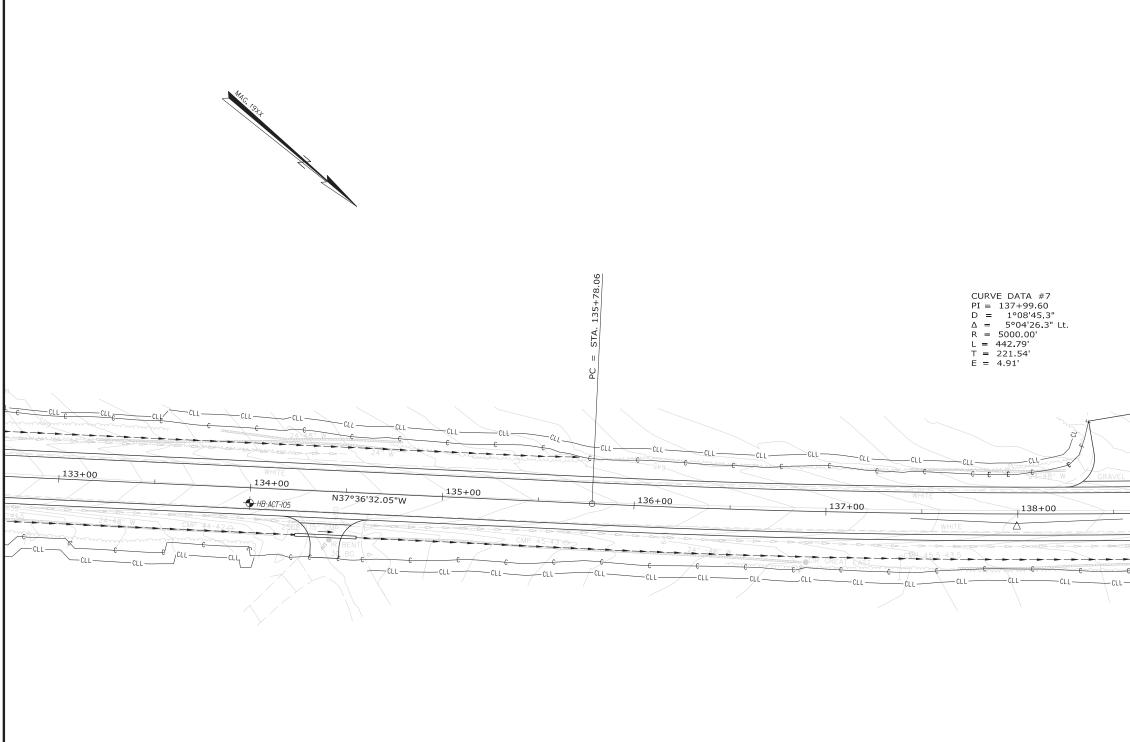
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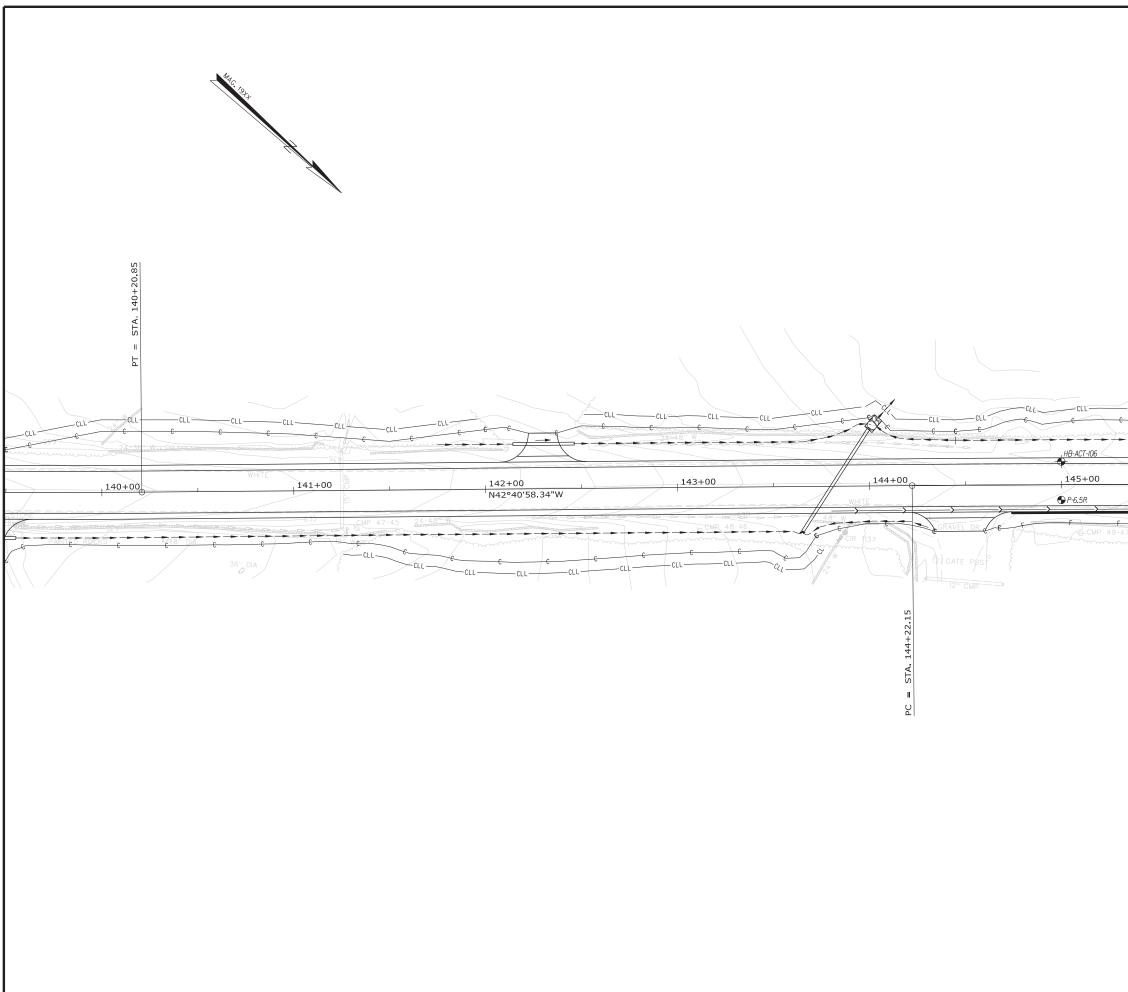
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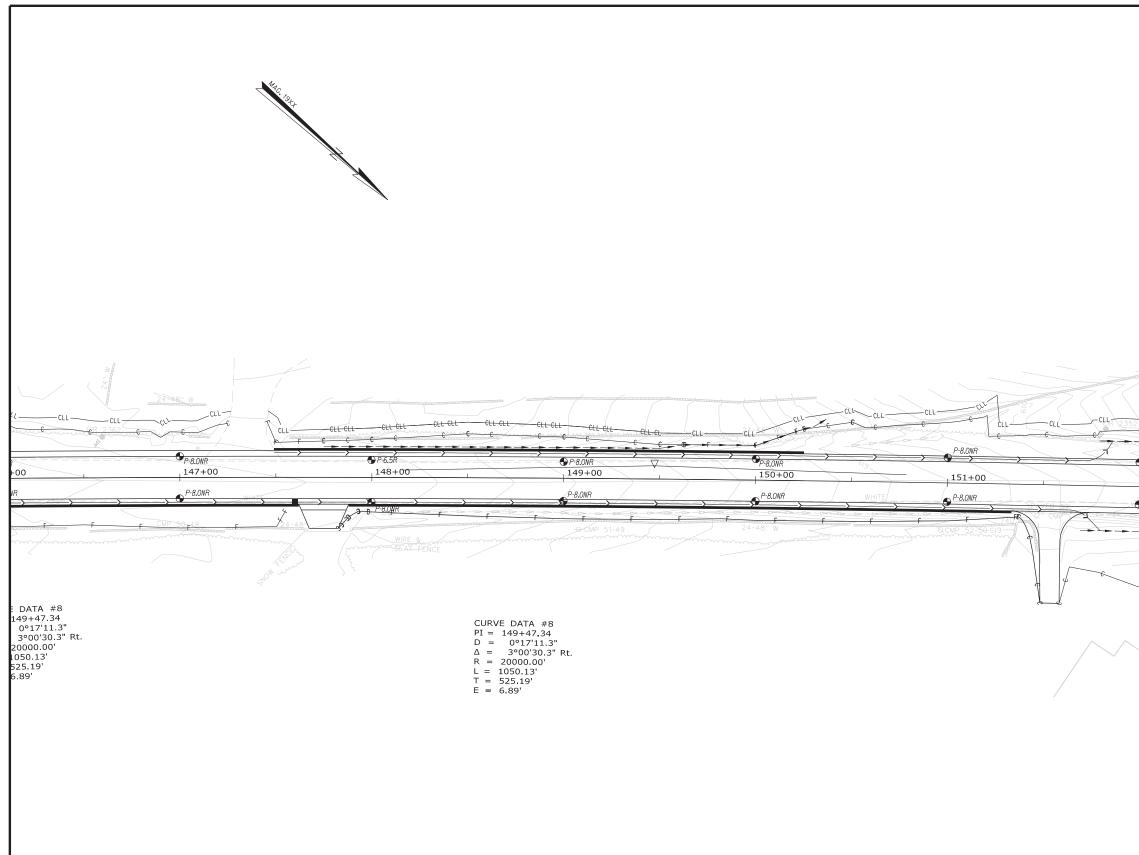
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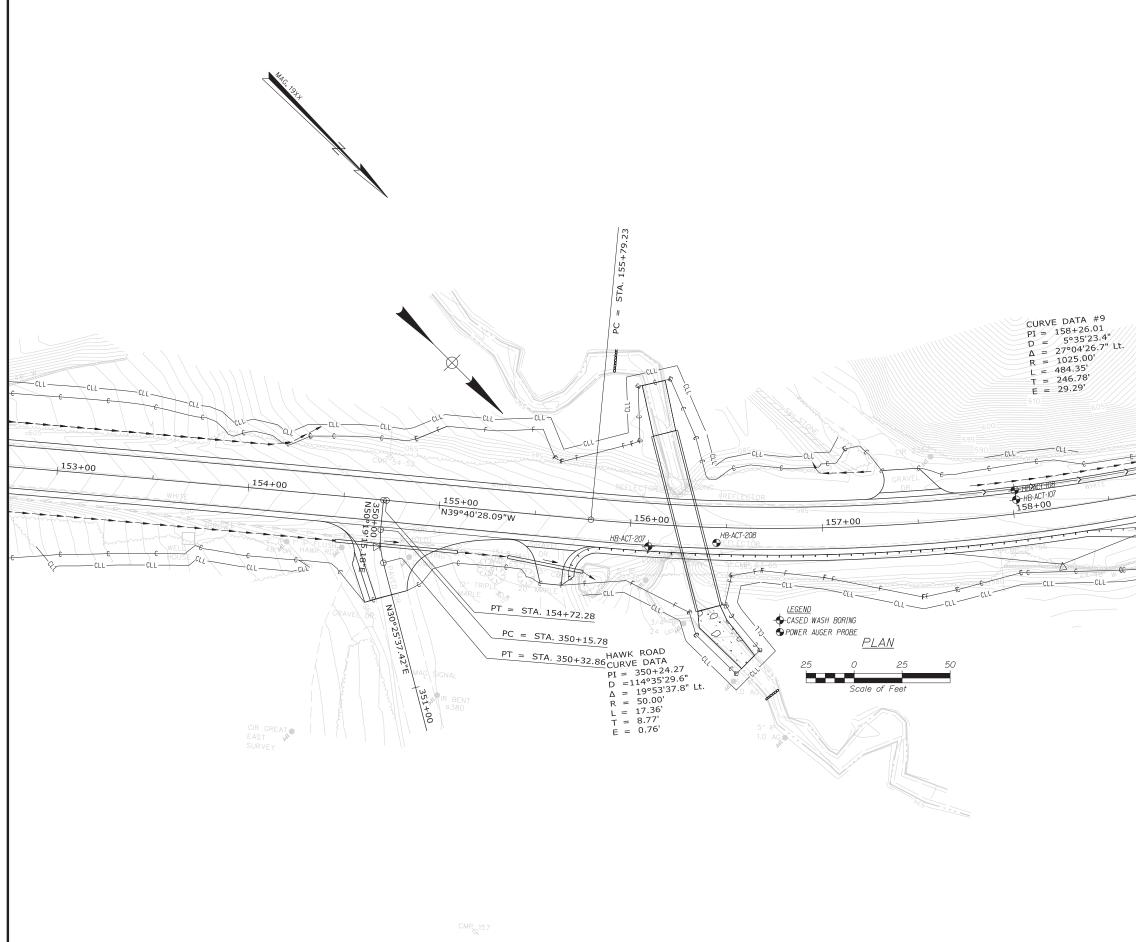
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CURVE DATA #8 P1 = 19947.34 D = 017/11.37 R. = 20000.000 R = 2050.130 T = 1050.137 T = 525.19 E = 6.89'		STATE OF MAINE DEPARTMENT OF TRANSPORTATION	STP-2026(700)	VIN 020267.00 HIGHWAY PLANS
CURVE DATA #8 PI = 149+47.34 D = 0°17'11.3" A = 3°00'30.3" Rt. R = 20000.00' L = 1050.13' T = 525.19' E = 6.89' BORTO PICA ROUTE 100 ROUTE 100	-CLL - CLL	D.LOVELY BY DATE R.BETZ	C.RUSSELL 1.WHIE AUG 2024	52
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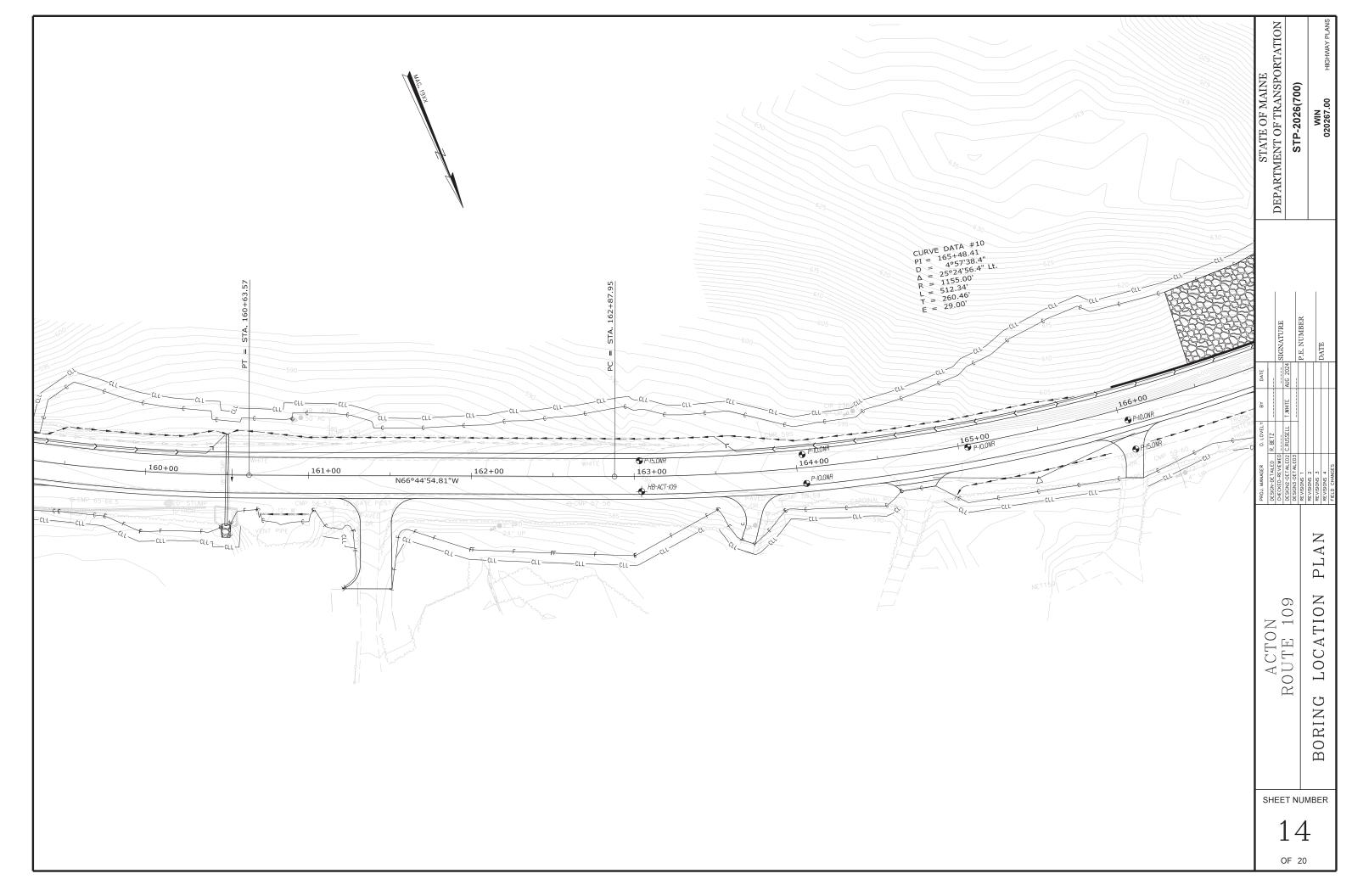
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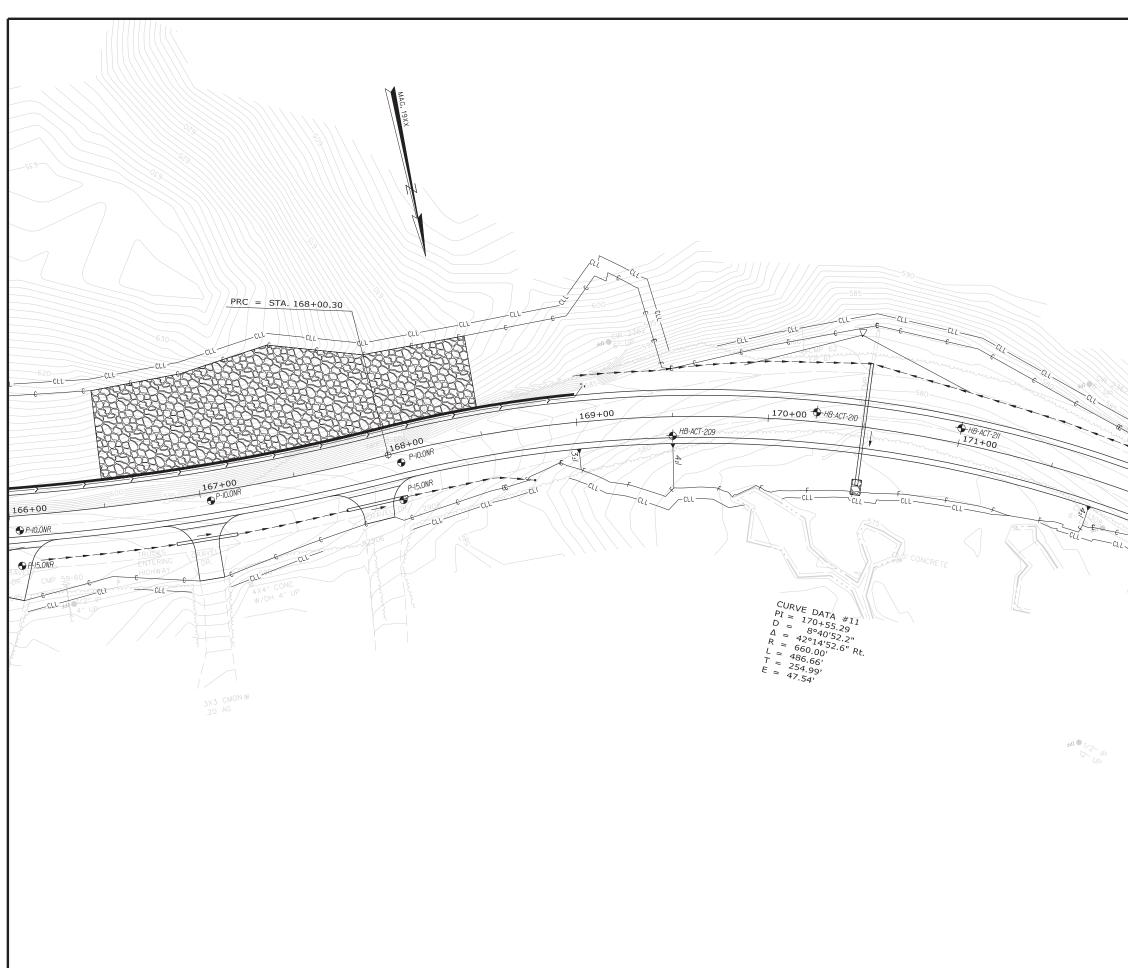
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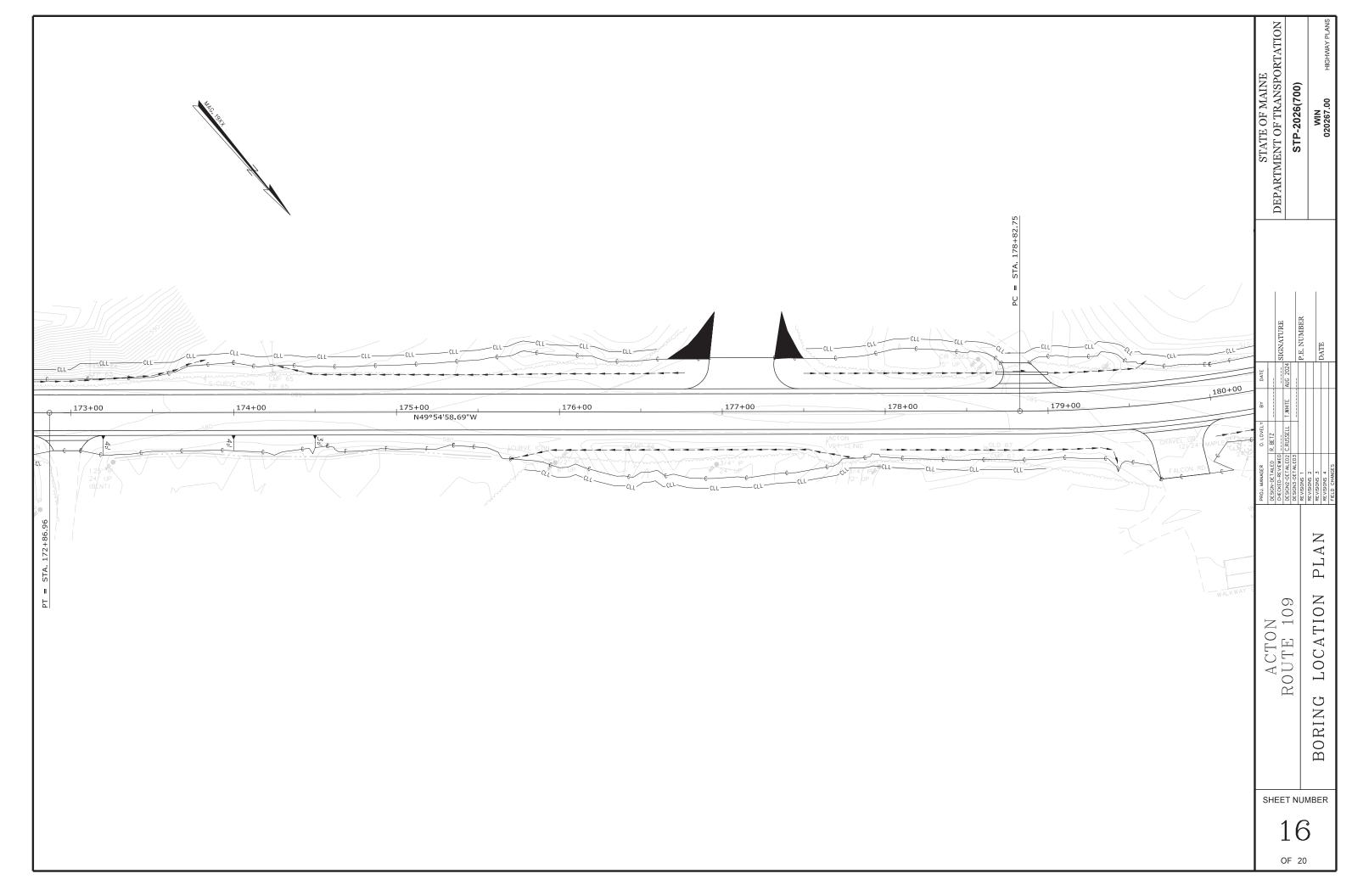
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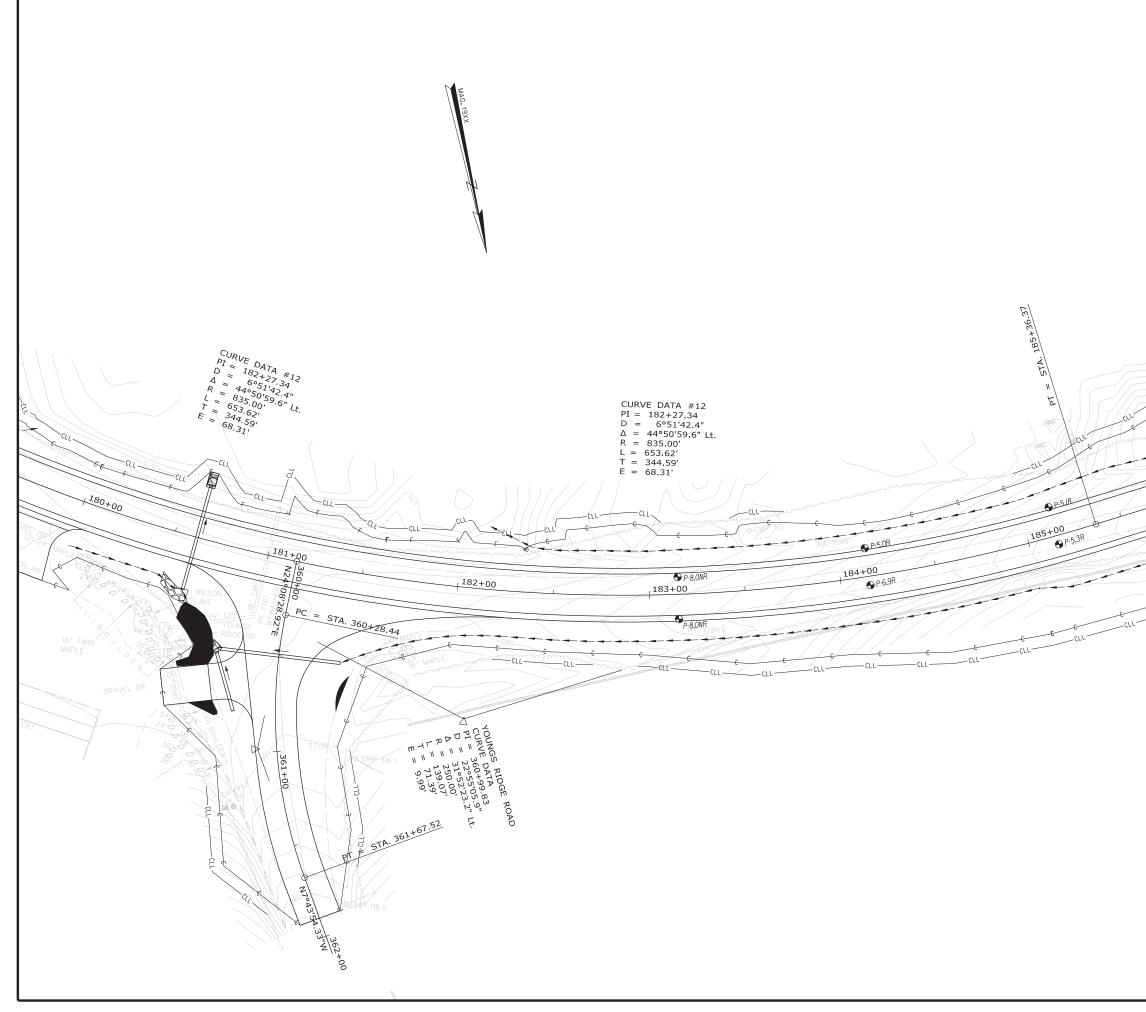
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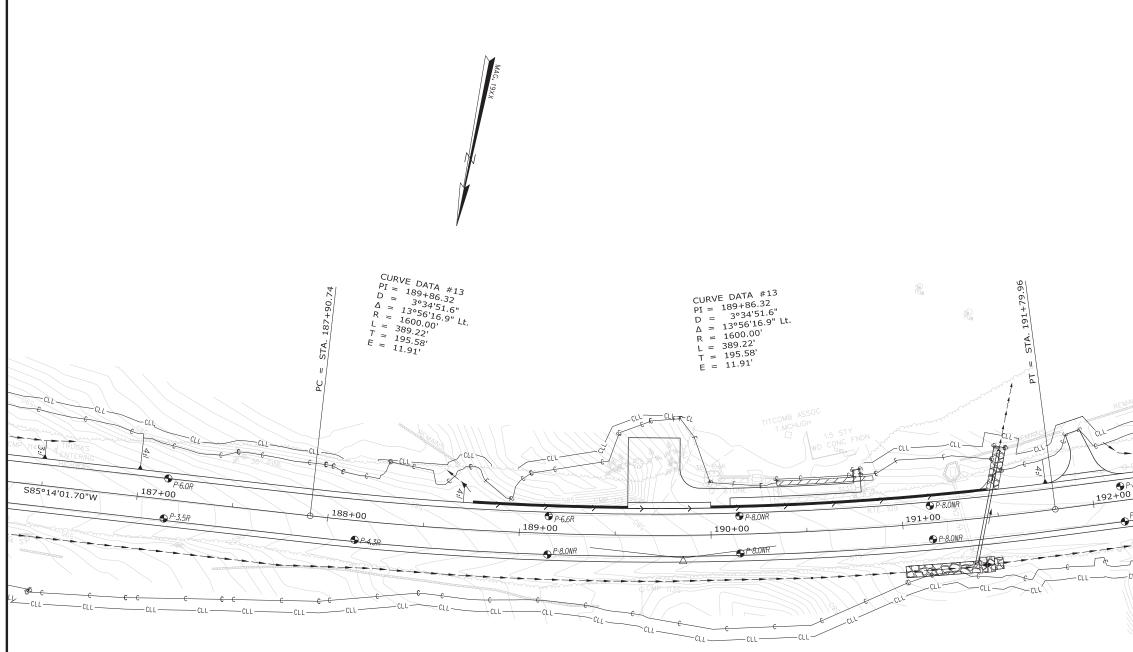
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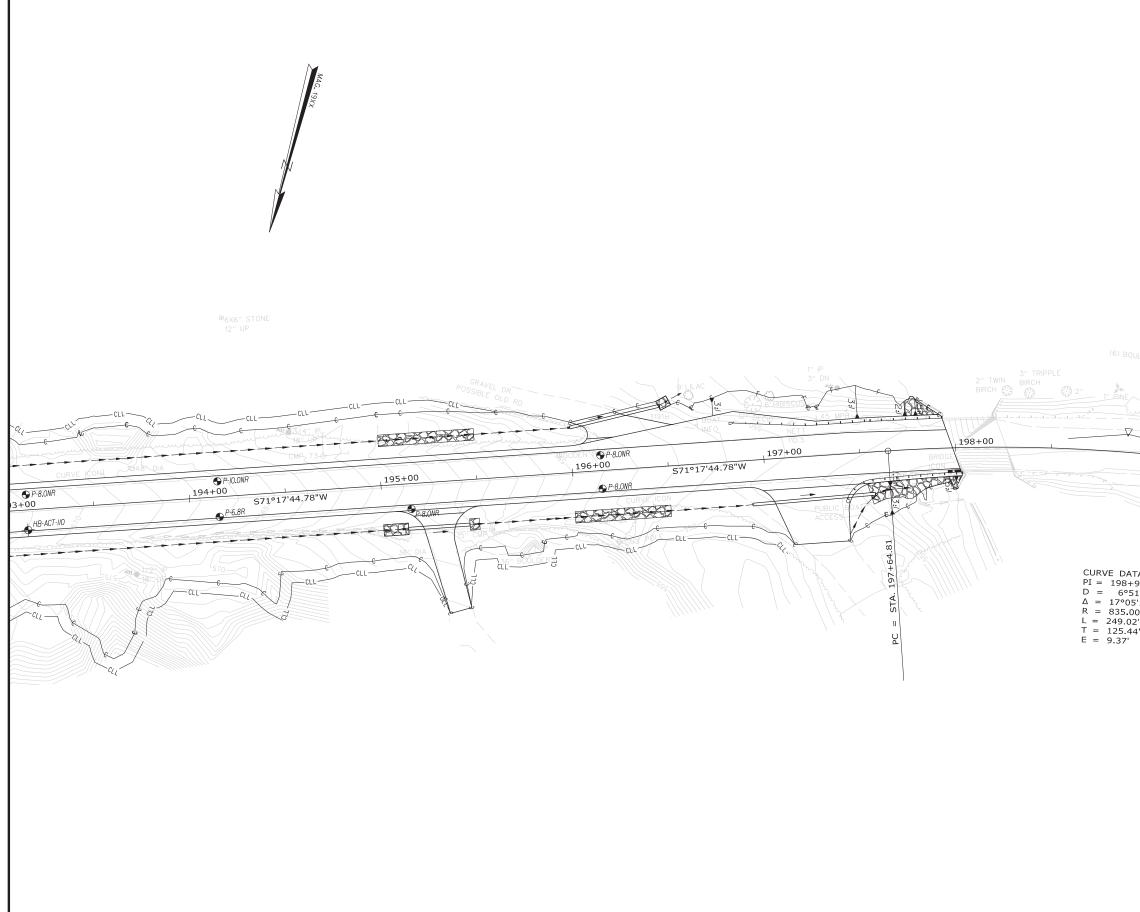


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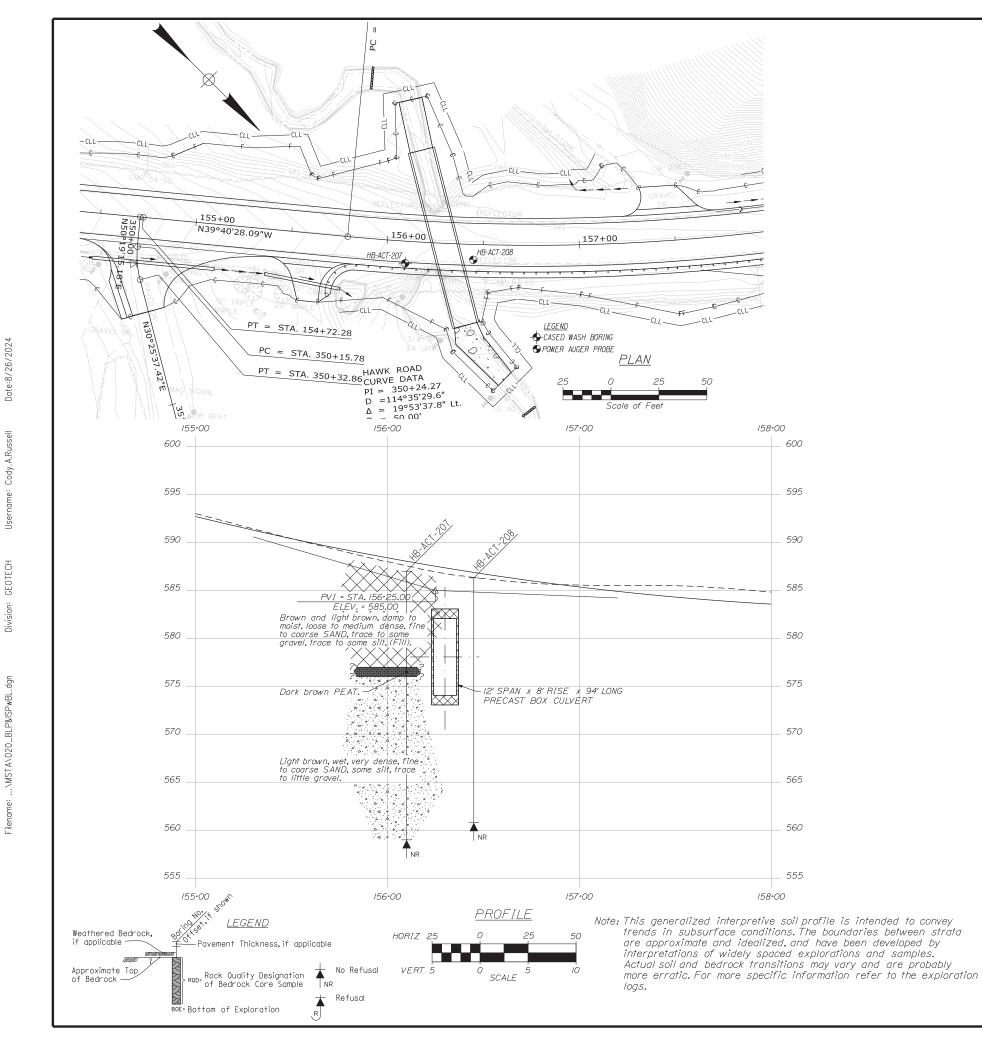
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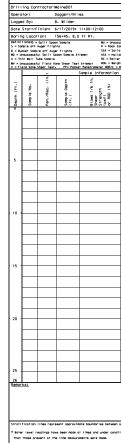


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	ta†i					portion of Route 109	Boring No.:	HB-A	CT-207
			Locotic			ine	WIN:		67.00
	Ele		(ft.)	587 NAV			Auger ID/OD: Sompler:	5" Solid St Standard Sp	
		Type: Iling	Method:		45C ed Wasl	n Boring	Hammer Wt./Fall Core Barrel:	1: 140#/30* N/A	
	Cos	ing ID mer Ty	/00:	N#-	3″		Noter Level®:	12.0 ft bgs	
	Core Song Id Stem J Iow Stem	Auger Auger		Su : Su : Qu :	Peck/Re (db) = Lc Unconfi	molded Fleid Vone Undralined S b Vone Undralined Shear Streng ned Compressive Strength (kaf	hear Strength (psf) 1 th (psf))	BC = Boter Content, p LL = Liquid Limit PL = Blockst	or Strength (psf ercent
	ar Cone pht of 1 Meight o loht of (4016. Ho of Rods	or Cosin son	N+ur Horm N60	eorrecte er Effic = SPT N- = (Home	Hydroulic L molded Fleid Vone Undrolned S b Vone Undrolned Smerr Streng ned Compressive Strength Kast d = Rem Fleid SPT N-volue lency foctor = Rig Specific J uncornected Cornected for Hon r Efficiency Foctor/6031Hf-un	nnual Calibration Va mer Efficiency corrected	iue PI = Plasticity II G = Orain Size Analys C = Consolidation Tes	ndex Is F
n	uncorrected	NGO	Cosing Bloes	levation ft.)	Log		scription and Rem		Laboratory Testing Results/ AASHTD and Unified Class
	ż 14	22	SSA	ű:		Brown, moist, medium gravel, trace silt, (dense. fine to c Fill).	oorse SAND, some	G#337347 1-1-D. SW-SN MC=4.8%
	3	5		•		Light brown, domp, io silt, trace gravel, (ose, fine to com Fill).	rse SAMD+ some	₩C=4.8% G#337348 A-2-4. SM ₩C=12.8%
			łV						
	8	12	2	577.0 576.0	BROOM	Dark brown PEAT.			8-1-b. SW-SA
	_		11 82			Brown, wet, medium de gravel, trace silt.	nse, fine to coo	rse SAND+ troce	Loss on Ignition (4.7%)
	47	73	86 107 9 26			Light brown, wet, ver silt, little grovel, Roller Coned cheod to	y dense. fine to 20.0 ft bgs.	coorse SAND, som	
	40	62	27 38 77 39 63			Light brown, wet, ver silt, trace gravel,	y dense. fine to	coarse SAND. som	e G#337301 A-2-4- SM ₩C=12.6%
			64 0100 0PEN HOLE			G100 blows for 0.8 ft Cobble from 23.8-24.2 Cobble from 24.6-24.9 Light brown, wet, ver Silt, trace gravel. Cobble from 25.7-26.0 Roller Coned cheod to	ft bgs.	coorse SAND, som	e G#337302 A-2-4. SM ₩C=9.2%
				er fluct	productions	moy occur due to conditions o	Poge 1 of Boring	1 No.: HB-ACT-:	207
r	tati			: A 2.	iuotions	portion of Route 109	ther	No.: HB-ACT-; : <u>HB-AC</u>	
r		vation	Project	: A 2	17 mile	portion of Route 109	Boring No.: WIN: Auger ID/00: Sampler:	No.: HB-ACT-: HB-AC 2021 5" Dio.	-208
r ·	Ele Dati	vation um: Type:	Project Locatio	: A 2, - m: Act 586 NAV CME	117 mile ron, Mo .3 088 450	portion of Route 109 Ine	Boring No.: WIN: Auger 10/00:	No.: HB-ACT-: HB-AC 2021 5" Dio.	-208
	Eler Date Rig Dr1	vation um: Type: IIIng	Project Locatic (ft.) Method:	586 NAV CME SOI	10012016 17 milie 10 milie 10 milie 10 milie 10 milie 10 milie 10 milie	portion of Route 109 ine	Boring No.: WIN: Auger (D/OD): Sampler: Harmer Wt./Fall Core Barrel: Mater Level*:	No.: HB-ACT-; HB-AC 2024 5" Dio. N/A 1: N/A N/A N/A N/A	7-208 57.00
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	Eler Dati Rig Dr1 Cas sasful Sten Au Cas t of 140 hight of	vation un: Type: Iiing ID hin Bai ger Hos Kos C S S O m	Project Locatic	5 A 2, 5 Set 1 5 Set 2 5 Set 1 5 Se	17 mile 17 mile 10 mile 10 Ster 10	portion of Route 109 ine h Auger In + Region of Person + Region of Pe	mer Boring No. 2 Boring No. 2 WIN: Auger 10/00: Someter I Hommer V./fail Roter (Internet) Someter I ster (Internet) Someter I ster (Internet) Someter I Someter I Some	NO. : HB-ACT : <u>HB-ACT</u> 2021 5° Dio. <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i> <i>N/A</i>	A Constraint of the second sec
	Electronic State S		Project Locatic	5866 NAV COLE COLE N/A	17 m1 m 17 m1 m 10 m	portion of Route 109 ine h Auger In + Region of Person + Region of Pe	mer Boring No. 2 Boring No. 2 WIN: Auger 10/00: Someter I Hommer V./fail Roter (Internet) Someter I ster (Internet) Someter I ster (Internet) Someter I Someter I Some	NO. 2 HB-ACT 	A Constraint of the second sec

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ACTON UTE 109 	ACTON ROUTE 109 BORING LOCATION PLAN & INTERPRETIVE SUBSURFACE PROFILE WITH BORING LOGS
	SHEET NUMBER

Appendix A

Boring Logs & Probe Summary Sheets

	UNIFIE	ED SOIL C	LASSIFIC	ATION SYSTEM		MODIFIED B	URMISTER S	YSTEM				
			GROUP									
COARSE- GRAINED	GRAVELS	CLEAN GRAVELS	SYMBOLS GW	TYPICAL NAMES Well-graded gravels, gravel- sand mixtures, little or no fines.	tra	ive Term_ ace tle	Port	ion of Total (%) 0 - 10 11 - 20				
SOILS	(more than half of coarse fraction is larger than No. 4 sieve size)	(little or no fines)	GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.	so adjective (e.g.		S DESCRIBIN	21 - 35 36 - 50				
	n half arger ve siz						Y/CONSISTEN	-				
al is larger size)	(more tha fraction is l sie	GRAVEL WITH FINES (Appreciable amount of fines)	GM GC	Silty gravels, gravel-sand-silt mixtures. Clayey gravels, gravel-sand-clay mixtures.	sieve): Includes (1) Clayey or Gravelly penetration resistan	<u>bils</u> (more than half of) clean gravels; (2) S sands. Density is ra nce (N-value). sity of	ilty or Clayey gravels ted according to star	; and (3) Silty,				
ateria ieve s		lilles)			Cohesion	less Soils		e (blows per foot)				
(more than half of material is larger than No. 200 sieve size)	SANDS	CLEAN SANDS	SW	Well-graded sands, Gravelly sands, little or no fines	Very Loo Medium Dei	ose 1 Dense		0 - 4 5 - 10 11 - 30 31 - 50				
(more tha than	if coarse than No. 4 ()	(little or no fines)	SP	Poorly-graded sands, Gravelly sand, little or no fines.	Very [Dense <u>s</u> (more than half of n	naterial is smaller tha	> 50				
	(more than half of coarse fraction is smaller than No. sieve size)	SANDS WITH FINES	SM	Silty sands, sand-silt mixtures	, , , , , , , , , , , , , , , , , , , ,) Gravelly, Sandy ording to undrained shear				
	(more fraction	(Appreciable amount of fines)	SC	Clayey sands, sand-clay mixtures.	Consistency of Cohesive soils	<u>SPT N-Value</u> (blows per foot)	<u>Undrained</u> <u>Shear</u> Strength (psf)	<u>Field</u> Guidelines				
			ML	Inorganic silts and very fine sands, rock flour, Silty or Clayey fine sands, or Clayey silts with	Very Soft Soft Medium Stiff	WOH, WOR, WOP, <2 2 - 4 5 - 8	0 - 250 250 - 500 500 - 1000	Fist easily penetrates Thumb easily penetrates Thumb penetrates with				
				slight plasticity.	Stiff	9 - 15	1000 - 2000	moderate effort				
FINE- GRAINED SOILS			ED S		plastici clays, S		Inorganic clays of low to medium plasticity, Gravelly clays, Sandy clays, Silty clays, lean clays.	Very Stiff Hard	16 - 30 >30	2000 - 4000 over 4000	Indented by thumb with great effort Indented by thumbnail Indented by thumbnail with difficulty	
	(inquid infint i			Organic silts and organic Silty clays of low plasticity.	RQD (%) = s	ignation (RQD): sum of the lengths	of intact pieces of length of core ad	core* > 4 inches				
ial is e size					-	*Minimu	im NQ rock core (
half of material is No. 200 sieve size)	SILTS AND CLAYS		SILTS AND CLAYS		SILTS AND CLAYS		MH	Inorganic silts, micaceous or diatomaceous fine Sandy or Silty soils, elastic silts.		Rock Quality Ba <u>Rock Quality</u> Very Poor	ased on RQD <u>RQD (%)</u> ≤25	
(more than h smaller than N			СН	Inorganic clays of high plasticity, fat clays.		Poor Fair Good	26 - 50 51 - 75 76 - 90					
sma sma	(liquid limit greater than 50) C			Organic clays of medium to high plasticity, organic silts.	Excellent 91 - 100 Desired Rock Observations (in this order, if applicable): Color (Munsell color chart)							
		ORGANIC	Pt	Peat and other highly organic soils.	Texture (aphanitic, fine-grained, etc.) Rock Type (granite, schist, sandstone, etc.) Hardness (very hard, hard, mod. hard, etc.) Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)							
			s order, if	applicable):	Geologic discont	tinuities/jointing:						
Color (Muns Moisture (dr Density/Cor Texture (find Name (Sand Gradation (N	sell color ch. ry, damp, m isistency (fr e, medium, d, Silty Sand well-graded, on-plastic, s ayering, frac all, moderat n (weak, mo rigin (till, ma	art) oist, wet) om above ri coarse, etc. d, Clay, etc. , poorly-grad slightly plast :tures, crack ely, loosely, oderate, or s	ght hand s) , including led, uniforr ic, moderat s, etc.) etc.,) trong)	ide) portions - trace, little, etc.) n, etc.) tely plastic, highly plastic)	 -dip (horiz - 0-5 deg., low angle - 5-35 deg., mod. dipping - 35-55 deg., steep - 55-85 deg., vertical - 85-90 deg.) -spacing (very close - <2 inch, close - 2-12 inch, mod. close - 1-3 feet, wide - 3-10 feet, very wide >10 feet) -tightness (tight, open, or healed) -infilling (grain size, color, etc.) Formation (Waterville, Ellsworth, Cape Elizabeth, etc.) RQD and correlation to rock quality (very poor, poor, etc.) ref: ASTM D6032 and FHWA NHI-16-072 GEC 5 - Geotechnical Site Characterization, Table 4-12 Recovery (inch/inch and percentage) Rock Core Rate (X.X ft - Y.Y ft (min:sec)) 							
Key	/ to Soil a	Geotechi	<i>nical</i> Sec Descrip	tions and Terms	Sample Conta WIN Bridge Name / Boring Numbe Sample Numb Sample Depth	r	Requirements: Blow Counts Sample Recov Date Personnel Initia	ery				

N	laine			of Transpo	rtatio	on	Pi	roject:	A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	Г-101
			oil/Rock Expl				Lo	ocatior	n: Act	on, Maine	WIN:	2020	67.00
Drillin	a Contr	actor:	MaineDOT		F	levatio	n (f	÷)	738	4	Auger ID/OD:	12" Dia.	
Opera	-		Giles/Daggett/	Giles		atum:	/I (I)		- /D88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder	Glies		ig Typ	<u>.</u>			E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		7/15/2015-7/1:	5/2015		rilling		hod		d Stem Auger	Core Barrel:	N/A	
	g Locat		94+50, 9.0 ft F			asing			N/A	-	Water Level*:	None Observed	4
	-	Spilt Spoon			successfu						Water Lever .	None Observed	
B = Bu MD = U U = Thi MV = U	cket Sampl Insuccessf n Wall Tub Insuccessf	e Sample ul Field Van	on Sample Atterr le Shear Test Att <u>PP= Pocket Pen</u>	ssA = 5 hpt HSA = H RC = Ro empt WOH =	Core Sar olid Stem J ollow Sten ller Cone Weight of 1 = Weight o on	Auger n Auger 140lb. Ha				$S_u = Peak/Remolded Field Vane Ur S_{U(ab)} = Lab Vane Undrained Shee q_p = Unconfined Compressive Stret N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strengt WC = Water Content, percent = 5$	ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size C = Consolidati	nit ndex Analysis
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Descr	iption and Remarks		Testing Results/ AASHTO and Unified Class.
0	B1		0.79 - 1.50			SS		737.6		9½" PAVEMENT			G#302216
	S1		1.50 - 5.00					736.9	Î	Brown, damp, fine to coarse Sandy (Fill).			A-1-a, GW- GM
										Light brown, moist, fine to coarse	SAND, some silt, little gr	avel.	WC=5.3% G#302217 A-2-4, SM WC=7.9%
- 5 -								733.4				5.0-	
- 10 -										Bottom of Exploration a NO REFUSAL	t 5.0 feet below ground s	urface.	
- 20 -													
25 Rema	urke:												
Stratific * Water	ation lines	ings have b							ns may d	ccur due to conditions other	Page 1 of 1 Boring No.	: HB-ACT-	101

N	laine		rtment			tion	Pi	roject:	A 2.17	7 mile portion of Route 109	Boring No.:	HB-AC	Г-102
			oil/Rock Expl				Lo	ocatior	n: Acto	on, Maine	WIN:	2026	57.00
Drillin	a Contr	actor	MaineDOT			Elevati		÷)	740.	0	Auger ID/OD:	5" Dia.	
Opera	-		Giles/Daggett/	Giles		Datum)		° /D88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder	Glies		Rig Ty				E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		7/15/2015-7/1:	5/2015		Drilling		hod		d Stem Auger	Core Barrel:	N/A N/A	
	g Locat		105+50, 9.0 ft			Casing			N/A	-	Water Level*:	None Observed	
Definiti	ons: D =	Spilt Spoon	-	ICt.	MU = Unsucce	ssful Thin W				pt WO1P = Weight of 1 Person		Tone Observed	
B = Buo MD = U U = Thi MV = U	cket Sampl Insuccessf n Wall Tub Insuccessf	e Sample ul Field Van	on Sample Attem e Shear Test Atte <u>PP= Pocket Pen</u>	npt empt netrometer	R = Rock Core SSA = Solid Si HSA = Hollow RC = Roller Co WOH = Weigh WOR/C = Wei	tem Auger Stem Auger one t of 140lb. H	amme			$\begin{array}{l} S_{u} = \text{Peak/Remolded Field Vane Ur}\\ S_{U(lab)} = Lab Vane Undrained Sheiq_p = Unconfined Compressive StreiN-value = Raw Field SPT N-valueT_v = Pocket Torvane Shear StrengtWC = Water Content, percent \cong = S$	ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size C = Consolidati	iit idex Analysis
				Sample Inf	ormation								Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strondth	or RQD (%)	N-value Casind	Blows	Elevation (ft.)	Graphic Log	Visual Descr	ption and Remarks		Testing Results/ AASHTO and Unified Class.
0	S2		0.75 - 2.40			s	SA	740.1		9" PAVEMENT			
								740.1 738.4		Brown, moist, fine to coarse SANI		2.4-	G#302218 A-1-b, SM WC=6.5%
										Bottom of Exploration a AUGER REFU	JSAL	urrace.	
- 5 -													
- 10 -													
- 15 -													
- 20 -													
25													
Rema			,			1					Done 4 - 64		
* Water	level read	ings have b	pproximate bour een made at time ne measurement	es and under					ns may c	ccur due to conditions other	Page 1 of 1 Boring No.	: HR-ACT-	102
unan t	nose prese	ni at the tin	ne measurement	is were made.								· 110-AC1-	102

N	Iaine			of Transport	ation	F	Project:	A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	Г-103
			oil/Rock Expl			L	ocatio	n: Act	on, Maine	WIN:	2026	57.00
Drilli	a Cont	actor:	MaineDOT		Elevat		ft)	737	2	Auger ID/OD:	12" Dia.	
Opera	-		Giles/Daggett/	Giles	Datum		11.)		2 VD88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder	Giles	Rig Ty				E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		7/15/2015-7/1:	5/2015	Drilling		thod:		d Stem Auger	Core Barrel:	N/A	
	g Locat		111+00, 7.0 ft		Casing			N/A		Water Level*:	None Observed	1
Definiti	ons: D =	Spilt Spoon		MU = Unsuce	cessful Thin V	·			wo1P = Weight of 1 Person			
B = Bu MD = U U = Th MV = U	cket Sampl Jnsuccessf in Wall Tub Jnsuccessf	e Sample ul Field Van	on Sample Atterr e Shear Test Att <u>PP= Pocket Pen</u>	empt RC = Roller (Stem Auger v Stem Auge Cone ht of 140lb. H	lamm			$\begin{array}{l} S_u = \text{Peak/Remolded Field Vane U}\\ S_{u(lab)} = \text{Lab Vane Undrained She}\\ q_p = Unconfined Compressive StreitN-value = Raw Field SPT N-value\\ T_v = \text{Pocket Torvane Shear Strengt}\\ WC = Water Content, percent \underline{z} = 5 \end{array}$	ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size C = Consolidati	nit ndex Analysis on Test
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Blows	Elevation (ft.)	Graphic Log	Visual Descr	iption and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0		<u>ц</u>				SA	- 736.2		12" PAVEMENT		1 0-	
	B2		1.00 - 2.10				735.1		Brown, moist, fine to coarse SAN		2.1-	G#302219 A-1-b, SW-SM WC=6.2%
	S3		2.10 - 5.00				-		Light brown, moist, Silty fine to co	oarse SAND, trace gravel.		G#302220 A-4, SM WC=20.1%
- 5 -							732.2					
- 10 -							-		Bottom of Exploration a NO REFUSAL	t 5.0 feet below ground s		
- 15 -							-					
							-					
- 20 -							-					
* Wate	cation lines	ings have b						ns may c	ccur due to conditions other	Page 1 of 1 Boring No.	: HB-ACT-	103

N	laine		rtment		sporta	tion		Project	: A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	Г-104
			oil/Rock Expl					Locatio	on: Act	on, Maine	WIN:	2020	57.00
Drilli	a Contr	actor	MaineDOT			Elov	ation	(#+)	697	2	Auger ID/OD:	12" Dia.	
Opera	-		Giles/Daggett/	Gilas		Datu		(11.)		5 VD88	Sampler:	Off Flights	
<u> </u>				Ulles							<u> </u>		
	ed By:		B. Wilder	5/2015			Гуре:	. 4le e el .		E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		7/15/2015-7/1				-	ethod:		d Stem Auger	Core Barrel:	N/A	,
	g Locat	Spilt Spoon	121+00, 12.0 f		U = Unsucce		n g ID / n Wall 1		N/A		Water Level*:	None Observed	1
S = Sa B = Bu MD = U U = Th MV = U	mple off Au cket Sampl Insuccessf in Wall Tub Insuccessfi	iger Flights e off Auger ul Split Spoo e Sample ul Field Van	Flights on Sample Attem e Shear Test Atte <u>PP= Pocket Pen</u>	R S npt H R empt W	= Rock Core SA = Solid St SA = Hollow S C = Roller Co /OH = Weight /OR/C = Weight	Sample em Auge Stem Aug ne : of 140lb	er ger o. Hamn	ner		$\begin{array}{l} S_{U} = \text{Peak/Remolded Field Vane U}\\ S_{U(lab)} = \text{Lab Vane Undrained She}\\ q_{p} = \text{Unconfined Compressive Stre}\\ N-value = \text{Raw Field SPT N-value}\\ T_{v} = \text{Pocket Torvane Shear Streng}\\ WC = Water Content, percent \cong \Xi \end{array}$	ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity II G = Grain Size C = Consolidati	nit ndex Analysis
		, Li	pth	(;									Testing
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(psf) or RQD (%	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Descr	iption and Remarks		Results/ AASHTO and Unified Class.
0	В3		0.00 - 1.10				SSA			Brown, damp, fine to coarse SAN	D, some gravel, trace silt, ((Fill).	G#302221
	S4		1.10 - 5.90					- 696. -	2	Light brown, moist, fine to coarse	SAND, little gravel, little	1.1-	A-1-b, SW-SM WC=3.0% G#302222 A-1-b, SM WC=7.2%
- 5 -							17	1					
								_ 691.· _	4	Bottom of Exploration a AUGER REF	t 5.9 feet below ground s USAL	urface.	
- 10 -								-					
- 15 -								-					
- 20 -								-					
Rema	arks:				I								
* Wate	level read	ings have b	pproximate bour een made at time ne measurement	es and under co						ccur due to conditions other	Page 1 of 1 Boring No.	: HB-ACT-	104

N	laine			of Transport	ation	F	Project	: A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	T-105
			oil/Rock Expl			l	ocatio	n: Act	on, Maine	WIN:	202	67.00
					1							
L	-		MaineDOT		Eleva		(ft.)	651		Auger ID/OD:	12" Dia.	
Opera			Giles/Daggett/	Giles	Datun				VD88	Sampler:	Off Flights	
	ed By:		B. Wilder	5/2015	Rig Ty		the di		E 45C	Hammer Wt./Fall:	N/A	
L	Start/Fir		7/15/2015-7/1 134+00, 8.0 ft		Drillin Casin	-		N/A	d Stem Auger	Core Barrel: Water Level*:	N/A None Observe	4
Definitio	ons: D =	Spilt Spoon		MU = Unsuc	cessful Thin				pt WO1P = Weight of 1 Person			
B = Buo MD = U U = Thi MV = U	cket Sampl Insuccessf in Wall Tub Insuccessf	e Sample ul Field Van	on Sample Atterr e Shear Test Att <u>PP= Pocket Pen</u>	RC = Roller empt WOH = Wei etrometer WOR/C = W	Stem Auger w Stem Auge	Hamm			$\begin{array}{l} S_u = \text{Peak/Remolded Field Vane Ur}\\ S_{U(ab)} = Lab Vane Undrained Sherq_p = Unconfined Compressive StretN-value = Raw Field SPT N-valueT_v = Pocket Torvane Shear StrengtWC = Water Content, percent \cong = S$	ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lir Pl = Plasticity I G = Grain Size C = Consolidat	nit ndex Analysis
				Sample Information								Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Descr	iption and Remarks		Testing Results/ AASHTO and Unified Class.
0	B4		0.92 - 2.40			SSA	(50)		11" PAVEMENT		0.0	
							650.		Brown, damp, Gravelly, fine to co (Fill).	arse SAND, trace silt, occ		G#302223 A-1-a, SW-SM WC=4.4%
	S5		2.40 - 5.00				649.	1	Light brown, moist, fine to coarse	SAND, some silt, trace gr	avel.	G#302224 A-2-4, SM WC=8.3%
- 5 -					\ \	\bigvee	646.:	_			5.0	
							040	5	Bottom of Exploration a NO REFUSAL	t 5.0 feet below ground s	urface.	
							1					
							-					
							4					
1.0												
- 10 -												
							1					
							-					
							-					
- 15 -							1					
							-					
							-					
							1					
- 20 -							-					
							1					
							-					
							-					
25												
<u>Rema</u>	arks:											
Stratific	ation lines	represent a	pproximate bour	ndaries between soil types;	transitions n	ay be	gradual.			Page 1 of 1		
									ccur due to conditions other			
			ne measurement							Boring No.	: HB-ACT	105

N	Aaine			of Transpo	rtatio	1	Projec	t: A	2.17	mile portion of Route 109	Boring No.:	HB-AC	Г-106
			oil/Rock Expl				Locati	on:	Acto	n, Maine	WIN:	2026	57.00
Drilli	na Cont	ractor:	MaineDOT		Fle	vation	(ft)		627.9)	Auger ID/OD:	12" Dia.	
Oper	-		Giles/Daggett/	Giles		um:	(10)			D88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder			Type:				2.45C	Hammer Wt./Fall:	N/A	
	Start/Fi		7/15/2015-7/1:	5/2015			lethod:			Stem Auger	Core Barrel:	N/A	
	ng Locat		145+00, 12.0 f			sing ID			N/A	Stelli Muger	Water Level*:	None Observed	1
Definiti	ions: D =	Spilt Spoon	,	MU = Ur	successful T	hin Wall							
B = Bu MD = U U = Th	icket Samp Jnsuccess in Wall Tul	be Sample	Flights on Sample Atterr e Shear Test Att	npt SSA = S HSA = H RC = Rc	Core Sampl olid Stem Aug ollow Stem A ller Cone Veight of 140	ger luger	mer			$\begin{array}{l} S_{u} = \text{Peak/Remolded Field Vane Un}\\ S_{u}(ab) = Lab Vane Undrained Sheiq_{p} = Unconfined Compressive StreiN-value = Raw Field SPT N-valueT_{v} = Pocket Torvane Shear Strengt$	ar Strength (psf) ngth (ksf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size	nit ndex
			PP= Pocket Pen	etrometer WOR/C	= Weight of R					WC = Water Content, percent ≅ = 5		C = Consolidati	
				Sample Informati	on				_				Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation	(III.)	Graphic Log	Visual Descr	iption and Remarks		Testing Results/ AASHTO and Unified Class.
0	В5		0.00 - 1.60			SSA				Brown, damp, fine to coarse SANI	D, some gravel, trace silt, ((Fill).	G#302225 A-1-b, SW-SM WC=3.5%
	S6		1.60 - 8.00				626	.3 🇙		Light brown, damp, fine to coarse	SAND, some silt, little gra	1.6- avel.	G#302151 A-2-4, SM WC=11.2%
							_						
- 5 -													
							/						
							619	.9		Bottom of Exploration a NO REFUSAL	t 8.0 feet below ground s	urface.	
- 10 -							-						
- 15 -							-						
							-						
- 20 -													
							_						
_ 25													
<u>Rem</u> a	<u>arks:</u>												
Stratifi	cation lines	s represent a	approximate bour	ndaries between soil ty	es; transition	is may b	e gradua	I.			Page 1 of 1		
			een made at time ne measurement		stated. Gro	undwate	er fluctuat	ions m	nay oc	ccur due to conditions other	Boring No.	: HB-ACT-	106

N	laine			of Transport	ation	Ī	Project	A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	Г-107
			oil/Rock Expl				Locatio	n: Act	on, Maine	WIN:	2026	57.00
Drillin	na Conti	ractor:	MaineDOT		Elevat	ion	(ft)	584	1	Auger ID/OD:	5" Dia.	
Opera	-		Giles/Daggett/	Giles	Datun		(10.)		VD88	Sampler:	Off Flights	
<u> </u>			B. Wilder	Glies	Rig Ty				E 45C	Hammer Wt./Fall:	N/A	
	ed By:			(/2015		-	. 4le e el .					
	Start/Fir		7/16/2015-7/1		Drillin	-			d Stem Auger	Core Barrel:	N/A	
	g Locat	Spilt Spoon	158+00, 6.0 ft	Rt. MU = Unsuce				N/A		Water Level*:	None Observed	1
S = Sar B = Buo MD = U U = Thi MV = U	mple off Au cket Sampl Insuccessf in Wall Tub Insuccessf	uger Flights le off Auger ul Split Spo be Sample ul Field Van	Flights on Sample Atten le Shear Test Att <u>PP= Pocket Per</u>	R = Rock Co SSA = Solid HSA = Hollov RC = Roller WOH = Weig ietrometer WOR/C = Wo	re Sample Stem Auger v Stem Auge Cone ht of 140lb.	er Hamn	ner		$ \begin{array}{l} \begin{array}{l} \text{S}_{\text{U}} = \text{Peak/Remoided Field Vane Un}\\ \text{S}_{\text{U}}(\text{lab}) = \text{Lab Vane Undrained She}\\ \text{q}_{\text{p}} = \text{Unconfined Compressive Street}\\ \text{N-value} = \text{Raw Field SPT N-value}\\ \text{T}_{\text{V}} = \text{Pocket Torvane Shear Strengt}\\ \text{WC} = \text{Water Content, percent} \equiv \text{S} \end{array} $	ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size C = Consolidati	nit ndex Analysis
				Sample Information			-		-			Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log		iption and Remarks		Testing Results/ AASHTO and Unified Class.
0	S7		0.83 - 1.30		:	SSA	583.3		10" PAVEMENT			
	S8		1.30 - 5.00				582.8		Brown, damp, fine to coarse Sandy	y GRAVEL, trace silt, (Fill)1.3-	G#302152 A-1-a, GW-
						+-	-		Light brown, moist, fine to coarse	SAND, some silt, trace gra		GM
							-					WC=4.45% G#302153 A-2-4, SM WC=20.3%
- 5 -						V.	579.1		Pottom of Evaluation a	t 5.0 feet below ground si		
- 10 -									NO REFUSAL			
25							_					
* Water	cation lines	lings have b						ns may	occur due to conditions other	Page 1 of 1 Boring No.	: HB-ACT-	107

N	laine			of Tran	sporta	tion	Р	roject:	A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	Г-108
			oil/Rock Expl				L	ocatio	n: Act	on, Maine	WIN:	2020	57.00
Drillir	a Cont	actor:	MaineDOT			Eleva	tion (ft)	583	6	Auger ID/OD:	5" Dia.	
Opera	-		Giles/Daggett/	/Giles		Datur				/D88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder	Glies		Rig T				E 45C	Hammer Wt./Fall:	N/A	
	Start/Fin		7/16/2015-7/1	6/2015		Drillir		thod:		d Stem Auger	Core Barrel:	N/A N/A	
	g Locat		158+00, 1.0 ft			Casin	-		N/A	-	Water Level*:	None Observed	1
Definitio	ons: D =	Spilt Spoon		М	U = Unsucce	ssful Thin	-			pt WO1P = Weight of 1 Person			·
B = Buo MD = U U = Thi MV = U	cket Samp Insuccessf in Wall Tub Insuccessf	e Sample ul Field Van	on Sample Atterr e Shear Test Att <u>PP= Pocket Pen</u>	Sanpt H R tempt W tetrometer W	= Rock Core SA = Solid Sta SA = Hollow S C = Roller Co OH = Weight	em Auger Stem Aug one t of 140lb.	er Hamm			$\begin{array}{l} S_{u} = \text{Peak/Remolded Field Vane Ur}\\ S_{u}(\text{[ab)} = \text{Lab Vane Undrained Shee}\\ q_{p} = \text{Unconfined Compressive Strer}\\ N-value = \text{Raw Field SPT N-value}\\ T_{v} = \text{Pocket Torvane Shear Strengt}\\ WC = Water Content, percent \equiv S \end{array}$	ar Strength (psf) ngth (ksf) n (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size C = Consolidati	nit ndex Analysis
				Sample Info									Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(pst) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Descri	ption and Remarks		Testing Results/ AASHTO and Unified Class.
0							SSA	583.2		Brown, damp, fine to coarse Sandy	GRAVEL, trace silt, (Fil		
								-		Light brown, moist, fine to coarse	SAND, some silt, trace gr.		
- 5 -								578.6		Bottom of Exploration a NO REFUSAL	t 5.0 feet below ground s	urface.	
- 10 -								-					
- 20 -								-					
								1					
								-					
25													
* Water	ation lines	ings have b	een made at tim						ns may d	ccur due to conditions other	Page 1 of 1 Boring No.	• HR ACT	108
than t	nose prese	ent at the tin	ne measurement	ts were made.								. пр-АСІ-	100

N	laine		rtment		isporta	tion	P	roject:	A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	T-109
			oil/Rock Expl				L	ocatio	n: Act	on, Maine	WIN:	2020	67.00
Drillin	a Cont	actor	MaineDOT			Eleva	tion (F4)	589.	4	Auger ID/OD:	12" Dia.	
Opera	-		Giles/Daggett/	Giles		Datur		n.)		4 VD88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder	Glies		Rig T				E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		7/15/2015-7/1:	5/2015		-		thod:		d Stem Auger	Core Barrel:	N/A	
	g Locat		163+00, 11.1 f			Casir	-		N/A		Water Level*:	None Observe	4
Definition S = Sant B = Buon MD = U U = Thi MV = U	ons: D = mple off Au cket Sampl Insuccessf in Wall Tub Insuccessf	Spilt Spoon Iger Flights le off Auger ul Split Spo le Sample ul Field Van	Sample	rpt F empt N	MU = Unsucce R = Rock Core SSA = Solid St HSA = Hollow S RC = Roller Co NOH = Weight NOR/C = Weight	ssful Thin Sample tem Auger Stem Aug one t of 140lb.	Wall Ti er Hamm	ube Samj er	ole Atten	pt WO1P = Weight of 1 Person $S_u = Peak/Remolded Field Vane UI S_{U(lab)} = Lab Vane Undrained Shet q_p = Unconfined Compressive Stret N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strengt WC = Water Content, percent z = 5$	ndrained Shear Strength (psf) ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lir PI = Plasticity I G = Grain Size C = Consolidat	it nit Analysis
				Sample Info									
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strendth	(psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Descr	iption and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	B6		0.75 - 5.00				SSA			9" PAVEMENT			
			0.75 - 5.00					588.7		Brown, damp, Gravelly, fine to co (Fill).	arse SAND, trace silt, occ		G#302154 A-1-a, SW-SM WC=3.0%
- 5 -								- 584.4	×××××	Bottom of Exploration a NO REFUSAL	t 5.0 feet below ground s	urface. 5.0	
- 10 -								-					
- 15 -													
- 20 -								-					
Rema Stratific * Water	ation lines	ings have b	pproximate bour een made at tim ne measurement	es and under c					ns may c	ccur due to conditions other	Page 1 of 1 Boring No.	: HB-ACT-	109

N	Iaine		rtment			atior	ı	Proj	ject:	A 2.1	mile portion of Route 109	Boring No.:	HB-AC	Г-110
			oil/Rock Expl					Loc	atior	n: Act	n, Maine	WIN:	2026	57.00
Drillin	a Contr	actor	MaineDOT			Elo	vatior	(ft)		571	0	Auger ID/OD:	12" Dia.	
Opera	-		Giles/Daggett/	Giles		_	um:	i (ii.)			7D88	Sampler:	Off Flights	
<u> </u>	ed By:		B. Wilder	Giles		_	Туре				E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		7/15/2015-7/1:	5/2015		-	ling N	_	od.		l Stem Auger	Core Barrel:	N/A	
	g Locat		193+00, 10.5 f			_	ing I			N/A	r Stelli / Yuger	Water Level*:	None Observed	1
Definiti	ons: D =	Spilt Spoon			MU = Unsuc	cessful Th	nin Wall							
B = Bu	cket Sampl	iger Flights e off Auger			R = Rock Co SSA = Solid	Stem Aug	ger				S _u = Peak/Remolded Field Vane Ur S _{u(lab)} = Lab Vane Undrained Shea		LL = Liquid Lim	t
	Insuccessf in Wall Tub		on Sample Atterr	npt	HSA = Hollo RC = Roller		uger				q _p `= Unconfined Compressive Strer N-value = Raw Field SPT N-value	ngth (ksf)	PL = Plastic Lin PI = Plasticity Ir	
MV = L V = Fie	Insuccessfi Id Vane Sh	ul Field Van lear Test.	e Shear Test Att PP= Pocket Pen	empt ietrometer	WOH = Weig WOR/C = W				1		T_V = Pocket Torvane Shear Strengt WC = Water Content, percent \cong = S		G = Grain Size C = Consolidati	
					formation				, 			•		
		in.)	oth		-					_				Laboratory Testing
ft.)	No).	Det	/6 in	(%)			9	Ξ	Lo ⁰	Visual Descr	iption and Remarks		Results/ AASHTO
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Jple	vs (ar	() ()	N-value	ing		/allc	Graphic Log				and
Dep	San	Pen	Sample Depth (ft.)	She	Strength (psf) or RQD (%)	N-N	Casing		(ft.)	Gra				Unified Class.
0	B7		0.42 - 5.00				SSA		570.6		5" PAVEMENT			G#302155
								-			Brown, damp, fine to coarse Sandy	GRAVEL, trace silt, (Fill		A-1-a, GW-
														GM WC=3.7%
								/						
- 5 -								5	566.0	××××			5.0-	
											Bottom of Exploration a NO REFUSAL	t 5.0 feet below ground su	rface.	
								_						
- 10 -														
								_						
								_						
- 15 -														
15														
								_						
- 20 -								-						
25														
Rema	arks:													
			pproximate bour									Page 1 of 1		
			een made at time ne measurement			ited. Gro	undwat	er fluct	tuatior	ns may c	ccur due to conditions other	Boring No.:	HB-ACT-	110 I
a.diri			acaromoni											

I	Main	e Depa	artment	of Transport	ation		Projec	t: A	2.17	mile	oortion of Route 109	Boring No.:	HB-A	CT-201
		_	Soil/Rock Exp				Locati	on:	Acto	n, Ma	ne			-
		<u>[</u>	JS CUSTOM	<u>ARY UNITS</u>								WIN:	2026	57.00
Drill	er:		MaineDOT		Eleva	ation	(ft.)	2	726.9)		Auger ID/OD:	5" Solid Stem	
Ope	rator:		Daggett/Niles		Datu	m:		l	NAV	D88		Sampler:	Standard Split	Spoon
Log	ged By:		B. Wilder		Rig T	уре	:	(CME	45C		Hammer Wt./Fall:	140#/30"	
Date	Start/Fi	inish:	6/12/2019;06	:30-08:15		-	lethod:	(Case	d Was	n Boring	Core Barrel:	N/A	
	ng Loca		96+50, 7.5 ft	Lt.	Casir	-		1	NW-	3"		Water Level*:	1.9 ft bgs.	
Ham Defini		iciency F	actor: 0.928	R = Rock C			Туре:			tic⊠ Peak/R	Hydraulic emolded Field Vane Undrained She	Rope & Cathead	Pocket Torvane She	ar Strength (psf)
D = S MD = U = TI MU = V = Fi	plit Spoon S Unsuccess hin Wall Tu Unsuccess ield Vane S	sful Split Spo Ibe Sample sful Thin Wa Shear Test,	oon Sample Atter Il Tube Sample A PP = Pocket Pe ne Shear Test At	SSA = Solid mpt HSA = Holly RC = Roller Attempt WOH = We enetrometer WOR/C = V	d Stem Aug ow Stem Au Cone ight of 140I Veight of Re	ger uger Ib. Ha ods o	r Casing	2 0 1 1	Su(lal 1p = l N-unc Hamn N60 =	o) = Lal Jnconfi correcte ner Effi SPT N	Vane Undrained Shear Strength (hed Compressive Strength (ksf) d = Raw Field SPT N-value siency Factor = Rig Specific Annual -uncorrected Corrected for Hamme her Efficiency Factor/60%)*N-uncor	psf) WC LL = PL = PL = PC Calibration Value PI = er Efficiency G =	Water Content, peri- Liquid Limit Plastic Limit Plastic Limit Plasticity Index Grain Size Analysis <u>Consolidation Test</u>	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation	(ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA				11" HMA.			
	1D	24/12	1.00 - 3.00	12/13/9/8	22	34		_	26.0		Brown, moist, medium den old pavement, (Fill).	se, Silty fine to coarse Sz	-	
								72	2.9	ĬĬĬ			4.0-	
- 5 -	2D	9.6/9.6	5.00 - 5.80	13/50(3.6")			a100	_			^a 100 blows for 0.8 ft. Brown, moist, dense, Silty	fine to coarse SAND, tra	ce gravel.	G#337341 A-4, SM
							OPEN HOLE				Cobble from 5.8-6.3 ft bgs. Roller Coned ahead to 10.0			WC=11.1%
								-			Cobble from 6.9-7.5 ft bgs.	it ogs.		
								_						
- 10 -	3D	12/12	10.00 - 11.00	16/66				71	6.9		Brown, wet, very dense, Gr occasional cobble.	ravelly fine to coarse SAl	ND, little silt,	
								_			Roller Coned ahead to 13.0 Cobble from 11.0-11.4 ft b	ft bgs. gs.		
							$\downarrow V$	- 71	3.9		Bottom of Exploratio	n at 13.0 feet below grou	13.0-	
								1			NO REFUSAL			
- 15 -														
								_						
								-						
								-						
- 20 -								-						
								_						
								1						
								-						
25 Rem	arks:													
Stratif	ication line	s represent	approximate bou	ndaries between soil types;	transitions i	may b	e gradua	I.				Page 1 of 1		
			been made at tim me measuremen	nes and under conditions sta ts were made.	ted. Groun	ndwate	er fluctuat	ions m	ay oo	cur du	to conditions other	Boring No	HB-ACT-	201

[]	Main	e Dep	artment	of Transport	ation	Р	roject:	A 2.1	7 mile j	portion of Route 109	Boring No.:	HB-A	CT-202
			Soil/Rock Exp	-		L	ocatio	n: Act	on, Ma	ine			
		<u> </u>	US CUSTOM	<u>ARY UNITS</u>							WIN:	2020	67.00
Drill	er:		MaineDOT		Elevat	ion (ft.)	722	9		Auger ID/OD:	5" Dia.	
Ope	rator:		Daggett/Niles		Datum	:		NA	/D88		Sampler:	Standard Split	Spoon
Log	ged By:		B. Wilder		Rig Ty	pe:		CM	E 45C		Hammer Wt./Fall:	140#/30"	
Date	e Start/Fi	nish:	6/12/2019; 13	:30-14:45	Drilling	-		Soli	d Stem	Auger	Core Barrel:	N/A	
Bori	ng Loca	tion:	97+25, 12.5 f	t Rt.	Casing			N/A			Water Level*:	None Observe	d
Ham Defini		ciency F	actor: 0.928	R = Rock	Hamm Core Sample	er Ty	/pe:	Autom		Hydraulic emolded Field Vane Undrained She	Rope & Cathead	Pocket Torvane She	ar Strength (psf)
D = S MD = U = T MU = V = F	plit Spoon Unsuccess hin Wall Tu Unsuccess ield Vane S	sful Split Spo be Sample sful Thin Wa Shear Test,	oon Sample Atter Il Tube Sample A PP = Pocket Pe <u>ne Shear Test At</u>	SSA = Sol mpt HSA = Hol RC = Rolle kttempt WOH = W enetrometer WOR/C = tempt WO1P = V	d Stem Auger low Stem Aug	ler Hamr Is or C	asing	S _{u(la} q _p = N-ur Ham N ₆₀	_{ib)} = Lal Unconfi correcte mer Effi = SPT N	Vane Undrained Shear Strength (ned Compressive Strength (ksf) d = Raw Field SPT N-value ciency Factor = Rig Specific Annua I-uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-unco	psf) WC LL = PL = I Calibration Value PI = er Efficiency G =	= Water Content, per Liquid Limit : Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	09v1	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/14	0.00 - 2.00	4/5/5/7		5	SSA			Brown, moist, medium den	se, fine to coarse SAND,	some gravel, trace	
								718.9		silt, (Fill).		4.0	A-1-b, SW-SM WC=7.1%
- 5 -	2D	24/20	5.00 - 7.00	4/18/14/20	32 4	9				Brown, moist, dense, fine t	o coarse SAND, little gra	vel, little silt.	
		24/20	5.00 - 7.00	4/10/14/20	J2 7								
								1		Cobble from 7.2-7.6 ft bgs.			
										Cobble from 8.1-8.5 ft bgs.			
							+/	713.9				9.0	
- 10 -	3D	24/18	10.00 - 12.00	19/30/21/36	51 7	'9				Brown, moist, very dense,	Gravelly fine to coarse SA	AND, little silt.	
								710.9		-			
						_				Bottom of Exploration NO REFUSAL	n at 12.0 feet below grou	ind surface.	
- 15 -													
15						_							
	<u> </u>												
- 20 -													
	L												
						_							
25													
Rem	arks:				I								·
Stratit	fication line	s represent	approximate bou	ndaries between soil types;	transitions ma	ay be	gradual.				Page 1 of 1		
			been made at tim me measuremen	nes and under conditions sta ts were made.	ated. Ground	water 1	fluctuatio	ns may o	ccur du	e to conditions other	Boring No	.: HB-ACT-	202

	Main	e Dep	artment	of Transport	ation		Project:	A 2.1	7 mil	e portion of Route 109	Boring No.:	HB-A	CT-203
			Soil/Rock Exp	-			Locatio	n: Act	on, N	aine		202	(7.00
		<u>!</u>	US CUSTOM	ARY UNITS							WIN:	2020	67.00
Drill	er:		MaineDOT		Eleva	tion	(ft.)	721	.4		Auger ID/OD:	5" Dia.	
Ope	rator:		Daggett/Niles		Datun	n:		NA	VD8		Sampler:	Standard Split	Spoon
	ged By:		B. Wilder		Rig Ty	ype			E 45		Hammer Wt./Fall:	140#/30"	
⊢	e Start/Fi		6/12/2019; 08		_	-	lethod:			n Auger	Core Barrel:	N/A	
L	ng Loca		98+00, 12.0 ft	Lt.	Casin	-		N/A			Water Level*:	9.0 ft bgs.	
Ham Defini		ciency F	actor: 0.928	R = Rock C	Hamn ore Sample		Туре:	Auton S =		I Hydraulic □ Remolded Field Vane Undrained She	Rope & Cathead \Box	Pocket Torvane She	ar Strength (psf)
D = S MD = U = T MU = V = Fi	plit Spoon Unsuccess hin Wall Tu Unsuccess ield Vane S	sful Split Spo be Sample sful Thin Wa Shear Test,	con Sample Atten Il Tube Sample A PP = Pocket Pe <u>ne Shear Test Att</u>	SSA = Solie npt HSA = Holl RC = Rolle ttempt WOH = We netrometer WOR/C = W	d Stem Auge ow Stem Au	er ger o. Ha ids oi	r Casing	S _{u(I} q _p = N-u Han N ₆₀	ab) = : Unco ncorre nmer E = SP	ab Vane Undrained Shear Strength (fifned Compressive Strength (ksf) ted = Raw Field SPT N-value ficiency Factor = Rig Specific Annual N-uncorrected Corrected for Hamme <u>mmer Efficiency Factor/60%)*N-uncor</u>	psf) WC LL = PL = Calibration Value PI = er Efficiency G =	= Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation (ft.)	Cranhic Lod	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/18	0.00 - 2.00	2/4/5/7	9	14	SSA		\otimes	Brown, damp, medium den silt, occasional cobble, (Fill		some gravel, trace	
- 5 -	2D	24/20	5.00 - 7.00	5/5/7/9	12	19		716.4		Brown, moist, medium den		5.0- some silt, trace	
								712.4	4	gravel.		9.0-	
- 10 -	3D	24/18	10.00 - 12.00	1/2/2/4	4	6		709.4	1	Grey, wet, medium stiff, fir	- · ·		G#337343 A-4, CL WC=41.4%
										Bottom of Exploration NO REFUSAL	1 at 12.0 feet below grou	ind surface.	
- 15 -													
- 20 -													
25													
Rem	<u>narks:</u>												
Stratif	fication line	s represent	approximate bou	ndaries between soil types;	transitions n	nay b	e gradual.				Page 1 of 1		
			been made at tim me measuremen	es and under conditions sta ts were made.	ted. Ground	dwate	er fluctuatio	ns may	occur	ue to conditions other	Boring No	.: HB-ACT-	-203

Ι	Main	e Depa	artment	of Transport	ation		Project:	A 2.1	7 mile	portion of Route 109	Boring No.:	HB-A	CT-204
		_	Soil/Rock Exp				Locatio	n: Act	on, M	ine			
		<u>[</u>	JS CUSTOM	<u>ARY UNITS</u>							WIN:	2020	67.00
Drill	er:		MaineDOT		Eleva	tion	(ft.)	720	.8		Auger ID/OD:	5" Solid Stem	
Ope	rator:		Daggett/Niles		Datur	n:	. ,	NA	VD88		Sampler:	Standard Split	Spoon
Log	ged By:		B. Wilder		Rig T	ype	:	CM	E 450		Hammer Wt./Fall:	140#/30"	
Date	Start/Fi	inish:	6/12/2019; 10	:30-12:00	Drillin	ng N	lethod:	Cas	ed Wa	sh Boring	Core Barrel:	NQ-2"	
Bori	ng Loca	tion:	98+75, 12.0 ft	t Rt.	Casir	ng IE)/OD:	NW	-3"		Water Level*:	1.9 ft bgs.	
		iciency Fa	actor: 0.928		Hamr		Туре:	Autom			Rope & Cathead □		
MD = U = TI MU = V = Fi	plit Spoon Unsuccess hin Wall Tu Unsuccess eld Vane S	sful Split Spo Ibe Sample sful Thin Wa Shear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	RC = Roller WOH = We enetrometer WOR/C = V	Stem Aug w Stem Au Cone ght of 140I /eight of Ro	er uger b. Ha ods o	r Casing	S _{u(li} q _p = N-ur Harr N ₆₀	ab) = L Uncor Icorrec mer E = SPT	temolded Field Vane Undrained She b Vane Undrained Shear Strength (ined Compressive Strength (ksf) ed = Raw Field SPT N-value ciciency Factor = Rig Specific Annual N-uncorrected Corrected for Hamme mer Efficiency Factor/60%)*N-uncor	wc LL = PL = Calibration Value PI = r Efficiency G =	Pocket Torvane She = Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/15	0.00 - 2.00	3/5/7/7	12	19	SSA			Brown, moist, medium den silt, (Fill).	se, fine to coarse SAND,	some gravel, trace	
								717.3				3.5-	
- 5 -							$\downarrow V$	-	5	^a 20 blows for 0.5 ft.			
	2D	3.6/3.6	5.00 - 5.30	50(3.6")			a20 OPEN		2	Very dense, COBBLES.			
							HOLE			Roller Coned ahead to 8.0 f	t bgs.		
									•				
								712.8					
	R1	60/60	8.00 - 13.00	RQD = 68%			NQ-2			Top of Bedrock at Elev. 71: R1: Bedrock: Interbedded F		E and/or	
								1		DOLOSTONE [Rindgemer		E and/or	
- 10 -										Rock Quality = Fair R1: Core Times (min:sec)			
										8.0-9.0 ft (2:34)			
										9.0-10.0 ft (1:59) 10.0-11.0 ft (2:03)			
							1.7	1		11.0-12.0 ft (2:18)			
							$+ \vee$	707.8		12.0-13.0 ft (2:16) 100% Recovery			
										Bottom of Exploration	at 13.0 feet below grou	13.0-	
- 15 -													
								1					
- 20 -													
								1					
								1					
25 Rem	arks:												
Stratif	ication line	s represent :	approximate hou	ndaries between soil types; t	ransitions r	nav ^k	e gradual				Page 1 of 1		
				ies and under conditions stat				ns may		e to conditions other			
			me measuremen		Su. Groun	awall			ui U		Boring No	.: HB-ACT-	204

	Main	e Depa	artment	of Transport	ation		Project	A 2.17	mile p	portion of Route 109	Boring No.:	HB-A	CT-205
			Soil/Rock Exp				Locatio	n: Acto	n, Mai	ne			
		<u>l</u>	JS CUSTOM	ARY UNITS					,		WIN:	2026	57.00
Drill	er:		MaineDOT		Eleva	ation	(ft.)	723.	9		Auger ID/OD:	5" Solid Stem	
⊢	rator:		Daggett/Niles		Datu		()		/D88		Sampler:	Standard Split	Spoon
Log	ged By:		B. Wilder		Rig T	уре		CMI	E 45C		Hammer Wt./Fall:	140#/30"	
	Start/Fi	nish:	6/12/2019; 09	:30-10:30	Drilli	ng N	lethod:	Case	d Was	h Boring	Core Barrel:	NQ-2"	
Bori	ng Loca	tion:	99+40, 9.5 ft I	Lt.	Casir	ng IE)/OD:	NW	3"		Water Level*:	None Observed	ł
Ham	mer Effi	ciency F	actor: 0.928		Hamr	mer	Туре:	Automa			Rope & Cathead □		
MD = U = T MU = V = Fi	plit Spoon S Unsuccess hin Wall Tu Unsuccess ield Vane S	ful Split Spo be Sample ful Thin Wa hear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	. RC = Roller ttempt WOH = We netrometer WOR/C = V	d Stem Aug ow Stem Au Cone ight of 140I Veight of Re	jer uger Ib. Ha ods o	r Casing	S _{u(la} q _p = N-uno Hamr N ₆₀ =	b) = Lab Unconfii correcte ner Effic = SPT N	emolded Field Vane Undrained She Vane Undrained Shear Strength (ed Compressive Strength (ksf) d = Raw Field SPT N-value ency Factor = Rig Specific Annual -uncorrected Corrected for Hamme nec Efficiency Factor/60%)*N-uncor	psf) WC = LL = PL = I Calibration Value PI = F er Efficiency G = C	Pocket Torvane She: Water Content, pero Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	702.0		9" HMA.			
	1D	24/10	1.00 - 3.00	8/7/7/8	14	22		723.2		Brown, moist, medium den silt, (Fill).	se, fine to coarse SAND, s	0.8- some gravel, trace	
- 5 -								719.9	****	Brown, moist, very dense, 1	fine to coarse SAND_little		
	2D	24/8	5.00 - 7.00	8/16/22/40	38	59				brown, moist, very dense, i	line to coarse 57(17), nuc	graver, intre sint.	
	R1	60/60	9.50 - 14.50	RQD = 57%			a50	714.4		a50 blows for 0.5 ft.		9.5-	
- 10 -							NQ-2			Top of Bedrock at Elev. 71 R1: Bedrock: Interbedded I DOLOSTONE [Rindgemer Rock Quality = Fair	PELITE and LIMESTONE	E and/or	
										R1: Core Times (min:sec) 9.5-10.5 ft (2:04) 10.5-11.5 ft (2:01)			
										11.5-12.5 ft (2:29)			
							$\uparrow \forall /$	700.4		12.5-13.5 ft (2:08) 13.5-14.5 ft (2:27)			
- 15 -							<u> </u>	709.4		100% Recovery		14.5-	
										Bottom of Exploration	n at 14.5 feet below grou		
- 20 -													
_25	arks:												
Kem	<u>iai 115.</u>												
Stratif	fication line	s represent	approximate bour	ndaries between soil types;	transitions i	may b	e gradual.				Page 1 of 1		
				es and under conditions sta				ns may o	ccur due	e to conditions other			
than	those pres	ent at the ti	me measurement	ts were made.							Boring No.	: HB-ACT-	205

	Main	e Depa	artment	of Transport	atior	1	Project	A 2.1	7 mile p	portion of Route 109	Boring No.:	HB-A	CT-206
			Soil/Rock Exp JS CUSTOM				Locatio	n: Act	on, Mai	ne	WIN:	2024	7.00
		<u>_</u>	<u>55 C05 T0IVI</u>	AIT UNITS							VVIIN.	2020	57.00
Drill			MaineDOT		-	vation	(ft.)	722			Auger ID/OD:	5" Solid Stem	
<u> </u>	rator:		Daggett/Niles		-	um:			VD88		Sampler:	Standard Split	Spoon
<u> </u>	ged By: e Start/Fi	inich:	B. Wilder 6/17/2019; 06		_	Type	: lethod:		E 45C	h Boring	Hammer Wt./Fall: Core Barrel:	140#/30" NQ-2"	
<u> </u>	ng Loca		113+75, 15.0		_	sing ID		NW		n bornig	Water Level*:	5.0 ft bgs.	
			actor: 0.928		_	nmer		Autom		Hydraulic 🗆	Rope & Cathead □		
Defini D = S MD = U = T MU = V = F	itions: plit Spoon Unsuccess hin Wall Tu Unsuccess ield Vane S	Sample sful Split Spo ube Sample sful Thin Wa Shear Test, <u>sful Field Va</u>	oon Sample Atter II Tube Sample A PP = Pocket Pe ne Shear Test At	RC = Rolle Attempt WOH = W enetrometer WOR/C =	d Stem A low Stem r Cone eight of 14 Weight of	uger Auger 40lb. Ha Rods o	r Casing	S _{u(la} q _p = N-ur Ham N ₆₀	ab) = Lat Unconfi correcte mer Effic = SPT N	emolded Field Vane Undrained Shi Vane Undrained Shear Strength (hed Compressive Strength (ksf) d = Raw Field SPT N-value itency Factor = Rig Specific Annua -uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-unco	ear Strength (psf) T, (psf) W Pi I Calibration Value P er Efficiency G	 Pocket Torvane Shei Water Content, perc Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test 	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)	Graphic Log		scription and Remark		Testing Results/ AASHTO and Unified Class.
0	1D	24/14	0.00 - 2.00	4/3/2/2	5	8	SSA			Brown, moist, loose, fine to (Fill).	o coarse SAND, some g	gravel, little silt,	
								1					
								1					
								719.9				3.0-	
							$\left \right $	-					
- 5 -							$ \vee $			Deserve and deserve Correctly	- CAND	11441	
	2D	21.6/18	5.00 - 6.80	5/8/23/40(3.6")	31	48	15			Brown, wet, dense, Gravell weathered rock in tip of spo		, little silt,	
	R1	60/60	6.80 - 11.80	RQD = 65%			NQ-2	716.1	×// ×			6.8-	
										Top of Bedrock at Elev. 71 R1: Bedrock: Interbedded I			
								1		DOLOSTONE [Rindgemen			
								-		Rock Quality = Fair R1: Core Times (min:sec)			
- 10 -								-		6.8-7.8 ft (2:02) 7.8-8.8 ft (1:58)			
										8.8-9.8 ft (1:56) 9.8-10.8 ft (1:58)			
							$ \vee $	711.1		10.8-11.8 ft (2:00) 100% Recovery			
								1		Bottom of Exploration	n at 11 8 faat balow gr		
								1		Dottoin of Exploration	ii at 11.0 ieet below gi	ound surface.	
								1					
- 15 -								-					
								1					
								1					
- 20 -								-					
								-					
]					
								1					
25 Rem	harks:						1	1	1	1			
Strati	fication line	s represent	approximate bou	ndaries between soil types	transition	is may b	e gradual.				Page 1 of 1		
				nes and under conditions st	ated. Gro	undwate	er fluctuatio	ons may o	occur due	e to conditions other	Boring N		206
thar	those pre	sent at the ti	me measuremen	ts were made.							Boring N	o.: HB-ACT-	200

Ι	Main	e Dep	artment	of Transporta	atio	n	Project:	A 2.1	7 mile p	oortion of Route 109	Boring No.:	HB-A	CT-207
		-	Soil/Rock Exp	0			Locatio	n: Acto	on, Mai	ne		• • •	
		<u> </u>	US CUSTOMA	ARY UNITS							WIN:	2020	57.00
Drille	er:		MaineDOT		Ele	vation	ı (ft.)	587.	0		Auger ID/OD:	5" Solid Stem	
Oper	rator:		Daggett/Niles		Dat	tum:	. ,	NA	/D88			Standard Split	Spoon
Log	ged By:		B. Wilder		Rig	ј Туре	:	CM	E 45C		Hammer Wt./Fall:	140#/30"	
Date	Start/Fi	inish:	6/17/2019; 08:	45-10:45	Dri	lling N	lethod:	Case	ed Wasl	n Boring	Core Barrel:	N/A	
Bori	ng Loca	tion:	156+10, 11.5	ì Rt.	Ca	sing IC	D/OD:	NW	-3"		Water Level*:	12.0 ft bgs.	
Ham	mer Effi	ciency F	actor: 0.928		Hai	mmer	Туре:	Autom	atic 🛛	Hydraulic 🗆	Rope & Cathead □		
Definit	tions: plit Spoon	Sample		R = Rock C SSA = Solid						emolded Field Vane Undrained She Vane Undrained Shear Strength (ket Torvane She ater Content, per	
MD =	Unsuccess		oon Sample Atten		w Stem			qp`=	Unconfir	ned Compressive Strength (ksf) d = Raw Field SPT N-value	LL = Liqu PL = Plas	id Limit	
MU =	Unsuccess	sful Thin Wa	II Tube Sample A	ttempt WOH = We	ght of 1			Ham	mer Effic	iency Factor = Rig Specific Annual	Calibration Value PI = Plas	ticity Index	
			PP = Pocket Per ne Shear Test Att					№60 N ₆₀	= (Hamn	-uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	rected C = Cons	n Size Analysis solidation Test	
			T T	Sample Information					{				Laboratory
	ö	(in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected				Log				Testing Results/
Depth (ft.)	Sample No.	Pen./Rec.	e D	gth D (9	orre		0	Elevation (ft.)	ic L	Visual De	scription and Remarks		AASHTO
epth	dme	en./F	dme 🤆	ows near rren(RQ	-nnc	N60	Casing Blows	.) eva	Graphic				and Unified Class.
	ů	ď	й ŧ,	ଅନ୍ଦ୍ର ନ	ż	ž	U III	⊟€	Ū	Duran and the diam day	Sector CAND		-
	1D	24/17	0.00 - 2.00	4/4/10/9	14	22	SSA			silt, (Fill).	se, fine to coarse SAND, som	ie gravel, trace	G#337347 A-1-b, SW-SM
]					WC=4.8%
								1	××				
								1					
- 5 -										Light brown damn loose f	ine to coarse SAND, some si	It trace	G#337348
	2D	24/15	5.00 - 7.00	1/1/2/3	3	5				gravel, (Fill).	the to course shirts, some s	it, titee	A-2-4, SM
]					WC=12.8%
- 10 -							<u> </u>	577.0	*****				G#337349
	3D	24/16	10.00 - 12.00	2/2/6/15	8	12	2	576.0		Dark brown PEAT.		11.0	A-1-b, SW-SM
							11	570.0			, fine to coarse SAND, trace		WC=45.3% Loss on
							82			silt.			Ignition,(4.7%)
							86						
							107						
- 15 -	4D	24/19	15.00 - 17.00	12/17/30/27	47	73	9	572.0		Light brown, wet, very dens	se, fine to coarse SAND, som		G#337350 A-2-4, SM
										gravel. Beller Canad should to 20.0	fthee		WC=12.5%
							26			Roller Coned ahead to 20.0	11 025.		
							27						
							38	1					
								•					
- 20 -							77			Light brown wat yang dan	se, fine to coarse SAND, som	a cilt traca	G#337301
	5D	24/18	20.00 - 22.00	15/21/19/22	40	62	39			gravel.	se, fine to coarse SAIND, SOIT	ie sin, uace	A-2-4, SM
							63	1					WC=12.6%
							(1						
							64			a100 blows for 0.8 ft.			
							a100 OPEN						
							HOLE			Cobble from 23.8-24.2 ft by	-		
25 Rem	arks:							I		Cobble from 24.6-24.9 ft bg	30.		
	-												
				ndaries between soil types; t			-				Page 1 of 2		
		-	been made at tim me measurement	es and under conditions stat s were made	ed. Gro	oundwate	er fluctuatio	ns may c	ccur due	to conditions other	Boring No.:	HB-ACT-	207
uian	alose pres	sont at the t	me measurement	S were made.									201

	Main	e Dep	artment	of Transport	ation	Project	A 2.17	7 mile p	ortion of Route 109	Boring No.:	HB-A	CT-207
			Soil/Rock Exp US CUSTOM			Locatio	n: Acto	on, Mai	ne	WIN:	2020	67.00
Drill	er:		MaineDOT		Elevatio	n (ft.)	587.	0		Auger ID/OD:	5" Solid Stem	
L	rator:		Daggett/Niles		Datum:			/D88		Sampler:	Standard Split	Spoon
⊢÷-	ged By:		B. Wilder		Rig Type	e:		E 45C		Hammer Wt./Fall:	140#/30"	1
<u> </u>	Start/Fi	inish:	6/17/2019;08	:45-10:45	Drilling				1 Boring	Core Barrel:	N/A	
<u> </u>	ing Loca		156+10, 11.5		Casing I		NW		6	Water Level*:	12.0 ft bgs.	
Ham	nmer Effi	iciency F	actor: 0.928		Hammer	r Type:	Automa	atic 🛛	Hydraulic 🗆	Rope & Cathead □		
MD = U = T MU = V = F	plit Spoon Unsuccess hin Wall Tu Unsuccess ield Vane S	sful Split Sp ibe Sample sful Thin Wa Shear Test,	II Tube Sample A PP = Pocket Pe ne Shear Test At	SSA = Sol mpt HSA = Hol RC = Rolle Attempt WOH = Wo workrometer WOR/C = tempt WO1P = V	d Stem Auger d Stem Auger low Stem Auger r Cone eight of 140 lb. H Weight of Rods /eight of One Pe	lammer or Casing	S _{u(la} q _p = N-un Hami N ₆₀ :	b) = Lab Unconfir correcte mer Effic = SPT N	molded Field Vane Undrained Sh Vane Undrained Shear Strength (led Compressive Strength (ksf) = Raw Field SPT N-value iency Factor = Rig Specific Annua -uncorrected Corrected for Hamm her Efficiency Factor/60%)*N-unco	ear Strength (psf) T _v = (psf) WC = LL = PL = I Calibration Value PI = F er Efficiency G = C	Pocket Torvane She Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis consolidation Test	
	<u> </u>			Sample Information	7			1				Laboratory
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		escription and Remarks		Testing Results/ AASHTO and Unified Class.
25	6D	8.4/6	25.00 - 25.70	46/50(2.4")			-		Light brown, wet, very den gravel. Cobble from 25.7-26.0 ft b Roller Coned ahead to 28.0	gs.	ome silt, trace	G#337302 A-2-4, SM WC=9.2%
							559.0		Bottom of Exploration NO REFUSAL	n at 28.0 feet below grou	nd surface.	
- 30 ·												
							-					
- 35 -							-					
- 40 ·							-					
							-					
- 45 ·												
							1					
<u>50</u> <u>Rem</u>	larks:						1	I				
				ndaries between soil types; nes and under conditions sta			ins may o	cour due	to conditions other	Page 2 of 2		
			ime measuremen			ter nuctuatio	ma may 0			Boring No.	: HB-ACT-	207

N	Iaine			of Trans	sporta	tion	Pr	roject:	A 2.17	7 mile portion of Route 109	Boring No.:	HB-AC	Г-208
			Soil/Rock Expl				Lo	ocation	: Acto	on, Maine	WIN:	2020	67.00
Drillin	na Conti	actor:	MaineDOT			Elevatio	n (f	+)	586.	3	Auger ID/OD:	5" Dia.	
Opera	-		Daggett/Niles			Datum:				/D88	Sampler:	N/A	
<u> </u>	ed By:		B. Wilder			Rig Typ	٥.			E 45C	Hammer Wt./Fall:	N/A	
	Start/Fir		6/17/2019; 11:	·00-12·00		Drilling		hod.		d Stem Auger	Core Barrel:	N/A	
	g Locat		156+45, 8.0 ft			Casing			N/A	-	Water Level*:	None Observed	1
Definition S = Sart B = Buon MD = U U = Thi MV = U	ons: D = mple off Au cket Sampl Jnsuccessf in Wall Tub Jnsuccessf	Spilt Spoor Iger Flights e off Auger ul Split Spo e Sample ul Field Var	n Sample Flights ion Sample Attern ne Shear Test Att <u>PP= Pocket Per</u>	MI R SS npt HS RC tempt W	J = Unsucces = Rock Core & = Solid Sta & = Hollow & C = Roller Co OH = Weight <u>OR/C = Weig</u>	ssful Thin Wa Sample em Auger Stem Auger ne of 140lb. Ha	all Tul	be Sampl			ndrained Shear Strength (psf) ar Strength (psf) ngth (ksf) h (psf)	LL = Liquid Lim PL = Plastic Lin PI = Plasticity Ir G = Grain Size C = Consolidati	it nit Analysis
		<u> </u>											Laboratory
o Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(psi) or RQD (%)	N-value Casing	Blows	Elevation (ft.)	Graphic Log		iption and Remarks		Testing Results/ AASHTO and Unified Class.
0						SS	A			Probe, no samples taken.			
- 5 - - 10 - - 20 -										Soils Similar to HB-ACT-207.			
Ot	ation P	'	annewi	nderies 5-1	noil trans t	maiti	/ ha =	una d '			Dogo 1 of 0		
				ndaries between							Page 1 of 2		
			been made at tim me measurement		ditions stated	d. Groundwa	ater fl	uctuation	s may o	ccur due to conditions other	Boring No.	: HB-ACT-	208

N	Iaine	e Depa	rtment	of Tra	nsporta	tion	F	Project:	A 2.1	7 mile portion of Route 109	Boring No.:	HB-AC	Г-208
			oil/Rock Exp				L	.ocation	: Acto	on, Maine		202	
		<u>L</u>	S CUSTOM	<u>ARY UNITS</u>	<u>.</u>						WIN:	2020	57.00
Drilliı	ng Cont	ractor:	MaineDOT			Elevat	on ((ft.)	586.	3	Auger ID/OD:	5" Dia.	
Oper	ator:		Daggett/Niles			Datum	:		NAV	/D88	Sampler:	N/A	
Logg	ed By:		B. Wilder			Rig Ty	pe:		CM	E 45C	Hammer Wt./Fall:	N/A	
	Start/Fi		6/17/2019; 11			Drilling				d Stem Auger	Core Barrel:	N/A	
	g Locat	tion: Spilt Spoon	156+45, 8.0 ft		MU = Unsucce	Casing	·		N/A		Water Level*:	None Observe	1
S = Sa B = Bu MD = U U = Th	mple off Au cket Samp Jnsuccessi in Wall Tub	uger Flights le off Auger ful Split Spo pe Sample		npt	R = Rock Core SSA = Solid Si HSA = Hollow RC = Roller Co WOH = Weigh	e Sample tem Auger Stem Auger one				$ \begin{array}{l} S_{u} = \text{Peak/Remolded Field Vane U} \\ S_{u}(lab) = \text{Lab Vane Undrained She} \\ q_{p} = \text{Unconfined Compressive Stree} \\ \text{N-value} = \text{Raw Field SPT N-value} \\ T_{v} = \text{Pocket Torvane Shear Strengt} \end{array} $	ar Strength (psf) ngth (ksf)	LL = Liquid Lim PL = Plastic Lir Pl = Plasticity I G = Grain Size	nit ndex
V = Fie	ld Vane Sl	hear Test,	PP= Pocket Per	netrometer	WOR/C = Wei					WC = Water Content, percent ≅ = S		C = Consolidat	on Test
		<u> </u>		Sample Inf									Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strendth	(psf) or RQD (%)	N-value	Blows	Elevation (ft.)	Graphic Log	Visual Descr	iption and Remarks		Testing Results/ AASHTO and Unified Class.
25							V	560.8				25.5	
								_		Bottom of Exploration at NO REFUSAL	25.5 feet below ground s		
- 30 -								-					
- 35 -								-					
- 40 -								-					
- 45 -								-					
Rema Stratific * Water	cation lines	lings have b	pproximate bour een made at tim re measuremeni	ies and under					s may c	ccur due to conditions other	Page 2 of 2 Boring No.	: HB-ACT-	208

	Main	e Depa	artment	of Transport	ation	Τ	Project:	A 2.1	7 mile j	portion of Route 109	Boring No.:	HB-A	CT-209
			Soil/Rock Exp JS CUSTOM				Locatio	n: Act	on, Ma	ne	WIN:	2026	57.00
			MaineDOT		Elevet		(64.)	590	2			5" Die	
Drill	er: rator:		Daggett/Niles		Elevat Datum		(π.)	580	5 /D88		Auger ID/OD: Sampler:	5" Dia. Standard Split	Spoon
⊢÷–	ged By:		B. Wilder		Rig Ty				E 45C		Hammer Wt./Fall:	140#/30"	вроон
	Start/Fi	nish:	6/17/2019; 13	:00-13:30	Drilling	· ·				Auger	Core Barrel:	N/A	
L	ng Loca		169+50, 10.0		Casing	-		N/A		0	Water Level*:	3.5 ft bgs.	
Ham	mer Effi	ciency F	actor: 0.928		Hamm	er 1	Гуре:	Autom	atic 🖂	Hydraulic 🗆	Rope & Cathead □		
MD = U = T MU = V = F	plit Spoon S Unsuccess hin Wall Tu Unsuccess ield Vane S	ful Split Spo be Sample ful Thin Wa hear Test,	oon Sample Atter II Tube Sample A PP = Pocket Pe ne Shear Test At	SSA = Soli npt HSA = Holl RC = Rolle MOH = We enetrometer WOR/C = N	Core Sample d Stem Auger ow Stem Aug r Cone eight of 140lb. Veight of Roc leight of One	ger . Har ds or	Casing	S _{u(la} q _p = N-ur Ham N ₆₀	_{ib)} = Lat Unconfi correcte mer Effi = SPT N	emolded Field Vane Undrained Shea Vane Undrained Shear Strength (ned Compressive Strength (ksf) d = Raw Field SPT N-value ciency Factor = Rig Specific Annual -uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	psf) WC = LL = L PL = I Calibration Value PI = F er Efficiency G = G	Pocket Torvane She Water Content, per iquid Limit Plastic Limit Plasticity Index rain Size Analysis onsolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/13	0.00 - 2.00	3/4/5/5	9 1	14	SSA			Brown, wet, medium dense silt, (Fill).	, fine to coarse SAND, so	ne gravel, little	
- 5 -								575.3		он, (тн).		5.0	0//2272.14
	2D/A	24/18	5.00 - 7.00	3/2/9/16	11 1	17		070.0		2D (5.0-6.0 ft bgs.) Black O	Organic SILT, fine sand.	5.0	G#337344 A-1-b, SM
										2D/A (6.0-7.0 ft bgs.) Brow SAND, some gravel, little s		e to coarse	WC=172.4%
								571.8					
- 10 -	3D	24/19	10.00 - 12.00	2/5/14/17	19 2	29				Light brown, wet, medium	dense, fine to medium SA	ND, trace silt.	
								568.3		Bottom of Exploration NO REFUSAL	n at 12.0 feet below groun	12.0- ad surface.	
- 15 -													
- 20 -													
25 Rem	arks:												
				ndaries between soil types;							Page 1 of 1		
			been made at tim me measuremen	es and under conditions sta ts were made.	ted. Ground	wate	r fluctuatio	ns may o	ccur due	e to conditions other	Boring No.	HB-ACT-	209

[]	Main	e Depa	artment	of Transport	ation		Project:	A 2.1′	mile j	portion of Route 109	Boring No.:	HB-A	CT-210
			Soil/Rock Exp				Locatio	n: Acto	on, Ma	ine			
		<u> </u>	JS CUSTOM	<u>ARY UNITS</u>							WIN:	2026	67.00
Drill	er:		MaineDOT		Eleva	ation	(ft.)	578.	7		Auger ID/OD:	5" Dia.	
Ope	rator:		Daggett/Niles	5	Datu	m:		NAV	/D88		Sampler:	Standard Split	Spoon
Log	ged By:		B. Wilder		Rig T	уре		CM	E 45C		Hammer Wt./Fall:	140#/30"	
Date	Start/Fi	nish:	6/17/2019; 11	:30-14:00	_	-	lethod:	Soli	l Stem	Auger	Core Barrel:	N/A	
⊢	ng Loca		170+25, 5.0 f	t Lt.	Casir	-		N/A			Water Level*:	2.5 ft bgs.	
Ham Defini		ciency F	actor: 0.928	R = Rock (Hamr Core Sample		Туре:	Automa S., =		Hydraulic emolded Field Vane Undrained Sho	Rope & Cathead ear Strength (psf) T=	Pocket Torvane She	ar Strength (psf)
D = S MD = U = T MU = V = F	plit Spoon Unsuccess hin Wall Tu Unsuccess ield Vane S	sful Split Spo be Sample sful Thin Wa Shear Test,	oon Sample Atter Il Tube Sample A PP = Pocket Pe ne Shear Test At	SSA = Soli mpt HSA = Hol RC = Rolle Attempt WOH = We enetrometer WOR/C = V	d Stem Aug ow Stem Au	jer uger Ib. Ha ods o	r Casing	S _{u(la} q _p = N-un Ham N ₆₀	b) = La Unconfi correcte ner Effi = SPT N	b Vane Undrained Shear Strength (ined Compressive Strength (ksf) id = Raw Field SPT N-value ciency Factor = Rig Specific Annua I-uncorrected Corrected for Hammin mer Efficiency Factor/60%)*N-unco	(psf) WC = LL = PL = I Calibration Value PI = er Efficiency G = 0	Evater Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	escription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/16	0.00 - 2.00	4/6/4/4	10	15	SSA			Brown, wet, medium dense	e, fine to coarse SAND, so	me gravel, trace	G#337345
- 5 -								574.0		silt, (Fill).			A-1-b, SW-SM WC=9.6%
- 5 -	2D	24/17	5.00 - 7.00	4/7/9/12	16	25		573.7	0.020 0.020 0.020	Layer of Black Organics.			
										Brown, wet, medium dense silt.	e, fine to coarse SAND, so	me gravel, trace	
- 10 -							$\downarrow V$		0,000	Brown, wet, dense, fine to	coarse SAND some grav	el trace silt	
	3D	24/6	10.00 - 12.00	8/13/10/12	23	36			0.00 0.00 0.00	brown, wet, dense, mie to	coarse strives, some grav	ei, trace siit.	
]	000				
- 15 -								566.7	001142	Bottom of Exploration NO REFUSAL	n at 12.0 feet below grou	nd surface.	
-													
- 20 -								1					
								1					
								1					
25 Rem	arks:									I			
Strati	fication line	s represent	approximate bou	indaries between soil types;	transitions i	may b	e gradual.				Page 1 of 1		
			been made at tim me measuremen	nes and under conditions sta nts were made.	ited. Groun	dwate	er fluctuatio	ns may c	ccur du	e to conditions other	Boring No.	: HB-ACT-	210
	. alose pres		insasuremen										

	Main	e Depa	artment	of Transport	ation		Project:	A 2.1	7 mile	portion of Route 109	Boring No.:	HB-A	CT-211
			Soil/Rock Exp JS CUSTOM	-			Locatio	n: Act	on, Ma	ine	WIN:	2020	57.00
Drill	-		MaineDOT		Eleva		ı (ft.)	578			Auger ID/OD:	5" Dia.	
⊢÷–	rator:		Daggett/Niles		Datur				VD88		Sampler:	Standard Split	Spoon
	ged By: e Start/Fi	nich	B. Wilder 6/17/2019; 14	-20 15-20	Rig T				E 45C	Auger	Hammer Wt./Fall: Core Barrel:	140#/30" N/A	
L	ing Loca		171+00, 8.0 ft		Casin	-	lethod:	N/A		Auger	Water Level*:	4.0 ft bgs.	
⊢	-		actor: 0.928		_	-	Type:	Autom		Hydraulic 🗆	Rope & Cathead	1.0 11 0 g 5.	
Defini D = S MD = U = T MU = V = F	itions: plit Spoon & Unsuccess hin Wall Tu Unsuccess ield Vane S	Sample ful Split Spo be Sample ful Thin Wa hear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	Attempt RC = Rolle WOH = We netrometer WOR/C = V	core Sample d Stem Aug ow Stem Au r Cone ight of 140ll Veight of Ro	er uger b. Ha	mmer r Casing	S _u = S _{u(li} q _p = N-ur Ham N ₆₀	Peak/F ab) = La Uncon ncorrect mer Eff = SPT	temolded Field Vane Undrained She b Vane Undrained Shear Strength (ined Compressive Strength (ksf) de = Raw Field SPT N-value iciency Factor = Rig Specific Annua N-uncorrected Corrected for Hamme mer Efficiency Factor/60%)*N-unco	Strength (psf) T _V = psf) WC LL = PL = I Calibration Value PI = or Efficiency G =	Pocket Torvane She = Water Content, per Liquid Limit = Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/14	0.00 - 2.00	4/5/6/5	11	17	SSA			Brown, moist, medium den silt, (Fill).	se, fine to coarse SAND,	some gravel, trace	
								573.8				4.5	
- 5 -	2D	24/4	5.00 - 7.00	2/2/5/5	7	11		-		Brown, wet, medium dense silt.	, fine to coarse SAND, li	-	
								571.3		Dark brown Organic SILT	on auger flight.		
- 10 ·								-		Brown, wet, loose, fine to c	coarse SAND trace grav.	el trace silt trace	G#337346
	3D	24/6	10.00 - 12.00	1/1/2/3	3	5		566.3		organics.			A-1-b, SW WC=37.8%
										Bottom of Exploration NO REFUSAL	n at 12.0 feet below grou		
- 15 -								-					
								-					
- 20 ·													
								-					
								-					
25 Rem	narks:												
Stratit	fication line	s represent	approximate bou	ndaries between soil types;	transitions r	nay b	e gradual.				Page 1 of 1		
			been made at tim me measuremen	es and under conditions sta ts were made.	ted. Groun	dwate	er fluctuatio	ns may o	occur du	e to conditions other	Boring No	.: HB-ACT-	211

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

Town(s):	Acton	Ì		Proje	ct Numbe	r: 20267.00
Station	Offset	Top of Boring	Refusal	No Refusal	Bottom of Boring	Comments / Date
(Feet)	(Feet)	Elev. (Feet)	(Feet)	(Feet)	Elev. (Feet)	7/15-16/2015
109+00	8.0 Rt.	738.4	7.8		730.6	Probe
109+00	7.0 Lt.	738.5	3.0		735.5	Probe
110+00	9.0 Rt.	737.9	3.5		734.4	Probe
110+00	8.0 Lt.	738.0	3.4		734.6	Probe
111+00	9.0 Rt.	736.8	3.6		733.2	Probe
112+00	7.0 Rt.	734.6	1.6		733.0	Probe
112+00	16.0 Rt.	736.5				Bedrock Outcrop
112+00	12.0 Lt.	734.6	2.1		732.5	Probe
113+00	7.0 Rt.	728.1	2.4		725.7	Probe
113+00	13.0 Rt.	728.1				Bedrock Outcrop
113+00	12.5 Lt.	728.1	2.5		725.6	Probe
114+00	7.5 Rt.	721.6		10.0	711.6	Probe
114+00	13.5 Rt.	720.9		10.0	710.9	Probe
118+00	10.5 Rt.	710.1	6.4		703.7	Probe
118+00	9.0 Lt.	709.9	7.4		702.5	Probe
119+00	10.0 Rt.	707.7	5.5		702.2	Probe
119+00	9.0 Lt.	708.0	7.0		701.0	Probe
120+00	7.0 Rt.	704.1	2.0		702.1	Probe
120+00	8.0 Lt.	704.3	1.9		702.4	Probe
121+00	9.0 Lt.	697.4	9.6		687.8	Probe
122+00	8.5 Rt.	693.3	9.9		683.4	Probe
122+00	9.0 Lt.	693.1		10.0	683.1	Probe
145+00	8.0 Rt.	627.9	6.5		621.4	Probe
146+00	10.0 Rt.	625.6		8.0	617.6	Probe
146+00	11.0 Lt.	625.1	5.6		619.5	Probe
147+00	11.0 Rt.	624.3		8.0	616.3	Probe
147+00	11.0 Lt.	623.7		8.0	615.7	Probe
148+00	13.0 Rt.	623.4		8.0	615.4	Probe
148+00	9.0 Lt.	623.3	6.5		616.8	Probe
149+00	12.0 Rt.	620.9		8.0	612.9	Probe
149+00	8.5 Lt.	620.6		8.0	612.6	Probe
150+00	11.0 Rt.	617.4		8.0	609.4	Probe
150+00	11.0 Lt.	617.1		8.0	609.1	Probe
151+00	10.0 Rt.	613.9		8.0	605.9	Probe
151+00	13.3 Lt.	613.2		8.0	605.2	Probe
152+00	9.4 Rt.	609.9	6.5		603.4	Probe
152+00	12.8 Lt.	609.5		9.5	600.0	Probe
163+03	9.7 Lt.	590.0	1	15.0	575.0	Probe
164+05	9.8 Rt.	593.5		10.0	583.5	Probe
164+04	8.1 Lt.	593.6		10.0	583.6	Probe
165+05	1.8 Rt.	595.6		10.0	585.6	Probe
166+05	7.8 Rt.	595.1	1	10.0	585.1	Probe
166+05	26.1 Rt.	596.3	1	15.0	581.3	Probe
167+05	4.5 Rt.	592.9	1	10.0	582.9	Probe
168+03	24.5 Rt.	590.3	1	15.0	575.3	Probe
168+06	5.4 Rt.	589.5	1	10.0	579.5	Probe

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

Town(s):	Acton	•		Proje	ct Numbe	er: 20267.00
Station	Offset	Top of Boring	Refusal	No Refusal	Bottom of Boring	Comments / Date
(Feet)	(Feet)	Elev. (Feet)	(Feet)	(Feet)	Elev. (Feet)	7/15-16/2015
183+15	13.1 Rt.	583.3		8.0	575.3	Probe
183+15	9.1 Lt.	581.9		8.0	573.9	Probe
184+15	4.9 Rt.	586.4	6.9		579.5	Probe
184+15	15.0 Lt.	584.9	5.0		579.9	Probe
185+15	5.0 Rt.	590.7	5.3		585.4	Probe
185+15	15.2 Lt.	589.3	5.1		584.2	Probe
186+15	9.0 Rt.	594.8	7.9		586.9	Probe
186+15	10.5 Lt.	594.1	8.4		585.7	Probe
187+15	10.1 Rt.	592.4	3.5		588.9	Probe
187+15	10.9 Lt.	591.1	6.0		585.1	Probe
188+15	10.1 Rt.	587.6	4.3		583.3	Probe
189+15	11.2 Rt.	583.2		8.0	575.2	Probe
189+15	8.9 Lt.	582.3	6.6		575.7	Probe
190+15	10.1 Rt.	578.0		8.0	570.0	Probe
190+15	9.5 Lt.	577.2		8.0	569.2	Probe
191+15	8.6 Rt.	574.2		8.0	566.2	Probe
191+15	9.0 Lt.	573.8		8.0	565.8	Probe
192+15	11.1 Rt.	572.8		8.0	564.8	Probe
192+15	7.7 Lt.	572.6		8.0	564.6	Probe
193+15	8.0 Lt.	570.8		8.0	562.8	Probe
194+15	10.5 Rt.	566.2	6.8		559.4	Probe
194+15	7.9 Lt.	566.2		10.0	556.2	Probe
195+15	13.2 Rt.	560.4		8.0	552.4	Probe
196+15	9.7 Rt.	553.8		8.0	545.8	Probe
196+15	8.0 Lt.	553.8		8.0	545.8	Probe

Appendix **B**

Laboratory Test Results

State of Maine - Department of Transportation Laboratory Testing Summary Sheet

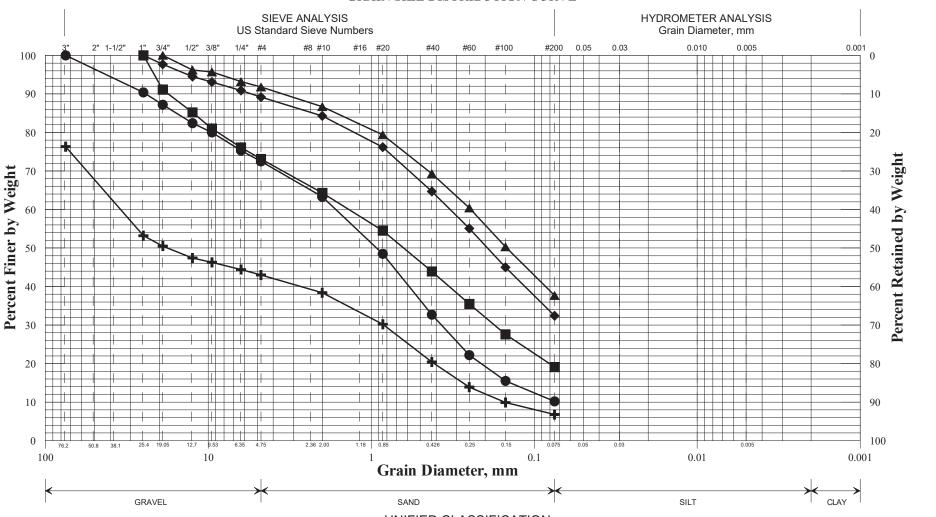
Town(s):	Actor	1			Worl	ς Nι	umber	: 2026	67.00			
Boring & Sample	Station	Offset	Depth	Reference	G.S.D.C.	W.C.	% Passing	g Classification				
Identification Number	(Feet)	(Feet)	(Feet)	Number	Sheet		200 Sieve	Unified	AASHTO	Frost		
HB-ACT-101, B1	94+50	9.0 Rt.	0.79-1.5	302216	1	5.3	6.8	GW-GM	A-1-a	0		
HB-ACT-101, S1	94+50	9.0 Rt.	1.5-5.0	302217	1	7.9	32.4	SM	A-2-4	11		
HB-ACT-102, S2	105+50	9.0 Rt.	0.75-2.4	302218	1	6.5	19.1	SM	A-1-b	11		
HB-ACT-103, B2	111+00	7.0 Lt.	1.0-2.1	302219	1	6.2	10.2	SW-SM	A-1-b	0		
HB-ACT-103, S3	111+00	7.0 Lt.	2.1-5.0	302220	1	20.1	37.7	SM	A-4			
HB-ACT-104, B3	121+00	12.0 Rt.	0.0-1.1	302221	2	3.0	8.2	SW-SM	A-1-b	0		
HB-ACT-104, S4	121+00	12.0 Rt.	1.1-5.9	302222	2	7.2	13.2	SM	A-1-b	Ш		
HB-ACT-105, B4	134+00	8.0 Rt.	0.92-2.4	302223	2	4.4	6.7	SW-SM	A-1-a	0		
HB-ACT-105, S5	134+00	8.0 Rt.	2.4-5.0	302224	2	8.3	32.5	SM	A-2-4	Ш		
HB-ACT-106, B5	145+00	12.0 Lt.	0.0-1.6	302225	2	3.5	9.6	SW-SM	A-1-b	0		
HB-ACT-106, S6	145+00	12.0 Lt.	1.6-8.0	302151	2	11.2	29.9	SM	A-2-4	11		
HB-ACT-107, S7	158+00	6.0 Rt.	0.83-1.3	302152	3	4.4	8.9	GW-GM	A-1-a	0		
HB-ACT-107, S8	158+00	6.0 Rt.	1.3-5.0	302153	3	20.3	31.4	SM	A-2-4	Ш		
HB-ACT-109, B6	163+00	11.1 Rt.	0.75-5.0	302154	3	3.0	7.7	SW-SM	A-1-a	0		
HB-ACT-110, B7	193+00	10.5 Rt.	0.42-5.0	302155	3	3.7	7.1	GW-GM	A-1-a	0		
HB-ACT-201, 2D	96+50	7.5 Lt.	5.0-5.8	337341	4	11.1	36.8	SM	A-4			
HB-ACT-202, 1D	97+25	12.5 Rt.	0.0-2.0	337342	4	7.1	8.8	SW-SM	A-1-b	0		
HB-ACT-203, 3D	98+00	12.0 Lt.	10.0-12.0	337343	4	41.4	53.1	CL	A-4	IV		
HB-ACT-207, 1D	156+10	11.5 Rt.	0.0-2.0	337347	5	4.8	8.2	SW-SM	A-1-b	0		
HB-ACT-207, 2D	156+10	11.5 Rt.	5.0-7.0	337348	5	12.8	25.4	SM	A-2-4			
HB-ACT-207, 3D	156+10	11.5 Rt.	10.0-12.0	337349	5	45.3	8.4	SW-SM	A-1-b	0		
HB-ACT-207, 4D	156+10	11.5 Rt.	15.0-17.0	337350	5	12.5	29.5	SM	A-2-4	11		
HB-ACT-207, 5D	156+10	11.5 Rt.	20.0-22.0	337301	5	12.6	28.0	SM	A-2-4			
HB-ACT-207, 6D	156+10	11.5 Rt.	25.0-25.7	337302	5	9.2	23.1	SM	A-2-4			
HB-ACT-209, 2D	169+50	10.0 Rt.	5.0-6.0	337344	6	172	12.3	SM	A-1-b			
HB-ACT-210, 1D	170+25	5.0 Lt.	0.0-2.0	337345	6	9.6	6.9	SW-SM	A-1-b	0		
HB-ACT-211, 3D	171+00	8.0 Lt.	10.0-12.0	337346	6	37.8	4.1	SW	A-1-b	0		
							Loss on l	gnition, %	% (T 267	')		
HB-ACT-207, 3D	156+10	11.5 Rt.	10.0-12.0	337349	5			4.7				
	1				1							
Classification of th	ese soil sam	oles is in a	ccordance wit	h AASHTO C	lassificati	on Sys	tem M-145-4	0. This cla	ssificatio	n		
is followed by the												
	usceptibility F	-	-					-				

GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

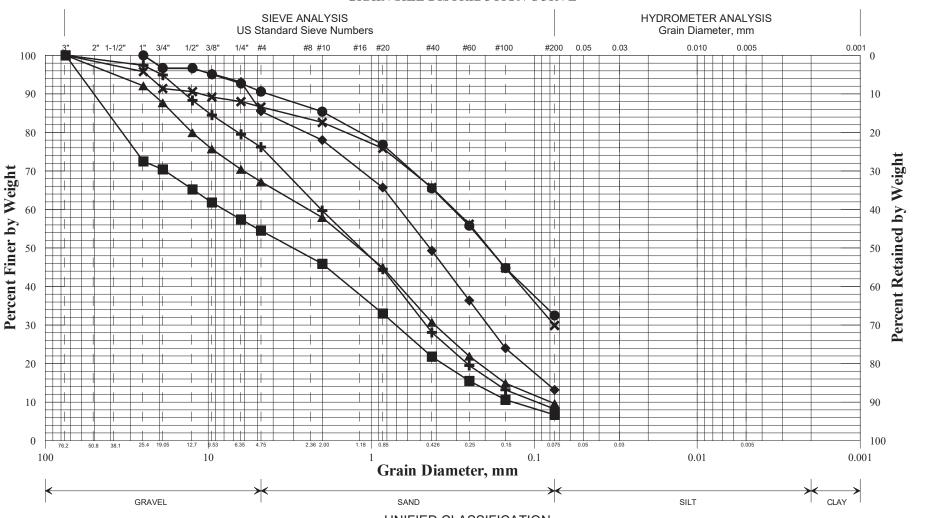
LL = Liquid limit as determined by AASHTO T 89-96 and/or ASTM D 4318-98

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



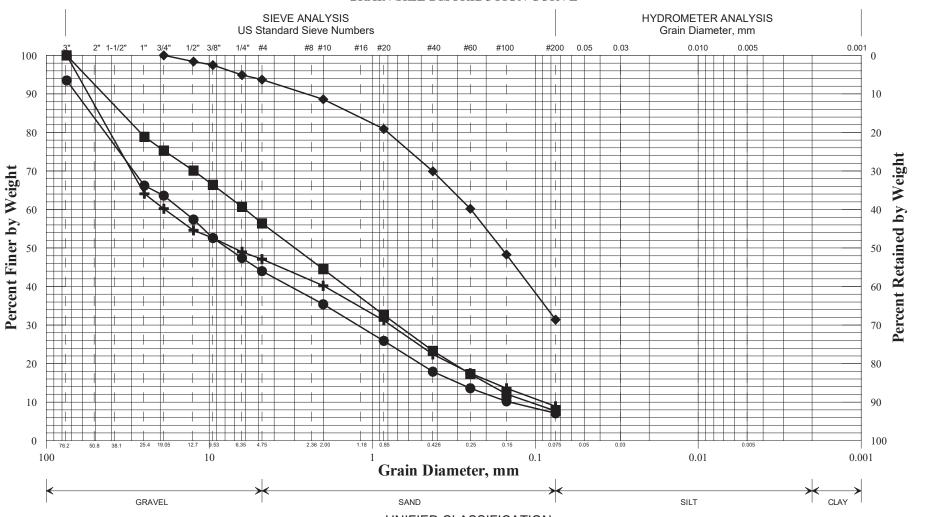
State of Maine Department of Transportation GRAIN SIZE DISTRIBUTION CURVE

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	W, % LL PL PI		ΡI	WIN
+	HB-ACT-101/B1	94+50	9.0 RT	0.79-1.5	Sandy GRAVEL, trace silt.	5.3				020267.00
•	HB-ACT-101/S1	94+50	9.0 RT	1.5-5.0	SAND, some silt, little gravel.	7.9				Town
	HB-ACT-102/S2	105+50	9.0 RT	0.75-2.4	SAND, some gravel, little silt.	6.5				Acton
	HB-ACT-103/B2	111+00	7.0 RT	1.0-2.1	SAND, some gravel, trace silt.	6.2				
	HB-ACT-103/S3	111+00	7.0 LT	2.1-5.0	Silty SAND, trace gravel.	20.1				Reported by/Date
×										WHITE, TERRY A 8/27/2015



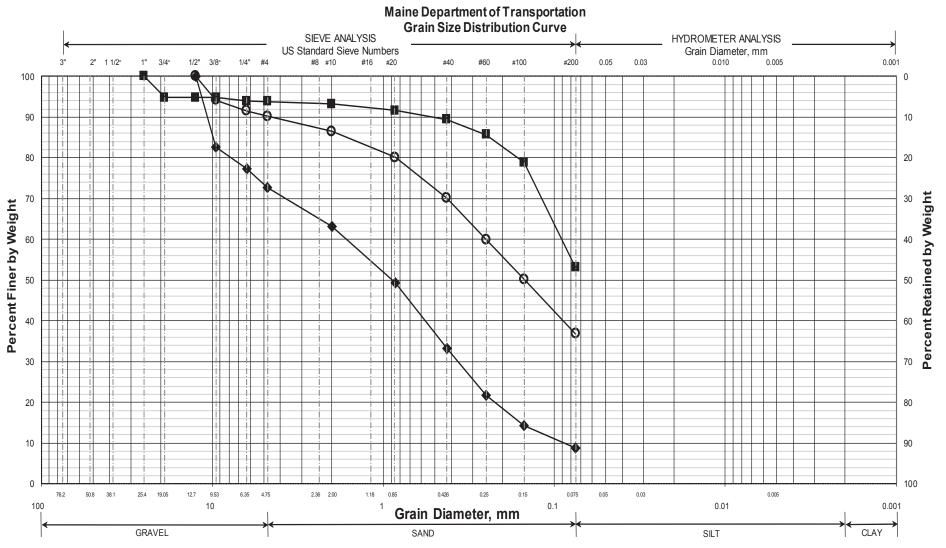
State of Maine Department of Transportation GRAIN SIZE DISTRIBUTION CURVE

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	6 LL PL PI		PI	WIN
+	HB-ACT-104/B3	121+00	12.0 RT	0.0-1.1	SAND, some gravel, trace silt.	3.0			020267.00	
	HB-ACT-104/S4	121+00	12.0 RT	1.1-5.9	SAND, little gravel, little silt.	7.2			Town	
	HB-ACT-105/B4	134+00	8.0 RT	0.92-2.4	Gravelly SAND, trace silt.	4.4			Acton	
	HB-ACT-105/S5	134+00	8.0 RT	2.4-5.0	SAND, some silt, trace gravel.	8.3				
	HB-ACT-106/B5	145+00	12.0 LT	0.0-1.6	SAND, some gravel, trace silt.	3.5				Reported by/Date
×	HB-ACT-106/S6	145+00	12.0 LT	1.6-8.0	SAND, some silt, little gravel.	11.2			WHITE, TERRY A 8/27/2015	



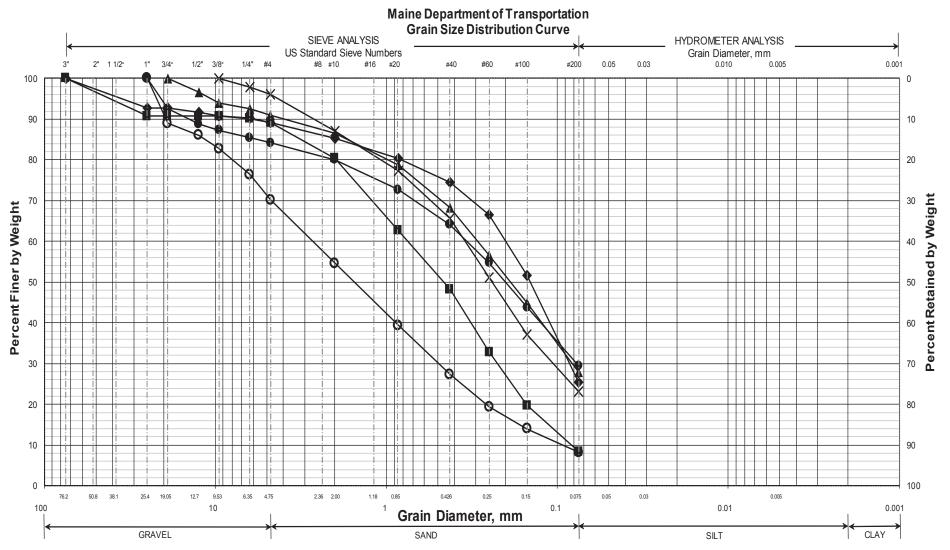
State of Maine Department of Transportation GRAIN SIZE DISTRIBUTION CURVE

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	ΡI	WIN
+	HB-ACT-107/S7	158+00	6.0 RT	0.83-1.3	Sandy GRAVEL, trace silt.	4.4				020267.00
	HB-ACT-107/S8	158+00	6.0 RT	1.3-5.0	SAND, some silt, trace gravel.	20.3				Town
	HB-ACT-109/B6	163+00	11.1 RT	0.75-5.0	Gravelly SAND, trace silt.	3.0				Acton
	HB-ACT-110/B7	193+00	10.5 RT	0.42-5.0	Sandy GRAVEL, trace silt.	3.7				
										Reported by/Date
×										WHITE, TERRY A 8/27/2015



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
0	HB-ACT-201/2D	96+50	7.5 LT	5.0-5.8	Silty SAND, trace gravel.	11.1			
•	HB-ACT-202/1D	97+25	12.5 RT	0.0-2.0	SAND, some gravel, trace silt.	7.1			
	HB-ACT-203/3D	98+00	12.0 LT	10.0-12.0	Sandy SILT, trace gravel.	41.4			
X									

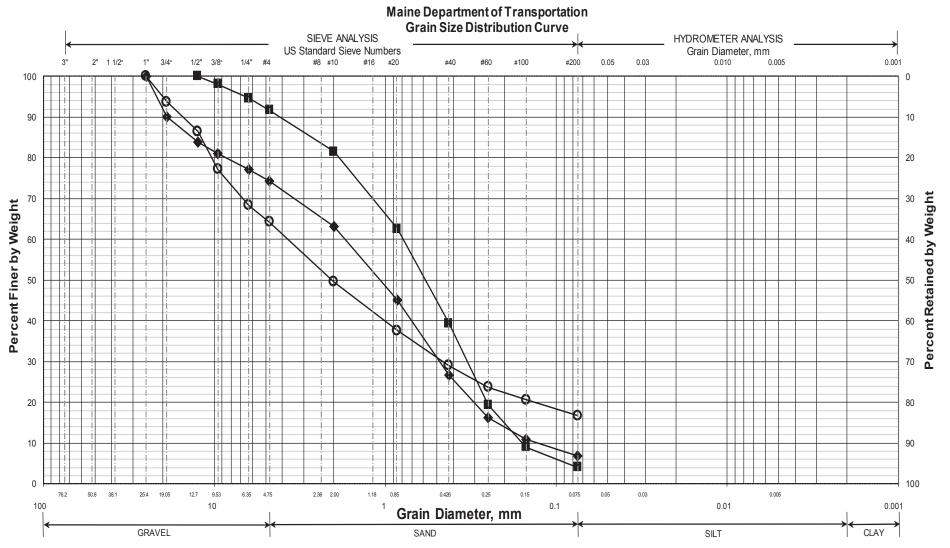
WI	N					
020267.00						
Τον	vn					
Acton						
Reported by/Date						
WHITE, TERRY A	9/6/2019					



		Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
C)	HB-ACT-207/1D	156+10	11.5 RT	0.0-2.0	SAND, some gravel, trace silt.	4.8			
		HB-ACT-207/2D	156+10	11.5 RT	5.0-7.0	SAND, some silt, trace gravel.	12.8			
		HB-ACT-207/3D	156+10	11.5 RT	10.0-12.0	SAND, trace gravel, trace silt.	45.3			
		HB-ACT-207/4D	156+10	11.5 RT	15.0-17.0	SAND, some silt, little gravel.	12.5			
		HB-ACT-207/5D	156+10	11.5 RT	20.0-22.0	SAND, some silt, trace gravel.	12.6			
×	(HB-ACT-207/6D	156+10	11.5 RT	25.0-25.8	SAND, some silt, trace gravel.	9.2			

WI	N					
020267.00						
Tov	vn					
Acton						
Reported by/Date						
WHITE, TERRY A	9/6/2019					

SHEET 5



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
0	HB-ACT-209/2D	169+50	10.0 RT	5.0-6.0	SAND, some gravel, little silt.	172.4			
•	HB-ACT-210/1D	170+25	5.0 LT	0.0-2.0	SAND, some gravel, trace silt.	9.6			
	HB-ACT-211/3D	171+00	8.0 LT	10.0-12.0	SAND, trace gravel, trace silt.	37.8			
X									

WI	N					
020267.00						
Τον	vn					
Acton						
Reported by/Date						
WHITE, TERRY A	9/6/2019					

SHEET 6

Appendix C

Calculations

Bearing Resistance - Box Culvert on Native Soils:

Part 1 - Service Limit State

Nominal and factored Bearing Resistance - Box Culvert on Sand

Presumptive Bearing Resistance for Service Limit State ONLY

Reference: AASHTO LRFD Bridge Design Specifications 9th Edition 2020 Table C10.6.2.6.1-1 Presumptive Bearing Resistances for Spread Footings at the Service Limit State Modified after US Department of Navy (1982)

Type of Bearing Material: Sand (SM)

Based on N-values, soils are dense near the bearing elevation

Density In Place: very dense

Bearing Resistance: Ordinary Range (ksf) 6 to 10

Recommended Value of Use: $q_{nom} := 6 \cdot ksf$

Resistance factor at the service limit state = 1.0 (LRFD Article 10.5.5.1)	$\phi_{\text{service bc}} \coloneqq 1.0$
---	--

 $q_{factored_service_bc} \coloneqq q_{nom} \cdot \phi_{service_bc}$

 $q_{factored_service_bc} = 6 \cdot ksf$

Note: This bearing resistance is settlement limited (1 inch) and applies only at the service limit state.

Part 2 - Strength Limit State

Nominal and factored Bearing Resistance - Box Culvert on Sand

Reference: AASHTO LRFD Bridge Design Specifications 9th Edition 2020 - Article 10.6.3.1

Assumptions:

1. The box will be founded at ~ Elev 243.3 feet

Bottom of Construction will be 2 feet below box invert $D_{footing} \coloneqq 2.0 \cdot ft$

2. Assumed parameters for fill soils:

Saturated unit weight:	$\gamma_s := 125 \cdot pcf$
Internal friction angle:	$\varphi_{ns} \coloneqq 32 \cdot deg$
Undrained shear strength:	$c_{ns} := 0 \cdot psf$

3. Box Culvert parameters

Width of box culvert, B	$B_{box} := 12 \cdot ft$
Length of box culvert, L	$L_{box} := 94 \cdot ft$

Nominal Bearing Resistance per LRFD Equation 10.6.3.1.2a-1

 $q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma BN_{\gamma m} C_{w\gamma}$

Bearing Capacity Factors - LRFD Table 10.6.3.1.2a-1

For
$$\phi$$
=32 deg N_c := 35.5 N_g := 23.2 N_y := 30.2

Shape Correction Factors LRFD Table 10.6.3.1.2a.-3

for ϕ =32 degrees

$$s_{c} \coloneqq 1 + \left(\frac{B_{box}}{L_{box}}\right) \left(\frac{N_{q}}{N_{c}}\right) \qquad s_{c} = 1.08$$
$$s_{\gamma} \coloneqq 1 - 0.4 \left(\frac{B_{box}}{L_{box}}\right) \qquad s_{\gamma} = 0.9489$$

$$s_q := 1 + \left(\frac{B_{box}}{L_{box}} \cdot tan(\phi_{ns})\right) \qquad s_q = 1.08$$

Load Inclination Factors: Assume all are 1.0 (LRFD Article C10.6.3.1.2a)

 $i_c \coloneqq 1.0 \qquad \qquad i_q \coloneqq 1.0 \qquad \qquad i_\gamma \coloneqq 1.0$

Depth Correction Factor $d_q := 1 + 2 \cdot tan(\phi_{ns}) \cdot (1 - sin(\phi_{ns}))^2 \cdot tan\left(\frac{D_{footing}}{B_{box}}\right)^{-1}$ $d_q = 2.6416$ LRFD Eq. 10.6.3.1.2a-10

$N_{cm} := N_c \cdot s_c \cdot i_c$	$N_{cm} = 38.4617$	LRFD Eq. 10.6.3.1.2a-2
$N_{qm} \coloneqq N_q \cdot s_q \cdot d_q \cdot i_q$	$N_{qm} = 66.17$	LRFD Eq. 10.6.3.1.2a-3
$N_{\gamma m} \coloneqq N_{\gamma} \cdot s_{\gamma} \cdot i_{\gamma}$	$N_{\gamma m} = 28.66$	LRFD Eq. 10.6.3.1.2a-4

Coefficients for Groundwater Depths LRFD Table 10.6.3.1.2a-2

 $q_{nominal} = 19 \cdot ksf$

Factored Bearing Resistance for Strength Limit State

Resistance Factor: $\phi_h := 0.45$ LRFD Table 10.5.5.2.2-1

 $q_{factored} \coloneqq q_{nominal} \cdot \varphi_b$

 $q_{factored} = 8.6 \cdot ksf$

Recommend a limiting factored bearing resistance of 9.0 ksf for the Strength Limit State.

Modulus of Subgrade Reaction - Box Culvert on Native Soil:

Reference: Foundation Analysis and Design 5th Edition JE Bowles Section 9-6

Width of box culvert, B	$B_{box} = 12 ft$
Length of box culvert, L	$L_{box} = 94 \text{ ft}$
Thickness of box culve	t $t_{box} := 12 \cdot in$ assumed
Depth of box, D	$D_{box} := 14.2 \cdot ft$
Bearing Resistance:	$q_{factored_service_bc} = 6 \cdot ksf$ Calculated above
Modulus of Elasticity:	Site soils at bearing elevation are Sand. Use values for Sand (dense) From Bowles Table 2-8 Modulus Es for Sand, dense ranges from 1000 - 1700 ksf

Modulus of Elasticity, Es Use $E_s := 1200 \cdot ksf$

Poisson's Ratio:

Site conditions at bearing elevation are Sand Use values for Sand, gravely sand. From Bowles Table 2-7 Poisson's Ration μ for Sand, gravely sand ranges from 0.3 - 0.4

Analyze corner:

Take H as 5*B as recommended in Bowles Chapter 5

$$\begin{split} H_{inf} &\coloneqq \frac{5 \cdot B_{box}}{B_{box}} & H_{inf} = 5 \quad \text{N in Table 5-2} \\ \hline \\ \frac{L_{box}}{B_{box}} &= 7.8333 & \text{M in Table 5-2} \\ \end{split} \label{eq:Hinf} \begin{array}{c} \text{From Table 5-2 for N=5 and M=7.8333} \\ I_1 &\coloneqq 0.541 \\ I_2 &\coloneqq 0.132 \\ \end{array} \\ \begin{array}{c} \text{by interpolation} \\ \text{by interpolation} \\ \end{array} \end{split}$$

Determine Steinbrenner influence factor - Bowles Section 5-6:

$$I_s := I_1 + \left[\frac{1 - (2 \cdot \mu)}{1 - \mu}\right] \cdot I_2$$
 $I_s = 0.6019$

Determine Influence factor for footing depth - Bowles Figure 5-7

Depth ratio:
$$\frac{D_{box}}{B_{box}} = 1.1833$$
 $\frac{L_{box}}{B_{box}} = 7.8333$ $\mu = 0.35$ $I_F := 0.80$

Calculate modulus of subgrade reaction - Bowles Eq. 9-7

$$k_s \coloneqq \frac{1}{B_{box} \cdot E_{prime_s} \cdot I_s \cdot I_F} \qquad \qquad \begin{array}{l} \text{Bowles Eq.} \\ \textbf{9-7} \end{array}$$

 $k_s = 137 \cdot pci$

Recommend Modulus of Subgrade Reaction of 140 pci

Bearing Resistance - Retaining Wall on Native Soils:

Part 1 - Service Limit State

Nominal and factored Bearing Resistance - block wall on sand

Presumptive Bearing Resistance for Service Limit State ONLY

Reference: AASHTO LRFD Bridge Design Specifications 9th Edition 2020 Table C10.6.2.6.1-1 Presumptive Bearing Resistances for Spread Footings at the Service Limit State Modified after US Department of Navy (1982)

Type of Bearing Material: Sand (SM)

Assume soils are medium dense at bearing elevation

Consistency In Place: medium dense

Bearing Resistance: Ordinary Range (ksf) 4 to 8

Recommended Value of Use:

 $q_{nom} := 5 \cdot ksf$

 $q_{\text{factored service bc}} = 5 \cdot \text{ksf}$

 $\phi_{\text{service bc}} \coloneqq 1.0$

Resistance factor at the service limit state = 1.0 (LRFD Article 10.5.5.1)

 $q_{\text{factored_service_bc}} := q_{\text{nom}} \cdot \phi_{\text{service_bc}}$

Part 2 - Strength Limit State

Nominal and factored Bearing Resistance - block wall on sand

Reference: Foundation Engineering and Design by JE Bowles Fifth Edition

Assumptions:

- 1. The walls will be founded at ~ Elev 570 feet Bottom of Construction will be 2 feet below grade for. $D_{\text{footing}} \coloneqq 2.0 \cdot \text{ft}$
- 2. Assumed parameters for fill soils: (Ref: Bowles 5th Ed Table 3-4)
 - Saturated unit weight: $\gamma_s := 125 \cdot pcf$ Dry unit weight: $\gamma_d := 120 \cdot pcf$ Internal friction angle: $\phi_{ns} := 32 \cdot deg$ Undrained shear strength: $c_{ns} := 0 \cdot psf$
- 3. Use Terzaghi strip equations as L>B
- 4. Effective stress analysis footing on (-c soil (Bowles 5th Ed. Example 4-1 pg 231)

Depth to the water table: Assume $D_w := 8 \cdot ft$ Unit Weight of water: $\gamma_w := 62.4 \cdot pcf$

Effective stress at bearing level:

 $q_{eff} := (D_{footing}) \cdot (\gamma_s)$ $q_{eff} = 0.25 \cdot ksf$

Maximum block width is 18 inches

Terzaghi Shape factors from Table 4-1 For a strip footing: $s_c := 1.0$ $s_\gamma := 1.0$ Meyerhof Bearing Capacity Factors - Bowles 5th Ed. table 4-4 pg 223 For ϕ =32 deg $N_c := 35.47$ $N_q := 23.2$ $N_{\gamma} := 22$ Nominal Bearing Resistance per Terzaghi equation (Bowles 5th Ed. Table 4-1 pg 220) $q_{nominal} := c_{ns} \cdot N_c \cdot s_c + q_{eff} \cdot N_q + 0.5(\gamma_s) B \cdot N_\gamma \cdot s_\gamma$ $q_{nominal} = 7.9 \cdot ksf$ Factored Bearing Resistance for Strength Limit State Resistance Factor: AASHTO LRFD Table 10.5.5.2.2-1 $\phi_b := 0.45$ $q_{factored} := q_{nominal} \cdot \phi_b$

 $B := 18 \cdot in$

 $q_{\text{factored}} = 3.5 \cdot \text{ksf}$ $B = 18 \cdot \text{in}$

Recommend a limiting factored bearing resistance of 3.5 ksf for the Strength Limit State.

Appendix D

Slope Stability Analyses

